Table 6-28. 50-Hour Engine Inspection Checklist

Engine Model Number: _____ **Engine Serial Number:** _____

Total Time Engine has been in Service: _____

Time Since Major Overhaul (TSMOH): _____ **Engine in Storage?** _____

Date Inspection Performed: _____ **Inspection Performed by:**_____

Complete the 50-hour inspection according to the instructions referenced in the table, heeding all warnings, cautions and notes. Initial the block beside the procedure upon completion. Note discrepancies in the Inspector Comments or Remarks sections.

Inspection Item	Initials	Inspector Comments
Oil Consumption and Trend Monitoring		
Collect oil sample (Section 6-4.8.4) and Establish Oil Analysis Profile (Section 6-4.8.5)		
Oil Analysis Laboratory used?		
Date of last oil sample analysis:		
Silicone content of last sample:		
Oil consumption quantity noted during oil change:		
Is oil consumption excessive? ❑Yes ❑No		
"Visual Inspection" (Section 6-4.6)		
Oil and Filter Change (Section 6-4.8.2)		
"Induction System Inspection" (Section 6-4.14)		
"Induction System Drain Inspection" (Section 6-4.20)		
For specified turbocharged engines only, lubricate the wastegate butterfly valve (Section 6-4.21) and clean the turbocharger oil supply check valve (Section 6-4.21.1)		
Engine Run (Section 7-3.2)		
•Idle RPM:		
•Idle Mixture Cutoff Rise		
•Acceleration		

Remarks:

Approval Block:

Checklist Page 1 of 1

6-4.6. Visual Inspection

Frequency

- Begin any service interval with a visual inspection

Procedure

1. Verify the engine nacelle is clean and free of fuel leaks, oil leaks, dirt and debris.
2. Inspect all fuel and oil lines for signs of chafing.
3. Inspect the oil cooler and oil filter (or screen) for signs of leaks and physical discrepancies.
4. Check the following on the engine for cracks, dents, pitting or physical damage:
   a. External cylinder barrels
   b. Cylinder barrel fins
   c. Areas between and adjacent to the cylinder barrel fins.
   d. External surfaces of the cylinder head, including areas around
      1) Cylinder head fins
      2) Top and bottom spark plug bosses
      3) Fuel nozzle bosses
      4) Crankcase external surfaces
      5) Accessories
      6) Support structures adjacent to accessories

   NOTE: If cylinder discrepancies are discovered during the visual inspection, perform the "Cylinder Inspections" in Section 6-4.11.
5. Check security of engine and accessory wiring harnesses, including ignition leads. Check for signs of thermal breakdown, chafing, deterioration or improper routing.
6. Replace broken or damaged cushion clamps and stressed or broken wire ties.
7. Check magnetos for external damage, cracks and mounting security. Ensure the ignition plate is securely fastened to the magneto and the harness is properly routed.
8. Inspect external drive belts for nicks, cracks and visible wear; replace belts exhibiting nicks, cracks, or visible wear. Check belt tension and adjust, as required according to instructions in Section 6-4.10.4.
9. Inspect the exposed area of the crankshaft between the crankshaft nose oil seal and the propeller flange for evidence of corrosion. If corrosion is detected, use a Scotch-Brite® pad and a no-corrosive soap solution to remove surface corrosion.
   a. If the cleaning process eliminated the corrosion and no evidence of pitting exists, apply a generous coat of silver or aluminum paint according to the paint manufacturer's instructions to the exposed portion of the crankshaft to prevent further corrosion.

b. If cleaning is unsuccessful (suspected corrosion has advanced to pitting), disassemble the engine and replace the crankshaft.

10. Check electrical connectors for signs of corrosion or contamination; if external corrosion or contamination is discovered, disconnect the connectors and inspect the internal pins for corrosion or contamination.

11. Inspect installed accessories for proper mounting and security. Inspect brush holders for soot accumulation. If large amount of soot is present, inspect brushes (Section 6-4.22).

    NOTE: For items 12 - 16, inspect for obvious signs of physical damage, wear or deterioration, loose or missing hardware, leaks or foreign material that may hinder normal operation. Correct any discrepancies.

12. Inspect the physical security of the fuel system.

13. Inspect the physical integrity of the induction system airbox, ducts, seals and gaskets.

14. Inspect the physical integrity of the lubrication system.

15. Inspect the physical integrity of the turbocharger and exhaust system.

    a. Inspect the stacks, risers, elbows and transitions for burns, cracks or leaks.

    b. Inspect turbocharger and exhaust system hardware and joints for stress.

    c. Inspect slip joints for leaks, bulges, cracks, deformation, or hot spots.

    d. Inspect multi-segment V-band clamp spot welds (or rivets) for cracks or physical damage.

        1) Inspect the corner radii of clamp inner segments for cracks with a flashlight and inspection mirror.

        2) Inspect the V-band clamp outer band for flatness, especially within two inches of spot-weld tabs that retain the T-bolt fastener variance must be less than 0.062 in.

    e. Inspect the heat exchanger, if installed, seams, joints and transition slip joints for evidence of leakage or cracks using a mirror or flexible borescope. Replace any heat exchanger assembly that exhibits cracks or is suspected of leaking.

16. Repair any observable damage or deficiency before the aircraft is returned to service. Refer to Chapter 10, Non-Overhaul Repair and Replacement Procedures.

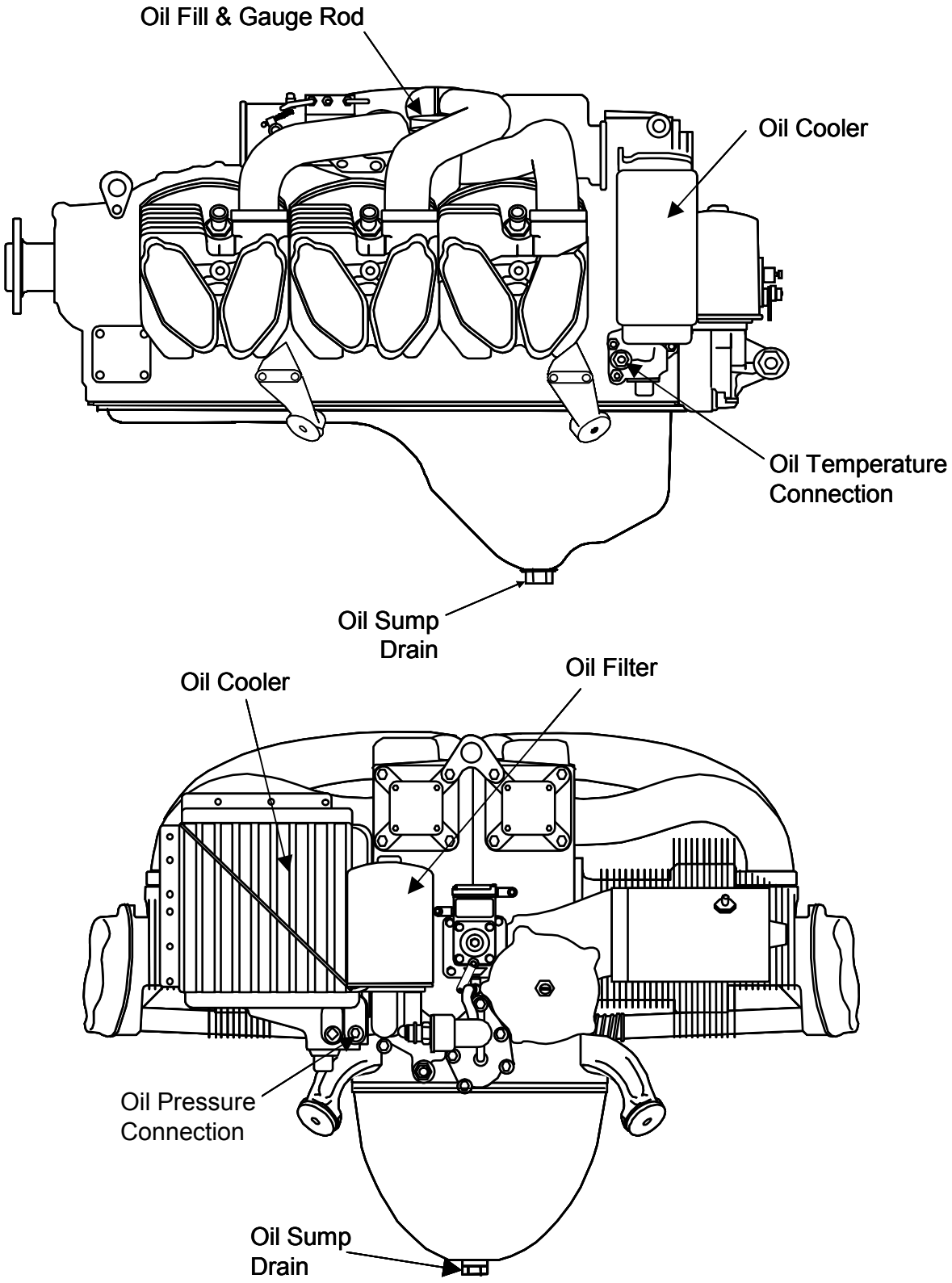
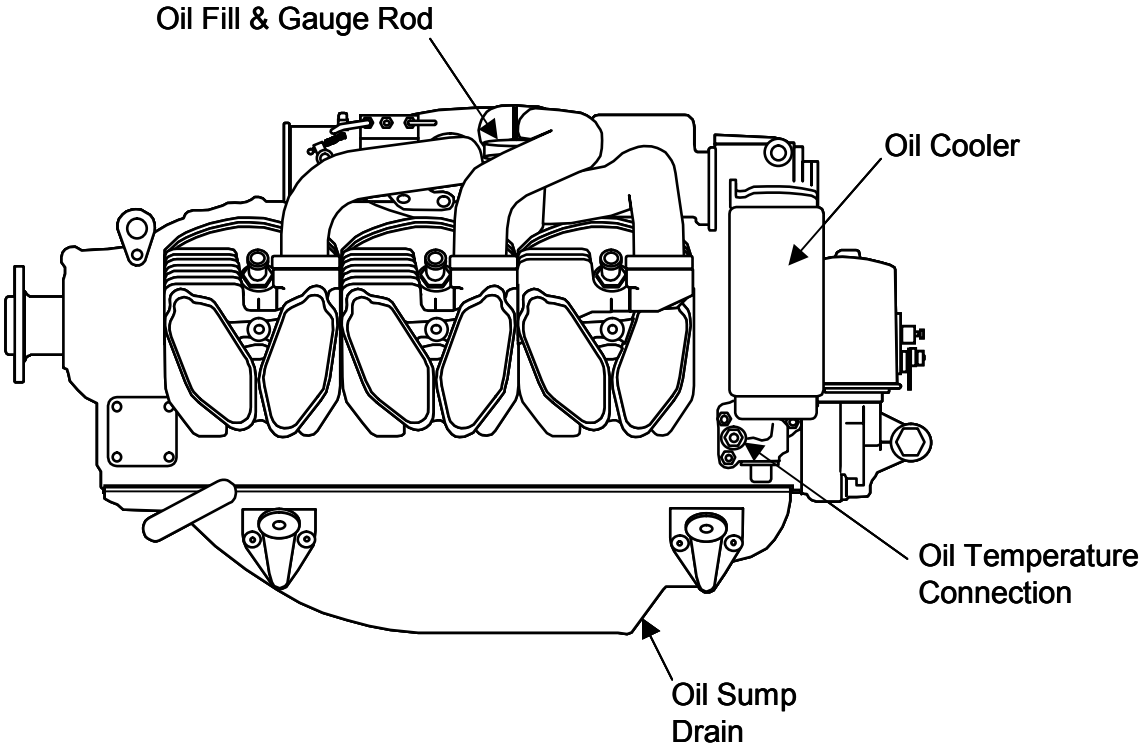


Figure 6-20. IO-550-P Oil Servicing Points



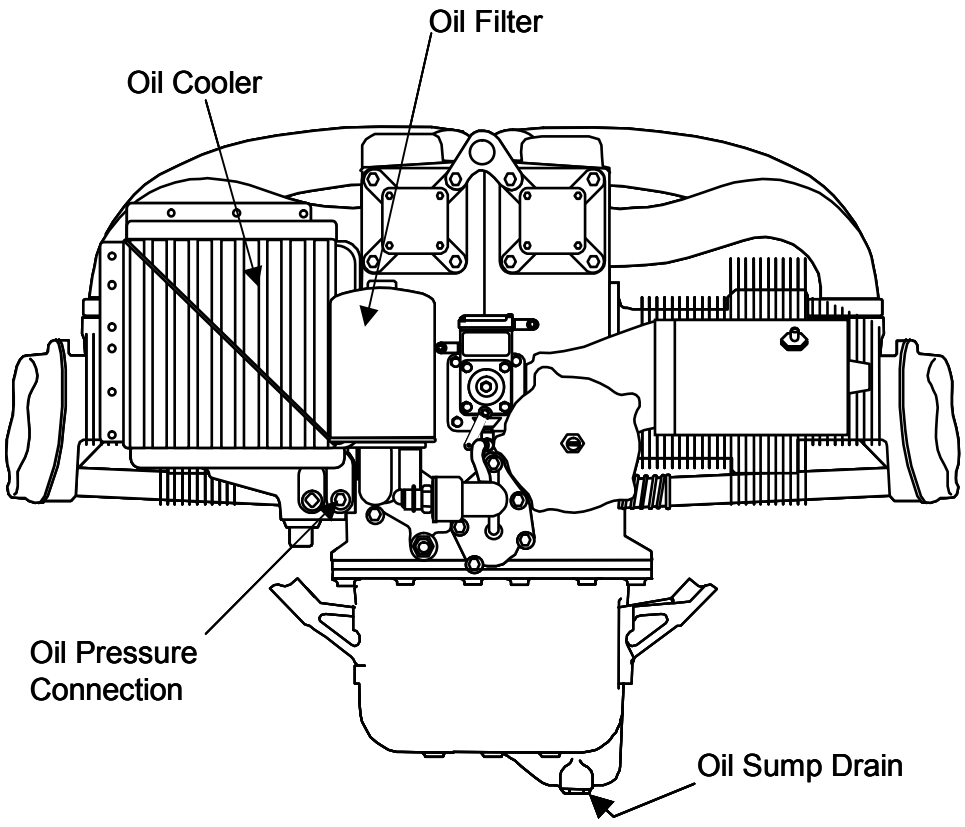


Figure 6-21. IO-550-R Oil Servicing Points

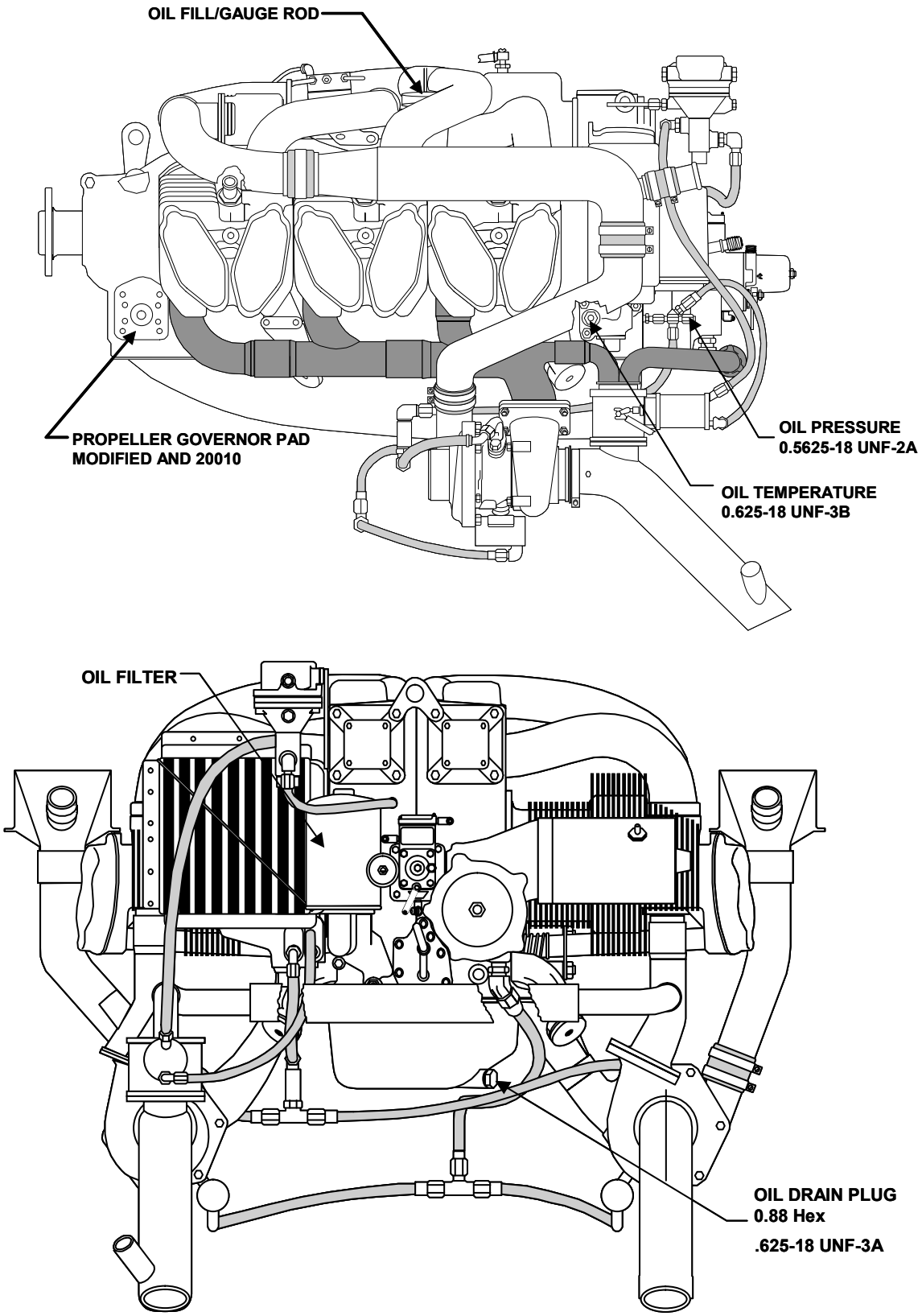


Figure 6-22. TSIO-550 Oil Servicing Points (typical)

6-4.8.2. Oil Change

Perform an oil change within 30 minutes of engine shutdown (to obtain a useful oil sample) according to the oil changes intervals specified in Section 6-2.

NOTE: More frequent oil changes are recommended under extreme usage (flight training, shuttle service, or crop dusting) or adverse (desert or arctic climates) weather conditions.

Procedure

1. Place a catch basin, approved for collecting oil, beneath the oil sump. Remove the oil sump drain plug (Figure 6-7 through Figure 6-22), or quick drain fitting, and drain the oil into the catch basin.
2. Collect an oil sample according to the "Oil Sample Collection" instructions in Section 6-4.8.4. Inspect the oil sump drain plug for evidence of wear material. Metal fragments on the drain plug may indicate excessive wear or part disintegration. Evidence of bronze in the oil sump suggests piston pin bushing loss. Remove the cylinders and inspect the piston pin bushings for proper installation according to instructions in Section 10-10.

   CAUTION: Dispose of used engine oil in accordance with local environmental standards.

   NOTE: Continental Motors recommends customers submit a sample of the oil drained during each oil change, or if engine trouble is suspected, for spectrographic oil analysis. The first three samples establish the oil analysis trend baseline.

   The amount of wear material present in new, rebuilt, or overhauled engines is typically greater during the engine break in period, tapering off during subsequent oil changes. If the amount of wear material does not decrease during subsequent oil changes, note the wear material characteristics (refer to Section 6-4.8.5, "Oil Trend Monitoring and Spectrographic Oil Analysis") and troubleshoot the engine according to instructions in Chapter 8.
3. Oil Filter or Integral Screen Change
   Engines covered in this manual are equipped with either a screw-on, disposable oil filter or an integral screen (Figure 6-23). Maintenance pertaining to the filter media is listed in the "Engine Inspection and Maintenance Schedule" in Section 6-2. To change disposable filters, follow the instructions in step a; for the integral screen, follow the instructions in step b.
   a. Remove the oil filter (Figure 6-8 through Figure 6-22).Cut the oil filter in two parts using an Oil Filter Can Cutter (P/N CT-923 (Table 2-1, "Special Tools List")).
      1) Inspect the oil filter element for metal debris trapped within the filter to assess the engine condition. If debris is found, wash the filter media in a clean glass container to determine content. Use a magnet to differentiate the ferrous materials from non-ferrous particulate.

2) New, rebuilt, or overhauled engines exhibit more wear material during the break-in period; material found in the filter media will diminish over time. If wear material in the oil filter does not diminish, or increases, note the characteristics of the wear material (Section 6-4.8.5, "Oil Trend Monitoring and Spectrographic Oil Analysis") and troubleshoot the engine according to instructions in Chapter 8.

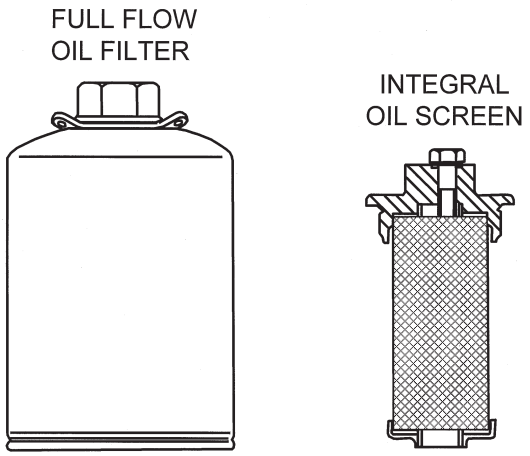


Figure 6-23. Disposable Oil Filter and Integral Screen

b. If the engine is equipped with an integral oil screen (Figure 6-23), cut the safety wire from the oil screen and remove the fastening hardware. The integral screen is not disposable, rinse the integral screen with mineral spirits over filter paper to clean the media. Use a magnet to differentiate the ferrous materials from non-ferrous particulate.

4. Install the oil filter or screen. For disposable filters, follow the instructions in step a; for the integral screen, follow the instructions in step b.

   a. Apply a thin coating of Dow Corning DC-4 compound to the oil filter gasket to prevent gasket material sticking to the mating surface. Install the new oil filter; torque the filter to Appendix B specifications and safety wire the filter according to instructions in Section C-3.

   b. After thorough cleaning, install a new copper gasket on the oil screen flange and install the oil screen in the oil pump, or oil screen adapter. Place a new copper gasket on the plug (or oil temperature sensor provided by aircraft manufacturer) and thread the screen (or plug) in to the housing. Torque to Appendix B specifications and safety wire according to instructions in Appendix C-3.

5. Reinstall the oil drain plug with a new crush gasket; torque the drain plug to Appendix B specifications and safety wire the drain plug according to instructions in Section C-3.

6. Add fresh oil and check the oil level according to instructions in Section 6-4.8.1.

7. Check for oil leaks according to instructions in Section 6-4.8.3.

6-4.8.3. Check for Oil Leaks

WARNING

Keep the engine compartment, nacelle, and fuselage adjacent to the nacelle clean to enable detection of oil leaks.

Procedure

1. Perform a normal "Engine Start" according to instructions in Section 7-3.2 and "Ground Run-up" according to Section 7-3.3 to allow the engine to warm to normal operating temperatures. Document engine oil pressure and temperature.
2. Shut down the engine according to the "Engine Shutdown" instructions in Section 7-3.4.
3. Check the engine nacelle, engine compartment, and adjacent area for oil leaks. If leaks are found, determine the source and correct the cause of the leak(s).
4. Check the oil level in the sump according to Section 6-4.8.1, "Check and Replenish Engine Oil Level."

6-4.8.4. Oil Sample Collection

Oil samples may be collected during the oil change procedure, before new oil is added or between oil changes. The oil sample must be taken after the engine has been operated within normal operating limits (See Engine Specifications and Operating Limits in primary ICA (**Ref: Section 1-1.1**)), including normal cruise and maximum power settings for at least 30 minutes.

NOTE: Collect oil samples within 30 minutes of engine shutdown.

Procedure

1. Clean any dirt or debris from around the oil sump drain plug.
2. Use the following sample collection devices:
   a. Sampling tube and/or funnel
   b. Sample vial

   NOTE: Oil sampling equipment must be clean and free of debris, foreign material, or residue to ensure sample integrity and accurate analysis.
3. Collect oil from one of the following sample collection locations consistently according to the Oil Analysis Laboratory's oil sampling kit instructions:
   a. Midstream of the oil drain flow after 1/3 of the oil has drained from the oil sump.
   b. From the oil fill port, at least 2 to 3 inches above the bottom of the oil sump.

   NOTE: Never take an oil sample from the bottom of the oil sump or the oil filter canister.
4. Fill the oil sample tube or vial 3/4 full and tighten the cap.
5. Label the oil sample vial with the date the sample was taken, the serial number of engine it was taken from, and the submitter's name and company.

NOTE: Duplicate oil samples, submitted to different oil analysis laboratories will render an equal number of different reports. Establish a rapport with one laboratory and use it consistently for meaningful trend analysis.

6. Submit the oil sample for analysis. The following laboratories provide thorough, detailed oil analysis and reporting:

Aviation Oil Analysis 3319 W. Earll Drive Phoenix, AZ 85017	Aviation Laboratories 910 Maria Street Kenner, LA 70062

6-4.8.5. Oil Trend Monitoring and Spectrographic Oil Analysis

Spectrographic oil analysis identifies concentration, in parts per million (PPM), of wear material in an oil sample (see Section 6-4.8.4) collected during an oil change. Analysis begins with the first oil change sample, and continues with successive oil changes. The first samples establish a baseline. Subsequent samples, taken over time, establish trends. These trends help determine if wear material is deviating from the baseline. (Establishment of the baseline and ensuing wear trends assume analysis is done by the same laboratory using the same method of analysis.)

Spectrographic oil analysis results will vary for reasons exclusive of engine condition. Chemical composition of engine oils vary by manufacturer. For consistent, meaningful analysis, service the engine with the appropriate grade of aviation engine oil from the same manufacturer, collect engine oil samples at regular intervals and submit the samples to the same laboratory for analysis.

6-4.13. Engine Mount Inspection

Frequency

During 100-hour/Annual inspection

Procedure

1. Inspect engine mounts for signs of cracks, deterioration, proper assembly and security. If cracks are suspected, perform a nondestructive inspection using fluorescent penetrant or eddy current methods to determine engine mount condition.
2. Inspect engine mount isolators for signs of deterioration, proper assembly and security. Replace engine mount isolators exhibiting any of these conditions.

WARNING

Do not allow a cracked engine mount to remain in service. Replace upon discovery.

3. Replace damaged or deteriorated engine mounts or engine mount isolators.

6-4.14. Induction System Inspection

Purpose

Check the integrity of the air filter, seals, and airbox to prevent particulates from entering the engine that can abrade cylinder walls and ring faces thereby damaging the engine.

Frequency

During 100-hour/Annual inspection

Procedure

1. Remove and inspect the induction air filter for cleanliness, normal operation and the absence of gaps or leaks in the filtering element. Verify the air filter seal prevents airflow except through the filter. Inspect or replace, as required, according to the aircraft manufacturer/STC holder's instructions.
2. Verify the integrity of the airbox; look for alternate air circuits which can bypass the filtering system. Any holes or bypass circuits found behind the filtering element should be repaired, as required, according to the aircraft manufacturer/STC holder's instructions.
3. Verify operation of the alternate air door and the integrity of the seal in the closed position. Verify the door operating mechanism closes securely. Replace or repair, as required, according to the aircraft manufacturer/STC holder's instructions.
4. If oil analyses are done on engine oil samples, check the silicone content of the most recent oil analysis and the overall silicone trend to further assess the possibility of Induction System leaks or pilot operational issues such as extensive use of carburetor heat or alternate air during ground operation.
5. Inspect the induction tube and hose connections to verify proper installation. Induction tubes incorporate a “bead” (Figure 6-89) which provides an anchor point for the induction tube clamps and enhances the seal between the induction tube and hose. Remove, inspect and install induction system according to instructions in the applicable Maintenance and Overhaul (or Overhaul) Manual if induction tubes,

hoses or clamps are improperly installed or inspection identifies parts as unserviceable.

a. Visually inspect the induction system clamps for proper fit and positioning. Clamps should be positioned squarely over the joint between the induction tubes and hose (Figure 6-89), inboard of the induction tube bead; no part of the end of the induction tube should be visible with the hose and clamp properly installed. Loosen the clamps, reposition, and torque the clamps 25-35 in. lbs. If the clamp will not tighten or remain torqued, the clamp is unserviceable - replace the clamp.

b. Perform a visual inspection on the induction hoses for proper fit and positioning. Hoses should be flexible; splits, tears, or cracks are unserviceable conditions. Replace cracked, split, or torn induction hoses. Hoses should not exhibit “twists” from misalignment, which can cause stress cracks. Hoses must be positioned over the induction tubes to secure the induction tube beads within the clamped portion of the hose.

c. Perform a visual inspection on the induction tubes. Replace tubes exhibiting deep scratches, dents, cracks, or eroded sealing beads.

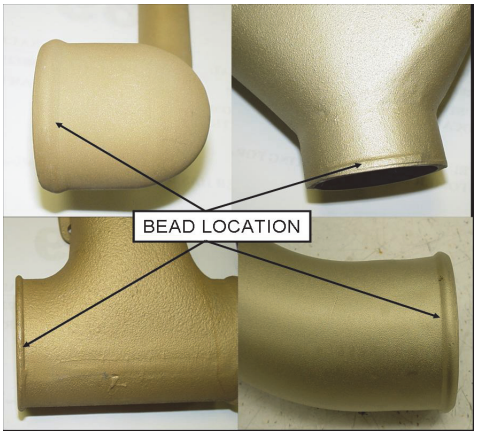
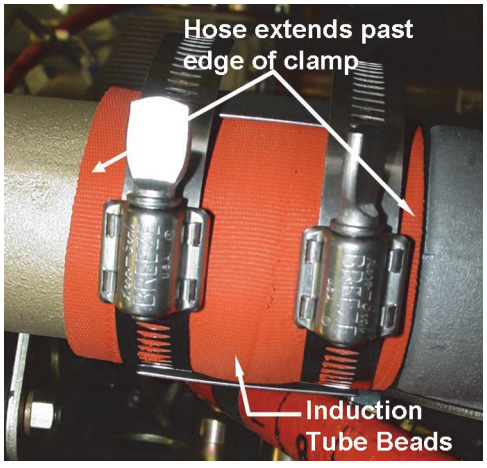


Figure 6-89. Induction Tube Bead Location



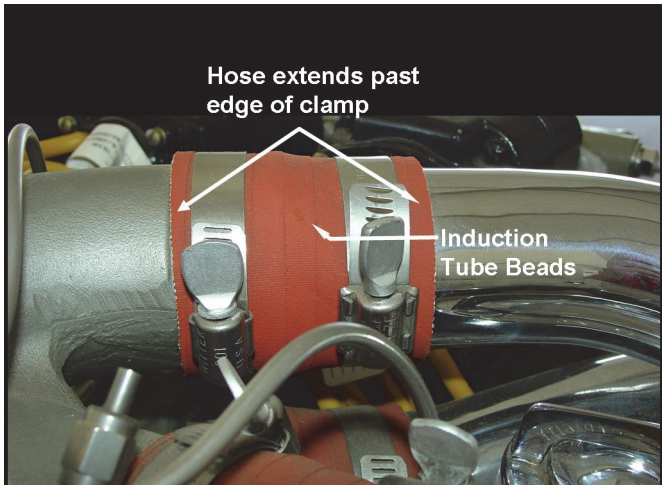


Figure 6-90. Properly Installed Induction Tube, Hose and Clamps

6-4.20. Induction System Drain Inspection

NOTE: This inspection only applies to fuel injected engines. Engines with carburetors do not offer induction system drains.

Induction system drains are incorporated on all engines featuring cross-flow (induction tubes above) cylinders. Engine models with updraft induction (below the cylinder) incorporate drains in the induction tubes to allow excess fuel to drain from the induction system. A check valve is incorporated in the induction drain to isolate the fuel in the induction system when the intake valve opens. Naturally aspirated engines use a two-way check valve. Because the induction system on turbocharged engines can operate in a negative pressure state, a three-way check valve is required for the turbocharged induction. An improved drain connector (Figure 6-95) was introduced in 2000 for improved cold weather starting characteristics. If the cylinder drain terminates at the taper (Part No. 632068), the drain connector is no longer available, replace with Part No. 655742, or later, if unserviceable, or to improve cold weather operation.

Purpose

Induction system drains evacuate excess fuel from the intake ports. Restricted induction system drains can accumulate excessive amounts of fuel and may cause hydraulic lock.

Frequency

During all periodic inspections

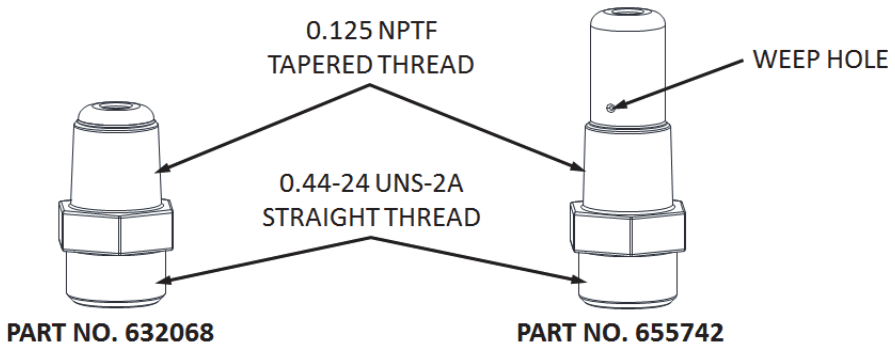


Figure 6-95. Induction Port Drain Connectors

Procedures

6-4.20.1. Induction System Drain Inspection (Naturally aspirated engines)

1. Remove the aircraft cowling according to the aircraft manufacturer's instructions.
2. At each 100-Hour/Annual Inspection, remove the connectors (Figure 6-95) from the cylinder head and clean according to the instructions in Section 10-3.1 and install serviceable, or new connector fittings in each cylinder according to the instructions in Section 10-3.2.
3. Connect a section of clear, fuel rated hose to the aircraft fuel drain outlet.

WARNING

Vacuum pumps are commercially available from a number of sources. Use only a spark-arrested vacuum pump, designed for use with flammable liquids.

4. Apply light vacuum (< -5 psi) from a spark-arrested source rated for flammable liquids to the clear hose connected to the aircraft fuel drain outlet and activate the aircraft engine fuel priming system for five seconds.
   RESULT: Fuel drains from the hose into the container.
5. Apply light positive pressure (< 5 psi) from a spark-arrested source rated for flammable liquids to the clear hose connected to the aircraft fuel drain outlet and activate the aircraft engine fuel priming system for five seconds.
   RESULT: Drain valve is closed - no fuel flows into the clear hose.
6. Remove air pressure source from the fuel drain hose. Allow the fuel in the hose to drain into a fuel rated container.
   RESULT: Fuel drains from the hose into the container.

6-4.20.2. Induction System Drain Inspection (Turbocharged engines)

1. Remove the aircraft cowling according to the aircraft manufacturer's instructions.
2. At each 100-Hour/Annual Inspection, remove the connectors (Figure 6-95) from the cylinder head and clean according to the instructions in Section 10-3.1 and install serviceable, or new connector fittings in each cylinder according to the instructions in Section 10-3.2.
3. Connect a section of clear, fuel rated hose to the cylinder drain hose.

WARNING

Vacuum pumps are commercially available from a number of sources. Use only a spark-arrested vacuum pump, designed for use with flammable liquids.

4. Apply light vacuum (< -5 psi) from a spark-arrested source rated for flammable liquids to the clear hose and activate the aircraft engine fuel primer system for five seconds.
   RESULT: No fuel flows into the clear hose.
5. Remove the vacuum source from the drain and allow the residual fuel to drain in to a fuel rated container.
   RESULT: Fuel drains from the hose into the container.
6. Apply light pressure (< 5 psi) from a spark-arrested source rated for flammable liquids to the clear hose and activate the aircraft engine fuel primer system for five seconds.
   RESULT: No fuel flows into the clear hose.
7. Remove air pressure source from the cylinder drain hose. Allow the fuel in the hose to drain into a fuel rated container.
   RESULT: Fuel drains from the hose into the container.

6-4.21. Turbocharger and Exhaust System Inspection

Purpose

Verify the integrity of the turbocharger and exhaust system, including the heater muff (if installed). Isolate and correct cracks or leaks in the exhaust system.

Frequency

During 100-hour/Annual inspection

CAUTION: Ensure the turbocharger and exhaust system components are cool before inspection to prevent burns.

Procedure

1. Remove airframe items that hinder visual inspection of the exhaust and turbochargers.
2. Clean the exhaust system, removing oil and grease, by spraying the exhaust systems parts with Stoddard solvent. Allow the solvent to drain and wipe the parts with a clean cloth.

   CAUTION: Cracks in the exhaust system can release carbon monoxide in the nacelle or the cabin; correct exhaust leaks before further flight.

3. Inspect the exhaust system components according to the instructions in Table 6-24.

Table 6-24. Exhaust Inspection Criteria

Part	Inspection Action
Stacks Risers Elbows	Check parts for the following: • Burned areas • Cracks • Loose parts/hardware • Pay particular attention to welded areas and seams, checking for cracks. • Replace parts that are cracked, burned, or worn
Slip joints	Check for bulges, cracks, or hot spots (see Figure 6-96)
Multi-segment V-band clamps	Inspect spot-weld (or rivet) areas for cracks or physical damage. Inspect the corner radii of clamp inner segments for cracks with a flashlight and mirror. Inspect the inner segment spacing. Inspect the clamp outer band for flatness using a straight edge, especially within 2 inches of spot-weld tabs that retain the T-bolt fastener - clearance must be less than 0.062 inches. Verify 100% inner and outer band segment contact. To replace a multi-segment V-band clamp, refer to the primary ICA. Ref: Section 1-1.1
Heater muff	Inspect the heat exchanger seams, joints and transitions with a flashlight and mirror or a flexible borescope for physical damage, cracks, corrosion, and burn-through. Inspect connecting flanges for security and proper mating.

4. Connect a high volume, dust-free, air pressure source to the exhaust tailpipe outlet.
5. Apply five (5) psi of air pressure to the exhaust system.

6. Apply soapy water to the exhaust system and check for bubbling in areas of the exhaust other than the slip joints. If bubbling is found, replace the leaking exhaust components according to the instructions in primary ICA (**Ref: Section 1-1.1**) or aircraft maintenance manual.

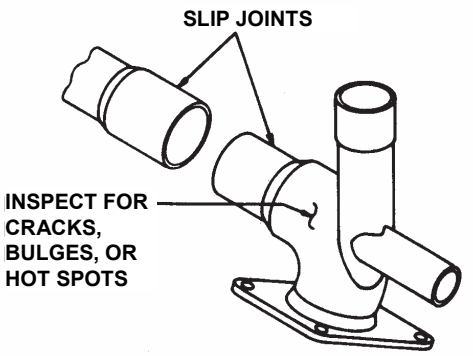


Figure 6-96. Exhaust Slip joint Inspection

WARNING

Exhaust system weld repairs may only be performed by an FAA Part 145 authorized repair station certified to perform the specific repairs.

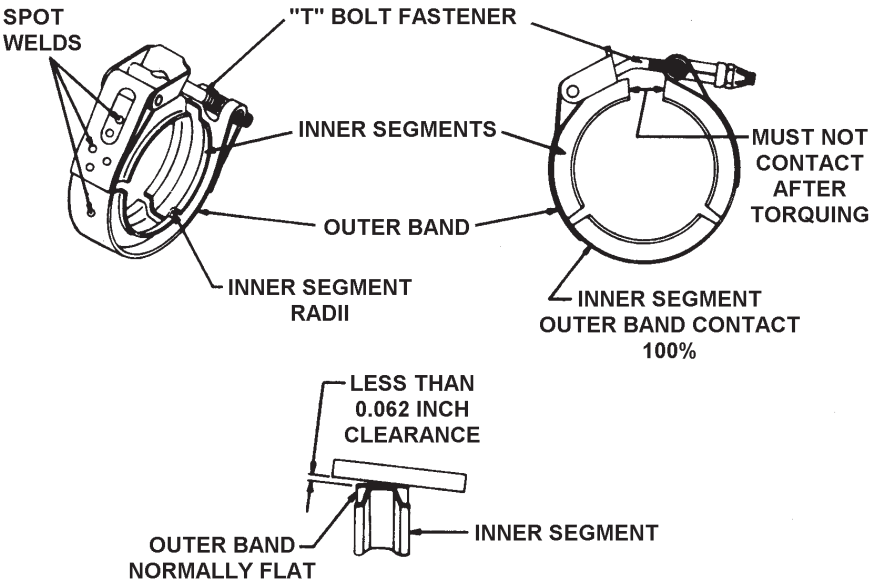


Figure 6-97. V-band Clamp Inspection

7. Visually inspect the exhaust stacks and transition unit for wear, leaks, cracks, or distortion. Replace worn, leaking, cracked, or distorted exhaust parts. Inspect the exhaust manifold connections at the cylinder to verify the physical security of the exhaust flange, gasket and exhaust manifold fasteners. Exhaust system removal and installation procedures may be found in the primary ICA (**Ref: Section 1-1.1**) or the aircraft maintenance manual, if disassembly is required.

8. Remove the multi-segment V-band clamps from the exhaust tailpipes according to instructions in the primary ICA (**Ref: Section 1-1.1**) or the aircraft maintenance manual. Clean the outer band of the multi-segment V-band clamps with crocus cloth. Inspect the V-band clamps according to the instructions in Table 6-24.
9. Inspect the turbocharger oil reservoirs, oil inlet and outlet fittings and surrounding area for signs of leakage. Torque fasteners or fittings to Appendix B specifications or replace leaking parts, as required to remedy leaking reservoirs or fittings.
10. Remove the induction air supply from the turbocharger compressor according to the aircraft manufacturer's instructions. Inspect the induction air supply duct for wear, deformation, cracks or other physical damage; replace, if necessary.
11. Remove the turbocharger compressor discharge duct from the induction system according to instructions in the primary ICA (**Ref: Section 1-1.1**) or the aircraft maintenance manual. Inspect the hardware for wear, deformation, cracks or other physical damage; replace, if necessary.
12. Inspect the turbine and compressor housings for cracks or physical damage, especially at the mounting flanges. If cracks or physical damage is discovered, replace the turbocharger with a new, rebuilt or serviceable unit.
13. Inspect the turbine and compressor wheel blades for damage. If turbine or compressor blades are damaged, replace the turbocharger with a new, rebuilt or serviceable unit.
14. Spin the turbine shaft to check for freedom of movement and end play. If the turbine or compressor blades touch the housing during rotation, if the shaft does not rotate freely, or if the shaft exhibits noticeable "wobble" during rotation, replace the turbocharger with a new, rebuilt or serviceable unit.
15. Inspect the interior of the turbine and compressor housings for oil, indicating oil seal damage or a faulty check valve. If oil is found inside the housing, troubleshoot to isolate cause of oil accumulation.
16. Inspect the wastegate for cracks or physical damage. If the wastegate is cracked or damaged, replace the wastegate with a new, rebuilt or serviceable unit. Inspect the security of the mounting flange fasteners, retorque if fasteners appear loose.
17. Inspect the wastegate actuator fittings for leaks and physical security; retorque loose fittings to Appendix B specifications. If leaks persist, replace O-rings, retorque fittings and repeat leak inspection after a ground engine run. Inspect the wastegate actuator hydraulic hoses for chafing, nicks, cuts or leaks; replace hoses exhibiting these conditions.
18. Inspect the wastegate actuator and butterfly valve for general condition and freedom of movement. Check the link rod pins and levers for wear. If the wastegate actuator, butterfly valve, link rod pins or levers are worn, binding, or damaged, replace the wastegate actuator.

19. Clean and lubricate the butterfly valve and associated linkages:

    a. Inspect fixed wastegate valves according to the instructions in the primary ICA (**Ref: Section 1-1.1**).

    b. For variable wastegate valves resembling the Figure 6-97.1, lubricate the butterfly shaft with Mouse Milk® (see Table 3-5) penetrating lubricant at initial installation and at each 100-hour maintenance interval.

    NOTE: The installed wastegate may be positioned in a manner that differs from the illustration. The fittings used to connect the hydraulic hoses may differ from those depicted in the illustration.

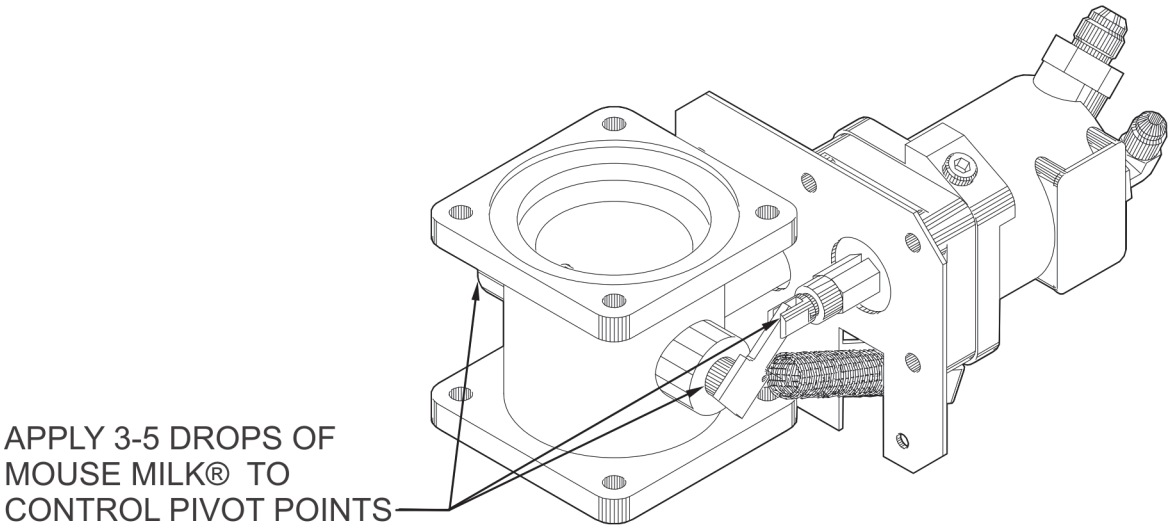


Figure 6-97.1. Typical Wastegate Lubrication Points

20. For applicable engine models: remove, disassemble, and inspect the turbocharger oil supply check valve according to the instructions in Section 6-4.21.1.

procedure continues on next page...

21. Inspect the wastegate controller and fittings for physical condition and security. If the wastegate controller exhibits physical damage, replace the wastegate controller with a new, rebuilt, or serviceable unit. Inspect the wastegate controller hoses, or tubes, for chafing, nicks, cuts or leaks; replace hoses exhibiting these conditions. Inspect the wastegate controller reference hoses or tubes for bends, dents, nicks or leaks; replace reference lines exhibiting these conditions.
22. Inspect the wastegate controller (Figure 6-56) housing for oil leaks around the diaphragm, deck pressure sensing port, oil inlet, oil outlet, or adjustment screw. If oil is leaking from a fitting, remove the fitting and replace O-rings, install and torque the fitting to Appendix B specifications. If oil is leaking from the housing, replace the wastegate controller with a new, rebuilt, or serviceable unit.

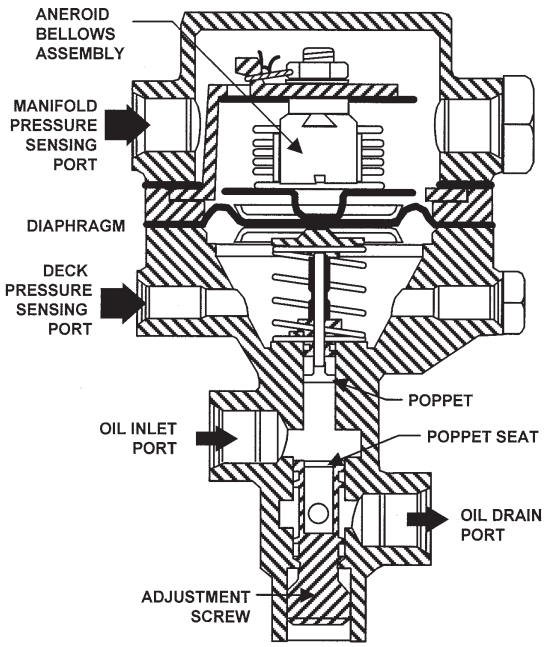


Figure 6-56 repeated for reference (typical sloped controller)

23. Inspect the overboost valve housing for cracks or physical damage; replace cracked or damaged overboost valve assembly with a new, rebuilt or serviceable unit. Remove accumulated debris from the overboost valve exposed bellows assembly shaft (behind the housing flange) and housing according to instructions in the primary ICA (**Ref: Section 1-1.1**). Inspect the mounting flange for fastener security; replace missing fasteners; re-torque loose overboost valve fasteners to Appendix B specifications.
24. Inspect the compressor housing V-band clamp, exhaust housing bolts and lock tabs for security. Torque loose hardware to Appendix B specifications.
25. Reassemble the turbocharger and exhaust system.
    a. Install the induction system air supply according to aircraft manufacturer's instructions.
    b. Install the turbocharger compressor discharge duct and exhaust pipe/heater muff according to the instructions in the primary ICA (**Ref: Section 1-1.1**) or the aircraft maintenance manual.

6-4.21.1. Turbocharger Oil Supply Check Valve Inspection

Applicable Engines: TSIO-520-BE, LB, UB, WB;
TSIO-550-A, B, C, E, G, K, N;
TSIOF-550-D, J, K, P;
TSIOL-550-B, C

The check valve is designed to prevent oil flow from the engine oil cooler to the turbocharger when the engine is shut down. If the check valve does not close properly, or becomes blocked with foreign matter, the check valve may remain open, allowing oil to continuously flow to the turbocharger (usually accompanied by oil puddling below the turbocharger).

Purpose

Inspect, clean and lubricate the check valve.

Procedure

1. Disconnect oil hose from the oil cooler at the check valve.
2. Disconnect check valve (where applicable) from:
   a. hose servicing turbocharger (see Figure 6-97.3), or
   b. tee fitting (Figure 6-97.4).

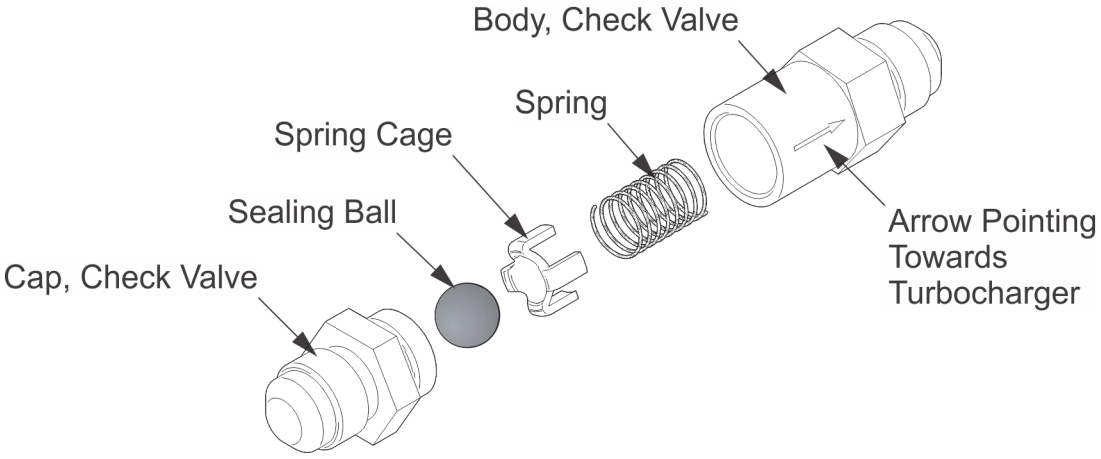


Figure 6-97.2. Check Valve Detail Illustration

3. To disassemble the check valve (see Figure 6-97.2), unscrew the check valve cap from the check valve body. Remove the sealing ball, spring cage, and spring.

   CAUTION: Do not use metal cleaning tools such as brass or wire brushes or steel wool to clean the check valve.

4. In a clean container, clean check valve and all components with mineral spirits.

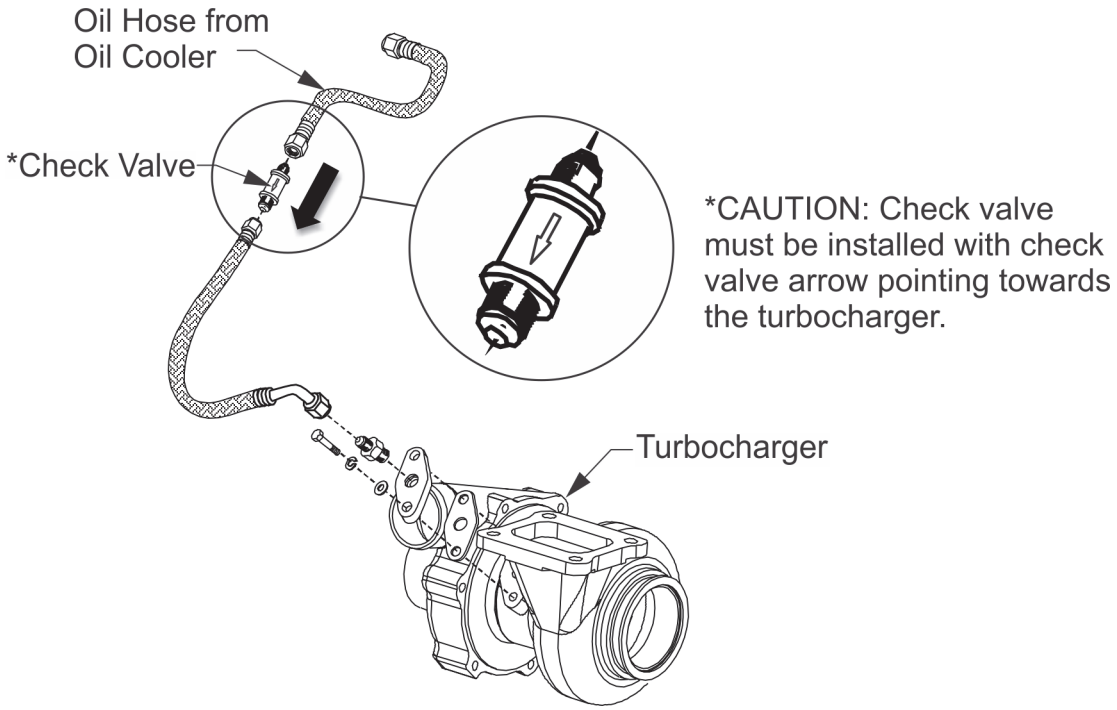


Figure 6-97.3. Single Turbocharger Lubrication (check valve location, typical)

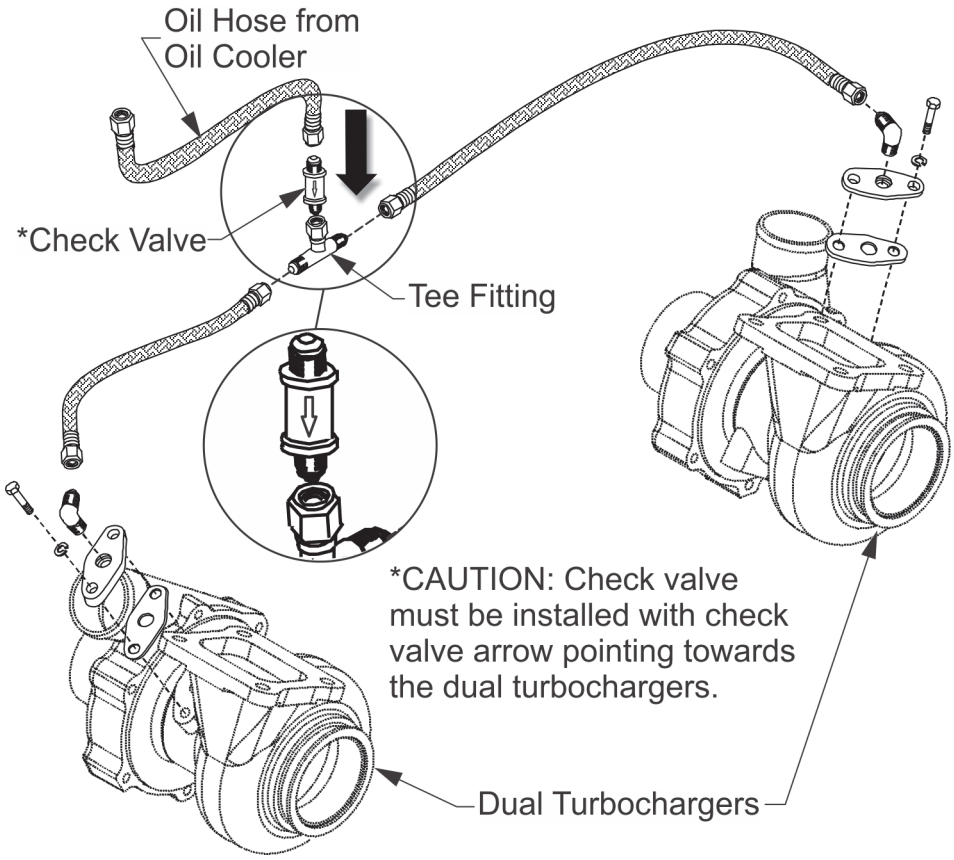


Figure 6-97.4. Dual Turbocharger (check valve location, typical)

5. Completely dry the body of the check valve with compressed air.
6. Inspect the check valve and all components for debris, corrosion, or physical damage. If damage is found, replace the entire check valve according to the Maintenance and Overhaul Manual instructions. If no damage is found, proceed to next step.
7. Apply a light coating of 50-weight aviation oil to all components and threads of check valve body and cap.

   CAUTION: Do not force or cross-thread the check valve cap into the check valve body. Misaligning the internal components could cause the check valve to malfunction and hinder turbocharger lubrication.

8. Assemble the check valve (see Figure 6-97.2, for correct orientation):
   a. Stack the spring, spring cage, and sealing ball and properly seat these internal components in the check valve body.
   b. Insert the check valve cap squarely over the check valve body and tighten until the sealing surfaces make finger tight contact.

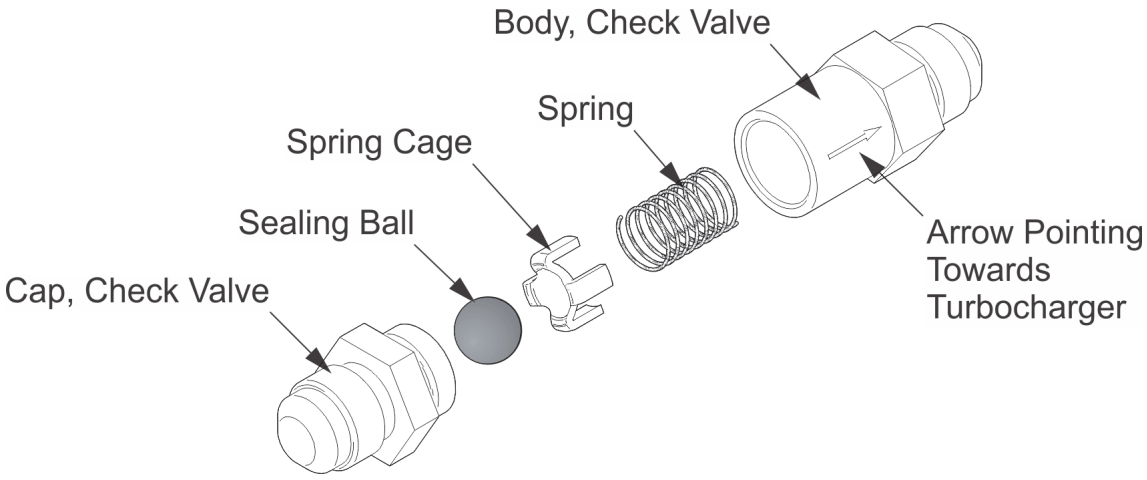
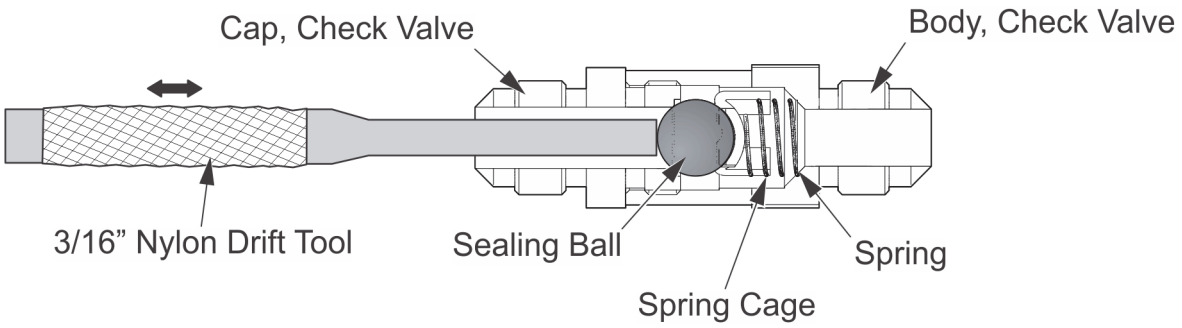


Figure 6-97.2 repeated for reference

CAUTION: Do not use sharp metal tools to verify movement of internal components, as it may damage the check valve's operation.

   c. Carefully insert a clean 3/16" nylon (or equivalent) drift tool into the check valve (as shown in Figure 6-97.5). Use light pressure to verify free, unobstructed movement of the internal components. Normal travel is approximately 0.06 inch.



Note: Gently insert drift tool and verify free movement of internal components

Figure 6-97.5. Check Valve Functional Check

d. Torque the check valve cap and body to 100-150 in.-lbs and repeat step 8, c.

CAUTION: Check valve must be installed with the check valve arrow pointing towards the turbocharger (see Figure 6-97.3 or Figure 6-97.4). If the check valve is installed improperly it will cause the check valve to malfunction and prevent turbocharger lubrication.

9. Connect check valve (with the check valve arrow pointing towards the turbocharger) to:

   a. hose servicing turbocharger and torque to 150-195 in.-lbs. (reference Figure 6-97.3), or

   b. tee fitting and torque to 150-195 in.-lbs. (reference Figure 6-97.4).

10. Connect the oil hose from the oil cooler to the check valve and tighten nut finger tight. Torque hose fittings to 150-195 in.-lbs.

11. Replenish engine oil levels according to the instructions in Section 6-4.8.

12. Perform a “Ground Run-up”; check for oil leaks and correct any discrepancies.

7-3.2. Engine Start

WARNING

Do not attempt to start an engine with an over-primed or flooded induction system. Starting an engine with a flooded induction system can result in hydraulic lock and subsequent engine malfunction or failure. Allow excess fuel to drain from the intake manifold and/or cylinder prior to attempting to start the engine.

Refer to the aircraft POH for detailed engine starting procedures. Complete Section 7-3.1, "Pre-operational Requirements" prior to engine start. Be familiar with the quantity and location of the engine fuel system drains.

CAUTION: Attempting to start an engine with a partially discharged aircraft battery may result in damage to the starter relay or possible engine kick-back resulting in a broken starter adapter clutch spring and/or subsequent engine damage.

When starting the engine, ensure the battery is completely charged, especially in sub-freezing temperatures.

Verify the tasks listed in Table 7-2, "Flight Prerequisites," have been completed in addition to those required by the aircraft POH, aircraft manufacturer, or Supplemental Type Certificate (STC) holder. Note the following:

- If the engine is being started in extreme cold, preheating may be required. Refer to Section 7-4.1, "Engine Operation in Extreme Cold."
- If the engine is started in hot weather, refer to the AFM/POH
- If the engine is being started at high altitude, refer to the AFM/POH

WARNING

Ensure the propeller arc is clear of personnel and obstructions before starting the engine.

CAUTION: Release the starter as soon as the engine fires. Never engage the starter while the propeller is turning.

Engine operation without oil pressure will result in engine malfunction and probable failure.

NOTE: Check oil pressure frequently. Oil pressure indication must be noted within 30 seconds in normal weather. If no oil pressure is observed, stop the engine and investigate the cause.

1. Propeller ..... Clear
2. Master Switch ..... ON
3. Ignition Switch ..... BOTH
4. Mixture Control ..... FULL RICH
5. Propeller Control ..... High RPM

6. Boost Pump (if equipped) ..... According to AFM/POH
7. Throttle ..... ¼ Open
8. Primer (if equipped) ..... ON (refer to AFM/POH for priming time)

CAUTION: Release starter switch as soon as engine fires. Never engage the starter while the propeller is still turning.

EZR *Do not energize the starter for longer than 30 seconds. If the engine does not start after cranking for 30 seconds, release the starter switch and allow the starter motor to cool for 3-5 minutes before another starting attempt.*

SKY *Do not engage the starter for longer than 10 seconds. Allow 20 seconds for the starter to cool after each engagement. If engine start is unsuccessful after six attempts, release the starter switch and allow the starter motor to cool for 30 minutes before another starting attempt is made.*

9. Ignition Switch ..... Start, then RELEASE
10. Throttle ..... According to AFM/POH
11. Primer (if equipped) ..... OFF (refer to AFM/POH for priming time)
12. Oil Pressure ..... Check
    RESULT: Must have oil pressure indication within 30 seconds.

7-3.2.1. Cold Start

Follow the AFM/POH instructions, using the same procedure as for a normal start. After the engine begins running, it may be necessary to operate the boost pump intermittently to prevent the engine from stalling.

7-3.2.2. Flooded Engine

WARNING

Do not operate the engine if hydraulic lock is suspected. Engine damage may occur. Perform a "Hydraulic Lock Inspection" according to instructions in Section 6-5.2. If no fuel drainage is observed, discontinue starting attempts until the cause is determined. Inspect the cylinder drains for obstructions.

Excessive priming may cause fuel to accumulate in the induction system or cylinder faster than cylinder drains can evacuate it. If hydraulic lock is suspected, discontinue starting attempts until proper drain operation is verified.