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

Applies To: 2010 MaxxForce 11/13, 2010+ TranStar

CHANGE LOG

2015/09/16 - Updated O2 Sensor relearn reference to manual.
2015/09/14 - Updated SRT to link to repair times.
2015/01/23 - Minor formatting revisions, updates based on feedback (numbering format, grille removal/installation-TSI added to removal step 3 and install step 37)
2014/06/12 - Added link to Video Instructions on LMS, in the repair procedure. Fixed SRT for in chassis pressure testing.
2014/05/28 - Fixed hood position instruction for hood torsion bracket.

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 TranStar (8600) 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	Status	Description
SPN 111 FMI 1	Any	Low Coolant
SPN 2659 FMI 21	Any	EGR Low Flow

Possible status: Active, Inactive, Pending, Healing

Customer Observations or Concerns:

- Malfunction Indicator Light (MIL)
- Red Stop Lamp (RSL)
- Coolant consumption/Low Coolant
- 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 passages is still enough to cause bubbles when putting pressure to the LT.

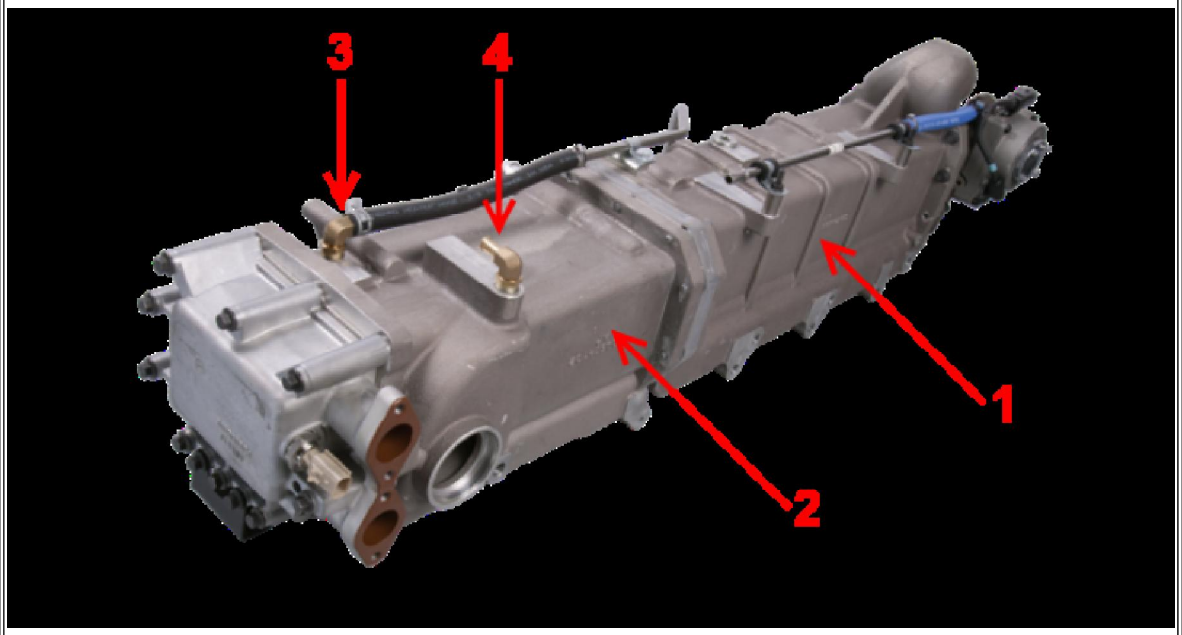

Figure 1: 2010 MaxxForce 11/13 EGR Cooler Assembly

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)

SERVICE PARTS INFORMATION

Kit Description	Part Number	Qty	Notes
Kit, Low Temp Core	2513209C91	1	Required

3M Tape Removal Kit	07498		Obtain Locally
3M Double Sided Tape (3/8" wide)	3585047C1		OR Obtain Locally (VHB 4956)
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. 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. Continue with Steps x through x while draining.

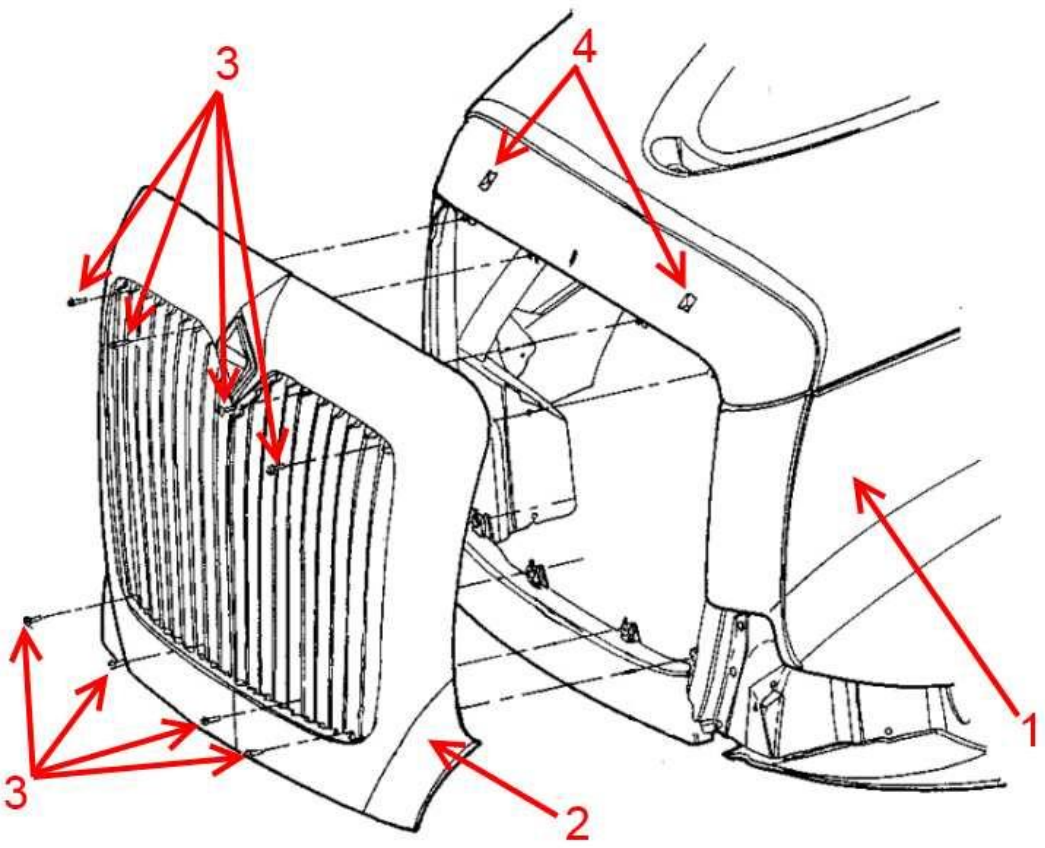

Figure 2: Front Grille Assembly

Item 1: Hood
Item 2: Grille
Item 3: Mounting Screws
Item 4: Push Tab Slot

3. With the hood closed, remove the eight grille mounting screws (**Figure 2**, Item 3). Follow TSI 13-09-01R instructions for grille removal/install (instructions 3a-3e): ***NEW SECTION***

a. Ensure vehicle is in a warm environment, as head will aid tape removal.
b. Open the hood and apply heat to underside of hood for 3-4 minutes. Make certain that the heat is applied where the hood overlaps with the top of the grille. Too much heat will discolor the hood and/or grille. Keep the heat gun moving. Tape is positioned ~1" above push tabs (**Figure 2,** Item 4)
c. Close hood and position yourself in front of the hood, facing the vehicle.
d. Firmly grasp the lower edge of the grille and pull outward/upward as if pivoting the grille about the upper edge where it meets the hood. Since the tape has such high retaining force, a minimum of two people lifting is recommended to maintain an even force across the bottom of the grille. Pull slowly!
e. Once the grille and hood have separated, clean the tape residue from the hood and grille using 3M Tape Removal Kit.

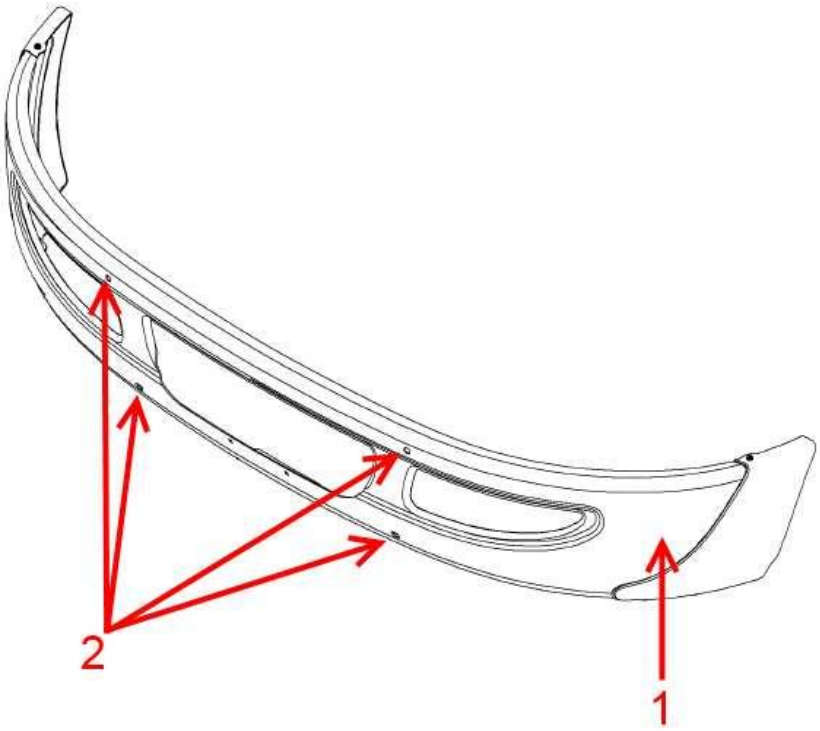

Figure 3: Front Bumper

Item 1: Bumper Assembly
Item 2: Mounting Bolts

4. Remove the four bolts from the front bumper (**Figure 3**, Item 2) and remove the bumper from the vehicle.

Figure 4: Torsion Bar Stop Bracket

Item 1: Torsion Bar Brackets
Item 2: Bracket Bolts

5. **With the hood open**, remove the four torsion bar stop bracket bolts (**Figure 4**, Item 2).

Figure 5: Radiator Hoses

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

6. Remove the Low Temp Radiator (LTR) hose (**Figure 5**, Item 1).

7. Remove the Radiator hose (**Figure 5**, Item 2)

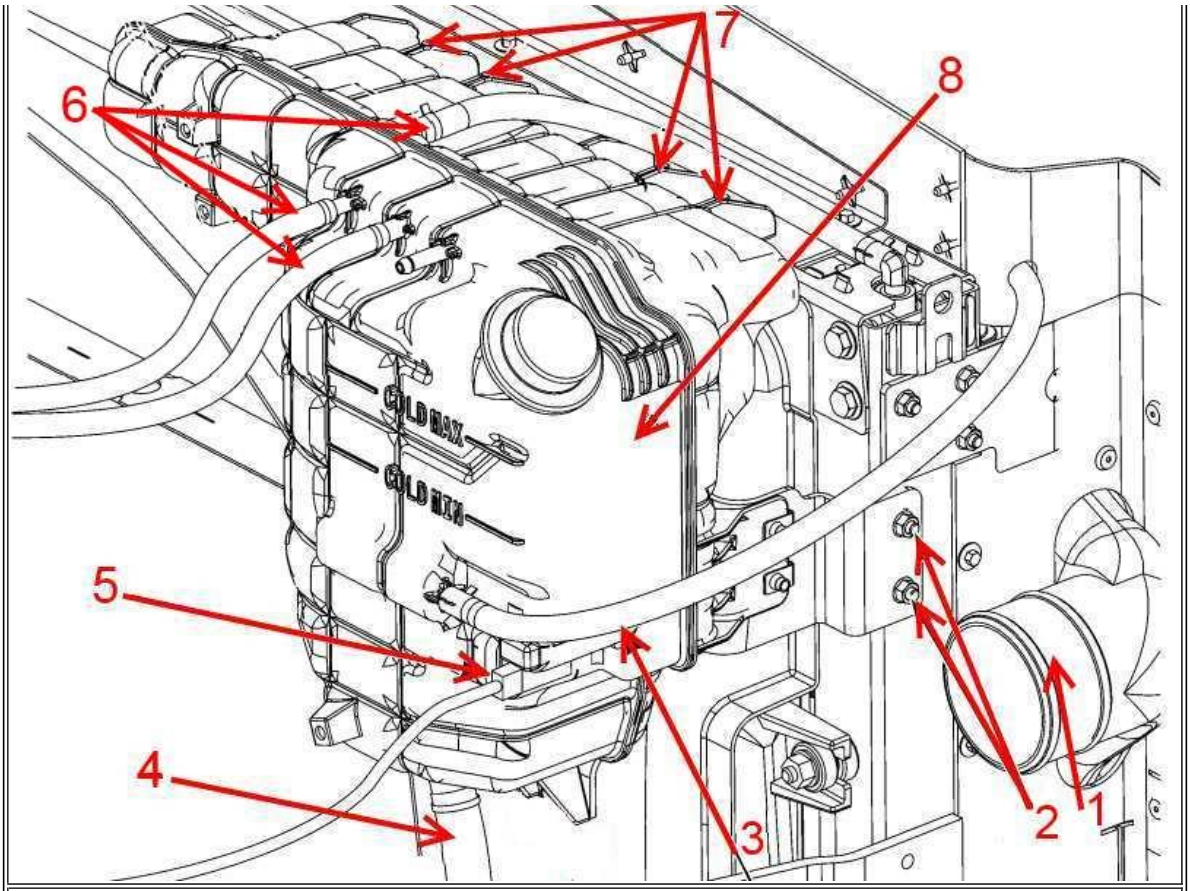

Figure 6: Dearation Tank Assembly

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. Loosen the clamp and remove the passenger side HP CAC inlet pipe (**Figure 6**, Item 1).

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

10. Disconnect the engine harness from the Engine Coolant Level Sensor (**Figure 6**, Item 5).

11. Remove the dearation tank return hose (**Figure 6**, Item 4).

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

13. Remove the two nuts securing the mounting bracket to the radiator (**Figure 6**, Item 2).

14. Remove the four nuts securing the top of the tank to the radiator (**Figure 6**, Item 7), and remove the dearation tank.

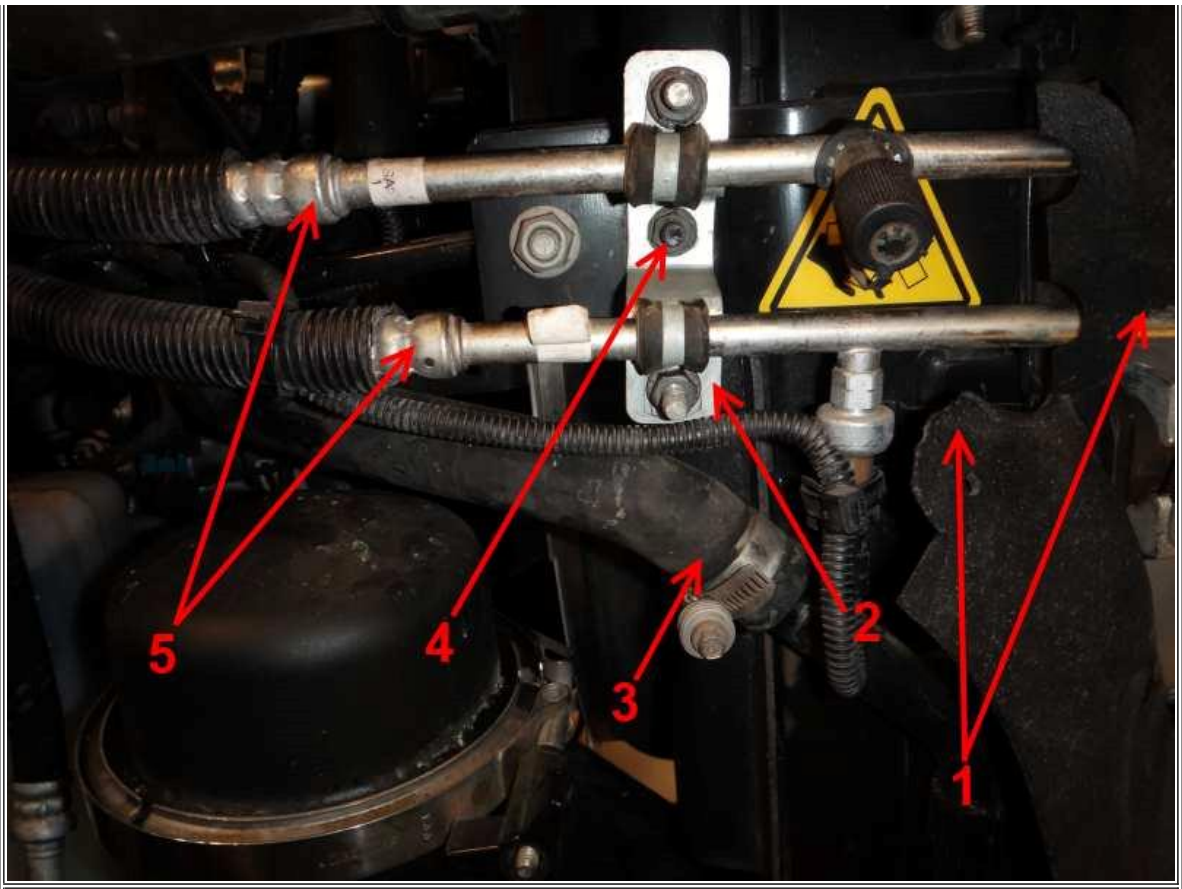

Figure 7: A/C Line Bracket

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

15. Remove the nut securing the A/C condenser line bracket to the radiator (**Figure 7**, Item 4).

16. Loosen the hose clamp and remove the Low Temp Radiator (LTR) return hose from the return tube (**Figure 7**, Items 3).

17. Cut the recirculation seal to allow the condenser to swing around the engine (**Figure 7**, 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.

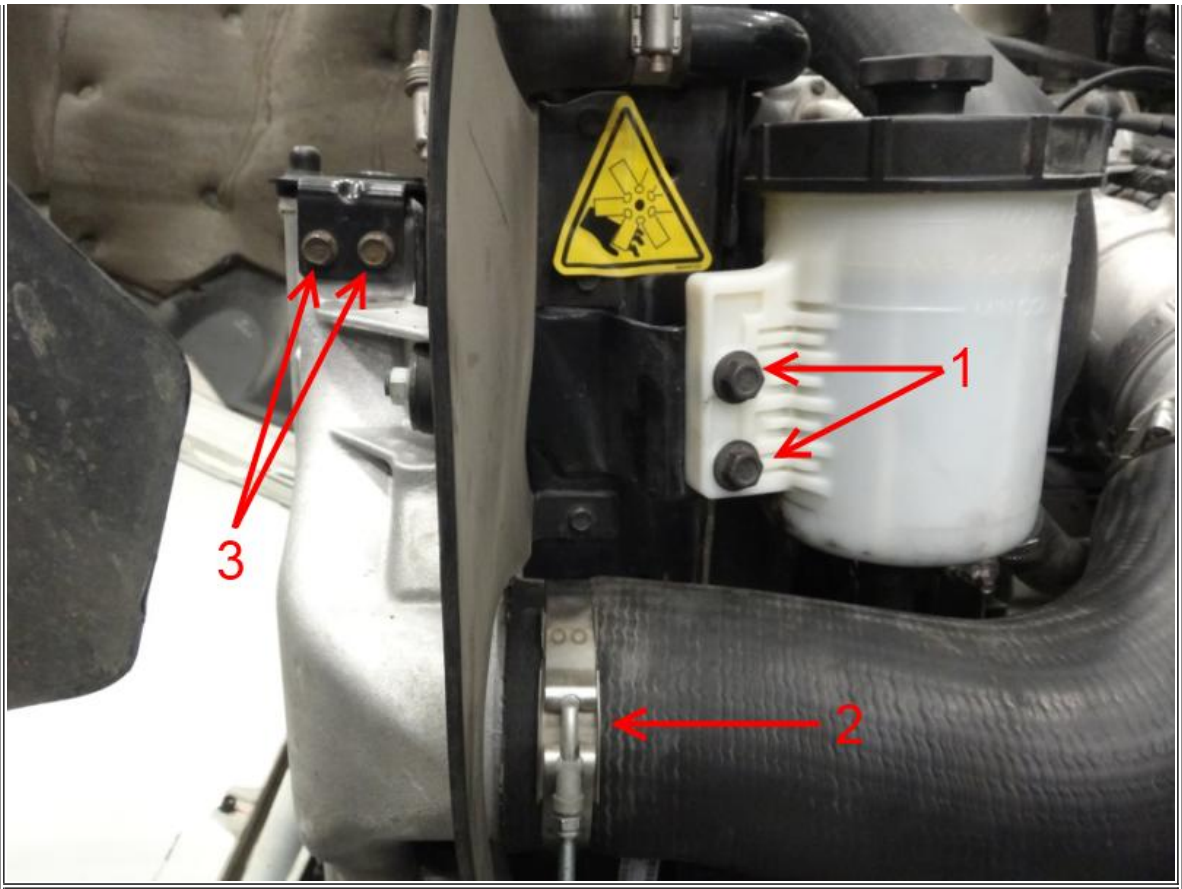

Figure 8: Driver Side HPCAC

Item 1: Power Steering Reservoir Bolts
Item 2: HPCAC Clamp/hose
Item 3: Upper A/C Condenser Bracket

18. Loosen the driver side HPCAC outlet clamp and disconnect the HPCAC pipe (**Figure 8**, Item 2).

19. Remove the two power steering reservoir bolts, and reposition away from the radiator (**Figure 8**, Item 1).

20. Remove the two A/C Condenser support bracket bolts (Figure 8, Item 3).

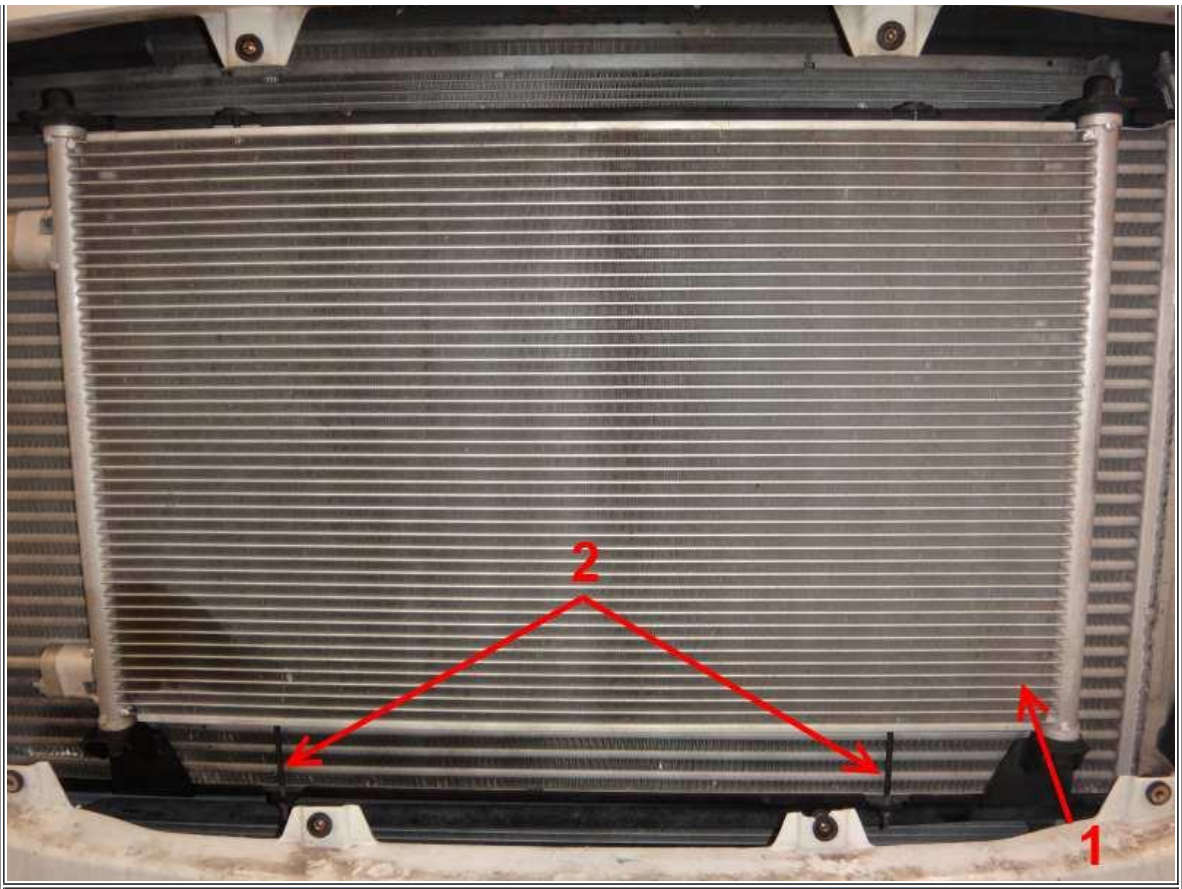

Figure 9: A/C Condenser Mounting

Item 1: A/C Condenser
Item 2: Condenser Stay Rods

21. Remove the four nuts and washers securing the A/C condenser to the HP CAC (**Figure 9**, Item 2).

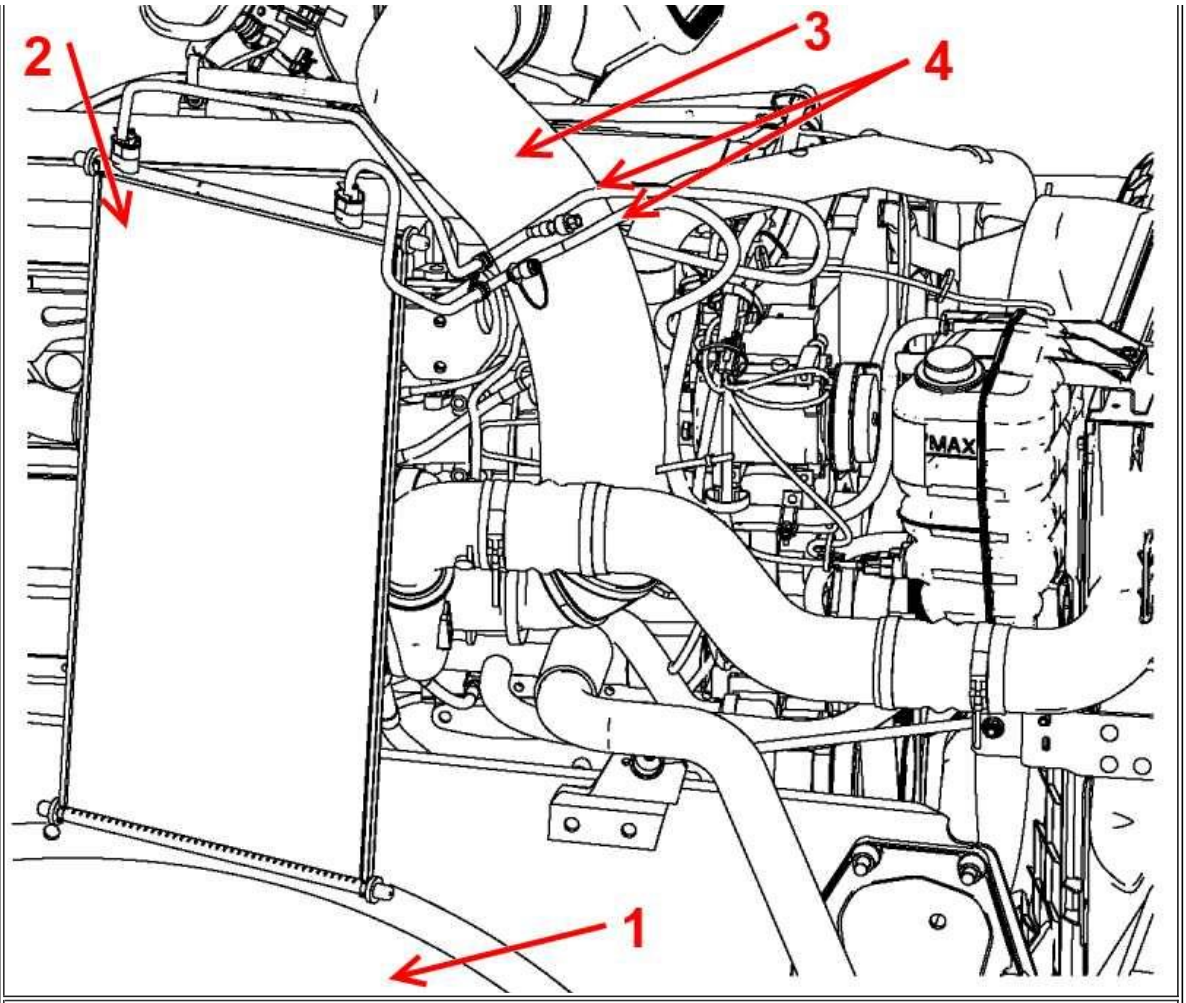

Figure 10: A/C Condenser Repositioning

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

22. Carefully flip the A/C condenser over the cooling package and rest the passenger side on the passenger front tire (**Figure 10**). Secure the A/C lines to the intake pipe using a bungee cord or zip tie.

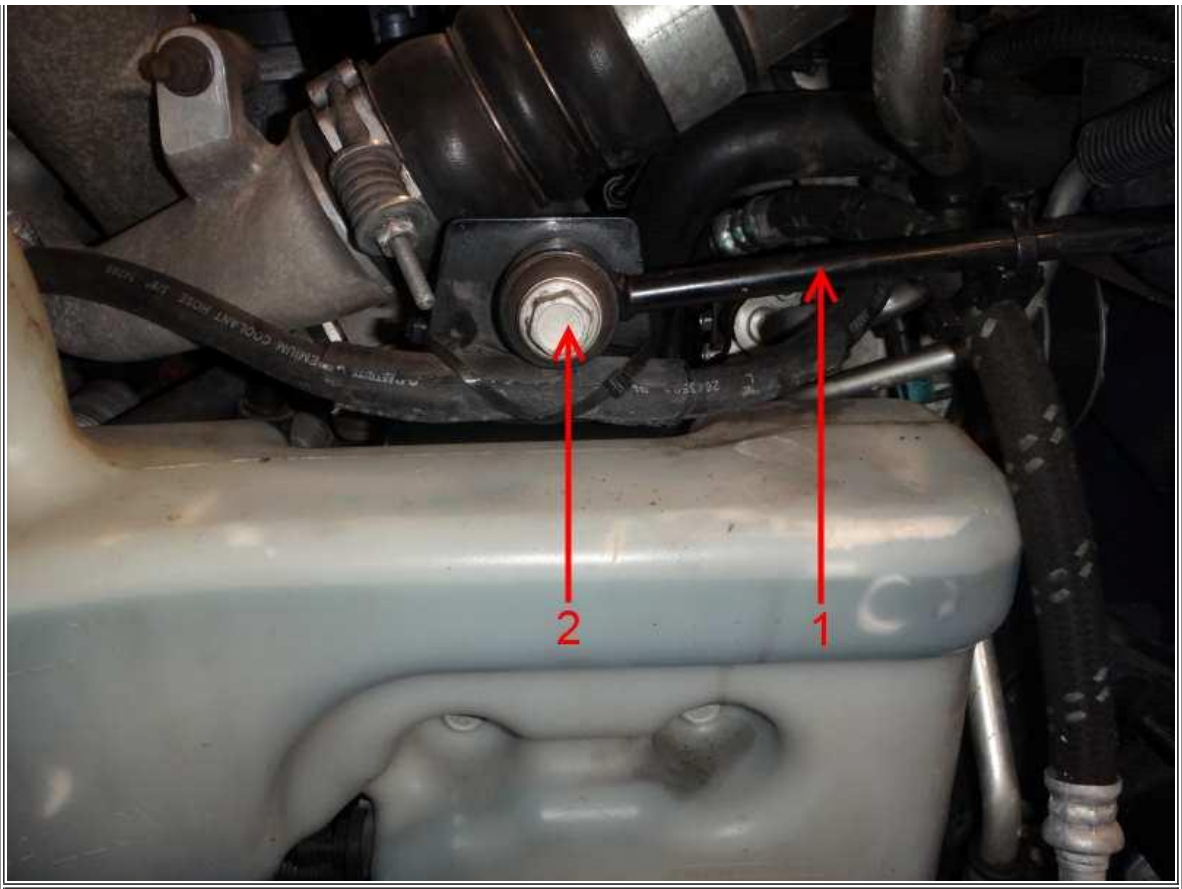

Figure 11: Passenger Side Radiator Support

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

23. Remove the nut and bolt from the passenger side radiator support rod, at the frame (**Figure 11**, Item 2).

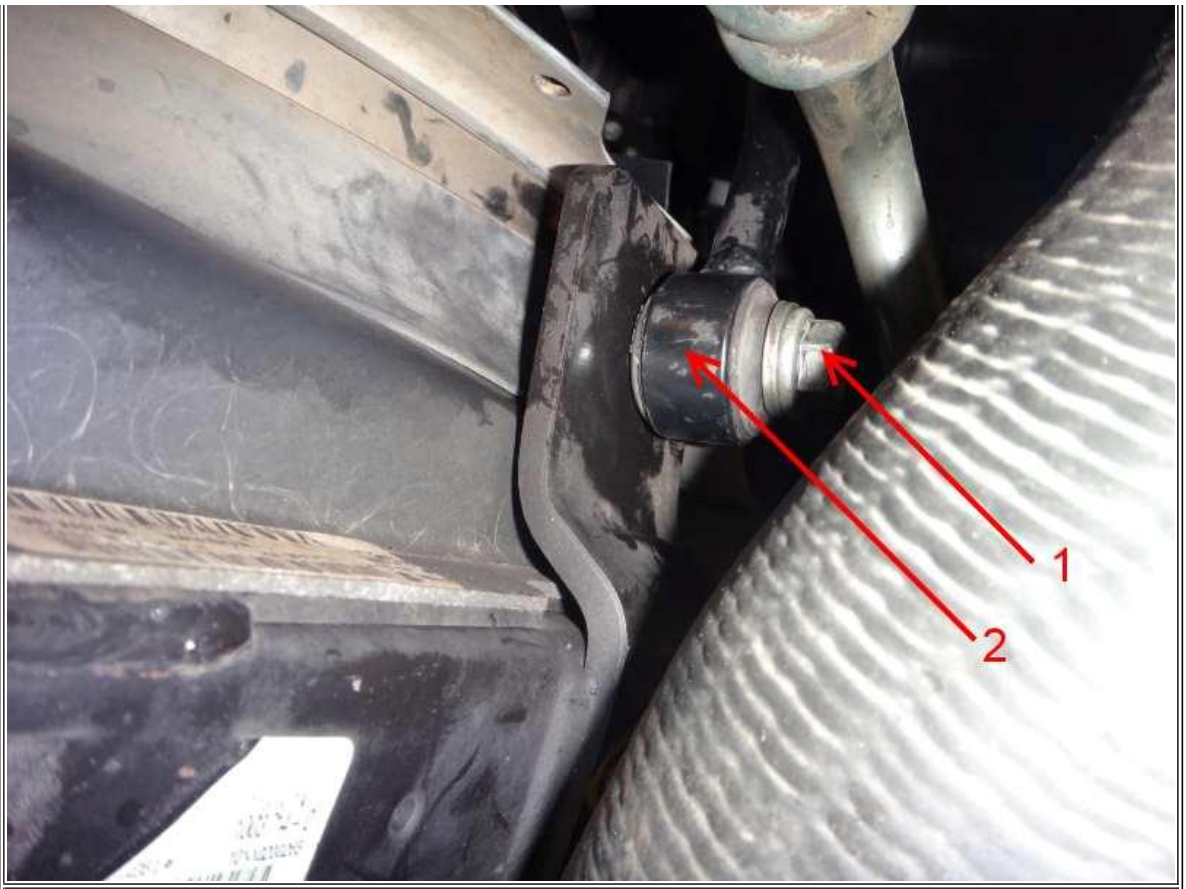

Figure 12: Driver Side Radiator Support

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

24. Remove the nut and bolt form the driver side radiator support rod, at the frame **(Figure 12**, Item 1**).**

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

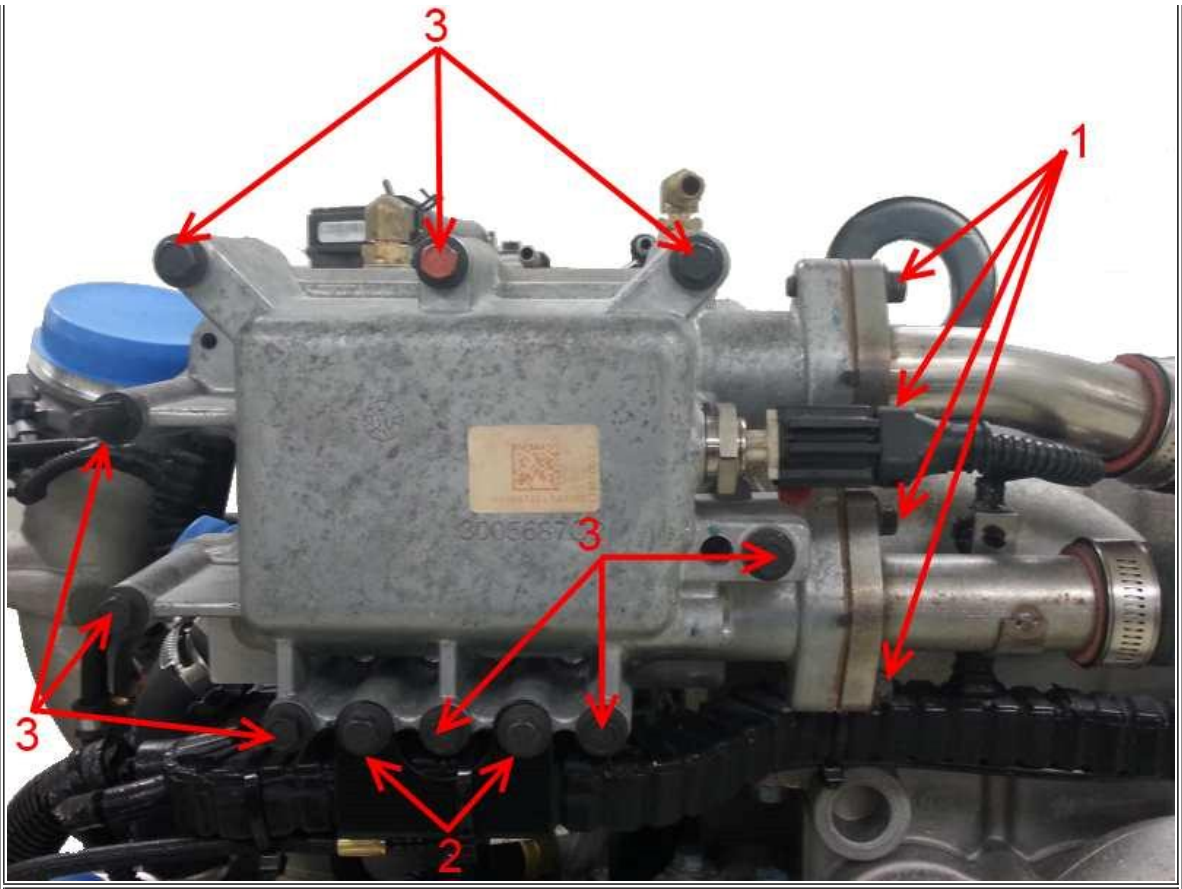

Figure 13: EGR Outlet Cover, Bolts and Tubes

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

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

27. Remove the four bolts holding the outlet tubes to the front cover--discard the gaskets (**Figure 13**, Item 1).

28. Remove the two bolts holding the engine harness, and reposition as necessary, for front cover removal (**Figure 13**, Item 2).

29. Remove the eight bolts and one stud bolt from the front cover, and remove (**Figure 13**, Item 3).

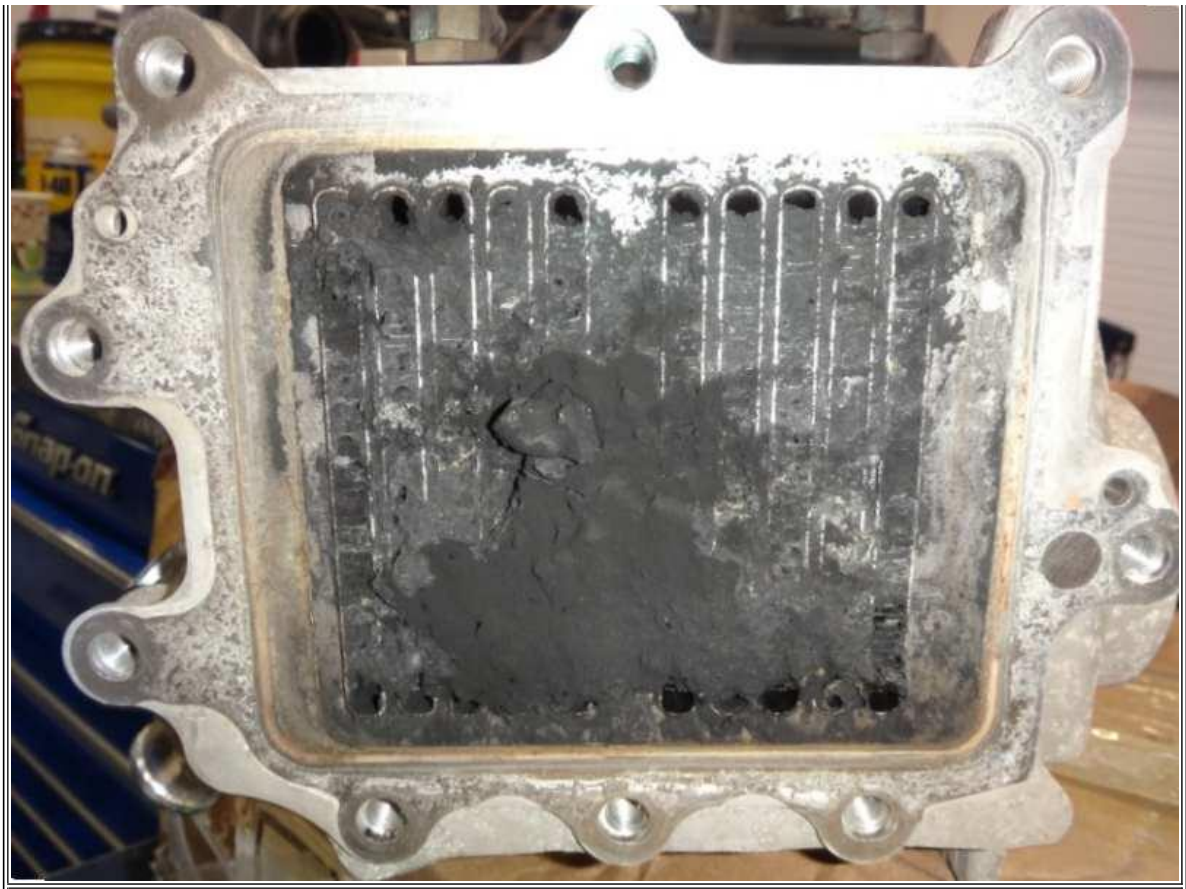

Figure 14: Soot Build-Up on the Core Face

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

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

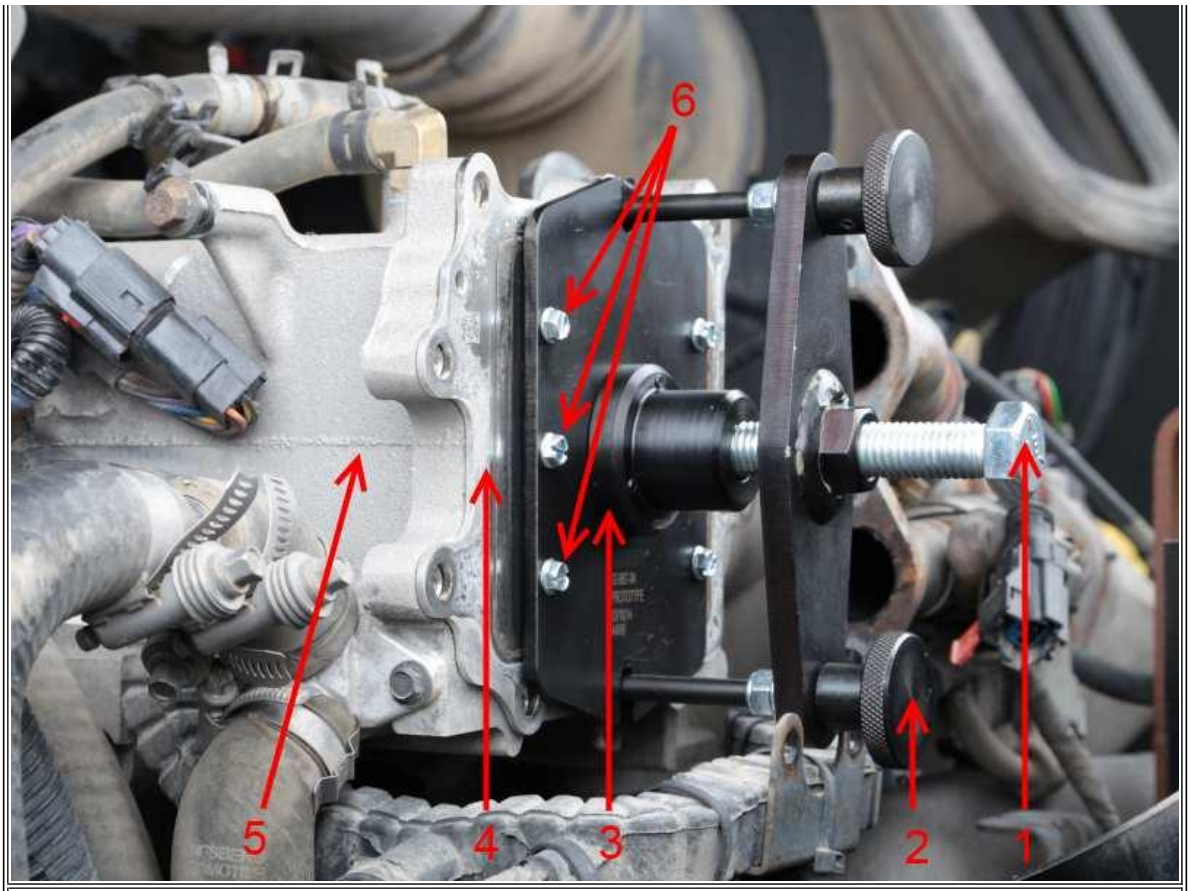

Figure 15: Low Temp EGR Core Extractor

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

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

32. Back out the bolt (**Figure 15**, Item 1) until the core pulls loose (typically 3/4" from the housing).

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

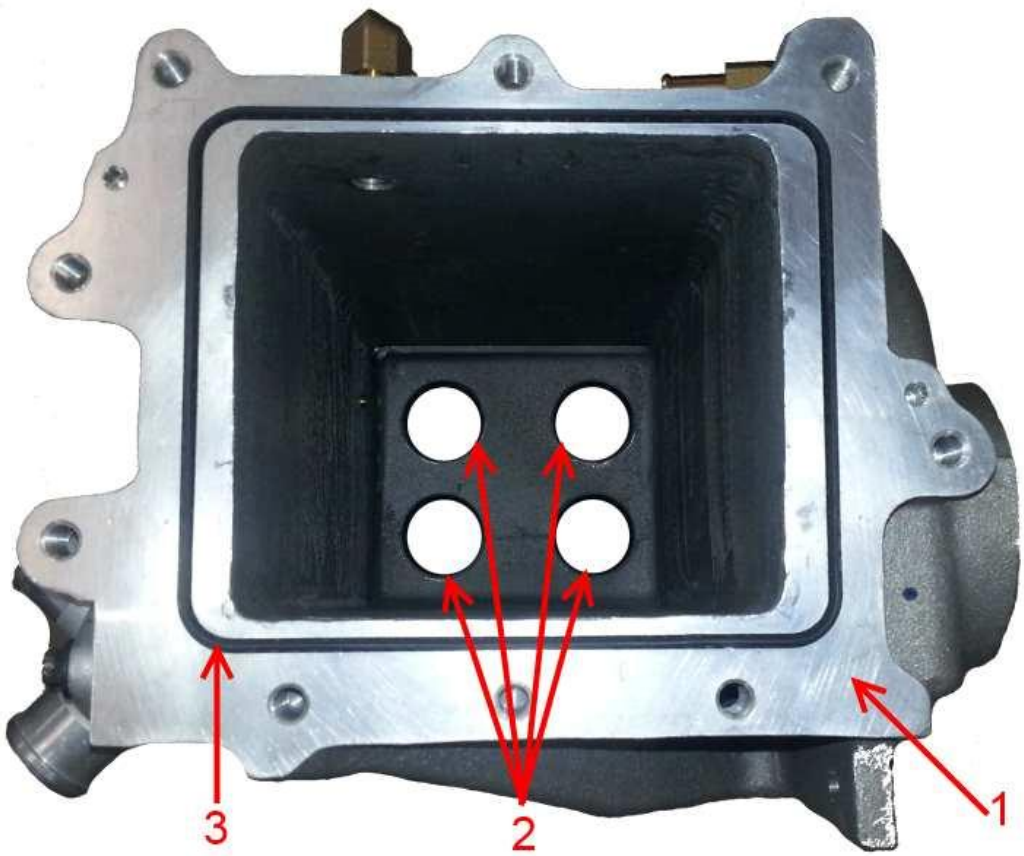

Figure 16: Low Temp Cooler Housing Face

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

34. Remove the housing seal and discard (**Figure 16**, Item 3)

35. Use a seal pick to remove the four o-rings at the housing inlet and discard (**Figure 16**, Item 2).

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

INSTALLATION PROCEDURE

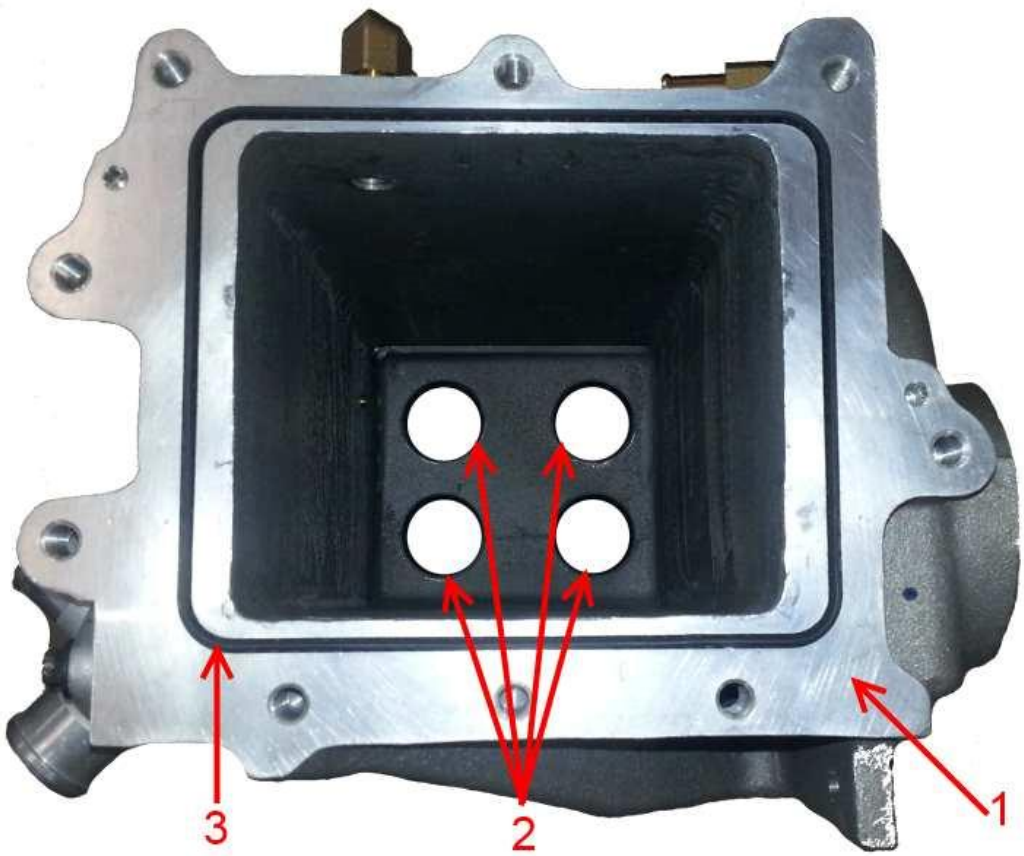

Figure 17: Low Temp Cooler Housing Face

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

1. Install the new seal into the LT housing (**Figure 17**, 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 17**, 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.

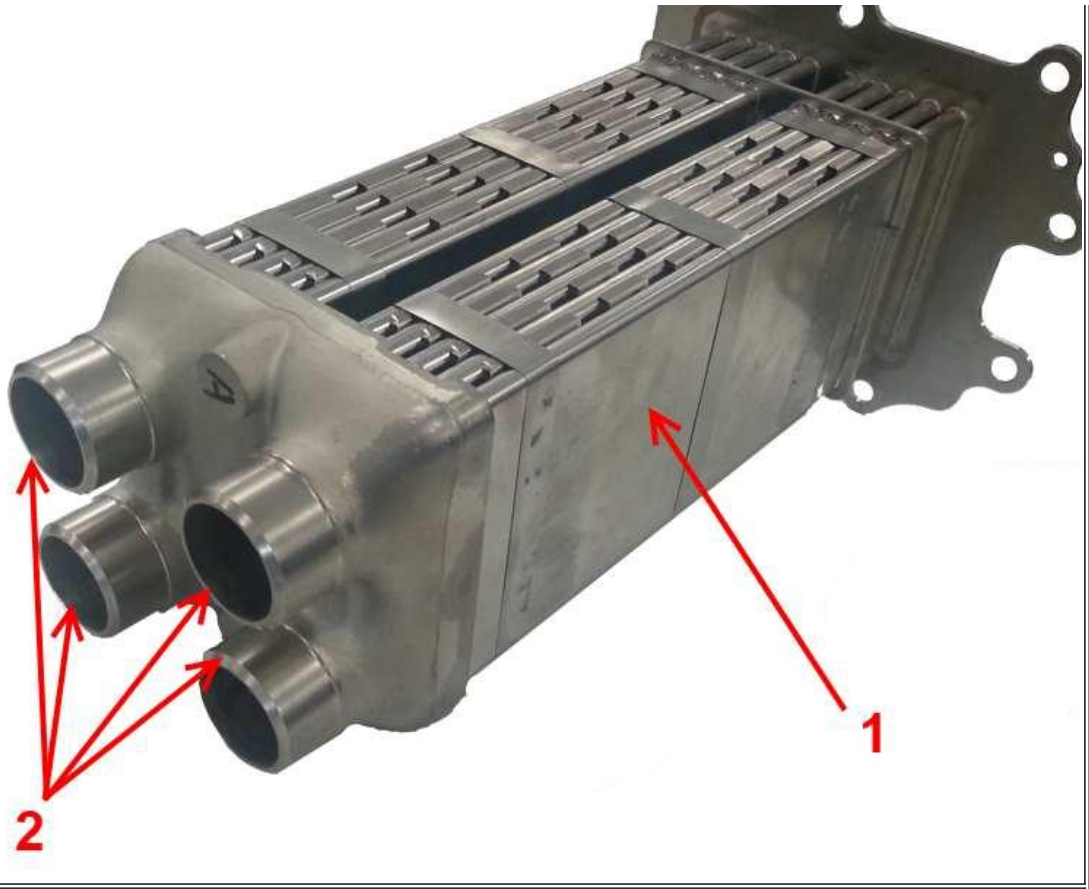

Figure 18: Low Temp Cooler Inlet Manifold

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.

5. 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.

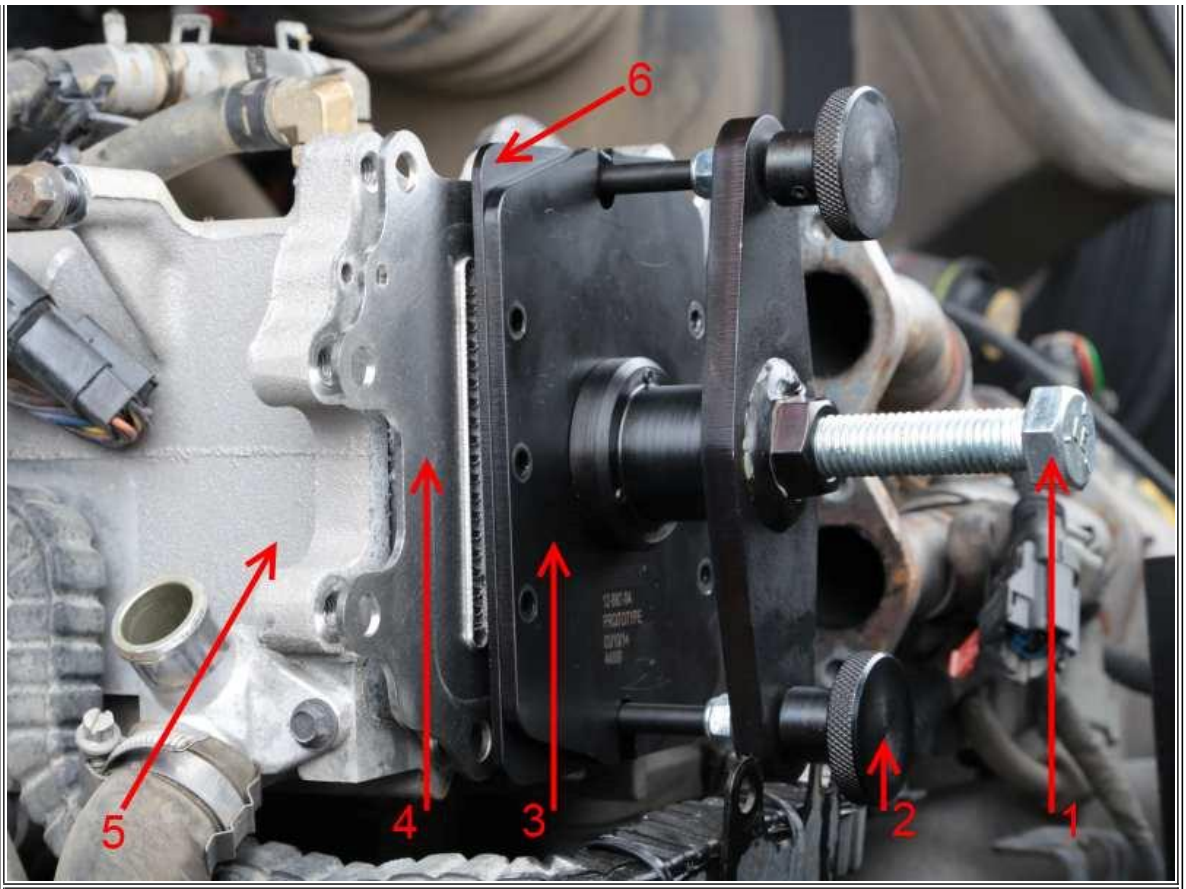

Figure 19: Low Temp Core Install Tool

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 will aid in alignment of the core, as well.

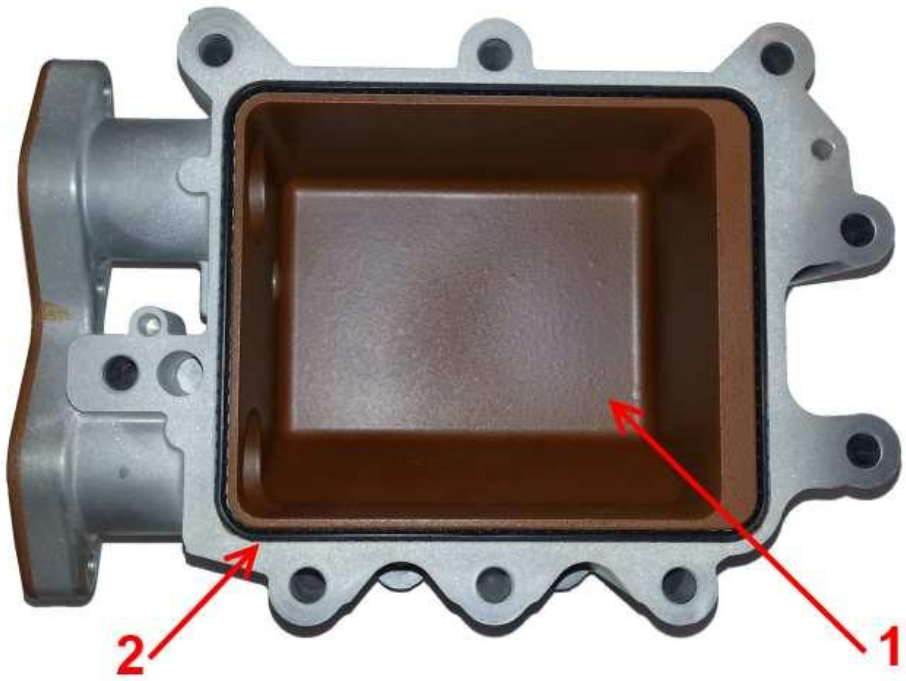

Figure 20: EGR Outlet Cover

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.

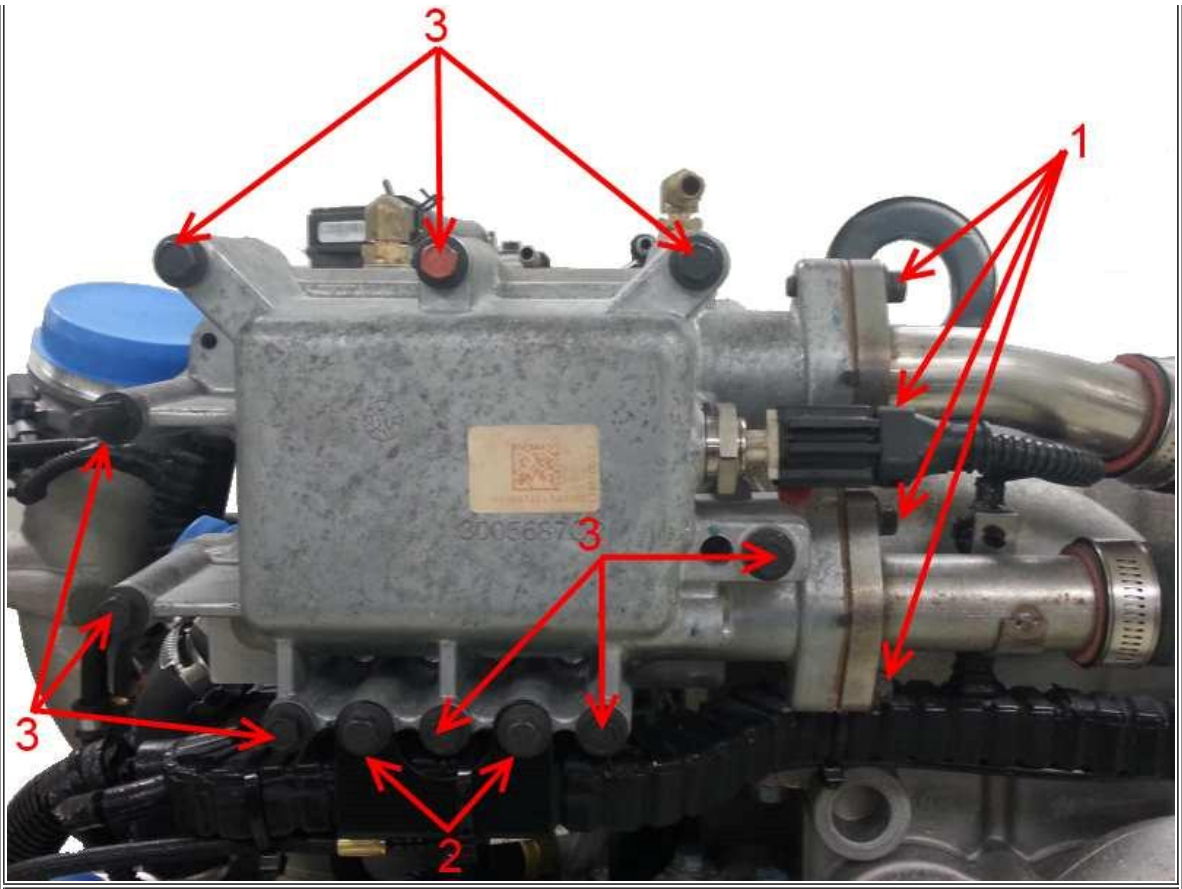

Figure 21: EGR Outlet Cover, Bolts and Tubes

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 21**.

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 21**, Item 1).

14. Install the two engine harness bracket bolts (**Figure 21**, Item 2).

15. Connect the EGRT sensor.

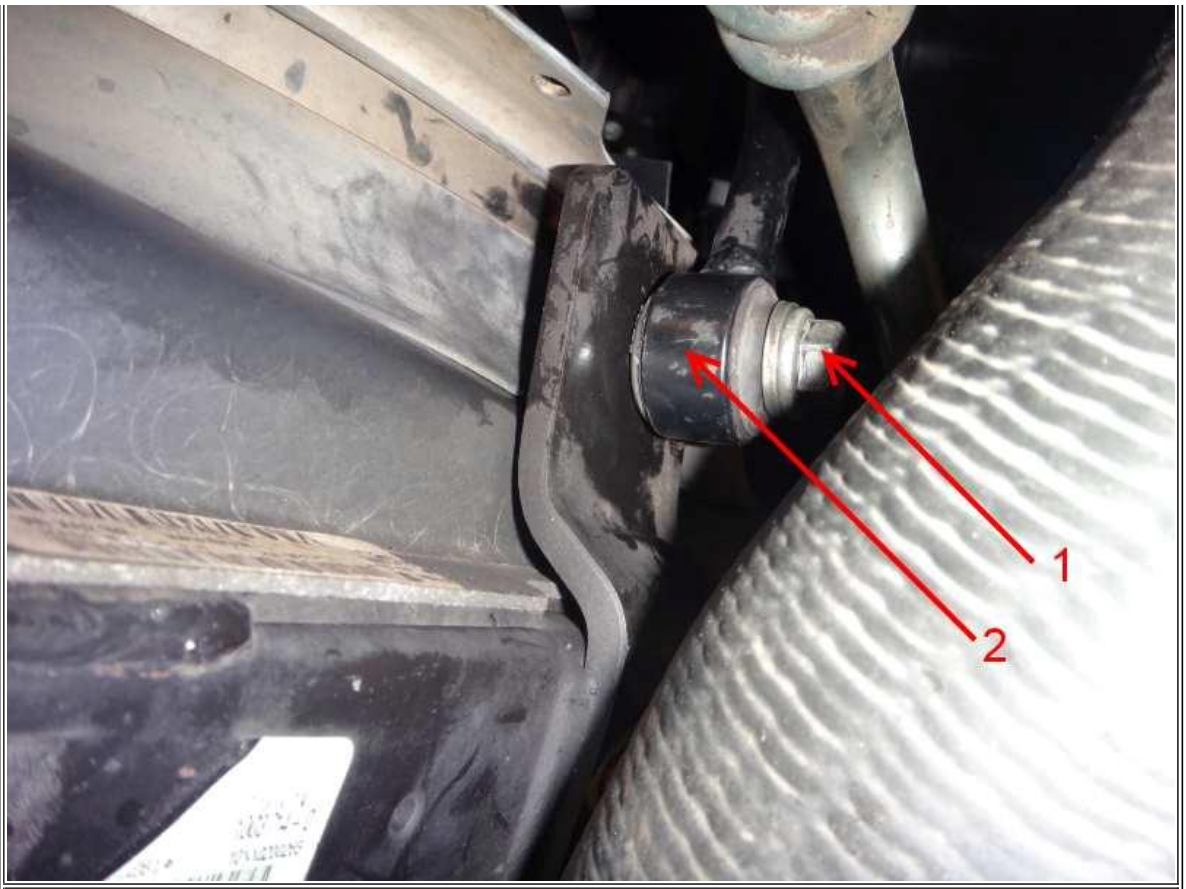

Figure 22: Driver Side Radiator Support

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

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

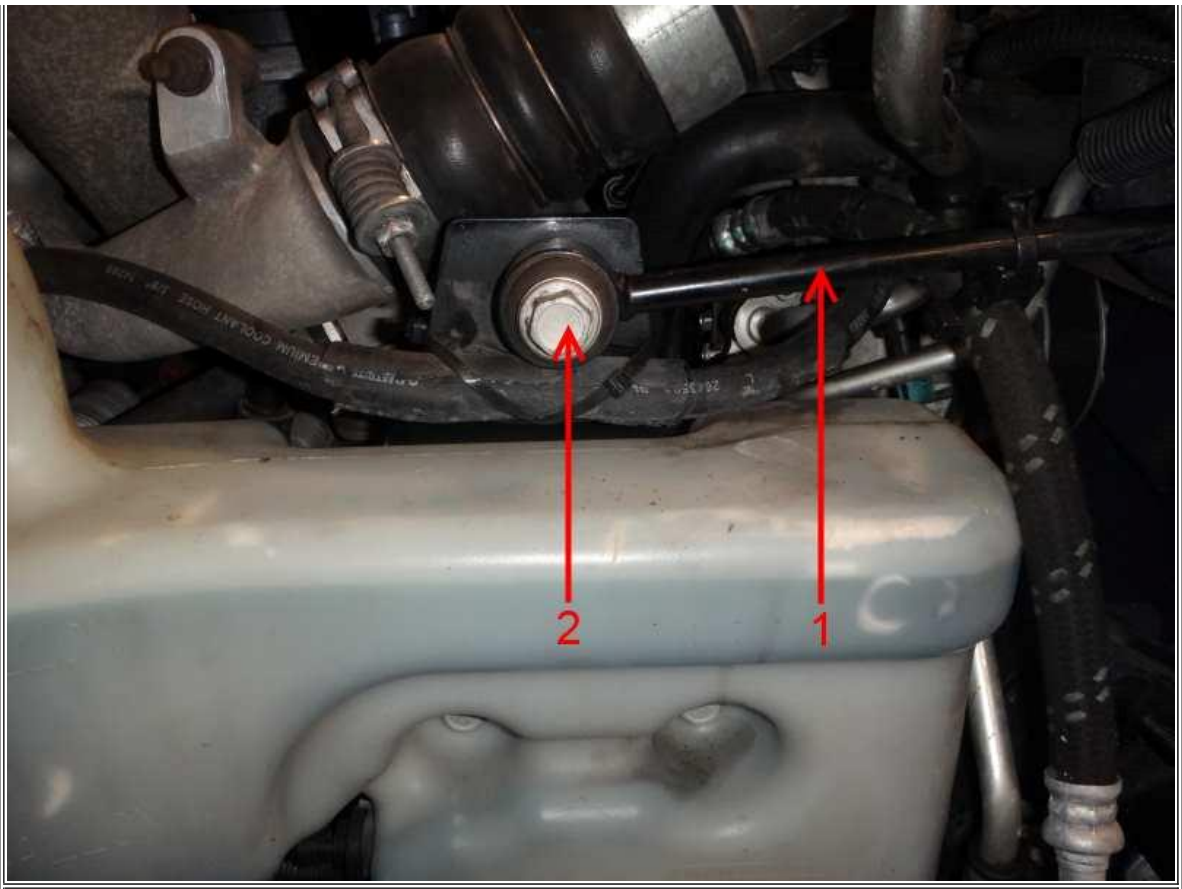

Figure 23: Passenger Side Radiator Support

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

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

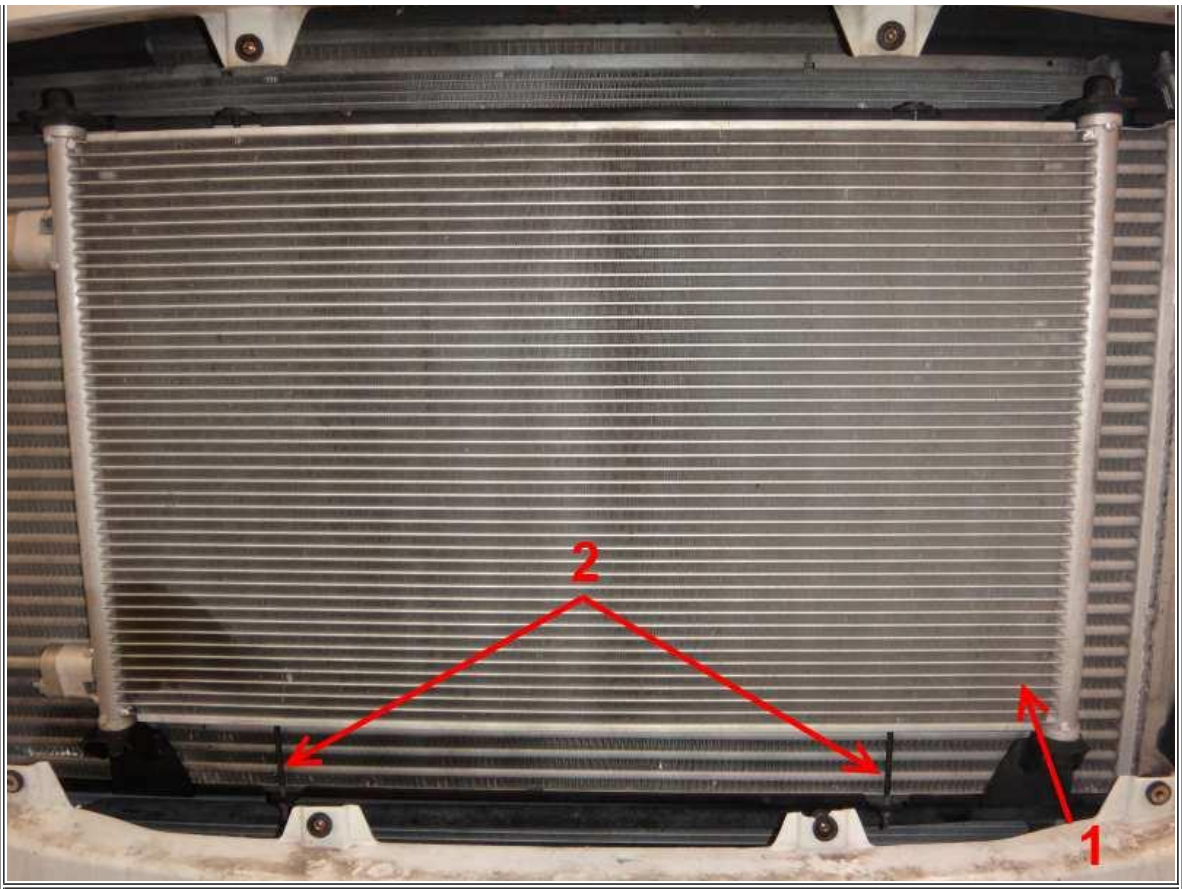

Figure 24: A/C Condenser Mounting

Item 1: A/C Condenser
Item 2: Condenser Stay Rods

18. Install the A/C Condenser Stay Rods

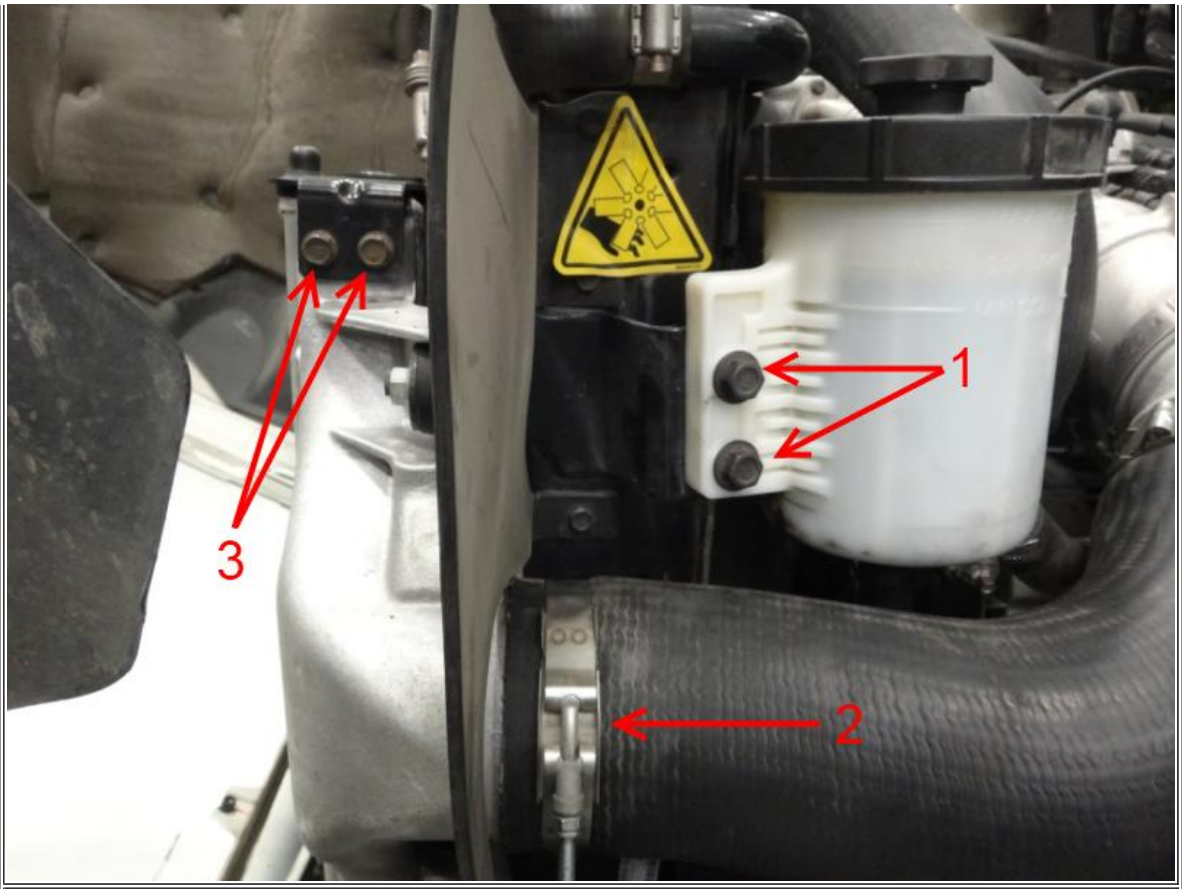

Figure 23: Driver Side HPCAC

Item 1: Power Steering Reservoir Bolts
Item 2: HPCAC Clamp/hose
Item 3: A/C Bracket bolts

19. Position the power steering reservoir (**Figure 23**, Item 1) and torque the bolts to 14 lb-ft (19 N-m).

20. Install the HP CAC outlet pipe and tighten the clamp (**Figure 23**, Item).

21. Install the A/C condenser support bracket and bolts (**Figure 23**, Item 3).

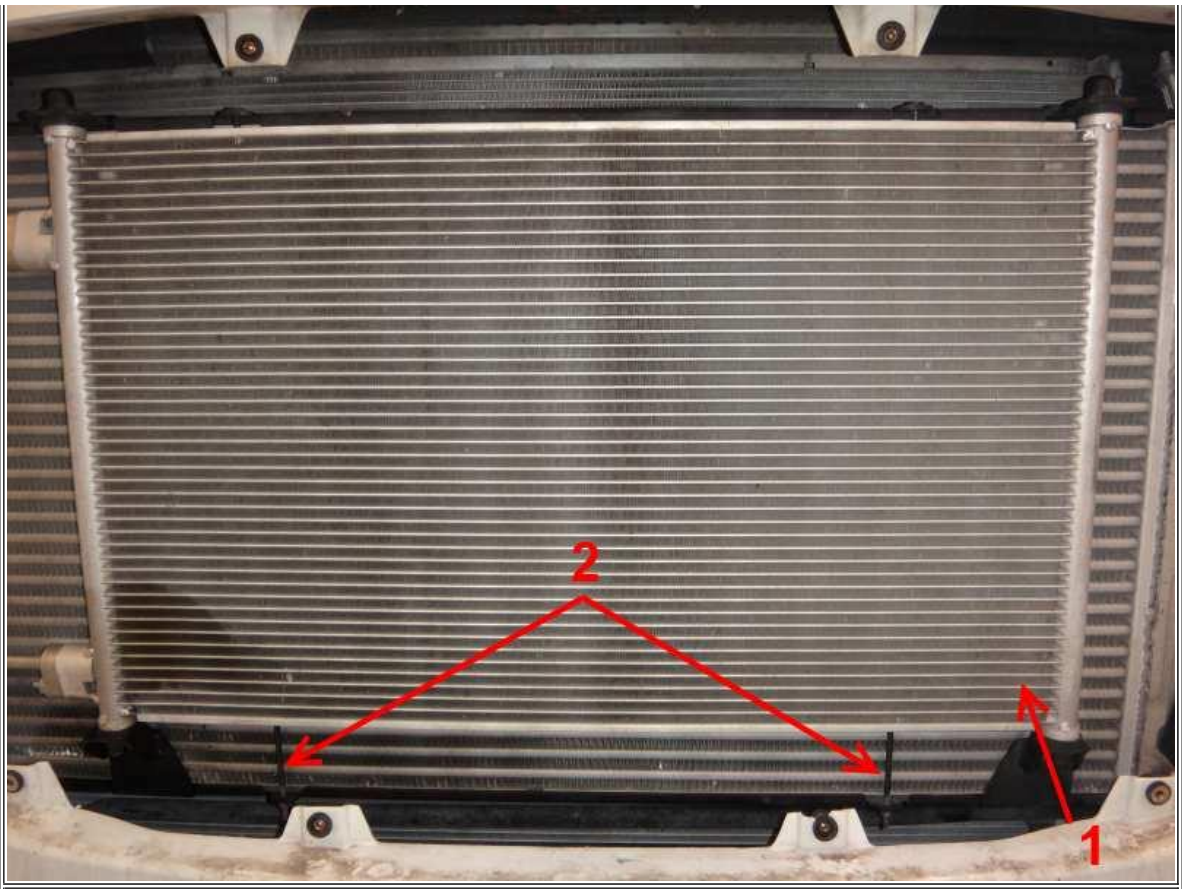

Figure 24: A/C Condenser Mounting

Item 1: A/C Condenser
Item 2: Condenser Stay Rods

22. Swing the A/C condenser over the engine and secure using the stay rods (**Figure 24**, Item 2)

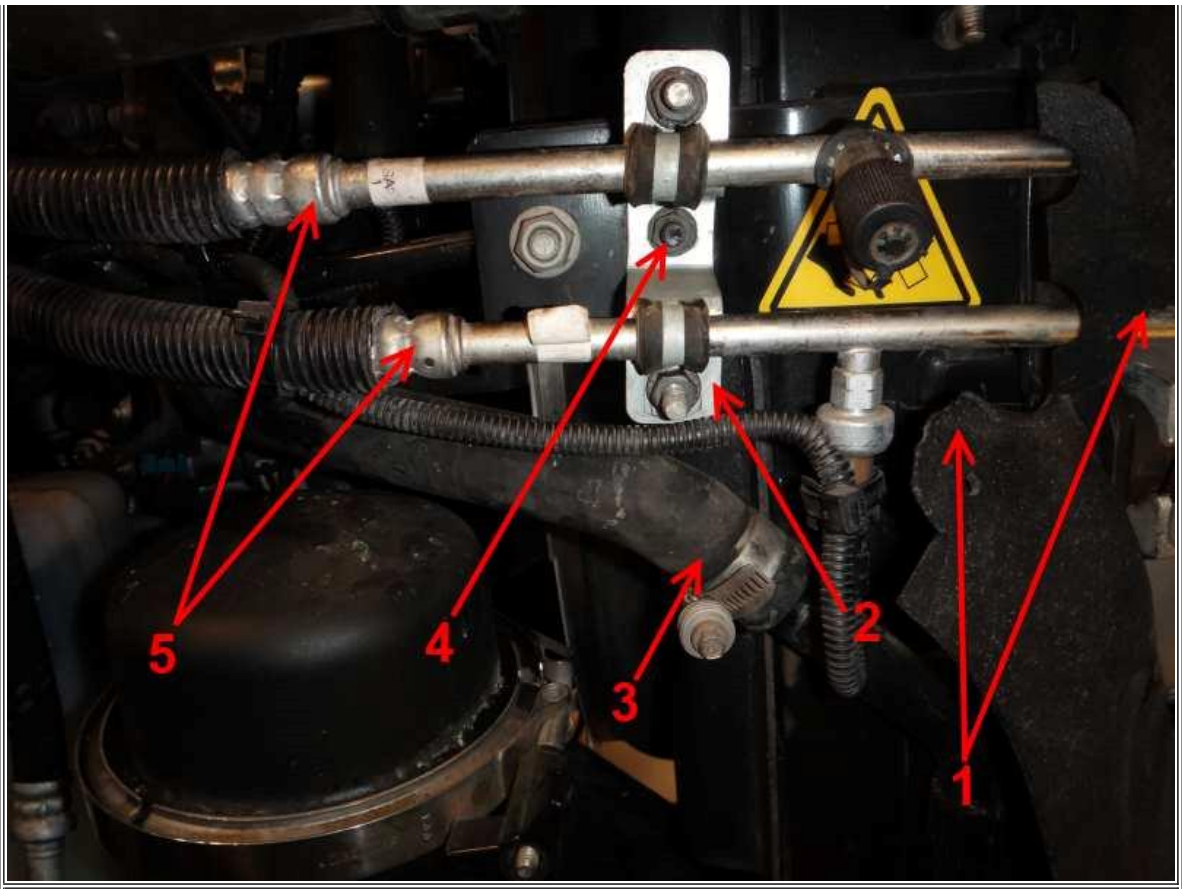

Figure 25: A/C Line Bracket

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

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

24. 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

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

Figure 27: Radiator Hoses

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

26. Attach the radiator hose and tighten the clamp (**Figure 27**, Item 2).

27. Attach the LTR hose and tighten the clamp (**Figure 27**, Item 1).

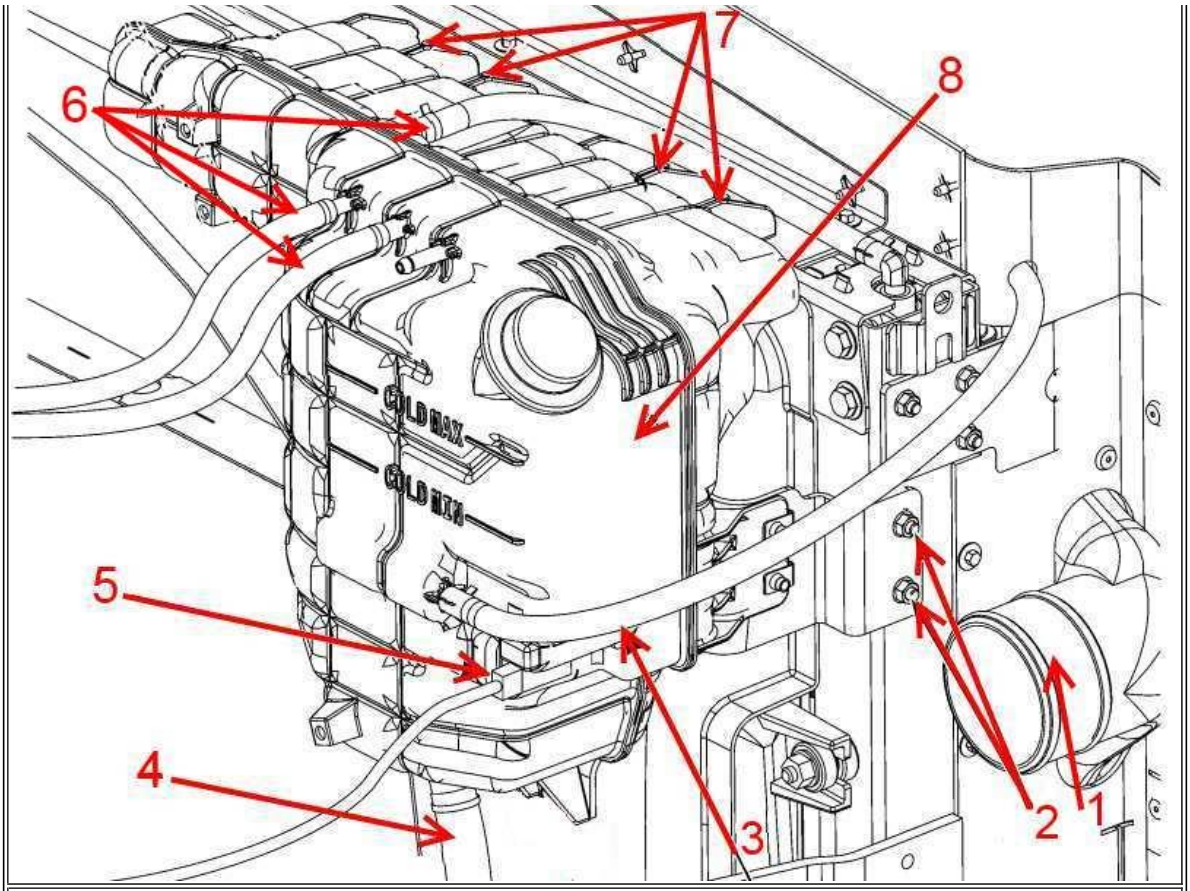

Figure 28: Dearation Tank Assembly

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

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

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

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

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

32. Attach the dearation lines (**Figure 28**, Items 3 & 6).

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

34. Use the Coolant Management Tool to refill the cooling system. CONTINUE WITH STEP 33 WHILE THE COOLING 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.
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.

Figure 29: Torsion Bar Stop Bracket

Item 1: Torsion Bar Brackets
Item 2: Bracket Bolts

35. With the hood open, install the four bolts for the torsion bar stop brackets (**Figure 29**, Item 2).

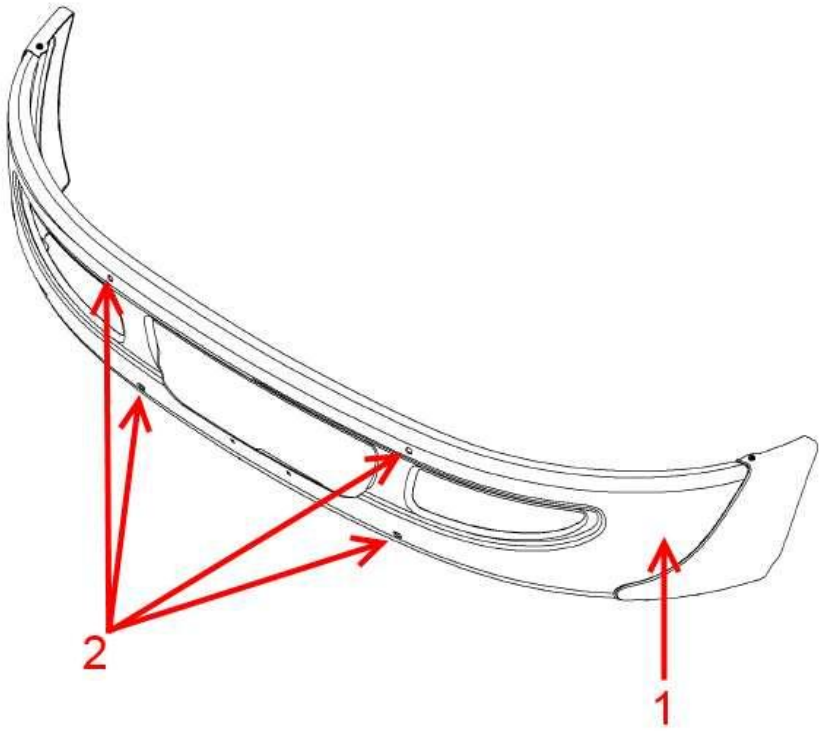

Figure 30: Front Bumper

Item 1: Bumper Assembly
Item 2: Mounting Bolts

36. Install the bumper and the four bolts securing the bumper to the frame (**Figure 30**, Item 2) .

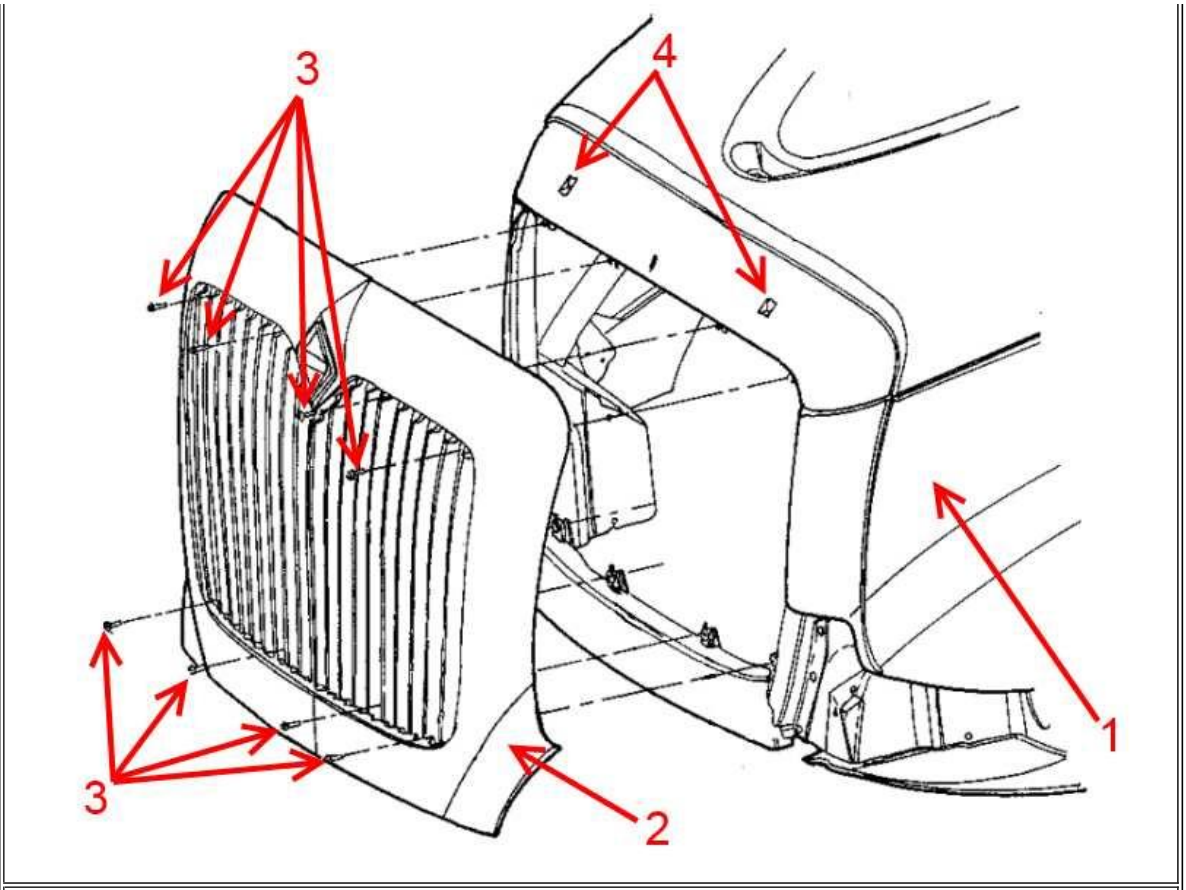

Figure 31: Front Grille Assembly

Item 1: Hood
Item 2: Grille
Item 3: Mounting Screws
Item 4: Push Tab Slot

37. Install the front grille

a. Cut one 41" piece of 3/8" wide 3M Double Sided Adhesive Tape.
b. Place the tape on the hood. The tape should be centered on the hood and placed one inch forward of the rear grille contour.
c. Remove the paper backing from one side of the tape and place it on the hood. Firmly press on the backside of the tape to seat it against the surface of the hood.
d. Place the grille into position against the hood. Do not remove the protective paper from the second surface of the tape!
e. Make certain that the grille is in the proper position with mounting holes aligned and mark its location by placing masking tape on the hood and grille at several locations. Mark the tape so the grille can be precisely located once the adhesive tape is exposed.
f. Remove the protective paper from the second surface of the adhesive tape.
g. Carefully locate the grille slightly above its proper location on the hood and lower it slowly into position against the hood. Make certain that the locating marks previously made on the masking tape are in the proper location.
h. Press the grille down firmly against the hood. Apply approximately 20 pounds of force along the grille area above the tape.
i. Secure using the eight grille mounting screws (**Figure 31**, Item 3).

38. Connect the battery cable.

39. 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 proedure.
Provide the customer with oil change information.

WARRANTY INFORMATION

Warranty Claim Coding:

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

Standard Repair Times:

Step	Description	SRT	Hours
All	LT Core Removal/Installation for TranStar	Q12-7892U	SRT LINK
	LT Core R&R during HT replacement (add-on)	Q12-6892U-8	
32	Cooling System Leak Test (ONLY if necessary)	A09-9022A	SRT LINK
	EGR Cooler Pressure Test (in chassis, LT leak only)	Q12-7892U-4	SRT LINK
	EGR Cooler Pressure Test (add-on if cooler assembly rep'd)	Q12-6892U-1	
	Lambda Sensor Replacement or Relearn (review iKNow)	IK1201065	
	Engine Oil and Filter Change	A12-1889U	SRT LINK

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

SRT Manual

OTHER RESOURCES

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

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