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Title: WorkStar with MaxxForce 11/13L or N13 - LT EGR Core Removal and Insertion

Applies To: 2010 MaxxForce 11/13, 2013 N13, WorkStar,

CHANGE LOG

2015/08/10 - Minor formatting revision, Feedback update for Lambda relearn, removed all references to CAT
2014/06/12 - Added link to Video Instructions on LMS, in the repair procedure. Fixed SRTs for pressure testing in chassis.
2014/05/12 - Launch to field

DESCRIPTION

A faster, more effective procedure for Low Temp (LT) Exhaust Gas Recirculation (EGR) Cooler repair has been developed. This document will guide the user through the procedure of in chassis replacement of the cooler core on a WorkStar (7600) with a 2010 Emissions MaxxForce 11 or 13 or the 2013 Emissions N13. The new procedure will **REPLACE** LT cooler cleaning for fouling (plugging) and LT assembly replacement for internal leaks.

Please note, if the LT is being repaired with a High Temp (HT) replacement, reference iKNow 1201100 for instructions. Also, see the "OTHER RESOURCES" section at the bottom of the document, for other truck model instructions.

SYMPTOMS

Diagnostic Trouble Codes & Dashboard Indicator Lights:

DTC/Light	Description
SPN 111 FMI 1	Low Coolant
SPN 2659 FMI 21	EGR Low Flow
	Malfunction Indicator Light (MIL)
	Red Stop Lamp (RSL)

Customer Observations or Concerns:

- Malfunction Indicator Light (MIL)
- Red Stop Lamp (RSL)
- Coolant consumption

- Low coolant
- Coolant puddling under engine
- White smoke from the exhaust
- Coolant in the oil or oil analysis

SPECIAL TOOLS

Tool Description	Tool Number	Comments	Instructions
LT EGR Core Puller	12-892-04		Link
Coolant Management Tool	KL5007NAV		Link
EGR Leak Detection Kit	12-892-02	Only if necessary	Link

DIAGNOSTIC STEPS

All diagnostic steps should be completed through the Service Action Repair Plans or Diagnostic Manual. At this point, the truck should have been diagnosed with either;

- An **internal** coolant leak in the Low Temp EGR cooler (reference **Figure 1** below for the cooler assembly notation), or
- EGR Low Flow (2659-21)

The following procedure should **NOT BE USED** if the cooler is leaking externally for cracks, porosity, broken fittings, etc. Instead, replace the entire LT cooler assembly.

NOTE: If BOTH cooler halves are found leaking, make sure the LT cooler did not appear failed due to residual air in the core from the High Temp testing. Typically this happens when the leak detection hose is not vented to atmosphere (left in water) between tests and/or when the HT is tested and the fittings are switched quickly--the air pressure in the core is still enough to cause bubbles when putting pressure to the LT.

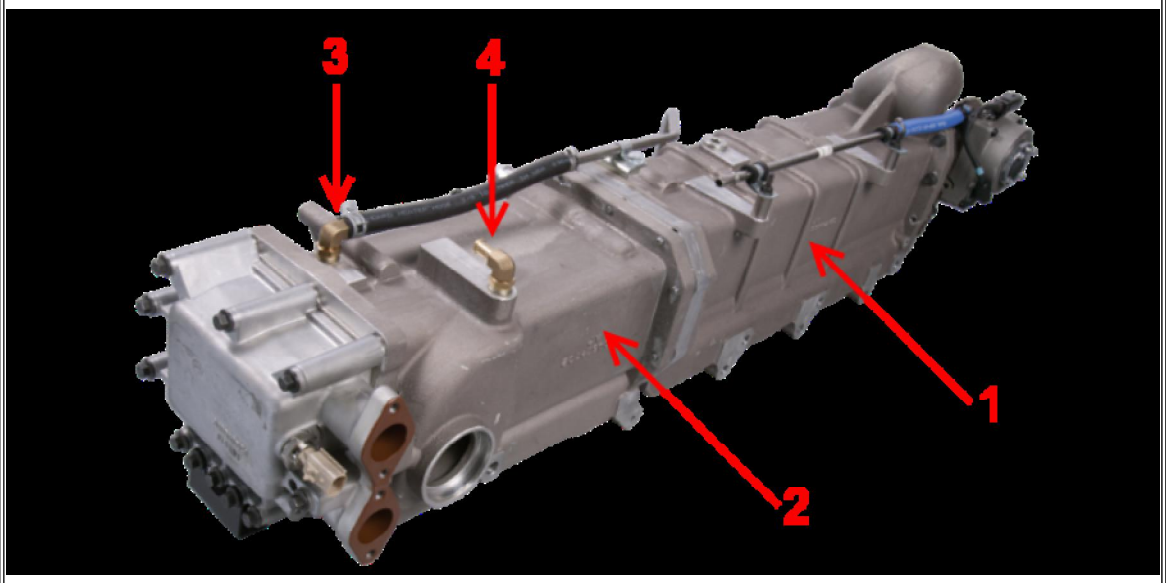

Figure 1: 2010 MaxxForce 11/13 EGR Cooler Assembly

Item 1: High Temp (HT) Cooler
Item 2: Low Temp (LT) Cooler
Item 3: LT Cooler Pressure Test Port (dearation fitting)
Item 4: HT Cooler Pressure Test Port (dearation fitting)

SERVICE PARTS INFORMATION

Kit Description	Part Number	Quantity Required	Notes
Kit, Low Temp Core	2513209C91	1	Required
Module, HT	3014254C95		ONLY if necessary (HT failure)
Module, LT (MaxxForce)	3015862C92		For external leaks ONLY, in place of LT Kit
Module, LT (N13)	2511089C91		For external leaks ONLY, in place of LT Kit
P-80 Assembly Lube	2511097C1		Case of 6 Pints

REPAIR STEPS

The following repair steps are for the cooler removal and installation in chassis. There is no limitation to the number of times this procedure can be used for a given housing, as long as there are no physical concerns with the housing itself (cracks, damage, broken fittings, etc).

Follow the service procedure for HT replacement in the cases where both coolers are leaking or the vehicle also has a 2659-21 code. When the cooler assembly is off the engine and separated, reference iKNow 1201100 for removal and installation of the LT core.

WARNING
To prevent personal injury or death, read all safety instructions in the "Safety Information" section of the diagnostic manual, linked here.

WARNING
To prevent personal injury or death, shift transmission to park or neutral, set parking brake, and block wheels before doing diagnostic or service procedures.

WARNING
To prevent personal injury or death, make sure the engine has cooled before removing components.

WARNING
To prevent personal injury or death, do not let engine fluids stay on your skin. Clean skin and nails using hand cleaner and wash with soap and water. Wash or discard clothing and rags contaminated with engine fluids.

REPAIR VIDEO

The entire repair procedure for a ProStar (core procedure is the same for all vehicles) has been put into video and available in the Learning Management System. Go to the LMS via this link. Then "Course Catalog," "Critical Repair Videos," "LT EGR Cooler Core Replacement Procedure," and enroll. After enrolling, go back to "My Current Enrollments" to watch.

REMOVAL PROCEDURE

1. Open the battery box and disconnect the negative battery cable.
2. Use the Coolant Management Tool to drain the cooling system. Steps 3-7 can be performed while the system is draining.

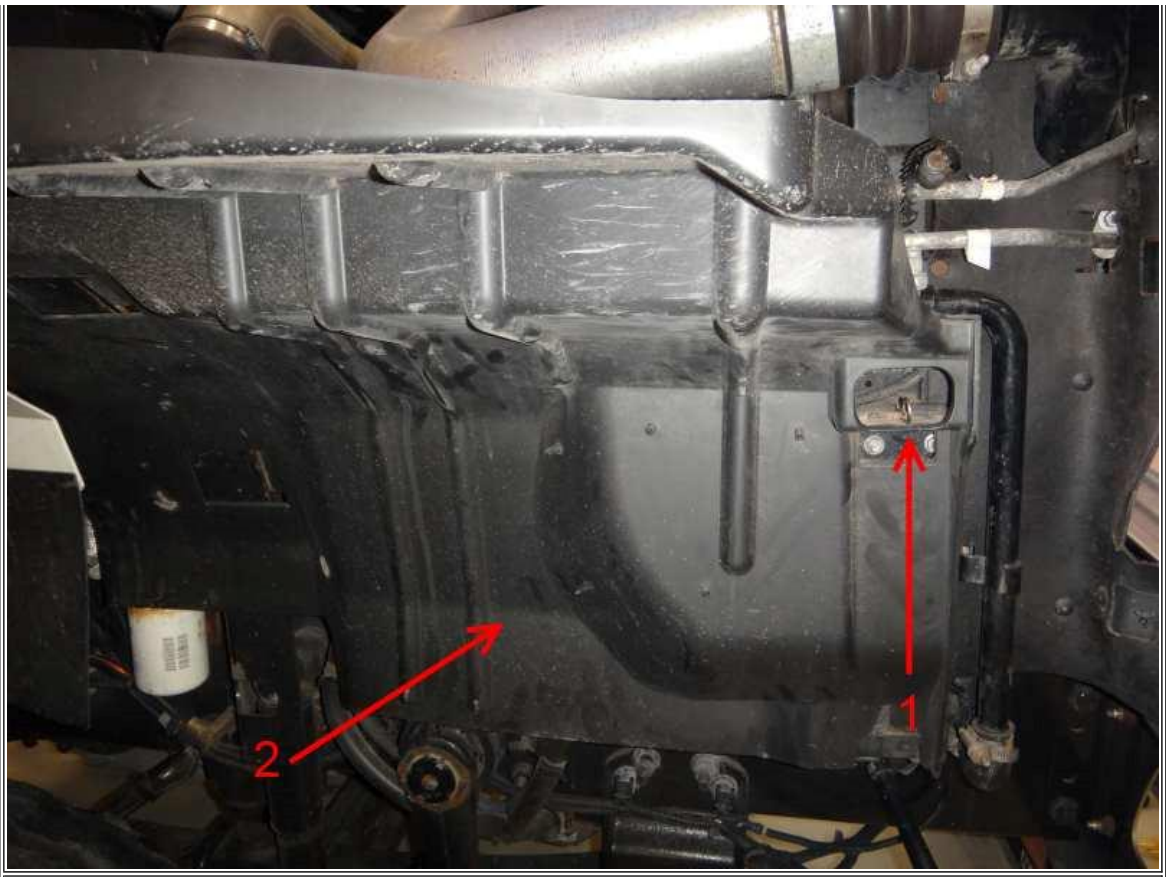

Figure 2: WorkStar Fender Well

Item 1: Fender liner retention pin
Item 2: Inner fender liner

3. Remove the pin holding the passenger inner fender in place (**Figure 2**, Item 1) and remove from vehicle.
4. Remove the pin holding the driver side inner fender in place and remove from vehicle.

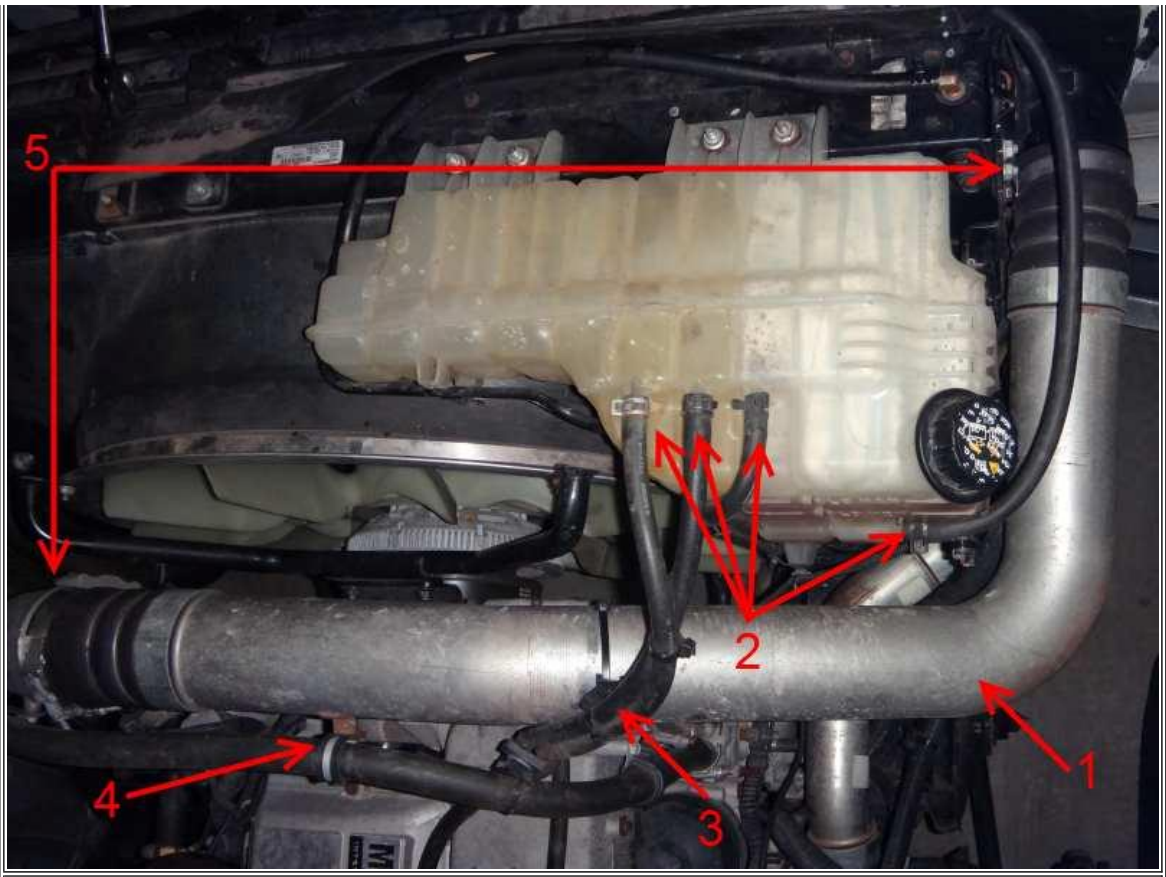

Figure 3: Dearation Tank Hoses and CAC Pipe

Item 1: CAC Outlet Pipe
Item 2: Dearation Hoses
Item 3: Dearation Line Zip-Tie
Item 4: LTR Hose Clamp
Item 5: CAC Clamps

5. Cut the zip tie securing the dearation hoses to the High Pressure (HP) Charge Air Cooler (CAC) (**Figure 3**, Item 3).
6. Remove the bolt from the p-clamp securing the Low Temp Radiator (LTR) supply hose to the HP CAC pipe (**Figure 3**, Item 4).
7. Loosen both HP CAC clamps (**Figure 3**, Item 5) and remove the pipe (**Figure 3**, Item 1).

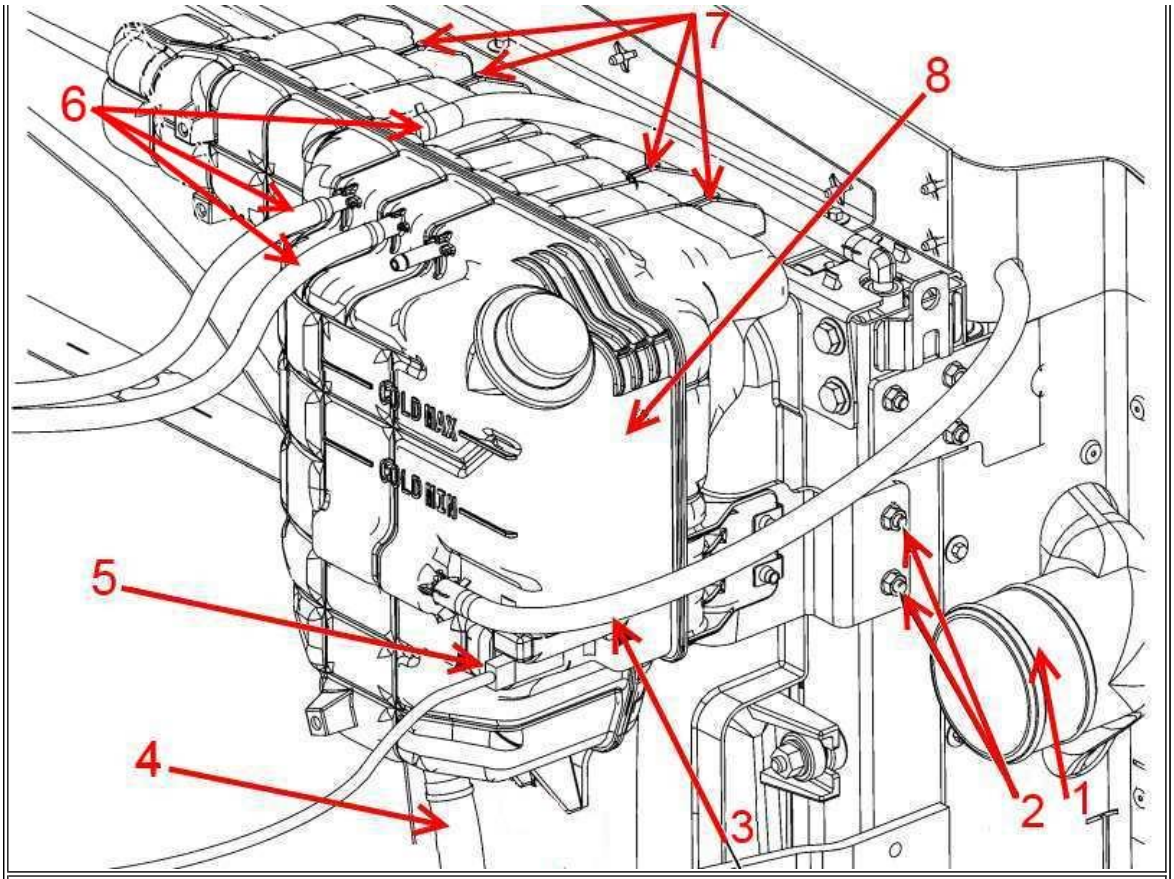

Figure 4: Dearation Tank Assembly

Item 1: HP CAC Inlet
Item 2: Dearation Tank Side Bracket
Item 3: Radiator Dearation Hose
Item 4: Coolant Return Hose
Item 5: Coolant Level Sensor
Item 6: Engine Dearation Hoses
Item 7: Upper Tank Mount
Item 8: Dearation Tank

8. Disconnect the engine wire harness from the low coolant level sensor (**Figure 4**, Item 5).
9. Disconnect the four dearation hoses from the dearation tank (**Figure 4**, Items 3 and 6).
10. Disconnect the coolant return hose from the bottom of the dearation tank (**Figure 4**, Item 4)..
11. Remove the four nuts and washers from the top of the dearation tank (**Figure 4**, Item 7).
12. Remove the two bolts from the side of the radiator support (**Figure 4**, Item 2 and remove the dearation tank.

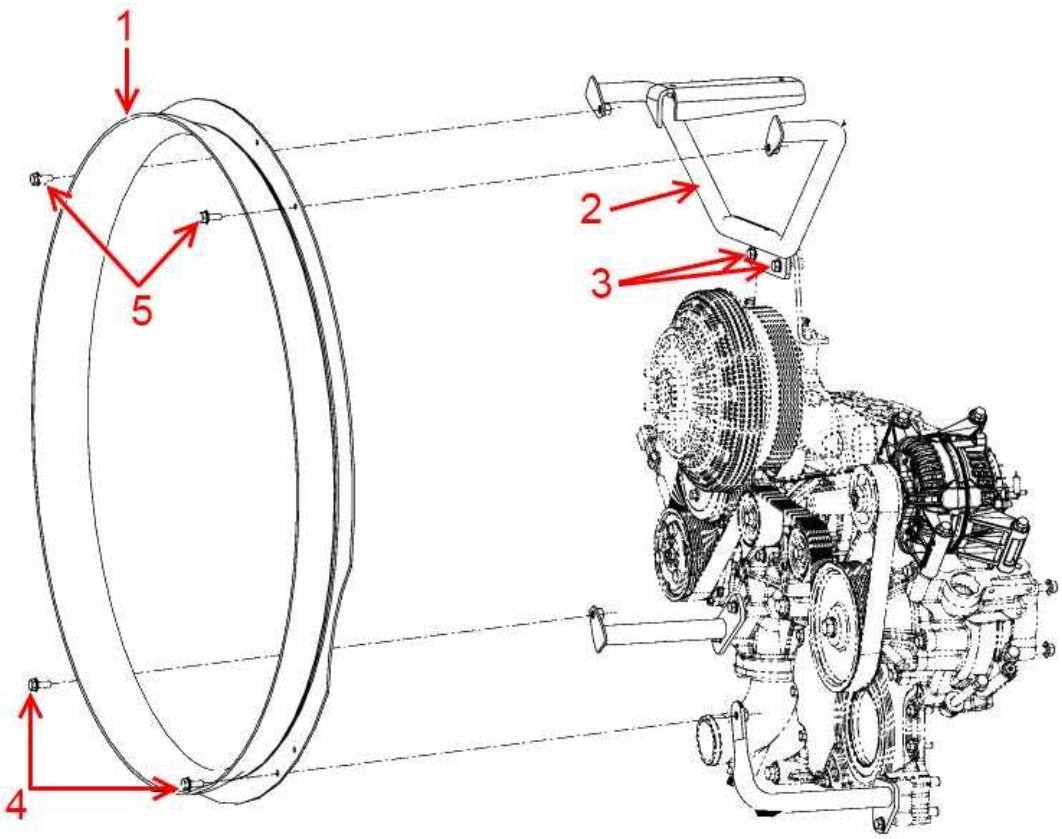

Figure 5: Fan Ring Assembly

Item 1: Fan Ring
Item 2: Upper Fan Ring Bracket
Item 3: Upper Bracket Mounting Bolts
Item 4: Lower Fan Ring Bolts
Item 5: Upper Fan Ring Bolts

13. Remove the two bolts from the fan ring bracket (**Figure 5**, Item 3).

14. Remove the 4 nuts and bolts securing the fan ring to the engine brackets (**Figure 5**, Items 4 & 5), and remove.

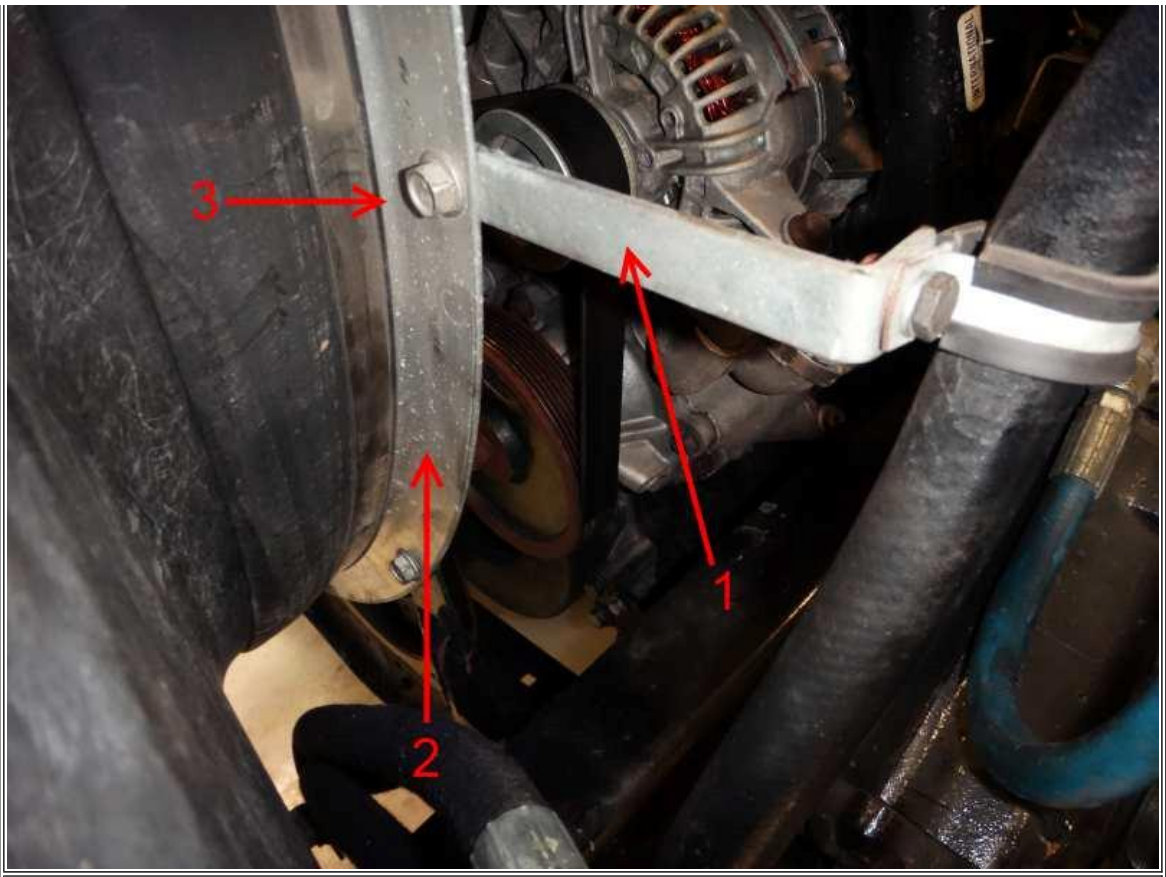

Figure 6: Power Steering Line Bracket

Item 1: Power Steering Bracket
Item 2: Fan Ring
Item 3: Bracket Bolt

15. Remove the nut and bolt (**Figure 6**, Item 3) securing the power steering hose support bracket to the driver side of the fan ring.

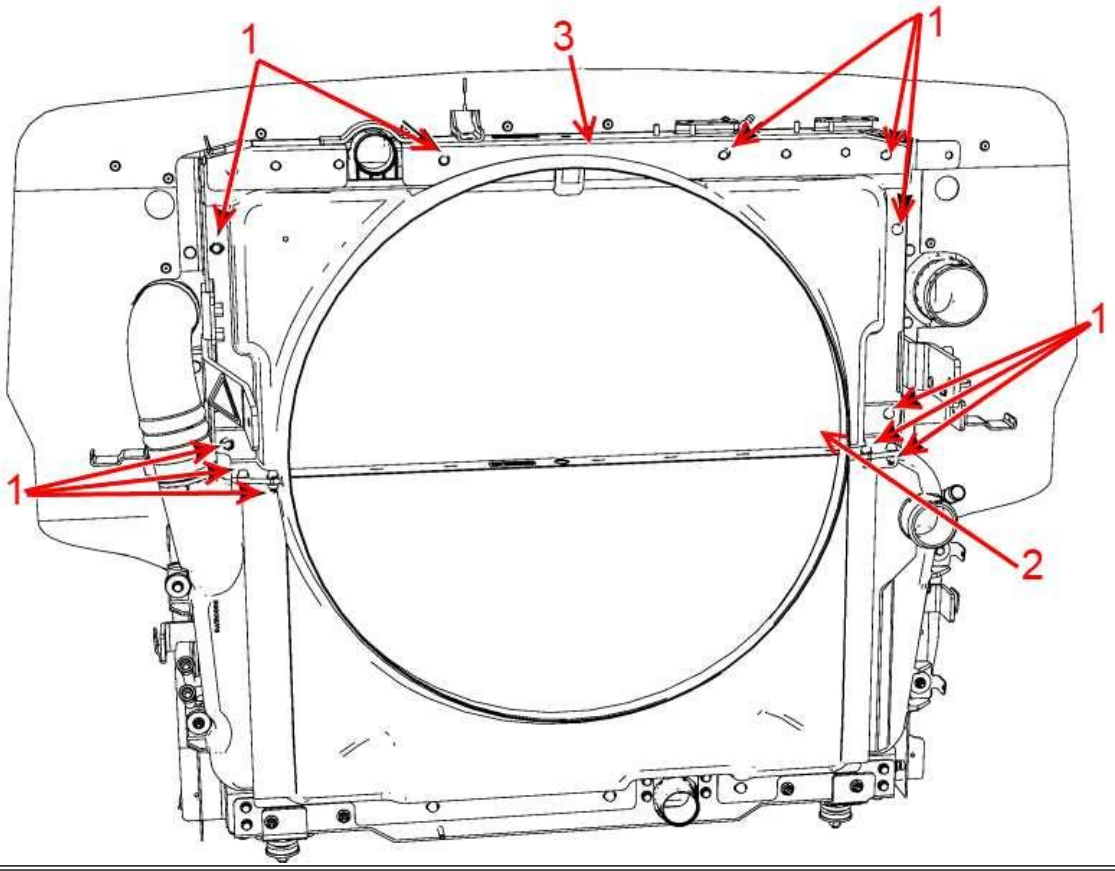

Figure 7: Radiator Fan Shroud

Item 1: Fan shroud fasteners
Item 2: Radiator
Item 3: Fan Shroud

16. Remove the 11 bolts and 6 nuts (**Figure 7**, Item 1) securing the upper fan shroud to the radiator.

17. Carefully remove the upper fan shroud (**Figure 7**, Item 3) from the radiator.

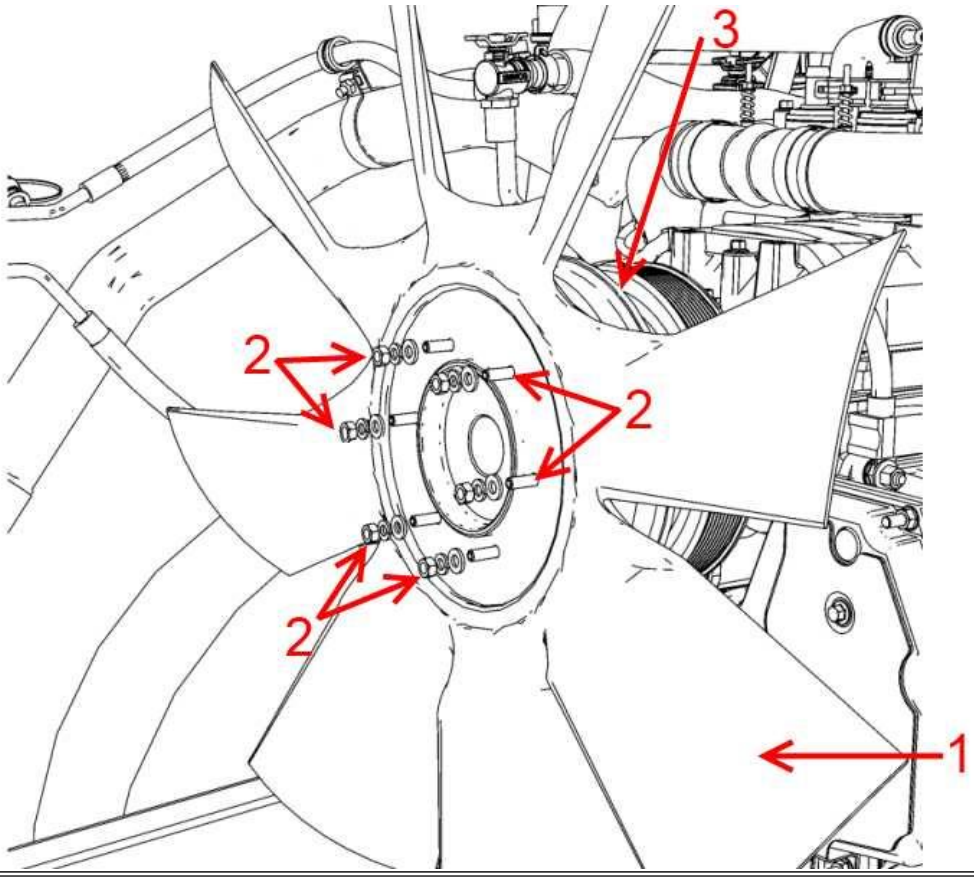

Figure 8: Cooling Fan

Item 1: Fan
Item 2: Fan Mounting Stud, Nut, Washer and Lock Washer
Item 3: Fan Clutch

18. Remove the six fan mount nuts, lock washers, and flat washers securing the fan to the drive, then remove the fan (**Figure 8**, Item 2).

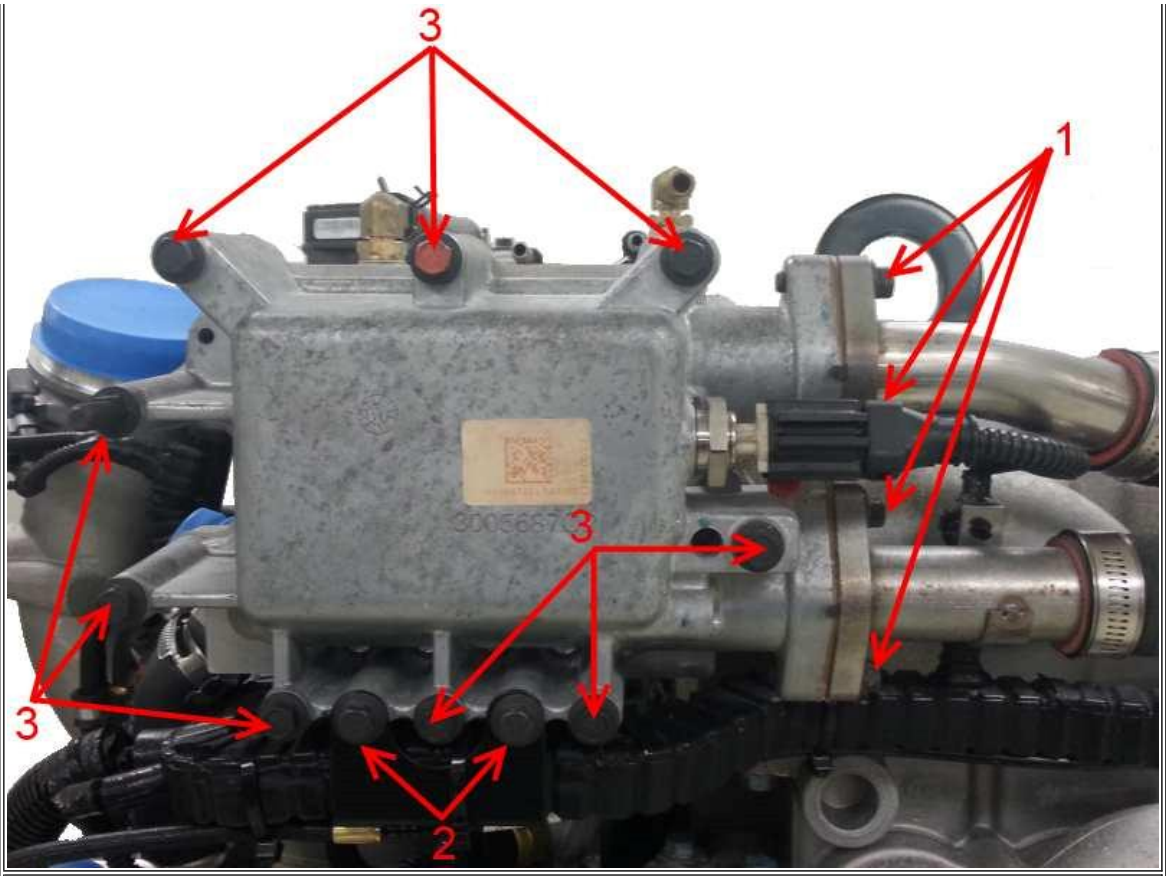

Figure 9: EGR Outlet Cover, Bolts and Tubes

Item 1: EGR Outlet Tube Bolts
Item 2: Engine Harness Bracket Bolts
Item 3: EGR Outlet Cover Bolts

19. Remove the four bolts holding the outlet tubes to the front cover--discard the gaskets (**Figure 9**, Item 1).
    Alternatively, the hose clamps for the EGR outlet tubes can be loosened and the tubes pulled out, if access to the bolts is unfeasable.

20. Remove the two bolts holding the engine harness and reposition as necessary, for front cover removal (**Figure 9**, Item 2).

21. Remove the eight bolts and one stud bolt from the front cover, and remove (**Figure 9**, Item 3).

22. Disconnect the engine harness from the EGR Temperature (EGRT) Sensor.

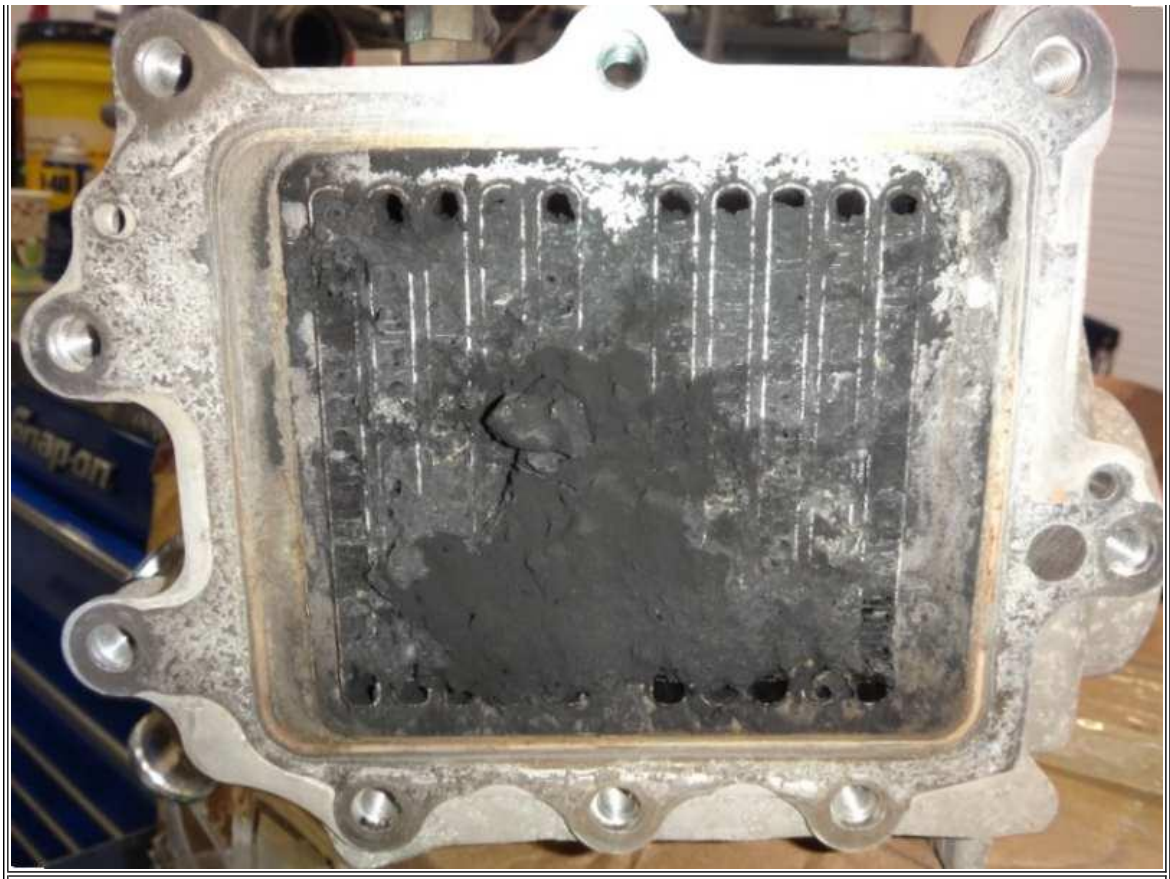

Figure 10: Soot Build-Up on the Core Face

Significant build-up will not allow the tool to sit against the core.

23. If necessary, scrape off soot build-up on the outlet of the core. The plate must sit flat against the face.

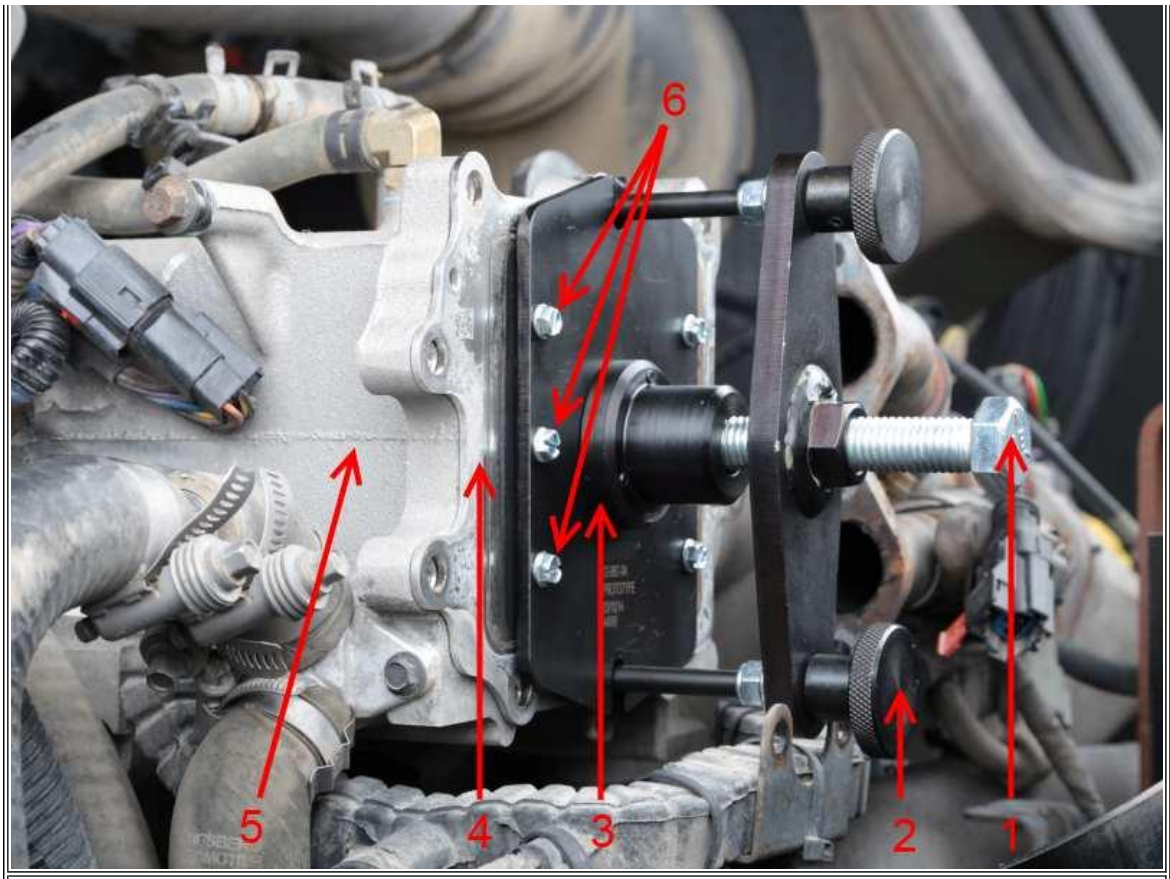

Figure 11: Low Temp EGR Core Extractor

Item 1: Removal Bolt
Item 2: Thumb Screws
Item 3: Removal Plate
Item 4: LT Core
Item 5: LT Housing
Item 6: Self Tapping Screws

24. Install the LT EGR Core Puller Tool (12-892-04), per the tool instructions.
25. Back out the bolt (**Figure 11**, Item 1) until the core pulls loose (typically 3/4" from the housing).
26. Remove the tool and pull the core from the housing.

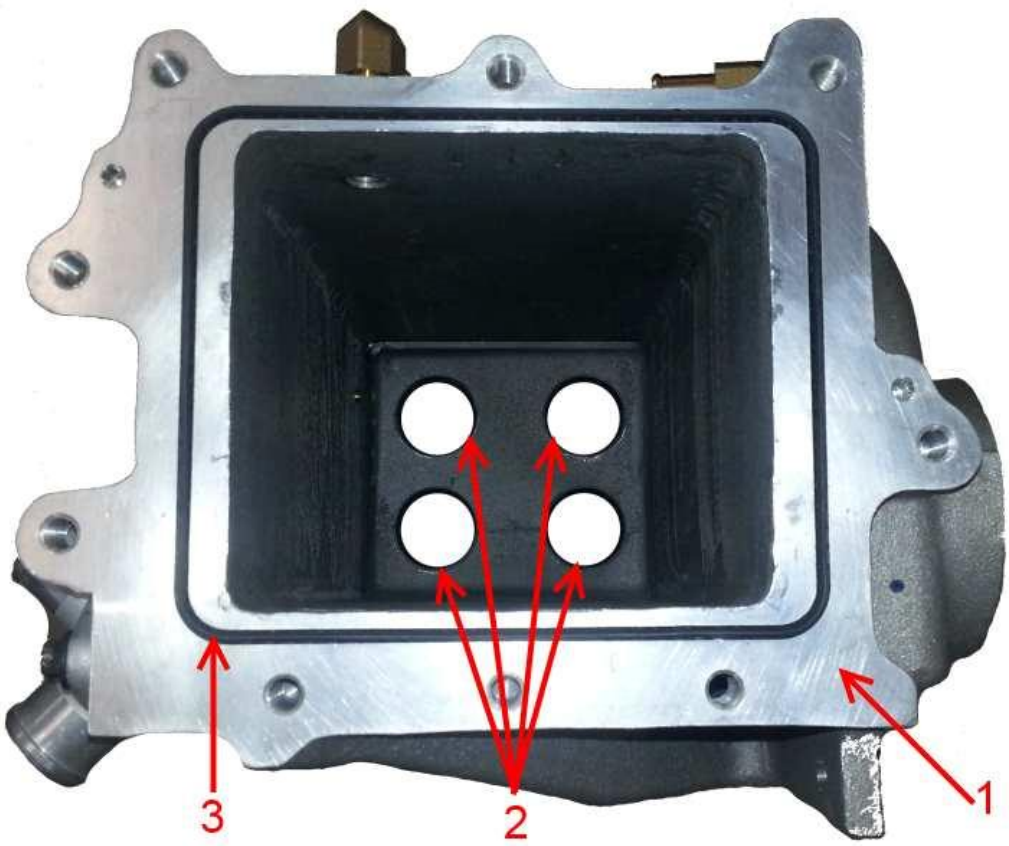

Figure 12: Low Temp Cooler Housing Face

Item 1: Housing
Item 2: Core O-Rings
Item 3: Housing Seal

27. Remove the housing seal and discard (**Figure 12**, Item 3)

28. Use a seal pick to remove the four o-rings at the housing inlet and discard (**Figure 12**, Item 2).

CAUTION
Use care not to damage the o-ring groove in the housing.

INSTALLATION PROCEDURE

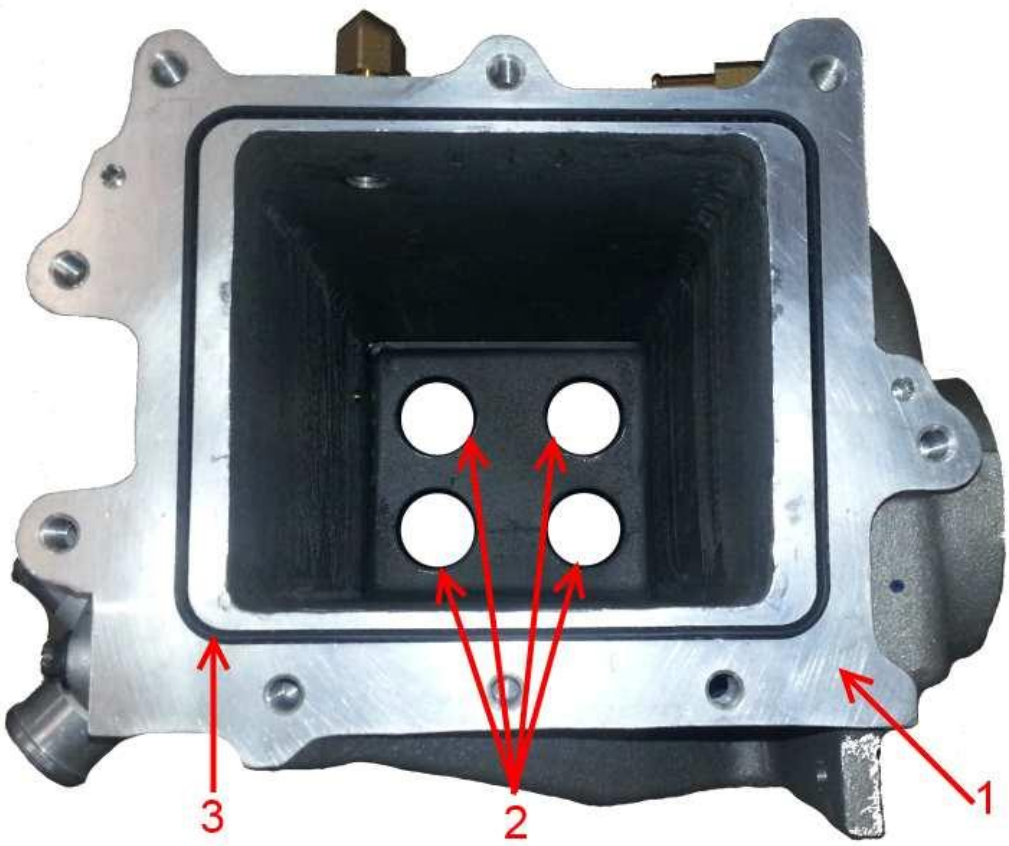

Figure 13: Low Temp Cooler Housing Face

Item 1: Housing
Item 2: Core O-Rings
Item 3: Housing Seal

1. Install the new seal into the LT housing (**Figure 13**, Item 3).
2. Clean the o-ring grooves of contaminates (soot). Coolant is not a concern, and will act as a lubricant.
3. Install the new o-rings from the LT core kit (**Figure 13**, Item 2).

NOTE
Ensure no soot or other debris are left in the grooves. Debris can cause leaks from improper sealing and/or cause the o-ring to be damaged by the core during installation.

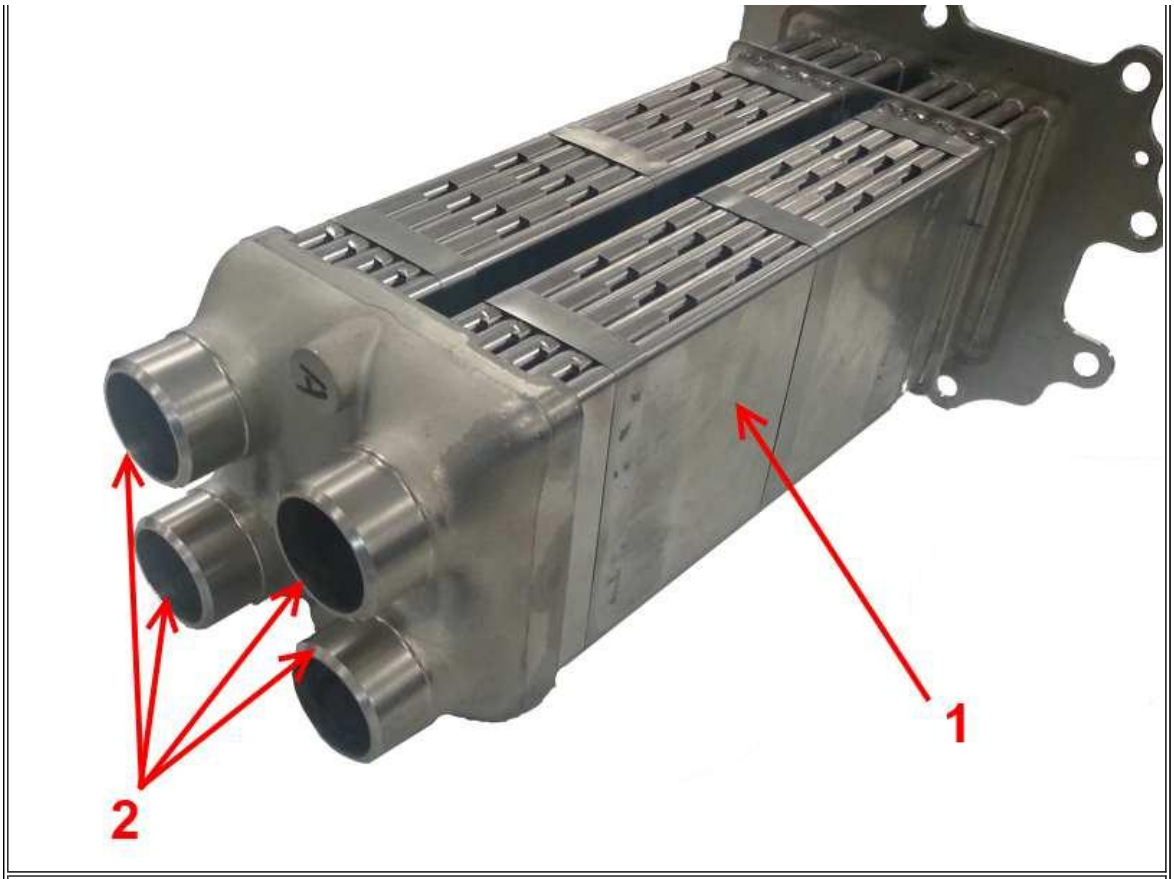

Figure 14: Low Temp Cooler Inlet Manifold

Item 1: Low Temp EGR Cooler Core
Item 2: Inlet Manifold Ports

4. Use P80 to lubricate the LT core inlet manifold and the four o-rings in the LT housing (**Figure 14**, Item 2).

5. Ensure proper orientation then insert the core into the housing and maneuver it into the o-rings.

WARNING
The core header plate must be less than a 1/2" from the housing face (core resting in o-rings) before driving the core in. Failure to comply will result in damage to the core, housing and tool.

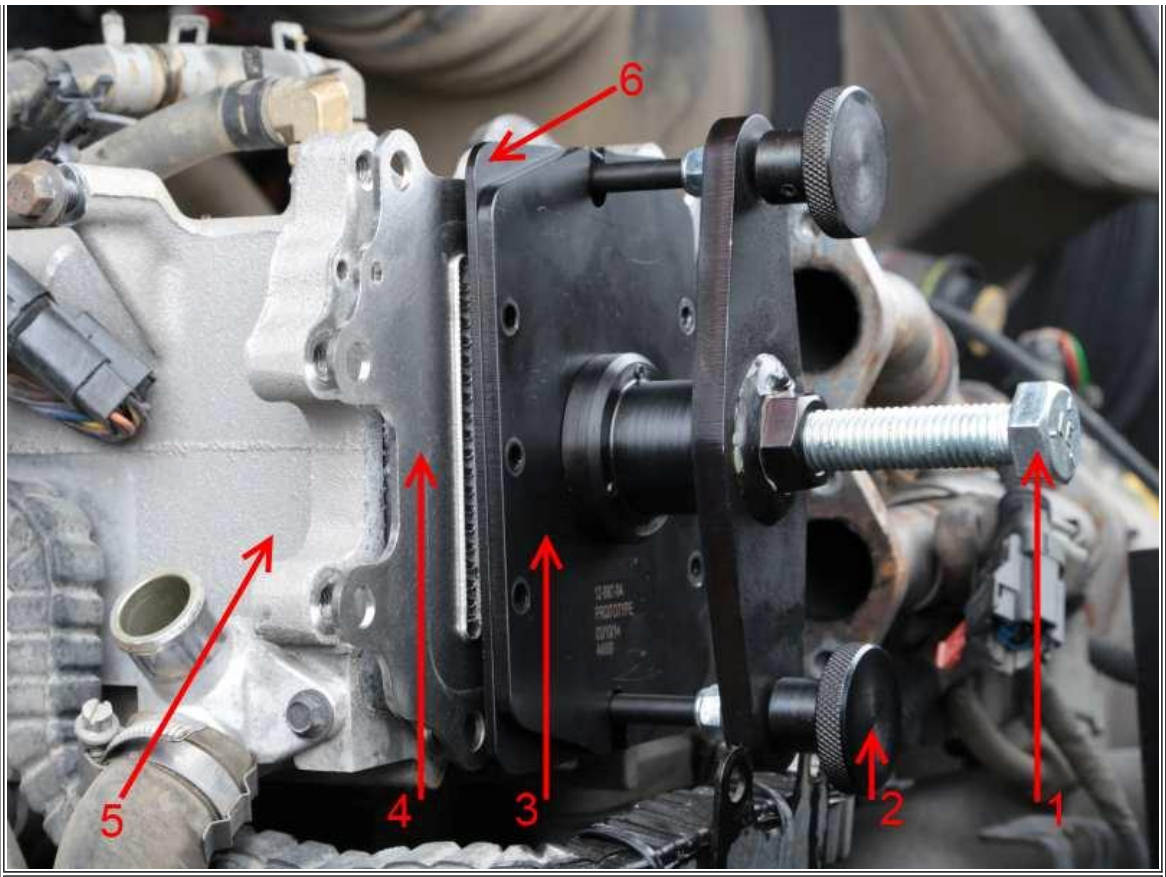

Figure 15: Low Temp Core Install Tool

Item 1: Insertion Bolt
Item 2: Thumb Screw
Item 3: Removal Plate
Item 4: LT Core
Item 5: LT Housing
Item 6: Installation Plate

6. Install the LT Core installation tool, per the tool instructions.

7. Press the EGR cooler core into the housing **until the core header plate makes contact with the housing seal**.

WARNING

DO NOT over-torque the bolt, as damage to the core may result. Typical installation will take less than 5 lb-ft of torque to drive the core in. It is normal for the core to sit a couple millimeters off the face of the housing, and will seat/seal when the front cover is installed.

WARNING

Never use the front cover to drive the core into the housing. Damage to the tube to header braze will result. Always use the tool, as it also aids in alignment of the core.

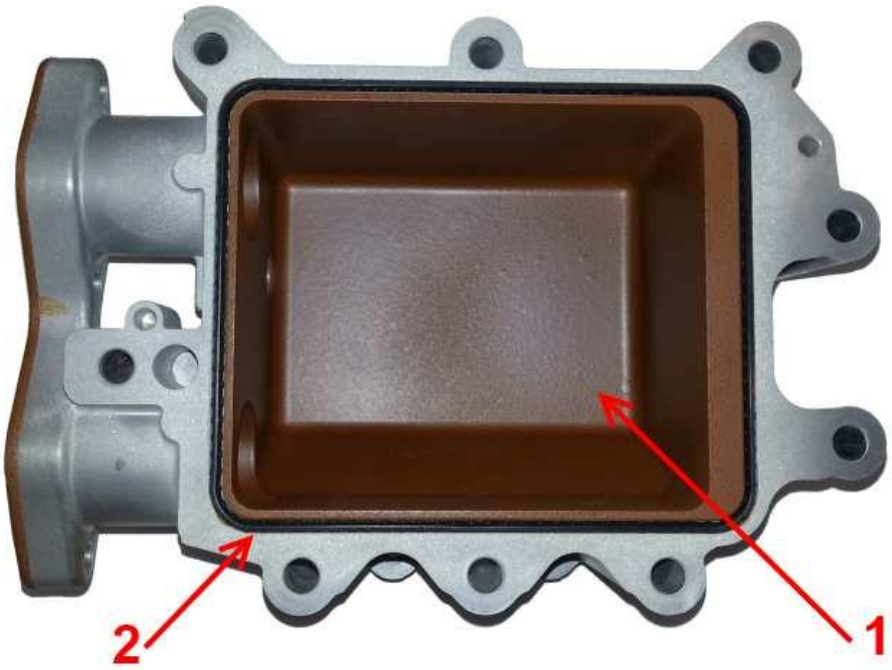

Figure 16: EGR Outlet Cover

Item 1: Front Cover
Item 2: Ring Seal

8. Inspect the front cover for reuse--Review IK1201087 - Front Cover Reuse Guidelines for direction.
9. Remove the seal from the groove and discard.
10. Insert the new seal from the LT Core kit.

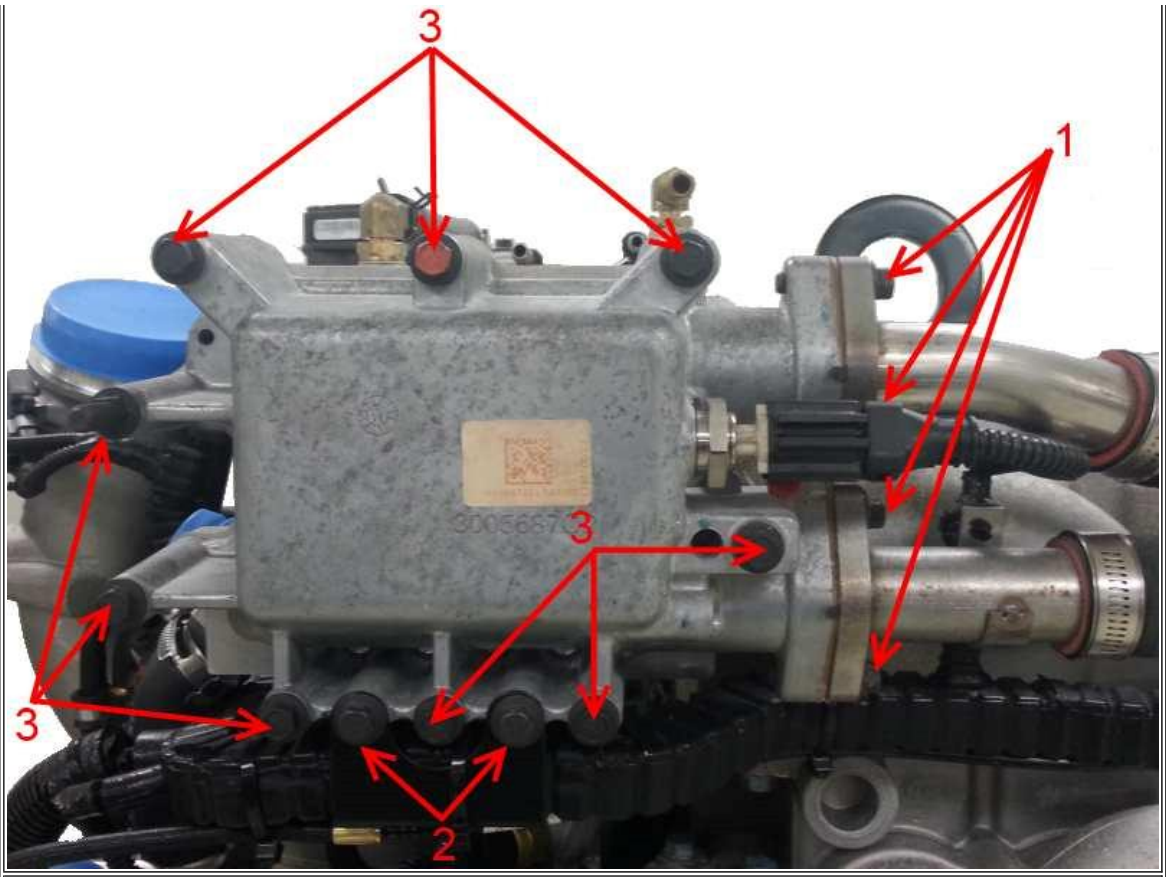

Figure 17: EGR Outlet Cover, Bolts and Tubes

Item 1: EGR Outlet Tube Bolts
Item 2: Engine Harness Bracket Bolts
Item 3: EGR Outlet Cover Bolts

11. Install the front cover, noting the location of the stud bolt in **Figure 17**.
12. Hand tighten all bolts then torque in a criss-cross pattern to 18 lb-ft (24 N-m).
13. Install the four bolts for the EGR outlet tubes, using new gaskets from the kit (**Figure 17**, Item 1).
    If the clamps were loosened and the hard tubes pulled out of the hoses, reinsert and tighten.
14. Install the two engine harness bracket bolts (**Figure 17**, Item 2).
15. Connect the EGRT sensor.

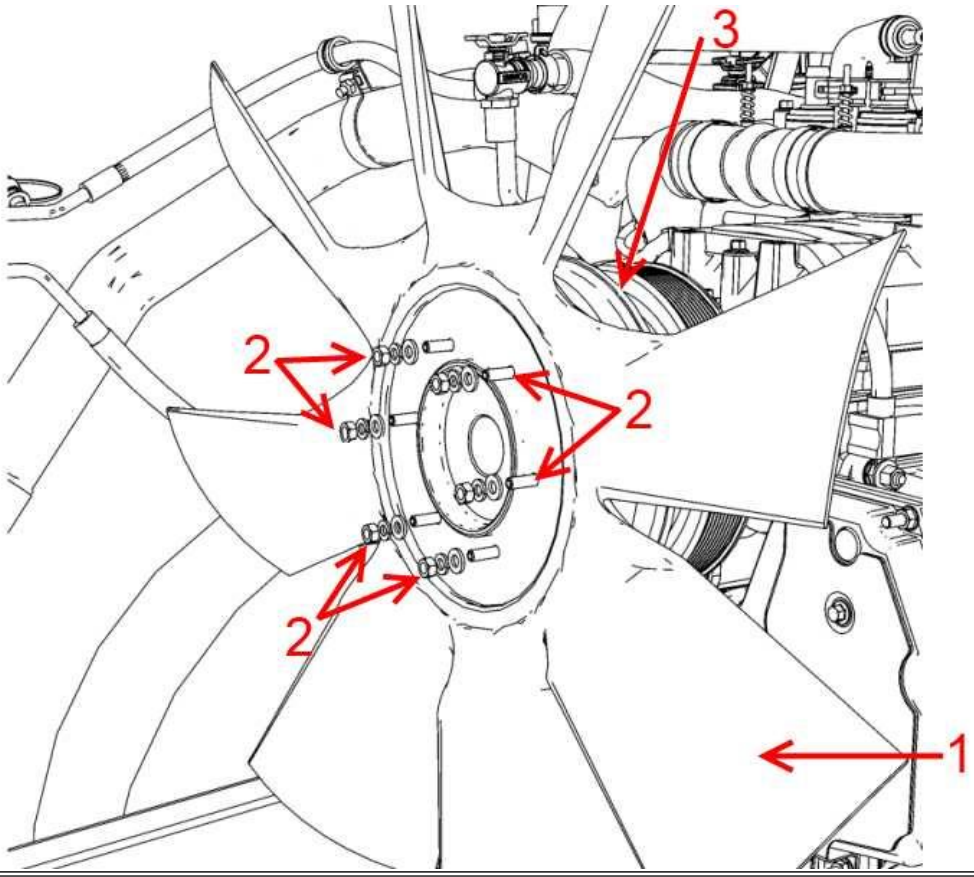

Figure 18: Cooling Fan

Item 1: Fan
Item 2: Fan Mounting Stud, Nut, Washer and Lock Washer
Item 3: Fan Clutch

16. Install the radiator fan onto the fan drive using the six flat washers, lock washers and then nuts. Torque to 28 lb-ft (38 N-m)

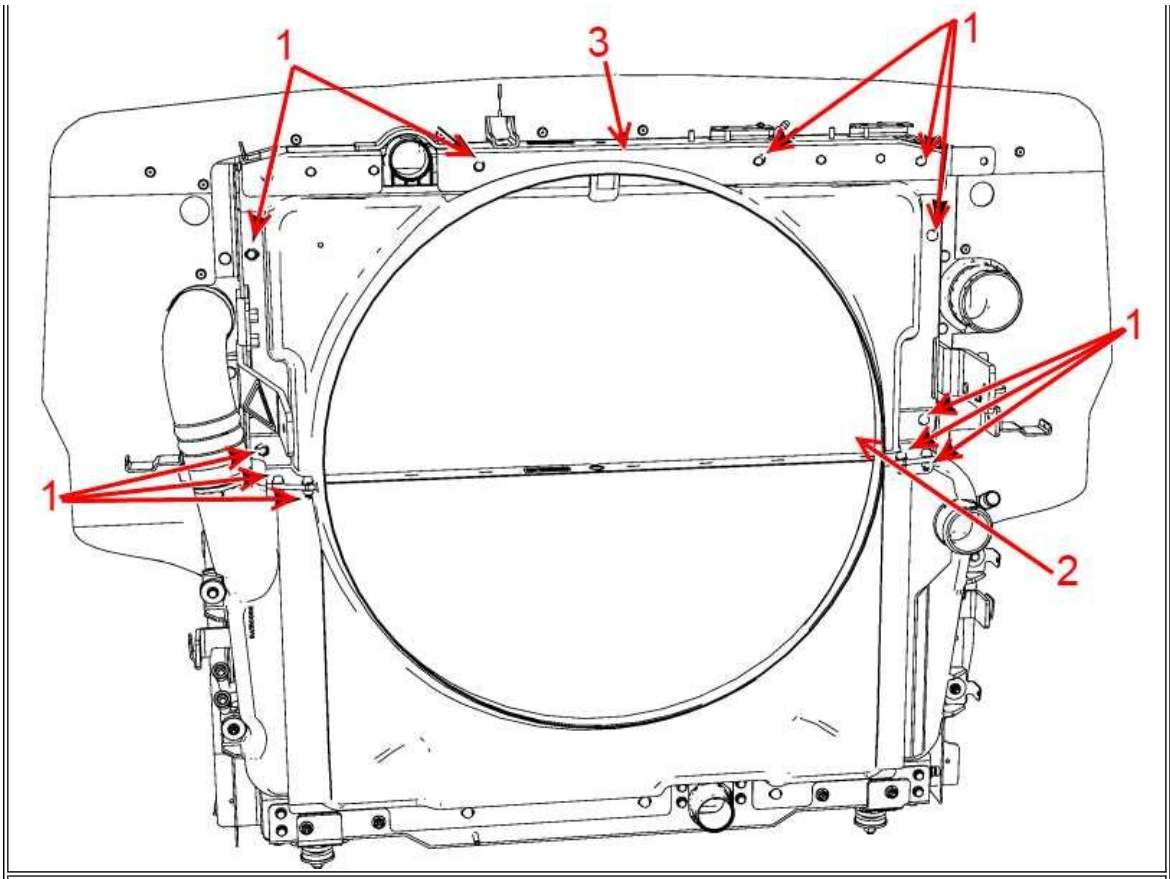

Figure 19: Radiator Fan Shroud

Item 1: Fan shroud fasteners
Item 2: Radiator
Item 3: Fan Shroud

17. Install the fan shroud to the radiator using the 11 bolts. Torque to 7 lb-ft (10 N-m).

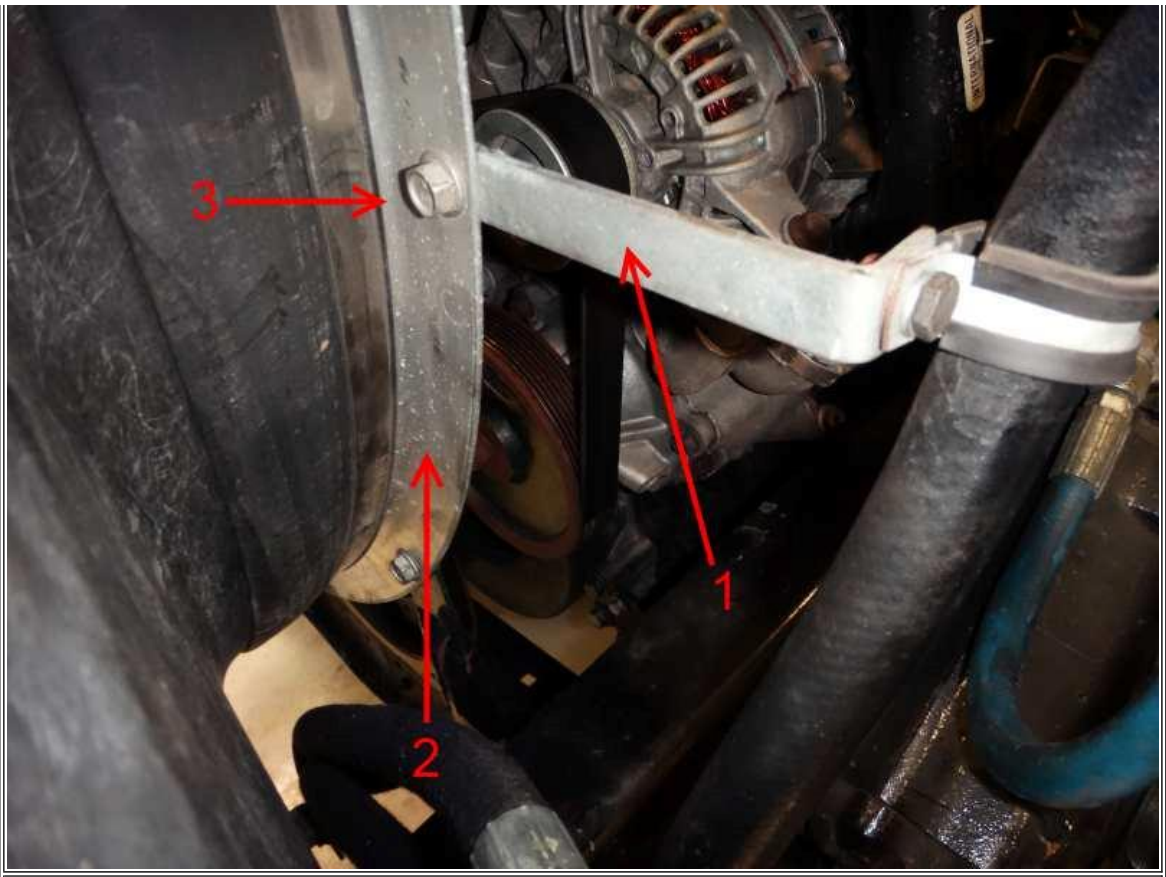

Figure 6: Power Steering Line Bracket

Item 1: Power Steering Bracket
Item 2: Fan Ring
Item 3: Bracket Bolt

18. Attach the power steering hose bracket to the fan ring. Torque the nut to 21 lb-ft (30 N-m)

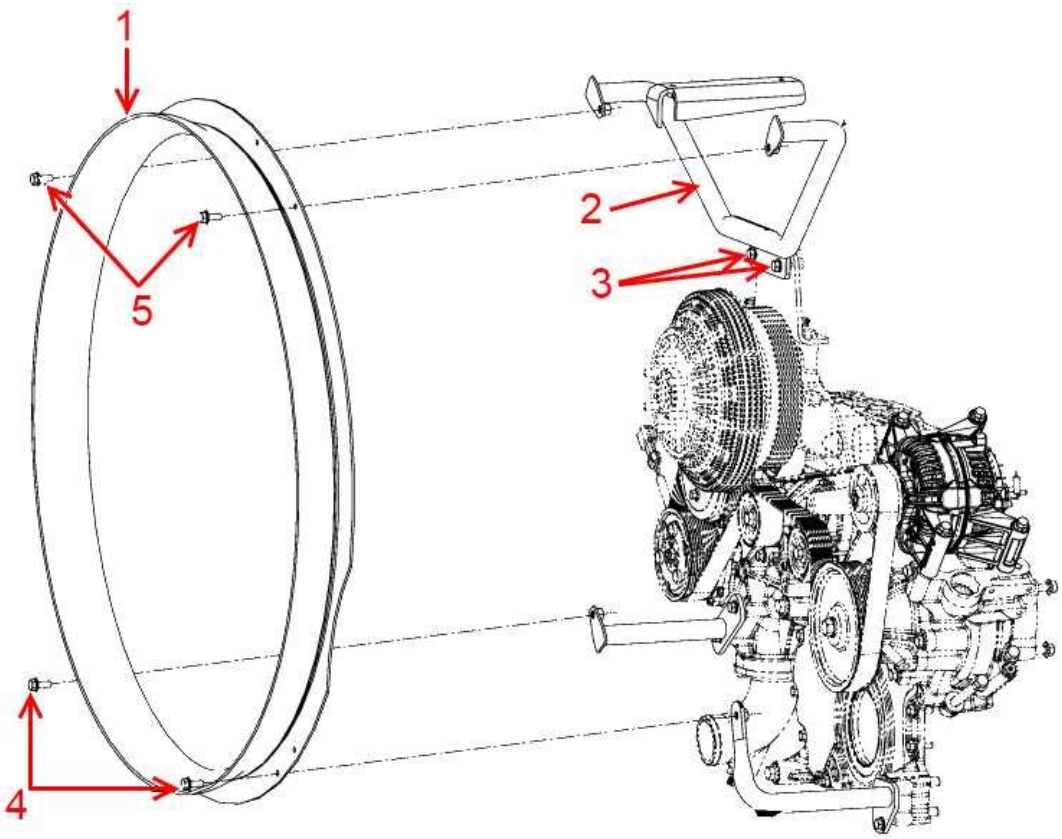

Figure 21: Fan Ring Assembly

Item 1: Fan Ring
Item 2: Upper Fan Ring Bracket
Item 3: Upper Bracket Mounting Bolts
Item 4: Lower Fan Ring Bolts
Item 5: Upper Fan Ring Bolts

19. Align the fan ring bracket with the fan ring and install the four nuts and bolts.

20. Install the two bolts securing the fan ring bracket to the fan drive bracket. Torque to 21 lb-ft (30 N-m).

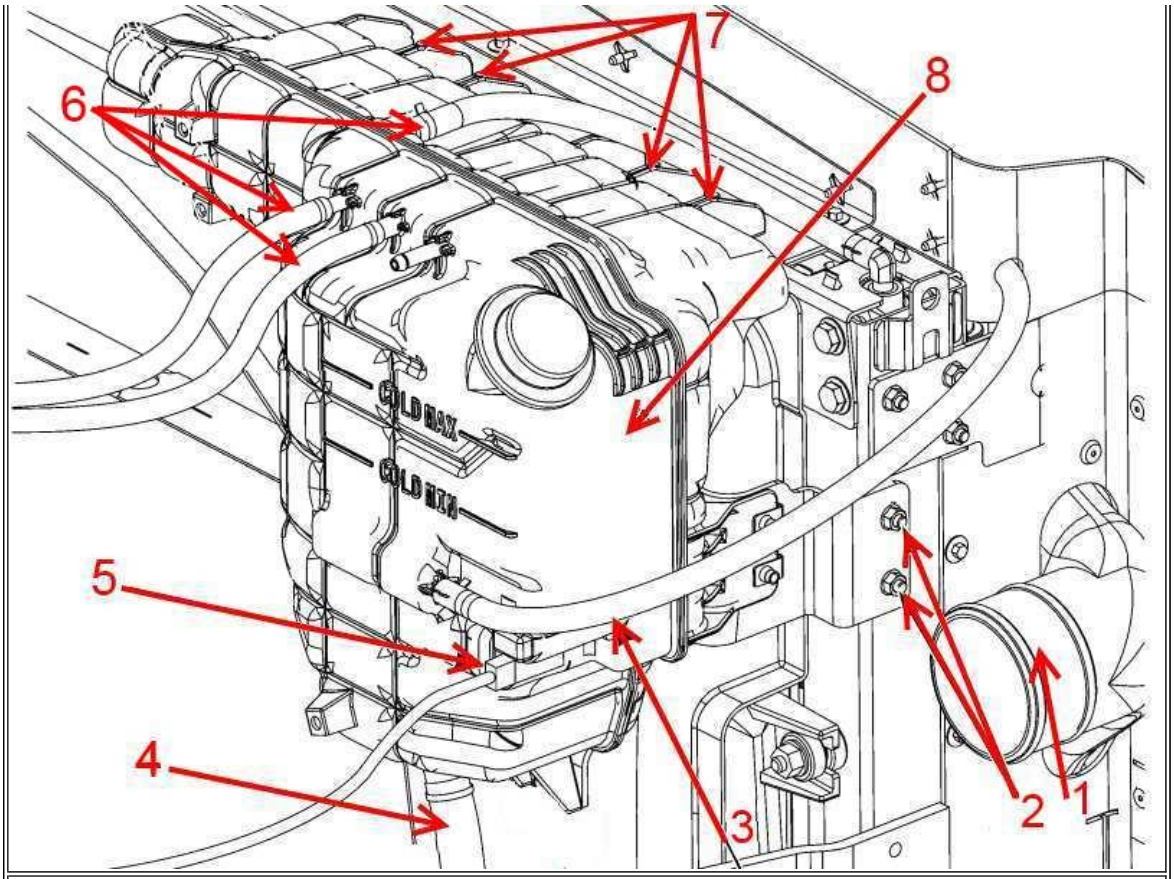

Figure 22: Dearation Tank Assembly

Item 1: HP CAC Inlet
Item 2: Dearation Tank Side Bracket
Item 3: Radiator Dearation Hose
Item 4: Coolant Return Hose
Item 5: Coolant Level Sensor
Item 6: Engine Dearation Hoses
Item 7: Upper Tank Mount
Item 8: Dearation Tank

21. Install the dearation tank and the four washers and nuts to the radiator studs (**Figure 22**, Item 7). Torque to 15 lb-ft (20 N-m).
22. Install the two tank bracket bolts (**Figure 22**, Item 2) and torque to 15 lb-ft (20 N-m).
23. Attach the dearation tank return hose and tighten (**Figure 22**, Item 4).
24. Attach the four dearation lines to the top of the tank (**Figure 22**, Items 3 & 6).
25. Connect the coolant level sensor wire harness (**Figure 22**, Item 5)
26. Fill the cooling system with the coolant management tool. Steps 25- can be performed while the system is filling.

NOTE
If the system is unable to maintain vacuum, perform a cooling system pressure decay test. If no external leaks can be found, pressure test the EGR Cooler using the leak detection tool.

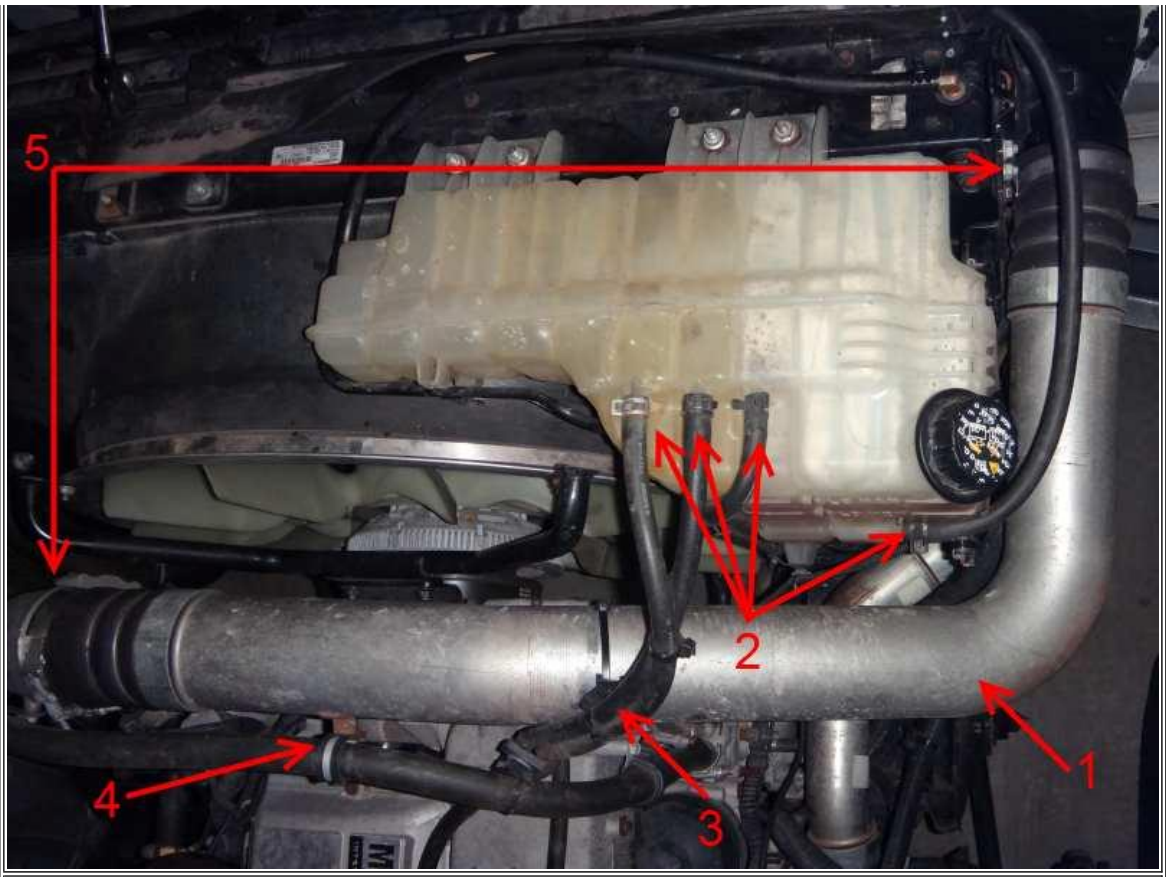

Figure 23: Dearation Tank Hoses and CAC Pipe

Item 1: CAC Outlet Pipe
Item 2: Dearation Hoses
Item 3: Dearation Line Zip-Tie
Item 4: LTR Hose Clamp
Item 5: CAC Clamps

27. Install the HP CAC pipe (**Figure 23**, Item 5). Torque to 6 lb-ft (8 N-m).
28. Secure the LTR supply hose to the HP CAC with the p-clamp, nut and bolt.
29. Secure the dearation hoses to the HP CAC with a saddle clamp and zip-tie.

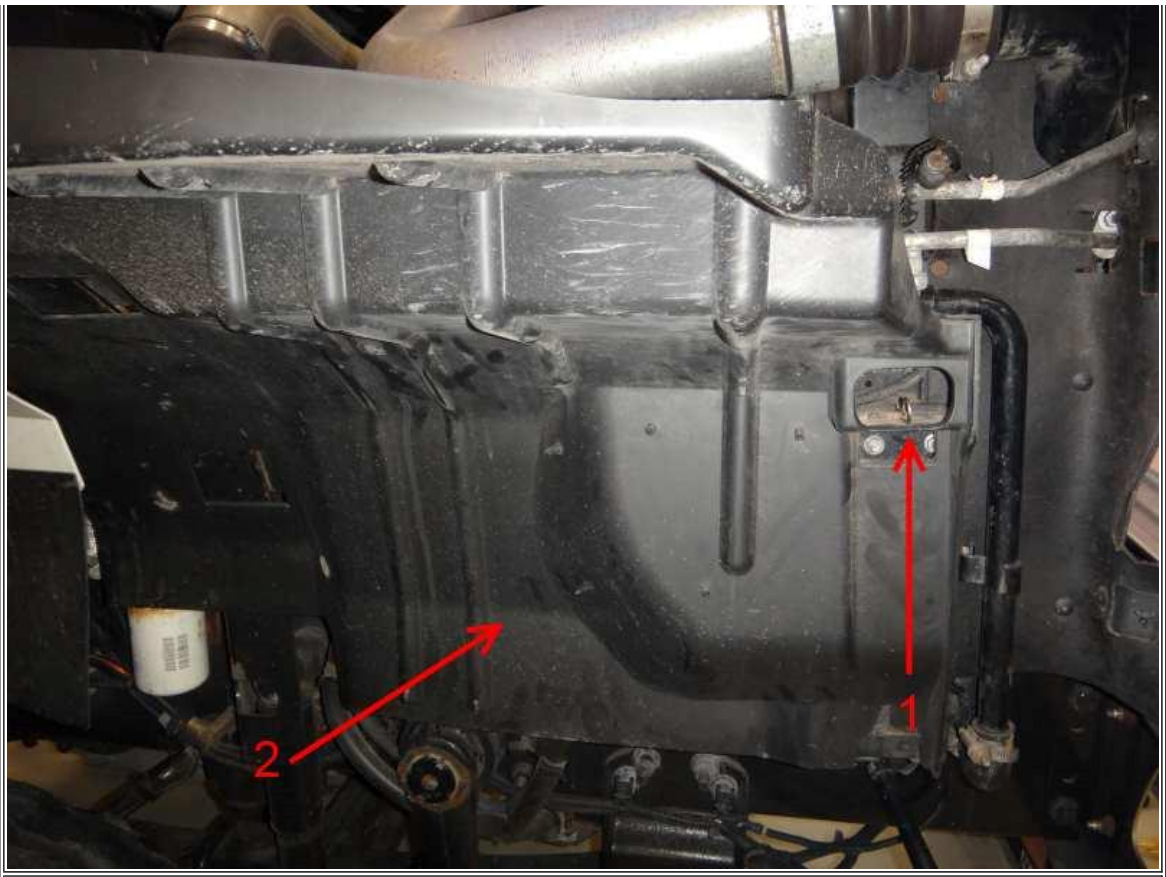

Figure 24: WorkStar Fender Well

Item 1: Fender liner retention pin
Item 2: Inner fender liner

30. Install the passenger side inner fender and secure with the pin.
31. Install the driver side inner fender and secure with the pin.
32. Connect the battery cable.
33. Per best practice, verify repair.

For an internal leaking cooler

Replace the engine oil and filter for coolant contamination and follow FCAP 724-20 for Lambda Sensor Diagnostics (contamination) and Relearn.
Provide the customer with oil change information.

2010-2013 MaxxForce 11
2010-2013 MaxxForce 13
2013-2014 N13

WARRANTY INFORMATION

Warranty Claim Coding:

Group:	12000 - Engine
Noun:	892 - Cooler, EGR

Standard Repair Times:

Step	Description	SRT	Hours
All	LT Core Removal/Installation	N12-7892U	2.1
	LT Core R&R during HT replacement (add-on)		0.3
32	Cooling System Leak Test	A09-9022A	0.3
	EGR Cooler Pressure Test (in chassis, LT leak only)	N12-7892U-4	2.6
	EGR Cooler Pressure Test (add-on if cooler rep'd)	N12-6892U-1	0.8
	Lambda Sensor Replacement or Relearn (review iKNow)	FCAP	
	Engine Oil and Filter Change	A12-1889U	0.6

SRT Manual

OTHER RESOURCES

2010 MaxxForce 11/13 Resource Center (IK1200548)
2010 MaxxForce 11/13 EGR Cooler Resource Center (RC1200004)
2010 MaxxForce 11/13 Diagnostic Manual
2010 MaxxForce 11/13 Service Manual

LT Core Removal/Install Tool Instructions (TL2900085)
Front Cover Reuse Guidelines (iKNow 1201087
EGR Low Flow (2659-21) (iKNow 1201100)
ProStar Instructions (iKNow 1201096)
TranStar Instructions (iKNow 1201097)
HT Core Removal/Installation (iKNow 1201113)

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