

COMANCHE

PA-24-180 PA-24-250

Owner's Handbook

**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 INSTRUCTION, 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 COMANCHE 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 COMANCHE'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.

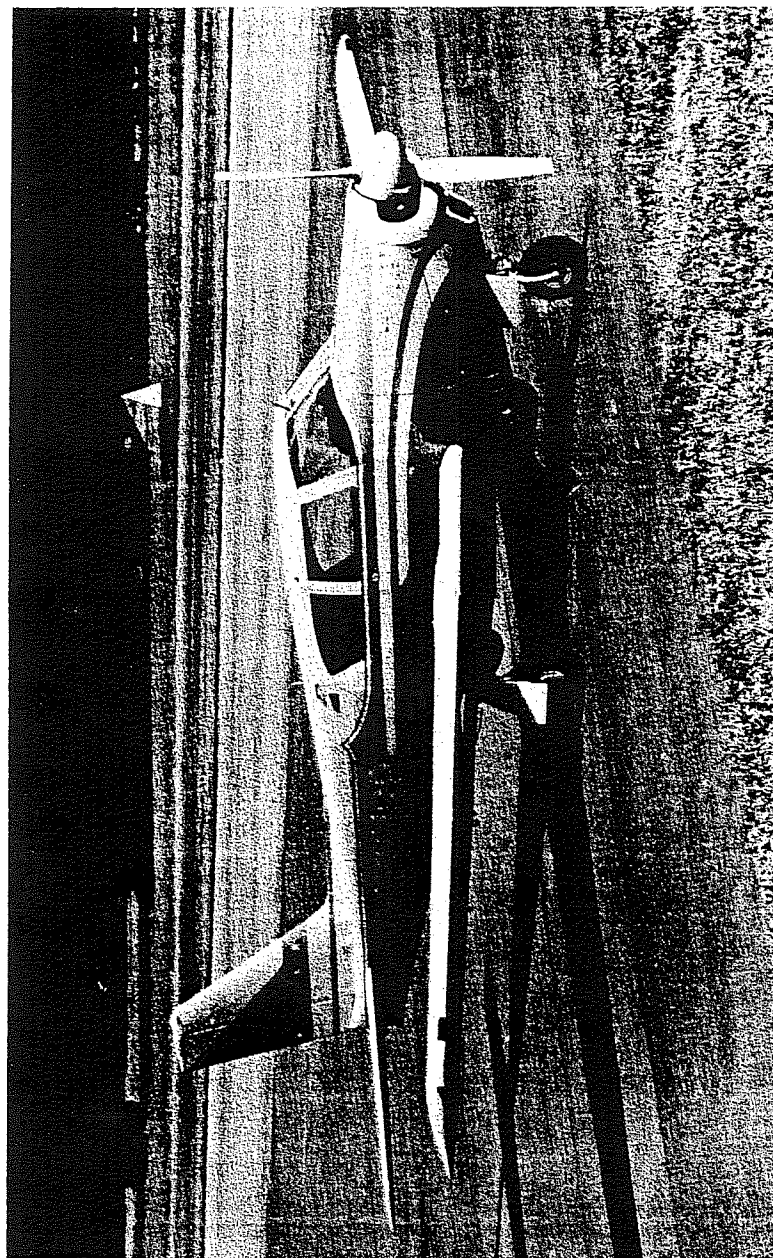
Revised text and illustrations shall be indicated by a black vertical line in the margin opposite the change.

Additional copies of this manual, Part No. 753 529, may be obtained from your Piper Dealer.

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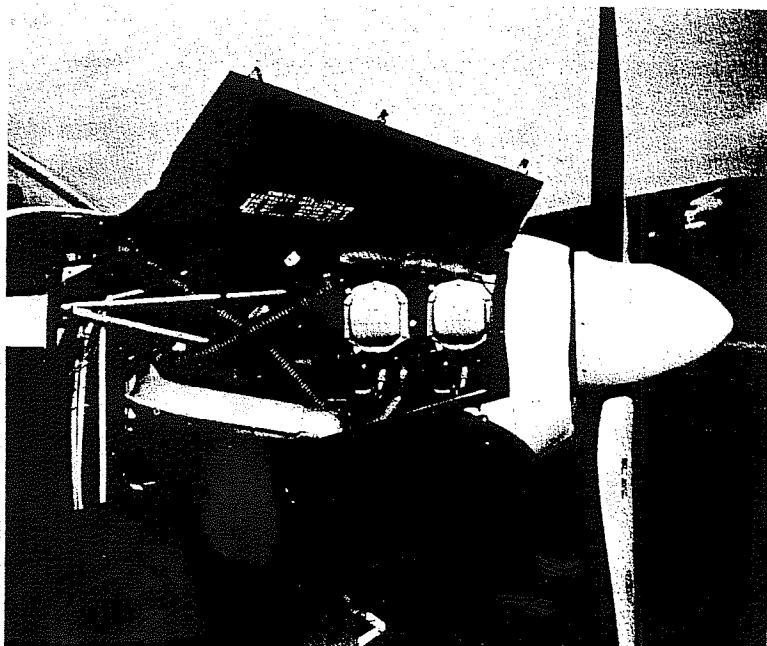
DESIGN FEATURES

1. Specifications:

	PA-24 180	PA-24 250
Engine -----	Lyc. O-360-A	Lyc. O-540-A1A5
HP and RPM -----	180 at 2700	250 at 2575
Gross Weight (Lbs.) -----	2550	2800
Empty Weight (Standard) (Lbs.) -----	1455	1600
Useful Load (Lbs.) -----	1095	1200
Empty Weight (Custom) (Lbs.) -----	1485	1630
Useful Load (Custom) (Lbs.) -----	1065	1170
Empty Weight (Super Custom) (Lbs.) -----	1530	1675
Useful Load (Super Custom) (Lbs.) -----	1020	1125
Wing Span (Ft.) -----	36	36
Wing Area (Sq. Ft.) -----	178	178
Length (Ft.) -----	24.7	24.9
Height (Ft.) -----	7.3	7.3
Propeller Diam. (Max. In.) -----	74	77
Power Loading (Lbs. per HP) -----	14.2	11.2
Wing Loading (Lbs. per Sq. Ft.) -----	14.3	15.7
Baggage Capacity -----	200	200
Fuel Capacity (Standard, Gals.) -----	50	60
Fuel Capacity (With Reserve Fuel, Gals.) -----	60	
Tire Pressure (Lbs.) -----	Nose 27, Main 27	Nose 27, Main 42
Wheel Base (Ft.) -----	6.5	6.5
Wheel Tread (Ft.) -----	9.8	9.8
Top Speed (MPH) -----	167	190
Cruising Speed -----		
(75% Power, Sea Level, MPH) -----	150	171
Optimum Cruising Speed -----		
(75% Power, Optimum Alt.) -----	160	181
Stalling Speed (Flaps Down, MPH) -----	61	61
Take-off Run (Ft.) -----	750	750
Landing Roll (Flaps Down, Ft.) -----	600	650
Best Rate of Climb Speed (MPH) -----	96	95
Rate of Climb (Ft. per Min.) -----	910	1400
Service Ceiling (Ft.) -----	18,500	20,000
Absolute Ceiling (Ft.) -----	21,000	22,000
Fuel Consumption -----		
(Gal. per Hr., 75% Power) -----	10	14
Cruising Range -----		
(75% Sea Level, 50 Gals. Fuel) -----	5 Hrs., 750 Mi.	
Cruising Range, Optimum (50 Gals. Fuel) -----	6.2 Hrs., 920 Mi.	
Cruising Range -----		
(75%, Sea Level, 60 Gals. Fuel) -----	6 Hrs., 900 Mi.	4.3 Hrs., 740 Mi.
Cruising Range, Optimum (60 Gals. Fuel) -----	7.5 Hrs., 1100 Mi.	7.5 Hrs., 1100 Mi.

Performance figures are for Custom model airplanes flown at gross weight under standard conditions at sea level, or stated altitude. Any deviation from Custom equipment may result in changes in performance.

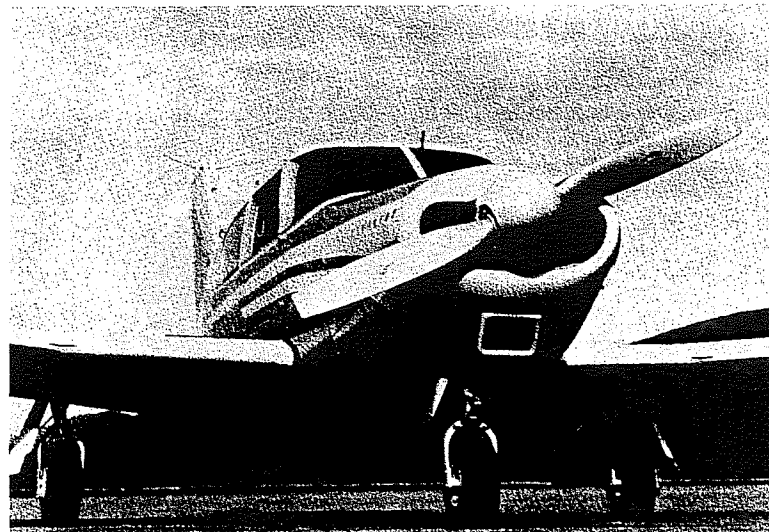
II. Engine and Propeller:



The Comanche Model 180 is equipped with a Lycoming O-360-A series engine rated at 180 HP at 2700 RPM. The engine in the 250 is a Lycoming O-540-A series, developing 250 HP at 2575 RPM. Both engines have compression ratios of 8.5 to 1, and require 91/96 octane minimum fuel. They are furnished with a geared starter, 35 ampere 12-volt generator, voltage regulator, shielding, fuel pump, propeller governor, vacuum pump drive, and carburetor air box and filter.

The exhaust system on the 180 is a stainless steel cross over type. A large muffler and oversize heater shroud is provided on both the 180 and 250 installations, to supply heat for cabin and carburetor heater systems.

Engine cooling is accomplished without the complication of cowl flaps or exhaust augmenters, and without drag producing fixed cowl flanges.



The 180 uses the Hartzell, model HC92ZK8D or the McCauley, model 2D36C14.

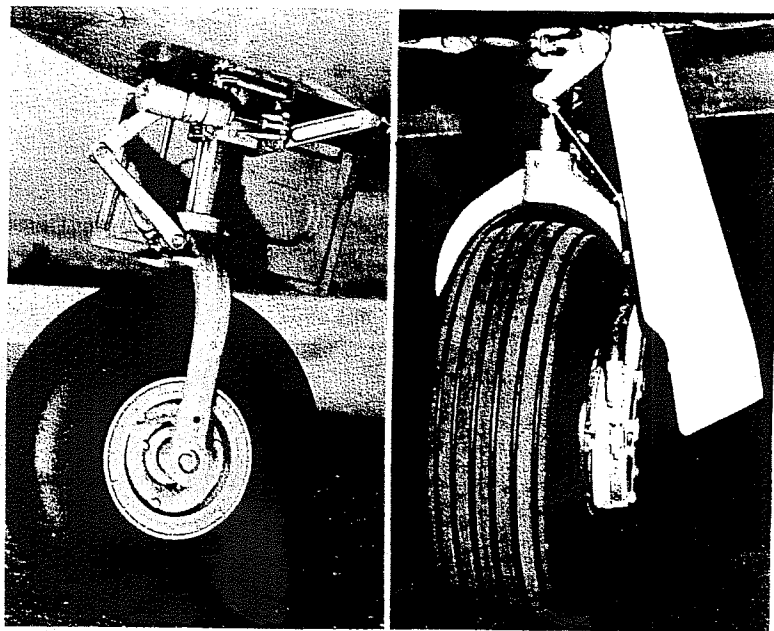
The 250 uses the Hartzell, model HC82XKID. All propellers are constant speed controllable.

III. Fuselage and Wing Structures:

Structures are of sheet aluminum construction, and are designed to ultimate load factors well in excess of normal requirements. All components are completely zinc chromate primed, exterior surfaces are enameled as well.

The main spars of the wings are joined with high strength butt fittings in the center of the fuselage, making in effect a continuous main spar. Main spars are attached to the fuselage at the side of the fuselage and in the center of the structure; wings are attached also at the rear spar and at an auxiliary front spar.

The wing airfoil section is a laminar flow type, NACA642A215, with maximum thickness about 40% aft of the leading edge. This permits the main spar, located at the point of maximum thickness, to pass through the cabin under the rear seat, providing unobstructed cabin floor space ahead of the rear seat.



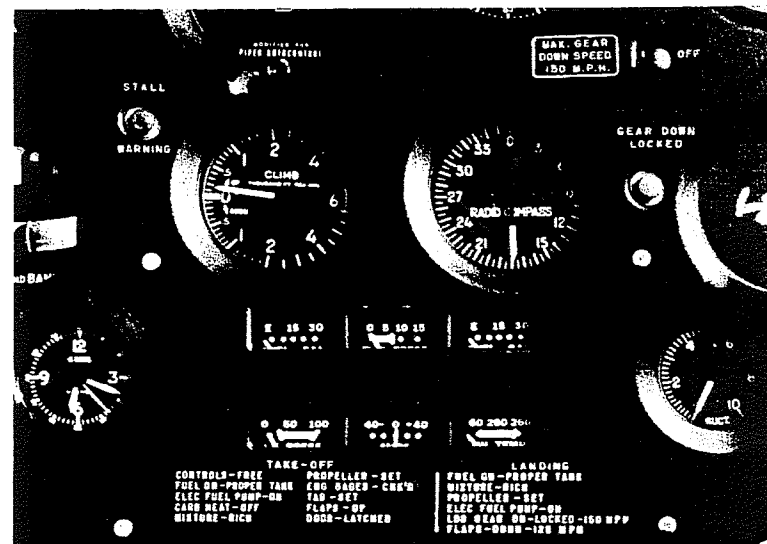
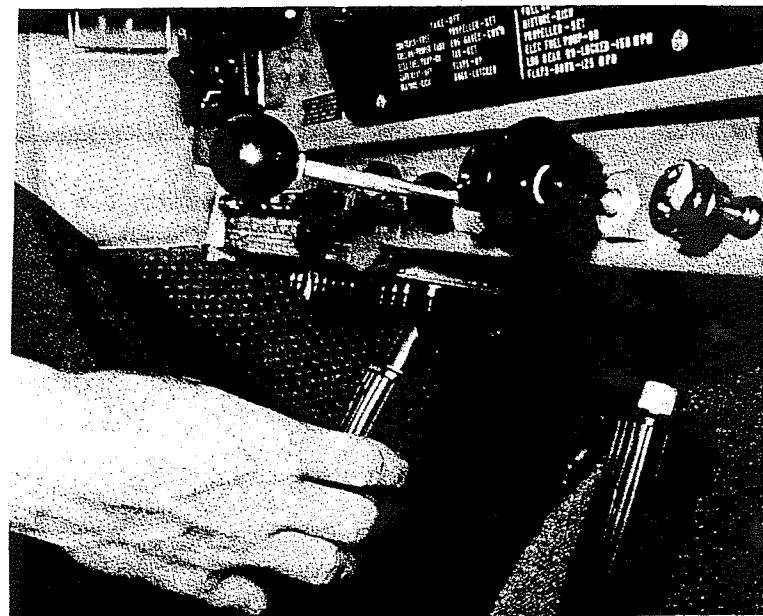
IV. Landing Gear:

The main wheels are Cleveland Aircraft Products Model 3070, 600 x 6, with single disc hydraulic brakes, Model 3000-250. The nose wheel is Cleveland Model 38501; all wheels have 600 x 6 tires.

The nose gear is steerable through a 40 degree arc through use of the rudder pedals. As the nose gear retracts, the steering linkage disengages to reduce rudder pedal loads in flight. The nose wheel is equipped with a hydraulic shimmy damper.

Many of the parts of the three air-oil type landing gear units, including the forks, struts, and torque links, are interchangeable. All three gears are inflated to approximately $2\frac{3}{4}$ inches of strut extension.

The landing gear is retracted or extended in 7 seconds by an electric motor installed under the front center floorboards, actuating push-pull controls to each of the gears. Manual extension of the



gear is accomplished with the Emergency Gear Lever aft of the nose gear well.

The brakes are actuated by a hand lever and a master cylinder located under the front left floorboards along with the parking brake unit. The brake fluid reservoir is installed on the front left side of the firewall.

To prevent inadvertent retraction of gear on the ground, a switch is installed on the left main gear which cuts off current to the retraction motor until the gear is fully extended. This feature must not be tested during ground operation.

A green light on the instrument panel below the landing gear switch indicates all gears down and locked. An amber light above the switch indicates gears up. These lights are automatically dimmed when the navigation lights are turned on.



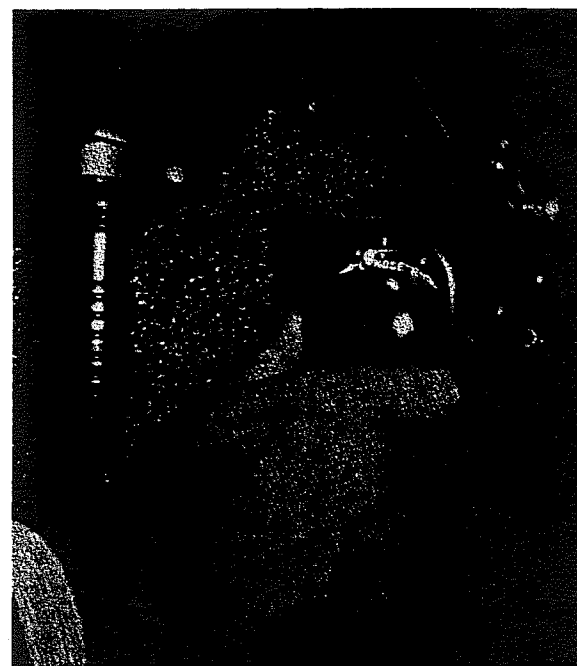
V. Control System and Surfaces:

Dual wheel and rudder controls are provided, with cables to control surfaces. The horizontal tail is a stabilator, with an anti-servo tab which also acts as a longitudinal trim tab, actuated with trim crank in the cabin ceiling. The stabilator provides extra stability and controllability with less size, drag and weight than with conventional horizontal tail surfaces.

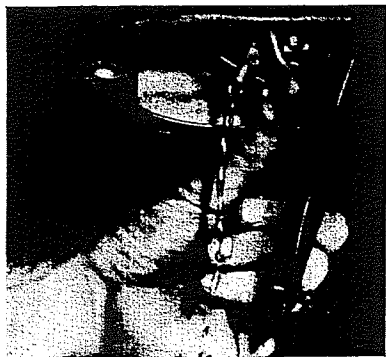
A rudder trim adjustment is mounted on the right side of the nose wheel dome to permit directional trim as needed in flight.

The flaps are manually operated, balanced for light operating forces and spring loaded to return to the up position. Locks on the inboard ends of the flaps hold them in the up position so that the right flap can be stepped on for entry or exit. The flap will not support a step load except when in the full up position, so must be completely retracted when used as a step.

The flaps have three extended positions, 9, 18 and 27 degrees. Full flap is recommended for landing, zero or partial flap for take-offs.



VI. Fuel System:

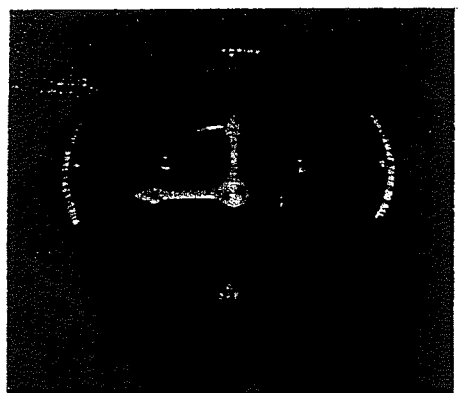


Two nylon and neoprene fuel cells in the inboard leading edge sections of the wings provide fuel capacity. The cells should be kept full of fuel during storage of the airplane to prevent accumulation of moisture and deterioration of the cells. For long term storage without fuel, the cells should be coated with light engine oil to keep the rubber from drying out.

Each fuel cell holds a maximum of 30 gallons. On the 180, to obtain the standard fuel quantity of 50 gallons total, or 25 gallons per tank, the cells are filled only to the bottom of the filler neck, which extends into the fuel cell about one inch. To obtain the standard plus reserve quantity, the cells are filled to the top of the filler necks. This system provides a reserve fuel capacity without the necessity for extra tanks, valves and lines.

On the 250 Comanche, 60 gallons is the standard fuel capacity, and the tanks are normally filled to the tops of the filler necks.

An electric auxiliary fuel pump is provided for use in the event



of failure of the standard engine driven pump. The electric pump is normally turned on for landings and take-offs.

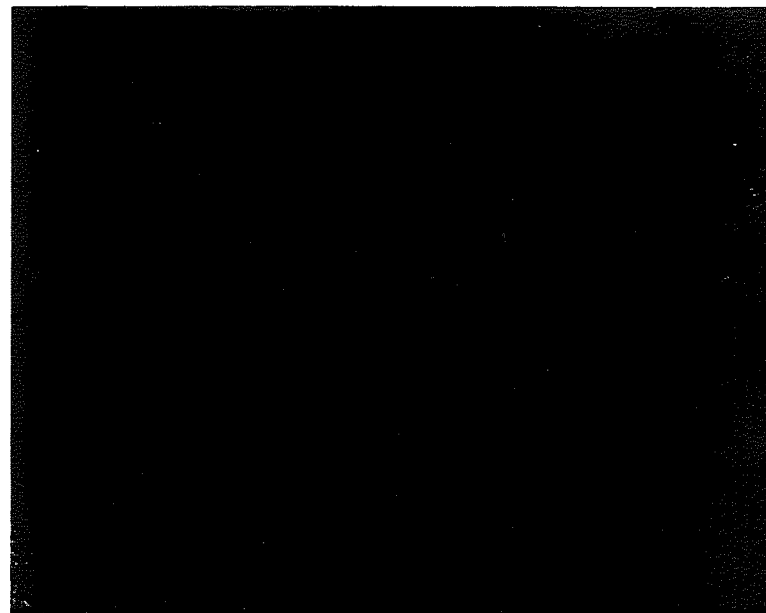
The fuel strainer, equipped with a quick drain, is mounted under the right forward section of the fuselage. The strainer should be drained regularly to check for water or dirt accumulations.

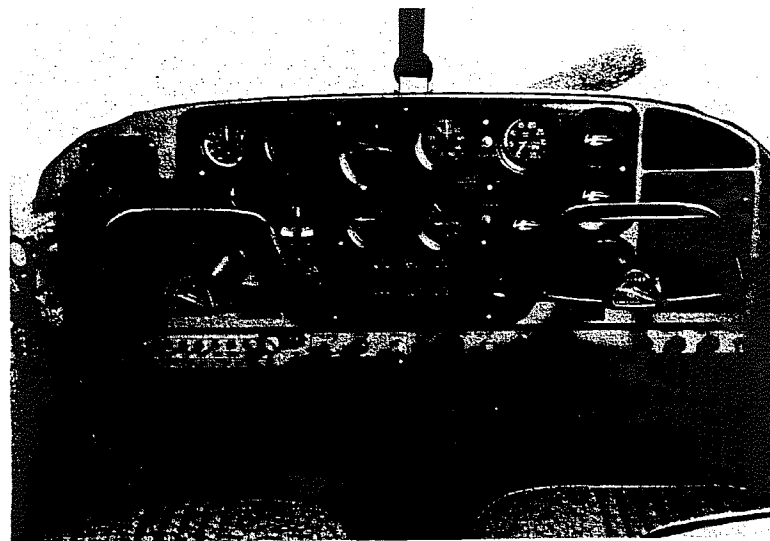
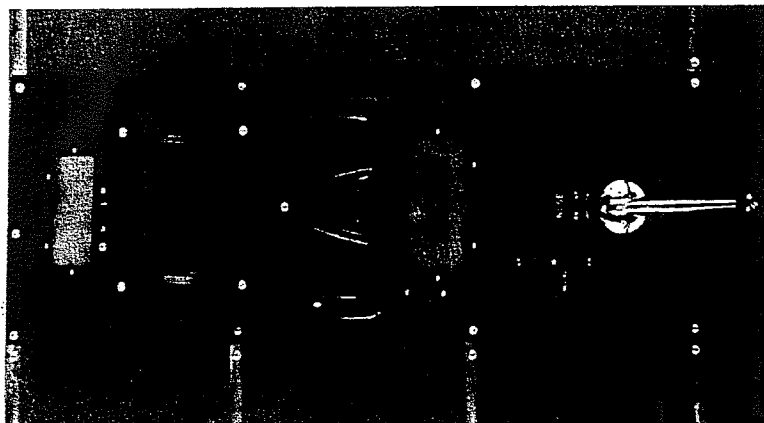
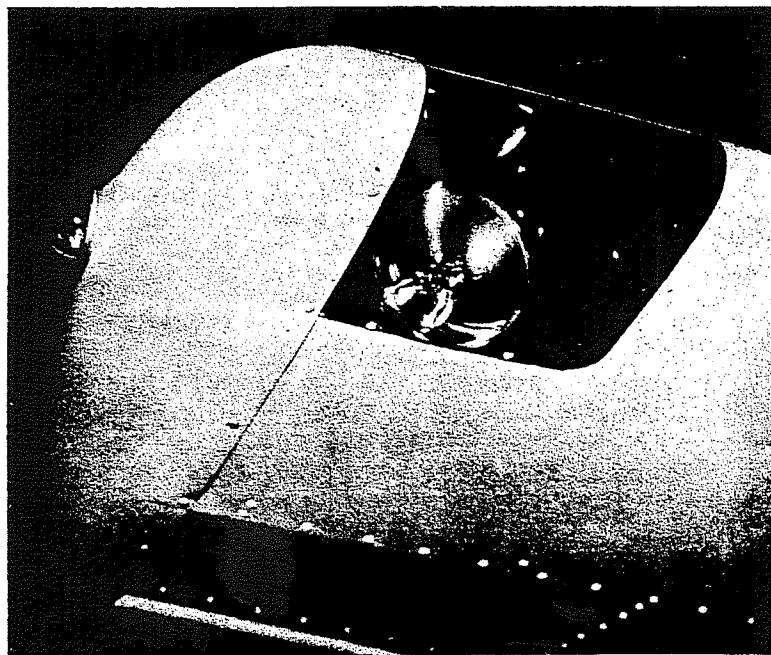
The procedure for draining the right and left tanks and lines is to open the gasculator quick drain for a few seconds with the fuel tank selector on one tank. Then change the fuel selector to the opposite tank and repeat the process, allowing enough fuel to flow out to clear the line as well as the gasculator.

VII. Electrical System:

A 12-volt 33 ampere hour battery is mounted behind the baggage compartment in a sealed stainless steel battery box. The standard generator has an output of 50 amperes.

Electrical switches and circuit breakers, located on the lower left instrument panel, control the navigation and instrument lights,





two landing lights, electric turn and bank, and other electrical components. The circuit breakers automatically break the electrical circuit if an overload is applied to the system, preventing damage to electrical wiring. To reset the breakers, simply push in the buttons. Allow approximately two minutes for breakers to cool before resetting.

VIII. Cabin Features:

The instrument panel of the Comanche is designed to accommodate the customary advanced blind flight instruments on the left side in front of the pilot, and the engine instruments on the right side. Provision for extra instruments is made in both sections. Instruments are shock mounted, and are accessible for maintenance by removing a portion of the fuselage cowl over the instruments.

Front seats are adjustable through a long range for pilot comfort and to facilitate entry and exit. They are easily removed by taking out the stops at the end of the mounting tracks and sliding the seats off their tracks.

The rear seat back is adjusted to various fore and aft positions by use of the latches at the outboard upper corners. The entire rear

BRITTAIN INDUSTRIES
FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
TO
PIPER MODEL PA24-250
AND
PIPER MODEL PA24-260 (4 PCLM)
S/N 24-3642, 24-4000 THRU 24-4246
AND 24-4248 THRU 24-4299
AIRPLANE FLIGHT MANUAL(S)
FOR
15 GALLON WING TIP FUEL TANK INSTALLATION

This aircraft is equipped with Mark II Wing Tip Tanks (Part #4009), 15 Gallons each, and must be operated in compliance with the limitations herein.

I. LIMITATIONS SECTION

Same as prescribed in applicable FAA Approved Airplane Flight Manual except:

1. C.G. Range - No change from original.
2. Auxiliary Wing Tip Tank Fuel to be used in level flight only.
3. Maximum allowable gross weight is increased to 3000 pounds.
4. Va reduced to 129 MPH. All other speeds remain unchanged.

II. PROCEDURE SECTION

Same as prescribed in applicable FAA Approved Airplane Flight Manual except:

1. If unsymmetrical fuel loading occurs in flight, no landing difficulties will be experienced as adequate control is available.
2. When parking aircraft, turn one fuel selector valve to OFF position to prevent transfer of fuel.
3. If the wing tip tank fuel cells and associated plumbing have been completely drained of fuel and the tanks subsequently filled, it is possible to trap a small volume of air in the fuel line leading from a selector valve to the tip tank. To purge the line of any possible air pocket subsequent to refuelling the wing tip tanks, accomplish either of the following procedures:

N _____

FAA Approved:

Date: 9/24/68

Revision (A) 10/9/68

- A. Place the left fuel selector valve in the "OFF" position and the right fuel selector valve on "Tip Tank". Drain the sump, or fuel filter assembly, until a free flow of fuel is established by visually observing the flow through the clear plastic tubing. Repeat process for draining left tip tank and associated plumbing.

OR

- B. After starting engine, and prior to taxiing, feed separately and alternately from the left tip tank only and then from the right tip tank only for a period of one minute each. Return fuel selector system to main tanks for taxi, take-off and climb.

4. When any tank is run dry, position that fuel selector valve to "OFF" position or to a tank with fuel remaining. Do not leave tank selector valves on an empty tank position.

III. PERFORMANCE

Same as prescribed in applicable FAA Approved Airplane Flight Manual except:

- I. STALLS - A minimum of 130 feet of altitude is required to recover from POWER OFF stalls.

FAA Approved: _____

Robert N. Solomon

Chief, Aircraft Engineering Division
Western Region
Federal Aviation Administration

Items denoted by "A" Bar Incorporated by Revision dated 10/9/68

Approved: _____

Robert N. Solomon

Date: _____

9/24/68

BRITAIN INDUSTRIES

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