SECTION 8

HANDLING, SERVICING AND MAINTENANCE

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8.1 INTRODUCTION

This section contains the precautions and procedures recommended by the factory for the correct handling, servicing and routine care of the airplane.

A planned schedule of lubrication and maintenance should be followed to ensure maximum utilisation of the airplane, the airplane maintenance manual includes a suggested schedule and lubrication chart.

The identification and procurement procedures for spare parts is contained in the airplane illustrated parts list.

WARNING

The airplane should be inspected and maintained in accordance with the airplane Maintenance Manual, Service Bulletins and Service letters. Pacific Aerospace Corporation Limited does not encourage or support modifications to the airplane unless approved by Pacific Aerospace Corporation Limited. Modifications not approved by the Pacific Aerospace Corporation Limited may affect the operation of the airplane as detailed in all sections of this handbook and therefore put the airplane and occupants at risk. Modifications not approved by the Pacific Aerospace Corporation Limited to the airplane may affect any warranty conditions.

8.2 IDENTIFICATION

A manufacturers identification plate which includes the airplane serial number, type certificate, model number and date of manufacture is attached to the right hand side rear fuselage adjacent to the tail plane leading edge. All correspondence relating to the airplane should include the airplane serial number.

8.3 PUBLICATIONS

When the airplane is delivered from the factory, it is accompanied by a pilot's operating handbook/flight manual, maintenance manual and illustrated parts catalogue. Further copies of these manuals may be purchased as required from Pacific Aerospace Corporation Limited

8.4 AIRPLANE FILE

A number of certificates and documents pertaining to the airplane are contained in an ‘Airplane File' supplied with each airplane which together with any additional data that may be required by the appropriate airworthiness authority should be maintained as a

permanent record of the airplane. Applicable regulations should be checked periodically to ensure the file is up to date.

log books for airframe, engine, propeller and radio (when required) are supplied by the manufacturer.

8.5 AIRPLANE INSPECTION PERIODS

The manufacturer recommends 150 hour or 1500 landing, whichever occurs first, inspection cycles, with 'before', 'after' and 'between' flight inspections. The airplane maintenance schedule (refer maintenance manual) has been compiled to accommodate these cycles.

New Zealand registered airplane must conform to the requirements laid down by the New Zealand Civil Aviation Rules regarding airworthiness.

Airplane not on the New Zealand register will comply with the regulations issued by the airworthiness authority in the country of registration, regarding airworthiness certificates and inspection periods.

Airworthiness authorities may require other inspections, for which an airworthiness directive is issued applicable to the airframe, engine, propeller or other components. When these inspections are repetitive, they should be added to the maintenance schedule.

8.6 PILOT'S MAINTENANCE

A pilot appropriately trained by a LAME and authorised by an owner/operator may perform pilot maintenance.

If the airplane is registered outside New Zealand, then the regulations of the country of registration will determine the extent of 'pilot maintenance' that may be performed by the pilot.

A maintenance manual must be available prior to performing any ‘pilot maintenance’ to ensure correct procedures are followed. Pilot maintenance must be accomplished in accordance with the airplane maintenance manual.

CAUTION

Any maintenance and servicing not included in the permissible 'pilot maintenance' must be accomplished by appropriately authorised personnel.

8.7 GROUND HANDLING

TOWING

Whether the airplane is towed by hand or by power it is most easily and safely achieved using an approved tow bar fitted to the nose wheel. Connect the nose steering bar, position one person in the cockpit to apply the brakes and ensure the propeller has one blade vertical (12 o'clock position).

All towing should be carried out at slow speeds.

Care should be exercised when towing over rough ground to limit the loads on nose wheel steering.

CAUTION

When moving the airplane avoid pushing or pulling on the following areas: outer half of propeller blades, control surfaces, flaps, tail-cone, wing tips, spinner, aerials and leading edge fuel tanks.

NOTE

The nose wheel steering mechanism has an angular movement of 20^{o} either side of the airplane centre line, if this movement is exceeded, damage to the rudder / steering travel stops will result.

PARKING

Park the airplane heading into wind, apply the parking brake as follows:

Depress the toe brake pedals.

Pull out the parking brake knob and hold.

Release the toe brake pedals.

Release hold of the parking brake knob

To release the parking brake, depress the toe pedals, push in the park brake knob, then release the toe pedals.

NOTE

Do not apply the parking brake when the brakes are in an overheated condition or when accumulated moisture may freeze the brakes on.

NOTE

Do not leave the park brake on for extended periods or where the ambient air temperature may rise sufficiently to expand the trapped fluid and damage the system.

Install the control column lock.

Chock the wheels front and rear.

Close and latch the crew entry doors and cargo door.

Ensure the pitot head cover is fitted.

Fit engine inlet and exhaust covers.

Fit propeller restraint.

The following precautions are recommended to prevent heat deformation of transparent plastic enclosures on airplane parked exposed to the sun:

If surrounding air temperature is below 38ºC (100ºF), no special precautions are necessary.

If surrounding air temperature is between 38ºC (100ºF) and 49ºC (120ºF) enclosures should be opened sufficiently to permit free circulation of air through the airplane and under the enclosure.

If the surrounding air temperature is above 49ºC (120ºF) the enclosure must be opened and protected from the sun by a suitable cover which does not come into contact with the transparent plastic. If possible the airplane should be parked in the shade.

To remove enclosure covers lift them off; sliding may cause abrasion of the plastic surfaces.

MOORING

To tie the airplane down carry out the parking procedures, then secure the airplane at the wing and tail tie down rings to tie down points or stakes with sufficiently strong rope or chains.

NOTE

When using natural fibre ropes, leave sufficient slack to compensate for shrinkage when wet.

JACKING

When it is necessary to perform any jacking of the airplane, or raising the nose for maintenance, reference should be made to the maintenance manual for the correct procedure and equipment required.

LEVELLING

Level the airplane as described in Section 6 for weighing or refer to the airplane maintenance manual for levelling procedures associated with maintenance activities.

8.8 SERVICING

INTRODUCTION

In addition to the pre-flight inspection detailed in Section 4, information on servicing, inspection, maintenance and test requirements is contained in the maintenance manual. The maintenance manual details all items that require periodic maintenance plus those that require servicing, inspection and / or testing at special intervals.

The following procedures, quantities and specification of frequently serviced items are mentioned for quick and ready reference.

FUEL

APPROVED FUELS

Approved fuels are detailed in Figure 8-1. Refer to P&WC S.B. No. 1344 for specific details.

APPROVED FUELS	
Jet A /A1 (ASTM D1655)	
Jet B (ASTM D1655)	
JP-4 (MIL-T-5624)	Contains fuel system ice inhibitor
JP-5 (MIL-T-5624)	Contains fuel system ice inhibitor
F-40 (NATO Code)	Contains fuel system ice inhibitor
F-34 (Nato Code)	Contains fuel system ice inhibitor
F-44 (Nato Code)	Contains fuel system ice inhibitor

Figure 8-1, Approved Fuels

FUEL TANK CAPACITY

The airplane fuel capacity is detailed in Figure 8-2.

Total Capacity: 861 litres (227.4 U.S. gallons, 1512 lbs)

Total Useable: 841 litres (221 U.S. gallons, 1476 lbs)

TANK	TOTAL CAPACITY	UNUSABLE FUEL	USABLE
FRONT LEFT TANK *	284* litres, 499 lbs 75* U.S. gallons	10 litres, 18 lbs 3 U.S. gallons	274 litres, 481 lbs 72 U.S. gallons
FRONT RIGHT TANK	293 litres, 515 lbs 77 U.S. gallons	10 litres, 18 lbs 3 U.S. gallons	283 litres, 497 lbs 74 U.S. gallons
REAR LEFT TANK	142 litres, 249 lbs 37.5 U.S. gallons	0	142 litres, 249 lbs 37.5 U.S. gallons
REAR RIGHT TANK	142 litres, 249 lbs 37.5 U.S. gallons	0	142 litres, 249 lbs 37.5 U.S. gallons
TOTAL	861 litres, 1512 lbs 227 U.S. gallons	20 litres, 36 lbs 6 U.S. gallons	841 litres, 1476 lbs 221 U.S. gallons

* Includes 26 litres (6.8 U.S. gallons) of fuel in sump tank

Figure 8-2, Fuel Capacity

CAUTION

The accuracy of the fuel indicating system will be affected is the airplane is parked on sloping ground.

REFUELLING

Each of the four wing tanks is fitted with a filler aperture. Access to the tanks is achieved by removing the fuel tank cap.

Fuel may be introduced into the airplane by either pouring or pumping. When fuelling by pouring from containers ensure that the fuel is adequately filtered, ie. chamois leather and funnel.

Fill the front tanks first.

Observe the following precautions whilst refuelling:

A. Fuelling must be carried out in the open.

B. Ensure purity of fuel. Use an approved detector kit to determine water suspension.

C. Ensure correct bonding of airplane, filling hose and refuelling equipment.

D. Ensure adequate fire appliances are available.

E. Ensure NO SMOKING within 100 ft (30m) of the airplane.

F. Ensure all airplane electrical systems are de-energised.

G. If fuel is spilled ensure the area of spillage is thoroughly flushed with water and that all residual fuel and vapour have been dispersed before attempting to start the engine.

H. Ensure fuel tank caps are securely installed on completion of refuelling.

I. Complete a fuel check for contamination from the four fuel tank drains, sump tank drain and the fuel filter drain.

Use a clear sampler to drain a fuel sample from each of the fuel drains. Fill the sampler up and hold the sampler up to the light to allow a clear view of the fuel in the sampler. If any contamination is present clean the sampler and take repeated samples from all drains until the fuel is free of contamination. The airplane fuel tanks should be completely drained of all fuel and cleaned if evidence of contamination remains after repeated fuel sample checks.

WARNING

It is the pilot's responsibility to ensure the airplane's fuel supply is suitable to use before flight. Fuel should be checked to ensure that it is a fuel type approved for use in the airplane and that it is free from all types of solid and liquid contamination. A fuel sample is required during each pre flight inspection and after each refuel.

WARNING

The airplane must not be flown with fuel in the rear tanks unless the front tanks are full.

DEFUELLING

The airplane may be defuelled either by draining or syphoning. Complete the defuelling operation by opening the quick-drain plug fitted to the base of each tank and sump tank.

WARNING

When syphoning fuel from the tanks, use only safety approved equipment, never attempt to commence syphoning by mouth. Introduction of even small quantities of fuel into the lungs may prove fatal

NOTE

The precautions listed under REFUELLING must be observed when defuelling by either method.

OIL

INTRODUCTION

Access to the oil dipstick/filter cap is via a small hinged panel on the left side of the upper engine cowl. The oil tank is an integral part of the compressor inlet case and is located in front of the accessory gearbox. The oil filler neck protrudes through the accessory gearbox and is closed by a cap which incorporates a quantity measuring dipstick. The markings on the dipstick correspond to U.S. quarts and indicate the oil level below the maximum capacity of the oil tank. Normal cold oil level is MAX COLD mark on the dipstick. Normal hot oil level is the MAX HOT mark on the dipstick.

Filling the oil to the maximum level may result in a high consumption rate, with the oil exiting through the accessory gearbox breather. On some engines, this may also occur with the oil level at one or two U.S. quarts below the maximum level. In such cases, operators are advised to service the oil to the level that results in acceptable consumption down to 3 quarts below the maximum. This practice is acceptable, due to the large usable oil quantity. Oil temperature and pressure indications should be monitored and consumption rates monitored and checked against the engine maintenance manual recommendations.

OIL TANK CAPACITY

	U.S. GAL		**IMPERIAL GAL.**	
Total capacity of tank	2.3	2.7	1.9	2.16
Quantity of useable oil	1.5	1.5	1.2	1.2

Figure 8-3, Oil Tank Capacity

OIL SPECIFICATIONS

The approved oil brands and types are detailed in Figure 8-4. Refer to P&WC S.B 1001 for full details.

BRAND	TYPE
AeroShell Turbine Oil 750	Synthetic, CPW202 (7.5 Centistokes)
Royco Turbine Oil 750	Synthetic, CPW202 (7.5 Centistokes)
Castrol 98	Synthetic, CPW202 (7.5 Centistokes)
BP Turbo Oil 274	Synthetic, CPW202 (7.5 Centistokes)
Turbonycoil 35 M	Synthetic, CPW202 (7.5 Centistokes)
AeroShell Turbine Oil 500	Synthetic, PWA 521- Type II (5 Centistokes)
Royco Turbine Oil 500	Synthetic, PWA 521- Type II (5 Centistokes)
Mobil Jet Oil II	Synthetic, PWA 521- Type II (5 Centistokes)
Castrol 5000	Synthetic, PWA 521- Type II (5 Centistokes)
BP Turbo Oil 2380	Synthetic, PWA 521- Type II (5 Centistokes)
Turbonycoil 525-2A	Synthetic, PWA 521- Type II (5 Centistokes)
Turbonycoil 600	Synthetic, PWA 521- Type II (5 Centistokes)
Mobil Jet Oil 254	Synthetic, PWA 521- Type II (5 Centistokes),THIRD GENERATION
AeroShell Turbine Oil 560	Synthetic, PWA 521- Type II (5 Centistokes),THIRD GENERATION
Royco Turbine Oil 560	Synthetic, PWA 521- Type II (5 Centistokes),THIRD GENERATION

Figure 8-4, Oil Specifications

CAUTION

Only use oil which meets the specifications listed in Pratt & Whitney Engine Service Bulletin No 1001 PWC. Do not mix different viscosities or specifications of oil as their different chemical structure can make them incompatible. Drain the complete oil system before changing oil viscosities or specifications.

CAUTION

When changing from an existing lubricant formulation to a "Third Generation" lubricant formulation P&WC strongly recommends that such a change should only be made when an engine is new or freshly overhauled.

NOTE

Where operation will result in frequent cold soaking at ambient temperature of -18^{0}C (64.4^{0}F) or lower, use of a 5 centistoke oil is recommended.

CHECKING OIL LEVEL

The oil level is best checked when the engine is warm. The preference is to check the oil level within 10 - 20 minutes after shut down (MAX HOT marking on the dip stick is used). If the engine has been shut down for more than 30 minutes and the engine is warm run the engine before checking the oil level. The MAX COLD mark on the dip stick is used to check oil levels when the engine is completely cold.

MAXIMUM OIL CONSUMPTION

The maximum oil consumption is 0.2 lb./hr. For better accuracy, consumption should be monitored over a 10 hour period 2 lb/10 hrs, (2 lbs. = 1 U.S. quart approx).

WARNING

Ensure the oil dipstick is fitted and locked before engine operation. Loss of oil due to an insecure oil cap will result in excessive loss of oil and eventual engine stoppage.

BRAKE FLUID

Replenish the brake hydraulic fluid using hydraulic fluid to specification MIL-H-5606A; ensure oil is uncontaminated; do not reuse oil drained from the system as this may be both contaminated and aerated.

A. Ensure the parking brake is OFF.

B. Remove engine upper cowling.

C. Remove the filler plug from the brake system reservoir.

D. Top up the reservoir, avoid overfilling and subsequent spillage.

BATTERY ELECTROLYTE

The airplane is fitted with a regenerative gas maintenance free battery. No battery electrolyte replenishment is permitted.

TIRE INFLATION

The following tIre pressures are recommended for normal operations:

Main landing gear tires 40 psi

Nose landing gear tires 30 psi

CLEANING AND CARE

The airplane should be maintained in a clean condition both internally and externally as a pre-requisite to efficient servicing and maintenance.

EXTERNAL CLEANING

The paint finish on the airplane is long lasting and weather resistant. Damage to the finish should be restored as soon as possible by feathering edges, cleaning area with solvent and applying primer and top coat.

Clean the airplane externally by washing with clean water and mild soap or detergent.

CAUTION

Use only clean cold water and mild soap during initial curing period of paint.

A good quality automotive wax may be applied to the exterior paint work if desired.

Oil or grease spots may be removed with kerosene or mineral spirits.

INTERNAL CLEANING

Clean the interior of the airplane with a vacuum cleaner to remove dust, dirt and loose articles.

Regular cleaning will prolong the life of upholstery. A damp cloth is recommended for general cleaning. For accumulated dirt or more stubborn solid areas, a mild detergent and water mixture should be employed.

CAUTION

Do not use solvents as they may damage upholstery.

TRANSPARENCY CLEANING

CAUTION

Damage to transparencies will be minimised if the correct cleaning procedures are followed.

Routine removal of film and other operational soiling, where abrasive polishing for scratch removal is not required, can be accomplished by the use of aqueous detergents solutions of 2 or 3 oz per gallon of water. The fluid should be applied with soft cloths or cellulose sponges which have been used for no other purpose.

When cleaning surfaces always remove rings from the hands before washing the transparent plastic. The cleaning procedure comprises the following steps:

A. Flush the plastic surface with plenty of water, using bare hands to feel for and gently dislodge any dirt, sand or mud.

B. Wash with mild soap and water. Be sure the water is free of harmful abrasives. A soft cloth, sponge, or chamois may be used in washing, but only to carry the soapy water to the plastic. Go over the surface with bare hands to quickly detect and remove any remaining dirt before it scratches the plastic.

C. Dry with a damp clean chamois, a clean soft cloth, or soft tissue. Do not continue rubbing the transparent plastic after it is dry. This not only scratches, but may build up an electro static charge which attracts dust particles. If the surface becomes charged, patting or gently blotting with a clean damp chamois will remove the charge as well as the dust.

D. Never use a coarse or rough cloth for polishing, cheesecloth is not acceptable.

The procedure for cleaning interior surfaces comprises three steps:

E. Dust the plastic surface lightly with a clean soft cloth saturated with clean water. Do not use a dry cloth.

F. Wipe carefully with a damp soft cloth or sponge. Keep the cloth or sponge free from grit by rinsing it frequently with clean water.

E. Clean with an approved cleaner.

PROPELLER

Clean the propeller with a mild soap and water. Refer to the Hartzell Owner's Manual for further detail.

ENGINE

Refer to the Pratt & Whitney Maintenance Manual for the airplane engine for cleaning procedures including compressor wash details.

8.9 PROLONGED OUT-OF SERVICE CARE

The length of time and environment that the airplane is expected to be out of service will determine the extent to which the airplane and systems are prepared for periods of inactivity. It is not possible to cover every eventuality but the following guidelines will assist in determining the extent of the preparation. Airplanes and the associated systems, like any other mechanised item, need a certain amount of activity to reduce deterioration of systems and parts. Long periods of inactivity may result in faster deterioration compared to if the airplane was in service.

HANGARAGE

Airplanes will always benefit from being hangared compared to parked outside, whether overnight or for longer periods. Refer to Towing in this section for details on moving the airplane. Exercise caution manoeuvring the airplane in and out of the hanger. A dust cover will further assist to keep any dust and foreign debris from settling directly on the airplane. Try and locate the airplane clear of any areas where it might be in the way of other activities that occur in the hanger. If possible consider leaving the park brake OFF so that the airplane can be quickly moved in the event that the hanger is required to be cleared in a hurry. Ensure the control lock, pitot heat, engine inlet and exhaust covers and propeller restraint are fitted and doors all closed. Ensure the airplane MASTER switch is turned off.

PARKING AND MOORING

Follow the procedures detailed in Parking and Mooring in this section for securing the airplane outside. When storing for prolonged periods make every effort to find an area to secure the airplane which is clear of other activities which occur on or in the vicinity of the intended parking area. If not familiar with the area speak to someone who is.

ENGINE

Preservation of engines in service depends on the period of inactivity and whether or not the engine may be rotated during the inactive period. An engine is considered inactive when it has not been operated either on the ground, or in flight for a minimum of ten minutes after the oil temperature has stabilized.

Any preservation done should be entered in the logbook and on tags attached to the engine.

For an engine inactive in a severe environment such as extreme temperature changes, high humidity, dusty, polluted or salt laden atmosphere, it is recommended that the engine be preserved to the next higher schedule or the engine started and run more frequently, for a minimum of ten minutes each time.

The engine preservation and depreservation procedures are detailed in the Pratt & Whitney Maintenance Manual. Preservation and the associated depreservation requirements start after the engine has been inactive for more than 7 days. Refer to the Pratt & Whitney Maintenance Manual for the PT6A-34 for detailed procedures.

BATTERY

To safe guard against deterioration of the battery condition consideration should be given to disconnecting the battery from the airplane at the battery.

RETURNING TO SERVICE

Ensure the applicable engine depreservation requirements are completed. Ensure all covers and mooring apparatus are removed from the airplane. Reconnect any airplane systems which were disconnected. Conduct a thorough preflight of the entire airplane. Pay particular attention to the engine oil quantity and condition, fuel quantity and condition, battery condition, tire inflation, vents, ducts and intakes. During and after start pay particular attention to the airplane systems to ensure the correct functionality and indications.