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

Applies To: 2010 MaxxForce 11/13, N13, ProStar+113, ProStar+122

CHANGE LOG

2015/09/16 - Updated O2 Sensor Relearn Procedure reference to manual.
2015/09/14 - Updated SRT to link to repair times.
2015/07/30 - Fixed hyperlinks, minor formatting revisions,
2014/06/12 - Added link to Video Instructions on LMS, in the repair procedure.
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 ProStar+113 or ProStar+122 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	Engine Coolant Level Below Critical Warning
SPN 2659 FMI 21	EGR Low Flow Detected

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 Tool	12-892-04		Link
Coolant Management Tool	KL5007NAV		Link
EGR Leak Detection Kit	12-892-02	Only if necessary	Link

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
Kit, LT Seal	2512193C91		Leak between LT housing and joint plate
P-80 Assembly Lube	2511097C1		Case of 6 Pints

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 passages is still enough to cause bubbles when putting pressure to the LT.

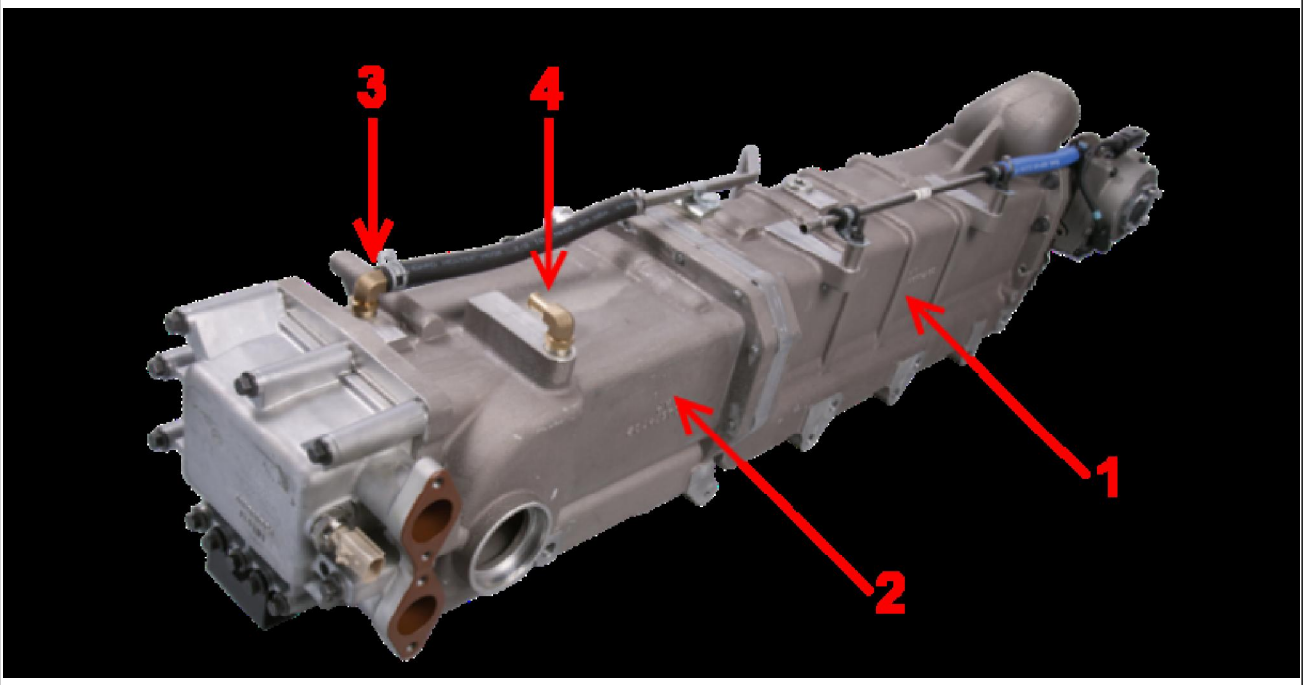

Figure 1: 2010 MaxxForce 11/13 EGR Cooler Assembly

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)

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. A separate (add-on) SRT is listed below, for this situation.

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.

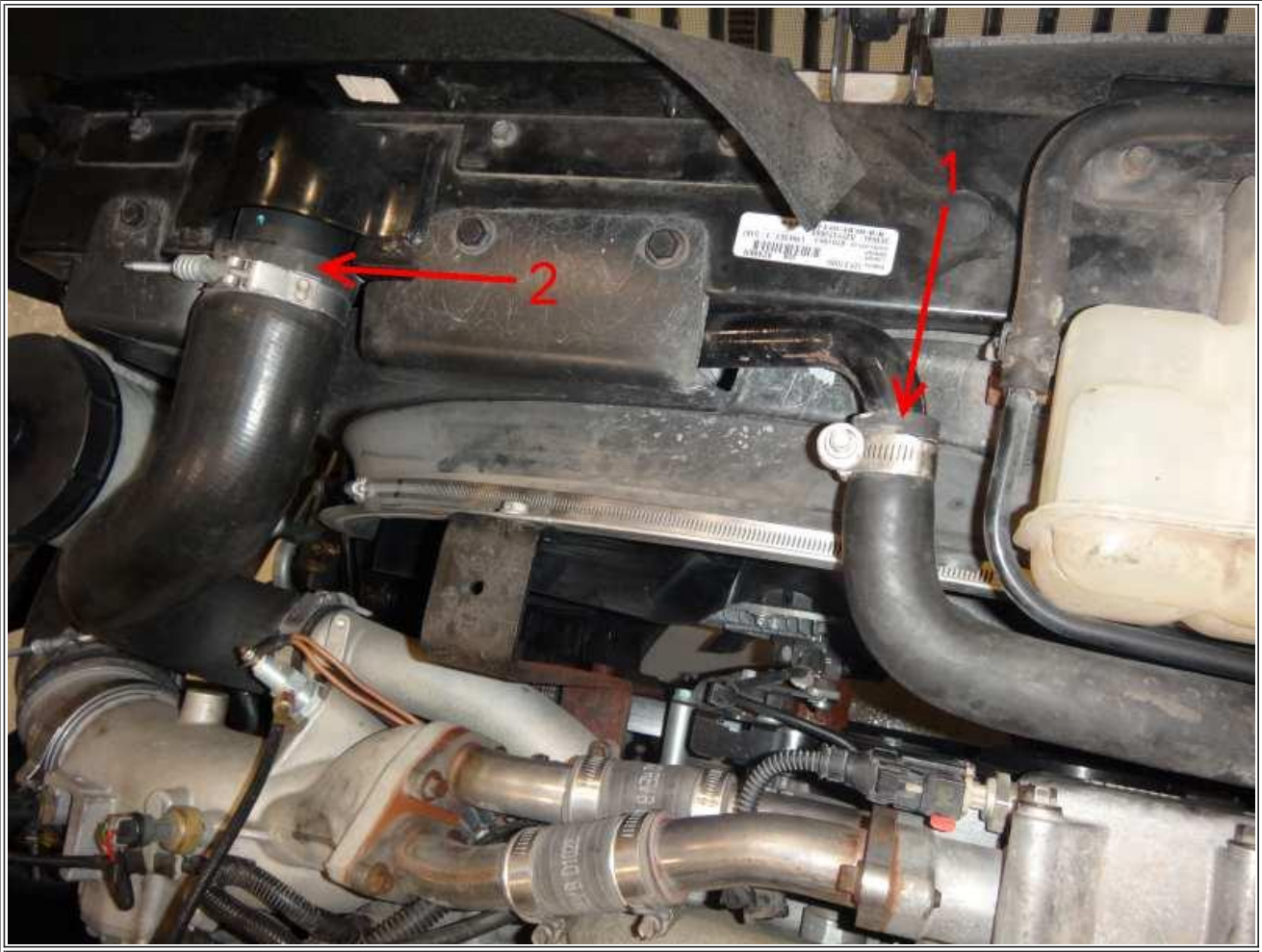

Figure 2: Top of Radiator

Item 1: Low Temp Radiator Hose
Item 2: Radiator Hose

3. Remove the Low Temp Radiator (LTR) hose (**Figure 2**, Item 1).

4. Remove the Radiator hose (**Figure 2**, Item 2)

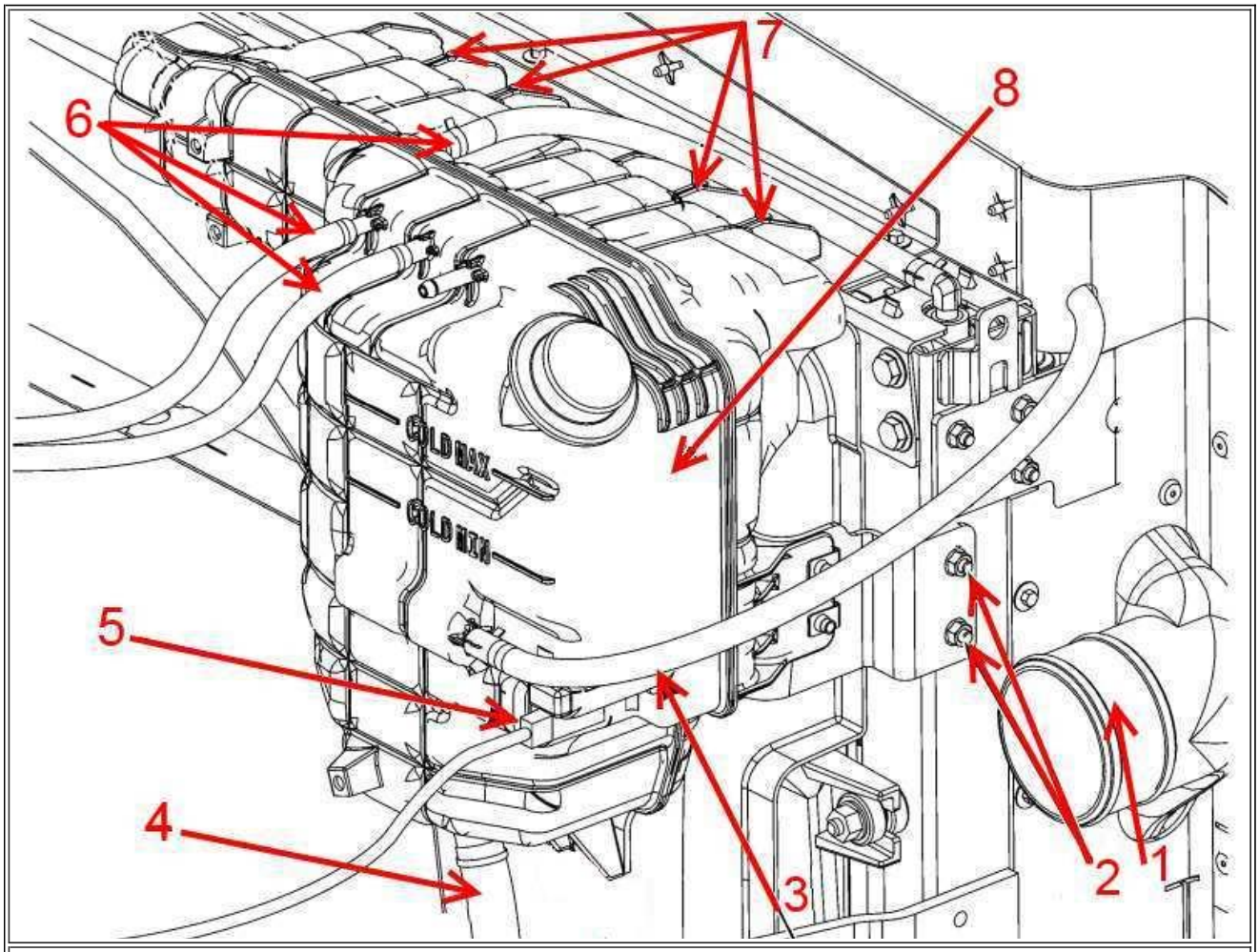

Figure 3: Dearation Tank Assembly

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

5. Loosen the clamp and remove the driver side HP CAC inlet pipe (**Figure 3**, Item 1).

6. Remove the 3 or 4 dearation lines from the tank (depending on configuration. **Figure 3**, Items 3 & 6).

For ProStar+113, continue with Steps 7 through 11.
For ProStar+122 skip to Step 12 (dearation tank does not need to be removed).

7. Disconnect the engine harness from the Engine Coolant Level Sensor (**Figure 3**, Item 5).

8. Remove the dearation tank return hose (**Figure 3**, Item 4).

9. Cut any zip ties holding the LT radiator hose to the tank.

10. Remove the two nuts securing the mounting bracket to the radiator (**Figure 3**, Item 2).

11. Remove the four nuts securing the top of the tank to the radiator (**Figure 3**, Item 7), and remove the dearation tank.

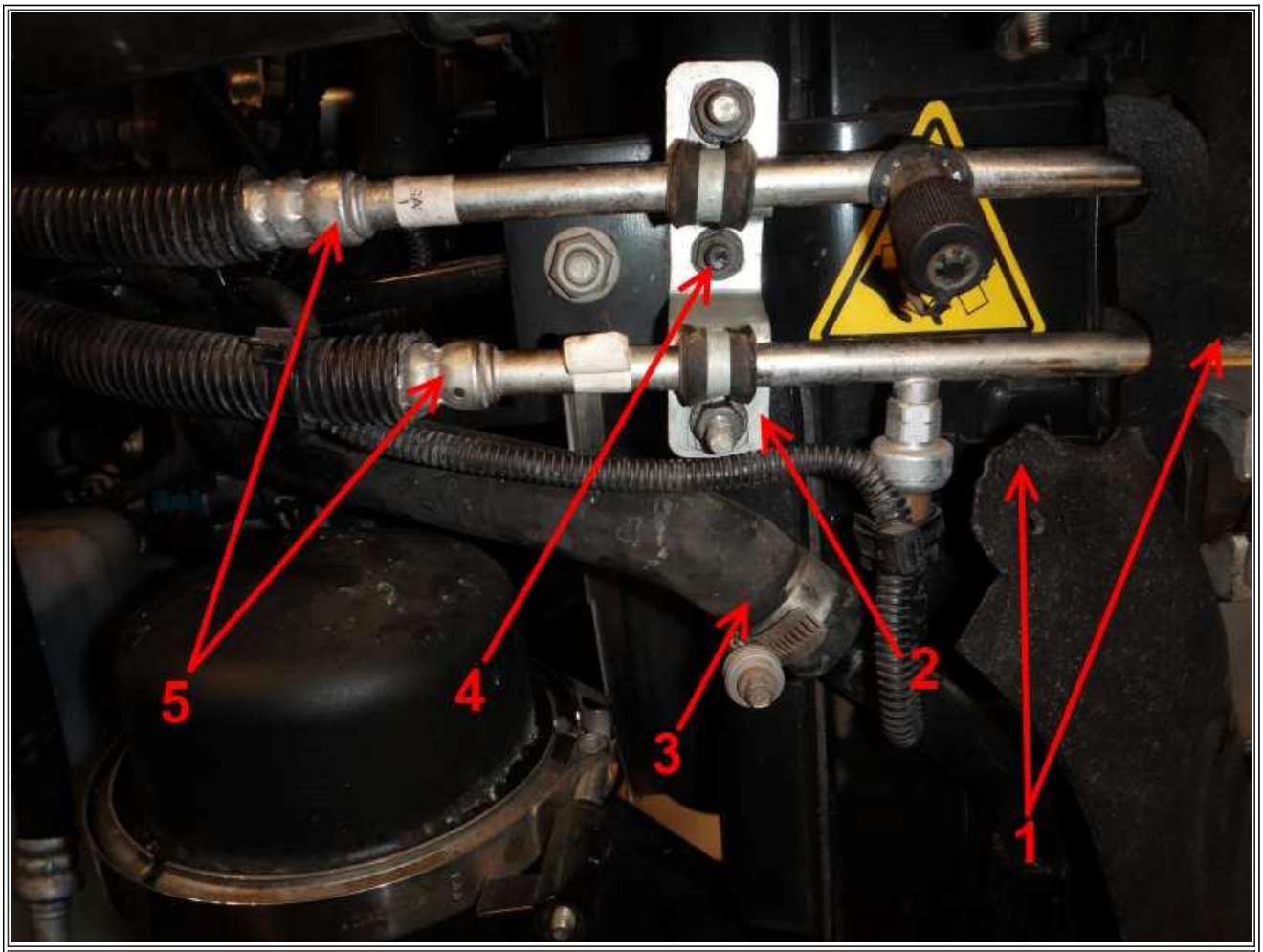

Figure 4: A/C Line Bracket

Item 1: Recirculation Seal
Item 2: A/C Line Bracket
Item 3: Low Temp Radiator Hose
Item 4: A/C Bracket Nut
Item 5: A/C Lines

12. Remove the nut securing the A/C condenser line bracket to the radiator (**Figure 4**, Item 4).

13. Loosen the hose clamp and remove the Low Temp Radiator (LTR) return hose from the return tube (**Figure 4**, Items 3).

14. Cut the recirculation seal to allow the condenser to swing around the engine (**Figure 4**, Item 1).

NOTE
It is common for this seal to have been cut in a prior repair. If this is the case, skip this step.

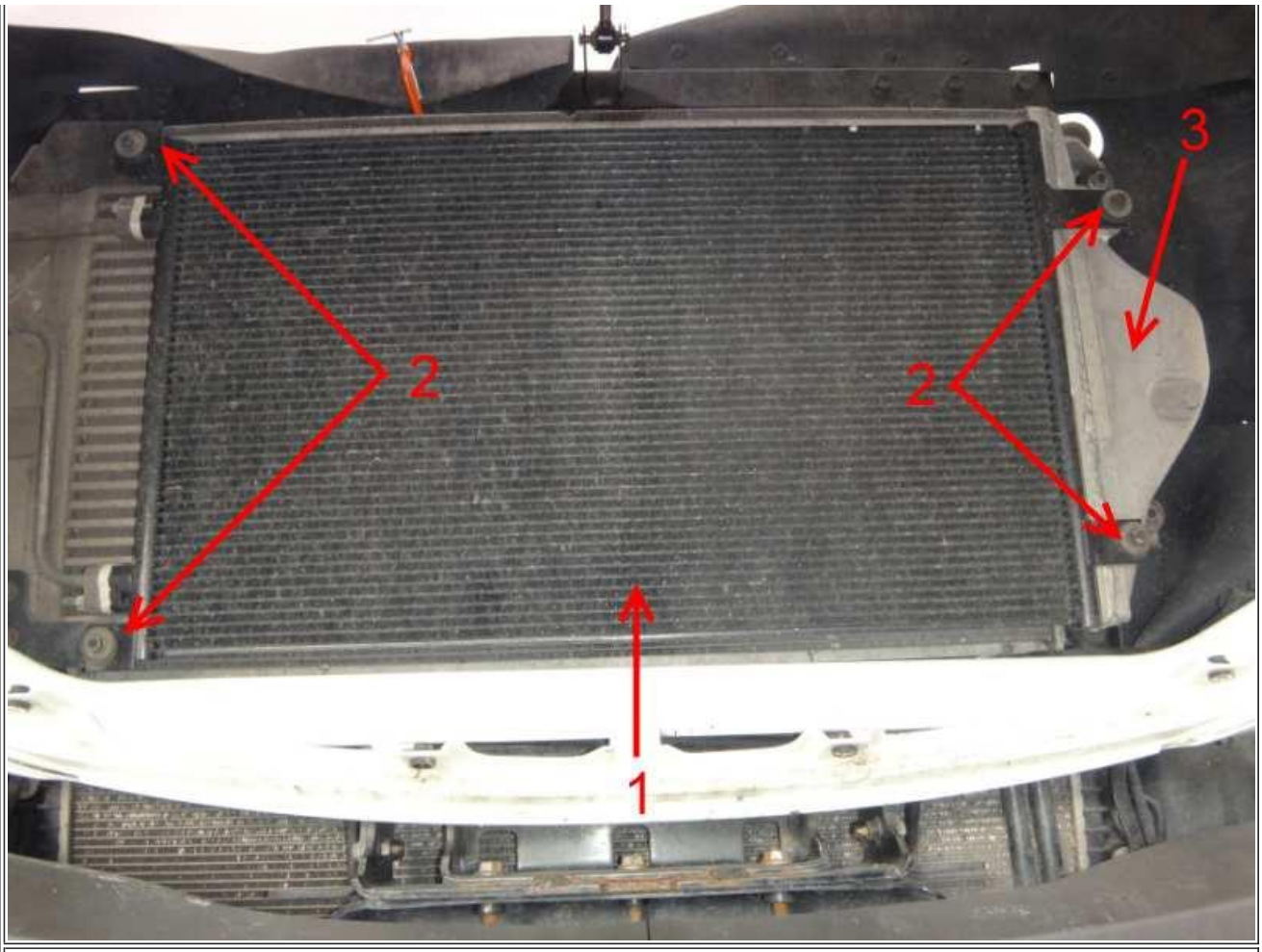

Figure 5: A/C Condenser Mounting

Item 1: A/C Condenser
Item 2: Condenser Mounting Nuts/washers
Item 3: High Pressure Charge Air Cooler

15. Remove the four nuts and washers securing the A/C condenser to the HP CAC (**Figure 5**, Item 2).

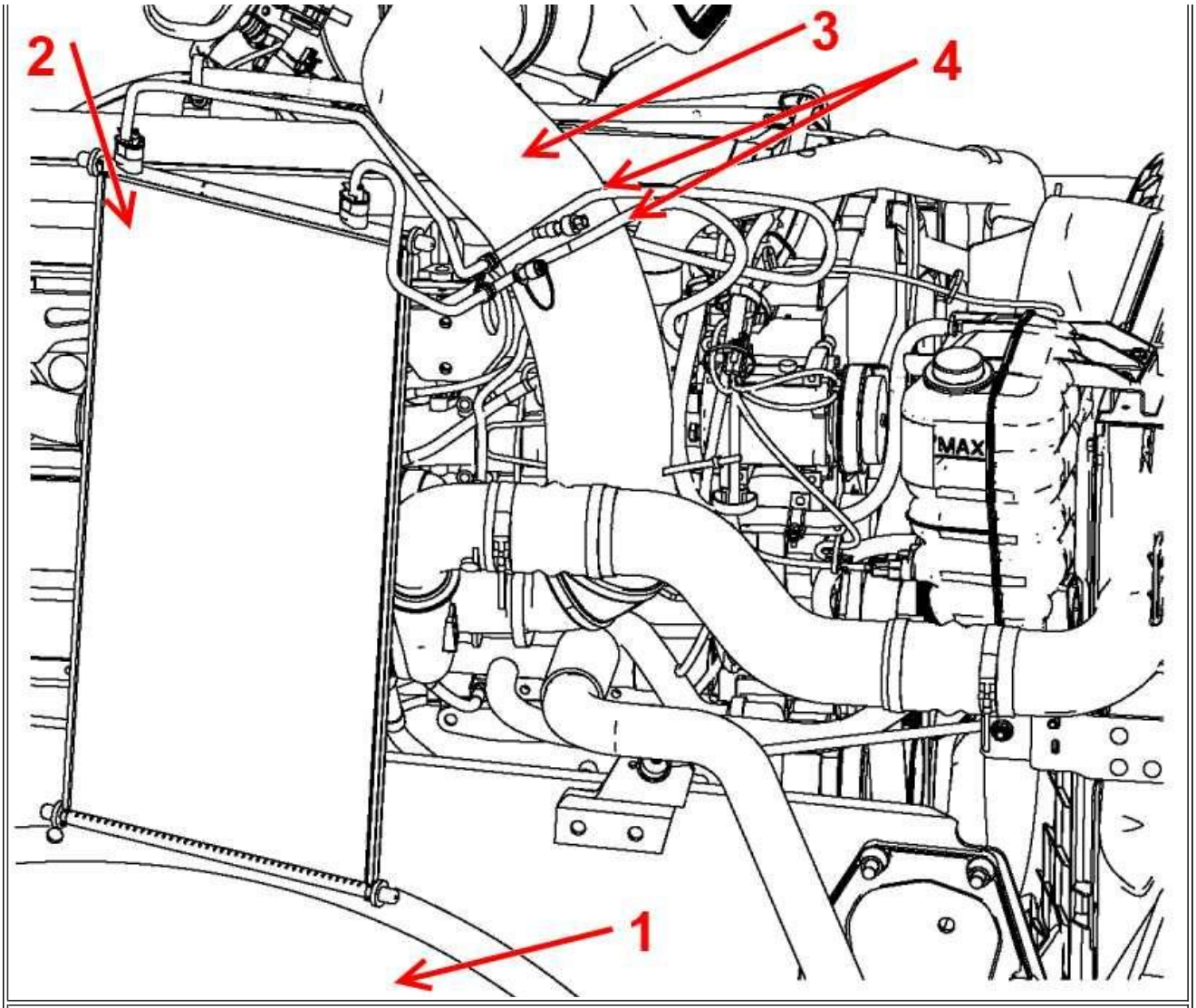

Figure 6: A/C Condenser Repositioning

Item 1: Passenger Front Tire
Item 2: A/C Condenser
Item 3: Air Intake Pipe
Item 4: A/C Lines

16. Carefully flip the A/C condenser over the cooling package and rest the driver side on the passenger front tire (**Figure 6**). Secure the A/C lines to the intake pipe using a bungee cord or zip tie.

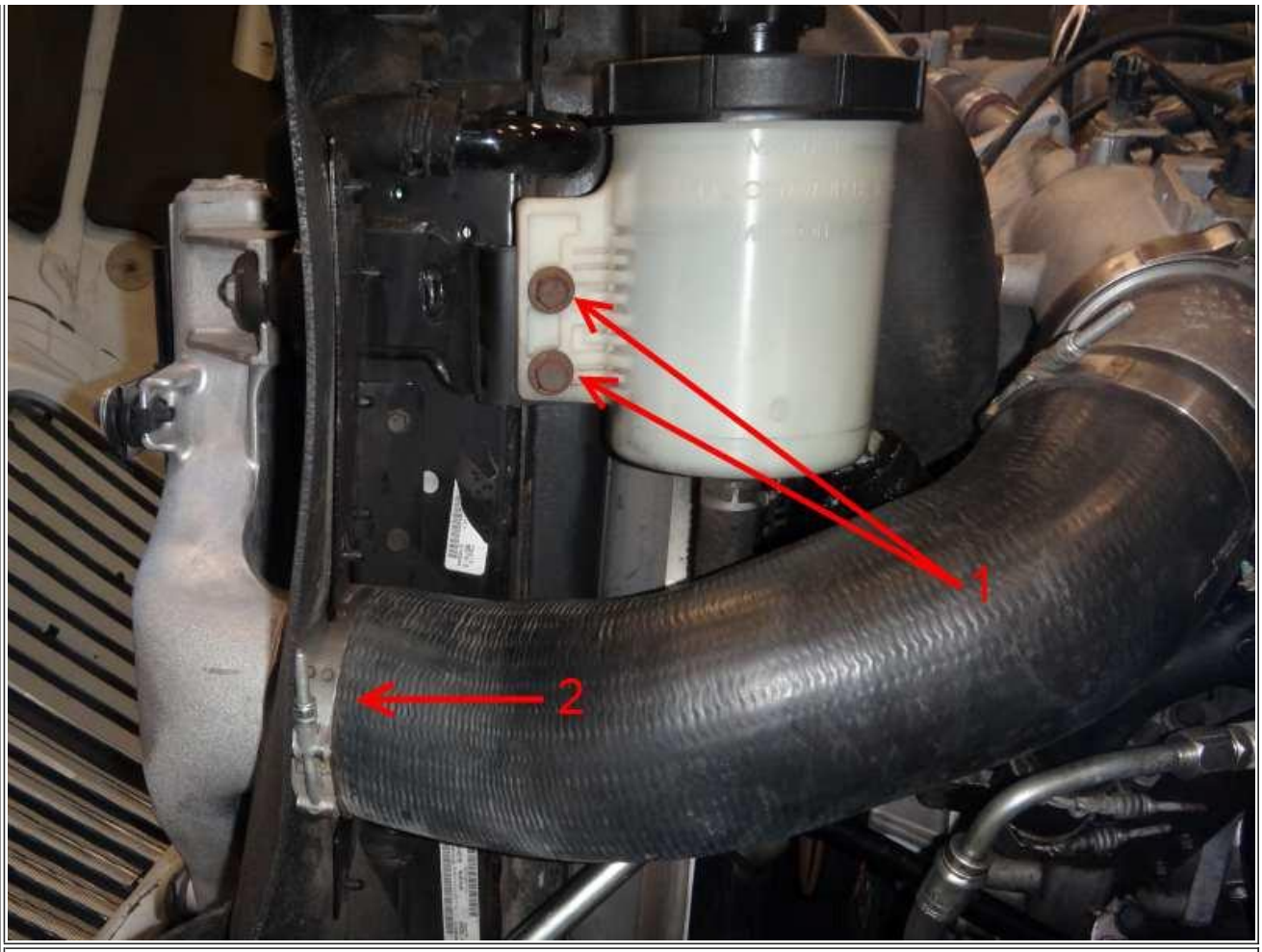

Figure 7: Driver Side HPCAC

Item 1: Power Steering Reservoir Bolts
Item 2: HPCAC Clamp/hose

17. Loosen the driver side HPCAC outlet clamp and disconnect the HPCAC pipe (**Figure 7**, Item 2).

18. Remove the two power steering reservoir bolts, and reposition away from the radiator (**Figure 7**, Item 1).

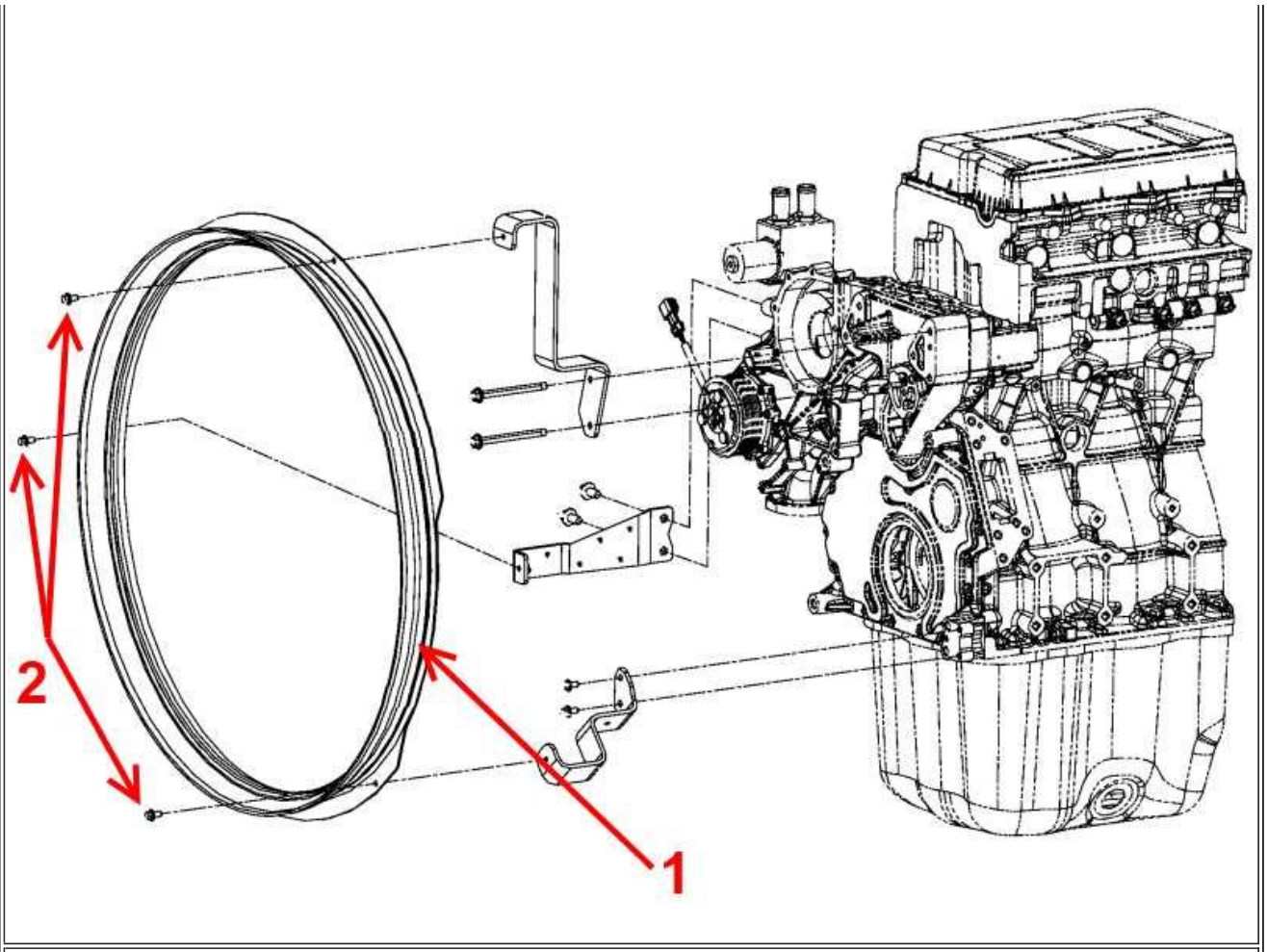

Figure 8: Fan Shroud Ring

Item 1: Fan Ring
Item 2: Fan Ring Bolts

19. Remove the three bolts securing the fan shroud ring to their respective brackets (**Figure 8**, Item 2).

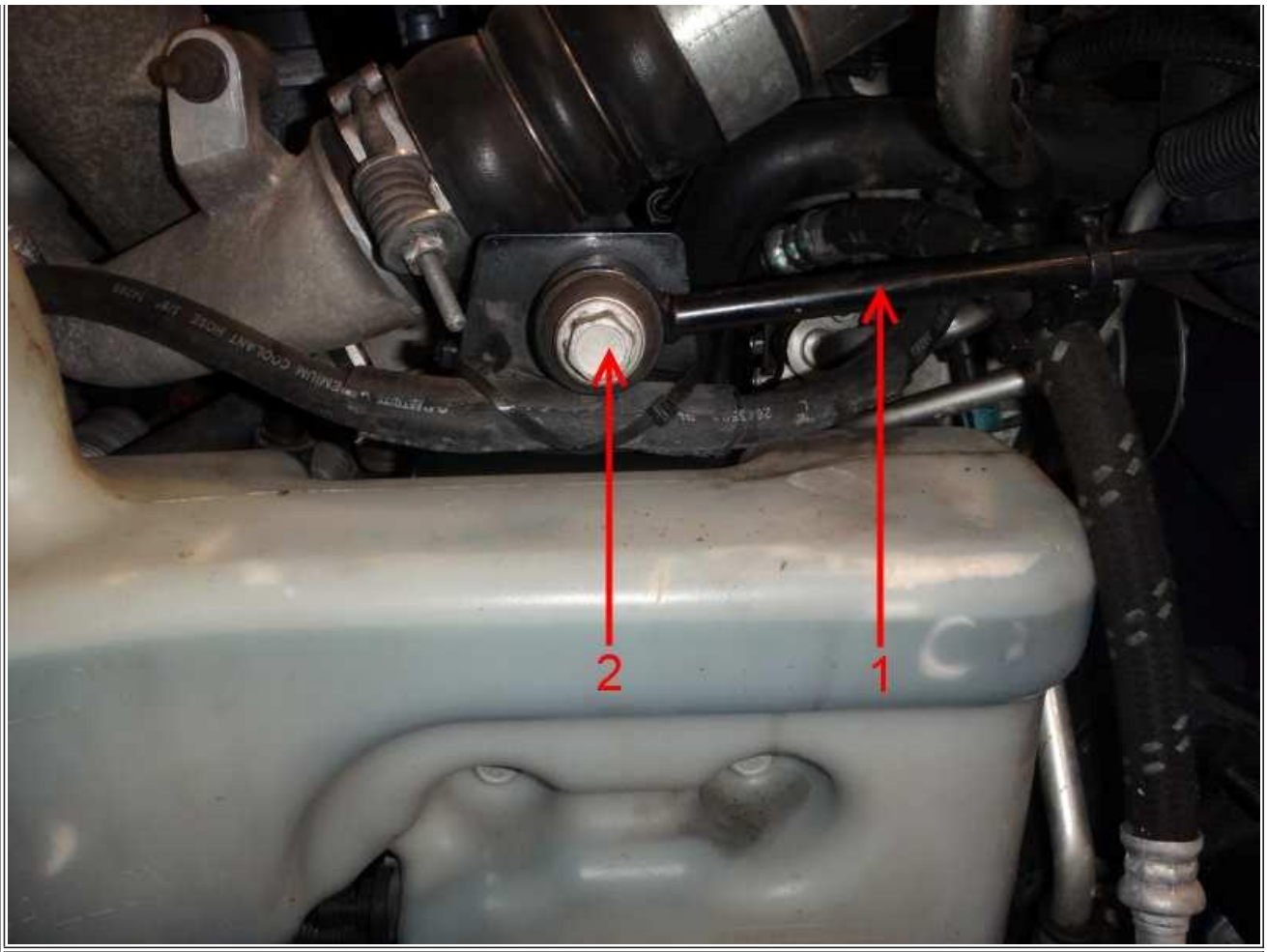

Figure 9: Passenger Side Radiator Support

Item 1: Radiator Support Rod
Item 2: Support Rod Nut/Bolt

20. Remove the nut and bolt from the passenger side radiator support rod.

Figure 10: Driver Side Radiator Support

Item 1: Support Rod Nut/Bolt
Item 2: Radiator Support Rod

21. Remove the nut and bolt form the driver side radiator support rod.

22. Tilt the cooling package forward, allowing room for LT Core removal.

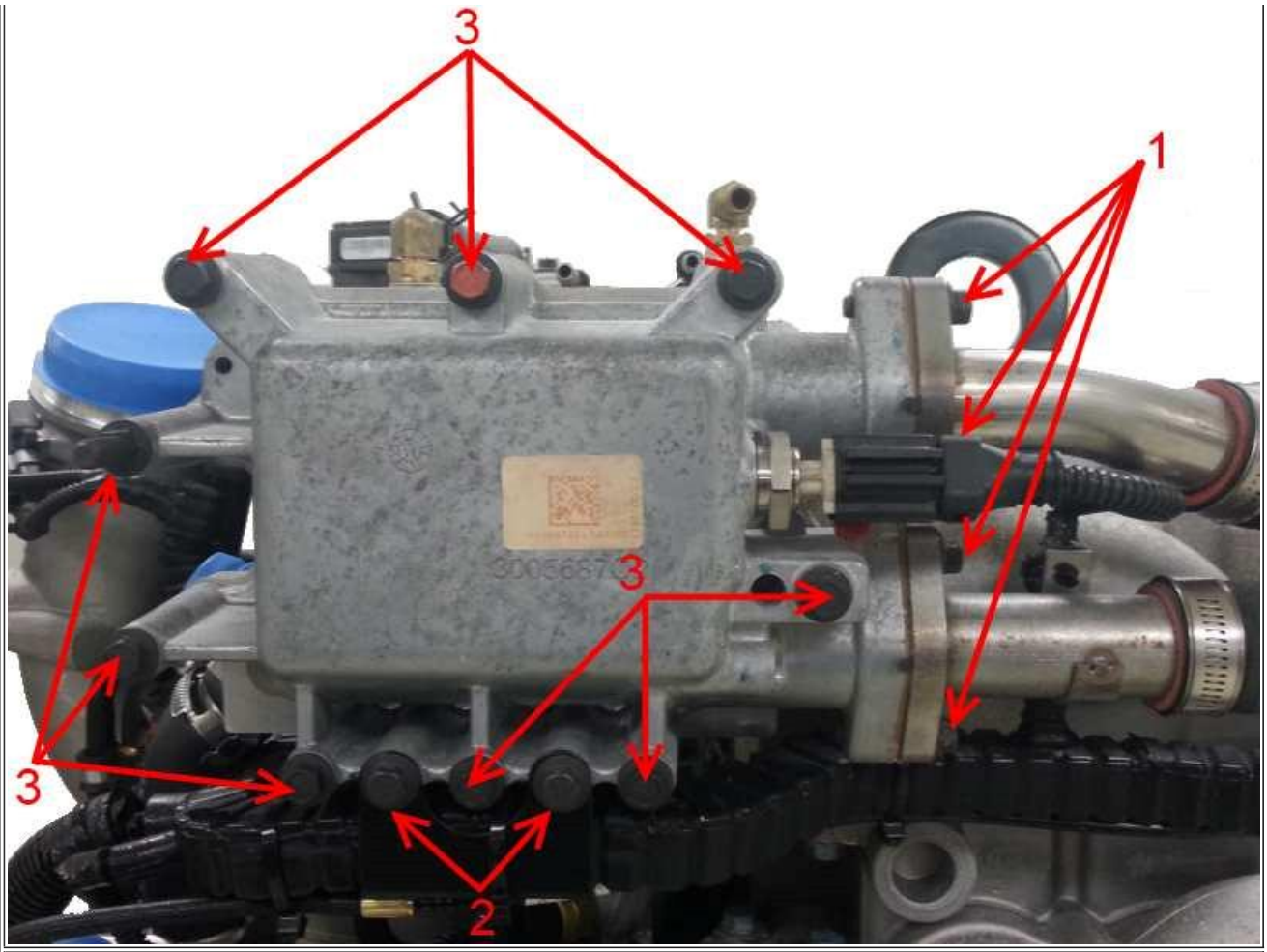

Figure 11: EGR Outlet Cover, Bolts and Tubes

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

23. Disconnect the engine harness from the EGR Temperature (EGRT) sensor.

24. Remove the four bolts holding the outlet tubes to the front cover--discard the gaskets (**Figure 11**, Item 1).

25. Remove the two bolts holding the engine harness, and reposition as necessary, for front cover removal (**Figure 11**, Item 2).

26. Remove the eight bolts and one stud bolt from the front cover, and remove (**Figure 11**, Item 3).

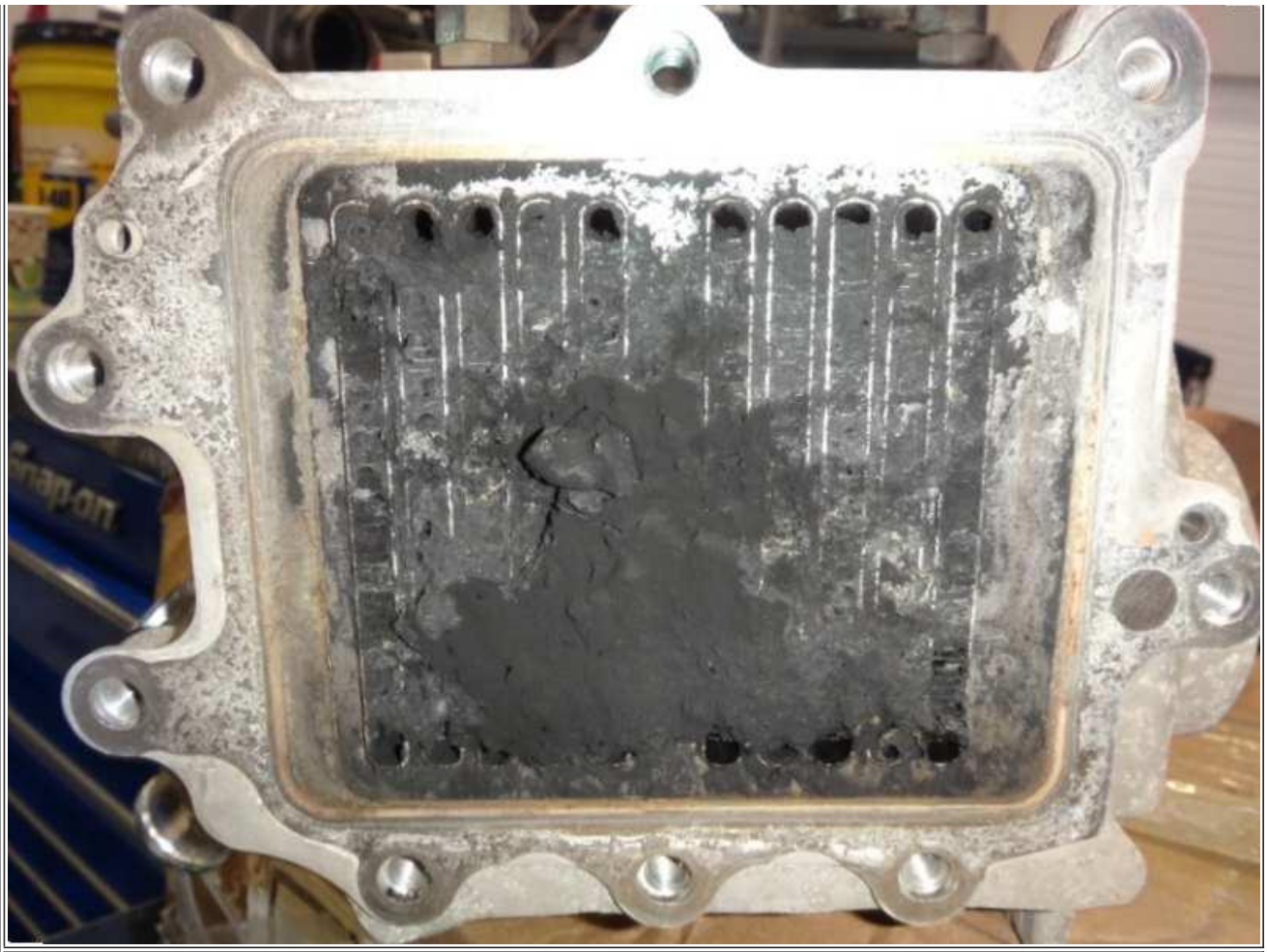

Figure 12: Soot Build-Up on the Core Face

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

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

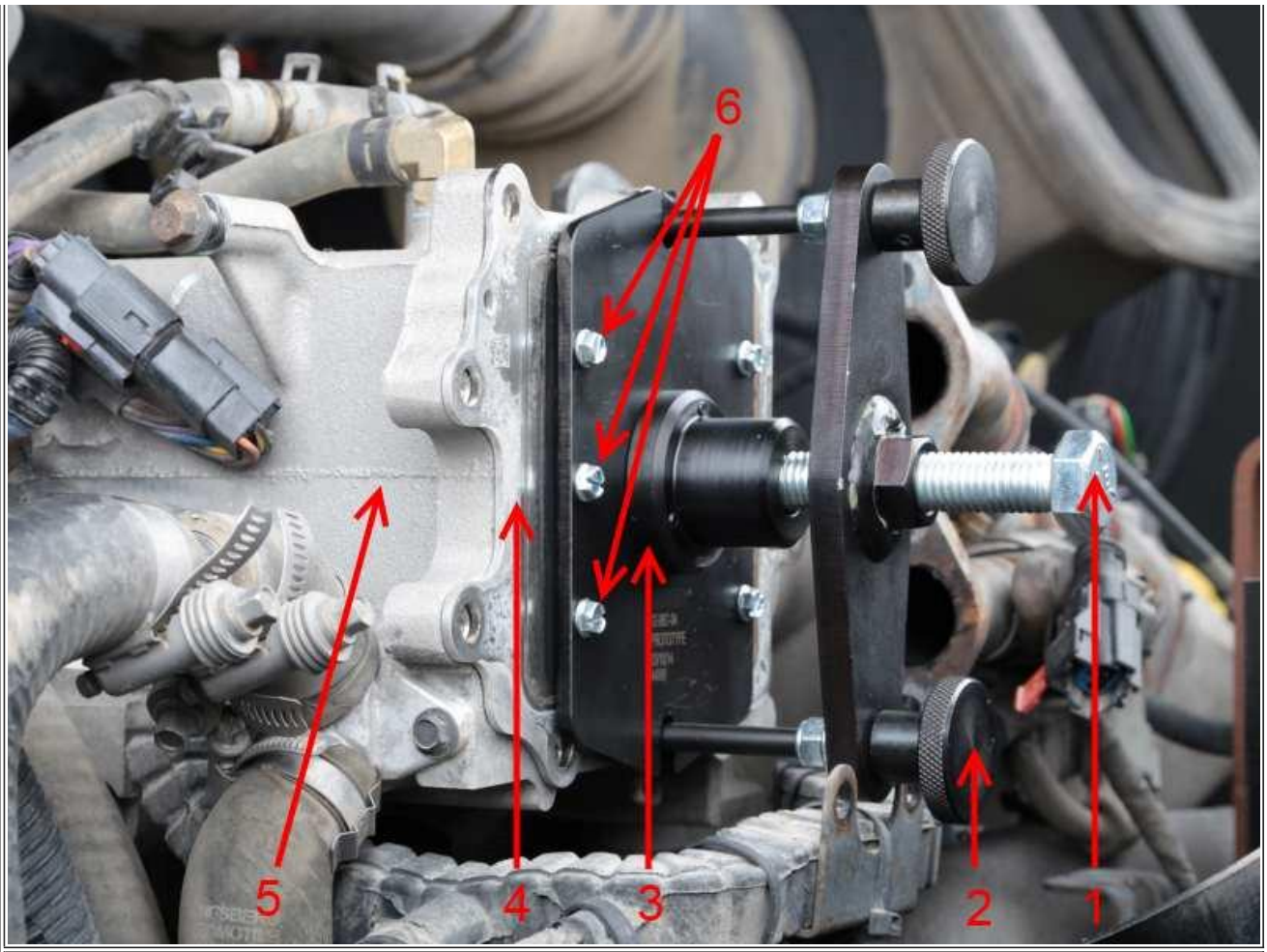

Figure 13: Low Temp EGR Core Extractor

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

28. Install the LT EGR Core Puller Tool (12-892-04), per the tool instructions.

29. Back out the bolt (**Figure 13**, Item 1) until the core pulls loose (typically 3/4" from the housing).

30. Remove the tool and pull the core from the housing.

NOTE
Do not use power tools to back the bolt out. The core is held in place with o-rings and as such, should take very little force to extract. Use only a ratchet or wrench.

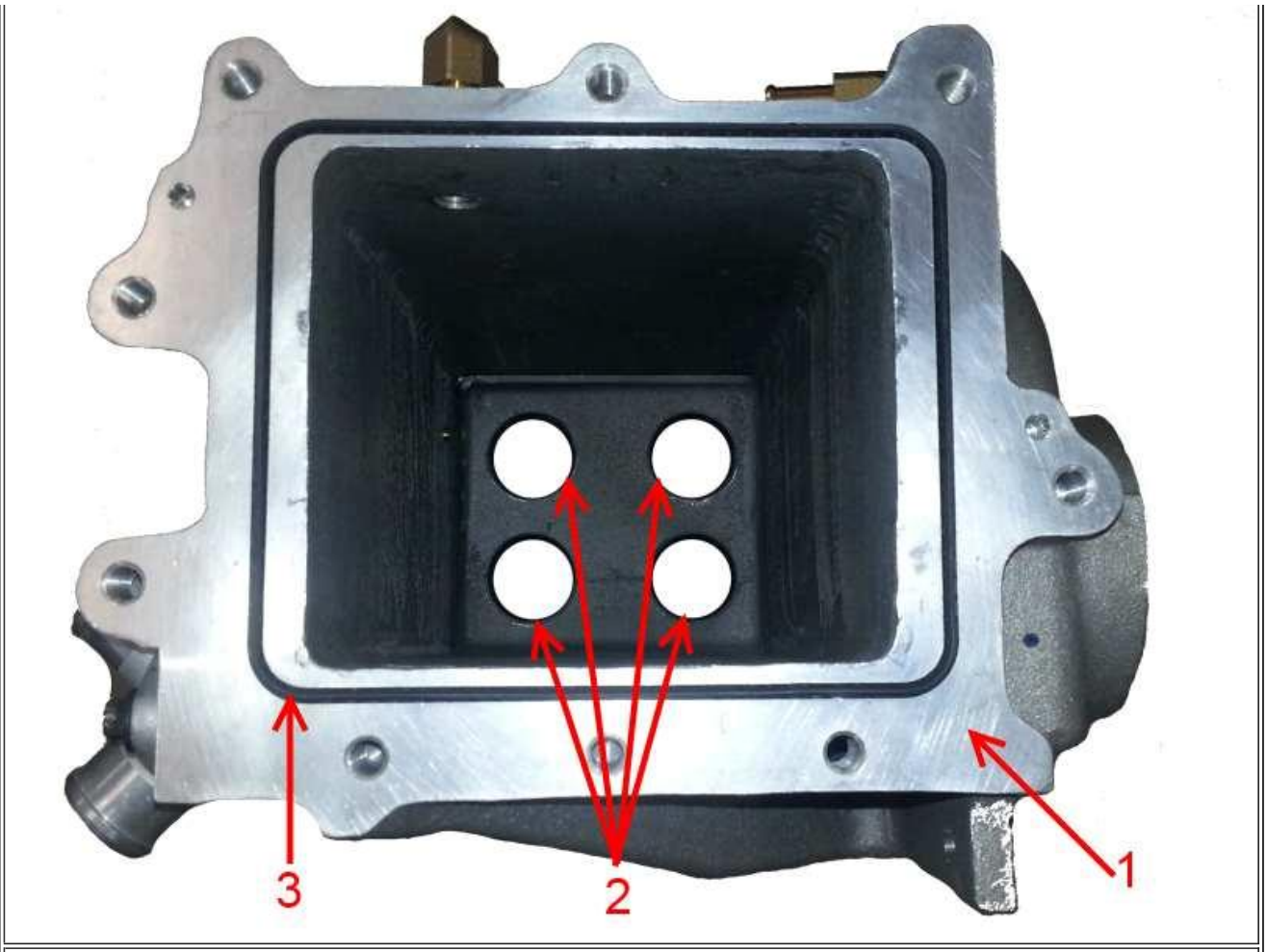

Figure 14: Low Temp Cooler Housing Face

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

31. Remove the housing seal and discard (**Figure 14**, Item 3)

32. Use a seal pick to remove the four o-rings at the housing inlet and discard (**Figure 14**, Item 2).

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

INSTALLATION PROCEDURE

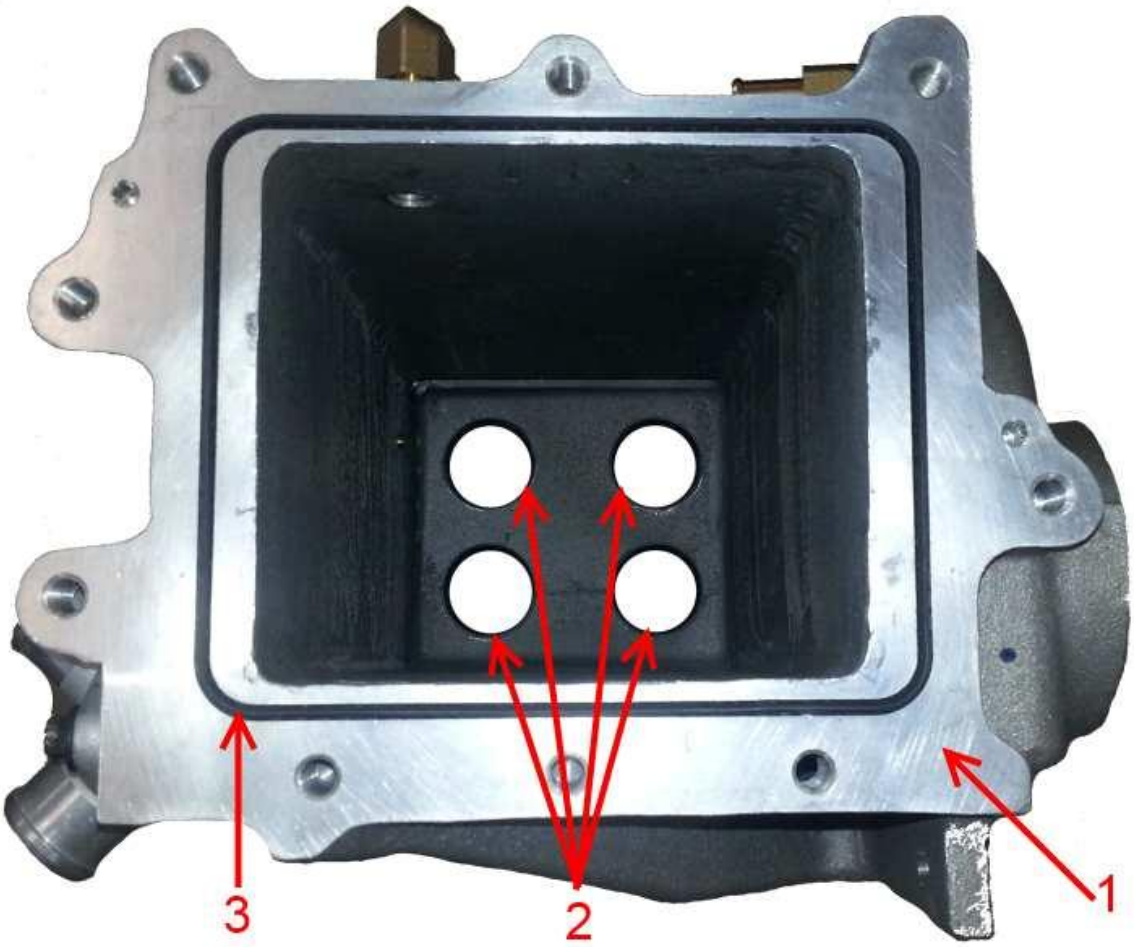

Figure 15: Low Temp Cooler Housing Face

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

1. Install the new seal into the LT housing (**Figure 15**, 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 15**, 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.

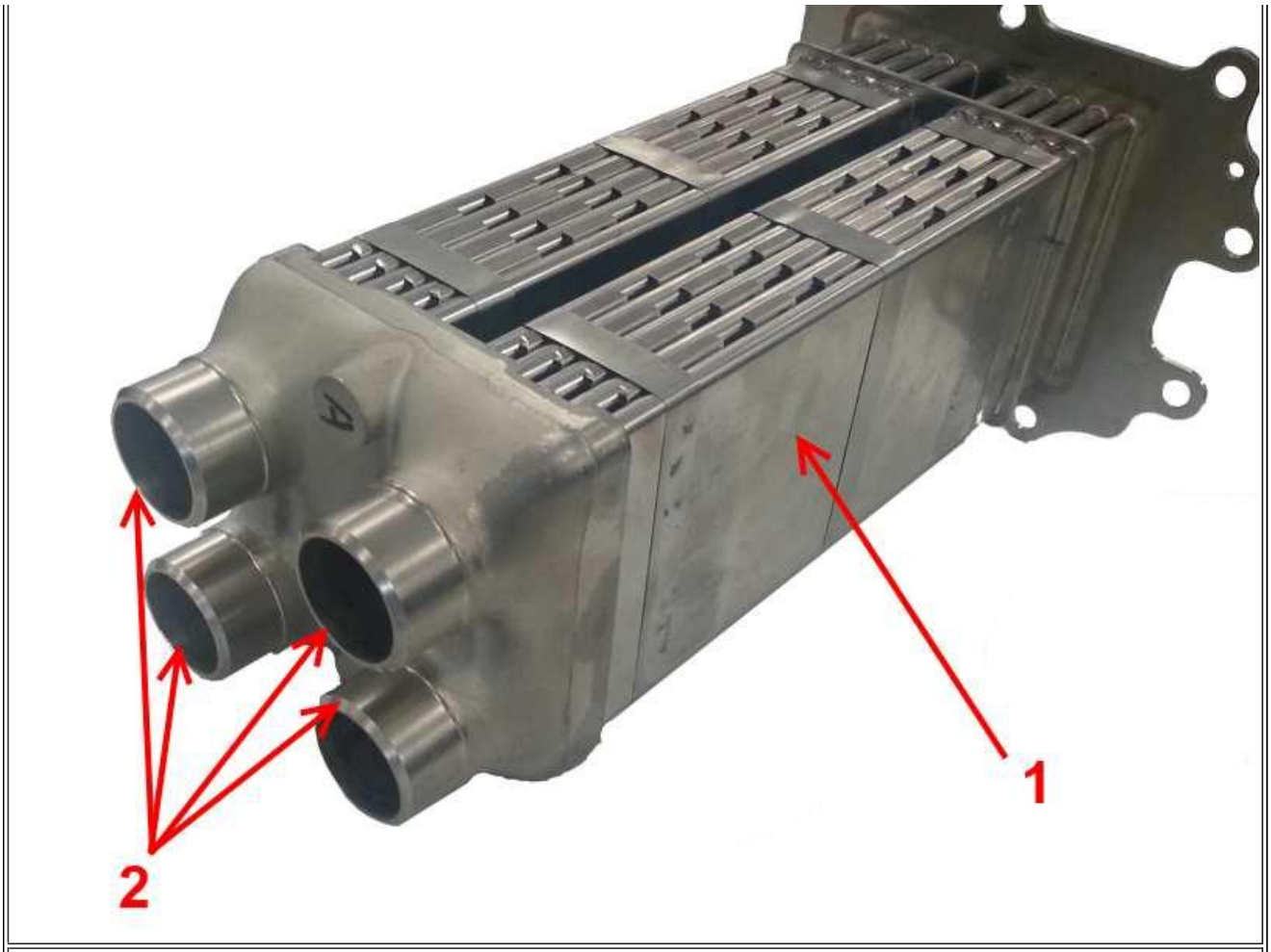

Figure 16: Low Temp Cooler Inlet Manifold

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

3. Use P-80 to lubricate the LT core inlet manifold and the four o-rings in the LT housing.

4. 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.

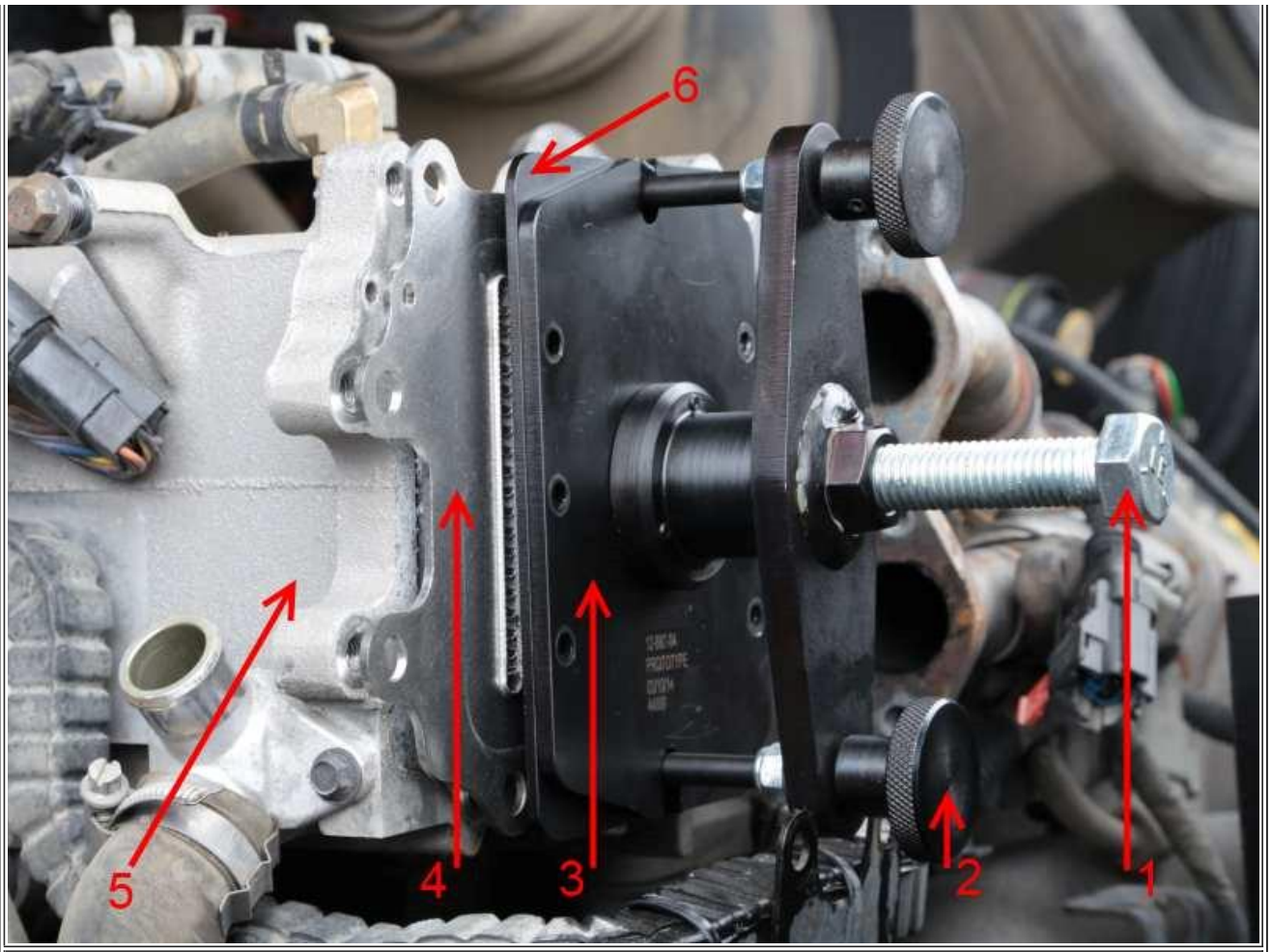

Figure 17: Low Temp Core Install Tool

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

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

6. 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 will aid in alignment of the core, as well.

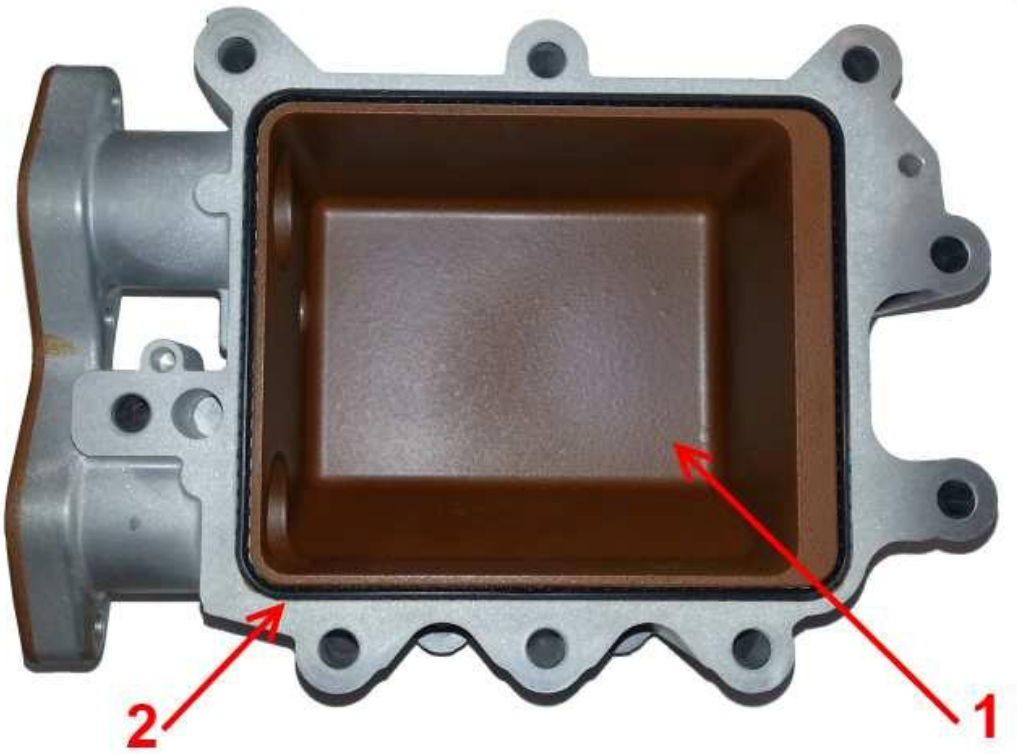

Figure 18: EGR Outlet Cover

Item 1: Front Cover
Item 2: Ring Seal

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

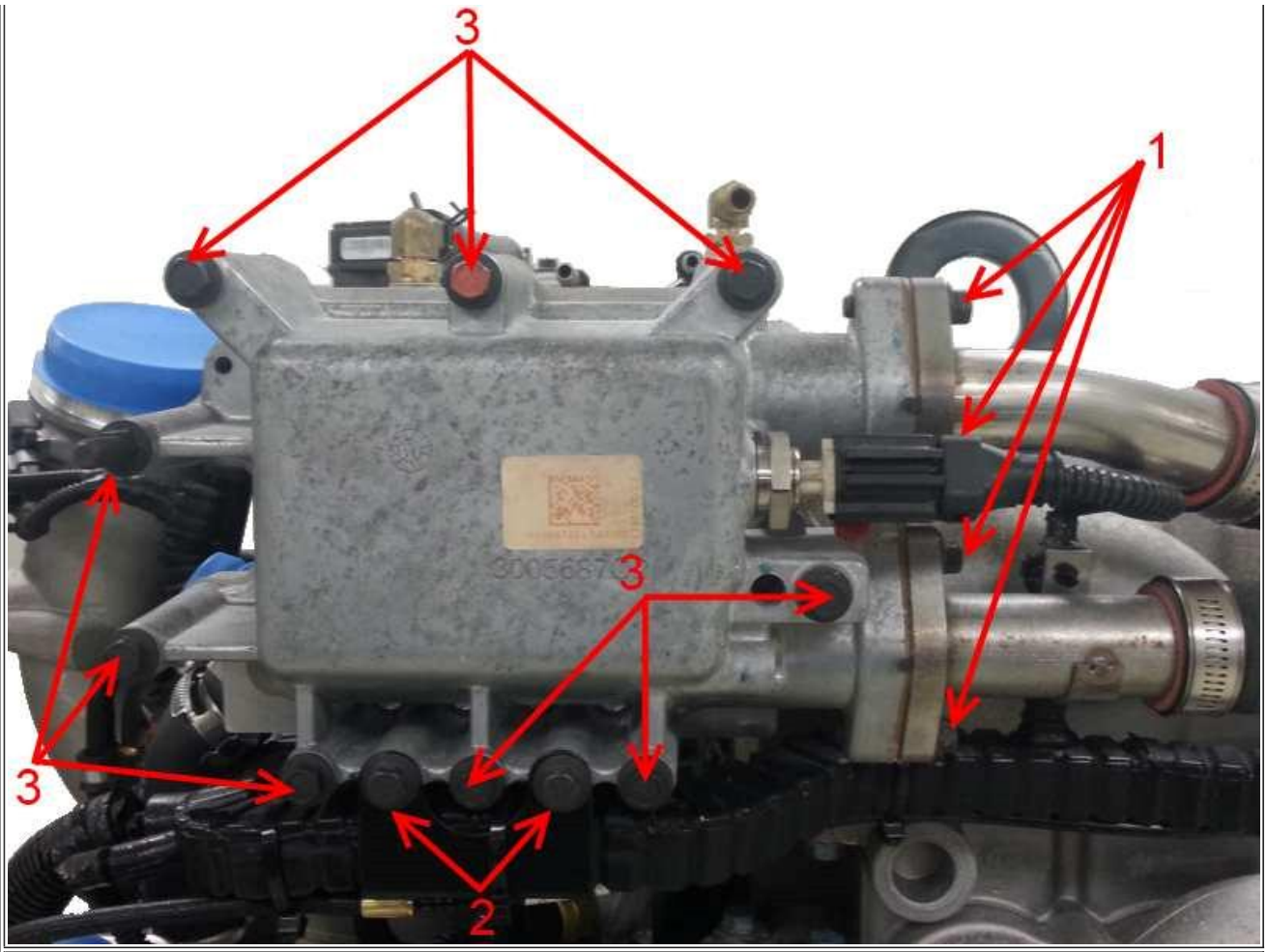

Figure 19: EGR Outlet Cover, Bolts and Tubes

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

10. Install the front cover, noting the location of the stud bolt in **Figure 19**.
11. Hand tighten all bolts then torque in a criss-cross pattern to 18 lb-ft (24 N-m).
12. Install the four bolts for the EGR outlet tubes, using new gaskets from the kit (**Figure 19**, Item 1).
13. Install the two engine harness bracket bolts (**Figure 19**, Item 2).
14. Connect the EGRT sensor.

Figure 20: Driver Side Radiator Support

Item 1: Support Rod Nut/Bolt
Item 2: Radiator Support Rod

15. Install the driver side radiator stay rod and torque to 85 lb-ft (115 N-m).

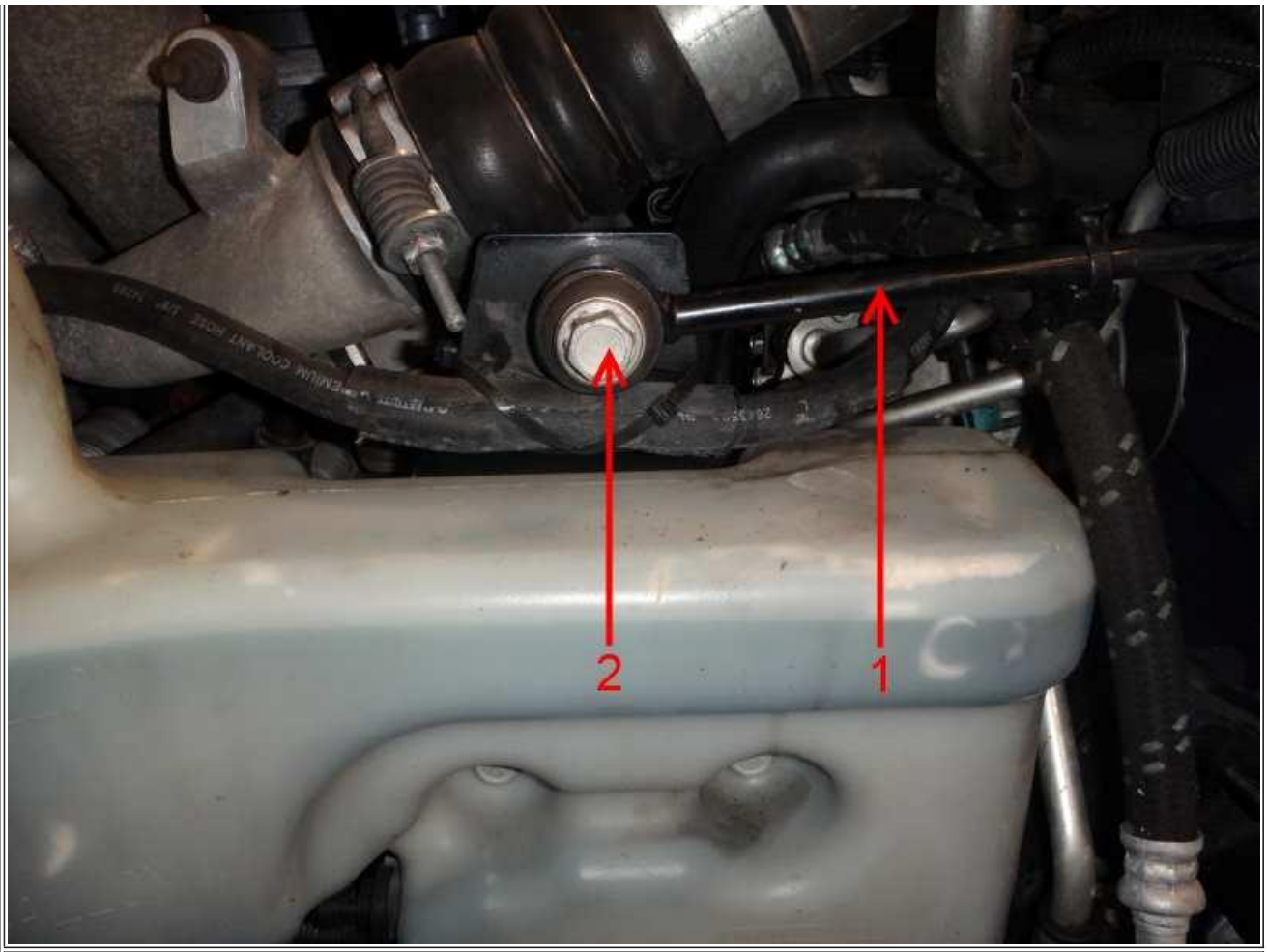

Figure 21: Passenger Side Radiator Support

Item 1: Radiator Support Rod
Item 2: Support Rod Nut/Bolt

16. Install the driver side radiator stay rod and torque to 85 lb-ft (115 N-m).

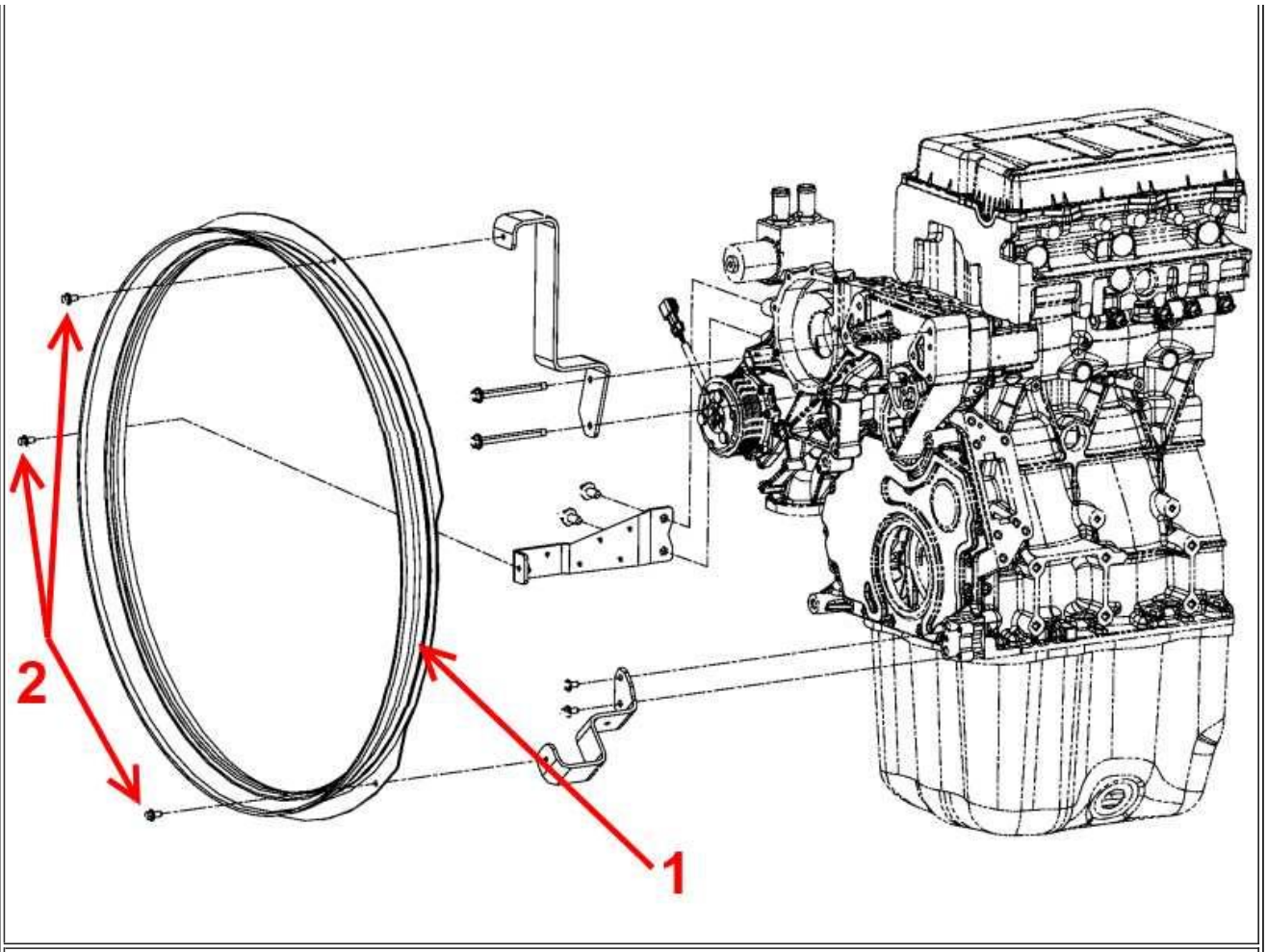

Figure 22: Fan Shroud Ring

Item 1: Fan Ring
Item 2: Fan Ring Bolts

17. Align the fan ring bolt holes and install the three M8 bolts. Torque to 21 lb-ft (19 N-m).

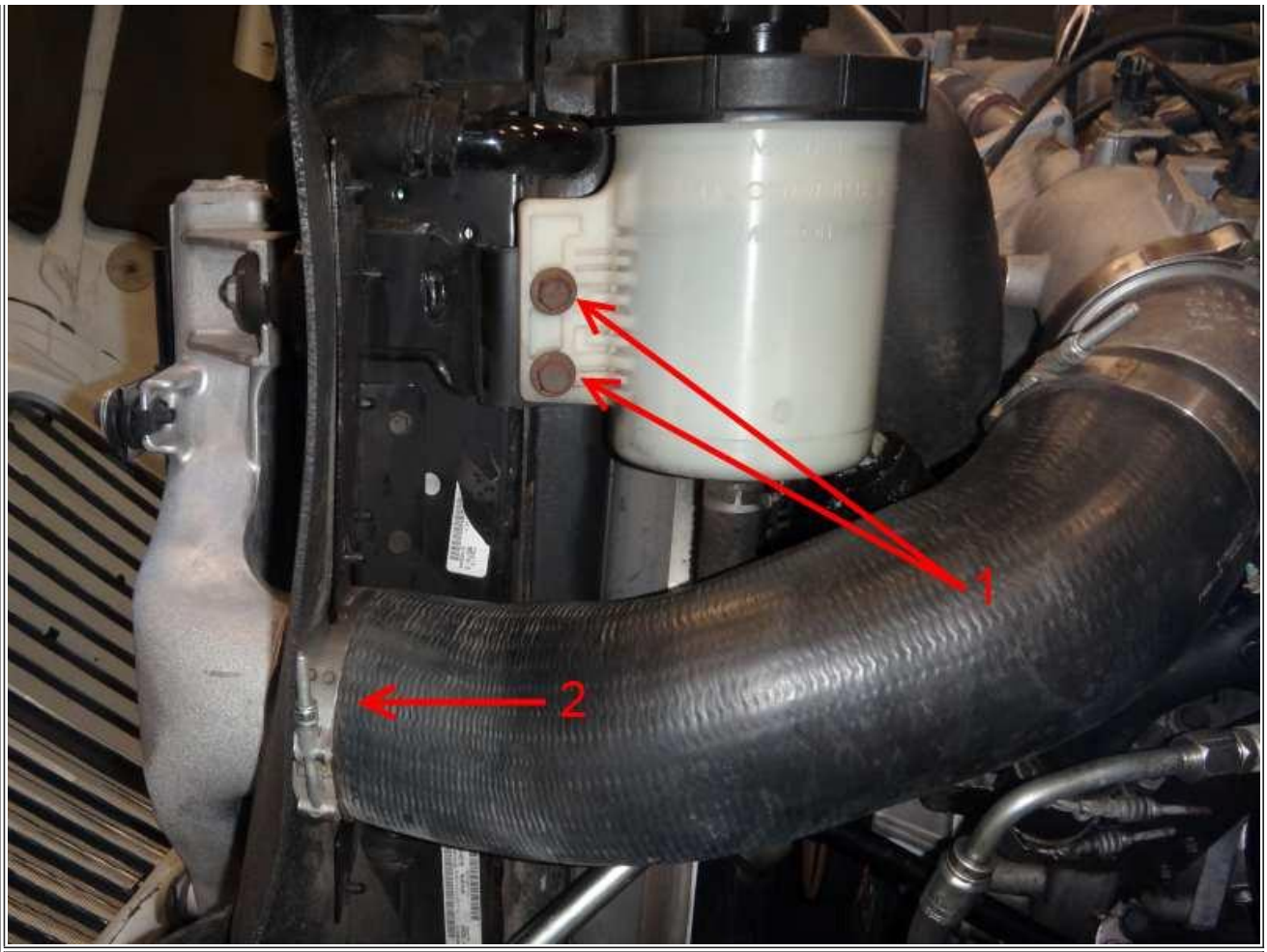

Figure 23: Driver Side HPCAC

Item 1: Power Steering Reservoir Bolts
Item 2: HPCAC Clamp/hose

18. Position the power steering reservoir and torque the bolts to 14 lb-ft (19 N-m).

19. Install the HP CAC outlet pipe and tighten the clamp.

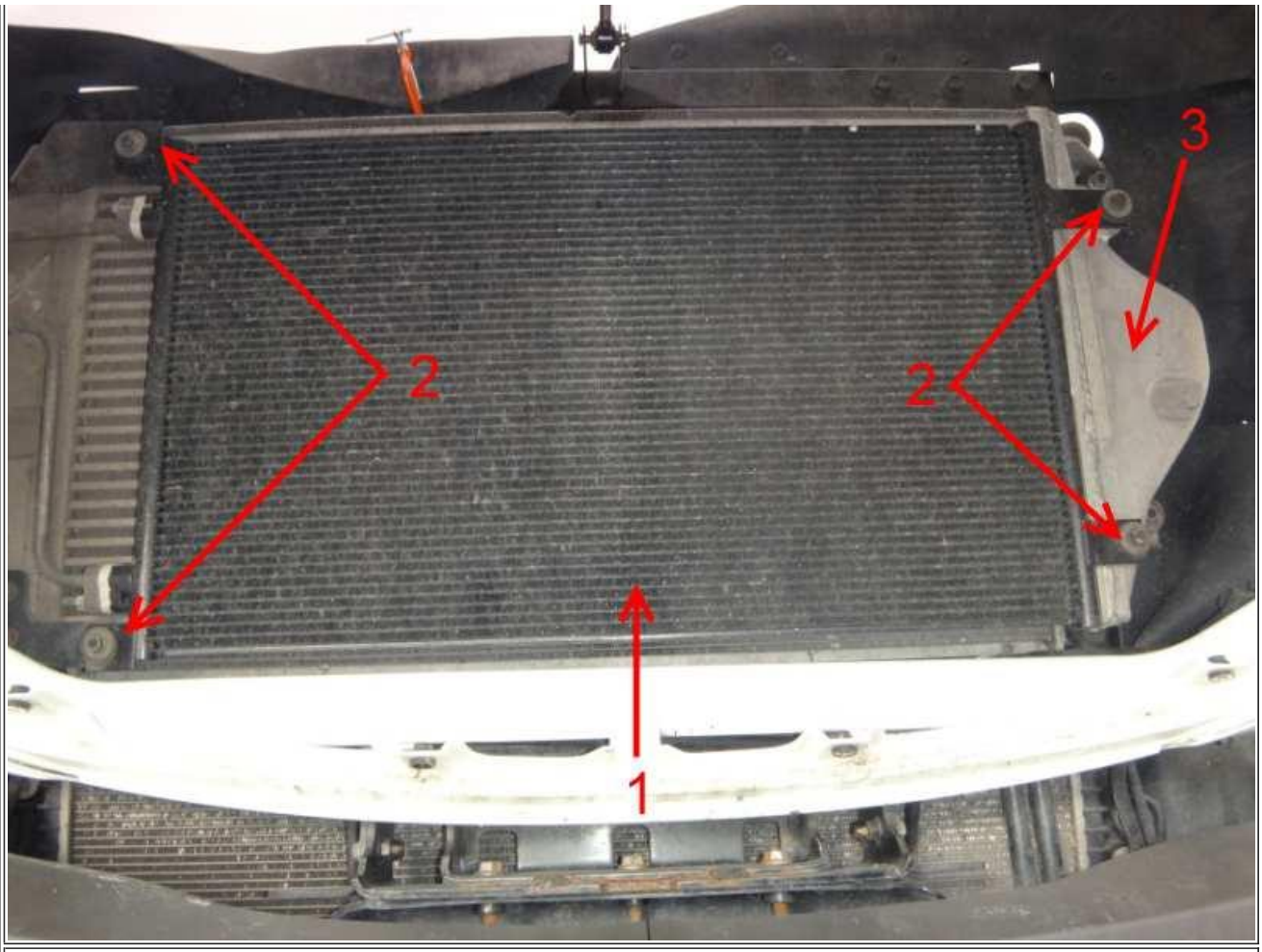

Figure 24: A/C Condenser Mounting

Item 1: A/C Condenser
Item 2: Condenser Mounting Nuts/washers
Item 3: High Pressure Charge Air Cooler

20. Swing the A/C condenser over the engine and secure using the four nuts and washers. Torque to 14 lb-ft (19 N-m)

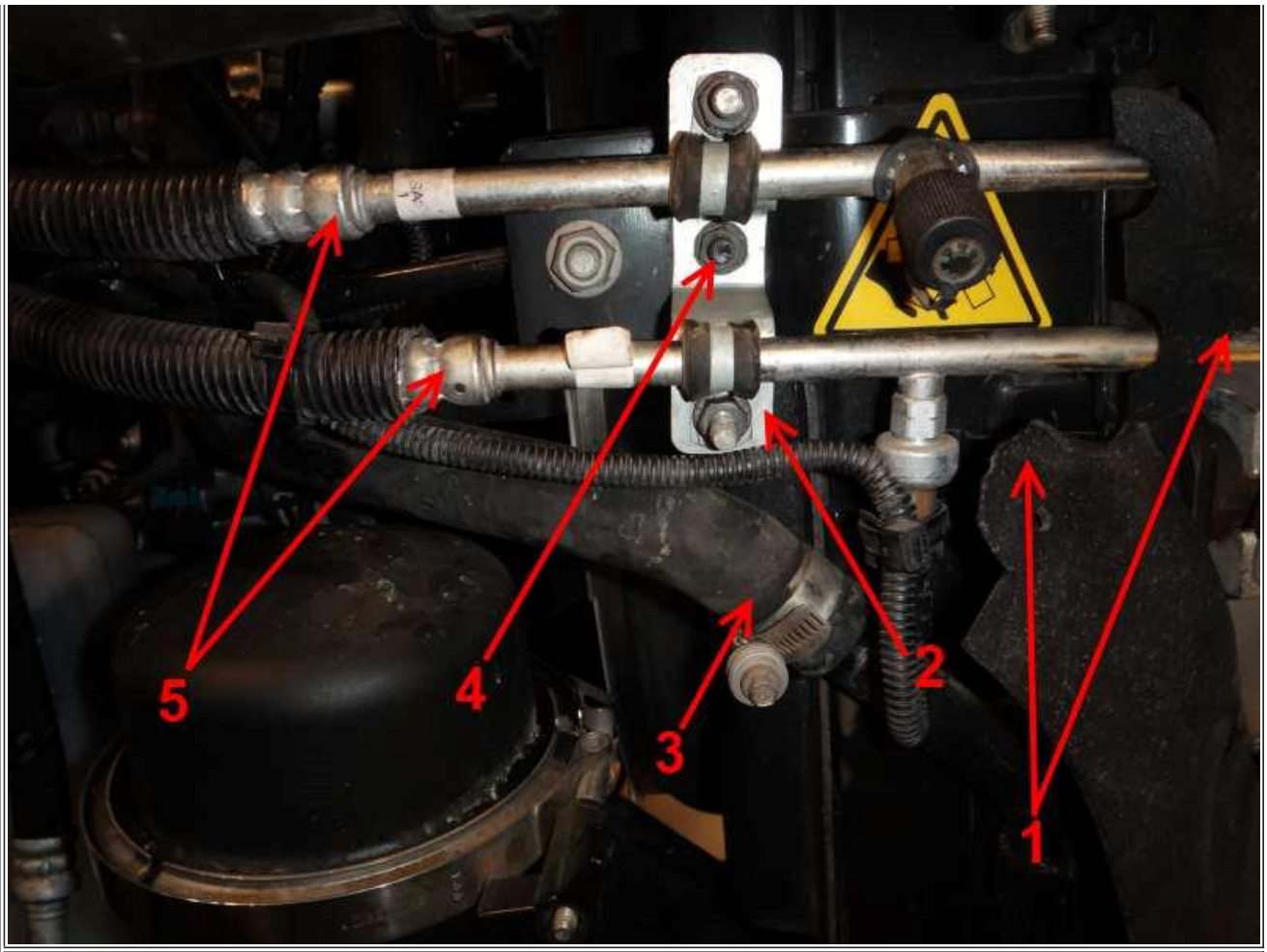

Figure 25: A/C Line Bracket

Item 1: Recirculation Seal
Item 2: A/C Line Bracket
Item 3: Low Temp Radiator Hose
Item 4: A/C Bracket Nut
Item 5: A/C Lines

21. Attach the LTR hose and tighten the clamp (**Figure 25**, Item 3).

22. Install the A/C line bracket and torque the nut to 15 lb-ft (20 N-m) (**Figure 25**, Item 4).

Figure 26: Recirculation Seal

23. Add holes to the recirculation seal and zip tie the halves together.

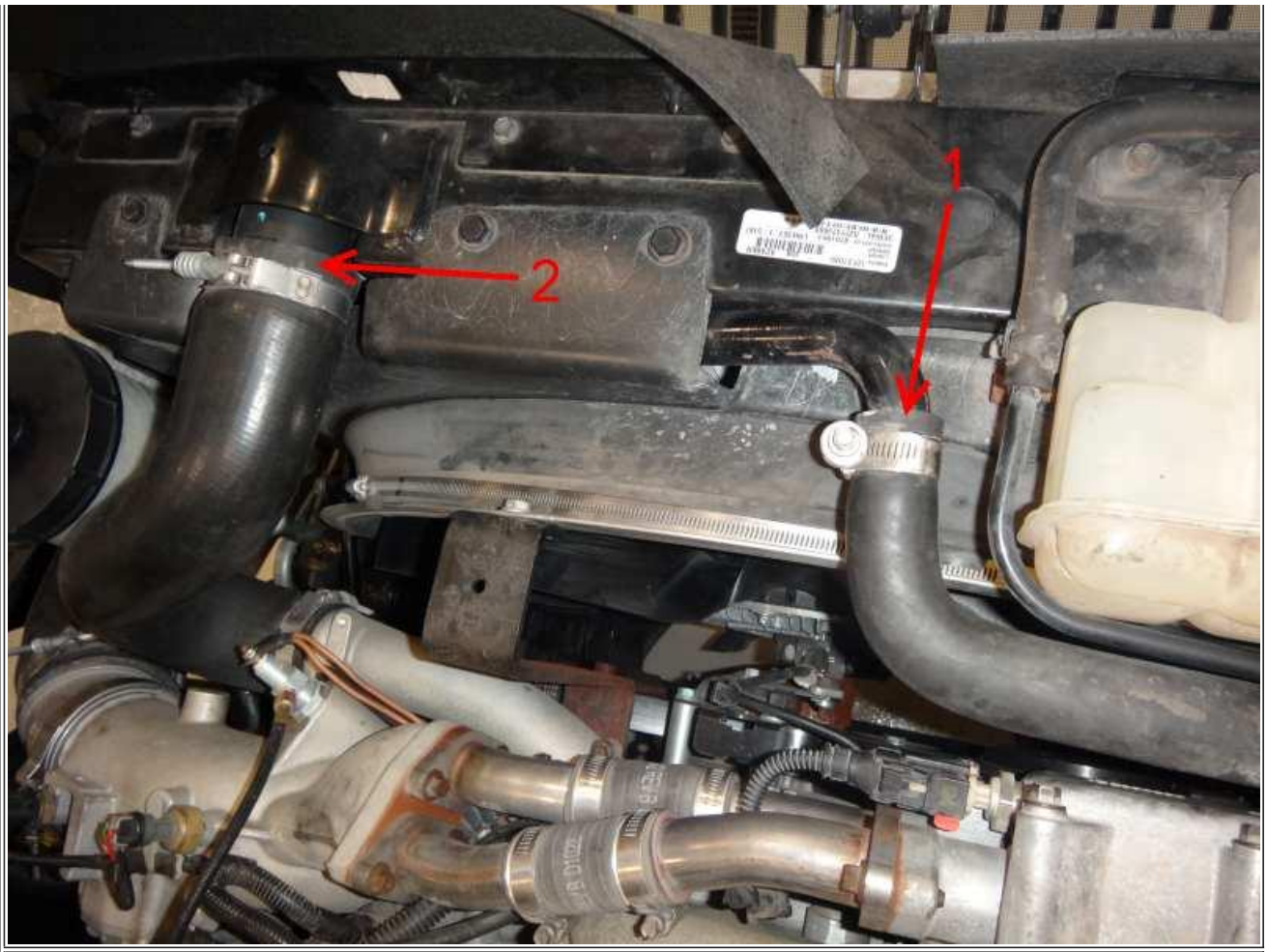

Figure 27: Dearation Tank Assembly

Item 1: Low Temp Radiator Hose
Item 2: Radiator Hose

24. Attach the radiator hose and tighten the clamp.

25. Attach the LTR hose and tighten the clamp.

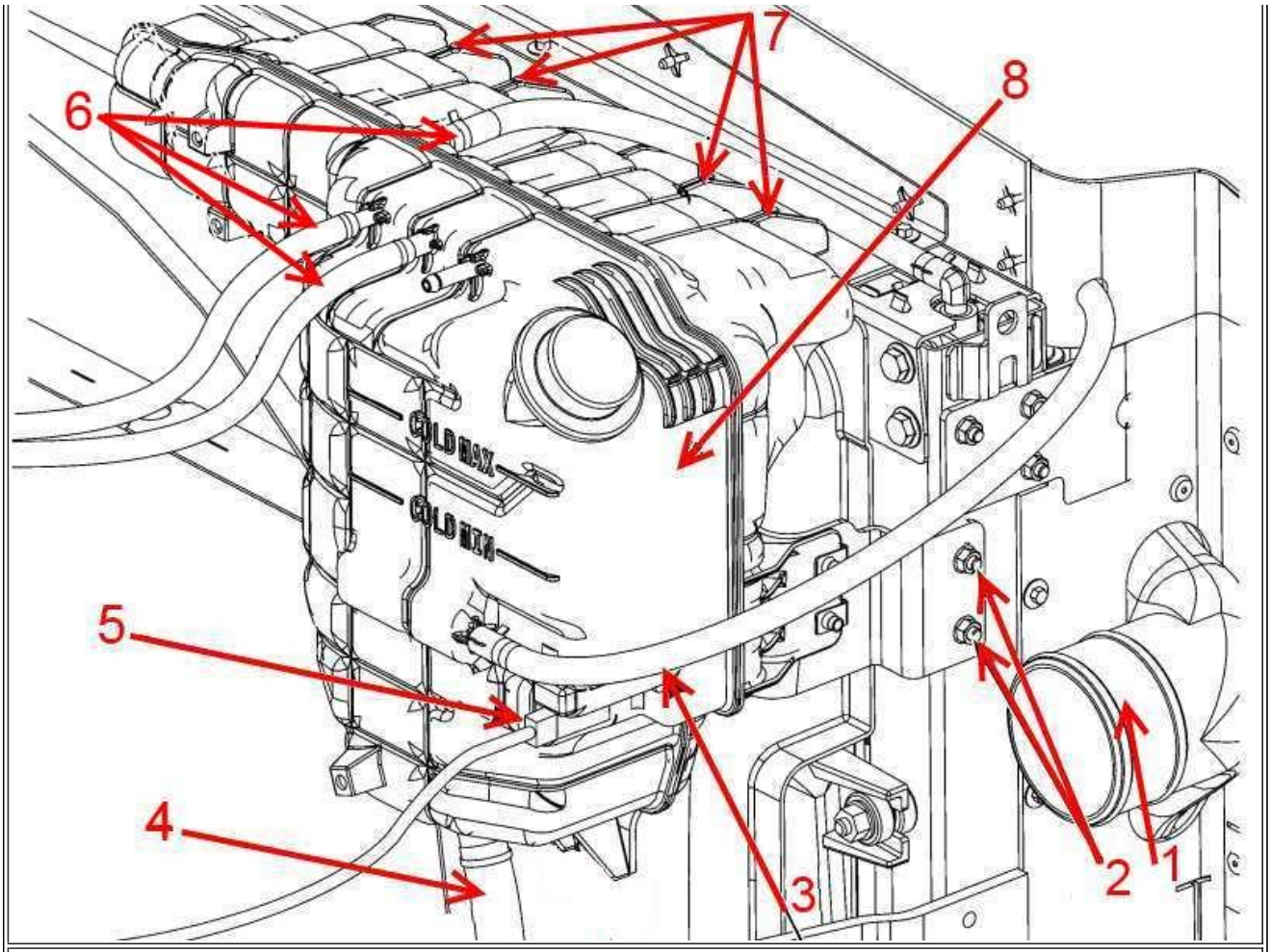

Figure 28: Deration Tank Assembly

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

For ProStar+122, skip to Step 30.

26. Attach the deration tank to the radiator. Install the four nuts and washers to the top of the radiator (**Figure 28**, Item 7) and torque to 14 lb-ft (19 N-m).

27. Install the nuts securing the side bracket to the radiator (**Figure 28**, Item 2). Torque to 14 lb-ft (19 N-m).

28. Attach the wire harness to the coolant level sensor (**Figure 28**, Item 5).

29. Attach the coolant return line to the bottom of the deration tank (**Figure 28**, Item 4)

30. Attach the deration lines (**Figure 28**, Items 3 & 6).

31. Install the HP CAC (**Figure 28**, Item 1) and torque the clamp to 6 lb-ft (8 N-m).

32. Use the Coolant Management Tool to refill the cooling system. Reach full vacuum and hold for two minutes before allowing fill (verify there are no leaks).

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.

WARNING
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.

The vacuum fill is a critical aspect of the repair. Any issues (cut/damaged/missing o-rings) will be caught here, as well as ensuring no air pockets are left in the system (which can reduce the life of the cooler or make the system appear leaking as the pockets are burped).

If there is no choice but to use the bucket fill method, it will be CRITICAL to pressure test the cooling system after the repair.

33. Connect the battery cable.

34. Per best practice, verify repair.

For an internal leaking cooler
Replace the engine oil and filter for coolant contamination and follow the procedure in the appropriate diagnostic manual for Lambda/Oxygen Sensor Relearn procedure.
Provide the customer with oil change information.

WARRANTY INFORMATION

Warranty Claim Coding:

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

Warranty Claim Comment Guidance:

"Vehicle had 2659-21, replaced LT Core."

"Vehicle came in with [**coolant consumption / 111-1**], pressure tested LT leaking, replaced LT Core, replaced engine oil, performed Lambda [**relearn / replacement**]."

Standard Repair Times:

Step	Description	SRT	Hours
All	LT Core Removal/Installation for ProStar+ 113	R12-7892U	SRT LINK
All	LT Core Removal/Installation for ProStar+ 122	R12-7892U-20	
	LT Core R&R during HT replacement (add-on)	R12-6892U-6	
	Cooling System Leak Test	A09-9022A	SRT LINK
	EGR Cooler Pressure Test (in chassis)	R12-7892U-4	SRT LINK
	EGR Cooler Pressure Test (add-on if cooler rep'd)	R12-6892U-1	
	Lambda Sensor Replacement or Relearn (review iKNow)	K1201065	
	Engine Oil and Filter Change	A12-1889U	SRT LINK

A typical low temp core replacement (low flow only) will take less than 2 hours.

SRT Manual

OTHER RESOURCES

Master Service Information

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