

2013 ENGINE 2.8L Diesel - Service Information - C/V**Tradesman, Grand Caravan, Town & Country****DESCRIPTION****DESCRIPTION**

The 2.8L (2777cc) four-cylinder "common rail" direct injection engine is an in-line overhead valve design. The engine utilizes a cast iron cylinder block. The engine has a one piece aluminum cylinder head with four valves per cylinder and dual overhead camshafts. The 2.8L is turbocharged, intercooled and also equipped with a EGR cooler.

The identification stamp for the 2.8L is located on the right side of the engine block, below the turbocharger. The engine code label is located on the front timing cover and is the same as the engine I.D. and serial number. There is also a fuel system label on the front timing cover used for fuel system identification during Powertrain Control Module (PCM) programming.

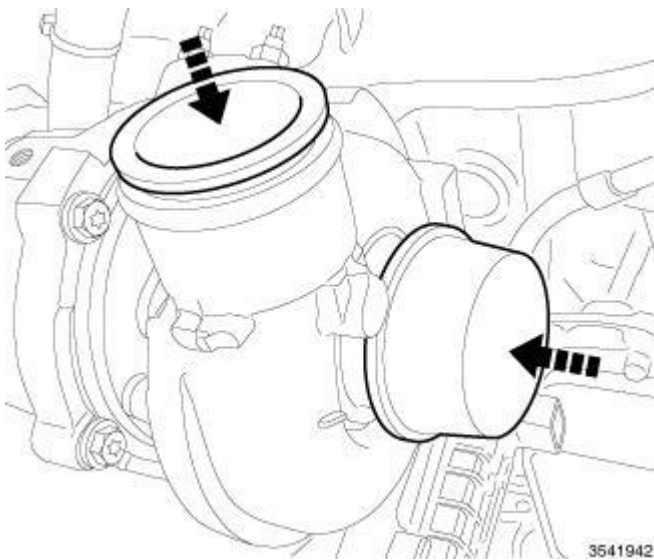
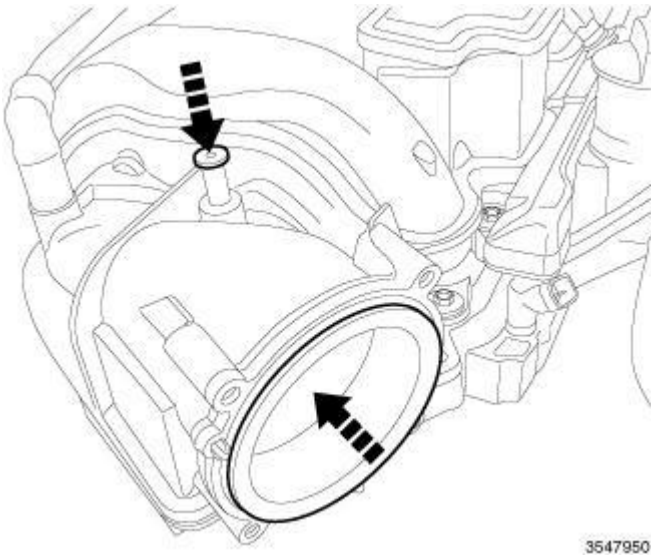
STANDARD PROCEDURE**DUST COVERS AND CAPS**

Fig. 1: Covers/Caps

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Due to the high amounts of failures caused by dust, dirt, moisture and other foreign debris being introduced to the engine during service. Covers or caps are needed to reduce the possible damage that can be caused or created.



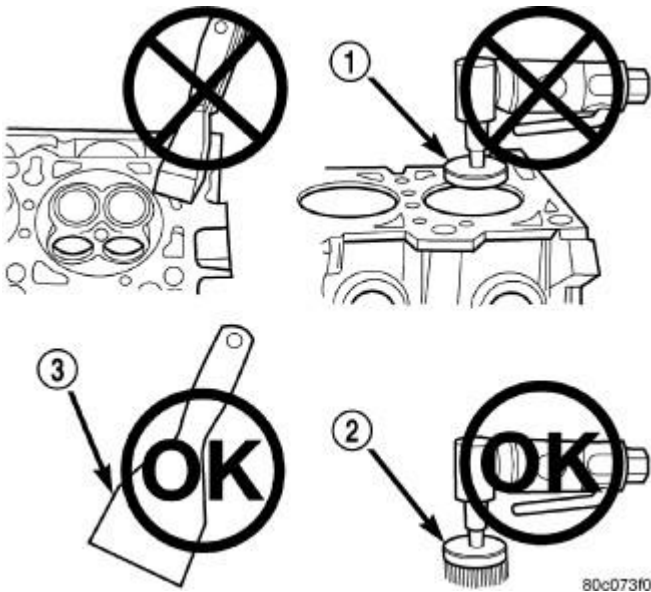
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Fig. 2: Opening Cover

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Covers over openings will reduce any possibilities for foreign materials to enter the engine systems. Using miller tool (special tool #10368, Set, Universal Protective Cap), Select the appropriated cover needed to the procedure.

ENGINE GASKET SURFACE PREPARATION



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Fig. 3: Proper Tool Usage For Surface Preparation

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- 1 - ABRASIVE PAD
- 2 - 3M ROLOC™ BRISTLE DISC
- 3 - PLASTIC SCRAPER

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad (1), or a wire brush

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- High speed power tool with an 3M Roloc™ Bristle Disc (2), Plastic scraper (3)
- Sealing surfaces must be free of grease or oil residue. Clean surfaces with Mopar® brake parts cleaner (or equivalent)

FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II

Mopar® Engine RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV

Mopar® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER

Mopar® Gasket Maker is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® GASKET SEALANT

Mopar® Gasket Sealant is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can with applicator.

MOPAR® THREEBOND ENGINE RTV SEALANT

MOPAR® THREEBOND ENGINE RTV SEALANT is a unique gasket material that is specially made to retain adhesion and sealing properties when used to seal components exposed to engine oil.

FORM-IN-PLACE GASKET AND SEALER APPLICATION

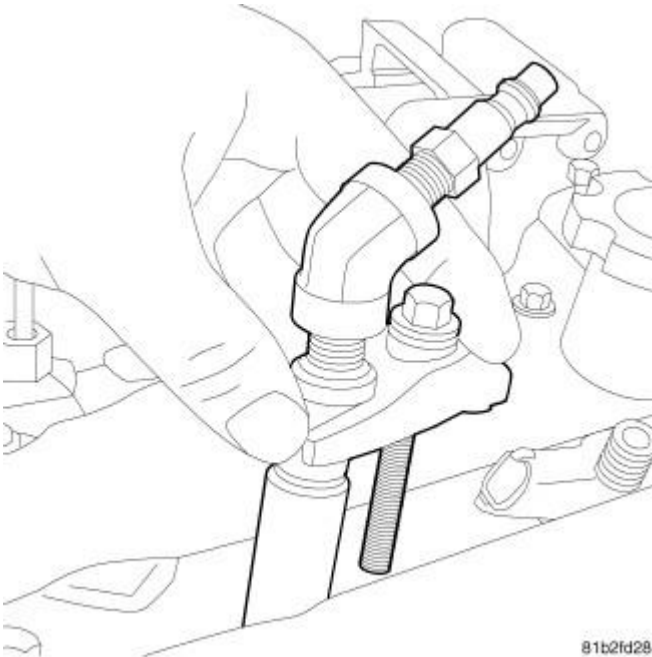
Assembling parts using a form-in-place gasket requires care but it's easier than using precut gaskets.

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can with applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

COMPRESSION TEST



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Fig. 4: Compression Tester

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1. Warm up the engine to operating temperature (approximately 80 degrees C).
2. Shut off the engine.
3. Disable the low pressure fuel pump.
4. Remove the fuel injectors. Refer to **INJECTOR(S), FUEL, REMOVAL** .
5. Cranks the engine with the starter to remove combustion residue in the cylinders.
6. Install the (special tool #VM.10010, Adapter, Compression Test) into the fuel injector bore of the cylinder to be tested. Install the fuel injector retainer, bolt and securely tighten.
7. Test compression pressure by cranking the engine with the starter for at least eight revolutions.

Cylinder compression Difference Between Cylinders	10 Bar (145 psi)
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8. Measure the pressure in all of the cylinders.
9. Remove the (special tool #VM.10010, Adapter, Compression Test).
10. Install the fuel injectors. Refer to **INJECTOR(S), FUEL, INSTALLATION** .

SPECIFICATIONS

ENGINE SPECIFICATIONS

2.8L Engine Specifications	
Engine	2.8L RT
Engine Type	2.8L - 16 Valves

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Displacement	2776 cc
Bore	94.00
Stroke	100.00
Power (VGT)	120 kW (163 CV) @ 3800 RPM
Torque (ATX)	360 N.m @ 1800 RPM ±2000 RPM
Cylinders	4 In line
Injection Order	1-3-4-2
Compression Ratio	16.5:1
Vacuum at idle	600 mm/HG (27.5 In/HG) @ 800 RPM
Idle Speed (ATX)	815 ± 100 RPM
Maximum RPM in Gear	4600 RPM ± 80 RPM
Maximum RPM in neutral	ATX 3000 ± 50 RPM
Belt tension	Automatic Belt Tensioner
Thermostat opening	90°C ± 2°C
Generator Rating	Denso 12V-220A
Glow Plug	4.4V
Emissions Level	EU5
Block configuration/Material	Open/Cast Iron
Cylinder Head	Dual Overhead Cam
Timing System	Belt
Fuel System	CP1H HP 1800 bar (26.106 psi) Fuel Pump, Piezo Injectors
Fuel Supply	Electric Fuel Pump In the Fuel Tank
Electronic Control Unit	EDC 17
Timing System	Belt Driven DOHC Overhead Camshaft
Air Intake	Dry Filter With turbocharger and Charge Air Cooler
Fuel System	Direct Fuel Injection Common Rail System
Emission devices	Cooled EGR (electric DC motor) Electric Intake Throttle Fast Metallic Glow plugs
Combustion Cycle	4 Stroke
Cylinder Compression Difference Between Cylinders	10 bar (145 psi)
Cooling System	Water Cooling
Pressure Cap Setting	14 psi
Turbocharger	Single VGT with REA
Intake Ports	Aluminum heads with traditional dual side intake and exhaust ports. One intake port is helical and the other has a directed entry.
Crankshaft	8 Counterweights with an incorporated balance shaft gear.
	2 overhead camshafts with axial front bearings

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Camshafts	and identical camshaft caps, finger followers, and hydraulic lifters.
Intake AND Exhaust Valves	Flat with fire deck face.
Intake Manifold	Plastic, with integrated swirl control flap and actuator
Lubrication	Pressure Lubricated By Rotary Pump
Minimum Oil Pressure (warm)	0.7 BAR (10 psi) at idle / 2.5 BAR (36 psi) at 3800 RPM
Engine Rotation	Clockwise Viewed From Front Cover
Engine Oil Capacity with Oil Filter	6.5 Liters (6.9 Quarts)

2.8L Engine Specifications**Cylinder Head**

Cylinder head height	135.5 mm (5.334 in.)
Cylinder head flatness deformation tolerance	0.075 mm (0.003 in.)

Cylinder Head Gasket Thickness

0 Hole	1.10 mm (0.043 in)
1 Hole	1.20 mm (0.047 in)
2 Holes	1.30 mm (0.051 in)

Intake Manifold

Intake manifold flatness deformation tolerance	0.15 mm (0.006 in.)
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Exhaust Manifold

Exhaust manifold flatness deformation tolerance	0.1 mm (0.004 in.)
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Tappets

Hydraulic tappet outside diameters	11.994 mm $\pm$ 0.06 mm (0.472 in $\pm$ 0.002)
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Valves

Intake valve face angle	45°30'
Exhaust valve face angle	45°30'
Intake Valve Head Diameter	32 mm (1.25 in.)
Exhaust Valve Head Diameter	29.4 mm (1.15 in.)
Intake Valve Stem Diameter	5.97 mm (0.235 in.)
Exhaust Valve Stem Diameter	5.96 mm (0.235 in.)

Intake Valve Guide Stem Clearance

Min	0.030 mm (0.0012 in.)
Max	0.060 mm (0.0024 in.)

Exhaust Valve Guide Stem Clearance

Min	0.040 mm (0.0016 in.)
Max	0.070 mm (0.0028 in.)

Valve Springs

Free Length	50.8 mm (2 in.)
Closed Valve	38 mm (1.49 in.)

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Opened Valve	29 mm (1.14 in.)
Camshafts	
Camshaft End Play	
Min	0.150 mm (0.006 in.)
Max	0.350 mm (0.013 in.)
Outer Journal Diameter (at crankshaft)	25.95 mm $\pm$ 0.01 mm (1.021 mm $\pm$.0004 in)
Inner Journal Diameter (at cylinder head)	26.00 mm + 0.015 mm (1.027 in $\pm$.0006 in)
Crankshaft Journal Clearance	
Max	0.075 mm (0.003 in.)
Min	0.030 mm (0.0012 in)
Connecting Rods	
Connecting Rod Diameter (Small End)	32 mm (1.26 in.)
Connecting Rod Diameter (Large End)	57.563 mm (2.266 in.)
Piston Pin	
Diameter	32 mm (1.26 in.)
Length: Federal Mogul	74 mm $\pm$ 0.3 mm (2.9 in. $\pm$ 0.3 in.)
Crankshaft	
End Play	0.1 mm - 0.34 mm (0.004 in. - 0.013 in.)
Bearing Selection. Refer to BEARING(S), CRANKSHAFT, STANDARD PROCEDURE .	
Engine Block	
Cylinder Bore Internal Diameter	94 mm (3.700 in.)
Cylinder Bore Out-Of-Round (Roundness)	0.009 mm (0.0003 in.)
Oversized Piston	+0.40 mm (+0.015 in.)
Fuel System	
Injection Pressure	1800 Bar (26.106 psi)
High Pressure Pump	CP1H
ECU	EDU 17
Injectors	Piezo CRI 3.2
Glow Plugs	
Make/Type	Bosch / GLP2 HS
Voltage	4.4V
Lubrication System	
Oil Pump Outer Rotor End Play	
Min	0.01 (0.0004 in.)
Max	0.09 (0.0036 in.)
Oil Pump Inner Rotor End Play	
Max	0.01 mm (0.0004 in.)
Min	0.09 mm (0.0036 in.)
Oil Pump Outer Rotor to Body Diameter Clearance	
Max	0.130 mm (0.052 in.)
Min	0.230 mm (0.0091 in)

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Opening Pressure	5 Bar (73 psi)
Oil Pressure Valve Spring Free Length	46.8 mm (1.84 in)
Minimum Oil Pressure (Warm)	
at Idle	0.7 Bar (10 psi)
at 3800 RPM	2.5 Bar (36 psi)
Cooling System	
Thermostat Opening Temperature	90°C (194°F)
Pressure Cap Setting	1.2 Bar (17 psi)
Engine Oil	
Specification. Refer to CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION .	
Coolant	
Specification. Refer to CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION .	

Cylinder Head Gasket Selection		
	Millimeters	Inches
DISTANCE FROM PISTON AT TDC TO CYLINDER BLOCK	0.300 - 0.399	0.0119 - 0.0158
CYLINDER HEAD GASKET THICKNESS	1.10	0.0434
PISTON CLEARANCE	0.700-0.800	0.0276 -0.0315
DISTANCE FROM PISTON AT TDC TO CYLINDER BLOCK	0.400 - 0.499	0.0158 - 0.0197
CYLINDER HEAD GASKET THICKNESS	1.20	0.0473
PISTON CLEARANCE	0.700-0.800	0.0276 -0.0315
DISTANCE FROM PISTON AT TDC TO CYLINDER BLOCK	0.500 - 0.600	0.0197 - 0.0237
CYLINDER HEAD GASKET THICKNESS	1.30	0.0512
PISTON CLEARANCE	0.700-0.800	0.0276 -0.0315

TORQUE**ENGINE BLOCK**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Balance Shaft	33	24	-
Connecting Rod Caps	Specific fastener placement and torque pattern is required. Refer to ROD, PISTON AND CONNECTING, INSTALLATION .		
Dipstick Tube (block)	11	-	97
Dipstick Tube (sump)	11	-	97
Engine Mounts and Brackets	Specific fastener placement and torque pattern is required (Refer to ENGINE MOUNTING)		
Fuel Quantity Solenoid	7	-	62

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Main Bearing Caps	Specific fastener placement and torque pattern is required. Refer to <u>CRANKSHAFT, INSTALLATION</u> .		
Oil Cooler	12	-	106
Oil Cooler Coolant Adapter Tube at Oil Filter Housing Bolt	11	-	97
Oil Cooler Coolant Tube Bolt	15	-	133
Oil Drain Plug	45	33	-
Oil Filter Cap	25	18	-
Oil Filter Housing Bolts	33	24	-
Oil Jet	11	-	97
Oil Pan	Specific fastener placement and torque pattern is required. Refer to <u>PAN, OIL, INSTALLATION</u> .		
Oil Pan to Transaxle Bolts	60	44	-
Oil Pickup Tube	15	-	133
Oil Pressure Sensor	14	-	124

CYLINDER HEAD

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Camshaft Cap	11	-	97
Camshaft Position Sensor	11	-	97
Camshaft Sprocket	80	59	-
Charge Air Cooler Clamp - Intercooler Side	25	18	-
Charge Air Cooler Clamp - Turbocharger Side	5	-	44
Cylinder Head Bolt	Specific fastener placement and torque pattern is required. Refer to <u>CYLINDER HEAD, INSTALLATION</u> .		
Cylinder Head Cover	11	-	97
EGR Air Flow Control Valve Bolts	11	-	97
Exhaust Elbow	33	24	-
Exhaust Elbow Bracket	33	24	-
Exhaust Manifold	Specific fastener placement and torque pattern is required. Refer to <u>MANIFOLD, EXHAUST, INSTALLATION</u> .		
Exhaust Manifold Heat Shield	33	24	-
Front Camshaft Journal	11	-	97
Fuel Injector	32	24	-
Fuel Tubes at Fuel Injector	28	21	-
Fuel Tubes at Fuel Rail	5 + 75°	-	44 + 75°
Fuel Tube at High Pressure Pump	28	21	-
Fuel Rail	24	18	-

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Fuel Return Line Bracket Nut	11	-	97
Glow Plugs	14	-	124
High Pressure Fuel Tube Bracket Bolt	15	-	133
Intake Manifold Nuts	Specific fastener placement and torque pattern is required. Refer to <u>MANIFOLD, INTAKE, INSTALLATION</u> .		
Turbocharger	32	24	-
Turbocharger Brace Bolts	32	24	-
Turbocharger Oil Feed Line at the Engine Block	32	24	-
Turbocharger Adapter (oil feed line to engine block connection)	54	40	-
Turbocharger Oil Feed Line Banjo Bolt at Turbocharger	24	18	-
Turbocharger Oil Return Line	15	-	133
Vacuum Tube	11	-	97

FRONT ENGINE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Crankshaft Damper	32	24	-
Crankshaft Sprocket	100 + 120°	74 + 120°	-
Front Engine Cover	33	24	-
High Pressure Fuel Pump	24	18	-
High Pressure Fuel Pump Sprocket Nut.	88	65	-
Power Steering Line Support Bracket Bolt	8	-	71
Timing Belt Cover (upper)	8	-	71
Timing Belt Cover (inner)	11	-	97
Timing Belt Cover (lower)	8	-	71
Timing Belt Tensioner	28	21	-
Water Pump	32	24	-

REAR ENGINE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Crankshaft Position Sensor Cover Plate	15	-	133
Crankshaft Position Sensor	11	-	97
Flex Plate (ATX) Bolt	Specific fastener placement and torque pattern is required. Refer to <u>FLEXPLATE, INSTALLATION</u> .		
Flex Plate-to-Torque Converter Bolts	88	65	-
Transmission Adapter Plate			

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(Allen bolts)	79	58	-
Transmission Adapter Plate (hex bolts)	45	33	-

ACCESSORY DRIVE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
A/C Compressor Bolts	40	30	-
A/C Compressor Nut	24	18	-
A/C Compressor/Generator Bracket Bolts	45	33	-
Accessory Drive Belt Tensioner Bolt	48	35	-
Accessory Drive Idler Pulley Bolt	50	37	-
Generator Bolts	25	18	-
Power Steering Pump Bolts	23	17	-
Power Steering Pump Pulley Bolts	33	24	-

REMOVAL

REMOVAL

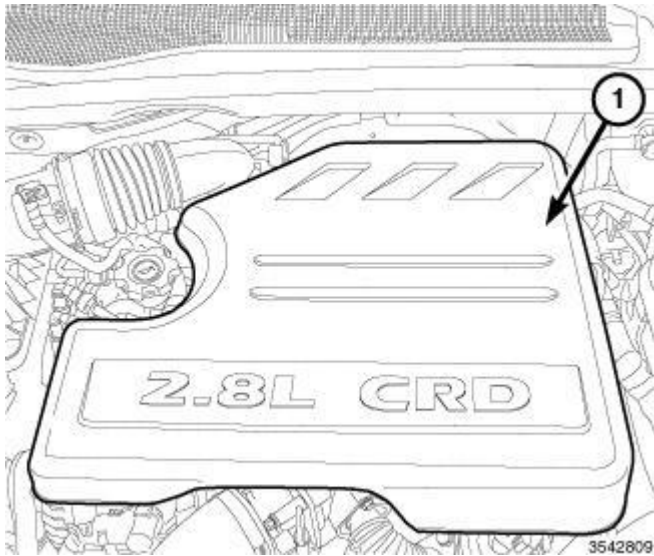


Fig. 5: Engine Cover

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1. Remove the engine cover (1).

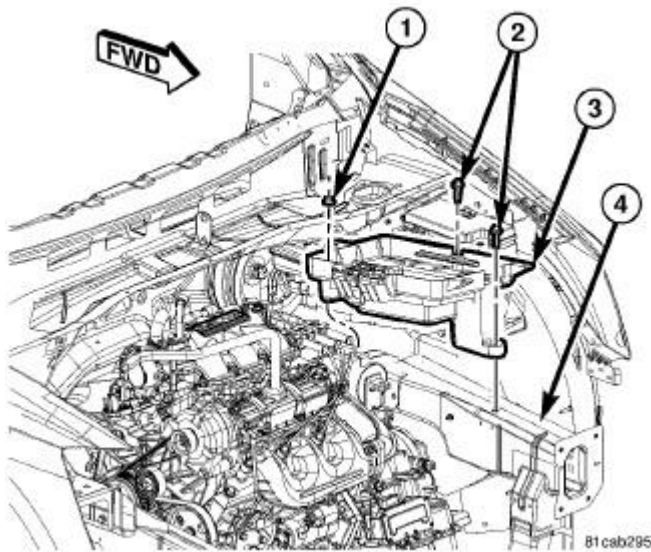


Fig. 6: Identifying Bolts, Nut, Battery Tray And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

2. Remove the battery tray. Refer to **TRAY, BATTERY, REMOVAL** .
3. Evacuate the A/C system. Refer to **PLUMBING, FRONT, STANDARD PROCEDURE** .

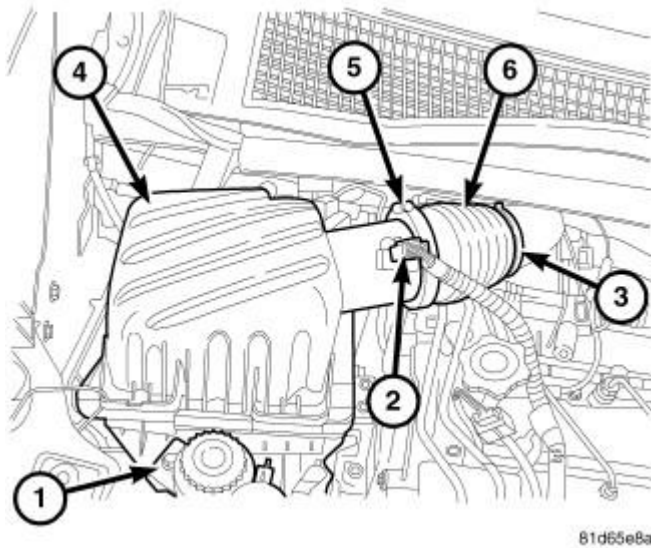


Fig. 7: Intake Air Box
Courtesy of CHRYSLER GROUP, LLC

4. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
5. Remove the cooling fan module. Refer to **FAN, COOLING, REMOVAL** .

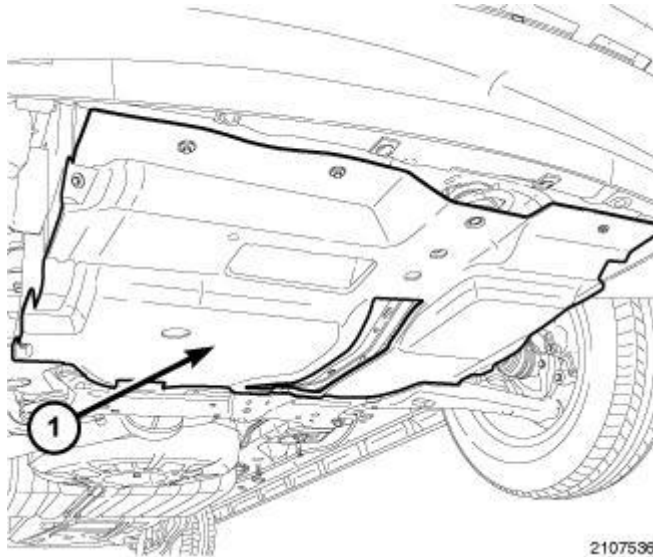


Fig. 8: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

6. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
7. Remove the underbody splash shield (1).

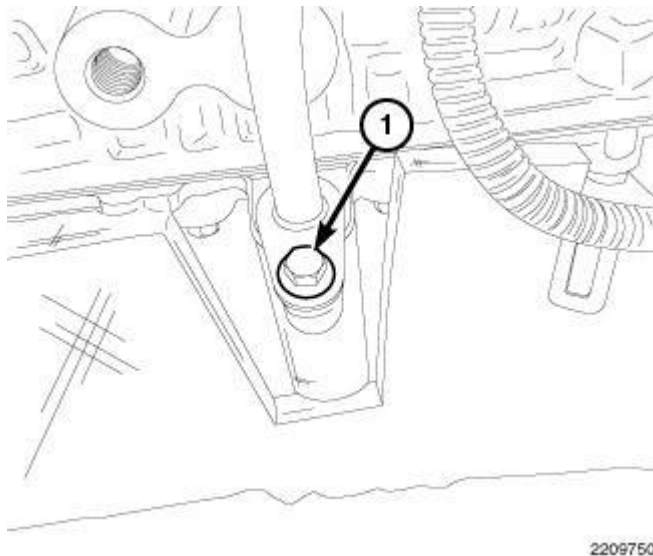


Fig. 9: Oil Level Indicator Tube Lower Bolt
Courtesy of CHRYSLER GROUP, LLC

8. Remove lower bolt (1) from the oil indicator tube.

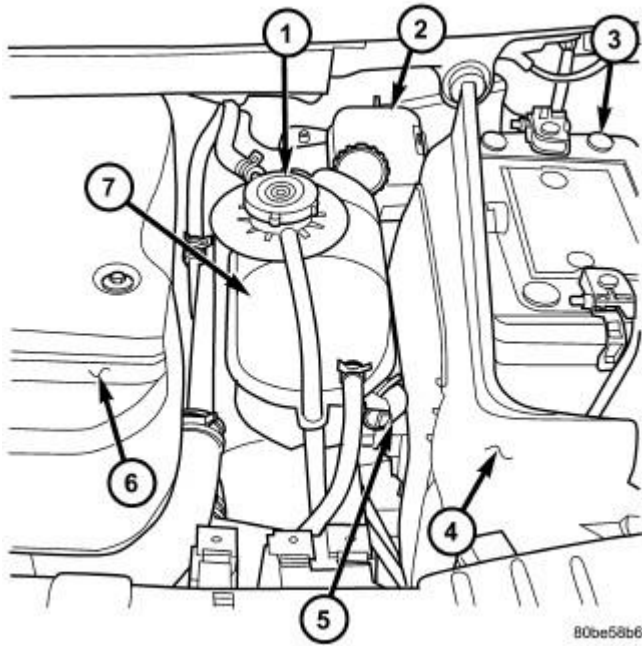


Fig. 10: Coolant Recovery Container Components
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9. Remove the coolant recovery bottle. Refer to **BOTTLE, COOLANT RECOVERY, REMOVAL**.

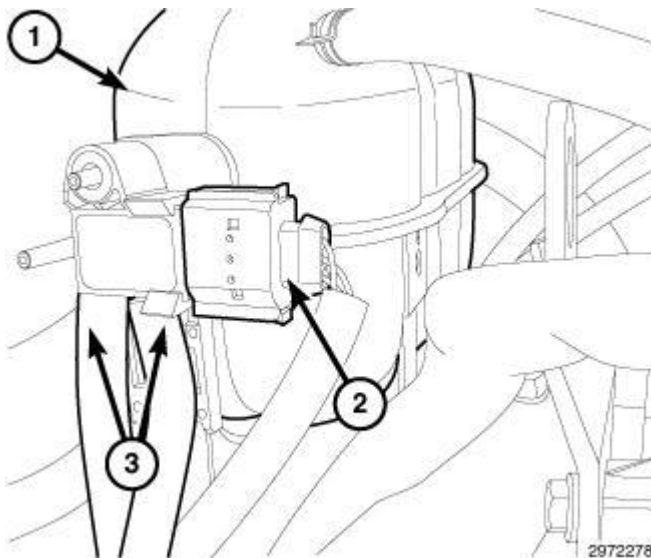


Fig. 11: Differential Pressure Sensor Hoses & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the brake booster vacuum hose.
11. Disconnect the two Differential Pressure Sensor (DPS) hoses (3).
12. Disconnect the DPS wire harness connector (2).

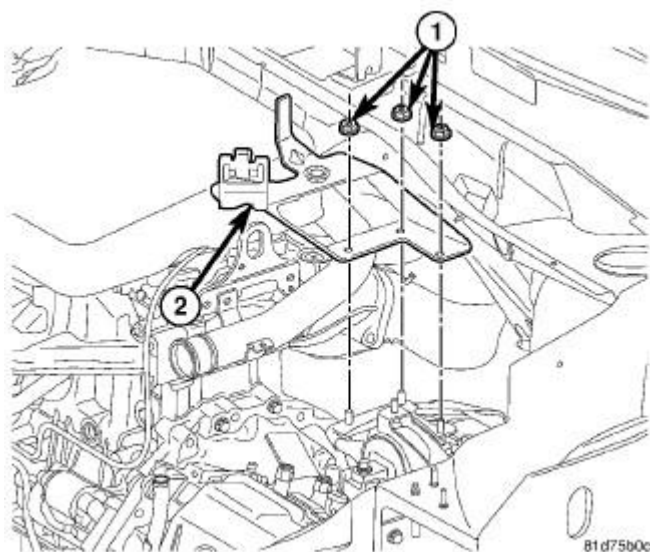


Fig. 12: Coolant Overflow Bottle Bracket & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

13. Remove the fasteners (1), and the coolant overflow bottle bracket.

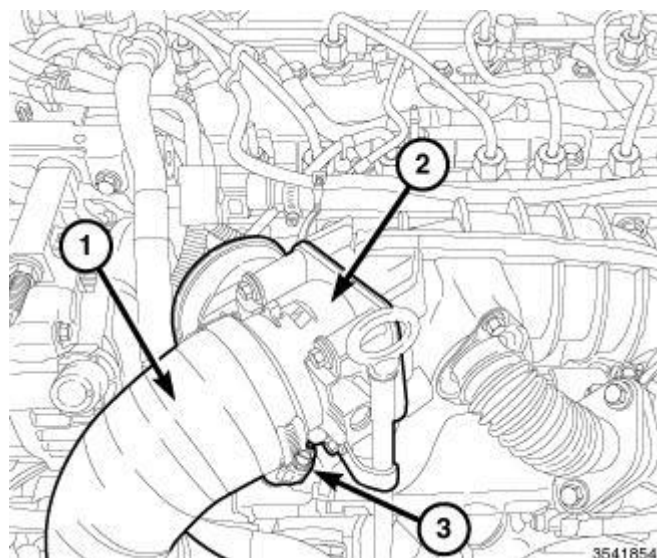


Fig. 13: Charge Inlet Tube, EGR Air Control Valve & Clamp
 Courtesy of CHRYSLER GROUP, LLC

14. Loosen clamp (3) and disconnect the charge inlet tube (1) from the EGR air control valve (2).

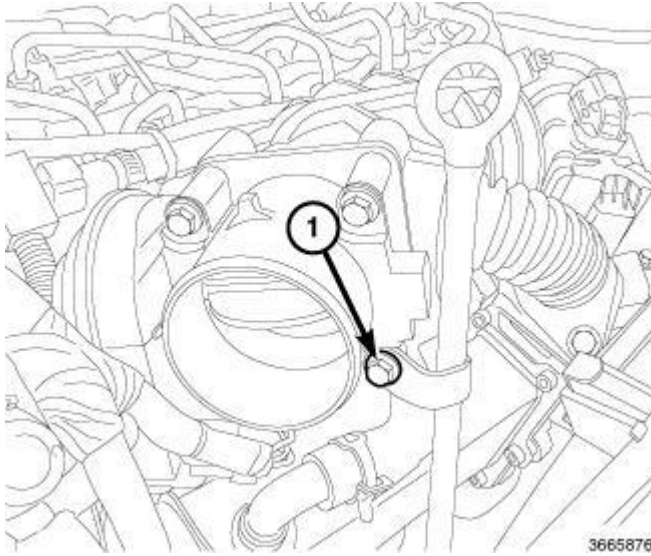


Fig. 14: Oil Level Indicator Tube Upper Bolt
Courtesy of CHRYSLER GROUP, LLC

15. Remove upper bolt (1) and the oil level indicator tube.
16. Disconnect engine to body wire harness connectors.
17. Disconnect the engine harness connectors from the Powertrain Control Module (PCM).
18. Disconnect the A/C pressure transducer wire harness connector.

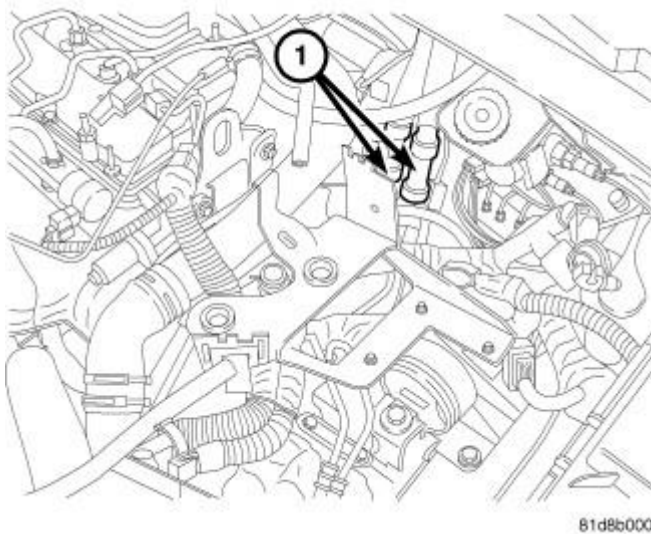


Fig. 15: Heater Core Coolant Hoses
Courtesy of CHRYSLER GROUP, LLC

19. Disconnect the coolant hoses (1) from heater core.

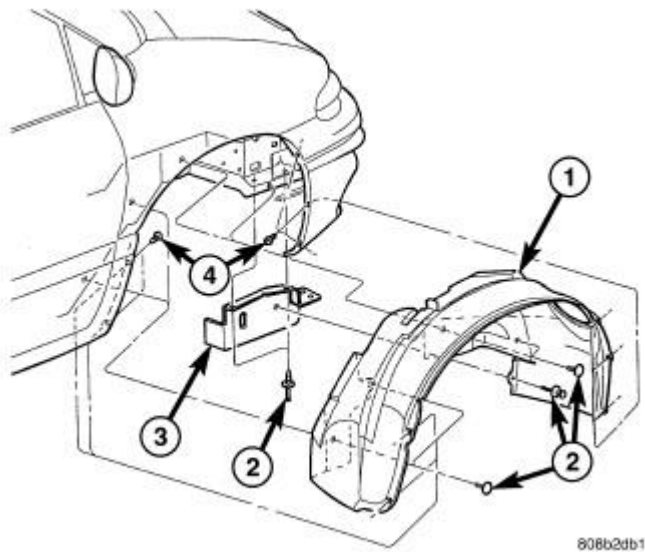


Fig. 16: Front Wheelhouse Splash Shield
Courtesy of CHRYSLER GROUP, LLC

20. Remove the front tires. Refer to **REMOVAL** .
21. Remove the left and right front inner fender well (1). Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
22. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .
23. Remove the A/C compressor. Refer to **COMPRESSOR, A/C, REMOVAL** .
24. Remove the ground cable at transmission.

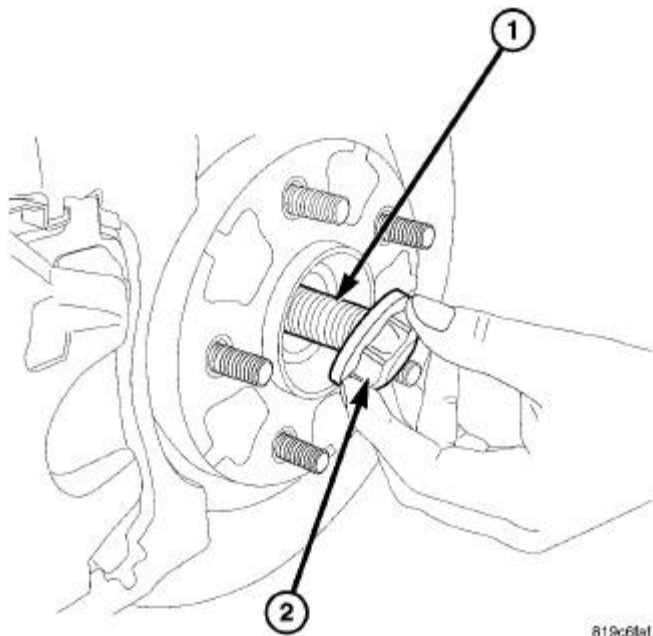


Fig. 17: View Of Nut & Halfshaft
Courtesy of CHRYSLER GROUP, LLC

25. Remove the right and left driveline half shafts. Refer to **REMOVAL** .

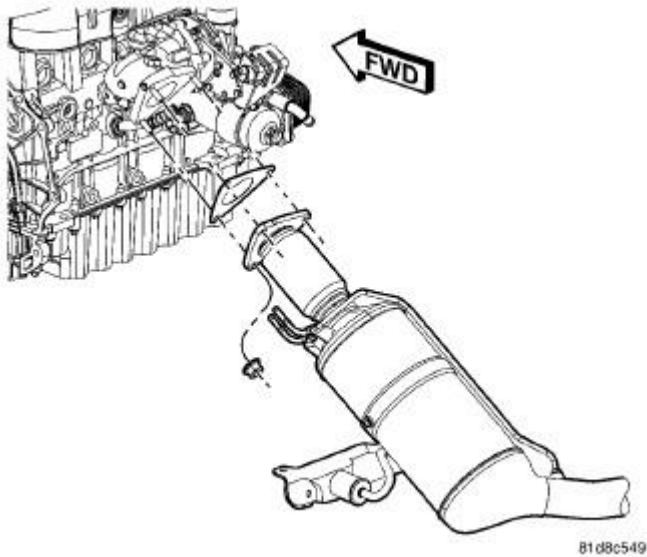


Fig. 18: Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF)
Courtesy of CHRYSLER GROUP, LLC

26. Remove the Diesel Particulate Filter (DPF). Refer to **FILTER, DIESEL PARTICULATE, REMOVAL** .

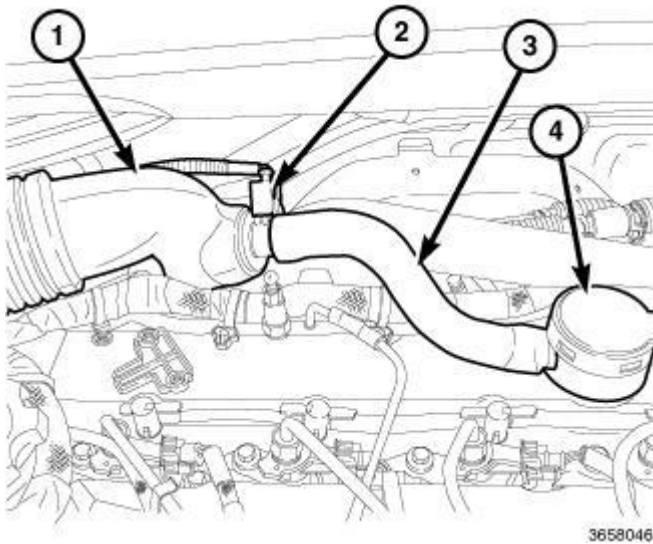
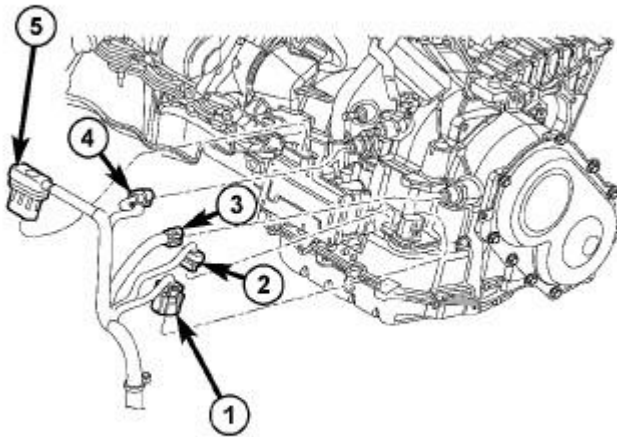


Fig. 19: Turbocharger Inlet Tube, Crankcase Vent Hose Heater Wire Harness Connector, Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

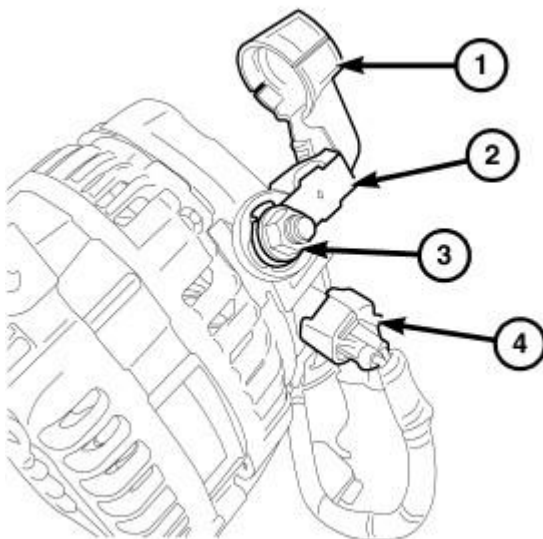
27. Disconnect the crankcase vent hose heater wire harness connector (2).
28. Disconnect the crankcase vent hose (3) from the oil separator (4).
29. Loosen clamp and remove the turbocharger inlet tube (1) from turbocharger.



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Fig. 20: Electrical Connectors At Case
Courtesy of CHRYSLER GROUP, LLC

30. Disconnect the transmission harness connectors (1 - 5).



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Fig. 21: Alternator/Generator Electrical Connection
Courtesy of CHRYSLER GROUP, LLC

31. Remove the generator. Refer to **GENERATOR, REMOVAL**.
32. Remove the power steering pump (2). Refer to **PUMP, REMOVAL**.

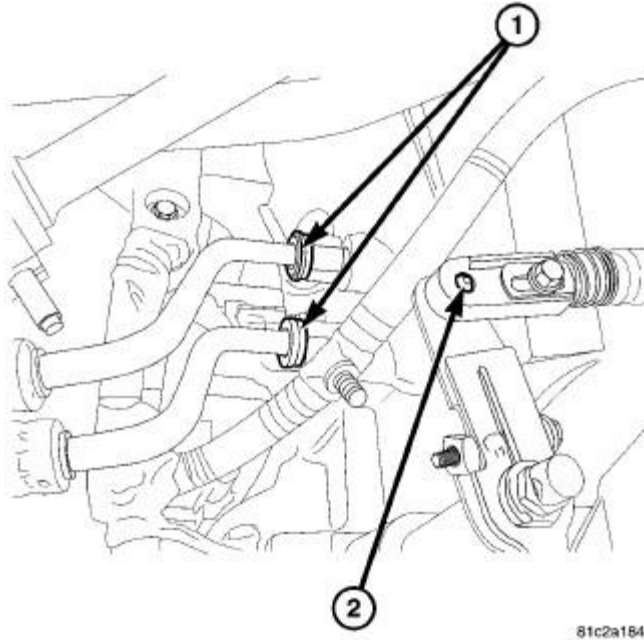


Fig. 22: Transmission Cooler Lines & Transmission Shift Cable
Courtesy of CHRYSLER GROUP, LLC

33. Disconnect the transmission shift cable (2) at the transmission.
34. Disconnect the transmission cooler lines (1).

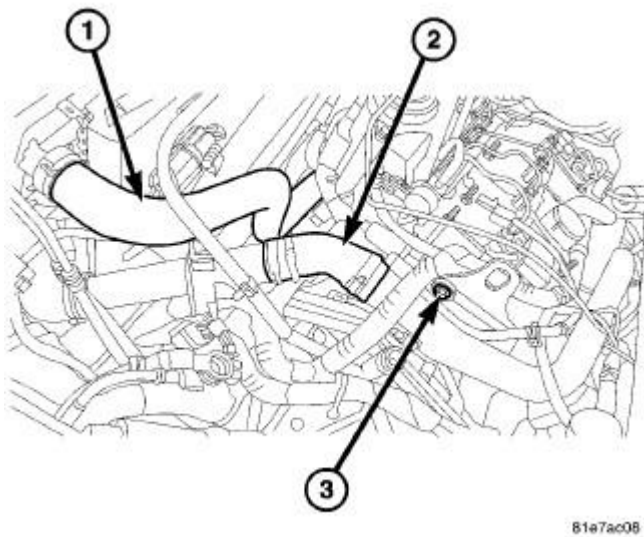


Fig. 23: Upper Radiator Hose, Charge Air Cooler Hose & Fastener

Courtesy of CHRYSLER GROUP, LLC

35. Remove the lower radiator hose.
36. Remove the upper radiator hose (1).
37. Remove the charge air cooler outlet tube (2).
38. Remove the exhaust manifold and turbocharger assembly. Refer to **MANIFOLD, EXHAUST, REMOVAL**.

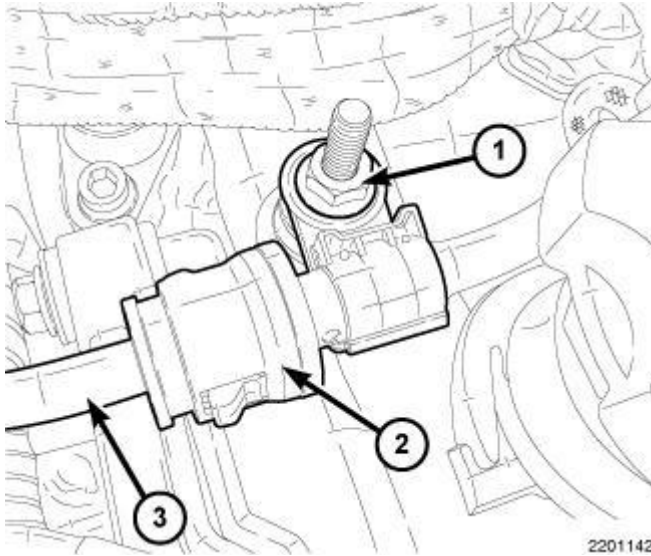


Fig. 24: Fuel Injector Return Line & Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

39. Remove the retaining nut (1) and disconnect the fuel injector return line (2).

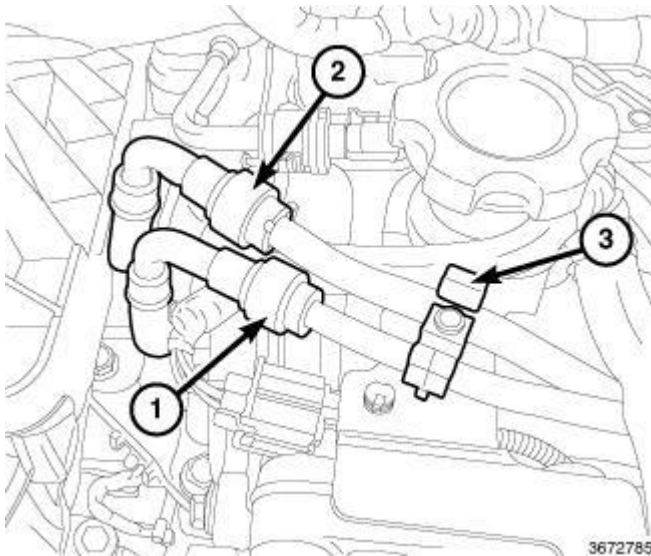


Fig. 25: Fuel Return Line, Fuel Feed Line & Fuel Line Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

40. Disconnect the fuel return line (1).
41. Disconnect the fuel feed line (2).
42. Remove the fuel line mounting bracket (3).

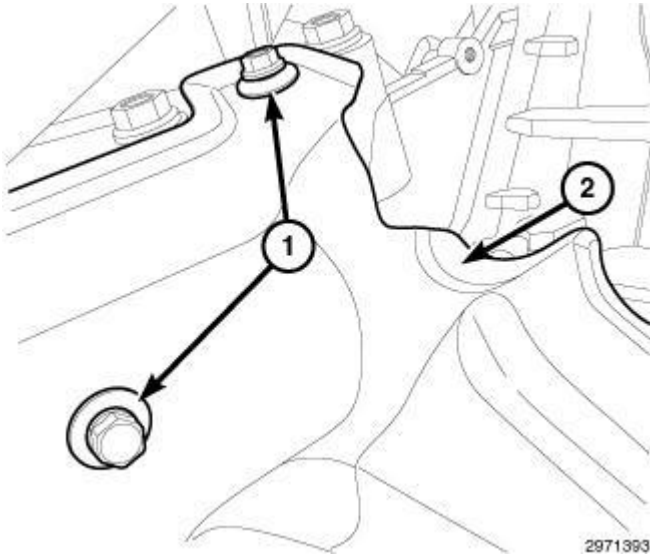


Fig. 26: Rear Mount Heat Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

43. Remove bolts (1) and the rear mount heat shield (2).

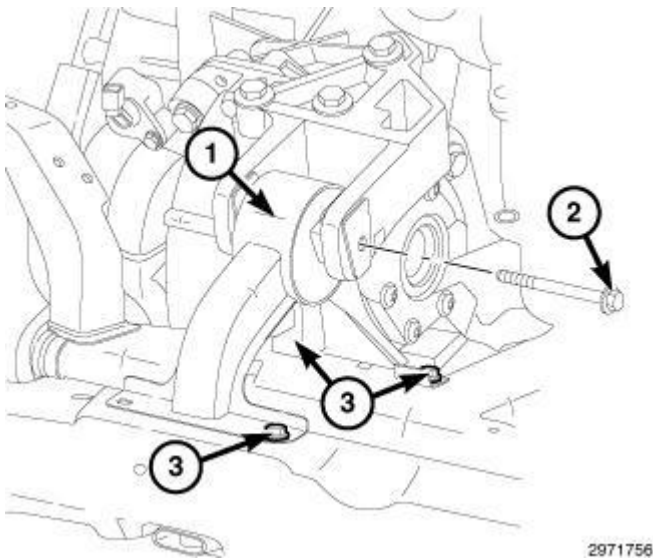


Fig. 27: Rear Engine Mount, Rear Mount Through Bolt & Bolts
Courtesy of CHRYSLER GROUP, LLC

44. Remove the rear mount through bolt (2).

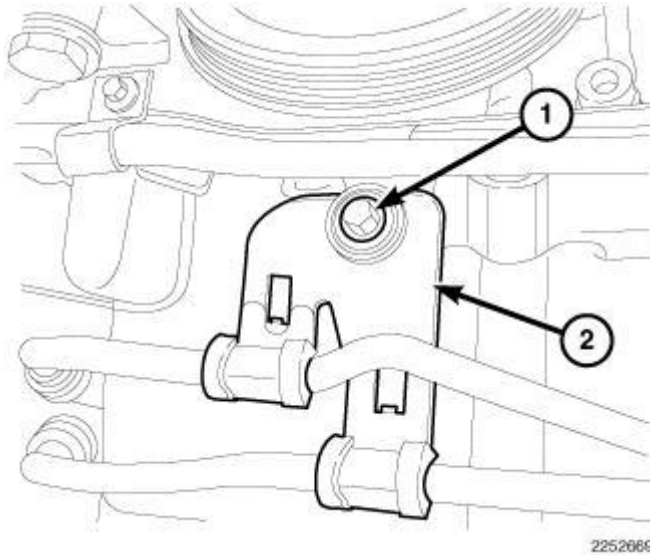


Fig. 28: Retaining Bolt & Power Steering Line Bracket
Courtesy of CHRYSLER GROUP, LLC

45. Remove the bolt (1) securing the power steering lines.
46. Remove the front fore-aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, REMOVAL**.

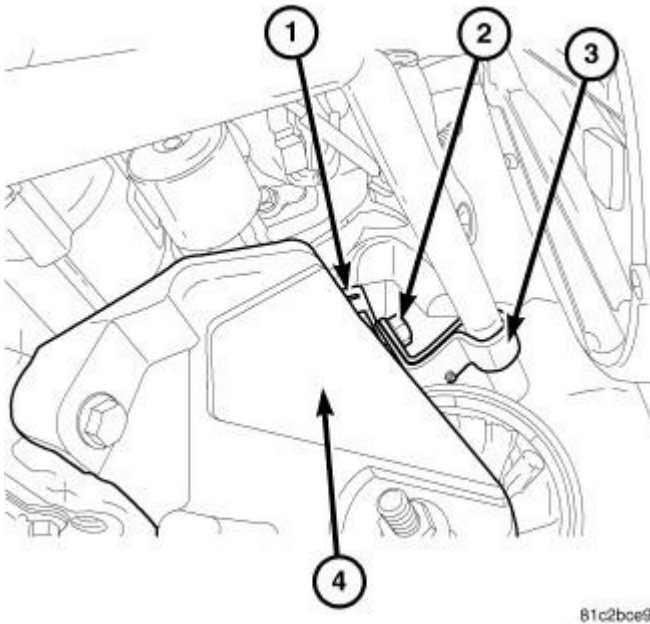


Fig. 29: Ground Cable, Bolt, Heater Tube Bracket & Front Mount
Courtesy of CHRYSLER GROUP, LLC

47. Remove the bolt (2) holding the ground cable (1) and the heater tube bracket (3) to the front mount (4).

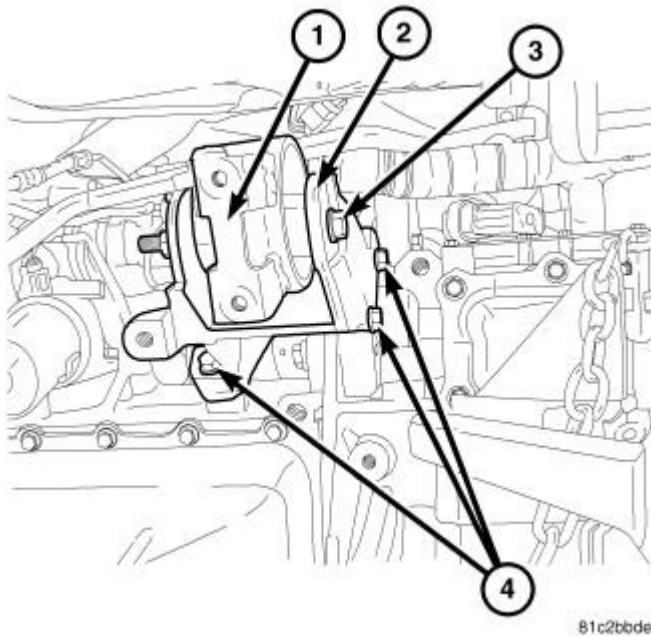


Fig. 30: Front Transmission Mount, Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

48. Remove the bolts (4) at the front mount bracket (2).

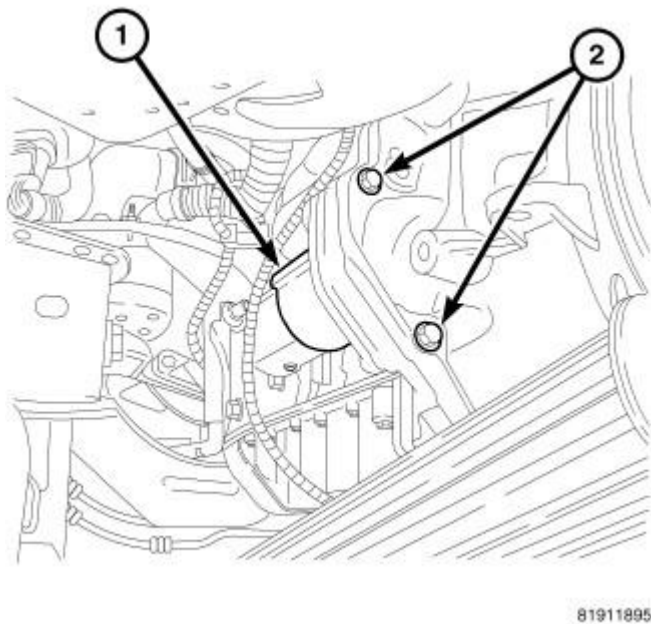


Fig. 31: Starter & Bolts
Courtesy of CHRYSLER GROUP, LLC

49. Remove the starter (1). Refer to **STARTER, REMOVAL** .

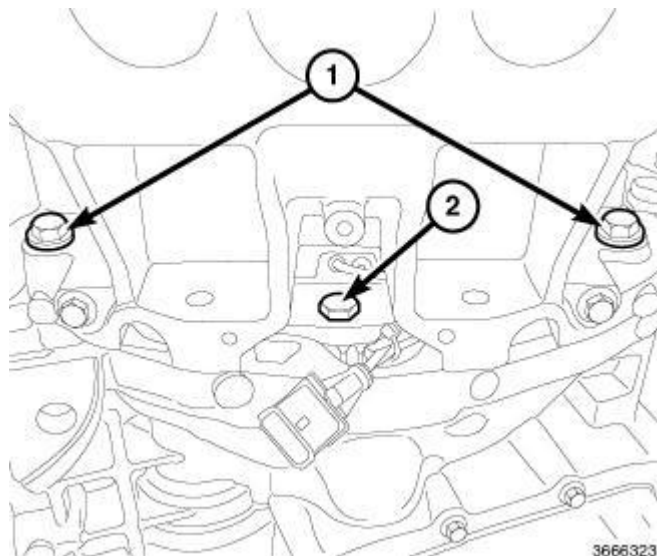


Fig. 32: Oil Pan To Transaxle Bolts & Flex Plate-To-Torque Converter Bolts
 Courtesy of CHRYSLER GROUP, LLC

50. Remove the flex plate-to-torque converter bolts (2).
51. Remove the two oil pan to transaxle bolts (1).

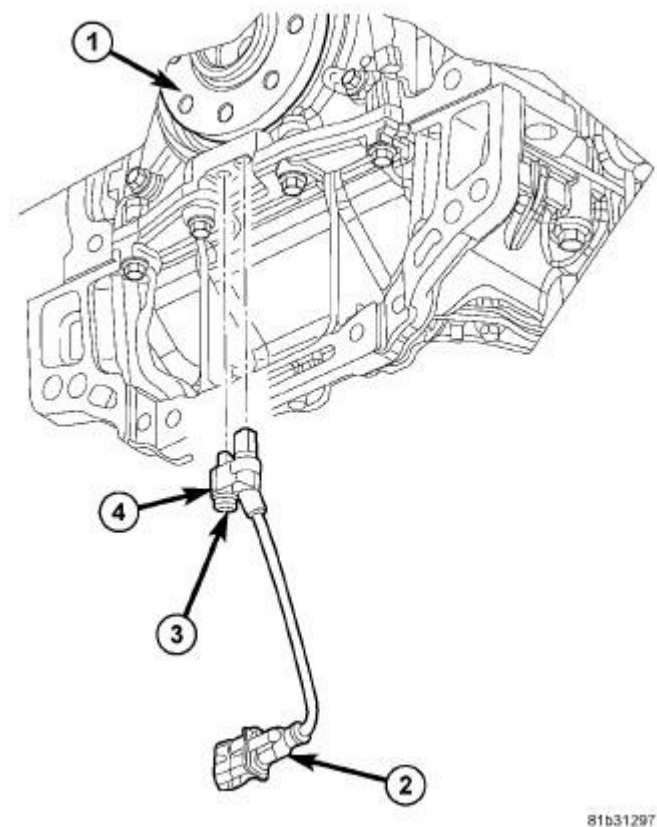


Fig. 33: Crankshaft Hub, Electrical Connector, Mounting Bolt & CKP Sensor

Courtesy of CHRYSLER GROUP, LLC

52. Remove the Crankshaft Position Sensor (CKP). Refer to **SENSOR, CRANKSHAFT POSITION, REMOVAL**.
53. Drain the engine oil.
54. Using a new copper sealing washer, tighten oil drain plug to 54 N.m (40 ft. lbs.).
55. Assemble the (special tool #6135, Dolly, Power Train), and the (special tool #6710A, Cradle, Engine Support).
56. Lower vehicle and position (special tool #6135, Dolly, Power Train), and (special tool #6710A, Cradle, Engine Support) under engine.
57. Install a safety strap to the engine and transaxle assembly, securing it to the cradle.
58. Lower vehicle so that only the weight of the engine and transaxle assembly is on dolly fixture.

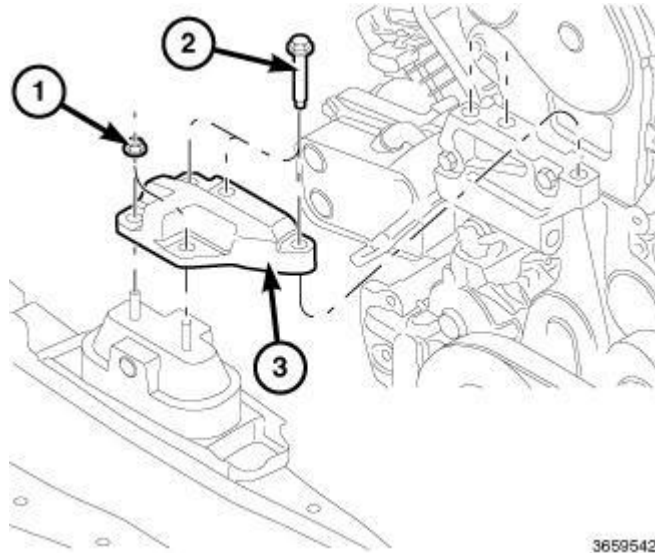


Fig. 34: Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

59. Remove the ground wire.
60. Remove fasteners (1) and (2) and the engine mount bracket (3).

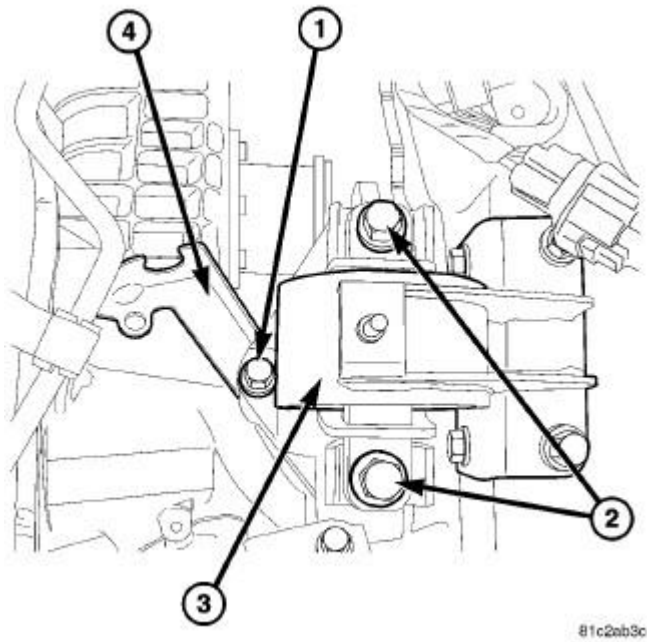


Fig. 35: Transmission Mount Bracket & Bolts
 Courtesy of CHRYSLER GROUP, LLC

61. Remove the bolt from the right engine mount.
62. Carefully raise vehicle, leaving engine and transmission on engine cradle.

INSTALLATION

INSTALLATION

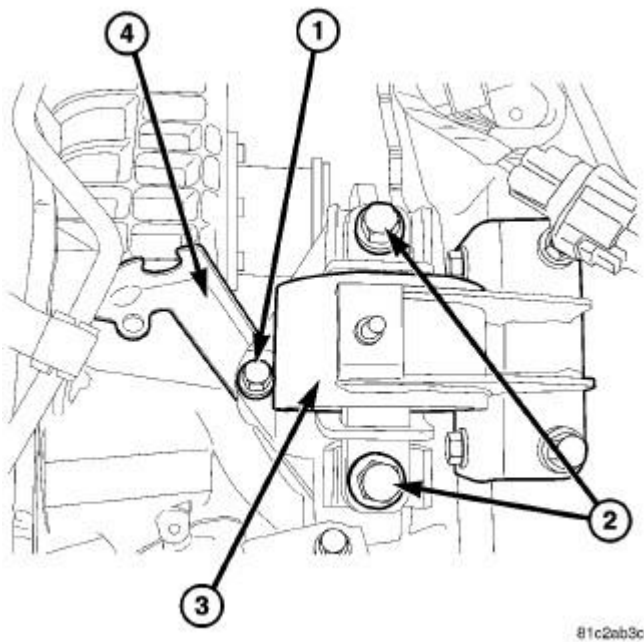


Fig. 36: Transmission Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position engine and transmission assembly under vehicle. Slowly lower the vehicle down over the engine and transmission. It is necessary to move the engine/transmission assembly with the dolly for clearance around body flanges.
2. Align engine and transmission mounts to attaching points.
3. Align the transmission mount with the left transmission mount bracket, and install the trans mount-to-trans bracket bolts (1). Tighten bolts to 95 N.m (70 ft. lbs.).

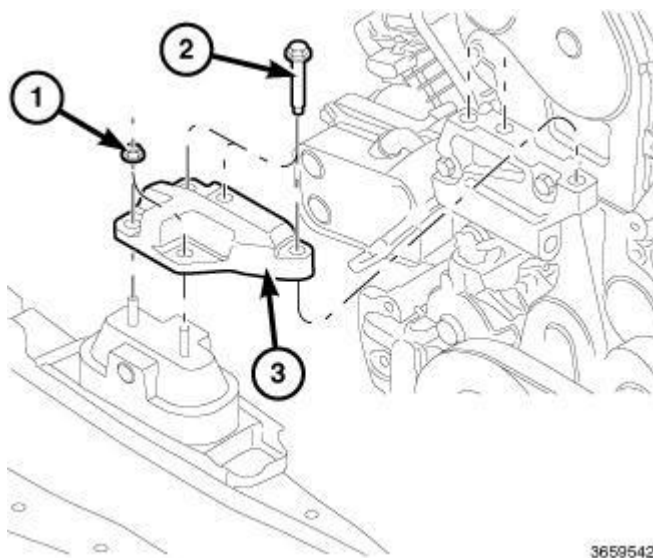


Fig. 37: Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Install the engine mount bracket (3).
 - Tighten the bolts (2) to 61 N.m (44 ft. lbs.).
 - Tighten the nuts (1) to 20 N.m (177 in. lbs.).
5. Install the ground strap (2).
6. Remove the safety strap securing the engine and transaxle assembly to the cradle.
7. Raise the vehicle and remove the (special tool #6135, Dolly, Power Train) and (special tool #6710A, Cradle, Engine Support).

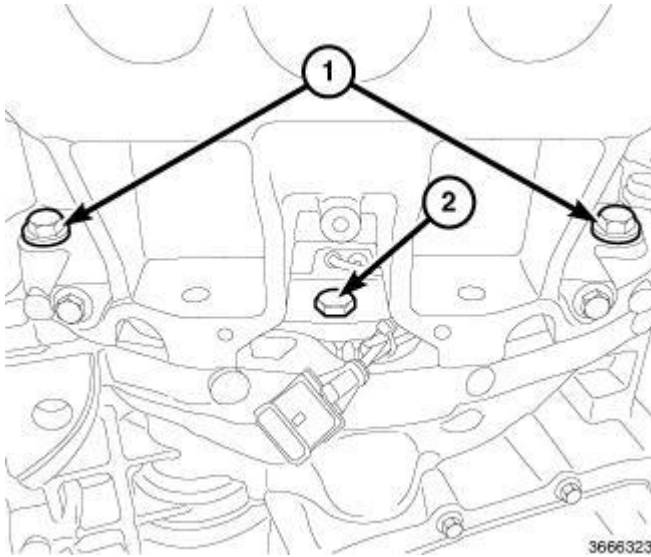


Fig. 38: Oil Pan To Transaxle Bolts & Flex Plate-To-Torque Converter Bolts
 Courtesy of CHRYSLER GROUP, LLC

8. Install the oil pan to transaxle bolts (1) and tighten to 60 N.m (44 ft. lbs.).
9. Install flex plate- to-torque converter bolts (2) and tighten to 88 N.m (65 ft. lbs.).

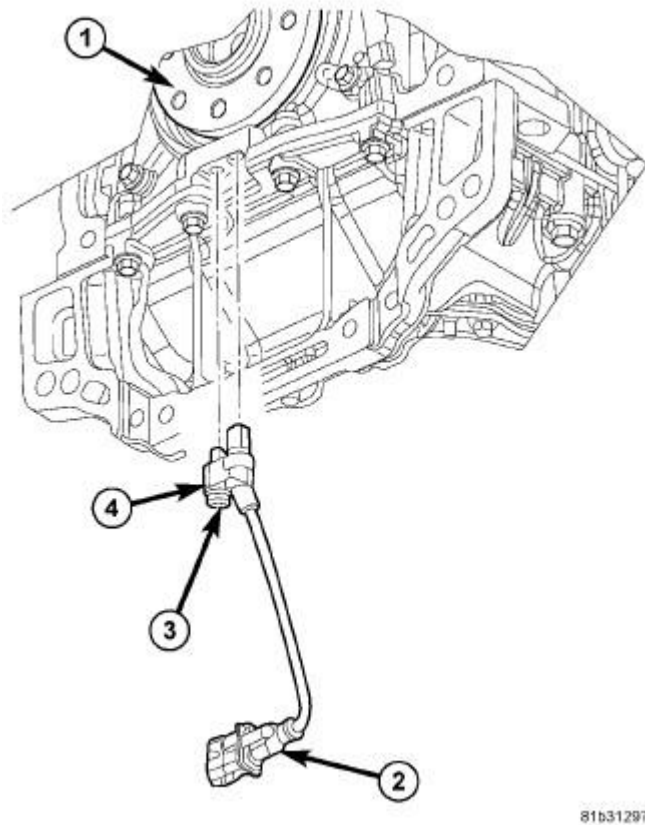
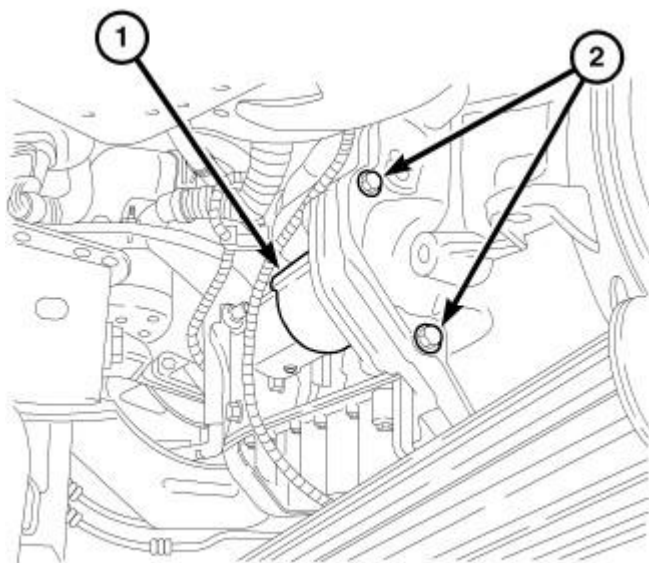


Fig. 39: Crankshaft Hub, Electrical Connector, Mounting Bolt & CKP Sensor
Courtesy of CHRYSLER GROUP, LLC

10. Install the Crankshaft Position Sensor (CKP). Refer to **SENSOR, CRANKSHAFT POSITION, INSTALLATION**.

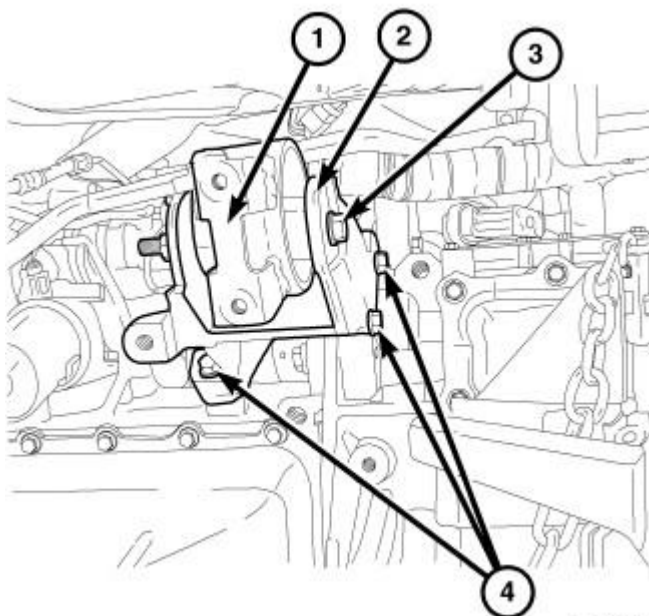


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Fig. 40: Starter & Bolts

Courtesy of CHRYSLER GROUP, LLC

11. Install the starter (1). Refer to **STARTER, INSTALLATION** .



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Fig. 41: Front Transmission Mount, Bracket & Bolts

Courtesy of CHRYSLER GROUP, LLC

12. Install the front mount bracket (2). Tighten bolts to 95 N.m (70 ft. lbs.).

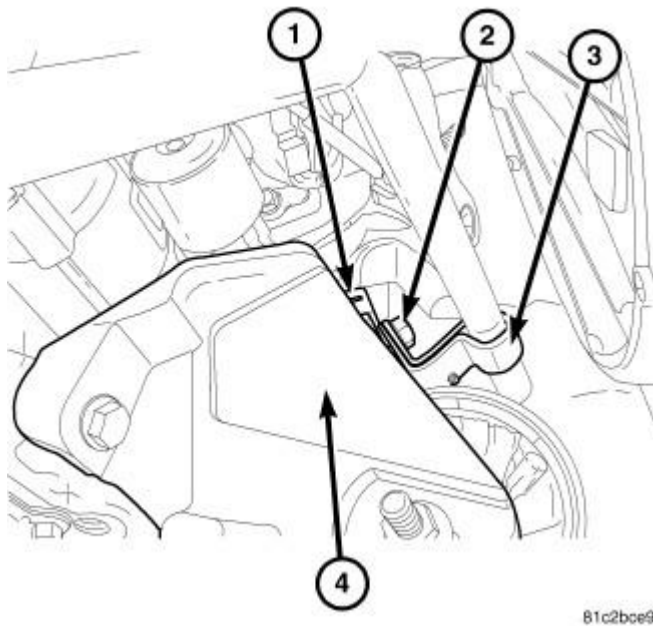


Fig. 42: Ground Cable, Bolt, Heater Tube Bracket & Front Mount
 Courtesy of CHRYSLER GROUP, LLC

13. Install the bolt (2) holding the ground cable (1) and the heater tube bracket (3) to the front mount (4).

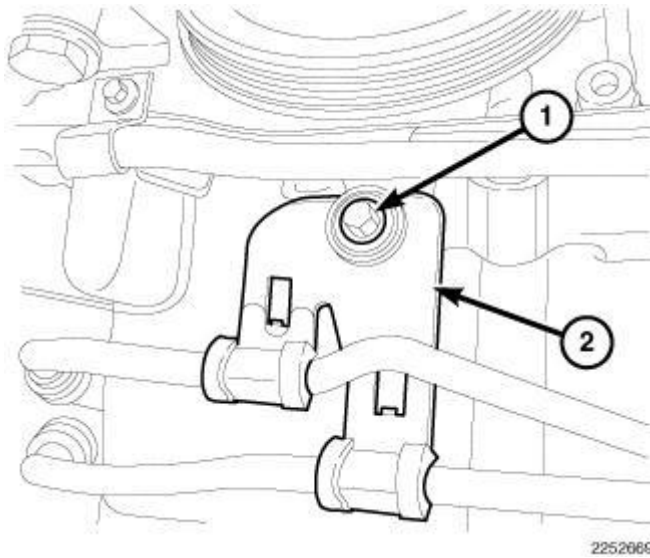


Fig. 43: Retaining Bolt & Power Steering Line Bracket
 Courtesy of CHRYSLER GROUP, LLC

14. Install the front fore-aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, INSTALLATION**.
15. Install the retaining bolt (1) securing the power steering lines. Tighten to 8 N.m (71 in. lbs.).

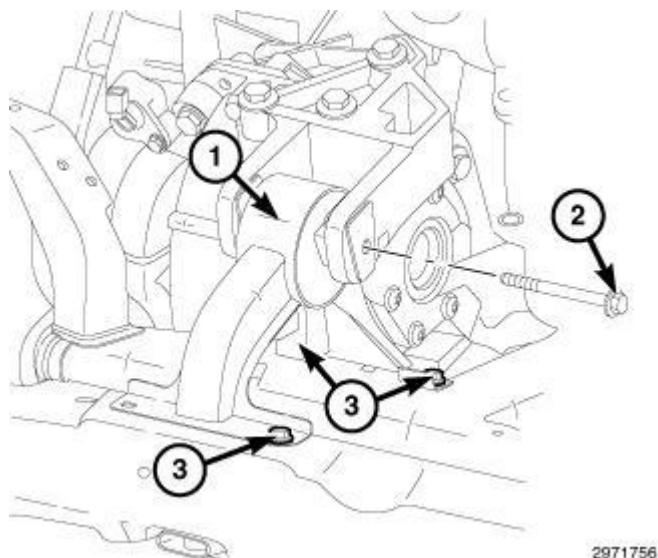


Fig. 44: Rear Engine Mount, Rear Mount Through Bolt & Bolts
Courtesy of CHRYSLER GROUP, LLC

16. Install the rear mount through bolt and tighten to 61 N.m (45 ft. lbs.).

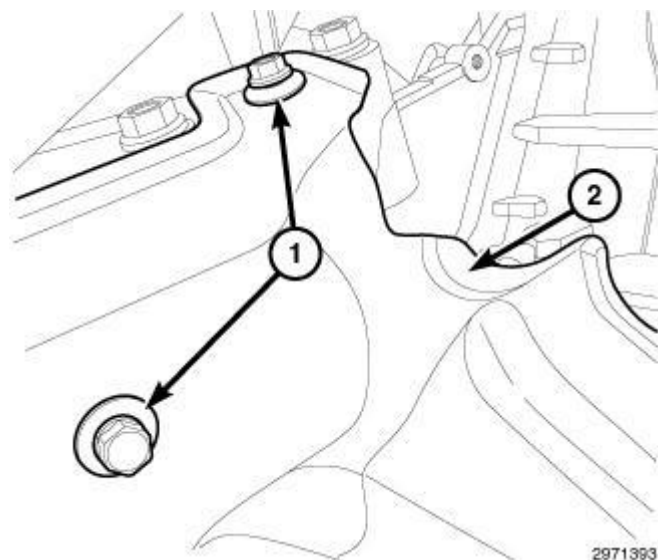


Fig. 45: Rear Mount Heat Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Install the rear mount heat shield (2). Tighten bolts (1) to 14 N.m (124 in. lbs.).

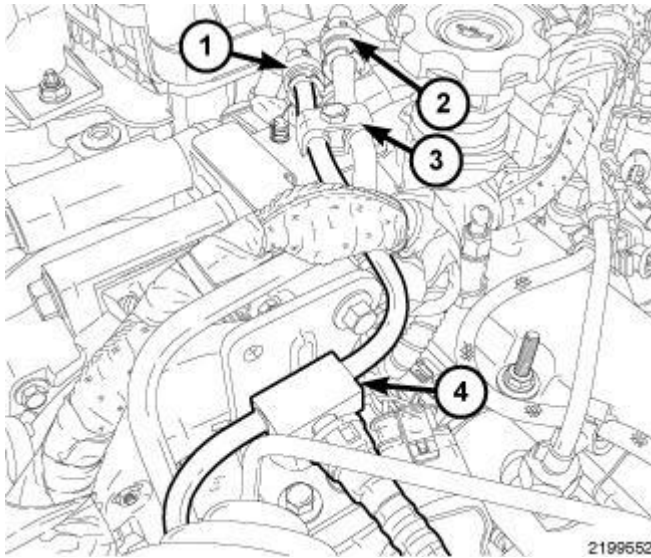


Fig. 46: Fuel Return Line, Fuel Feed Line, Fuel Line Mounting Bracket & Fuel Return Line Block
Courtesy of CHRYSLER GROUP, LLC

18. Install the fuel return line block (4).
19. Install the fuel line mounting bracket (3).
20. Connect the fuel feed line (2).
21. Connect the fuel return line (1).

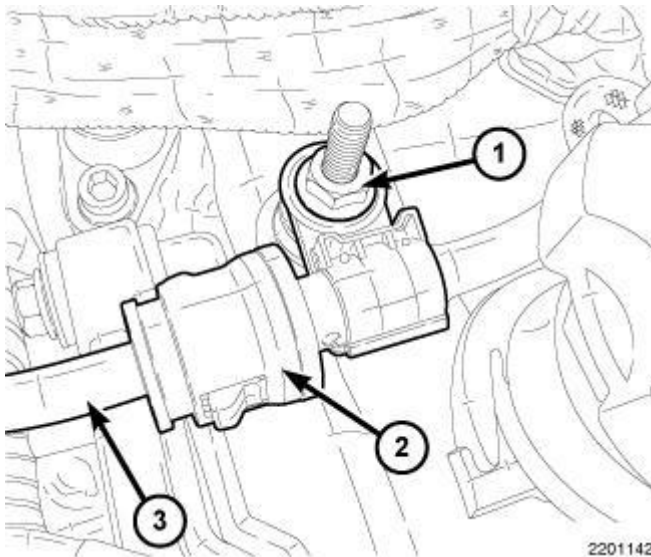


Fig. 47: Fuel Injector Return Line & Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

22. Connect the fuel injector return line (2). Tighten nut (1) 11 N.m (97 in. lbs.).

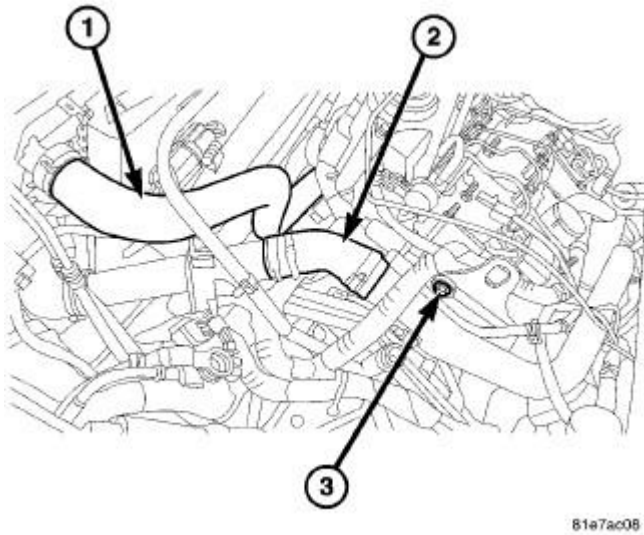


Fig. 48: Upper Radiator Hose, Charge Air Cooler Hose & Fastener
Courtesy of CHRYSLER GROUP, LLC

23. Install the exhaust manifold and turbocharger assembly. Refer to **MANIFOLD, EXHAUST, INSTALLATION**.
24. Install the upper radiator hose (1).
25. Install the charge air cooler outlet tube (2).
26. Install the lower radiator hose.

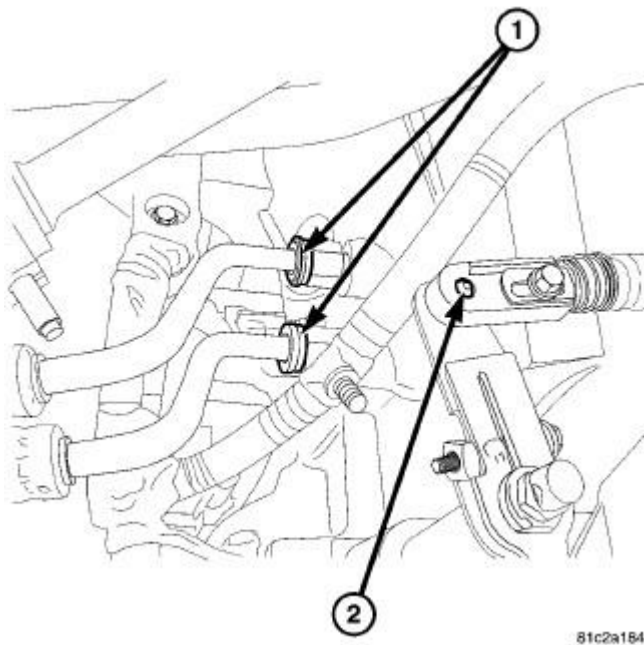
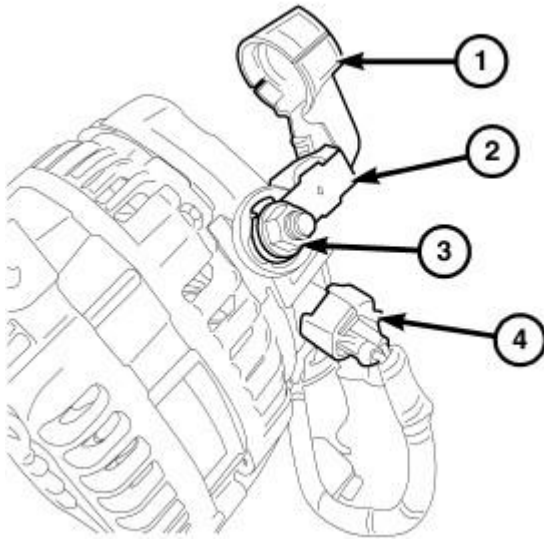


Fig. 49: Transmission Cooler Lines & Transmission Shift Cable

Courtesy of CHRYSLER GROUP, LLC

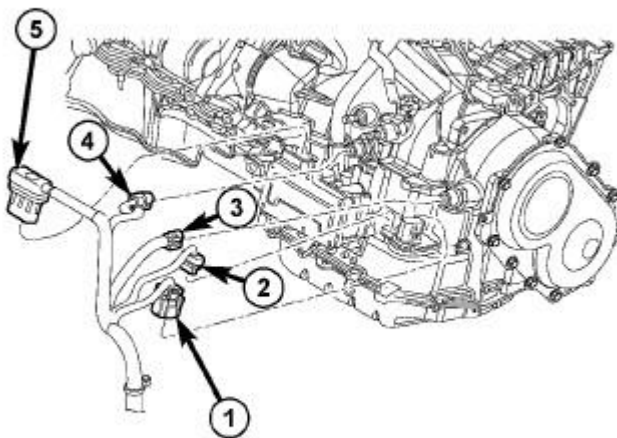
27. Connect the transmission shift cable (2) at the transmission.
28. Connect the transmission lines (1).



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Fig. 50: Alternator/Generator Electrical Connection
Courtesy of CHRYSLER GROUP, LLC

29. Install the power steering pump (2). Refer to **PUMP, INSTALLATION** .
30. Install the generator. Refer to **GENERATOR, INSTALLATION** .



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Fig. 51: Electrical Connectors At Case

Courtesy of CHRYSLER GROUP, LLC

31. Connect the transmission harness connectors (1, 5).
32. Install the turbocharger inlet tube (3) to turbocharger and securely tighten clamp (2).

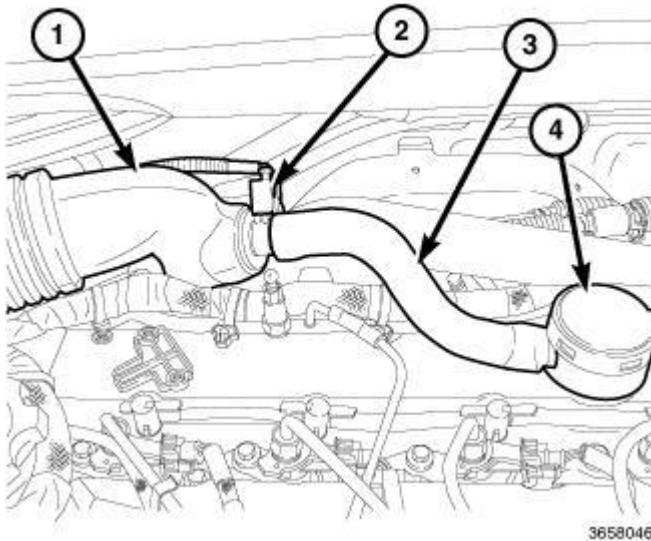


Fig. 52: Turbocharger Inlet Tube, Crankcase Vent Hose Heater Wire Harness Connector, Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

33. Install the turbocharger inlet tube (1) to the turbocharger and securely tighten clamp.
34. Connect the crankcase vent hose (3) to the oil separator (4).
35. Connect the crankcase vent hose heater wire harness connector (2).

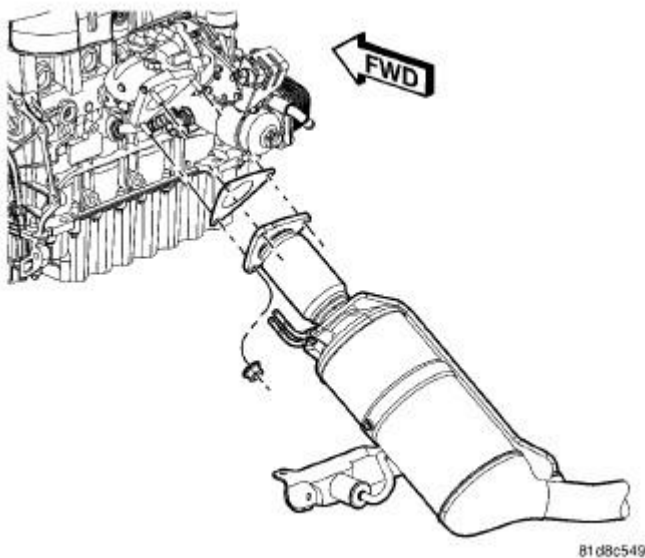


Fig. 53: Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF)

Courtesy of CHRYSLER GROUP, LLC

36. Install the Diesel Particulate Filter (DPF). Refer to **FILTER, DIESEL PARTICULATE, INSTALLATION** .

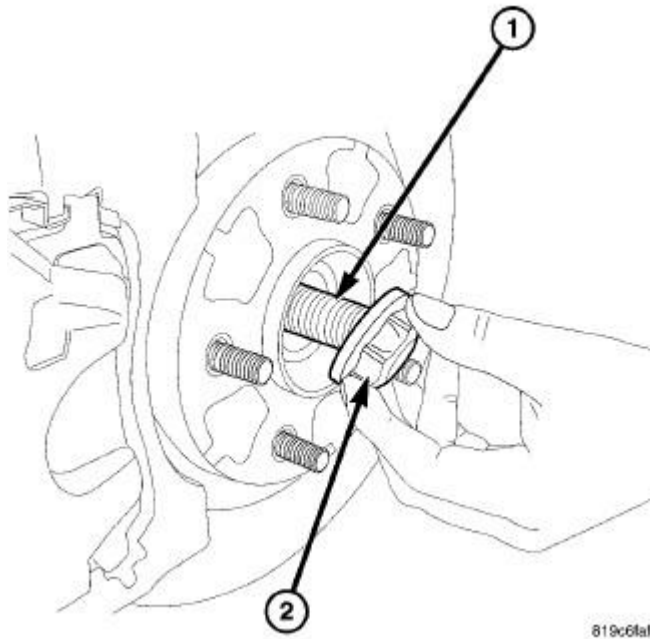


Fig. 54: View Of Nut & Halfshaft
Courtesy of CHRYSLER GROUP, LLC

37. Install the right and left driveline half shafts. Refer to **INSTALLATION** .
38. Install the ground cable at transmission. Tighten bolt to 54 N.m (40 ft. lbs.).
39. Install the A/C compressor. Refer to **COMPRESSOR, A/C, INSTALLATION** .
40. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .

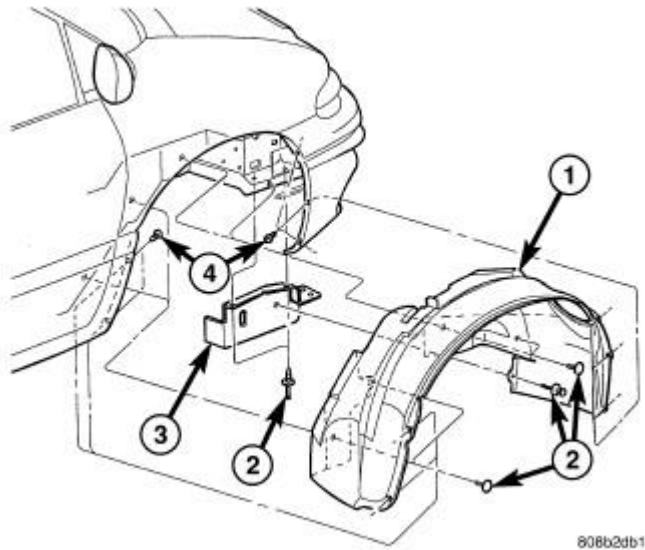


Fig. 55: Front Wheelhouse Splash Shield
Courtesy of CHRYSLER GROUP, LLC

41. Install the right and left front inner fender well (1). Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
42. Install the front tires. Refer to **INSTALLATION** .

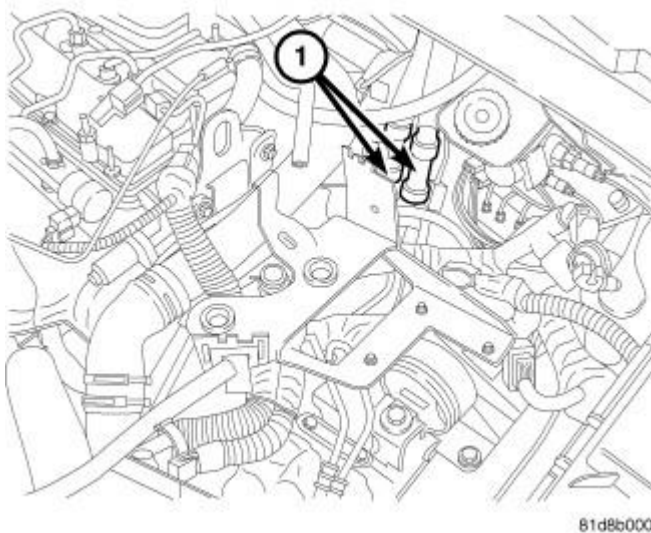


Fig. 56: Heater Core Coolant Hoses
Courtesy of CHRYSLER GROUP, LLC

43. Connect the coolant hoses (1) to the heater core.

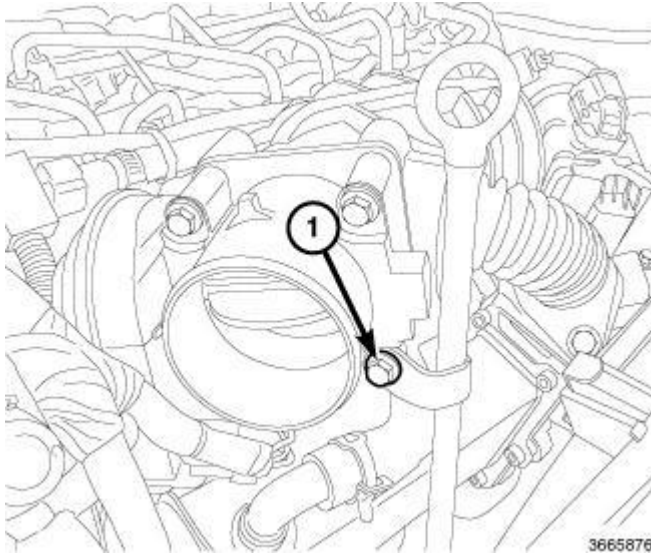


Fig. 57: Oil Level Indicator Tube Upper Bolt
Courtesy of CHRYSLER GROUP, LLC

44. Connect the A/C pressure transducer harness connector.
45. Connect the engine harness connectors to the Powertrain Control Module (PCM).
46. Connect engine to body harness connectors.
47. Install the oil level indicator tube. Tighten bolt (1) to 11 N.m (97 in. lbs.).

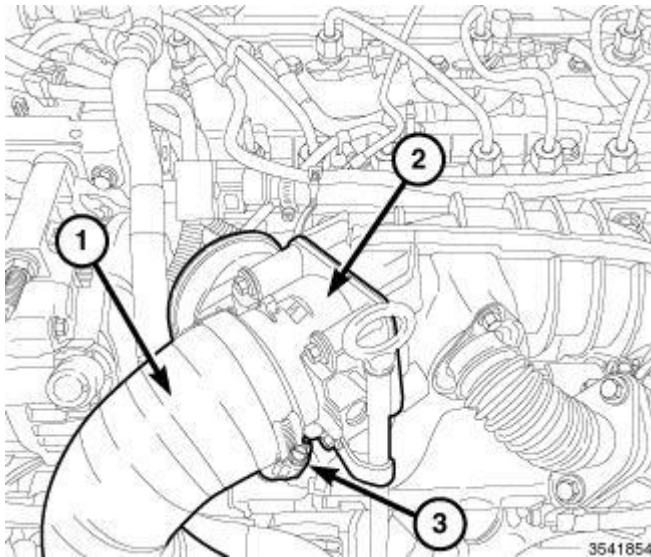


Fig. 58: Charge Inlet Tube, EGR Air Control Valve & Clamp
Courtesy of CHRYSLER GROUP, LLC

48. Connect the charge inlet tube (1) from the EGR air control valve (2) securely tighten clamp (3).

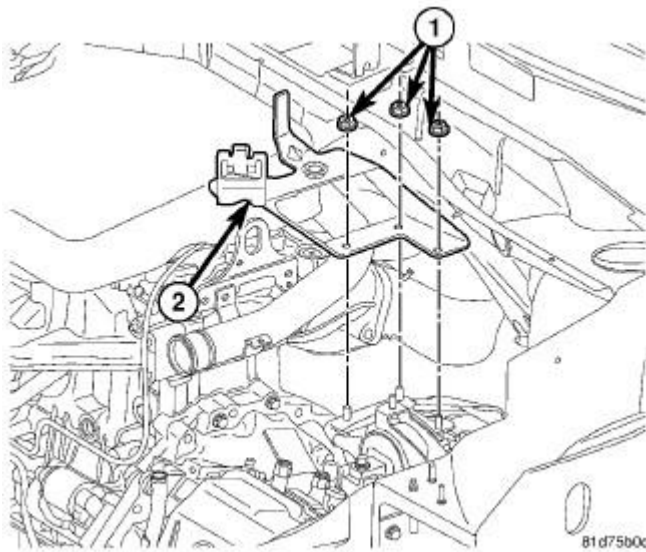


Fig. 59: Coolant Overflow Bottle Bracket & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

49. Install the fasteners (1), and the coolant overflow bottle bracket.

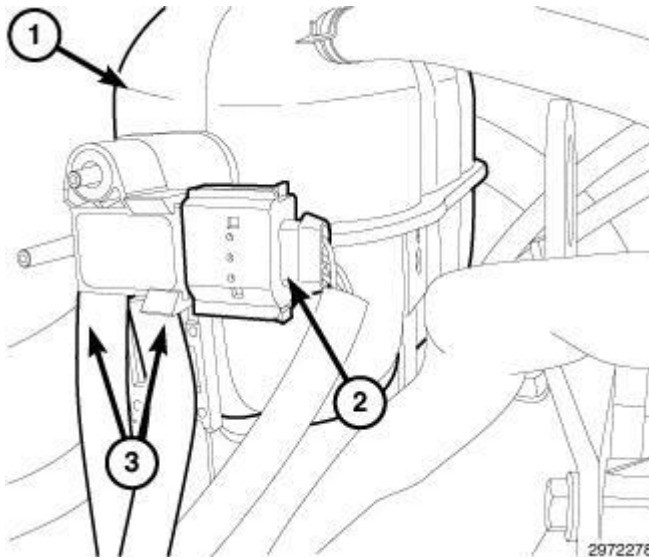


Fig. 60: Differential Pressure Sensor Hoses & Harness Connector
 Courtesy of CHRYSLER GROUP, LLC

50. Connect the Differential Pressure Sensor (DPS) wire harness connector (2).
51. Connect the two DPS hoses (3).
52. Connect the brake booster vacuum hose.

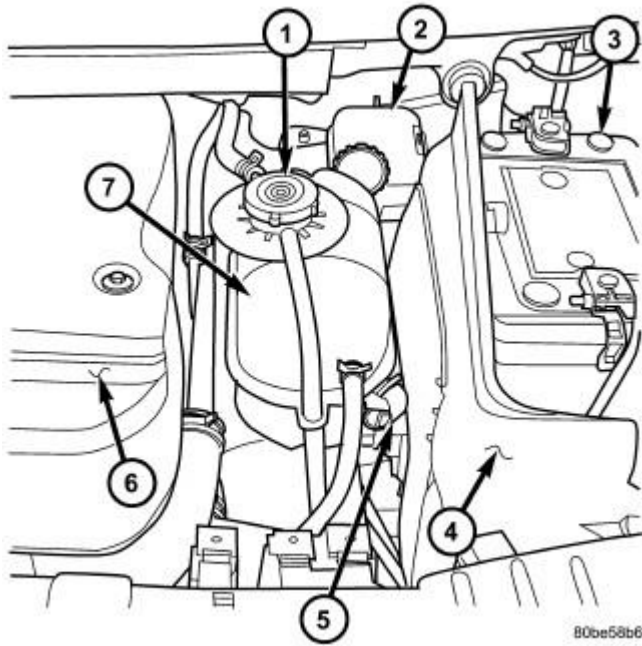


Fig. 61: Coolant Recovery Container Components
Courtesy of CHRYSLER GROUP, LLC

53. Install the coolant recovery bottle. Refer to **BOTTLE, COOLANT RECOVERY, INSTALLATION**.

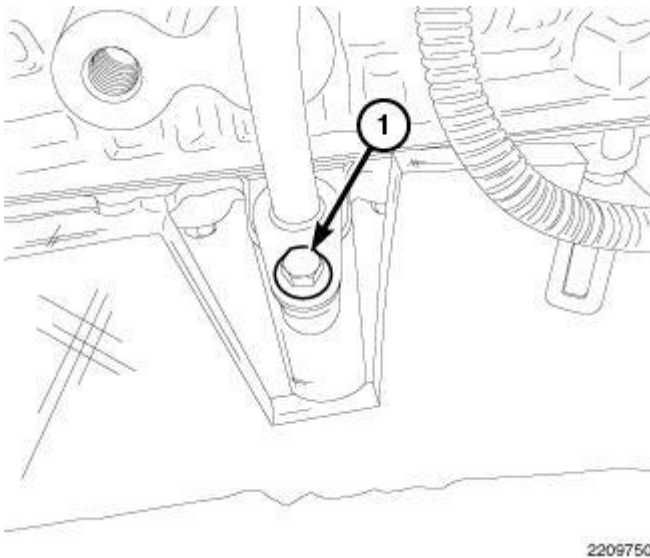
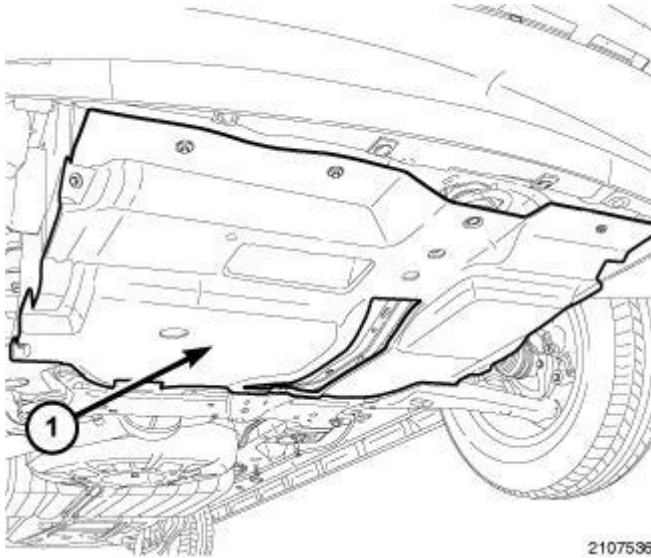


Fig. 62: Oil Level Indicator Tube Lower Bolt
Courtesy of CHRYSLER GROUP, LLC

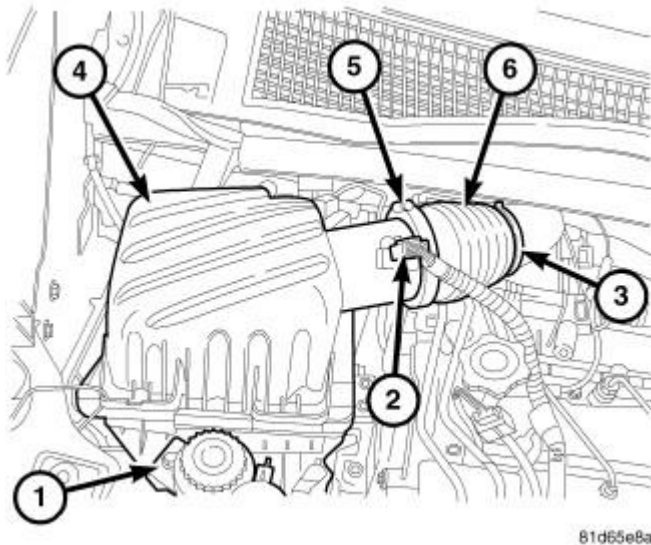
54. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
55. Install the oil indicator lower bolt (1). Tighten bolt (1) to 11 N.m (97 in. lbs.).



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Fig. 63: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

56. Install the underbody splash shield (1).
57. Lower the vehicle.



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Fig. 64: Intake Air Box
Courtesy of CHRYSLER GROUP, LLC

58. Install the cooling fan module. Refer to **FAN, COOLING, INSTALLATION** .
59. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .

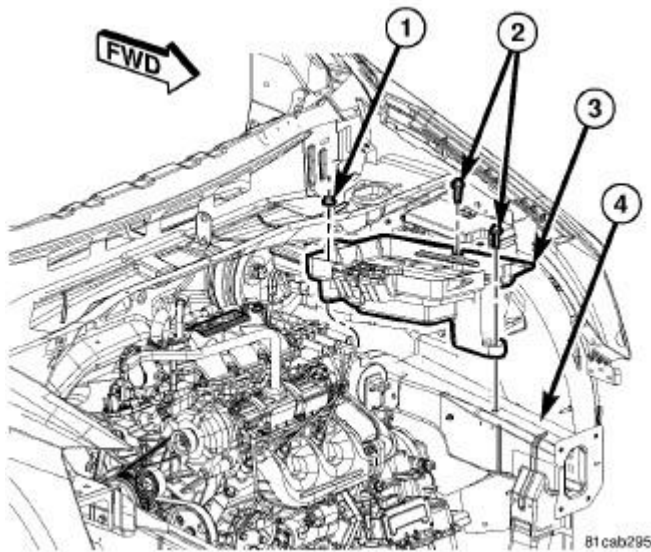


Fig. 65: Identifying Bolts, Nut, Battery Tray And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

60. Charge the refrigerant system. Refer to **PLUMBING, FRONT, STANDARD PROCEDURE** .
61. Install the battery tray. Refer to **TRAY, BATTERY, INSTALLATION** .
62. Install a new oil filter. Fill the engine crankcase with the proper oil to the correct level. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
63. Start the engine and run until operating temperature is reached.
64. Adjust transmission linkage, if necessary.

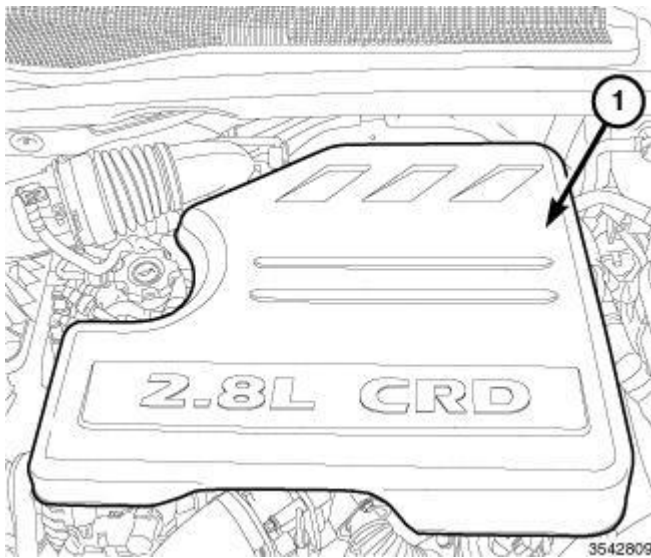
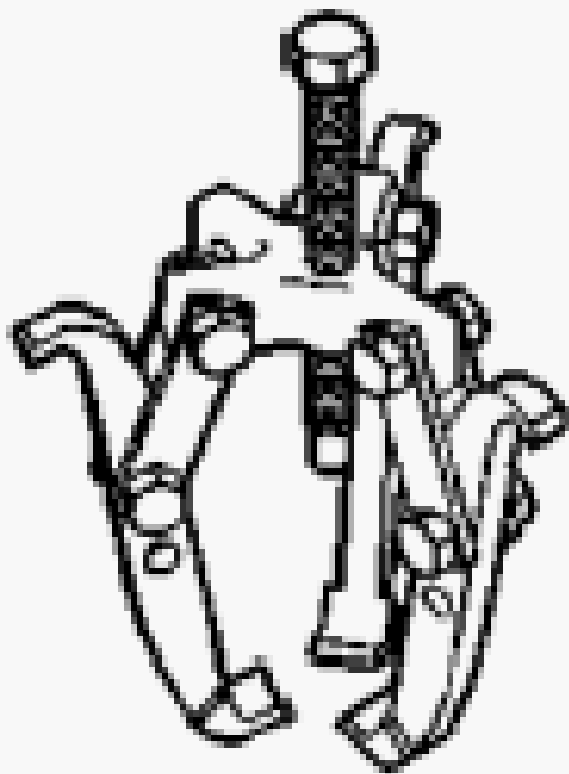


Fig. 66: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

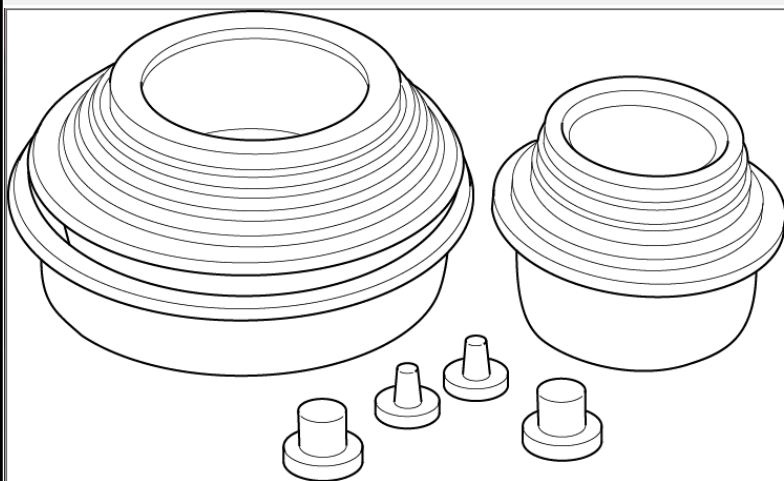
65. Install the engine cover (1).

SPECIAL TOOLS

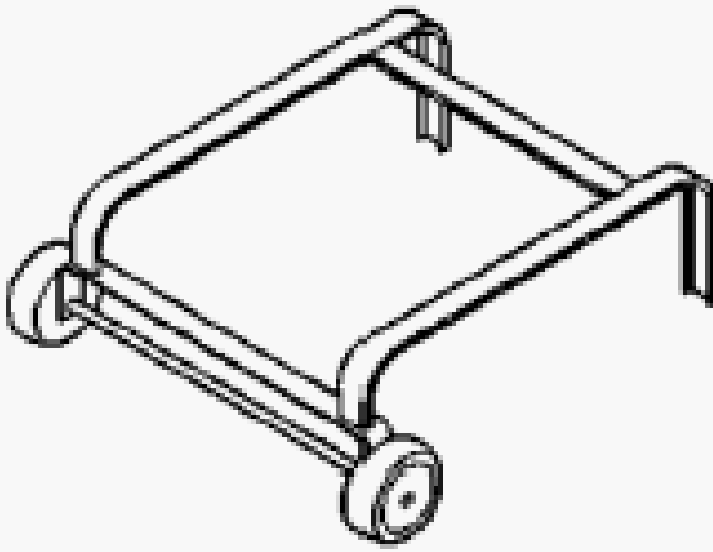
SPECIAL TOOLS



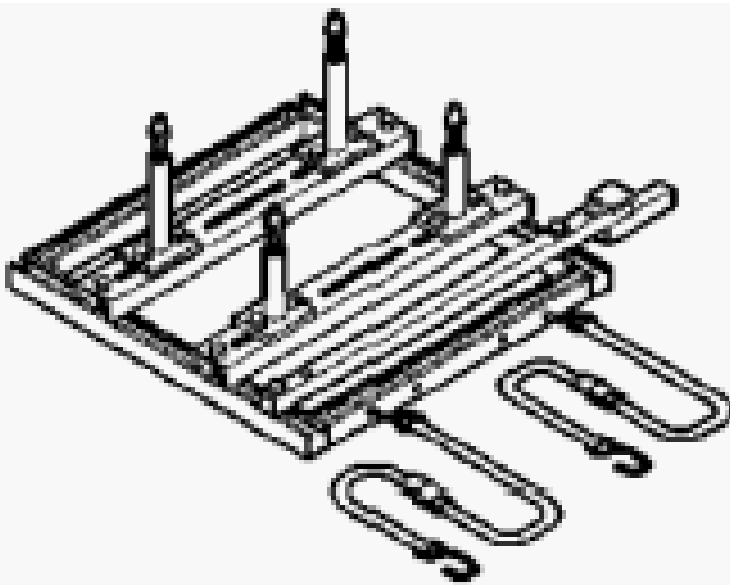
1023 - Puller
(Originally Shipped In Kit Number(s)
8678.)



10368 - Set, Universal Protective Cap

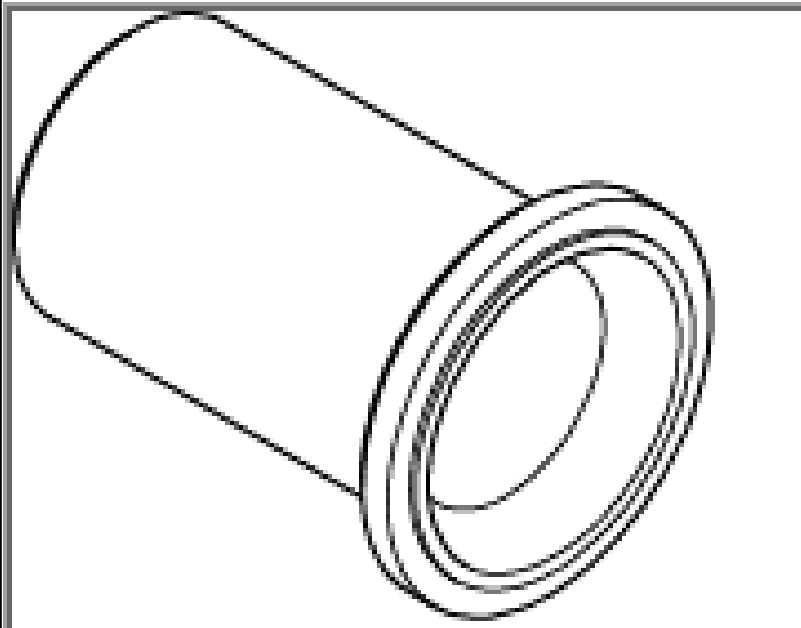
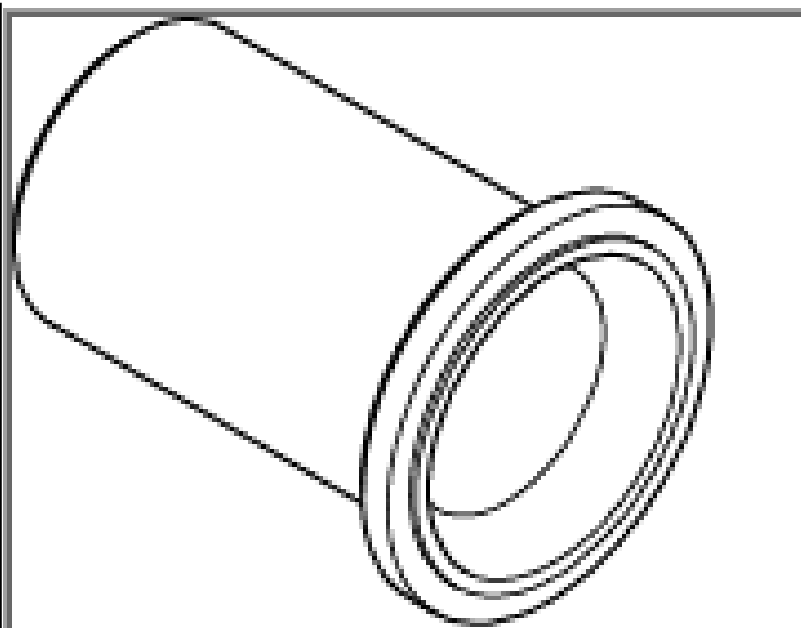


6135 - Dolly, Power Train
(Originally Shipped In Kit Number(s)
6784C.)

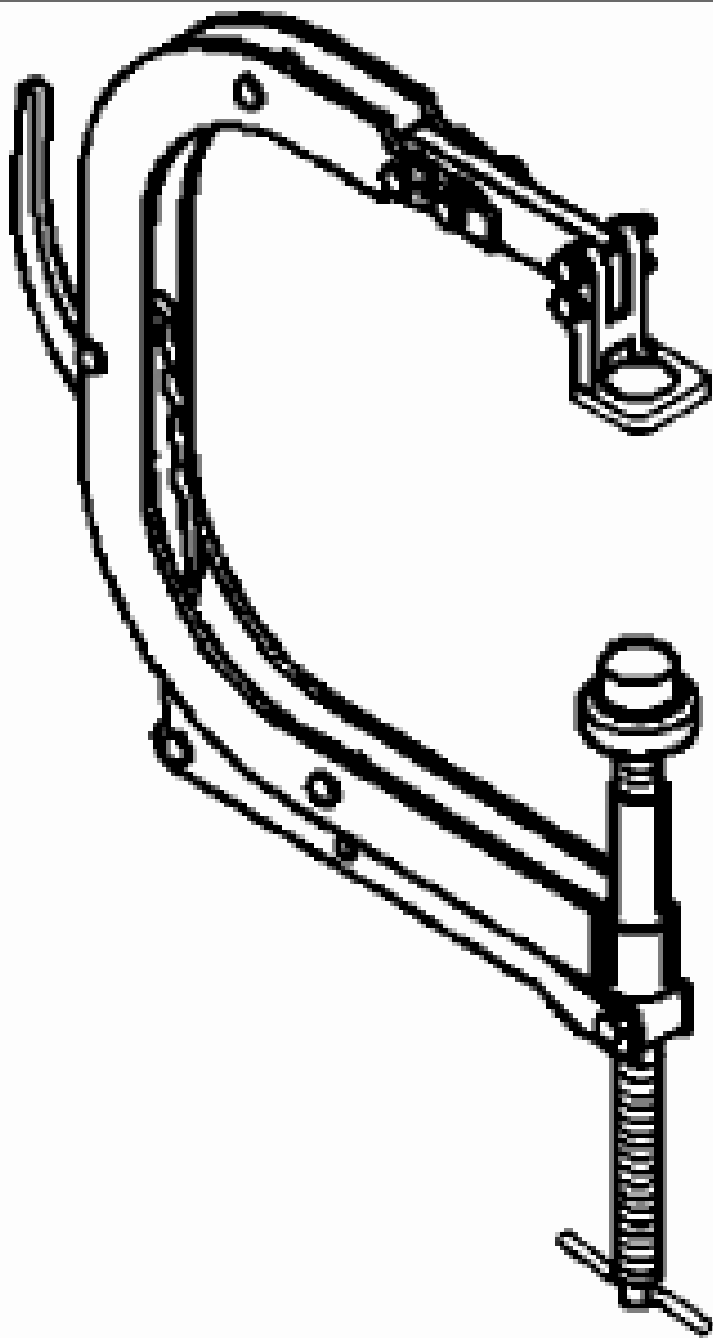


6710A - Cradle, Engine Support
(Originally Shipped In Kit Number(s)
6784, 6809.)

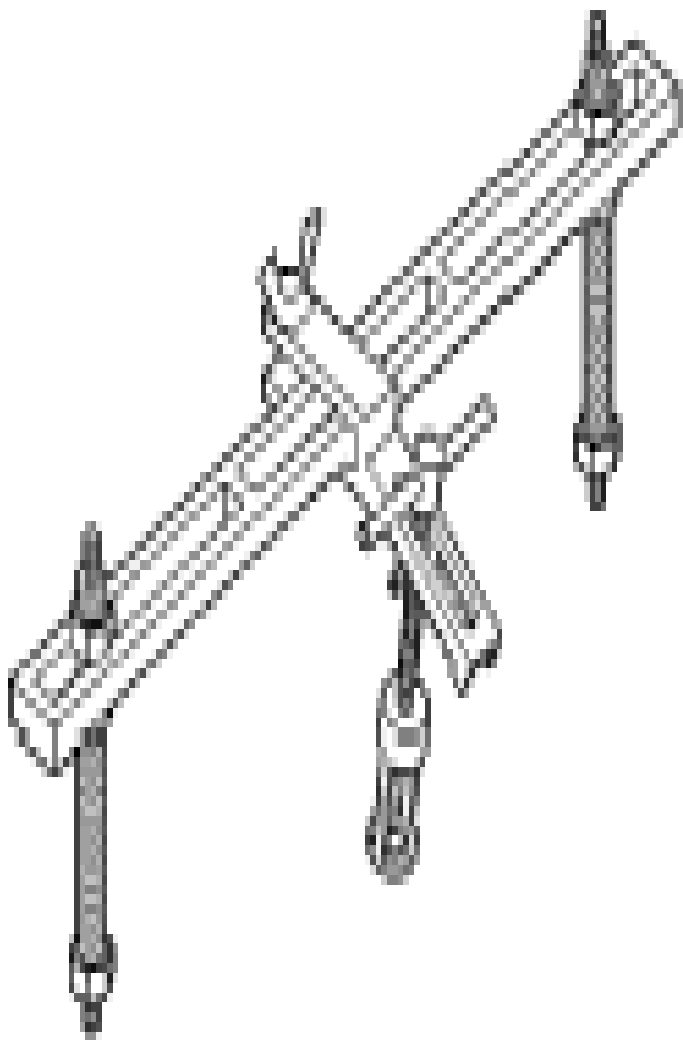
9937-1 - Installer, Seal
(Originally Shipped In Kit Number(s)
9937.)



9937-2 - Guide, Seal
(Originally Shipped In Kit Number(s)
9937.)

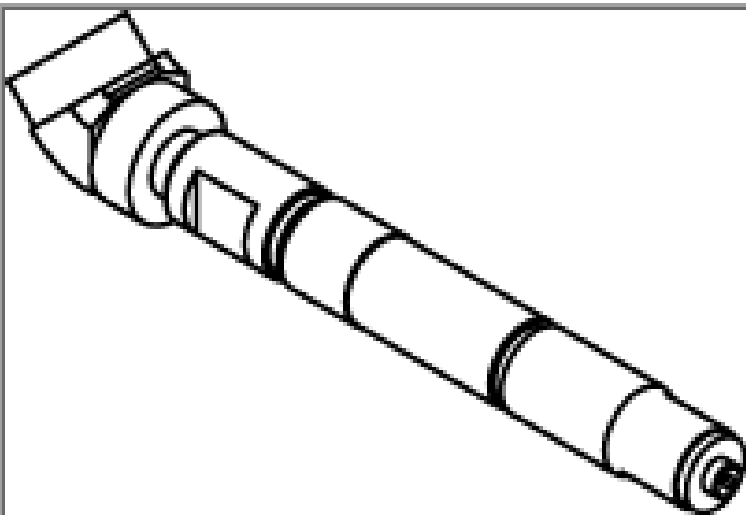
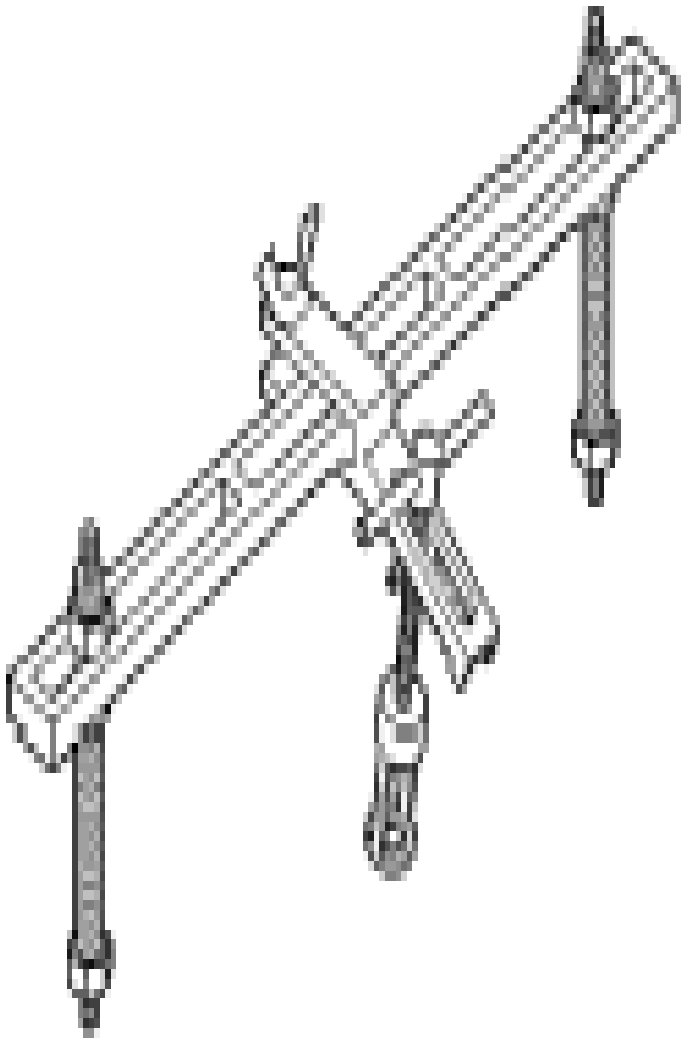


C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s)
9202.)

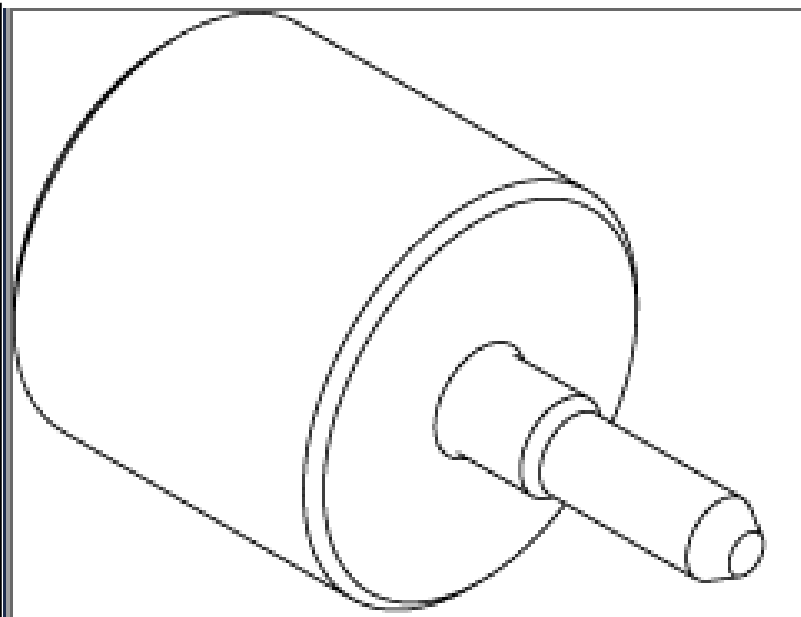


MD998772A - Compressor, Valve Spring
(Originally Shipped In Kit Number(s)
8678, 8853, 8854.)

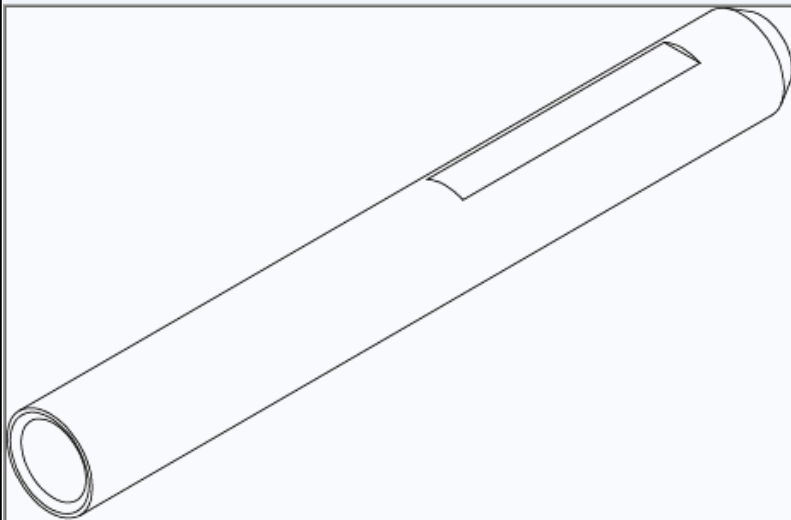
MD998772A-15 - Adapter
(Originally Shipped In Kit Number(s)
8678, 8853, 8854.)



VM.10010 - Adapter, Compression Test

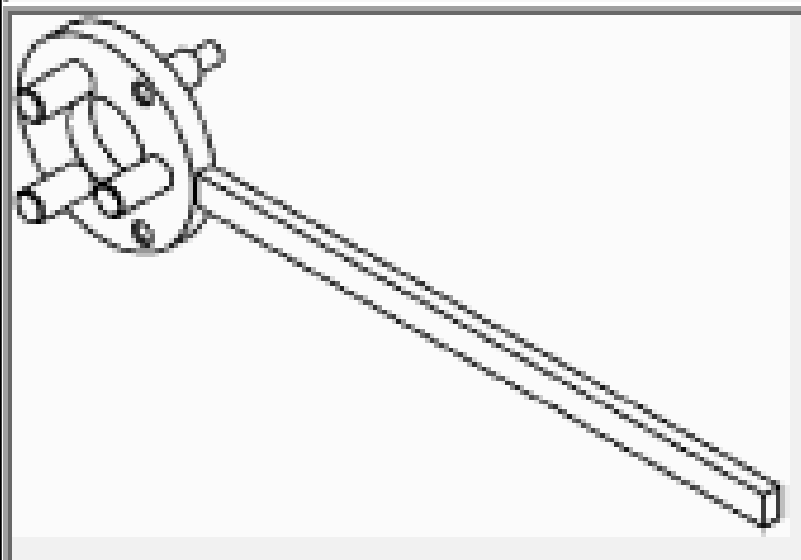
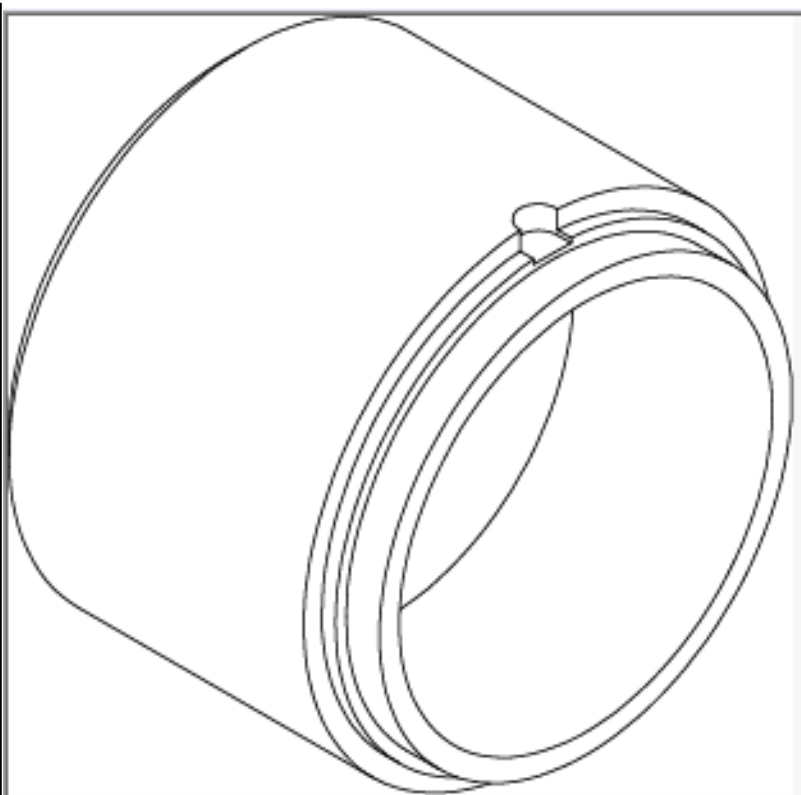


VM.10012 - Balance Shaft Split Gear
Align



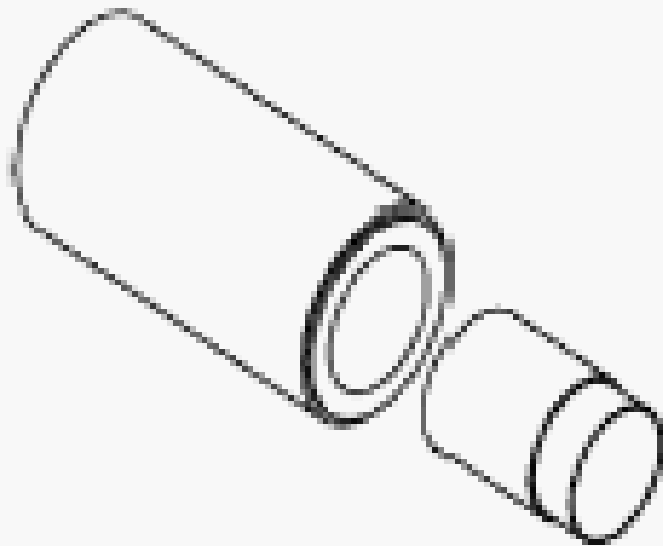
VM.10334 - Tool, Exhaust Manifold
Alignment

VM.10335 - Installer, Front Crankshaft
Oil Seal

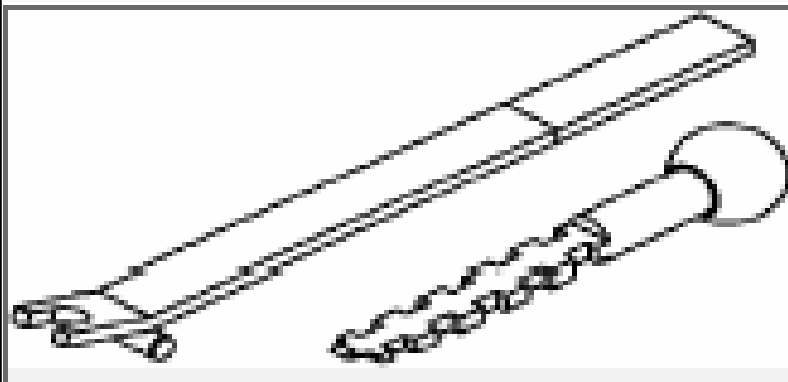


VM.1055 - Locking Tool
(Originally Shipped In Kit Number(s)
9599.)

VM.1057 - Installer, Seal

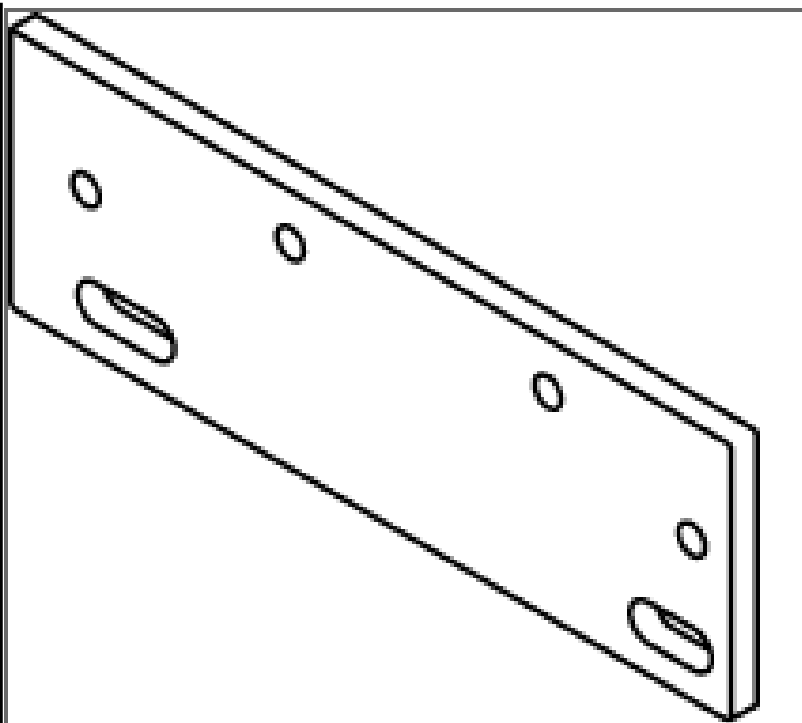


(Originally Shipped In Kit Number(s)
9599.)



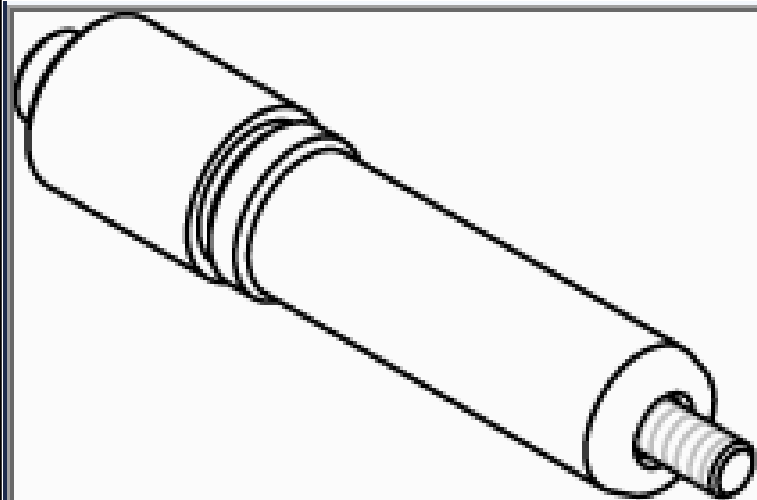
VM.1058 - Remover, Seal
(Originally Shipped In Kit Number(s)
9599.)

VM.9990 - Tool, Front And Rear Seal



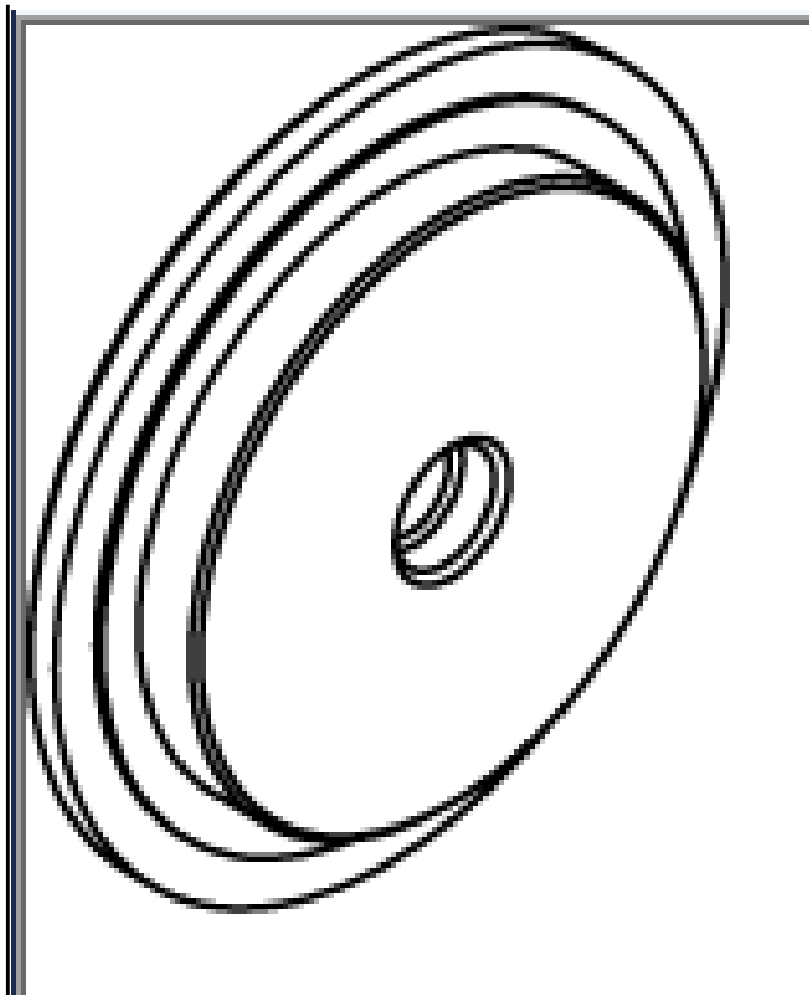
VM.9991 - Alignment Tool, Camshaft Sprocket





VM.9992 - Adapter, 90 Degree ATDC

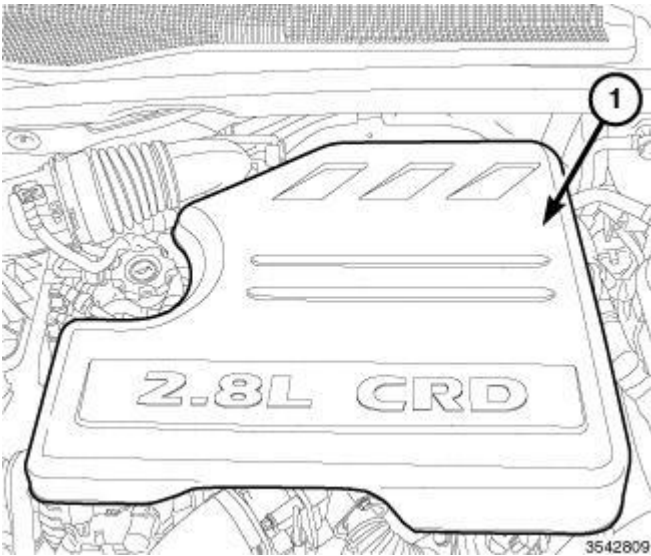
VM.9993 - Installer, Crankshaft Rear Oil Seal



COVER, ENGINE

DESCRIPTION

DESCRIPTION

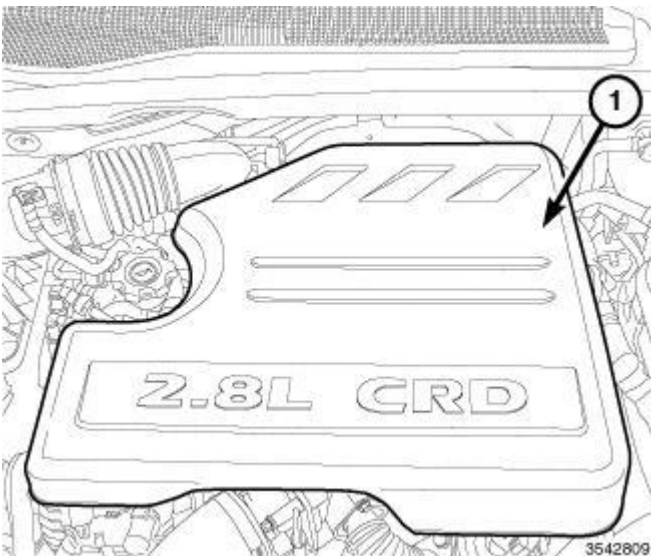
**Fig. 67: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

The insulated engine cover (1) is made of composite material and used cosmetically to cover the top of the engine and greatly reduce engine noise. Four brackets secure the cover to the engine.

REMOVAL

REMOVAL

**Fig. 68: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

1. Pull upward on the engine cover (1) to release from mounting brackets and remove the engine cover (1).

INSTALLATION

INSTALLATION

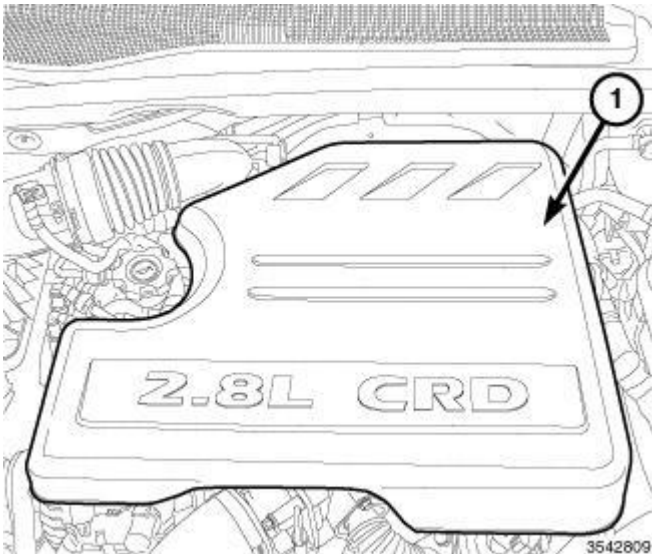


Fig. 69: Engine Cover

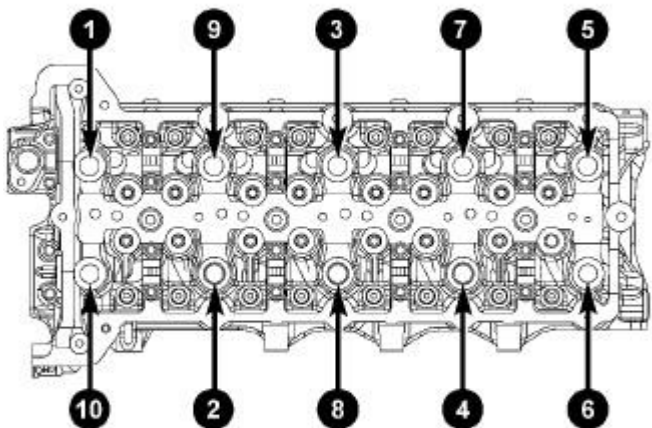
Courtesy of CHRYSLER GROUP, LLC

1. Align the engine cover (1) with the mounting bracket and push down to seat the cover.

CYLINDER HEAD

DESCRIPTION

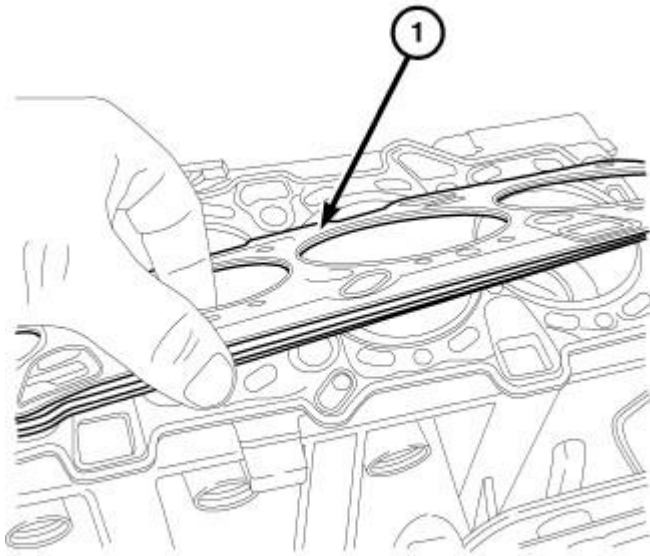
DESCRIPTION



8196b560

Fig. 70: Cylinder Head Bolt Tightening Sequence**Courtesy of CHRYSLER GROUP, LLC**

The 2.8L aluminum, overhead valve cylinder head is torqued in a cross pattern. The cylinder head itself is not resurfacingable.



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Fig. 71: MLS Head Gasket**Courtesy of CHRYSLER GROUP, LLC**

1. The cylinder head uses a selectable Multi-layered Steel gasket that is available in three sizes.

STANDARD PROCEDURE**VALVE SEALS - IN VEHICLE**

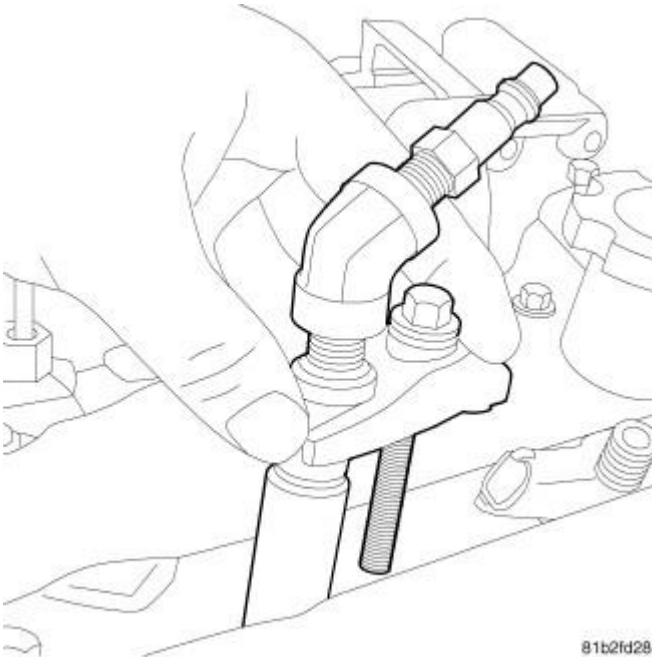


Fig. 72: Compression Tester
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.

NOTE: **Rocker arms and lifters must be kept in order of removal and stored in the up right position.**

2. Remove the rocker arms. Refer to **ROCKER ARM, VALVE, REMOVAL** .
3. Install the Compression Tester Adaptor Tool VM.10010, into the injector hole and retain with an injector hold down (2) bolt.
4. Prepare the (special tool #MD998772A, Compressor, Valve Spring) for usage by inverting the tool to cylinder head holding screws so that the thread size matches the cylinder head.
5. Install the (special tool #MD998772A, Compressor, Valve Spring) onto cylinder head and using (special tool #MD998772A-15, Adapter), place the adaptor over the valve spring.
6. Connect a regulated air supply (3) to Compression Test Adapter Tool VM.10010 and pressurize the cylinder.
7. Place shop towels around the working area of the cylinder head to prevent valve locks from accidentally entering the engine.

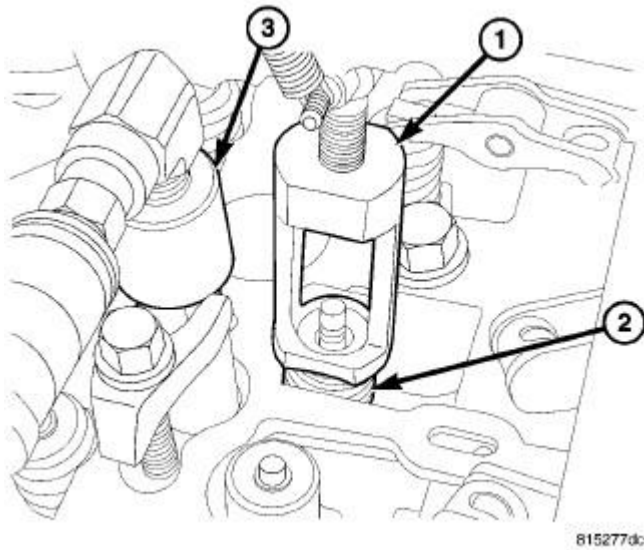


Fig. 73: Adaptors & Valve Spring
Courtesy of CHRYSLER GROUP, LLC

8. Using the (special tool #MD998772A-15, Adapter) (1), collapse the valve spring (2) and remove the locks.
9. Remove the valve spring (2) assembly.

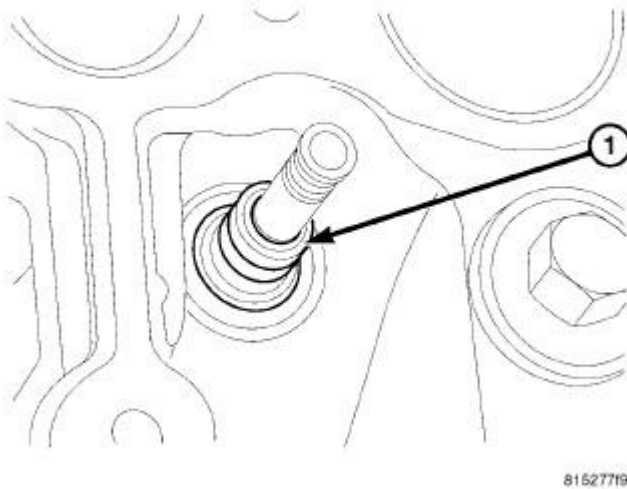


Fig. 74: Valve Seal
Courtesy of CHRYSLER GROUP, LLC

1 - VALVE SEAL

10. Remove the valve seal (1).

11. Repeat this procedure for all cylinders.
12. Install the rocker arms. Refer to **ROCKER ARM, VALVE, INSTALLATION** .
13. Connect the negative battery cable.

VALVE SERVICE

This procedure is done with the cylinder head removed.

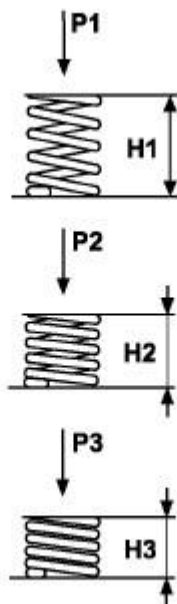
DISASSEMBLY

1. Remove the cylinder head. Refer to **CYLINDER HEAD, REMOVAL** .
2. Use Valve Spring Compressor Tool (special tool #MD998772A, Compressor, Valve Spring) and Valve Spring Adapter Tool (special tool #MD998772A, Compressor, Valve Spring) -15 and compress each valve spring.
3. Remove the valve locks, retainers, and springs.
4. Use a smooth stone or a jewelers file to remove any burrs on the top of the valve stem, especially around the groove for the locks.
5. Remove the valves, and place them in a rack in the same order as removed.

VALVE CLEANING

1. Clean all carbon deposits from the combustion chambers, valve ports, valve stems, valve stem guides and head.
2. Clean all residue and gasket material from the engine cylinder head machined gasket surface.

INSPECTION



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Fig. 75: Valve Spring Load Heights

Courtesy of CHRYSLER GROUP, LLC

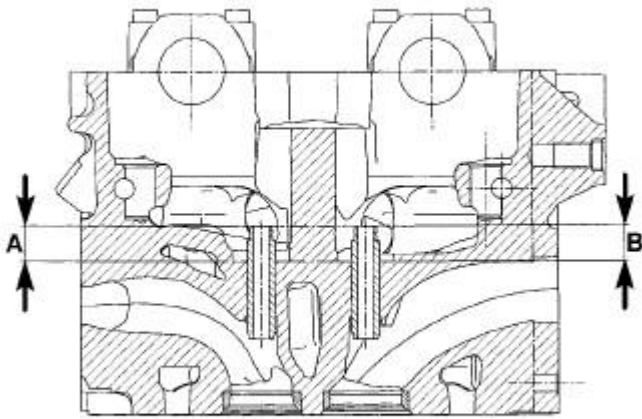
DESCRIPTION	LOAD Kg	HEIGHT mm	STATE
P1			
H1	0.00	50.8 mm	FREE LENGTH
P2			
H2	182-5 +10%	38.0 mm	VALVE CLOSED
P3			
H3	395±5%	29.0 mm	VALVE OPEN

1. Inspect for cracks in the combustion chambers and valve ports.
2. Inspect for cracks on the exhaust seat.
3. Inspect for cracks in the gasket surface at each coolant passage.
4. Inspect valves for burned, cracked or warped heads.
5. Inspect for scuffed or bent valve stems.
6. Replace valves displaying any damage.
7. Check valve spring height.

VALVE SEAT REFACING

1. Install a pilot of the correct size in the valve guide bore. Reface the valve seat to the specified angle with a good dressing stone. Remove only enough metal to provide a smooth finish.
2. Use tapered stones to obtain the specified seat width when required.

VALVE GUIDES



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Fig. 76: Valve Height

Courtesy of CHRYSLER GROUP, LLC

1. Valve Guides height requirement.
2. Measurement A and B: 13.50 mm - 14.00 mm (0.570 in - 0.590 in).

VALVE STEM-TO-GUIDE CLEARANCE MEASUREMENT

1. Measure and record internal diameter of valve guides. Valve guide internal diameter is 6.0 to 6.012 mm (0.2362 to 0.2366 in).
2. Measure valve stems and record diameters. Intake valve stem diameter 5.952 to 5.97 mm (0.2343 to 0.2350 in). Exhaust valve stem diameter 5.942 to 5.96 mm (0.2339 to 0.2346 in).
3. Subtract diameter of valve stem from internal diameter of its respective valve guide to obtain valve stem clearance in valve guide. Clearance of inlet valve stem in valve guide is 0.03 to 0.06 mm (.0011 to .0023 in). Clearance of exhaust valve stem in valve guide is 0.04 to 0.07 mm (.0015 to .0027 in).
4. If valve stem clearance in valve guide exceeds tolerances, new valve guides must be installed.

REMOVAL

REMOVAL

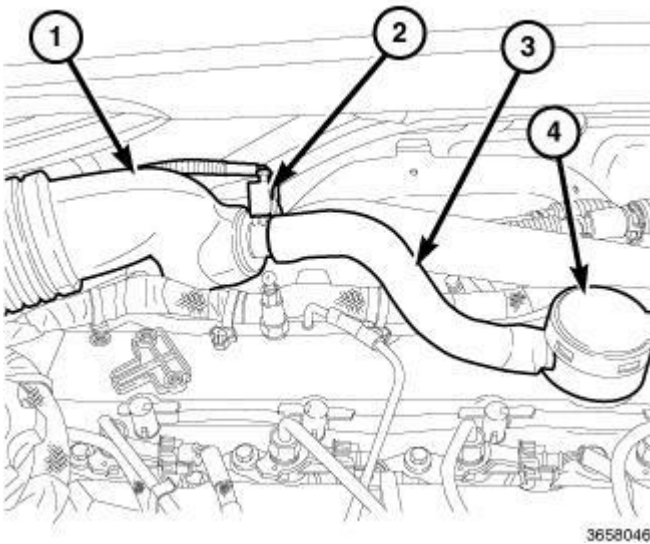


Fig. 77: Turbocharger Inlet Tube, Crankcase Vent Hose Heater Wire Harness Connector, Crankcase Vent Hose & Oil Separator

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
4. Disconnect the crankcase vent hose (3) from the oil separator (4).
5. Disconnect the crankcase vent hose heater harness connector (2).
6. Loosen clamp and remove the turbocharger inlet tube (1) from turbocharger.

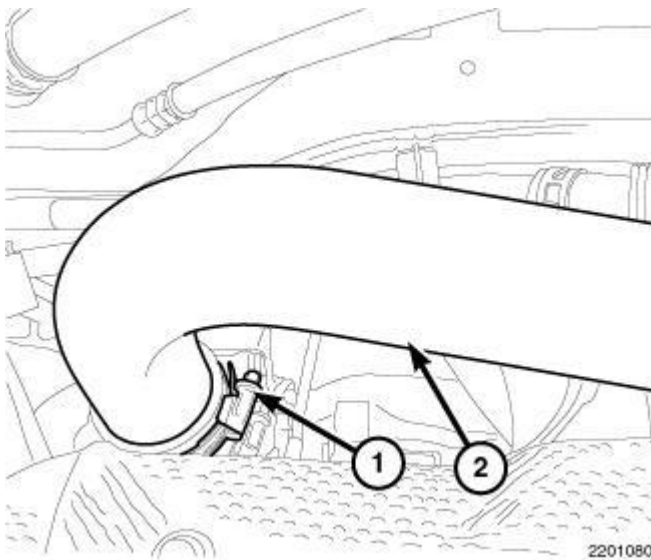


Fig. 78: Charge Air Cooler Inlet Hose & Clamp

Courtesy of CHRYSLER GROUP, LLC

7. Loosen clamp (1) and disconnect the charge air cooler inlet hose (2) from turbocharger.

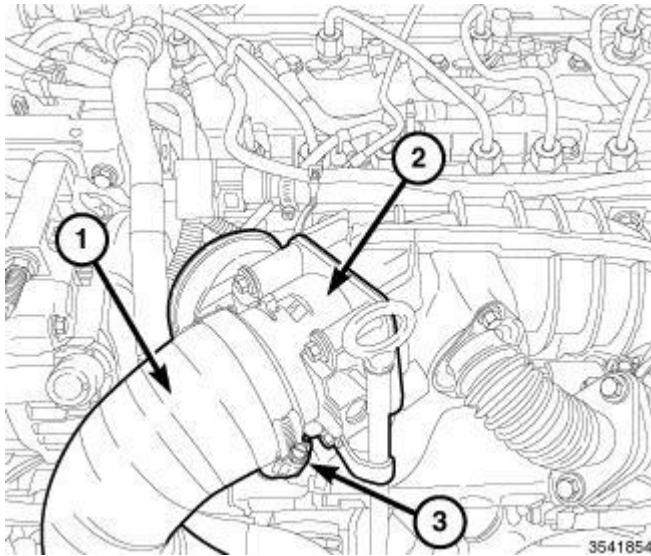


Fig. 79: Charge Inlet Tube, EGR Air Control Valve & Clamp
Courtesy of CHRYSLER GROUP, LLC

8. Remove the Charge Air Cooler (CAC) outlet hose (1) from the EGR air flow control valve (2).
9. Remove the intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL** .
10. Remove the exhaust manifold. Refer to **MANIFOLD, EXHAUST, REMOVAL**.
11. Remove the camshafts. Refer to **CAMSHAFT, ENGINE, REMOVAL** .

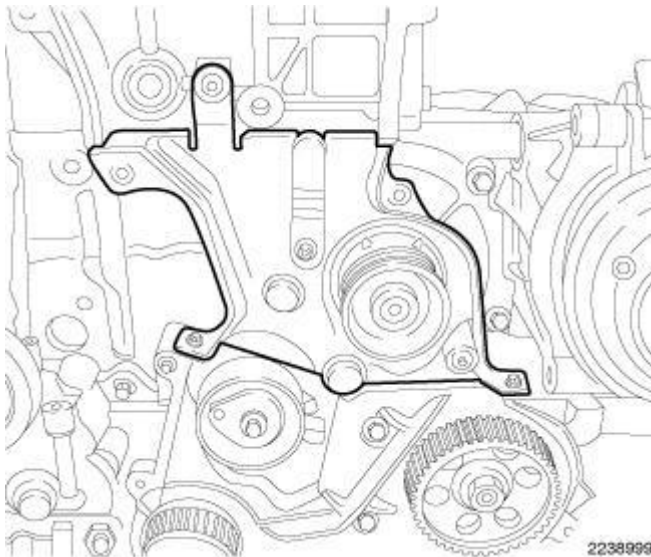


Fig. 80: Inner Timing Belt Cover
Courtesy of CHRYSLER GROUP, LLC

12. Remove the inner timing cover.

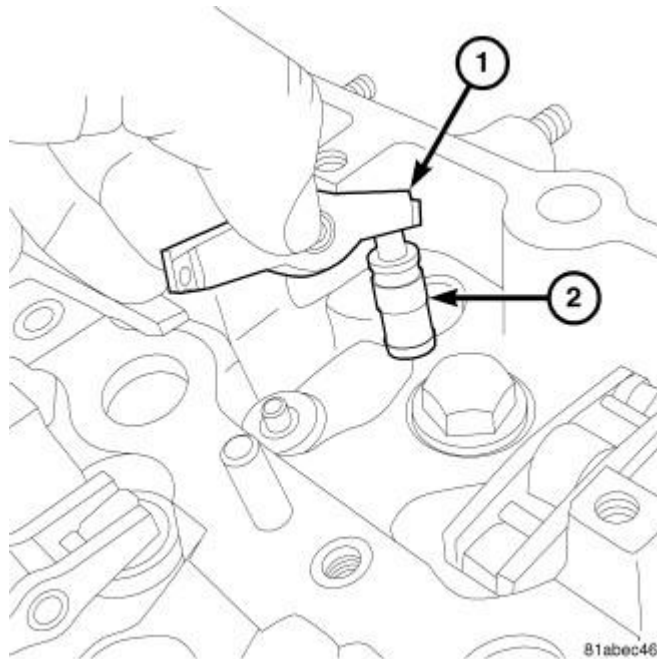


Fig. 81: Rocker Arms & Hydraulic Lifters
Courtesy of CHRYSLER GROUP, LLC

NOTE: Observe the position of the rocker arms and lifters. Always return the rocker arms and lifters to their original location.

13. Remove the rocker arms (1) and hydraulic lifters (2).
14. Remove the cylinder head bolts.
15. Remove the cylinder head.

CLEANING

CLEANING

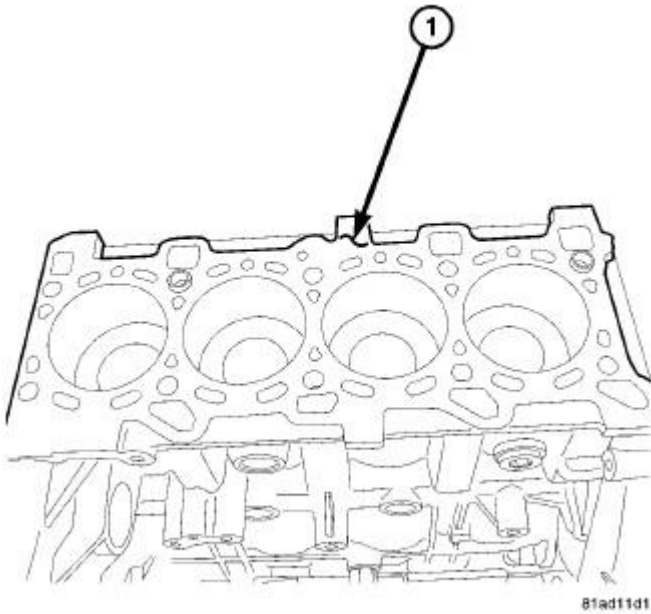


Fig. 82: Engine Block

Courtesy of CHRYSLER GROUP, LLC

Thoroughly clean the engine cylinder head and cylinder block mating surfaces. Clean the intake and exhaust manifold and engine cylinder head mating surfaces. Remove all gasket material and carbon. Refer to **ENGINE GASKET SURFACE PREPARATION** .

Check to ensure that no coolant or foreign material has fallen into the tappet bore area.

Remove the carbon deposits from the combustion chambers and top of the pistons.

INSPECTION

INSPECTION

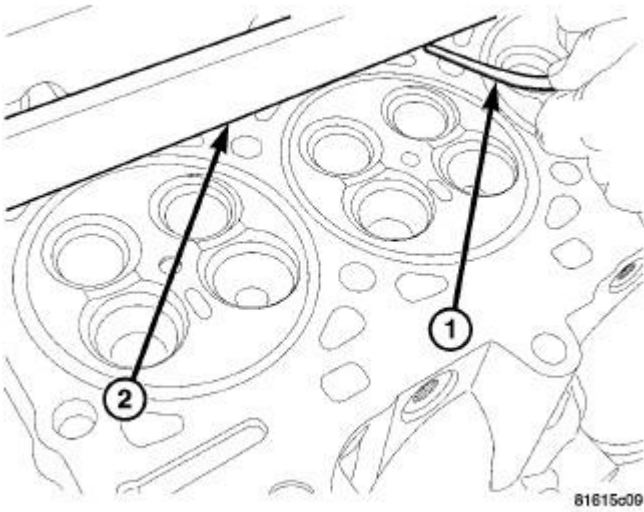


Fig. 83: Measuring Cylinder Head Flatness (1 Of 2)
Courtesy of CHRYSLER GROUP, LLC

- 1 - FEELER GAUGE
- 2 - STEEL STRAIGHT EDGE

CAUTION: The cylinder head surface and straight edge must be absolutely clean before the flatness measurement is taken. **DO NOT** check flatness across the combustion chamber area or on the marks left by the gasket stopper.

Use a cleaned straight edge (2) and feeler (1) gauge to check the flatness. Lie the straight edge (2) parallel across the cooling ports. Measure before each combustion chamber toward the outer edge of the cylinder head, above and below each combustion chamber, between each combustion chamber, top and bottom, on the cylinder head and block mating surfaces. The **maximum** allowed warpage is 0.075mm (0.003 in.).

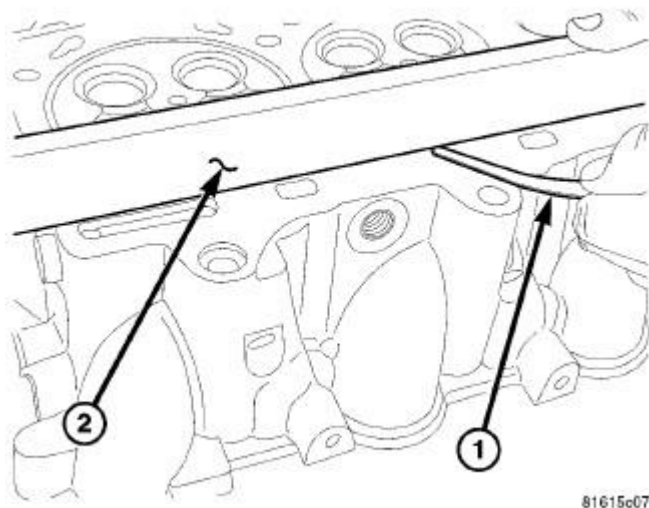


Fig. 84: Measuring Cylinder Head Flatness (2 Of 2)
Courtesy of CHRYSLER GROUP, LLC

- 1 - Item_1
- 2 - Item_2

The minimum cylinder head thickness is 135.5 mm (5.33 in.).

INSTALLATION

INSTALLATION

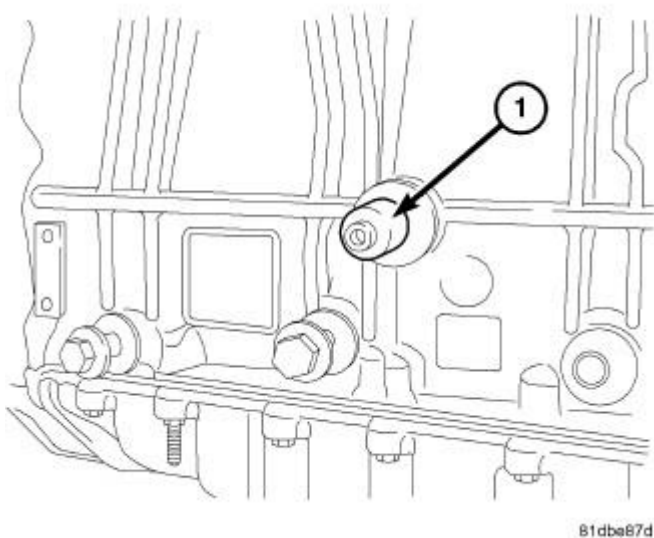
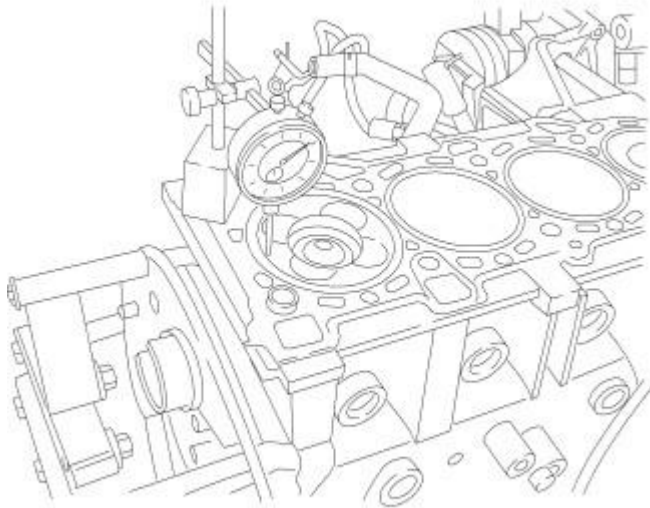


Fig. 85: Crankshaft Locking Tool
Courtesy of CHRYSLER GROUP, LLC

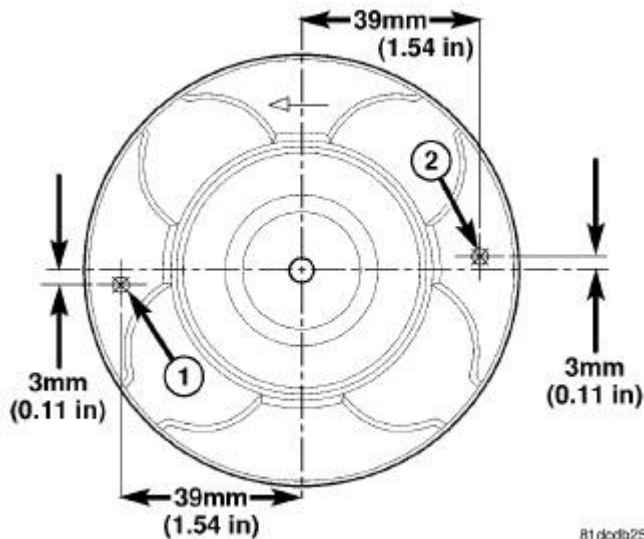
1. Remove the (special tool #VM.9992, Adapter, 90 Degree ATDC) (1).
2. Set the number one piston to top dead center (TDC).



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Fig. 86: Deck Height

Courtesy of CHRYSLER GROUP, LLC



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Fig. 87: Piston Protrusion Measurement

Courtesy of CHRYSLER GROUP, LLC

3. Assemble and position the (special tool #C-3339A, Set, Dial Indicator) on the top of the piston at location (1) shown in illustration.
4. Use the (special tool #C-3339A, Set, Dial Indicator) to measure the height of the piston at top dead center.

5. Zero the (special tool #C-3339A, Set, Dial Indicator) on the top of the piston at location (2) shown in illustration.
6. Use the (special tool #C-3339A, Set, Dial Indicator) to measure the height of the piston at top dead center.
7. Repeat the procedure for each cylinder.
8. Average the 4 piston protrusion readings to determine the required gasket thickness.
9. Select the appropriate cylinder head gasket from the cylinder head gasket chart.

Cylinder Head Gasket Selection		
	Millimeters	Inches
DISTANCE FROM PISTON AT TDC TO CYLINDER BLOCK	0.300 - 0.399	0.0119 - 0.0158
CYLINDER HEAD GASKET THICKNESS (No Hole)	1.10	0.0434
PISTON CLEARANCE	0.700 - 0.800	0.0276 - 0.0315
DISTANCE FROM PISTON AT TDC TO CYLINDER BLOCK	0.400 - 0.499	0.0158 - 0.0197
CYLINDER HEAD GASKET THICKNESS (One Hole)	1.20	0.0473
PISTON CLEARANCE	0.700 - 0.800	0.0276 - 0.0315
DISTANCE FROM PISTON AT TDC TO CYLINDER BLOCK	0.500 - 0.600	0.0197 - 0.0237
CYLINDER HEAD GASKET THICKNESS (Two Holes)	1.30	0.0512
PISTON CLEARANCE	0.700 - 0.800	0.0276 - 0.0315

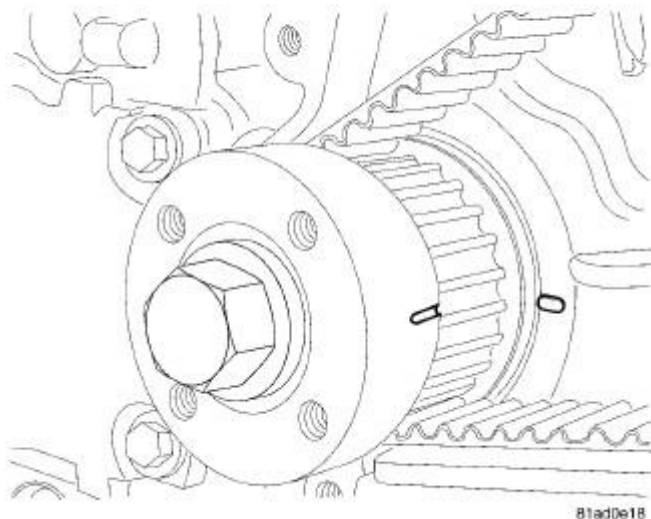
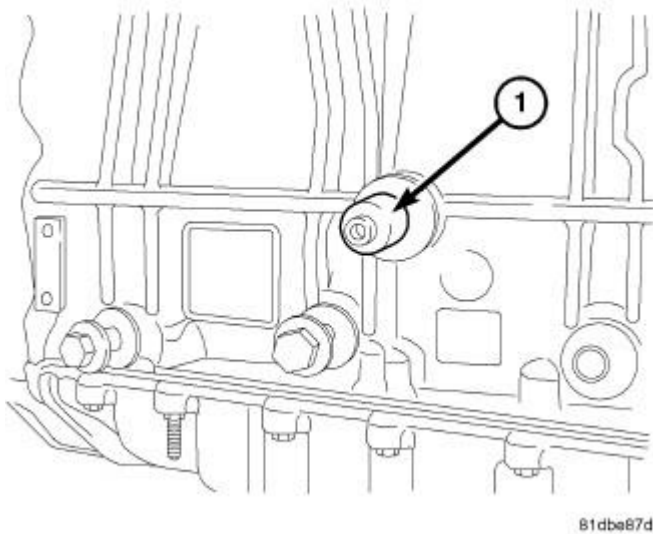


Fig. 88: Crankshaft Timing Marks

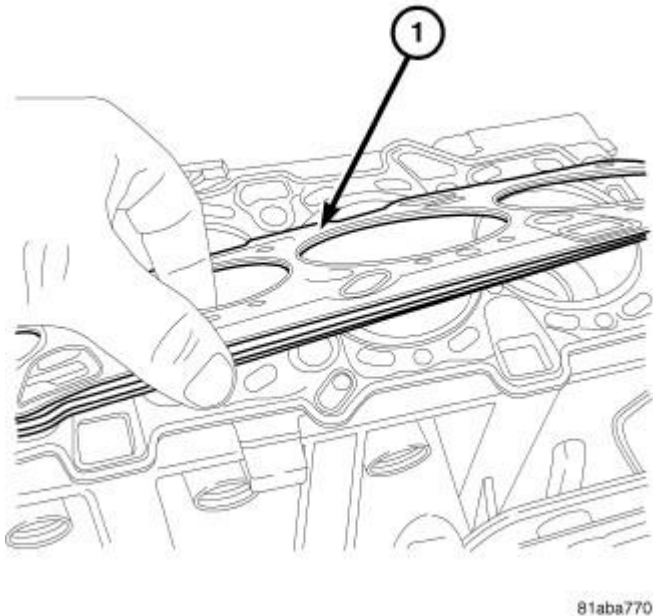
Courtesy of CHRYSLER GROUP, LLC

10. Return piston No. 1 to 90 degrees ATDC, and align the crankshaft timing marks.

**Fig. 89: Crankshaft Locking Tool**

Courtesy of CHRYSLER GROUP, LLC

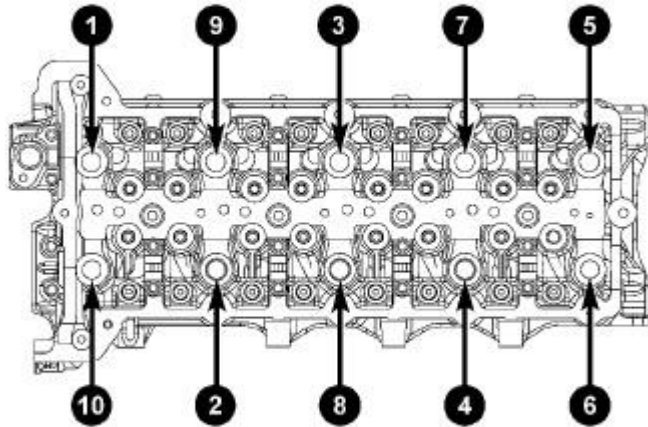
11. Reinstall the (special tool #VM.9992, Adapter, 90 Degree ATDC) (1).

**Fig. 90: MLS Head Gasket**

Courtesy of CHRYSLER GROUP, LLC

12. Install the head gasket (1).

13. Install the cylinder head.



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Fig. 91: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

NOTE: Always use new cylinder head bolts with permanent washer whenever the existing bolts have been removed.

14. Install the cylinder head bolts in the illustrated pattern. Tighten the bolts to 30 N.m (22 ft. lbs.).
15. Repeat the pattern, turning the bolts an additional 85 degrees. Repeat the pattern twice more, turning an additional 85 degrees each time for a total of 255 degrees.

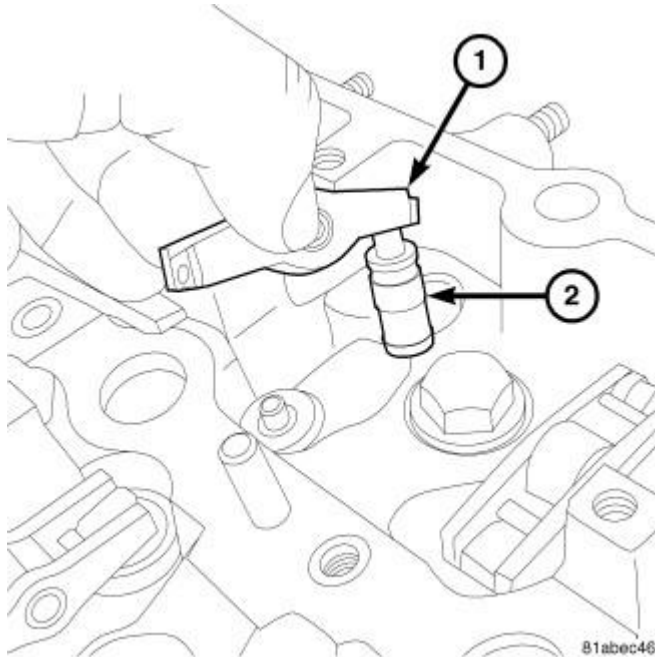


Fig. 92: Hydraulic Lifters & Rocker Arms
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure to return the lifters and arms to their original position.

16. Install the hydraulic lifters (2) and rocker arms (1).

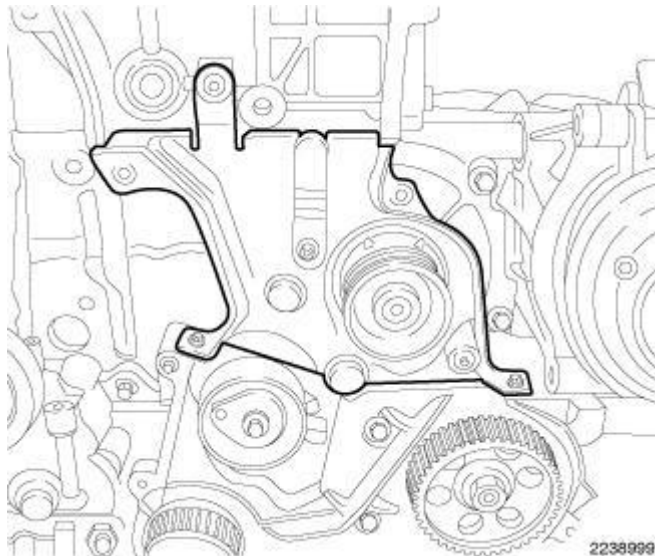


Fig. 93: Inner Timing Belt Cover
Courtesy of CHRYSLER GROUP, LLC

17. Install the inner timing cover. Torque the bolts to 11 N.m (97 in. lbs.).
18. Install the camshafts. Refer to **CAMSHAFT, ENGINE, INSTALLATION**.
19. Install the exhaust manifold. Refer to **MANIFOLD, EXHAUST, INSTALLATION**.

20. Install the intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION** .

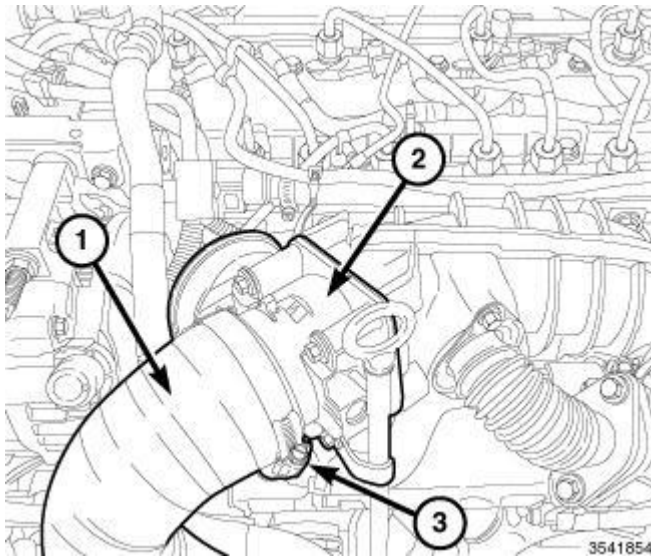


Fig. 94: Charge Inlet Tube, EGR Air Control Valve & Clamp
 Courtesy of CHRYSLER GROUP, LLC

21. Install the charge air cooler outlet hose (1) top the EGR air flow control valve (2).

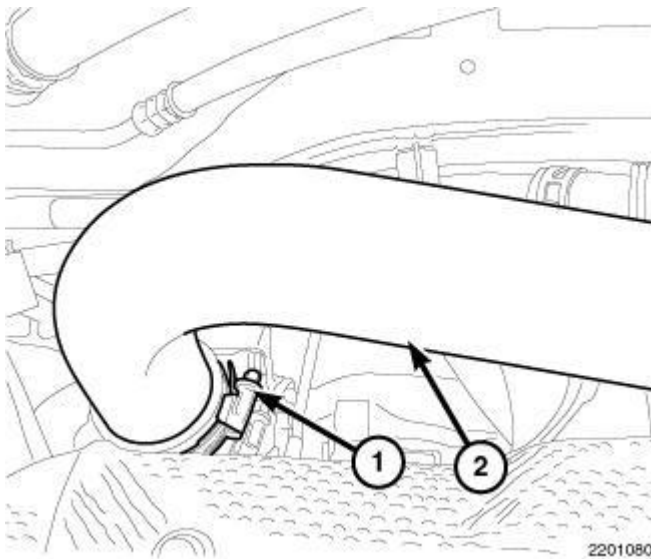


Fig. 95: Charge Air Cooler Inlet Hose & Clamp
 Courtesy of CHRYSLER GROUP, LLC

22. Install the charge air cooler inlet hose (2) to the turbocharger and tighten clamp (1).

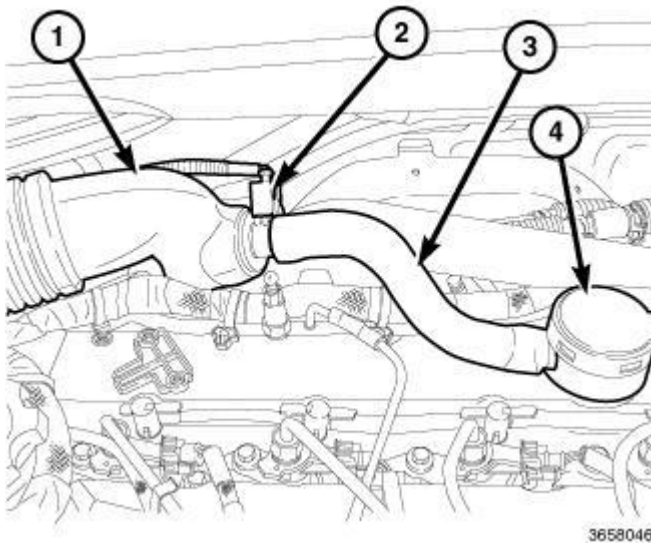


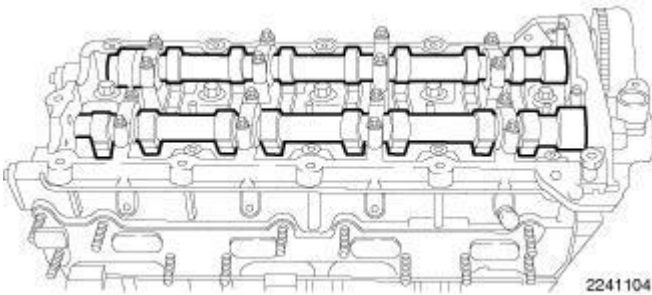
Fig. 96: Turbocharger Inlet Tube, Crankcase Vent Hose Heater Wire Harness Connector, Crankcase Vent Hose & Oil Separator
 Courtesy of CHRYSLER GROUP, LLC

23. Install the turbocharger inlet tube (1) and securely tighten clamp.
24. Connect the crankcase vent hose heater wire harness connector (2).
25. Connect the crankcase vent hose (3) to the oil separator (4).
26. Install the intake air body. Refer to **BODY, AIR CLEANER, INSTALLATION** .
27. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
28. Connect the negative battery cables.
29. Start the engine, and inspect for leaks.

CAMSHAFT, ENGINE

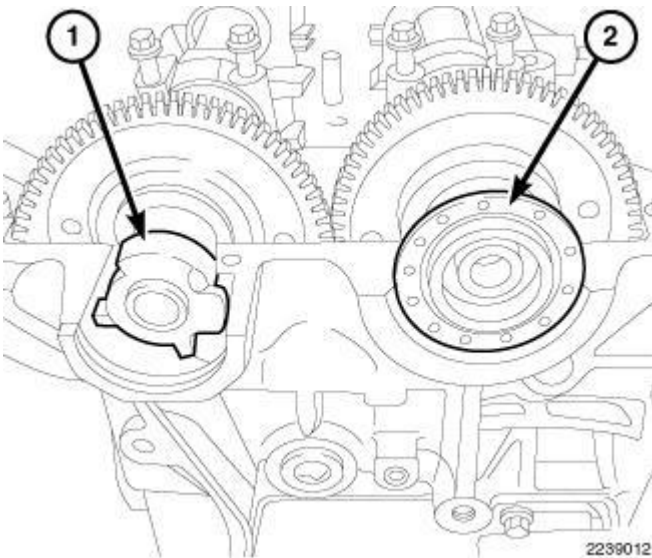
DESCRIPTION

DESCRIPTION

**Fig. 97: Camshafts**

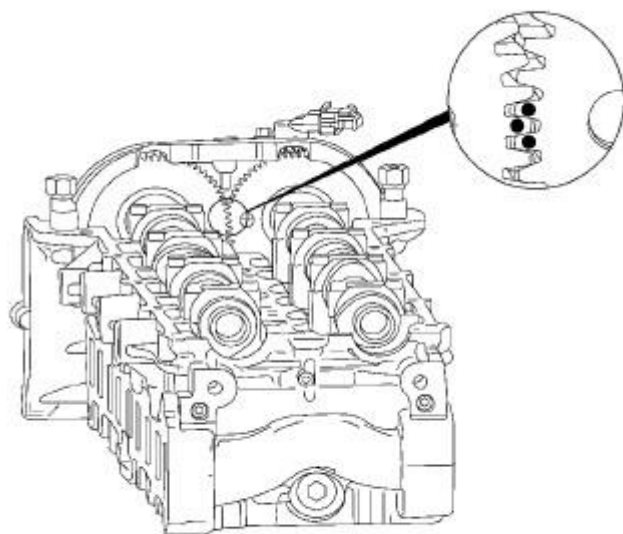
Courtesy of CHRYSLER GROUP, LLC

The camshafts are made of cast iron with eight machined lobes and four bearing journals.

**Fig. 98: Camshaft Oil Seal**

Courtesy of CHRYSLER GROUP, LLC

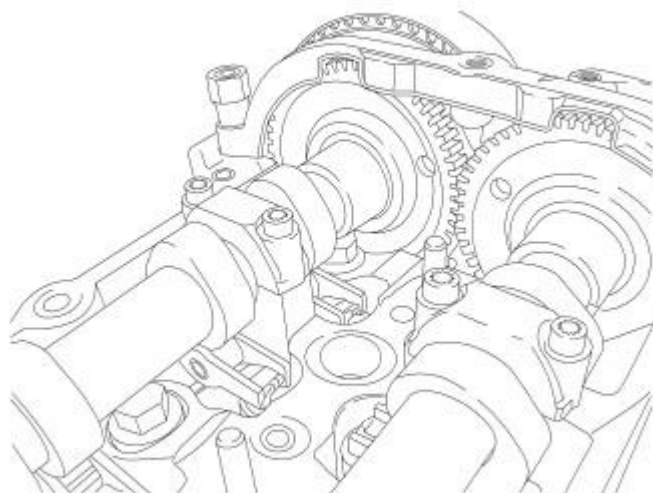
1. The exhaust camshaft (1) incorporates the Camshaft Position (CMP) sensor reluctor wheel. The intake camshaft uses a camshaft seal (2).



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Fig. 99: Camshaft Timing Dots
Courtesy of CHRYSLER GROUP, LLC

2. The dots on the back of the camshaft gears are for initial timing only. These dots are for timing the camshafts to each other.



81ad10c7

Fig. 100: Camshafts Set To 90 Degrees ATDC
Courtesy of CHRYSLER GROUP, LLC

3. To correctly set engine timing, the camshafts must be set to 90° ATDC. The Camshaft Locking Tool

(special tool #VM.9991, Alignment Tool, Camshaft Sprocket) is used to correctly set the camshafts to their proper location. The illustration above shows camshafts set at 90° ATDC.

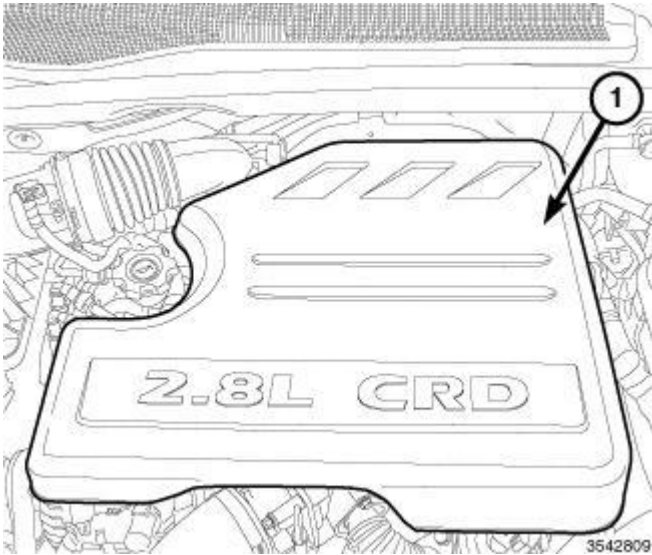
REMOVAL**REMOVAL**

Fig. 101: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

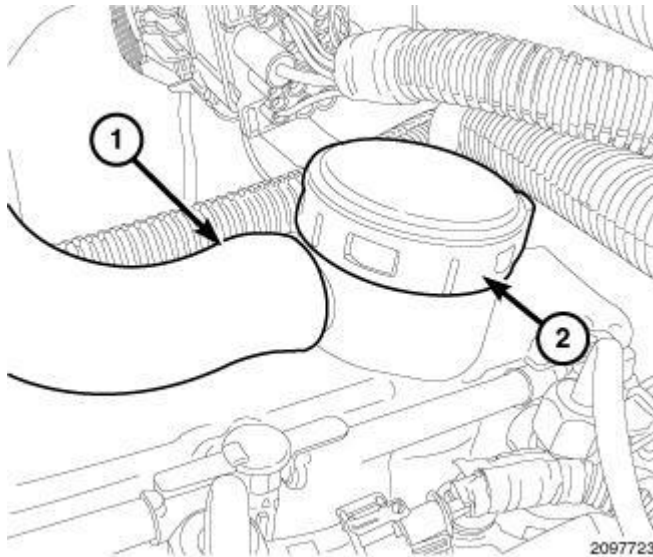


Fig. 102: Crankcase Vent Hose & Oil Separator

Courtesy of CHRYSLER GROUP, LLC

3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
4. Disconnect the crankcase vent hose (1) from the oil separator (2).

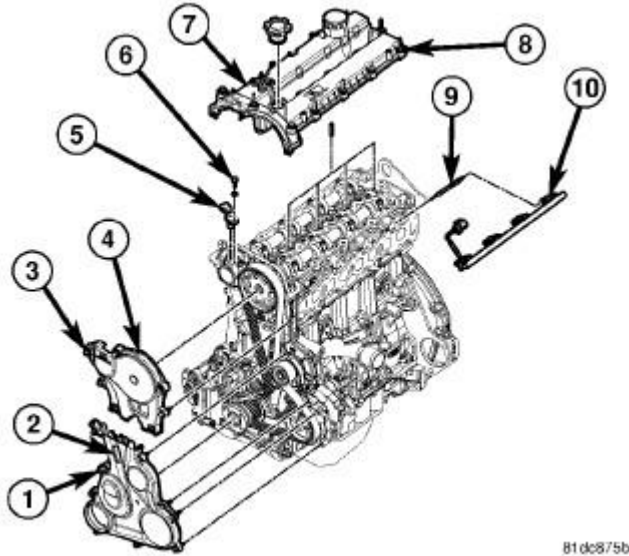


Fig. 103: Upper And Lower Front Covers
Courtesy of CHRYSLER GROUP, LLC

5. Remove the cylinder head cover (7). Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .

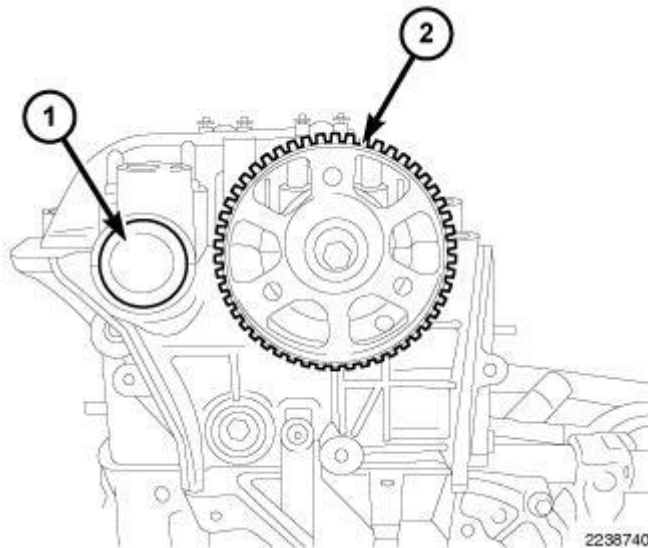


Fig. 104: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

6. Remove the camshaft sprocket (2). Refer to **SPROCKET(S), TIMING BELT AND CHAIN, REMOVAL**.

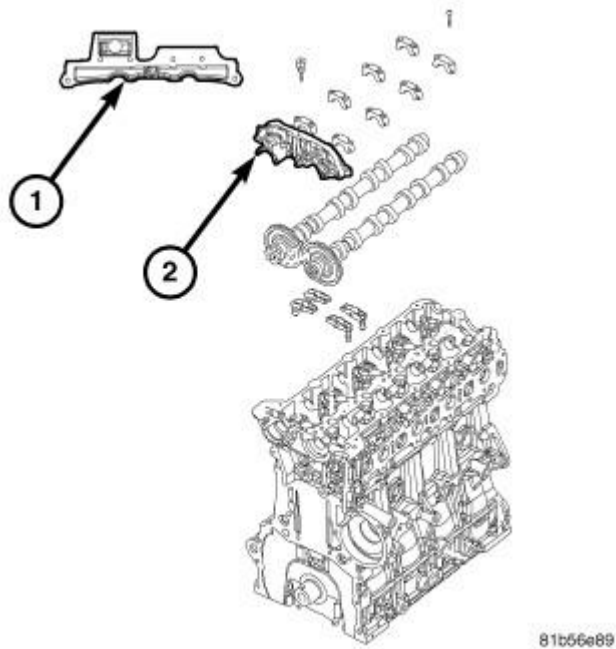


Fig. 105: Front Camshaft Bearing Journal
Courtesy of CHRYSLER GROUP, LLC

7. Remove bolts, and the front camshaft bearing journal (2).

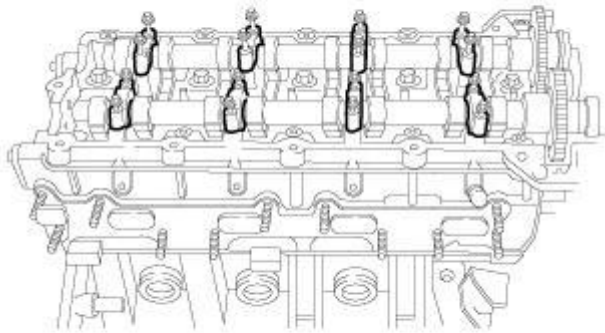


Fig. 106: Camshaft Cap Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Using a circular pattern, loosen the camshaft bearing cap bolts.

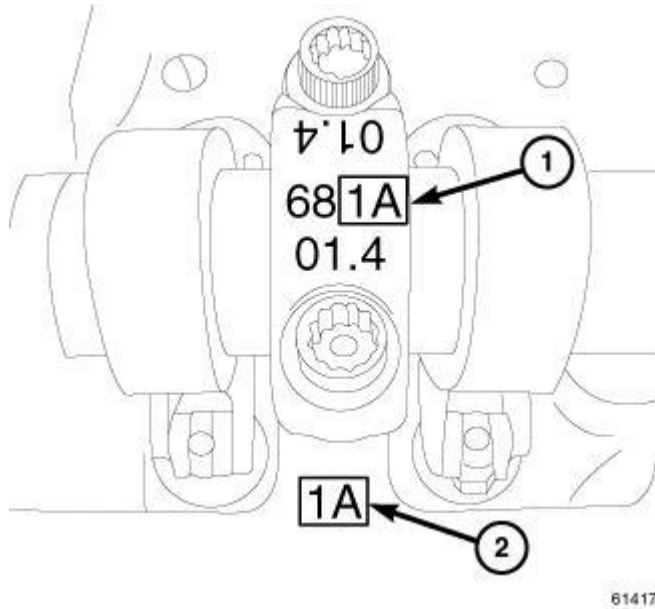


Fig. 107: Identifying Camshaft Cap & Cylinder Head (Intake Side) Markings
Courtesy of CHRYSLER GROUP, LLC

NOTE: The camshaft bearing caps must be installed in the same location and direction as they were removed. Match the marks on the camshaft cap to the marks on the cylinder head (1). The illustration is an example of a camshaft cap mark.

9. Remove the camshaft bearing caps.

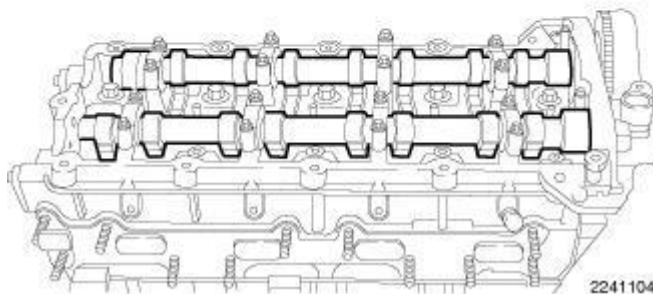


Fig. 108: Camshafts
Courtesy of CHRYSLER GROUP, LLC

10. Remove the camshafts.

INSTALLATION

INSTALLATION

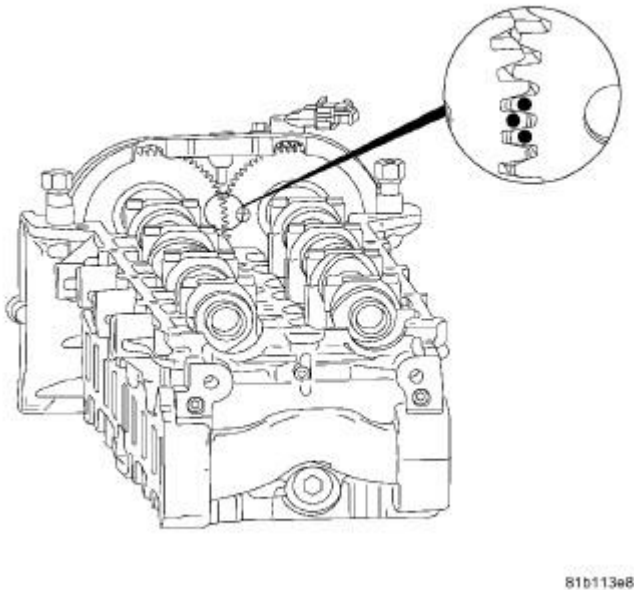


Fig. 109: Camshaft Timing Dots
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate the camshaft journals with Mopar® Engine Oil Supplement, or equivalent.

NOTE: The dots on the back of the camshaft gears are for initial timing only. These dots are for timing the camshafts to each other. To correctly set engine timing, the camshafts must be set to 90° ATDC. The camshaft locking tool is used to correctly set the camshafts to their proper location.

2. Make sure that the three small orientation dots marks on the back side of the camshaft gears are horizontal and facing each other.
3. Carefully install camshafts onto the camshaft journals and align the dots.

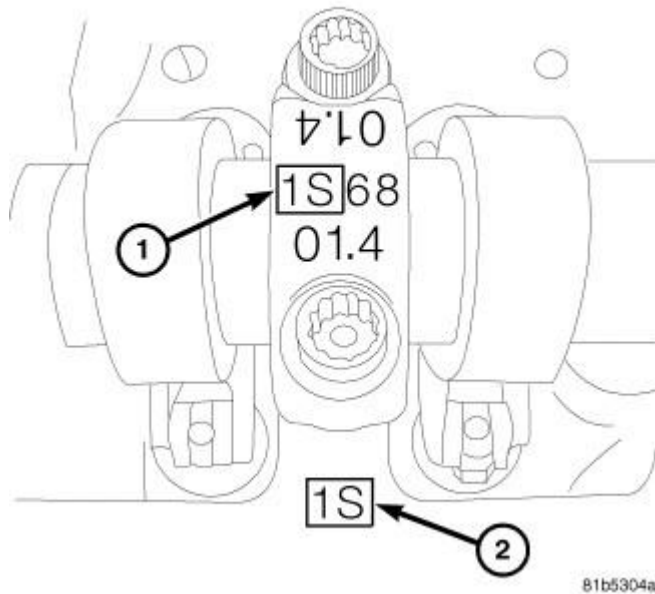


Fig. 110: Identifying Camshaft Cap & Cylinder Head (Exhaust Side) Markings
Courtesy of CHRYSLER GROUP, LLC

4. The camshaft cap must be aligned with the mark (1) aligned in the same direction as the cylinder head mark (2). In the illustration, the camshaft cap is the first cylinder (indicated by the 1S); the exhaust side of the cylinder head (indicated by the 1S). Each camshaft cap location is marked in this manner on both the camshaft cap and cylinder head. It is critical that all of the camshaft caps are returned to their correct.

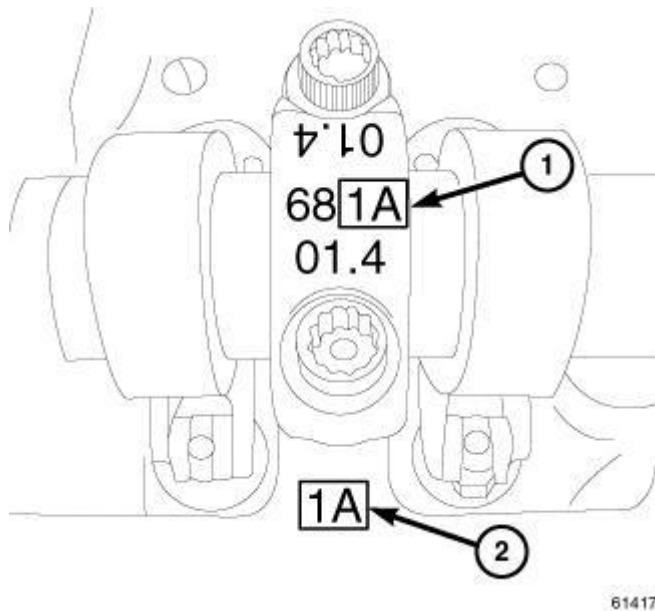
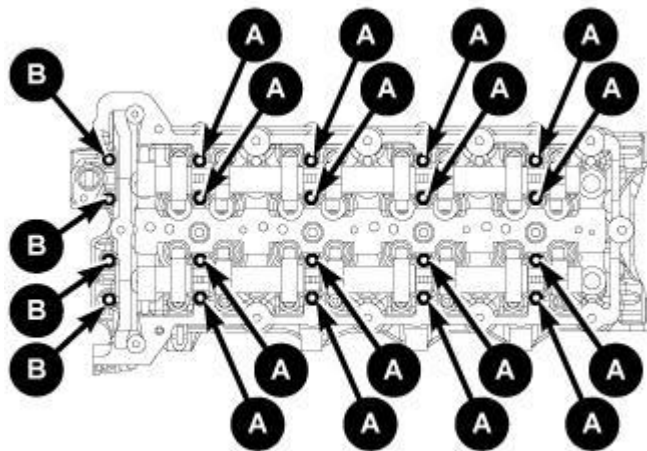


Fig. 111: Identifying Camshaft Cap & Cylinder Head (Intake Side) Markings
Courtesy of CHRYSLER GROUP, LLC

5. The camshaft cap must be aligned with the mark (1) aligned in the same direction as the cylinder head

mark (1). In the illustration, the camshaft cap is the first cylinder (indicated by the 1A); the intake side of the cylinder head is (indicated by the 1A). Each camshaft cap location is marked in this manner on both the camshaft cap and cylinder head. It is critical that all of the camshaft caps are returned to their correct locations.



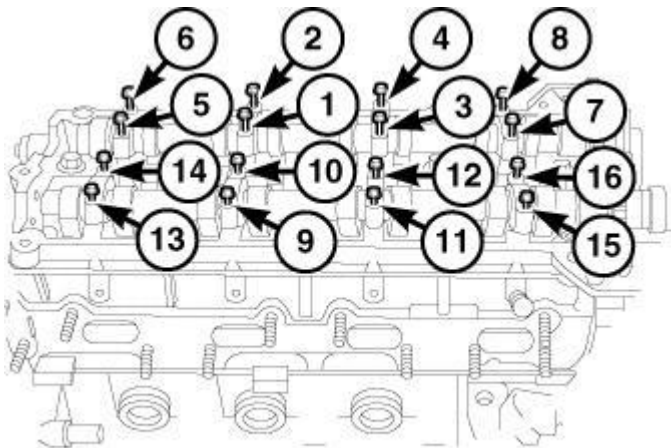
61631

Fig. 112: Identifying Camshaft Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: When the camshaft caps are removed, always replace the camshaft cap bolts.

6. The camshaft bolts have 2 different bolt sizes:

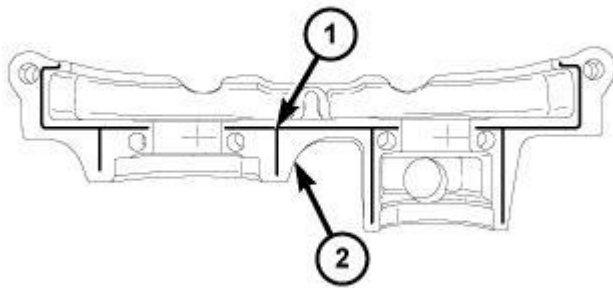
- Bolts A are M6 35 mm.
- Bolts B are M6 45 mm.



2711430

Fig. 113: Camshaft Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

7. Using new bolts and the tightening sequence shown in illustration, install the camshaft bolts and tighten bolts in one turn increments until finger tight.

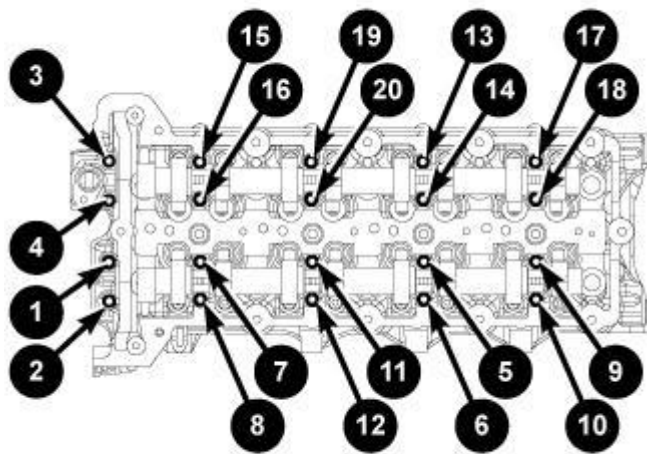


2711392

Fig. 114: Camshaft Cap RTV Location
Courtesy of CHRYSLER GROUP, LLC

NOTE: Clean the excess Loctite® 510 and care should be given so that the Loctite® 510 doesn't enter the front camshaft journal.

8. Apply a thin bead of Loctite® 510 to the front camshaft bearing journal (1) in the location illustrated (1).
9. Install the front camshaft bearing journal and tighten the new bolts finger tight.

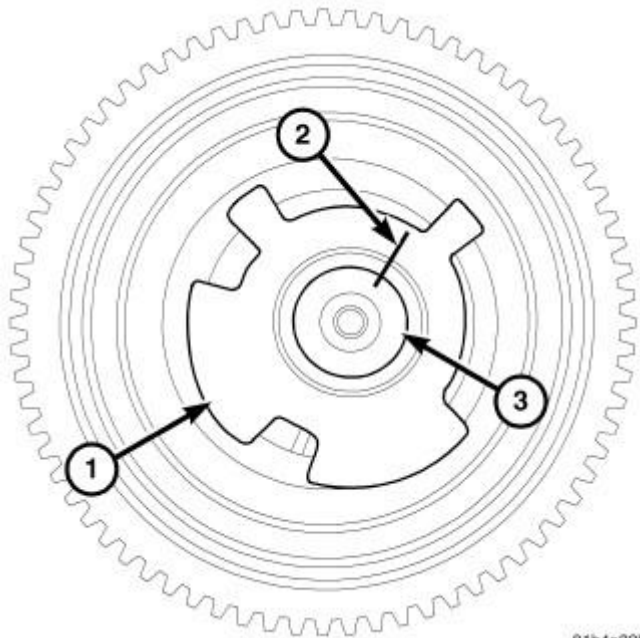


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Fig. 115: Camshaft Cap Bolt Tightening Sequence

Courtesy of CHRYSLER GROUP, LLC

10. Using the tightening sequence shown in illustration, tighten the camshaft cap bolts to 11 N.m (97 in. lbs.).



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Fig. 116: Marking CMP Sensor Reluctor Wheel & Exhaust Camshaft

Courtesy of CHRYSLER GROUP, LLC

11. Use a paint marker to mark the location of the camshaft tone wheel on the camshaft. It is critical that the tone wheel is not rotated on the camshaft.

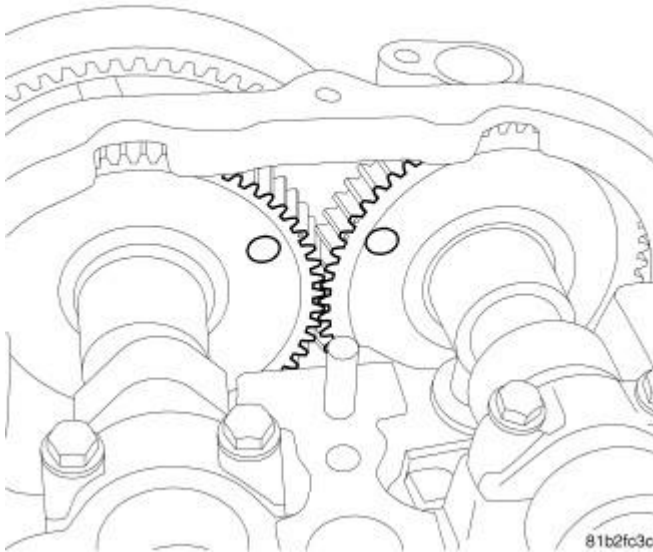


Fig. 117: Camshaft Marks At 90 Degrees ATDC
Courtesy of CHRYSLER GROUP, LLC

WARNING: DO NOT USE TO ROTATE THE ENGINE. THE TOOL MAY ROTATE THE TONE WHEEL ON THE CAMSHAFT. IF THE TONE WHEEL IS ROTATED ON THE CAMSHAFT, THE CAMSHAFT MUST BE REPLACED.

NOTE: Starting in model year 2013, the exhaust camshaft reluctor is now bolted on requiring a change in the Camshaft Sprocket Alignment Tool VM.9991. The new Camshaft Sprocket Alignment Tool number is VM.9991A. This tool can be used on older models.

12. Rotate the camshafts so that the (special tool #VM.9991A, Alignment Tool, Camshaft Sprocket) fits into place.

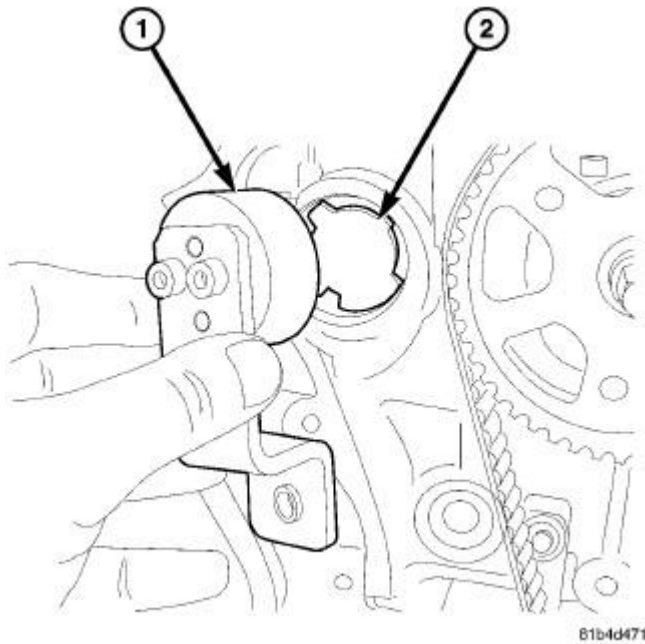


Fig. 118: Removing/Installing Camshaft Locking Tool
Courtesy of CHRYSLER GROUP, LLC

13. Install the (special tool #VM.9991A, Alignment Tool, Camshaft Sprocket) (1).

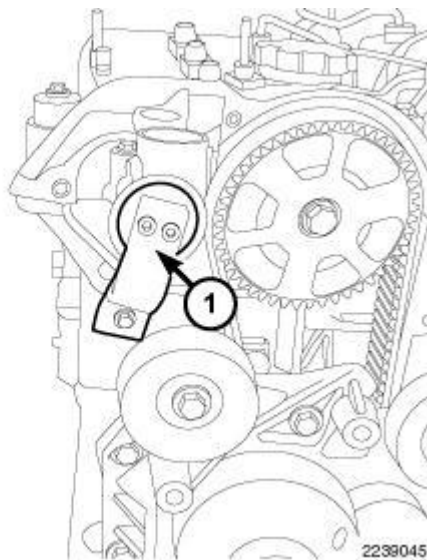


Fig. 119: Camshaft Locking Tool
Courtesy of CHRYSLER GROUP, LLC

14. When the (special tool #VM.9991A, Alignment Tool, Camshaft Sprocket) (1) is bolted in place, the camshafts are locked at 90 degrees ATDC.

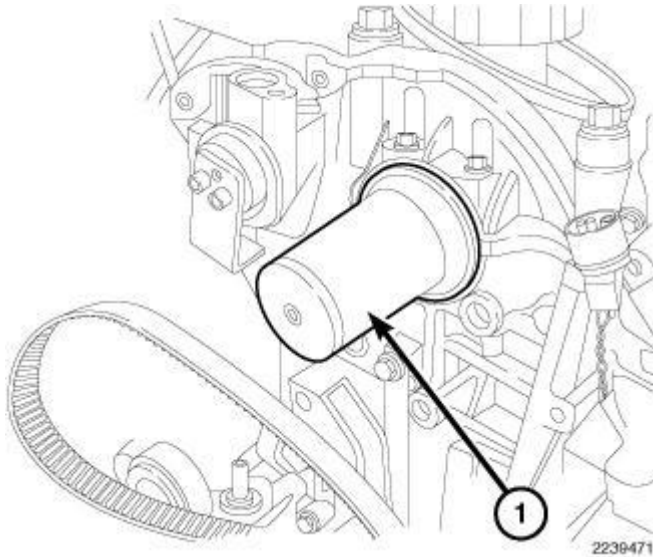


Fig. 120: Seal Installer
Courtesy of CHRYSLER GROUP, LLC

15. Using the (special tool #9937-2, Guide, Seal) and (special tool #9937-1, Installer, Seal) (1), install the intake camshaft oil seal.

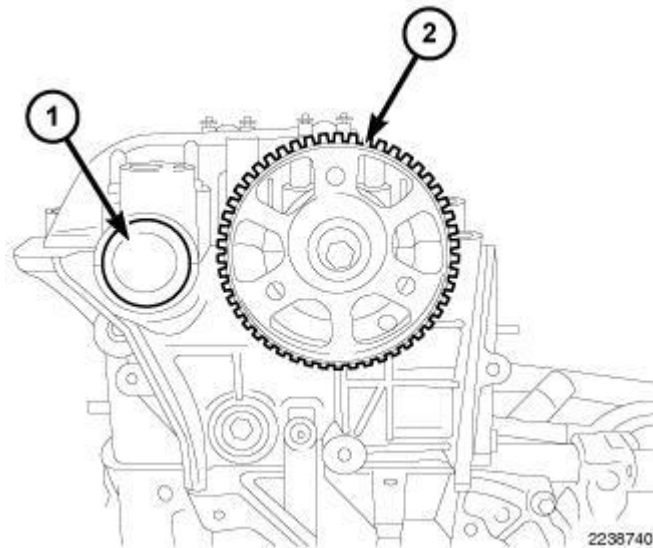
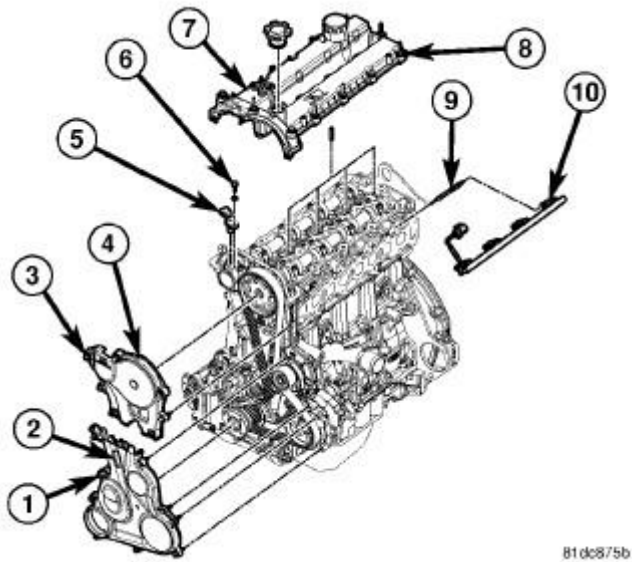


Fig. 121: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

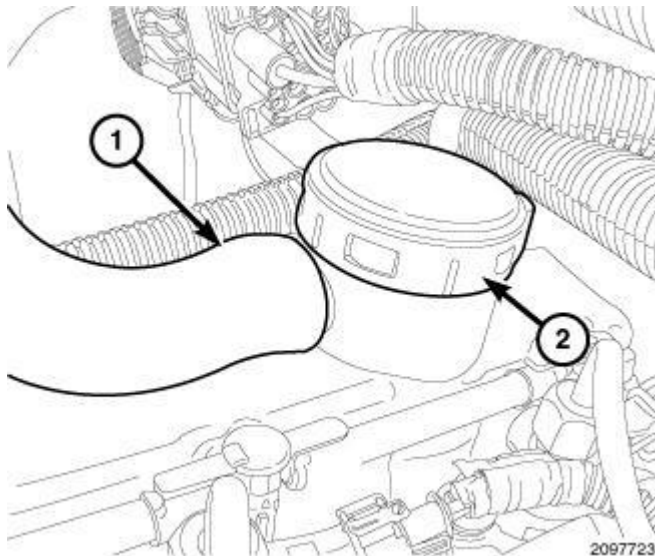
16. Install the camshaft sprocket (2). Refer to **SPROCKET(S), TIMING BELT AND CHAIN, INSTALLATION.**



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Fig. 122: Upper And Lower Front Covers
Courtesy of CHRYSLER GROUP, LLC

17. Install the cylinder head cover (7). Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .



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Fig. 123: Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

18. Connect the crankcase vent hose (1) from the oil separator (2).
19. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .

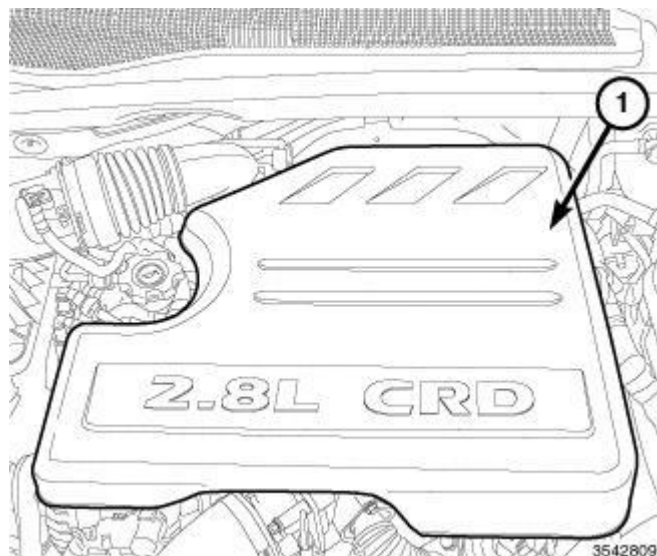


Fig. 124: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

20. Install the engine cover (1).
21. Connect the negative battery cable.

COVER(S), CYLINDER HEAD

DESCRIPTION

DESCRIPTION

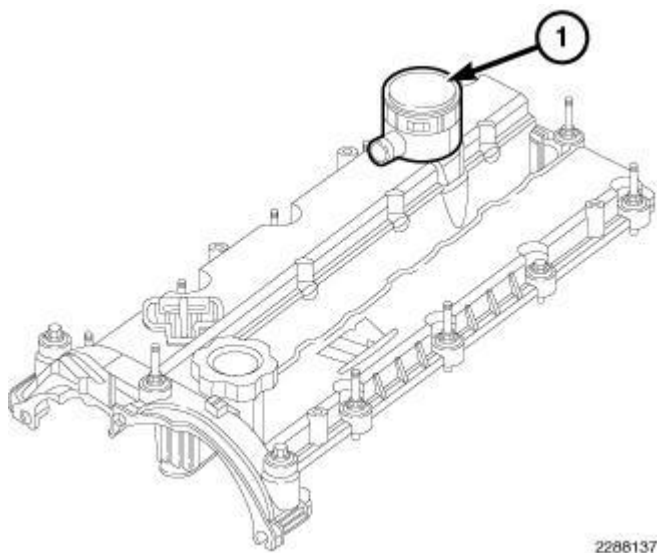
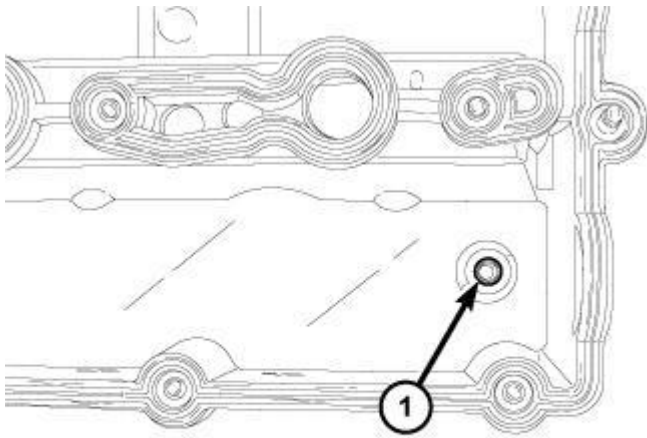


Fig. 125: Crankcase Ventilation (CCV) System
Courtesy of CHRYSLER GROUP, LLC

The cylinder head cover is made of an injection molded composite and incorporates crankcase ventilation

(CCV) system (1).

The cylinder head cover gasket is not a serviceable component, if the gasket is found to be defective then a **new** cylinder head cover must be installed.



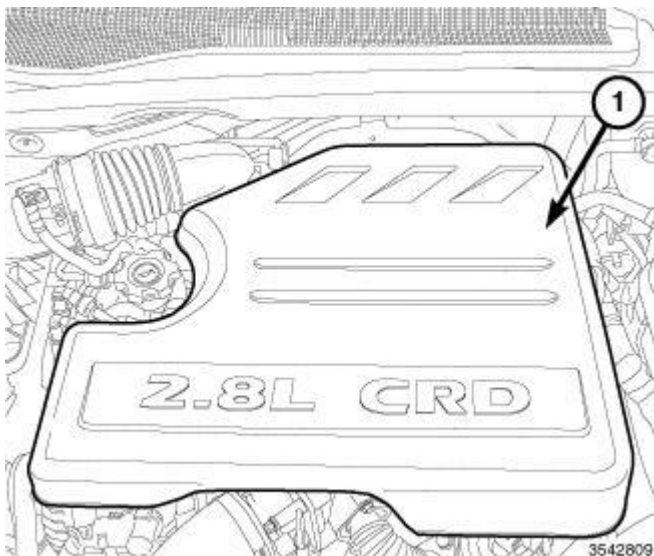
2238983

Fig. 126: Oil Drain Back Access Hole
Courtesy of CHRYSLER GROUP, LLC

The cylinder head cover also incorporates a oil drain back hole (1) for the crankcase ventilation (CCV) system.

REMOVAL

REMOVAL



3542809

Fig. 127: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

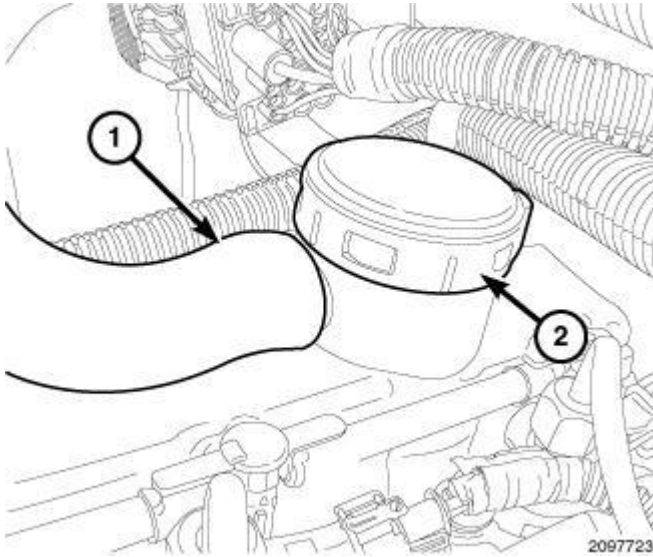


Fig. 128: Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL**.
4. Disconnect the crankcase vent hose (1) from the oil separator (2).

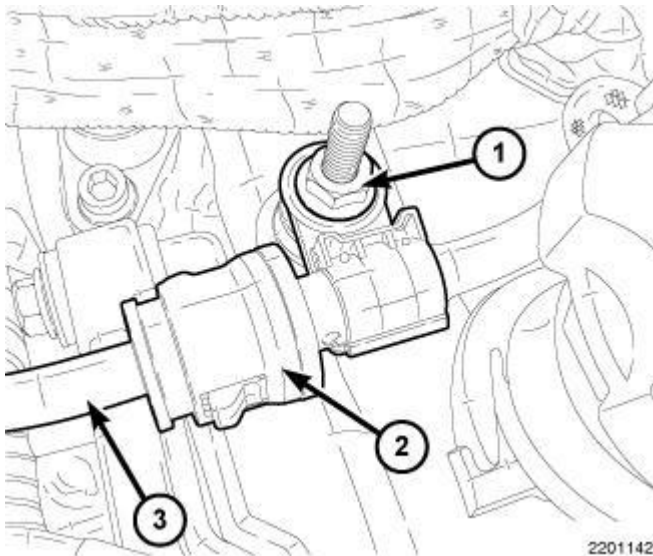


Fig. 129: Fuel Injector Return Line & Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

5. Remove the retaining nut (1) and disconnect the fuel injector return line (2).

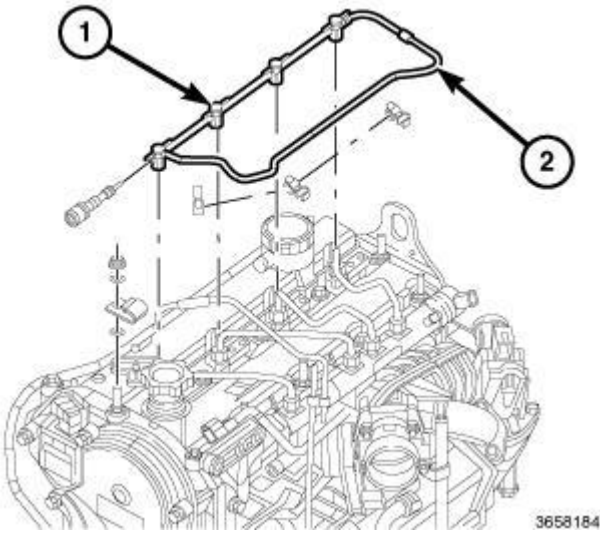


Fig. 130: Lock Buttons & Fuel Injector Return Line
Courtesy of CHRYSLER GROUP, LLC

6. A lock button (1) is used to secure the common fuel return line to each fuel injector. Use your fingers to lift up all four lock buttons (1) to unlock them. After unlocking all four buttons, lift fuel return line assembly and remove the fuel injector return line (2).

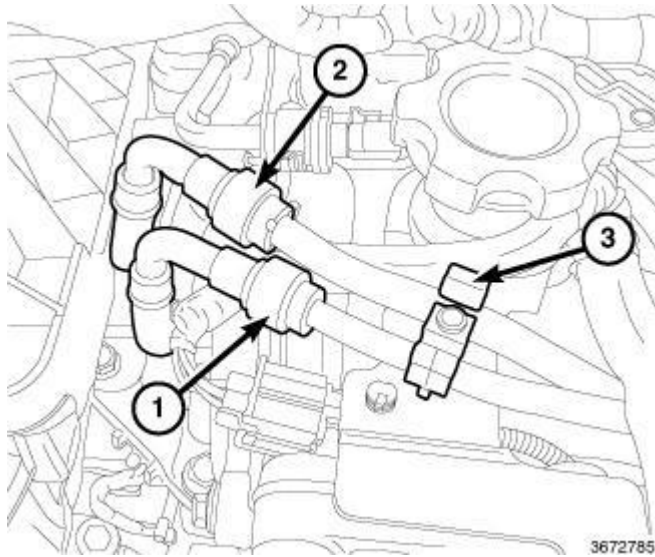


Fig. 131: Fuel Return Line, Fuel Feed Line & Fuel Line Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the fuel return line (1).
8. Disconnect the fuel feed line (2).
9. Remove the fuel line mounting bracket (3).

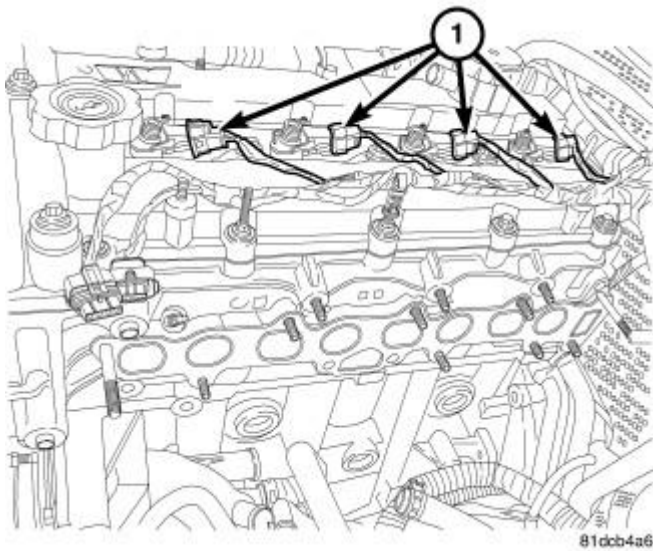


Fig. 132: Fuel Injector Harness
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the fuel injector harness connectors from the fuel injectors (1).

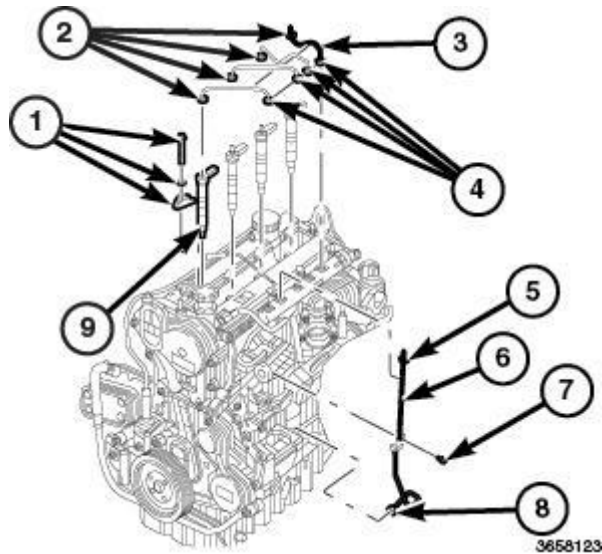


Fig. 133: Fuel Injectors, Fuel Tubes & Fasteners
Courtesy of CHRYSLER GROUP, LLC

11. Remove the fuel tubes (3). Refer to TUBE(S), FUEL, REMOVAL.
12. Remove bolts (1) and the fuel injectors (7).

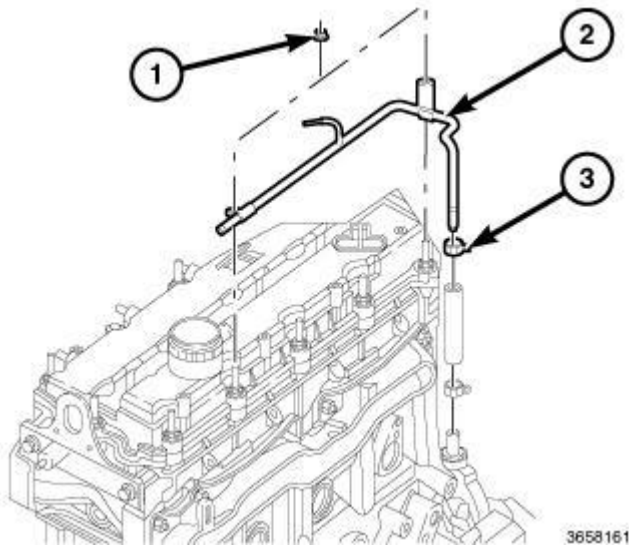


Fig. 134: Vacuum Line, Retaining Nuts & Clamp
 Courtesy of CHRYSLER GROUP, LLC

13. Remove the engine wire harness retaining clips from the cylinder head cover stud bolts.
14. Disconnect the vacuum line.
15. Disconnect the vacuum line clamp (3).
16. Remove retaining nuts (1) and remove the vacuum line (2) from the vacuum pump.

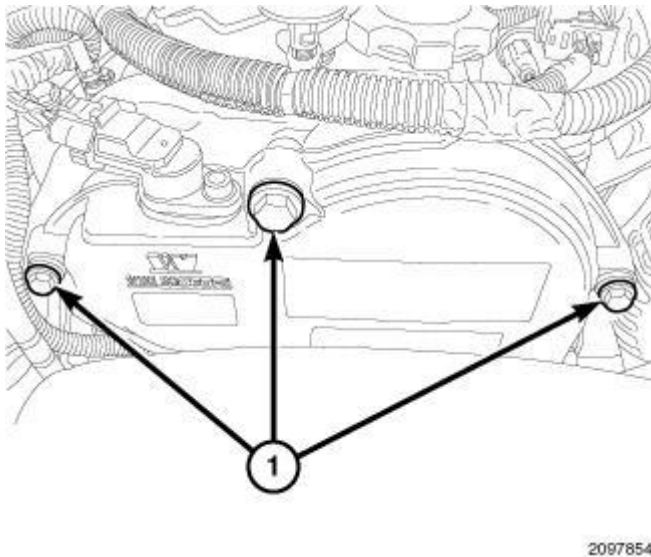


Fig. 135: Upper Front Timing Cover Bolts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The upper cover bolts are encased in a collar which does not permit them to be removed.

17. Loosen the upper front timing cover bolts (1).

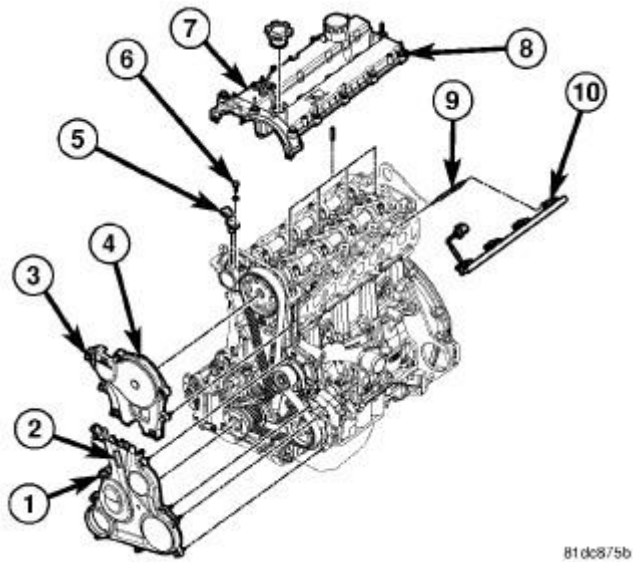


Fig. 136: Upper And Lower Front Covers
Courtesy of CHRYSLER GROUP, LLC

18. Remove the 12 fasteners (8) and the cylinder head cover (7).

INSTALLATION

INSTALLATION

NOTE: The cylinder head cover gasket is not serviceable, if the gasket is found to be defective then a new cylinder head cover must be installed.

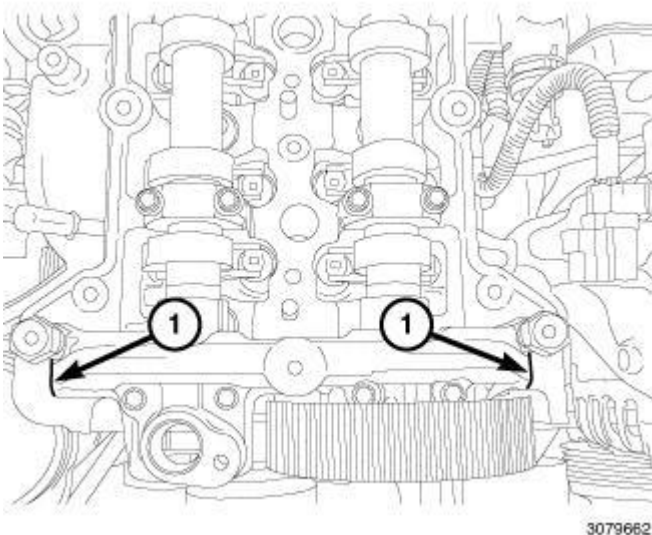
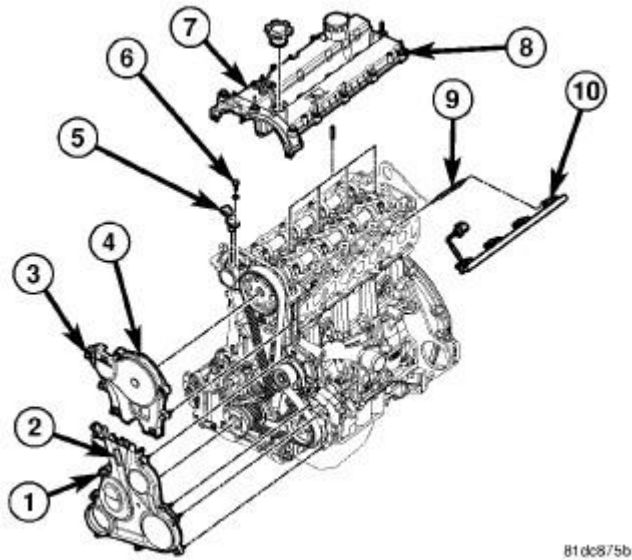


Fig. 137: Locating Application Marks Of Mopar® Engine Sealant RTV Bead
Courtesy of CHRYSLER GROUP, LLC

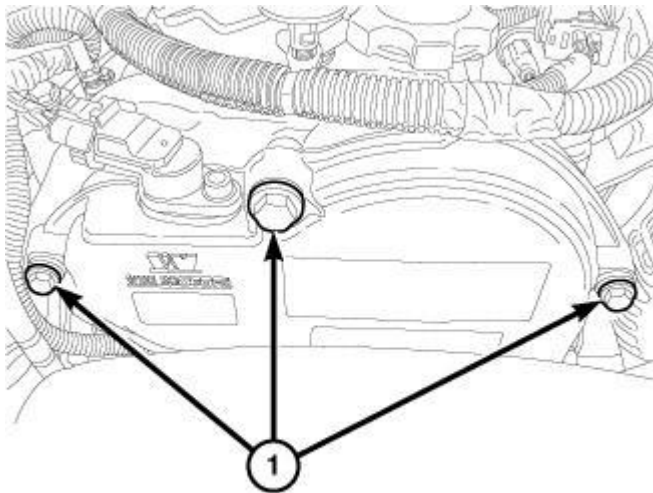
1. Clean the sealing surfaces and inspect the gasket for damage and replace the cylinder head cover with a new one if the gasket is found to be defective.
2. Apply a 3 mm bead of Mopar® Engine Sealant RTV to the camshaft bearing cap (1).



81dc8/5b

Fig. 138: Upper And Lower Front Covers
Courtesy of CHRYSLER GROUP, LLC

3. Install the cylinder head cover (7). Tighten fasteners to 11 N.m (97 in. lbs.).



2097854

Fig. 139: Upper Front Timing Cover Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Tighten the upper front timing cover bolts (1) to 8 N.m (71 in. lbs.).

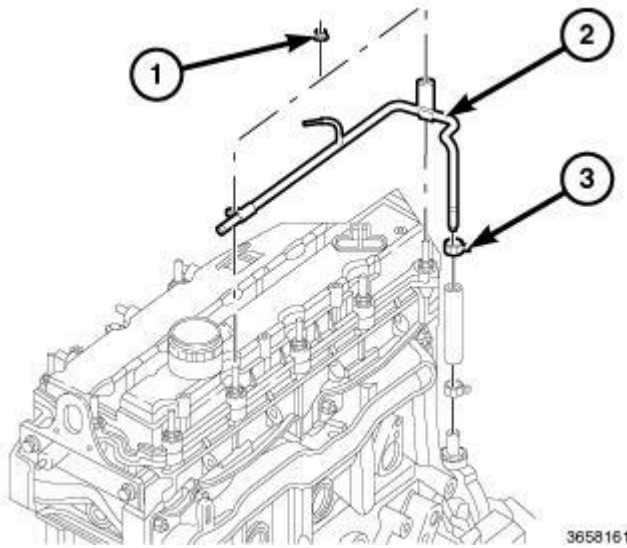


Fig. 140: Vacuum Line, Retaining Nuts & Clamp
Courtesy of CHRYSLER GROUP, LLC

5. Install the vacuum line (2) to the vacuum pump. Tighten nuts (1) to 11 N.m (97 in. lbs.).
6. Connect the vacuum line clamp (3).
7. Connect the vacuum line.
8. Install the engine wire harness retaining clips from the cylinder head cover stud bolts.

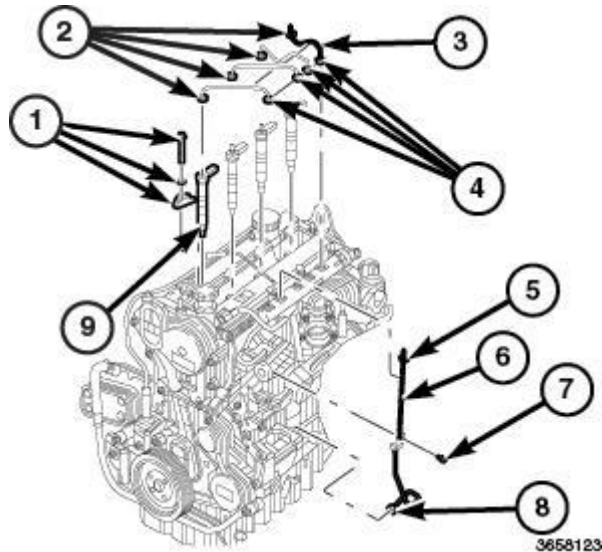


Fig. 141: Fuel Injectors, Fuel Tubes & Fasteners
Courtesy of CHRYSLER GROUP, LLC

9. Using new washers, install injectors (8) and injector retainer claw (1).
10. Install the injector clamp bolts and washer (1) and tighten bolts to 33 N.m (24 ft. lbs.).
11. Install the fuel tubes. Refer to **TUBE(S), FUEL, INSTALLATION**.

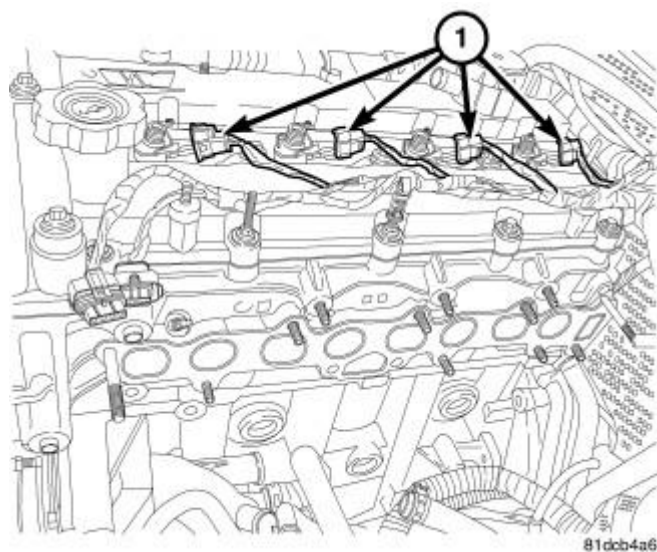


Fig. 142: Fuel Injector Harness
Courtesy of CHRYSLER GROUP, LLC

12. Connect the fuel injector harness connectors (1).

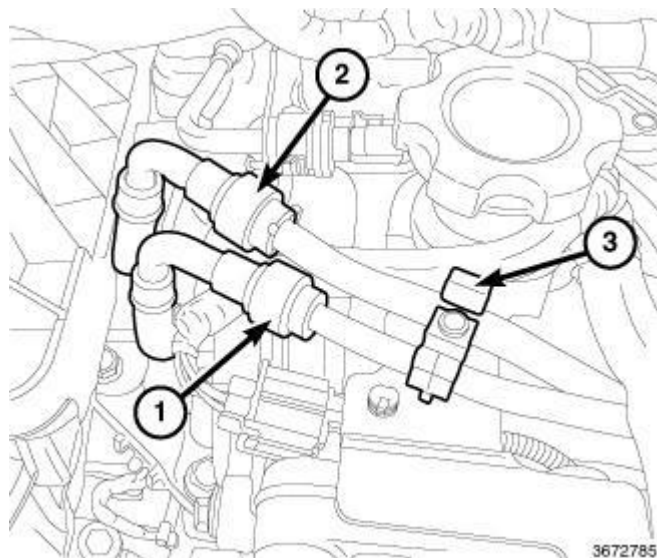


Fig. 143: Fuel Return Line, Fuel Feed Line & Fuel Line Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

13. Install the fuel line mounting bracket (3).
14. Connect the fuel feed line (2).
15. Connect the fuel return line (1).

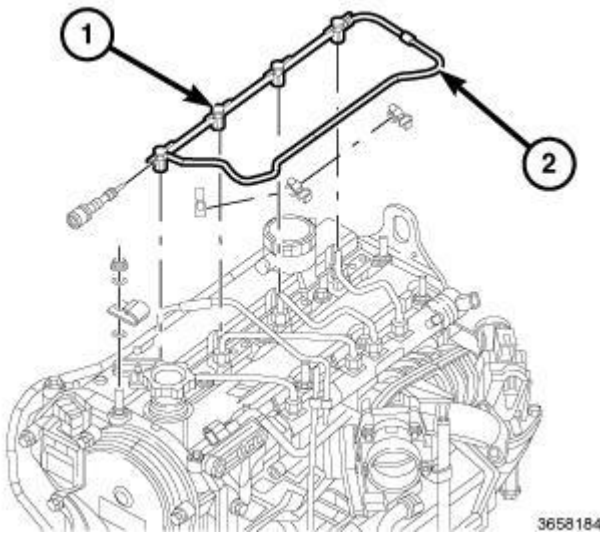


Fig. 144: Lock Buttons & Fuel Injector Return Line
Courtesy of CHRYSLER GROUP, LLC

16. Install the fuel injector fuel return line (2) onto the fuel injector and push down on the lock tab (1) to lock in place.

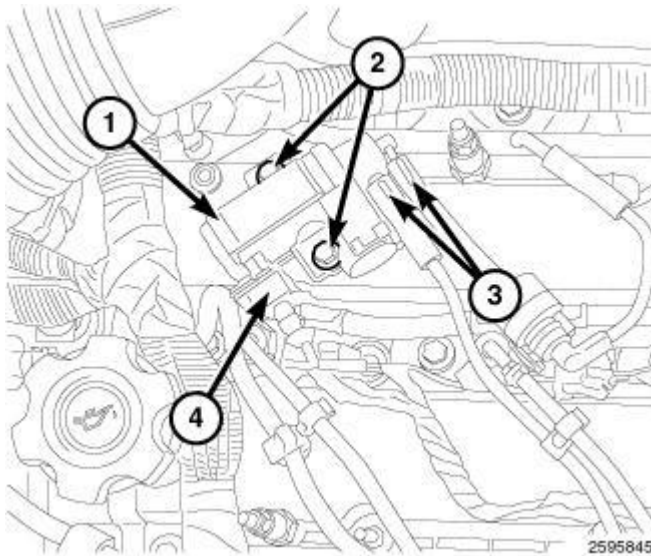


Fig. 145: EGR Vacuum Solenoid, Bolts, Vacuum Lines & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

17. Install the EGR vacuum solenoid (1). Tighten bolts to 12 N.m (106 in. lbs).
18. Connect the EGR vacuum solenoid harness connector (4).
19. Connect the EGR vacuum solenoid vacuum lines (3).

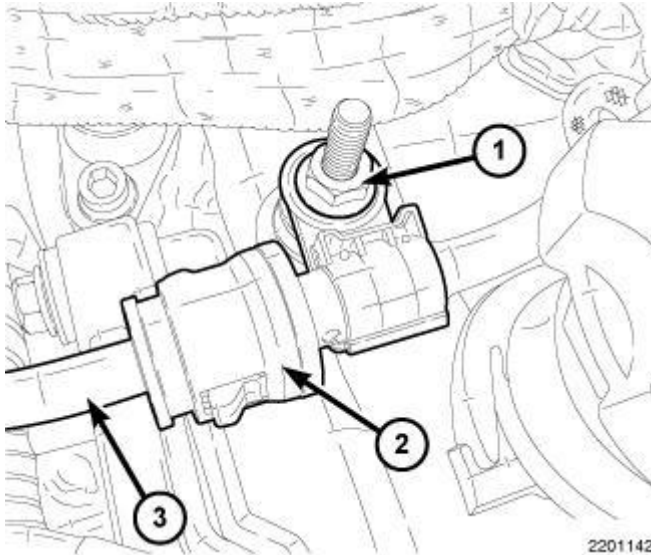


Fig. 146: Fuel Injector Return Line & Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

20. Connect the fuel injector return line (2) and securely tighten the retaining nut (1).

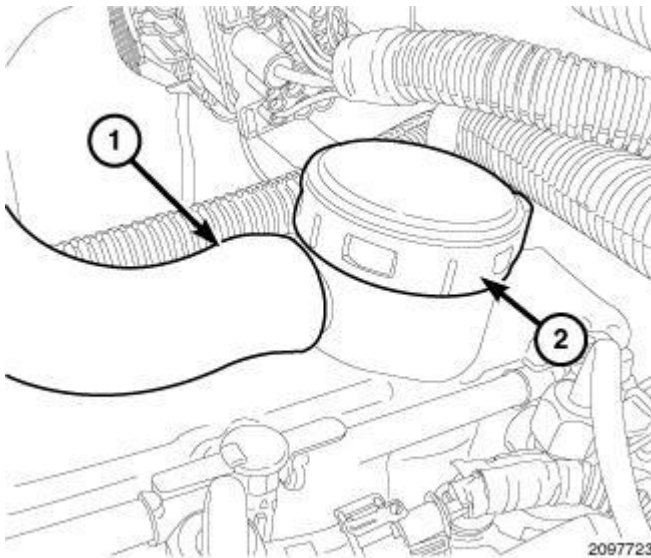
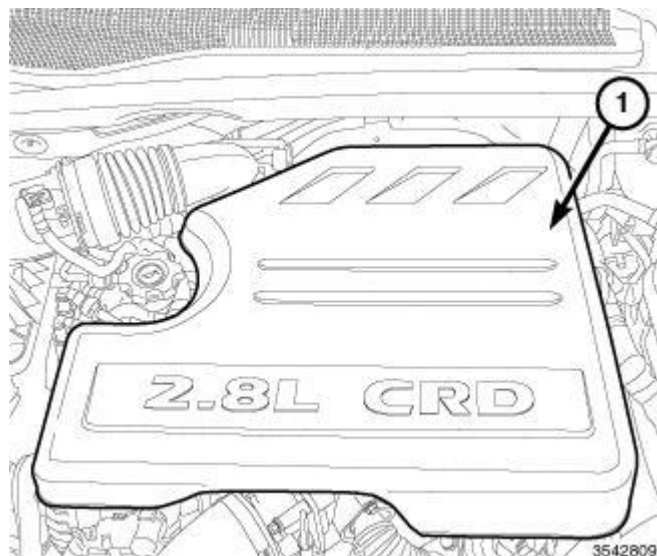


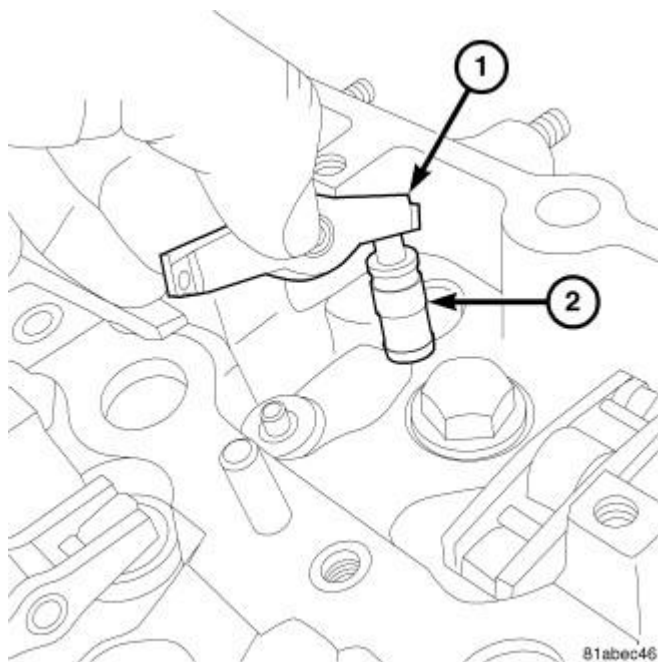
Fig. 147: Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

21. Connect the crankcase vent hose (1) to the oil separator (2).
22. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .

**Fig. 148: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

23. Install the engine cover (1).
24. Connect the negative battery cable.

LIFTER(S), HYDRAULIC**DESCRIPTION****DESCRIPTION****Fig. 149: Rocker Arms & Hydraulic Lifters**

Courtesy of CHRYSLER GROUP, LLC

Valve lash is controlled by hydraulic tappets (2) located inside the cylinder head, in tappet bores below the camshafts.

REMOVAL

REMOVAL

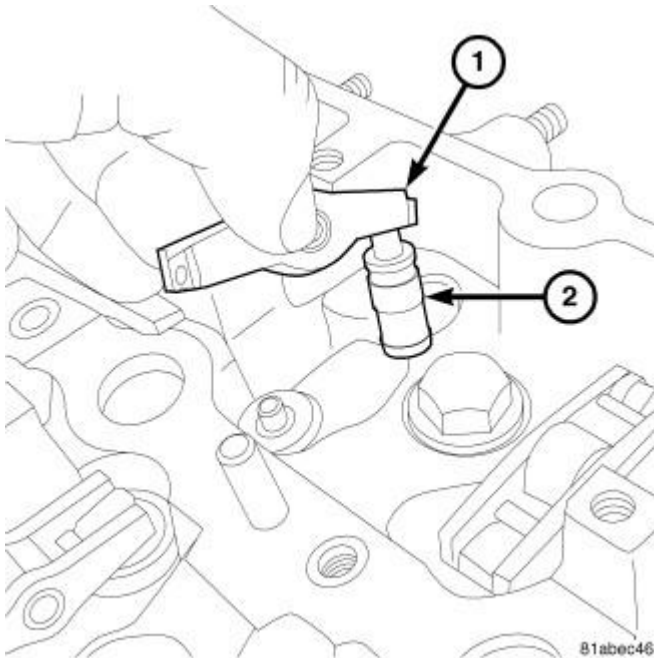


Fig. 150: Rocker Arms & Hydraulic Lifters
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the camshafts. Refer to CAMSHAFT, ENGINE, REMOVAL .

NOTE: Always return the hydraulic lifters to their original location in the cylinder head.

3. Remove the rocker arms (1) and hydraulic lifters (2).

INSPECTION

INSPECTION

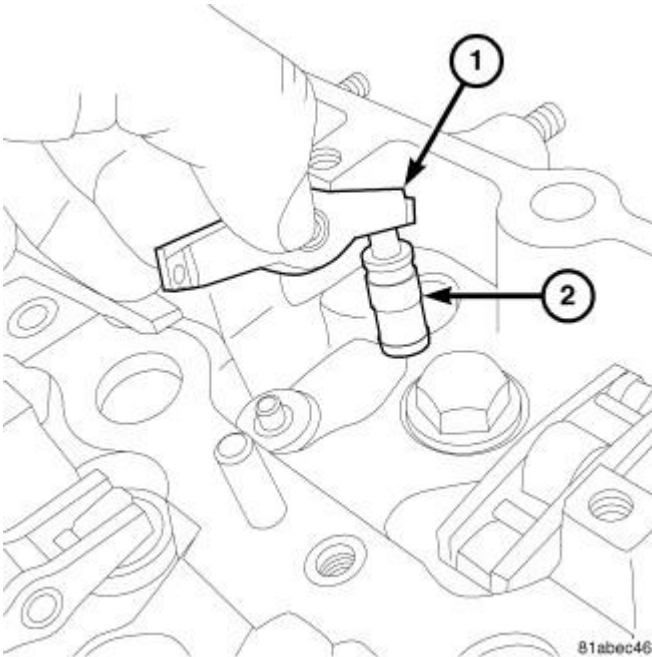


Fig. 151: Rocker Arms & Hydraulic Lifters
Courtesy of CHRYSLER GROUP, LLC

Clean each lifter assembly (1) in cleaning solvent to remove all varnish and sludge deposits. Inspect for indications of scuffing on the side and base of each lifter body.

INSTALLATION

INSTALLATION

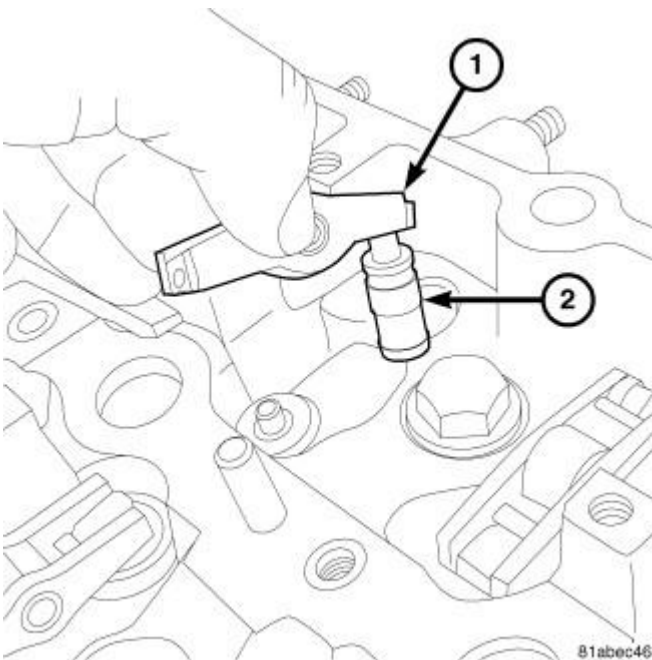


Fig. 152: Rocker Arms & Hydraulic Lifters

Courtesy of CHRYSLER GROUP, LLC

1. Install the rocker arms (1) and hydraulic lifters (2) into their original locations.
2. Install the camshafts. Refer to **CAMSHAFT, ENGINE, INSTALLATION** .
3. Connect the negative battery cable.

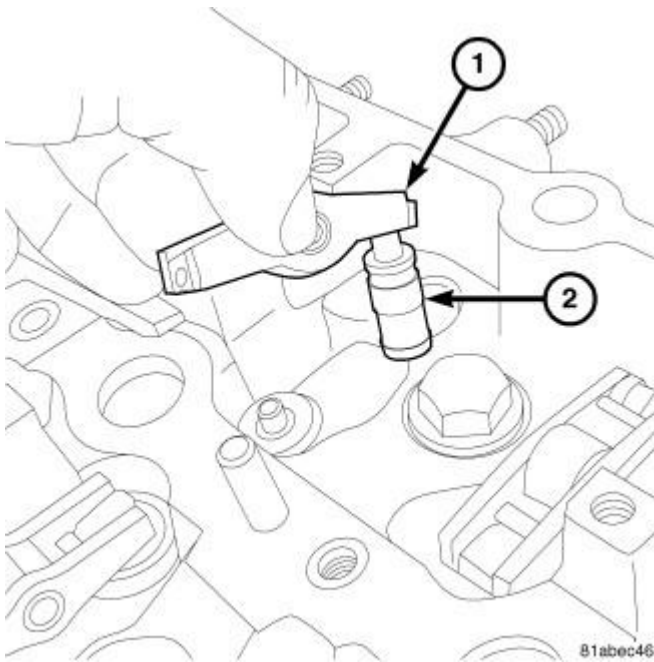
ROCKER ARM, VALVE**DESCRIPTION****DESCRIPTION**

Fig. 153: Rocker Arms & Hydraulic Lifters
Courtesy of CHRYSLER GROUP, LLC

The rocker arms (1) are made of stamped steel and serviced as an assembly along with the lifter.

The rocker arms (1) are used as a link between the camshaft and valves. As the camshaft rotates, the lobes of the camshafts apply downward pressure on the rocker arms (1). This pressure is then applied to the hydraulic lifter (2) which opens the valve.

REMOVAL**REMOVAL**

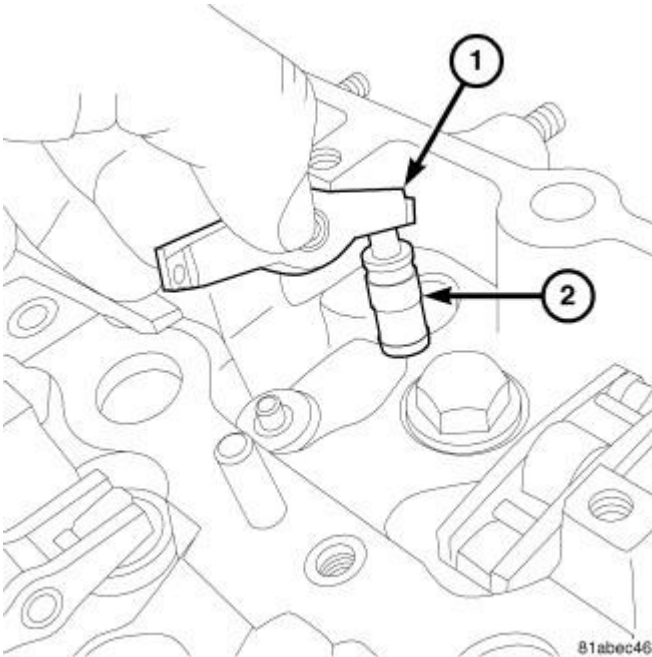


Fig. 154: Rocker Arms & Hydraulic Lifters
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Before removing the cylinder head cover/intake manifold (2) the engine must rotated to 90° after TDC to assure proper alignment of the engine timing components. Failure to do so could result in valve and/or piston damage during reassembly.

CAUTION: Before removing the cylinder head cover/intake manifold (2) the engine must rotated to 90° after TDC to assure proper alignment of the engine timing components. Failure to do so could result in valve and/or piston damage during reassembly.

1. Disconnect negative battery cable.
2. Remove the camshafts. Refer to **CAMSHAFT, ENGINE, REMOVAL** .
3. Remove rocker arms (1) and lifters (2).

INSTALLATION

INSTALLATION

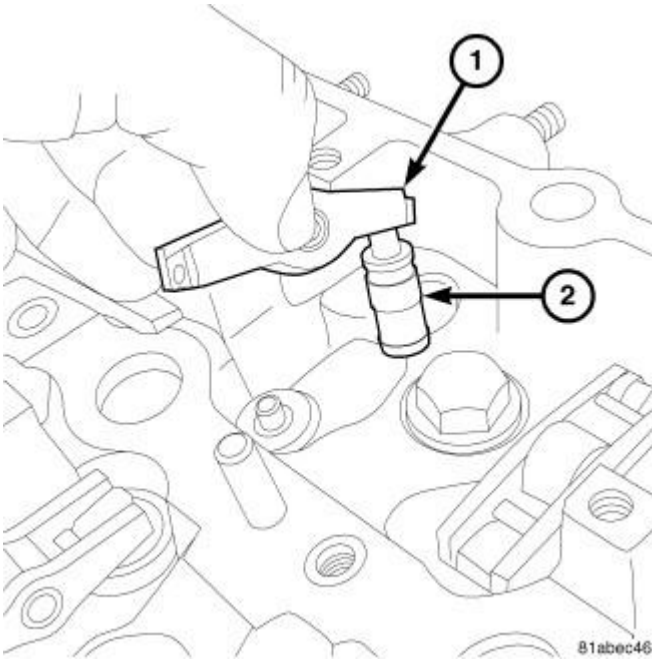


Fig. 155: Rocker Arms & Hydraulic Lifters
 Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect gasket sealing surfaces.
2. Lubricate lifter ball end of lifter(s), valve(s), and rocker arm roller(s) with Mopar® Engine Oil Supplement or equivalent.
3. Connect rocker arm(s) to lifter and position on valve(s).
4. Install the camshafts. Refer to **CAMSHAFT, ENGINE, INSTALLATION** .
5. Connect negative battery cable.

SEAL(S), CAMSHAFT

REMOVAL

INTAKE

CAUTION: Before removing the timing belt, the engine must be placed at 90° after TDC. Failure to do so may result in valve and/or piston damage during assembly.

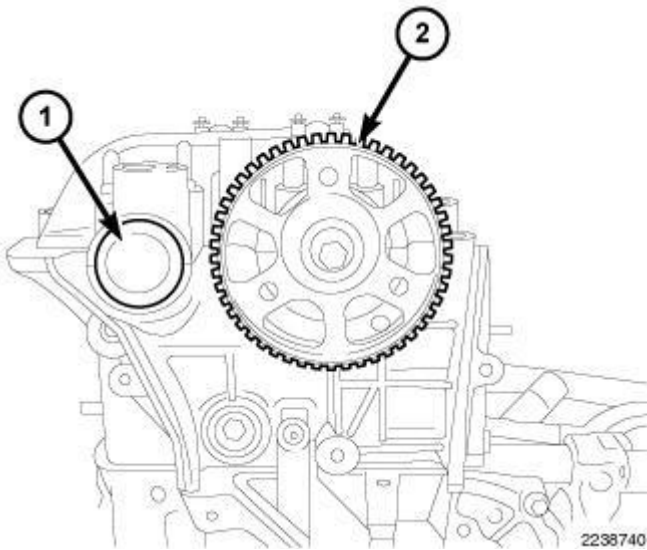


Fig. 156: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the intake camshaft sprocket (2). Refer to **SPROCKET(S), TIMING BELT AND CHAIN, REMOVAL**.

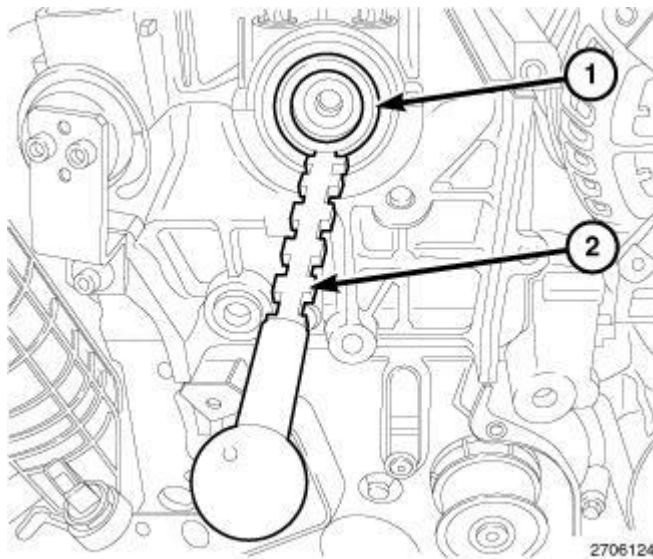


Fig. 157: Seal Remover & Seal
Courtesy of CHRYSLER GROUP, LLC

3. Install the Seal Remover (special tool #VM.1058, Remover, Seal) (2) into seal (1) as illustrated.

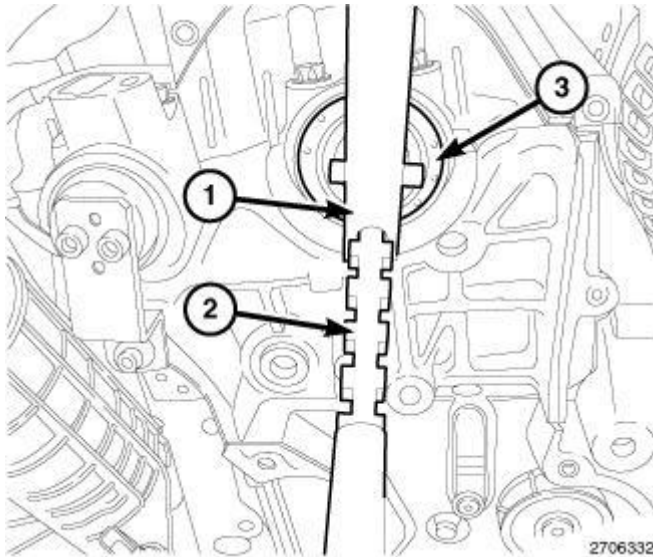


Fig. 158: Seal Remover Handle, Seal Remover & Intake Camshaft Oil Seal
Courtesy of CHRYSLER GROUP, LLC

4. Position the Seal Remover Handle (special tool #VM.1058, Remover, Seal) (1) onto Seal Remover (special tool #VM.1058, Remover, Seal) (2) and remove the intake camshaft oil seal (3).

EXHAUST

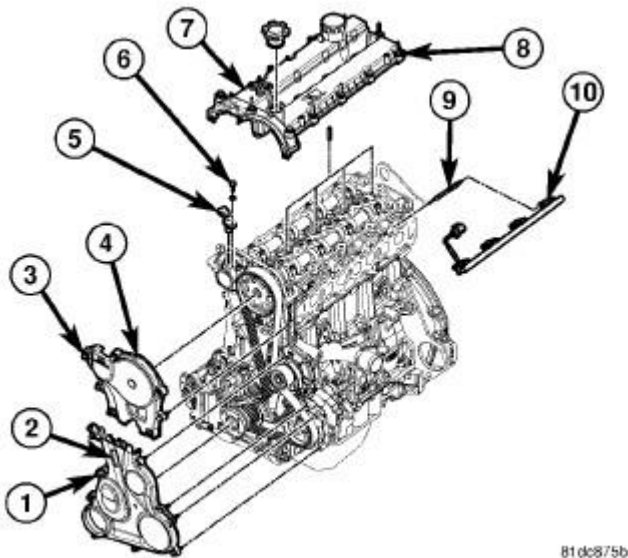


Fig. 159: Upper And Lower Front Covers With Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the upper outer timing belt cover (4). Refer to **COVER(S), ENGINE TIMING, REMOVAL**.

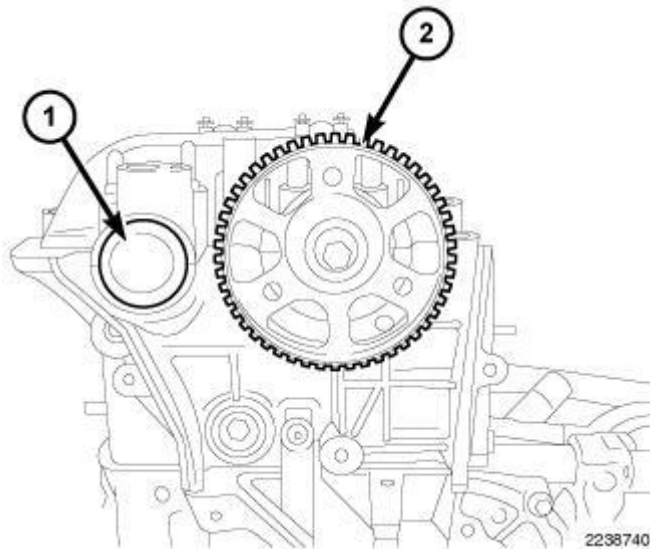


Fig. 160: Exhaust Camshaft Oil Seal & Camshaft Sprocket
 Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable removal tool, remove the exhaust camshaft oil seal (1).

INSTALLATION

INTAKE

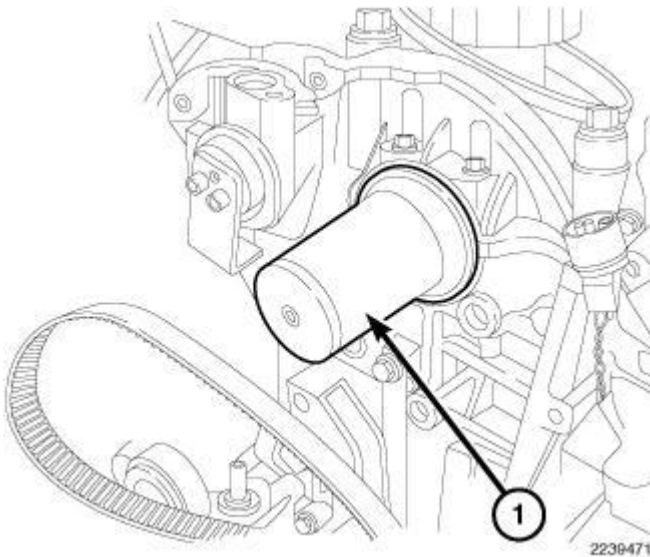


Fig. 161: Seal Installer
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The lip of the camshaft seal must face the outside (Air Side) of engine.

1. Using the Seal Guide (special tool #9937-2, Guide, Seal) and Seal Installer (1) (special tool #9937-1, Installer, Seal) (1), install the intake camshaft oil seal.

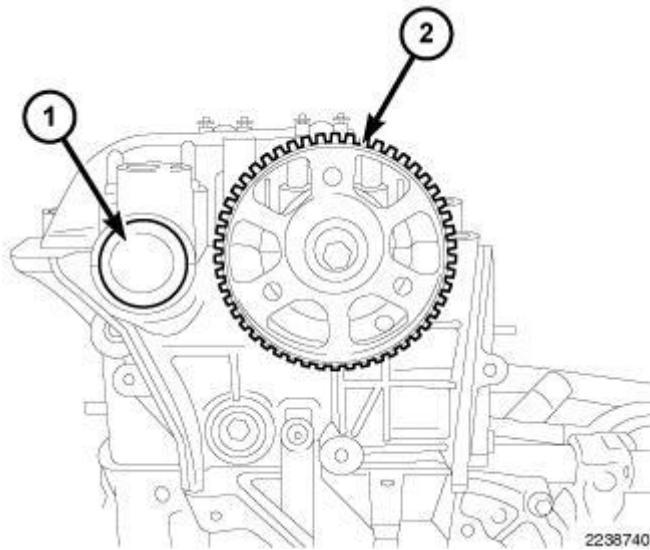


Fig. 162: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

2. Install the intake camshaft sprocket (2). Refer to **SPROCKET(S), TIMING BELT AND CHAIN, INSTALLATION**.
3. Connect the negative battery cable.

EXHAUST

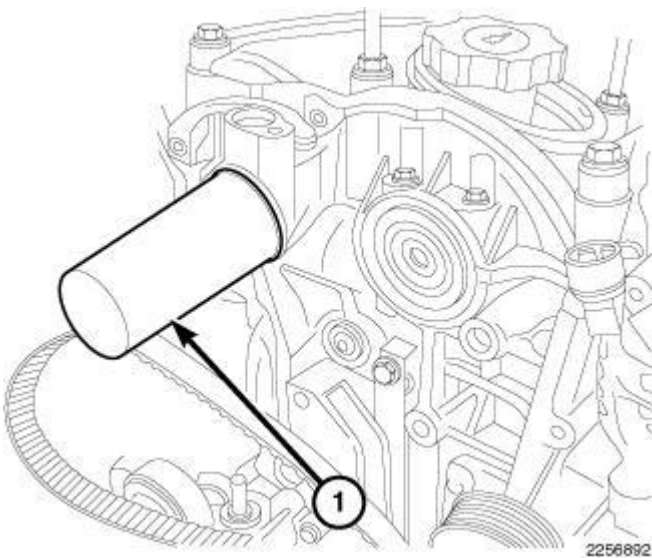
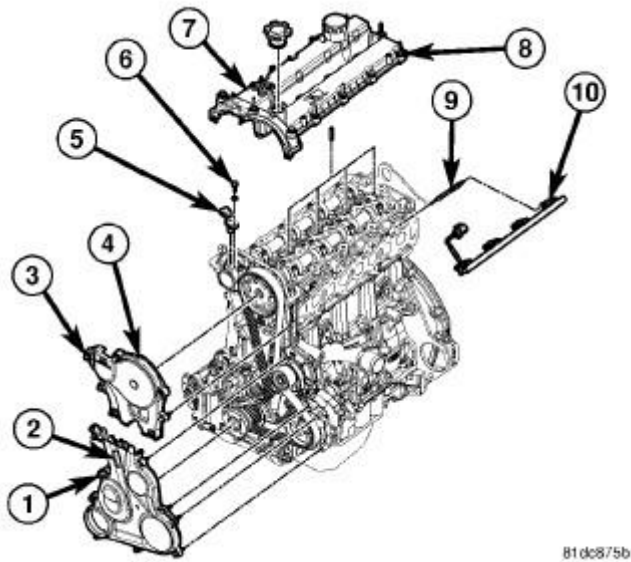


Fig. 163: Seal Installer
Courtesy of CHRYSLER GROUP, LLC

1. Clean the camshaft seal sealing area.
2. Using the (special tool #VM.1057, Installer, Seal) (1), install the exhaust camshaft seal.



81dc875b

Fig. 164: Locating Cylinder Head & Front Timing Belt Covers
Courtesy of CHRYSLER GROUP, LLC

3. Install the upper (4) outer timing belt cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION**.
4. Connect the negative battery cable.

ENGINE BLOCK

DESCRIPTION

DESCRIPTION

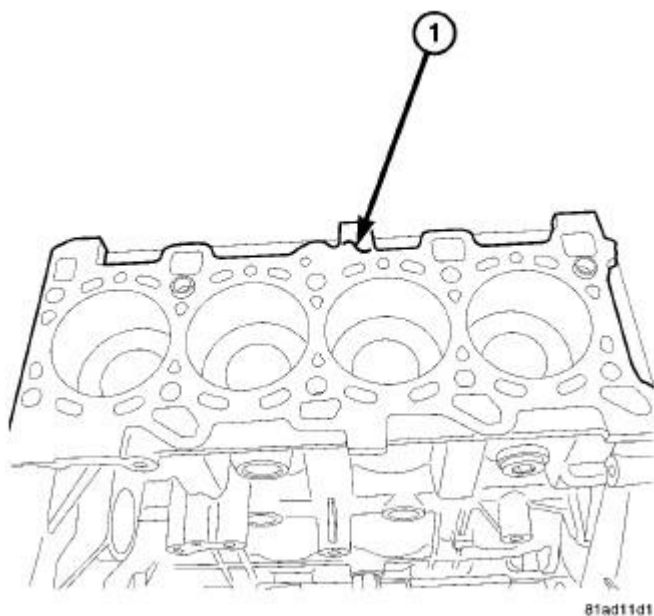


Fig. 165: Engine Block

Courtesy of CHRYSLER GROUP, LLC

The 2.8L CRD Diesel engine uses a cast iron engine block. The cylinder block has increased stiffness that reduces structural flexing and a fractured connecting rod cap design that can not distort connecting rod cap fit.

STANDARD PROCEDURE

BEARING SELECTION CHARTS

CONNECTING ROD BEARINGS - LARGE END

Connecting Rod Journal Diameter - Connecting Rod Large End	Bearing Half	Connecting Rod Journal Diameter - Crankshaft			
		D	C	B	A
		53.929 - 53.936	53.936 - 53.942	53.942 - 53.948	53.948 - 53.955
A 57.563 - 57.568	Upper Bearing Shell	Blue	Blue	Red	Red
	Lower Bearing Shell	Yellow	Blue	Blue	Red
B 57.568 - 57.573	Upper Bearing Shell	Yellow	Blue	Blue	Red
	Lower Bearing Shell	Yellow	Yellow	Blue	Blue

2013 RAM C/V Tradesman

2014 ENGINE 2.8L Diesel - Service Information - C/V Tradesman, Grand Caravan, Town & Country

C 57.573 - 57.578	Upper Bearing Shell	Yellow	Yellow	Blue	Blue
	Lower Bearing Shell	Green	Yellow	Yellow	Blue
D 57.578 - 57.583	Upper Bearing Shell	Green	Yellow	Yellow	Blue
	Lower Bearing Shell	Green	Green	Yellow	Yellow

CRANKSHAFT BEARINGS

Cylinder Block Seat Diameter	Bearing Half	Crankshaft Main Journal Diameter			
		D	C	B	A
		64.974 - 64.981	64.981 - 64.987	64.987 - 64.993	64.993 - 65.000
A 69.000 - 69.005	Upper Bearing Shell	Blue	Blue	Red	Red
	Lower Bearing Shell	Yellow	Blue	Blue	Red
B 69.005 - 69.010	Upper Bearing Shell	Yellow	Blue	Blue	Red
	Lower Bearing Shell	Yellow	Yellow	Blue	Blue
C 69.010 - 69.015	Upper Bearing Shell	Yellow	Yellow	Blue	Blue
	Lower Bearing Shell	Green	Yellow	Yellow	Blue
D 69.015 - 69.020	Upper Bearing Shell	Green	Yellow	Yellow	Blue
	Lower Bearing Shell	Green	Green	Yellow	Yellow

BEARING(S), CRANKSHAFT, MAIN

REMOVAL

REMOVAL

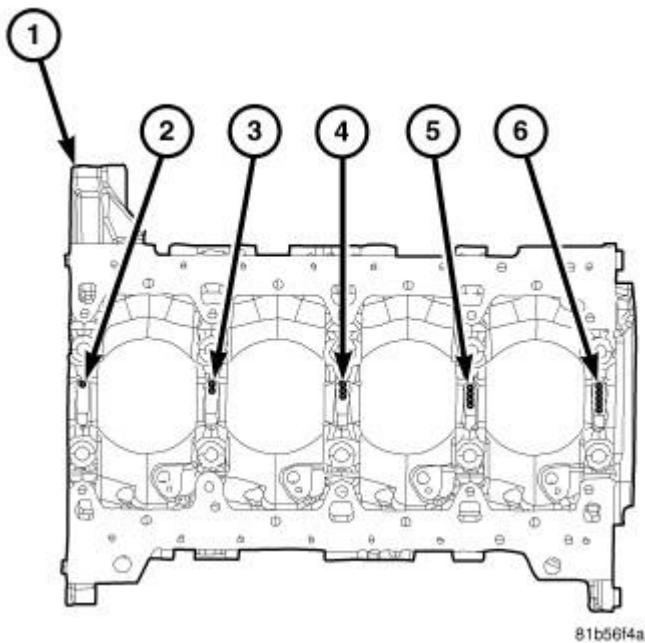


Fig. 166: Crankshaft Cap Location Marks
Courtesy of CHRYSLER GROUP, LLC

NOTE: Bearing caps (2-6) are not interchangeable and are marked to ensure according to their locations (2-6) in the block (1). Upper and lower bearing halves are NOT interchangeable, and must be installed facing in the correct direction.

1. Remove the balance shaft assembly. Refer to **MODULE, BALANCE SHAFT, REMOVAL**.
2. Identify bearing cap locations (2-6) before removal.

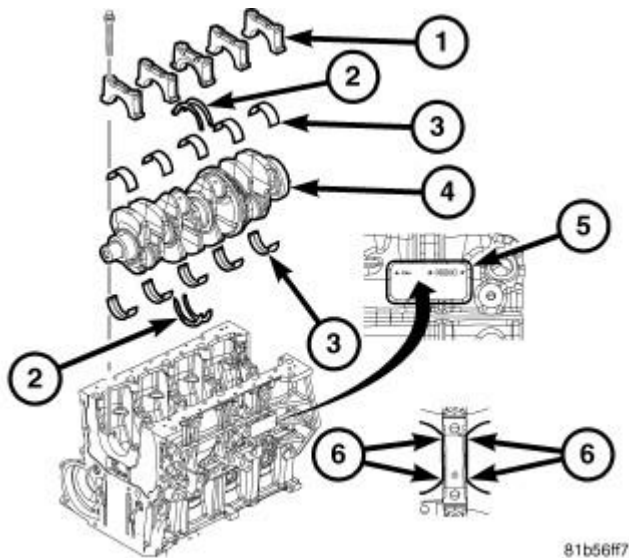
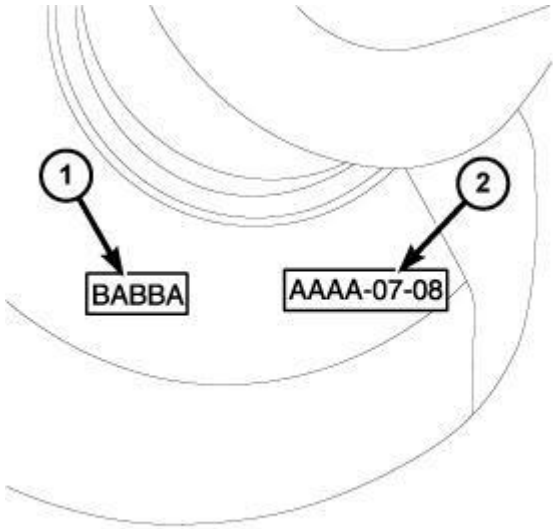


Fig. 167: Crankshaft Bearing Size Mark & Crankshaft Bearing Assembly
Courtesy of CHRYSLER GROUP, LLC

3. Remove the bearing caps (1) one at a time, and if possible, replace the crankshaft bearings (3) one at a time. Carefully rotate upper half of bearing from between the carrier and the crankshaft (4). If the upper half of the bearing does not easily slide out of position, the crankshaft must be removed for further inspection. Refer to **CRANKSHAFT, REMOVAL**.

INSTALLATION

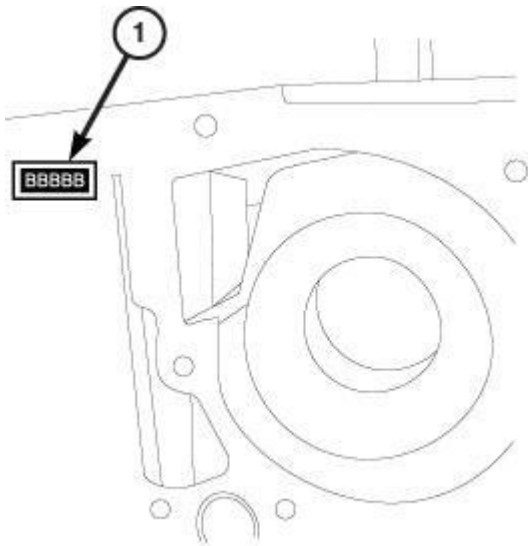
INSTALLATION



61703

Fig. 168: Main Bearing Size Mark On Crank
Courtesy of CHRYSLER GROUP, LLC

1. Locate the crankshaft journal size (1) stamp on the crankshaft weight.



61705

Fig. 169: Main Bearing Size Mark On Block
Courtesy of CHRYSLER GROUP, LLC

2. Locate the engine block crankshaft journal size stamp on the engine block (1).
3. Use the crankshaft bearing selection chart to select the correct crankshaft bearing sizes. The letters stamped into the block are in the same order as the cylinders (5). The first letter corresponds to the first cylinder, the second to the second, etc. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**.

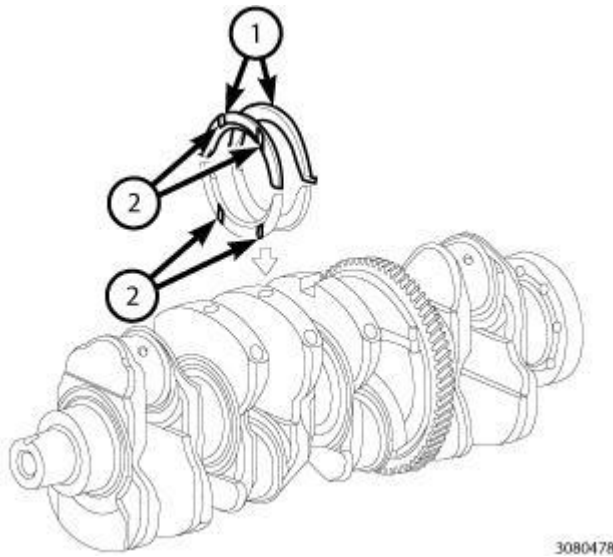


Fig. 170: Thrust Bearings & Oil Discharge Grooves Facing Toward Crankshaft
Courtesy of CHRYSLER GROUP, LLC

4. When Installing the thrust bearings (1) make sure the oil discharge grooves (2) face towards the crankshaft.
5. If the crankshaft was removed to install the bearings, install the crankshaft. Refer to **CRANKSHAFT, INSTALLATION**.
6. Install the balance shaft assembly. Refer to **MODULE, BALANCE SHAFT, INSTALLATION**.

COVER, ENGINE, FRONT

DESCRIPTION

DESCRIPTION

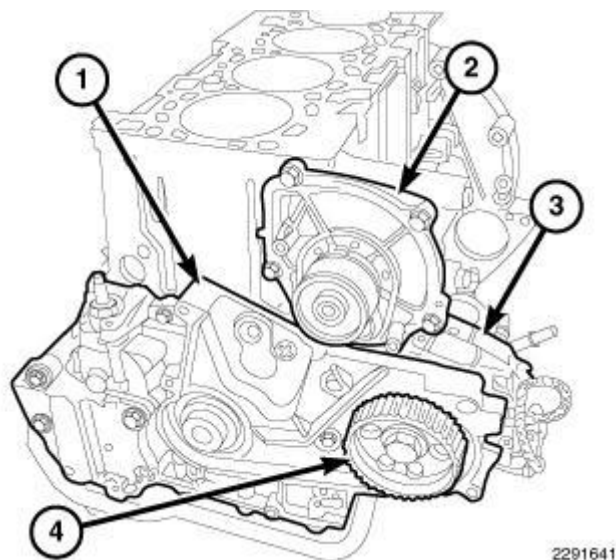


Fig. 171: Oil Pump Cover Assembly
Courtesy of CHRYSLER GROUP, LLC

The front engine cover assembly on this engine is an aluminum cover that incorporates the oil pump and vacuum pump.

REMOVAL

REMOVAL

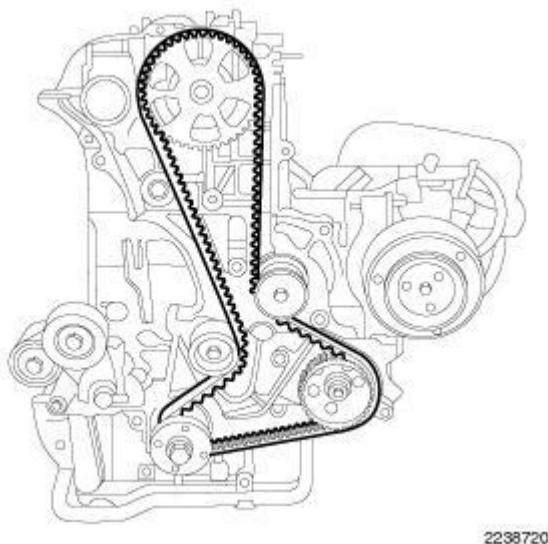


Fig. 172: Timing Belt Routing
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.

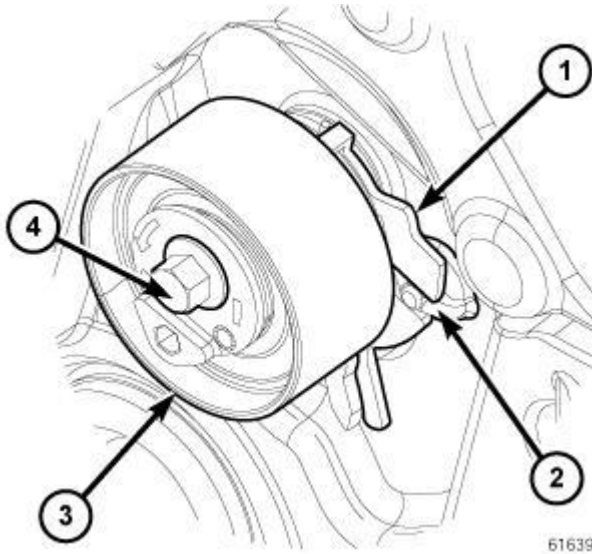


Fig. 173: Timing Belt Tensioner, Alignment Plate, Engine Cover Boss & Bolt
 Courtesy of CHRYSLER GROUP, LLC

3. If necessary, remove bolt (4) and the timing belt tensioner (3).

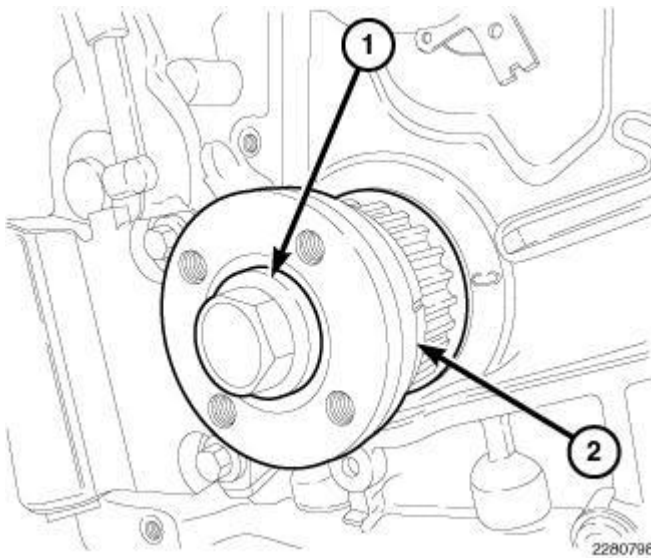


Fig. 174: Crankshaft Timing Belt Sprocket & Bolt
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft sprocket bolt is a left handed thread.

4. Remove the bolt (1) and the crankshaft sprocket (2).

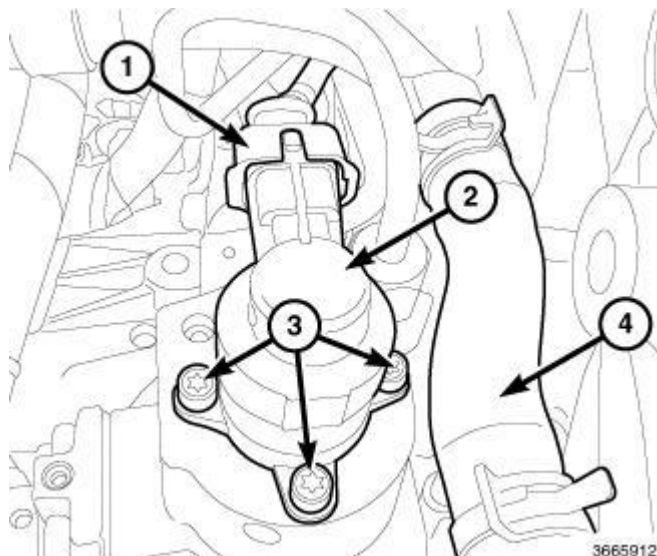


Fig. 175: Fuel Quantity Solenoid, Connector, Bolts & Engine Coolant Hose
 Courtesy of CHRYSLER GROUP, LLC

5. Remove the fuel quantity solenoid (2). Refer to **SOLENOID, FUEL QUANTITY, REMOVAL** .

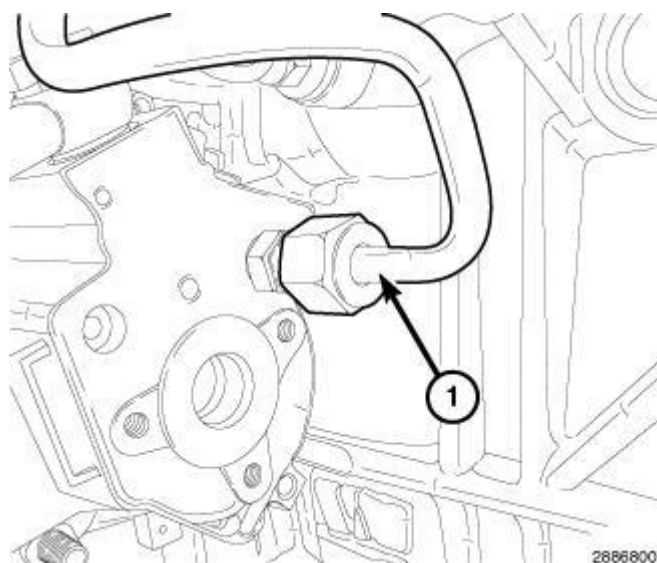


Fig. 176: High-Pressure Fuel Line
 Courtesy of CHRYSLER GROUP, LLC

6. Remove high-pressure fuel tube (1) at rear of fuel injection pump.

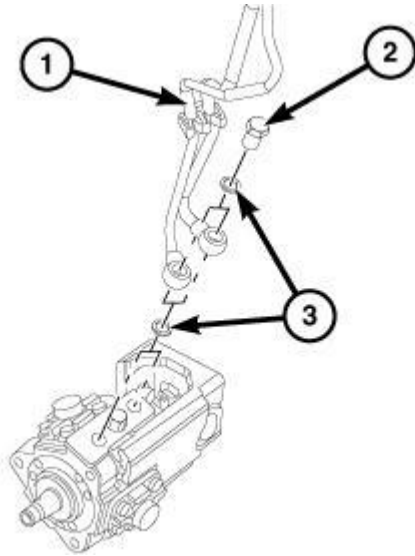


Fig. 177: Low-Pressure Supply And Return Line, Banjo Bolts & Washers
Courtesy of CHRYSLER GROUP, LLC

7. Remove the banjo bolt (2) and the low pressure supply and return lines (1) from fuel injection pump.

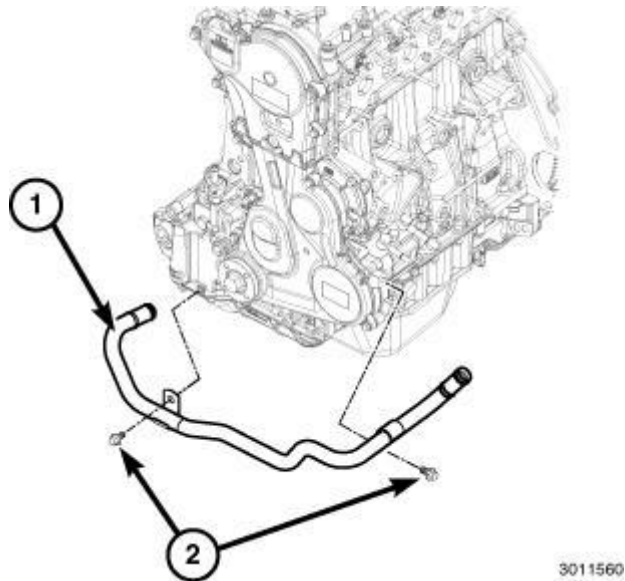


Fig. 178: Coolant Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the coolant tube hose at oil cooler and by fuel injection pump.
9. Remove bolts (2), and the coolant tube (1).

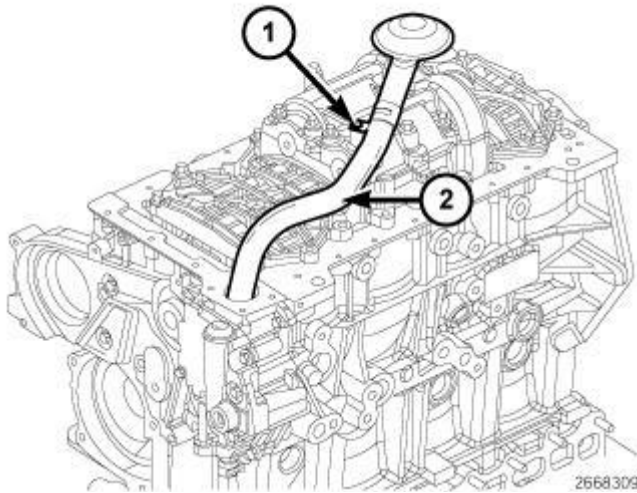


Fig. 179: Oil Pump Pickup Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

10. Remove the oil pickup tube. Refer to PICK-UP, OIL PUMP, REMOVAL .

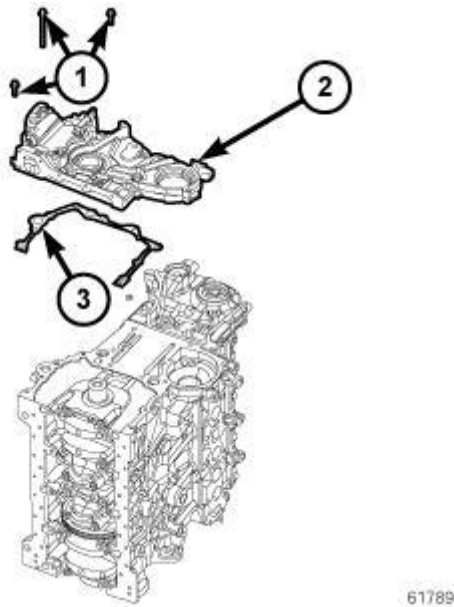


Fig. 180: Front Cover, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Disconnect the vacuum hose at vacuum pump.
12. Remove the eight bolts (1), and the front cover assembly (2).

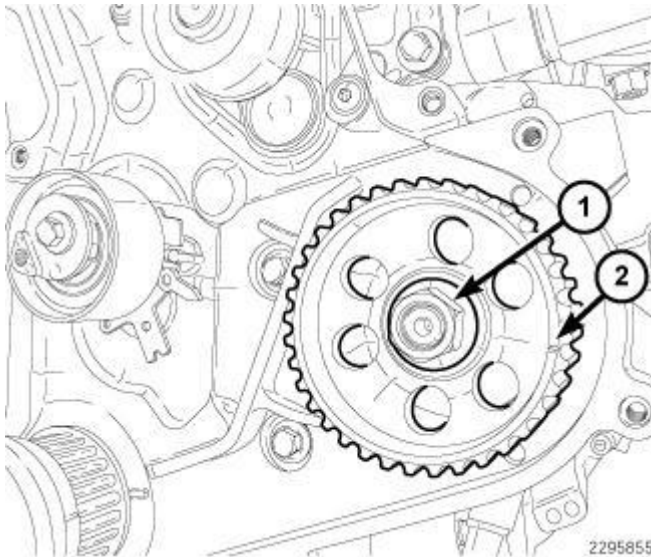


Fig. 181: Injection Pump Gear & Mounting Nut
 Courtesy of CHRYSLER GROUP, LLC

13. If necessary, using Locking Tool (special tool #VM.1055, Locking Tool), remove the nut (1).
14. If necessary, attach a typical 3-jaw Gear/Sprocket Puller (special tool #1023, Puller) and remove sprocket from pump.
15. If necessary, remove nuts and the injection fuel pump.

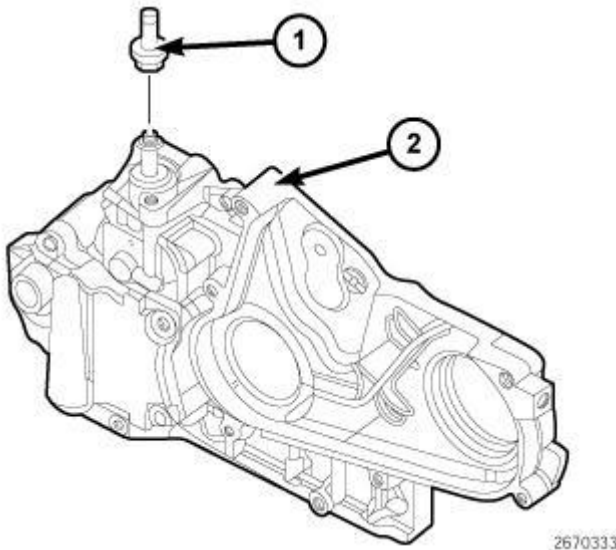


Fig. 182: Vacuum Pump Check Valve & Front Engine Cover
 Courtesy of CHRYSLER GROUP, LLC

16. If necessary, remove the vacuum pump check valve.

INSTALLATION

INSTALLATION

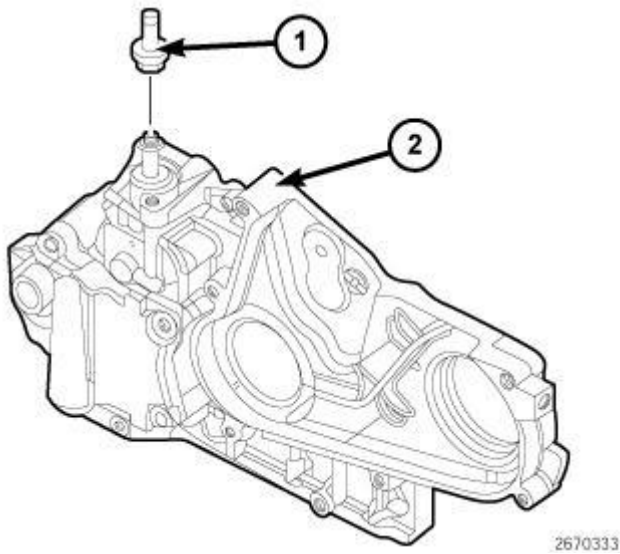


Fig. 183: Vacuum Pump Check Valve & Front Engine Cover
Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect the gasket mating services.
2. If necessary, install the front crankshaft oil seal. Refer to **SEAL, CRANKSHAFT OIL, FRONT, INSTALLATION**.
3. If necessary, transfer the vacuum pump check valve (1) and securely tighten.

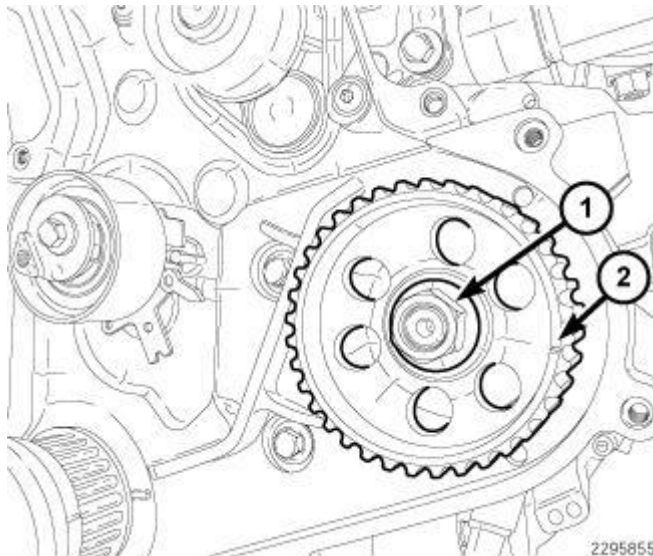
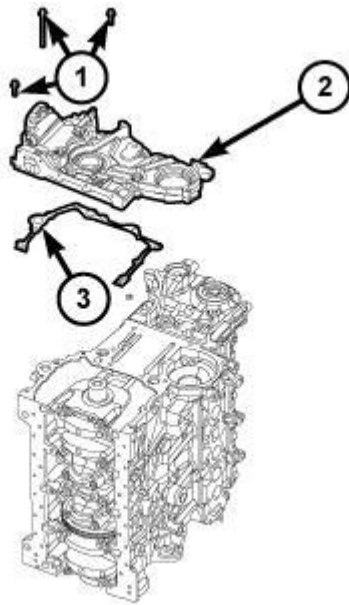


Fig. 184: Injection Pump Gear & Mounting Nut
Courtesy of CHRYSLER GROUP, LLC

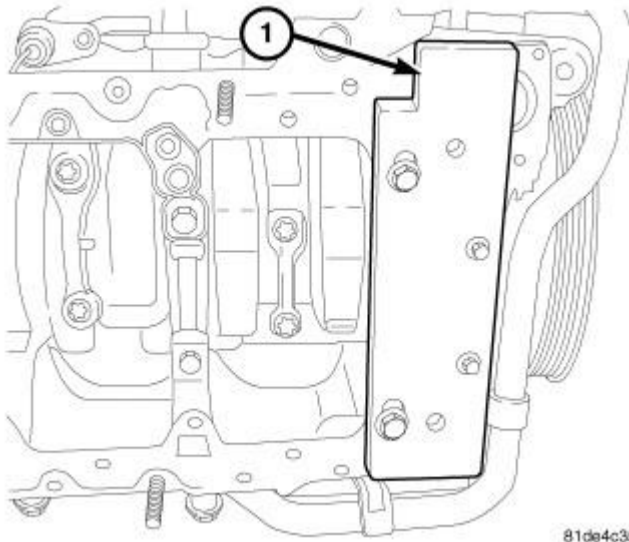
4. If necessary, install the high pressure fuel pump (3). Tighten nuts to 24 N.m (18 ft. lbs.).
5. Install the high pressure fuel pump (4) sprocket.
6. Using the Locking Tool (special tool #VM.1055, Locking Tool). Tighten nut (1) to 88 N.m (65 ft. lbs.).



61789

Fig. 185: Front Cover, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

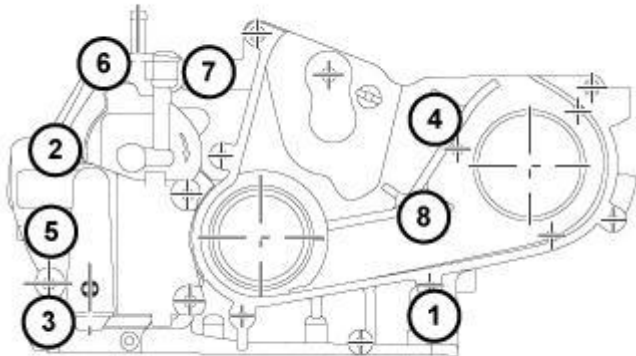
7. Install the front cover gasket (3).
8. Install the front cover assembly (2) and tighten the eight bolts (1) finger tight.



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Fig. 186: Front Cover Alignment Tool
Courtesy of CHRYSLER GROUP, LLC

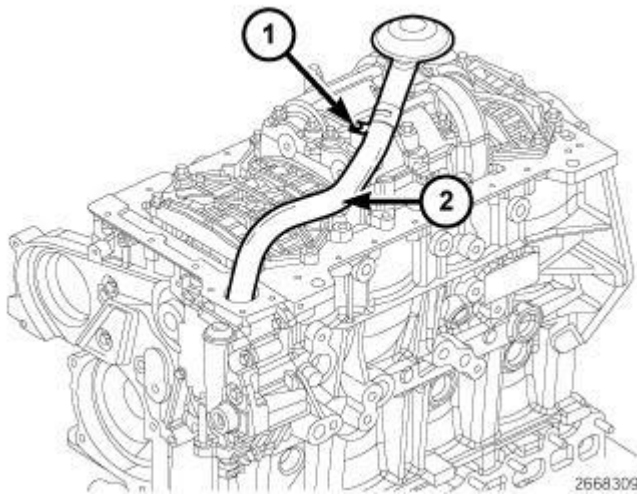
9. Install the (special tool #VM.9990, Tool, Front And Rear Seal) (1) to align the front cover.



2670240

Fig. 187: Front Cover Assembly Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

10. Using the tightening sequence shown in illustration, tighten bolts to 33 N.m (24 ft. lbs.).
11. Remove the front and rear seal tool.
12. Connect the vacuum hose at vacuum pump.



2668309

Fig. 188: Oil Pump Pickup Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

13. Install the oil pump pickup tube. Refer to **PICK-UP, OIL PUMP, INSTALLATION** .

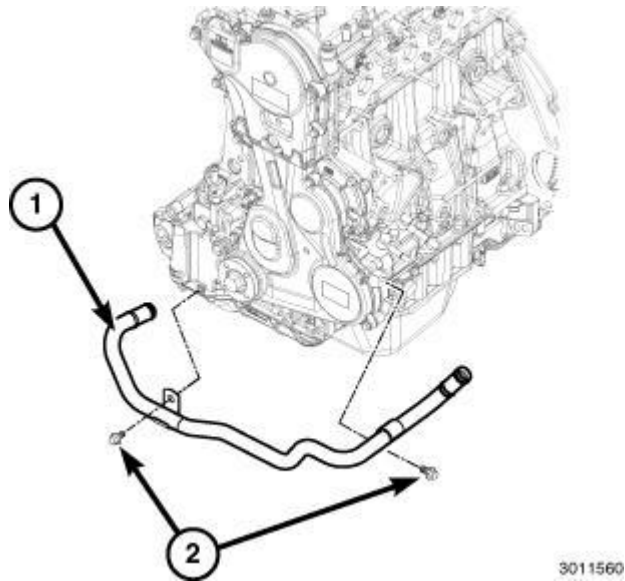


Fig. 189: Coolant Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Install the coolant tube (1). Tighten bolts (2) to 15 N.m (133 in. lbs.).
15. Connect the coolant tube hose at oil cooler and by fuel injection pump.

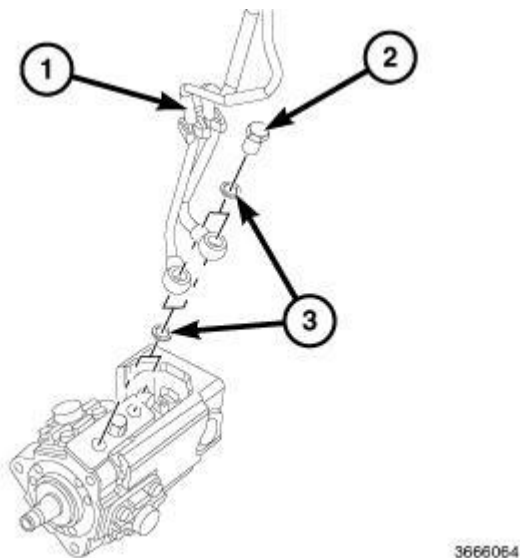


Fig. 190: Low-Pressure Supply And Return Line, Banjo Bolts & Washers
Courtesy of CHRYSLER GROUP, LLC

16. Using new sealing washers (3), install the low pressure supply and return line (1) onto the fuel injection pump. Tighten banjo bolt (2) to 28 N.m (21 ft. lbs.).

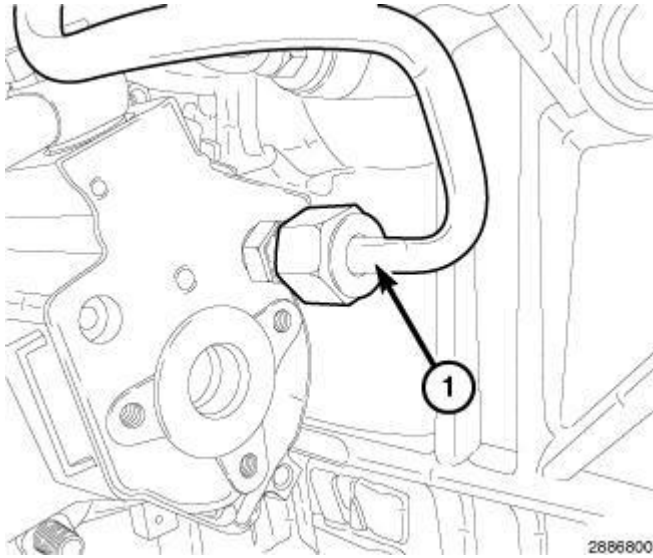


Fig. 191: High-Pressure Fuel Line
Courtesy of CHRYSLER GROUP, LLC

17. Install a new high-pressure fuel line (1) at rear of pump. Tighten line nut to 28 N.m (21 ft. lbs.).

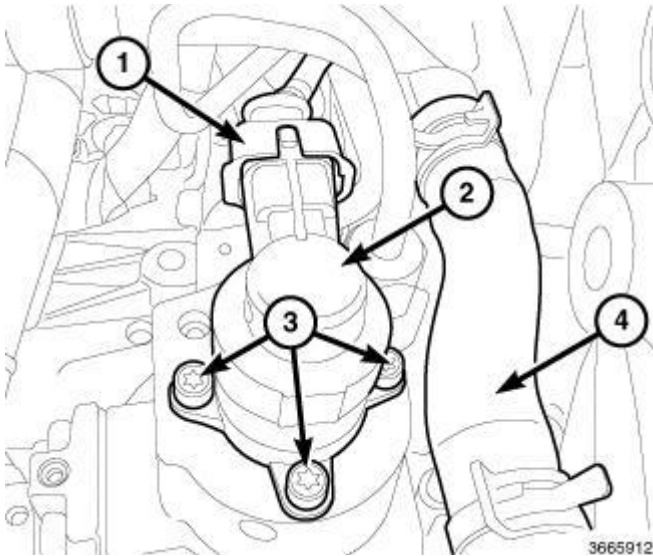


Fig. 192: Fuel Quantity Solenoid, Connector, Bolts & Engine Coolant Hose
Courtesy of CHRYSLER GROUP, LLC

18. Install the fuel quantity solenoid (1). Refer to **SOLENOID, FUEL QUANTITY, INSTALLATION** .

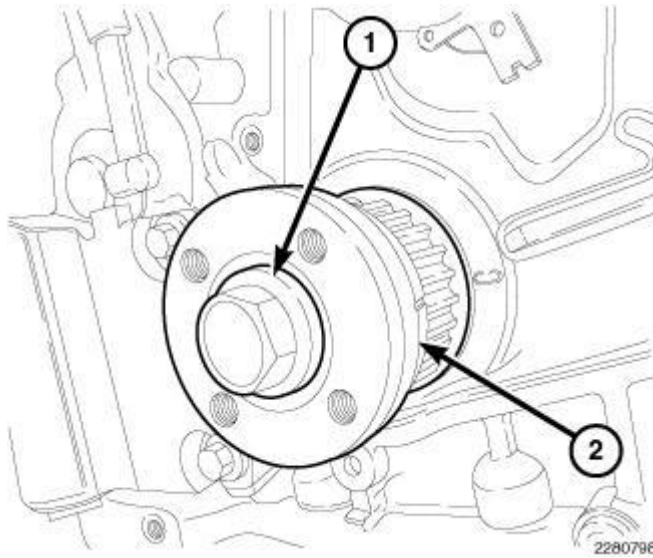


Fig. 193: Crankshaft Timing Belt Sprocket & Bolt
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft sprocket bolt is a left handed thread.

19. Install the crankshaft sprocket (2). Tighten bolt (1) to 100 N.m (74 ft. lbs.) plus an additional 120 degrees turn.

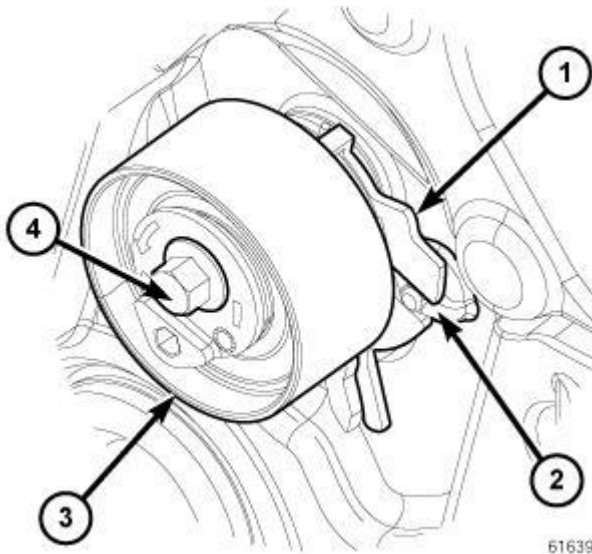
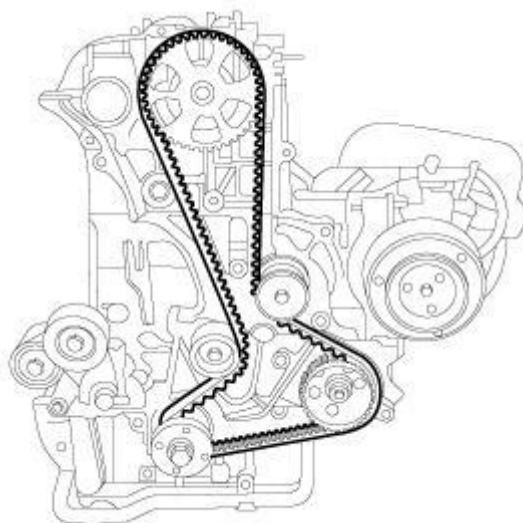


Fig. 194: Timing Belt Tensioner, Alignment Plate, Engine Cover Boss & Bolt
 Courtesy of CHRYSLER GROUP, LLC

20. If necessary, install the timing belt tensioner (3) and tighten bolt finger tight.



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Fig. 195: Timing Belt Routing

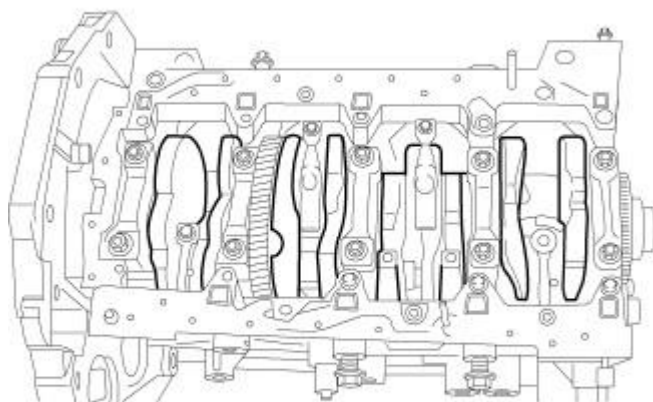
Courtesy of CHRYSLER GROUP, LLC

21. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
22. Connect the negative battery cable.

CRANKSHAFT

DESCRIPTION

DESCRIPTION

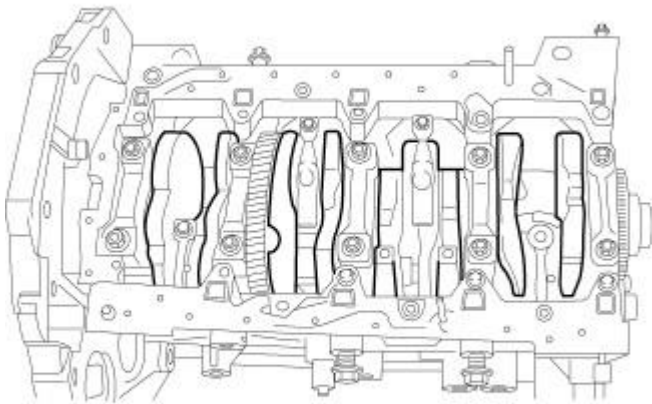


81ab8609

Fig. 196: Crankshaft

Courtesy of CHRYSLER GROUP, LLC

The crankshaft for the 2.8L is a forged steel type design with five main bearing journals. The crankshaft is located at the bottom of the engine block.

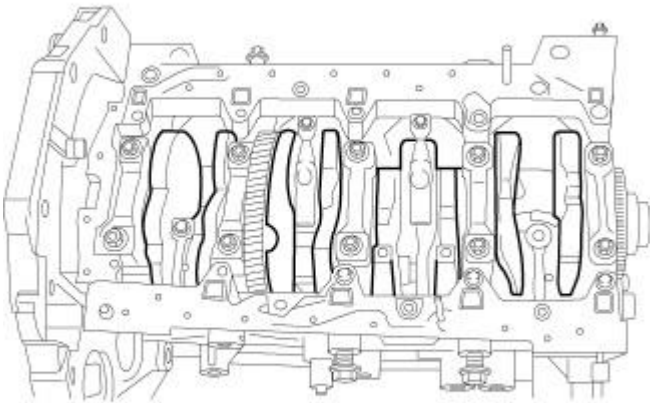
STANDARD PROCEDURE**STANDARD PROCEDURE**

81ab8609

Fig. 197: Crankshaft**Courtesy of CHRYSLER GROUP, LLC**

1. Mount a (special tool #C-3339A, Set, Dial Indicator) to a stationary point at rear of engine. Locate the probe perpendicular against the flywheel.
2. Move the crankshaft all the way to the front of its travel.
3. Zero the dial indicator.
4. Move the crankshaft all the way to the rear and read dial indicator. For crankshaft end play clearances. Refer to **ENGINE SPECIFICATIONS** .

REMOVAL**REMOVAL**



81ab8609

Fig. 198: Crankshaft

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the balance shaft assembly. Refer to **MODULE, BALANCE SHAFT, REMOVAL**.
3. Remove the rear crankshaft oil seal carrier. Refer to **SEAL, CRANKSHAFT OIL, REAR, REMOVAL**.
4. Remove the front cover. Refer to **COVER, ENGINE, FRONT, REMOVAL**.
5. Remove the bearing caps from the connecting rods.
6. Remove the bearing caps from the crankshaft journals.
7. Remove the crankshaft.

INSTALLATION**INSTALLATION**

1. Use the crankshaft bearing selection chart for main bearing selection. Refer to **BEARING(S), CRANKSHAFT, STANDARD PROCEDURE**.
2. Lubricate and install the crankshaft bearings. Make sure the thrust washer is not touching the engine block.
3. Install the crankshaft.

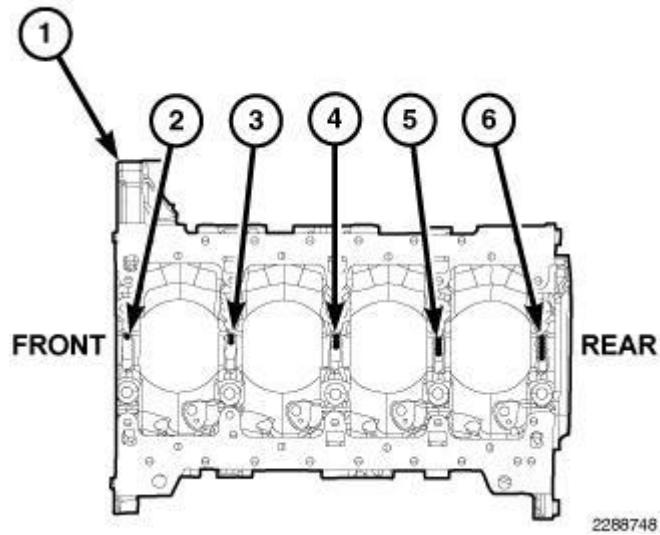


Fig. 199: Main Bearing Caps

Courtesy of CHRYSLER GROUP, LLC

4. Using new bolts, install the main bearing caps in the same location as they were removed. The notches on the top of the bearing caps indicate their proper position. The front cap has one notch, the next cap two, etc.

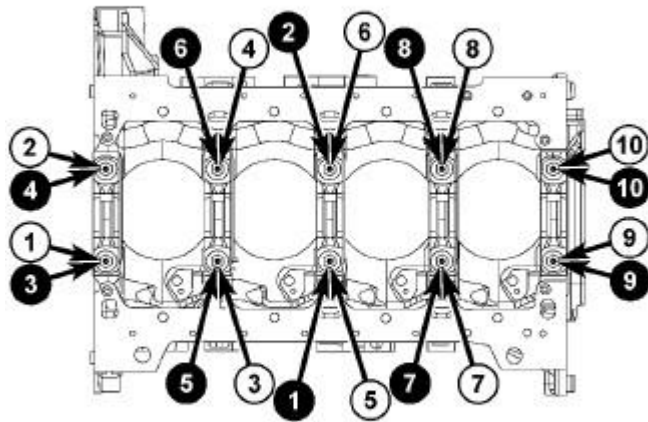


Fig. 200: Crankshaft Bolt Tightening Sequence

Courtesy of CHRYSLER GROUP, LLC

5. Using the black number bubbles in the tightening pattern, tighten the crankshaft bolts to 50 N.m (36 ft. lbs.).

6. Using the white number bubbles in the tightening pattern, tighten the bolts an additional 90 degrees turn.
7. Using (special tool #C-3339A, Set, Dial Indicator), measure the crankshaft end play. Crankshaft end play must be between 0.1 mm and 0.33 mm (0.004 in - 0.13 in).
8. Using the bearing chart, select the correct bearings and install the connecting rod bearings. Using new bolts, install the connecting rod bearing caps. Refer to **ROD, PISTON AND CONNECTING, INSTALLATION** .
9. Install the front cover. Refer to **COVER, ENGINE, FRONT, INSTALLATION**.
10. Install the rear crankshaft seal carrier. Refer to **SEAL, CRANKSHAFT OIL, REAR, INSTALLATION** .
11. Install the balance shaft assembly. Refer to **MODULE, BALANCE SHAFT, INSTALLATION**.
12. connect the negative battery cable.

DAMPER, VIBRATION

REMOVAL

REMOVAL

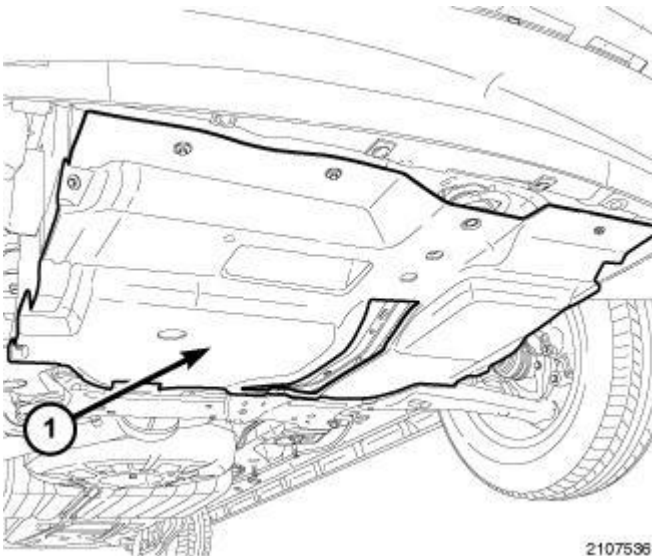


Fig. 201: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle.
3. Remove the underbody splash shield (1).
4. Remove the right front inner splash shield.
5. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .

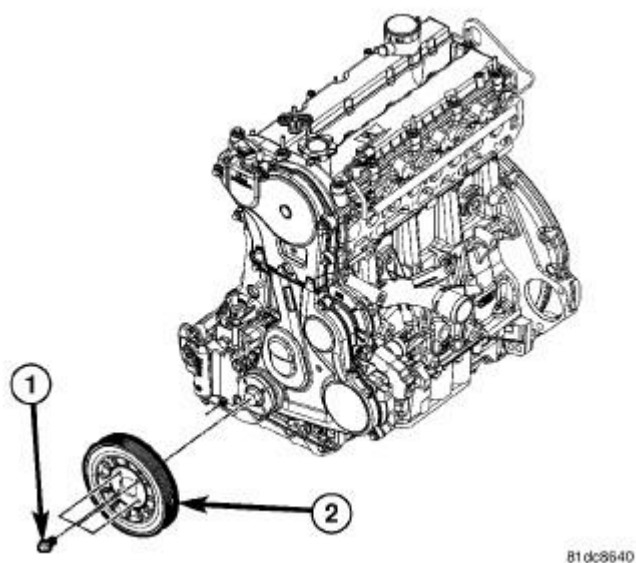


Fig. 202: Crankshaft Damper & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the bolts (1) and the vibration damper (2).

INSTALLATION

INSTALLATION

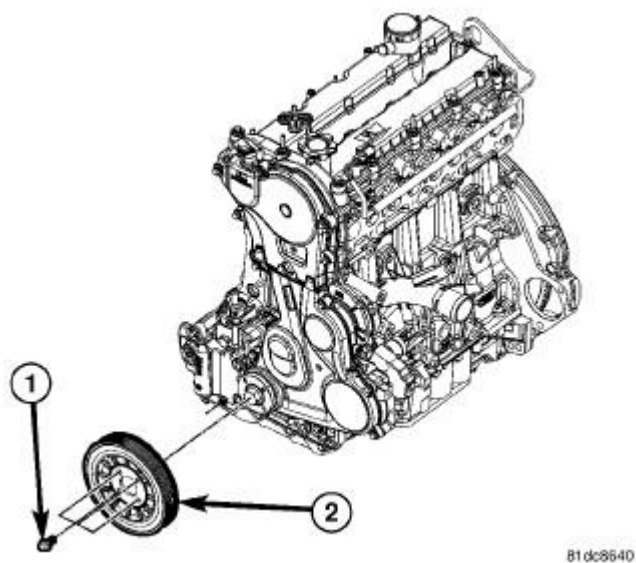


Fig. 203: Crankshaft Damper & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Install the vibration damper (2). Tighten bolts (1) to 32 N.m. (24 ft. lbs.).

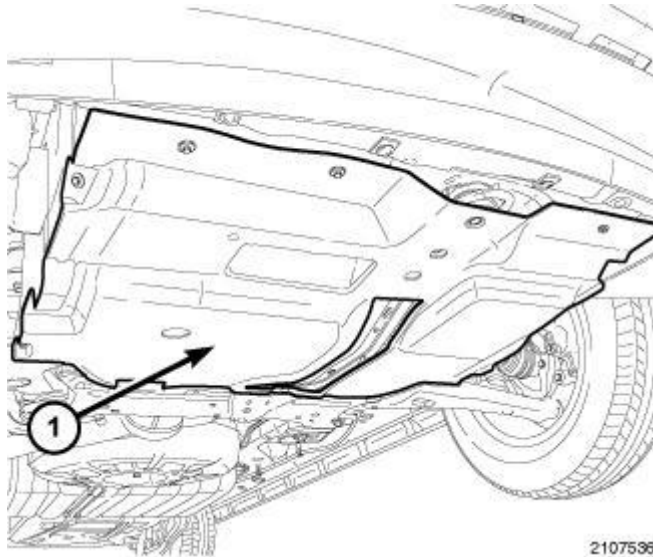


Fig. 204: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

2. Install accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .
3. Install the right front inner splash shield.
4. Install the underbody splash shield (1).
5. Lower the vehicle.
6. Connect the negative battery cable.

FLEXPLATE

REMOVAL

REMOVAL

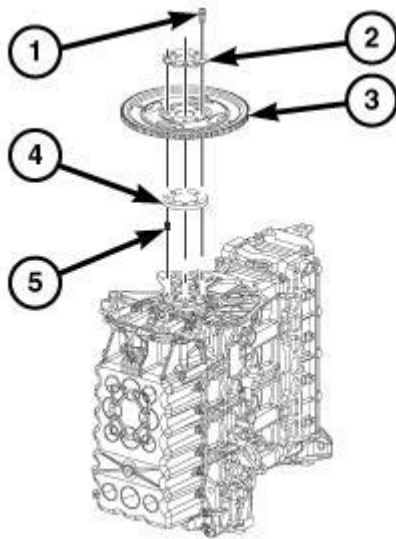


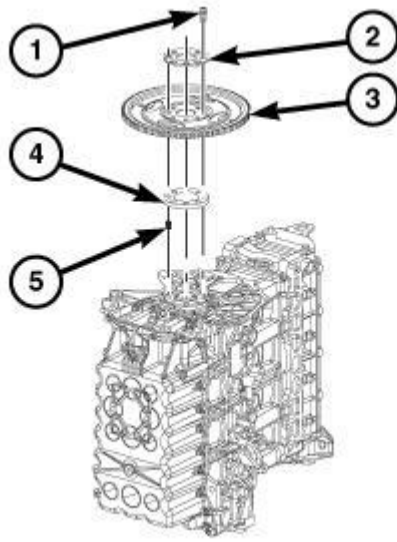
Fig. 205: Bolts, Backing Plate, Flexplate/Flywheel, Tone Wheel & Dowel Pin

Courtesy of CHRYSLER GROUP, LLC

1. Remove the transmission. Refer to **REMOVAL** .
2. Paint mark the flexplate hub to flex plate relation.
3. Remove the 40 mm bolts (1), backing plate (2) and flexplate (3).
4. Inspect the flexplate (3) and tone wheel (4) for damage.

INSTALLATION

INSTALLATION



3658526

Fig. 206: Bolts, Backing Plate, Flexplate/Flywheel, Tone Wheel & Dowel Pin

Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the tone wheel and make sure it is align properly on alignment pin (5).
2. Install the flexplate.

NOTE: Always use new flexplate bolts.

NOTE: Do not lubricate new bolts threads as they are already coated with an anti-scuff treatment.

NOTE: Lubricate the underneath side of flexplate bolt head.

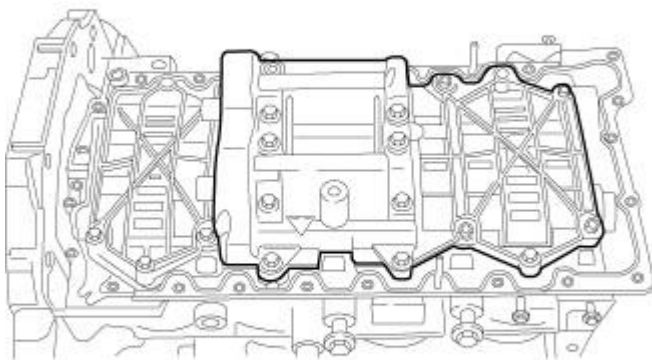
3. Install the backing plate (2) and flexplate bolts (1) finger tight.
4. Using a torque wrench fitted with a Torque Angle Gauge, tighten bolt in a cross pattern to 50 N.m (37 ft. lbs.).
5. Loosen each bolt 90° then tighten the bolt to 25 N.m (ft. lbs.) plus an additional 60° turn in a cross pattern.

6. Install the transmission. Refer to **INSTALLATION** .

MODULE, BALANCE SHAFT

DESCRIPTION

DESCRIPTION



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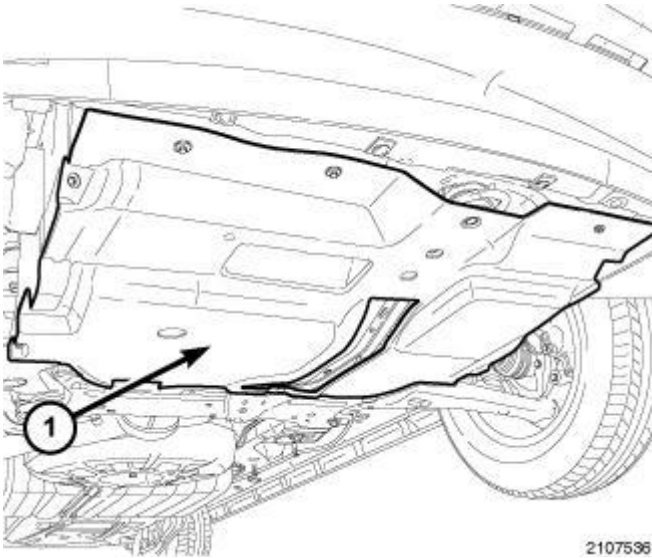
Fig. 207: Balance Shaft

Courtesy of CHRYSLER GROUP, LLC

The balance shaft is gear-driven and is used to counteract engine vibration and roughness. The balance shaft assembly includes balancers on two shafts. It is only serviced as an assembly. Balance shafts must be timed to the crankshaft.

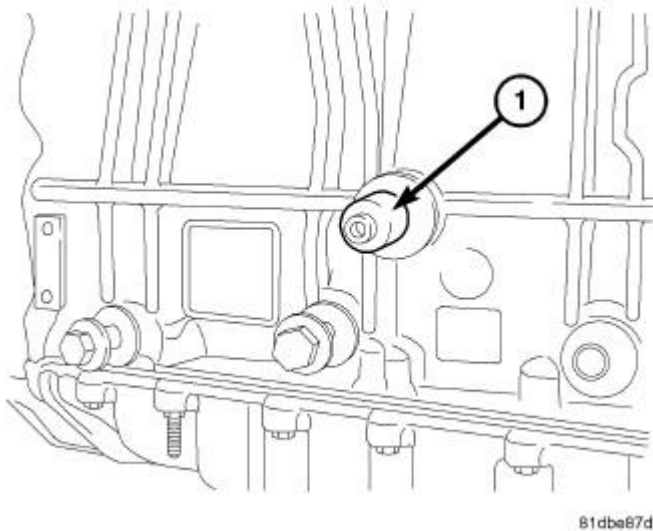
REMOVAL

REMOVAL

**Fig. 208: Underbody Splash Shield**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the underbody splash shield (1).

**Fig. 209: Crankshaft Locking Tool**

Courtesy of CHRYSLER GROUP, LLC

4. Lock the engine 90 degrees ATDC. Refer to **VALVE TIMING - STANDARD PROCEDURE** .

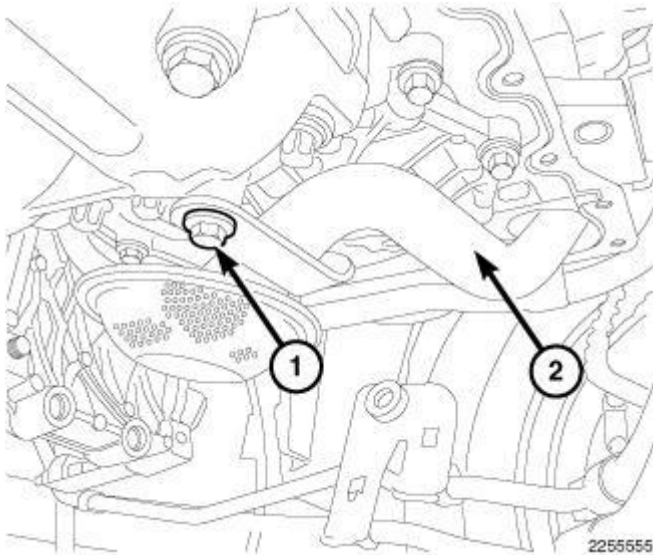


Fig. 210: Oil Pickup Tube With Bolt
Courtesy of CHRYSLER GROUP, LLC

5. Remove the oil pickup tube (2). Refer to **PICK-UP, OIL PUMP, REMOVAL** .

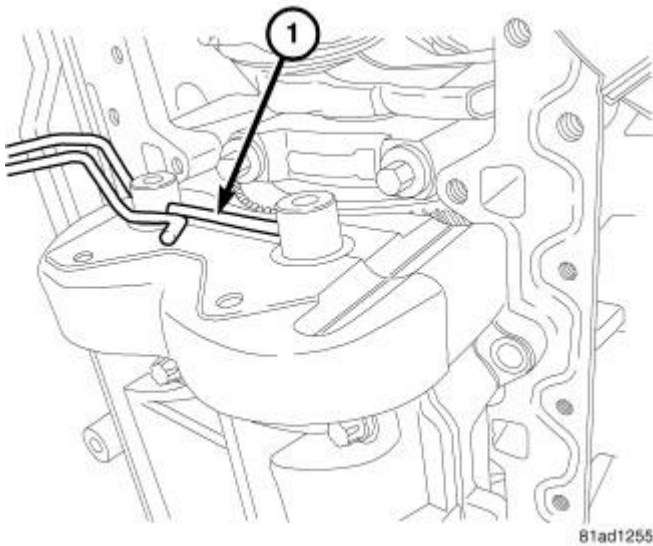
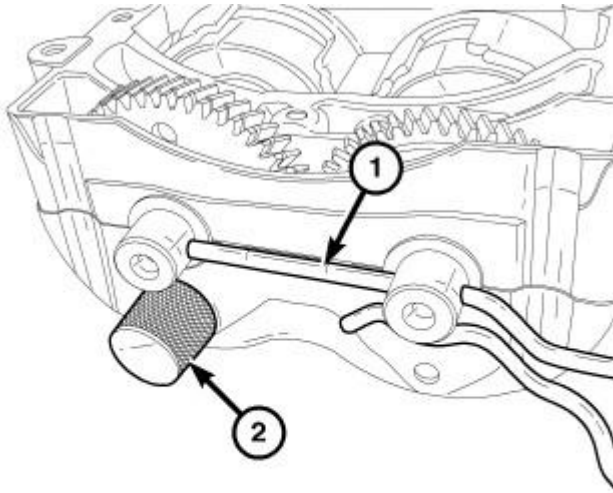


Fig. 211: Balance Shaft Timing Tool
Courtesy of CHRYSLER GROUP, LLC

6. Place a dowel rod through the holes in the balance shaft axles to keep the balance shafts in the correct position for reassembly.

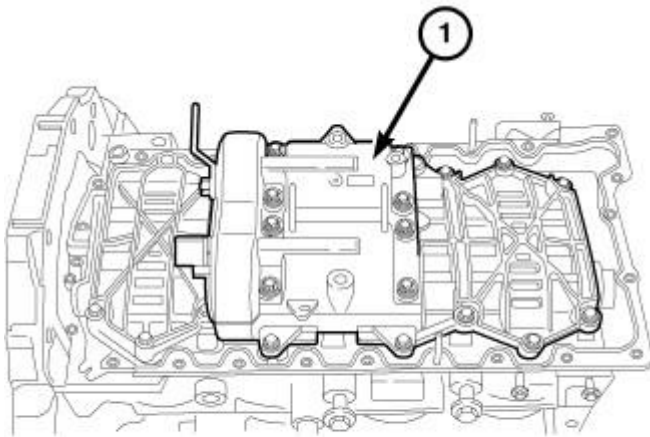


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Fig. 212: Balance Shaft Tool Installed
Courtesy of CHRYSLER GROUP, LLC

WARNING: The balance shaft pin must be installed before the balance shaft assembly is removed from the engine. The balance shaft pin must always remain in the balance shaft assembly while the assembly is removed from the engine. Do not remove the balance shaft pin until the balance shaft assembly is completely installed on the engine, and the 90° after TDC crank locking tool is correctly installed.

7. Insert the Balance Shaft Locking Pin Tool (special tool #VM.10012, Balance Shaft Split Gear Align) (2) into the balance shaft assembly to lock the split gears together.

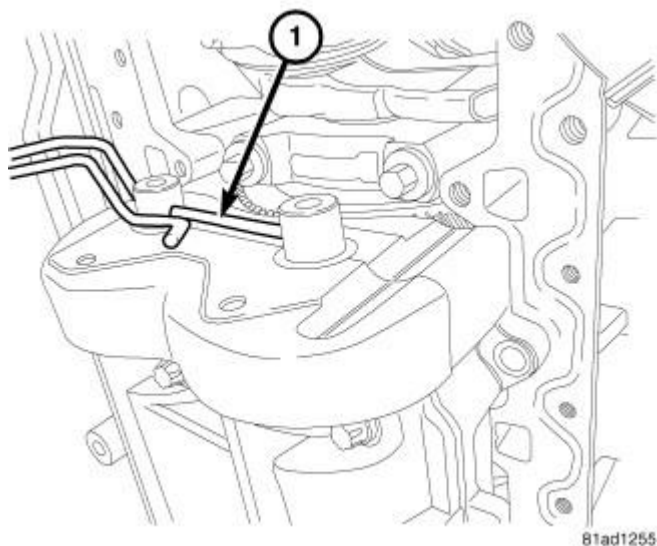


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Fig. 213: Balance Shaft Housing

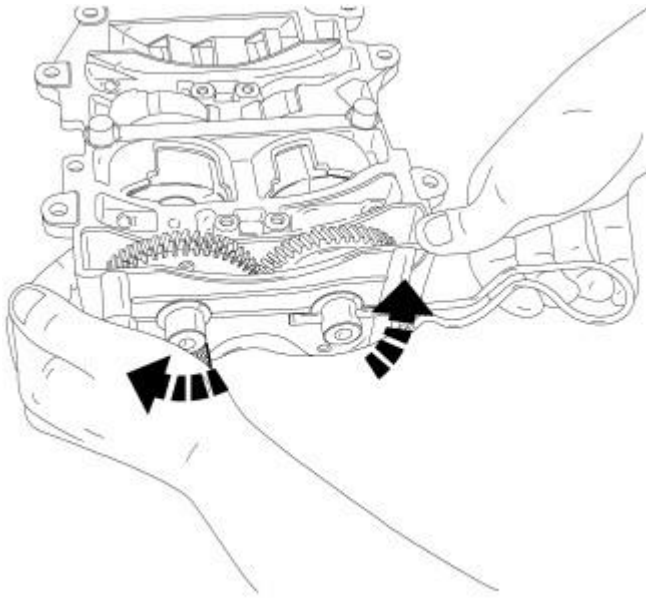
Courtesy of CHRYSLER GROUP, LLC

8. Remove bolts and the balance shaft housing (1).

INSTALLATION**INSTALLATION****Fig. 214: Balance Shaft Timing Tool**

Courtesy of CHRYSLER GROUP, LLC

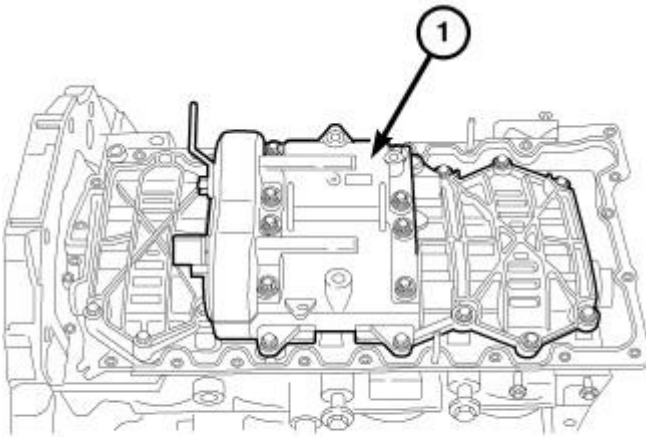
1. The balance shafts must remain aligned by the alignment dowel and the balance shaft pin must remain in the balance shaft assembly until the assembly is completely installed to the engine.



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Fig. 215: Balance Shaft Tool Installation
Courtesy of CHRYSLER GROUP, LLC

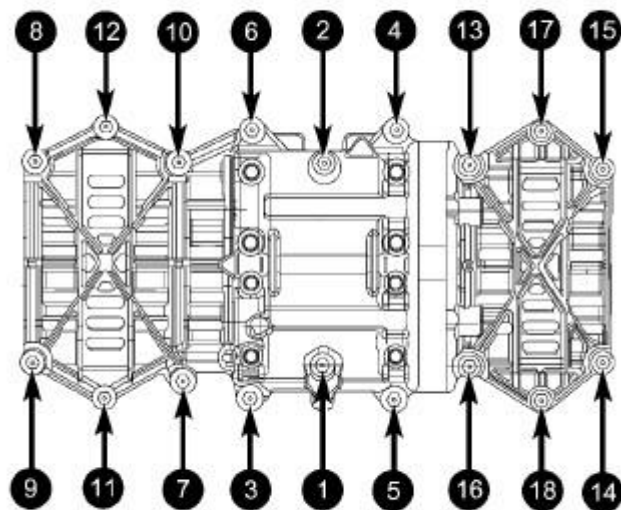
2. The balance shaft pin should never be removed from the balance shaft assembly when the balance shaft assembly is not installed in the engine. If the balance shaft was removed from the vehicle without the pin, or the pin was removed, use the dowel to load the spring while pressing the tool into place as shown in illustration.



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Fig. 216: Balance Shaft Housing
Courtesy of CHRYSLER GROUP, LLC

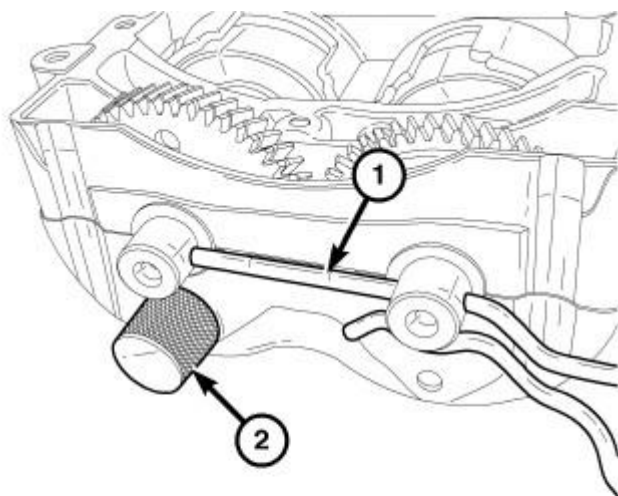
3. Install the balance shaft housing (1).



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Fig. 217: Balance Shaft Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

4. Use the tightening sequence shown in illustration, tighten bolts to 33 N.m (24 ft. lbs.).



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Fig. 218: Balance Shaft Tool Installed
Courtesy of CHRYSLER GROUP, LLC

5. Remove the balance shaft dowel assembly and the Balance Shaft Locking Pin Tool (special tool #VM.10012, Balance Shaft Split Gear Align) (2).

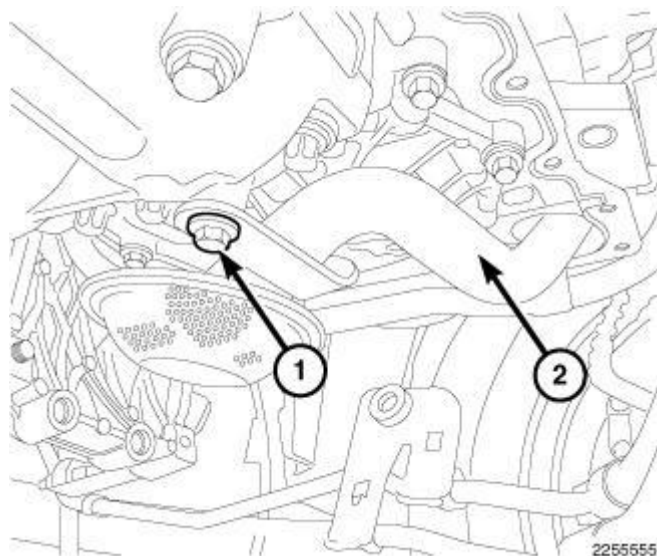


Fig. 219: Oil Pickup Tube With Bolt
Courtesy of CHRYSLER GROUP, LLC

6. Install the oil pickup tube. Refer to **PICK-UP, OIL PUMP, INSTALLATION** .

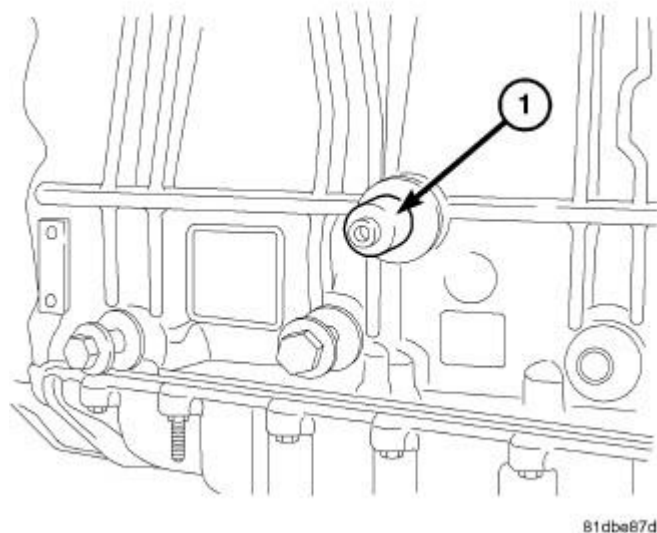


Fig. 220: Crankshaft Locking Tool
Courtesy of CHRYSLER GROUP, LLC

7. Remove the Crank Locking Tool (special tool #VM.9992, Adapter, 90 Degree ATDC) (1).

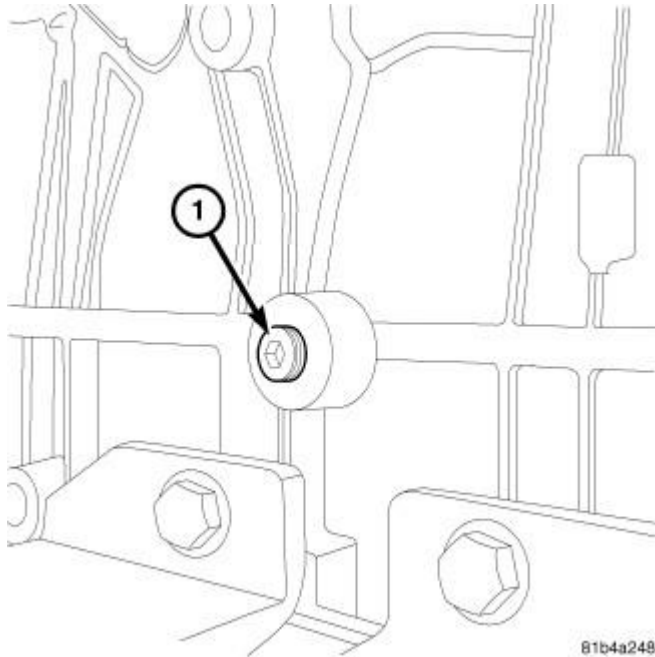


Fig. 221: Engine Block Plug
Courtesy of CHRYSLER GROUP, LLC

8. Install the engine block plug (1). Tighten the engine block plug to 30 N.m (22 ft. lbs.).

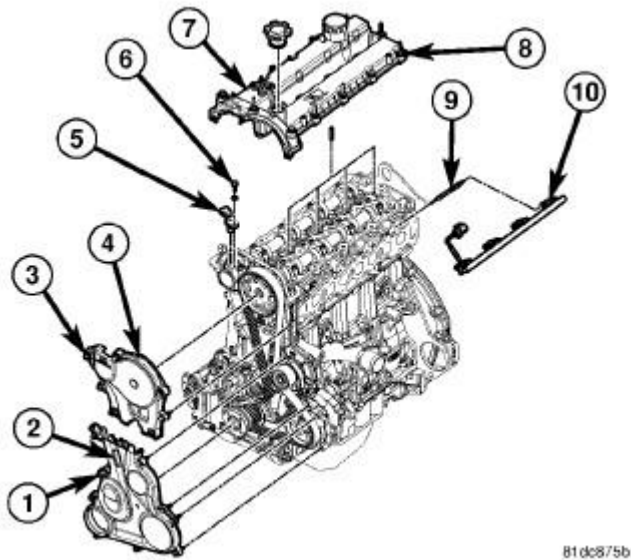


Fig. 222: Upper And Lower Front Covers With Fasteners
Courtesy of CHRYSLER GROUP, LLC

9. Install the upper (4) and lower (2) front covers. Refer to **COVER(S), ENGINE TIMING, INSTALLATION**.
10. Fill the engine with recommended engine oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.

11. Connect the negative battery cable.
12. Start the engine and check for leaks.

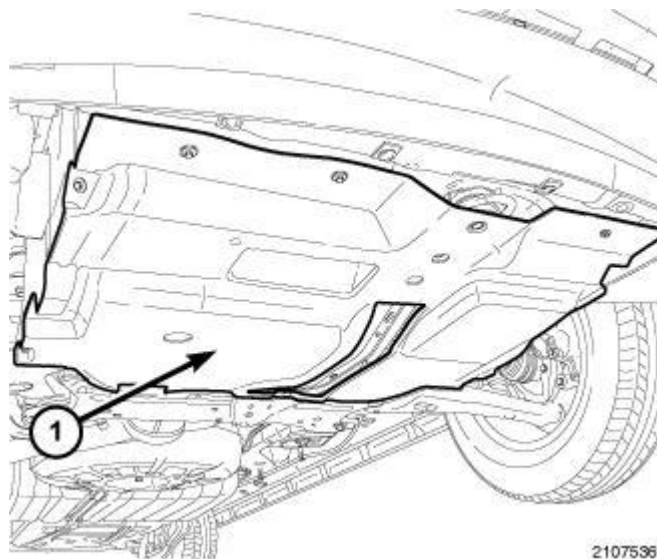


Fig. 223: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

13. Install the underbody splash shield (1) and securely tighten fasteners.
14. Lower the vehicle.

PUMP, INTERNAL VACUUM

DESCRIPTION

DESCRIPTION

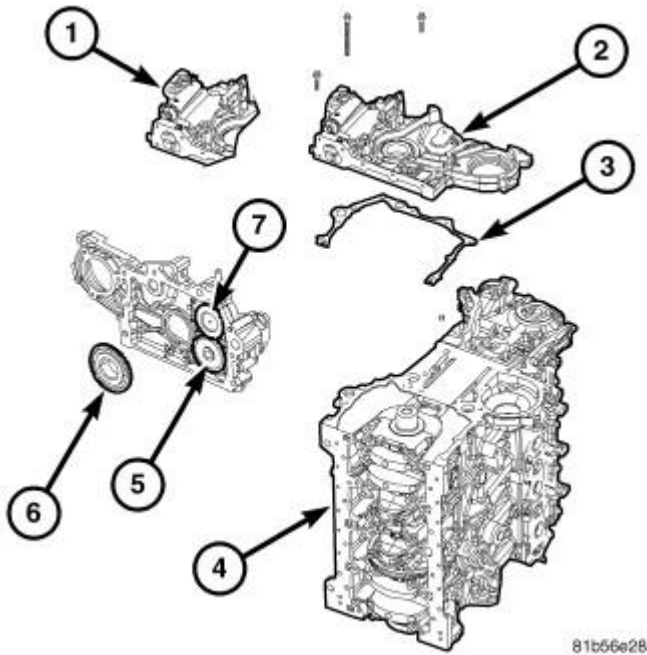


Fig. 224: Vacuum Pump And Oil Pump Assembly
Courtesy of CHRYSLER GROUP, LLC

The diesel engine uses an internal vacuum pump (7). This vacuum pump (7) is mounted in the front engine cover (2). The vacuum pump is driven by a sprocket (6) on the crankshaft.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - VACUUM PUMP

1. Connect a vacuum gauge to the booster check valve with a short length of hose and T-fitting.
2. Start the engine allowing the engine to run for 30 seconds. Vacuum should be 18 inches HG (609 millibars). Verify the vacuum line is not leaking. If no leak is present replace vacuum pump. Refer to **PUMP, INTERNAL VACUUM, REMOVAL**.

REMOVAL

REMOVAL

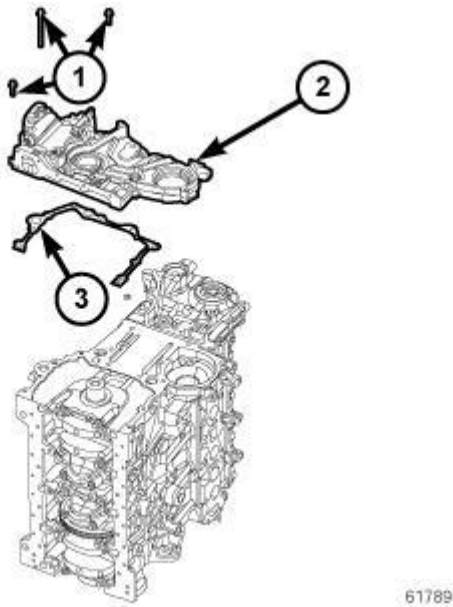


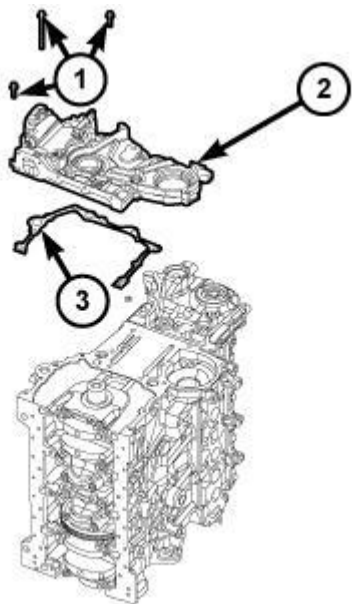
Fig. 225: Front Cover, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The vacuum pump is not a serviceable component, it is part of the front cover. If diagnosis has directed you to replace the vacuum pump, then the front cover needs to be replaced.

1. Disconnect the negative battery cable.
2. Remove the front cover (1). Refer to **COVER, ENGINE, FRONT, REMOVAL**.

INSTALLATION

INSTALLATION



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Fig. 226: Front Cover, Gasket & Bolts

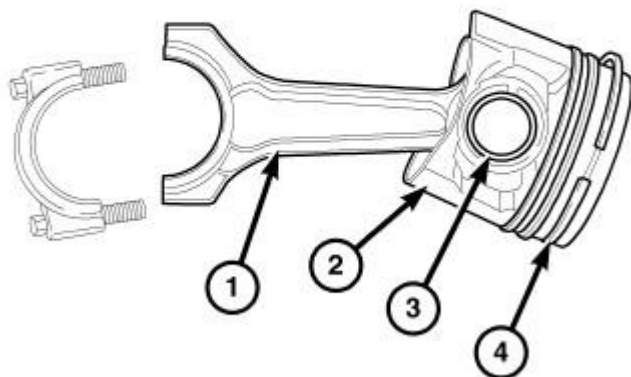
Courtesy of CHRYSLER GROUP, LLC

1. Install the front cover (1). Refer to **COVER, ENGINE, FRONT, INSTALLATION.**
2. Connect the negative battery cable.

ROD, PISTON AND CONNECTING

DESCRIPTION

DESCRIPTION



81abebb4

Fig. 227: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

The pistons (2) are of a free floating design. Oil jets in the engine block lubricate and cool the piston and piston pin (3) assembly. The connecting rods (1) have a pressed in place wrist pin bushing which is lubricated by the oil jets. Connecting rod (7) and bearing caps have cracked mating surfaces and are not interchangeable.

REMOVAL

REMOVAL

PISTON

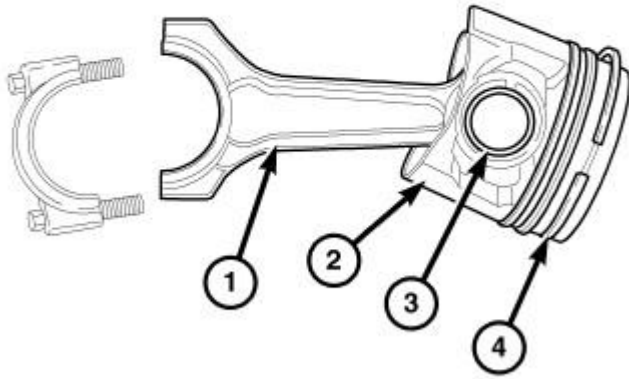
NOTE: Both the connecting rod and the connecting rod cap are paint marked to aid during assembly. Paint marks disappear after time. If the rod and the cap are not marked with paint, paint mark or scribe them before disassembly.

1. Disconnect the negative battery cable.
2. Remove the cylinder head. Refer to **CYLINDER HEAD, REMOVAL** .
3. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
4. Remove the oil jets. Refer to **JET, PISTON OIL COOLER, REMOVAL** .
5. Remove top ridge of cylinder bores with a ridge reamer before removing pistons from cylinder block. **Be sure to keep top of pistons covered during this operation.**
6. Piston and connecting rods must be removed from top of cylinder block. Rotate crankshaft so that each connecting rod is centered in cylinder bore.

NOTE: Be careful not to nick or scratch crankshaft journals

7. After removal, install bearing cap on the mating rod and mark pistons with matching cylinder number when removed from engine block.

PISTON PIN

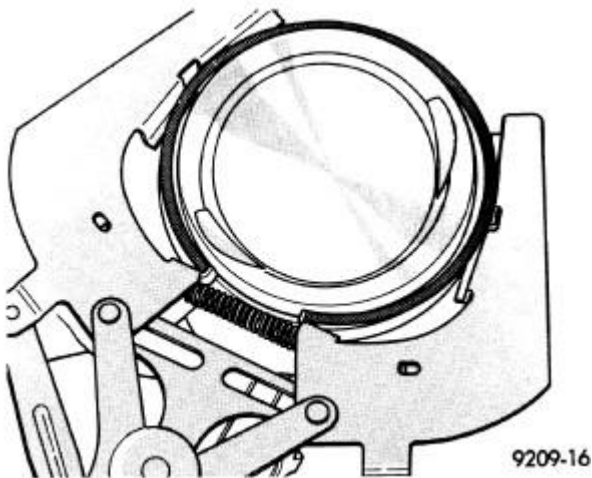


81abebb4

Fig. 228: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Secure connecting rods (1) in a soft jawed vice.
2. Remove 2 snap rings securing piston pin (3).
3. Push piston pin (3) out of piston (2) and connecting rod (1).

PISTON RING



9209-16

Fig. 229: Piston Rings - Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

NOTE: New piston rings are only supplied with the piston as an assembly.

1. ID mark on face of top and second piston rings must point toward piston crown.

2. Using a suitable ring expander, remove top and second piston rings.
3. Remove upper oil ring side rail, lower oil ring side rail and then the oil expander from piston.
4. Carefully clean carbon from piston crowns, skirts and ring grooves ensuring the 4 oil holes in the oil control ring groove are clear.

INSPECTION

INSPECTION

PISTONS

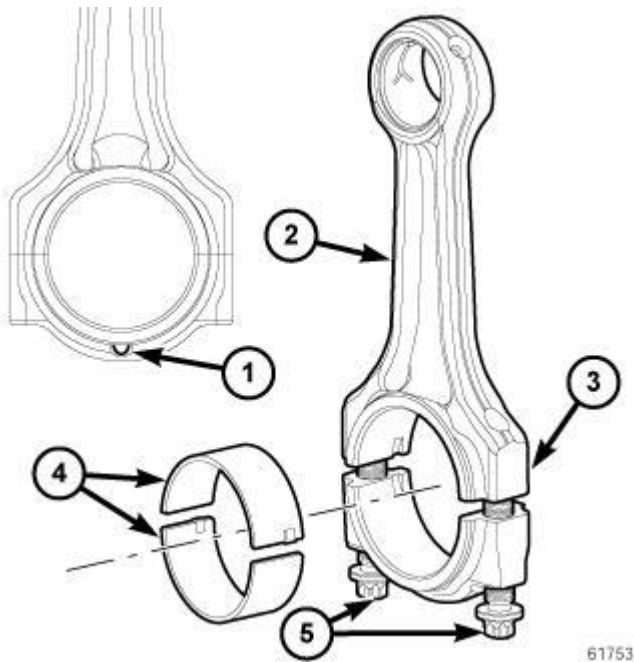
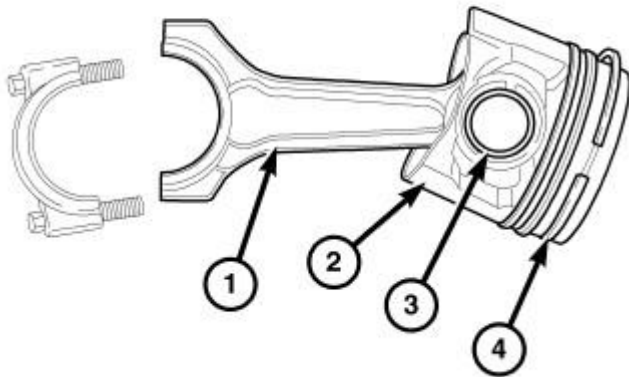


Fig. 230: Connecting Rod Identification
Courtesy of CHRYSLER GROUP, LLC

- 1 - CONNECTING ROD PAWL
- 2 - CONNECTING ROD
- 3 - PAINTED CYLINDER IDENTIFIER
- 4 - CONNECTING ROD BEARINGS

1. Piston Diameter: Size: 91.912 - 91.928 mm (3.6185 - 3.6192 in.) Maximum wear limit.05 mm (.0019 in.).
2. Check piston pin bores in piston for roundness. Make 3 checks at 120° intervals. Maximum out of roundness.05 mm (.0019 in.).
3. The piston diameter should be measured approximately 15 mm (.590 in.) up from the base.
4. Skirt wear should not exceed 0.1 mm (.00039 in.).
5. The clearance between the cylinder liner and piston should not exceed 0.065-0.083 mm (.0025-.0032 in.).

CONNECTING RODS



81abebb4

Fig. 231: Piston & Connecting Rod Assembly
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Connecting rod bolts must be replaced when disassembled. When assembling the connecting rod (2), be sure that the connecting rod pawl (1) on each of the connecting rod caps is facing the rear (fly wheel) side of the engine.

NOTE: Do Not lubricate the new connecting rod bolts. They are already coated with a anti scuff treatment.

1. Assemble connecting rod bearings (4) and bearing caps to their respective connecting rods (2) ensuring that the serrations on the cap and. Reference marks are aligned.
2. Tighten connecting cap bolts to 10 N.m (89 in. lbs.).
3. Without loosening connecting rod bolts, tighten all bolts to 30 N.m (22 ft. lbs.).
4. Using a torque angle gauge, tighten each bolt an additional 40°.
5. Recheck all bolt tightening with a torque wrench set to 88 N.m (65 ft. lbs.).
6. Check and record internal diameter of crank end of connecting rod (2).

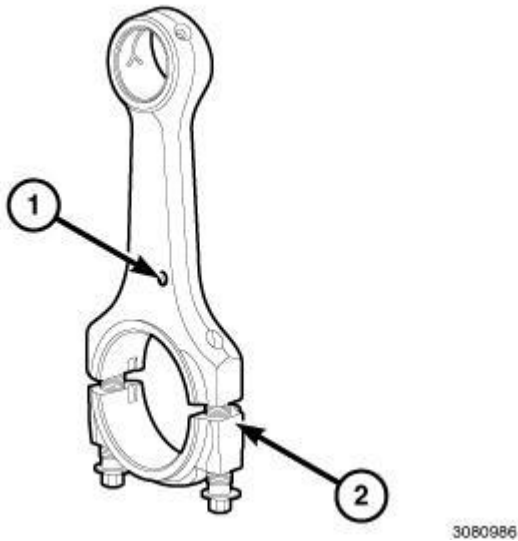


Fig. 232: Connecting Rod & Cap
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When changing connecting rods (2), DO NOT use a stamp to mark the cylinder location. Identify the connecting rods (2) and caps location using a paint marker. All four must have the same weight. Replacement connecting rods (2) will only be supplied in sets of four.

Connecting rods (2) are supplied in sets of four since they all must be of the same weight category. The weight of the connecting rod is identified by a paint mark (1) on the connecting rod.

PISTON PINS

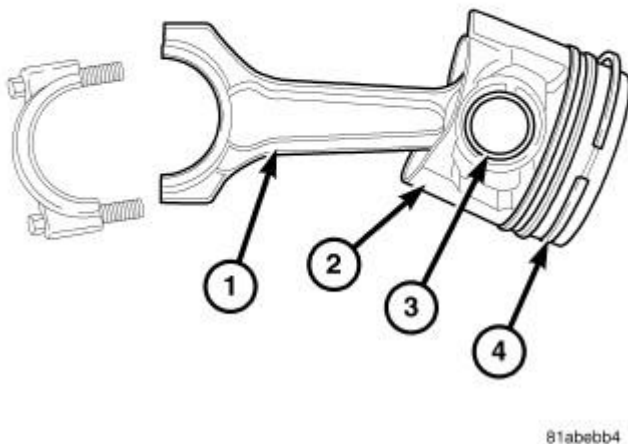


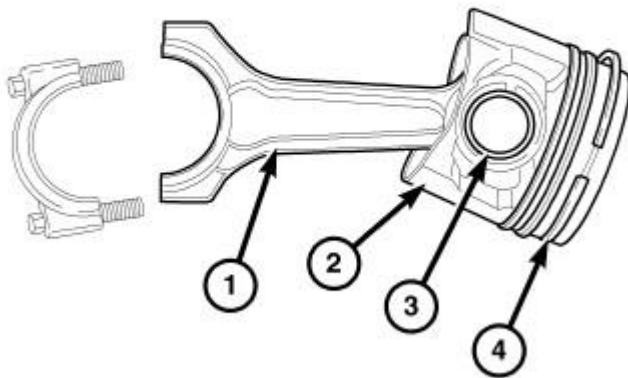
Fig. 233: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Measure the diameter of piston pin in the center and both ends. For specification. Refer to **ENGINE SPECIFICATIONS**.

INSTALLATION

INSTALLATION

PISTON PIN



81abebb4

Fig. 234: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Secure connecting rod (1) in soft jawed vice.
2. Lubricate piston pin (3) and piston (2) with clean engine oil.
3. Position piston (2) on connecting rod (1).

CAUTION: Ensure arrow on piston crown and the bearing cap numbers on the connecting rod are on the opposite side.

4. Install piston pin (1).

NOTE: Visually inspect the snap ring to ensure that it is correctly seated into piston seat.

5. Install snap ring in piston (2) to retain piston pin (3).

6. Remove connecting rod (1) from vice.

PISTON RINGS

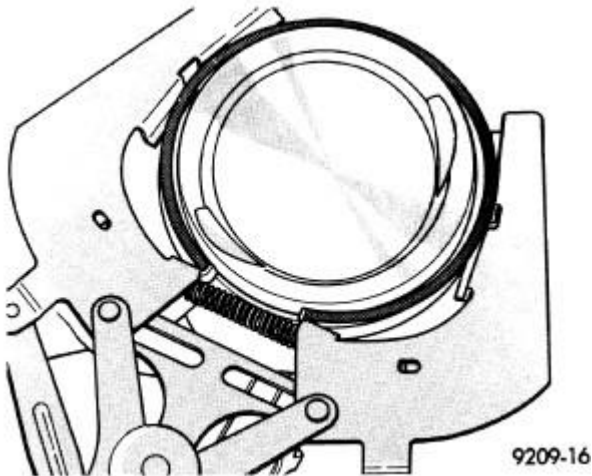


Fig. 235: Piston Rings - Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

NOTE: New piston rings are only supplied with the piston as an assembly.

1. Install rings on the pistons using a suitable ring expander.

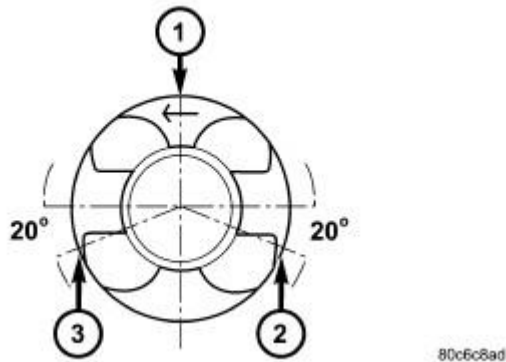


Fig. 236: Piston Ring Gap Location
Courtesy of CHRYSLER GROUP, LLC

- | |
|--|
| 1 - SECOND COMPRESSION RING GAP POSITION
2 - OIL CONTROL RING GAP POSITION
3 - TOP COMPRESSION RING GAP POSITION |
|--|

2. Top compression ring is tapered and chromium plated. The second ring is of the scraper type and must be installed with scraping edge facing bottom of the piston. The third is an oil control ring. Ring gaps must be positioned, before inserting piston into the liners, as follows.

3. Top ring gap must be positioned at the No. 3 position (looking at the piston crown from above).
4. Second piston ring gap should be positioned at the No. 1 position.
5. Oil control ring gap should be positioned at the No. 2 position.

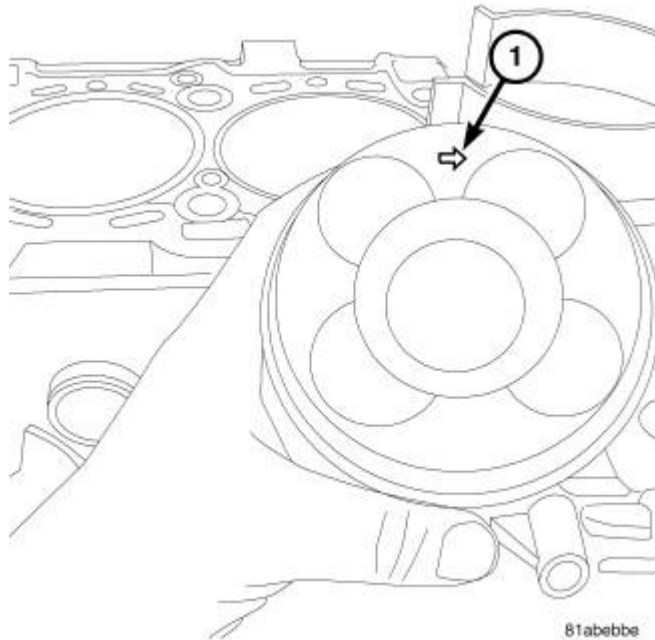


Fig. 237: Piston Direction
Courtesy of CHRYSLER GROUP, LLC

6. When assembling pistons check that components are installed in the same position as before disassembly, determined by the numbers stamped on the crown of individual pistons. Engine cylinders are numbered starting from gear train end of the engine. **Face arrow on top of piston toward front of engine .** Therefore, the numbers stamped on connecting rod big end should face toward the injection pump side of engine. To insert piston into cylinder use a ring compressor as shown in illustration.

PISTON

1. Before installing pistons, and connecting rod assemblies into the bore, be sure that compression ring gaps are staggered so that neither is in line with oil ring rail gap.
2. Before installing the ring compressor, make sure the oil ring expander ends are butted together.
3. Immerse the piston head and rings in clean engine oil, slide the piston ring compressor, over the piston and tighten. **Ensure position of rings does not change during this operation .**
4. Face arrow on piston towards front of engine.

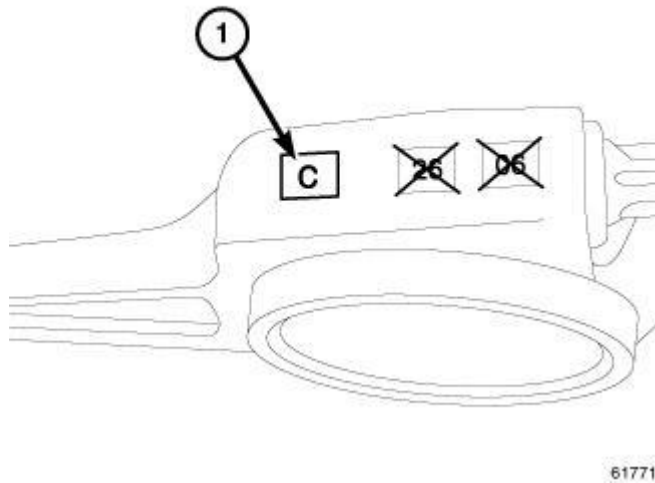


Fig. 238: Connecting Rod Size
 Courtesy of CHRYSLER GROUP, LLC

5. The letter "C" (1) is used for connecting rod bearing selection on the bearing chart and is to be matched with the letter found on the crankshaft in order to determine the correct size bearings to be used.

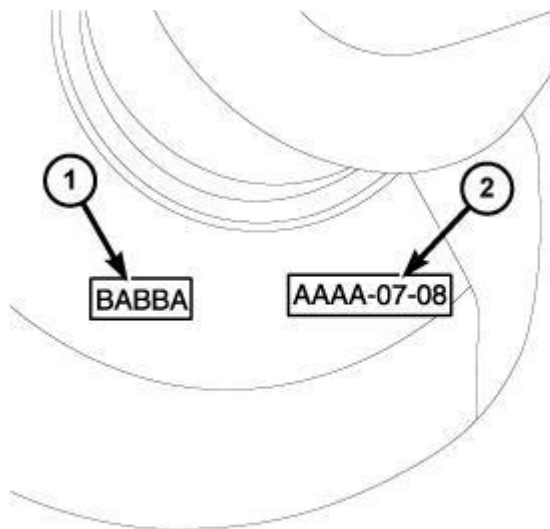


Fig. 239: Main Bearing Size Mark On Crank
 Courtesy of CHRYSLER GROUP, LLC

6. Compare the crankshaft connecting rod journal diameter (2) with the bearing selection chart to determine the correct bearing size for each cylinder. The letters stamped into the crankshaft (2) are in the same order as the cylinders. The first letter corresponds to the first cylinder, the second to the second, etc. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**.

NOTE: The connecting rod bolts must be replaced every time they are loosened or removed.

CAUTION: Care must be taken not to nick crankshaft journal when installing pistons.

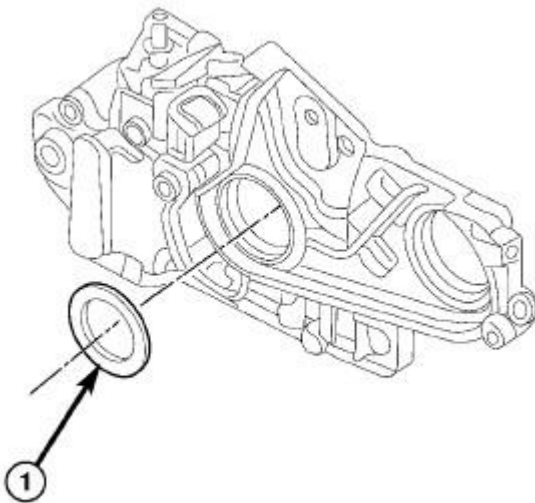
7. Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal.
8. Guide the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.
9. Install connecting rod caps. Using new rod bolts, tighten to 10 N.m (88 in. lbs.). Then, tighten bolts to 30 N.m (22 ft. lbs.) plus an additional 40 degrees turn. Then with a torque wrench set to 88 N.m (65 ft. lbs.) make the final tighten check on bolts.
10. Install the oil jets. Refer to **JET, PISTON OIL COOLER, INSTALLATION** .
11. Install cylinder head. Refer to **CYLINDER HEAD, INSTALLATION** .
12. Connect the negative battery cable.

SEAL, CRANKSHAFT OIL, FRONT

REMOVAL

REMOVAL

1. Remove the crankshaft sprocket. Refer to **SPROCKET(S), TIMING BELT AND CHAIN, REMOVAL**.



81df239a

Fig. 240: Front Crankshaft Oil Seal
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not gouge or scratch the surface of the crankshaft when removing the front crankshaft oil seal.

2. Remove the front crankshaft oil seal (1).

INSTALLATION

INSTALLATION

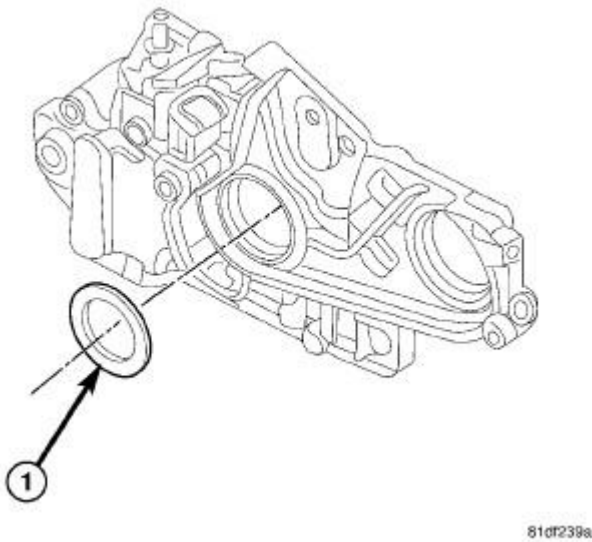


Fig. 241: Front Crankshaft Oil Seal
Courtesy of CHRYSLER GROUP, LLC

NOTE: The lip of the front crankshaft oil seal faces away from the engine on installation.

1. Position the front crankshaft oil seal (1) into the front cover.

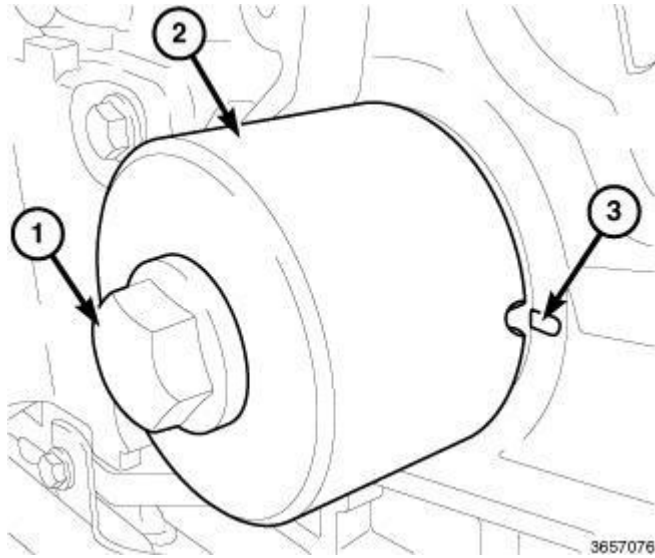


Fig. 242: Front Crankshaft Oil Seal Installer & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft sprocket bolt is a left handed thread.

2. Using (special tool #VM.10335, Installer, Front Crankshaft Oil Seal) (2), install the front crankshaft oil seal using the vibration damper bolt (1) to draw the seal in place.
3. Remove bolt (1) and the (special tool #VM.10335, Installer, Front Crankshaft Oil Seal) (2).
4. Install the crankshaft sprocket. Refer to **SPROCKET(S), TIMING BELT AND CHAIN, INSTALLATION**.

SEAL, CRANKSHAFT OIL, REAR

DESCRIPTION

DESCRIPTION

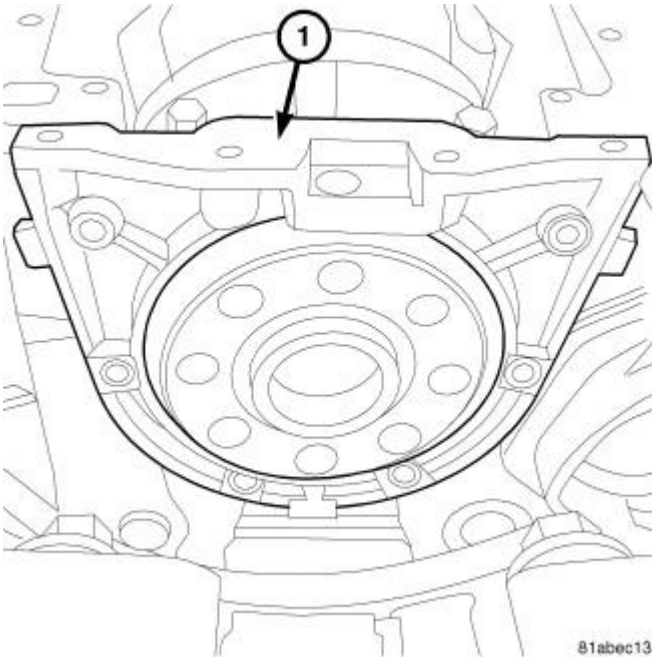


Fig. 243: Rear Crankshaft Seal & Rear Main Oil Seal Carrier
Courtesy of CHRYSLER GROUP, LLC

The rear crankshaft seal consists of a seal and a seal carrier (1). The rear seal is inserted into the carrier. Once assembled the rear main seal assembly should not be separated to reduce the possibility of damage to the internal rear seal lip.

REMOVAL

REMOVAL

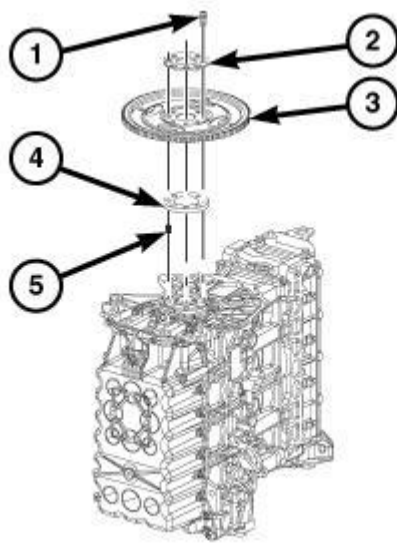


Fig. 244: Bolts, Backing Plate, Flexplate/Flywheel, Tone Wheel & Dowel Pin
Courtesy of CHRYSLER GROUP, LLC

1. Remove flywheel assembly (3).
2. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .
3. Remove the crankshaft sensor tone wheel (4) before removing the rear main oil seal.

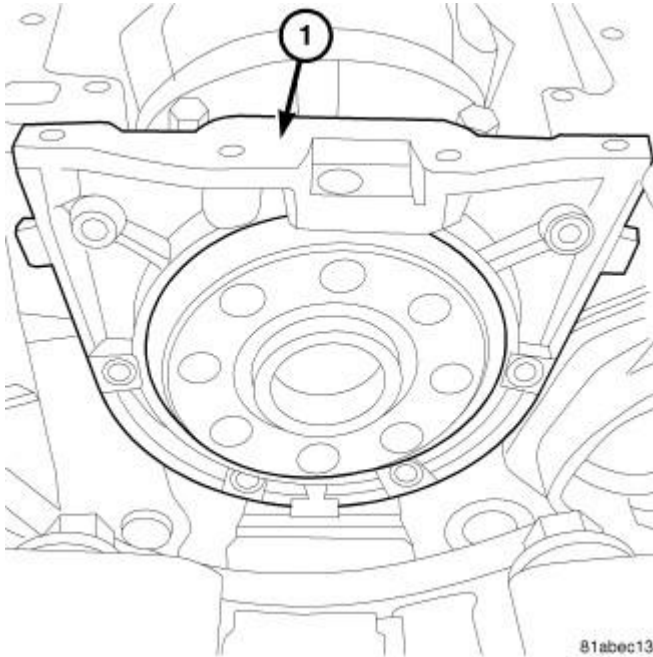


Fig. 245: Rear Crankshaft Seal & Rear Main Oil Seal Carrier
Courtesy of CHRYSLER GROUP, LLC

4. Remove the rear crankshaft seal and the rear main oil seal carrier.

INSTALLATION

INSTALLATION

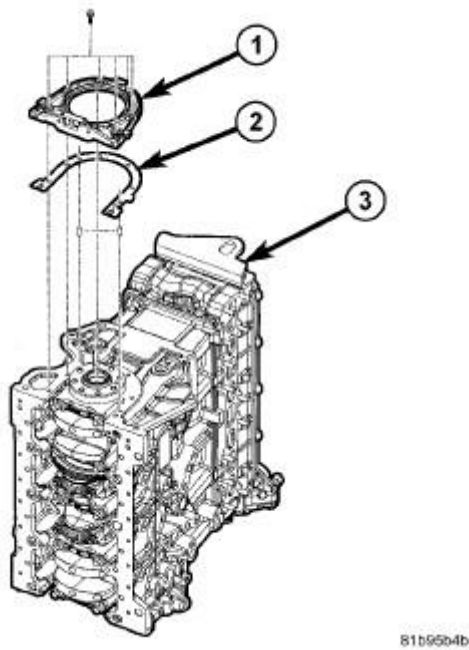


Fig. 246: Rear Main Seal Carrier, Gasket & Engine Block
 Courtesy of CHRYSLER GROUP, LLC

1. Make sure the rear main seal sealing surfaces are free of oil and debris.
2. Position the rear main seal carrier gasket (2) onto the rear of the engine block (3).
3. Using the (special tool #VM.9993, Installer, Crankshaft Rear Oil Seal), install rear crankshaft oil seal into the rear main seal carrier (1).
4. Using the (special tool #VM.9993, Installer, Crankshaft Rear Oil Seal), install the rear main seal carrier onto the engine block (3).

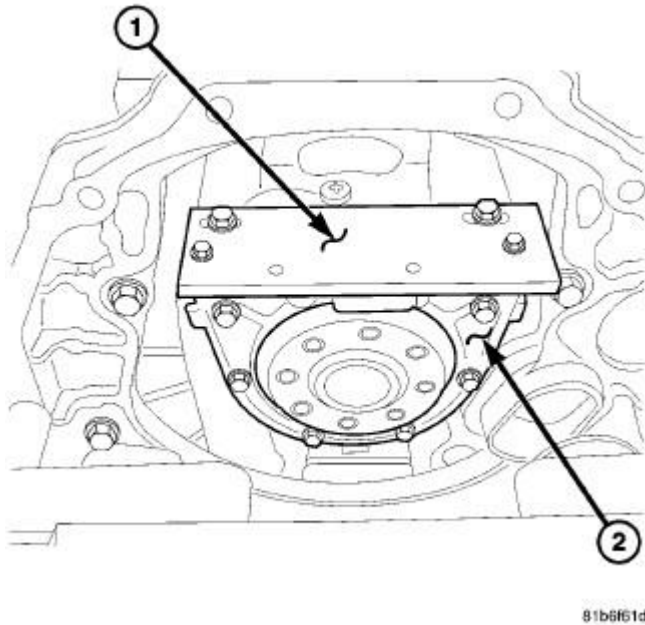


Fig. 247: Front And Rear Seal Tool Installed Onto Rear Oil Seal Carrier
Courtesy of CHRYSLER GROUP, LLC

5. Loosely install the bolts that secure the rear oil seal carrier (2) to the engine block.
6. Use the (special tool #VM.9990, Tool, Front And Rear Seal) (1) to set the depth of the rear main seal (2).

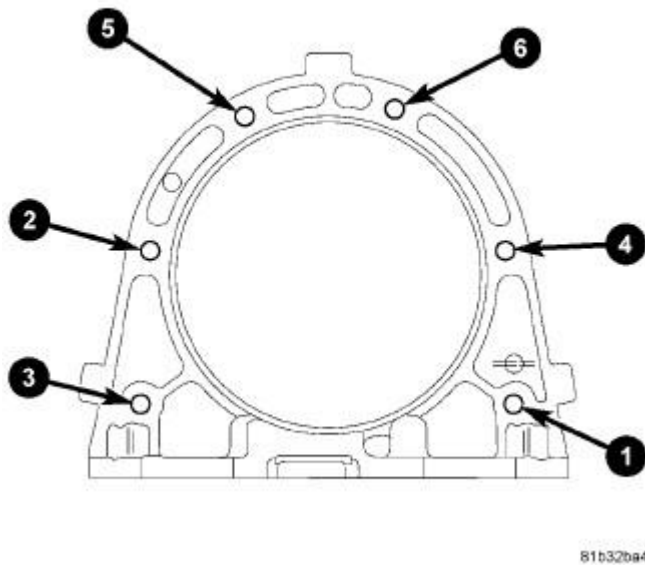


Fig. 248: Rear Cover Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

7. Use the illustrated pattern, tighten the rear seal cover bolts to 15 N.m (133 in. lbs.).

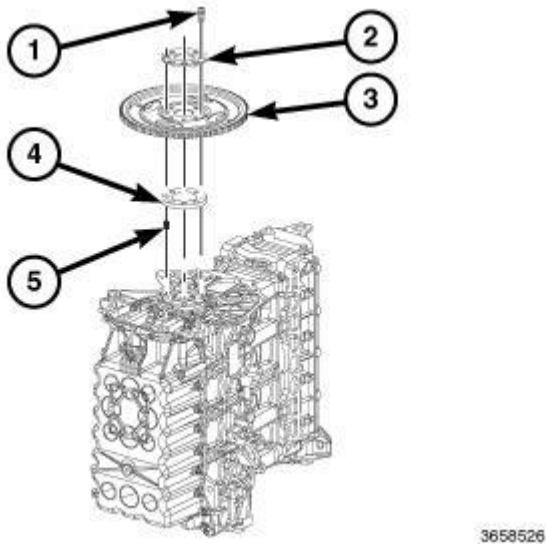


Fig. 249: Bolts, Backing Plate, Flexplate/Flywheel, Tone Wheel & Dowel Pin
 Courtesy of CHRYSLER GROUP, LLC

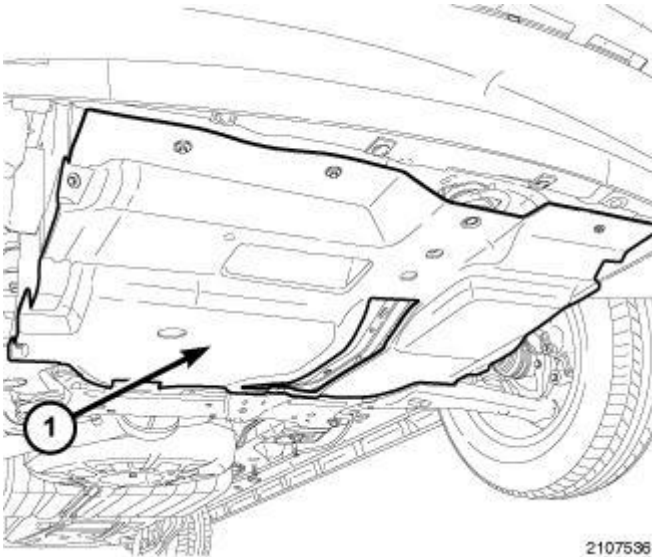
8. Make sure the crankshaft sensor tone wheel (4) is positioned correctly on the crankshaft and is aligned on dowel pin (5).
9. Install the crankshaft sensor tone wheel (4) to the rear of the crankshaft.
10. Install the oil pan. Refer to **PAN, OIL, INSTALLATION**.
11. Install the flexplate (3). Refer to **FLEXPLATE, INSTALLATION**.

ENGINE MOUNTING

BRACKET, ENGINE MOUNT, REAR

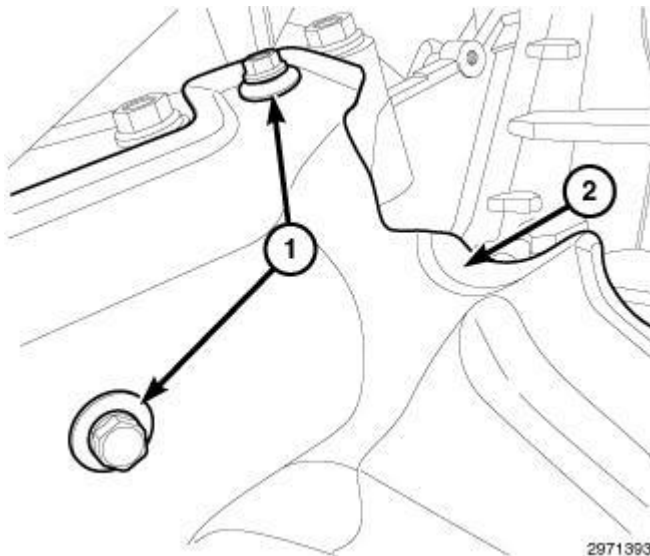
REMOVAL

REMOVAL

**Fig. 250: Underbody Splash Shield**

Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle.
2. Remove the underbody splash shield (1).

**Fig. 251: Rear Mount Heat Shield & Bolts**

Courtesy of CHRYSLER GROUP, LLC

3. Remove bolts (1) and the rear mount heat shield (2).

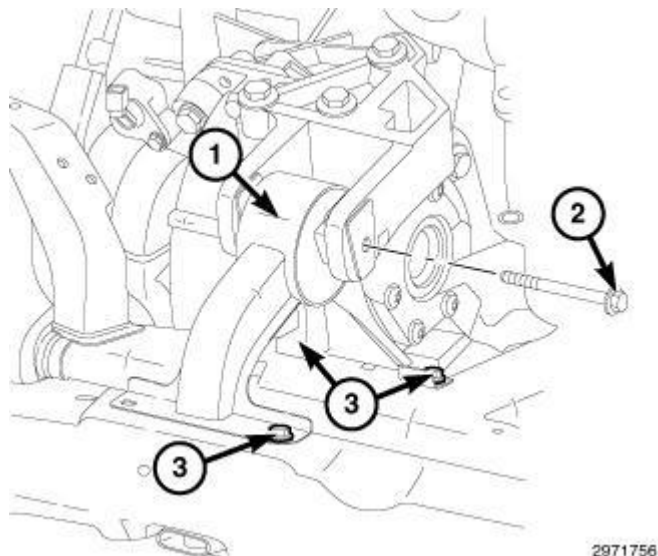


Fig. 252: Rear Engine Mount, Rear Mount Through Bolt & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the rear mount through bolt (2).

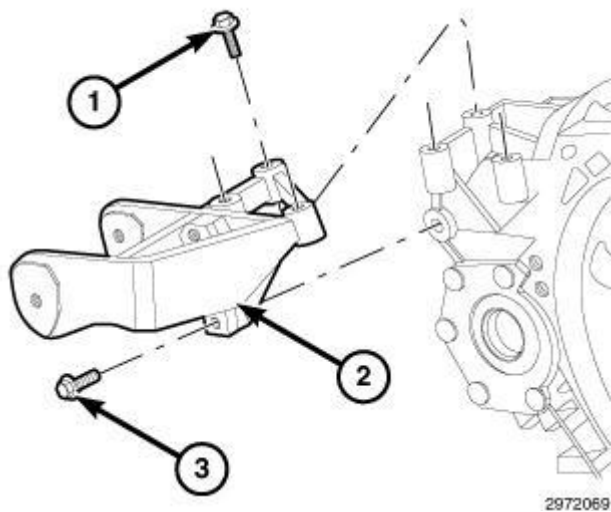


Fig. 253: Rear Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the three upper rear mount bolts (1).
6. Remove lower bolt (3) and the rear mount bracket (2).

INSTALLATION

INSTALLATION

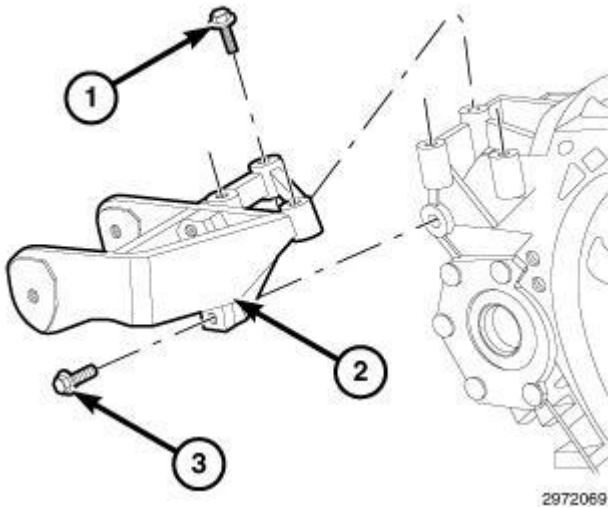


Fig. 254: Rear Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Install the rear mount bracket and tighten lower bolt (3) finger tight.
2. Install the three upper rear mount bolts (1) to 110 N.m (81 ft. lbs.).
3. Tighten the lower bolt (3) to 110 N.m (81 ft. lbs.).

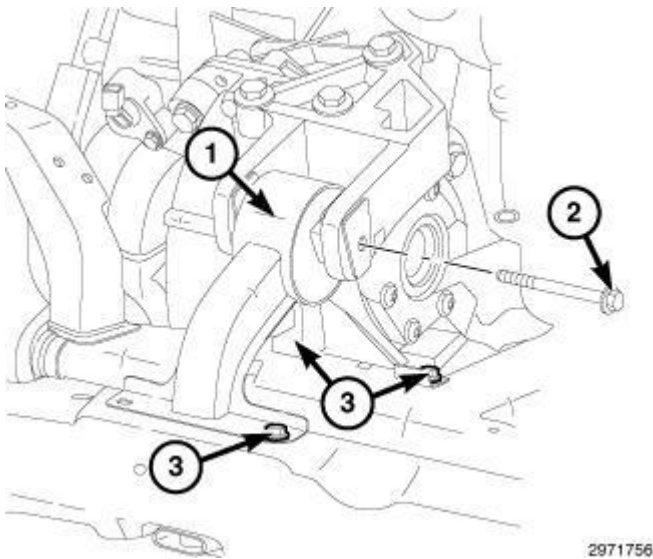


Fig. 255: Rear Engine Mount, Rear Mount Through Bolt & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the rear mount through bolt and tighten to 61 N.m (45 ft. lbs.).

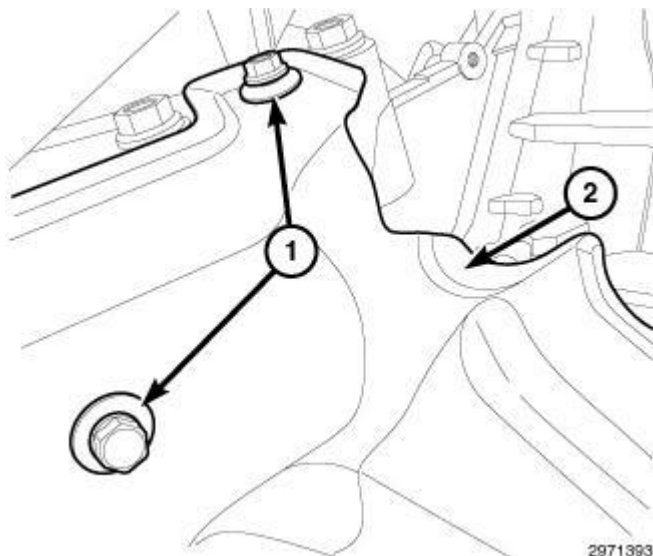


Fig. 256: Rear Mount Heat Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Install the rear mount heat shield (2). Tighten bolts (1) to 14 N.m (124 in. lbs.).

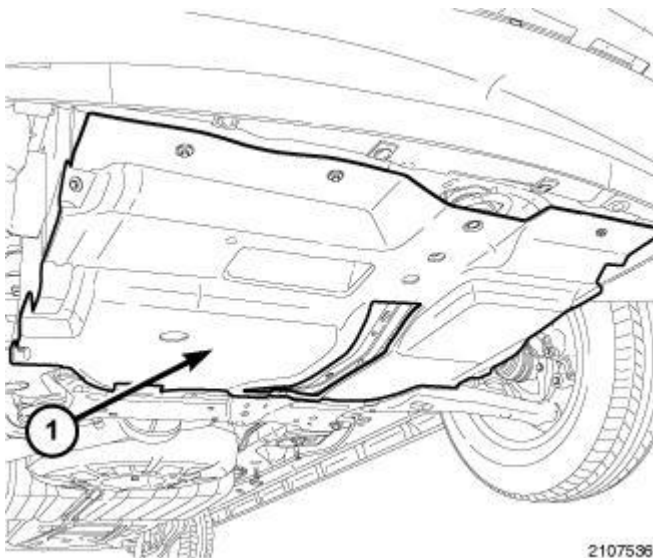


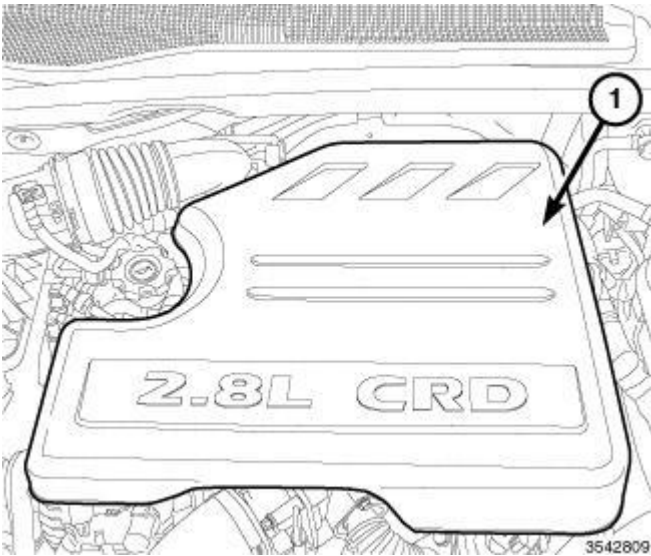
Fig. 257: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

6. Install the underbody splash shield (1).
7. Lower the vehicle.

INSULATOR, ENGINE MOUNT, RIGHT

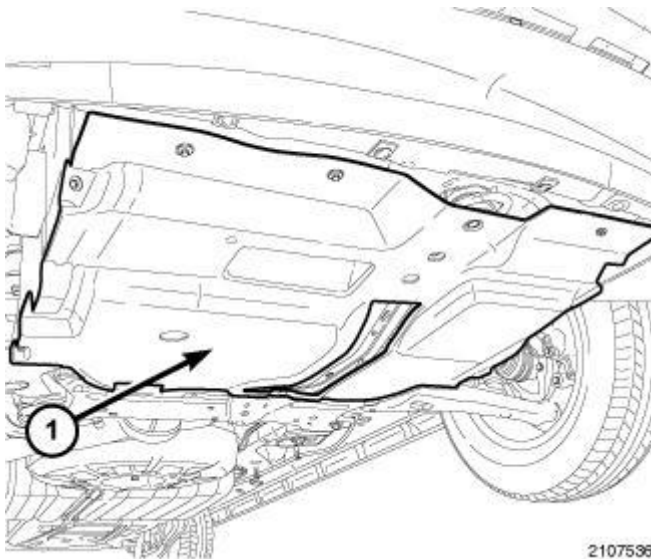
REMOVAL

REMOVAL

**Fig. 258: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Pull upward on the engine cover (1) to release from mounting brackets and remove the engine cover (1).
3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
4. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

**Fig. 259: Underbody Splash Shield**

Courtesy of CHRYSLER GROUP, LLC

5. Remove the underbody splash shield (1).

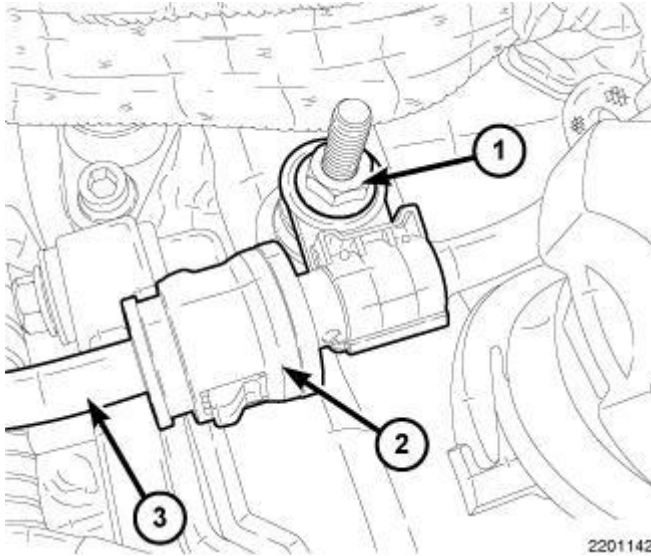


Fig. 260: Fuel Injector Return Line & Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

6. Remove the retaining nut (1) and disconnect the fuel injector return line (2).

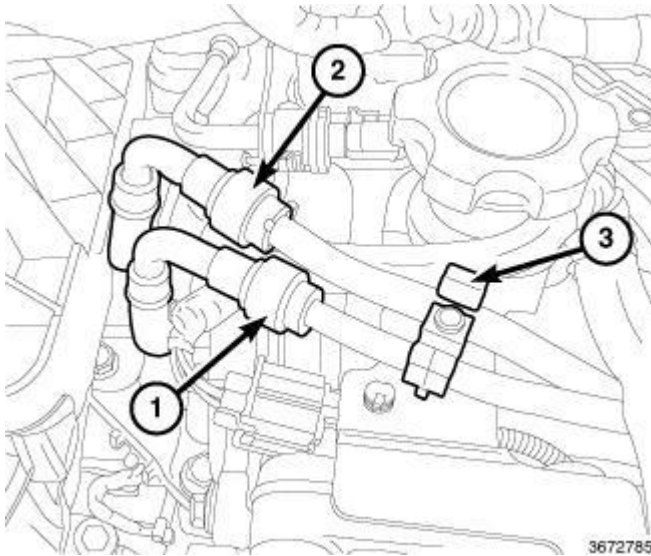


Fig. 261: Fuel Return Line, Fuel Feed Line & Fuel Line Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the fuel return line (1).
8. Disconnect the fuel feed line (2).

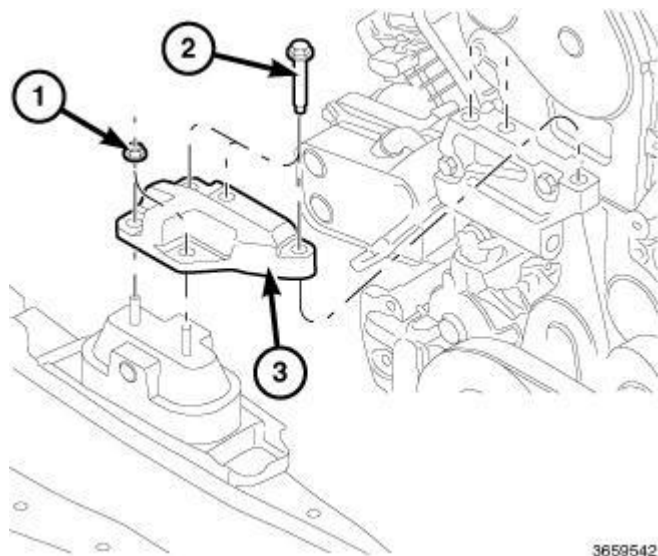


Fig. 262: Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

9. Support the engine from below.
10. Remove the ground strap.
11. Remove the fasteners (1 and 2) and the engine mount bracket (3).

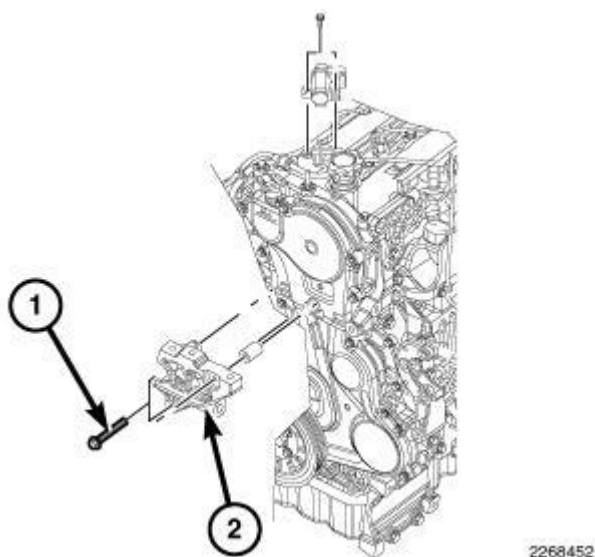


Fig. 263: Inner Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

12. Remove fasteners (1) and the inner engine mount bracket (2).

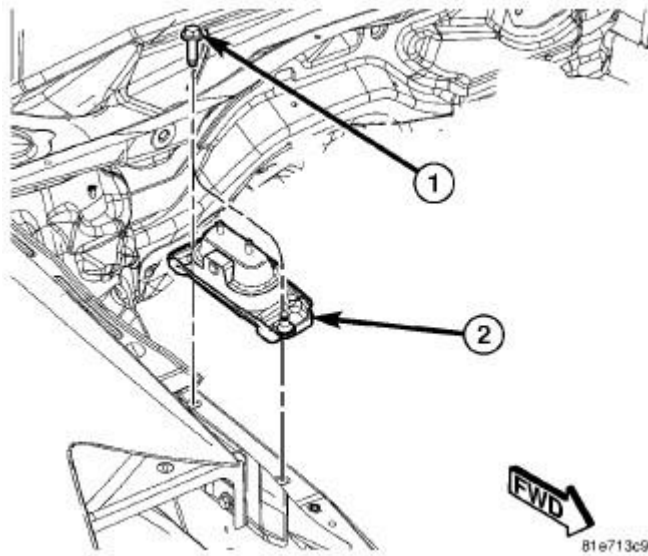


Fig. 264: Lower Engine Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Remove the bolts (1) and the engine mount (2).

INSTALLATION

INSTALLATION

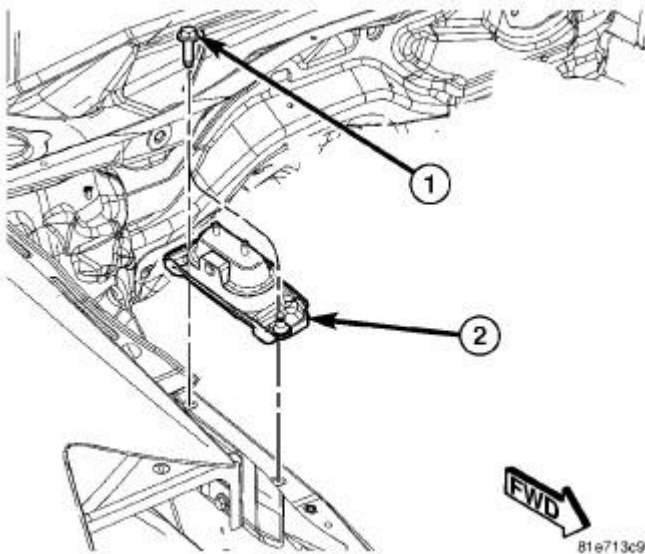


Fig. 265: Lower Engine Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Install the engine mount (2). Tighten the fasteners (1) to 54 N.m (40 ft. lbs.).

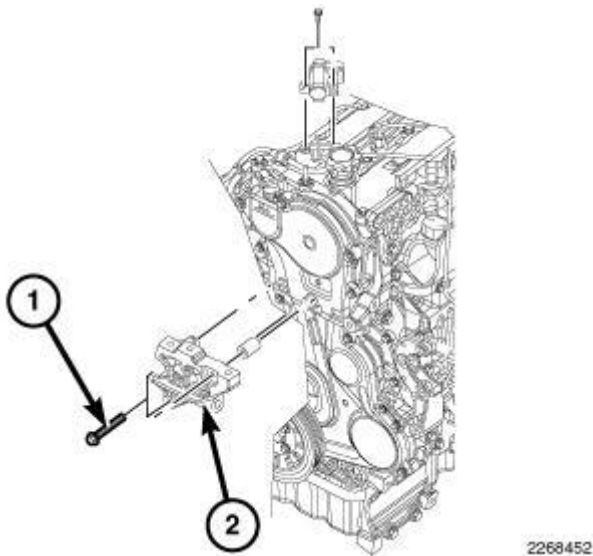


Fig. 266: Inner Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Install the inner engine mount bracket (2). Tighten fasteners (1) to 45 N.m (33 ft. lbs.).

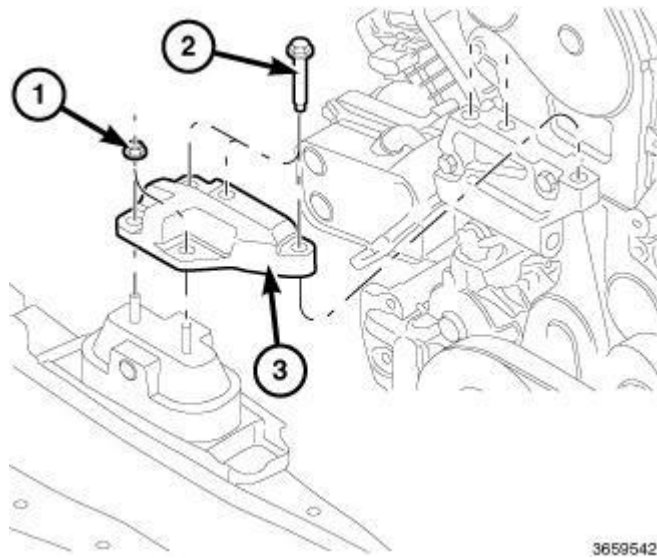


Fig. 267: Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Install the engine mount bracket (3).
 - Tighten the bolts (2) to 61 N.m (44 ft. lbs.).
 - Tighten the nuts (1) to 20 N.m (177 in. lbs.).
4. Install the ground strap.
5. Remove the support from under engine.

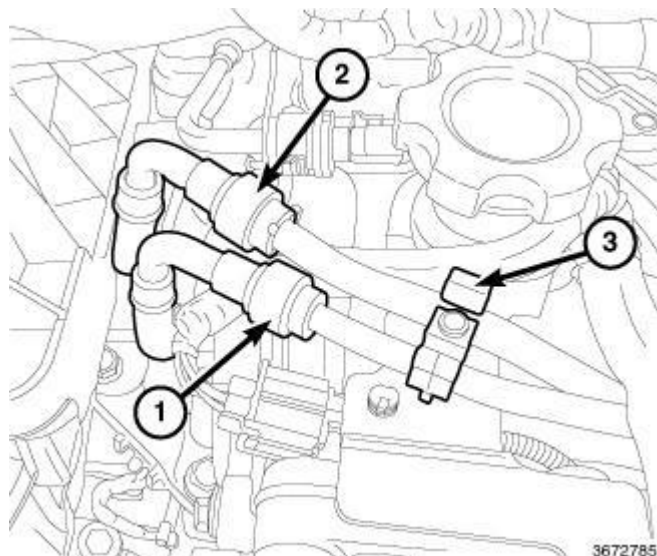


Fig. 268: Fuel Return Line, Fuel Feed Line & Fuel Line Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

6. Connect the fuel feed line (2).
7. Connect the fuel return line (1).

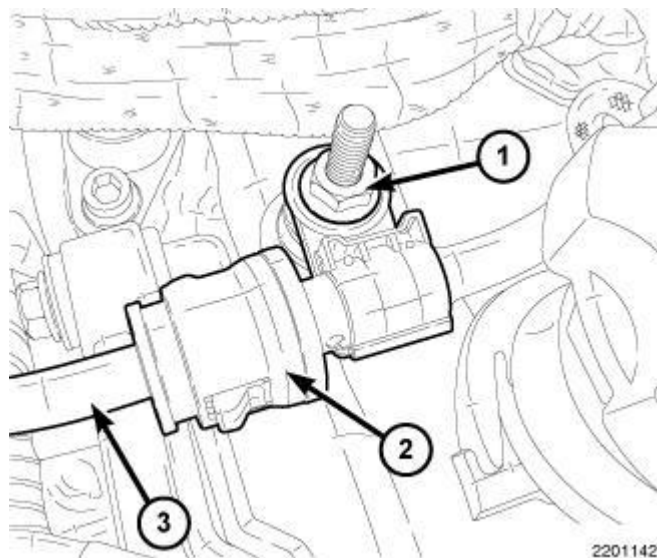


Fig. 269: Fuel Injector Return Line & Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

8. Connect the fuel injector return line (2) and install the retaining nut (1).

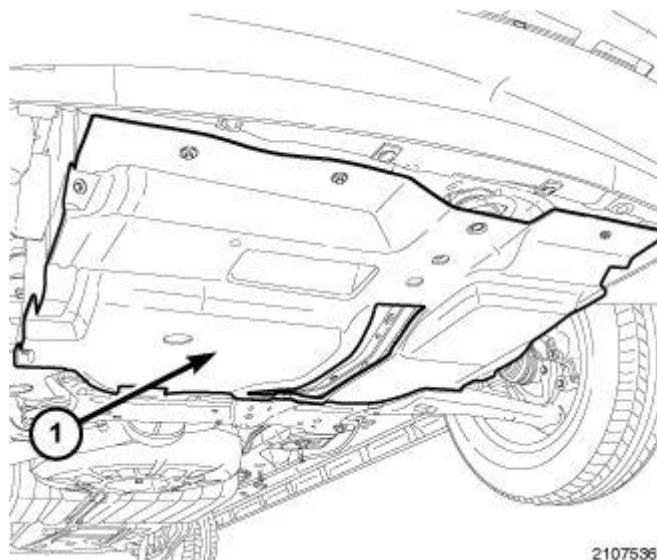


Fig. 270: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

9. Install the underbody splash shield (1).
10. Lower the vehicle.

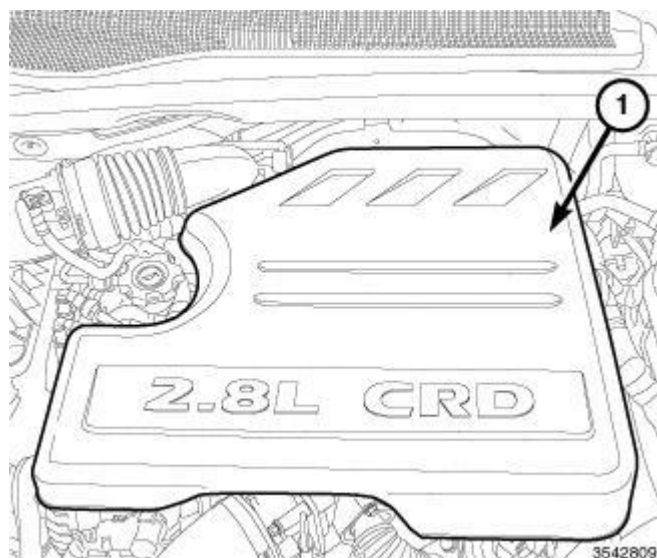


Fig. 271: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

11. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .
12. Install the engine cover (1).
13. Connect the negative battery cable.

INSULATOR, ENGINE MOUNT, LEFT

REMOVAL

REMOVAL

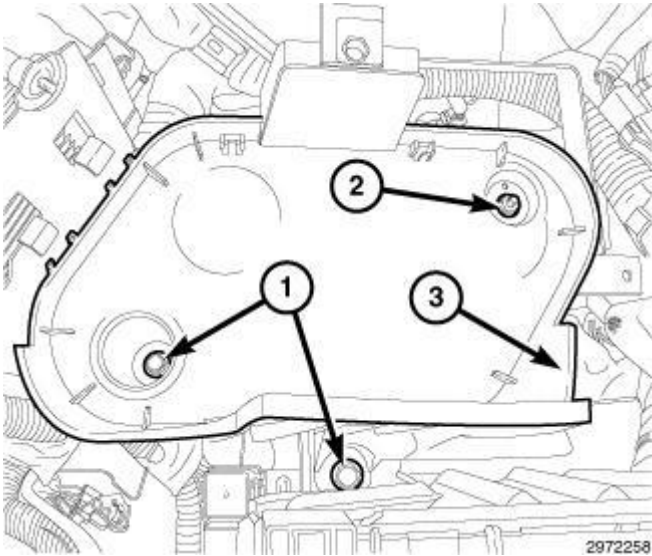


Fig. 272: Battery Tray Bolts & Nut
Courtesy of CHRYSLER GROUP, LLC

1. Remove the battery. Refer to **BATTERY, REMOVAL** .
2. Detach the wire harness loom from battery tray.
3. Remove two bolts (1), one nut (2), and the battery tray.

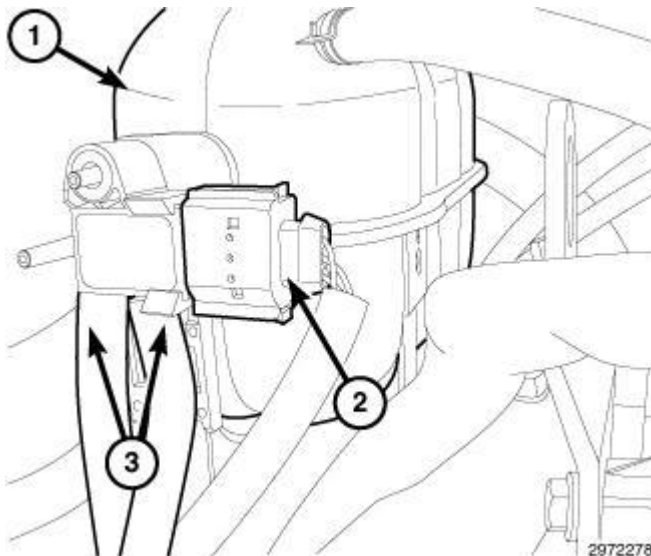


Fig. 273: Differential Pressure Sensor Hoses & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Remove the coolant bottle (1) from bracket and position aside.
5. Disconnect the Differential Pressure Sensor (DPS) harness connector (2).
6. Disconnect the two DPS sensor hoses (3).

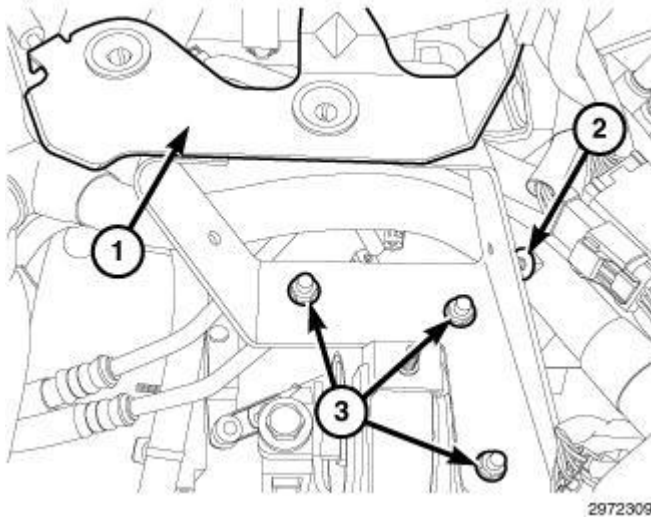


Fig. 274: Wire Harness Loom Clips, Coolant Bottle Bracket & Nuts
Courtesy of CHRYSLER GROUP, LLC

7. Remove the wire harness loom clips (2) from coolant bottle bracket (1).
8. Remove the three nuts (3) and the coolant bottle bracket (1).

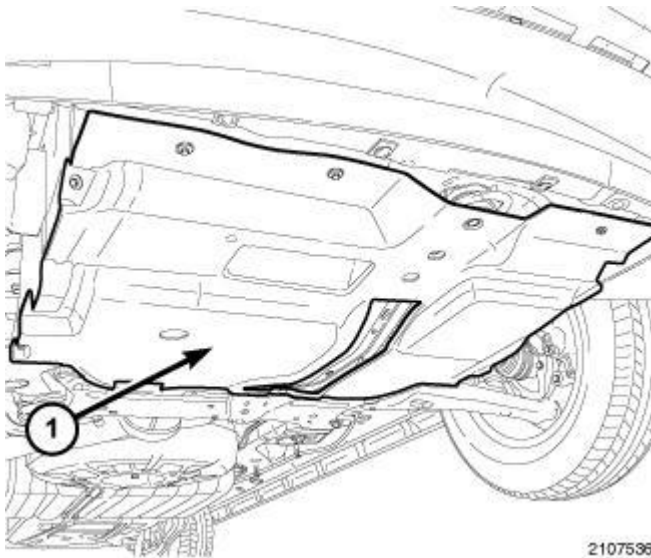


Fig. 275: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

9. Remove the underbody splash shield (1).
10. Remove the left side front wheel house splash shield.
11. Support the transmission and engine from below.

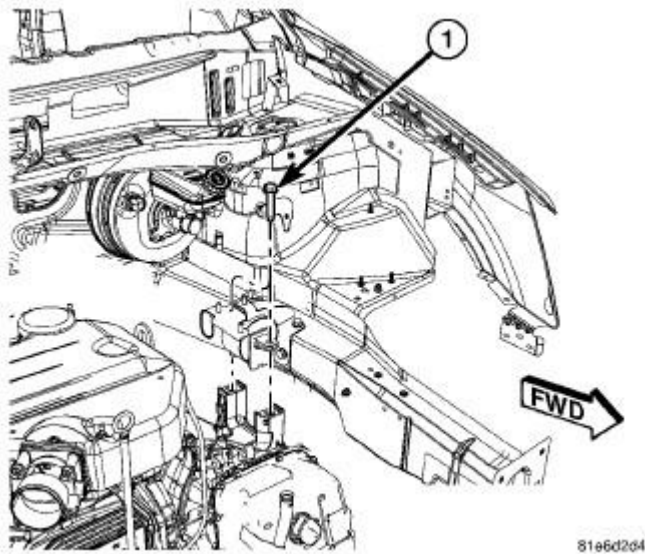


Fig. 276: Engine Mount-To-Transmission Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Remove the engine mount-to-trans bracket bolts (1).

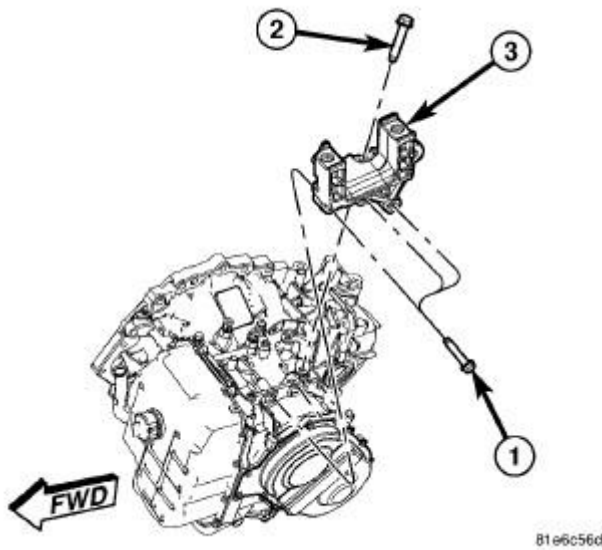


Fig. 277: Transmission Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Remove the upper transaxle bracket-to-case bolt (2).
14. Raise and support the vehicle.
15. Position transmission jack.
16. Remove the fore/aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, REMOVAL**.

17. Lower transmission jack.
18. Remove the three bolts (1), and the transmission mount bracket (3).

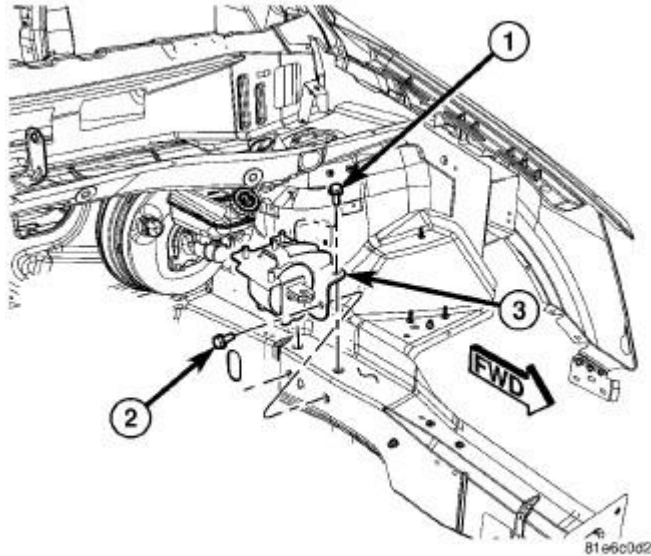


Fig. 278: Left Engine Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

19. Reinstall the fore/aft crossmember loosely.
20. Lower the vehicle.
21. Remove the engine mount-to-rail bolts (1) and (2), and the left engine mount (3) from the rail.

INSTALLATION

INSTALLATION

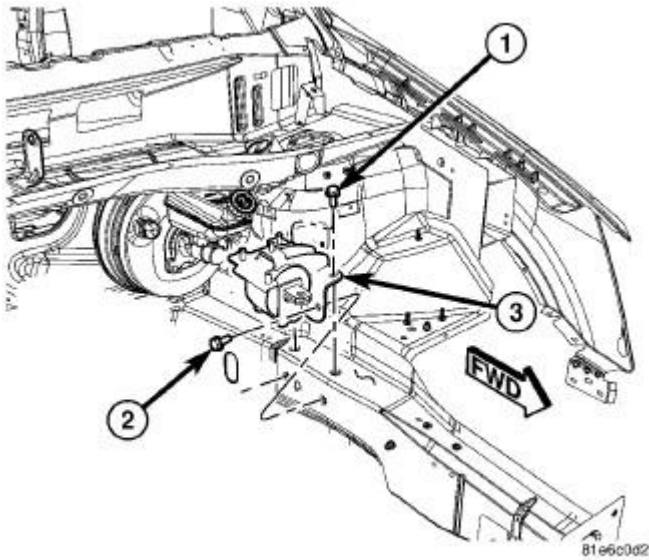


Fig. 279: Left Engine Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Install the left engine mount (3) onto the rail. Tighten the bolts (1) and (2) to 54 N.m (40 lbs. ft.).
2. Raise and support the vehicle.
3. Remove the fore/aft crossmember.

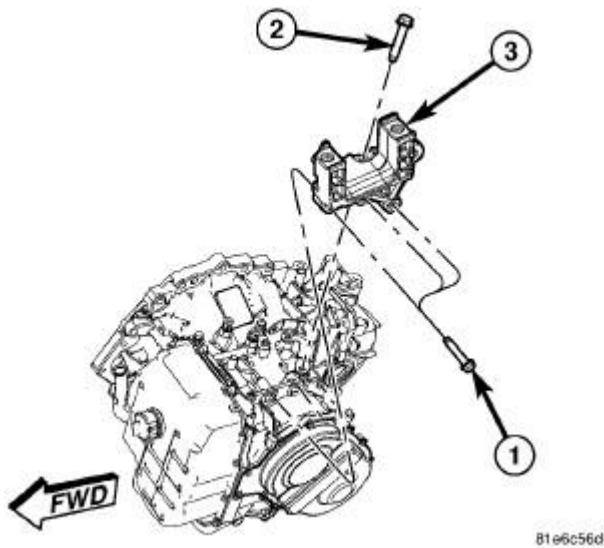


Fig. 280: Transmission Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the transmission mount bracket (3). Tighten the bolts (3) to 45 N.m (33 ft. lbs.).
5. Raise transmission jack.
6. Install the fore/aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT,**

INSTALLATION

7. Remove transmission jack.
8. Lower the vehicle.
9. Install the upper transaxle bracket-to-case bolt (2). Tighten bolt (2) to 40 N.m (30 ft. lbs.).

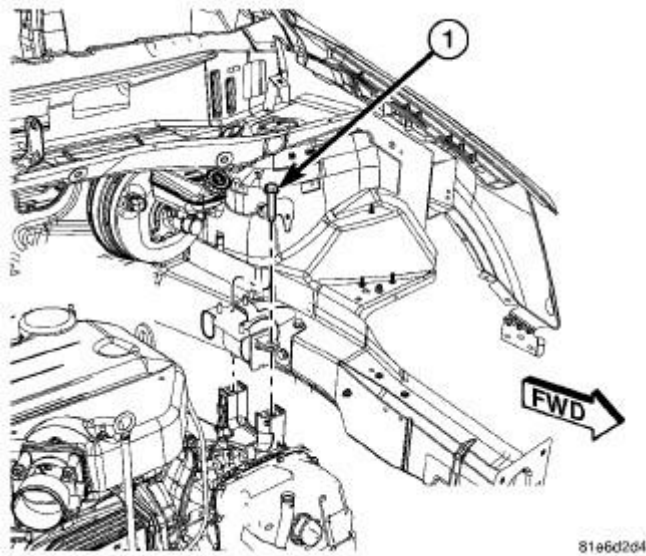


Fig. 281: Engine Mount-To-Transmission Bracket Bolts
 Courtesy of CHRYSLER GROUP, LLC

10. Align the transmission mount with the left transmission mount bracket, and install the trans mount-to-trans bracket bolts (1). Tighten bolts to 95 N.m (70 ft. lbs.).

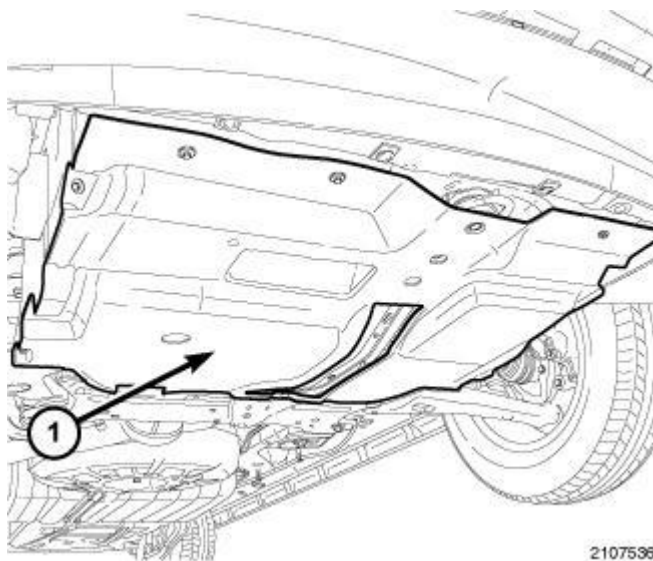


Fig. 282: Underbody Splash Shield
 Courtesy of CHRYSLER GROUP, LLC

11. Remove transmission jack.
12. Install the left side front wheel house splash shield.
13. Remove the underbody splash shield (1).

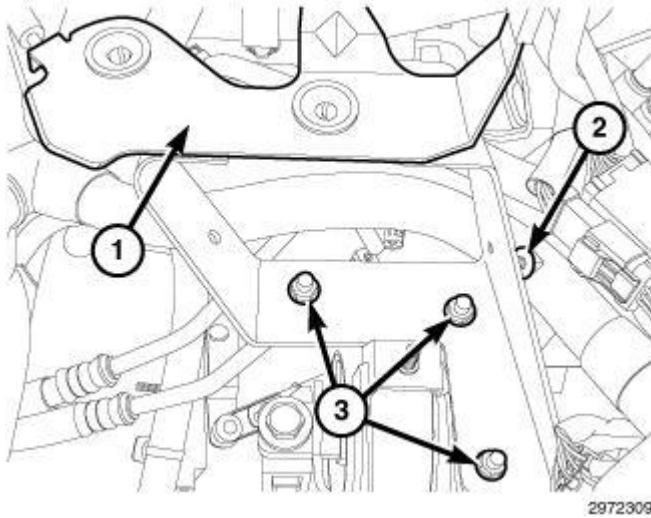


Fig. 283: Wire Harness Loom Clips, Coolant Bottle Bracket & Nuts
 Courtesy of CHRYSLER GROUP, LLC

14. Install the coolant bottle bracket (1). Tighten nuts (3) to 12 N.m (106 in. lbs.).
15. Install the wire harness loom clips (2) to the coolant bottle bracket (1).

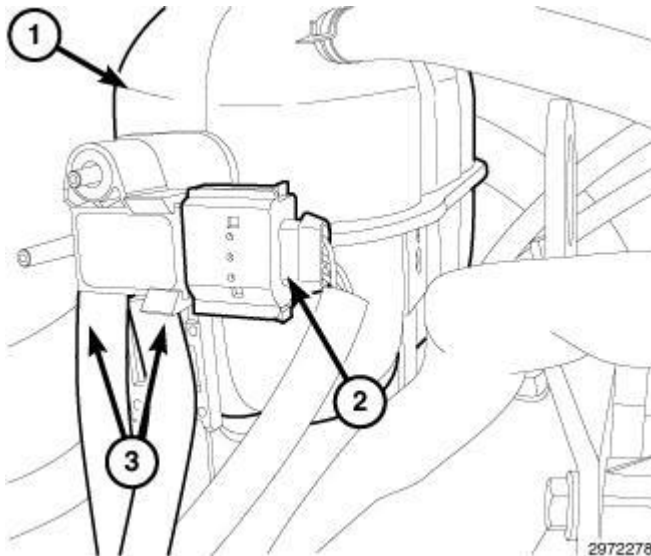


Fig. 284: Differential Pressure Sensor Hoses & Harness Connector
 Courtesy of CHRYSLER GROUP, LLC

16. Connect the two DPS sensor hoses (3).
17. Connect the DPS sensor harness connector (2).

18. Install the coolant bottle (1) onto the bracket.

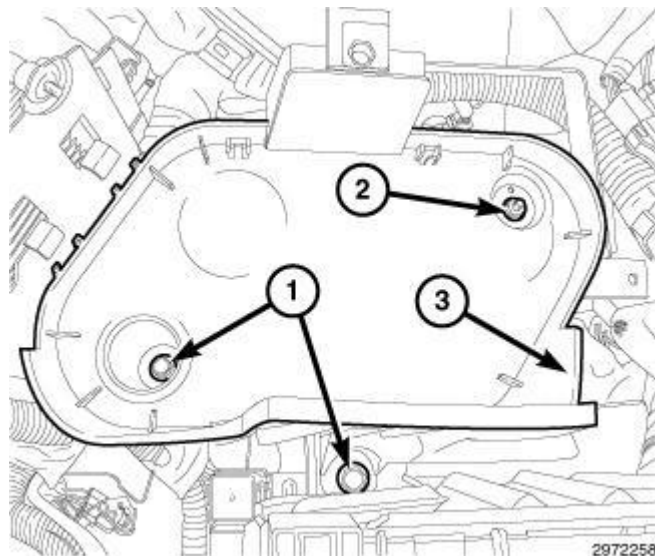


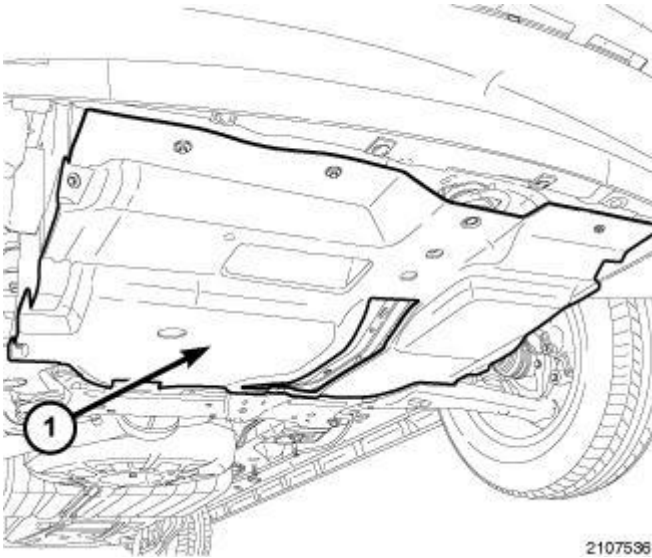
Fig. 285: Battery Tray Bolts & Nut
Courtesy of CHRYSLER GROUP, LLC

19. Install the battery tray.
- Tighten nut (2) to 12 N.m (106 in. lbs.).
 - Tighten the two bolts (1) to 12 N.m (106 in. lbs.).
20. Attach the wire harness loom from battery tray.
21. Install the battery. Refer to **BATTERY, INSTALLATION** .

INSULATOR, ENGINE MOUNT, FRONT

REMOVAL

REMOVAL

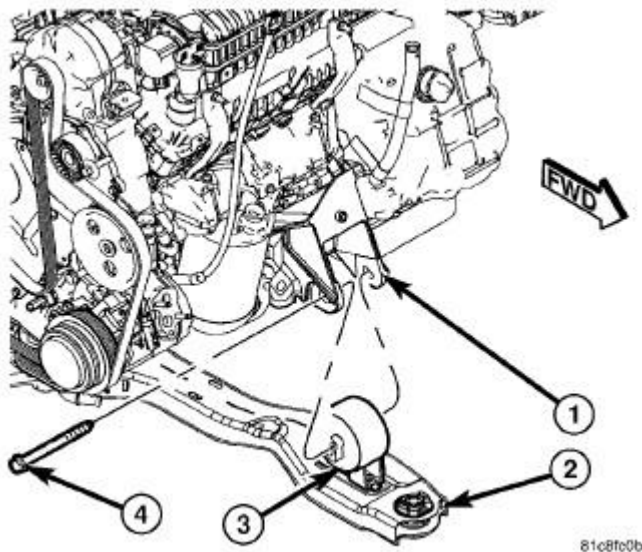


2107536

Fig. 286: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Raise the vehicle.
2. Remove the underbody splash shield (1).

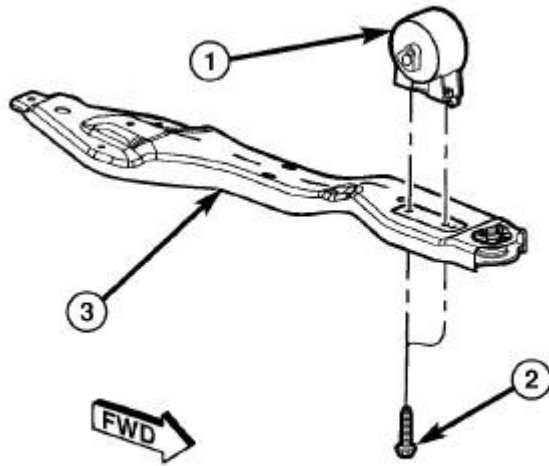


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Fig. 287: Front Engine Mount & Thru-Bolt

Courtesy of CHRYSLER GROUP, LLC

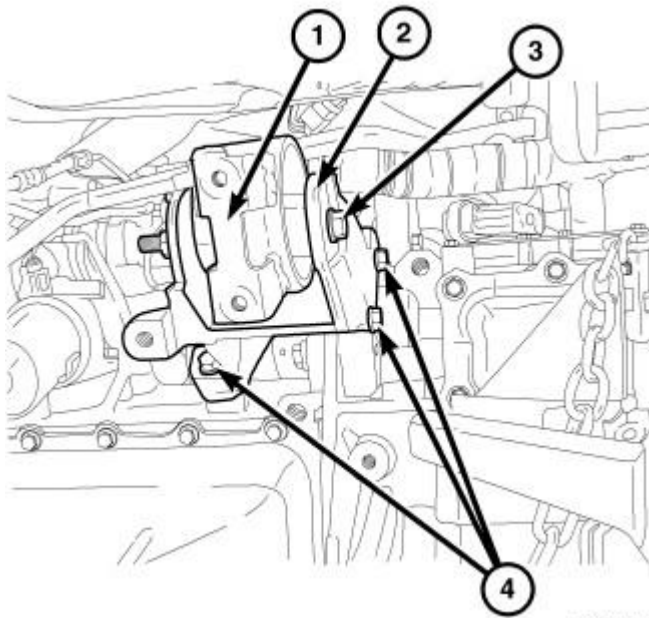
3. Remove front engine mount thru-bolt (4).



81c90320

Fig. 288: Removing/Installing Front Engine Mount Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (2) and the front engine mount (1).



81c2bbde

Fig. 289: Front Transmission Mount, Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolts (4) and the front mount bracket (2).

INSTALLATION

INSTALLATION

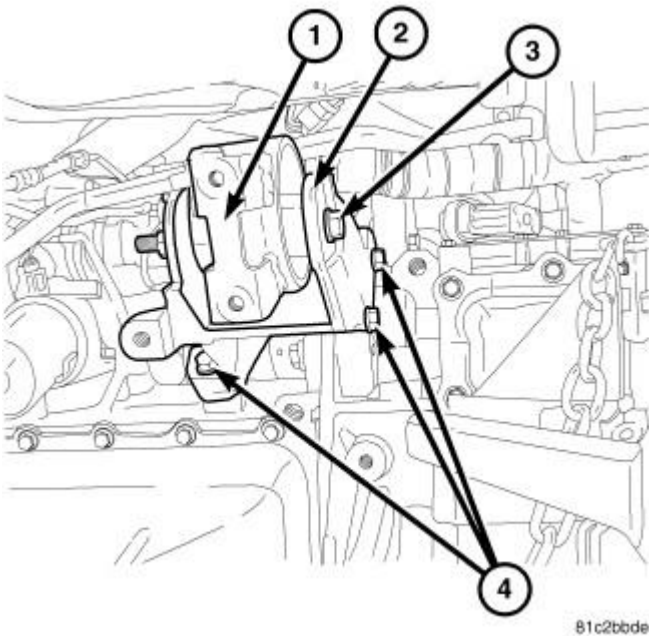


Fig. 290: Front Transmission Mount, Bracket & Bolts
 Courtesy of CHRYSLER GROUP, LLC

1. Install the front mount bracket (2). Tighten bolts (4) to 54 N.m (40 ft. lbs.).

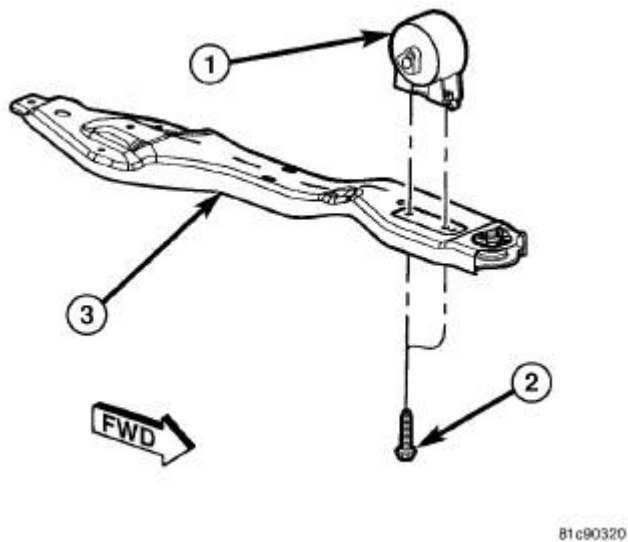


Fig. 291: Removing/Installing Front Engine Mount Mounting Bolts
 Courtesy of CHRYSLER GROUP, LLC

2. Install front engine mount (1). Tighten bolts (2) to 54 N.m (40 ft. lbs.).

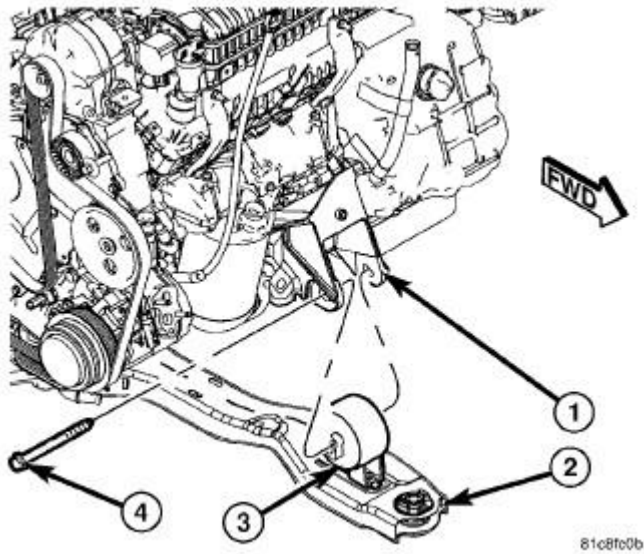


Fig. 292: Front Engine Mount & Thru-Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Install front engine mount thru-bolt (4). Tighten bolt to 61 N.m (45 ft. lbs.).

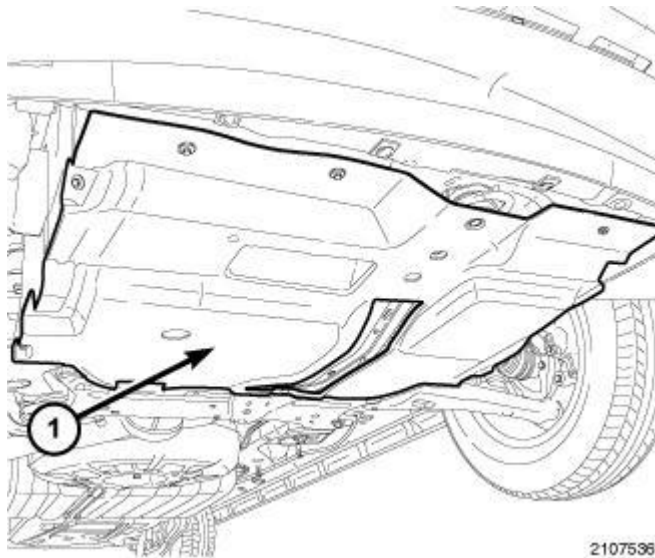


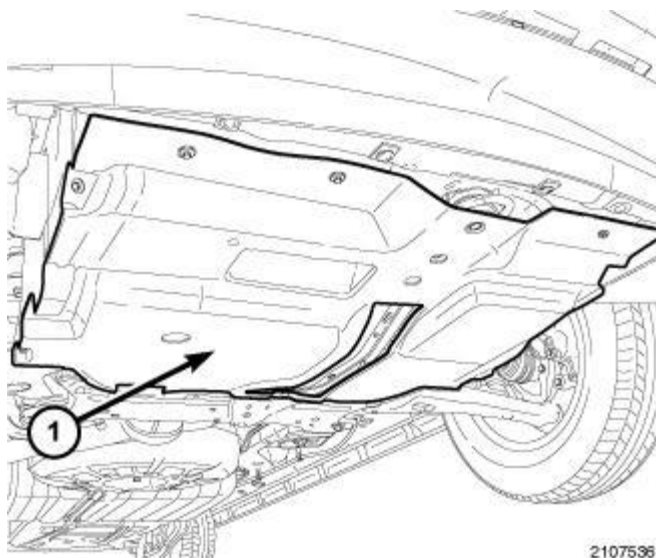
Fig. 293: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

4. Install the underbody splash shield (1).
5. Lower the vehicle.

INSULATOR, ENGINE MOUNT, REAR

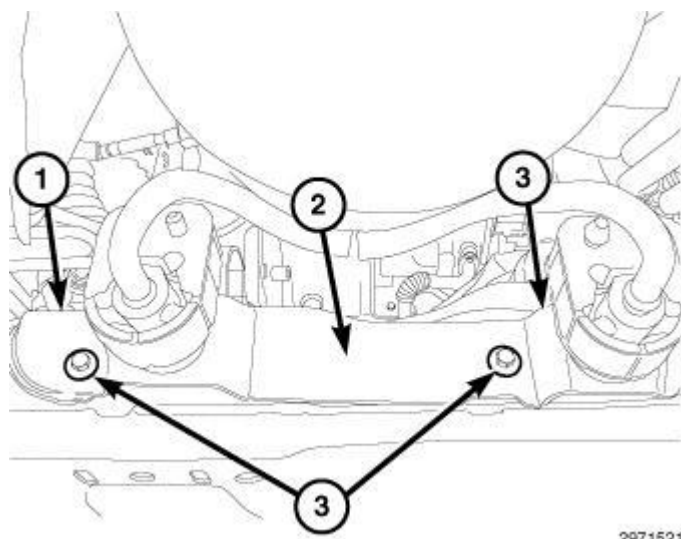
REMOVAL

REMOVAL

**Fig. 294: Underbody Splash Shield**

Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle.
2. Remove the underbody splash shield (1).
3. Remove the fore/aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, REMOVAL** .

**Fig. 295: Exhaust Hanger & Bolts**

Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (1 and 3) and the exhaust hanger (2).

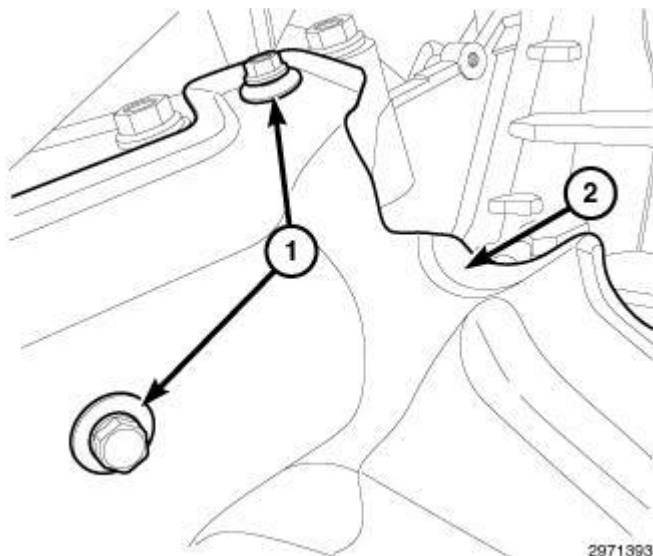


Fig. 296: Rear Mount Heat Shield & Bolts
 Courtesy of CHRYSLER GROUP, LLC

5. Remove bolts (1) and the rear mount heat shield (2).

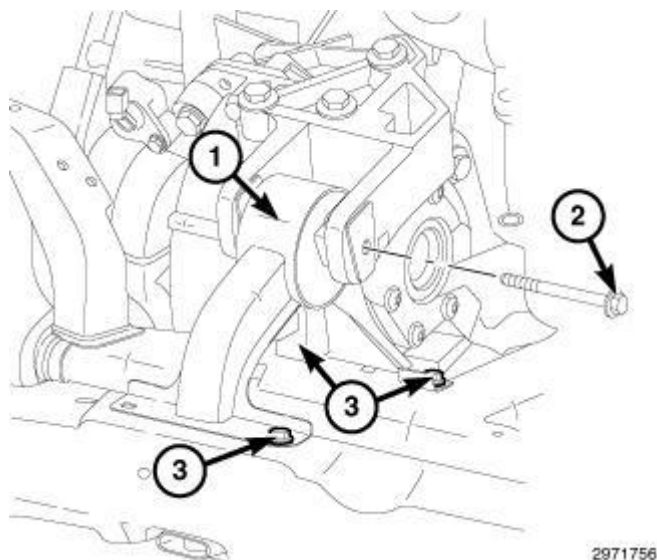


Fig. 297: Rear Engine Mount, Rear Mount Through Bolt & Bolts
 Courtesy of CHRYSLER GROUP, LLC

6. Remove the rear mount through bolt (2).
7. Remove bolts (3) and the rear engine mount (1).

INSTALLATION

INSTALLATION

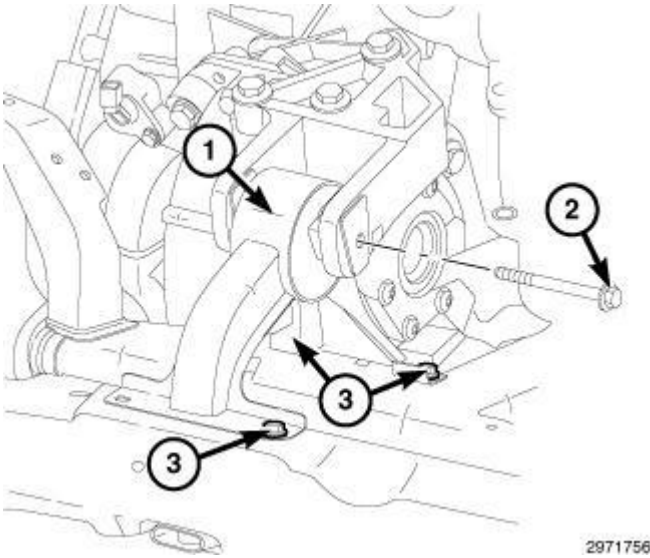


Fig. 298: Rear Engine Mount, Rear Mount Through Bolt & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The left rear mount bolt will not be installed until the exhaust hanger is installed.

1. Install the rear engine mount. Tighten bolts to 54 N.m (40 ft. lbs.).
2. Install the rear mount through bolt and tighten to 61 N.m (45 ft. lbs.).

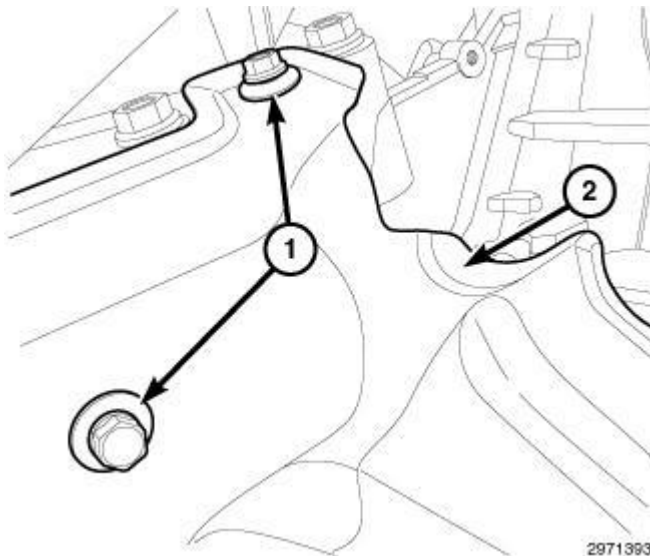


Fig. 299: Rear Mount Heat Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the rear mount heat shield (2). Tighten bolts (1) to 14 N.m (124 in. lbs.).

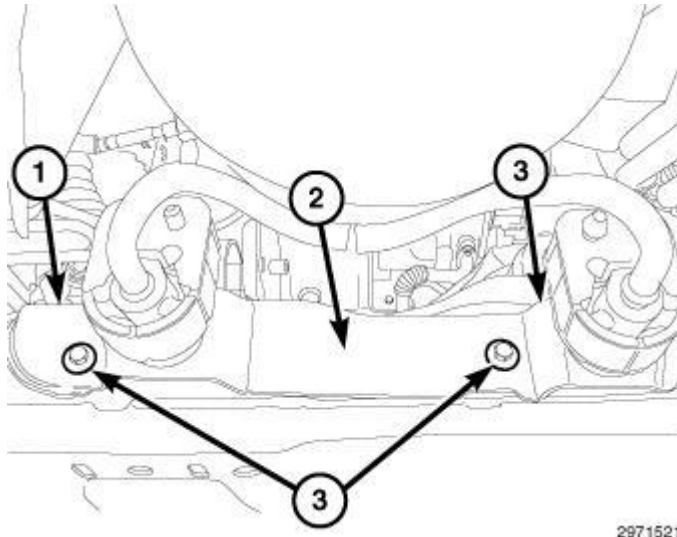


Fig. 300: Exhaust Hanger & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the exhaust hanger (2).
 - Tighten bolt (1) to 54 N.m (40 ft. lbs.).
 - Tighten bolts (3) to 14 N.m (124 in. lbs.).

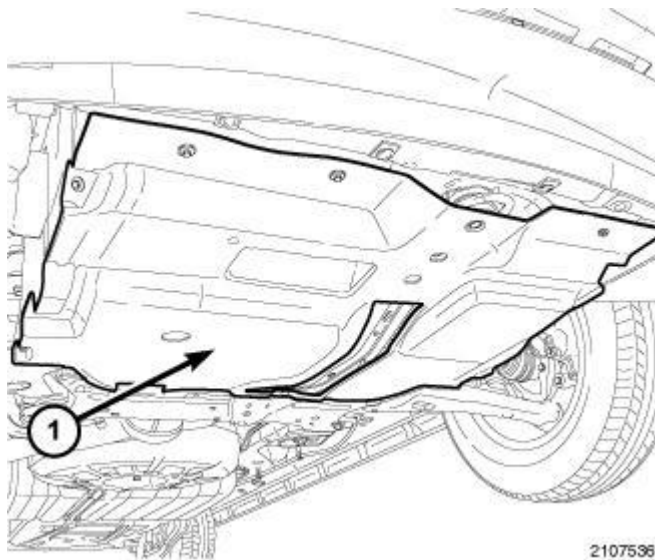
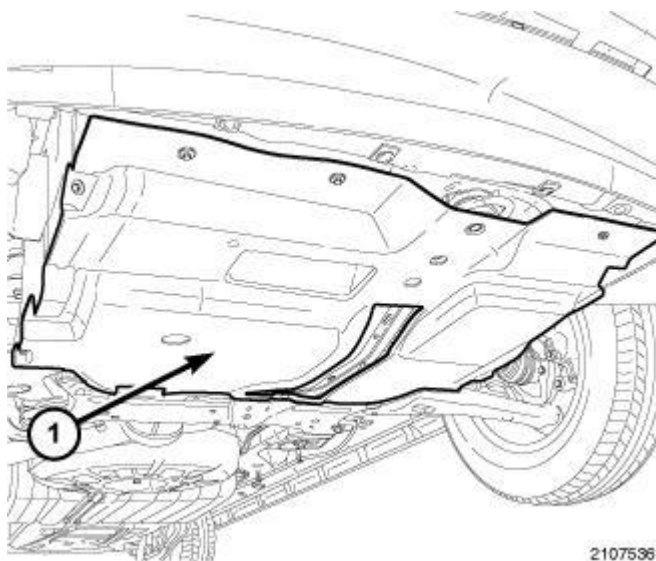


Fig. 301: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

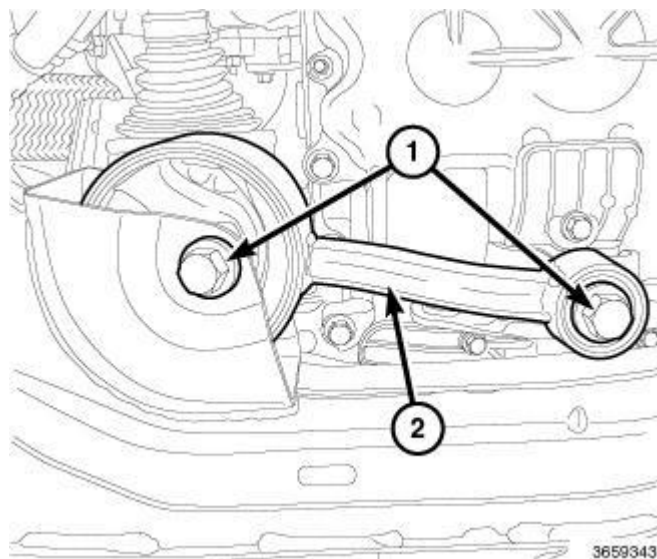
5. Install the fore/aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, INSTALLATION**.
6. Install the underbody splash shield (1).
7. Lower the vehicle.

STRUT, TORQUE

REMOVAL**REMOVAL****Fig. 302: Underbody Splash Shield**

Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the underbody splash shield (1).

**Fig. 303: Lower Torque Strut & Bolts**

Courtesy of CHRYSLER GROUP, LLC

3. Remove bolts (1) and the lower torque strut (2).

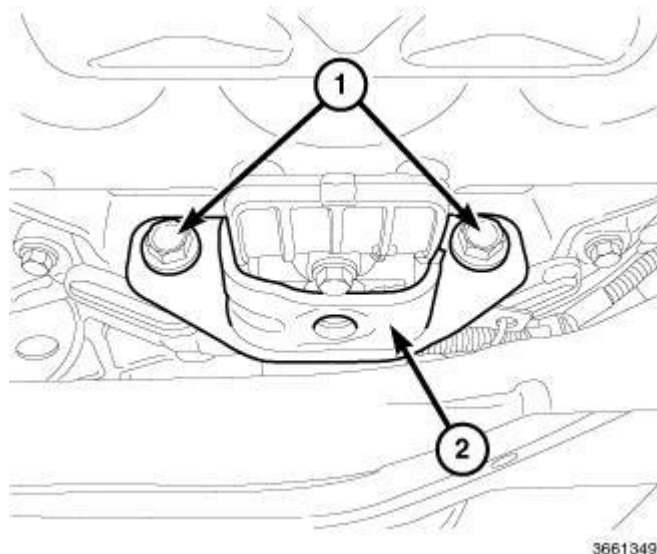


Fig. 304: Lower Torque Strut Mounting Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. If necessary, remove bolts (1) and the lower torque strut mounting bracket (2).

INSTALLATION

INSTALLATION

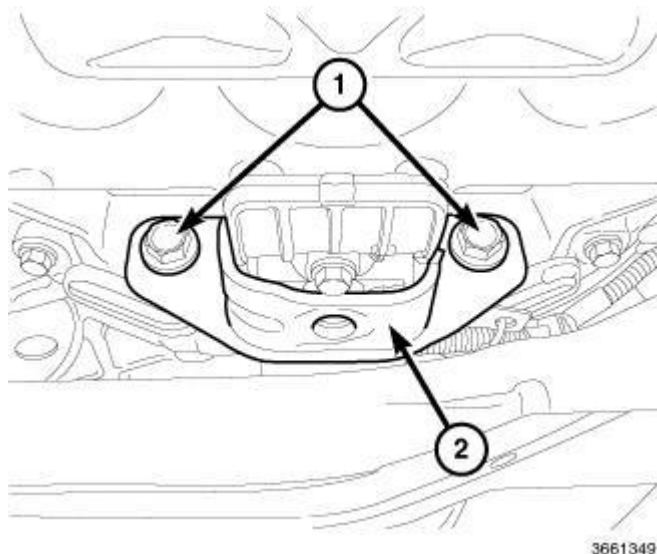


Fig. 305: Lower Torque Strut Mounting Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If necessary, install the torque strut mounting bracket (2). Tighten bolts (1) 60 N.m (44 ft. lbs.).

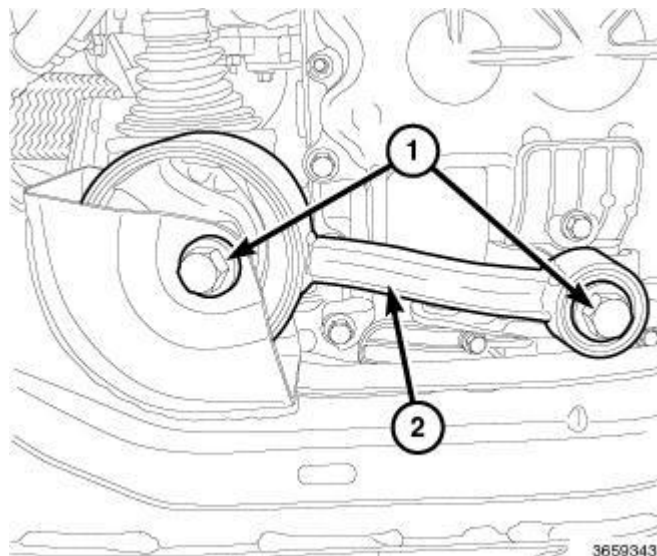


Fig. 306: Lower Torque Strut & Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Install the lower torque strut (2). Tighten bolts to 54 N.m (40 ft. lbs.).

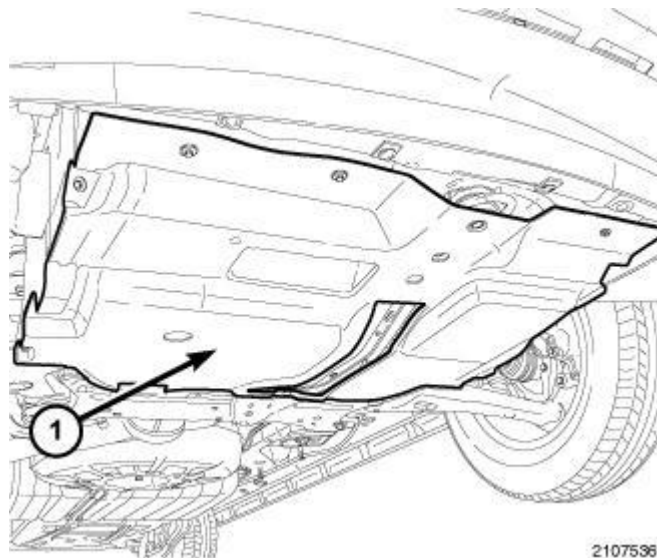


Fig. 307: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

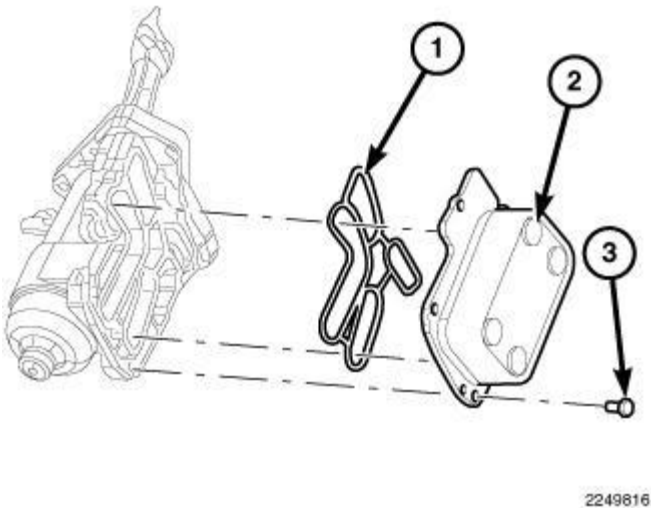
3. Install the underbody splash shield (1).
4. Lower the vehicle.

LUBRICATION

COOLER, OIL

DESCRIPTION

DESCRIPTION



2249816

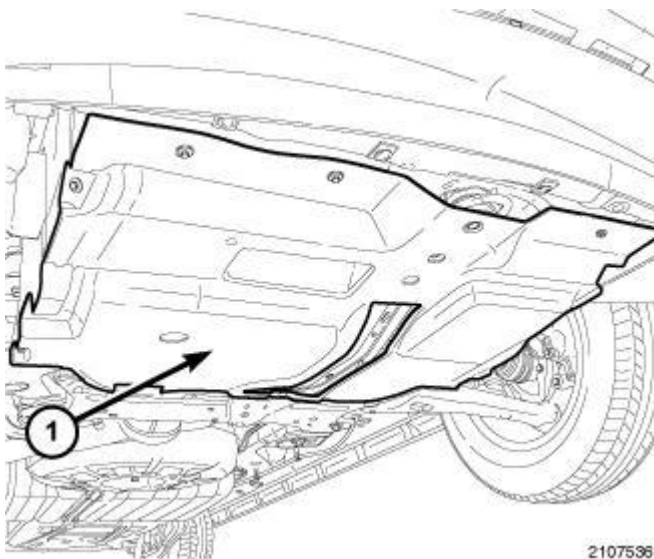
Fig. 308: Oil Cooler Components

Courtesy of CHRYSLER GROUP, LLC

1. Engine coolant is used to cool the engine oil. A plate-style external heat exchanger (2) is located on the oil filter housing (3) which is on the right side of the engine. A gasket (1) seals the oil cooler to the oil filter housing. Replace the gasket (1) whenever the oil cooler is removed or replaced. The oil is fed to the oil cooler through the oil filter housing.

REMOVAL

REMOVAL



2107536

Fig. 309: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle.
3. Remove the underbody splash shield (1).
4. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
5. Drain the engine oil.
6. Using a new copper sealing washer, tighten oil drain plug to 54 N.m (40 ft. lbs.).
7. Remove the right front inner splash shield.

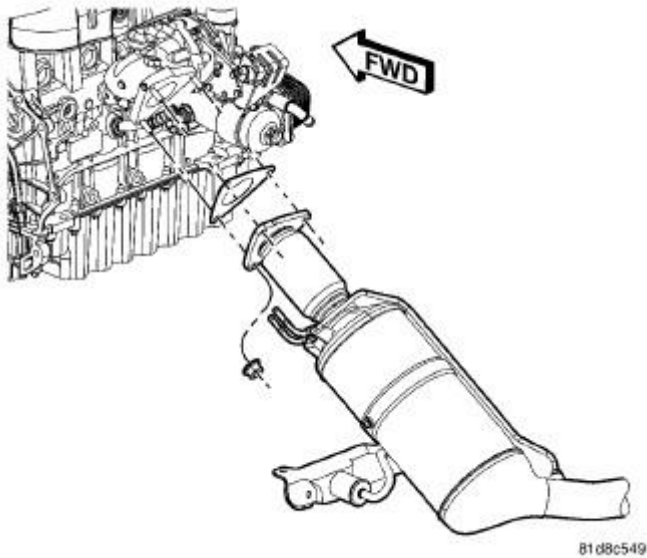
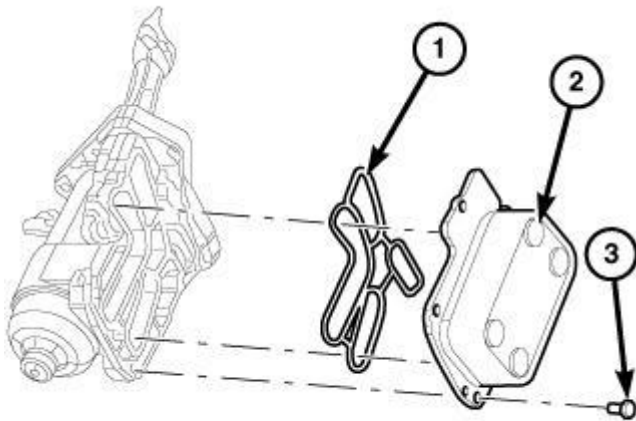


Fig. 310: Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF)
Courtesy of CHRYSLER GROUP, LLC

8. Remove the Diesel Particulate Filter (DEF). Refer to **FILTER, DIESEL PARTICULATE, REMOVAL** .



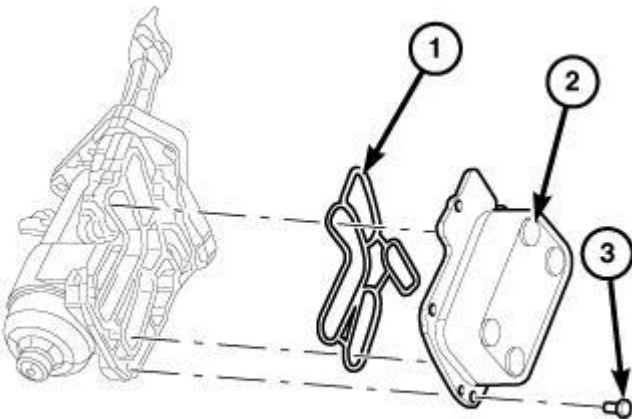
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Fig. 311: Oil Cooler Components
Courtesy of CHRYSLER GROUP, LLC

9. Remove the oil filter housing. Refer to **HOUSING, OIL FILTER, REMOVAL**.
10. Remove the five bolts (3) and the oil cooler (2).

INSTALLATION

INSTALLATION



2249816

Fig. 312: Oil Cooler Components
Courtesy of CHRYSLER GROUP, LLC

1. Using a new gasket (1), install the oil cooler (2). Tighten bolts (3) to 12 N.m (106 in. lbs.).
2. Install the oil filter housing. Refer to **HOUSING, OIL FILTER, INSTALLATION**.

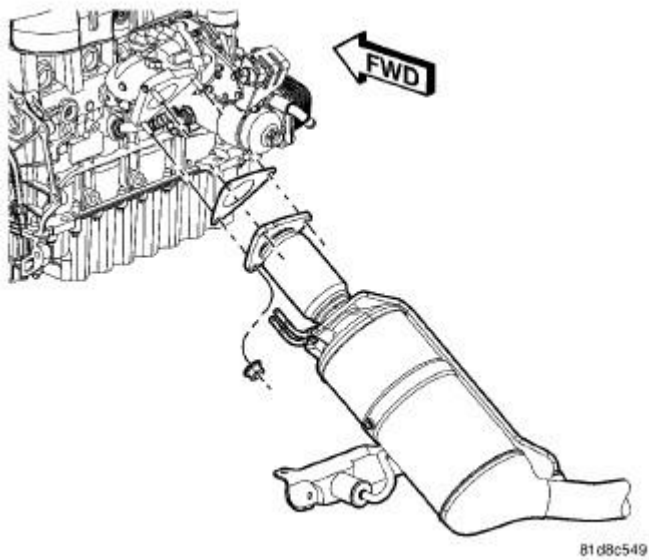


Fig. 313: Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF)
Courtesy of CHRYSLER GROUP, LLC

3. Install the Diesel Particulate Filter (DEF). Refer to **FILTER, DIESEL PARTICULATE, INSTALLATION** .
4. Install the right front inner splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
5. Fill the engine with the recommended engine oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
6. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
7. Connect the negative battery cable.
8. Start engine and check for leaks.

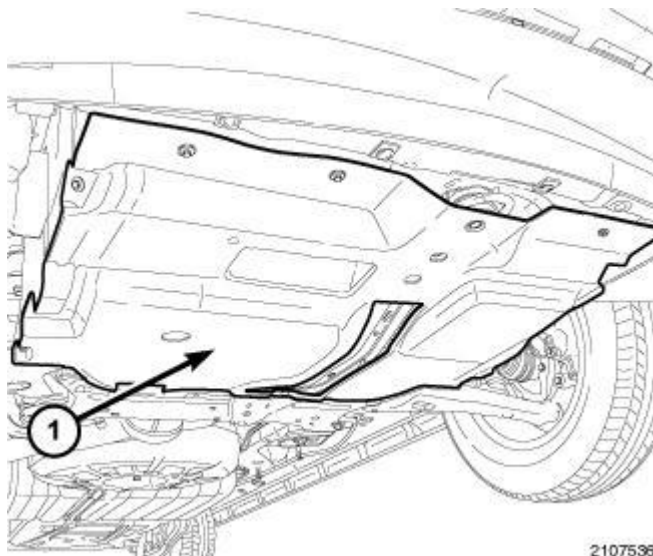


Fig. 314: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

9. Install the underbody splash shield (1) and securely tighten the fasteners.
10. Lower the vehicle.

FILTER, ENGINE OIL

REMOVAL

REMOVAL

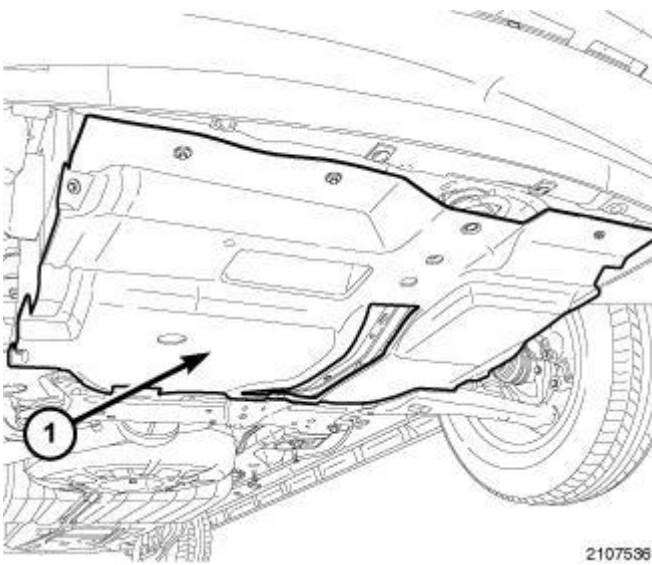
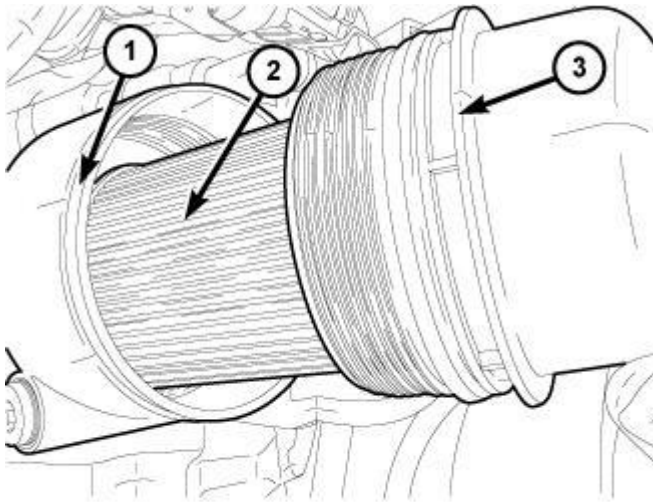


Fig. 315: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the underbody splash shield (1).
4. Drain the engine oil.
5. Using a new copper sealing washer, tighten oil drain plug to 54 N.m (40 ft. lbs.).



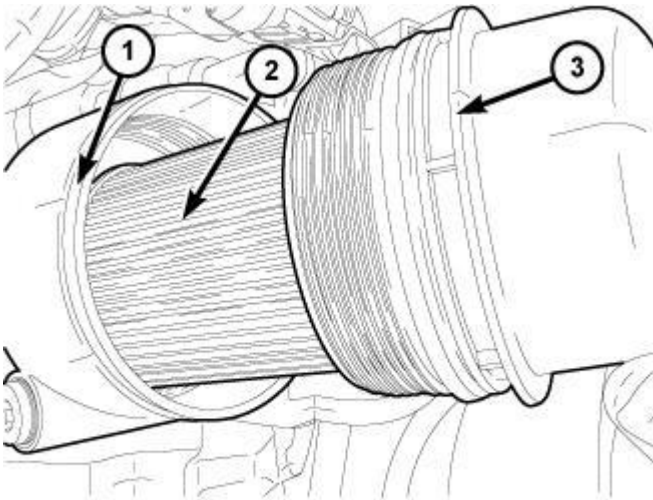
2243978

Fig. 316: Oil Filter Seal, Oil Filter & Housing Adapter Cap
 Courtesy of CHRYSLER GROUP, LLC

6. Remove oil filter housing adapter cap (3) and the oil filter (2).

INSTALLATION

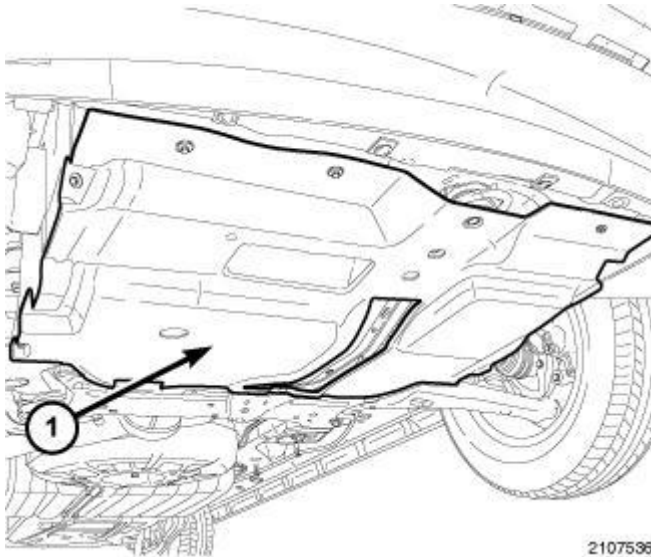
INSTALLATION



2243978

Fig. 317: Oil Filter Seal, Oil Filter & Housing Adapter Cap
 Courtesy of CHRYSLER GROUP, LLC

1. Install the oil filter (2) and oil filter housing adapter cap (3). Tighten cap to 25 N.m (18 ft. lbs.).



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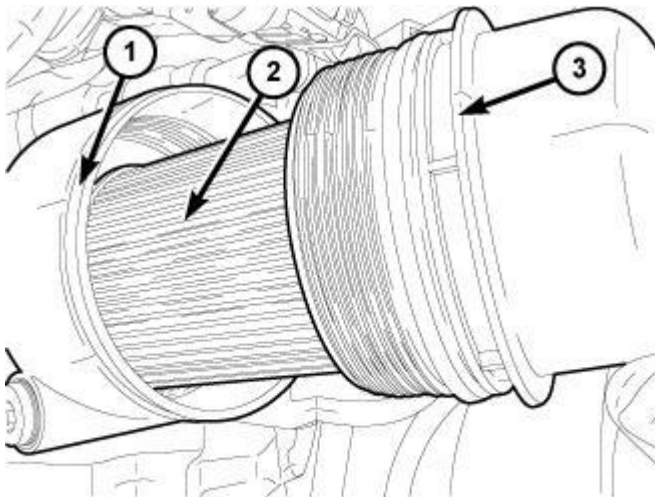
Fig. 318: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

2. Install the under body splash shield.
3. Lower the vehicle.
4. Fill the engine with recommended engine oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
5. Connect the negative battery cable.

HOUSING, OIL FILTER

DESCRIPTION

DESCRIPTION



2243978

Fig. 319: Oil Filter Seal, Oil Filter & Housing Adapter Cap

Courtesy of CHRYSLER GROUP, LLC

An oil filter adapter is used on this vehicle to relocate the oil filter for easier access when servicing.

REMOVAL

REMOVAL

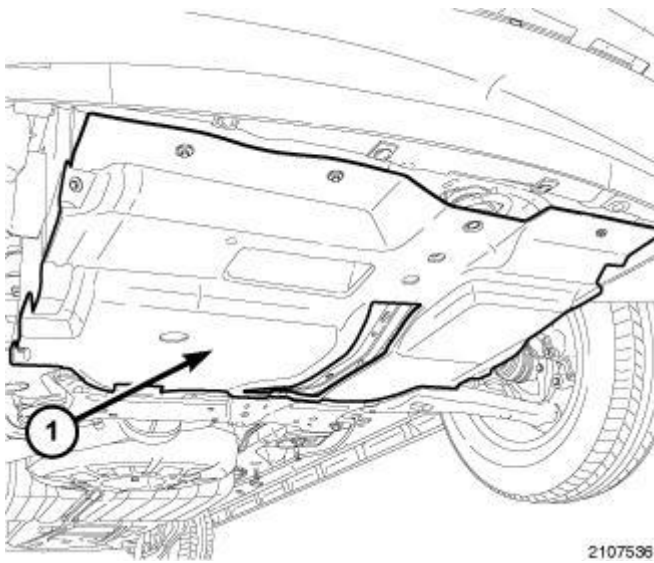


Fig. 320: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the underbody splash shield (1).
4. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
5. Drain the engine oil.
6. Using a new copper sealing washer, tighten oil drain plug to 45 N.m (33 ft. lbs.).
7. Remove the right front inner splash shield.
8. Remove the Diesel Particulate Filter (DEF). Refer to **FILTER, DIESEL PARTICULATE, REMOVAL** .

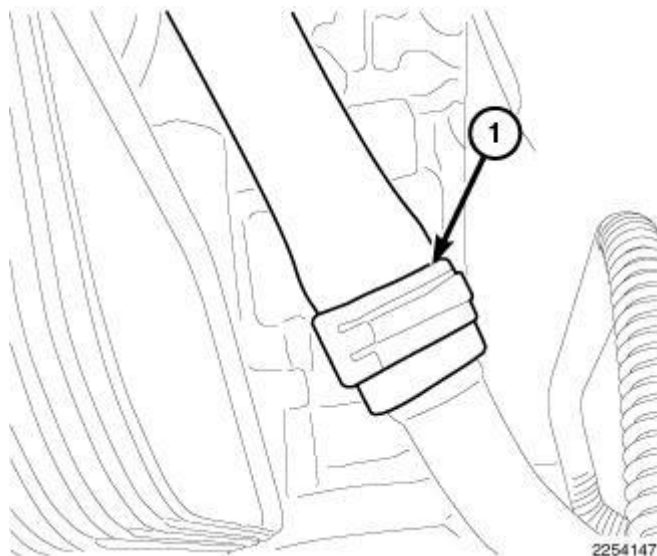


Fig. 321: Engine Oil Coolant Hose
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the engine oil coolant hose (1).

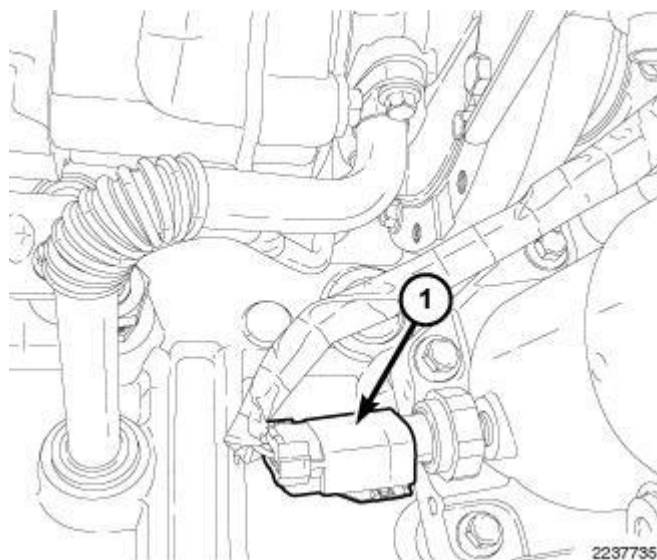


Fig. 322: Oil Pressure Switch Harness Connector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the oil pressure switch harness connector (1).

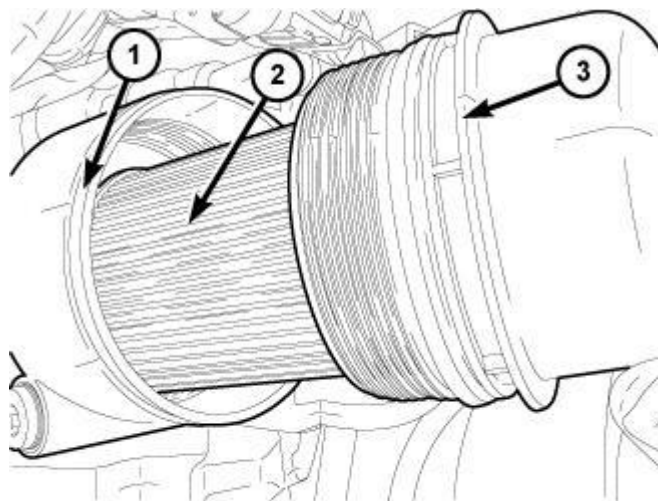


Fig. 323: Oil Filter Seal, Oil Filter & Housing Adapter Cap
Courtesy of CHRYSLER GROUP, LLC

11. Remove oil filter housing adapter cap (3) and the oil filter (2).

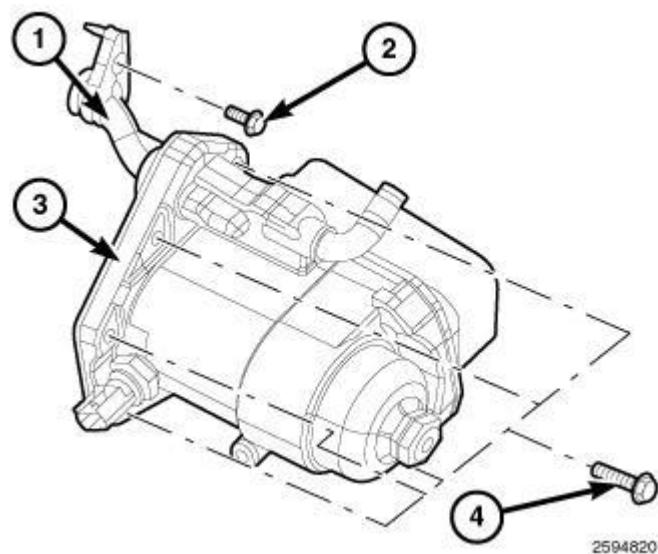
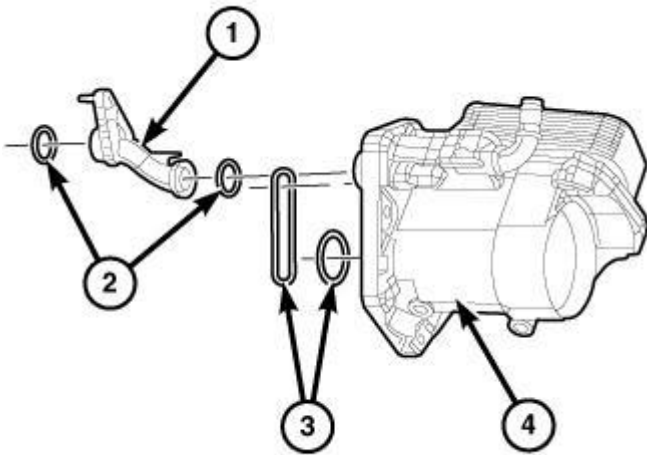


Fig. 324: Oil Filter Tube, Engine Oil Filter Housing & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Remove bolts (2 and 4) along with the oil filter housing (3) and oil filter tube (1) from engine block.

INSTALLATION

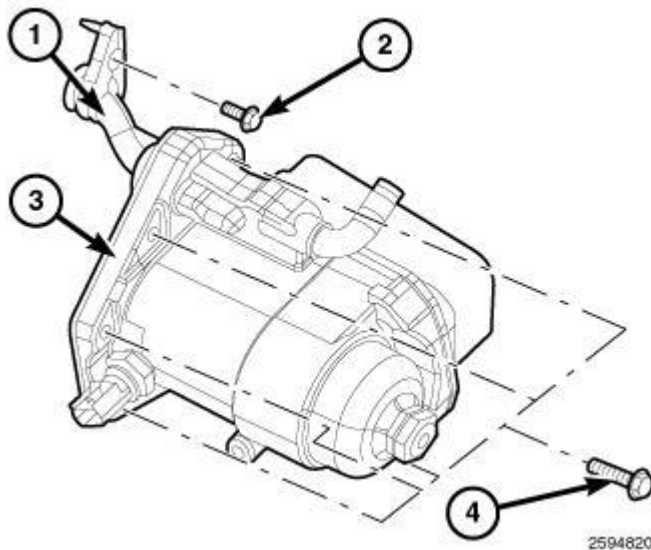
INSTALLATION



2595386

Fig. 325: Oil Filter Tube & Housing With O-Ring Gaskets
Courtesy of CHRYSLER GROUP, LLC

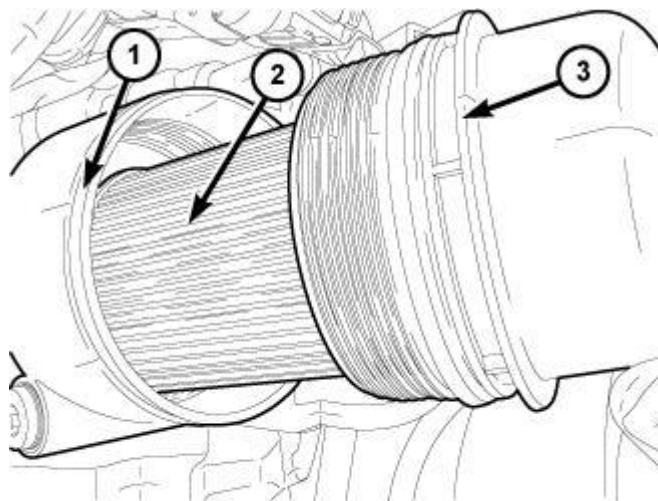
1. Install new O-ring gaskets (2) onto the oil filter tube (1).
2. Install new O-ring gaskets (3) onto the oil filter housing (4).



2594820

Fig. 326: Oil Filter Tube, Engine Oil Filter Housing & Bolts
Courtesy of CHRYSLER GROUP, LLC

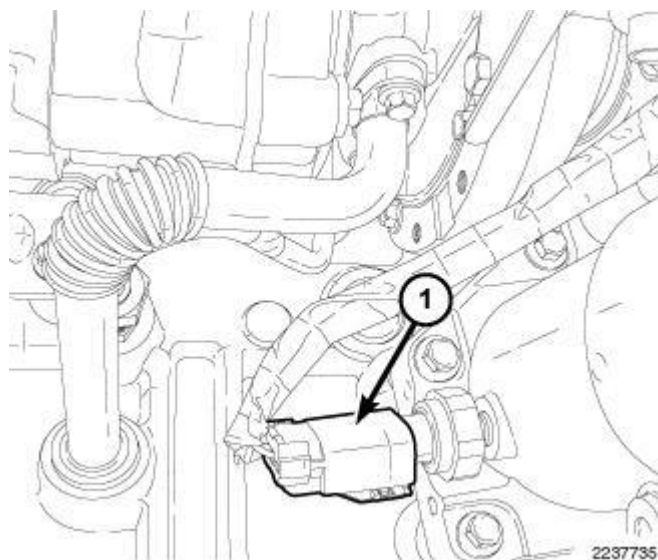
3. Install the oil filter tube (1) to the engine block. Tighten bolt (2) to 11 N.m (97 in. lbs.).
4. Install the oil filter housing (3). Tighten bolts (4) to 32 N.m (24 ft. lbs.).



2243978

Fig. 327: Oil Filter Seal, Oil Filter & Housing Adapter Cap
 Courtesy of CHRYSLER GROUP, LLC

5. Install the oil filter (2).
6. Install the oil filter housing adapter cap (3). Tighten to 25 N.m (18 ft. lbs.).



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Fig. 328: Oil Pressure Switch Harness Connector
 Courtesy of CHRYSLER GROUP, LLC

7. Connect the oil pressure switch harness connector (1).

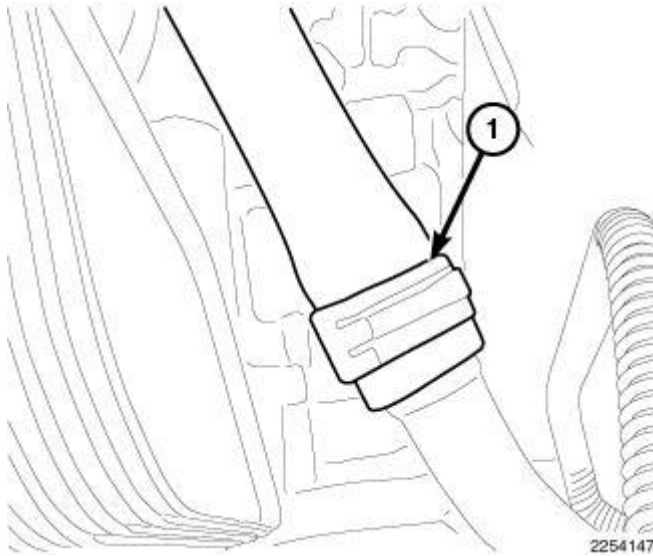


Fig. 329: Engine Oil Coolant Hose
Courtesy of CHRYSLER GROUP, LLC

8. Connect the engine oil coolant hose (1).
9. Install the Diesel Particulate Filter (DEF). Refer to **FILTER, DIESEL PARTICULATE, INSTALLATION** .
10. Install the right front inner splash shield.
11. Fill the engine with recommended oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
12. Fill the cooling system. Refer to **STANDARD PROCEDURE** .

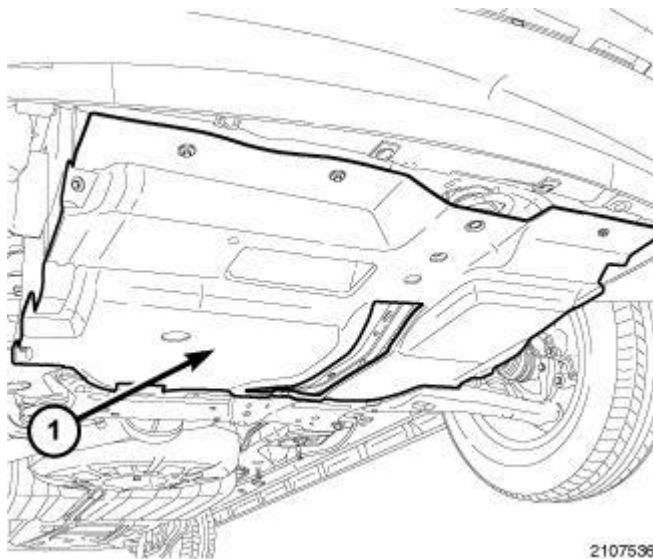


Fig. 330: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

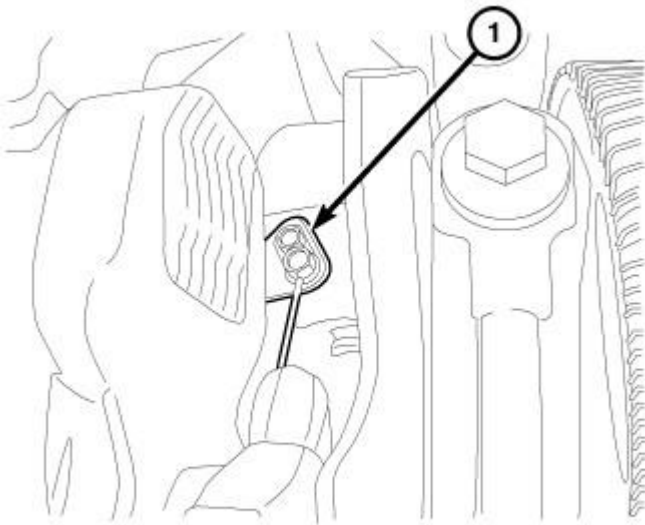
13. Connect the negative battery cable.

14. Start the engine and check for leaks.
15. Install the underbody splash shield (1) and securely tighten fasteners.

JET, PISTON OIL COOLER

DESCRIPTION

DESCRIPTION



81abeb67

Fig. 331: Oil Jet

Courtesy of CHRYSLER GROUP, LLC

There are four oil jets installed in the engine block. These oil jets are used to cool and lubricate the piston assemblies.

REMOVAL

REMOVAL

CAUTION: Use caution when removing and installing oil jets. Damage to oil jet nozzle could cause severe engine damage. Care must be taken not to damage the crankshaft tone ring when removing cylinder number four oil jet.

NOTE: To prevent damage to the oil jets, remove the oil jets before removing the pistons.

1. Disconnect the negative battery cable.

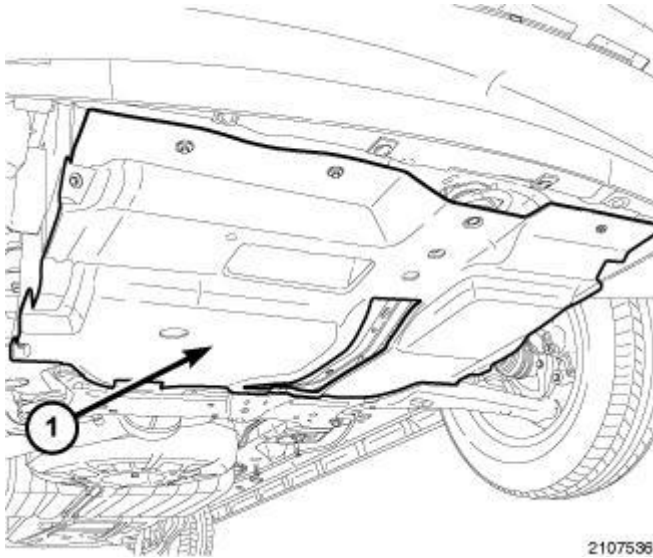


Fig. 332: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

2. Remove the underbody splash shield (1).
3. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .

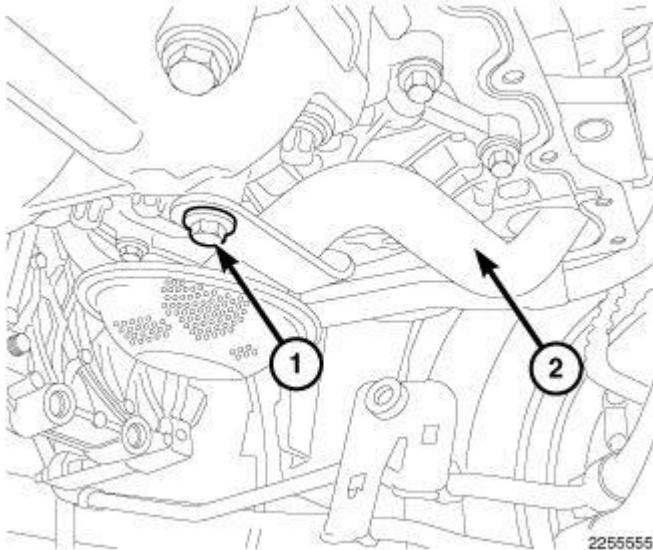
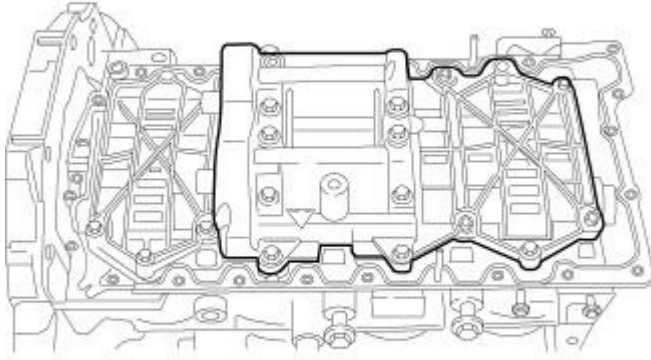


Fig. 333: Oil Pickup Tube With Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Remove retaining bolt (1) and the oil pickup tube (2) from engine. Discard the O-rings.

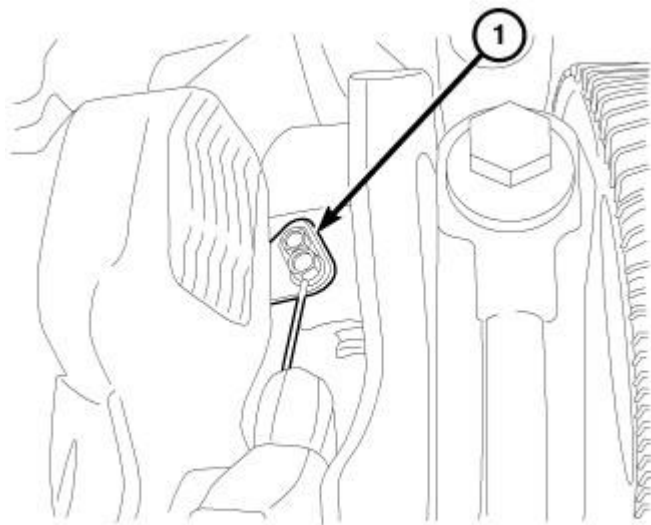


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Fig. 334: Balance Shaft

Courtesy of CHRYSLER GROUP, LLC

5. Remove the balance shaft assembly. Refer to **MODULE, BALANCE SHAFT, REMOVAL**.



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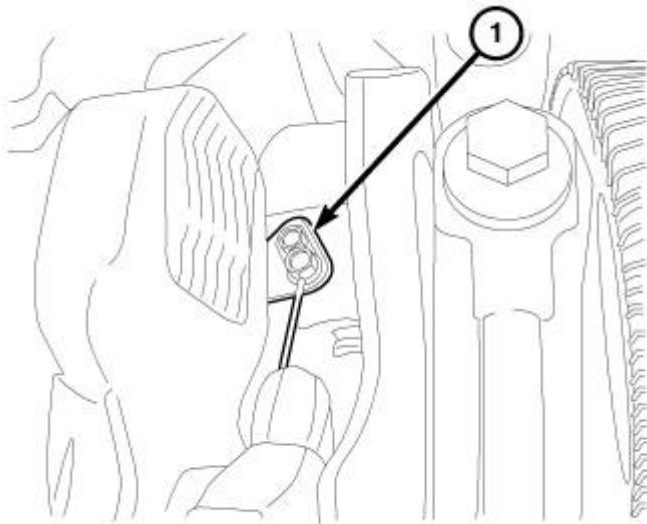
Fig. 335: Oil Jet

Courtesy of CHRYSLER GROUP, LLC

6. Remove the oil jet (1) and discard the O-rings.

INSTALLATION

INSTALLATION



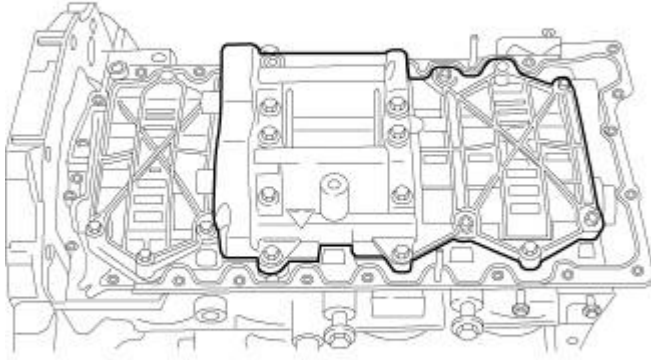
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Fig. 336: Oil Jet

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use caution when removing and installing oil jets. Damage to oil jet nozzle could cause severe engine damage. Care must be taken not to damage the crankshaft tone ring when removing cylinder number four oil jet.

1. Using a new O-ring, lubricate and install the O-ring on oil jet.
2. Install the oil jet (1). Tighten bolt to 11 N.m (97 in. lbs.).

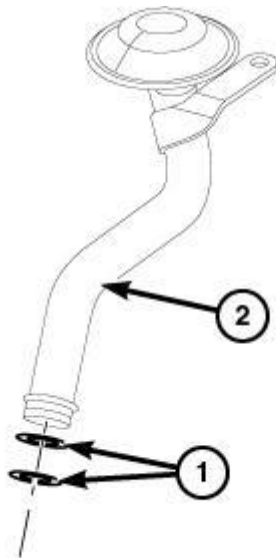


81ab8223

Fig. 337: Balance Shaft

Courtesy of CHRYSLER GROUP, LLC

3. Install the balance shaft assembly. Refer to **MODULE, BALANCE SHAFT, INSTALLATION**.



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Fig. 338: Oil Pickup Tube & O-Rings

Courtesy of CHRYSLER GROUP, LLC

4. Using new O-rings, lubricate and install the 2 O-rings (1) on oil pickup tube (2).

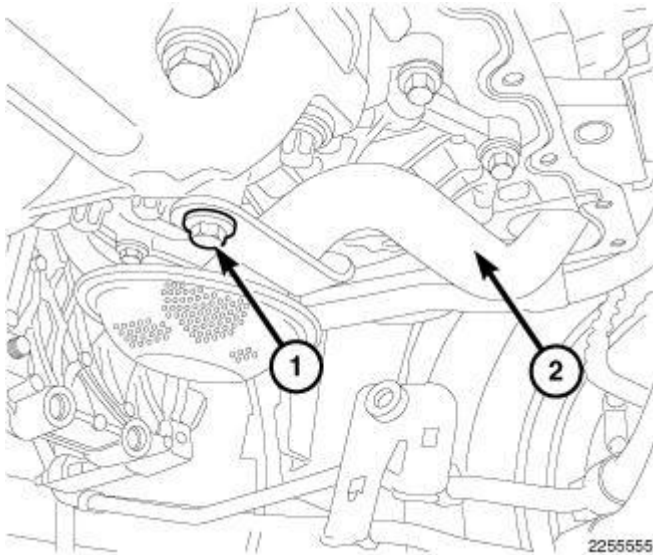


Fig. 339: Oil Pickup Tube With Bolt
Courtesy of CHRYSLER GROUP, LLC

5. Install the oil pickup tube. Tighten the bolt to 15 N.m (133 in. lbs.).
6. Install the oil pan. Refer to **PAN, OIL, INSTALLATION** .
7. Fill the engine with oil.
8. Connect the negative battery cable.
9. Start the engine and check for leaks.

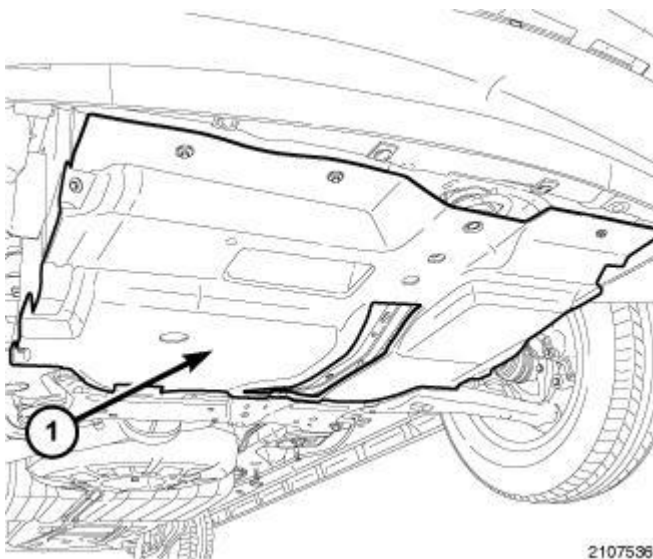


Fig. 340: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

10. Install the underbody splash shield (1) and securely tighten fasteners.

OIL

DESCRIPTION**DESCRIPTION**

Refer to the Lube and Maintenance information for oil specifications. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .

STANDARD PROCEDURE**STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE****WARNING**

WARNING: New or used engine oil can be irritating to the skin. Avoid prolonged or repeated skin contact with engine oil. Contaminants in used engine oil, caused by internal combustion, can be hazardous to your health. Thoroughly wash exposed skin with soap and water. Do not wash skin with gasoline, diesel fuel, thinner, or solvents, health problems can result. Do not pollute, dispose of used engine oil properly. Contact your dealer or government agency for location of collection center in your area.

Change the engine oil and filter at mileage and time intervals described in the Maintenance Schedule. Refer to **MAINTENANCE SCHEDULES, DESCRIPTION** .

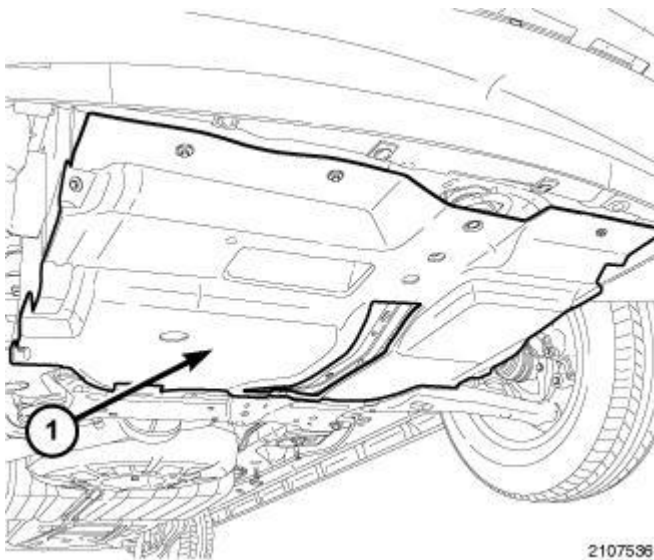


Fig. 341: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Run the engine until achieving normal operating temperature.
2. Position the vehicle on a level surface and turn the engine off.
3. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
4. Remove the under body splash shield (1).

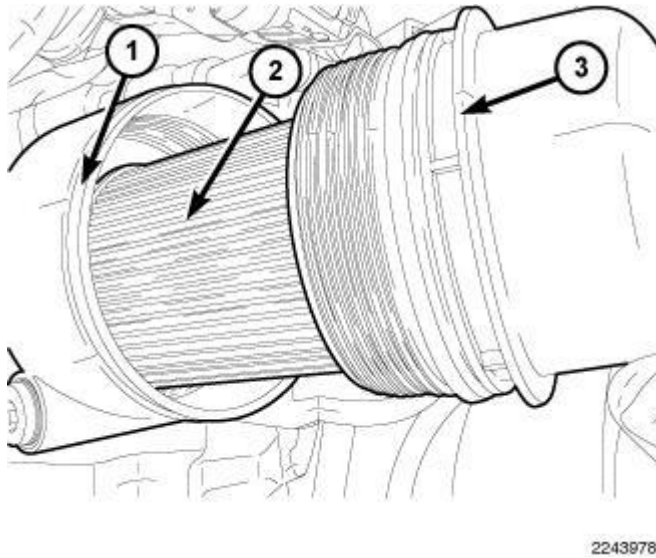


Fig. 342: Oil Filter Seal, Oil Filter & Housing Adapter Cap
 Courtesy of CHRYSLER GROUP, LLC

5. Place a suitable drain pan under the oil filter housing.
6. Rotate the oil filter cap (3) counterclockwise and remove the oil filter (2) and cap.

CAUTION: When performing an engine oil change, the oil filter cap must be removed. Removing the oil filter cap releases oil held within the oil filter cavity and allows it to drain into the sump. Failure to remove the cap prior to reinstallation of the drain plug will not allow complete draining of the used engine oil.

NOTE: The oil filter (2) is attached to the oil filter cap (3).

7. While holding the oil filter cover (3), pushdown on base oil filter (2) to separate from cover and remove the oil filter (2).
8. Place a suitable drain pan under the oil pan.
9. Remove drain plug and drain the engine oil.
10. Inspect the drain plug threads for stretching or other damage. Replace the drain plug if damaged.
11. Using a new copper sealing washer, install and tighten oil drain plug to 45 N.m (33 ft. lbs.).

NOTE: It is not necessary to pre-oil the oil filter or fill the oil filter housing.

12. Lubricate and install the new oil filter cap O-ring gasket. Make sure the oil filter cap O-ring is in the correct location.
13. Install the oil filter (3) into oil filter cap (3).
14. Install oil filter cap (3) and tighten to 25 N.m (18 ft. lbs.).

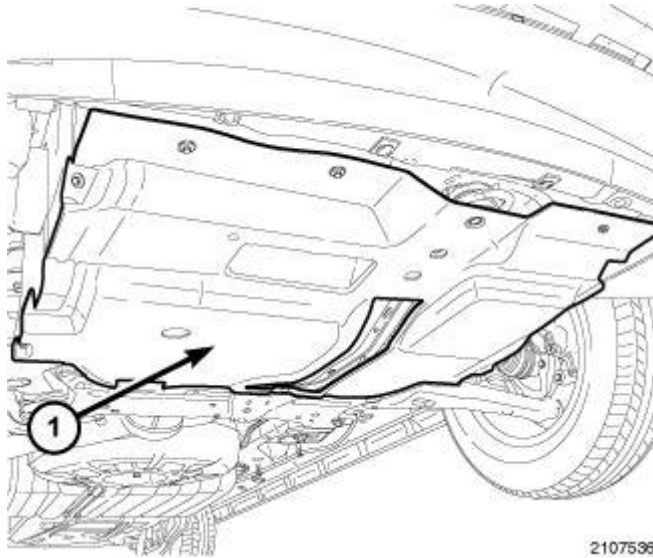


Fig. 343: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

15. Install the under body splash shield.
16. Lower the vehicle.
17. Fill the crankcase with the specified type and amount of engine oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
18. Start the engine and inspect for leaks.
19. Stop the engine and check the oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. When replacing oil filter, use a Mopar® filter or equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing of used engine oil after it has been drained from a vehicle engine. Refer to **WARNING**.

PAN, OIL

REMOVAL

REMOVAL

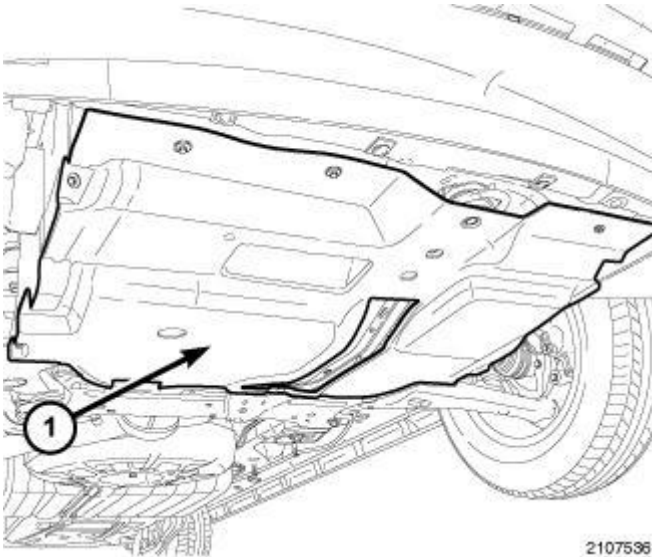


Fig. 344: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the underbody splash shield (1).
4. Drain the engine oil.
5. Using a new copper sealing washer, tighten oil drain plug to 45 N.m (33 ft. lbs.).
6. Remove accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .
7. If equipped, remove the insulation around the oil pan.
8. Remove the front fore and aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, REMOVAL** .

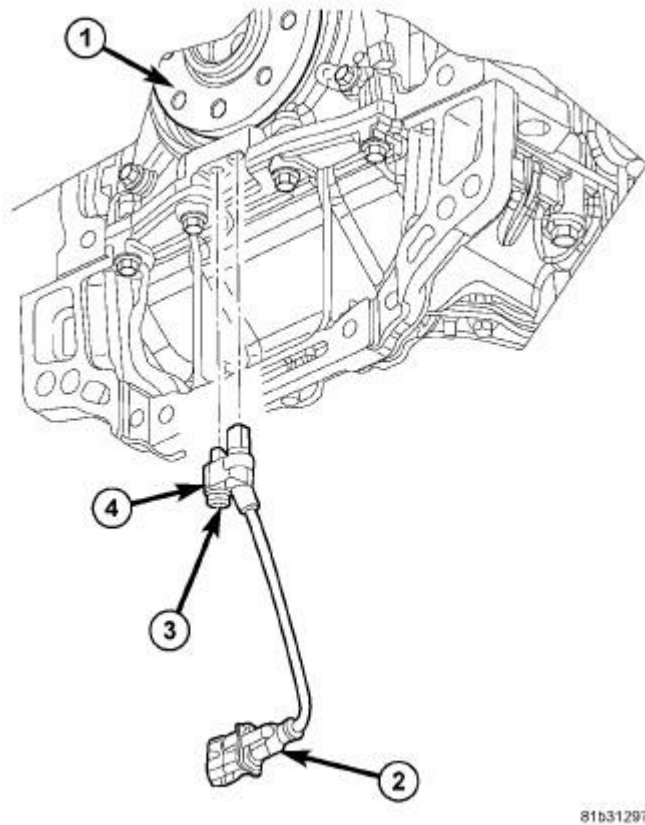


Fig. 345: Crankshaft Hub, Electrical Connector, Mounting Bolt & CKP Sensor
Courtesy of CHRYSLER GROUP, LLC

9. Remove Crankshaft Position Sensor (CKP) Sensor (4). Refer to **SENSOR, CRANKSHAFT POSITION, REMOVAL** .

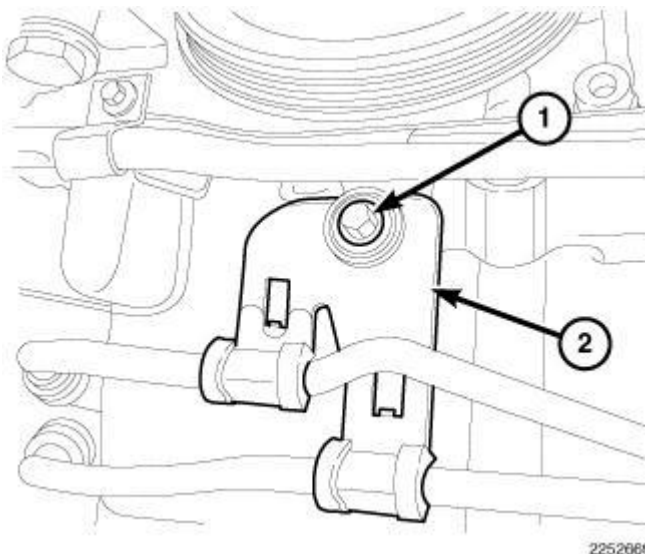


Fig. 346: Retaining Bolt & Power Steering Line Bracket

Courtesy of CHRYSLER GROUP, LLC

10. Remove the bolt (1) securing the power steering lines.

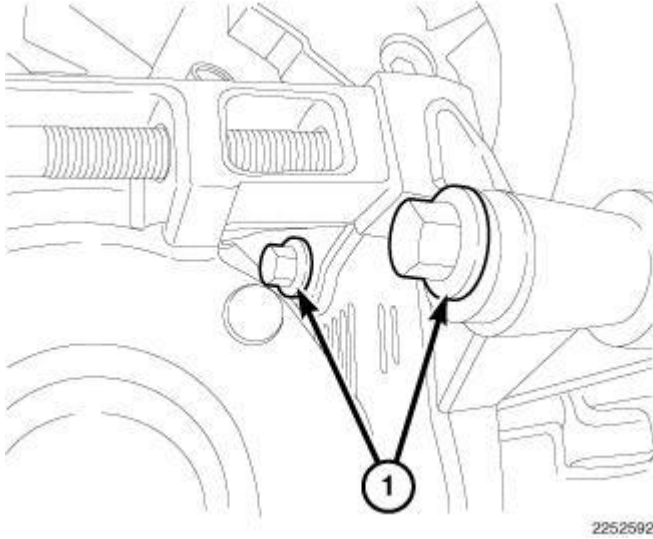


Fig. 347: Upper A/C Mounting Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Loosen the upper A/C mounting bracket bolts (1).

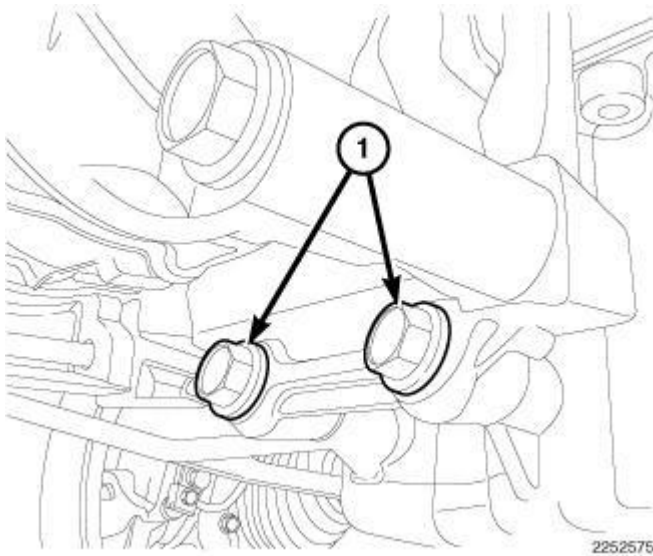


Fig. 348: A/C Mounting Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Loosen the lower A/C mounting bracket bolts and position the A/C mounting bracket forward to clear oil pan bosses.

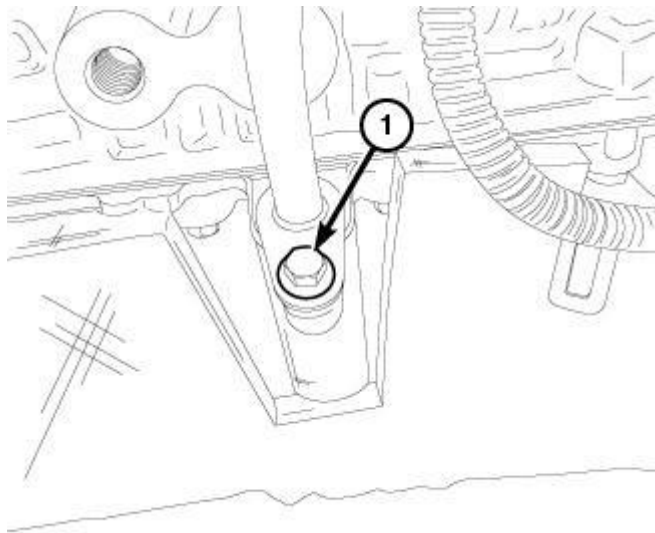


Fig. 349: Oil Level Indicator Tube Lower Bolt
Courtesy of CHRYSLER GROUP, LLC

13. Remove lower bolt (1) from the oil indicator tube.

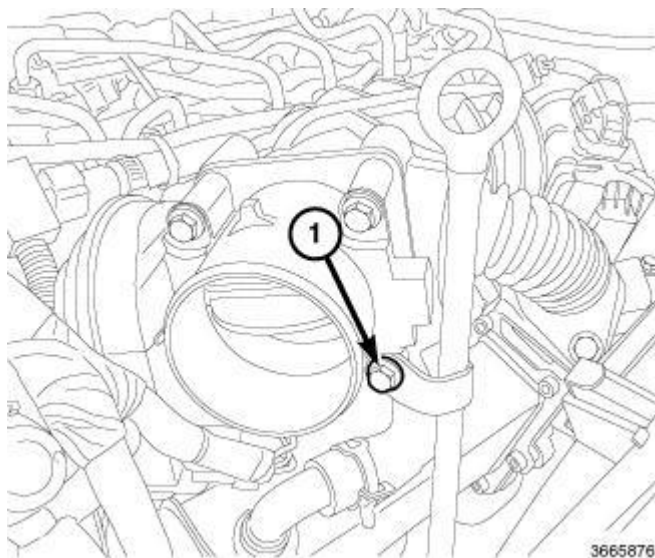


Fig. 350: Oil Level Indicator Tube Upper Bolt
Courtesy of CHRYSLER GROUP, LLC

14. Remove upper bolt (1) and the oil level indicator tube.

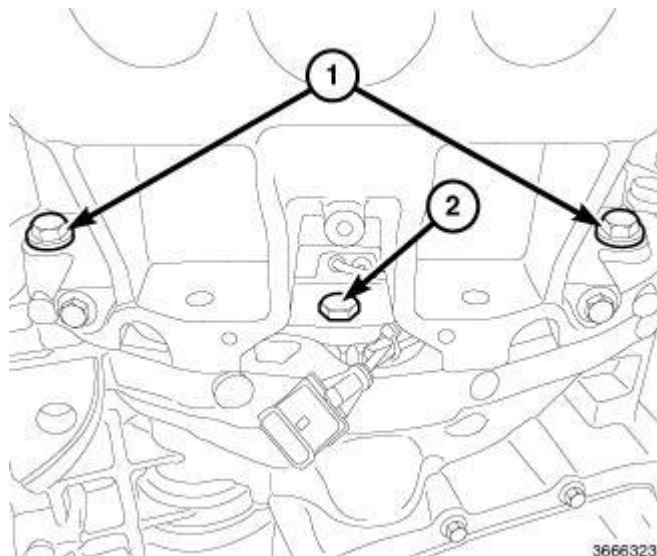


Fig. 351: Oil Pan To Transaxle Bolts & Flex Plate-To-Torque Converter Bolts
 Courtesy of CHRYSLER GROUP, LLC

15. Remove oil pan-to-transaxle bolts (1).

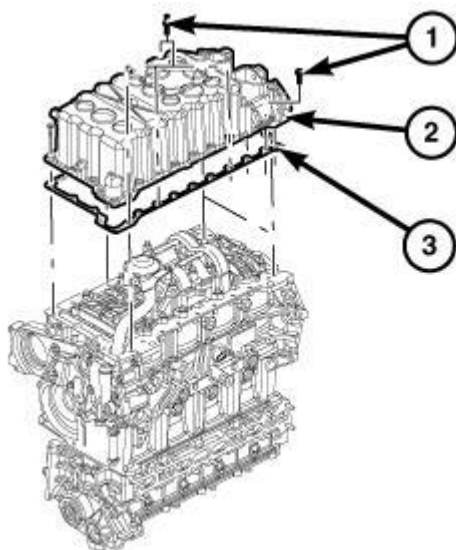


Fig. 352: Oil Pan Gasket With Oil Pan & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

16. Remove fasteners (1) and the oil pan (2).
17. Remove the oil pan gasket (3).

INSTALLATION

INSTALLATION

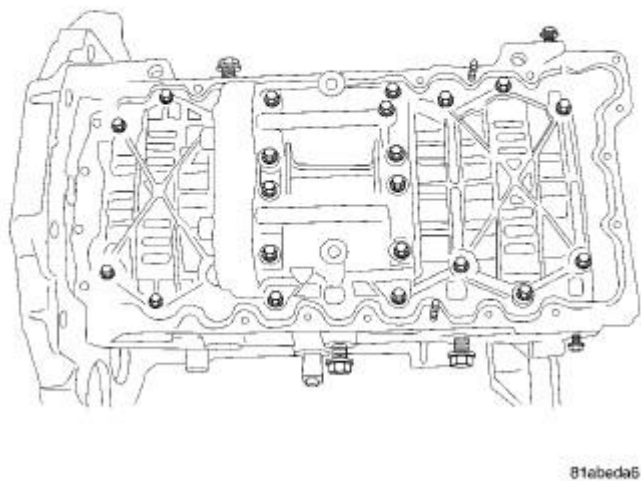


Fig. 353: Engine Block Gasket Surface
Courtesy of CHRYSLER GROUP, LLC

1. Clean oil pan and engine block gasket surfaces.

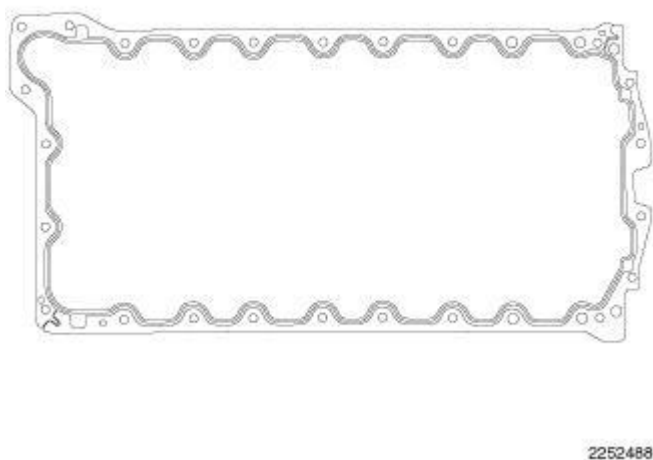
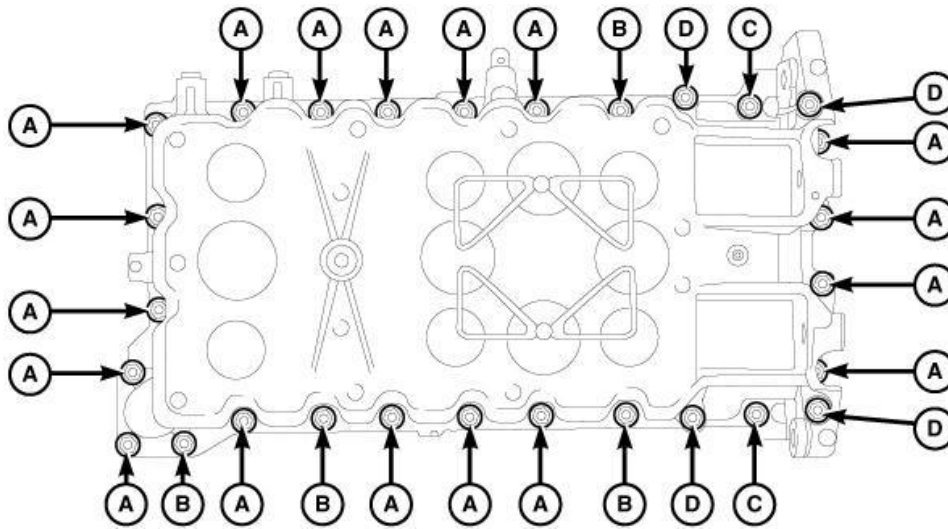


Fig. 354: Upper Oil Pan Gasket
Courtesy of CHRYSLER GROUP, LLC

2. Install the upper oil pan gasket.



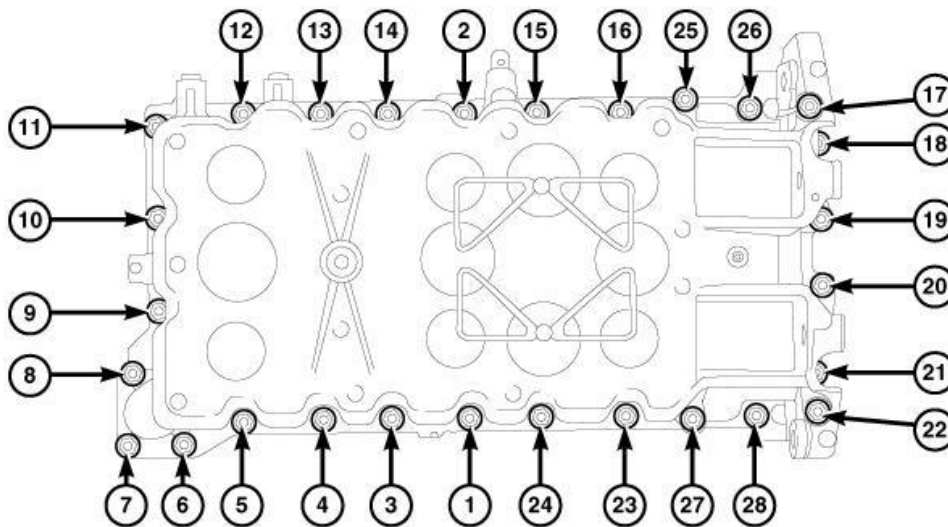
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Fig. 355: Oil Pan Bolts

Courtesy of CHRYSLER GROUP, LLC

3. The oil pan bolts have 2 different bolt sizes:

- Bolts A are M6.
- Bolts B are M6 stud bolts.
- Bolts C are M8 short.
- Bolts D are M8 long.



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Fig. 356: Oil Pan Bolt Tightening Sequence

Courtesy of CHRYSLER GROUP, LLC

4. Install oil pan.

5. Tighten oil pan bolts to:

- M6 bolts to 15 N.m (133 in. lbs.).
- M8 bolts to 32 N.m (24 ft. lbs.).

6. Loosen all of the oil pan and stud bolts 90 degrees and retighten to:

- M6 bolts to 15 N.m (133 in. lbs.).
- M8 bolts to 32 N.m (24 ft. lbs.).

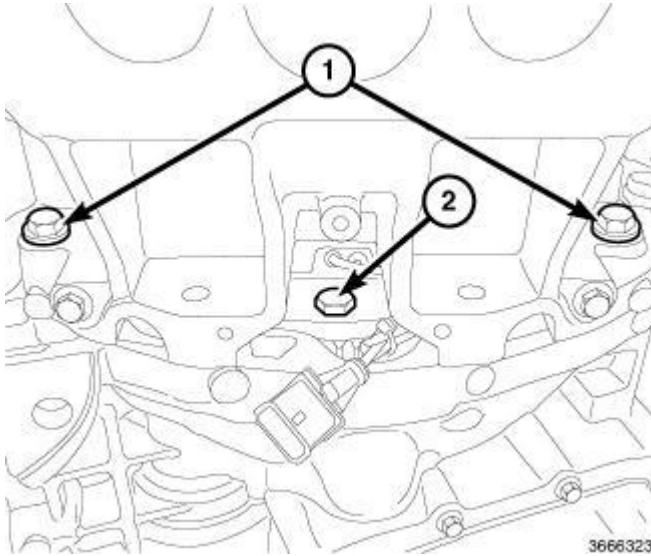


Fig. 357: Oil Pan To Transaxle Bolts & Flex Plate-To-Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Install the oil pan-to-transaxle bolts (1). Tighten bolts (1) to 60 N.m (44 ft. lbs.).

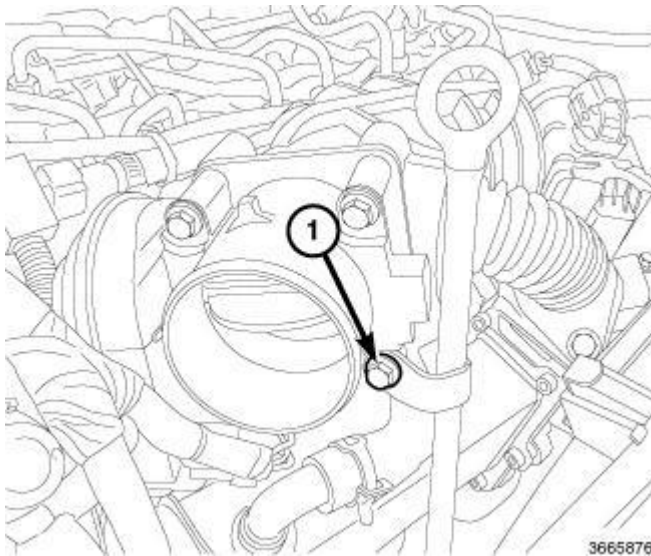


Fig. 358: Oil Level Indicator Tube Upper Bolt
Courtesy of CHRYSLER GROUP, LLC

8. Install the oil level indicator tube. Tighten upper bolt (1) to 11 N.m (97 in. lbs.).

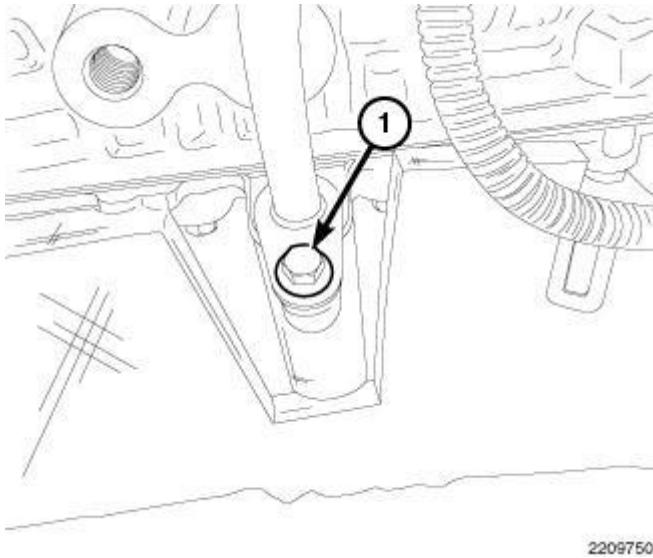


Fig. 359: Oil Level Indicator Tube Lower Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Install the oil indicator lower bolt (1). Tighten lower bolt to 11 N.m (97 in. lbs.).

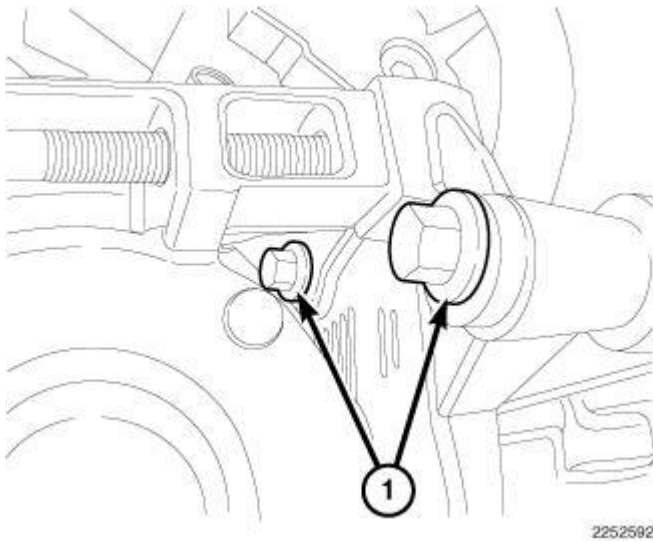


Fig. 360: Upper A/C Mounting Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Position the A/C bracket onto oil pan bosses. Tighten the upper A/C mounting bracket bolts (1) to 23 N.m (17 ft. lbs.).

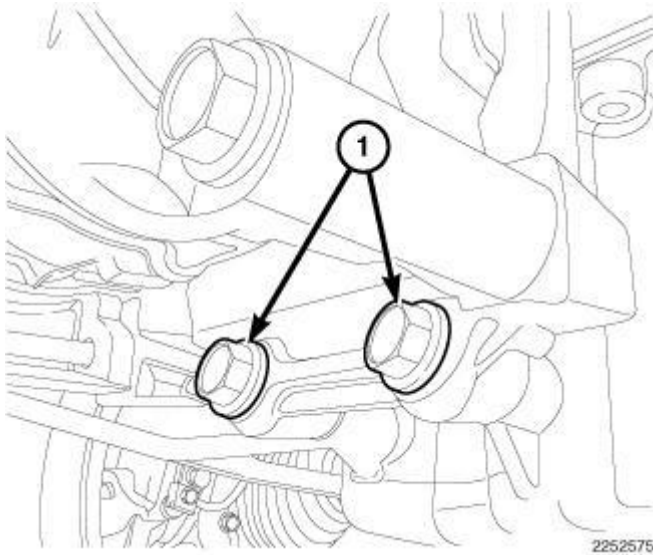


Fig. 361: A/C Mounting Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Tighten the lower A/C mounting bracket bolts (1) to 23 N.m (17 ft. lbs.).

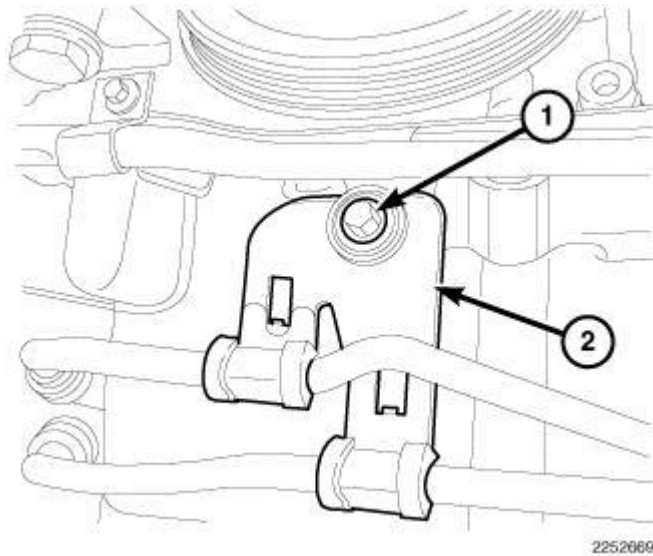


Fig. 362: Retaining Bolt & Power Steering Line Bracket
Courtesy of CHRYSLER GROUP, LLC

12. Install the retaining bolt (1) securing the power steering lines. Tighten to 15 N.m (133 in. lbs.).

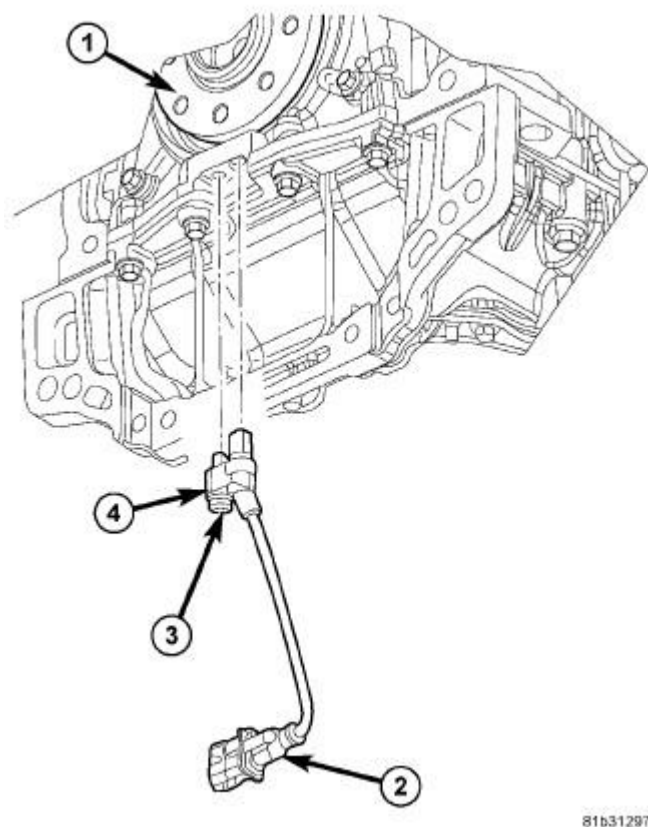


Fig. 363: Crankshaft Hub, Electrical Connector, Mounting Bolt & CKP Sensor
Courtesy of CHRYSLER GROUP, LLC

13. Install the Crankshaft Position Sensor (CKP) (4). Refer to **SENSOR, CRANKSHAFT POSITION, INSTALLATION** .

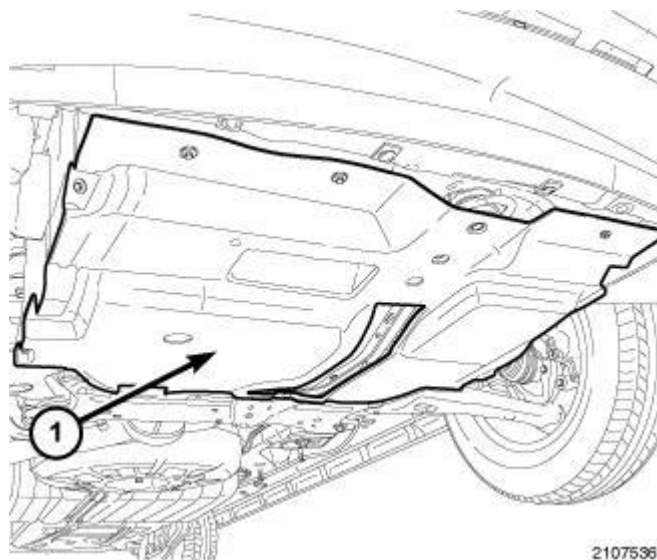


Fig. 364: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

14. Install the front fore and aft crossmember. Refer to **CROSSMEMBER, FRONT FORE AND AFT, INSTALLATION** .
15. If equipped, install the insulation around the oil pan.
16. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .
17. Fill engine with recommended oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
18. Connect the negative battery cable.
19. Start engine and check for leaks.
20. Install the underbody splash shield (1) and securely tighten fasteners.
21. Lower the vehicle.

PICK-UP, OIL PUMP

REMOVAL

REMOVAL

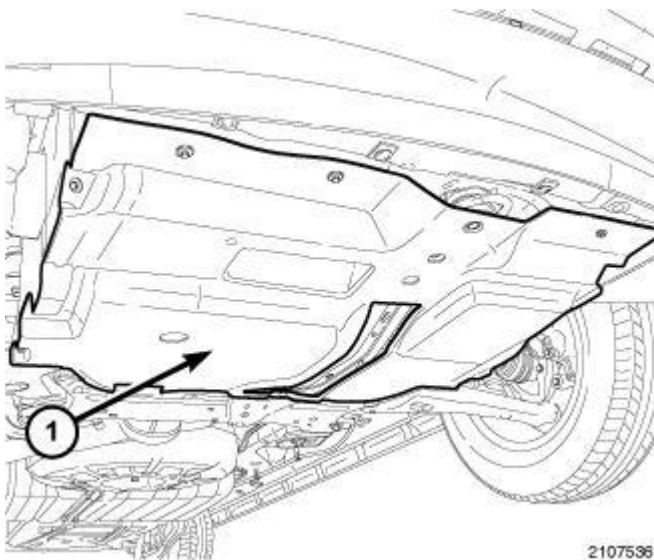


Fig. 365: Underbody Splash Shield

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Remove the underbody splash shield (1).
3. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .

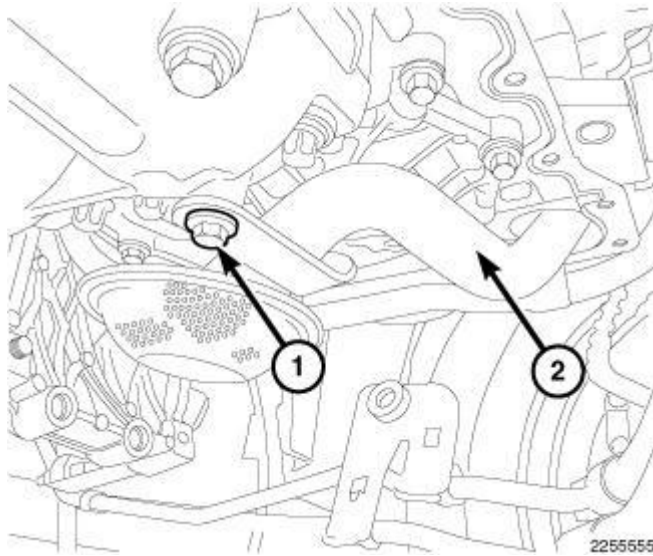


Fig. 366: Oil Pickup Tube With Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolt (1), and the oil pickup tube (2) from engine.
5. Discard O-rings seals.

INSTALLATION

INSTALLATION

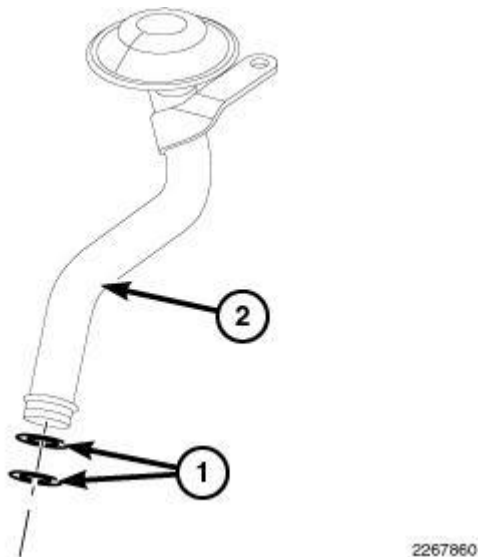


Fig. 367: Oil Pickup Tube & O-Rings
Courtesy of CHRYSLER GROUP, LLC

1. Using new O-rings, lubricate and install the 2 O-rings (1) on oil pickup tube (2).

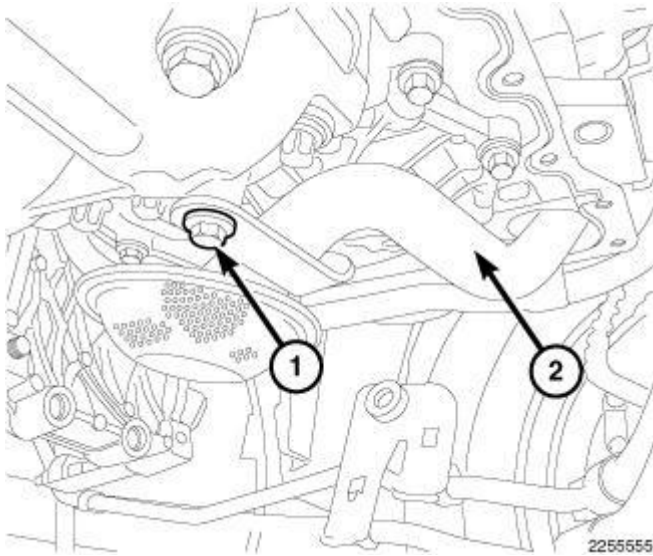


Fig. 368: Oil Pickup Tube With Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Install the oil pickup tube. Tighten bolt to 15 N.m (133 in. lbs.).
3. Install the oil pan. Refer to **PAN, OIL, INSTALLATION**.
4. Fill the engine with recommended oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.
5. Connect negative battery cable.
6. Start engine and check for leaks.

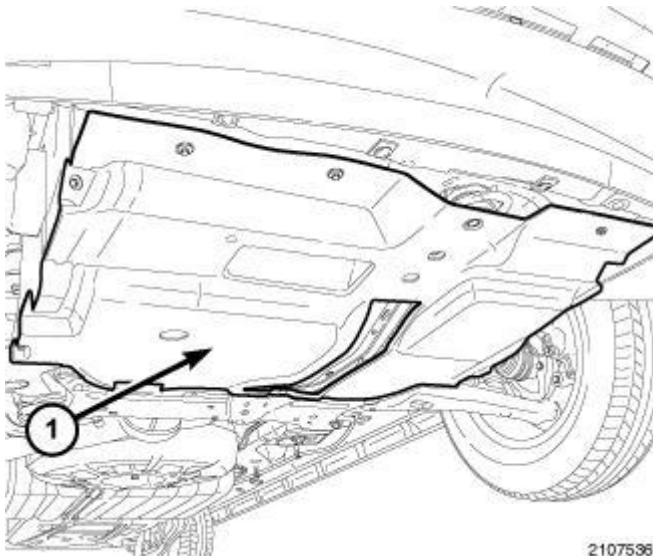


Fig. 369: Underbody Splash Shield
Courtesy of CHRYSLER GROUP, LLC

7. Install the underbody splash shield (1) and securely tighten fasteners.

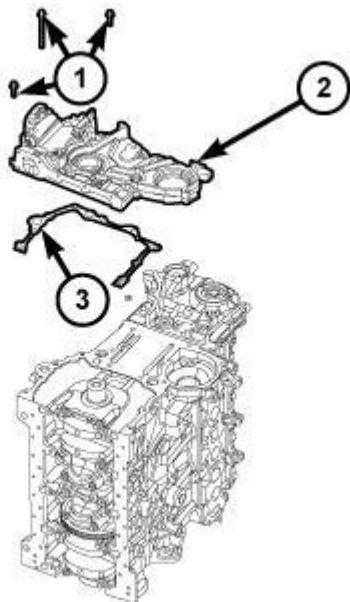
PUMP, ENGINE OIL**REMOVAL****REMOVAL**

Fig. 370: Front Cover, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The oil pump is not a serviceable component, it is part of the front cover. If diagnosis has directed you to replace the oil pump, then the front cover needs to be replaced.

1. Disconnect negative battery cable.
2. Remove the front cover. Refer to COVER, ENGINE, FRONT, REMOVAL.

INSTALLATION**INSTALLATION**

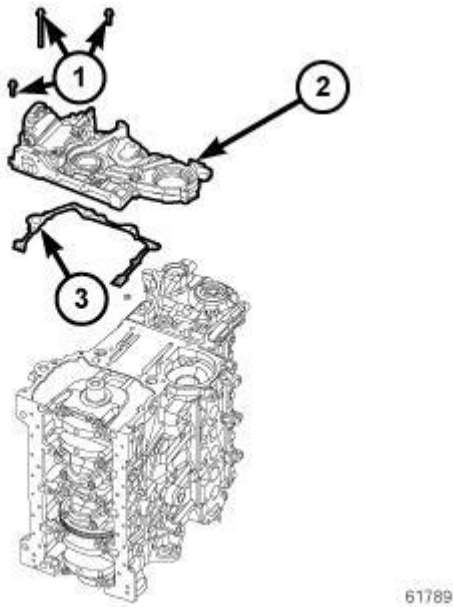


Fig. 371: Front Cover, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Clean the gasket mating surfaces. Refer to ENGINE GASKET SURFACE PREPARATION .
2. Lubricate oil pump rotor with engine oil.
3. Install front cover assembly (2). Refer to COVER, ENGINE, FRONT, INSTALLATION.

SENSOR, OIL PRESSURE

DESCRIPTION

DESCRIPTION

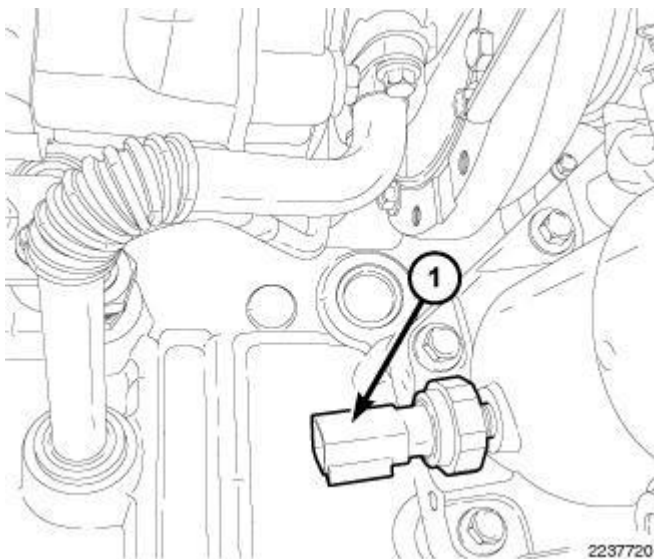


Fig. 372: Oil Pressure Switch
Courtesy of CHRYSLER GROUP, LLC

The oil pressure sending unit uses three circuits. They are:

- A signal circuit to the Powertrain Control Module (PCM).
- A sensor ground circuit through the PCM.
- A 5 volt. Reference circuit from the PCM.

The oil pressure sending unit returns a voltage signal back to the PCM relating oil pressure. Ground for the sensor is supplied by the PCM.

The oil pressure switch (1) is located on the left side of the oil filter housing. The switch screws into the engines main oil gallery.

REMOVAL

REMOVAL

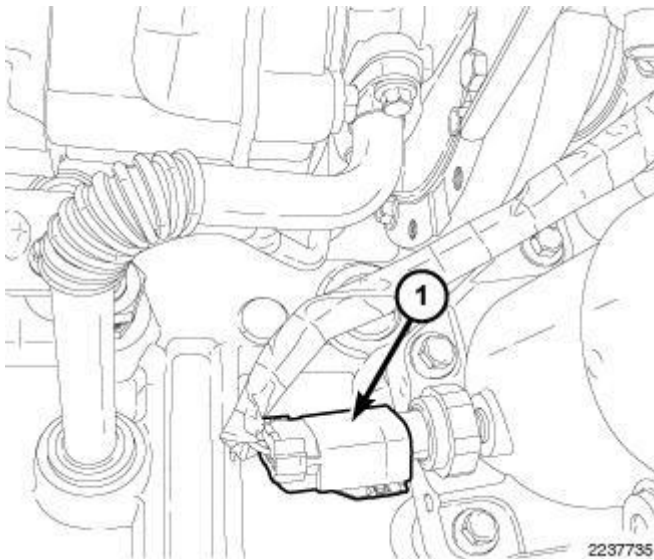


Fig. 373: Oil Pressure Switch Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the belly pan.
3. Disconnect the oil pressure sensor harness connector (1).

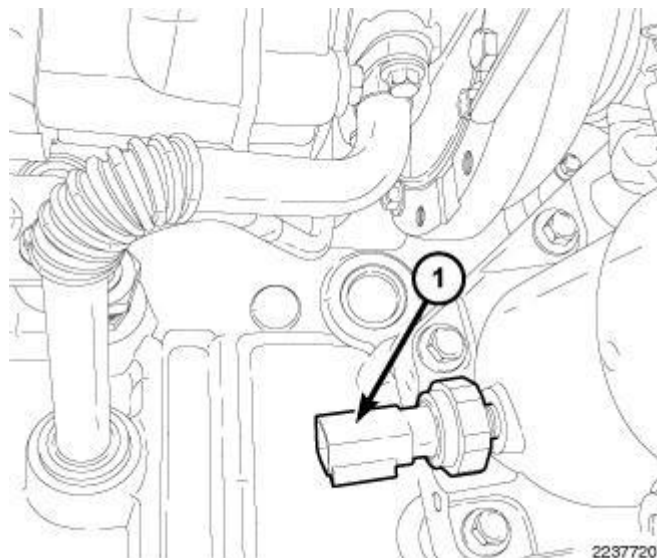


Fig. 374: Oil Pressure Switch
Courtesy of CHRYSLER GROUP, LLC

4. Remove the oil pressure sensor (1).

INSTALLATION

INSTALLATION

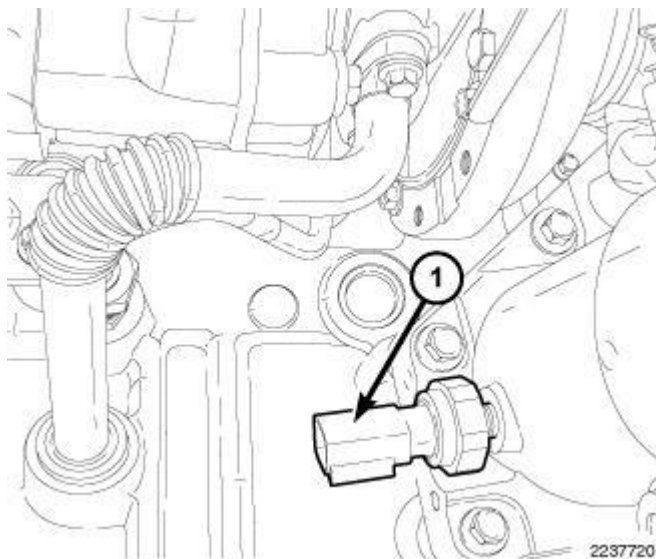


Fig. 375: Oil Pressure Switch
Courtesy of CHRYSLER GROUP, LLC

1. Install the oil pressure sensor. Tighten to 14 N.m (124 in. lbs.).

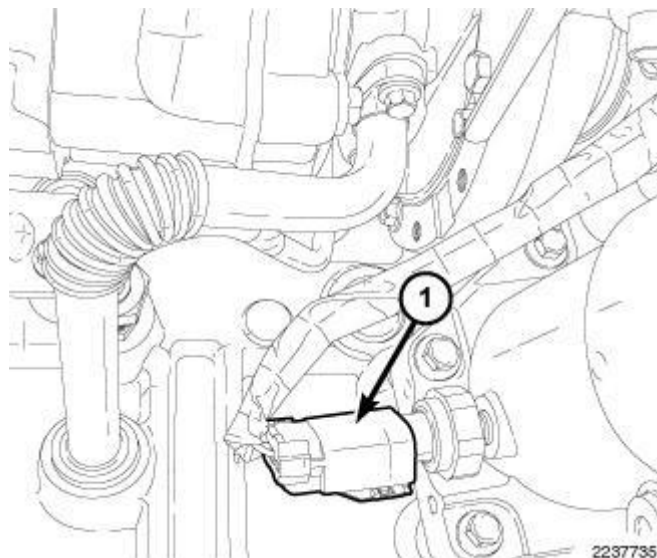


Fig. 376: Oil Pressure Switch Harness Connector
Courtesy of CHRYSLER GROUP, LLC

2. Connect the oil pressure sensor harness connector (1).
3. Install the belly pan.
4. Connect the negative battery cable.
5. Start engine and check for oil leaks.

SEPARATOR, OIL

REMOVAL

REMOVAL

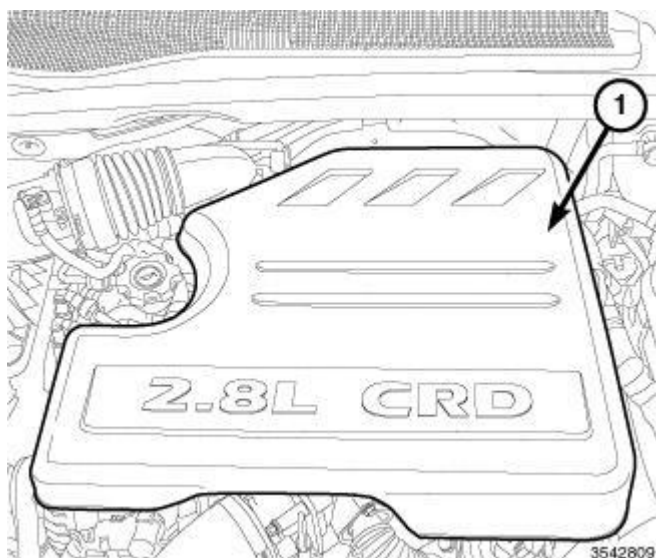


Fig. 377: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

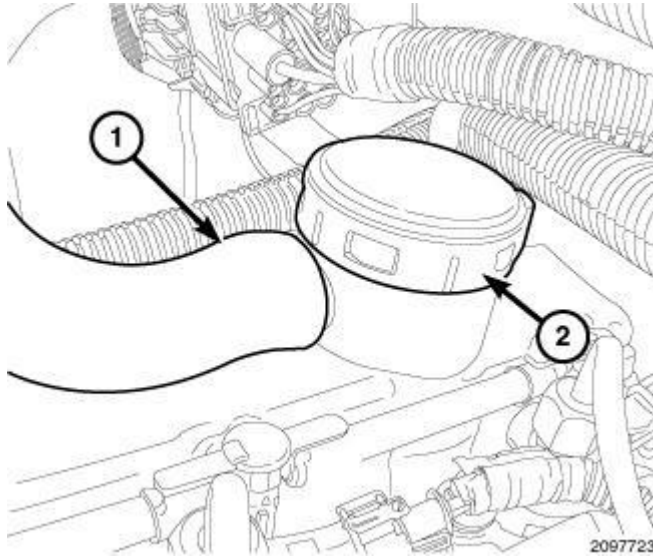


Fig. 378: Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

3. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .
4. Remove the oil separator cover (2).

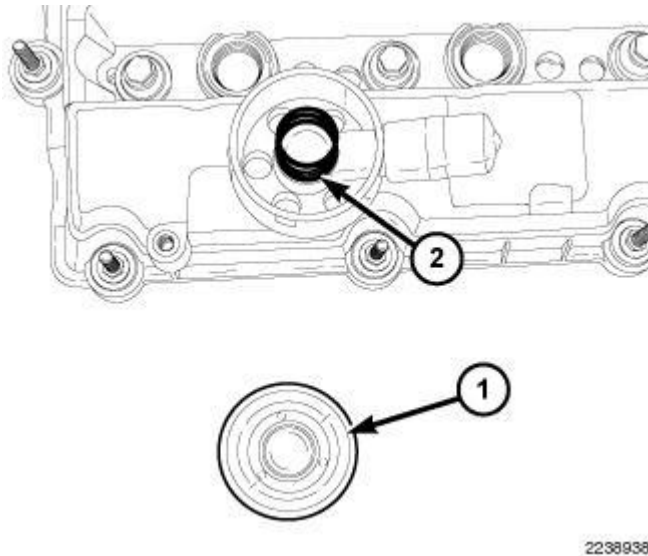
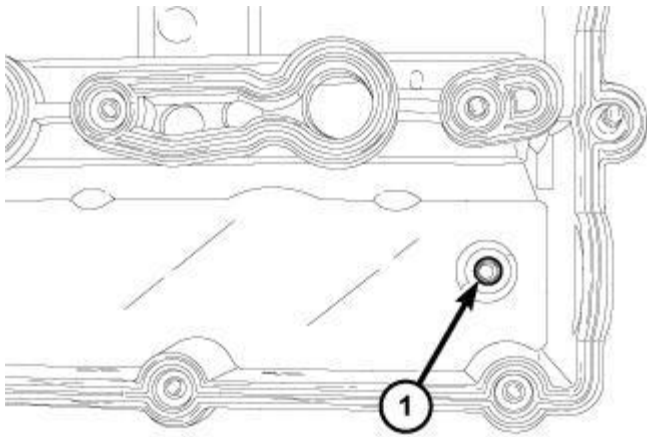


Fig. 379: Diaphragm & Diaphragm Spring
Courtesy of CHRYSLER GROUP, LLC

5. Remove diaphragm (1) and the diaphragm spring (2).

INSTALLATION

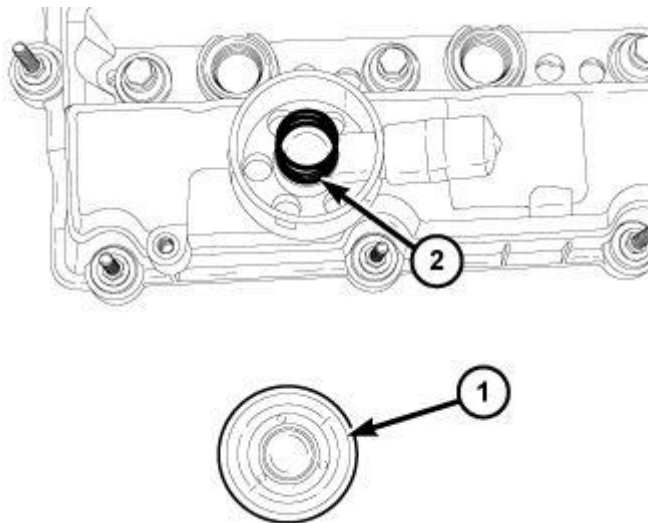
INSTALLATION



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Fig. 380: Oil Drain Back Access Hole
Courtesy of CHRYSLER GROUP, LLC

1. Inspect the oil drain back access hole (1) in the cylinder head cover to assure that it is free of obstruction.



2238938

Fig. 381: Diaphragm & Diaphragm Spring
Courtesy of CHRYSLER GROUP, LLC

2. Lubricate the oil separator O-rings with clean engine oil.
3. Install the diaphragm spring (2) and the diaphragm (1).

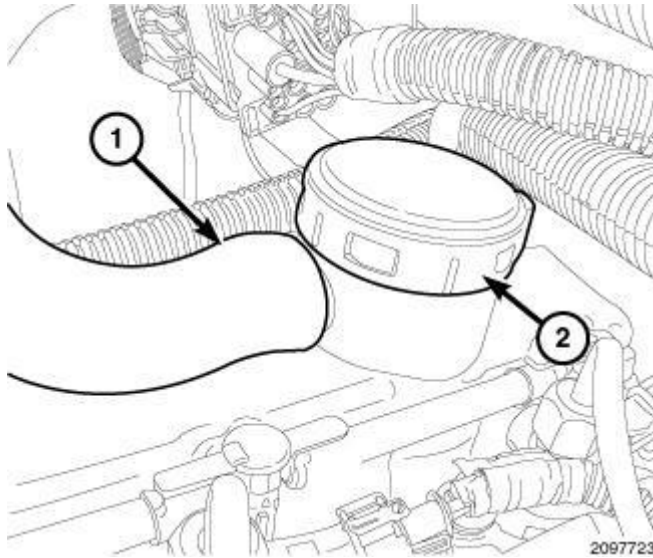


Fig. 382: Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

4. Carefully position and push down on the oil separator cover (2) to seat.
5. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .

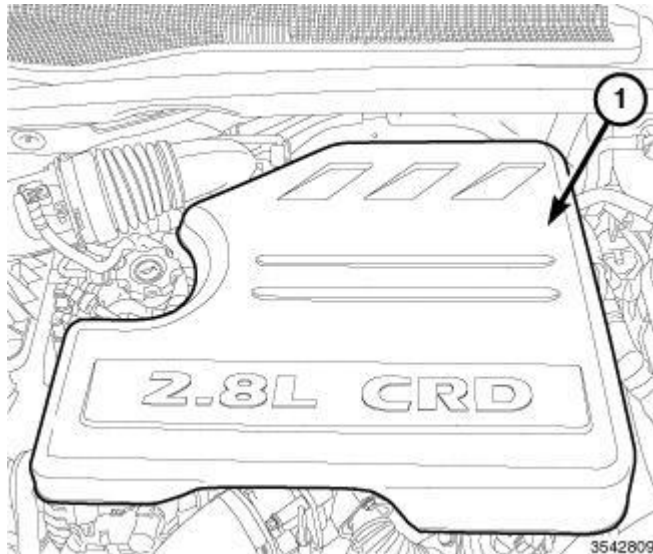


Fig. 383: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

6. Install the engine cover (1).
7. Connect the negative battery cable.

VALVE, OIL PRESSURE RELIEF

DESCRIPTION

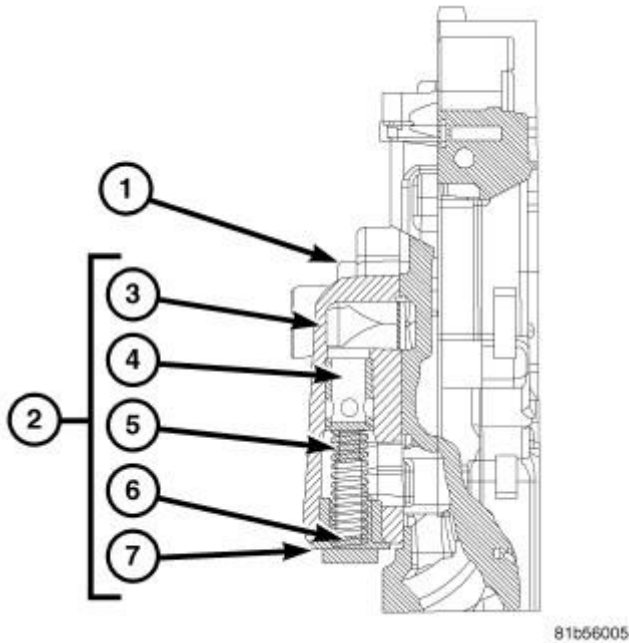
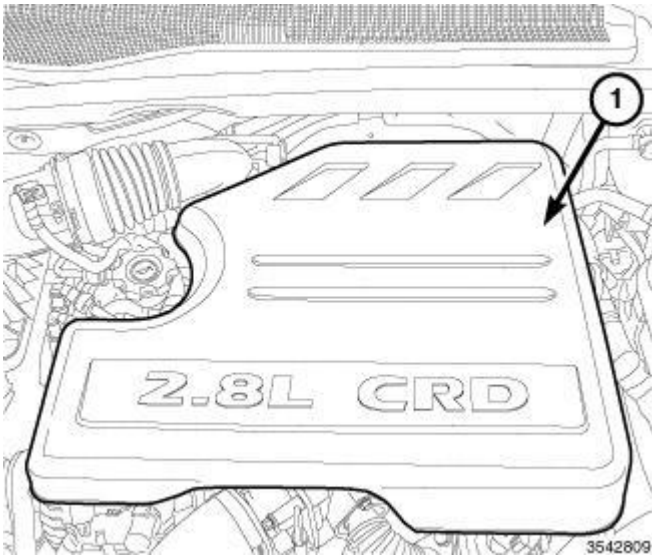
DESCRIPTION

Fig. 384: Oil Pressure Relief Valve Components
Courtesy of CHRYSLER GROUP, LLC

The oil pressure relief valve is built into the front cover (1). The oil pressure relief valve assembly (2) consists of several components. The plunger (4) is held in place by the spring (5). The plug (6) keeps the plug and spring in place, and the o-ring (7) prevents oil from leaking past the plug (6).

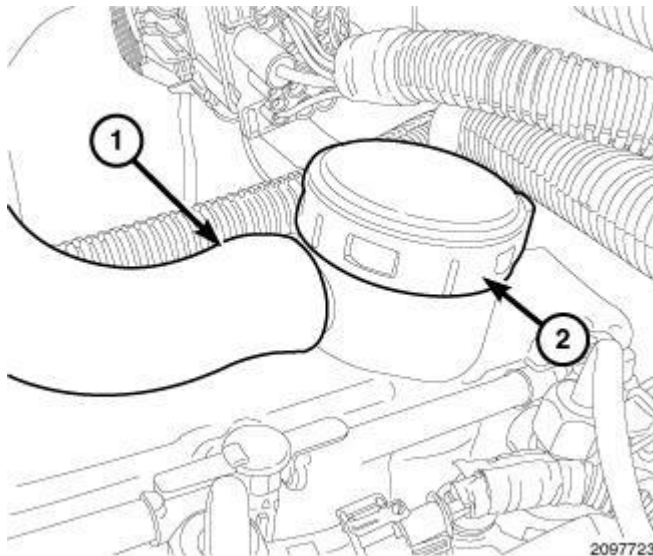
In the case of excessively high oil pressure, the oil pressure on the piston (4) overcomes the spring (5) pressure and the piston is forced off its seat. When the piston is forced off its seat, a drain back passage is opened and the excess oil pressure is vented back into the crankcase.

MANIFOLDS**MANIFOLD, EXHAUST****REMOVAL****REMOVAL**

**Fig. 385: Engine Cover**

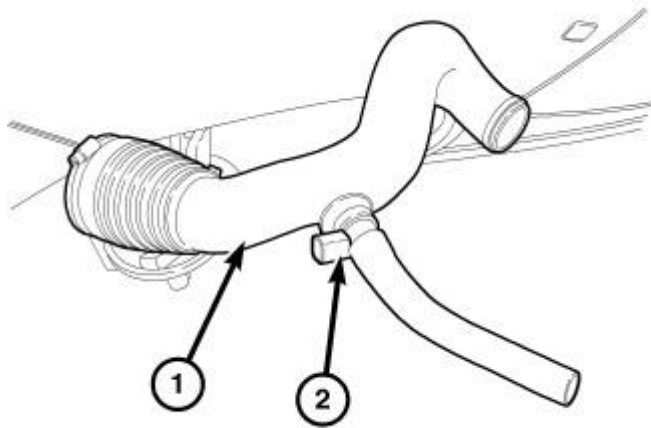
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

**Fig. 386: Crankcase Vent Hose & Oil Separator**

Courtesy of CHRYSLER GROUP, LLC

3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL**.
4. Disconnect the crankcase vent hose (1) from the oil separator (2).



81d66e9b

Fig. 387: Turbocharger Air Inlet Tube & Crankcase Vent Hose Heater Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the crankcase vent hose heater electrical connector (2).
6. Remove the turbocharger air inlet tube (1) from turbocharger.

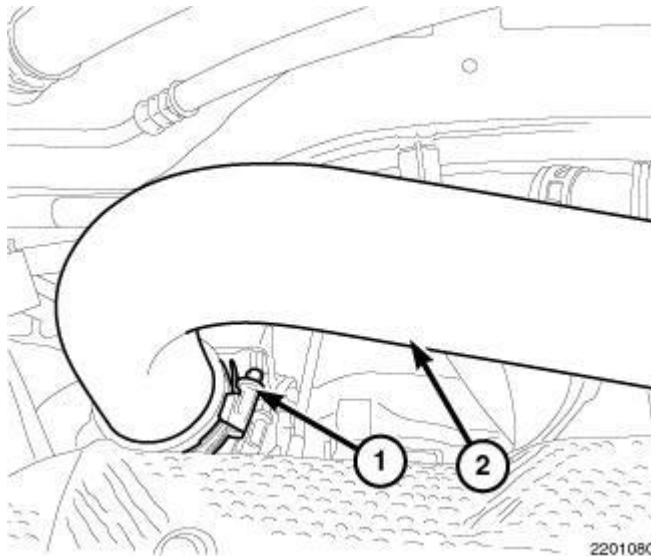


Fig. 388: Charge Air Cooler Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

7. Loosen clamp (1) and disconnect the charge air cooler inlet hose (2) from turbocharger.

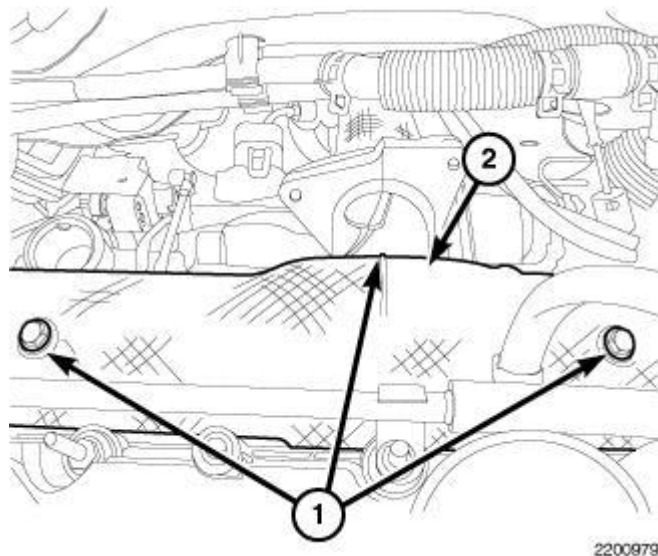


Fig. 389: Exhaust Manifold Heat Shield Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Remove the three bolts (1) and the exhaust manifold heat shield (2).
9. Remove the belly pan.
10. Remove the right front inner splash shield.

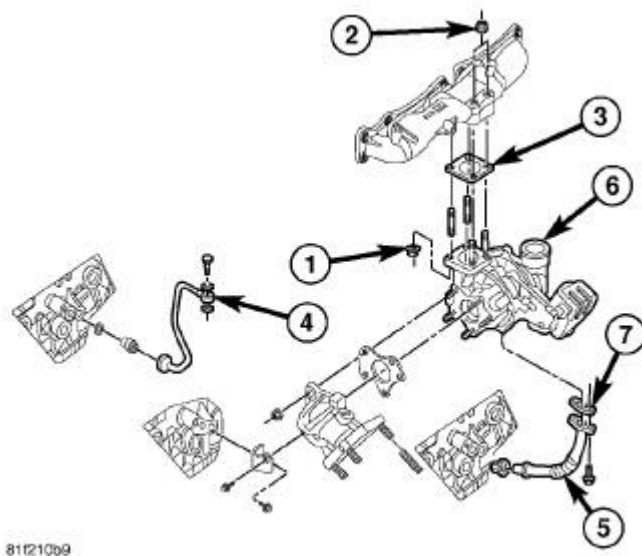
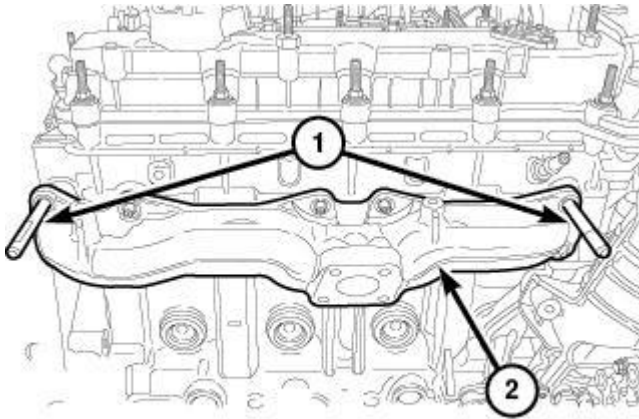


Fig. 390: Turbocharger Assembly & Fasteners
Courtesy of CHRYSLER GROUP, LLC

11. Remove the turbocharger (6). Refer to **TURBOCHARGER, REMOVAL.**
12. Remove nuts and the exhaust manifold.

INSTALLATION

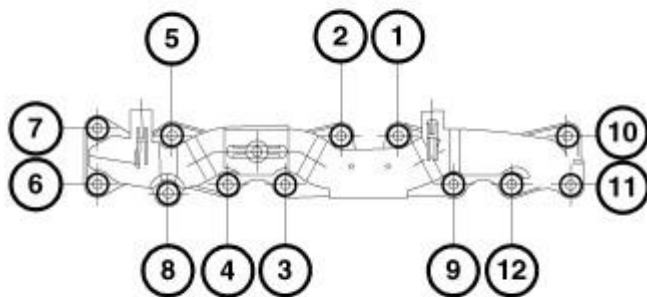
INSTALLATION



3078739

Fig. 391: Exhaust Manifold Alignment Tools & Exhaust Manifold
Courtesy of CHRYSLER GROUP, LLC

1. Clean the exhaust manifold and cylinder head surfaces.
2. Install a new exhaust manifold gasket.
3. Install the (special tool #VM.10334, Tool, Exhaust Manifold Alignment) (1) onto studs.
4. Install the exhaust manifold (2) and tighten nuts finger tight.
5. Remove the (special tool #VM.10334, Tool, Exhaust Manifold Alignment) (1). Install and tighten nuts finger tight.



81ad7d48

Fig. 392: Exhaust Manifold Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

6. Using the sequence shown in illustration, tighten nuts to 36 N.m (27 ft. lbs.).
7. Repeat the tightening procedure at the same torque.

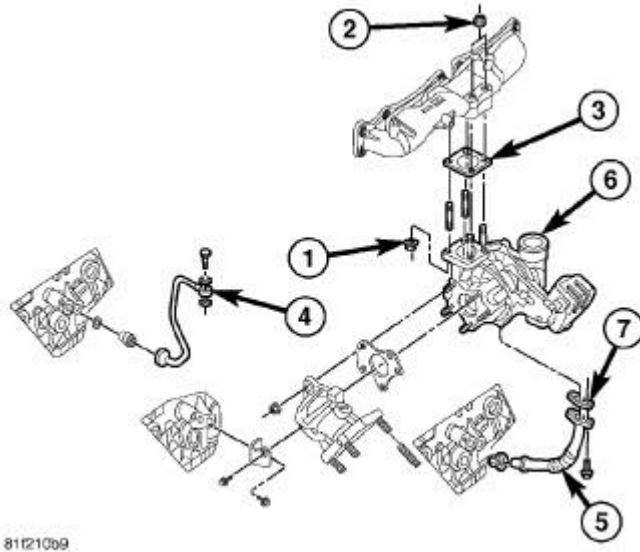


Fig. 393: Turbocharger Assembly & Fasteners
Courtesy of CHRYSLER GROUP, LLC

8. Install the turbocharger (6). Refer to **TURBOCHARGER, INSTALLATION.**

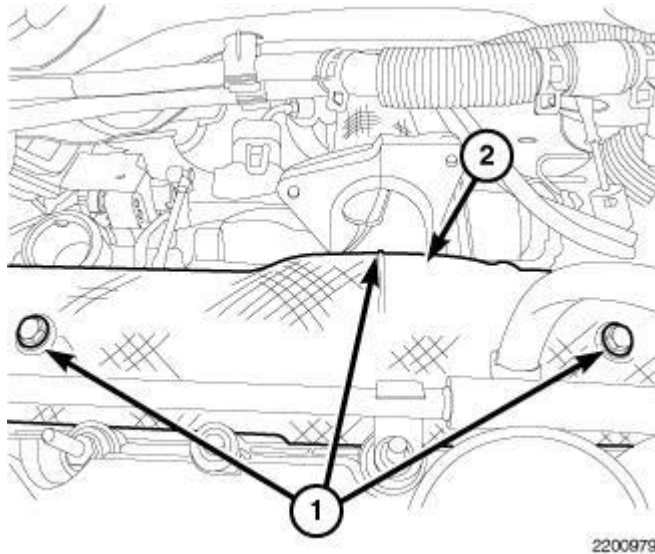


Fig. 394: Exhaust Manifold Heat Shield Bolts
Courtesy of CHRYSLER GROUP, LLC

9. Install the right front inner splash shield.
10. Install the belly pan.
11. Install the exhaust manifold heat shield (2). Tighten bolts to 33 N.m (24 ft. lbs.).

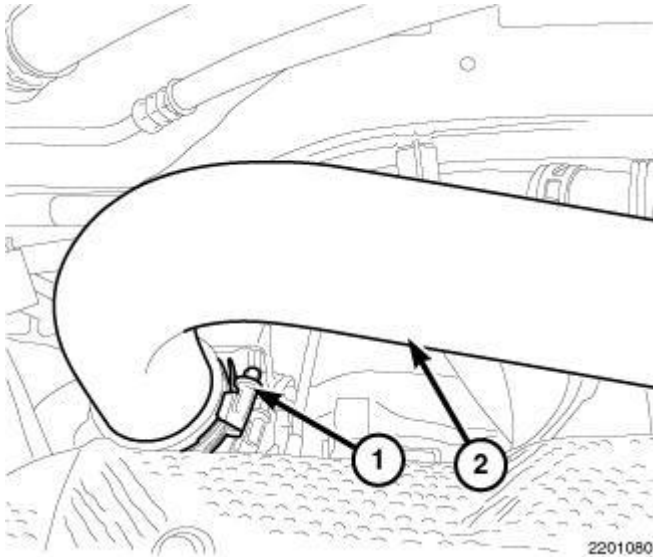


Fig. 395: Charge Air Cooler Inlet Hose & Clamp
 Courtesy of CHRYSLER GROUP, LLC

12. Connect the charge air cooler inlet hose (2) to the turbocharger and tighten clamp (1).

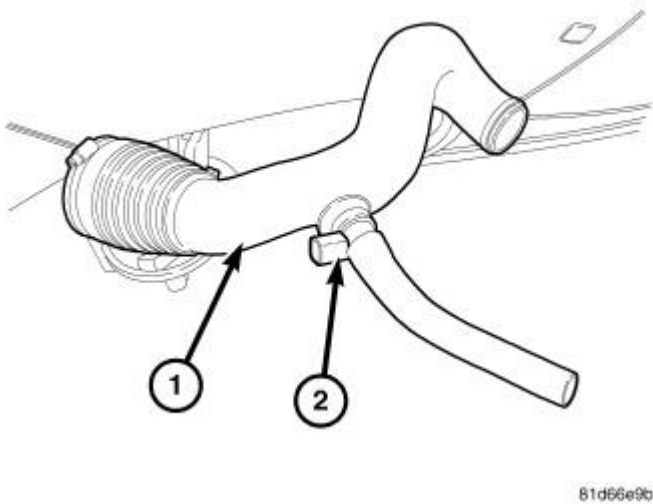


Fig. 396: Turbocharger Air Inlet Tube & Crankcase Vent Hose Heater Electrical Connector
 Courtesy of CHRYSLER GROUP, LLC

13. Install the air inlet tube to the turbocharger.
14. Connect the crankcase vent hose heater electrical connector (2).

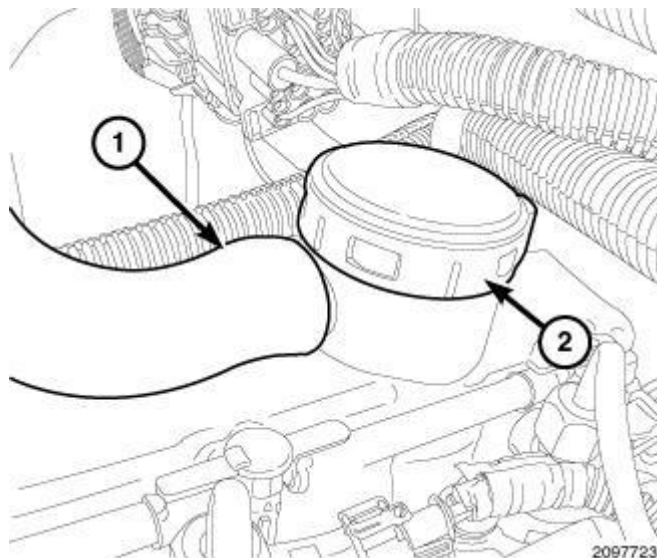


Fig. 397: Crankcase Vent Hose & Oil Separator
Courtesy of CHRYSLER GROUP, LLC

15. Connect the crankcase vent hose (1) to the oil separator (2).
16. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .

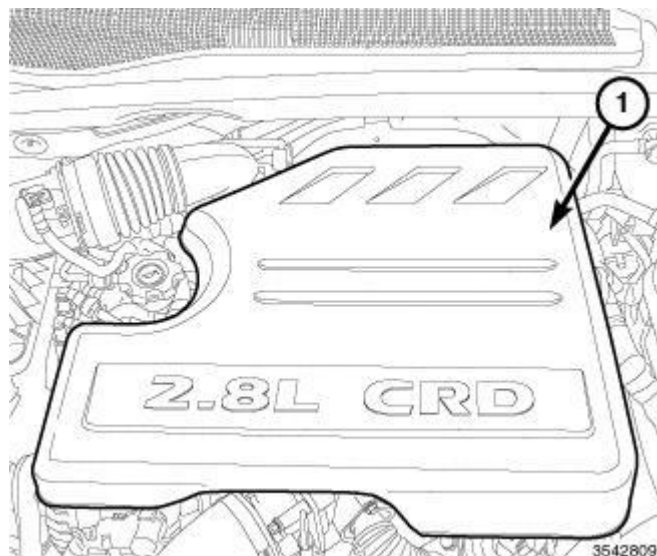
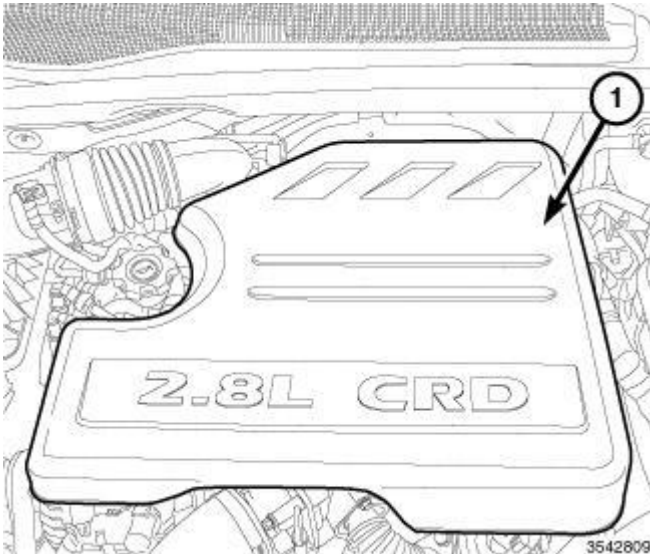


Fig. 398: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

17. Install the engine cover (1).
18. Connect the negative battery cable.

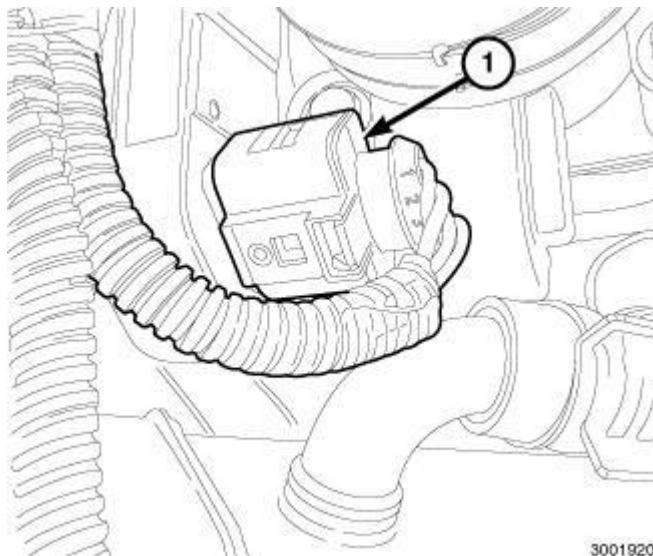
MANIFOLD, INTAKE

REMOVAL

REMOVAL**Fig. 399: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Remove the EGR cooler. Refer to **COOLER, EGR, DIESEL, REMOVAL** .

**Fig. 400: EGR Air Flow Control Valve Connector**

Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the EGR air flow control valve wire harness connector (2).

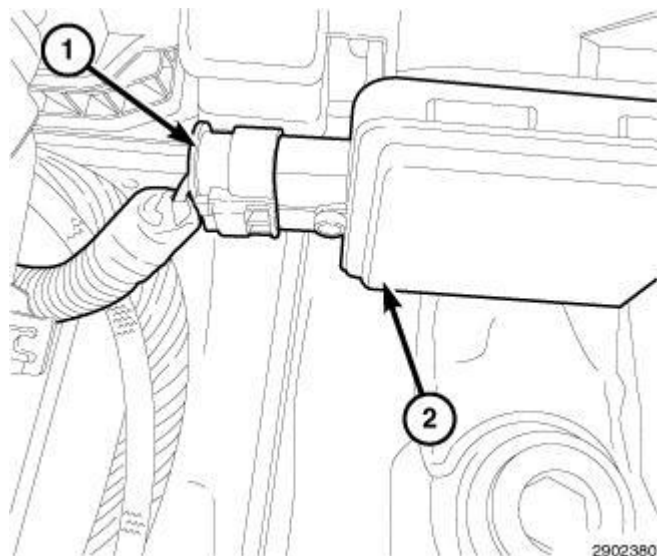


Fig. 401: Tuning Valve Harness Connector
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the tuning valve wire harness connector (1).

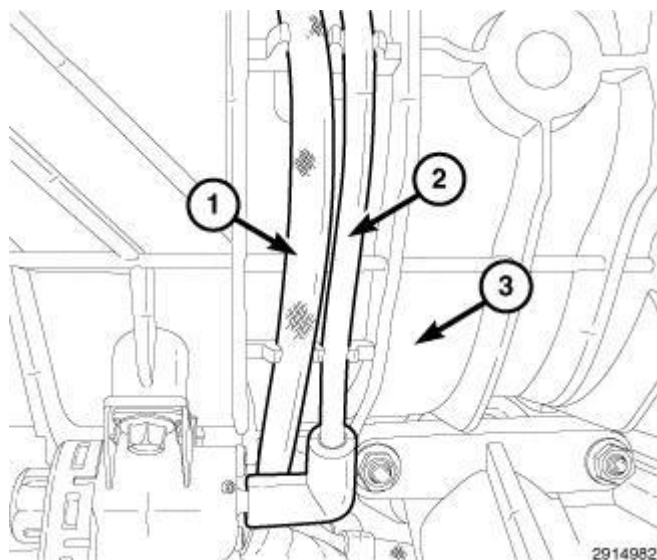


Fig. 402: Fuel Injector Return Line, Vacuum Line & Intake Manifold
Courtesy of CHRYSLER GROUP, LLC

6. Disconnect the fuel injector return line (1) to the intake manifold (3).
7. Disconnect the vacuum line (2) to the vacuum solenoid and intake manifold (3).

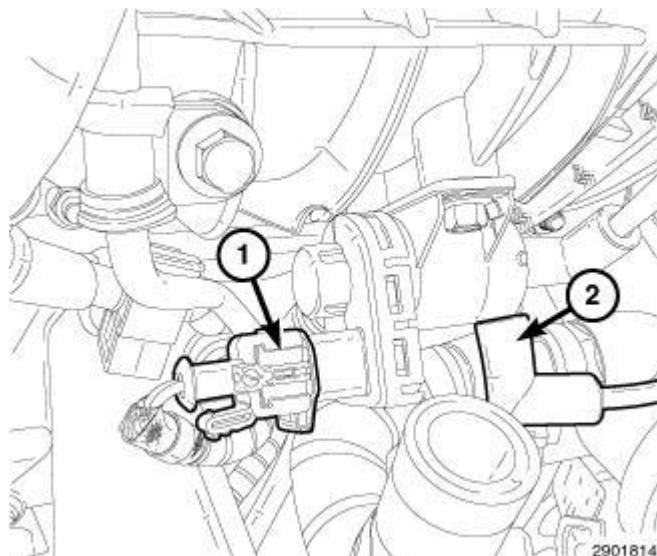


Fig. 403: Vacuum Solenoid Harness Connector
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the vacuum solenoid harness connector (1).

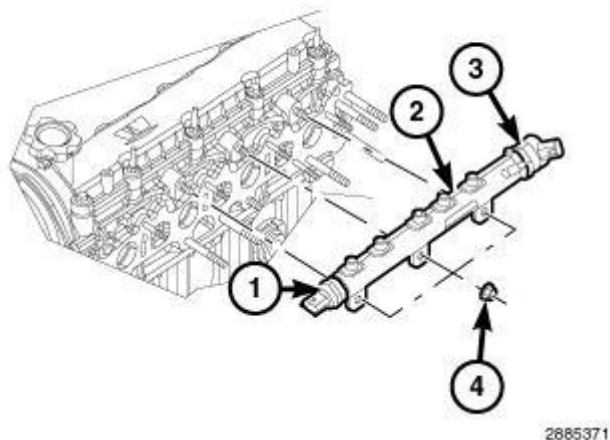


Fig. 404: High Pressure Fuel Line
Courtesy of CHRYSLER GROUP, LLC

9. Remove the fuel rail (2). Refer to **RAIL, FUEL, REMOVAL** .

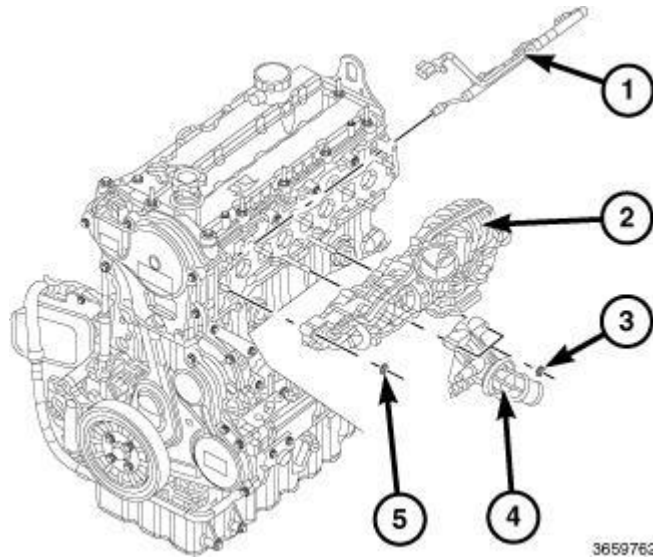


Fig. 405: Glow Plug Harness, Intake Manifold, Thermostat Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect and position aside the glow plug harness (1).
11. Remove nuts (3) and the thermostat housing (4).
12. Remove nuts (4) and the intake manifold (2).

INSTALLATION

INSTALLATION

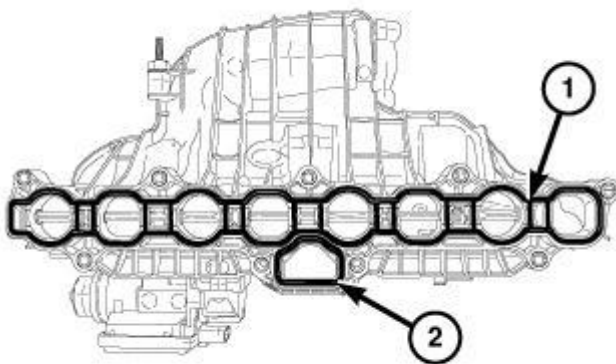


Fig. 406: Intake Manifold Gasket & Water Jacket Gasket
Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect the gasket surface area of the intake manifold and the cylinder head.
2. Install the intake manifold gasket (1) and water jacket gasket (2).

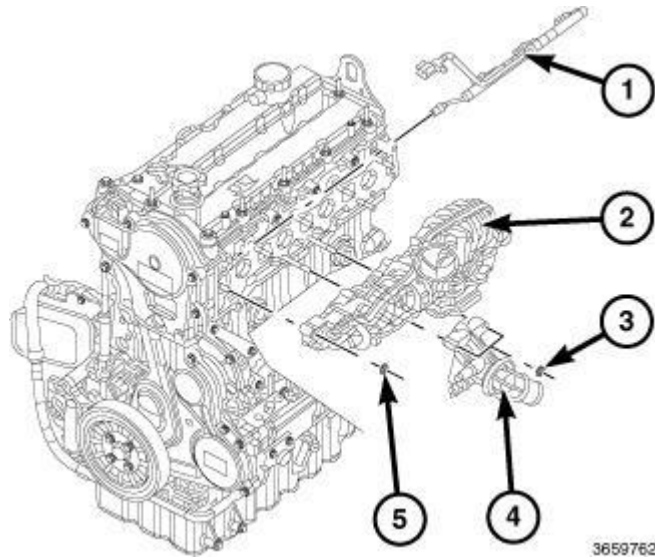


Fig. 407: Glow Plug Harness, Intake Manifold, Thermostat Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Install the intake manifold (2) and tighten nuts (5) finger tight.
4. Install the thermostat housing (4) and tighten nuts (3) finger tight.
5. Reposition glow plug harness (1) and connect the glow plug connectors.

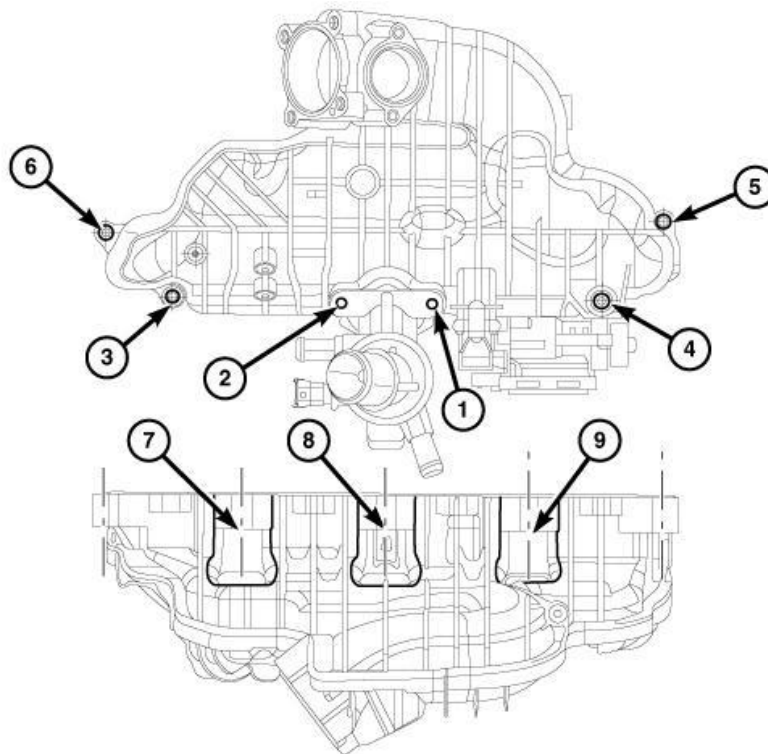


Fig. 408: Intake Manifold Retaining Nuts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

6. Using the tightening sequence shown in illustration, tighten nuts 5, 1, 2, 6 to 5 N.m (44 in. lbs.).
7. Using the tightening sequence shown in illustration, tighten nuts 1 through 9 to 12 N.m (106 in. lbs.).

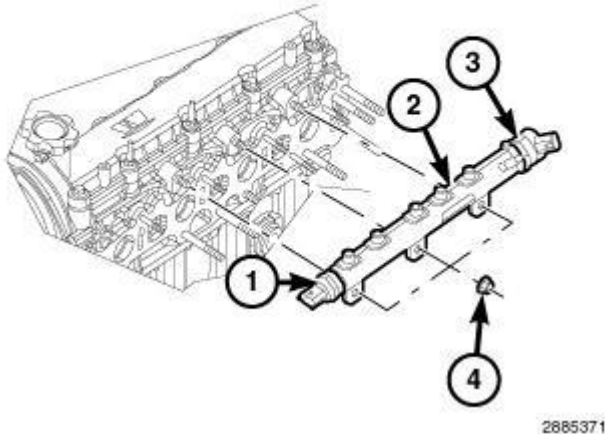


Fig. 409: High Pressure Fuel Line
Courtesy of CHRYSLER GROUP, LLC

8. Install the fuel rail (2). Refer to **RAIL, FUEL, INSTALLATION** .

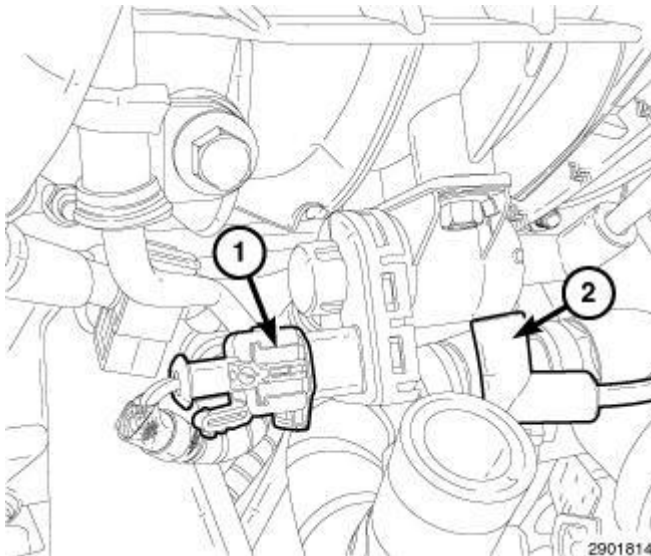


Fig. 410: Vacuum Solenoid Harness Connector
Courtesy of CHRYSLER GROUP, LLC

9. Connect the vacuum solenoid harness connector (1).

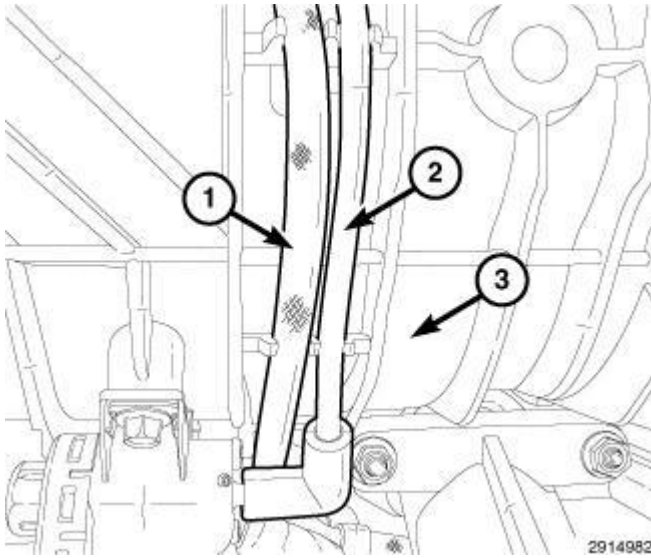


Fig. 411: Fuel Injector Return Line, Vacuum Line & Intake Manifold
Courtesy of CHRYSLER GROUP, LLC

10. Connect the vacuum line (2) to the vacuum solenoid and intake manifold (3).
11. Connect the fuel injector return line (1) to the intake manifold (3).

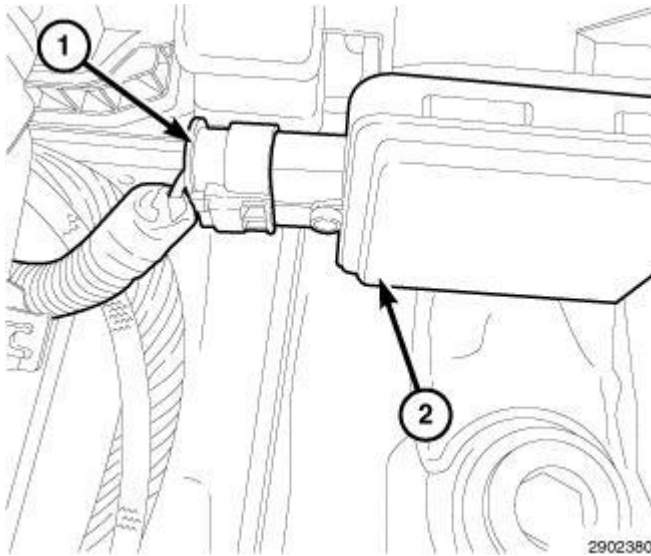


Fig. 412: Tuning Valve Harness Connector
Courtesy of CHRYSLER GROUP, LLC

12. Connect the tuning valve wire harness connector (1).

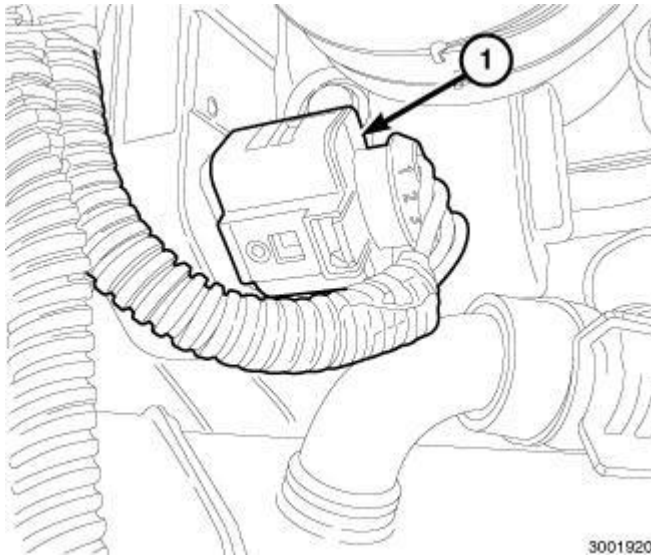


Fig. 413: EGR Air Flow Control Valve Connector
Courtesy of CHRYSLER GROUP, LLC

13. Connect the EGR air flow control valve harness connector (1).

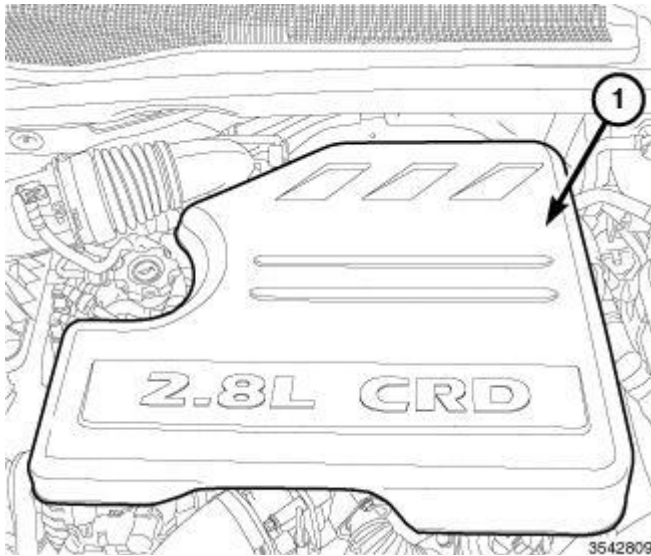
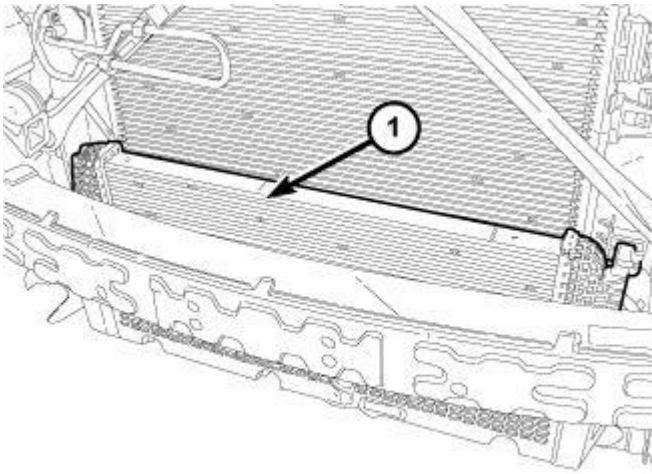


Fig. 414: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

14. Install the EGR cooler. Refer to **COOLER, EGR, DIESEL, INSTALLATION**.
15. Connect the negative battery cable.
16. Install the engine cover (1).

TURBOCHARGER SYSTEM

COOLER AND HOSES, CHARGE AIR

REMOVAL**REMOVAL**

2721196

Fig. 415: Charge Air Cooler

Courtesy of CHRYSLER GROUP, LLC

WARNING: If the engine was just turned off, the air intake system tubes may be hot.

NOTE: When servicing the Air Charge Cooler and/or Turbocharger, the Air Charger Hose (orange) seal located between the Air Charge Hose and Turbocharger must be replaced.

NOTE: Note the location of the rubber charge air cooler to A/C condenser and air charger cooler to radiator air seals. The seals are use to prevent overheating and improve charge air and A/C efficiency.

1. To remove the charge air cleaner (1). Refer to the radiator removal procedure. Refer to **RADIATOR, ENGINE COOLING, REMOVAL** .

INSTALLATION**INSTALLATION**

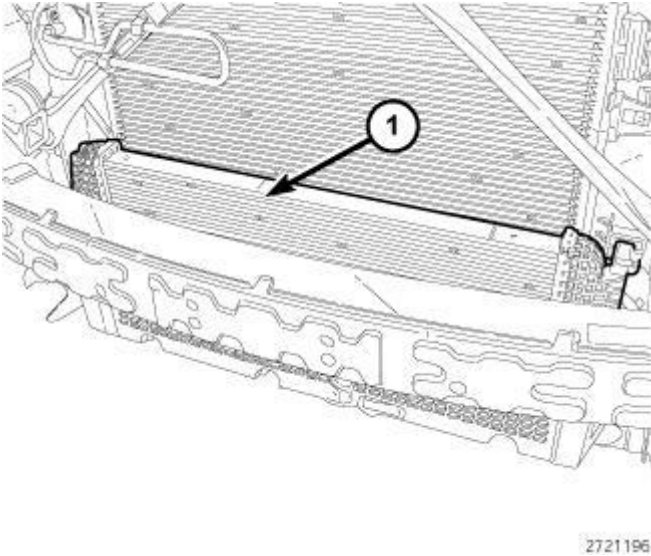


Fig. 416: Charge Air Cooler
Courtesy of CHRYSLER GROUP, LLC

NOTE: When servicing the Air Charge Cooler and/or Turbocharger, the Air Charger Hose (orange) seal located between the Air Charge Hose and Turbocharger must be replaced.

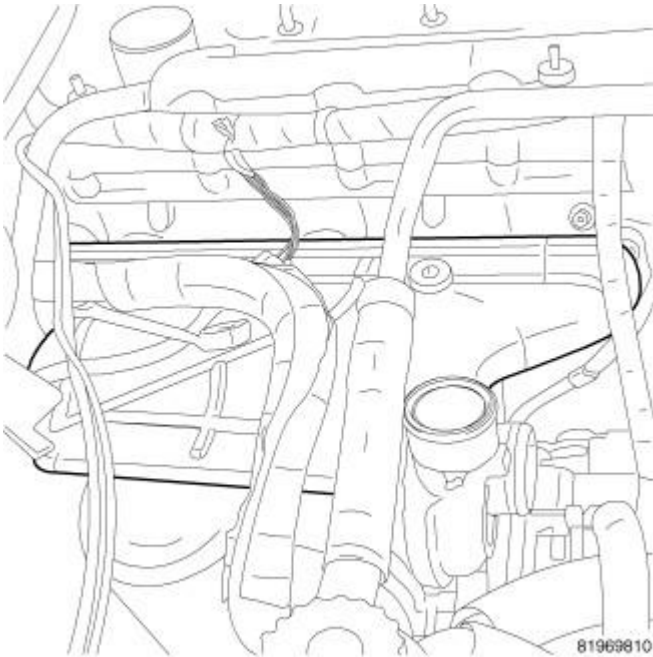
NOTE: Care must be taken not to damage the charge air cooler fins and the fins of other ancillary cooler components.

1. To install the charge air cooler (1). Refer to the radiator installation procedure. Refer to **RADIATOR, ENGINE COOLING, INSTALLATION** .

TURBOCHARGER

REMOVAL

REMOVAL

**Fig. 417: Heat Shield**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover.
3. Disconnect the inlet air pressure sensor wiring harness connector and disconnect the air outlet duct from the turbocharger.
4. Remove air inlet tube from turbocharger.
5. Remove the exhaust manifold heat shield. Refer to **MANIFOLD, EXHAUST, REMOVAL**.

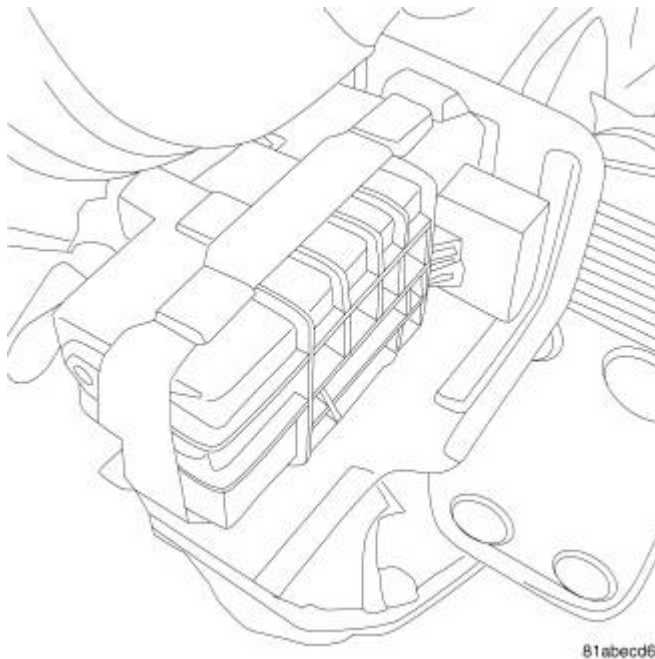


Fig. 418: Boost Pressure Solenoid Harness Connector
Courtesy of CHRYSLER GROUP, LLC

6. Disconnect the boost pressure solenoid harness connector.

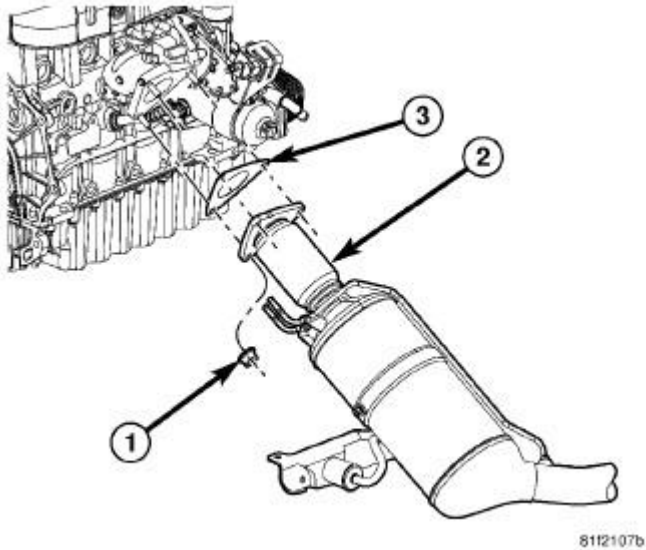


Fig. 419: Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF) & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Remove the fasteners (1) from the upstream side of the diesel particulate filter (2).

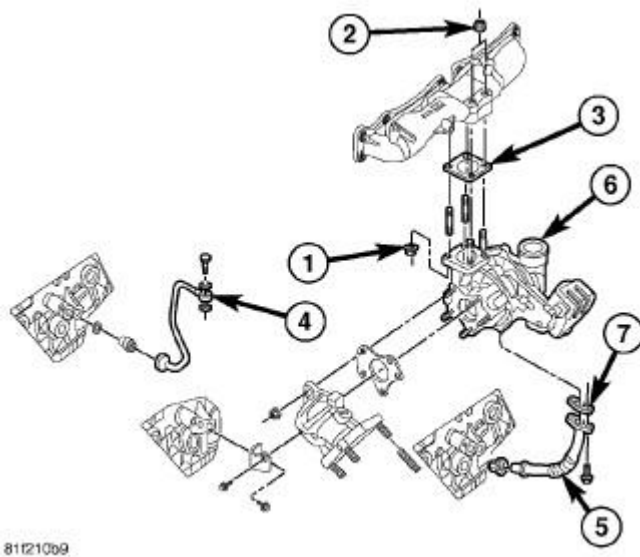
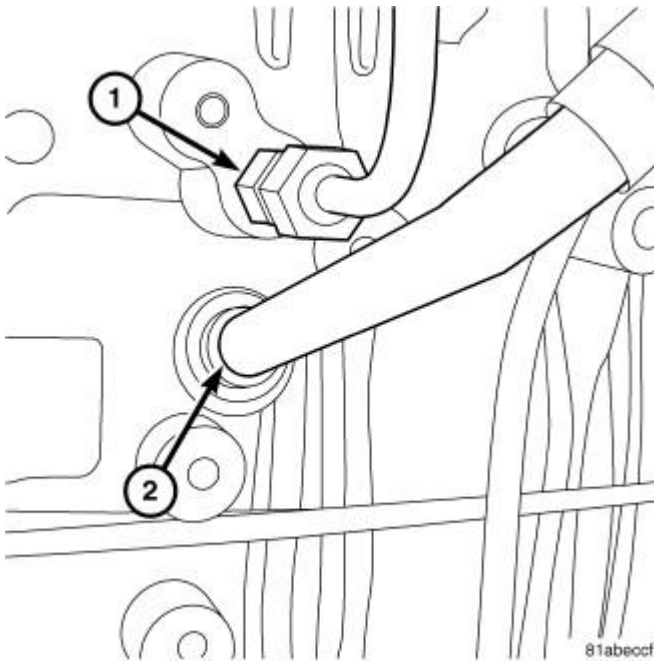


Fig. 420: Turbocharger Assembly & Fasteners
Courtesy of CHRYSLER GROUP, LLC

8. Remove the bolts from the turbocharger to engine bracket.

9. Remove the engine oil cooler.
10. Remove the turbocharger oil lines (4 and 5).
11. Remove the turbocharger to exhaust manifold fasteners (1 and 2).
12. Remove the turbocharger (6).
13. If damaged, remove the oil line fitting from cylinder block.

INSTALLATION**INSTALLATION****Fig. 421: Turbocharger Oil Lines****Courtesy of CHRYSLER GROUP, LLC**

1. If removed, install oil line fitting (1). Tighten to 54 N.m (39 ft. lbs.).

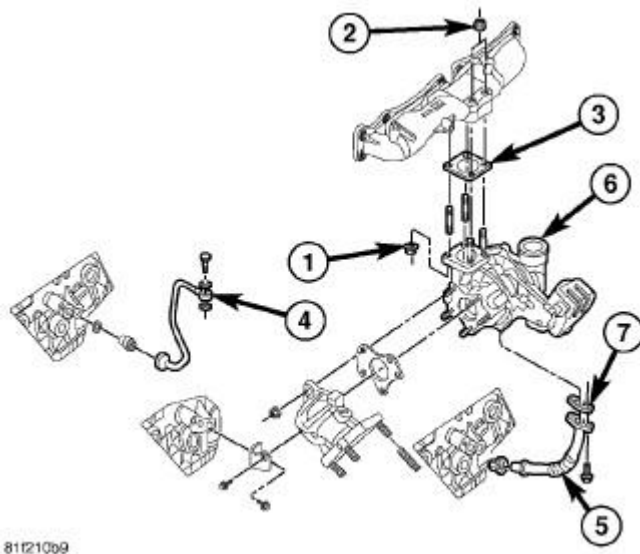


Fig. 422: Turbocharger Assembly & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Position turbocharger (6) to exhaust manifold with new gasket (3). Tighten retaining nuts (1) and (2) to 32 N.m (24 ft. lbs.).
3. Using a new gasket (7), Install the oil return line (5). Tighten bolts to 15 N.m (133 in. lbs.).
4. Using new sealing washers, install the turbocharger oil feed line (4). Tighten bolt :
 - Banjo bolt to 32 N.m (24 ft. lbs.).
 - Union nut to 32 N.m (24 ft. lbs.).

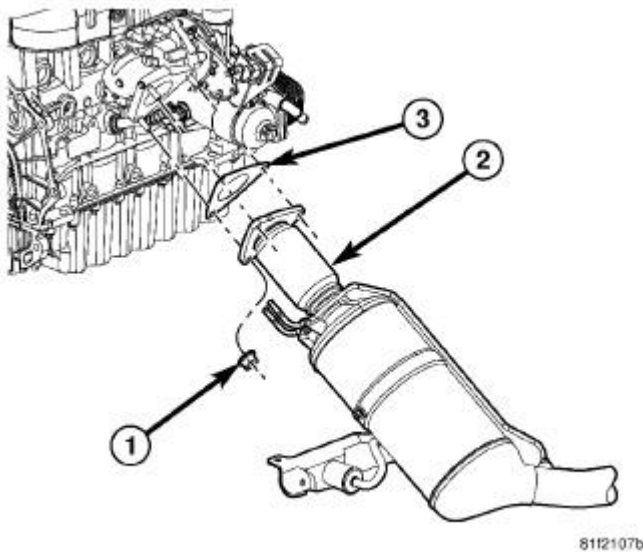


Fig. 423: Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF) & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Install the engine oil cooler.
6. Install the diesel particulate filter fasteners (1). Tighten to 34 N.m (25 ft. lbs.).

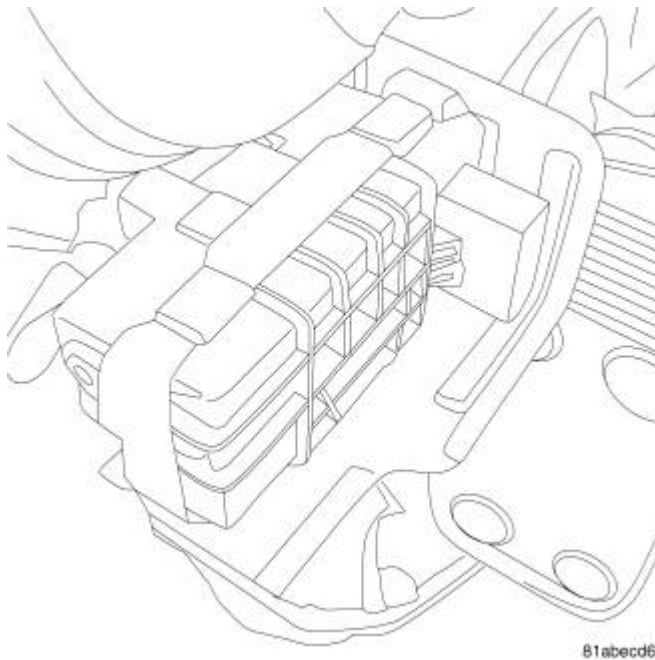


Fig. 424: Boost Pressure Solenoid Harness Connector
Courtesy of CHRYSLER GROUP, LLC

7. Connect the boost pressure solenoid harness connector.

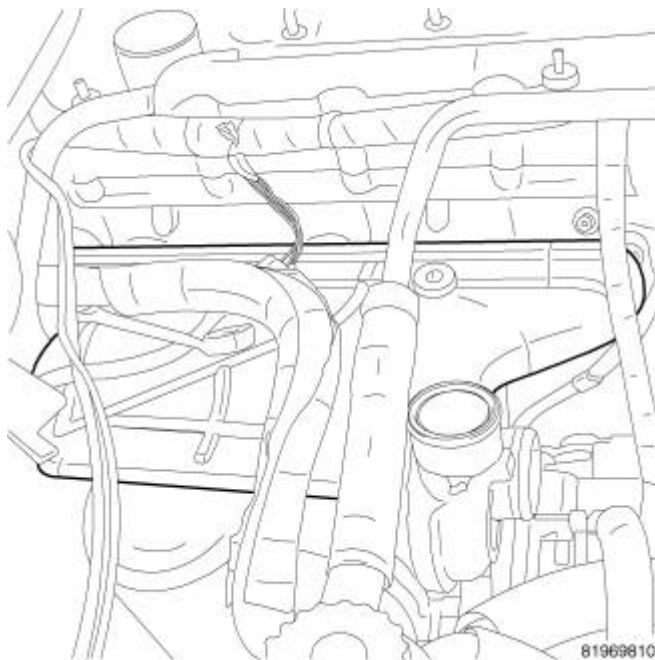


Fig. 425: Exhaust Manifold Heat Shield
Courtesy of CHRYSLER GROUP, LLC

8. Install the exhaust manifold heat shield. Refer to **MANIFOLD, EXHAUST, INSTALLATION**.
9. Install the inlet air tube from the turbocharger.
10. Install the engine cover.

VALVE TIMING

STANDARD PROCEDURE

CAMSHAFT TIMING PROCEDURE

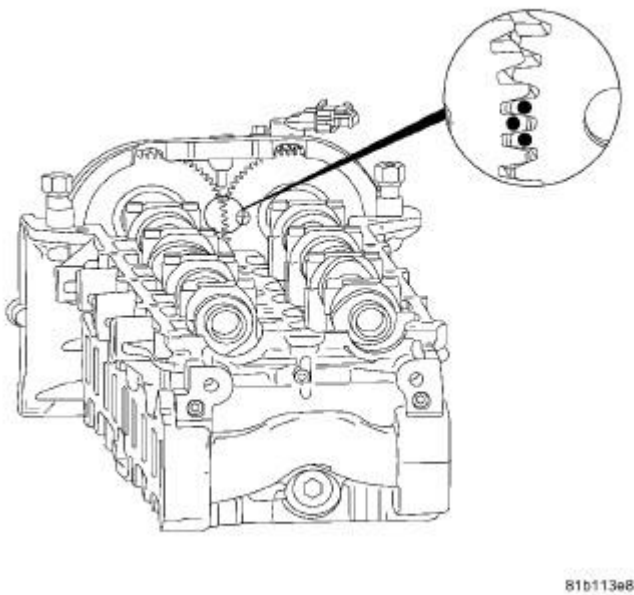


Fig. 426: Camshaft Timing Dots
Courtesy of CHRYSLER GROUP, LLC

NOTE: In order to validate camshaft timing, the cylinder head cover and timing belt should already have been removed.

1. Line up the camshaft dots.

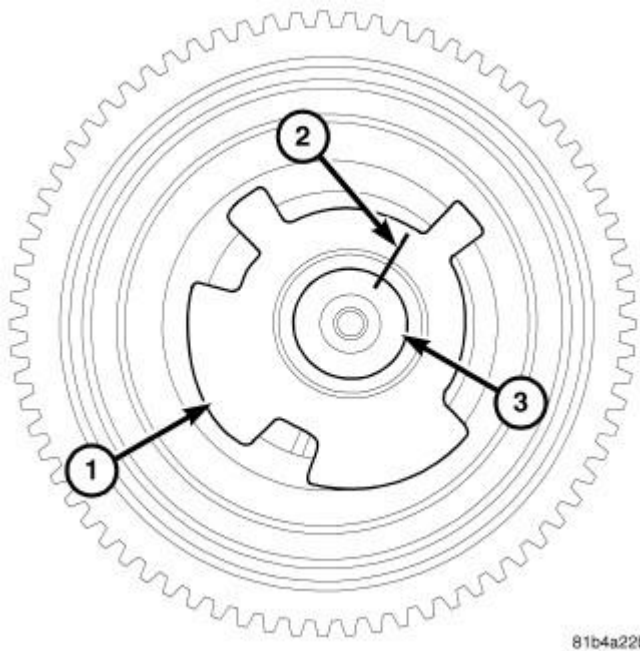


Fig. 427: Marking CMP Sensor Reluctor Wheel & Exhaust Camshaft
Courtesy of CHRYSLER GROUP, LLC

2. Mark the camshaft tone wheel with a paint marker.

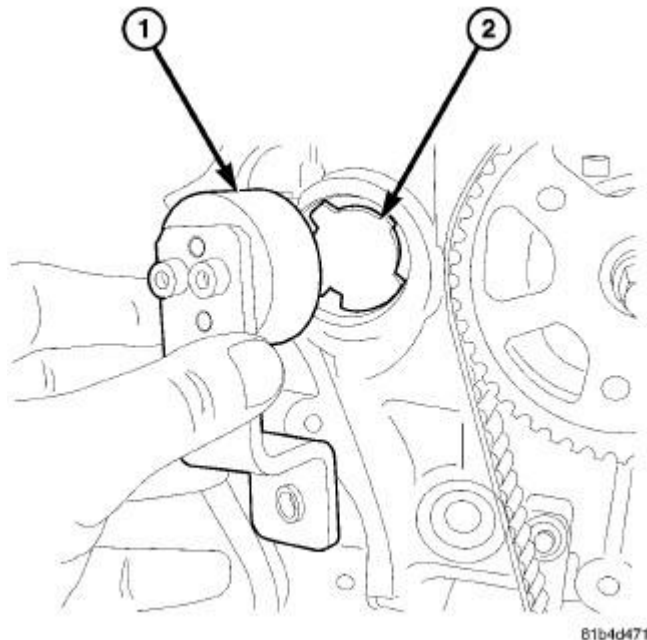


Fig. 428: Installing Camshaft Lock Tool
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rotate the camshaft using the camshaft locking tool. The tone

wheel may spin on the camshaft. If the tone wheel is rotated on the camshaft, the camshaft must be replaced.

NOTE: Starting in model year 2013, the exhaust camshaft reluctor is now bolted on requiring a change in the Camshaft Sprocket Alignment Tool VM.9991. The new Camshaft Sprocket Alignment Tool number is VM.9991A. This tool can be used on older models.

3. Rotate the camshafts until the (special tool #VM.9991A, Alignment Tool, Camshaft Sprocket) can be installed.
4. Install the (special tool #VM.9991A, Alignment Tool, Camshaft Sprocket) (1).

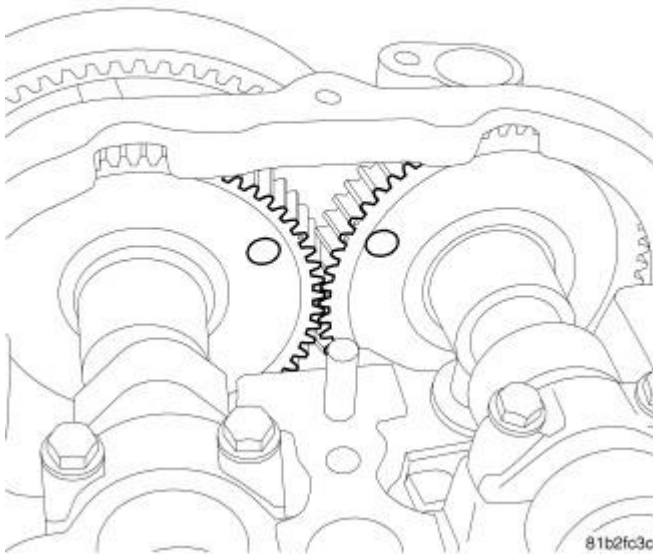


Fig. 429: Camshaft Marks At 90 Degrees ATDC
Courtesy of CHRYSLER GROUP, LLC

5. Verify the camshafts are set correctly at 90 degrees ATDC as illustrated.

LOCKING ENGINE 90 DEGREES AFTER TDC

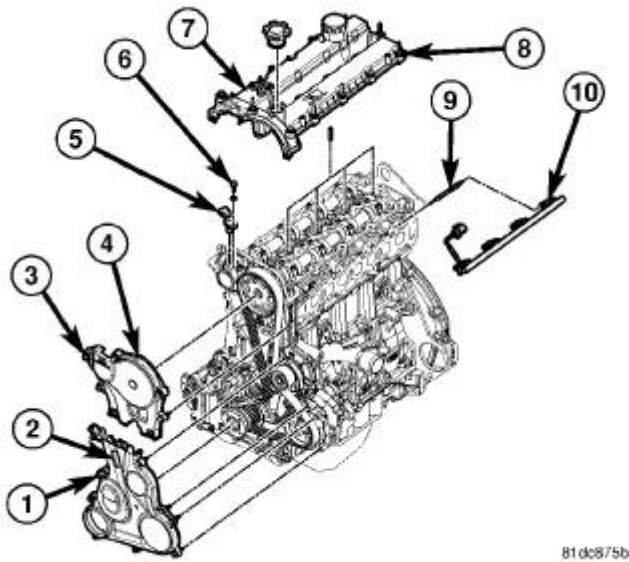


Fig. 430: Upper And Lower Front Covers With Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Remove the upper (4) and lower (2) front covers. Refer to **COVER(S), ENGINE TIMING, REMOVAL**.

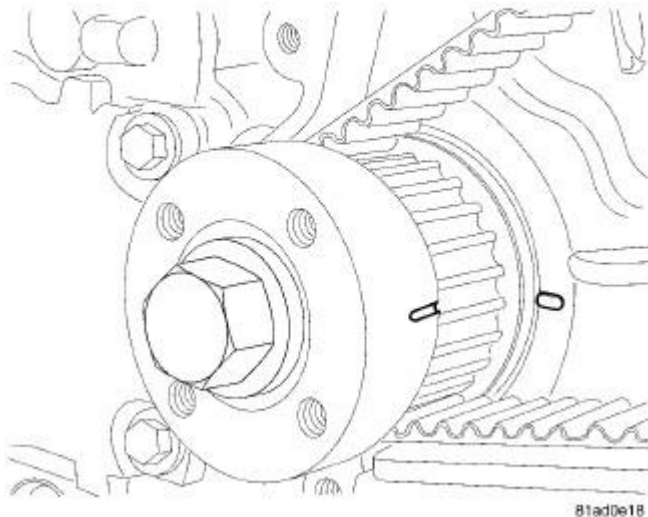


Fig. 431: Crankshaft Timing Marks
Courtesy of CHRYSLER GROUP, LLC

3. Rotate the engine until the 90 degrees ATDC marks on the crankshaft timing belt drive sprocket and

timing belt cover are aligned.

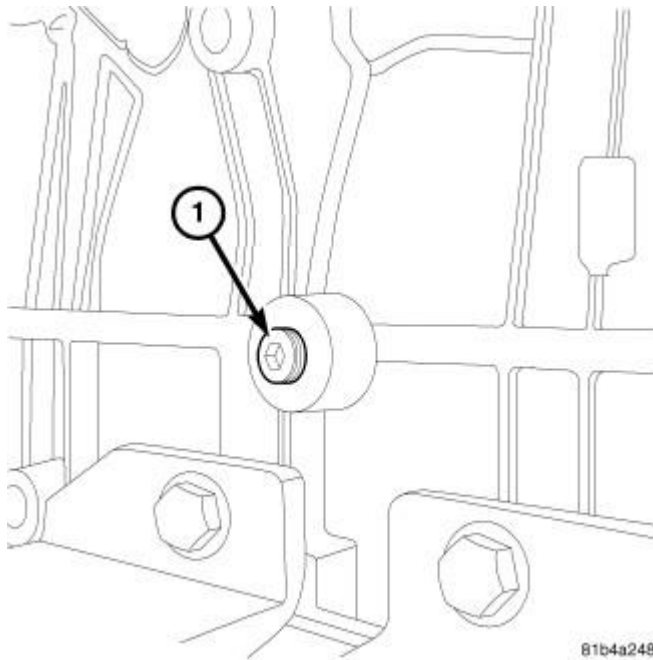


Fig. 432: Engine Block Plug

Courtesy of CHRYSLER GROUP, LLC

4. Remove the engine block plug (1).

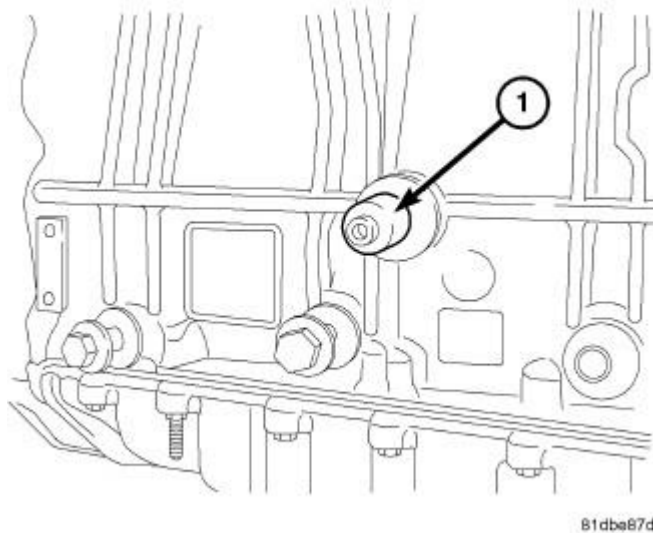


Fig. 433: Crankshaft Locking Tool

Courtesy of CHRYSLER GROUP, LLC

5. Install the Crankshaft Locking Tool (special tool #VM.9992, Adapter, 90 Degree ATDC) into engine block. Make sure the Crankshaft Locking Tool (special tool #VM.9992, Adapter, 90 Degree ATDC) threads into the crankshaft. If it does not thread into the crankshaft, the crankshaft is not at 90 degrees ATDC. If necessary, realign the 90 degrees ATDC marks on the crankshaft timing belt drive sprocket and

timing belt cover.

BELT, TIMING

REMOVAL

REMOVAL

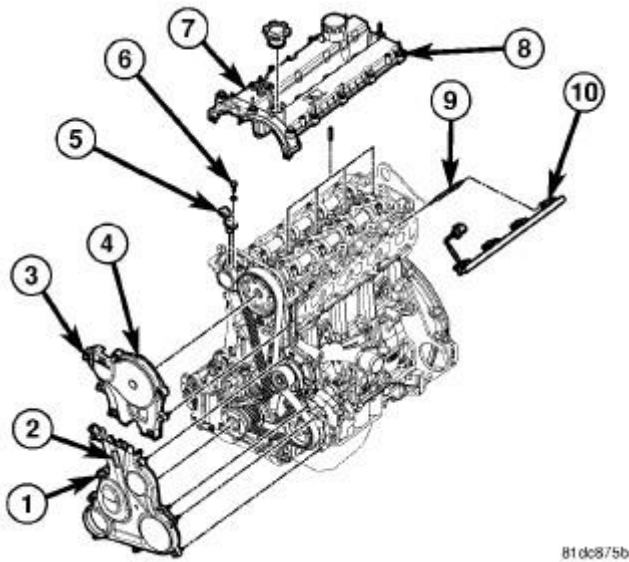
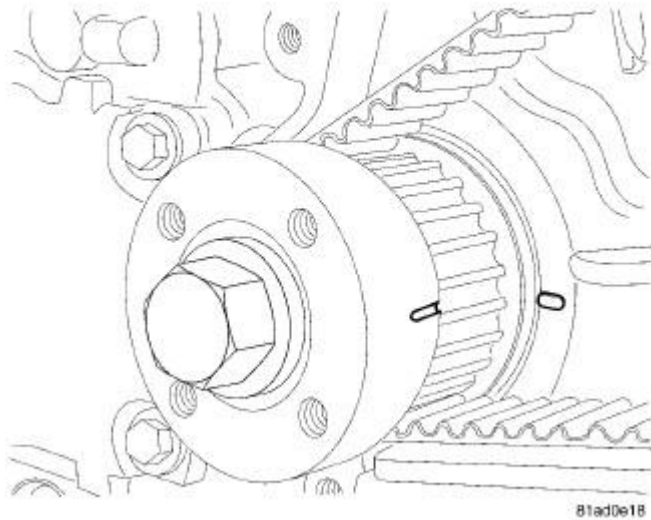


Fig. 434: Upper And Lower Front Covers With Fasteners

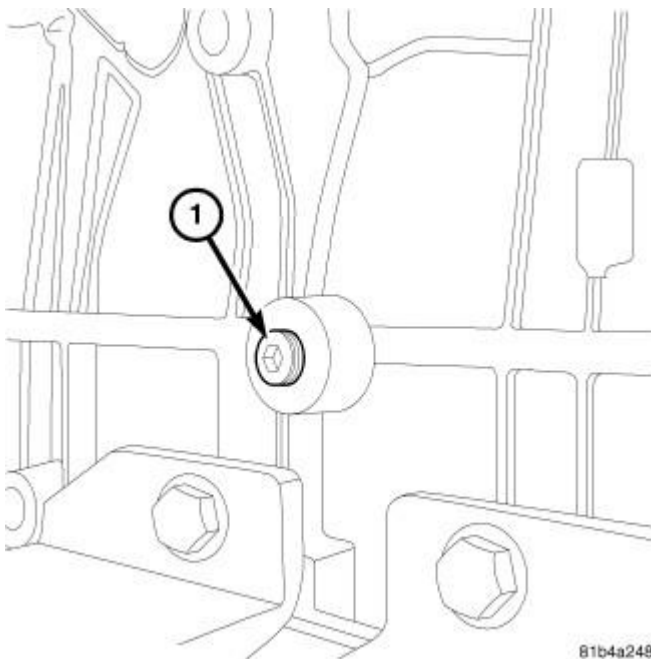
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the upper (4) and lower (2) outer timing belt covers. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .

**Fig. 435: Crank Timing Mark**

Courtesy of CHRYSLER GROUP, LLC

3. Rotate the engine by hand until the crankshaft 90° ATDC marks are aligned.

**Fig. 436: Engine Block Plug**

Courtesy of CHRYSLER GROUP, LLC

4. Remove the engine block plug (1).

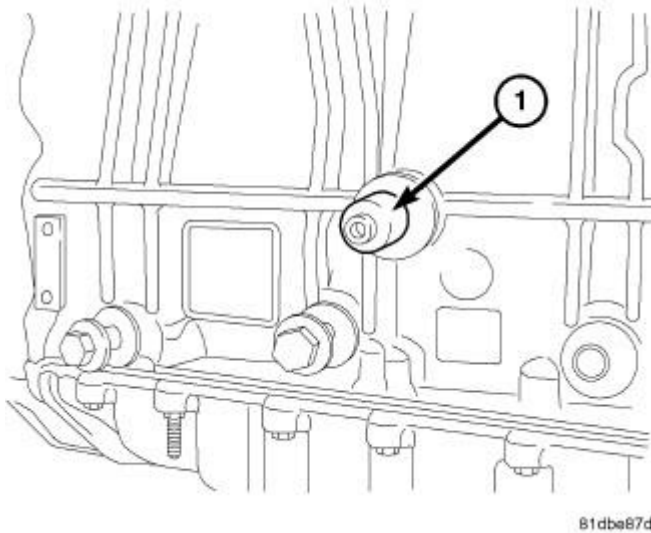


Fig. 437: Crankshaft Locking Tool
Courtesy of CHRYSLER GROUP, LLC

5. Install the (special tool #VM.9992, Adapter, 90 Degree ATDC) (1).

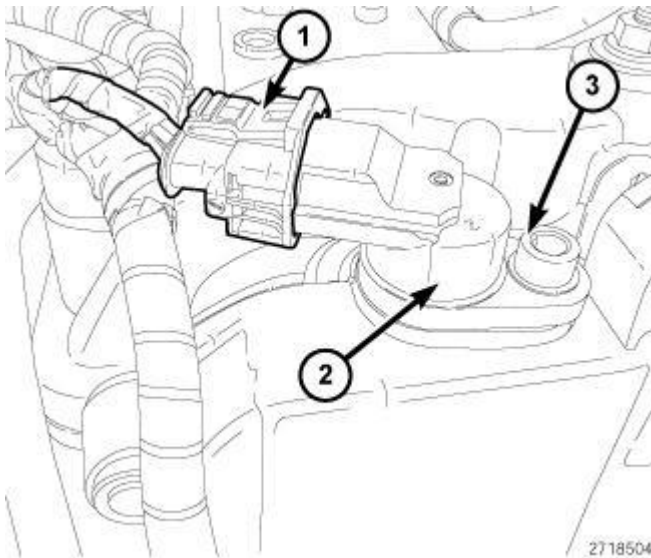


Fig. 438: Camshaft Position Sensor Harness Connector, Sensor & Bolt
Courtesy of CHRYSLER GROUP, LLC

6. Disconnect the Camshaft Position Sensor (CMP) harness connector (1).
7. Remove bolt (3) the CMP sensor (2).

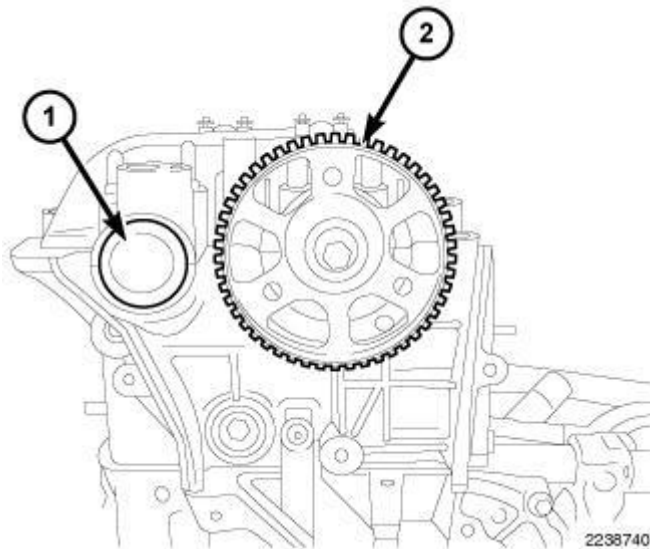


Fig. 439: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

8. Remove the exhaust camshaft oil seal (1).

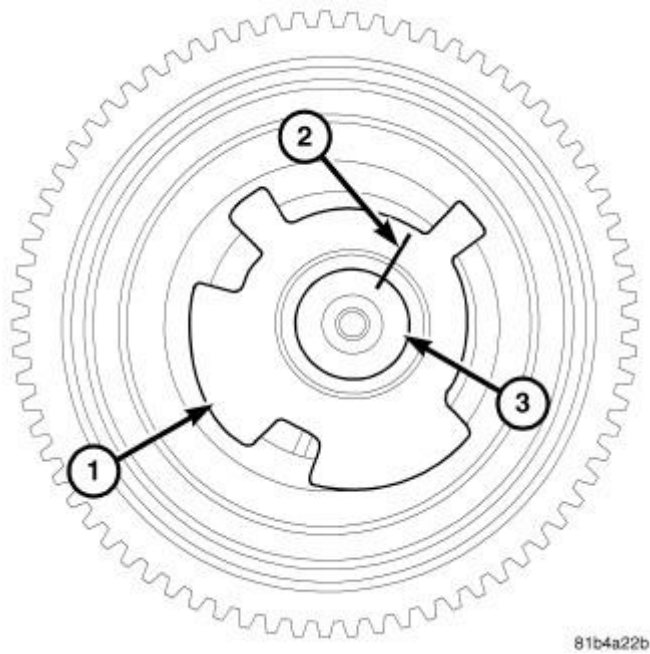


Fig. 440: Mark Across Reluctor Wheel & Exhaust Camshaft
Courtesy of CHRYSLER GROUP, LLC

9. Make a mark (2) across the reluctor wheel (1) and the exhaust camshaft (3). This mark will be used to verify that the reluctor wheel did not rotate on the camshaft during assembly.

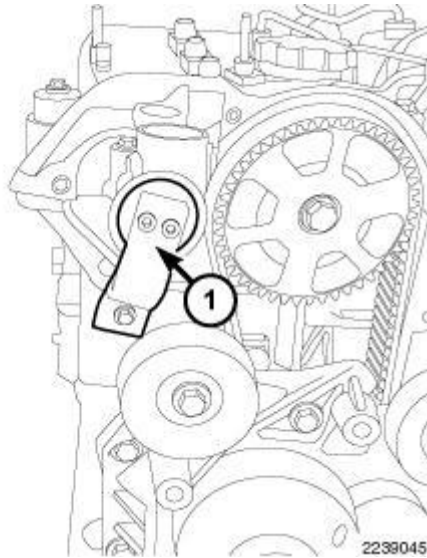


Fig. 441: Camshaft Locking Tool
 Courtesy of CHRYSLER GROUP, LLC

NOTE: If it is suspected that the camshafts are not correctly timed to each other. Refer to the camshaft timing procedure to reset the camshaft timing. Refer to **VALVE TIMING - STANDARD PROCEDURE** .

10. Install the (special tool #VM.9991, Alignment Tool, Camshaft Sprocket) (1). The crankshaft and camshafts are now locked at 90° ATDC.

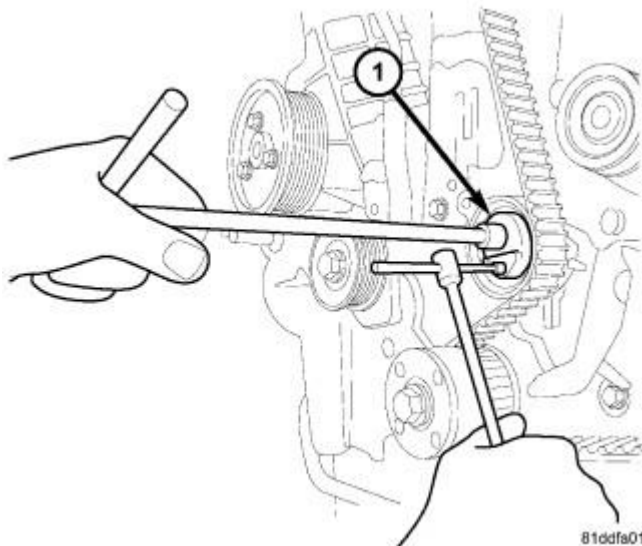


Fig. 442: Tighten/Loosen Timing Belt Tensioner Bolt
 Courtesy of CHRYSLER GROUP, LLC

11. Loosen the timing belt tensioner bolt (1), and remove the timing belt.

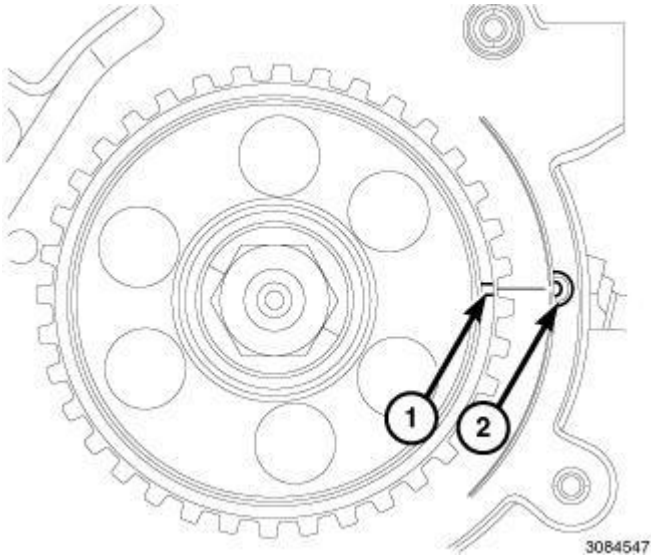
INSTALLATION**INSTALLATION**

Fig. 443: Fuel Injection Pump Timing Marks
Courtesy of CHRYSLER GROUP, LLC

1. Align the high pressure fuel pump sprocket timing mark (1) with the timing mark (2) on the block.

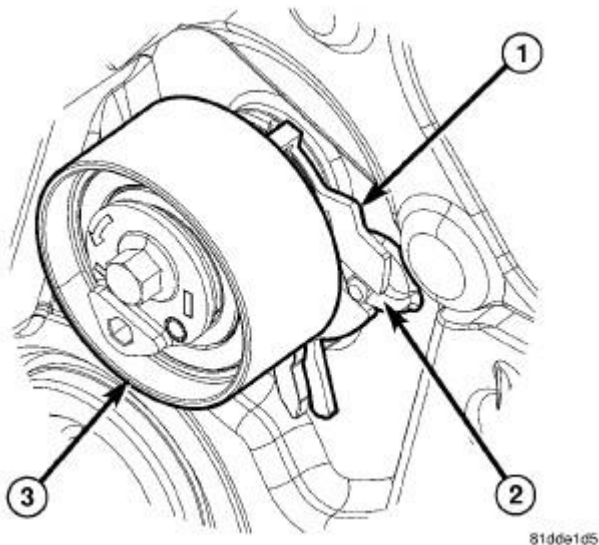


Fig. 444: Timing Belt Tensioner & Alignment Plate
Courtesy of CHRYSLER GROUP, LLC

2. Verify that the bolt is finger tight and tensioner alignment plate (1) is aligned with the boss (2) on the front engine cover.

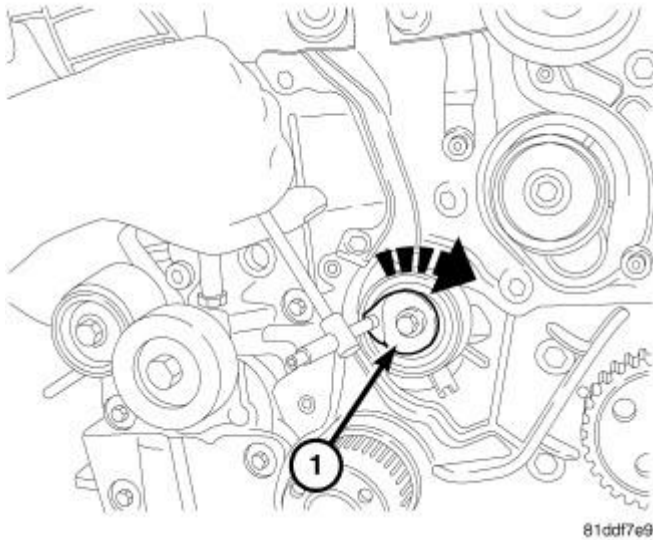


Fig. 445: Turning Timing Belt Tensioner Clockwise
Courtesy of CHRYSLER GROUP, LLC

3. Turn the timing belt tensioner (1) clockwise to unload the tensioner enough for the timing belt to be installed.

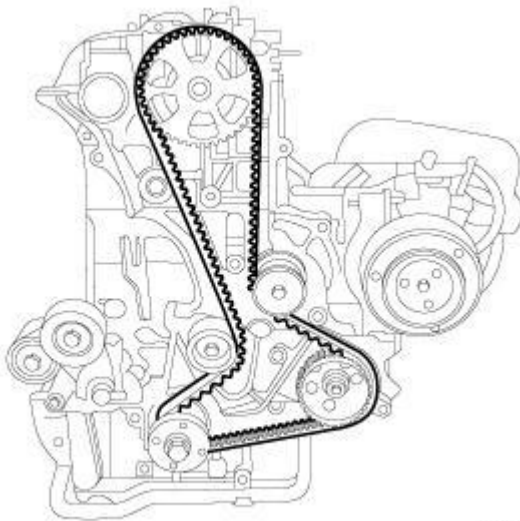


Fig. 446: Timing Belt Routing
Courtesy of CHRYSLER GROUP, LLC

NOTE: DO NOT remove the timing belt from the package until it is going to be installed. DO NOT expose timing belt to oil, grease or water contamination. DO NOT crimp belt at a sharp angle. DO NOT clean belt, pulleys or tensioner with solvent. Check that pulleys and bearings are not seized or damaged before installing belt.

4. Install the timing belt on the components in the following order:

- Crankshaft sprocket (1).
- High pressure fuel pump (2).
- Water pump pulley (3).
- Intake camshaft pulley (4),
- Timing belt tensioner (5).

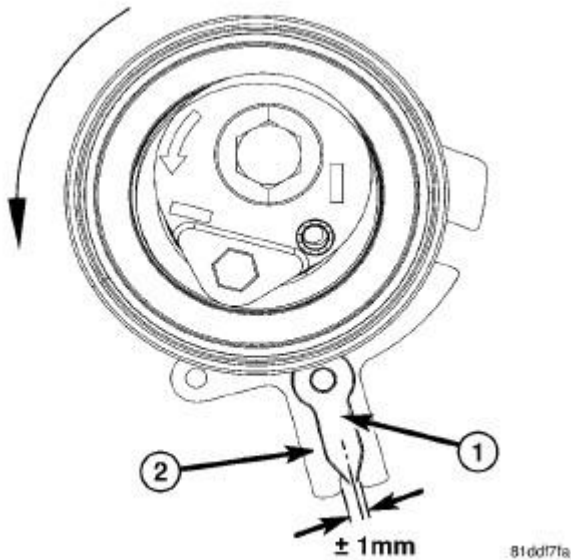


Fig. 447: Timing Belt Tensioner Load Indicator & Gauge
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Turning the belt tensioner counter clockwise moves the pointer in a clockwise direction. Also, if the tensioner bolt is too loose this will cause the tensioner alignment slot to jump off the alignment boss on timing cover.

5. Adjust timing belt tensioner by lining up the load indicator arrow (1) to the center of the (2) tensioner load gage as illustrated.

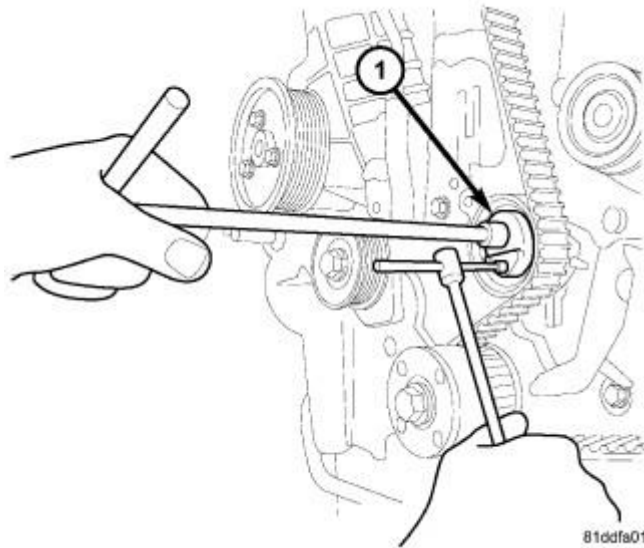


Fig. 448: Tightening Timing Belt Tensioner
Courtesy of CHRYSLER GROUP, LLC

6. Tighten the timing belt tensioner bolt to 28 N.m (21 ft. lbs.).

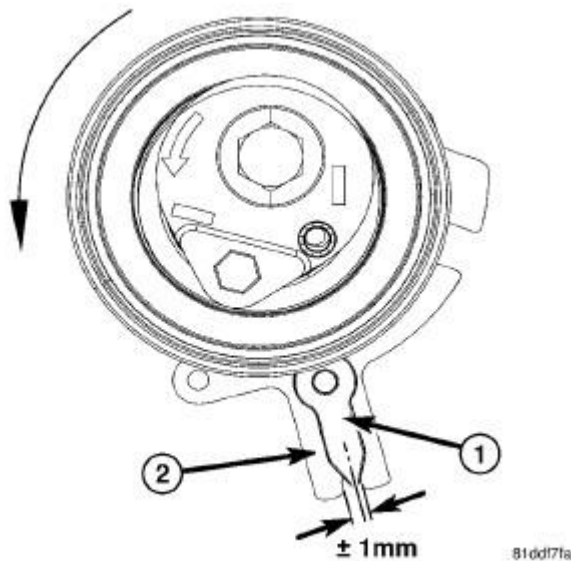


Fig. 449: Timing Belt Tensioner Load Indicator & Gauge
Courtesy of CHRYSLER GROUP, LLC

7. Verify the tensioner load indicator (1) is still centered in the tensioner load gage (2).

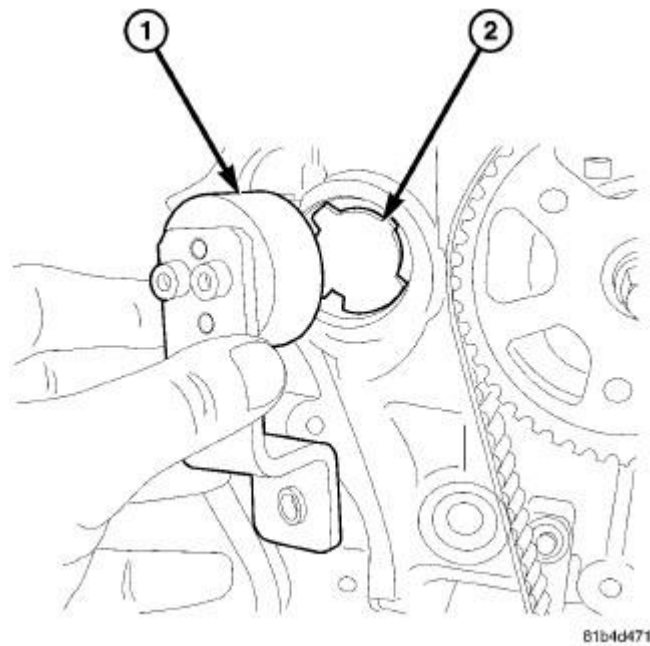


Fig. 450: Installing Camshaft Lock Tool
Courtesy of CHRYSLER GROUP, LLC

8. Remove the (special tool #VM.9991, Alignment Tool, Camshaft Sprocket) (1).

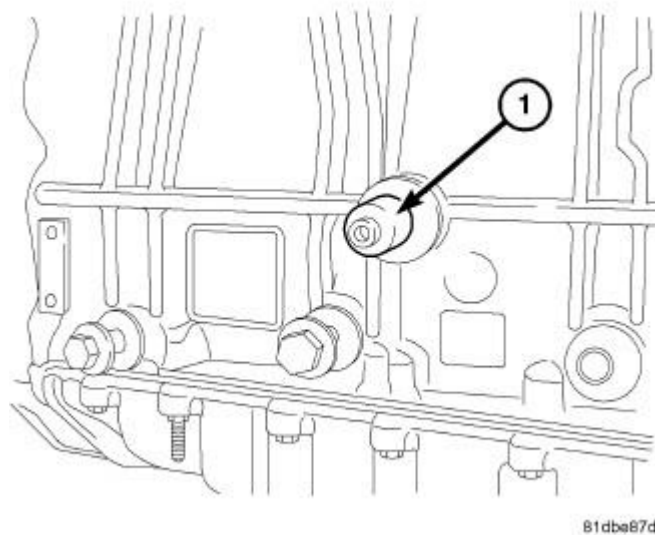


Fig. 451: Crankshaft Locking Tool
Courtesy of CHRYSLER GROUP, LLC

9. Remove the (special tool #VM.9992, Adapter, 90 Degree ATDC) (1).

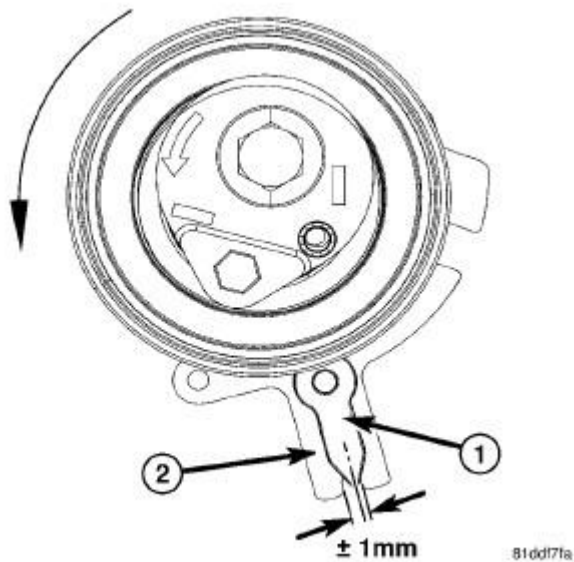


Fig. 452: Timing Belt Tensioner Load Indicator & Gauge
Courtesy of CHRYSLER GROUP, LLC

NOTE: In order to rotate the engine, the (special tool #VM.9991, Alignment Tool, Camshaft Sprocket) and the (special tool #VM.9992, Adapter, 90 Degree ATDC) need to be removed.

10. Rotate engine 2 complete revolutions and then recheck tensioner alignment. Verify that the tension indicator (1) is centered in the slot on the tensioner gage (2) slot as shown in illustration. Readjust tensioner alignment is necessary.

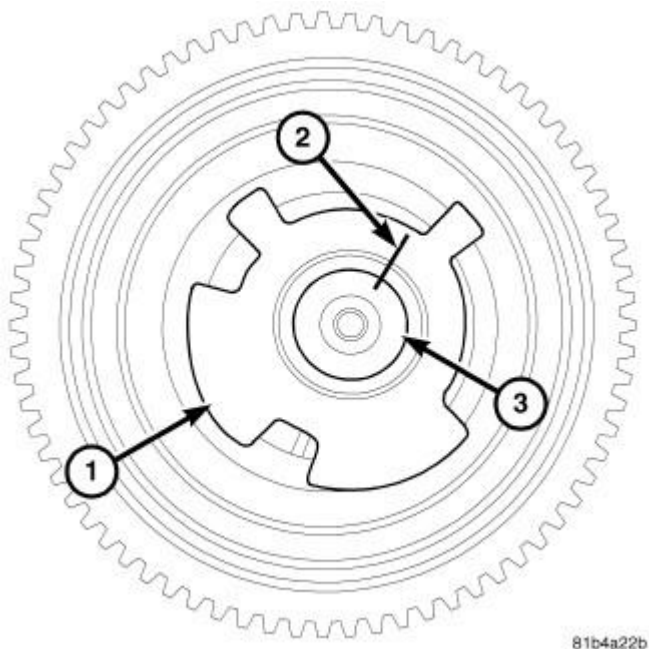
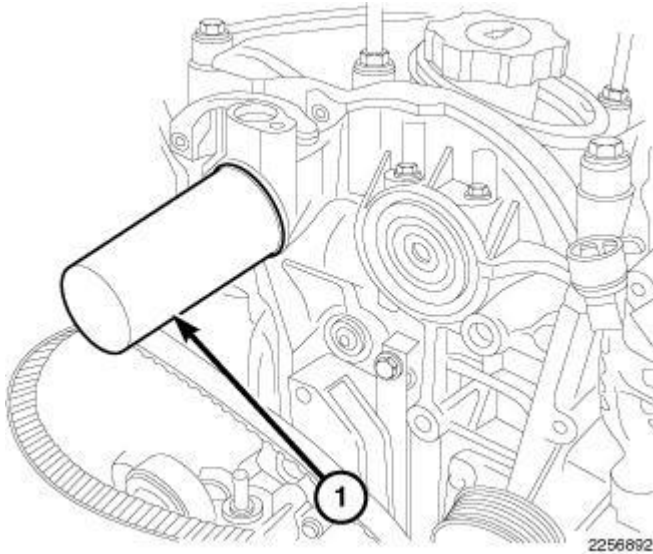


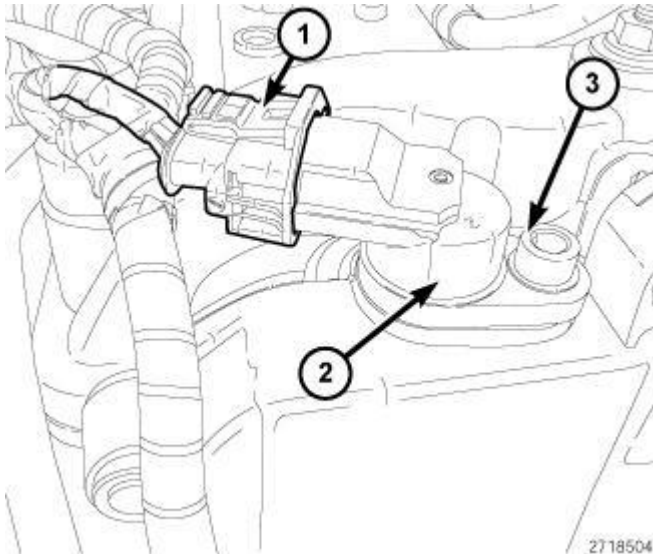
Fig. 453: Mark Across Reluctor Wheel & Exhaust Camshaft

Courtesy of CHRYSLER GROUP, LLC

11. Verify that the reluctor wheel (1) has not moved on the camshaft. If the witness marks are not aligned, the reluctor wheel (1) has spun on the camshaft (3) during the assembly process. If so, the exhaust camshaft must be replaced.

**Fig. 454: Seal Installer****Courtesy of CHRYSLER GROUP, LLC**

12. Using the (special tool #VM.1057, Installer, Seal) (1), install the exhaust camshaft seal using.

**Fig. 455: Camshaft Position Sensor Harness Connector, Sensor & Bolt****Courtesy of CHRYSLER GROUP, LLC**

13. Install the Camshaft Position Sensor (CMP) sensor (2). Tighten bolt (3) to 11 N.m (97 in. lbs.).
14. Connect the CMP wire harness connector (1).

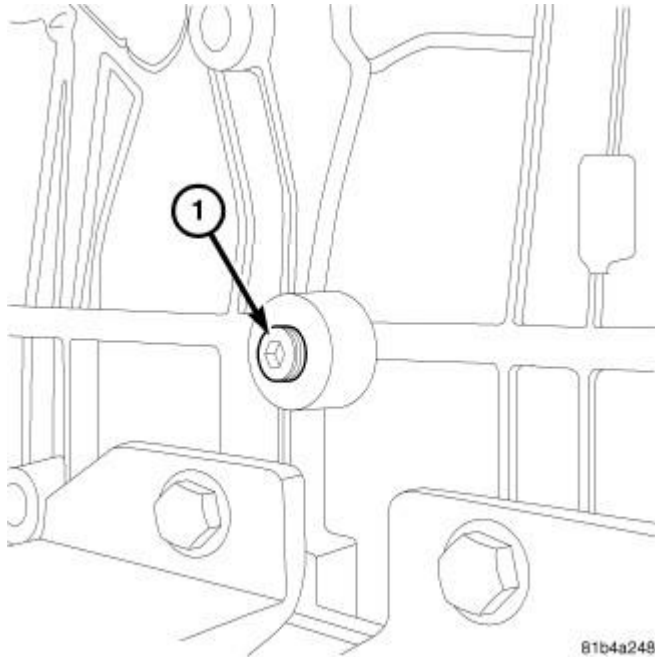


Fig. 456: Engine Block Plug
Courtesy of CHRYSLER GROUP, LLC

15. Install the engine block plug (1). Tighten block plug to 30 N.m (22 ft. lbs.).

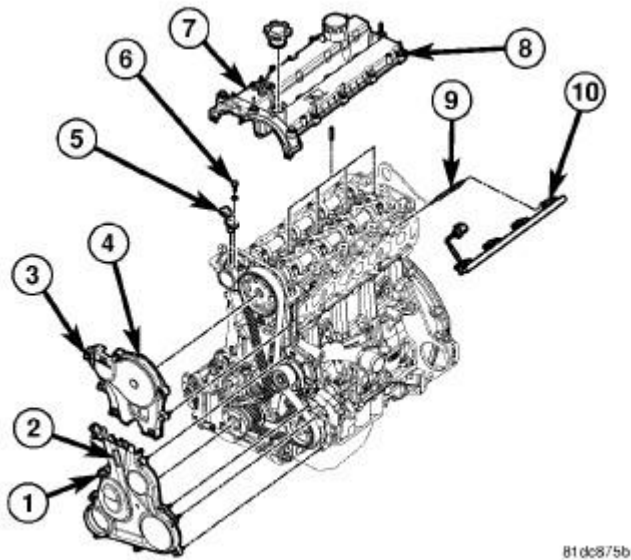
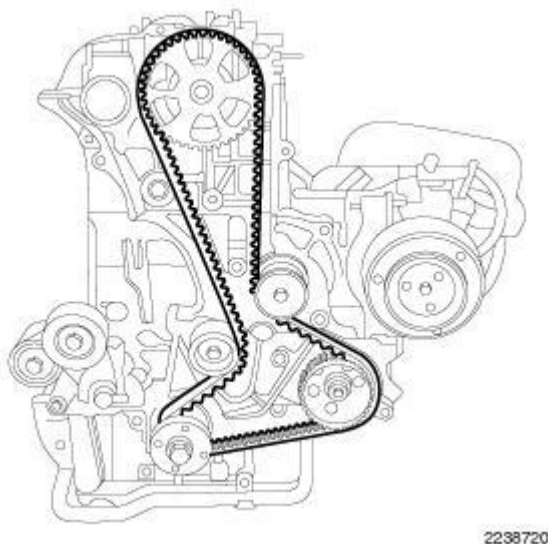


Fig. 457: Locating Cylinder Head & Front Timing Belt Covers
Courtesy of CHRYSLER GROUP, LLC

16. Install the upper (4) and lower (2) outer timing belt covers. Refer to **COVER(S), ENGINE TIMING, INSTALLATION**.
17. Connect the negative battery cable.

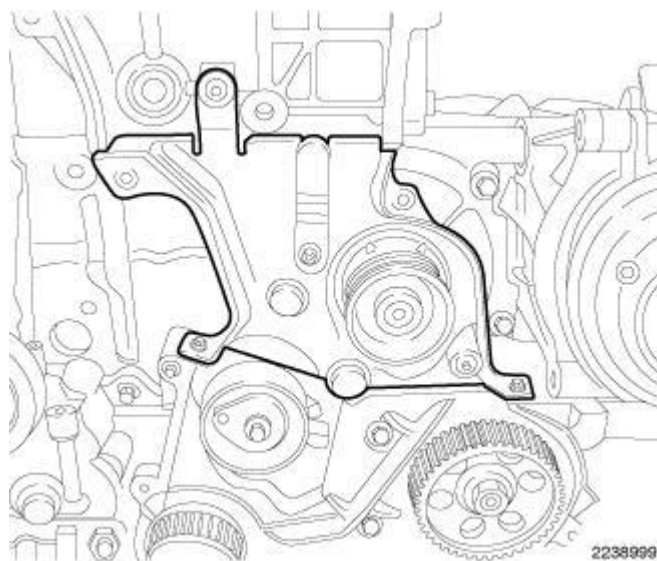
COVER(S), ENGINE TIMING**REMOVAL****REMOVAL - TIMING BELT INNER COVER**

2238720

Fig. 458: Timing Belt Routing

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.



2238999

Fig. 459: Inner Timing Belt Cover

Courtesy of CHRYSLER GROUP, LLC

3. Remove the inner timing belt cover.

UPPER AND LOWER TIMING BELT OUTER COVERS

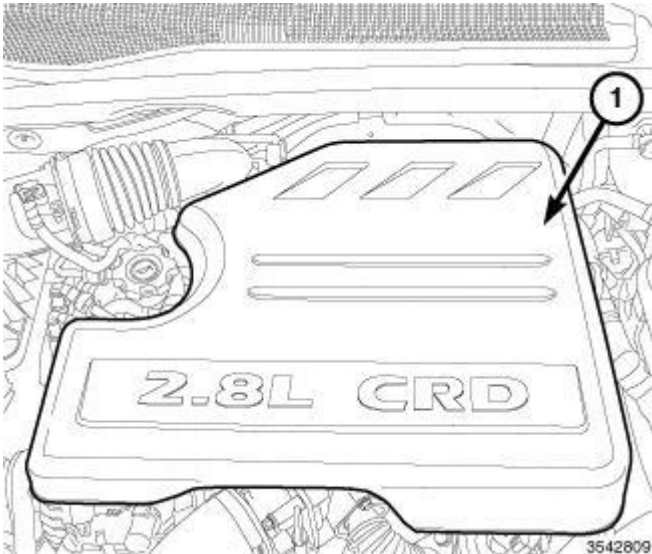


Fig. 460: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL**.

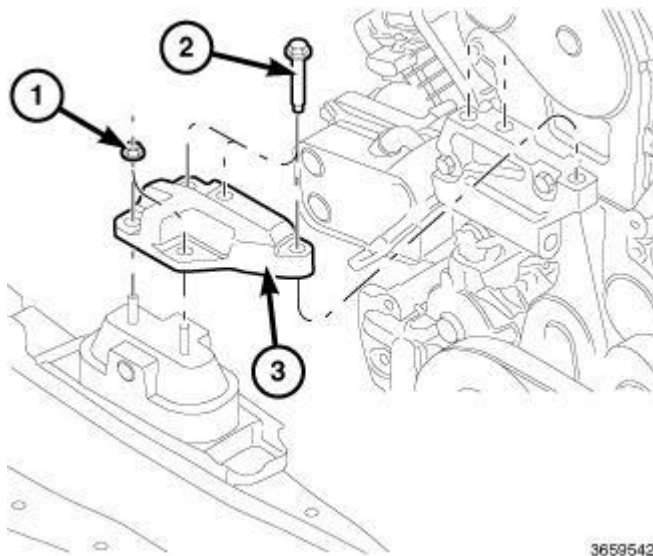
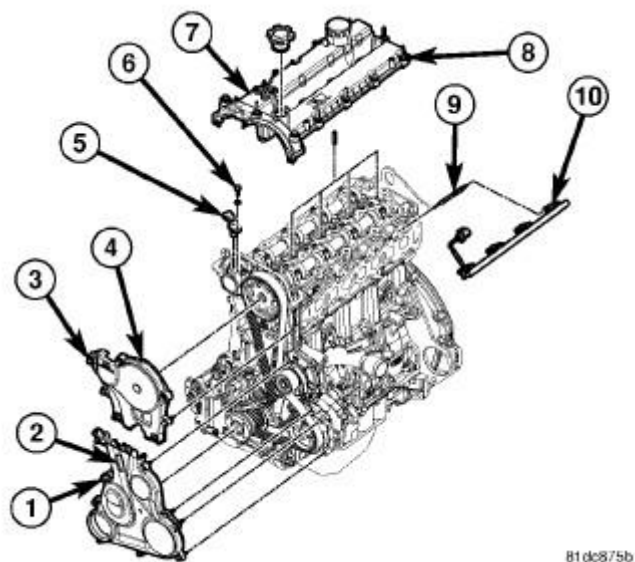


Fig. 461: Engine Mount Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

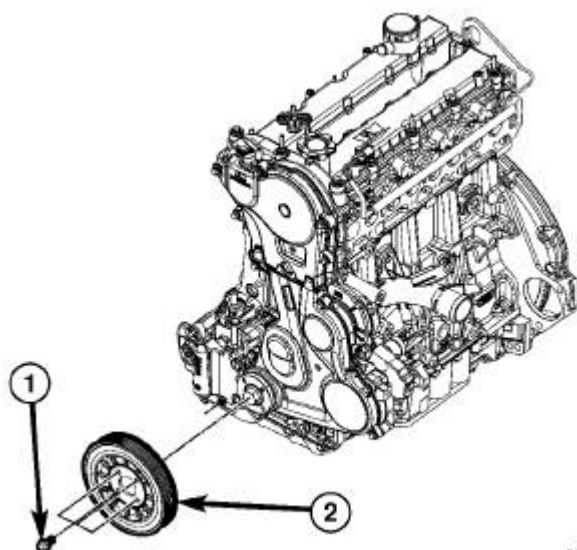
4. Remove the right engine mount bracket (3). Refer to **INSULATOR, ENGINE MOUNT, RIGHT, REMOVAL**.
5. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL**.
6. Remove the accessory drive idler pulley.



81dc875b

Fig. 462: Upper And Lower Front Covers With Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Remove the upper timing belt cover (4).



81dc8640

Fig. 463: Crankshaft Damper & Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Remove the bolts (1) and the crankshaft damper (2).

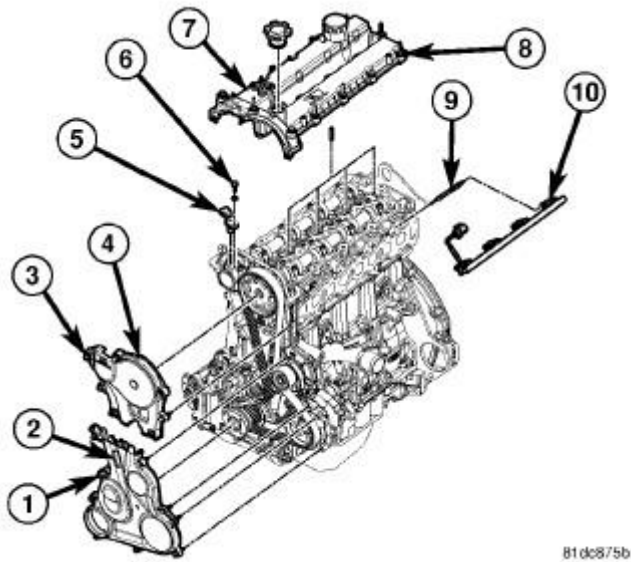


Fig. 464: Upper And Lower Front Covers With Fasteners
Courtesy of CHRYSLER GROUP, LLC

9. Remove the bolts (1), and the lower timing belt cover (2).

INSTALLATION

INSTALLATION - TIMING BELT INNER COVER

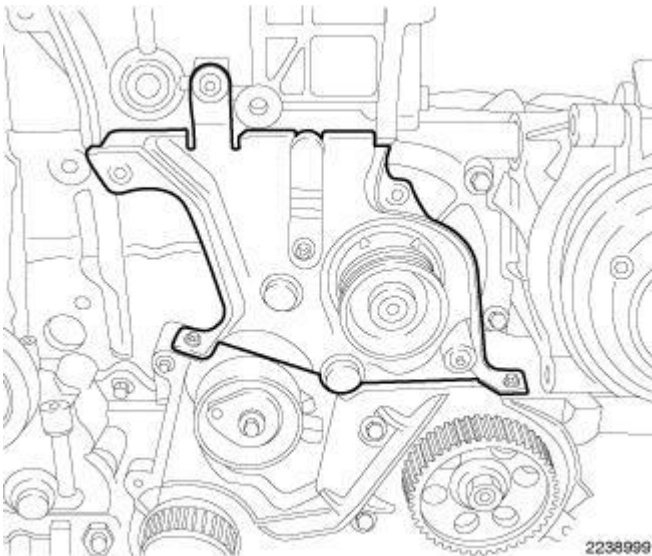
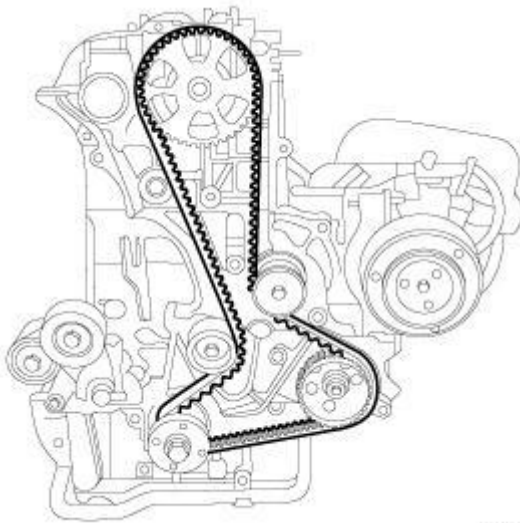


Fig. 465: Inner Timing Belt Cover
Courtesy of CHRYSLER GROUP, LLC

1. Install the inner timing belt cover. Tighten the bolts to 11 N.m (97 in. lbs.).

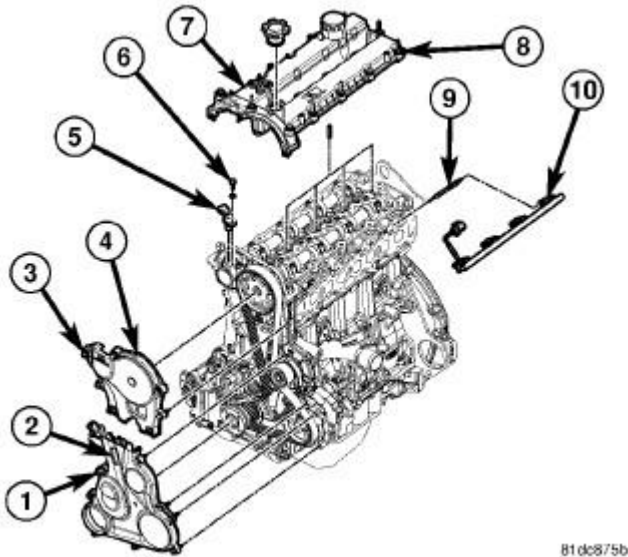


2238720

Fig. 466: Timing Belt Routing
Courtesy of CHRYSLER GROUP, LLC

2. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
3. Connect the negative battery cable.

UPPER AND LOWER OUTER TIMING BELT COVERS



81dc8/5b

Fig. 467: Locating Cylinder Head & Front Timing Belt Covers
Courtesy of CHRYSLER GROUP, LLC

1. Install the lower timing belt cover (2). Tighten the bolts to 8 N.m (71 in. lbs.).

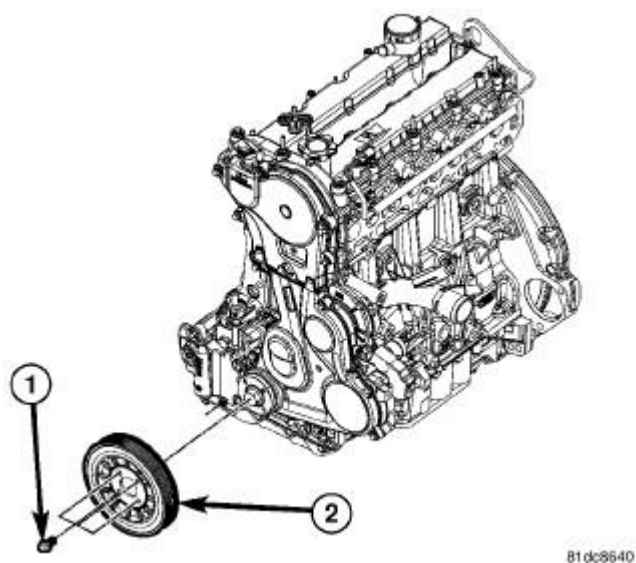


Fig. 468: Crankshaft Damper & Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Install the crankshaft damper (1). Tighten the bolts to 32 N.m (24 ft. lbs.).

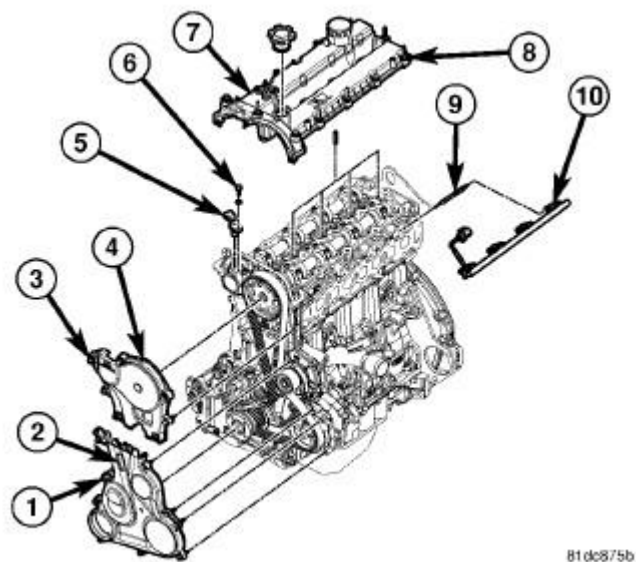
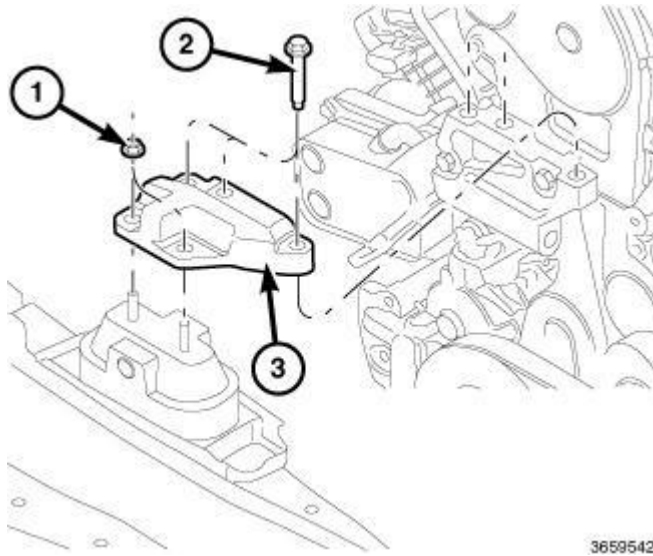


Fig. 469: Locating Cylinder Head & Front Timing Belt Covers
Courtesy of CHRYSLER GROUP, LLC

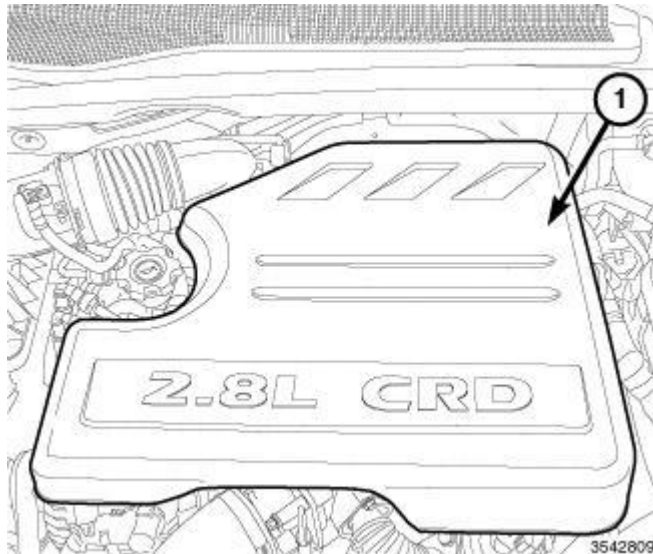
3. Install the upper timing cover (4). Tighten the bolts to 8 N.m (71 in. lbs.).



3659542

Fig. 470: Engine Mount Bracket & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

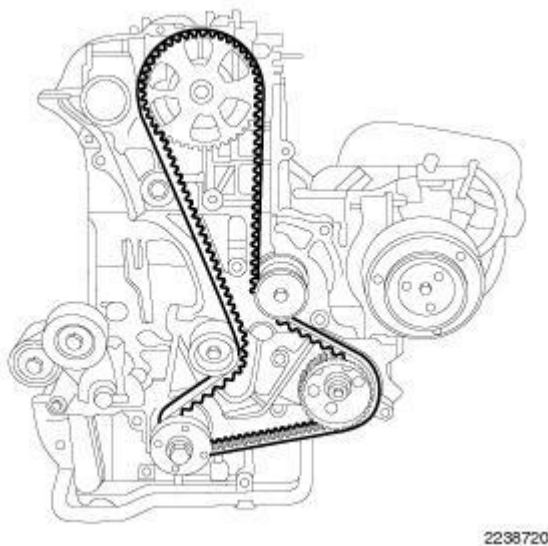
4. Install the accessory drive idler pulley. Tighten bolts to 45 N.m (33 ft. lbs.).
5. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .
6. Install the right front engine mount bracket (2). Refer to **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** .



3542809

Fig. 471: Engine Cover
 Courtesy of CHRYSLER GROUP, LLC

7. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .
8. Install the engine cover (1).
9. Connect the negative battery cable.

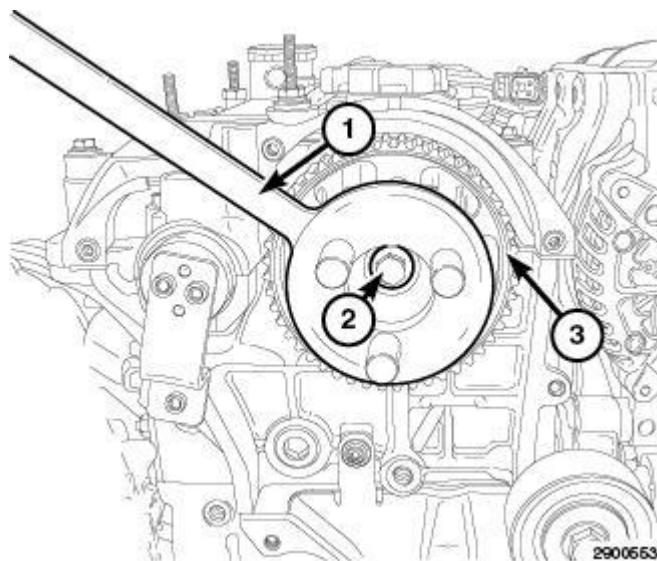
SPROCKET(S), TIMING BELT AND CHAIN**REMOVAL****CAMSHAFT SPROCKET**

2238720

Fig. 472: Timing Belt Routing

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.



2900653

Fig. 473: Locking Tool, Camshaft Sprocket & Bolt

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Always use to hold the camshaft while loosening the camshafts.

Failure to use this tool can cause the camshaft holding tool to rotate the tone wheel on the camshaft. If the tone wheel is spun on the camshaft, the camshaft must be replaced.

3. Using the (special tool #VM.1055, Locking Tool) (1) to hold the intake camshaft sprocket (3), remove the bolt (2).

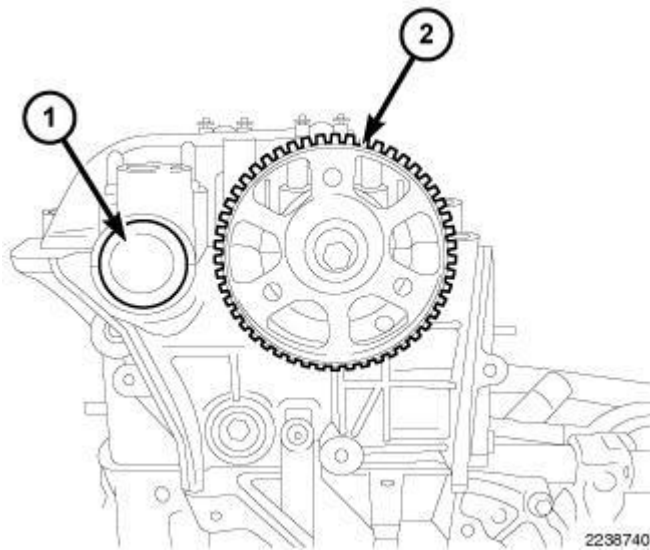


Fig. 474: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

4. Remove the camshaft sprocket (2).

CRANKSHAFT SPROCKET

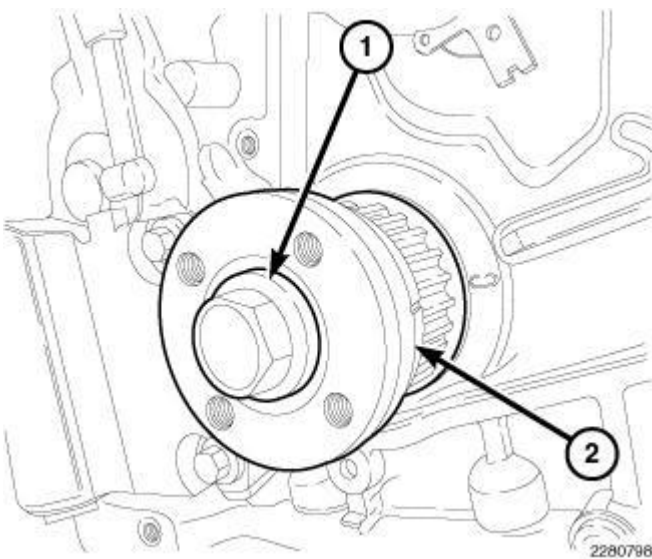


Fig. 475: Crankshaft Timing Belt Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.

NOTE: The crankshaft sprocket bolt is a left handed thread.

3. Remove the bolt (1) and the crankshaft sprocket (2).

INSTALLATION

CAMSHAFT SPROCKET

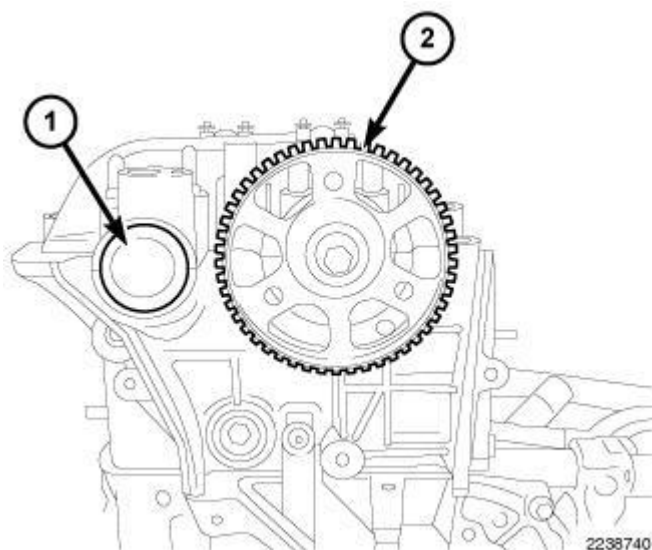


Fig. 476: Exhaust Camshaft Oil Seal & Camshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

1. Install the intake camshaft sprocket (2) and finger tighten bolt.

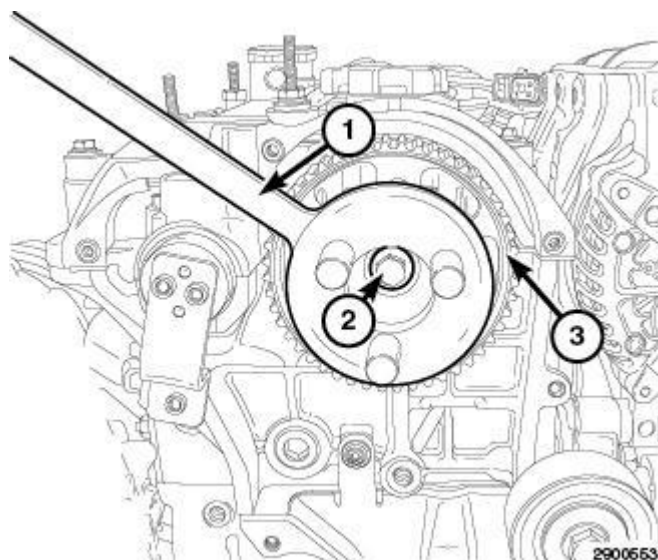


Fig. 477: Locking Tool, Camshaft Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Using the (special tool #VM.1055, Locking Tool) (1) to hold the intake camshaft sprocket (3), tighten bolt (2) to 64 N.m (47 ft. lbs.).

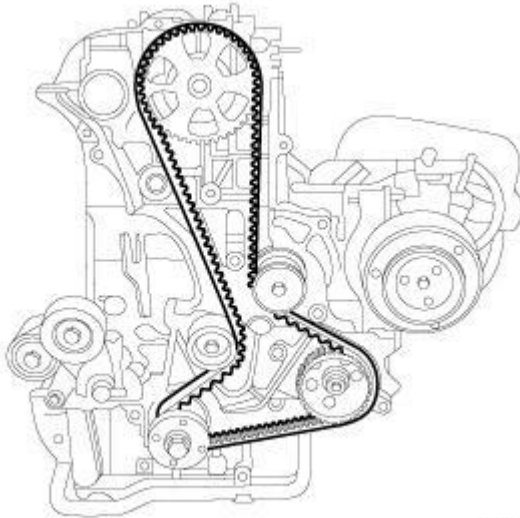


Fig. 478: Timing Belt Routing
Courtesy of CHRYSLER GROUP, LLC

3. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
4. Connect the negative battery cable.

CRANKSHAFT SPROCKET

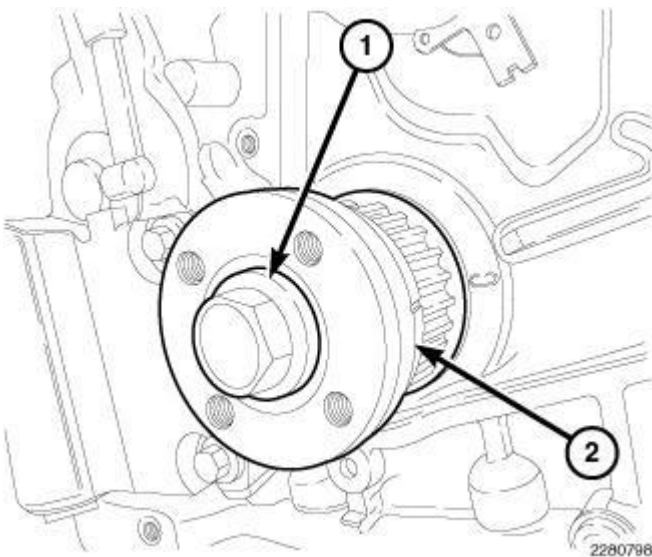
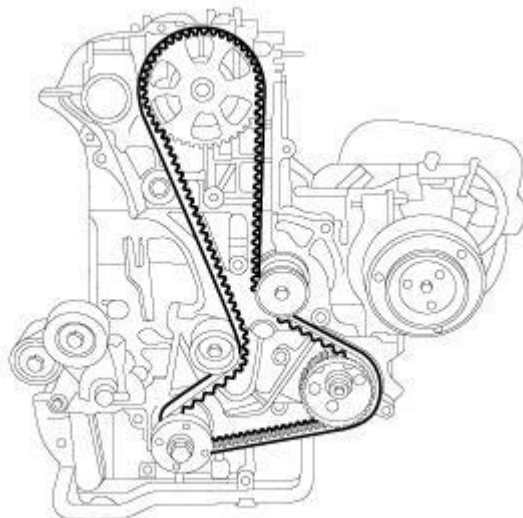


Fig. 479: Crankshaft Timing Belt Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft sprocket bolt is a left handed thread.

1. Install the crankshaft sprocket. Tighten bolt to 100 N.m (74 ft. lbs.) plus an additional 120 degrees turn.



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Fig. 480: Timing Belt Routing

Courtesy of CHRYSLER GROUP, LLC

2. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
3. Connect the negative battery cable.

TENSIONER, ENGINE TIMING

ADJUSTMENTS

ADJUSTMENTS

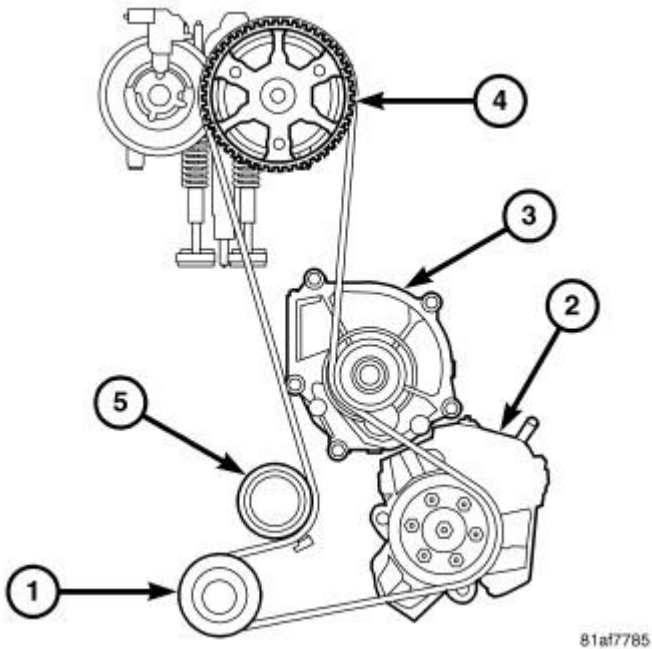


Fig. 481: Timing Belt Tensioner
Courtesy of CHRYSLER GROUP, LLC

1. With the upper and lower front covers removed and the timing belt installed, loosen timing belt tensioner (5).

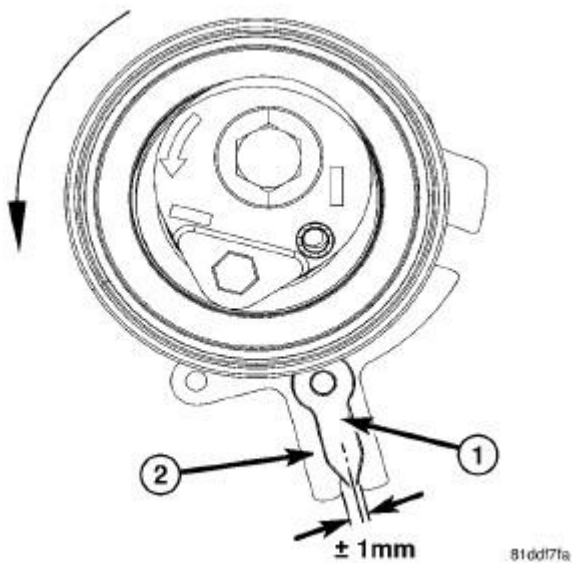


Fig. 482: Timing Belt Tensioner Load Indicator & Gauge
Courtesy of CHRYSLER GROUP, LLC

NOTE: Turning the belt tensioner counter clockwise moves the pointer in a clockwise direction. Also, if the tensioner bolt is too loose this will cause the tensioner alignment slot to jump off the alignment boss on timing

cover.

2. Align timing belt tensioner pointer (1) so that it is centered in the notch (2) and tighten timing belt tensioner retaining bolt to 28 N.m (21 ft. lbs.).

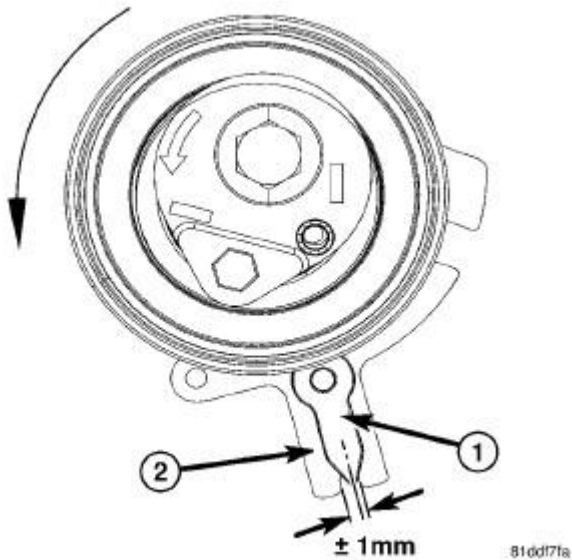
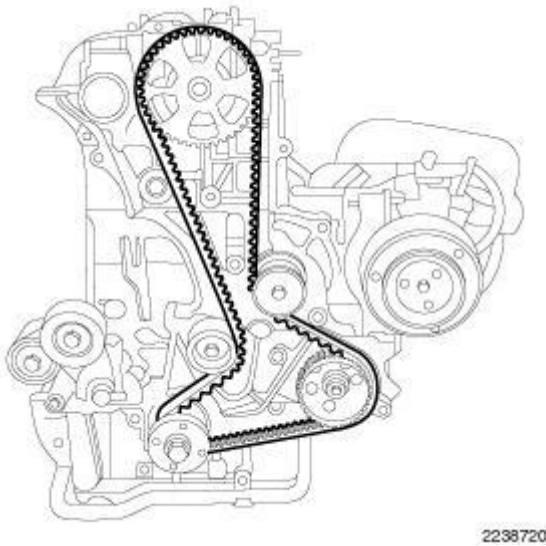


Fig. 483: Timing Belt Tensioner Load Indicator & Gauge
 Courtesy of CHRYSLER GROUP, LLC

3. Rotate engine 2 complete revolutions and then recheck tensioner alignment. Verify that the tension indicator (1) is centered in the slot on the tensioner gage (2) as shown in illustration. Readjust tensioner alignment as necessary.

REMOVAL

REMOVAL

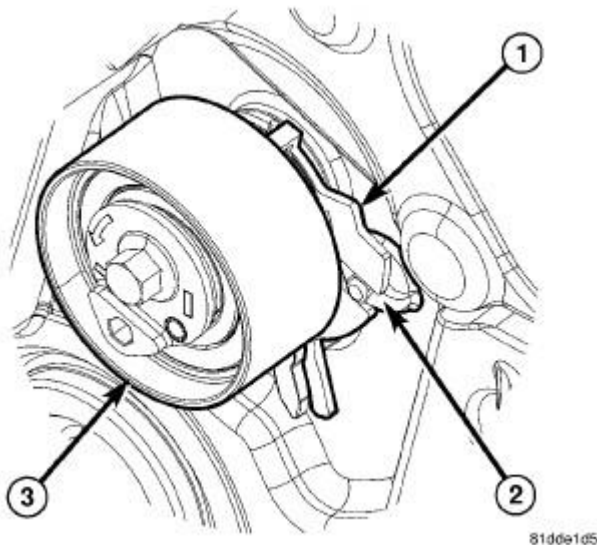


2238720

Fig. 484: Timing Belt Routing

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.



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Fig. 485: Timing Belt Tensioner & Tensioner Alignment Plate

Courtesy of CHRYSLER GROUP, LLC

3. Remove bolt, and the timing belt tensioner (3).

INSTALLATION

INSTALLATION

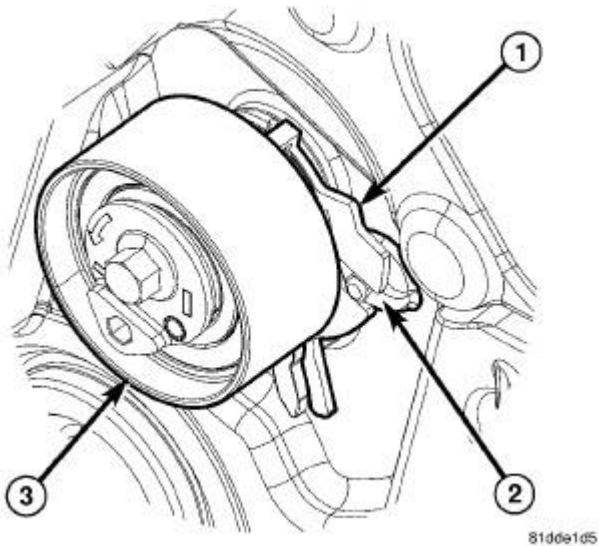


Fig. 486: Timing Belt Tensioner & Tensioner Alignment Plate
Courtesy of CHRYSLER GROUP, LLC

1. Install the timing belt tensioner (3). Do not tighten at this time. Verify that the slot in the tensioner alignment plate (1) is aligned with the boss (2) on the engine cover.

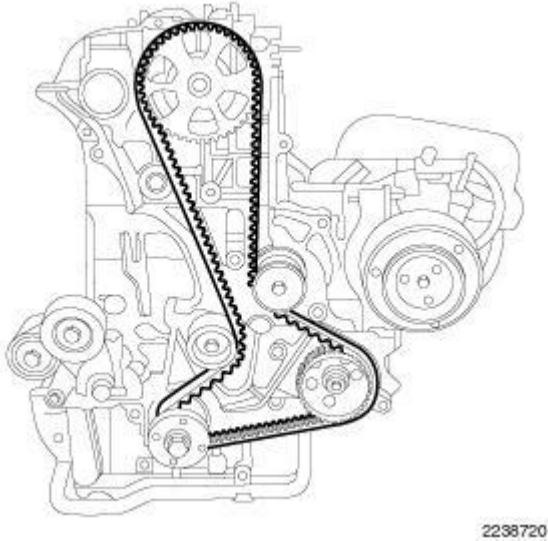


Fig. 487: Timing Belt Routing
Courtesy of CHRYSLER GROUP, LLC

2. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
3. Connect the negative battery cable.

AIR INTAKE SYSTEM

AIR CLEANER

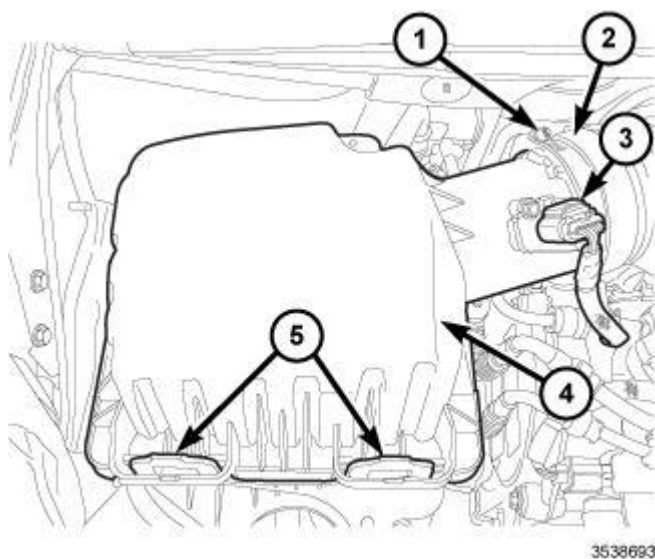
REMOVAL**REMOVAL**

Fig. 488: Clamp, Turbocharger Air Inlet Tube, Mass Airflow (MAF) Sensor Harness Connector, Intake Air Housing & Tabs

Courtesy of CHRYSLER GROUP, LLC

1. Release the lock tabs (5) and remove the intake air body cover (4).

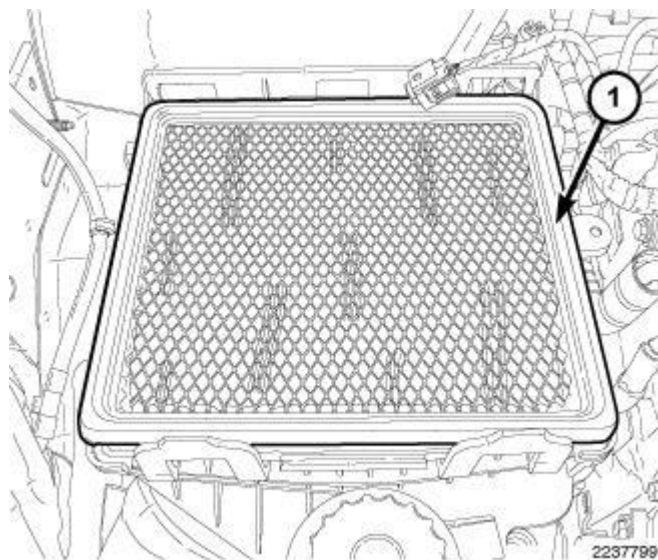


Fig. 489: Air Filter

Courtesy of CHRYSLER GROUP, LLC

2. Lift up and remove the air cleaner (1) from air cleaner body.

INSTALLATION

INSTALLATION

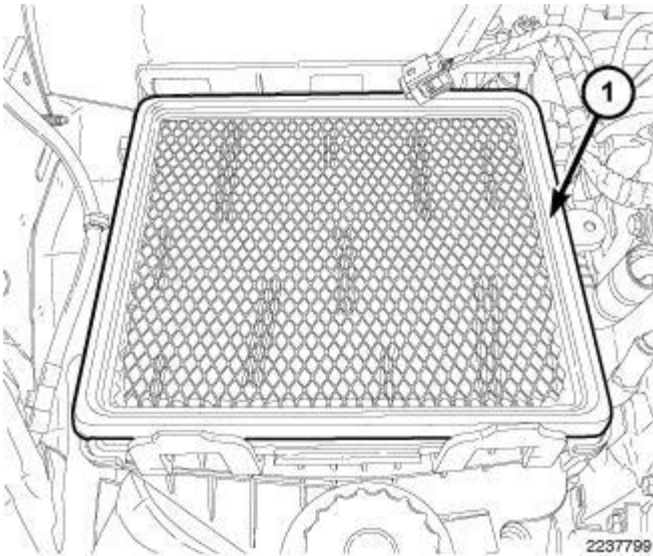


Fig. 490: Air Filter

Courtesy of CHRYSLER GROUP, LLC

1. Clean out the inside of air cleaner body.
2. Install the new air cleaner (1).

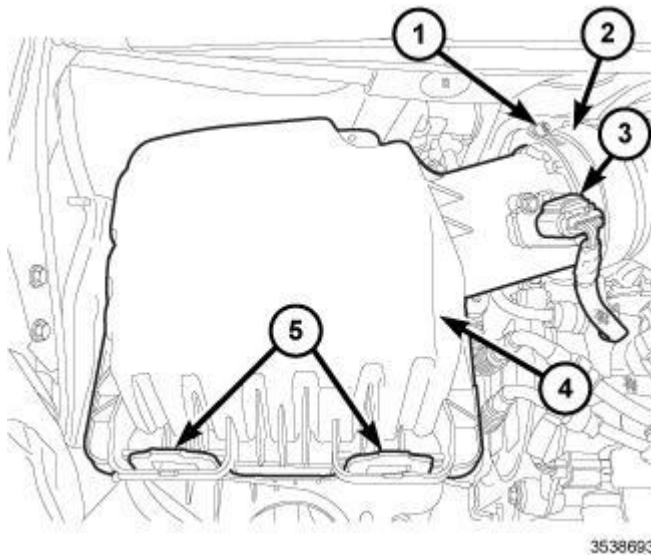


Fig. 491: Clamp, Turbocharger Air Inlet Tube, Mass Airflow (MAF) Sensor Harness Connector, Intake Air Housing & Tabs

Courtesy of CHRYSLER GROUP, LLC

3. Install the intake air body cover (4) and push down to lock the tabs (5).

BODY, AIR CLEANER

REMOVAL

REMOVAL

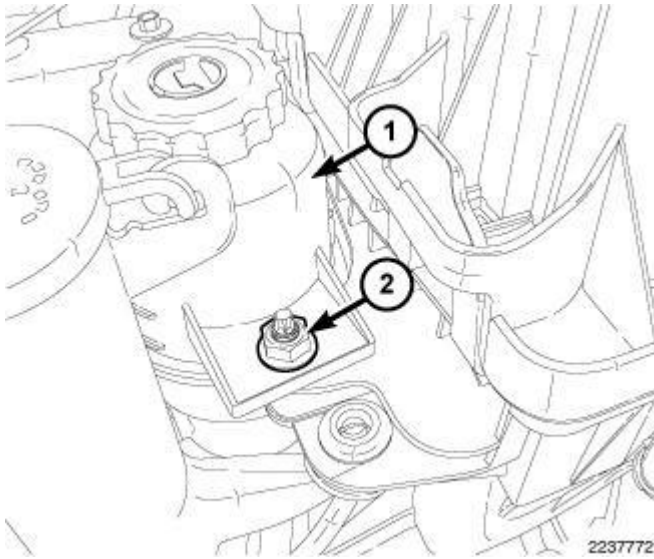


Fig. 492: Power Steering Reservoir & Retaining Nut
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the retaining nut (2) and position the power steering reservoir (1) aside.

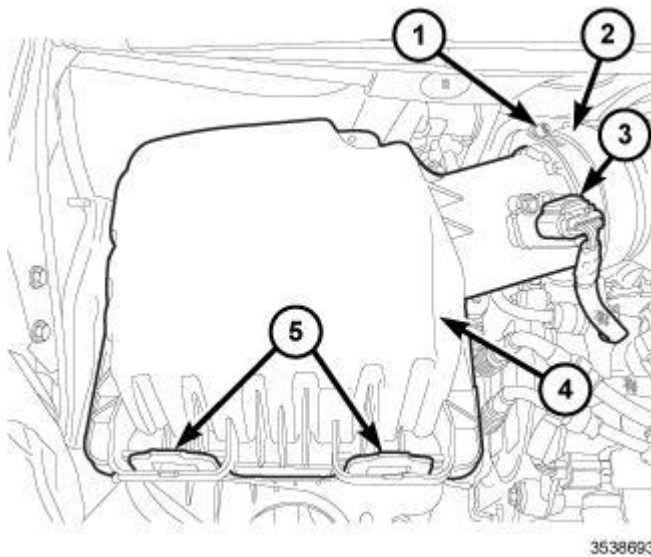


Fig. 493: Clamp, Turbocharger Air Inlet Tube, Mass Airflow (MAF) Sensor Harness Connector, Intake Air Housing & Tabs
 Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the Mass Airflow (MAF) sensor harness connector (3).
4. Loosen clamp (1) and disconnect the turbocharger air inlet tube (2) from the intake air housing (4).

5. Pull upward on the intake air housing (4) to release it from the grommets, and remove the intake air housing.

INSTALLATION

INSTALLATION

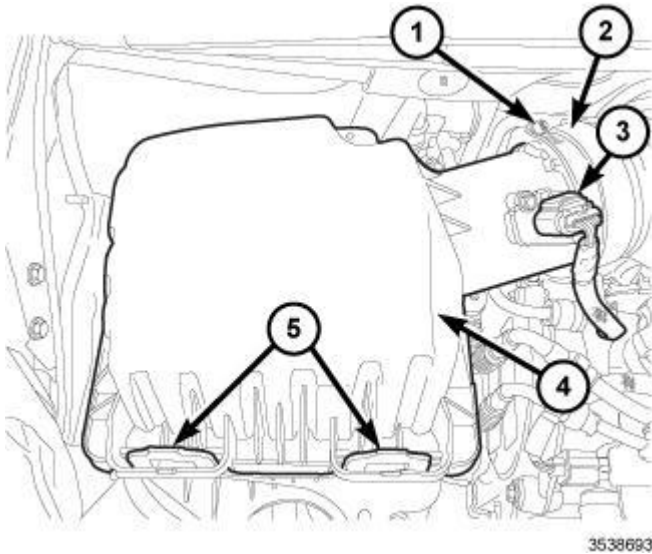


Fig. 494: Clamp, Turbocharger Air Inlet Tube, Mass Airflow (MAF) Sensor Harness Connector, Intake Air Housing & Tabs

Courtesy of CHRYSLER GROUP, LLC

1. Position the intake air housing (4) in the grommets, and push down on the intake air housing to seat it.
2. Connect the turbocharger air inlet tube (2) to the intake air housing (4) and tighten the clamp (1).
3. Connect the Mass Airflow (MAF) sensor harness connector (3).

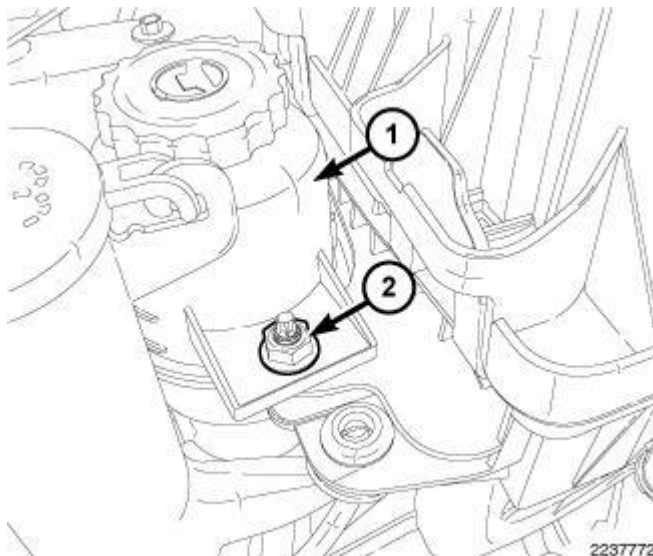


Fig. 495: Power Steering Reservoir & Retaining Nut

Courtesy of CHRYSLER GROUP, LLC

4. Position the power steering reservoir (1) to the air cleaner body. Tighten retaining nut (2) to 12 N.m (105 in. lbs.).
5. Connect the negative battery cable.