

## SECTION 8 - MAINTENANCE

PA-30 \* 3600 LBS GROSS WEIGHT

### Table of Contents

Introduction .....	8-2
Serial Number Plate .....	8-2
Inspection Periods .....	8-2
Alterations .....	8-3
Ground Handling .....	8-3
Towing .....	8-3
Parking and Mooring .....	8-3
Jacking .....	8-3
Preventative Maintenance .....	8-4
Engine Care .....	8-4
Fuel Requirements .....	8-4
Oil Requirements .....	8-5
Battery Service .....	8-5
Air Filter Care .....	8-5
Propeller Care .....	8-6
Landing Gear Service .....	8-6
Brake Service .....	8-6
Tire Care .....	8-7
Lubrication .....	8-7
Cleaning .....	8-7
Windshield and Windows Care .....	8-7
Exterior Surfaces .....	8-7
Interior Care .....	8-7
Intermittent Operation Procedure .....	8-8
Airplane File .....	8-8

## **MAINTENANCE**

PA-30 \* 3600 LBS GROSS WEIGHT

### **INTRODUCTION**

This section provides general guidelines relating to servicing and maintenance of the Twin Comanche. Piper Aircraft has from time to time issued Service Bulletins, Service Letters and Service Spares Letters relating to the aircraft which have been available from various sources including a subscription service.

Service Bulletins are of special importance and should be complied with promptly. Service Letters deal with product improvements and service hints pertaining to the aircraft. Service Spares Letters offer improved parts, kits and optional equipment that were not available originally, and which may be of interest to the owner. In addition, numerous STC modifications are available for the aircraft from independent sources.

A Service Manual and Parts Catalog are also available from Piper dealers and other sources.

### **SERIAL NUMBER PLATE**

The serial number plate on the Twin Comanche is located in one of the following locations: On the left side of the fuselage by the tail skid; inside the left side of the fuselage opposite the rear fuselage access panel, or on the forward cabin bulkhead. The serial number of the plane should always be used when referring to the airplane in service matters.

### **INSPECTION PERIODS**

The FAA occasionally publishes Airworthiness Directives that apply to specific groups of aircraft. When an AD is issued, it is sent to the registered owner of the aircraft. The owner is advised to periodically check with his Piper dealer or A&P mechanic to insure that he has all ADs issued against his aircraft.

One-Hundred Hour Inspections are required by law if the aircraft is used commercially, otherwise this inspection is left to the discretion of the owner. Details of the inspection are listed in the inspection report of the Service Manual.

An Annual Inspection is required once each twelve calendar months to keep the Airworthiness Certificate in effect. It is the same as a 100 Hour Inspection except that it must be signed by an IA mechanic or a GADO representative. This inspection is required whether the aircraft is operated commercially or otherwise.

In place of the 100 Hour and Annual Inspection requirements, an aircraft may be inspected in accordance with a Progressive Inspection schedule which allows the work to be divided into smaller operations that can be accomplished in shorter time periods thereby allowing maximum utilization of the aircraft while complying with all FAA and factory recommended maintenance procedures.

## ALTERATIONS

If the owner of an aircraft desires to have it modified, FAA approval must be obtained prior to modification to insure that the proposed alteration does not violate the airworthiness of the aircraft. Any major alteration to the basic airframe or any aircraft system requires a STC and must be accomplished by licensed personnel.

## GROUND HANDLING

### 1.) Towing:

The airplane is most safely and easily moved on the ground by use of the nose wheel steering bar that is stowed in the baggage compartment. Towing lugs are incorporated as part of the nose gear fork. The three-view drawing in Section 1 of this Handbook shows the minimum clearances needed to hangar the airplane.

#### \*\* CAUTION \*\*

When towing with power equipment, do not exceed the nose gear steering angle of 20 degrees either side of center or structural damage will result. To insure adequate propeller ground clearance, always observe recommended strut servicing procedures and tire inflation pressures.

### 2.) Parking and Mooring:

When parking the airplane, face it into the wind if possible and set the parking brake. Care should be exercised when setting parking brakes that are overheated or in cold weather when accumulated moisture can freeze the brake.

The airplane should be moored for immovability, security and protection. The following procedure is recommended.

- A.) Block the wheels, fore and aft.
- B.) Secure tie-down ropes to the wing tie-down rings and tail skid at approximately 45 degree angles to the ground. Use bowline or square knots; do not use slip knots.
- C.) Immobilize ailerons and stabilator.
- D.) Retract the wing flaps.
- E.) Close fresh air inlets.
- F.) Release the parking brake.
- G.) Install a pitot head cover.
- H.) Cabin, baggage compartment and storm window should be locked when the airplane is unattended.

### 3.) Jacking:

When jacking the airplane for landing-gear service or any other purpose, two hydraulic jacks and a tail stand should be used. The airplane is equipped with a jacking pad located on each main spar just outboard of the main landing gear. Approximately 300 to 400 pounds of ballast should be placed on the base of the tail stand before jacking the airplane.

## PREVENTATIVE MAINTENANCE

A certified pilot who owns or operates an aircraft not used as an air carrier is authorized to perform certain preventative maintenance described in FAR Part 43. A Service Manual should be obtained prior to performing any preventative maintenance to insure that proper procedures are followed.

Although such maintenance is allowed by law, each individual should determine whether he has the ability to perform the work. All other maintenance not outlined in FAR Part 43 is required to be accomplished by appropriately licensed personnel. A pilot can, however, perform any other maintenance on an aircraft if he works under the direct supervision of a properly certified mechanic.

If maintenance is performed, an entry must be made in the appropriate logbook. The entry should contain:

- 1.) Date the work was accomplished.
- 2.) Engine tachometer hours.
- 3.) Description of the work.
- 4.) Signature and certificate number of pilot performing the work.

Among the examples listed in FAR Part 43 considered as preventative maintenance are:

### 1.) Engine Care:

The engines may be cleaned with Stoddard solvent or the equivalent then thoroughly dried. Cleaning solutions should be used cautiously and should always be properly neutralized after use. Care should be taken to prevent cleaning fluids from entering the magnetos, starters, generators, alternators or vacuum pumps. Spark plugs should be cleaned and gapped every 50 hours of engine operation.

### 2.) Fuel Requirements:

The minimum grade of aviation fuel that can be used in the normally aspirated Twin Comanche is (blue) 91/96 octane (100 LL). The use of lower grades of fuel can cause serious engine damage in a short period of time, and use of fuel with lower grades of octane will invalidate the engine warranty.

The fuel system sumps should be drained daily to avoid the accumulation of contaminants such as water or sediment. Keep fuel tanks full after aircraft operation to minimize the chance of accumulation of water in the tanks due to condensation. The fuel strainer and injector screens should be checked and cleaned with acetone at 50 hour intervals.

### 3.) Oil Requirements:

Ashless dispersant aircraft engine oil must be used for all operating conditions. The oil capacity of each engine is 8 US quarts, but the operating level is normally kept a few quarts below maximum to reduce oil consumption. It is recommended that the oil and filter be changed and the oil screen be checked after every 50 hours of operation (25 hours if the engine is not equipped with an external full flow, spin-on oil filter) or every four months, whichever comes first. Under unfavorable conditions, the oil should be changed even sooner.

The following oil grades are required for the specified temperature:

Temperature	Single-Viscosity	Multi-Viscosity All Temps.
Above 60 Degrees F.	SAE 50	
Between 30 & 90 Degrees F.	SAE 40	
Between 00 & 70 Degrees F.	SAE 30	15W50 or 20W50
Below 10 Degrees F.	SAE 20	

During the oil and filter change it is advisable to inspect the overall condition of the engine compartment giving attention to items not normally checked during a preflight inspection.

Hoses, metal lines and fittings should be inspected for signs of oil or fuel leaks, and checked for abrasions, chafing, support and evidence of deterioration. Inspect the intake and exhaust systems for cracks, evidence of leakage and security of attachment. Inspect wiring for loose, broken or corroded terminals and any evidence of chafing, burning or heat deterioration.

### 4.) Battery Service:

The 12-volt, 35 ampere-hour battery is located either in the tail section aft of the baggage compartment or in the nose section of the fuselage. The stainless-steel battery box has a plastic drain tube which is normally closed off with a clamp and should be opened occasionally to drain off any accumulation of liquid.

The battery should be checked frequently for proper fluid level. Do not fill the battery above the baffle plates. Use only distilled water to replenish the electrolyte, never use acid.

A hydrometer can be used to determine the percentage of charge in the battery. If the battery is not up to proper charge, re-charge following the instructions located on the battery-box cover and in Section 9 (Supplements) of this Manual under the heading "Placards". Quick charges are not recommended.

### 5.) Air Filter Care:

The induction system air filters must be cleaned at least once every 50 hours and more often, even daily, when operating in dusty conditions. To clean the filters, tap gently to dislodge dust particles. Do not use compressed air or wash the filters in any liquid.

Replace each filter when it becomes excessively dirty or shows any damage. The usable life of a filter should be limited to one year or 500 hours of operation, whichever comes first.

## 6.) Propeller Care:

Before each flight, the propellers should be checked for nicks and corrosion. Small nicks produce stress concentrations and should be dressed out as soon as possible to prevent serious cracks or the loss of a propeller tip.

The propeller cylinder charge should be kept at the proper pressure. A placard specifying pressure readings is located inside the spinner caps and a table of pressure readings for both high and low pressure systems is listed in Section 1 (General) or Section 2 (Limitations) of this Manual under the heading "Placards". The cylinders should be charged with dry nitrogen to eliminate the possibility of any moisture collecting in the cylinders and freezing in cold weather or while operating the aircraft at altitude.

## 7.) Landing Gear Service:

Raise the airplane on jacks using procedures outlined in "Ground Handling" of this Section.

Wheels are removed by taking off the hub nut and withdrawing the axle bolt, the axle retainer clips and the axle. Main gear wheels also require the removal of four bolts from the brake assembly.

Mark the tire and wheel for re-installation. Tires are dismounted from the wheels by deflating the tube, then removing the wheel through-bolts, allowing the wheel halves to be separated.

Landing-gear strut exposure is measured with the airplane parked on a level surface with all fuel tanks full. Should the strut exposure be below that required, it should be determined if oil or air is needed. To do this, first raise the airplane on jacks.

To add oil, release the air in the strut allowing the oleo to compress fully. Remove the air-valve core and fill the unit through this opening by attaching a clear plastic hose to the valve stem and submerging the other end in a container of hydraulic fluid. Fully compress and extend the strut several times, thus drawing fluid from the container and expelling air from the strut chamber. When air bubbles cease to flow through the hose, compress the oleo to within 1/4 inch of full compression allowing excess oil to escape.

Air (or preferably dry nitrogen) is then added to the oleo struts with the aid of a strut pump. Re-insert the valve core, and with the airplane on the ground; inflate the strut to the proper position.

Wheel bearings should be replaced if they show signs of pitting or wear. If the bearings are serviceable, clean them thoroughly in solvent and re-pack with wheel-bearing grease.

## 8.) Brake Service:

The hydraulic brake system is filled with petroleum base MIL-H-5606 (red) hydraulic fluid. The fluid level should be checked after every 50 hours of airplane operation and replenished if necessary. The brake fluid reservoir is located on the firewall in the engine compartment.

No adjustment of brake clearances is necessary. If brake blocks become worn excessively, an A&P mechanic can easily replace them with new segments.

### **9.) Tire Care:**

For maximum service from the tires, keep them inflated to the proper pressures. When checking tire pressure, examine the tires for wear, cuts and bruises.

All wheels and tires are balanced before installation, and the relationship of tire, tube and wheel should be maintained when servicing. Unbalanced wheels can cause extreme vibration in the landing gear. In the installation of new components, it may be necessary to re-balance the wheels with the tires mounted.

### **10.) Lubrication:**

Lubrication at regular intervals is an essential part of the maintenance of any aircraft. The Service Manual contains charts showing lubrication points, types of lubricants to be used, and recommended frequency of application. Refer to the Service Manual for detailed lubrication instructions and methods.

## **CLEANING**

### **1.) Windshield and Window Care:**

The Plexiglas windshield and windows should be cleaned with an aircraft windshield cleaner following directions supplied with the cleaner. If windshield cleaner is not available, the Plexiglas can be cleaned by using water and a mild soap to remove dirt and loose particles. After cleaning, apply a thin coat of a good commercial wax. A severe scratch or mar can be removed with Plexiglas polish.

Oil and grease can be removed with kerosene or Stoddard solvent. Never use gasoline, benzine, alcohol, acetone, paint or lacquer thinner, or glass cleaner to clean the Plexiglas. These materials will attack the plastic and cause it to craze.

### **2.) Exterior Surfaces:**

The airplane should be washed with a mild soap and water. Harsh abrasives or alkaline detergents can cause scratches on painted and plastic surfaces or cause corrosion of metal. Oil and grease can be removed with kerosene or Stoddard solvent. Any good auto wax may be used to preserve painted surfaces.

### **3.) Interior Care:**

Clean side panels, seats and carpet with a stiff-bristle brush and vacuum cleaner. Soiled upholstery may be cleaned with a good upholstery cleaner suitable for the material. Carefully follow the instructions supplied with the product.

## INTERMITTENT OPERATION PROCEDURE

Airplanes that receive only intermittent operation should be flown once every two to three weeks for fifteen to thirty minutes. This practice is intended to prevent accumulation of corrosion on engine cylinder walls and keep the battery fully charged. It also helps to eliminate accumulations of water in the fuel system and air spaces in the engine, and helps prevent seals from drying out and leaking.

If the airplane is to be stored temporarily or indefinitely, refer to the Service Manual for proper storage procedures.

### AIRPLANE FILE

The pilot is responsible for insuring that the following papers are in order and in the aircraft for inspection by the proper authority.

#### 1.) To be displayed in the airplane at all times:

- A.) Aircraft Airworthiness Certificate (FAA Form 8100-2)
- B.) Aircraft Registration Certificate (FAA Form 8050-3)
- C.) Aircraft Radio Station License (FCC Form 556)

#### 2.) To be carried in the airplane at all times:

- A.) FAA Approved "Airplane Flight Manual"
- B.) Weight and Balance Data
- C.) Aircraft Equipment List
- D.) Repair and Alteration Form (FAA Form 337)

#### 3.) To be made available upon request:

- A.) Airplane Logbook
- B.) Engine Logbook

#### \*\* NOTE \*\*

The items listed are required by Federal Aviation Regulations of the United States of America. Owners of aircraft not registered in the United States should check with their country's aviation officials to determine their individual requirements.