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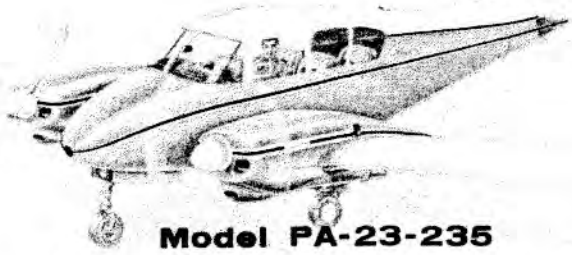
APACHE
OWNER'S HANDBOOK

the PIPER Apache

Owner's Handbook



Model PA-23-235

Piper Aircraft Corporation, Lock Haven, Pa.
U. S. A.

NOTICE

THIS HANDBOOK IS NOT DESIGNED, NOR CAN ANY HANDBOOK SERVE, AS A SUBSTITUTE FOR ADEQUATE AND COMPETENT FLIGHT INSTRUCTIONS, 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 APACHE 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 APACHE'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 test 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. 753 624, may be obtained from your Piper Dealer.

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753 624
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SECTION I

SPECIFICATIONS

SPECIFICATIONS

POWER PLANT

	PA-23-235
Engine	O-540-B1A5
Rated Horsepower	235
Rated Speed, RPM	2575
Bore, inches	5-1/8
Stroke, inches	4-3/8
Displacement, cubic inches	541.5
Compression Ratio	7.20:1
Dry Weight, pounds	395
Fuel Consumption (65% power, gph, leaned)	24
Oil Sump Capacity, quarts	12
Fuel Aviation Grade Octane	80/87

PERFORMANCE

Take-off Run (ft.)	1080
Take-off Run over 50 ft. barrier	1520
Minimum Controllable Single Engine Speed (MPH)	80
Best Rate of Climb Speed (MPH)	112
Rate of Climb (ft. per min.)	1450
Best Angle of Climb Speed (MPH)	85
Best Single Engine Rate of Climb Speed (MPH)	110
Single Engine Rate of Climb (left engine out) (ft. per min.)	220
Absolute Ceiling (ft.)	18, 500
Service Ceiling (ft.)	17, 200
Single Engine Absolute Ceiling (left engine out) (ft.)	6600
Single Engine Service Ceiling (ft.) (left engine out)	5100
Top Speed (MPH)	202
Optimum Cruising Speed (75% power at 7, 000) (MPH)	191

SPECIFICATIONS: (cont)

PERFORMANCE	PA-23-235
Cruising Speed (65% power at 11,000 ft.) (MPH)	183
Sea Level Cruise Speed (75% power) (MPH)	181
Stalling Speed (MPH) (flaps down)	62
Landing Roll (flaps down) (ft.)	880
Landing Roll over 50 ft. barrier (flaps down)	1260
Fuel Consumption (Gal. per hr. at 75% power) (gph) (both engines)	28
Fuel Consumption (Gal. per hr. at 65% power) (gph)	24
Cruising Range (maximum at 75% power at 7,000 ft.) (mi.)	980
Cruising Range (maximum at 65% power at 11,000 ft.)	1110
Cruising Range (55% power at 7,000 ft.)	1185

Published figures are for Standard airplanes flown at gross weight under standard conditions at sea level unless otherwise stated.

WEIGHT	PA-23-235
Gross Weight (lbs.)	4800
Empty Weight (Standard) (lbs.)	2735
Empty Weight (AutoFlite) (lbs.)	2850
USEFUL LOAD (Standard) (lbs.)	2065
USEFUL LOAD (AutoFlite) (lbs.)	1950

FUEL AND OIL	
Fuel Capacity (gal.)	144

SPECIFICATIONS: (cont)

FUEL AND OIL

	PA-23-235
Fuel Aviation Grade (Minimum Octane)	80/87
(Specified Octane)	80/87
(Alternate Fuels)	Refer to Fuel Requirements, Page 61.
Oil Capacity (qts) (each engine)	12

BAGGAGE

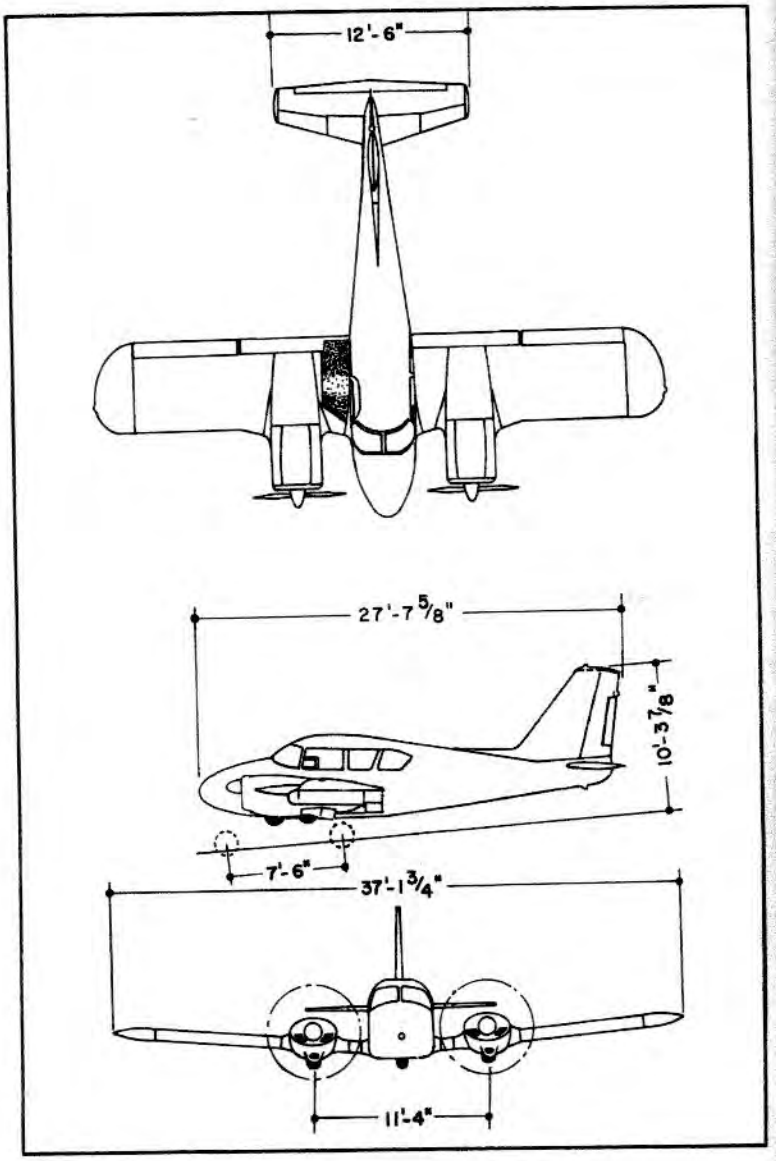
Maximum Baggage (lbs.)	200
Baggage Space (cubic ft.)	25
Baggage Door Size (in.)	23 x 24

DIMENSIONS

Wing Span (ft.)	37'
Wing Area (sq. ft.)	207
Length (ft.)	27.6
Height (ft.)	10.3
Wing Loading (lbs. per sq. ft.)	23.2
Power Loading (lbs. per HP)	10.2
Propeller Diameter - Max. (in.)	74

LANDING GEAR

Wheel Base (ft.)		7.3
Wheel Tread		11.3
Tire Pressure	Nose	27
	Main	42
Tire Size	Nose (four ply rating)	600 x 6
	Main (eight ply rating)	700 x 6


12'-6"
27'-7 5/8"
10'-3 7/8"
7'-6"
37'-1 3/4"
11'-4"

SECTION II

DESIGN INFORMATION

SECTION II

DESIGN INFORMATION

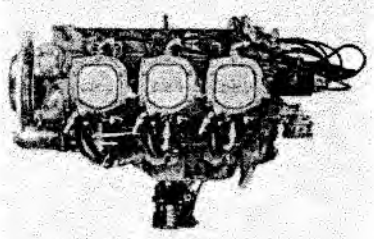
ENGINES AND PROPELLERS

The Lycoming O-540-B1A5 engines in the Apache are rated at 235 HP at 2575 RPM. These engines have a compression ratio of 7.20:1 and use 80/87 minimum octane fuel. Refer to Fuel Requirements, page 61 when using alternate fuels.

Both engines on the Super Custom and AutoFlite Apache are equipped with a geared starter, generator, vacuum pump, float type carburetor, two magnetos, shielded harness, shielded spark plugs, diaphragm fuel pump, propeller governor and an oil thermostat. The left engine only is equipped with a hydraulic pump.

Engine mounts are of steel tubing construction and incorporate vibration absorbing dynafocal mounts. Engine cowls are largely interchangeable and are cantilever structures attached at the firewall. Side panels are quickly removed by means of quick release fasteners. The nose section is split for quick removal.

The exhaust system is a straight type with exhaust gases directed into muffled jet augmenter tubes located on the outboard side of each engine. This system provides for exhaust elimination without power loss, and effective engine cooling through the pumping action of the exhaust gases into the augmenter tubes, which draws cooling air through the engine compartment; no cowl flaps or cooling flanges are needed on the cowling. Higher aircraft speeds are obtainable with this system due to reduced cooling drag and due to extra



thrust furnished by the exhaust augmentation.

Efficient aluminum oil coolers are mounted on the rear of each engine firewall. Engine oil drainage is accomplished with quick oil drain valves located on the right rear corner of the engine crankcases.

Carburetor air is directed through quickly removable filters, located in the nose cowls, to the carburetor air boxes. Heated air for the carburetors is taken from shrouds on the exhaust manifolds through flexible tubes to the air boxes. (See Section III, for carburetor heat application).

The propellers on the Apache are Hartzell HG-A2XK-2/8433-10 constant-speed controllable full-feathering units. These are controlled entirely by use of the propeller pitch levers located in the center of the control quadrant. Feathering of the propellers is accomplished by moving the controls fully aft through the high pitch detent into the feathering position. Feathering takes place in approximately three seconds. A propeller is unfeathered by moving the prop control ahead and engaging the starter. (See Section III, for complete feathering and unfeathering instructions.)

FUSELAGE AND WING STRUCTURES

The Apache fuselage is a composition of four basic units: the sheet metal tail cone, cabin section, nose section, and the steel tubular structure which extends from the tail cone to the nose wheel. The steel tube unit is intended to withstand the high loads imposed on the center section region of the airplane, and provides an extra safety factor in this area.

Finish on the tubular unit, as on all steel tube structures in the Apache, is zinc chromate primer with synthetic enamel.

The wing structure is lightweight but rugged, and consists of a massive stepped-down main spar, a front and rear spar, lateral stringers, longitudinal ribs, stressed skin sheets, and a readily detachable wing tip section. The rectangular plan form of the wing permits the use of many interchangeable parts and simplifies the construction while providing for excellent

stability and performance characteristics.

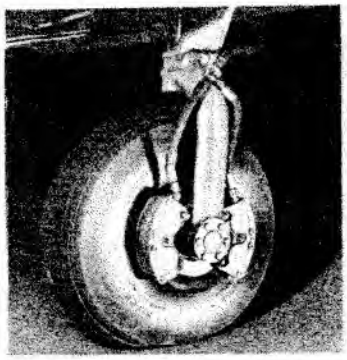
The wings are attached to the fuselage steel tubular structure with fittings at the sides and in the center of this structure, and the main spars are bolted to each other with high strength butt fittings in the center of the fuselage, making in effect a continuous main spar. This arrangement combines high strength and lightweight 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.

LANDING GEAR

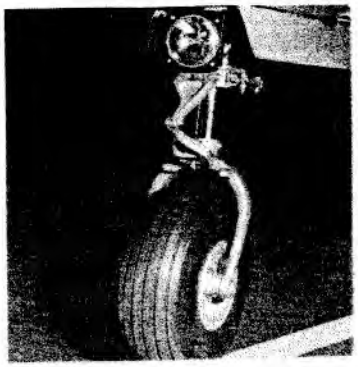
All three landing gear units on the Apache incorporate the same soft acting air-oil oleo struts, and contain many directly interchangeable parts.

Main wheels are 600 x 6 Cleveland Aircraft Products units with disc type brakes and 700 x 6 tires with an eight ply rating. The nose wheel is a Cleveland 600 x 6 model fitted with a 600 x 6 tire with a four ply rating. All tires have tubes.

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 connected to the brake cylinders with flexible lines provides a reserve of fluid for the brake system, and is mounted on the fuselage structure inside the left nose access panel. (See Section V, for brake service).



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 three 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, (approximately 12" hg. manifold pressure) with wheels not down, the landing gear warning horn sounds.

To guard against inadvertent 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. There is also an anti-retraction valve located on the left main gear which prevents a build up of hydraulic pressure in the retraction system while

the weight of the airplane is resting on its wheels.

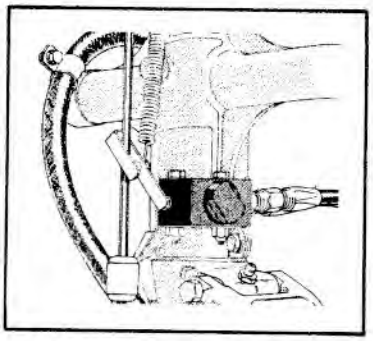
HYDRAULIC SYSTEM

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. The landing gear position lights and the flap indicator should be used as primary indications.

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

The emergency hydraulic hand pump, which is integral with the selector valve unit, is used to obtain hydraulic pressure in event of failure of the hydraulic pump on the left



Anti-Retraction Valve

1. Vent Line, Hydraulic Overflow
2. Hydraulic Powerpack
3. Flap Actuating Cylinder
4. Emergency Hand Pump
5. Hydraulic Filler Line
6. CO_2 Emergency Bottle
7. CO_2 Emergency Control
8. Anti-Retraction Valve
9. Left Main Gear Actuating Cylinder
10. Shuttle Valve
11. Filter
12. Engine Driven Pump
13. Shuttle Valve
14. Nose Gear Actuating Cylinder
RIGHT GEAR
HYDRAULIC SYSTEM

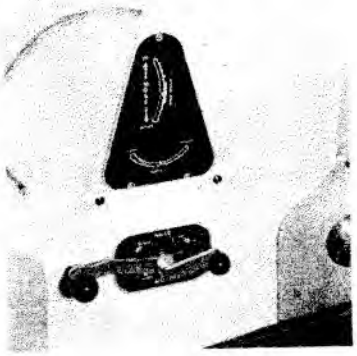
engine. To operate the emergency pump, the handle should be extended to its full length by pulling aft and positioning the control handle as desired. 30 to 40 pump strokes are required to raise or lower the landing gear.

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 CO_2 system is available to extend the landing gear. (See Section III, Emergency Landing Gear Extension.)

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.

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 cable controlled and are conventional sheet metal structures, fitted with cast aluminum hinges and needle bearings. The flaps are actuated 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.

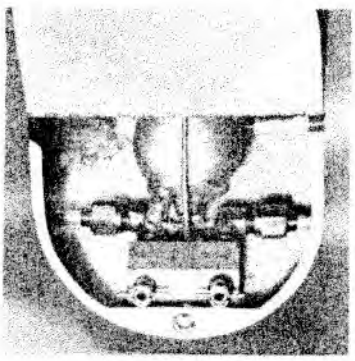
The ailerons and rudder are connected by cables with the control wheel and rudder pedals. The rudder has a servo tab which also acts as a directional trim tab, actuated by a crank in the center of the forward cabin ceiling.

The horizontal tail is a stabilator, with an anti-servo tab which also acts as longitudinal trim tab, actuated by a larger crank adjacent to the rudder tab crank in the center of the forward cabin ceiling. The stabilator provides extra stability and controllability with less size, drag and weight than with conventional horizontal tail surfaces.

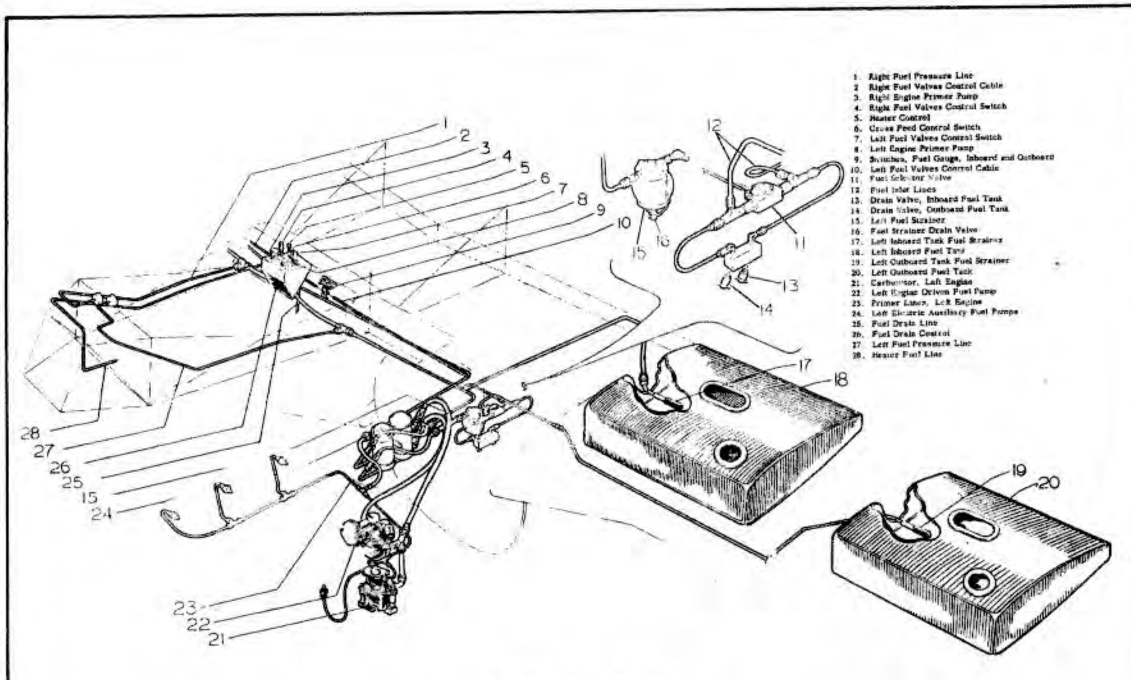
FUEL SYSTEM

Four thirty-six gallon nylon and neoprene fuel cells located outboard of the engines provide fuel storage in the Apache. The cells should be kept full of fuel during storage of the airplane to prevent accumulation of moisture, and to prevent deterioration of the cells. For long term storage without fuel, the cells should be coated with light engine oil to keep from drying out.

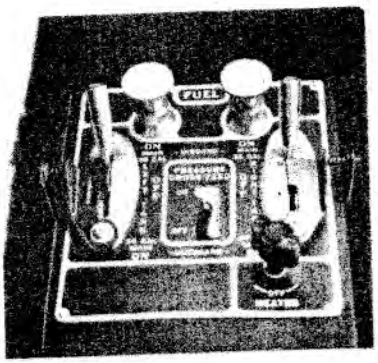
The fuel system in the Apache is simple, but completely effective. Fuel can be pumped from any tank to both engines, through use of the engine driven and/or electric fuel pumps.



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, located in the engine compartments,



FUEL SYSTEM
Left Side and Crossfeed Shown



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 engine pumps. They are normally turned on to check their operation before starting the engines, turned off after starting, to check engine driven pumps 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 pumps 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 pumps on the failed pump side, leaving the crossfeed on, and turning the fuel valve on the empty tank off. Then the electric pumps 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. (Caution) The electric fuel gauges indicate the fuel quantity in the tank selected by means of the fuel selector handle located in the fuel control box. The electric fuel pump switches are on the lower left side of the instrument panel.

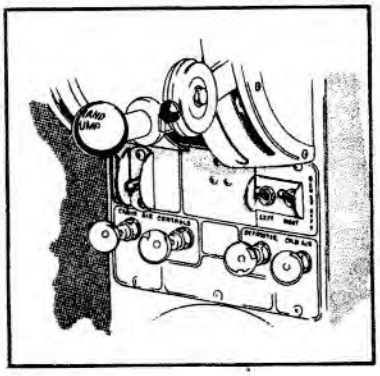
A crossfeed line drain valve control is mounted on the front face of the fuel control panel box. This valve should be opened occasionally, with the crossfeed on, the left electric fuel pump on, and then the right electric fuel pump on to allow any water that might accumulate at that point to be drained 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 fuel strainers and fuel line drain valves 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. In order to check the fuel system for possible moisture content, the inboard fuel cell line quick drain valve should be opened and drained; the outboard fuel cell line quick drain valve should be opened and drained and the quick drain valve on the fuel strainer should be opened and drained. This procedure should be repeated at the three quick drain valves located in the other main wheel well. Fuel screens are provided at the tank outlets, in the carburetors and in the fuel pumps.

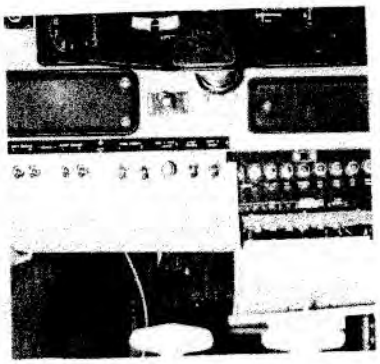
Idle cut-offs are incorporated in the carburetors and should always be used to stop the engines. This is accomplished by pulling the mixture control levels to the rearmost position.

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



parking brake handle 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 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 all electrical circuits. These units automatically break the electrical circuit if an overload is applied to the system, preventing damage to the wires. 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. The circuit breakers can be manually tripped by pulling on knobs to isolate or determine the source of electrical trouble.

A 12-volt 35-ampere hour battery, enclosed in a sealed stainless steel battery box, is mounted in the nose section on the right side. (See Section V for Battery Service.)

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. Also, as optional equipment, individual instrument lights mounted on the instrument cover panel are turned on by the same rheostat, but panel light intensity is controlled by a separate rheostat. 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 generators are installed as optional equipment on the Standard Apache or as standard equipment on the Super Custom and AutoFlite Apache, a voltage regulator for each generator is attached to the adjacent firewall. A

ELECTRICAL LOAD ANALYSIS

A. MAXIMUM PROBABLE CONTINUOUS LOAD — (less radio equipment):

ITEM	NUMBER USED	TOTAL CURRENT IN AMPERES	
		12.0 Volts	14.3 Volts
Flap Gauge	1		
Fuel Gauge	2		
Oil Temperature Gauge	2		
Carb. Temperature Gauge	1	.5	.6
L. G. Indicating Lights	1	.08	.1
Master Contactor	1	.6	.7
Navigation Lights	3		
Instrument Lights	2		
Compass Lights	1	4.6	5.5
Turn and Bank	1	.9	1.1
Heater (operating)	1	5.7	6.8
Pitot (operating)	1	10.9	13.0
Rotating Beacon (Grimes)	1	5.0	5.9

B. INTERMITTENT LOADS:

Dome Light	1		.6
Landing Lights	2	24.5	29.0
Fuel Pumps	4	1.6	1.9
Landing Gear Horn	1	.7	.8
Starter Solenoids	2	10.0 ea.	
Cigar Lighter	1	6.6	7.9

paralleling relay equally divides the total electrical load between generators. In case of engine or generator failure a reverse current relay automatically disconnects that generator from the circuit.

WARNING

When utilizing external power source, airplane master switch must be in the "OFF" position.

FINISH

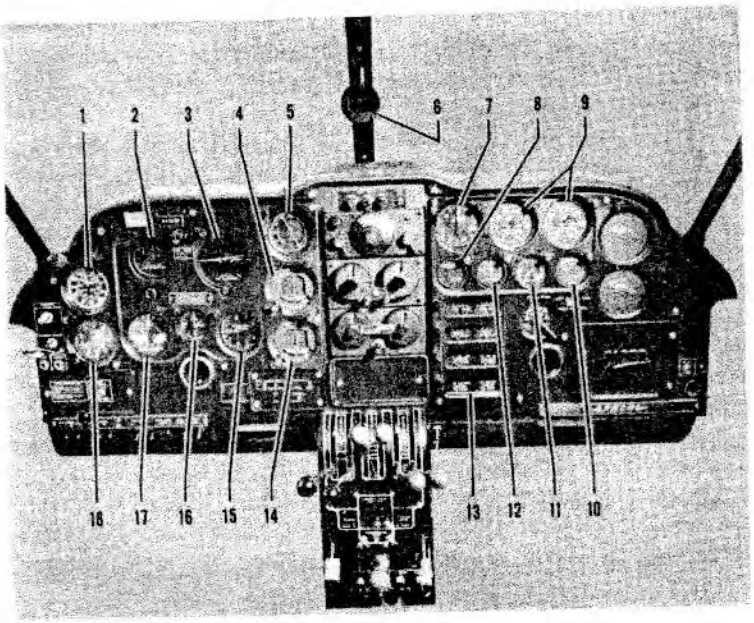
All aluminum sheet components of the Apache are carefully finished inside and outside to assure maximum service life. Both sides of all pieces are alodine treated, and/or sprayed with zinc chromate primer. External surfaces are coated with durable synthetic enamels in attractive high gloss colors. The application of primer to interior surfaces will prevent corrosion of structural and non-structural parts on the inside where there is no access for normal maintenance.

Steel tubular structures are also finished with zinc chromate primer and enamel.

INSTRUMENT PANEL

The instrument panel of the Apache has been designed to accommodate all of the customary advanced flight instruments on the left side in front of the pilot, and all required engine instruments on the right side. Provision for extra instruments has been made in both sections. The flight instrument group is shock mounted in an easily removed sub-panel. All instruments are accessible for maintenance by removing a portion of the fuselage cowl over the instruments.

The Artificial Horizon and Directional Gyro in the flight group are vacuum operated through use of a vacuum pump installed on the right engine. When the dual vacuum system is installed, as optional equipment, a check valve is installed in the vacuum system so that in case of a pump failure the



INSTRUMENT PANEL ARRANGEMENT

1. Airspeed Indicator
2. Directional Gyro
3. Artificial Horizon
4. Omni Indicator
5. ADF Radio Compass
6. Compass
7. Manifold Pressure Gauge
8. Flap Indicator
9. Tachometer
10. Manifold Temp. Gauge
11. Suction Gauge
12. Ammeter
13. Instrument Cluster
14. Omni Indicator
15. Rate of Climb Indicator
16. Eight Day Clock
17. Turn and Bank Indicator
18. Altimeter

system will automatically continue to operate on the remaining vacuum source. The Turn and Bank is an electrically operated instrument and serves as a standby for the Gyros in case of vacuum system failure. The vacuum gauge in the engine instrument group should indicate 4.50 to 5.0 inches of suction required to operate the gyros.

Two recording tachometers are provided to eliminate the need for constant reference to aircraft and engine log books. An engine instrument cluster, at the bottom of the engine group, includes two oil pressures, two oil temperatures, two fuel pressures, two fuel quantity gauges. The gauges in this cluster can be replaced individually by removing the column of four gauges in which the defective unit is incorporated, then detaching the proper gauge from this column.

Radio units are installed in the center of the main panel. Radio power supplies are mounted in the forward part of the nose section near the battery.

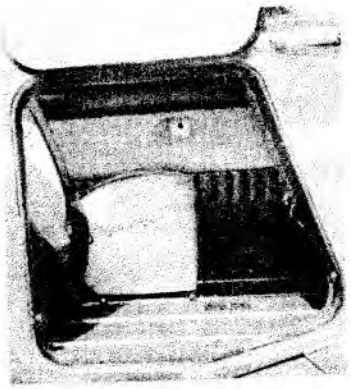
RADIO EQUIPMENT

In the standard model of the Apache, provisions for radio installations include dual microphone and headset jacks, a microphone and headset mounting bracket, a loud speaker, wiring to these units and panel space for at least four radio sets. Radios, in different combinations, are available and are specifically chosen to provide in the Apache all of the most recent radio developments normally desired in this type of aircraft.

SEATS

All seats in the Apache are constructed of steel tubing, with no-sag springs and foam cushions. The front seats are adjustable fore and aft through a seven inch range by operation of a release control under the front of each seat. The right front seat is also adjustable aft beyond the normal range to provide ease of entry to the pilot's seat. Both front seats are easily removed by taking out the lower bolts in the stop plates

at the rear of the seat structure, swinging the stop plates laterally and sliding the seats forward off their tracks.



The rear seat area is equipped with three individually adjustable and quickly removable seats. To remove these seats, stop plates on the track are taken off, and the seats moved fore or aft as required to disengage from their tracks.

The Apache has four reclining seats provided with headrests and one non-reclining seat without a headrest.

Arm rests for all seats, coat hangers, ash trays, a cigarette lighter, a spacious map drawer and glove compartment are all standard on the Apache. The cabin door and baggage door are equipped with locks operated by the same key. A tow bar is provided with each airplane and, when not in use, is stowed in the baggage compartment.

HEATING AND VENTILATING

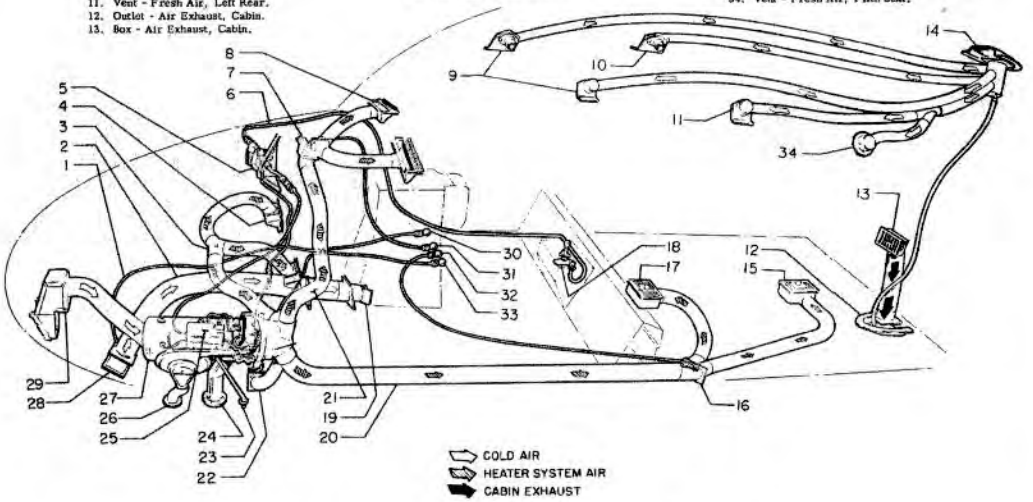
The flow of air for cooling or heating the Apache cabin may be controlled by the four knobs on the cabin air control panel, and by individual overhead outlets. Air is exhausted through an outlet on the rear trim panel of the cabin.

The left hand control regulates air flowing to the front seat through the heater system and the second knob from the left controls air flowing to the rear seat through this system.

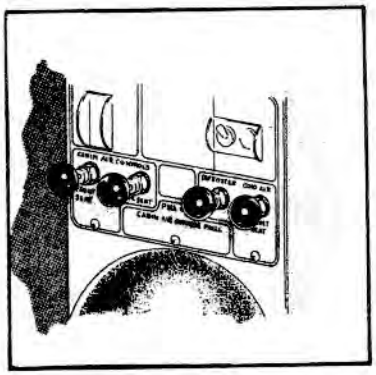
The second knob from the right is the defroster control and the right hand control supplies additional cold air to the front seat through a vent on the firewall.

Cabin air enters the heater system through an inlet beside the landing light, and when heater is not in operation, the inlet can serve as a source for cool air by pulling out the heater

1. Cable - Cold Air Inlet Control, Front Seat.
2. Duct - Fresh Air, Front Seat.
3. Duct - Heater System Air, Front Seat.
4. Inlet - Heater System Air, Front Seat.
5. Control Valve - Heater Fuel.
6. Line - Heater Fuel.
7. Control Valve - Defroster.
8. Inlet - Heater System Air, Defroster.
9. Vents - Fresh Air, Front Seat.
10. Vent - Fresh Air, Right Rear.
11. Vent - Fresh Air, Left Rear.
12. Outlet - Air Exhaust, Cabin.
13. Box - Air Exhaust, Cabin.
14. Scoop - Fresh Air, Cabin.
15. Inlet - Heater System Air, Rear Cabin.
16. Control Valve - Heater System, Rear Seats.
17. Inlet - Heater System Air, Center Cabin.
18. Shut-off Valve, Heater Fuel.
19. Inlet - Fresh Air, Front Seat.
20. Duct - Heater System Air, Rear Seats.
21. Duct - Heater System Air, Defroster.
22. Duct - Heater System Air, Overboard Dump.
23. Vent Line - Heater Fuel.
24. Tube - Heater Exhaust.
25. Control Valve - "Hi-Low", Heater Fuel.
26. Tube - Combustion Air Intake.
27. Heater.
28. Scoop - Fresh Air, Front Seat.
29. Scoop - Outside Air to Heater System.
30. Control - Fresh Air, Front Seat.
31. Control - Heater System Air, Defroster.
32. Control - Heater System Air, Rear Seats.
33. Control - Heater System Air, Front Seat.
34. Vent - Fresh Air, Fifth Seat.



HEATING AND VENTILATING SYSTEM



controls. Air controlled by the right hand knob above is picked up by a scoop below the landing light. An additional scoop on the top of the airplane supplies the air for the overhead outlets.

A 27,500 B.T.U. Southwind heater installed in the nose section of the Apache furnishes a source of hot air for cabin heating and windshield defrosting. Heater operation is controlled by an off-prime-low and high-heat switch which is located below and to the left of the control wheel.

During ground operation or when the landing gear is extended, the ventilating fan motor operates and provides hot air flow through the heater system. In flight, when the gear is retracted, a micro switch on the nose gear cuts off the heater fan, and the heater air is supplied by ram pressure through the nose inlet beside the landing light. This arrangement assures an adequate flow of air through the heater at all times.

To heat the cabin – (1) turn the heater switch to high heat or low heat as desired, (2) adjust the left hand cabin air control to get the required heat to the front seat, (3) adjust the rear seat control to obtain the required flow to the back of the cabin. The amount of heated air passing to the rear seat area can also be regulated by opening or closing the shutters at the outlets in the floor. Low heat should be used to as low an outside temperature as possible, with the control valves fully opened if necessary; below this temperature, the high heat setting should be used.

Use of the high heat position on the ground may result in excessive exhaust smoke from the heater; therefore, high heat should only be used in flight and the low heat position be used for heating the cabin during ground operation.

The cabin heater uses gasoline from the left main fuel tank

when the fuel crossfeed is off, and from both tanks when the crossfeed is on. Only about one quart of gasoline per hour is used by the heater at maximum output.

To turn the heater on, first ascertain that the heater fuel valve (on the fuel control panel) is on, then move the heater switch to "High" or "Low" heat. If the heater does not start promptly, return the heater switch to "Prime" position for 15 seconds to prime the heater; then upon moving the "Switch" to "High" heat, the heater should start and continue to operate after 1 to 1-1/2 minutes of warm-up.

After the heater switch is turned to the "Off" position, combustion in the heater stops, but the combustion fan and the circulating air fan continues to operate for about two minutes, while the heater cools slowly and purges itself of hot air and fumes. To obtain best service life from the heater components, it is recommended that the heater switch be turned off about two minutes before stopping the engines and shutting off the master switch. This should normally be done during taxiing after landing.

The heater can be used to warm up the cabin before flight by turning on the master switch, the left electrical fuel pump, and the heater switch. The operation of these units takes about 8 amps, and they should not be used in such a way as to run down the battery, making starting difficult.

There is a dump valve arrangement in the heater bonnet to exhaust excessive heat thereby making it possible to operate the heater with all controls in the closed position.