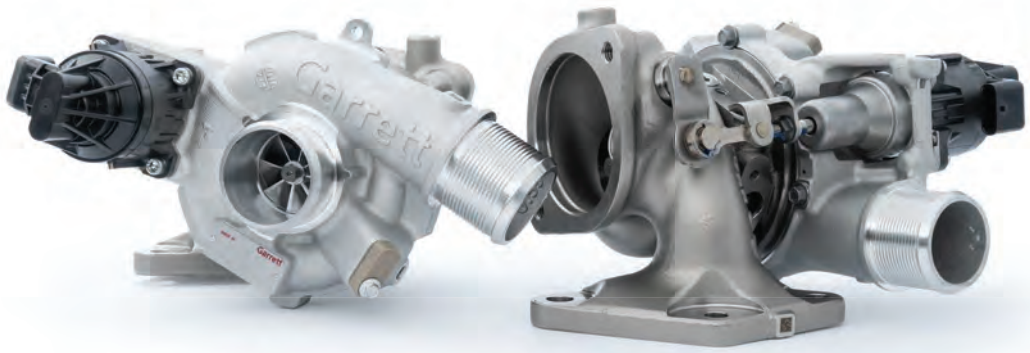
INSTALLATION MANUAL

Garrett
ADVANCING MOTION

POWERMAX



Installation Manual
2022+ Ford Bronco / Ranger Raptor 3.0L

KIT CONTAINS

Turbo Left (Driver side) 922700-5002W
Check Valve Kit 953418-0002

Turbo Right (Passenger side) 922701-5002W
Check Valve Kit 953418-0002

WARNING

Before raising the vehicle on a hoist, make sure the hoist capacity is adequate for the vehicle weight, including any vehicle cargo or modifications. Always position the hoist lift arms as shown in section 100-02 of this manual. Do not use the engine to power the drive wheels unless all drive wheels are elevated off the ground. Incorrect hoist arm positioning or drive wheels in contact with the ground can cause unintended vehicle movement. Failure to follow these instructions may result in serious personal injury or death.

WARNING

Only raise the vehicle when positioned on a hard, level surface. Attempting to raise the vehicle on an uneven or soft surface may result in vehicle slipping or falling from the jack or jackstand. Failure to follow this instruction may result in serious personal injury.

WARNING

When jacking or lifting the vehicle, block all wheels remaining on the ground. Set the parking brake if the rear wheels will remain on the ground. These actions help prevent unintended vehicle movement. Failure to follow these instructions may result in serious personal injury.

NOTICE

The jack provided with the vehicle is intended to be used in an emergency for changing a deflated tire. To avoid damage to the vehicle, never use the jack to hoist the vehicle for any other purpose.

Do not attempt to jacking on the front bumper or the rear bumper on any vehicle. Damage to bumper covers will occur.

Do not attempt to jacking on the front control arm or rear control arm on any vehicle. Damage to control arms may occur.

Do not use the differential housing as a lift point. Leaks or damage to the rear axle cover and adjoining differential housing surface may occur if a floor jack or any lifting device is allowed to contact the cover at any point where the cover joins the housing.

Place blocks underneath the lifting points if a two-column hoist is used.

Damage to the suspension, exhaust or steering linkage components may occur if care is not exercised when positioning the hoist adapters prior to lifting the vehicle.

To prevent possible damage to the underbody, do not drive the vehicle onto the drive-on lift without first checking for possible interference.

When raising a vehicle on a two-column hoist, use care when positioning the vehicle so that the hoisting forks do not interfere with suspension components, mounting brackets or stabilizer mounting brackets, if equipped. In addition, use care in hoist positioning to avoid possible damage to the axle or rear cover.

JACKING & LIFTING

1. With the vehicle in NEUTRAL, position it on a hoist.

JACKING POINTS

NOTE
4-door shown,
2-door similar.

Only the specified jacking points may be used for jacking and supporting the vehicle.

LIFTING POINTS

NOTE
RH side shown,
LH side similar.

The lifting points for both the 2 and 4-door variants are aft of the front wheels on the chassis frame as indicated, and fore of the suspension rear trailing arm on the chassis frame.

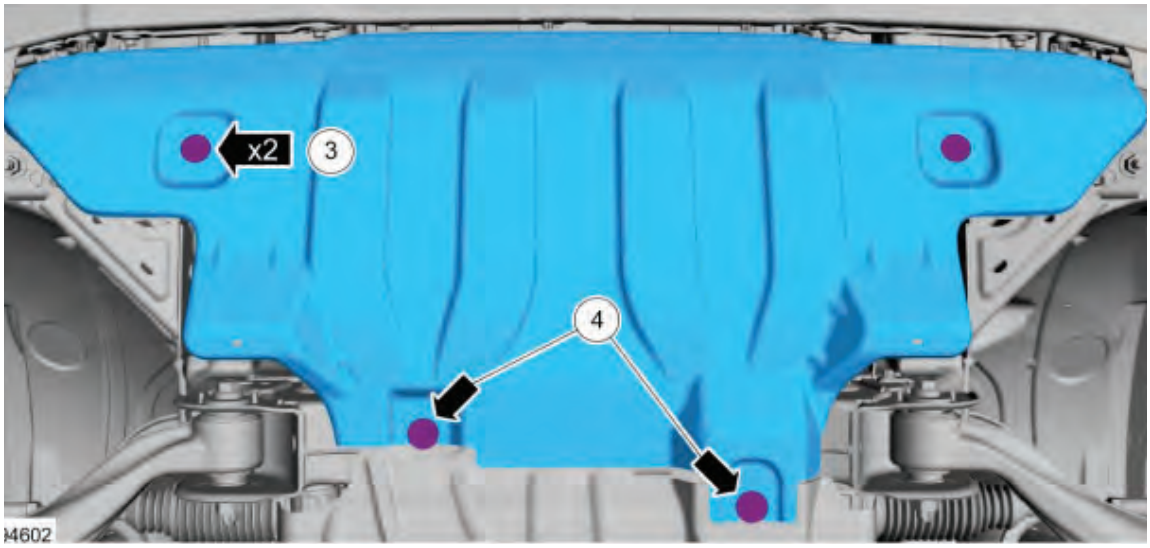
ENGINE UNDERSHIELD

FRONT ENGINE UNDERSHIELD REMOVAL

NOTE

Underbody shields vary by model.

1. Remove the bolts and the engine front undershield.



DRAIN THE COOLING SYSTEM

DRAIN THE COOLING SYSTEM

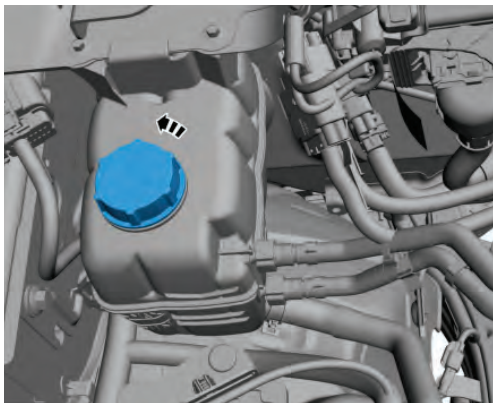
NOTICE

The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated, it must be recycled or disposed of correctly. Using contaminated coolant may result in damage to the engine or cooling system components.

Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

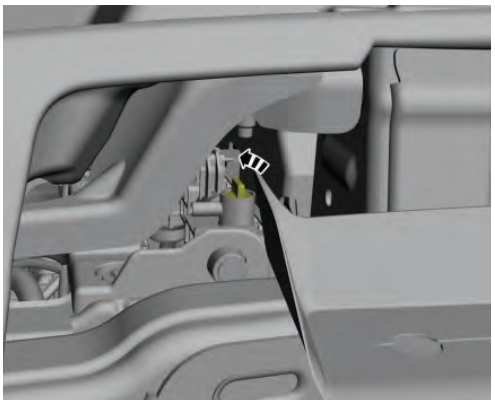
WARNING

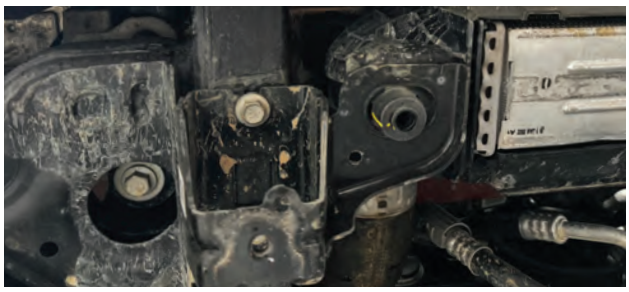
When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.



NOTE Be prepared to collect escaping fluid.

Locate the coolant drain on the right side of the the vehicle. Connect a hose to drain the coolant. Open the radiator drain valve and drain the engine coolant in a suitable, clean container.





FRONT FENDER SPLASH SHIELDS

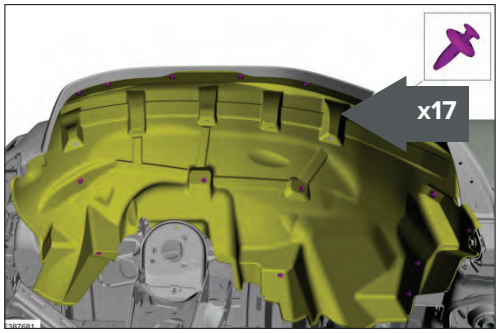
FRONT FENDER SPLASH SHIELDS

NOTE

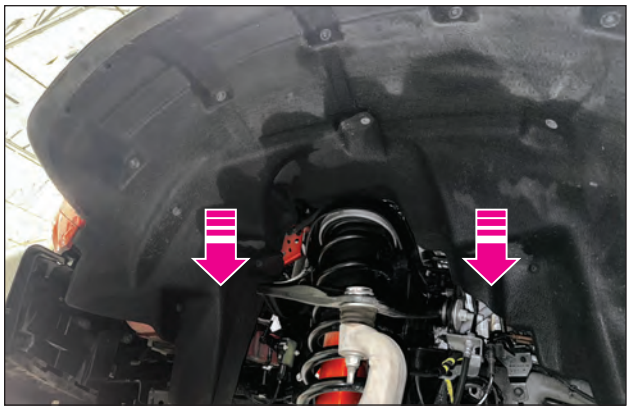
LH side shown, RH side similar.

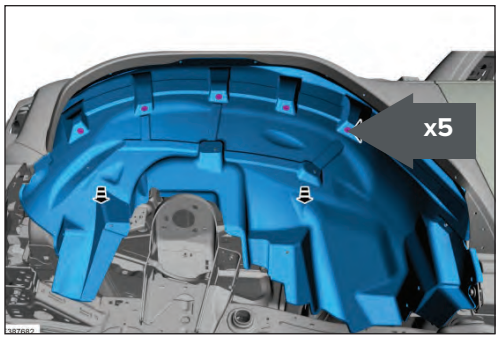
1. Remove the wheel and tire.

2. Remove the trim pins.



3. Remove the screws and the fender splash shield.





AIR CLEANER REMOVAL

NOTICE

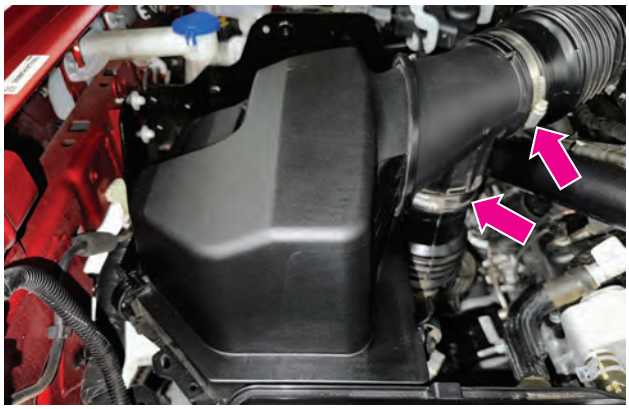
The turbocharger compressor vanes can be damaged by even the smallest particles. When removing any turbocharger or engine air intake system component, ensure that no debris enters the system. Failure to do so may result in damage to the turbocharger.

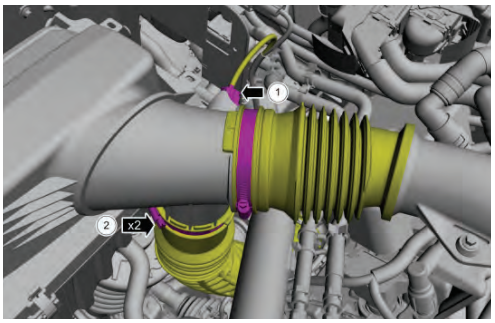
NOTE

Perform a push, click and pull test on the electrical connector to confirm good connection.

1. Disconnect the electrical connector and position aside the wiring harness.

Loosen the clamps -arrows- and position aside the air cleaner outlet pipes.

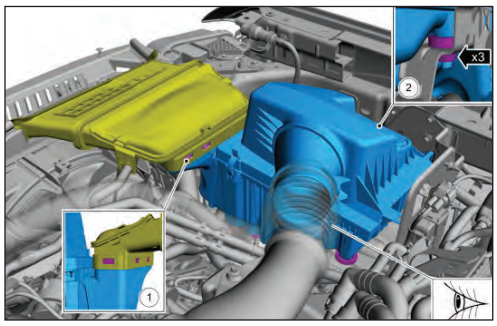




2. Press the lock points to pull out and position aside the air cleaner intake pipe.

NOTE: Check the isolators for damage and replace if required.

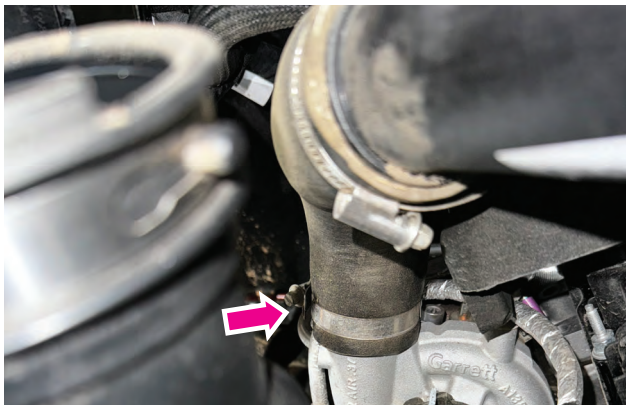
Detach the isolators and remove the air cleaner assembly.

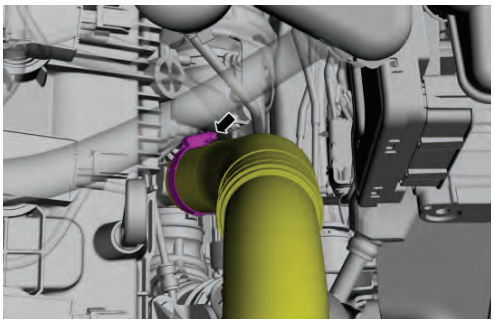


LH TURBOCHARGER OUTLET PIPE REMOVAL

LH TURBOCHARGER OUTLET PIPE REMOVAL

1. Loosen the clamp -arrow-.



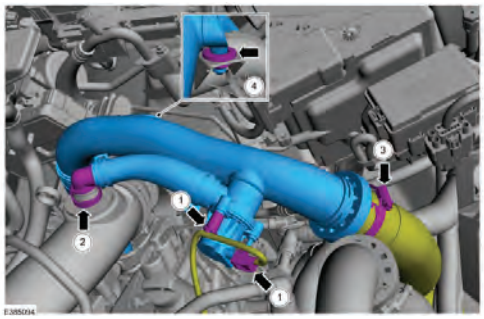


2. 1. Disconnect the electrical connector.

   2. Disconnect the quick connector.

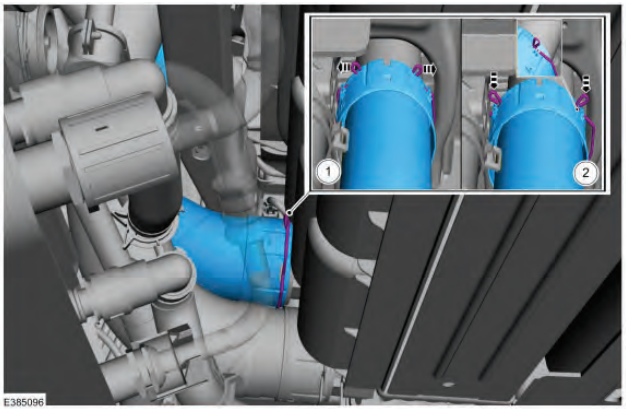
   3. Loosen the clamp.

   4. Detach the retainer and remove the TC outlet pipe upper LH.



3. 1. Release the TC outlet pipe LH by spreading the retainer ends outward.

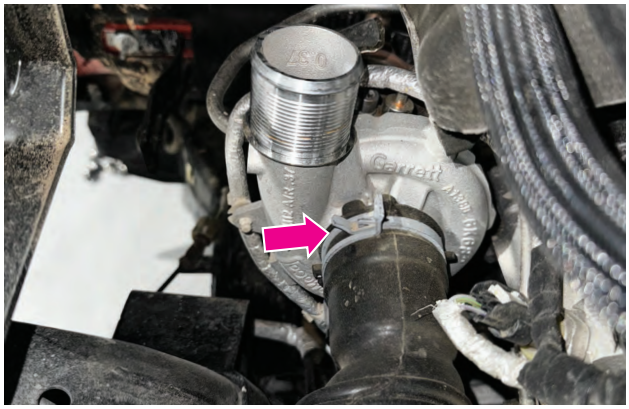
   2. Position the retainer ends in the notches locking the retainer in the open position and remove the TC outlet pipe lower LH .

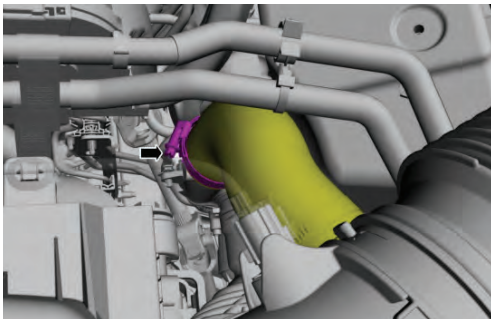


RH TURBOCHARGER OUTLET PIPE REMOVAL

RH TURBOCHARGER OUTLET PIPE REMOVAL

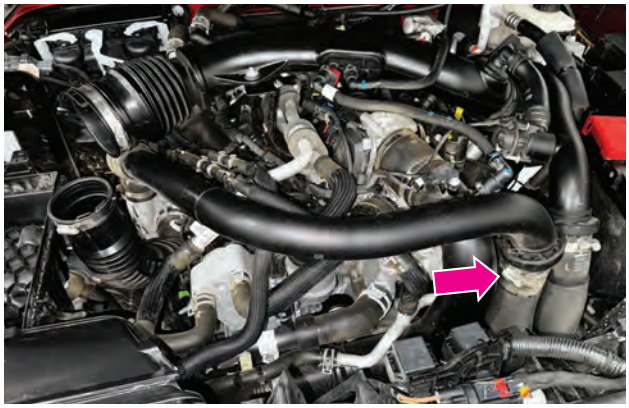
1. Loosen the clamp -arrow-.

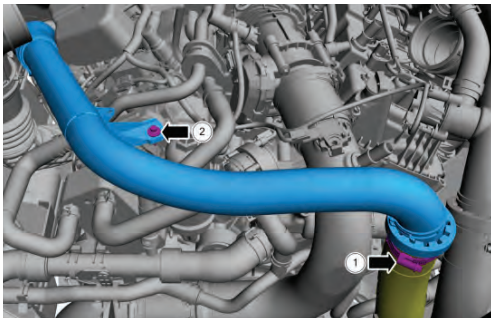


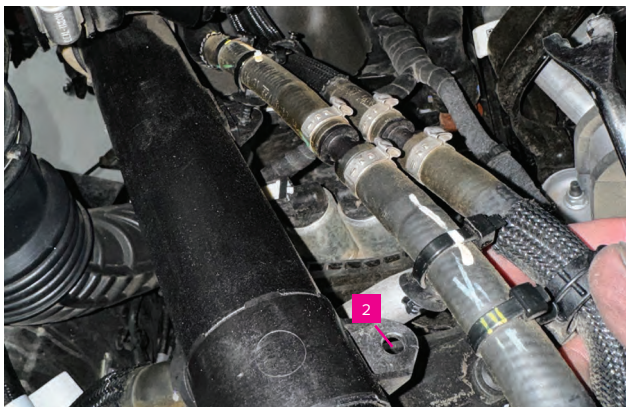


2. 1. Loosen the clamp -arrow-.

2. Carefully remove the two retaining clips from RH TC outlet pipe, then remove outlet pipe.



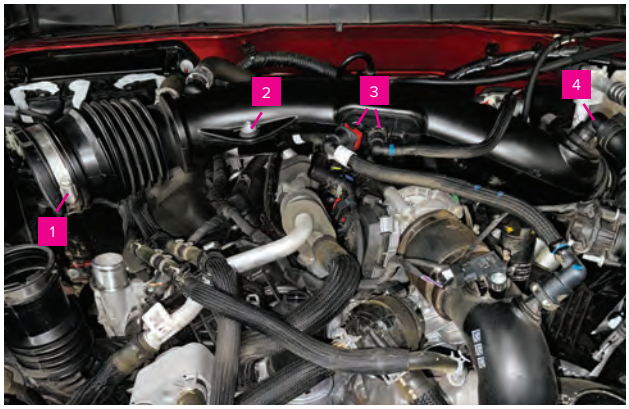


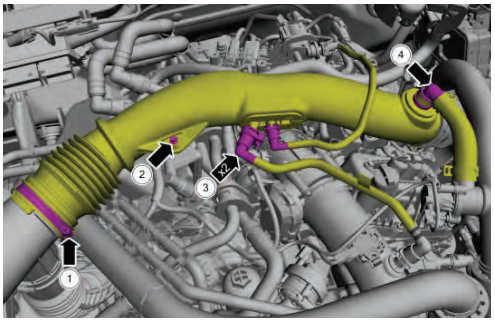


LH AIR CLEANER OUTLET PIPE REMOVAL

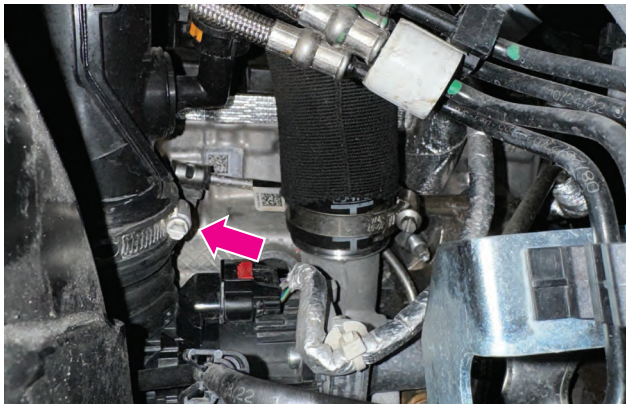
LH AIR CLEANER OUTLET PIPE REMOVAL

1. 1. Loosen the clamp.
   2. Remove the bolt.
   3. Disconnect the quick connectors.
   4. Disconnect the quick connector.

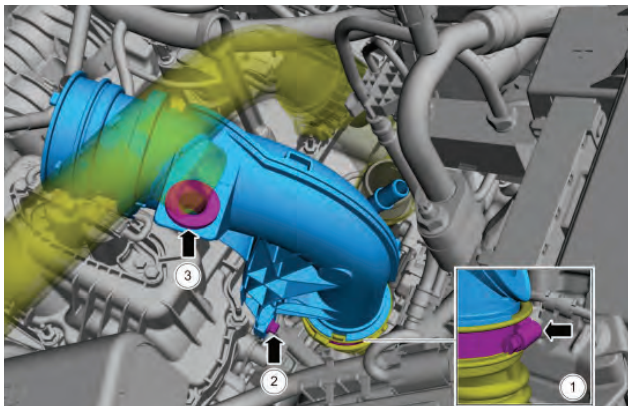




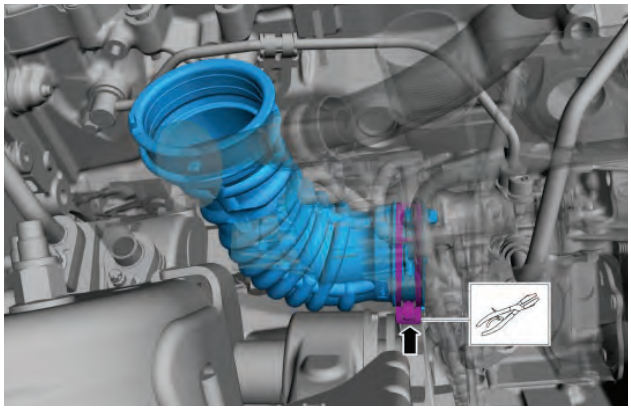
2. Loosen the clamp -arrow-.



3. 1. Loosen the clamp.
   2. Remove the bolt.
   3. Detach the retainer. Remove the LH air cleaner outlet pipe LH.



4. Release and remove the hose clamp. Remove the air cleaner outlet pipe LH .

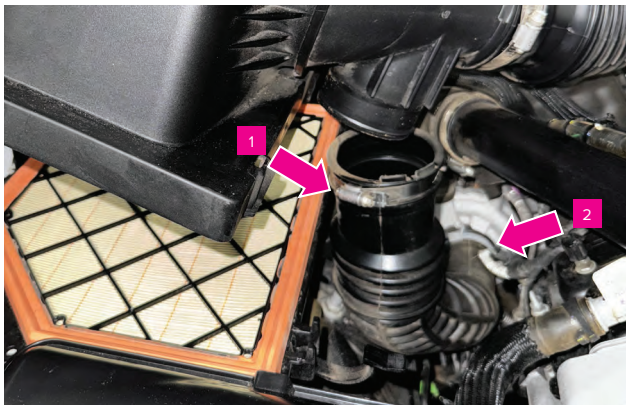


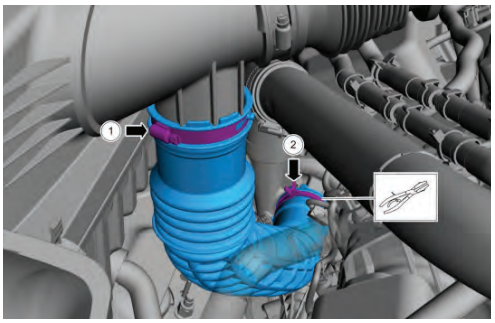
RH AIR CLEANER OUTLET PIPE REMOVAL

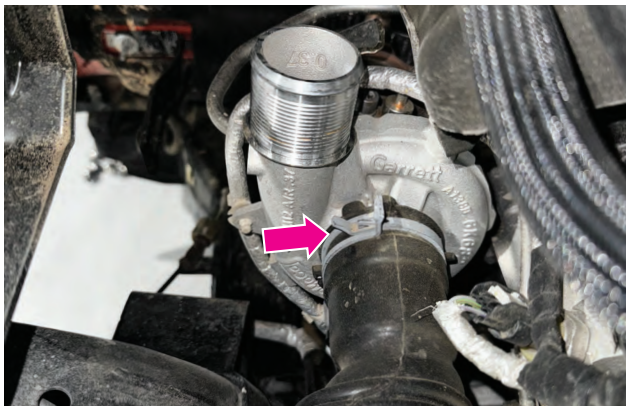
RH AIR CLEANER OUTLET PIPE REMOVAL

1. 1. Loosen the clamp -arrow-.

   2. Release and remove the hose clamp -arrow-. Remove the air cleaner outlet pipe RH.





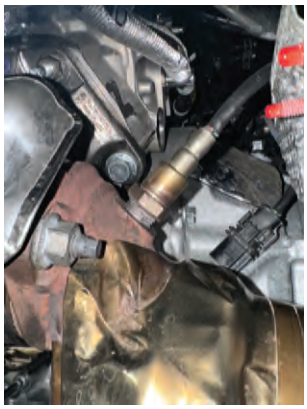


LH CATALYTIC CONVERTER REMOVAL

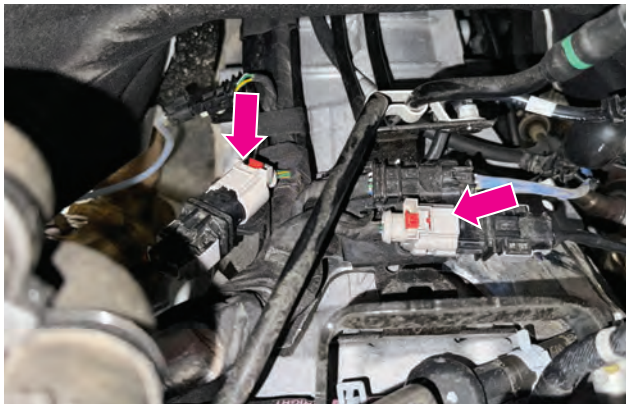
LH CATALYTIC CONVERTER REMOVAL

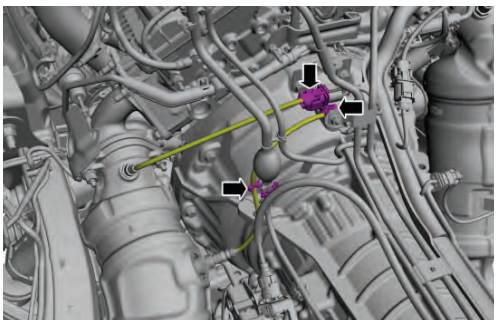
NOTICE
The catalytic converters are not being removed, but will be slid backwards on their exhaust hangers.

1. Remove the 02 sensors using 22mm wrench. (O2 Sensor must be removed to allow enough space for exhaust to slide backwards)

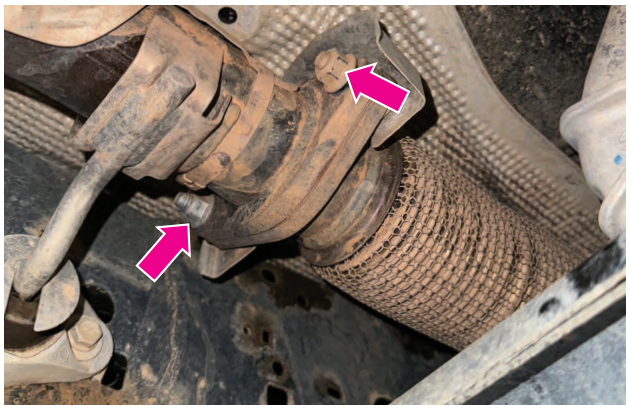


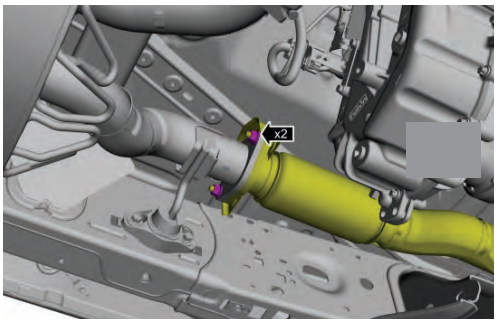
2. Disconnect the LH and RH electrical connectors -arrow- and detach the wire clips.



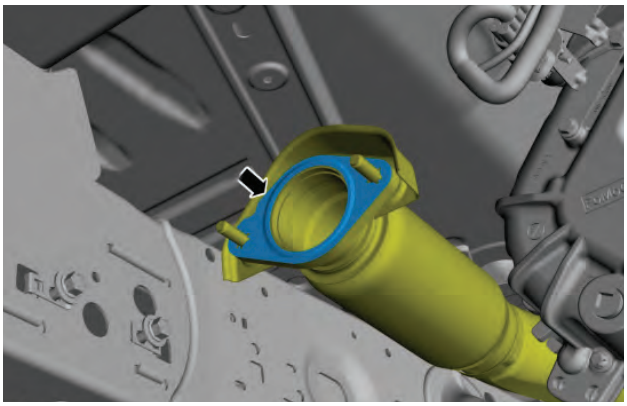


3. Remove the nuts -arrow-.

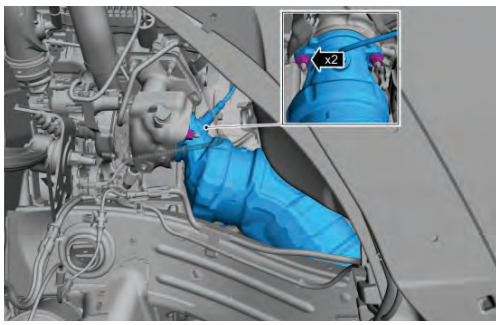




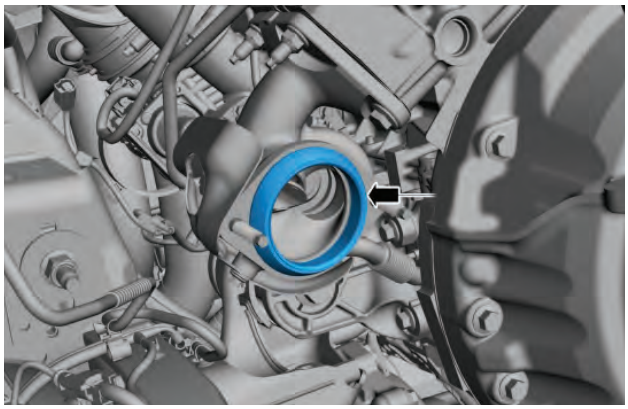
4. Inspect gasket and replace if necessary.



5. Remove the nuts. With nuts removed, complete right hand side before sliding exhaust backwards.



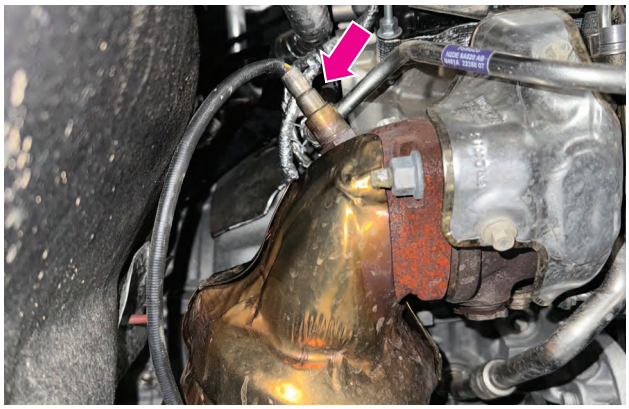
6. Remove the gasket and replace if necessary.



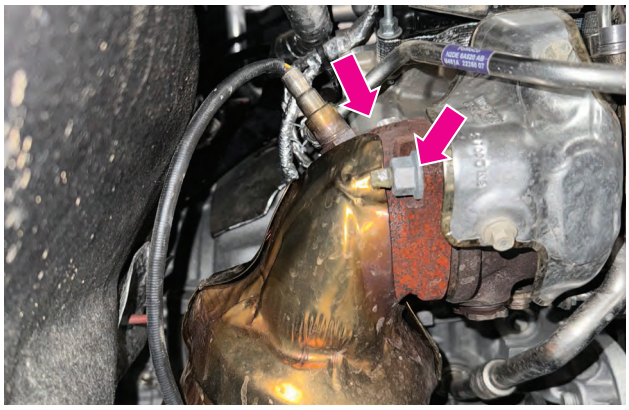
RH CATALYTIC CONVERTER REMOVAL

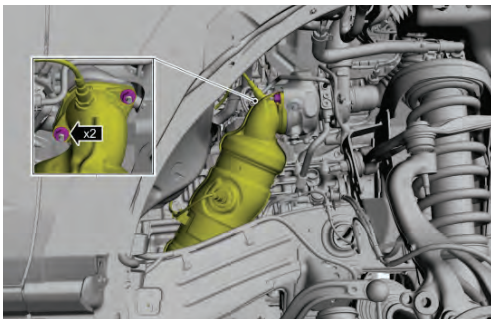
RH CATALYTIC CONVERTER REMOVAL

1. Reaching behind engine unplug, right hand O2 sensor -arrow-. (You do not have to remove the O2 sensor from the exhaust).

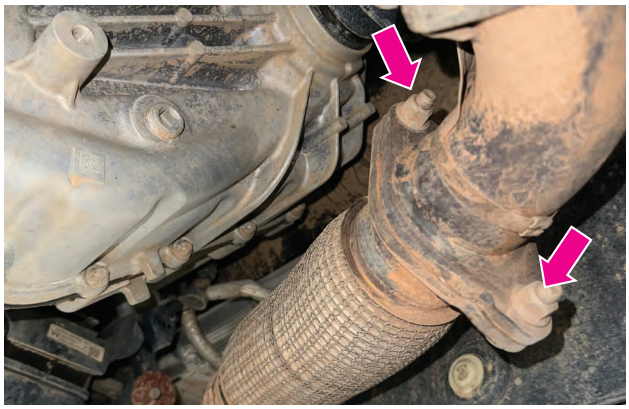


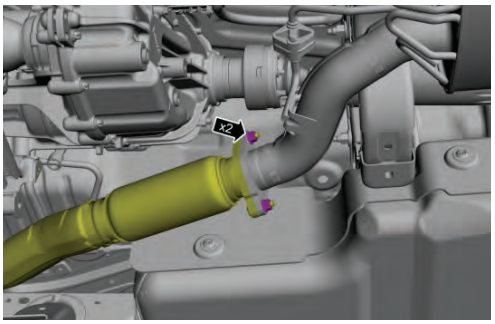
2. Remove the RH catalytic converter nuts -arrow-.



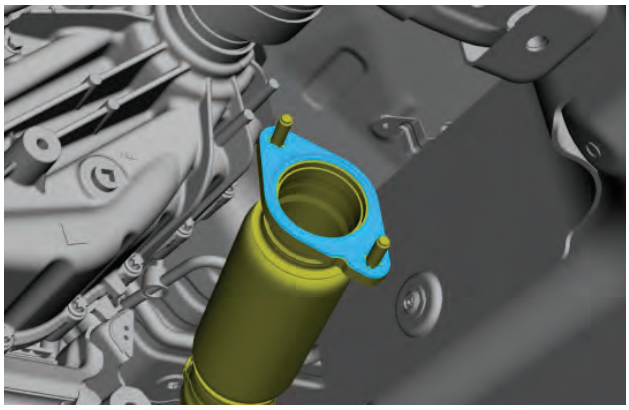


3. Remove the nuts.





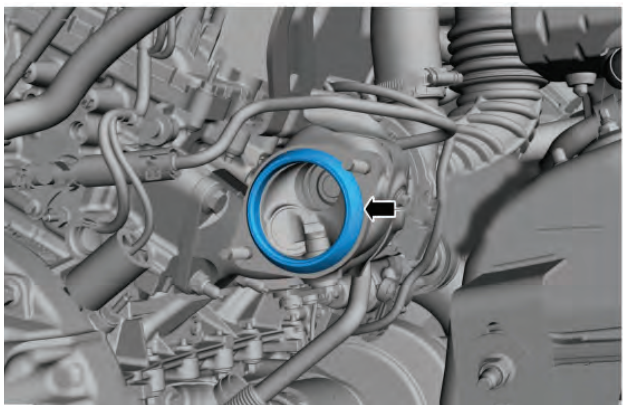
4. Remove the gasket. Inspect and replace if necessary.



5. Slide exhaust back in vehicle as far as possible making sure not to drop exhaust flange gaskets out of turbos. (No need to remove exhaust hangers, they allow the exhaust to slide back as is).

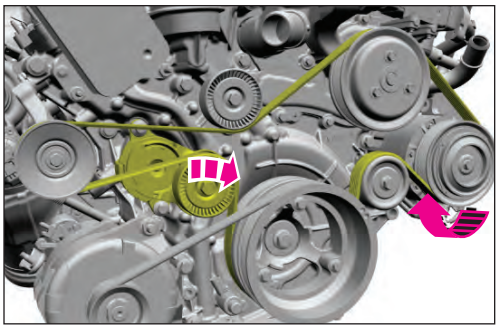
Exhaust hangers pictured.

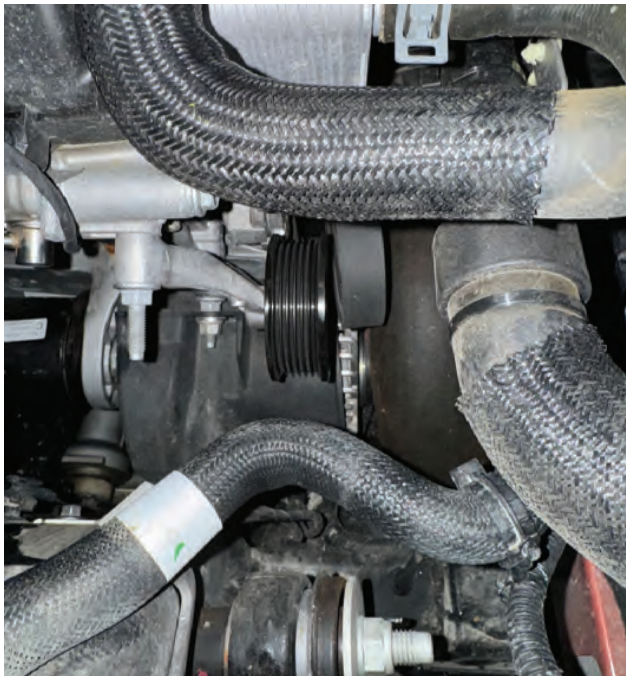
6. Remove the gasket. Inspect and replace if necessary.



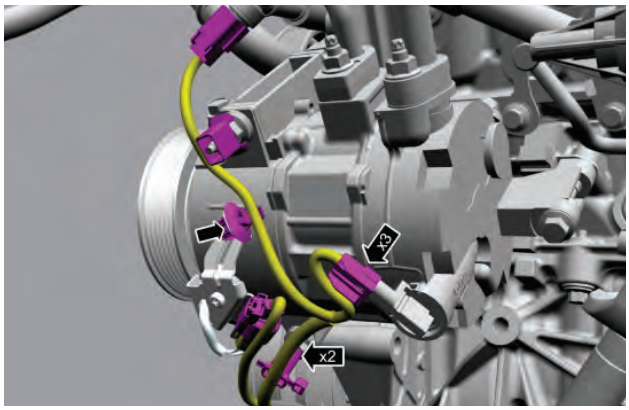
LH TURBOCHARGER REMOVAL

1. Using a 15 mm socket with a short extension. Rotate the accessory drive belt tensioner clockwise, then position the accessory drive belt off the air conditioning compressor pulley.

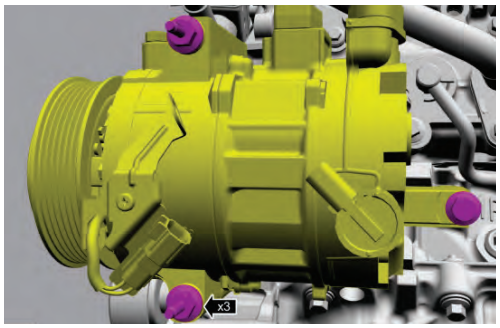




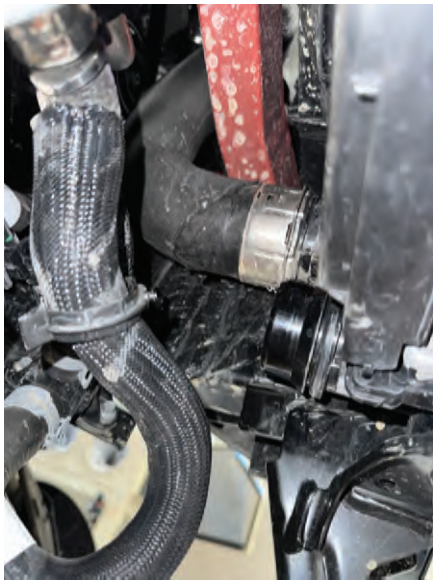
2. Disconnect the electrical connectors, then detach the wiring harness retainers.



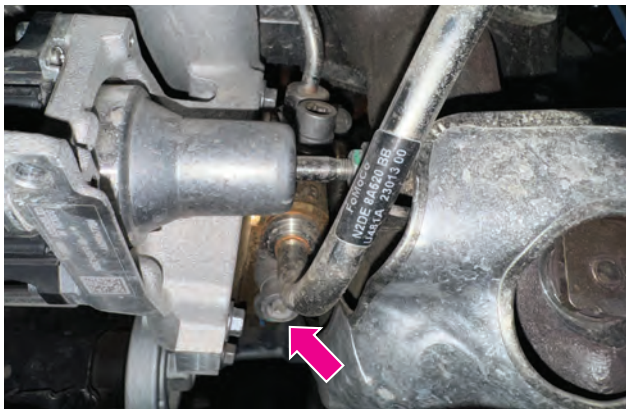
3. AC compressor will have to be loosened not removed. Loosen AC compressor mounting bolts using a 13 mm wrench to gain enough room to access the coolant feed line hardware.

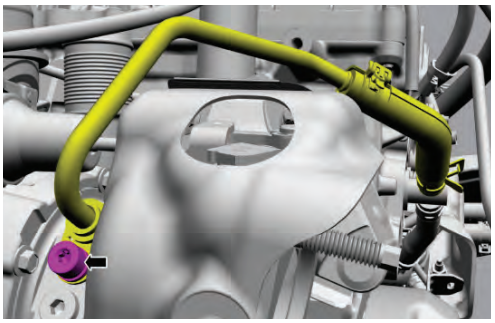


4. It may be easier to unclip and remove bottom intercooler connection to access lower AC compressor bolt.

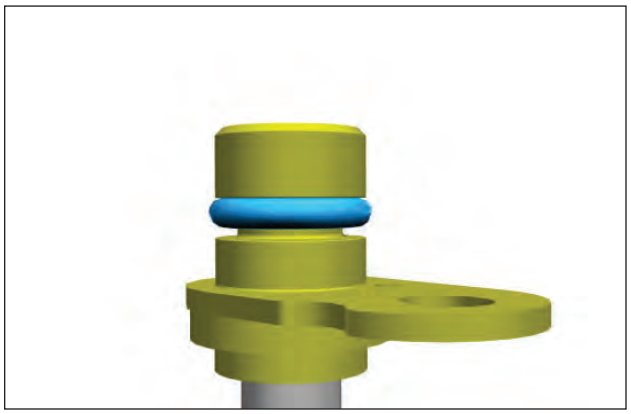


5. Remove the turbocharger coolant return tube bolt -arrow-, then disconnect the turbocharger coolant return tube from the turbocharger and position it out of the way.

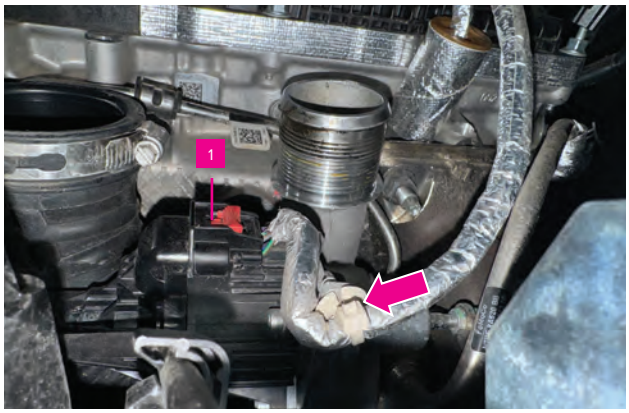


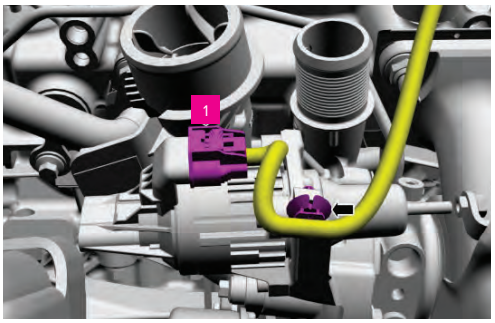


6. Inspect the O-ring and replace if necessary.

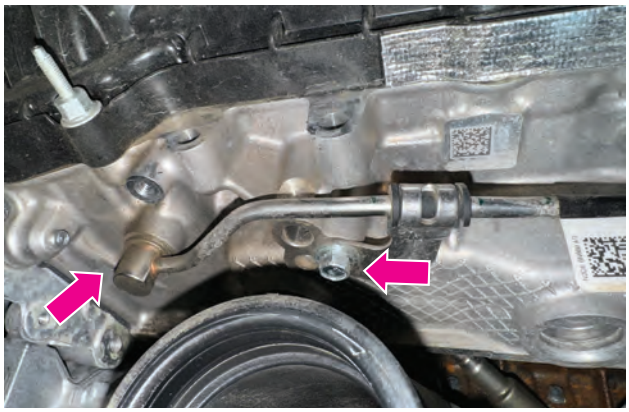


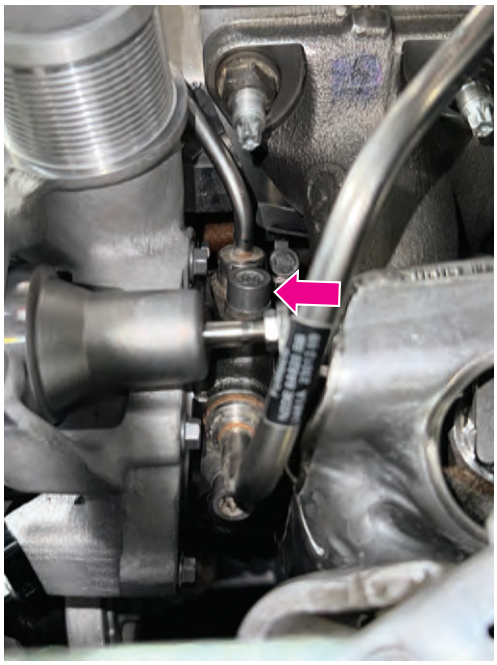
7. Detach the wire harness retainer -arrow-, then disconnect the electrical connector -1-.

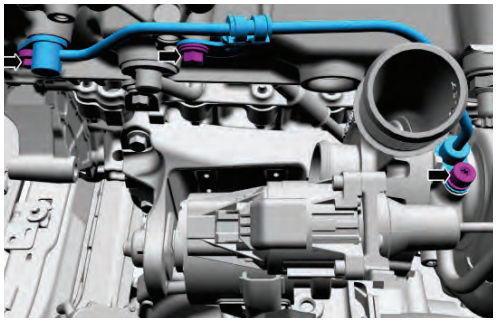




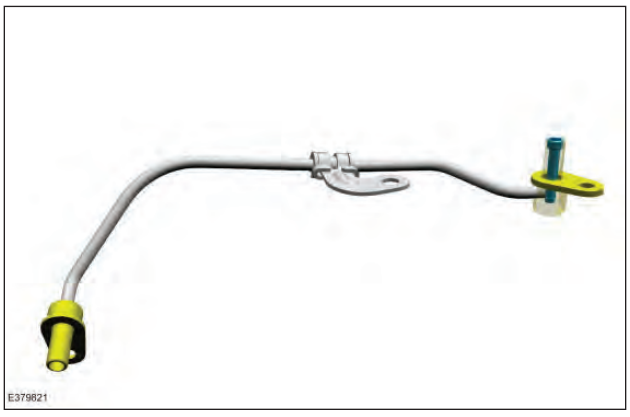
8. Remove the turbocharger oil supply tube bolts arrows, then remove the turbocharger oil supply tube.



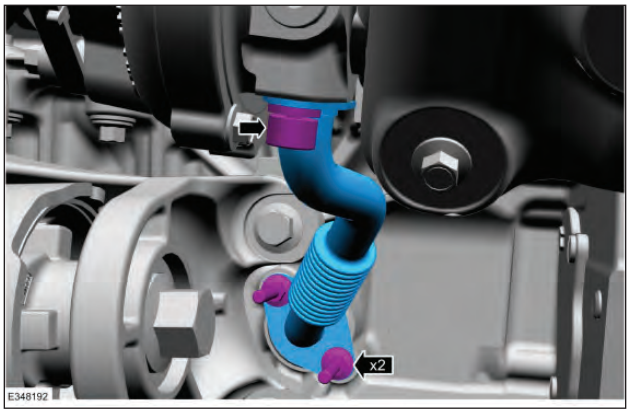




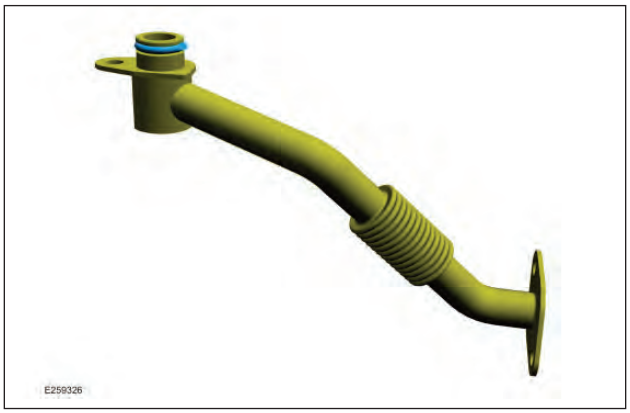
9. Remove and inspect the seals. Remove and inspect the turbocharger oil supply tube oil filter. Replace if necessary.



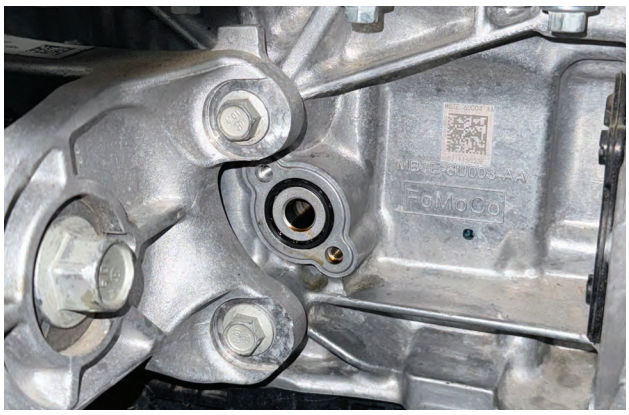
10. Remove the turbocharger oil return tube bolts, then remove the tube.

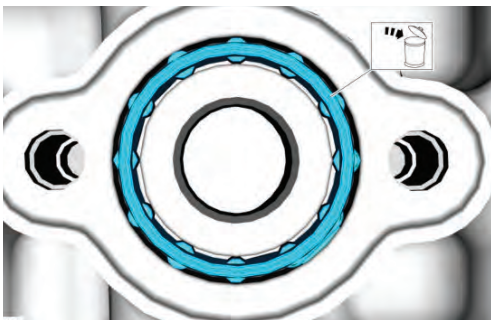


11. Remove the O-ring seal. Inspect and replace if necessary.

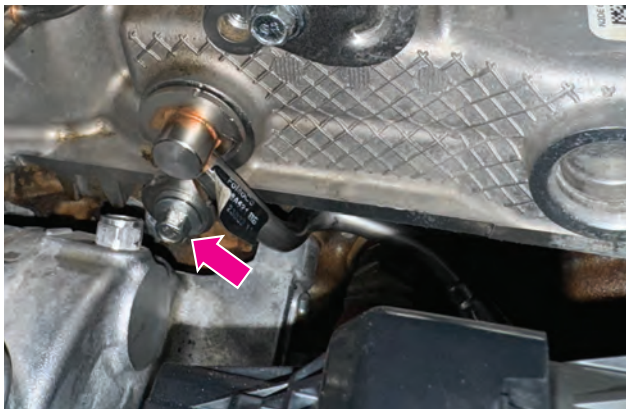


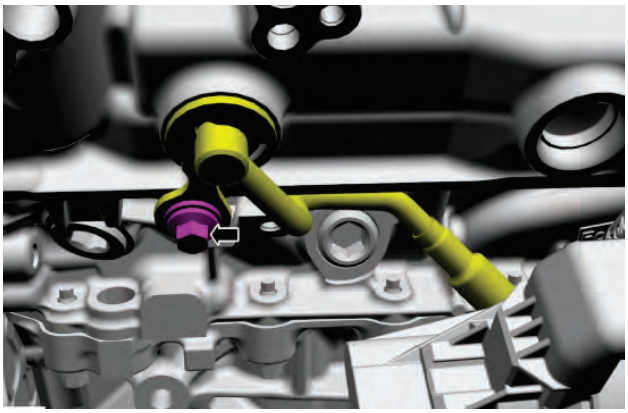
12. Inspect the oil return tube gasket and replace if necessary.





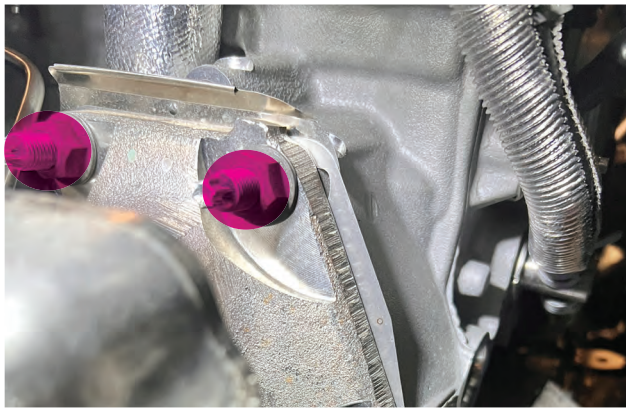
13. Remove the turbocharger coolant supply tube bolt -arrow-, then disengage the tube from the engine block.

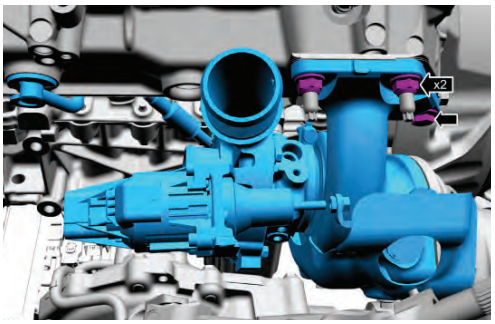




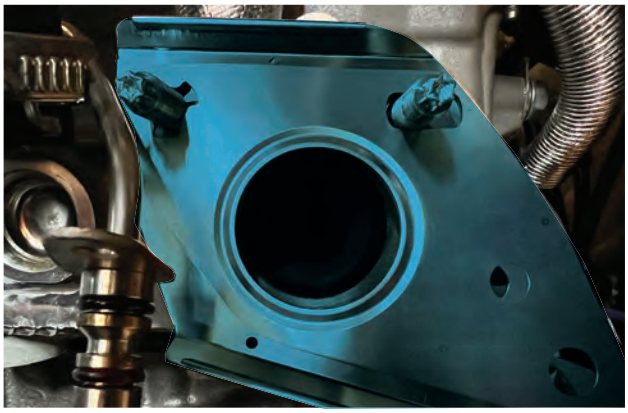
14. Remove the turbocharger coolant supply tube from the engine block while removing the turbocharger.

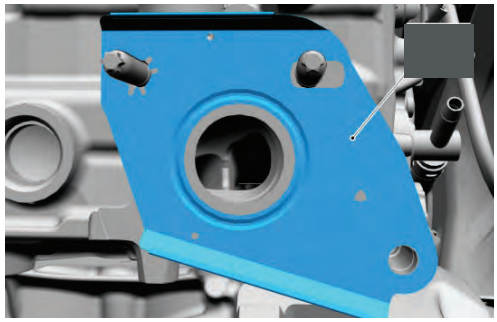
Remove the turbocharger nuts, then remove the turbocharger.



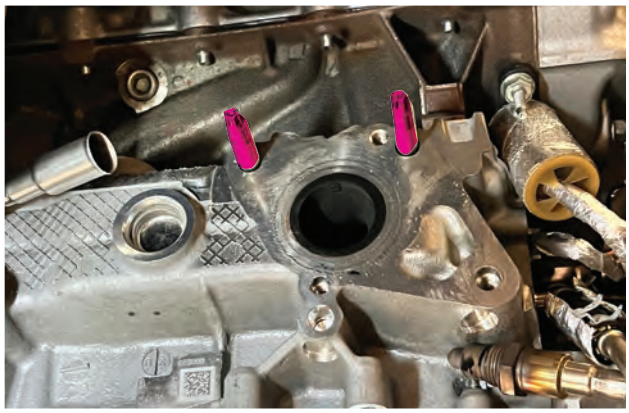


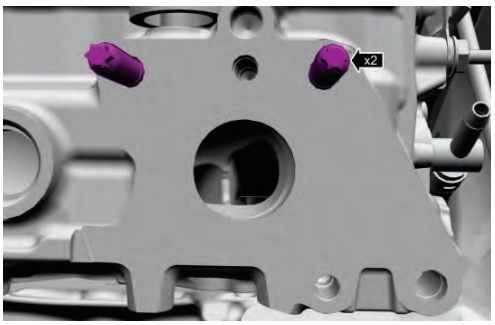
15. Remove and inspect the turbocharger gasket. Replace if necessary.



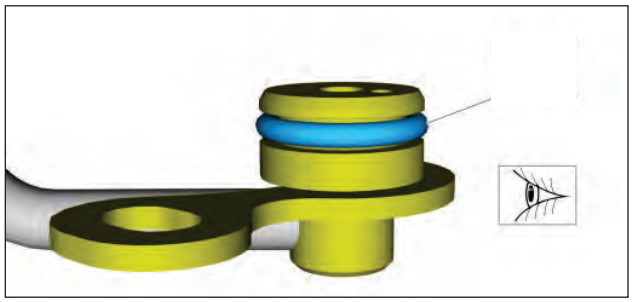


16. Remove the turbocharger mounting studs only if needed after inspection.

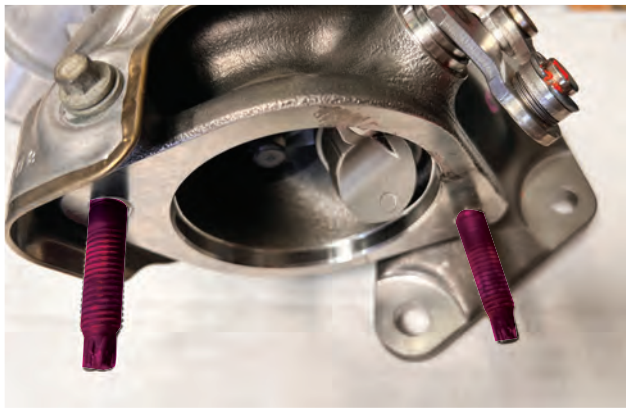


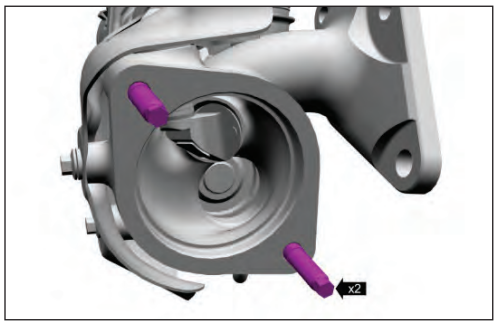


17. Inspect the O-ring seal and replace if necessary.

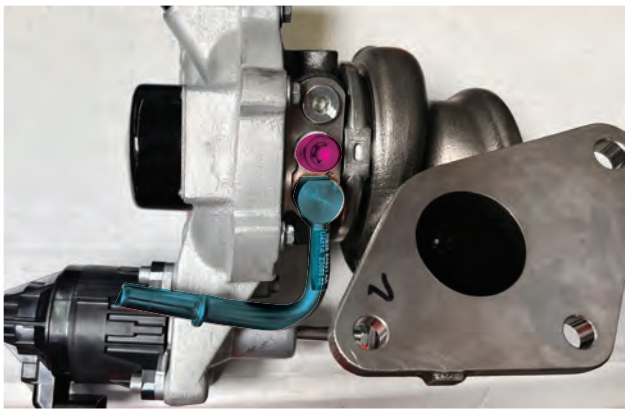


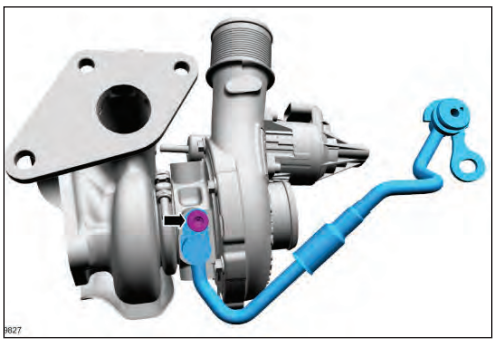
18. Remove the turbocharger exhaust flange studs. Replace if necessary.



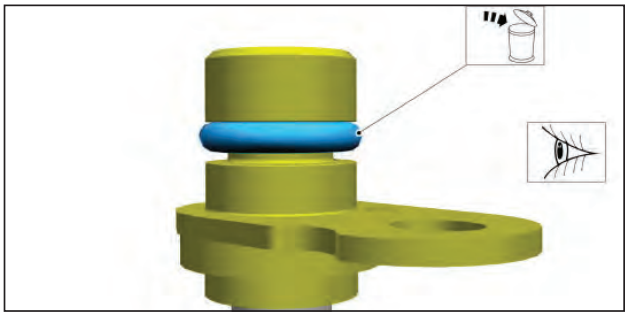


19. Remove the bolt, then remove the turbocharger coolant supply tube.

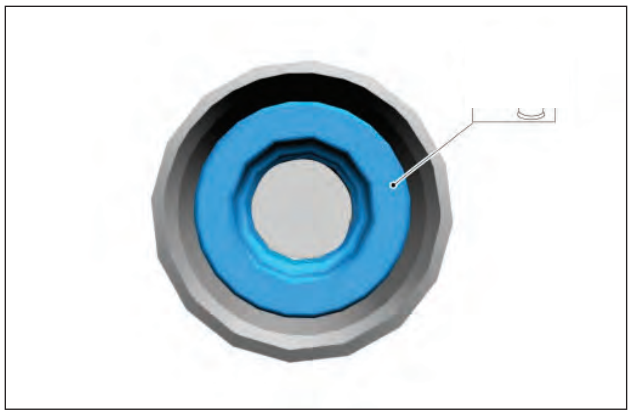




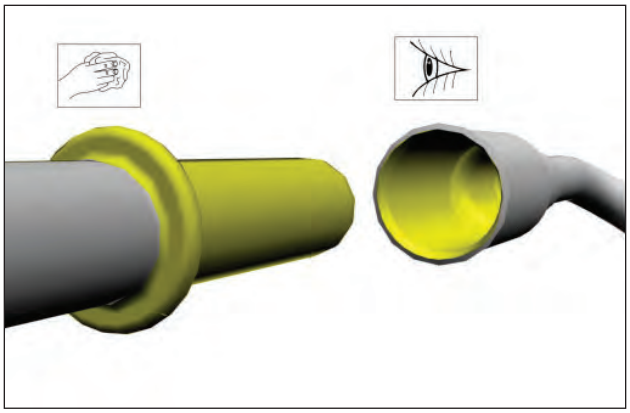
20. Inspect the O-ring seal and replace if necessary.



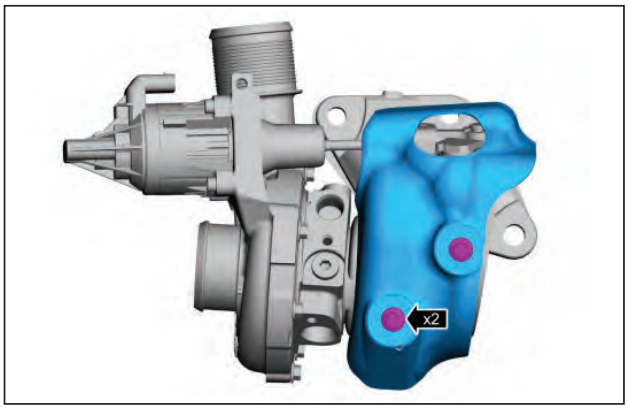
21. Inspect the rubber gasket and replace if necessary.



22. Clean the turbocharger cooling tube sealing surfaces, using brake cleaner and a nylon brush to clean. Install new components as needed.

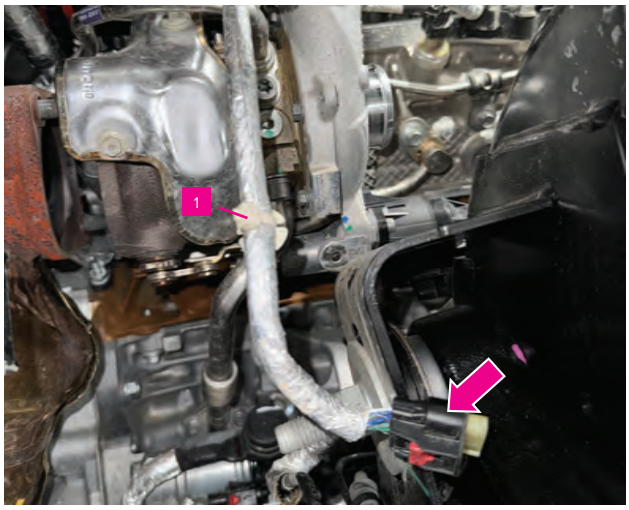


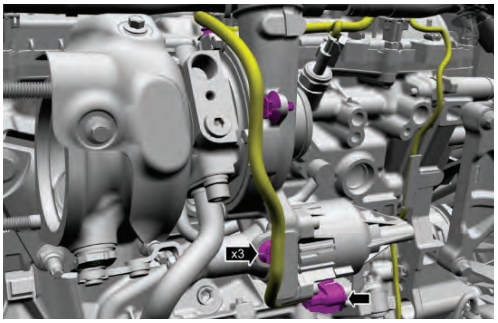
23. Remove the turbocharger heat shield.



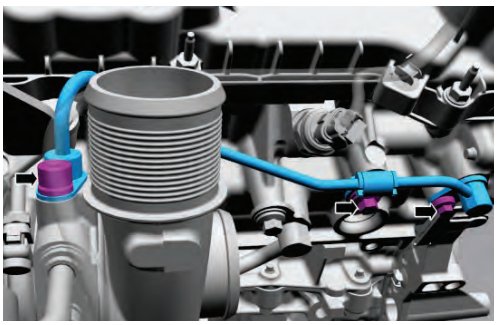
RH TURBOCHARGER REMOVAL

1. Detach the wire harness retainers -1-, then disconnect the electrical connector -arrow-.

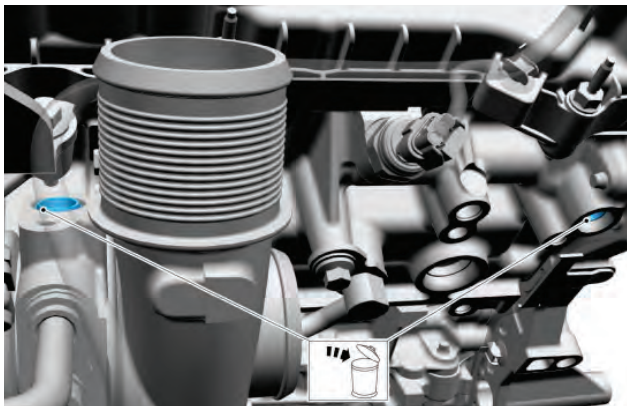




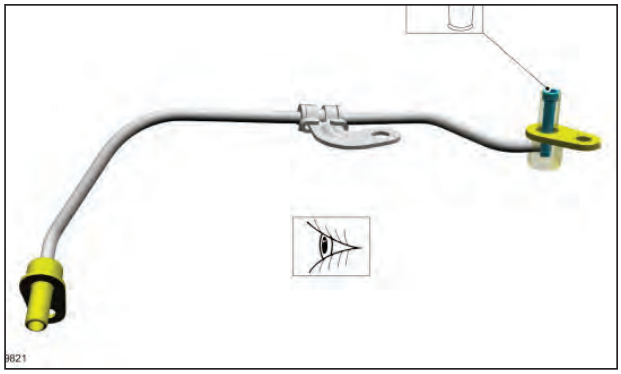
2. Remove the turbocharger oil supply tube bolts -arrow-, then remove the turbocharger oil supply tube.



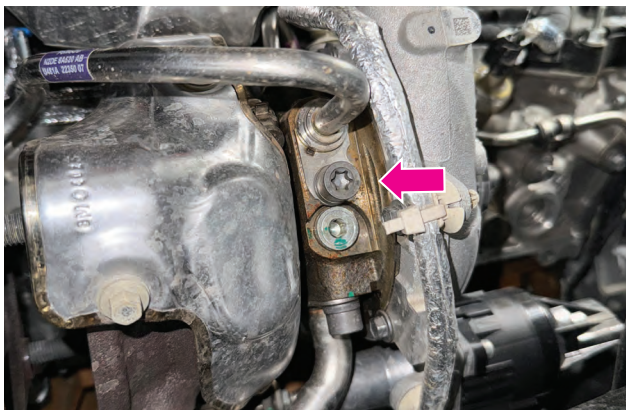
3. Remove the seals. Inspect and replace if necessary.

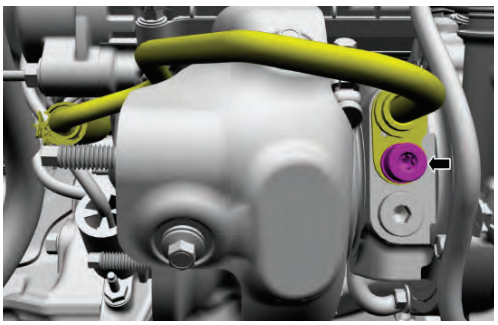


4. Inspect the O-ring seals and the turbocharger oil supply tube oil filter and replace if necessary.

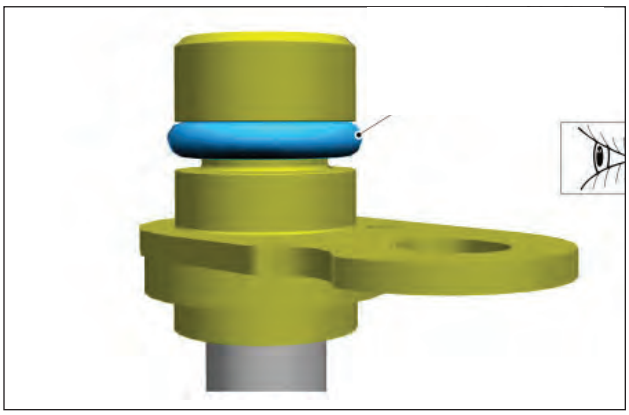


5. Remove the turbocharger coolant return tube bolt, then disconnect the turbocharger coolant return tube from the turbocharger and position it out of the way.

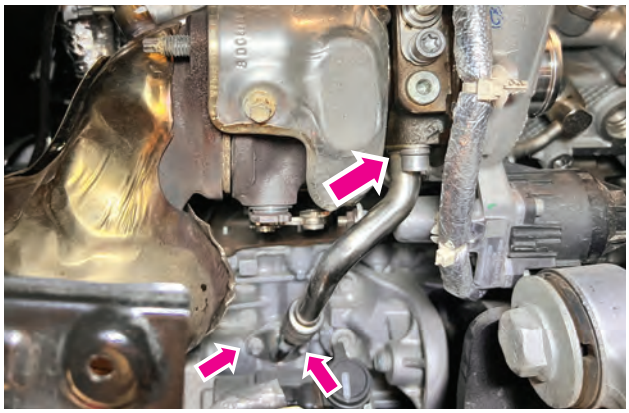


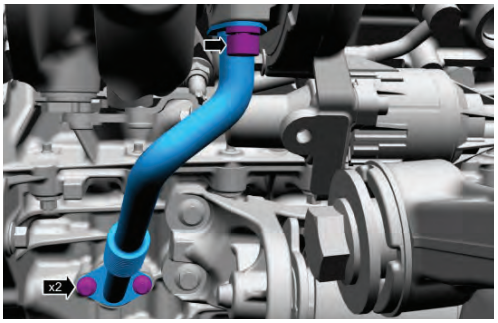


6. Inspect the O-ring seal and replace if necessary.

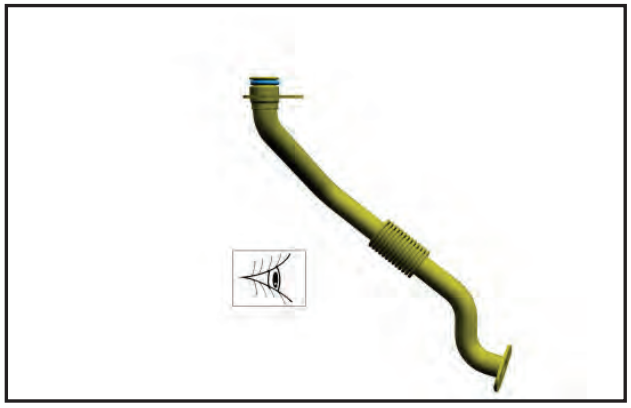


7. Remove the turbocharger oil return tube bolts, then remove the tube.

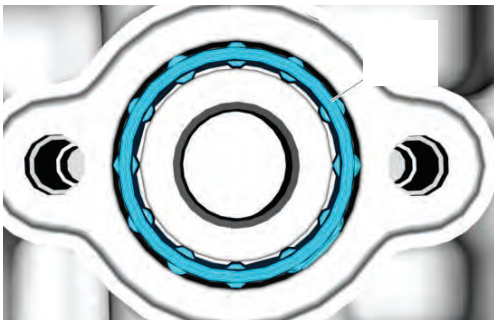




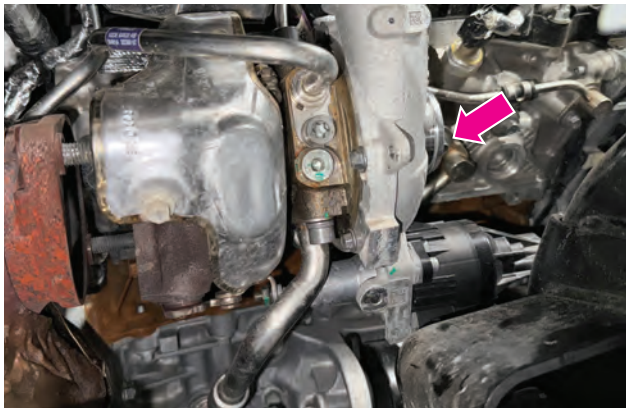
8. Inspect the O-ring seal and replace if necessary.

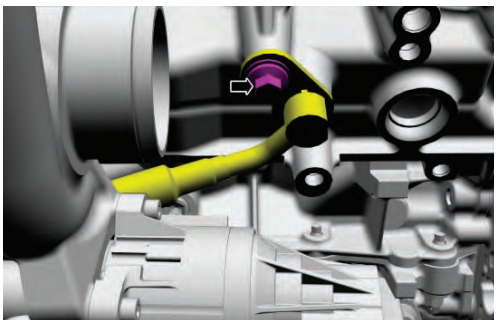


9. Inspect the turbocharger oil return tube gasket and replace if necessary.



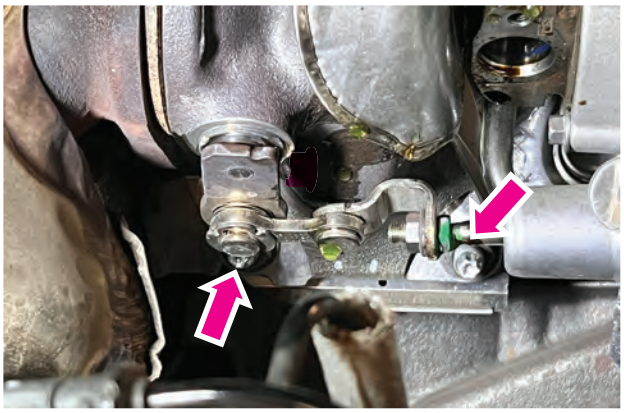
10. Remove the turbocharger coolant supply tube bolt (10mm).

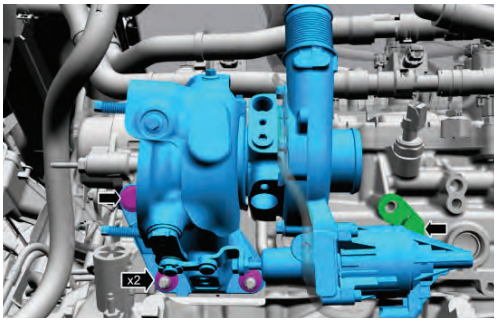




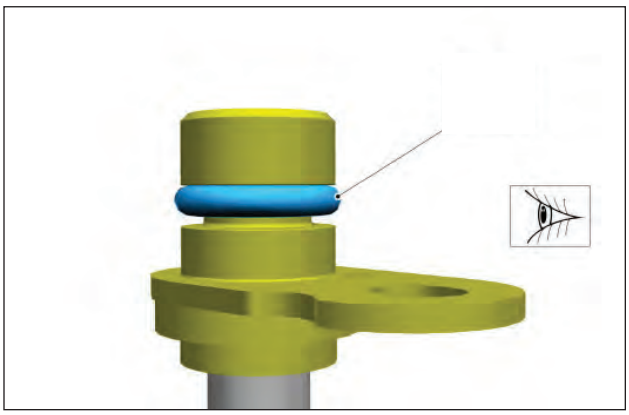
11. Remove the turbocharger coolant supply tube from the engine block while removing the turbocharger.

Remove the turbocharger nuts, then remove the turbocharger.





12. Inspect the O-ring seal and replace if necessary.

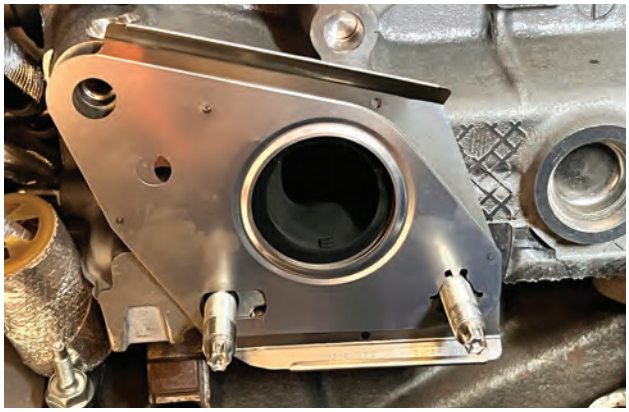


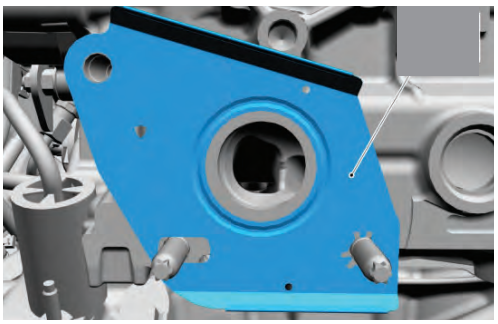
NOTICE

1. Do not use a metal brush, damage to sealing area will result in leaks. Inspect the turbocharger tube and the sealing surfaces. Ensure that the retaining bracket is not bent, check for square-ness of the retaining bracket to the O-ring area. Use brake cleaner and a nylon brush to clean. Install new components as needed.

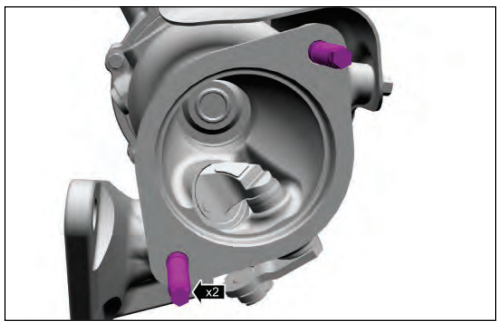
Material: Motorcraft® Metal Brake Parts Cleaner / PM-4-A, PM-4-B

13. Inspect the turbocharger gasket and replace if necessary.

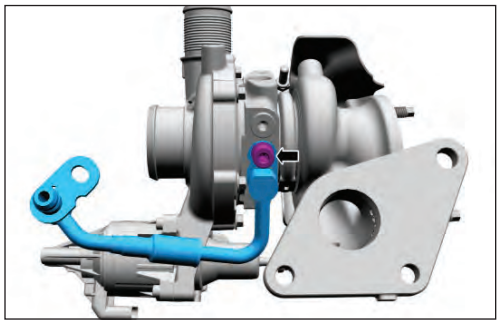




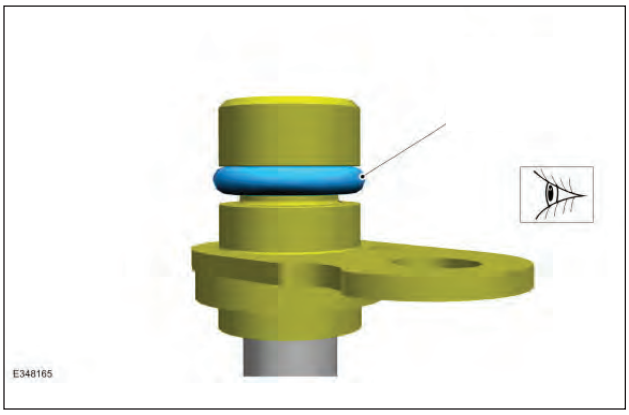
14. Remove the turbocharger exhaust flange studs. Replace if necessary.



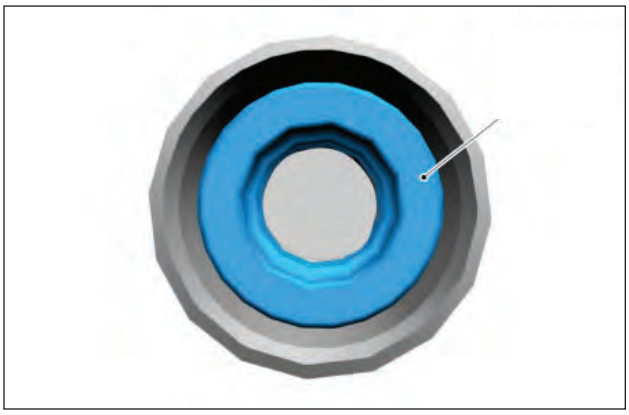
15. Remove the bolt, then remove the turbocharger coolant supply tube.



16. Inspect the O-ring seal and replace if necessary.

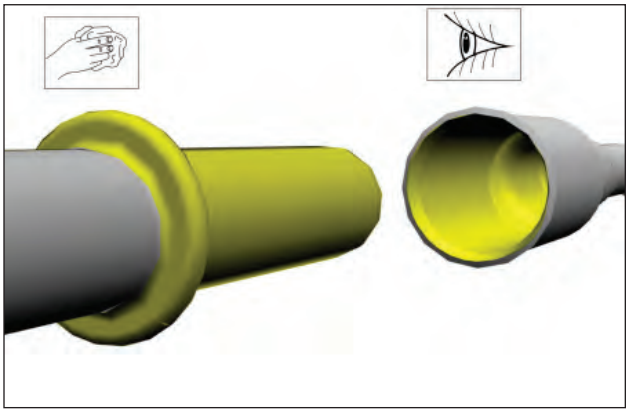


17. Inspect the rubber gasket and replace if necessary.

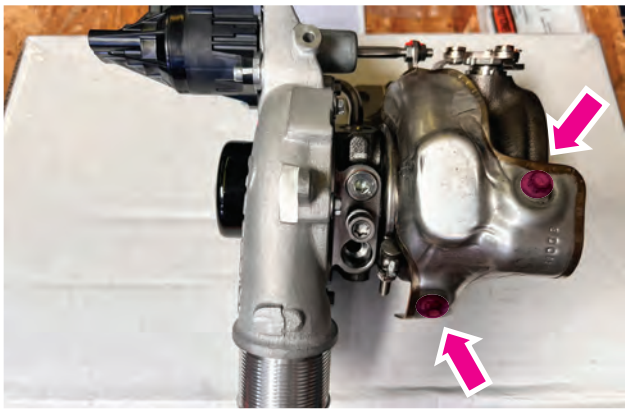


NOTICE
If the 2 piece turbocharger cooling tubes are separated or the rubber gasket is leaking, then the rubber gasket must be replaced.
If needed, then remove and discard the rubber gasket.

18. Inspect and clean the turbocharger cooling tube sealing surfaces, using brake cleaner and a nylon brush to clean. Install new components as needed.

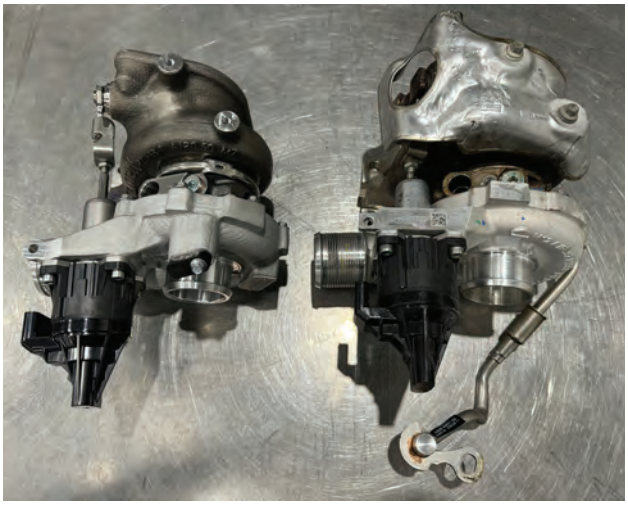


19. Remove the heat shield bolts, then remove the heat shield.



TURBOCHARGER TRANSFER

1. With the LH & RH OE turbos removed and the new ones sitting next to them, transfer coolant feed and heat shield inspecting parts before installation (note clamp may need to be rotated to clear heat shield).

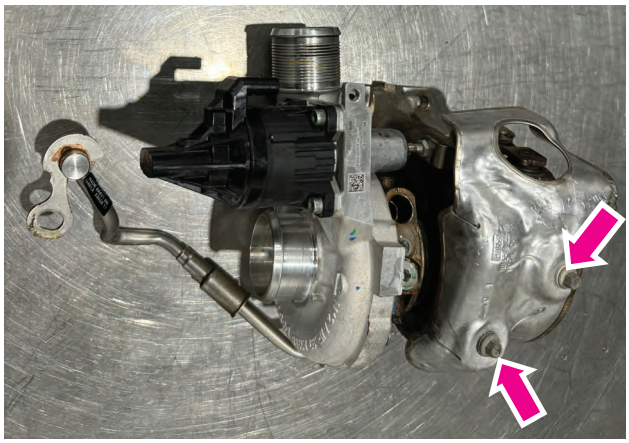


TORQUE
97 lb.in (11 Nm)

2. Intake elbow needs to be modified to rotate spring clamp for clearance against the turbo speed sensor port.

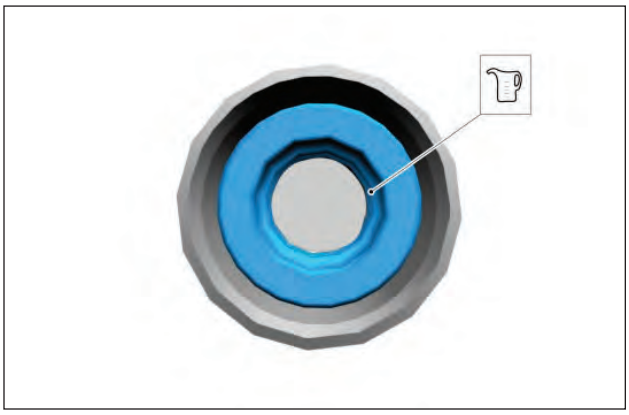
TORQUE
97 lb.in (11 Nm)

3. Install the heat shield and tighten the bolts -arrow-.

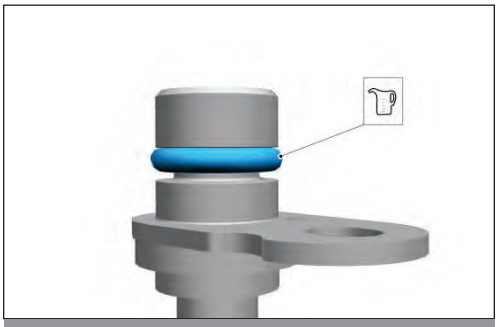


TORQUE
89 lb.in (11 Nm)

4. Inspect the turbocharger cooling tube rubber gasket. Replace if necessary. Lubricate with clean engine coolant.

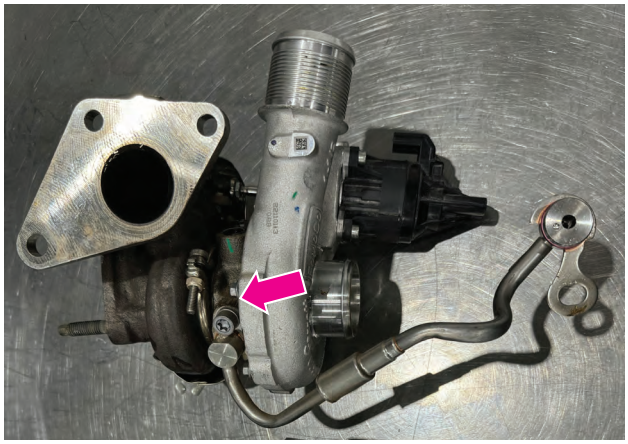


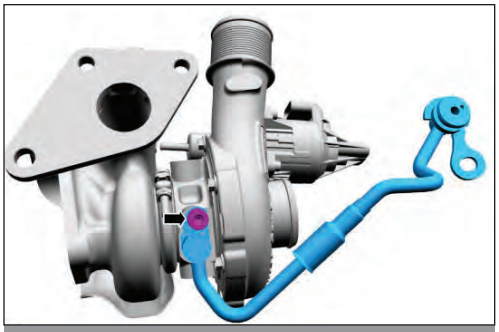
5. Inspect O-ring seal and replace if necessary. Lubricate the new O-ring seal with clean engine coolant.



Part: FT4Z-6N652-D QTY: 1

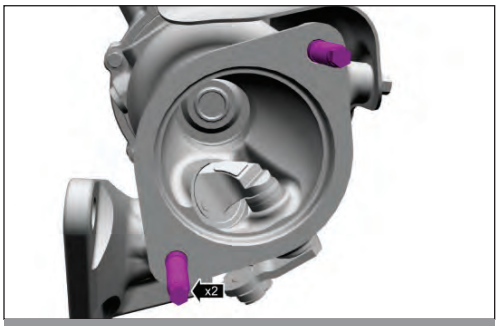
6. Install the turbocharger coolant supply tube to the turbocharger, then install and tighten the turbocharger coolant supply tube bolt -arrow-.





TORQUE
89 lb.in (10 Nm)

7. Install and tighten the turbocharger exhaust flange studs.

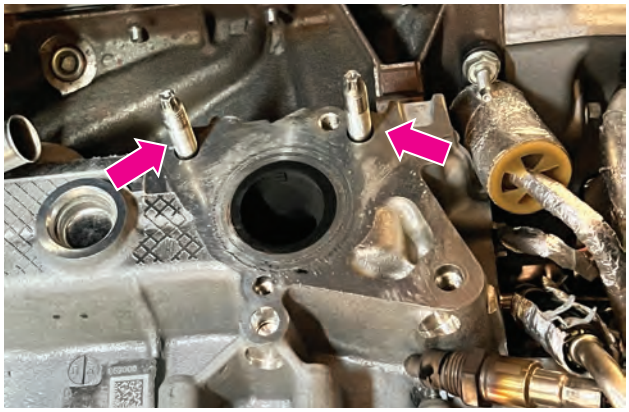


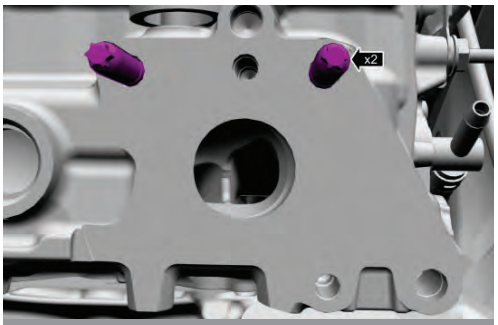
TORQUE
18 lb.ft (25 Nm)

LH TURBOCHARGER INSTALL

NOTICE
These studs and the gasket should be installed once the turbo is in place. The extra space is need to nestle the turbo between the abs unit and the engine.

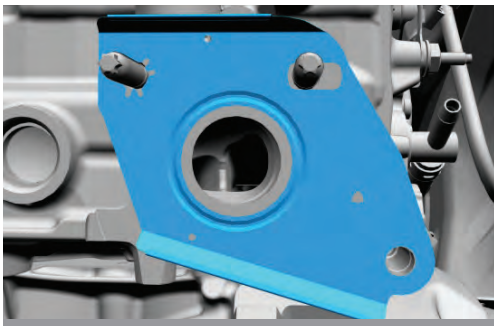
1. Install and tighten the turbocharger mounting studs -arrow-.





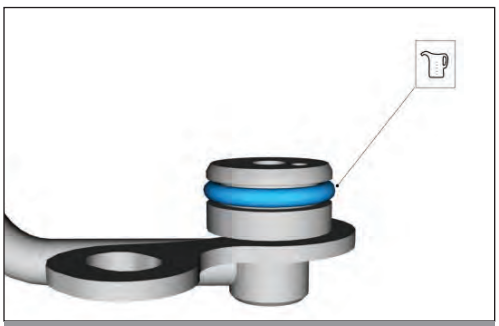
TORQUE
106 lb.in (12 Nm)

2. Install the turbocharger gasket. Inspect and replace if necessary.



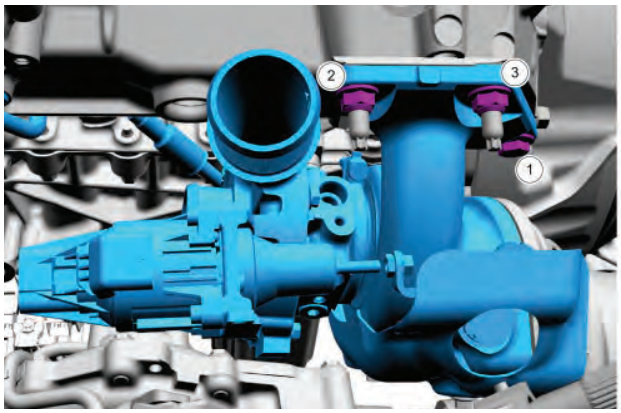
Part: JT4Z-9448-D QTY: 1

3. Install the O-ring seal. Inspect and replace if necessary. Lubricate with clean engine coolant.



Part: FT4Z-6N652-D QTY: 1

4.

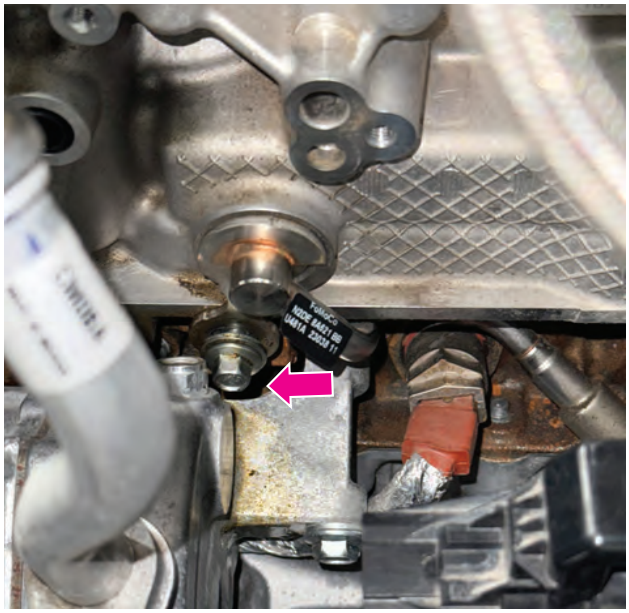


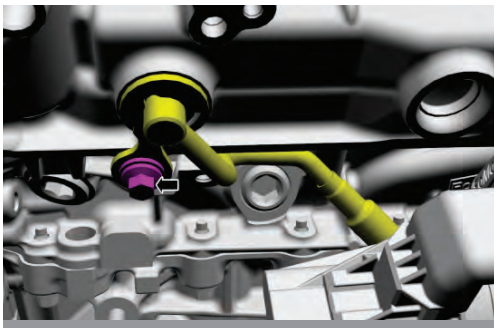
Install the turbocharger coolant supply tube to the engine block while installing the turbocharger. Loosely install the turbocharger retainers.

Tighten the turbocharger retainers in the following 3 stages, in the sequence shown.

Tighten 1 to : 44 lb.ft (60 Nm) Tighten 2 to : 44 lb.ft (60 Nm) Tighten 3 to : 27 lb.ft (37 Nm)	Re-tighten 1 to : 44 lb.ft (60 Nm) Re-tighten 2 to : 44 lb.ft (60 Nm) Re-tighten 3 to : 27 lb.ft (37 Nm)

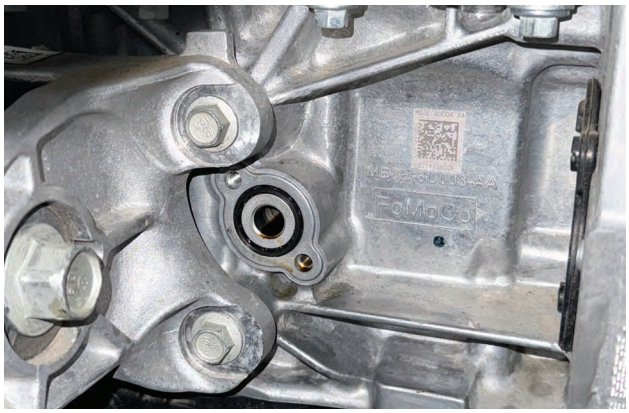
5. Install and tighten the turbocharger coolant supply tube bolt -arrow-.

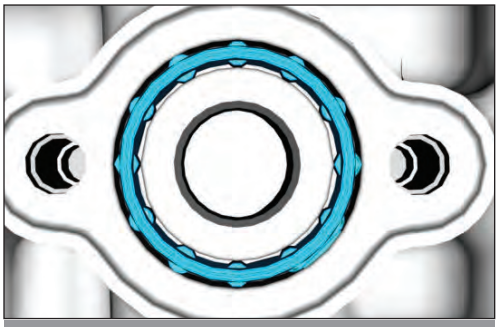




TORQUE
18 lb.ft (24 Nm)

6. Install the turbocharger oil return tube gasket. Inspect and replace if necessary.



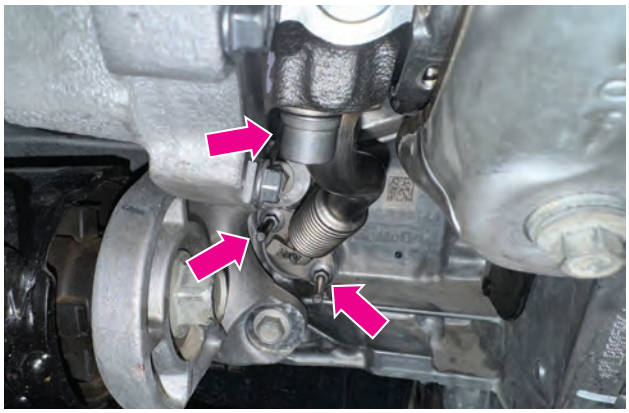


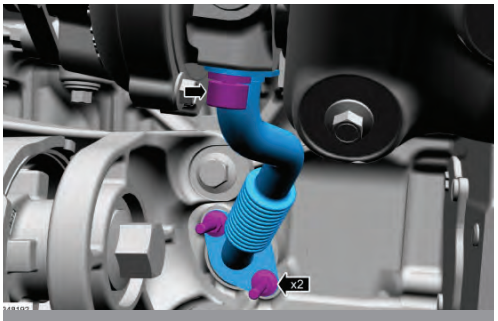
Part: FT4Z-6N652-F QTY: 1

7. Install O-ring seal. Inspect and replace if necessary. Then lubricate with clean engine oil.

Part: ML3Z-6N652-F QTY: 1

8. Install the turbocharger oil return tube, then install and tighten the bolts -arrow-.



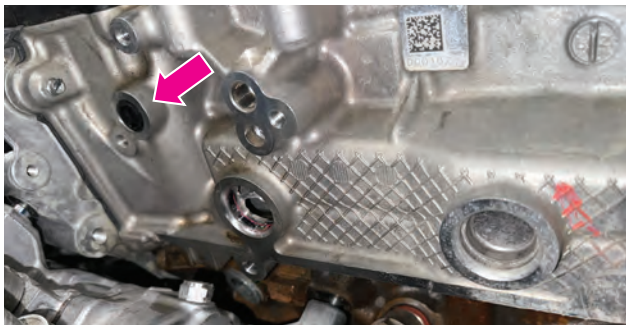


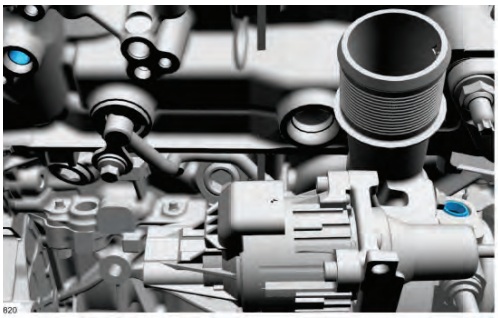
TORQUE
89 lb.in (10 Nm)

9. Inspect the rubber seals on both ends of the oil supply tube and replace if necessary. Insert the supplied check valve in the turbocharger side of the oil supply tube. **Important: the check valve assembly can only go one way. Ensure that the chamfered opening goes toward the turbocharger and the o-ring toward the supply tube!** See illustration for reference. Lubricate the rubber seals with clean engine oil.

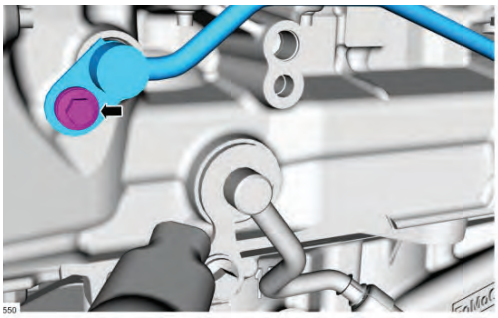
Part: FT4Z-6N652-D QTY: 1

10. Re-install the seals -arrow-. Replace if necessary. Lubricate the inner seal surface with clean engine oil.

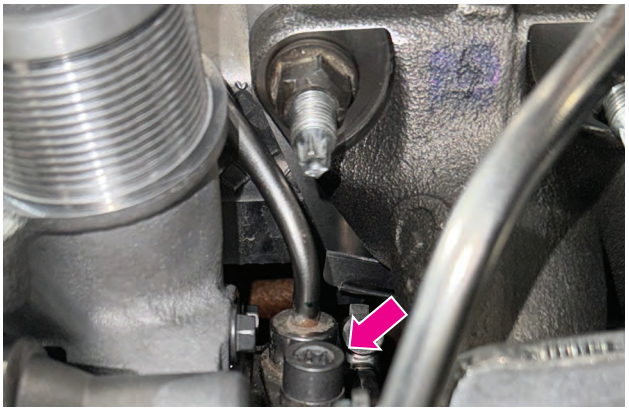


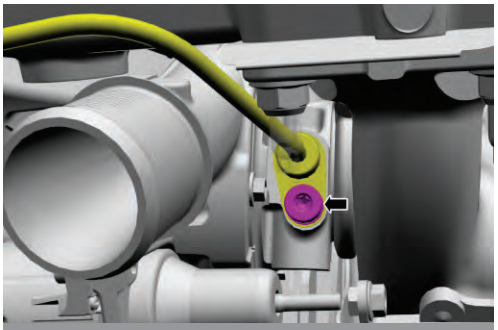


11. Install the turbocharger oil supply tube, then loosely install the bolt -arrow-.



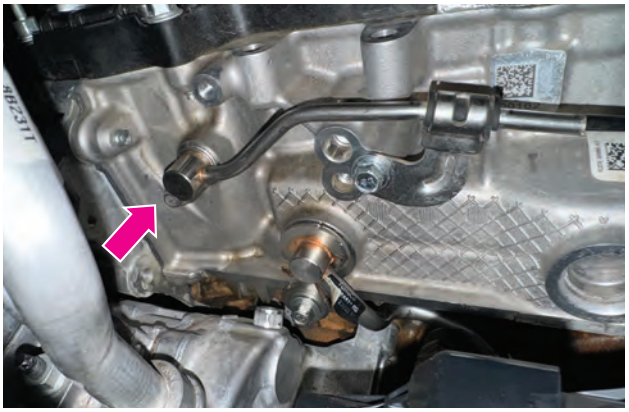
12. Connect the turbocharger oil supply tube to the turbocharger, then install and tighten the bolt -arrow-.

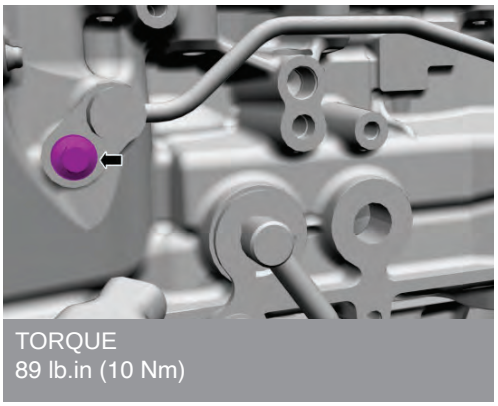




TORQUE
89 lb.in (10 Nm)

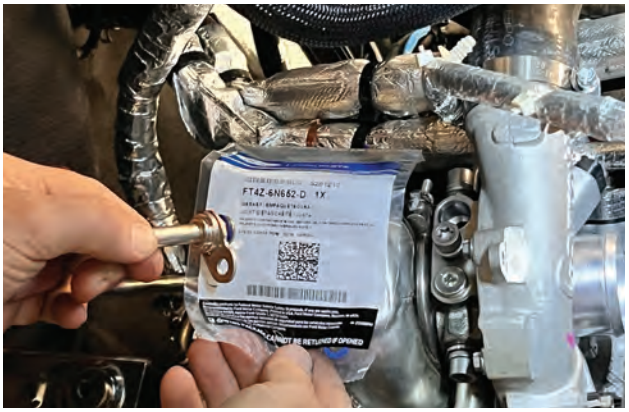
13. Tighten the turbocharger oil supply tube bolt -arrow-.

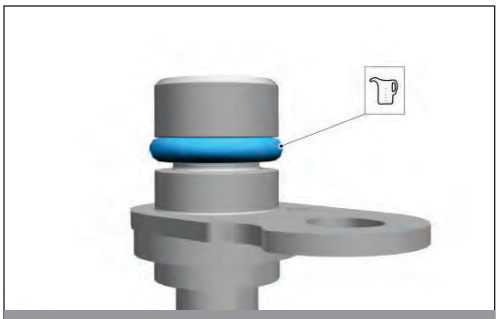




TORQUE
89 lb.in (10 Nm)

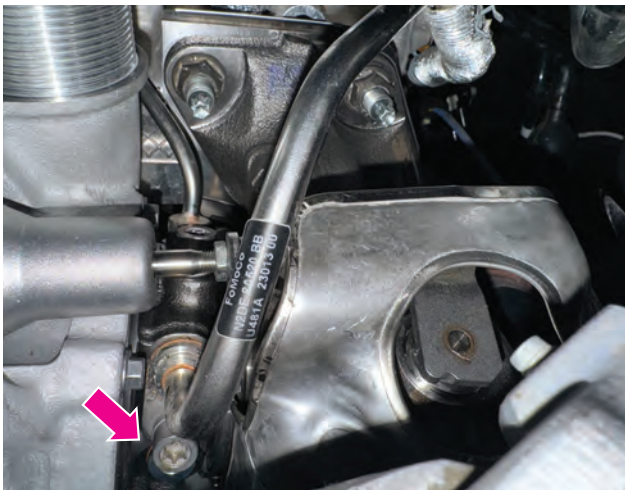
14. Inspect coolant return tube O-ring seal. Replace if necessary. Then lubricate with clean engine coolant.

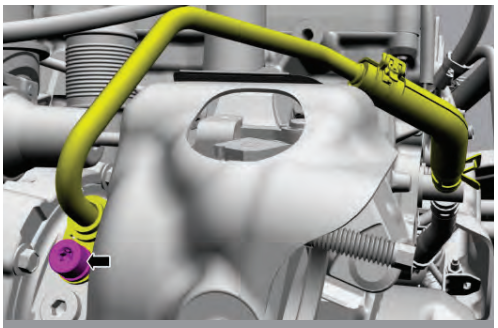




Part: FT4Z-6N652-D QTY: 1

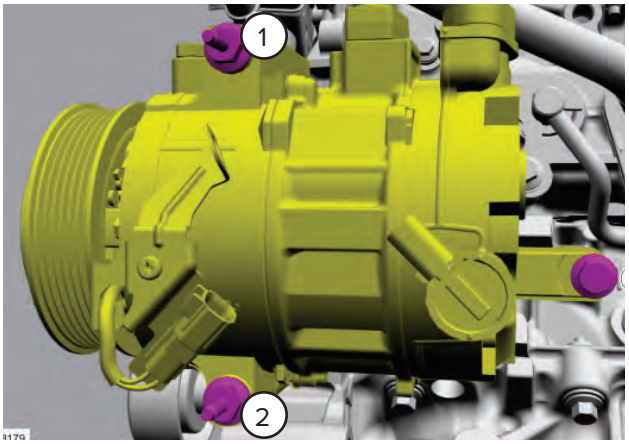
15. Install the turbocharger coolant return tube to the turbocharger, then install and tighten the turbocharger coolant return tube bolt -arrow-.





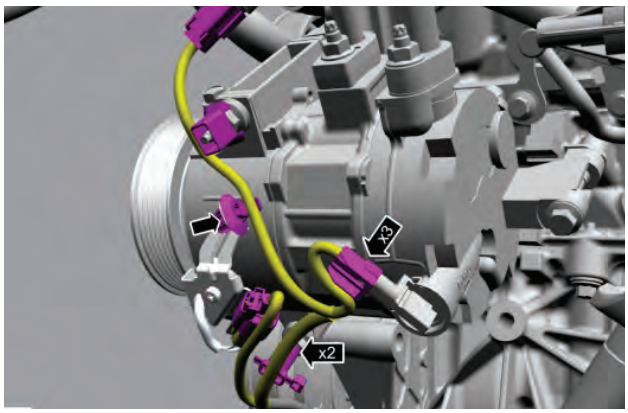
TORQUE
89 lb.in (10 Nm)

16. Install the air conditioning compressor with the bolts, then tighten the bolts in the sequence shown.

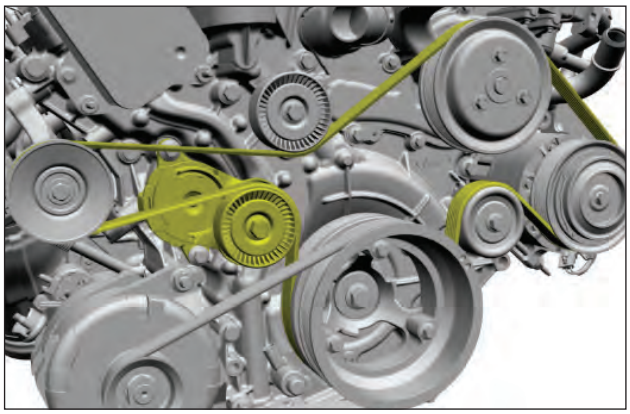


TORQUE
18 lb.ft (25 Nm)

17. Connect the electrical connectors and attach the wiring harness retainers.

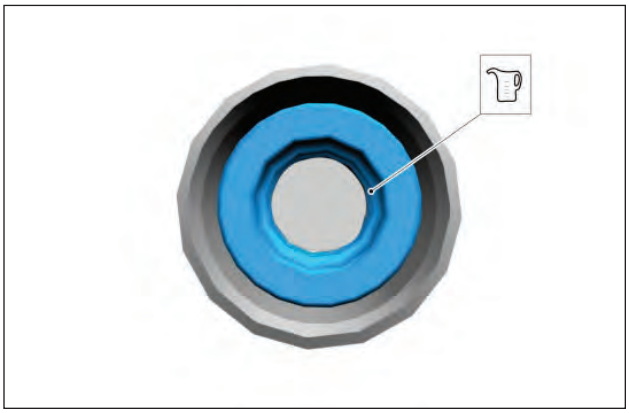


18. Install the accessory drive belt, make sure the accessory drive belt is correctly seated on all pulleys.

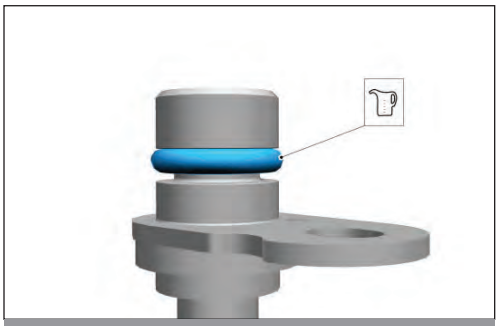


RH TURBOCHARGER INSTALL

1. Inspect the turbocharger cooling tube rubber gasket. Replace if necessary. Lubricate with clean engine coolant.

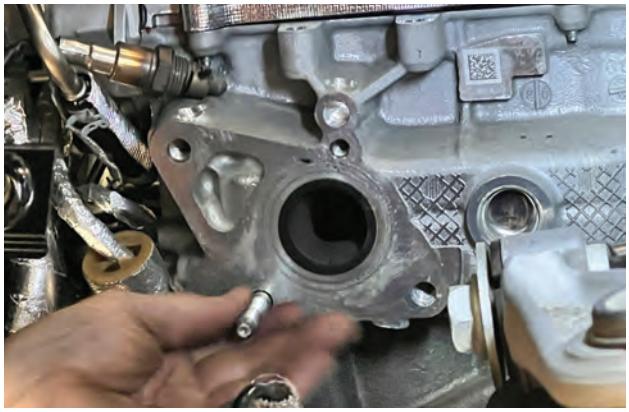


2. Inspect O-ring seal. Inspect and replace if necessary. Lubricate the O-ring seal with clean engine coolant.



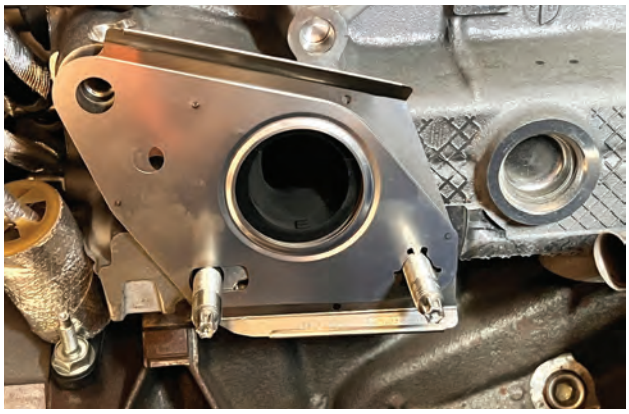
Part: FT4Z-6N652-D QTY: 1

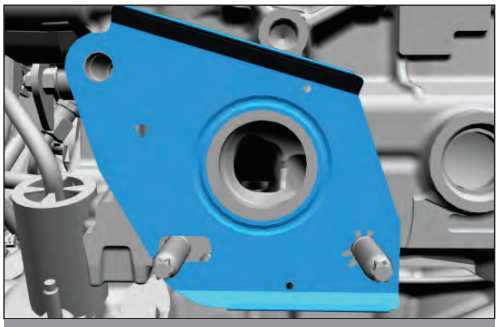
3. Inspect studs. Replace if necessary.



TORQUE
106 lb.in (12 Nm)

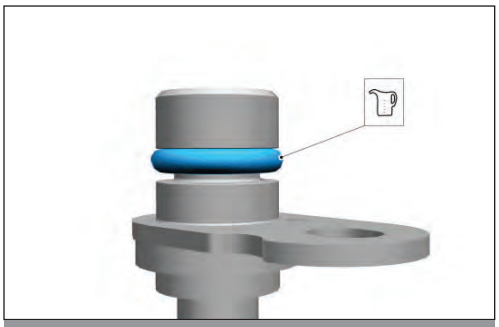
4. Inspect gasket. Replace if necessary.





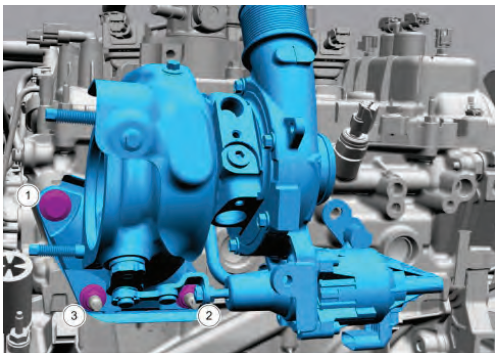
Part: JT4Z-9448-D QTY: 1

5. Inspect turbocharger coolant return tube O-ring seal. Replace if necessary.



Part: FT4Z-6N652-D QTY: 1

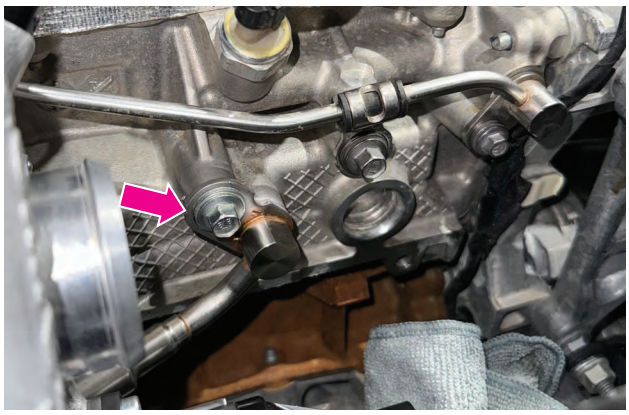
6. Reinstall mounting bolt and nuts.

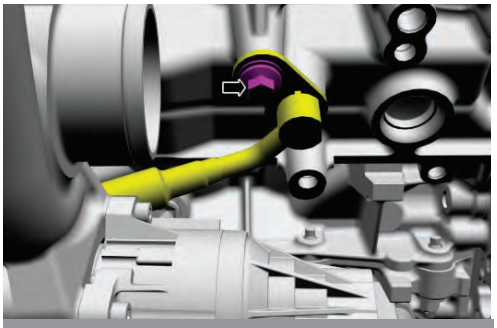


Tighten the turbocharger retainers in the following 3 stages, in the sequence shown.

Tighten 1 to : 44 lb.ft (60 Nm) Tighten 2 to : 44 lb.ft (60 Nm) Tighten 3 to : 27 lb.ft (37 Nm)	Re-tighten 1 to : 44 lb.ft (60 Nm) Re-tighten 2 to : 44 lb.ft (60 Nm) Re-tighten 3 to : 27 lb.ft (37 Nm)

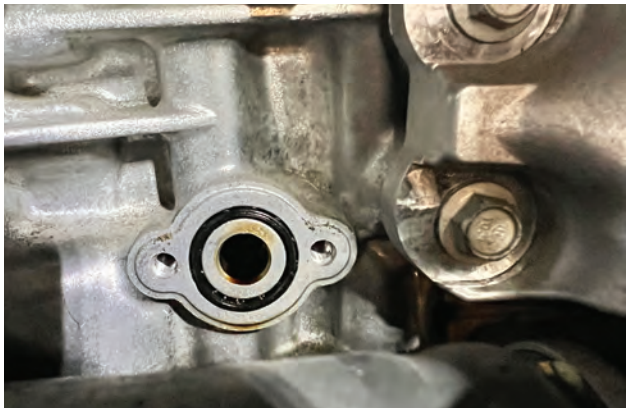
7. Install and tighten the turbocharger coolant supply tube bolt -arrow-.

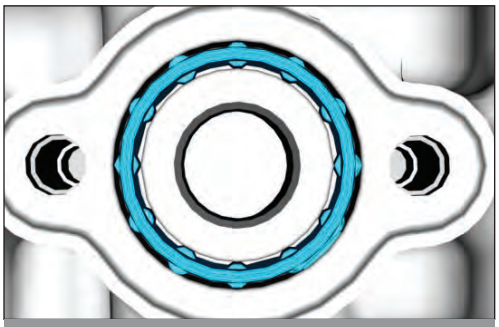




TORQUE
18 lb.ft (24 Nm)

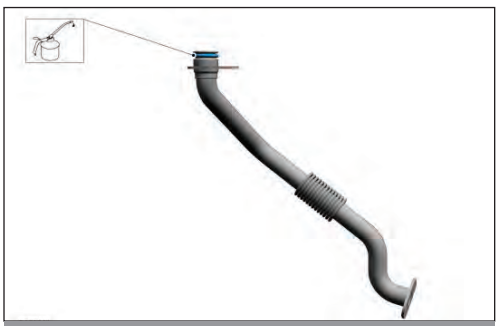
8. Inspect turbocharger oil return tube gasket. Replace if necessary.





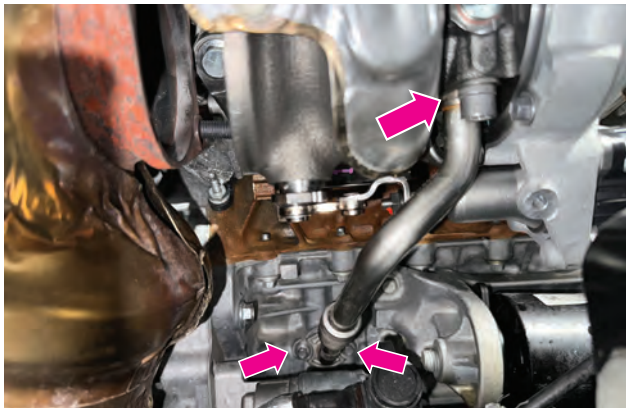
Part: FT4Z-6N652-F QTY: 1

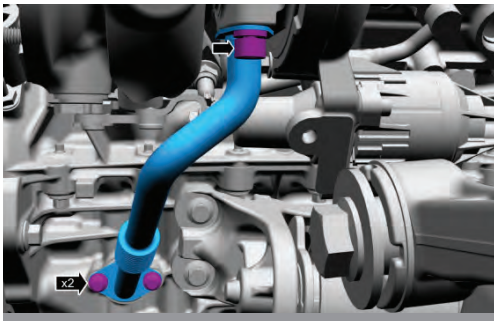
9. Inspect O-ring seal. Replace if necessary. Lubricate with clean engine oil.



Part: ML3Z-6N652-F QTY: 1v

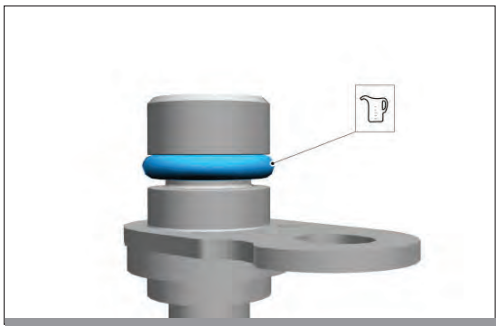
10. Inspect the area for deep scratches and gouges. Install and tighten the oil return bolts -arrows-.





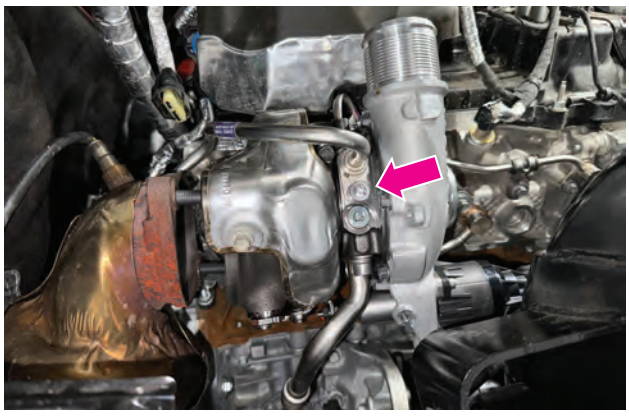
TORQUE
89 lb.in (10 Nm)

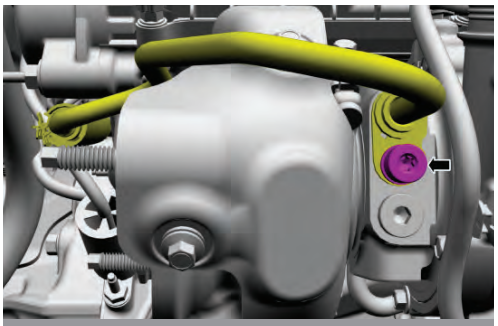
11. Inspect turbocharger coolant return tube O-ring seal. Replace if necessary. Lubricate with clean engine coolant.



Part: FT4Z-6N652-D QTY: 1

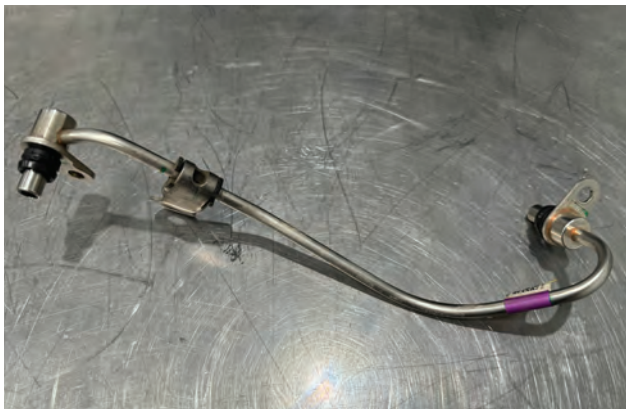
12. Install the turbocharger coolant return tube to the turbocharger, then install and tighten the turbocharger coolant return tube bolt.





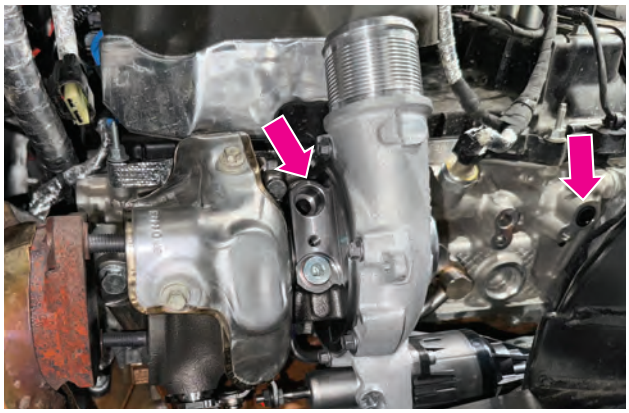
TORQUE
89 lb.in (10 Nm)

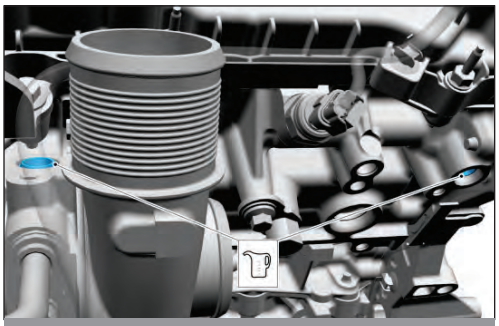
13. Inspect the rubber seals on both ends of the oil supply tube and replace if necessary. Insert the supplied check valve in the turbocharger side of the oil supply tube. **Important: the check valve assembly can only go one way. Ensure that the chamfered opening goes toward the turbocharger and the o-ring toward the supply tube!** See illustration for reference. Lubricate the rubber seals with clean engine oil.



Part: FT4Z-6N652-D QTY: 1

14. Inspect the seals -arrow-. Replace if necessary. Lubricate the inner seal surface with clean engine oil.



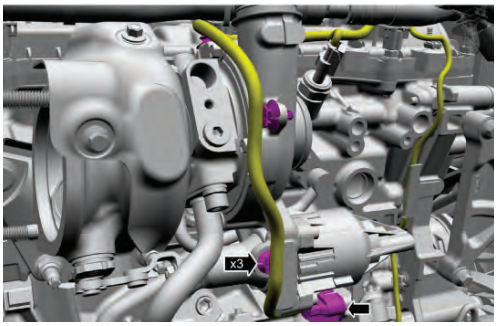


Part: FT4Z-6N652-D QTY: 1

15. Install the turbocharger oil supply tube, then install and tighten the turbocharger oil supply tube bolts.

TORQUE
89 lb.in (10 Nm)

16. Connect the electrical connector, then attach the wire harness retainers.

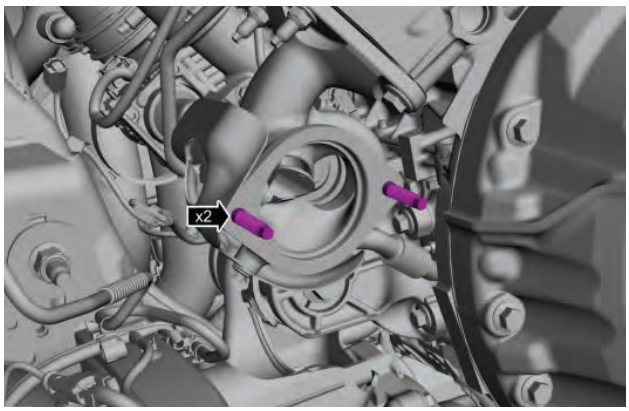


LH CATALYTIC CONVERTER INSTALL

LH CATALYTIC CONVERTER INSTALL

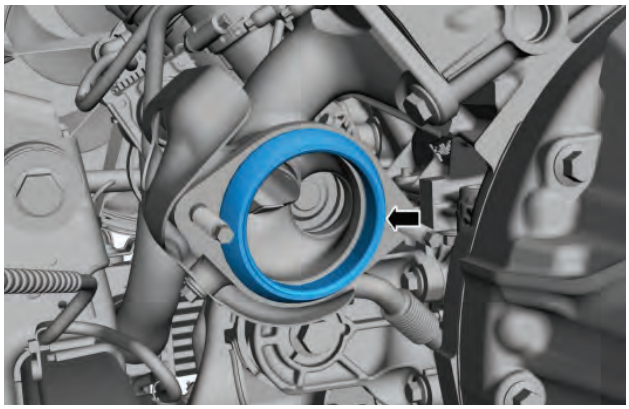
1. Clean all exhaust connections before reassembly.

2. Clean and inspect the studs.

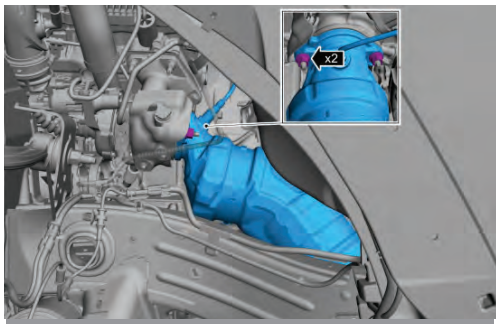


TORQUE
18 lb.ft (25 Nm)

3. Inspect the gasket. Replace if necessary. Install gasket.



4. Position the LH catalytic converter in vehicle. Slide exhaust forward with exhaust flange. Install the LH catalytic converter nuts to LH turbo.

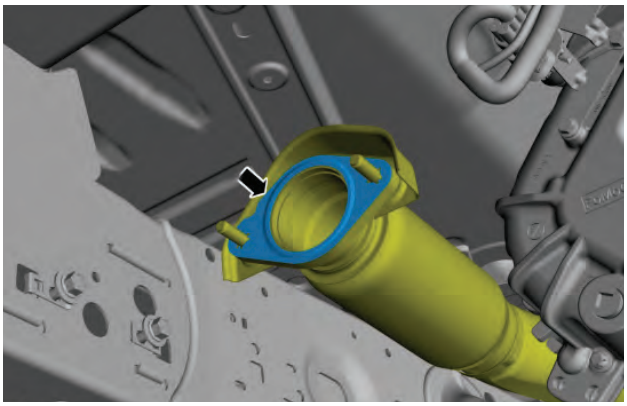


TORQUE
Stage 1: 133 lb.in (15 Nm)
Stage 2: 30 lb.ft (40 Nm)

NOTE

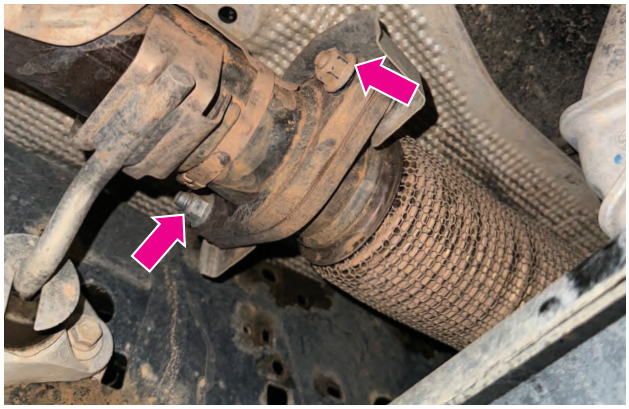
During installation all the nuts must be finger tight before final tightening.

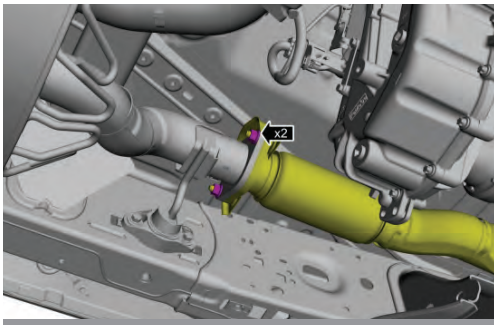
5. Inspect gasket and replace if necessary.



TORQUE
18 lb.ft (25 Nm)

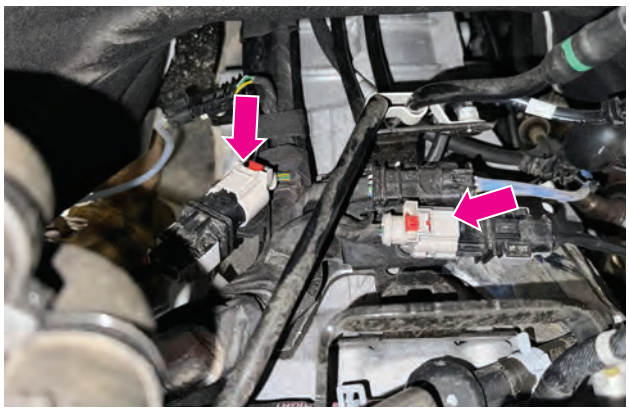
6. Reinstall flanges at muffler.

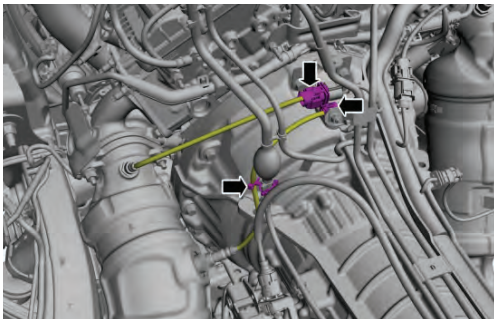




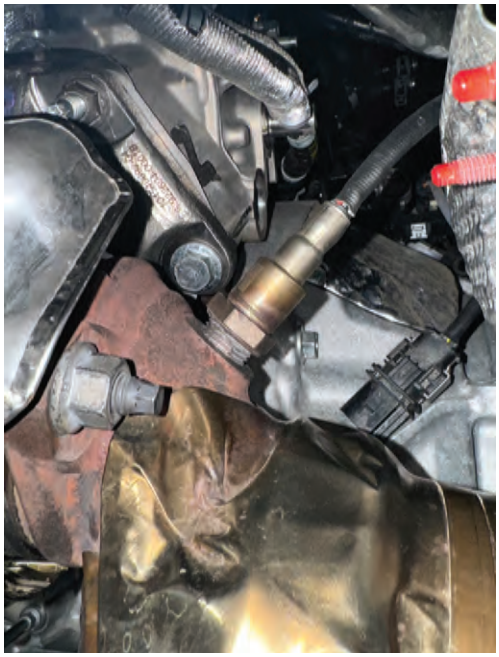
TORQUE
41 lb.ft (55 Nm)

7. Connect the LH and RH electrical connectors -arrow- and attach the wire clips.





8. Connect the O2 sensor.

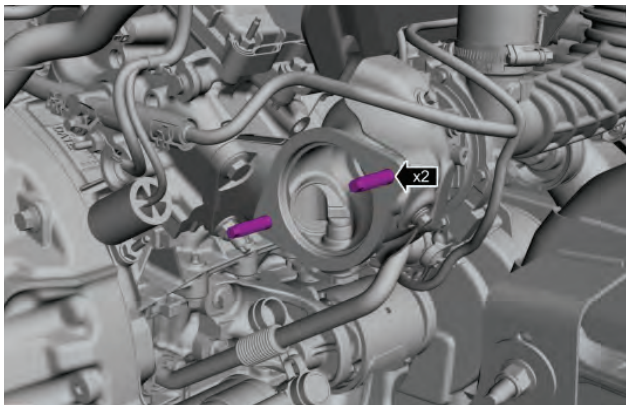


RH CATALYTIC CONVERTER INSTALL

RH CATALYTIC CONVERTER INSTALL

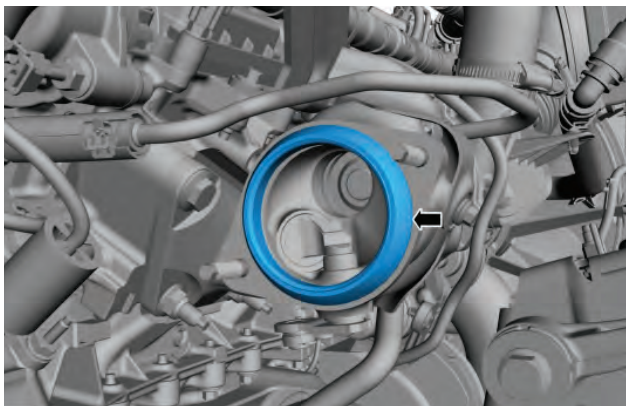
1. Clean all exhaust connections before reassembly.

2. Clean and inspect the studs.



TORQUE
18 lb.ft (25 Nm)

3. Inspect the gasket. Replace if necessary. Install gasket.

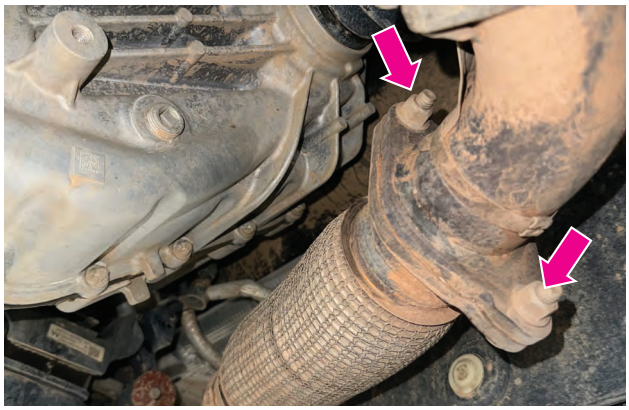


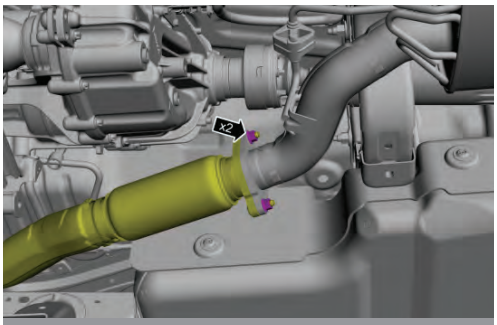
4. Install the hanger bracket and the bolts.

Exhaust hangers pictured.

TORQUE
41 lb.ft (44Nm)

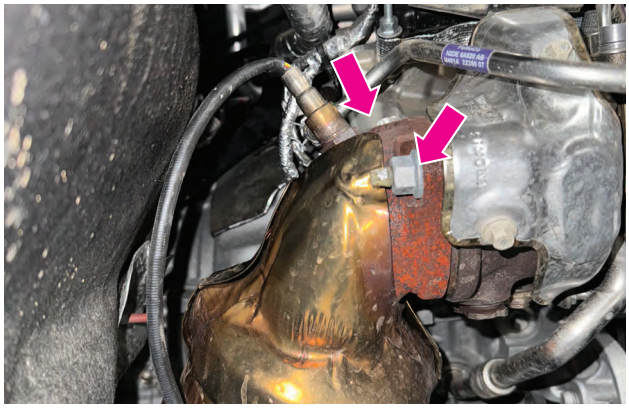
5. Tighten the nuts.

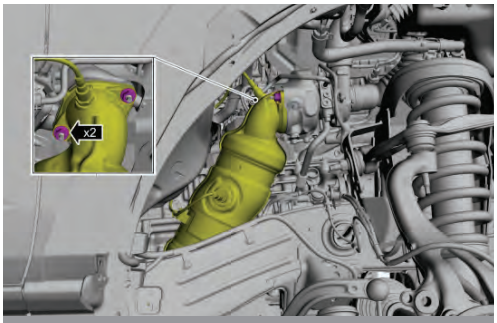




TORQUE
41 lb.ft (55Nm)

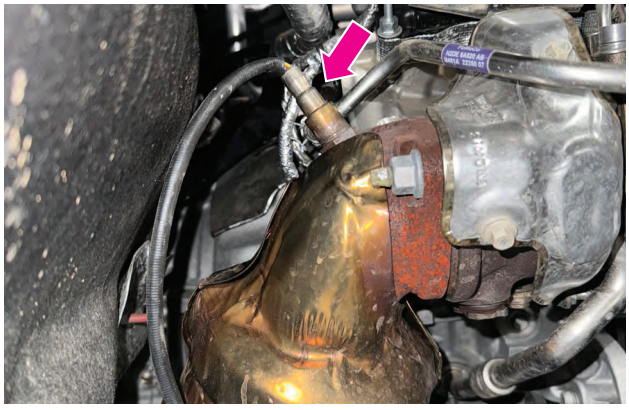
6. Install the RH catalytic converter nuts -arrow- to the RH turbo.





TORQUE
Stage 1: 133 lb.in (15 Nm)
Stage 2: 30 lb.ft (40 Nm)

7. Connect the O2 sensor using a 22mm wrench.

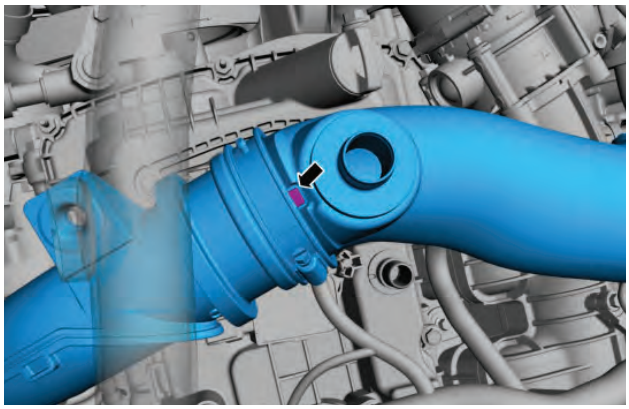


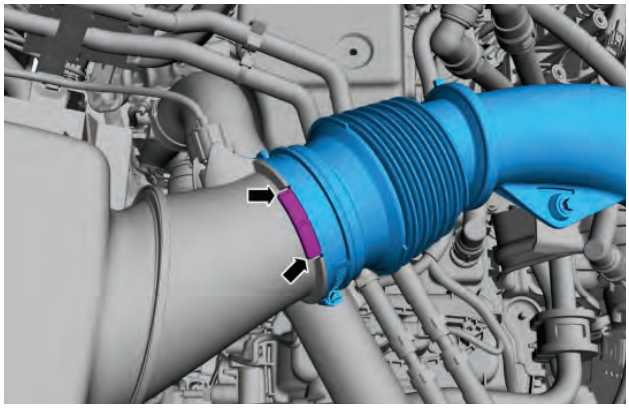
LH AIR CLEANER OUTLET PIPE INSTALL

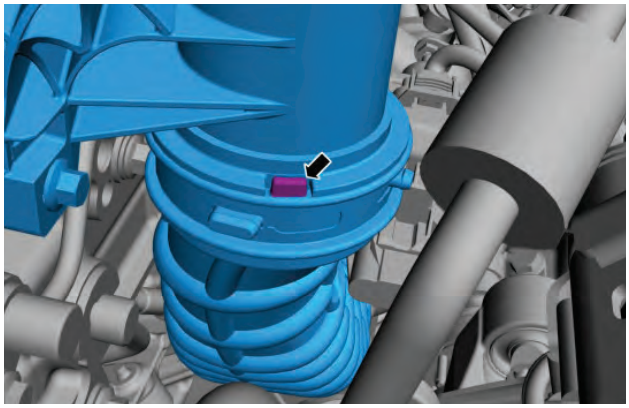
LH AIR CLEANER OUTLET PIPE INSTALL

NOTICE
Inspect the turbocharger or engine air intake system components and clean, if necessary.

NOTE
Make sure that the installation marks are aligned.

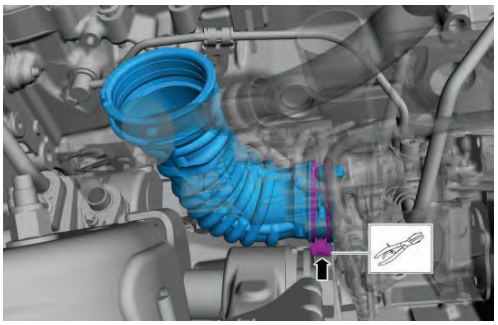




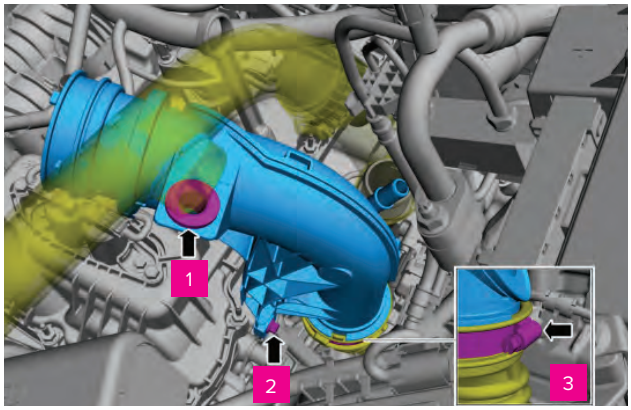


LH AIR CLEANER OUTLET PIPE INSTALL

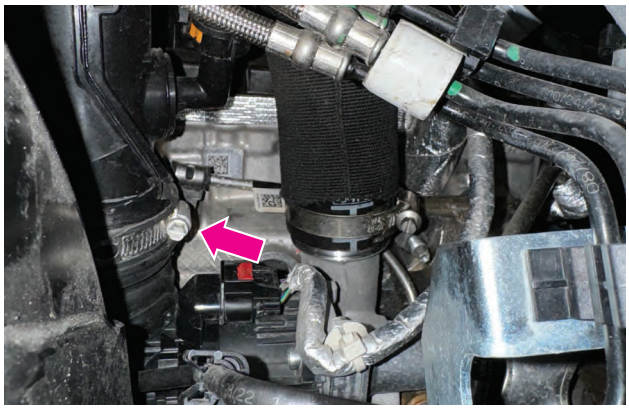
1. Install the intake pipe.

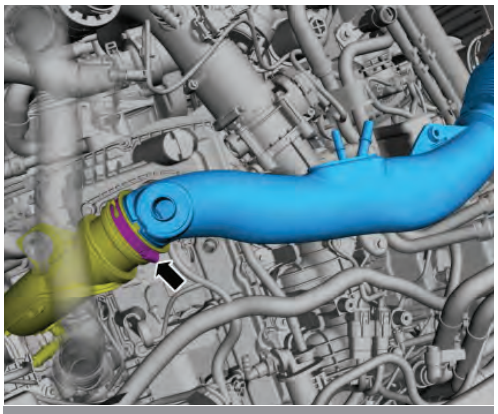


2.
   1. Attach the retainer. Insert the LH air cleaner outlet pipe.
   2. Tighten the bolt. **TORQUE 97 lb.in** (11 Nm)
   3. Tighten the clamp. **TORQUE**
      Stage 1: 26 lb.in (2.9 Nm)
      Stage 2: 42 lb.in (11 Nm)



3. Tighten the clamp -arrow-.



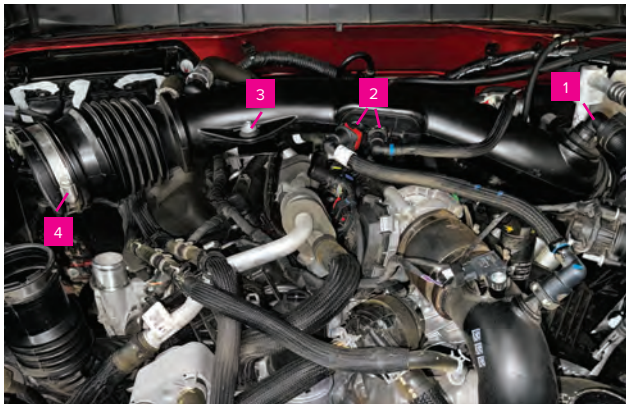


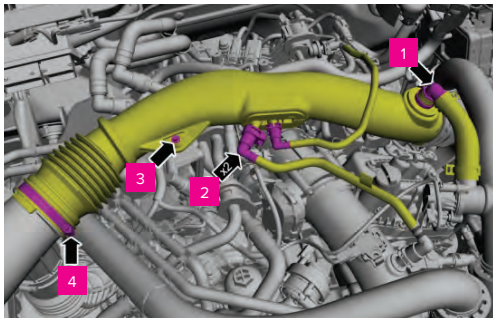
TORQUE
Stage 1: 26 lb.in (2.9 Nm)
Stage 2: 42 lb.in (11 Nm)

4.

1. Connect the quick connector.
2. Connect the quick connectors.
3. Tighten the bolt. **TORQUE 97 lb.in** (11 Nm)
4. Tighten the clamp.

TORQUE
Stage 1: 26 lb.in (2.9 Nm)
Stage 2: 42 lb.in (11 Nm)



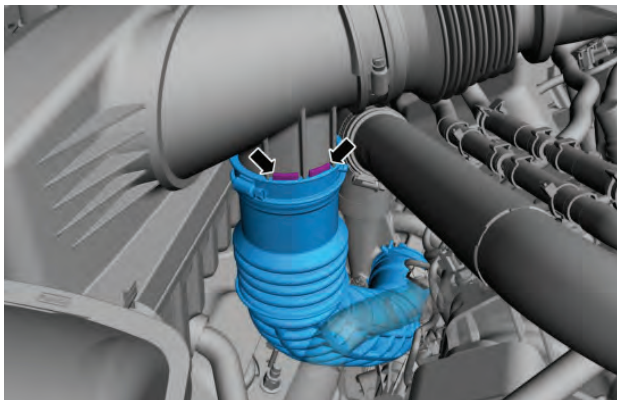


RH AIR CLEANER OUTLET PIPE INSTALL

RH AIR CLEANER OUTLET PIPE INSTALL

NOTICE
Inspect the turbocharger or engine air intake system components and clean, if necessary.

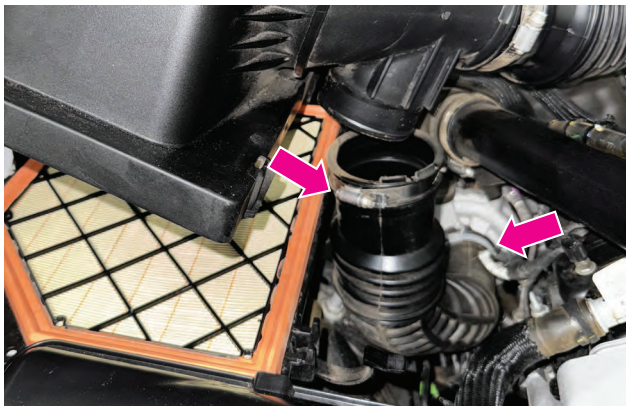
NOTE
Make sure that the installation marks are aligned.

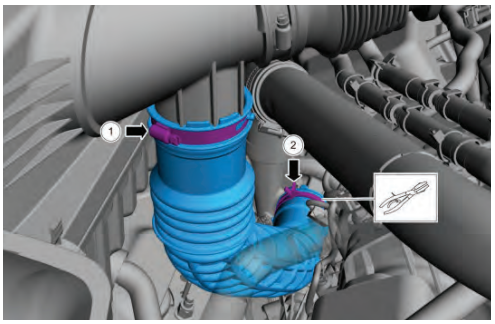


1.

1. Insert the RH air cleaner outlet pipe. Tighten the hose clamp -arrow-.
2. Tighten the clamp -arrow-.

TORQUE
Stage 1: 26 lb.in (2.9 Nm)
Stage 2: 42 lb.in (11 Nm)





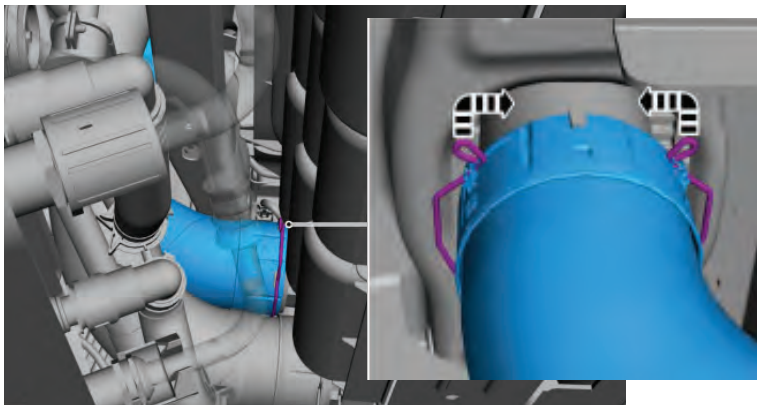
LH TURBOCHARGER OUTLET PIPE INSTALL

LH TURBOCHARGER OUTLET PIPE INSTALL

NOTICE
Inspect the turbocharger or engine air intake system components and clean, if necessary.

NOTE
Perform a push, click and pull test on the charge air cooler quick connections to confirm good connection.

1. Release the retainers from the locking notches after installing the TC outlet pipe LH .

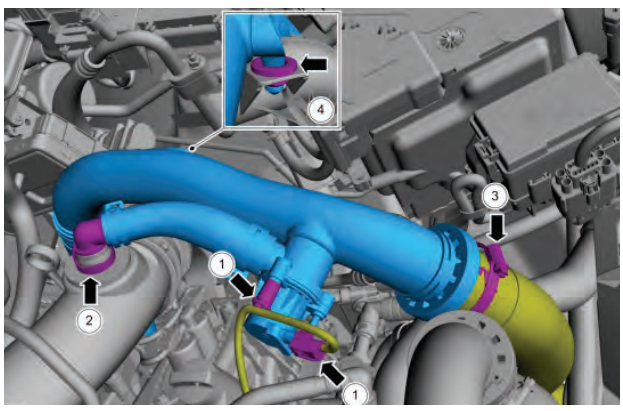


NOTICE
Do not exceed stated torque value, or damage to the component may result.

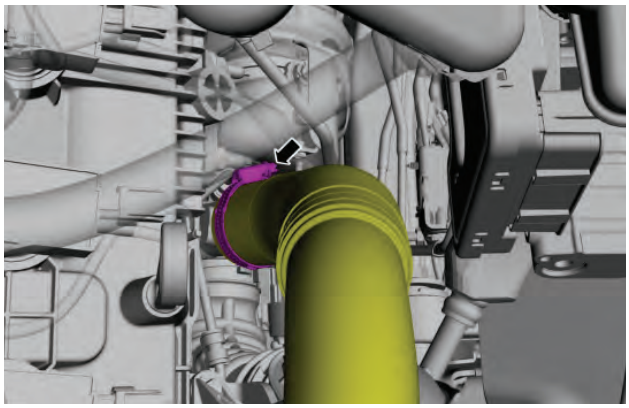
NOTE
Perform a push, click and pull test on the electrical connector to confirm good connection.

2.

1. Connect the electrical connector.
2. Connect the quick connector.
3. Tighten the clamp. **TORQUE** 48 lb.in (5.4 Nm)
4. Attach the retainer to the TC outlet pipe upper LH .



3. Tighten the clamp.



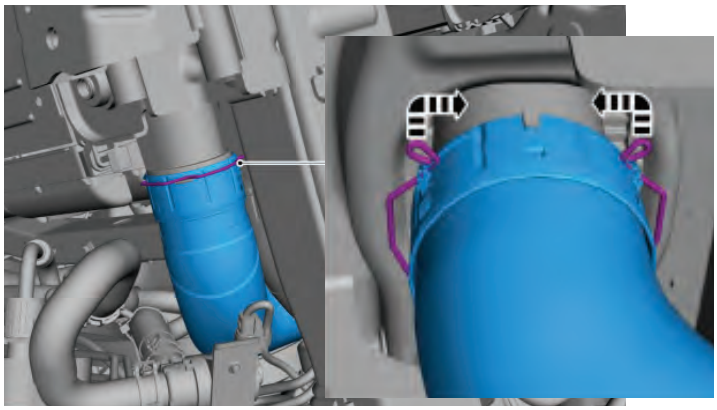
RH TURBOCHARGER OUTLET PIPE INSTALL

RH TURBOCHARGER OUTLET PIPE INSTALL

NOTICE
Inspect the turbocharger or engine air intake system components and clean, if necessary.

NOTE
Once connected, perform a push, click and pull test on the electrical connector to confirm good connection.

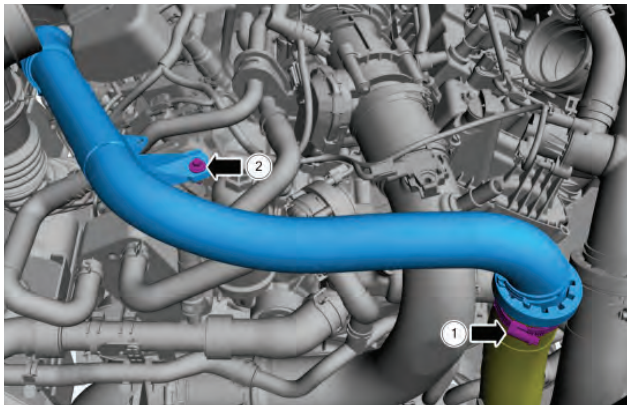
1. Release the retainers from the locking notches after installing the TC outlet pipe lower RH .



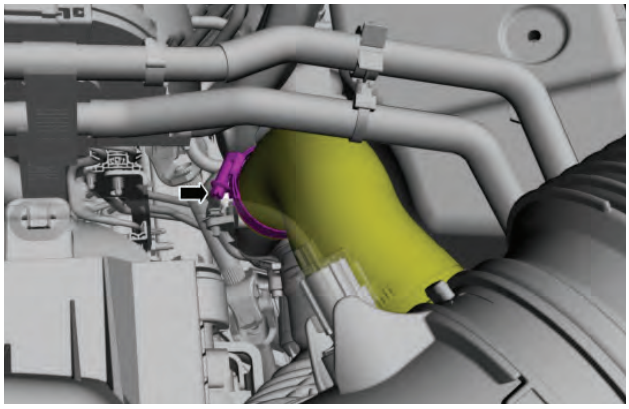
NOTICE
Do not exceed stated torque value, or damage to the component may result.

2. Tighten the clamp. **TORQUE** 48 lb.in (5.4 Nm)

3. Tighten the bolt. **TORQUE** 97 lb.in (11 Nm)



4. Tighten the clamp. **TORQUE** 48 lb.in (5.4 Nm)



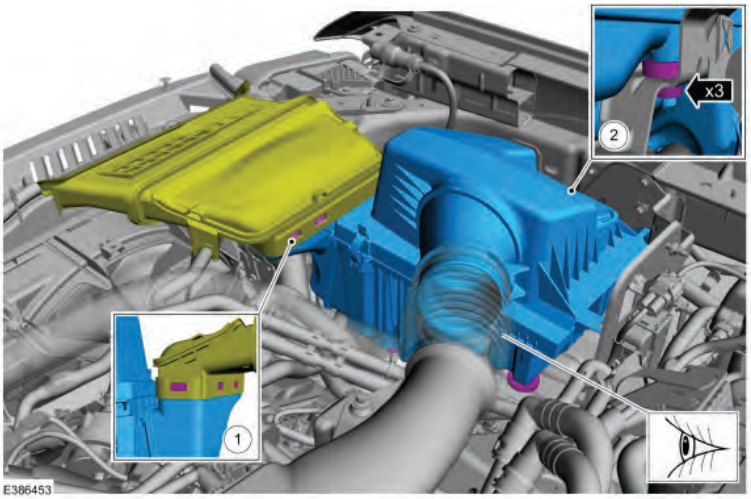
AIR CLEANER INSTALL

NOTICE
Inspect the turbocharger or engine air intake system components and clean, if necessary.

1. Push the lock points on the air cleaner intake pipe.

2. **NOTE:** Check the isolators for damage and replace if required.

Attach the isolators on the air cleaner assembly.

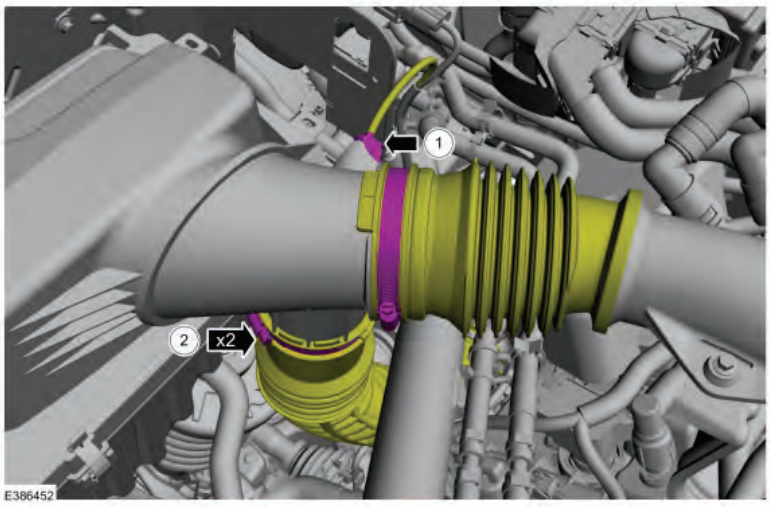


NOTICE
Do not exceed stated torque value, or damage to the component may result.

1. NOTE: Perform a push, click and pull test on the electrical connector to confirm good connection.

2. Connect the electrical connector and attach the wiring harness.

Tighten the clamps for the air cleaner outlet pipes.



TORQUE
Stage 1: 26 lb.in (2.9 Nm)
Stage 2: 42 lb.in (4.8 Nm)

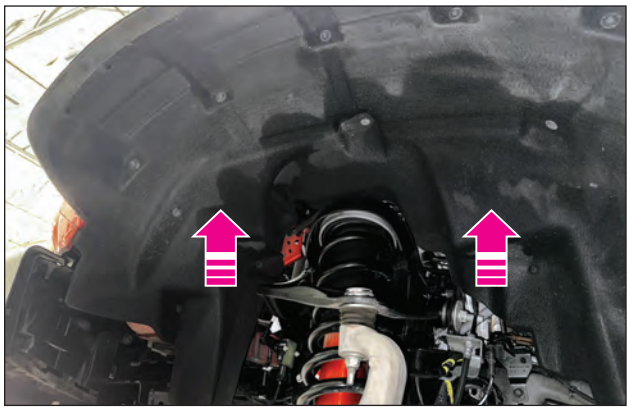
FRONT FENDER SPLASH SHIELDS INSTALL

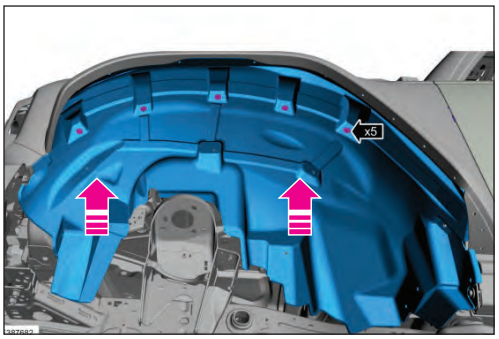
FRONT FENDER SPLASH SHIELDS INSTALL

NOTE

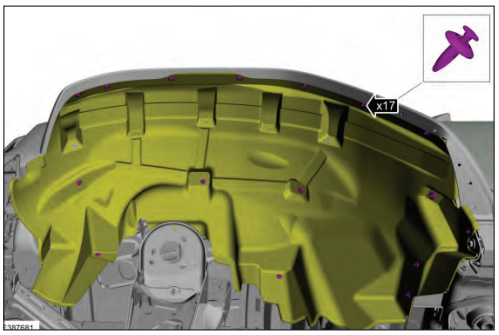
LH side shown, RH side similar.

1. Install the screws and the fender splash shield.





2. Insert the trim pins.



3. Install the wheel and tire.

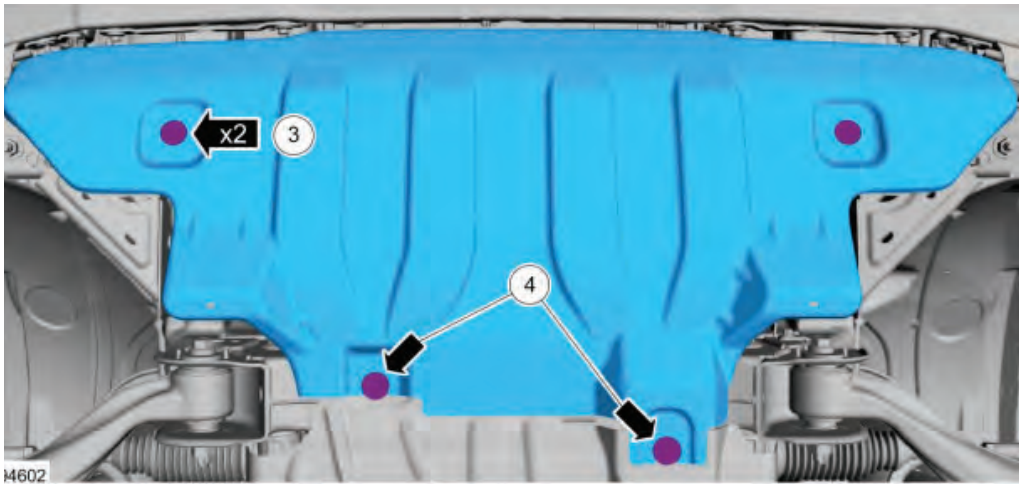
TORQUE
100 lb.ft (135 Nm)

ENGINE UNDERSHIELD INSTALL

NOTE

Underbody shields vary by model.

1. Tighten the bolts and the engine front undershield.



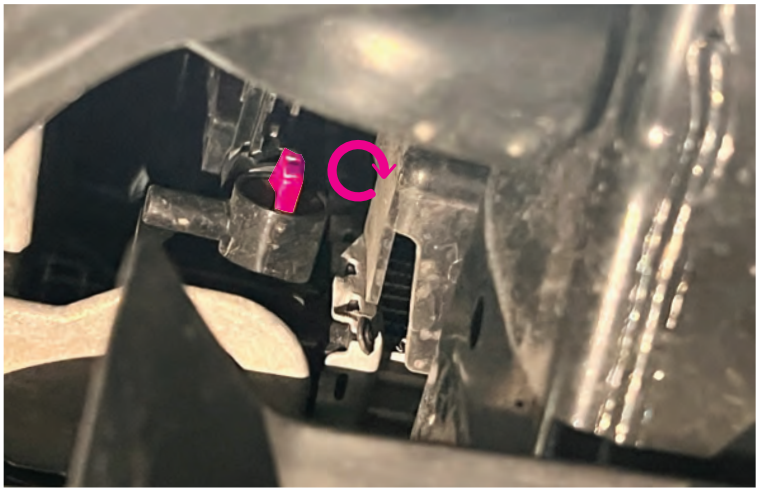
TORQUE
1. 124 lb.in (14 Nm)
2. 124 lb.in (14 Nm)
3. 26 lb.ft (35 Nm)
4. 26 lb.ft (35 Nm)

FILL THE COOLING SYSTEM

FILL THE COOLING SYSTEM

1. When adding or topping off the engine coolant:

- Make sure radiator valve is closed.
- Measure the coolant concentration in the vehicle.
- Determine the concentration desired based on the vehicle duty cycle operating conditions (non-extreme climate, extreme hot, or extreme cold).
- Add, top-off or adjust the coolant to the correct concentration.



2. Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the system.

3. Fill the degas bottle to the MAX FILL line.

4. Install the degas bottle cap until it contacts the hard stop.

5. Turn the climate control system off.

6. Start the engine and increase the engine speed to 3,500 rpm and hold for 30 seconds.

7. Turn the engine off and wait for 1 minute to purge any large air pockets from the cooling system.

8. **WARNING:** Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

9. Check the engine coolant level in the degas bottle and, if necessary, fill to the top of the MAX FILL line.

10. Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

11. Increase the engine speed to 3,500 rpm and hold for 30 seconds.

12. Allow the engine to idle for 30 seconds.

13. Turn the engine off for 1 minute.

NOTICE

Use the correct coolant. Do not mix coolant types. Mixing coolant types may degrade the coolant corrosion protection and may damage the engine or cooling system. For the correct coolant specified for this vehicle, refer to Specifications.

Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

Make sure that the concentration of antifreeze is not below 40% or above 60% as engine parts could become damaged.

Vehicles without auxiliary heating

For a total of 5 times to remove any remaining air trapped in the system.

1. Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

2. Increase the engine speed to 3,500 rpm and hold for 30 seconds.

3. Allow the engine to idle for 30 seconds.

4. Turn the engine off for 1 minute.

Vehicles with auxiliary heating

For a total of 10 times to remove any remaining air trapped in the system.

1. Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

2. Increase the engine speed to 3,500 rpm and hold for 30 seconds.

3. Allow the engine to idle for 30 seconds.

4. Turn the engine off for 1 minute.

All vehicles

WARNING

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1. Check the engine coolant level in the degas bottle and, if necessary, fill to the top of the MAX FILL line on the degas bottle.

2. Install the pressure relief cap until it contacts the hard stop.

FINAL STEPS

1. Check and top off engine oil.

Motorcraft® SAE 5W-30 Synthetic Blend Motor Oil

XO-5W30-Q1SP

Specification

WSS-M2C961-A1

Fill capacity

Initial fill 8.3 qt (7.85 L)

2. Start and check for leaks.

3. Road test.