

# Permold Series Maintenance Manual

**MODELS I0-550-A**  
**B**  
**C**  
**G**  
**N**  
**P**  
**R**

Mixture Rise at Idle Cutoff-RPM .....	25-50
Oil Temperature	
Minimum for takeoff .....	75° F.
Limit .....	240° F.
Recommended operational range.....	170° - 220° F.
Oil Pressure	
Idle, minimum psi.....	10
Normal operation, psi.....	30 - 60
Max. (Oil Cold).....	100
Oil Sump Capacity (Quarts)	
IO-550-A, B, C & R .....	12
IO-550-G & N .....	8
IO-550-P .....	10
Magneto Drop (Max.).....	150 RPM
Magneto Spread (Max.) .....	50 RPM
Cylinder head temperature	
with Bayonet Thermocouple (Limit) .....	460°F
Recommended Operational Maximum .....	420°F

#### 5-4 TIME INTERVAL INSPECTIONS

Engine mounted accessories not supplied by TCM may require servicing at specific intervals; some of these are alternators, pneumatic pumps, air/oil separators and stand-by generators. Refer to the instructions provided by the aircraft manufacturer, accessory manufacturer or STC holder for detailed information.

*CAUTION...New, rebuilt and overhauled engines or engines that have had overhauled or new cylinders and new piston rings installed must be given a 100-hour inspection after 25 hours of operation.*

Oil and Filter Change Interval ..... 50 hours

Or six months, whichever comes first

*CAUTION...Use only TCM approved oils. See TCM approved oils in chapter 3, "Table of Sealants and Lubricants."*

## 25-HOUR INSPECTION

NOTE...Research and comply with all applicable Service Publications and Airworthiness Directives.

1. After the first 25 hours of operation on new, rebuilt or overhauled engines, perform a complete 100-hour inspection. Drain the oil used for engine break-in. If engine oil consumption has stabilized, service the engine with TCM approved oil. If oil consumption has not stabilized, service engine with a mineral oil conforming to MIL-C-6529 Type II.

NOTE...Mineral oil conforming to MIL-C-6529 Type II is a straight mineral oil with a corrosion preventive additive. This oil must not be operated in excess of 25 hours or 6 months, whichever occurs first. If oil consumption has not stabilized within the first 25 hours of engine operation, drain and replenish the oil and replace the filter.

Approved Oil Grade: All Temperatures ..... TCM Approved Multi Viscosity  
Below 40° F. Ambient Air (Sea Level )..... TCM Approved SAE 30 or Multi Viscosity  
Above 40° F. Ambient Air (Sea Level ) ..... TCM Approved SAE 50 or Multi Viscosity

2. Visually inspect the engine and nacelle for fuel, oil leaks and other discrepancies.
3. Correct any discrepancies noted during this inspection prior to returning the engine to service

## 50-HOUR INSPECTION

NOTE...Research and comply with any applicable Service Publications and Airworthiness Directives.

1. Thoroughly inspect the engine for any signs of leakage. Clean engine exterior by spraying or brushing with a flame resistant solvent used for general cleaning of engine parts.

NOTE...Any environmentally hazardous materials used in cleaning must be caught and disposed of in accordance with Environmental Protection Agency regulations.

*CAUTION...Do not use any alkaline cleaning solutions for external engine cleaning, these solutions will remove the "alodized" finish of aluminum parts.*

*CAUTION...Do not use Kerosene or Gasoline for cleaning.*

2. A pre-inspection operational run-up must be performed. See "Operational Inspection" of this chapter.

- (a) Record the engine operating parameters.
- (b) Verify the recorded parameters meet the published specifications for the engine as provided in the aircraft or engine manufacturer's Maintenance, Operator's and Overhaul Manuals.

After the operational inspection, inspect, isolate and repair any leaks found.

3. Reference the applicable Airplane Flight Manual for operational values.

4. Remove and inspect induction air filter. Clean or replace as instructed by the filter manufacturer. Inspect induction system ducts, seals and gaskets for condition, deterioration and obstructions in accordance with the aircraft manufacturer's instructions. With induction air filter installed:
  - (a) Verify the induction air filter retainer is properly installed and the attaching hardware is secure in accordance with the aircraft manufacturer's instructions.
  - (b) Replace any questionable components as required in accordance with the aircraft manufacturer's instructions.
  - (c) Inspect all engine controls for proper travel, freedom of movement, wear, correct rigging and correct attachment in accordance with the aircraft manufacturer's instructions.

*CAUTION...Failure to properly install the induction air filter will result in unfiltered air being ingested into the engine which will accelerate engine wear and reduce engine service life.*

5. Inspect induction air box for security and deterioration in accordance with the aircraft manufacturer's instructions.

### **WARNING**

**Insure the fuel selector is in the off position prior to servicing fuel filters.**

6. Drain the fuel filter and if sediment was noted, remove it. Service as required and reinstall in accordance with the aircraft manufacturer's instructions.
7. Visually inspect engine and nacelle for fuel, oil leaks and other discrepancies.
8. Drain engine oil. During engine oil change, oil must be drained into an appropriate container and disposed of properly. Reinstall oil drain plug with new gasket, torque and safety.
9. Remove oil filter. Inspect filter element. See "Oil Filter Element Inspection, Oil Analysis and Spectrographic Oil Analysis" in chapter 7, "Servicing Fluids."
10. Place a thin film of Dow Corning® DC-4 compound on new oil filter gasket. Install new oil filter. Torque filter to values as directed by filter manufacturer and safety wire.
11. Inspect all induction system or cylinder drain(s) for clogging or restriction.
12. Inspect ignition leads for chafing, deterioration and proper routing.
13. Visually inspect magnetos for condition. Inspect, repair and adjust as required if magneto drop or spread was not within published limits.
14. Correct all discrepancies noted .

## **WARNING**

**Operation of a malfunctioning engine can result in additional engine damage, bodily injury or death.**

15. At the completion of any maintenance event the engine must be given a complete and thorough operational run-up. A test flight will be required if any engine adjustments have been made which affect flight characteristics or operation; this test flight is required by FAR 91.167.
  - (a) Record all engine parameters.
  - (b) Verify recorded parameters are within the specifications published for the engine and aircraft.

## **WARNING**

**Failure to identify and correct fuel or oil leaks can result in engine/nacelle fire, loss of engine power, engine failure, bodily injury or death.**

16. Correct any discrepancies noted during operational run-up prior to returning aircraft to service.

## **100-HOUR INSPECTION**

NOTE...Research and comply with the Service Publications and Airworthiness Directives.

In addition to the items listed in 50 Hour inspection, the following inspections and maintenance must be performed.

1. Drain engine oil. Reinstall oil drain plug with new gasket, torque and safety.
2. Inspect the cylinder barrels and cylinder heads for cracks, leaks rust and pitting. Inspect cylinder head and barrel cooling fins for any restriction of cooling airflow.
3. Inspect all inner cylinder and peripheral baffling for correct installation, proper positioning, deterioration and missing or broken sections.
4. Perform a cylinder compression test in accordance with chapter 19
5. Inspect the entire engine, accessory section and nacelle for indications of fuel or oil leaks. Inspect all wiring, fluid lines, hoses and electrical connections for proper routing, support and evidence of deterioration.
6. Visually inspect all cylinder and accessory to engine attaching hardware for security. Visually inspect airframe to engine connections for security and corrosion.
7. Inspect the induction and exhaust system for leaks, cracks, deterioration, broken, missing or loose brackets, clamps and hardware.
8. Insure magneto to engine timing is within specifications in accordance with chapter 12 .

*CAUTION...Magnetos using riveted type impulse coupling require repetitive 100-hour inspection in accordance with the manufacturer's instructions.*

9. Clean, inspect, gap, test and rotate all spark plugs. See chapter 12 for spark plug wear determination and spark plug rotation.

### **WARNING**

**Worn spark plugs that are continued in service may cause internal arcing in the magnetos.**

10. Check all engine controls, control cables, control rod ends and levers for security, wear, proper assembly, routing and freedom of movement throughout the entire range of travel. See chapter 13 for fuel system component replacement and throttle/mixture control lever lubrication.
11. Inspect fuel nozzles, upper deck and fuel injection nozzle reference lines, hoses, manifolds and fittings for proper routing, support and signs of fuel stains. Inspect manifold valve for security of installation, proper venting and signs of fuel stains.

*CAUTION...Never clean nozzles with wire or other similar object. If nozzle jet is plugged and obstruction cannot be removed by solvent action, REPLACE THE NOZZLE.*

12. At the first 100-hour inspection on new, rebuilt or overhauled engines, remove and clean all fuel injection nozzles. See 300 Hour Inspection.

NOTE...Any environmentally hazardous materials used in cleaning must be caught and disposed of in accordance with Environmental Protection Agency regulations.

13. Inspect all accessories for condition, security of mounting and proper operation. Refer to aircraft or component manufacturer's Maintenance Manual for specifics.
14. Inspect engine mount legs for cracks. Check engine mount isolators for signs of deterioration, proper assembly and security.
15. Verify operation and accuracy of exhaust gas temperature (EGT) system. Note: The aircraft manufacturer may require the EGT system to be operational for all categories of flight. Check the limitations section of the Airplane Flight Manual for specific requirements.
16. Correct any discrepancies noted.
17. Perform post inspection operational run-up. Visually inspect engine and nacelle for fuel and oil leaks.
18. Correct any discrepancies noted during this inspection prior to returning engine to service.

NOTE...IO-550-A, B & C engines with the altitude compensating type fuel pump must be test flown every 100 hours or annual inspection and anytime an adjustment is made to the fuel injection system. The test flight must be accomplished in accordance with chapter 22, "Test Flight."

### **300-HOUR INSPECTION**

In addition to the items listed for 100-hour inspections, perform the following inspection and maintenance every 300 hours of engine operation.

Remove and clean all fuel nozzles by soaking in lacquer thinner, acetone or methyl ethyl ketone (MEK). Fuel nozzles must be cleaned every 300-hours and annual inspection.

### **500-HOUR INSPECTION**

In addition to the items listed for 100-hour inspections, perform the following inspections and maintenance every 500 hours of engine operation.

1. Magnetos require a thorough, detailed inspection. Refer to the applicable service and overhaul information published by the manufacturer of the magneto. Magnetos must be overhauled or replaced at the same intervals as the engine. TCM magnetos must be overhauled or replaced every four years regardless of total operating hours since last overhaul or replacement.
2. Engine mounted accessories not supplied by TCM such as alternators, stand-by generators, etc., may require servicing at specific intervals. Refer to the instructions provided by the aircraft manufacturer, accessory manufacturer or STC holder for detailed information.
3. TCM gear driven alternators require inspection and testing at 500-hour intervals. Refer to the applicable alternator manufacturer's instructions. See "Related Publications" in the Introduction section of this manual.

### **ANNUAL INSPECTION**

Perform all requirements of 25, 50, 100, 200, 300 hour and any calendar inspections due. Comply with any 500 hour inspections that will come due before the next regularly scheduled maintenance event.

## **5-5 UNSCHEDULED MAINTENANCE**

Unscheduled maintenance events include but are not limited to:

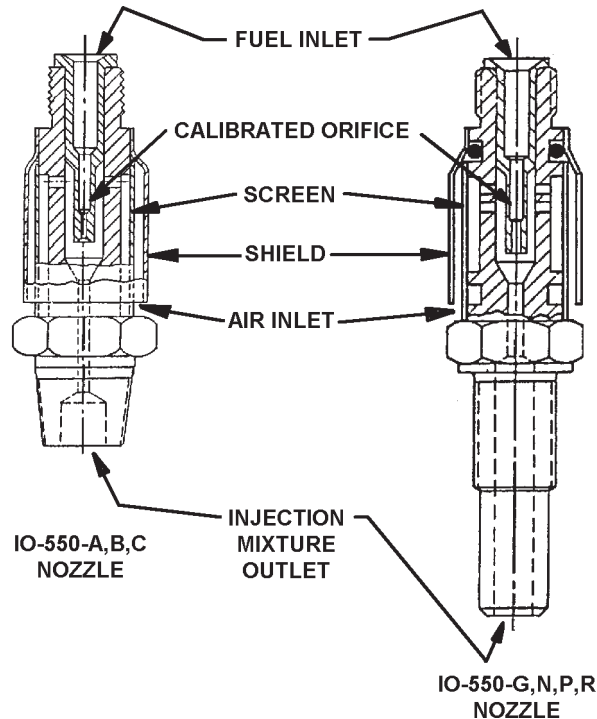
### **PROPELLER STRIKES**

A propeller strike is any incident, whether or not the engine is operating, that requires repair to the propeller or any incident while the engine is operating in which the propeller makes contact with any object that results in a loss of engine RPM. Propeller strikes against the ground or any object, can cause engine and component damage even though the propeller may continue to rotate. This damage can result in engine failure.

When the propeller is damaged by a small object during operation, such as a small stone, inspection and repair must be accomplished in accordance with the propeller manufacturer's published instructions. Any time damage from an object strike requires propeller removal for repairs the incident is considered a propeller strike.

Following any propeller strike a complete engine disassembly and inspection is mandatory and must be accomplished prior to further operation. Inspect all engine accessories in accordance with the manufacturer's instructions.

retains the diaphragm loading spring. When the plunger is down in the body bore, fuel passages to the nozzles are closed off. The plunger is drilled for passage of fuel from the diaphragm chamber to its base and the valve within the plunger. As fuel flow increases pressure overcomes diaphragm spring tension causing the plunger to move to the open position and fuel flows from manifold valve outlets through fuel lines to the fuel nozzle assemblies.



**FIGURE 13-10. FUEL NOZZLE GENERAL DESCRIPTION**

**13-9 Fuel Nozzle (See Figure 13-10)**

The fuel discharge nozzle is located in the cylinder head. The nozzle outlet is screwed into the tapped fuel nozzle hole in the cylinder head. The nozzle body has a drilled central passage with a counterbore at each end. The lower end is the fuel outlet. The upper bore contains a removable jet for calibrating the nozzles. Near the top, radial holes connect the upper counterbore with the outside of the nozzle body for air admission. These holes enter the counterbore above the orifice and draw outside air through a cylindrical screen fitted over the nozzle body which keeps dirt and foreign material out of the interior of the nozzle. A press-fitted shield is mounted on the nozzle body and extends over the greater part of the filter screen, leaving an opening near the bottom. This provides both mechanical protection and an air path .

Nozzles are calibrated in several ranges and all nozzles furnished for one engine are of the same range identified by a letter stamped on the hex of the nozzle body.



17. Remove all protective covers from fuel lines and hoses, and reinstall fuel lines to the manifold valve. Insure that B-nut threads are clean and free of damage.
18. Torque fuel line to nozzle nuts to 40 - 45 inch pounds. Torque fuel line to manifold valve nuts to 55 - 60 inch pounds.
19. Torque fuel inlet hose "B" nut and fuel pressure sensing line "B" nut to manifold valve elbows in accordance with Table 2, "Torque Specifications For Hose Fittings."
20. Reinstall removed airframe components in accordance with airframe manufacturer's instructions.
21. After all requirements of scheduled maintenance have been performed and prior to any engine operation, a complete fuel system leak check must be performed in accordance with the aircraft manufacturer or STC holder's information.

### **Fuel Nozzle Removal, Cleaning and Replacement**

1. Remove cowling and any airframe accessories that may obstruct access to the fuel nozzles in accordance with the airframe manufacturer's instructions
2. Loosen and remove the fuel line from the fuel injector nozzle assembly.
3. Loosen and remove the fuel nozzle.
4. Clean nozzle by soaking in lacquer thinner, methyl ethyl keytone or acetone for several hours.
5. If a nozzle is obstructed and cannot be cleaned by solvent action, it must be replaced with a new nozzle.

*CAUTION...Do not attempt to clear nozzle obstruction with wire.*

6. Apply TCM 646943 antiseize lubricant to cylinder end of nozzle threads in accordance with Figure 13-14B. Reinstall the nozzle and torque to 55 - 65 inch pounds.
7. Install fuel line on nozzle.
8. Torque the fuel line "B" nut to 40 - 45 inch pounds.
9. Reinstall all airframe supplied accessories and cowling in accordance with the airframe manufacturer's instructions.
10. After all requirements of scheduled maintenance have been performed and prior to any engine operation, a complete fuel system leak check must be performed in accordance with the aircraft manufacturer or STC holder's information.