INSTALLATION INSTRUCTIONS

SUBJECT: CHEETAH TURBOCHARGER FOR 2017-2023 L5P 6.6L DURAMAX

FITMENT: 2017-2023 6.6L Duramax Equipped Silverado/Sierra 2500/3500 Pickup Trucks
KIT P/N: FPE-L5P-VNT63-1723
EST INSTALL TIME: 8 Hours

TOOLS REQUIRED: Pliers, T15 torx socket, 4mm allen wrench or socket, 10mm socket or wrench, 11mm socket or wrench, 13mm socket or wrench, 15mm socket or wrench, 16mm socket or wrench, 17mm socket or wrench, 17mm flare nut socket, 22mm socket or wrench, 22mm flare nut socket, 26mm socket or wrench, trim tool, flathead screwdriver, charge air cooler pressure tester.

KIT CONTENTS:

Item #	Description	QTY
1	Turbocharger	1
2	EGR tube gasket to intake bridge	1
3	EGR coolant pipe gasket	1
4	PCV to compressor cover	1
5	Gasket; coolant feed, coolant return, oil feed	3
6	Turbine housing to catalyst	1
7	Oil drain gasket	2
8	Pedestal gasket	1

IMPORTANT NOTICES FOR CALIFORNIA RESIDENTS:
For California customers: An E.O. identification label is required for Smog Check inspection. The E.O. identification label included with this kit MUST be placed in the engine compartment so that smog check technicians can verify the E.O. number.

WARNINGS:

- Use of this product may void or nullify the vehicle's factory warranty.
- User assumes sole responsibility for the safe & proper use of the vehicle at all times.
- The purchaser and end user releases, indemnifies, discharges, and holds harmless Fleece Performance Engineering, Inc. from any and all claims, damages, causes of action, injuries, or expenses resulting from or relating to the use or installation of this product that is in violation of the terms and conditions on this page, the product disclaimer, and/or the product installation instructions. Fleece Performance Engineering, Inc. will not be liable for any direct, indirect, consequential, exemplary, punitive, statutory, or incidental damages or fines cause by the use or installation of this product.

PROCEDURE:

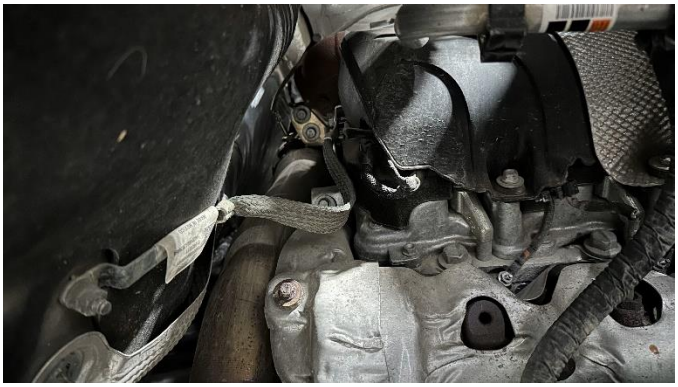
STEP 1: Disconnect both batteries.

STEP 2: Using a T15 torx socket or bit, remove the 18 screws retaining the front passenger side fender liner. Using a trim tool or flat head screwdriver, remove the one push pin. Remove the fender liner.

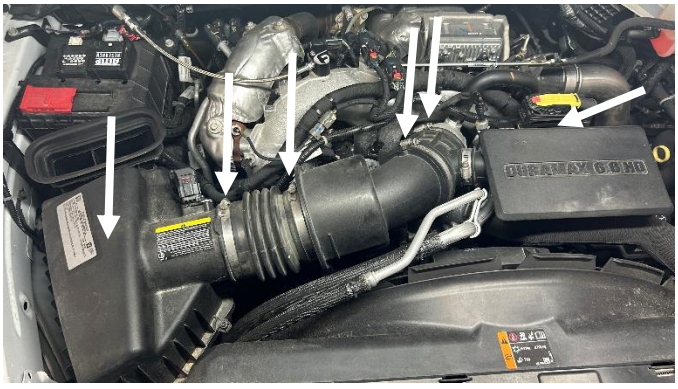
STEP 3: Disconnect the lower radiator hose and drain the coolant into a clean bucket or pail.

STEP 4: Loosen, but do not remove the two catalyst mounting bolts located on the rear of the passenger side of the engine using a 13mm socket or wrench. Loosen the bolts three rotations out from tight

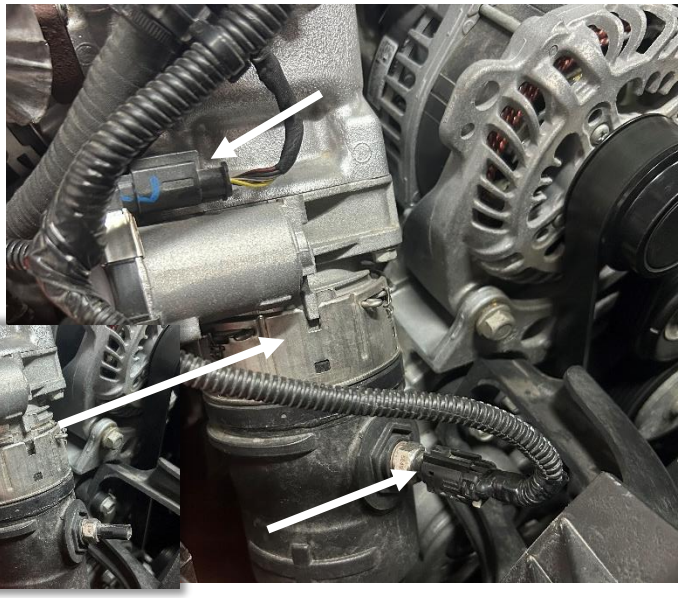
NOTE: A 12-18" socket extension may be required to reach the two catalyst mounting bolts.



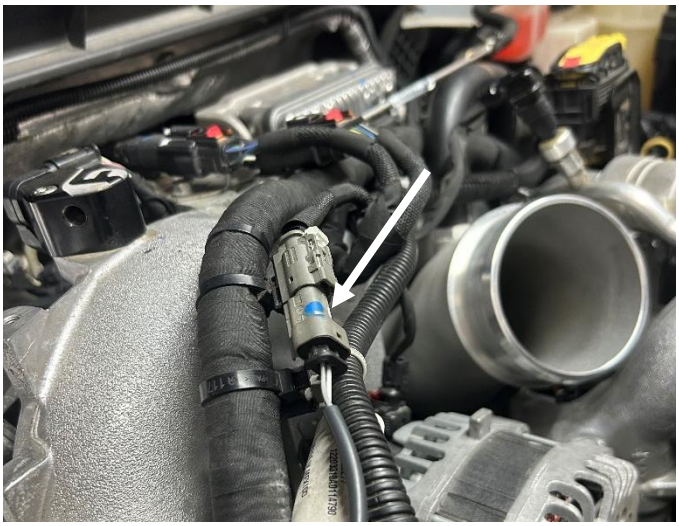
STEP 5: Remove the 13mm bolt located behind the center of the resonator. Loosen the hose clamp connecting the intake tube to the intake horn. Disconnect the mass airflow (MAF) sensor. Remove the bolts retaining the upper half of the airbox. Remove the intake and upper airbox.



STEP 6: Disconnect the harness connectors for the throttle valve and the charge air cooler outlet temperature sensor. Uncouple the charge air cooler outlet tube from the intake bridge.



STEP 7: Disconnect the exhaust gas recirculation (EGR) temperature sensor located on the top of the intake bridge.

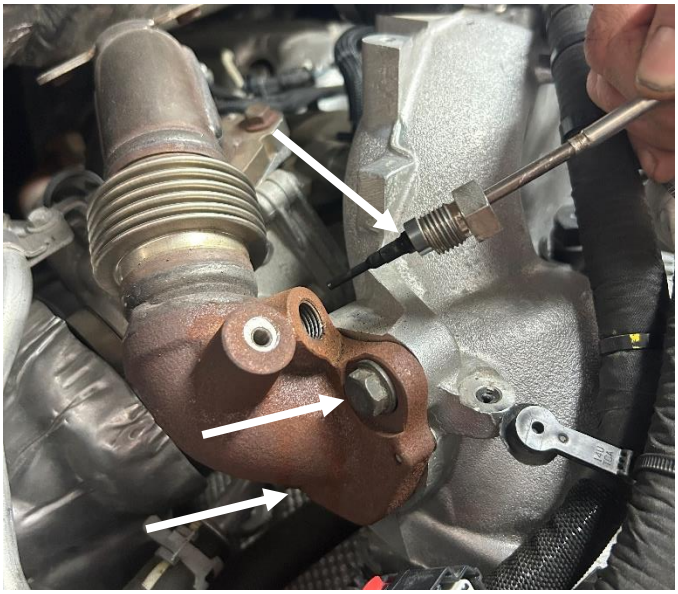


STEP 8: Remove the three bolts retaining the heat shield covering the EGR pipe using a 10mm socket or wrench. Remove the heat shield.

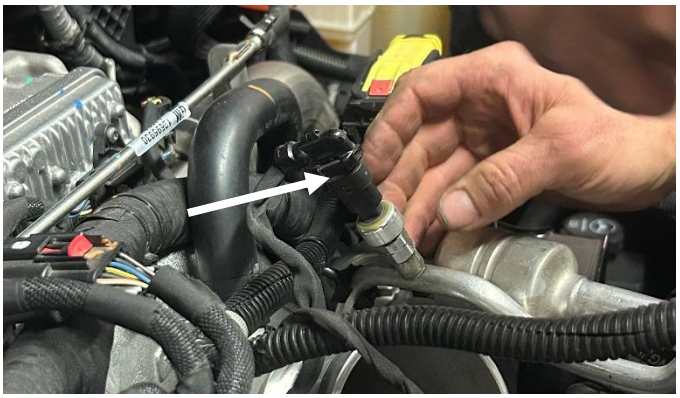
STEP 9: Remove the EGR temperature sensor using a 17mm wrench.

STEP 10: Remove the two bolts retaining the end of the EGR pipe to the intake bridge.

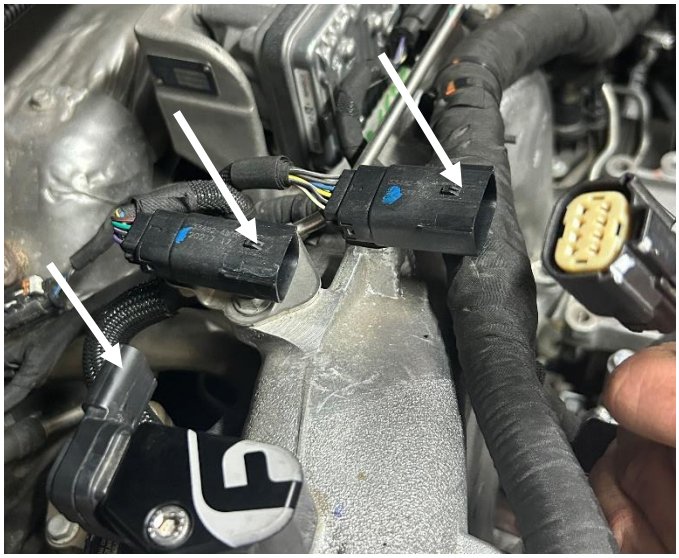
NOTE: The gasket between the EGR pipe and intake bridge will be removed and replaced in a later step.



STEP 11: Disconnect the A/C pressure sensor connector located just above the intake horn.



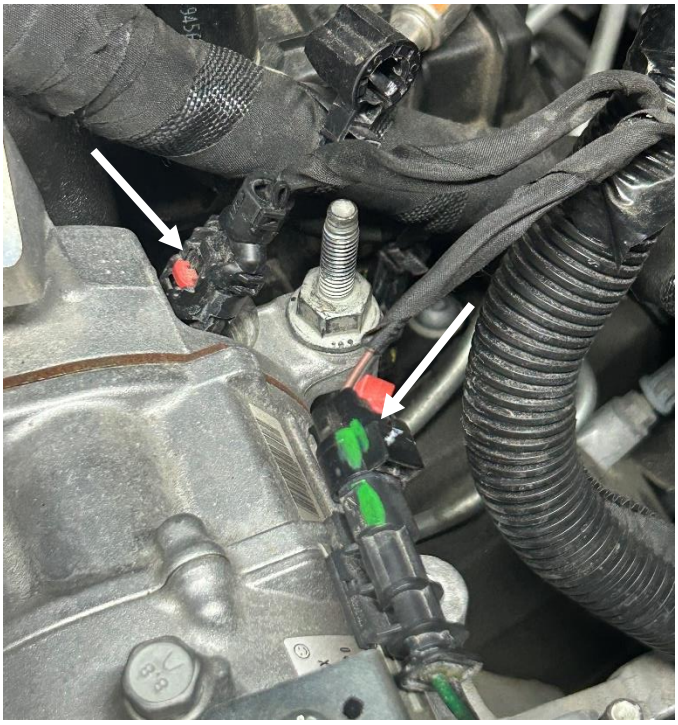
STEP 12: Disconnect the two 8-pin harness connectors located on the top of the intake bridge as well as the manifold absolute pressure (MAP) sensor connector.



STEP 13: Remove the two bolts retaining the A/C bulkhead bracket using a 13mm socket or wrench. Set the bulkhead bracket to the side to make room for removal of the A/C compressor.

STEP 14: Disconnect the two harness connectors located on the driver's side of the A/C compressor.

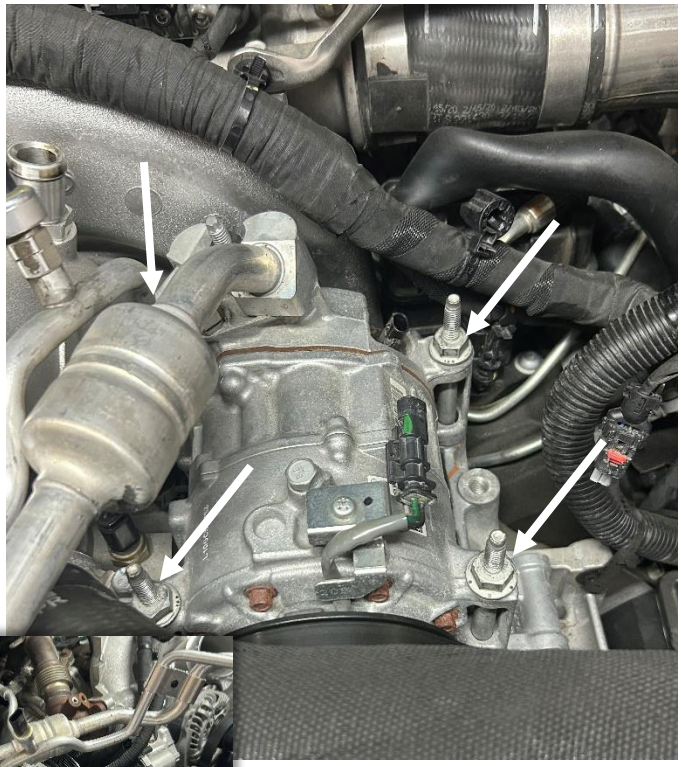
NOTE: It may be helpful to mark one of the connectors using a paint pen as shown at right in green. The connectors are similar and can easily be mistaken for one another.



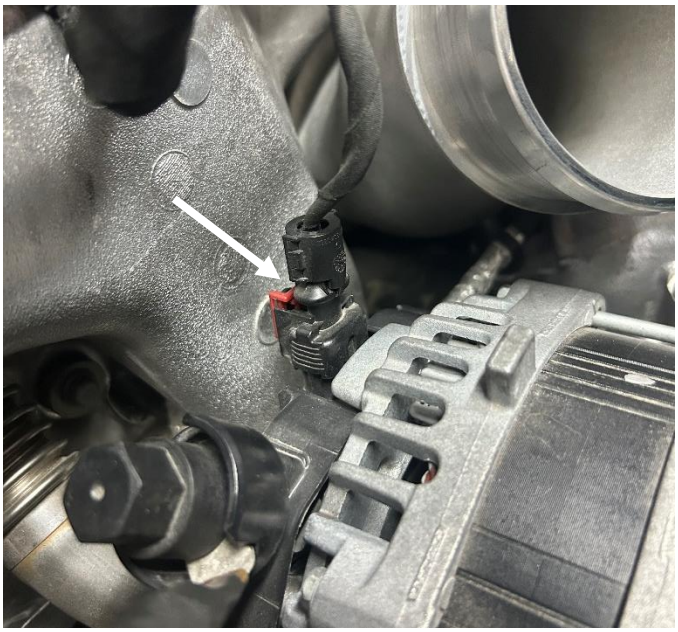
STEP 15: Loosen the tension on the accessory drive belt and remove the belt from the A/C compressor.

STEP 16: Remove the four bolts retaining the A/C compressor to its mounting bracket using a 15mm socket or wrench. Set the A/C compressor aside without disconnecting the hoses as shown at right.

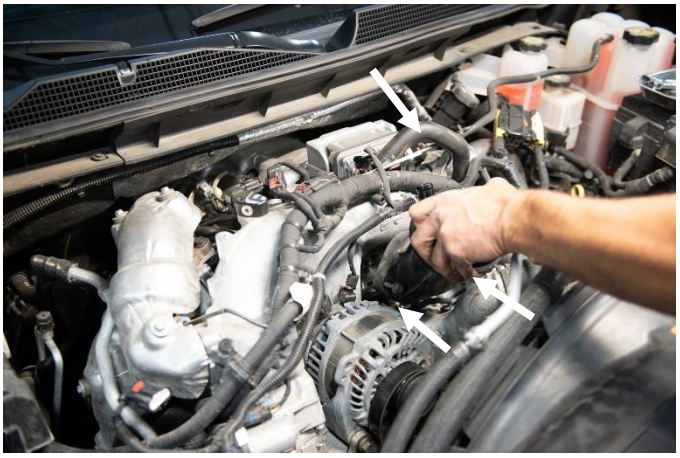
NOTE: A wobble socket is recommended when removing the passenger side bolts retaining the A/C compressor



STEP 17: Disconnect the harness connector on the top of the alternator.

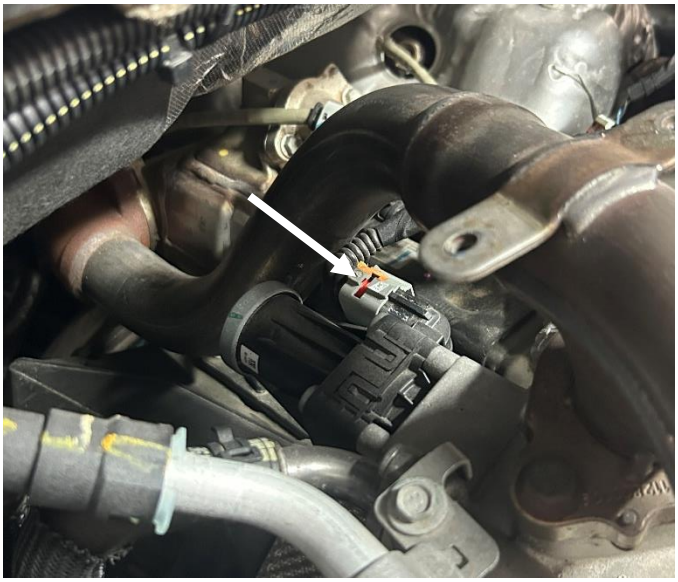


STEP 18: Disconnect the crankcase ventilation (CCV) hose from the top of the OE intake horn. Remove the two bolts retaining the intake horn using a 13mm socket or wrench.



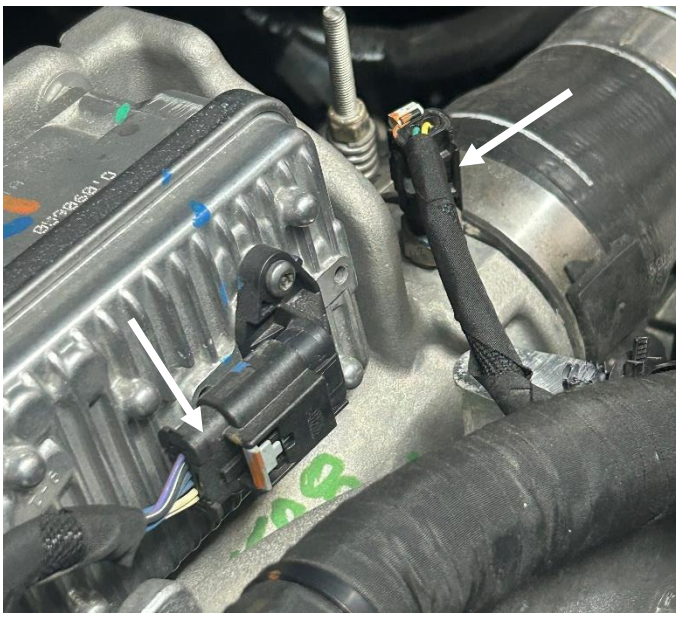
STEP 19: Disconnect the SCR and post-SCR temperature sensor connectors.

STEP 20: Disconnect the harness connector for the EGR mixing valve.



STEP 21: Disconnect the coolant hose from the passenger side of the coolant pipe located in front of the turbocharger actuator. Remove the two bolts retaining the coolant pipe to the top of the intake bridge using a 10mm socket or wrench. Place the pipe on top of the coolant tank or set aside.

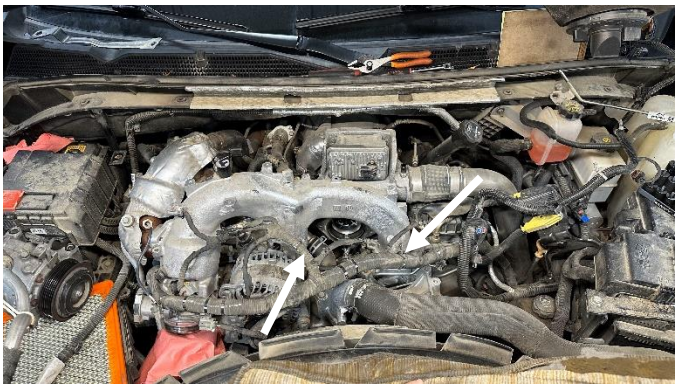
STEP 22: Disconnect the harness connectors for the turbocharger actuator and turbocharger inlet air temperature sensor.



STEP 23: Disconnect the harness connector for the coolant temperature sensor located near the passenger side of the A/C mounting bracket.

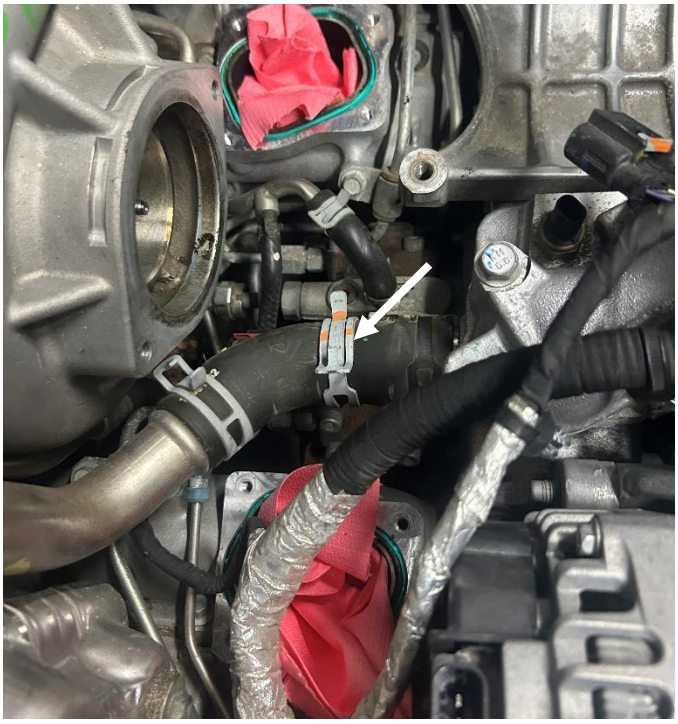
STEP 24: Carefully remove any zip ties and fir trees retaining the electrical harness to the intake bridge. Position the harness towards the front of the engine bay to make room for the remaining disassembly steps.

STEP 25: Remove the eight bolts retaining the intake bridge using a 10mm socket or wrench. There are four bolts per side. See the arrows at right for the general location of the bolts. Carefully remove the intake bridge from the engine bay. Do not remove the intake bridge gaskets as they will be reused.

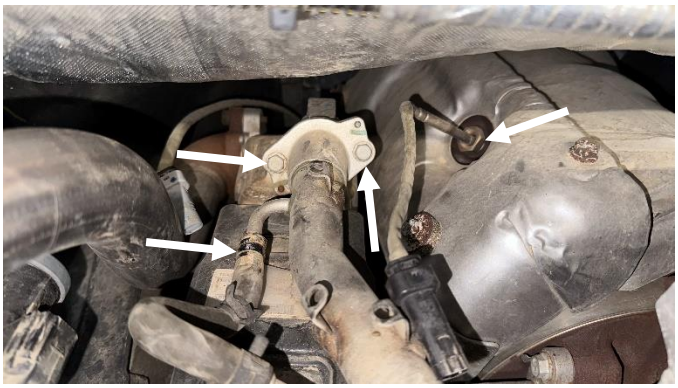


STEP 26: With the intake bridge removed, place rags or covers over the intake manifold inlets to prevent foreign debris/objects from entering the engine.

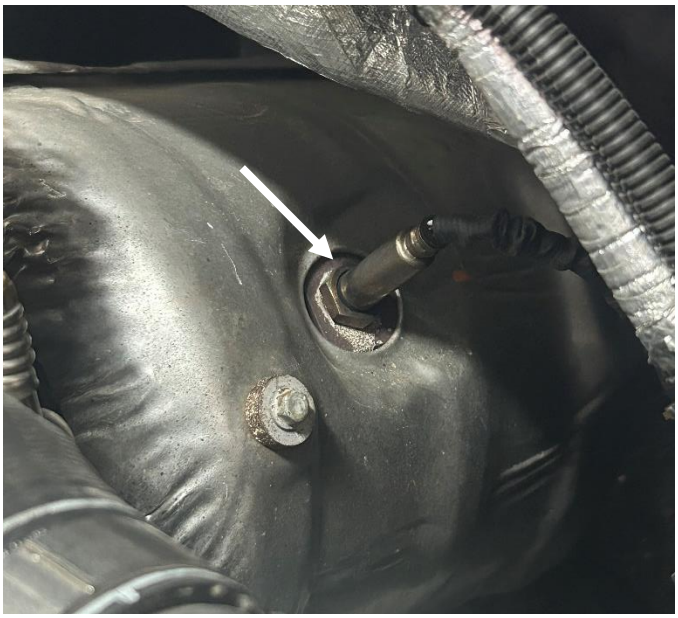
STEP 27: Using pliers, loosen the hose clamp retaining the EGR coolant return hose to the coolant riser and move it rearward. Disconnect the hose from the coolant riser.



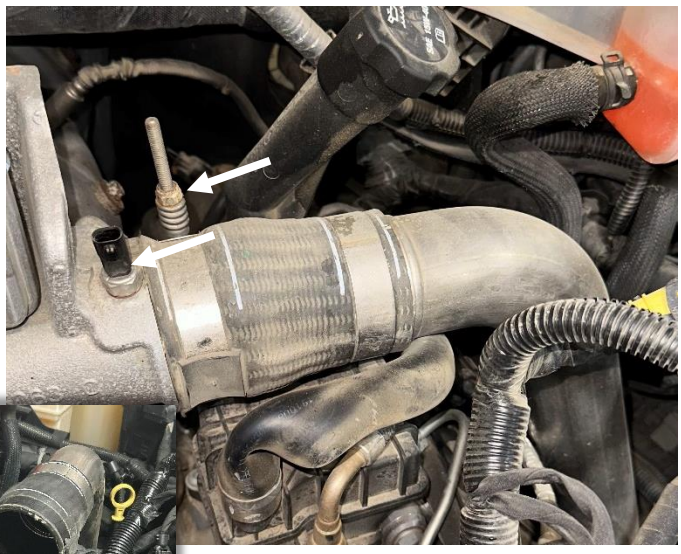
STEP 28: Remove the two bolts retaining the EGR coolant return pipe using a 10mm socket or wrench. Use pliers to loosen the hose clamp and remove the turbocharger coolant return hose. Remove the coolant return pipe and hose assembly.



STEP 29: Remove the SCR temperature sensor using a 17mm wrench or sensor removal socket



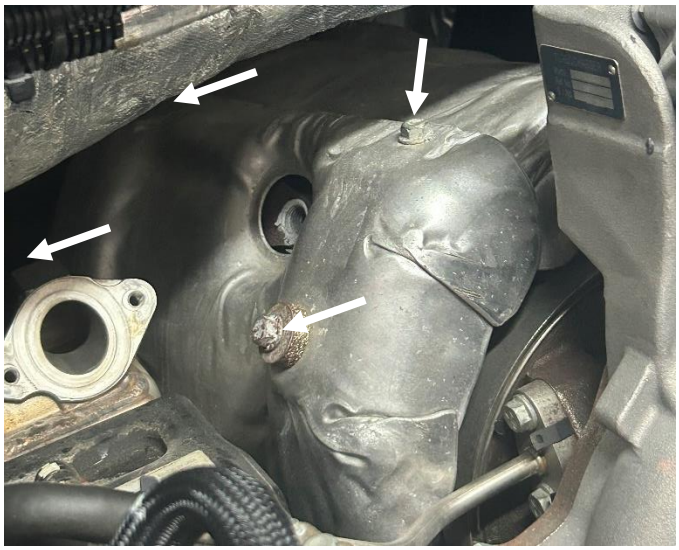
STEP 30: On the driver's side of the SCR, remove the NOx sensor using a 22mm wrench or sensor removal socket.



STEP 31: Loosen the hose clamp on the charge air cooler pipe using an 11mm socket or wrench. Disconnect the boot from the turbocharger outlet. Remove the charge air cooler inlet temperature sensor using a 16mm wrench.

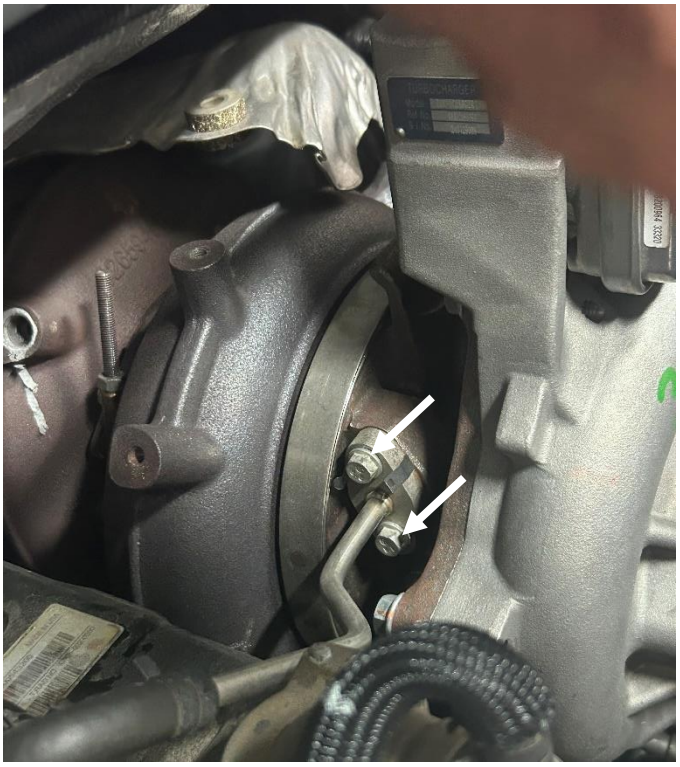
NOTE: The charge air cooler inlet temperature sensor will be reused on the new turbocharger.

STEP 32: Remove the SCR heat shield.



a. Remove the four bolts retaining the passenger side of the heat shield using a 10mm socket or wrench. Remove the passenger side shield from the engine bay.

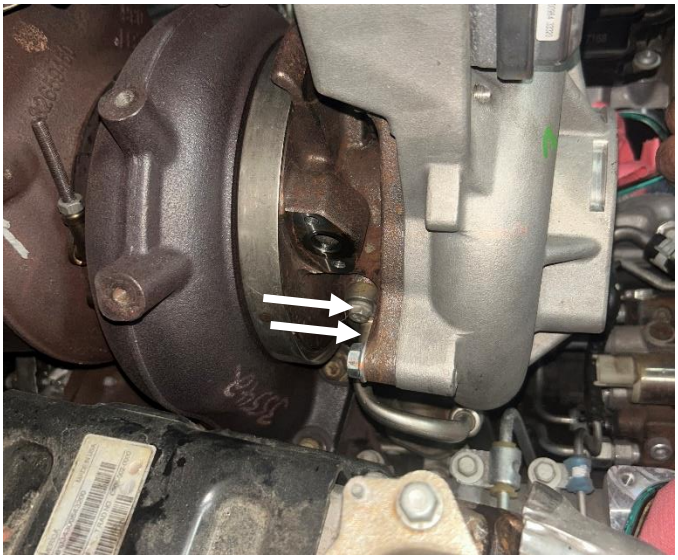
b. Remove the two bolts retaining the driver's side heat shield using a 10mm socket or wrench.



c. There will not be enough room to fully remove the driver's side heat shield. Lift the shield up and push it towards the firewall to provide access when loosening and removing the turbocharger discharge clamp.

STEP 33: Remove the two bolts retaining the turbocharger coolant return fitting using a 10mm socket or wrench. Move the fitting away from the turbocharger. Remove and discard of the gasket.

STEP 34: Remove the two bolts retaining the turbocharger coolant feed fitting using a 10mm socket or wrench. Move the fitting away from the turbocharger. Remove and discard of the gasket.

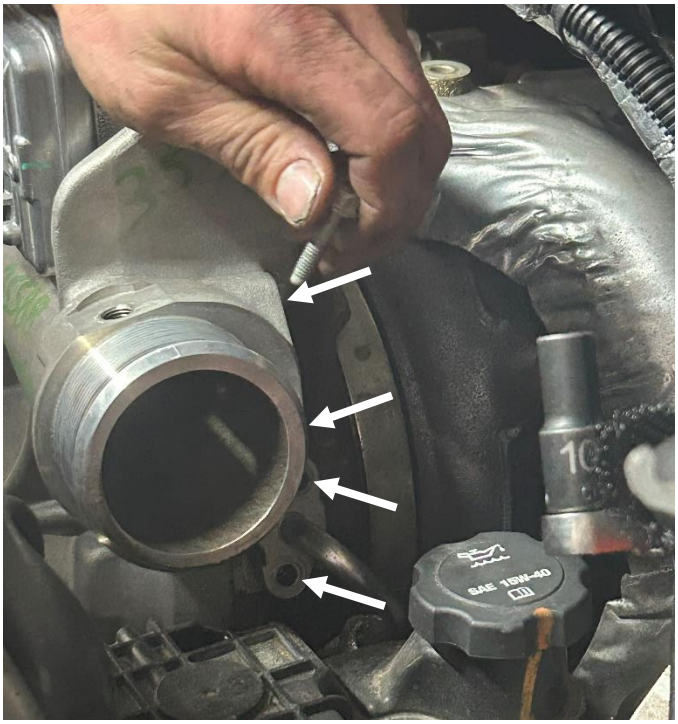


STEP 35: Locate the turbocharger oil drain just below the coolant feed fitting removed in step 34. Remove the two bolts retaining the turbocharger oil drain to the engine block using a 10mm socket or wrench.

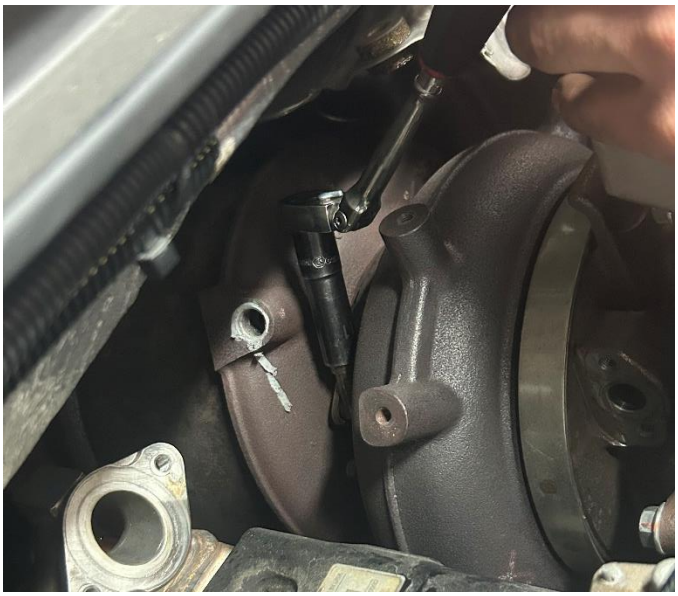
STEP 36: Remove the two bolts retaining the PCV tube and fitting to the rear of the turbocharger outlet using a 10mm socket or wrench. Remove and discard of the gasket.

STEP 37: Remove the two bolts retaining the turbocharger oil feed using a 10mm socket or wrench. Move the fitting away from the turbocharger. Remove and discard of the gasket.

NOTE: Ensure that you label the oil feed and oil return fitting bolts or keep them separate when setting aside. The bolts are not interchangeable between the feed and return and can damage the turbocharger if installed in the incorrect location.

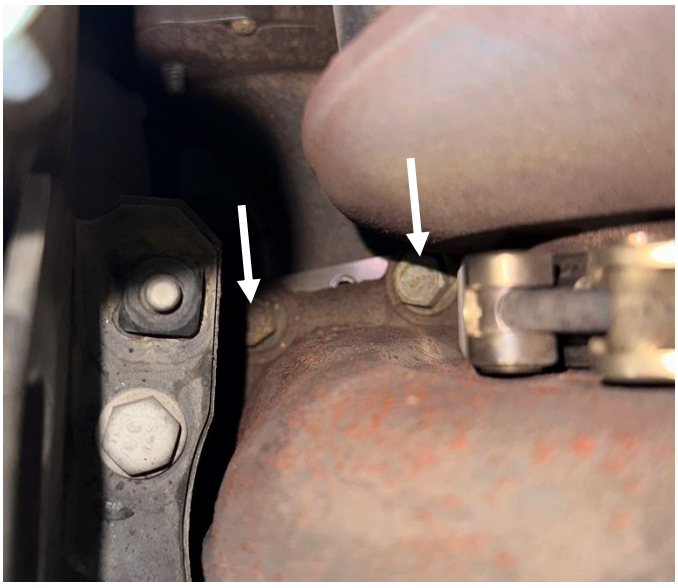


STEP 38: Loosen the nut on the turbocharger discharge clamp using an 11mm socket or wrench. Leave the nut three to four rotations from the end of the threaded rod.



STEP 39: Remove the four bolts retaining the turbine housing to the exhaust up pipe using a 15mm socket or wrench. The four bolts are stainless steel and are not magnetic. A grabbing tool may be required to lift the bolts out of the mounting holes once fully loosened.

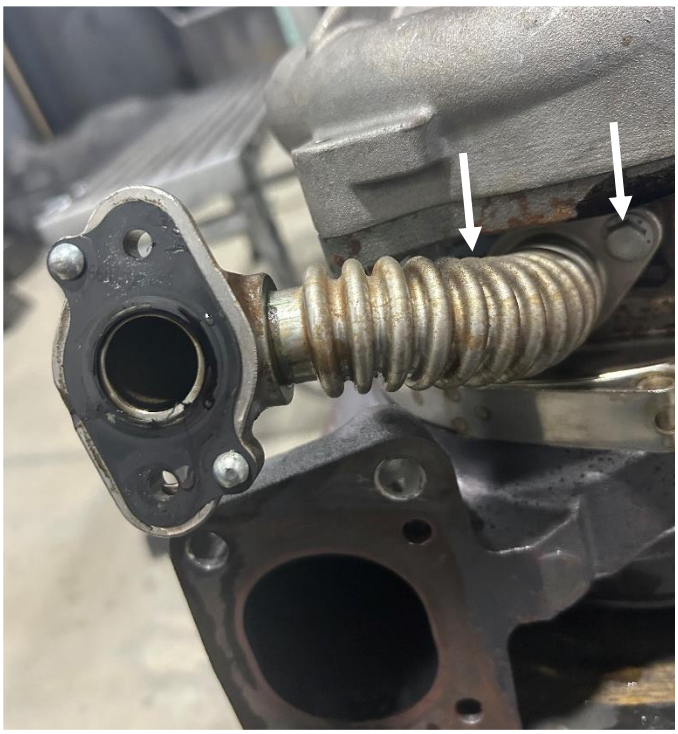
NOTE: The two images at right show the two bolts on the front facing side of the turbine housing and the two bolts on the rear facing side of the turbine housing respectively.



STEP 40: Fully remove the nut on the turbocharger discharge clamp and disconnect the clamp from the turbocharger and the SCR. Gently lift the turbocharger off of the pedestal to clear the locating dowels. Carefully lift the turbocharger out of the engine bay making sure not to damage the oil drain tube or the fuel control actuator on the injection pump.

STEP 41: Remove and discard of the turbo discharge and turbo pedestal gaskets. See the arrows at right for locations. These gaskets will be replaced.

STEP 42: Clean any oil and/or coolant spills in the engine bay that may have occurred during the turbocharger removal process.

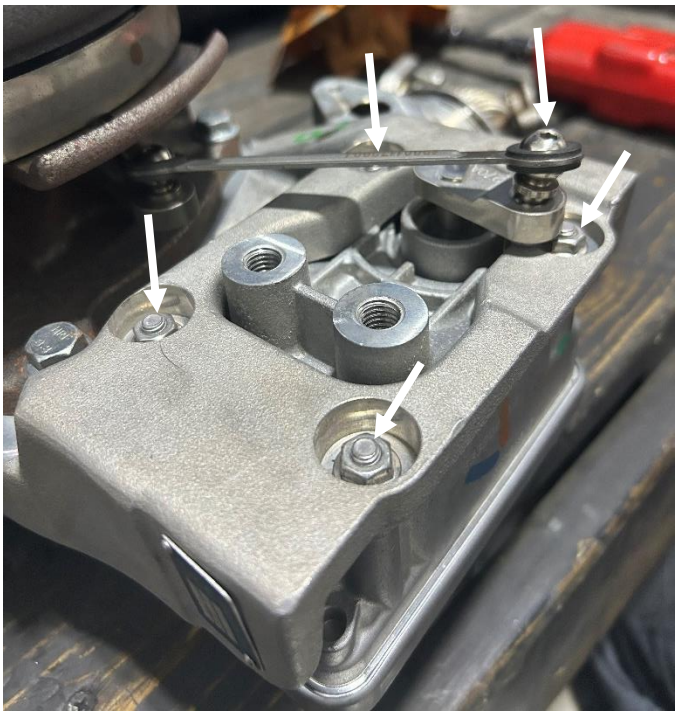


STEP 43: Remove the two bolts retaining the oil drain tube to the bottom of the OE turbocharger using a 10mm socket or wrench. Discard of the gasket between the turbocharger and drain tube.

NOTE: The gasket will be removed from the bottom portion of the drain tube and replaced in a later step.

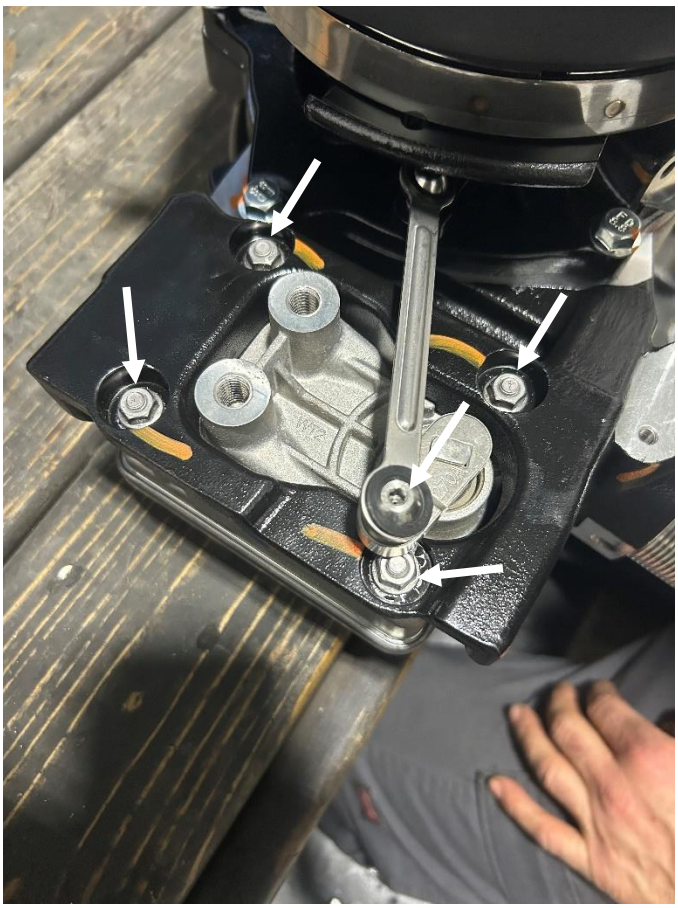
STEP 44: Using a 4mm allen wrench, remove the screw retaining the turbocharger actuator arm. Remove the four bolts retaining the actuator to the turbocharger using a 10mm socket or wrench. Remove the actuator from the turbocharger. Retain the nuts for installation onto the new turbo.

NOTE: The actuator will be reused on the new Fleece Performance Turbocharger.



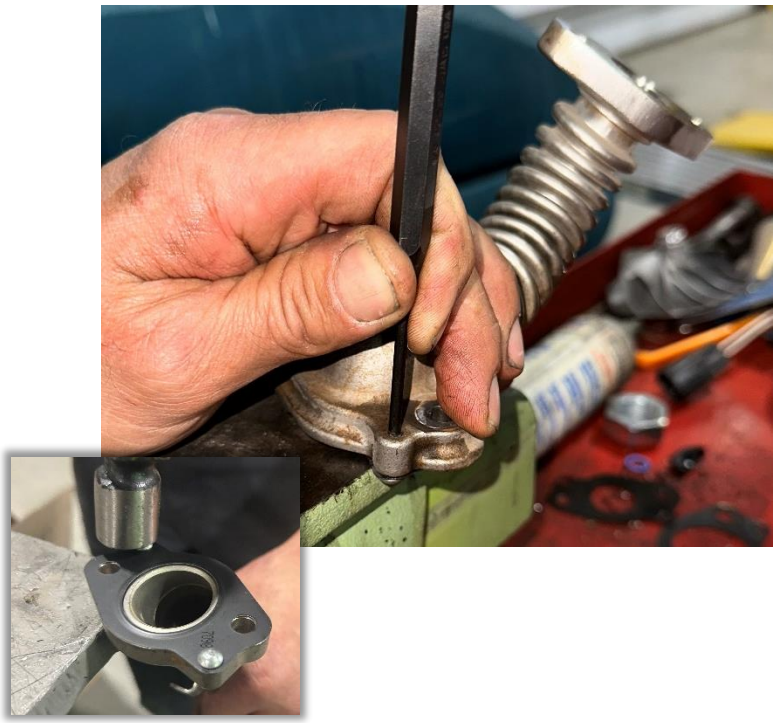
STEP 45: Install the OE actuator onto the new Fleece Performance Cheetah turbocharger. Use the four nuts that retained the actuator to the OE turbo to mount the actuator. Torque the four nuts to 93 in-lb.

STEP 46: Connect the turbocharger actuator arm to the actuator using a 4mm allen wrench or socket. Torque the screw to 119 in-lb.

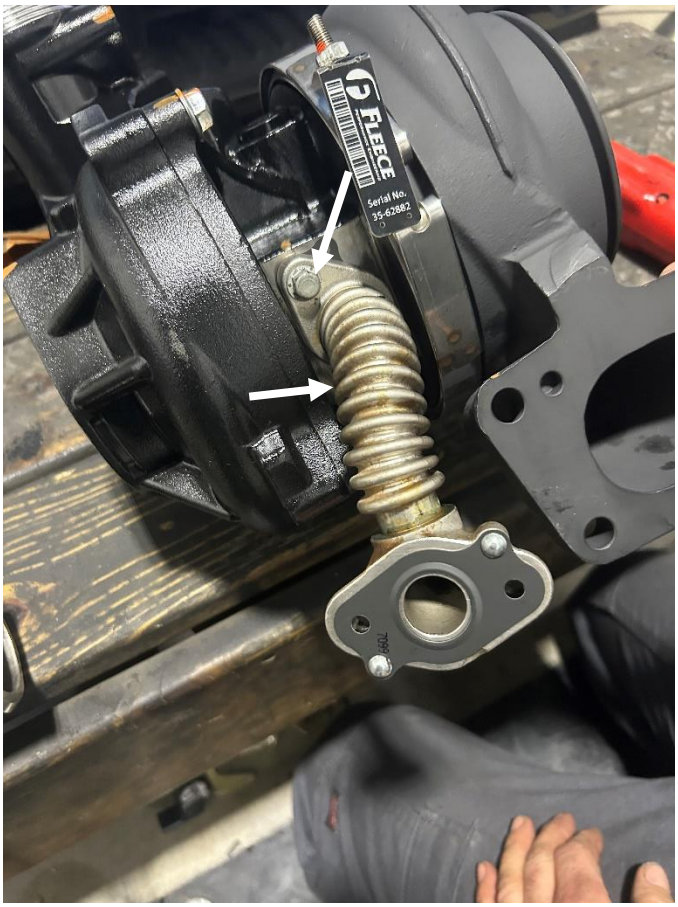


STEP 47: Remove the OE gasket from the turbocharger oil drain tube. Using a hammer and punch, remove the two retaining pins. Remove and discard of the gasket. Replace the gasket with the new one included in your kit (GM 12642429). Carefully tap the pins back into place to retain the gasket.

NOTE: This procedure will be repeated with the EGR pipe gasket later in the installation process.



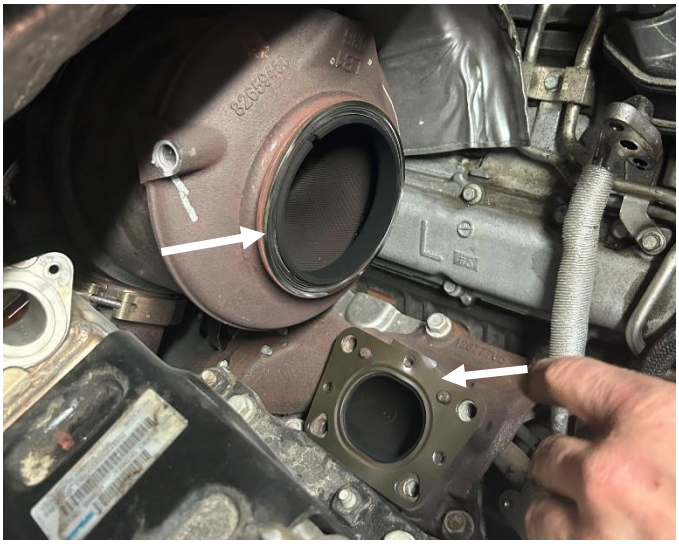
STEP 48: Install the turbocharger oil drain tube onto the new Fleece Performance Cheetah turbo along with the new included gasket (GM 12642429). Using a 10mm socket or wrench, torque the two bolts to 89 in-lb.



STEP 49: Install the included gaskets onto the turbo pedestal and the SCR inlet flange.

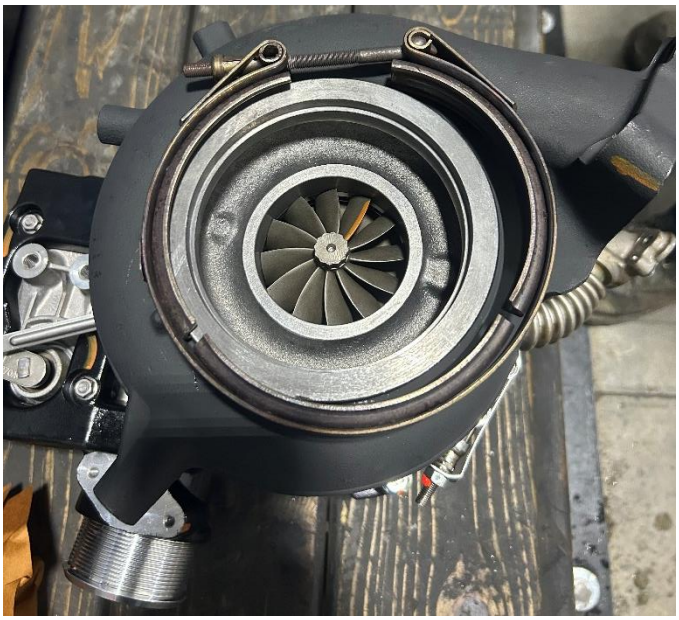
Turbo exhaust inlet flange gasket: GM 12677294

SCR inlet flange gasket: GM 12672821



STEP 50: Place the OE v-band clamp around the turbocharger exhaust outlet flange. Carefully place the new turbocharger onto the pedestal, ensuring that the locating dowels are fully seated. Line up the clamp with the SCR inlet flange. Hand tighten the clamp until it stays put on the flanges. Do not torque the nut.

NOTE: The gasket between the SCR and turbo can be knocked out of place if not careful. Ensure that the gasket remains in place.



STEP 51: Install the four bolts removed in step 39 to retain the turbocharger to the pedestal. Using a 15mm socket, torque the four pedestal bolts to 43 ft-lb.

NOTE: Forward facing bolts shown. Rear two bolts are in a similar configuration behind the turbine housing.

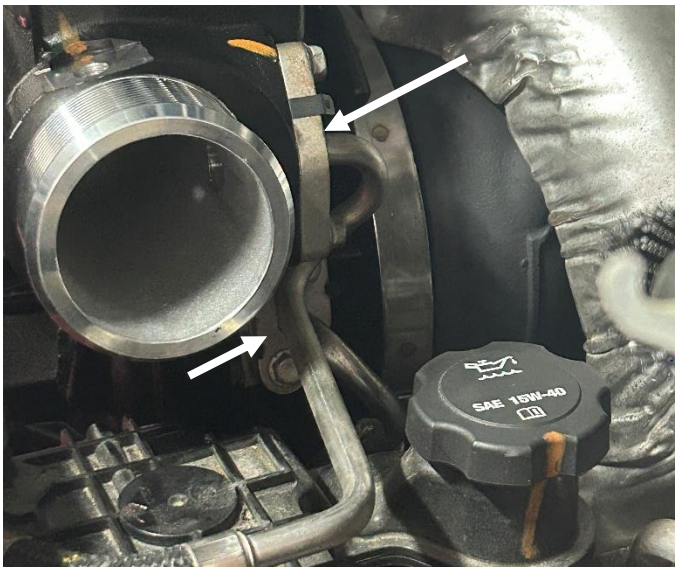
STEP 52: Fully tighten the v-band clamp retaining the turbo to the SCR. Using an 11mm socket, torque the nut to 18 ft-lb.

STEP 53: Install the two bolts retaining the bottom of the turbocharger oil drain tube to the engine. Using a 10mm socket, torque the bolts to 89 in-lb.

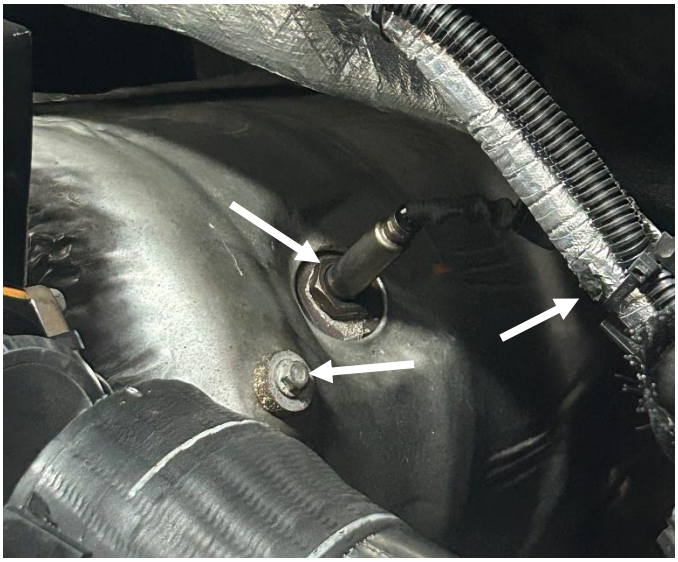
STEP 54: Install new gaskets onto the coolant feed and drain connections. Both connectors will use GM 12737099 included in the kit. The gaskets will clip into place on the fittings. Install the coolant feed (lower) first, then the return (upper). Using a 10mm socket, torque the bolts (two per fitting) to 89 in-lb.

STEP 55: Install a new gasket onto the turbocharger oil feed fitting (GM 12737099). The gasket will clip into place on the fitting. Install the fitting into the turbo and use a 10mm socket to torque the two bolts to 89 in-lb.

STEP 56: Install a new gasket onto the PCV to compressor cover fitting (GM 12671847). The fitting will clip into place on the fitting. Install the fitting using a 10mm socket and torque the two bolts to 89 in-lb.

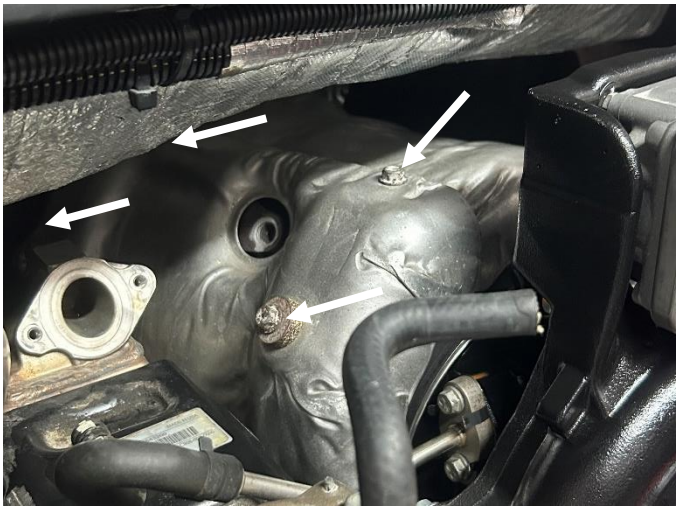


STEP 57: Position the driver's side of the SCR heat shield back into place and install the two bolts using a 10mm socket or wrench. Torque the bolts to 89 in-lb.

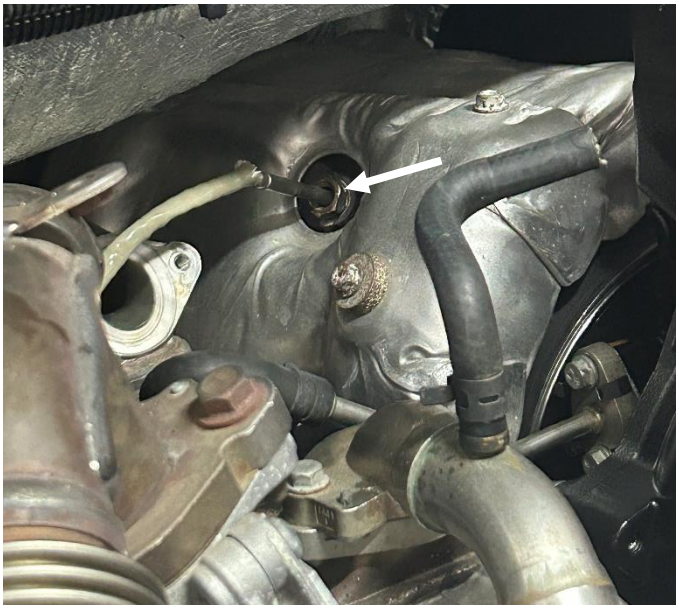


STEP 58: Install the NOx sensor into the driver's side of the SCR. Using a 22mm socket or flare nut socket, torque the sensor to 33 ft-lb.

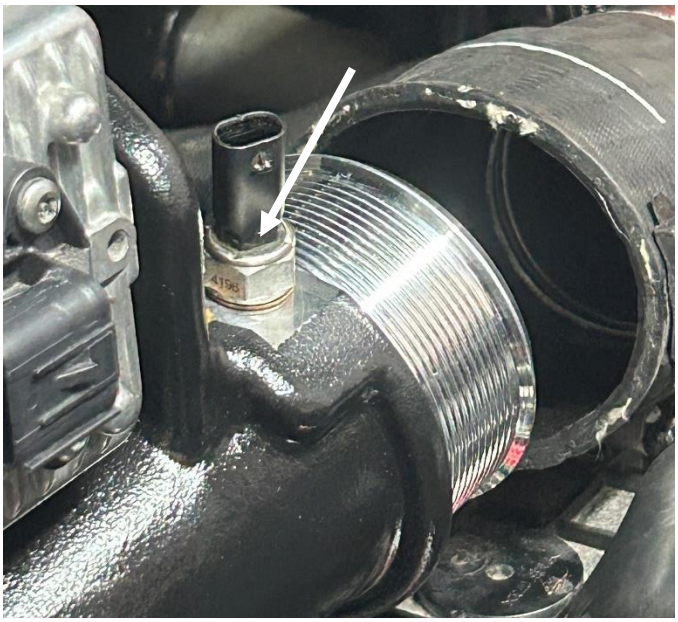
STEP 59: Install the passenger side of the SCR heat shield. Using a 10mm socket or wrench, torque the four bolts to 89 in-lb.



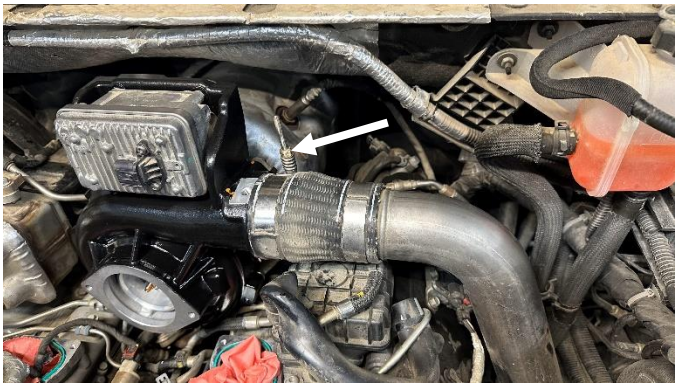
STEP 60: Install the SCR temperature sensor. Using a 17mm socket or flare nut socket, torque the sensor to 33 ft-lb.



STEP 61: Install the charge air temperature sensor onto the compressor housing of the turbo. Using a 16mm socket or wrench, torque the sensor to 14 ft-lb.

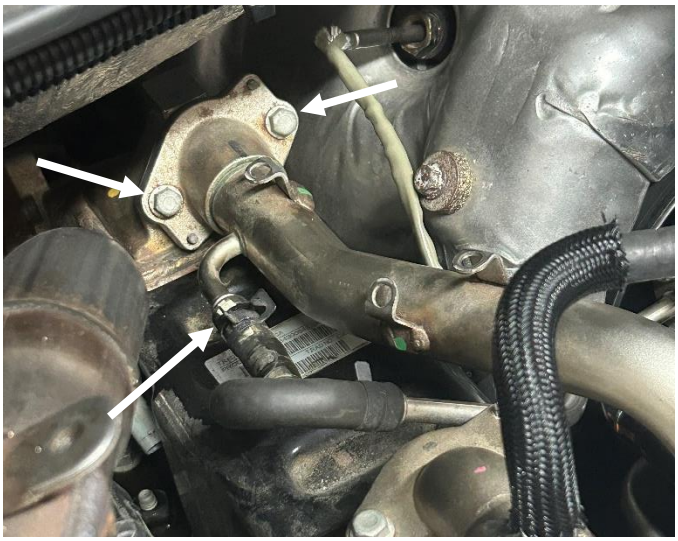


STEP 62: Connect the charge air cooler inlet boot to the compressor housing of the turbocharger. Torque the nut on the clamp to 89 in-lb.

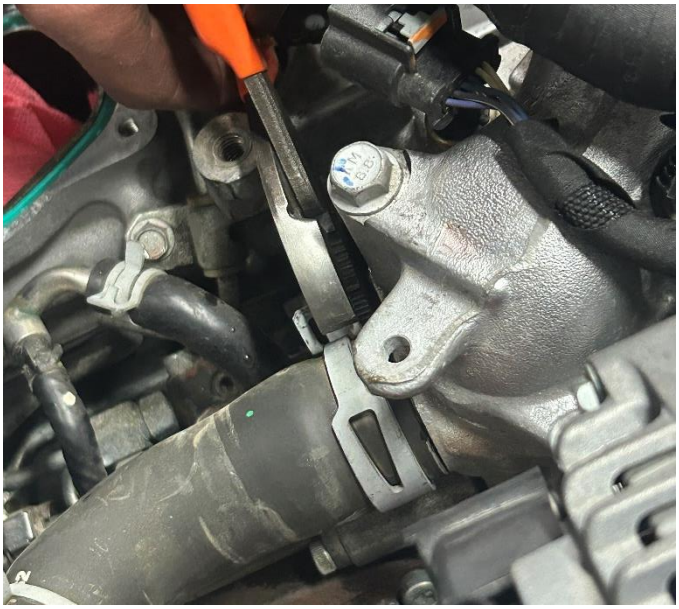


STEP 63: Remove the old gasket from the EGR coolant pipe and hose removed in step 28. Refer to the procedure outlined in step 47 to remove and install the new gasket. Use the included gasket P/N GM 12648141.

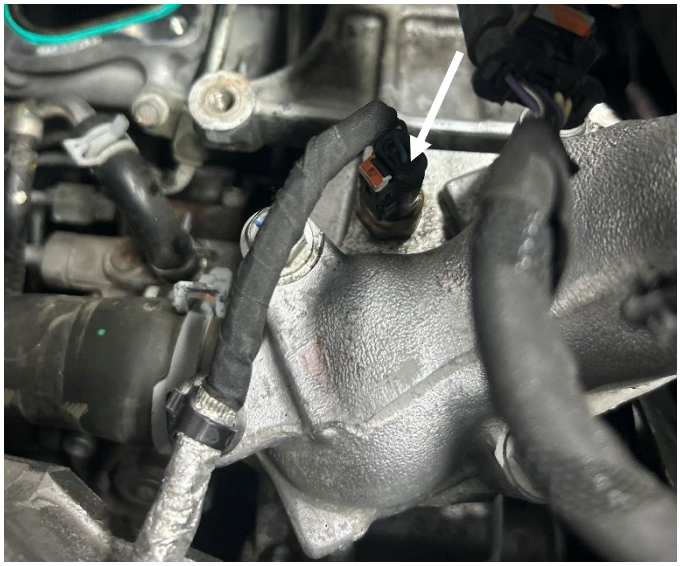
STEP 64: Install the EGR coolant pipe as shown at right. Using a 10mm socket or wrench, torque the two bolts to 89 in-lb. Connect the turbocharger coolant return hose to the barb on the pipe. Fasten the hose clamp.



STEP 65: Connect the EGR coolant pipe to the coolant return fitting in the valley. Use pliers to position the hose clamp.



STEP 66: Connect the coolant temperature sensor.



STEP 67: Remove and replace the gasket from the EGR feed pipe using the procedure outlined in step 47. Use the included gasket P/N GM 12680216.

STEP 68: Remove any rags or covers placed in the intake manifolds. Ensure that the intakes are free of debris or foreign material.

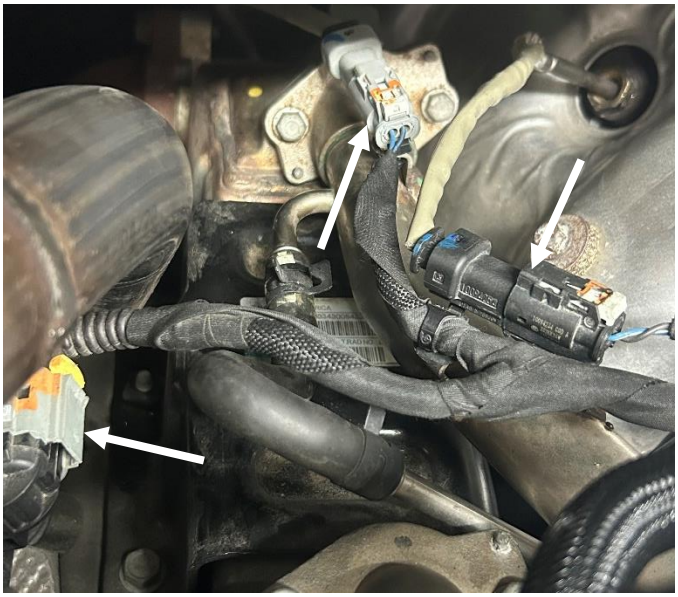
STEP 69: Carefully place the intake bridge onto the intake manifolds. Using a 10mm socket or wrench, torque the eight bolts to 89 in-lb.

STEP 70: Reposition the electrical harness to its original location. Connect all fir tree mounts and replace any zip ties removed during disassembly.

STEP 71: Install the coolant pipe onto the intake bridge. Using a 10mm socket or wrench, torque the two bolts to 89 in-lb. Connect the coolant hose to the end of the hose and fasten the hose clamp.

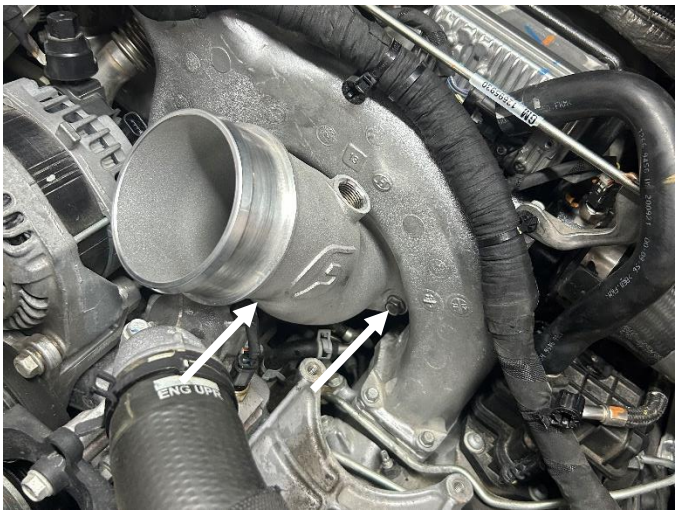
STEP 72: Connect the charge air temperature sensor and the turbocharger actuator connectors.

STEP 73: Connect the SCR temperature sensor, post-SCR temperature sensor, and the EGR mixing valve connectors.



STEP 74: Connect the two harness connectors on the top of the intake bridge. Connect the MAP sensor.

STEP 75: Install the intake horn onto the turbocharger compressor inlet. Using a 13mm socket or wrench, torque the two bolts to 18 ft-lb.

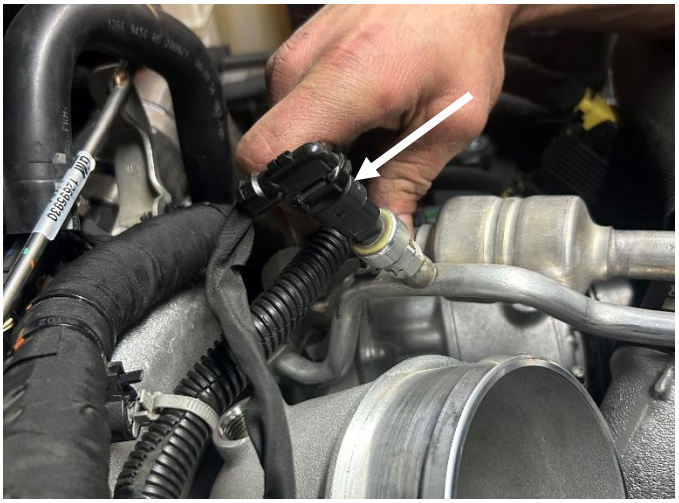


STEP 76: Place the A/C compressor back onto its base and install the four mounting bolts. Using a 15mm socket or wrench, torque the four bolts to 43 ft-lbs.

STEP 77: Connect the two harness connectors on the A/C compressor.

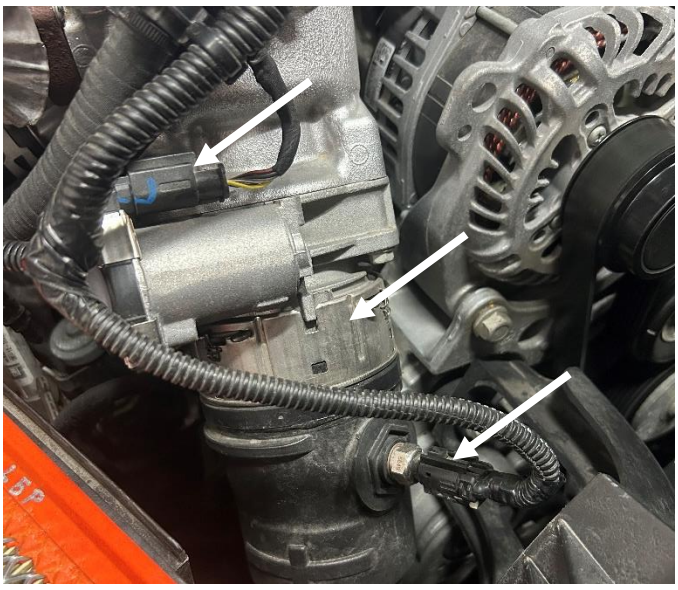
STEP 78: Install the accessory drive belt onto the A/C compressor and re-tension the belt.

STEP 79: Connect the A/C pressure switch.

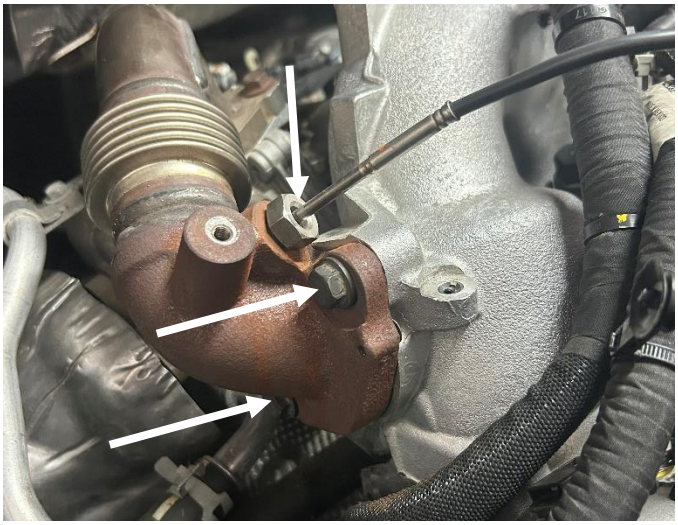


STEP 80: Connect the alternator harness connector.

STEP 81: Connect the charge air cooler outlet pipe to the throttle body. Connect the throttle valve connector and the charge air cooler outlet temperature sensor.



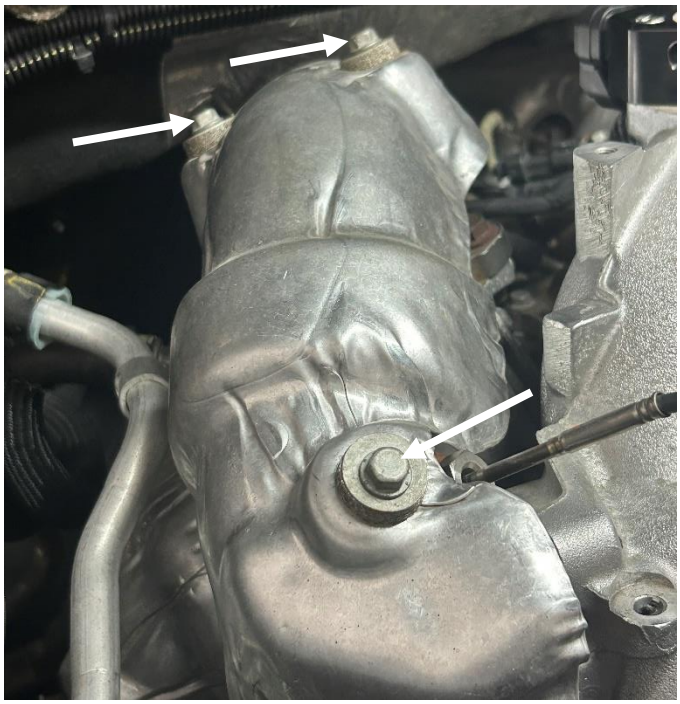
STEP 82: Connect the EGR feed pipe to the intake bridge. Using a 13mm socket or wrench, torque the two bolts to 27 ft-lb.



STEP 83: Install the EGR temperature sensor. Using a 17mm wrench or flare nut socket, torque the sensor to 33 ft-lb.

STEP 84: Connect the EGR temperature sensor.

STEP 85: Install the EGR feed pipe heat shield. Using a 10mm socket or wrench, torque the three bolts to 80 in-lb.



STEP 86: Install the A/C bulkhead bracket onto the A/C compressor. Using a 13mm socket or wrench, torque the two nuts to 16 ft-lb.

STEP 87: Boost leak test the charge air system. Fleece Performance recommends pressurizing the charge air system to ensure that zero boost leaks are present. Follow the steps below to test your system.

a. Install a plug in the CCV port on the intake horn.
b. Install a boot onto the end of the intake horn. Connect your endcap to the boot and tighten any clamps.
c. Pressurize the charge air system to between 15 and 20 psi. Check for leaks.
d. If leaks are present, repair the affected part and restart the boost leak test.
e. If no leaks are found, remove the endcap, boot, and CCV plug.
f. Proceed to step 88.

STEP 88: Install the CCV hose onto the intake horn fitting as shown at right.

STEP 89: Install the intake system. Connect the intake tube boot to the intake horn and install the nut retaining the resonator box. Using a 13mm socket or wrench, torque the mounting nut to 16 ft-lb. Tighten the hose clamps.

Connect the air filter box and middle intake tube to the boot installed onto the intake horn. Tighten any hose clamps. Install the screws retaining the upper air filter housing.

STEP 90: Connect the mass airflow sensor.

STEP 91: Locate the two catalyst mounting bolts on the rear passenger side of the block. Using a 13mm socket, torque the two bolts to 18 ft-lb.

STEP 92: Connect the lower radiator hose to the radiator and fasten the hose clamp.

STEP 93: Install the fender liner. Using a T15 Torx socket, install the 18 screws retaining the fender liner. Install the one plastic pop rivet.

STEP 94: Refill the coolant to factory specifications using clean coolant.

STEP 95: Connect the battery terminals.

STEP 96: Start the vehicle. Inspect for leaks. Add coolant as necessary.

Fastener Torque Specification Table

Fastener Description	Torque Spec	Fastener Size	Step Number	Page Number
Turbocharger actuator mounting nuts	93 in-lb	10mm	45	15
Actuator lever screw and nut	119 in-lb	4mm allen	46	15
Turbocharger oil drain tube bolts (upper and lower)	89 in-lb	10mm	48,53	16,18
Turbocharger pedestal mounting bolts	43 ft-lb	15mm	51	17
Turbo to SCR v-band clamp nut	18 ft-lb	11mm	52	17
Turbocharger oil feed fitting bolts	89 in-lb	10mm	55	18
PCV to compressor cover fitting bolts	89 in-lb	10mm	56	18
SCR heat shield bolts (driver and passenger)	89 in-lb	10mm	57,59	19
NOx sensor	33 ft-lb	22mm	58	19
SCR temperature sensor	33 ft-lb	17mm	60	19
Charge air inlet temperature sensor	14 ft-lb	16mm	61	20
Charge air cooler inlet boot clamp nut	89 in-lb	11mm	62	20
EGR coolant return pipe bolts	89 in-lb	10mm	64	21
Intake bridge bolts	89 in-lb	10mm	69	22
Coolant pipe mounting bolts	89 in-lb	10mm	71	22
Intake horn mounting bolts	18 ft-lb	13mm	75	24
A/C compressor mounting bolts	43 ft-lb	15mm	76	24
EGR feed pipe bolts	27 ft-lb	13mm	82	26
EGR temperature sensor	33 ft-lb	17mm	83	26
EGR feed pipe heat shield bolts	80 in-lb	10mm	85	26
A/C bulkhead bracket nuts	16 ft-lb	13mm	86	27
CCV Fitting onto intake horn	18 ft-lb	26mm	88	28
Resonator box mounting nut	16 ft-lb	13mm	89	28
Catalyst lower mounting bolts	18 ft-lb	13mm	91	29