



SERVICE DIRECTIVE BULLETIN

SERVICE DIRECTIVE BULLETIN NO. 0122

Revision 2

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DATE: April 26, 2018

1. SUBJECT: Exhaust Clamp Installations
2. MODEL: F-28C, F-28C-2, F-28C-2R F-28F, F-28F-R, 280C, 280F, and 280FX
3. EFFECTIVITY: All S/N
4. BACKGROUND:

Enstrom has received a report of a fire which was attributed to a failed exhaust clamp (V-band clamp or coupling) in a model 280FX. The clamp failure allowed the muffler to separate from the turbocharger.

This Service Directive Bulletin (SDB) requires an initial inspection of the clamps and a repetitive inspection of the clamps at every 100-hour/annual inspection. A clamp that fails inspection must be replaced prior to the next flight.

Revision 1 modifies the scope of the initial and the repetitive 100 hour/annual inspection. Previously, inspections were performed with the clamp as installed. Now, initial and repetitive action requires loosening the latch nut, cleaning, and visual inspection. Also, this revision details the installation procedures for a proper and secure clamp installation.

Revision 2 clarifies and expands the clamp inspection and installation requirements.

5. COMPLIANCE:
 - 5.1 Within the next 5 hours time in service, inspect the turbocharger inlet clamp, P/N 28-12162-1, and the turbocharger outlet clamp, P/N LW-13464, for condition in accordance with paragraphs 6.1 through 6.5, unless already complied with upon initial release of this SDB. Refer to Figure 1 for the clamp locations.
 - 5.1.1 Clamp P/N 28-12162-1 inspection is performed with the clamp removed.
 - 5.1.2 Clamp P/N LW-13464 inspection is performed with the clamp nut loosened only. However, if cracks are suspect in the V-retainer, the clamp will be removed for the inspection procedure.

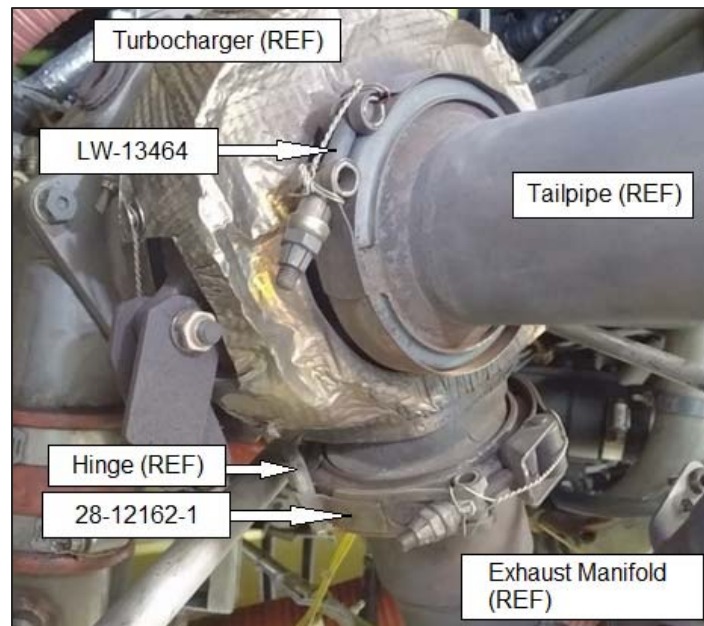


Figure 1. Turbocharger inlet/exhaust manifold clamp connection, P/N 28-12162-1; Turbocharger outlet/tailpipe clamp connection, P/N LW-13464

- 5.2 Installation of the clamps must be in accordance with the procedure detailed in paragraph 6.7. This procedure supersedes the instructions provided in the maintenance manual. Applicable manuals include:
- 5.2.1 F-28C/280C Maintenance Manual Supplement, page MM-20-24, steps g and i.
 - 5.2.2 F-28F/280F/280FX Maintenance Manual, paragraph 13-5, D, steps (7) and (9).

6. INSPECTION:

6.1 Clamp P/N 28-12162-1

- 6.1.1 P/N 28-12162-1 is a hinged band clamp that connects the turbocharger inlet to the exhaust manifold (Figure 1, bottom center).
- 6.1.2 Using a flashlight or other bright light source, inspect the clamp and exhaust manifold flange for carbon deposits (soot).
 - 6.1.2.1 Note evidence of soot. If soot is evident, note the location and pattern of the soot relative to the V-retainers for the inspection performed in paragraph 6.3.4.
- 6.1.3 Remove P/N 28-12162-1 clamp.
- 6.1.4 Visually inspect the clamp for secure attachment of the outer band to the V-retainer segments.
- 6.1.5 Proceed to paragraph 6.3.

6.2 Clamp P/N LW-13464

6.2.1 P/N LW-13464 is a continuous band clamp that connects the tailpipe (or muffler) to the turbocharger outlet (Figure 1, top center).

WARNING

Never use highly flammable solvents, wire brushes, or abrasives to clean exhaust systems. Do not use an etch tool, graphite lead pencil, or scribe to apply a mark on exhaust pipes.

6.2.2 Using a flashlight or other bright light source, inspect the clamp and tailpipe flange for soot.

6.2.2.1 If there is evidence of soot, remove the clamp to facilitate closer examination for cracks (paragraph 6.3.4) and proceed to paragraph 6.3.

6.2.3 Remove the safety wire.

6.2.4 Apply a penetrant (LPS 2, ACF-50, or equivalent) to the base of the nut.

6.2.5 Loosen the nut.

6.2.6 Lightly tap the band circumference to check that the band is securely attached to the V-retainer segments. Finger tap or use a small rubber mallet.

6.2.6.1 If the band is not securely attached to the V-retainers (loose or becomes separated from the V-retainer segments), the clamp must be replaced (reference paragraph 7 for parts).

6.3 Visually inspect both P/N 28-12162-1 (as removed) **and** P/N LW-13464 (as installed or removed) as follows:

NOTE

Inspection of P/N LW-13464, as installed, requires use of a flashlight or other light source and an inspection mirror.

6.3.1 Inspect the T-bolt for bends, distortion, cracks, and thread damage.

6.3.2 Inspect the clamp outer band for “cupping” (Figure 2).

6.3.2.1 Lay a straight edge across the width of the outer band.

6.3.2.2 The gap between the straight edge and the band must be less than 0.062” (1.58 mm).

6.3.3 Inspect the clamp for deformity.

6.3.3.1 Inspect for bulges in the outer band circumference (Figure 2).

- 6.3.3.2 Inspect the clamp for other permanent deformity including, but not limited to, out of round, bowed or wavy, twisted, and/or re-formed by any method.

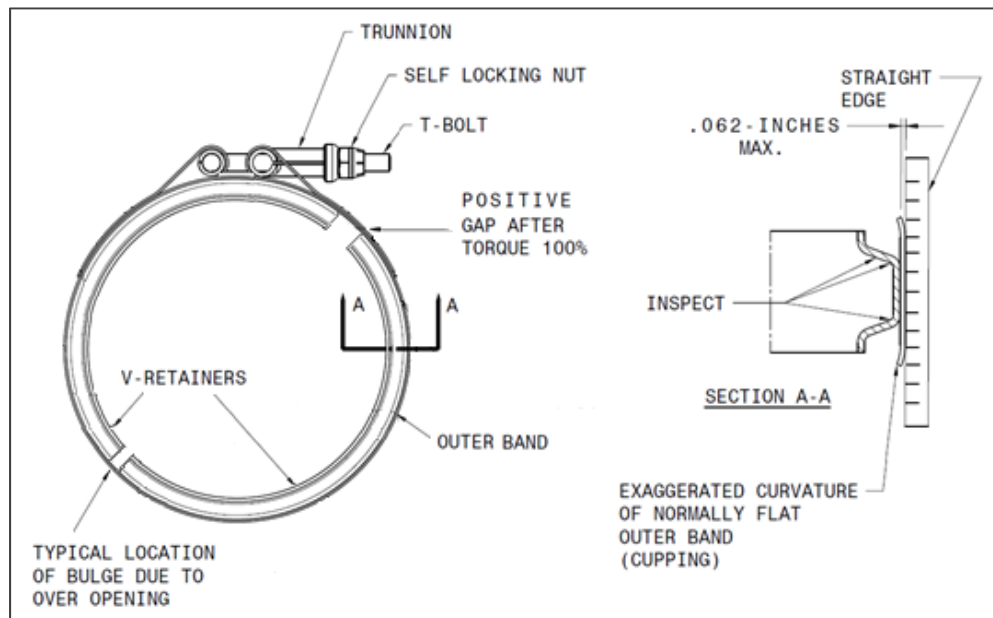


Figure 2. P/N LW-13464 Schematic – Inspection Checks

- 6.3.4 Inspect for cracks in the bend radii of the inner V-retainer segments throughout the length of the segments, particularly if soot was noted previously. (This inspection applies to the hinged clamp, P/N 28-12162-1, and the continuous band clamp, P/N LW-13464, if removed).
- 6.3.5 Inspect the clamp for other damage including, but not limited to, cracks, gouges, notches, tears, bulges, bumps, deterioration, and fractures
- 6.4 Replace the clamp if any of the conditions listed in paragraph 6.3 are evident. Refer to paragraph 7 for parts.
- 6.5 Perform a visual inspection of both P/N 28-12162-1 **and** P/N LW-13464 clamp bands for cracks through the band spot welds.
- 6.5.1 Remove surface oxidation from the band at the spot welds (Figure 3).

WARNING

Never use highly flammable solvents, a wire brush, or abrasives to clean exhaust systems. Do not use an etch tool, graphite lead pencil, or scribe to apply a mark on exhaust pipes.

- 6.5.1.1 Clean the band with a polymer cleaning pad (Scotch-Brite™ or similar) and non-flammable solvent. Pay particular attention to the spot weld areas.

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6.5.1.2 Replace the clamp (reference paragraph 7) if oxidation is not easily removed with a polymer cleaning pad or if pitting is evident.

6.5.2 Using a flashlight or other bright light source, inspect the band for cracks at the spot welds.

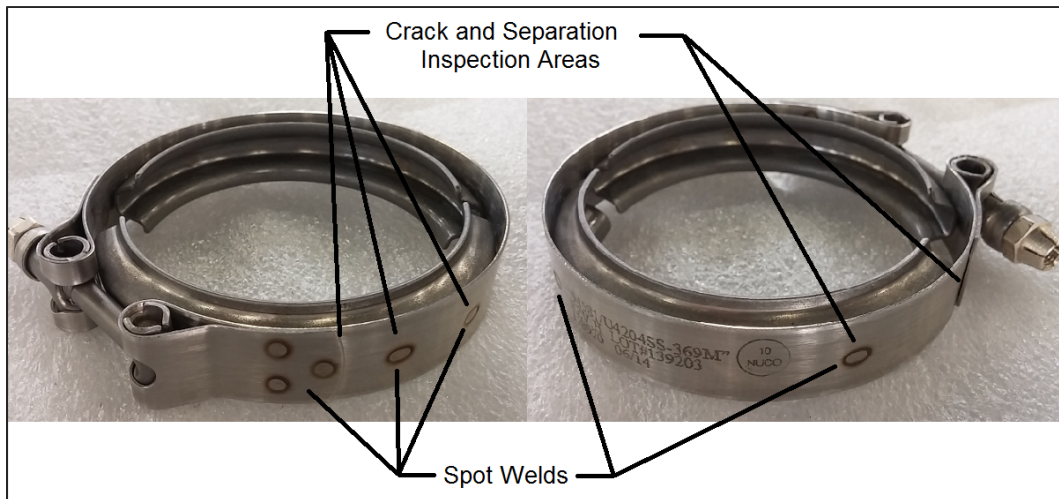


Figure 3. Spot weld locations and crack and separation inspection areas (P/N LW-13464 shown)



**Figure 4. Cracked Clamp (P/N LW-13464 shown);
Note the coloration in the crack area.**

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- 6.6 Replace the clamp if any of the conditions listed in paragraph 6.5 are evident. Refer to paragraph 7 for parts.
- 6.7 Install the clamp as follows:
 - 6.7.1 P/N 28-12162-1
 - 6.7.1.1 Proceed with paragraph 6.7.3.
 - 6.7.2 P/N LW-13464
 - 6.7.2.1 If removed, proceed with paragraph 6.7.3.
 - 6.7.2.2 If not removed, proceed with paragraphs 6.7.7 through 6.7.11.

WARNING

Incorrect assembly or installation of the turbocharger exhaust system can adversely affect engine operation or result in the release of hot and toxic gases, which can cause damage to nearby components, systems, or a fire.

CAUTION

Interfacing flanges must be aligned correctly for the clamp installation to ensure maximum sealing.

NOTE

Anytime a P/N 28-12162-1 clamp is disassembled, it is required to install a new metal gasket at reassembly. Anytime a P/N LW-13464 clamp is disassembled, it is recommended to install a new metal gasket at reassembly.

CAUTION

During removal or installation of clamp P/N LW-13464, use care not to spread or force the clamp beyond its normal open position to prevent distortion of the clamp. This distortion can cause an ineffective seal or rupture the metal which can result in failure of the clamp.

NOTE

Figures 5a-5d depict a P/N LW-13464 installation. Differences in the installation of P/N 28-12162-1 are noted where applicable.

CAUTION

The sides of P/N 28-12162-1 are machined to optimize the fit adjacent to the turbocharger. For clamps manufactured circa 2015 and prior, only one side was machined. Inspect the clamp to determine if one or both sides are machined.

- 6.7.3 Slip the clamp over the tailpipe or exhaust manifold flange, as applicable (Figure 5a).

6.7.3.1 For P/N 28-12162-1 machined on one side only, verify the clamp is installed with the machined side toward the turbocharger.

- 6.7.4 Place the metal gasket in between the flanges (Figure 5b).

- 6.7.5 Join the flanges.

- 6.7.6 Assemble the clamp over both flanges and the gasket (Figure 5c).

NOTE

Paragraph 6.7.6.1 is intended to aid visual inspection of the spot welds during an intermediate inspection routine, such as a pre-flight inspection, and also during subsequent 100 hour/annual inspections.

- 6.7.6.1 Position the clamp to facilitate visual inspections of the spot welds (Figure 5d).

- 6.7.7 Engage the T-bolt on the clamp and press the clamp over the flanges. Using a torque indicator wrench, tighten the nut to approximately 50 in-lb/5.6 N/m (70% of the maximum torque).

- 6.7.7.1 P/N LW-13464: Maximum torque: 70 in-lb/7.9 Nm.

- 6.7.7.2 P/N 28-12162-1: Maximum torque: 70 in-lb/7.9 Nm.



Figure 5a. Clamp P/N LW-13464 prepared for joining the tailpipe to the turbocharger outlet

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Figure 5b. Installing metal gasket, P/N LW-14485



Figure 5c. Flanges and metal gasket joined; clamp positioned over joint



Figure 5d. Clamp positioned for ease of spot weld inspections

CAUTION

To prevent damage, apply tapping force perpendicular to the clamp circumference – not to the edge of the clamp.

6.7.8 Tap the outer diameter of the clamp band in several places around the circumference using a small rubber mallet and a plastic drift (if required) and to distribute band tension.

6.7.9 Tighten the nut the maximum required torque (70 in-lb/7.9 Nm).

NOTE

It may require approximately 10-15 tap and torque repetitions to achieve a stabilized torque reading.

6.7.10 Repeat as in paragraphs 6.7.8 and 6.7.9 until the torque reading stabilizes. Do **NOT** overtorque.

6.7.11 Safety the clamp (MS20995C32) (Figure 1).

7. PARTS:

Part Number	Description	Quantity
28-12162-1	Clamp (Turbocharger Inlet)	1
LW-13464	Clamp (Turbocharger Outlet)	1
LW-14485	Metal Gasket (Turbocharger Inlet)	1
	Metal Gasket (Turbocharger Outlet)	1 (A/R)

8. SPECIAL TOOLS:

8.1 N/A

9. MAN-HOURS:

9.1 Inspection – 1 hour

10. WARRANTY:

10.1 Per Enstrom Helicopter Warranty policy

11. WEIGHT CHANGE:

11.1 N/A

12. LOG BOOK ENTRY:

12.1 Enter compliance with this SDB in the aircraft maintenance records.

13. REPETITIVE ACTION:

13.1 Repeat the inspection procedure at every 100 hour/annual inspection.

14. REFERENCE INFORMATION:

14.1 Lycoming Service Instruction No. 1238

14.2 Lycoming Service Instruction No. 1562

14.3 Special Airworthiness Information Bulletin (SAIB) CE-13-45