2008 ENGINE

5.7L - Service Information - Commander

DESCRIPTION

5.7L ENGINE

The 5.7L engine (345 CID) eight-cylinder engine is a 90° V-Type lightweight, deep skirt cast iron block, aluminum heads, single cam, overhead valve engine with hydraulic roller tappets. The heads incorporate splayed valves with a hemispherical style combustion chamber and dual spark plugs. The cylinders are numbered from front to rear; 1, 3, 5, 7 on the left bank and 2, 4, 6, 8 on the right bank. The firing order is 1-8-4-3-6-5-7-2.

DIAGNOSIS AND TESTING

CYLINDER COMBUSTION PRESSURE LEAKAGE

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

Exhaust and intake valve leaks (improper seating).
Leaks between adjacent cylinders or into water jacket.
Any causes for combustion/compression pressure loss.

1. Check the coolant level and fill as required. DO NOT install the radiator cap.
2. Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.
3. Remove the spark plugs.
4. Remove the oil filler cap.
5. Remove the air cleaner hose.
6. Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum and 552 kPa (80 psi) recommended.
7. Perform the test procedures on each cylinder according to the tester manufacturer's instructions. Set piston of cylinder to be tested at TDC compression, while testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

   All gauge pressure indications should be equal, with no more than 25% leakage.

   FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

   Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART**.

CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
AIR ESCAPES THROUGH THROTTLE BODY	Intake valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH TAILPIPE	Exhaust valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH RADIATOR	Head gasket leaking or cracked cylinder head or block	Remove cylinder head and inspect. Replace defective part
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	Head gasket leaking or crack in cylinder head or block between adjacent cylinders	Remove cylinder head and inspect. Replace gasket, head, or block as necessary
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	Stuck or broken piston rings; cracked piston; worn rings and/or cylinder wall	Inspect for broken rings or piston. Measure ring gap and cylinder diameter, taper and out-of-round. Replace defective part as necessary

CYLINDER COMPRESSION PRESSURE

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

1. Clean the spark plug recesses with compressed air.
2. Remove the spark plugs.
3. Disable the fuel system.
4. Remove the ASD relay.
5. Insert a compression pressure gauge and rotate the engine with the engine starter motor for three revolutions.
6. Record the compression pressure on the 3rd revolution. Continue the test for the remaining cylinders.
7. See **SPECIFICATIONS** for the correct engine compression pressures.

ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either performance (e.g, engine idles rough and stalls) or mechanical (e.g, a strange noise).

See **ENGINE DIAGNOSIS - PERFORMANCE** and **ENGINE DIAGNOSIS - MECHANICAL** for possible

causes and corrections of malfunctions.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

Cylinder Compression Pressure Test. See **CYLINDER COMPRESSION PRESSURE**.
Cylinder Combustion Pressure Leakage Test. See **CYLINDER COMBUSTION PRESSURE LEAKAGE**.
Engine Cylinder Head Gasket Failure Diagnosis. See **CYLINDER HEAD GASKET FAILURE**.
Intake Manifold Leakage Diagnosis. See **INTAKE MANIFOLD LEAKAGE**.

ENGINE DIAGNOSIS - MECHANICAL

ENGINE MECHANICAL DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES/LIFTERS	1. High or low oil level in crankcase	1. Check for correct oil level. Adjust oil level by draining or adding as needed
	2. Thin or diluted oil	2. Change oil. See **STANDARD PROCEDURE**.
	3. Low oil pressure	3. Check engine oil level. If ok, Perform oil pressure test. See **DIAGNOSIS AND TESTING** for engine oil pressure test/specifications
	4. Dirt in tappets/lash adjusters	4. Clean/replace hydraulic tappets/lash adjusters
	5. Bent push rod(s)	5. Install new push rods
	6. Worn rocker arms	6. Inspect oil supply to rocker arms and replace worn arms as needed
	7. Worn tappets/lash adjusters	7. Install new hydraulic tappets/lash adjusters
	8. Worn valve guides	8. Inspect all valve guides and replace as necessary
	9. Excessive runout of valve seats or valve faces	9. Grind valves and seats
CONNECTING ROD NOISE	1. Insufficient oil supply	1. Check engine oil level.
	2. Low oil pressure	2. Check engine oil level. If ok, Perform oil pressure test. See **DIAGNOSIS AND TESTING** engine oil pressure test/specifications
	3. Thin or diluted oil	3. Change oil to correct viscosity.

		See **STANDARD PROCEDURE** for correct procedure/engine oil specifications
	4. Excessive connecting rod bearing clearance	4. Measure bearings for correct clearance with plasti-gage. Repair as necessary
	5. Connecting rod journal out of round	5. Replace crankshaft or grind journals
	6. Misaligned connecting rods	6. Replace bent connecting rods
MAIN BEARING NOISE	1. Insufficient oil supply	1. Check engine oil level.
	2. Low oil pressure	2. Check engine oil level. If ok, Perform oil pressure test. See **DIAGNOSIS AND TESTING**.
	3. Thin or diluted oil	3. Change oil to correct viscosity.
	4. Excessive main bearing clearance	4. Measure bearings for correct clearance. Repair as necessary
	5. Excessive end play	5. Check crankshaft thrust bearing for excessive wear on flanges
	6. Crankshaft main journal out of round or worn	6. Grind journals or replace crankshaft
	7. Loose flywheel or torque converter	7. Inspect crankshaft, flexplate/flywheel and bolts for damage. Tighten to correct torque
LOW OIL PRESSURE	1. Low oil level	1. Check oil level and fill if necessary
	2. Faulty oil pressure sending unit	2. Install new sending unit
	3. Clogged oil filter	3. Install new oil filter
	4. Worn oil pump	4. Replace oil pump assembly.
	5. Thin or diluted oil	5. Change oil to correct viscosity.
	6. Excessive bearing clearance	6. Measure bearings for correct clearance
	7. Oil pump relief valve stuck	7. Remove valve to inspect, clean and reinstall
	8. Oil pickup tube loose, broken, bent or clogged	8. Inspect oil pickup tube and pump, and clean or replace if necessary
	9. Oil pump cover warped or cracked	9. Install new oil pump
OIL LEAKS	1. Misaligned or deteriorated gaskets	1. Replace gasket
	2. Loose fastener, broken or porous metal part	2. Tighten, repair or replace the part
	3. Front or rear crankshaft oil seal leaking	3. Replace seal
	4. Leaking oil gallery plug or cup	4. Remove and reseal threaded

	plug	plug. Replace cup style plug
EXCESSIVE OIL CONSUMPTION OR SPARK PLUGS OIL FOULED	1. CCV System malfunction	1. Refer to **DESCRIPTION** for correct operation
	2. Defective valve stem seal(s)	2. Repair or replace seal(s)
	3. Worn or broken piston rings	3. Hone cylinder bores. Install new rings
	4. Scuffed pistons/cylinder walls	4. Hone cylinder bores and replace pistons as required
	5. Carbon in oil control ring groove	5. Remove rings and de-carbon piston
	6. Worn valve guides	6. Inspect/replace valve guides as necessary
	7. Piston rings fitted too tightly in grooves	7. Remove rings and check ring end gap and side clearance. Replace if necessary

ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTIONS
NOISY VALVES	1. High or low oil level in crankcase.	1. Refer to **SPECIFICATIONS** .
	2. Thin or diluted oil.	2. Change oil and filter.
	3. Low oil pressure.	3. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	4. Dirt in lash adjusters.	4. Replace as necessary.
	5. Worn rocker arms.	5. Replace as necessary.
	6. Worn lash adjusters	6. Replace as necessary.
	7. Worn valve guides.	7. See **STANDARD PROCEDURE**.
	8. Excessive runout of valve seats on valve faces.	8. See **STANDARD PROCEDURE**.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Refer to **SPECIFICATIONS** .
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Connecting rod journal out-of-round.	5. Service or replace crankshaft.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Refer to **SPECIFICATIONS** .
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.

	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Excessive end play.	5. Check thrust washers for wear.
	6. Crankshaft journal out-of round.	6. Service or replace crankshaft.
	7. Loose flywheel or torque converter.	7. Tighten to correct torque

ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery	1. Charge or replace as necessary.
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to the terminals.
	3. Faulty starter.	3. Refer to **DIAGNOSIS AND TESTING** .
	4. Incorrect spark plug gap.	4. Refer to **SPECIFICATIONS** .
	5. Dirt or water in fuel system.	5. Clean system and replace fuel filter.
	6. Faulty fuel pump, relay or wiring.	6. See **DIAGNOSIS AND TESTING**.
ENGINE STALLS OR ROUGH IDLE	1. Idle speed set to low.	1. See **DIAGNOSIS AND TESTING**.
	2. Vacuum leak.	2. Inspect intake manifold and vacuum hoses, repair or replace as necessary.
	3. Incorrect engine timing.	3. Refer to **TIMING DRIVE**.
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped spark plugs.	1. Replace spark plugs.
	2. Dirt or water in fuel system.	2. Clean system and replace fuel filter.
	3. Blown cylinder head gasket.	3. Replace cylinder head gasket.
	4. Low compression.	4. See **DIAGNOSIS AND TESTING**.
	5. Burned, warped or pitted valves.	5. Replace as necessary.
	6. Plugged or restricted exhaust system.	6. Inspect and replace as necessary.

LUBRICATION

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Gaskets and O-Rings.	1. Replace as necessary.
	(a) Misaligned or damaged.	(a) Replace as necessary.

	(b) Loose fasteners, broken or porous metal parts.	(b) Tighten fasteners, Repair or replace metal parts.
	2. Crankshaft rear seal	2. Replace as necessary.
	3. Crankshaft seal flange. Scratched, nicked or grooved.	3. Polish or replace crankshaft.
	4. Oil pan flange cracked.	4. Replace oil pan.
	5.Front cover seal, damaged or misaligned.	5. Replace seal.
	6. Scratched or damaged vibration damper hub.	6. Polish or replace damper.
-	7. Crankshaft Rear Flange Microporosity	7. Replace Crankshaft
OIL PRESSURE DROP	1. Low oil level.	1. Check and correct oil level.
	2. Faulty oil pressure sending unit.	2. Replace sending unit.
	3. Low oil pressure.	3. Check pump and bearing clearance.
	4. Clogged oil filter.	4. Replace oil filter.
	5. Worn oil pump.	5. Replace as necessary.
	6. Thin or diluted oil.	6. Change oil and filter.
	7. Excessive bearing clearance.	7. Replace as necessary.
	8. Oil pump relief valve stuck.	8. Replace oil pump.
	9. Oil pickup tube loose or damaged.	9. Replace as necessary.
OIL PUMPING AT RINGS; SPARK PLUGS FOULING	1. Worn or damaged rings.	1. Hone cylinder bores and replace rings.
	2. Carbon in oil ring slots.	2. Replace rings.
	3. Incorrect ring size installed.	3. Replace rings.
	4. Worn valve guides.	4. Ream guides and replace valves.
	5. Leaking intake gasket.	5. Replace intake gaskets.
	6. Leaking valve guide seals.	6. Replace valve guide seals.

STANDARD PROCEDURE

HYDROSTATIC LOCK

CAUTION: DO NOT use the starter motor to rotate the crankshaft. Severe damage could occur.

When an engine is suspected of hydrostatic lock (regardless of what caused the problem), follow the steps below.

1. Perform the Fuel Pressure Release Procedure. Refer to **STANDARD PROCEDURE** .
2. Disconnect the negative cable(s) from the battery.

3. Inspect air cleaner, induction system, and intake manifold to ensure system is dry and clear of foreign material.
4. Place a shop towel around the spark plugs to catch any fluid that may possibly be under pressure in the cylinder head. Remove the spark plugs.
5. With all spark plugs removed, rotate the crankshaft using a breaker bar and socket.
6. Identify the fluid in the cylinders (coolant, fuel, oil, etc.).
7. Be sure all fluid has been removed from the cylinders.
8. Repair engine or components as necessary to prevent this problem from occurring again.
9. Squirt a small amount of engine oil into the cylinders to lubricate the walls. This will prevent damage on restart.
10. Install new spark plugs. Tighten the spark plugs to 41 N.m (30 ft. lbs.) torque.
11. Drain engine oil. Remove and discard the oil filter.
12. Install the drain plug. Tighten the plug to 34 N.m (25 ft. lbs.) torque.
13. Install a new oil filter.
14. Fill engine crankcase with the specified amount and grade of oil. Refer to **SPECIFICATIONS** .
15. Connect the negative cable(s) to the battery.
16. Start the engine and check for any leaks.

REPAIR DAMAGED OR WORN THREADS

CAUTION: Be sure that the tapped holes maintain the original center line.

Damaged or worn threads can be repaired. Essentially, this repair consists of:

Drilling out worn or damaged threads.
Tapping the hole with a special Heli-Coil Tap, or equivalent.
Installing an insert into the tapped hole to bring the hole back to its original thread size.

REMOVAL

REMOVAL - ENGINE

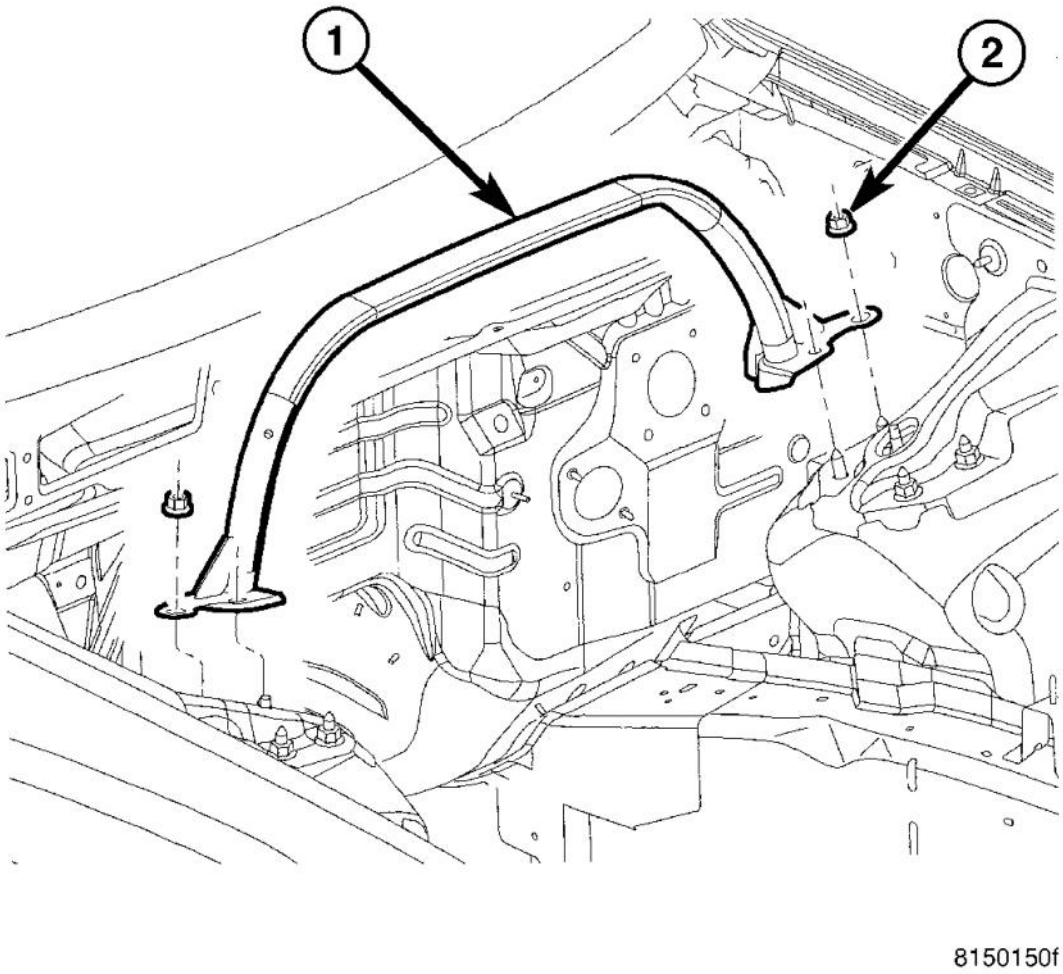

Fig. 1: Strut Tower Support
Courtesy of CHRYSLER LLC

1. Remove the strut tower support (1).

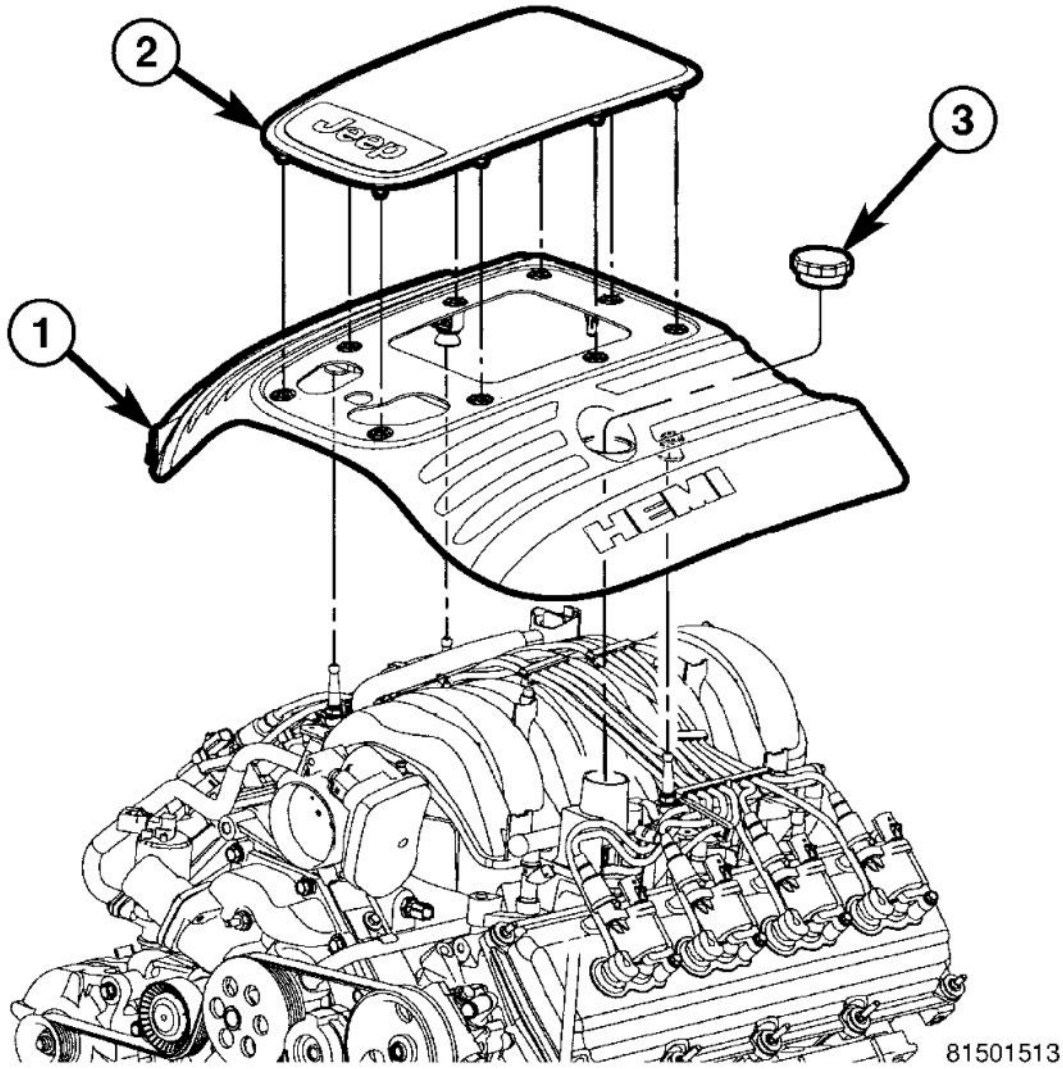

Fig. 2: 5.7L Engine Appearance Cover
Courtesy of CHRYSLER LLC

2. Remove the engine cover (1).

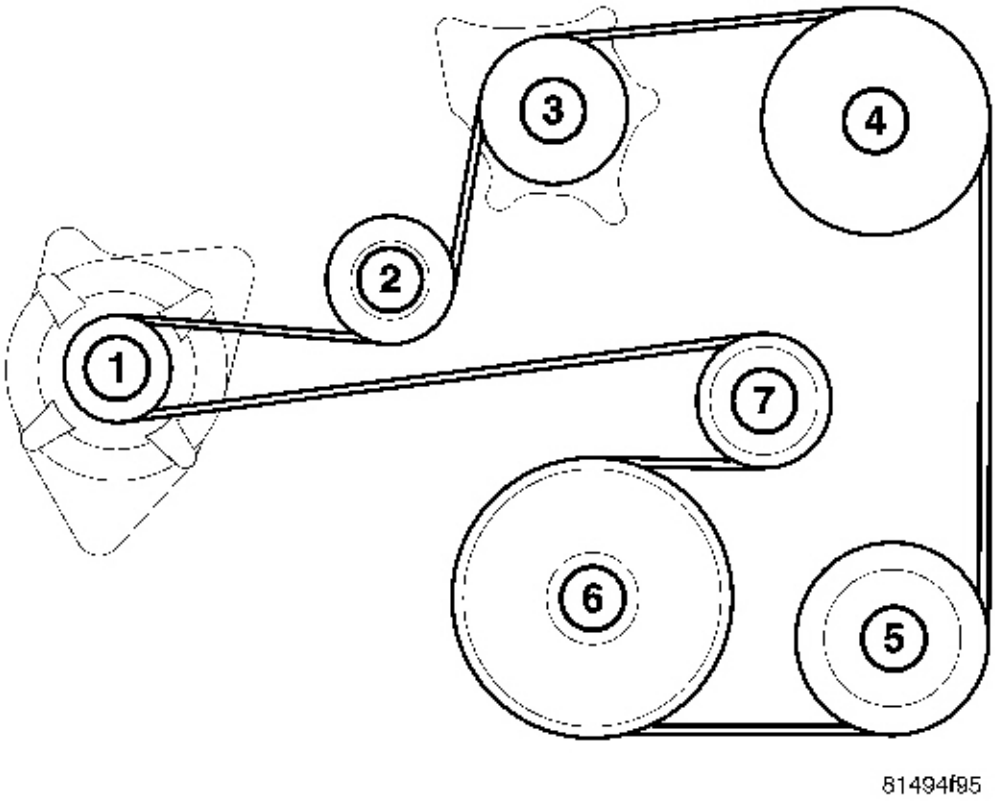

Fig. 3: Accessory Drive Belt Routing
Courtesy of CHRYSLER LLC

1 - GENERATOR
2 - IDLER PULLEY
3 - WATER PUMP
4 - P/S PUMP
5 - A/C COMPRESSOR
6 - CRANKSHAFT
7 - BELT TENSIONER

3. Perform the Fuel System Pressure Release procedure. Refer to **STANDARD PROCEDURE** .
4. Disconnect the battery negative cable.
5. Remove the air cleaner resonator and duct work as an assembly.
6. Drain cooling system. Refer to **STANDARD PROCEDURE** .

7. Remove the accessory drive belt. Refer to **REMOVAL** .
8. Remove radiator fan shroud. Refer to **REMOVAL** .

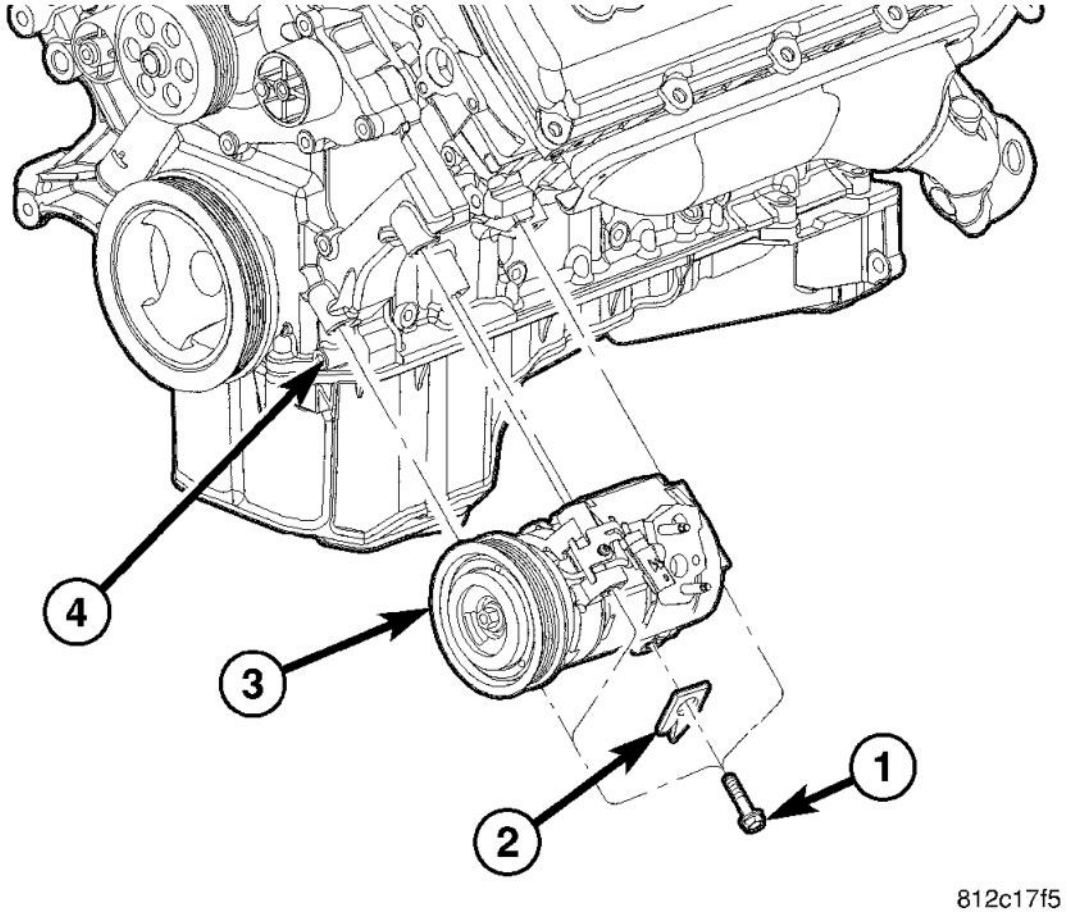

Fig. 4: A/C Compressor Mounting - 5.7L
Courtesy of CHRYSLER LLC

9. Remove the A/C compressor with the lines attached. Secure compressor out of the way.

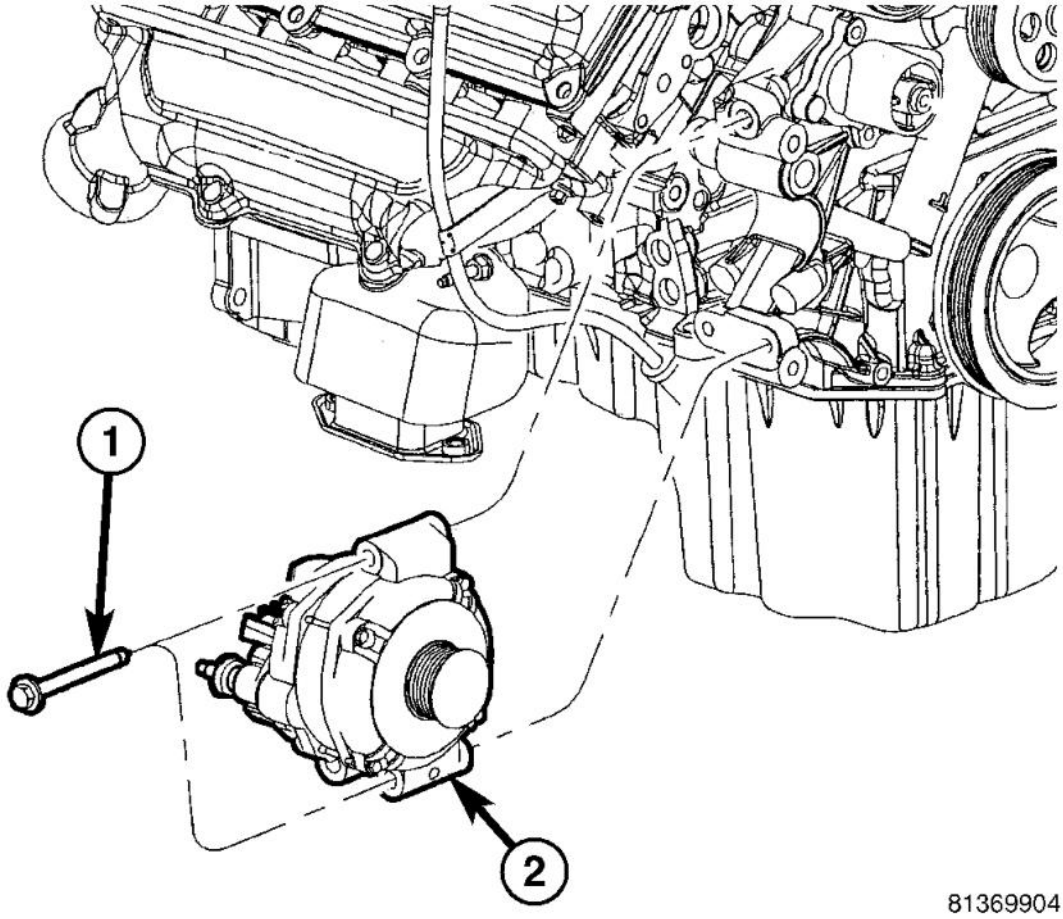

Fig. 5: Generator Mounting - 5.7L
Courtesy of CHRYSLER LLC

10. Remove generator assembly. Refer to **REMOVAL** .
11. Remove the intake manifold and IAFM as an assembly. See **REMOVAL**.
12. Remove the ground wires from the rear of each cylinder head.

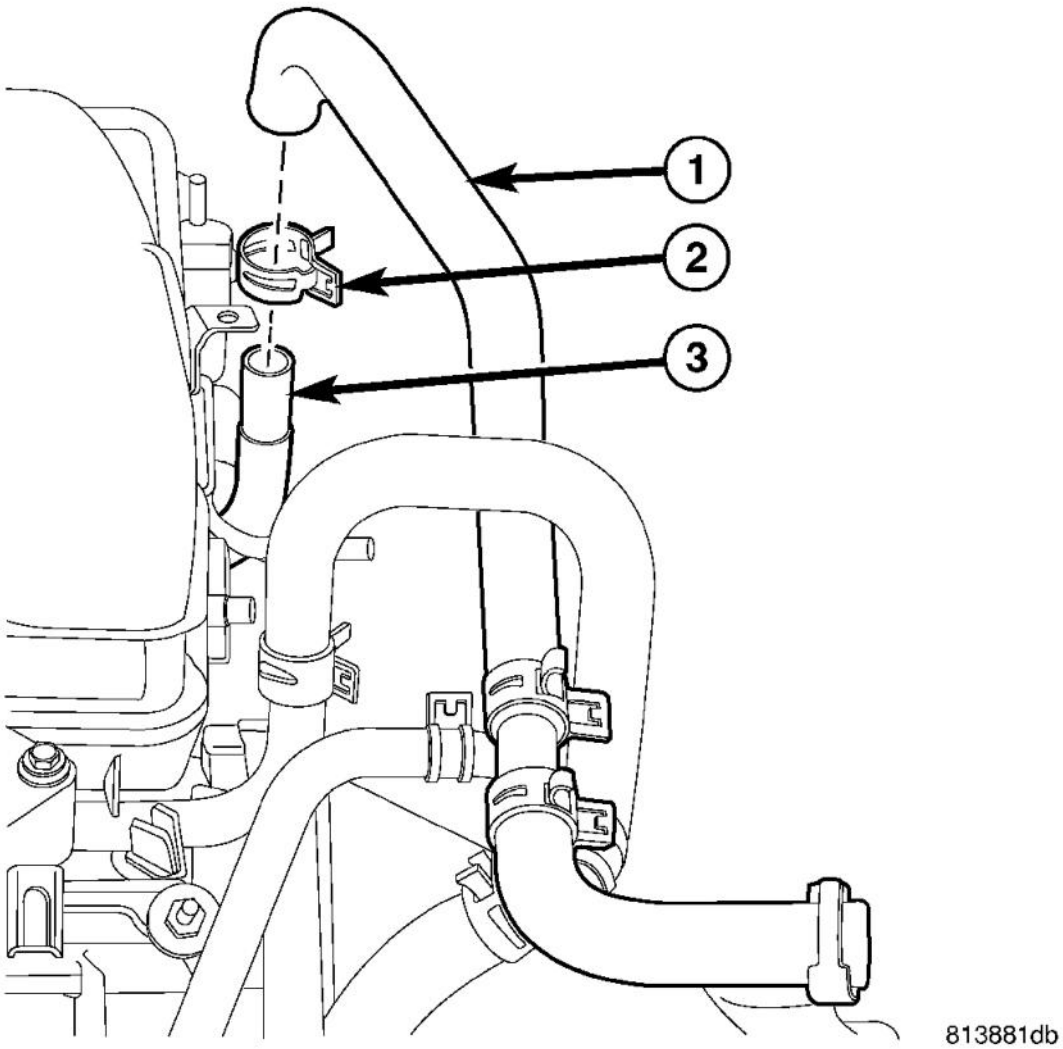

Fig. 6: Heater Supply Hose
Courtesy of CHRYSLER LLC

1 - Heater Hose 2 - Clamp 3 - Tube

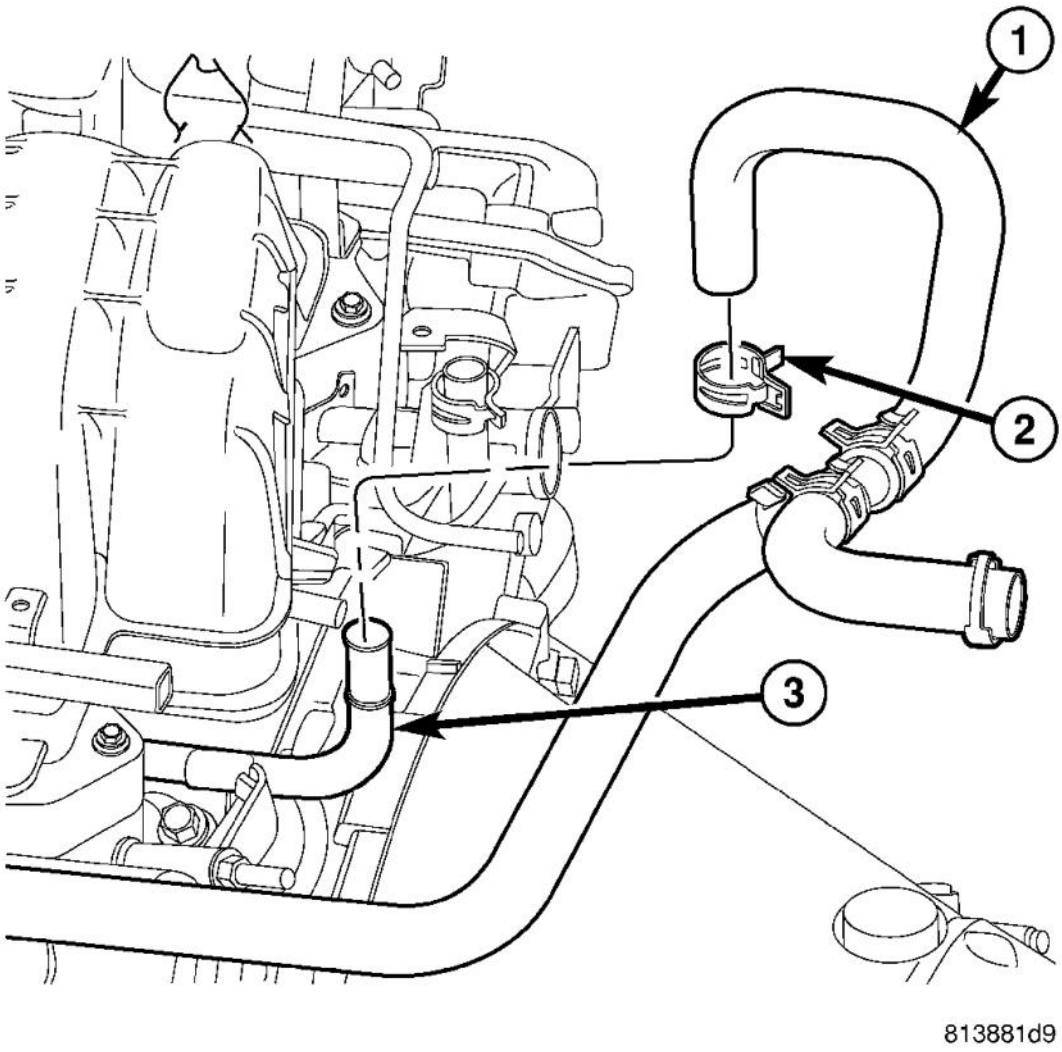

Fig. 7: Heater Hose Return
Courtesy of CHRYSLER LLC

1 - Heater Hose
2 - Clamp
3 - Tube

13. Disconnect the heater hoses (1).

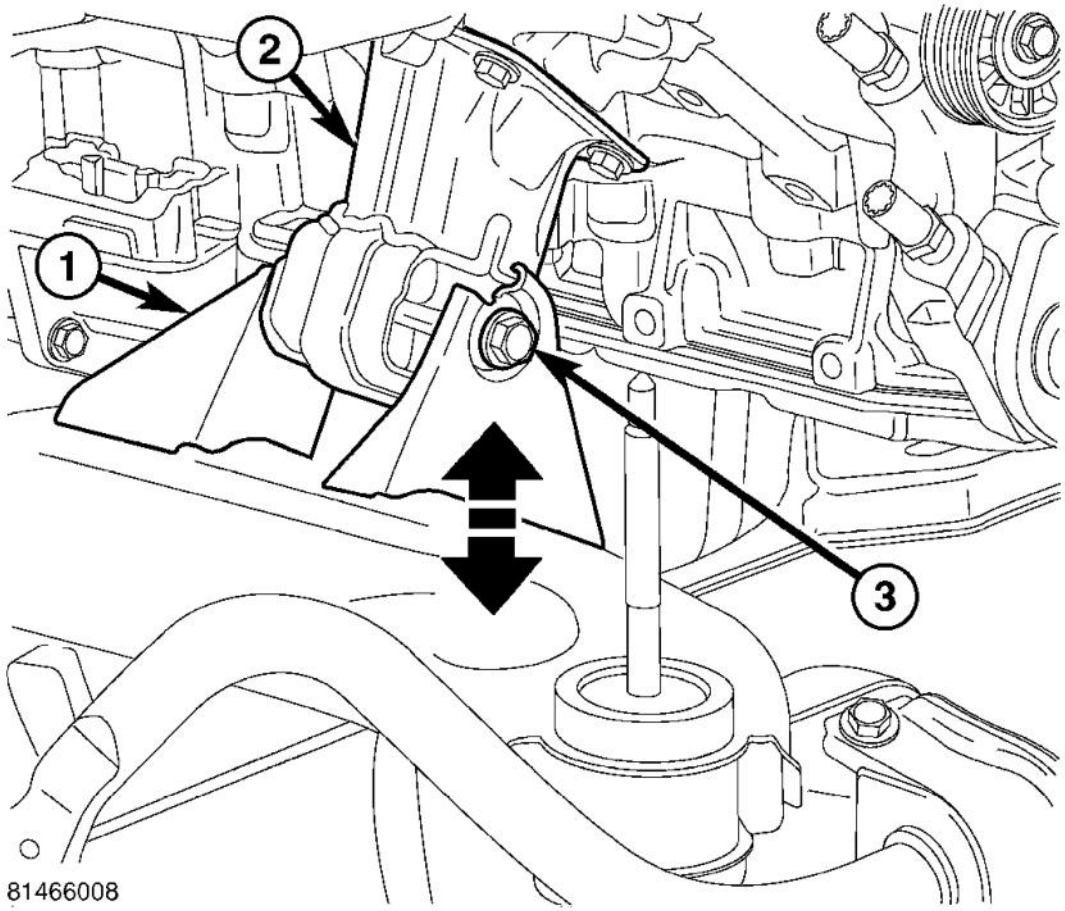

Fig. 8: Engine Mount Bolt
Courtesy of CHRYSLER LLC

NOTE: It is not necessary to disconnect P/S hoses from pump, for P/S pump removal.

14. Remove the power steering pump and set aside.
15. Disconnect the fuel supply line. Refer to **STANDARD PROCEDURE** .
16. Raise and support the vehicle on a hoist and drain the engine oil.
17. Remove engine front mount to frame bolts (3) and nuts.
18. Disconnect the transmission oil cooler lines from their retainers at the oil pan bolts.

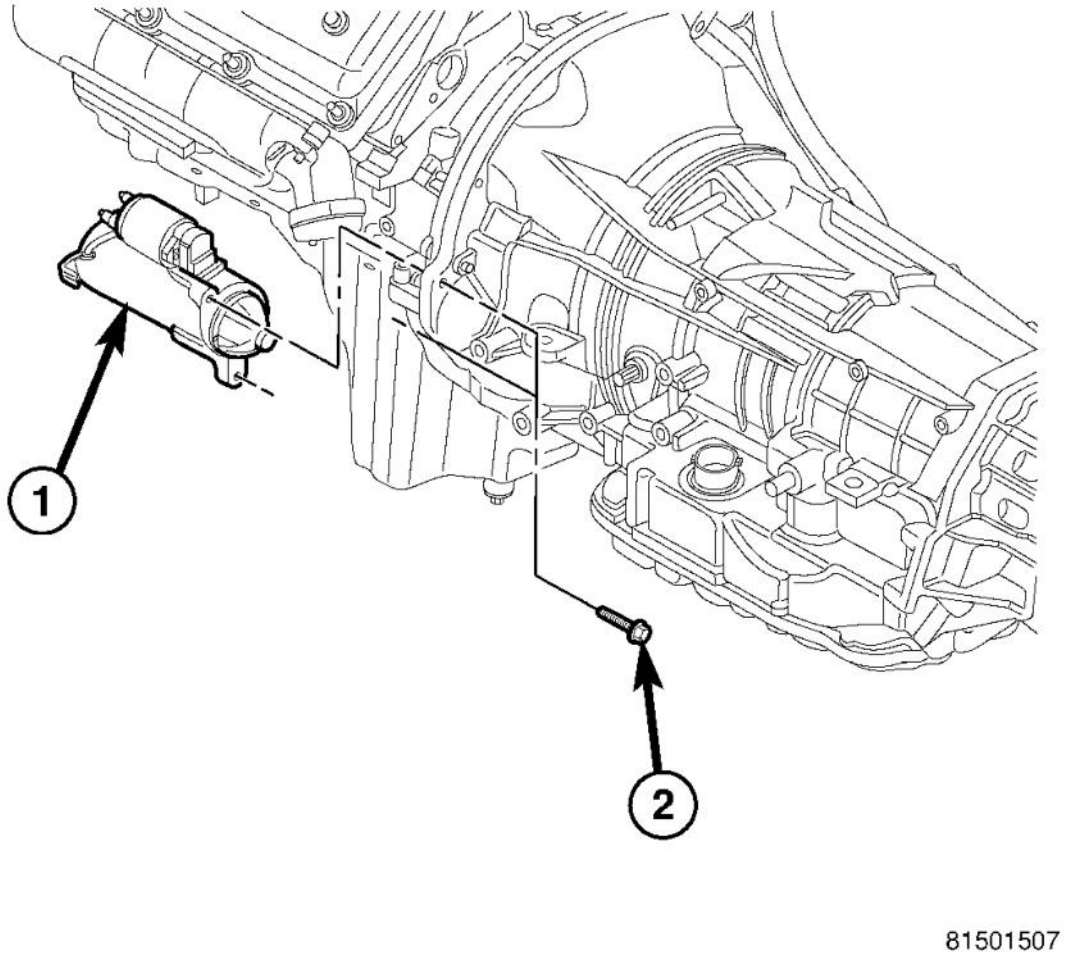

Fig. 9: Starter - 5.7L
Courtesy of CHRYSLER LLC

19. Disconnect exhaust pipe at manifolds.
20. Disconnect the starter wires. Remove starter motor (1). Refer to **REMOVAL** .

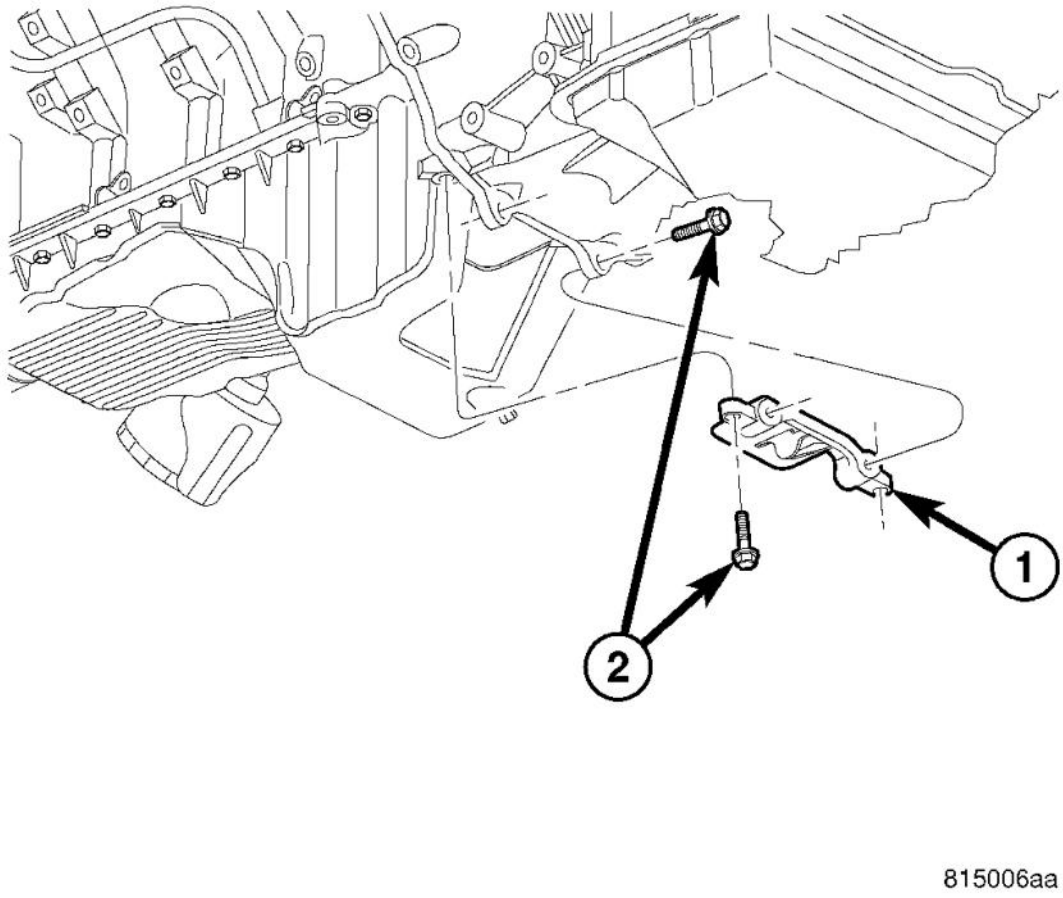

Fig. 10: Structural Dust Cover
Courtesy of CHRYSLER LLC

1 - STRUCTURAL COVER 2 - BOLTS

21. Remove the structural dust cover (1).

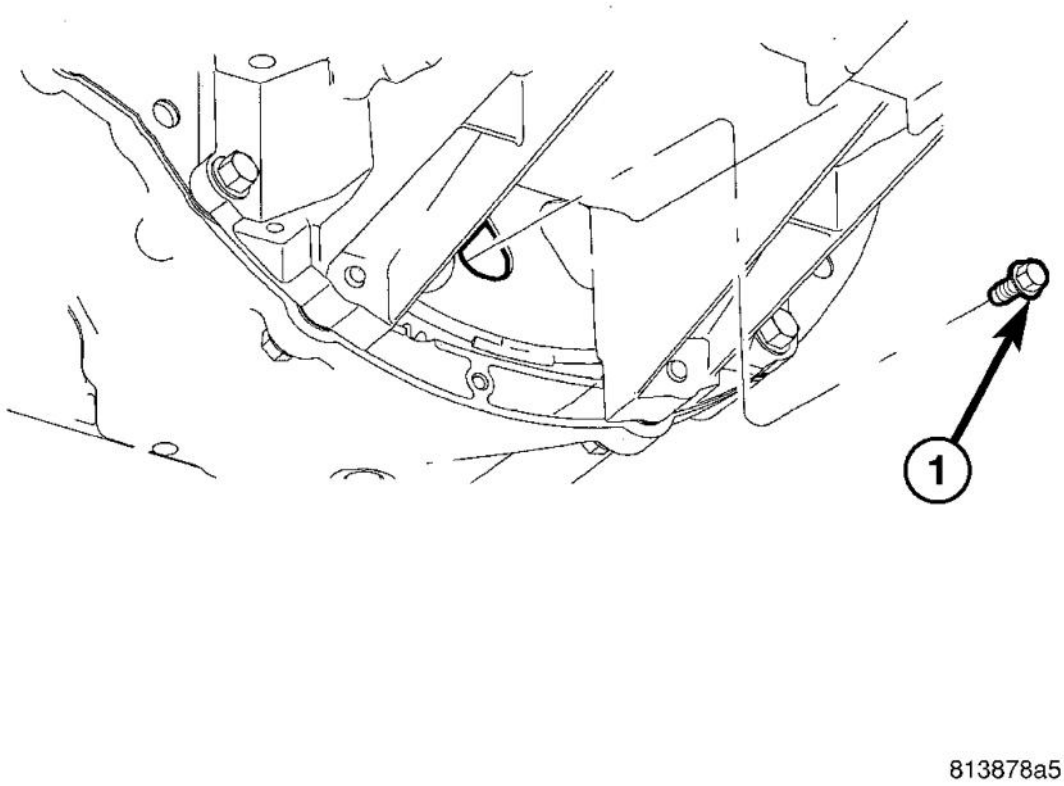

Fig. 11: Torque Converter Bolts
Courtesy of CHRYSLER LLC

1 - Bolts

22. Remove drive plate to converter bolts.

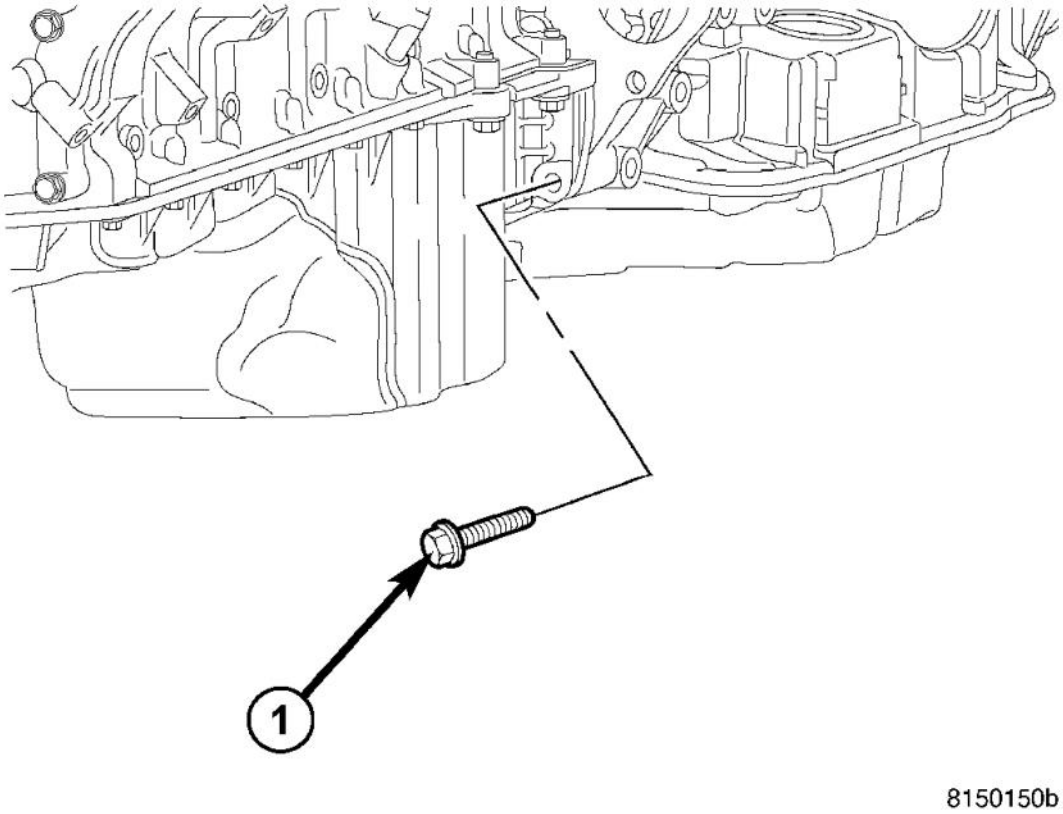

Fig. 12: Remove/Install Oil Pan To Transmission Bolts
Courtesy of CHRYSLER LLC

1 - BOLTS

23. Remove the oil pan to transmission bolts (1).

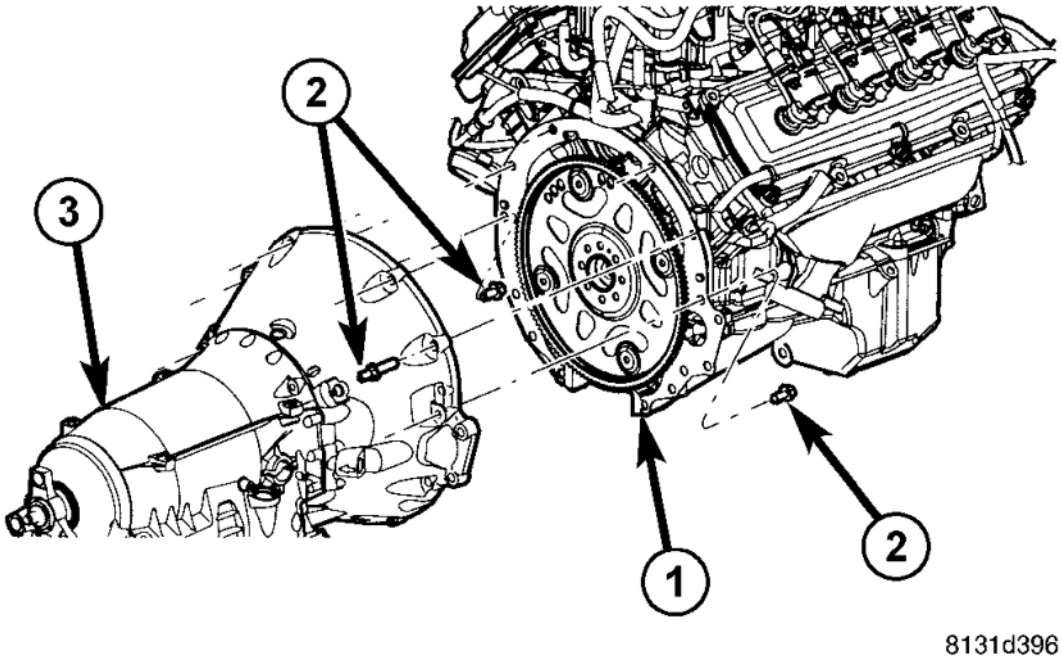

Fig. 13: Remove/Install Transmission to Engine Bolts
Courtesy of CHRYSLER LLC

1 - ENGINE
2 - BOLTS
3 - TRANSMISSION

24. Remove transmission bell housing to engine block bolts (2).
25. Lower the vehicle.

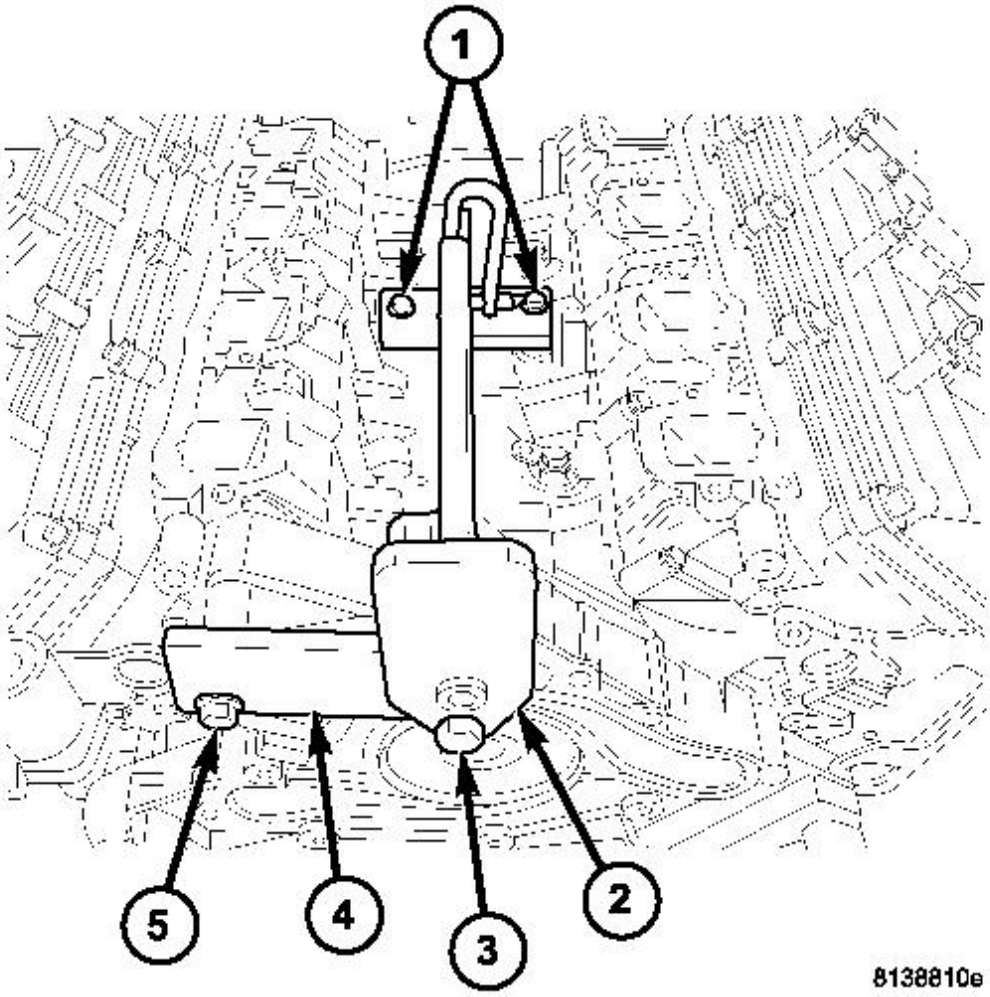

Fig. 14: Engine Lift Fixture And Adapter
Courtesy of CHRYSLER LLC

1 - Bolts
2 - Engine Lift Fixture
3 - Adapter Bolt
4 - Adapter
5 - Adapter Nut

26. Install engine lift fixture, special tool # 8984 and 8984-UPD.
27. Separate engine from transmission, remove engine from vehicle, and install engine assembly on a repair

stand.

INSTALLATION

INSTALLATION - ENGINE

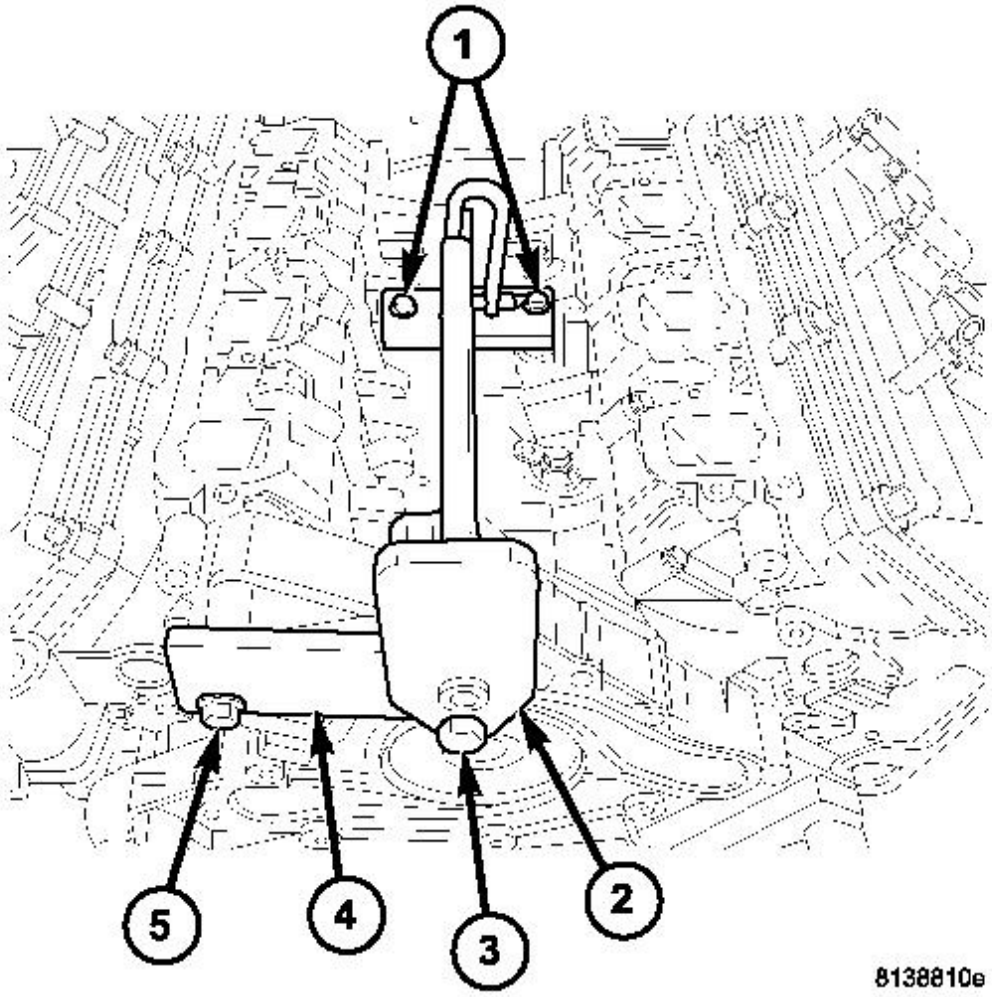

Fig. 15: Engine Lift Fixture And Adapter
Courtesy of CHRYSLER LLC

1 - Bolts 2 - Engine Lift Fixture

3 - Adapter Bolt 4 - Adapter 5 - Adapter Nut

1. Install engine lift fixture Special tool # 8984 and 8984-UPD.
2. Position the engine in the engine compartment.
3. Lower engine into compartment and align engine with transmission.

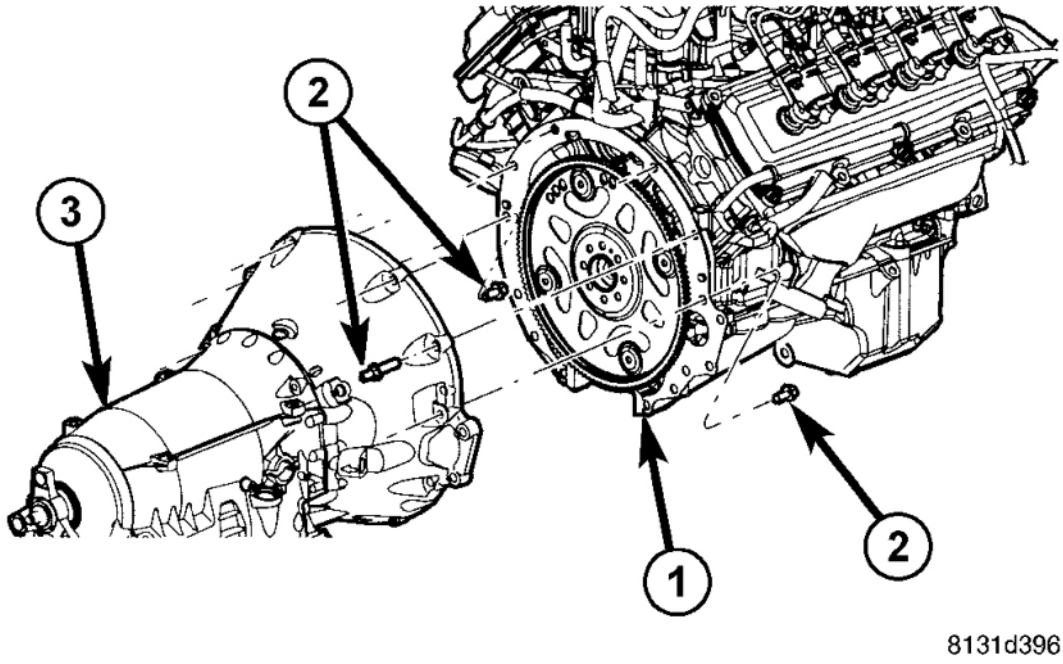

Fig. 16: Remove/Install Transmission to Engine Bolts
Courtesy of CHRYSLER LLC

1 - ENGINE 2 - BOLTS 3 - TRANSMISSION

4. Mate engine (1) and transmission (3) and install two transmission to engine block mounting bolts (2) finger tight.

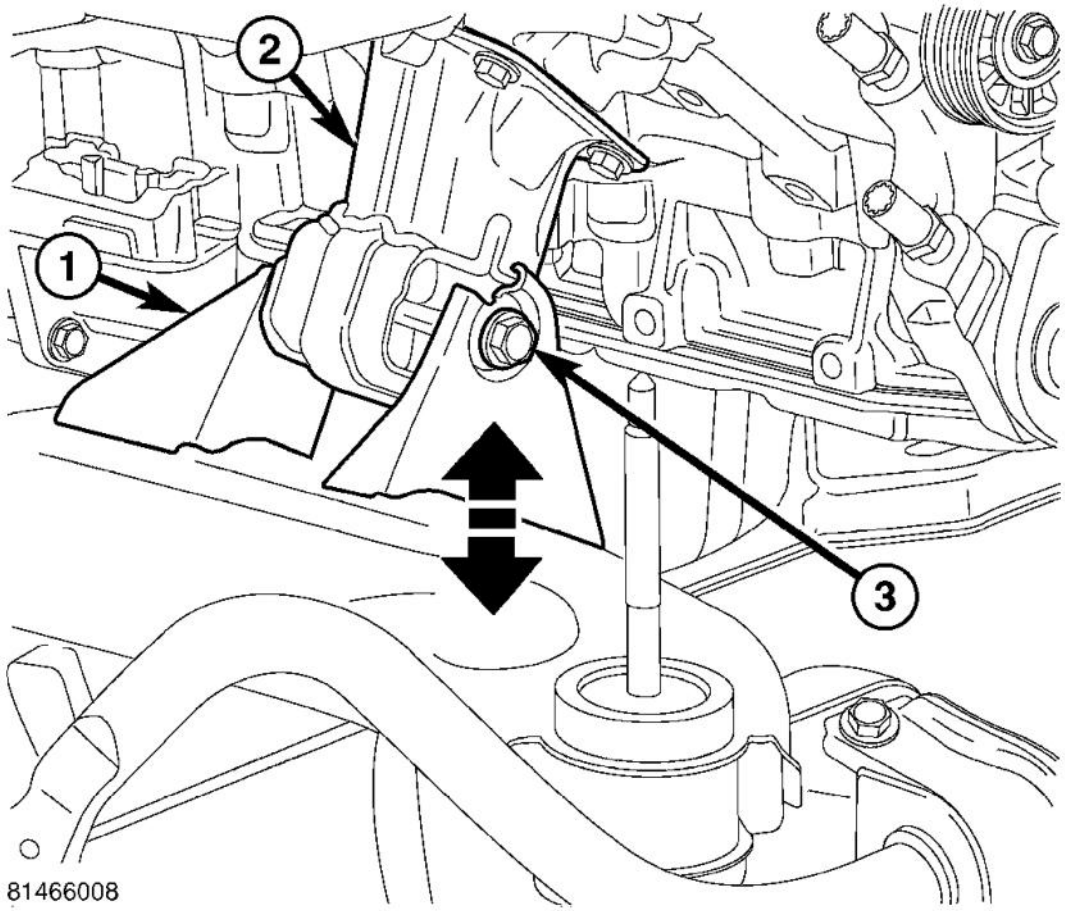

Fig. 17: Engine Mount Bolt
Courtesy of CHRYSLER LLC

5. Lower engine assembly until the engine mounts (2) rests in frame perches (1).

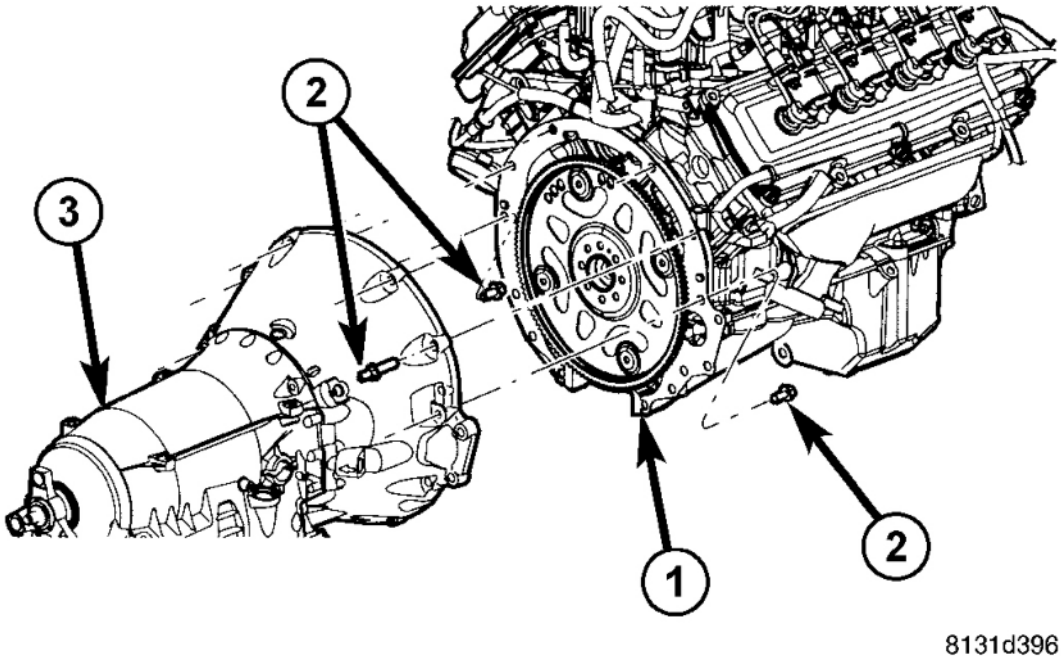

Fig. 18: Remove/Install Transmission to Engine Bolts
Courtesy of CHRYSLER LLC

1 - ENGINE
2 - BOLTS
3 - TRANSMISSION

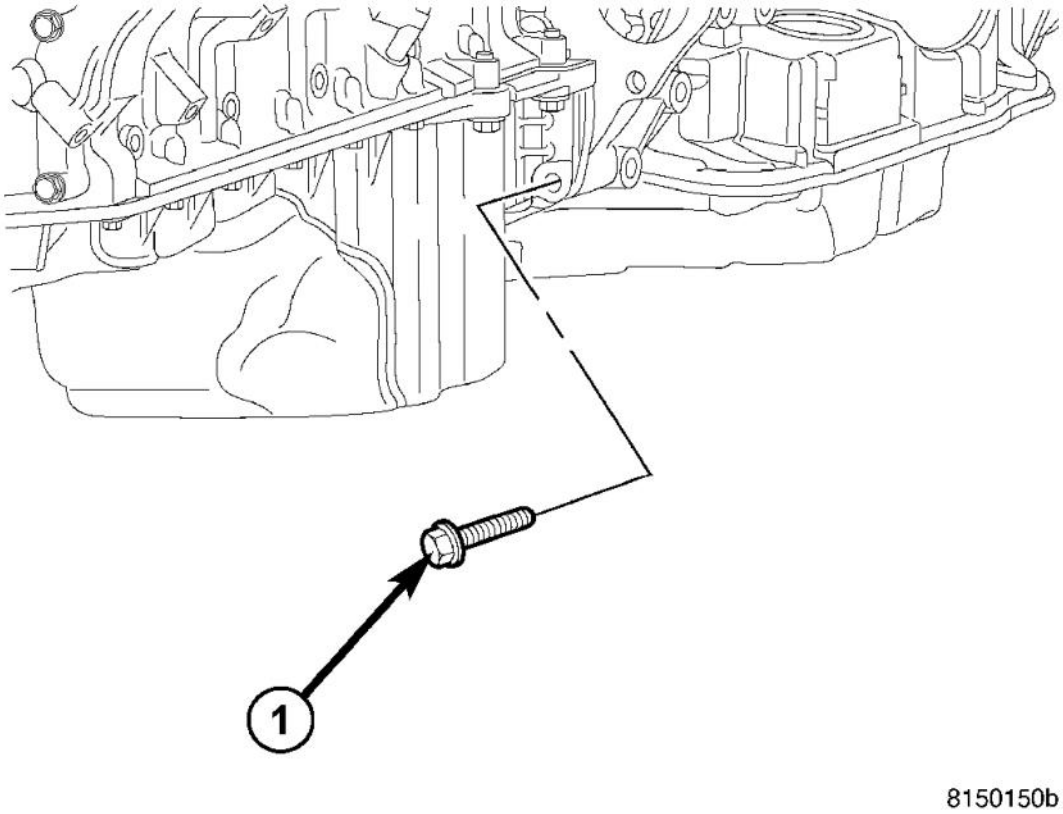

Fig. 19: Remove/Install Oil Pan To Transmission Bolts
Courtesy of CHRYSLER LLC

1 - BOLTS

6. Install remaining transmission to engine block mounting bolts (2) and the oil pan to transmission bolts (1) and tighten.

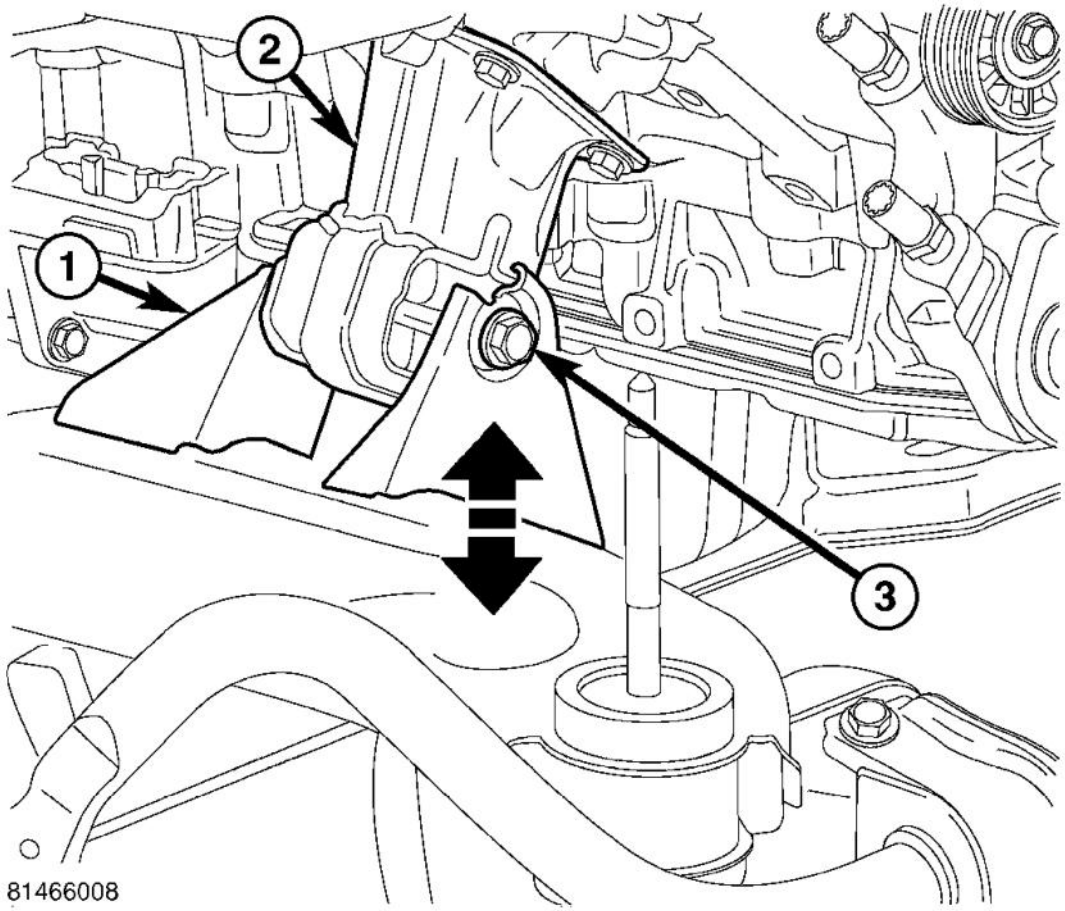

Fig. 20: Engine Mount Bolt
Courtesy of CHRYSLER LLC

7. Install and tighten engine mount to frame bolts (3) and nuts.

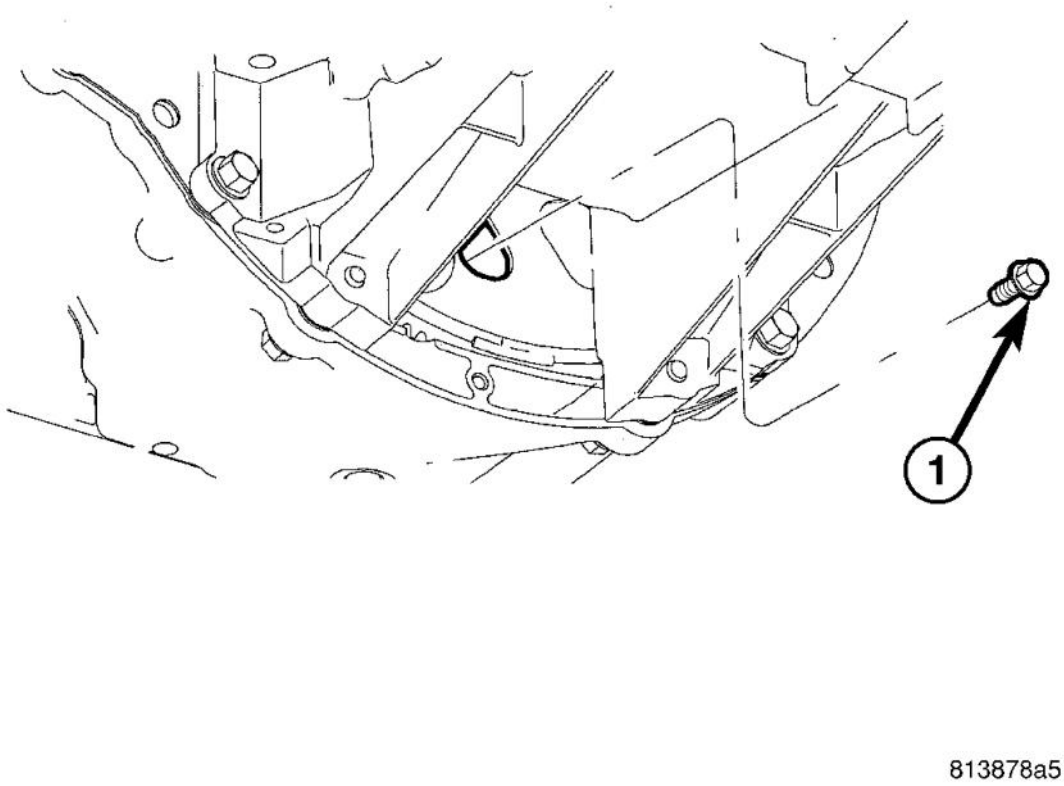

Fig. 21: Torque Converter Bolts
Courtesy of CHRYSLER LLC

1 - Bolts

8. Install drive plate to torque converter bolts (1).

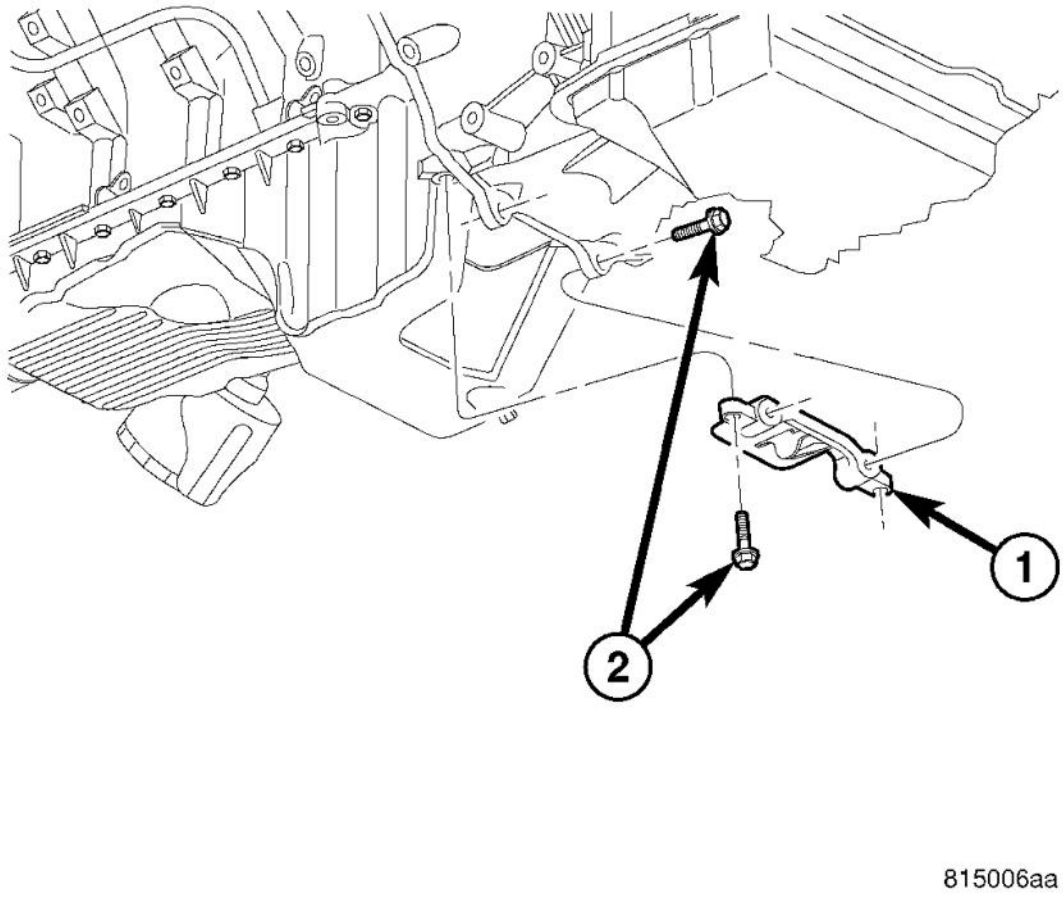

Fig. 22: Structural Dust Cover
Courtesy of CHRYSLER LLC

1 - STRUCTURAL COVER 2 - BOLTS

9. Install the structural dust cover (1).

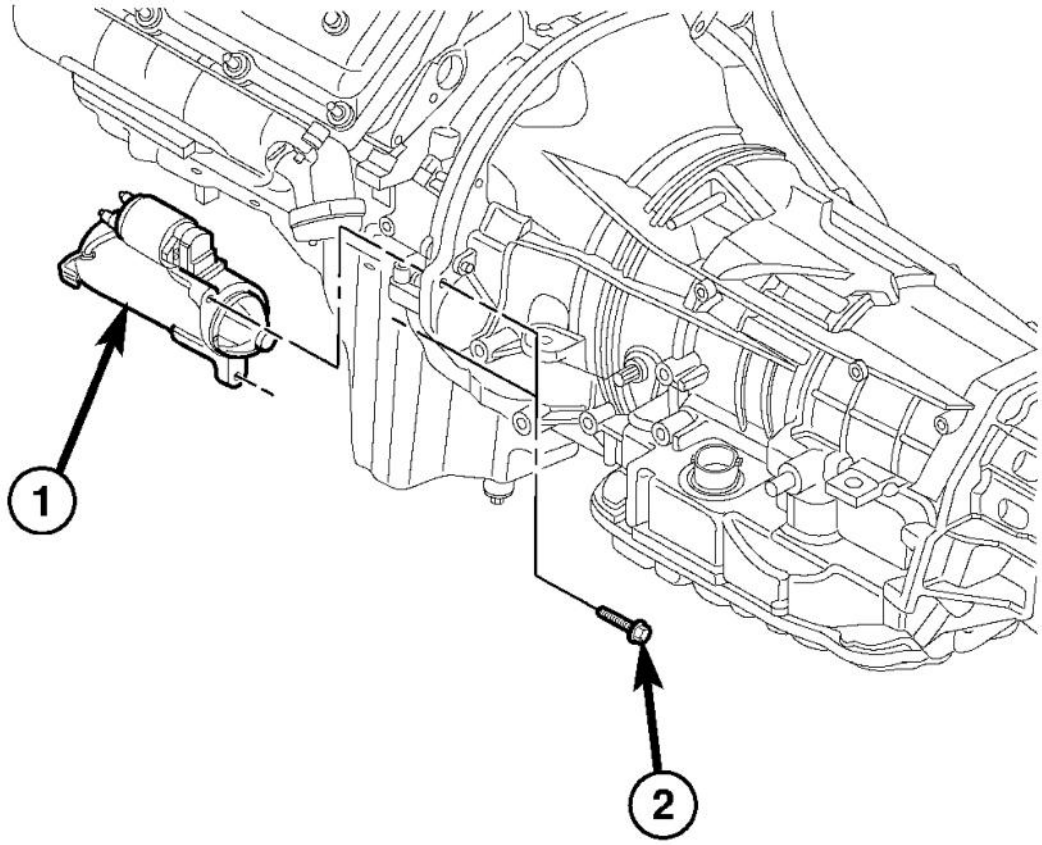

Fig. 23: Starter - 5.7L
Courtesy of CHRYSLER LLC

10. Install the starter (1) and connect the starter wires. Refer to **INSTALLATION** .
11. Install exhaust pipe to manifold.
12. Lower the vehicle.

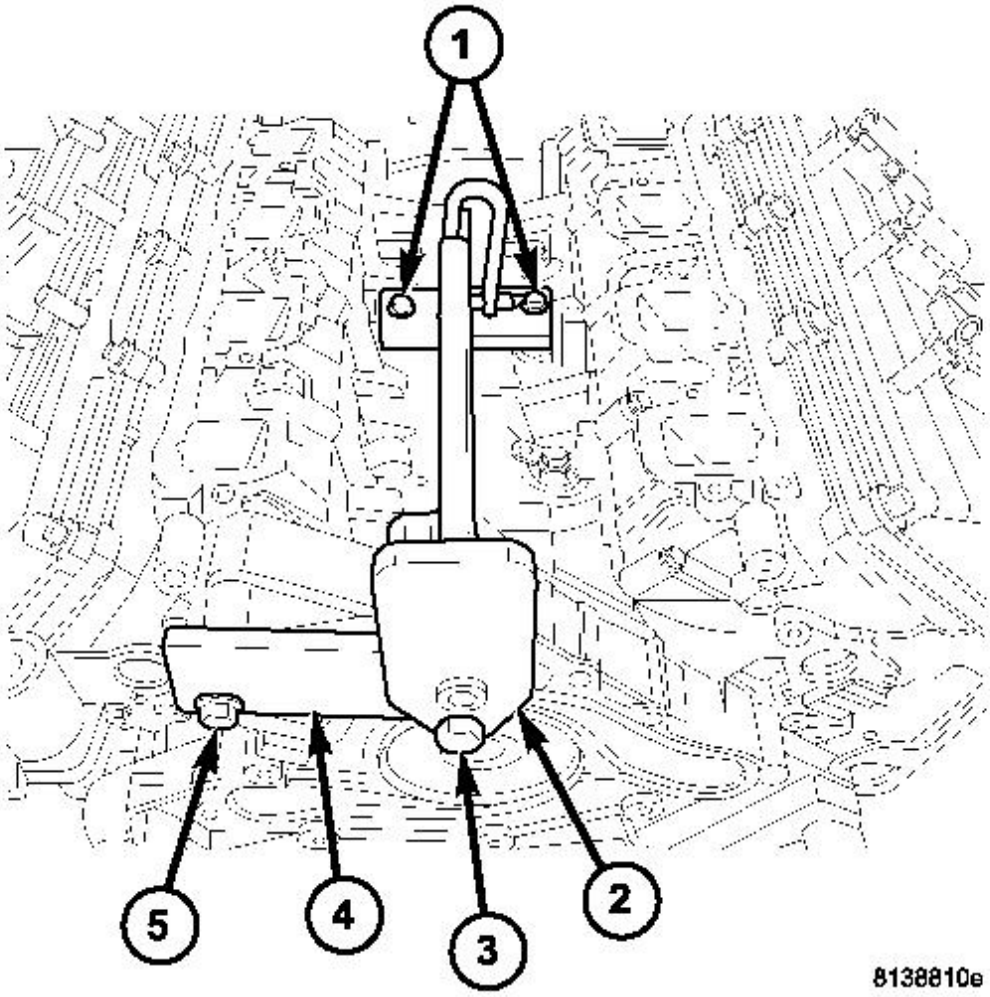

Fig. 24: Engine Lift Fixture And Adapter
Courtesy of CHRYSLER LLC

1 - Bolts
2 - Engine Lift Fixture
3 - Adapter Bolt
4 - Adapter
5 - Adapter Nut

13. Remove engine lift fixture (2), special tool # 8984 and 8984-UPD.

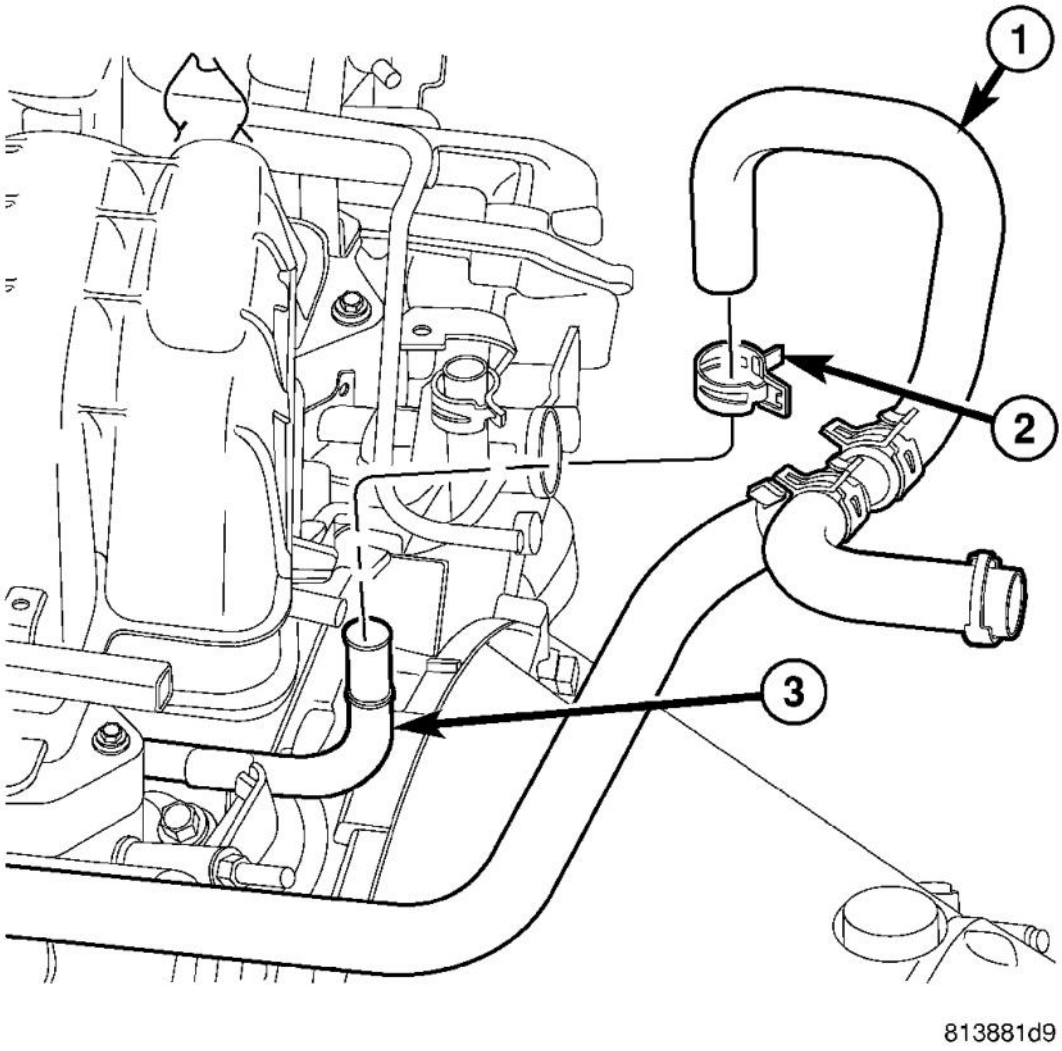

Fig. 25: Heater Hose Return
Courtesy of CHRYSLER LLC

1 - Heater Hose
2 - Clamp
3 - Tube

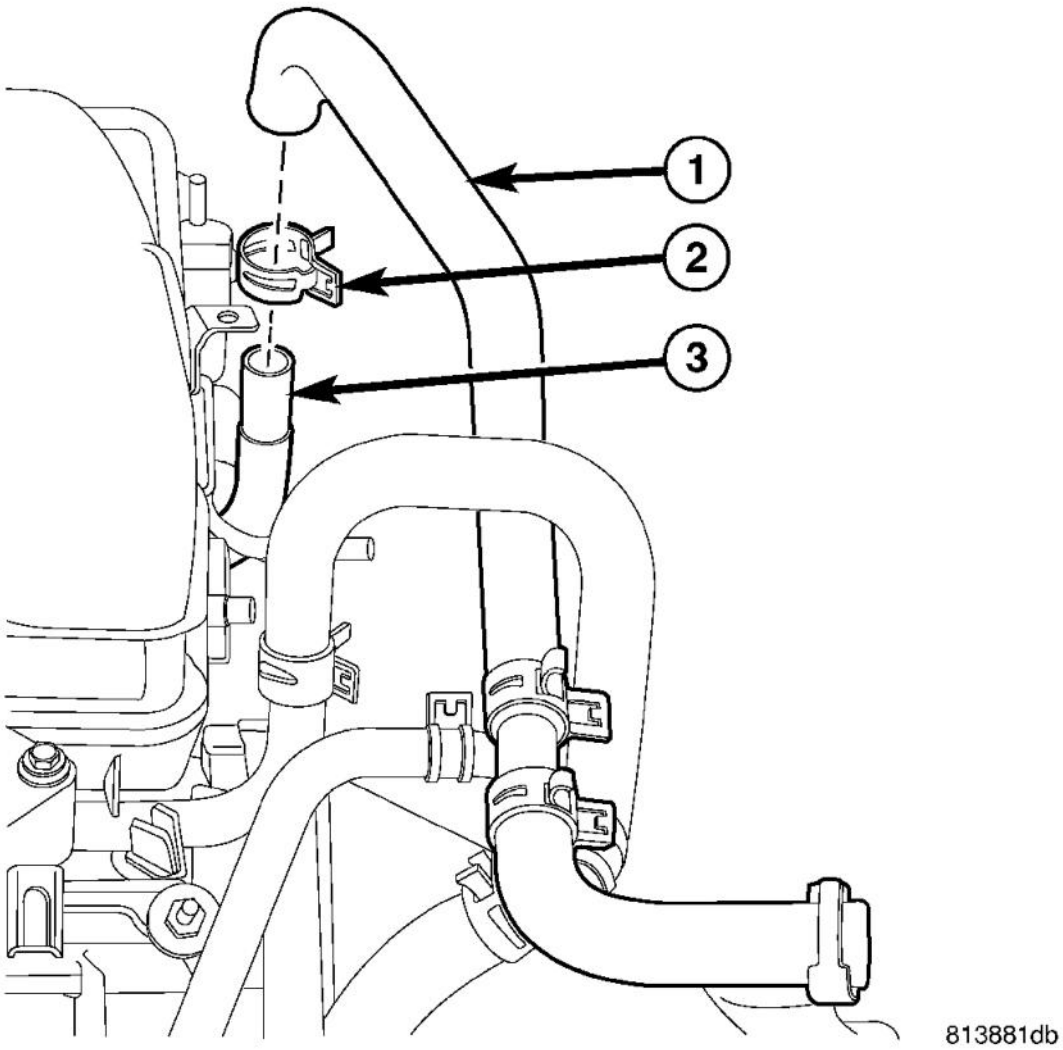

Fig. 26: Heater Supply Hose
Courtesy of CHRYSLER LLC

1 - Heater Hose
2 - Clamp
3 - Tube

14. Connect the fuel supply line. Refer to **STANDARD PROCEDURE** .
15. Reinstall the power steering pump.
16. Connect the heater hoses (1).

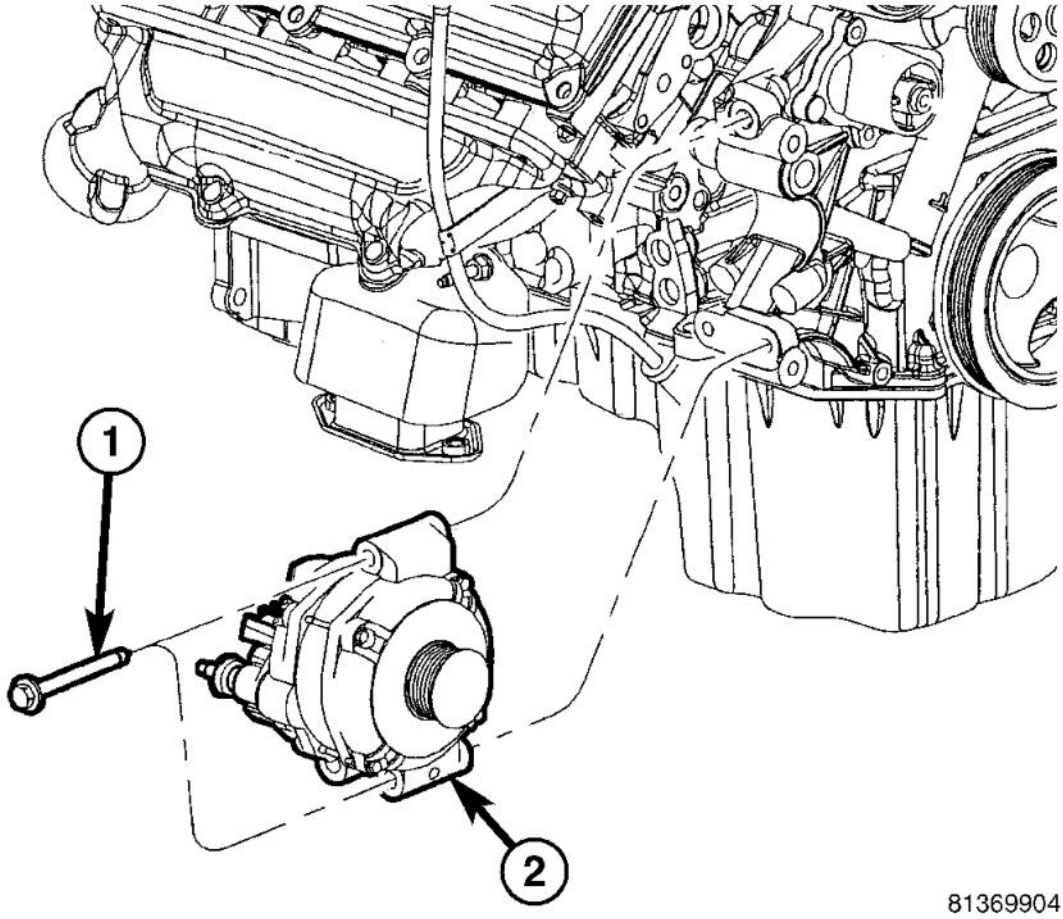

Fig. 27: Generator Mounting - 5.7L
Courtesy of CHRYSLER LLC

17. Reconnect the ground wires to the rear of each cylinder head.
18. Install the intake manifold. See **INSTALLATION**.
19. Install the generator (2), and wire connections. Refer to **INSTALLATION** .

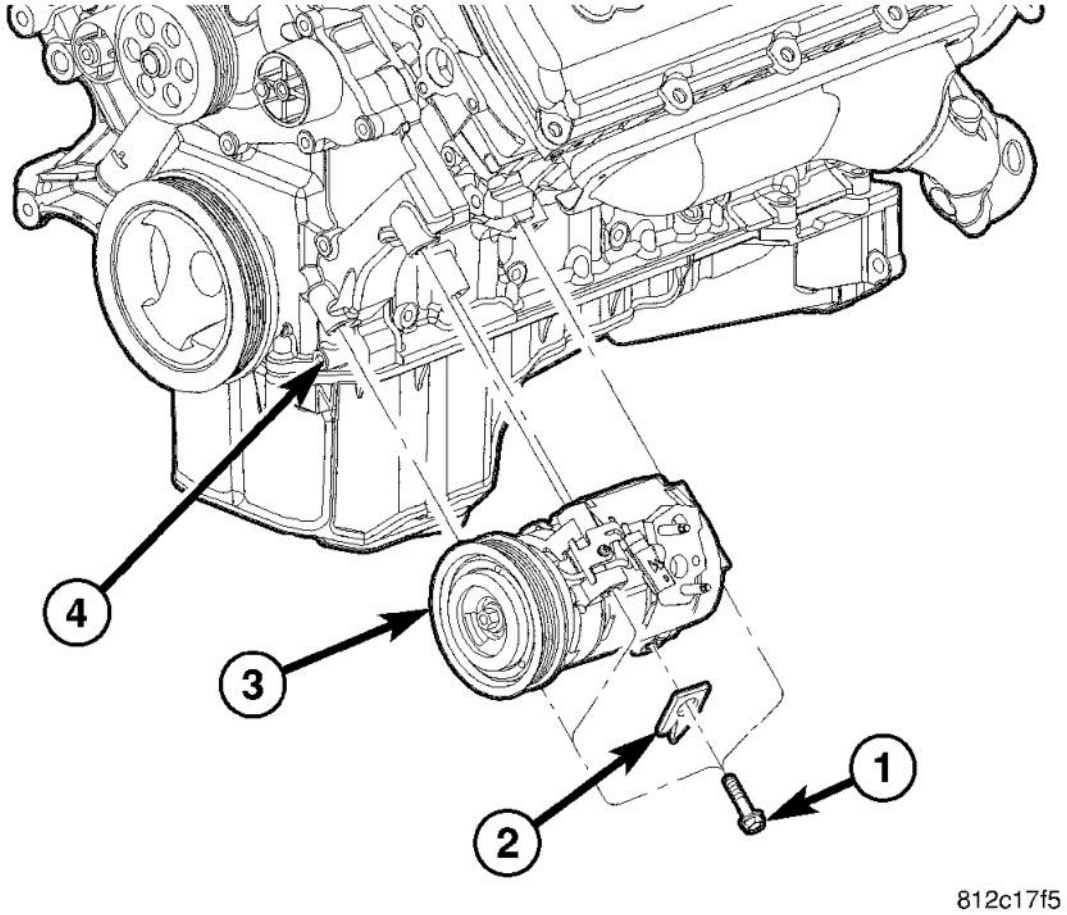

Fig. 28: A/C Compressor Mounting - 5.7L
Courtesy of CHRYSLER LLC

20. Install a/c compressor (3). Refer to **INSTALLATION** .

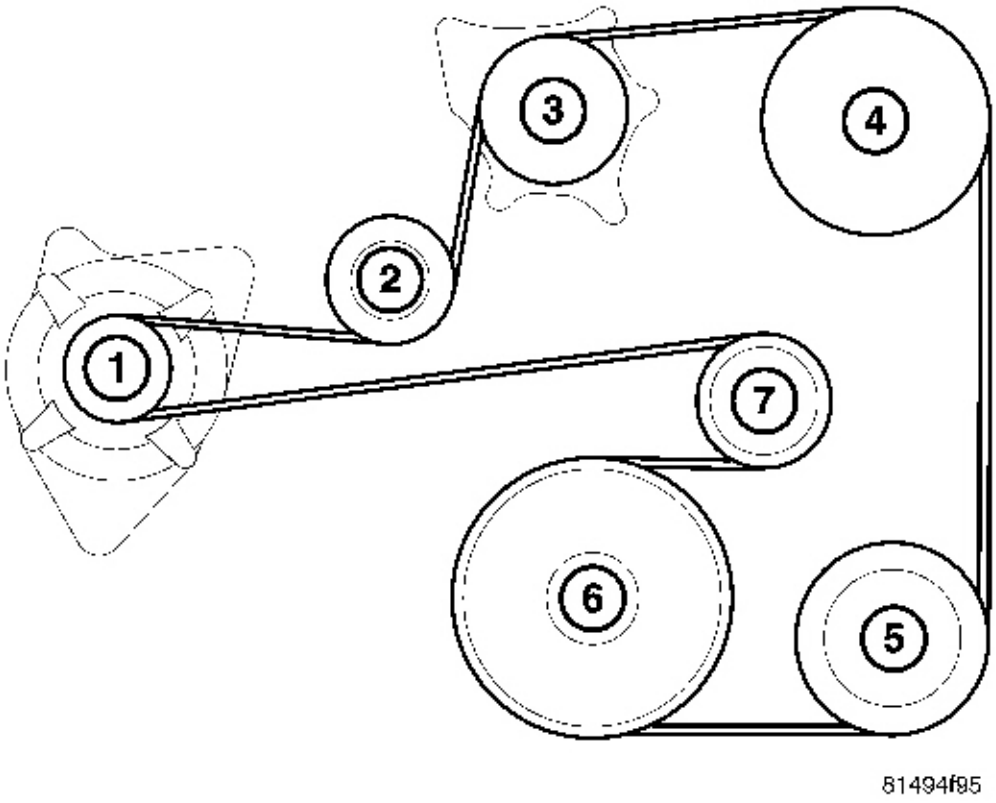

Fig. 29: Accessory Drive Belt Routing
Courtesy of CHRYSLER LLC

1 - GENERATOR
2 - IDLER PULLEY
3 - WATER PUMP
4 - P/S PUMP
5 - A/C COMPRESSOR
6 - CRANKSHAFT
7 - BELT TENSIONER

21. Install the accessory drive belt. Refer to **INSTALLATION** .
22. Install the radiator fan shroud. Refer to **INSTALLATION** .
23. Connect the radiator lower hose.
24. Connect the transmission oil cooler lines to the radiator.

25. Connect the radiator upper hose.

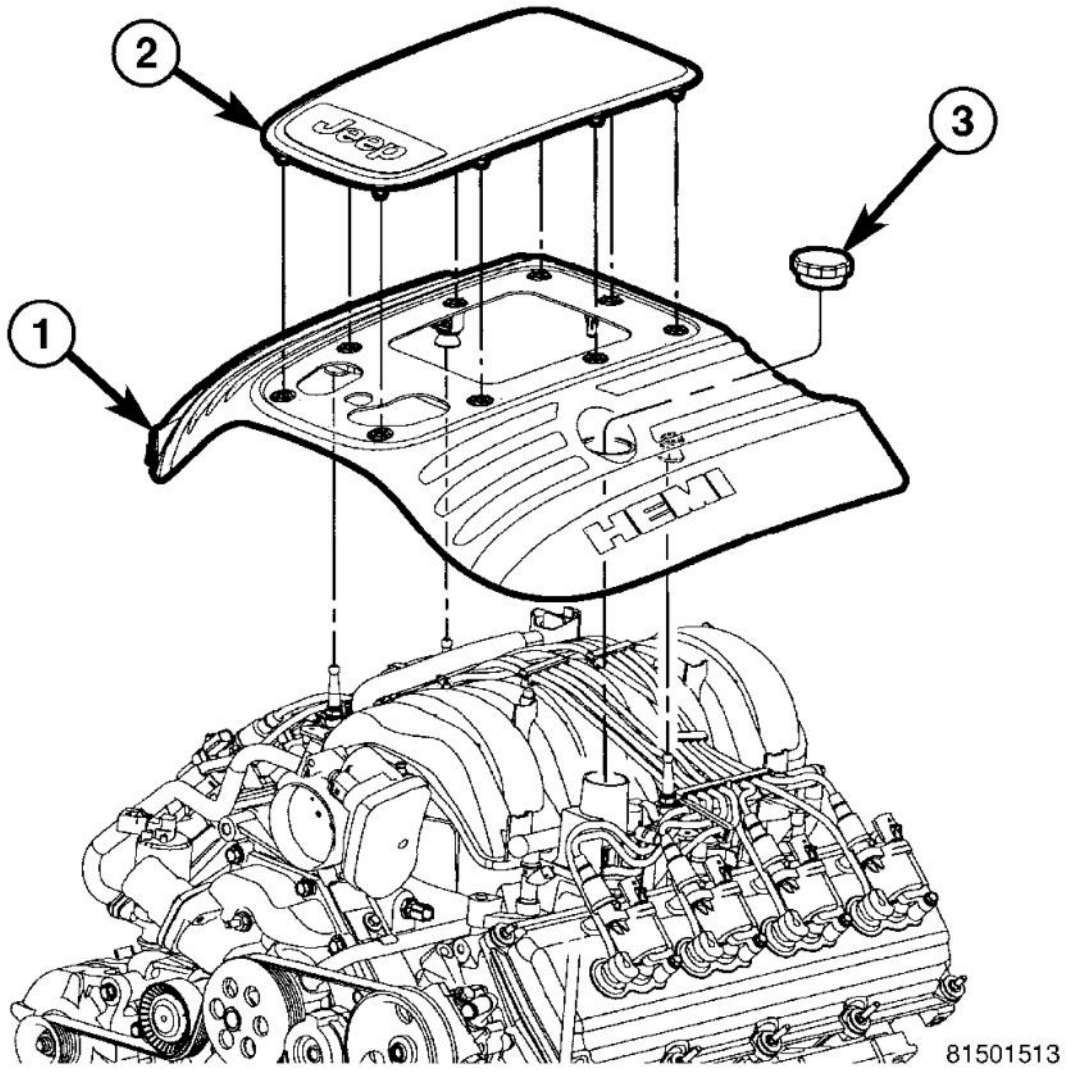

Fig. 30: 5.7L Engine Appearance Cover
Courtesy of CHRYSLER LLC

26. Install the air cleaner resonator and duct work.
27. Add engine oil to crankcase. Refer to **SPECIFICATIONS** .
28. Fill cooling system. Refer to **STANDARD PROCEDURE** .
29. Install the engine cover (1).

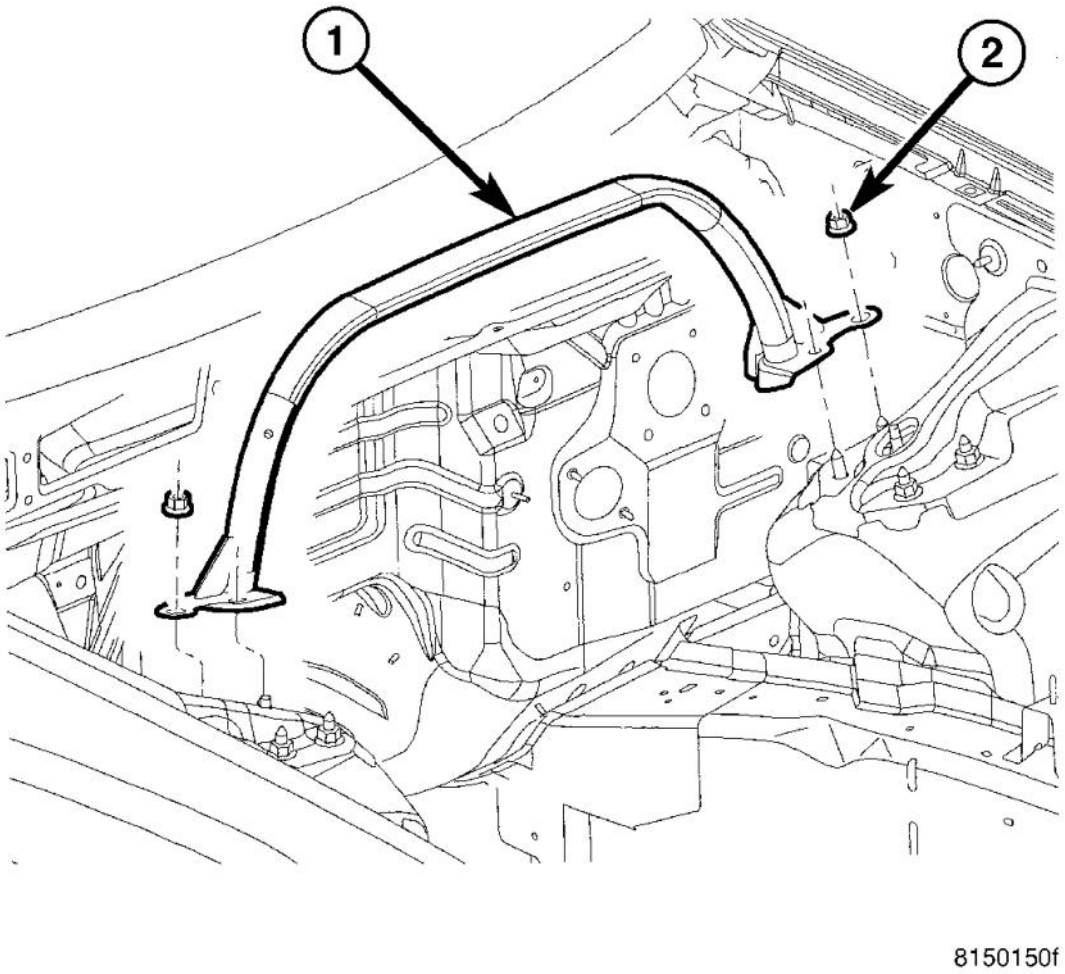

Fig. 31: Strut Tower Support
Courtesy of CHRYSLER LLC

30. Install the strut tower support (1).
31. Connect battery negative cable.
32. Start engine and inspect for leaks.
33. Road test vehicle.

SPECIFICATIONS

SPECIFICATIONS-5.7L ENGINE

GENERAL DESCRIPTION

DESCRIPTION	SPECIFICATION
Engine Type	90° V-8 OHV

Displacement	5.7 Liters 345 (Cubic Inches)
Bore	99.5 mm (3.91 in.)
Stroke	90.9 mm (3.58 in.)
Compression Ratio	9.6:1
Max. Variation Between Cylinders	25%
Firing Order	1-8-4-3-6-5-7-2
Lubrication -	Pressure Feed - Full Flow Filtration
Cooling System -	Liquid Cooled - Forced Circulation
Cylinder Block	Cast Iron
Cylinder Head	Aluminum
Crankshaft	Nodular Iron
Camshaft	Hollow Assembled Camshaft
Pistons	Aluminum Alloy
Connecting Rods	Powdered Metal

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	**Standard**
Cylinder Bore Diameter	99.50 mm	3.917 in.
Out of Round (MAX)	0.0076 mm	0003 in.
Taper (MAX)	0.0127 mm	0.0005 in.
Lifter Bore Diameter	21.45 - 21.425 mm	0.8444 - 0.8435 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	**Standard**
Clearance Measured at 38.0 mm (1.5 in.) Below Deck	0.0215 - 0.0485 mm	0.0008 - 0.0019 in.
Ring Groove Diameter		
Groove #1	89.6 - 89.8 mm	3.527 - 3.535 in.
Groove #2	88.1 - 88.3 mm	3.468 - 3.476 in.
Weight	414.5 grams	14.62 oz.
Piston Length	54.70 - 55.30	2.153 - 2.177 in.
Ring Groove Width		
No. 1	1.51 - 1.54 mm	0.0594 - 0.0606 in
No. 2	1.51 - 1.53 mm	0.0594 - 0.0602 in.
No. 3	3.030 - 3.055 mm	0.1192 - 0.1202 in.

PISTON PINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance In Piston	0.009 - 0.018 mm	0.00035 - 0.0007 in.
Diameter	24.0 - 24.003 mm	0.9448 - 0.9449 in.
Length	70.53 - 71.03 mm	2.78 - 2.80 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring Gap		
Top Compression Ring	0.23 - 0.38 mm	0.0090 - 0.0149 in.
Second Compression Ring	0.35 - 0.60 mm	0.0137 - 0.0236 in.
Oil Control (Steel Rails)	0.15 - 0.66 mm	0.0059 - 0.0259 in.
Side Clearance	-	
Top Compression Ring	.02 -.068 mm	0.0007 - 0.0026 in.
Second Compression Ring	0.02 - 0.058 mm	0.0007 - 0.0022 in.
Oil Ring (Steel Ring)	.019 -.229 mm	.0007 -.0091 in.
Ring Width		
Top Compression Ring	1.472 - 1.490 mm	0.0579 - 0.0586 in.
Second Compression Ring	1.472 - 1.490 mm	0.0579 - 0.0586 in.
Oil Ring (Steel Rails)	0.447 - 0.473 mm	0.0175 - 0.0186 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Pin Bore Diameter	23.955 - 23.975 mm	0.9431 - 0.9438 in.
Side Clearance	0.10 - 0.35 mm	0.003 - 0.0137 in.

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Main Bearing Journal Diameter	64.988 - 65.012 mm	2.5585 - 2.5595 in.
Bearing Clearance	0.023 - 0.051 mm	0.0009 - 0.002 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.003 mm	0.0001 in.
End Play	0.052 - 0.282 mm	0.002 - 0.011 in.
End Play (MAX)	0.282 mm	0.011 in.
Connecting Rod Journal Diameter	53.992 - 54.008 mm	2.125 - 2.126 in.
Bearing Clearance	0.020 - 0.060 mm	0.0007 - 0.0023 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.003 mm	0.0001 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Journal Diameter	-	-
No. 1	58.2 mm	2.29 in.
No. 2	57.8 mm	2.27 in.
No. 3	57.4 mm	2.26 in.
No. 4	57.0 mm	2.24 in.
No. 5	43.633 mm	1.72 in.
Bearing To Journal Clearance Standard		
No. 1	0.040 - 0.080 mm	.0015 -.003 in.
No. 2	0.050 -0.090 mm	0.0019 -.0035 in.
No. 3	0.040 - 0.080 mm	.0015 -.003 in.
No. 4	0.050 - 0.090 mm	0.0019 -.0035 in.
No. 5	0.040 - 0.080 mm	.0015 -.003 in.
Camshaft End Play	.080 - 0.290mm	0.0031 - 0.0114 in.

VALVE TIMING

DESCRIPTION	SPECIFICATION
Intake	
Opens (BTDC)	5.0°
Closes (ATDC)	255.0°
Exhaust	
Opens (BTDC)	236°
Closes (ATDC)	32°
Duration	269.3°
Valve Overlap	37°

CYLINDER HEAD

DESCRIPTION	SPECIFICATION
Valve Seat Angle	44.5° - 45.0°
Valve Seat Runout (MAX)	0.05 mm (0.0019 in.)
Valve Seat Width (Finish)	
Intake	1.18 - 1.62 mm
-	(0.0464 - 0.0637 in.)
Exhaust	1.48 - 1.92 mm
-	(0.0582 - 0.0755 in.)
Guide Bore Diameter (Std.)	7.975 - 8.00 mm
-	(0.313 - 0.314 in.)

HYDRAULIC TAPPETS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Body Diameter	21.387 - 21.405 mm	0.8420 - 0.8427 in.
Clearance (To Bore)	0.020 - 0.063 mm	0.0007 - 0.0024 in.
Dry Lash	3.0 mm (at the valve)	0.1181 in.

VALVES

DESCRIPTION		SPECIFICATION
Face Angle		45.0° - 45.5°
Head Diameter		
	Intake	50.67 - 50.93 mm (1.99 - 2.00 in.)
	Exhaust	39.27 - 39.53 mm (1.54 - 1.55 in.)
Length (Overall)		
	Intake	123.38 - 123.76 mm (4.857 - 4.872 in.)
	Exhaust	120.475 - 120.855 mm (4.743 - 4.758 in.)
Stem Diameter		
	Intake	7.935 - 7.953 mm (0.312 - 0.313 in.)
	Exhaust	7.932 - 7.950 mm (0.312 - 0.313 in.)
Stem - to - Guide Clearance		
	Intake	0.022 - 0.065 mm (0.0008 - 0.0025 in.)
-	Exhaust	0.025 - 0.065 mm (0.0009 - 0.0025 in.)
-		
Valve Lift (@ Zero Lash)		
	Intake	12.0 mm (0.472 in.)
	Exhaust	11.70 mm (0.460 in.)

VALVE SPRING

DESCRIPTION		SPECIFICATION
Spring Force (Valve Closed)		
	Intake and Exhaust	435.0 N +/- 22.0 N @ 45 mm (97.8 lbs +/- 5.0 lbs. @ 1.771 in.)
Spring Force (Valve Open)		1077.0 N +/- 48.0 N @ 32.6 mm.
	Intake and Exhaust	(242.0 lbs. +/- 11 lbs. @ 1.283 in.)
Free Length (approx)		55.6 mm (2.189 in.)
Number of Coils		

Intake and Exhaust	7.95
Wire Diameter Intake and Exhaust -	 4.95 x 4.1 mm (0.194 - 0.161 in.)
Installed Height (Spring Seat to Bottom of Retainer) Intake and Exhaust	 46.0 mm (1.81 in.)

OIL PUMP

DESCRIPTION	SPECIFICATION
Clearance Over Rotors (MAX)	0.095 mm (0.0038 in.)
Outer Rotor to Pump Body Clearance (MAX)	.235 mm (.009 in.)
Tip Clearance Between Rotors (MAX)	0.150 mm (0.006 in.)

OIL PRESSURE

SPECIFICATION	SPECIFICATION
At Curb Idle Speed (MIN)*	25 kPa (4 psi)
@ 3000 RPM	170 - 758 kPa (25 - 110 psi)
***CAUTION: If pressure is zero at curb idle, DO NOT run engine**	

TORQUE SPECIFICATIONS

TORQUE CHART 5.7L ENGINE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Block Pipe Plugs (1/4 NPT)	20	-	177
(3/8 NPT)	27	-	240
Camshaft Sprocket Bolt	122	90	-
Camshaft Tensioner Plate Bolts	28	-	250
Coil to Cylinder Head Cover Bolts	7	-	62
Timing Chain Case Cover Bolts	28	-	250
Lifting Stud	55	40	-
Connecting Rod Cap Bolts	21 plus 90° Turn	15 plus 90° Turn	-
Main Bearing Cap Bolts M-12	27 plus 90° Turn	-	-
Crossbolts M-8	28	-	-
Cylinder Head Bolts M-12 Bolts			
Step 1	34	25	-
Step 2	54	40	-
Step 3	Turn 90°	Turn 90°	-

M-8 Bolts	-	-	-
Step 1	20	15	-
Step 2	34	25	-
Cylinder Head Cover Bolts	8	-	70
Exhaust Manifold to Cylinder Head	25	-	220
Flexplate to crankshaft Bolts	95	70	-
Flywheel to crankshaft Bolts	75	55	-
Front Insulator Through bolt/nut	95	70	-
Front Insulator to Block Bolts	95	70	-
Generator Mounting Bolt	55	40	-
Intake Manifold Bolts	Refer to **INSTALLATION**		
Lifter Guide Holder	12	-	106
Oil Pan Bolts	12	-	105
Oil Dipstick Tube	12	-	105
Oil Pan Drain Plug	27	20	-
Oil Pump Attaching Bolts	28	-	250
Oil Pump Pickup Tube Bolt and Nut	28	-	250
Rear Seal Retainer Attaching Bolts	15	-	132
Rear Insulator to Bracket	68	50	-
Rear Insulator to Crossmember	41	30	-
Rear Insulator to Transmission	68	50	-
Rear Insulator Bracket Bolts	68	50	-
Rocker Arm Bolts	22	-	195
Spark Plugs	-	-	-
Thermostat Housing Bolts	28	-	250
Throttle Body Bolts	12	-	105
Vibration Damper Bolt	176	129	-
Water Pump to Timing Chain Case Cover Bolts	28	-	250

SPECIAL TOOLS

5.7L ENGINE

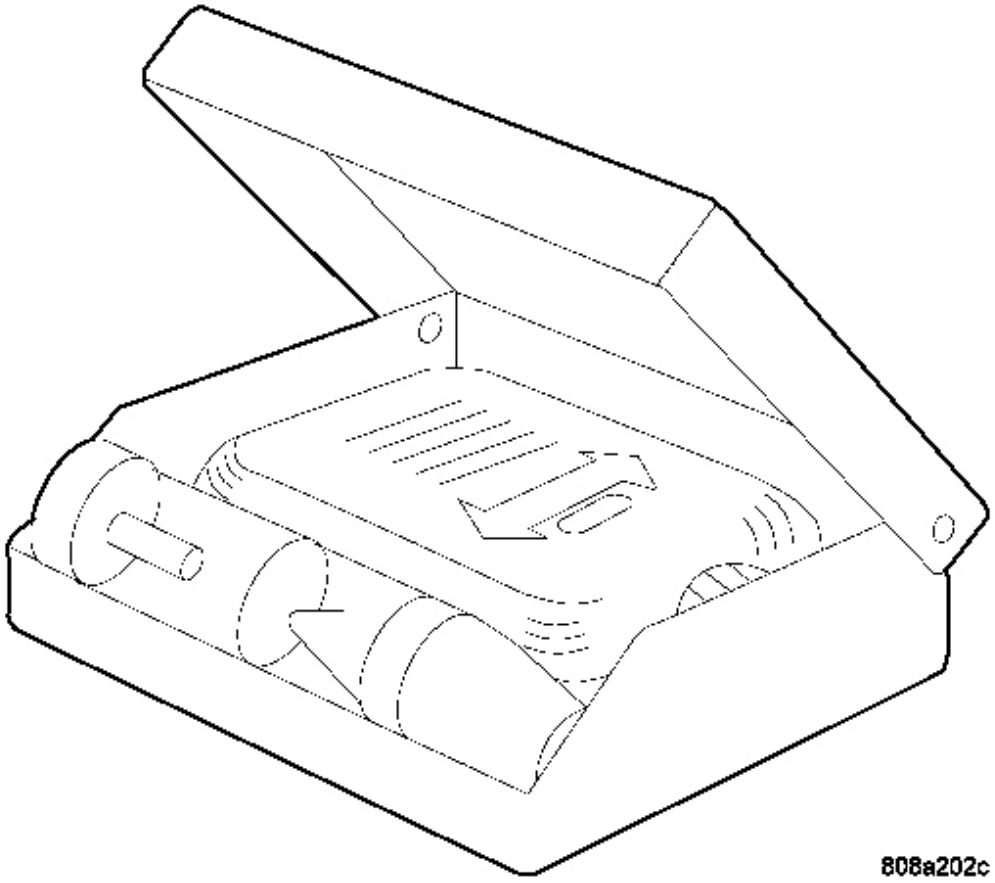

Fig. 32: Bloc-Chek Kit C-3685
Courtesy of CHRYSLER LLC

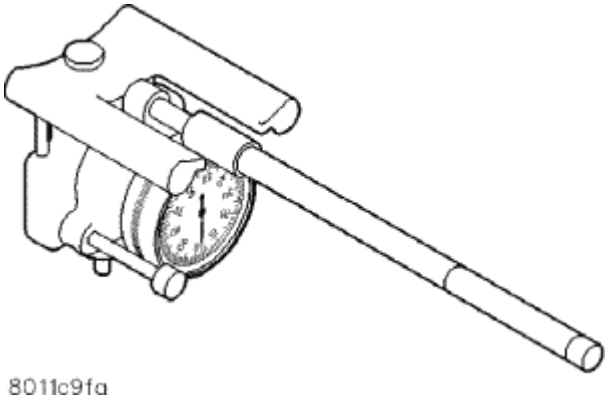

Fig. 33: Bore Size Indicator C-119

Courtesy of CHRYSLER LLC

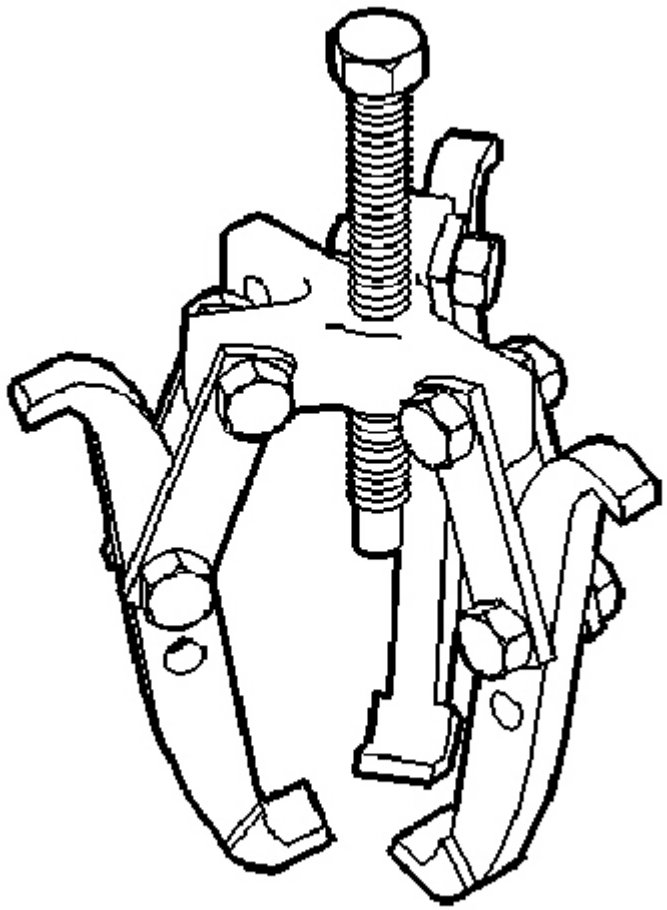

Fig. 34: Puller 1023
Courtesy of CHRYSLER LLC

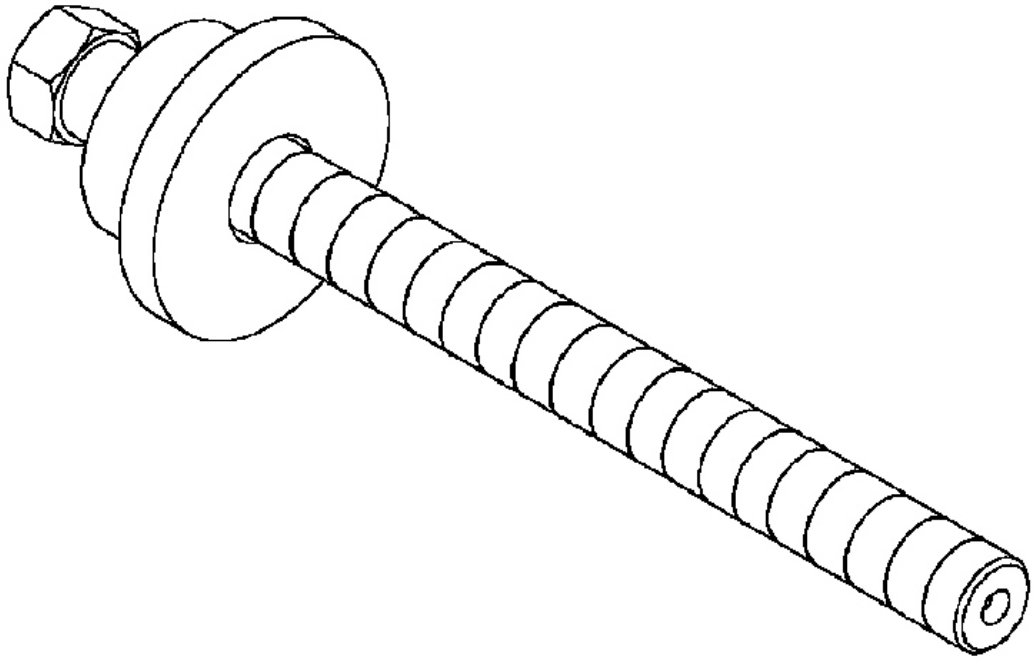

Fig. 35: Crankshaft Damper Installer 8512
Courtesy of CHRYSLER LLC

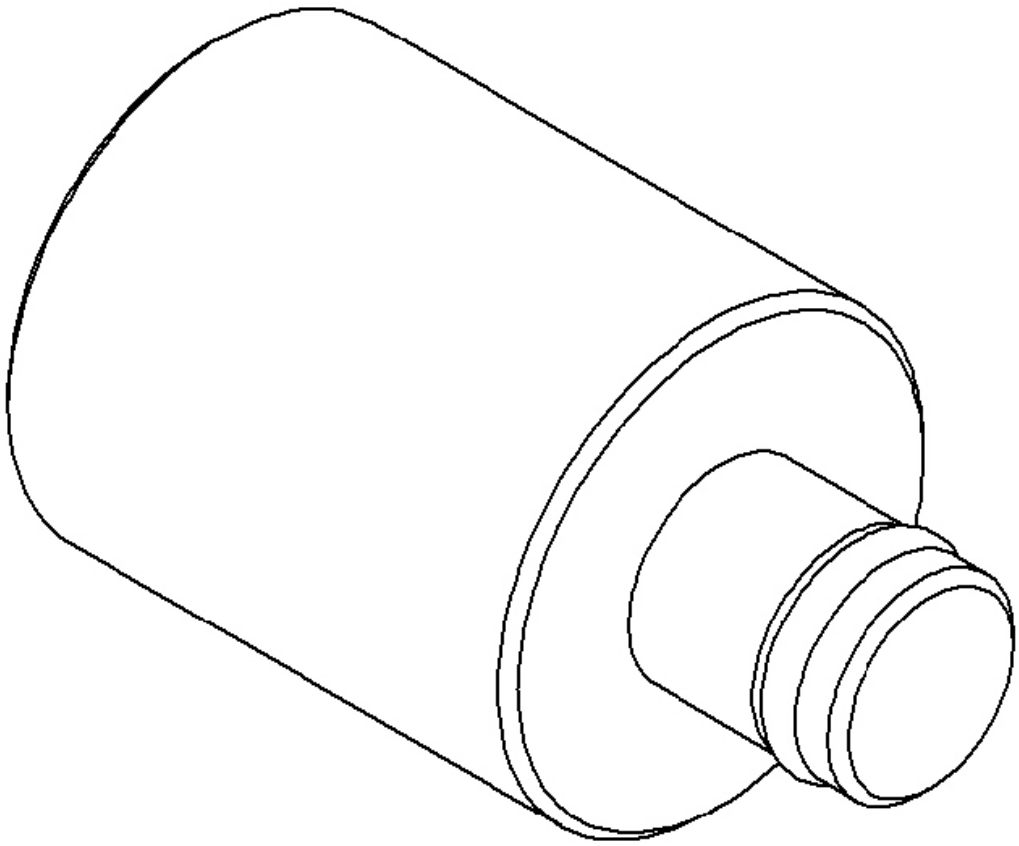

Fig. 36: Crankshaft Damper Remover Insert - 8513-A
Courtesy of CHRYSLER LLC

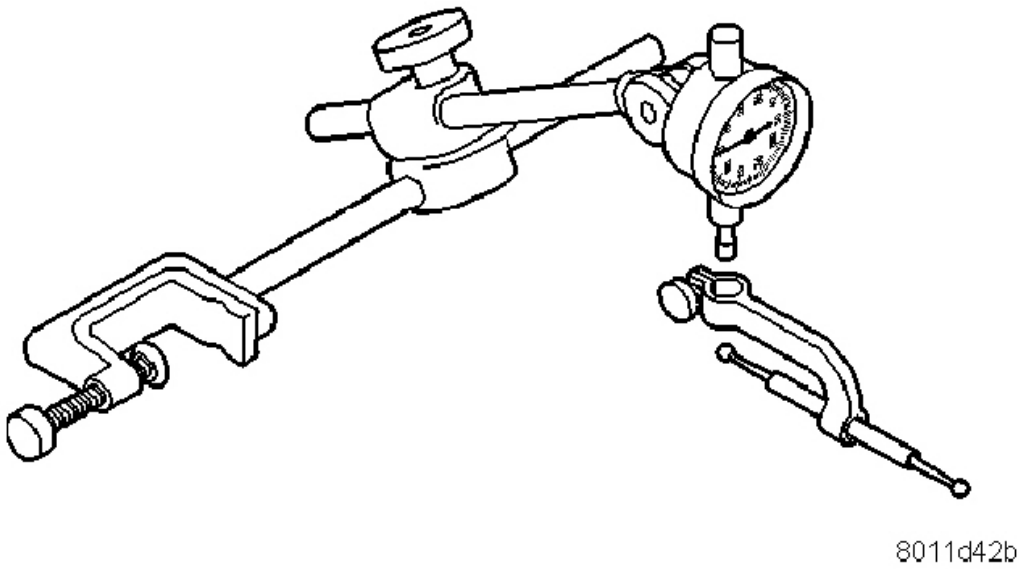

Fig. 37: Dial Indicator C-3339
Courtesy of CHRYSLER LLC

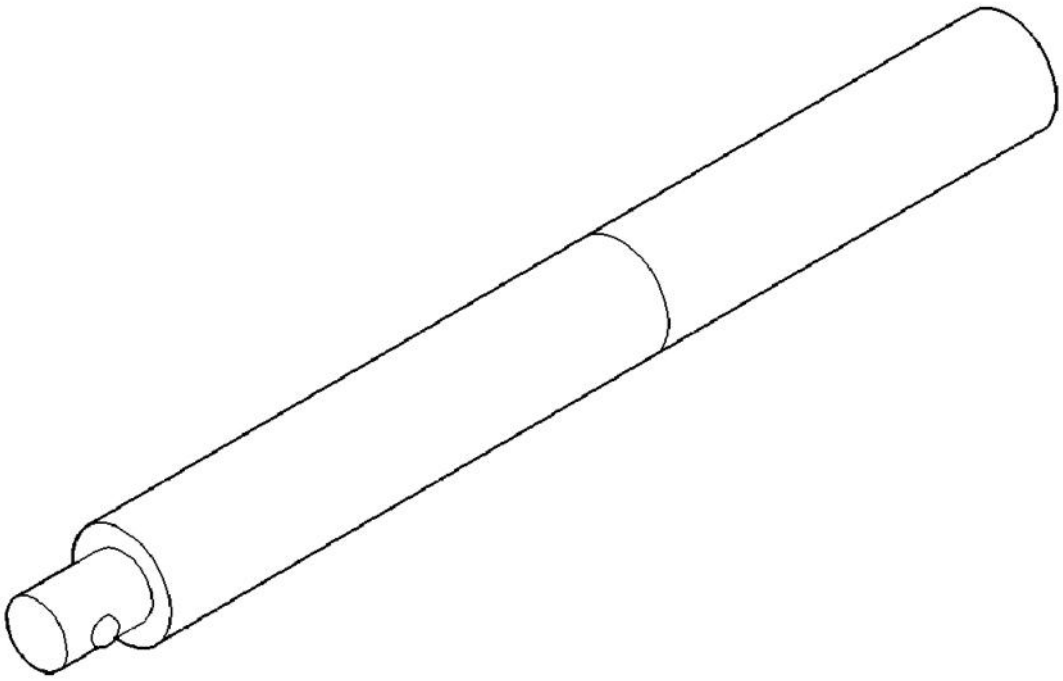

Fig. 38: Universal Driver Handle - C4171
Courtesy of CHRYSLER LLC

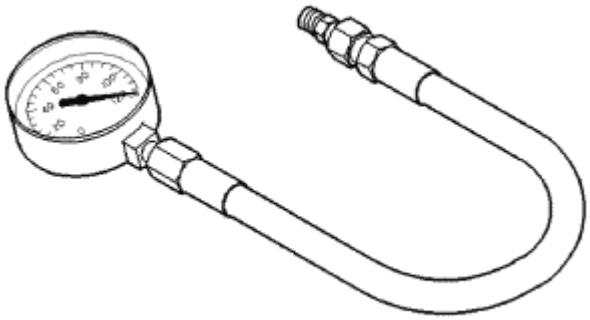

Fig. 39: Oil Pressure Gauge C-3292
Courtesy of CHRYSLER LLC

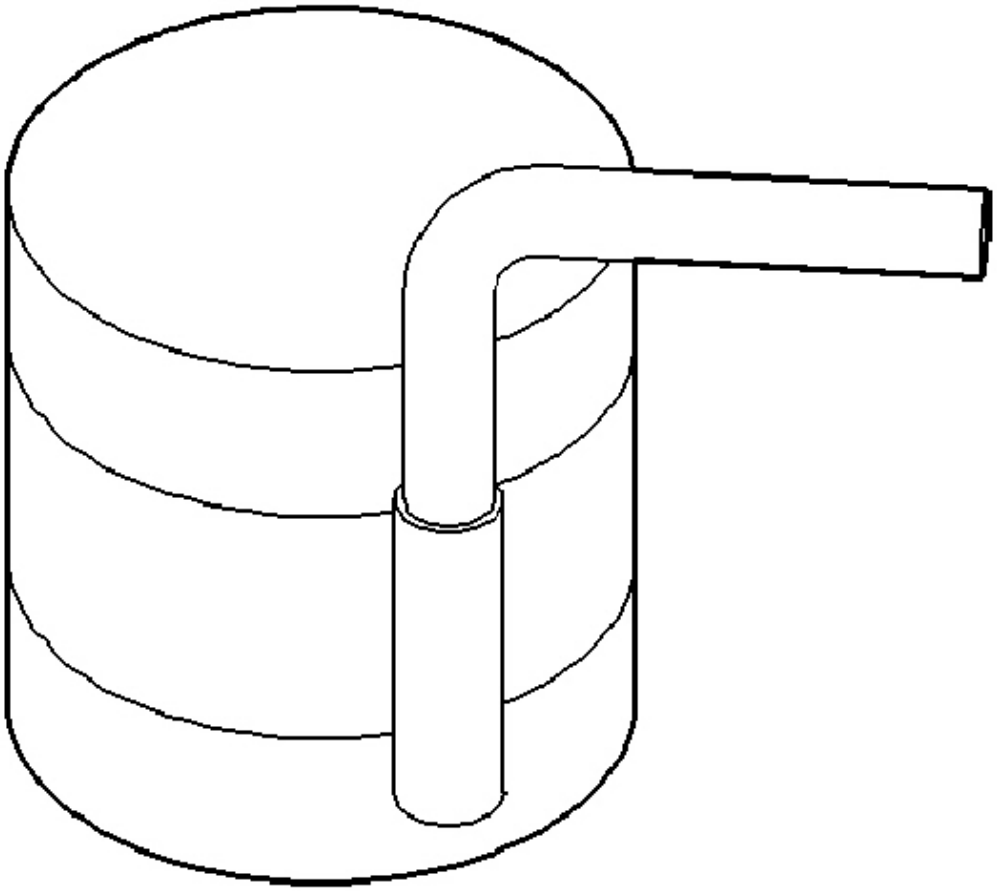

Fig. 40: Piston Ring Compressor C-385
Courtesy of CHRYSLER LLC

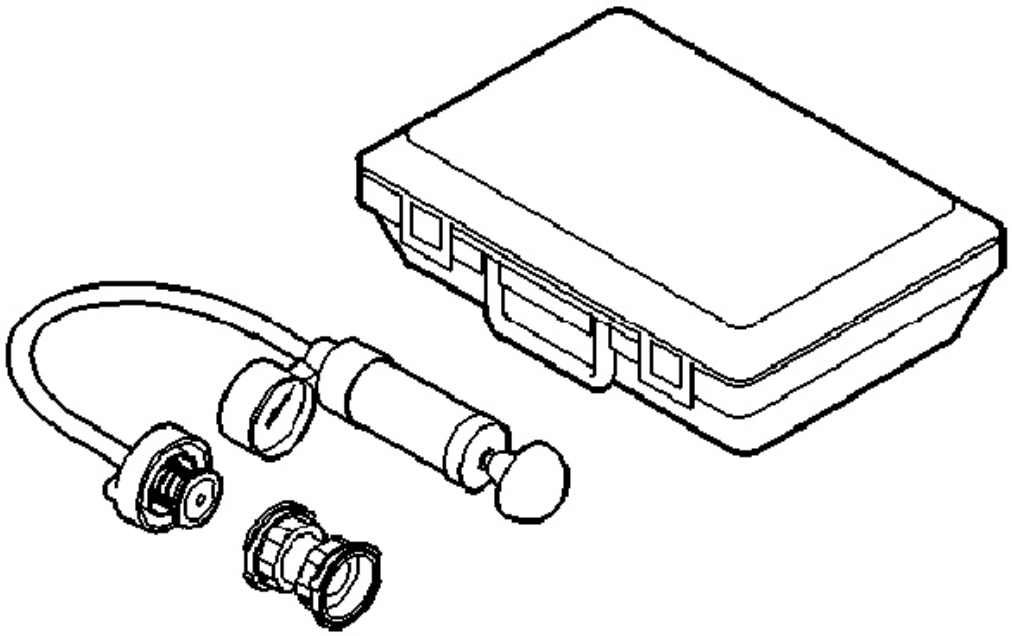

Fig. 41: Cooling System Tester 7700
Courtesy of CHRYSLER LLC

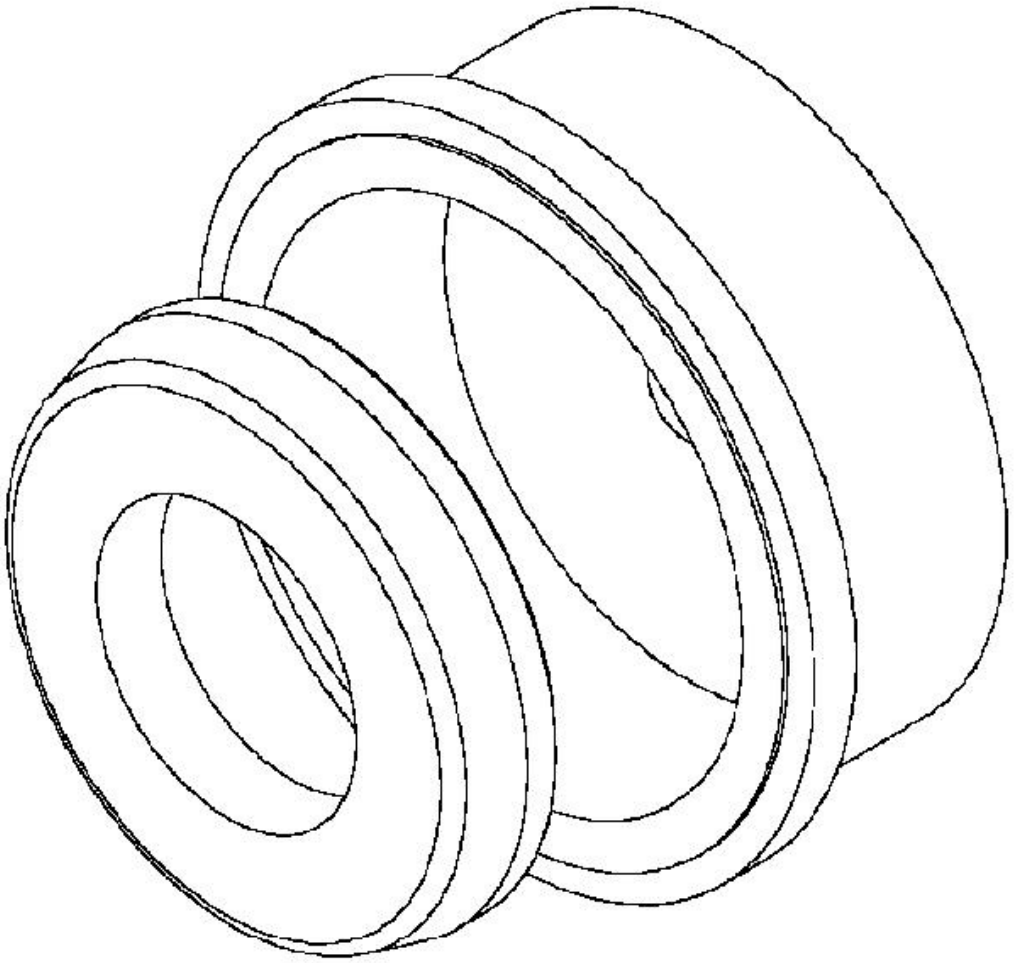

Fig. 42: Rear Crankshaft Seal Installer 8349
Courtesy of CHRYSLER LLC

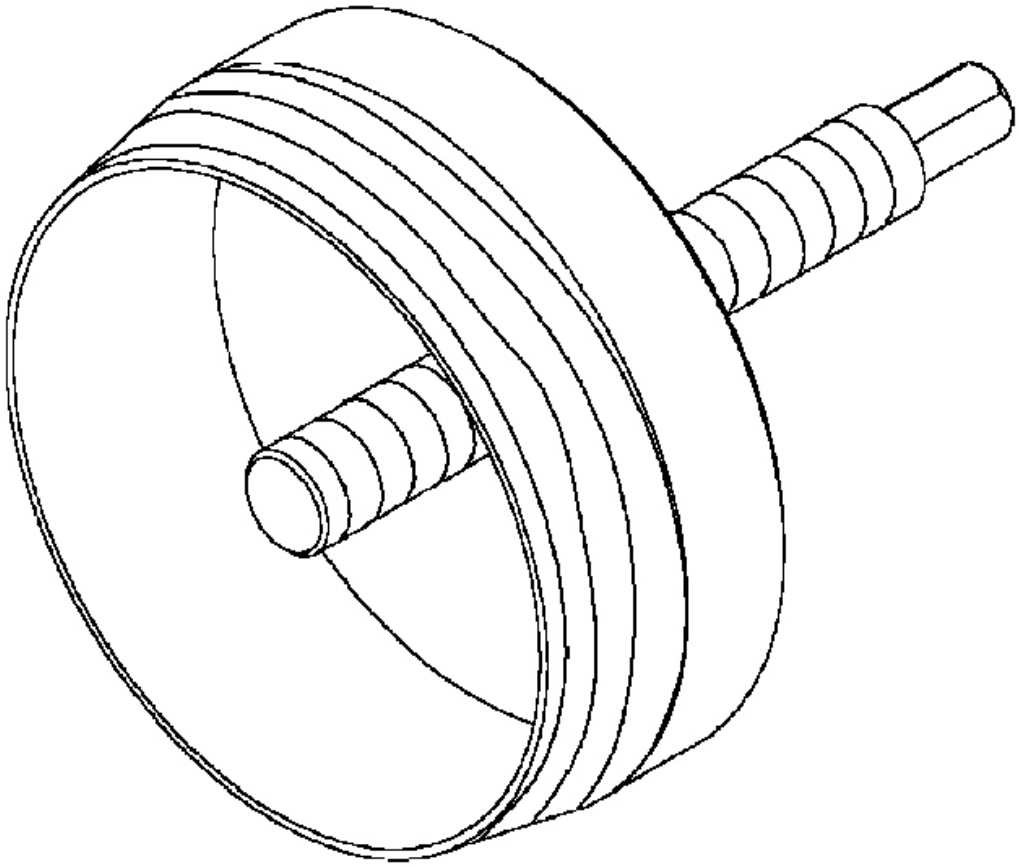

Fig. 43: Rear Crankshaft Seal Remover 8506
Courtesy of CHRYSLER LLC

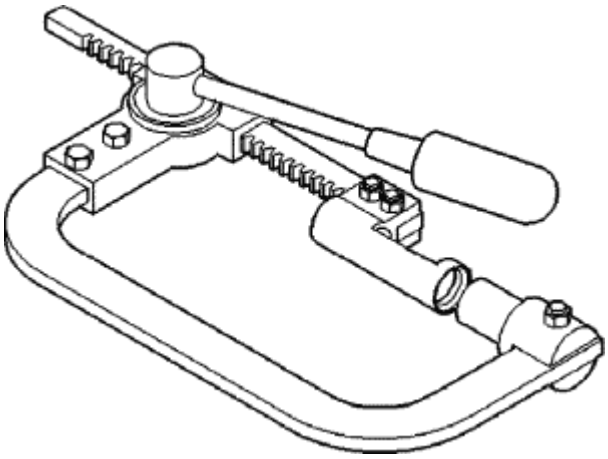

Fig. 44: Valve Spring Compressor

Courtesy of CHRYSLER LLC

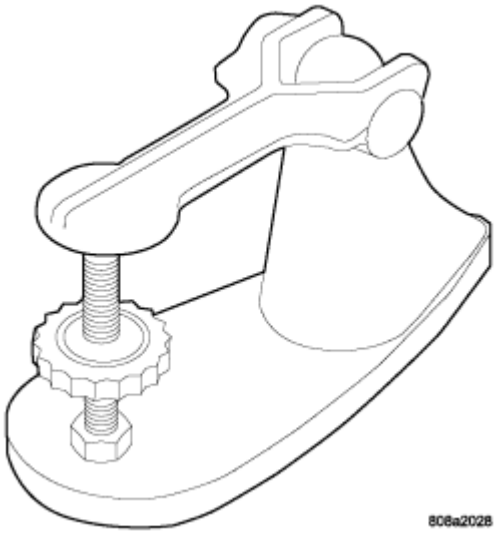

Fig. 45: Valve Spring Tester C-647
Courtesy of CHRYSLER LLC

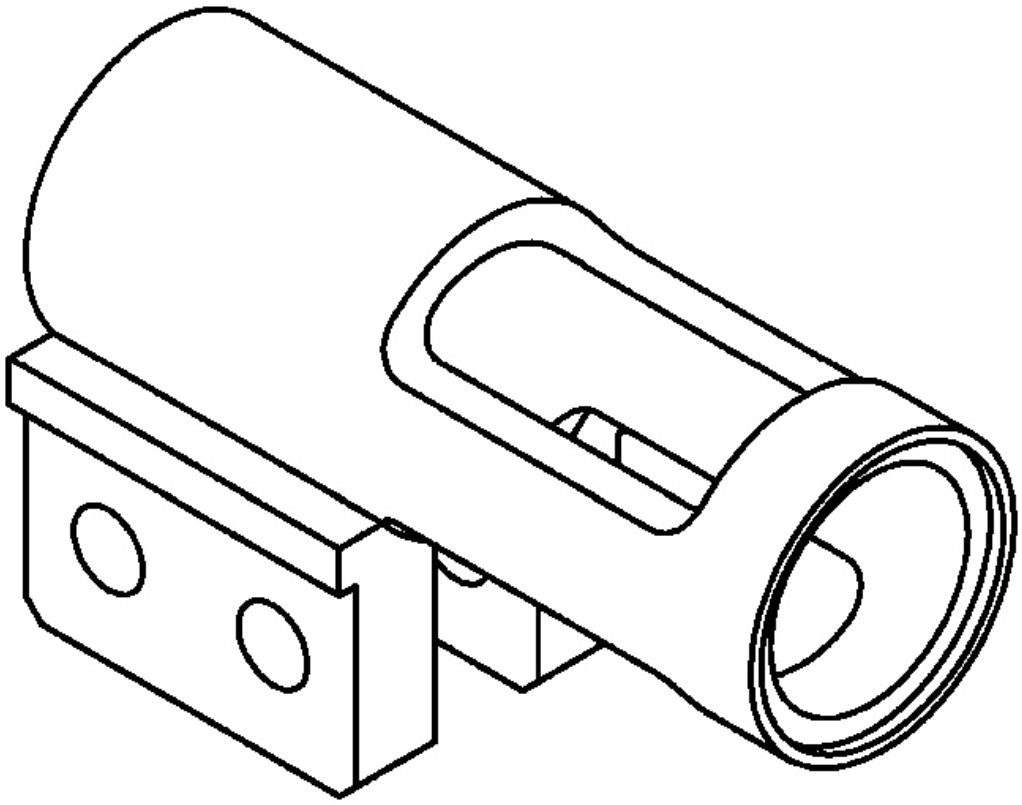

Fig. 46: Adapter, Valve Spring Compressor Off-Vehicle 8464
Courtesy of CHRYSLER LLC

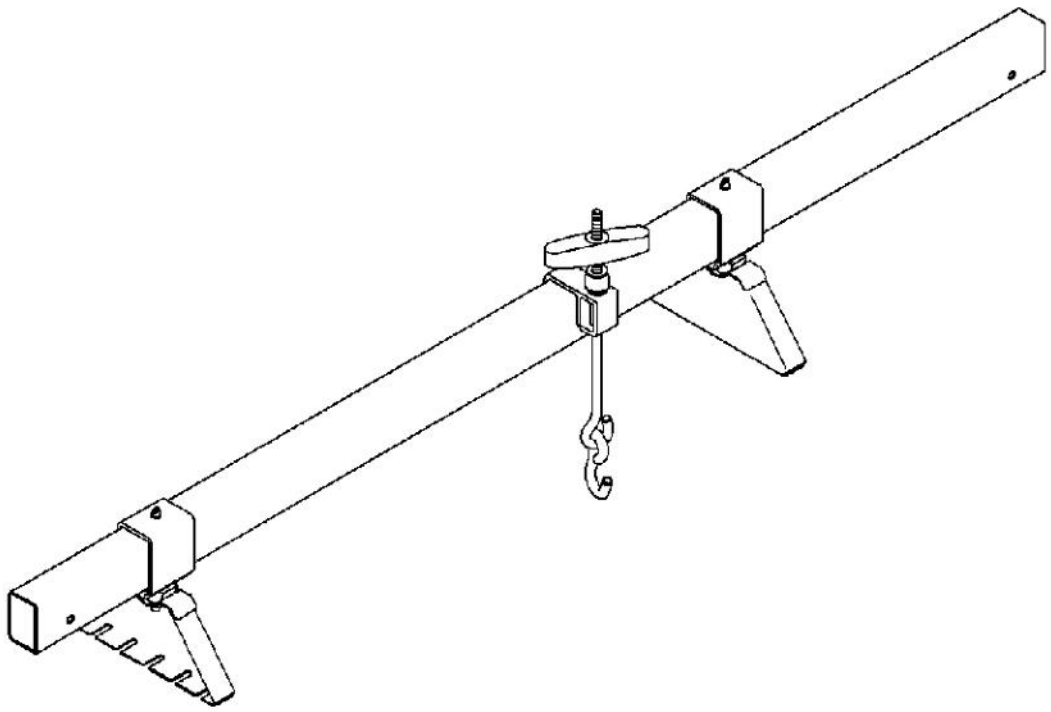

Fig. 47: Engine Support Fixture 8534
Courtesy of CHRYSLER LLC

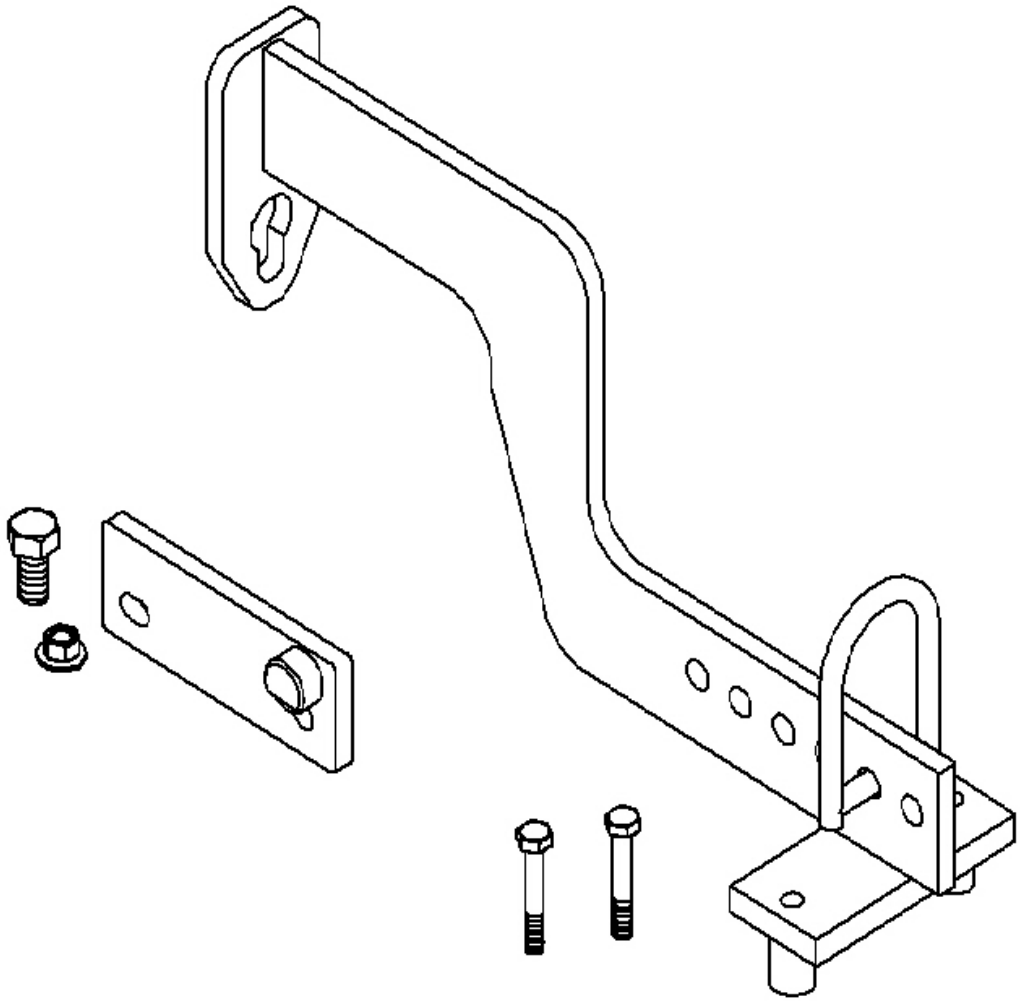

Fig. 48: Engine Lift Fixture & Adapter
Courtesy of CHRYSLER LLC

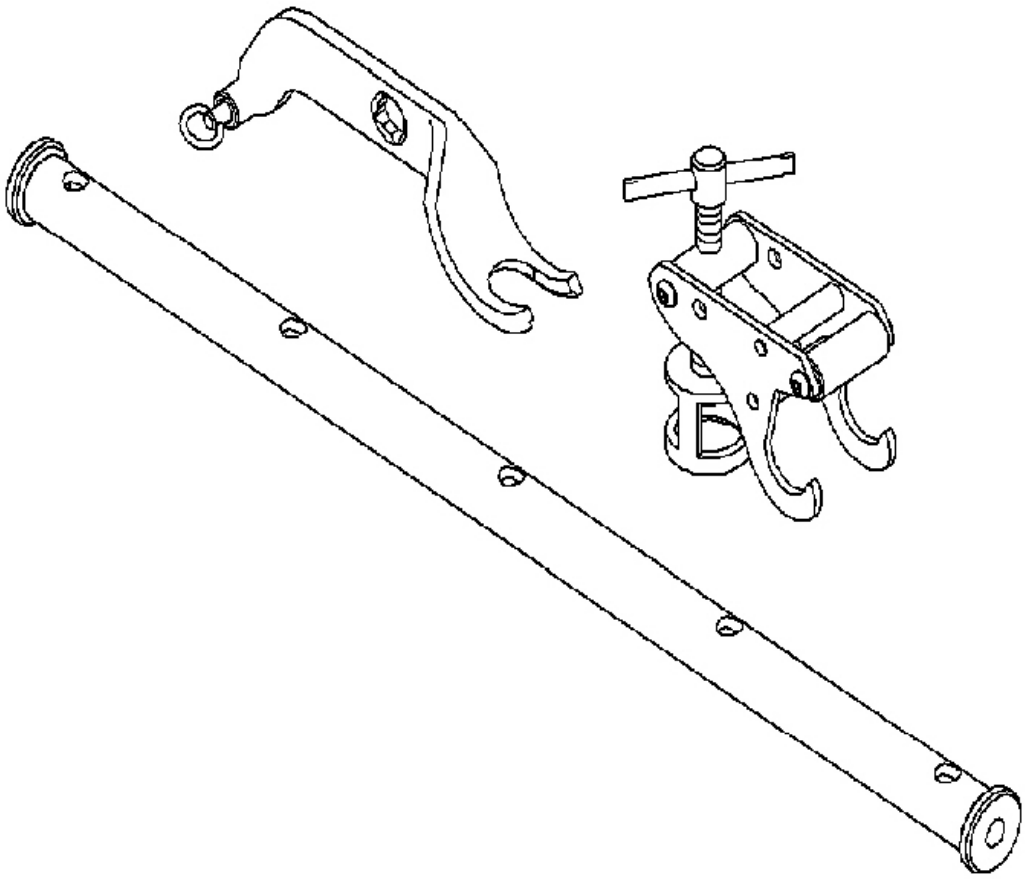

Fig. 49: Valve Spring Compressor 9065A
Courtesy of CHRYSLER LLC

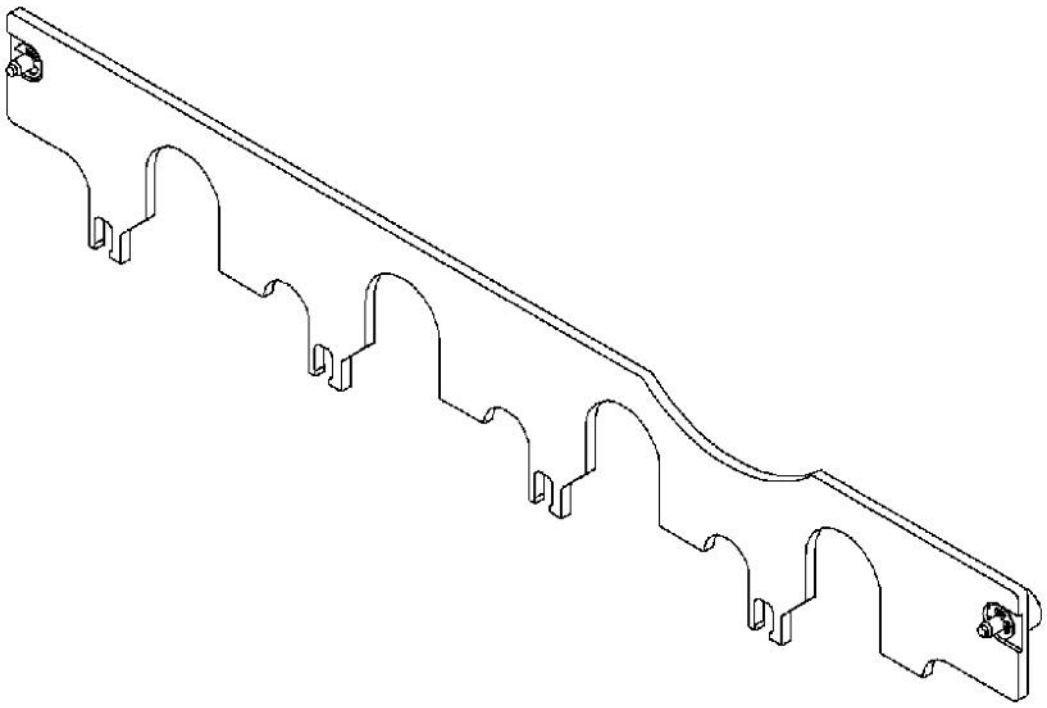

Fig. 50: Pushrod Retaining Plate - 9070
Courtesy of CHRYSLER LLC

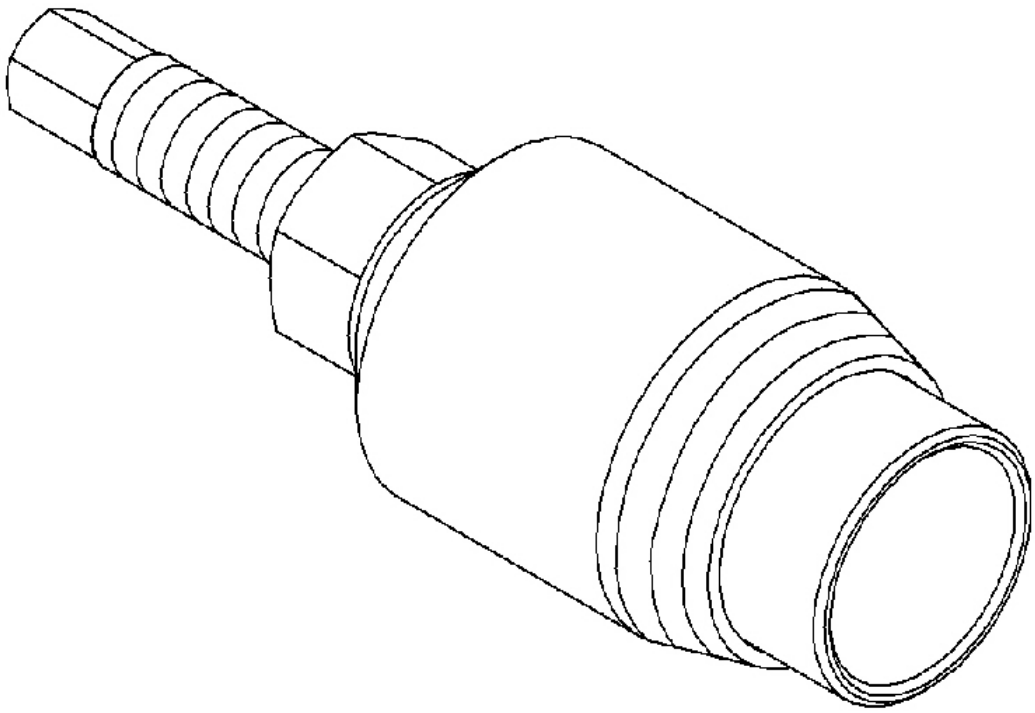

Fig. 51: Front Crank Seal Remover - 9071
Courtesy of CHRYSLER LLC

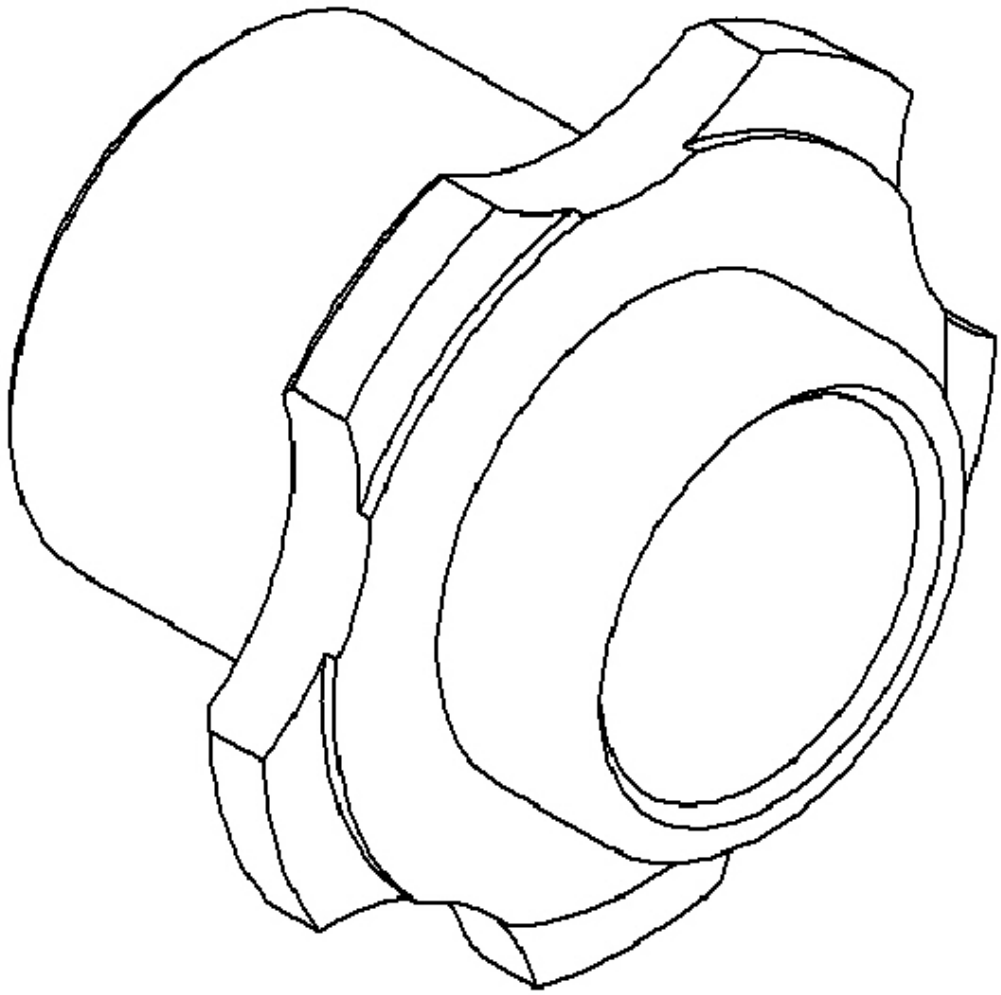

Fig. 52: Front Crank Seal Installer 9072
Courtesy of CHRYSLER LLC

MDS SYSTEM

DESCRIPTION

MDS SYSTEM

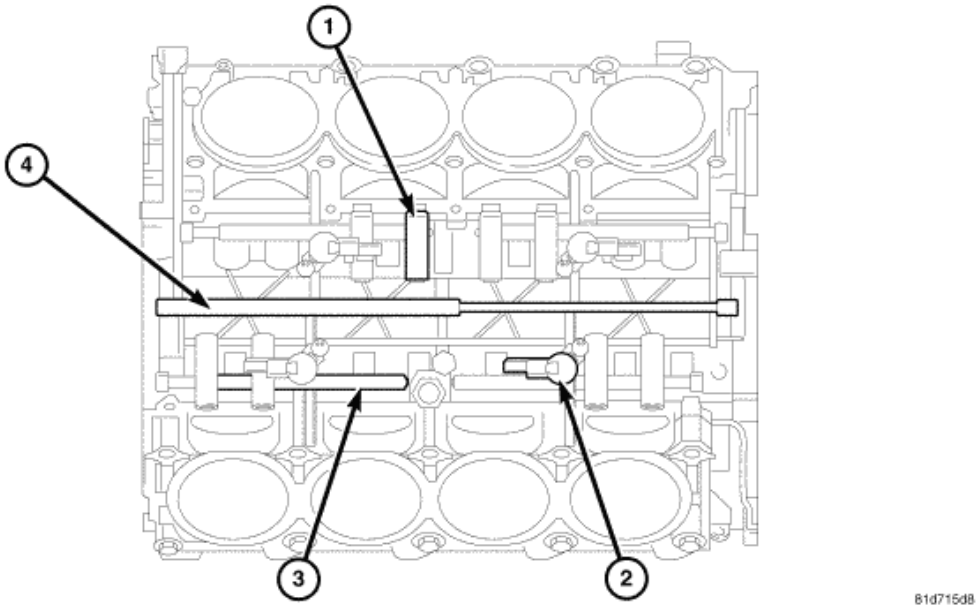

Fig. 53: MDS Cylinder View
Courtesy of CHRYSLER LLC

1 - DEACTIVATING LIFTERS
2 - SOLENOIDS
3 - LIFTER OIL GALLERY
4 - MAIN OIL GALLERY

The Multiple Displacement System (MDS) provides cylinder deactivation during steady-speed, low-acceleration and shallow grade climbing conditions to increase fuel economy.

MDS can provide a 5-20 percent fuel economy benefit when operating in four-cylinder mode, depending on driving habits and vehicle usage. For EPA rating purposes, fuel economy is 8-15 percent higher than if the engine was operating on eight cylinders at all times.

MDS is integrated into the basic engine architecture, requiring a minimum of additional parts - four additional solenoids, an oil temperature sensor and a wire harness. Eight unique valve lifters and a modified camshaft are also required.

OPERATION

MDS SYSTEM

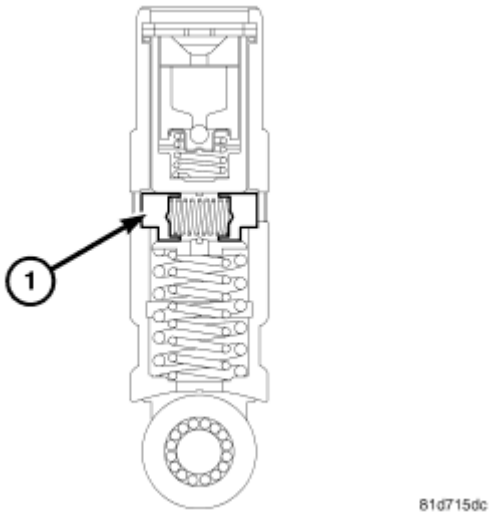

Fig. 54: MDS Lifter Cross-Section
Courtesy of CHRYSLER LLC

1 - LATCHING PIN

The Multiple Displacement System (MDS) provides cylinder deactivation during steady-speed, low-acceleration and shallow grade climbing conditions to increase fuel economy. Both four- and eight-cylinder configurations have even firing intervals, providing smooth operation. Two cylinders on each bank are active when the engine is in four-cylinder mode - every other cylinder in the firing order. All of the cylinders that are deactivated have unique hydraulic valve lifters that collapse when deactivated to prevent the valves from opening. Engine oil pressure is used to activate and deactivate the valves. It is delivered through special oil passages drilled into the cylinder block. Solenoid valves control the flow. When activated, pressurized oil pushes a latching pin on each valve lifter, which then becomes a "lost motion" link. Its base follows the camshaft, but its top remains stationary, held in place against the pushrod by light spring pressure but unable to move because of the much higher force of the valve spring.

NOTE: It is critical to use the recommended oil viscosity in 5.7L engines that use MDS.

Deactivation occurs during the compression stroke of each cylinder, after air and fuel enter the cylinder. Ignition then occurs, but the combustion products remain trapped in the cylinder under high pressure, because the valves no longer open. No air enters or leaves. During subsequent piston strokes, this high-pressure gas is repeatedly compressed and expanded like an air spring, but fuel is not injected.

AIR INTAKE SYSTEM

REMOVAL

REMOVAL

Filter Element Only

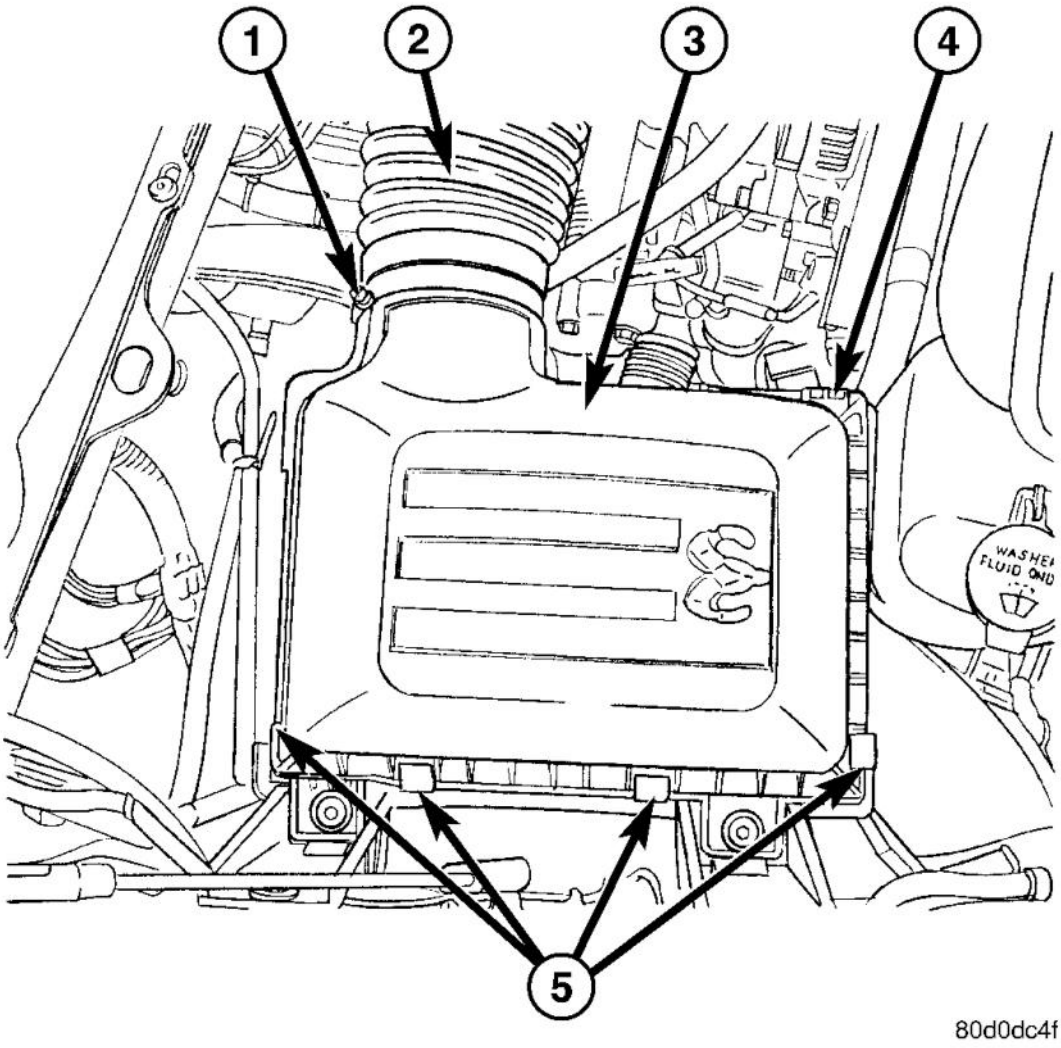

Fig. 55: Air Cleaner System
Courtesy of CHRYSLER LLC

1 - CLAMP
2 - AIR DUCT
3 - AIR CLEANER COVER
4 - LOCATING TABS
5 - CLIPS (4)

NOTE: Always unplug the Charge Air Temperature sensor before removing the resonator.

Housing removal is not necessary for element (filter) replacement.

1. Loosen clamp (1) and disconnect air duct (2) at air cleaner cover.
2. Pry over 4 spring clips (5) from housing cover (3) (spring clips retain cover to housing).
3. Release housing cover from locating tabs on housing and remove cover.
4. Remove air cleaner element (filter) from housing.
5. Clean inside of housing before replacing element.

Housing Assembly

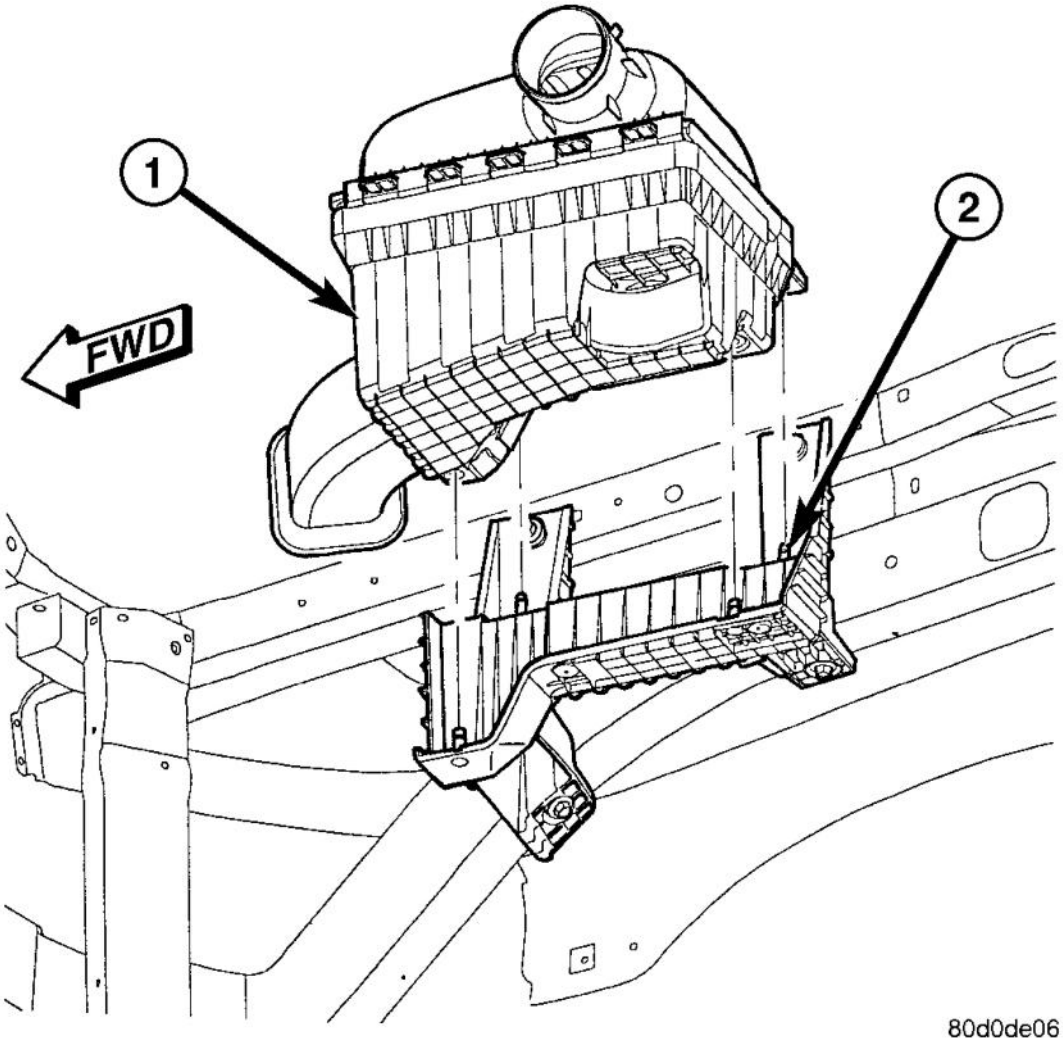

Fig. 56: Air Cleaner Housing
Courtesy of CHRYSLER LLC

1 - AIR CLEANER HOUSING ASSEMBLY
2 - LOCATING PINS (4)

NOTE: Always unplug the Charge Air Temperature sensor before removing the resonator.

1. Loosen clamp and disconnect air duct at air cleaner cover.
2. Lift entire housing assembly (1)from 4 locating pins (2).

INSTALLATION

INSTALLATION

1. Install filter element into housing.
2. Position housing cover into housing locating tabs.
3. Pry up 4 spring clips and lock cover to housing.
4. Install air duct to air cleaner cover and tighten hose clamp to 5 N.m (45 in. lbs.) torque.
5. If any other hose clamps were removed from air intake system, tighten them to 5 N.m (45 in. lbs.) torque.
6. If any bolts were removed from air resonator housing or air intake tubing, tighten them to 5 N.m (45 in. lbs.) torque.

CYLINDER HEAD

OPERATION

CYLINDER HEAD

The cylinder head closes the combustion chamber allowing the pistons to compress the air fuel mixture to the correct ratio for ignition. The valves located in the cylinder head open and close to either allow clean air into the combustion chamber or to allow the exhaust gases out, depending on the stroke of the engine.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET FAILURE

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust

- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in **CYLINDER COMPRESSION PRESSURE** . An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50-70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL

CYLINDER HEADS

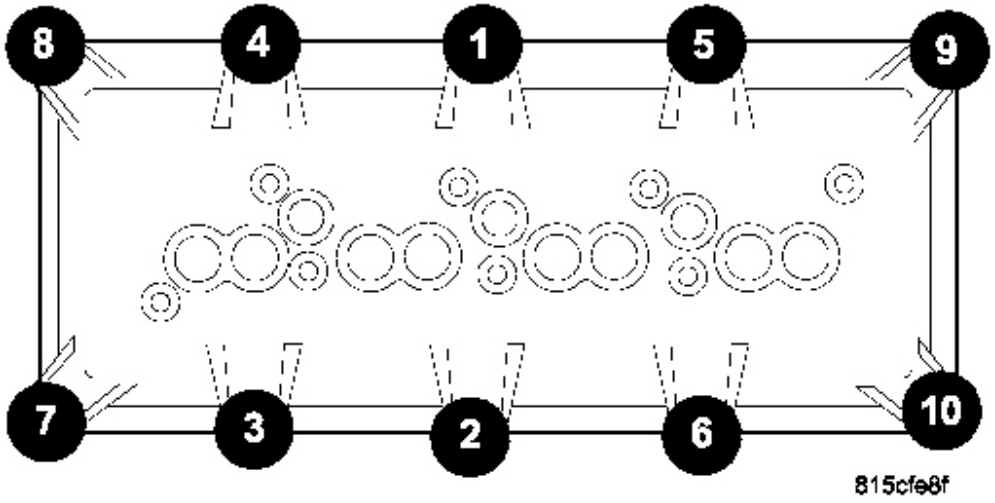

Fig. 57: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

1. Perform the Fuel System Pressure Release procedure. Refer to **STANDARD PROCEDURE** . Disconnect the fuel supply line , refer to **STANDARD PROCEDURE** .
2. Disconnect the battery negative cable.
3. Drain cooling system. Refer to **STANDARD PROCEDURE** .
4. Remove the air cleaner resonator and duct work.
5. Remove closed crankcase ventilation system.
6. Disconnect the exhaust at the exhaust manifolds.
7. Disconnect the evaporation control system.
8. Disconnect heater hoses.
9. Remove the power steering pump.
10. Remove cylinder head cover bolts as shown.

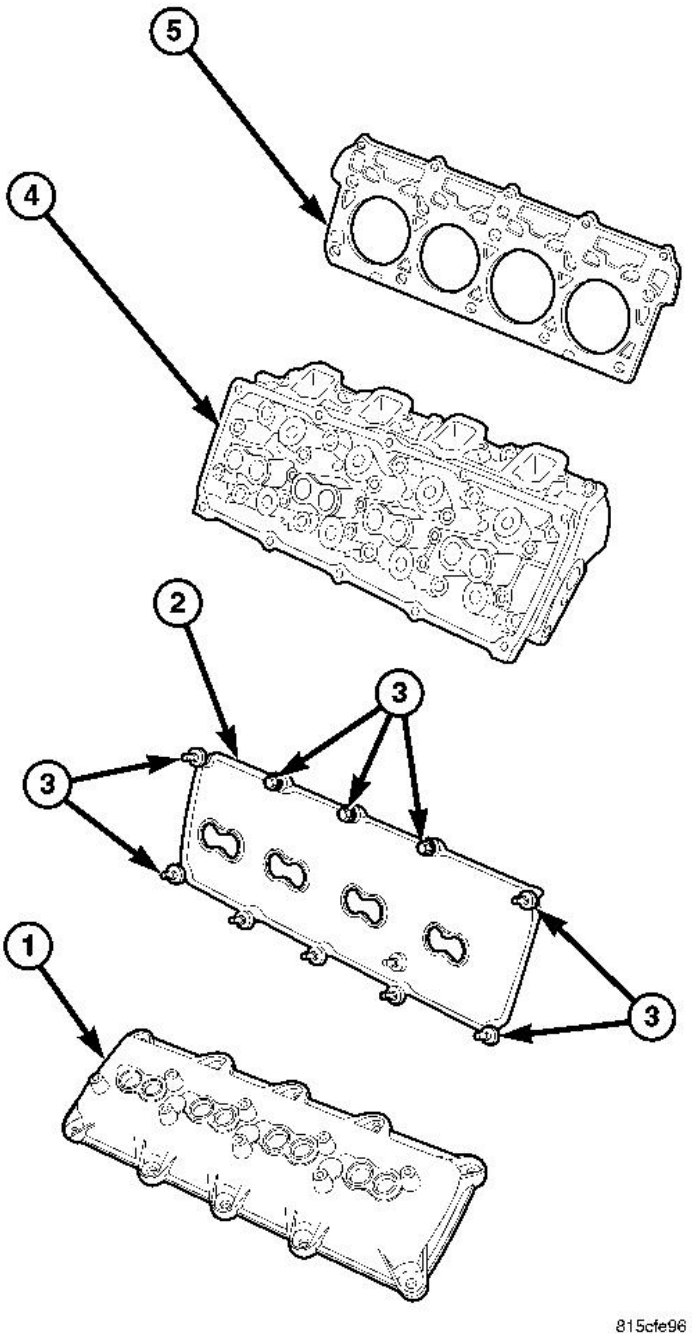

Fig. 58: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET
3 - FASTENERS
4 - CYLINDER HEAD
5 - HEAD GASKET

11. Remove cylinder head covers (1), using the sequence provided, and gaskets (2). See **REMOVAL** .

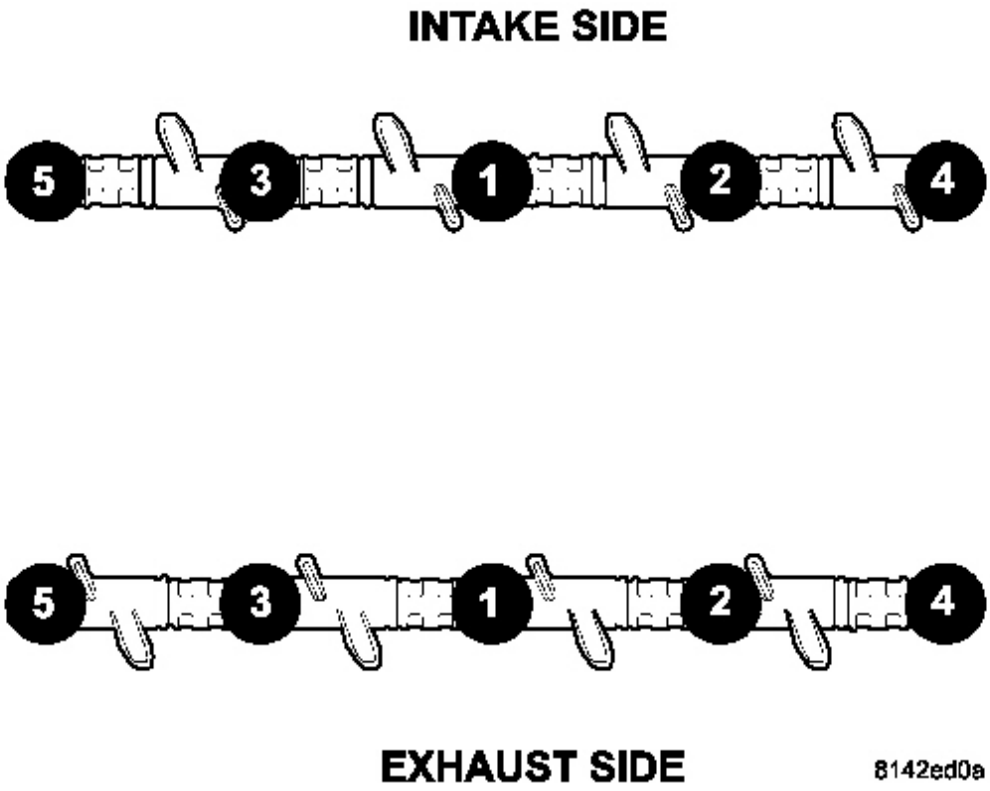

Fig. 59: Rocker Shaft Torque Sequence
Courtesy of CHRYSLER LLC

12. Remove intake manifold and throttle body as an assembly. See **REMOVAL**.
13. Remove rocker arm assemblies and push rods. Identify to ensure installation in original locations. See **REMOVAL**.

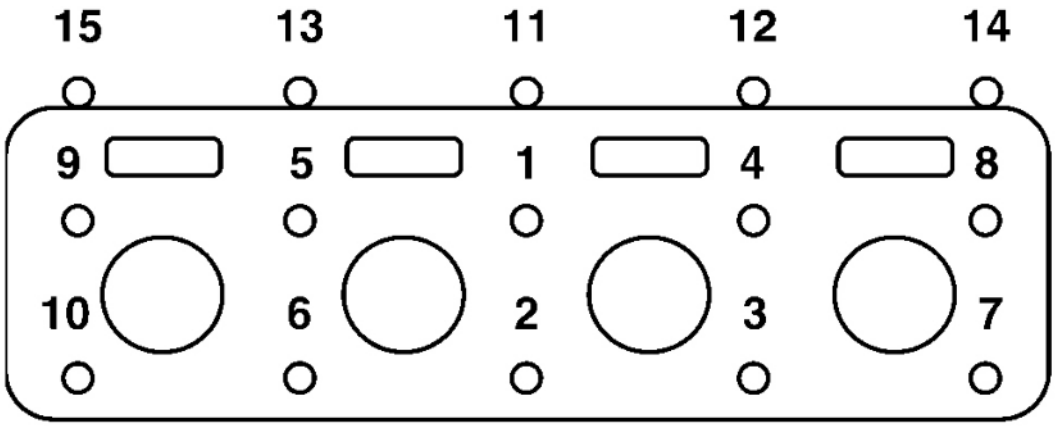

Fig. 60: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER LLC

14. Remove the head bolts from each cylinder head, using the sequence provided, and remove cylinder heads. Discard the cylinder head gasket.

CLEANING

CYLINDER HEAD

Clean all surfaces of cylinder block and cylinder heads.

Clean cylinder block front and rear gasket surfaces using a suitable solvent.

INSPECTION

CYLINDER HEADS

1. Inspect the cylinder head for out-of-flatness, using a straightedge and a feeler gauge. If tolerances exceed 0.0508 mm (0.002 in.) replace the cylinder head.
2. Inspect the valve seats for damage. Service the valve seats as necessary.

3. Inspect the valve guides for wear, cracks or looseness. If either condition exist, replace the cylinder head.
4. Inspect pushrods. Replace worn or bent pushrods.

INSTALLATION

CYLINDER HEADS

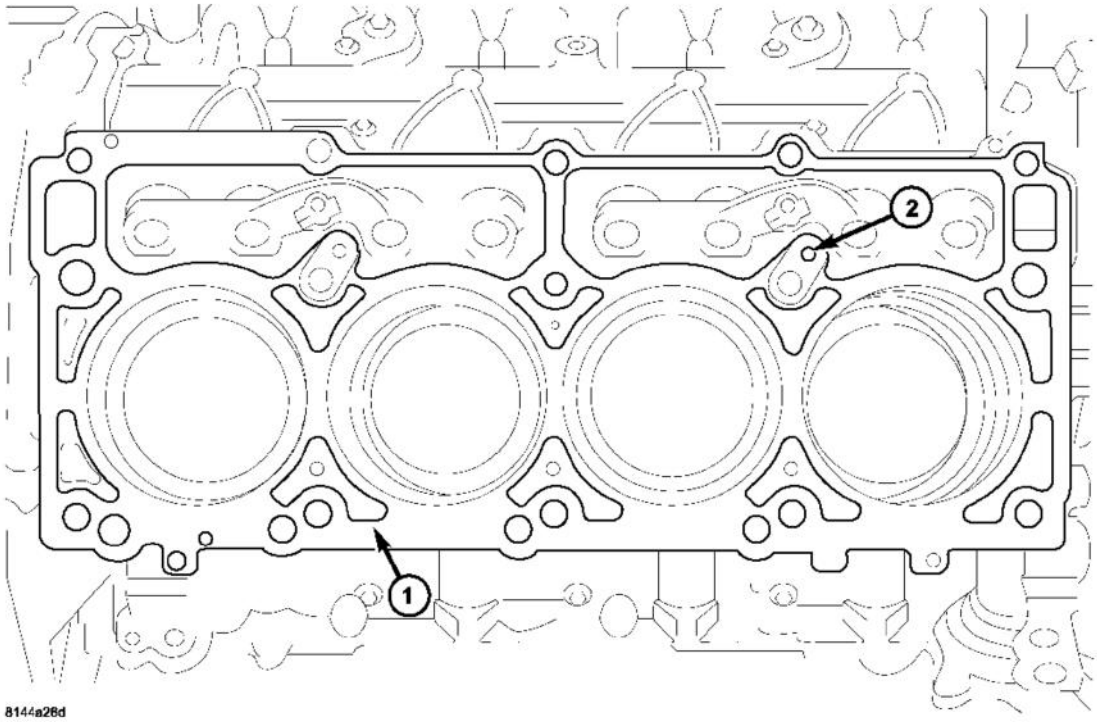

Fig. 61: Head Gasket & Oil Holes
Courtesy of CHRYSLER LLC

1 - HEAD GASKET 2 - OIL HOLES

1. Clean all surfaces of cylinder block and cylinder heads.
2. Clean cylinder block front and rear gasket surfaces using a suitable solvent.

CAUTION: The head gaskets (1) are not interchangeable between left and right sides. They are marked "L" and "R" to indicate left and right sides.

CAUTION: The head gaskets (1) are marked "TOP" to indicate which side goes up.

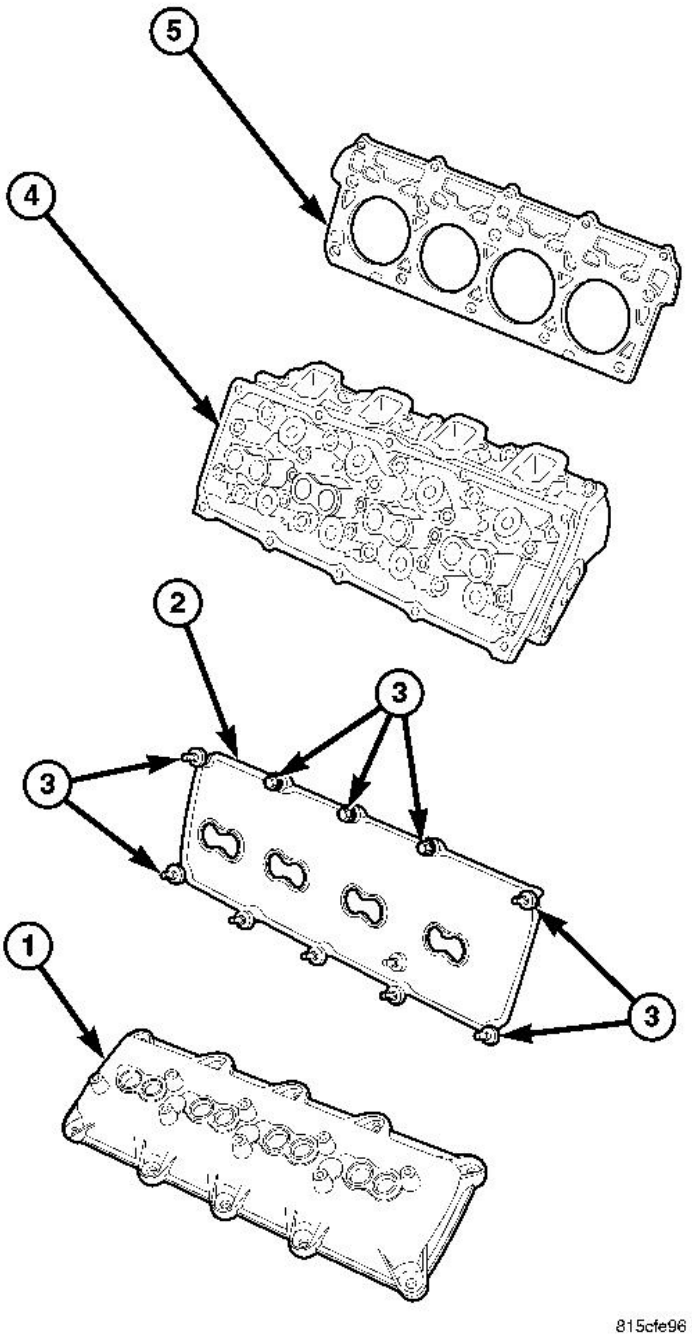

Fig. 62: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET 3 - FASTENERS 4 - CYLINDER HEAD 5 - HEAD GASKET

3. Position new cylinder head gaskets (5) onto the cylinder block.
4. Position cylinder heads (4) onto head gaskets (5) and cylinder block.

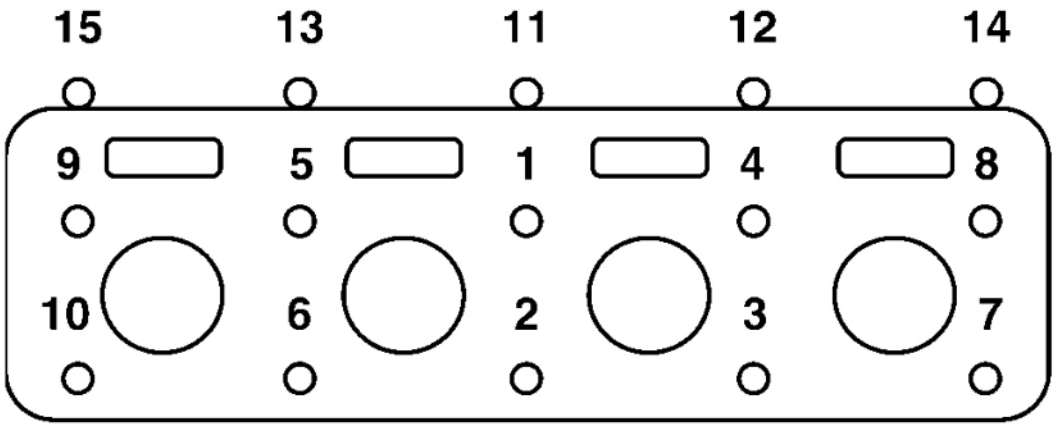

Fig. 63: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER LLC

5. Tighten the cylinder head bolts in three steps using the sequence provided :

   Step 1 - Snug tighten M12 cylinder head bolts, in sequence, to 34 N.m (25 ft. lbs.) and M8 bolts to 20 N.m (15 ft. lbs.).

   Step 2 - Tighten M12 cylinder head bolts, in sequence, to 54 N.m (40 ft. lbs.) and verify M8 bolts to 20 N.m (15 ft. lbs.).

   Step 3 - Turn M12 cylinder head bolts, in sequence, 90 degrees and tighten M8 bolts to 34 N.m (25 ft. lbs.).

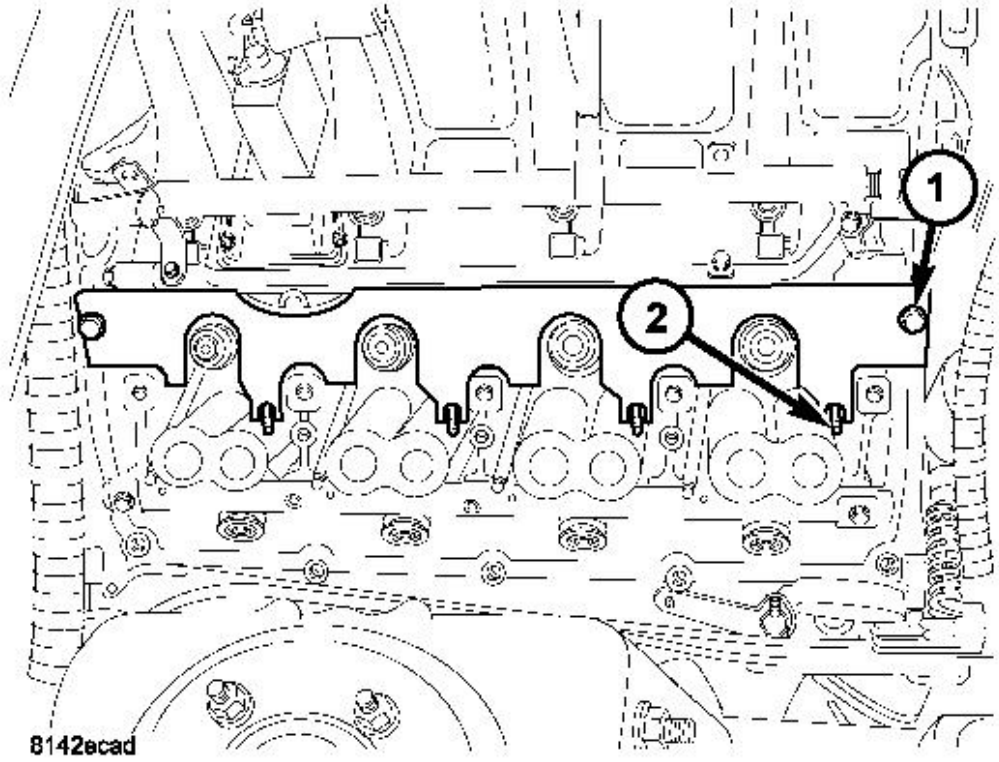

Fig. 64: Push Rod Retainer Fastener & Push Rod Retainer 9070
Courtesy of CHRYSLER LLC

1 - PUSH ROD RETAINER FASTENER 2 - PUSH ROD RETAINER 9070

6. Install push rods and rocker arm assemblies in their original position, using push rod retainer 9070. See **INSTALLATION**.
7. Install the intake manifold and throttle body assembly. See **INSTALLATION**.
8. If required, adjust spark plugs to specifications. Install the plugs.
9. Connect the heater hoses.
10. Install the fuel supply line.
11. Install the power steering pump.
12. Install the drive belt. Refer to **INSTALLATION** .

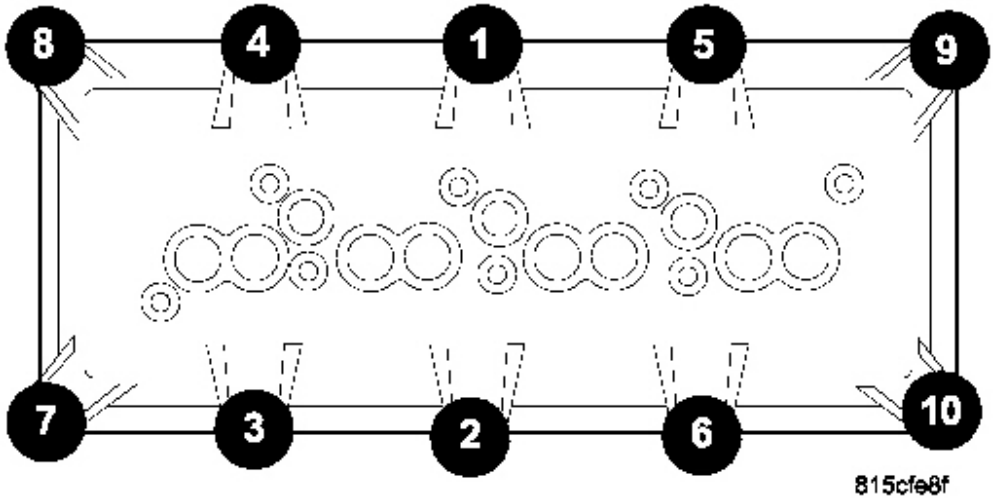

Fig. 65: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

13. Install cylinder head covers (1). See **INSTALLATION**.
14. Connect the evaporation control system.
15. Install the air cleaner.
16. Fill cooling system. Refer to **STANDARD PROCEDURE** .
17. Connect the negative cable to the battery.
18. Start engine check for leaks.

COVER-CYLINDER HEAD

REMOVAL

CYLINDER HEAD COVER

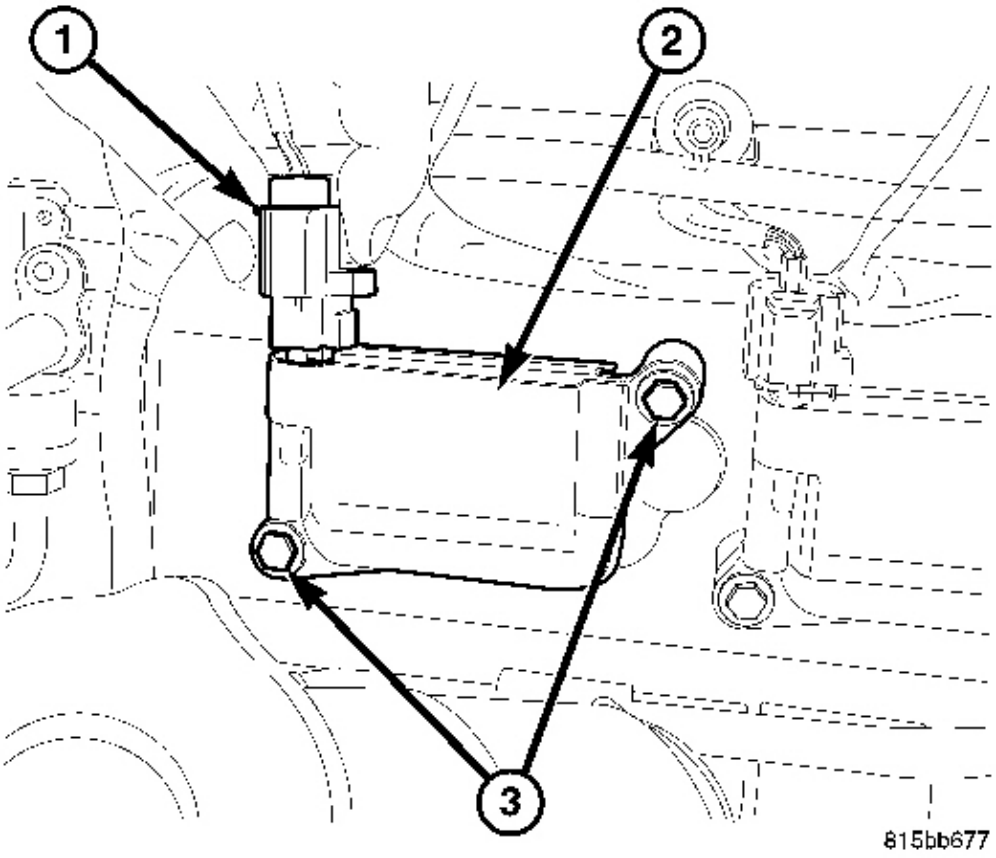

Fig. 66: Ignition Coil Connectors, Ignition Coils & Torque Fasteners
Courtesy of CHRYSLER LLC

1. Disconnect battery negative cable.
2. Disconnect ignition coil connector (1).
3. Remove ignition coil retaining bolts (3).

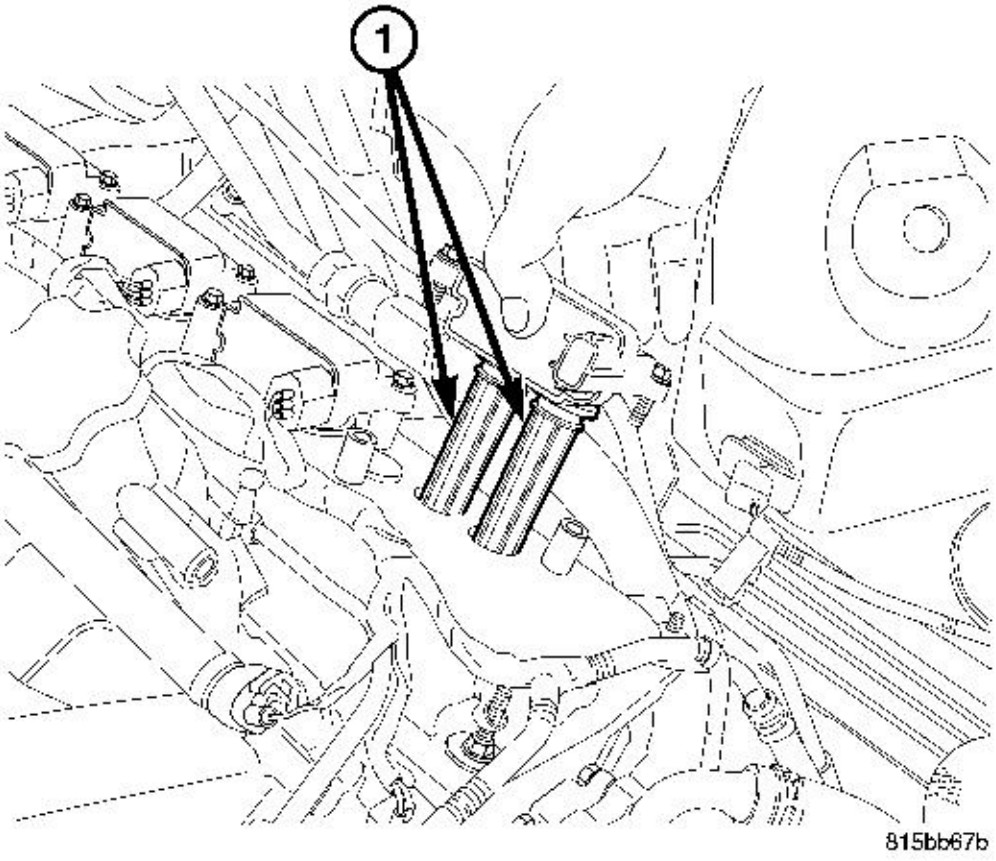

Fig. 67: Removing/Installing Ignition Coil
Courtesy of CHRYSLER LLC

4. Remove ignition coil (1).

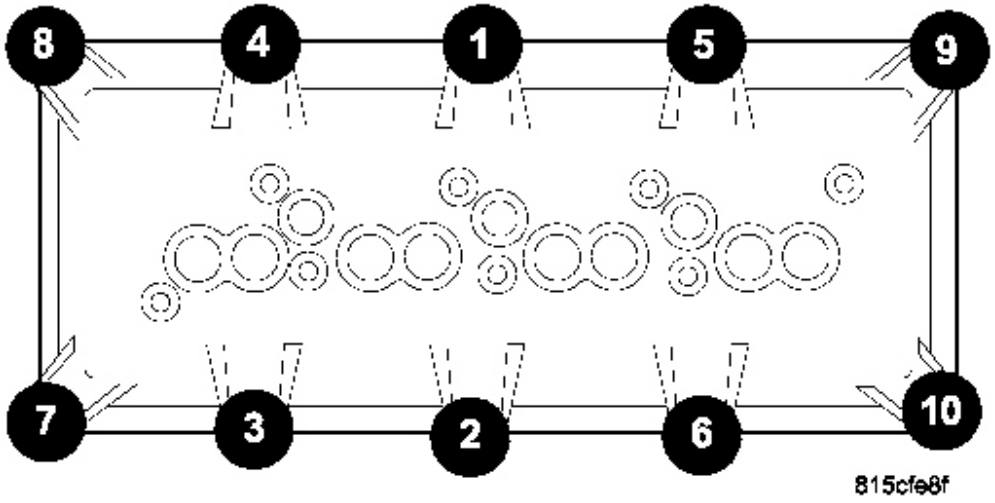

Fig. 68: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

5. Remove cylinder head cover retaining bolts.

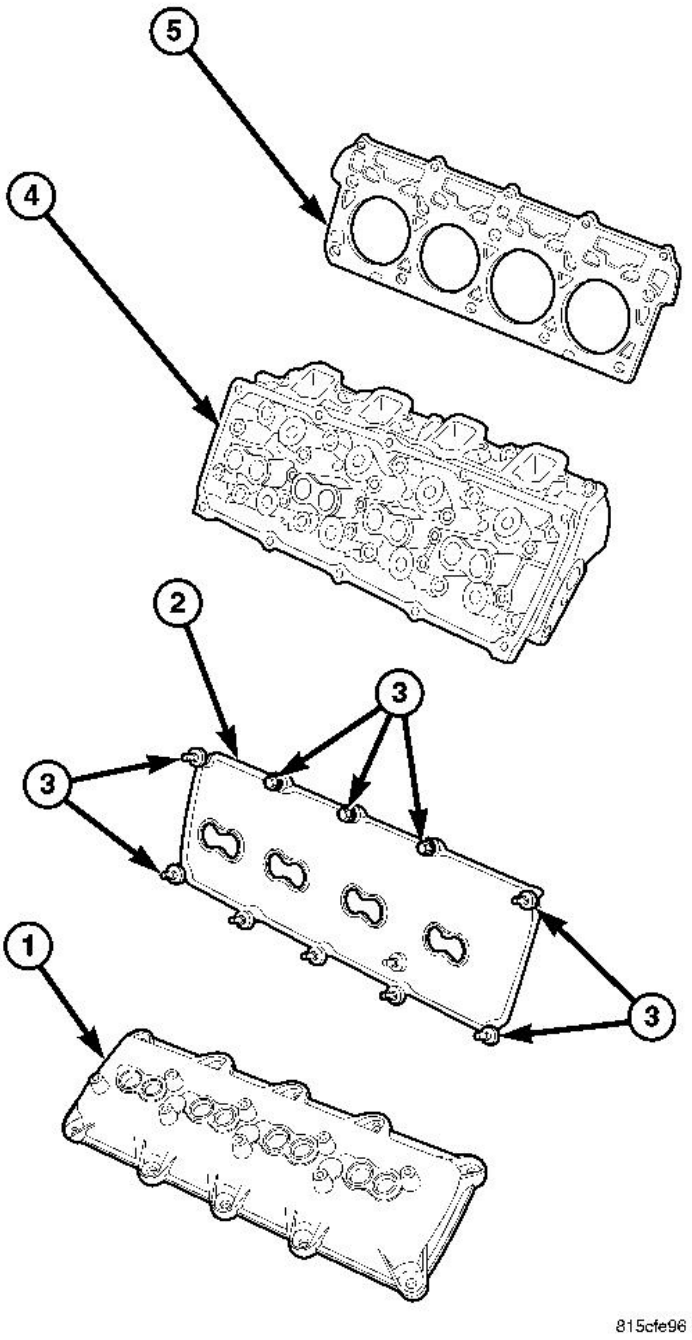

Fig. 69: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET
3 - FASTENERS
4 - CYLINDER HEAD
5 - HEAD GASKET

6. Remove cylinder head cover (1).

NOTE: The gasket (2) may be used again, provided no cuts, tears, or deformation has occurred.

INSTALLATION

CYLINDER HEAD COVER

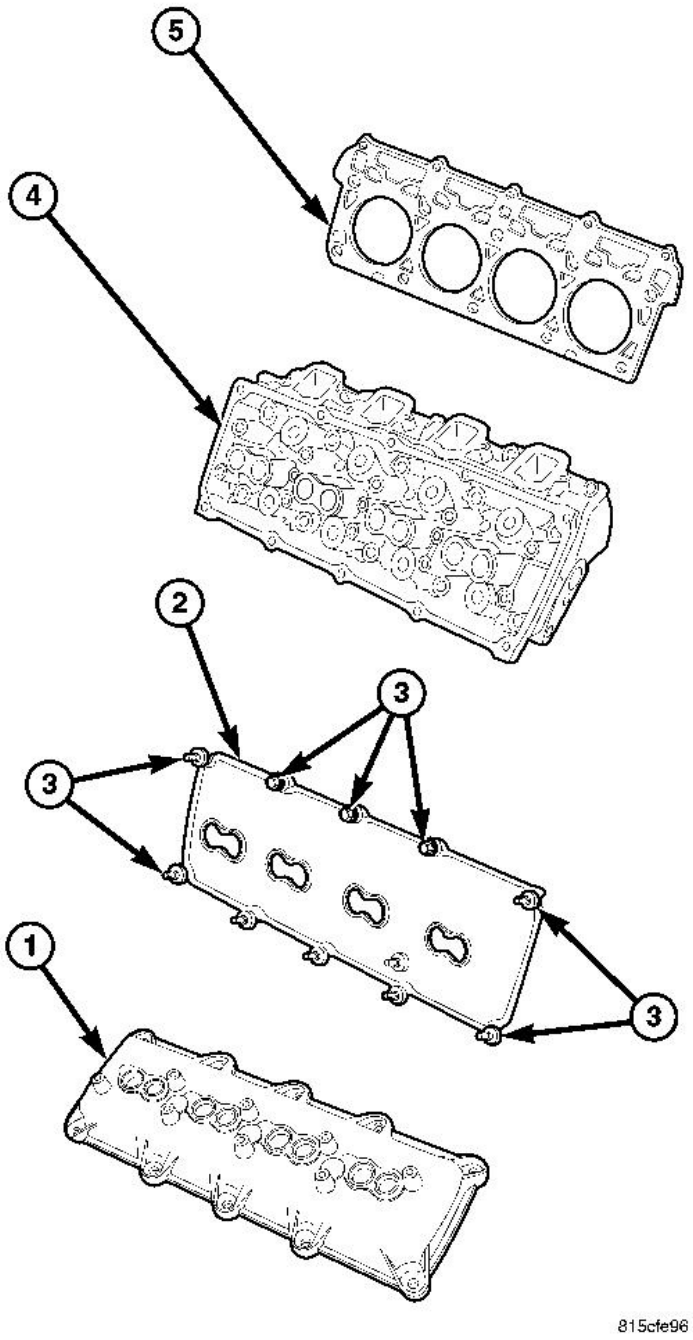

Fig. 70: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET
3 - FASTENERS
4 - CYLINDER HEAD
5 - HEAD GASKET

CAUTION: Do not use harsh cleaners to clean the cylinder head covers. Severe damage to covers may occur.

CAUTION: DO NOT allow other components including the wire harness to rest on or against the engine cylinder head cover. Prolonged contact with other objects may wear a hole in the cylinder head cover.

1. Clean cylinder head cover (1) and both sealing surfaces (1,4,). Inspect and replace gasket (2) as necessary.
2. Install cylinder head cover and hand start all fasteners. Verify that all double ended studs (3) are in the correct location.

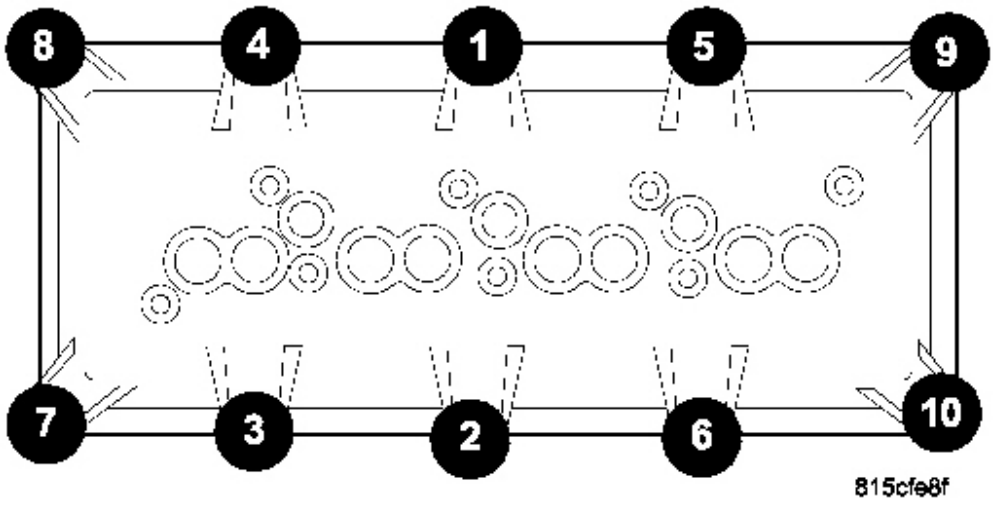

Fig. 71: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

3. Tighten cylinder head cover bolts and double ended studs to 8N.m (70 lbs in.). Begin torque sequence in the middle of head cover and tighten bolts moving outward in a crisscross pattern from top to bottom.

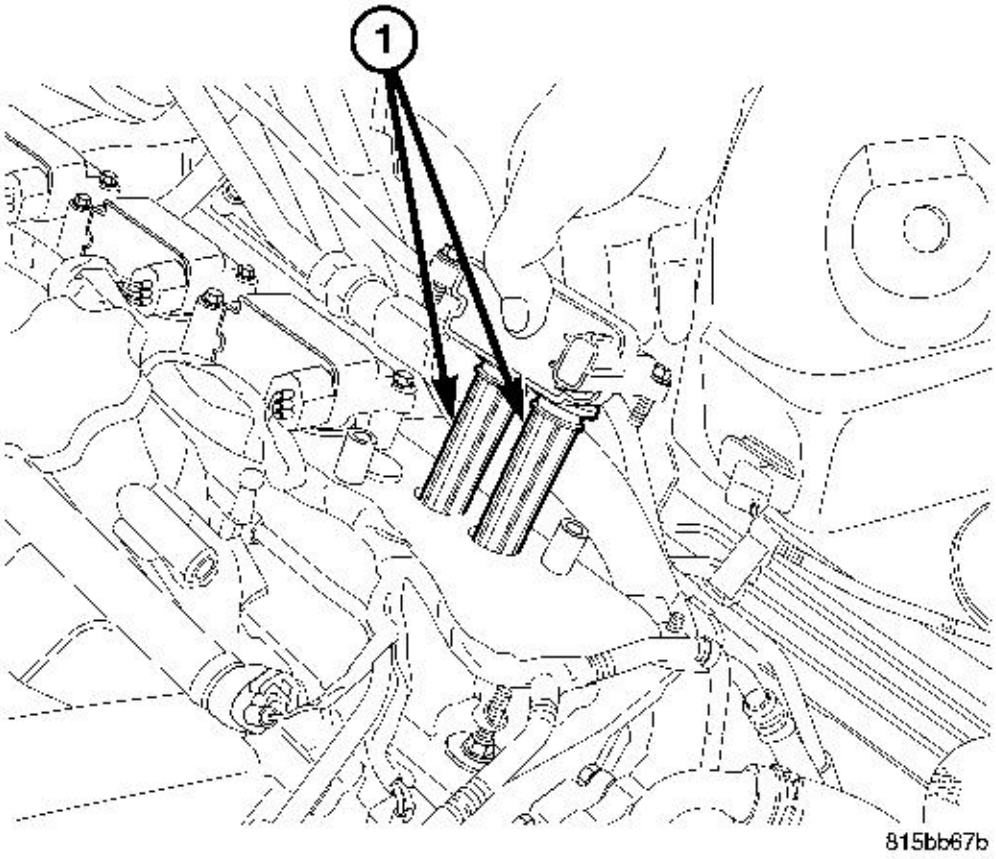

Fig. 72: Removing/Installing Ignition Coil
Courtesy of CHRYSLER LLC

4. Before installing coil(s), apply dielectric grease to inside of spark plug boots (1).
5. Install ignition coils.

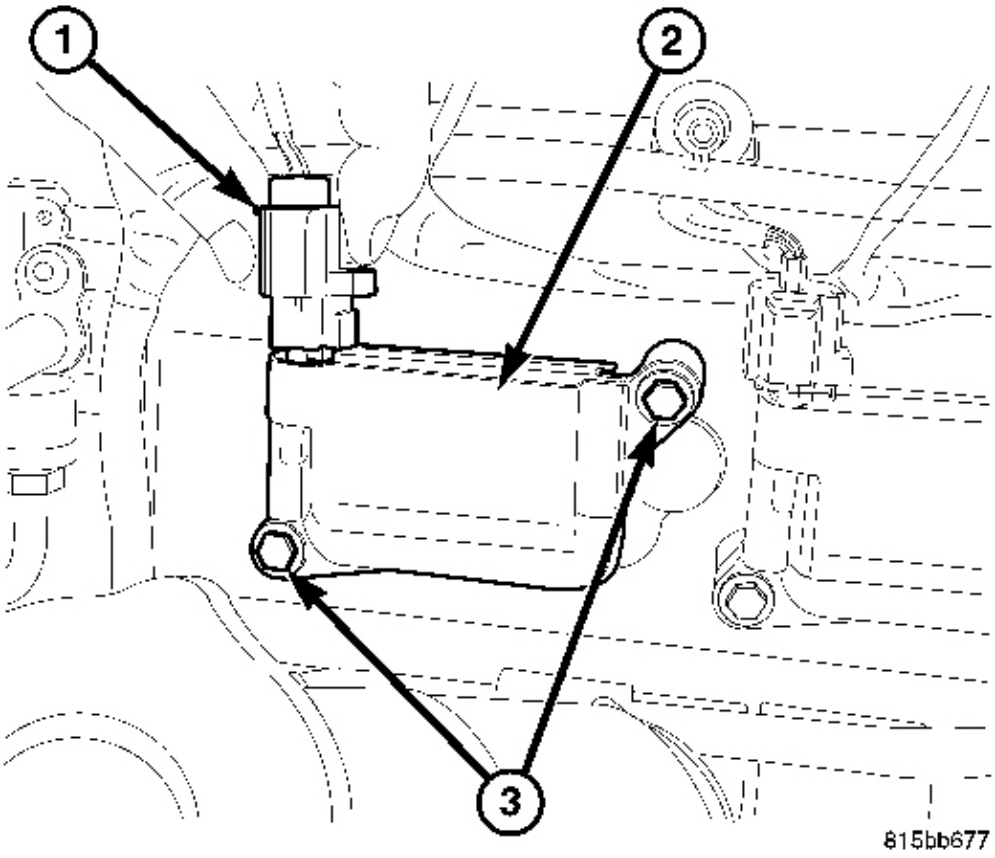

Fig. 73: Ignition Coil Connectors, Ignition Coils & Torque Fasteners
Courtesy of CHRYSLER LLC

6. Tighten fasteners (3) to 7N.m (62 in. lbs.).
7. Connect ignition coil electrical connectors (1).
8. Install PCV hose.
9. Connect battery negative cable.

VALVES & SEATS - INTAKE/EXHAUST

DESCRIPTION

VALVE GUIDES

The valve guides are made of powdered metal and are pressed into the cylinder head. The guides are not

replaceable or serviceable, and valve guide reaming is not recommended. If the guides are worn beyond acceptable limits, replace the cylinder heads.

VALVES

Both the intake and exhaust valves are made of steel. The intake valve is 50.93 mm (2.00 inches) in diameter and the exhaust valve is 39.53 mm (1.55 inches) in diameter. All valves use three bead lock keepers to retain the springs and promote valve rotation.

STANDARD PROCEDURE

REFACING

NOTE: Valve seats that are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

NOTE: When refacing valves and valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

1. Using a suitable dial indicator measure the center of the valve seat Total run out must not exceed 0.051 mm (0.002 in).
2. Apply a small amount of Prussian blue to the valve seat, insert the valve into the cylinder head, while applying light pressure on the valve rotate the valve. Remove the valve and examine the valve face. If the blue is transferred below the top edge of the valve face, lower the valve seat using a 15 degree stone. If the blue is transferred to the bottom edge of the valve face, raise the valve seat using a 65 degree stone.
3. When the seat is properly positioned the width of the intake seat must be 1.18 - 1.62 mm (0.0464 - 0.0637 in.) and the exhaust seat must be 1.48 - 1.92 mm (0.058 - 0.075 in.).
4. Check the valve spring installed height after refacing the valve and seat. The installed height for both intake and exhaust valve springs must not exceed 46.0 mm (1.81 in.).

VALVE FACE AND VALVE SEAT ANGLE CHART

DESCRIPTION	SPECIFICATION
SEAT WIDTH	-
INTAKE	1.18 - 1.62 mm (0.0464 - 0.0637 in.)
EXHAUST	1.48 - 1.92 mm (0.058 - 0.075 in.)
FACE ANGLE (INT. AND EXT.)	- 45° - 451/2°
SEAT ANGLE (INT. AND EXT.)	- 441/2° - 45°

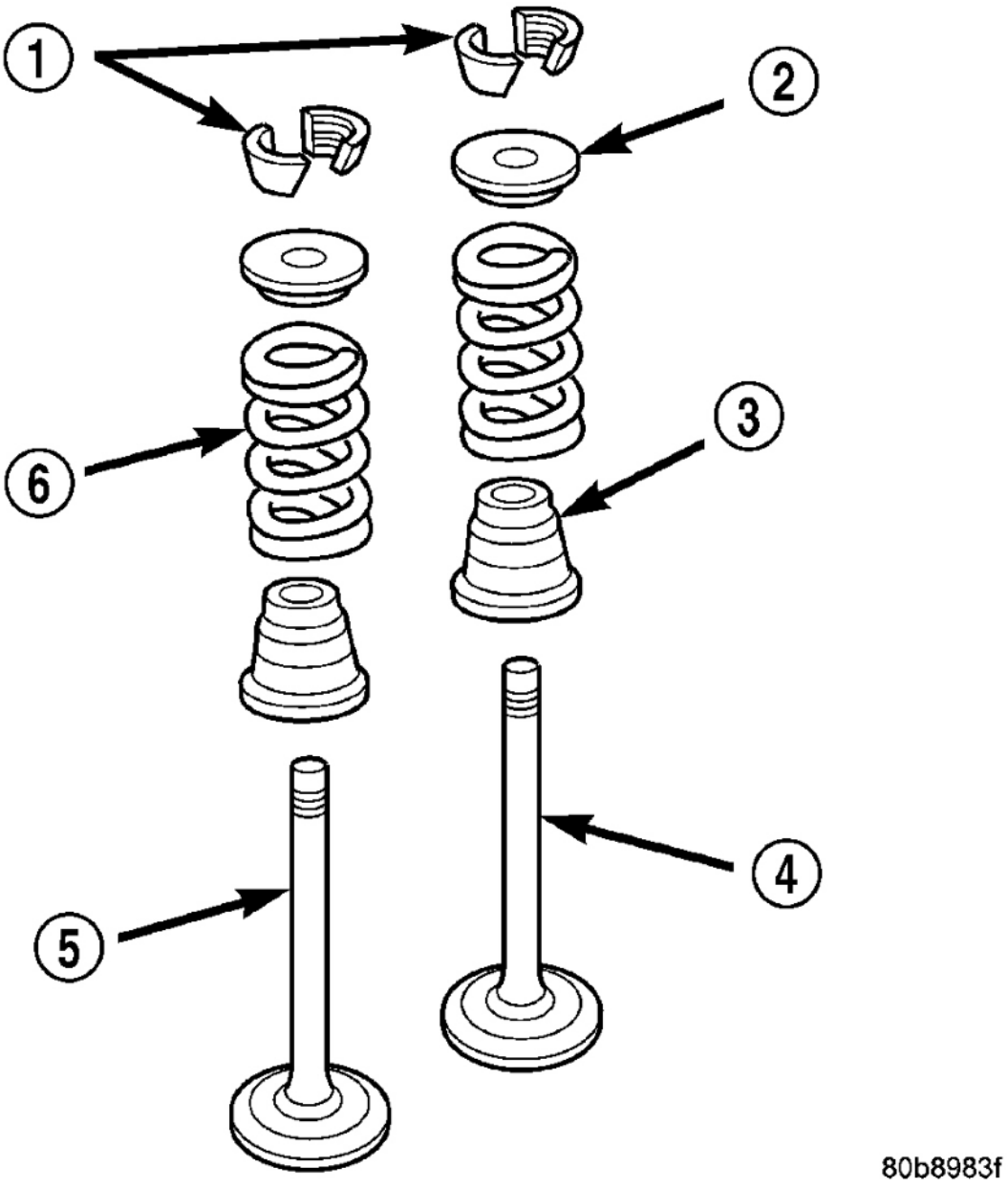

Fig. 74: Valve Assembly Configuration
Courtesy of CHRYSLER LLC

1 - VALVE LOCKS (3-BEAD)
2 - RETAINER

3 - VALVE STEM OIL SEAL
4 - INTAKE VALVE
5 - EXHAUST VALVE
6 - VALVE SPRING

5. The valve seat must maintain an angle of 44.5 - 45.0 degrees angle.
6. The valve face must maintain a face angle of 45.0 - 45.5 degrees angle. See **Fig. 74**.

REMOVAL

VALVES AND VALVE SPRINGS

1. Remove the cylinder head. See **REMOVAL**.
2. Compress valve springs using Valve Spring Compressor Tool special tool # C-3422 and adapter 8464.
3. Remove valve retaining locks, valve spring retainers, valve stem seals and valve springs.
4. Before removing valves, remove any burrs from valve stem lock grooves to prevent damage to the valve guides. Identify valves to ensure installation in original location.

INSTALLATION

VALVES AND VALVE SPRINGS

1. Clean valves thoroughly. Discard burned, warped and cracked valves.
2. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
3. Measure valve stems for wear. If wear exceeds 0.051 mm (0.002 inch), replace the valve.
4. Coat valve stems with lubrication oil and insert them in cylinder head.
5. If valves or seats are reground, check valve stem height. If valve is too long, replace cylinder head.
6. Install new seals on all valve guides. Install valve springs and valve retainers.
7. Compress valve springs with Valve Spring Compressor Tool special tool # C- 3422 and adapter 8464, install locks and release tool. If valves and/or seats are ground, measure the installed height of springs. Make sure the measurement is taken from bottom of spring seat in cylinder head to the bottom surface of spring retainer.
8. Install cylinder head. See **INSTALLATION**.

ROCKER ARM

REMOVAL

ROCKER ARMS AND PUSH ROD

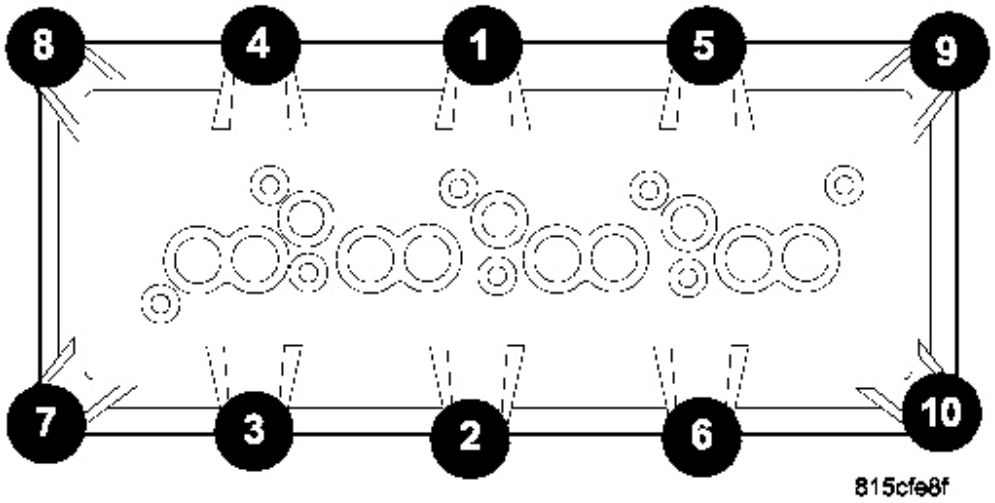

Fig. 75: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

1. Remove cylinder head cover. See **REMOVAL**.

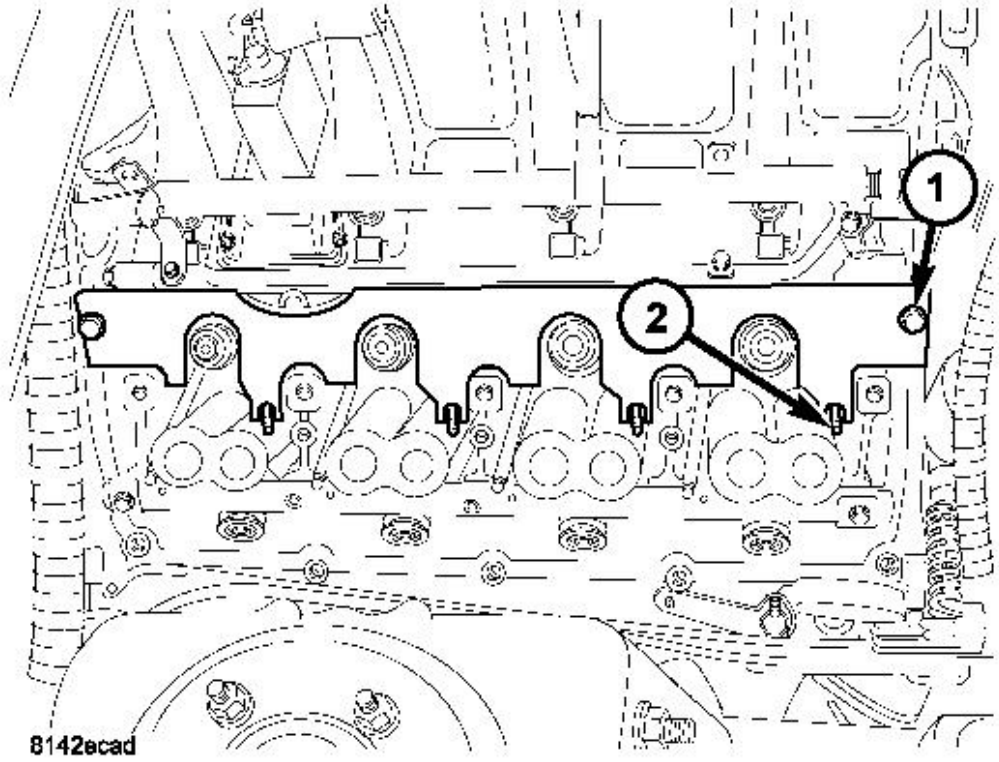

Fig. 76: Push Rod Retainer Fastener & Push Rod Retainer 9070
Courtesy of CHRYSLER LLC

1 - PUSH ROD RETAINER FASTENER 2 - PUSH ROD RETAINER 9070

2. Install push rod retainer (1) 9070.

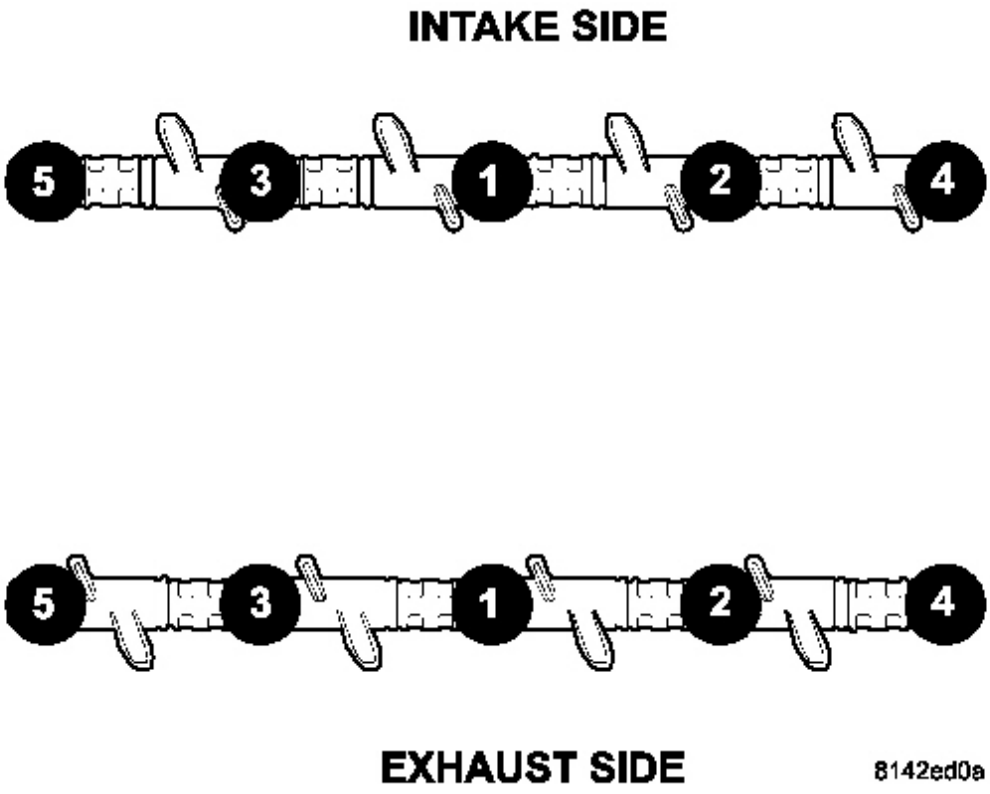

Fig. 77: Rocker Shaft Torque Sequence
Courtesy of CHRYSLER LLC

3. Loosen the rocker shafts using the sequence provided.

CAUTION: The rocker shaft assemblies are not interchangeable between intake and exhaust. The intake rocker arms are marked with an "I".

4. Remove the rocker shafts. Note location for reassembly.

CAUTION: The longer push rods are for the exhaust side, and the shorter push rods are for intake side.

5. Remove the push rods. Note push rod location for reassembly.

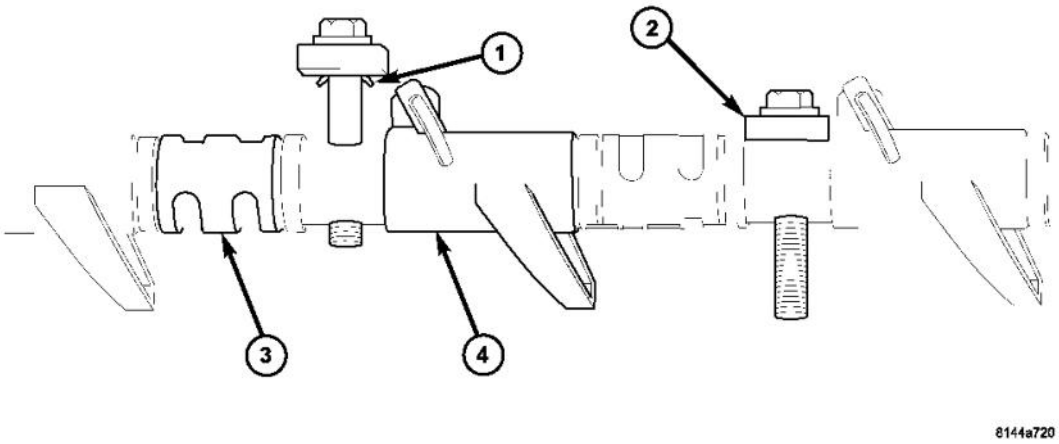

Fig. 78: Rocker Arm Retainer Assembly
Courtesy of CHRYSLER LLC

1 - ASSEMBLY TANG
2 - RETAINER (FULLY SEATED)
3 - SPACER
4 - ROCKER ARM

CAUTION: Do not remove the retainers from the rocker shaft. The assembly tangs (1) at the bottom of the retainers (2) can be damaged, causing the assembly tangs to break off, and get into the engine.

INSTALLATION

ROCKER ARMS AND PUSH ROD

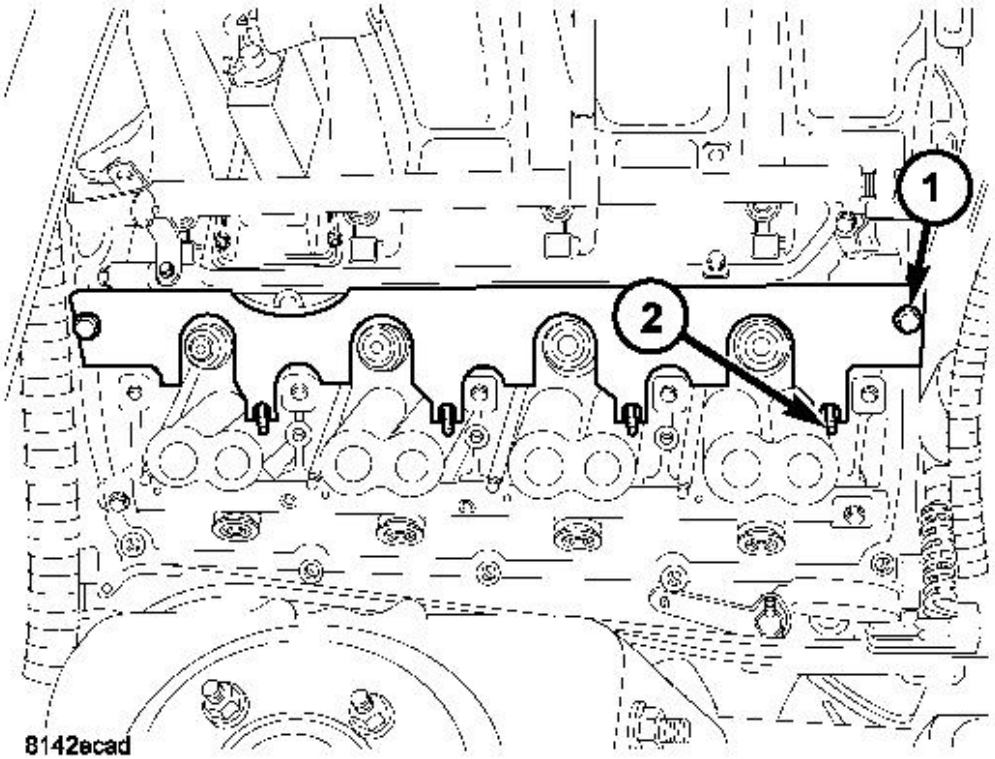

Fig. 79: Push Rod Retainer Fastener & Push Rod Retainer 9070
Courtesy of CHRYSLER LLC

1 - PUSH ROD RETAINER FASTENER
2 - PUSH ROD RETAINER 9070

CAUTION: The longer push rods are for the exhaust side, and the shorter push rods are for intake side.

1. Install the push rods in the same order as removed.
2. Install the push rod retainer (1) 9070.

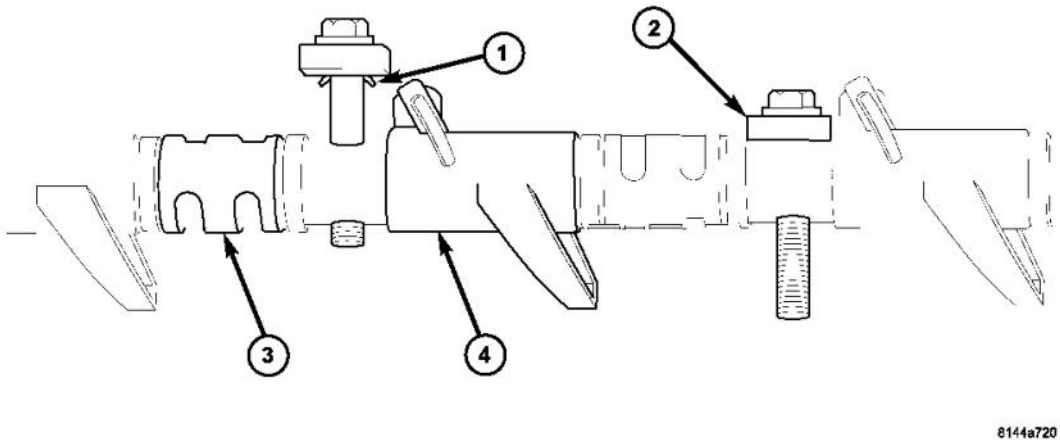

Fig. 80: Rocker Arm Retainer Assembly
Courtesy of CHRYSLER LLC

1 - ASSEMBLY TANG
2 - RETAINER (FULLY SEATED)
3 - SPACER
4 - ROCKER ARM

CAUTION: Ensure that retainers (2) and rocker arms (4) are not overlapped when tightening bolts or engine damage could result.

CAUTION: Verify that push rod is installed into rocker arm (4) and tappet correctly while installing rocker shaft assembly or engine damage could result. Recheck after rocker shaft has been tightened to specification.

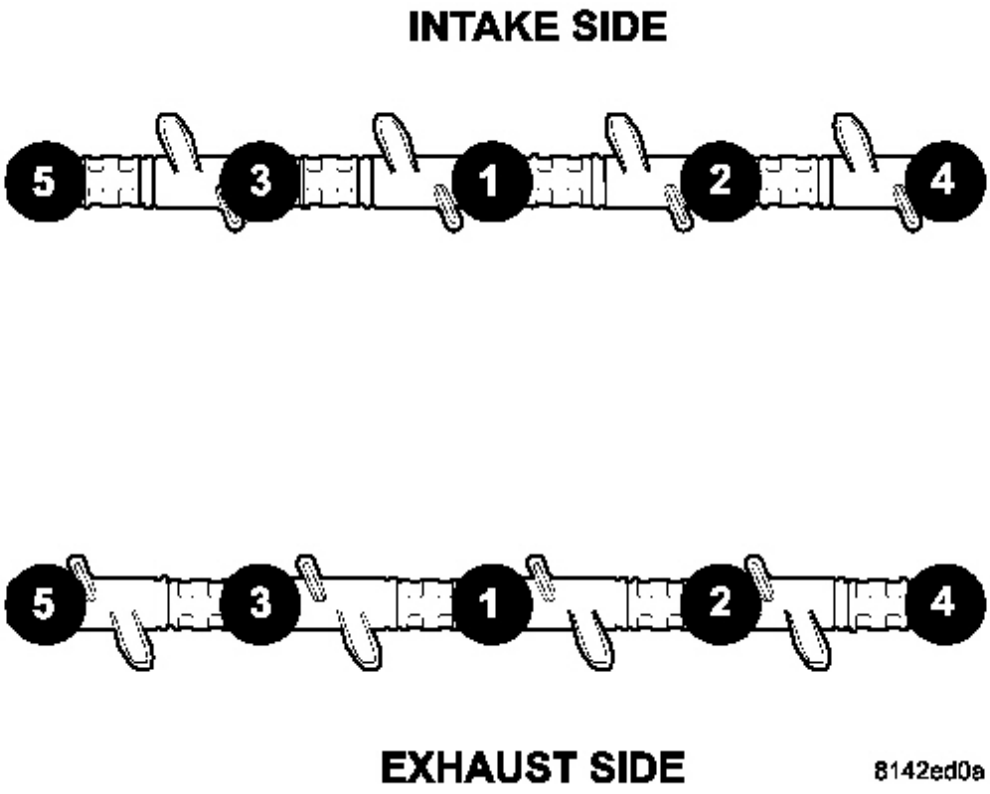

Fig. 81: Rocker Shaft Torque Sequence
Courtesy of CHRYSLER LLC

CAUTION: The rocker shaft assemblies are not interchangeable between intake and exhaust, failure to install in the correct location could result in engine damage. The intake rocker arms are marked with the letter "I".

3. Install rocker shaft assemblies in the same order as removed.
4. Tighten the rocker shaft bolts to 22 N.m (195 in. lbs.) as shown.

CAUTION: DO NOT rotate or crank the engine during or immediately after rocker arm installation. Allow the hydraulic roller tappets adequate time to bleed down (about 5 minutes).

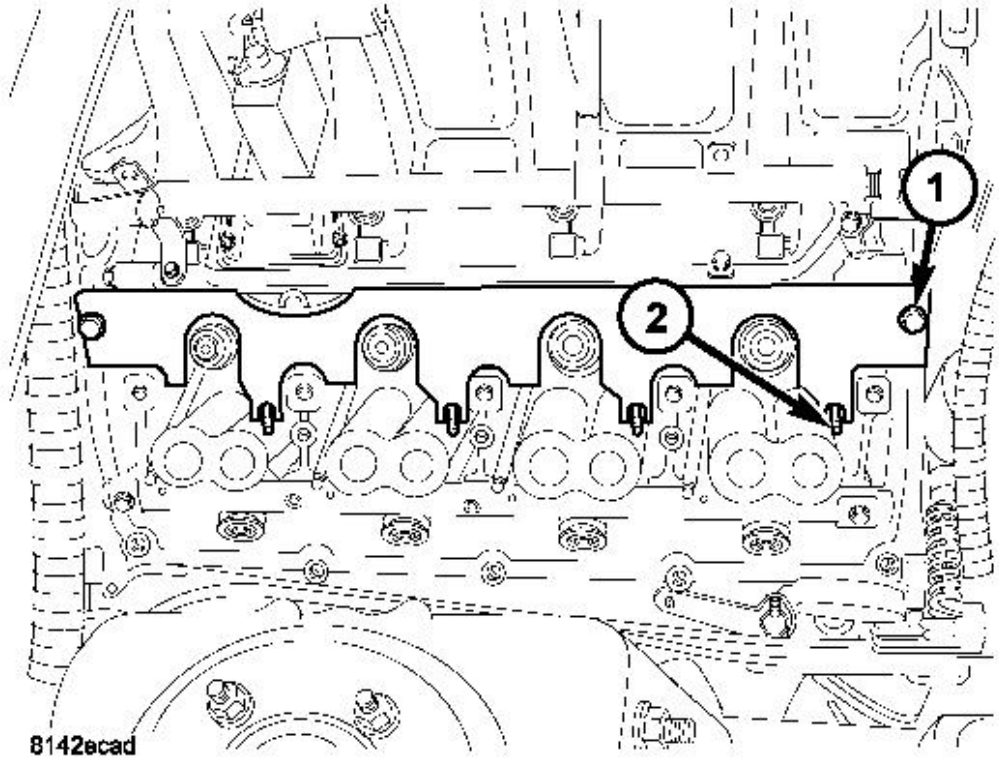

Fig. 82: Push Rod Retainer Fastener & Push Rod Retainer 9070
Courtesy of CHRYSLER LLC

1 - PUSH ROD RETAINER FASTENER 2 - PUSH ROD RETAINER 9070

5. Remove push rod retainer (1) 9070.

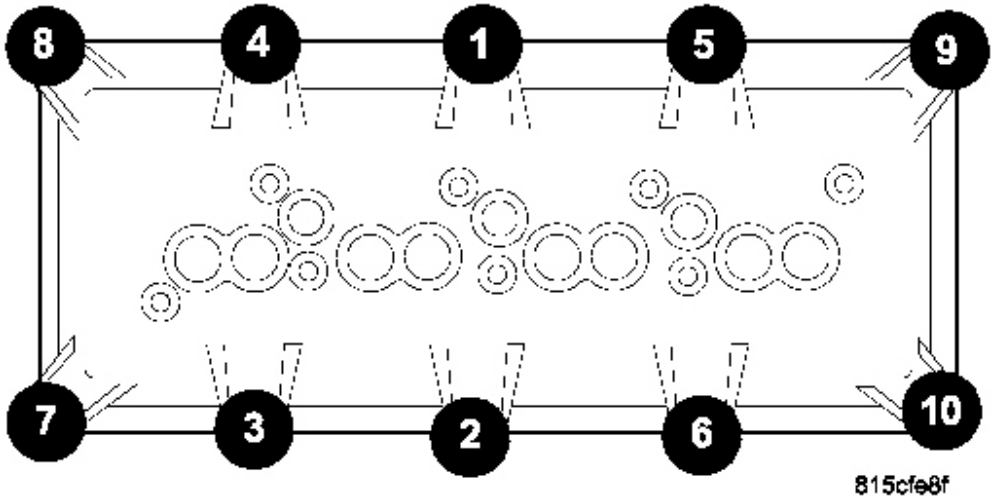

Fig. 83: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

6. Install cylinder head cover. See **INSTALLATION**.

SEALS-VALVE GUIDE

DESCRIPTION

DESCRIPTION VALVE GUIDE SEAL

The valve guide seals are made of rubber and incorporate an integral steel valve spring seat. The integral garter spring maintains consistent lubrication control to the valve stems.

SPRINGS-VALVE

REMOVAL

VALVE SPRINGS

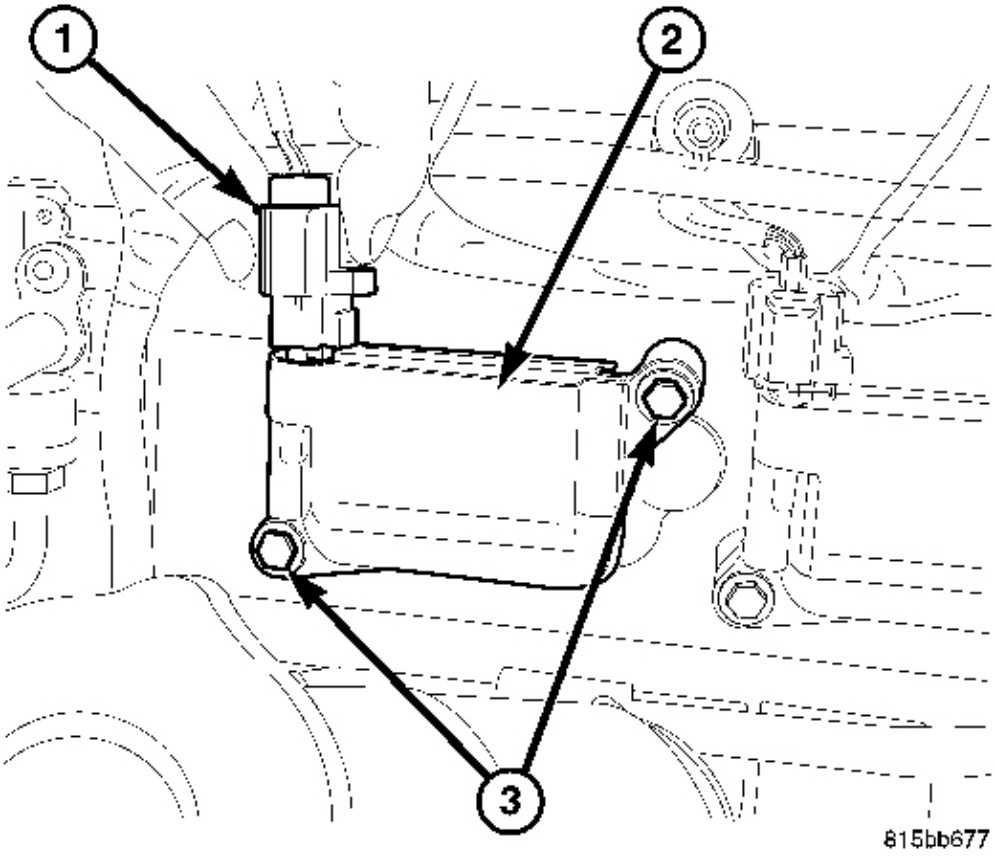

Fig. 84: Ignition Coil Connectors, Ignition Coils & Torque Fasteners
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable.
2. Remove air cleaner assembly.
3. Remove air intake resonator.
4. Remove ignition coil connector (1).
5. Remove ignition coils (2).
6. Remove one spark plug.

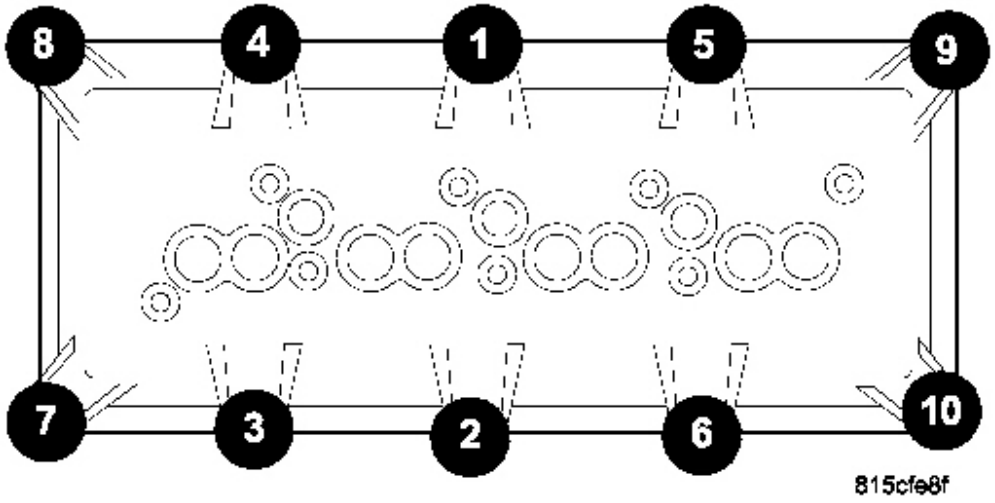

Fig. 85: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

7. Remove cylinder head cover (1) using the sequence shown. See **REMOVAL**.

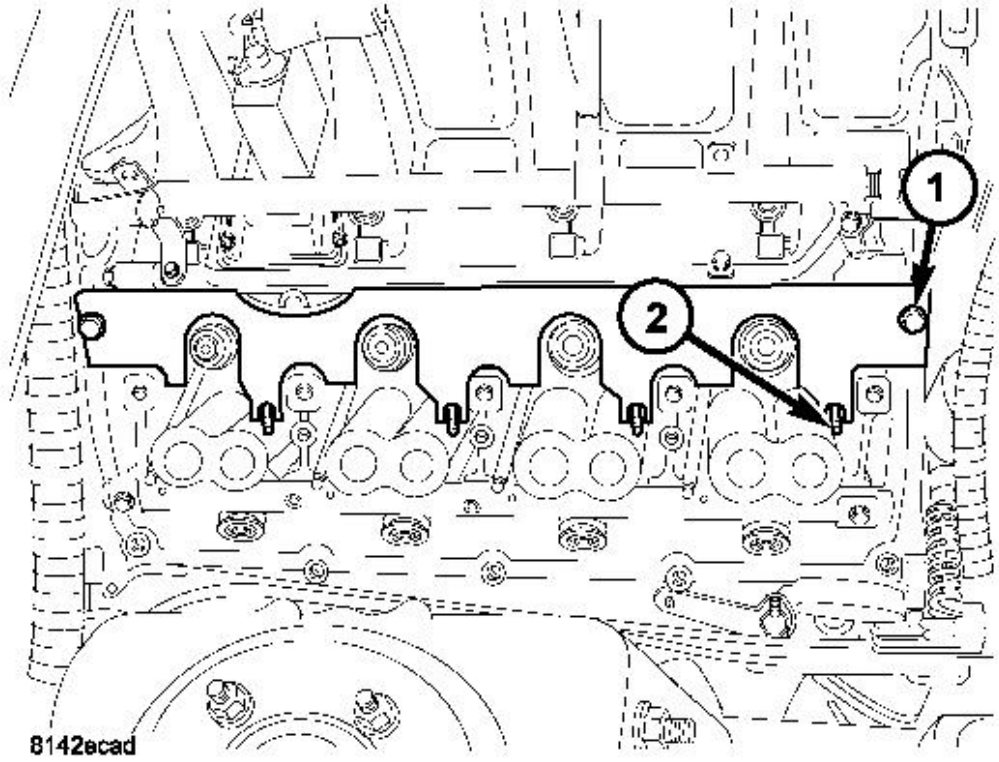

Fig. 86: Push Rod Retainer Fastener & Push Rod Retainer 9070
Courtesy of CHRYSLER LLC

1 - PUSH ROD RETAINER FASTENER
2 - PUSH ROD RETAINER 9070

CAUTION: The piston must be at TDC, and both valves closed on the cylinder to be serviced.

NOTE: If removing intake valve spring, install push rod retaining plate 9070, (1), to retain the intake push rods (2).

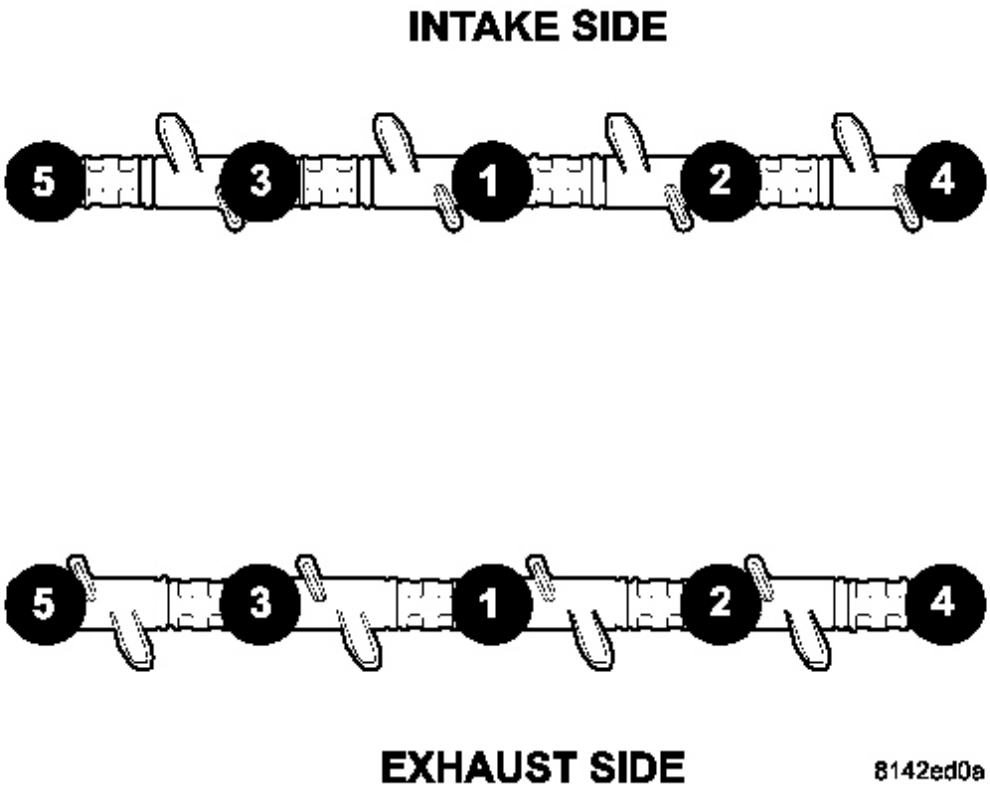

Fig. 87: Rocker Shaft Torque Sequence
Courtesy of CHRYSLER LLC

8. Remove exhaust/intake rocker arm shafts using the sequence shown.

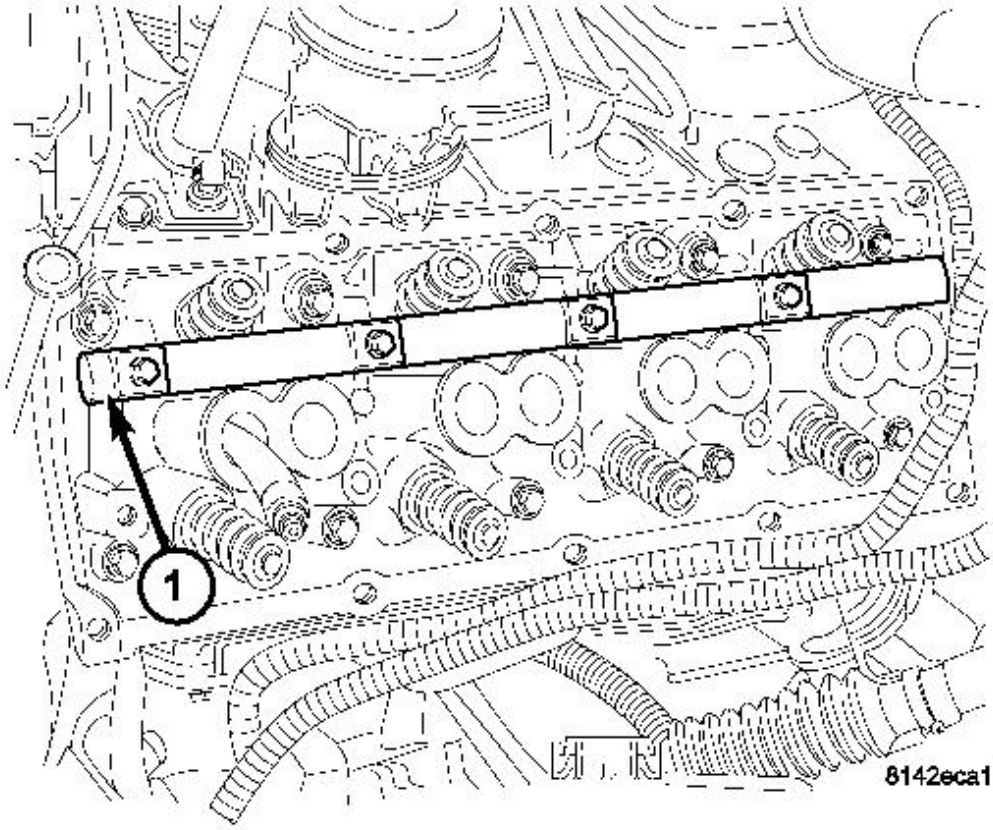

Fig. 88: Rocker Arm Shaft 9065
Courtesy of CHRYSLER LLC

1 - ROCKER ARM SHAFT 9065

9. Install rocker arm shaft 9065 (1).

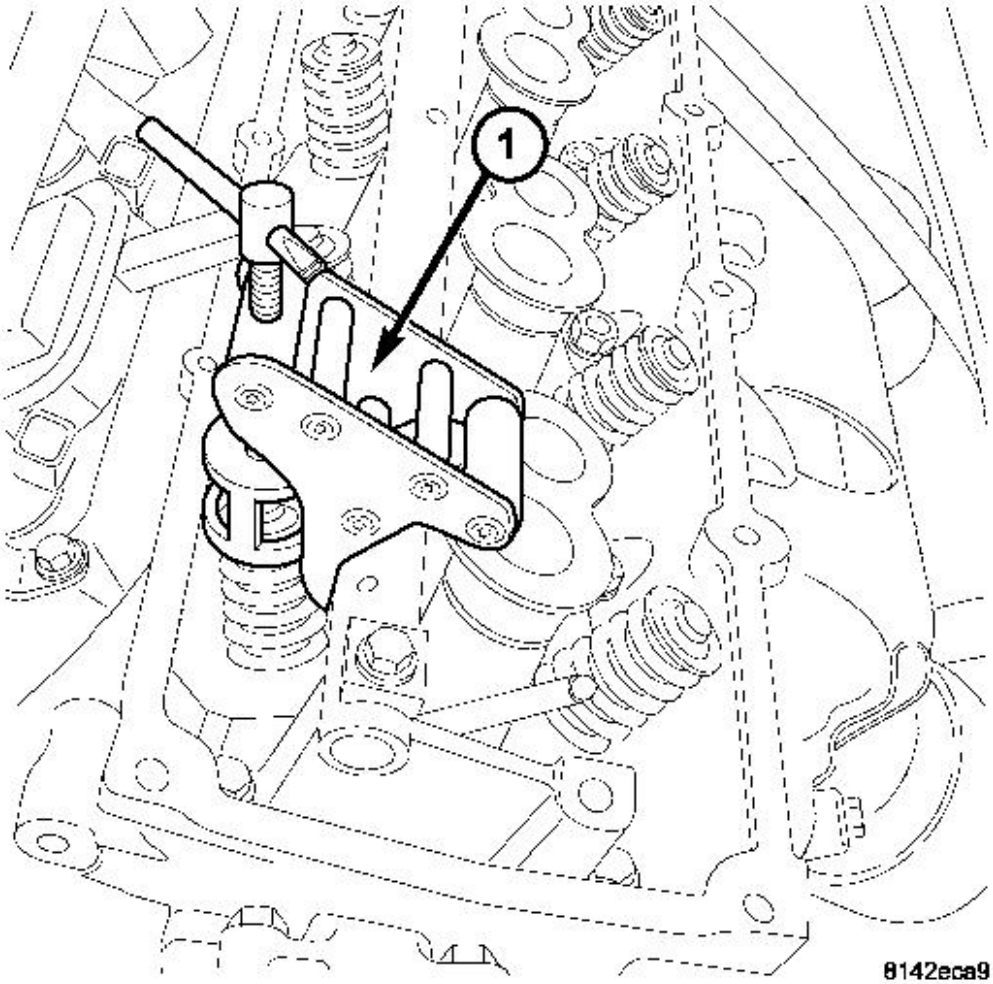

Fig. 89: Valve Spring Compressor Tool 9065
Courtesy of CHRYSLER LLC

1 - VALVE SPRING COMPRESSOR TOOL 9065

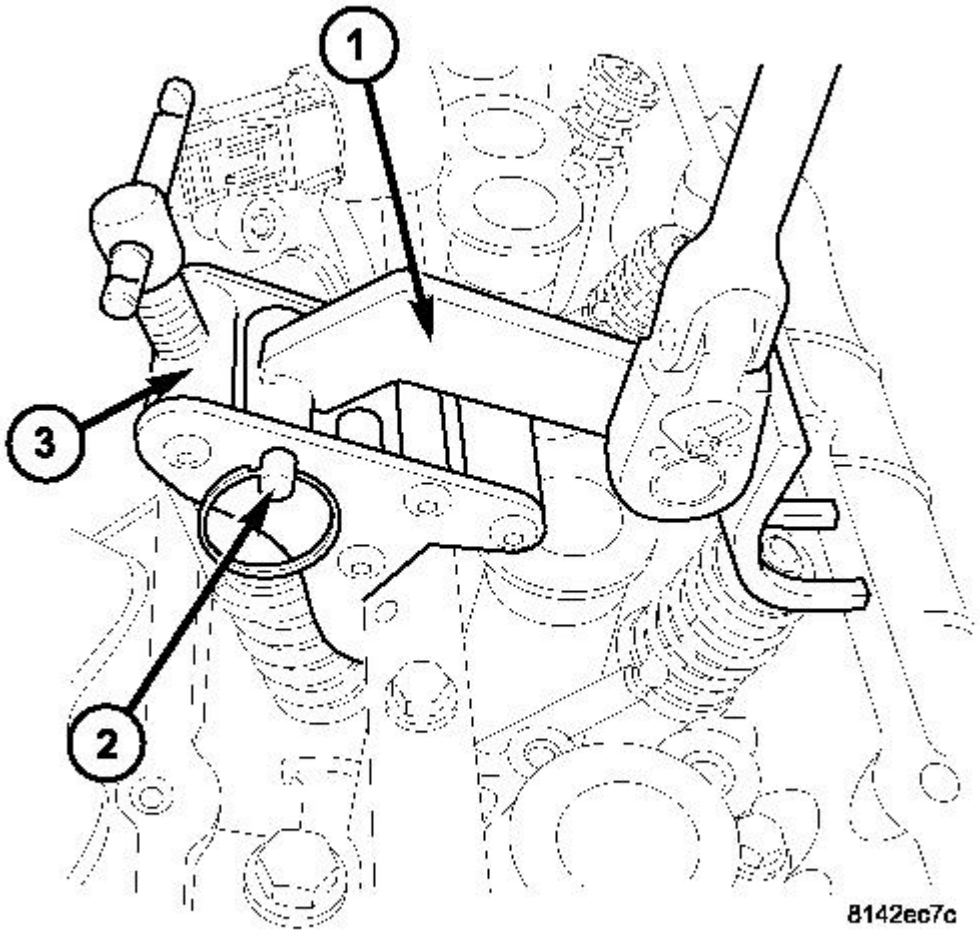

Fig. 90: Valve Spring Tool Adapter
Courtesy of CHRYSLER LLC

1 - EXHAUST ADAPTER 9065
2 - ADAPTER PIN
3 - VALVE SPRING COMPRESSOR 9065

10. Install spring compressor 9065 (1,3,) and exhaust adapter arm (1) if needed.

NOTE: All valve springs and seals are removed in the same manner.

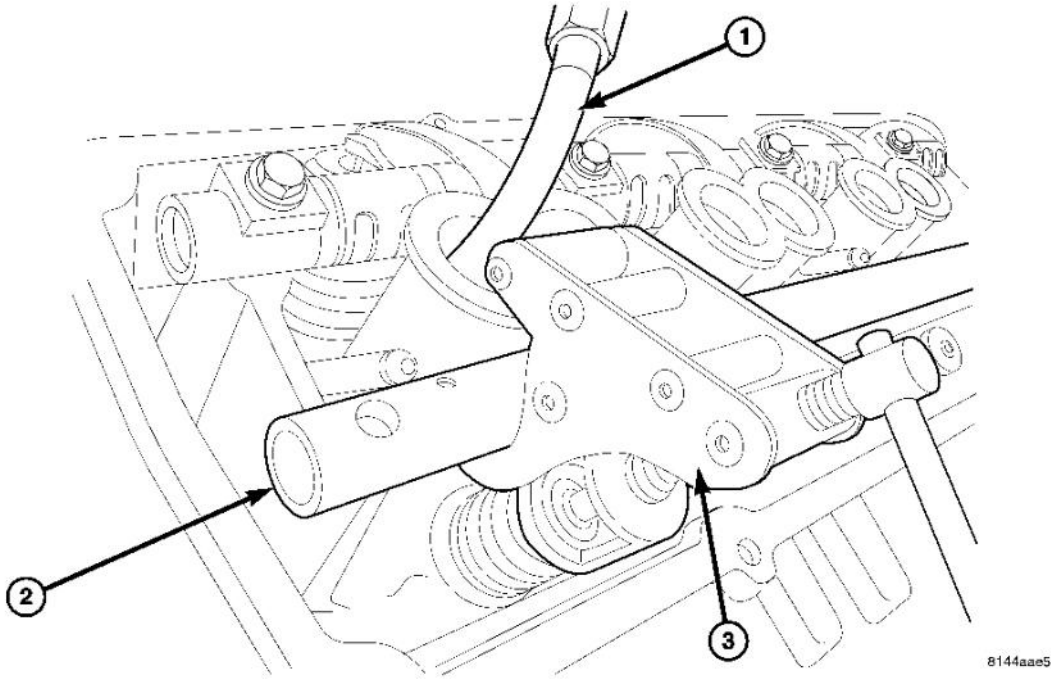

Fig. 91: Air Hose, Dummy Shaft & Valve Spring Compressor 9065
Courtesy of CHRYSLER LLC

1 - AIR HOSE
2 - DUMMY SHAFT
3 - VALVE SPRING COMPRESSOR 9065

11. Insert air hose (1) into spark plug hole and charge cylinder with air.

NOTE: Tap the top of the valve spring retainer to loosen the spring retainers locks.

12. Compress valve spring with valve spring compressor 9065 (3) and remove valve retainer locks.
13. Release spring compressor (3) and remove valve spring.

NOTE: The valve springs are interchangeable between intake and exhaust.

14. Remove valve seal.

INSTALLATION

VALVE SPRINGS

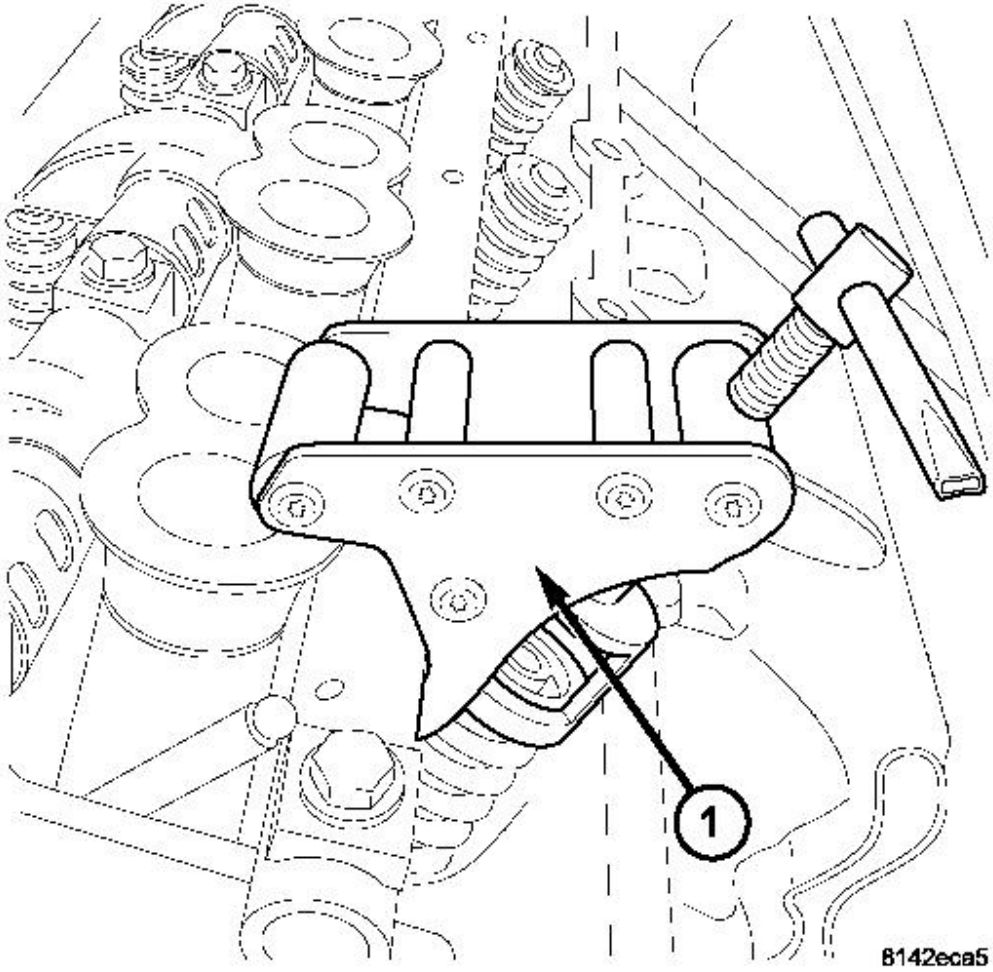

Fig. 92: Valve Spring Remove/Install - Exhaust
Courtesy of CHRYSLER LLC

1 - VALVE SPRING COMPRESSOR TOOL# 9065

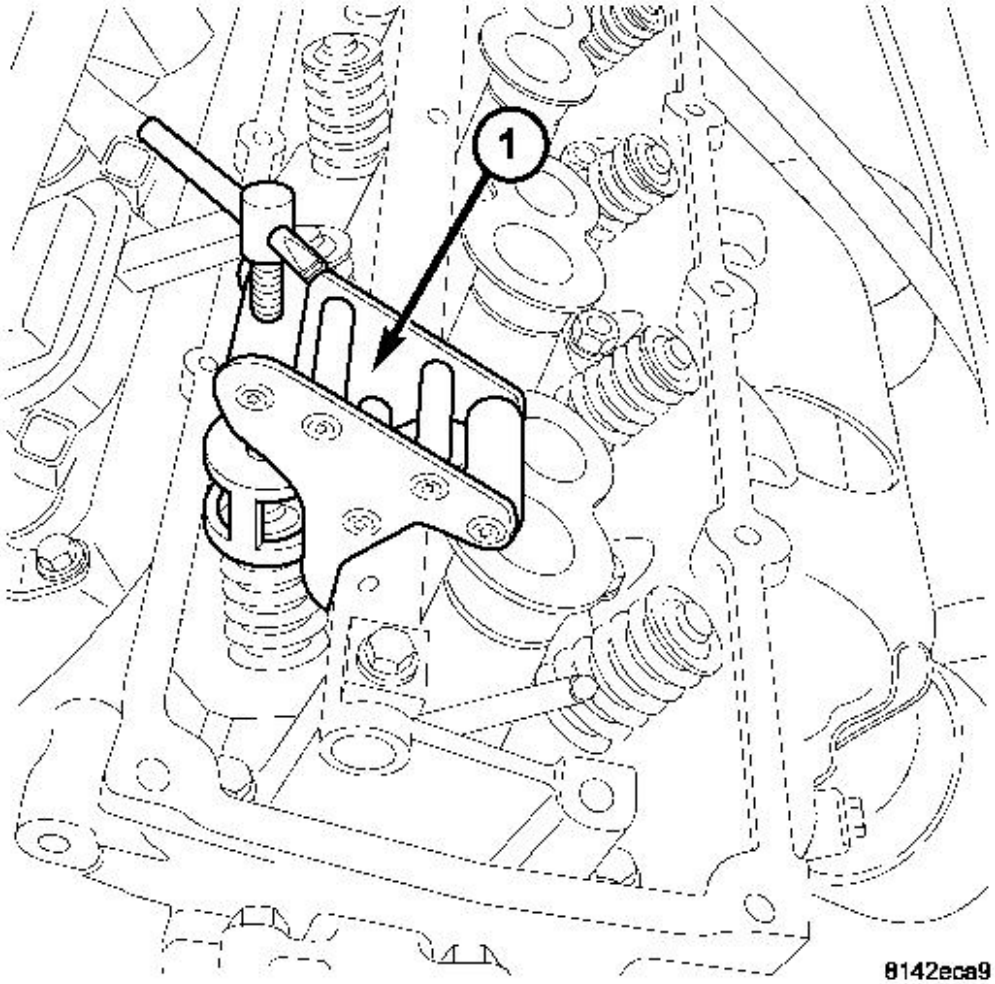

Fig. 93: Valve Spring Compressor Tool 9065
Courtesy of CHRYSLER LLC

1 - VALVE SPRING COMPRESSOR TOOL 9065

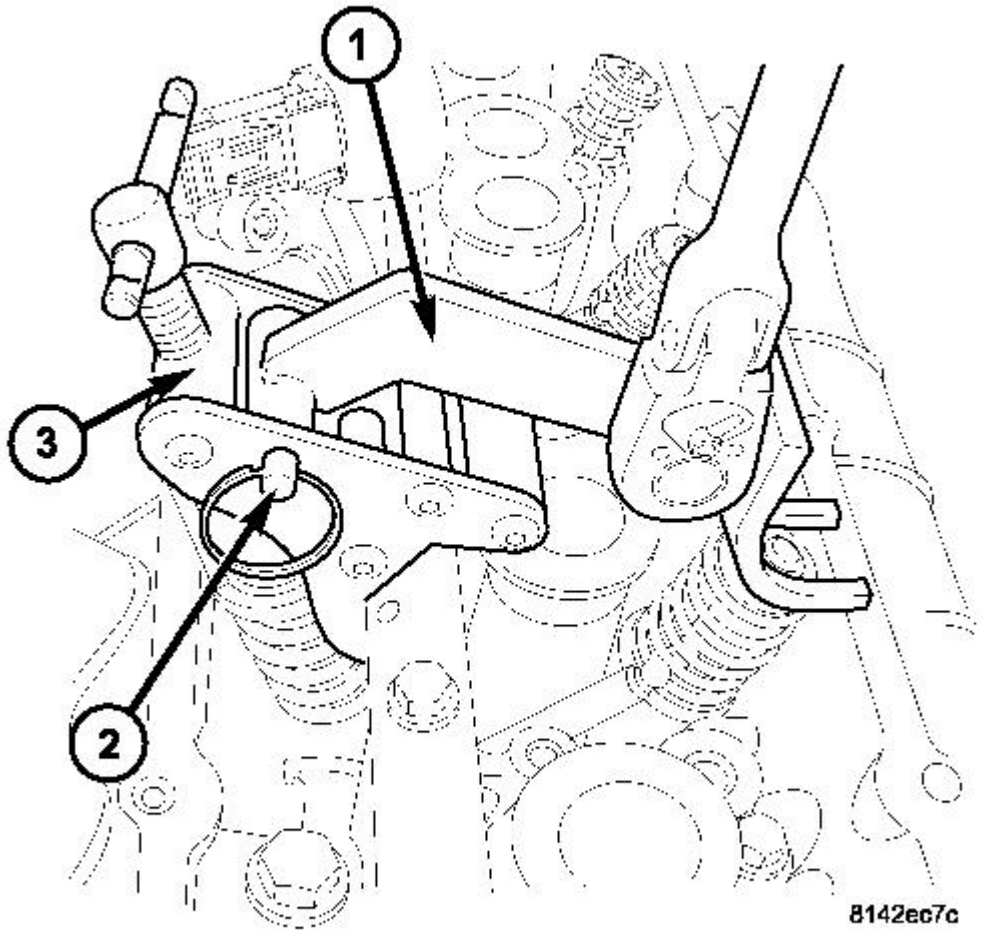

Fig. 94: Valve Spring Tool Adapter
Courtesy of CHRYSLER LLC

1 - EXHAUST ADAPTER 9065
2 - ADAPTER PIN
3 - VALVE SPRING COMPRESSOR 9065

1. Install valve seal.
2. Install valve spring.
3. Using special tool# 9065 (1,3,), compress valve spring and install valve spring retainer and locks.

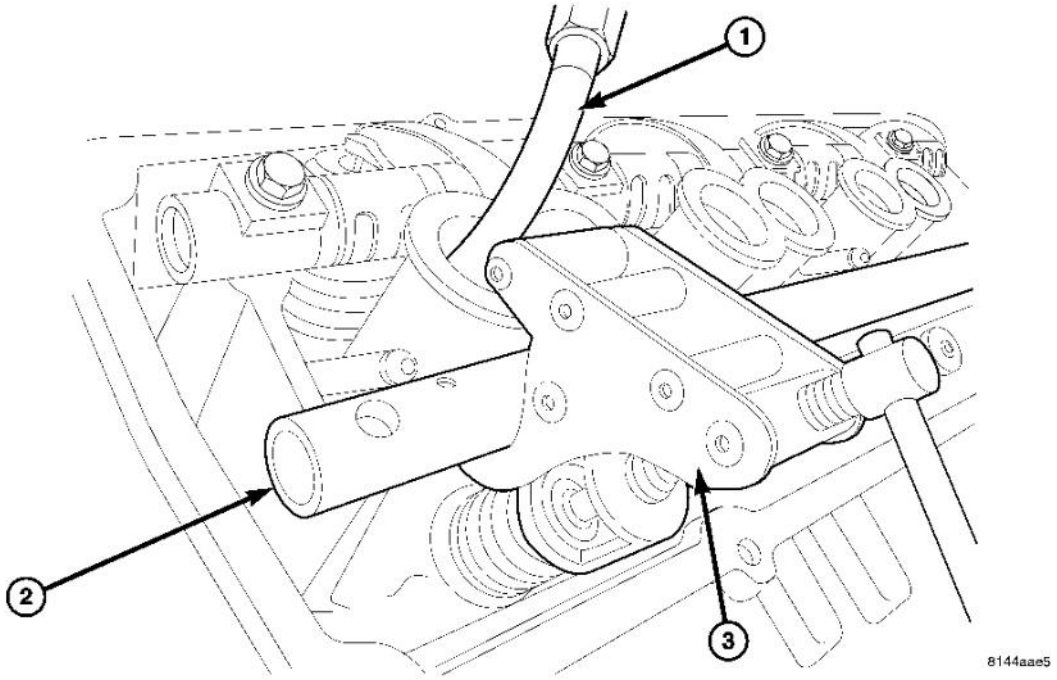

Fig. 95: Air Hose, Dummy Shaft & Valve Spring Compressor 9065
Courtesy of CHRYSLER LLC

1 - AIR HOSE
2 - DUMMY SHAFT
3 - VALVE SPRING COMPRESSOR 9065

4. Release air charge in cylinder (1).
5. Remove spring compressor tool # 9065 (3).

CAUTION: Verify that the pushrods are fully seated into lifter and rocker arm. Recheck after rocker arm shaft has been torqued to specification.

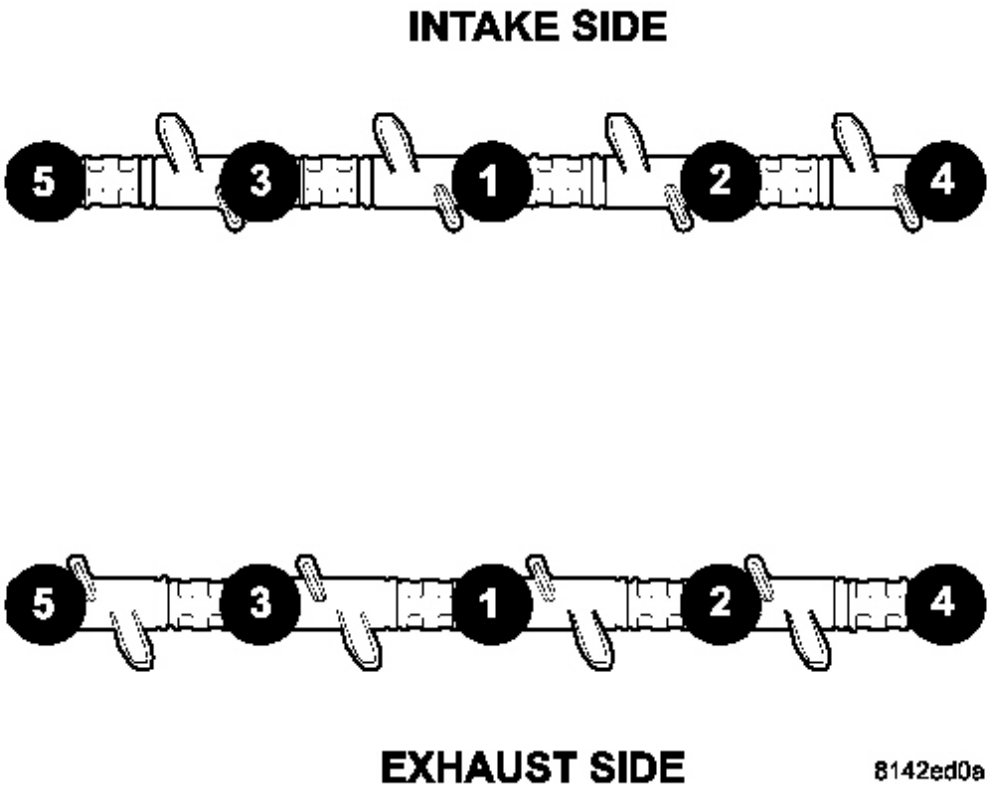

Fig. 96: Rocker Shaft Torque Sequence
Courtesy of CHRYSLER LLC

6. Install rocker arm shaft and pushrods. See **INSTALLATION**.
7. Tighten the rocker shaft bolts to 22 N.m (195 in. lbs.) torque, using the rocker shaft torque sequence.

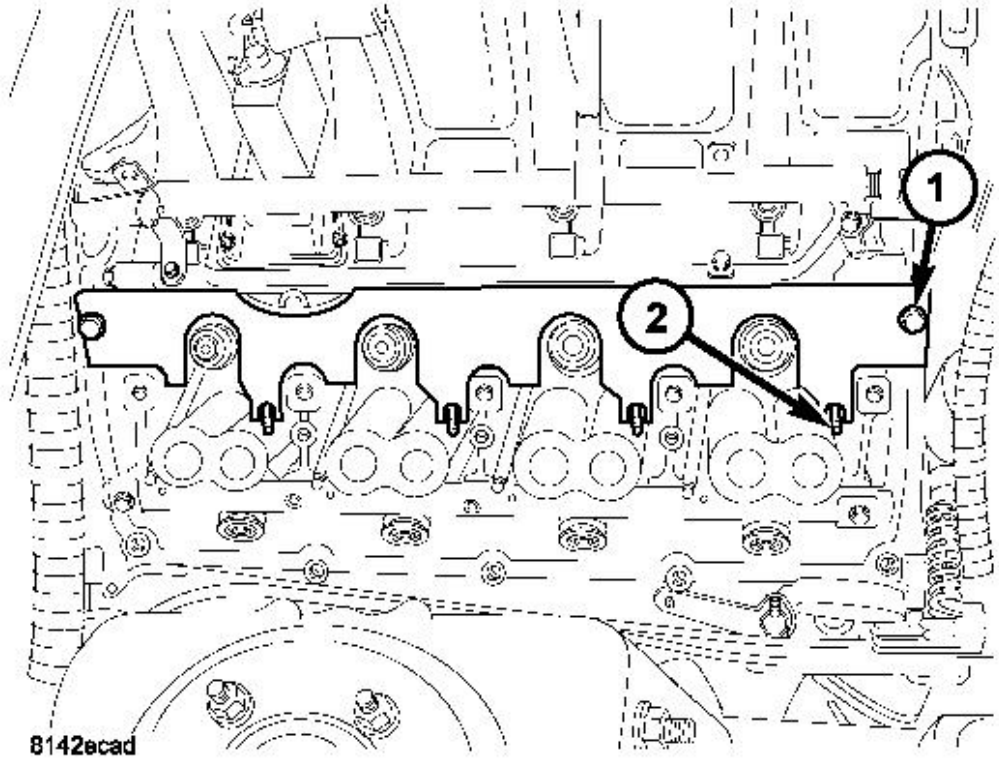

Fig. 97: Push Rod Retainer Fastener & Push Rod Retainer 9070
Courtesy of CHRYSLER LLC

1 - PUSH ROD RETAINER FASTENER 2 - PUSH ROD RETAINER 9070

8. Remove special tool# 9070, pushrod retaining plate (1), if used.

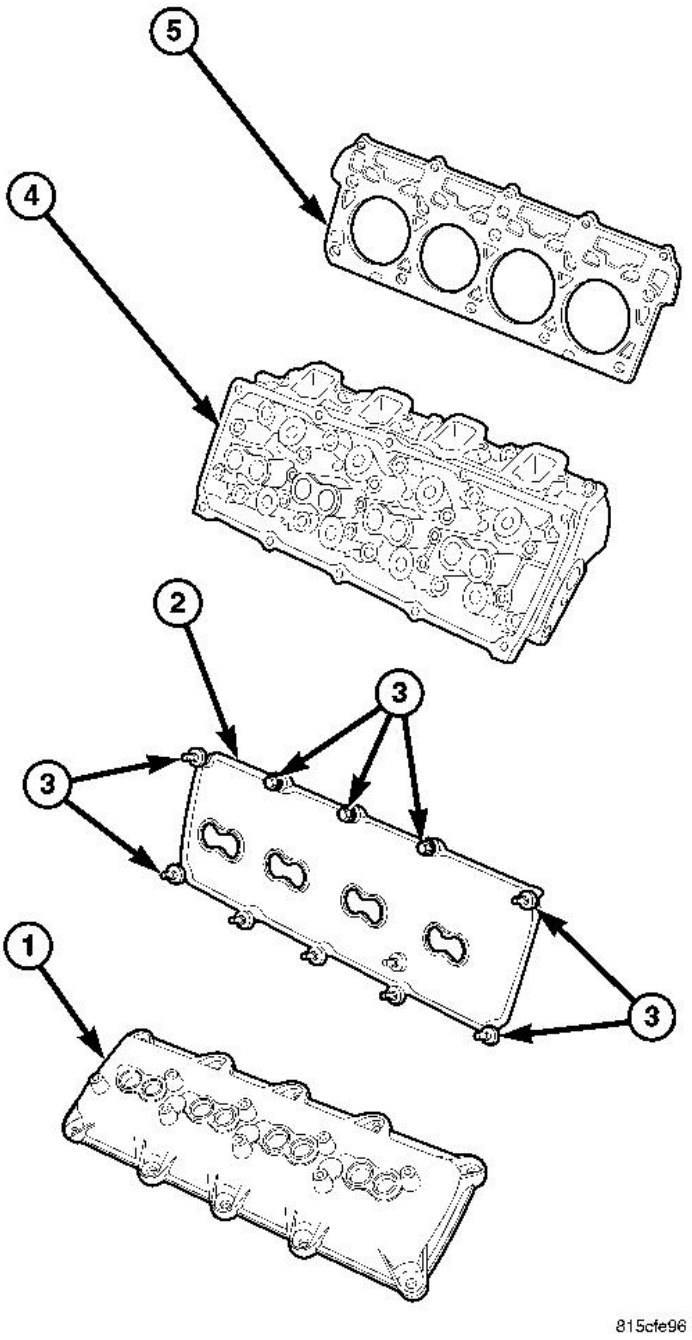

Fig. 98: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET 3 - FASTENERS 4 - CYLINDER HEAD 5 - HEAD GASKET

9. Install cylinder head cover (1).

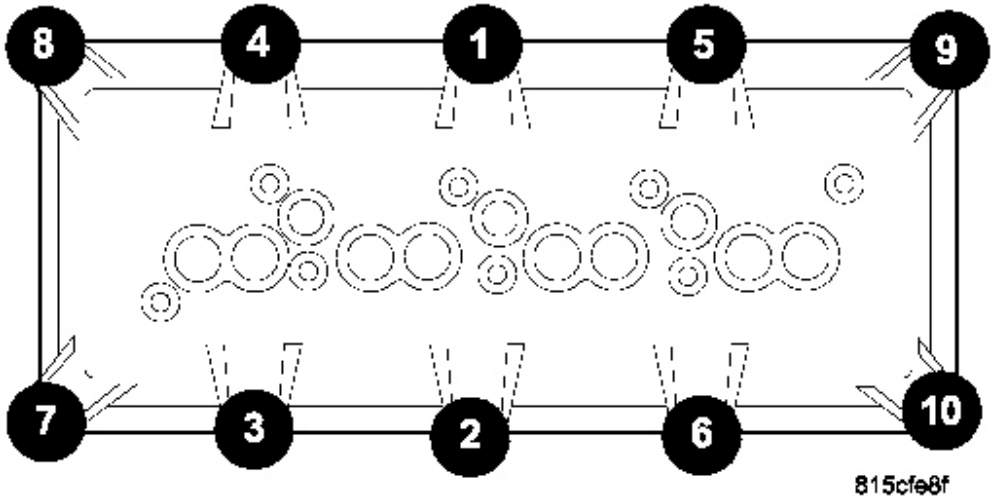

Fig. 99: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

10. Tighten cylinder head cover bolts and double ended studs. See **INSTALLATION**.
11. Install spark plugs.

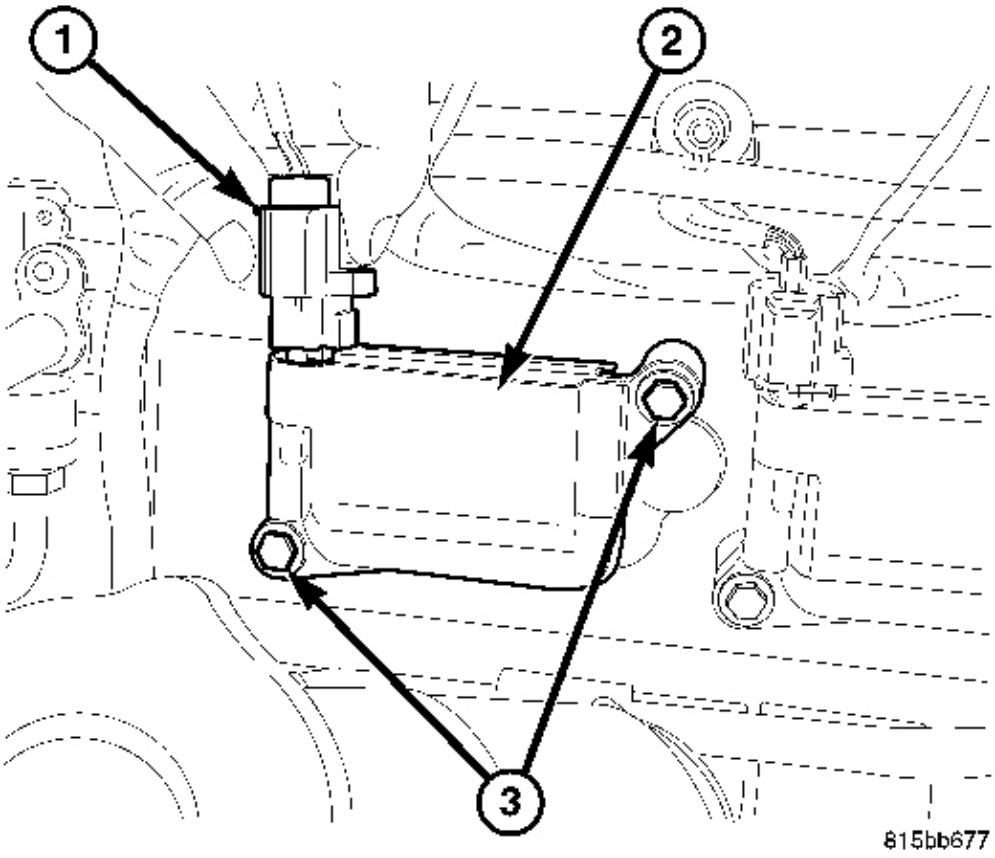

Fig. 100: Ignition Coil Connectors, Ignition Coils & Torque Fasteners
Courtesy of CHRYSLER LLC

12. Install ignition coil on plug (2), and torque fasteners (3) to 7 N.m (62 in. lbs)
13. Install ignition coil connectors (4).
14. Install air intake resonator.
15. Install air cleaner assembly.
16. Connect negative battery cable.

ENGINE BLOCK

CLEANING

CYLINDER BLOCK

Thoroughly clean the oil pan and engine block gasket surfaces.

Use compressed air to clean out:

- The galley at the oil filter adapter hole.
- The front and rear oil galley holes.
- The MDS oil galley holes in the valley.
- The feed holes for the crankshaft main bearings.

Drill and tapped holes should be free of debris upon assembly.

Once the block has been completely cleaned, apply Loctite PST pipe sealant with Teflon 592 to the threads of the front and rear oil galley plugs, and coolant drain plugs. Tighten the oil galley 1/4 inch x 18 NPT plugs to 20 N.m (177 in. lbs.) torque. Tighten the coolant drain 1/4 inch x 18 NPT plugs to 34N.m (300 in. lbs.) torque. Tighten the 3/8 inch x 18 NPT plugs to 27 N.m (240 in. lbs.) torque.

INSPECTION

ENGINE BLOCK

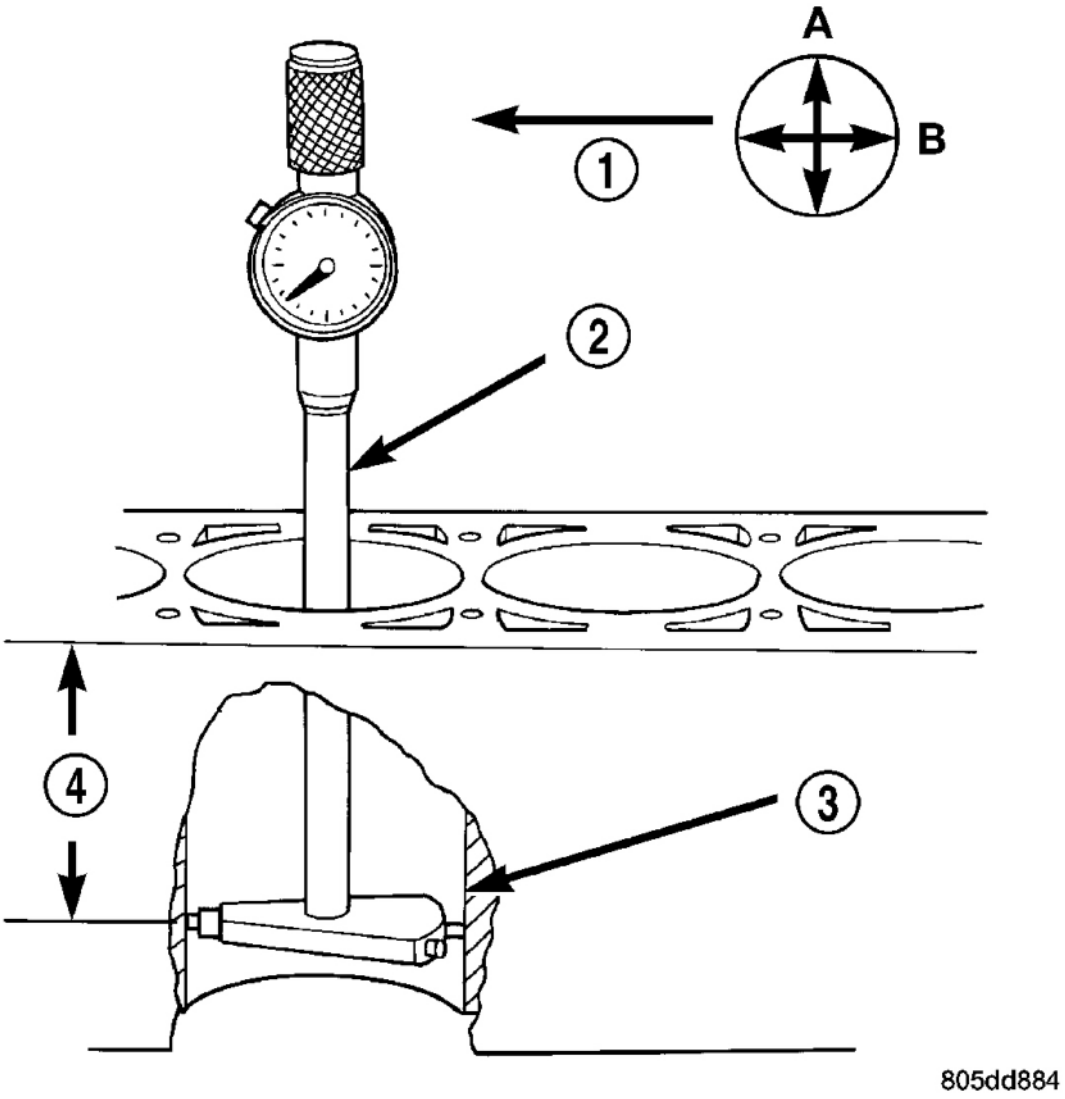

Fig. 101: Measuring Cylinder Bore With Gauge - Typical
Courtesy of CHRYSLER LLC

1 - FRONT
2 - BORE GAUGE
3 - CYLINDER BORE
4 - 38 MM (1.5 in)

1. It is mandatory to use a dial bore gauge to measure each cylinder bore diameter. To correctly select the proper size piston, a cylinder bore gauge, capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at three levels below top of bore. Start perpendicular

(across or at 90 degrees) to the axis of the crankshaft and then take two additional reading.

3. Measure the cylinder bore diameter crosswise to the cylinder block near the top of the bore. Repeat the measurement near the middle of the bore, then repeat the measurement near the bottom of the bore.
4. Determine taper by subtracting the smaller diameter from the larger diameter.
5. Rotate measuring device 90° and repeat steps above.
6. Determine out-of-roundness by comparing the difference between each measurement.
7. If cylinder bore taper does not exceed 0.025 mm (0.001 inch) and out-of-roundness does not exceed 0.015 mm (0.0006 inch), the cylinder bore can be honed. If the cylinder bore taper or out- of-round condition exceeds these maximum limits, the cylinder block must be replaced. A slight amount of taper always exists in the cylinder bore after the engine has been in use for a period of time.

CAMSHAFT

REMOVAL

CAMSHAFT

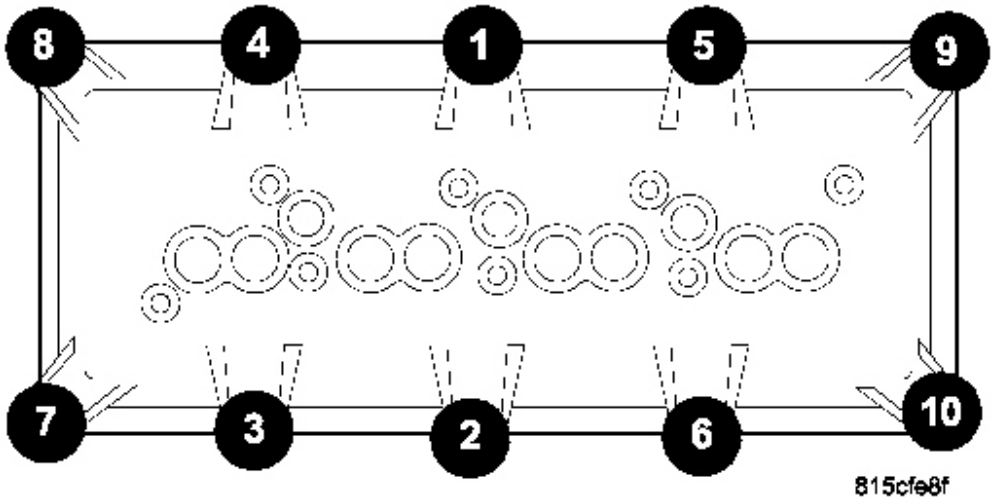

Fig. 102: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

1. Remove the battery negative cable.
2. Remove the air cleaner assembly.
3. Drain coolant. Refer to **STANDARD PROCEDURE** .
4. Remove the accessory drive belt. Refer to **REMOVAL** .

5. Remove the generator.
6. Remove the A/C compressor, and set aside.
7. Remove the radiator. Refer to **REMOVAL** .
8. Remove intake manifold. See **REMOVAL**.
9. Remove cylinder head covers. See **REMOVAL**.

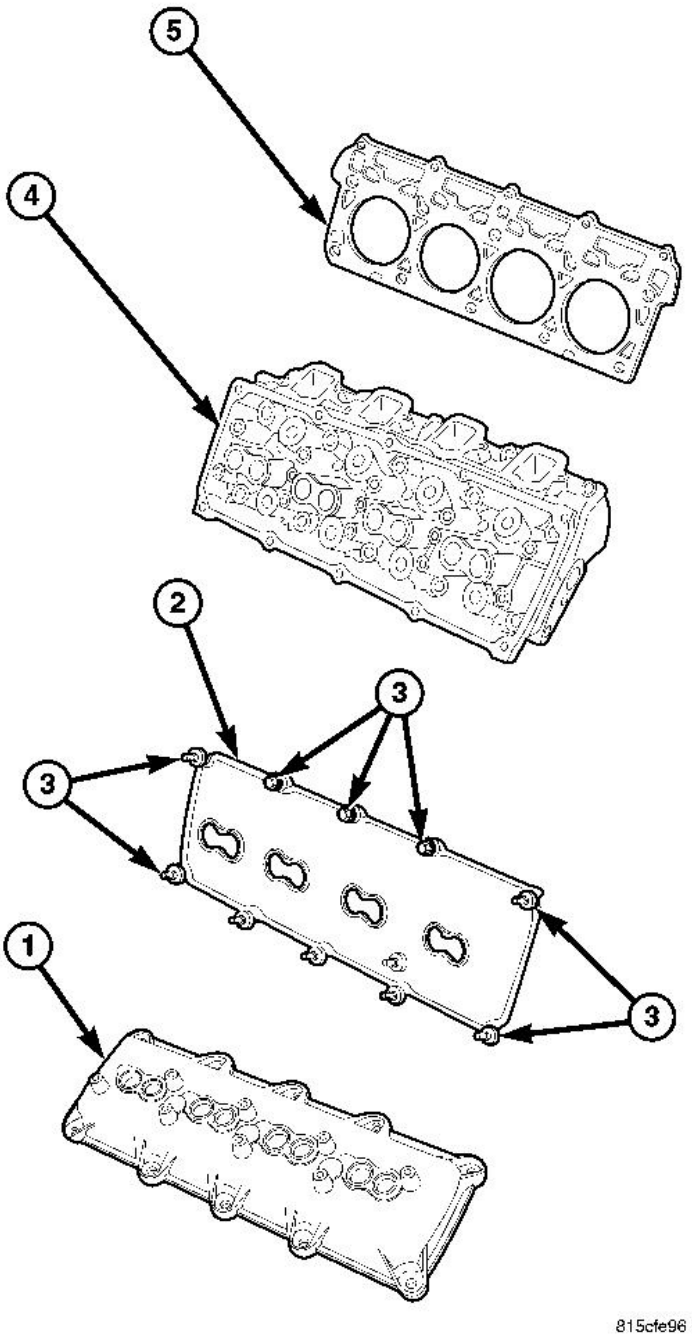

Fig. 103: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET
3 - FASTENERS
4 - CYLINDER HEAD
5 - HEAD GASKET

10. Remove both left and right cylinder heads (4). See **REMOVAL**.
11. Remove the oil pan. See **REMOVAL**.

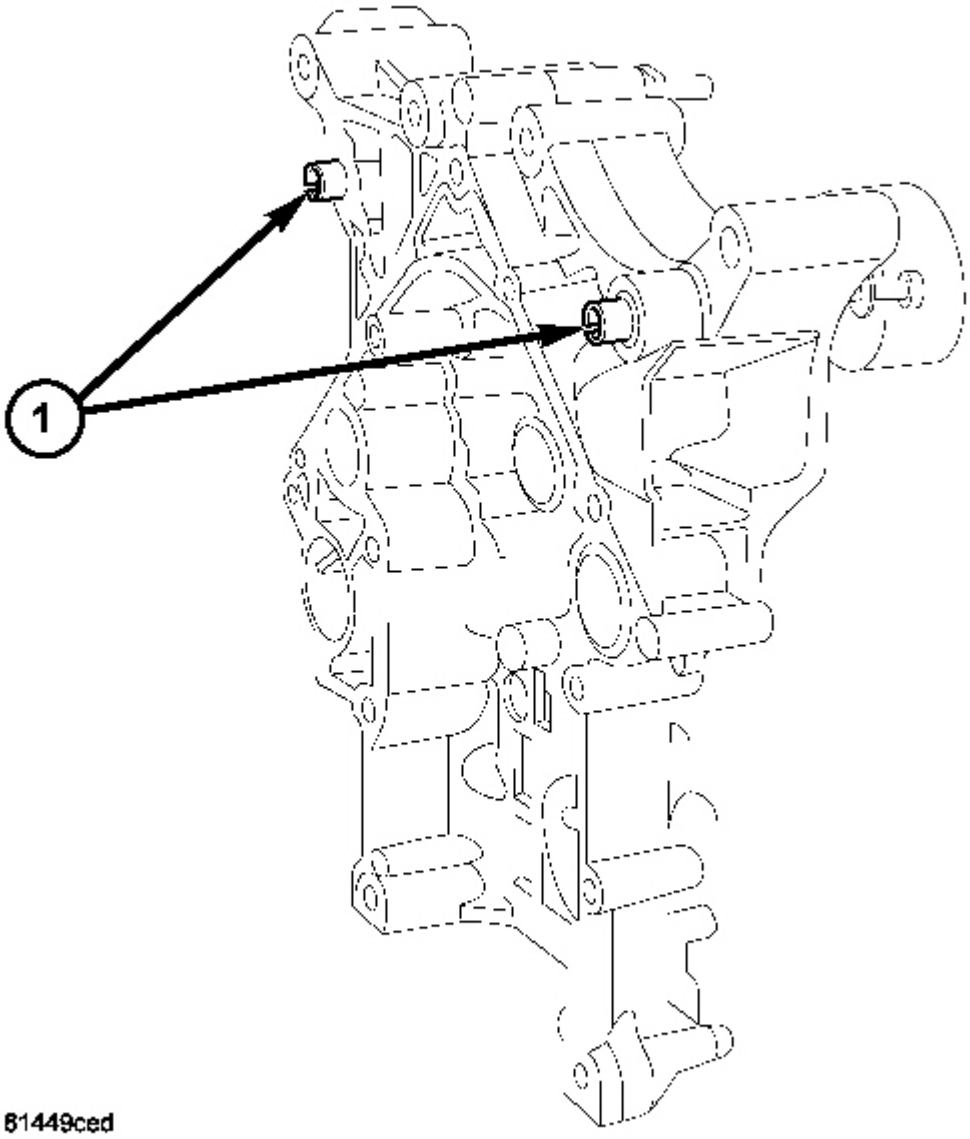

Fig. 104: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

12. Remove timing case cover (1). See **REMOVAL**.
13. Remove the oil pick up tube.

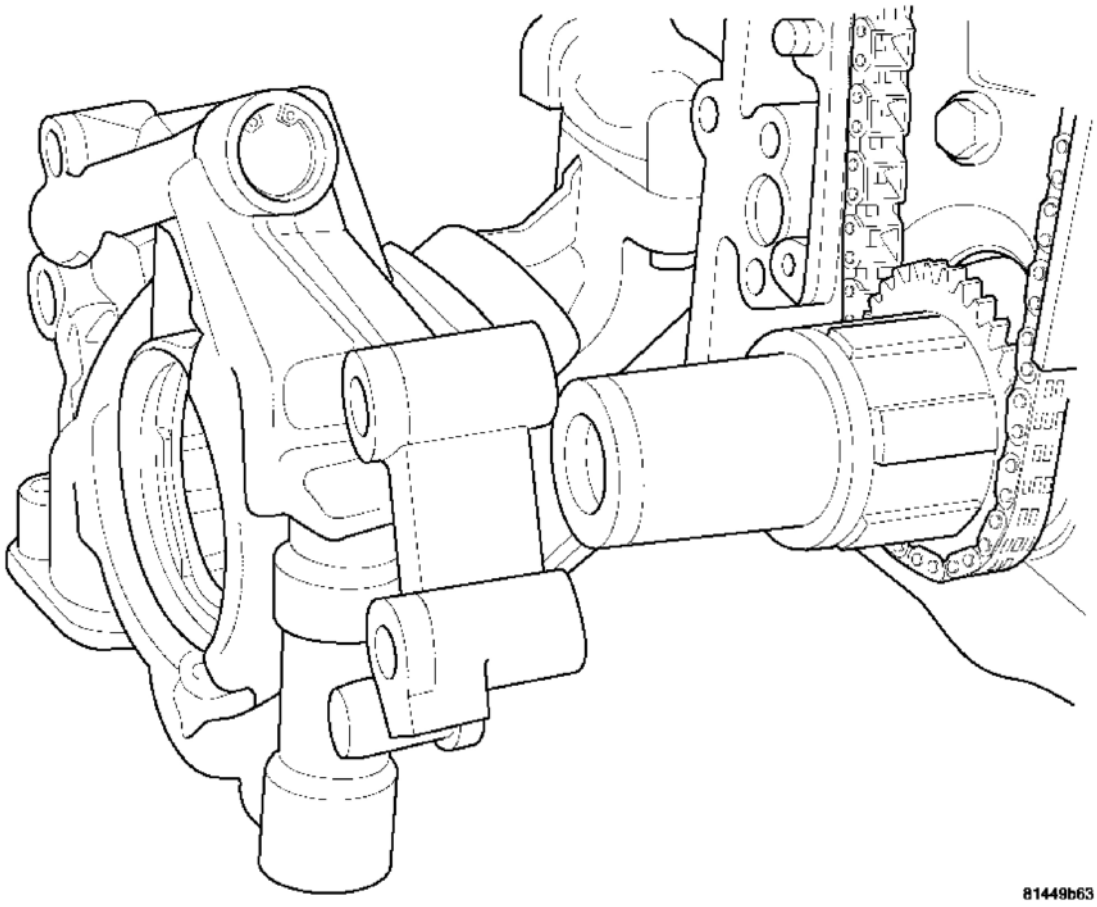

Fig. 105: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

14. Remove the oil pump. See **REMOVAL**.

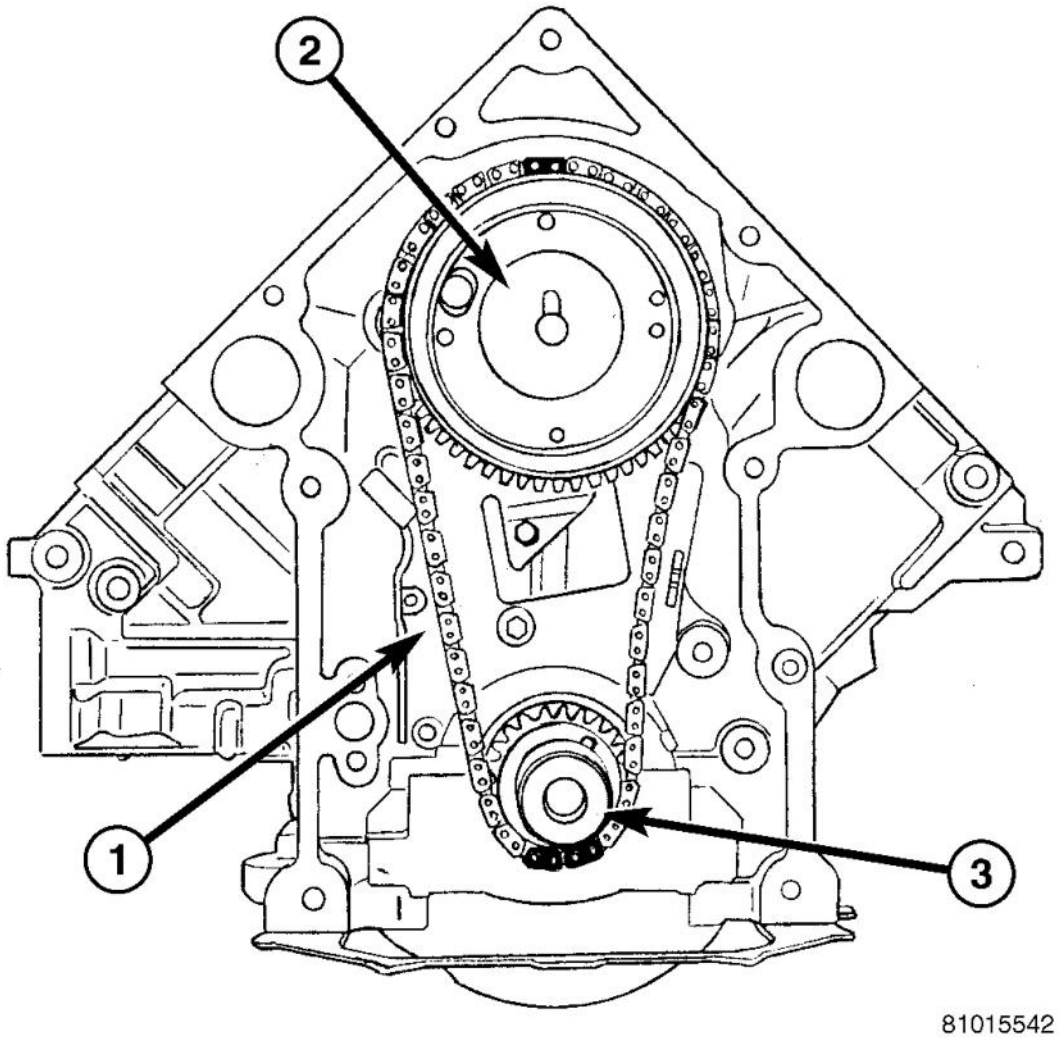

Fig. 106: Identifying Chain Tensioner, Camshaft Sprocket & Crankshaft Sprocket
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

15. Remove timing chain (2). See **REMOVAL**.
16. Remove camshaft tensioner/thrust plate assembly.

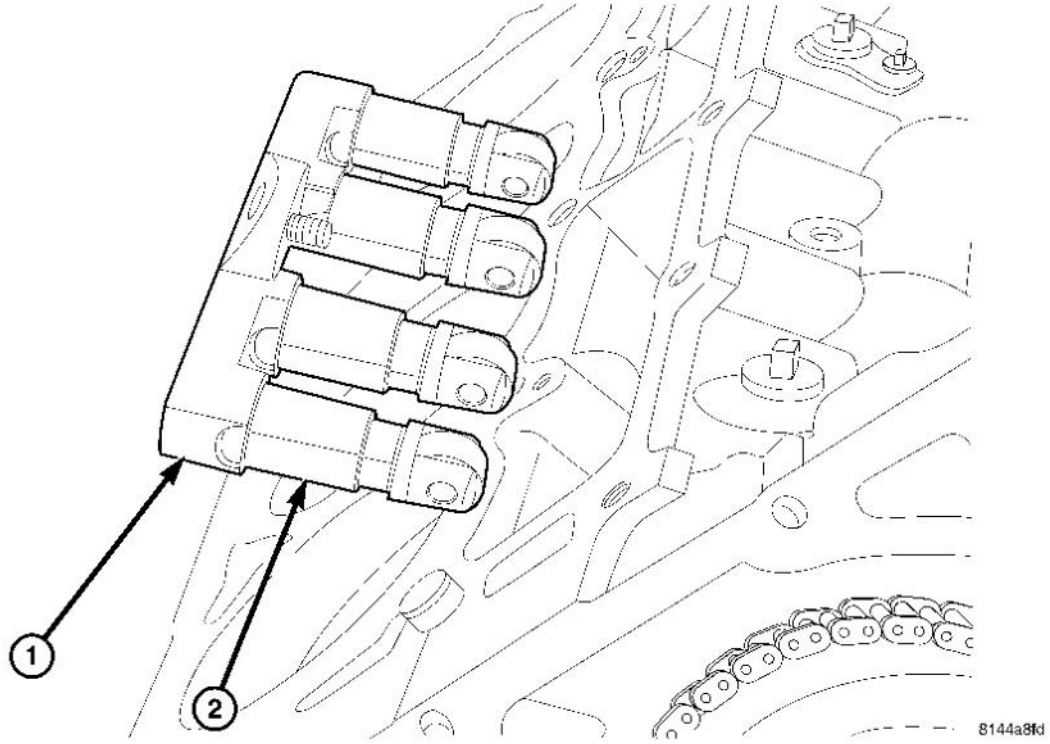

Fig. 107: Tappet Retainer & Hydraulic Roller Tappet
Courtesy of CHRYSLER LLC

1 - TAPPET RETAINER 2 - HYDRAULIC ROLLER TAPPET

NOTE: Identify lifters to ensure installation in original location.

17. Remove the tappets (2) and retainer (1) assembly.

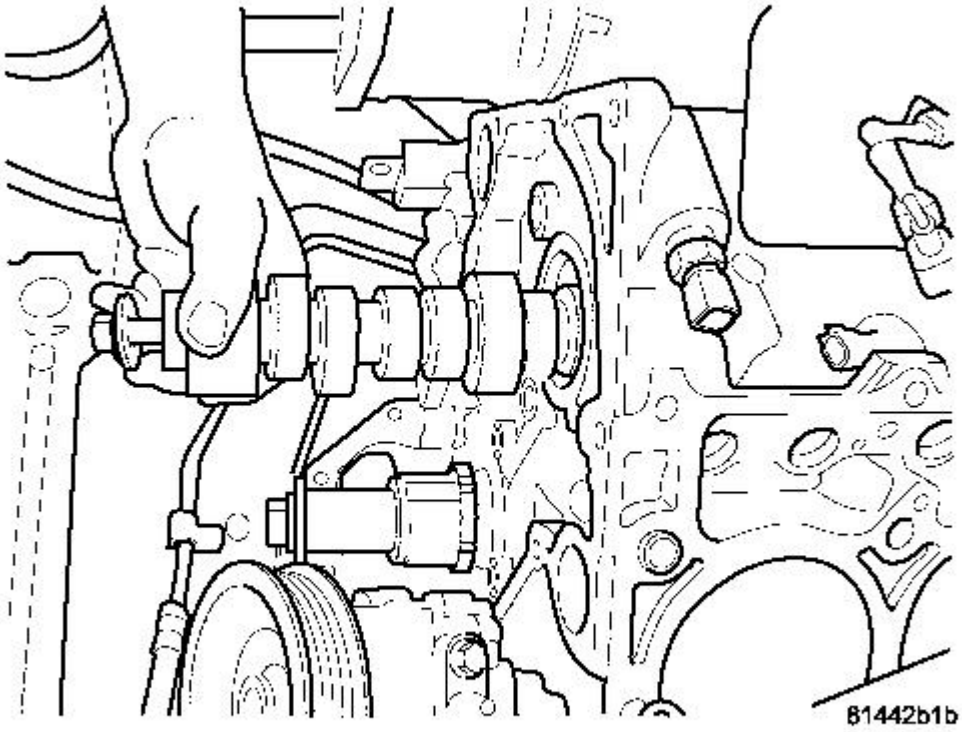

Fig. 108: Removing/Installing Camshaft
Courtesy of CHRYSLER LLC

18. Install a long bolt into front of camshaft to aid in removal of the camshaft. Remove camshaft, being careful not to damage cam bearings with the cam lobes.

CAMSHAFT CORE HOLE PLUG

CAUTION: Do not damage the rear surface of the camshaft or the core plug sealing surface, when removing the core plug.

1. Remove the rear cam bearing core plug.

INSPECTION

CAMSHAFT BEARINGS

1. The cam bearings are not serviceable. Do not attempt to replace cam bearings for any reason.

INSTALLATION

CAMSHAFT

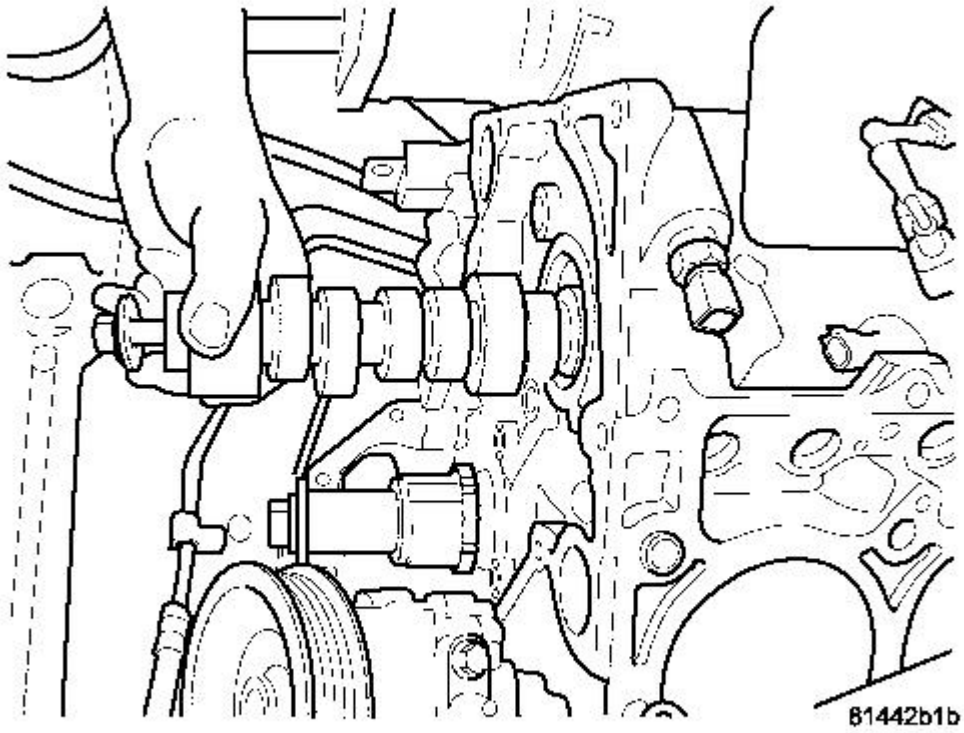

Fig. 109: Removing/Installing Camshaft
Courtesy of CHRYSLER LLC

CAUTION: 5.7L engines equipped with MDS uses a unique camshaft for use with the Multi Displacement System. When installing a new camshaft, the replacement camshaft must be compatible with the Multi Displacement System.

1. Lubricate camshaft lobes and camshaft bearing journals and insert the camshaft.

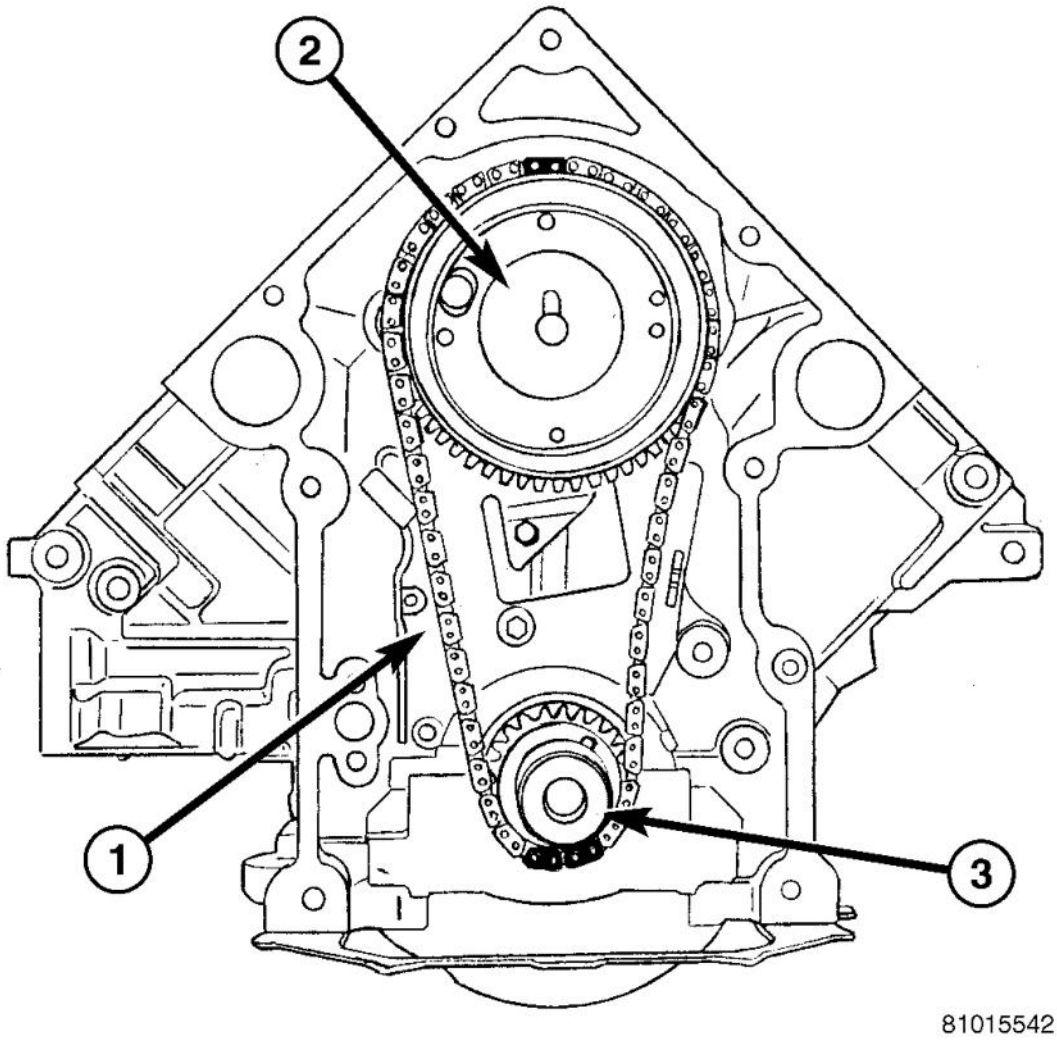

Fig. 110: Identifying Chain Tensioner, Camshaft Sprocket & Crankshaft Sprocket
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

2. Install camshaft Tensioner plate assembly. Tighten bolts to 28 N.m (250 in. lbs.).
3. Install timing chain and sprockets. See **INSTALLATION**.
4. Measure camshaft end play. See **SPECIFICATIONS**. If not within limits install a new thrust plate.

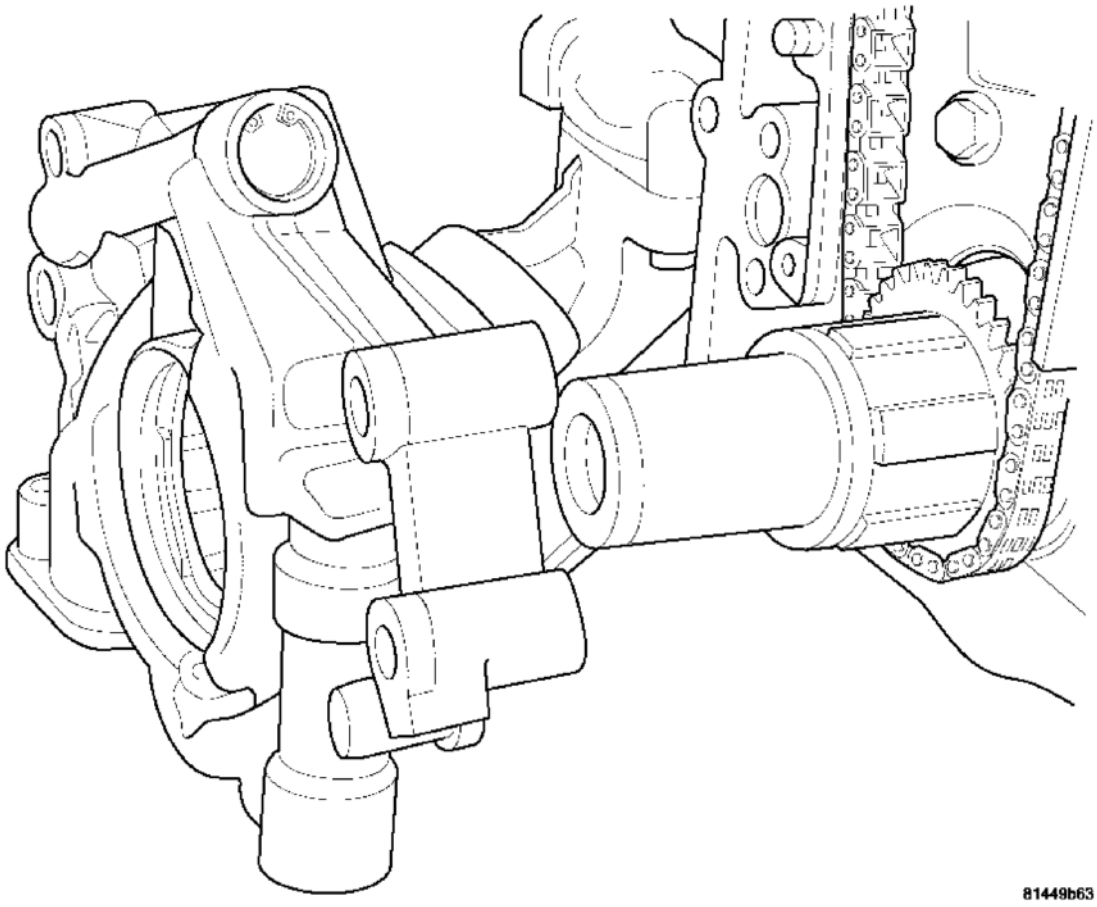

Fig. 111: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

5. Install the oil pump. See **INSTALLATION**.
6. Install the oil pick up tube.

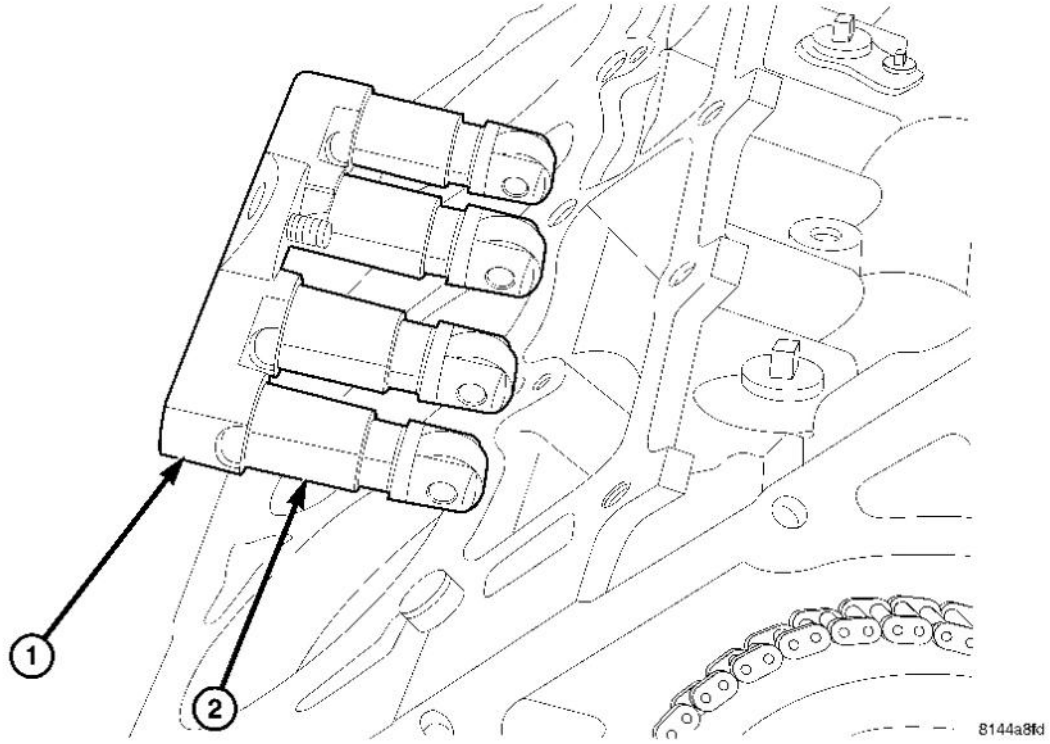

Fig. 112: Tappet Retainer & Hydraulic Roller Tappet
Courtesy of CHRYSLER LLC

1 - TAPPET RETAINER 2 - HYDRAULIC ROLLER TAPPET

7. Each tappet (2) reused must be installed in the same position from which it was removed. **When camshaft is replaced, all of the tappets must be replaced.**

CAUTION: 5.7L engines equipped with MDS uses both standard roller tappets and deactivating roller tappets, for use with the Multi Displacement System. The deactivating roller tappets must be used in cylinders 1,4,6,7. The deactivating tappets can be identified by the two holes in the side of the tappet body, for the latching pins.

8. Install tappets (2) and retaining yoke assembly (1). See **INSTALLATION**. - INSTALLATION).

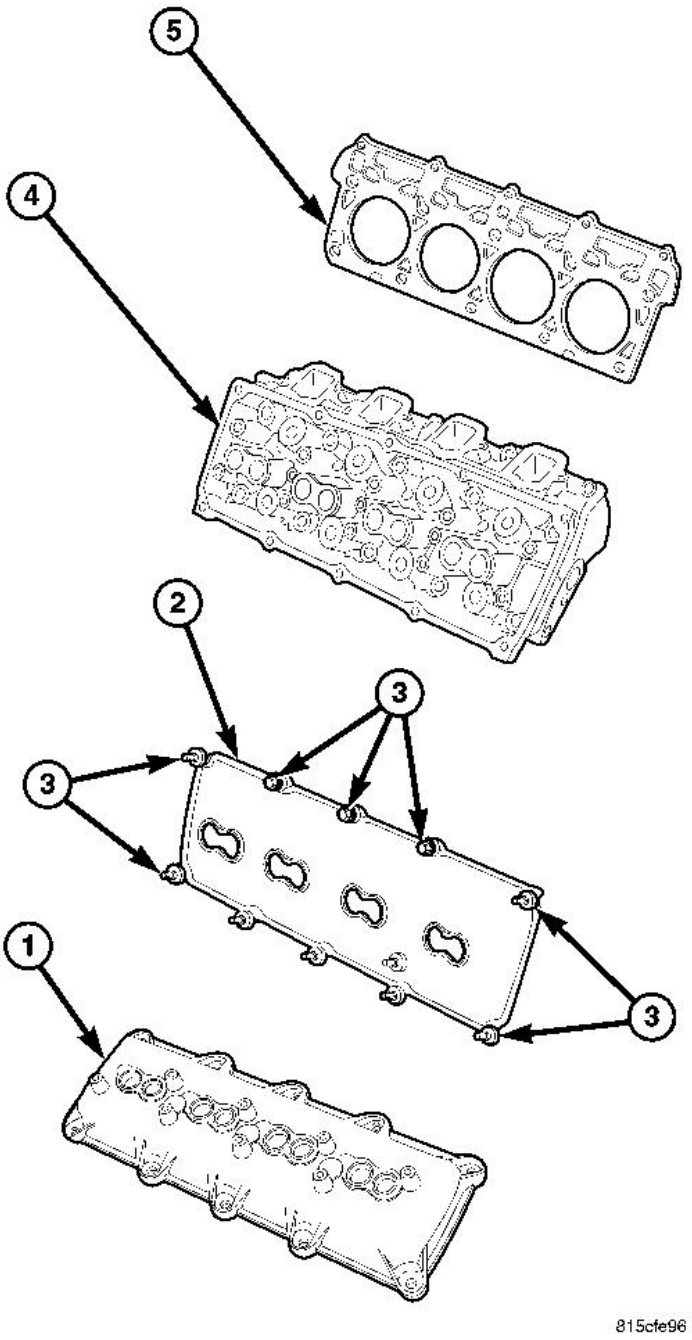

Fig. 113: 5.7L/6.1L Cylinder Head Components
Courtesy of CHRYSLER LLC

1 - CYLINDER HEAD COVER

2 - GASKET 3 - FASTENERS 4 - CYLINDER HEAD 5 - HEAD GASKET

9. Install both left and right cylinder heads (4). See **INSTALLATION**.
10. Install push rods.

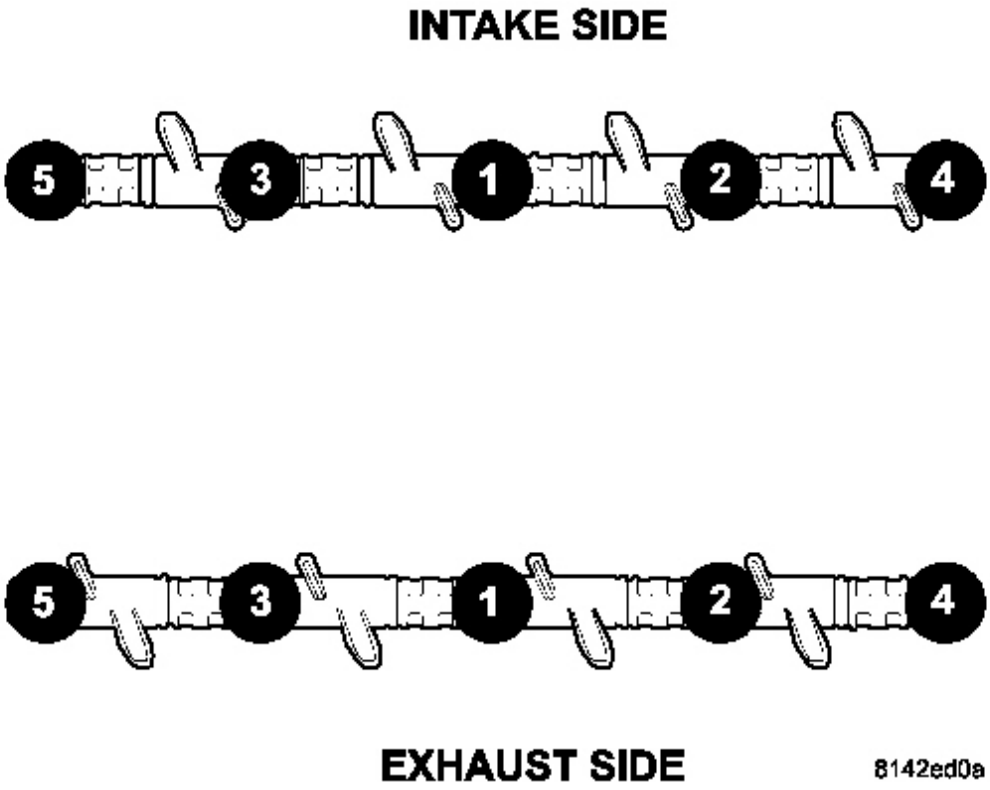

Fig. 114: Rocker Shaft Torque Sequence
Courtesy of CHRYSLER LLC

11. Install rocker arms. See **INSTALLATION**.

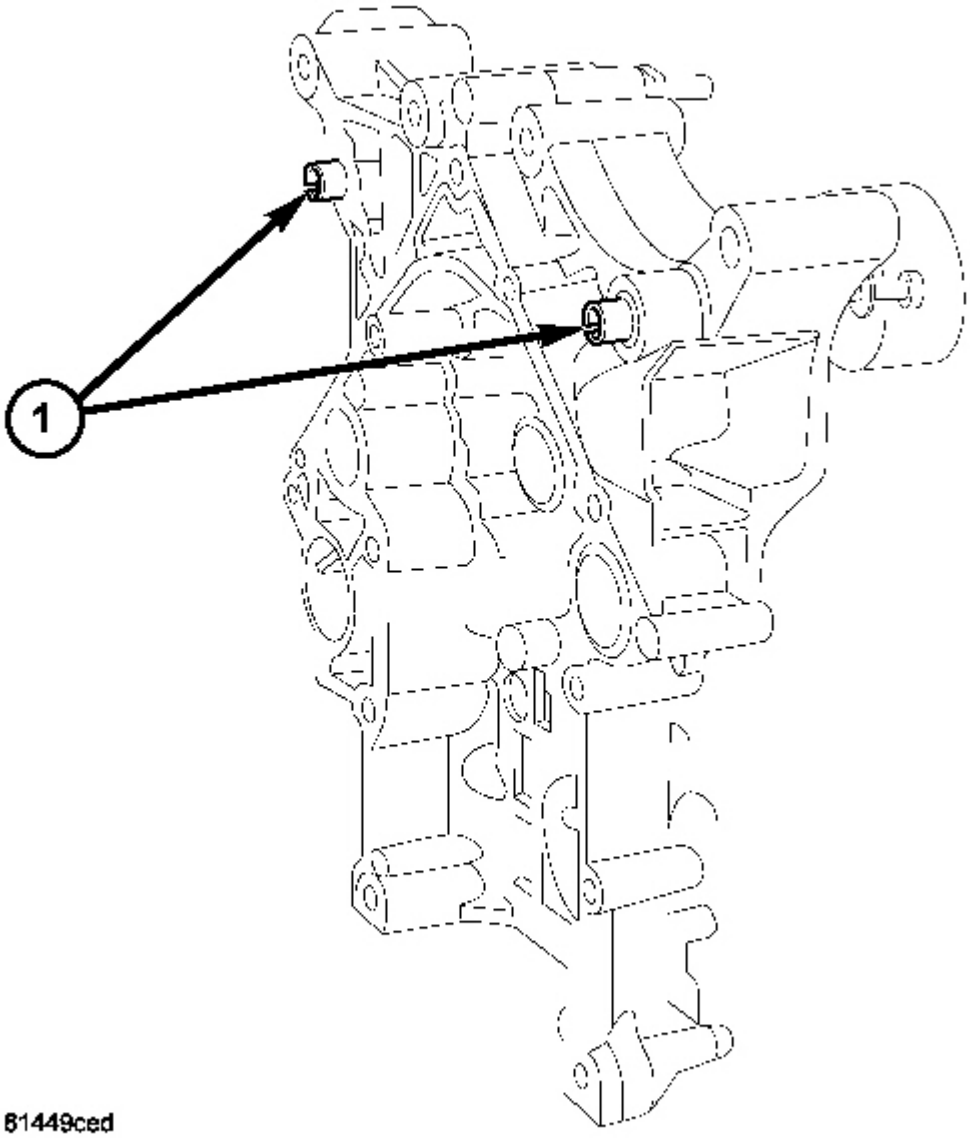

Fig. 115: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

12. Install timing case cover. See **INSTALLATION**.
13. Install the oil pan. See **INSTALLATION**.

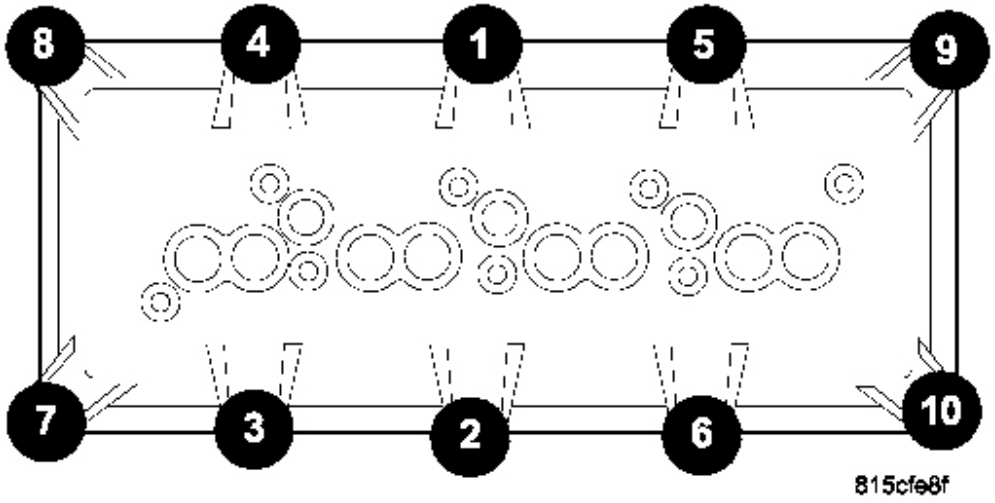

Fig. 116: Cylinder Head Cover Torque Sequence
Courtesy of CHRYSLER LLC

14. Install cylinder head covers. See **INSTALLATION**.

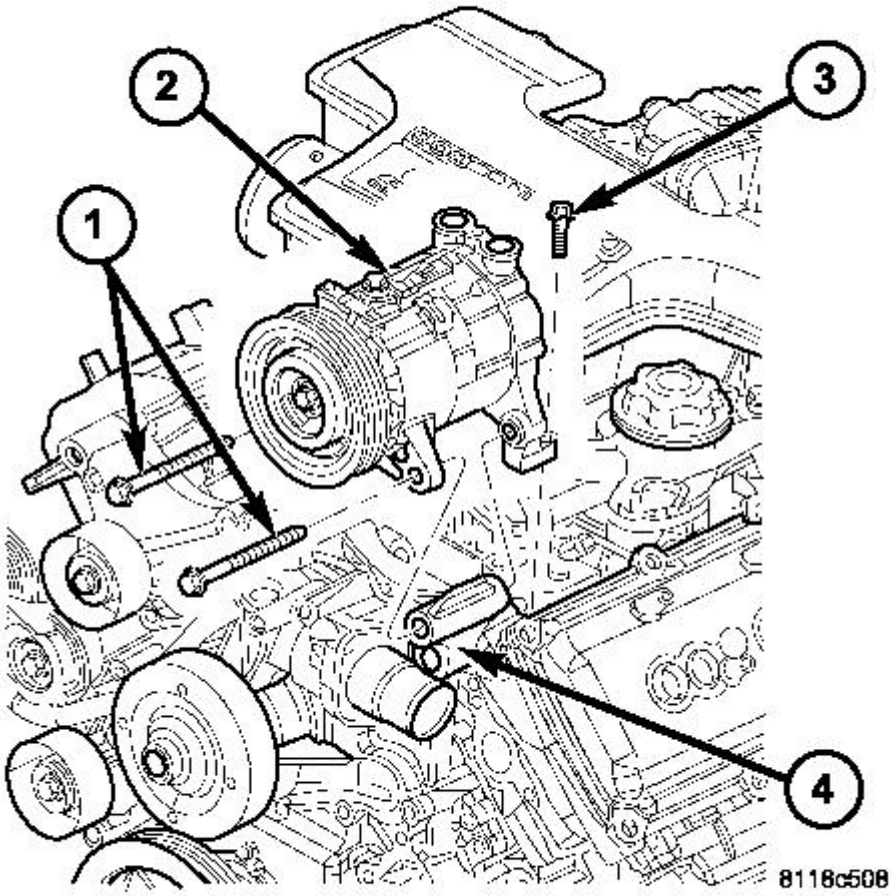

Fig. 117: A/C Compressor Mounting - 5.7L
Courtesy of CHRYSLER LLC

15. Install intake manifold. See **INSTALLATION**.
16. Install the A/C compressor (2).

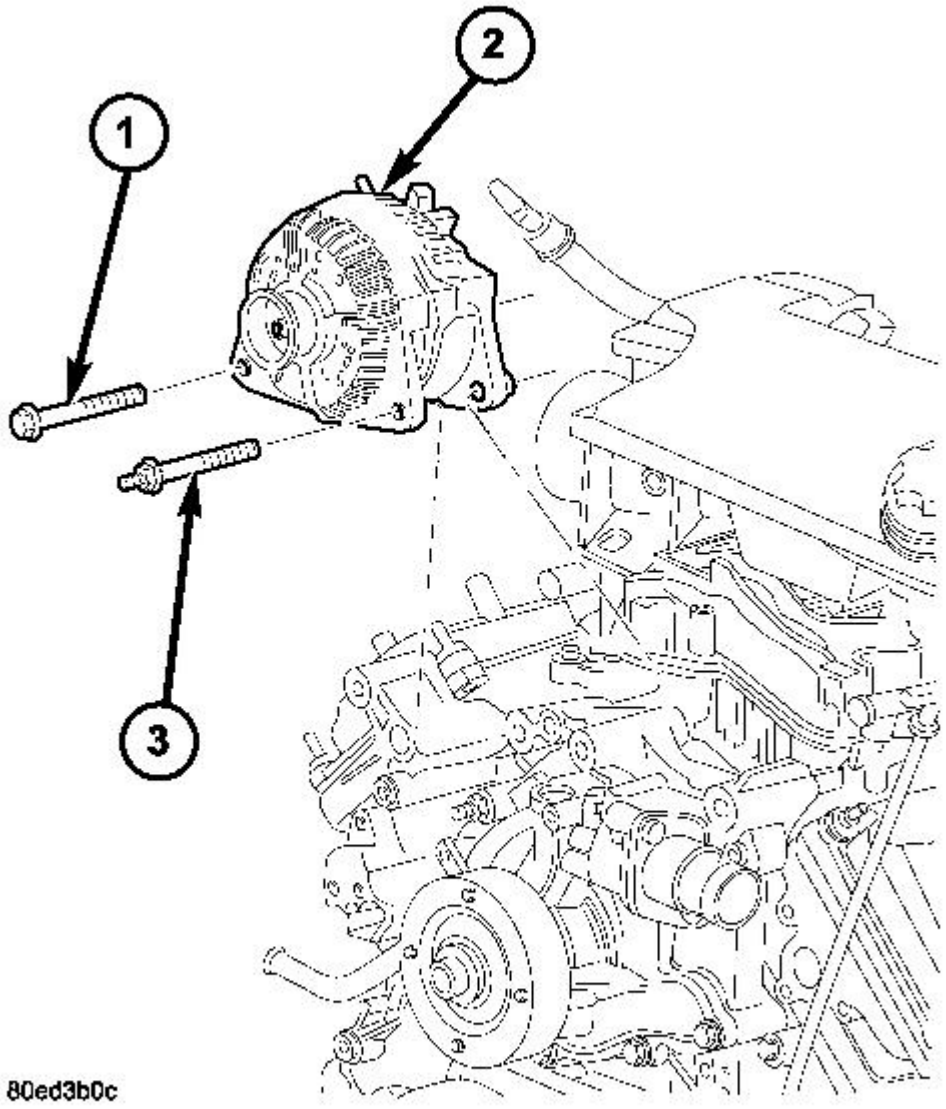

Fig. 118: Identifying Generator - 5.7L
Courtesy of CHRYSLER LLC

1 - MOUNTING BOLT
2 - GENERATOR
3 - MOUNTING STUD/BOLT

17. Install the generator (2).

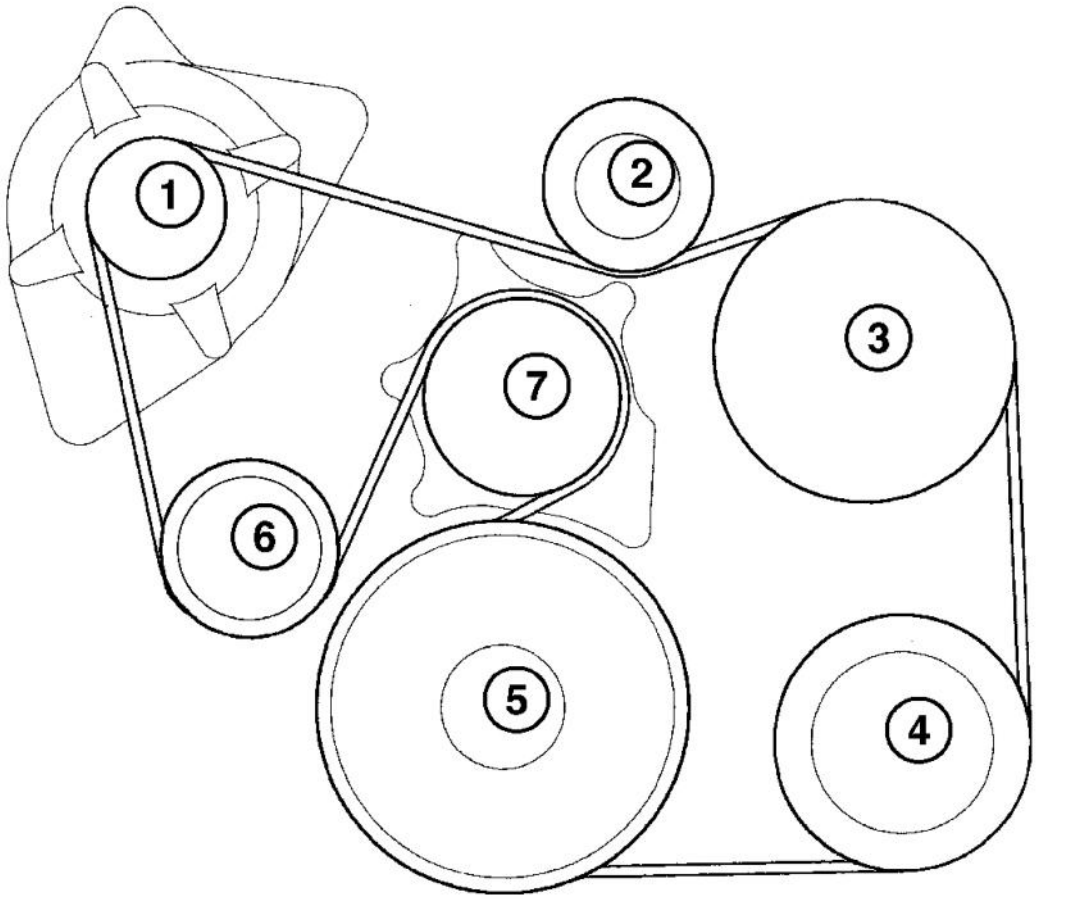

Fig. 119: Accessory Drive Belt Routing
Courtesy of CHRYSLER LLC

1 - GENERATOR
2 - IDLER PULLEY
3 - POWER STEERING PUMP
4 - A/C COMPRESSOR
5 - CRANKSHAFT
6 - BELT TENSIONER
7 - WATER PUMP

18. Install the accessory drive belt. Refer to **INSTALLATION** .
19. Install the radiator. Refer to **INSTALLATION** .
20. Install the air cleaner assembly.

21. Install the battery negative cable.
22. Refill coolant. Refer to **STANDARD PROCEDURE** .
23. Refill engine oil.
24. Start engine and check for leaks.

CAMSHAFT CORE HOLE PLUG

1. Clean core hole in block.

NOTE: Do not apply adhesive to the new core hole plug. A new plug will have adhesive pre-applied.

2. Install a new core hole plug at the rear of camshaft, using suitable flat faced tool. The plug must be fully seated on the cylinder block shoulder.

CRANKSHAFT

REMOVAL

CRANKSHAFT

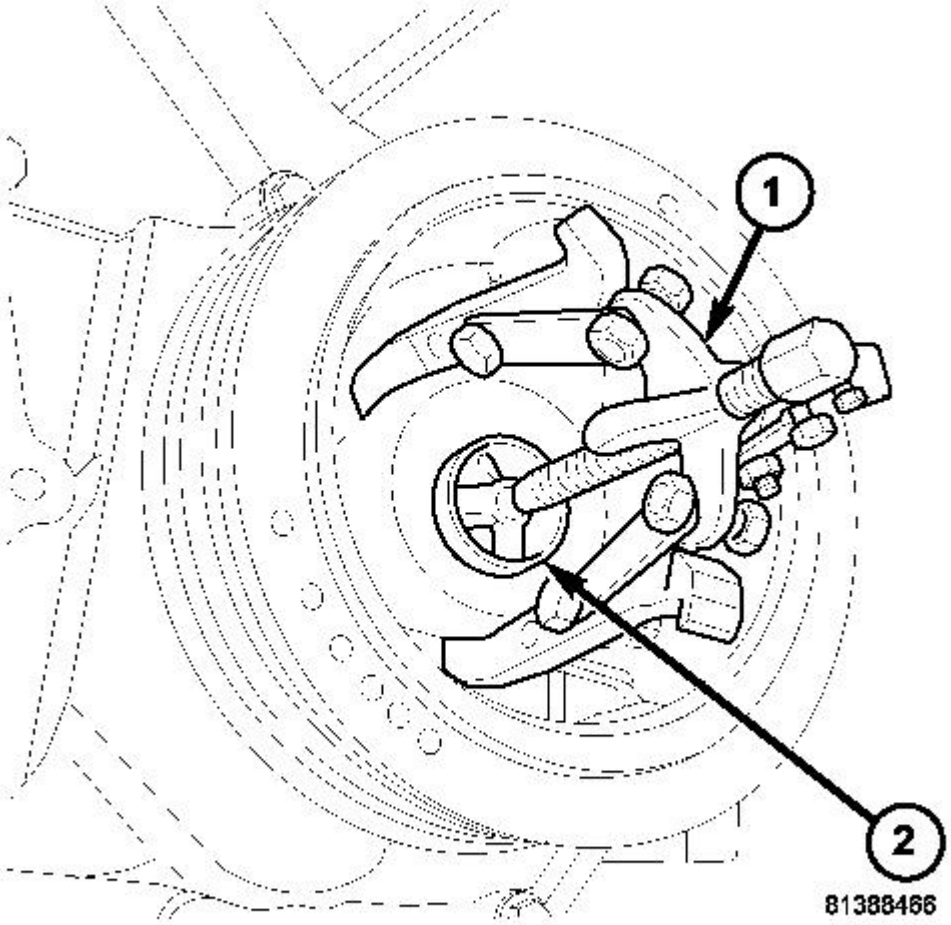

Fig. 120: Crankshaft Damper Removal
Courtesy of CHRYSLER LLC

1 - 3-Jaw Puller 1023 2 - Crankshaft Insert 8513A

1. Remove the vibration damper (1). See **REMOVAL**.

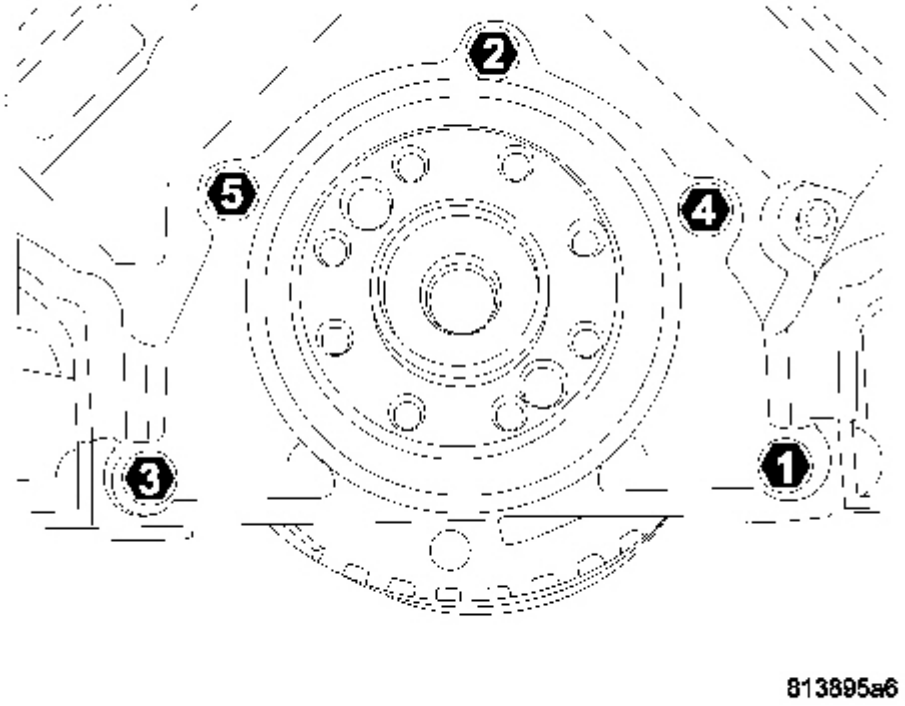

Fig. 121: Rear Seal Retainer Torque Sequence
Courtesy of CHRYSLER LLC

2. Remove the rear oil seal retainer. See **REMOVAL**.
3. Remove the oil pan. See **REMOVAL**.
4. Remove the oil pump pickup.
5. Remove the windage tray/oil pan gasket.

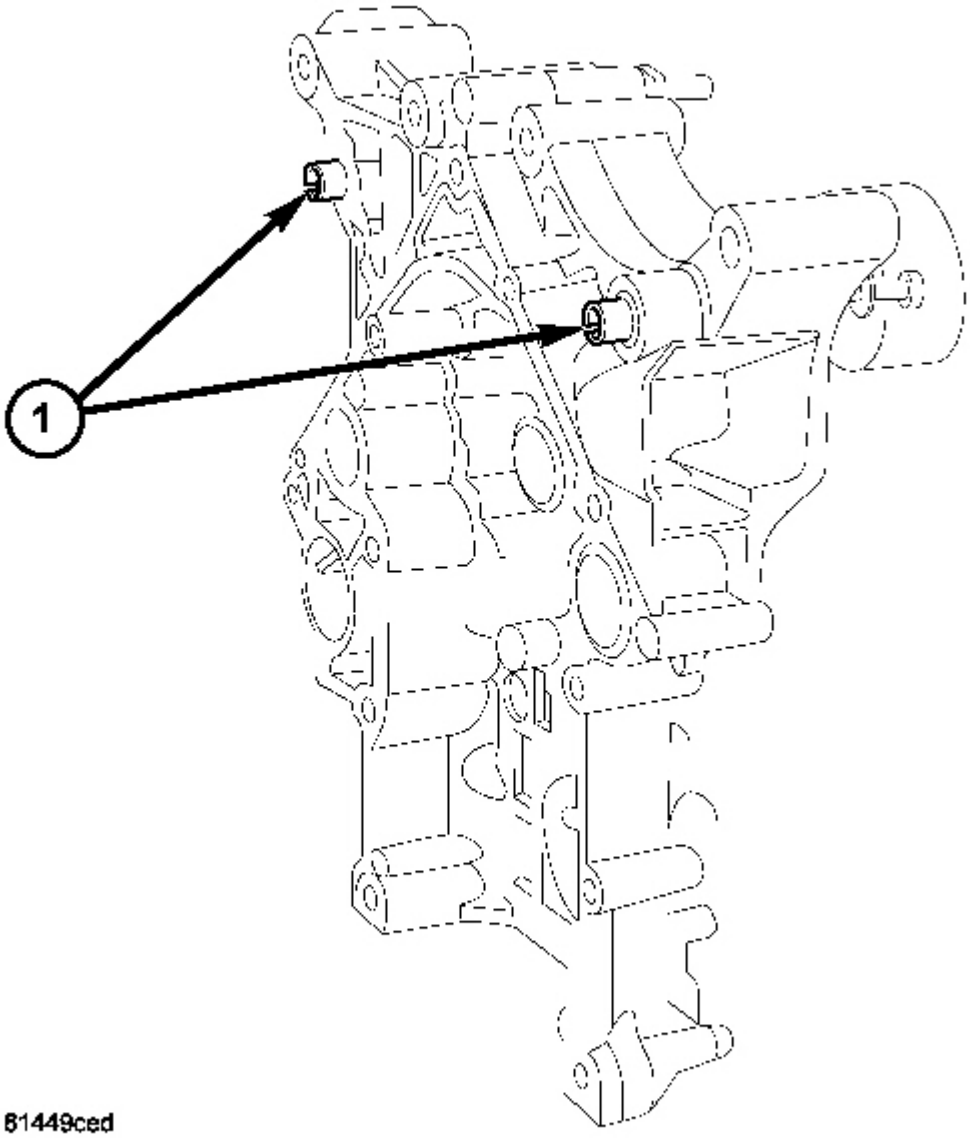

Fig. 122: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

6. Remove the timing chain cover. See **REMOVAL**.

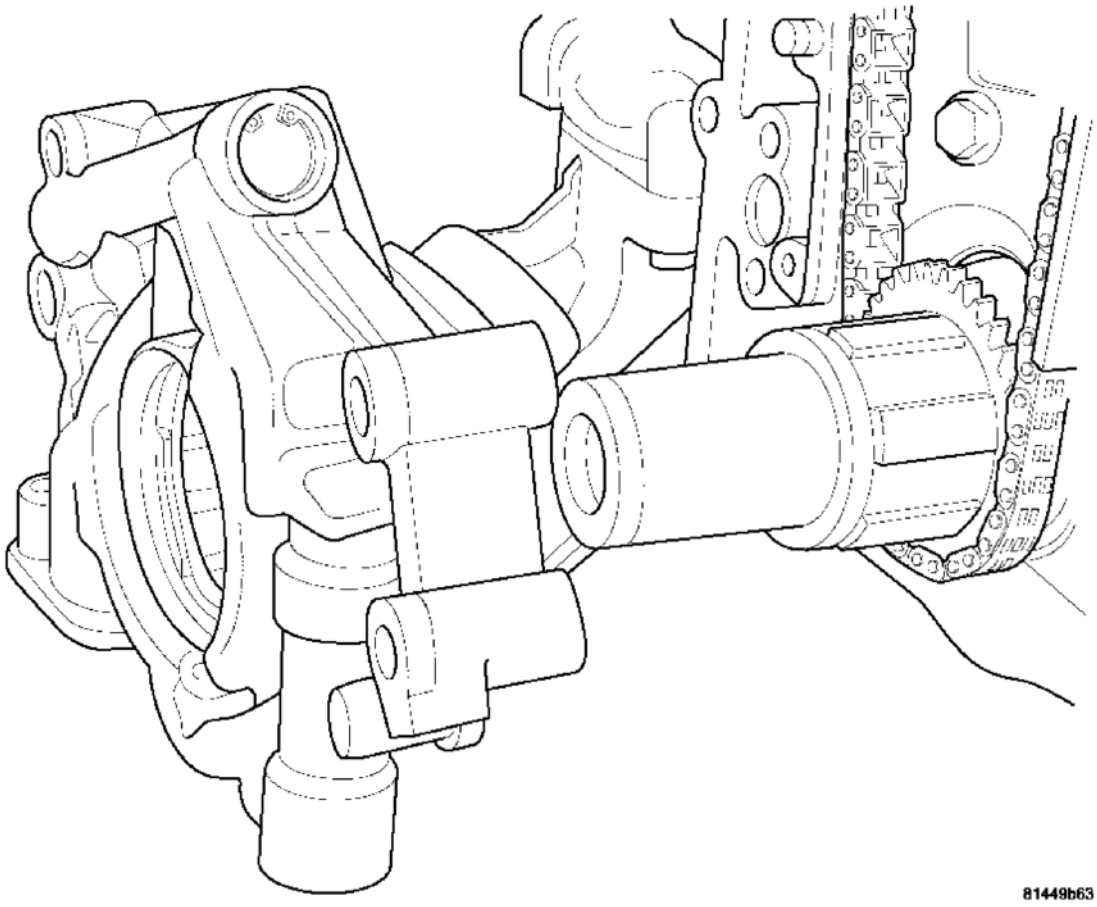

Fig. 123: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

7. Remove the oil pump. See **REMOVAL**.

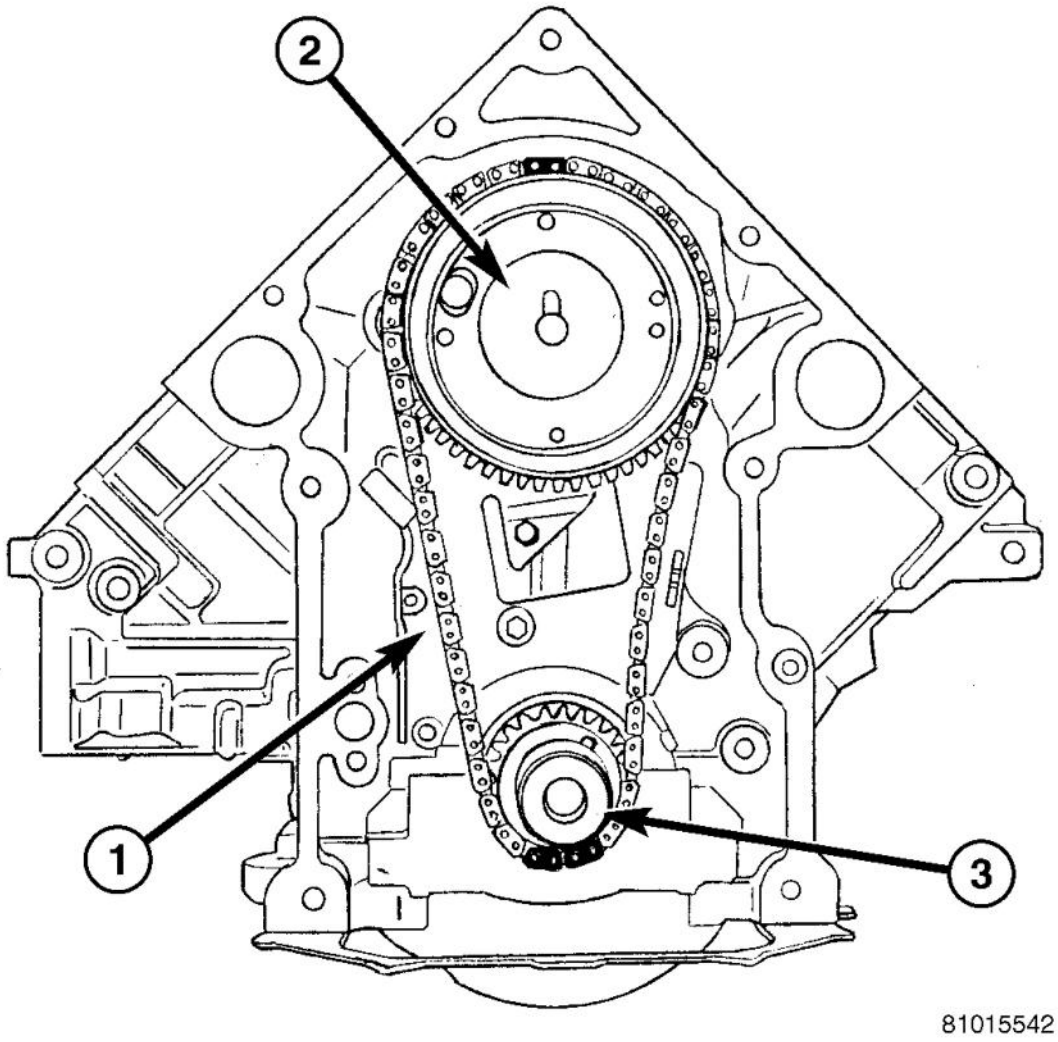

Fig. 124: Timing Mark Alignment
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

8. Remove the timing drive (2). See **REMOVAL**.

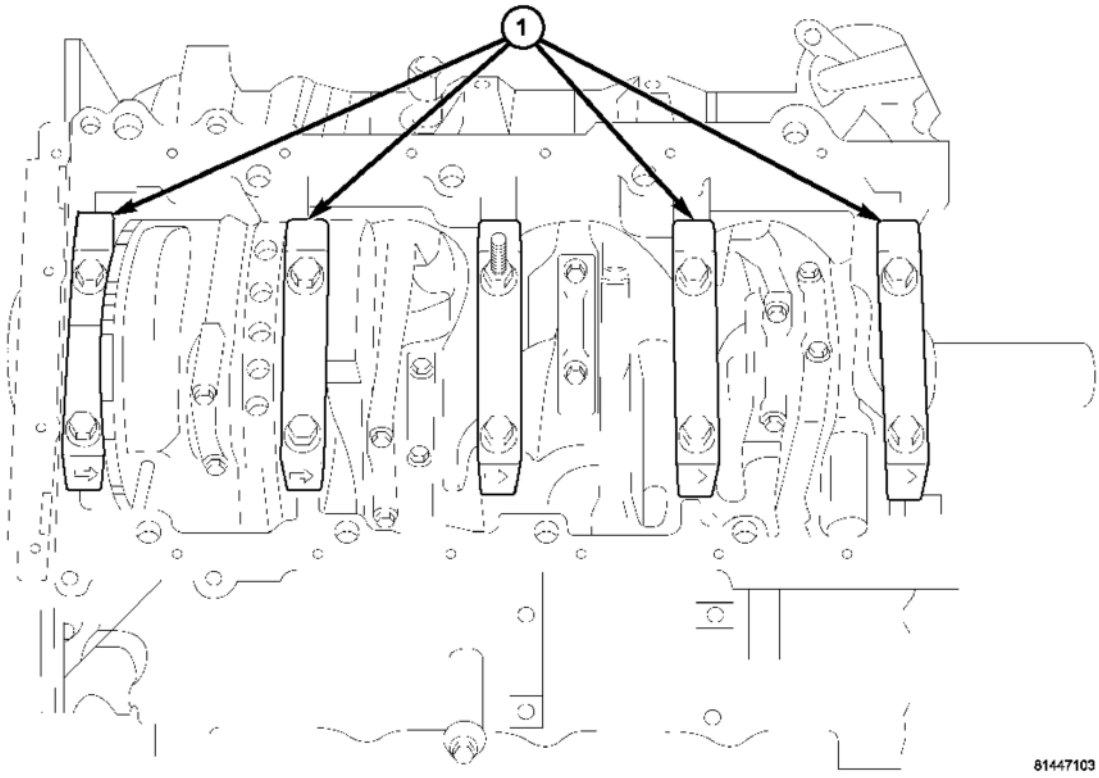

Fig. 125: Main Bearing Caps
Courtesy of CHRYSLER LLC

1 - MAIN BEARING CAPS

9. Identify rod bearing caps before removal. Remove rod bearing caps with bearings.
10. Identify main bearing caps (1) before removal.

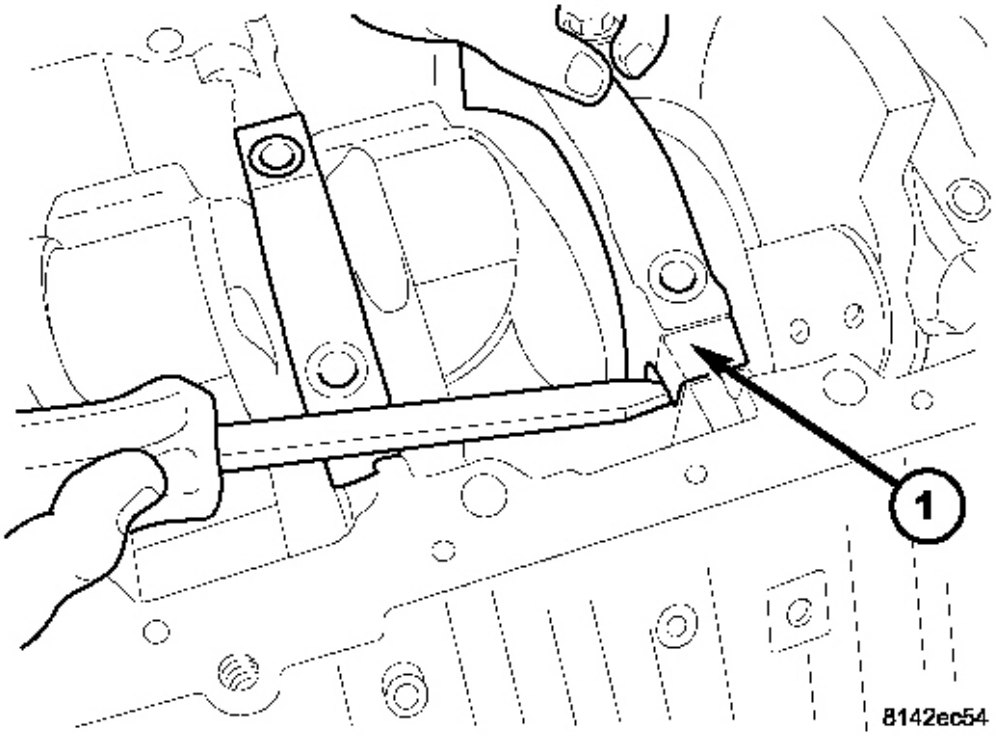

Fig. 126: Main Bearing Cap Removal
Courtesy of CHRYSLER LLC

1 - MAIN CAP

11. Remove main bearing caps (1) and bearings one at a time.

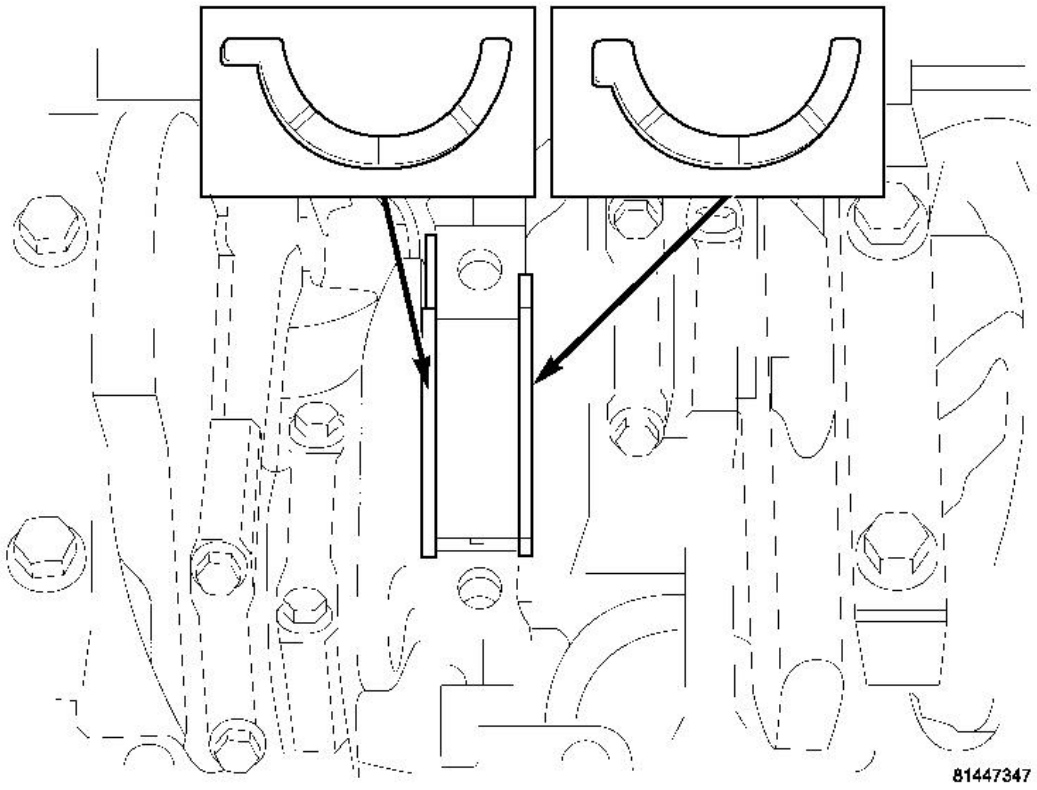

Fig. 127: Identifying Thrust Washer Locations
Courtesy of CHRYSLER LLC

12. Remove the thrust washers.
13. Remove the crankshaft out of the block.

INSTALLATION

CRANKSHAFT

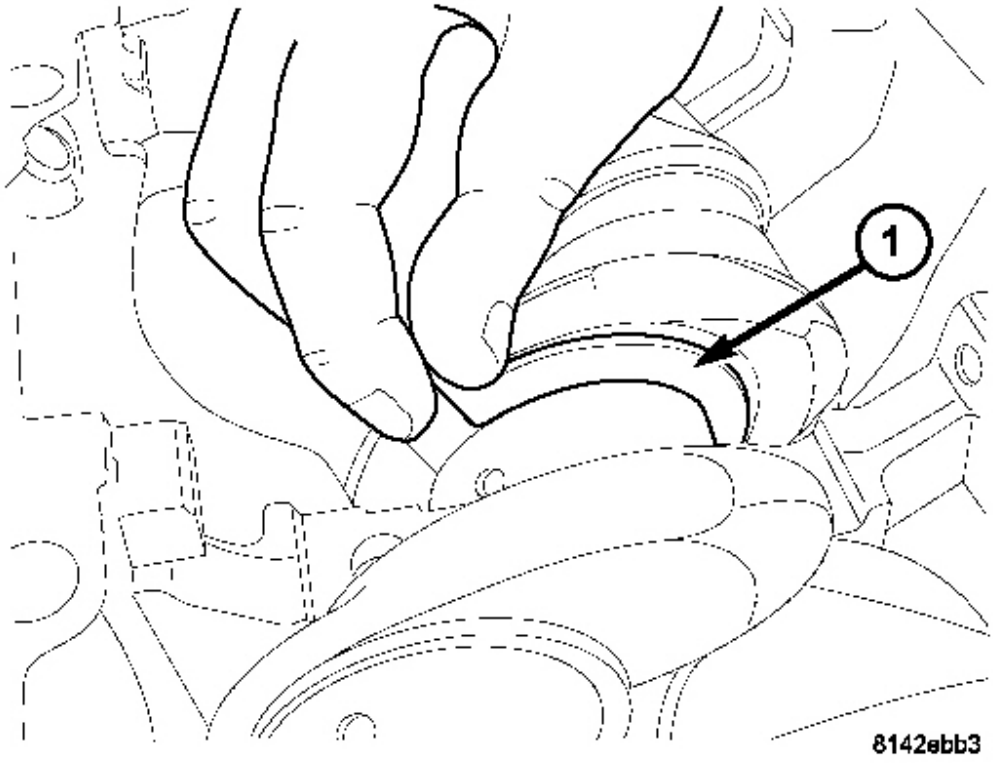

Fig. 128: Removing/Installing Thrust Washer
Courtesy of CHRYSLER LLC

1. Select the proper main bearings. See **STANDARD PROCEDURE**.
2. Install main bearings in block and caps, and lubricate bearings.
3. Position the crankshaft into the cylinder block.
4. Install the thrust washers (1).

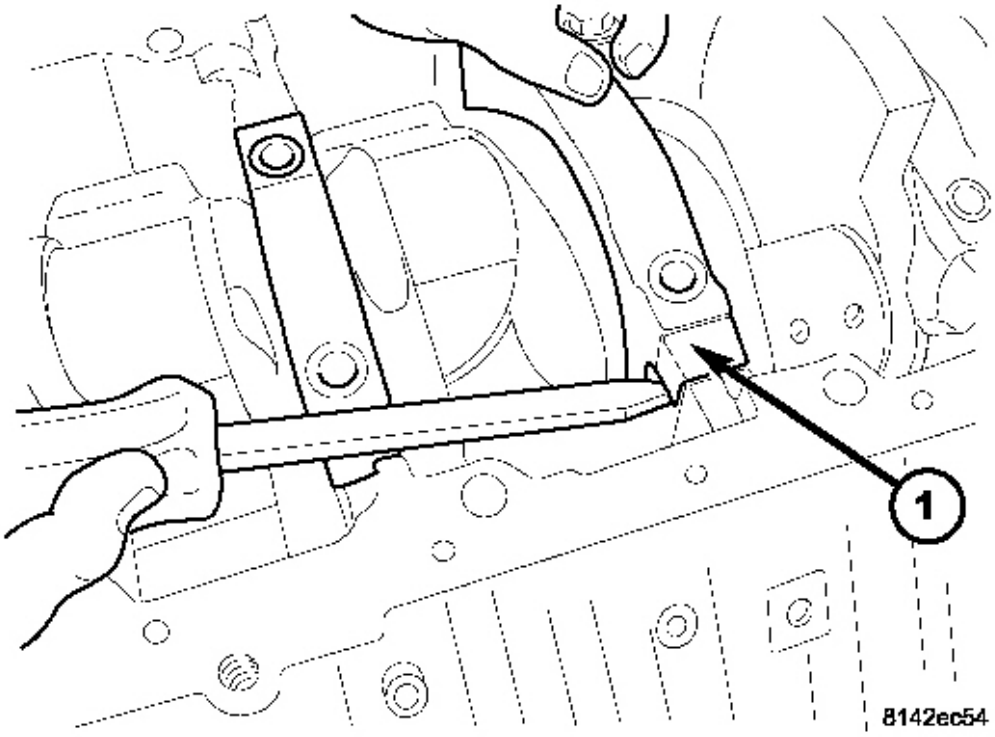

Fig. 129: Main Bearing Cap Removal
Courtesy of CHRYSLER LLC

1 - MAIN CAP

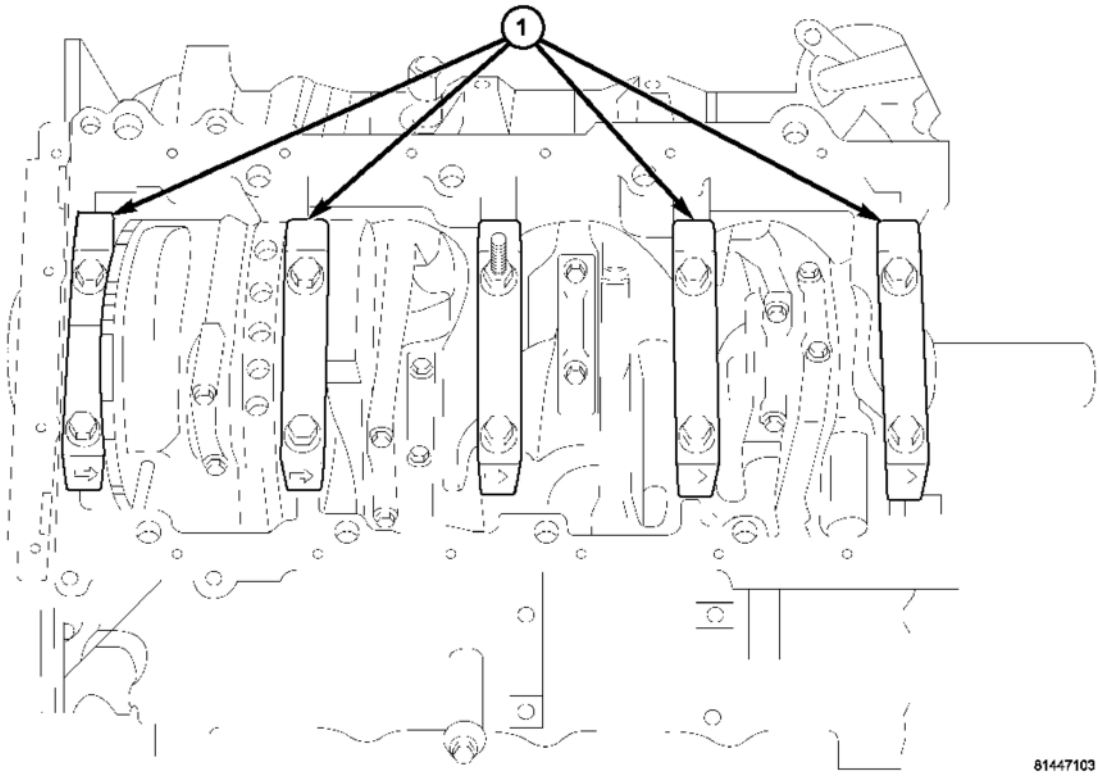

Fig. 130: Main Bearing Caps
Courtesy of CHRYSLER LLC

1 - MAIN BEARING CAPS

NOTE: The main cap crossbolts are torqued after final torque of the main cap bolts. Always use a new washer/seal on crossbolts.

5. Clean and oil all cap bolts. Install all main bearing caps (1). Install all cap bolts and alternately tighten in two steps using the following sequence.

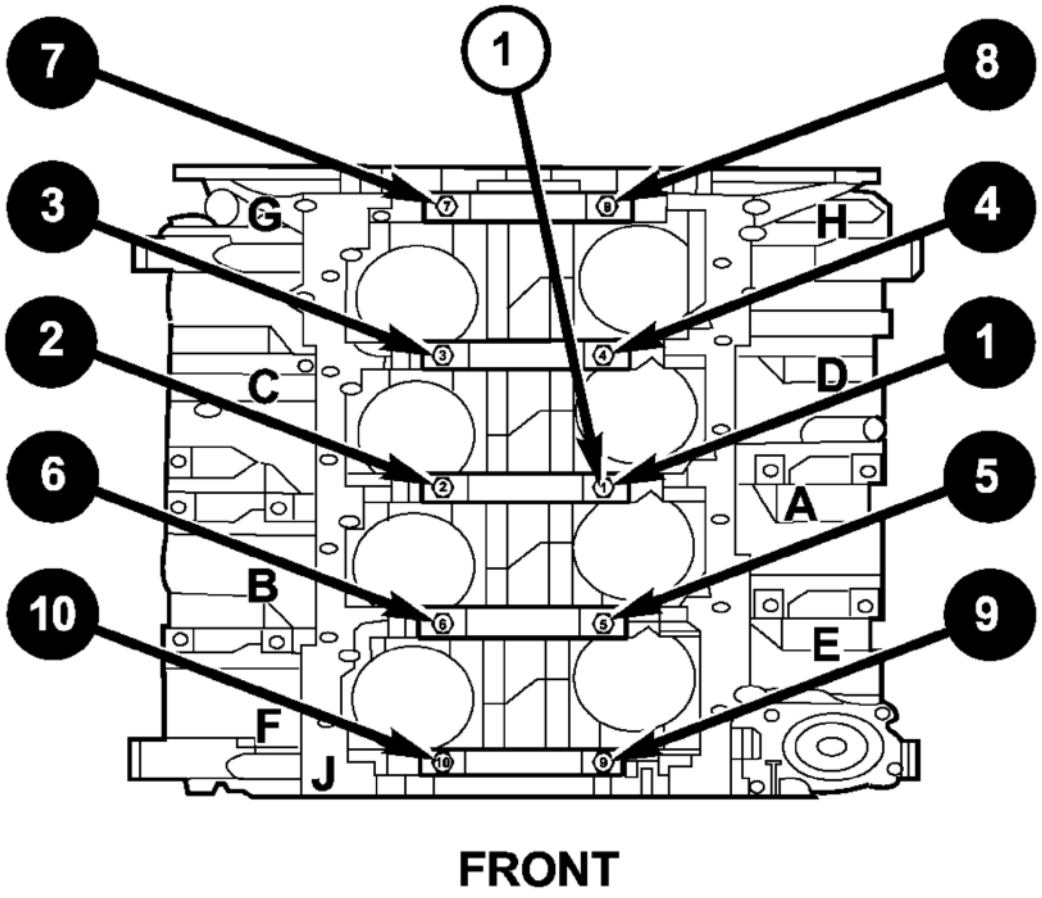

Fig. 131: Main Bearing Cap Torque Sequence
Courtesy of CHRYSLER LLC

6. Step 1 - 27 N.m (20 ft. lbs.).
7. Step 2 - Turn main cap bolts an additional 90°.
8. Install the crossbolts with new washer/gasket. Starting with crossbolt A, tighten each crossbolt to 28 N.m (21 ft. lbs.).
9. Repeat crossbolt tightening procedure.
10. Measure crankshaft end play. See **STANDARD PROCEDURE**.

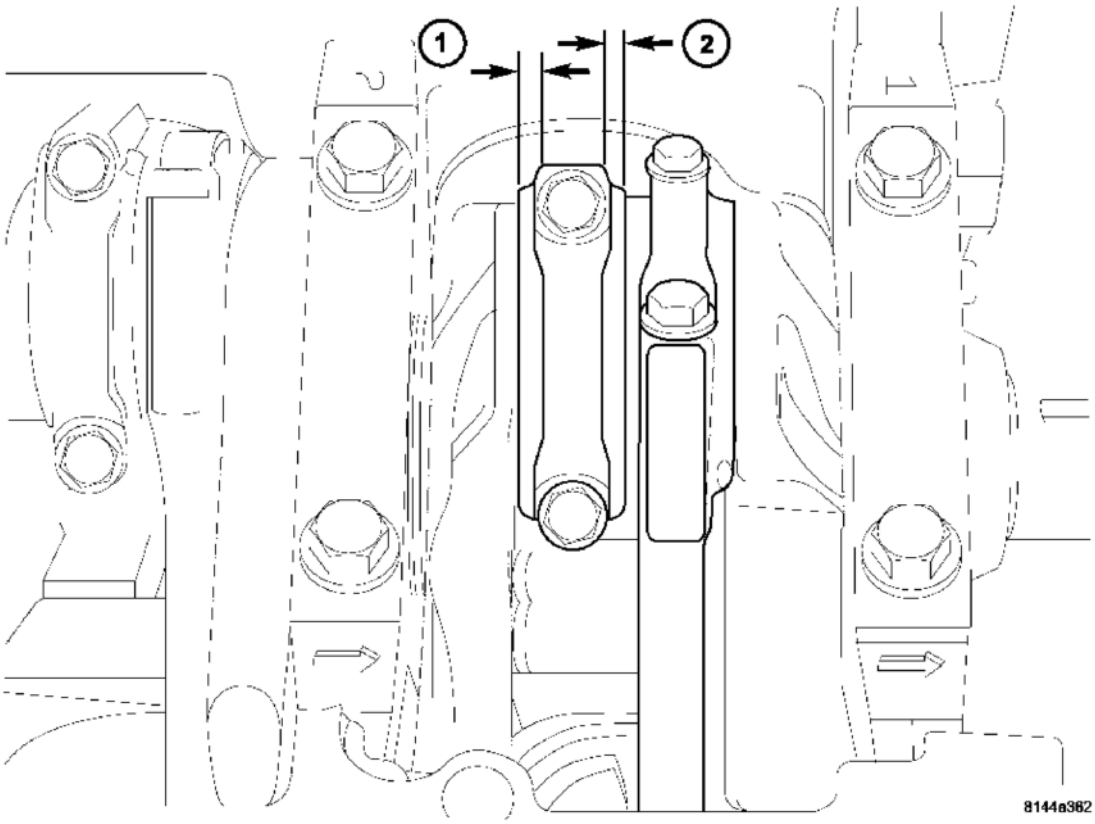

Fig. 132: Positioning Connecting Rods Onto Crankshaft And Installing Rod Bearing Caps
Courtesy of CHRYSLER LLC

11. Position the connecting rods onto the crankshaft and install the rod bearing caps. See **INSTALLATION**.

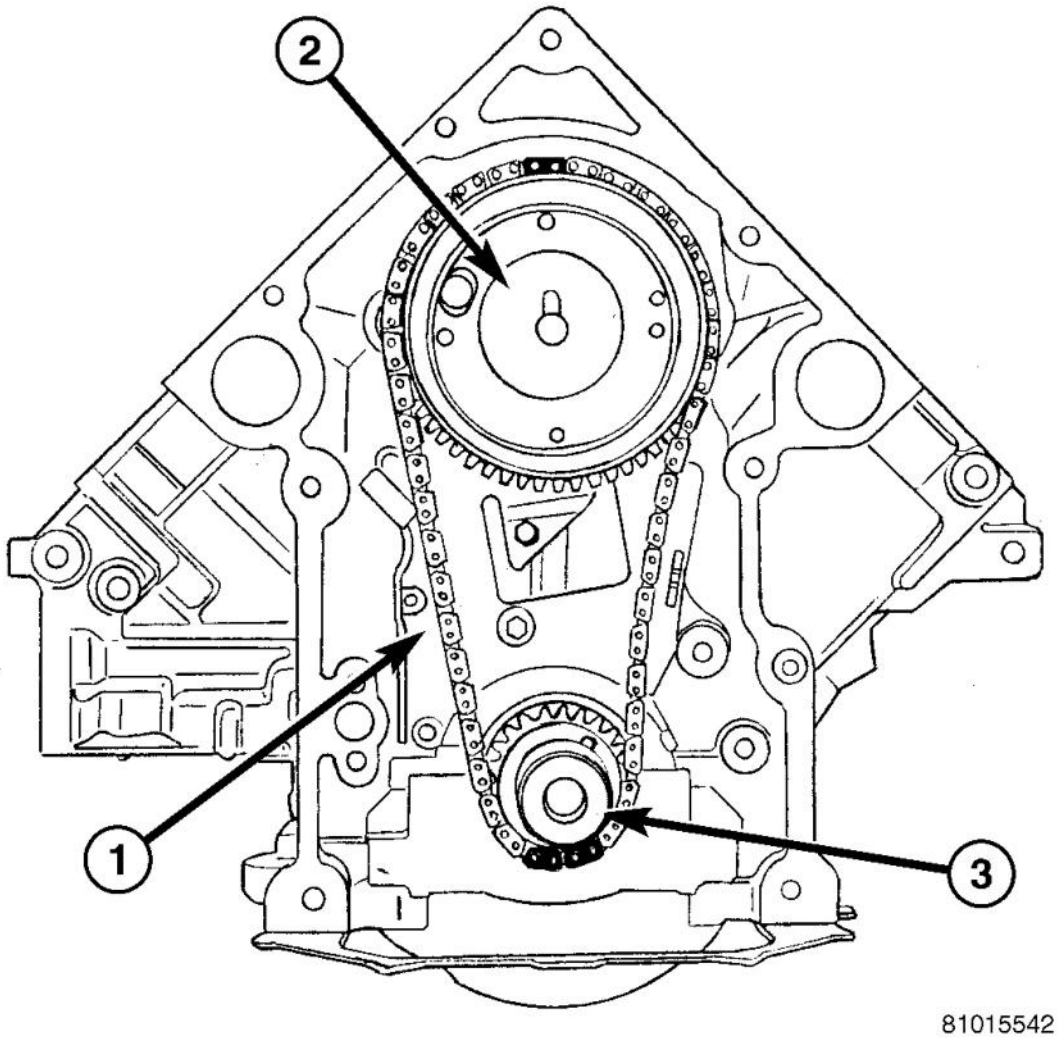

Fig. 133: Timing Mark Alignment
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

12. Install timing drive (2). See **INSTALLATION**.

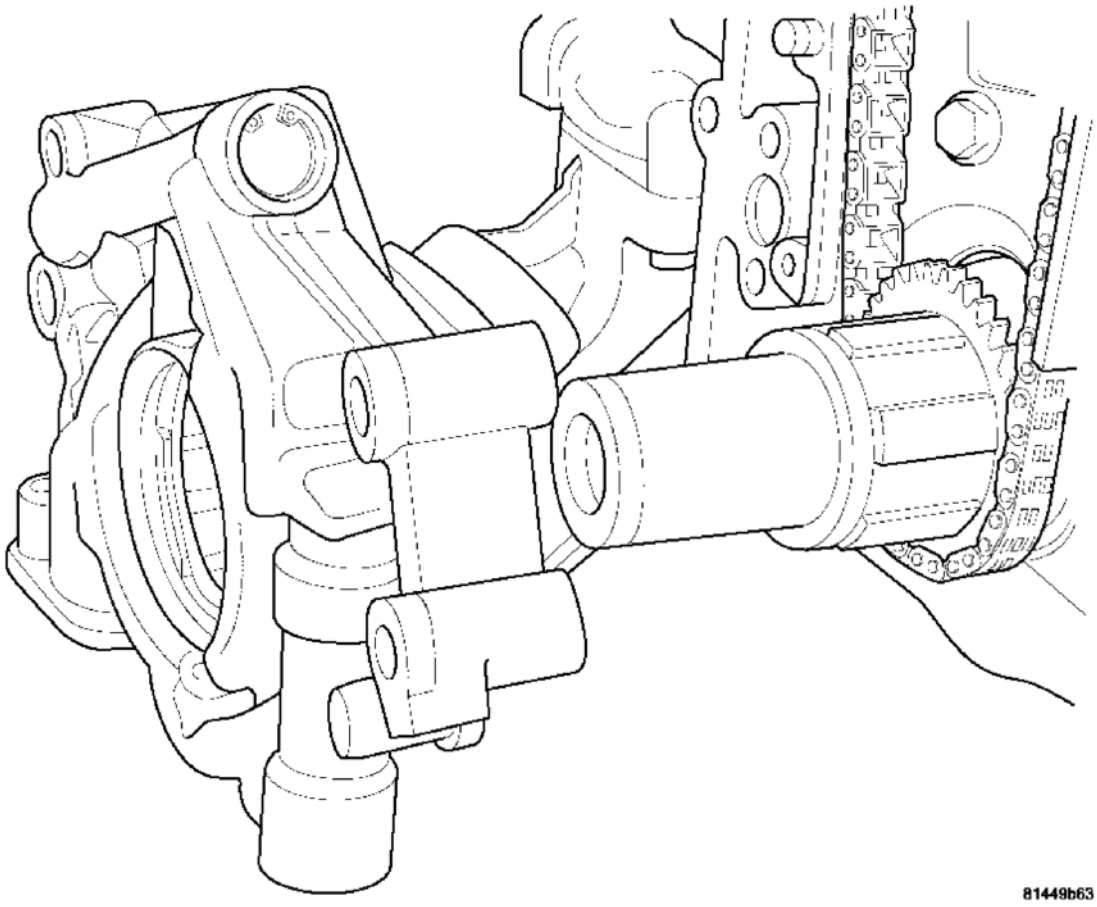

Fig. 134: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

13. Install oil pump. See **INSTALLATION**.

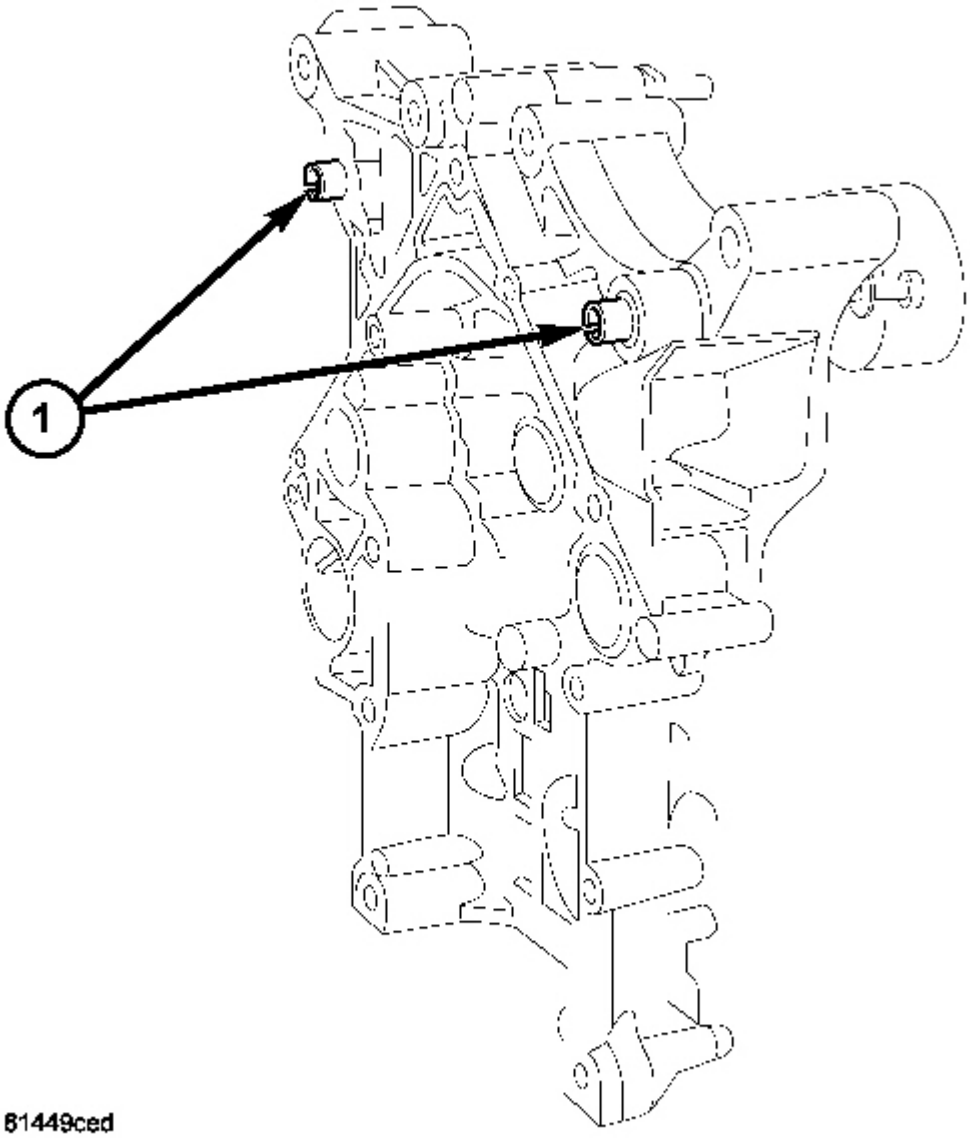

Fig. 135: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

14. Install the timing chain case cover (1). See **INSTALLATION**.

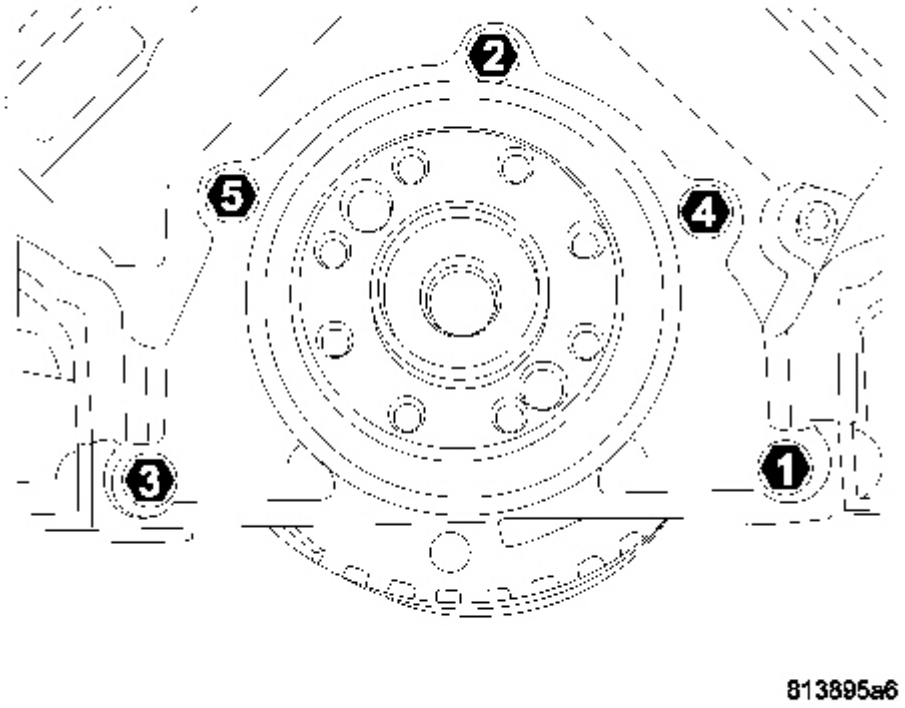

Fig. 136: Rear Seal Retainer Torque Sequence
Courtesy of CHRYSLER LLC

15. Install the rear main seal and retainer. See **INSTALLATION**.
16. Install the windage tray/oil pan gasket.
17. Install the oil pick up tube.
18. Install the oil pan. See **INSTALLATION**.
19. Install the vibration damper. See **INSTALLATION**.
20. Install the engine. See **INSTALLATION**.

BEARINGS-CRANKSHAFT MAIN

STANDARD PROCEDURE

CRANKSHAFT MAIN BEARING - FITTING

MAIN BEARING JOURNAL DIAMETER (CRANKSHAFT REMOVED)

Crankshaft removed from the cylinder block.

Clean the oil off the main bearing journal.

Determine the maximum diameter of the journal with a micrometer. Measure at two locations 90° apart at each end of the journal.

The maximum allowable taper is 0.008mm (0.0004 inch.) and maximum out of round is 0.005mm (0.0002 inch). Compare the measured diameter with the journal diameter specification (Main Bearing Fitting Chart). Select inserts required to obtain the specified bearing-to-journal clearance.

CRANKSHAFT MAIN BEARING SELECTION

The main bearings are "select fit" to achieve proper oil clearances. For main bearing selection, the crankshaft counterweight has grade identification marks stamped into it. These marks are read from left to right, corresponding with journal number 1, 2, 3, 4 and 5.

NOTE: Service main bearings are coded. These codes identify what size (grade) the bearing is.

MAIN BEARING SELECTION CHART - 5.7L

GRADE	SIZE mm (in.) MARKING	FOR USE WITH JOURNAL SIZE
A -	0.008 mm U/S (0.0004 in.) U/S	64.988-64.995 mm (2.5585- 2.5588in.)
B	NOMINAL -	64.996-65.004 mm (2.5588-2.5592 in.)
C -	0.008 mm O/S (0.0004 in.) O/S	65.005-65.012 mm (2.5592-2.5595 in.)

INSPECTION

CRANKSHAFT MAIN BEARING

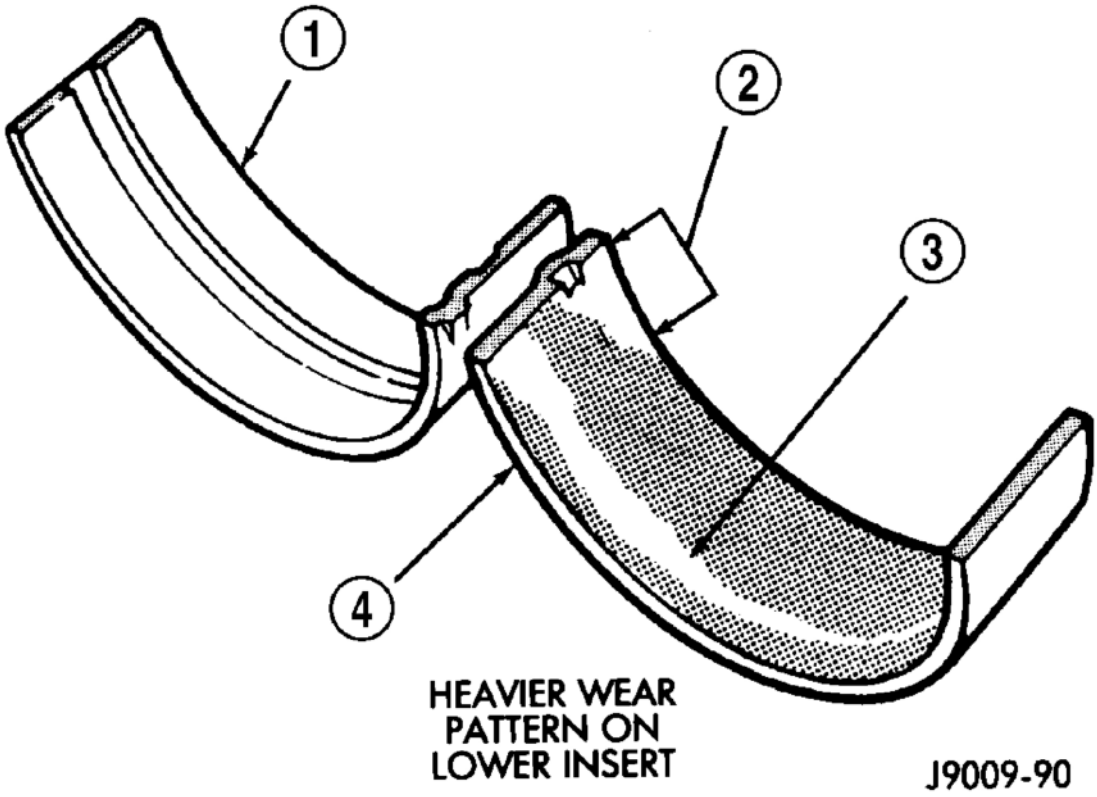

Fig. 137: Main Bearing Wear Patterns
Courtesy of CHRYSLER LLC

1 - UPPER INSERT
2 - NO WEAR IN THIS AREA
3 - LOW AREA IN BEARING LINING
4 - LOWER INSERT

Wipe the inserts clean and inspect for abnormal wear patterns and for metal or other foreign material imbedded in the lining. Normal main bearing insert wear patterns are illustrated.

NOTE: If any of the crankshaft journals are scored, the crankshaft must be repaired or replaced.

Inspect the back of the inserts for fractures, scrapings or irregular wear patterns.

Inspect the upper insert locking tabs for damage.

Replace all damaged or worn bearing inserts.

SEAL-CRANKSHAFT OIL-FRONT

REMOVAL

CRANKSHAFT OIL SEAL - FRONT

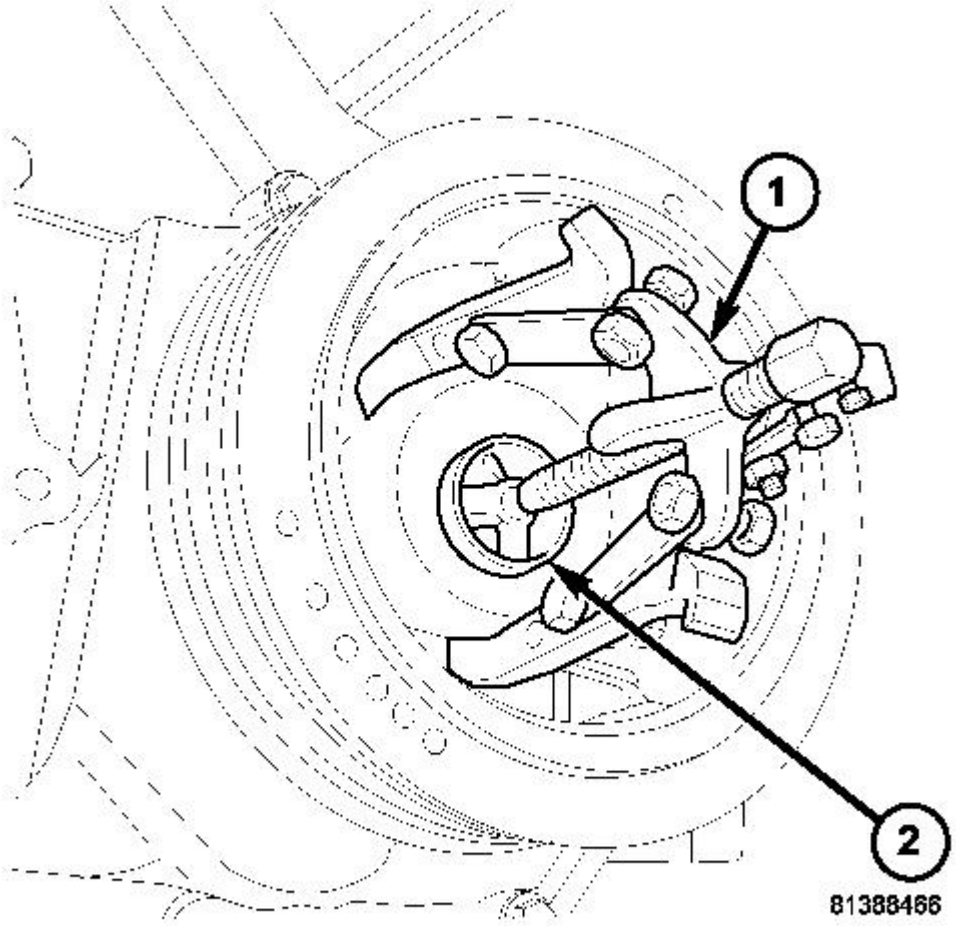

Fig. 138: Crankshaft Damper Removal
Courtesy of CHRYSLER LLC

1 - 3-Jaw Puller 1023 2 - Crankshaft Insert 8513A

1. Disconnect negative cable from battery.
2. Remove accessory drive belt. Refer to **REMOVAL** .
3. Drain cooling system. Refer to **STANDARD PROCEDURE** .

4. Remove upper radiator hose.
5. Remove radiator shroud attaching fasteners.
6. Remove radiator cooling fan and shroud. Refer to **REMOVAL** .
7. Remove crankshaft damper bolt.
8. Remove damper using Crankshaft insert 8513A (2) and Three Jaw Puller 1023 (1). See **REMOVAL**.

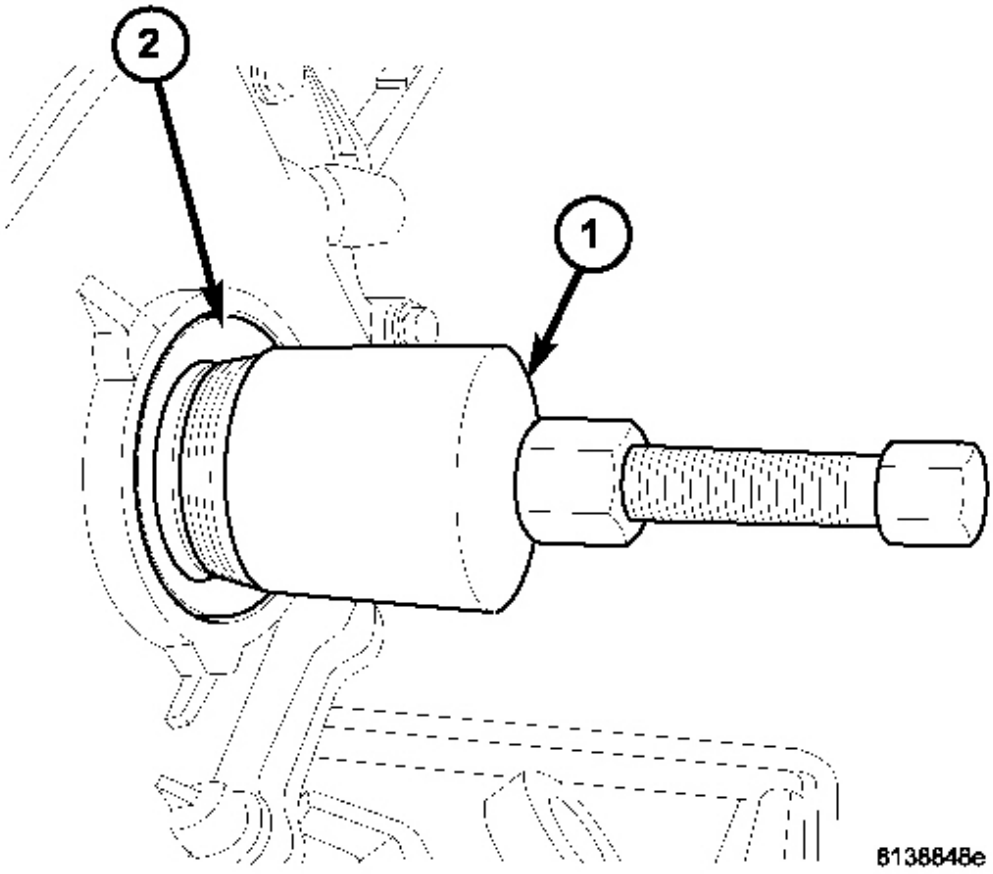

Fig. 139: Using Crankshaft Front Seal Remover 9071 To Remove Crankshaft Front Seal
Courtesy of CHRYSLER LLC

1 - Crankshaft Front Seal Remover 9071
2 - Seal

9. Using Crankshaft Front Seal Remover 9071 (1), remove crankshaft front seal (2).

INSTALLATION

CRANKSHAFT OIL SEAL - FRONT

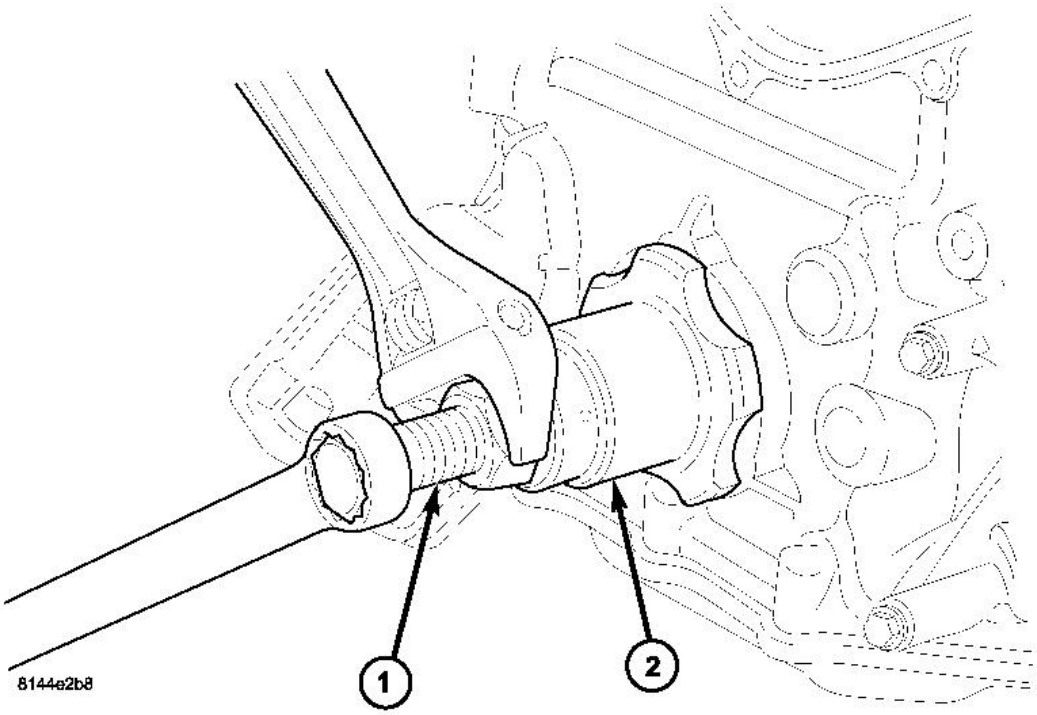

Fig. 140: Using Crankshaft Front Oil Seal Installer 9072 And Damper Installer 8512A To Install Crankshaft Front Seal
Courtesy of CHRYSLER LLC

1 - SPECIAL TOOL 8512A INSTALLER 2 - SPECIAL TOOL 9072 INSTALLER

CAUTION: The front crankshaft seal must be installed dry. Do not apply lubricant to sealing lip or to outer edge.

1. Using Crankshaft Front Oil Seal Installer 9072 (2) and Damper Installer 8512A (1), install crankshaft front seal.

CAUTION: To prevent severe damage to the Crankshaft or Damper, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

2. Install vibration damper. See **INSTALLATION**.
3. Install radiator cooling fan and shroud. Refer to **INSTALLATION** .
4. Install upper radiator hose.
5. Install accessory drive belt refer. Refer to **INSTALLATION** .
6. Refill cooling system. Refer to **STANDARD PROCEDURE** .
7. Connect negative cable to battery.

SEAL-CRANKSHAFT OIL-REAR

DIAGNOSIS AND TESTING

REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
   - Circular spray pattern generally indicates seal leakage or crankshaft damage.
   - Where leakage tends to run straight down, possible causes are a porous block, camshaft bore cup plugs, oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces. Refer to appropriate component for repair procedures.
4. If no leaks are detected, pressurize the crankcase as outlined in **AIR LEAK DETECTION TEST METHOD**.

   CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

   CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks or scratches. The crankshaft seal flange is specially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled. See **LUBRICATION** table, under the Oil Leak row, for components inspections on possible causes and corrections.

7. After the oil leak root cause and appropriate corrective action have been identified, see **REMOVAL**.

REMOVAL

CRANKSHAFT OIL SEAL - REAR

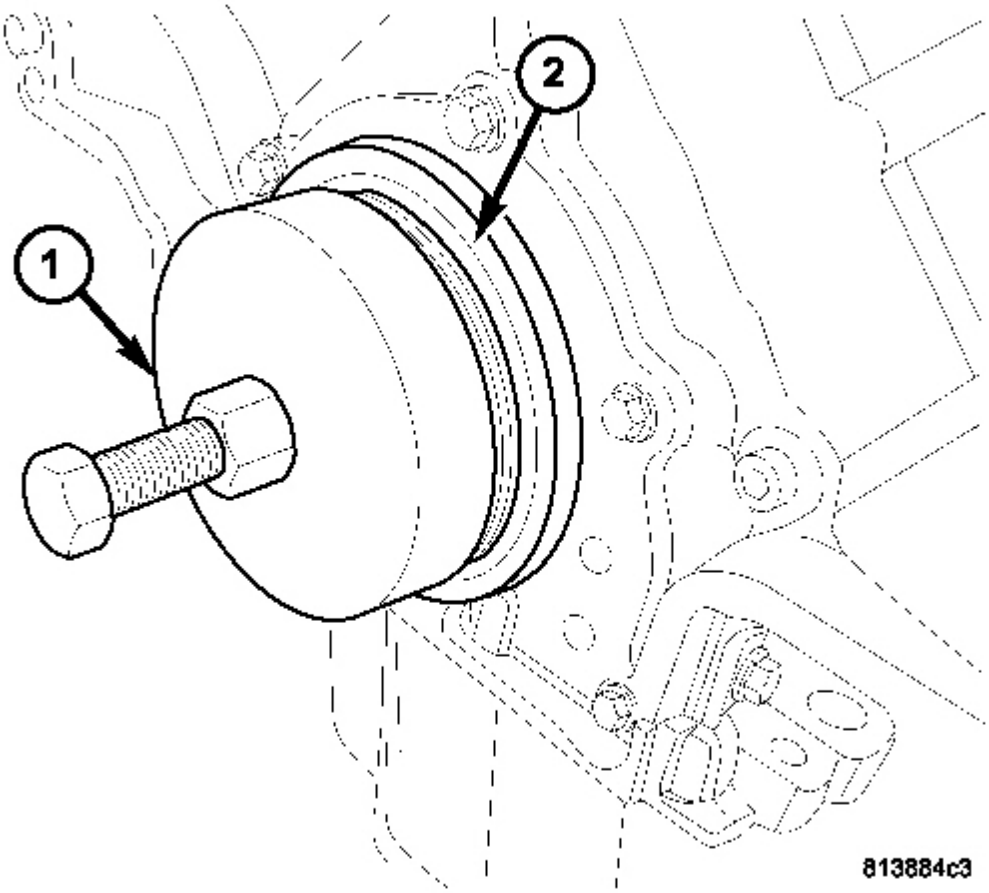

Fig. 141: Using Special Tool 8506 To Remove Crankshaft Rear Oil Seal
Courtesy of CHRYSLER LLC

1 - Special Tool 8506 2 - Seal

NOTE: This procedure can be performed in vehicle.

1. If being performed in vehicle, remove the transmission.
2. Remove the flexplate. See **REMOVAL**.

NOTE: The crankshaft oil seal CAN NOT be reused after removal.

NOTE: The crankshaft rear oil seal remover Special Tool 8506 must be installed deeply into the seal. Continue to tighten the removal tool into the seal until the tool can not be turned farther. Failure to install tool correctly the first time will cause tool to pull free of seal without removing seal from engine.

3. Using Special Tool 8506 (1), remove the crankshaft rear oil seal (2).

INSTALLATION

CRANKSHAFT OIL SEAL - REAR

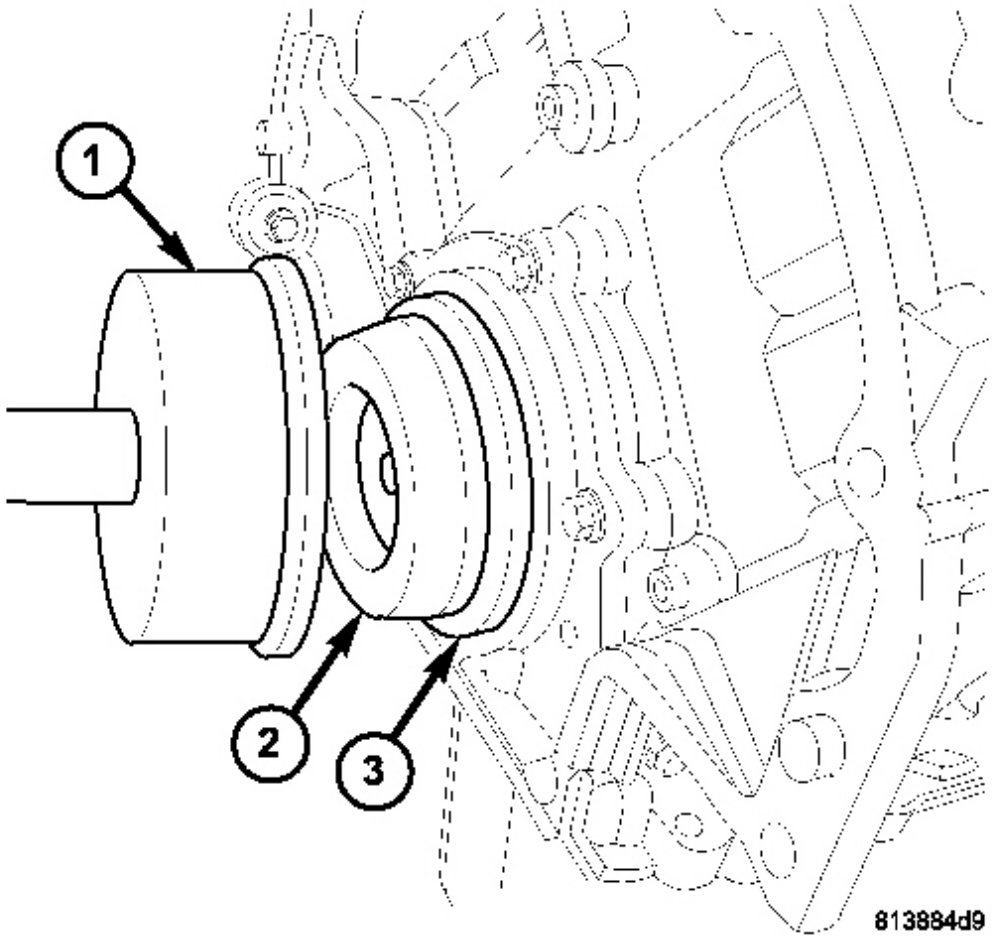

Fig. 142: Using Special Tools 8349 Crankshaft Rear Oil Seal Installer And C-4171 Driver Handle With Hammer To Tap Seal Into Place
Courtesy of CHRYSLER LLC

1 - Special Tool 8349 and C-4171 handle
2 - Seal Guide
3 - Seal

CAUTION: The rear seal must be installed dry for proper operation. Do not lubricate the seal lip or outer edge.

1. Position the plastic seal guide (2) onto the crankshaft rear face. Then position the crankshaft rear oil seal

(3) onto the guide.

2. Using Special Tools 8349 Crankshaft Rear Oil Seal Installer (1) and C-4171 Driver Handle, with a hammer, tap the seal (3) into place. Continue to tap on the driver handle until the seal installer seats against the cylinder block crankshaft bore.
3. Install the flexplate. See **INSTALLATION**.
4. Install the transmission.

RETAINER-CRANKSHAFT REAR OIL SEAL

REMOVAL

CRANKSHAFT REAR SEAL RETAINER

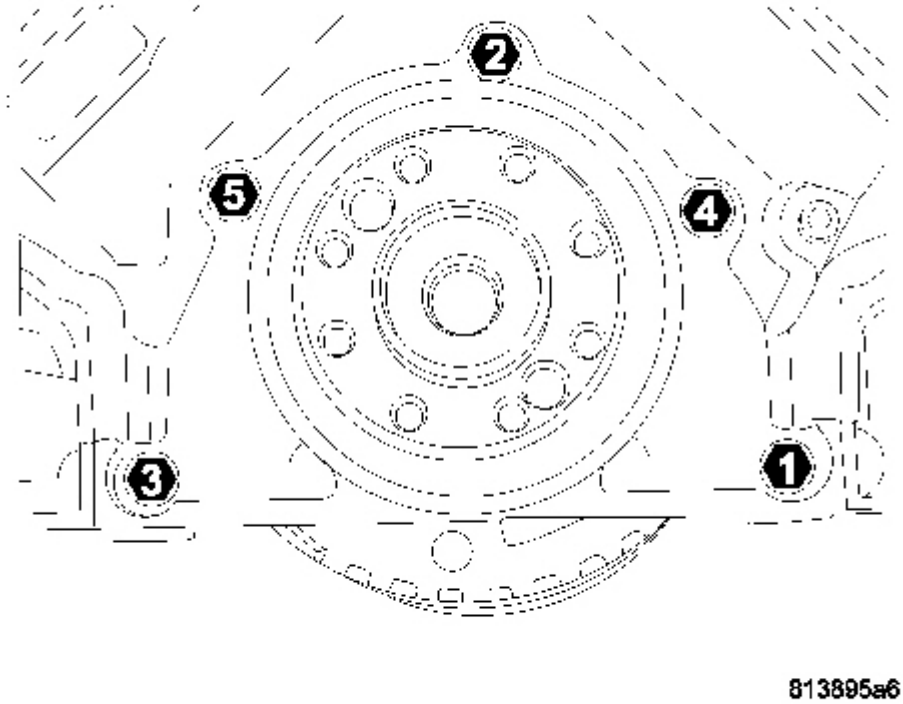

Fig. 143: Rear Seal Retainer Torque Sequence
Courtesy of CHRYSLER LLC

1. Disconnect negative cable from battery.
2. Remove the transmission.
3. Remove the flexplate. See **REMOVAL**.

4. Remove the oil pan. See **REMOVAL**.
5. Remove the rear oil seal retainer mounting bolts.
6. Carefully remove the retainer from the engine block.

INSTALLATION

CRANKSHAFT REAR SEAL RETAINER

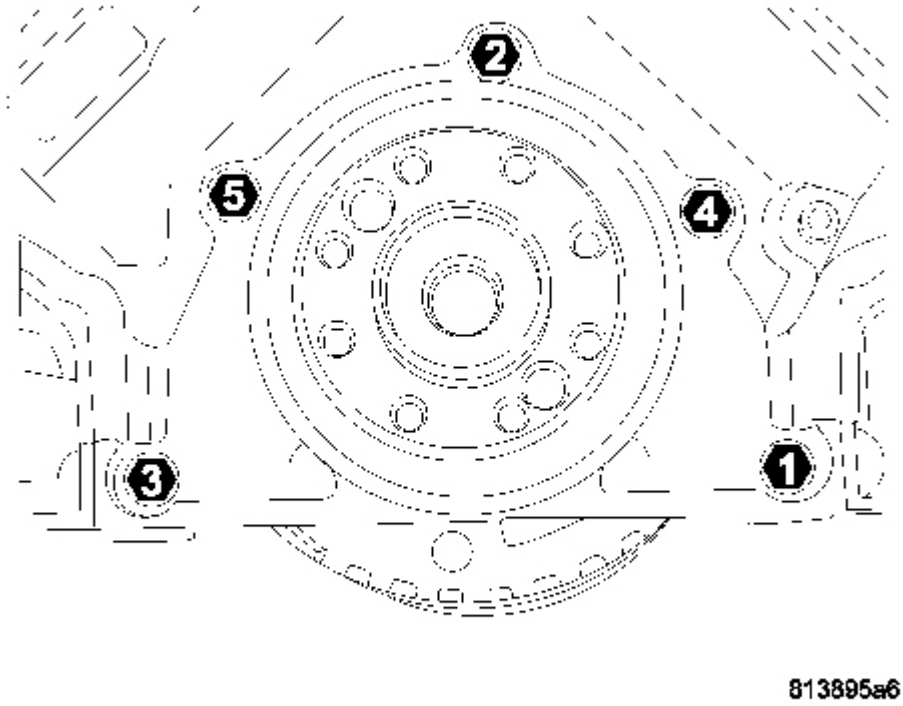

Fig. 144: Rear Seal Retainer Torque Sequence
Courtesy of CHRYSLER LLC

1. Thoroughly clean all gasket residue from the engine block.
2. Use extreme care and clean all gasket residue from the retainer.
3. Position the gasket onto the retainer.
4. Position the retainer onto the engine block.
5. Install the retainer mounting bolts. Tighten the bolts to 15 N.m (132 in. lbs.) using the procedure shown.
6. Install the oil pan. See **INSTALLATION**.
7. Install the flexplate. See **INSTALLATION**.

8. Install the transmission.
9. Check and verify engine oil level.
10. Start engine and check for leaks.

FLEXPLATE

REMOVAL

FLEX PLATE

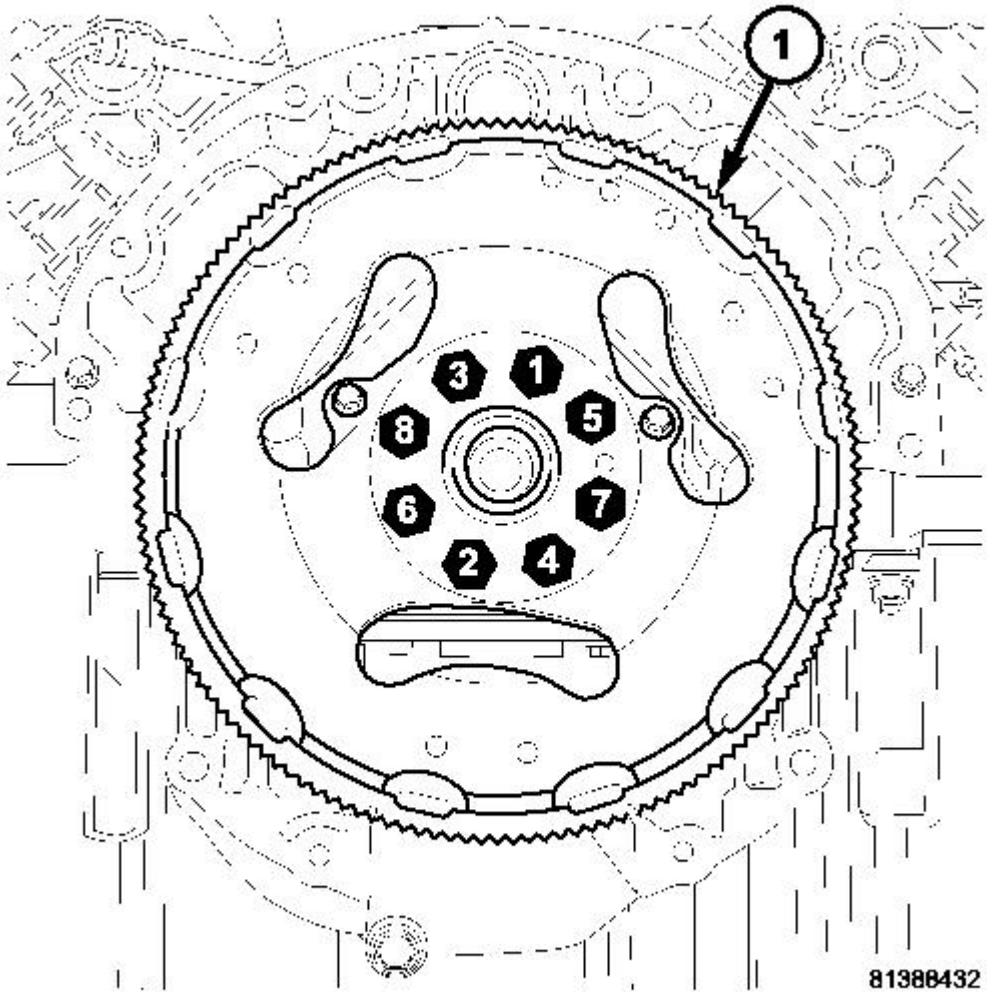

Fig. 145: Flex Plate Bolt Tightening Sequence

Courtesy of CHRYSLER LLC

1 - Flexplate

1. Remove the transmission.
2. Remove the bolts and flexplate (1).

INSTALLATION

FLEX PLATE

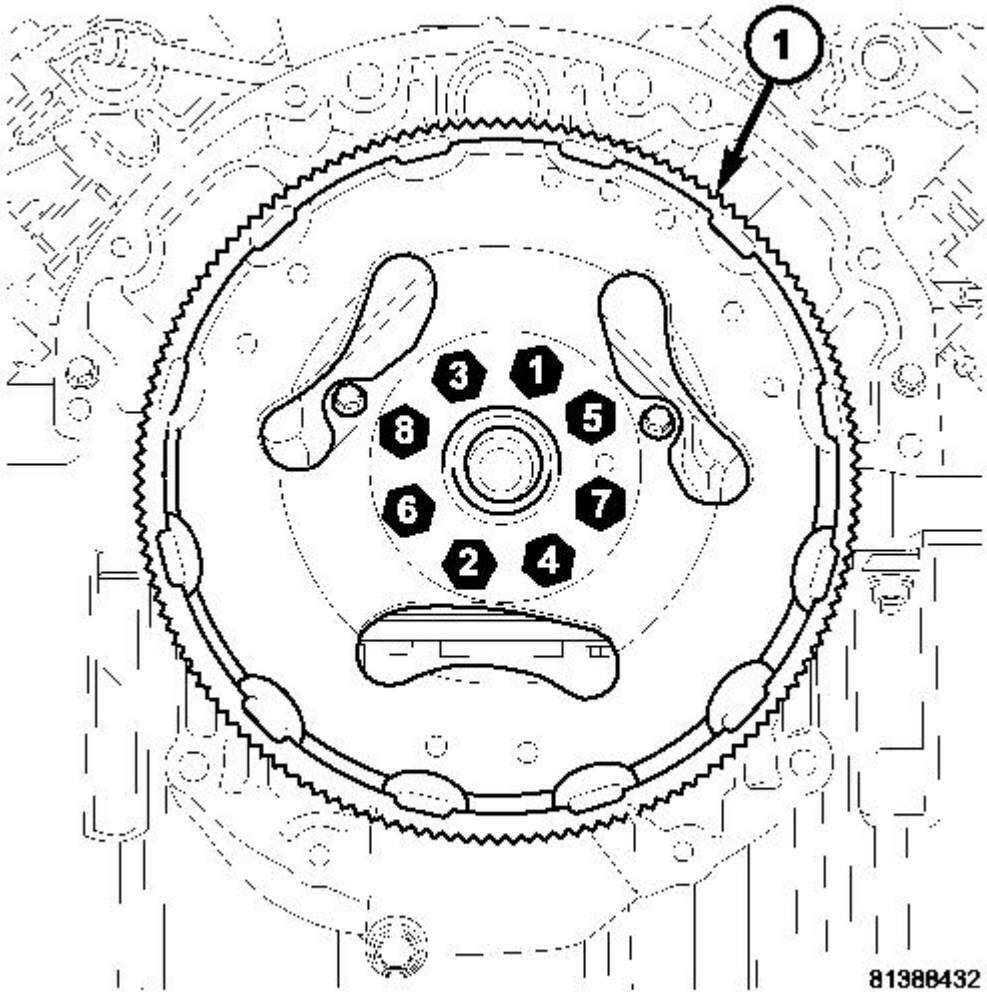

Fig. 146: Flex Plate Bolt Tightening Sequence
Courtesy of CHRYSLER LLC

1 - Flexplate

1. Position the flexplate or flywheel onto the crankshaft and install the bolts hand tight.
2. **For automatic transmissions:** Tighten the flexplate retaining bolts to 95 N.m (70 ft. lbs.).
3. Install the transmission.

TAPPETS-HYDRAULIC ROLLER

DIAGNOSIS AND TESTING

HYDRAULIC TAPPETS

Before disassembling any part of the engine to correct tappet noise, check the oil pressure. If vehicle has no oil pressure gauge, install a reliable gauge at the pressure sending-unit. The pressure should be between 207-552 kPa (30-70 psi) at 3,000 RPM.

Check the oil level after the engine reaches normal operating temperature. Allow 5 minutes to stabilize oil level, check dipstick. The oil level in the pan should never be above the FULL mark or below the ADD OIL mark on dipstick. Either of these two conditions could be responsible for noisy tappets.

OIL LEVEL HIGH

If oil level is above the FULL mark, it is possible for the connecting rods to dip into the oil. With the engine running, this condition could create foam in the oil pan. Foam in oil pan would be fed to the hydraulic tappets by the oil pump causing them to lose length and allow valves to seat noisily.

OIL LEVEL LOW

Low oil level may allow oil pump to take in air. When air is fed to the tappets, they lose length, which allows valves to seat noisily. Any leaks on intake side of oil pump through which air can be drawn will create the same tappet action. Check the lubrication system from the intake strainer to the pump cover, including the relief valve retainer cap. When tappet noise is due to aeration, it may be intermittent or constant, and usually more than one tappet will be noisy. When oil level and leaks have been corrected, operate the engine at fast idle. Run engine for a sufficient time to allow all of the air inside the tappets to be bled out.

TAPPET NOISE DIAGNOSIS

1. To determine source of tappet noise, crank over engine with cylinder head covers removed.
2. Feel each valve spring or rocker arm to detect noisy tappet. The noisy tappet will cause the affected spring and/or rocker arm to vibrate or feel rough in operation.

NOTE: Worn valve guides or cocked springs are sometimes mistaken for noisy tappets. If such is the case, noise may be dampened by applying side thrust on the valve spring. If noise is not appreciably reduced, it can be

assumed the noise is in the tappet. Inspect the rocker arm push rod sockets and push rod ends for wear.

3. Valve tappet noise ranges from light noise to a heavy click. A light noise is usually caused by excessive leak-down around the unit plunger, or by the plunger partially sticking in the tappet body cylinder. The tappet should be replaced. A heavy click is caused by a tappet check valve not seating, or by foreign particles wedged between the plunger and the tappet body. This will cause the plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between the valve stem and rocker arm as valve closes. In either case, tappet assembly should be removed for inspection and cleaning.
4. The valve train generates a noise very much like a light tappet noise during normal operation. Care must be taken to ensure that tappets are making the noise. If more than one tappet seems to be noisy, it's probably not the tappets.

REMOVAL

REMOVAL

1. Disconnect the negative cable from the battery.
2. Remove the air cleaner. See **REMOVAL**.
3. Remove intake manifold. See **REMOVAL**.
4. Remove cylinder head cover. See **REMOVAL**.
5. Remove rocker arm assembly and push rods. See **REMOVAL**. Identify push rods to ensure installation in original location.
6. Remove the cylinder head. See **REMOVAL**.

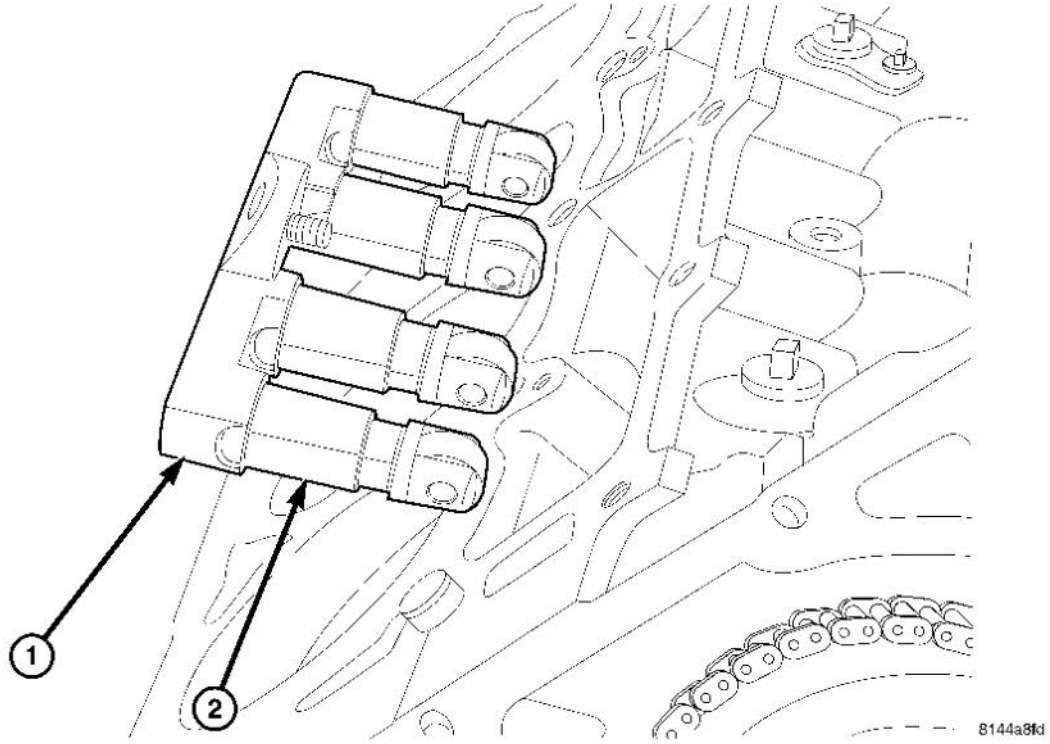

Fig. 147: Tappet Retainer & Hydraulic Roller Tappet
Courtesy of CHRYSLER LLC

1 - TAPPET RETAINER 2 - HYDRAULIC ROLLER TAPPET

7. Remove bolt from tappet guide holder.
8. Remove tappet guide holder.
9. Pull tappet out of bore with a twisting motion. **If all tappets are to be removed and reused, identify tappets to ensure installation in original location.**
10. Check camshaft lobes for abnormal wear.

INSTALLATION

INSTALLATION

1. Lubricate tappets.

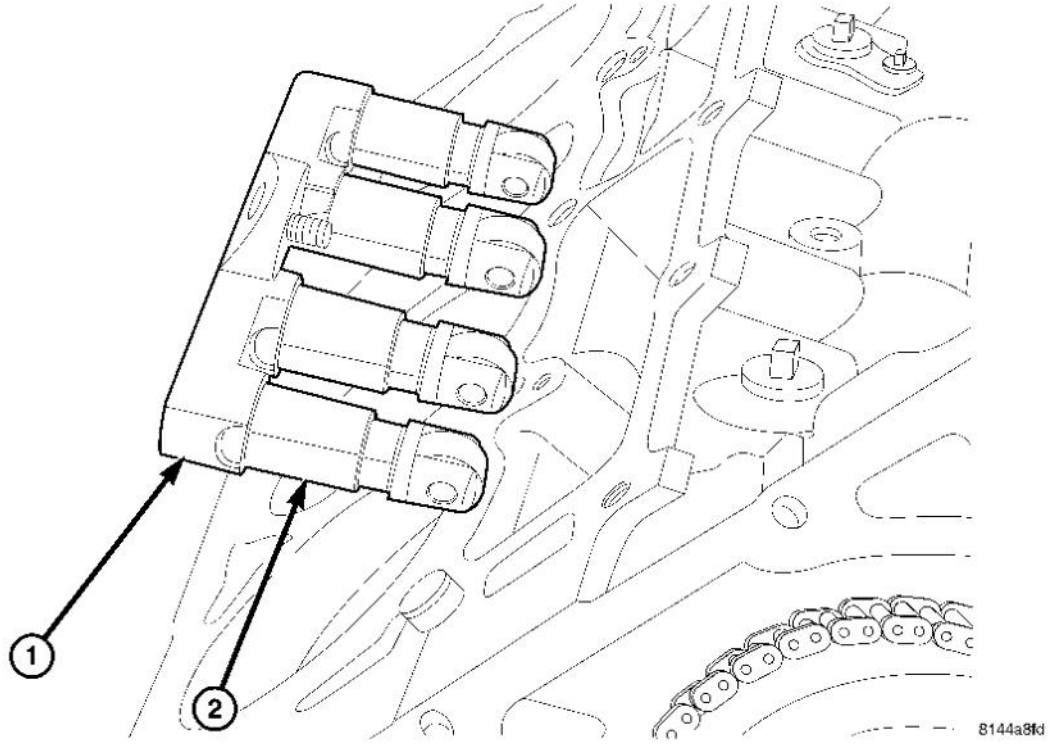

Fig. 148: Tappet Retainer & Hydraulic Roller Tappet
Courtesy of CHRYSLER LLC

1 - TAPPET RETAINER 2 - HYDRAULIC ROLLER TAPPET

2. Install tappets in their original positions.

CAUTION: 5.7L engines equipped with MDS uses both standard roller tappets and deactivating roller tappets, for use with the Multi Displacement System. The deactivating roller tappets must be used in cylinders 1,4,6,7. The deactivating tappets can be identified by the two holes in the side of the tappet body, for the latching pins.

3. Install tappet guide yoke. Install the tappet guide yoke bolt and tighten to 12 N.m (106 in. lbs.) torque.
4. Install cylinder head. See **INSTALLATION**.
5. Install pushrods and rocker arm assembly. See **INSTALLATION**.
6. Install cylinder head cover. See **INSTALLATION**.
7. Install intake manifold. See **INSTALLATION**.
8. Install the air cleaner.

9. Connect the negative cable to the battery.

CAUTION: To prevent damage to valve mechanism, engine must not be run above fast idle until all hydraulic tappets have filled with oil and have become quiet.

10. Road test vehicle and check for leaks.

ROD-PISTON & CONNECTING

DESCRIPTION

PISTON AND CONNECTING ROD

CAUTION: Do not use a metal stamp to mark connecting rods as damage may result, instead use ink or a scratch awl.

The pistons are made of a high strength aluminum alloy. Piston skirts are coated with a solid lubricant (Molykote) to reduce friction and provide scuff resistance. The piston top ring groove and land is anodized. The connecting rods are made of forged powdered metal, with a "fractured cap" design. A pressed fit piston pin is used to attach the piston and connecting rod.

STANDARD PROCEDURE

PISTON FITTING

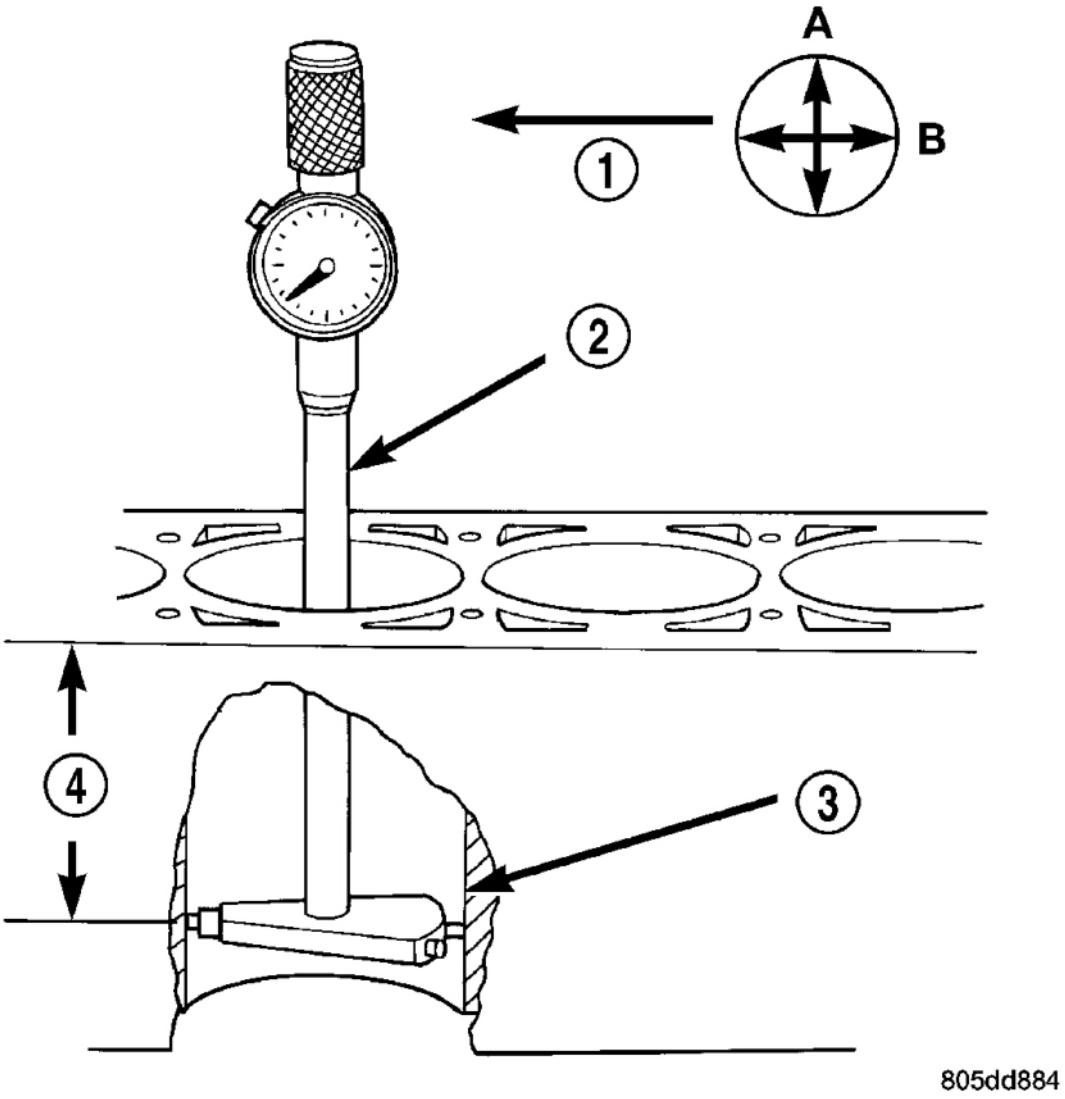

Fig. 149: Measuring Inside Diameter Of Cylinder Bore Using Bore Gauge - Typical
Courtesy of CHRYSLER LLC

1 - FRONT 2 - BORE GAUGE 3 - CYLINDER BORE 4 - 38 MM (1.5 in)

1. To correctly select the proper size piston, a cylinder bore gauge (2), capable of reading in 0.003 mm (0.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at a point 38.0 mm (1.5 inches) below top of bore (4).

Start perpendicular (across or at 90 degrees) to the axis of the crankshaft at point A (1) and then take an additional bore reading 90 degrees to that at point B (1).

3. The coated pistons will be serviced with the piston pin and connecting rod pre-assembled. The piston-rod assembly is specific for the left cylinder bank (odd numbered) and the right cylinder bank (even numbered) and must not be interchanged.

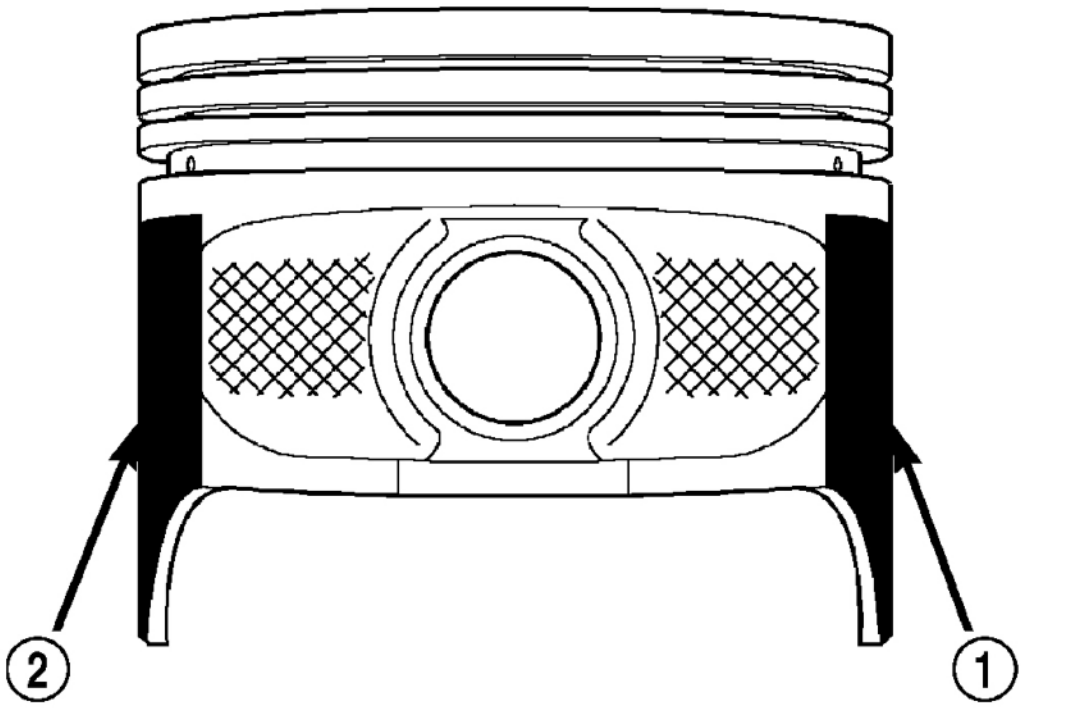

Fig. 150: Moly Coated Piston
Courtesy of CHRYSLER LLC

1 - MOLY COATED
2 - MOLY COATED

4. Measure the piston diameter with a micrometer at points (1,2).

REMOVAL

PISTON AND CONNECTING ROD

1. Disconnect negative cable from battery.
2. Oil pan and gasket/windage tray. See **REMOVAL**.

3. Cylinder head covers. See **REMOVAL**.
4. Timing chain cover. See **REMOVAL**.
5. Cylinder head(s). See **REMOVAL**.
6. If necessary, remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation.** When removing piston and connecting rod assemblies from the engine, rotate crankshaft so the each connecting rod is centered in cylinder bore.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur.

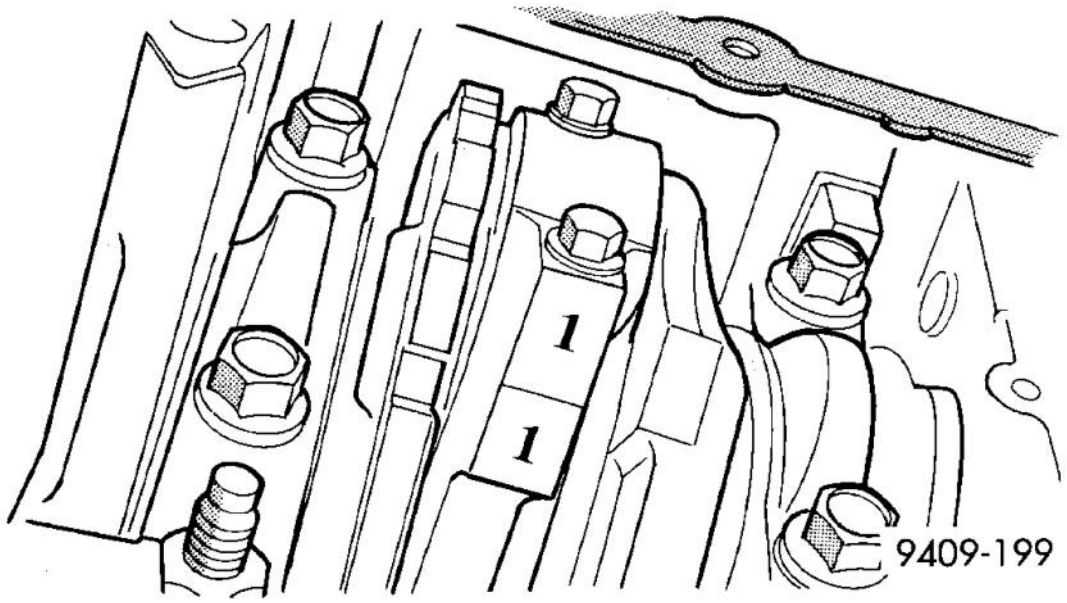

Fig. 151: Marking Connecting Rod And Bearing Cap Positions
Courtesy of CHRYSLER LLC

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removal to ensure correct reassembly.

7. Mark connecting rod and bearing cap positions using a permanent ink marker or scribe tool.

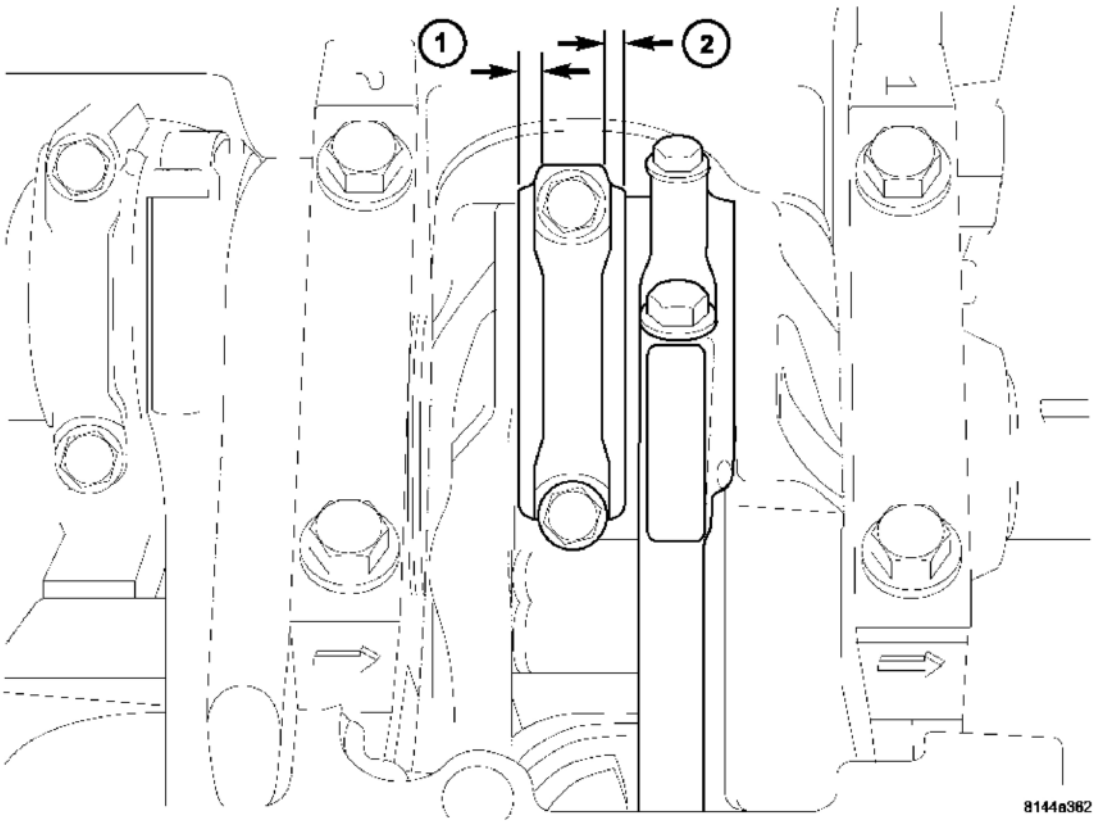

Fig. 152: Identifying Connecting Rod Proper Installation
Courtesy of CHRYSLER LLC

1 - WIDE SIDE 2 - NARROW SIDE

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

8. Remove connecting rod cap. Install Connecting Rod Guides 8507 into the connecting rod being removed. Remove piston from cylinder bore. Repeat this procedure for each piston being removed.
9. Immediately after piston and connecting rod removal, install bearing cap on the mating connecting rod to prevent damage to the fractured cap and rod surfaces.
10. Carefully remove piston rings from piston(s).

CLEANING

PISTON AND CONNECTING ROD

CAUTION: DO NOT use a wire wheel or other abrasive cleaning devise to clean the pistons or connecting rods. The pistons have a Moly coating, this coating must not be damaged.

1. Using a suitable cleaning solvent clean the pistons in warm water and towel dry.
2. Use a wood or plastic scraper to clean the ring land grooves.

CAUTION: DO NOT remove the piston pin from the piston and connecting rod assembly.

INSPECTION

PISTON AND CONNECTING ROD

Check the connecting rod journal for excessive wear, taper and scoring. Refer to **STANDARD PROCEDURE** .

Check the connecting rod for signs of twist or bending.

Check the piston for taper and elliptical shape before it is fitted into the cylinder bore. See **STANDARD PROCEDURE**.

Check the piston for scoring, or scraping marks in the piston skirts. Check the ring lands for cracks and/or deterioration.

INSTALLATION

PISTON AND CONNECTING ROD

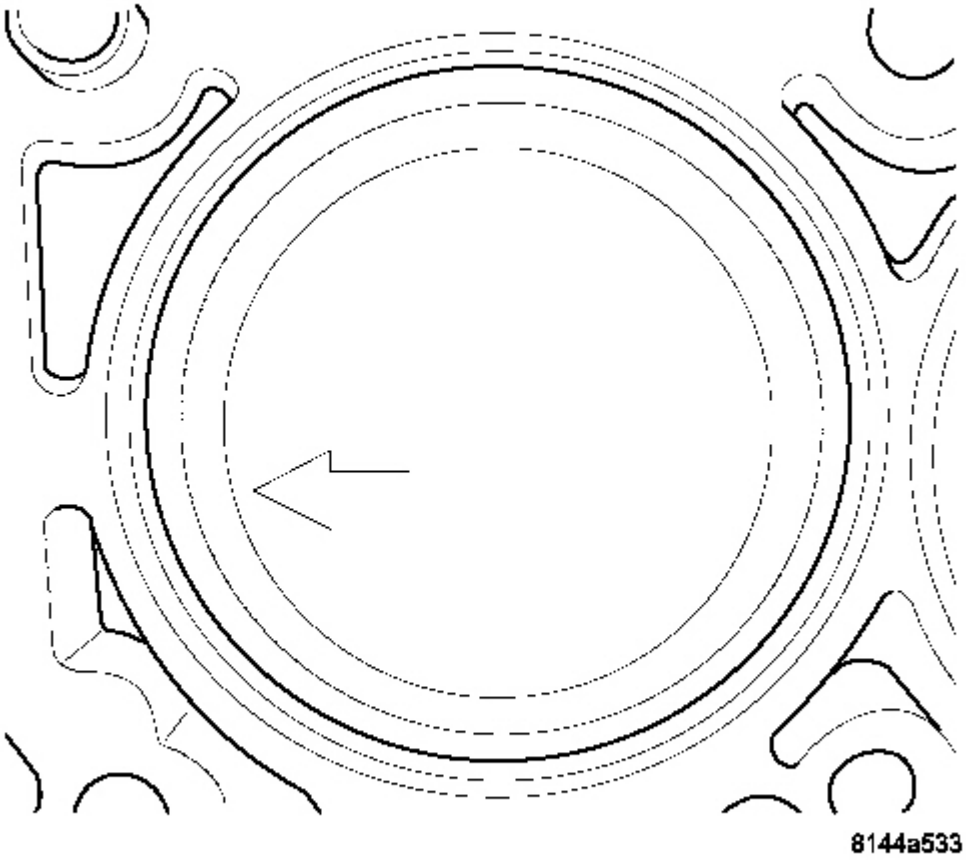

Fig. 153: View Of Piston Direction Arrow
Courtesy of CHRYSLER LLC

1. Before installing piston and connecting rod assemblies into the bore, install the piston rings. See **STANDARD PROCEDURE**.
2. Immerse the piston head and rings in clean engine oil. Position a ring compressor over the piston and rings. Tighten ring compressor. **Ensure position of rings do not change during this operation.**
3. Position bearing onto connecting rod. Lubricate bearing surface with clean engine oil.
4. Install Connecting Rod Guides 8507 into connecting rod bolt threads.
5. The pistons are marked on the piston pin bore surface with an raised "F" or arrow on top of piston indicating installation position. This mark must be pointing toward the front of engine on both cylinder banks.
6. Wipe cylinder bore clean and lubricate with engine oil.
7. Rotate crankshaft until connecting rod journal is on the center of cylinder bore. Insert rod and piston into

cylinder bore and carefully position connecting rod guides over crankshaft journal.

8. Tap piston down in cylinder bore using a hammer handle. While at the same time, guide connecting rod into position on rod journal.

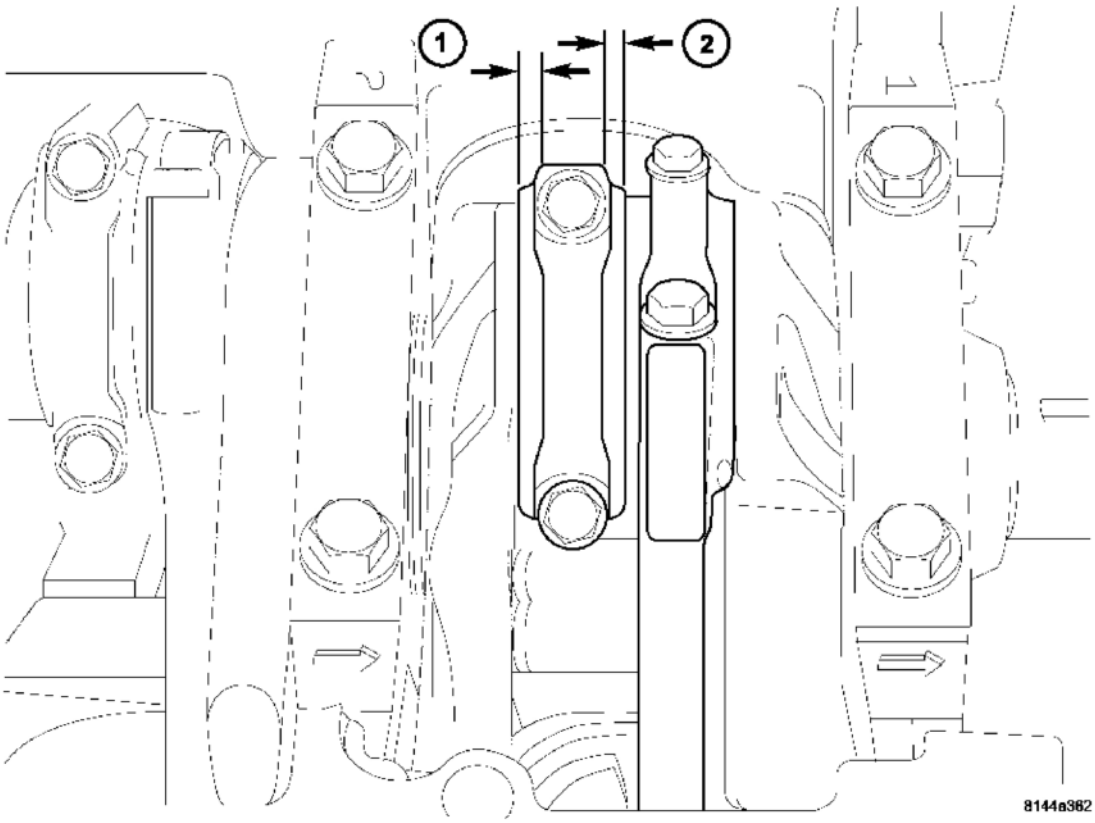

Fig. 154: Identifying Connecting Rod Proper Installation
Courtesy of CHRYSLER LLC

1 - WIDE SIDE 2 - NARROW SIDE

CAUTION: Connecting Rod Bolts Must Not Be Reused. Always replace the Rod Bolts whenever they are loosened or removed.

9. Wipe connecting rod cap clean and install bearing.
10. Lubricate with clean engine oil and install**new** rod bolts.
11. Lubricate bearing surfaces with clean engine oil. Tighten bolts to 21 N.m (15 ft. lbs.) plus a 90° turn.
12. Cylinder head(s). See **INSTALLATION**.
13. Cylinder head covers. See **INSTALLATION**.
14. Install the intake manifold.

15. Oil pan and gasket/windage tray. See **INSTALLATION**.
16. Fill crankcase with proper engine oil to correct level.
17. Connect negative cable to battery.

RINGS-PISTON

STANDARD PROCEDURE

PISTON RING FITTING

PISTON RING END GAP

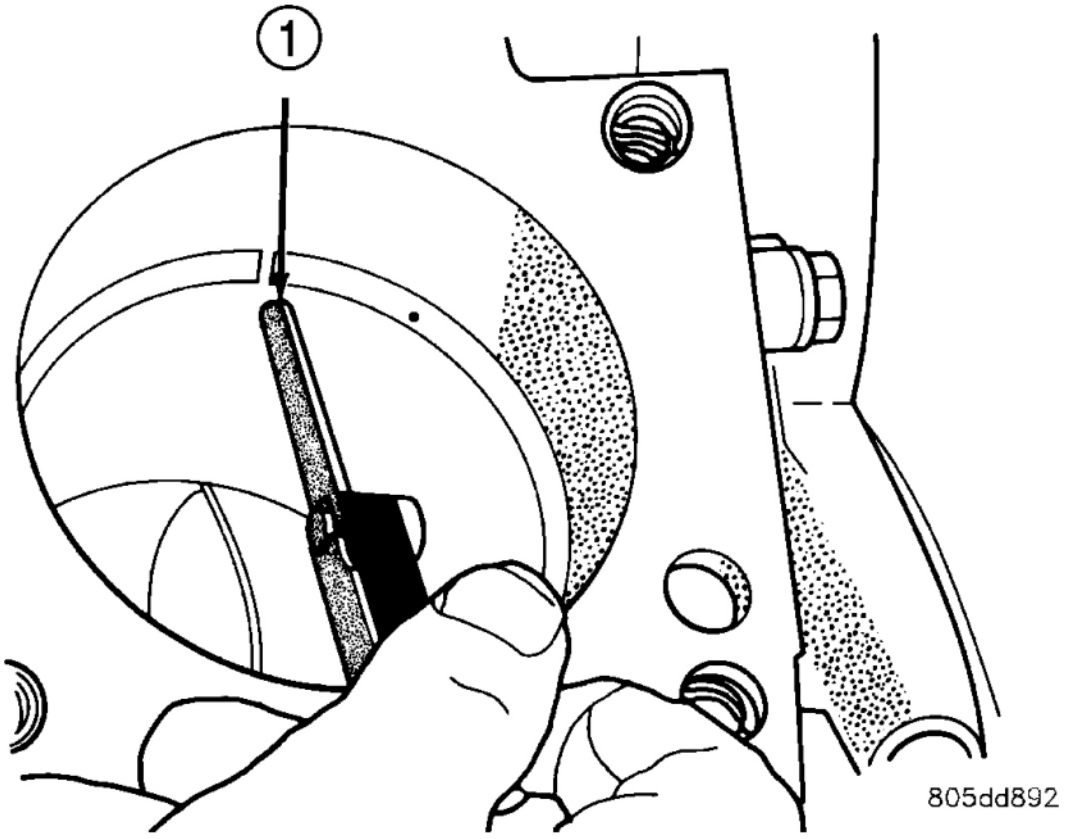

Fig. 155: Checking Ring End Gap
Courtesy of CHRYSLER LLC

1 - FEELER GAUGE

NOTE: Before reinstalling used rings or installing new rings, the ring clearances must be checked.

1. Wipe the cylinder bore clean.
2. Insert the ring in the cylinder bore.

NOTE: The ring gap measurement must be made with the ring positioned at least 12 mm (0.50 inch.) from bottom of cylinder bore.

3. Using a piston, to ensure that the ring is squared in the cylinder bore, slide the ring downward into the cylinder.
4. Using a feeler gauge check the ring end gap. Replace any rings not within specification.

PISTON RING SIDE CLEARANCE

NOTE: Make sure the piston ring grooves are clean and free of nicks and burrs.

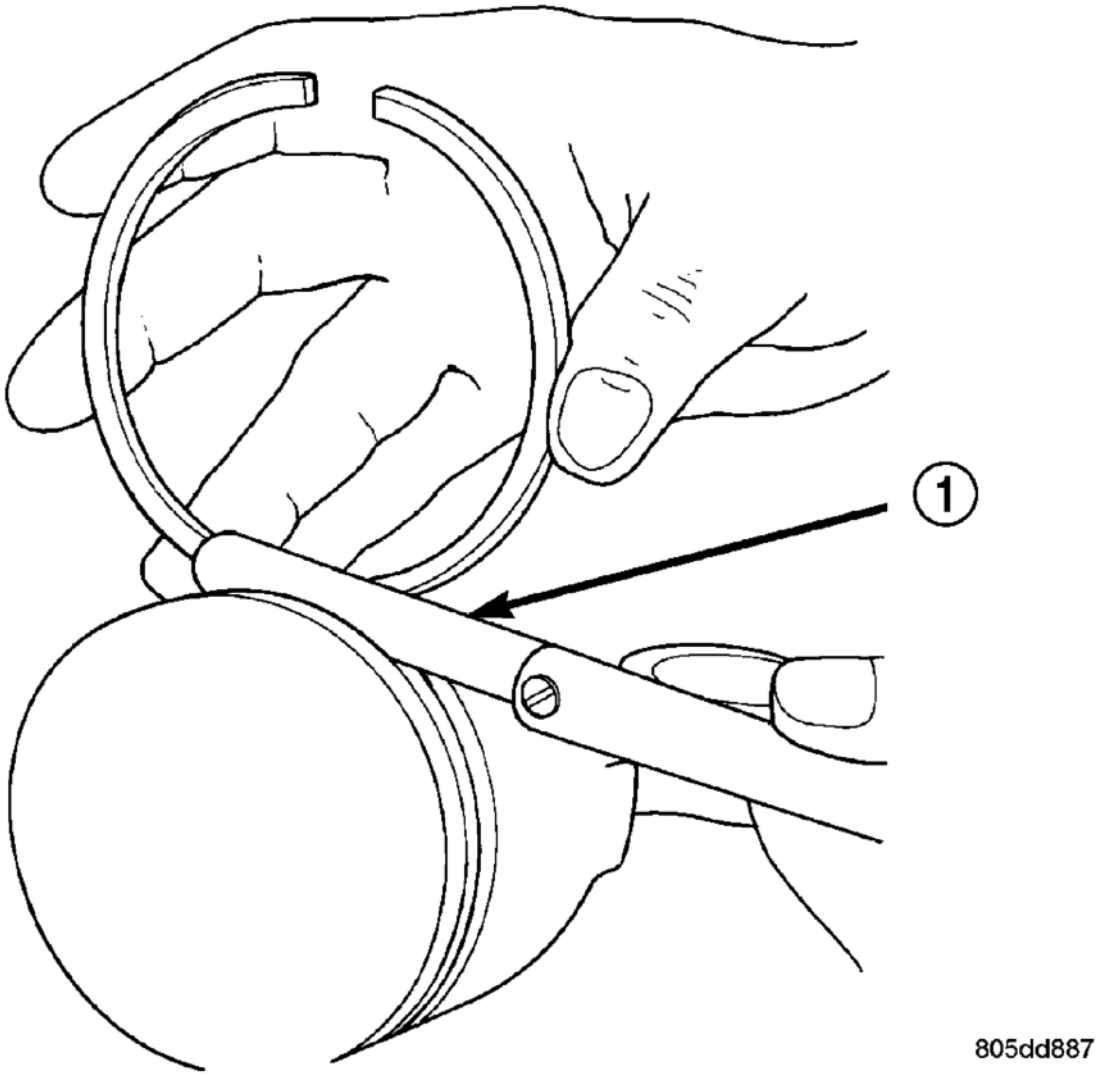

Fig. 156: Measuring Piston Ring Side Clearance
Courtesy of CHRYSLER LLC

1 - FEELER GAUGE

1. Measure the ring side clearance as shown make sure the feeler gauge (1) fits snugly between the ring land and the ring. Replace any ring not within specification.
2. Rotate the ring around the piston, the ring must rotate in the groove with out binding.

PISTON RING SPECIFICATION CHART

Ring Position	Ring/Groove Side Clearance	Maximum Clearance
Upper Ring	0.02-0.07mm	0.11mm

	(0.0008- 0.0028 in.)	(0.004 in.)
Intermediate Ring	0.02-0.06 mm (0.0008-0.0023 in.)	0.10mm (0.004 in.)
Ring Position	**Ring Gap**	**Wear Limit**
Upper Ring -	0.23-0.38mm (0.0090-0.0149 in.)	0.43mm (0.017 in.)
Intermediate Ring -	0.35-0.60mm (0.0137-0.0236 in.)	0.74mm (0.029 in.)
Oil Control Ring (Steel Rail)	0.015-0.66mm (0.0059- 0.0259 in.)	0.76mm (0.030 in.)

PISTON RING INSTALLATION

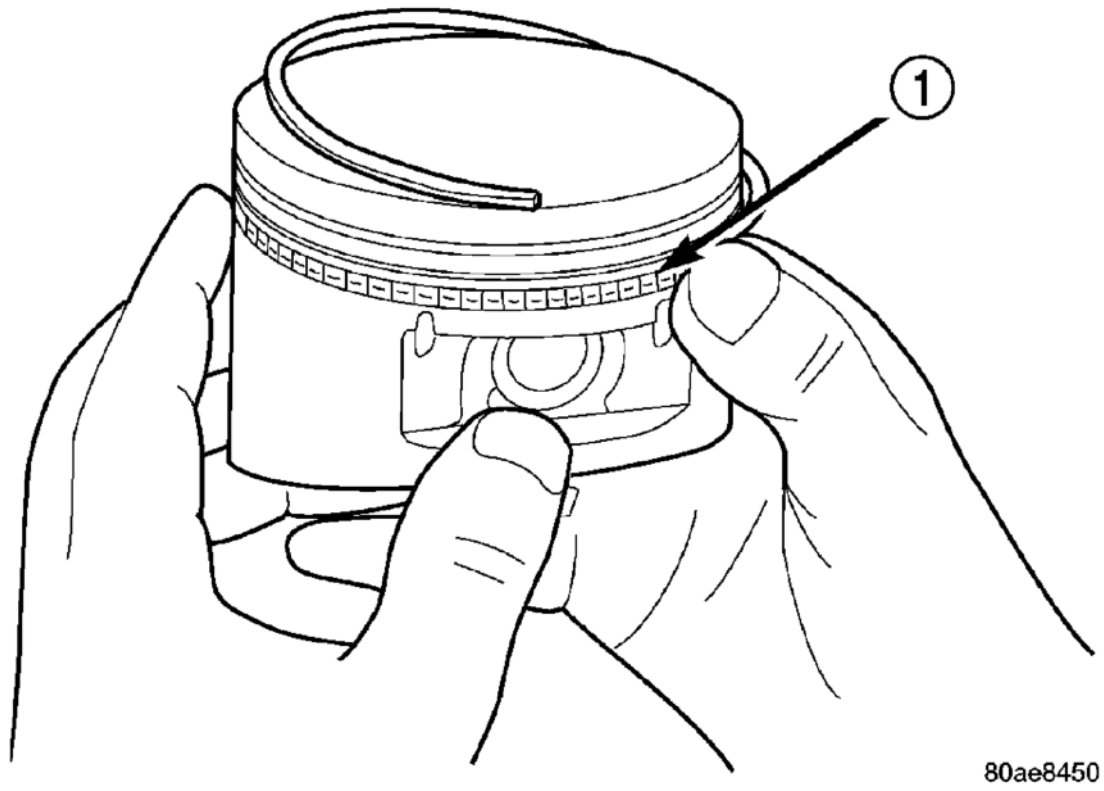

Fig. 157: Side Rail - Installation
Courtesy of CHRYSLER LLC

1 - SIDE RAIL END

NOTE: The No. 1 and No. 2 piston rings have a different cross section. Ensure No. 2 ring is installed with manufacturers I.D. mark (Dot) facing up, towards top of the piston.

NOTE: Piston rings are installed in the following order:

Oil ring expander.
Lower oil ring side rail.
Upper oil ring side rail.
No. 2 Intermediate piston ring.
No. 1 Upper piston ring.

1. Install the oil ring expander.
2. Install upper side rail by placing one end between the piston ring groove and the expander ring. Hold end firmly and press down the portion to be installed until side rail is in position. Repeat this step for the lower side rail.

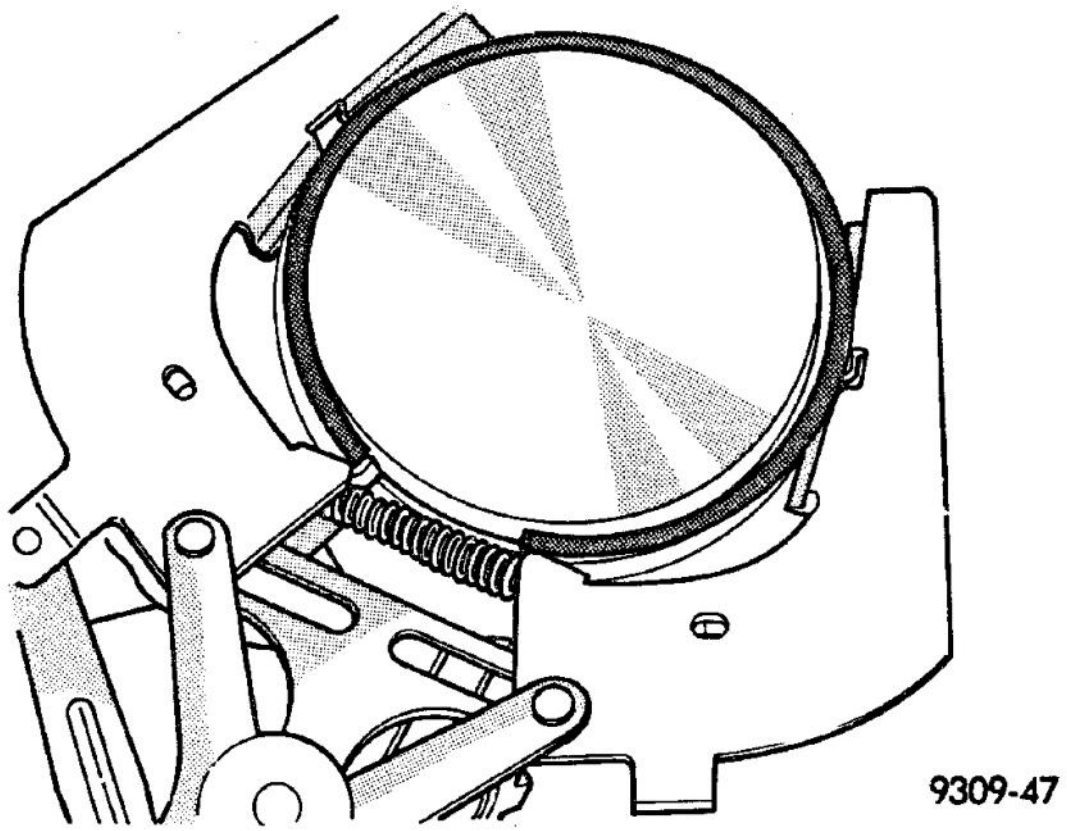

Fig. 158: Installing Upper And Intermediate Rings
Courtesy of CHRYSLER LLC

3. Install No. 2 intermediate piston ring using a piston ring installer.
4. Install No. 1 upper piston ring using a piston ring installer.

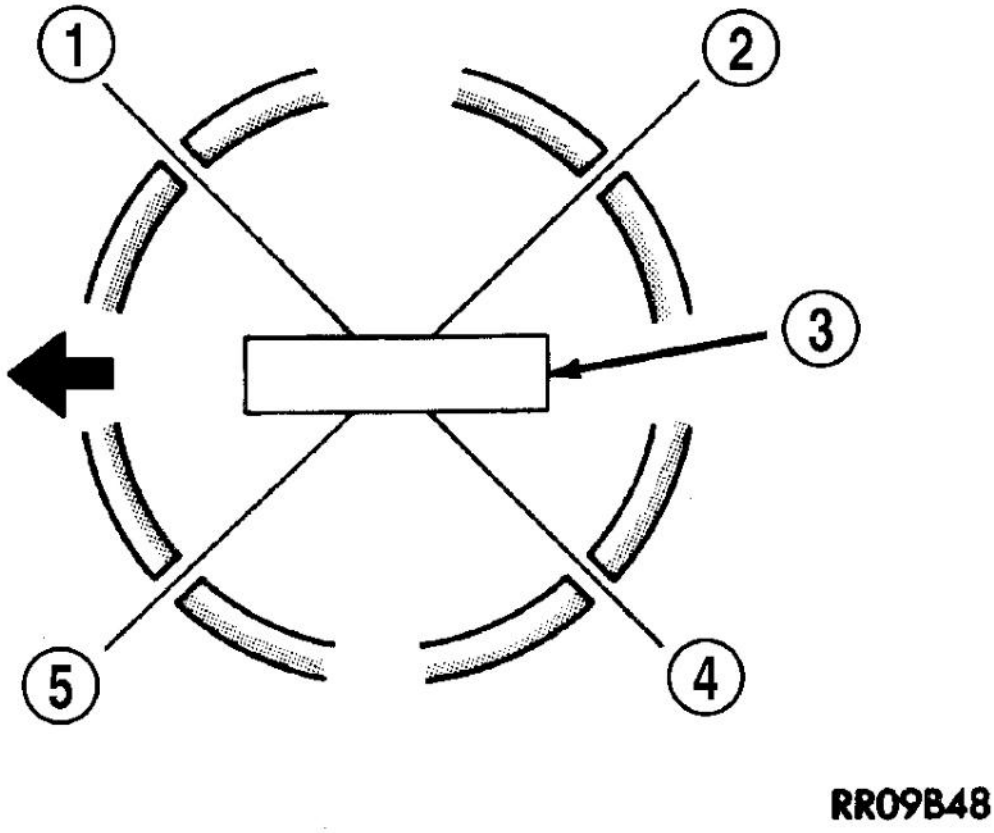

Fig. 159: Piston Ring End Gap Positions
Courtesy of CHRYSLER LLC

NOTE: Install the piston rings so the gaps positioned as indicated with the piston viewed from the top.

NOTE: Staggering ring gap is important for oil control.

5. Install the oil expander so the ring gap is located in the (1) position.
6. Install the oil ring rails so the ring gap is located in the (2,4) position.
7. Install the second compression ring so the ring gap is located in the (3) position.
8. Install the top compression so the ring gap is located in the (1) position.

DAMPER-CRANKSHAFT

REMOVAL

CRANKSHAFT DAMPER

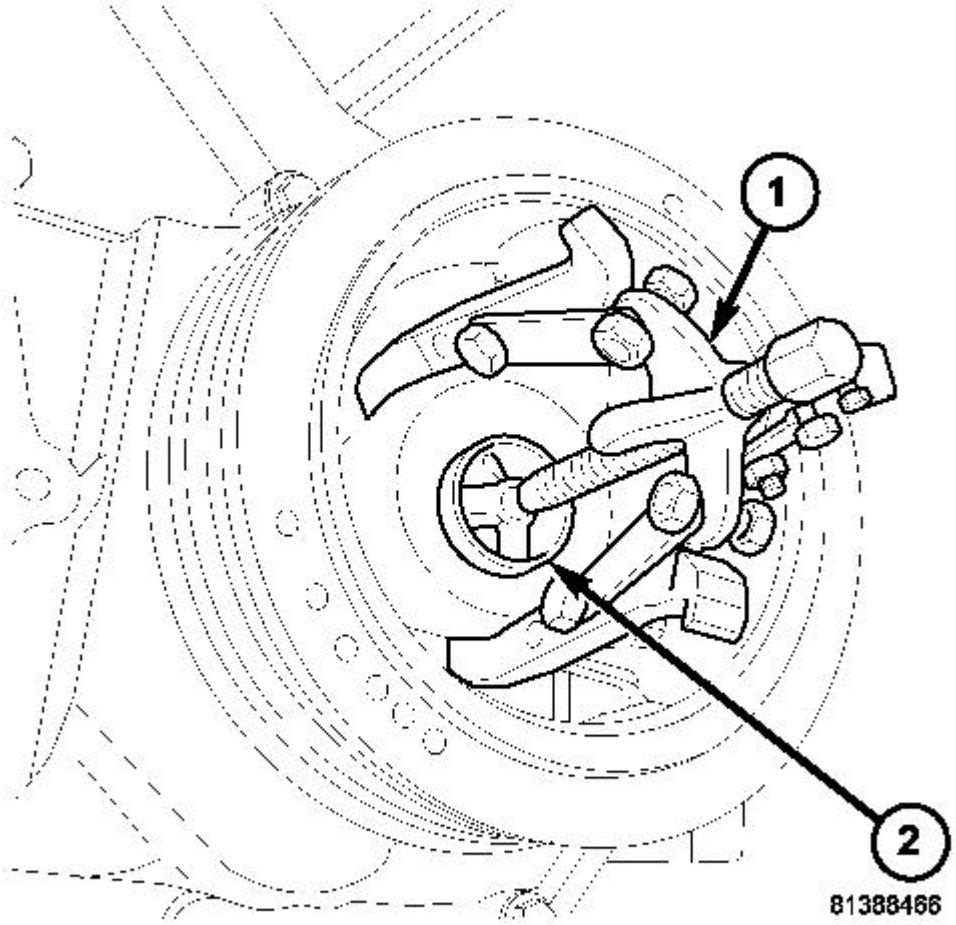

Fig. 160: Crankshaft Damper Removal
Courtesy of CHRYSLER LLC

1 - 3-Jaw Puller 1023 2 - Crankshaft Insert 8513A

1. Disconnect negative cable from battery.
2. Remove accessory drive belt. Refer to **REMOVAL** .
3. Drain cooling system. Refer to **STANDARD PROCEDURE** .
4. Remove radiator upper hose.
5. Remove fan shroud. Refer to **REMOVAL** .
6. Remove crankshaft damper bolt.

7. Remove damper using Crankshaft Insert 8513A and Three Jaw Puller 1023.

INSTALLATION

CRANKSHAFT DAMPER

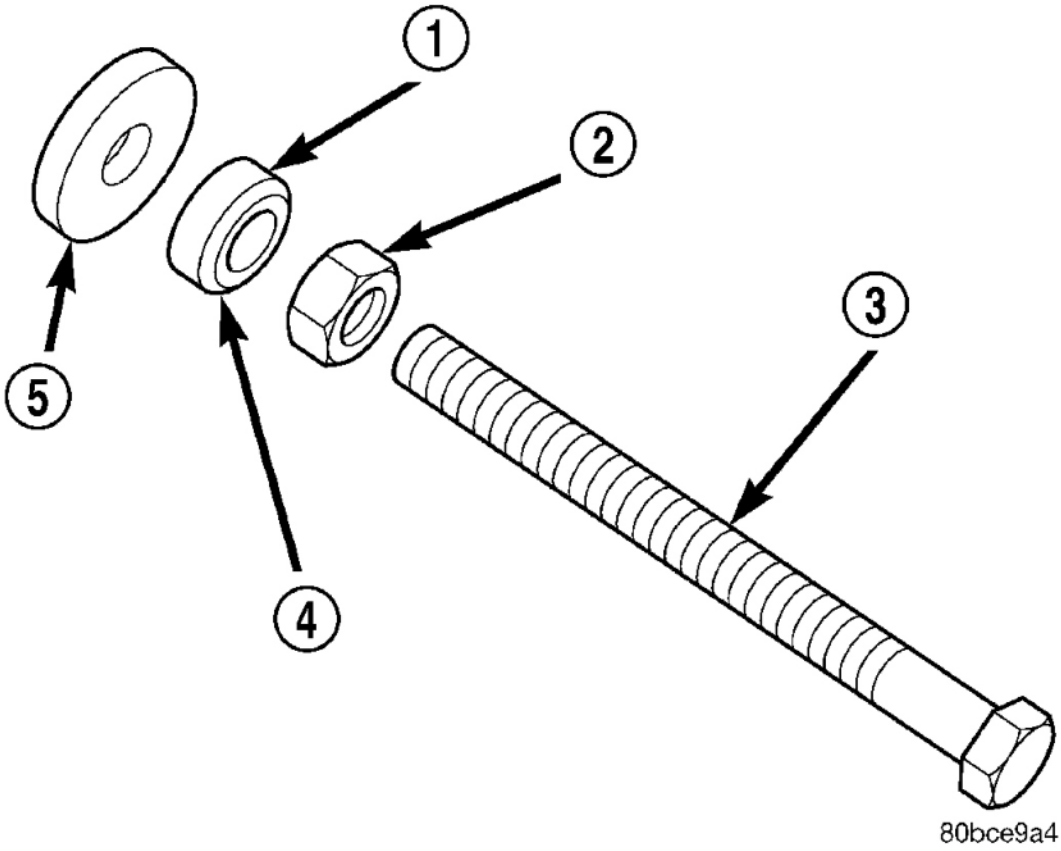

Fig. 161: Proper Assembly Method For Special Tool 8512
Courtesy of CHRYSLER LLC

1 - BEARING
2 - NUT
3 - THREADED ROD
4 - BEARING HARDENED SURFACE (FACING NUT)
5 - HARDENED WASHER

CAUTION: To prevent severe damage to the Crankshaft, Damper or Damper Installer 8512-A, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

1. Slide damper onto crankshaft slightly.

CAUTION: Special Tool 8512-A, is assembled in a specific sequence. Failure to assemble this tool in this sequence can result in tool failure and severe damage to either the tool or the crankshaft.

2. Assemble Damper Installer 8512-A as follows, thread nut (2) onto the bolt (3) then install the roller bearing (1) followed by the hardened washer (5) slides onto the threaded rod (3). Once assembled coat the threaded rod's threads with Mopar® Nickel Anti-Seize (or equivalent).
3. Using Damper Installer 8512-A, press damper onto crankshaft.
4. Install then tighten crankshaft damper bolt to 176 N.m (129 ft. lbs.).
5. Install radiator upper hose.
6. Install accessory drive belt. Refer to **INSTALLATION** .
7. Refill cooling system. Refer to **STANDARD PROCEDURE** .
8. Connect negative cable to battery.

COVER-STRUCTURAL

DESCRIPTION

STRUCTURAL DUST COVER

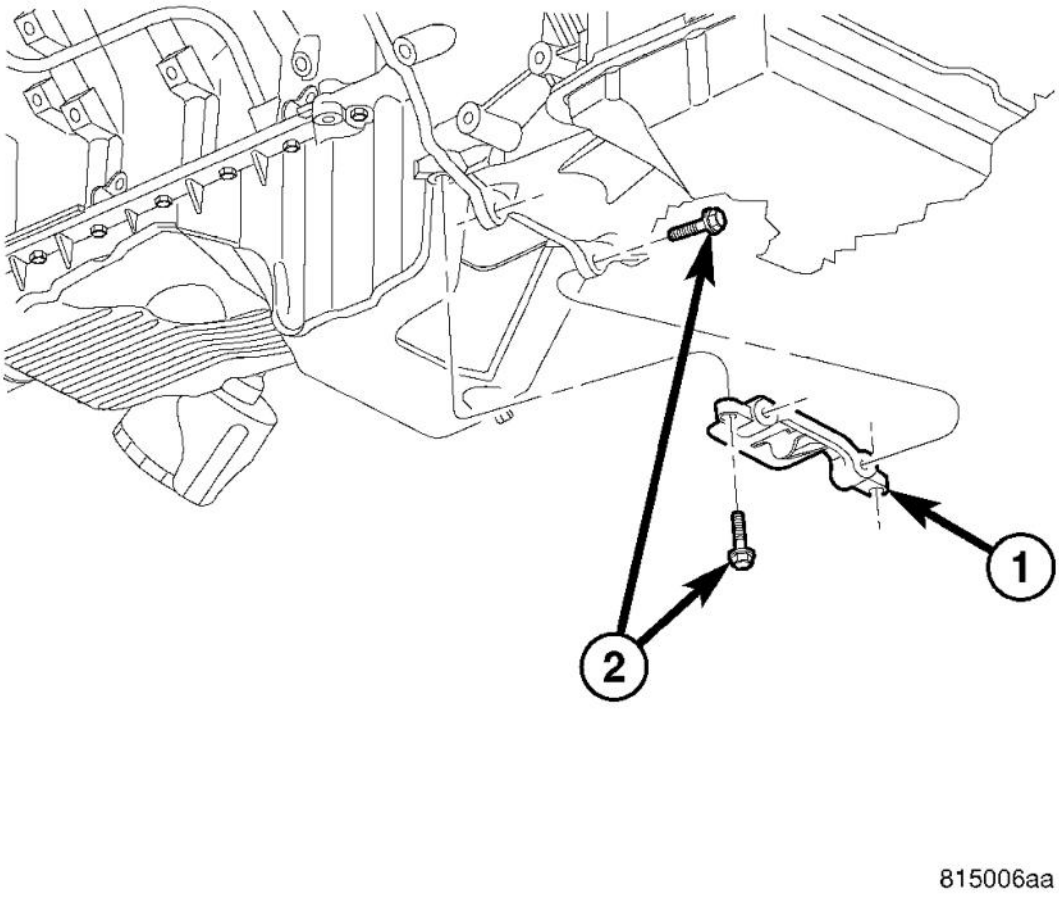

Fig. 162: Structural Dust Cover
Courtesy of CHRYSLER LLC

1 - STRUCTURAL COVER 2 - BOLTS

The structural dust cover (1) is made of die cast aluminum and joins the lower half of the transmission bell housing to the engine oil pan.

OPERATION

STRUCTURAL DUST COVER

The structural cover provides additional powertrain stiffness and reduces noise and vibration.

REMOVAL

REMOVAL

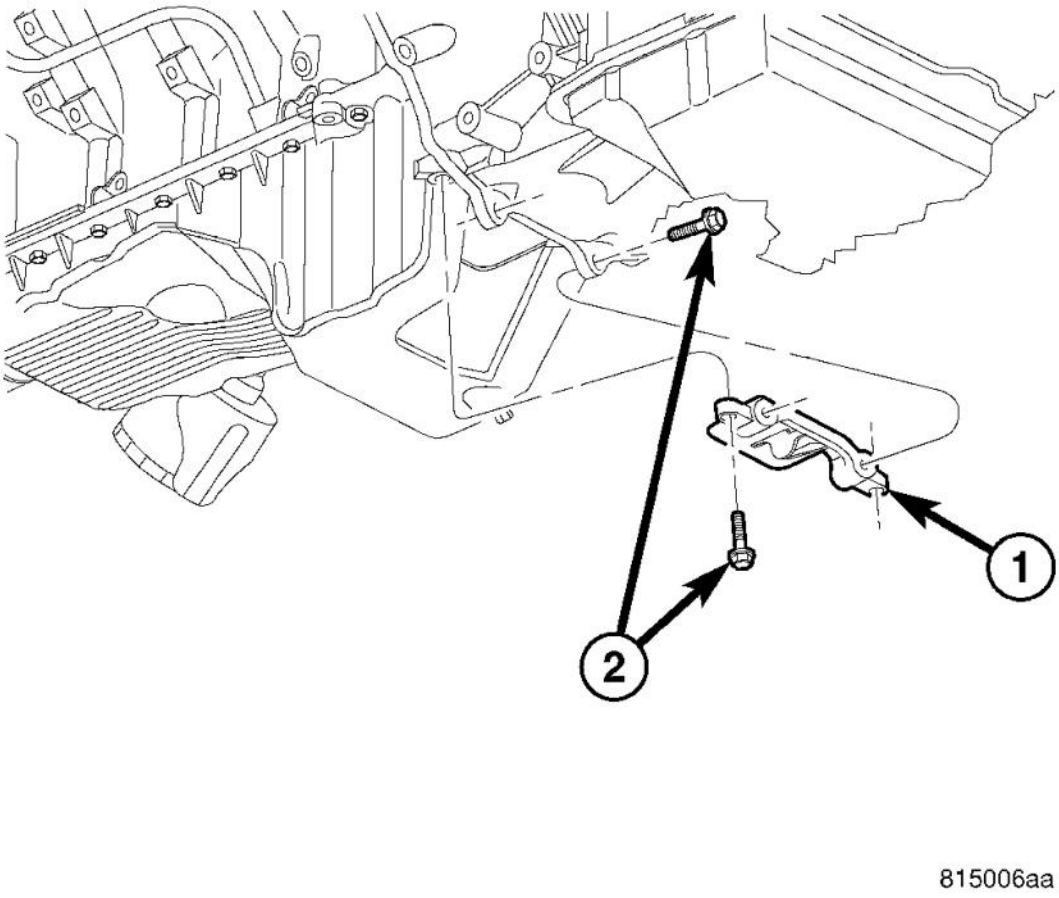

Fig. 163: Structural Dust Cover
Courtesy of CHRYSLER LLC

1 - STRUCTURAL COVER 2 - BOLTS

1. Remove the 4 bolts (2) attaching the structural dust cover (1) to the transmission and the oil pan.
2. Remove the structural dust cover from the vehicle.

INSTALLATION

INSTALLATION

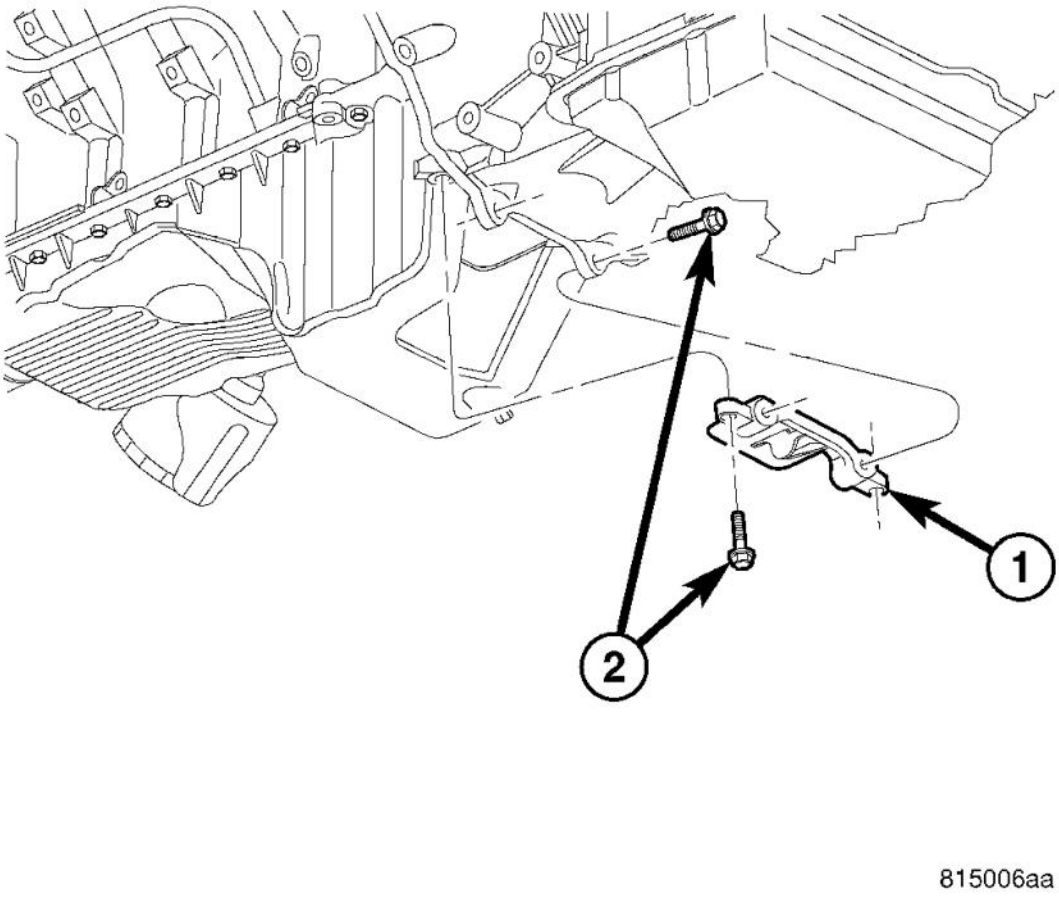

Fig. 164: Structural Dust Cover
Courtesy of CHRYSLER LLC

1 - STRUCTURAL COVER 2 - BOLTS

1. Position the structural dust cover (1) onto the oil pan and transmission.
2. Install the 4 bolts (2) and torque to 54 N.m (39 ft. lbs).

SOLENOID-MDS

DESCRIPTION

MDS SOLENOID

The Multi Displacement System selectively deactivates cylinders 1,4,6, and 7, to improve fuel economy. It has two modes of operation:

8 cylinders for acceleration and heavy loads.
4 cylinders for cruising and city traffic.

The main components of the Multi Displacement System are:

Unique MDS camshaft.
Deactivating roller tappets.
4 control valves/solenoids.
Control valve/solenoid wiring harness.
Oil temp sensor.

OPERATION

MDS SOLENOID

Cylinder Deactivation

Trap an exhaust charge from a normal combustion event
Normal combustion event
Don't open the exhaust valve
Don't open the intake valve
Piston is an air spring
Cylinders deactivated in firing sequence

Cylinder Reactivation

Open the exhaust valve
Empty the cylinder
Open the intake valve
Normal combustion event
Cylinders reactivated in firing sequence

DIAGNOSIS AND TESTING

MDS SOLENOID

The Multi Displacement System has the following detectable issues:

Solenoid circuit
Fail to deactivate a cylinder(s)
Fail to reactivate a cylinder(s)
Low oil pressure

CONDITION	POSSIBLE CAUSES	CORRECTION
MDS does not activate	1. Low oil pressure	1. Check for proper oil pressure
	2. Bad oil temp sensor	2. Replace oil temp sensor
-	3. Malfunctioning MDS Solenoid	3. Replace Solenoid
-	4. Malfunctioning MDS Tappet	4. Replace Tappet
MDS Does Not Deactivate	1. Low oil pressure	1. Check for proper oil pressure
	2. Bad oil temp sensor	2. Replace oil temp sensor
-	3. Malfunctioning MDS Solenoid	3. Replace Solenoid
-	4. Malfunctioning MDS Tappet	4. Replace Tappet

REMOVAL

MDS SOLENOID

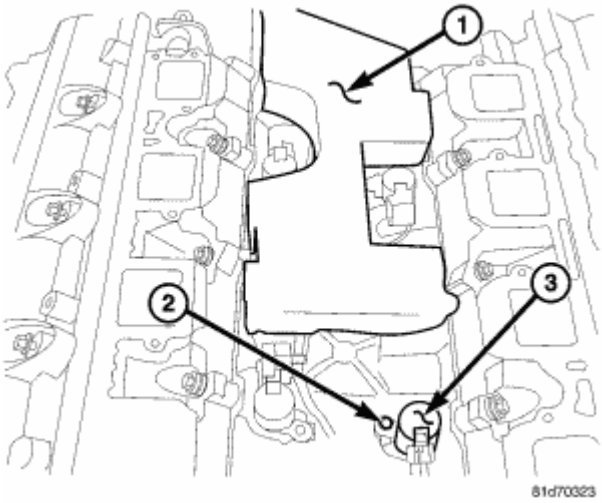

Fig. 165: MDS Solenoids
Courtesy of CHRYSLER LLC

1. Disconnect the negative battery cable.
2. Remove the intake manifold. See **REMOVAL**.
3. Remove foam insulator pad (1) if necessary.

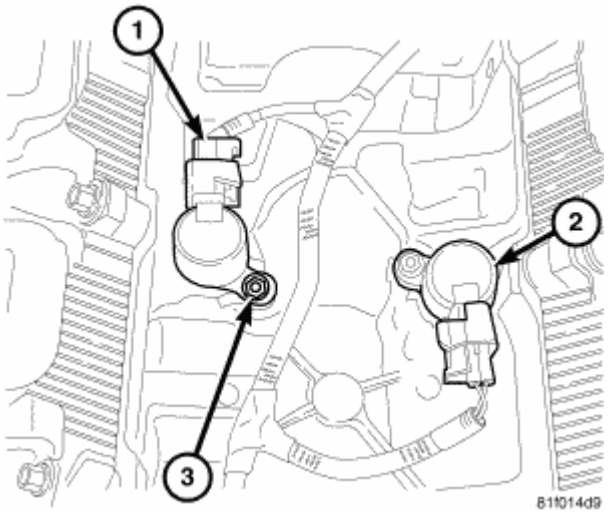

Fig. 166: MDS Solenoid(s), Wiring Harness Connectors & Hold Down Bolt
Courtesy of CHRYSLER LLC

4. Remove wiring harness connectors (1) from the MDS solenoid(s) (2) that require removal.
5. Remove hold down bolt (3) from MDS solenoid(s) (2).

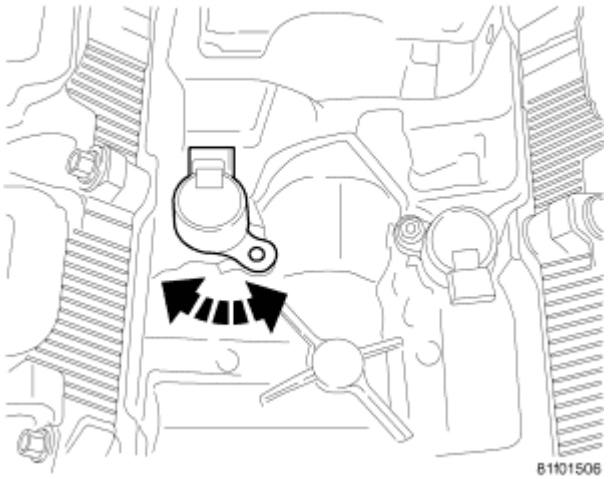

Fig. 167: MDS Solenoid Removal
Courtesy of CHRYSLER LLC

CAUTION: Do not try to pry the solenoid out. This could lead to breakage and contamination of the lubrication system.

6. Lightly tap on solenoid with a rubber mallet. Wiggle solenoid from side to side.
7. Remove MDS solenoid(s) (3).

INSTALLATION

MDS SOLENOID

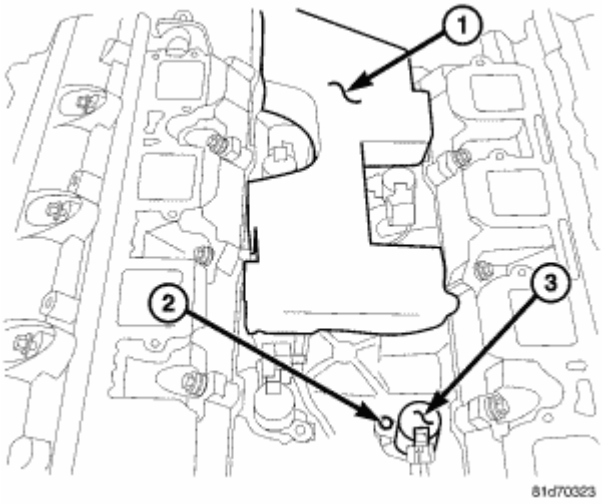

Fig. 168: MDS Solenoids
Courtesy of CHRYSLER LLC

1. Verify that MDS bores are free of debris, before solenoid installation.
2. Install MDS solenoid(s) (3) fully into block.
3. Install hold down bolt (2) and tighten to 11 N.m (97 in. lbs.).
4. Reconnect the MDS wiring harness to the solenoid(s) (3).
5. Install foam insulator pad (1) if removed.
6. Install the intake manifold. See **INSTALLATION**.

ENGINE MOUNTING

MOUNT-FRONT

REMOVAL

FRONT ENGINE MOUNT

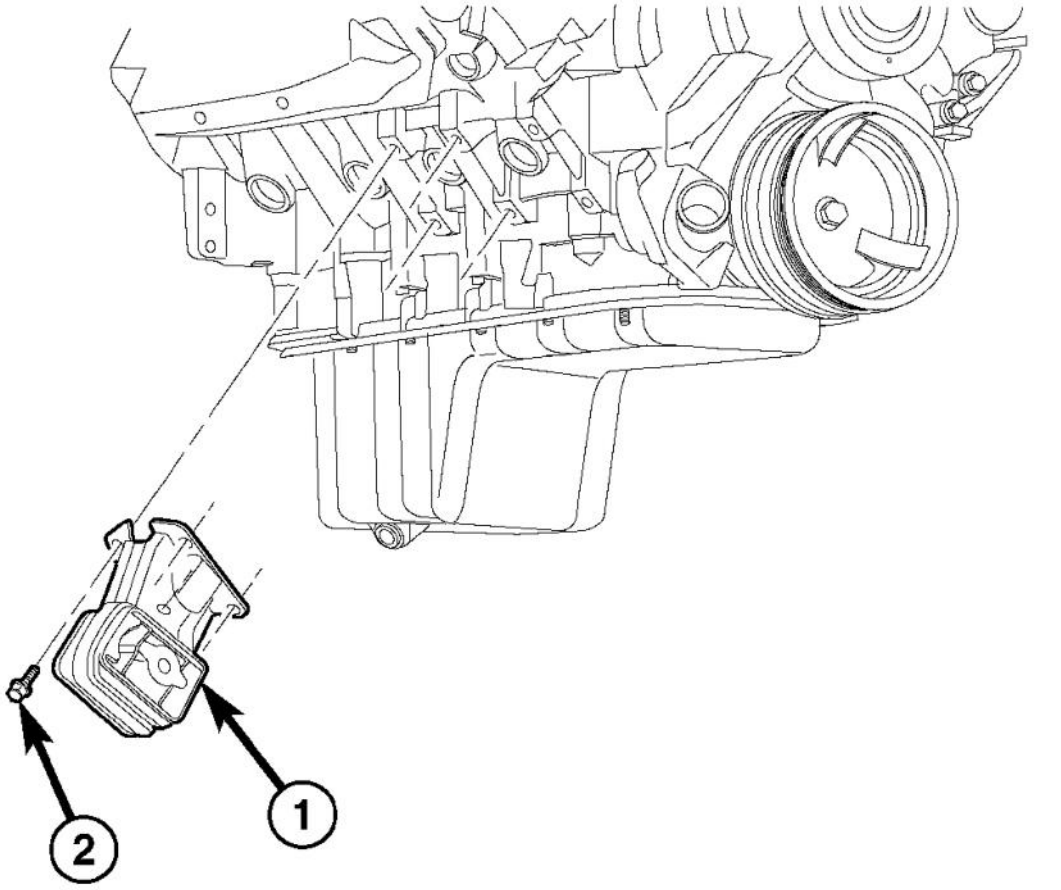

Fig. 169: Removing/Installing Engine Mount
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable.
2. Raise vehicle.
3. Remove engine mount thru bolts.
4. Raise engine using suitable jack.
5. Remove engine mount bolts (2).
6. Remove mount (1) from engine.

INSTALLATION

FRONT ENGINE MOUNT

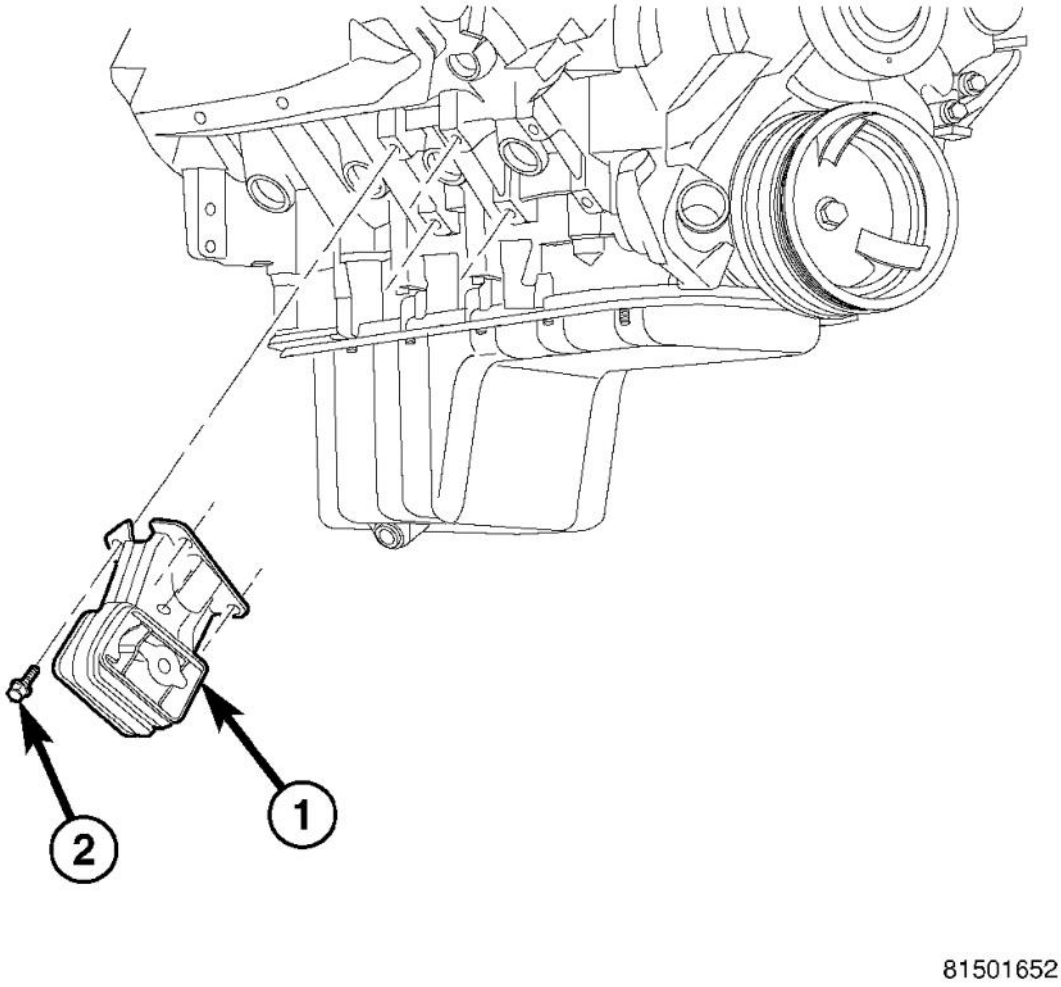

Fig. 170: Removing/Installing Engine Mount
Courtesy of CHRYSLER LLC

1. Install the engine mount (1).
2. Lower the engine.
3. Install the thru bolts and nuts
4. Lower vehicle.
5. Connect negative battery cable.

MOUNT-REAR

REMOVAL

REAR ENGINE MOUNT

4X2

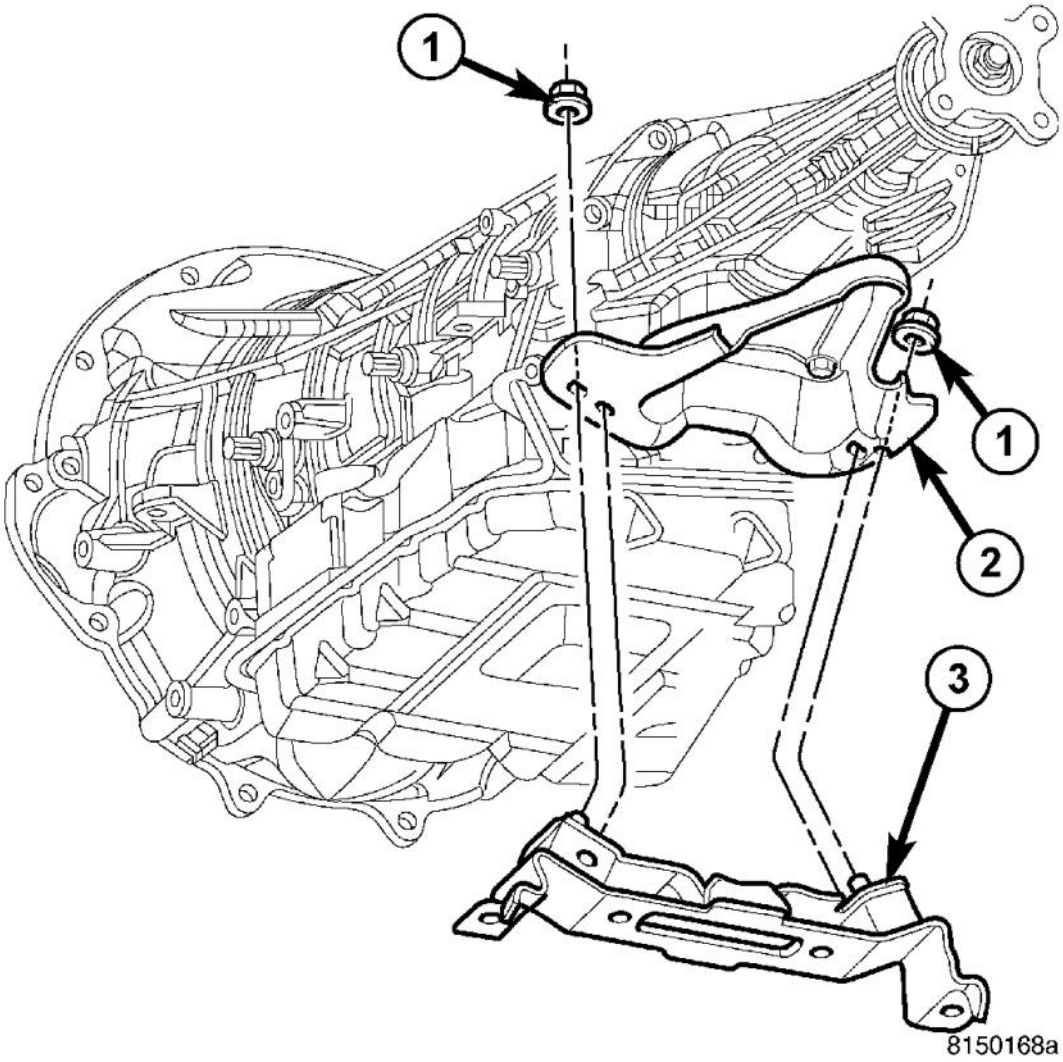

Fig. 171: Removing/Installing Engine Rear Mount (4X2)
Courtesy of CHRYSLER LLC

1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (1) from the transmission mount to transmission.
5. Remove the mount (3).
6. Remove the transmission mount bracket (2), if required.

4X4

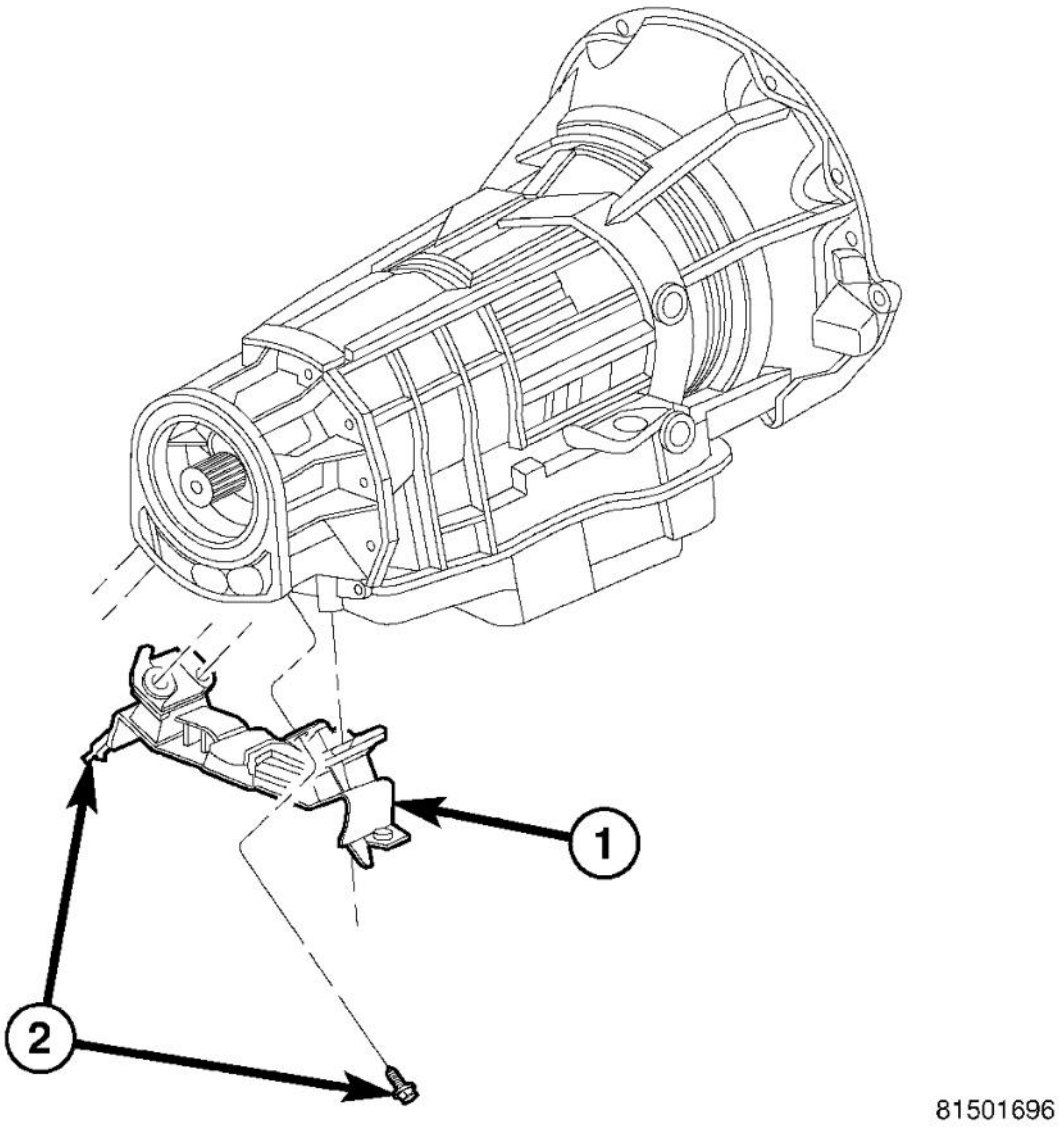

Fig. 172: Removing/Installing Engine Rear Mount (4X4)
Courtesy of CHRYSLER LLC

1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (2) from the transmission mount (1) to transmission.
5. Remove the mount.

INSTALLATION

REAR ENGINE MOUNT

4X2

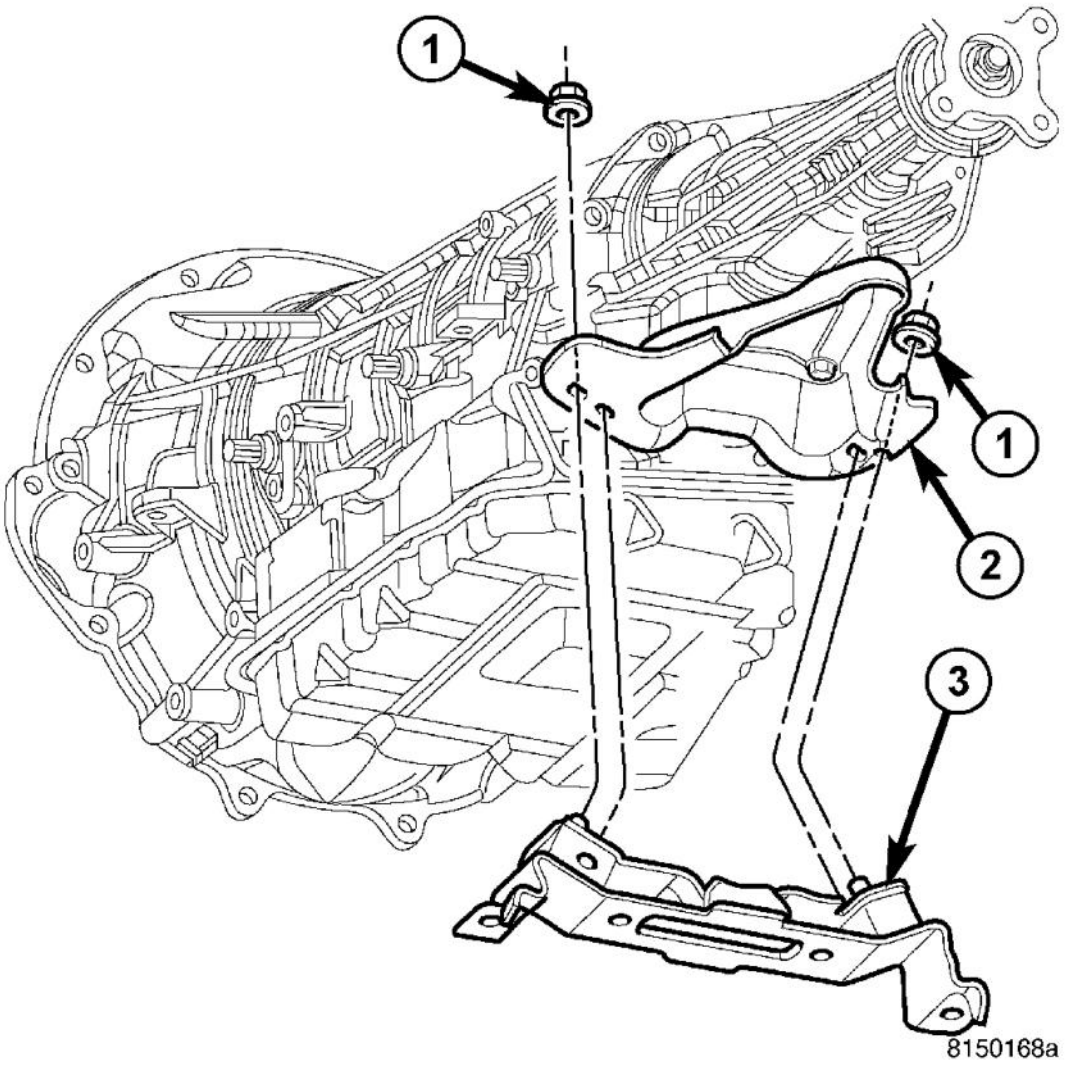

Fig. 173: Removing/Installing Engine Rear Mount (4X2)
Courtesy of CHRYSLER LLC

1. Install the transmission mount bracket (2), if removed.
2. Position the transmission mount (3) on the transmission mount bracket (2). Install the fasteners (1) that attach the transmission mount to the bracket.
3. Tighten the bolts to 30 N.m (22 ft. lbs.).
4. Install the crossmember.

4X4

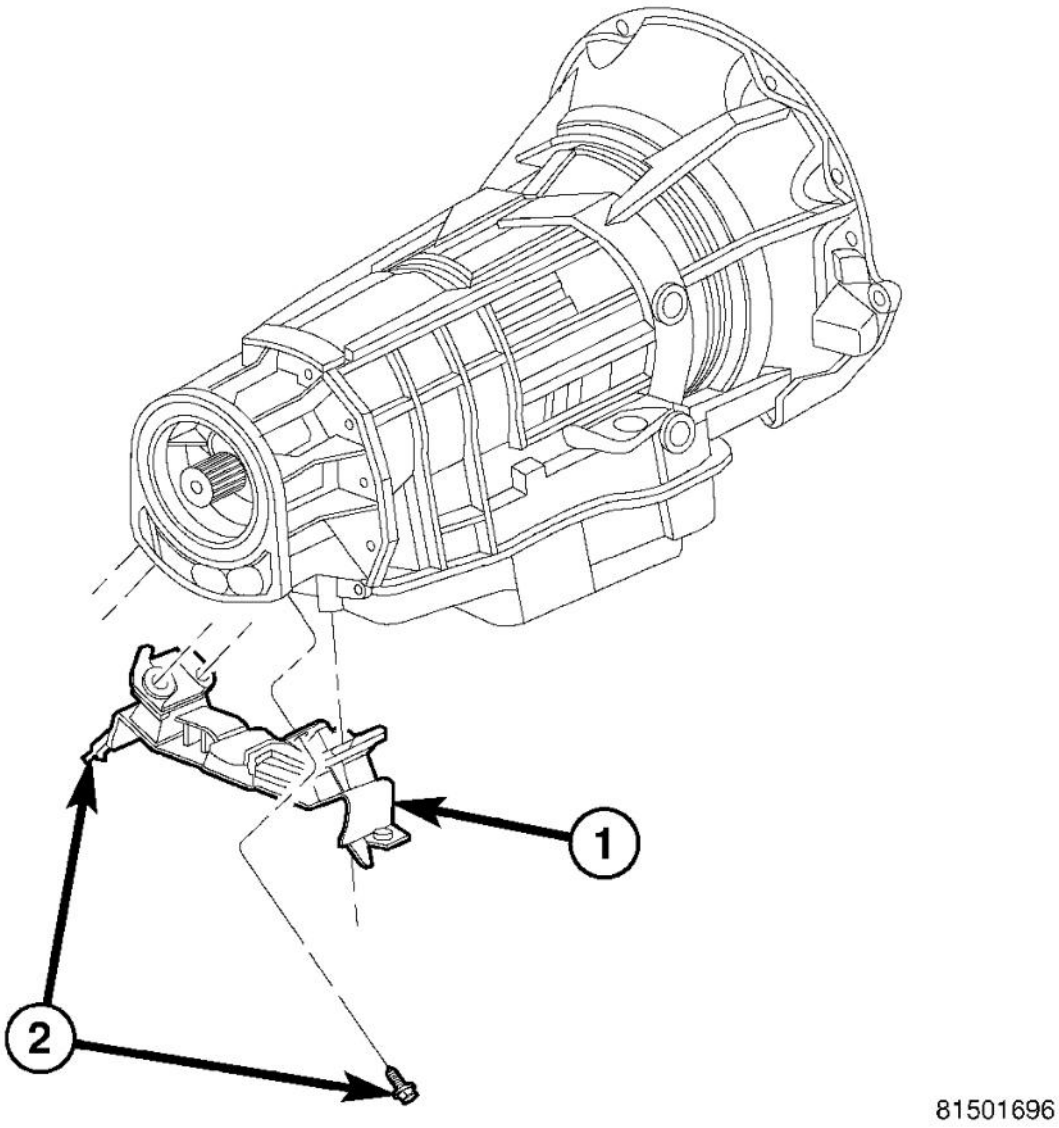

Fig. 174: Removing/Installing Engine Rear Mount (4X4)
Courtesy of CHRYSLER LLC

1. Position the transmission mount (1) on the transmission. Install the bolts (2) that attach the transmission mount to the transmission.
2. Tighten the bolts to 30 N.m (22 ft. lbs.).
3. Install the crossmember.

LUBRICATION

DESCRIPTION

ENGINE LUBRICATION SYSTEM

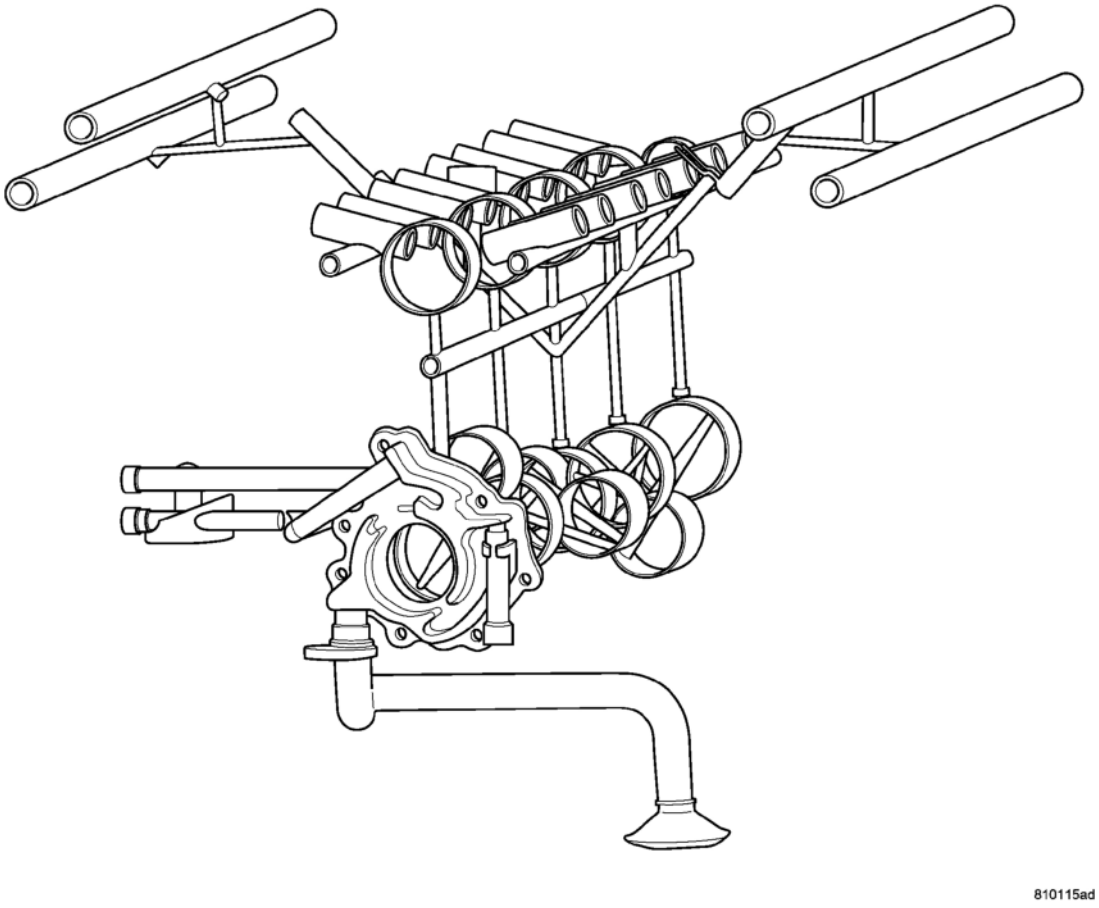

Fig. 175: Engine Oil Lubrication System
Courtesy of CHRYSLER LLC

The lubrication system is a full flow filtration pressure feed type.

DIAGNOSIS AND TESTING

CHECKING ENGINE OIL PRESSURE

1. Remove oil pressure sending unit and install gauge assembly C-3292.
2. Run engine until thermostat opens.
3. Oil Pressure:

   Curb Idle-25 kPa (4 psi) minimum

   3000 rpm-170 - 758 kPa (25 - 110 psi)
4. If oil pressure is 0 at idle, shut off engine. Check for a clogged oil pick-up screen or a pressure relief valve stuck open.

ENGINE OIL LEAK

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.
2. Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.
3. Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair per service information instructions.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

   If the oil leak source is not positively identified at this time , proceed with the AIR LEAK DETECTION TEST METHOD.

Air Leak Detection Test Method

1. Remove the PCV valve from the IAFM. Cap or plug the PCV valve grommet.
2. Attach an air hose with pressure gauge and regulator to the dipstick tube.

   CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

3. Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provide the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service information procedures.
4. If the leakage occurs at the rear oil seal area, refer to **INSPECTION FOR REAR SEAL AREA LEAKS** .
5. If no leaks are detected, turn off the air supply and remove the air hose and all plugs and caps. Install the PCV valve.
6. Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.

3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
   - Circular spray pattern generally indicates seal leakage or crankshaft damage.
   - Where leakage tends to run straight down, possible causes are a porous block, distributor seal, camshaft bore cup plugs oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces.
4. If no leaks are detected, pressurize the crankcase as outlined in **AIR LEAK DETECTION TEST METHOD**.

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

OIL

STANDARD PROCEDURE

ENGINE OIL SERVICE

The engine oil level indicator is located at the right hand of the engine on the 5.7L engines.

CRANKCASE OIL LEVEL INSPECTION

CAUTION: Do not overfill crankcase with engine oil, pressure loss or oil foaming can result.

Inspect engine oil level approximately every 800 kilometers (500 miles). Unless the engine has exhibited loss of oil pressure, run the engine for about ten minutes before checking oil level. Checking engine oil level on a cold engine is not accurate.

To ensure proper lubrication of an engine, the engine oil must be maintained at an acceptable level. The acceptable levels are indicated between the ADD and SAFE marks on the engine oil dipstick.

1. Position vehicle on level surface.
2. With engine OFF, allow approximately five minutes for oil to settle to bottom of crankcase, remove

engine oil dipstick.

3. Wipe dipstick clean.
4. Install dipstick and verify it is seated in the tube.
5. Remove dipstick, with handle held above the tip, take oil level reading.
6. Add oil only if level is below the ADD mark on dipstick.

ENGINE OIL CHANGE

Change engine oil at mileage and time intervals described in Maintenance Schedules. Refer to **DESCRIPTION** .

Run engine until achieving normal operating temperature.

1. Position the vehicle on a level surface and turn engine off.
2. Remove oil fill cap.
3. Hoist and support vehicle on safety stands.
4. Place a suitable drain pan under crankcase drain.
5. Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug if damaged.
6. Install drain plug in crankcase. Torque to 27 N.m (20 ft. lbs.).
7. Lower vehicle and fill crankcase with specified type and amount of engine oil.
8. Install oil fill cap.
9. Start engine and inspect for leaks.
10. Stop engine and inspect oil level.

NOTE: Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine.

FILTER-ENGINE OIL

REMOVAL

ENGINE OIL FILTER

All engines are equipped with a high quality full-flow, disposable type oil filter. DaimlerChrysler Corporation recommends a Mopar® or equivalent oil filter be used.

1. Position a drain pan under the oil filter.
2. Using a suitable oil filter wrench loosen filter.
3. Rotate the oil filter counterclockwise to remove it from the cylinder block oil filter boss.
4. When filter separates from cylinder block oil filter boss, tip gasket end upward to minimize oil spill. Remove filter from vehicle.

NOTE: Make sure filter gasket was removed with filter.

5. With a wiping cloth, clean the gasket sealing surface of oil and grime.

INSTALLATION

ENGINE OIL FILTER

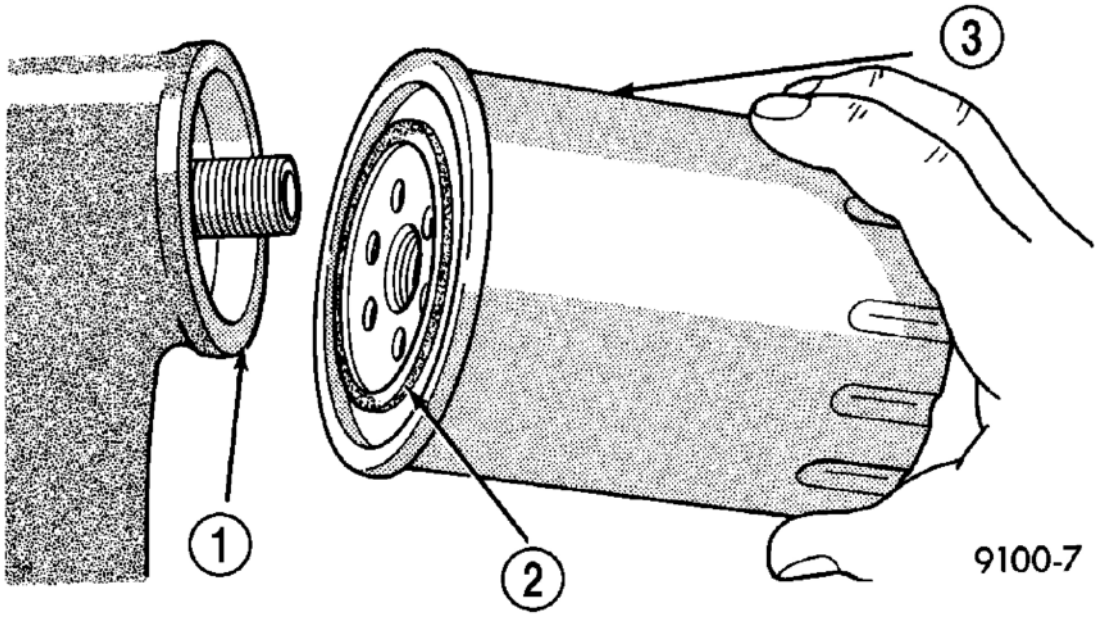

Fig. 176: Removing & Installing Oil Filter
Courtesy of CHRYSLER LLC

1 - SEALING SURFACE 2 - RUBBER GASKET 3 - OIL FILTER

1. Lightly lubricate oil filter gasket (2) with engine oil.
2. Thread filter onto adapter nipple. When gasket makes contact with sealing surface, hand tighten filter one half turn, or 180°, do not over tighten. See **Fig. 176**.
3. Add oil, verify crankcase oil level and start engine. Inspect for oil leaks.

PAN-ENGINE OIL

REMOVAL

REMOVAL

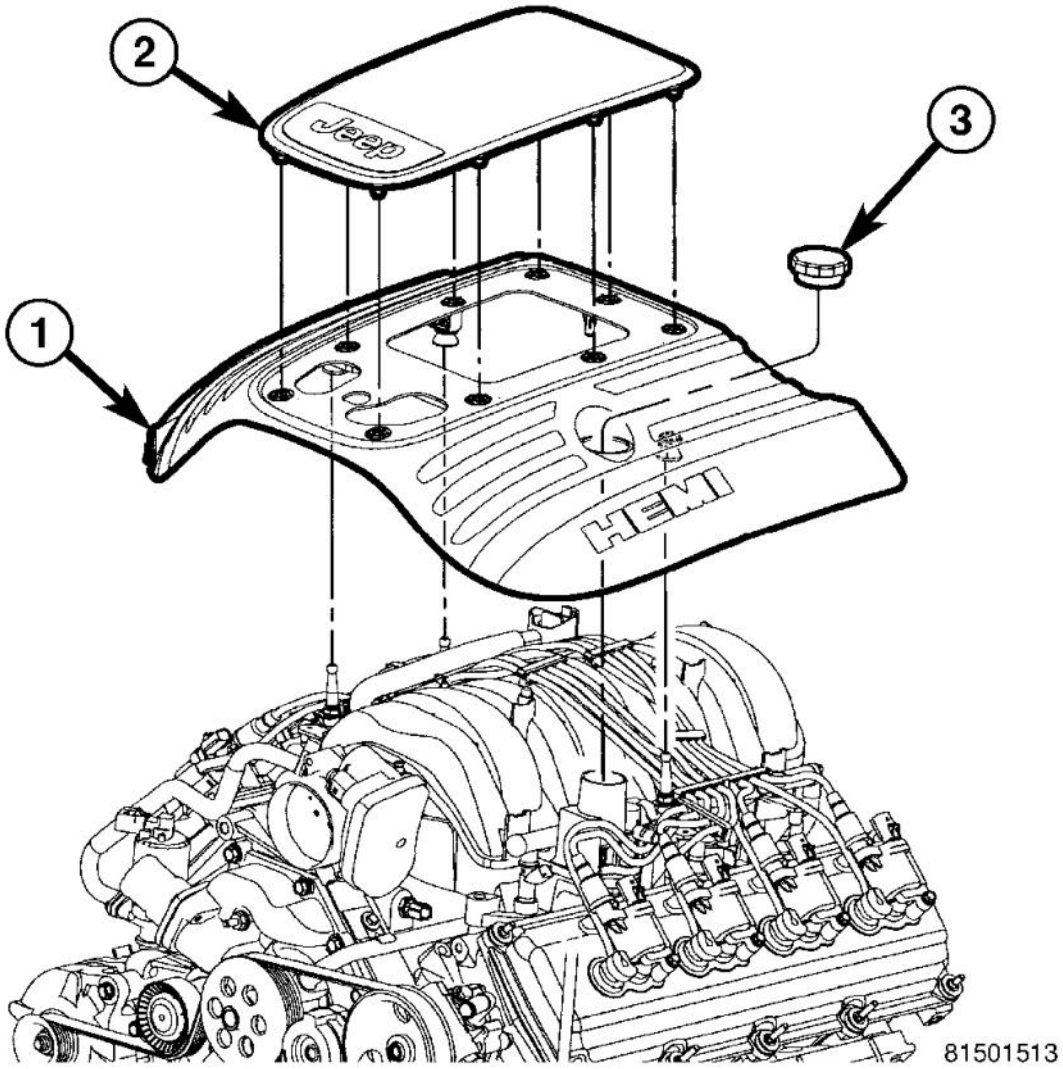

Fig. 177: 5.7L Engine Appearance Cover
Courtesy of CHRYSLER LLC

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

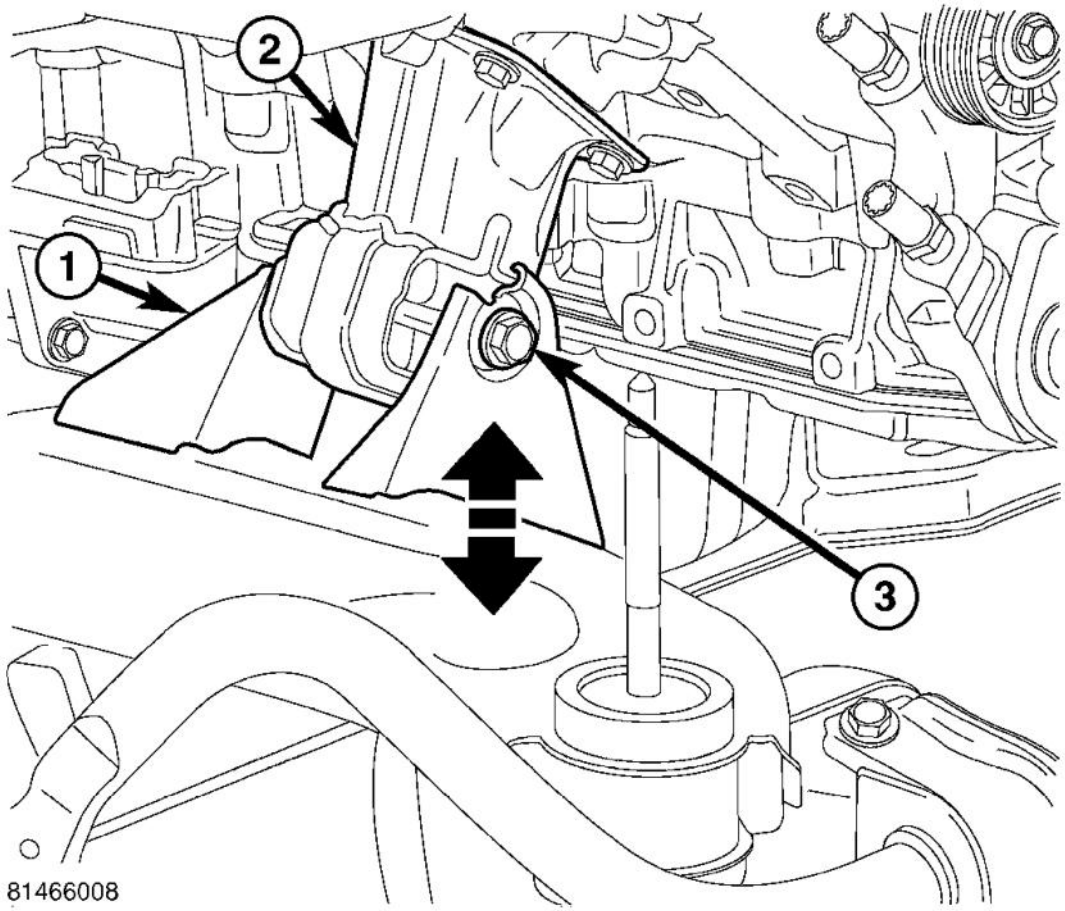

Fig. 178: Engine Mount Bolt
Courtesy of CHRYSLER LLC

3. Remove the intake manifold. See **REMOVAL**.
4. Raise vehicle.
5. Remove both left and right side engine mount to frame bolts (3).
6. Drain engine oil and remove the oil filter.
7. Remove the engine oil dipstick and tube from the oil pan.
8. Lower the vehicle.

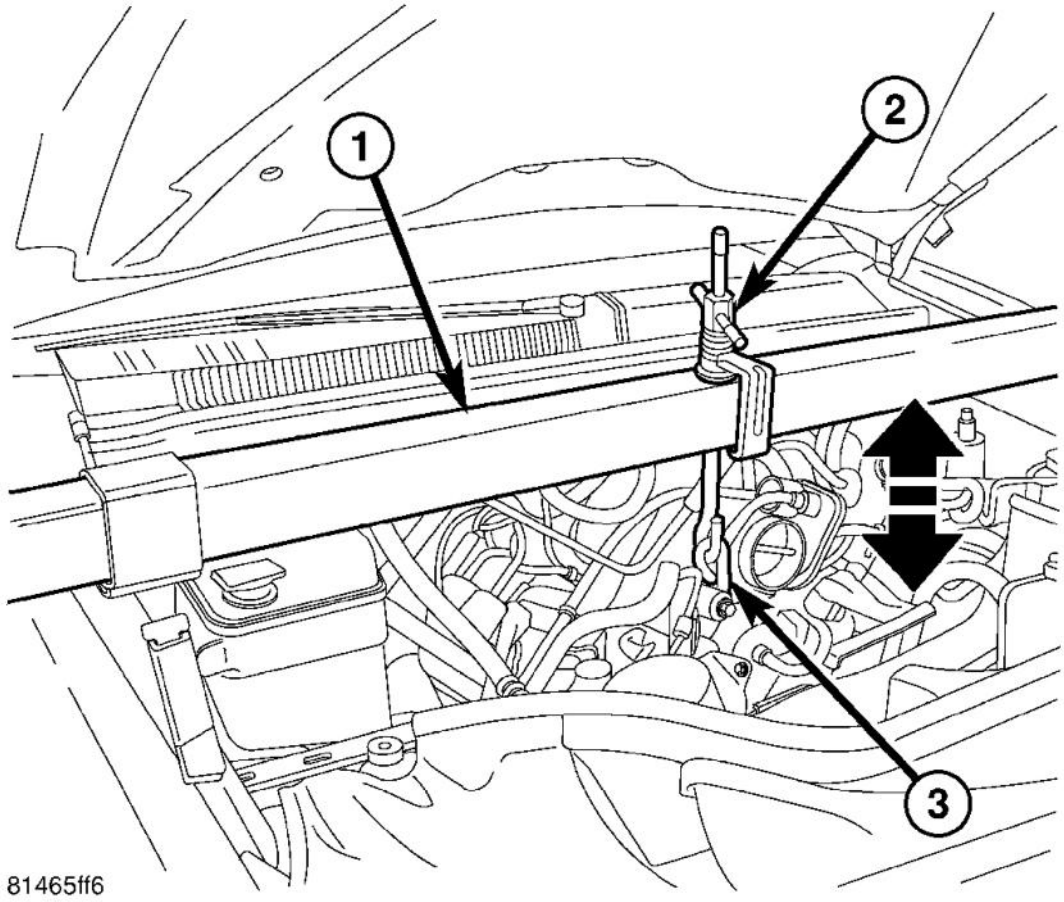

Fig. 179: Engine Support Tool
Courtesy of CHRYSLER LLC

9. Install engine support fixture special tool # 8534 (1). **Do not use the third leg.**
10. Raise engine using special tool # 8534 to provide clearance to remove oil pan.
11. Raise the vehicle.
12. Remove the front axle. Refer to **REMOVAL** .

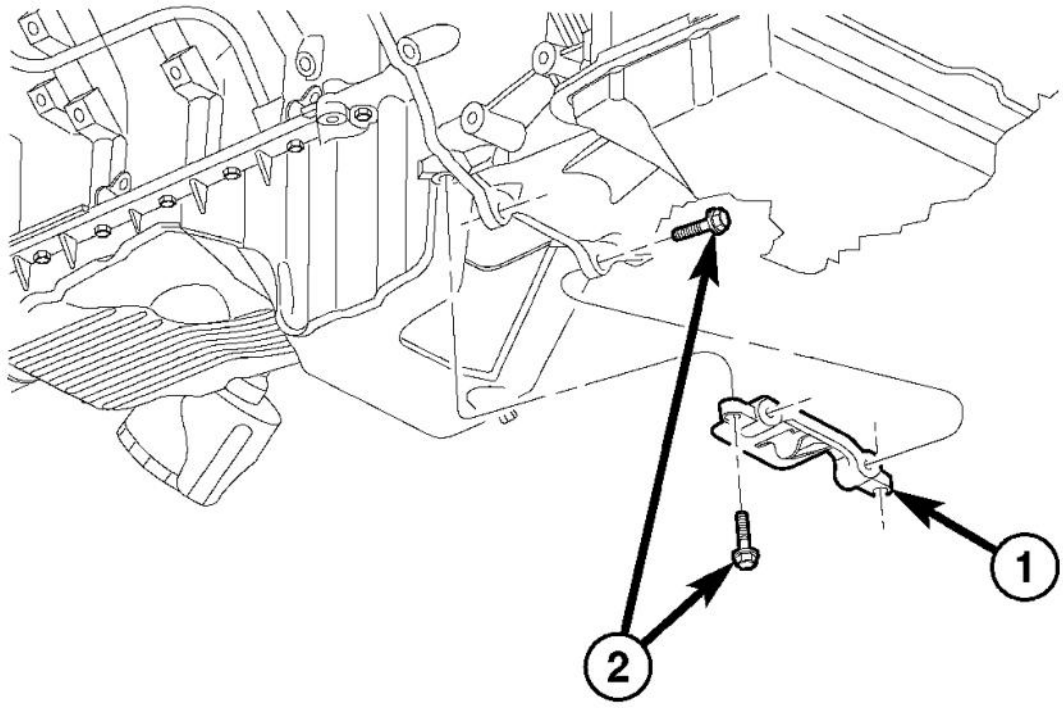

Fig. 180: Structural Dust Cover
Courtesy of CHRYSLER LLC

1 - STRUCTURAL COVER 2 - BOLTS

13. Remove the structural dust cover (1). See **REMOVAL**.

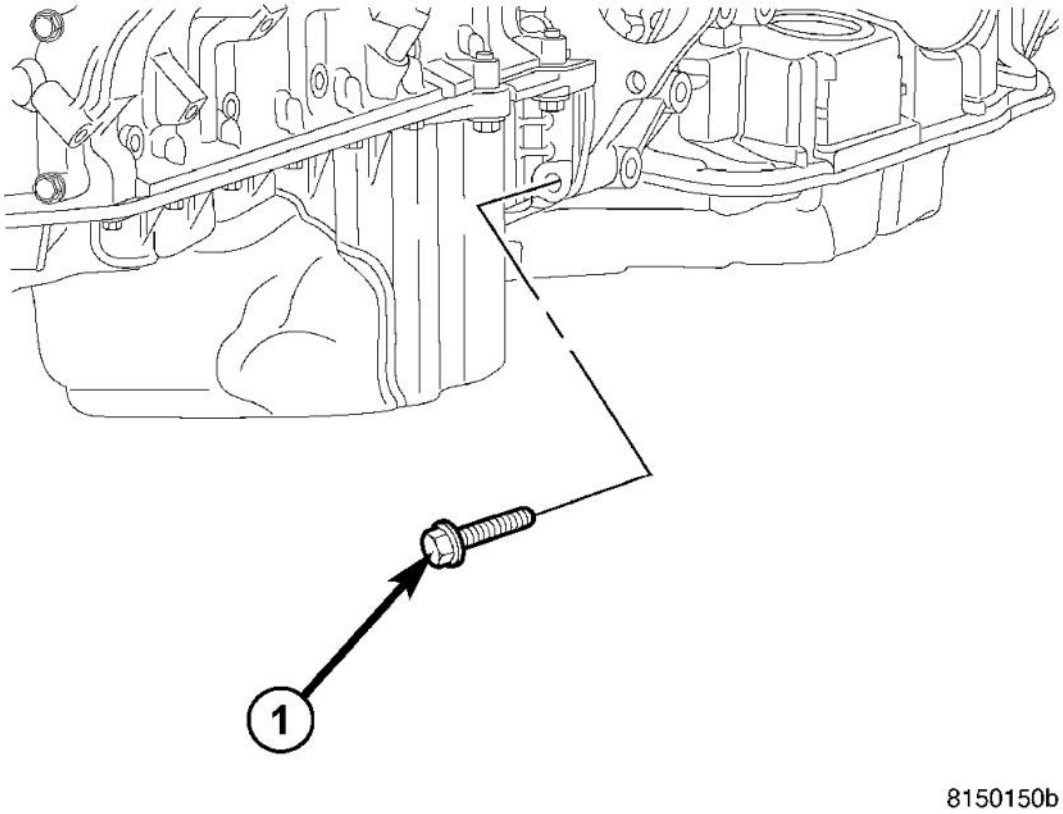

Fig. 181: Remove/Install Oil Pan To Transmission Bolts
Courtesy of CHRYSLER LLC

1 - BOLTS

NOTE: Do not pry on oil pan or oil pan gasket. Gasket is integral to engine windage tray and does not come out with oil pan.

NOTE: The horizontal M10 fasteners are 5 mm longer in length, and must be reinstalled in original locations.

14. Remove the M10 fasteners (1) (vertical and horizontal) from the rear of the oil pan to the transmission and engine.

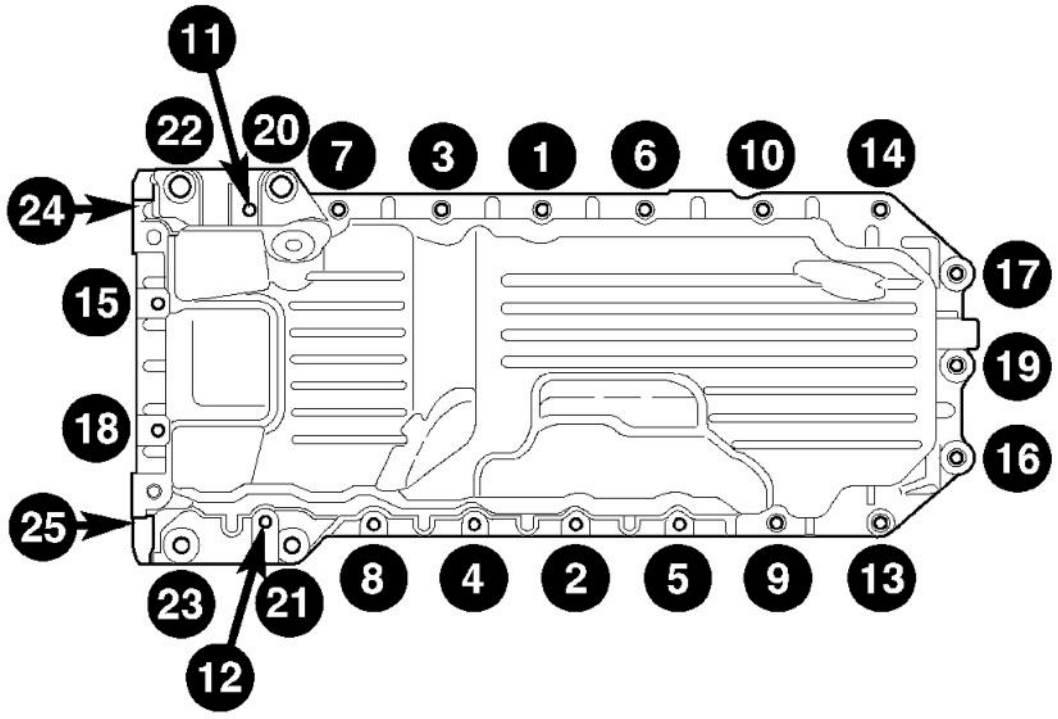

Fig. 182: Oil Pan Torque Sequence - 5.7L
Courtesy of CHRYSLER LLC

15. Remove the oil pan mounting bolts using the sequence provided, and oil pan.

NOTE: When the oil pan is removed, a new oil pan gasket/windage tray assembly must be installed. The old gasket cannot be reused.

16. Discard the integral windage tray and gasket and replace.

INSTALLATION

INSTALLATION

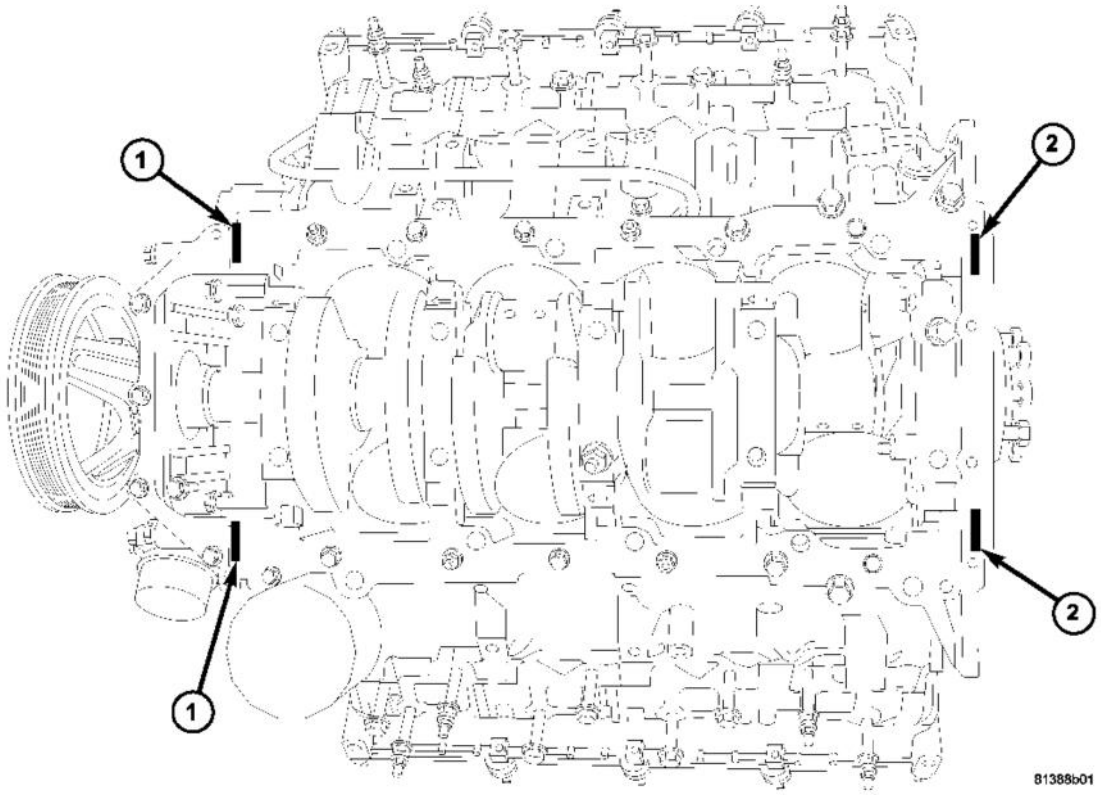

Fig. 183: T-Joint RTV Sealant Application
Courtesy of CHRYSLER LLC

1 - Front Cover T-Joints
2 - Rear Oil Retainer T-Joints

1. Clean the oil pan gasket mating surface of the block and oil pan.

NOTE: Mopar® Engine RTV must be applied to the 4 T-joints, (area where front cover, rear retainer, block, and oil pan gasket meet). The bead of RTV should cover the bottom of the gasket. This area is approximately 4.5 mm x 25 mm in each of the 4 T-joint locations.

2. Apply Mopar® Engine RTV at the 4 T- joints.

NOTE: When the oil pan is removed, a new oil pan gasket/windage tray assembly must be installed. The old gasket cannot be reused.

3. Install a new oil pan gasket/windage tray assembly.
4. If removed, reinstall the oil pump pickup tube with new o-ring. Tighten tube to pump fasteners to 28 N.m (250 in. lbs.).

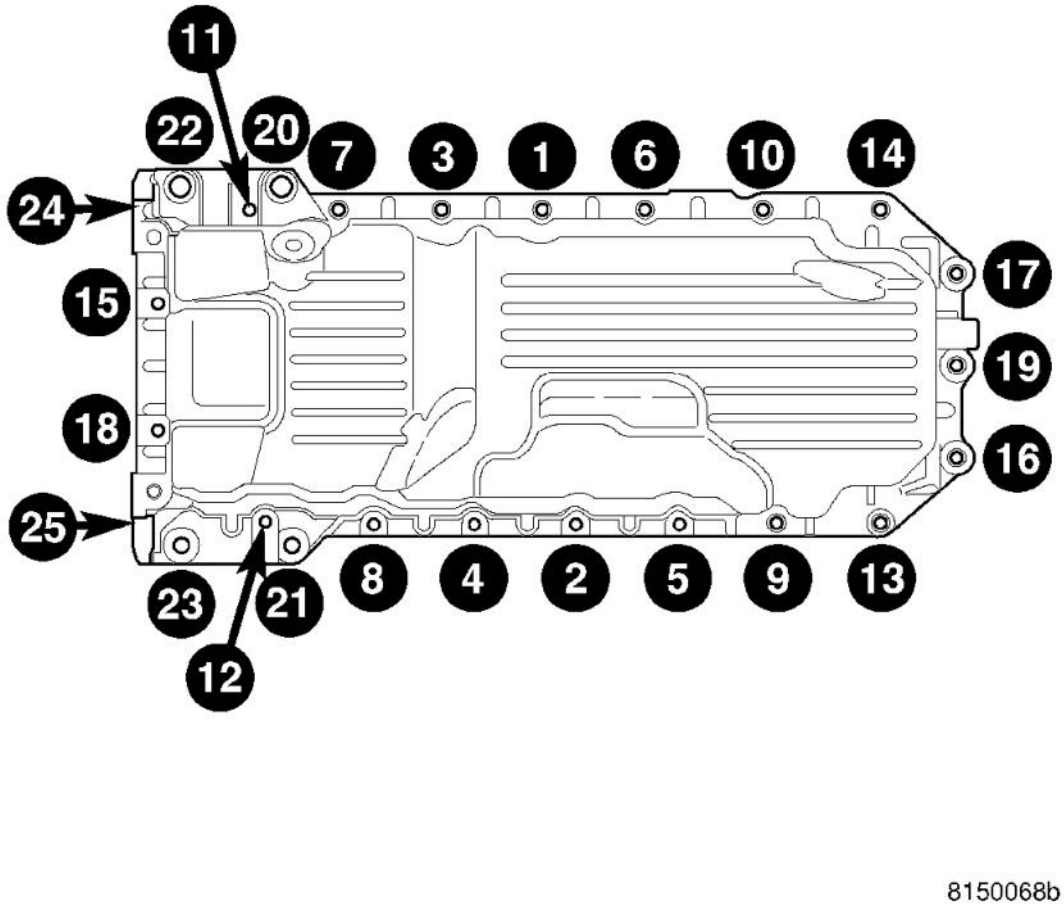

Fig. 184: Oil Pan Torque Sequence - 5.7L
Courtesy of CHRYSLER LLC

NOTE: The horizontal M10 fasteners are 5 mm longer in length, and must be reinstalled in original locations.

NOTE: New M6 fasteners must be used when reinstalling the oil pan. Do not reuse the old M6 fasteners.

5. Align the rear of the oil pan with the rear face of the engine block, and install the M10 and M6 oil pan fasteners finger tight. Using the following torque sequence, torque the M6 mounting bolts to 5 N.m (44 in.lbs.).
6. Using the following torque sequence, torque the M10 oil pan fasteners to 54 N.m (39 ft.lbs.).
7. Using the following torque sequence, torque the M6 oil pan fasteners to 12 N.m (106 in.lbs.).

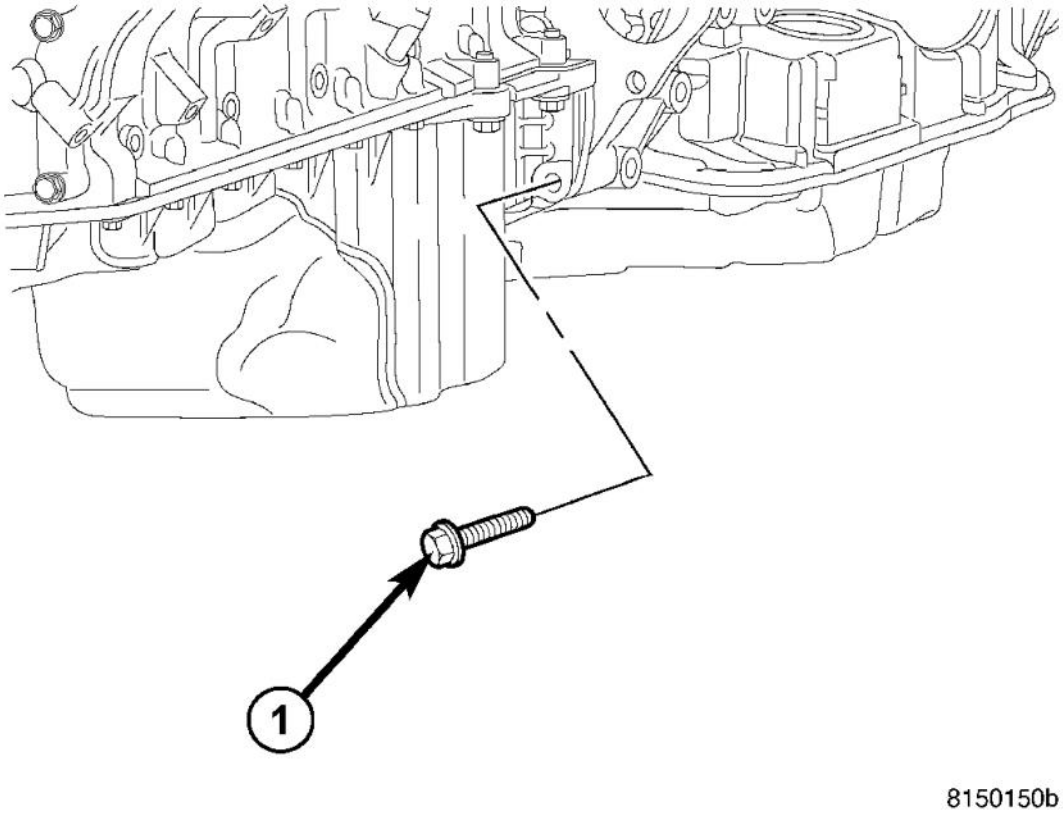

Fig. 185: Remove/Install Oil Pan To Transmission Bolts
Courtesy of CHRYSLER LLC

1 - BOLTS

8. Install both the left and right side oil pan to transmission bolts (1). Torque the bolts to 54 N.m (39 ft. lbs.).

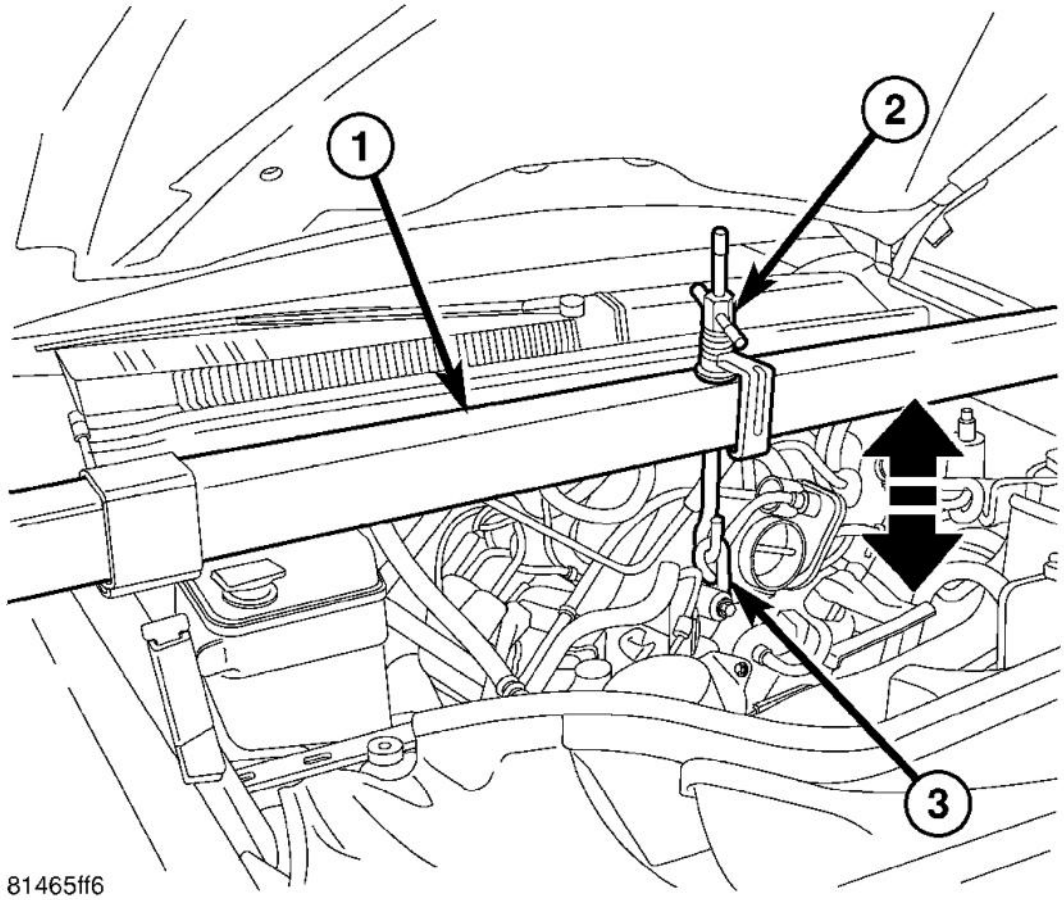

Fig. 186: Engine Support Tool
Courtesy of CHRYSLER LLC

9. Lower the engine into mounts using special tool # 8534 (1).

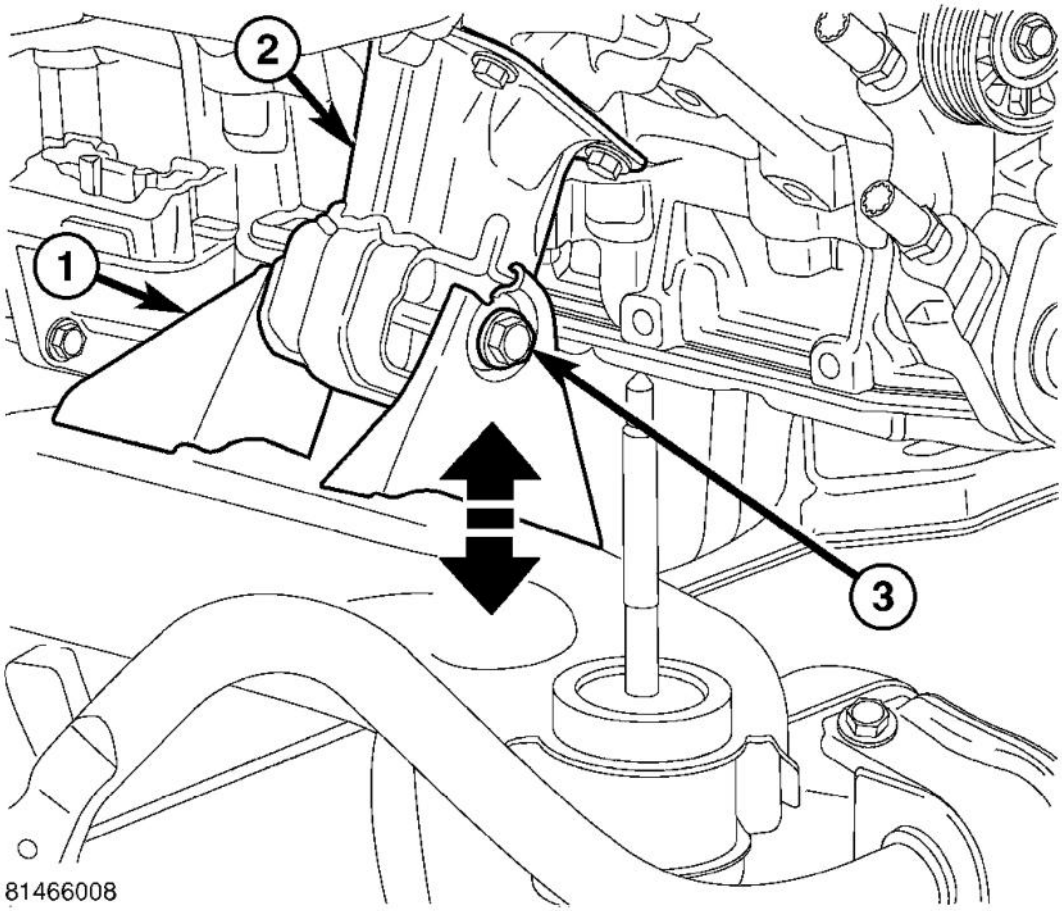

Fig. 187: Engine Mount Bolt
Courtesy of CHRYSLER LLC

10. Install both the left and right side engine mount bolts (3) and nuts. Torque the studs and nuts to 54 N.m (39 ft. lbs.).
11. Install the engine oil dipstick and tube.

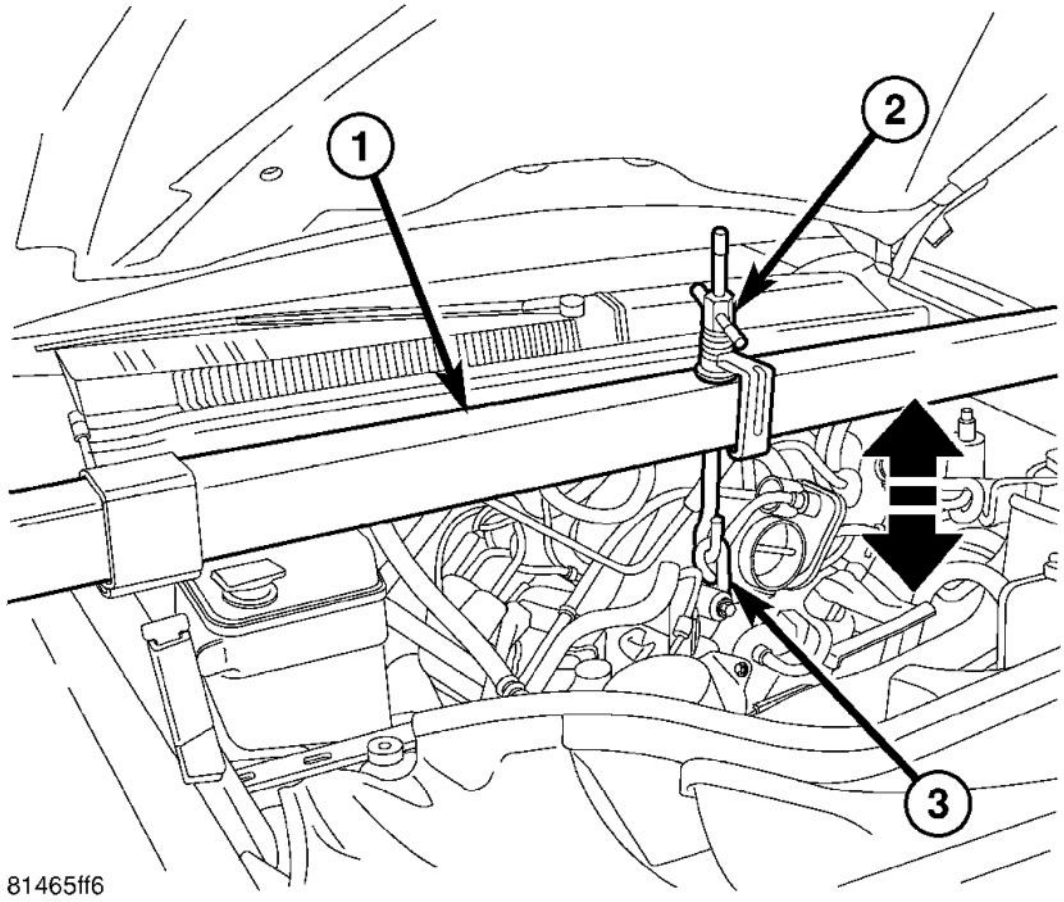

Fig. 188: Engine Support Tool
Courtesy of CHRYSLER LLC

12. Remove special tool # 8534 (1).
13. Install the intake manifold. See **INSTALLATION**.
14. Install the front axle. Refer to **INSTALLATION** .

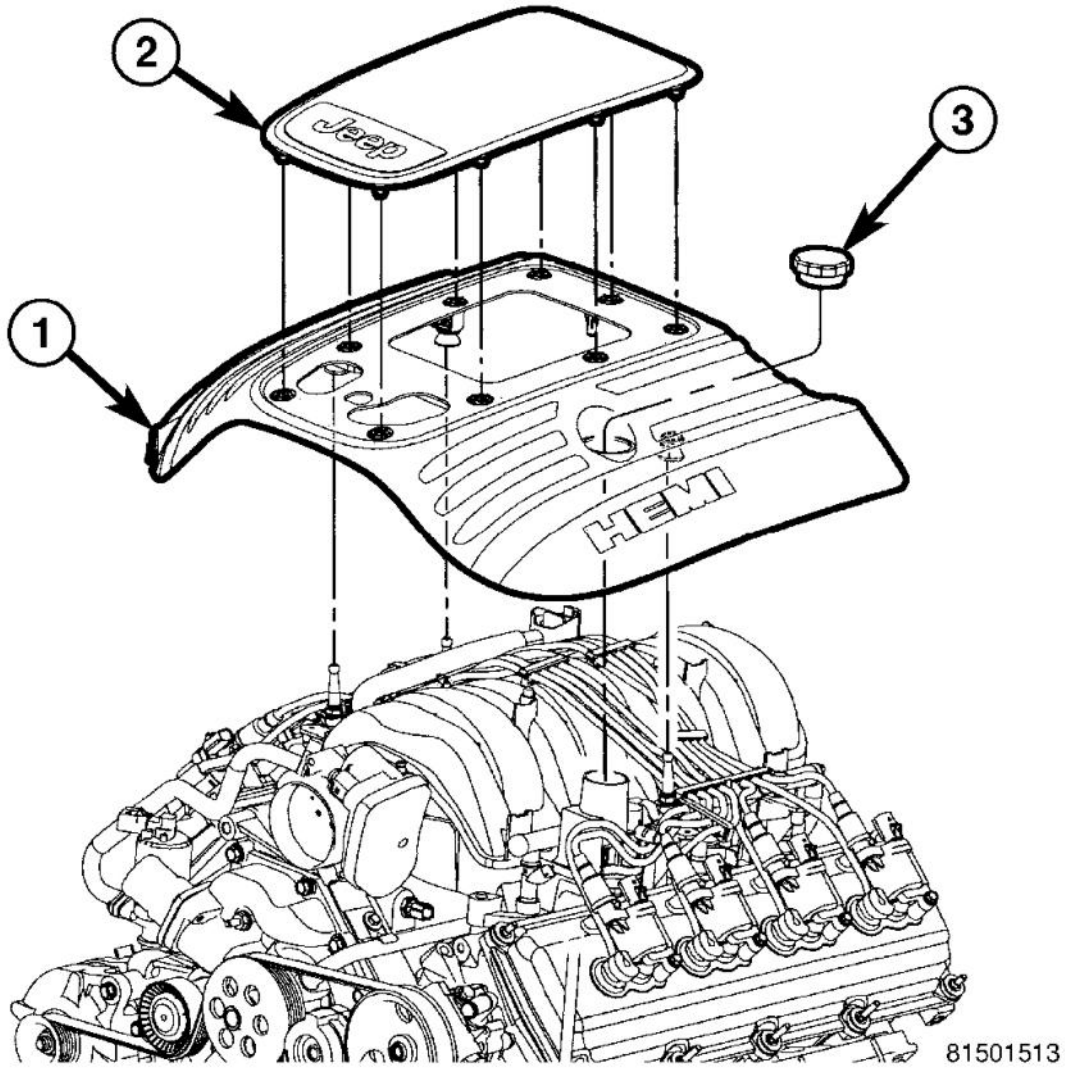

Fig. 189: 5.7L Engine Appearance Cover
Courtesy of CHRYSLER LLC

15. Install the engine cover (1).
16. Fill engine oil.
17. Install oil filter, if removed.
18. Reconnect the negative battery cable.
19. Start engine and check for leaks.

PUMP-ENGINE OIL

REMOVAL

OIL PUMP

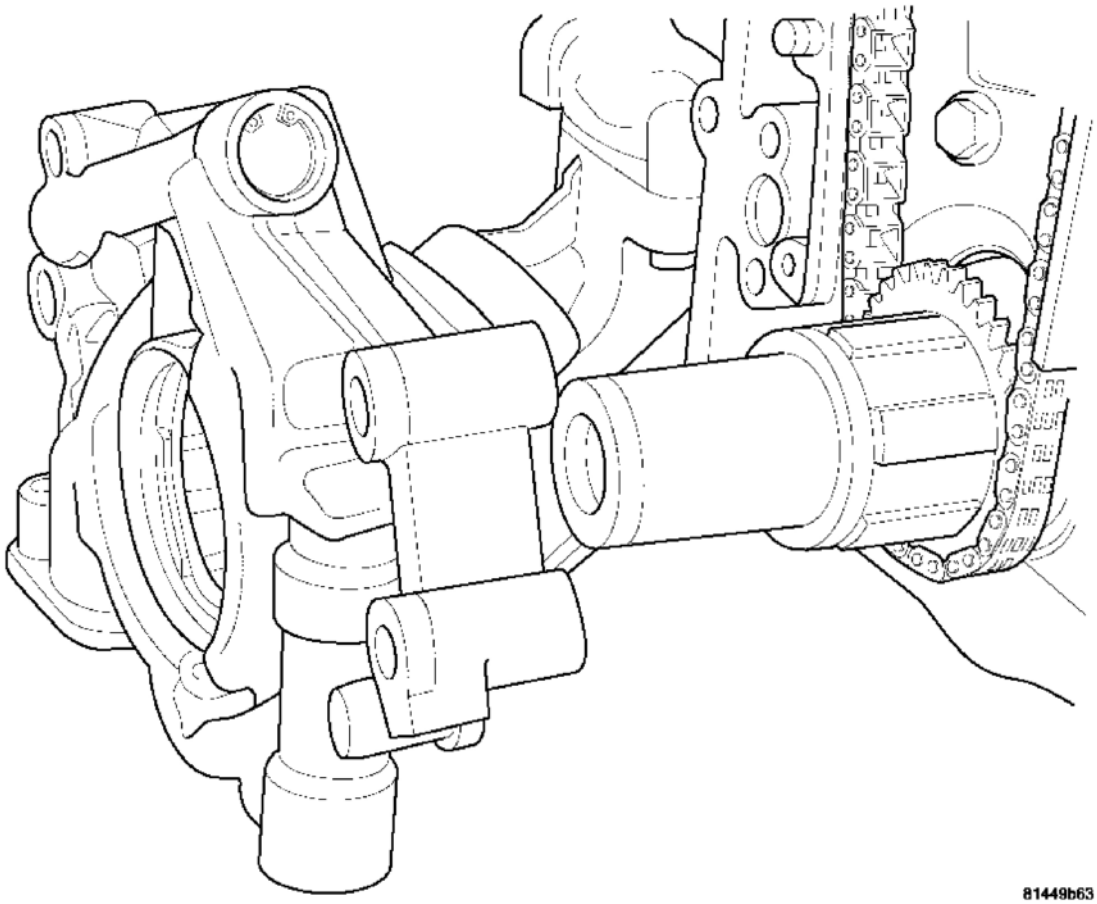

Fig. 190: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

1. Remove the oil pan and pick-up tube. See **REMOVAL**.
2. Remove the timing chain cover. See **REMOVAL**.
3. Remove the four bolts, and the oil pump.

CLEANING

OIL PUMP

1. Wash all parts in a suitable solvent.

INSPECTION

OIL PUMP

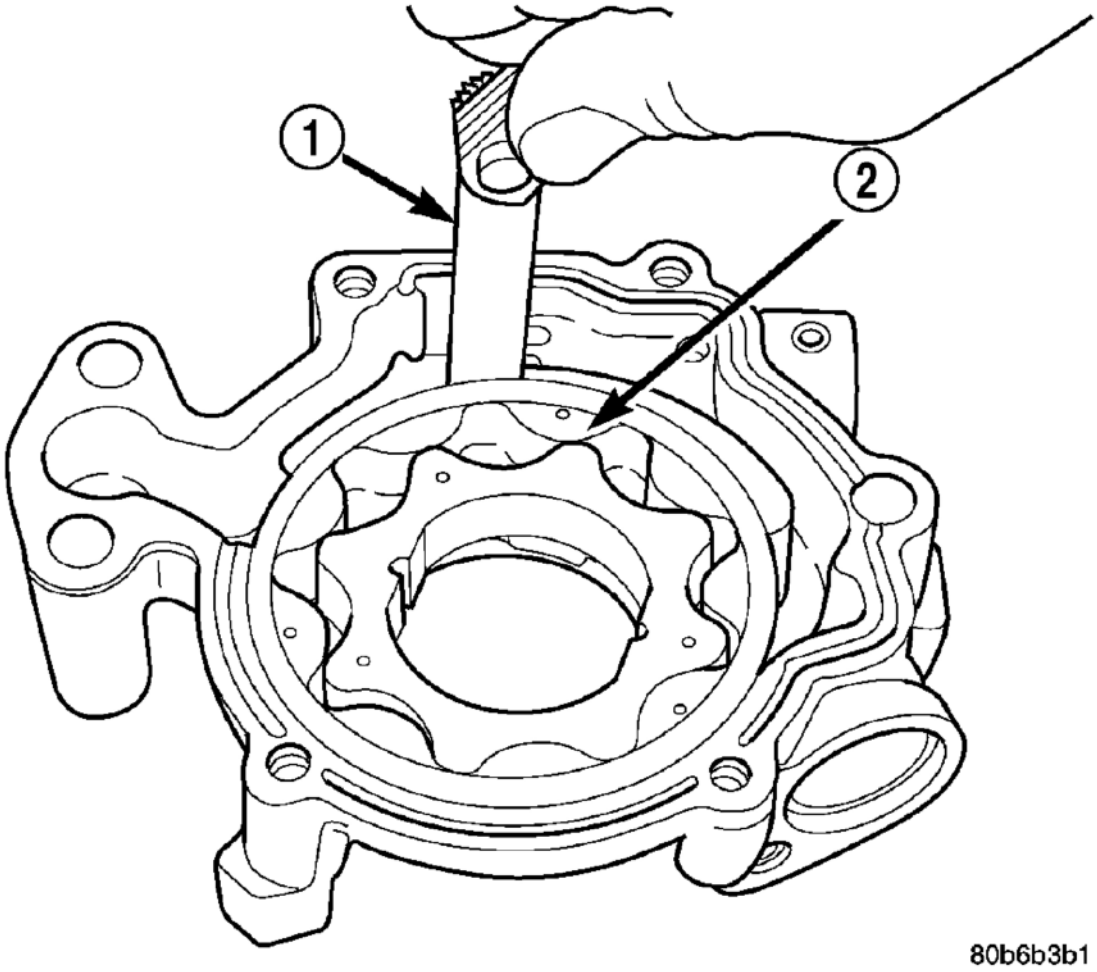

Fig. 191: Measuring Clearance Between Outer Rotor And Body
Courtesy of CHRYSLER LLC

1 - FEELER GAUGE
2 - OUTER ROTOR

CAUTION: Oil pump pressure relief valve and spring should not be removed from the oil pump. If these components are disassembled and or removed from the pump the entire oil pump assembly must be replaced.

1. Remove the pump cover.
2. Clean all parts thoroughly. Mating surface of the oil pump housing should be smooth. If the pump cover is scratched or grooved the oil pump assembly should be replaced.
3. Slide outer rotor into the body of the oil pump. Press the outer rotor to one side of the oil pump body and measure clearance between the outer rotor (2) and the body. If the measurement is 0.235mm (0.009 in.) or more the oil pump assembly must be replaced.

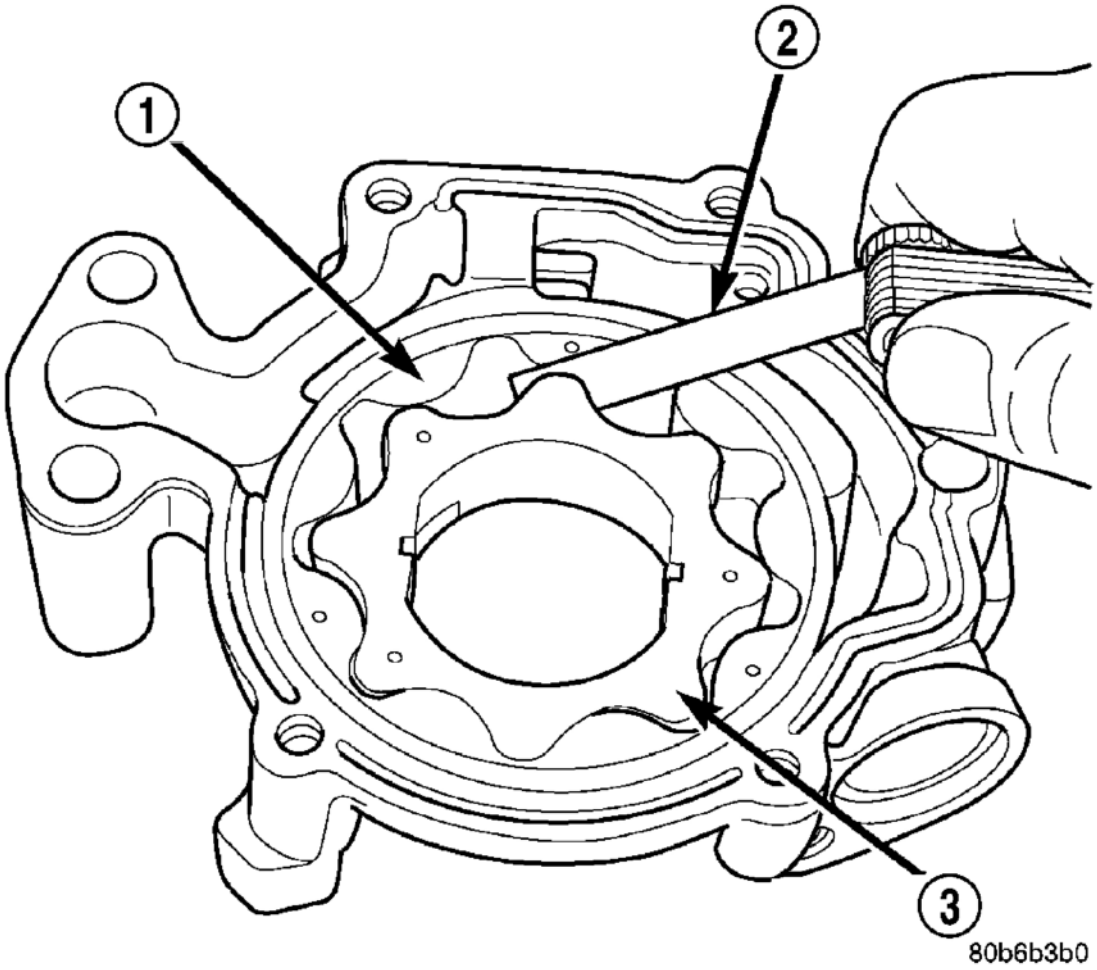

Fig. 192: Measuring Clearance Between Rotors
Courtesy of CHRYSLER LLC

1 - OUTER ROTOR
2 - FEELER GAUGE
3 - INNER ROTOR

4. Install the inner rotor in the into the oil pump body. Measure the clearance between the inner (3) and outer rotors (1). If the clearance between the rotors is 0.150 mm (0.006 in.) or more the oil pump assembly must be replaced.

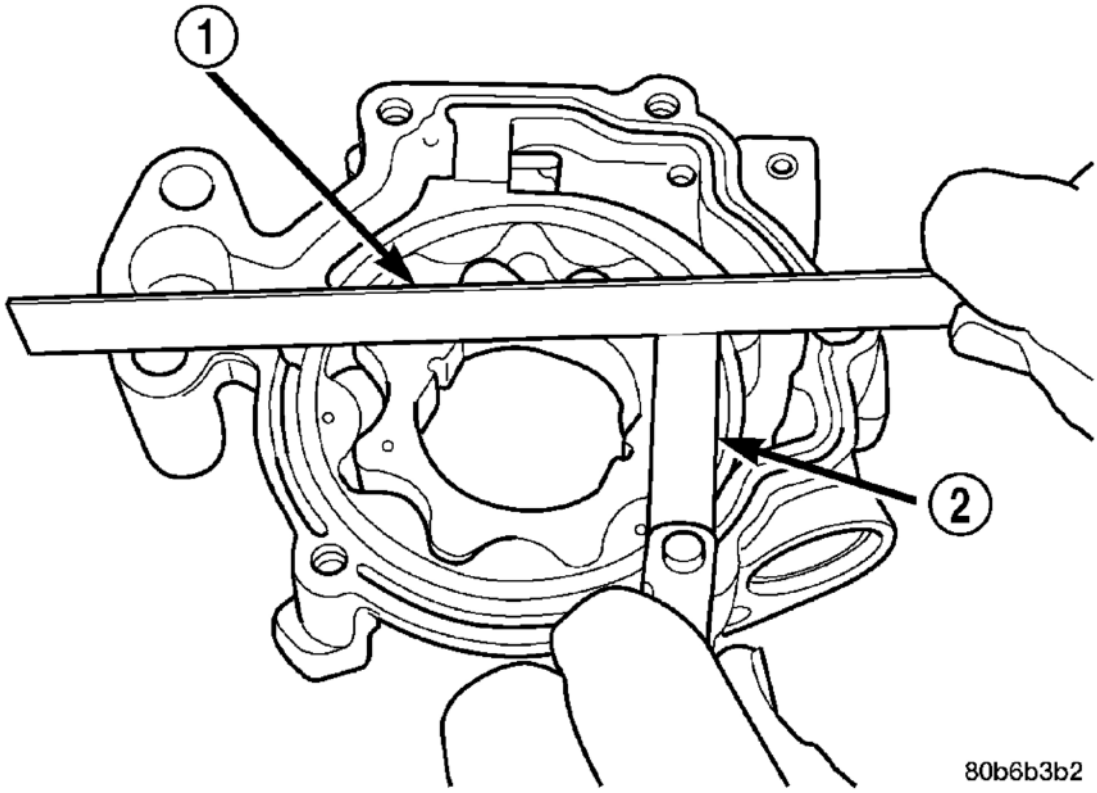

Fig. 193: Measuring Clearance Over Rotors
Courtesy of CHRYSLER LLC

1 - STRAIGHT EDGE
2 - FEELER GAUGE

5. Place a straight edge (1) across the body of the oil pump (between the bolt holes), if a feeler gauge (2) of 0.095 mm (0.0038 in.) or greater can be inserted between the straightedge and the rotors, the pump must be replaced.
6. Reinstall the pump cover. Tighten fasteners to 15 N.m (132 in. lbs.).

NOTE: The 5.7 Oil pump is serviced as an assembly. In the event the oil pump is not functioning or out of specification it must be replaced as an assembly.

INSTALLATION

OIL PUMP

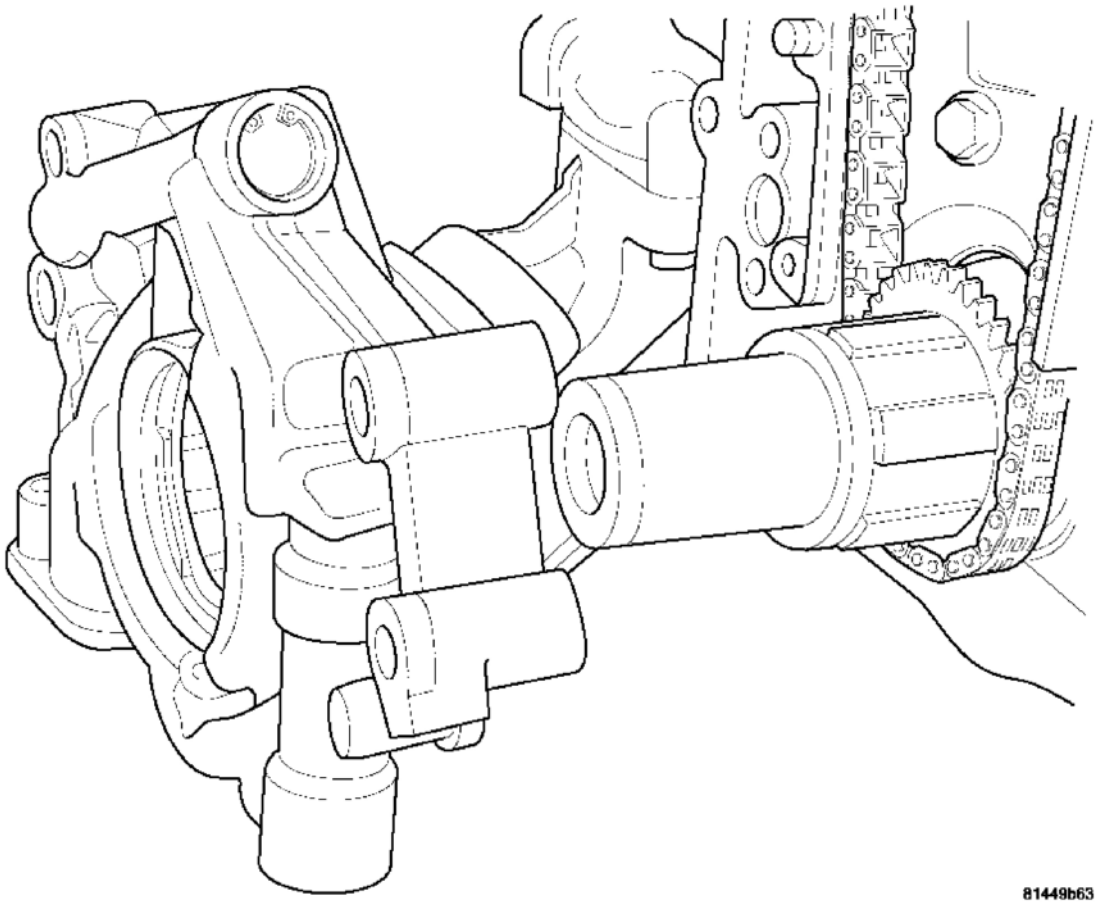

Fig. 194: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

1. Position the oil pump onto the crankshaft and install the 4 oil pump retaining bolts.
2. Tighten the oil pump retaining bolts to 28 N.m (250 in. lbs.).
3. Install the timing chain cover. See **INSTALLATION**.
4. Install the pick-up tube and oil pan. See **INSTALLATION**.

MANIFOLDS

MANIFOLD - INTAKE

DESCRIPTION

INTAKE MANIFOLD

The intake manifold is made of a composite material and features long runners which maximizes low end torque. The intake manifold uses single plane sealing which consist of eight individual press in place port gaskets to prevent leaks.

DIAGNOSIS AND TESTING

INTAKE MANIFOLD LEAKAGE

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

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 THE FAN. DO NOT WEAR LOOSE CLOTHING.

1. Start the engine.
2. Spray a small stream of water at the suspected leak area.
3. If a change in RPM is observed the area of the suspected leak has been found.
4. Repair as required.

REMOVAL

REMOVAL

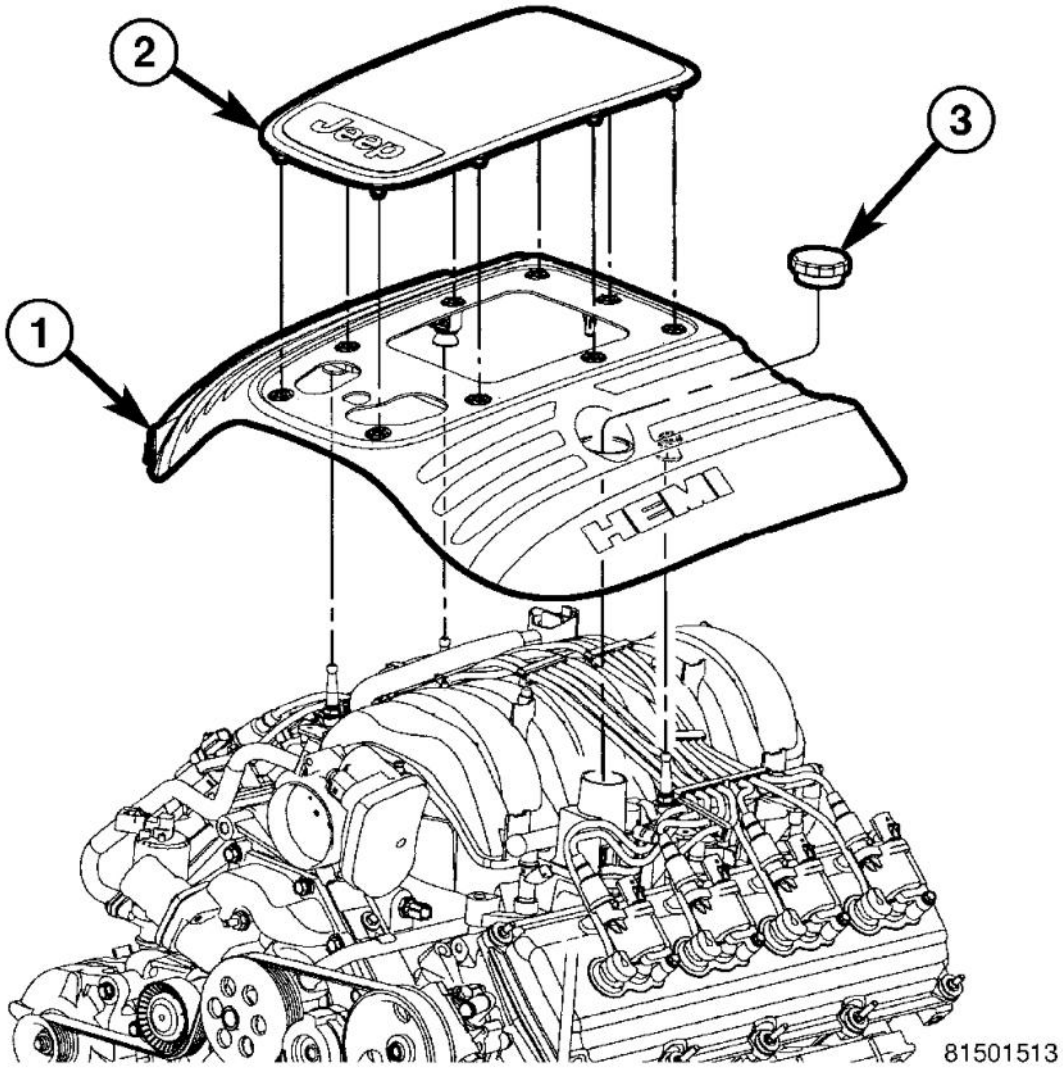

Fig. 195: 5.7L Engine Appearance Cover
Courtesy of CHRYSLER LLC

1. Remove engine cover (1).
2. Bleed fuel system. Refer to **STANDARD PROCEDURE** .
3. Disconnect negative cable from battery.
4. Remove air inlet hose.
5. Remove ignition wires from on top of intake manifold.
6. Disconnect electrical connectors for the following components:
   - Manifold Absolute Pressure (MAP) Sensor
   - Fuel Injectors
   - ETC (Electric Throttle Control)

7. Remove wire harness from intake manifold.
8. Disconnect brake booster hose, purge hose, and MUA hose (Make Up Air Hose).
9. Remove EGR tube from intake manifold.
10. Remove intake manifold retaining fasteners in a crisscross pattern starting from the outside bolts and ending at the middle bolts.
11. Remove intake manifold as an assembly.

CLEANING

INTAKE MANIFOLD

NOTE: There is NO approved repair procedure for the intake manifold. If severe damage is found during inspection, the intake manifold must be replaced.

Before installing the intake manifold thoroughly clean the mating surfaces. Use a suitable cleaning solvent, then air dry.

INSPECTION

INTAKE MANIFOLD

1. Inspect the intake sealing surface for cracks, nicks and distortion.
2. Inspect the intake manifold vacuum hose fittings for looseness or blockage.

INSTALLATION

INSTALLATION

1. Position intake manifold.
2. Install intake manifold retaining bolts, and tighten in sequence from the middle bolts towards the outside in a crisscross pattern. Torque fasteners to 12 N.m (105 in. lbs.).
3. Install EGR tube.
4. Install wire harness on intake manifold.
5. Connect electrical connectors for the following components:

   Manifold Absolute Pressure (MAP) Sensor

   Fuel Injectors

   ETC (Electronic Throttle Control)

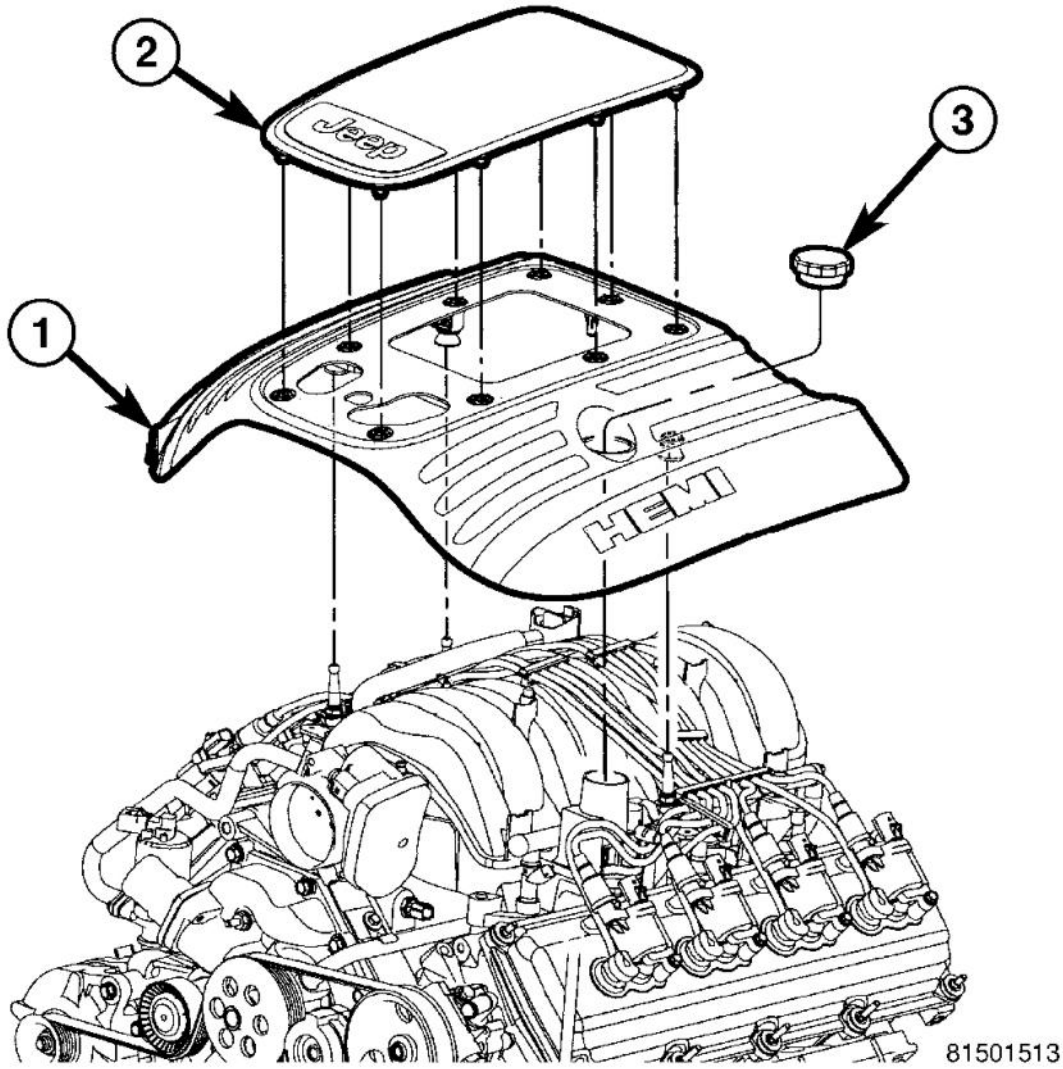

Fig. 196: 5.7L Engine Appearance Cover
Courtesy of CHRYSLER LLC

6. Install ignition wires.
7. Connect Brake booster hose, purge hose, and MUA hose (Make Up Air hose).
8. Install air inlet hose.
9. Connect negative cable to battery.
10. Install engine cover (1).

MANIFOLD - EXHAUST

DESCRIPTION

EXHAUST MANIFOLD

The exhaust manifolds are log style with a patented flow enhancing design to maximize performance. The exhaust manifolds are made of high silicon molybdenum cast iron. A multi-layer stainless steel exhaust manifold gasket is used to improve sealing to the cylinder head. The exhaust manifolds are covered by a three layer laminated heat shield for thermal protection and noise reduction. The heat shields are fastened with a torque prevailing nut that is backed off slightly to allow for the thermal expansion of the exhaust manifold, with the exception of the nut, which also secures the oil dipstick tube bracket. That nut should not be backed off.

OPERATION

EXHAUST MANIFOLD

The exhaust manifolds collect the engine exhaust exiting the combustion chambers, then channels the exhaust gases to the exhaust pipes attached to the manifolds.

REMOVAL

EXHAUST MANIFOLDS

EXHAUST MANIFOLD

1. Disconnect negative battery cable.
2. Raise vehicle.
3. Remove exhaust pipe to manifold bolts.
4. Remove engine mount to frame fasteners.
5. Using suitable jack, raise engine enough to remove manifolds.

CAUTION: Do not damage engine harness while raising the engine.

6. Remove the engine mount. See **REMOVAL**.

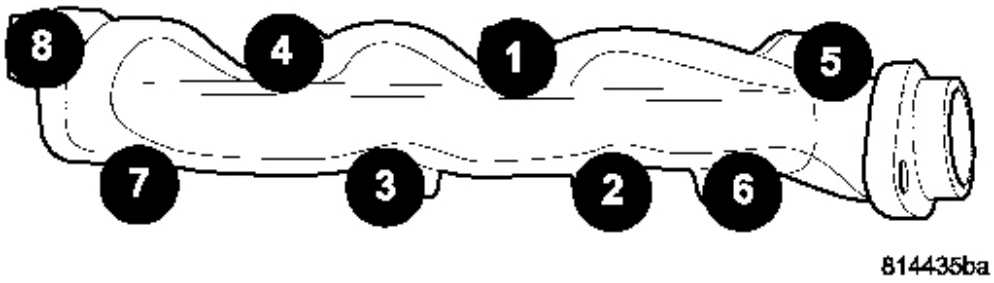

Fig. 197: Exhaust Manifold Bolt Tightening Sequence - Left
Courtesy of CHRYSLER LLC

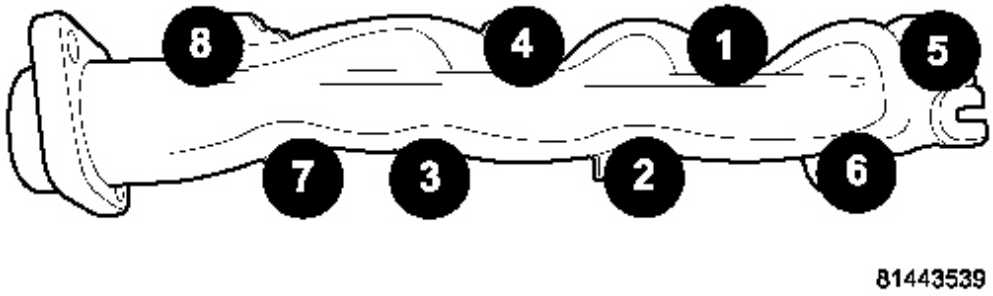

Fig. 198: Exhaust Manifold Bolt Tightening Sequence - Right
Courtesy of CHRYSLER LLC

7. Remove heat shield.
8. Remove manifold bolts using sequence provided.
9. Remove manifold and gasket.

CLEANING

EXHAUST MANIFOLD

Clean mating surfaces on cylinder head and manifold. Wash with solvent and blow dry with compressed air.

INSPECTION

EXHAUST MANIFOLD

Inspect manifold for cracks.

Inspect mating surfaces of manifold for flatness with a straight edge. Gasket surfaces must be flat within 0.2 mm per 300 mm (0.008 inch per foot).

INSTALLATION

EXHAUST MANIFOLD

EXHAUST MANIFOLD

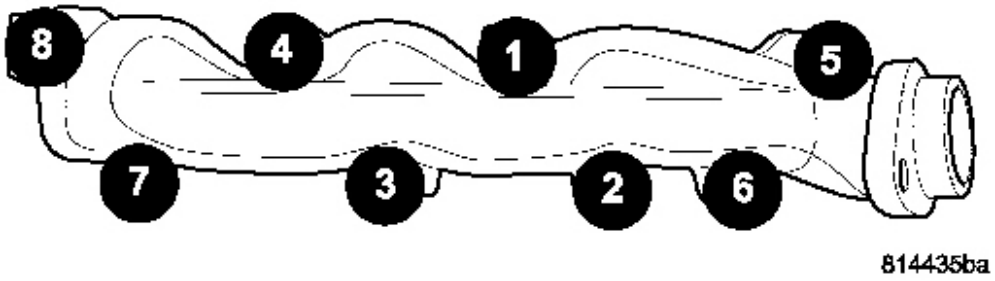

Fig. 199: Exhaust Manifold Bolt Tightening Sequence - Left
Courtesy of CHRYSLER LLC

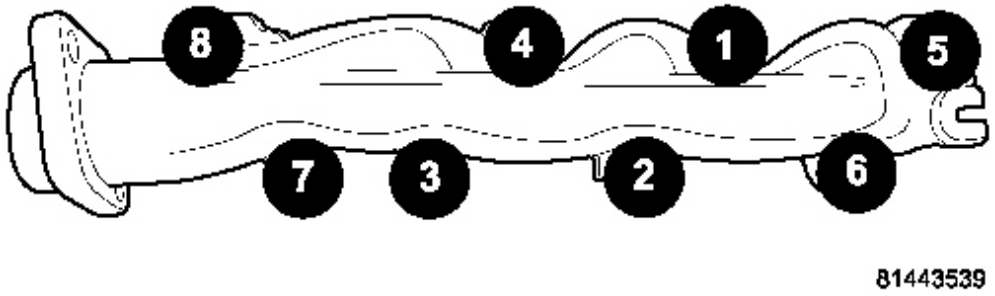

Fig. 200: Exhaust Manifold Bolt Tightening Sequence - Right
Courtesy of CHRYSLER LLC

1. Install manifold gasket and manifold.
2. Install manifold bolts and tighten to 25 N.m (18 ft. lbs.).
3. Install heat shield and tighten nuts to 8 N.m (70 in. lbs.).
4. Install engine mounts. See **INSTALLATION**.
5. Lower engine.

CAUTION: Do not damage engine harness while lowering the engine.

6. Install and tighten right and left side engine mount to frame fasteners. See **INSTALLATION**.
7. Install exhaust flange to pipe bolts.
8. Lower vehicle.
9. Connect negative battery cable.

TIMING DRIVE

COVER-TIMING

REMOVAL

TIMING CHAIN COVER

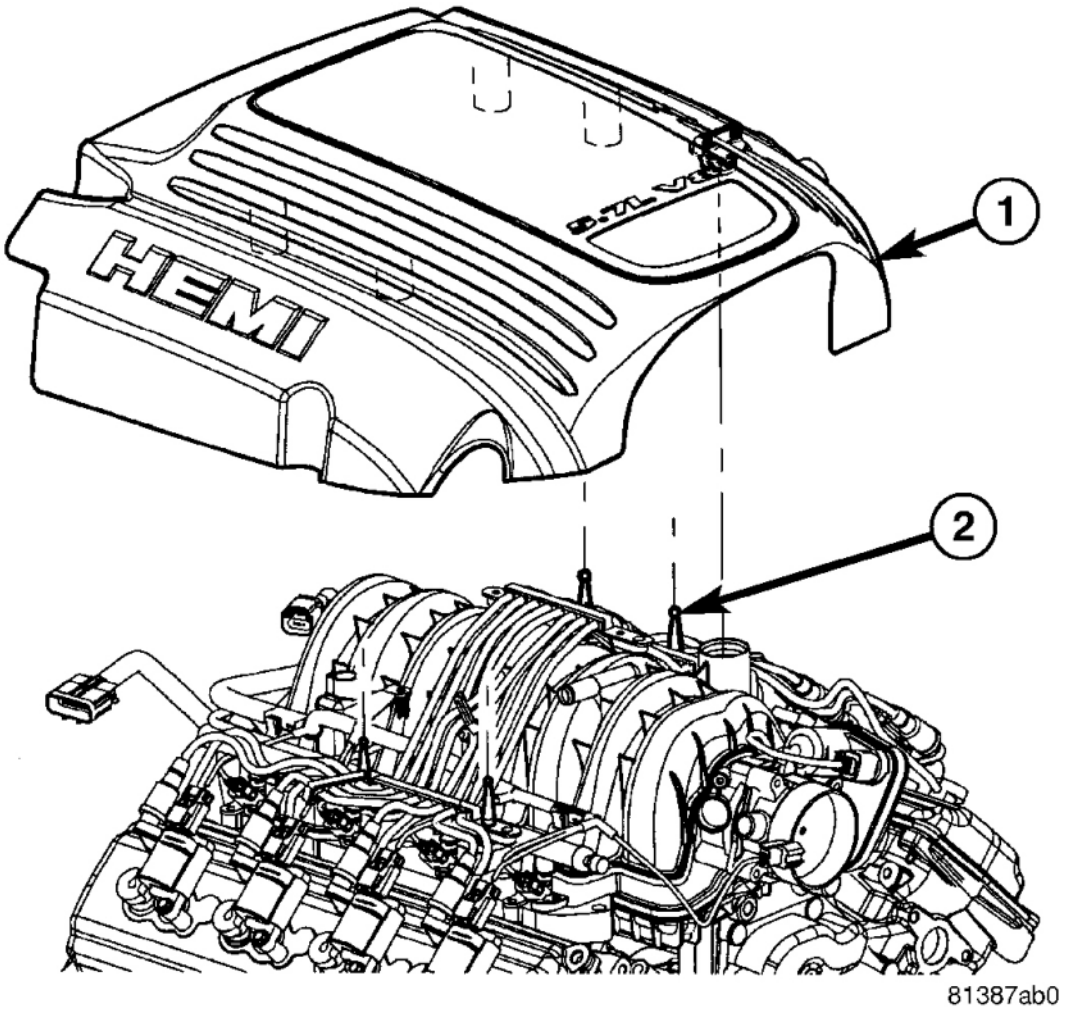

Fig. 201: Engine Cover
Courtesy of CHRYSLER LLC

1 - Engine Cover 2 - Attaching Studs

1. Disconnect the battery negative cable.
2. Remove the engine cover (1).
3. Remove air cleaner assembly.
4. Drain cooling system.
5. Remove accessory drive belt.
6. Remove the cooling fan.
7. Remove coolant bottle and washer bottle.

8. Remove fan shroud.

NOTE: It is not necessary to disconnect A/C lines or discharge freon.

9. Remove A/C compressor and set aside.

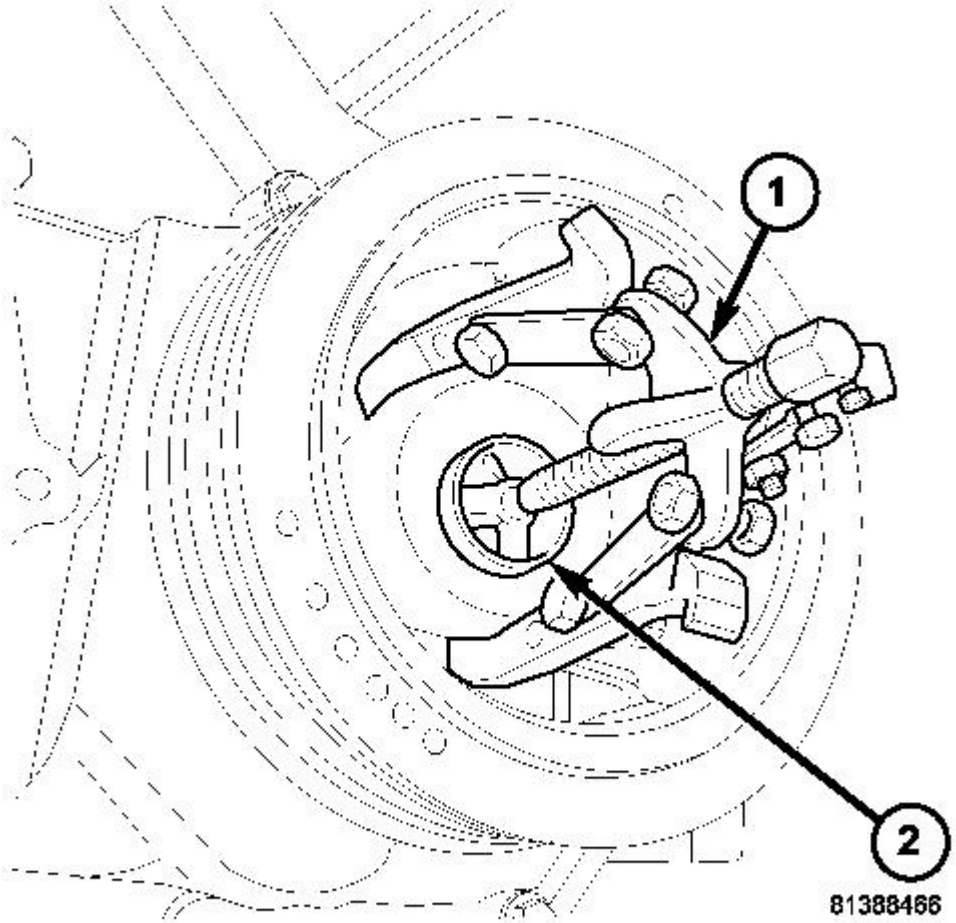

Fig. 202: Crankshaft Damper Removal
Courtesy of CHRYSLER LLC

1 - 3-Jaw Puller 1023 2 - Crankshaft Insert 8513A

10. Remove the generator.
11. Remove upper radiator hose.
12. Disconnect both heater hoses at timing cover.
13. Disconnect lower radiator hose at engine.
14. Remove accessory drive belt tensioner and both idler pulleys.
15. Remove crankshaft damper (2). See **REMOVAL**.

NOTE: Do not remove the hoses from the power steering pump.

16. Remove power steering pump and set aside.

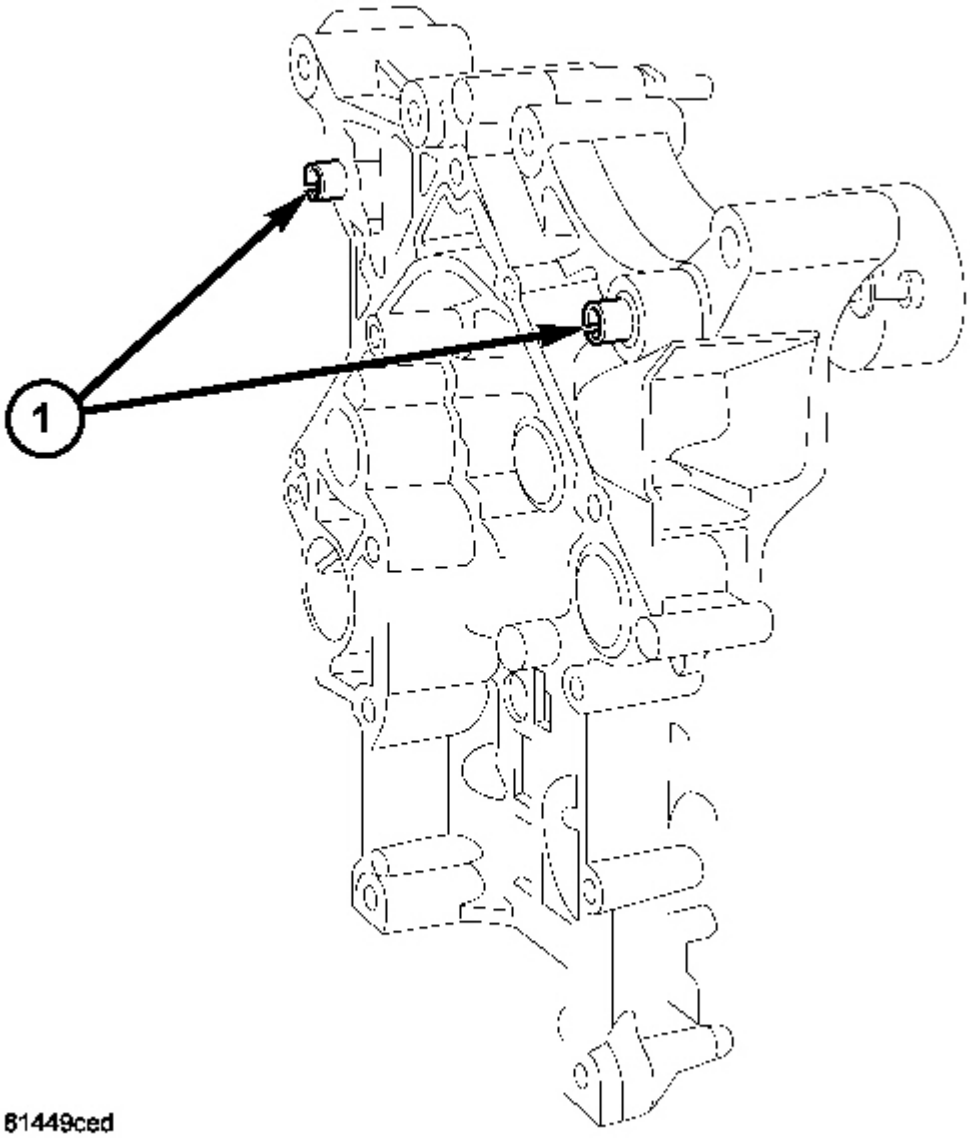

Fig. 203: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

17. Remove the dipstick support bolt.
18. Drain the engine oil.
19. Remove the oil pan and pick up tube. See **REMOVAL**.

NOTE: It is not necessary to remove water pump for timing cover removal.

20. Remove timing cover bolts and remove cover.
21. Verify that timing cover slide bushings (1) are located in timing cover.

INSTALLATION

TIMING CHAIN COVER

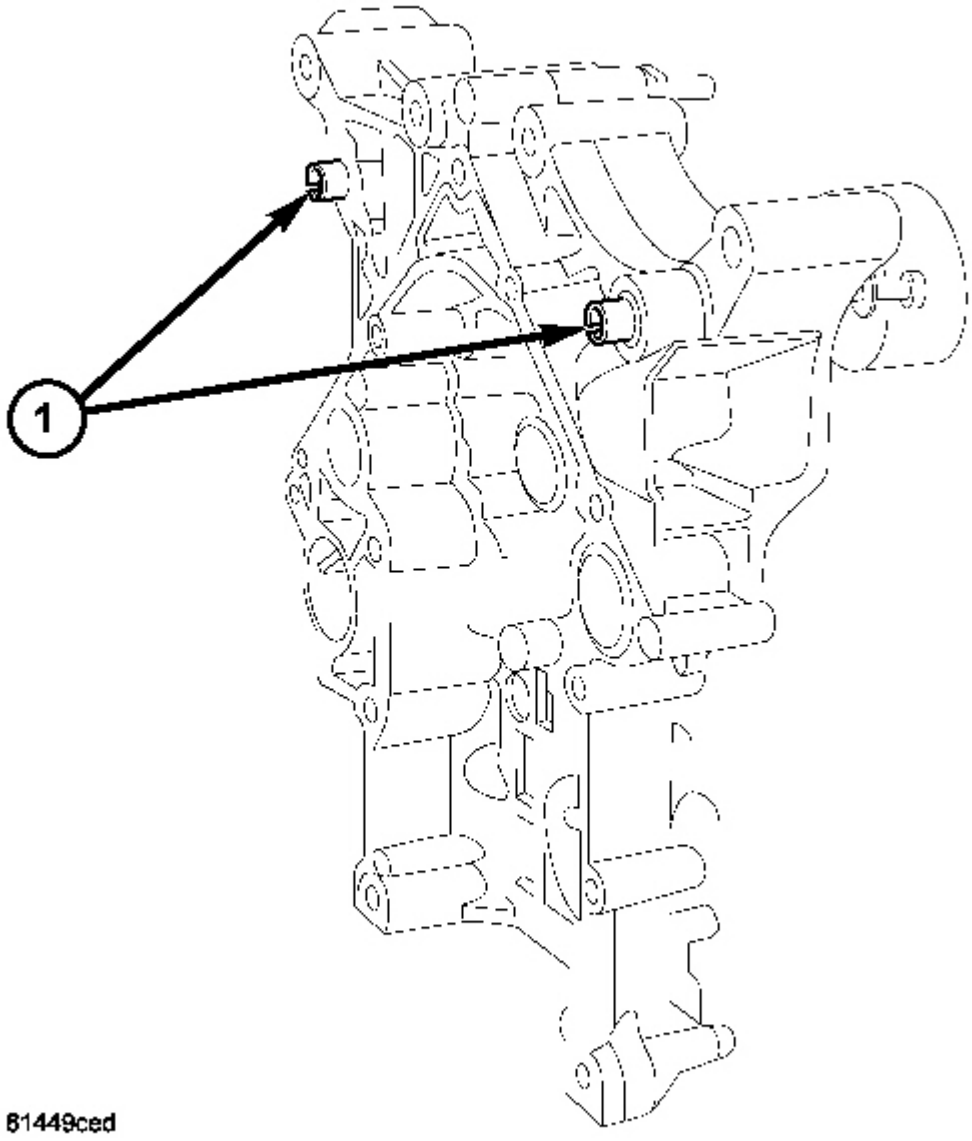

Fig. 204: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

1. Clean timing chain cover and block surface.

NOTE: Always install a new gasket on timing cover.

2. Verify that the slide bushings (1) are installed in timing cover.
3. Install cover and new gasket. Tighten fasteners to 28 N.m (250 in. lbs.).

NOTE: The large lifting stud is torqued to 55 N.m (40 ft. lbs.).

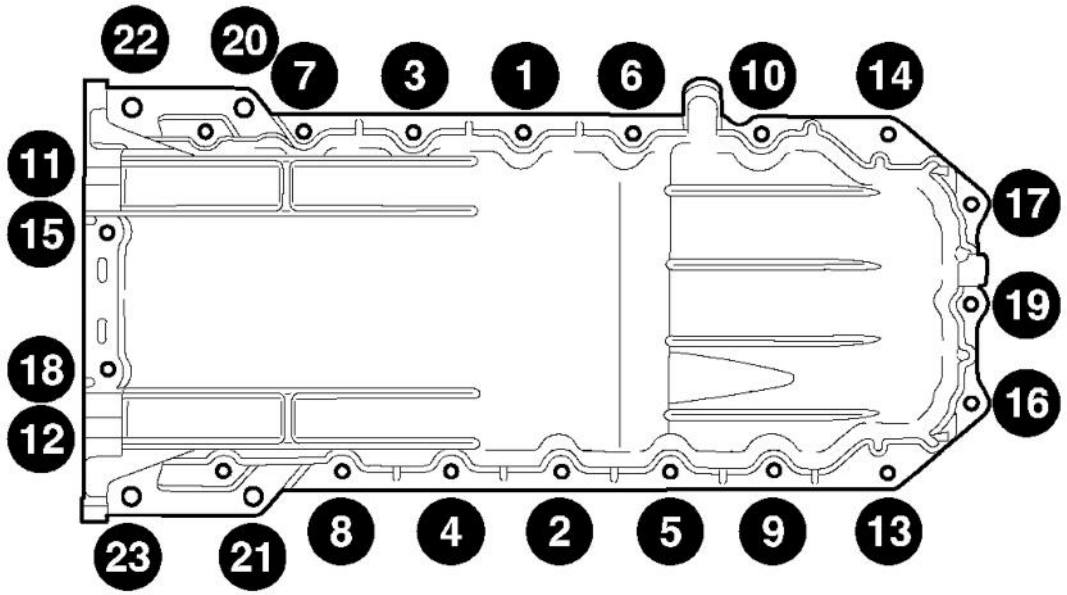

Fig. 205: Oil Pan Torque Sequence
Courtesy of CHRYSLER LLC

4. Install the oil pan and pick up tube. See **INSTALLATION**.
5. Install the A/C compressor.
6. Install the generator.
7. Install power steering pump.
8. Install the dipstick support bolt.
9. Install the thermostat housing.
10. Install crankshaft damper. See **INSTALLATION**.
11. Install accessory drive belt tensioner assembly and both idler pulleys.

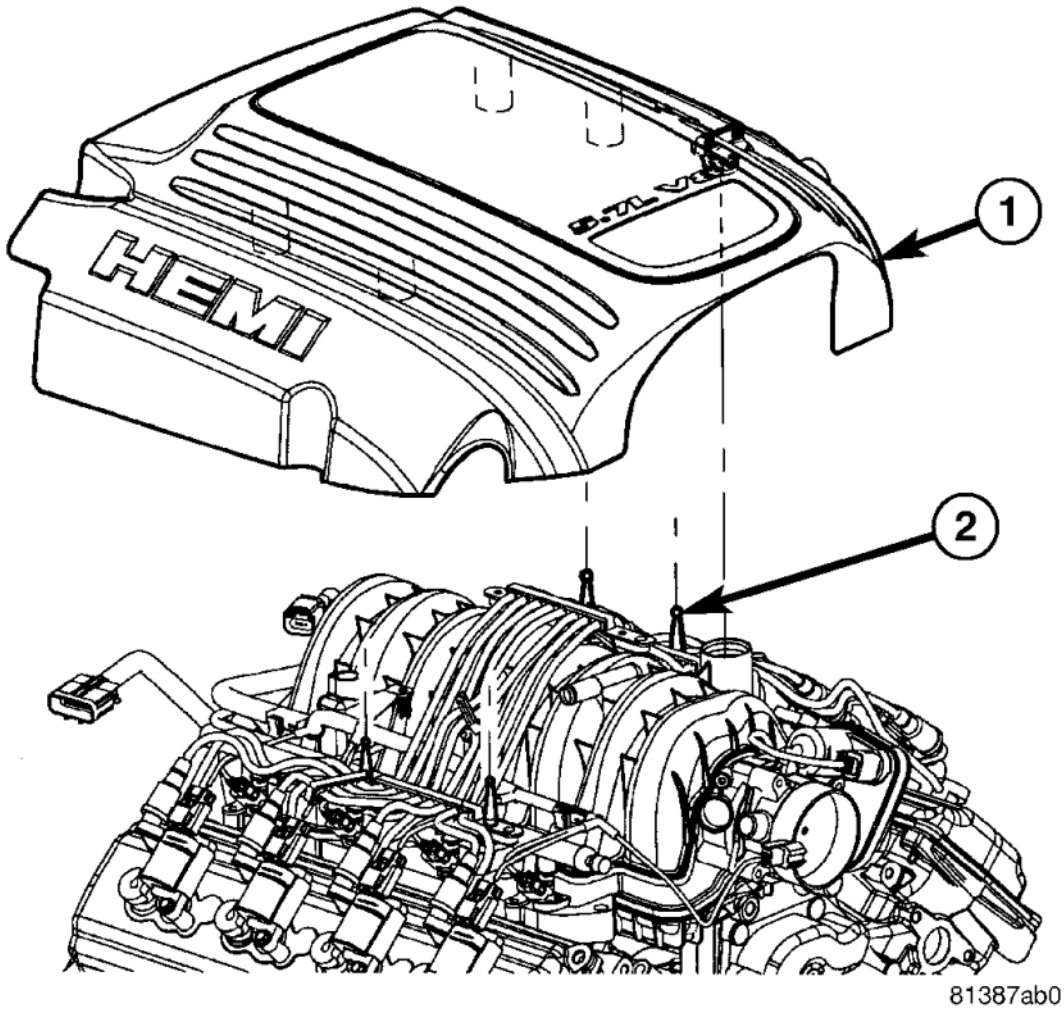

Fig. 206: Engine Cover
Courtesy of CHRYSLER LLC

1 - Engine Cover
2 - Attaching Studs

12. Install radiator lower hose.
13. Install both heater hoses.
14. Install radiator fan shroud.
15. Install the cooling fan.
16. Install the accessory drive belt.
17. Install the coolant bottle and washer bottle.
18. Install the upper radiator hose.

19. Install the air cleaner assembly.
20. Fill cooling system.
21. Refill engine oil.
22. Connect the battery negative cable.
23. Install the engine cover (1).

TIMING CHAIN & SPROCKETS

REMOVAL

TIMING CHAIN

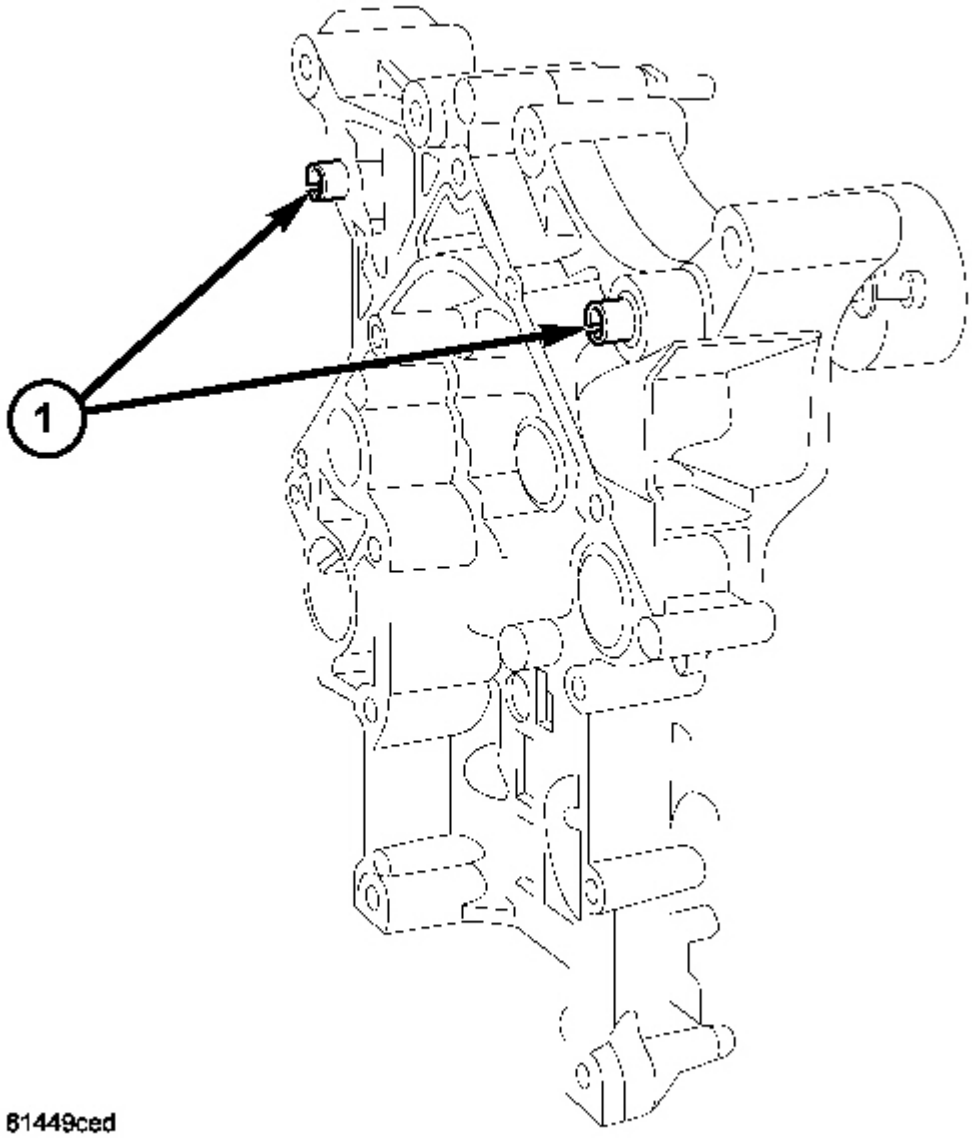

Fig. 207: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

1. Disconnect battery negative cable.
2. Drain cooling system.
3. Remove Timing Chain Cover (1).

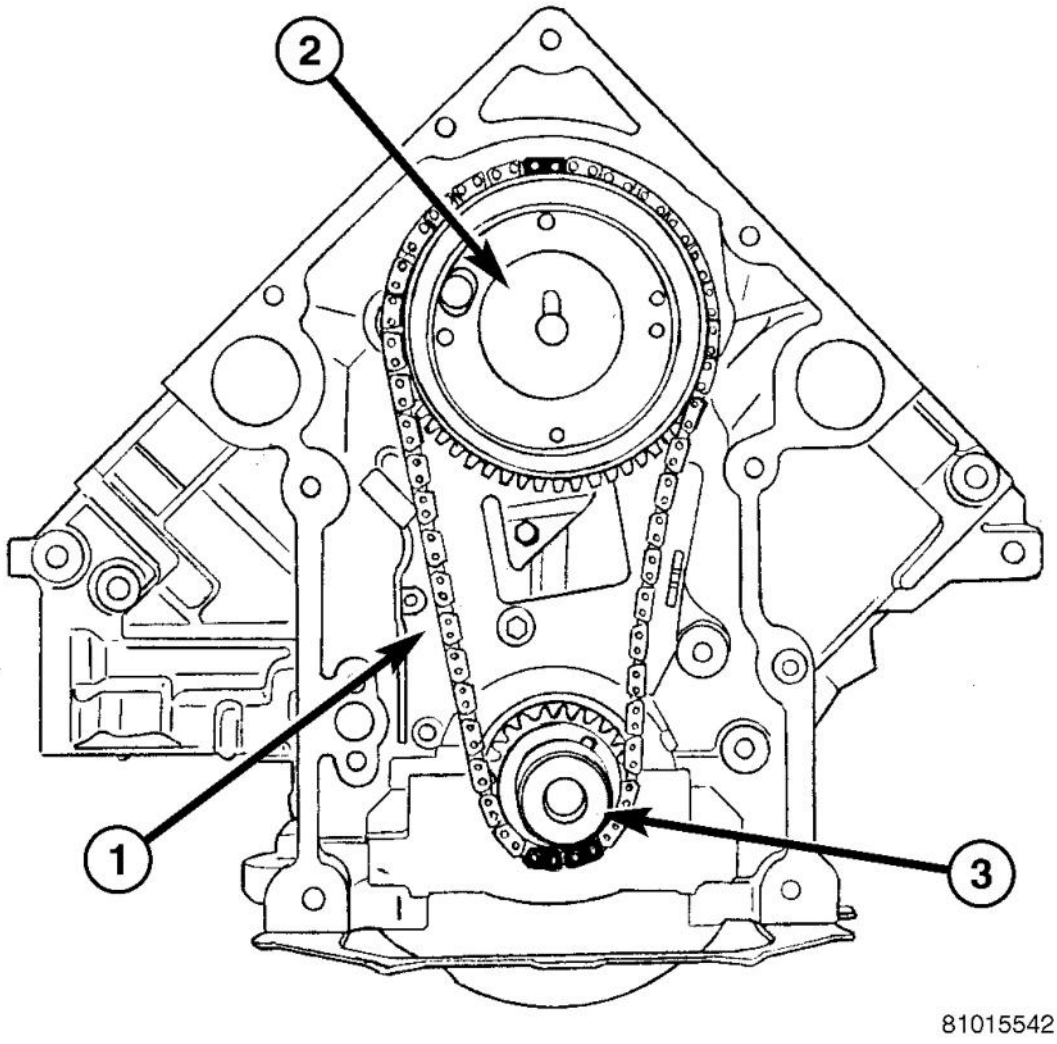

Fig. 208: Identifying Chain Tensioner, Camshaft Sprocket & Crankshaft Sprocket
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

4. Re-install the vibration damper bolt finger tight. Using a suitable socket and breaker bar, rotate the crankshaft to align timing chain sprockets and keyways as shown.

CAUTION: The camshaft pin and the slot in the cam sprocket must be clocked at 12:00 (2). The crankshaft keyway must be clocked at 2:00 (3). The crankshaft sprocket must be installed so that the dots and or paint marking is at 6:00.

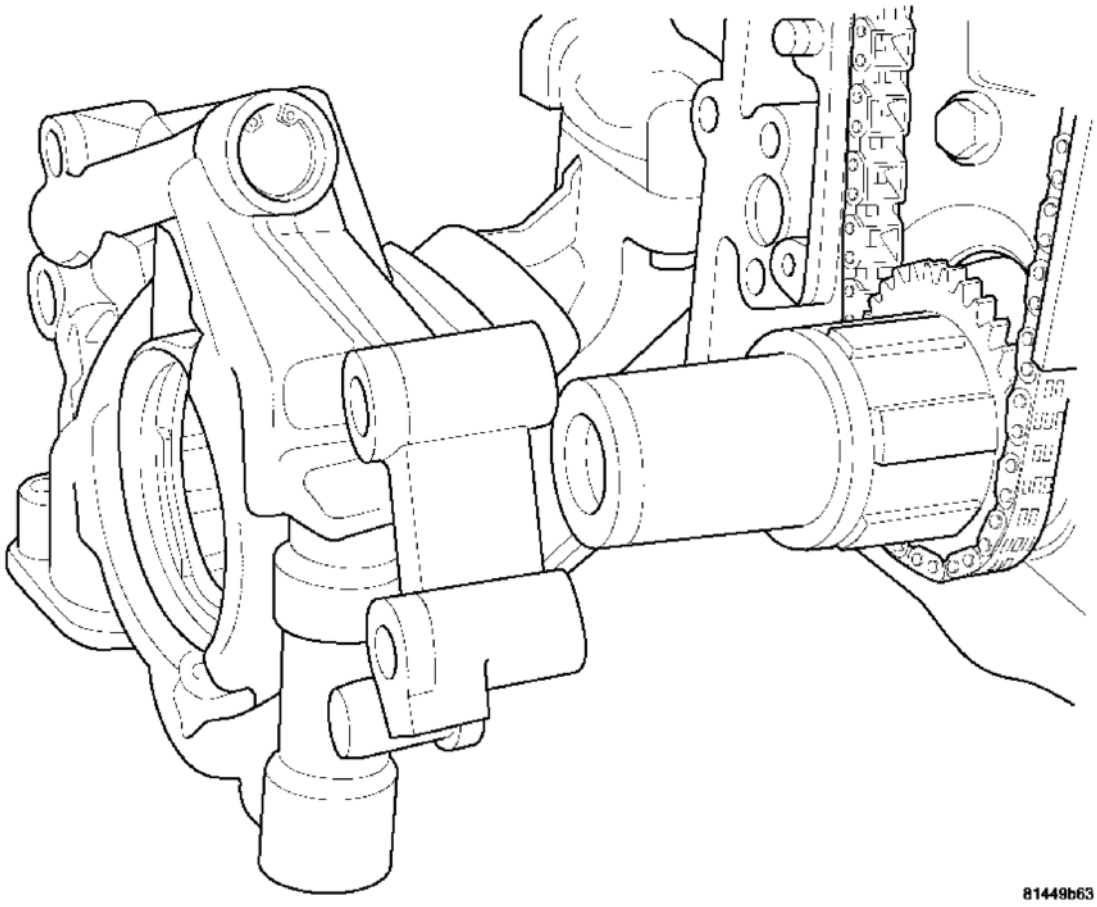

Fig. 209: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

5. Remove oil pump.

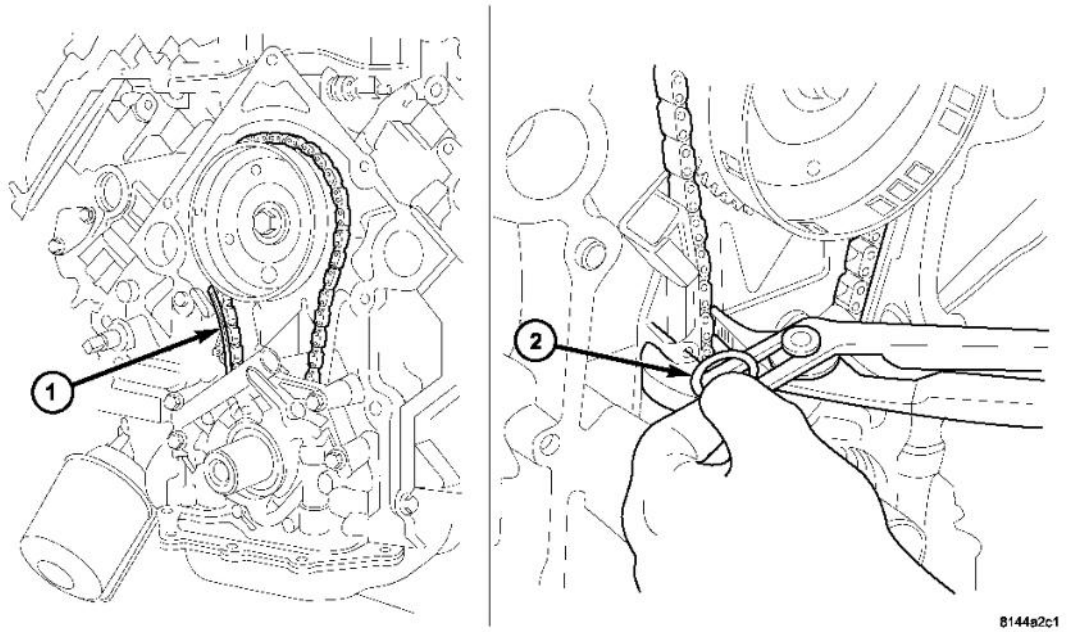

Fig. 210: Retracting Tensioner
Courtesy of CHRYSLER LLC

1 - TENSIONER 2 - TENSIONER PIN 8514

6. Retract tensioner shoe (1) until hole in shoe lines up with hole in bracket.

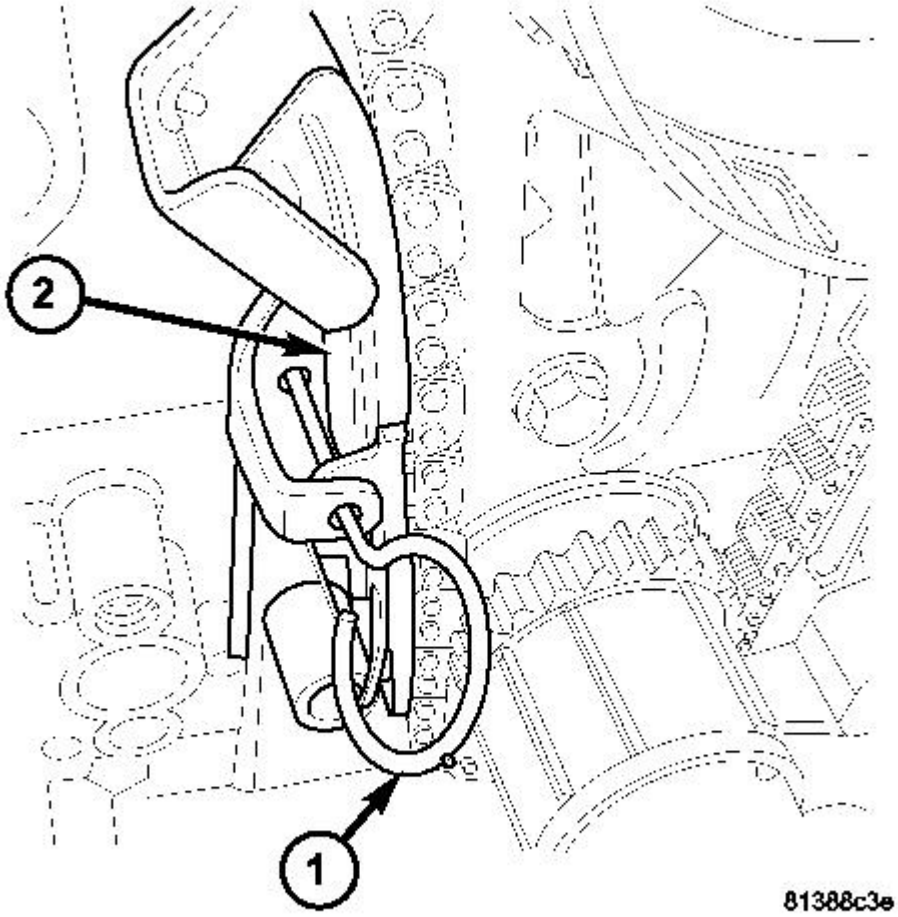

Fig. 211: Tensioner Pin
Courtesy of CHRYSLER LLC

1 - Pin 2 - Tensioner

7. Install Tensioner Pin 8514 (1) into the holes.

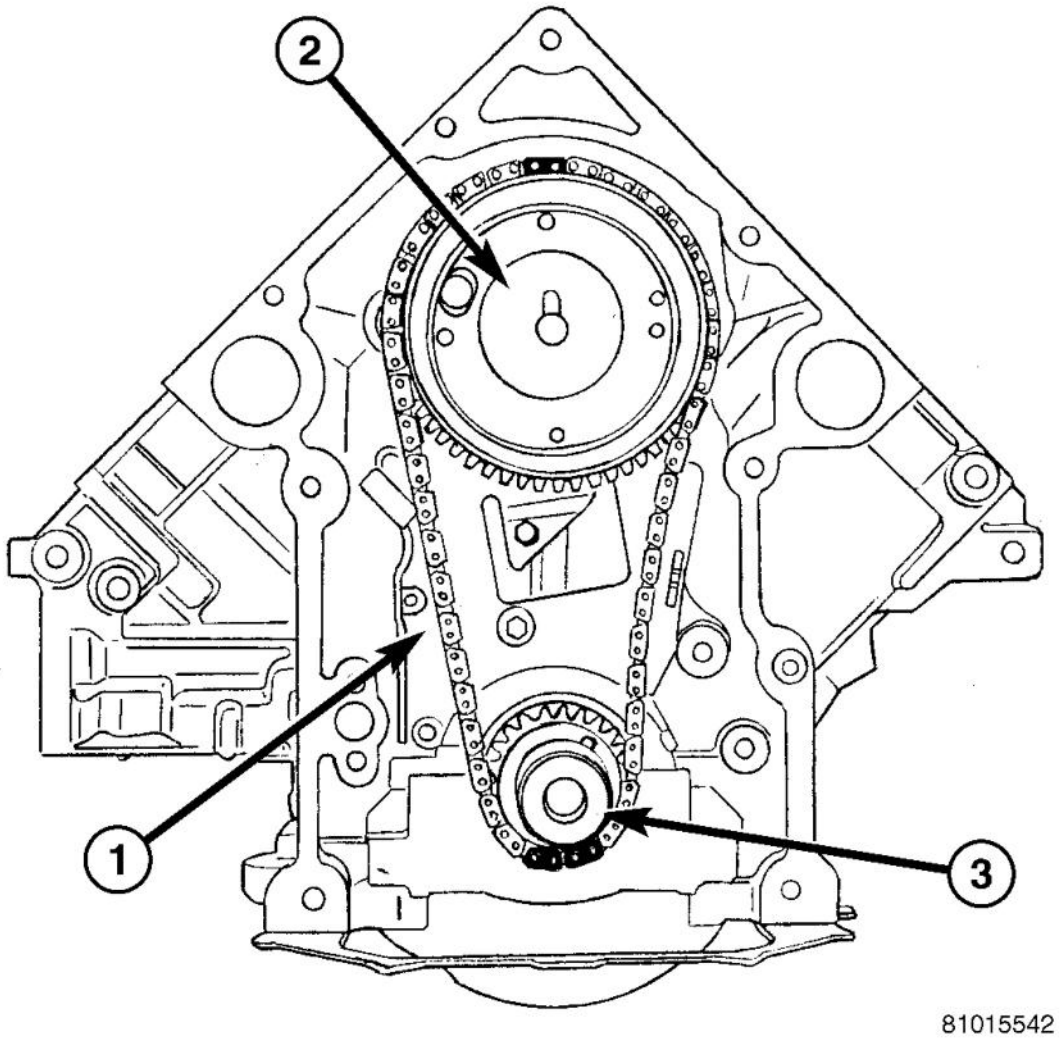

Fig. 212: Identifying Chain Tensioner, Camshaft Sprocket & Crankshaft Sprocket
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

8. Remove camshaft sprocket attaching bolt and remove timing chain with crankshaft and camshaft sprockets (2).
9. If tensioner assembly is to be replaced, remove the tensioner to block bolts and remove tensioner assembly.

INSTALLATION

TIMING CHAIN

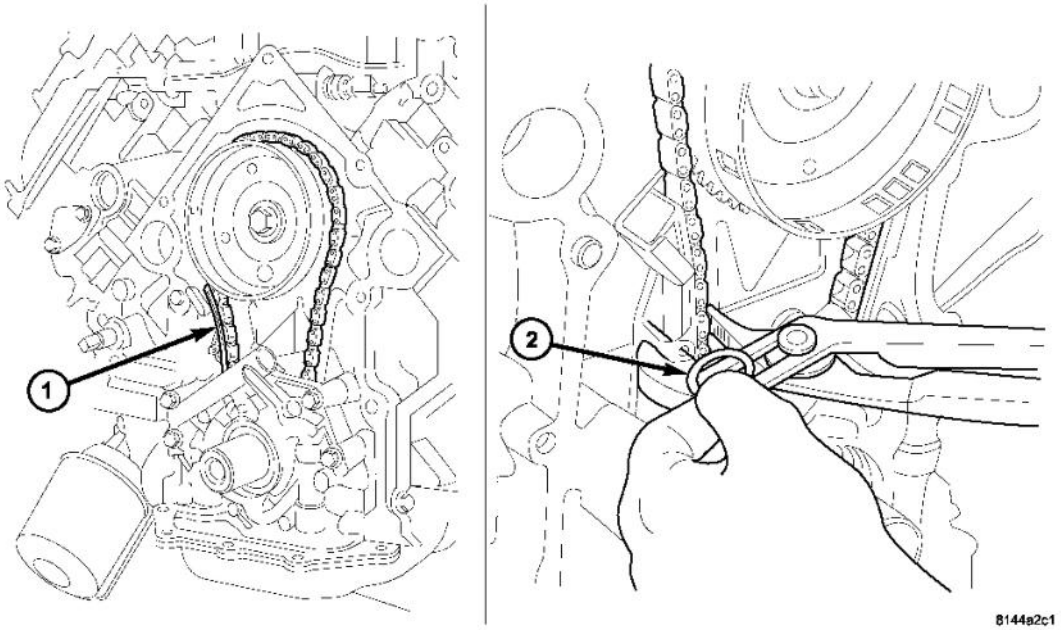

Fig. 213: Retracting Tensioner
Courtesy of CHRYSLER LLC

1 - TENSIONER 2 - TENSIONER PIN 8514

1. If tensioner (1) assembly is being replaced, install tensioner and mounting bolts. Tighten bolts to 28 N.m (250 in. lbs.).
2. Retract tensioner (2) if required.

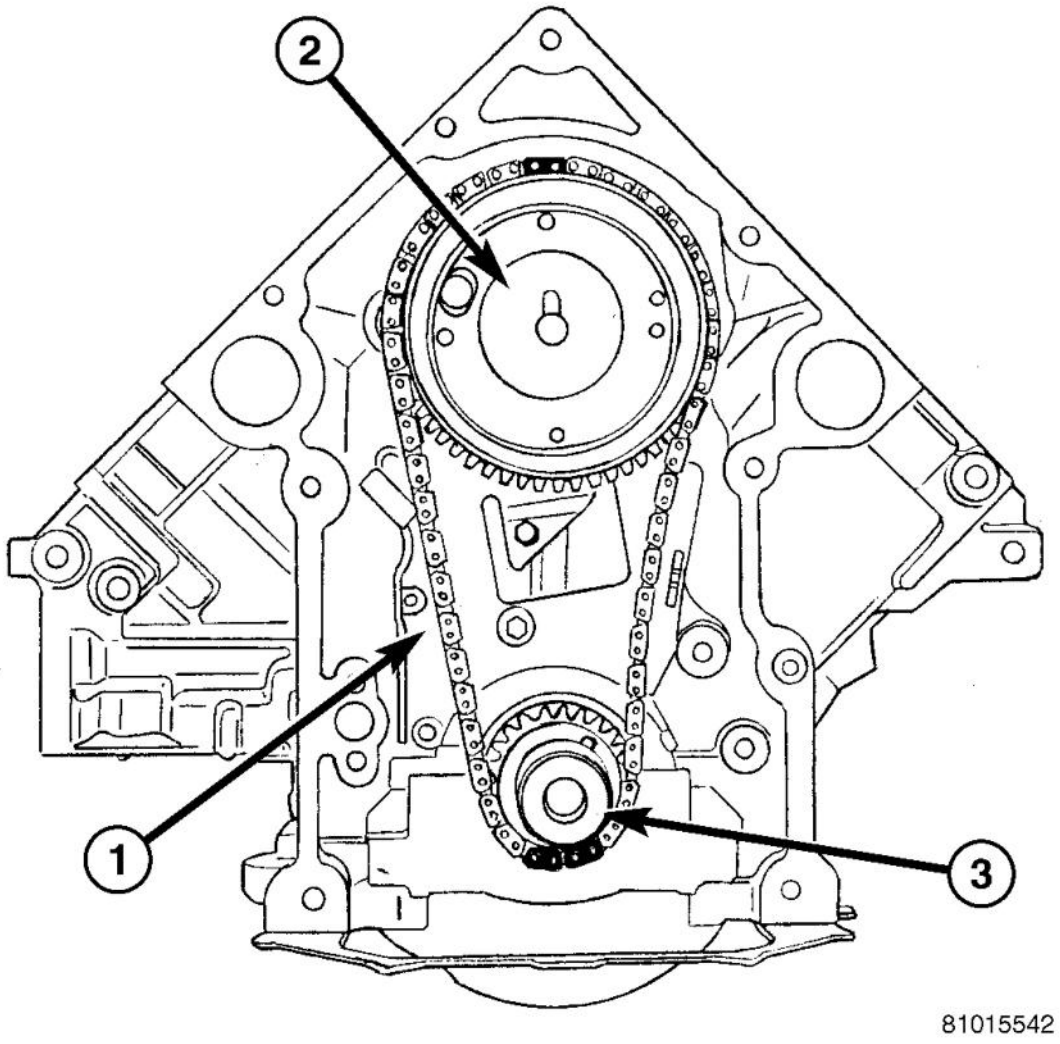

Fig. 214: Identifying Chain Tensioner, Camshaft Sprocket, And Crankshaft Sprocket
Courtesy of CHRYSLER LLC

1 - Chain Tensioner
2 - Camshaft Sprocket
3 - Crankshaft Sprocket

CAUTION: The timing chain must be installed with the single plated link aligned with the dot and or paint marking on the camshaft sprocket. The crankshaft sprocket is aligned with the dot and or paint marking on the sprocket between two plated timing chain links.

CAUTION: The camshaft pin and the slot in the cam sprocket must be clocked at

12:00. The crankshaft keyway must be clocked at 2:00. The crankshaft sprocket must be installed so that the dots and or paint marking is at 6:00.

3. Place timing chain around both sprockets with timing marks aligned with the plated links.
4. Slide both sprockets (2,3) evenly over their respective shafts and check alignment of timing marks.
5. Install the camshaft bolt. Tighten the bolt to 122 N.m (90 ft. lbs.).

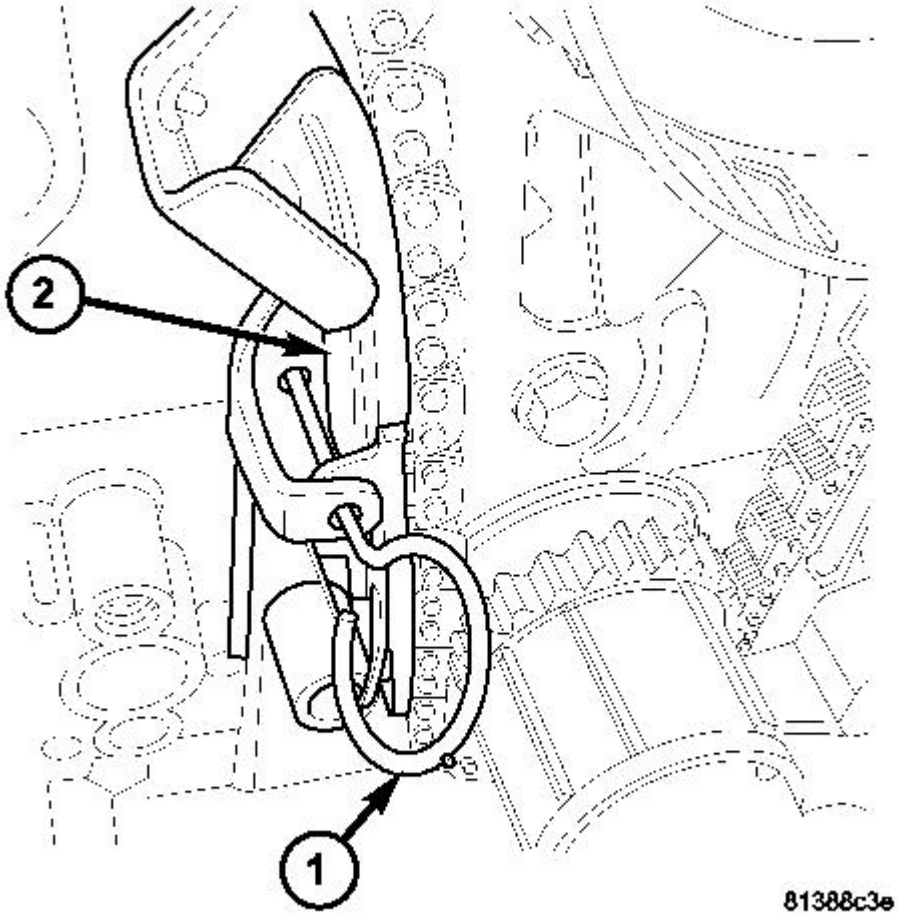

Fig. 215: Tensioner Pin
Courtesy of CHRYSLER LLC

1 - Pin 2 - Tensioner

6. **Remove tensioner pin. (1)** Again, verify alignment of timing marks.

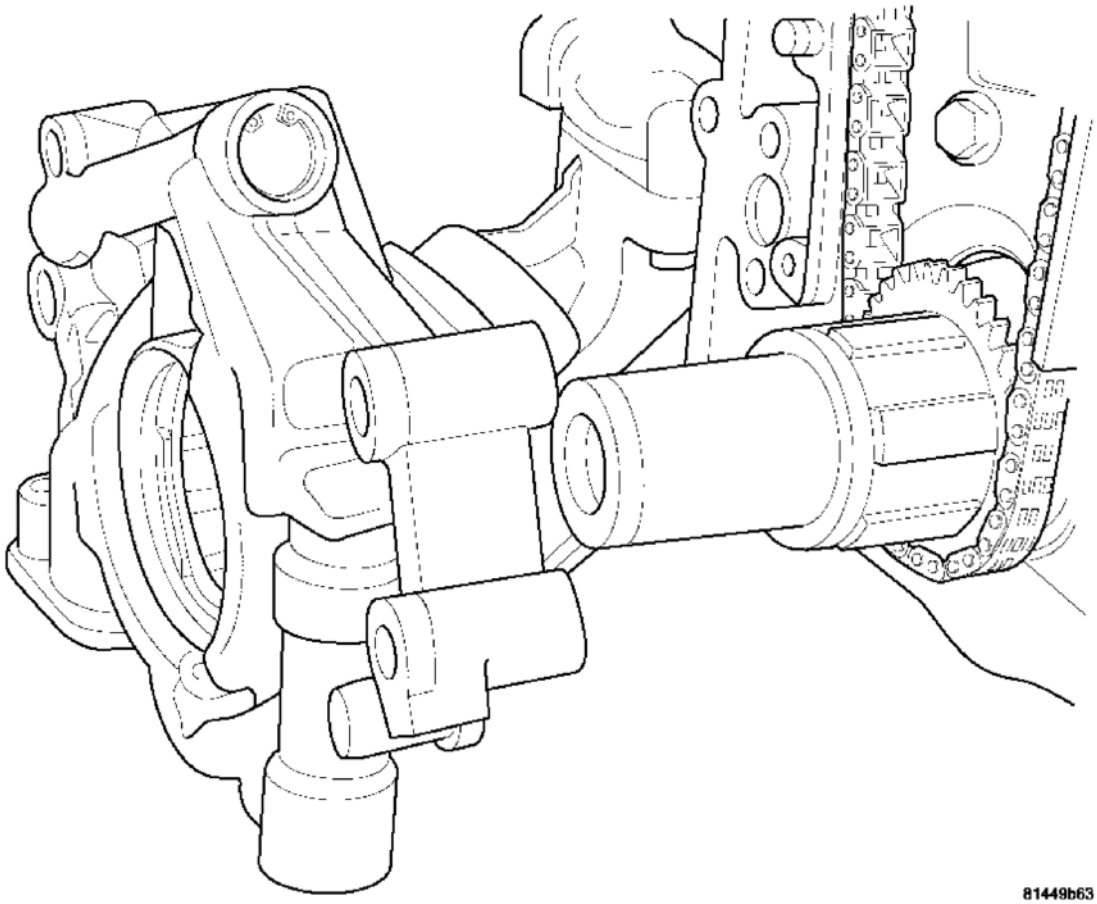

Fig. 216: Removing/Installing Oil Pump
Courtesy of CHRYSLER LLC

7. Install the oil pump. See **INSTALLATION**.
8. Install the oil pan and pick up. See **INSTALLATION**.

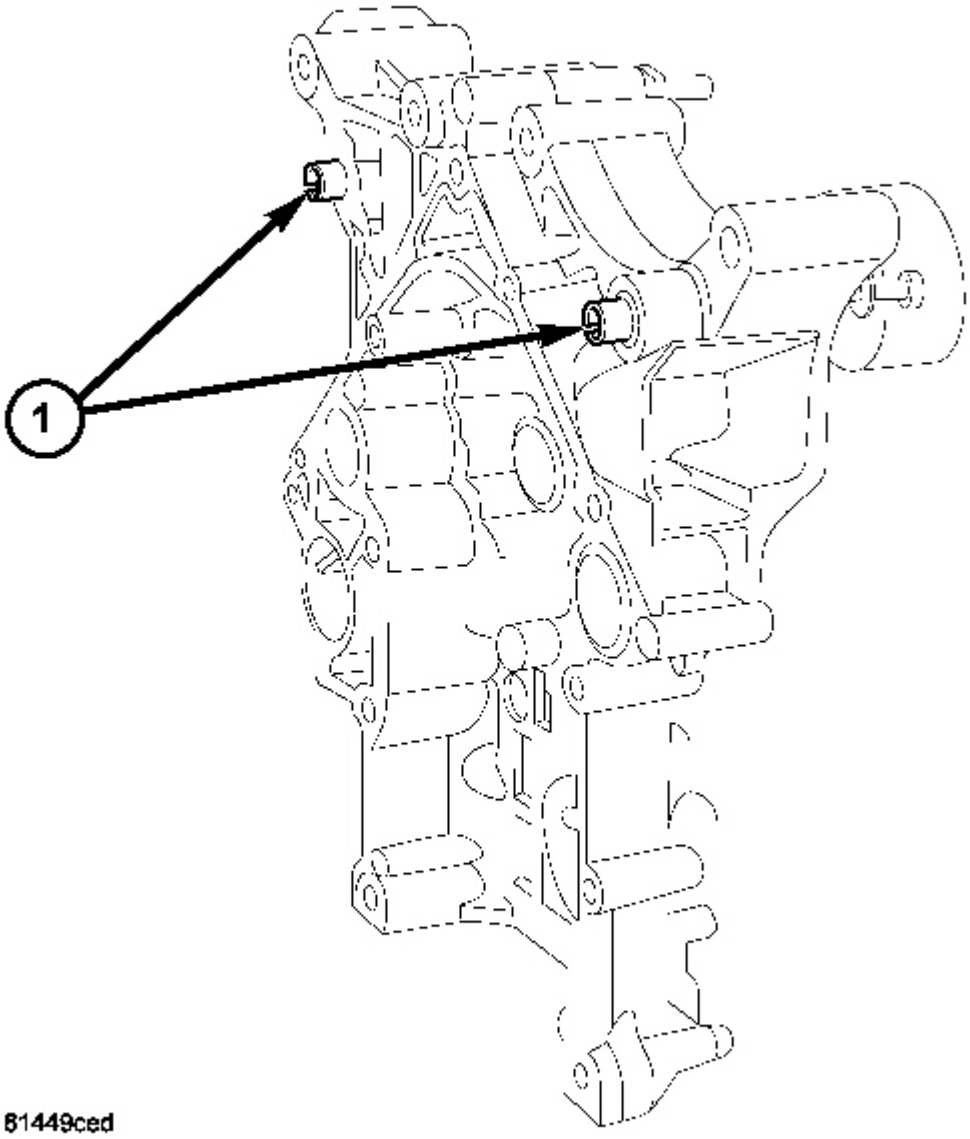

Fig. 217: Front Cover Slide Bushings
Courtesy of CHRYSLER LLC

9. Install the timing chain cover. See **INSTALLATION**.
10. Fill engine with oil.
11. Fill cooling system. Refer to **STANDARD PROCEDURE** .
12. Connect battery negative cable.

13. Start engine and check for leaks.

TENSIONER - TIMING CHAIN

DESCRIPTION

TIMING CHAIN TENSIONER

The timing chain tensioner is a stamped steel constant tension mechanical design. It is mounted to the front of the engine, behind the timing chain drive.

OPERATION

TIMING CHAIN TENSIONER

The timing chain tension is maintained by routing the timing chain through the tensioner assembly. A nylon covered spring steel arm presses on the timing chain maintaining the correct chain tension.

