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Title: Medium Duty (I6) High Pressure Turbo Center Section Replacement Procedure

Applies To: 2010 (EPA 10 Emissions) MaxxForce® DT, 9, 10 Engines

CHANGE LOG

2014/12/02- Added Link to Low-Pressure Turbocharger Center Section Procedure.
2014/09/09 - Revised formatting, added steps for oil supply tube replacement, and new link to CAC cleaning.
2014/06/17 - Added training video inforamtion.
2014/04/28 - Added turbo center section part number. Removed steps for separating a new turbo.
2014/02/17 - Added step and SPTs for cleaning HPCAC if oil contaminated

QUICK LINKS

DESCRIPTION

For most repairs it is unnecessary and time consuming to replace an entire turbocharger assembly. Therefore, a procedure—outlined in this document—was developed to replace the center section of the High-Pressure (HP) Turbocharger, in chassis. The procedure applies to all 2010 and newer Medium Duty I6 engines (MaxxForce® DT, 9, 10) including the 2013 OBD and outlines the tools, parts, and important notes, necessary for successful repair.

Return to top

SPECIAL TOOLS

Tool Description	Tool Number	Comments	Instructions
ISC Outlet Seal Removal Tool	ZTSE4937	Kit	In Procedure Below
CAC Cleaning Adapter Kit	09-925-01	ONLY if necessary	Link

Return to top

SERVICE PARTS INFORMATION

Kit Description	Part Number	Qty	Notes
Kit, HP Turbo Cartridge	2512354C91	1	Required
Seal, LP Turbo	1881990C1	1	Only if necessary, Standard Torque
Tube Assembly, Turbo Oil Supply	1885590C92	1	Required, Never reuse oil supply tubes
Kit, Turbo Oil Line Seals	1889328C93	1	Required

Return to top

DIAGNOSTIC STEPS

All diagnostics should be completed through the diagnostics manual or performance diagnostic sheet.

Return to top

PROCEDURE OVERVIEW

GOVERNMENT REGULATION: Engine fluids (oil, fuel, and coolant) may be a hazard to human health and the environment. Handle all fluids and other contaminated materials (e.g. filters, rags) in accordance with applicable regulations. Recycle or dispose of engine fluids, filters, and other contaminated materials according to applicable regulations.

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

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

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

Return to top

REPAIR-REMOVAL PROCEDURE

If replacing LP Center Section the Removal Procedure from this document must be completed first, then follow the link to the LP Center Section Procedure.

1. Bring truck into shop and park on flat surface with wheels turned fully to the right.
2. Shift transmission to Park or Neutral, set parking brake, and install wheel chocks.
3. Unlatch and open hood.
4. Open battery box and disconnect negative battery cable.

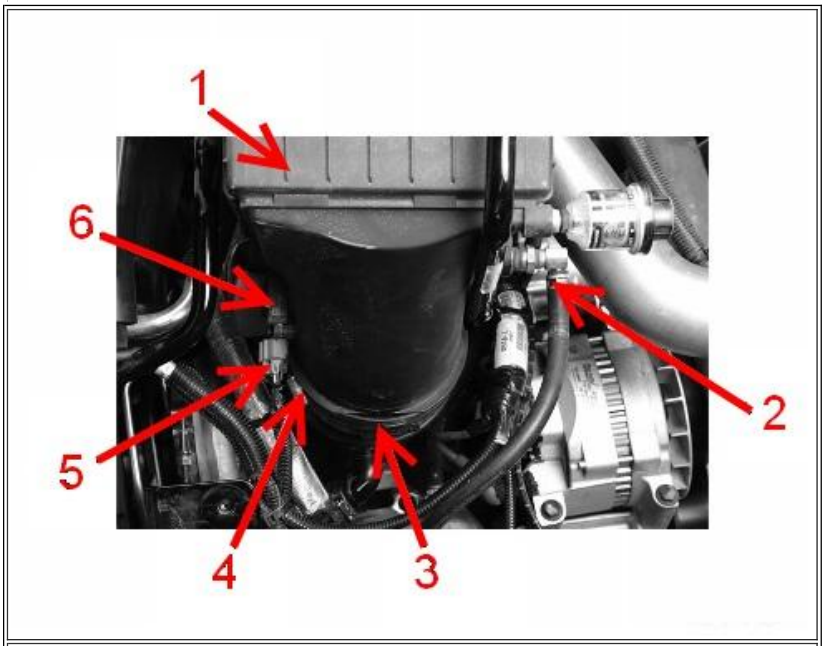

Figure 1: MAF Sensor and Air Compressor Inlet Hose.

Item 1: Air box
Item 2: Air compressor inlet hose
Item 3: LP turbocharger inlet elbow duct
Item 4: LP turbocharger inlet elbow duct clamp
Item 5: MAF sensor connector
Item 6: MAF sensor

5. Disconnect MAF sensor connector (**Figure 1**, Item 5) from MAF sensor (**Figure 1**, Item 6).
6. Disconnect air compressor inlet hose (**Figure 1**, Item 2) from air box (**Figure 1**, Item 1).
7. Loosen air box to LP turbocharger inlet elbow duct clamp (**Figure 1**, Item 4) and remove LP turbocharger inlet elbow duct (**Figure 1**, Item 3).
8. Remove bolt, two nuts, and air box with bracket from vehicle.

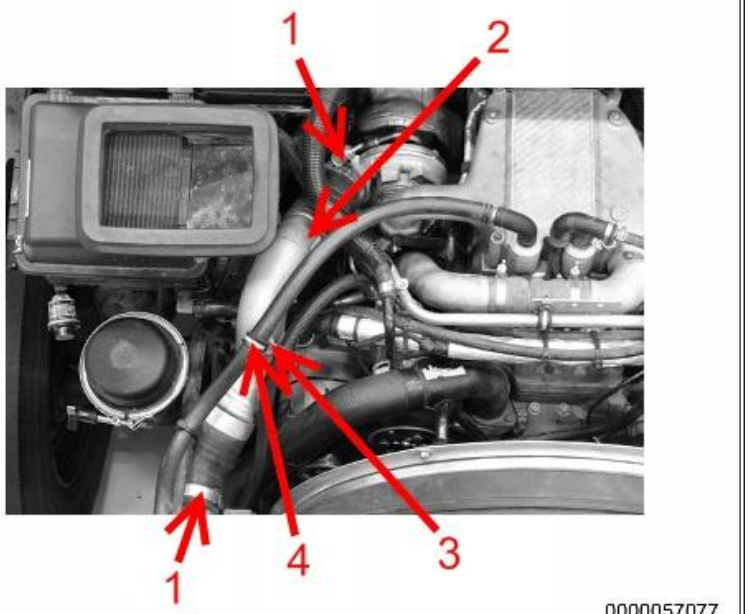

Figure 2: High Pressure Charge Air Cooler Duct

Item 1: Clamp
Item 2: HPCAC duct
Item 3. Bolt
Item 4. P-clamp

9. Remove bolt (**Figure 2**, Item 3) from P-clamp (**Figure 2**, Item 4) on HPCAC duct (**Figure 2**, Item 2).

10. Loosen two clamps (**Figure 2**, Item 1) and remove HPCAC duct (**Figure 2**, Item 2).

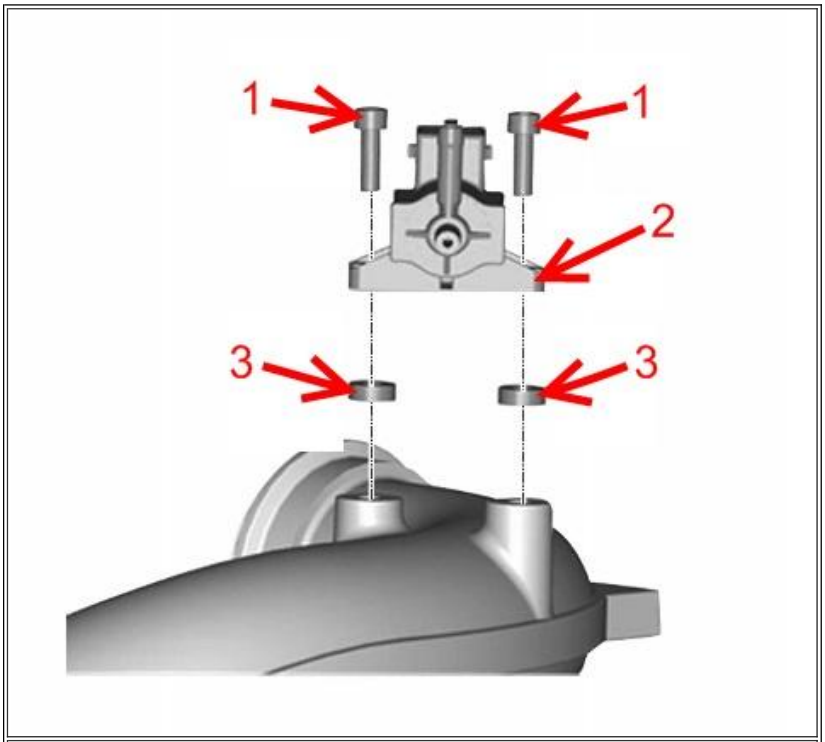

Figure 3: Turbocharger 2 Wastegate Control (TC2WC) Valve

Item 1: Bolt (2)
Item 2: TC2WC
Item 3: Insulator (2)

Perform Steps 11 and 12 only if the engine is NOT equipped with an Interstage Cooler (ISC).

11. Remove two bolts (**Figure 3**, Item 1) and insulators (**Figure 3**, Item 3) from TC2WC valve (**Figure 3**, Item 2) and position for access to High Pressure (HP) turbocharger.

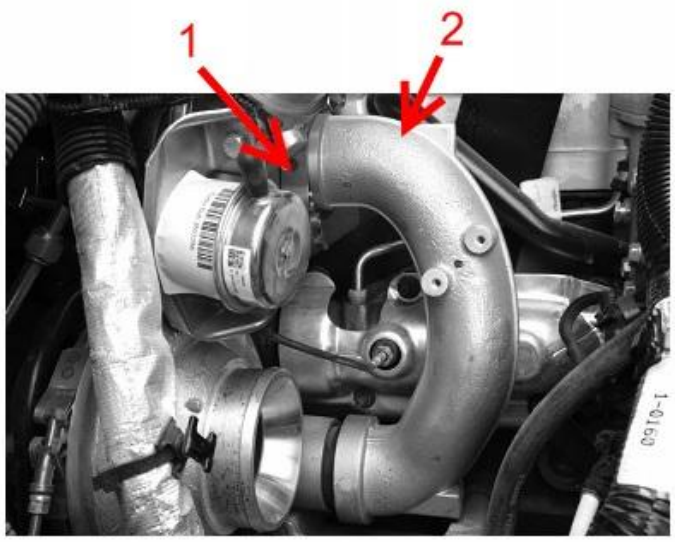

Figure 4: Turbo Crossover Tube

Item 1: V-band clamp
Item 2: Crossover tube

12. Remove V-band clamp (**Figure 4**, Item 1) and crossover tube (**Figure 4**, Item 2).

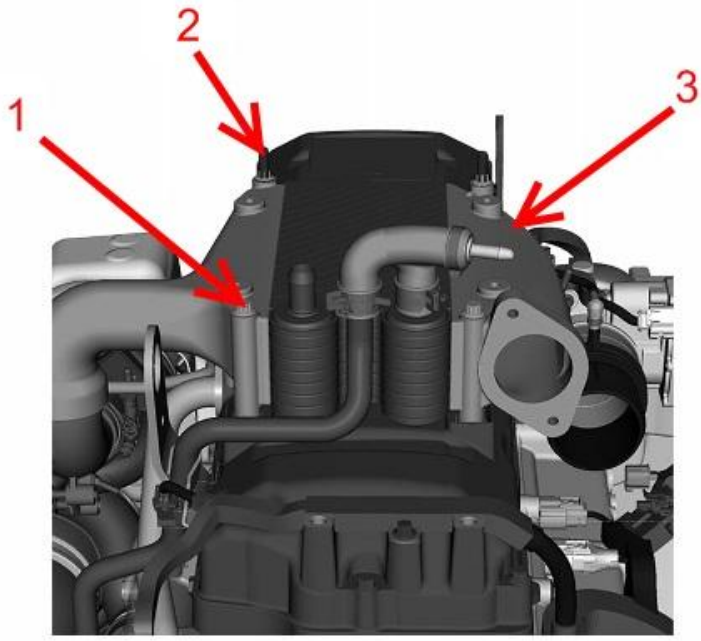

Figure 5: Interstage Cooler (ISC)

Item 1: M8 x 110 bolt
Item 2: M8 x 110 stud bolt
Item 3: Interstage cooler (ISC)

Perform Steps 13 through 19 of removal procedure only if equipped with an Interstage Cooler (ISC).

13. Remove two bolts (**Figure 5**, Item 1) and stud bolts (**Figure 5**, Item 2) from Interstage Cooler (ISC) (**Figure 5**, Item 3).

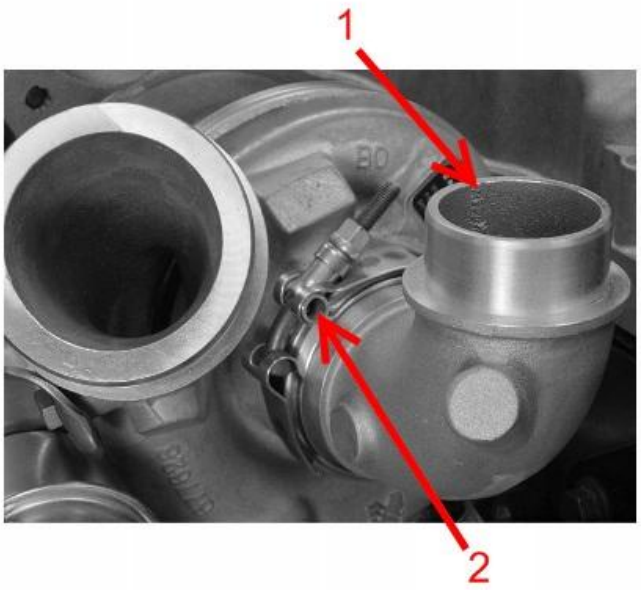

Figure 6: Turbocharger Inlet Elbow

Item 1: Turbocharger inlet elbow
Item 2: V-band clamp

14. Remove V-band clamp (**Figure 6**, Item 2) from turbocharger inlet elbow (**Figure 6**, Item 1).

15. Raise ISC from valve cover and remove turbocharger inlet elbow.

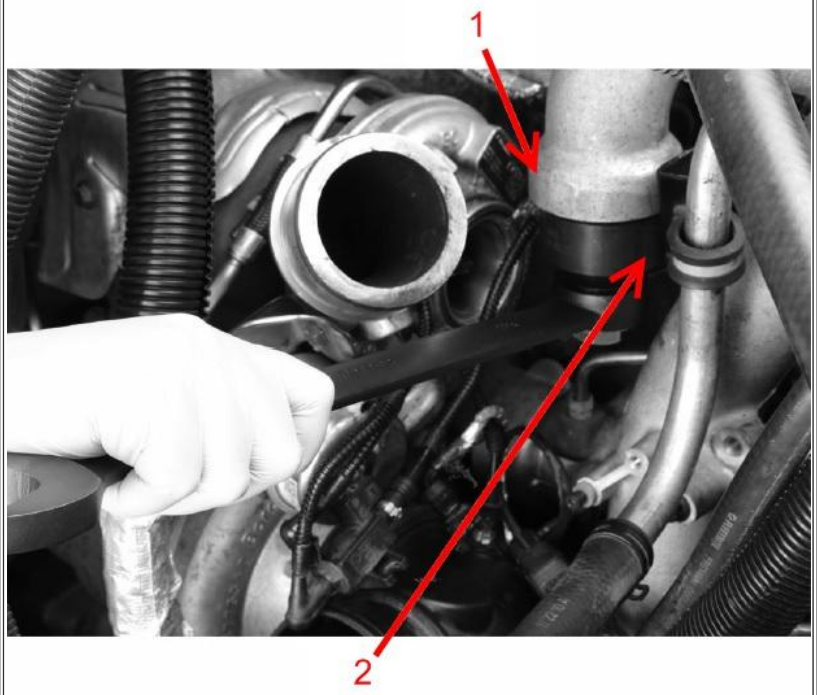

Figure 7: ISC Seal Removal

Item 1: ISC Outlet Seal
Item 2: ZTSE4937-2 Seal Remover

16. Install ZTSE4937-2 seal remover (**Figure 7**, Item 2) into ISC Outlet Seal (**Figure 7**, Item 1).

17. Using a 1-1/4 inch combination wrench, thread ISC seal remover into outlet until it tightly grips crossover tube lip seal.

18. Using provided bolt and washer, secure box end of 1-1/4 inch box end wrench to seal remover.

19. Using up-and-down prying motion, remove seal from ISC outlet.

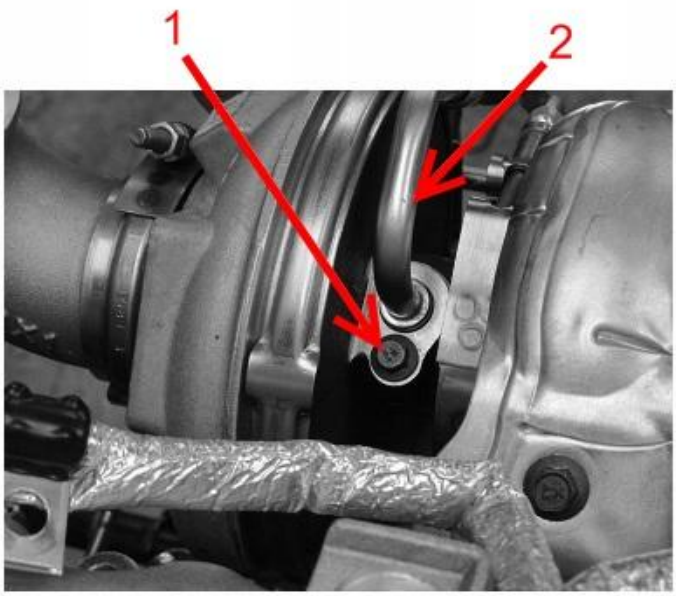

Figure 8: HP Turbocharger Oil Supply Tube

Item 1: M6 x 16 bolt
Item 2: Oil supply tube assembly

20. Remove bolt (**Figure 8**, Item 1) from oil supply tube (**Figure 8**, Item 2). Discard bolt.

21. Apply rust penetrating oil to oil supply tube (**Figure 8**, Item 2) and disconnect from HP turbocharger.

22. Remove and discard oil supply tube O-ring.

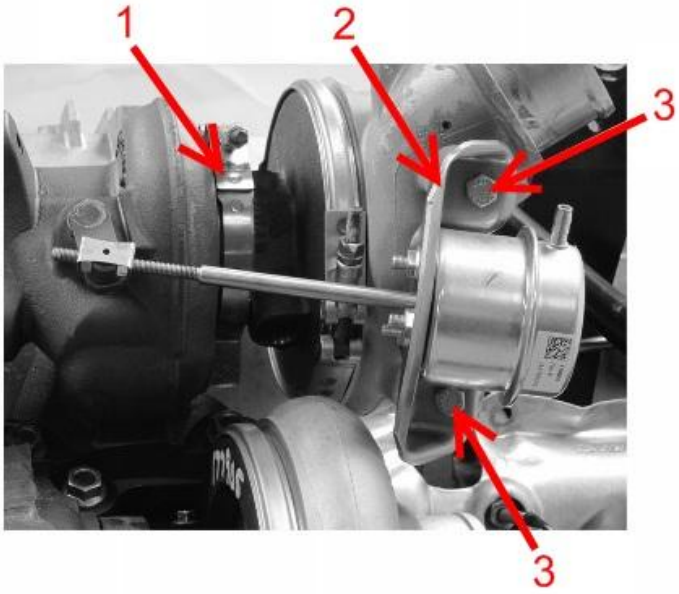

Figure 9: Turbo Wastegate Actuator

Item 1: Turbine v-band clamp
Item 2: Wastegate actuator
Item 3: M8 x 16 bolt

CAUTION
Be sure not to bend or damage the wastegate actuator rod and ensure it is positioned such that adjustment is not compromised. Failure to do so may result in damage to equipment.

23. Remove two bolts (**Figure 9,** Item 3) and position wastegate actuator (**Figure 9**, Item 2) for access to HP turbocharger.

24. Remove turbine V-band clamp (**Figure 9**, Item 1) from HP turbocharger.

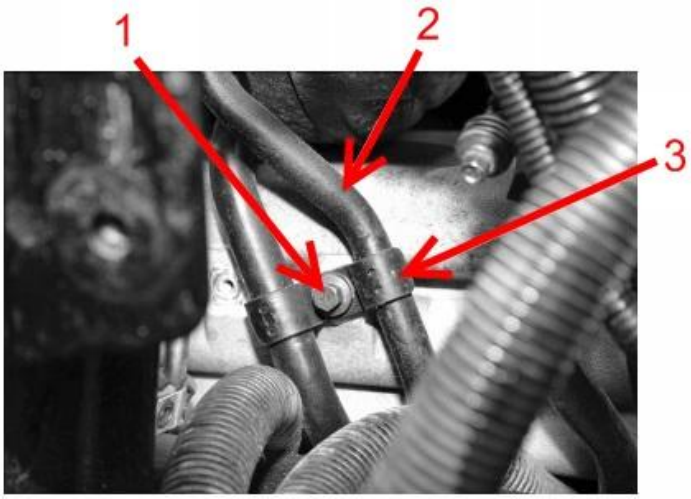

Figure 10: Turbo Oil Drain Tube

Item 1: Bolt
Item 2: Oil drain tube
Item 3: P-clamp

25. Remove bolt (**Figure 10**, Item 1) from P-clamp (**Figure 10**, Item 3) on oil drain tube (**Figure 10**, Item 2).

26. Using a rubber mallet, tap HP turbocharger center section until loose and remove from turbine housing and oil drain tube.

27. Using a clean emery cloth, clean turbine housing and mating surfaces.

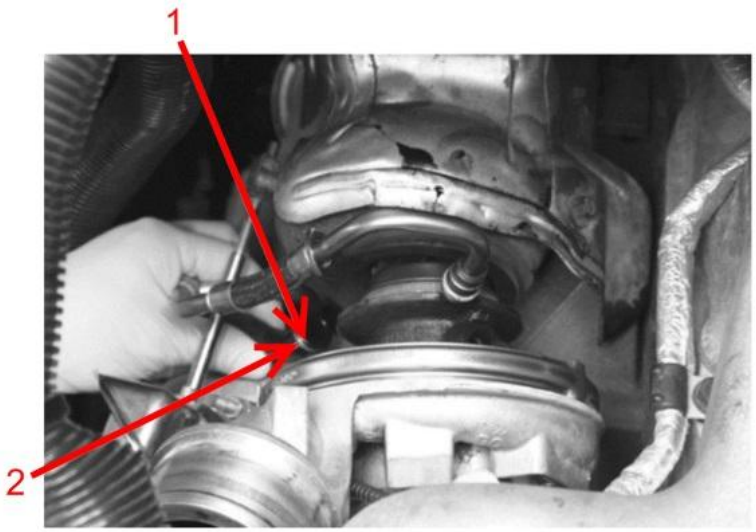

Figure 11: Turbo Oil Drain Tube O-ring

Item 1: O-ring
Item 2: HP Turbocharger Oil drain tube

28. Remove HP turbocharger oil drain O-ring (**Figure 11**, Item 1). Discard O-ring.

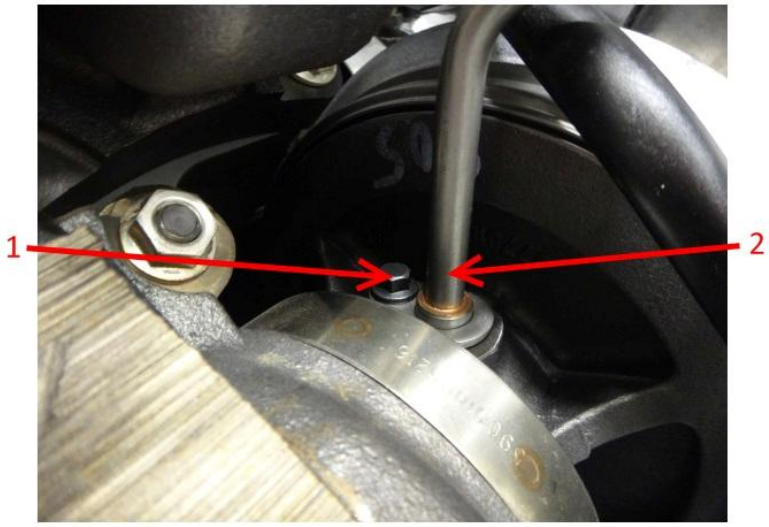

Figure 12: Oil Supply Tube to Low Pressure Turbocharger

Item 1: M6 X 16 Bolt
Item 2: Oil supply tube to Low Pressure Turbocharger

29. Remove bolt (**Figure 12**, Item 1) from oil supply tube (**Figure 12**, Item 2), and discard bolt.

30. Disconnect oil supply tube from LP turbocharger.

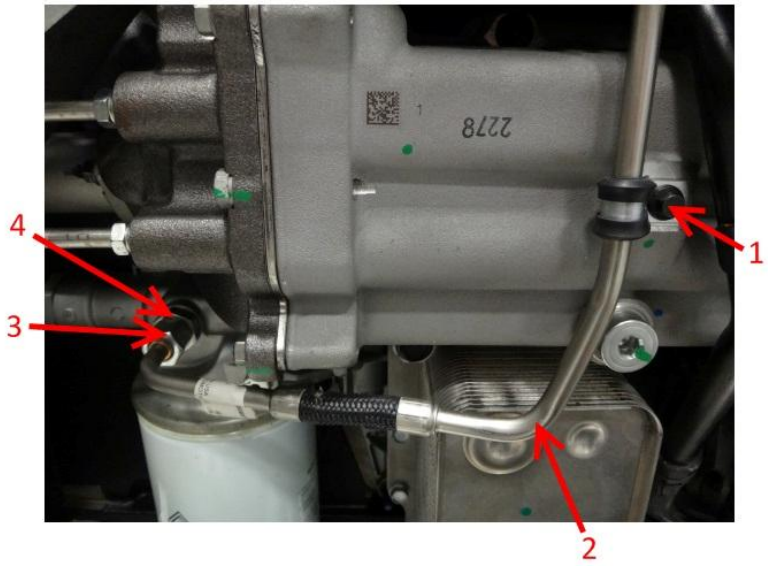

Figure 13: Oil Supply Tube at Oil Cooler Housing

Item 1: M6 X 12 Bolt
Item 2: Oil Supply Tube Assembly
Item 3: Turbocharger Oil Supply Tube Nut
Item 4: Fitting and O-ring (with screen)

31. Remove M6 X 12 bolt (**Figure 13**, Item 1) securing turbocharger oil supply tube retainer from EGR cooler.

32. Remove turbocharger oil supply tube nut (**Figure 13**, Item 3) from fitting and o-ring (**Figure 13**, Item 4) on the oil cooler housing and discard oil supply tube.

33. Remove o-ring from fitting (**Figure 13**, Item 4) and discard.

If replacing LP Center Section proceed to IK1201238 Removal Section, Step 1.

Return to top

REPAIR-INSTALLATION PROCEDURE

If replacing LP Center Section perform the installation steps in IK1201238 before continuing.

1. If HPCAC is internally contaminated with oil, refer to IK1201175 for the cleaning procedure.
2. Install new O-ring (**Figure 11**, Item 1) onto the oil drain tube (**Figure 11**, Item 2) and lubricate with P-80.

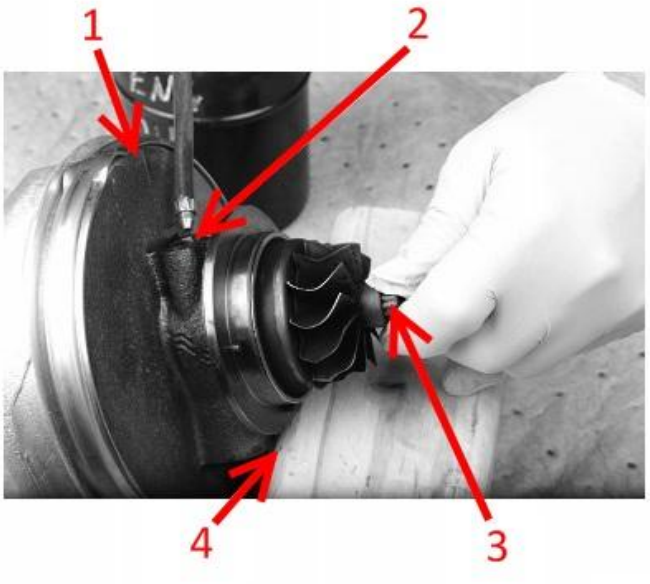

Figure 14: HP Turbocharger Center Section Priming

Item 1: HP turbocharger center section
Item 2: Oil supply port
Item 3: Turbine wheel nut
Item 4: Oil drain port

3. Using 15W-40 engine oil, prime the new HP turbo center section oil supply port (**Figure 14**, Item 2) while spinning the turbine wheel nut (**Figure 14**, Item 3) until oil begins exiting the oil drain port (**Figure 14**, Item 4).

WARNING
Make sure the oil drain tube is fully seated in the HP turbo when installing the turbo into the turbine housing. Failure to comply will result in personal injury or damage to equipment.

4. Install new HP turbo center section onto the HP oil drain tube while installing into the turbine housing.

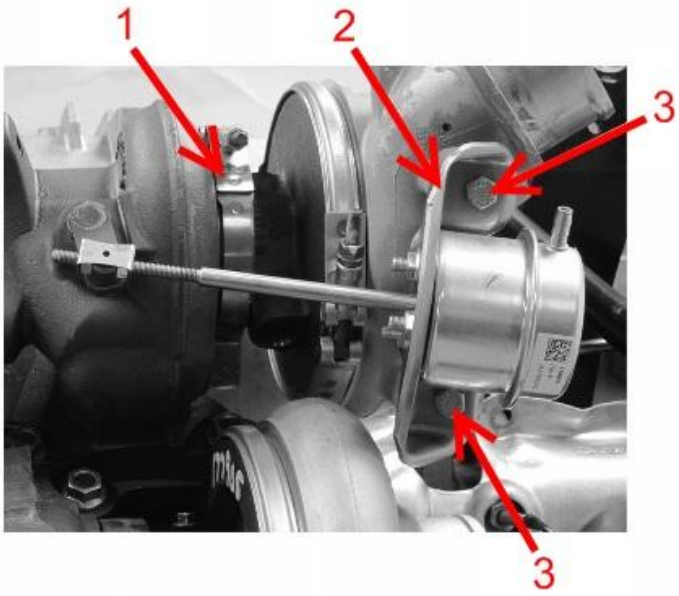

Figure 15: Turbo Wastegate Actuator

Item 1: Turbine v-band clamp
Item 2: Wastegate actuator
Item 3: M8 x 16 bolt (2)

5. Install turbine V-band clamp (**Figure 15**, Item 1) on HP turbocharger.

6. Using torque wrench, torque turbine V-band clamp (**Figure 15**, Item 1) to 13 lb-ft (17 N•m).

CAUTION
Be sure not to bend or damage the wastegate actuator rod and ensure it is positioned such that adjustment is not compromised. Failure to do so may result in damage to equipment.

7. Install wastegate actuator (**Figure 15**, Item 2) with two bolts (**Figure 15**, Item 3).

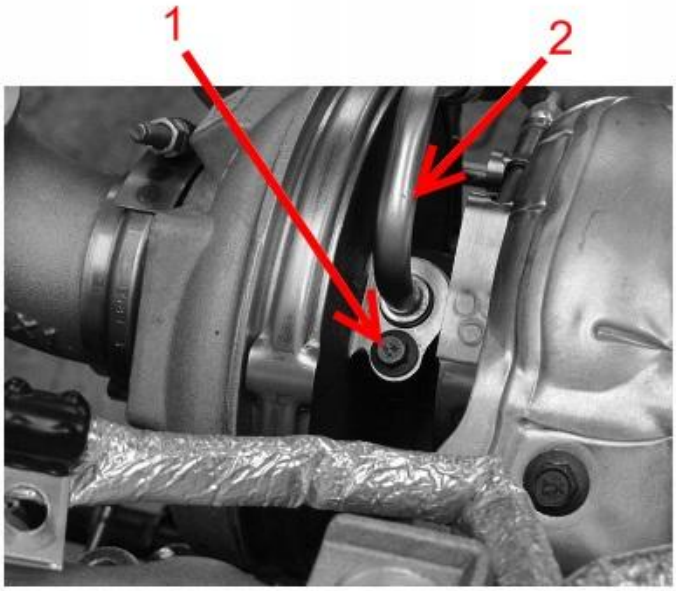

Figure 16: Turbo Oil Supply Tube

Item 1: M6 x 16 bolt
Item 2: Oil supply tube assembly

8. Connect oil supply tube (**Figure 16**, Item 2) to HP turbocharger.
9. Install oil supply tube (**Figure 16**, Item 2) and secure with new M6 X 16 bolt (**Figure 16**, Item 1).
10. Torque M6 X 16 bolt to 110 in-lbs.

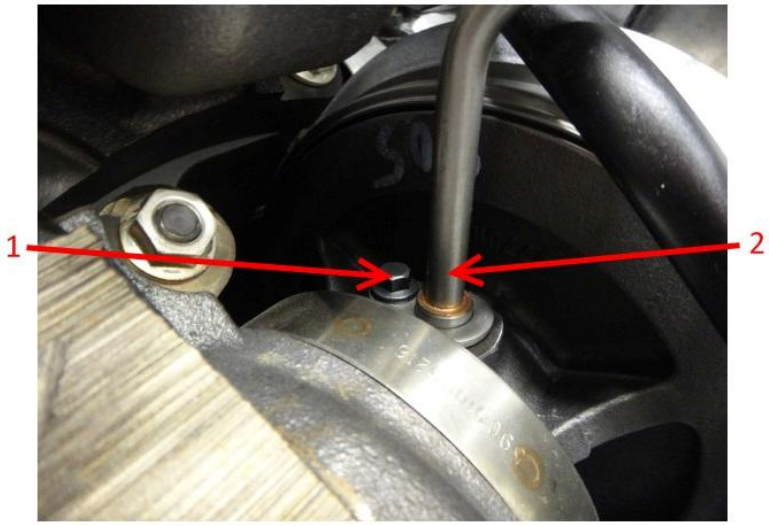

Figure 17: Oil Supply Tube to Low Pressure Turbocharger

Item 1: M6 X 16 Bolt
Item 2: Oil supply tube to Low Pressure Turbocharger

11. Connect oil supply tube (**Figure 17**, Item 2) to LP turbocharger, secure with new M6 X 16 bolt (**Figure 17**, Item 1).

12. Torque M6 X 16 bolt to 110 in-lbs.

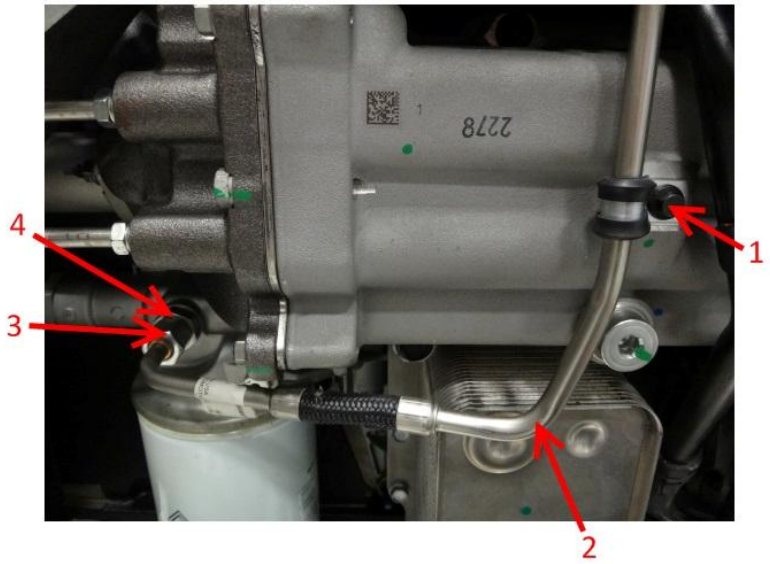

Figure 18: Oil Supply Tube at Oil Cooler Housing

Item 1: M6 X 12 Bolt
Item 2: Oil Supply Tube Assembly
Item 3: Turbocharger Oil Supply Tube Nut
Item 4: Fitting and O-ring (with screen)

13. Install new o-ring onto fitting (**Figure 18**, Item 4).

14. Connect turbocharger oil supply tube nut (**Figure 18,** Item 3) to fitting and o-ring (**Figure 18**, Item 4) (with screen) on the oil cooler housing.

15. Torque turbocharger oil supply tube nut (**Figure 18**, Item 3) to 18 lb-ft.

16. Install M6 X 12 bolt securing turbocharger oil supply tube assembly retainer to EGR cooler. Torque M6 X 12 bolt (**Figure 18**, Item 1) to 110 in-lbs.

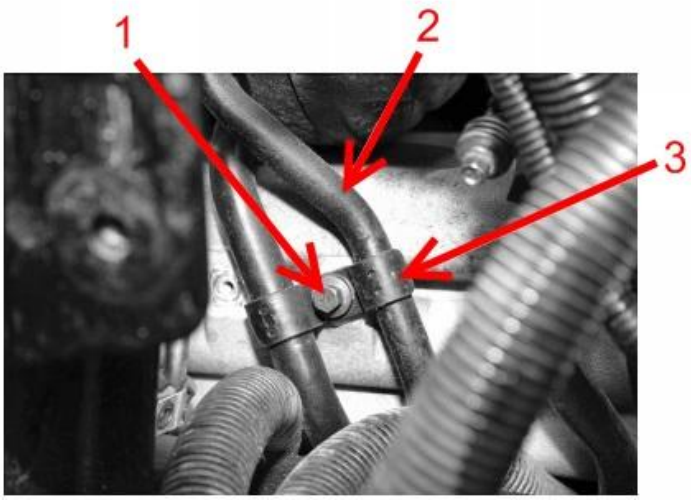

Figure 19: Turbo Oil Drain Tube

Item 1: Bolt
Item 2: Oil drain tube
Item 3: P-clamp

17. Install bolt (**Figure 19**, Item 1) in P-clamp (**Figure 19,** Item 3) on oil drain tube (**Figure 19**, Item 2).

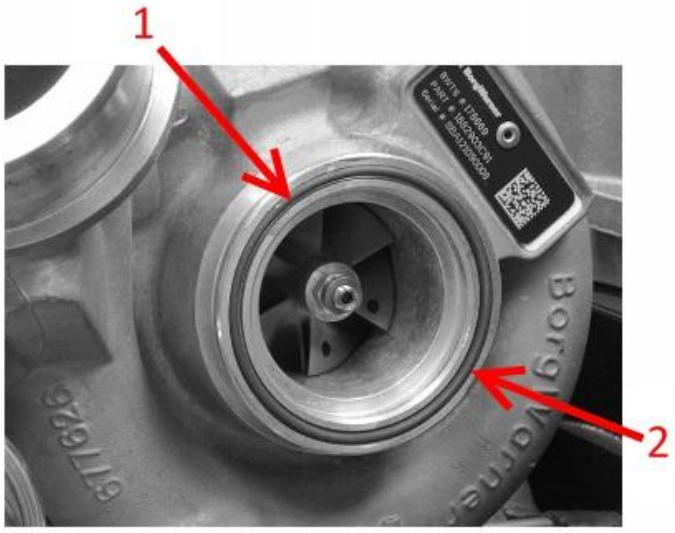

Figure 20: HP Turbocharger O-Ring

Item 1: 2.62 X 61.6 ID o-ring
Item 2: HP turbocharger

18. Install new O-ring (**Figure 20**, Item 1) into groove on HP turbocharger (**Figure 20**, Item 2).

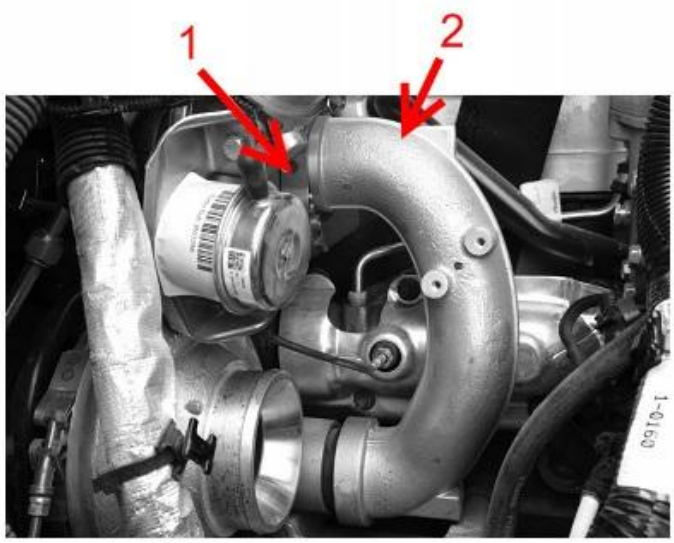

Figure 21: Turbo Crossover Tube

Item 1: V-band clamp
Item 2: Crossover tube

Follow steps 19 through 21 for non-ISC engines only.

19. Inspect crossover tube (**Figure 21**, Item 2) seal for damage. If damaged, discard seal.

20. Apply P-80 or equivalent to outside of crossover tube seal and inside of interstage inlet duct. Push crossover tube onto crossover tube seal until it pops into place.

21. Install crossover tube (**Figure 21**, Item 2) on to HP turbocharger with V-band clamp (**Figure 21**, Item 1).

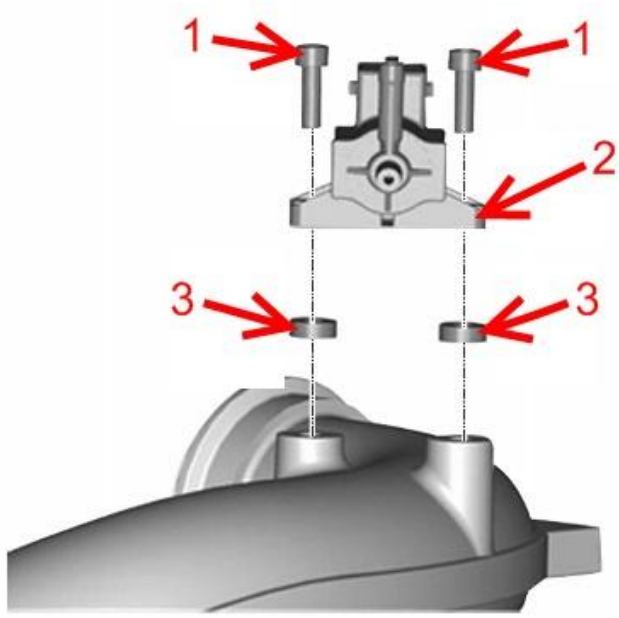

Figure 22: Turbocharger 2 Wastegate Control (TC2WC) Valve

Item 1: Bolt (2)
Item 2: TC2WC valve
Item 3: Insulator (2)

22. Install TC2WC valve (**Figure 22**, Item 2) onto crossover tube with two insulators (**Figure 22**, Item 3) and bolts (**Figure 22**, Item 1).

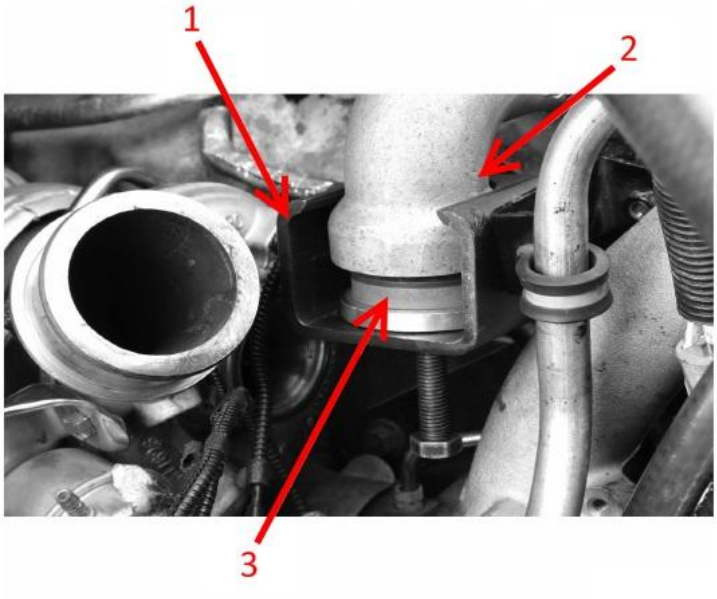

Figure 23: ISC Outlet Seal Installation

Item 1: ZTSE4937-4 Press (3/4 inch Wrench is required to operate press)
Item 2: ISC Outlet
Item 3: ISC Outlet Lip Seal

23. Apply P-80 to new ISC outlet lip seal.

24. Position ZTSE4937-1A seal installer into ZTSE4937-4 (**Figure 23**, Item 1) press with new outlet lip seal (**Figure 23**, Item 3).

NOTE
Make sure the seal is properly aligned with the ISC outlet.

25. Tighten forcing screw until seal installer is flush with the bottom of the outlet (**Figure 23**, Item 2).

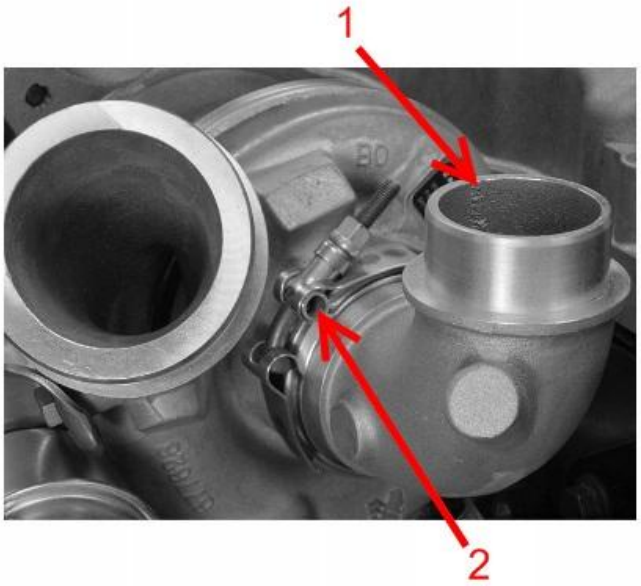

Figure 24: Turbocharger Inlet Elbow

Item 1: Turbocharger inlet elbow
Item 2: V-band clamp

Follow steps 26 through 29 for only ISC equipped engines.

26. Position turbocharger inlet elbow (**Figure 24**, Item 1) onto HP turbocharger with V-band clamp (**Figure 24**, Item 2) hand tight.

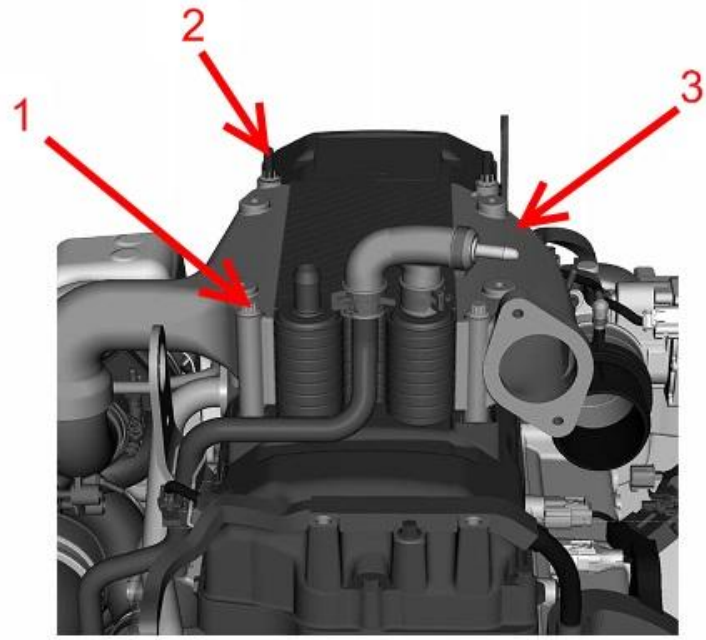

Figure 25: Interstage Cooler (ISC)

Item 1: M8 x 110 bolt (2)
Item 2: M8 x 110 stud bolt (2)
Item 3: Interstage cooler (ISC)

27. Install ISC (**Figure 25**, Item 3) onto turbocharger inlet elbow and valve cover with two bolts (**Figure 25**, Item 1) and two stud bolts (**Figure 25**, Item 2).

28. Using torque wrench, torque bolts and stud bolts to 23 lb-ft (31 N•m).

29. Using torque wrench, torque V-band clamp to 13 lb-ft (17 N•m).

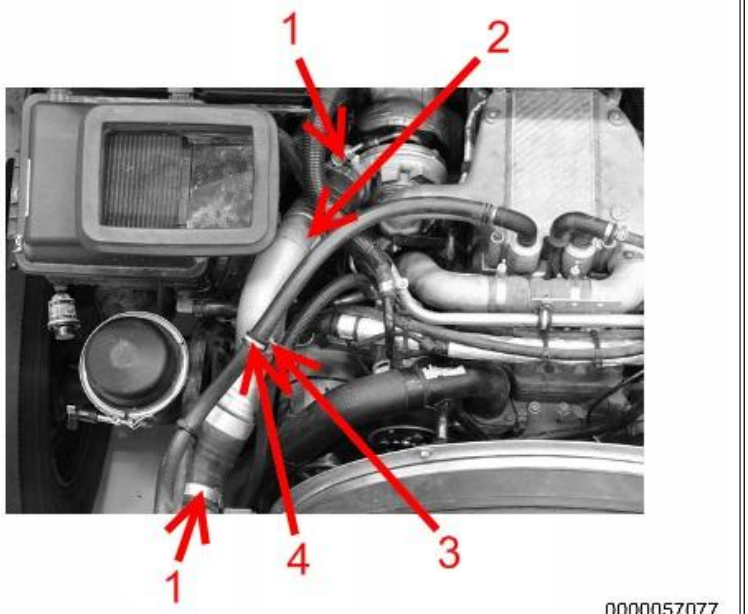

Figure 26: HPCAC Duct

Item 1: Clamp (2)
Item 2: HPCAC duct
Item 3: Bolt
Item 4: P-clamp

30. Install HPCAC duct (**Figure 26**, Item 2) with two clamps (**Figure 26,** Item 1) .

31. Install bolt (**Figure 26**, Item 3) in P-clamp (**Figure 26**, Item 4) on HPCAC duct (**Figure 26**, Item 2).

32. Install air box and bracket with nut and two bolts.

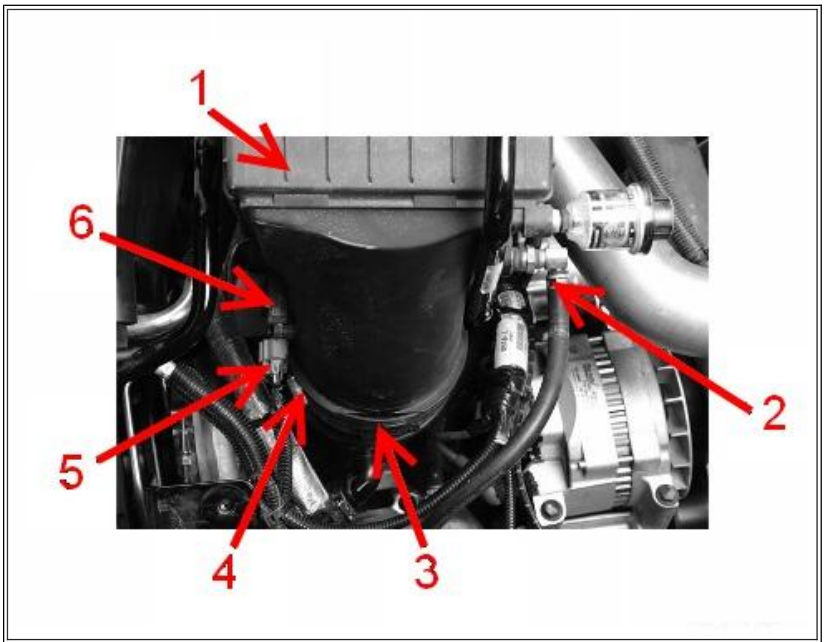

Figure 27: MAF Sensor and Air Compressor Inlet Hose

Item 1: Air box
Item 2: Air compressor inlet hose
Item 3: LP turbocharger inlet elbow duct
Item 4: LP turbocharger inlet elbow duct clamp
Item 5: MAF sensor connector
Item 6: MAF sensor

33. Install air box outlet into LP turbocharger inlet elbow duct (**Figure 27**, Item 3) and torque clamp (**Figure 27**, Item 4).

34. Connect air compressor inlet hose (**Figure 27,** Item 2) to air box (**Figure 27**, Item 1).

35. Connect MAF sensor connector (**Figure 27**, Item 5) to MAF sensor (**Figure 27,** Item 6).

36. Install right side inner fender with four washers and bolts.

37. Connect negative battery cable and close battery box.

38. Run engine to verify proper operation, no leaks, and no fault codes.

39. Close and latch hood.

40. Remove wheel chocks.

41. Connect to truck with EZ-Tech and using ServiceMaxx recalibrate the Mass Air Flow (MAF) Sensor

Return to top

WARRANTY INFORMATION

Warranty Claim Coding:

Group:	12000 - Engine
Noun:	135 - Turbo, High Pressure or Single

Standard Repair Times:

High-PressureTurbo Center Section Replacement					
Step	**Repair**	**Model**	**Engine**	**SRT**	**Hours**
All	H.P. Turbo Center Section Replacement	CE / BE	Engines below 245hp	GY12-6135T-23	1.8
All	H.P. Turbo Center Section Replacement	CE / BE	Engines with 245hp and up	GY12-6135T-24	1.9
All	H.P. Turbo Center Section Replacement	4300 / 4400	Engines below 245hp	KL12-6135T-23	1.8
All	H.P. Turbo Center Section Replacement	4300 / 4400	Engines with 245hp and up	KL12-6135T-24	1.9
All	H.P. Turbo Center Section Replacement	7300 / 7400 / 7500	Engines below 245hp	M12-6135T-25	1.8
All	H.P. Turbo Center Section Replacement	7300 / 7400 / 7500	Engines with 245hp and up	M12-6135T-24	1.9
	CAC Cleaning	All	All	A09-3925A	1.1

SRT Manual

Return to top

OTHER RESOURCES

2010 MaxxForce DT/9/10 Resource Center (IK1200549)
2010 MaxxForce DT/9/10 Diagnostic Manual
2010 MaxxForce DT/9/10 Service Manual

Master Service Information Site
Tools Resource Center (TL2900008)

Return to top

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