CONTINENTAL MOTORS® AIRCRAFT ENGINE

SERVICE BULLETIN
Contains Important Information Pertaining to Your Aircraft Engine.
Compliance Will Enhance Safety

SUBJECT: Exhaust and Turbocharger System Inspection

PURPOSE: Inspection criteria for installed systems

COMPLIANCE: Any engine that has had turbo and/or transition removed and reinstalled, must be inspected within 25 hours from date of this bulletin. All other affected models, must be inspected no later than next scheduled 50-hour maintenance event.

MODELS AFFECTED: TSIO-520-BE; TSIO-550-A, B, C, E, G

General:

This bulletin details inspection procedures to be utilized in service and troubleshooting of the Turbocharger and Exhaust systems for the engine models listed above.

These inspection procedures are included in Engine and Airframe Maintenance Manuals and are recommended at the following occurrences;

50 hour (Visual), 100 hour and/or Annual Inspections (Complete)
Anytime exhaust system leakage is suspected
Anytime turbocharger system is inoperative, sluggish or erratic.

In most instances, the recommended inspection procedures do not require removal of system components. System components should only be removed when conditions require repair or replacement of components. Care must be taken at time of reinstallation to assure correct alignment of all components.

A list of current exhaust system assembly and component part numbers is included for information.

WARNING

Failure to complete these inspection procedures can cause leakage of Carbon Monoxide (CO) gases into the nacelle and cabin area of the aircraft. Any leaks found in these inspections must be repaired prior to further flight.
Figure 1
Examples of transition components requiring replacement
<table>
<thead>
<tr>
<th>Exhaust Component Original Part Number</th>
<th>Exhaust Component Current Part Number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>657143</td>
<td>657980 (Without Heater)</td>
<td>TSIO-550-G1B, G2B</td>
</tr>
<tr>
<td>657587</td>
<td>657981 (With Heater)</td>
<td>TSIO-550-G3B, G4B</td>
</tr>
<tr>
<td>656783</td>
<td>657977</td>
<td>TSIO-550-C8B, C19B</td>
</tr>
<tr>
<td>656858</td>
<td>657979</td>
<td>TSIO-550-E11B, E15B</td>
</tr>
<tr>
<td>654326</td>
<td>657971</td>
<td>654252, 654254, 656783, 656823, 656888, 657977, 657979</td>
</tr>
<tr>
<td>654327</td>
<td>657683</td>
<td>654252, 654254, 656783, 656823, 656888, 657977, 657979</td>
</tr>
<tr>
<td>657009</td>
<td>657972</td>
<td>657013, 657143, 657980, 657981</td>
</tr>
<tr>
<td>657010</td>
<td>657687</td>
<td>657013, 657143, 657980, 657981</td>
</tr>
</tbody>
</table>
Exhaust and Turbocharger System Inspection

Frequency

25 Hour Inspection: Initial inspection on systems with prior maintenance history (Table 1 Below)

50 Hour Visual Inspection: Components, joints and attachment points. (Table 2 below)

100 hour/Annual Inspection: (Table 3 and following)

On condition; at any time leakage of exhaust system is suspected or any time Turbocharger system is erratic, sluggish, inoperative or exhibits visible oil leaks.

ALLOW EXHAUST AND TURBOCHARGER COMPONENTS TO COOL PRIOR TO INSPECTION

Procedure
1. Remove airframe items that hinder visual inspection of the exhaust and turbocharger components.
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 all parts with a clean cloth.
3. Inspect the exhaust system components according to the following Table 1.

<table>
<thead>
<tr>
<th>Component</th>
<th>Inspection Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust and Turbo system</td>
<td>Loosen the entire system. Inspect for possible damage or binding in prior reassembly paying special attention to tie rod installation on RH transition. Tie rod must be allowed to move after installation. Repair or replace any component discovered to be bent, cracked, leaking, deformed, bound or binding during reassembly.</td>
</tr>
</tbody>
</table>
| Stacks Risers Elbows Transitions | Visually check components for the following:  
• Burned areas  
• Cracks  
• Loose parts/hardware  
• Hardware and/or joints in tension (bind)  
• Pay particular attention to welded areas and seams while checking for cracks.  
• Replace parts that are cracked, leaking, burned, deformed or worn |
| Slip joints | Visually check for bulges, leaks, cracks, deformation or hot spots |
| Multi-segment V-band clamps | Inspect spot-weld (or rivet) areas for cracks and looseness. Verify 100% inner and outer band segment contact. |
| Crossover pipe/Heat exchanger | Inspect the heat exchanger seams, joints and transition slip joints for any evidence of leakage or cracks using a flashlight and mirror or a flexible borescope. Replace any heat exchanger that is suspect to be cracked or leaking. |
| Reassemble | Reassemble and tighten complete exhaust and turbo systems. IAW airframe manufacturer’s instructions, reinstall any airframe items removed to facilitate this inspection. |

Table 1 25 Hour Inspection
CAUTION: The exhaust system requires freedom of movement for proper operation after installation. Ensure the bushing (Item 10 page 11) is properly installed in the tie rod to allow expansion movement and all exhaust system components have adequate clearance from surrounding objects during and after installation.

**50 Hour Inspection**

**Procedure**

1. Remove airframe items that hinder visual inspection of the exhaust and turbocharger components.

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 all parts with a clean cloth.

3. Inspect the exhaust system components according to the following Table 2.

<table>
<thead>
<tr>
<th>Component</th>
<th>Inspection Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stacks</td>
<td>Visually inspect all components for the following:</td>
</tr>
<tr>
<td>Risers</td>
<td>• Burned areas</td>
</tr>
<tr>
<td>Elbows</td>
<td>• Cracks, Leaks</td>
</tr>
<tr>
<td>Transitions</td>
<td>• Loose parts/hardware</td>
</tr>
<tr>
<td></td>
<td>• Hardware and/or joints in tension (bind)</td>
</tr>
<tr>
<td></td>
<td>• Pay particular attention to welded areas and seams while checking for cracks and leakage</td>
</tr>
<tr>
<td></td>
<td>• Replace parts that are leaking, cracked, burned, deformed or worn</td>
</tr>
<tr>
<td>Slip joints</td>
<td>Check for leaks, bulges, cracks, deformation or hot spots</td>
</tr>
<tr>
<td>Multi-segment V-band clamps</td>
<td>• Inspect spot-weld (or rivet) areas for cracks and looseness.</td>
</tr>
<tr>
<td></td>
<td>• Inspect the corner radii of clamp inner segments for cracks with a flashlight and mirror.</td>
</tr>
<tr>
<td></td>
<td>• Inspect the clamp outer band for flatness, especially within 2 inches of spot-weld tabs that retain the T-bolt fastener – variance to flat must be less than 0.062 inches.</td>
</tr>
<tr>
<td>Crossover pipe/Heat exchanger</td>
<td>Inspect the heat exchanger seams, joints and transition slip joints for any evidence of leakage or cracks using a flashlight and mirror or a flexible borescope. Replace any heat exchanger that is suspect to be cracked or leaking.</td>
</tr>
<tr>
<td>Reassemble</td>
<td>IAW airframe manufacturer’s instructions, reassemble any airframe items removed to facilitate this inspection</td>
</tr>
</tbody>
</table>

**Table 2  50 Hour Inspection**
CAUTION: The exhaust system requires freedom of movement for proper operation after installation. Ensure the bushing (Item 10 page 11) is properly installed in the tie rod to allow expansion movement and all exhaust system components have adequate clearance from surrounding objects during and after installation.

**100 hour/Annual Inspection**

**Procedure**
1. Remove airframe items that hinder visual inspection of the exhaust and turbocharger components.
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 all parts with a clean cloth.
3. Inspect the exhaust system components according to the following Table 3 and following.

<table>
<thead>
<tr>
<th>Component</th>
<th>Inspection Action</th>
</tr>
</thead>
</table>
| Stacks Risers Elbows Transitions | Visually inspect all components for the following:  
  - Burned areas  
  - Cracks  
  - Loose parts/hardware  
  - Hardware and/or joints in tension (bind)  
  - Pay particular attention to welded areas and seams while checking for cracks.  
  - Replace parts that are cracked, burned, deformed or worn |
| Slip joints | Check for bulges, cracks, deformation or hot spots |
| Multi-segment V-band clamps |  
  - Inspect spot-weld (or rivet) areas for cracks and looseness.  
  - Inspect the corner radii of clamp inner segments for cracks with a flashlight and mirror.  
  - Inspect the clamp outer band for flatness, especially within 2 inches of spot-weld tabs that retain the T-bolt fastener – variance to flat must be less than 0.062 inches. |
| Crossover pipe/Heat exchanger | Inspect the heat exchanger seams, joints and transition slip joints for any evidence of leakage or cracks using a flashlight and mirror or a flexible borescope. Replace any heat exchanger that is suspect to be cracked or leaking. |
| Reassemble | IAW airframe manufacturer’s instructions reassemble any airframe items removed to facilitate this inspection |

**Table 3  100 Hour/Annual Inspection**
Connect a high volume, dust-free forced air source to the exhaust tailpipe outlet(s).

4. Apply approximately 5 psi of air pressure to the exhaust system.

5. Apply soap and water solution (ex; liquid dish washing soap and water solution with sufficient soap in water to produce bubbles in the solution when crack is located) to the entire exhaust system and check for air bubbling. If bubbling is found, examine components for cracks, security and overall condition. Check for any loose or leaking slip joints. Replace any cracked, worn, deformed or leaking exhaust components according to instructions that follow. Visually inspect the exhaust components and transition units for wear, leaks, cracks, or distortion. Replace any worn, leaking, cracked, or deformed exhaust system components. Inspect the exhaust riser connections at the cylinders to verify the condition of the exhaust flange, sealing of the gasket and exhaust manifold fastener security.

Exhaust Slip Joint Inspection

Figure 1

WARNING

Exhaust system weld repairs may only be performed by an FAA Approved repair facility certified to perform specific weld repairs

WARNING

Cracks in the exhaust system can release carbon monoxide into the nacelle or the cabin area; correct any exhaust leaks prior to further flight.
6. Replace worn, leaking, cracked, or distorted parts according to the criteria in Tables 1-3 and appropriate Engine Maintenance and Overhaul Manual.

7. Remove and inspect the multi-segment V-band clamps:

   **CAUTION:** Stretching the V-band clamp excessively will cause undue stress on the outer band and lead to V-band clamp fracture or failure.

   a. Allow the engine (and exhaust system) to cool prior to commencing exhaust system removal to avoid burn injuries.

   b. If the left tailpipe is to be removed, remove the four bolts, washers, and lock nuts connecting the tailpipe to the wastegate. Remove and discard the gasket and lock nuts.

   c. Remove the safety wire and nut from the V-band clamp. Gently spread the V-band clamp and work the edges away from the turbocharger flange, onto the heater muff/tailpipe flange. Remove the heater muff/tailpipe.

   d. Gently spread the V-band clamp over the removed exhaust flange.

   e. 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 1. Replace the V-band clamp if it fails inspection criteria.

8. Inspect the turbocharger oil reservoirs, oil inlet and outlet fittings and surrounding area for signs of leakage. Torque fasteners or fittings to specifications contained in the latest revision of M-0, Standard Practice Maintenance Manual or replace leaking parts, as required to remedy leaking reservoirs or fittings.

9. Remove the induction air supply from the turbocharger compressor according to the airframe manufacturer’s instructions. Inspect the induction air supply duct for wear, deformation, cracks or other physical damage; replace, if necessary.
10. Reassemble the turbocharger and exhaust system.
   a. Install the induction system air supply according to airframe manufacturer’s instructions.
   b. Connect the turbocharger compressor discharge to the aftercooler assembly with serviceable hose and induction tube clamps.
   c. Spread a serviceable V-band clamp over the face of the turbocharger flange in a twisting motion.
   d. Mate the exhaust tailpipe (or heater muff) and turbocharger flanges.
   e. Gently spread the V-band clamp over the face of the tailpipe/heater muff flange in a twisting motion to center the V-band clamp evenly over the turbocharger and exhaust tailpipe flanges. Initially torque the clamp nut to half the amount specified in the latest revision of M-0, Standard Practice Maintenance Manual.
   f. Use a rawhide or plastic mallet to lightly tap the outer edge of the clamp to distribute the load. Align the flanges and torque the clamp to the final torque value of the clamp specified in the latest revision of M-0, Standard Practice Maintenance Manual. Safety wire the V-band clamp from the T-bolt side of the clamp to the exposed t-bolt threads according to instructions.

   NOTE: TSIO-550-G V-band clamps are riveted instead of welded.

![V-Band Clamp Safety Wire](image)

Torque nut to specification plus nut running torque and secure V-Band clamp fastener with Ø .032 safety wire.

V-Band Clamp Safety Wire
Typical Turbocharger and Induction System

1. Gasket
2. Induction Manifold
3. Rubber Bumper
4. Adapter
5. Fitting
6. Elbow Fitting
7. Elbow, Primer
8. Plug
9. Tube
10. Tube
11. Tube
12. Tube
13. Tube
14. Tube
15. Gasket
16. Flange
17. Washer
18. Lock Washer
19. Nut
20. Hose
21. Clamp
22. Aftercooler
23. Tube
24. Tube
25. Tube
26. Tube
27. Hose
28. Hose
29. Clamp
30. Clamp
31. O-ring
32. Overboost Valve
33. Bolt
34. Washer
35. Lock Nut
36. Screw
37. Nozzle
38. Hose
39. Clamp
40. Sleeve Assembly
41. Seal
42. Washer
43. Washer
44. Tube Assembly
45. LH Air Ref Tube Assembly
46. Hose
47. Seal
48. RH Air Ref Tube Assembly
Typical Turbocharger and Exhaust System

1. Elbow
2. Elbow
3. Tee
4. Tee
5. Transition
6. Transition
7. Riser
8. Crossover
8A Crossover w/Heater Option
9. Transition
10. Bushing
11. Tie Rod
12. Bolt
13. Nut
14. Contoured Tailpipe
14A Inverse Tailpipe Option
15. Contoured Tailpipe
15A Straight Tailpipe Option
15B Heater Muff
15C Inverse Tailpipe Option
16. V-band clamp
17. Gasket
18. Wastegate
19. Bolt
20. Washer
21. Lock Nut
22. Plug
23. Gasket
24. Turbocharger
25. Gasket
26. Bolt
27. Washer
28. Lock Nut
29. Support Bracket
30. Support Bracket
31. Screw
32. Washer
33. Lock Nut
34. Controller
35. Hose
36. Hose
37. Hose
38. Elbow Fitting
39. O-ring
40. Elbow Fitting
41. O-ring
42. Adapter
43. O-ring
44. Elbow Fitting
45. Adapter
46. Reducer
Turbocharger and Exhaust System Installation

Procedure

1. Install risers (7) on the exhaust transitions (5 and 6). Apply 646943 antiseize compound on all slip joints.

2. Slide the riser, tee, transition and flange assemblies (2, 3, 5, and 7) together to make up the 2-4-6 side collector assembly.

3. Slide the riser, tee, transition and flange assemblies (1, 4, 6 and 7) together to make up the 1-3-5 side collector assembly.

4. Install a new exhaust flange gasket (25) on each cylinder.

5. Carefully install the left and right side collectors on the cylinder exhaust ports; position the collector so the flanges mate with the risers and seat squarely on the ports; lubricate and install new lock nuts (21) on each cylinder flange- do not torque.

6. Install the turbochargers (24), mounted on the support brackets (29 and 30) on the turbo mount brackets (not shown); loosely install the mounting hardware with new lock nuts (33). This hardware will be torqued later in this procedure.

7. Install a new gasket (23) between the transitions (5 and 6) and the turbochargers (22 and 23). Hand-tighten the bolts and washers (26 and 27) with new lock nuts (28). This hardware will be torqued later in this procedure.

8. Loosely install the wastegate (18) between the tailpipe (14) and bypass transition assembly (9) positioned between two new gaskets (15) one gasket on top of the wastegate and one on the tailpipe mounting flange, using eight sets of fastening hardware (17 and 18) with new lock nuts (19). Fit this bypass transition assembly to the 2-4-6 side collector, transition and turbo. All this hardware will be torqued later in this procedure.

9. Slide the crossover (8) (or with heater if so equipped 8A) onto the slip joints of the 2-4-6 side bypass transition (9) and the 1-3-5 side transition (6). Check to assure that the crossover does NOT fit in a bind and slides smoothly onto the two slip joints (6 and 9).

10. Install the 1-3-5 side crossover to transition tie rod (11) with elongated hole matched with the transition and bushing. Install loosely to allow free movement of the tie rod and securing hardware (10, 12 and 13).

11. Place an exhaust flange v-band clamp (16) halfway onto each turbocharger exhaust flange.

12. Install the tailpipe (14) flange inside the clamp (16) mounted on the left side turbine exhaust flange.

13. Install the tailpipe flange (15) or heat exchanger flange (15A), if so equipped, inside the clamp (16) mounted on the right side turbine exhaust flange.

14. Assure that all components of the exhaust and turbocharger systems are correctly installed. Assure that 646943 anti-seize compound has been applied to all slip joints. Assure a loose fit to all components. Confirm that systems are installed with no misfit or bind in the completed installation. Any system misfit or binding must be corrected prior to applying the final torque to the components.
15. Torque the support bracket screws (31) and nuts (33) to the latest revision of M-0, Standard Practice Maintenance Manual.

16. Torque the turbocharger riser bolts (26) and lock nuts (28) to the latest revision of M-0, Standard Practice Maintenance Manual.

17. Torque the exhaust flange nuts (21) to the latest revision of M-0, Standard Practice Maintenance Manual.

18. Secure the crossover assembly (8) on the transition (6) using the tie rod (11), bushing (10), nut (13) and bolt (12). Torque to the latest revision of M-0, Standard Practice Maintenance Manual. Check the installed assembly for freedom of movement and lack of binding.

CAUTION: The exhaust system requires freedom of movement for proper operation after installation. Ensure the bushing (10) is properly installed in the tie rod to allow expansion movement and all exhaust system components have adequate clearance from surrounding objects after installation.

![Diagram]

Torque nut to specification plus nut running torque and secure V-Band clamp fastener with Ø .032 safety wire.

V-Band Clamp Safety Wire Detail.

19. Reinstall airframe items, baffle pieces, electrical, sensors and cowling.

20. Run for test of exhaust and turbocharging systems.

21. After inspection is complete, make an appropriate log book entry for completion of this Service Bulletin, note time for next inspection and return aircraft to service.