

2009 ENGINE

2.0L Diesel - Service Information - Journey

DESCRIPTION

DESCRIPTION

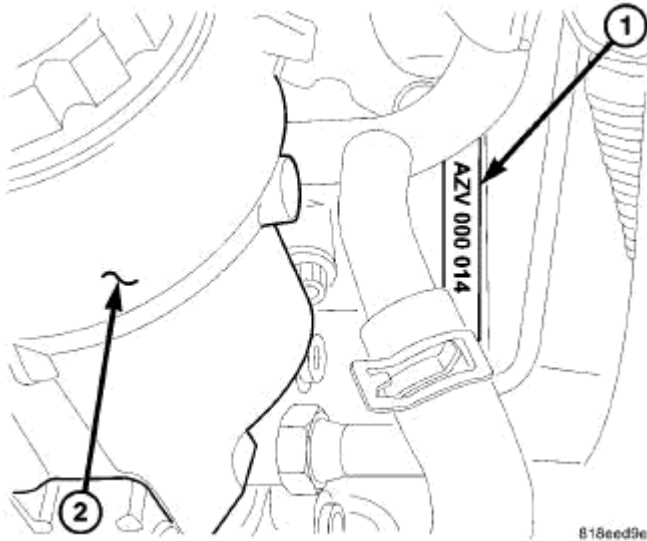


Fig. 1: Serial Number
Courtesy of CHRYSLER LLC

This is an 2.0L electronic unit injector turbo diesel engine. The engine serial number is located on the rear flange of the engine block behind the oil filter housing (2).

STANDARD PROCEDURE

COMPRESSION TESTING ENGINE

CAUTION: Injector retaining bolts must be replaced after performing compression test.

1. Warm up engine to operating temperature (approximately 80 °C, 176°F).
2. Shut off engine.
3. Remove engine cover. See **Removal** .
4. Disconnect fuel feed and return lines from the fuel filter.
5. Operate a vacuum pump connected to the return line until no more fuel comes out.
6. Remove injectors. Refer to **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Removal** .

7. Crank engine several times with the starter to eliminate combustion residues in the cylinders.
8. Insert compression adapter 9889 into injector hole of cylinder to be tested. Install injector retainer bolts and tighten.
9. Test compression pressure by cranking engine with starter for at least 8 revolutions.
10. Carry out test procedure at the remaining cylinders in the same way.
11. Compare pressure readings obtained with the specified pressures. If the pressure reading is below the minimum compression pressure or if the permissible difference between the individual cylinders is exceeded. See **Standard Procedure** .

COMPRESSION SPECIFICATION - 2.0L

COMPRESSION SPECIFICATION	
Minimum Allowable	18 bar (261 psi.)
Maximum Allowable	3 bar (44 psi.)
Difference Between Cylinders	
Average Compression	24 - 30 bar (348 - 435 psi)

12. Remove adapter from cylinder head.

NOTE: **Injector retaining bolts must be replaced when installing injectors.**

13. Install injectors with new bolts. Refer to **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Installation** .
14. Install engine cover. See **Installation** .

FORM-IN-PLACE GASKETS AND SEALERS

NOTE: **All sealants mentioned below are not used on every engine, they are listed as general reference guide. See Service Information for specific sealer usage.**

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 of 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. All sealing surfaces that use form-in-place gaskets and sealers must be free of grease or oil. Clean surfaces with Mopar® brake parts cleaner prior to sealer application. After the sealer is applied, assemble the parts within 10 minutes.

Numerous types of form-in-place gasket materials are used in the engine area. Mopar® Sealant RTV Silicone Rubber Adhesive, MOPAR® Silicone Rubber RTV, Mopar® ATF-RTV and Mopar® Gasket Maker gasket materials, each have different properties and cannot be used in place of the other.

MOPAR® SEALANT RTV SILICONE RUBBER ADHESIVE 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® SILICONE RUBBER RTV is used to seal components exposed to engine oil, gear lubricant, and coolant. This material is a specially designed gray silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil, gear lubricant and coolant. Excellent adhesion even on oily surfaces, withstands temperatures to 330° C (626° F). 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 is a specially 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 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 is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. It can be used on threaded and machined parts under all temperatures. This material also prevents corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or in a 4 oz. or 6 oz. can with applicator.

SEALER APPLICATION

Apply 1 mm (0.040 in.) diameter or less of Mopar® Gasket Maker material to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Tighten the components in place within 15 minutes. Use a locating dowel during assembly to prevent smearing material off the location.

Apply Mopar® RTV or ATF-RTV gasket material in a continuous bead approximately 3 mm (0.120 in.) in diameter. For corner sealing and "T-Joint" locations and waffle pad area, a 0.635 mm (0.025 in.) drop is placed in the center of the gasket contact area. Remove uncured sealant with a shop towel. Tighten the components in place while the sealant is still wet to the touch (within 10 minutes). Use a locating dowel during assembly to prevent smearing material off the location.

CYLINDER LEAK DOWN TEST

1. Warm engine to operating temperature.

WARNING: Do not open cooling system unless coolant temperature is below 90° C (194°F). Risk of injury to skin and eyes as a result of scalding with hot coolant which splashes out. Risk of poisoning from swallowing coolant. Open cap slowly and release pressure. Store coolant in proper containers only. Wear protective gloves, clothing and eye protection.

NOTE: Turn cap carefully as far as first detent, release pressure, then unscrew cap.

2. Open cooling system cap at coolant recover pressure container.
3. Remove engine cover. See **Removal** .
4. Unscrew oil filler cap.
5. Remove glow plugs. Refer to **Electrical - Ignition Control/Ignition Control/PLUG, Glow - Removal** .

NOTE: Crank engine at crankshaft in direction of rotation of the engine (clockwise).

6. Position cylinder to be tested to ignition Top Dead Center (TDC).

NOTE: Calibrate cylinder leak down tester and remove check valve in screw-in fitting.

7. Connect cylinder leak down tester and refer to **INSPECTING**.

INSPECTING

NOTE: If crankshaft rotates, install retaining lock for crankshaft/ring gear.

1. Pressurize cylinder with compressed air and read off pressure loss at cylinder leak tester. If excessive pressure loss exists, refer to **DETERMINING PRESSURE LOSS**.

NOTE: If the retaining lock is installed, remove it, rotate engine and install lock once again.

2. Carry out test of other cylinders in the firing order of engine.

DETERMINING PRESSURE LOSS

If a great pressure loss was detected, listen using a stethoscope around suspected areas, such as the cylinder head gasket through the air suction area, the exhaust system, the oil filler neck, the pre-chamber, the bore wholes of the cylinder effected or neighboring cylinders. Observe the coolant in the expansion tank, looking for traces of bubbles.

The possible causes of pressure loss are:

- If air leak is detected through the prechamber, cylinder bore hole, from a neighboring cylinder or air bubbles in the coolant expansion tank, pressure loss may be caused by the cylinder head gasket.
- If the air leak occurs in the air suction area, the pressure loss may be caused by the intake valve(s).
- Air leak through the exhaust system, may be caused by the exhaust valve(s).

- Air leak through the oil filler neck, may be caused by piston, ring, or cylinder sleeve.

If none of the above evidence supports a failure, the engine may be assembled and run until operating temperature is reached. Reconnect engine leak down tester on a warm engine with a few drops of clean engine oil in the cylinder being tested. Engine oil seals the clearance between the piston and cylinder for a short length of time. If under this condition a smaller pressure loss occurs for a shorter length of time, it is possible that the cause is piston, ring or cylinder sleeve related.

ENGINE GASKET SURFACE PREPARATION

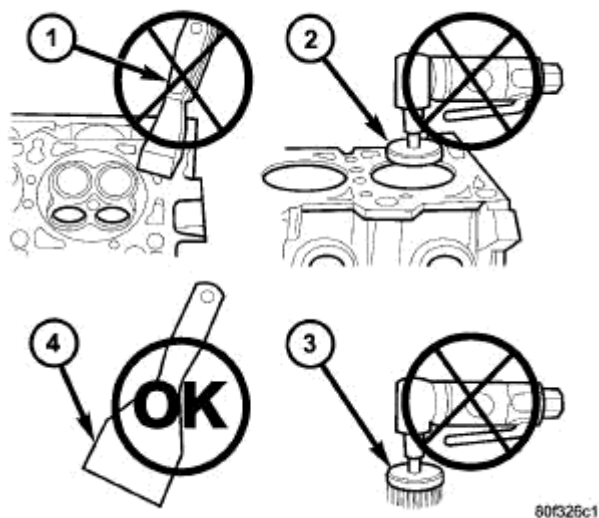


Fig. 2: Proper Tool Usage For Surface Preparation

Courtesy of CHRYSLER LLC

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 (1).
- High speed power tool with an abrasive pad or paper to clean cylinder block and head (2).
- High speed power tool with 3M Roloc™ Bristle Disc (white or yellow) (3).

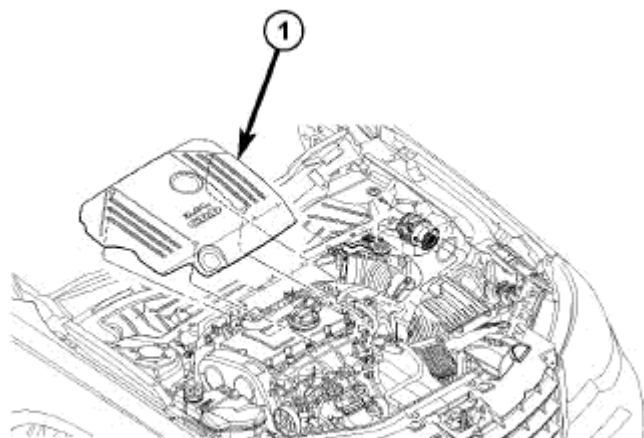
NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover.
- Plastic or wood scraper (4).

REMOVAL

ENGINE COVER



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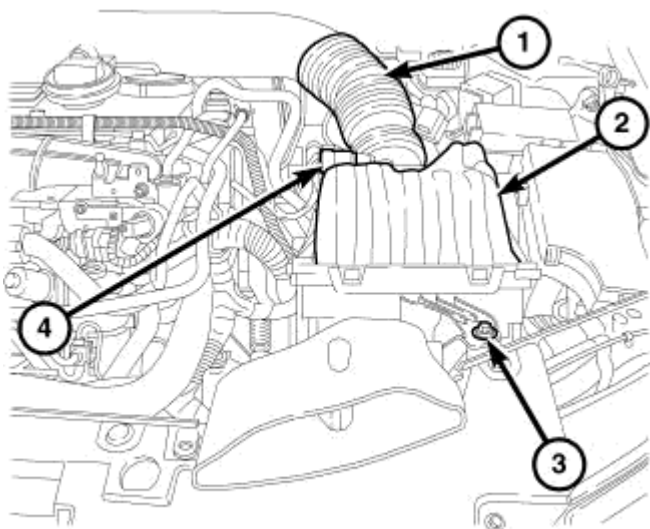
Fig. 3: Engine Cover Removal/Installation

Courtesy of CHRYSLER LLC

1. Remove engine cover (1) by lifting upwards.

ENGINE

CAUTION: When removing or disconnecting components, plug all inlet/outlet and fluid lines to prevent residual leakage and contamination.

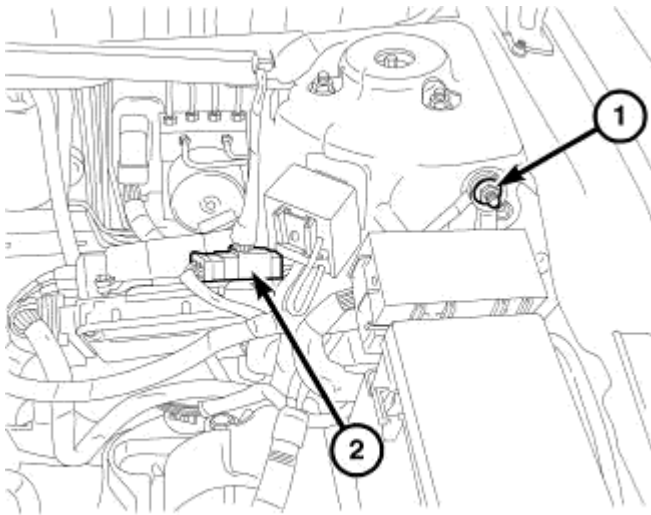


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Fig. 4: Air Cleaner Housing

Courtesy of CHRYSLER LLC

1. Remove air cleaner assembly (2).

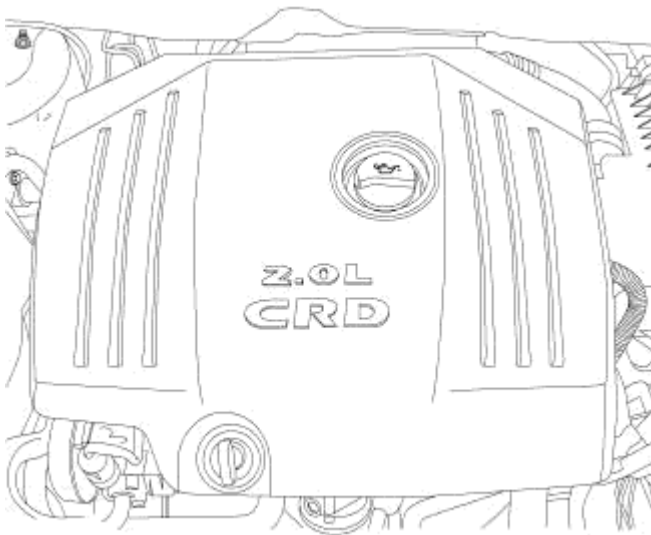


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Fig. 5: Battery Cable

Courtesy of CHRYSLER LLC

2. Disconnect negative battery cable (1).



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Fig. 6: Engine Cover

Courtesy of CHRYSLER LLC

3. Remove engine cover. See **Removal** .
4. Remove body ground.

5. Disconnect the EGR cooler vacuum line.
6. Disconnect the swirl valve vacuum line.
7. Disconnect the turbocharger vacuum line.
8. Disconnect ECM connector.

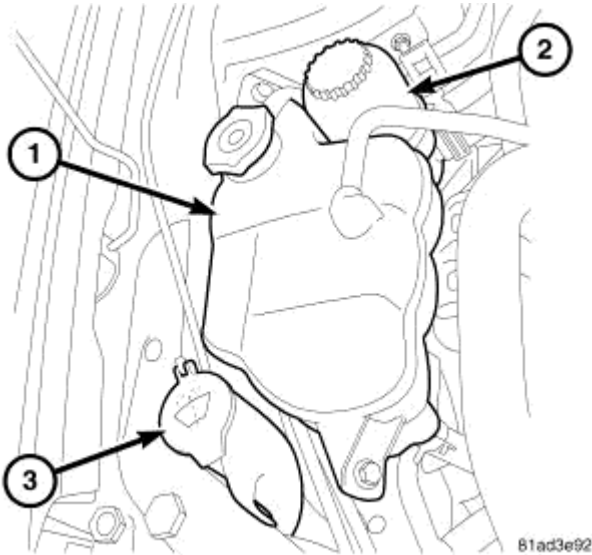


Fig. 7: Coolant Reservoir
Courtesy of CHRYSLER LLC

9. Drain cooling system. Refer to Cooling - Standard Procedure .
10. Discharge air conditioning. Refer to Heating and Air Conditioning/Plumbing - Standard Procedure .
11. Remove cooling module assembly. Refer to Cooling/Engine/FAN, Cooling - Removal .
12. Remove coolant recovery reservoir (2).
13. Remove power steering reservoir (3) and reposition.

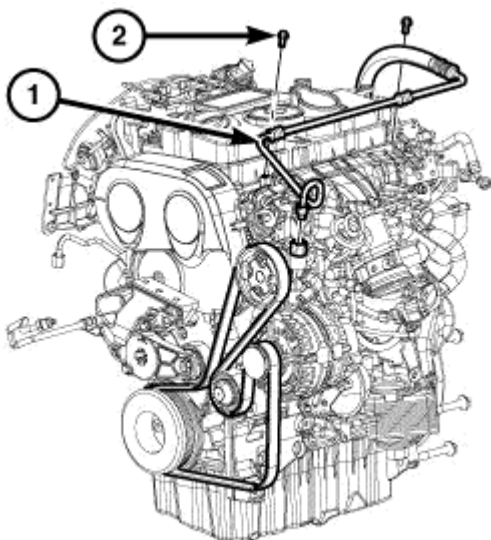
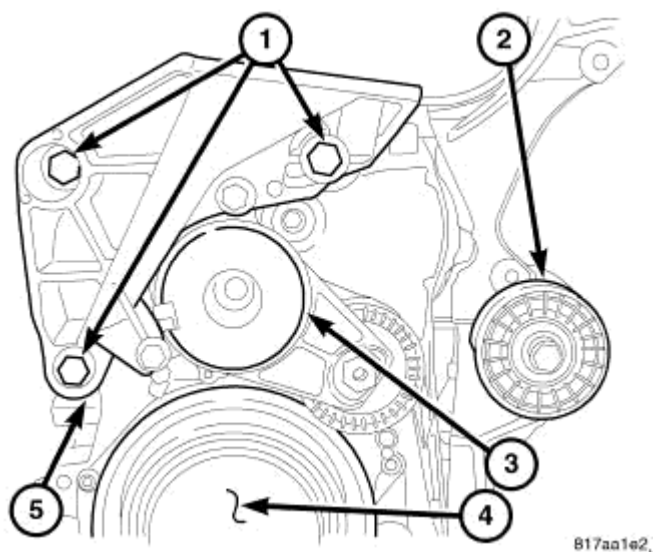


Fig. 8: Pressure Line

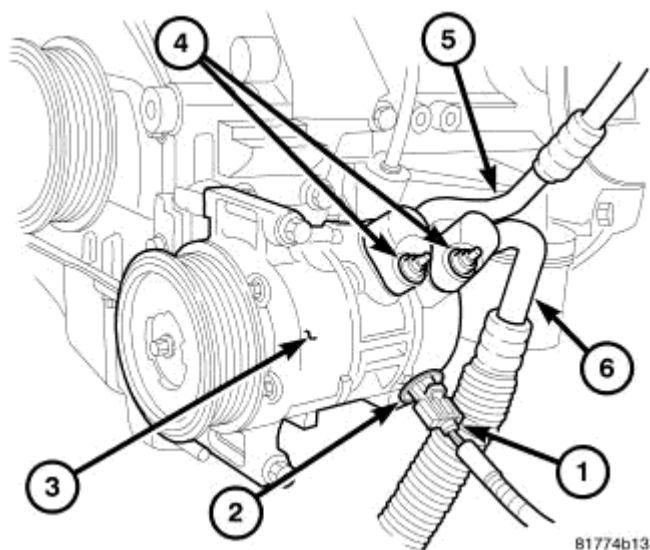
Courtesy of CHRYSLER LLC

14. Remove accessory drive belt (5).
15. Remove power steering line support bracket retaining bolt (2).
16. Remove power steering pump (6) and set aside.

**Fig. 9: Right Engine Mount Bracket**

Courtesy of CHRYSLER LLC

17. Remove accessory drive idler pulley (2).
18. Disconnect electrical connectors at generator.
19. Remove generator.

**Fig. 10: A/C Compressor-Refrigerant Lines**

Courtesy of CHRYSLER LLC

20. Disconnect A/C compressor electrical connector (2).
21. Disconnect A/C lines (4) at the compressor.
22. Remove A/C compressor (3).

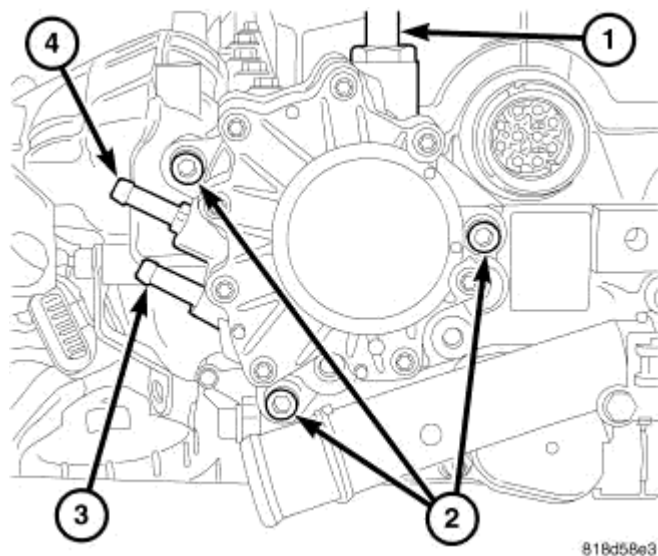


Fig. 11: Tandem Pump
Courtesy of CHRYSLER LLC

23. Disconnect vacuum hose at tandem pump (1).
24. Disconnect heater hoses at engine.
25. Remove air inlet tube from intake manifold.

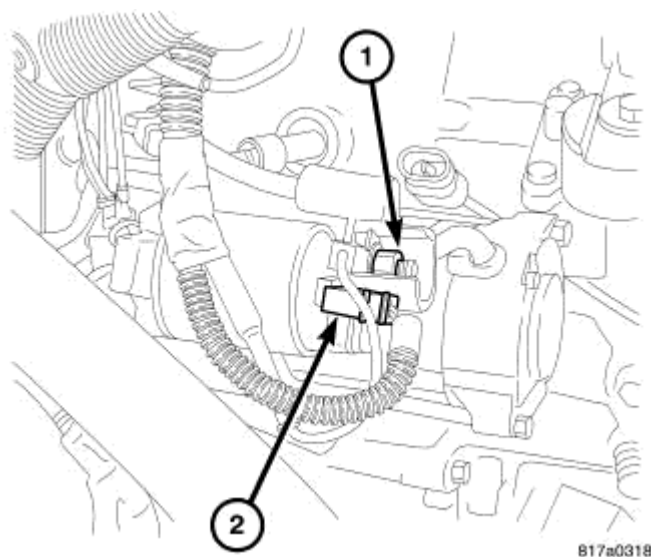


Fig. 12: Starter Electrical
Courtesy of CHRYSLER LLC

26. Disconnect starter electrical connections (1, 2) and remove starter.

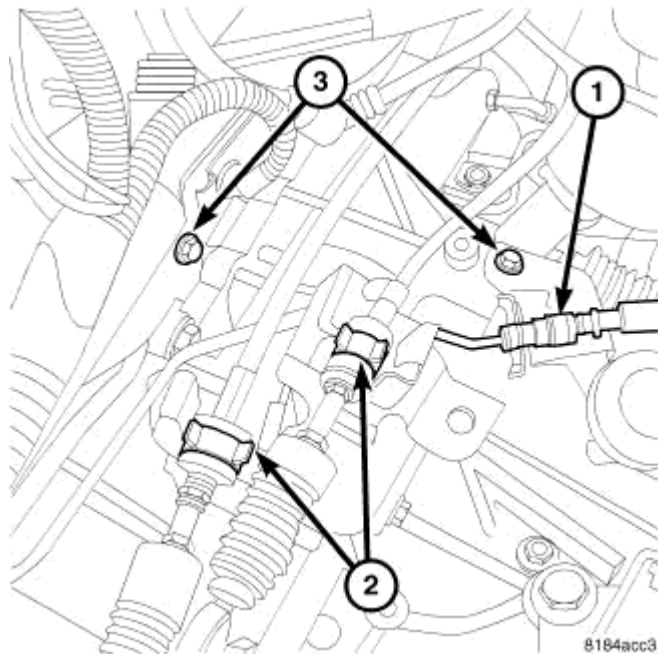


Fig. 13: Hydraulic Line
Courtesy of CHRYSLER LLC

27. Remove shift cables (2) from transaxle.
28. Remove shift cable retaining bracket from transaxle.
29. Disconnect hydraulic clutch line (1).

NOTE: When removing tripod joint, DO NOT let spline or snap ring drag across transaxle oil seal lip.

30. Remove left and right axle shafts. Refer to **Differential and Driveline/Half Shaft - Removal** .

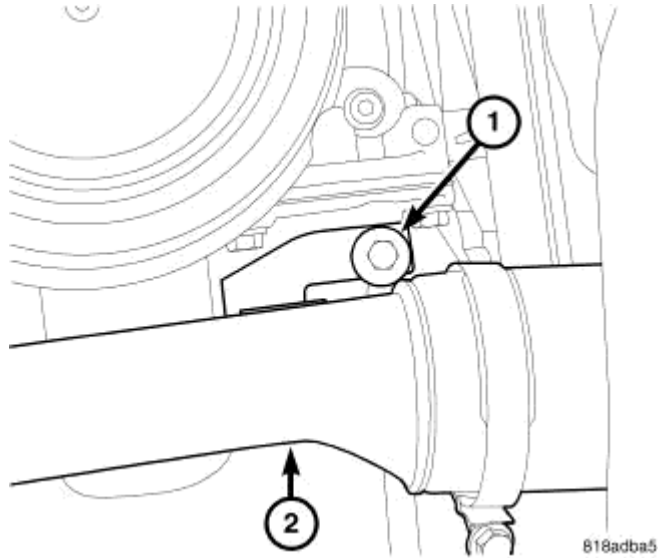


Fig. 14: Air Inlet Tube
Courtesy of CHRYSLER LLC

31. Remove turbocharger inlet and outlet tubes.
32. Remove air tube retaining bolt (1) and remove air inlet tube (2).

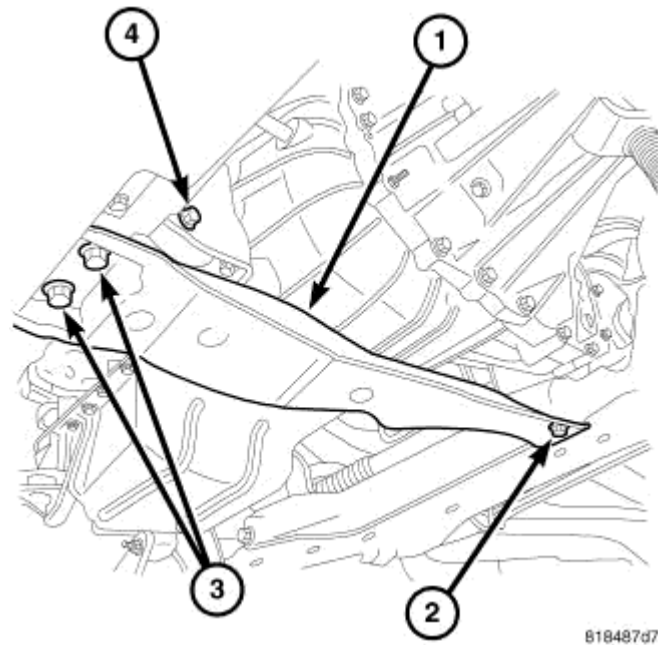
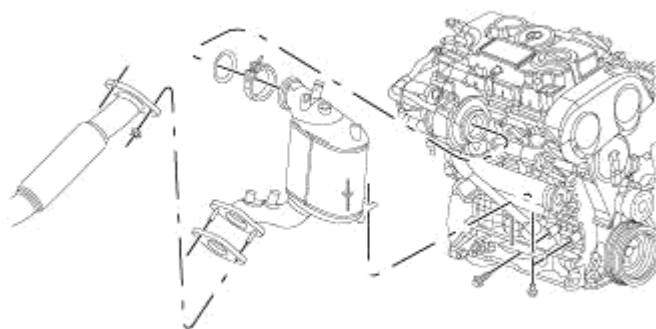


Fig. 15: Transmission Crossmember
Courtesy of CHRYSLER LLC

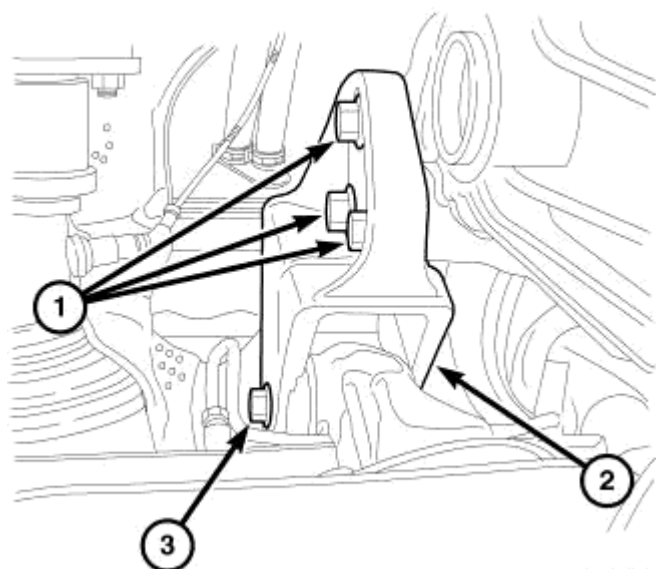
33. Remove front transaxle mount through bolt (4).
34. Remove fore/aft member retaining bolts (2,3) and remove fore/aft member (1).



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Fig. 16: Catalytic Converter - Diesel
Courtesy of CHRYSLER LLC

35. Disconnect catalytic converter (1) from exhaust pipe.
36. Loosen catalytic converter clamp (2) and remove catalytic converter (1) and gasket (3) from turbocharger.
37. Remove catalytic converter assembly (1).
38. Remove PTU assembly (if equipped).



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Fig. 17: Rear Mount
Courtesy of CHRYSLER LLC

39. Remove rear engine mount through bolt (3).

40. Remove rear engine mount bracket retaining bolts (1) and remove engine mount bracket (2).
41. Remove rear engine mount.

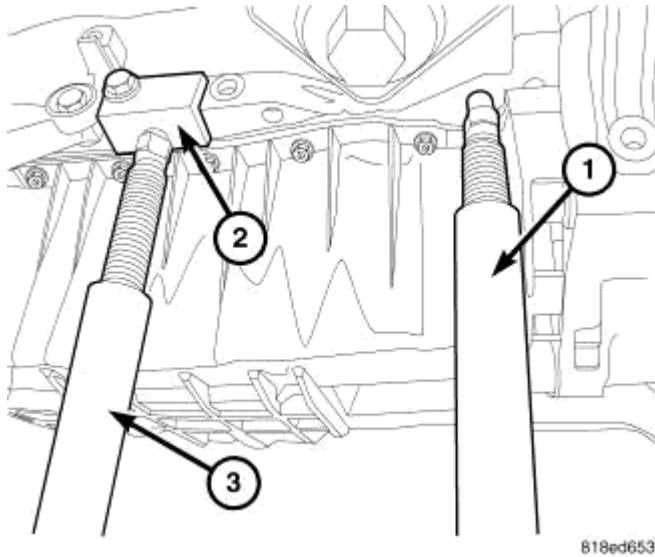


Fig. 18: Engine Cradle Bracket 6973
Courtesy of CHRYSLER LLC

42. Install engine cradle bracket 6973 (2) to engine block.

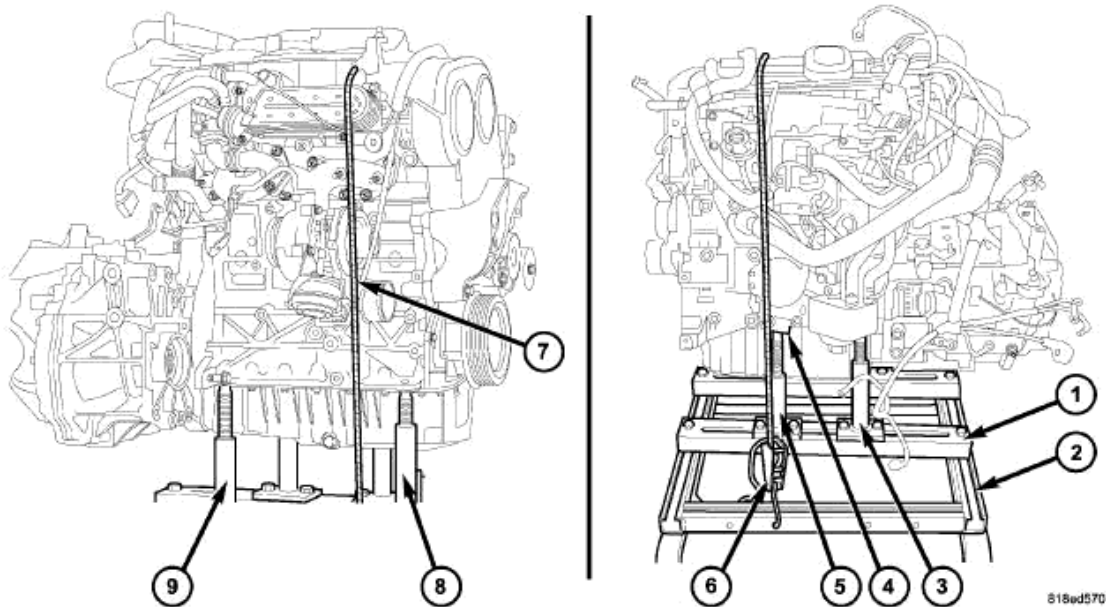


Fig. 19: Engine Dolly
Courtesy of CHRYSLER LLC

43. Lower vehicle and position power train dolly 6135 (2) and engine support cradle 6710A (1) under engine.
44. Position the engine cradle support and dolly with the support posts 6710A (3,5,8,9) underneath the

engine.

45. Carefully lower the vehicle enough to position the engine above the support posts.
46. Adjust the height of each support post as necessary and tighten the support posts and cradle fasteners.

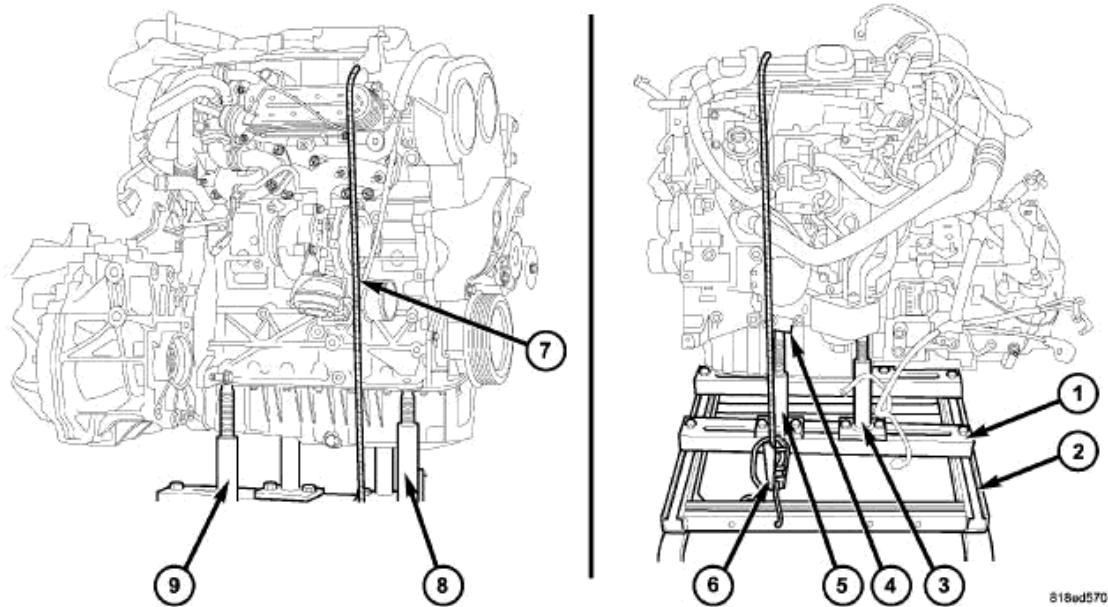


Fig. 20: Engine Dolly
Courtesy of CHRYSLER LLC

47. Carefully lower vehicle enough to seat engine onto support posts.

WARNING: Safety straps must be used to secure engine to the dolly fixture.

48. Install, tighten and lock safety straps (6,7) around engine and attach them to the cradle.
49. Lower vehicle so that only the weight of the engine and transmission assembly is on dolly fixture.

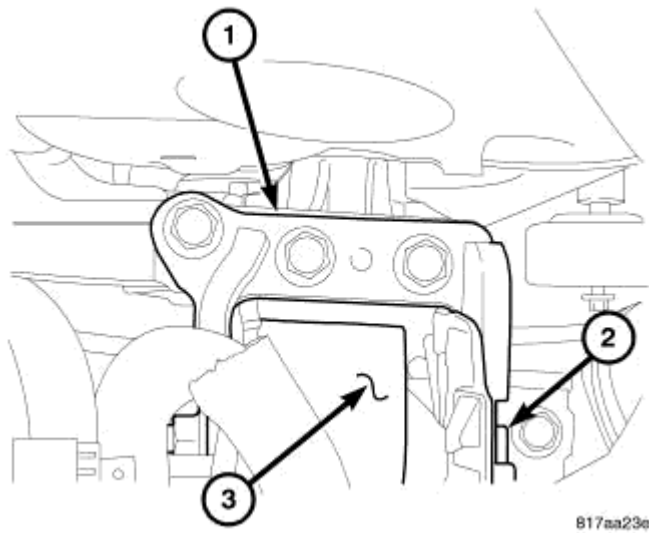


Fig. 21: Right Engine Mount
Courtesy of CHRYSLER LLC

50. Remove right mount (1) to engine bracket retaining bolts.

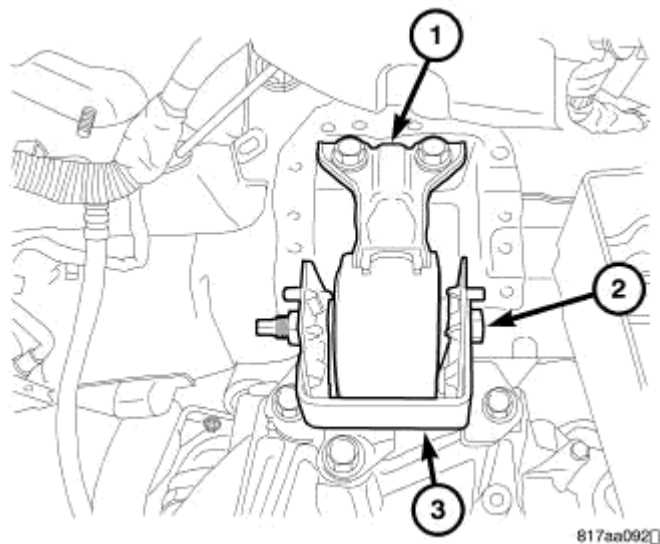


Fig. 22: Left Engine Mount
Courtesy of CHRYSLER LLC

51. Remove left mount (3) to transaxle retaining bolts.

CAUTION: It may be necessary to adjust the engine and transmission assembly, with the dolly fixture attached, to successfully clear the engine compartment.

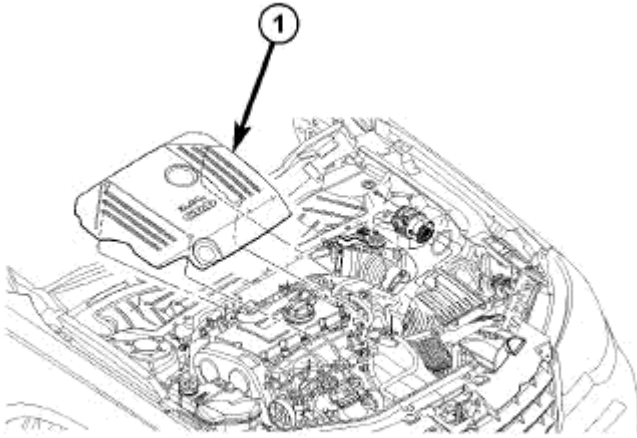
52. While watching for obstructions, slowly raise the vehicle until the engine and transmission assembly clear

the engine compartment.

53. Separate engine and transmission.

INSTALLATION

ENGINE COVER



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Fig. 23: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

1. Align engine cover (1) with mounting retainers.
2. Firmly press cover onto mounting studs.

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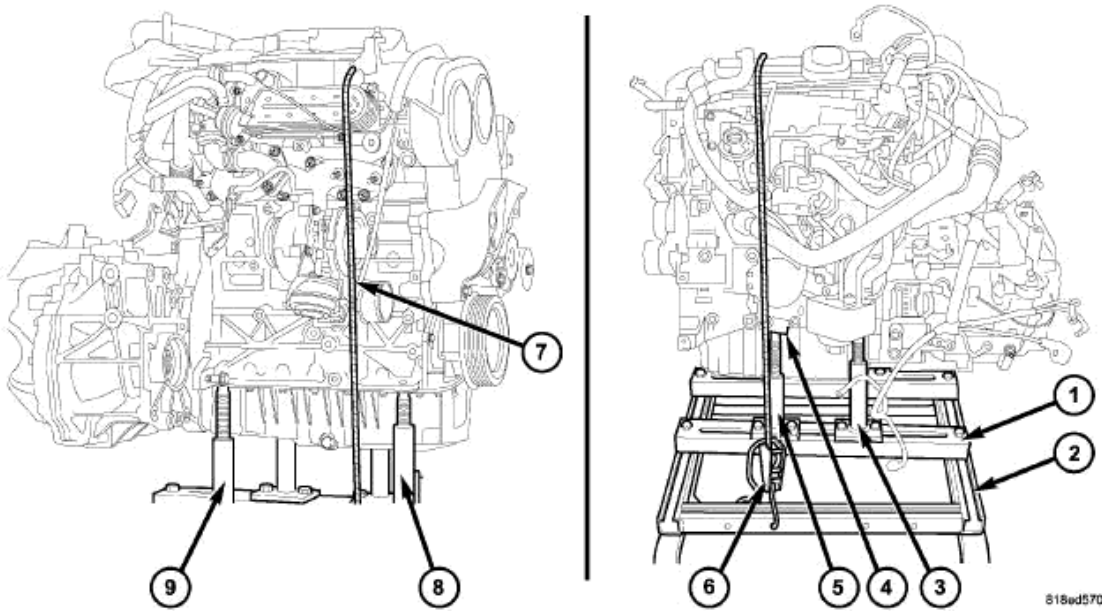


Fig. 24: Engine Dolly

Courtesy of CHRYSLER LLC

WARNING: Safety straps must be used to secure engine to the dolly fixture.

1. Seat engine onto fixture support posts then install safety straps (6,7) around engine, securing it to the cradle.
2. Position the engine and transmission assemblies below vehicle engine compartment.

CAUTION: It may be necessary to adjust the engine and transmission assembly, with the dolly fixture attached, to successfully clear the engine compartment.

3. While watching for obstructions, slowly lower the vehicle until the engine and transmission assembly clearly fit the engine compartment.

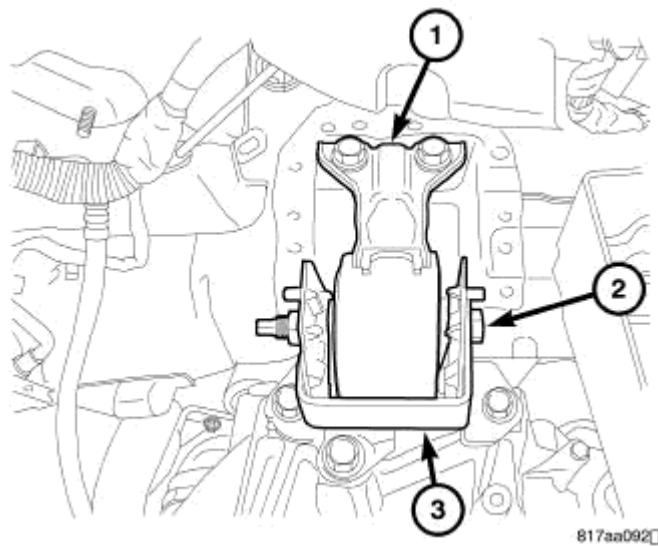


Fig. 25: Left Engine Mount
Courtesy of CHRYSLER LLC

4. Install left mount bracket (3) to transaxle retaining bolts and tighten to 65 N.m (50 ft. lbs.).

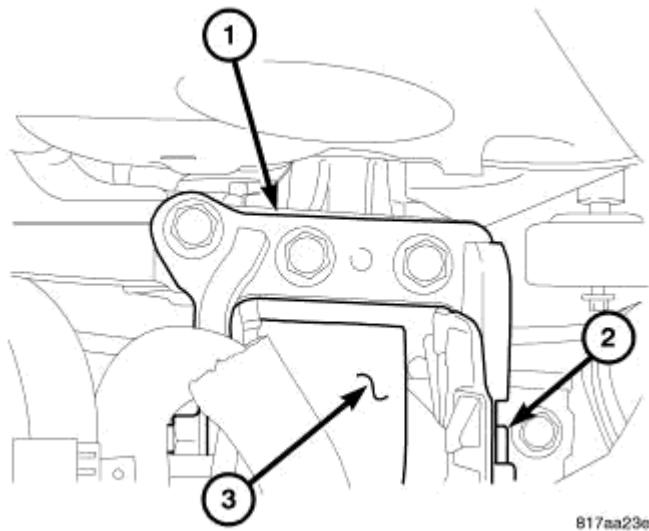


Fig. 26: Right Engine Mount
Courtesy of CHRYSLER LLC

5. Install right mount bracket (1) to frame rail retaining bolts and tighten to 65 N.m (50 ft. lbs.).

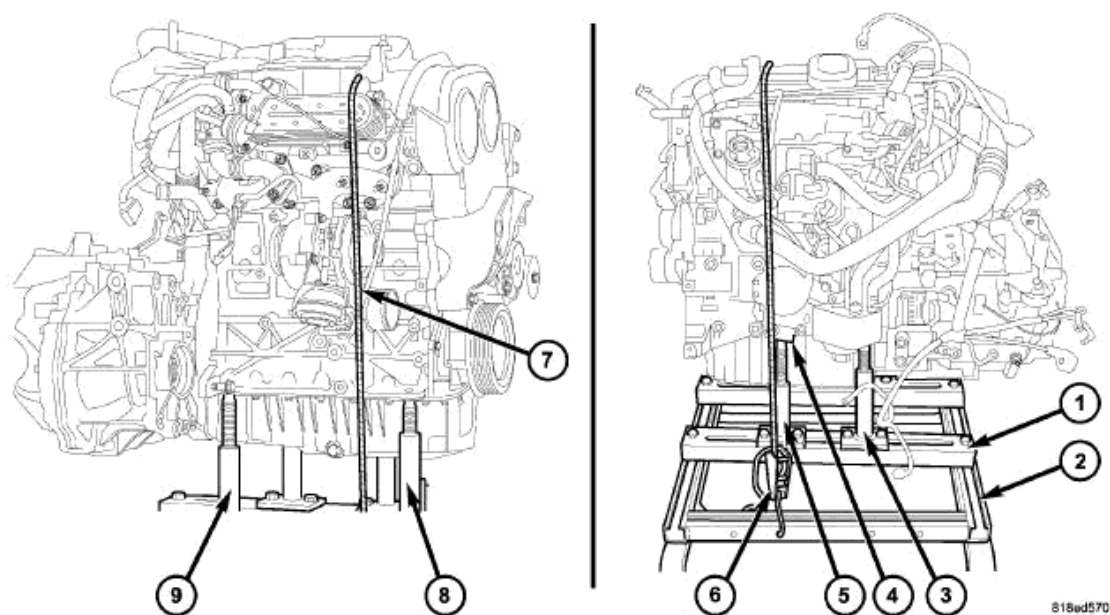


Fig. 27: Engine Dolly
Courtesy of CHRYSLER LLC

6. Remove safety straps (6,7) and remove dolly fixture
7. Carefully raise the vehicle enough to clear the cradle and support post.
8. Install catalytic converter loosely with new seal.
9. If equipped, install PTU.
10. Place a suitable jack under transaxle and raise engine/trans assembly.
11. Install exhaust to PTU mount.

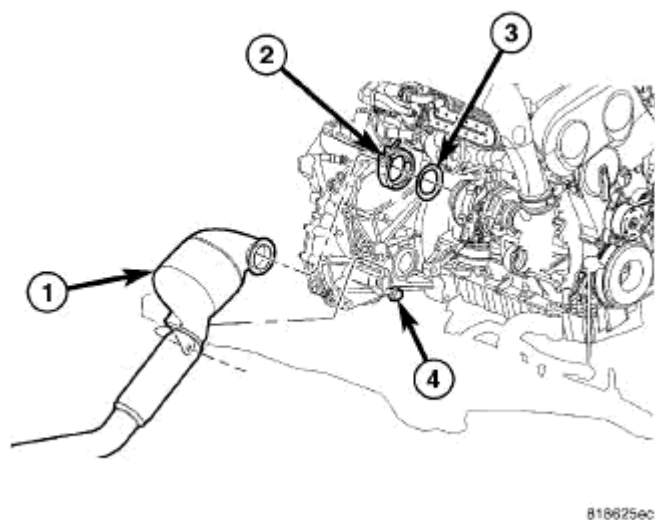


Fig. 28: Catalytic Converter - Diesel

Courtesy of CHRYSLER LLC

12. Install catalytic converter band clamp (2) and tighten.
13. Install power steering hose clamp to exhaust manifold.
14. Install PTU to block support bracket.

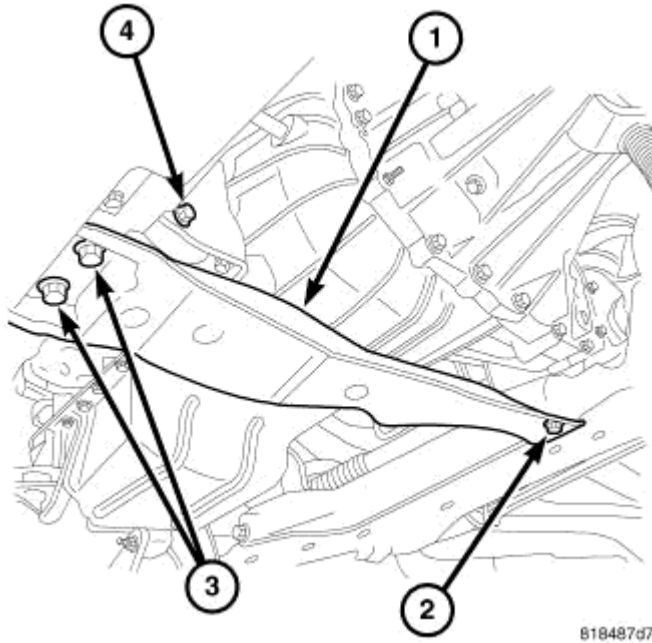


Fig. 29: Transmission Crossmember
Courtesy of CHRYSLER LLC

15. Install rear mount bracket to cradle.
16. Install front transaxle mount bracket to transaxle.
17. Install fore/aft member (1).

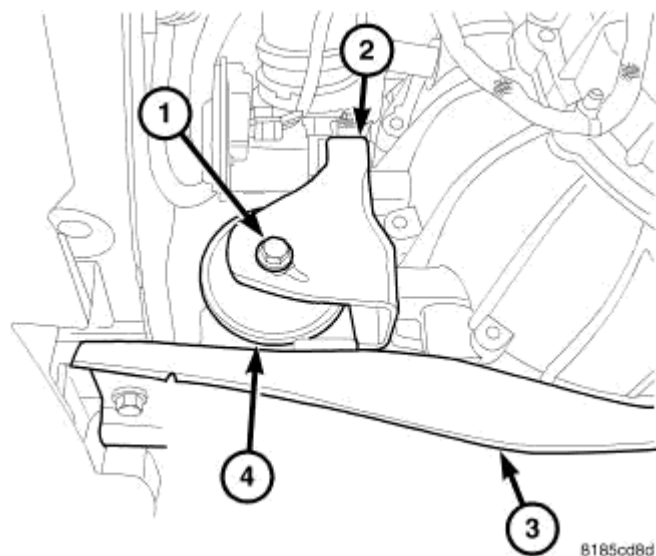


Fig. 30: Front Mount Through Bolt
Courtesy of CHRYSLER LLC

18. Install front mount through bolt (1) and tighten.
19. Install turbo outlet pipe.
20. Install axle shafts. Refer to **Differential and Driveline/Half Shaft - Installation** .
21. Install turbo inlet pipe from air cleaner to turbocharger.
22. Install charge air hose from inter cooler to throttle body.
23. Install shift cables.

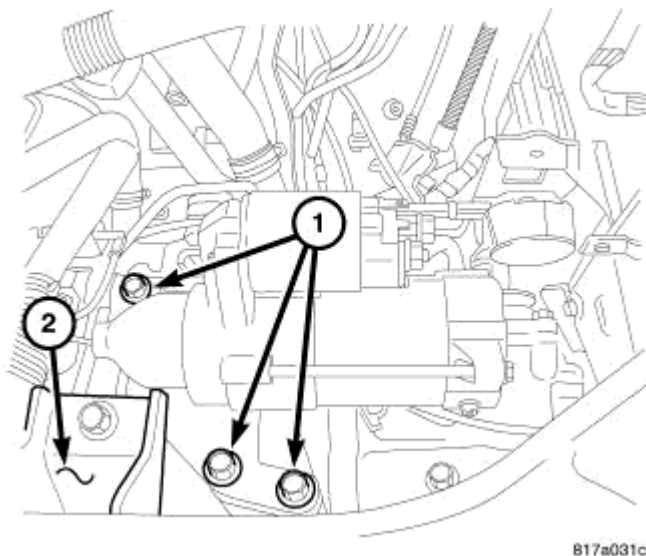


Fig. 31: Starter Bolts
Courtesy of CHRYSLER LLC

24. Position starter and install starter mounting bolts (1).

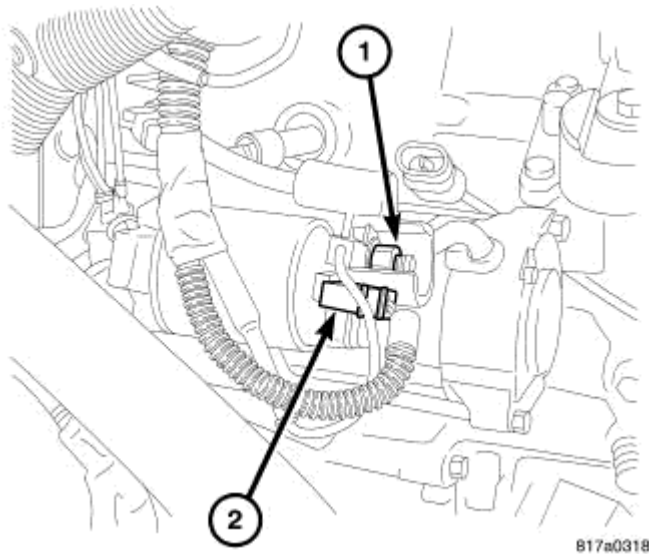


Fig. 32: Starter Electrical
Courtesy of CHRYSLER LLC

25. Connect starter electrical connectors.
26. Install vacuum harness and coolant tube.
27. Connect fuel lines near head.
28. Connect vacuum hose to brake booster.

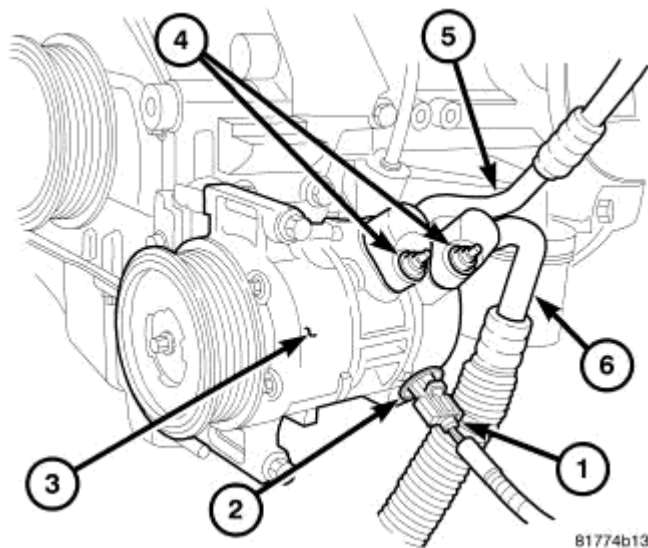


Fig. 33: A/C Compressor-Refrigerant Lines
Courtesy of CHRYSLER LLC

29. Install A/C compressor (3) and connect A/C lines (4).
30. Connect engine wiring harness connectors.
31. Install generator and connect electrical connectors.

32. Install serpentine belt tensioner and install serpentine belt.

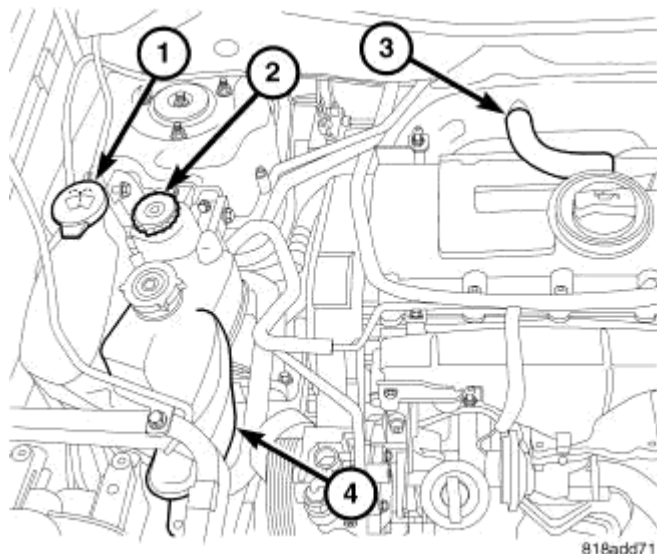


Fig. 34: Coolant Reservoir
Courtesy of CHRYSLER LLC

33. Install coolant reservoir (4).
34. Install coolant module, connect cooling fan connectors.
35. Connect upper and lower radiator hoses.
36. Connect charge air hoses to intercooler.
37. Connect A/C lines to condenser and connect electrical connectors.
38. Fill engine with coolant. Refer to **Cooling - Standard Procedure**.

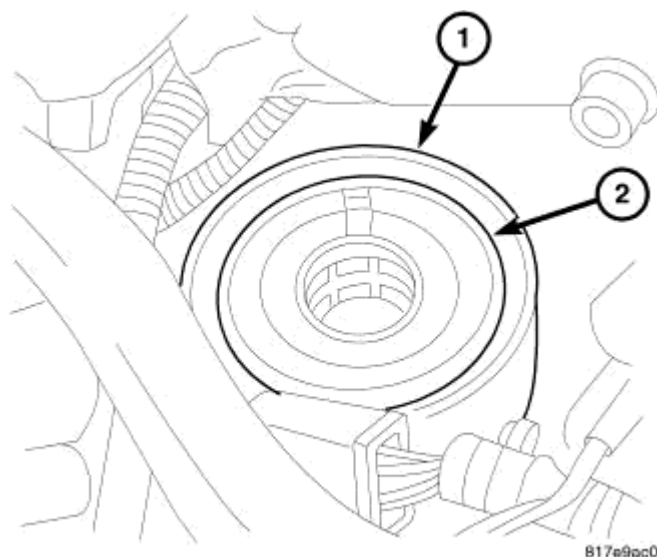
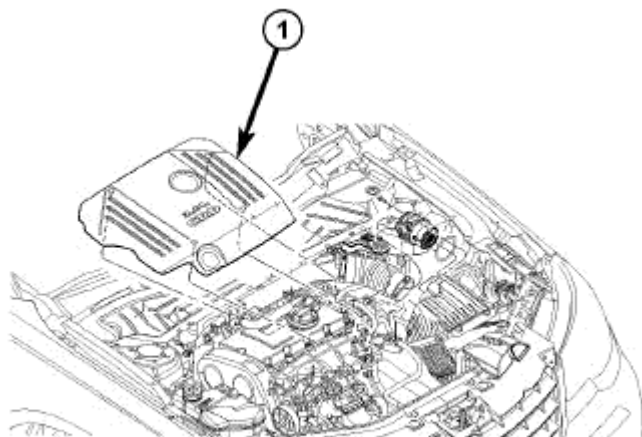


Fig. 35: Filter In Housing
Courtesy of CHRYSLER LLC

39. Install new oil filter (2) and fill engine with oil.



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Fig. 36: Engine Cover-Removal/Installation

Courtesy of CHRYSLER LLC

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

40. Evacuate the refrigerant system. Refer to **Heating and Air Conditioning/Plumbing - Standard Procedure**.
41. Charge the refrigerant system. Refer to **Heating and Air Conditioning/Plumbing - Standard Procedure**.
42. Install engine cover (1).
43. Start engine and check for leaks.

SPECIFICATIONS

2.0L DIESEL ENGINE

GENERAL

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Type	In-Line OHV, DOHC	
Number of Cylinders	4	
Firing Order	1 - 3 - 4 - 2	
Compression Ratio	18.5:1	

2009 Dodge Journey R/T

2009 ENGINE 2.0L Diesel - Service Information - Journey

Max. Variation Between Cylinders	25%	
Displacement	2.0 L	122 CID
Bore	81.0 mm	3.188 in.
Stroke	95.5 mm	3.759 in.

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Material	Cast Iron	
Cylinder Bore Diameter	81.01 mm	3.189 in.
Cylinder Bore Diameter Out-of-Round (Max.)	0.10 mm	0.003 in.
Cylinder Bore Diameter Taper (Max.)	0.10 mm	0.003 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Diameter	80.96 mm	3.187 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring Gap-Top Compression Ring	0.20 - 0.40 mm	0.007 - 0.015 in.
Wear Limit	1.0 mm	0.039 in.
Ring Gap - 2nd Compression Ring	0.20 - 0.40 mm	0.007 - 0.015 in.
Wear Limit	1.0 mm	0.039 in.
Ring Gap - Oil Scraper	0.20 - 0.50 mm	0.007 - 0.019 in.
Wear Limit	1.0 mm	0.039 in.
Ring Side Clearance-Top Compression	0.06 - 0.09 mm	0.002 - 0.003 in.
Wear Limit	0.25 mm	0.009 in.
Ring Side Clearance -2nd Compression Ring	0.05 - 0.08 mm	0.001 - 0.003 in.
Wear Limit	0.25 mm	0.009 in.
Ring Side Clearance - Oil Scraper	0.03 - 0.06 mm	0.001 - 0.002 in.
Wear Limit	0.15 mm	0.005 in.

CONNECTING ROD

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Clearance	0.03 - 0.08 mm	0.001 - 0.003 in.

2009 Dodge Journey R/T

2009 ENGINE 2.0L Diesel - Service Information - Journey

Side Clearance	0.37 mm	0.014 in.
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CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Connecting Rod Journal Diameter	50.878 - 50.942 mm	2.003 - 2.005 in.
Main Bearing Journal Diameter	53.978 - 54.042 mm	2.125 - 2.127 in.
End Play	0.07 - 0.17 mm	0.002 - 0.006 in.
Wear Limit	0.37 mm	0.014 in.
Main Bearing Clearance	0.03 - 0.08 mm	0.001 - 0.003 in.
Wear Limit	0.17 mm	0.006 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
End Play - Max	0.15 mm	0.005 in.

VALVE GUIDE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Stem to Guide Clearance - Max	1.3 mm	0.051 in.
NOTE: Insert new valve into guide. The end of the valve stem must be flush with guide. Use only inlet valve in inlet guide and exhaust valve in exhaust guide. Determine rock. Cylinder head must be renewed if rock exceeds wear limit.		

VALVES

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Face Angle - Intake and Exhaust	45°	45°
Head Diameter - Intake	29.40 mm	1.157 in.
Head Diameter - Exhaust	25.50 mm	1.003 in.
Valve Length (Overall)	-	-
Intake	88.50 mm	3.484 in.
Exhaust	88.20 mm	3.472 in.
Valve Stem Diameter	-	-
Intake	5.980 mm	0.235 in.
Exhaust	5.965 mm	0.234 in.

VALVE STEM TO GUIDE CLEARANCE

DESCRIPTION	SPECIFICATION	
	Metric	Standard

2009 Dodge Journey R/T

2009 ENGINE 2.0L Diesel - Service Information - Journey

Intake	-	-
Max. Allowable	1.3 mm	0.051 in.
Exhaust	-	-
Max. Allowable	1.3 mm	0.051 in.

OIL PRESSURE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
At Curb Idle Speed*	0.55 bar	8 psi
At 2000 RPM	2.0 bar	29 psi
Max Oil Pressure	7.0 bar	101 psi

CAUTION:***If pressure is ZERO at curb idle, DO NOT run engine at 2000 RPM.****TORQUE**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Accessory Bracket-Bolts	45	33	-
Accessory Drive Belt Tensioner-Bolt	25	-	221
Bearing Frame-Bolts	20	-	177
Cable Retainer-Bolts	10	-	89
Camshaft Hub-Bolt	100	74	-
Camshaft Position Sensor-Bolt	10	-	89
Camshaft Sprocket-Bolt	25	-	221
Connecting Rod Cap-Bolts	30 + 90°	22 + 90°	-
Crankshaft Main Bearing Cap-Bolts	65 + 90°	48 + 90°	-
Crankshaft Damper-Bolt	10 + 90°	-	89 + 90°
Crankshaft Position Sensor-Bolt	5	-	44
Crankshaft Front Sealing Flange-Bolts	15	-	133
Crankshaft Rear Sealing Flange-Bolts	15	-	133
Crankshaft Sprocket	120 + 90°	89 + 90°	-
Cylinder Head-Bolts	Refer to Procedure		
Cylinder Head Cover-Bolts	10	-	89
Engine Support Bracket-Bolts	45	33	-
Exhaust Gas Recirculation Valve-Bolts	10	-	89
Exhaust Gas Recirculation Valve Tube-Bolts	20	-	177
Exhaust Manifold-Nuts	25	-	221
Exhaust Manifold Heat Shield-Bolts	25	-	221
Flywheel-Bolts	60 + 90°	44 + 90°	-
Fuel Pump-Bolts	20	-	177
Glow Plugs	10	-	89

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Injector-Bolts	3 + 90° + 180°	-	27 + 90° + 180°
Intake Manifold-Bolts	20	-	177
Intake Manifold Flap-Bolts	10	-	89
Oil Cooler Connector Bolt	25	-	221
Oil Filter Cover	25	-	221
Oil Filter Housing-Bolts	15 + 90°	-	133 + 90°
Oil Pan-Bolts	15	-	133
Oil Pan Drain-Plug	30	22	-
Oil Pump-Bolts	15	-	133
Oil Pump Drive Chain Tensioner-Bolt	15	-	133
Oil Pump Pick-up Tube-Bolts	15	-	133
Oil Pump Sprocket-Bolt	22 + 90°	-	195 + 90°
Oil Spray Jet-Bolt	25	-	221
Rocker Arm Shaft-Bolts	20 + 90°	-	177 + 90°
Thermostat Housing-Bolts	15	-	133
Timing Belt Covers	10	-	89
Timing Belt Tensioner Assembly-Nut	20 + 45°	-	177 + 45°
Timing Belt Idler Upper Pulley-Bolt	40 + 90°	30 + 90°	-
Timing Belt Idler Lower Pulley-Nut	20	-	177

SPECIAL TOOLS

2.0L DIESEL

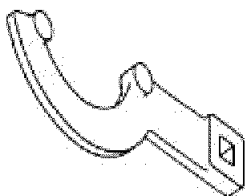
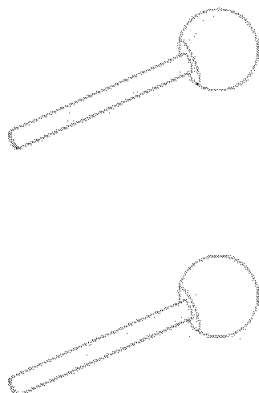


Fig. 37: Camshaft Hub Holder 9880
Courtesy of CHRYSLER LLC



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Fig. 38: Camshaft Locking Pins 9882
Courtesy of CHRYSLER LLC



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Fig. 39: Cam Seal Installer 9884
Courtesy of CHRYSLER LLC

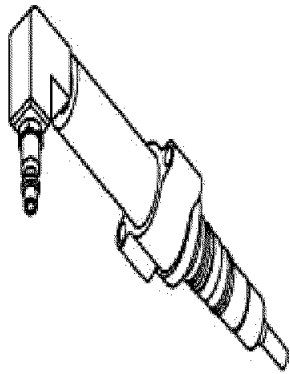
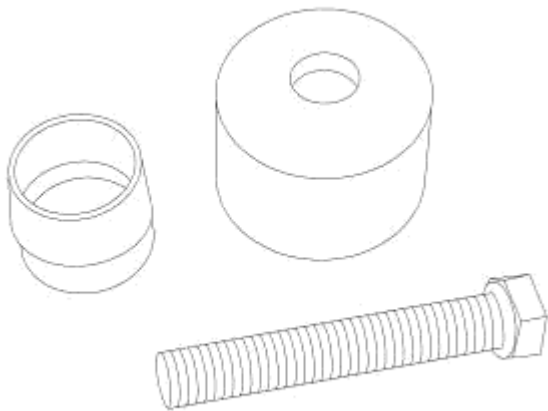
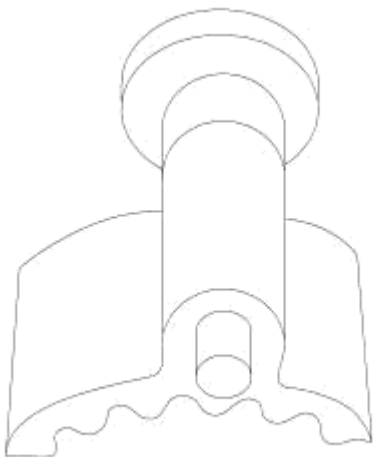


Fig. 40: Compression Adapter 9889
Courtesy of CHRYSLER LLC



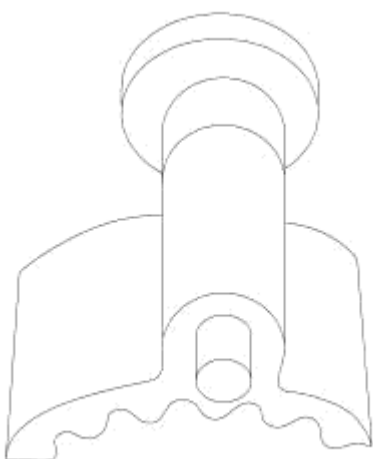
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Fig. 41: Crankshaft Front Oil Seal Installer 9884
Courtesy of CHRYSLER LLC



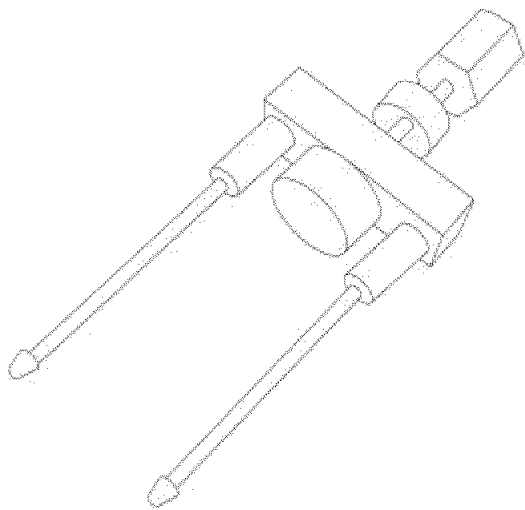
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Fig. 42: Crankshaft Lock 9883
Courtesy of CHRYSLER LLC



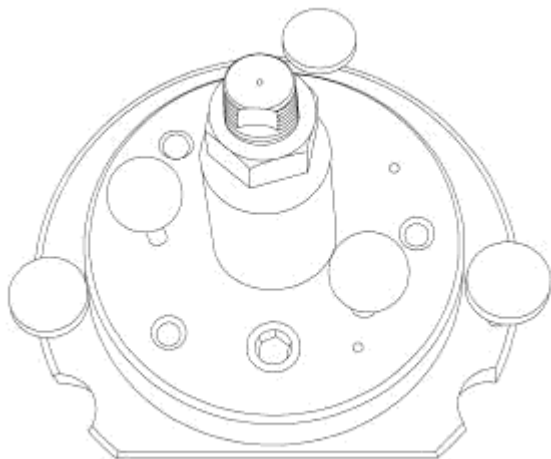
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Fig. 43: Crankshaft Lock 10122
Courtesy of CHRYSLER LLC



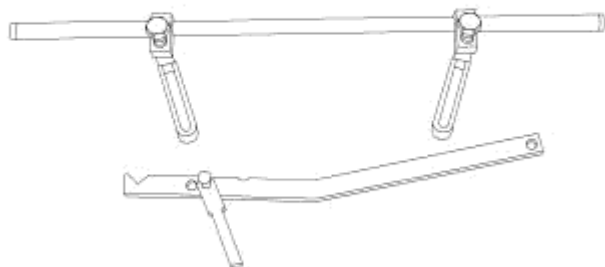
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Fig. 44: Injector Remover 9887
Courtesy of CHRYSLER LLC



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Fig. 45: Rear Main Seal Installer 9888
Courtesy of CHRYSLER LLC



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Fig. 46: Valve Spring Remover Installer 9916

Courtesy of CHRYSLER LLC

CYLINDER HEAD

DESCRIPTION

DESCRIPTION

The aluminum cylinder head is a two piece design. It consists of the cylinder head and a bearing frame.

The cylinder head is a cross flow type design with 4 valves per cylinder. The valves are installed vertically.

The bearing frame is used to mount the camshafts and provides mounting of the central power supply connector. It also provides mounting for the injector rocker shaft.

REMOVAL

REMOVAL

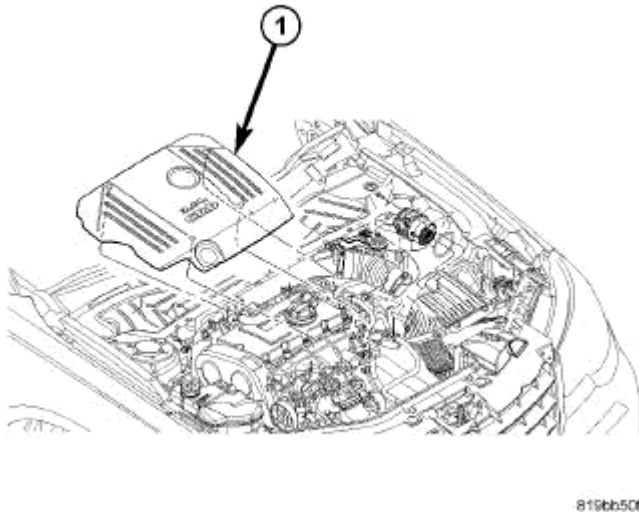


Fig. 47: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

1. Remove engine cover (1).

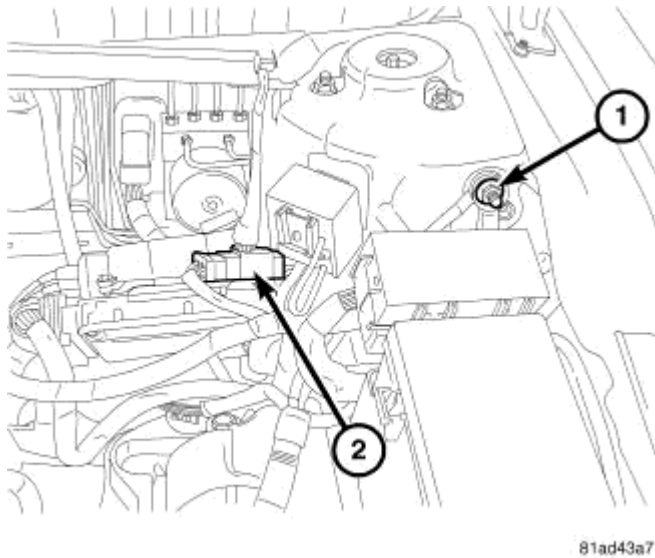


Fig. 48: Battery Cable
Courtesy of CHRYSLER LLC

2. Disconnect negative battery cable (1).

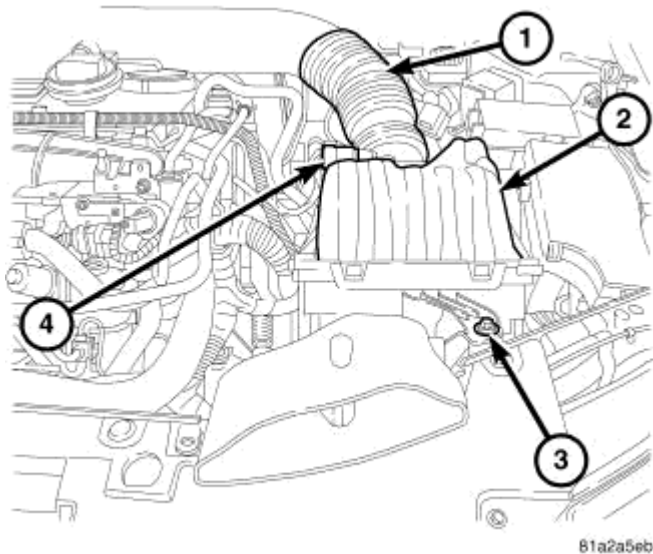


Fig. 49: Air Cleaner Housing
Courtesy of CHRYSLER LLC

3. Disconnect MAF sensor electrical connector (4).
4. Remove clean air tube (1).
5. Remove air cleaner housing (2).

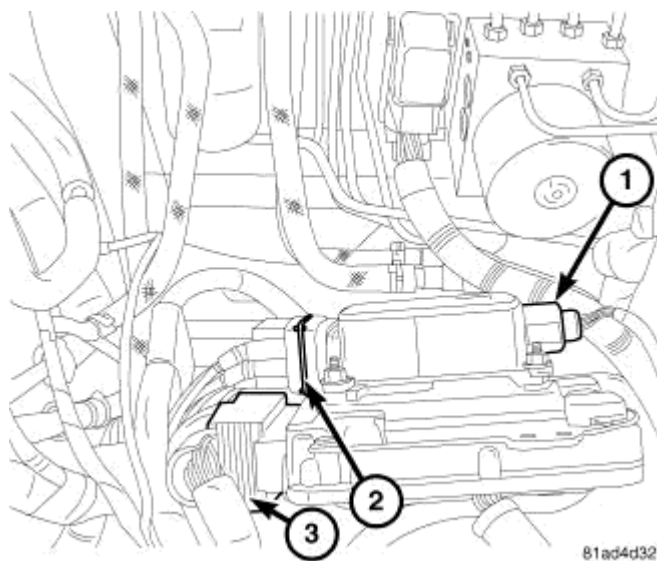


Fig. 50: Vacuum Solenoid Connectors
Courtesy of CHRYSLER LLC

6. Remove electrical connector (1) and set aside.
7. Remove vacuum harness (3) and set aside.
8. Disconnect brake booster vacuum line.

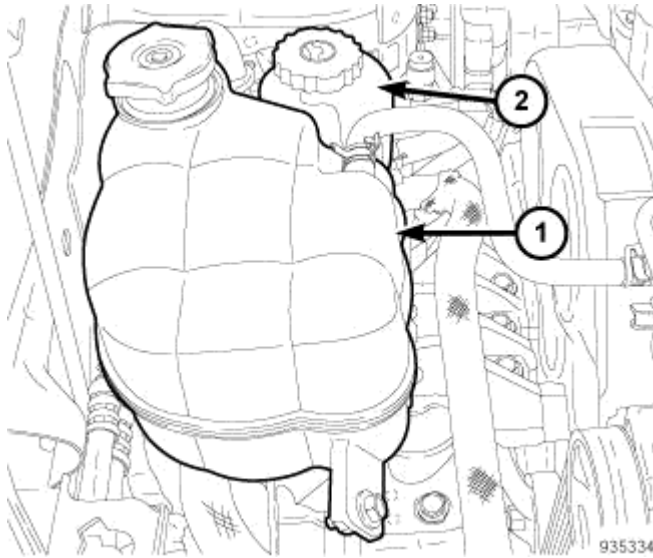


Fig. 51: Coolant Reservoir
Courtesy of CHRYSLER LLC

WARNING: Risk of injury to skin and eyes from scalding coolant. Do not open cooling system unless temperature is below 90°C (194°F). Open cap slowly to release pressure. Store coolant in approved container only. Wear protective gloves, clothing and eye wear.

9. Drain coolant.
10. Remove coolant tube from reservoir (1).
11. Remove coolant reservoir (4).

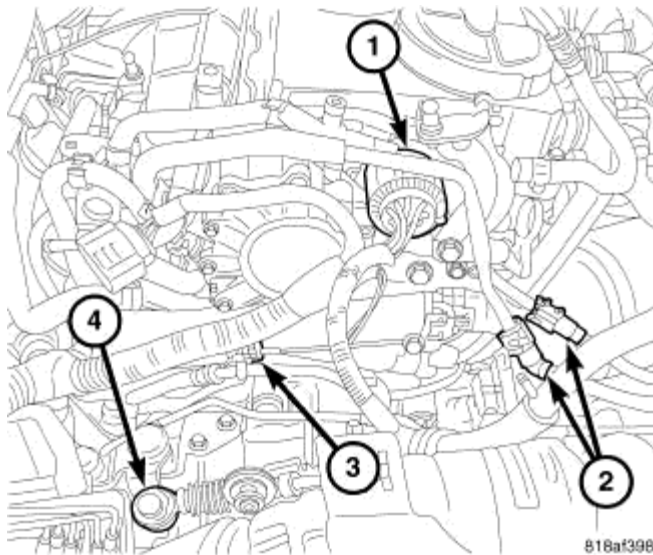


Fig. 52: Fuel Pump-High Pressure
Courtesy of CHRYSLER LLC

12. Disconnect injector harness connector (1) at cylinder head.
13. Remove fuel line retaining bracket.

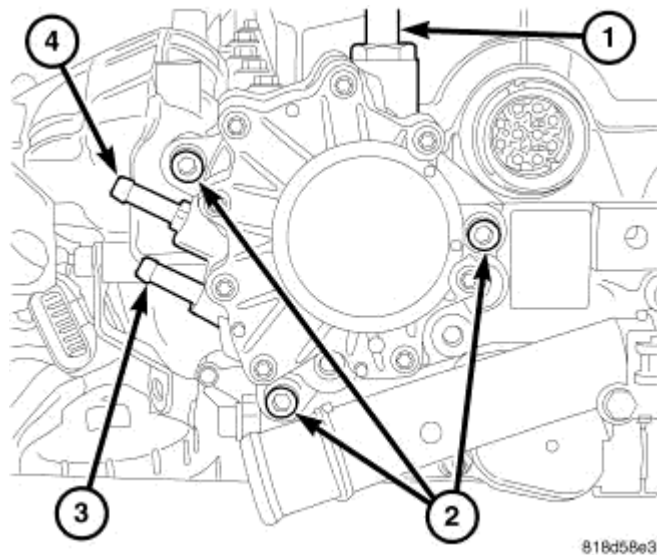


Fig. 53: Tandem Pump
Courtesy of CHRYSLER LLC

NOTE: Place rags below pump to catch fuel spillage.

14. Drain fuel from the injection system prior to removing fuel pump. Refer to **Fuel System/Fuel Injection - Standard Procedure** .
15. Disconnect vacuum line (1) from pump.
16. Disconnect fuel lines (3,4) from pump.
17. Remove fuel pump retaining bolts (2) and remove pump.
18. Disconnect coolant hose near fuel pump.
19. Remove upper radiator hose at cylinder head.
20. Disconnect engine electrical connectors.
21. Remove air inlet hose from throttle body.
22. Raise vehicle.
23. Remove right splash shield.
24. Remove turbo outlet pipe retaining bolt (1) and remove pipe (2).
25. Remove turbo inlet pipe.
26. Remove power steering hose support bracket at exhaust manifold. Refer to **Steering/Pump/HOSE, Power Steering - Removal** .
27. Remove EGR cooler.

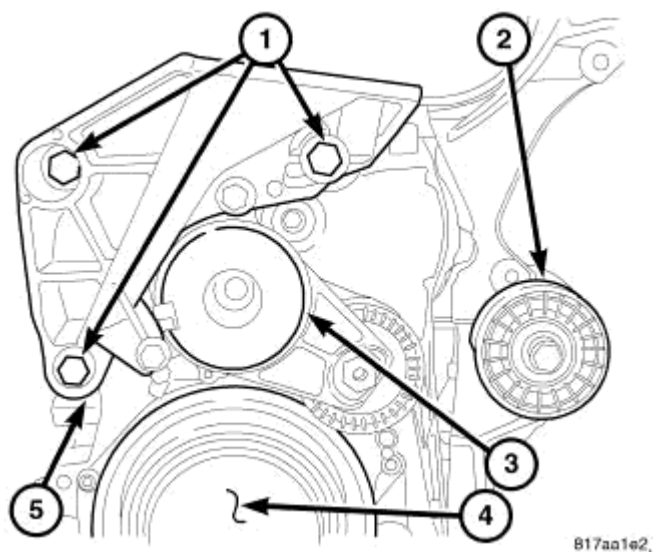


Fig. 54: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

28. Remove accessory drive belt.
29. Remove balancer (4).

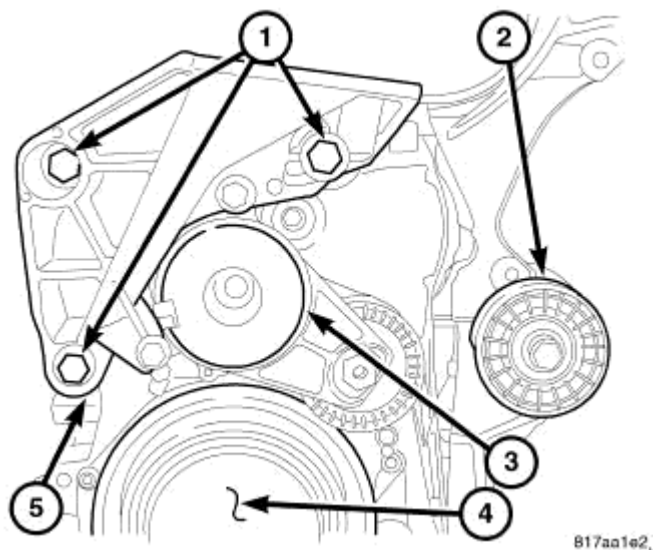
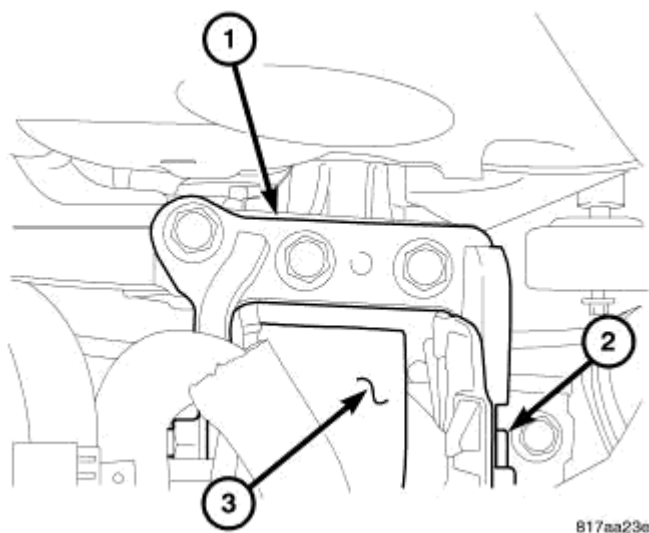


Fig. 55: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

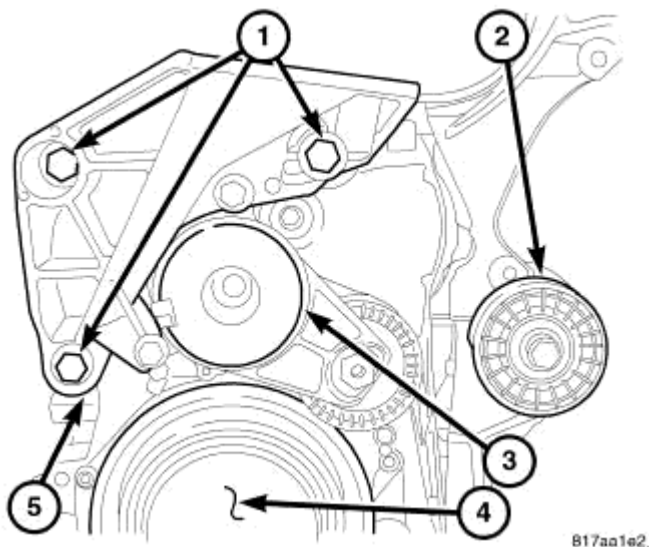
30. Remove right engine mount bracket (5) lower bolt.
31. Lower vehicle.



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Fig. 56: Right Engine Mount
Courtesy of CHRYSLER LLC

32. Support oil pan with a suitable jack.
33. Remove right engine mount through bolt (2).
34. Remove right engine mount bracket (1).
35. Remove right engine mount (3).



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Fig. 57: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

36. Remove accessory drive belt tensioner (3).
37. Remove the remaining engine mounting bracket retaining bolts (1).
38. Remove right engine mounting bracket (5).

39. Remove harmonic balancer (4).
40. Remove timing belt. See **Removal** .
41. Remove oil feed pipe from turbo and remove pipe retainers.
42. Remove exhaust manifold.

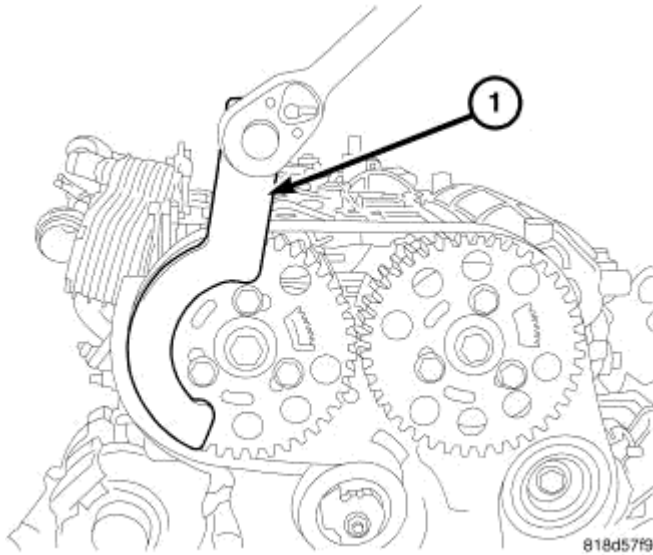


Fig. 58: Cam Holder
Courtesy of CHRYSLER LLC

43. Remove camshaft sprockets.
44. Remove camshaft sprocket hubs.
45. Remove injector rocker arm shaft.
46. Remove bearing frame.
47. Remove camshafts.

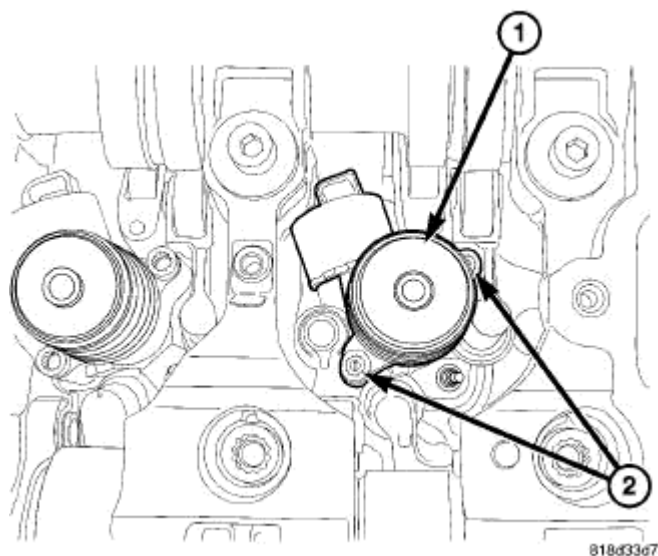


Fig. 59: Injector

Courtesy of CHRYSLER LLC

48. Remove injector retaining bolts (2) and discard.

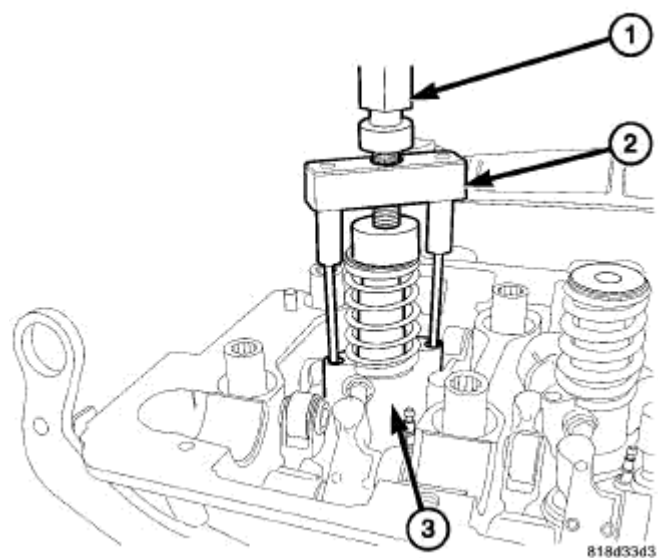
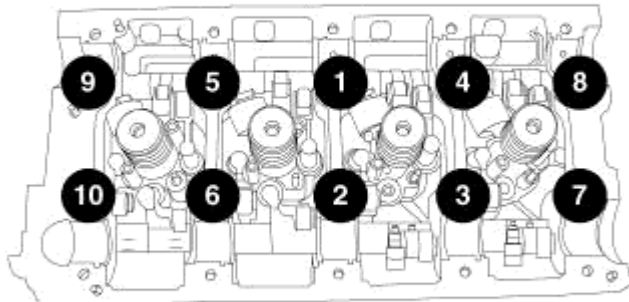


Fig. 60: Injector Removal

Courtesy of CHRYSLER LLC

49. Remove injectors (3) using injector remover 9887 (2) and a slide hammer (1). Refer to **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Removal** .



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Fig. 61: Cylinder Head Bolt Torque Sequence
Courtesy of CHRYSLER LLC

NOTE: Loosen cylinder head bolts in the reverse order of the tightening sequence.

50. Remove cylinder head bolts and discard.
51. Remove cylinder head.

WARNING: No fire, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury from skin and eye contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing when handling fuel.

CLEANING

CLEANING

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.

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

Remove all gasket material from cylinder head and block. See **Standard Procedure** . Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

INSPECTION

NOTE: Cylinder head cannot be resurfaced.

NOTE: Replacement cylinder heads will come complete with valves, seals, springs, retainers, keepers.

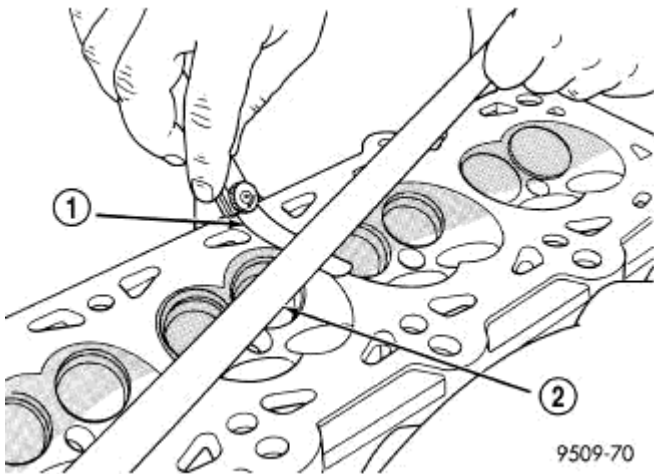
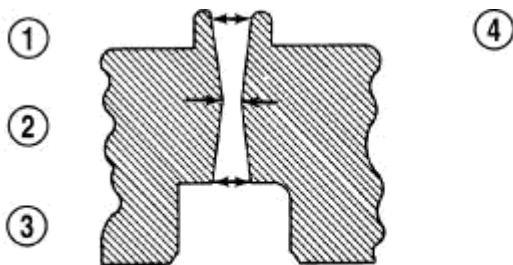


Fig. 62: Checking Cylinder Head Flatness

Courtesy of CHRYSLER LLC

- 1 - FEELER GAUGE
2 - STRAIGHT EDGE

1. Cylinder head must be flat within 0.1 mm (0.004 in.) .



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Fig. 63: Checking Wear on Valve Guide-Typical

Courtesy of CHRYSLER LLC

- 1 - TOP
2 - MIDDLE
3 - BOTTOM
4 - CUT AWAY VIEW OF VALVE GUIDE

MEASUREMENT LOCATIONS

2. Inspect camshaft bearing journals for scoring.
3. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
4. Using a small hole gauge and a micrometer, measure valve guides in 3 places top (1), middle (2), and bottom (3). See **Specifications**. Replace guides if they are not within specification.
5. Check valve guide height.
6. Prior to installing cylinder head, the cylinder block should be checked for flatness.

INSTALLATION

INSTALLATION

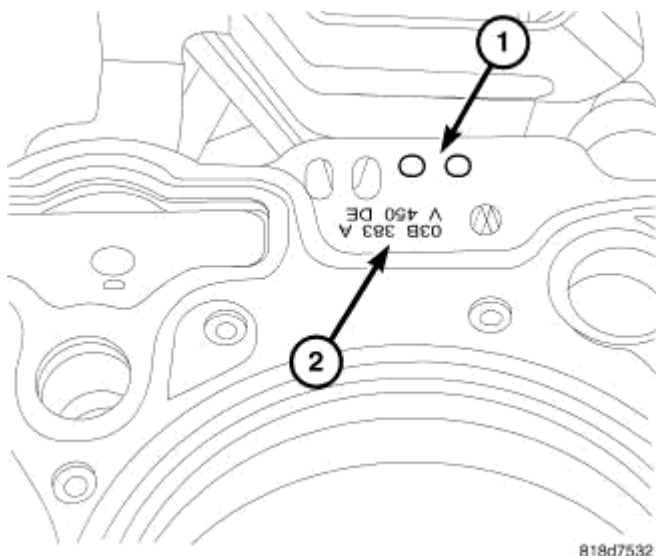


Fig. 64: Gasket Identification
Courtesy of CHRYSLER LLC

WARNING: No fire, open flames or smoking. Service vehicles in well ventilated areas. Risk of poisoning from inhaling or swallowing fuel. Risk of injury from skin and eye contact with fuel. Wear protective clothing.

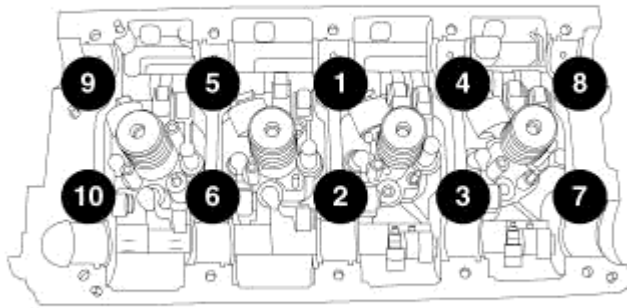
- NOTE:** Thoroughly clean all mating surfaces with appropriate solvents and blow out bolt holes, to assure that no grease or oil is present during reassembly.
- NOTE:** If piston or connecting rods have been replaced, measure piston projection to ensure proper head gasket selection. See **Standard Procedure**.
- NOTE:** Check facing cylinder head contact surface.

1. Remove crankshaft lock 9883.

2. Rotate crankshaft counterclockwise until all pistons are in the middle of the bore.

NOTE: Ensure that the gasket is correct before installing. Gasket is identified by holes stamped in the gasket (1).

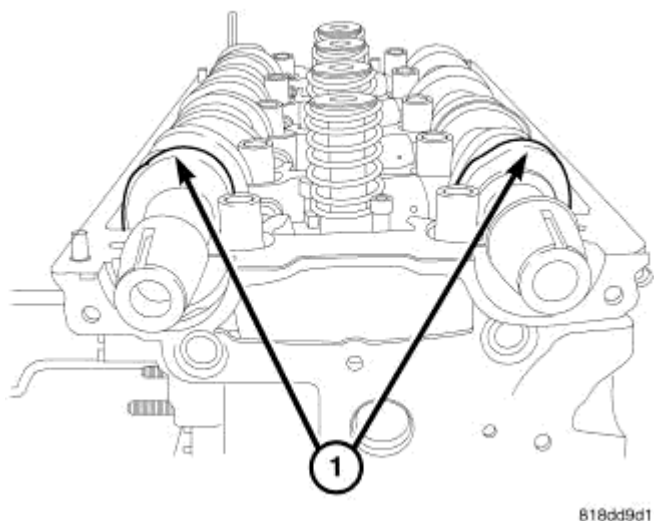
3. Position the cylinder head gasket with writing (2) facing upwards on engine using the dowel pins as guide.



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Fig. 65: Cylinder Head Bolt Torque Sequence
Courtesy of CHRYSLER LLC

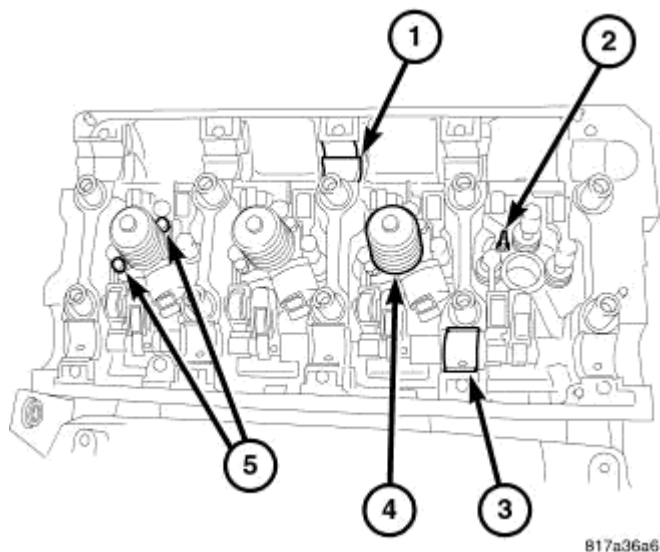
4. Position the cylinder head on the engine and install **new** cylinder head bolts.
 - a. Tighten cylinder head bolts to 35 N.m (26 ft. lbs.) in the sequence shown in illustration.
 - b. Tighten cylinder head bolts to 60 N.m (44 ft. lbs.) in the sequence shown in illustration.
 - c. Rotate each bolt in the sequence above 90°.
 - d. Rotate each bolt in the sequence above an additional 90°.



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Fig. 66: CAM REMOVAL/INSTALLATION
Courtesy of CHRYSLER LLC

5. Install camshafts (1). See **Installation** ,
6. Install camshaft oil seals. See **Installation** .



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Fig. 67: Injectors
Courtesy of CHRYSLER LLC

CAUTION: When installing unit injectors, new bolts (5) must be used.

NOTE: When installing used unit injector, new o-rings must be used.

7. Install unit injectors (4). Refer to **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Installation** .

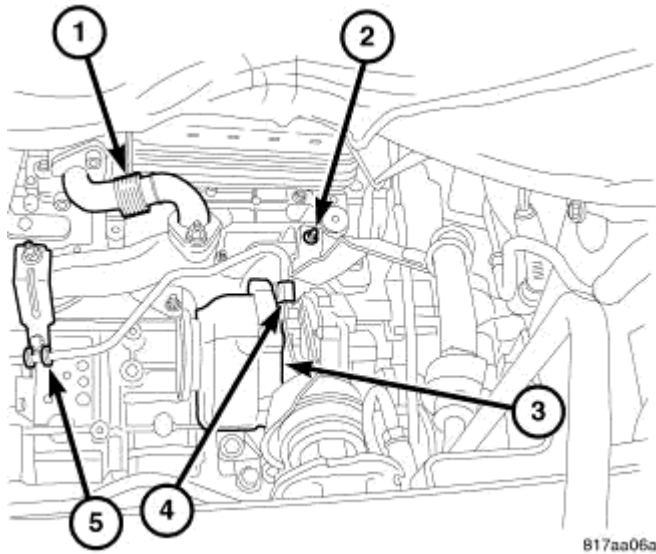
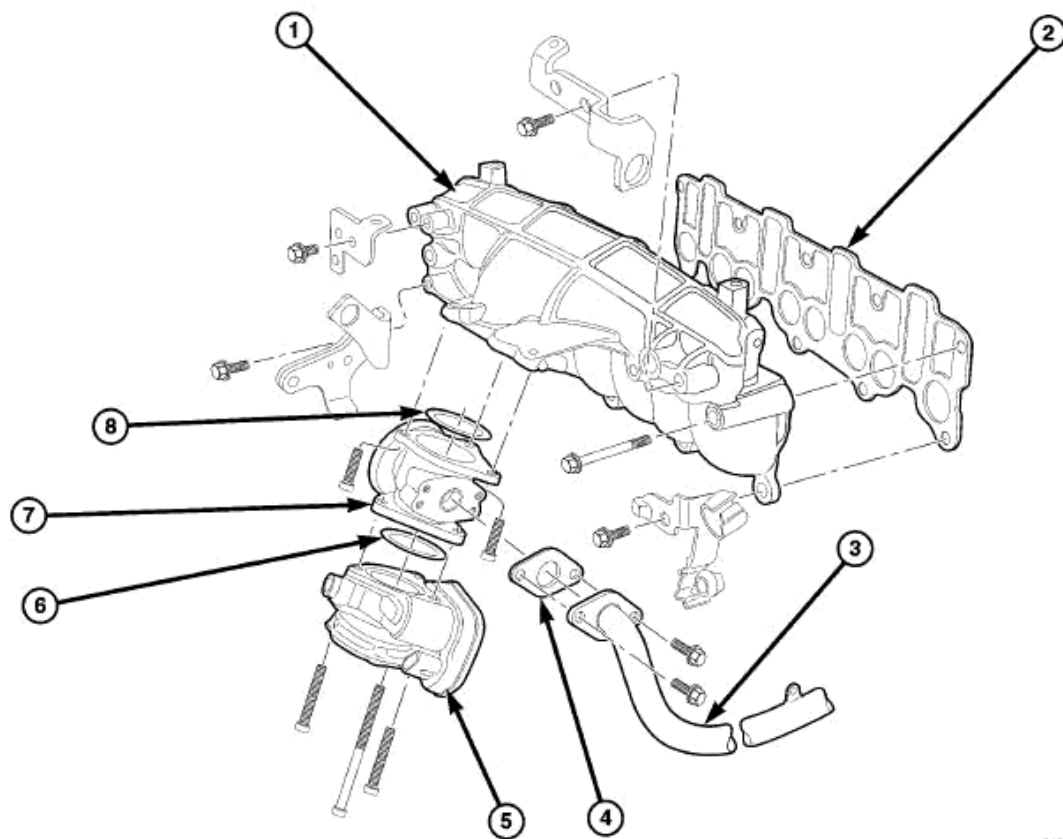


Fig. 68: Power Steering Line Support
Courtesy of CHRYSLER LLC

8. Install exhaust manifold gasket and manifold.
9. Install oil feed pipe (4) to turbo and install pipe hold down clamp (5).
10. Install exhaust manifold heat shields.



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Fig. 69: Intake Manifold

Courtesy of CHRYSLER LLC

11. Install intake manifold gasket (2) and manifold (1). See **Installation** .
12. Install EGR assembly (7).
13. Install throttle plate assembly (5).
14. Install exhaust manifold to EGR tube (3).
15. Install coolant hose to EGR cooler assembly.
16. Install timing belt cover.

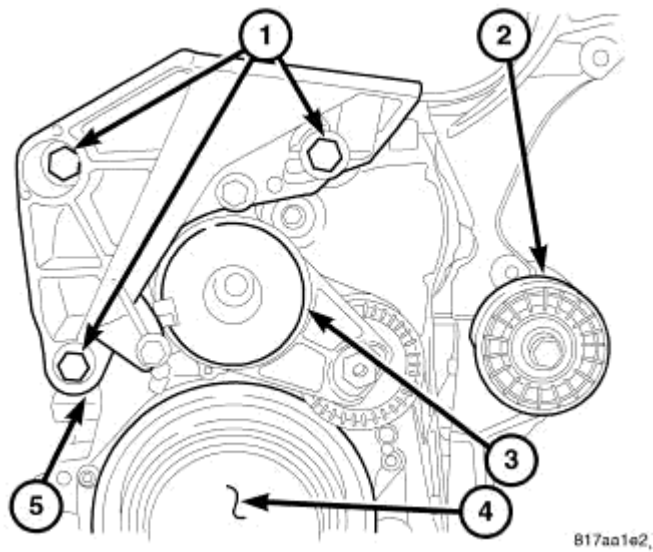


Fig. 70: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

17. Install right engine mount bracket (5).
18. Install accessory drive belt tensioner.

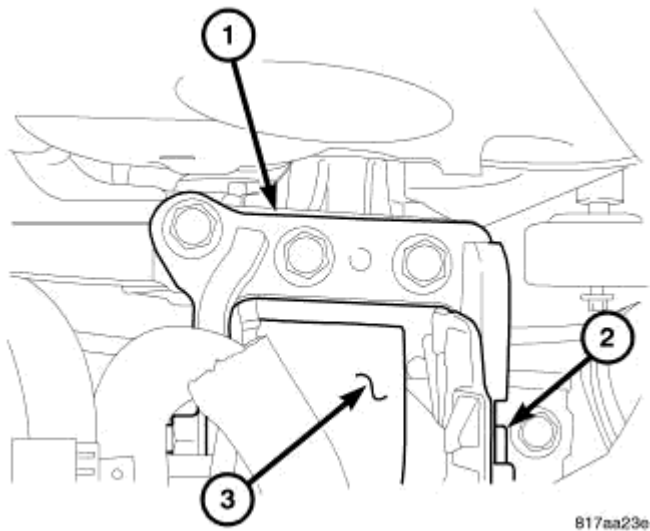


Fig. 71: Right Engine Mount
Courtesy of CHRYSLER LLC

19. Install right engine mount (3).
20. Remove jack.
21. Raise vehicle.
22. Install right engine mount lower bolt.

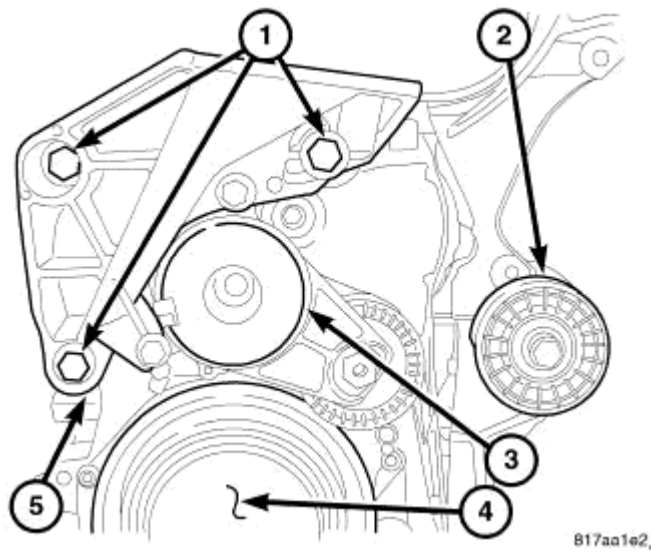


Fig. 72: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

23. Install balancer (4).
24. Install accessory drive belt.

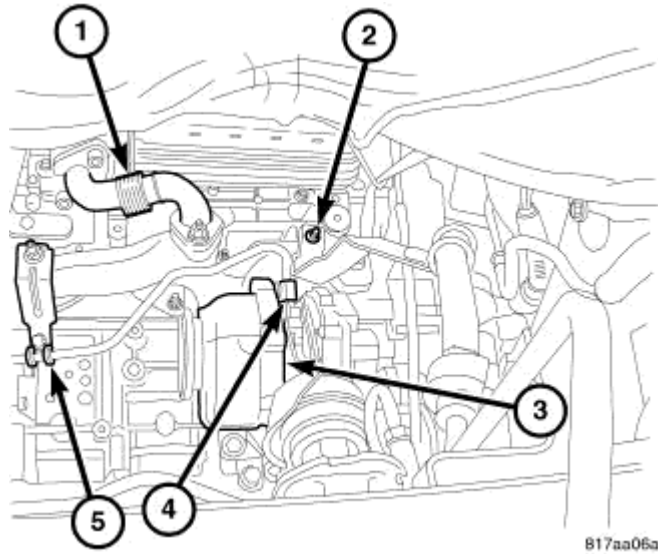


Fig. 73: Power Steering Line Support
Courtesy of CHRYSLER LLC

25. Install power steering hose support bracket at exhaust manifold (2).
26. Install turbo outlet pipe.
27. Install turbo inlet pipe.
28. Install right splash shield.
29. Lower vehicle.

30. Install coolant recovery bottle.
31. Install air inlet hose to throttle body.
32. Connect engine electrical connectors.
33. Install upper radiator hose at cylinder head.
34. Connect coolant hoses near fuel pump.

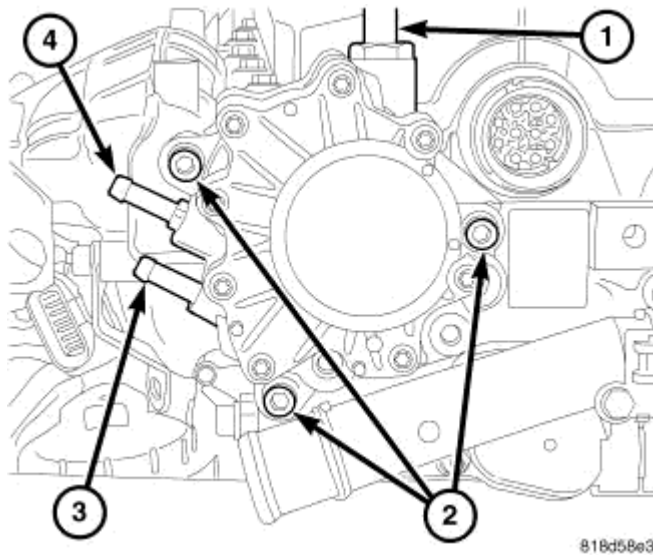


Fig. 74: Tandem Pump
Courtesy of CHRYSLER LLC

35. Install fuel pump. Refer to **Fuel System/Fuel Delivery/PUMP, Tandem Fuel - Installation** .
36. Install fuel line retaining bracket.
37. Connect injector harness at cylinder head.
38. Connect brake booster vacuum hose (1).
39. Connect coolant tube at reservoir.
40. Install vacuum harness.
41. Fill with coolant.
42. Install new oil filter and fill with oil.

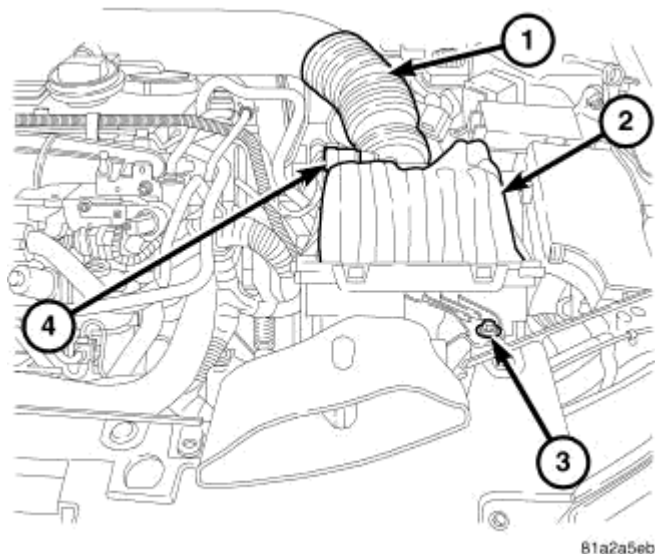


Fig. 75: Air Cleaner Housing
Courtesy of CHRYSLER LLC

43. Install air cleaner assembly (2).

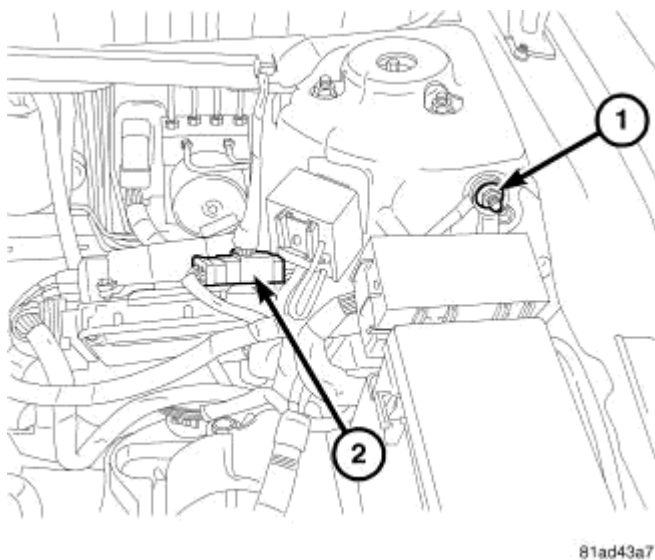


Fig. 76: Battery Cable
Courtesy of CHRYSLER LLC

44. Connect negative battery cable (1).
45. Start engine and check for leaks.

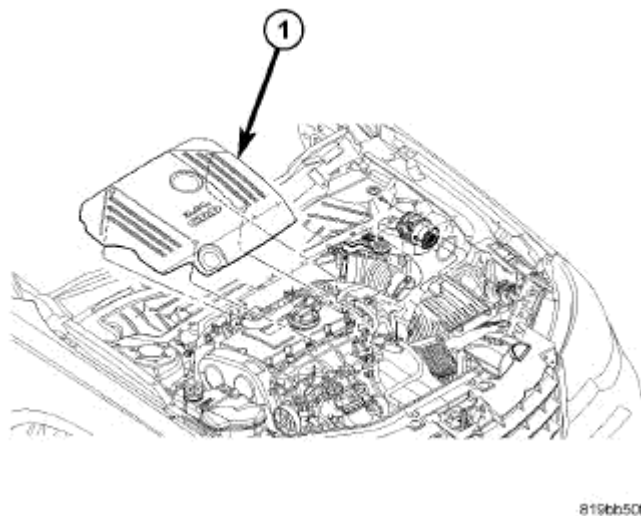


Fig. 77: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

46. Install engine cover (1).

CAMSHAFT, ENGINE

Removal

REMOVAL

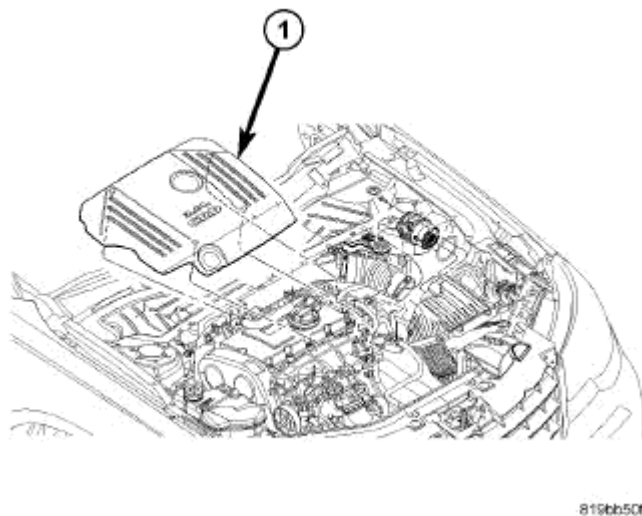


Fig. 78: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable.
2. Remove engine cover. See **Removal** .

WARNING: No fire, open flames or smoking. Risk of poisoning from inhaling or swallowing fuel. Risk of injury from skin and eye contact with fuel. Wear protective clothing. Store fuel only in suitable and appropriately marked containers.

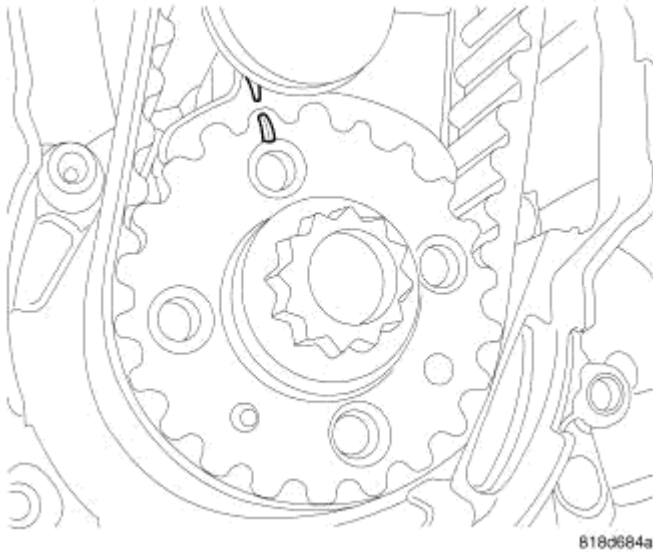


Fig. 79: Crankshaft Timing Marks
Courtesy of CHRYSLER LLC

NOTE: Engine equipped with a balance shaft module use an oval toothed belt, and crankshaft holding tool 10122 must be used

3. Place engine at TDC.
4. Install crankshaft lock 9883 or 10122.
5. Remove timing belt. See **Removal** .

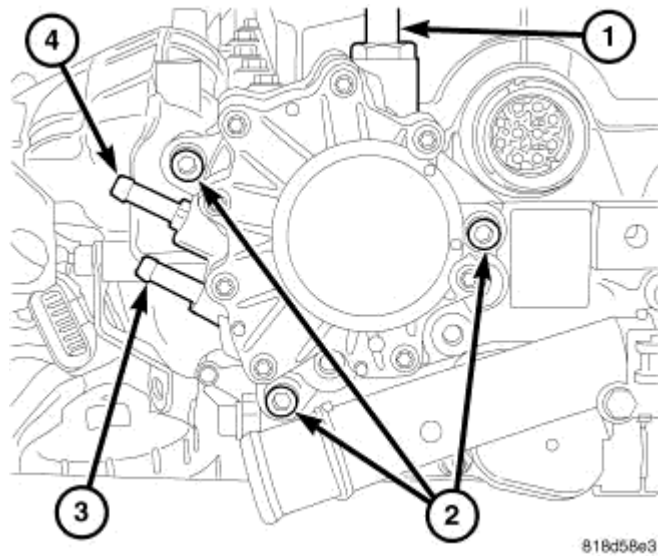


Fig. 80: Tandem Pump
Courtesy of CHRYSLER LLC

6. Remove tandem pump (refer to tandem pump **REMOVAL**).

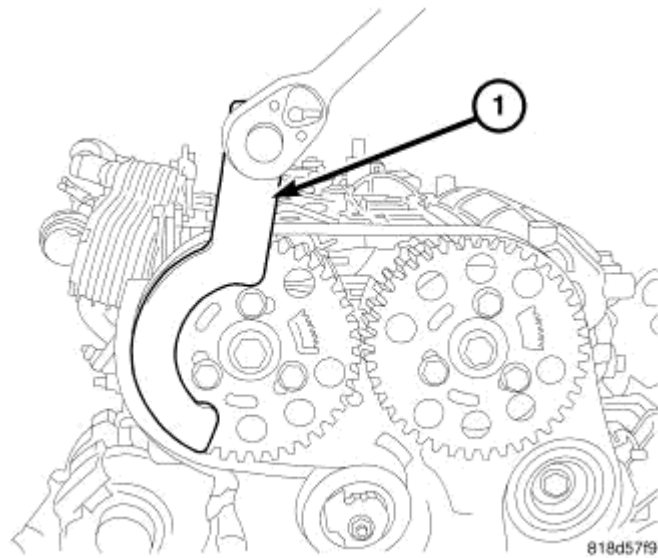
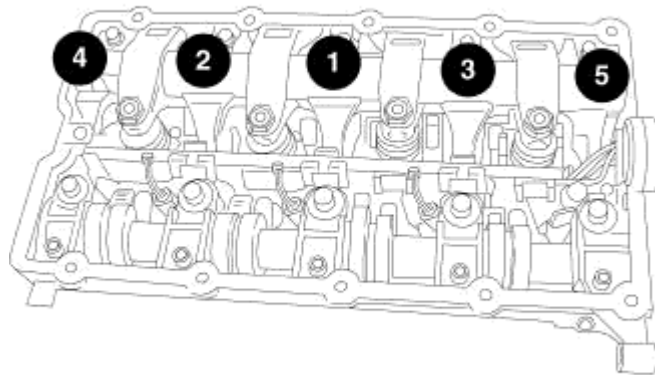


Fig. 81: Cam Holder
Courtesy of CHRYSLER LLC

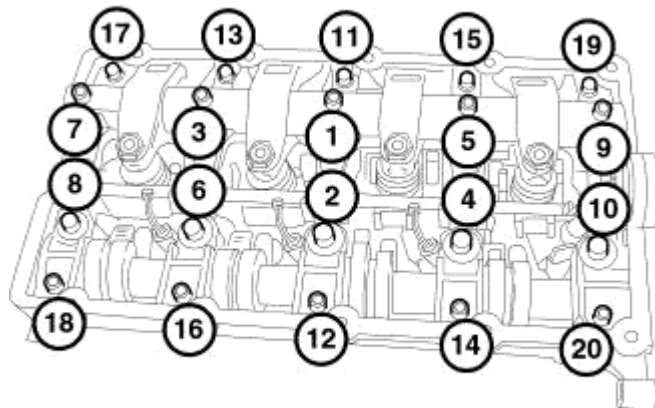
7. Loosen camshaft hub retaining bolt using camshaft sprocket/hub holder 9880 (1).
8. Remove camshaft sprocket retaining bolts using camshaft sprocket/hub holder 9880 (1) and remove sprockets.
9. Remove camshaft hub retaining bolt and remove hubs with puller.
10. Loosen injector adjusting lock nut and back off injector adjuster.



819100c3

Fig. 82: Rocker Arm Shaft Bolt Removal/Installation Sequence
Courtesy of CHRYSLER LLC

11. Remove rocker arm shaft and bearing frame retaining bolts.
12. Remove rocker arm shaft.



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Fig. 83: Cam Bearing Frame Torque
Courtesy of CHRYSLER LLC

13. Remove bearing frame.

NOTE: If bearing shells are to be reused, clean them and identify location with a marker.

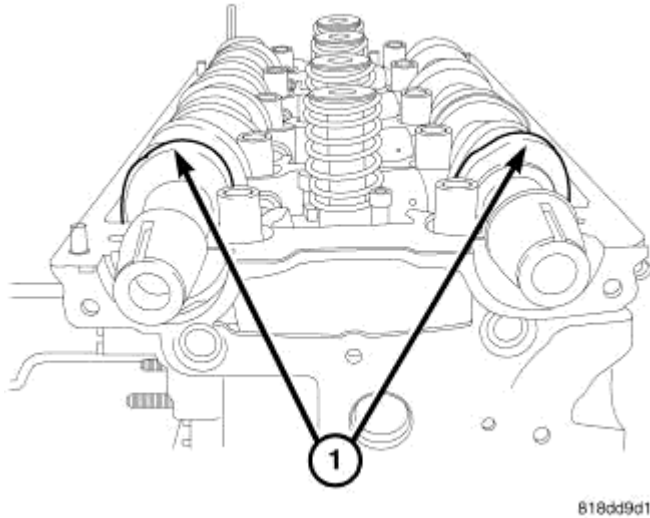


Fig. 84: CAM REMOVAL/INSTALLATION
Courtesy of CHRYSLER LLC

14. Remove camshafts (1).

Installation

INSTALLATION

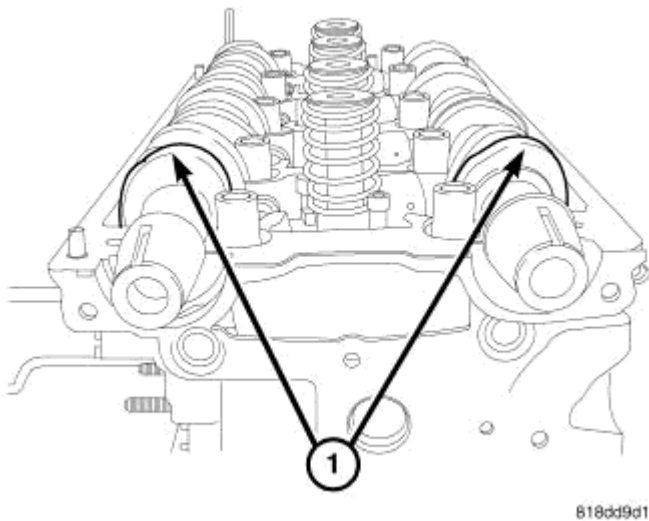
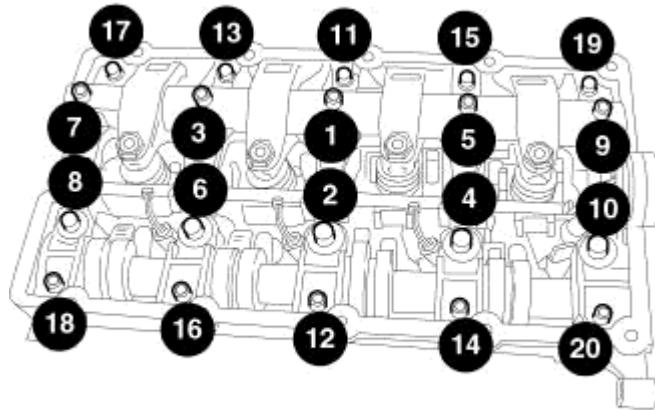


Fig. 85: CAM REMOVAL/INSTALLATION
Courtesy of CHRYSLER LLC

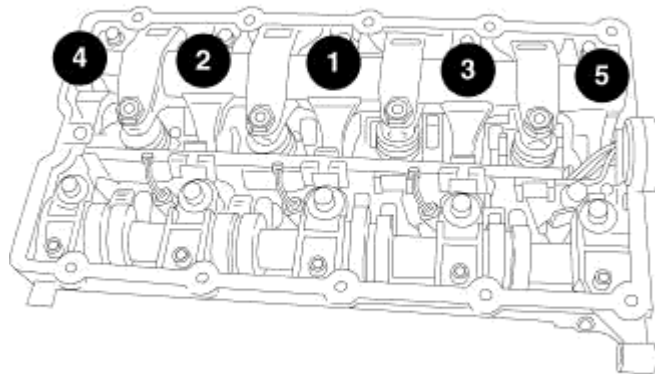
1. Install new bearing shells in cylinder head.
2. Lubricate bearings with clean engine oil.
3. Install camshafts with cylinder #1 lobes pointing upwards.



81a6bcd6

Fig. 86: Cam Bearing Frame Torque
Courtesy of CHRYSLER LLC

4. Apply a bead of RTV to cylinder head.
5. Install bearing frame and tighten bolts as shown in illustration.



819100c3

Fig. 87: Rocker Arm Shaft Bolt Removal/Installation Sequence
Courtesy of CHRYSLER LLC

6. Install injector rocker arm shaft.
7. Tighten bolts to 20 N.m (15 in. lbs.) in the sequence shown in illustration.
8. Tighten rocker arm shaft bolts an additional 90° as shown in illustration.
9. Install camshaft oil seals using. See **Installation** .
10. Install camshafts hubs onto camshafts and install bolts.

11. Install sprockets on camshaft hubs with the toothed segment facing upward.
12. Install retaining bolts finger tight.

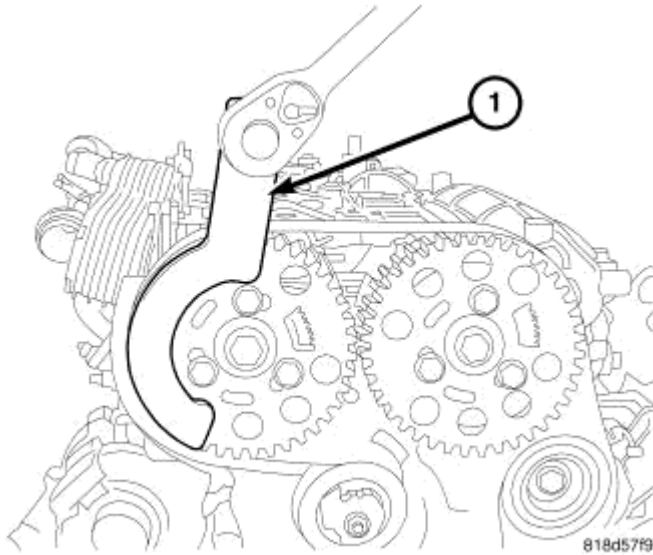


Fig. 88: Cam Holder

Courtesy of CHRYSLER LLC

13. Tighten camshaft hub bolts to 100 N.m (74 ft. lbs.) using hub/sprocket holder 9880 (1).
14. Install camshaft locking pins 9882.
15. Install timing belt. See **Installation** .
16. Perform injector adjustment. Refer to **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Standard Procedure** .

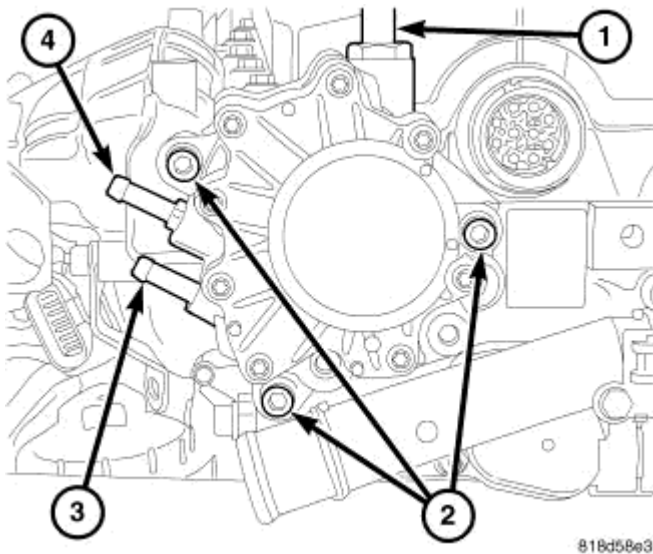


Fig. 89: Tandem Pump

Courtesy of CHRYSLER LLC

17. Install fuel pump. Refer to **Fuel System/Fuel Delivery/PUMP, Tandem Fuel - Installation** .
18. Install cylinder head cover. See **Installation** .

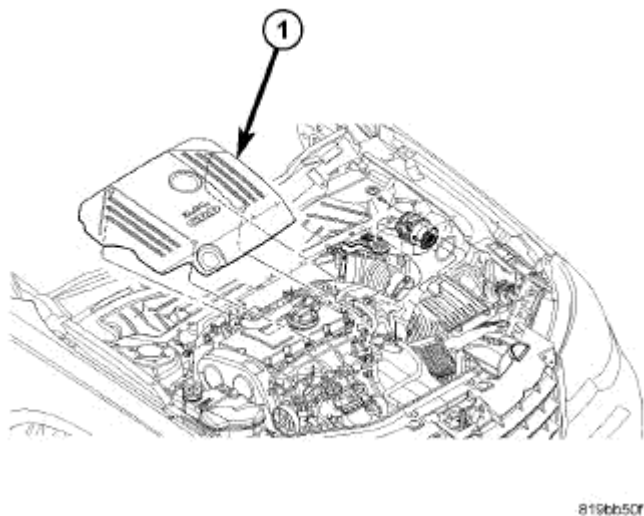


Fig. 90: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

19. Reconnect negative battery cable.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

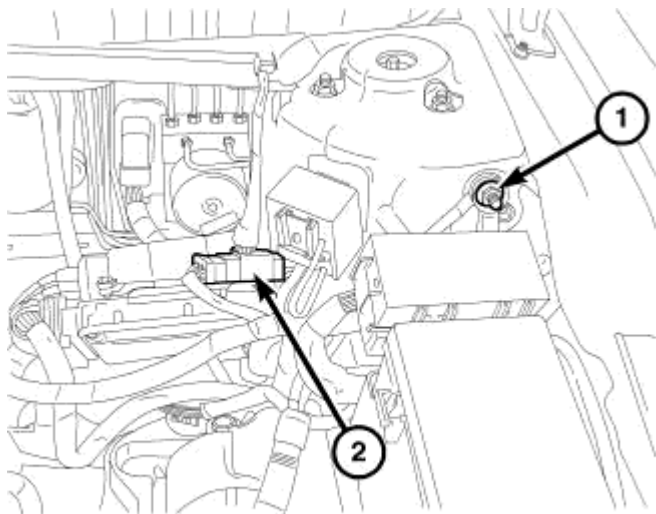
CAUTION: When new rocker fingers have been installed, engine must not be started for 30 minutes. The hydraulic compensation elements must settle or the pistons will contact the valves.

20. Start engine and inspect for leaks.
21. Install engine cover (1). See **Installation** .

COVER(S), CYLINDER HEAD

Removal

REMOVAL

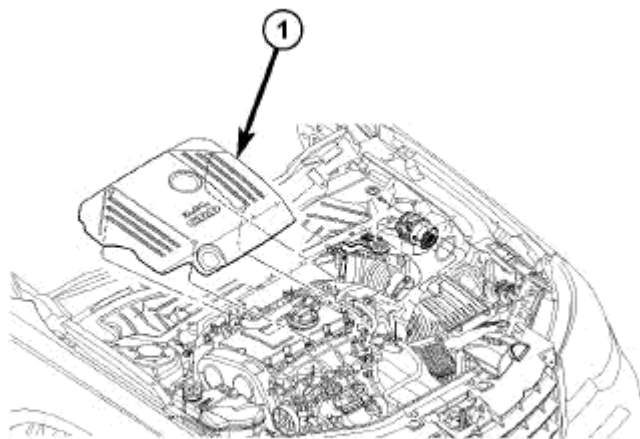


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Fig. 91: Battery Cable

Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable (1).



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Fig. 92: Engine Cover-Removal/Installation

Courtesy of CHRYSLER LLC

2. Remove engine cover. See **Removal**.

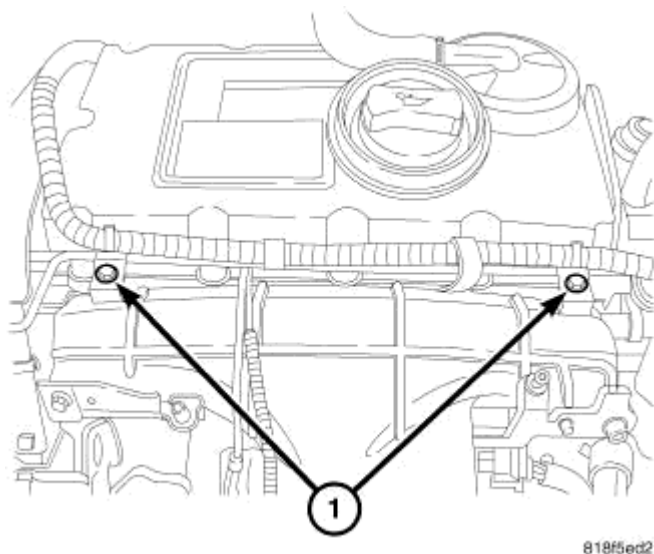


Fig. 93: Coolant Tube
Courtesy of CHRYSLER LLC

3. Remove coolant tube retaining bolts (1) and reposition coolant tubes.

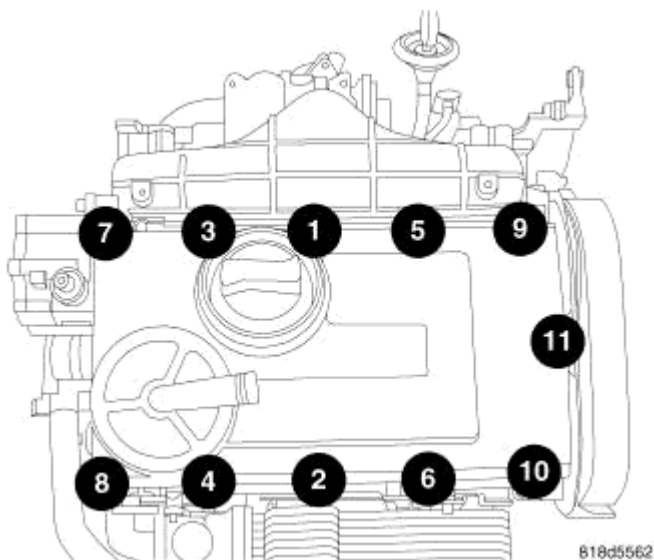


Fig. 94: Removing/Installing Cylinder Head Cover
Courtesy of CHRYSLER LLC

4. Remove cylinder head cover retaining bolts and remove cover.

Installation

INSTALLATION

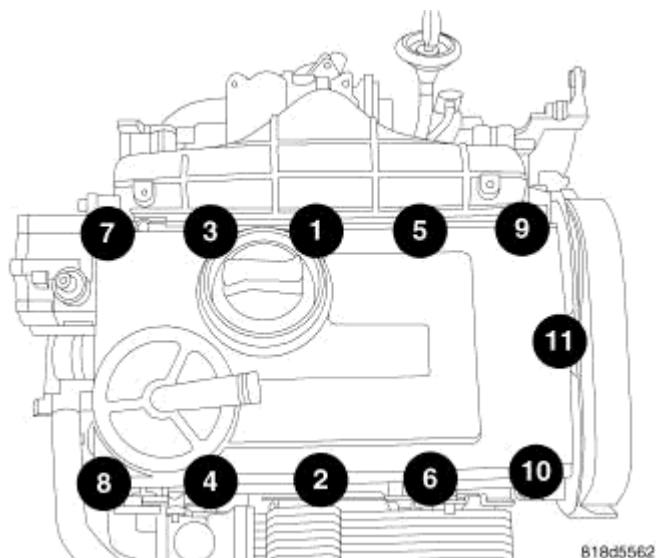


Fig. 95: Cylinder Head Cover Installation
Courtesy of CHRYSLER LLC

1. Clean sealing surfaces.
2. Install new cylinder head cover gasket.
3. Install cylinder head cover.
4. Tighten cylinder head cover bolts in the sequence shown in illustration to 10 N.m (89 in. lbs.).

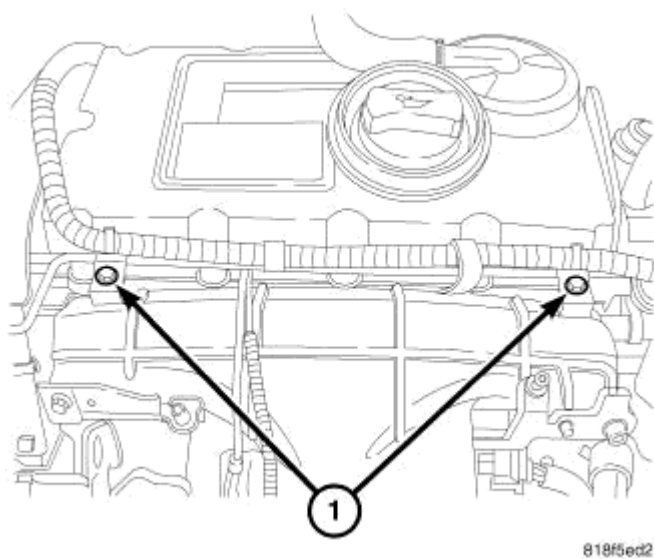


Fig. 96: Coolant Tube
Courtesy of CHRYSLER LLC

5. Install coolant tubes retaining bolts (1) and tighten.

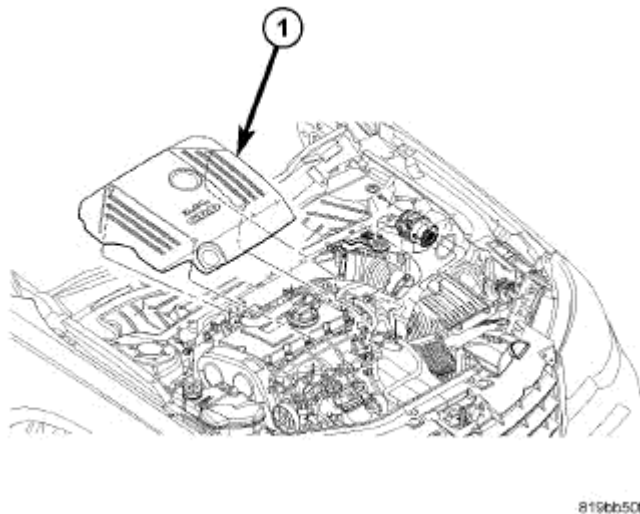


Fig. 97: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

6. Install engine cover.

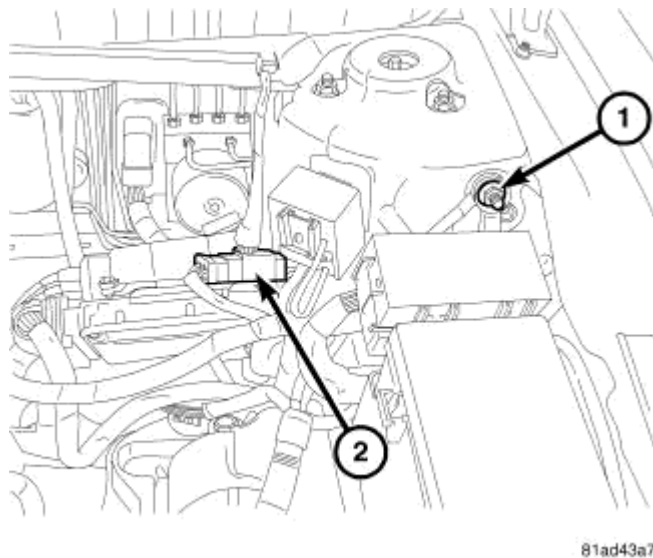


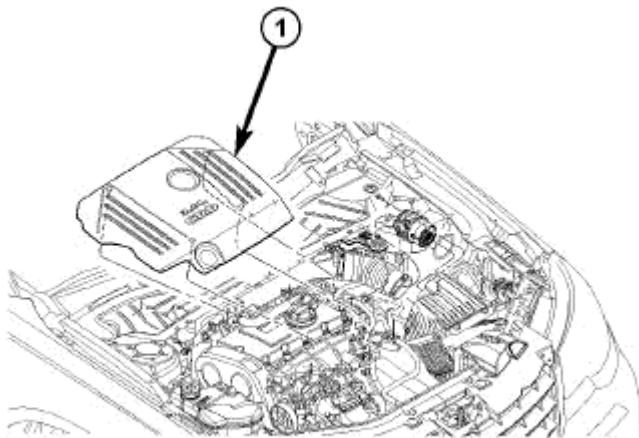
Fig. 98: Battery Cable
Courtesy of CHRYSLER LLC

7. Connect negative battery cable (1).

SEAL(S), CAMSHAFT

Removal

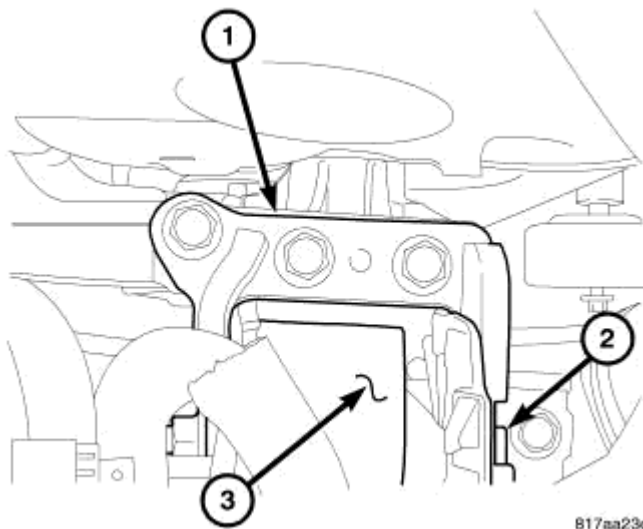
REMOVAL



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Fig. 99: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

1. Remove engine cover (1).
2. Remove upper timing belt cover. See **Removal** .



817aa23e

Fig. 100: Right Engine Mount
Courtesy of CHRYSLER LLC

3. Support engine and remove right engine mount through bolt (2).
4. Remove right engine mount bracket.
5. Remove timing belt. See **Removal** .
6. Remove timing belt rear cover.

7. Remove camshaft sprockets.
8. Remove camshaft hubs.

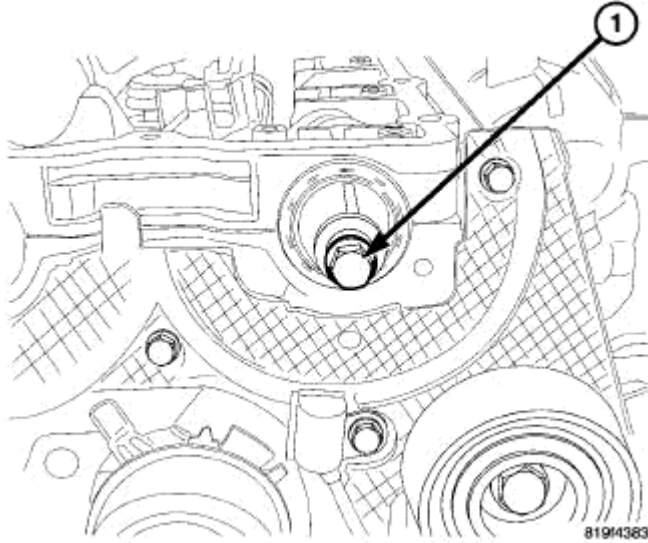


Fig. 101: Installing Bolt Into Camshaft
Courtesy of CHRYSLER LLC

9. Insert a bolt (1) in the camshaft.

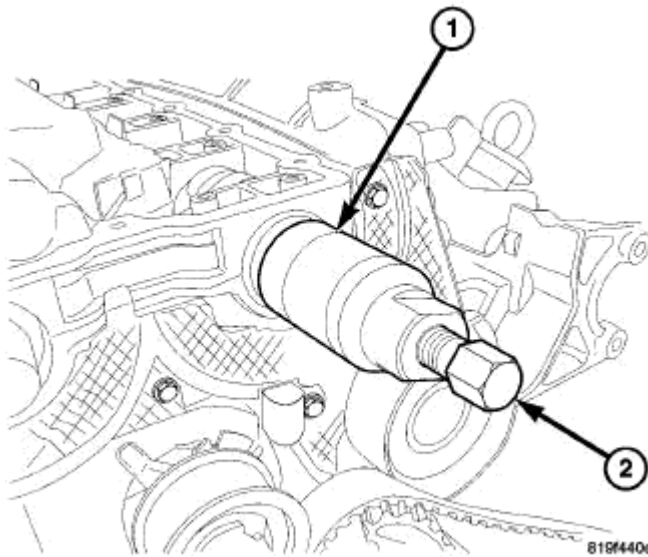
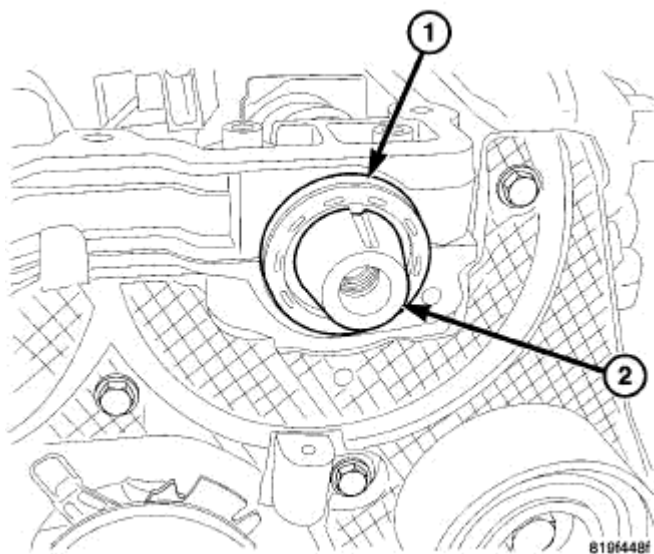


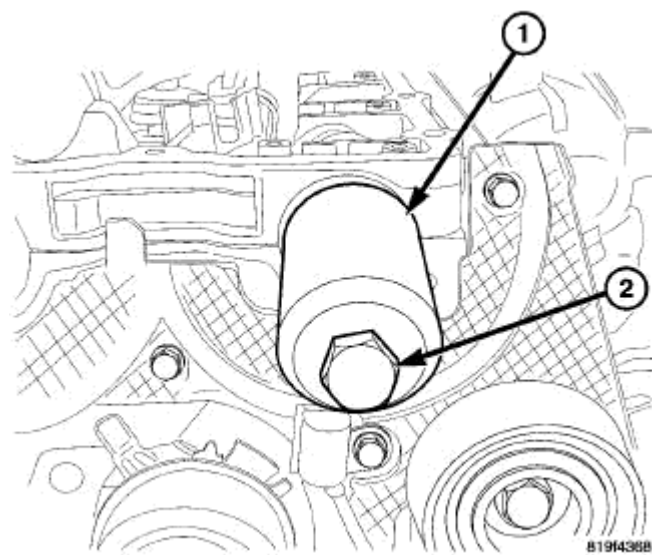
Fig. 102: Cam Seal Remover
Courtesy of CHRYSLER LLC

10. Screw seal remover 6771 (1) into camshaft seal.

11. Tighten force screw (2) to remove camshaft oil seals.

Installation**INSTALLATION****Fig. 103: Cam Seal****Courtesy of CHRYSLER LLC**

1. Position new cam seal (1) on camshaft (2) as shown in illustration.

**Fig. 104: Cam Seal Installer****Courtesy of CHRYSLER LLC**

2. Position cam seal installer 9884 (1) over camshaft and insert bolt (2).

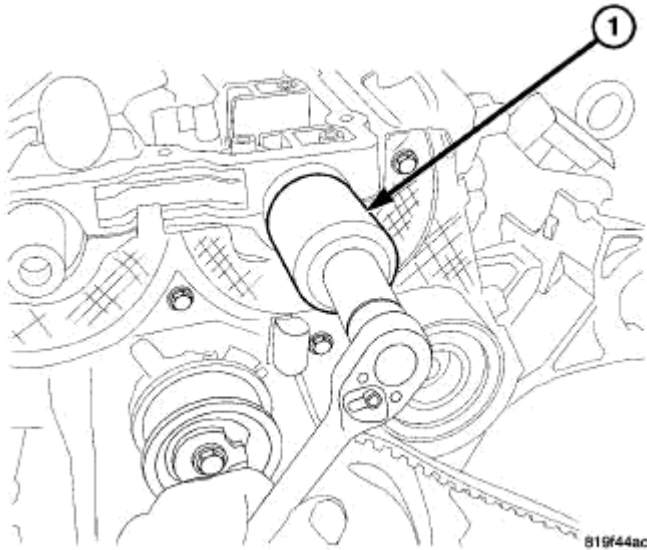


Fig. 105: Cam Seal Installation
Courtesy of CHRYSLER LLC

3. Tighten bolt until seal bottoms out.
4. Install timing belt hubs.
5. Install timing belt sprockets.
6. Install timing belt. See **Installation** .
7. Install lower timing belt cover. See **Installation** .

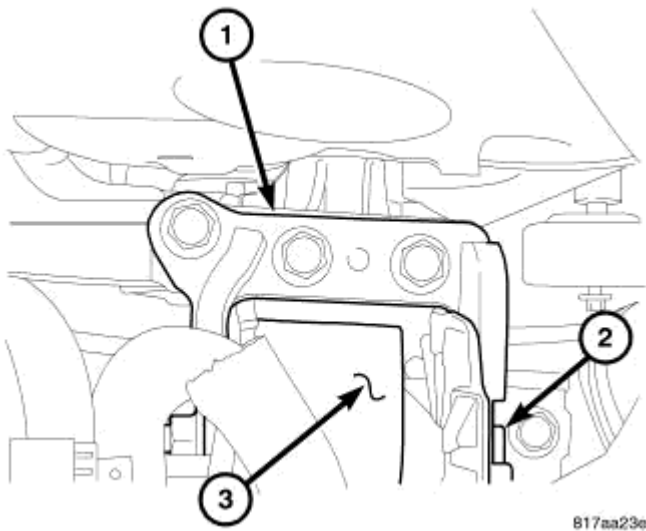
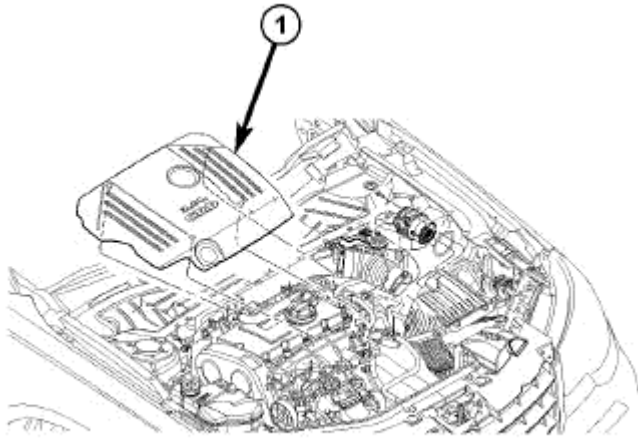


Fig. 106: Right Engine Mount
Courtesy of CHRYSLER LLC

8. Install right engine mount bracket.
9. Install damper.
10. Install right engine mount.



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Fig. 107: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

11. Install upper timing belt cover. See **Installation** .
12. Install engine cover (1).

SPRING(S), VALVE

Removal

REMOVAL

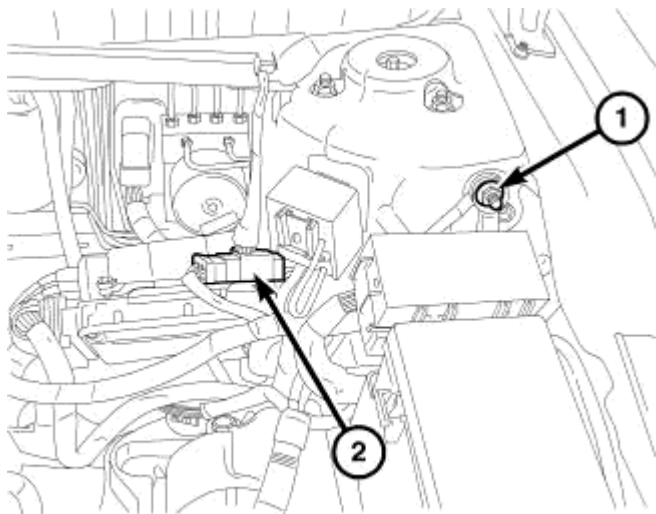


Fig. 108: Battery Cable
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable (1).

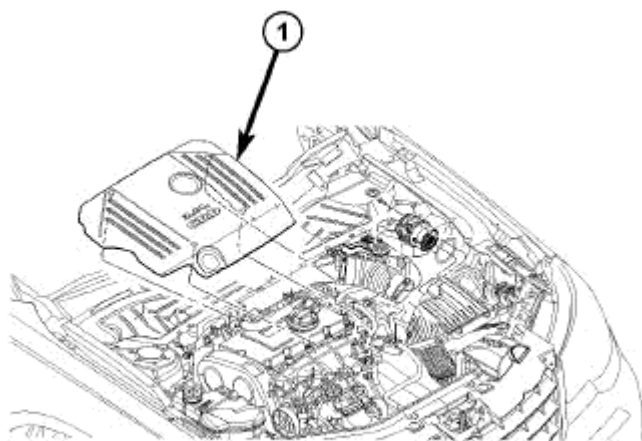


Fig. 109: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

2. Remove engine cover (1). See **Removal** .
3. Remove camshafts. See **Removal** .
4. Position piston of cylinder to be processed to TDC by rotating the crankshaft clockwise. **DO NOT crank engine. DO NOT rotate engine backward.**

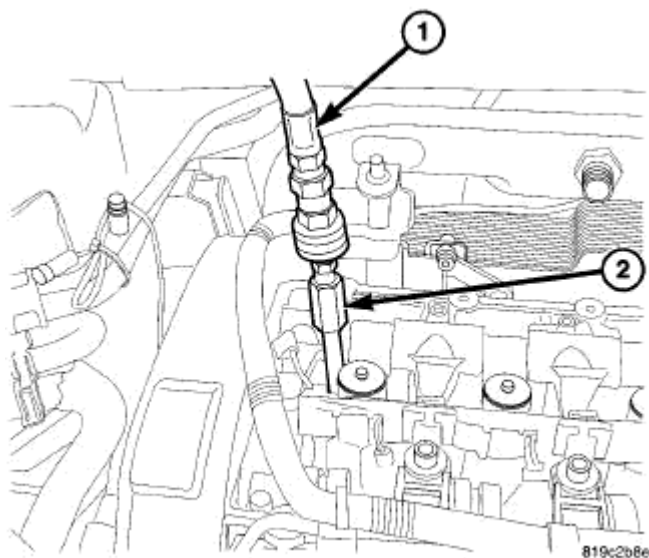


Fig. 110: Compression Adapter 9939
Courtesy of CHRYSLER LLC

5. Remove glow plugs. Refer to **Electrical - Ignition Control/Ignition Control/PLUG, Glow - Removal**.
6. Install glow plug adapter 9939 (2).
7. Connect air supply (1) to glow plug adapter 9939 (2) and pressurize the cylinder to 5 bar (73 psi.).

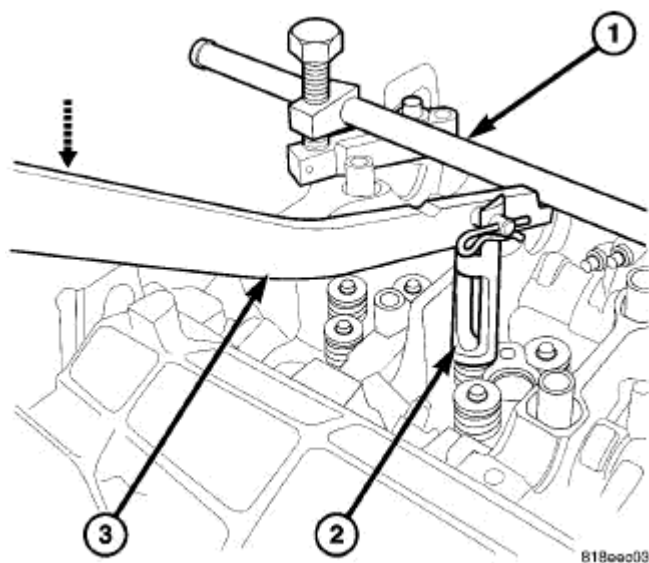
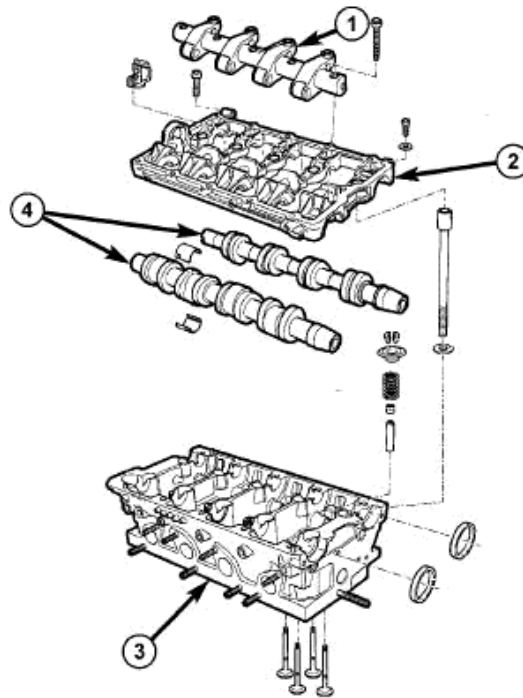


Fig. 111: Valve Spring Compressor 9916
Courtesy of CHRYSLER LLC

CAUTION: Valve springs and retainers must be kept in order of the cylinder they were removed.

8. Install valve spring compressor 9916 (1,2,3).



819d3456

Fig. 112: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

9. Compress valve spring.
10. Remove valve keepers.
11. Remove top valve spring retainer and valve spring.
12. Remove valve stem seals.
13. Remove bottom valve spring retainer.

NOTE: Inspect all cylinder head components for wear or damage.

14. Repeat procedure for each cylinder as necessary.

Installation

INSTALLATION

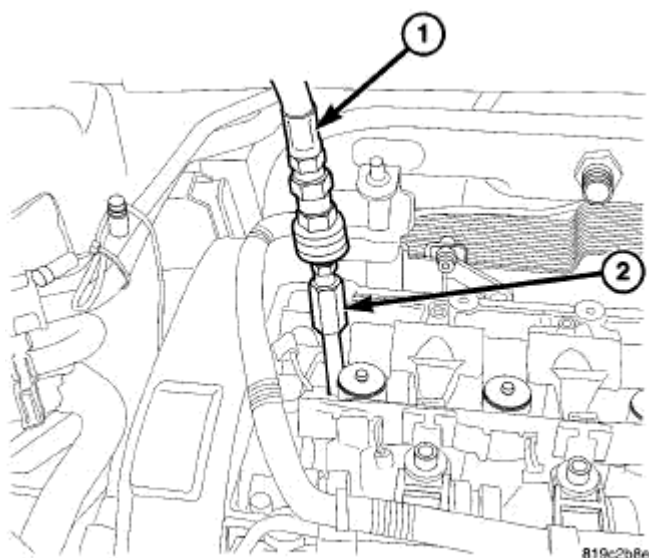
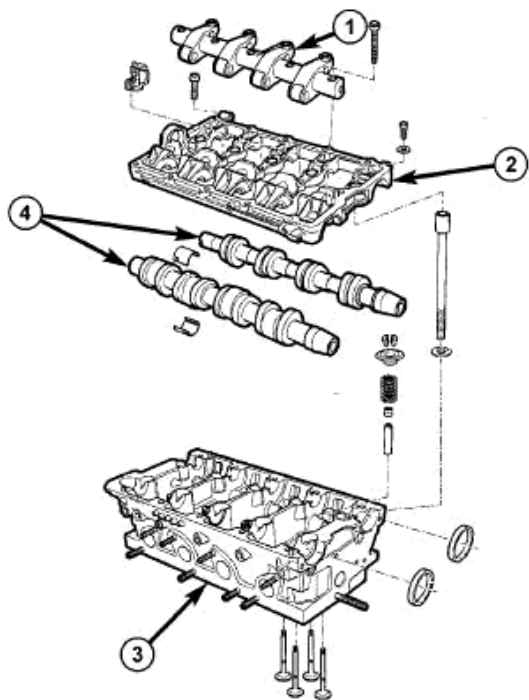


Fig. 113: Compression Adapter 9939

Courtesy of CHRYSLER LLC

NOTE: **Inspect all valve springs and retainers for wear or damage. Replace as necessary.**

1. Position piston of cylinder to be processed to TDC by rotating the crankshaft clockwise. **DO NOT crank engine or rotate engine counter clockwise.**
2. Install glow plug adapter 9939 (2).
3. Connect air supply (1) to #9939 glow plug adaptor and pressurize the cylinder to 5 bar (73 psi).



815d3456

Fig. 114: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

4. Install lower valve spring retainer.
5. Install valve stem seal.
6. Install valve spring.
7. Install valve spring retainer.

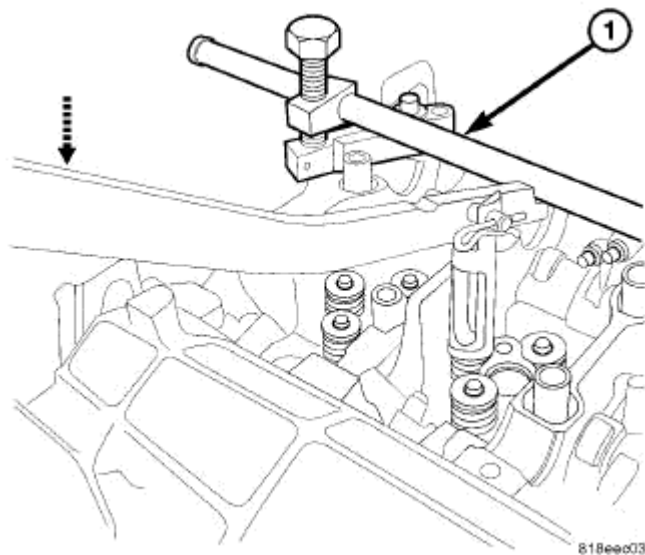


Fig. 115: Valve Spring Installer 9916
Courtesy of CHRYSLER LLC

8. Install valve spring installer 9916.
9. Compress valve and install valve keepers.

NOTE: Ensure that the valve keepers are seated properly.

10. Repeat procedure for each cylinder as necessary.
11. Remove special tooling from cylinder head.
12. Position piston of #1 cylinder to ignition TDC.
13. Install camshafts and check basic position. See **Installation** .

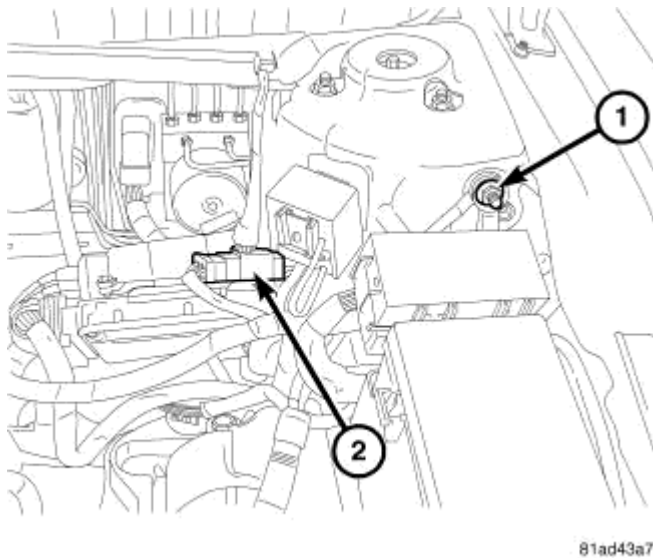
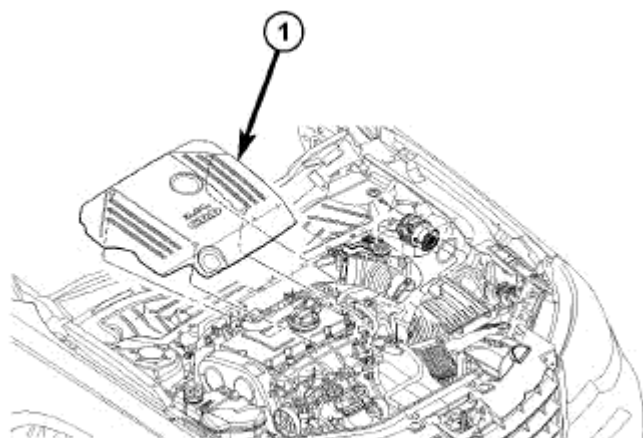


Fig. 116: Battery Cable
Courtesy of CHRYSLER LLC

14. Reconnect negative battery cable (1).

CAUTION: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

15. Start the engine and inspect for leaks.



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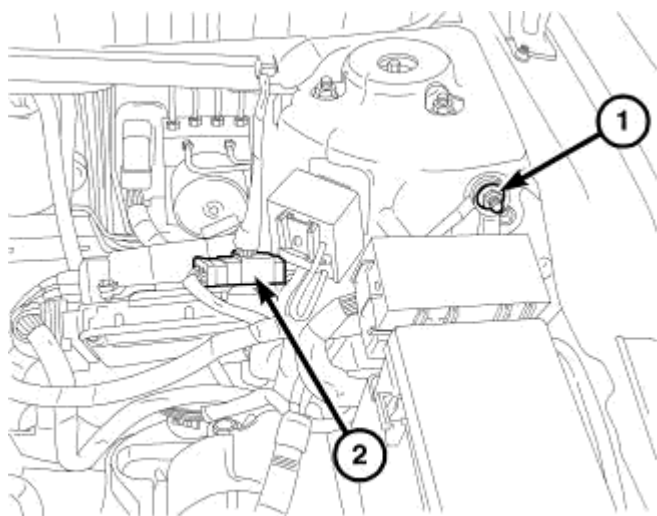
Fig. 117: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

16. Install engine cover (1). See **Installation** .

VALVES, INTAKE AND EXHAUST

Removal

REMOVAL

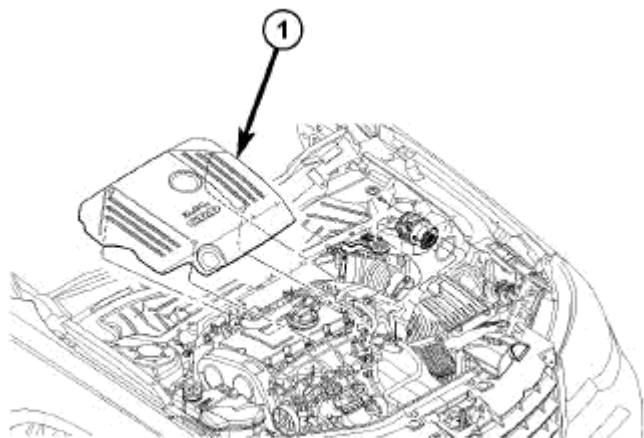


81ad43a7

Fig. 118: Battery Cable
Courtesy of CHRYSLER LLC

NOTE: Valves can not be ground, only lapping is permitted.

1. Disconnect negative battery cable (1).



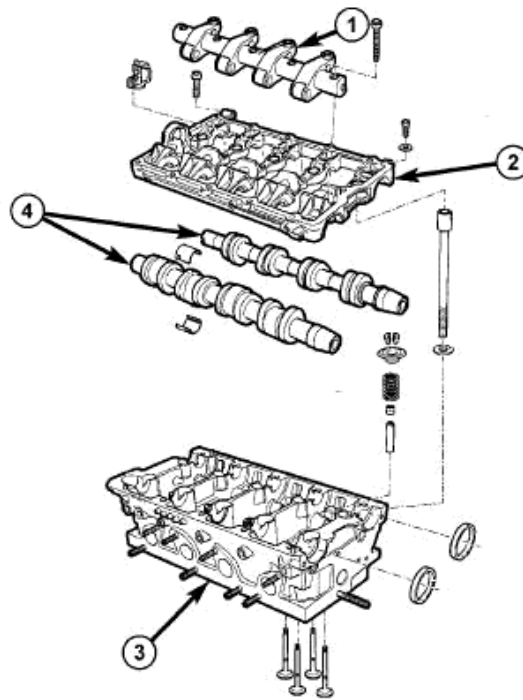
819bb50f

Fig. 119: Engine Cover-Removal/Installation

Courtesy of CHRYSLER LLC

2. Remove engine cover (1). See **Removal** .
3. Remove cylinder head. See **Removal** .

CAUTION: Suitably mark the valve and the position in the cylinder head before removal. Failure to do so will result in improperly seated valves and possible engine damage after reassembly.



815d3456

Fig. 120: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

4. Using a suitable valve spring compressor, compress valve spring.
5. Remove valve keepers.
6. Remove top valve spring retainer and valve spring.
7. Remove valve stem seals.
8. Repeat steps 5 through 9 for each valve as necessary.
9. Remove any burrs with a file prior to pulling valves through the guide.

CAUTION: Valves, springs and retainers must be kept in order of the cylinder they were removed.

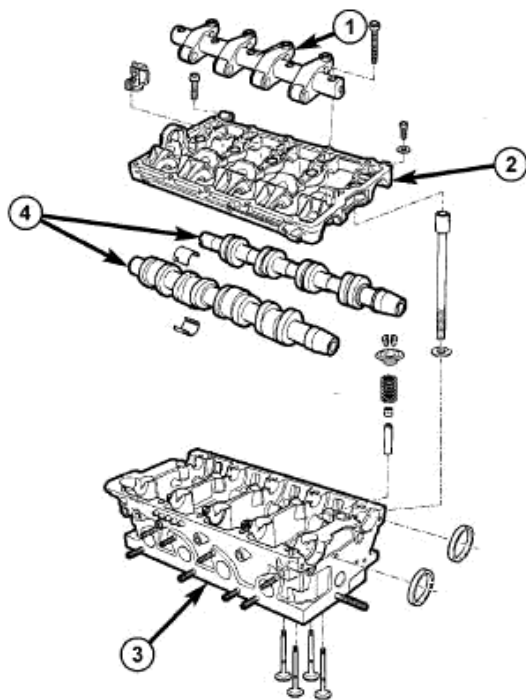
10. Remove valves.

Installation

INSTALLATION

WARNING: Valves must be kept in their original positions in cylinder head. Failure to do so will result in engine damage.

NOTE: Inspect all valves, springs and retainers for wear or damage. Replace as necessary.



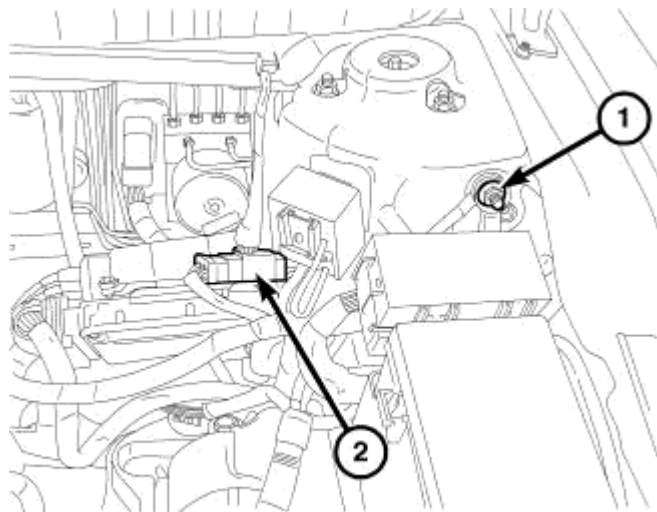
815d3456

Fig. 121: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

1. Install valves in their original position in the cylinder head.
2. Install lower valve spring retainer.
3. Install valve stem seal.
4. Install valve spring.
5. Install valve spring retainer.

NOTE: **Ensure that the valve keepers are seated properly.**

6. Using a suitable valve spring compressor, compress valve spring and install valve keepers.
7. Repeat steps 3 through 7 for each valve as necessary.

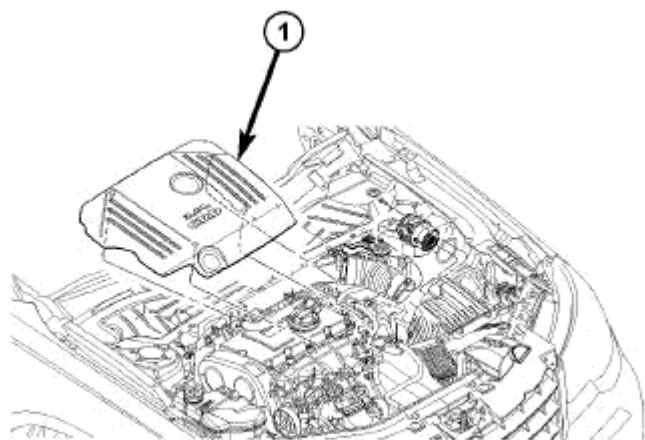


81ad43a7

Fig. 122: Battery Cable

Courtesy of CHRYSLER LLC

8. Install cylinder head on engine block. See **Installation** .
9. Install glow plugs. Refer to **Electrical - Ignition Control/Ignition Control/PLUG, Glow - Installation** .
10. Connect negative battery cable (1).



819bb50f

Fig. 123: Engine Cover-Removal/Installation

Courtesy of CHRYSLER LLC

WARNING: Use extreme caution when the engine is in operation. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

11. Start engine and check for leaks.
12. Install engine cover. See **Installation** .

ENGINE BLOCK

STANDARD PROCEDURE

REPLACING ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug .

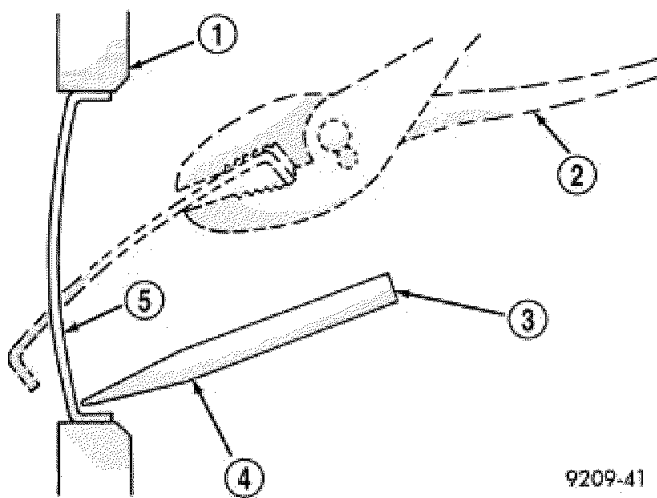


Fig. 124: Core Hole Plug Removal
Courtesy of CHRYSLER LLC

- 1 - CYLINDER BLOCK
- 2 - REMOVE PLUG WITH PLIERS
- 3 - STRIKE HERE WITH HAMMER
- 4 - DRIFT PUNCH
- 5 - CUP PLUG

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in

service immediately.

MEASURING CYLINDER BORES

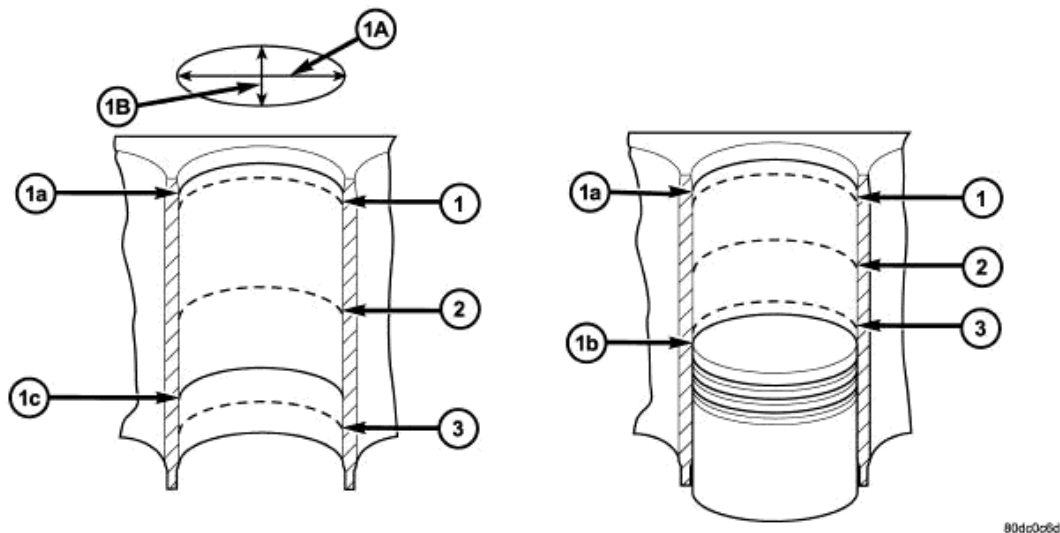


Fig. 125: Measuring Cylinder Bores
Courtesy of CHRYSLER LLC

- 1 - MEASURING POINT OF CYLINDER BORE
- 2 - MEASURING POINT OF CYLINDER BORE
- 3 - MEASURING POINT OF CYLINDER BORE
- 1a - UPPER REVERSAL POINT OF #1 PISTON RING
- 1b - BOTTOM DEAD CENTER OF PISTON
- 1c - BOTTOM REVERSAL POINT OF OIL SCRAPER RING
- 1A - LONGITUDINAL DIRECTION
- 1B - TRANSVERSE DIRECTION

NOTE: This must be done with engine completely disassembled.

1. Thoroughly clean all cylinder bores with appropriate cleaning solvent.
2. Measure each cylinder at the three measuring points shown in illustration .
3. Using the three measurement points, measure cylinder in the longitudinal and in the transverse direction .

PISTON PROTRUSION

NOTE: Any time a rod or piston is replaced, the piston protrusion must be checked.

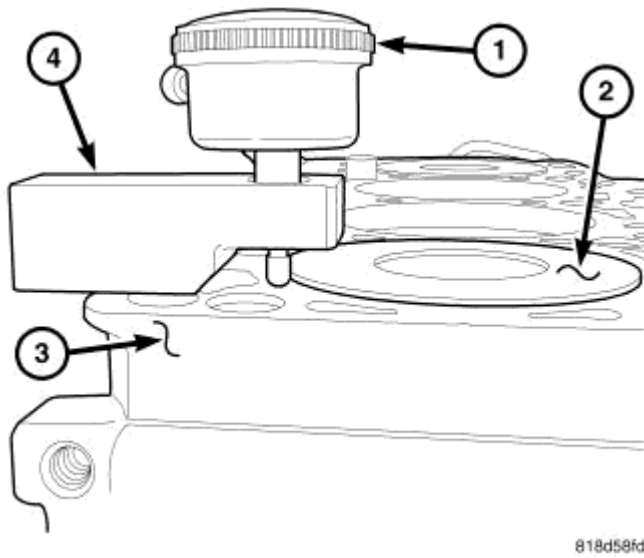


Fig. 126: Zero Dial Indicator
Courtesy of CHRYSLER LLC

1. Position scooter block D-115-2A (4) and a dial indicator flat on the cylinder block (3) head surface and zero the dial indicator.

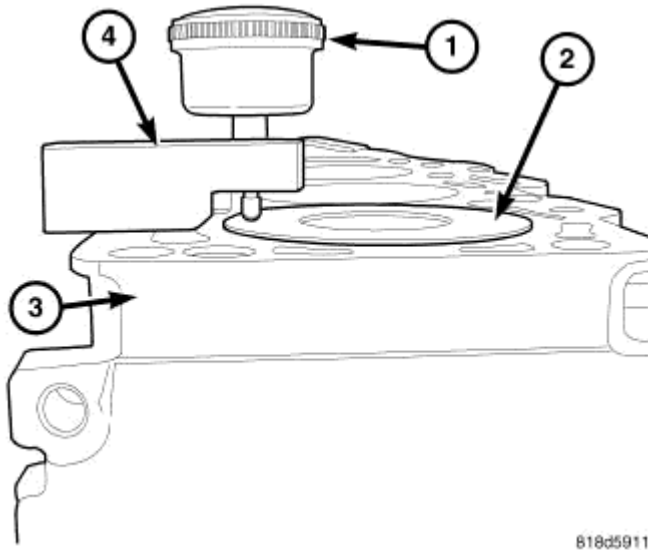


Fig. 127: Piston Height
Courtesy of CHRYSLER LLC

2. Slide Scooter block D-155-2A (4) so that the dial indicator (1) is now on the piston (2).
3. Read measurement and refer to the HEAD GASKET SELECTION table for the correct head gasket.

HEAD GASKET SELECTION

Piston Protrusion		Head Gasket Identification Notches
0.91 - 1.00 mm	0.035 - 0.039 in.	1

2009 Dodge Journey R/T

2009 ENGINE 2.0L Diesel - Service Information - Journey

1.01 - 1.10 mm	0.040 - 0.043 in.	2
1.11 - 1.20 mm	0.044 - 0.047 in.	3

4. Look up piston protrusion measurement in the table to find the correct head gasket. The head gasket is marked round holes (1).

CRANKSHAFT

Standard Procedure

MEASURE CRANKSHAFT AND BLOCK JOURNALS

NOTE: After bearing damage has occurred, remove all debris which is present in the main oil gallery, connecting rod bores, and in the crankshaft and oil galleries. Include removal of the inserting steel ball of the main oil gallery before cleaning.

1. Remove crankshaft. See **Removal** .
2. Clean all engine parts thoroughly.

CAUTION: After bearing damage has occurred, replace connecting rods which have suffered overheating because of bearing damage. The connecting rod must not have any cross scores and notches.

3. Inspect connecting rod. If damage is present, inspect crankshaft, replace as necessary.
4. Inspect crankcase.
5. Inspect standard size of crankshaft bearing shells.
6. Inspect crankshaft bearing cap.
7. Mount crankshaft radially.
8. Inspect crankshaft bearing play.

NOTE: Radial mounting of the main bearings of standard size crankshaft is possible by assigning the color-coded bearing shells.

ASSIGN CRANKSHAFT BEARING SHELLS

The oil pan rail of the cylinder block is marked with chisel punches indicating which bearing shells are used.

9. Assign crankshaft bearing shells.
10. Mount crankshaft axially.
11. Inspect crankshaft bearing play.

Removal

REMOVAL

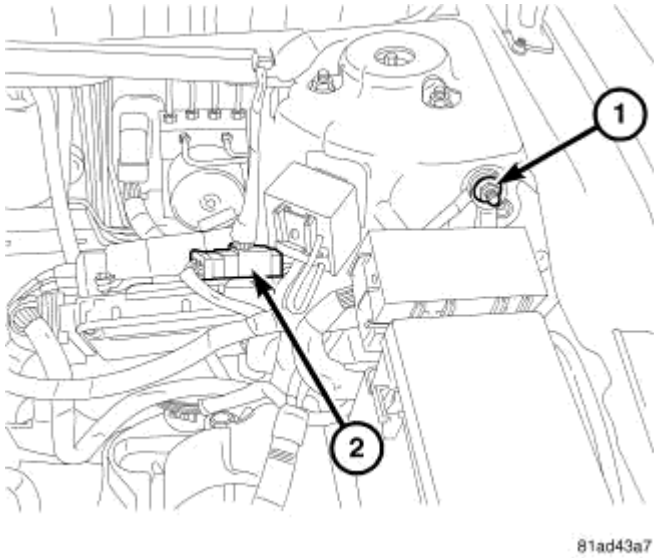


Fig. 128: Battery Cable
Courtesy of CHRYSLER LLC

NOTE: The engine must be removed from the vehicle to service crankshaft.

1. Disconnect negative battery cable (1).

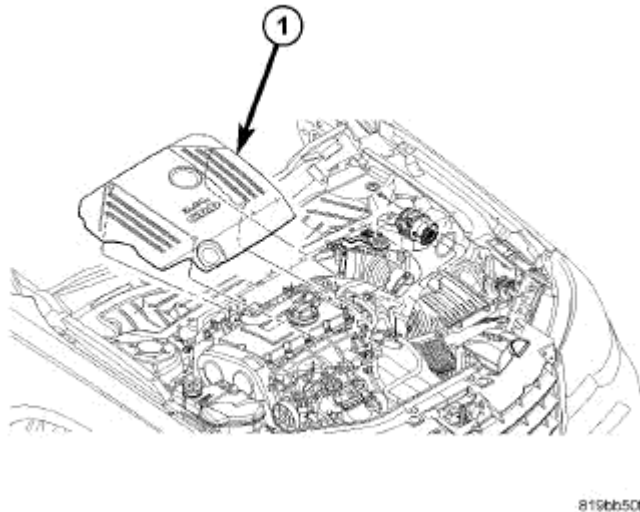
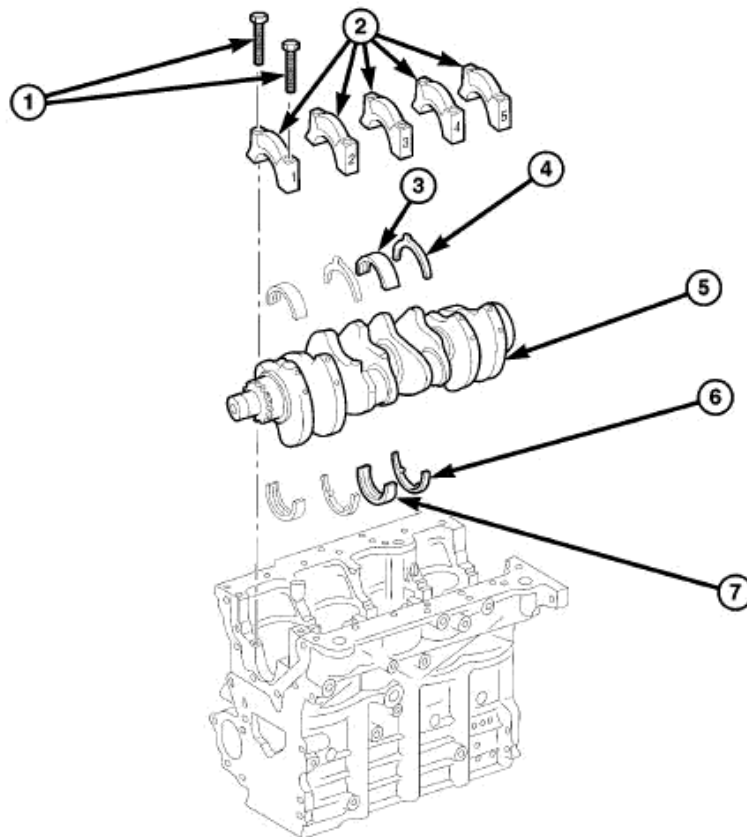


Fig. 129: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

2. Remove engine cover (1).
3. Remove engine. See **Removal** .

4. Remove cylinder head. See **Removal**.
5. Remove rear crankshaft seal adapter. See **Removal**.



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Fig. 130: Crank And Bearings
Courtesy of CHRYSLER LLC

6. Remove front crankshaft seal retainer.

NOTE: Mark piston and rod location prior to removal with paint pen. Do not use a punch.

7. Remove piston and connecting rod assemblies. See **Removal**.

CAUTION: The crankshaft bearing caps are numbered consecutively, beginning with the first crankshaft bearing cap at the front of engine. Attention must be paid to the way crankshaft bearing caps fit.

8. Unbolt crankshaft bearing caps (2).
9. Inspect crankshaft bearing caps (2) and bolts (1) for wear and stretching.
10. Remove crankshaft (5) from engine block.

Installation

INSTALLATION

CAUTION: Oil bearing shells before inserting crankshaft.

CAUTION: Oil thread and head contact surfaces of bolts that retain crankshaft bearing caps; tighten bolts from inside to outside, beginning at fit bearing. Rotate crankshaft to check clearance.

NOTE: The crankshaft bearing caps are numbered consecutively, beginning with the first crankshaft bearing cap at the front of engine. Attention must be paid to the way crankshaft bearing caps fit.

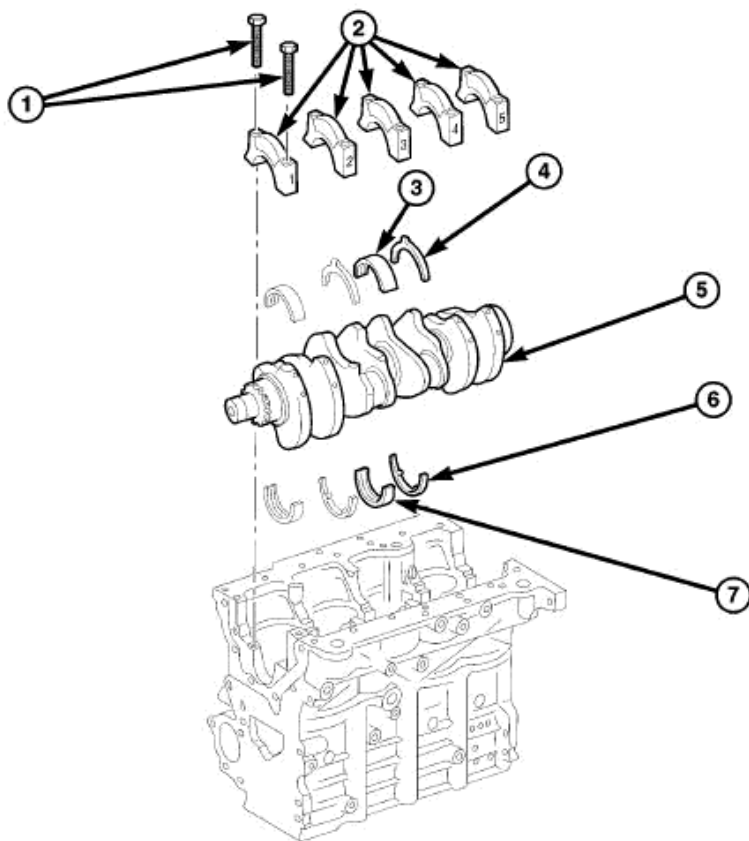
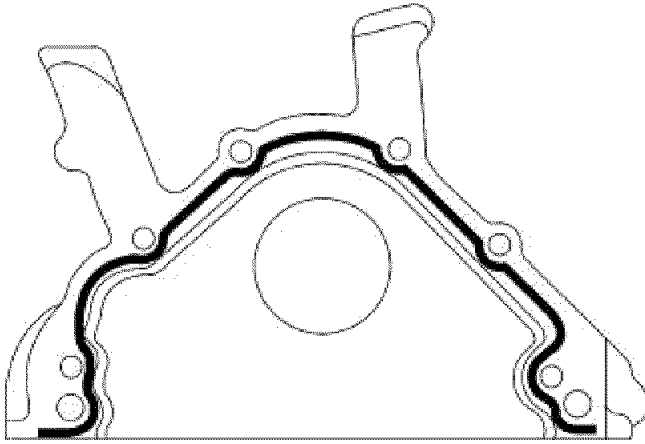


Fig. 131: Crank And Bearings
Courtesy of CHRYSLER LLC

1. Install bearing shells into engine block (7).
2. Oil bearing shells.
3. Install upper thrust bearings in block (6).

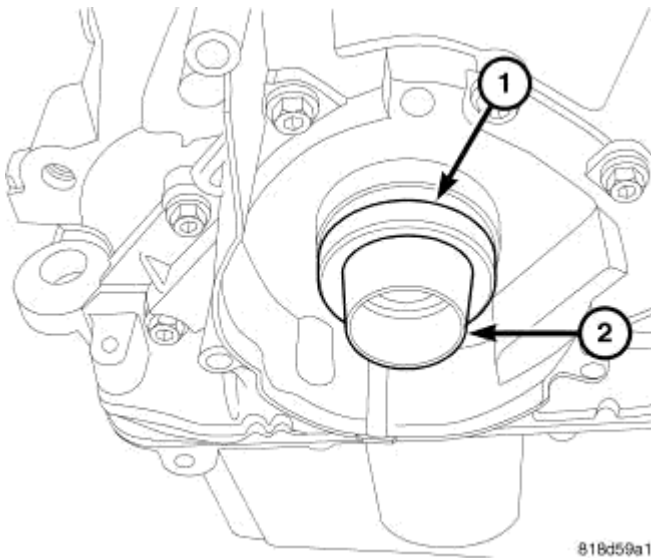
4. Install crankshaft into engine block (5).
5. Install bearing shells (3) into bearing caps (2).
6. Install lower thrust bearings (4).
7. Install crankshaft bearing caps (2). Tighten bolts in two stages. 65 N.m (48 lbs ft), then 90°.
8. Install piston and connecting rod assemblies. See **Installation** .



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Fig. 132: Front Seal Flange RTV Path
Courtesy of CHRYSLER LLC

9. Apply RTV to front sealing flange as shown in illustration.
10. Install front crankshaft sealing flange.



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Fig. 133: Front Crank Seal Sleeve

Courtesy of CHRYSLER LLC

11. Install front seal (1) and seal installation guide (2).

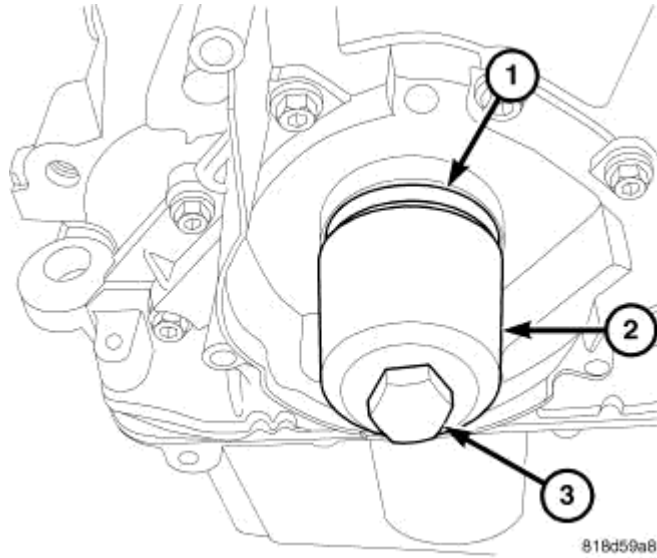
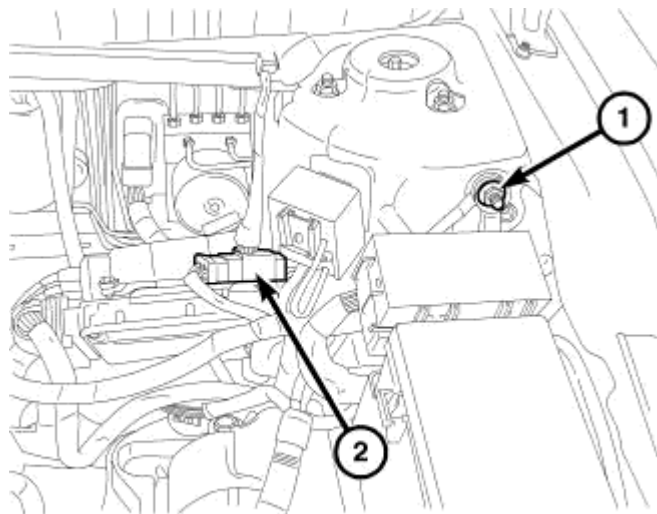


Fig. 134: Front Crank Seal Installation
Courtesy of CHRYSLER LLC

12. Install front crankshaft oil seal (1) using installer (2) and bolt (3).
13. Install rear timing belt cover.
14. Install rear crankshaft oil seal. See **Installation** .
15. Install timing belt cover. See **Installation** .
16. Install the engine. See **Installation** .
17. Fill crankcase with the correct engine oil, to the proper level.
18. Fill cooling system with the proper coolant, to the proper level. Refer to **Cooling - Standard Procedure** .



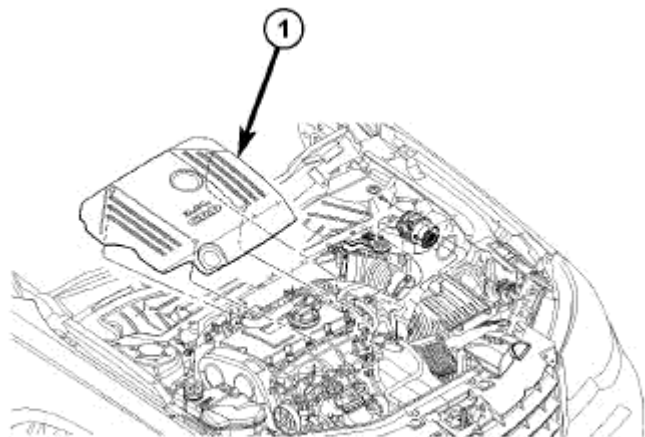
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Fig. 135: Battery Cable
Courtesy of CHRYSLER LLC

19. Connect negative battery cable (1).

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothes.

20. Start engine and inspect for leaks.



818bb50f

Fig. 136: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

21. Install engine cover (1). See **Installation** .

MODULE, BALANCE SHAFT

Description

DESCRIPTION

The balance shaft module bolts to the bottom of the engine. The oil pump is an integral part of the balance shaft module and cannot be serviced separately.

Operation

OPERATION

The balance shaft module is gear driven off the crankshaft. The oil pump is housed in the front portion of the module. The oil pump supplies the engines oil requirements. The balance shaft portion is for NVH reduction.

Removal

REMOVAL

NOTE: When Balance Shaft Module (BSM) is removed, a new BSM **MUST** be installed.

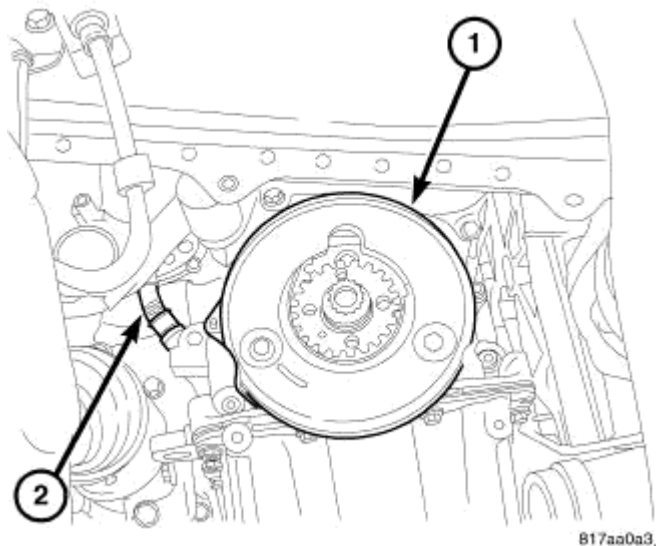


Fig. 137: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

1. Remove oil pan. See **Removal** .
2. Remove lower timing belt cover (1).

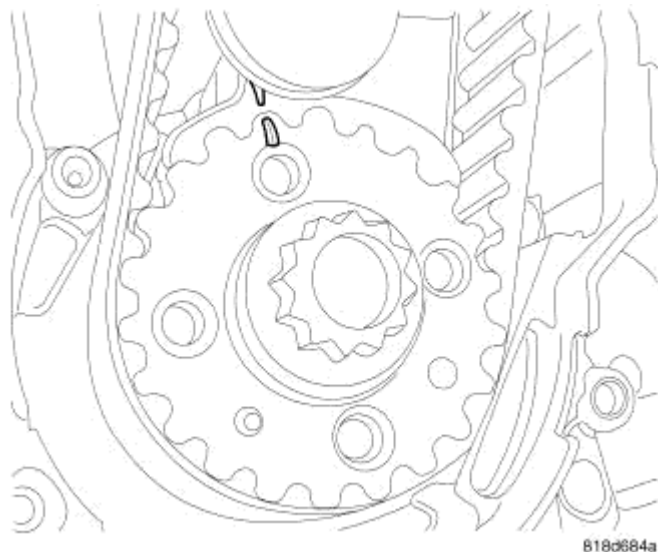


Fig. 138: Crankshaft Timing Marks
Courtesy of CHRYSLER LLC

3. Rotate engine to TDC and insert crankshaft timing lock 9883.

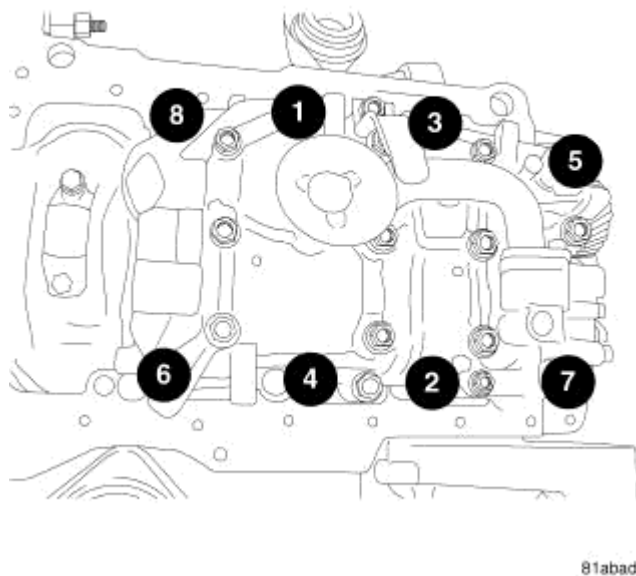


Fig. 139: Balance Shaft Retaining Bolt Torque Sequence
Courtesy of CHRYSLER LLC

4. Remove balance shaft retaining bolts.
5. Remove balance shaft.

Installation

INSTALLATION

NOTE: When installing a new balance shaft module, the oil pick-up and dip stick guide must be removed.

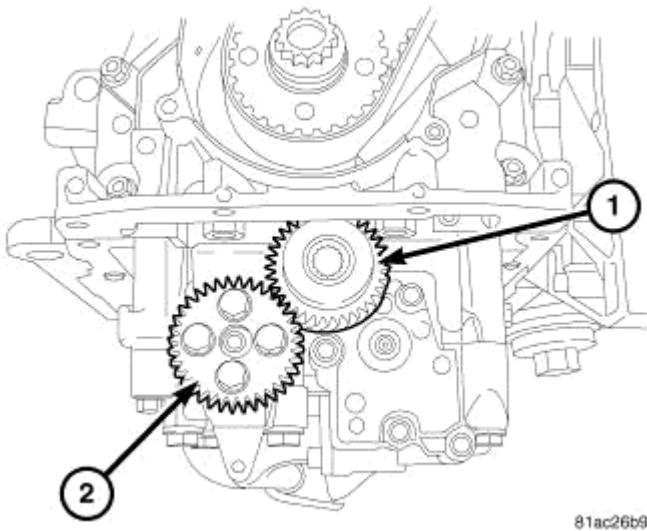


Fig. 140: BSM Timing Marks
Courtesy of CHRYSLER LLC

1. Remove dipstick guide from new BSM and discard.
2. Remove pick-up tube from BSM and discard.
3. Pour 15 ml (0.5 oz.) of oil into oil pump and turn balance shaft gear (2) a minimum of 3 revolutions.
4. Install new pick-up tube and new o-ring.
5. Tighten pick-up tube retaining bolt to 10 N.m (89 in. lbs.).
6. Tighten pick-up tube support bracket to 22 N.m (195 in. lbs.).

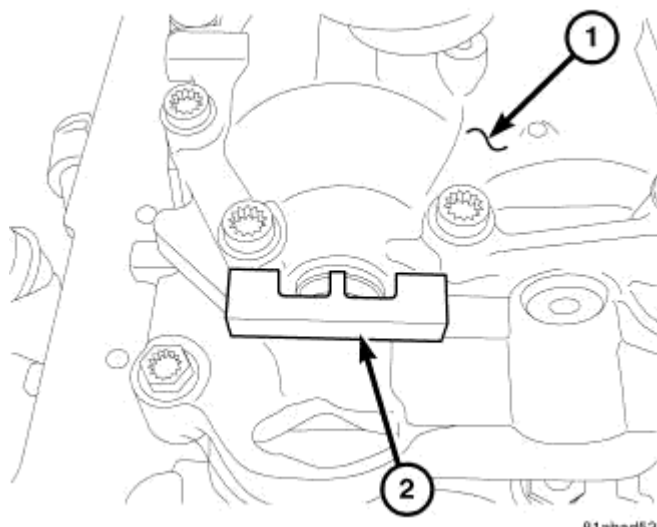


Fig. 141: BSM Timing Lock
Courtesy of CHRYSLER LLC

7. Install BSM lock 9991-2 (2).
8. Install 2 new locating sleeves.

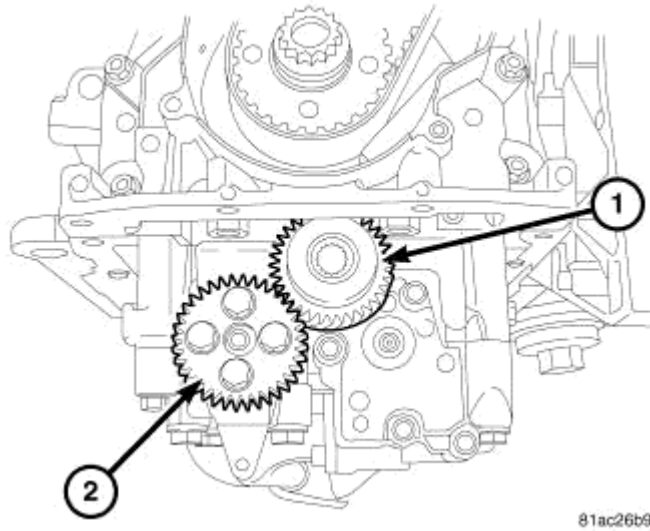


Fig. 142: BSM Timing Marks
Courtesy of CHRYSLER LLC

9. Loosen intermediate gear (1) retaining bolt 90°.
10. Install BSM with white dot on intermediate gear pointing towards the crankshaft.

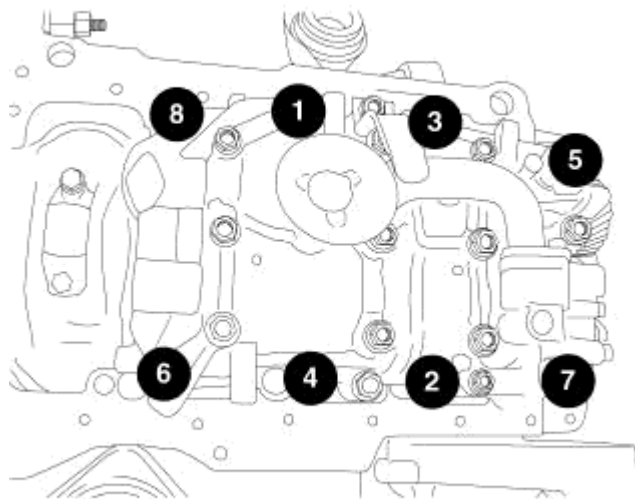


Fig. 143: Balance Shaft Retaining Bolt Torque Sequence

Courtesy of CHRYSLER LLC

11. Tighten all bolts to 6 N.m (53 in. lbs.) in the sequence shown in illustration.
12. Tighten bolts 1,2,3,4,6,8 to 20 N.m (177 in. lbs.).
13. Tighten bolts 5 and 7 to 15 N.m (133 in. lbs.).
14. Tighten all bolts an additional 90°.

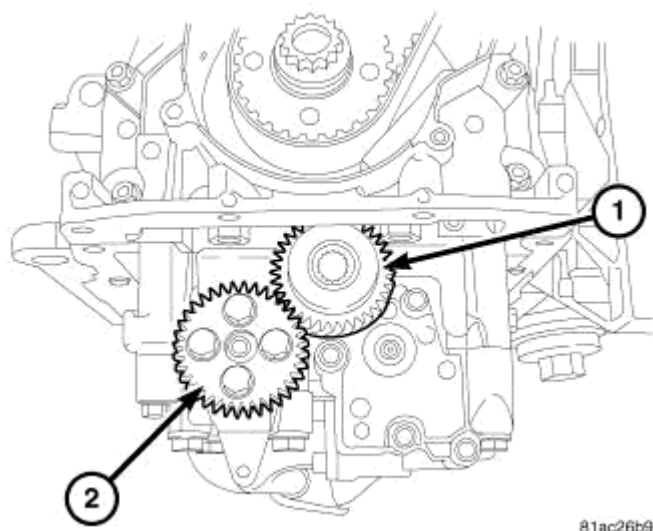


Fig. 144: BSM Timing Marks
Courtesy of CHRYSLER LLC

15. Install balance shaft gear (2) and tighten bolts to 20 N.m (177 in. lbs.).
16. Tighten bolts an additional 90°.

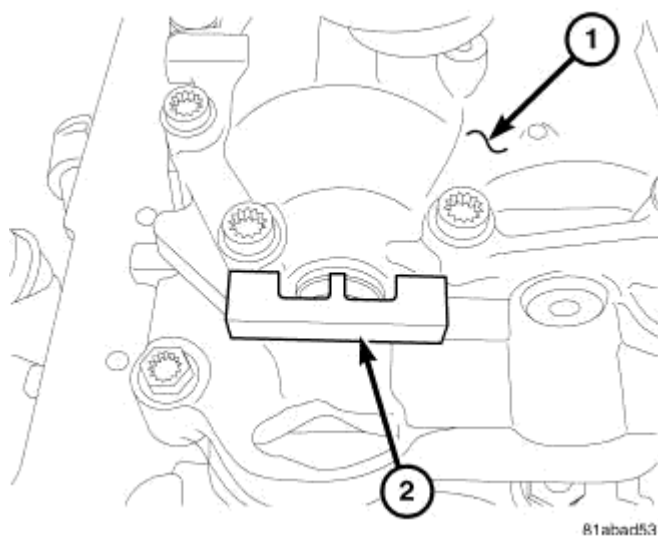


Fig. 145: BSM Timing Lock
Courtesy of CHRYSLER LLC

17. Remove BSM timing lock 9991-2 (2).

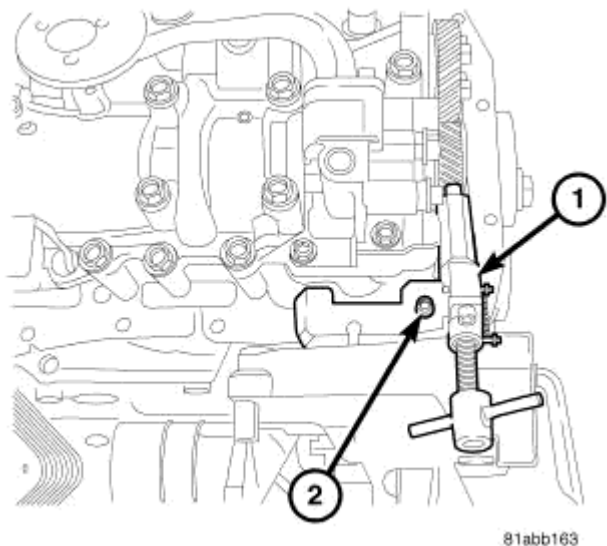


Fig. 146: Securing Bolt
Courtesy of CHRYSLER LLC

18. Secure gear lash adjuster 9991-1 (1) to engine block and install securing bolt (2).

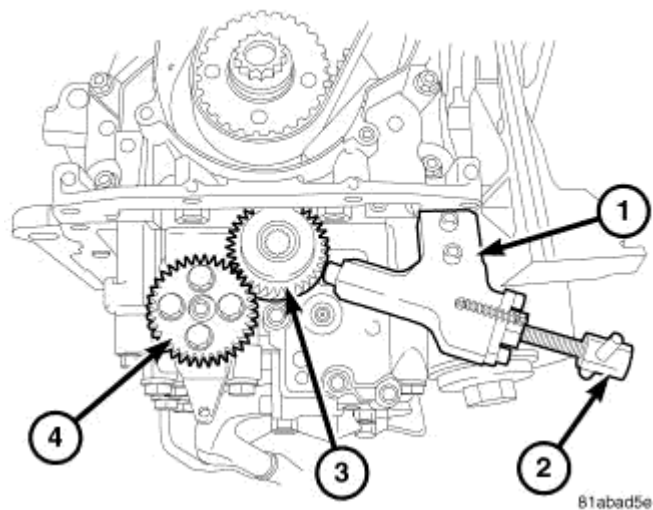


Fig. 147: Gear Lash Adjuster
Courtesy of CHRYSLER LLC

19. Tighten tensioner screw (2) to 2-4 N.m (18-35 in. lbs.).
20. Tighten intermediate gear (3) bolt to 90 N.m (66 ft. lbs.).
21. Loosen tension screw (2).
22. Check for zero backlash between gears.

23. If backlash is present, loosen intermediate gear (3) bolt 90° and repeat steps 19 through 22.
24. If no backlash was present, tighten intermediate gear an additional 90°.

CAUTION: If you have backlash after the intermediate bolt has been tightened the additional 90°, the BSM **MUST** be replaced.

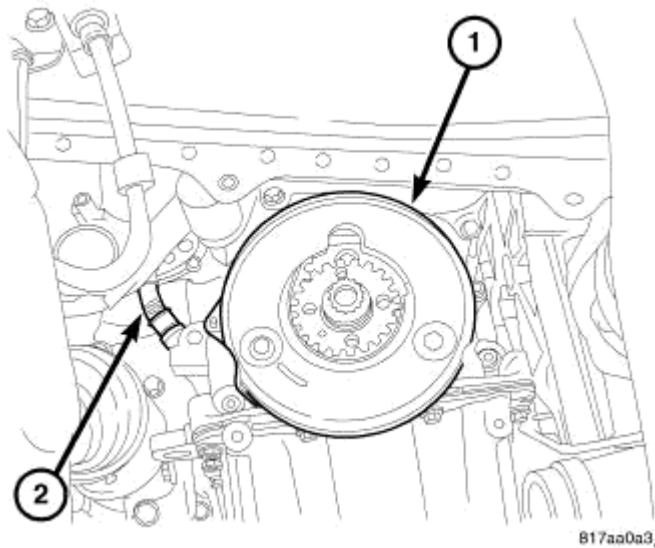


Fig. 148: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

25. Install the lower timing belt cover (1).
26. Install the crankshaft damper.
27. Install the oil pan. See **Installation** .
28. Fill with oil.
29. Start engine and check for leaks.

PUMP, TANDEM VACUUM

Description

DESCRIPTION

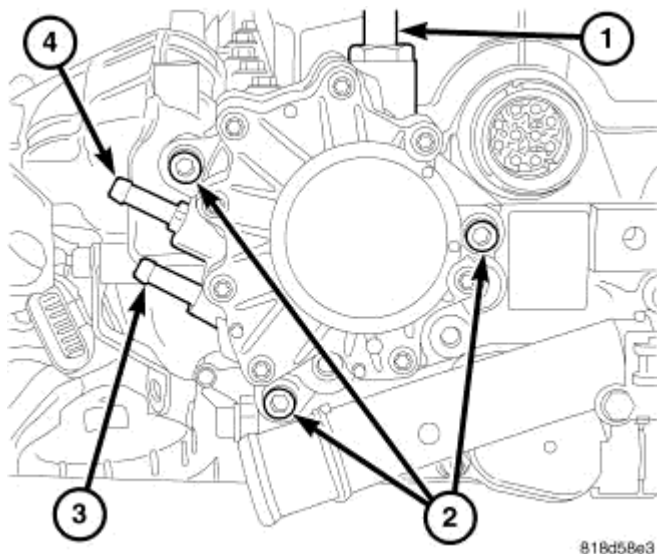


Fig. 149: Tandem Pump

Courtesy of CHRYSLER LLC

This pump is a tandem pump design. It contains a fuel pump and a vacuum pump in 1 housing. If either pump fails, the tandem pump assembly must be replaced.

Removal

REMOVAL

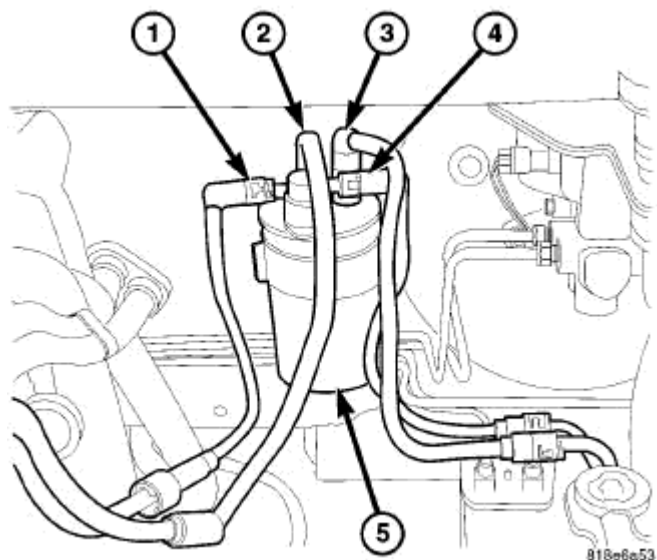


Fig. 150: Fuel Filter

Courtesy of CHRYSLER LLC

1. Remove Fuel feed line at filter (2).
2. Remove fuel return line at filter (1).

3. Connect vacuum pump to line and operate pump until no more fuel comes out.

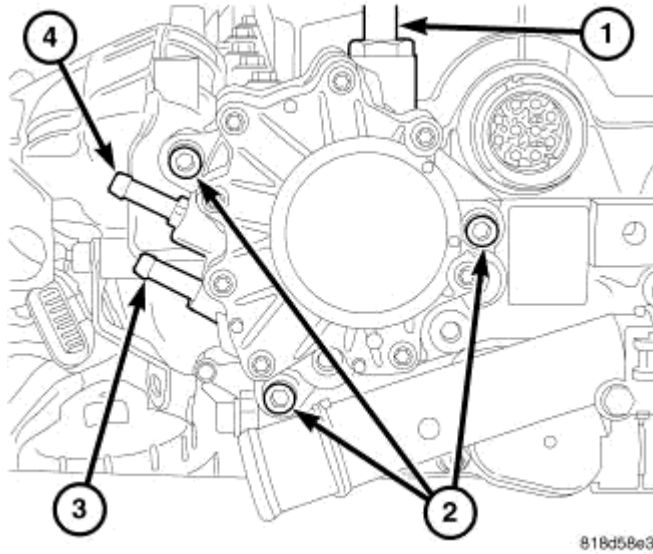


Fig. 151: Tandem Pump
Courtesy of CHRYSLER LLC

4. Remove fuel feed line (4).
5. Remove fuel return line (3).
6. Remove retaining bolts (2) and remove pump.

Installation

INSTALLATION

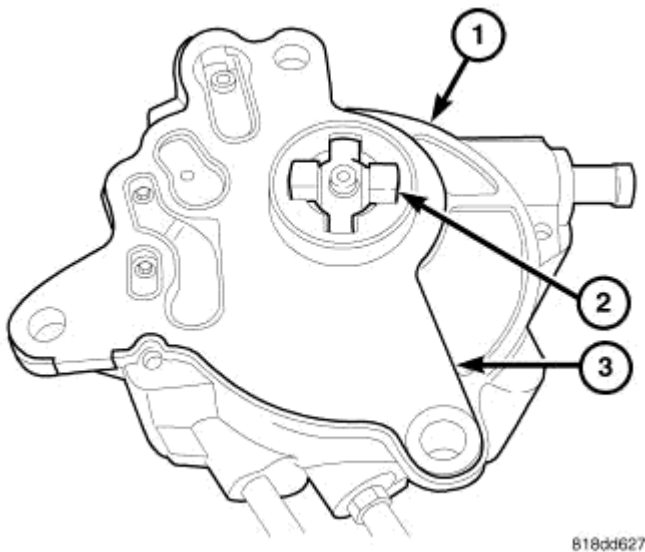


Fig. 152: Pump And Gasket
Courtesy of CHRYSLER LLC

1. Place new gasket (3) on pump (1).
2. Align pump drive (2) on pump.

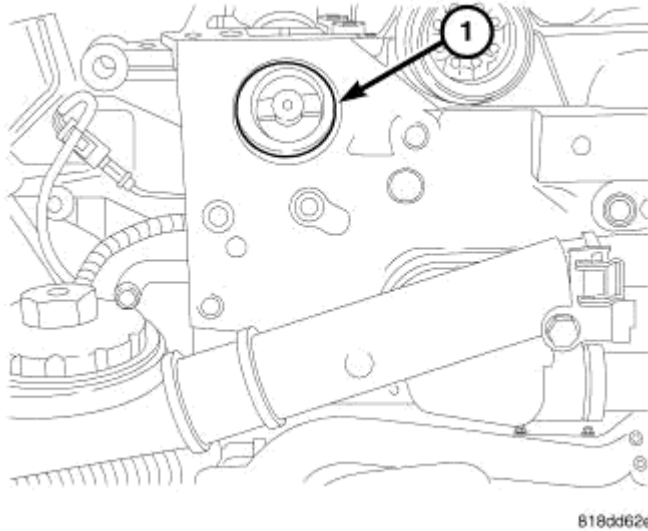


Fig. 153: Fuel Pump Drive
Courtesy of CHRYSLER LLC

3. Insert pump drive into slot on camshaft (1).

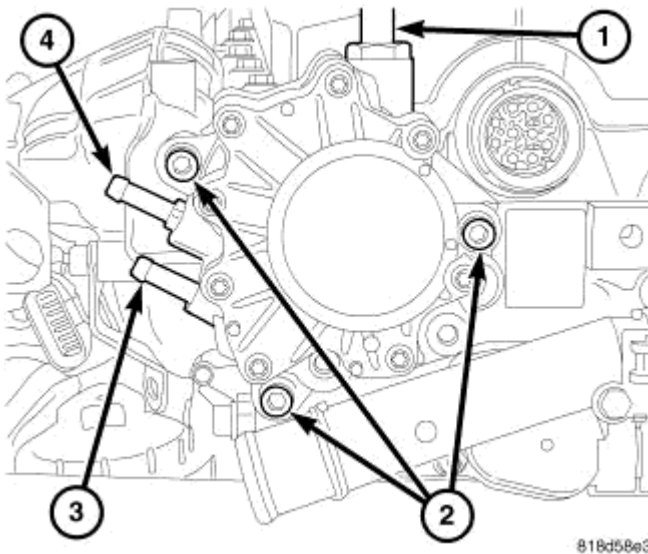


Fig. 154: Tandem Pump
Courtesy of CHRYSLER LLC

4. install pump retaining bolts (2) and tighten.
5. Install fuel feed line (4).
6. Install fuel return line (3).

ROD, PISTON AND CONNECTING**Removal****REMOVAL**

1. Remove cylinder head.
2. Remove oil pan.

NOTE: It may be necessary to remove the oil pump to gain access to all of the rods.

3. Remove oil pump if necessary.

NOTE: Do not use a punch to mark connecting rods.

4. Mark connecting rods with paint marker.
5. Remove connecting rod bolts and discard.
6. Push piston and rod assembly out of the engine block.
7. Repeat as needed.

Installation**INSTALLATION**

1. Make sure the ring end gaps are properly staggered.
2. Lubricate the piston and rings with clean engine oil.
3. Compress piston rings with a ring compressor.
4. Install upper rod bearing shell in to connecting rod and oil bearing shell.
5. Push piston into cylinder.

NOTE: Be careful when guiding rod into place not to nick the crankshaft journals.

6. Install lower bearing shell into connecting rod cap.
7. Lubricate lower bearing shell and position rod cap.
8. Install new rod bolts and tighten to 30 N.m + 90° (22 ft. lbs. + 90°).
9. Install oil pan. See **Engine/Lubrication/PAN, Oil - Installation** .
10. Install cylinder head. See **Installation** .
11. Replace oil filter and fill with oil. See **Installation** .
12. Fill cooling system. Refer to **Cooling - Standard Procedure** .
13. Start engine and check for leaks.

SEAL, CRANKSHAFT OIL, REAR

Removal

REMOVAL

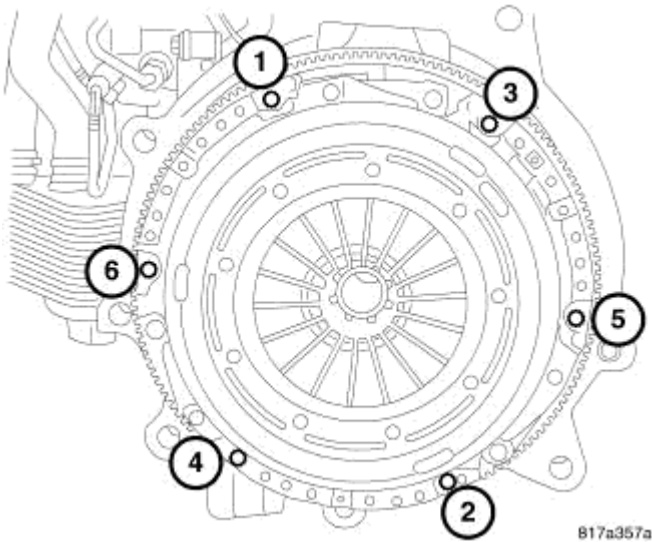


Fig. 155: Pressure Plate
Courtesy of CHRYSLER LLC

1. Disconnect the negative battery cable.
2. Remove the flywheel. Refer to **Clutch/FLYWHEEL - Removal** .

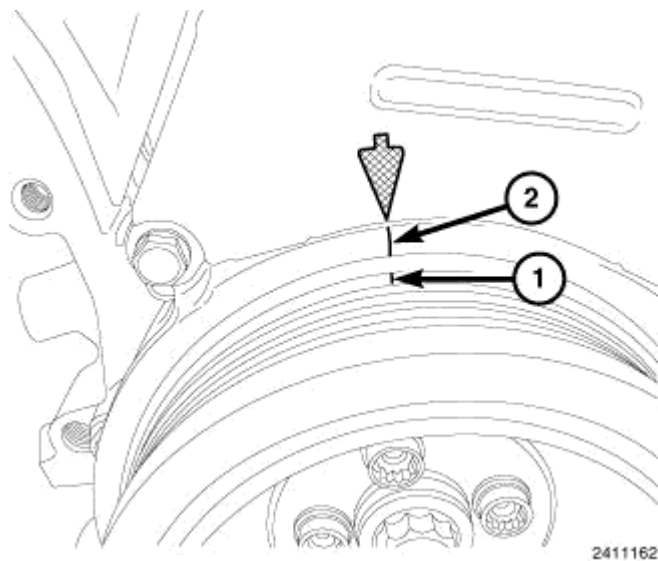


Fig. 156: Vibration Damper Dust Cover
Courtesy of CHRYSLER LLC

3. If equipped, remove the vibration damper dust cover.

4. Rotate the crankshaft to align the timing mark (1) with mark (2) to set cylinder No. 1 at Top Dead Center (TDC).

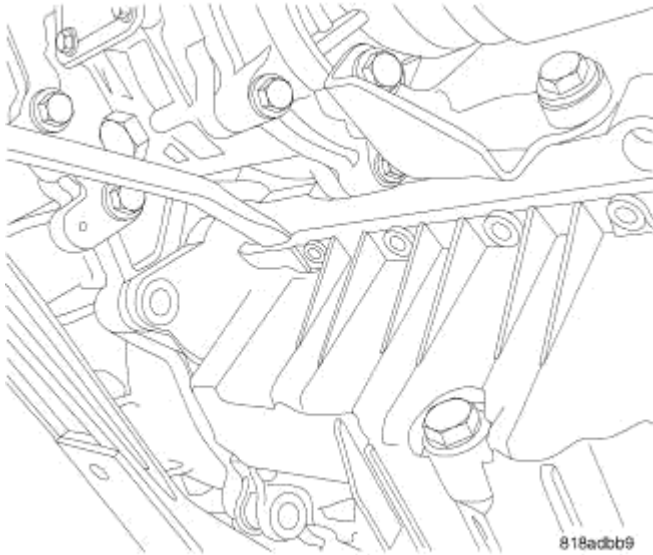


Fig. 157: Oil Pan-Removal
Courtesy of CHRYSLER LLC

5. Drain the engine oil.
6. Remove the oil pan bolts.
7. Using a suitable pry bar, remove the oil pan.

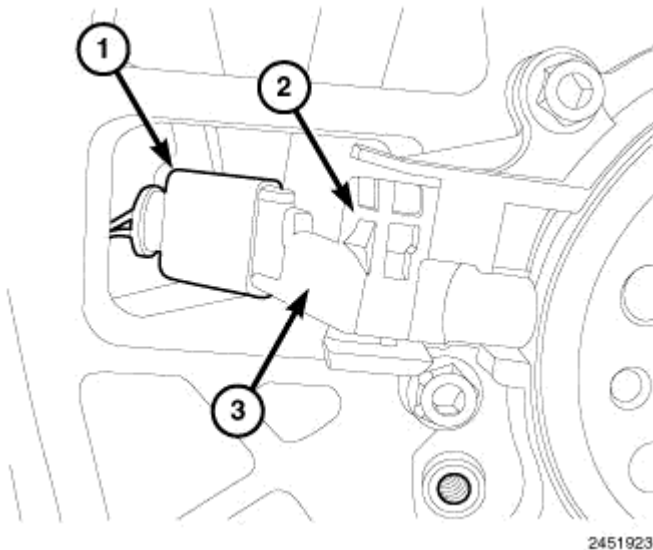
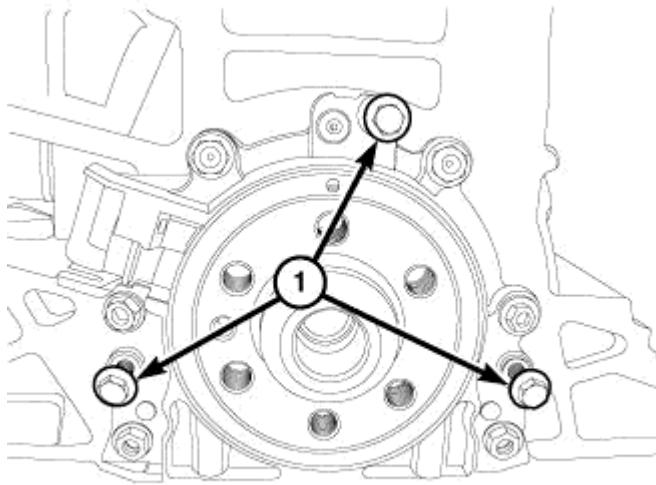


Fig. 158: Crankshaft Position Sensor
Courtesy of CHRYSLER LLC

8. Disconnect the crankshaft position sensor harness connector (1).
9. Remove the bolt (2) and the Crankshaft Position Sensor (CKP) (3).



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Fig. 159: Rear Crankshaft Seal Assembly Removal
Courtesy of CHRYSLER LLC

10. Install the three M6 x 35 bolts into the rear crankshaft seal assembly as illustrated.
11. Alternately screw in bolts 1/2 turn at a time to pull seal assembly off.
12. Wipe excess oil off the crankshaft.

Installation

INSTALLATION

- NOTE:** The rear crankshaft seal comes with an installation sleeve that must not be removed prior to installation.
- NOTE:** The sealing flange and sender wheel must not be separated or rotated after removing from package.
- NOTE:** The sealing flange and seal are one unit that must be replaced together with the sender wheel only.

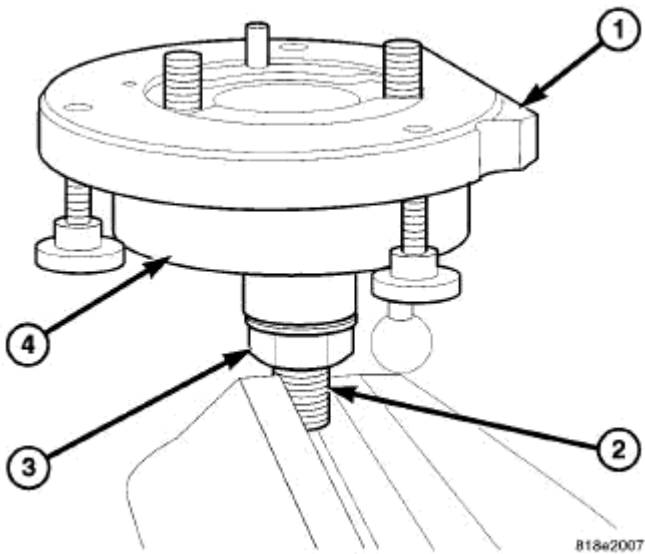


Fig. 160: Rear Main Installer 9888
Courtesy of CHRYSLER LLC

1. Screw in nut (3) to the edge of the clamping surface (2) of threaded spindle.
2. Clamp rear main seal installer 9888 in a vice on the clamping surface of threaded spindle (2).
3. Press assembly bell housing (4) down so it lies on nut (3).
4. Screw nut (3) onto threaded spindle (1) until inner part of assembly device and assembly are bell housing are level.

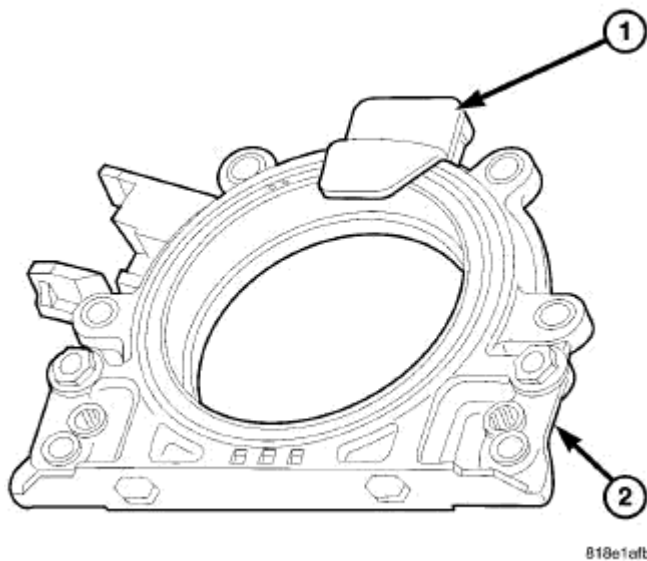


Fig. 161: Securing Clip
Courtesy of CHRYSLER LLC

5. Remove securing clip (1) from rear crankshaft sealing flange (2).

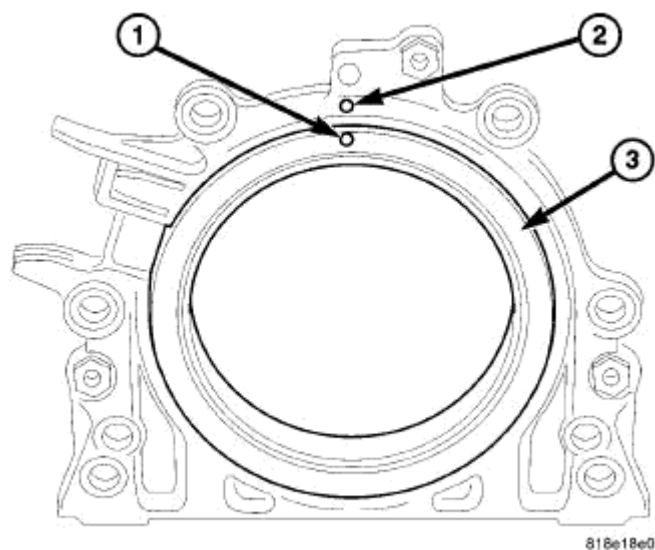


Fig. 162: Locating Hole
Courtesy of CHRYSLER LLC

NOTE: The sender wheel must not be taken out of the sealing flange or turned.

6. Locating hole (1) on sender wheel (3) must align with marking (2) on rear main seal.

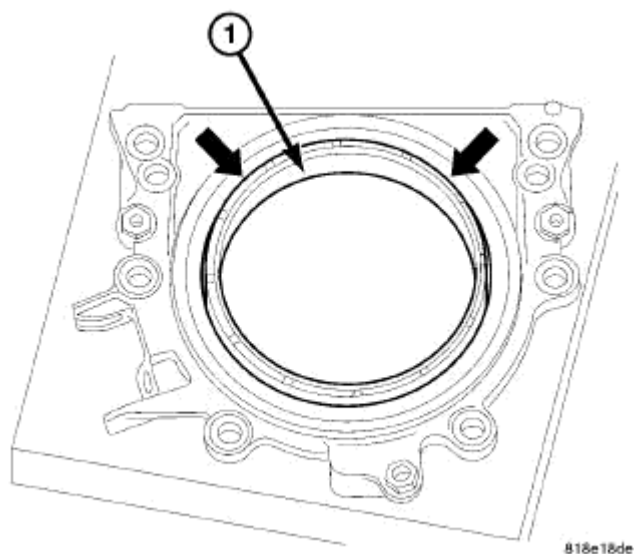


Fig. 163: Sealing Lip Support
Courtesy of CHRYSLER LLC

7. Place seal on clean flat surface with the outer edge facing down.
8. Push sealing lip support ring (1) downward until it lies on flat surface.

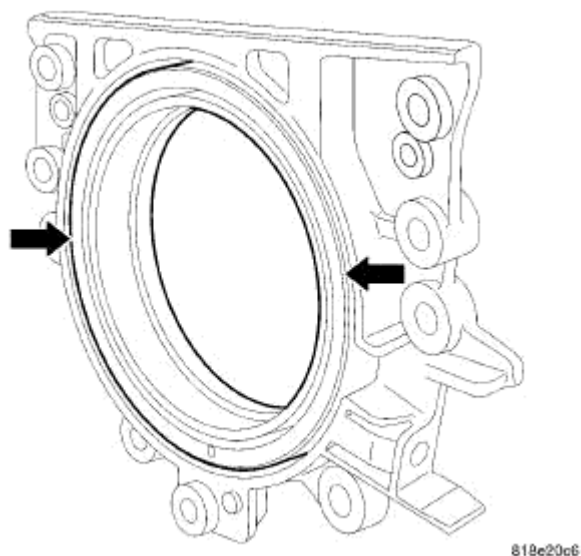


Fig. 164: Sender Wheel Alignment
Courtesy of CHRYSLER LLC

9. Upper edge of sender wheel and front edge of rear main seal must align.

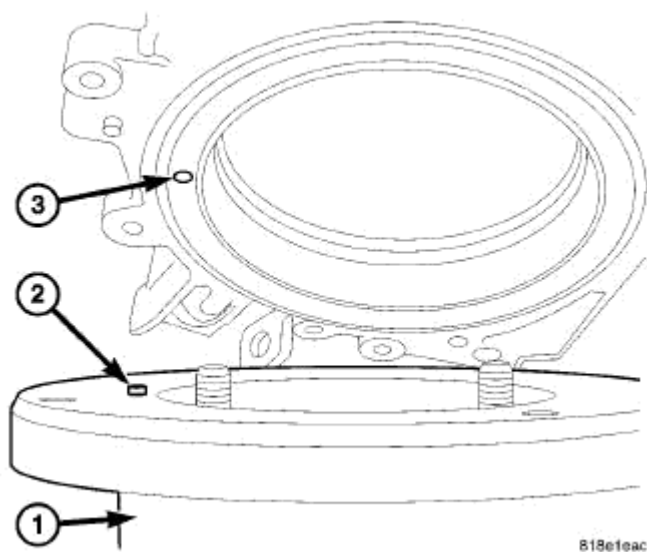


Fig. 165: Locating Pin
Courtesy of CHRYSLER LLC

10. Place rear main seal with outer edge on rear main seal installer 9888 (1) so that locating pin (2) can be inserted into hole (3).

NOTE: Ensure that the rear main seal lies flat on the installer.

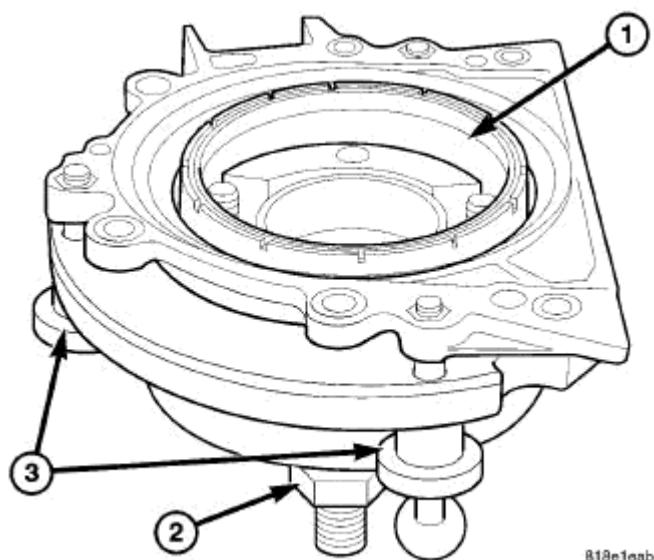


Fig. 166: Seal and Installer

Courtesy of CHRYSLER LLC

11. Push the flange and support ring for the sealing lip (1) against the installer (2) while tightening the three knurled knobs (3) so the locating pin cannot slide out of the sender wheel hole.

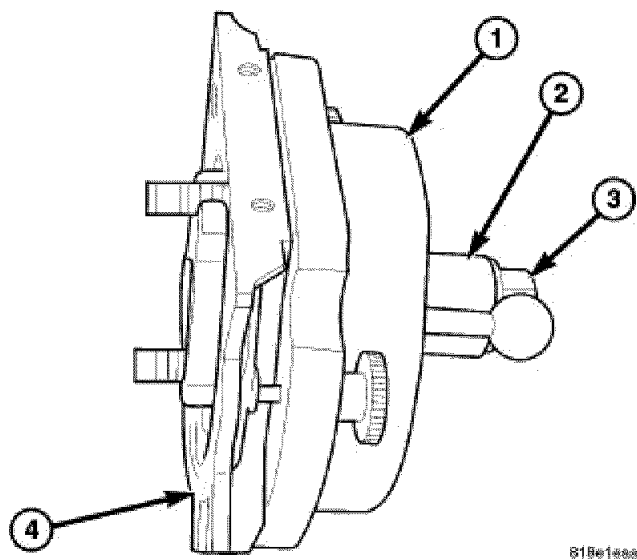


Fig. 167: Attaching Seal to Installer

Courtesy of CHRYSLER LLC

NOTE: When installing rear main seal, the sender wheel must remain fixed in assembly tool.

NOTE: The crankshaft flange must be free from oil and grease.

NOTE: The engine must be at TDC on the #1 cylinder.

12. Screw nut (3) to the end of the spindle.
13. Press threaded spindle of seal installer (1) until nut (3) lies against assembly bell housing (2).
14. Align flat side of assembly bell housing on sump side of crankcase sealing surface.

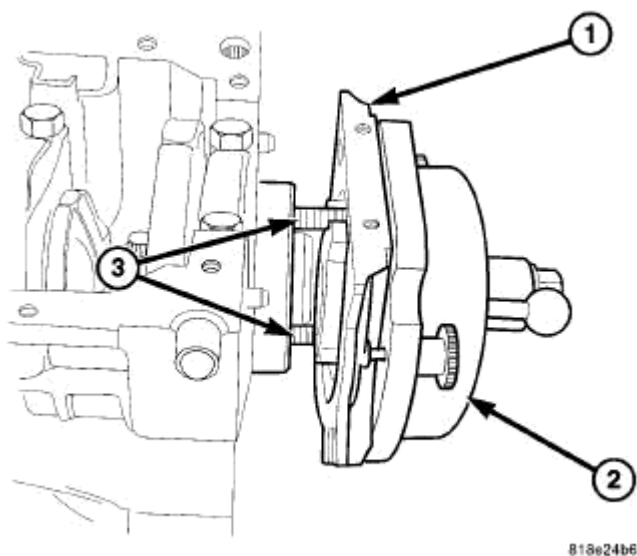


Fig. 168: Secure Installer to Crankshaft
Courtesy of CHRYSLER LLC

15. Secure assembly tool (2) to crankshaft using Allen head bolts (3).

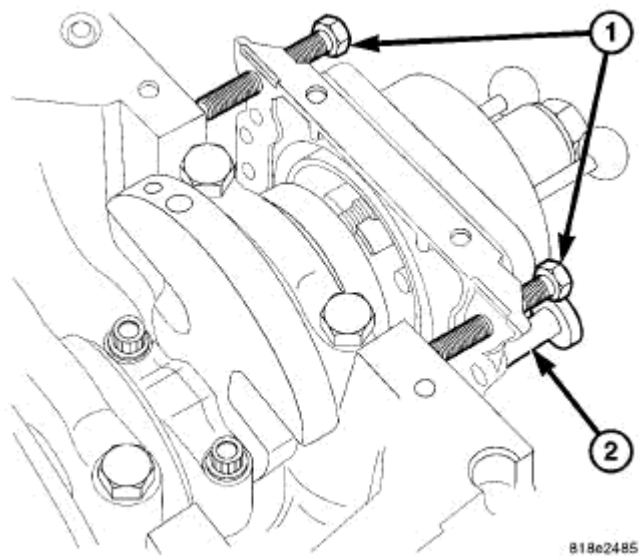


Fig. 169: Guide Bolts

Courtesy of CHRYSLER LLC

16. To guide sealing flange, screw two M7 x 35 mm bolts (1) into cylinder block.

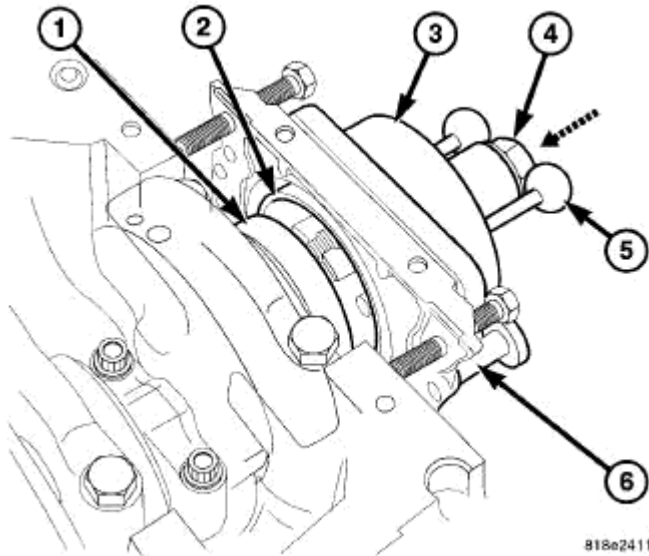


Fig. 170: Seal to Crankshaft Alignment
Courtesy of CHRYSLER LLC

17. Push assembly bell housing (3) by hand in the direction shown in illustration until sealing lip support ring (2) contacts the crankshaft (1).
18. Push guide pin with black knob (5), into hole in crankshaft. This is done to ensure the sender wheel reaches its final installation position.
19. Hand tighten both hexagon socket head bolts of assembly tool.
20. Screw hexagon nut (4) onto threaded spindle by hand until it lies against assembly bell housing (3).

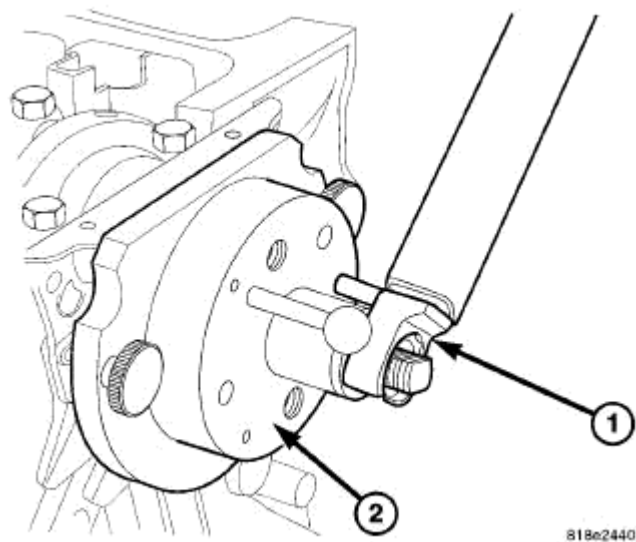


Fig. 171: Pressing Seal in Place
Courtesy of CHRYSLER LLC

NOTE: After nut is tightened, a small air gap must be present between cylinder block and sealing flange.

21. Torque hexagon nut to 35 N.m (26 ft. lbs.).

Checking sender wheel installation position

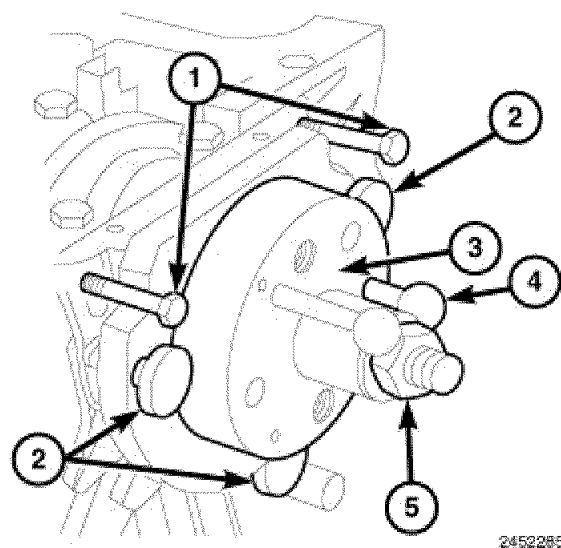


Fig. 172: Hexagon Nut, Bolts, Cylinder Block And Knurled Screws
Courtesy of CHRYSLER LLC

1. Remove hexagon nut (5) to the end of the threaded spindle.

2. Remove the two bolts (1) from cylinder block.
3. Loosen the three knurled screws (2).
4. Remove rear main installer 9888.
5. Remove sealing lip support ring.

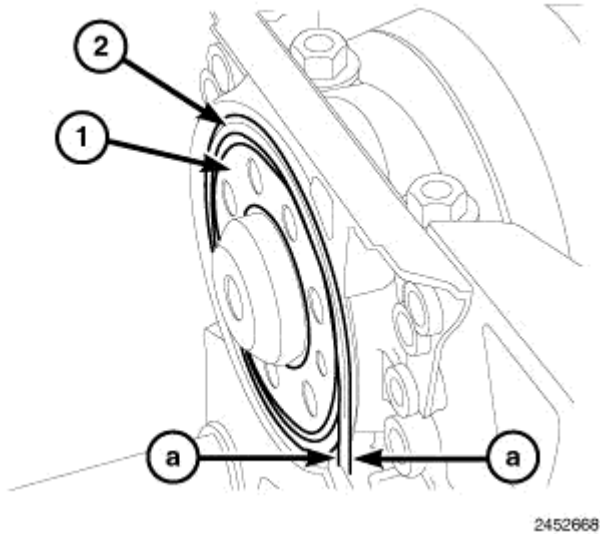


Fig. 173: Crankshaft Flange & Sender Wheel
 Courtesy of CHRYSLER LLC

6. The sender wheel is in the correct position if a gap of 0.5 mm (0.019 in.) exists between the crankshaft flange (1) and the sender wheel (2). Measure the distance -a- between the crankshaft flange and the sender wheel.

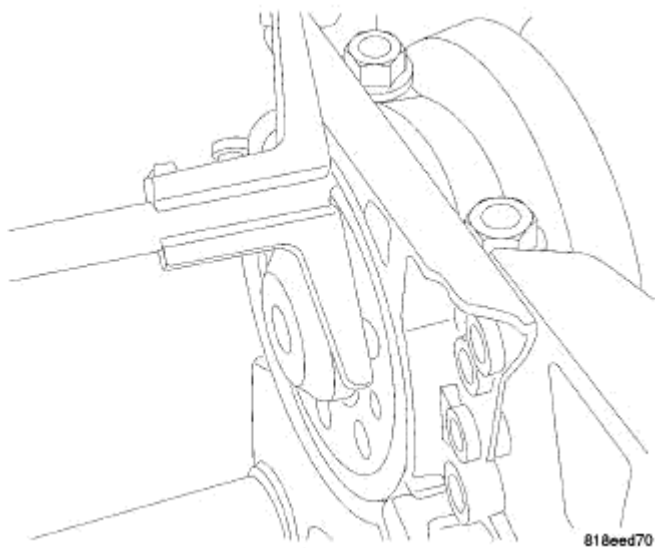
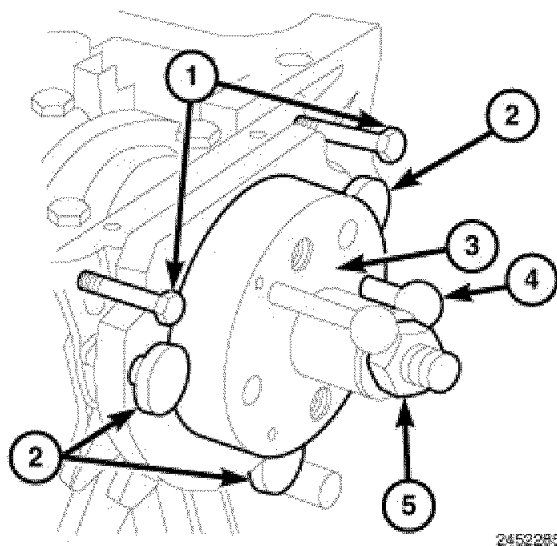


Fig. 174: Measuring Distance Between Crankshaft Flange & Sender Wheel
 Courtesy of CHRYSLER LLC

7. Set vernier gauge on crankshaft flange.
8. Measure the distance between the crankshaft flange and the sender wheel.
9. If the measurement is too small, press sender wheel further.

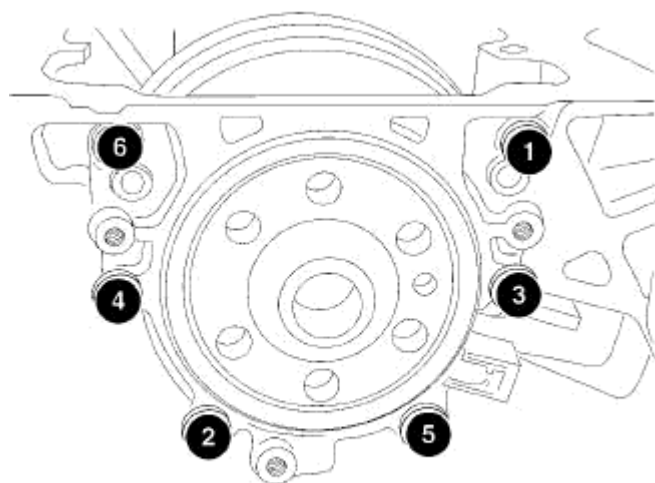


2452285

Fig. 175: Hexagon Nut, Bolts, Cylinder Block And Knurled Screws
Courtesy of CHRYSLER LLC

NOTE: Re-pressing sender wheel.

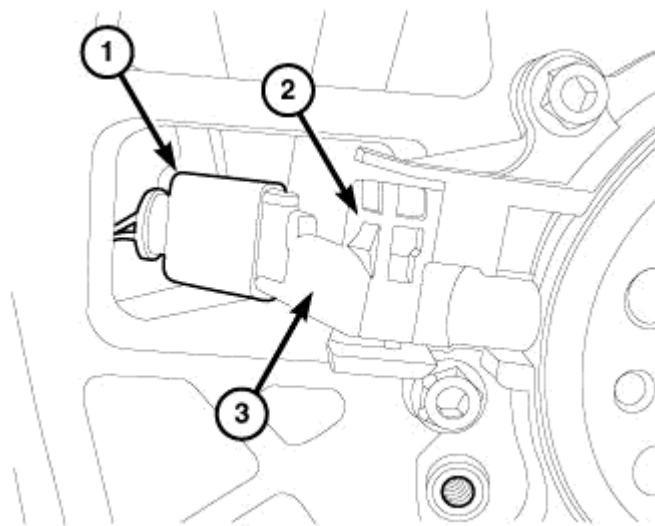
- a. Secure assembly rear main installer 9888 to crankshaft flange using Allen head bolts.
- b. Hand tighten both hexagon socket head bolts.
- c. Push assembly tool by hand to sealing flange.
- d. Screw hexagon nut (5) onto threaded spindle by hand until it lies against assembly bell housing (3).
- e. Tighten nut to 40 N.m (30 ft. lbs.).
- f. Check installation position again.
- g. If dimension is too small, repeat steps a through d again and torque to 45 N.m (33 ft. lbs.).
- h. Check installation position again.



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Fig. 176: Tighten Rear Main Bolts In Sequence
Courtesy of CHRYSLER LLC

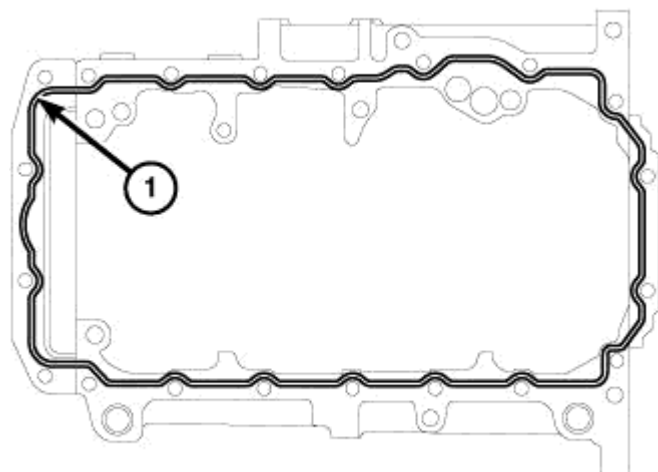
10. If dimension is attained, tighten rear sealing flange bolts to 15 N.m (133 in. lbs.) in the sequence shown in illustration.



2451923

Fig. 177: Crankshaft Position Sensor
Courtesy of CHRYSLER LLC

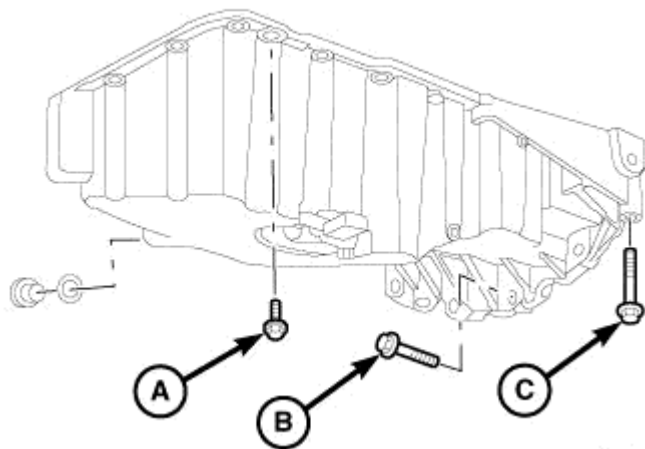
11. Install crankshaft position sensor (3). Tighten bolt (2) to 5 N.m (44 in. lbs.).
12. Connect the crankshaft position sensor harness connector (1).



2453821

Fig. 178: Applying Engine Sealant RTV
Courtesy of CHRYSLER LLC

13. Clean the oil gasket surfaces.
14. Apply a 3 mm bead of engine sealant RTV (1).



2453482

Fig. 179: Identifying Oil Pan Bolts
Courtesy of CHRYSLER LLC

15. Install oil pan.
 - Tighten bolts (A) to 15 N.m (133 in. lbs).
 - Tighten bolts (B) to 45 N.m (33 ft. lbs).
 - Tighten bolts (C) to 40 N.m (30 ft. lbs).

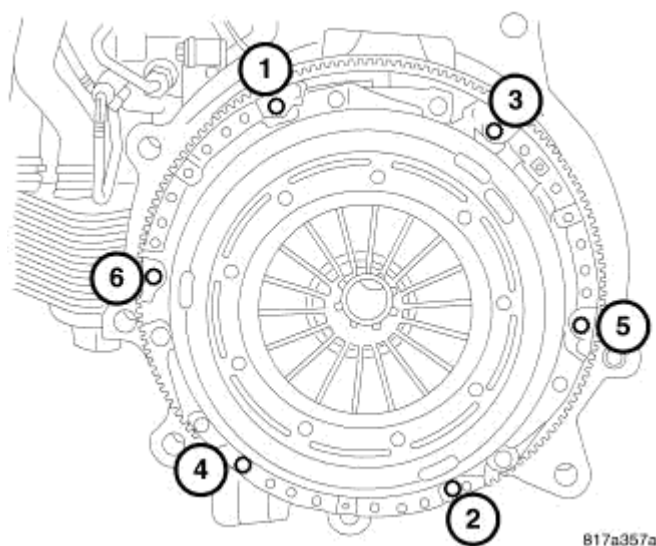


Fig. 180: Flywheel Assembly
Courtesy of CHRYSLER LLC

16. Install the flywheel. Refer to **Clutch/FLYWHEEL - Installation**.
17. If equipped, install the vibration damper dust cover.

WARNING: Use extreme caution when the engine is operating. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothes.

18. Fill engine with the recommended engine oil.
19. Start engine and inspect for leaks.
20. Connect the negative battery cable.

LUBRICATION

DESCRIPTION

DESCRIPTION

The lubrication system is a full-flow filtration, pressure feed type. The balance shaft module (BSM) is mounted below the ladder frame and chain driven by the crankshaft. The BSM consists of a non-serviceable pump, oil pressure relief valve, and a non-serviceable balance assembly.

OPERATION

OPERATION

Engine oil is drawn up through the pickup tube and is pressurized by the oil pump and routed through the full-flow filter to the main oil gallery running the length of the cylinder block. A diagonal hole in each bulkhead feeds oil to each main bearing. Drilled passages within the crankshaft route oil from main bearing journals to

connecting rod journals. Balance shaft lubrication is provided through an internal oil passage at the #3 bearing location around the BSM mounting bolt. A vertical hole at the number one bulkhead routes pressurized oil through a filter screen and head gasket up to the cylinder head. The oil then divides into three passages; one to the intake cam phaser, one to the exhaust cam phaser and one to the camshafts. The passage to the camshafts divides to feed both of the hollow camshafts at the second cam journal. The rest of cam journals are fed oil through the hollow camshafts. The #1 cam journals are fed oil through the VVT oil passages. Oil passages to the phasers are directed through the OCV (oil control valves) to the #1 journals. The oil then flows through the camshafts then to the cam phasers. Oil returning to the pan from pressurized components supplies lubrication to the valve stems, cam lobes, and tappets. Cylinder bores and wrist pins are splash lubricated from directed slots on the connecting rod thrust collars.

DIAGNOSIS AND TESTING

CHECKING ENGINE OIL PRESSURE

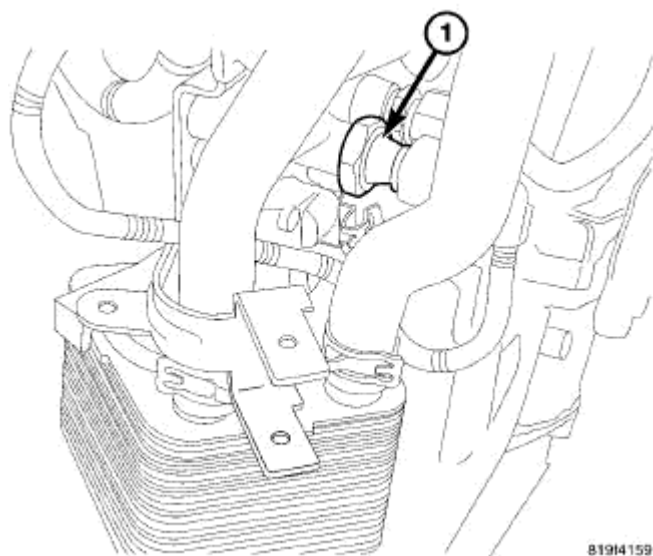


Fig. 181: Oil Pressure Sender
Courtesy of CHRYSLER LLC

1. Disconnect and remove oil pressure switch (1). See **Removal** .

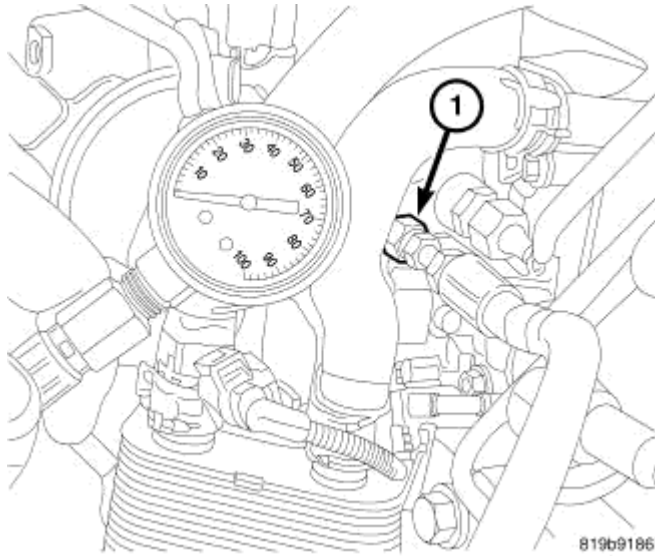


Fig. 182: Oil Pressure Gauge
Courtesy of CHRYSLER LLC

2. Install oil pressure gauge (1).
3. Start engine and record oil pressure. Refer to Specifications for correct oil pressure requirements. See **Specifications** .

CAUTION: If oil pressure is 0 at idle, do not perform the 3000 RPM test.

4. If oil pressure is 0 at idle, shut off engine. Check for pressure relief valve stuck open, a clogged oil pick-up screen or a damaged oil pick-up tube O-ring.
5. Remove oil pan and inspect for debris. See **Removal** .
6. Remove pressure relief valve and inspect. If damaged replace pressure relief valve.
7. If pressure relief valve is OK, replace balance shaft module assembly.
8. After test is complete, remove test gauge and fitting (1).

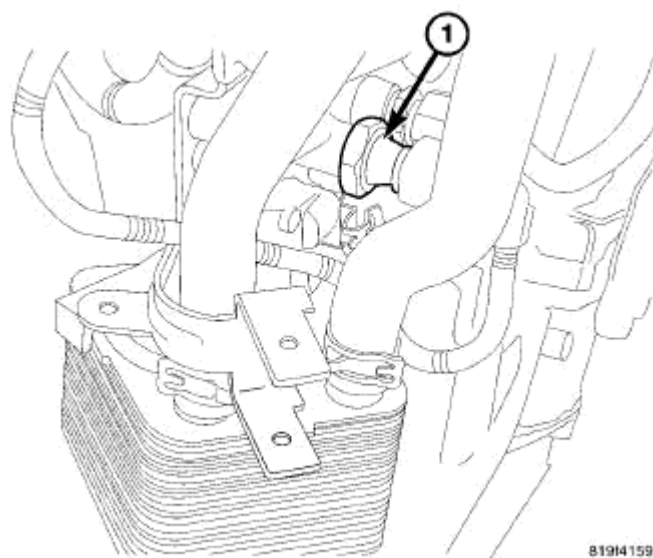


Fig. 183: Oil Pressure Sender
Courtesy of CHRYSLER LLC

9. Install oil pressure switch (1) and connector. See **Installation** .

FILTER, ENGINE OIL

Removal

REMOVAL

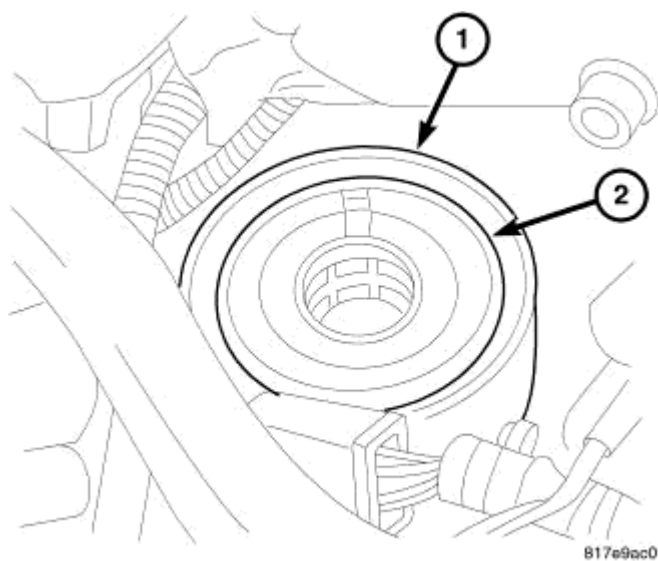


Fig. 184: Filter In Housing
Courtesy of CHRYSLER LLC

1. Remove oil filter housing cover.

2. Pull filter cartridge (2) out of the filter housing (1) and discard.

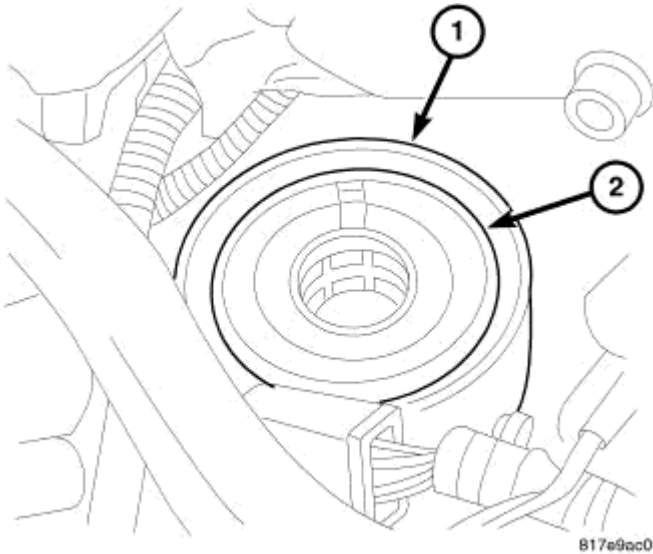
Installation**INSTALLATION**

Fig. 185: Filter In Housing
Courtesy of CHRYSLER LLC

1. Install oil filter cartridge (2) into housing (1).

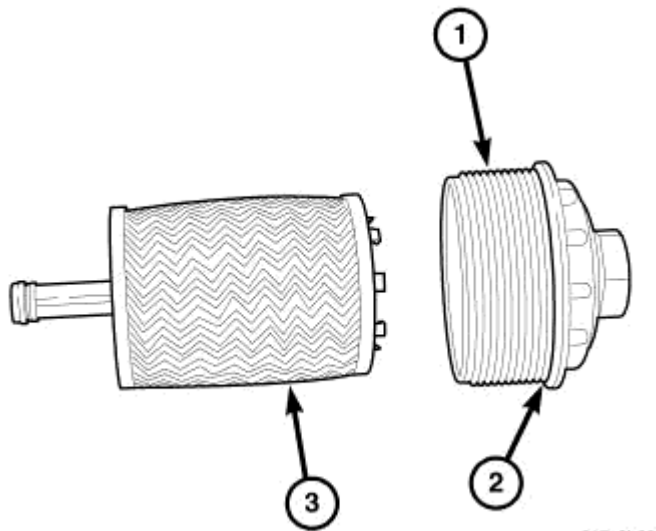


Fig. 186: Oil Filter
Courtesy of CHRYSLER LLC

2. Install new O-ring (2) onto cover (1).
3. Install cover.

OIL

Standard Procedure

ENGINE OIL LEVEL CHECK

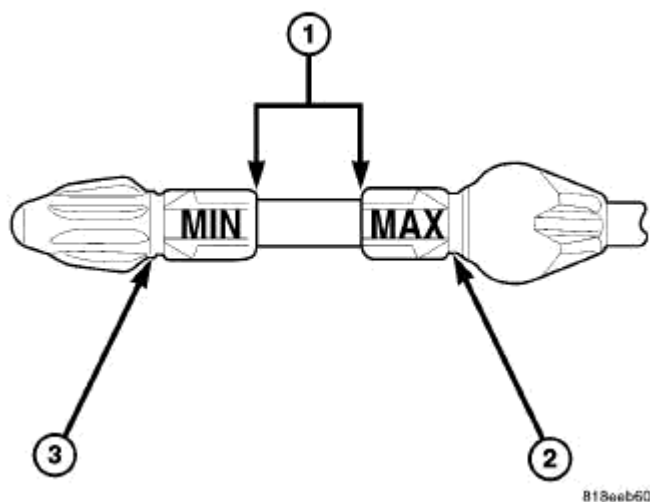


Fig. 187: Oil Level Indicator
Courtesy of CHRYSLER LLC

The best time to check engine oil level is after the vehicle has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading. Remove dipstick and observe oil level. Add oil only when the level is at or below the MIN mark (3).

CAUTION: Do not operate engine if the oil level is above the MAX (2) mark on the dipstick. Excessive oil volume can cause oil aeration which can lead to engine failure due to loss of oil pressure or increase in oil temperature.

ENGINE OIL AND FILTER CHANGE

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 engine oil at mileage and time intervals described in the Maintenance Schedule. Refer to **Vehicle**

Quick Reference/Maintenance Schedules - Description .

1. Run engine until achieving normal operating temperature.
2. Position the vehicle on a level surface and turn engine off.
3. Remove oil fill cap.
4. Raise vehicle on hoist.
5. Place a suitable oil collecting container under oil pan drain plug.
6. Remove oil pan drain plug or and allow oil to drain into collecting container. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.
7. Remove oil filter. See **Removal** .
8. Install oil pan drain plug. Tighten drain plug to 28 N.m (20 ft. lbs.).
9. Install new oil filter. See **Installation** .
10. Lower vehicle and fill crankcase with specified type and amount of engine oil. Refer to **Vehicle Quick Reference/Capacities and Recommended Fluids - Specifications** and refer to **Vehicle Quick Reference/Capacities and Recommended Fluids - Description** .
11. Install oil fill cap.
12. Start engine and inspect for leaks.
13. Stop engine and inspect oil level.

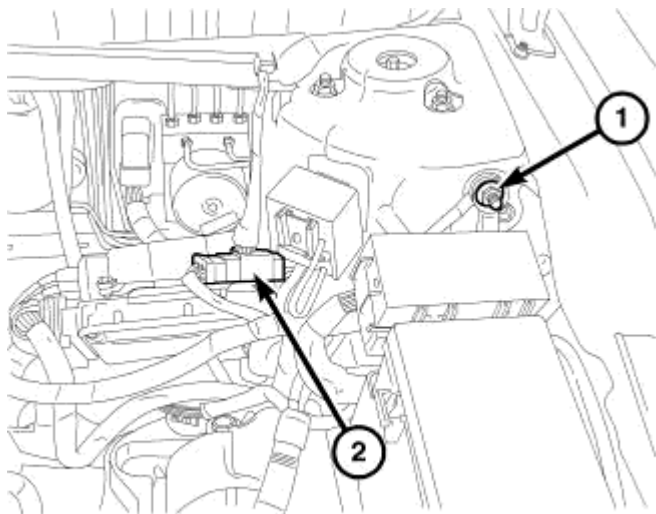
OIL FILTER SPECIFICATION

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

USED ENGINE OIL DISPOSAL

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

PAN, OIL**Removal****REMOVAL**

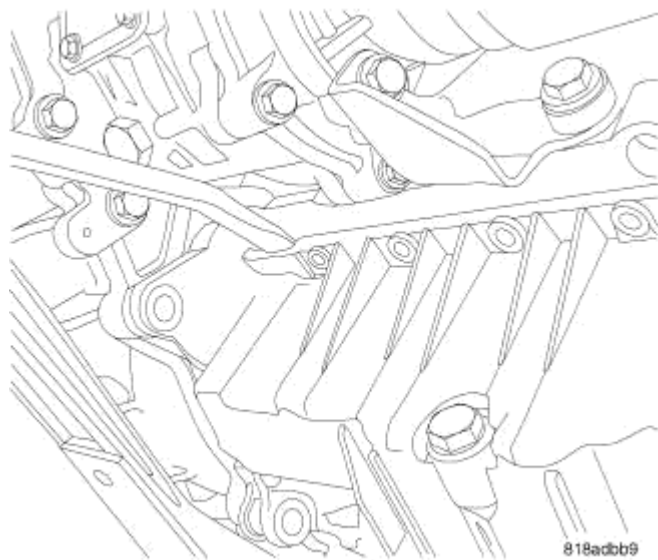


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Fig. 188: Battery Cable

Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable (1).
2. Raise vehicle on hoist.
3. Remove engine compartment lower silencer and accessory drive belt splash shield.



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Fig. 189: Oil Pan-Removal

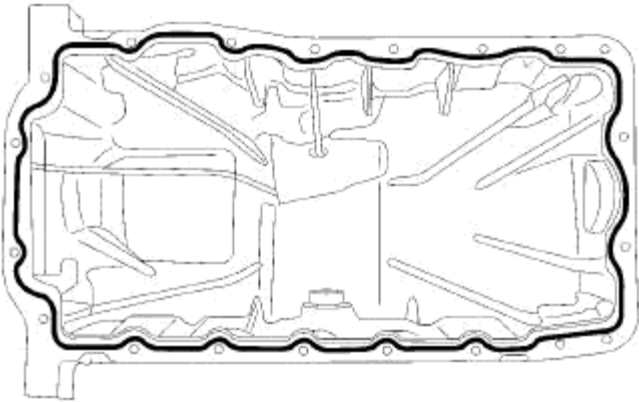
Courtesy of CHRYSLER LLC

4. Drain engine oil.

NOTE:

It may be necessary to rotate crankshaft to gain access to the rear oil pan bolts.

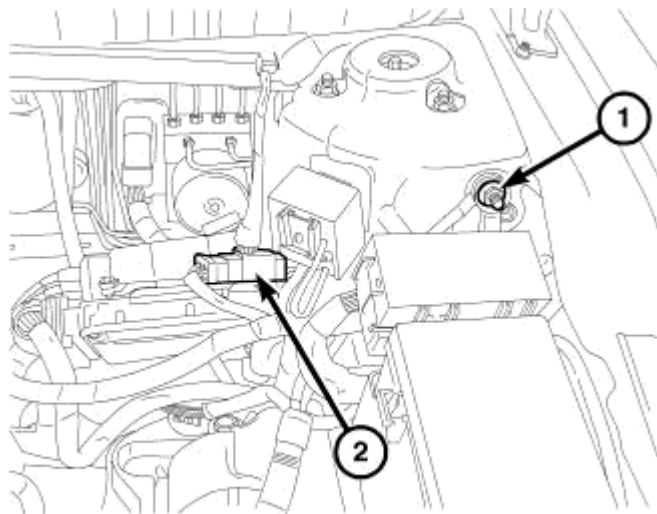
5. Remove oil pan fasteners.
6. Remove oil pan by prying off with suitable pry bar.
7. Clean oil pan and engine block sealing surfaces.

Installation**INSTALLATION**

81915470

Fig. 190: Oil Pan RTV Path
Courtesy of CHRYSLER LLC

1. Clean oil pan and all sealing surfaces.
2. Apply a 2-3 mm bead of RTV to oil pan as shown in illustration.
3. Position oil pan and install bolts.
4. Hand tighten oil pan bolts.
5. Install oil pan to bell housing bolts and hand tighten.
6. Tighten oil pan bolts to 15 N.m (133 in. lbs.).
7. Tighten oil pan to bell housing bolts to 40 N.m (30 ft. lbs.).



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Fig. 191: Battery Cable
Courtesy of CHRYSLER LLC

8. Install accessory drive belt splash shield and engine compartment lower silencer.
9. Lower vehicle.

NOTE: Sealer must cure for a minimum of 30 minutes prior to filling with oil.

10. Refill engine oil.
11. Connect negative battery cable (1).
12. Start engine and check for leaks.

SENSOR, OIL PRESSURE

Description

DESCRIPTION

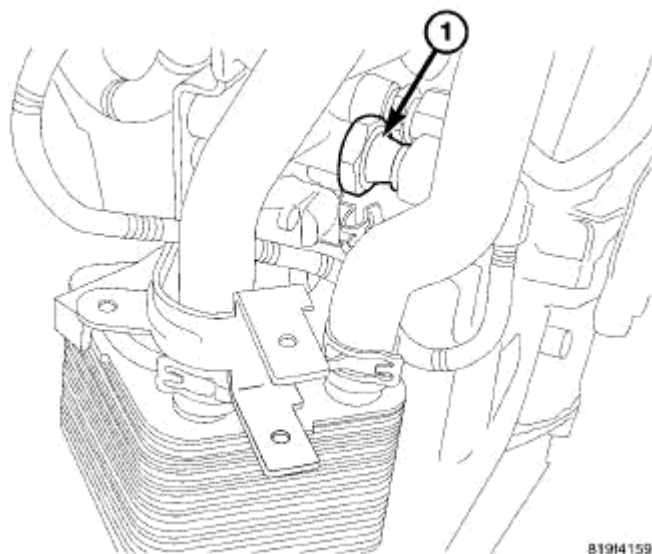
The oil pressure switch is located on the right front side of the engine block. The oil pressure switch is a pressure sensitive switch that is activated by the engine's oil pressure (in the main oil gallery). The switch is a single terminal device.

Operation

OPERATION

The oil pressure switch is normally "Closed." The switch changes from a "Closed" circuit to an "Open" circuit, on increasing pressure of 7 psig. The oil pressure switch changes from an "Open" circuit to a "Closed" circuit, on decreasing pressure, between 2 psig and 4 psig.

Removal

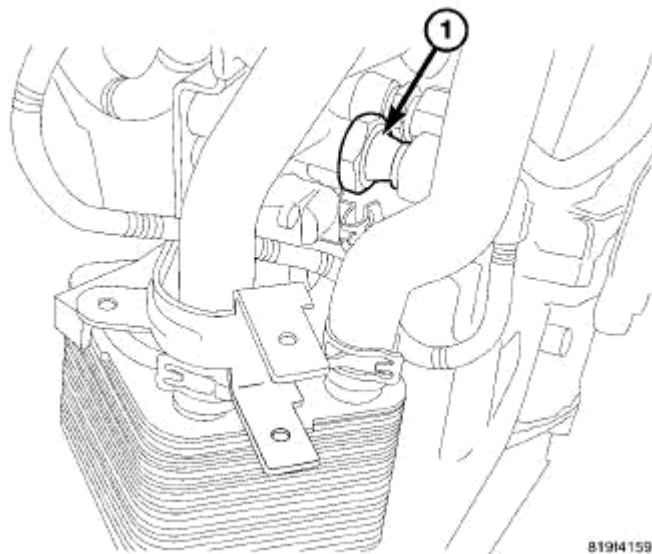
REMOVAL

81914159

Fig. 192: Oil Pressure Sender

Courtesy of CHRYSLER LLC

1. Disconnect oil pressure sensor electrical connector.
2. Remove oil pressure sensor (1).

Installation**INSTALLATION**

81914159

Fig. 193: Oil Pressure Sender

Courtesy of CHRYSLER LLC

1. Install oil pressure sensor (1) and tighten to 20 N.m (177 in. lbs.).
2. Connect oil pressure sensor electrical connector.

VALVE TIMING

BELT, TIMING

Removal

REMOVAL - TIMING BELT

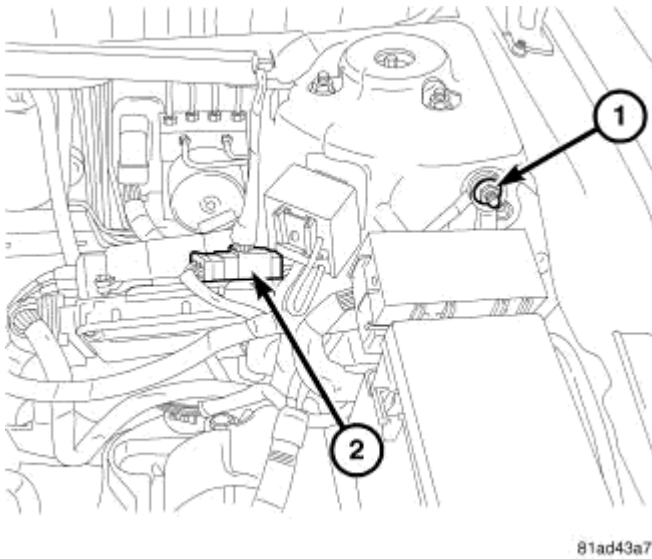


Fig. 194: Battery Cable
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable.

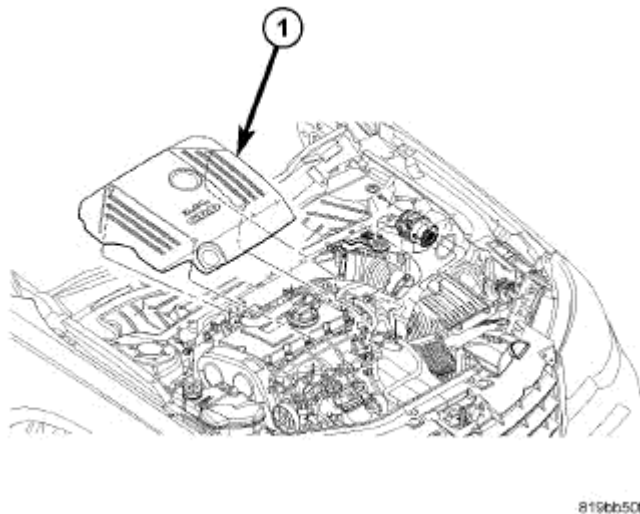


Fig. 195: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

2. Remove engine cover. See **Removal** .
3. Remove cylinder head cover.

NOTE: When rotating engine to TDC, verify that cylinder #1 is on the compression stroke. The camshaft lobes for cylinder #1 should be pointing upward.

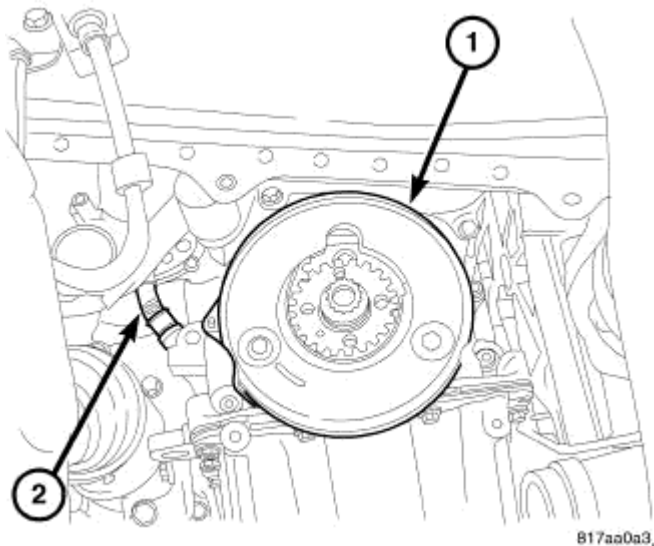


Fig. 196: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

4. Remove lower timing belt cover (1).

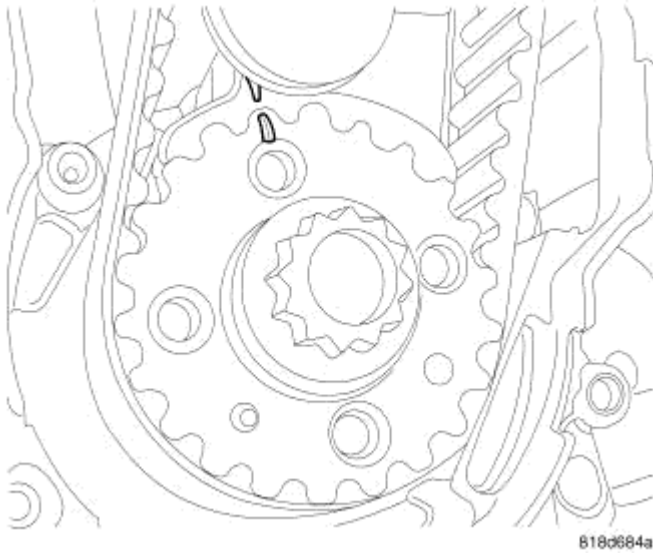


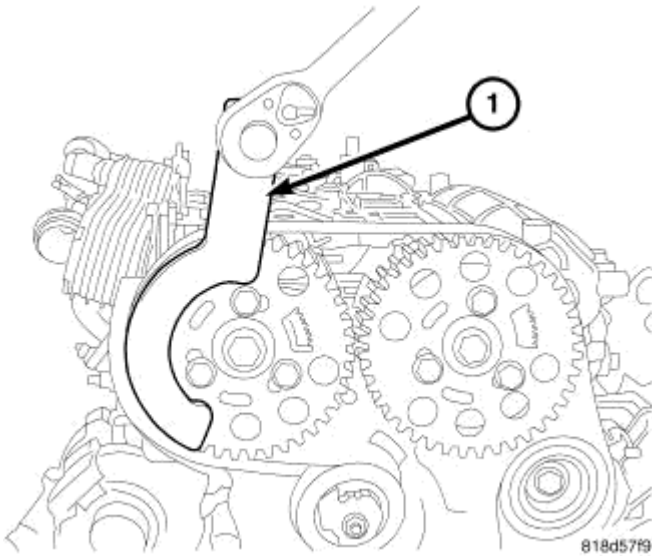
Fig. 197: Crankshaft Timing Marks
Courtesy of CHRYSLER LLC

NOTE: Engine equipped with a balance shaft module use an oval toothed belt, and crankshaft holding tool 10122 must be used

5. Rotate engine to TDC and insert crankshaft lock 10122.
6. Insert camshaft locking pins 9882.
7. Loosen tensioner retaining nut.
8. Rotate tensioner counterclockwise to release tension.
9. Remove timing belt.

Installation

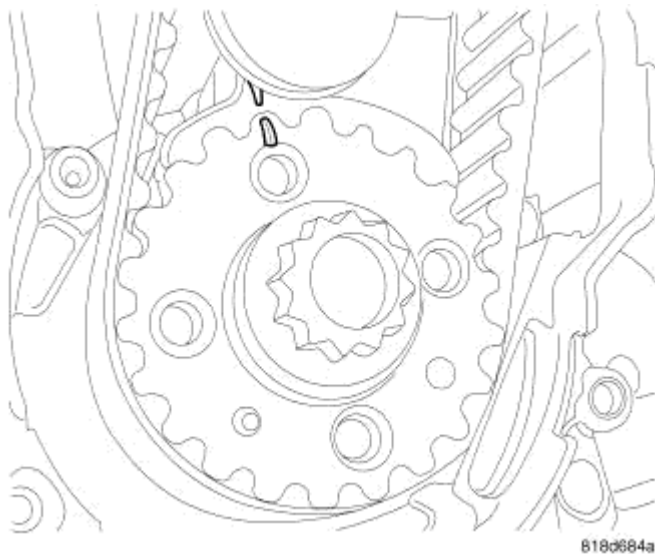
TIMING BELT

**Fig. 198: Cam Holder**

Courtesy of CHRYSLER LLC

CAUTION: IT IS ESSENTIAL that the installation procedure is followed exactly. Failure to do so will result in severe engine damage.

1. Loosen camshaft sprocket bolt using sprocket/hub holder 9880.
2. Start the timing belt around the crankshaft sprocket.
3. Wrap belt around water pump pulley, idler pulley, and tensioner.
4. Position belt over camshaft sprockets.
5. Tighten tensioner until marks are aligned.
6. Tighten tensioner nut to 20 N.m + 45° (177 in. lbs. + 45°).

**Fig. 199: Crankshaft Timing Marks**

Courtesy of CHRYSLER LLC

7. Tighten camshaft sprocket bolts using sprocket/hub holder 9880 to 25 N.m (221 in. lbs.).
8. Remove camshaft locking pins 9882.
9. Remove crankshaft lock 10122.

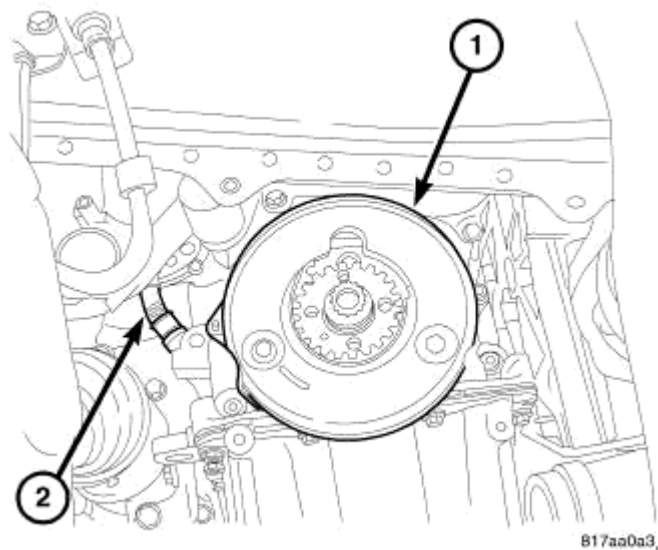
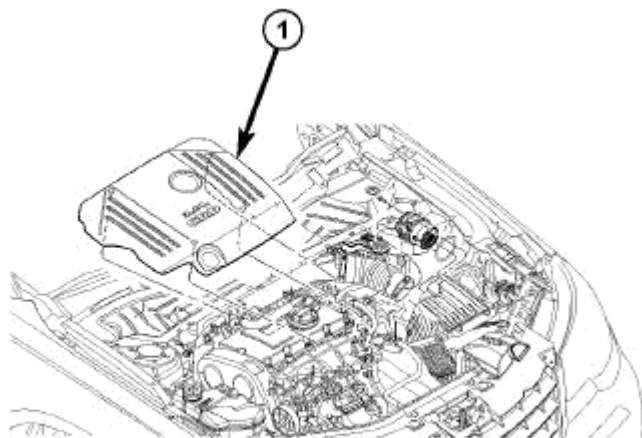


Fig. 200: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

10. Install lower timing belt cover (1).
11. Install balancer.
12. Install accessory drive belt.
13. Install upper timing belt cover.

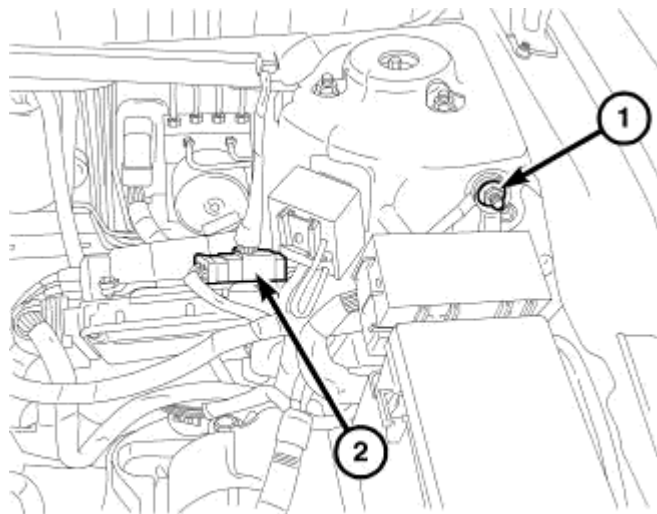


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Fig. 201: Engine Cover

Courtesy of CHRYSLER LLC

14. Install engine cover. See **Installation** .



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Fig. 202: Battery Cable

Courtesy of CHRYSLER LLC

15. Connect negative battery cable (1).

WARNING: Use extreme caution when the engine is operating. Do not put your hands near the pulleys belts or fan. Do not wear loose clothes.

COVER(S), ENGINE TIMING, LOWER

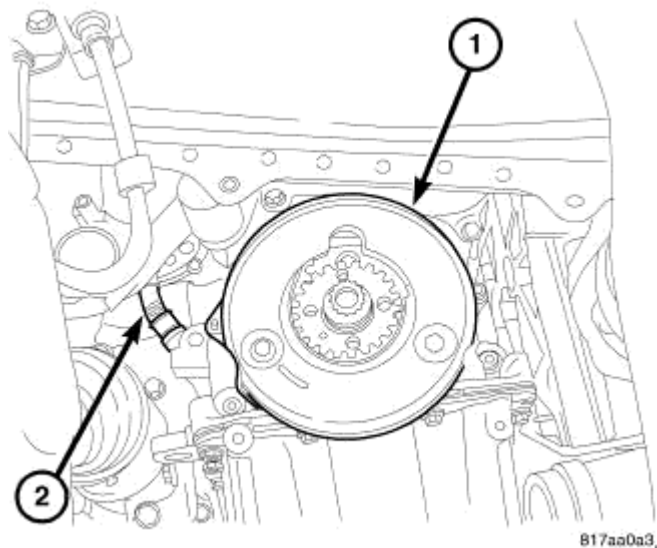
Removal**REMOVAL**

Fig. 203: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

1. Remove right splash shield.
2. Remove accessory drive belt.
3. Remove crankshaft damper.
4. Remove lower timing belt cover (1).

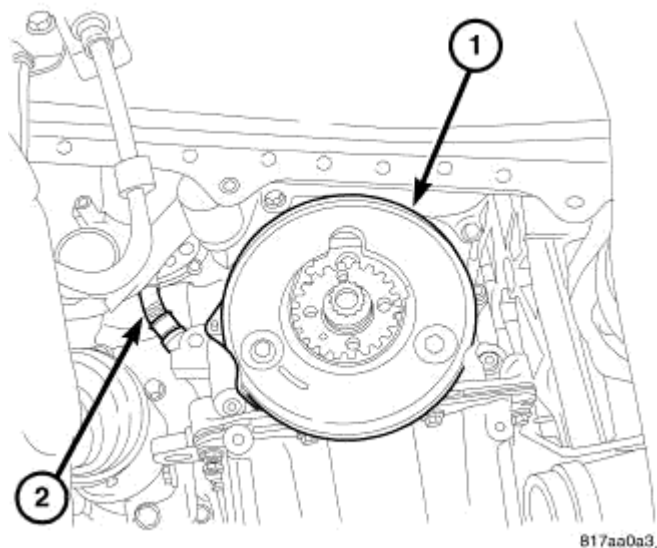
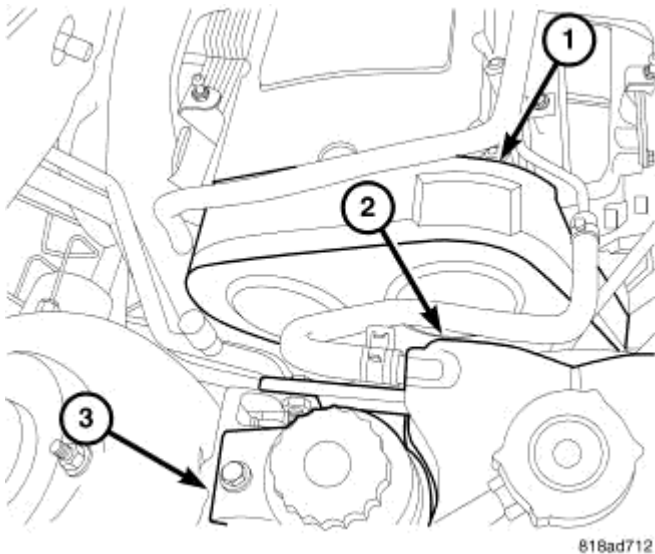
Installation**INSTALLATION**

Fig. 204: Lower Timing Belt Cover

Courtesy of CHRYSLER LLC

1. Position lower timing belt cover.
2. Install lower timing belt cover retaining bolts and tighten.
3. Install crankshaft balancer and tighten to 10 N.m + 90° (89 lbs. in. + 90°).
4. Install accessory drive belt.
5. Install splash shield.

COVER(S), ENGINE TIMING, UPPER**Removal****REMOVAL****Fig. 205: Timing Belt Cover**

Courtesy of CHRYSLER LLC

1. Remove upper timing belt cover (1) by releasing clasps and pull upward.

Installation**INSTALLATION**

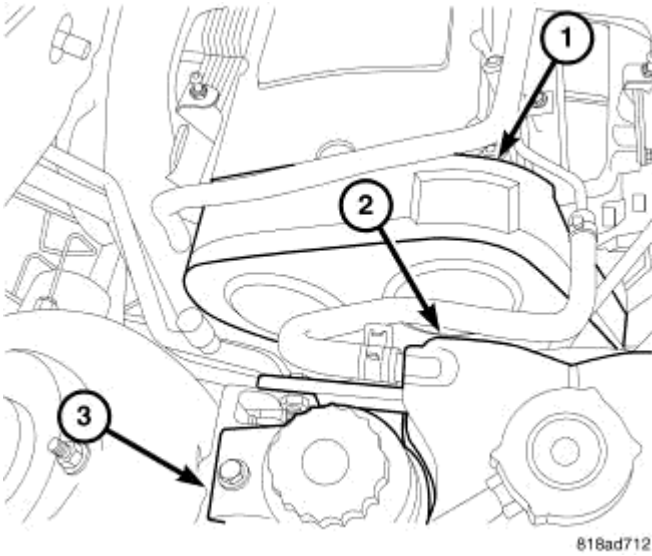


Fig. 206: Timing Belt Cover
Courtesy of CHRYSLER LLC

1. Position upper timing belt cover (1) in place and snap clasps in place.

TENSIONER, ENGINE TIMING

Removal

REMOVAL

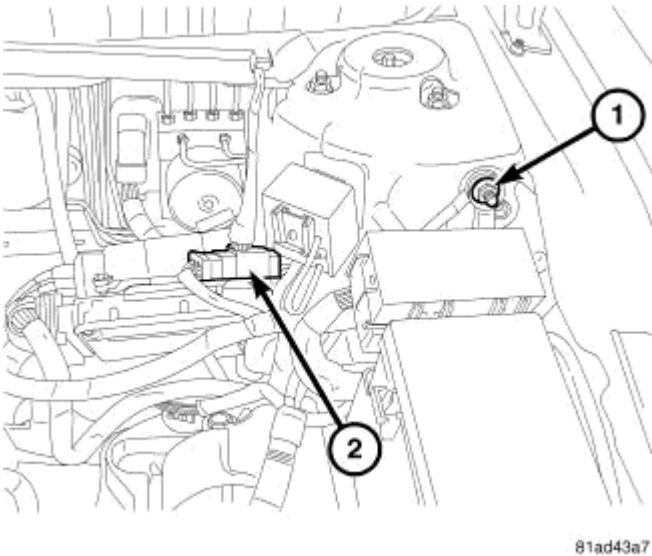


Fig. 207: Battery Cable
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable (1).

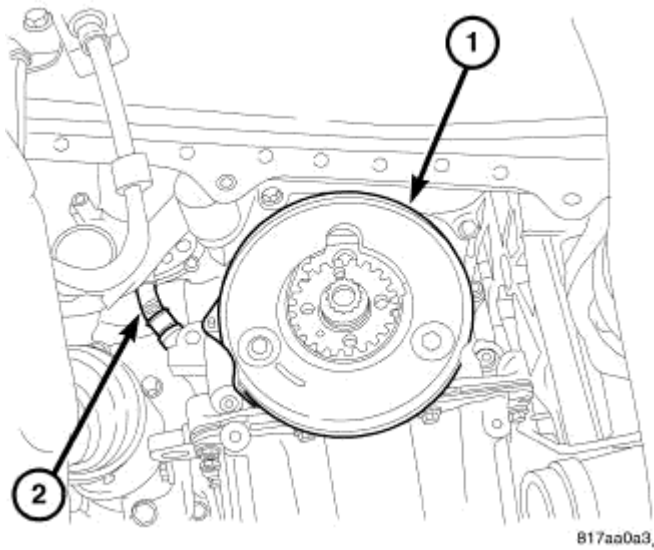


Fig. 208: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

2. Remove lower timing belt cover (1).
3. Position piston of number #1 cylinder to ignition TDC.

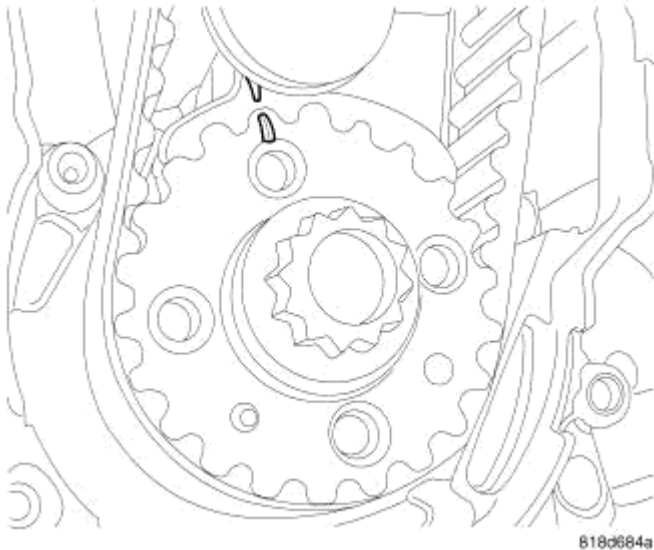


Fig. 209: Crankshaft Timing Marks
Courtesy of CHRYSLER LLC

4. Install crankshaft lock 9883.

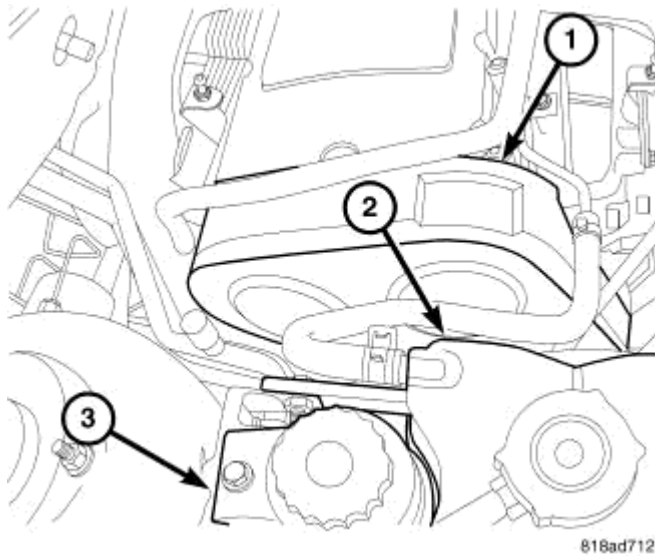


Fig. 210: Timing Belt Cover
Courtesy of CHRYSLER LLC

5. Remove upper timing belt cover (1).
6. Install camshaft lock pins 9882.
7. Install engine support fixture.

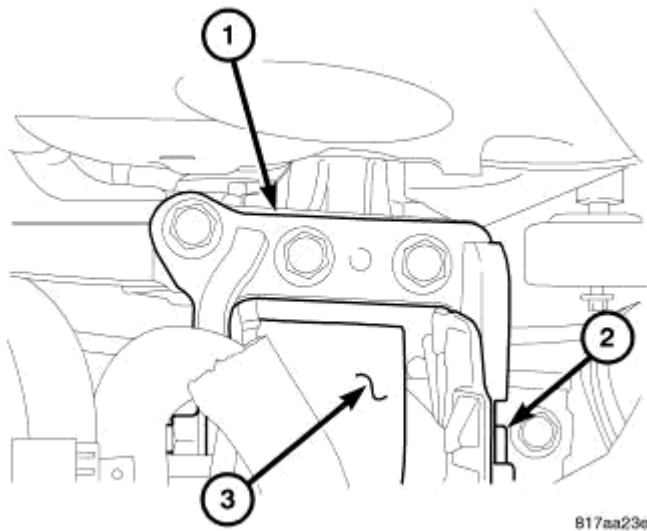


Fig. 211: Right Engine Mount
Courtesy of CHRYSLER LLC

8. Remove right engine mount through bolt (2).
9. Remove frame mount (1) and isolator (3).

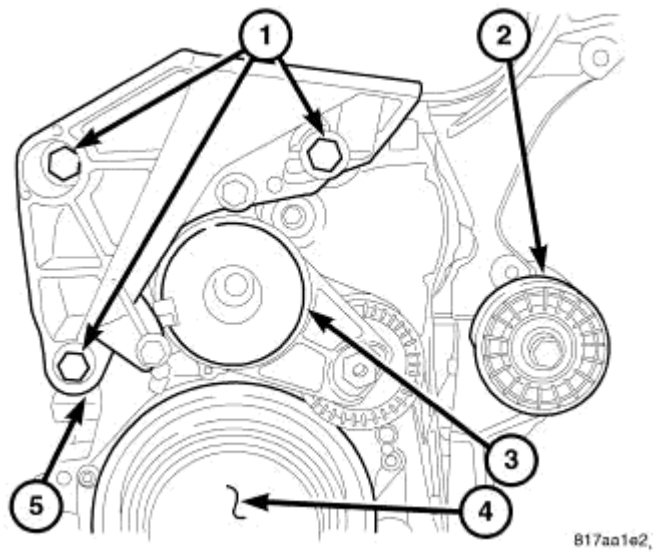


Fig. 212: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

10. Remove right engine mount bracket (5).
11. Raise vehicle on hoist.
12. Remove balancer (4).

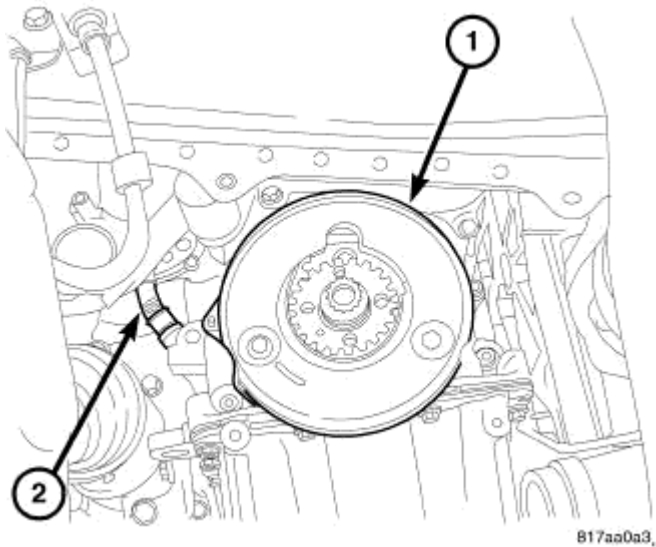


Fig. 213: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

13. Remove splash shield.
14. Remove lower timing belt cover (1).

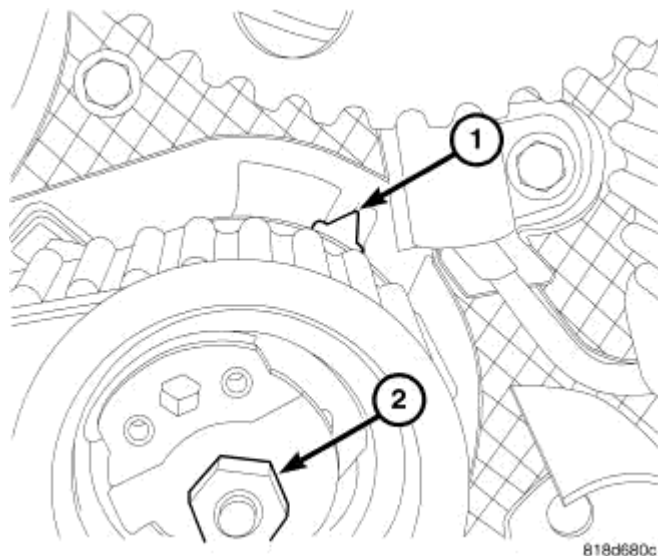


Fig. 214: Timing Belt Tensioner & Retaining Nut
Courtesy of CHRYSLER LLC

15. Remove tensioner retaining nut (2).
16. Remove timing belt tensioner.

Installation

INSTALLATION

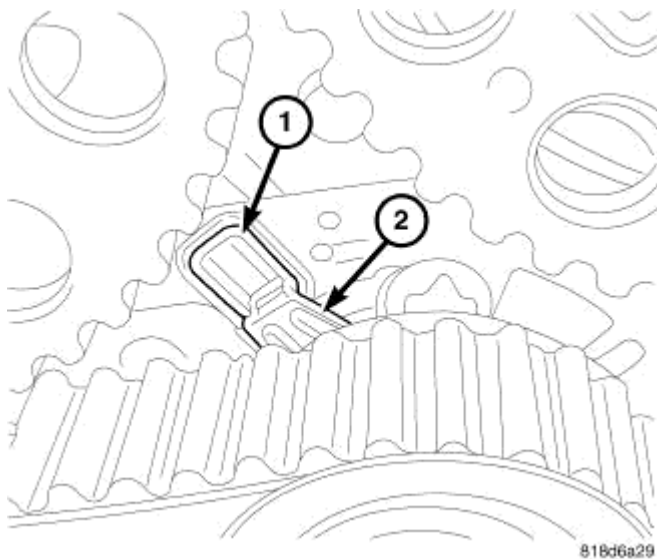


Fig. 215: Installing Tensioner
Courtesy of CHRYSLER LLC

1. Position timing belt tensioner so finger (2) is in slot (1) and hand tighten nut.

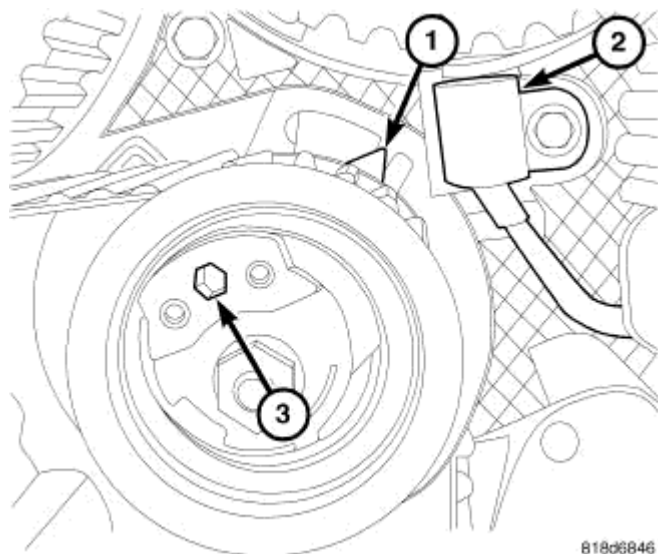


Fig. 216: Tensioner Adjustment
Courtesy of CHRYSLER LLC

2. Insert Allen wrench into tensioner (3) and rotate tensioner until indicator (1) is in the middle of the slot.

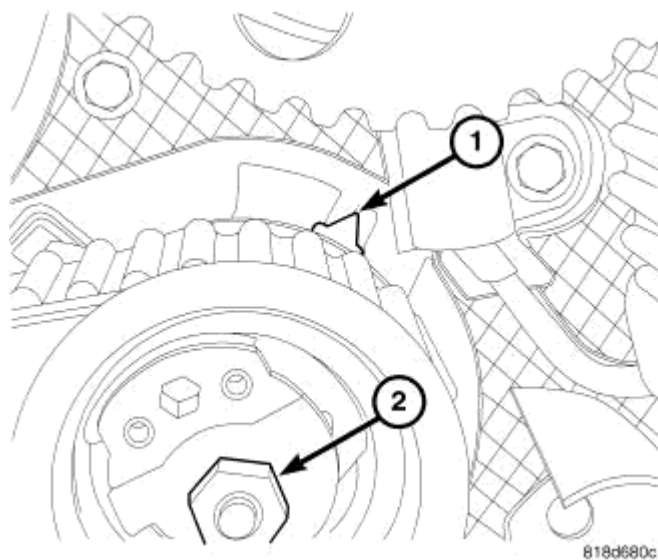


Fig. 217: Timing Belt Tensioner & Retaining Nut
Courtesy of CHRYSLER LLC

3. Tighten nut (2) to 20 N.m + 45° (177 in. lbs. +45°).

NOTE: Tensioner indicator (1) will move out of the slot when nut (2) is tightened. This is normal, do not reposition tensioner.

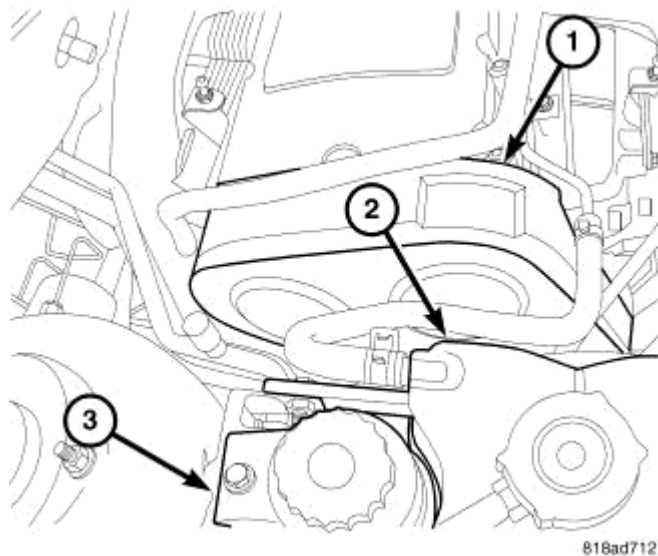


Fig. 218: Timing Belt Cover
Courtesy of CHRYSLER LLC

4. Remove camshaft locking pins 9882.
5. Install upper timing belt cover (1).

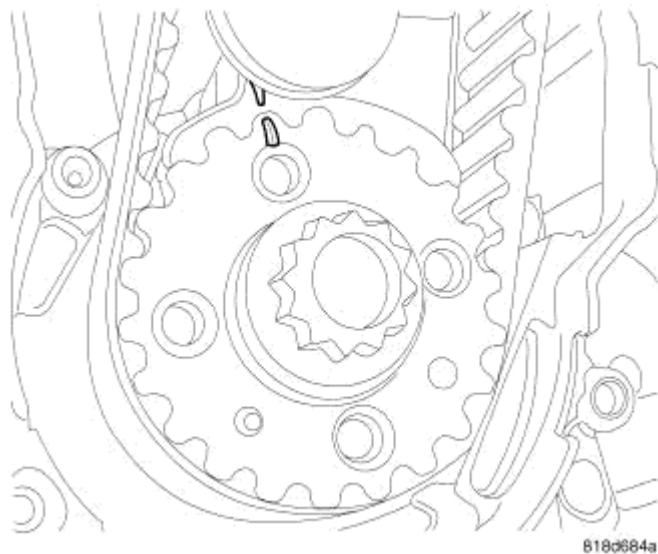


Fig. 219: Crankshaft Timing Marks
Courtesy of CHRYSLER LLC

6. Remove crankshaft lock 9883.

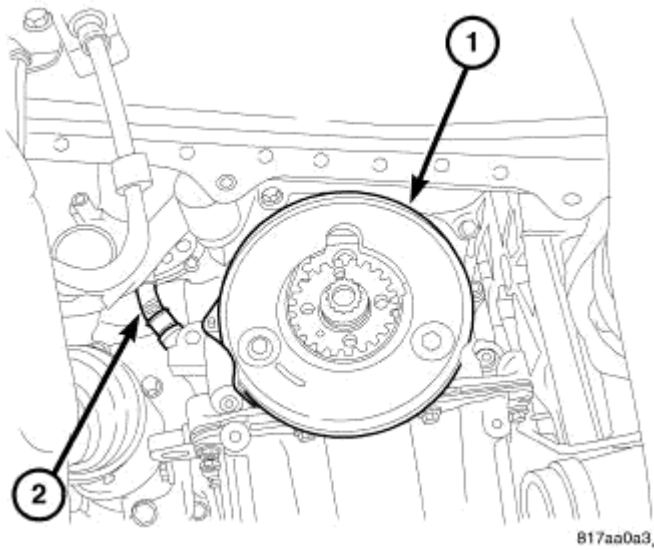


Fig. 220: Lower Timing Belt Cover
Courtesy of CHRYSLER LLC

7. Install lower timing belt covers (1).
8. Install balancer and tighten to 10 N.m + 90° (89 in. lbs. + 90°).

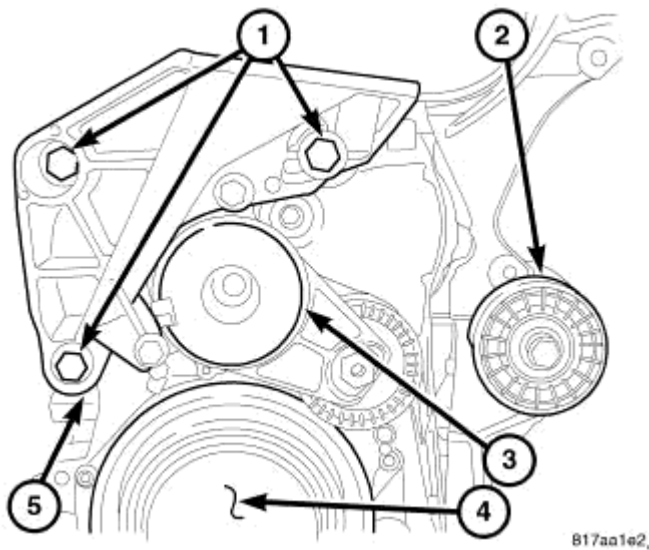


Fig. 221: Right Engine Mount Bracket
Courtesy of CHRYSLER LLC

9. Install engine mount bracket (5).

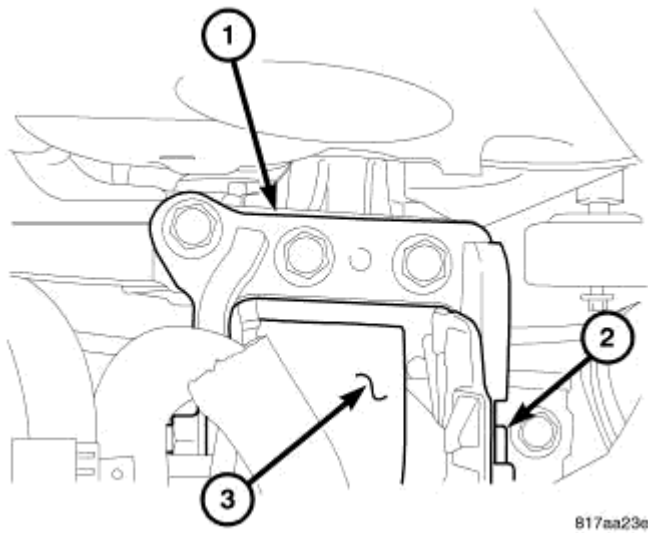


Fig. 222: Right Engine Mount
Courtesy of CHRYSLER LLC

10. Install isolator (3).
11. Install engine mount (1).
12. Install engine mount through bolt (2).
13. Remove engine support fixture.

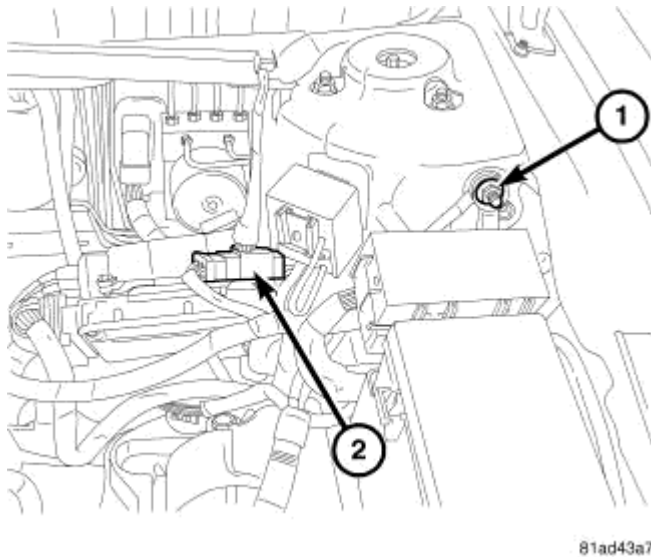
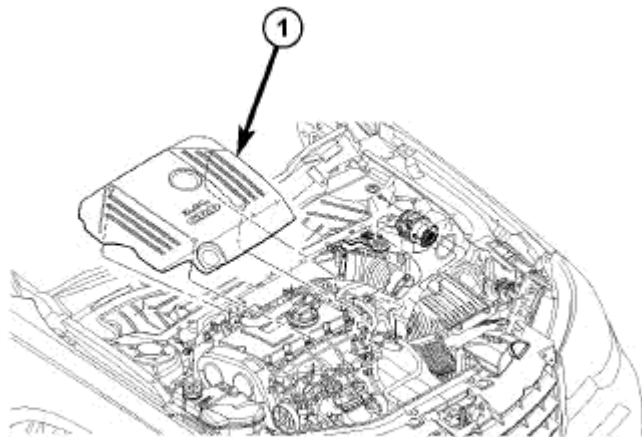


Fig. 223: Battery Cable
Courtesy of CHRYSLER LLC

14. Install accessory drive belt.
15. Install splash shield.
16. Lower vehicle.

17. Connect negative battery cable (1).



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Fig. 224: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

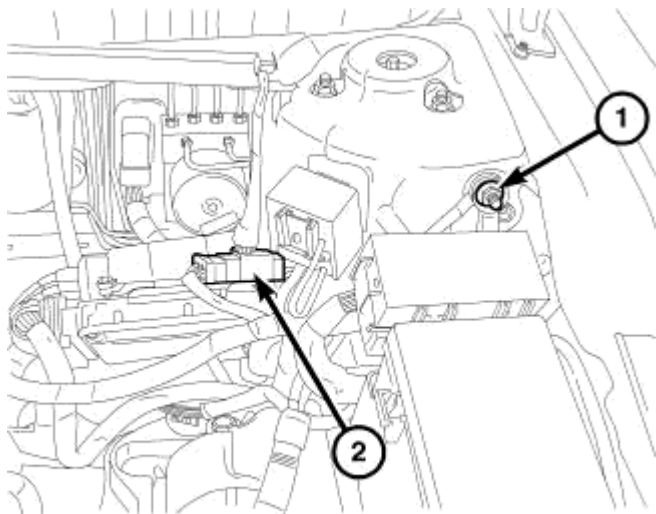
18. Install engine cover (1).

MANIFOLDS

MANIFOLD, EXHAUST

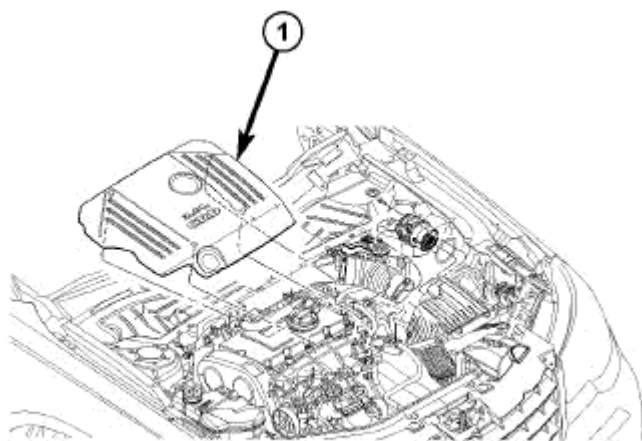
Removal

EXHAUST MANIFOLD/TURBOCHARGER

**Fig. 225: Battery Cable**

Courtesy of CHRYSLER LLC

1. Disconnect the negative battery cable (1).

**Fig. 226: Engine Cover-Removal/Installation**

Courtesy of CHRYSLER LLC

2. Remove the engine cover (1). See **Installation**
3. Remove the turbo air inlet hose at the air cleaner.
4. Remove the PCV air makeup hose.
5. Remove the air inlet hose at the turbocharger.
6. Remove the oil feed line at the turbocharger.

7. Remove the diesel particulate filter (DPF). Refer to **Exhaust System/FILTER, Diesel Particulate - Removal**
8. Raise and support the vehicle.

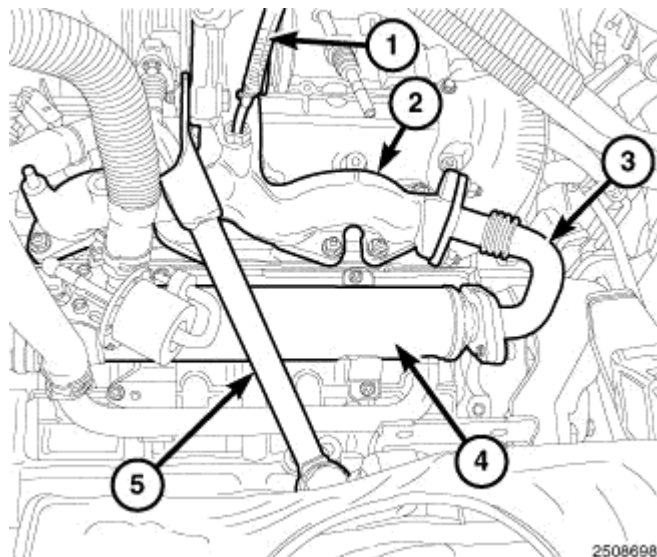


Fig. 227: EGR Tube , Exhaust Manifold & EGR Cooler
Courtesy of CHRYSLER LLC

9. Remove the charge air cooler outlet hose from the turbocharger.
10. Remove the charge air cooler outlet hose from the intermediate tube.
11. Remove the EGR tube (3) from the exhaust manifold (2) and the EGR cooler (4).
12. Remove the turbocharger oil return bolts at the turbocharger flange.
13. Remove the exhaust heat shield.
14. Remove the eight nuts from the exhaust manifold (2).
15. Lower the vehicle.
16. Remove the exhaust manifold/turbocharger assembly (2) from the vehicle.

Installation

EXHAUST MANIFOLD/TURBOCHARGER

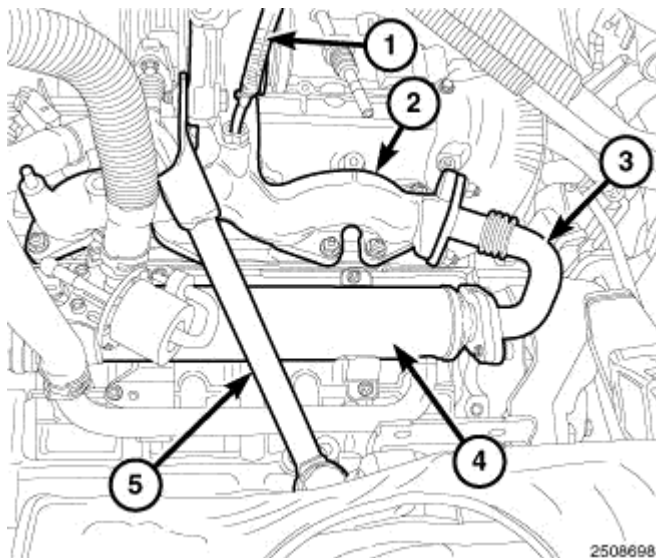


Fig. 228: EGR Tube , Exhaust Manifold & EGR Cooler
Courtesy of CHRYSLER LLC

1. Install the exhaust manifold gasket.
2. Position the exhaust manifold/turbo assembly (3) in place.
3. Install the eight exhaust manifold nuts. Tighten the nuts to 25 N.m (18 ft. lbs.).
4. Install the turbocharger oil return tube/support (5) at the engine block.
5. Install the exhaust heat shield. Tighten the fasteners to 5 N.m (44 in. lbs.).
6. Install the turbocharger oil return tube bolts at the turbocharger flange.
7. Install the EGR tube (3) to the exhaust manifold (2) and the EGR cooler (4). Tighten the bolts to 20 N.m (15 ft. lbs.).
8. Install the charge air cooler outlet hose to the intermediate tube.
9. Install the charge air cooler outlet hose to the turbocharger.
10. Lower the vehicle.
11. Install the diesel particulate filter (DPF). Refer to **Exhaust System/FILTER, Diesel Particulate - Installation** .
12. Install turbo oil feed line at oil filter housing. Tighten the fitting to 22 N.m (16 ft. lbs.).
13. Install the air inlet tube at the turbocharger.
14. Install the PCV air makeup hose.
15. Install the air inlet tube at the air cleaner.

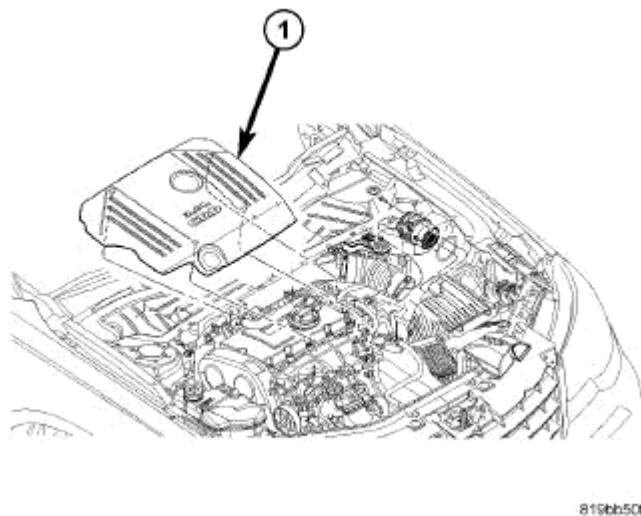


Fig. 229: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

16. Install the engine cover by pushing downward. See **Installation**.

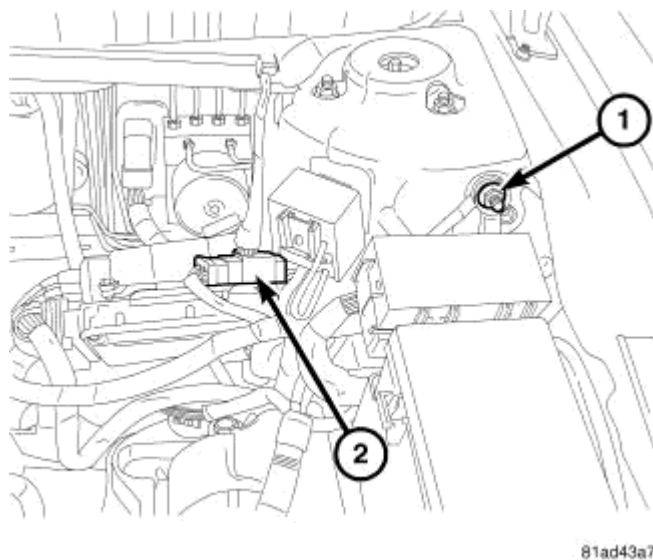


Fig. 230: Battery Cable
Courtesy of CHRYSLER LLC

17. Connect the negative battery cable (1).

MANIFOLD, INTAKE

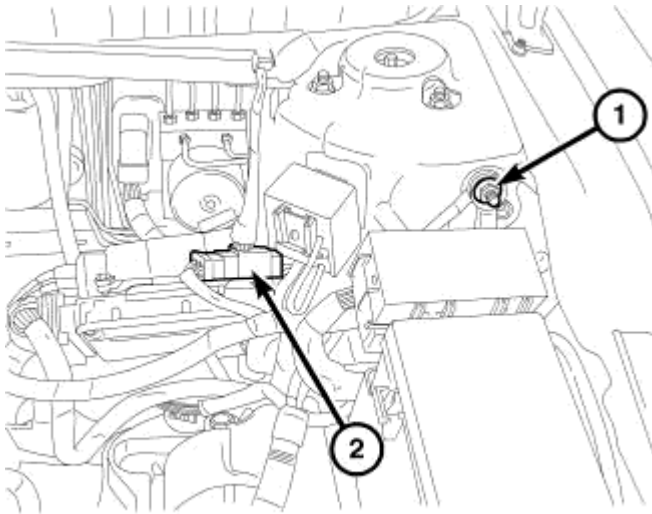
Description

DESCRIPTION

The intake manifold is one-piece design and is made from aluminum.

Removal

REMOVAL

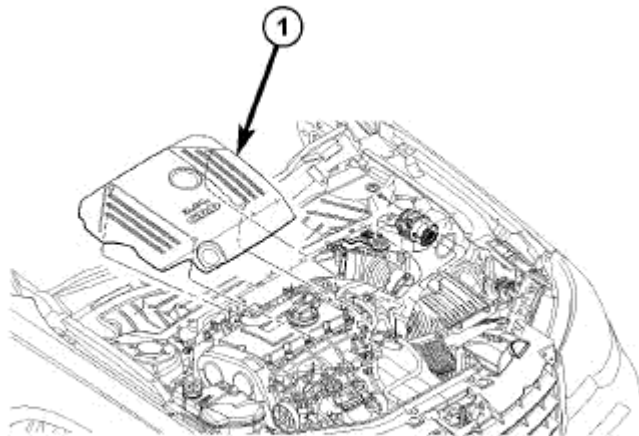


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Fig. 231: Battery Cable

Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable (1).



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Fig. 232: Engine Cover-Removal/Installation

Courtesy of CHRYSLER LLC

2. Remove engine cover by pulling upward.

3. Partially drain cooling system. Refer to **Cooling - Standard Procedure** .

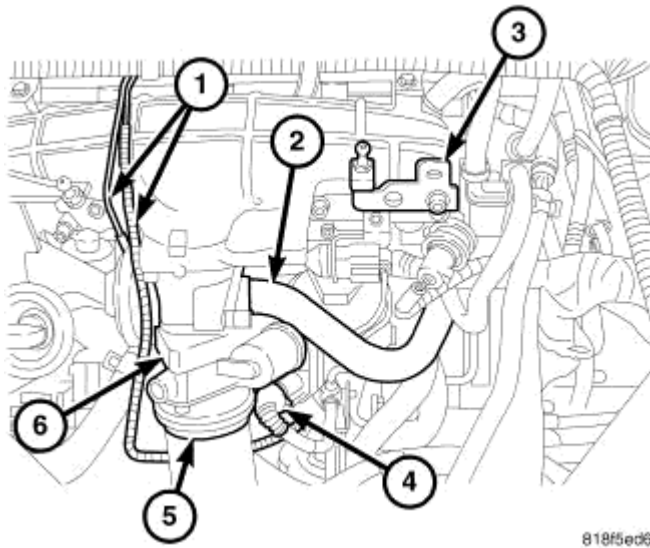


Fig. 233: EGR Valve
Courtesy of CHRYSLER LLC

4. Remove vacuum harness (1).

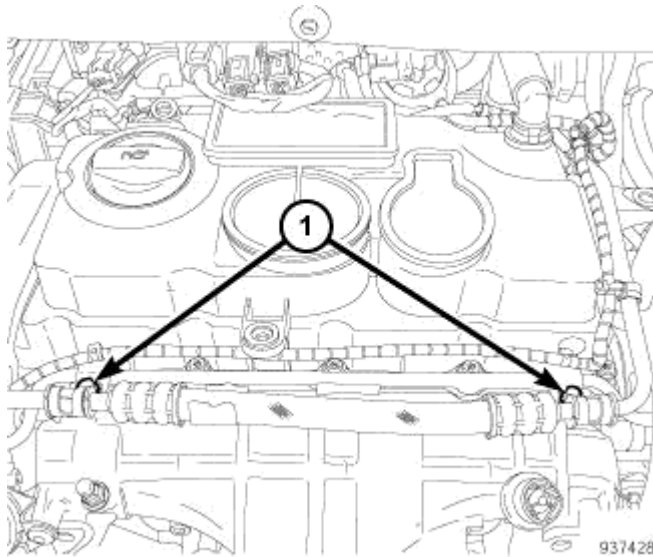
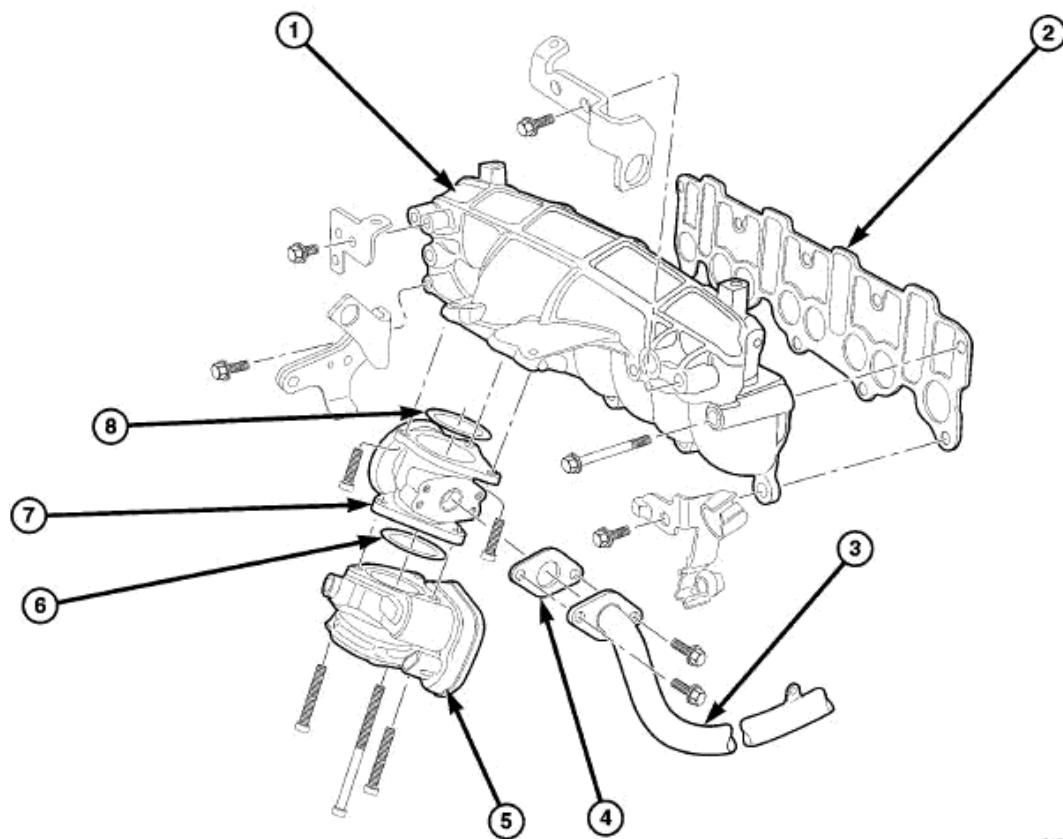


Fig. 234: Coolant Tube
Courtesy of CHRYSLER LLC

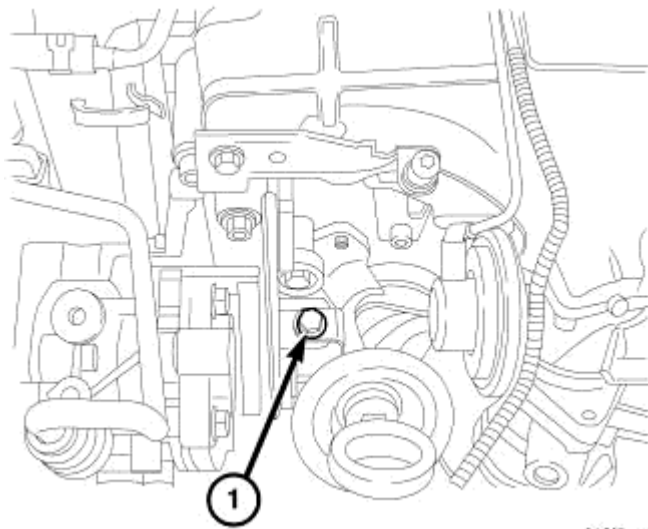
5. Remove coolant bypass tube retaining bolts (1) and reposition tube.
6. Remove fuel hose from lift bracket.
7. Remove upper radiator hose from cylinder head and reposition.



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Fig. 235: Intake Manifold
Courtesy of CHRYSLER LLC

8. Release air inlet pipe from throttle body.
9. Remove EGR pipe (3).



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Fig. 236: Dipstick Support Retaining Bolt

Courtesy of CHRYSLER LLC

10. Remove dip stick support bracket retaining bolt (1).
11. Remove left and right engine cover brackets.

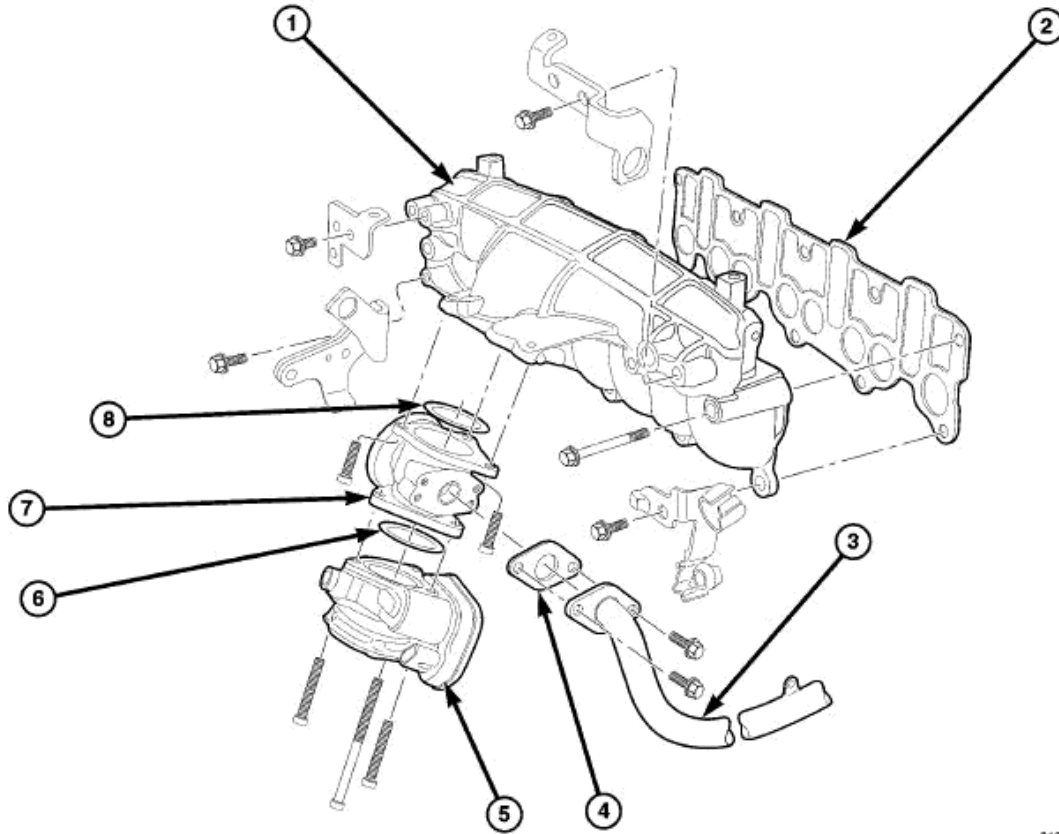


Fig. 237: Intake Manifold
Courtesy of CHRYSLER LLC

12. Disconnect throttle body connectors.
13. Remove throttle body assembly (5).
14. Remove EGR valve (7).
15. Remove electrical connector from intake bracket.

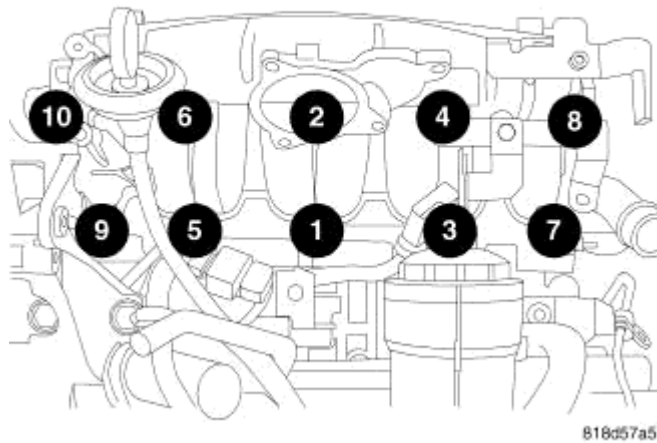


Fig. 238: Intake Manifold Bolt Torque Sequence
Courtesy of CHRYSLER LLC

16. Remove intake manifold bolts.
17. Remove intake manifold.

Cleaning

CLEANING

1. Discard gasket(s).
2. Clean all sealing surfaces.

Inspection

INSPECTION

1. Inspect manifold for cracks or distortion. Replace manifold if necessary.
2. Inspect manifold for gasket surface damage or warpage. Replace manifold if necessary.

Installation

INSTALLATION

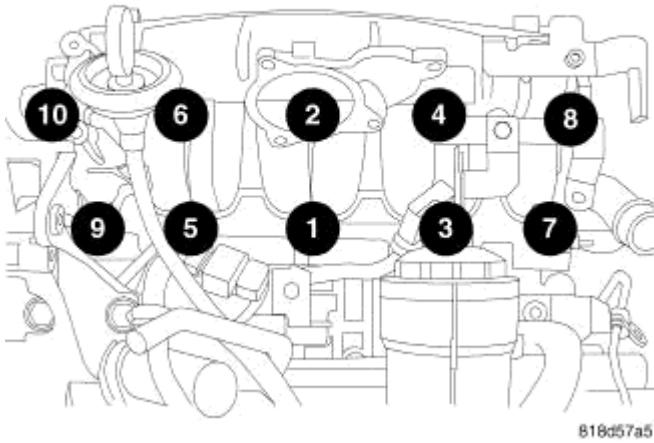
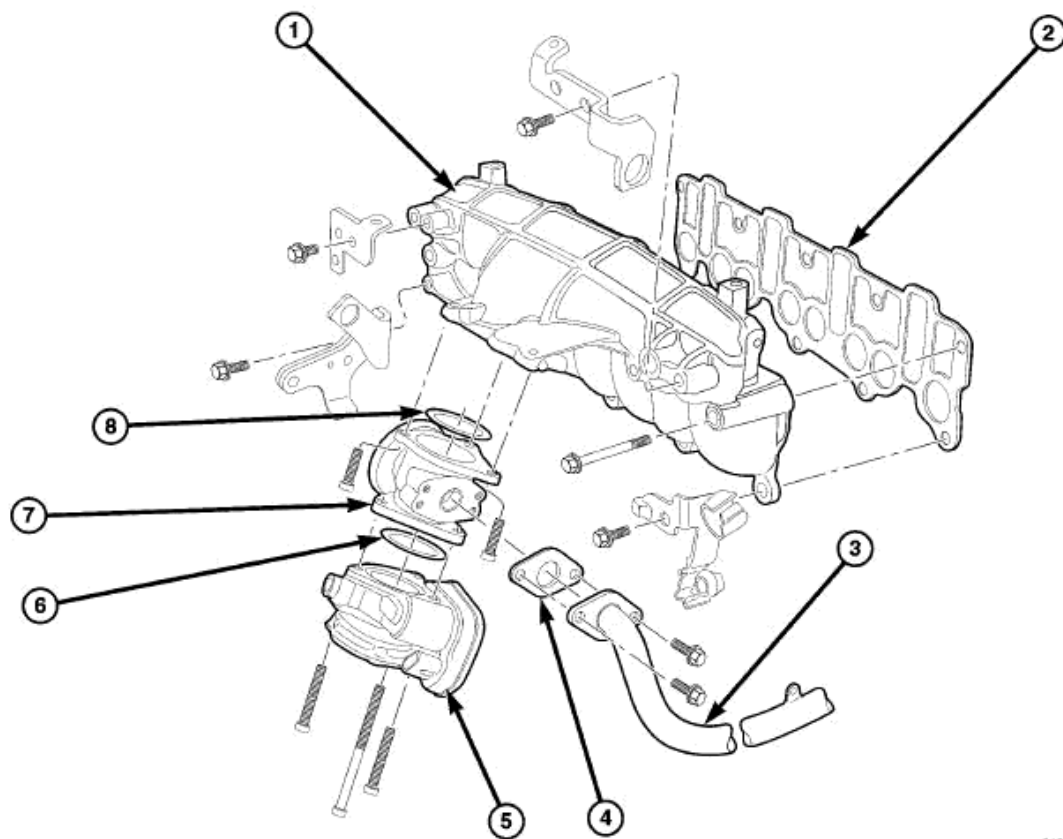


Fig. 239: Intake Manifold Bolt Torque Sequence
Courtesy of CHRYSLER LLC

1. Clean gaskets/seals mating surfaces.
2. Install new gasket.
3. Place intake on cylinder head and install retaining bolts. Tighten bolts to 20 N.m (14.7 lbs. ft.) as shown in illustration.



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Fig. 240: Intake Manifold

Courtesy of CHRYSLER LLC

4. Install electrical connector to intake bracket.
5. Install new EGR gasket (8) and EGR valve (7).
6. Install throttle plate assembly (5).
7. Connect throttle body electrical connector.
8. Install right and left engine cover brackets.
9. Install EGR pipe.
10. Install EGR pipe support bracket.

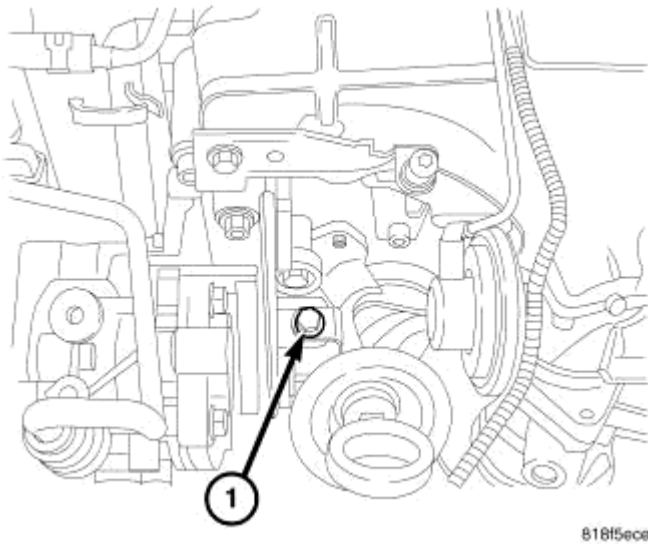


Fig. 241: Dipstick Support Retaining Bolt
Courtesy of CHRYSLER LLC

11. Install dipstick support retaining bolt (1).
12. Connect air inlet pipe to throttle body.
13. Install upper radiator hose to cylinder head.
14. Install fuel hose retainer to engine lift bracket.

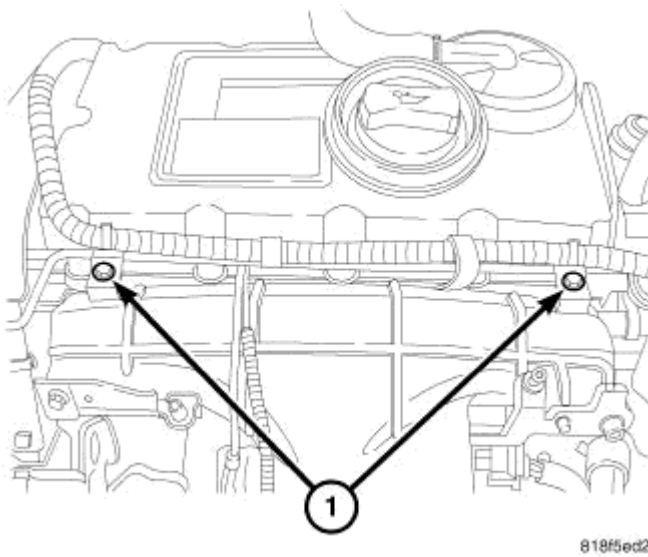


Fig. 242: Coolant Tube
Courtesy of CHRYSLER LLC

15. Position coolant tube in place and install fasteners (1).

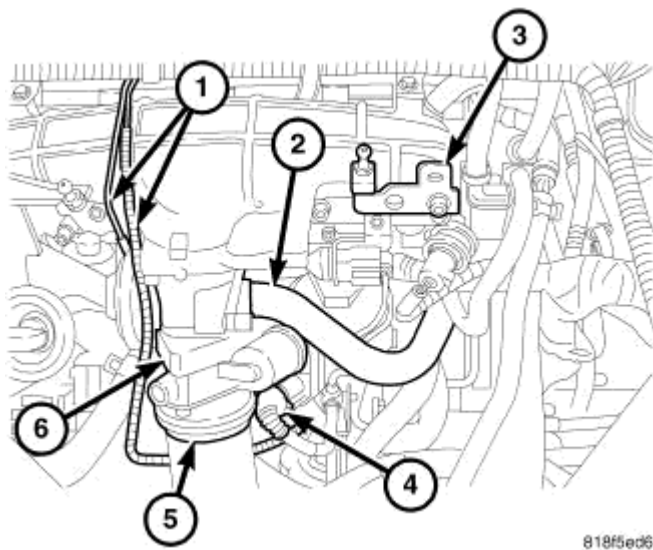


Fig. 243: EGR Valve
Courtesy of CHRYSLER LLC

16. Install vacuum harness (1).
17. Fill cooling system.
18. Change oil and filter.

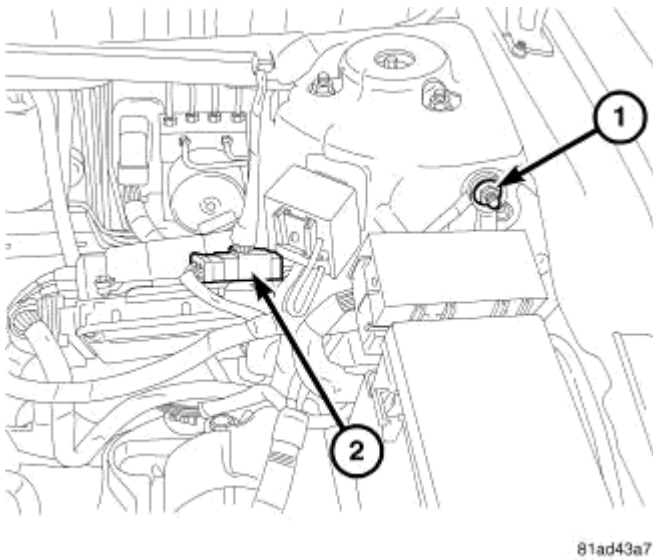


Fig. 244: Battery Cable
Courtesy of CHRYSLER LLC

19. Connect negative battery cable (1).
20. Start engine and check for leaks.

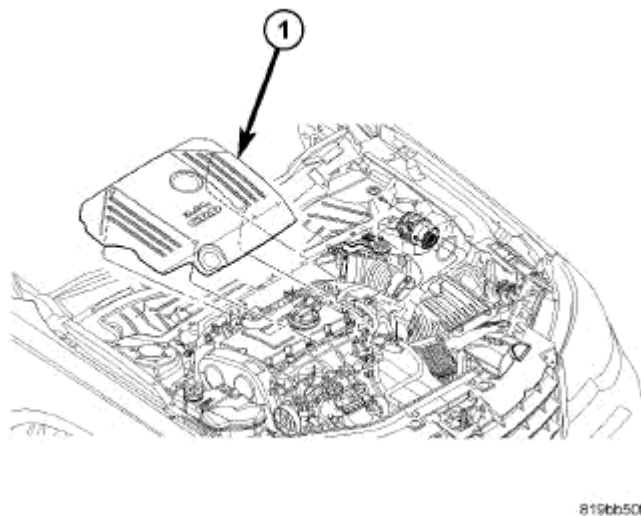


Fig. 245: Engine Cover-Removal/Installation
Courtesy of CHRYSLER LLC

21. Install engine cover (1).

AIR INTAKE SYSTEM

AIR CLEANER

Removal

REMOVAL

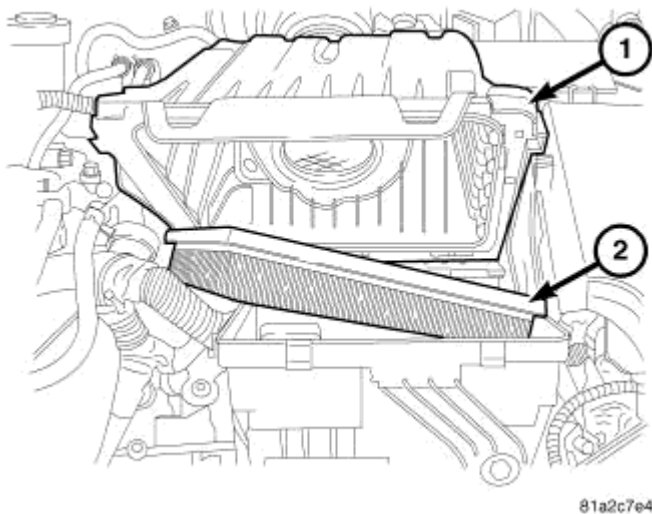


Fig. 246: Air Filter Element
Courtesy of CHRYSLER LLC

1. Unfasten clasps on front of air cleaner housing.
2. Move cover (1) aside.
3. Remove filter element (2).
4. If necessary, clean the inside of the air cleaner housing.

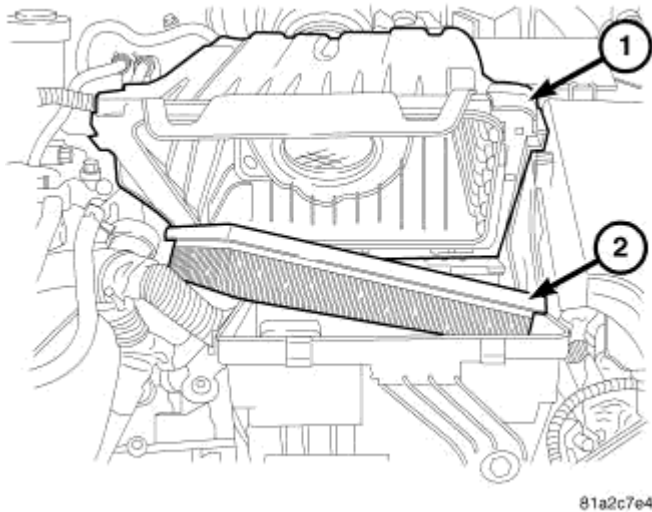
Installation**INSTALLATION**

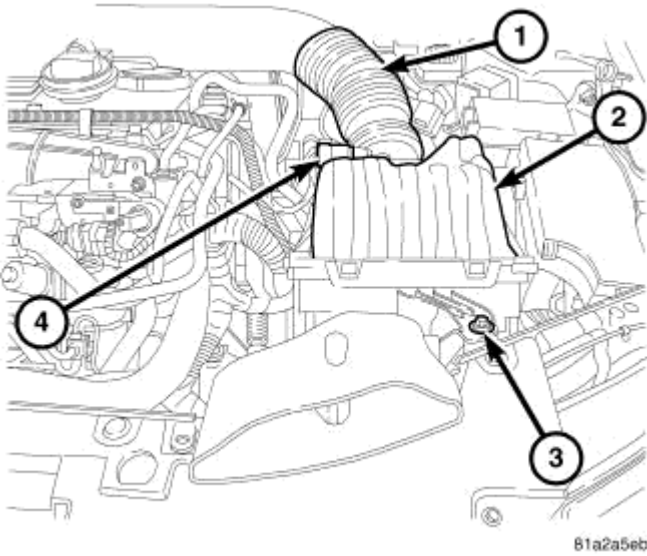
Fig. 247: Air Filter Element
Courtesy of CHRYSLER LLC

1. Install new filter element (2).
2. Replace air cleaner cover (1).
3. Snap clasps in place.

BODY, AIR CLEANER**Description****DESCRIPTION**

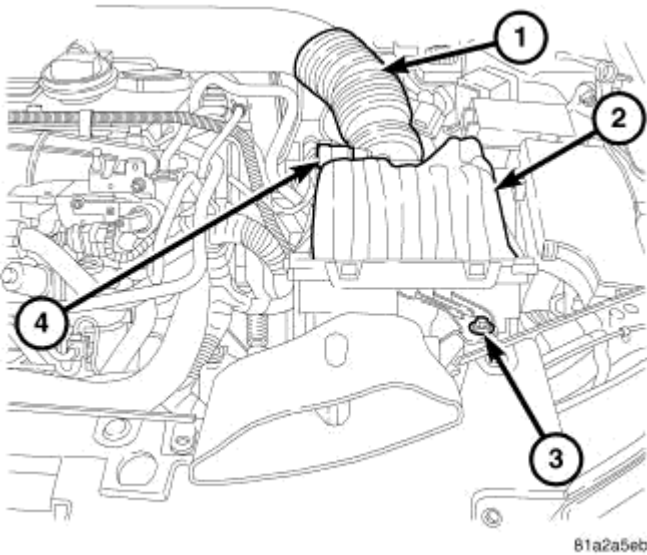
The air cleaner housing attaches to the inner fender in front of the left side strut tower. An ambient air duct supplies underhood air for the engine. It attaches to the lower air cleaner box.

Removal**REMOVAL**

**Fig. 248: AIR CLEANER HOUSING**

Courtesy of CHRYSLER LLC

1. Remove the hold down screw (3) from the air cleaner housing (2).
2. Disconnect turbocharger inlet hose (1) from air cleaner housing (2).
3. Disconnect mass air flow sensor electrical connector (4).
4. Pull air cleaner housing straight up to remove.

Installation**INSTALLATION****Fig. 249: AIR CLEANER HOUSING**

Courtesy of CHRYSLER LLC

1. Lower air cleaner housing assembly into engine compartment and align studs at bottom of housing with bracket. Push housing assembly (2) down until fully seated in bracket.
2. Connect turbocharger inlet hose (1) to air cleaner housing (2).
3. Connect mass air flow sensor connector (4).
4. Install hold down screw (3) and tighten.

ENGINE MOUNTING

DESCRIPTION

DESCRIPTION

The engine mounting system consists of a four-point system utilizing two load-carrying mounts and two torque controlling mounts. The load-carrying mounts are located on each frame rail. The right and left mounts are hydro-elastic mounts. The two torque controlling mounts are attached to a fore/aft member and the front and rear of the engine.

OPERATION

OPERATION

The four-point engine mounting system minimizes the transmission of structure-borne engine noise to the passenger compartment. The load-carrying right and left mounts dampen and isolate vertical motion and vibration. The front and rear mounts absorb torque reaction forces and torsional vibrations.

BRACKET, ENGINE MOUNT, RIGHT

Removal

REMOVAL

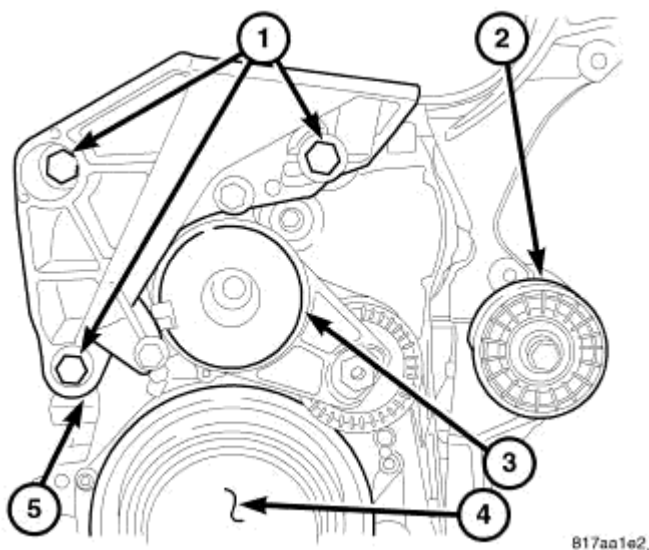
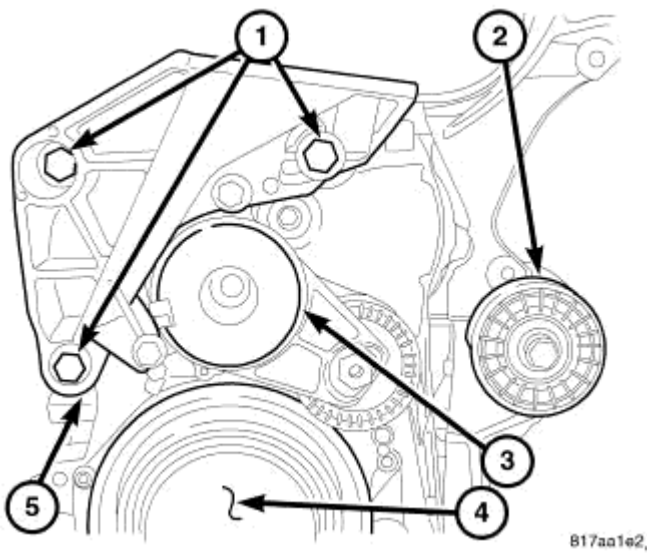


Fig. 250: Right Engine Mount Bracket

Courtesy of CHRYSLER LLC

1. Remove right engine mount. See **Removal** .
2. Remove accessory drive belt.
3. Remove bracket retaining bolts (1).
4. Remove bracket (5) through bottom rear.

Installation**INSTALLATION****Fig. 251: Right Engine Mount Bracket**

Courtesy of CHRYSLER LLC

1. Position right engine mount bracket (5).
2. Install bracket retaining (1) bolts and tighten to 50 N.m (37 ft. lbs.).
3. Install accessory drive belt.

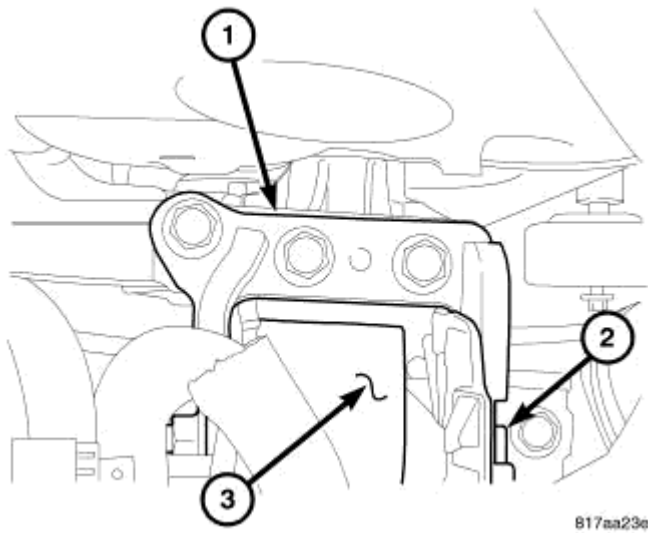


Fig. 252: Right Engine Mount
Courtesy of CHRYSLER LLC

4. Install mount (3). See **Installation** .

INSULATOR, ENGINE MOUNT, LEFT

Removal

REMOVAL

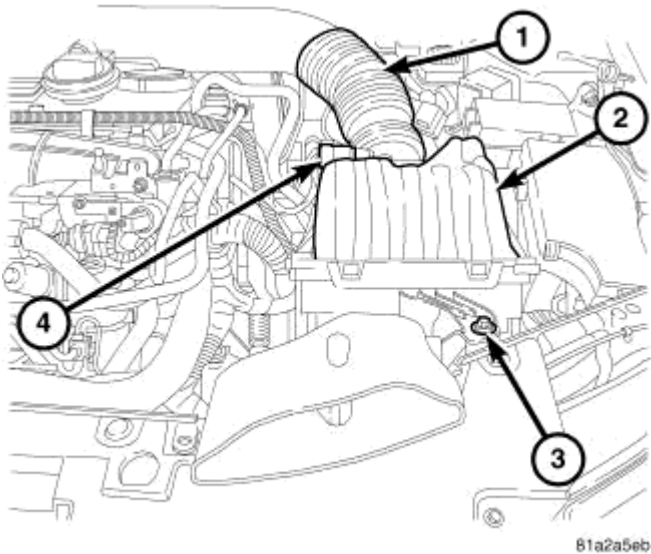


Fig. 253: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

1. Remove air cleaner assembly (2).

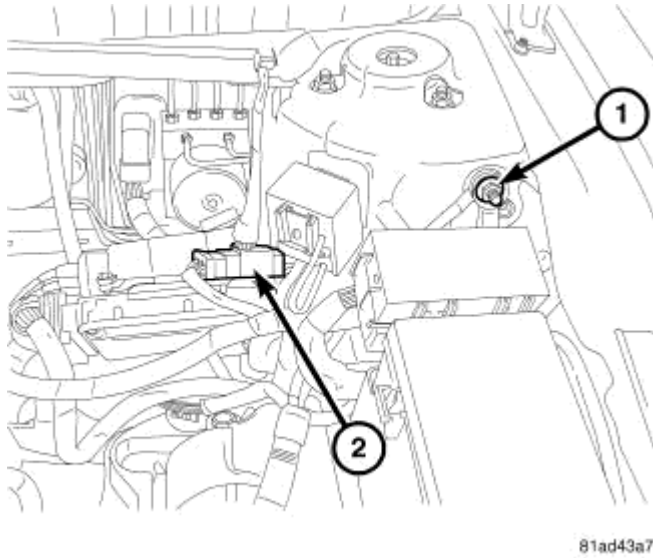


Fig. 254: Battery Cable
Courtesy of CHRYSLER LLC

2. Disconnect battery negative cable (1).

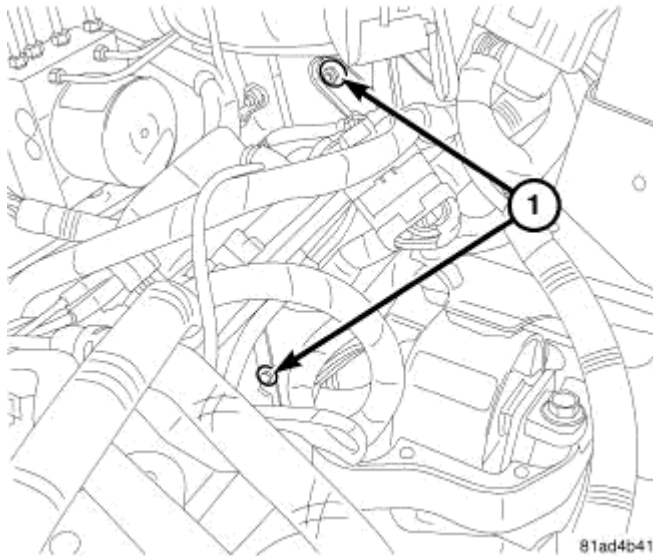
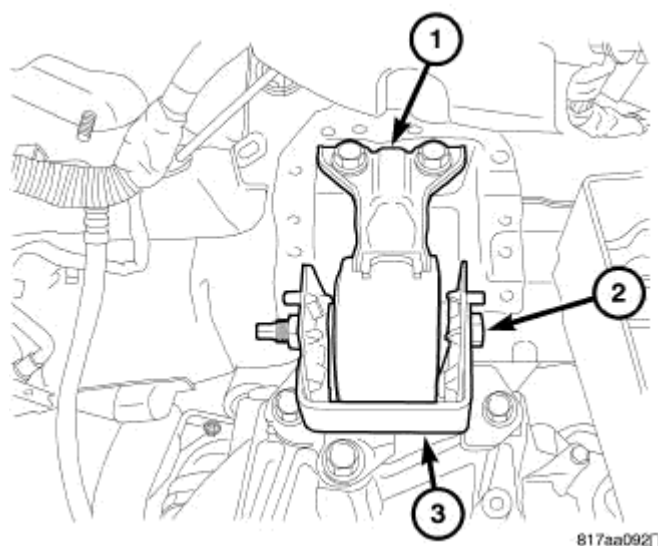


Fig. 255: ECM Bracket
Courtesy of CHRYSLER LLC

3. Disconnect ECM connectors and reposition harness.
4. Disconnect vacuum solenoid vacuum and electrical connectors.
5. Remove ECM mounting bracket retaining bolts (1).
6. Support engine with a suitable jack.



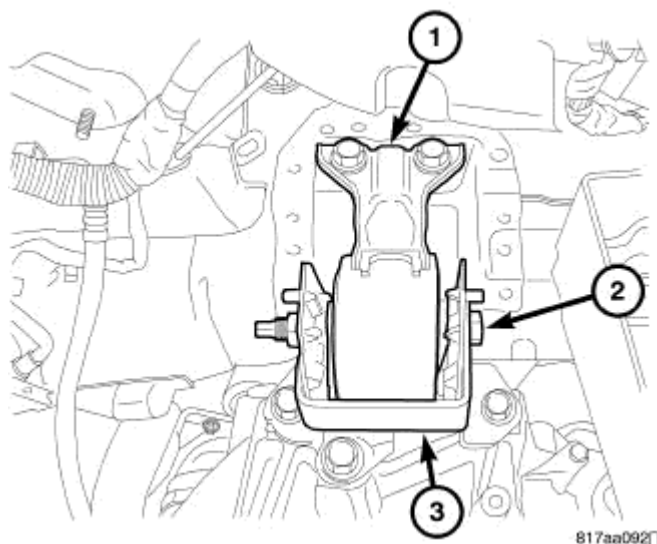
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Fig. 256: Left Engine Mount
Courtesy of CHRYSLER LLC

7. Remove mount through bolt (2).
8. Remove mount bracket (3) from transaxle.
9. Remove mount to frame rail retaining bolts.
10. Remove engine mount (1).

Installation

INSTALLATION



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Fig. 257: Left Engine Mount
Courtesy of CHRYSLER LLC

1. Position mount (1) on frame rail.
2. Install mount retaining bolts and tighten to 75 N.m (55 ft. lbs.).
3. Install mount bracket (3) to transaxle and tighten bolts to 61 N.m (45 ft. lbs.).
4. Install mount through bolt (2) and tighten to 100 N.m (74 ft. lbs.).
5. Remove jack.

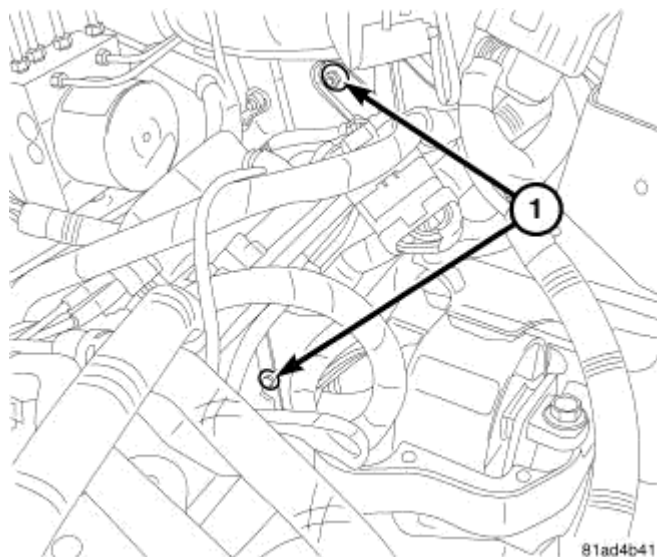


Fig. 258: ECM Bracket
Courtesy of CHRYSLER LLC

6. Install ECM mounting bracket retaining bolts (1).
7. Connect vacuum solenoid vacuum and electrical connectors.
8. Connect ECM electrical connectors.

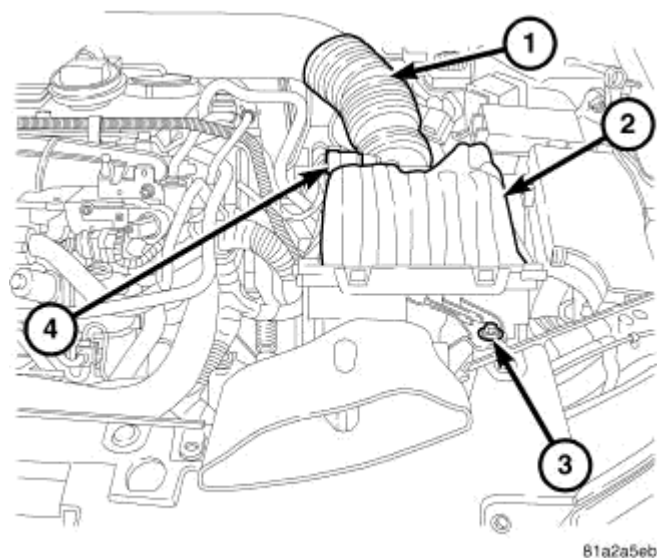


Fig. 259: AIR CLEANER HOUSING

Courtesy of CHRYSLER LLC

9. Install air cleaner assembly (2).

INSULATOR, ENGINE MOUNT, RIGHT

Removal

REMOVAL

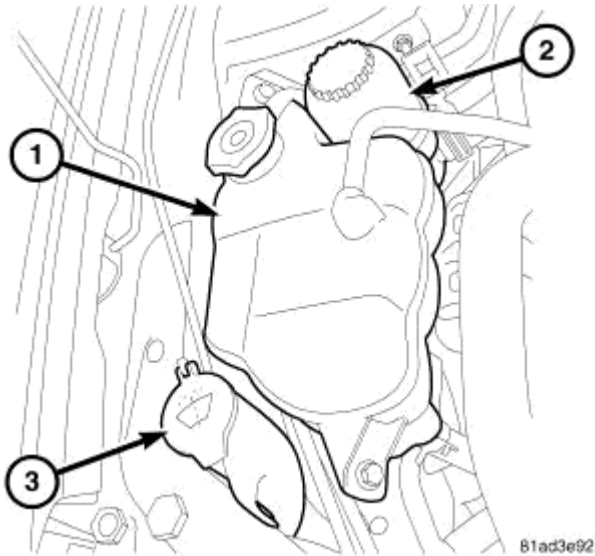


Fig. 260: Coolant Reservoir
Courtesy of CHRYSLER LLC

1. Remove right splash shield.
2. Remove accessory drive belt.
3. Lower vehicle.
4. Support engine with suitable jack.
5. Remove coolant reservoir (1).

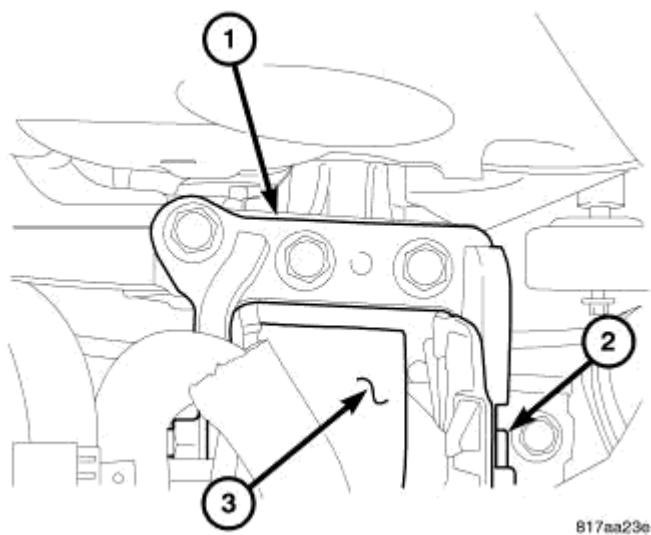


Fig. 261: Right Engine Mount
Courtesy of CHRYSLER LLC

6. Remove upper mount bolts.
7. Remove through bolt (2).
8. Remove mount (3).

Installation

INSTALLATION

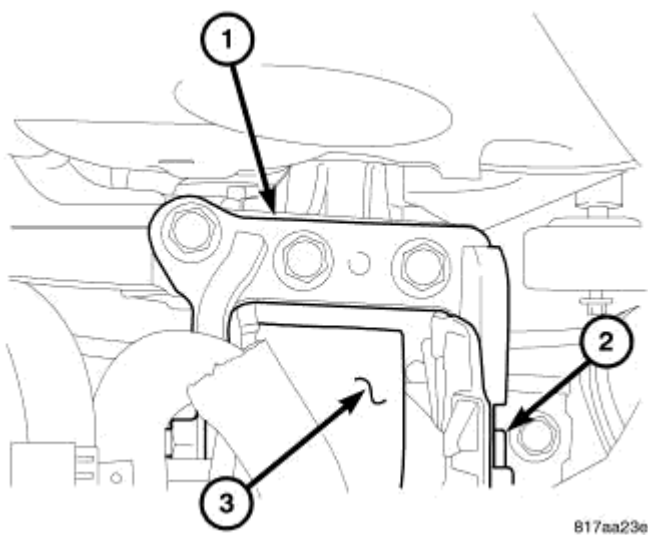


Fig. 262: Right Engine Mount
Courtesy of CHRYSLER LLC

1. Position mount (3) in place.

2. Install mount retaining bolts and tighten to 75 N.m (55 ft. lbs.).
3. Install mount through bolt (2) and tighten to 88 N.m (65 ft. lbs.).

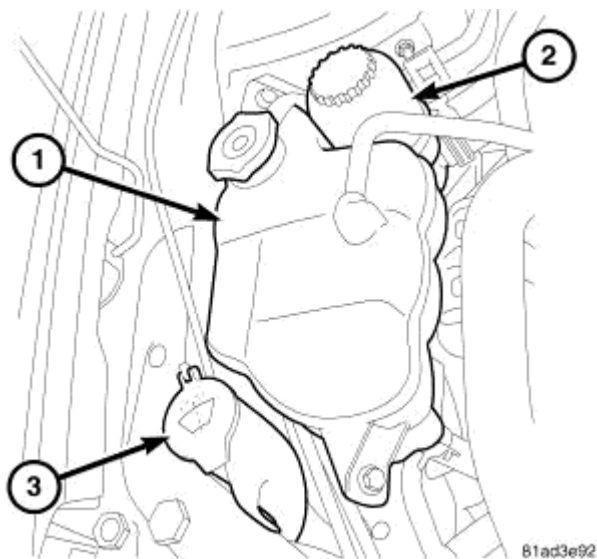


Fig. 263: Coolant Reservoir
Courtesy of CHRYSLER LLC

4. Install coolant reservoir (1).
5. Remove jack.
6. Raise vehicle.
7. Install lower mount bracket bolt and tighten to 68 N.m (50 ft. lbs.).
8. Install accessory drive belt. Refer to **Cooling/Accessory Drive/BELT, Serpentine - Installation** .
9. Install splash shield.

INSULATOR, ENGINE MOUNT, FRONT

Removal

REMOVAL

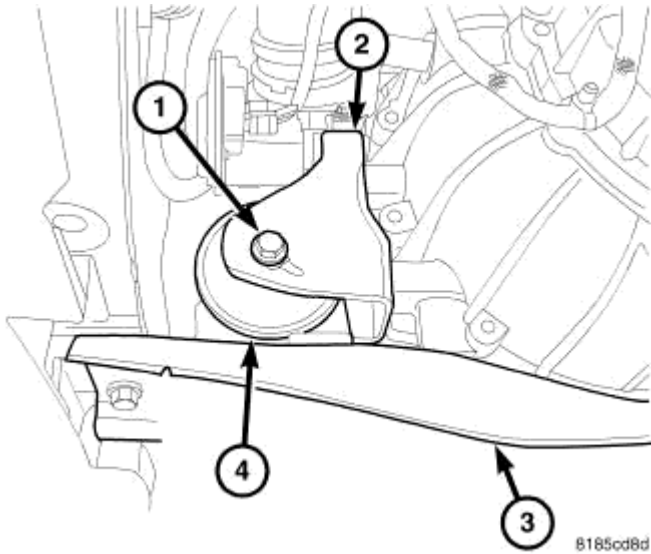


Fig. 264: Front Mount Through Bolt
Courtesy of CHRYSLER LLC

1. Raise vehicle.
2. Remove fore aft member (3) to mount (4) bolts.
3. Remove mount through bolt (1).
4. Remove fore aft member (3) mounting bolts and remove.
5. Remove front mount (4).

Installation

INSTALLATION

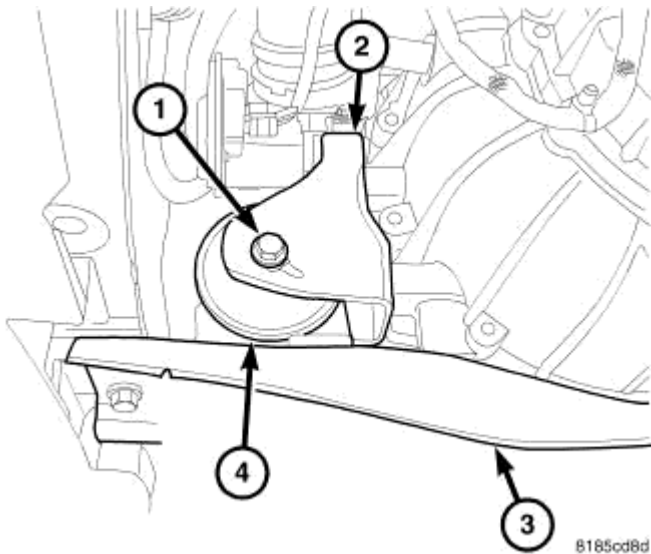


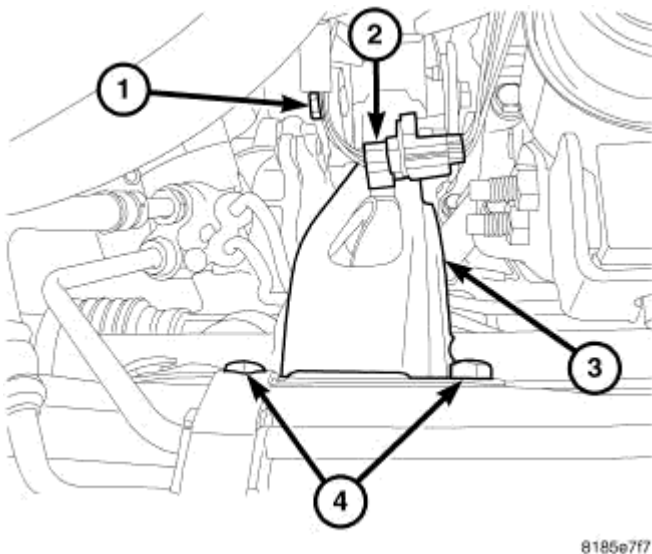
Fig. 265: Front Mount Through Bolt
Courtesy of CHRYSLER LLC

1. Position mount (4) and tighten bolts to 47 N.m (35 ft. lbs.).
2. Install fore aft member (3) and tighten bolts to 100 N.m (74 ft. lbs.).
3. Install mount through bolt (1) and tighten to 47 N.m (35 ft. lbs.).
4. Lower vehicle.

INSULATOR, ENGINE MOUNT, REAR

Removal

REMOVAL



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Fig. 266: Rear Mount - A/T
Courtesy of CHRYSLER LLC

1. Remove rear mount retaining bolts (4).
2. Remove rear mount through bolt (1).
3. Remove oxygen sensor connector (2) from mount.
4. Remove rear mount (3).

Installation

INSTALLATION

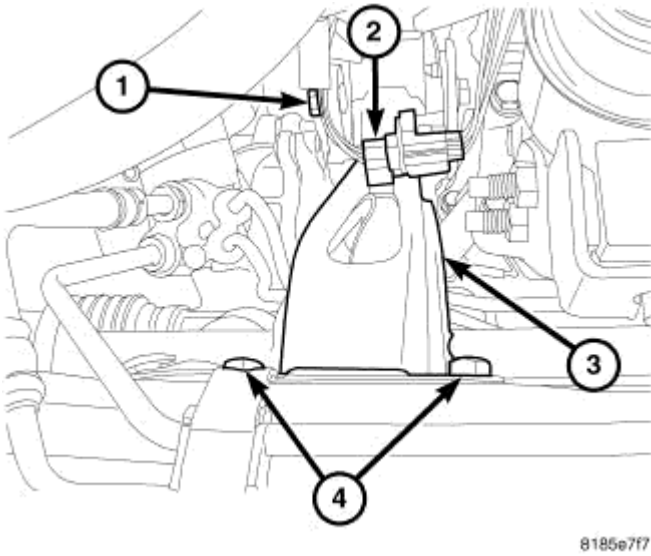


Fig. 267: Rear Mount - A/T
Courtesy of CHRYSLER LLC

1. Position rear mount (3).
2. Install rear mount retaining bolts (4) and tighten to 50 N.m (37 ft. lbs.).
3. Install rear mount through bolt (1) and tighten to 75 N.m (55 ft. lbs.).
4. Install oxygen sensor connector (2) retainer to mount (3).

TURBOCHARGER SYSTEM

COOLER AND HOSES, CHARGE AIR

Removal

CHARGE AIR COOLER

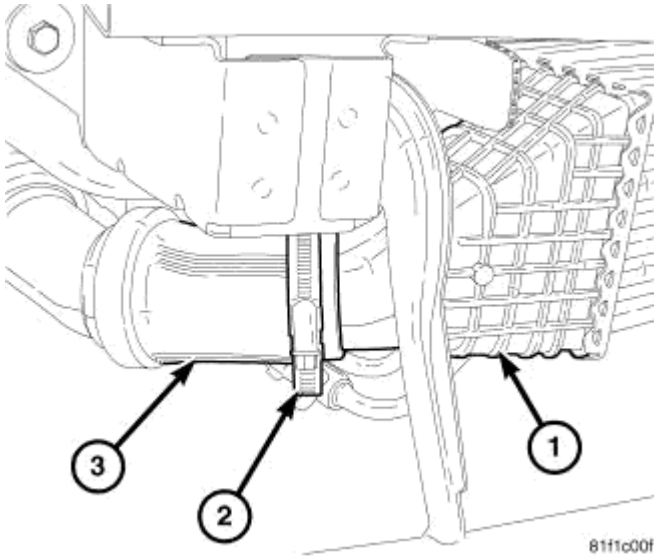


Fig. 268: Charge Air Cooler LH Clamp
Courtesy of CHRYSLER LLC

- | |
|-----------------------|
| 1 - CHARGE AIR COOLER |
| 2 - LH CLAMP |
| 3 - TUBING |

CAUTION: Do not use any tools to remove the rubber isolators-remove by hand only. Soapy water or silicone based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum based lubricant on the isolators, as damage to the rubber material can occur.

NOTE: Band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off the exhaust pipe.

1. Raise and support vehicle.
2. Remove belly pan (if equipped).
3. Remove front fascia lower closeout panel. Refer to Frame and Bumpers/Bumpers/FASCIA, Front Lower - Removal .
4. Remove front fascia. Refer to Frame and Bumpers/Bumpers/FASCIA, Front - Removal .
5. Remove RH tubing clamp (2) and tubing (1) at charge air cooler (3).

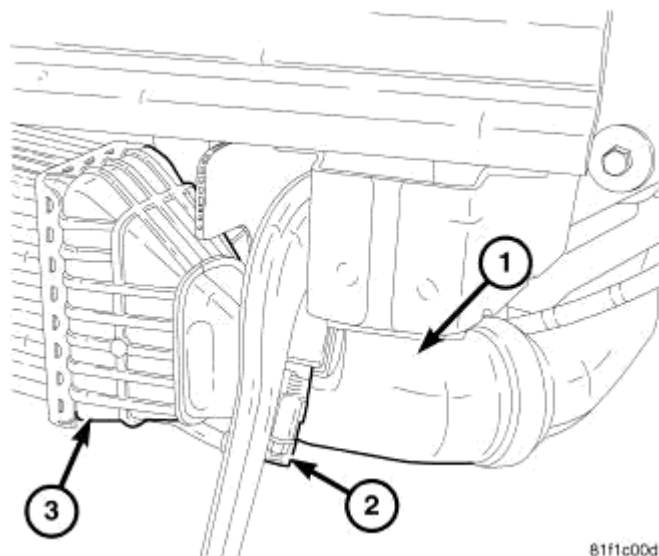


Fig. 269: Charge Air Cooler RH Clamp
Courtesy of CHRYSLER LLC

1 - TUBING
2 - CLAMP
3 - CHARGE AIR COOLER

6. Remove LH tubing clamp (2) and tubing (1) at charge air cooler (3).
7. Remove charge air cooler mounting bolts and charge air cooler (3).

Installation

CHARGE AIR COOLER

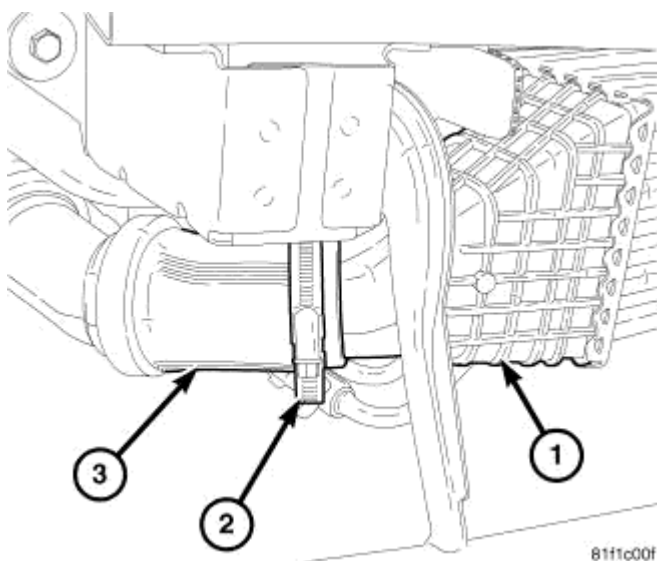


Fig. 270: Charge Air Cooler LH Clamp

Courtesy of CHRYSLER LLC

1 - CHARGE AIR COOLER

2 - LH CLAMP

3 - TUBING

1. Position charge air cooler (3) and install mounting bolts. Tighten bolts to 35 N.m (25 ft. lbs.).
2. Install LH tubing (3) and clamp (2) at charge air cooler (1). Tighten clamp to 10 N.m (89 in. lbs.).

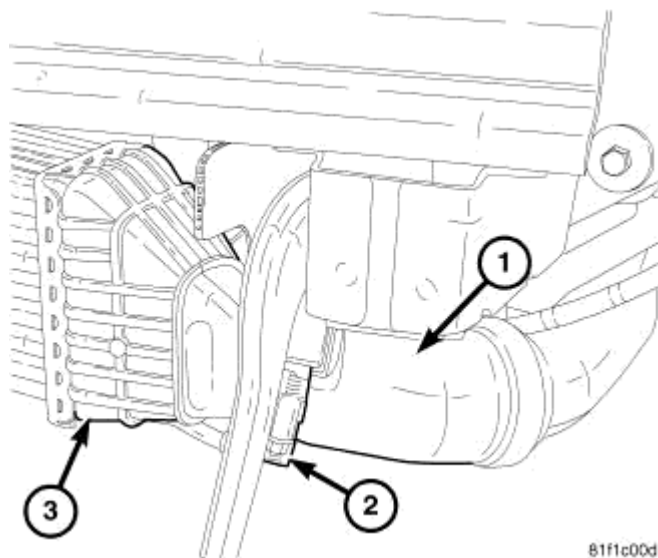


Fig. 271: Charge Air Cooler RH Clamp

Courtesy of CHRYSLER LLC

1 - TUBING

2 - CLAMP

3 - CHARGE AIR COOLER

3. Install RH tubing (1) and clamp (2) at charge air cooler (3). Tighten clamp to 10 N.m (89 in. lbs.).
4. Install front fascia. Refer to **Frame and Bumpers/Bumpers/FASCIA, Front - Installation** .
5. Install front fascia lower closeout panel. Refer to **Frame and Bumpers/Bumpers/FASCIA, Front Lower - Installation** .
6. Lower vehicle.

TURBOCHARGER

Removal

DIESEL ENGINE

1. For turbocharger removal, see **Removal** .

2009 Dodge Journey R/T

2009 ENGINE 2.0L Diesel - Service Information - Journey

Installation

DIESEL ENGINE

1. For turbocharger installation, see **Installation** .