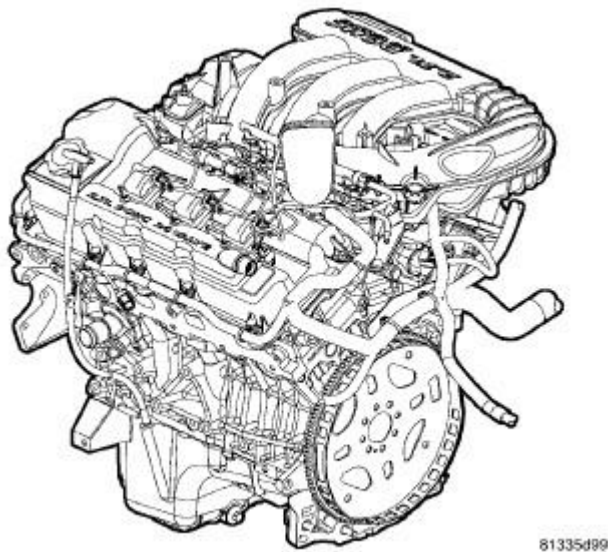


2010 ENGINE**2.7L DOHC - Service Information - 300 & Charger****DESCRIPTION****DESCRIPTION****Fig. 1: 2.7L ENGINE****Courtesy of CHRYSLER LLC**

The 2.7 Liter (167 Cubic Inches) 60 degree V6 engine is a double overhead camshaft design with hydraulic lifters and four valves per cylinder. The engine does not have provisions for a free wheeling valve train.

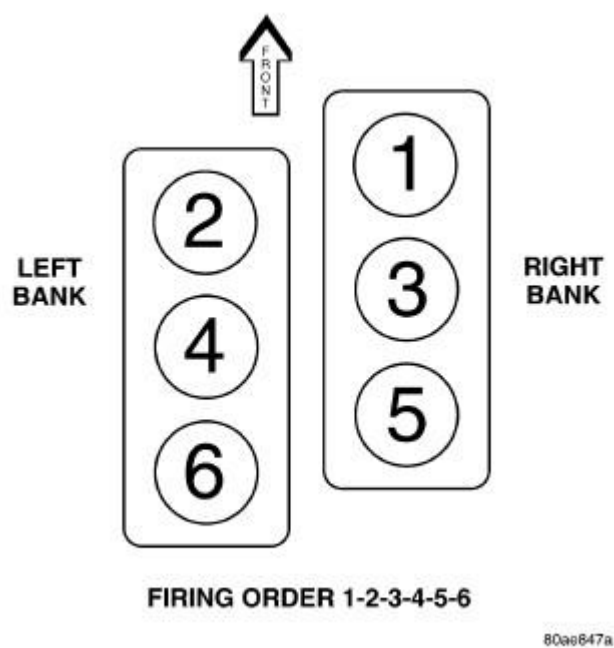


Fig. 2: Cylinder Numbering & Firing Order
Courtesy of CHRYSLER LLC

The cylinders are numbered from front to rear, with the right bank odd numbered, and the left bank even numbered. The firing order is 1-2-3-4-5-6.

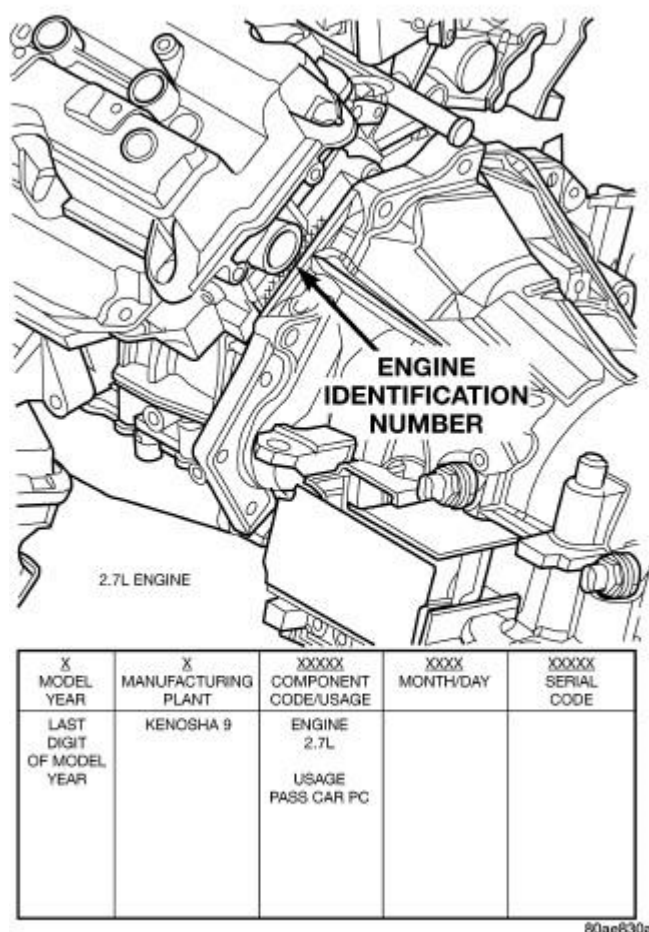


Fig. 3: Engine Identification
Courtesy of CHRYSLER LLC

The engine identification number is located on the rear of the cylinder block just below the left cylinder head

DIAGNOSIS AND TESTING

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 mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to **ENGINE DIAGNOSIS - PERFORMANCE** and **ENGINE DIAGNOSIS - MECHANICAL**.

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

within the following:

- Cylinder Compression Pressure Test: Refer to **CYLINDER COMPRESSION PRESSURE TEST**.
- Cylinder Combustion Pressure Leakage Test: Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE TEST**.
- Cylinder Head Gasket Failure Diagnosis: Refer to **CYLINDER HEAD GASKET**.
- Intake Manifold Leakage Diagnosis: Refer to **INTAKE MANIFOLD LEAKS**.
- Lash Adjuster (Tappet) Noise Diagnosis: Refer to **HYDRAULIC LASH ADJUSTER NOISE DIAGNOSIS**.
- Engine Oil Leak Inspection: Refer to **ENGINE OIL LEAK INSPECTION**.

ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery. 2. Corroded or loose battery connections. 3. Faulty starter. 4. Faulty coil(s) or control unit. 5. Incorrect spark plug gap. 6. Contamination in fuel system. 7. Faulty fuel pump. 8. Incorrect engine timing.	1. Test battery. Charge or replace as necessary. Refer to <u>Electrical/Battery System/BATTERY - Standard Procedure</u>. 2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals. 3. Test starting system. 4. Test and replace as needed. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u>. 5. Check and adjust gap as needed. 6. Clean system and replace fuel filter. 7. Test fuel pump and replace as needed. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u>. 8. Check for a skipped timing chain.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low. 2. Incorrect fuel mixture. 3. Intake manifold leakage. 4. Faulty coil(s).	1. Test minimum air flow. 2. Replace fuel. 3. Inspect intake manifold gasket, manifold, and vacuum hoses. 4. Test and replace as necessary. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u>.
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs. 2. Contamination in fuel system. 3. Faulty fuel pump.	1. Set gap as needed or replace plug(s). 2. Clean system and replace fuel filter. 3. Test and replace as necessary. Refer

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	4. Incorrect valve timing. 5. Leaking cylinder head gasket. 6. Low compression. 7. Burned, warped, or pitted valves. 8. Plugged or restricted exhaust system. 9. Faulty coil(s).	to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u> . 4. Correct valve timing as needed. 5. Replace cylinder head gasket. 6. Test compression of each cylinder. 7. Replace valves. 8. Check exhaust system restriction. Replace parts, as necessary. 9. Test and replace as necessary. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u> .
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs. 2. Contamination in Fuel System. 3. Burned, warped, or pitted valves. 4. Faulty coil(s).	1. Set gap as needed or replace plug(s). 2. Clean fuel system and replace fuel filter. 3. Replace valves. 4. Test and replace as necessary. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u> .
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap. 2. Faulty coil(s). 3. Dirty fuel injector(s). 4. Contamination in fuel system.	1. Set gap as needed or replace plug(s). 2. Test and replace as necessary. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u> . Test and replace as necessary. Refer to <u>Non-DTC Diagnostics/Driveability - Gas - Diagnosis and Testing</u> . 4. Clean system and replace fuel filter.

ENGINE DIAGNOSIS - MECHANICAL

ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	1. High or low oil level in crankcase.	1. Check and correct engine oil level.
	2. Thin or diluted oil.	2. Change oil to correct viscosity.
	3. Thick oil	3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again.
	4. Low oil pressure.	4. Check and correct engine oil

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		level.
	5. Dirt in tappets/lash adjusters.	5. Replace rocker arm/hydraulic lash adjuster assembly.
	6. Worn rocker arms.	6. Inspect oil supply to rocker arms.
	7. Worn tappets/lash adjusters.	7. Install new rocker arm/hydraulic lash adjuster assembly.
	8. Worn valve guides.	8. Ream guides and install new valves with oversize stems.
	9. Excessive runout of valve seats on valve faces.	9. Grind valve seats and valves.
	10. Missing adjuster pivot.	10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a.) Change oil and filter.
		(b.) Run engine to operating temperature.
		(c.) Change oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
MAIN BEARING NOISE	6. Connecting rod journal out-of-round.	6. Replace crankshaft or grind surface.
	7. Misaligned connecting rods.	7. Replace bent connecting rods.
	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil.	4. (a.) Change oil and filter.
		(b.) Run engine to operating temperature.
		(c.) Change oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Excessive end play.	6. Check thrust bearing for wear on flanges.
	7. Crankshaft journal out-of-round or worn.	7. Replace crankshaft or grind journals.
	8. Loose flywheel or torque converter.	8. Tighten to correct torque.
	1. Low oil level.	1. Check engine oil level.
OIL PRESSURE DROP	1. Low oil level.	1. Check engine oil level.

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	2. Faulty oil pressure sending unit.	2. Install new sending unit.
	3. Low oil pressure.	3. Check sending unit and main bearing oil clearance.
	4. Clogged oil filter.	4. Install new oil filter.
	5. Worn parts in oil pump.	5. Replace worn parts or pump.
	6. Thin or diluted oil.	6. Change oil to correct viscosity.
	7. Oil pump relief valve stuck.	7. Remove valve and inspect, clean, or replace.
	8. Oil pump suction tube loose.	8. Remove oil pan and install new tube or clean, if necessary.
	9. Oil pump cover warped or cracked.	9. Install new oil pump.
	10. Excessive bearing clearance.	10. Measure bearings for correct clearance.
OIL LEAKS	1. Misaligned or deteriorated gaskets.	1. Replace gasket(s).
	2. Loose fastener, broken or porous metal part.	2. Tighten, repair or replace the part.
	3. Misaligned or deteriorated cup or threaded plug.	3. Replace as necessary.
OIL CONSUMPTION OR SPARK PLUGS FOULED	1. PCV system malfunction.	1. Check system and repair as necessary.
	2. Worn, scuffed or broken rings.	2. Hone cylinder bores. Install new rings.
	3. Carbon in oil ring slots.	3. Clean pistons and install new rings.
	4. Rings fitted too tightly in grooves.	4. Remove rings and check grooves. If groove is not proper width, replace piston.
	5. Worn valve guide(s).	5. Replace cylinder head(s).
	6. Valve stem seal(s) worn or damaged.	6. Replace seal(s).

CYLINDER COMPRESSION PRESSURE TEST

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. Check engine oil level and add oil if necessary.
2. Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.
3. Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal

- firing indicators such as fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.
4. Remove the Auto Shutdown (ASD) relay from the Totally Integrated Power Module (TIPM).
 5. Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0-500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, see **Engine - Special Tools**.
 6. Crank engine until maximum pressure is reached on gauge. Record this pressure as #1 cylinder pressure.
 7. Repeat the previous step for all remaining cylinders.
 8. Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.
 9. If one or more cylinders have abnormally low compression pressures, repeat the compression test.
 10. If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

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.

WARNING: Do not remove the pressure cap with the system hot and under pressure because serious burns from coolant can occur.

Check the coolant level and fill as required. DO NOT install the pressure cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

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, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing,

listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

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

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

ENGINE OIL LEAK INSPECTION

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 level indicator 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 as necessary.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.
5. **If the oil leak source is not positively identified at this time**, proceed with the AIR LEAK DETECTION TEST METHOD as follows:
 - Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.
 - Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.
 - Attach an air hose with pressure gauge and regulator to the oil level indicator tube.

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

- 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 provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service information procedures.
 - If the leakage occurs at the crankshaft rear oil seal area, refer to **INSPECTION FOR REAR SEAL AREA LEAKS**.
6. If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.
 7. 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.

NOTE: If oil leakage is observed at the oil level indicator tube to block location; remove the tube, clean and reseal using Mopar® Stud AND Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

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

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

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. If a leak is present in this area, remove transmission for further inspection.
 - a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
 - b. Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.
4. If no leaks are detected, pressurize the crankcase. Refer to step 5 under ENGINE OIL LEAK INSPECTION.

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 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.

7. After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

STANDARD PROCEDURE

REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching 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) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

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

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

1. Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.
2. Remove negative battery cable.
3. Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.
4. With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.
5. Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).
6. Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)
7. Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

8. Install new spark plugs.
9. Drain engine oil and remove oil filter.
10. Install a new oil filter.

11. Fill engine with specified amount of approved oil.
12. Connect negative battery cable.
13. Start engine and check for any leaks.

FORM-IN-PLACE GASKETS AND SEALERS

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

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

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

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

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

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

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

SEALER APPLICATION

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

assembly to prevent smearing material off the location.

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

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

ENGINE GASKET SURFACE PREPARATION

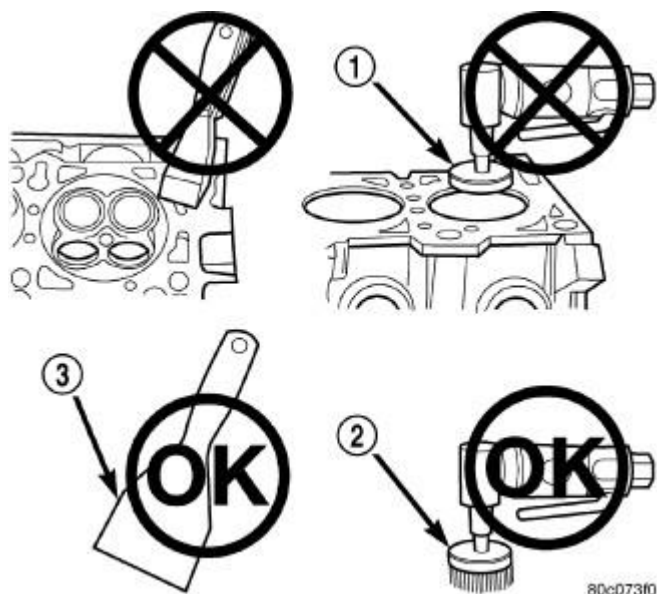


Fig. 4: Proper Tool Usage For Surface Preparation
Courtesy of CHRYSLER LLC

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

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

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head

- High speed power tool with an abrasive pad or a wire brush

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

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

ENGINE CORE AND OIL GALLERY PLUGS

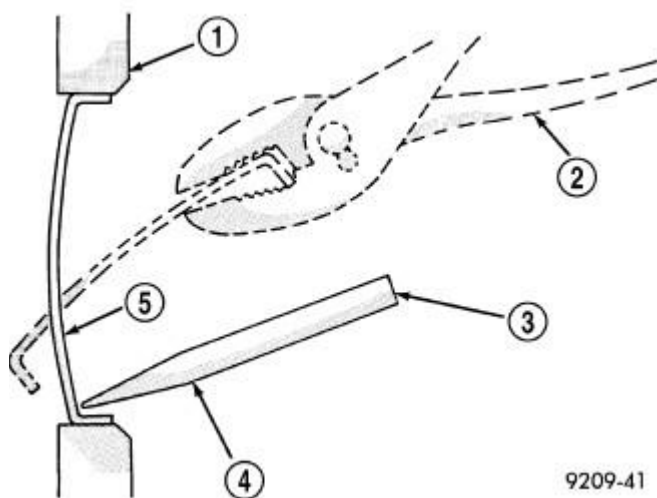


Fig. 5: Core Hole Plug Removal
Courtesy of CHRYSLER LLC

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

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

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and

cause serious engine problems.

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

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

REMOVAL

REMOVAL

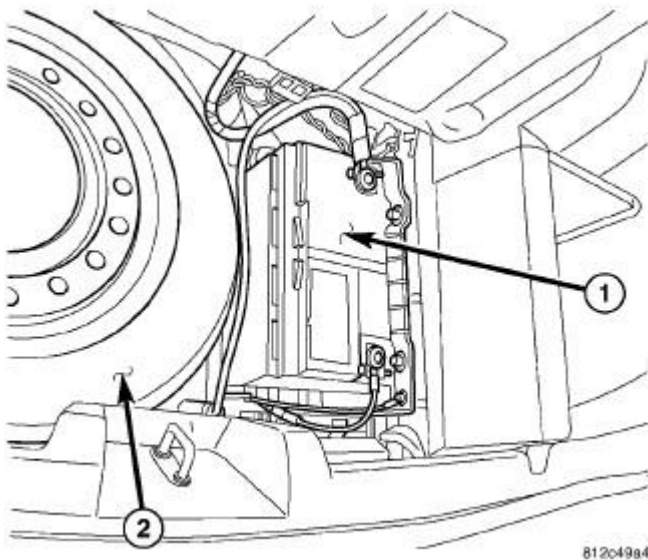


Fig. 6: Locating Battery

Courtesy of CHRYSLER LLC

1. Remove hood.
2. Release fuel pressure. Refer to **Fuel System/Fuel Delivery - Standard Procedure** .
3. Disconnect negative battery cable.

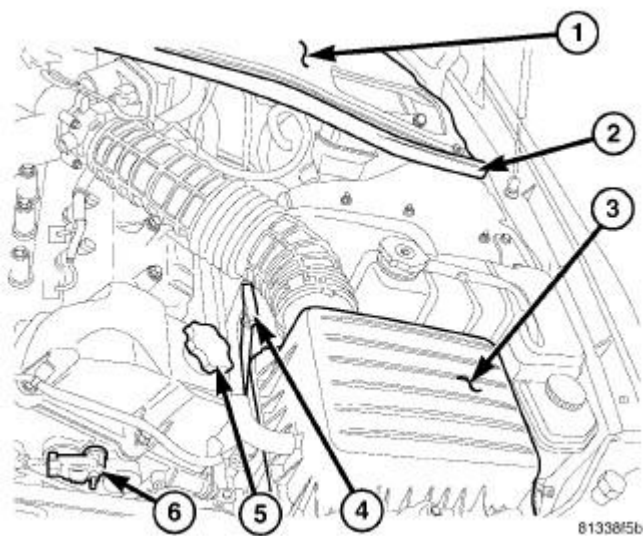


Fig. 7: AIR CLEANER HOUSING

Courtesy of CHRYSLER LLC

4. Disconnect intake air temperature sensor electrical connector.
5. Remove air cleaner housing assembly (3). See **Engine/Air Intake System/BODY, Air Cleaner - Removal**.

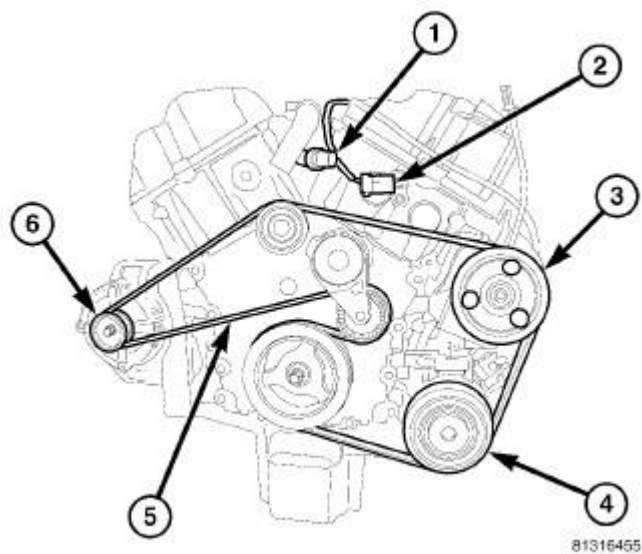


Fig. 8: Accessory Drive Belt

Courtesy of CHRYSLER LLC

6. Remove accessory drive belt (5).
7. Disconnect lines from power steering pump (3).
8. Remove power steering pump attaching bolts and set pump aside (3).

9. Recover A/C system. Refer to **Heating and Air Conditioning/Plumbing - Standard Procedure** .
10. Remove A/C compressor (4). Refer to **Heating and Air Conditioning/Plumbing/COMPRESSOR, A/C - Removal** .

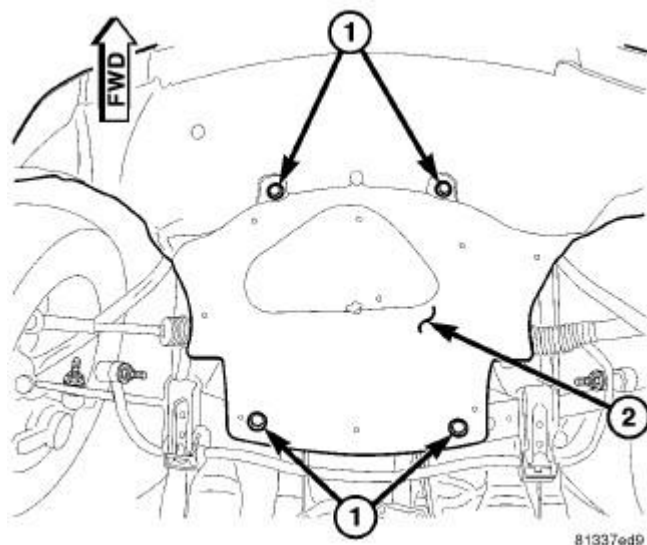


Fig. 9: Lower Splash Shield
Courtesy of CHRYSLER LLC

11. Raise vehicle.
12. Remove lower splash shield bolts (1) and remove splash shield (2).
13. Drain cooling system.

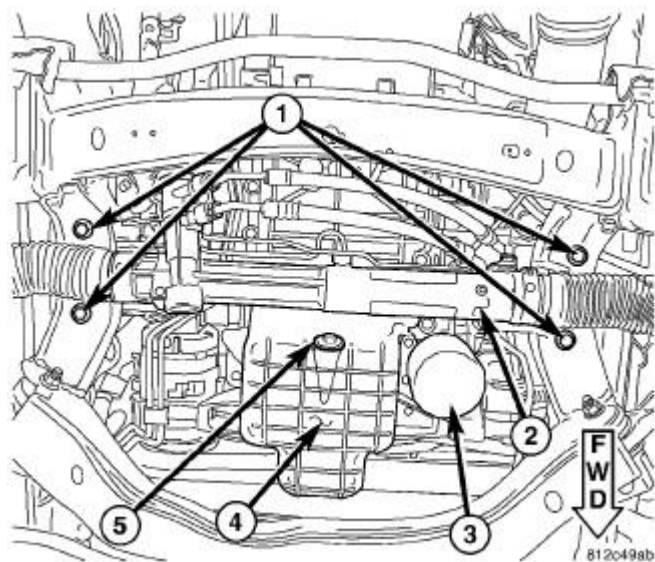


Fig. 10: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

14. Drain the engine oil (5) and remove the oil filter (3).
15. Disconnect down stream oxygen sensor connectors.
16. Disconnect exhaust pipes at the manifolds.

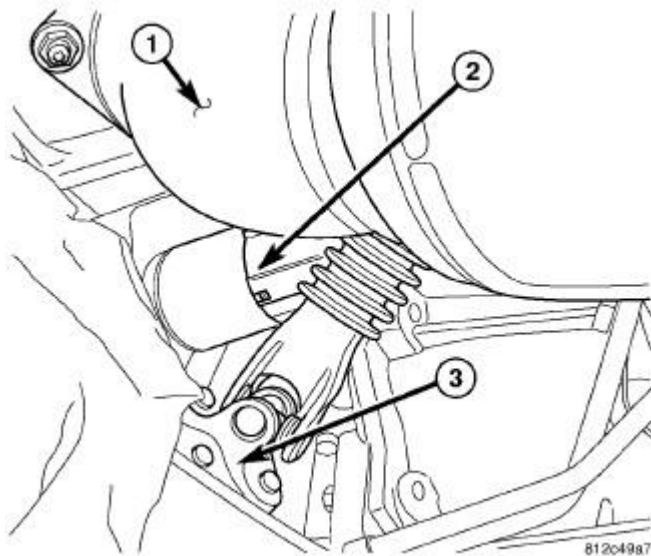


Fig. 11: Steering Shaft
Courtesy of CHRYSLER LLC

17. Disconnect starter (2) electrical connectors.
18. Remove starter (2) bolts and set starter aside.

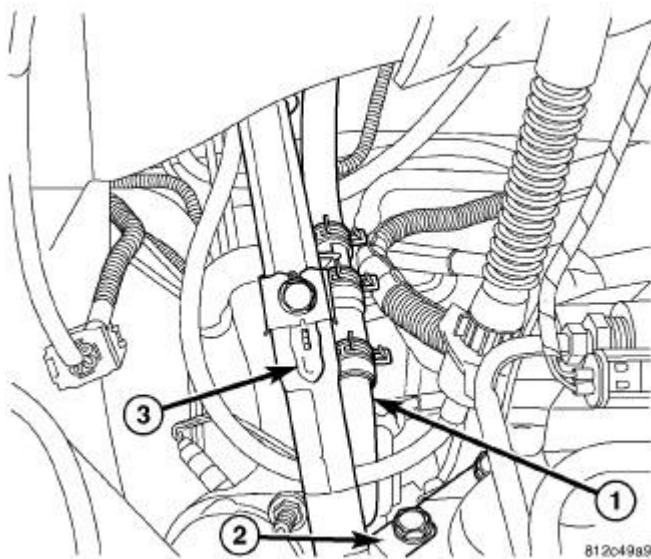


Fig. 12: Coolant Pipe
Courtesy of CHRYSLER LLC

19. Disconnect coolant pipe (1) near starter from hose.
20. Disconnect crankshaft position sensor electrical connector and remove sensor. Refer to **Fuel System/Fuel Injection/SENSOR, Crankshaft Position - Removal**.
21. Disconnect ground strap.

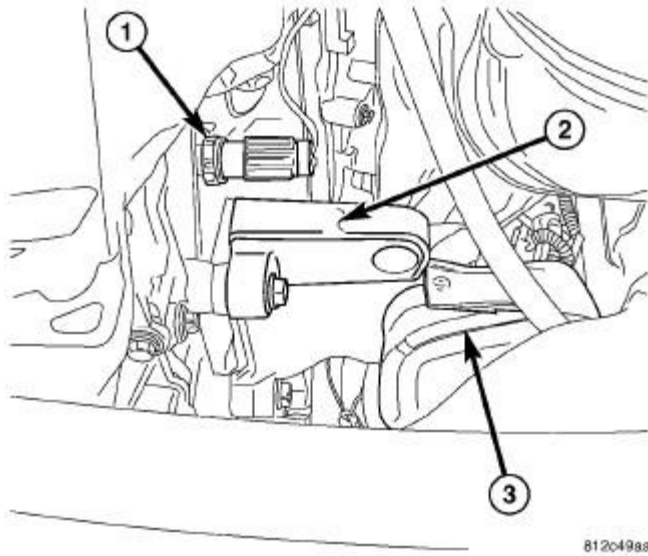


Fig. 13: Oil Pressure Sensor Connector
Courtesy of CHRYSLER LLC

22. Disconnect oil pressure sensor (1) electrical connector.
23. Remove 4 engine mount nuts (1).
24. Remove engine mount studs (1) from mount.

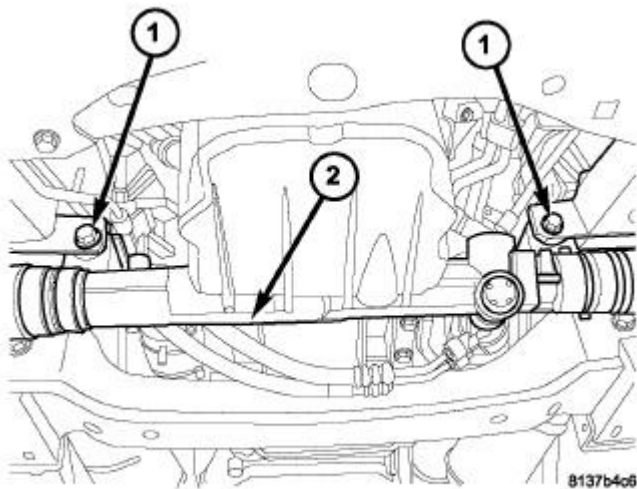
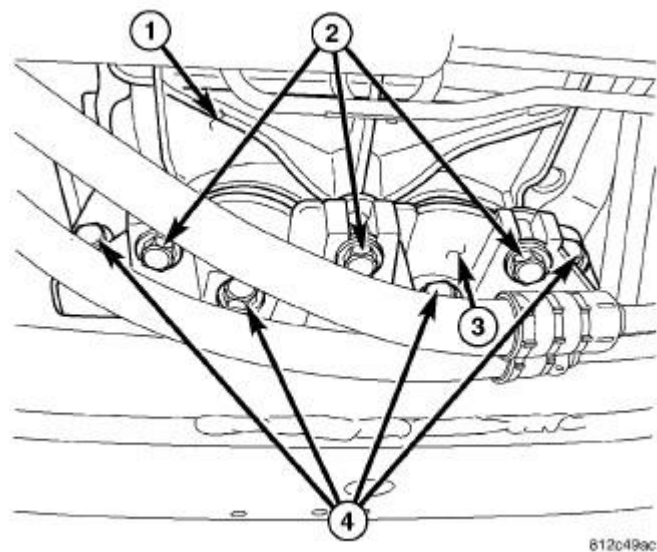


Fig. 14: GEAR MOUNTING BOLTS

Courtesy of CHRYSLER LLC

25. Remove steering gear mounting bolts (1) and lower steering gear (2) for clearance.

**Fig. 15: Removing/Installing Structural Collar Bolts At Oil Pan & Transmission Bell Housing**
Courtesy of CHRYSLER LLC

26. Using a block of wood and a suitable lifting device under the oil pan, raise the engine.
27. Remove structural collar bolts (2 and 4).
28. Remove structural collar (3).
29. Remove lower bell housing bolts.
30. Lower engine and remove jack stand.
31. Mark flex plate to torque converter location.
32. Remove torque converter bolts.
33. Lower vehicle.

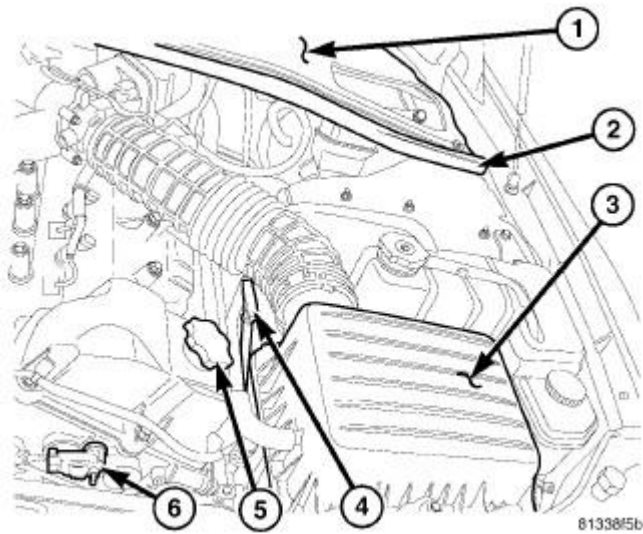


Fig. 16: AIR CLEANER HOUSING

Courtesy of CHRYSLER LLC

34. Remove wiper arms and wiper cowl (1). Refer to Electrical/Wipers/Washers/LINKAGE, Wiper Arm - Removal.
35. Remove strut tower support (2).

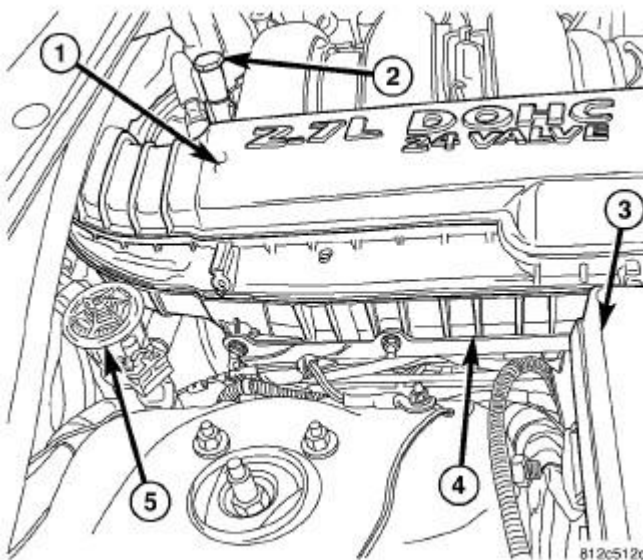


Fig. 17: Locating Purge Solenoid

Courtesy of CHRYSLER LLC

36. Reposition purge solenoid (5).

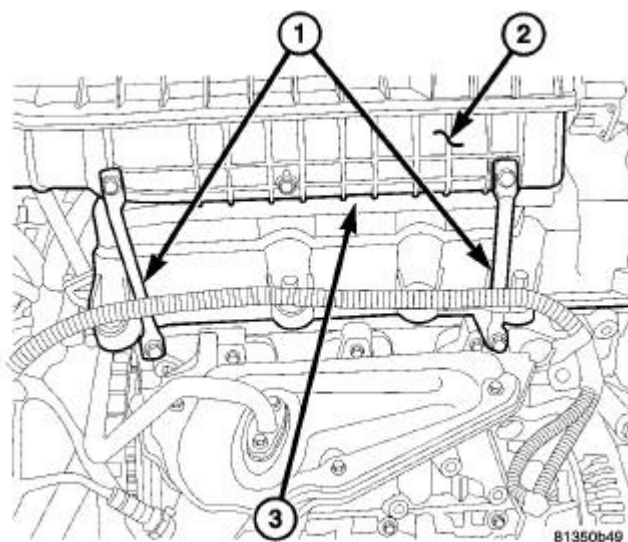


Fig. 18: Manifold Support Brackets
Courtesy of CHRYSLER LLC

37. Remove the intake manifold (2). See **Engine/Manifolds/MANIFOLD, Intake - Removal**.
38. Disconnect all vacuum lines and electrical connectors.
39. Disconnect all ground straps attaching to the engine.

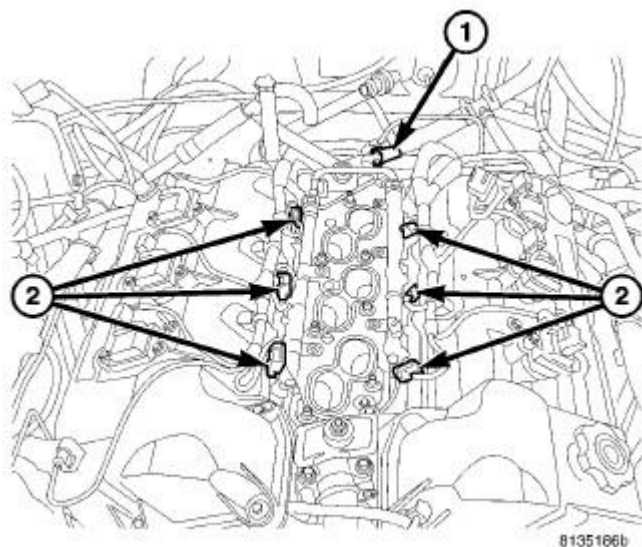


Fig. 19: Fuel Feed Line & Injector Connectors
Courtesy of CHRYSLER LLC

40. Disconnect fuel line at fuel rail (1).
41. Disconnect coil, injector (2), capacitor, and knock sensor connectors.
42. Remove EGR valve and tube assembly. Refer to **Emissions Control/Exhaust Gas**

Recirculation/VALVE, Exhaust Gas Recirculation (EGR) - Removal .

43. Remove upper bellhousing bolts and reposition electrical harness.

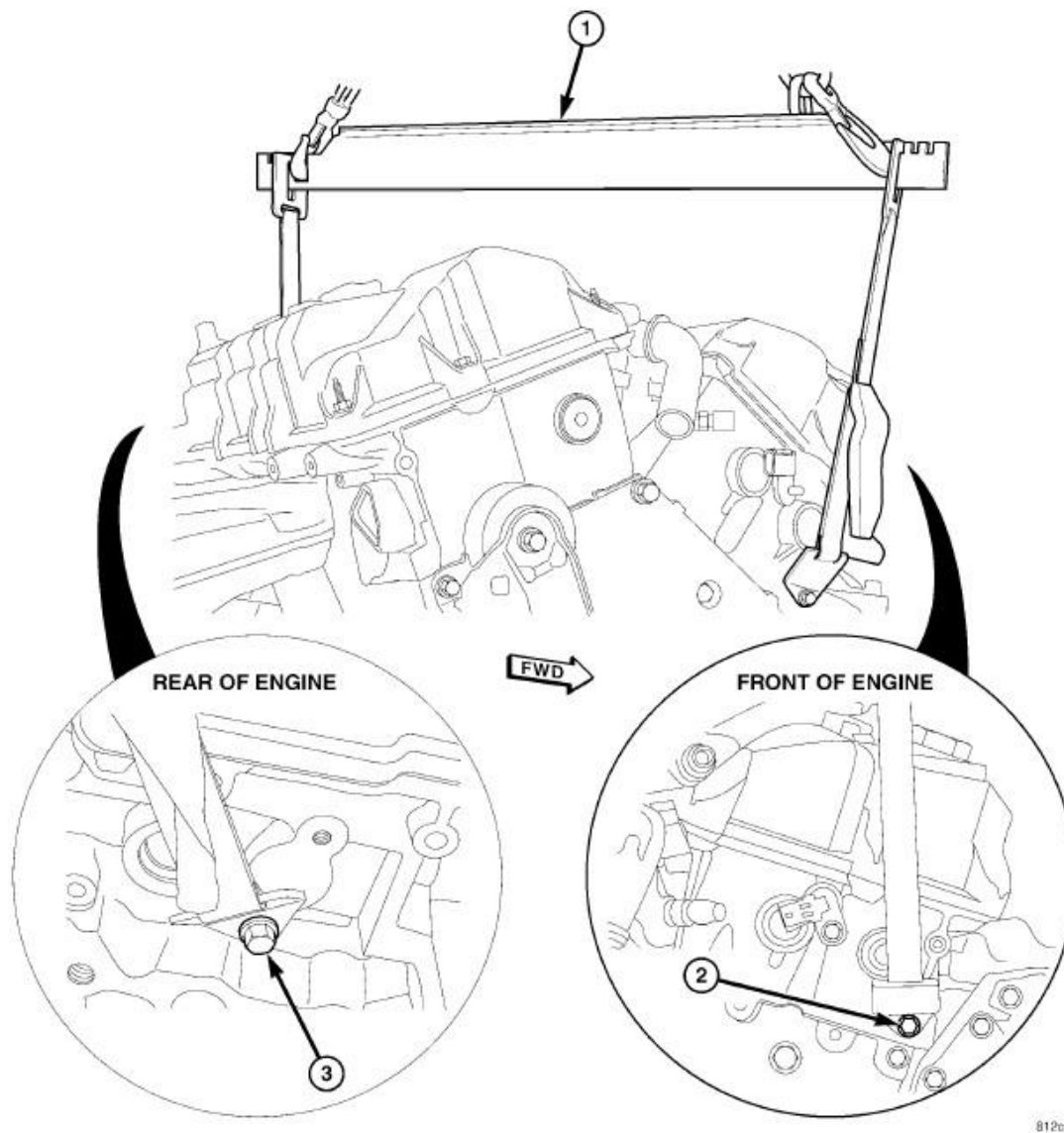


Fig. 20: Engine Lifting Bracket 8342A
Courtesy of CHRYSLER LLC

44. Attach Engine Lifting Bracket 8342A (1) to the left (2) and right (3) cylinder head.
45. Support transmission with a block of wood and floor jack.
46. Hoist engine from engine compartment.

INSTALLATION

INSTALLATION

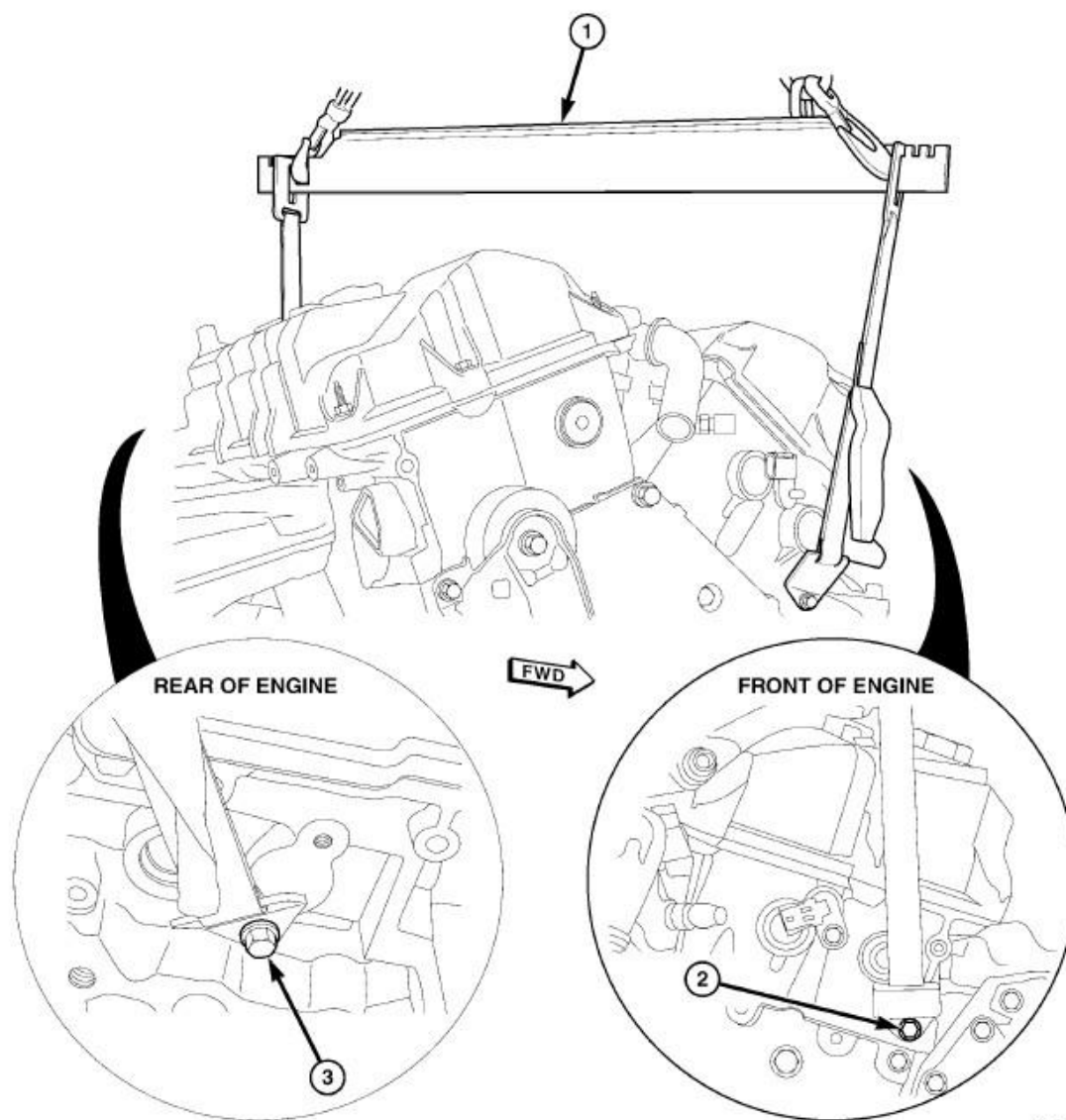


Fig. 21: Engine Lifting Bracket 8342A
Courtesy of CHRYSLER LLC

1. Attach Engine Lifting Bracket 8342A (1) to the left (2) and right (3) cylinder head.
2. Lower engine into engine compartment.
3. Remove Engine Lifting Bracket 8342A.

CAUTION: Do not tighten the transmission case to engine block bolts until all bolts have been hand started, and the two mating surfaces are completely joined together, as damage to cylinder block or transmission could occur.

4. Install bell housing to cylinder block bolts and tighten to 68 N.m (50 ft. lbs.).
5. Install EGR valve and tube assembly. Refer to Emissions Control/Exhaust Gas Recirculation/VALVE.

Exhaust Gas Recirculation (EGR) - Installation .

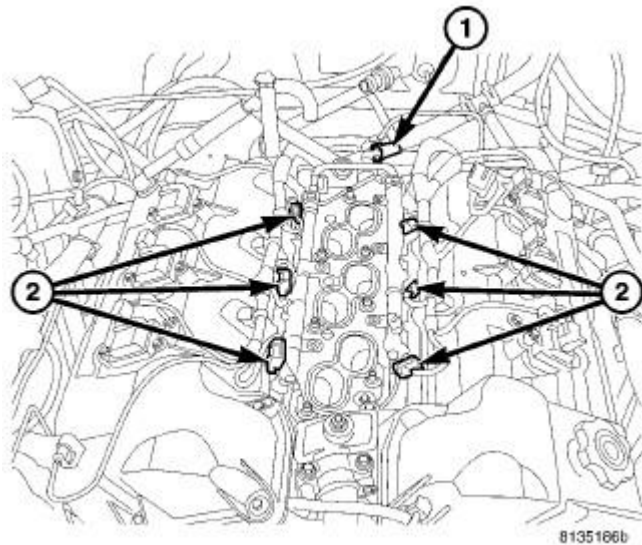


Fig. 22: Fuel Feed Line & Injector Connectors
Courtesy of CHRYSLER LLC

6. Connect coil, injector (2), capacitor and knock sensor connectors.
7. Connect the fuel line (1).
8. Install upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Installation.**

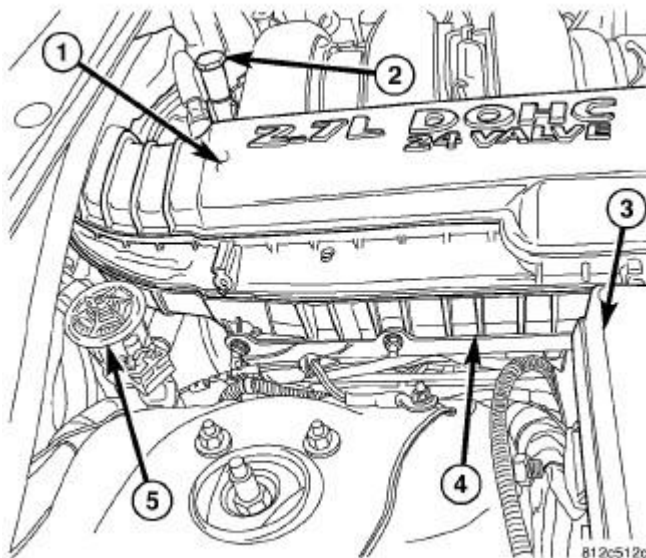


Fig. 23: Locating Purge Solenoid
Courtesy of CHRYSLER LLC

9. Install purge solenoid (5).

10. Connect all ground straps.
11. Connect all vacuum lines and electrical connectors.

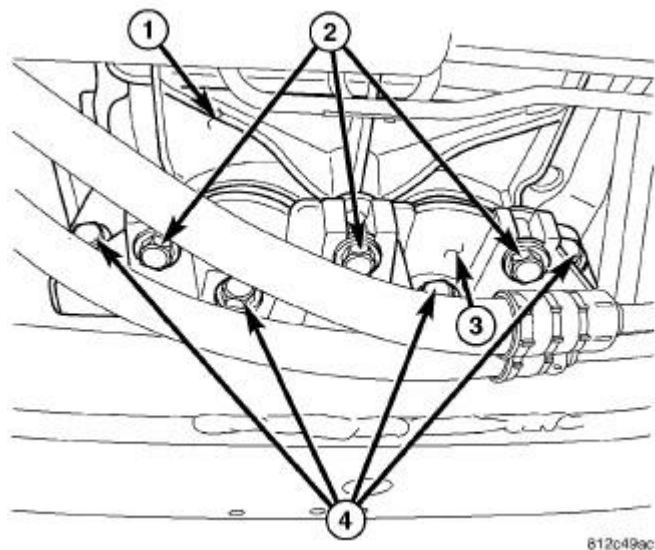


Fig. 24: Removing/Installing Structural Collar Bolts At Oil Pan & Transmission Bell Housing
Courtesy of CHRYSLER LLC

12. Raise and support vehicle.
13. Align flexplate and torque converter.

NOTE: Make sure all four bolts are installed finger tight before torquing bolts.

14. Tighten torque converter bolts to 75 N.m (55 ft. lbs.).
15. Using a block of wood and a suitable lifting device under the oil pan, raise the engine.
16. Install the structural collar (3) and position in place.

NOTE: Make sure that structural collar (3) is flush with the oil pan (1) and the transmission bell housing.

17. Finger tighten all bolts (2 and 4).
18. Tighten the structural collar to oil pan bolts (2) to 55 N.m (40 ft. lbs.).
19. Tighten structural collar to transmission bolts (4) to 55 N.m (40 ft. lbs.).

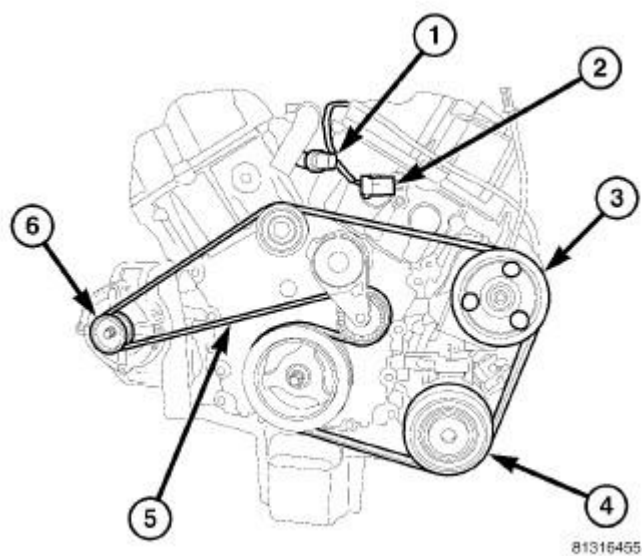


Fig. 25: Accessory Drive Belt
Courtesy of CHRYSLER LLC

20. Install the power steering pump (3).
21. Install the A/C compressor (4). Refer to **Heating and Air Conditioning/Plumbing/COMPRESSOR, A/C - Installation**.

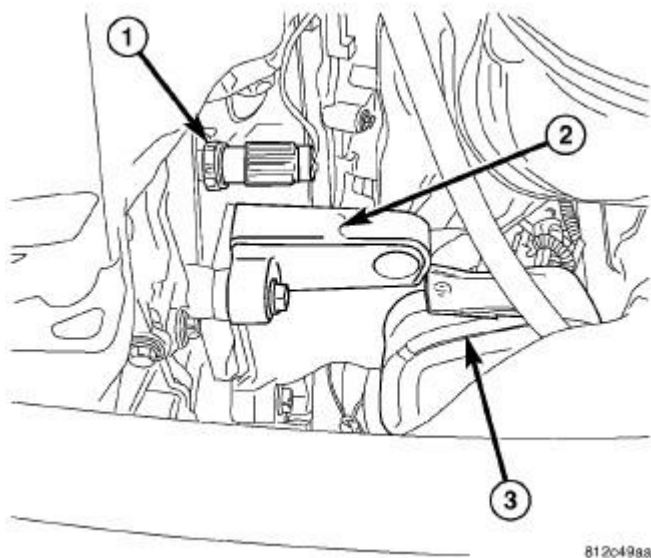


Fig. 26: Oil Pressure Sensor Connector
Courtesy of CHRYSLER LLC

22. Install the crankshaft position sensor and connect electrical connector. Refer to **Fuel System/Fuel Injection/SENSOR, Crankshaft Position - Installation**.
23. Connect oil pressure sensor (1) electrical connector.

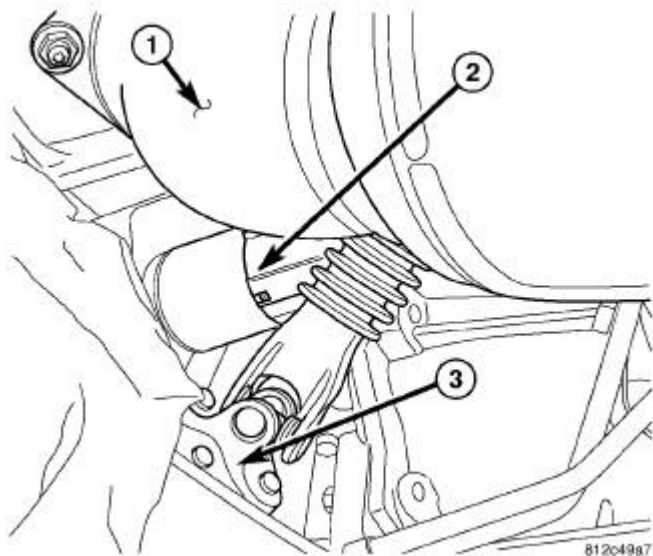


Fig. 27: Steering Shaft
Courtesy of CHRYSLER LLC

24. Install starter (2), tighten bolts to 41 N.m (30 ft. lbs.)
25. Connect electrical connectors at starter.

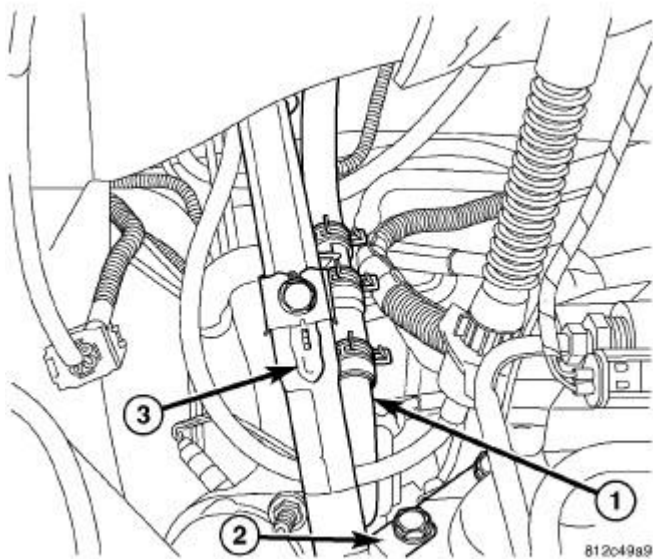


Fig. 28: Coolant Pipe
Courtesy of CHRYSLER LLC

26. Connect the coolant pipe (1) to coolant hose.
27. Connect the exhaust pipes to the manifolds.
28. Connect the down stream oxygen sensor connectors.
29. Connect A/C compressor electrical connectors.

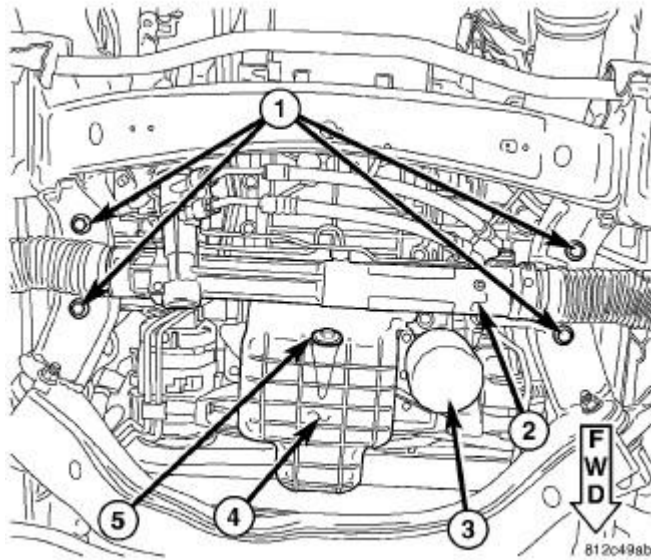


Fig. 29: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

30. Install new oil filter (3).

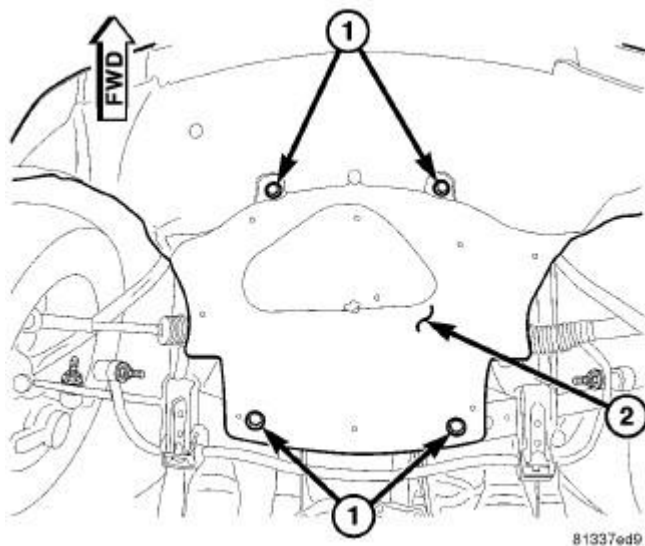


Fig. 30: Lower Splash Shield
Courtesy of CHRYSLER LLC

31. Install lower splash shield (2) and tighten retaining bolts (1).
32. Lower vehicle.

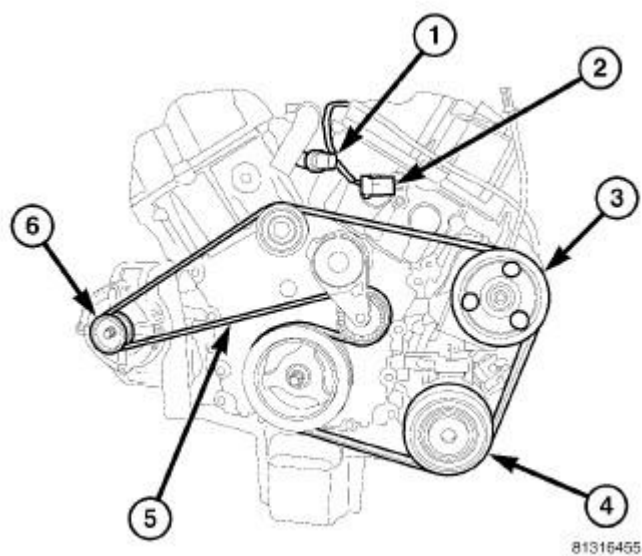


Fig. 31: Accessory Drive Belt
Courtesy of CHRYSLER LLC

33. Install power steering pump (3). Refer to **Steering/Pump - Installation** .
34. Connect lines to power steering pump (3).
35. Install accessory drive belt (5). Refer to **Cooling/Accessory Drive/BELT, Serpentine - Installation** .

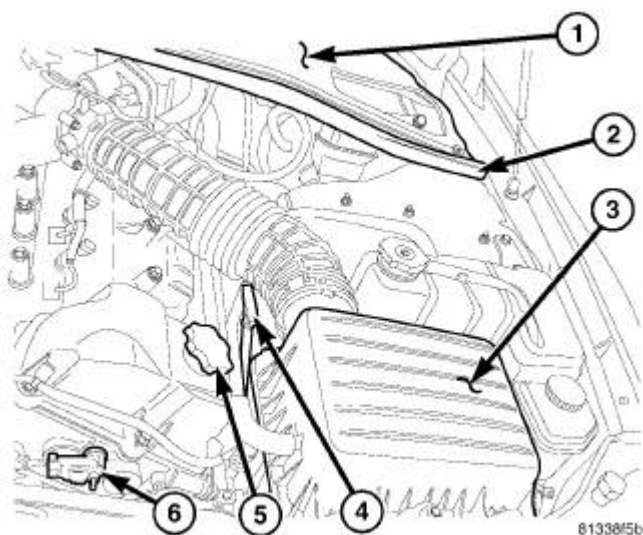


Fig. 32: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

36. Install air cleaner housing assembly (3). See **Engine/Air Intake System/BODY, Air Cleaner - Installation**.
37. Connect intake air temperature sensor connector.

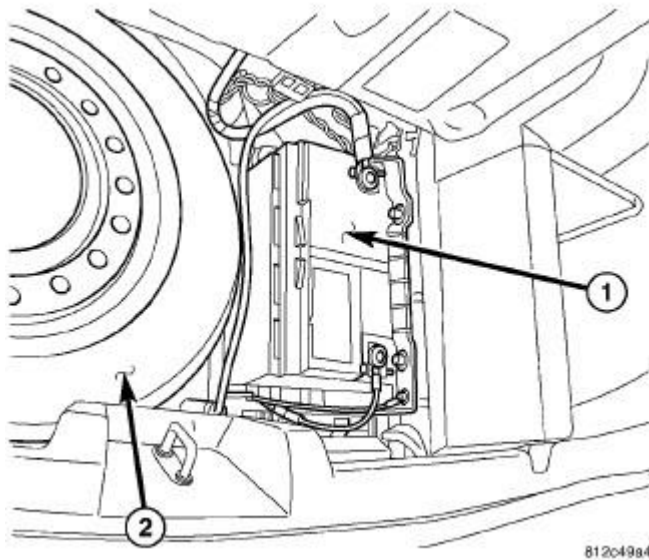


Fig. 33: Locating Battery
Courtesy of CHRYSLER LLC

38. Connect negative battery cable (1).

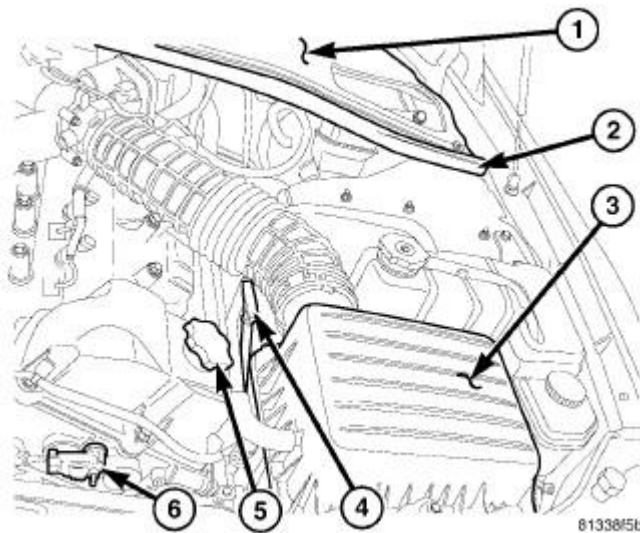


Fig. 34: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

39. Fill coolant system. Refer to **Cooling - Standard Procedure**.
40. Fill engine with correct grade of oil (5).
41. Install strut tower support (2).
42. Install cowl screen (1) and wiper arms. Refer to **Electrical/Wipers/Washers/LINKAGE, Wiper Arm - Installation**.

43. Install the hood.

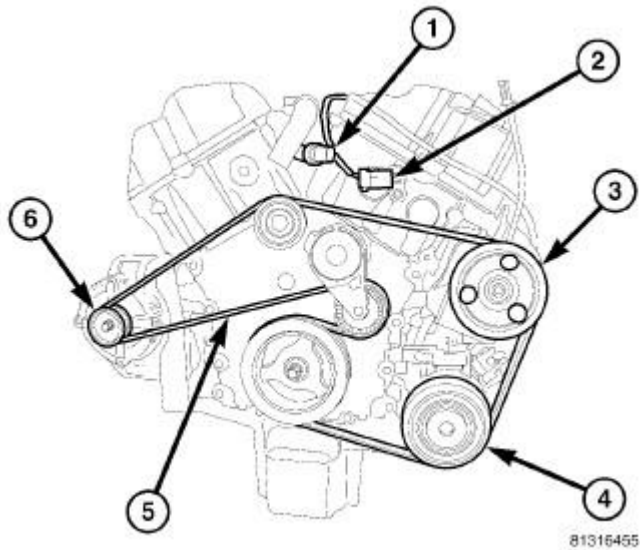


Fig. 35: Accessory Drive Belt
Courtesy of CHRYSLER LLC

44. Fill and bleed power steering system.
45. Evacuate and charge A/C system. Refer to **Heating and Air Conditioning/Plumbing - Standard Procedure**.
46. Start engine and check for leaks.

NOTE: The Cam/Crank Variation Relearn procedure must be performed anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. Refer to **DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure**.

SPECIFICATIONS

2.7L ENGINE

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION	
Type	60° DOHC V6 24-Valve	
Compression Ratio	9.67:1	
Lead Cylinder	#1 Right Bank	
Firing Order	1-2-3-4-5-6	
-	Metric	Standard
Displacement	2.7 Liters	167 Cubic Inches

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Bore AND Stroke	86.0 x 78.5 mm	3.386 in. x 3.091 in.
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CYLINDER BLOCK

Description	Specification	
	Metric	Standard
Cylinder Bore Diameter	86.0 mm ± 0.0076	3.3859 in. ± 0.0003
Out of Round (Max.)	0.076 mm	0.003 in.
Taper (Max.)	0.051 mm	0.002 in.

PISTONS

Description	Specification	
	Metric	Standard
Material	Aluminum Alloy	
Piston Diameter	85.983 mm ± 0.019	3.3851 in. ± 0.0017
Clearance at Size Location	- 0.0096 to +0.0436 mm	- 0.0003 to +0.0016 in.
Piston Weight	316-326 grams	11.1466-11.4994 oz.
Piston Ring Groove Diameter-No. 1	77.8-78 mm	3.063-3.070 in.
Piston Ring Groove Diameter-No. 2	75.9-76.1 mm	2.988-2.996 in.
Piston Ring Groove Diameter-No. 3	76.5-76.7 mm	3.011-3.019 in.

PISTON PINS

Description	Specification	
	Metric	Standard
Type	Full Floating	
Pin Diameter	21.997-22.000 mm	0.8661-0.8662 in.
Clearance in Piston	0.005-0.013 mm	0.0002-0.0005 in.
Clearance in Rod	0.007-0.018 mm	0.0003-0.0008 in.

PISTON RINGS

Description	Specification	
	Metric	Standard
Ring Gap-Top Compression Ring	0.20-0.36 mm	0.008-0.014 in.
Ring Gap-2nd Compression Ring	0.37-0.63 mm	0.0146-0.0249 in.
Ring Gap-Oil Control (Steel Rails)	0.25-0.76 mm	0.010-0.030 in.

PISTON RING SIDE CLEARANCE

Description	Specification	
	Metric	Standard
Compression Ring-Top	0.035-0.083 mm	0.0013-0.0032 in.

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Compression Ring-Second	0.040-0.080 mm	0.0016-0.0031 in.
Oil Ring (Steel Rails)	0.058-0.204 mm	0.0022-0.0080 in.

PISTON RING WIDTH

Description	Specification	
	Metric	Standard
Compression Rings-Top and Second	1.47-1.49 mm	0.0579-0.0587 in.
Oil Ring (Steel Rails)	0.445-0.470 mm	0.0176-0.0186 in.

CONNECTING RODS

Description	Specification	
	Metric	Standard
Side Clearance	0.13-0.38 mm	0.0052-0.015 in.
Side Clearance (Max.)	0.4318 mm	0.017 in.
Piston Pin Bore Diameter	22.007-22.015 mm	0.8665-0.8668 in.
Bearing Bore Out of Round (Max.)	0.004 mm	0.0002 in.
Total Weight (Less Bearing)	529.9 $\pm$ 7 grams	18.6917 $\pm$ 0.247 oz.

CRANKSHAFT MAIN BEARING JOURNALS

Description	Specification	
	Metric	Standard
Diameter	63.49-63.51 mm	2.4997-2.5004 in.
Bearing Clearance	0.032-0.056 mm	0.0012-0.0022 in.
Bearing Clearance (Max) (Wear Limit)	0.070 mm	0.0028 in.
Out of Round (Max)	0.008 mm	0.0003 in.
Diametrical Taper (Max)	0.010 mm	0.0004 in.
End Play	0.048-0.260 mm	0.002-0.010 in.
End Play (Max)	0.37 mm	0.015 in.

CONNECTING ROD JOURNALS

Description	Specification	
	Metric	Standard
Diameter	53.51-53.49 mm	2.1067-2.106 in.
Bearing Clearance	0.030-0.065 mm	0.0012-0.0026 in.
Bearing Clearance (Wear Limit)	0.075 mm	0.0030 in.
Out of Round (Max)	0.008 mm	0.0003 in.
Diametrical Taper (Max)	0.010 mm	0.0004 in.

CAMSHAFT

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Description	Specification	
	Metric	Standard
-		
Bore Diameter	24.050-24.071 mm	0.9469-0.09476 in.
Bearing Journal Diameter	24.000-23.981 mm	0.9449-0.9441 in.
Bearing Clearance	0.05-0.09 mm	0.0020-0.0035 in.
Bearing Clearance (Max.)	0.10 mm	0.004 in.
End Play	0.13-0.28 mm	0.0051-0.0110 in.

VALVE TIMING-INTAKE VALVES

Description	Specification
Opens (ATDC)	2°
Closes (ABDC)	44°
Duration	222°

VALVE TIMING-EXHAUST VALVES

Description	Specification
Opens (BBDC)	36°
Closes (ATDC)	4°
Duration	220°
Valve Overlap	2°

CYLINDER HEAD

Description	Specification	
	metric	Standard
Gasket Thickness (Compressed)	1.50 mm ±0.05	0.0591 in. ±0.002 in.
Valve Seat Angle	45°-45.5°	
Valve Seat Runout (Max.)	0.05 mm	0.002 in.
Intake Valve Seat Width	1.00-1.5 mm	0.0394-0.0591 in.
Exhaust Valve Seat Width	1.25-1.75 mm	0.0492-0.0689 in.
Guide Bore Diameter (Std.)	5.975-6.00 mm	0.2353-0.2363 in.
Valve Guide Height*- Intake AND Exhaust	13.25-13.75 mm	0.5217-0.5414 in.
*Measured from cylinder head surface to top of guide		

VALVES

Description	Specification	
	Metric	Standard
Face Angle	44.5°-45.5°	
Head Diameter-Intake	33.67-33.93	1.3256-1.3358 in.
Head Diameter-Exhaust	27.67-27.93 mm	1.0894-1.1000 in.
Length-Intake (Overall)	107.89-108.39 mm	4.2476-4.2673 in.
Length-Exhaust (Overall)	105.88-106.38 mm	4.1685-4.1882 in.

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Stem Diameter-Intake	5.934-5.952 mm	0.2337-0.2344 in.
Stem Diameter-Exhaust	5.906-5.924 mm	0.2326-0.2333 in.
Stem-to-Guide Clearance-Intake (New)	0.023-0.066 mm	0.0009-0.0026 in.
Stem-to-Guide Clearance-Exhaust (New)	0.051-0.094 mm	0.002-0.0037 in.
Stem-to-Guide Clearance-Intake (Max., Rocking Method)	0.29 mm	0.0114 in.
Stem-to-Guide Clearance-Exhaust (Max., Rocking Method)	0.370 mm	0.0146 in.
Valve Lift-Intake (Zero Lash)	9.0 mm	0.3543 in.
Valve Lift-Exhaust (Zero Lash)	8.0 mm	0.3150 in.
Valve Stem Tip Height-Intake	47.125 ±0.711 mm	1.8550 ±0.028 in.
Valve Stem Tip Height-Exhaust	47.187 ±0.65 mm	1.858 ±0.026 in.

VALVE SPRING

Description	Specification	
	Metric	Standard
-		
Free Length-Intake AND Exhaust (Approx.)	45.63 mm	1.7965 in.
Spring Force-Intake AND Exhaust (Valve Closed)	249-284 N @ 38.0 mm	56.0-64.0 lbs. @ 1.4961 in.
Spring Force-Intake (Valve Open)	658-721 N @ 29.0 mm	147.9-162.1 lbs. @ 1.1417 in.
Spring Force-Exhaust (Valve Open)	614-671 N @ 30.0 mm	138.0-150.8 lbs. @ 1.1811 in.
Number of Coils-Intake AND Exhaust	7.35	
Wire Diameter-Intake AND Exhaust	3.861 mm	0.1520 in.
Installed Height-Intake AND Exhaust (Spring seat to bottom of retainer)	38.0 mm	1.4961 in.

OIL PUMP

Description	Specification	
	Metric	Standard
-		
Clearance Over Rotors (Max.)	0.077 mm	0.003 in.
Cover-Out-of-Flat (Max.)	0.025 mm	0.001 in.
Inner AND Outer Rotor Thickness	9.955-9.980 mm	0.3919-0.3929 in.
Outer Rotor Clearance (Max.)	0.39 mm	0.015 in.
Outer Rotor Diameter (Min.)	89.175 mm	3.5109 in.
Tip Clearance Between Rotors (Max.)	0.20 mm	0.008 in.

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2010 ENGINE 2.7L DOHC - Service Information - 300 & Charger

OIL PRESSURE

Description	Specification	
	Metric	Standard
(NOTE: At Normal Operating Temperatures)		
Pressure @ Curb Idle Speed*	34.7 kPa Min.	5 psi Min.
Pressure @ 3000 RPM	300-724 kPa	45-105 psi
*CAUTION: If oil pressure is zero at idle, DO NOT run engine at 3000 RPM.		

TORQUE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
A/C Compressor to Engine - Bolts	28	21	-
Camshaft Sprocket - Bolts	28	-	250
Camshaft Chain Tensioner (Secondary) - Bolts	12	-	105
Camshaft Bearing Cap - Bolts	12	-	105
Connecting Rod Cap - Bolts	27 +1/4 Turn	20 +1/4 Turn	-
Cooling System Bleed Screw	12	-	110
Crankshaft Main Bearing Cap - Tie Bolts	28	-	250
Crankshaft Main Bearing Cap - Outer Cap Bolts	27 +1/4 Turn	20 +1/4 Turn	-
Crankshaft Main Bearing Cap - Inner Cap Bolts	20 +1/4 Turn	15 +1/4 Turn	-
Crankshaft Damper - Bolt	170	125	-
Crankshaft Rear Seal Retainer - Bolts	12	-	105
Cylinder Head - Bolts	See <u>Engine/Cylinder Head - Installation</u>		
Cylinder Head Cover - Bolts	12	-	105
Exhaust Manifold - Bolts	23	-	200
Exhaust Manifold Heat Shield - Bolts	12	-	105
Engine Mount Bracket to Block - Bolts	61	45	-
Engine Mount Isolator - Nuts	61	45	-
Intake Manifold (Upper and Lower) - Bolts	12	-	105
Generator Bracket-Bolts	41	30	-
Oil Pan - m8 Bolts	28	-	250
Oil Pan - m6 Nuts	12	-	105
Oil Pan Drain - Plug	27	20	-
Oil Cooler - Stud	61	45	-
Oil Filter	16	12	-
Oil Pump to Block - Bolts	28	-	250
Oil Pump Cover - Bolts	12	-	105
Oil Pump Pick Up Tube - Bolt	28	-	250
PCV Valve	7	-	60
Spark Plugs	20	15	-
Starter Mounting - Bolts	41	30	-

2010 Chrysler 300 C

2010 ENGINE 2.7L DOHC - Service Information - 300 & Charger

Structural Collar	See <u>Engine/Engine Block/COVER, Structural</u> <u>Dust - Installation</u>		
Thermostat Housing/Water Inlet Connector - Bolts	12	-	105
Throttle Body - Bolts	12	-	105
Timing Chain Cover - M6 Bolts	12	-	105
Timing Chain Cover - M10 Bolts	54	40	-
Timing Chain Tensioner (Primary)	12	-	105
Timing Chain Guide Access Plug	20	15	-
Torque Converter	75	55	-
Water Pump - Bolts	12	-	105
Water Outlet Housing - Bolts	12	-	105

SPECIAL TOOLS

2.7L ENGINE

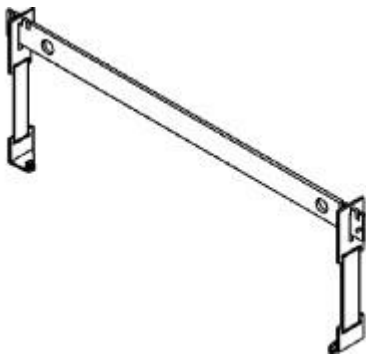


Fig. 36: BRACKET, ENGINE LIFTING - 8342A
Courtesy of CHRYSLER LLC

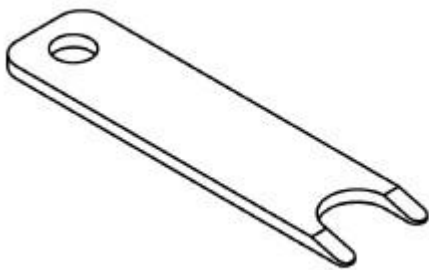
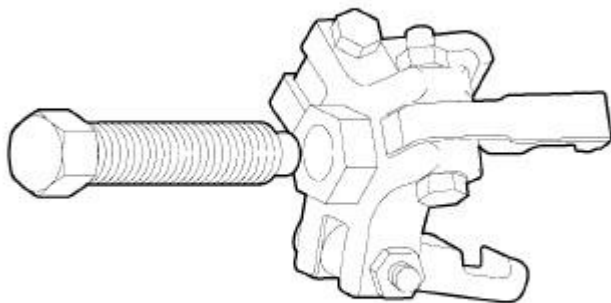


Fig. 37: TOOL, CLUTCH LINE DISCONNECT - 6638A
Courtesy of CHRYSLER LLC



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Fig. 38: HOLDING FIXTURE, DAMPER - 9365
Courtesy of CHRYSLER LLC



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Fig. 39: 3-JAW PULLER - 8454
Courtesy of CHRYSLER LLC

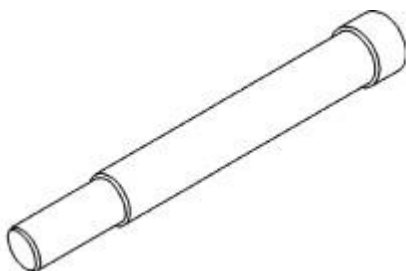


Fig. 40: INSERT, CRANKSHAFT - 8194

Courtesy of CHRYSLER LLC

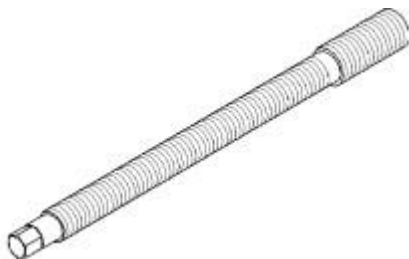


Fig. 41: SCREW, FORCING - 8179

Courtesy of CHRYSLER LLC

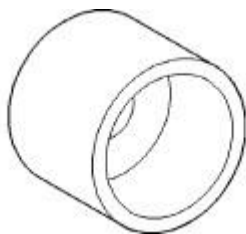
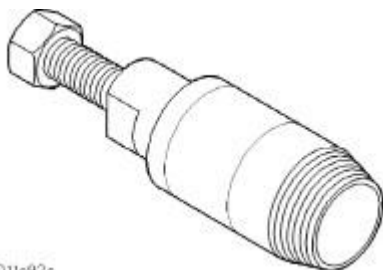


Fig. 42: INSTALLER, CRANK SPROCKET - 6792

Courtesy of CHRYSLER LLC



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Fig. 43: REMOVER, SEAL - 6771

Courtesy of CHRYSLER LLC

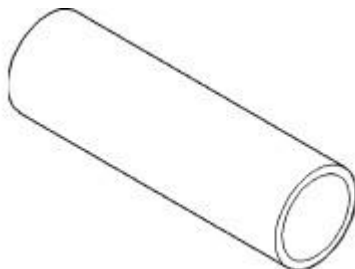


Fig. 44: INSTALLER, CRANKSHAFT SEAL - 6780

Courtesy of CHRYSLER LLC

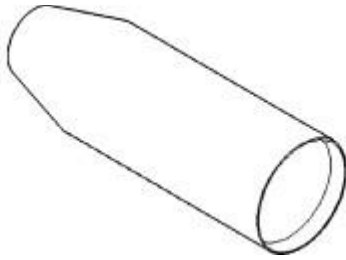


Fig. 45: INSTALLER, CRANKSHAFT SEAL - 6780

Courtesy of CHRYSLER LLC



Fig. 46: PULLER, BEARING - 5048

Courtesy of CHRYSLER LLC

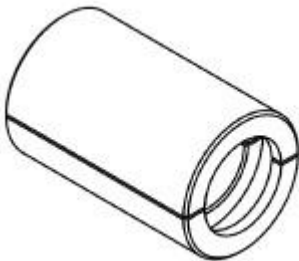


Fig. 47: REMOVER, SPROCKET - 8539

Courtesy of CHRYSLER LLC

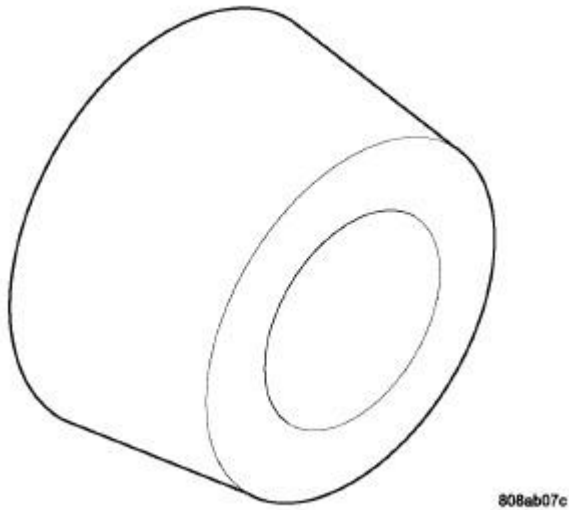


Fig. 48: INSTALLER, SEAL - 6926
Courtesy of CHRYSLER LLC

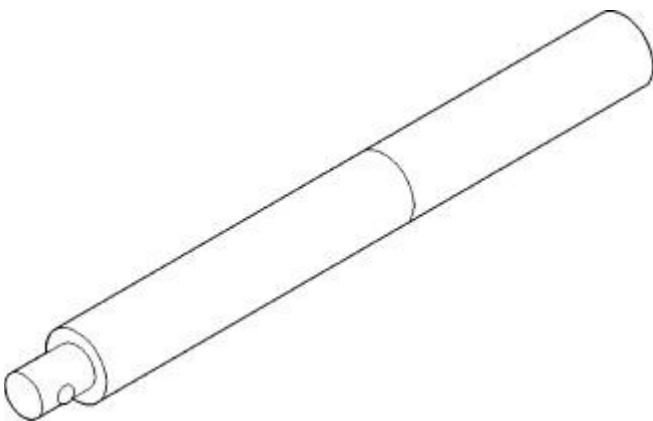


Fig. 49: DRIVER HANDLE, UNIVERSAL - C-4171
Courtesy of CHRYSLER LLC

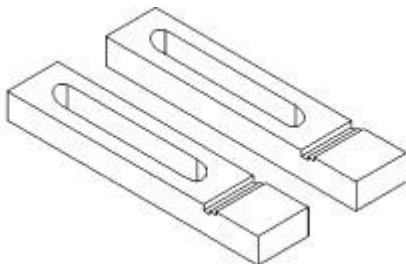


Fig. 50: ALIGNMENT FIXTURE - 8225
Courtesy of CHRYSLER LLC

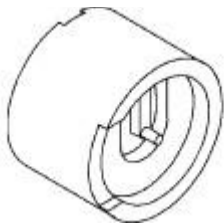


Fig. 51: GAUGE, CHAIN TENSIONER - 8186

Courtesy of CHRYSLER LLC

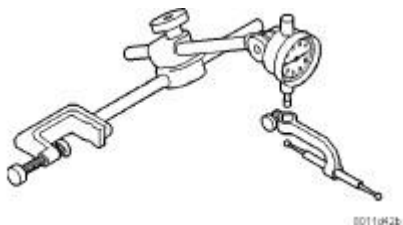


Fig. 52: SET, DIAL INDICATOR - C-3339A

Courtesy of CHRYSLER LLC

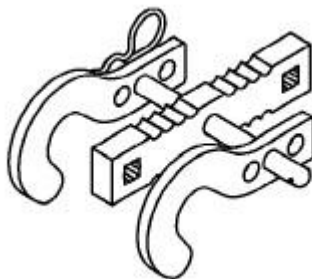


Fig. 53: COMPRESSOR, VALVE SPRING - 8215A

Courtesy of CHRYSLER LLC

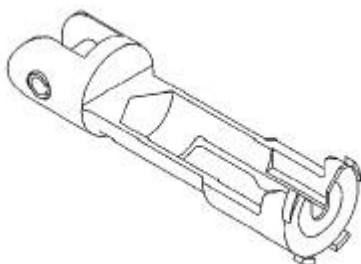


Fig. 54: VALVE SPRING ADAPTER - 8216A

Courtesy of CHRYSLER LLC



Fig. 55: COMPRESSOR, VALVE SPRING - C-3422-D

Courtesy of CHRYSLER LLC

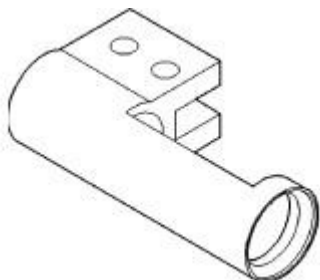


Fig. 56: ADAPTER, VALVE SPRING - 6526A

Courtesy of CHRYSLER LLC

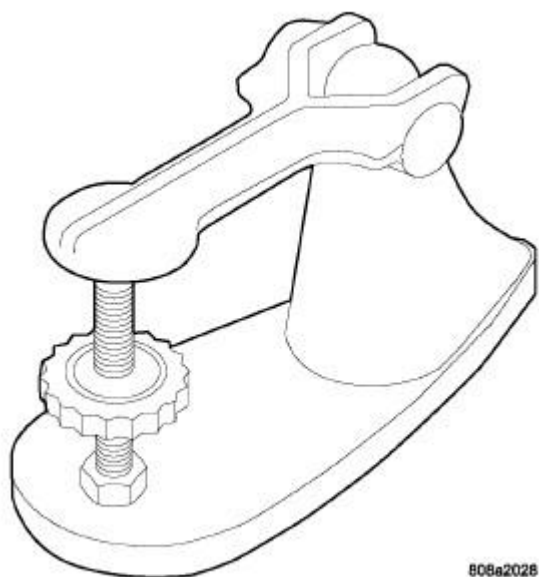


Fig. 57: Valve Spring Tester C-647

Courtesy of CHRYSLER LLC

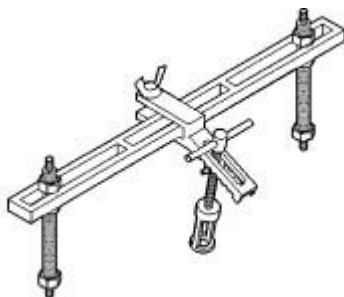


Fig. 58: COMPRESSOR, VALVE SPRING - MD998772A

Courtesy of CHRYSLER LLC

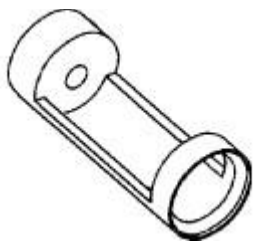
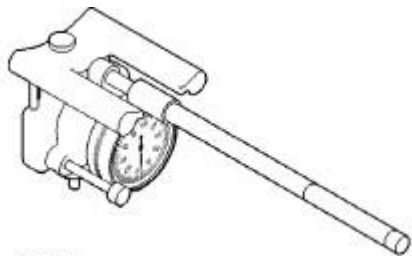


Fig. 59: ADAPTER - 6527

Courtesy of CHRYSLER LLC



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Fig. 60: CYLINDER INDICATOR - C-119

Courtesy of CHRYSLER LLC

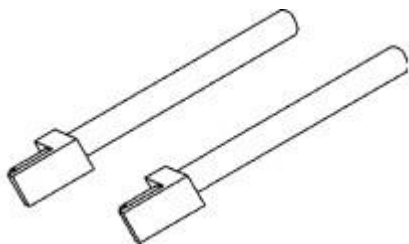


Fig. 61: GUIDE PINS - 8189

Courtesy of CHRYSLER LLC

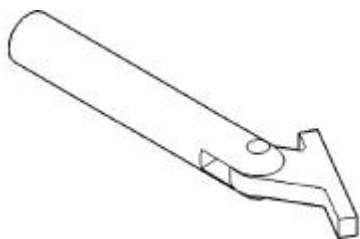


Fig. 62: v - C-3059A

Courtesy of CHRYSLER LLC

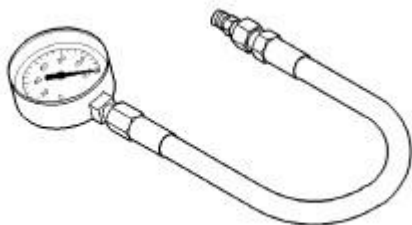


Fig. 63: GAUGE, PRESSURE - C-3292A

Courtesy of CHRYSLER LLC



Fig. 64: ADAPTER, OIL PRESSURE - 8406

Courtesy of CHRYSLER LLC



Fig. 65: DRB III ESSENTIAL KIT - CH6010A

Courtesy of CHRYSLER LLC

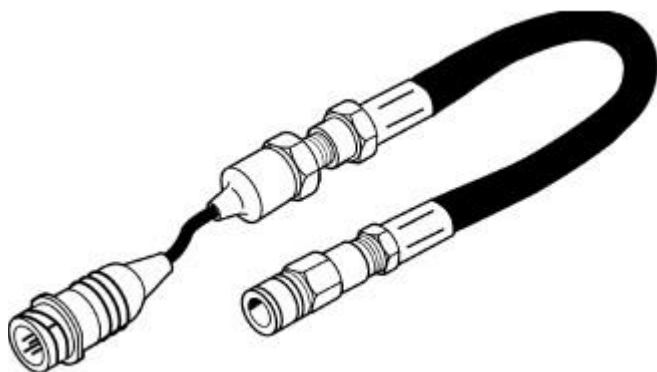


Fig. 66: PRESSURE TRANSDUCER, RPL, - CH7059

Courtesy of CHRYSLER LLC

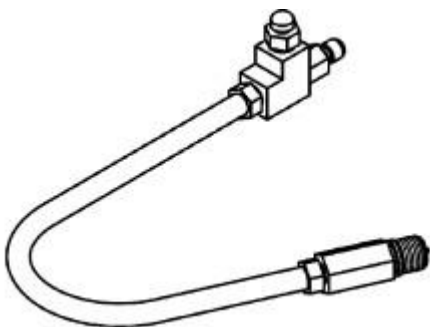


Fig. 67: ADAPTER, PRESSURE PEP - 8116

Courtesy of CHRYSLER LLC

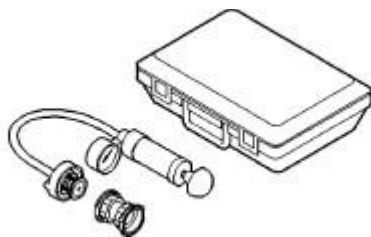


Fig. 68: TESTER, COOLING SYSTEM - 7700-A
Courtesy of CHRYSLER LLC

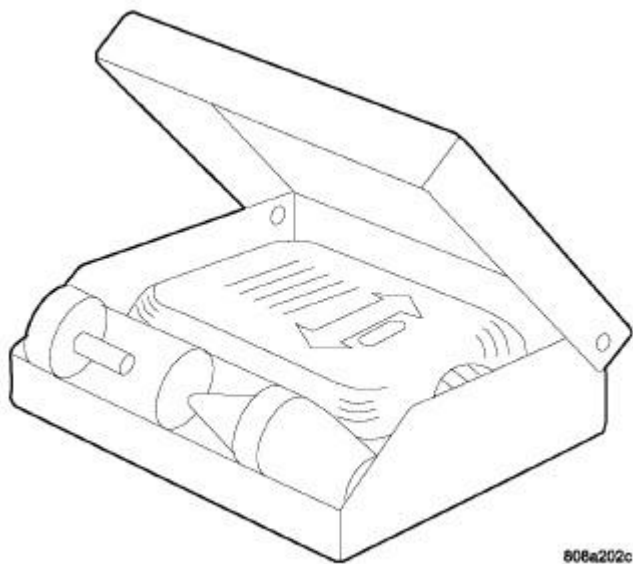


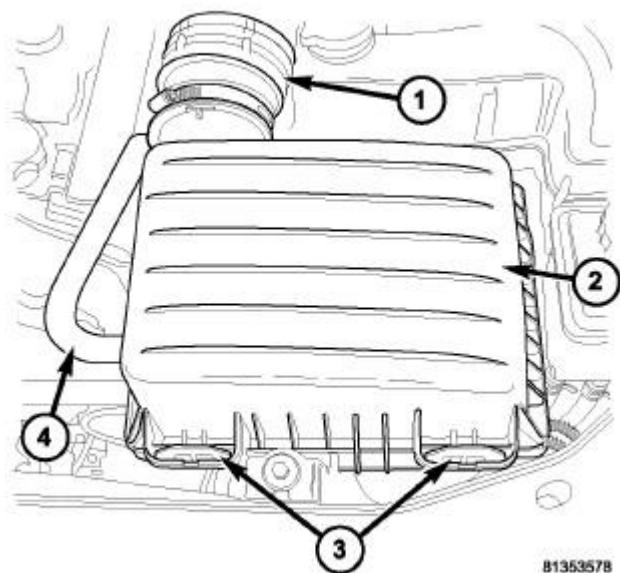
Fig. 69: BLOC-CHEK-KIT - C-3685-A
Courtesy of CHRYSLER LLC

AIR INTAKE SYSTEM

AIR CLEANER

Removal

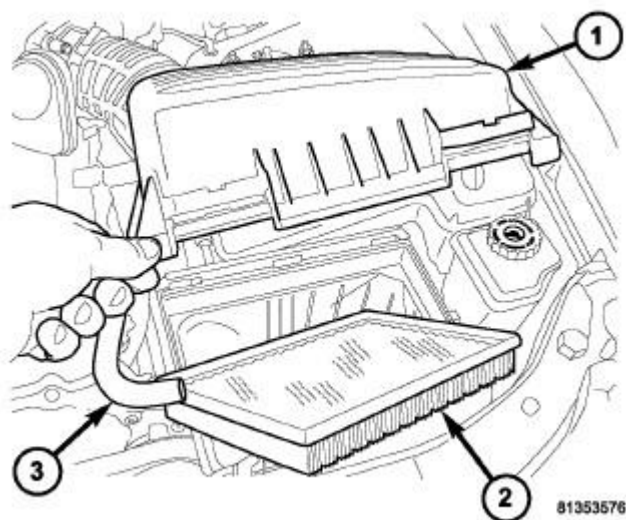
REMOVAL

**Fig. 70: AIR CLEANER HOUSING**

Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - AIR INLET DUCT TO THROTTLE BODY
2 - AIR CLEANER HOUSING COVER
3 - LOCKING TABS
4 - CCV HOSE |
|--|

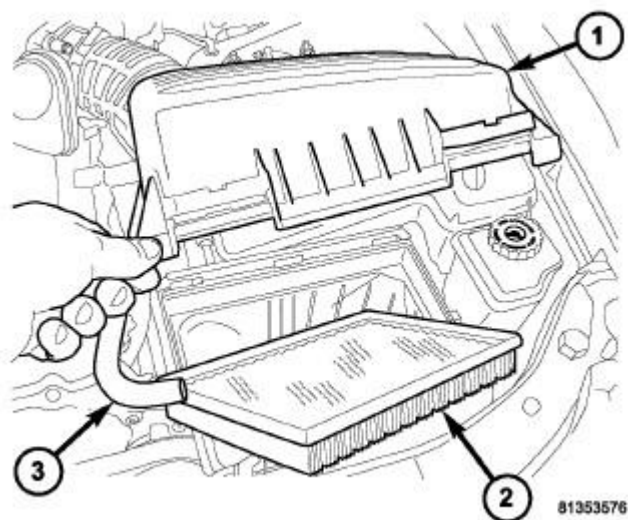
1. Disconnect the CCV hose (4) at the housing cover (2) .
2. Release the housing cover tabs (3).

**Fig. 71: AIR CLEANER ELEMENT****Courtesy of CHRYSLER LLC**

- | |
|--|
| 1 - AIR CLEANER COVER
2 - ELEMENT
3 - CCV HOSE |
|--|

3. Lift the cover (1) and pull toward the front of the vehicle to release the rear cover to housing alignment tabs .
4. Remove the element (2).
5. Remove any dirt or debris from the bottom of the air filter housing. Cover the air inlet to the throttle body, or do not use compressed air. Otherwise, dirt or foreign objects can enter the intake manifold.

Installation**INSTALLATION**

**Fig. 72: AIR CLEANER ELEMENT****Courtesy of CHRYSLER LLC****1 - AIR CLEANER COVER****2 - ELEMENT****3 - CCV HOSE**

1. Install the air filter element (2) into air box .
2. Position the cover (1) so that the rear locking tabs insert into the lower housing.
3. Seat cover (1) onto element housing and assure that the front locking tabs engage.
4. Reconnect the CCV hose (3).

BODY, AIR CLEANER**Removal****REMOVAL**

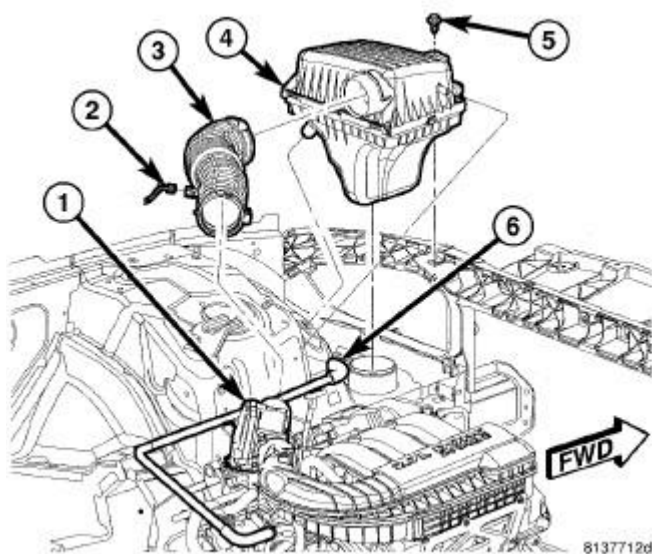


Fig. 73: AIR FILTER ASSEMBLY

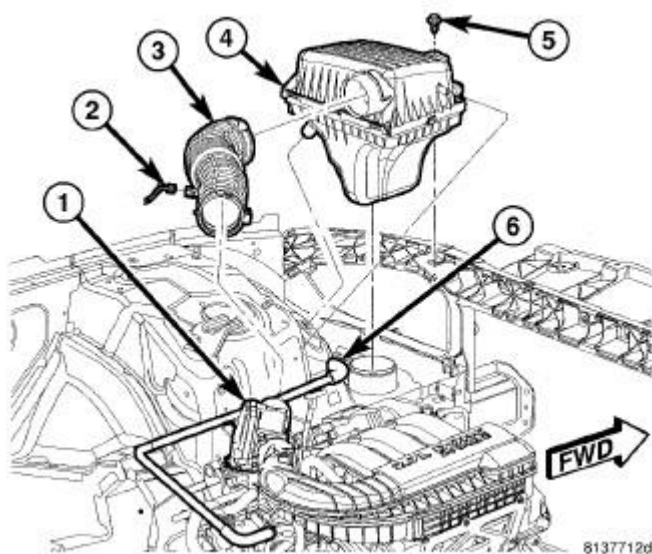
Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - THROTTLE BODY
2 - CHARGE AIR TEMPERATURE SENSOR ELECTRICAL CONNECTOR
3 - CLEAN AIR DUCT
4 - AIR FILTER HOUSING ASSEMBLY
5 - BOLT
6 - VENT TUBE |
|---|

1. Disconnect negative battery cable.
2. Disconnect the charge air temperature sensor electrical connector (2).
3. Disconnect the clean air duct between throttle body and air filter housing (3).
4. Disconnect the makeup air (MUA) tube.
5. Remove mounting bolt (5).
6. Remove air filter housing (4).
7. Raise vehicle.
8. Partially remove front fascia to gain access to air filter resonator. Refer to **Frame and Bumpers/Bumpers/FASCIA, Front - Removal** .
9. Remove mounting bolt.
10. Remove air cleaner resonator.

Installation

INSTALLATION

**Fig. 74: AIR FILTER ASSEMBLY**

Courtesy of CHRYSLER LLC

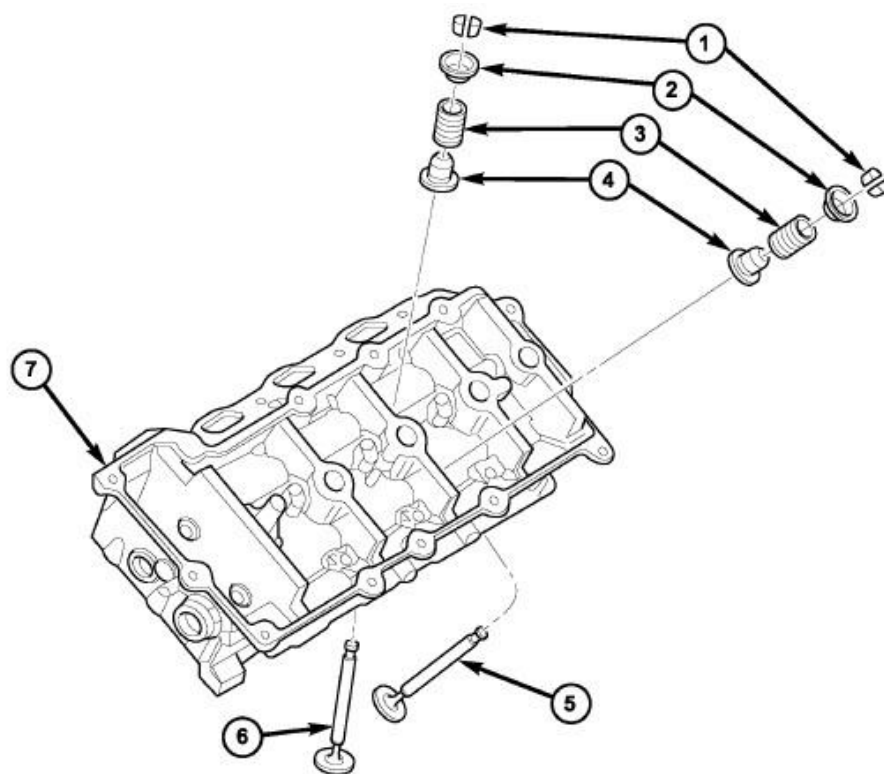
- | |
|---|
| 1 - THROTTLE BODY
2 - CHARGE AIR TEMPERATURE SENSOR ELECTRICAL CONNECTOR
3 - CLEAN AIR DUCT
4 - AIR FILTER HOUSING ASSEMBLY
5 - BOLT
6 - VENT TUBE |
|---|

1. Position air cleaner resonator assembly in vehicle.
2. Install mounting bolt. Tighten bolt to 8 Nm (71 in. lbs).
3. Install front fascia. Refer to **Frame and Bumpers/Bumpers/FASCIA, Front - Installation** .
4. Position air filter assembly (4) in vehicle.
5. Install mounting bolt (5). Tighten to 5 Nm (44 in. lbs.).
6. Install makeup air (MUA) tube.
7. Install clean air duct (3) between air filter housing (4) and throttle body.
8. Tighten all clamps to 4 Nm (35 in. lbs).

CYLINDER HEAD

DESCRIPTION

DESCRIPTION



812d7dc5

Fig. 75: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

The cylinder heads (7) are made of an aluminum alloy. The cylinder head features four valves (5 and 6) per cylinder with pressed in powdered metal valve guides. The cylinder heads provide enclosures for the timing chain drive, necessitating a unique right and left cylinder head.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET

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 Test. See **CYLINDER COMPRESSION PRESSURE TEST**. 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.

STANDARD PROCEDURE**STANDARD PROCEDURE - Cylinder Head Oil Gallery Cup Plug Service**

NOTE: Determine which cup plug is leaking before performing this procedure. If necessary, perform an engine oil leak dye test.

Each cylinder head on a 2.7L engine has 6 external oil gallery cup plugs. It is not necessary to remove the original cup plug to install a new cup plug. The cup plug bore is deep enough to allow for two plugs. If it becomes necessary to service an oil gallery cup plug, perform the Repair Procedure.

NOTE: Inspect the cup plug bore in question for the presence of two cup plugs. If the cup plug flange is just inside (1-2 mm) the chamfered edge of the bore two cup plugs are already in place and the cylinder head cannot be repaired.

Repair Procedure

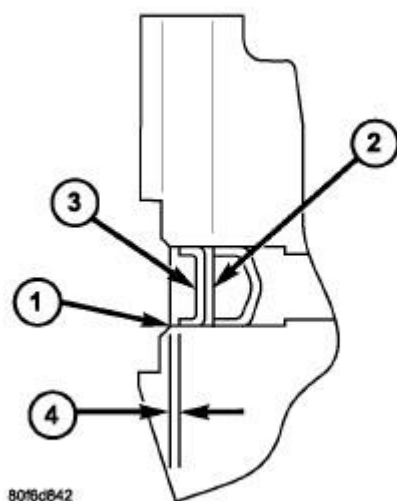


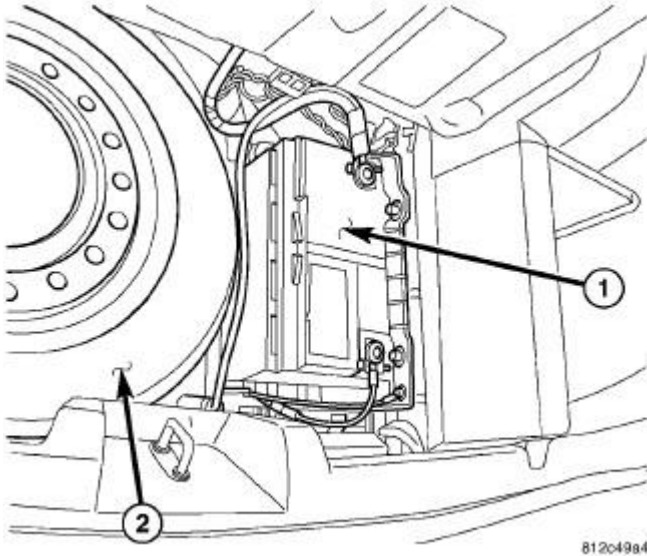
Fig. 76: Oil Gallery Cup Plug
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - CUP PLUG BORE CHAMFER
2 - ORIGINAL CUP PLUG
3 - NEW CUP PLUG
4 - 1-2 mm |
|--|

1. Remove component(s) necessary to gain access to the oil gallery cup plug requiring service.

NOTE: Some of the oil gallery cup plugs are serviceable with the head installed on the engine and the engine in the vehicle, while others require removing the affected cylinder head from the engine. In either case only replace the cup plug requiring service.

2. Clean the cup plug bore with brake cleaner and compressed air. It is not necessary to remove the existing cup plug.
3. Lightly coat the new cup plug with sealer; p/n 04318083.
4. Using an appropriate installation tool drive the new cup plug into the bore until the flanged edge of the plug is just inside (1-2 mm) the chamfered edge of the bore.
5. Allow the sealant to cure for at least 20 minutes.
6. Assemble any components removed in step #1 as necessary.

REMOVAL**REMOVAL****Fig. 77: Locating Battery**

Courtesy of CHRYSLER LLC

1. Perform fuel pressure release procedure **before attempting any repairs** . Refer to **Fuel System/Fuel Delivery - Standard Procedure** .
2. Disconnect and isolate the negative battery cable.
3. Raise and support vehicle on a hoist. Refer to **Vehicle Quick Reference/Hoisting - Standard Procedure** .
4. Drain cooling system. Refer to **Cooling - Standard Procedure** .

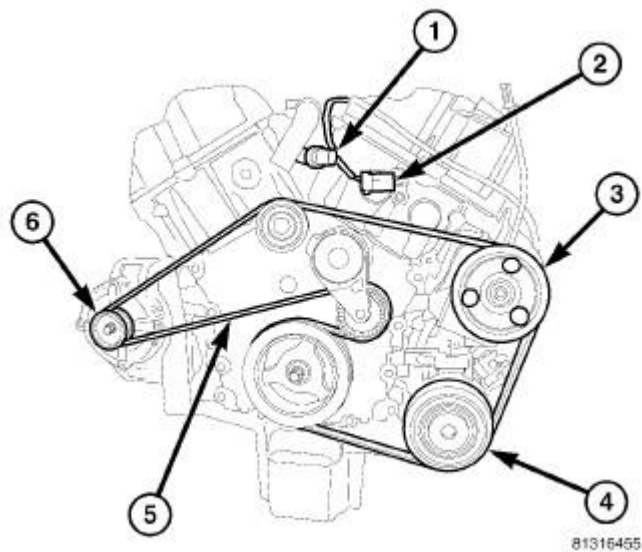


Fig. 78: Accessory Drive Belt
Courtesy of CHRYSLER LLC

5. Remove accessory drive belt (5). Refer to Cooling/Accessory Drive/BELT, Serpentine - Removal.
6. Remove the vibration damper. See Engine/Engine Block/DAMPER, Vibration - Removal.
7. Disconnect camshaft position sensor (2) and coolant temperature sensor (1) connectors.
8. Remove upper intake manifold. See Engine/Manifolds/MANIFOLD, Intake - Removal.

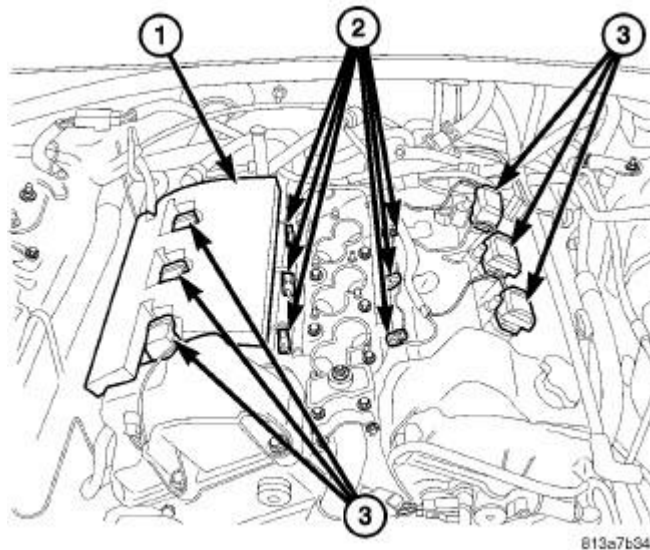


Fig. 79: Locating Coils & Injector Connectors
Courtesy of CHRYSLER LLC

9. Disconnect coils (3), injector connectors (2) and capacitors.
10. Reposition harness out of the way.

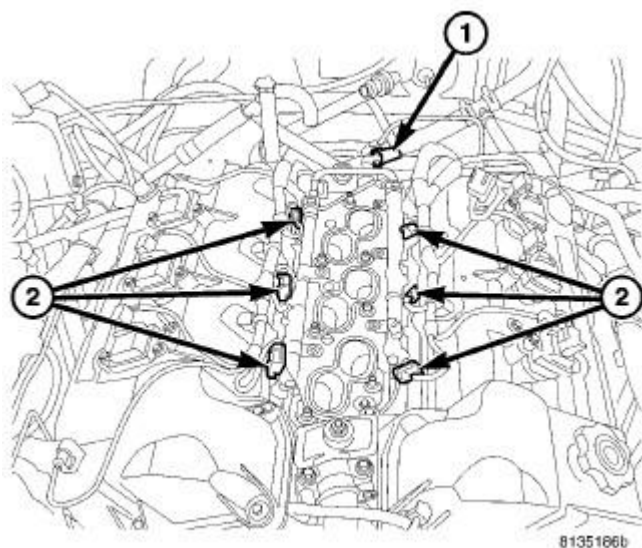


Fig. 80: Fuel Feed Line & Injector Connectors
Courtesy of CHRYSLER LLC

11. Disconnect fuel feed line (1). Refer to **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
12. Remove lower intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Removal**.
13. Remove cylinder head covers. See **Engine/Cylinder Head/COVER(S), Cylinder Head - Removal**.

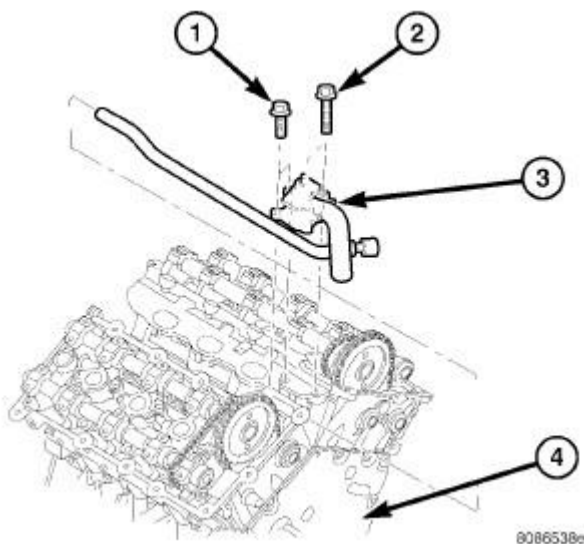


Fig. 81: WATER OUTLET CONNECTOR
Courtesy of CHRYSLER LLC

14. Remove coolant outlet (3). Refer to **Cooling/Engine/HOUSING, Coolant Outlet - Removal**.
15. Remove timing chain cover (4). See **Engine/Valve Timing/COVER(S), Engine Timing - Removal**.

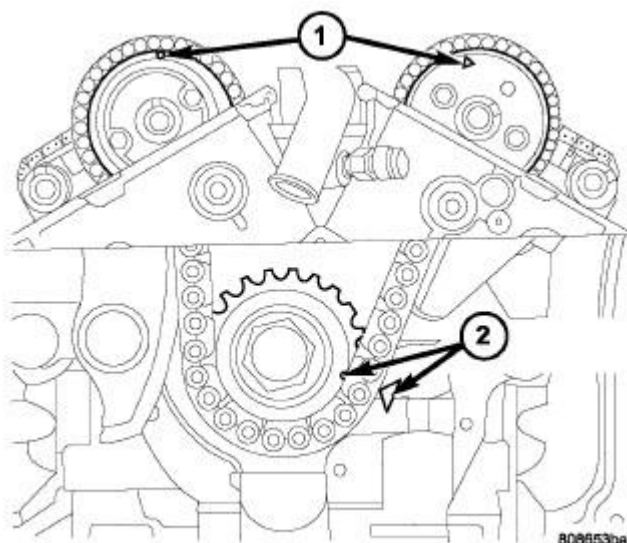
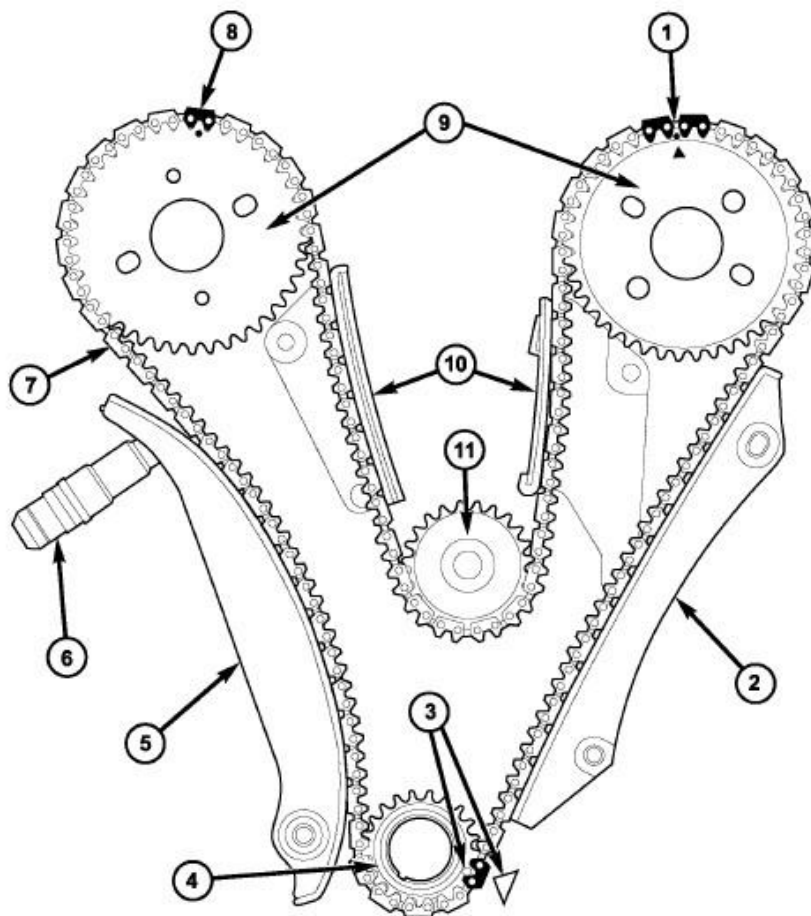


Fig. 82: TIMING MARK ALIGNMENT
Courtesy of CHRYSLER LLC

16. Rotate crankshaft until crankshaft sprocket timing mark aligns with timing mark on oil pump housing (2).



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Fig. 83: TIMING CHAIN ALIGNMENT MARKS - PRIMARY

Courtesy of CHRYSLER LLC

17. Remove primary timing chain (7). See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal**.
18. Remove upper primary timing chain guides (10).

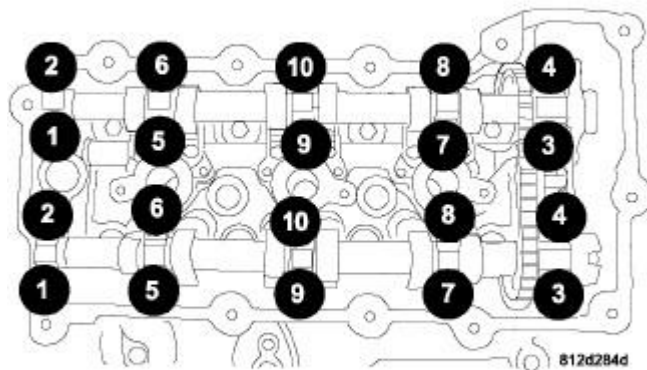


Fig. 84: Cam Bearing Cap Removal Sequence

Courtesy of CHRYSLER LLC

19. Remove camshaft bearing caps **gradually** in the sequence shown in illustration.

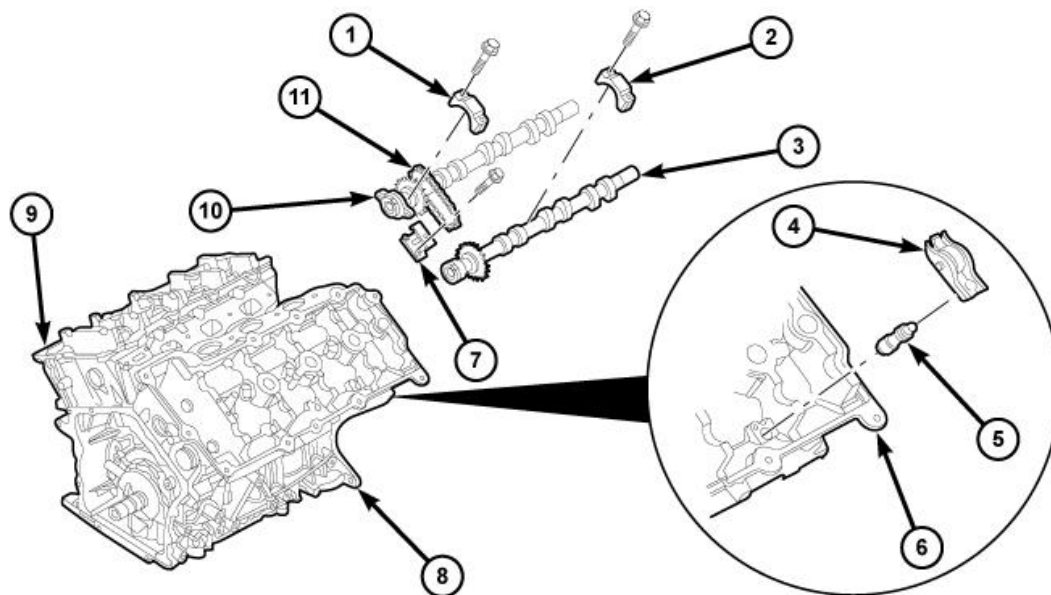


Fig. 85: Camshaft & Valvetrain Components

Courtesy of CHRYSLER LLC

20. Remove camshafts (3) and (10) and valvetrain components from cylinder head. Note component locations for re-installation in original locations.
21. For left cylinder head removal:
 - Reposition A/C compressor. Refer to Heating and Air Conditioning/Plumbing/COMPRESSOR, A/C - Removal.
 - Reposition power steering pump. Refer to Steering/Pump - Removal.
 - Remove fastener securing engine oil dipstick tube to cylinder head and remove engine oil dipstick tube
 - Remove power steering pump bracket
 - Remove left exhaust manifold. See Engine/Manifolds/MANIFOLD, Exhaust - Removal.
22. For right cylinder head removal:
 - Remove cylinder head ground strap
 - Reposition generator. Refer to Electrical/Charging/GENERATOR - Removal.
 - Disconnect EGR valve electrical connector and remove EGR valve from head. Refer to Emissions Control/Exhaust Gas Recirculation/VALVE, Exhaust Gas Recirculation (EGR) - Removal.
 - Remove right exhaust manifold. See Engine/Manifolds/MANIFOLD, Exhaust - Removal.

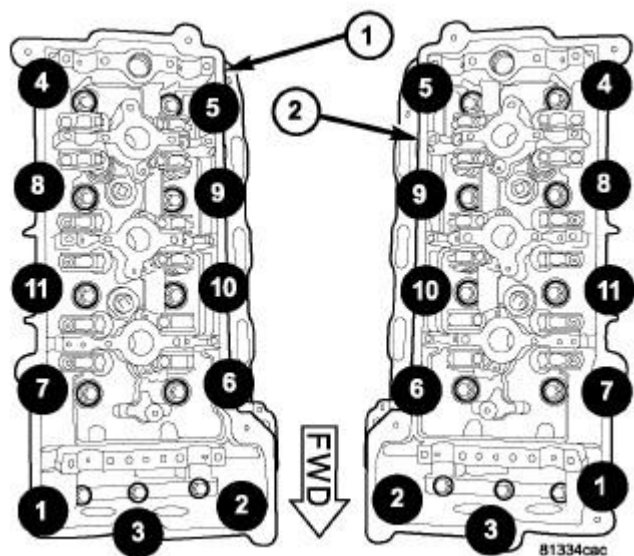


Fig. 86: Cylinder Head Bolt Removal Sequence
Courtesy of CHRYSLER LLC

CAUTION: Ensure cylinder head bolts 1-3 are removed before attempting the removal of cylinder head, as damage to cylinder head and/or block may occur.

23. Remove cylinder left head bolts (2) and right head bolts (1) in sequence shown in illustration.
24. Remove cylinder head(s).
25. Remove and discard cylinder head gasket.

26. Clean cylinder head and block sealing surfaces. See Engine/Cylinder Head - Cleaning.

CLEANING

CLEANING

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

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

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

Clean all engine oil passages.

INSPECTION

INSPECTION

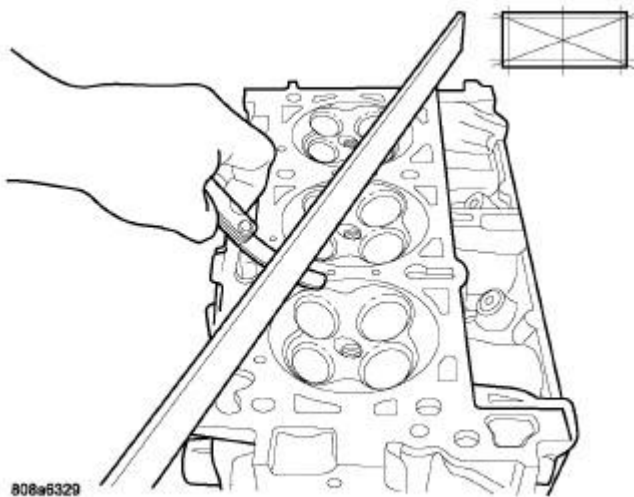


Fig. 87: Checking Cylinder Head Flatness-Typical
Courtesy of CHRYSLER LLC

1. Before cleaning, check for leaks, damage and cracks.
2. Clean cylinder head and oil passages. See Engine/Cylinder Head - Cleaning.
3. Check cylinder head for flatness .
4. Cylinder head must be flat within:

CAUTION: 0.20 mm (0.008 in.) MAX is a combined total dimension of the stock

removal limit from cylinder head and block top surface (Deck) together.

- Standard dimension = less than 0.05 mm (0.002 inch.)
- Service Limit = 0.2 mm (0.008 inch.)
- Grinding Limit = Maximum of 0.2 mm (0.008 inch.) is permitted.

INSTALLATION

INSTALLATION

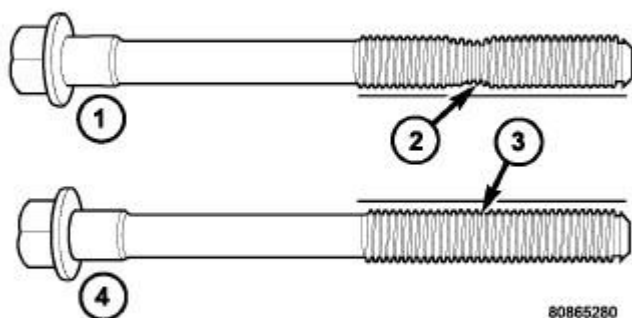


Fig. 88: Checking Cylinder Head Bolts for Stretching (Necking)
Courtesy of CHRYSLER LLC

NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced

Necking can be checked by holding a straight edge against the threads (3). If all the threads do not contact the scale (2), the bolt must be replaced.

CAUTION: When cleaning cylinder head and cylinder block surfaces, **DO NOT** use a metal scraper because the surfaces could be cut or ground. Use **ONLY** a wooden or plastic scraper.

1. Clean sealing surfaces of cylinder head and block. See Engine - Standard Procedure.
2. Install new head gasket over locating dowels.
3. Install cylinder head to block, assuring head is properly positioned over locating dowels.

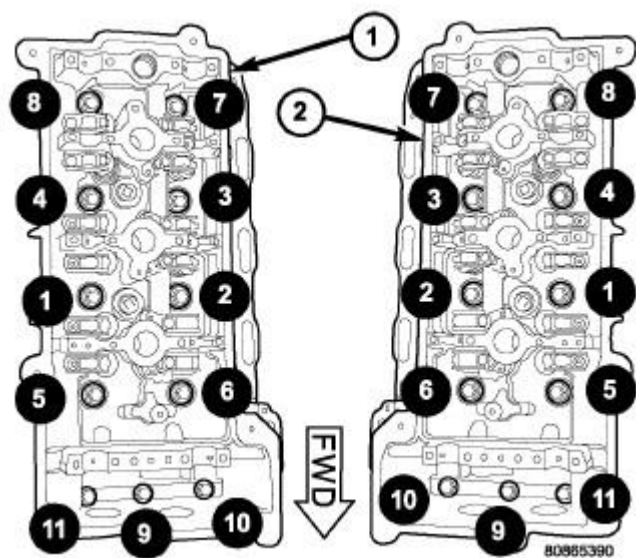


Fig. 89: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER LLC

4. Lubricate bolt threads with clean engine oil and install bolts.
5. Tighten bolts in sequence shown in illustration for left head (2) and right head (1) using the following steps and torque values:
 - Step 1: Bolts 1-8 to 48 N.m (35 ft. lbs.)
 - Step 2: Bolts 1-8 to 75 N.m (55 ft. lbs.)
 - Step 3: Bolts 1-8 to 75 N.m (55 ft. lbs.)
 - Step 4: Bolts 1-8 to +90° Turn **Do not use a torque wrench for this step.**
 - Step 5: Bolts 9-11 to 28 N.m (250 in. lbs.)
6. For left cylinder head installation:
 - Install left exhaust manifold. See **Engine/Manifolds/MANIFOLD, Exhaust - Installation.**
 - Install power steering pump bracket and tighten bolts to 28 N.m (250 in. lbs.)
 - Install engine oil dipstick tube and tighten bolt to 28 N.m (250 in. lbs.).
 - Install power steering pump. Refer to **Steering/Pump - Installation .**
 - Install A/C compressor. Refer to **Heating and Air Conditioning/Plumbing/COMPRESSOR, A/C - Installation .**
7. For right cylinder head Installation:
 - Install right exhaust manifold. See **Engine/Manifolds/MANIFOLD, Exhaust - Installation.**
 - Install EGR valve (if equipped). Refer to **Emissions Control/Exhaust Gas Recirculation/VALVE, Exhaust Gas Recirculation (EGR) - Installation .**
 - Install generator. Refer to **Electrical/Charging/GENERATOR - Installation .**
 - Install cylinder head ground strap.

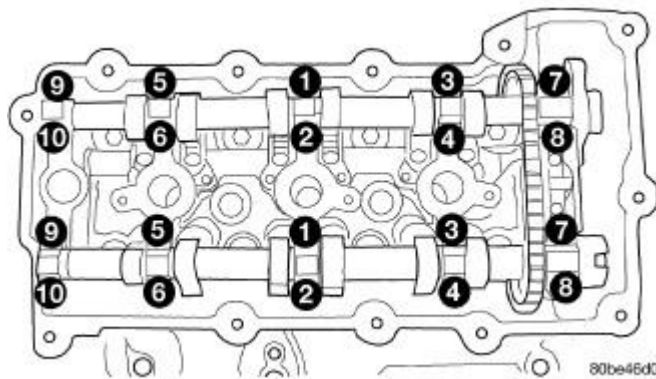


Fig. 90: Camshaft Bearing Cap Tightening Sequence
Courtesy of CHRYSLER LLC

8. Install all valvetrain components and camshafts. See **Engine/Cylinder Head/CAMSHAFT, Engine - Installation**. Tighten camshaft bearing caps in sequence shown in illustration to 12 N.m (105 in. lbs.).

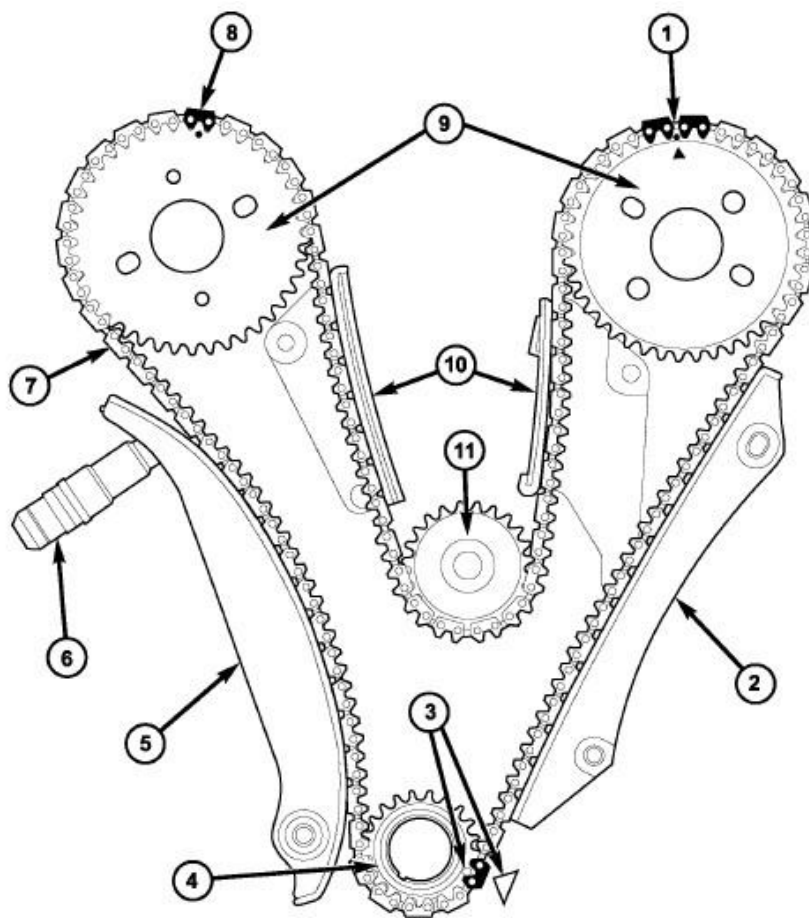


Fig. 91: TIMING CHAIN ALIGNMENT MARKS - PRIMARY
Courtesy of CHRYSLER LLC

9. Install primary timing chain (7), guides (2, 5, 10) and sprockets (9). See **Engine/Valve Timing/CHAIN**

and SPROCKETS, Timing - Installation.

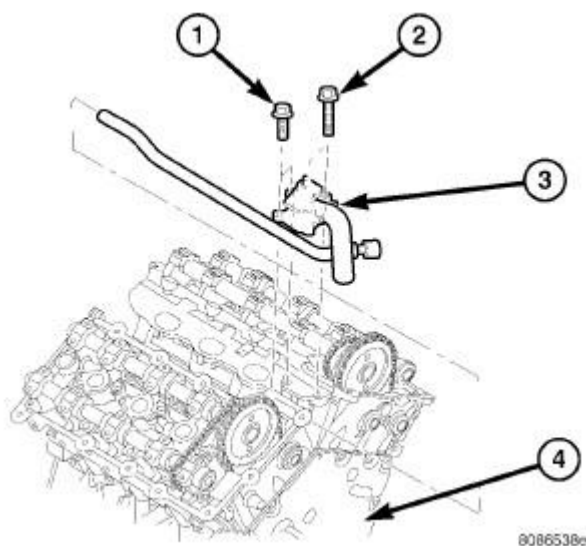


Fig. 92: WATER OUTLET CONNECTOR

Courtesy of CHRYSLER LLC

10. Install coolant outlet (3). Refer to **Cooling/Engine/HOUSING, Coolant Outlet - Installation** .

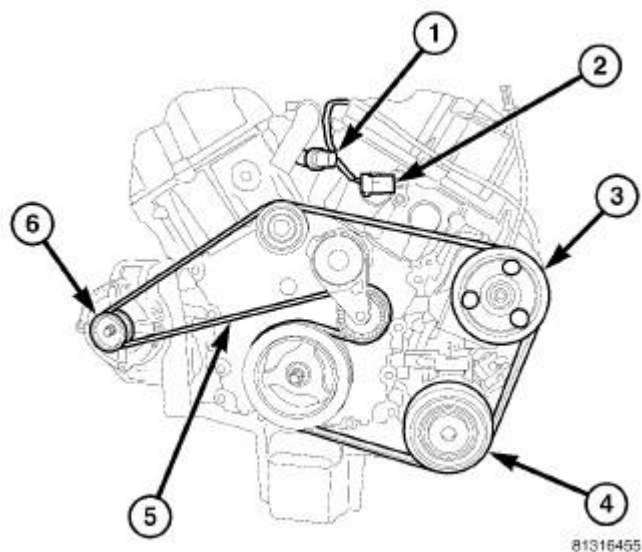


Fig. 93: Accessory Drive Belt

Courtesy of CHRYSLER LLC

11. Install lower intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Installation**.
12. Install cylinder head covers. See **Engine/Cylinder Head/COVER(S), Cylinder Head - Installation**.
13. Connect camshaft position sensor (2) and coolant temperature sensor (1) connectors.

14. Install timing chain cover. See **Engine/Valve Timing/COVER(S), Engine Timing - Installation**.
15. Install crankshaft vibration damper. See **Engine/Engine Block/DAMPER, Vibration - Installation**.
16. Install upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Installation**.

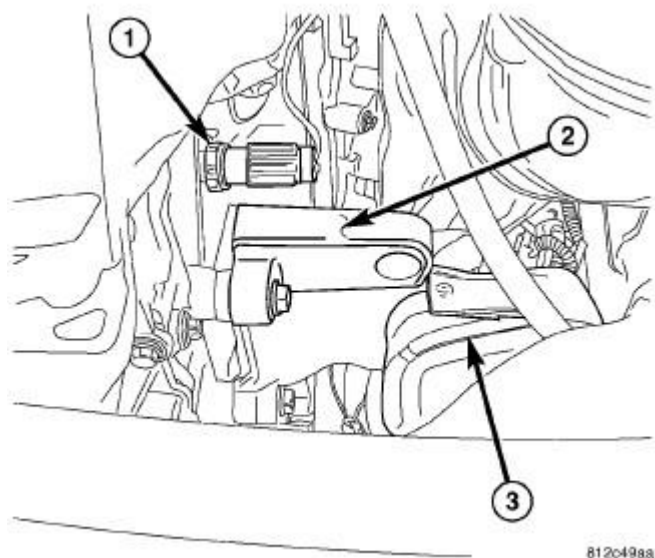


Fig. 94: Oil Pressure Sensor Connector
Courtesy of CHRYSLER LLC

17. Connect oil pressure sensor (1) connector.

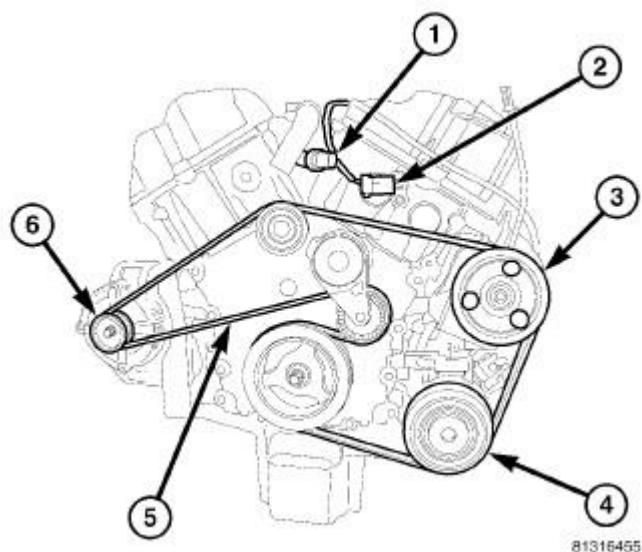


Fig. 95: Accessory Drive Belt
Courtesy of CHRYSLER LLC

18. Install accessory drive belt (5). Refer to **Cooling/Accessory Drive/BELT, Serpentine - Installation**.

19. Fill cooling system. Refer to **Cooling - Standard Procedure**.

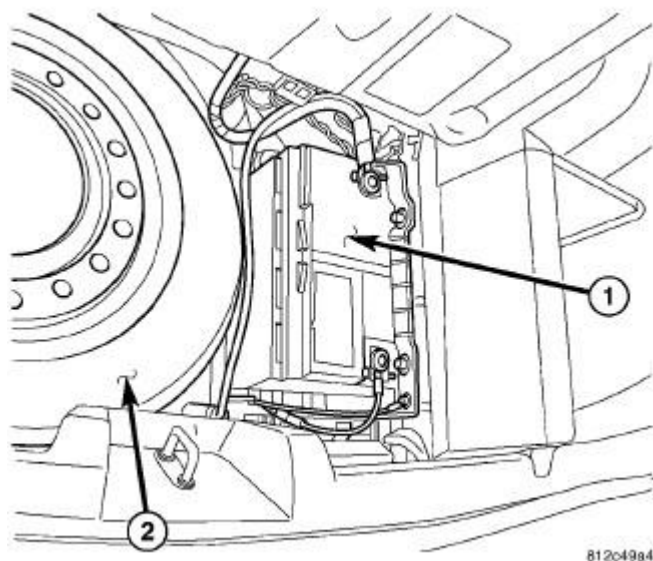


Fig. 96: Locating Battery
Courtesy of CHRYSLER LLC

20. Connect negative battery cable.
21. Start engine and check for leaks.

CAMSHAFT, ENGINE

Description

DESCRIPTION

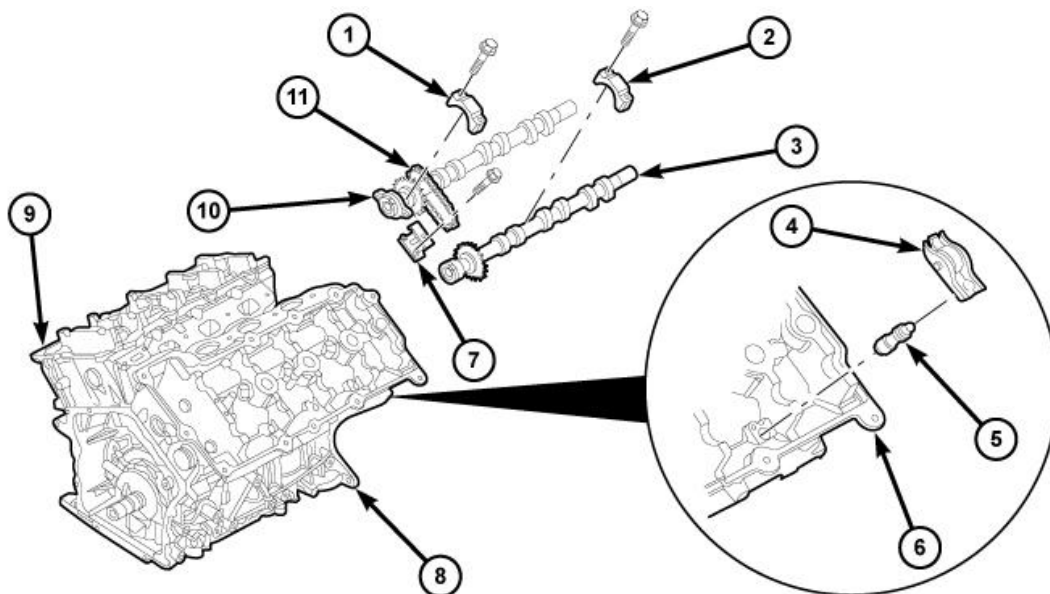


Fig. 97: Camshaft & Valvetrain Components
 Courtesy of CHRYSLER LLC

The assembled fabricated camshafts are composed of five bearing journals machined onto a hollow steel tube. The camshafts are secured in the cylinder head (6) by the camshaft bearing caps (1 and 2). Six steel lobes, a secondary timing drive sprocket, and a primary sprocket/thrust flange are pressed onto the camshaft tube using a unique assembly process. Camshaft end play is controlled by the primary camshaft sprocket attachment flange on the intake camshafts (7) and by a thrust flange on the exhaust camshafts (3). The intake camshafts are driven by the primary chain. The exhaust camshafts (3) are driven by the intake camshafts (10) through a secondary chain (11). The secondary chain tensioner (7) keeps tension on the secondary chain (11).

Operation

OPERATION

The camshaft has precisely machined (egg shaped) lobes to provide accurate valve timing and duration. The camshaft is driven by the crankshaft via drive sprockets and chains.

Removal

REMOVAL

NOTE: The engine can be equipped with either conventional roller-type (early production) or silent type (late production) secondary timing chains.

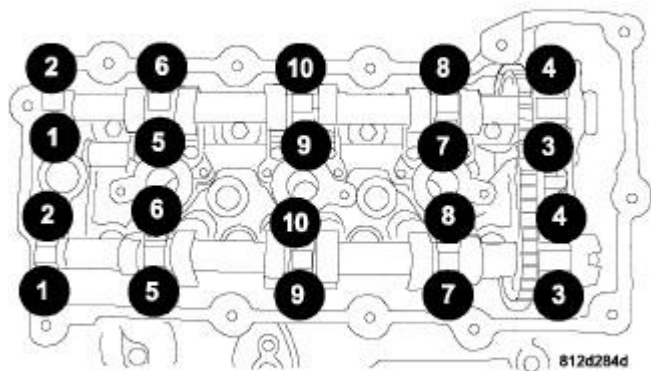


Fig. 98: Cam Bearing Cap Removal Sequence
 Courtesy of CHRYSLER LLC

1. Remove the primary timing chain. See Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal.
2. Remove secondary chain tensioner mounting bolts.

NOTE: Camshaft bearing caps should have been marked during engine manufacturing. For example, number one exhaust camshaft bearing is marked "1E & gt;"

3. Slowly loosen camshaft bearing cap bolts in the sequence shown in illustration.

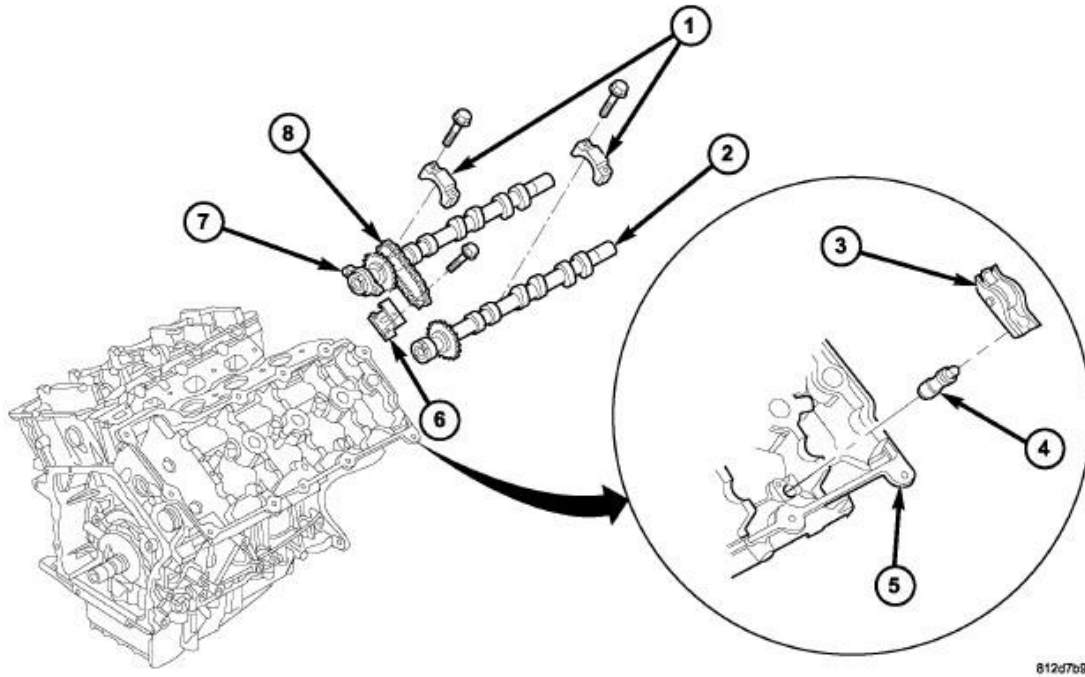
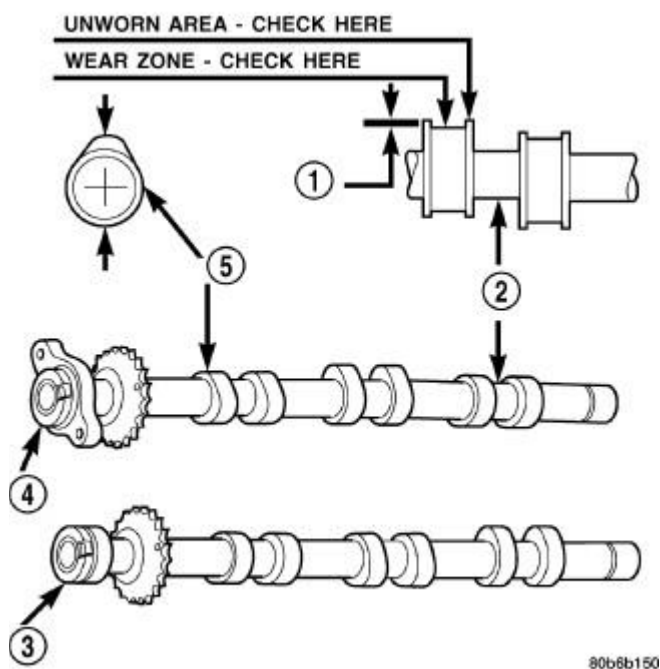


Fig. 99: Identifying Intake Camshaft, Exhaust Camshaft, Secondary Timing Chain & And Secondary Timing Chain Tensioner
Courtesy of CHRYSLER LLC

4. Remove camshaft bearing caps (1).
5. Remove intake camshaft (7), exhaust camshaft (2), secondary timing chain (8), and secondary timing chain tensioner (6) together as an assembly.
6. Remove secondary timing chain tensioner (6) and secondary timing chain (8) from camshafts (2) and (7).
7. Inspect camshafts. See Engine/Cylinder Head/CAMSHAFT, Engine - Inspection.

Inspection

INSPECTION

**Fig. 100: Camshaft Inspection**

Courtesy of CHRYSLER LLC

1. Inspect camshaft bearing journals (2) for damage and binding. If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.
2. Inspect camshaft sprockets for excessive wear. Replace camshafts if necessary.
3. Check the cam lobe (5) surfaces for abnormal wear and damage. Replace camshaft if defective. Measure the actual wear and replace, if out of limits-standard value is 0.0254 mm (0.001 in.); wear **limit** is 0.254 mm (0.010 in.).

Installation**INSTALLATION**

CAUTION: When the timing chain is removed and the cylinder heads are installed, **DO NOT** rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

NOTE: The engine can be equipped with either conventional roller-type (early production) or silent type (late production) secondary timing chains.

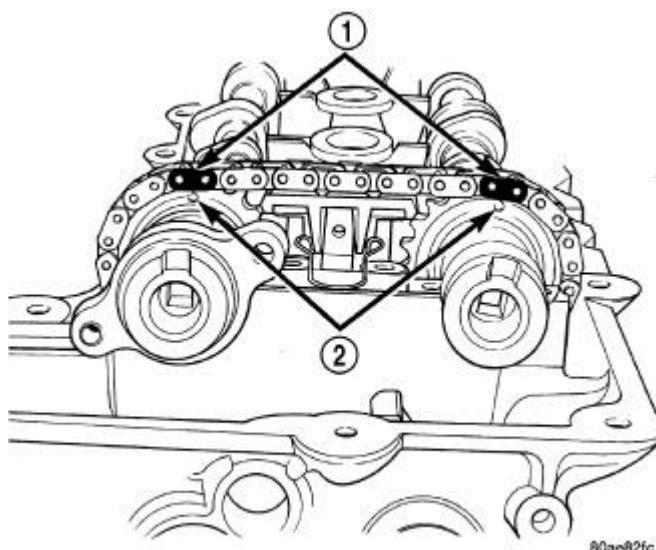


Fig. 101: Camshaft Chain Timing
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - PLATED CHAIN LINKS
2 - CAMSHAFT TIMING MARKS (DOTS) |
|--|

- For engines equipped with roller chains (early production), assemble camshaft chain on the cams ensuring that the plated links (1) are aligned with the timing dot (2) on the camshaft sprockets.

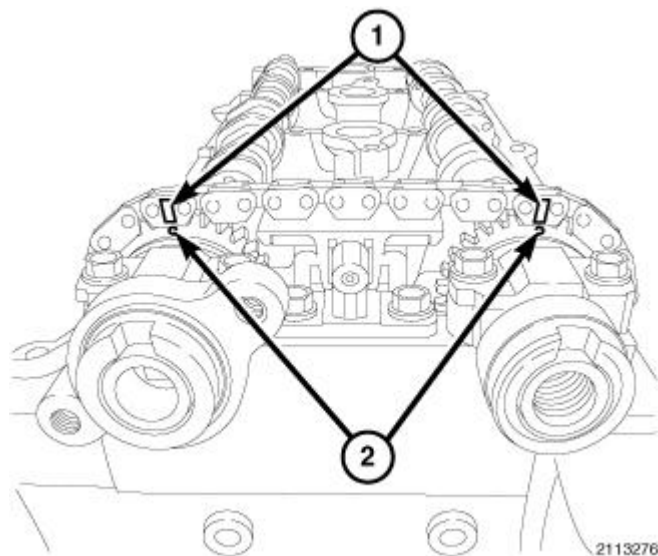


Fig. 102: Identifying Marked Links & Timing Dot On Camshaft Sprockets
Courtesy of CHRYSLER LLC

- For engines equipped with silent chains (late production) assemble camshaft chain on the cams ensuring that the marked links (1) are aligned with the timing dot (2) on the camshaft sprockets.

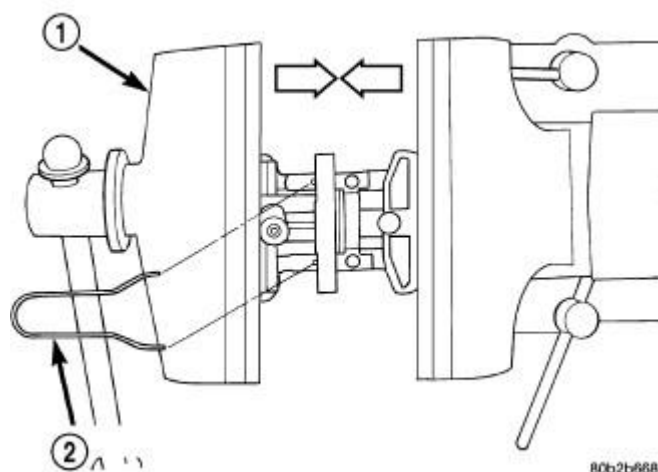


Fig. 103: Locking Camshaft (Secondary) Chain Tensioner
Courtesy of CHRYSLER LLC

1 - VISE
2 - LOCK PIN

3. If camshaft chain tensioner is already in the compressed and locked position, proceed to step 4.
4. When the camshaft chain tensioner is removed, it is necessary to compress and lock the tensioner using the following procedures:
 - a. Place tensioner (1) into a soft jaw vise.
 - b. SLOWLY compress tensioner until fabricated lock pin (2) or the equivalent can be inserted into the locking holes.
 - c. Remove compressed and locked tensioner from the vise.
5. Insert the compressed and locked camshaft chain tensioner in-between the camshafts and chain.

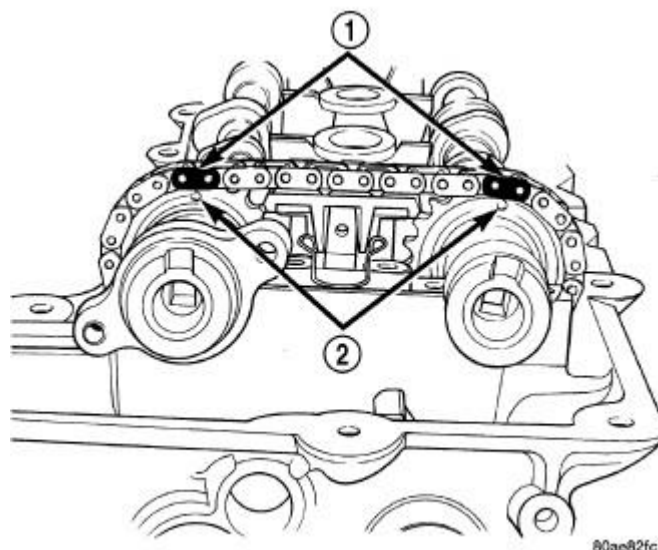
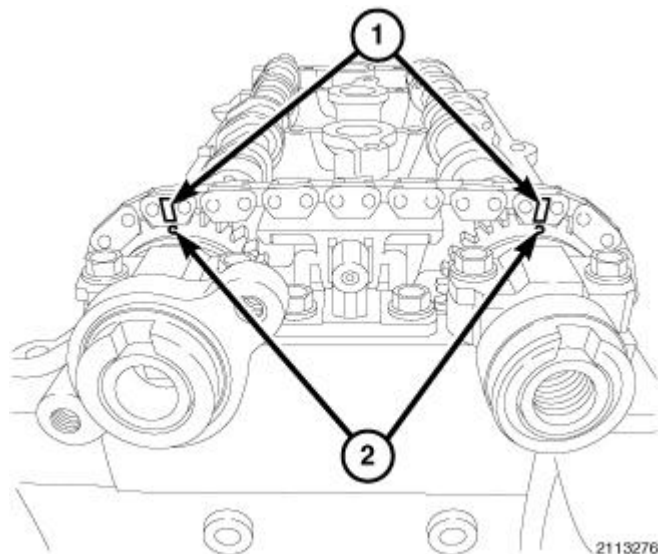


Fig. 104: Camshaft Chain Timing

Courtesy of CHRYSLER LLC

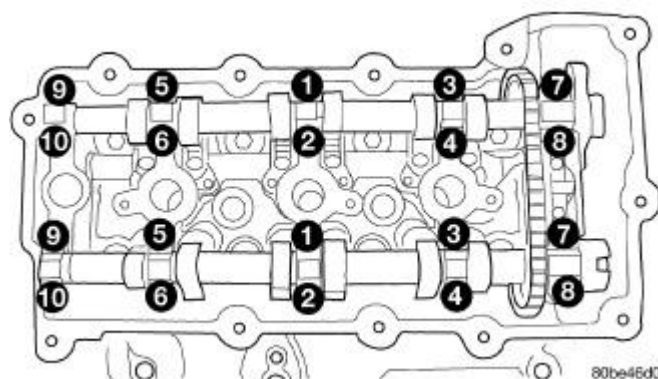
- 1 - PLATED CHAIN LINKS
2 - CAMSHAFT TIMING MARKS (DOTS)

6. For engines equipped with roller chains (early production), rotate the cams so that the plated links (1) and dots (2) are facing the 12:00 O'clock position.

**Fig. 105: Identifying Marked Links & Timing Dot On Camshaft Sprockets**

Courtesy of CHRYSLER LLC

7. For engines equipped with silent chains (late production), rotate the cams so that the marked links (1) and dots (2) are facing the 12:00 O'clock position.

**Fig. 106: Camshaft Bearing Cap Tightening Sequence**

Courtesy of CHRYSLER LLC

8. Install cams to cylinder head. Verify that rocker arms are correctly seated and in proper positions.
9. Install camshaft bearing caps. Verify that bearing caps are installed in same position as removed.

10. Tighten cam bearing cap bolts gradually in sequence shown in illustration to 12 N.m (105 in. lbs.).
11. Install secondary chain tensioner bolts and tighten to 12 N.m (105 in. lbs.).
12. Remove locking pin from secondary tensioners.
13. Verify end play of camshafts are within specification. See **Engine - Specifications**.
14. Install the primary timing chain. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Installation**.

COVER(S), CYLINDER HEAD

Removal

LEFT

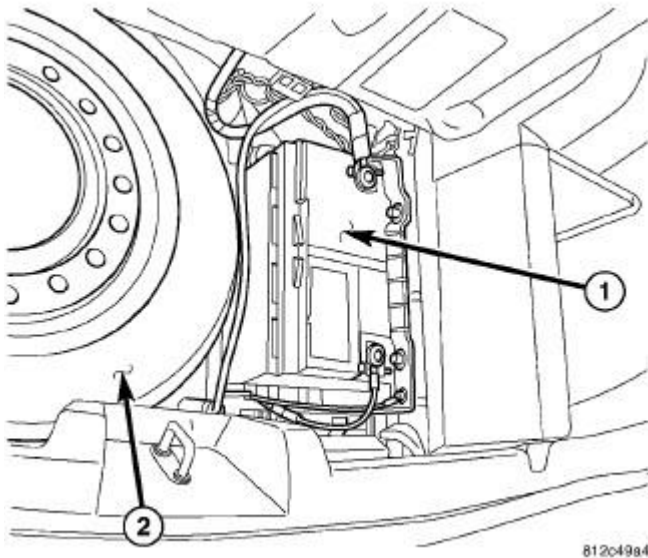
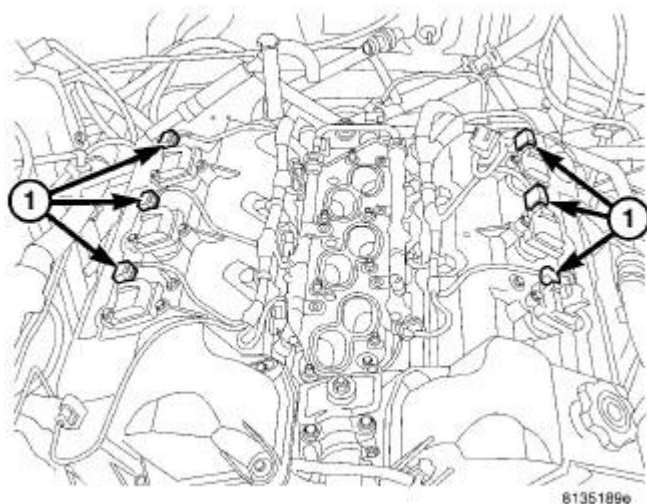


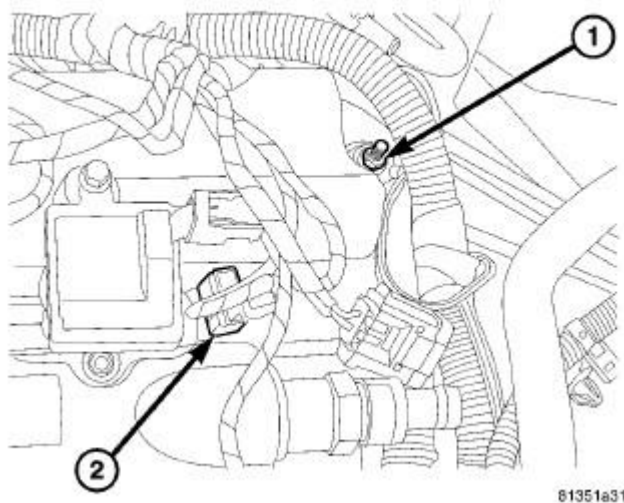
Fig. 107: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.

**Fig. 108: COIL CONNECTORS**

Courtesy of CHRYSLER LLC

2. Remove upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Removal**.
3. Disconnect electrical connectors from ignition coils (1).

**Fig. 109: CAPACITOR CONNECTOR - LEFT**

Courtesy of CHRYSLER LLC

4. Remove ground strap from cylinder head cover stud (1) and disconnect capacitor connector (2). Reposition electrical harness.
5. Disconnect electrical harness retaining clips from cylinder head cover studs. Reposition electrical harness.

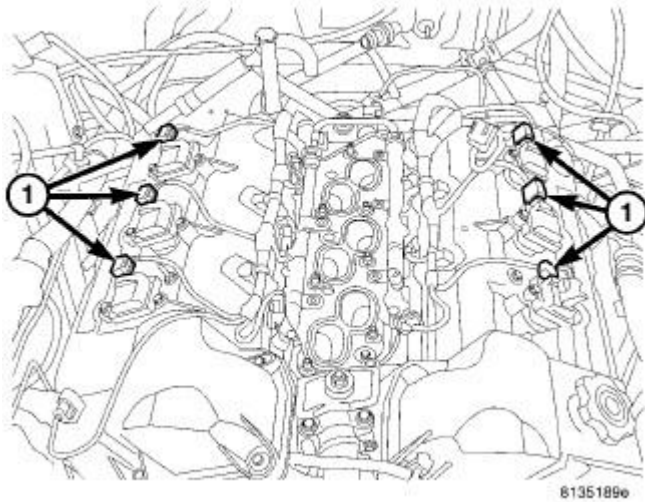


Fig. 110: COIL CONNECTORS
Courtesy of CHRYSLER LLC

6. Remove make up air hose.
7. Remove fastener attaching ignition coil capacitor.
8. Remove ignition coils (1).

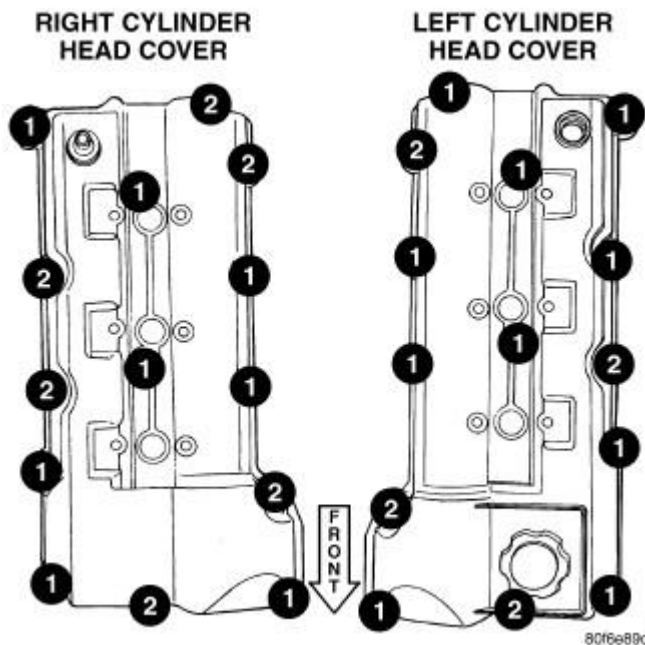


Fig. 111: Cylinder Head Cover Fasteners
Courtesy of CHRYSLER LLC

9. Loosen all cylinder head cover fasteners (1 and 2).

NOTE: **Cylinder head cover attaching bolts are captured to the cover.**

CAUTION: Make certain the double ended studs (1) in the center of the cylinder head cover are loose before attempting to remove cover.

10. Remove cylinder head cover.

RIGHT

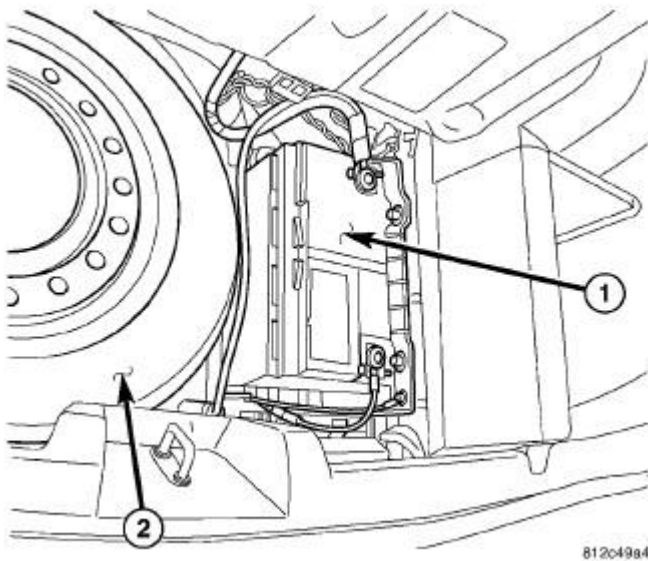
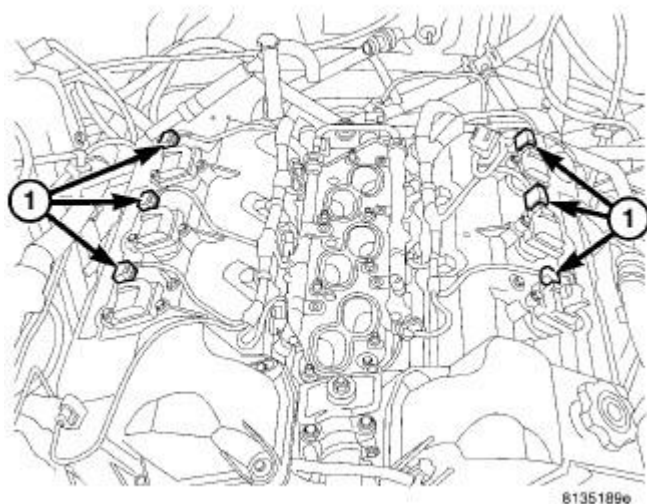


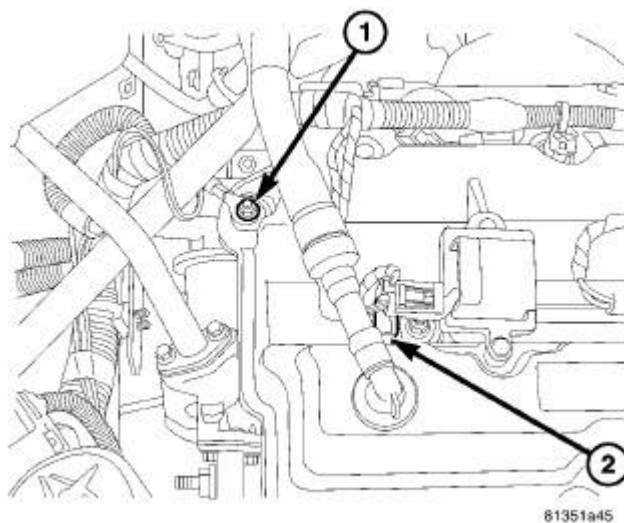
Fig. 112: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable.

**Fig. 113: COIL CONNECTORS**

Courtesy of CHRYSLER LLC

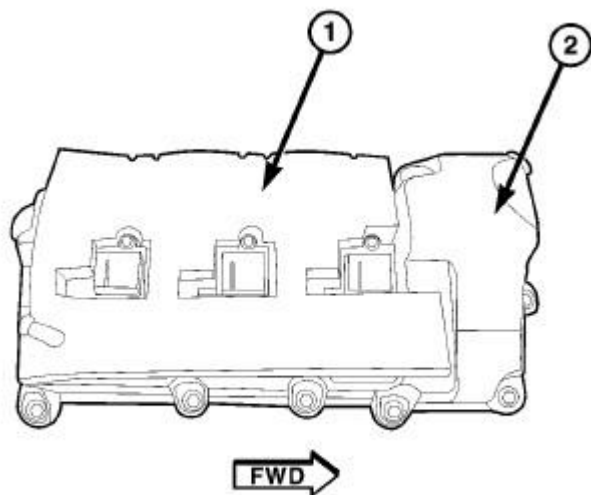
2. Remove upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Removal**.
3. Disconnect electrical connectors from ignition coils (1).

**Fig. 114: CAPACITOR CONNECTOR - RIGHT**

Courtesy of CHRYSLER LLC

4. Disconnect capacitor electrical connector (2).
5. Remove PCV hose from cylinder head cover grommet.
6. Remove ground strap from cylinder head cover stud (1).
7. Disconnect electrical harness retaining clips from cylinder head cover studs. Reposition electrical harness.

8. Remove fastener attaching ignition coil capacitor.
9. Remove ignition coils.



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Fig. 115: FOAM INSULATOR
Courtesy of CHRYSLER LLC

10. Remove foam insulator (1).

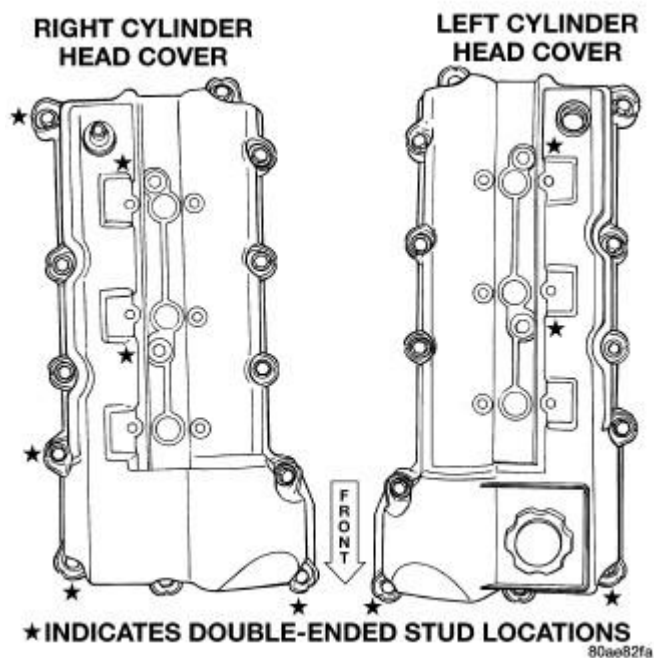


Fig. 116: Cylinder Head Covers
Courtesy of CHRYSLER LLC

11. Loosen all cylinder head cover fasteners.

NOTE: **Cylinder head cover attaching bolts are captured to the cover.**

CAUTION: Make certain the double ended studs in the center of the cylinder head cover are loose before attempting to remove cover.

12. Remove cylinder head cover.

Installation

LEFT

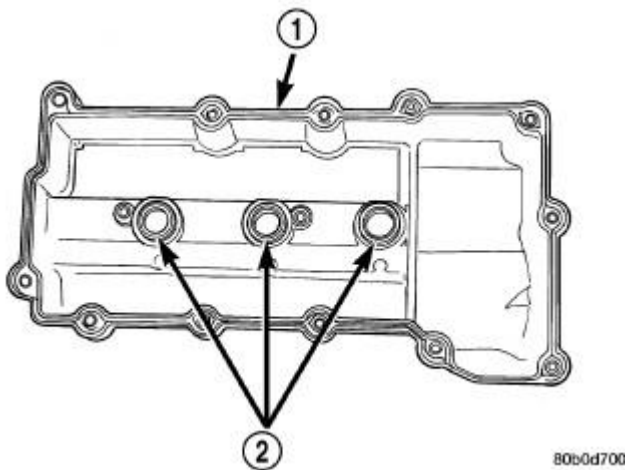


Fig. 117: Cylinder Head Cover Gasket and Spark Plug Seals
Courtesy of CHRYSLER LLC

1. Clean cylinder head cover and both sealing surfaces. Inspect and replace gaskets (1 and 2) as necessary.

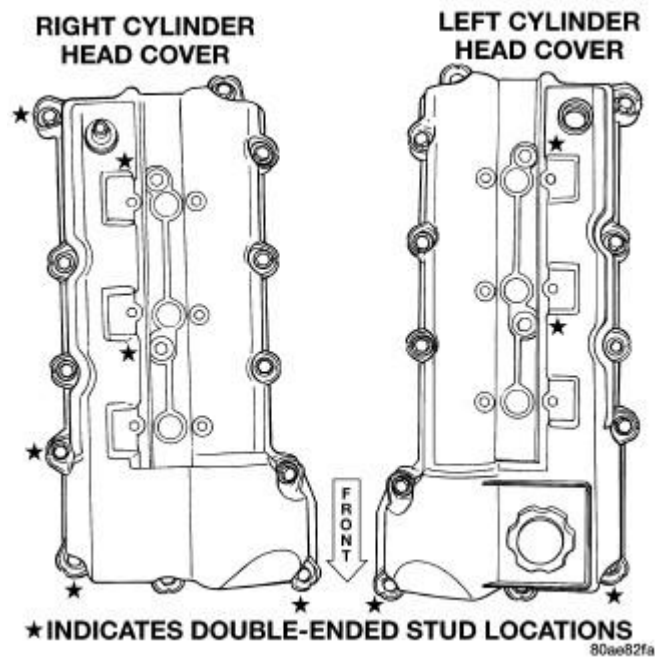


Fig. 118: Cylinder Head Covers
Courtesy of CHRYSLER LLC

2. Install cylinder head cover and hand start all fasteners. Verify that all double-ended studs are in the correct locations.
3. Tighten cylinder head cover attaching bolts and double-ended studs to 12 N.m (105 in. lbs.).

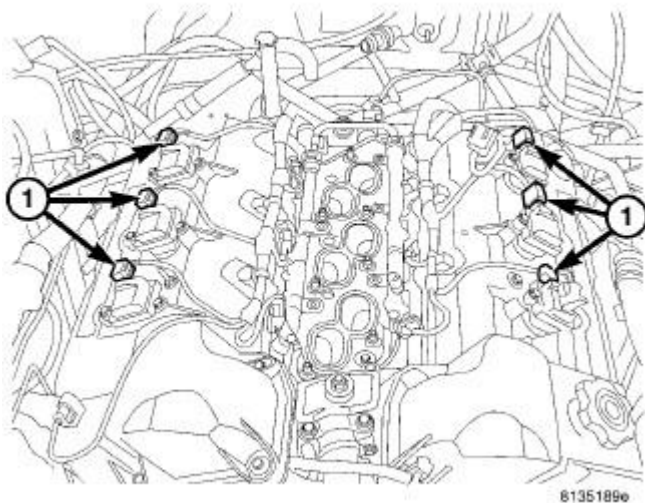


Fig. 119: COIL CONNECTORS
Courtesy of CHRYSLER LLC

4. Install ignition coils (1).

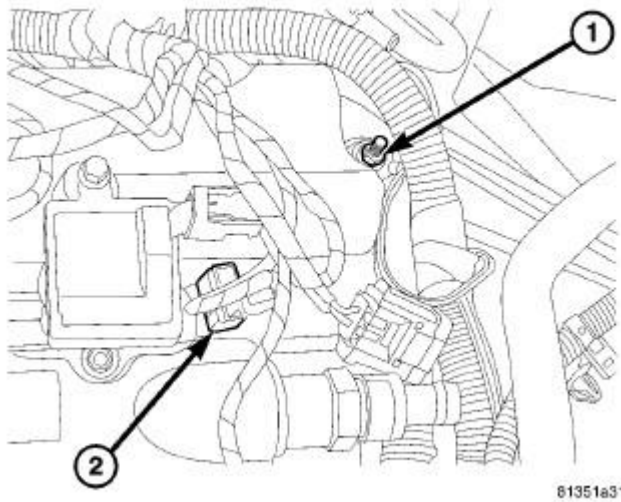


Fig. 120: CAPACITOR CONNECTOR - LEFT
Courtesy of CHRYSLER LLC

5. Install ignition coil capacitor (2) and fastener.
6. Install ground strap (1) to cylinder head cover stud.
7. Connect all electrical connectors and harness clips.
8. Connect make up air hose.
9. Install upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Installation.**

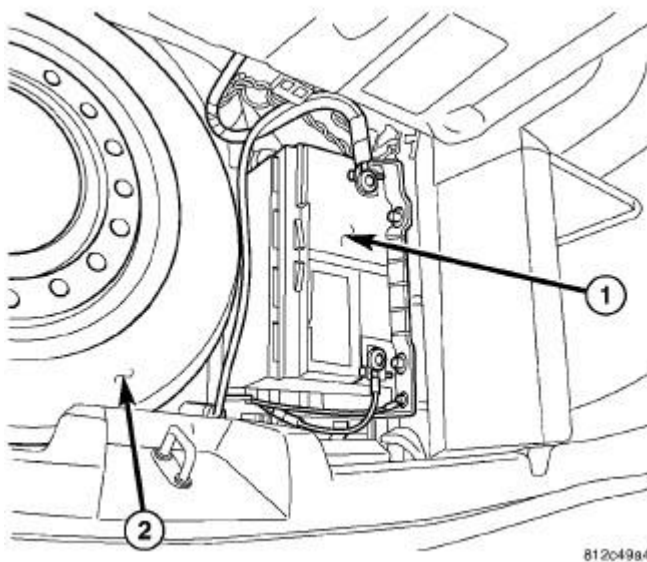


Fig. 121: Locating Battery
Courtesy of CHRYSLER LLC

10. Connect negative battery (1) cable.

RIGHT

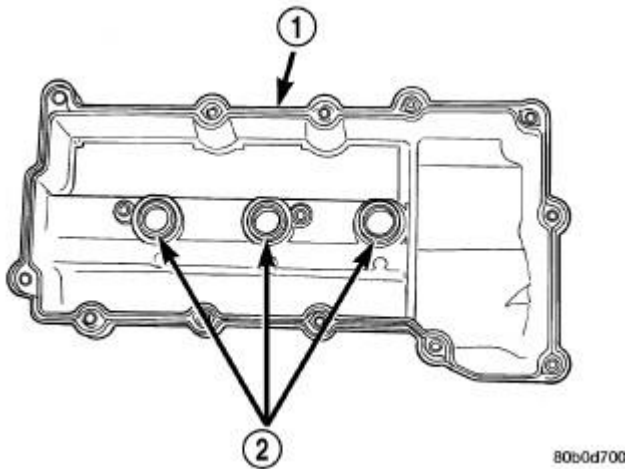


Fig. 122: Cylinder Head Cover Gasket and Spark Plug Seals
Courtesy of CHRYSLER LLC

1. Clean cylinder head cover and both sealing surfaces. Inspect and replace gaskets (1 and 2) as necessary.

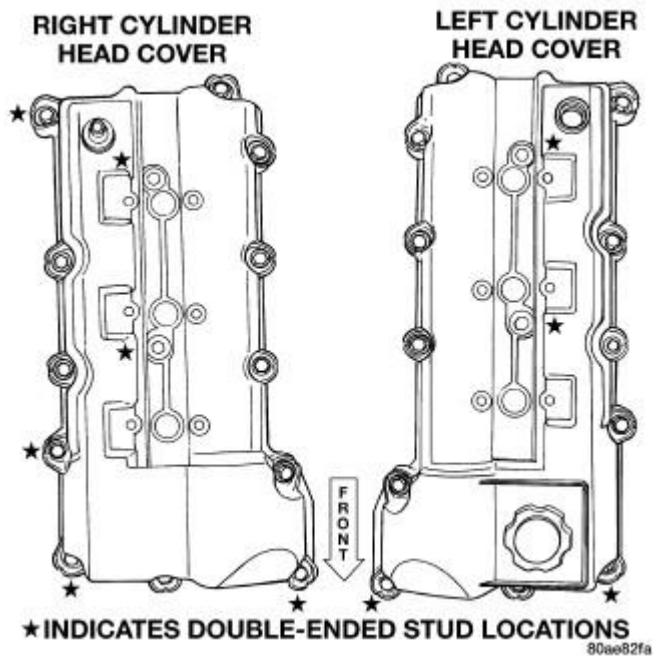


Fig. 123: Cylinder Head Covers
Courtesy of CHRYSLER LLC

2. Install cylinder head cover and hand start all fasteners. Verify that all double-ended studs are in the correct locations.
3. Tighten cylinder head cover attaching bolts and double-ended studs to 12 N.m (105 in. lbs.).

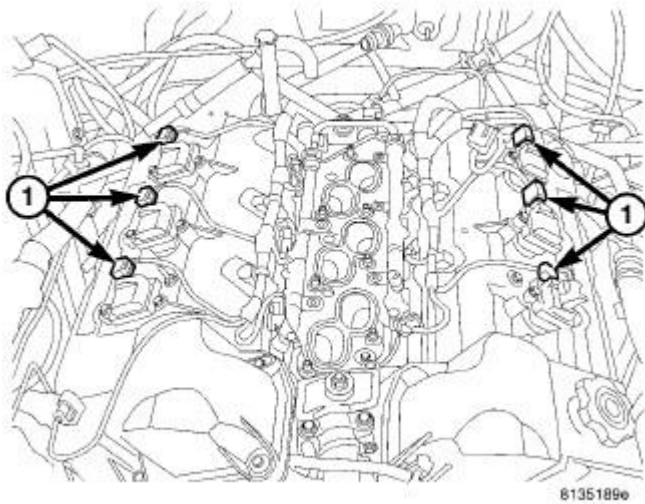


Fig. 124: COIL CONNECTORS
Courtesy of CHRYSLER LLC

4. Install ignition coils (1).

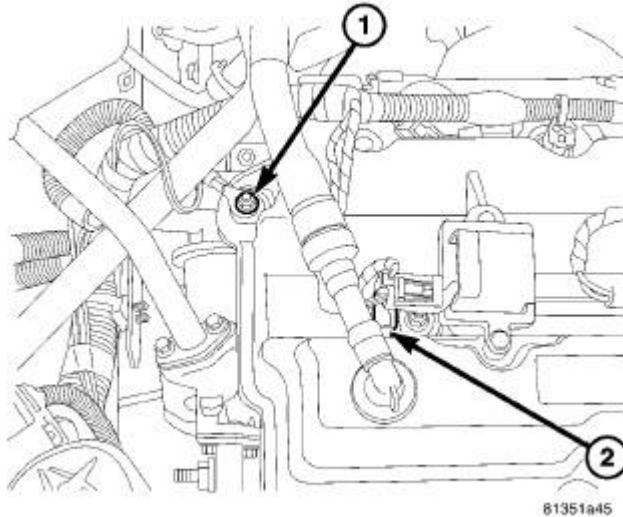
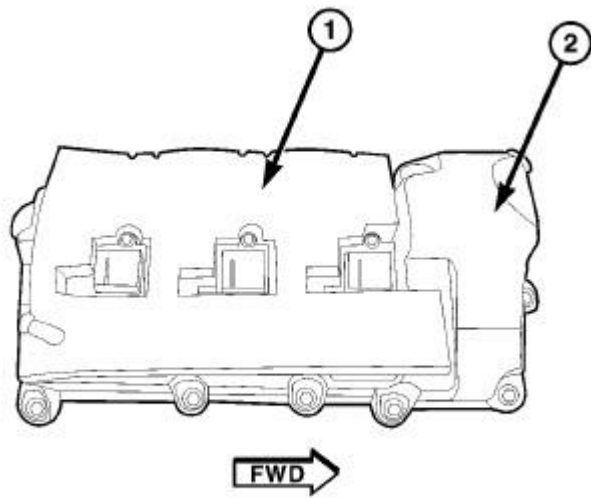


Fig. 125: CAPACITOR CONNECTOR - RIGHT
Courtesy of CHRYSLER LLC

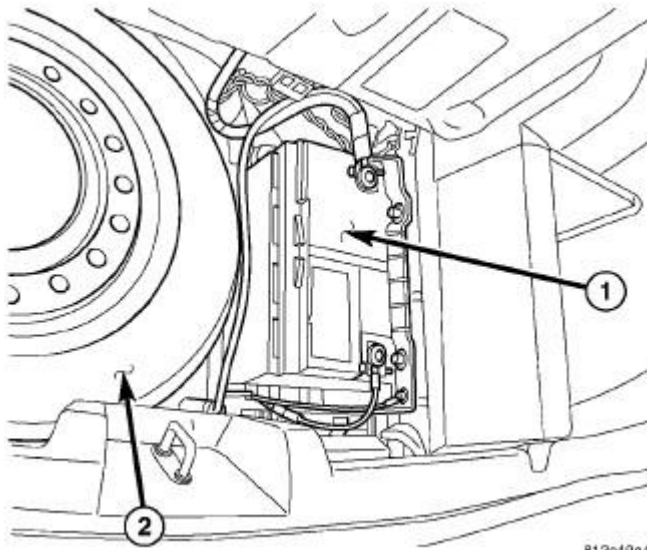
5. Install ignition coil capacitor (2) and fastener.
6. Connect ground strap (1) to cylinder head cover stud.
7. Connect PCV hose to cylinder head cover grommet.
8. Connect all electrical connectors and harness clips.



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Fig. 126: FOAM INSULATOR
Courtesy of CHRYSLER LLC

9. Install foam insulator (1) on top of cylinder head cover (2).
10. Install upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Installation**.



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Fig. 127: Locating Battery
Courtesy of CHRYSLER LLC

11. Connect negative battery (1) cable.

LIFTER(S), HYDRAULIC

Diagnosis and Testing

HYDRAULIC LASH ADJUSTER NOISE DIAGNOSIS

Proper noise diagnosis is essential in locating the source of a NVH complaint. Locating a lash adjuster (tappet) type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur.

Refer to **LASH ADJUSTER (TAPPET) NOISE CHART** indicating possible lash adjuster (tappet) noise sources and possible sources that could lead to a misdiagnosis.

Refer to **LASH ADJUSTER (TAPPET) NOISE CHART** for possible causes and correction of a lash adjuster (tappet) type noise.

LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level-too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct engine oil level.
2. Insufficient running time after rebuilding cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in lash adjuster (after 1 hour run time).	3. See below: (a) Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily. (b) If lash adjuster(s) are still spongy, replace with new adjuster/rocker arm assembly.
4. Low oil pressure	4. See below: (a) Check and correct engine oil level. (b) Check engine oil pressure. (c) Check for excessive bearing clearance and correct. (d) Check for worn oil pump.
5. Oil passage to cylinder head(s) plugged with debris.	5. Check cylinder head oil passages and cylinder head gasket restrictor for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Ream guide(s) and replace valve(s) with oversize valves and seal(s).
7. Air ingested into oil due to broken or cracked oil pump pickup tube.	7. Inspect pickup tube and replace as necessary.
8. Collapsed lash adjuster due to debris ingestion.	8. Clean debris from engine and replace lash adjuster(s).

Removal**REMOVAL**

1. Remove cylinder head cover(s). See Engine/Cylinder Head/COVER(S), Cylinder Head - Removal.
2. Remove rocker arm(s). See Engine/Cylinder Head/ROCKER ARM, Valve - Removal.

CAUTION: If lash adjusters and rocker arms are to be reused, always mark position for reassembly in their original positions.

3. Remove lash adjuster(s).

Installation**INSTALLATION**

1. Install hydraulic lash adjuster making sure adjusters are at least partially full of oil. This can be verified by little or no plunger travel when lash adjuster is depressed.
2. Install rocker arm(s) and cylinder head covers. See Engine/Cylinder Head/ROCKER ARM, Valve - Installation. See Engine/Cylinder Head/COVER(S), Cylinder Head - Installation.

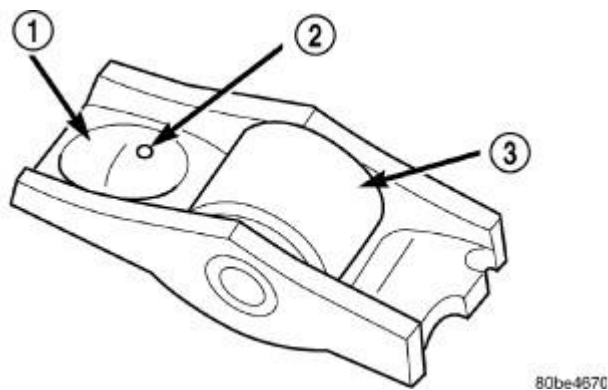
ROCKER ARM, VALVE**Description****DESCRIPTION**

Fig. 128: Rocker Arm
Courtesy of CHRYSLER LLC

The rocker arms are composed of steel stampings with an integral roller bearing (3). The rocker arms incorporate a 0.5 mm (0.0197 in.) oil hole (2) in the lash adjuster socket (1) for roller/camshaft lobe lubrication.

Removal**REMOVAL**

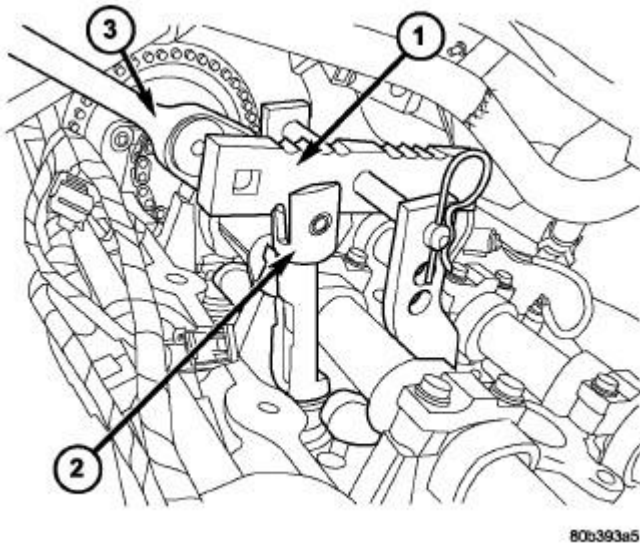


Fig. 129: Rocker Arm - Removal/Installation - 2.7L
 Courtesy of CHRYSLER LLC

1. Remove cylinder head cover(s). See Engine/Cylinder Head/COVER(S), Cylinder Head - Removal.

CAUTION: Always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

2. Rotate engine until the cam lobe is on its base circle (heel), on the rocker arm being removed.

CAUTION: Depress valve spring only enough to remove rocker arm.

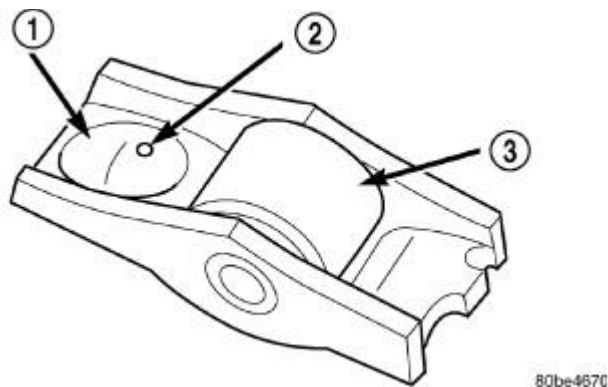
3. Using Special Tools 8215A (1) and 8216A Adaptor (2) and a 3/8" ratchet (3), depress valve spring only enough to release tension on rocker arm.
4. Remove rocker arm from cylinder head.

CAUTION: If rocker arms are to be reused, identify position of rocker arms for reassembly in their original positions.

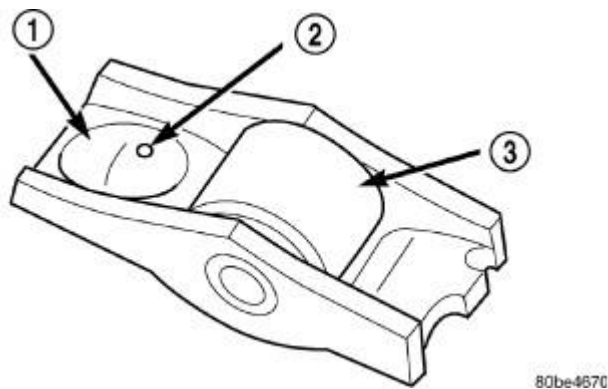
5. Repeat procedure for each rocker arm removed.
6. Inspect the rocker arm for wear or damage. See Engine/Cylinder Head/CAMSHAFT, Engine - Inspection.

Inspection

INSPECTION

**Fig. 130: Rocker Arm****Courtesy of CHRYSLER LLC**

Inspect the cam follower assembly for wear or damage . Replace as necessary.

Installation**INSTALLATION****Fig. 131: Rocker Arm****Courtesy of CHRYSLER LLC**

1. Lubricate rocker arms with clean engine oil before installation.
2. Rotate engine until cam lobe is on its base circle (heel) of rocker arm being installed.

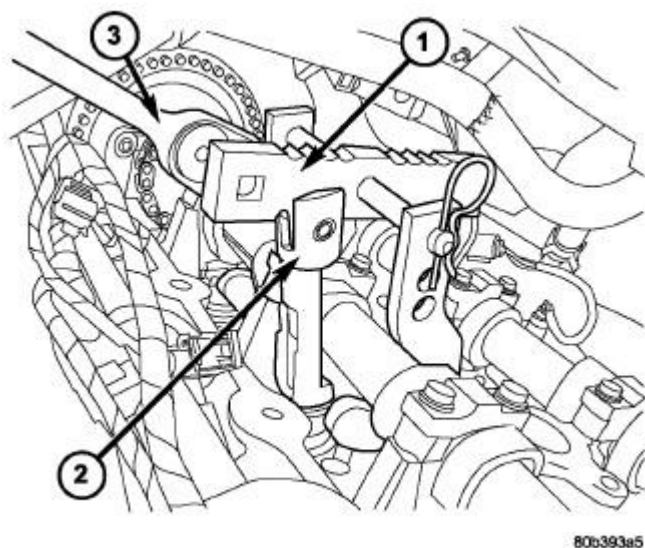


Fig. 132: Rocker Arm - Removal/Installation - 2.7L

Courtesy of CHRYSLER LLC

3. Using Special Tools 8215A (1), 8216A adaptor (2), and a 3/8" Drive Ratchet (3), depress valve spring only enough to install rocker arm.
4. Install rocker arm in original position (if reused) over valve and lash adjuster. Release tension on valve spring.

NOTE: **Inspect rocker arm for proper engagement into lash adjuster and valve tip.**

5. Repeat procedure for each rocker arm being installed.
6. Install cylinder head cover(s). See **Engine/Cylinder Head/COVER(S), Cylinder Head - Installation.**

SEAL(S), VALVE GUIDE

Removal

REMOVAL

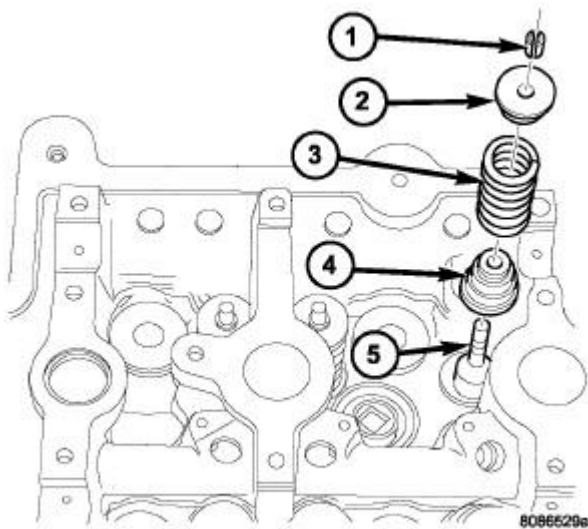


Fig. 133: Valve Seal and Spring
Courtesy of CHRYSLER LLC

1. Remove valve spring (3). See [Engine/Cylinder Head/SPRING\(S\), Valve - Removal](#).

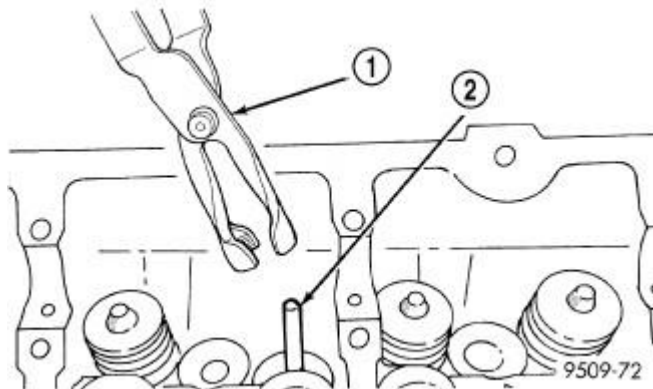


Fig. 134: Valve Stem Seal-Removal
Courtesy of CHRYSLER LLC

2. Remove valve stem seal by using a valve seal tool (1).

Installation

INSTALLATION

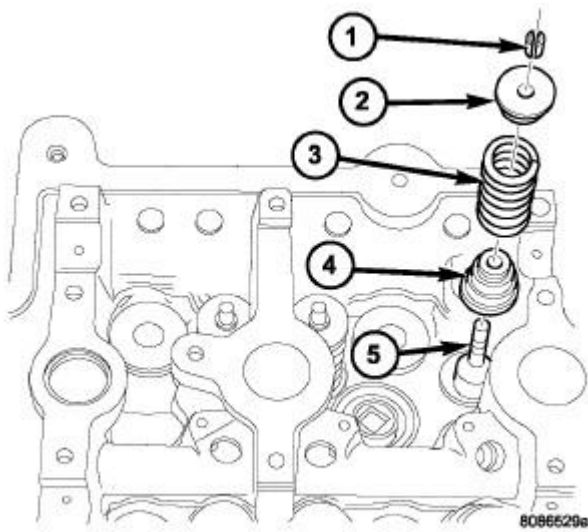


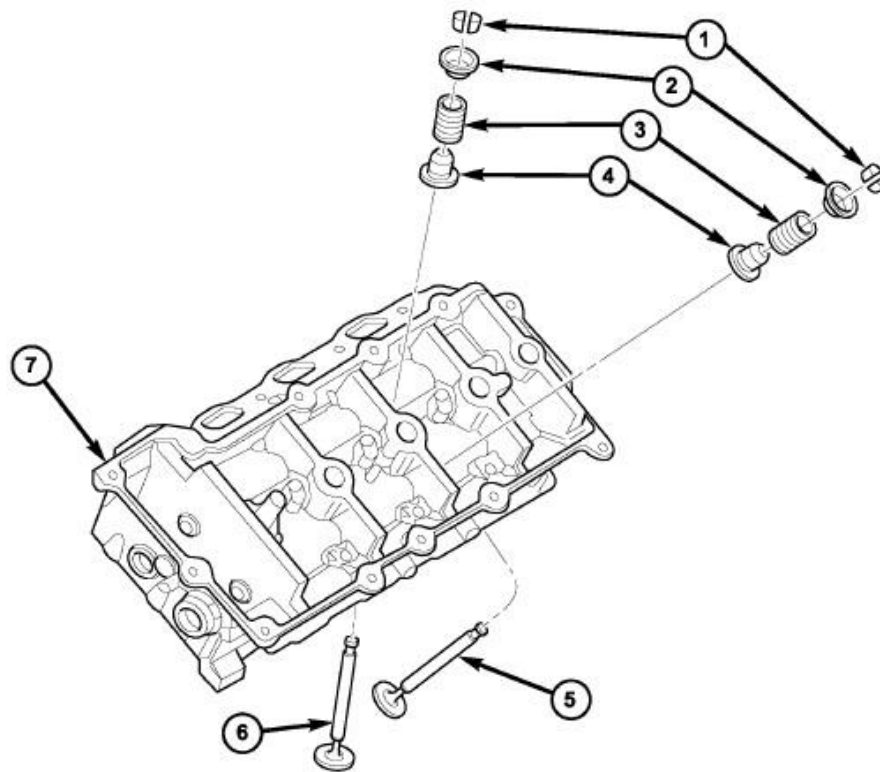
Fig. 135: Valve Seal and Spring
Courtesy of CHRYSLER LLC

1. The valve stem seal/valve spring seat (4) should be pushed firmly and squarely over the valve guide using the valve stem (5) as guide. **Do Not Force** seal against top of guide.
2. Install valve spring (3). See **Engine/Cylinder Head/SPRING(S), Valve - Installation**.

SPRING(S), VALVE

Description

DESCRIPTION



812d7dc5

Fig. 136: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

The valve springs (3) are made from high strength, chrome-silicon steel. The springs are common for intake and exhaust applications. The valve spring seat is integral with the valve stem seal (4), which incorporates a garter spring to maintain consistent lubrication control to the valve stem.

Removal

IN VEHICLE

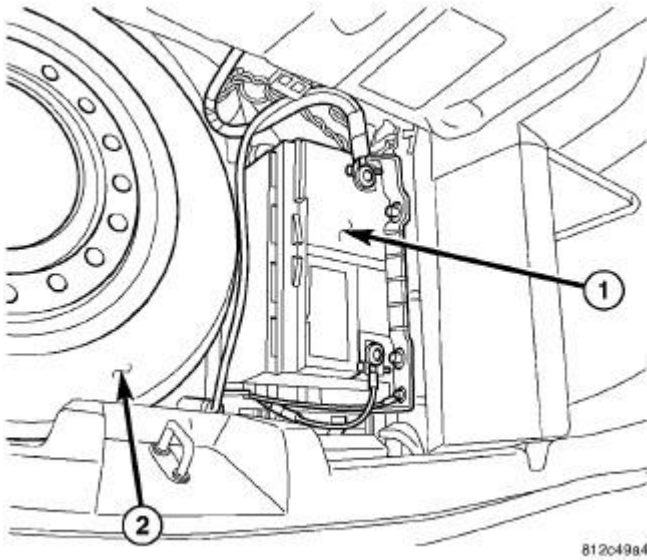


Fig. 137: Locating Battery
Courtesy of CHRYSLER LLC

1. Release fuel pressure **before attempting any repairs** . Refer to **Fuel System/Fuel Delivery - Standard Procedure** .
2. Disconnect negative battery (1) cable located in trunk.

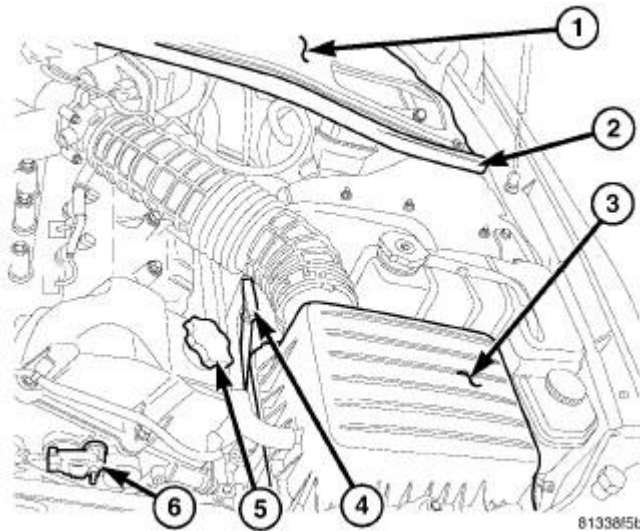


Fig. 138: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

3. Remove air cleaner housing (3) and inlet hose. See **Engine/Air Intake System/BODY, Air Cleaner - Removal**.

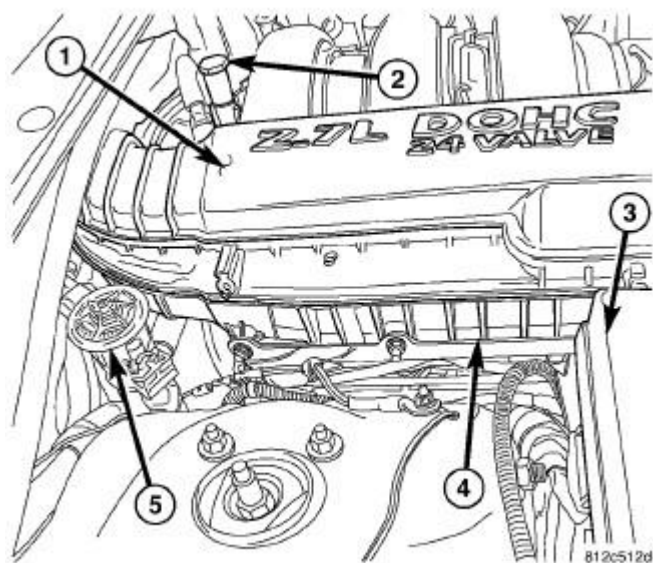
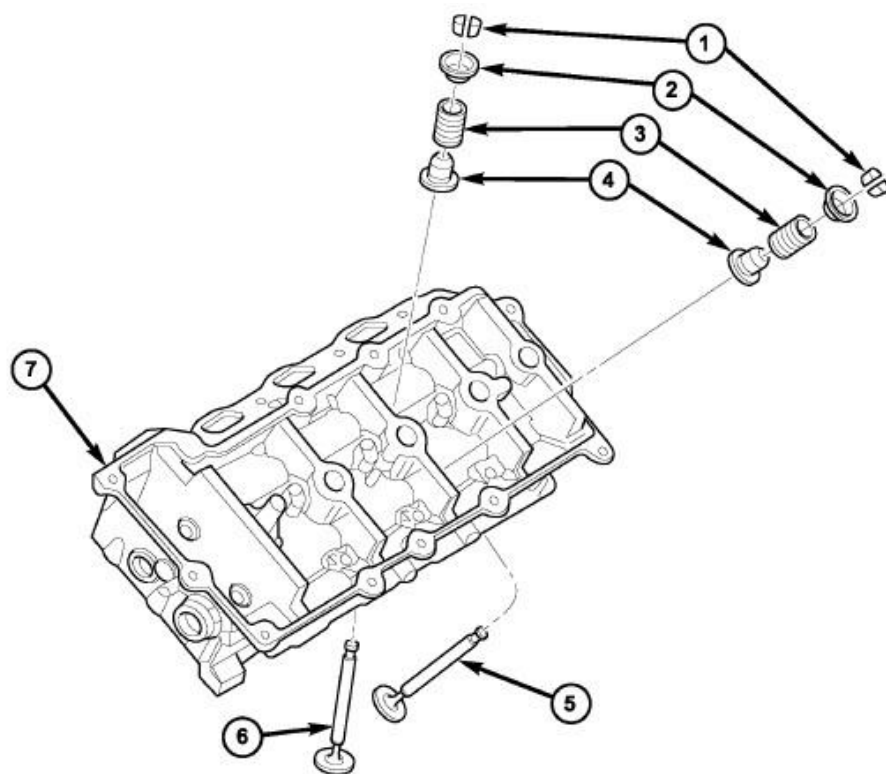


Fig. 139: Locating Purge Solenoid
Courtesy of CHRYSLER LLC

4. Remove upper intake manifold (1). See **Engine/Manifolds/MANIFOLD, Intake - Removal.**
5. Remove cylinder head covers. See **Engine/Cylinder Head/COVER(S), Cylinder Head - Removal.**
6. Remove crankshaft vibration damper. See **Engine/Engine Block/DAMPER, Vibration - Removal.**
7. Remove timing chain cover. See **Engine/Valve Timing/COVER(S), Engine Timing - Removal.**
8. Remove timing chain. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal.**
9. Remove camshafts and rocker arms. See **Engine/Cylinder Head/CAMSHAFT, Engine - Removal.**
10. With air hose attached to spark plug adapter installed in the cylinder being serviced, apply 620.5-689 kPa (90-100 psi) air pressure. This is to hold valves in place while servicing components.
11. Using Special Tool MD 998772A with adapter 6779, compress valve spring and remove valve locks, retainer, and valve spring.
12. Remove valve stem seal. See **Engine/Cylinder Head/SEAL(S), Valve Guide - Removal.**

OFF VEHICLE



812d7dc5

Fig. 140: Exploded View Of Cylinder Head Components**Courtesy of CHRYSLER LLC**

1. With cylinder head removed, compress valve springs (3) using a Special Tool C-3422-D, Valve Spring Compressor.
2. Remove valve retaining locks (1), valve spring retainers (2), valve springs (3).

Inspection**INSPECTION**

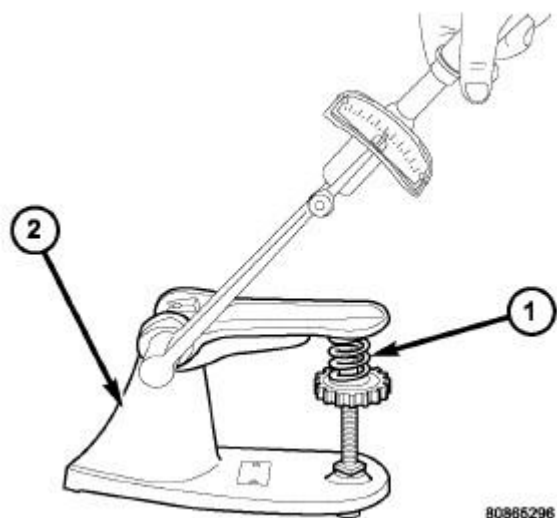
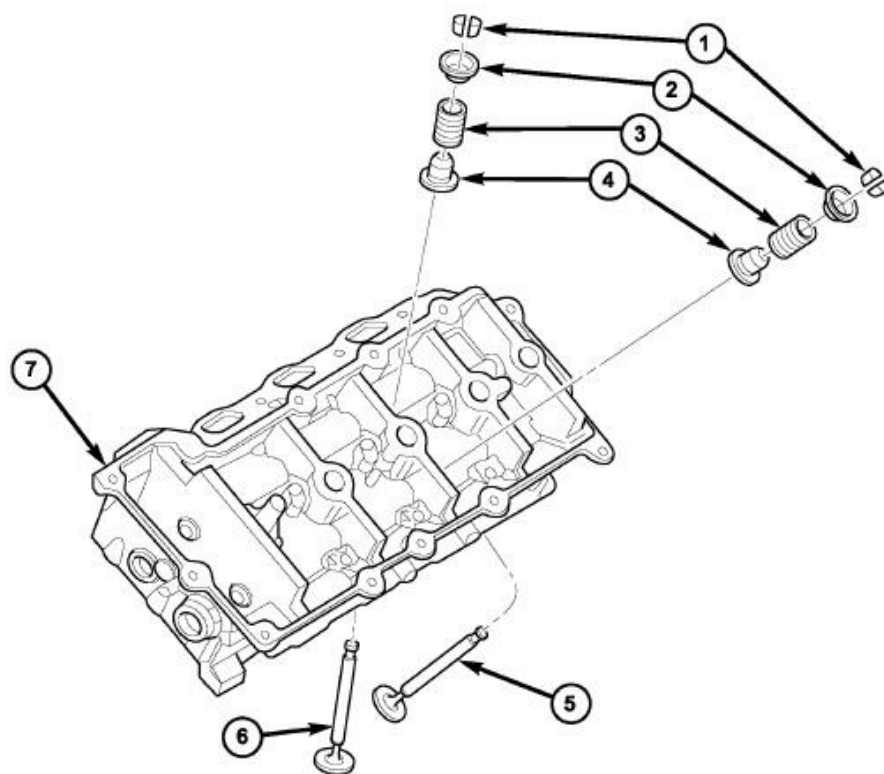


Fig. 141: Testing Valve Spring Using Special Tool C-647
Courtesy of CHRYSLER LLC

Whenever valves have been removed for inspection, reconditioning or replacement, valve springs (1) should be tested. **As an example;** the compression length of a spring to be tested is 38.00 mm (1.496 in.). Turn the table of Tool C-647 (2) until surface is in line with the 38.00 mm (1.496 in.) mark on the threaded stud and the zero mark on the front. Place spring (1) over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Engine Specifications to obtain specified height and allowable tensions. See **Engine - Specifications**. Replace any springs that do not meet specifications.

Installation

IN VEHICLE



812d7dc5

Fig. 142: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

1. The valve stem seal/valve spring seat (4) should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide. When installing the valve retainer locks (1), compress the spring (3) **only enough** to install locks (1).
2. Follow the same procedure on the remaining cylinders using the firing sequence 1-2-3-4-5-6. **Make sure piston is at TDC on the cylinder that the valve spring is to be removed.**
3. Remove spark plug adapter tool and Special Tool MD 998772A.
4. Install rocker arm(s). See **Engine/Cylinder Head/ROCKER ARM, Valve - Installation.**
5. Install camshafts, timing chain, and timing chain cover. See **Engine/Cylinder Head/CAMSHAFT, Engine - Installation.** See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Installation.** See **Engine/Valve Timing/COVER(S), Engine Timing - Installation.**
6. Install cylinder head covers. See **Engine/Cylinder Head/COVER(S), Cylinder Head - Installation.**

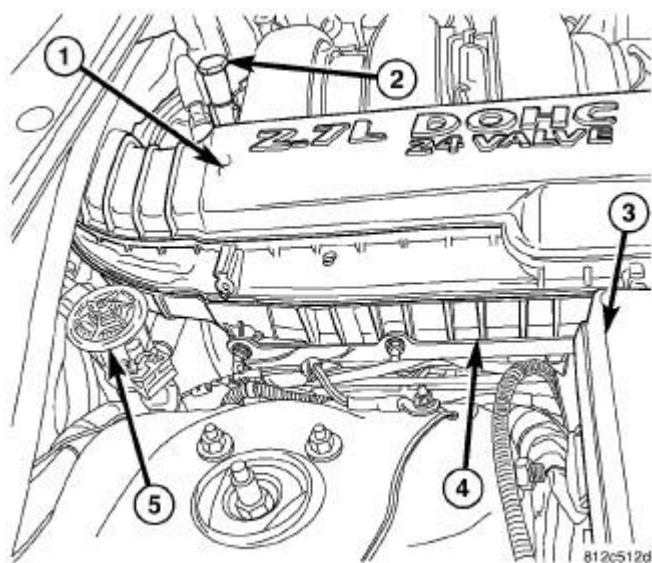


Fig. 143: Locating Purge Solenoid
Courtesy of CHRYSLER LLC

7. Install upper intake manifold (1). See **Engine/Manifolds/MANIFOLD, Intake - Installation.**

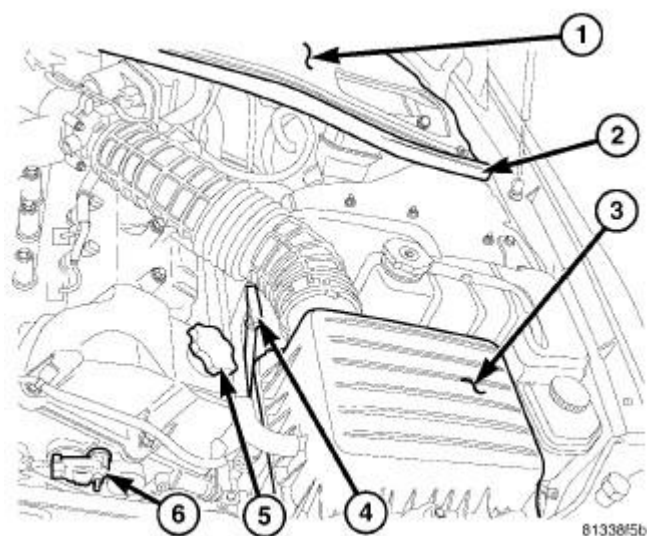


Fig. 144: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

8. Install air cleaner housing (3) and inlet hose. See **Engine/Air Intake System/BODY, Air Cleaner - Installation.**

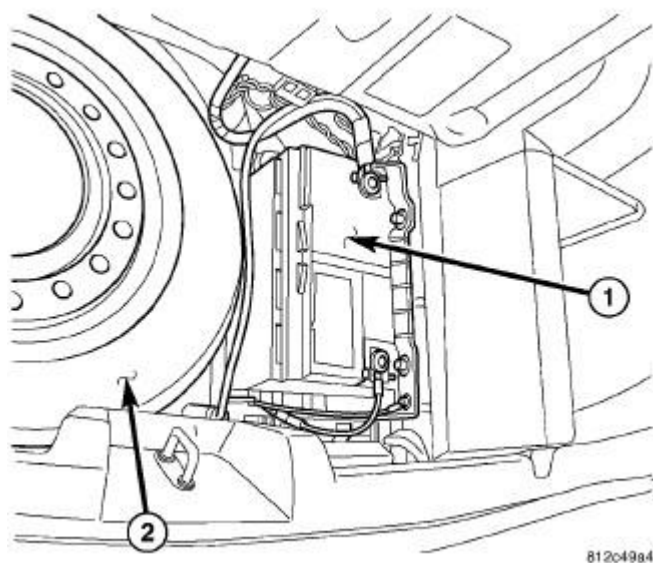


Fig. 145: Locating Battery
Courtesy of CHRYSLER LLC

9. Connect negative battery (1) cable.

OFF VEHICLE

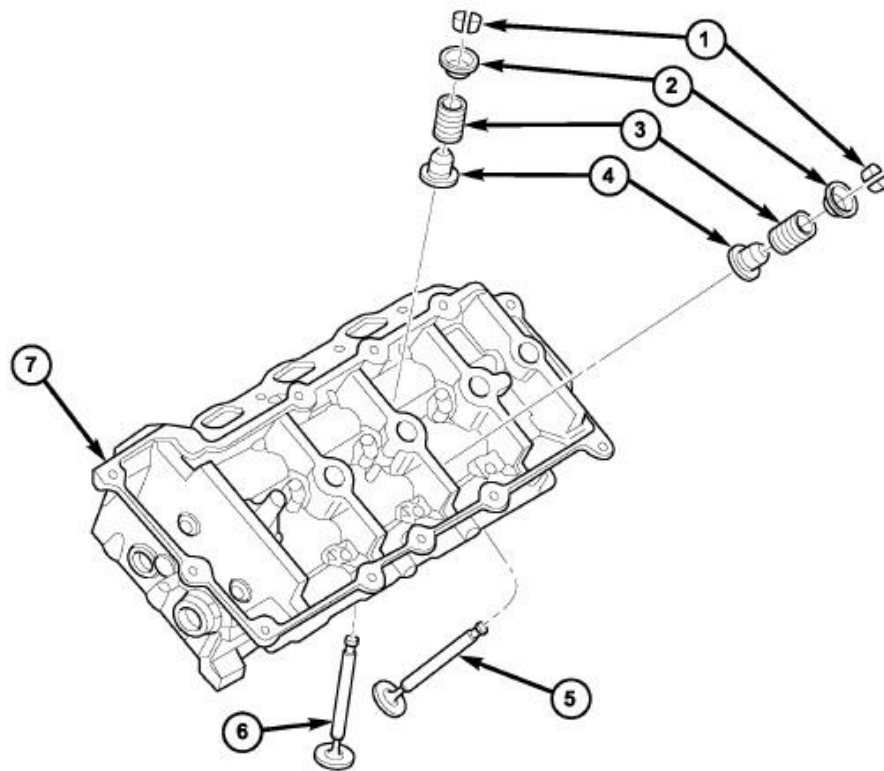


Fig. 146: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

1. If removed, install valve(s) (5 and 6). See **Engine/Cylinder Head/VALVES, Intake and Exhaust - Installation**.

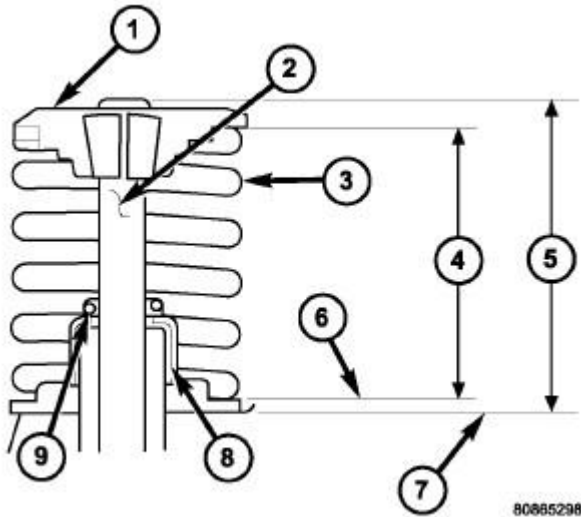


Fig. 147: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

2. If valves or seats have been reground, check valve tip height (5). If valve tip height for intake valve is greater than 47.836 mm (1.883 in.) or 47.837 mm (1.883 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

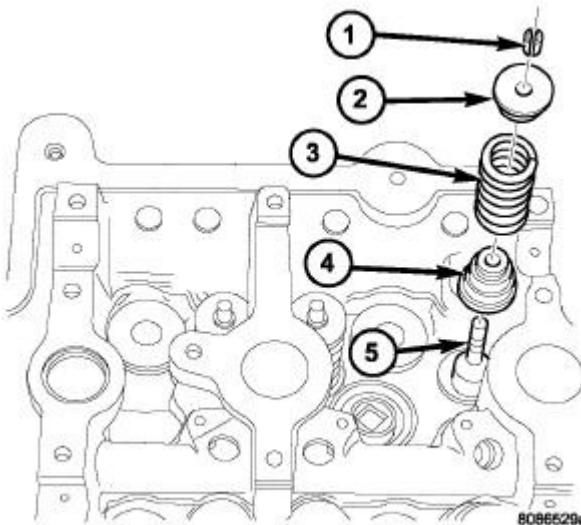


Fig. 148: Valve Seal and Spring
Courtesy of CHRYSLER LLC

3. Install valve seal/spring seat assembly (4) over valve guides on all valve stems (5).

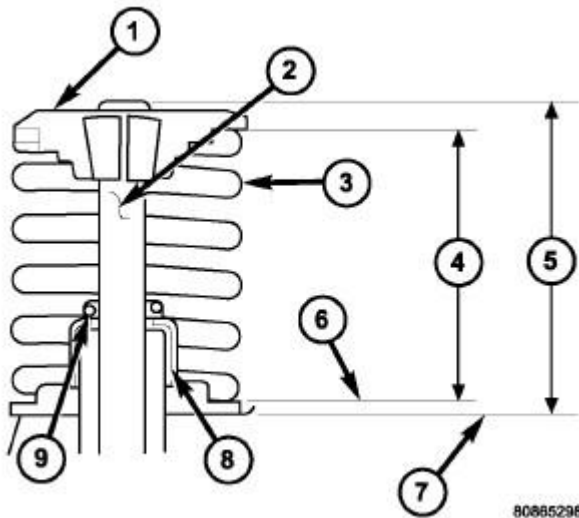


Fig. 149: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

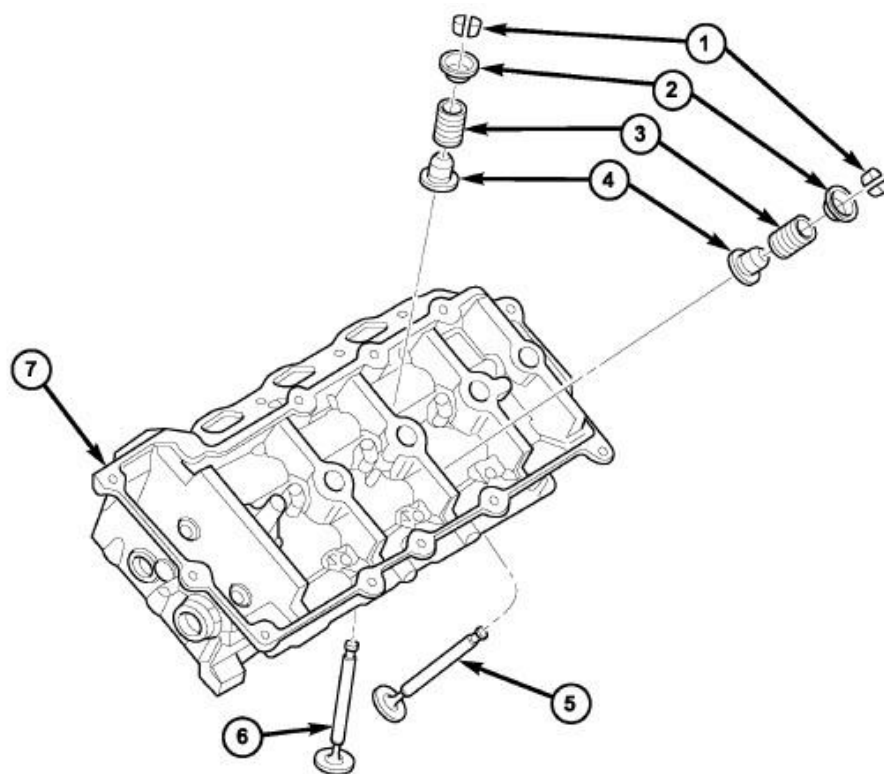
NOTE: Ensure that the garter spring (9) is intact around the top of the rubber seal. Install valve springs (3), valve retainers (1).

4. Compress valve springs with a valve spring compressor. Install locks and release tool. **If valves and/or seats are reground, measure the installed height of springs (4), make sure measurements are taken from top of spring seat (6) to the bottom surface of spring retainer (1).** If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve seal/spring seat (8) to bring spring height back within specification.

VALVES, INTAKE AND EXHAUST

Description

DESCRIPTION



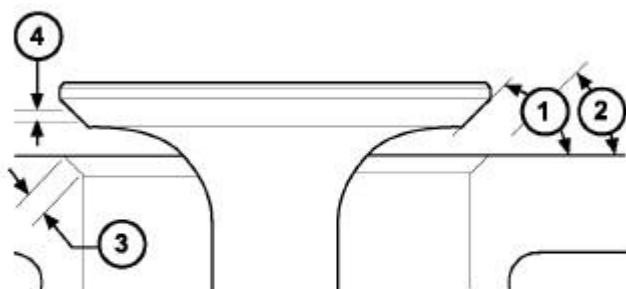
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Fig. 150: Exploded View Of Cylinder Head Components
Courtesy of CHRYSLER LLC

The valves (5 and 6) are made of heat resistant steel, and have chrome plated stems to prevent scuffing. The four valves per cylinder (two intake (6) and two exhaust (5)) are actuated by roller rocker arms, which pivot on stationary lash adjusters. All valves use three bead lock keepers (1) to retain springs (3) and to promote valve rotation.

Standard Procedure

STANDARD PROCEDURE - VALVE AND VALVE SEAT REFACING



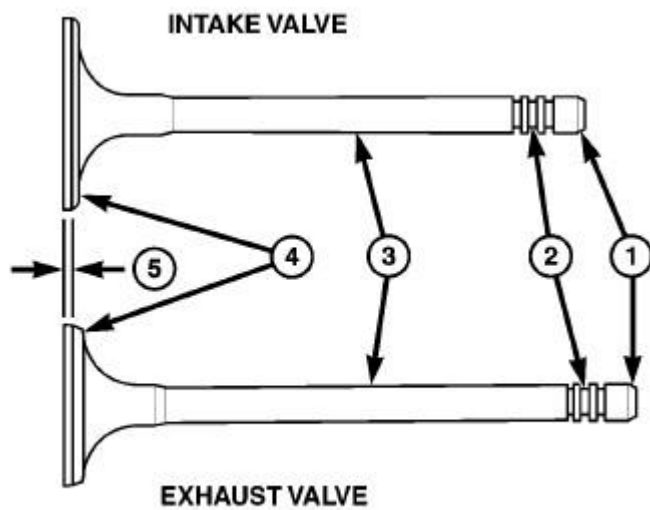
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Fig. 151: Valve Face and Seat
Courtesy of CHRYSLER LLC

- 1 - SEAT WIDTH
- 2 - FACE ANGLE
- 3 - SEAT ANGLE
- 4 - SEAT CONTACT AREA

The intake and exhaust valves have a 44.5 to 45 degree face angle (1). The valve seats (2) have a 45 to 45.5 degree face angle.

VALVES

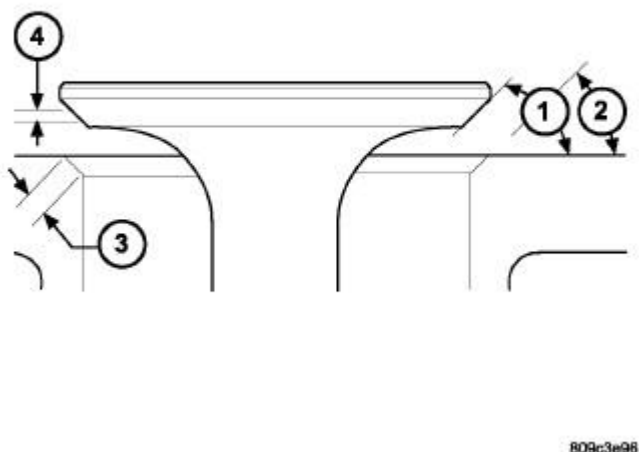


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Fig. 152: Intake and Exhaust Valves

Courtesy of CHRYSLER LLC

Inspect the remaining margin (5) after the valves are refaced. See **Engine - Specifications**.

VALVE SEATS**Fig. 153: Valve Face and Seat**

Courtesy of CHRYSLER LLC

- 1 - SEAT WIDTH
- 2 - FACE ANGLE
- 3 - SEAT ANGLE
- 4 - SEAT CONTACT AREA

NOTE: When refacing 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. Measure the concentricity of valve seat using dial indicator. Total runout should not exceed 0.051 mm (0.002 inch.) total indicator reading.
2. Inspect the valve seat (3) with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat (3) **LIGHTLY** with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face (4), contact is satisfactory. If the blue is transferred to top edge of valve face, then lower valve seat with a 15 degree stone. If the blue is transferred to the bottom edge of valve face, then raise valve seat with a 65 degree stone.

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

3. When seat is properly positioned the width of the intake 1.00 to 1.50 mm (0.0394 to 0.0591 in.) and exhaust seats should be 1.25 to 1.75 mm (0.049 to 0.069 in.).

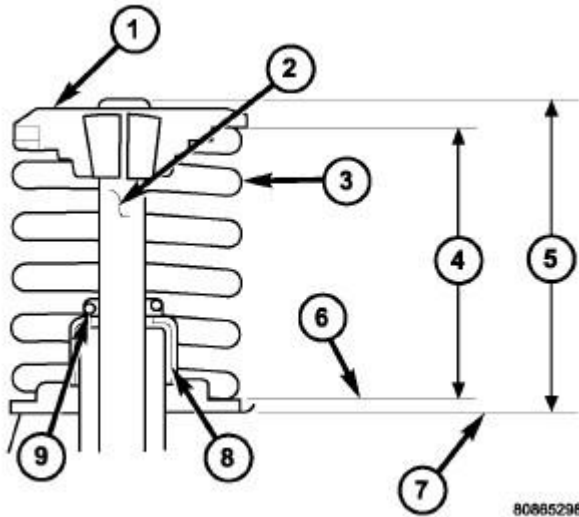


Fig. 154: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

4. Check the valve spring installed height (4) after refacing the valve and seat.

VALVE AND SPRING INSTALLED HEIGHT

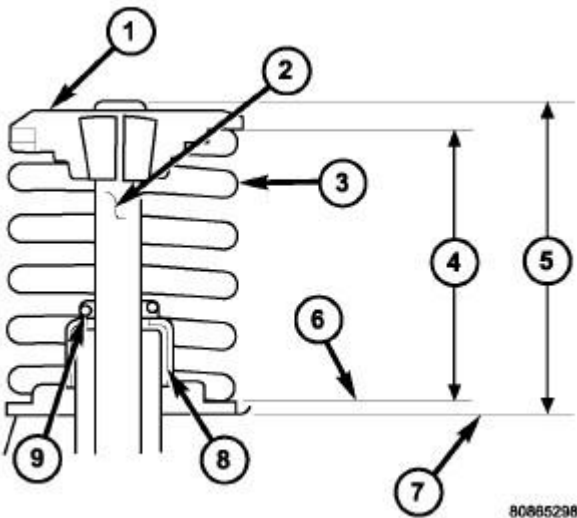


Fig. 155: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

1. Coat valve stems (2) with clean engine oil and insert them in cylinder head.

2. If valves or seats have been refaced, check valve tip height (5). If valve tip height (5) for intake valve is greater than 47.836 mm (1.883 in.) or 47.837 mm (1.883 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.
3. Install valve seal/spring seat assembly (8) over valve guides on all valve stems. Ensure that the garter spring (9) is intact around the top of the rubber seal.

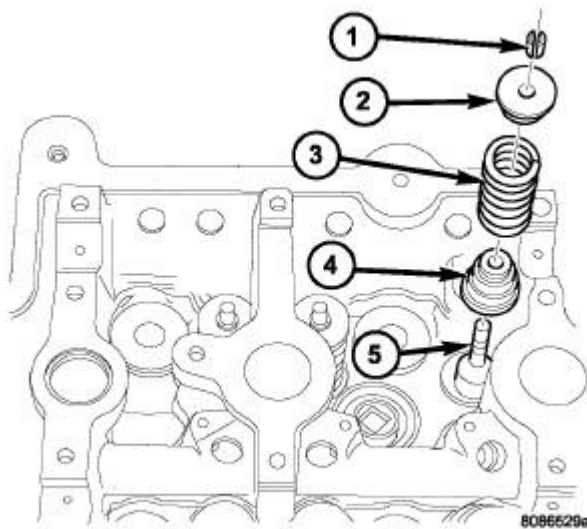


Fig. 156: Valve Seal and Spring
Courtesy of CHRYSLER LLC

4. Position valve springs (3) and retainer (2) on spring seat (4).
5. Compress valve spring with a valve spring compressor.
6. Install retainer locks (1) and release tool.

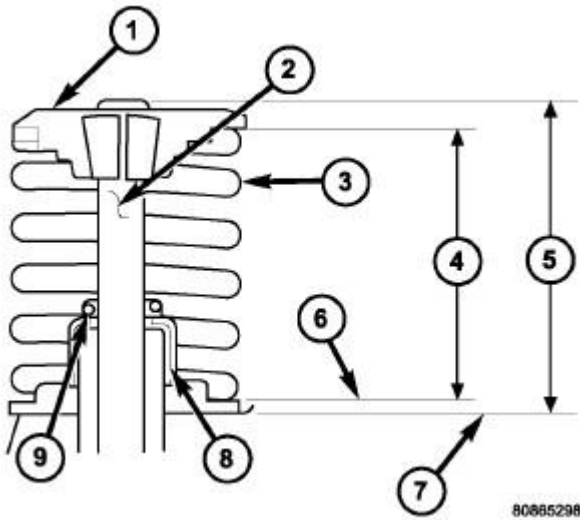


Fig. 157: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

7. If valves and/or seats are refaced, measure the installed height of springs (4). Measurement is taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.

Removal

REMOVAL

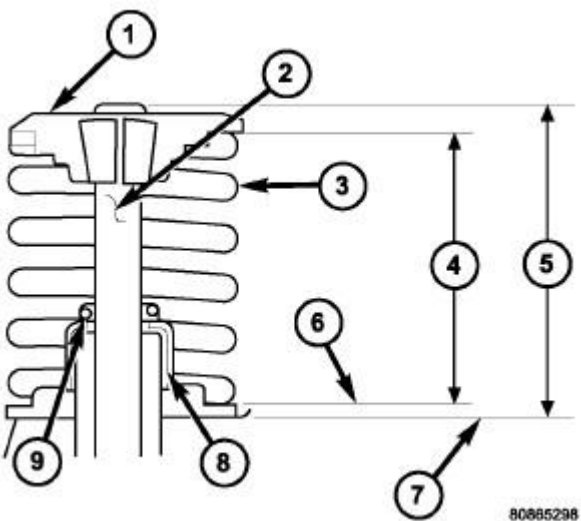


Fig. 158: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

1. Remove cylinder head(s). See [Engine/Cylinder Head - Removal](#).
2. Remove valve spring (3). See [Engine/Cylinder Head/SPRING\(S\), Valve - Removal](#).

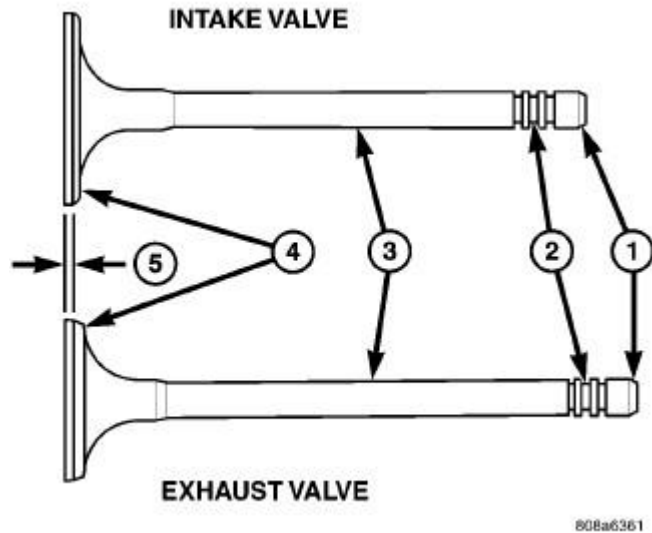


Fig. 159: Intake and Exhaust Valves
Courtesy of CHRYSLER LLC

3. Before removing valves (3), **remove any burrs from valve stem retainer lock grooves (2) and stem tip (1) to prevent damage to the valve guides.**
4. Remove valve. Identify each valve to ensure installation in original location.

Inspection

INSPECTION

VALVES

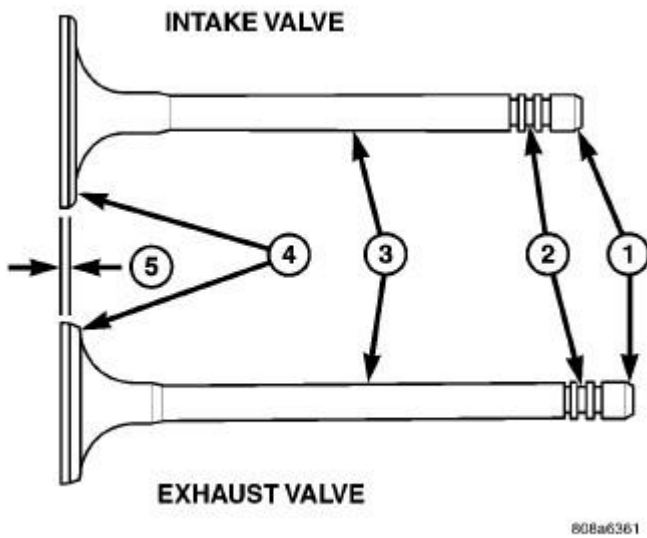


Fig. 160: Intake and Exhaust Valves
Courtesy of CHRYSLER LLC

1. Clean and inspect valves thoroughly. Replace burned, warped and cracked valves.
2. Inspect retainer lock grooves for wear or damage (2).
3. Inspect valve face (4) for wear and pitting.
4. Measure valve stems (3) and margins (5) for wear. For valve specifications, see Engine - Specifications.

NOTE: Valve stems (3) are chrome plated and should not be polished.

VALVE GUIDES

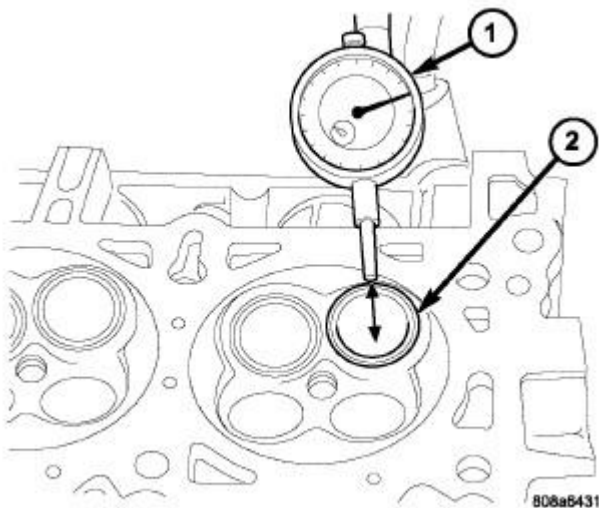


Fig. 161: Measuring Valve Guide Wear - Typical

Courtesy of CHRYSLER LLC

1. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
2. Measure valve stem-to-guide clearance as follows:
3. Install valve (2) into cylinder head so it is 15 mm (0.590 inch.) off the valve seat. A small piece of hose may be used to hold valve in place.
4. Attach dial indicator Tool C-3339A(1) to cylinder head and set it at right angle of valve stem being measured.
5. Move valve to and from the indicator. For clearance specifications, see Engine - Specifications.

NOTE: If stem-to-guide clearance exceeds specifications, you must measure valve stem. If valve stem is within specifications or if guide is loose in cylinder head, replace cylinder head.

Installation

INSTALLATION

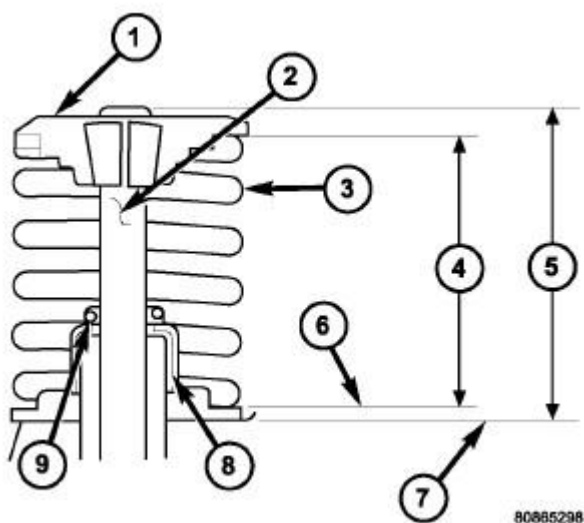


Fig. 162: Valve Tip Height & Valve Spring Installed Height
Courtesy of CHRYSLER LLC

1. Coat valve stems (2) with clean engine oil and insert them in cylinder head.
2. If valves or seats have been reground, check valve tip height (5). If valve tip height (5) for intake valve is greater than 47.836 mm (1.883 in.) or 47.837 mm (1.883 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface (7) to the top of valve stem (2).
3. Install valve stem seals (8). See Engine/Cylinder Head/SEAL(S), Valve Guide - Installation.
4. After installing valve stem seals, make sure the garter spring (9) is in place.
5. Install valve spring (3). See Engine/Cylinder Head/SPRING(S), Valve - Installation.

ENGINE BLOCK

DESCRIPTION

DESCRIPTION

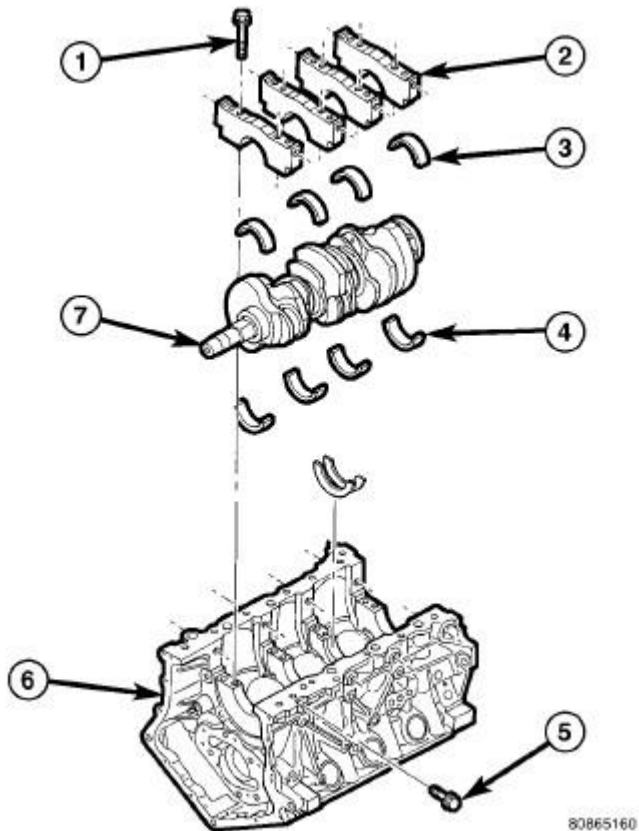


Fig. 163: Identifying Crankshaft Components

Courtesy of CHRYSLER LLC

The cylinder block (6) is made of heat treated aluminum with cast-in-place iron liners. The block is a closed deck design with the right bank forward. To provide high rigidity and improved NVH, the block has cast-in contours and ribs, along with powdered metal main caps (2) each with 6 bolts 4 vertical (1) and 2 horizontal (5). The engine is equipped with a windage tray mounted to the main caps.

The block design allows coolant flow between the cylinder bores and an internal coolant by-pass to the thermostat.

STANDARD PROCEDURE

STANDARD PROCEDURE - CYLINDER BORE HONING

1. Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with

220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

2. Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20-60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

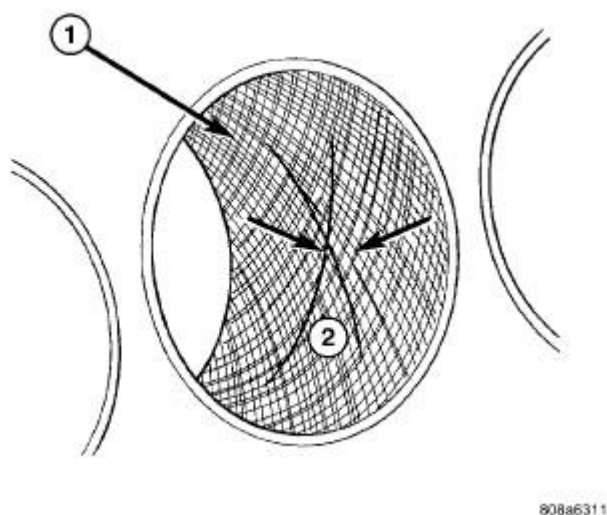


Fig. 164: Cylinder Bore Cross-Hatch Pattern

Courtesy of CHRYSLER LLC

1 - CROSS-HATCH PATTERN 2 - 40°-60°
--

3. Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern (1). When hone marks **intersect** at 40-60 degrees (2), the cross hatch angle is most satisfactory for proper seating of rings .

NOTE: A controlled hone motor speed between 200-300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40-60 degree angle (2). Faster up and down strokes increase the cross-hatch angle.

4. After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be

INSPECTION

INSPECTION

ENGINE BLOCK

1. Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.
2. If new core plugs are to be installed, see **Engine - Standard Procedure**.
3. Examine block and cylinder bores for cracks or fractures.
4. Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

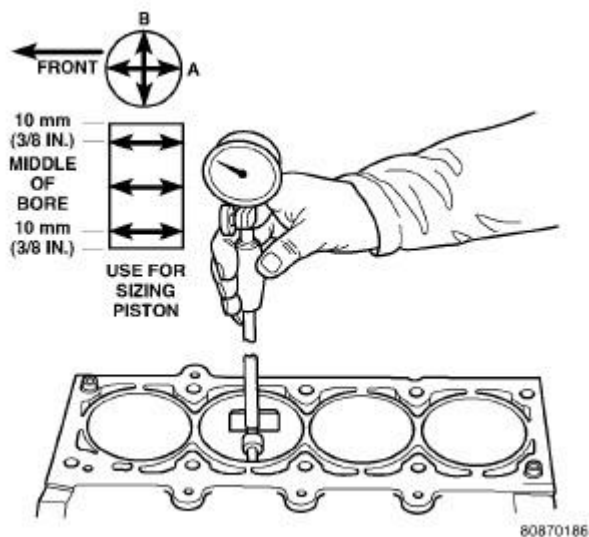


Fig. 165: Checking Cylinder Bore Size
Courtesy of CHRYSLER LLC

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent . See **Engine - Specifications**. If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

Measure the cylinder bore at three levels in directions A and B . Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. See **Engine - Specifications**.

BEARING(S), CONNECTING ROD

Standard Procedure

CONNECTING ROD AND BEARING FITTING

Fit all connecting rods on one bank until complete.

The bearing caps are not interchangeable and should be marked at removal to ensure correct assembly.

CAUTION: Do not use a punch to mark rods as rod damage may occur.

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

The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Also, assure that the hole in upper bearing half aligns with oil squirt hole in rod. Install cap with the tangs on the same side as the rod.

CAUTION: Assure that hole in upper bearing half aligns with hole in connecting rod as engine damage may occur.

Limits of taper on any crankshaft journals should be held to 0.015 mm (0.0006 in.). Limits of out-of-round on any crankshaft journal should be held to 0.010 mm (0.0004 in.). Bearings are available 0.025 mm (0.001 in.) and 0.250 mm (0.010 in.) undersize. **Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.**

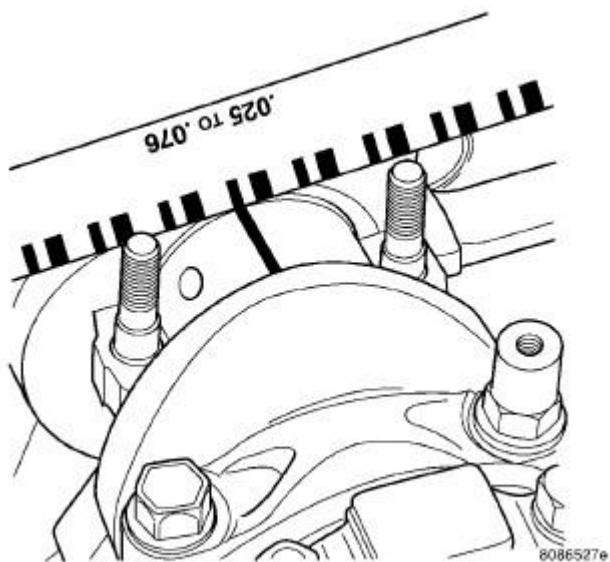


Fig. 166: Checking Connecting Rod Bearing Clearance-Typical

Courtesy of CHRYSLER LLC

1. For measuring Main Bearing Clearance and Connecting Rod Bearing Clearance use plastigage . For more information on using plastigage, see **Engine - Standard Procedure**. Refer to Engine Specifications for bearing clearance specifications. See **Engine - Specifications**.

CONNECTING ROD BOLTS

NOTE: The connecting rod bearing cap bolts must be examined before reuse. If the threads are necked down due to stretching, the bolt(s) must be replaced .

NOTE: Connecting rod bolts are retained in the rod cap with a light press fit. If bolts are to be removed, use a hammer and punch to drive bolts from connecting rod cap using care not to damage fractured cap surface.

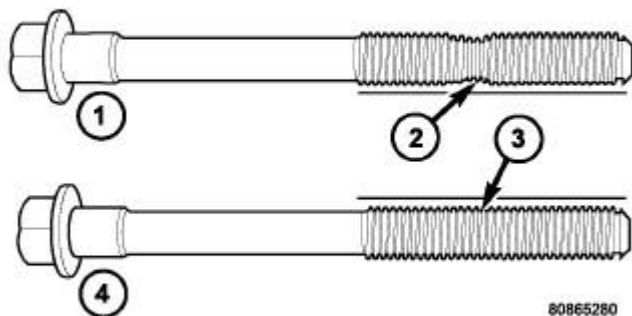


Fig. 167: Checking Cylinder Head Bolts for Stretching (Necking)

Courtesy of CHRYSLER LLC

1. Examine connecting rod bolt for stretching. Stretching can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt should be replaced.
2. Before installing the bolts, lubricate the threads with engine oil.
3. Install bolts finger tight. Then alternately torque each nut to assemble the cap properly.
4. Tighten the nuts to specification. See **Engine - Specifications**.

CONNECTING ROD SIDE CLEARANCE

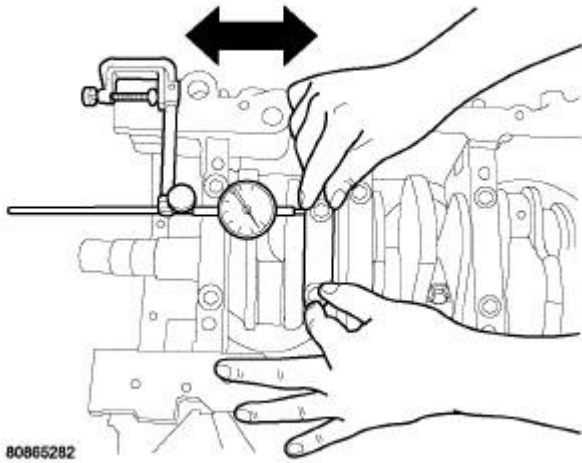


Fig. 168: Measuring Connecting Rod Side Clearance
Courtesy of CHRYSLER LLC

1. Mount a dial indicator to a stationary point on engine. Locate probe perpendicular to and resting against the connecting rod cap being checked. Move connecting rod all the way to rear of its travel. Zero the dial indicator. Move connecting rod forward to limit of travel and read the dial indicator. Compare measurement to specification listed in engine specifications. See **Engine - Specifications**. Repeat procedure for each connecting rod. Turn crankshaft for connecting rod accessibility.

BEARING(S), CRANKSHAFT, MAIN

Standard Procedure

CRANKSHAFT MAIN BEARING FITTING

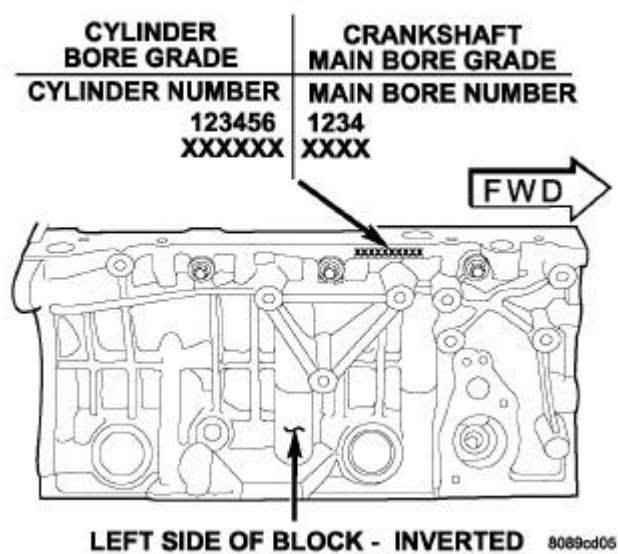


Fig. 169: Cylinder Block Main Bore Grade Marking
 Courtesy of CHRYSLER LLC

The main bearings are "select fit" to achieve proper oil clearances. For main bearing selection, the block and crankshaft have grade identification marks.

The grade marks for the cylinder block main bearing bore grade is located on the pan rail just below the left side engine mount bracket. These marks are read left to right, corresponding to main bore 1, 2, 3, 4.

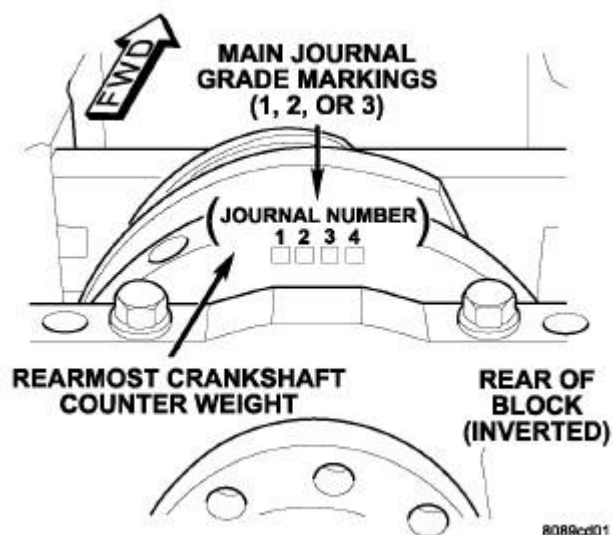


Fig. 170: Crankshaft Main Journal Grade Marking Location
 Courtesy of CHRYSLER LLC

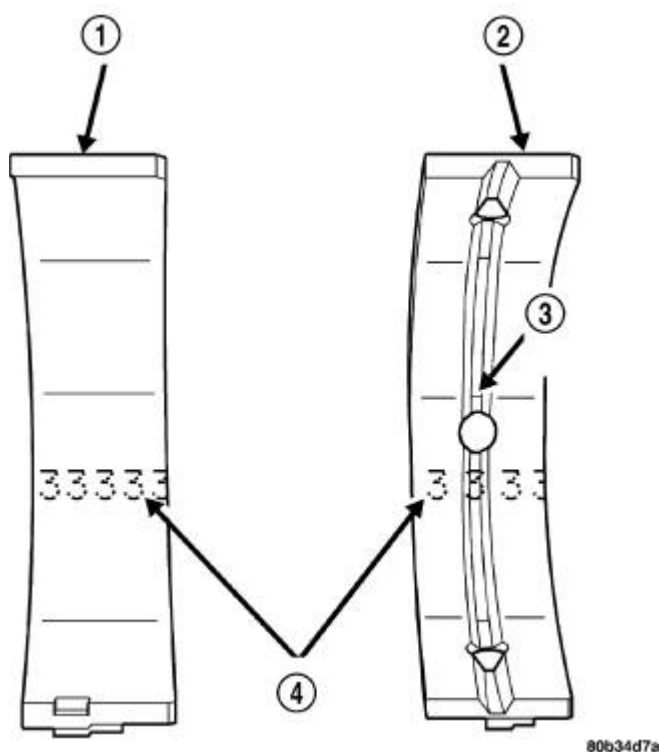
The grade marks for the crankshaft are located on the rearmost crankshaft counter weight as shown in illustration. The crankshaft journal grade marks are read left to right, corresponding with journal number 1, 2, 3,

4.

MAIN BEARING SELECTION CHART - 2.7L

-		Main Bearing Bore Grade Mark		
-		1	2	3
Crankshaft Main Journal Grade Mark	1	(3) standard	(2) +0.003 mm (+0.0001 in.)	(1) +0.006 mm (+0.0002 in.)
	2	(4) -0.003 mm (-0.0001)	(3) standard	(2) +0.003 mm (+0.0001 in.)
	3	(5) -0.006 mm (-0.0002 in.)	(4) -0.003 mm (-0.0001 in.)	(3) standard

Refer to the **MAIN BEARING SELECTION CHART - 2.7L** table to properly select the main bearings. For an example, if the main bore grade is 3 and the journal grade is 2, the proper select fit bearing would be (2) +0.003 mm (+0.0002 in.). Each bearing grade increment of 0.003 mm is for wall thickness so diametrical clearances are adjusted 0.006 mm per select fit class.

**Fig. 171: Main Bearing Grade Marks**

Courtesy of CHRYSLER LLC

NOTE: Service main bearings have a number from 1-5 marked in ink on the bearing surface. For verification, use the **MAIN BEARING SELECTION CHART - 2.7L** table for number to size identification.

The upper main bearing (2) has a oil feed hole and a center groove (3) to allow lubrication of the main journal

and must be properly positioned in the block.

NOTE: Although cylinder bores are graded for size, there is only one piston size.

COLLAR, STRUCTURAL

Removal

REMOVAL

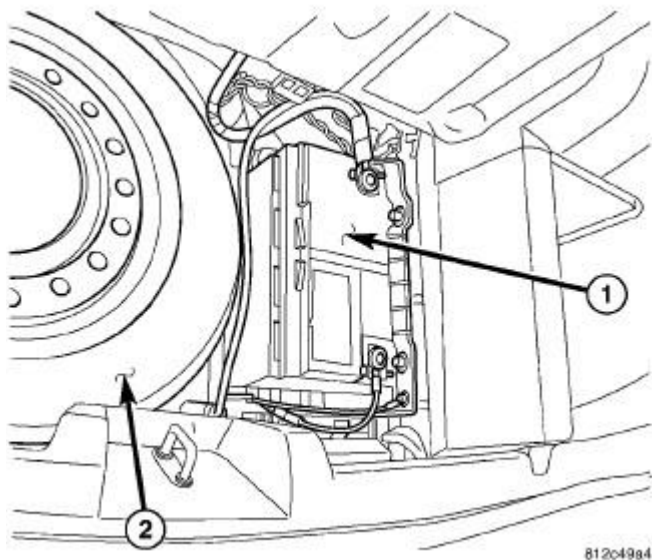


Fig. 172: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in the trunk.
2. Raise vehicle.

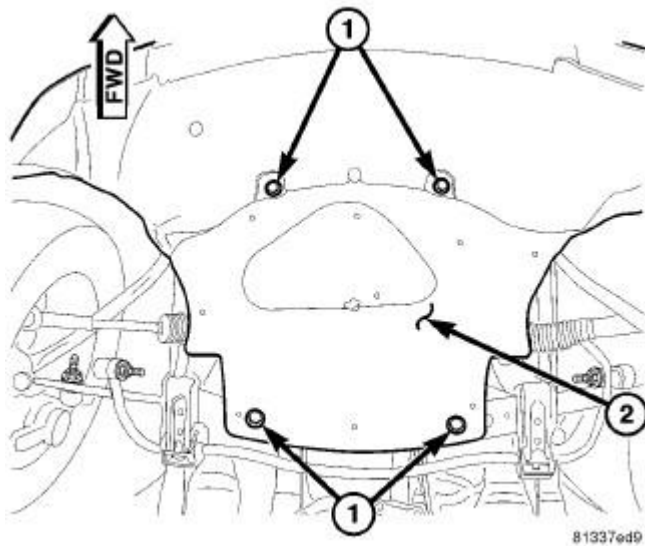


Fig. 173: Lower Splash Shield
Courtesy of CHRYSLER LLC

3. Remove lower splash shield retaining bolts (1) and splash shield (2).

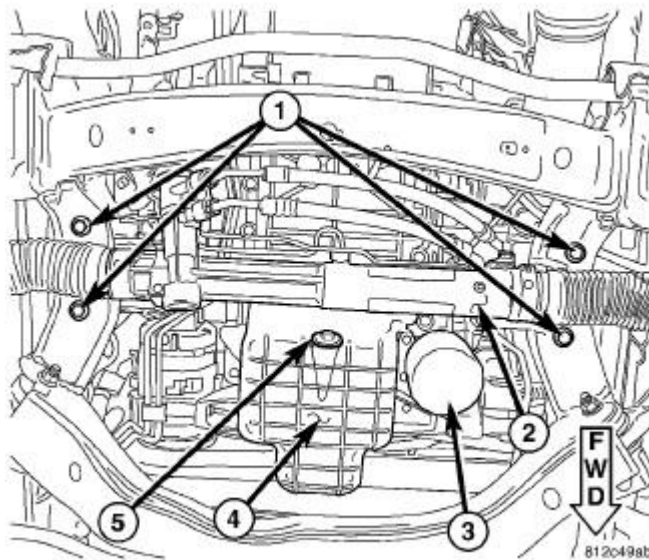


Fig. 174: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

4. Remove oil filter (3).
5. Remove oil pan (4). See Engine/Lubrication/PAN, Oil - Removal.

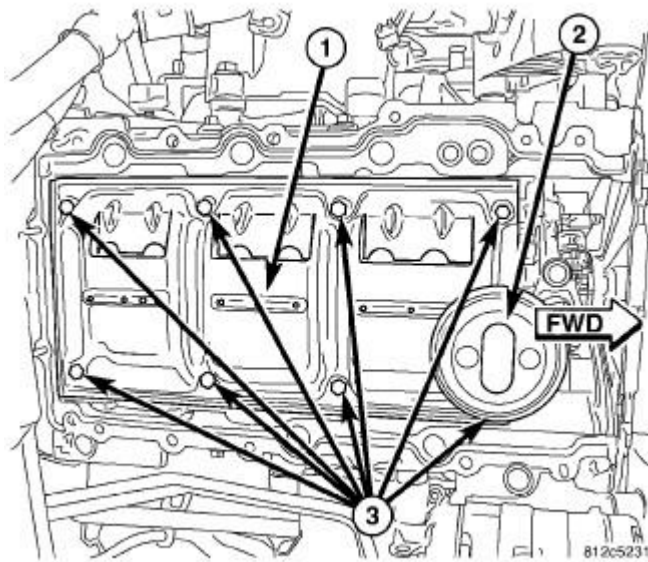


Fig. 175: Windage Tray
Courtesy of CHRYSLER LLC

6. Remove oil pump pickup tube (2).
7. Remove windage tray/outer main bearing cap bolts (3).
8. Remove windage tray (1).

Installation

INSTALLATION

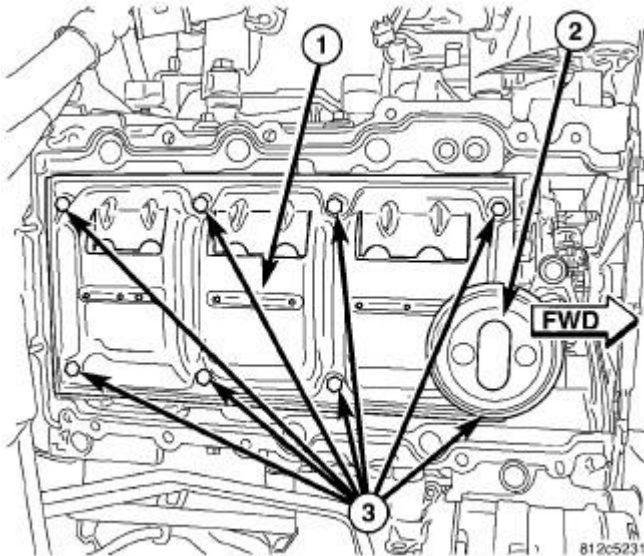


Fig. 176: Windage Tray
Courtesy of CHRYSLER LLC

NOTE: Slots in windage tray should be on the right side of engine. If windage tray is improperly installed, damage to oil pan could result.

1. Install windage tray (1) torque mounting bolts to 27 N.m + 1/4 turn (20 Ft. Lbs. +1/4 turn).
2. Install oil pump pick up tube, torque mounting bolts to 28 N.m (250 In. Lbs.).

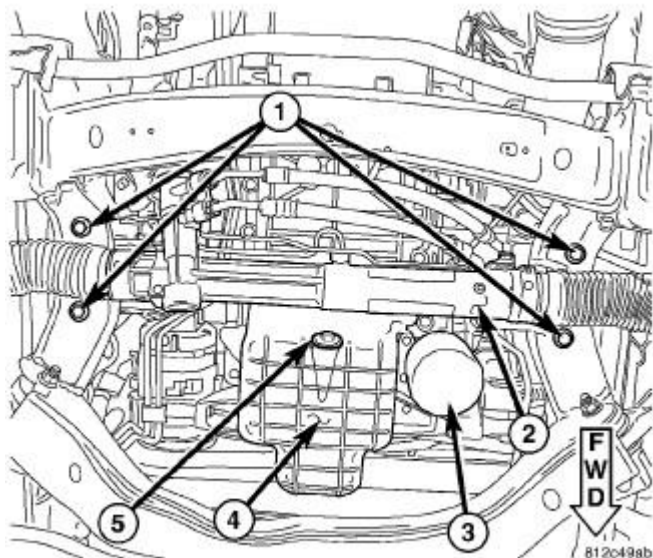


Fig. 177: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

3. Install oil pan. See Engine/Lubrication/PAN, Oil - Installation.
4. Install oil filter (3).

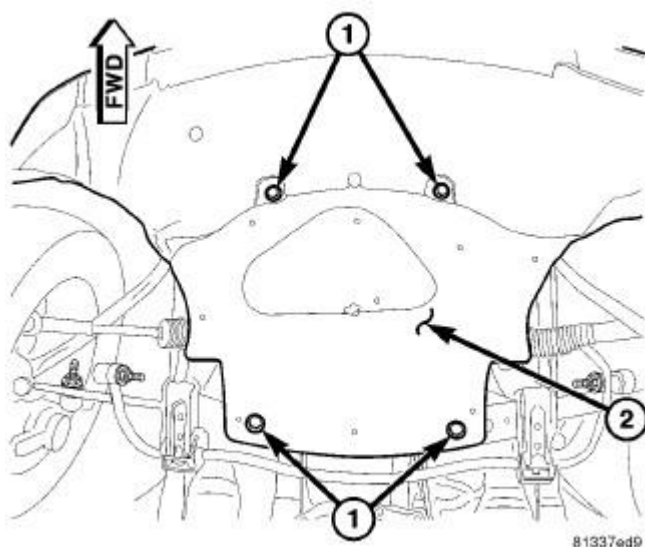


Fig. 178: Lower Splash Shield

Courtesy of CHRYSLER LLC

5. Install lower splash shield (2) and retaining bolts (1).
6. Lower vehicle.
7. Fill with correct grade of oil.

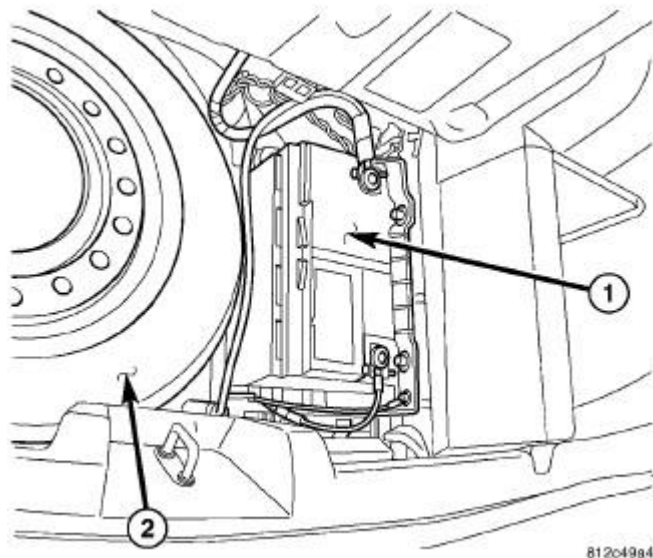


Fig. 179: Locating Battery
Courtesy of CHRYSLER LLC

8. Connect negative battery (1) cable located in trunk.
9. Start engine and check for leaks.

COVER, STRUCTURAL DUST**Removal****REMOVAL**

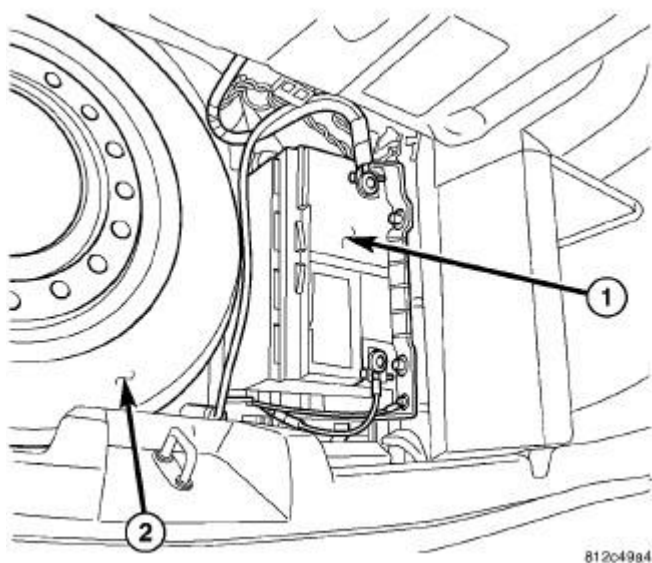


Fig. 180: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.

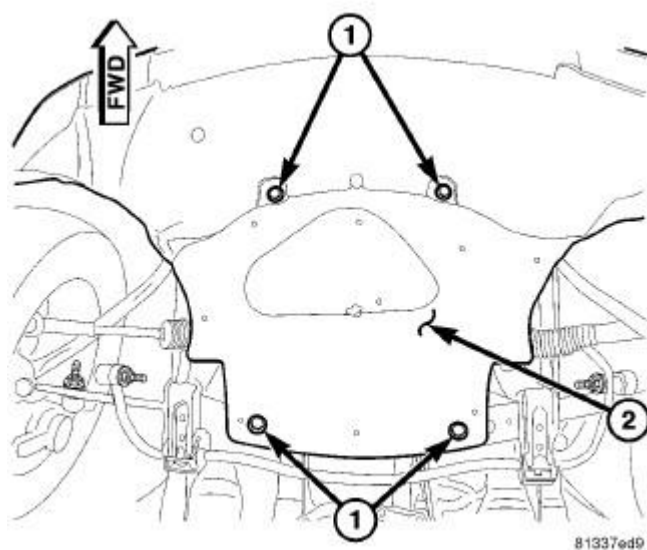


Fig. 181: Lower Splash Shield
Courtesy of CHRYSLER LLC

2. Raise vehicle on hoist.
3. Remove lower splash shield retaining bolts (1) and splash shield (2).

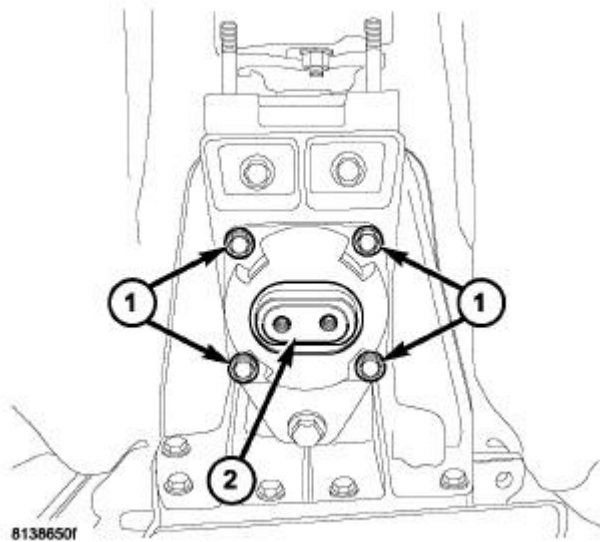


Fig. 182: Removing Transmission Mount Bolts
Courtesy of CHRYSLER LLC

4. Remove transmission mount bolts (2).
5. Place a transmission jack under the transmission pan and raise engine and transmission.

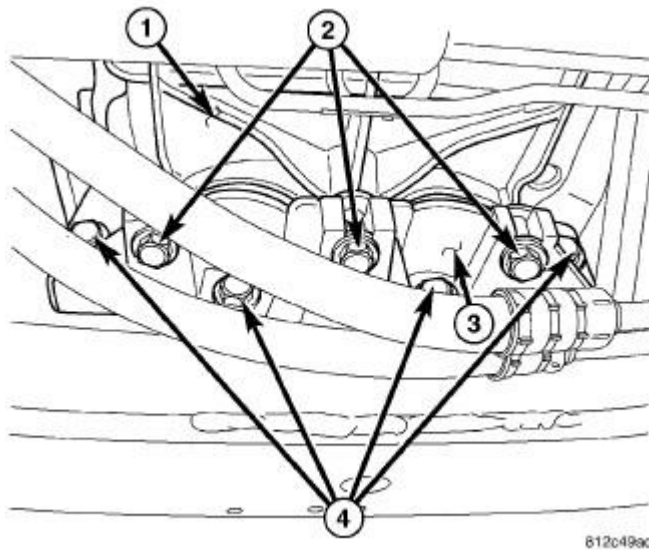


Fig. 183: Removing/Installing Structural Collar Bolts At Oil Pan & Transmission Bell Housing
Courtesy of CHRYSLER LLC

6. Remove bolts attaching structural collar to oil pan (3) and transmission bell housing (4).

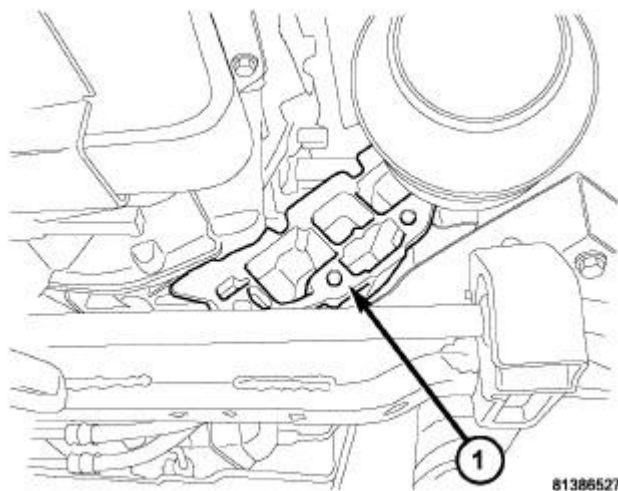


Fig. 184: Removing/Installing Structural Collar
Courtesy of CHRYSLER LLC

7. Move structural collar (1) to the right.
8. Remove structural collar (1) out towards the rear.

Installation

INSTALLATION

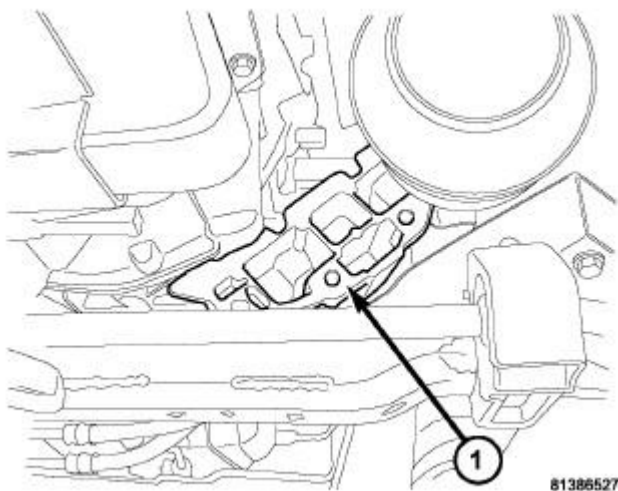


Fig. 185: Removing/Installing Structural Collar
Courtesy of CHRYSLER LLC

1. Install structural collar (1) from the right rear.

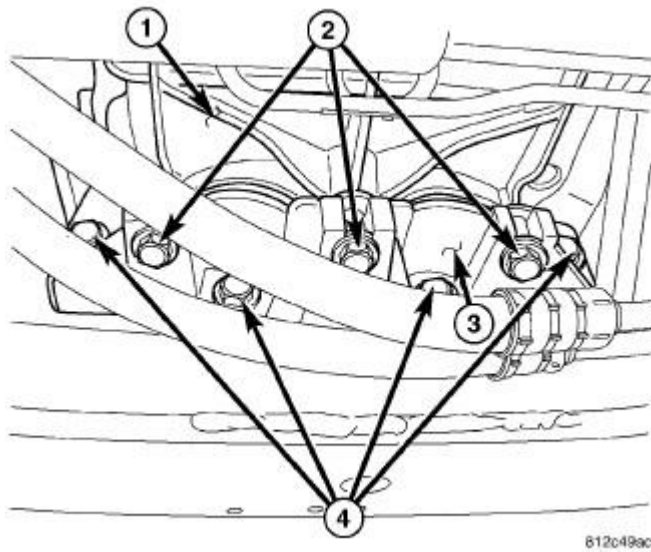


Fig. 186: Removing/Installing Structural Collar Bolts At Oil Pan & Transmission Bell Housing
Courtesy of CHRYSLER LLC

CAUTION: The structural collar must be tightened using this service procedure, or damage to transmission case and/or oil pan may occur.

2. Position structural collar (3) in place.
3. Finger tighten all bolts (2), (4).

NOTE: Make sure that structural collar (3) is flush with the oil pan (1) and the transmission bell housing.

4. Install the vertical collar bolts (2) to oil pan, pre-torque bolts to 1.1 N.m (10 in. lbs.).
5. Install the horizontal collar bolts (4) to transmission and tighten to 55 N.m (40 ft. lbs.).
6. Starting with the center vertical bolts and working outward, final torque all bolts to 55 N.m (40 ft. lbs.).

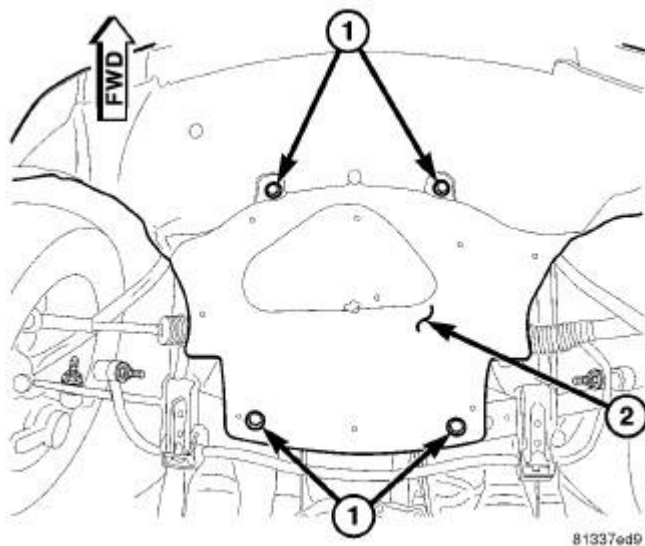


Fig. 187: Lower Splash Shield
Courtesy of CHRYSLER LLC

7. Install lower splash shield (2) and retaining bolts (1).
8. Lower vehicle.

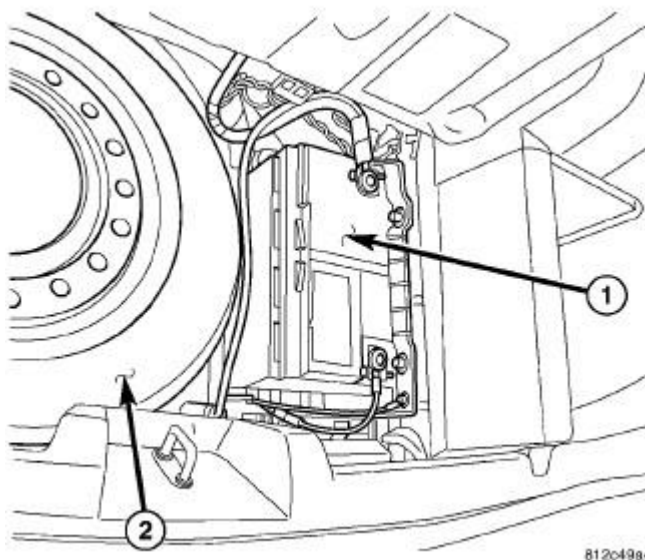


Fig. 188: Locating Battery
Courtesy of CHRYSLER LLC

9. Connect negative battery (1) cable.

CRANKSHAFT

Description

DESCRIPTION

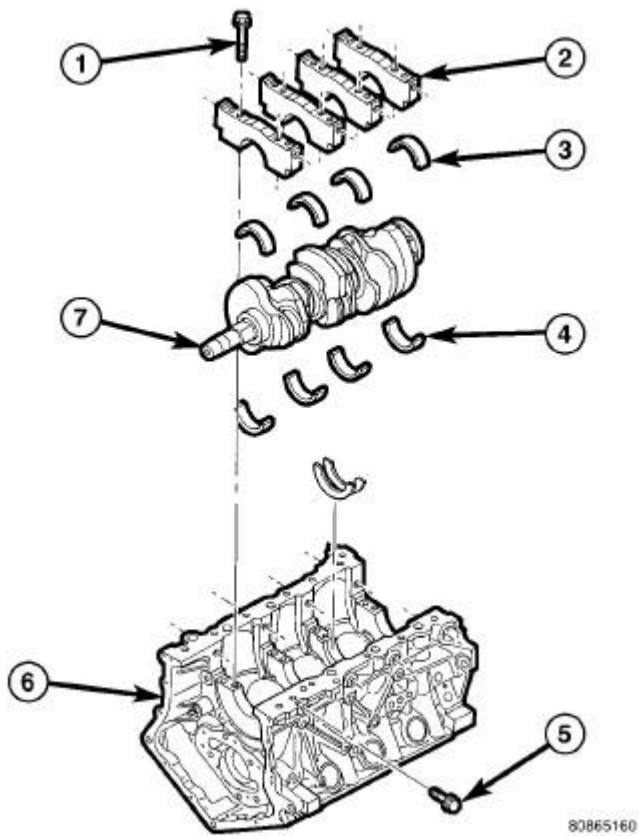


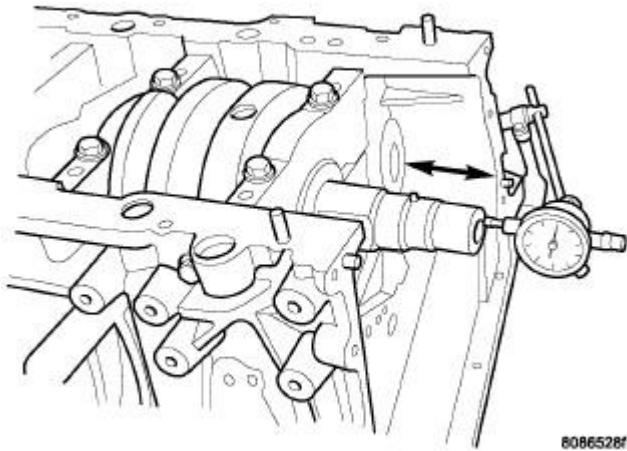
Fig. 189: Identifying Crankshaft Components
Courtesy of CHRYSLER LLC

The crankshaft (7) is constructed of a forged micro alloy steel. The six throw, nine counterweight crankshaft is supported by four select fit main bearings with the number three serving as the thrust washer location. The select fit identification markings will be on the rear side of the number nine (rearmost) counterweight. The six separate connecting rod throws are an even-firing design which reduces torque fluctuations while a vibration damper is used to control torsional vibration.

The crankshaft oil seals are a one piece design. The front seal is retained by the timing chain cover, and the rear seal is part of a housing that attaches to the cylinder block.

Standard Procedure

STANDARD PROCEDURE - CRANKSHAFT END PLAY

**Fig. 190: CHECKING CRANKSHAFT END PLAY**

Courtesy of CHRYSLER LLC

1. Mount a dial indicator to a stationary point at front of engine. Locate the probe perpendicular against nose of crankshaft .
2. Move crankshaft all the way to the rear of its travel.
3. Zero the dial indicator.
4. Move crankshaft all the way to the front and read the dial indicator. For crankshaft end play clearances, see **Engine - Specifications.**

Removal

REMOVAL

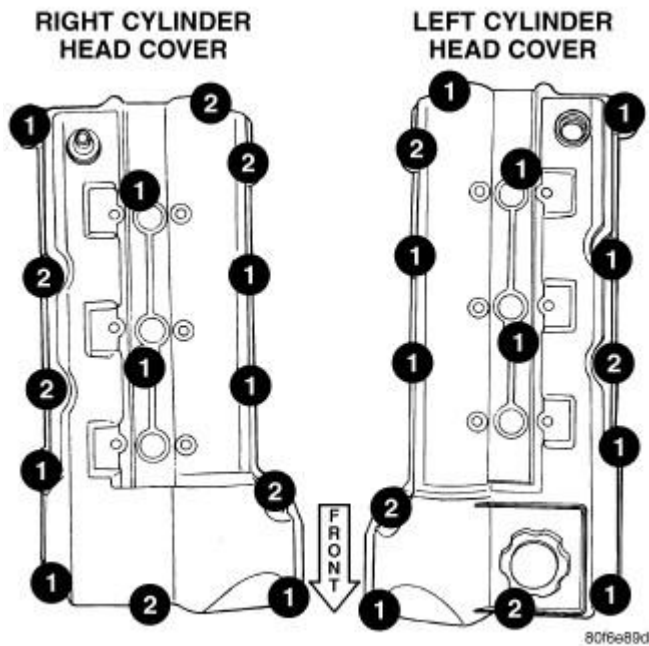


Fig. 191: Cylinder Head Cover Fasteners
Courtesy of CHRYSLER LLC

1. Drain engine oil and remove oil filter. See Engine/Lubrication/OIL - Standard Procedure.
2. Remove engine from vehicle. See Engine - Removal.
3. Mount engine on an engine stand.
4. Remove oil pan and oil pick-up tube. See Engine/Lubrication/PAN, Oil - Removal.
5. Remove idler pulley bracket for accessory drive belt.
6. Remove upper intake manifold. See Engine/Manifolds/MANIFOLD, Intake - Removal.
7. Remove cylinder head covers. See Engine/Cylinder Head/COVER(S), Cylinder Head - Removal.

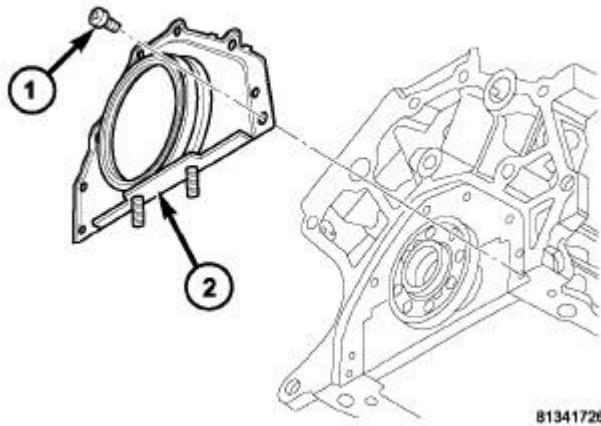


Fig. 192: Oil Seal Retainer

Courtesy of CHRYSLER LLC

8. Remove timing chain cover. See **Engine/Valve Timing/COVER(S), Engine Timing - Removal.**
9. Remove primary timing chain. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal.**
10. Remove crankshaft sprocket. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal.**
11. Remove oil pump. See **Engine/Lubrication/PUMP, Engine Oil - Removal.**
12. Remove crankshaft rear oil seal retainer (2). See **Engine/Engine Block/SEAL, Crankshaft Oil - Removal.**

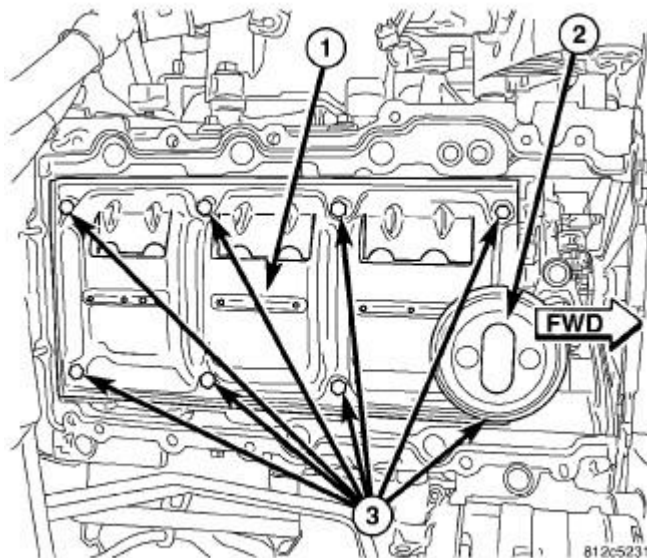


Fig. 193: Windage Tray

Courtesy of CHRYSLER LLC

13. Remove windage tray (1).

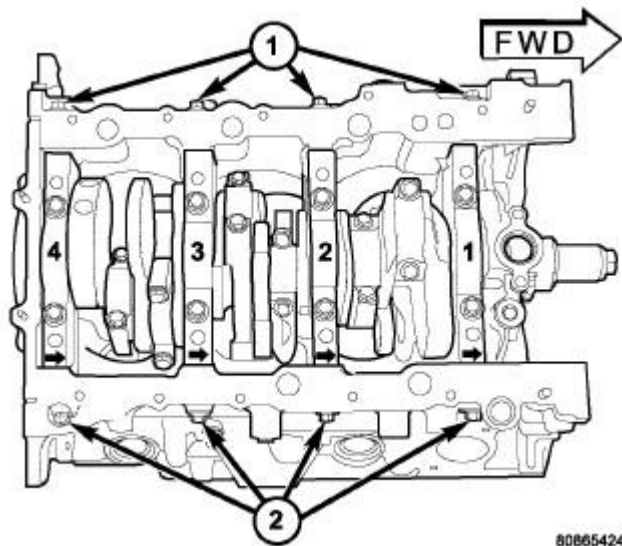


Fig. 194: Main Bearing Cap Identification

Courtesy of CHRYSLER LLC

14. Turn crankshaft until connecting rod cap to be removed is accessible.

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

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

15. Mark connecting rod bearing cap positions using a permanent ink marker or scribe tool. Also scribe a location reference mark from the #3 main bearing cap to the engine block to use as a guide during reassembly.
16. Remove connecting rod bearing caps. Use care to prevent damage to the crankshaft bearing surfaces.

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

17. Remove main bearing tie bolts (1) and (2).

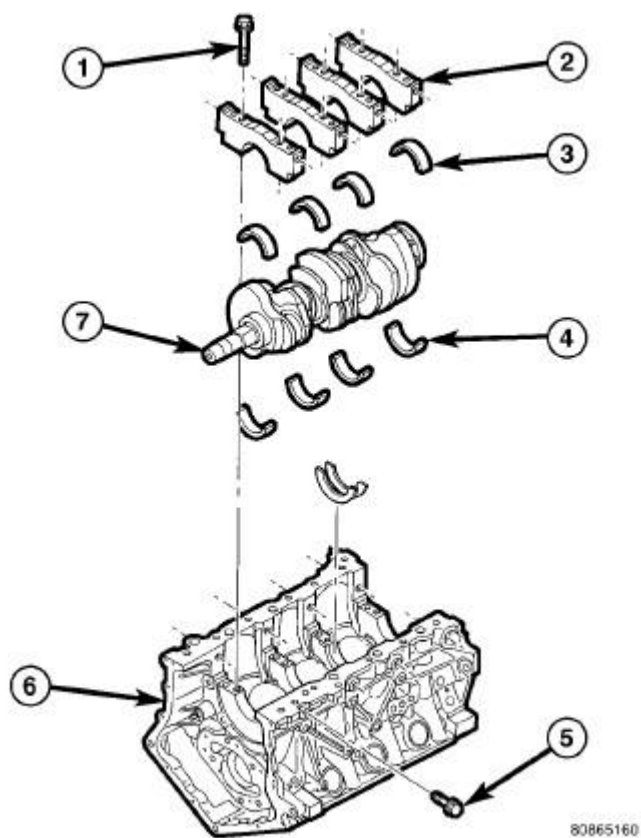


Fig. 195: Identifying Crankshaft Components
Courtesy of CHRYSLER LLC

18. Remove main bearing cap bolts (1) and main bearing caps (2).

CAUTION: When removing crankshaft, use care not to damage bearing surfaces on the crankshaft.

19. Remove crankshaft (7) from cylinder block (6).

Installation

INSTALLATION

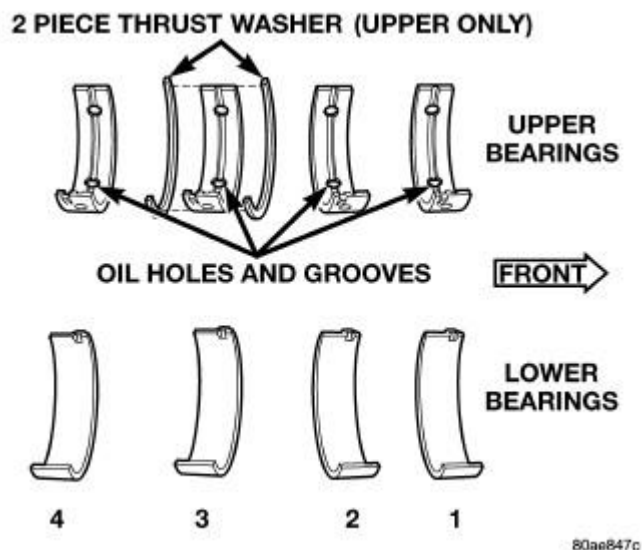


Fig. 196: Main Bearing Identification
Courtesy of CHRYSLER LLC

NOTE: Upper and lower bearing halves are NOT interchangeable.

CAUTION: Main bearings are select fit. See Engine/Engine Block/BEARING(S), Crankshaft - Standard Procedure.

1. Install crankshaft upper main bearings in cylinder block. Ensure the tangs engage the slots in the block and oil holes in bearings line up with oil holes in cylinder block. See Engine/Engine Block/BEARING(S), Crankshaft - Standard Procedure.
2. Lubricate upper main bearing halves with engine oil.

CAUTION: When installing crankshaft, use care not to damage bearing surfaces on the crankshaft.

3. Install crankshaft.

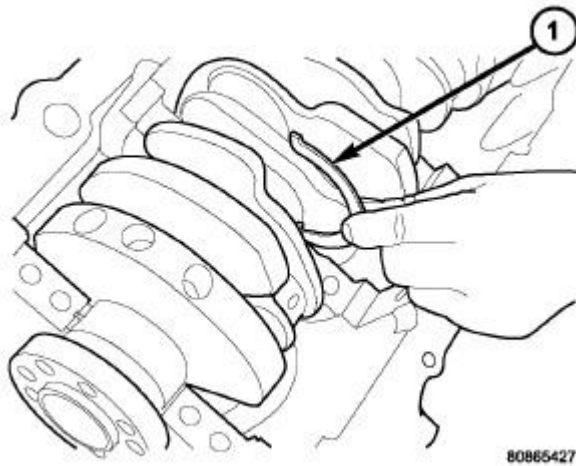


Fig. 197: Thrust Washer - Installation
Courtesy of CHRYSLER LLC

NOTE: Make sure that the coated and oil groove side of crankshaft thrust washer faces the crankshaft thrust surface.

4. Push crankshaft forward. Lubricate and install the front thrust washer (1) by rolling the thrust washer onto the machined shelf between the No. 3 upper main bulk head and crankshaft thrust surface.
5. Move crankshaft rearward. Lubricate and install the rear thrust washer by rolling the thrust washer onto the machined shelf between the No. 3 upper main bulk head and crankshaft thrust surface.

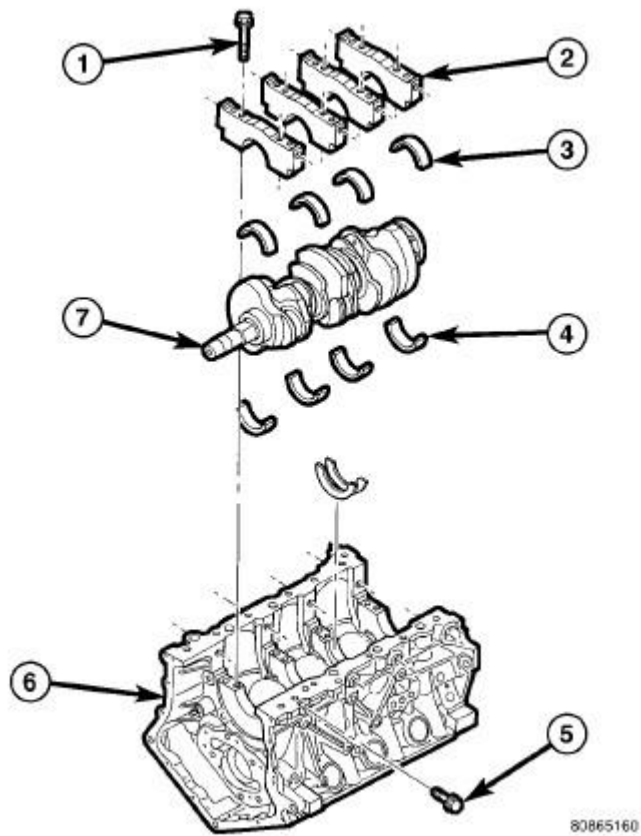
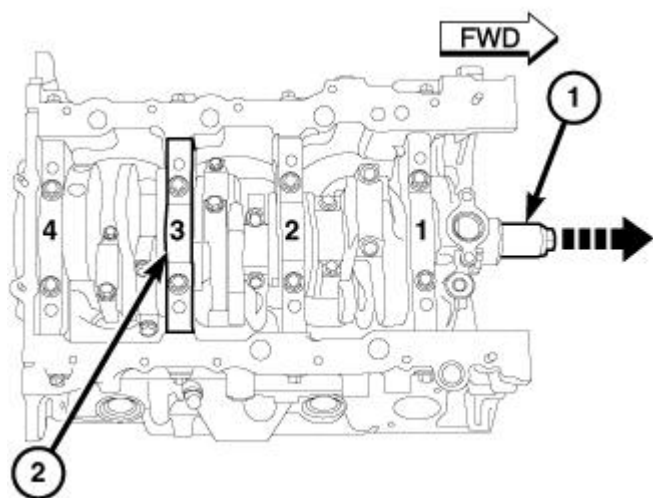


Fig. 198: Identifying Crankshaft Components
 Courtesy of CHRYSLER LLC

6. Install lower main bearings (3) into main bearing caps (2).
7. Lubricate lower main bearings (3) with clean engine oil.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

8. Install each main cap (2) and tighten inner bolts (1) finger tight. Align the location reference mark scribed on the #3 main bearing cap during disassembly.

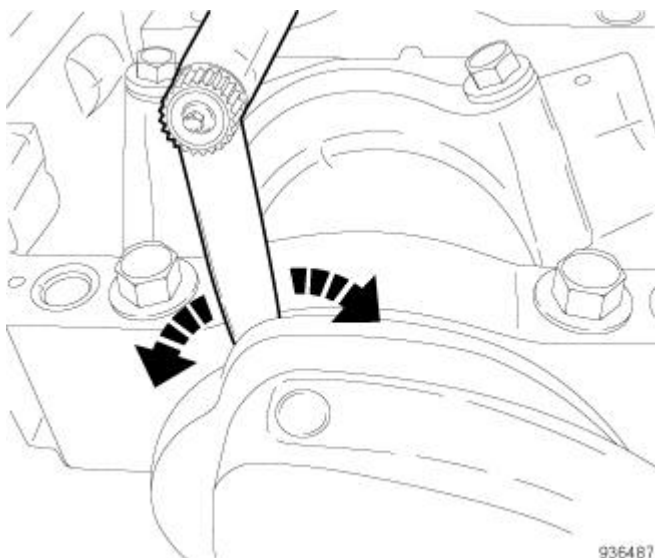


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Fig. 199: Moving Crankshaft Forward So Crankshaft Face Is Tight Against Thrust Bearing
Courtesy of CHRYSLER LLC

CAUTION: The #3 main bearing cap must be centered over the inner bolt holes located on the block. Failure to center the bearing cap can result in contact with the crankshaft counterweights and thrust bearing failure.

9. Verify that the #3 main bearing cap is properly centered over the inner bolt holes located in the block:
 - a. Tighten main bearing cap inner bolts to 20 N.m (15 ft. lbs.).
 - b. Move crankshaft (1) forward to limit of travel so that crankshaft thrust face (2) is tight against thrust bearing.



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Fig. 200: Sliding Feeler Gauge Side-To-Side Across Bearing Cap
Courtesy of CHRYSLER LLC

- c. Verify that a 0.25 mm (0.010 inch) shim or feeler gage will fit between the #3 main cap (rear face) and the crankshaft thrust face. Slide the gage side-to-side all of the way across the cap making sure that the clearance at all areas exceeds 0.25 mm (0.010 inch). The feeler gage should slide all the way down to the #3 main journal.

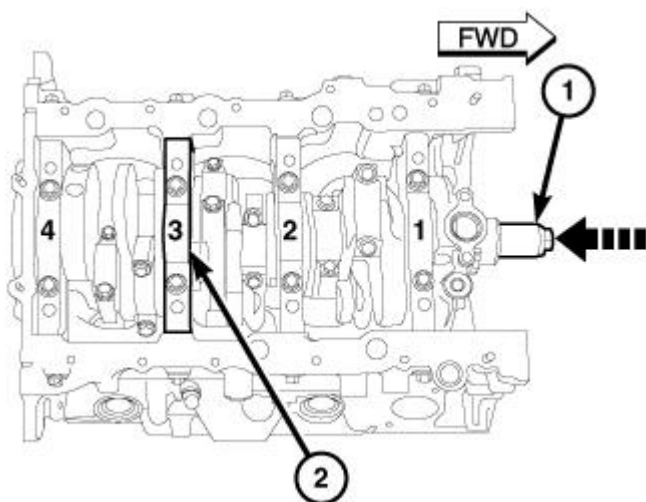
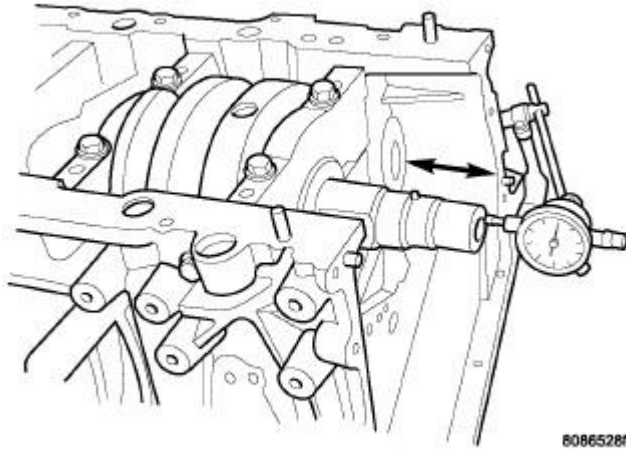


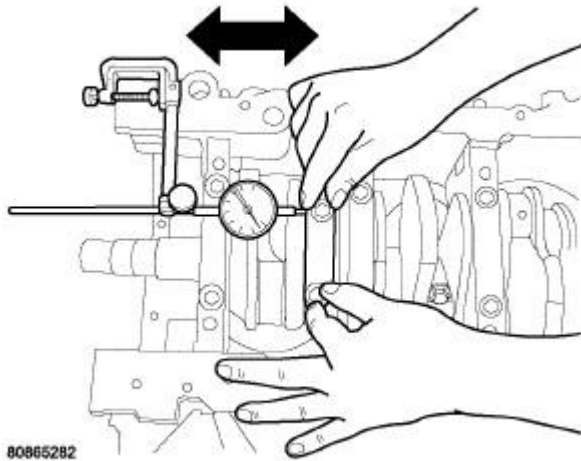
Fig. 201: Moving Crankshaft Rearward So Crankshaft Face Is Tight Against Thrust Bearing
Courtesy of CHRYSLER LLC

- d. Move crankshaft (1) rearward to limit of travel so that crankshaft thrust face (2) is tight against thrust bearing.
- e. Verify that a 0.25 mm (0.010 inch) shim or feeler gage will fit between the #3 main cap (front face) and the crankshaft thrust face. Slide the gage side-to-side all of the way across the cap making sure that the clearance at all areas exceeds 0.25 mm (0.010 inch). The feeler gage should slide all the way down to the #3 main journal.
- f. A properly centered #3 main bearing cap has a minimum of 0.25 mm (0.010 inch) clearance in both the forward and rearward crankshaft positions. If measured clearance is less than 0.25 mm (0.010 inch), loosen and reposition #3 main bearing cap until this minimum clearance can be verified by repeating this procedure.

**Fig. 202: CHECKING CRANKSHAFT END PLAY**

Courtesy of CHRYSLER LLC

10. Following verification of proper #3 bearing cap centering, finish tightening the main bearing cap inner bolts an additional 90° turn.
11. Measure crankshaft end play. See **Engine/Engine Block/CRANKSHAFT - Standard Procedure.**

**Fig. 203: Measuring Connecting Rod Side Clearance**

Courtesy of CHRYSLER LLC

12. Install connecting rods and measure side clearance. See **Engine/Engine Block/BEARING(S), Connecting Rod - Standard Procedure.**

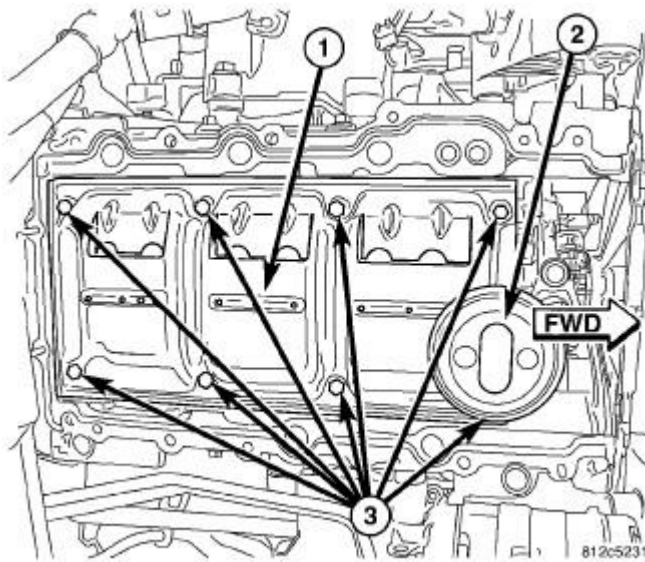


Fig. 204: Windage Tray
Courtesy of CHRYSLER LLC

NOTE: The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, and lastly the main cap tie (horizontal) bolts.

13. Install windage tray (1) with the slots to right side of engine. Lubricate bolts (3) with engine oil and tighten to 27 N.m + 90° Turn (20 ft. lbs. + 90° turn).

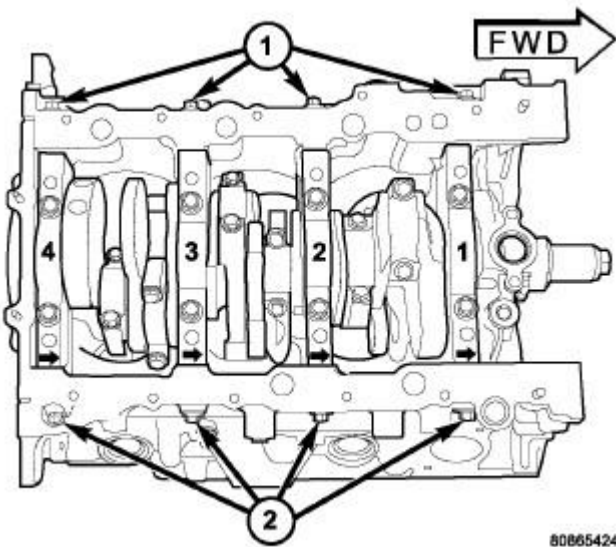


Fig. 205: Main Bearing Cap Identification
Courtesy of CHRYSLER LLC

14. Install the main cap tie (horizontal) bolts (1) and (2) and tighten to 28 N.m (250 in. lbs.).
15. Install rear crankshaft oil seal retainer and oil seal assembly. Refer to **Engine/Engine Block/SEAL, Crankshaft Oil - Installation**.

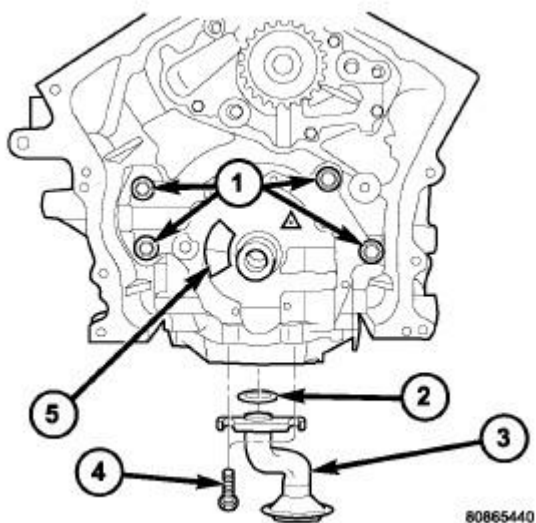


Fig. 206: Oil Pump and Pick-up Tube
Courtesy of CHRYSLER LLC

16. Install oil pump assembly (5). See **Engine/Lubrication/PUMP, Engine Oil - Installation**.
17. Install oil pick-up tube (3) and O-ring (2). Tighten bolts (4) to 28 N.m (250 in. lbs.).
18. Install oil pan gasket, oil pan, and oil filter. See **Engine/Lubrication/PAN, Oil - Installation**.
19. Install crankshaft sprocket. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Installation**.
20. Install timing chain. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Installation**.
21. Install timing chain cover. See **Engine/Valve Timing/COVER(S), Engine Timing - Installation**.

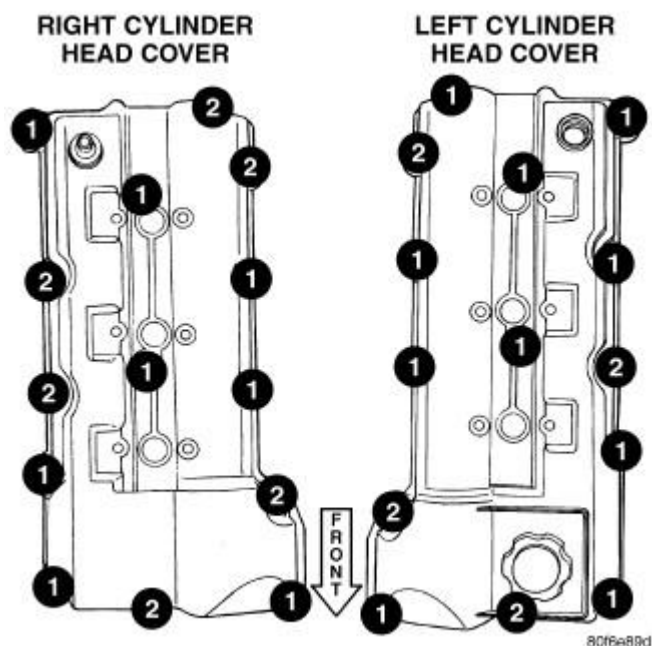


Fig. 207: Cylinder Head Cover Fasteners

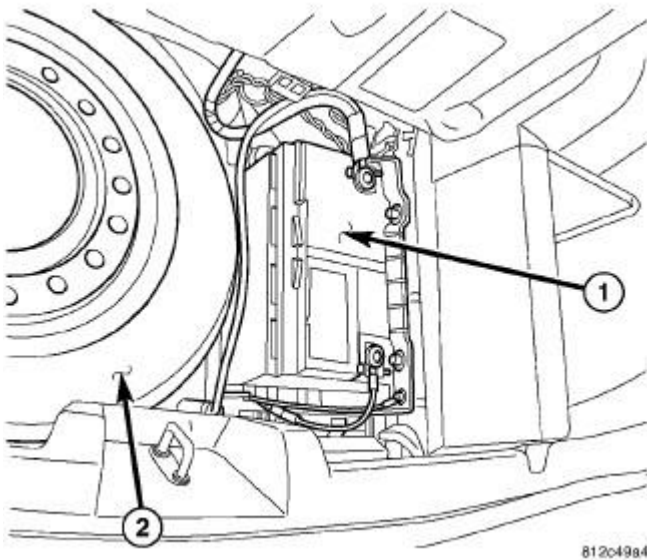
Courtesy of CHRYSLER LLC

22. Install cylinder head covers. See Engine/Cylinder Head/COVER(S), Cylinder Head - Installation.
23. Install oil dipstick tube.
24. Install engine assembly. See Engine - Installation.
25. Fill engine crankcase with proper oil to correct level. See Engine/Lubrication/OIL - Standard Procedure.
26. Fill with coolant. Refer to Cooling - Standard Procedure.
27. Start engine and check for leaks.

DAMPER, VIBRATION

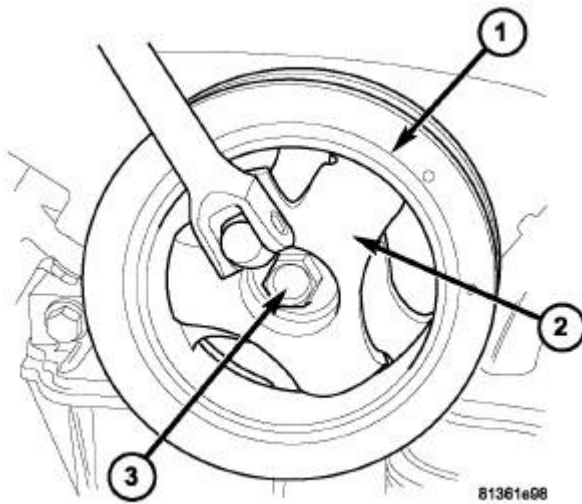
Removal

REMOVAL

**Fig. 208: Locating Battery**

Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.
2. Remove accessory drive belts. Refer to Cooling/Accessory Drive/BELT, Serpentine - Removal .

**Fig. 209: DAMPER HOLDER**

Courtesy of CHRYSLER LLC

3. Use special tool 9365 Damper Holder (2) to hold damper (1) while removing attaching bolt (3).

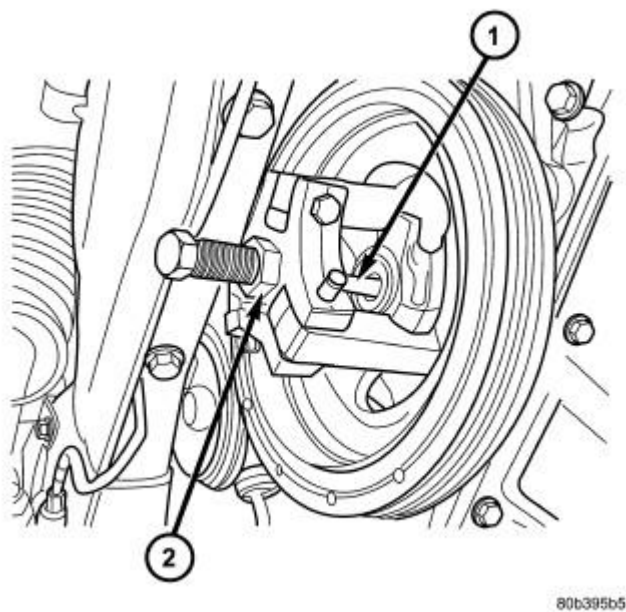


Fig. 210: Vibration Damper - Removal
Courtesy of CHRYSLER LLC

4. Remove damper by using Special Tools 8194 Insert (1) and 8454 Puller (2).

Installation

INSTALLATION

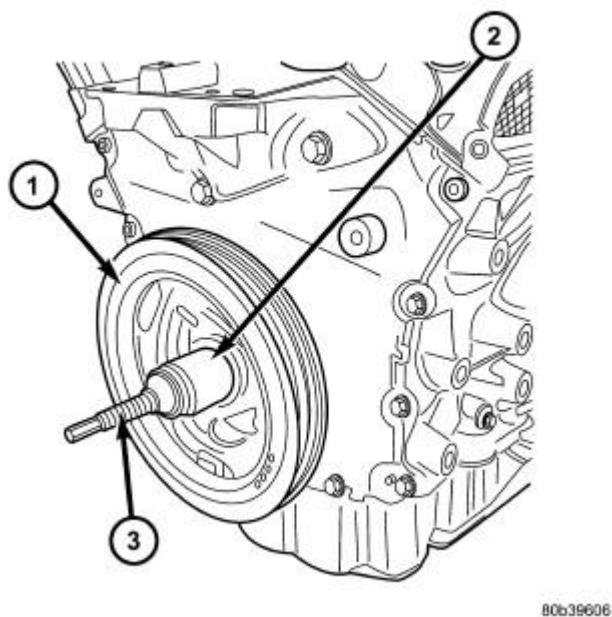
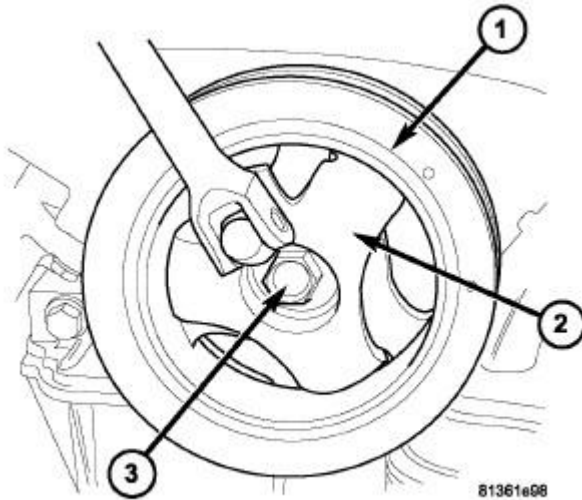


Fig. 211: Vibration Damper - Installation

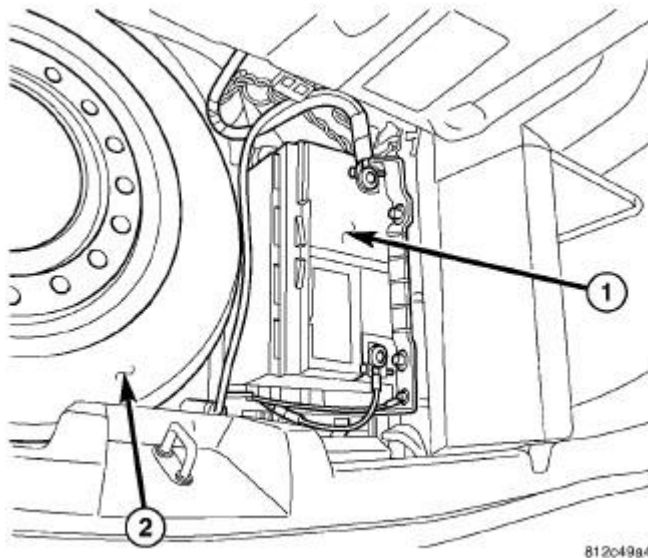
Courtesy of CHRYSLER LLC

1. Install damper (1) using Special Tools 8179 Screw (3), with Nut and Thrust Bearing from 6792, and 6792-1 Installer (2).

**Fig. 212: DAMPER HOLDER**

Courtesy of CHRYSLER LLC

2. Install damper attaching bolt (3). Use special tool 9365 damper holder (2) to hold damper (1) while tightening attaching bolt to 170 N.m (125 ft. lbs.).
3. Install accessory drive belts. Refer to **Cooling/Accessory Drive/BELT, Serpentine - Installation** .

**Fig. 213: Locating Battery**

Courtesy of CHRYSLER LLC

4. Connect negative battery (1) cable located in trunk.

FLEXPLATE

Removal

REMOVAL

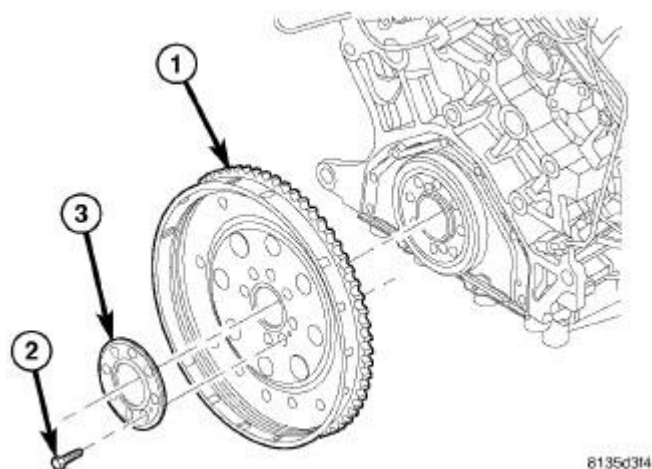


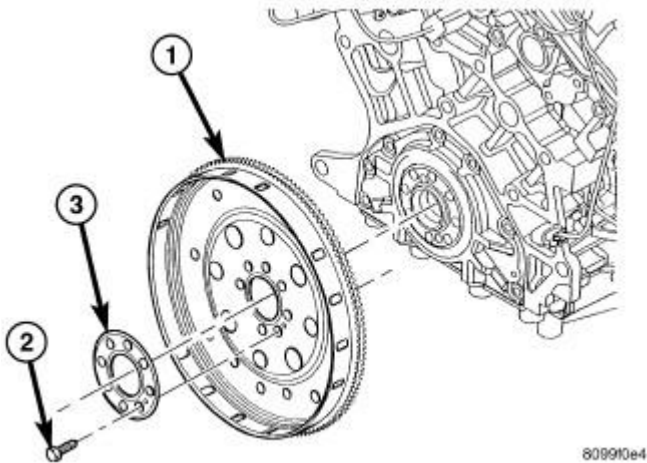
Fig. 214: Flex Plate

Courtesy of CHRYSLER LLC

1. Remove transmission.
2. Remove flex plate attaching bolts (2).
3. Remove backing plate (3) and flex plate (1).

Installation

INSTALLATION

**Fig. 215: FLEX PLATE**

Courtesy of CHRYSLER LLC

1. Position the flex plate (1) with backing plate (3) on the crankshaft.
2. Apply Mopar® Lock AND Seal Adhesive to the eight flex plate bolts (2).
3. Install the flex plate bolts (2). Tighten the bolts to 95 N.m (70 ft. lbs.).
4. Install the transmission. Refer to **Transmission and Transfer Case/Automatic - 42RLE - Installation** .

NOTE: The Cam/Crank Variation Relearn procedure must be performed anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. Refer to **DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure** .

RING(S), PISTON

Standard Procedure

STANDARD PROCEDURE - PISTON RING FITTING

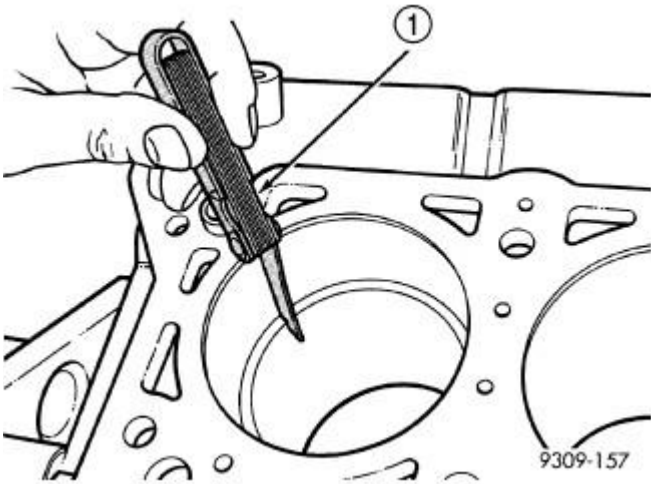


Fig. 216: CHECK GAP ON PISTON RINGS

Courtesy of CHRYSLER LLC

1. Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 inch.) from bottom of cylinder bore. Check gap with feeler gauge (1). See **Engine - Specifications** for clearance measurements.

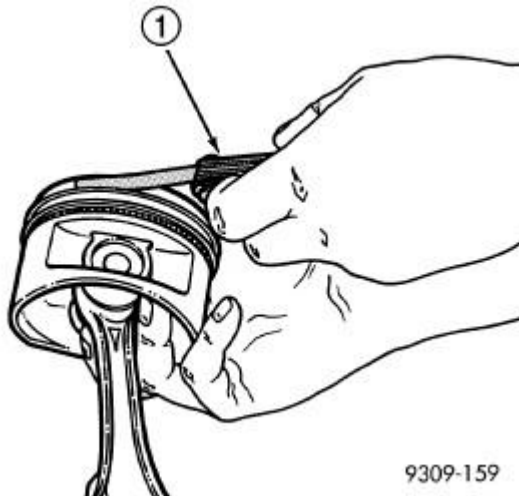


Fig. 217: Measuring Piston Ring Side Clearance

Courtesy of CHRYSLER LLC

2. Check piston ring to groove clearance with feeler gauge (1). For clearance specifications, see **Engine - Specifications**.

Removal

REMOVAL

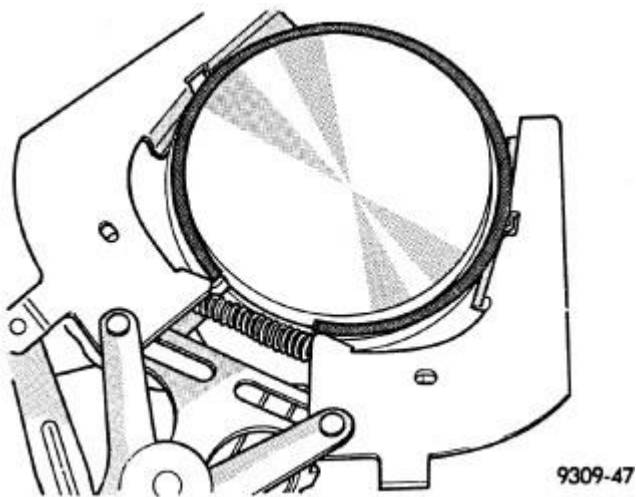


Fig. 218: Upper and Intermediate Rings - Removal & Installation
Courtesy of CHRYSLER LLC

1. Remove piston and connecting rod. See Engine/Engine Block/ROD, Piston and Connecting - Removal.
2. Remove #1 and #2 piston rings from piston using a ring expander tool.

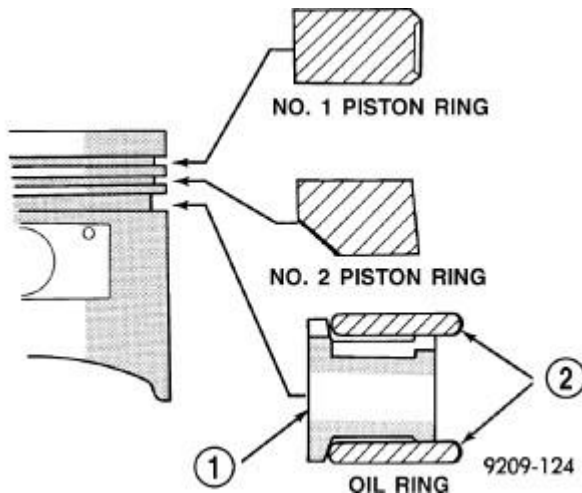


Fig. 219: PISTON RING LOCATIONS
Courtesy of CHRYSLER LLC

3. Remove upper oil ring side rail (2).
4. Remove lower oil ring side rail (2).
5. Remove oil ring expander (1).

Installation

INSTALLATION

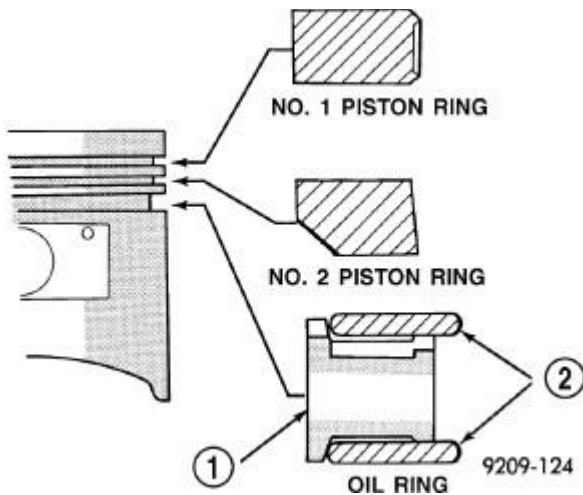


Fig. 220: PISTON RING LOCATIONS

Courtesy of CHRYSLER LLC

1. Measure clearance of piston rings to the cylinder bore and piston. See Engine/Engine Block/RING(S), Piston - Standard Procedure

CAUTION: Install piston rings in the following order:



Fig. 221: SIDE RAIL - INSTALLATION

Courtesy of CHRYSLER LLC

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

Install the side rail by placing one end between the piston ring groove and the oil ring expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander during this step.**

3. Install lower side rail first and then the upper side rail.

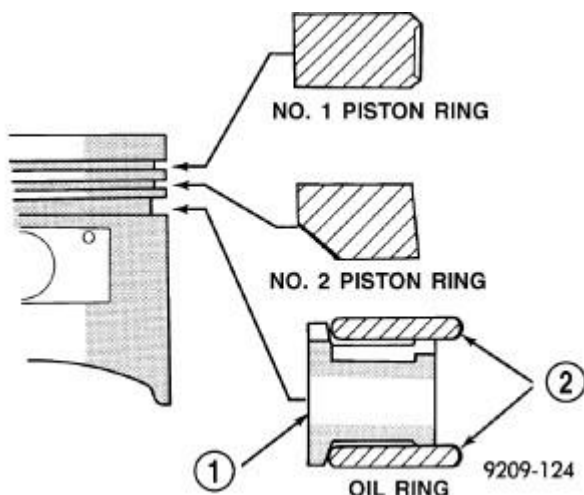


Fig. 222: PISTON RING LOCATIONS

Courtesy of CHRYSLER LLC

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.

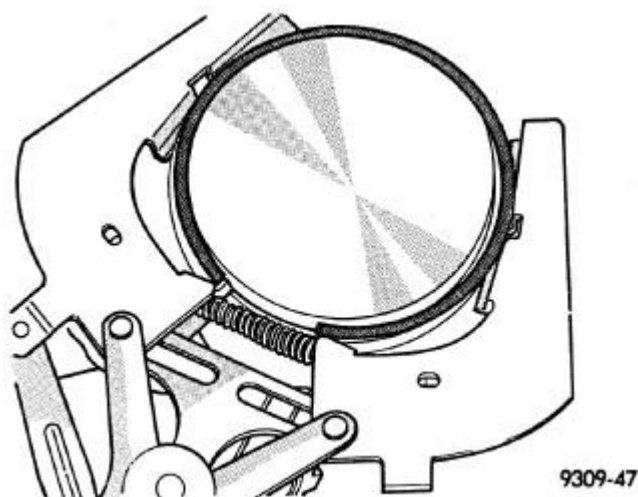
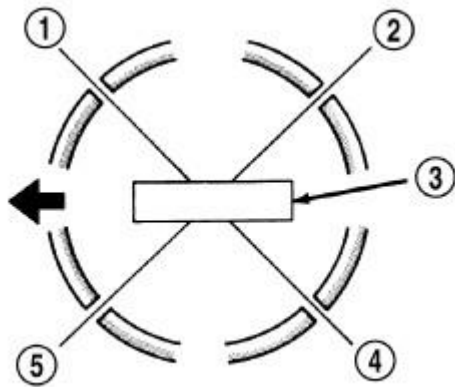


Fig. 223: Upper and Intermediate Rings - Removal & Installation

Courtesy of CHRYSLER LLC

NOTE: Be sure to use a ring expander to install piston rings.

4. Install No. 2 piston ring and then No. 1 piston ring.



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Fig. 224: PISTON RING END GAP POSITION**Courtesy of CHRYSLER LLC**

5. Position oil ring expander gap (5) as shown in illustration. Staggering ring gap is important for oil control.
6. Position piston lower side rail end gap (4) as shown in illustration.
7. Position piston upper side rail end gap (1) as shown in illustration.
8. Position piston ring #2 (5) end gap as shown in illustration.
9. Position piston ring #1 (2) end gap as shown in illustration.

ROD, PISTON AND CONNECTING**Description****DESCRIPTION**

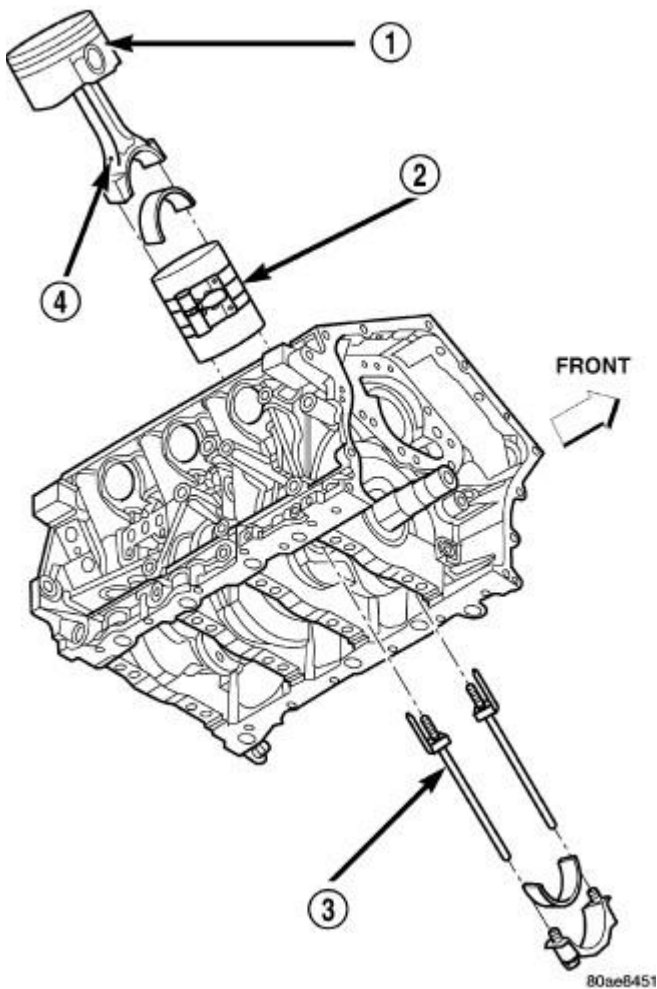


Fig. 225: Piston and Connecting Rod
Courtesy of CHRYSLER LLC

The pistons (1) are made of a high strength aluminum alloy with an anodized top ring groove. Piston skirts are coated with a solid lubricant for scuff resistance. The pistons have an "F" cast into the side next to the pin bore that must face towards the front of the engine. The connecting rods are made of powdered metal with a "fractured cap" design. The connecting rod attaches to the piston with a full floating pin retained by lock rings. The piston and connecting rod are serviced as an assembly.

Standard Procedure

STANDARD PROCEDURE - FITTING PISTONS

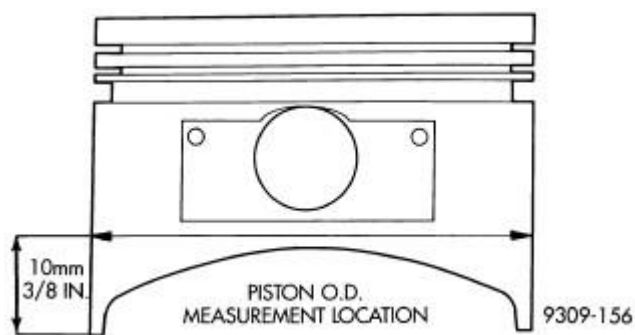


Fig. 226: Piston Measurements
Courtesy of CHRYSLER LLC

The pistons have been cast and machined to one size and weight. The piston and rod assemblies are matched to weigh the same for engine balance.

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin at size location shown in illustration. Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line. Refer to Engine Specifications. See **Engine - Specifications.** **Pistons and cylinder bores should be measured at normal room temperature, 70°F (21°C).**

PISTON PINS

The piston pin is full floating and is held in place by lock rings. **Do Not switch pistons with other rods .** Pistons and connecting rods are serviced as an assembly for balance.

Removal

REMOVAL

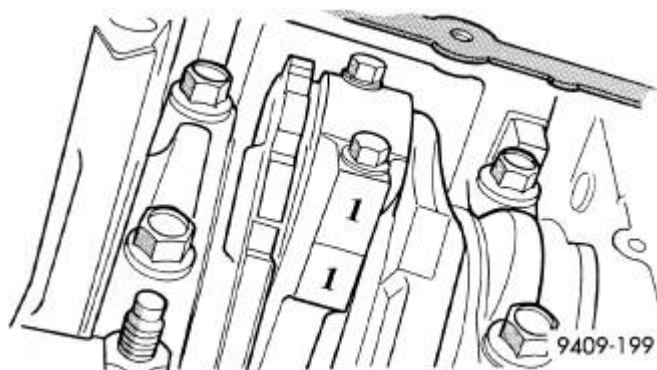


Fig. 227: Identify Connecting Rod to Cylinder
Courtesy of CHRYSLER LLC

1. 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. Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.**

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

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

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

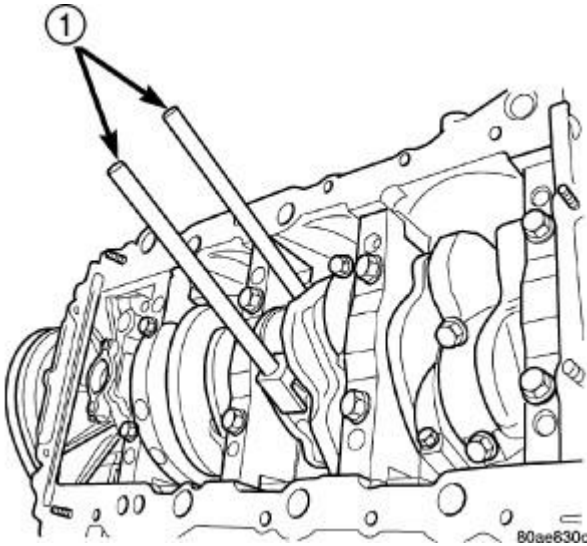


Fig. 228: Connecting Rod Guides
Courtesy of CHRYSLER LLC

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

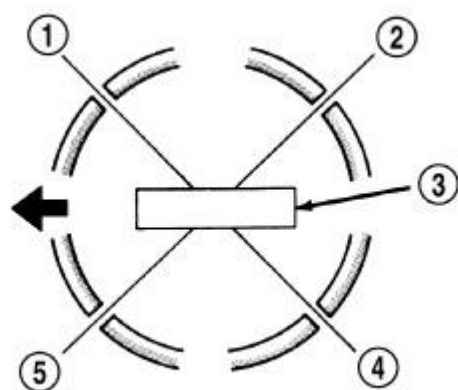
3. Remove connecting rod cap. Install Special Tool 8189 Connecting Rod Guides (1) into the connecting rod being removed. Remove each piston and rod assembly out of cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

4. After removal, install bearing cap on the mating rod to prevent damage to the fractured cap to rod surfaces.

Installation

INSTALLATION



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Fig. 229: PISTON RING END GAP POSITION

Courtesy of CHRYSLER LLC

1. Install the piston rings. See **Engine/Engine Block/RING(S), Piston - Installation**.
2. Before installing piston and connecting rod assemblies into the bore, ensure that compression ring gaps (2 and 5) are staggered so that neither is in line with oil ring rail gap (1 and 4).

NOTE: Make sure that the oil hole in the connecting rod is facing the thrust side of the cylinder bore (Left side of block viewed from front and pan rail down).

3. Before installing the ring compressor, make sure the oil ring expander (5) ends are butted and the rail gaps located as shown in illustration (1 and 4).
4. Immerse the piston head and rings in clean engine oil, slide the ring compressor over the piston and tighten with the special wrench. **Ensure position of rings does not change during this operation.**

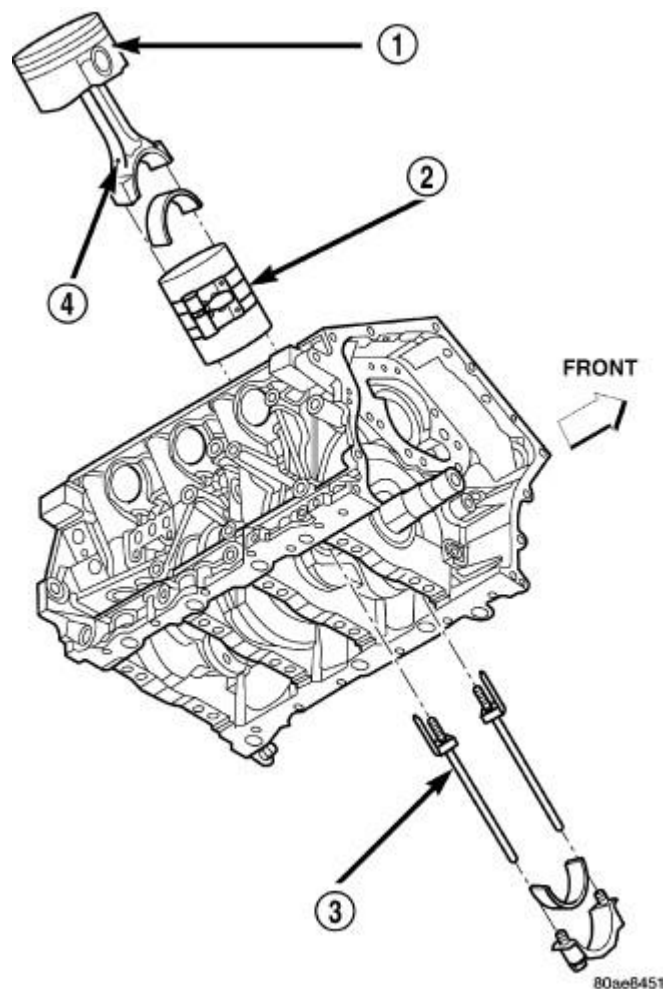
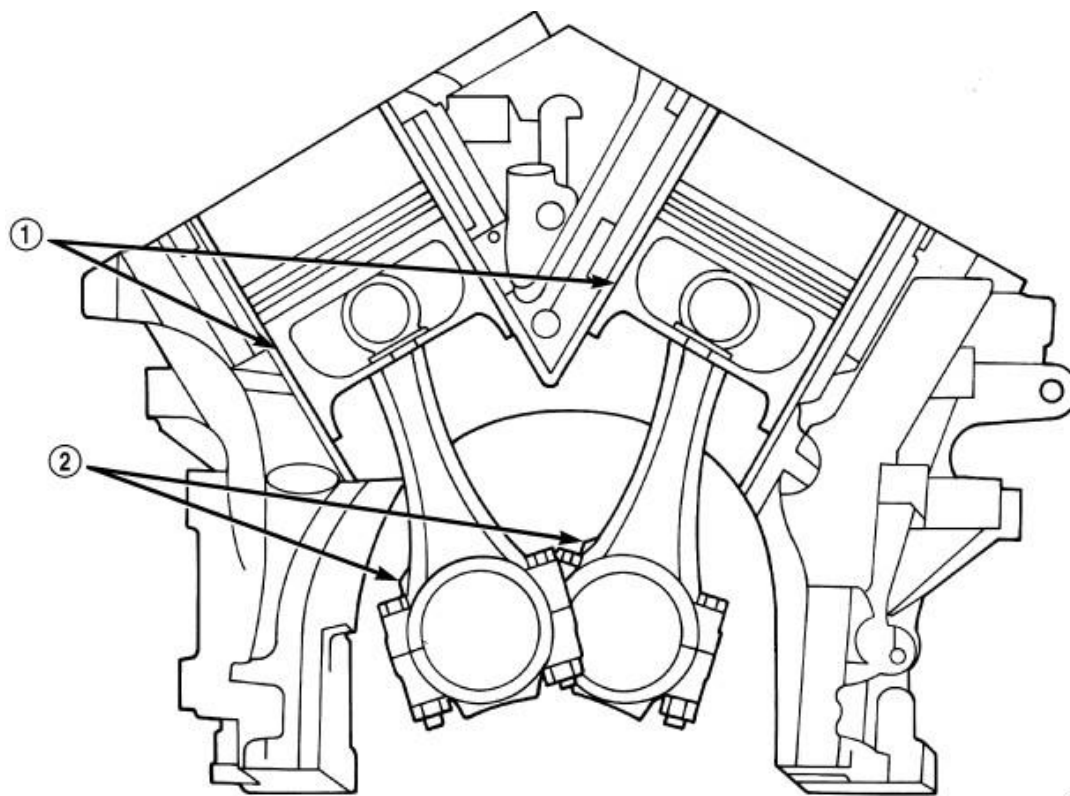


Fig. 230: Piston and Connecting Rod
Courtesy of CHRYSLER LLC

CAUTION: Ensure the hole in bearing half aligns with hole in connecting rod, as damage to engine may occur.

5. Position bearing onto connecting rod. Ensure that hole in bearing half is aligned to hole in connecting rod. Lubricate bearing surface with clean engine oil.
6. Install Special Tools 8189 Connecting Rod Guides (3) into connecting rod.
7. The pistons (1) are marked on top with an arrow and with an "F" (Front) above the pin boss. These marks must be pointing towards the front of engine on both cylinder banks.



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Fig. 231: Piston and Connecting Rod Positioning (Front View of Engine)
Courtesy of CHRYSLER LLC

8. The connecting rod oil squirt hole (2) faces the major thrust (right) side of the block (1).

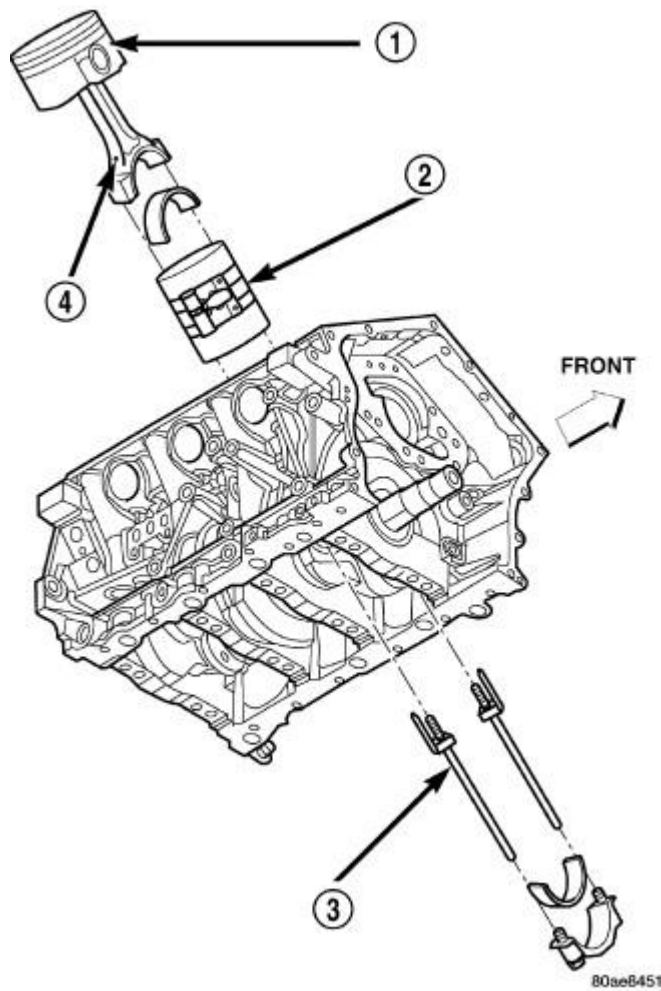


Fig. 232: Piston and Connecting Rod
Courtesy of CHRYSLER LLC

9. Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal.

CAUTION: Do Not interchange piston assemblies bank to bank, as engine damage may occur.

10. Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.
11. Lubricate rod bolts and bearing surface with engine oil. Install connecting rod cap and bearing. Tighten bolts to 27 N.m (20 ft. lbs.) Plus 1/4 turn.

SEAL, CRANKSHAFT OIL, FRONT

Removal

REMOVAL

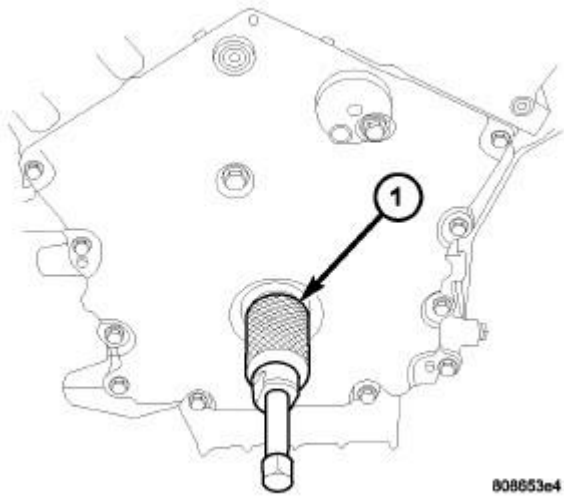


Fig. 233: Crankshaft Front Oil Seal - Removal
Courtesy of CHRYSLER LLC

1. Remove crankshaft vibration damper. See **Engine/Engine Block/DAMPER, Vibration - Removal**.
2. Install Special Tool 8194 (1), Insert into crankshaft nose. Remove seal using Special Tool 6771, Remover.

Installation

INSTALLATION

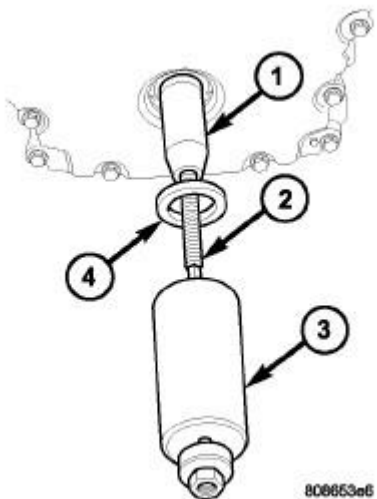


Fig. 234: Crankshaft Front Oil Seal - Installation
Courtesy of CHRYSLER LLC

1. Install new seal (4) using Special Tools 6780-2 Sleeve (1), 6780-1 Installer (3), and 8179 Stud (2).
2. Install crankshaft vibration damper. See **Engine/Engine Block/DAMPER, Vibration - Installation**.

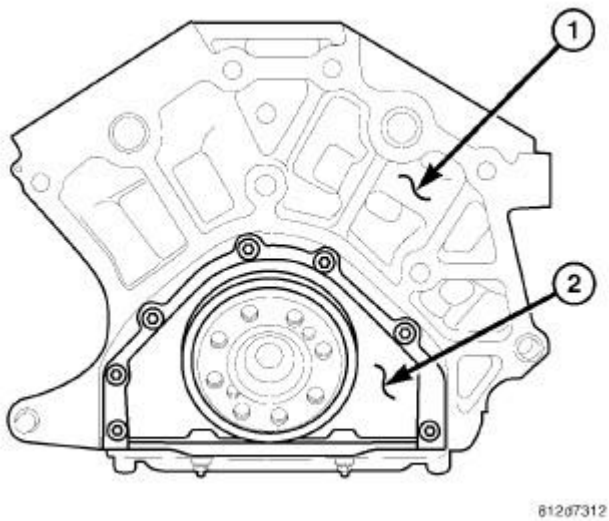
SEAL, CRANKSHAFT OIL, REAR**Removal****REMOVAL**

Fig. 235: Rear Oil Seal Removal & Installation
Courtesy of CHRYSLER LLC

The crankshaft rear oil seal is incorporated in the seal adapter (2) and can not be removed from the adapter. The crankshaft rear oil seal/seal adapter (2) are serviced as an assembly.

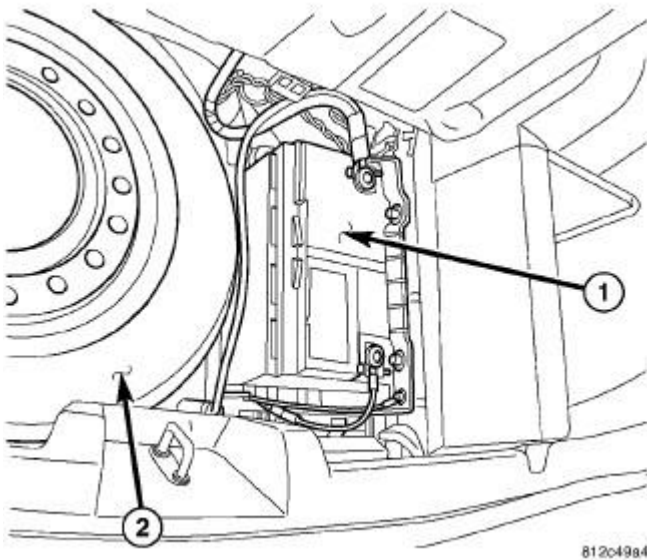


Fig. 236: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable.

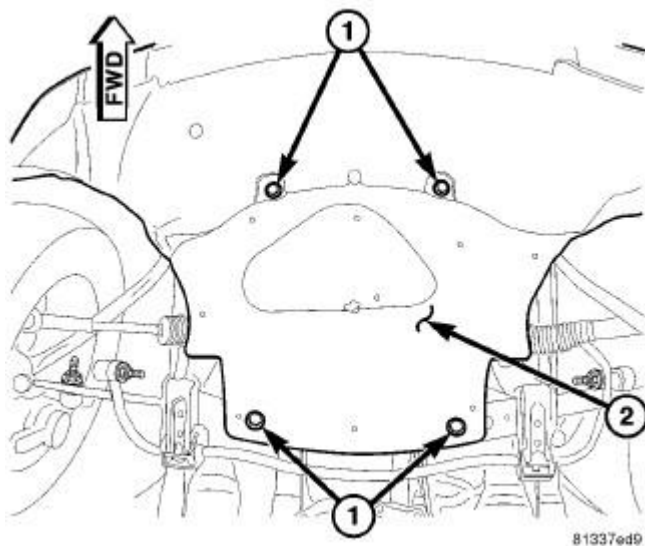
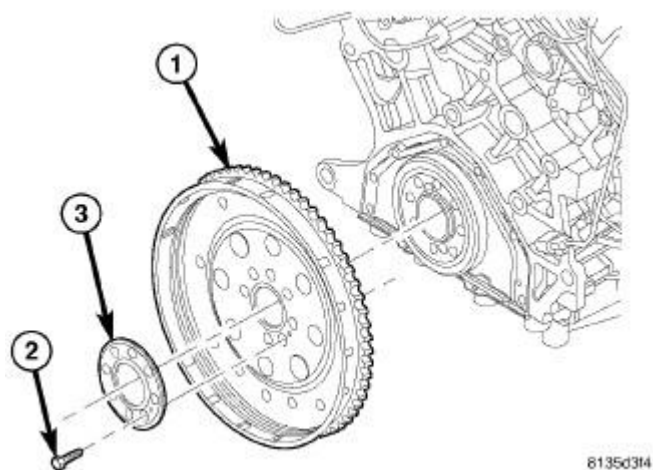


Fig. 237: Lower Splash Shield
Courtesy of CHRYSLER LLC

2. Raise vehicle.
3. Remove splash shield retaining bolts (1) and splash shield (2).
4. Remove the structural collar. See **Engine/Engine Block/COVER, Structural Dust - Removal.**
5. Remove transmission. Refer to **Transmission and Transfer Case/Automatic - 42RLE - Removal .**

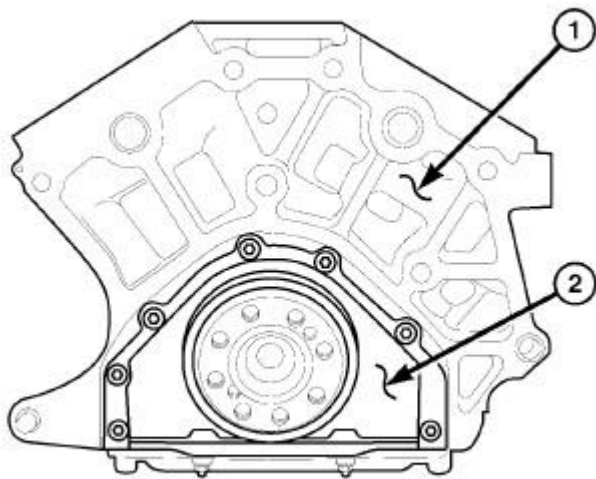


8135d314

Fig. 238: Flex Plate

Courtesy of CHRYSLER LLC

6. Remove flex plate attaching bolts (2), backing plate (3), and flex plate (1).
7. Remove oil pan. See **Engine/Lubrication/PAN, Oil - Removal**.



812d7312

Fig. 239: Rear Oil Seal Removal & Installation

Courtesy of CHRYSLER LLC

NOTE: The integrated stamped steel rear crankshaft seal is not interchangeable with the cast aluminum rear seal adapter and seal assembly.

8. Remove seal retainer attaching screws.
9. Remove crankshaft rear oil seal/adaptor (2).

Installation

INSTALLATION

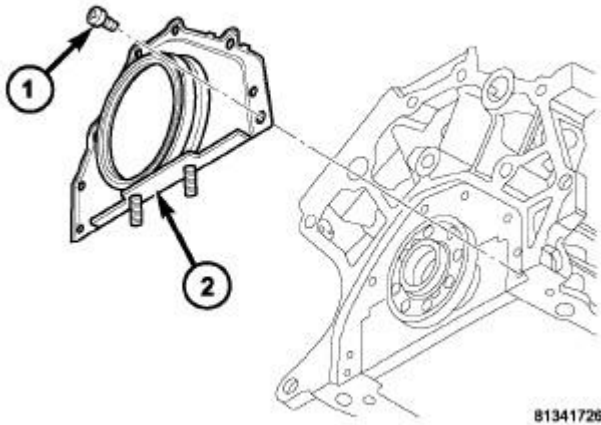


Fig. 240: Oil Seal Retainer
Courtesy of CHRYSLER LLC

NOTE: The integrated rear crankshaft seal (2) is not interchangeable with the cast aluminum rear seal adapter and seal assembly.

NOTE: Inspect the crankshaft to make sure no nicks or burrs are on the seal surface.

1. Clean sealing surfaces thoroughly.
2. Apply engine oil to the seal lip inside diameter.

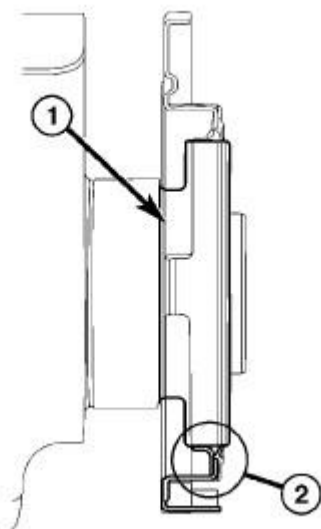
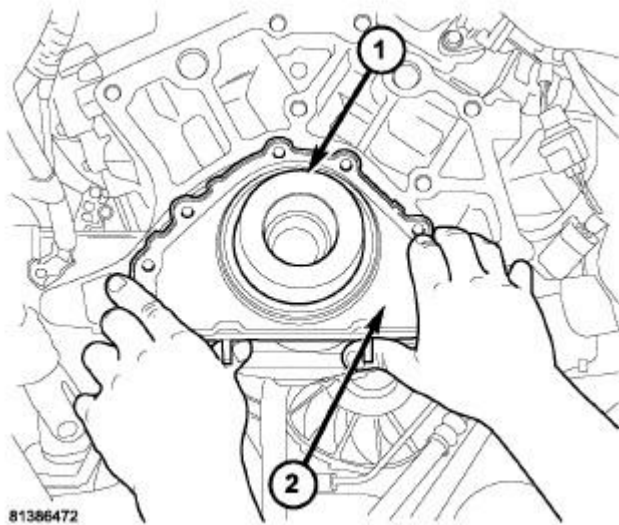


Fig. 241: Locating Crankshaft & Seal Lip

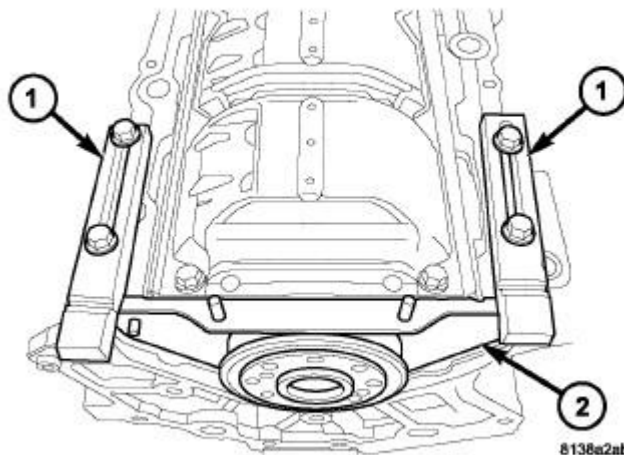
Courtesy of CHRYSLER LLC

NOTE: The seal lip (2) on the retainer must always uniformly curl inward toward the engine on the crankshaft (1).

**Fig. 242: Rear Seal Installation**

Courtesy of CHRYSLER LLC

3. Position the special tool 6926 (1) onto the crankshaft and gently slide the seal (2) over the crankshaft.
4. Install seal retaining bolts finger tight.

**Fig. 243: Attaching Special Tool 8225 To Pan Rail**

Courtesy of CHRYSLER LLC

NOTE: The following steps must be performed to prevent oil leaks at sealing joints.

5. Attach Special Tools 8225 (1) to pan rail using the oil pan fasteners.

NOTE: Make sure that the "2.7L" stamped on the special tool is facing the cylinder block (flat side of tools against pan rail).

NOTE: Make sure that the seal flange is flush with the block oil pan sealing surface.

6. While applying firm pressure to the seal assembly (2) against Special Tools 8225 (1), tighten seal assembly screws to 12 N.m (105 in. lbs.).
7. Remove special tool 8225.
8. Install oil pan. See Engine/Lubrication/PAN, Oil - Installation.

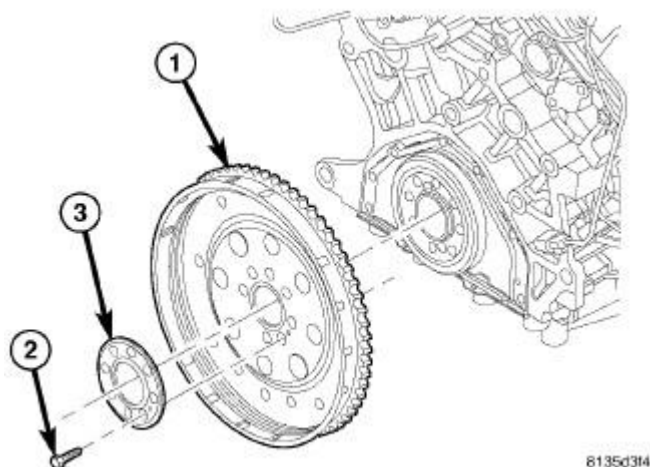


Fig. 244: Flex Plate

Courtesy of CHRYSLER LLC

9. Install flex plate (1), backing plate (3), and attaching bolts (2). See Engine/Engine Block/FLEXPLATE - Installation.
10. Install transmission. Refer to Transmission and Transfer Case/Automatic - 42RLE - Installation.

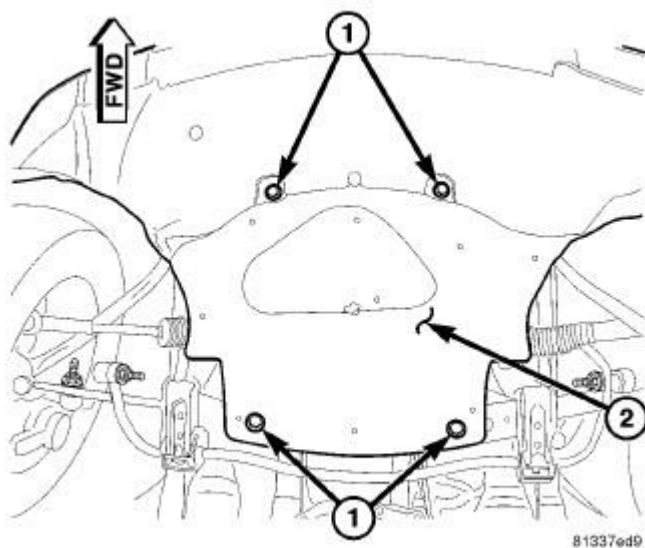


Fig. 245: Lower Splash Shield
Courtesy of CHRYSLER LLC

11. Install lower splash shield retaining bolts (1) and splash shield (2).
12. Lower vehicle.

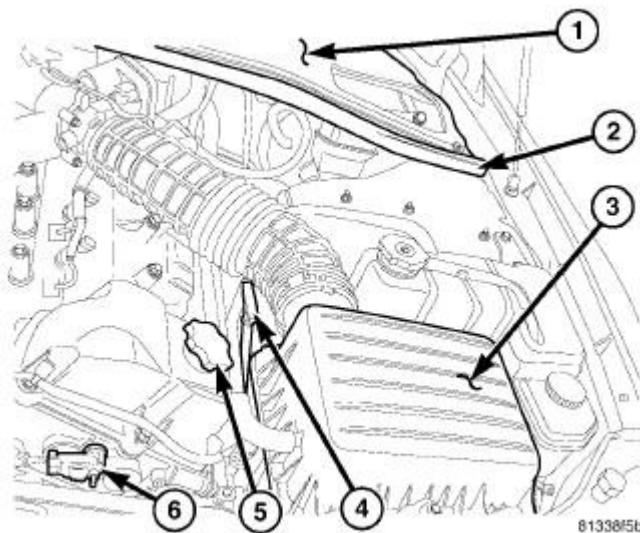


Fig. 246: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

13. Fill with oil (5).

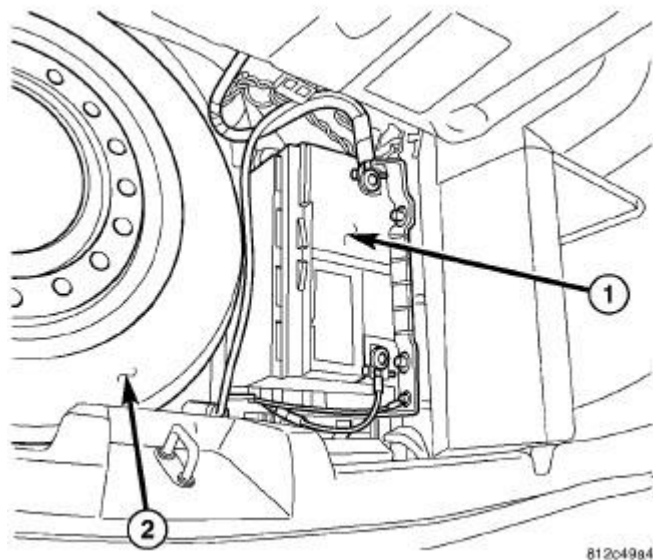


Fig. 247: Locating Battery
Courtesy of CHRYSLER LLC

14. Connect negative battery (1) cable.
15. Start engine and check for leaks.

ENGINE MOUNTING

INSULATOR, ENGINE MOUNT, LEFT

Removal

REMOVAL

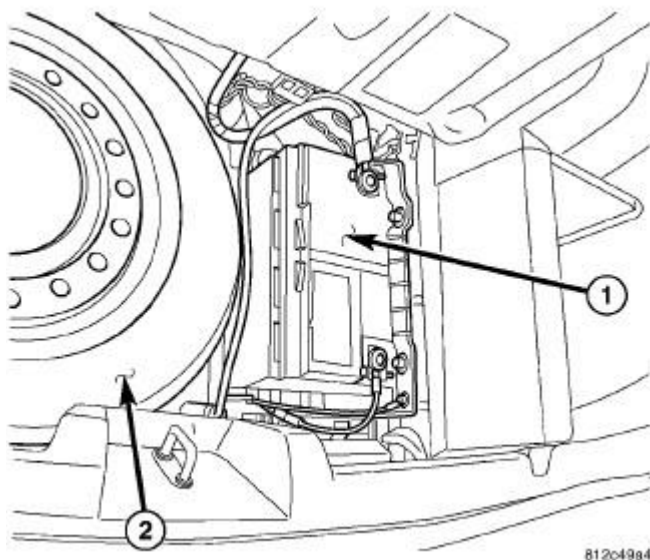


Fig. 248: Locating Battery

Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.

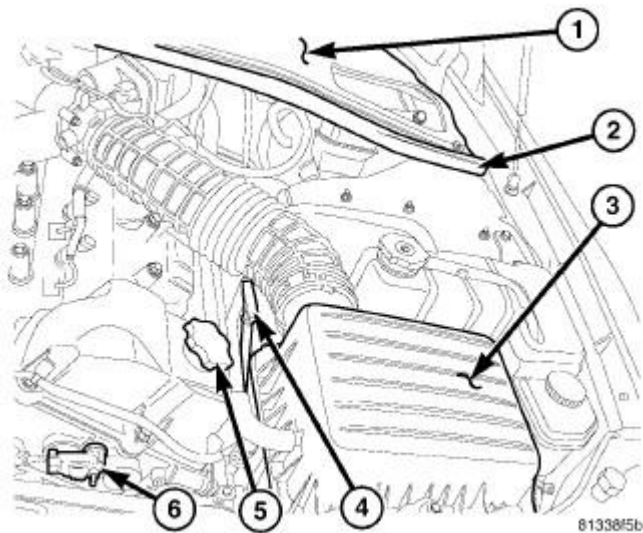


Fig. 249: AIR CLEANER HOUSING

Courtesy of CHRYSLER LLC

2. Remove air cleaner housing (3). See Engine/Air Intake System/BODY, Air Cleaner - Removal.
3. Raise vehicle.

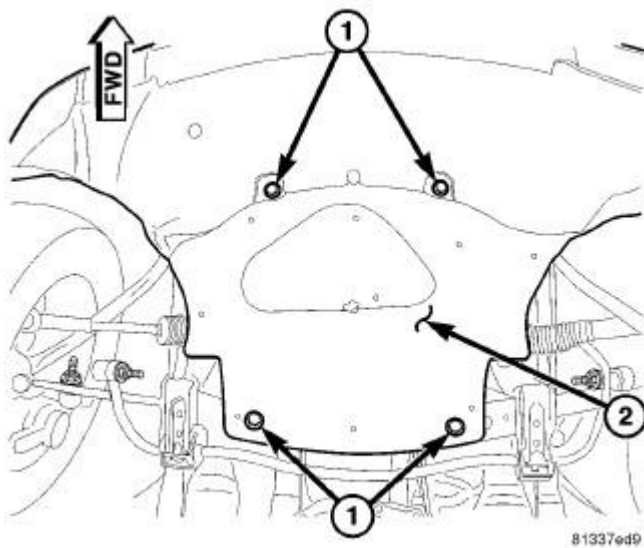


Fig. 250: Lower Splash Shield

Courtesy of CHRYSLER LLC

4. Remove lower splash shield retaining bolts (1) and splash shield (2).

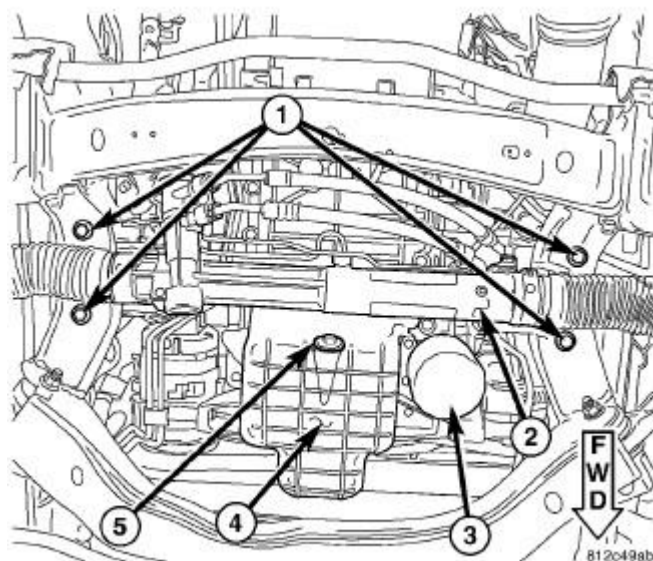


Fig. 251: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

5. Remove engine mount nuts (1).
6. Remove engine mount studs (1) from the left mount isolator.
7. Place a block of wood under the oil pan (4) and raise engine with suitable jackstand.

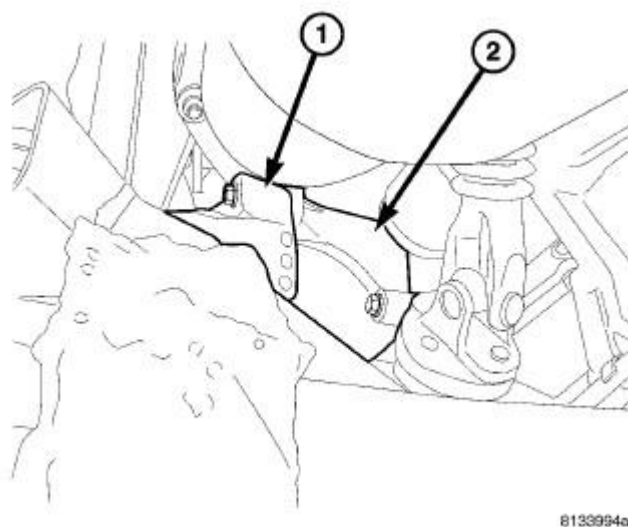


Fig. 252: Left Mount Adapter
Courtesy of CHRYSLER LLC

8. Remove engine mount isolator (1) to engine mount adapter (2) bolts.

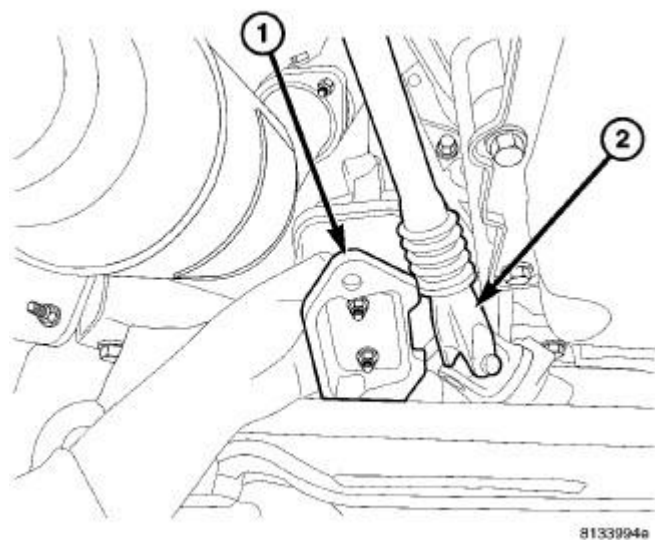


Fig. 253: MOUNT REMOVAL/INSTALLATION
Courtesy of CHRYSLER LLC

9. Remove engine mount isolator (1).

Installation

INSTALLATION

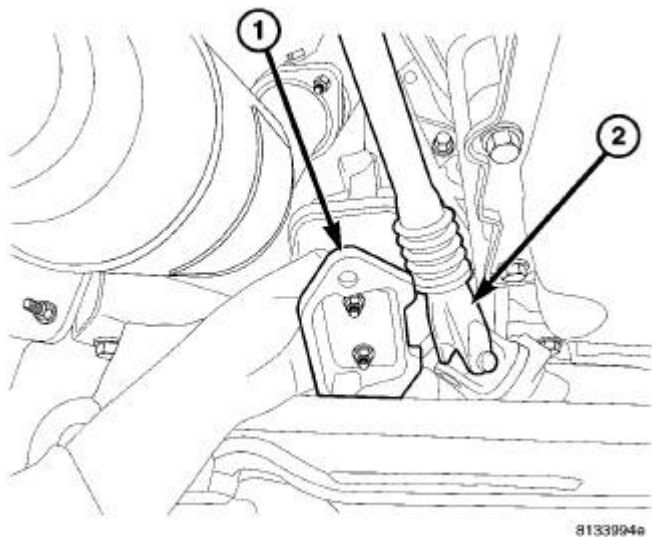


Fig. 254: MOUNT REMOVAL/INSTALLATION
Courtesy of CHRYSLER LLC

1. Install engine mount isolator (1) in place.

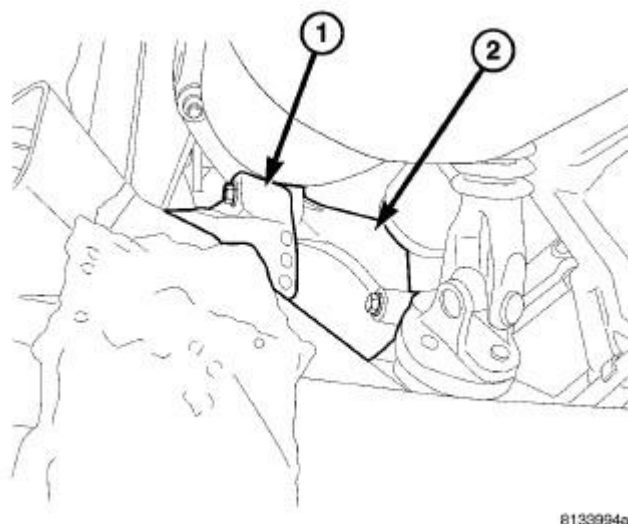


Fig. 255: Left Mount Adapter
Courtesy of CHRYSLER LLC

2. Attach left engine mount isolator (1) to engine mount adapter (2). Install bolts and tighten to 75 N.m (55 ft. lbs.).
3. Lower engine but do not let mount contact frame.
4. Install engine mount studs and tighten to 12 N.m (106 in. lbs.).

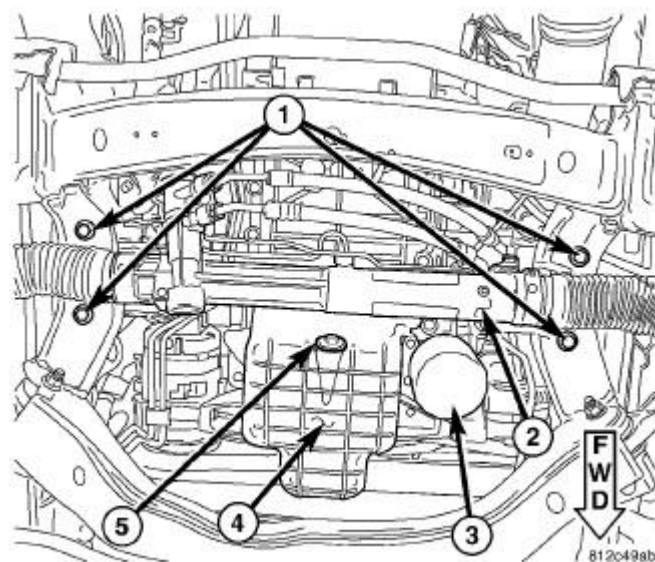


Fig. 256: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

5. Lower engine and remove lifting device.
6. Tighten engine mount isolator nuts (1) to 75 N.m (55 ft. lbs.).

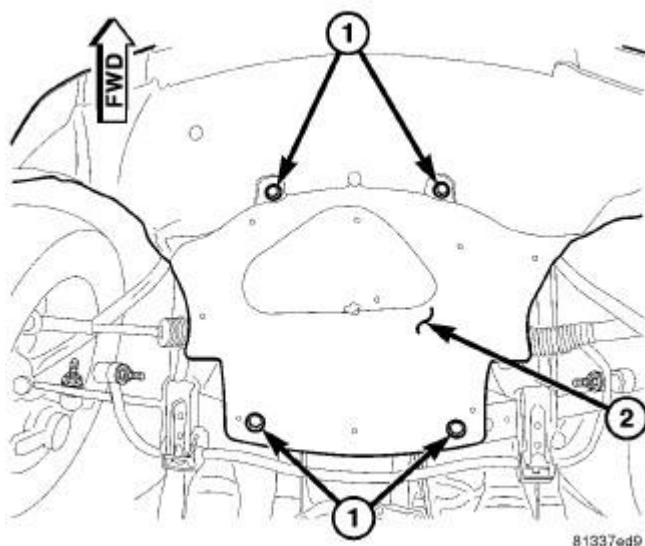


Fig. 257: Lower Splash Shield
Courtesy of CHRYSLER LLC

7. Install lower splash shield (2) and tighten retaining bolts (1).
8. Lower vehicle.

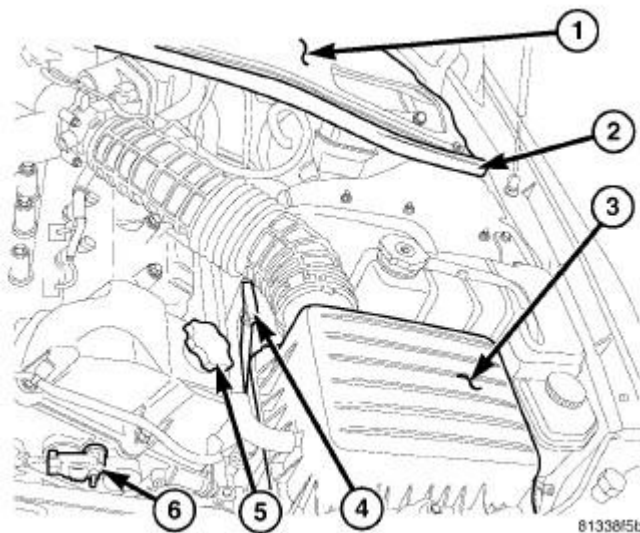


Fig. 258: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

9. Install air cleaner housing assembly (3). See **Engine/Air Intake System/BODY, Air Cleaner - Installation.**

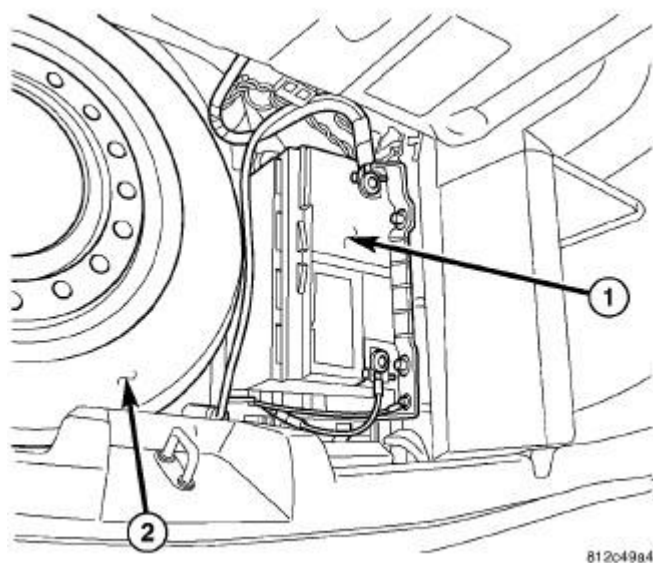


Fig. 259: Locating Battery
Courtesy of CHRYSLER LLC

10. Connect negative battery (1) cable.

INSULATOR, ENGINE MOUNT, RIGHT

Removal

REMOVAL

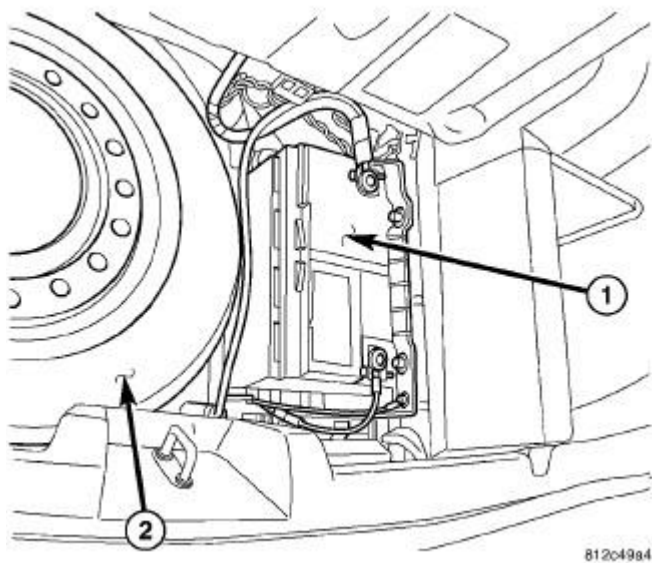


Fig. 260: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.

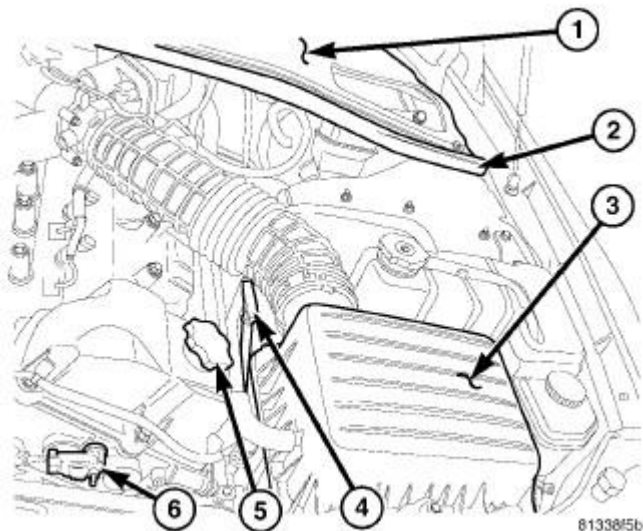


Fig. 261: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

2. Remove air cleaner housing (3). See Engine/Air Intake System/BODY, Air Cleaner - Removal.
3. Raise vehicle.

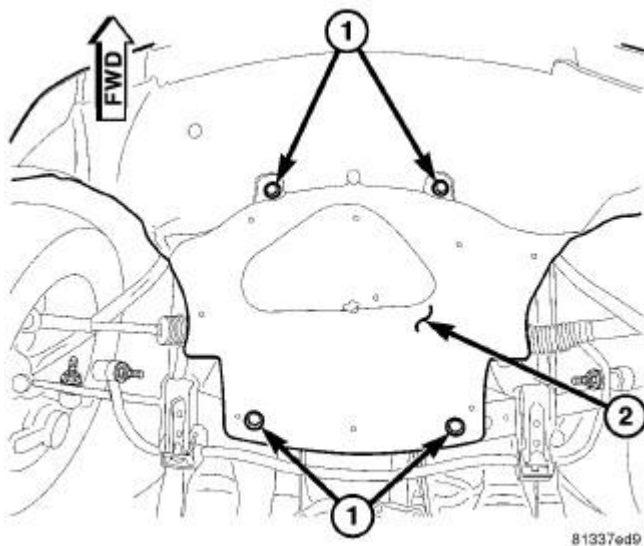


Fig. 262: Lower Splash Shield
Courtesy of CHRYSLER LLC

4. Remove lower splash shield retaining bolts (1) and splash shield (2).

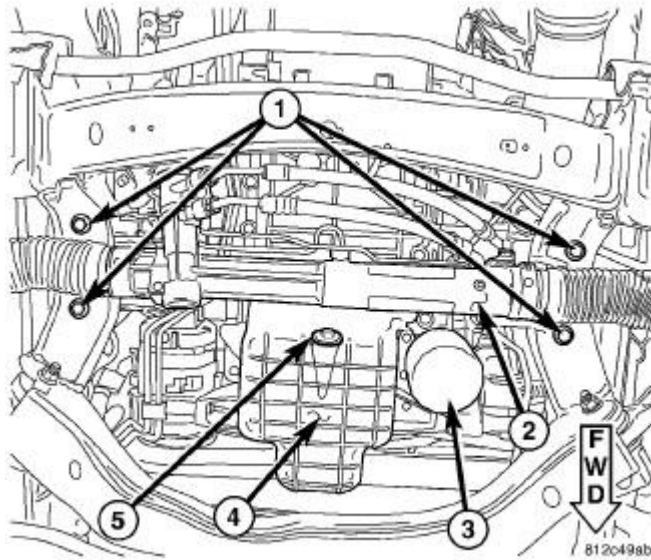


Fig. 263: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

5. Remove engine mount nuts (1).
6. Remove engine mount studs (1) from the right engine mount isolator.
7. Place a block of wood under the oil pan (4) and raise engine with suitable jackstand.

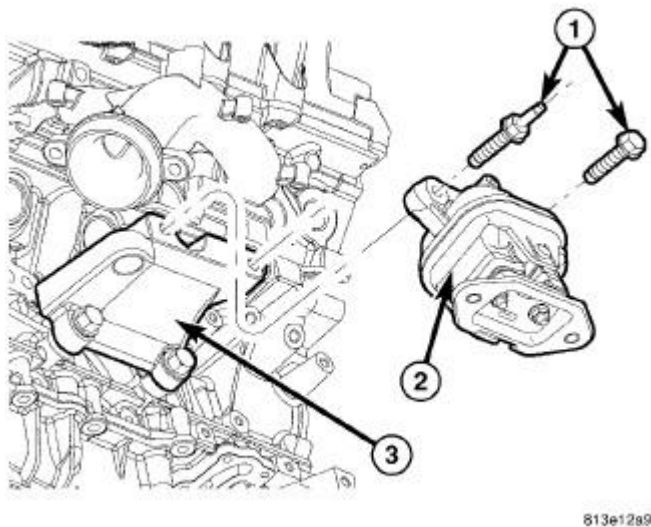
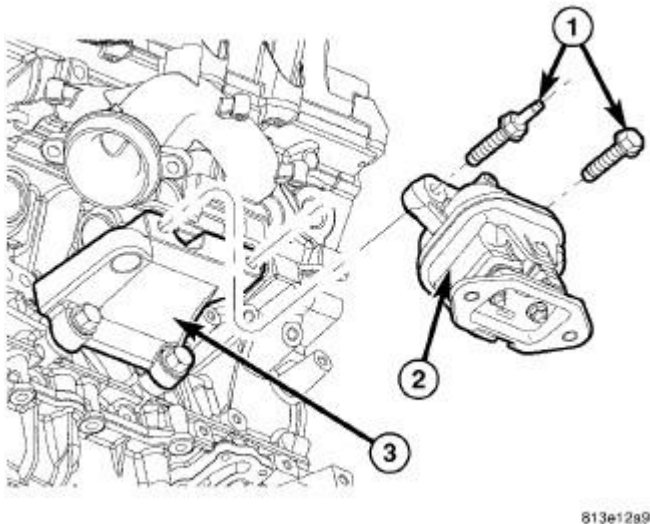


Fig. 264: RIGHT MOUNT
Courtesy of CHRYSLER LLC

8. Remove engine mount isolator to engine mount adapter bolts (1).
9. Remove engine mount isolator (2).

Installation

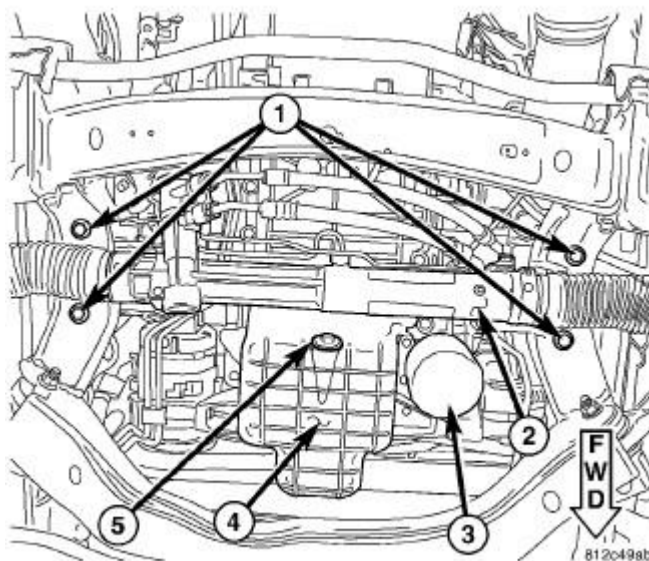
INSTALLATION



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Fig. 265: RIGHT MOUNT
Courtesy of CHRYSLER LLC

1. Install right engine mount isolator to engine mount adapter bolts (1). Tighten bolts to 75 N.m (55 ft. lbs.).
2. Lower engine but do not let mount contact frame.



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Fig. 266: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

3. Install engine mount studs (1) and tighten to 12 N.m (106 in. lbs.).

4. Lower engine and remove lifting device.
5. Tighten engine mount isolator nuts (1) to 75 N.m (55 ft. lbs.).

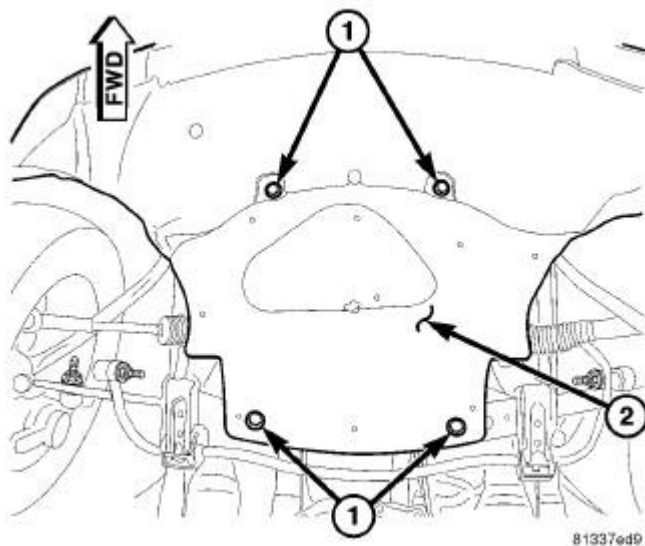


Fig. 267: Lower Splash Shield
Courtesy of CHRYSLER LLC

6. Install lower splash shield (2) and tighten retaining bolts (1).
7. Lower vehicle.

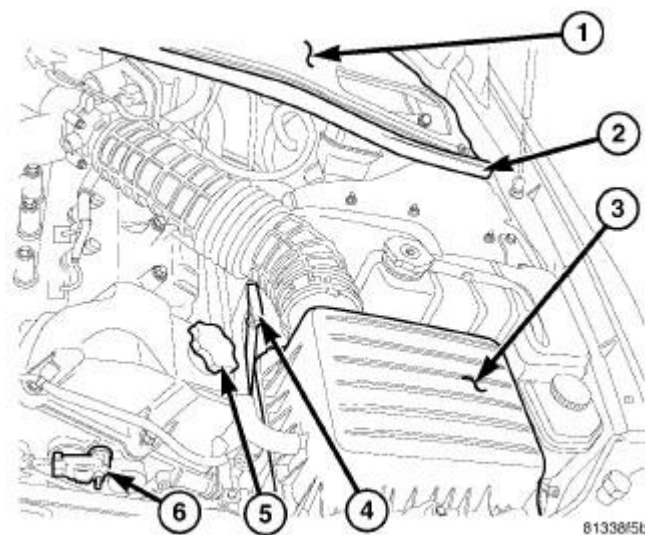


Fig. 268: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

8. Install air cleaner housing assembly (3). See Engine/Air Intake System/BODY, Air Cleaner -

Installation.

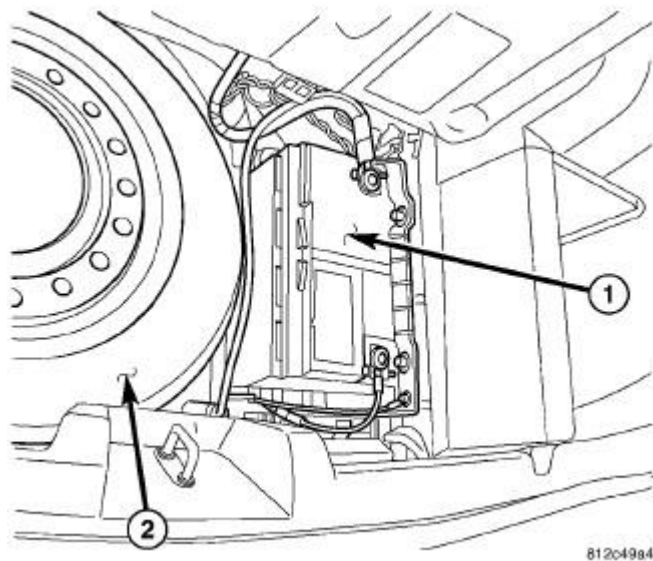


Fig. 269: Locating Battery
Courtesy of CHRYSLER LLC

9. Connect negative battery (1) cable.

INSULATOR, ENGINE MOUNT, REAR

Removal

REMOVAL

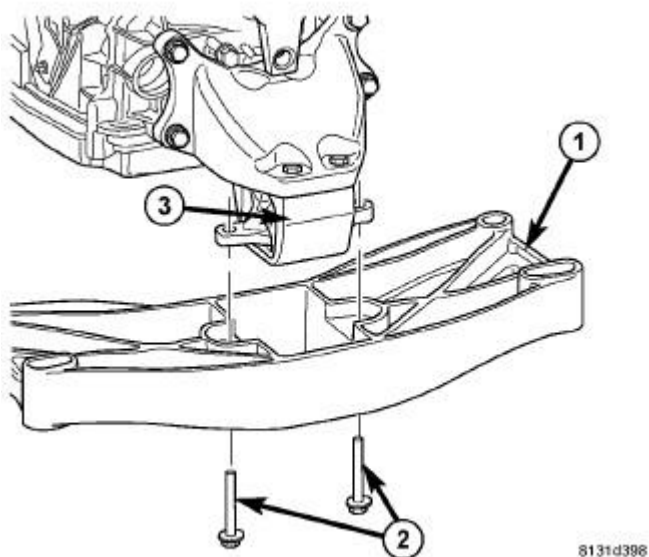


Fig. 270: Removing/Installing Transmission Crossmember Bolts

Courtesy of CHRYSLER LLC

1. Raise vehicle on hoist.
2. Remove cross member to mount bolts (2).
3. Place transmission jack under transmission pan and raise transmission.
4. Remove cross member attaching bolts and remove crossmember (1).

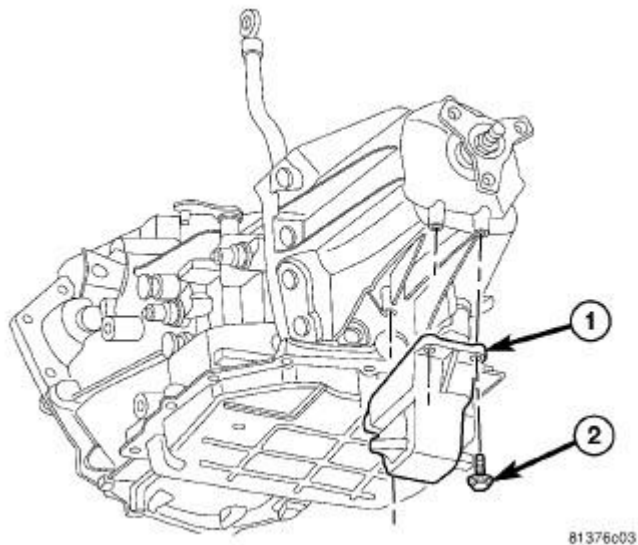


Fig. 271: Removing/Installing Transmission Mount Bolts
Courtesy of CHRYSLER LLC

5. Remove mount to transmission bolts (2), remove mount (1).

Installation**INSTALLATION**

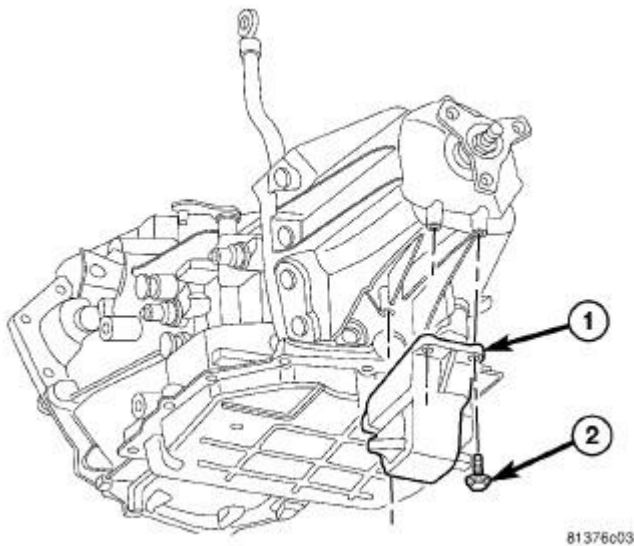


Fig. 272: Removing/Installing Transmission Mount Bolts
Courtesy of CHRYSLER LLC

1. Install mount to transmission bolts (2) and tighten to 47 N.m (35 ft. lbs.).

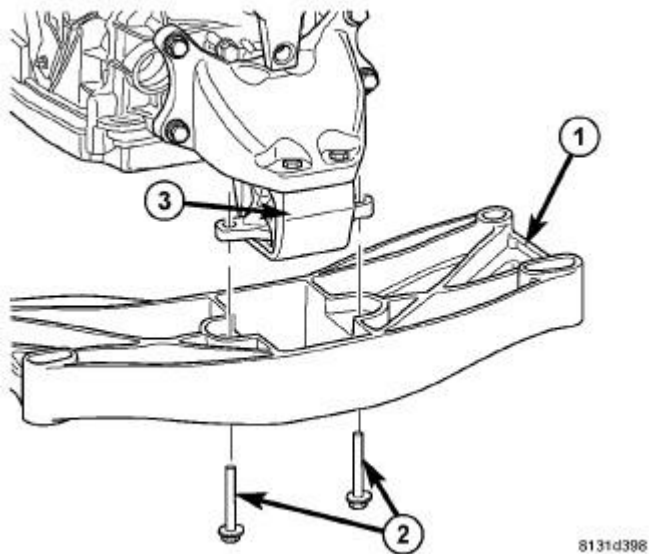


Fig. 273: Removing/Installing Transmission Crossmember Bolts
Courtesy of CHRYSLER LLC

2. Install cross member (1) and attaching bolts. Tighten bolts to 68 N.m (50 ft. lbs.).
3. Lower transmission so cross member to mount bolts (2) can be started tightened by hand.
4. Lower transmission and remove jack.
5. Tighten mount bolts (2) to 47 N.m (39 ft. lbs.).

LUBRICATION

DESCRIPTION

DESCRIPTION

The lubrication system is a full-flow filtration, pressure feed type. The oil pump body is mounted to the engine block. The pump inner rotor is driven by the crankshaft. A windage tray is used to increase power by minimizing oil windage at high engine RPM. An engine oil cooler is used on some models.

OPERATION

OPERATION

Oil from the oil pan is pumped by a gerotor type oil pump (3) directly coupled to the crankshaft. Oil pressure is controlled by a relief valve mounted inside the oil pump housing.

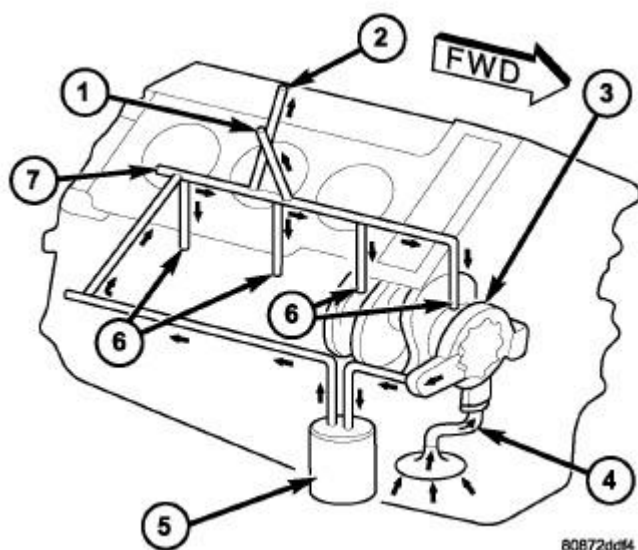


Fig. 274: Cylinder Block Oil Lubrication System
Courtesy of CHRYSLER LLC

1 - TO RIGHT CYLINDER HEAD	5 - OIL FILTER
2 - TO LEFT CYLINDER HEAD	6 - TO CRANKSHAFT MAIN JOURNALS
3 - OIL PUMP	7 - MAIN OIL GALLERY
4 - OIL PICKUP TUBE	

Oil from the oil pan is pumped by a gerotor type oil pump (3) directly coupled to the crankshaft. Oil pressure is controlled by a relief valve mounted inside the oil pump housing. Refer to Cylinder Block, Left Cylinder Head or Right Cylinder Head illustrations between the charts for engine oil lubrication circuits.

FROM:	TO:	FROM:	TO:
--------------	------------	--------------	------------

2010 Chrysler 300 C

2010 ENGINE 2.7L DOHC - Service Information - 300 & Charger

Oil Pump	Oil Filter Mounting (inlet)	Main Oil Gallery - Center of Block	1. Crankshaft Main Bearings
Oil Filter Mounting (inlet)	Oil Filter		2. Left Cylinder Head*
Oil Filter	Oil Filter Mounting (outlet)		3. Right Cylinder Head*
Oil Filter Mounting (outlet)	Oil Gallery - Right side of Block	Crankshaft Main Bearings	Connecting Rod Bearings
Oil Gallery - Right side of Block	Oil Gallery - Rear of Block and to Oil Cooler (some models)	Left Cylinder Head	Refer to Left Cylinder Head Illustration
Oil Gallery - Rear of Block	Main Oil Gallery - Center of Block	Right Cylinder Head	Refer to Right Cylinder Head Illustration

*The cylinder head gaskets have an oil restrictor to control oil flow to the cylinder heads.

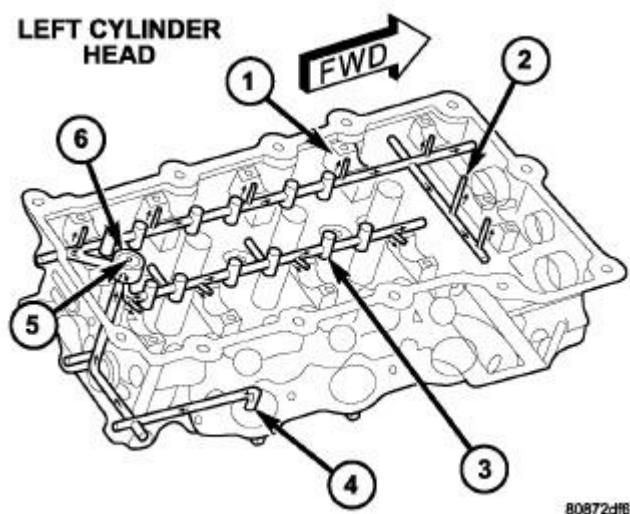


Fig. 275: Cylinder Head Oil Lubrication System - Left Side

Courtesy of CHRYSLER LLC

1 - CAM JOURNALS	4 - OIL FEED FROM BLOCK
2 - OIL FEED TO CAMSHAFT (SECONDARY) CHAIN TENSIONER	5 - VENT HOLE
3 - LASH ADJUSTER BORES	6 - ACCUMULATOR

FROM:	TO:
Left Cylinder Head Oil Inlet Gallery (intake side of head)	Oil Gallery and Accumulator - Rear of Head*
Oil Gallery and Accumulator - Rear of Head*	1. Exhaust Camshaft Oil Passage 2. Intake Camshaft Oil Passage

2010 Chrysler 300 C

2010 ENGINE 2.7L DOHC - Service Information - 300 & Charger

Left Exhaust Camshaft Oil Passage	1. Left Exhaust Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms 3. Left Camshaft (Secondary) Chain Tensioner**
Left Intake Camshaft Oil Passage	1. Left Intake Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms
* When oil reaches the back of the cylinder head, the oil gallery feeds oil into an accumulator chamber that is located towards center of the head. The accumulator chamber is closed off with a pressed in core plug that has a small orifice to act as a vent. Oil then travels down at a 45 degree angle from the accumulator into two passages, one for the intake and one for the exhaust side of the cylinder head.	
** The secondary camshaft chain tensioner is the last component to receive oil on the left cylinder head.	

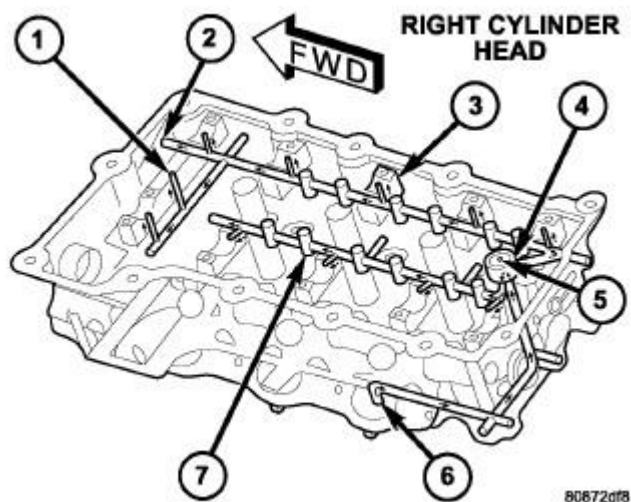


Fig. 276: Cylinder Head Oil Lubrication System - Right Side
 Courtesy of CHRYSLER LLC

1 - OIL FEED TO CAMSHAFT (SECONDARY) CHAIN TENSIONER	5 - VENT HOLE
2 - OIL FEED TO TIMING CHAIN (PRIMARY) TENSIONER	6 - OIL FEED FROM BLOCK
3 - CAM JOURNALS	7 - LASH ADJUSTOR BORES
4 - ACCUMULATOR	

FROM:	TO:
Right Cylinder Head Oil Inlet Gallery (intake side of head)	Oil Gallery and Accumulator - Rear of Head*
Oil Gallery and Accumulator - Rear of Head*	1. Exhaust Camshaft Oil Passage 2. Intake Camshaft Oil Passage

Right Exhaust Camshaft Oil Passage	1. Right Exhaust Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms 3. Right Camshaft (Secondary) Chain Tensioner 4. Primary Timing Chain Tensioner - Right Head**
Right Intake Camshaft Oil Passage	1. Right Intake Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms
* When oil reaches the back of the cylinder head, the oil gallery feeds oil into an accumulator chamber that is located towards center of the head. The accumulator chamber is closed off with a pressed in core plug that has a small orifice to act as a vent. Oil then travels down at a 45 degree angle from the accumulator into two passages, one for the intake and one for the exhaust side of the cylinder head.	
** The timing (primary) chain tensioner is the last component to receive oil on the right cylinder head.	

DIAGNOSIS AND TESTING

CHECKING ENGINE OIL PRESSURE

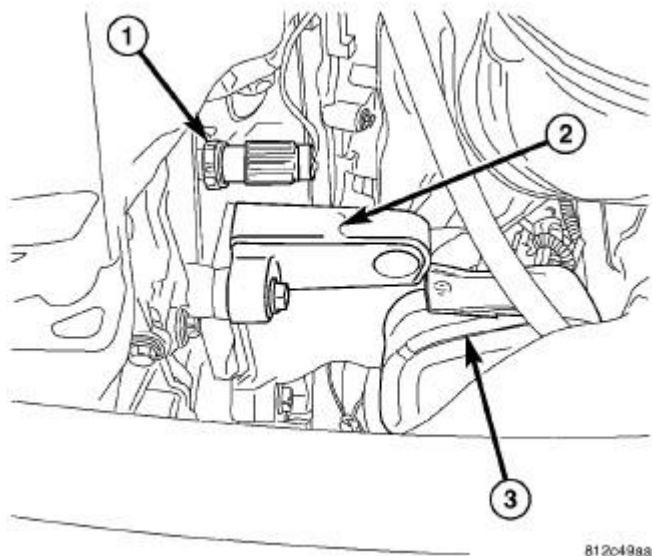


Fig. 277: Oil Pressure Sensor Connector
Courtesy of CHRYSLER LLC

1. Remove the oil pressure switch (1). See Engine/Lubrication/SWITCH, Oil Pressure - Removal.
2. Install oil pressure test gauge assembly, Special Tools C-3292A with 8406 adaptor.
3. Start engine and monitor gauge readings.

CAUTION: If oil pressure is 0 at idle, Do not run engine at 3000 RPM.

4. Oil Pressure (engine at operating temperature): **Curb Idle** 34.5 kPa (5 psi) minimum **3000 RPM** 300-724 kPa (45-105 psi).
5. If oil pressure is 0 at idle. shut off engine, check for pressure relief valve stuck open or a clogged oil pickup screen.
6. Remove oil pressure test gauge assembly, Special Tools C-3292A with 8406 adaptor and install oil pressure switch after testing is completed. See **Engine/Lubrication/SWITCH, Oil Pressure - Installation.**

COOLER AND LINES, OIL

Description

DESCRIPTION

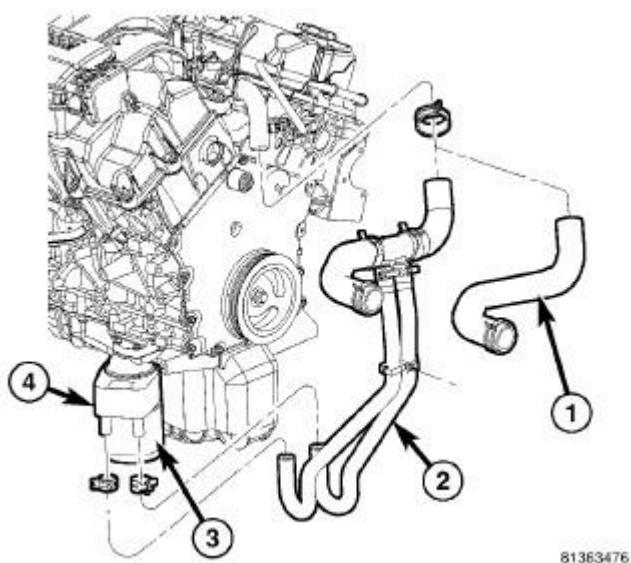


Fig. 278: OIL COOLER

Courtesy of CHRYSLER LLC

The 2.7L engine oil cooler (if equipped) is an oil-to-coolant type engine oil cooler (4). The cooler (4) is mounted between the oil filter adapter and the oil filter (3). If equipped, the engine will have hose assembly (2). If not equipped, the engine will have hose assembly (1).

Operation

OPERATION

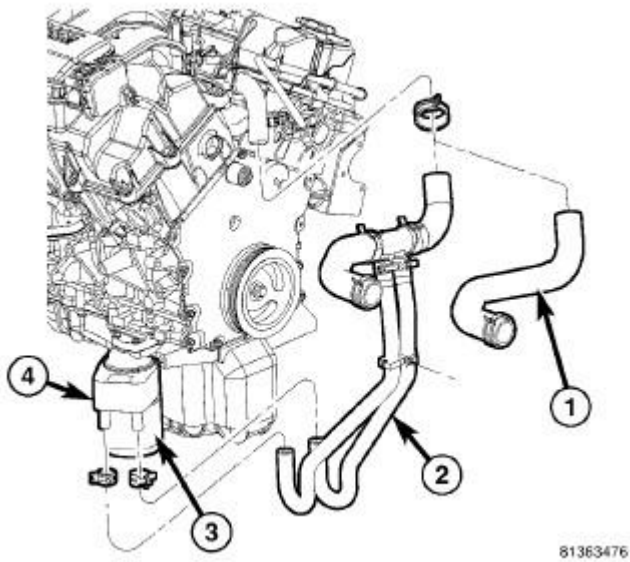


Fig. 279: OIL COOLER

Courtesy of CHRYSLER LLC

Engine oil travels from the oil cooler (4) and into the oil filter (3). Engine oil then exits the filter into the main gallery. Engine coolant flows from the upper radiator hose to and from the cooler through hoses (2) and back to the upper radiator hose.

Removal

REMOVAL

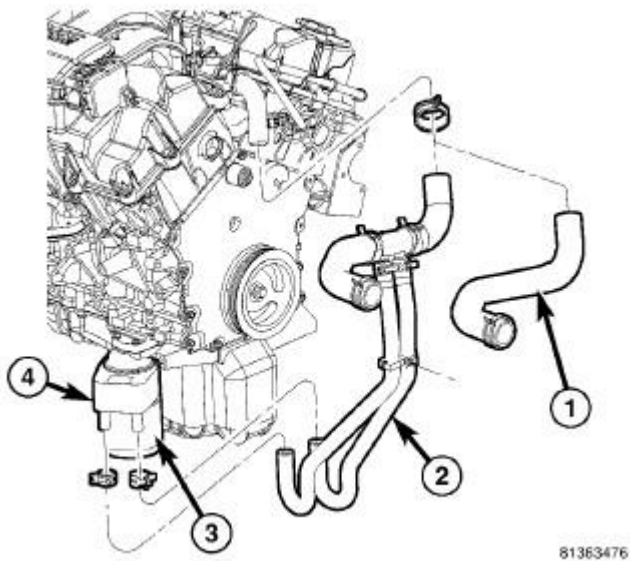


Fig. 280: OIL COOLER

Courtesy of CHRYSLER LLC

1. Drain cooling system. Refer to **Cooling - Standard Procedure** .
2. Raise vehicle on hoist.
3. Disconnect coolant hoses (2) from oil cooler (4).
4. Remove oil filter (3).
5. Remove oil cooler attaching fastener from center of oil cooler (4).
6. Remove oil cooler (4).

Installation

INSTALLATION

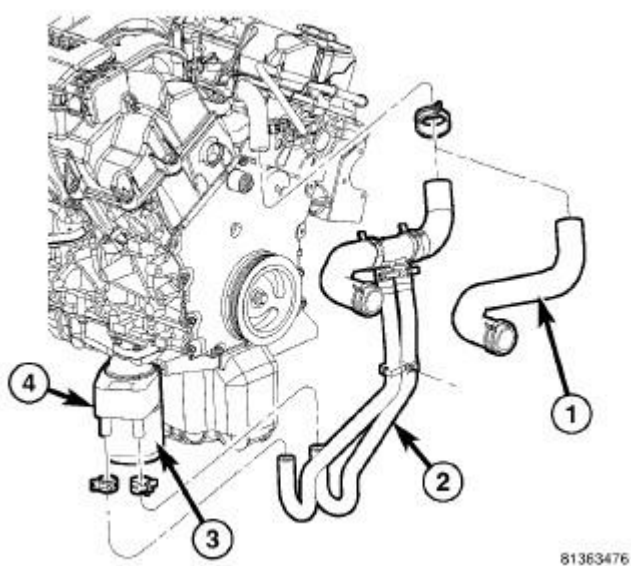


Fig. 281: OIL COOLER

Courtesy of CHRYSLER LLC

1. Install oil cooler (4).

NOTE: The cut out section of the oil cooler seal retainer flange (top), must be aligned with the tab on the oil pan. The oil cooler must be prevented from turning during the tightening sequence.

2. Install oil cooler (4) attaching fastener and tighten to 61 N.m (45 ft. lbs.).
3. Install oil filter (3).
4. Connect coolant hoses (2) to oil cooler (4).
5. Lower vehicle.
6. Fill cooling system. Refer to **Cooling - Standard Procedure** .
7. Start engine and check for leaks.
8. Check engine oil and add as needed.

FILTER, ENGINE OIL

Removal

REMOVAL

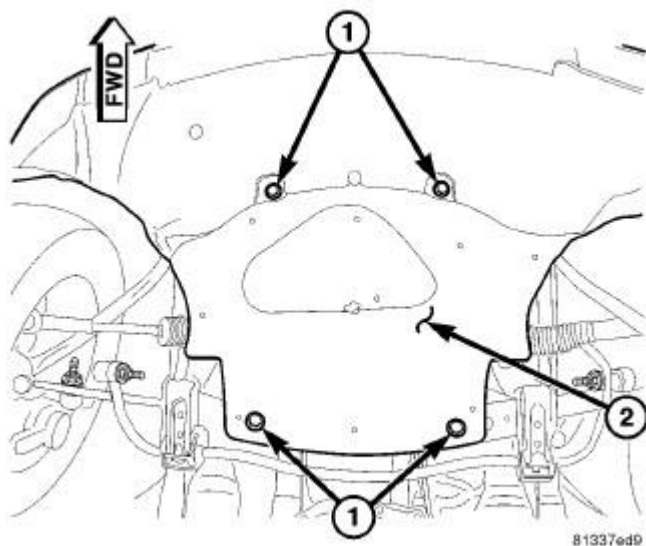


Fig. 282: Lower Splash Shield
Courtesy of CHRYSLER LLC

1. Raise vehicle on hoist.
2. Remove lower splash shield retaining bolts (1) and splash shield (2).

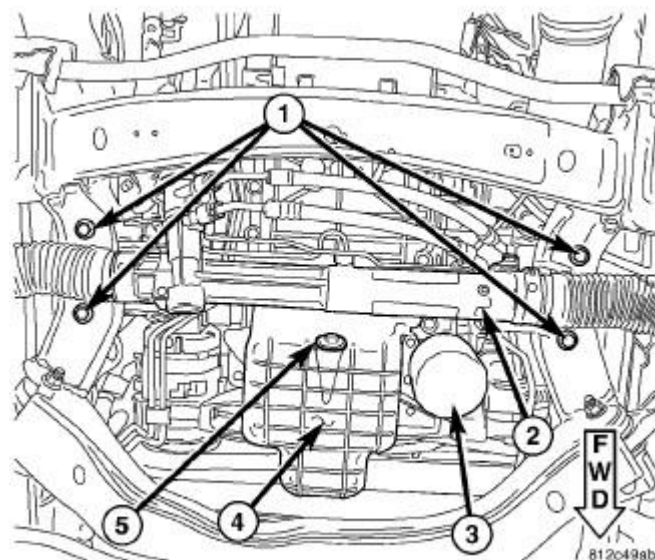


Fig. 283: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

3. Position a suitable collecting container under oil filter (3) location.
4. Remove oil filter (3) using a suitable oil filter wrench. Dispose of oil filter (3) following environmental guidelines.

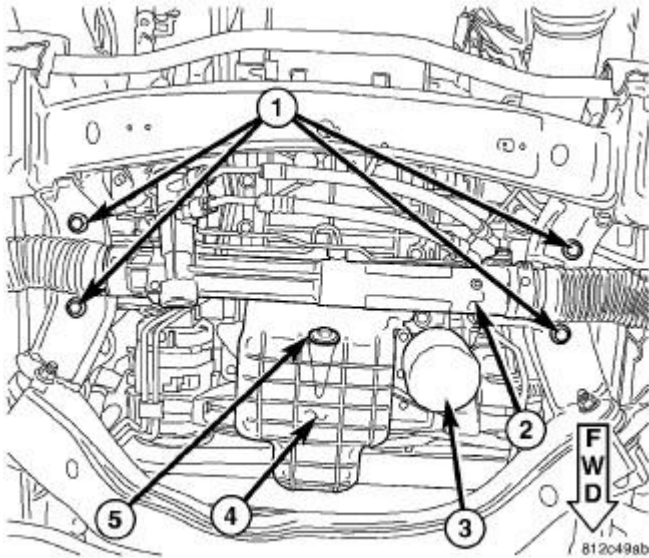
Installation**INSTALLATION**

Fig. 284: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

1. Wipe filter base clean, then inspect gasket sealing surface.
2. Lubricate gasket of new filter with clean engine oil.
3. Install oil filter (3) and tighten to 16 N.m (9 ft. lbs.) of torque after gasket contacts base. Use filter wrench if necessary.

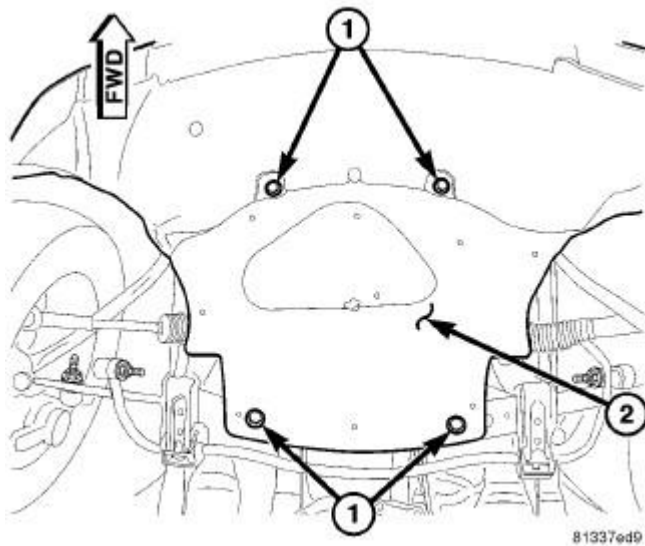


Fig. 285: Lower Splash Shield
Courtesy of CHRYSLER LLC

4. Install lower splash shield (2) and retaining bolts (1).

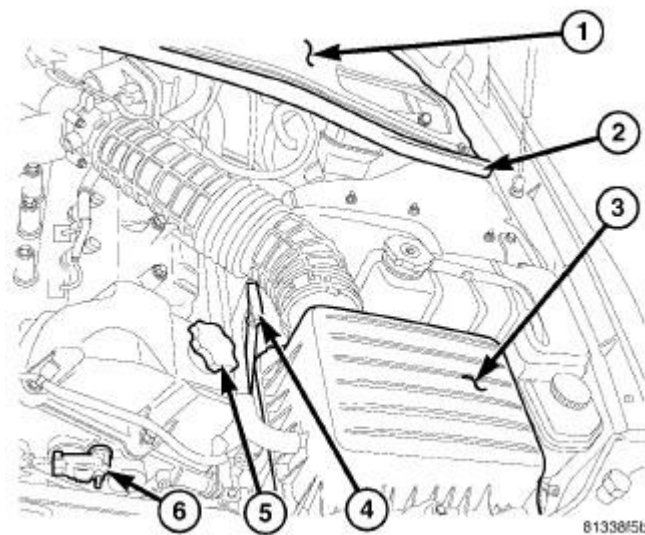


Fig. 286: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

5. Fill crankcase with proper engine oil to correct level. Start engine and check for leaks.
6. Check engine oil level on dipstick (4) and fill as needed (5).

OIL

Description

DESCRIPTION

For engine oil type and capacity, refer to Vehicle Quick Reference/Capacities and Recommended Fluids - Description .

Standard Procedure

ENGINE OIL AND FILTER CHANGE

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

Change engine oil and filter at mileage and time intervals described in the Maintenance Schedule. Refer to Vehicle Quick Reference/Maintenance Schedules - Description .

TO CHANGE ENGINE OIL

1. Run engine until achieving normal operating temperature.
2. Position the vehicle on a level surface and turn engine off.

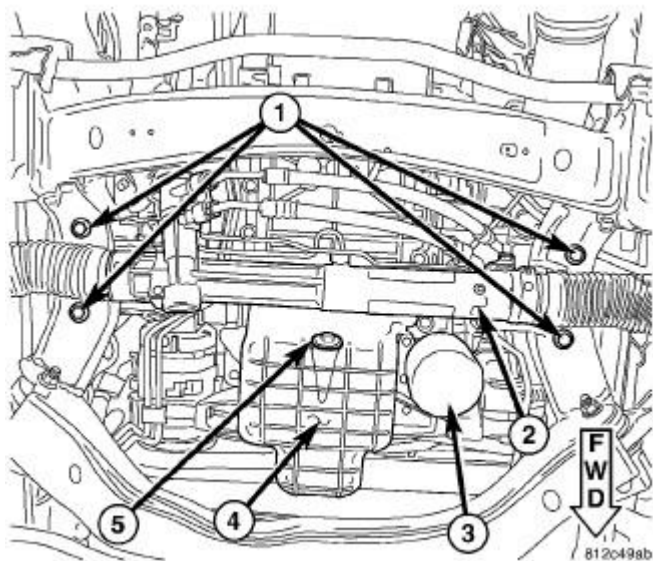


Fig. 287: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

3. Hoist and support vehicle on safety stands. Refer to Vehicle Quick Reference/Hoisting - Standard Procedure .

4. Remove engine splash shields.
5. Place a suitable drain pan under crankcase drain (5).
6. Remove drain plug (5) from oil pan and allow oil to drain into pan. Inspect drain plug (5) threads for stretching or other damage. Replace drain plug (5) and gasket if damaged.
7. Remove oil filter (3). See **Engine/Lubrication/FILTER, Engine Oil - Removal**.
8. Install drain plug (5) in oil pan. Tighten plug to 27 N.m (20 ft. lbs.).
9. Install new oil filter (3). See **Engine/Lubrication/FILTER, Engine Oil - Installation**.

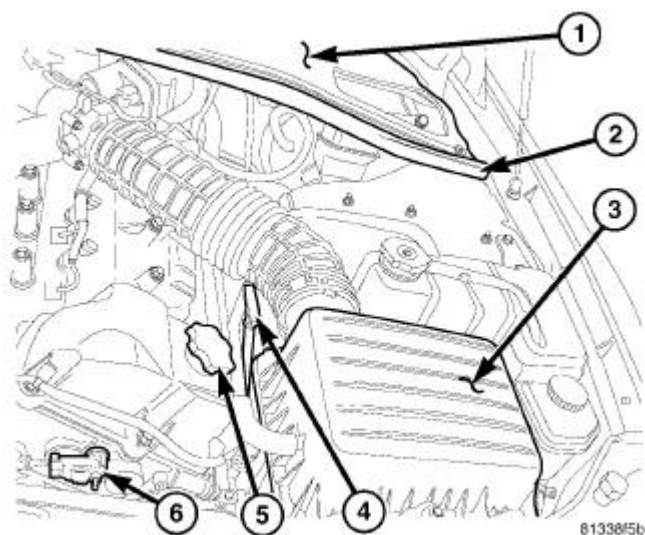


Fig. 288: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

10. Lower vehicle and remove oil fill cap (5). Fill crankcase with specified type and amount of engine oil. Refer to **Vehicle Quick Reference/Capacities and Recommended Fluids - Description** . Refer to **Vehicle Quick Reference/Capacities and Recommended Fluids - Specifications** .
11. Install oil fill cap (5).
12. Start engine and inspect for leaks.
13. Stop engine and inspect oil level (4).

OIL FILTER SPECIFICATION

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

USED ENGINE OIL DISPOSAL

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

PAN, OIL

Removal

REMOVAL

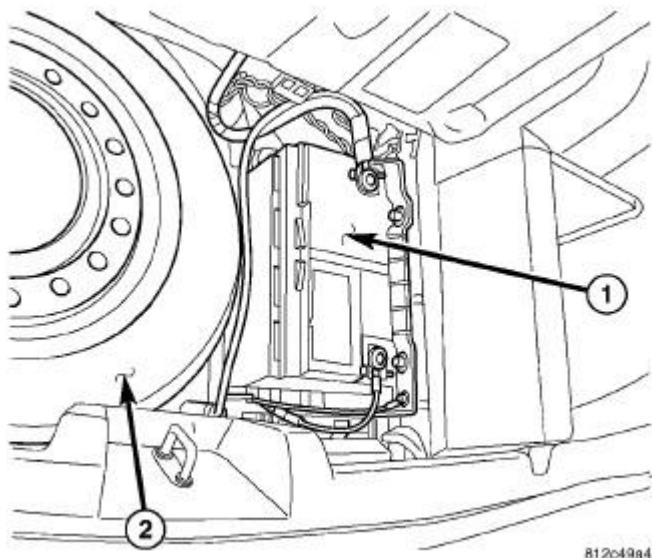


Fig. 289: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery cable (1) located in trunk.

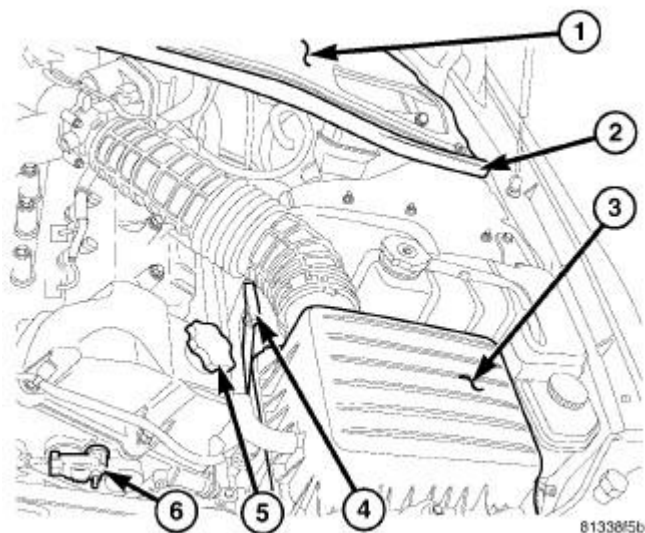


Fig. 290: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

2. Remove engine oil indicator (4).
3. Raise vehicle on hoist.

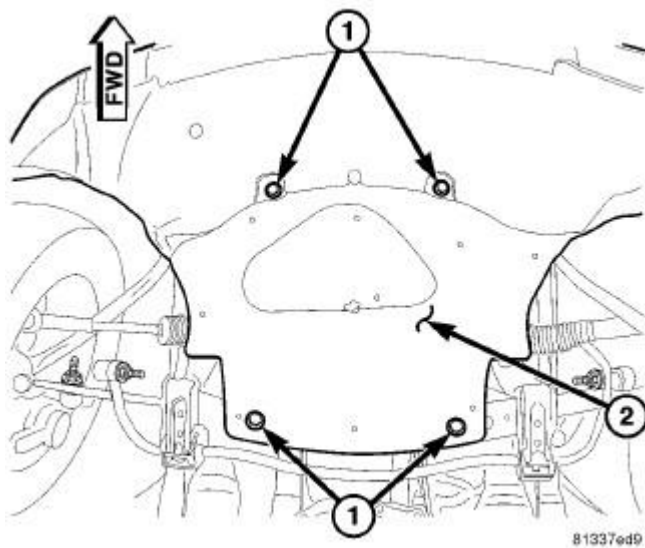


Fig. 291: Lower Splash Shield
Courtesy of CHRYSLER LLC

4. Remove lower splash shield retaining bolts (1) and splash shield (2).

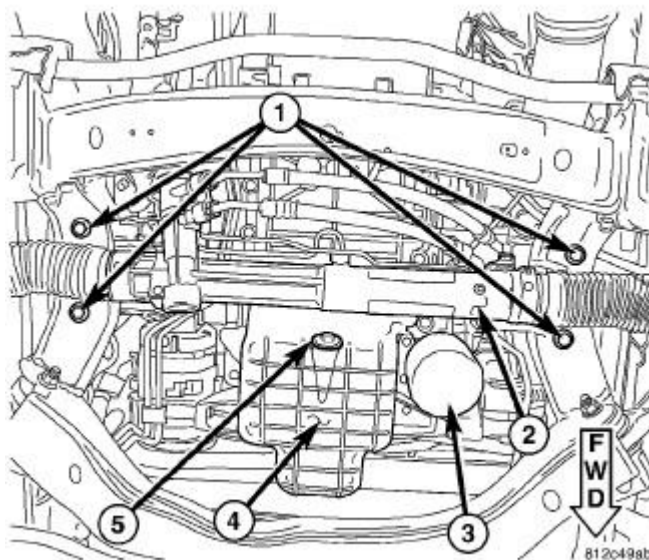


Fig. 292: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

5. Drain engine oil (5) and remove oil filter (3).

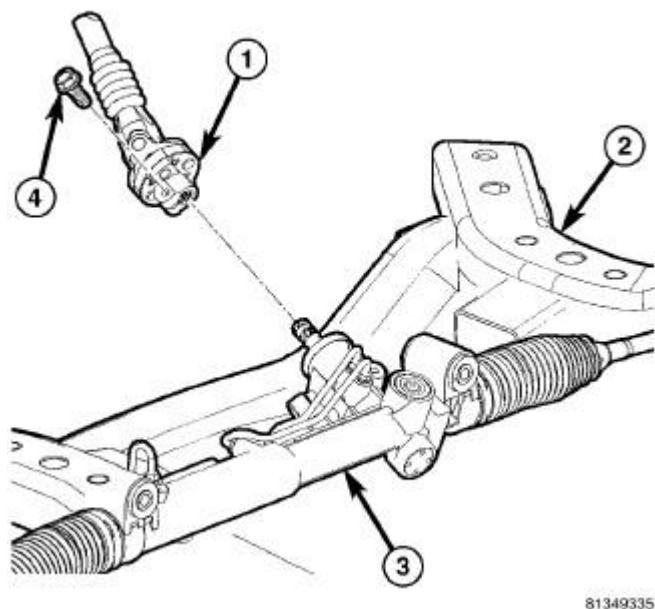


Fig. 293: Identifying Steering Coupler Bolt, Coupler & Rack
Courtesy of CHRYSLER LLC

6. Remove the steering coupler bolt (4) and separate coupler (1) from rack (3).

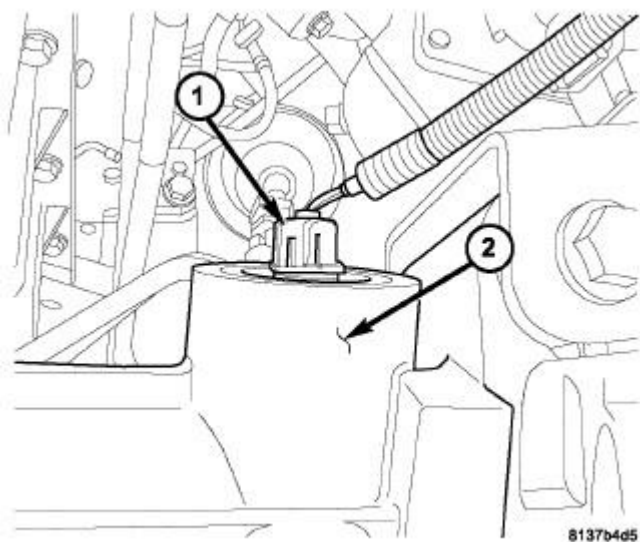


Fig. 294: Identifying Power Steering Pressure Switch Electrical Connector
Courtesy of CHRYSLER LLC

7. Disconnect power steering pressure switch electrical connector (1).

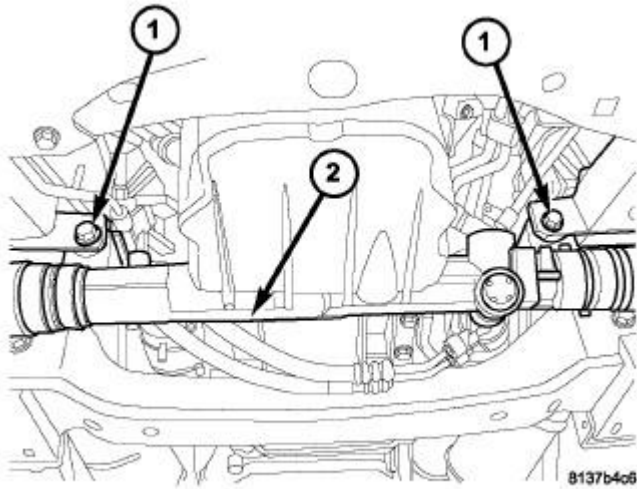


Fig. 295: GEAR MOUNTING BOLTS
Courtesy of CHRYSLER LLC

8. Remove steering rack mounting bolts (1).

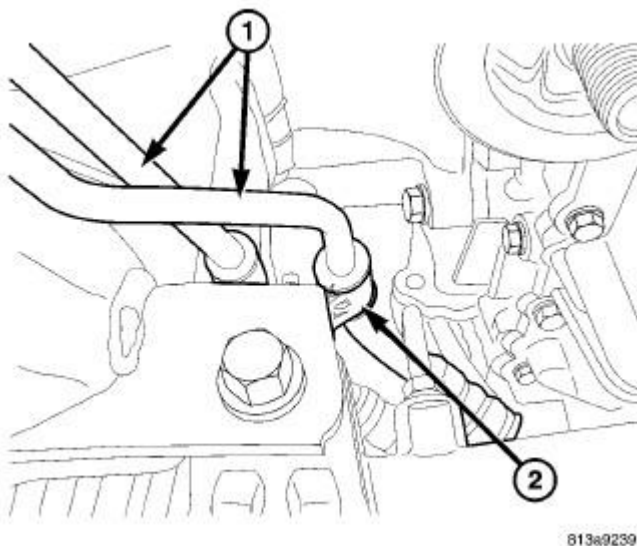


Fig. 296: Power Steering Line Support
Courtesy of CHRYSLER LLC

9. Remove power steering line support (2) from frame.
10. Reposition rack out of the way.
11. Remove structural collar. See **Engine/Engine Block/COVER, Structural Dust - Removal**.

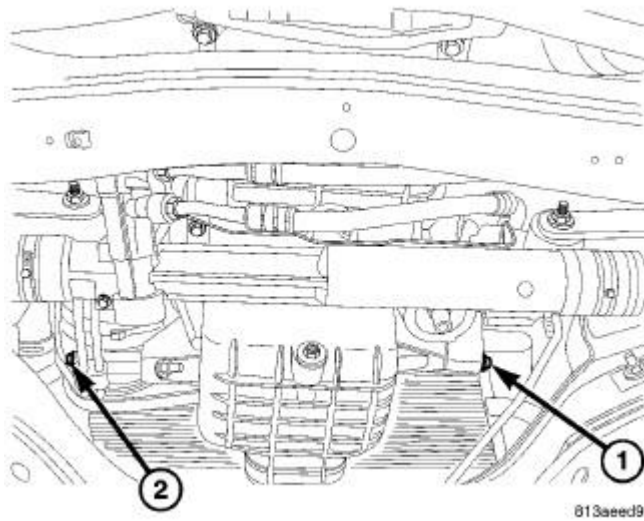


Fig. 297: Locating Mounting Bracket & A/C Compressor Bracket Bolts
Courtesy of CHRYSLER LLC

12. Remove mounting bracket to oil pan lower bolt (1).
13. Remove A/C compressor bracket to oil pan lower bolt (2).

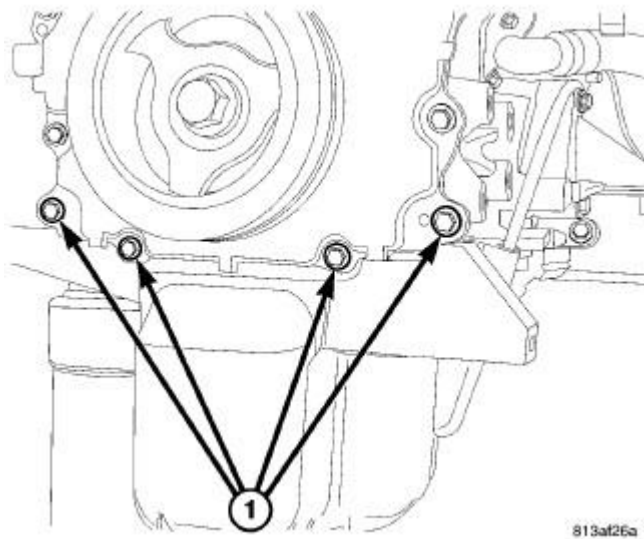
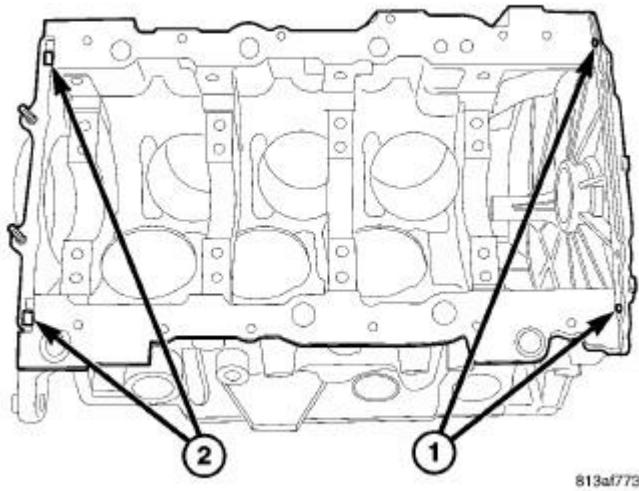


Fig. 298: FRONT COVER BOLTS
Courtesy of CHRYSLER LLC

14. Remove lower timing chain cover to oil pan bolts (1) .

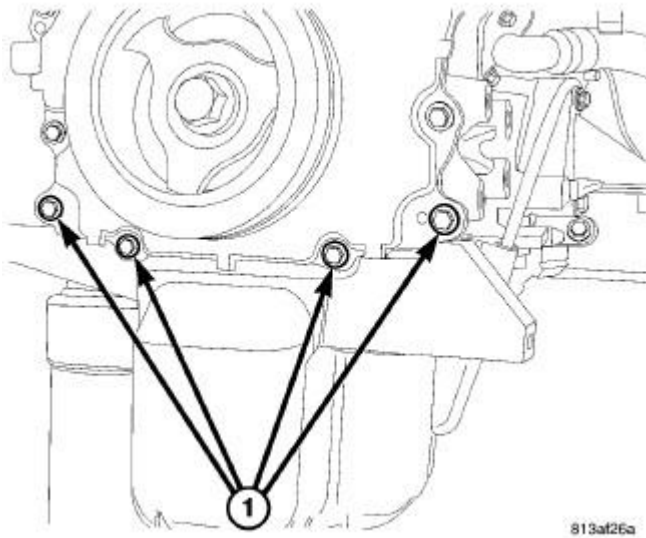
CAUTION: Assure removal of the four lower timing cover bolts, as damage to the timing cover and/or oil pan may occur.

15. Remove oil pan and gasket.

Installation**INSTALLATION****Fig. 299: OIL PAN SEALER****Courtesy of CHRYSLER LLC**

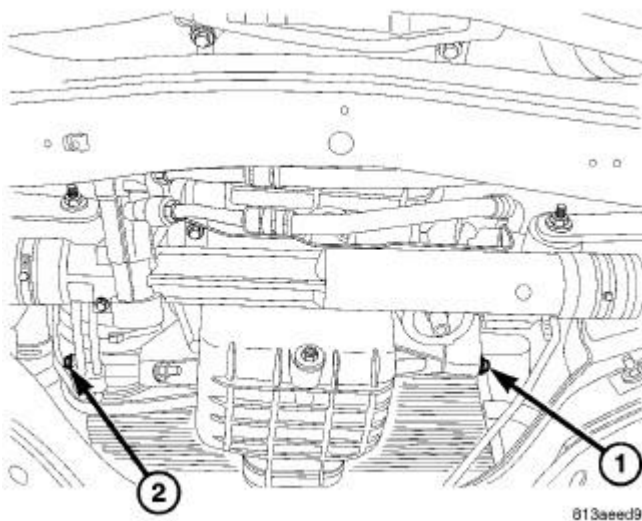
1. Clean oil pan and sealing surfaces. Inspect timing chain cover gaskets. Replace as necessary.
2. Apply an 1/8 inch bead of Mopar® Engine RTV GEN II to the front T-joints (1) (oil pan gasket to timing cover gasket interface) and the rear T-joints (2) (oil pan gasket to crankshaft rear oil seal retainer gasket interface).
3. Install oil pan gasket to block.

NOTE: To prevent oil leaks at oil pan to timing chain cover, the following tightening sequence procedure must be performed.

**Fig. 300: FRONT COVER BOLTS**

Courtesy of CHRYSLER LLC

4. Install oil pan while aligning the oil level indicator tube and attach fasteners using the following tightening sequence:
 - a. Install oil pan bolts and nuts **finger tight only-just tight enough to compress the gasket's rubber seal. Line up front of oil pan to be flush with front face of block.**
 - b. Install lower timing chain cover bolts (1) and tighten to 12 N.m (105 in. lbs.) .
 - c. Tighten oil pan bolts to 28 N.m (250 in. lbs.).
 - d. Tighten oil pan nuts to 12 N.m (105 in. lbs.).

**Fig. 301: Locating Mounting Bracket & A/C Compressor Bracket Bolts**

Courtesy of CHRYSLER LLC

5. Install lower bolt attaching the A/C compressor to oil pan (2). Tighten bolt to 28 N.m (21 ft. lbs.).
6. Install lower bolt attaching the alternator bracket to oil pan (1). Tighten bolt to 28 N.m (21 ft. lbs.).

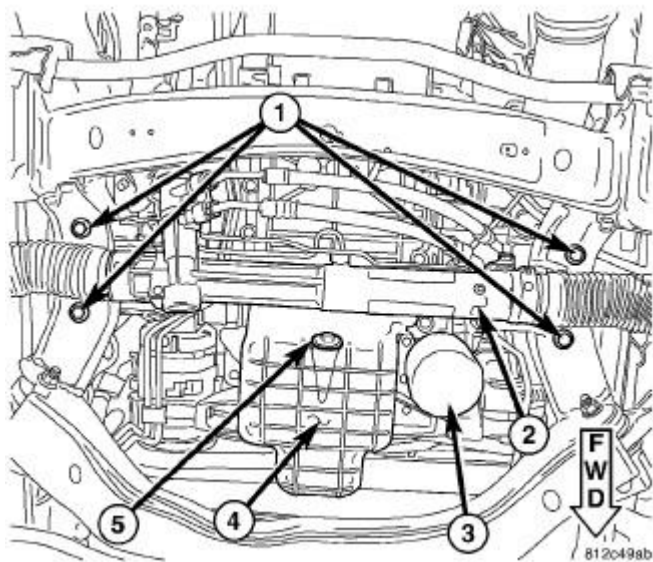


Fig. 302: Identifying Engine Mounts, Oil Pan, Drain Plug & Oil Filter
Courtesy of CHRYSLER LLC

7. Install oil filter (3) and drain plug (5).
8. Install structural collar. See **Engine/Engine Block/COVER, Structural Dust - Installation.**

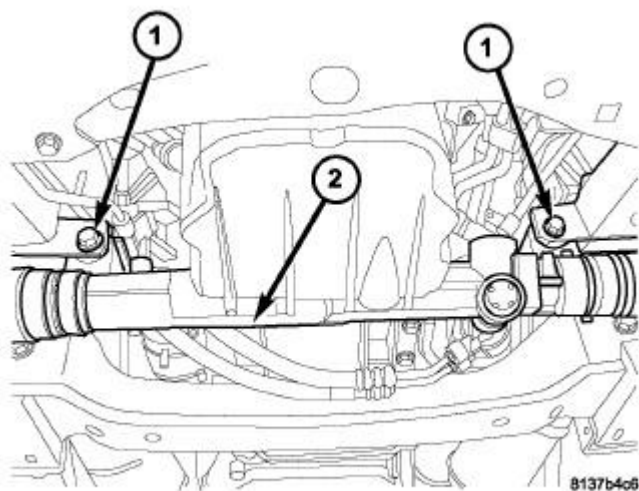
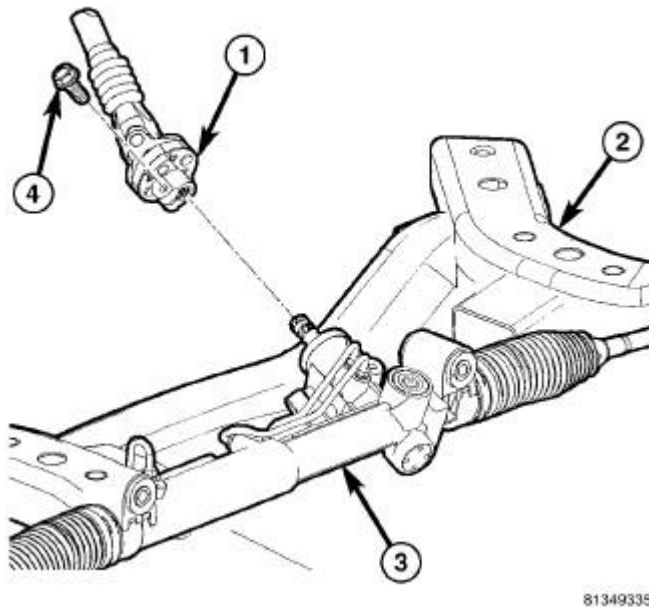


Fig. 303: GEAR MOUNTING BOLTS
Courtesy of CHRYSLER LLC

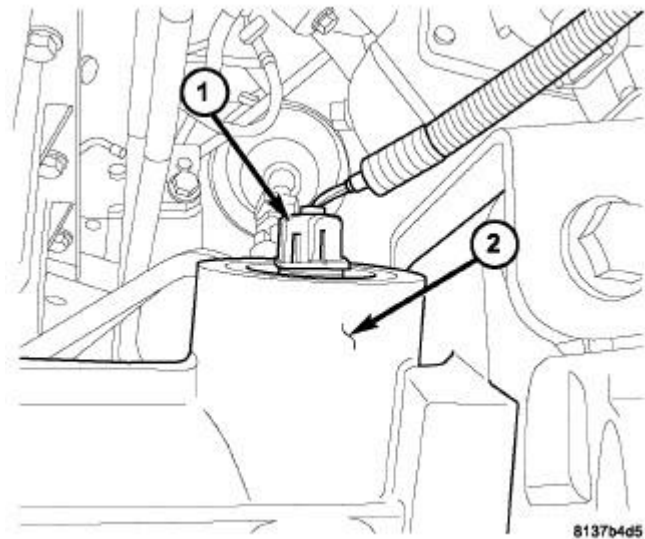
9. Position steering gear (2) in place and install mounting bolts (1). Tighten bolts (1) to 70 N.m (95 ft. lbs.).



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Fig. 304: Identifying Steering Coupler Bolt, Coupler & Rack
Courtesy of CHRYSLER LLC

10. Install the steering coupling (2) lower pinch bolt (1) at the gear (3) using a new bolt (1). Tighten to 30 N.m (22 ft. lbs.). Refer to **Steering/Column/COUPLING, Steering Column - Installation**.



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Fig. 305: Identifying Power Steering Pressure Switch Electrical Connector
Courtesy of CHRYSLER LLC

11. Connect electrical connector (1) to steering gear (2).

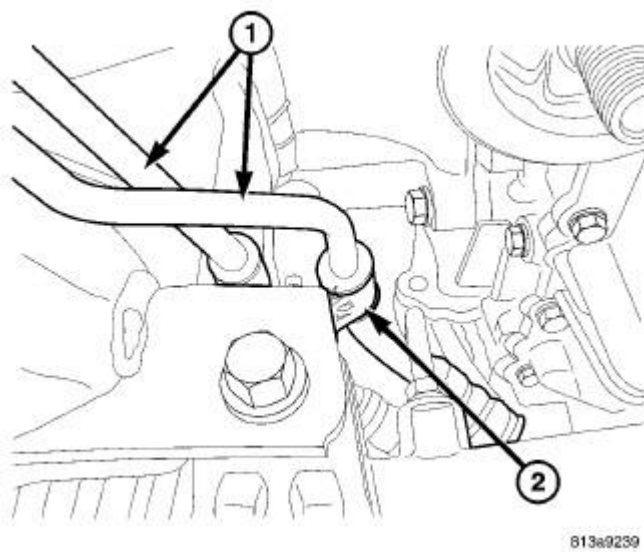


Fig. 306: Power Steering Line Support
Courtesy of CHRYSLER LLC

12. Install power steering line support (2) and tighten.

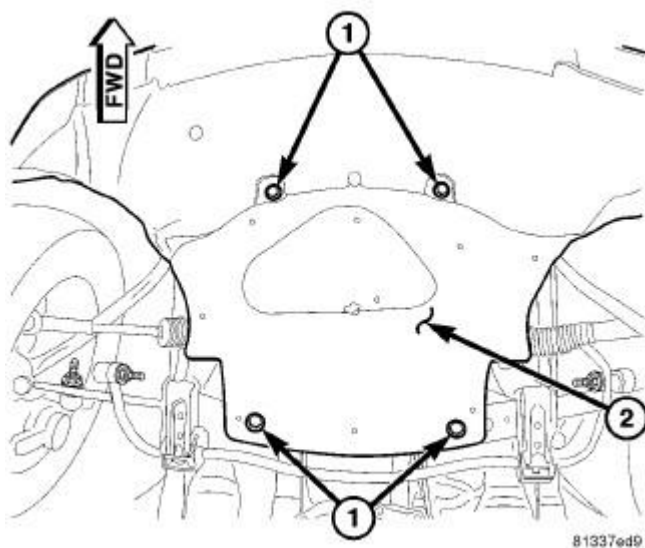


Fig. 307: Lower Splash Shield
Courtesy of CHRYSLER LLC

13. Install lower splash shield (2) and retaining bolts (1).
14. Lower vehicle.

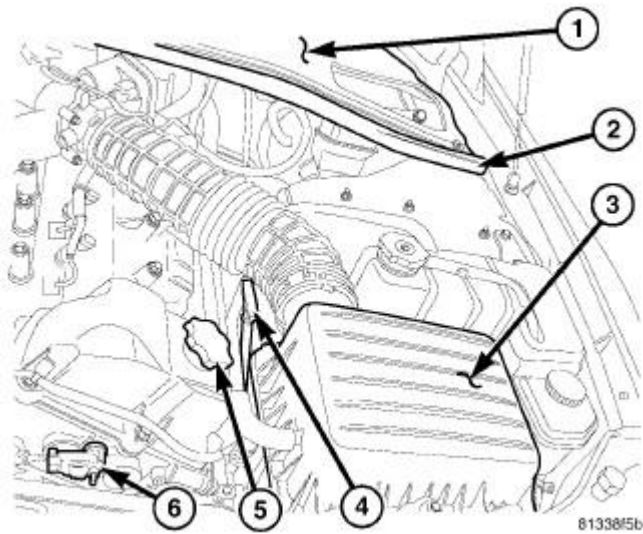


Fig. 308: AIR CLEANER HOUSING
Courtesy of CHRYSLER LLC

15. Install engine oil level indicator (4).
16. Fill engine crankcase (5) with proper oil to correct level.

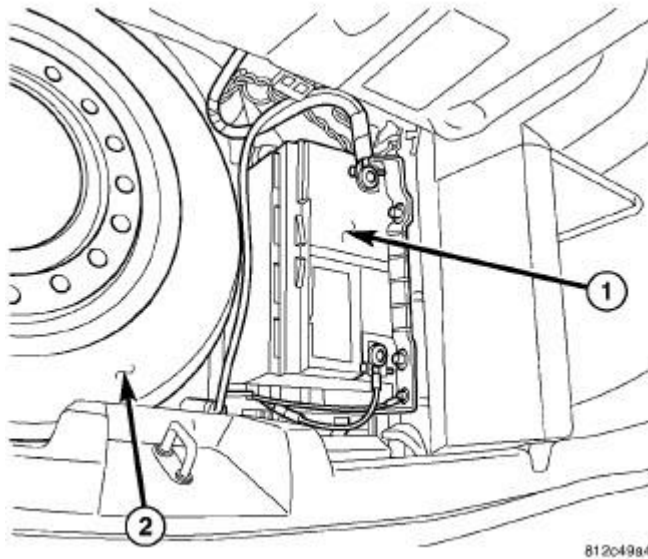


Fig. 309: Locating Battery
Courtesy of CHRYSLER LLC

17. Connect negative battery (1) cable.
18. Start engine and check for leaks.

PUMP, ENGINE OIL

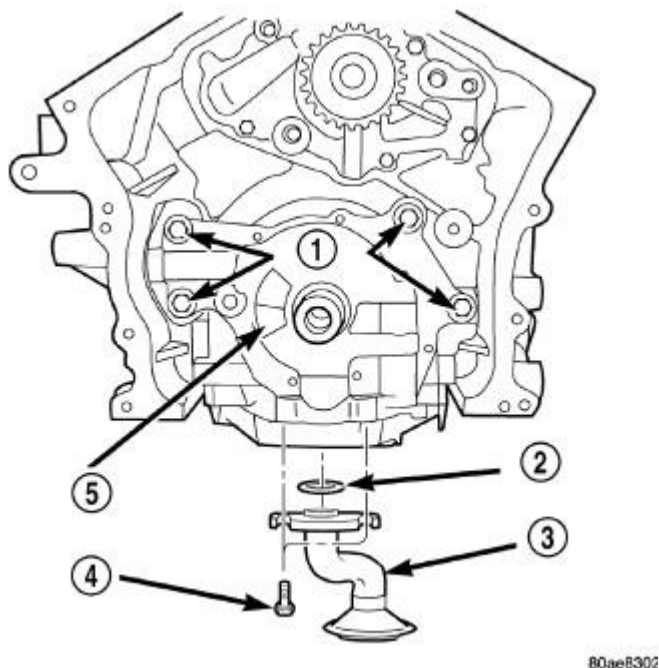
Removal**REMOVAL**

Fig. 310: Oil Pump and Pick-up Tube
Courtesy of CHRYSLER LLC

- 1 - BOLTS
- 2 - O-RING
- 3 - PICK-UP TUBE
- 4 - BOLT
- 5 - OIL PUMP

NOTE: The oil pump pressure relief valve can be serviced by removing the oil pan.

1. Remove crankshaft vibration damper. See [Engine/Engine Block/DAMPER, Vibration - Removal](#).
2. Remove timing chain cover. See [Engine/Valve Timing/COVER\(S\), Engine Timing - Removal](#).
3. Remove timing chain and sprockets. See [Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal](#).
4. Remove oil pan. See [Engine/Lubrication/PAN, Oil - Removal](#).
5. Remove oil pick-up tube (3) and O-ring (2).
6. Ensure that crankshaft is positioned so that the oil pump drive flats are parallel to the oil pan mounting surface. This position will properly locate oil pump upon installation.
7. Remove oil pump attaching bolts (1).
8. Remove oil pump (5).

Disassembly

DISASSEMBLY

NOTE: DO NOT remove oil pressure relief valve. If the oil pressure relief valve is suspect, replace the oil pump assembly.

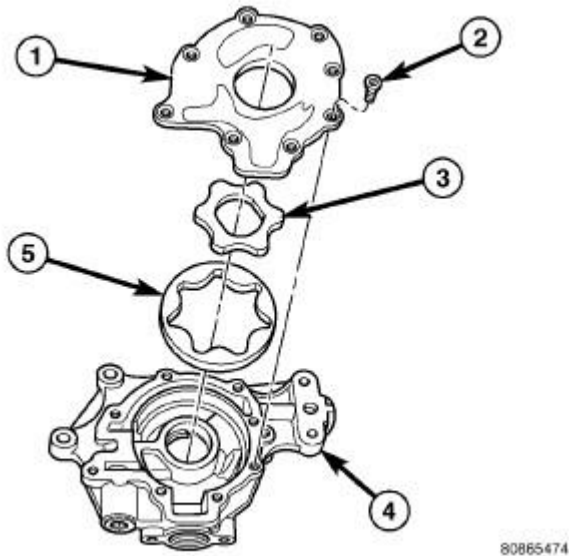


Fig. 311: Oil Pump

Courtesy of CHRYSLER LLC

1. Remove oil pump cover screws (2) and lift off oil pump cover (1).
2. Remove inner pump rotor (3) and outer pump rotor (5).
3. Wash all parts in a suitable solvent.
4. Inspect components carefully for damage or wear. See Engine/Lubrication/PUMP, Engine Oil - Inspection.

Inspection

INSPECTION

NOTE: DO NOT remove oil pressure relief valve. If the oil pressure relief valve is suspect, replace the oil pump assembly.

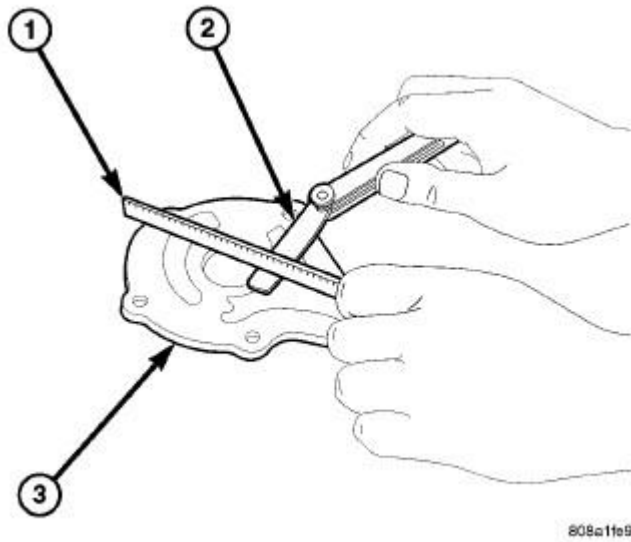


Fig. 312: CHECKING OIL PUMP COVER FLATNESS - TYPICAL
Courtesy of CHRYSLER LLC

1. Disassemble the oil pump. See **Engine/Lubrication/PUMP, Engine Oil - Disassembly**.
2. Clean all oil pump components.
3. Inspect mating surface of the oil pump housing and cover. Replace oil pump if deeply scratched or grooved (minor surface scratches and polishing is normal).
4. Lay a straightedge (1) across the pump cover (3) surface. If a 0.025 mm (0.001 in.) feeler gauge (2) can be inserted between cover and straight edge, cover should be replaced.

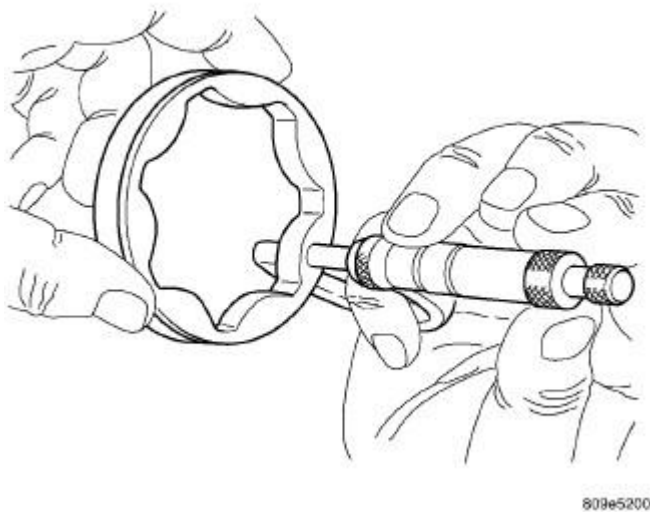


Fig. 313: MEASURING OUTER ROTOR THICKNESS
Courtesy of CHRYSLER LLC

5. Measure thickness and diameter of outer rotor. If outer rotor thickness measures 9.954 mm (0.392 in.) or less , or if the diameter is 89.174 mm (3.5108 in.) or less, replace outer rotor.

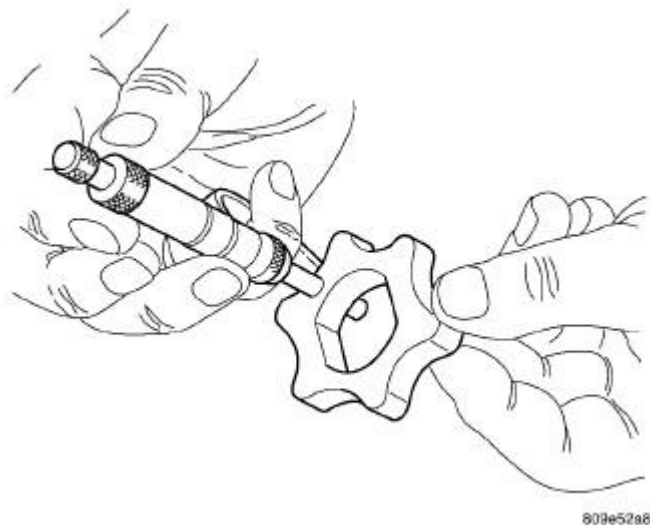


Fig. 314: MEASURING INNER ROTOR THICKNESS
Courtesy of CHRYSLER LLC

6. Measure the inner rotor, if inner rotor measures 9.954 mm (0.392 in.) or less replace inner rotor.

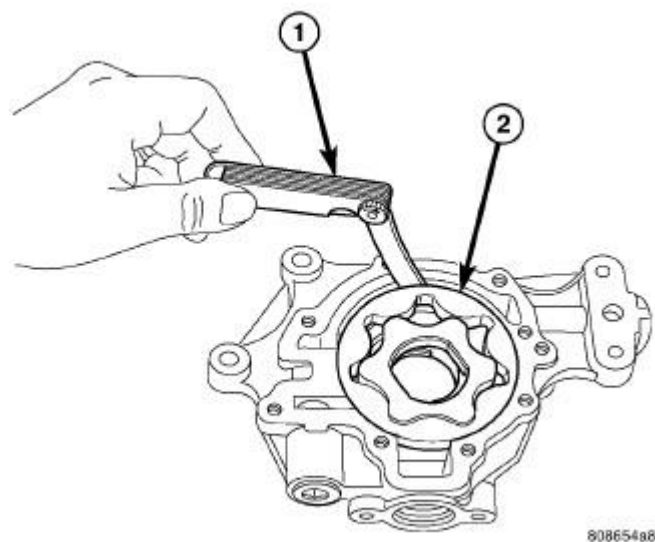


Fig. 315: Measuring Clearance Between Rotor & Body
Courtesy of CHRYSLER LLC

7. Slide outer rotor into body, press to one side with fingers and measure clearance between rotor and body (2). If measurement is 0.39 mm (0.015 in.) or more, replace body only if outer rotor is in specifications.

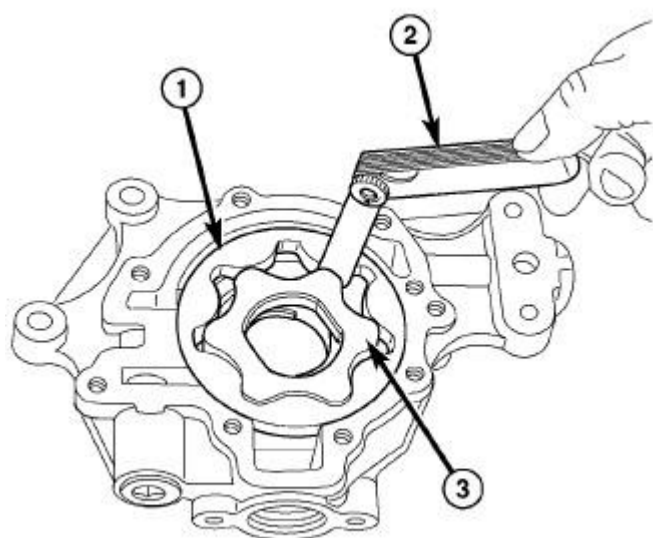


Fig. 316: MEASURING CLEARANCE BETWEEN ROTORS

Courtesy of CHRYSLER LLC

8. Install inner rotor (3) into body. If clearance between inner rotor (3) and outer rotor (1) is 0.20 mm (0.008 in.) or more, replace both rotors.

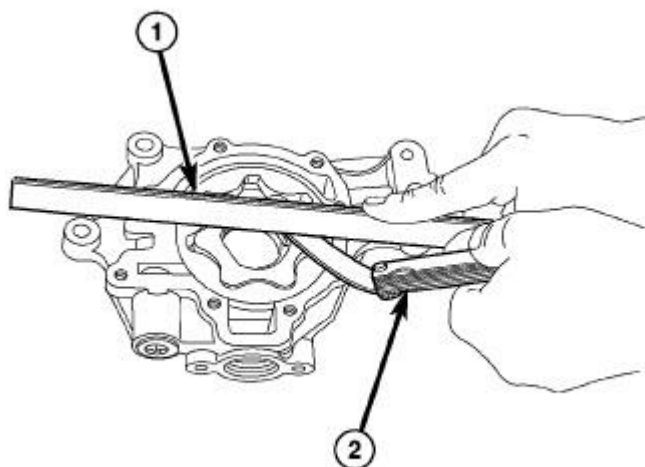
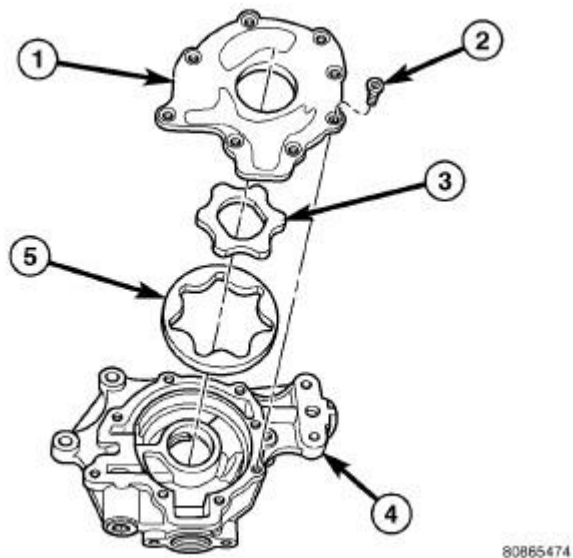


Fig. 317: MEASURING CLEARANCE OVER ROTORS

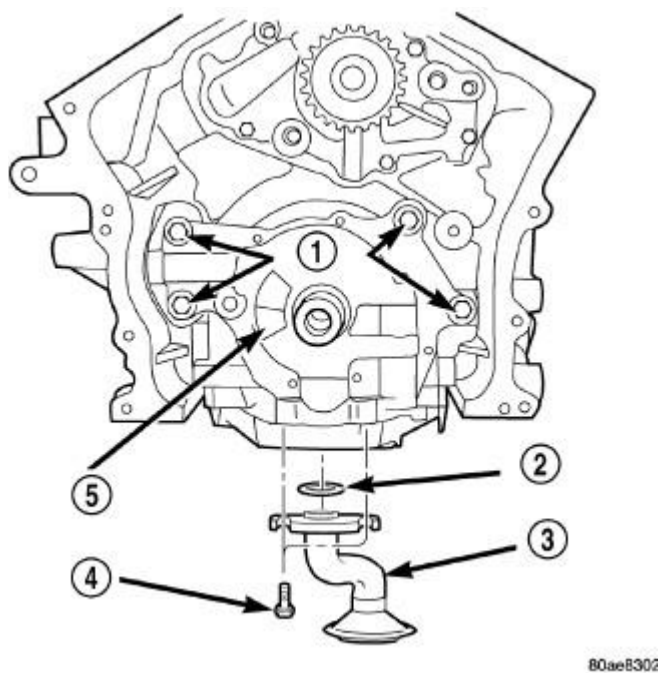
Courtesy of CHRYSLER LLC

9. Place a straightedge (1) across the face of the body, between bolt holes. If a feeler gauge (2) of 0.077 mm (0.003 in.) or more can be inserted between rotors and the straightedge, replace pump assembly **ONLY** if rotors are in specification.
10. Assemble oil pump. See **Engine/Lubrication/PUMP, Engine Oil - Assembly**.

Assembly**ASSEMBLY****Fig. 318: Oil Pump****Courtesy of CHRYSLER LLC**

1. Assemble pump using new parts as required.
2. Tighten cover screws (2) to 12 N.m (105 in. lbs.).
3. Prime oil pump before installation by filling rotor cavity with engine oil.

Installation**INSTALLATION**



80ae8302

Fig. 319: Oil Pump and Pick-up Tube
Courtesy of CHRYSLER LLC

- 1 - BOLTS
- 2 - O-RING
- 3 - PICK-UP TUBE
- 4 - BOLT
- 5 - OIL PUMP

CAUTION: The crankshaft oil pump drive flats must be parallel to the oil pan mounting surface before installing the oil pump. This position will properly locate the oil pump. If not properly located, severe damage to the oil pump can occur.

1. Prime the oil pump before installation by filling rotor cavity with engine oil.
2. If the crankshaft has been rotated, it must be repositioned so that the oil pump drive flats are parallel to the oil pan mounting surface prior to oil pump installation.
3. Install oil pump (5) carefully over crankshaft and into position.
4. Install oil pump attaching bolts (1). Tighten bolts to 28 N.m (250 in. lbs.).
5. Install oil pick-up tube (3) with new O-ring (2). Lubricate O-ring (2) with clean engine oil before installation. Tighten attaching bolts to 28 N.m (250 in. lbs.).
6. Install oil pan. See [Engine/Lubrication/PAN, Oil - Installation](#).
7. Install timing chain and sprockets. See [Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Installation](#).
8. Install timing chain cover. See [Engine/Valve Timing/COVER\(S\), Engine Timing - Installation](#).
9. Install crankshaft vibration damper. See [Engine/Engine Block/DAMPER, Vibration - Installation](#).

10. Fill crankcase with engine oil to correct level.

SWITCH, OIL PRESSURE

Description

DESCRIPTION

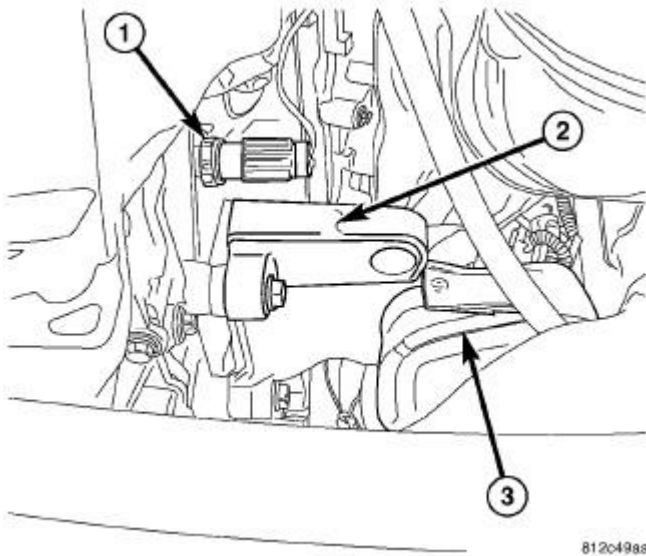


Fig. 320: Oil Pressure Sensor Connector
Courtesy of CHRYSLER LLC

The engine oil pressure switch (1) is located on the right side of the engine block. The switch screws into the engine main oil gallery. The normally closed switch provides an input through a single wire to the low pressure indicator light on the instrument cluster.

Removal

REMOVAL

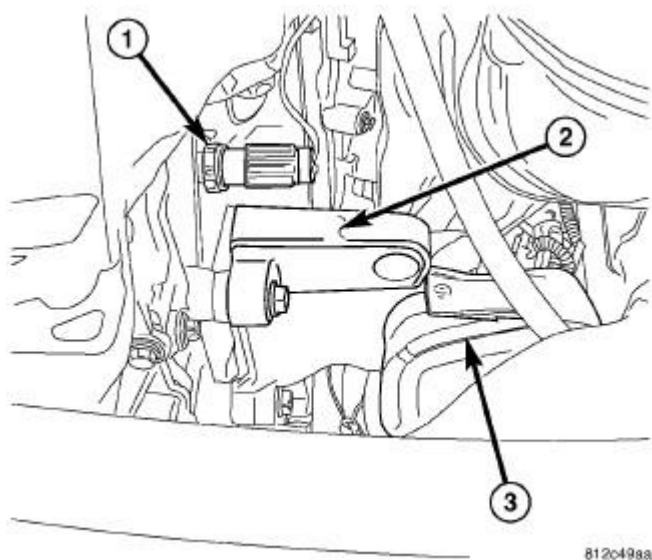


Fig. 321: Oil Pressure Sensor Connector
Courtesy of CHRYSLER LLC

1. Raise vehicle on hoist.
2. Remove lower splash shield.
3. Disconnect oil pressure switch (1) electrical connector.
4. Position an oil collecting container under switch location.
5. Remove switch by unscrewing from the engine block.

Installation

INSTALLATION

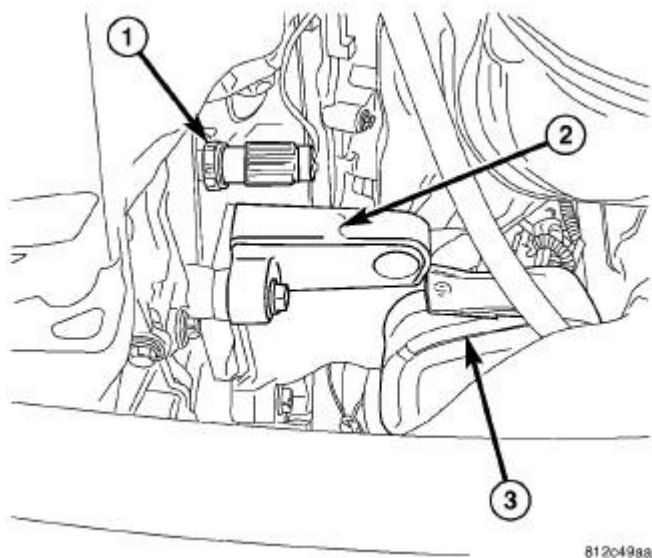
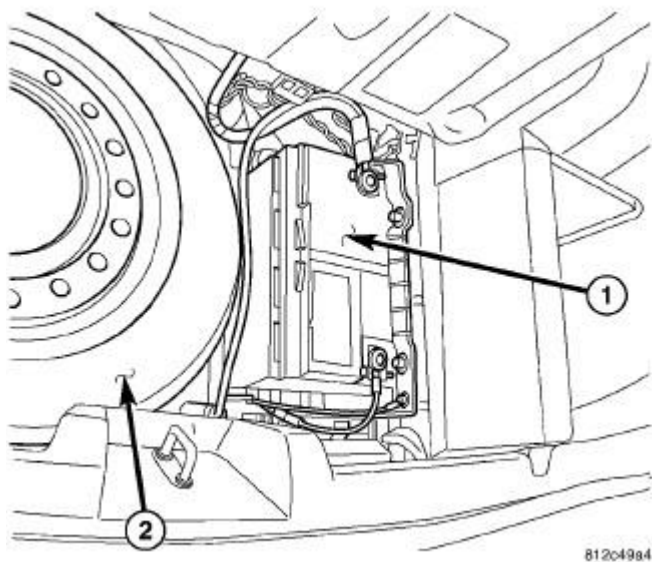


Fig. 322: Oil Pressure Sensor Connector

Courtesy of CHRYSLER LLC

1. Apply Mopar® Thread Sealant to the switch threads.
2. Install oil pressure switch (1).
3. Connect electrical connector.
4. Lower vehicle.
5. Start engine and check for leaks.
6. Check engine oil level and adjust as necessary.

MANIFOLDS**MANIFOLD, EXHAUST****Removal****LEFT EXHAUST MANIFOLD****Fig. 323: Locating Battery**

Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.

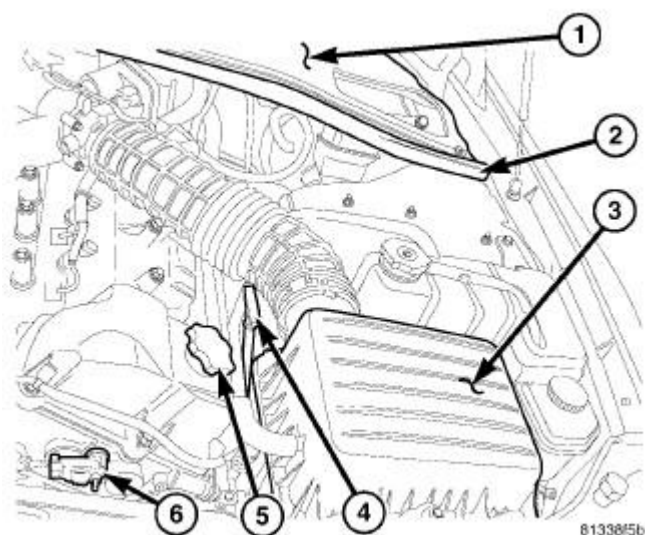


Fig. 324: AIR CLEANER HOUSING

Courtesy of CHRYSLER LLC

2. Disconnect intake air temperature sensor connector.
3. Remove air cleaner housing assembly (3). See **Engine/Air Intake System/BODY, Air Cleaner - Removal**.
4. Remove oil dipstick tube (4).

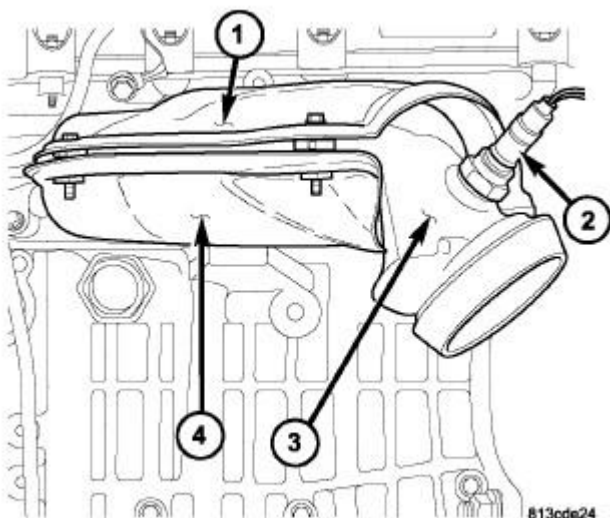


Fig. 325: LEFT EXHAUST MANIFOLD

Courtesy of CHRYSLER LLC

5. Disconnect and remove oxygen sensor (2).
6. Remove upper heat shield (1) and lower heat shield (4).

7. Raise vehicle on hoist.
8. Disconnect down stream oxygen sensor connector.
9. Remove exhaust pipe from manifold. Refer to **Exhaust System/CONVERTER, Catalytic - Removal**.
10. Remove exhaust manifold attaching bolts and remove manifold.

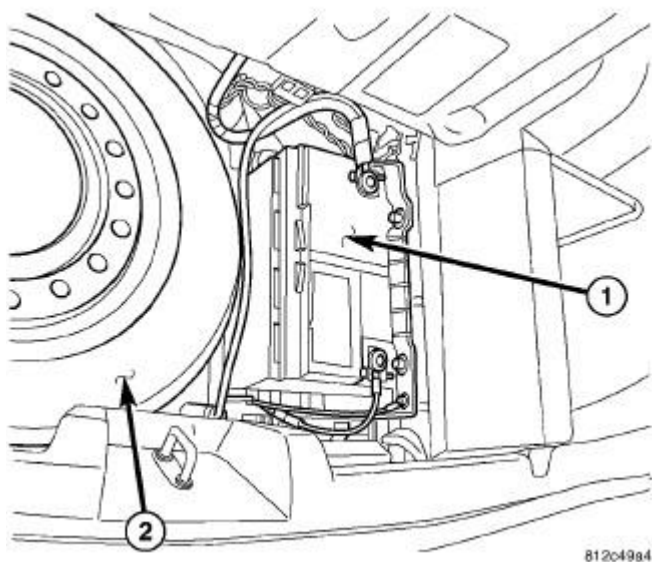
RIGHT EXHAUST MANIFOLD

Fig. 326: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable located in trunk.

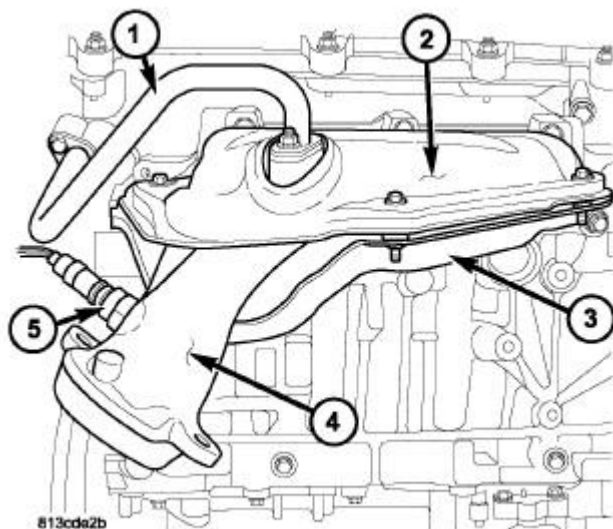


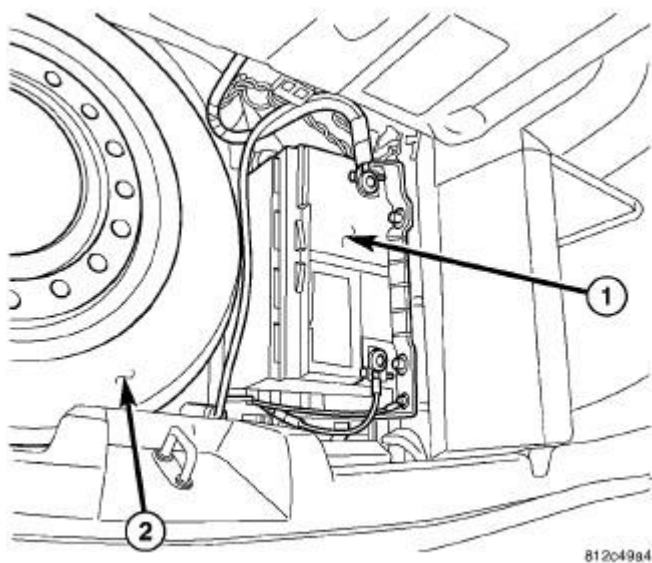
Fig. 327: RIGHT EXHAUST MANIFOLD

Courtesy of CHRYSLER LLC

2. Disconnect and remove upstream oxygen sensor (5).
3. Raise vehicle.
4. Remove EGR tube at EGR valve (1).
5. Remove EGR tube at manifold (4).
6. Disconnect down stream oxygen sensor electrical connector.
7. Disconnect exhaust pipe from manifold (4). Refer to **Exhaust System/CONVERTER, Catalytic - Removal**.
8. Remove upper heat shield (2) and lower heat shield (3).
9. Remove manifold attaching bolts and remove manifold.

Inspection**INSPECTION**

1. Inspect exhaust manifolds for damage or cracks.
2. Check manifold flatness.
3. Inspect the exhaust manifold gasket for obvious discoloration or distortion.
4. Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

Installation**LEFT EXHAUST MANIFOLD****Fig. 328: Locating Battery****Courtesy of CHRYSLER LLC**

1. Disconnect negative battery (1) cable.

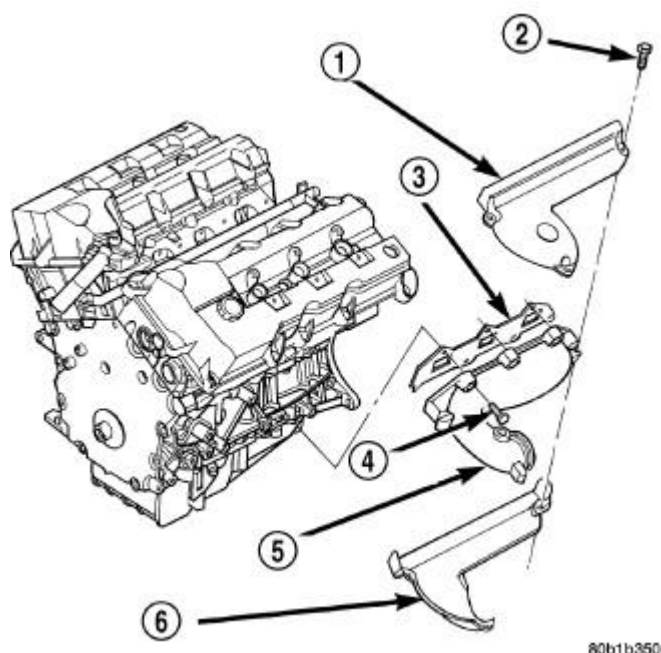


Fig. 329: Exhaust Manifold Gasket & Heat Shields
Courtesy of CHRYSLER LLC

2. Raise vehicle on hoist.
3. Install exhaust manifold gasket (3) and manifold (4). Tighten bolts starting at the center working outward to 23 N.m (200 in. lbs.).
4. Instal manifold lower heat shield (6) and upper heat shield (1). Tighten fasteners to 28 N.m (250 in. lbs.).
5. Install exhaust pipes to manifolds. Refer to **Exhaust System/CONVERTER, Catalytic - Installation** .
6. Connect down stream oxygen sensor connectors.
7. Lower vehicle.

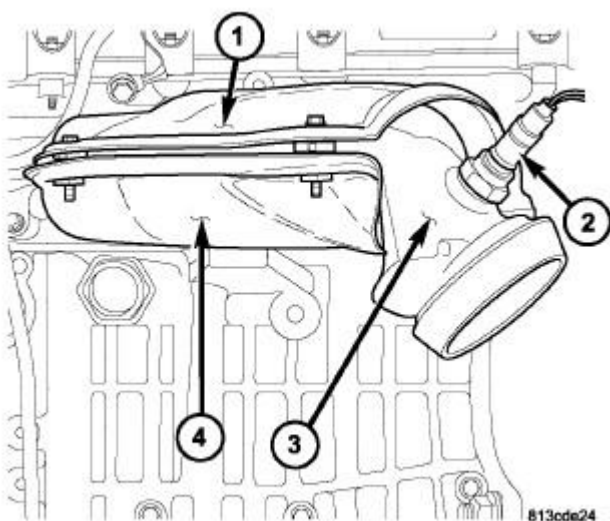


Fig. 330: LEFT EXHAUST MANIFOLD

Courtesy of CHRYSLER LLC

8. Install oxygen sensor (2) and connect electrical connector.

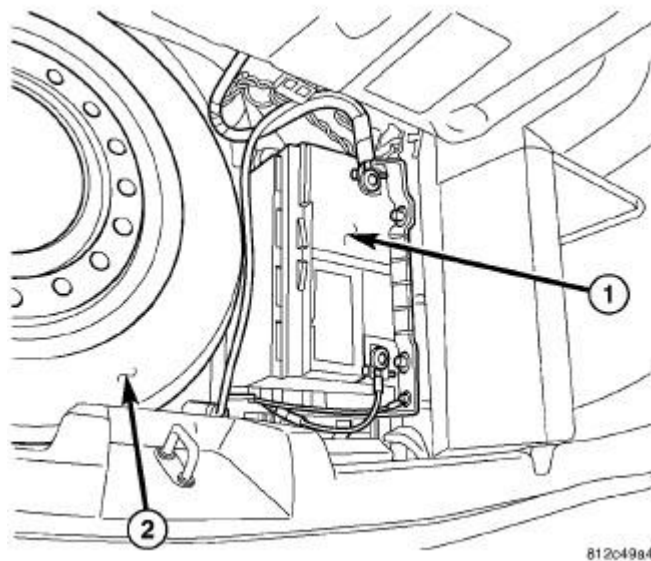


Fig. 331: Locating Battery

Courtesy of CHRYSLER LLC

9. Connect negative battery (1) cable.

RIGHT EXHAUST MANIFOLD

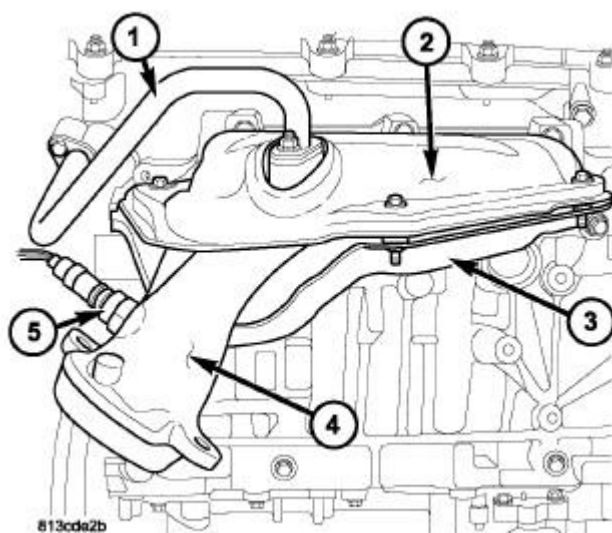


Fig. 332: RIGHT EXHAUST MANIFOLD

Courtesy of CHRYSLER LLC

1. Install exhaust manifold gasket and manifold (4). Tighten bolts working from center outwards to 23 N.m (200 in. lbs.).
2. Install exhaust pipe to manifold. Refer to **Exhaust System/CONVERTER, Catalytic - Installation**.
3. Install lower heat shield (3) and upper heat shield (2).
4. Install oxygen sensor (5) and connect electrical connector.
5. Connect down stream oxygen sensor electrical connector.
6. Lower vehicle.
7. Install EGR tube (1) using new gaskets. Tighten screws to 11 N.m (95 in. lbs.).

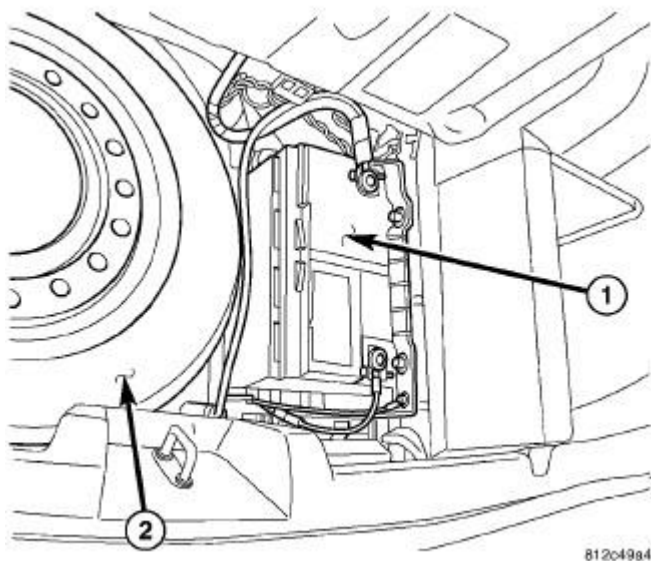


Fig. 333: Locating Battery
Courtesy of CHRYSLER LLC

8. Connect negative battery (1) cable.

MANIFOLD, INTAKE

Diagnosis and Testing

INTAKE MANIFOLD LEAKS

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 (Spray Bottle) at the suspected leak area.
3. If engine RPM'S change, the area of the suspected leak has been found.
4. Repair as required.

Standard Procedure

STANDARD PROCEDURE - INTAKE MANIFOLD VACUUM PORT REPAIR

The composite intake manifold vacuum ports can be repaired. Although, if the manifold plenum chamber is damaged or cracked, the manifold must be replaced.

To repair a broken or damaged vacuum nipple (port) on the composite intake manifold, perform the following procedure:

PARTS REQUIRED	TOOLS REQUIRED
Brass Nipple - 3/8" O.D. x 1/4" pipe thread (Speed Control Port)	Pipe Tap - 1/4" - 18 NPT
Brass Nipple - 1/2" O.D. x 1/4" pipe thread (Brake Booster Port)	Drill Bit - 7/16"
	File/Sand Paper

NOTE: While performing this procedure, avoid getting the manifold material residue into the plenum chamber.

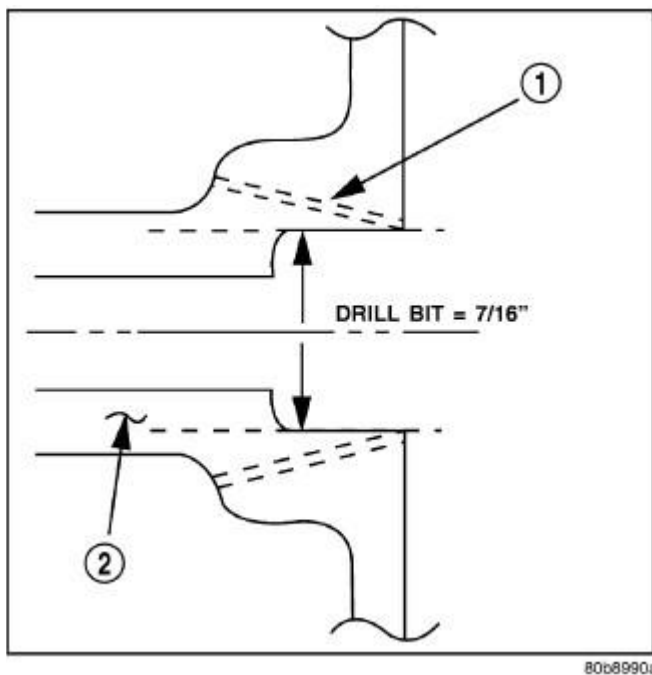
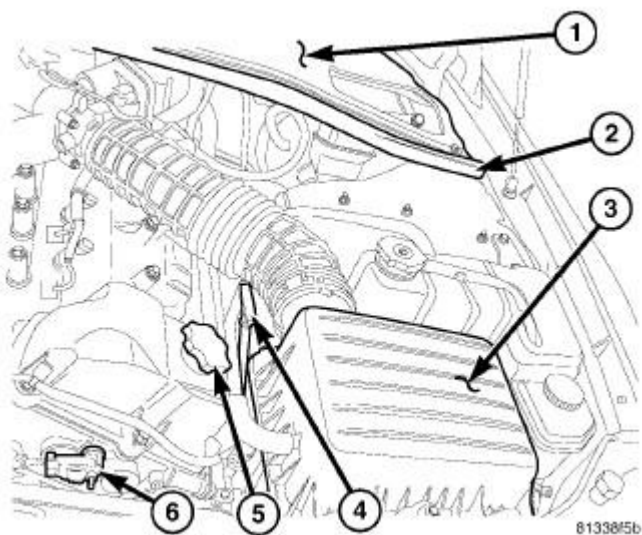


Fig. 334: MANIFOLD PORT (NIPPLE) REPAIR
Courtesy of CHRYSLER LLC

1. File or sand the remaining port back until a flat surface is obtained (plane normal to nipple (port) axis).

2. Drill out the nipple port (2) base using a 7/16" drill bit.
3. Using a 1/4"-18 NPT pipe tap (1), cut internal threads. Use caution to start tap in a axis same as original nipple.
4. Apply Mopar® Thread Sealant to threads of repair nipple(s).
5. Install repair nipple(s). Do not over torque repair nipple(s).

Removal**INTAKE MANIFOLD UPPER****Fig. 335: AIR CLEANER HOUSING****Courtesy of CHRYSLER LLC**

1. Disconnect and isolate the negative battery cable.
2. Remove the throttle body air inlet hose and air cleaner housing assembly (3). See **Engine/Air Intake System/BODY, Air Cleaner - Removal**.
3. Disconnect the electrical connectors from the Manifold Absolute Pressure (MAP) sensor and the Electronic Throttle Control (ETC).
4. Disconnect the vapor purge hose, brake booster hose and Positive Crankcase Ventilation (PCV) hose.

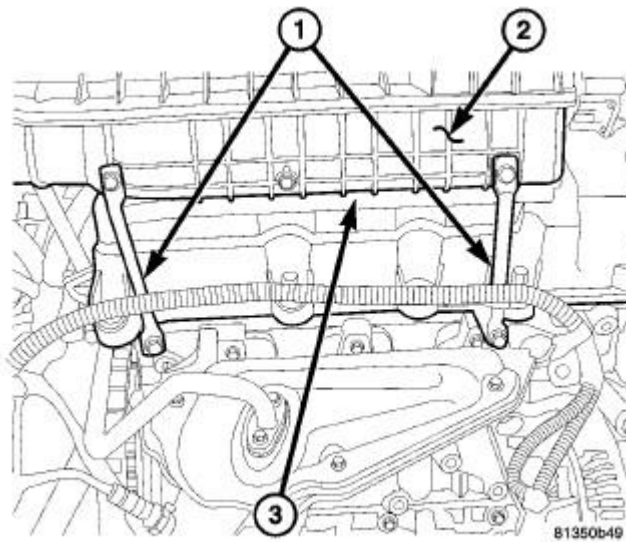


Fig. 336: Manifold Support Brackets
Courtesy of CHRYSLER LLC

5. Remove the manifold support brackets (1).
6. Remove the upper EGR tube from the intake manifold, and the upper EGR tube from the EGR valve.

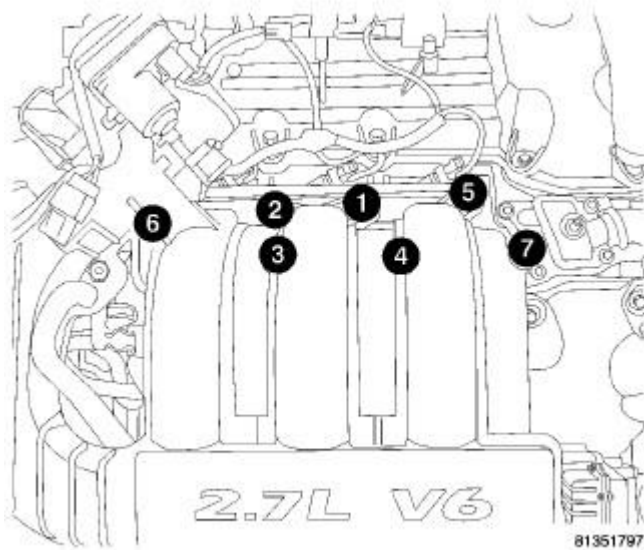


Fig. 337: Removing/Installing Intake Manifold Bolts
Courtesy of CHRYSLER LLC

7. Remove the manifold attaching bolts.

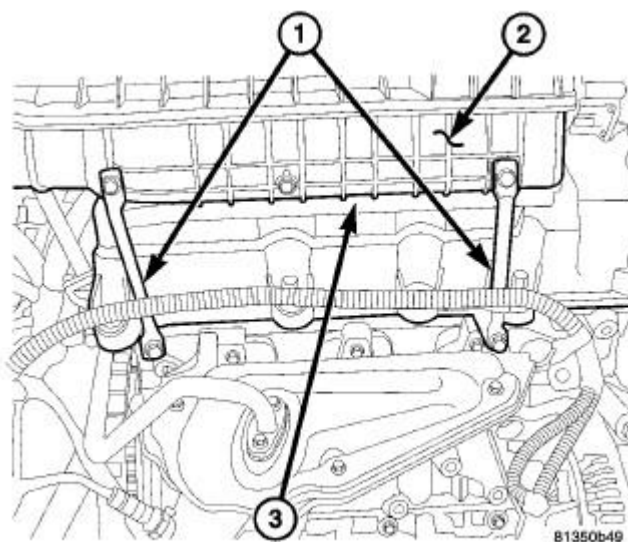


Fig. 338: Manifold Support Brackets
Courtesy of CHRYSLER LLC

8. Remove the upper manifold (2).
9. Remove the foam insulator (3).
10. Inspect manifold (2). See **Engine/Manifolds/MANIFOLD, Intake - Inspection**.

REMOVAL - INTAKE MANIFOLD LOWER

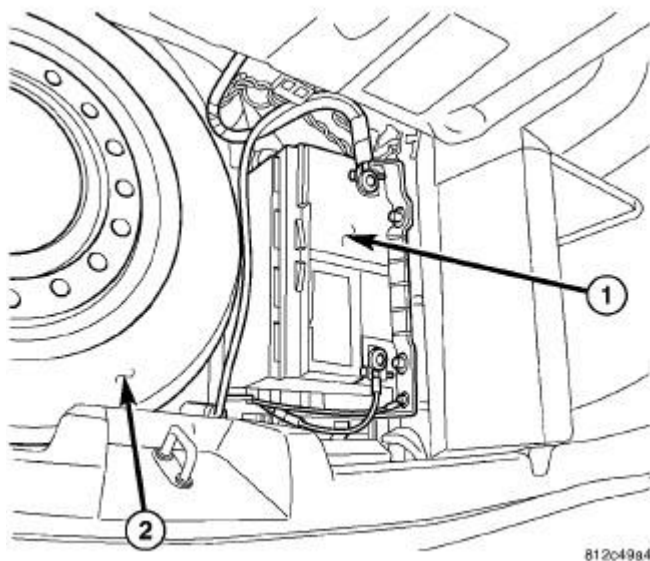


Fig. 339: Locating Battery
Courtesy of CHRYSLER LLC

1. Release fuel system pressure. Refer to **Fuel System/Fuel Delivery - Standard Procedure**.

2. Disconnect negative battery (1) cable located in trunk.
3. Remove upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Removal**.

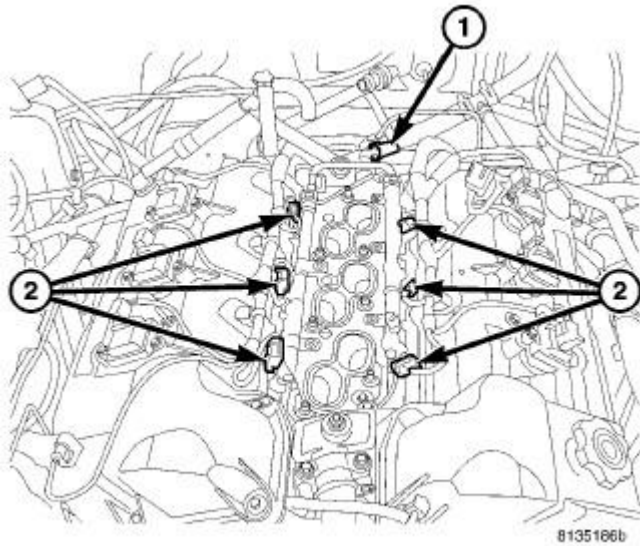


Fig. 340: Fuel Feed Line & Injector Connectors
Courtesy of CHRYSLER LLC

4. Disconnect injector electrical connectors (2).
5. Disconnect fuel supply hose (1) from fuel rail. Refer to **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.

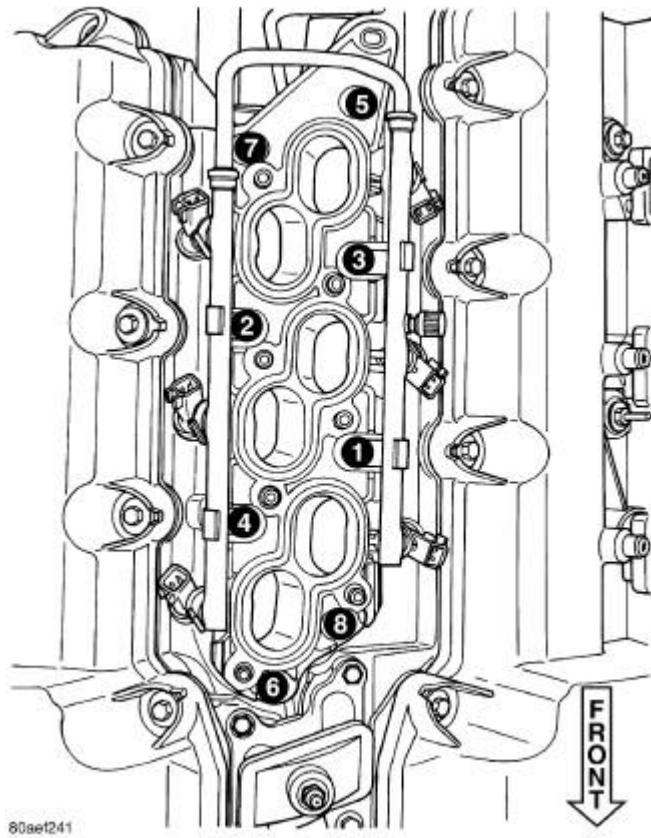


Fig. 341: Lower Intake Manifold Tightening Sequence
Courtesy of CHRYSLER LLC

6. Remove bolts attaching fuel rail (1 - 4).
7. Remove fuel rail and injectors as an assembly.
8. Remove manifold attaching bolts.
9. Remove lower manifold.
10. Inspect manifold. See **Engine/Manifolds/MANIFOLD, Intake - Inspection**.

Inspection

INTAKE MANIFOLD UPPER

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged or clogged EGR ports

If the manifold exhibits any damaged or warped conditions, replace the manifold. Clean EGR ports as necessary.

If a vacuum port is damaged, a repair procedure can be performed. See [Engine/Manifolds/MANIFOLD, Intake - Standard Procedure](#).

INSPECTION - INTAKE MANIFOLD LOWER

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged fuel injector ports

If the manifold exhibits any of these conditions, replace the manifold.

Installation

INTAKE MANIFOLD UPPER

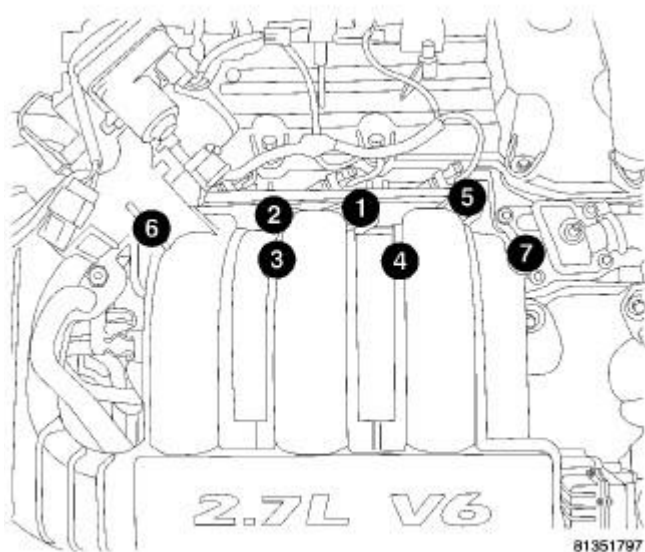


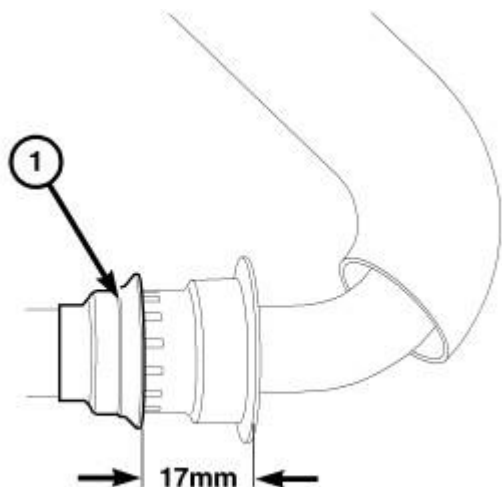
Fig. 342: Removing/Installing Intake Manifold Bolts
Courtesy of CHRYSLER LLC

1. Clean and inspect the sealing surfaces. Gaskets can be reused, if free of cuts or tears.

NOTE: Make sure fuel injectors and wiring harnesses are in correct position to not interfere with upper manifold installation.

2. Install the upper intake manifold gasket.
3. Position the upper intake manifold onto the lower intake manifold.
4. Install the manifold attaching bolts and tighten in the sequence shown in illustration to 12 N.m (105 in. lbs.).

5. Connect the vapor purge hose, brake booster hose and Positive Crankcase Ventilation (PCV) hose.



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Fig. 343: Identifying Inner EGR Tube Seal
Courtesy of CHRYSLER LLC

1 - INNER EGR TUBE SEAL

CAUTION: Do Not use metal scrapers when cleaning the mounting surface of the EGR valve. Damage from scratching the surface may cause an improper seal.

CAUTION: Do not allow debris to enter the EGR valve when cleaning the mounting surface. Debris can lodge between the pintle and the seat causing valve leakage that results in rough idle and depressed manifold vacuum.

6. Clean and inspect the EGR gasket sealing surfaces.

NOTE: Install new rubber silicone seals on intake manifold end of EGR tube any time it is removed from the intake manifold.

7. Install new silicone rubber seal (1) on the intake manifold end of the EGR tube. Position seal 17 mm (0.67 in.) from the tube flange.

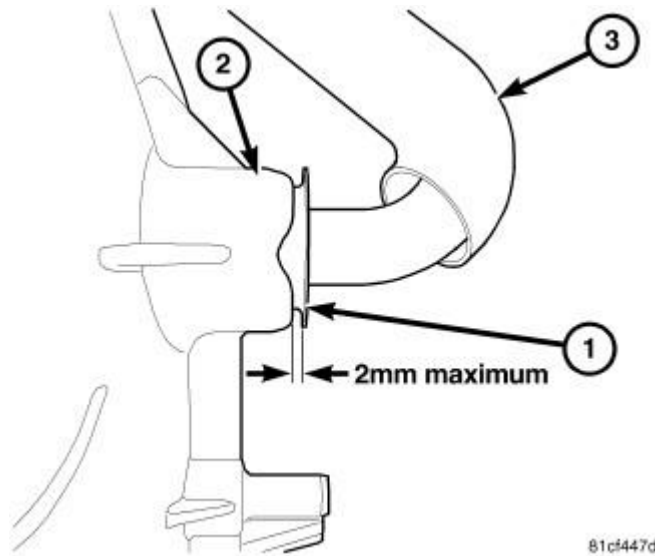


Fig. 344: Identifying EGR Flange, EGR Tube & Intake Manifold
Courtesy of CHRYSLER LLC

1 - Flange
2 - Intake Manifold
3 - EGR Tube

- Lubricate the EGR mounting tube hole in the intake manifold with Mopar® Rubber Bushing Installation Lube. Do not lubricate the EGR tube or seal.
- Install the EGR tube (3) into the intake manifold (2) being careful not to damage the silicone rubber seals, and verify that the seals are correctly positioned in the intake manifold.

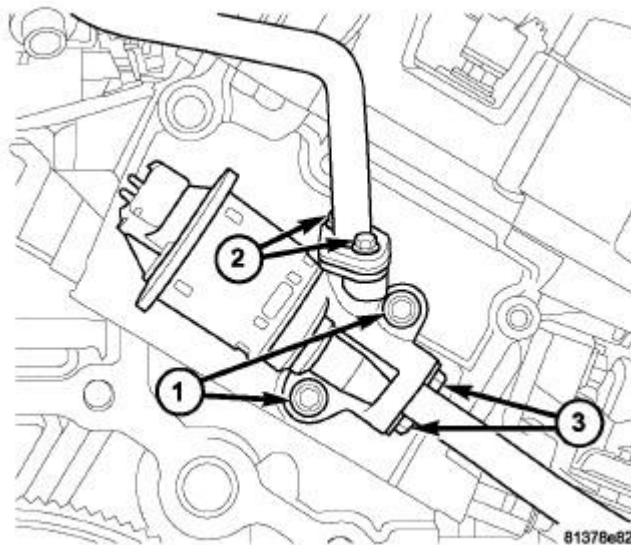
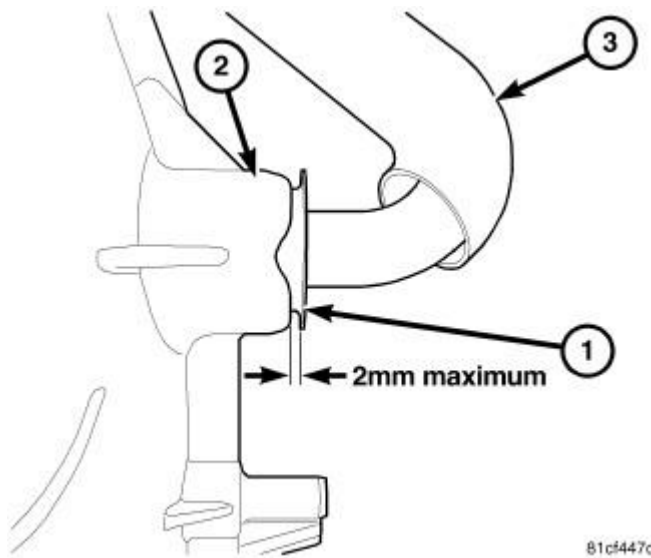


Fig. 345: EGR VALVE
Courtesy of CHRYSLER LLC

10. Install a new gasket between the EGR valve and the EGR tube and install bolts (2). Tighten bolts to 15 N.m (11 ft. lbs.).



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Fig. 346: Identifying EGR Flange, EGR Tube & Intake Manifold
Courtesy of CHRYSLER LLC

1 - EGR Tube Flange
2 - Intake Manifold
3 - EGR Tube

NOTE: The EGR tube flange (1) does not need to be flush with the intake manifold (2) to be sealed. The EGR tube flange can be up to 2 mm (0.08 in.) from intake manifold and still be sealed. This design allows the EGR tube position to vary with the tolerance stack up and remain properly sealed.

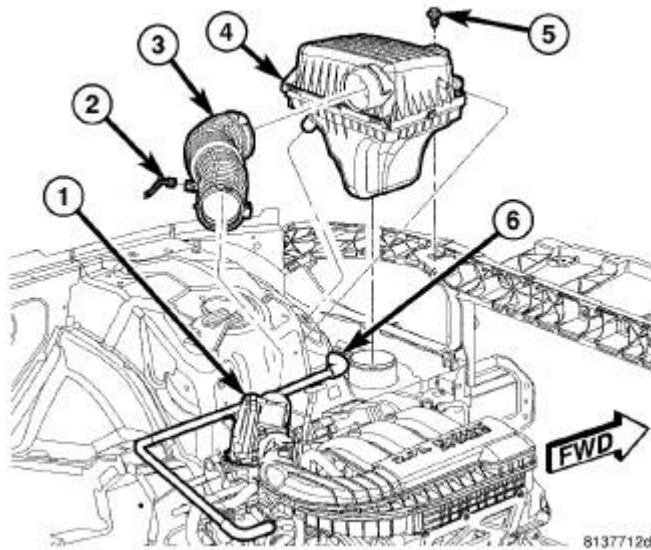


Fig. 347: AIR FILTER ASSEMBLY

Courtesy of CHRYSLER LLC

- 1 - THROTTLE BODY
- 2 - CHARGE AIR TEMPERATURE SENSOR ELECTRICAL CONNECTOR
- 3 - CLEAN AIR DUCT
- 4 - AIR FILTER HOUSING ASSEMBLY
- 5 - BOLT
- 6 - VENT TUBE

11. Connect the electrical connectors to the Manifold Absolute Pressure (MAP) sensor and the Electronic Throttle Control (ETC).
12. Install the throttle body air inlet hose and the air cleaner housing assembly. See **Engine/Air Intake System/BODY, Air Cleaner - Installation**.
13. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

LOWER INTAKE MANIFOLD

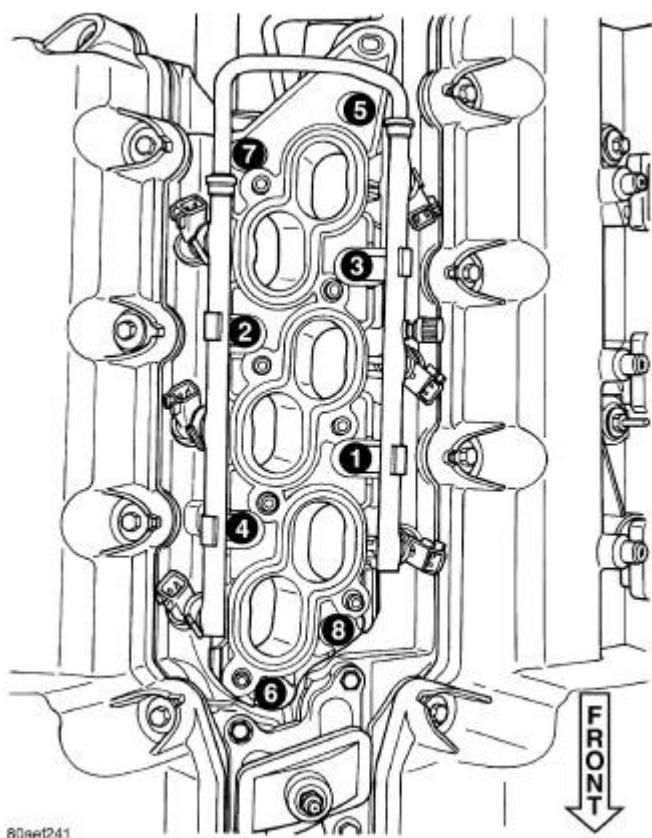


Fig. 348: Lower Intake Manifold Tightening Sequence
Courtesy of CHRYSLER LLC

1. Clean and inspect sealing surfaces of cylinder head and manifold. Gaskets can be reused provided they are free of cuts or tears.
2. Install lower manifold gasket.
3. Position manifold on cylinder head surfaces.

NOTE: For ease of installing upper intake manifold, install a bolt 2 - 3 turns to the rearmost attaching hole of intake. This will properly position lower manifold.

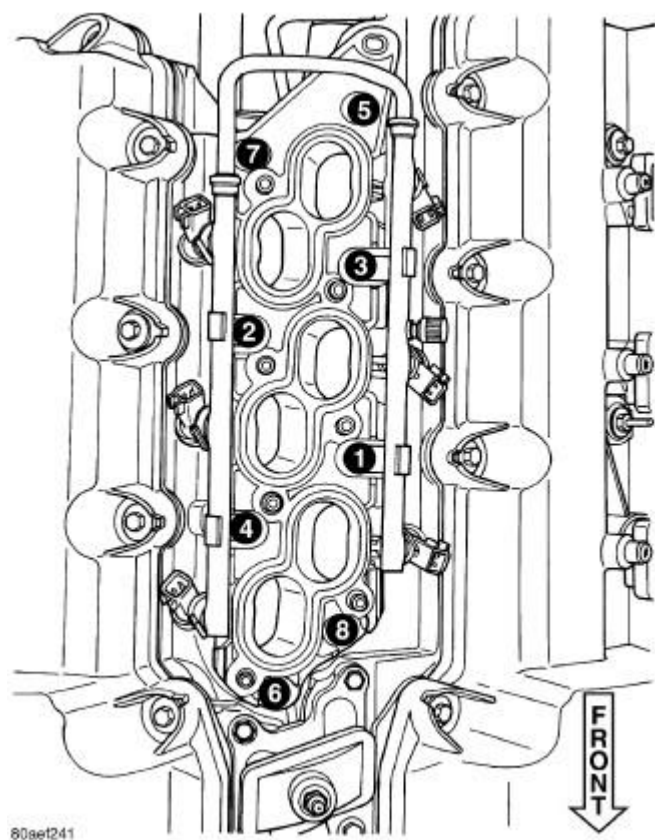


Fig. 349: Lower Intake Manifold Tightening Sequence
Courtesy of CHRYSLER LLC

4. Install fuel rail with injectors and start bolts (1 - 4).
5. Install manifold attaching bolts and tighten in sequence shown in illustration in to 12 N.m (105 in. lbs.). Remove bolt used for aligning manifold.

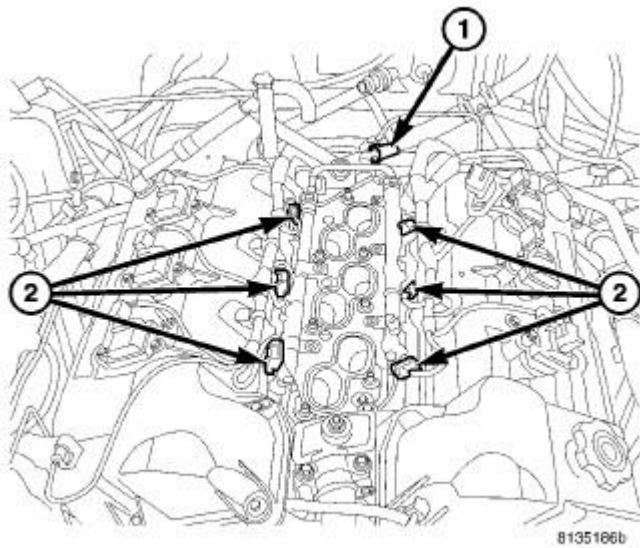


Fig. 350: Fuel Feed Line & Injector Connectors
Courtesy of CHRYSLER LLC

6. Connect the fuel injector electrical connectors (2).

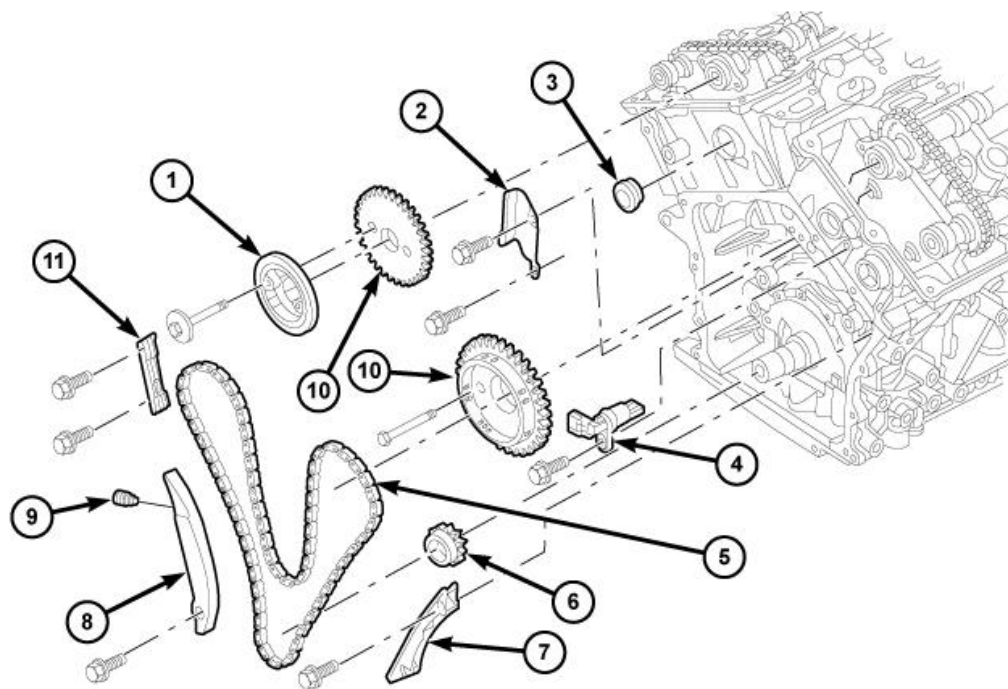
NOTE: Make sure fuel injectors are located in the correct location and position, as upper intake manifold interference could occur.

7. Connect fuel supply hose (1) to fuel rail. Refer to Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure .
8. Install upper intake manifold. See Engine/Manifolds/MANIFOLD, Intake - Installation.

VALVE TIMING

DESCRIPTION

DESCRIPTION



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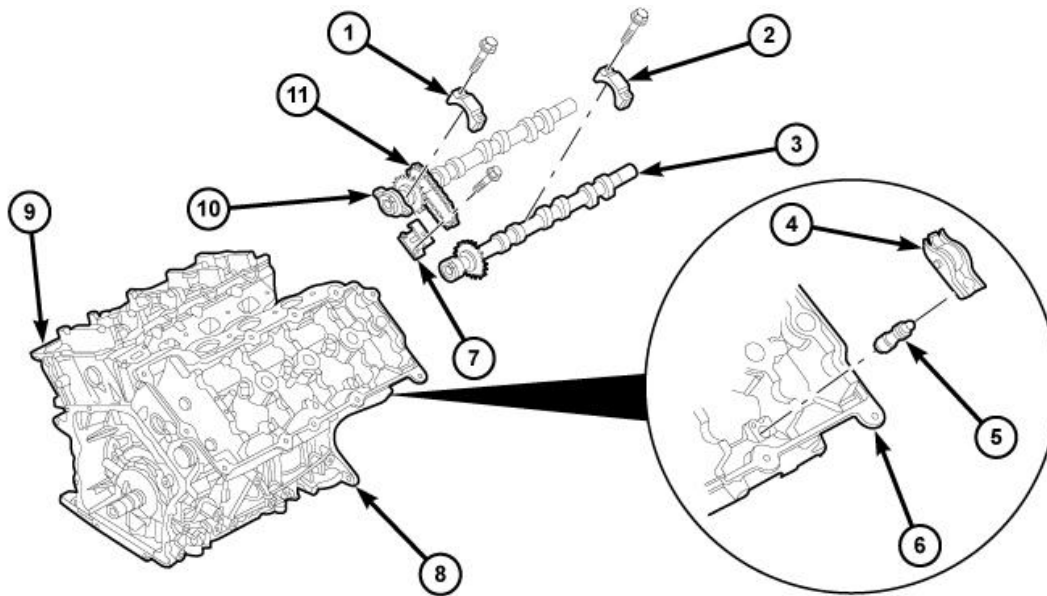
Fig. 351: Identifying Timing Drive System Components
 Courtesy of CHRYSLER LLC

The timing drive system has been designed to provide quiet performance and reliability to support a **NON** free-wheeling engine. The system consists of a primary (5) drive chain and a secondary chain drive.

The **primary** timing chain (5) is a double-flexure, inverted tooth type chain. The primary chain drives both of the intake camshafts directly from a sprocket mounted on the crankshaft. In addition, the water pump is driven by the "back side" of the primary chain, necessitating the double-flexure type chain.

The chain is controlled by three fixed chain guides (2), (7), (11) and a pivoting tensioner arm (8). These guides utilize low-friction and long wearing nylon plastic wear faces. To tension the primary chain, a fully automatic spring-loaded, engine oil-fed, hydraulic tensioner (9) is used. The tensioner (9) is mounted in the right cylinder head with the plunger contacting the pivoting tensioner arm (8). A mechanical ratchet mechanism inside the tensioner prevents excessive chain slack upon engine start-up as the chain wears. The tensioner is designed with an internal oil reservoir to assure noise-free performance, even during engine start-up before oil pressure reaches the tensioner.

For lubrication the primary chain utilizes oil leakage from the front of the oil pump. This oil spills on the crankshaft sprocket, which is then carried by the chain throughout the primary drive.



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Fig. 352: Camshaft & Valvetrain Components
Courtesy of CHRYSLER LLC

The **secondary** timing chain (11) drive system uses either two conventional roller-type chains (early production) or two silent type chains (late production), one at each cylinder bank. The purpose of the secondary chain (11) is to provide a mechanical driven connection between the intake and exhaust camshafts. The intake camshafts drive the exhaust camshafts. The sprockets for both intake and exhaust camshafts are a press-fit and are only serviced as an assembly with the camshafts.

To tension the secondary chain, spring-loaded, hydraulic tensioners (7) are used at each bank and attach to each cylinder head between the intake and exhaust camshafts. The tensioner (7) incorporates upper and lower chain guide faces. The lower guide face is attached directly to the tensioner's hydraulic plunger. Also, the tensioner uses an internal oil reservoir design to prevent engine start-up noise. The secondary chains are lubricated via an oil passage through the upper guide face on each tensioner.

STANDARD PROCEDURE

ENGINE TIMING - VERIFICATION

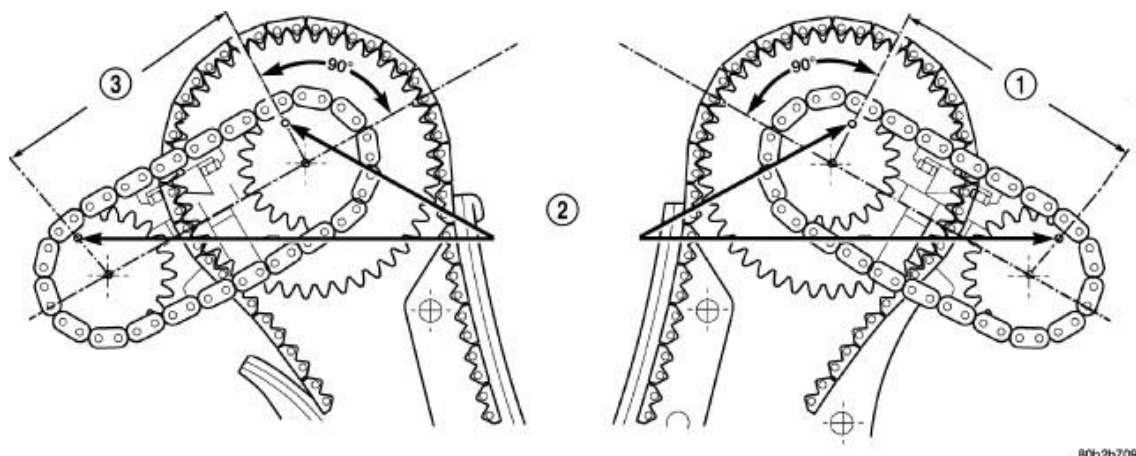


Fig. 353: Camshaft Timing Marks
 Courtesy of CHRYSLER LLC

1 - 12 PINS

3 - 12 PINS

2 - CAMSHAFT TIMING MARKS

NOTE: Note: The engine timing verification procedure is the same for both conventional roller-type (early production) or silent type (late production) secondary timing chains.

Correct timing is critical for the NON free-wheeling designed, 2.7L engine. Engine timing can be verified by using the following procedures:

1. Remove cylinder head covers. See [Engine/Cylinder Head/COVER\(S\), Cylinder Head - Removal](#).
2. Rotate engine until number one cylinder is at TDC on the EXHAUST stroke.
3. View the intake camshaft sprocket timing mark. The mark should be 90° from the cylinder head cover sealing surface on both right and left cylinder banks.
4. Count the chain pins between the timing marks (2) on the intake camshaft and the exhaust camshaft. Engine is timed correctly when there are 12 chain pins between the timing marks (2) on the intake camshaft and exhaust camshaft.
5. If marks are not correctly aligned, proceed to Timing Chain and Sprockets for service procedures. See [Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal](#).

CHAIN AND SPROCKETS, TIMING

Removal

TIMING CHAIN

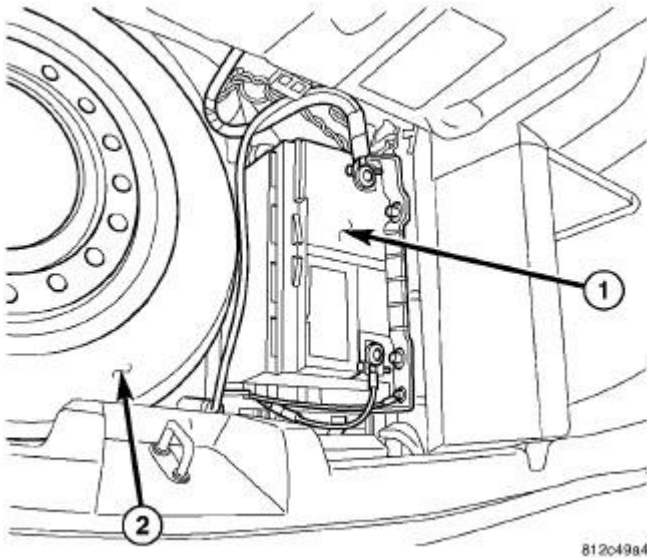


Fig. 354: Locating Battery
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable.
2. Drain cooling system.
3. Remove upper intake manifold. See **Engine/Manifolds/MANIFOLD, Intake - Removal.**
4. Remove cylinder head covers, crankshaft vibration damper, and timing chain cover. See **Engine/Cylinder Head/COVER(S), Cylinder Head - Removal.** See **Engine/Engine Block/DAMPER, Vibration - Removal.** See **Engine/Valve Timing/COVER(S), Engine Timing - Removal.**

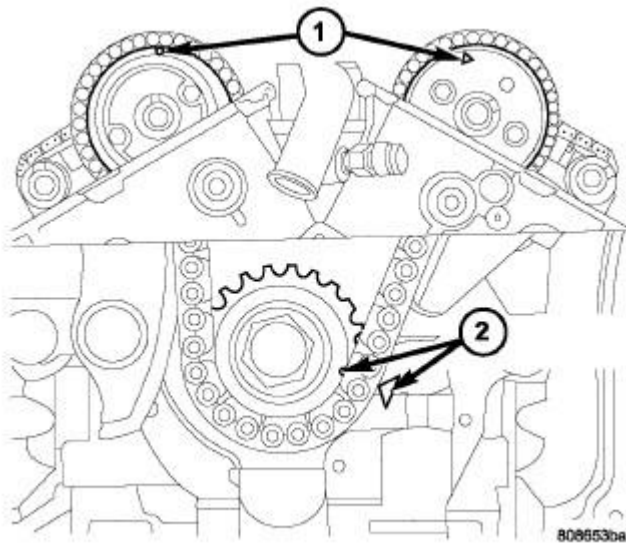


Fig. 355: TIMING MARK ALIGNMENT
Courtesy of CHRYSLER LLC

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

5. Align crankshaft sprocket timing mark to mark on oil pump housing (2). The mark on oil pump housing is 60° ATDC of #1 cylinder.

CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

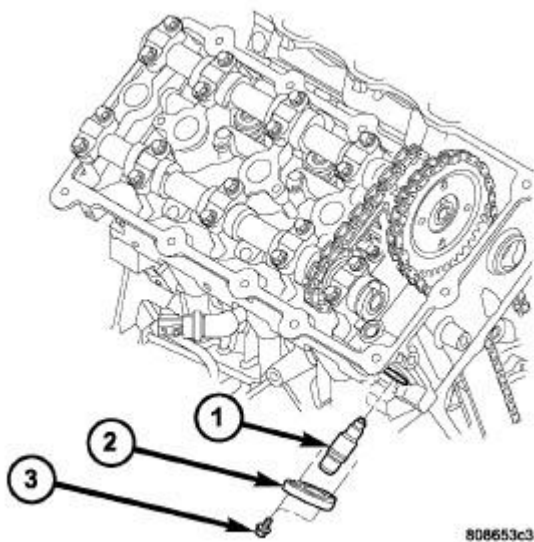


Fig. 356: PRIMARY TIMING CHAIN TENSIONER
Courtesy of CHRYSLER LLC

6. Remove primary timing chain tensioner retainer cap (2) and tensioner (1) from right cylinder head.

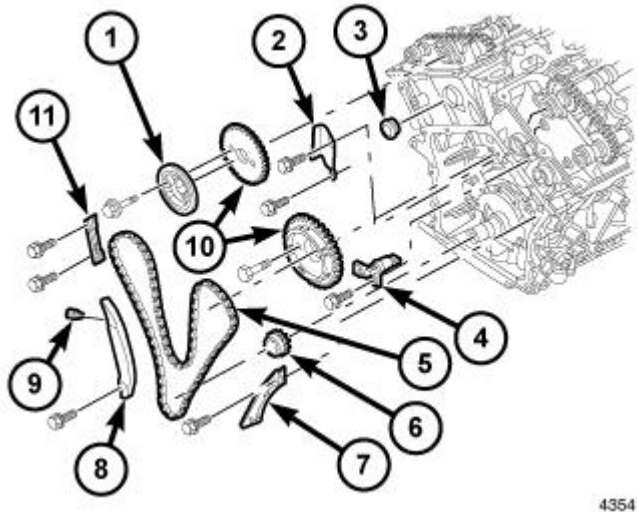


Fig. 357: TIMING DRIVE SYSTEM - PRIMARY
Courtesy of CHRYSLER LLC

7. Disconnect and remove camshaft position sensor (4) from left cylinder head.
8. Remove timing chain guide access plugs (3) from cylinder heads.

NOTE: When camshaft sprocket bolts are removed, the camshafts will rotate in a clockwise direction.

9. Starting with the right camshaft sprocket, remove the sprocket attaching bolts. Remove camshaft damper (1) (if equipped) and sprocket.
10. Remove left side camshaft sprocket attaching bolts and remove sprocket.
11. Remove lower chain guide (7) and tensioner arm (8).
12. Remove the primary timing chain (5).
13. For removal of crankshaft sprocket (6), see Engine/Engine Block/CRANKSHAFT - Removal.

CRANKSHAFT SPROCKET

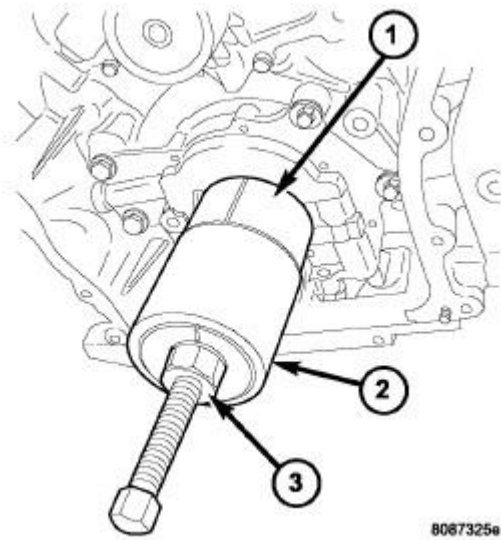


Fig. 358: Crankshaft Sprocket - Removal
Courtesy of CHRYSLER LLC

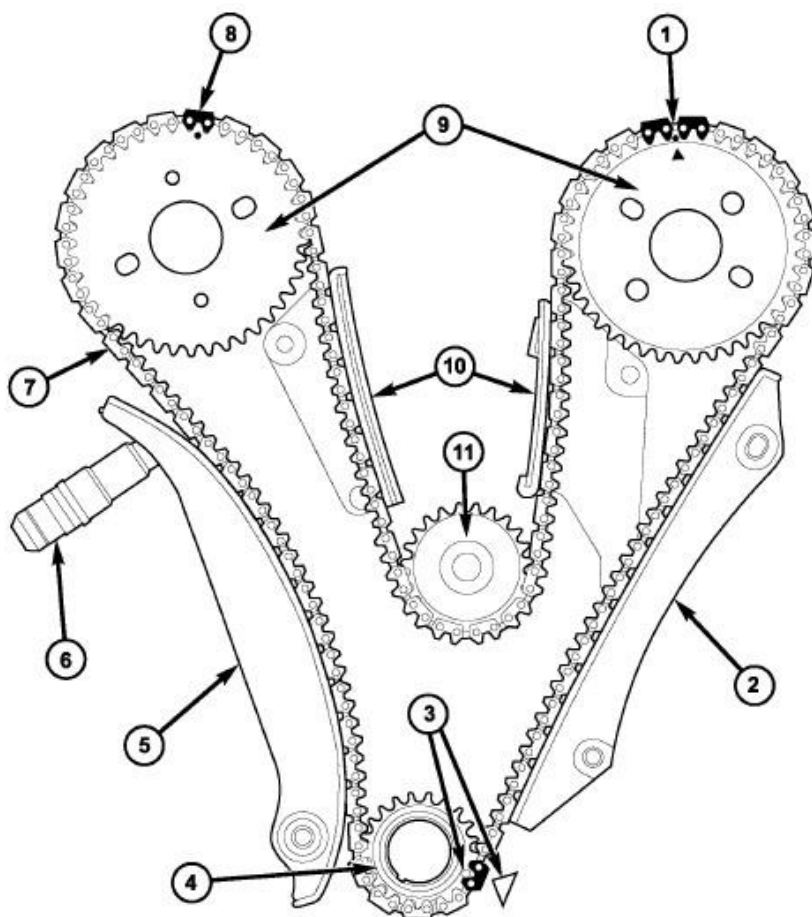
1. Remove primary timing chain. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Removal**.

CAUTION: Use care not to turn crankshaft while removing crankshaft sprocket, as damage to valves and or pistons could occur.

2. Remove crankshaft sprocket by first installing the crankshaft damper bolt. Apply grease or equivalent to damper bolt head and position Special Tools 5048-1(3), 5048-6 (2), and 8539 (1) on sprocket and crankshaft nose. Remove sprocket using care not to rotate the crankshaft.

Installation

TIMING CHAIN



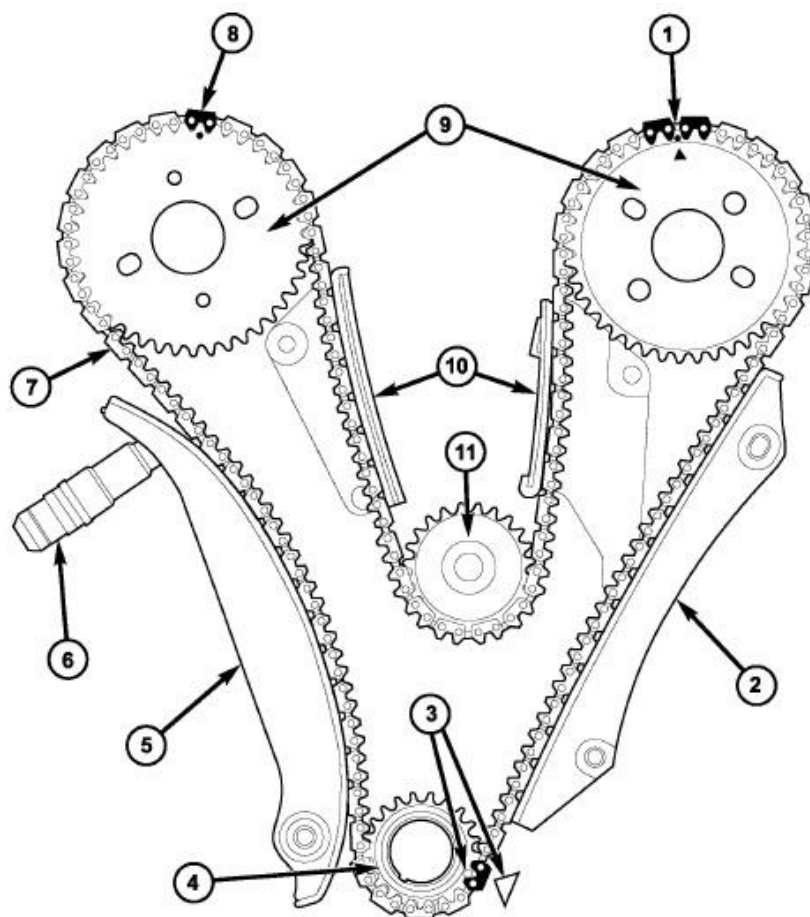
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Fig. 359: TIMING CHAIN ALIGNMENT MARKS - PRIMARY
 Courtesy of CHRYSLER LLC

1. Inspect all sprockets (4), (9), (11) and chain guides (2), (5), (10). Replace if worn.
2. For crankshaft sprocket installation procedures, see **Engine/Engine Block/CRANKSHAFT - Installation**.
3. If removed, install the right and left side short chain guides (10). Tighten attaching bolts to 28 N.m (250 in. lbs.).
4. Align the crankshaft sprocket timing mark to the mark on the oil pump housing (3).

NOTE: Lubricate timing chain and guides with engine oil before installation.

5. Place the left side primary chain sprocket onto the chain so that the timing mark is located in between the two (plated) timing links (1).



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Fig. 360: TIMING CHAIN ALIGNMENT MARKS - PRIMARY
Courtesy of CHRYSLER LLC

6. Lower the primary chain with the left side sprocket through the left cylinder head opening.

NOTE: The camshaft sprockets can be allowed to float on the camshaft hub during installation.

7. Loosely position the left side camshaft sprocket over the camshaft hub.
8. Align the timing (plated) link to the crankshaft sprocket timing mark (3).
9. Position the primary chain onto the water pump drive sprocket (11).
10. Align the right camshaft sprocket timing mark to the timing (plated) link on the timing chain (8) and loosely position over the camshaft hub.
11. Verify that all chain timing (plated) links are properly aligned to the timing marks on all sprockets.
12. Install the left side lower chain guide (2) and tensioner arm (5). Tighten attaching bolts to 28 N.m (250 in. lbs.).

NOTE: Inspect the O-ring on the chain guide access plugs before installing. Replace the O-ring as necessary.

13. Install the chain guide access plugs to the cylinder heads. Tighten plugs to 20 N.m (15 ft. lbs.).

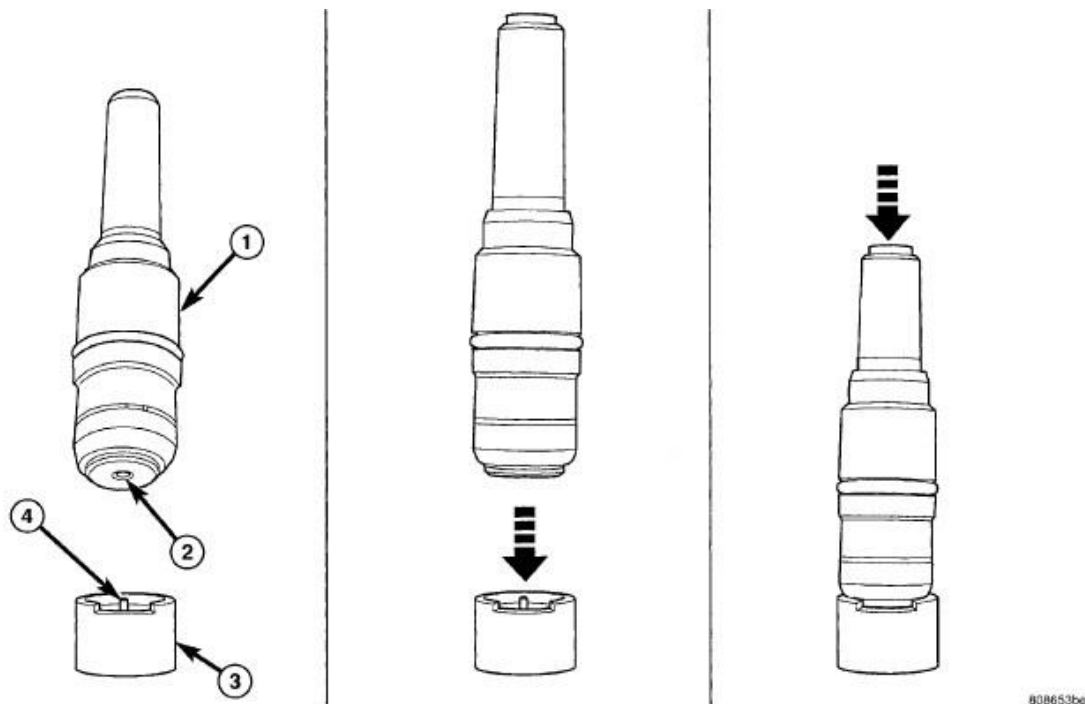


Fig. 361: TIMING CHAIN TENSIONER - OIL PURGING
Courtesy of CHRYSLER LLC

NOTE: To reset the primary timing chain tensioner, engine oil will first need to be purged from the tensioner.

14. Purge oil from the timing chain tensioner using the following procedure:
- Place the check ball (2) end of the tensioner into the shallow end of Chain Tensioner Gauge 8186 (3).
 - Using hand pressure, slowly depress the tensioner until oil is purged from the tensioner.
15. Reset the timing chain tensioner using the following procedure:
- Position the cylinder plunger (4) into the deeper end of Chain Tensioner Gauge 8186 (3).
 - Apply a downward force until tensioner is reset.

NOTE: If oil was not first purged from the tensioner, use slight finger pressure to assist the center arm pin of Chain Tensioner Gauge 8186 to unseat the tensioner's check ball.

CAUTION: Ensure the tensioner is properly reset. The tensioner body (4) must bottom against the top edge of Chain Tensioner Gauge 8186 (3). Failure to properly perform the resetting procedure may cause tensioner jamming.

NOTE: Inspect the tensioner O-ring (2) for nicks or cuts and make sure the snap ring (1) is correctly installed, replace as necessary.

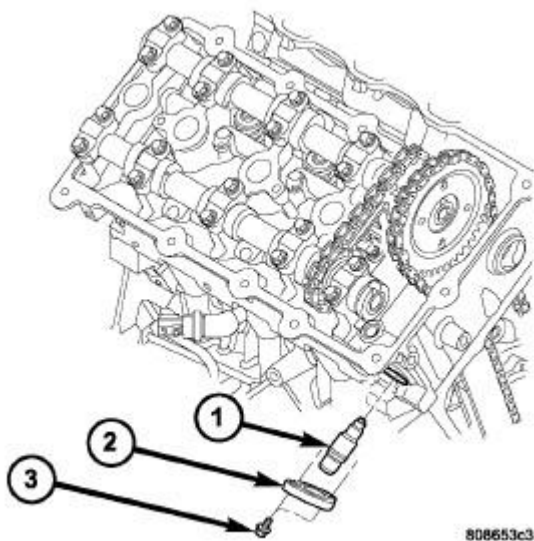


Fig. 362: PRIMARY TIMING CHAIN TENSIONER

Courtesy of CHRYSLER LLC

16. Install the reset chain tensioner (1) into the right cylinder head.
17. Position tensioner retaining plate (2) and tighten bolts (3) to 12 N.m (105 in. lbs.).

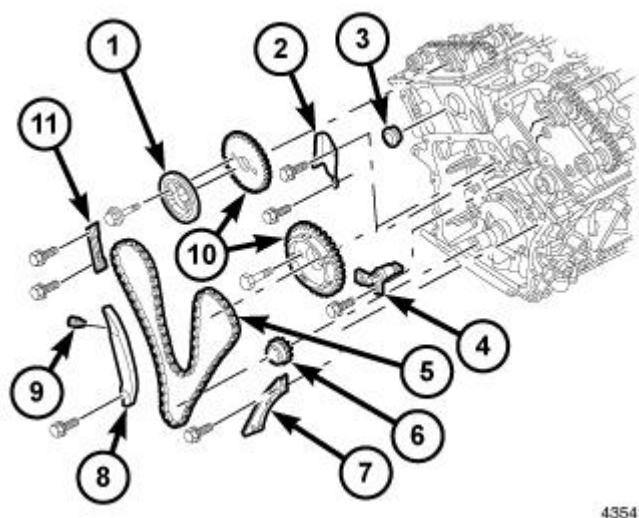


Fig. 363: TIMING DRIVE SYSTEM - PRIMARY

Courtesy of CHRYSLER LLC

18. Starting at the right cylinder bank, first position the camshaft damper (1) (if equipped) on the camshaft hub, then insert a 3/8" square drive extension with a breaker bar into the intake camshaft drive hub. Rotate the camshaft until the camshaft hub aligns to the camshaft sprocket and damper attaching holes.

Install the sprocket attaching bolts and tighten to 28 N.m (250 in. lbs.).

19. Insert a 3/8" square drive extension with a breaker bar into the intake camshaft drive hub and rotate the camshaft until the sprocket attaching bolts can be installed. Tighten the sprocket bolts to 28 N.m (250 in. lbs.).
20. Rotate the crankshaft slightly clockwise to remove timing chain slack, if necessary.

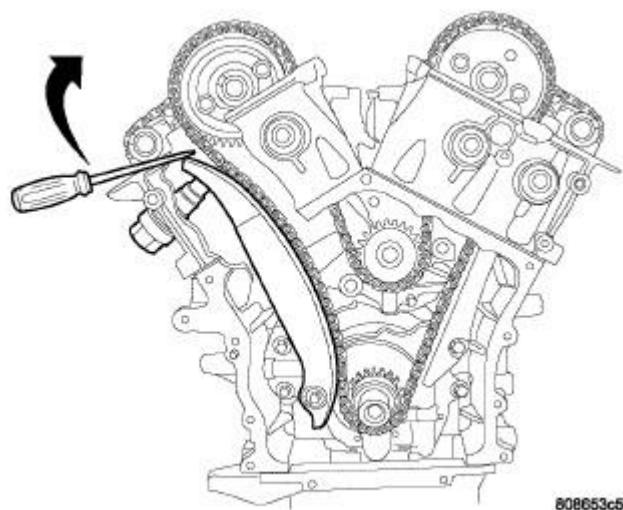


Fig. 364: TIMING CHAIN TENSIONER ACTIVATING
Courtesy of CHRYSLER LLC

21. Activate the timing chain tensioner by using a flat bladed pry tool to gently pry tensioner arm towards the tensioner slightly. Then release the tensioner arm. Verify the tensioner is activated (extends).

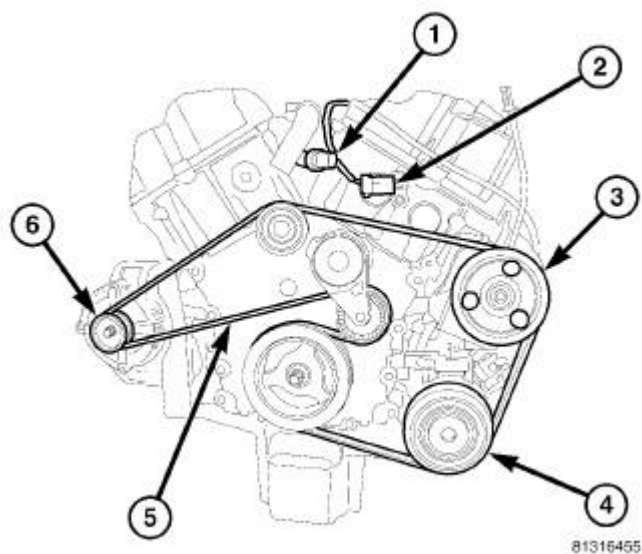


Fig. 365: Accessory Drive Belt

Courtesy of CHRYSLER LLC

22. Install the camshaft position sensor (2) and connect the electrical connector.
23. Install the timing chain cover, crankshaft vibration damper and accessory drive belt. See Engine/Valve Timing/COVER(S), Engine Timing - Installation.

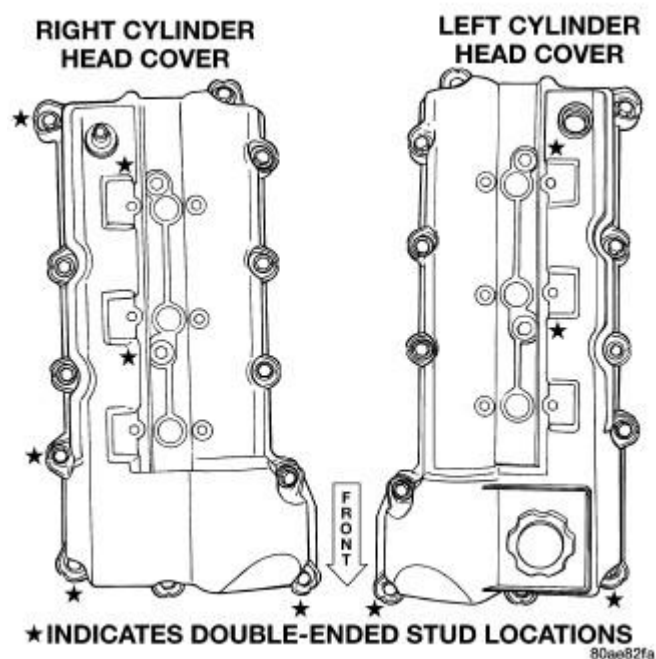


Fig. 366: Cylinder Head Covers

Courtesy of CHRYSLER LLC

24. Install the cylinder head covers. See Engine/Cylinder Head/COVER(S), Cylinder Head - Installation.

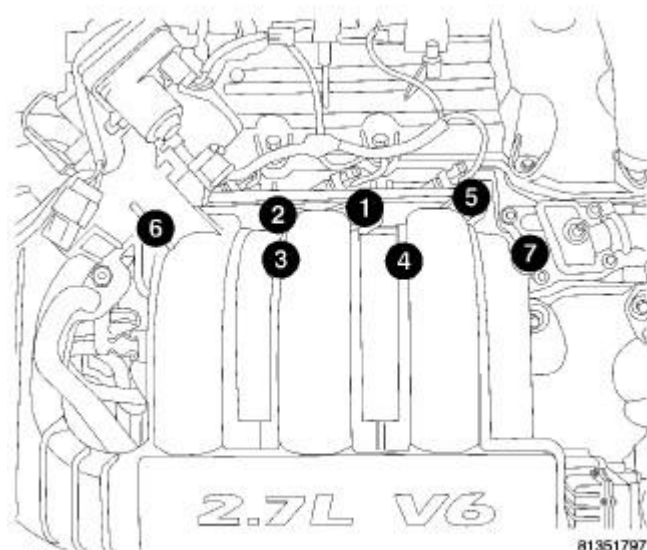


Fig. 367: Removing/Installing Intake Manifold Bolts
Courtesy of CHRYSLER LLC

25. Install the upper intake manifold and air cleaner housing assembly. See **Engine/Manifolds/MANIFOLD, Intake - Installation**.
26. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).
27. Fill the cooling system. Refer to **Cooling - Standard Procedure**.

NOTE: After installation of a reset tensioner, engine noise will occur after initial start-up. This noise will normally disappear within 5-10 seconds.

28. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **Cooling - Standard Procedure**.

NOTE: The Cam/Crank Variation Relearn procedure must be performed anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. Refer to **DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure**.

CRANKSHAFT SPROCKET

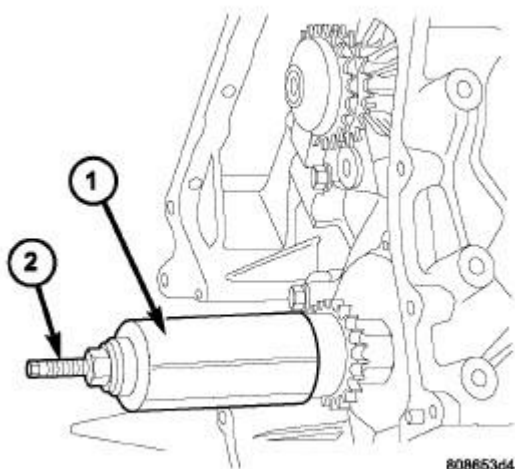


Fig. 368: Crankshaft Sprocket - Installation
Courtesy of CHRYSLER LLC

1. Install crankshaft sprocket using Special Tools 6780-1 (1) and 8179 (2) until sprocket bottoms against crankshaft step flange. Use care not to rotate crankshaft.

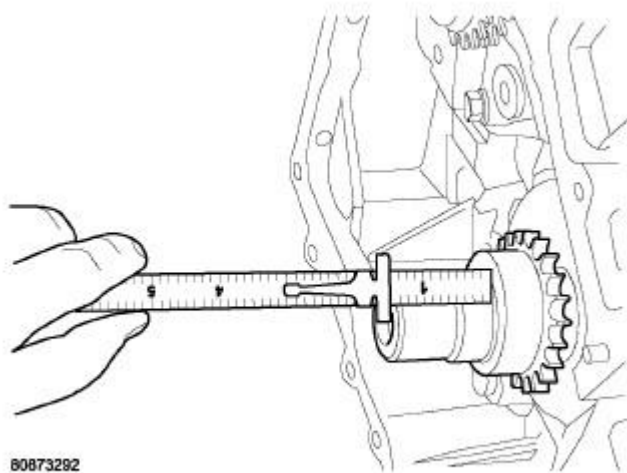


Fig. 369: Crankshaft Sprocket Depth Measurement
Courtesy of CHRYSLER LLC

2. Verify that crankshaft sprocket is installed to proper depth by measuring from sprocket outer face to end of crankshaft. Measurement should read: 39.05 ± 0.50 mm (1.5374 ± 0.020 in.).
3. Install primary timing chain. See **Engine/Valve Timing/CHAIN and SPROCKETS, Timing - Installation**.

COVER(S), ENGINE TIMING

Removal

REMOVAL

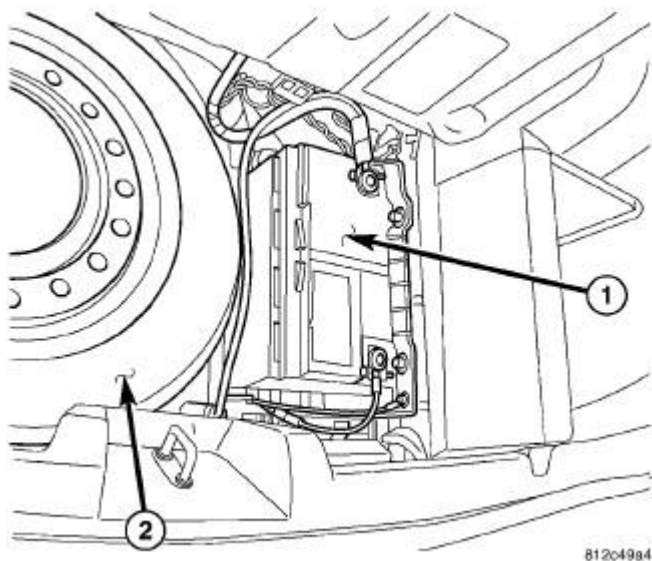
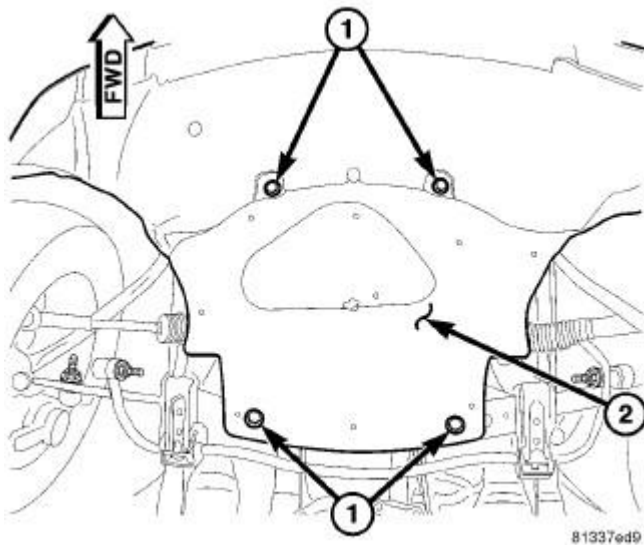


Fig. 370: Locating Battery

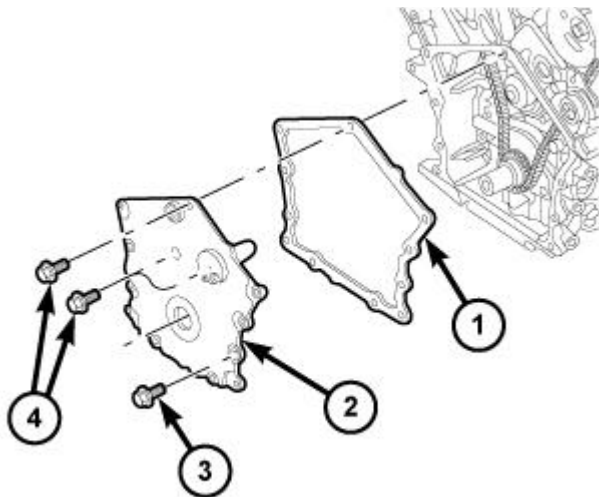
Courtesy of CHRYSLER LLC

1. Disconnect negative battery (1) cable.
2. Drain cooling system.
3. Remove coolant pressure container.

**Fig. 371: Lower Splash Shield**

Courtesy of CHRYSLER LLC

4. Raise vehicle on hoist.
5. Remove lower splash shield retaining bolts (1) and splash shield (2).
6. Remove accessory drive belts. Refer to **Cooling/Accessory Drive/BELT, Serpentine - Removal**.
7. Remove crankshaft vibration damper. See **Engine/Engine Block/DAMPER, Vibration - Removal**.
8. Lower vehicle.



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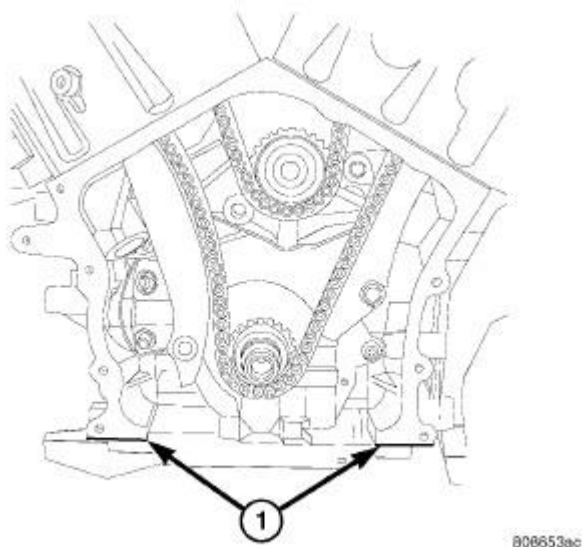
Fig. 372: TIMING CHAIN COVER

Courtesy of CHRYSLER LLC

9. Remove timing chain cover bolts (3 and 4).
10. Remove timing chain cover (2).
11. Discard timing chain cover gasket (1). Remove front crankshaft oil seal from cover (2).

Installation

INSTALLATION



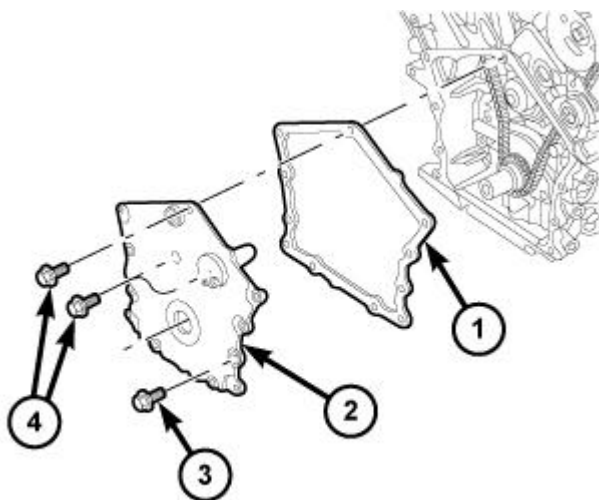
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Fig. 373: TIMING CHAIN COVER SEALING

Courtesy of CHRYSLER LLC

1. Inspect and clean timing chain cover sealing surfaces.

2. Before installing timing cover gasket apply a 1/8 inch bead of Mopar® Engine RTV GEN II to the parting lines between the oil pan and cylinder block (1).

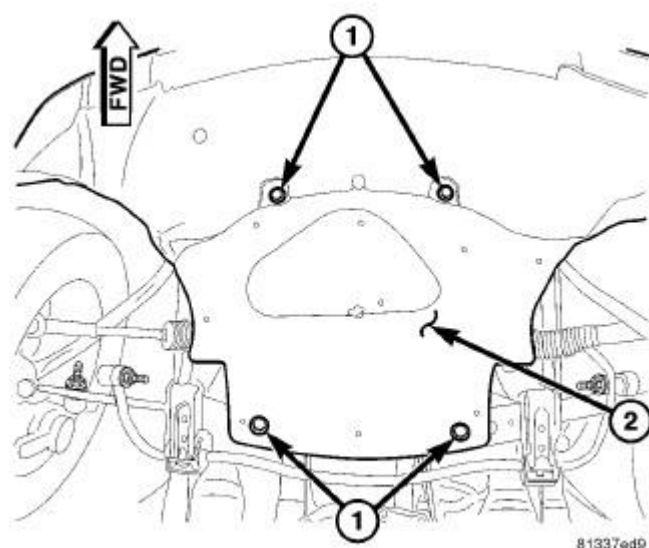


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Fig. 374: TIMING CHAIN COVER

Courtesy of CHRYSLER LLC

3. Install timing cover (2) and gasket (1). Tighten M10 cover bolts (4) to 54 N.m (40 ft. lbs.) and M6 bolts (3) to 12 N.m (105 in. lbs.).
4. Install front crankshaft oil seal using Special Tool 6780-2 sleeve and 6780-1 installer. See **Engine/Engine Block/SEAL, Crankshaft Oil - Installation.**
5. Install crankshaft vibration damper. See **Engine/Engine Block/DAMPER, Vibration - Installation.**
6. Install accessory drive belts. Refer to **Cooling/Accessory Drive/BELT, Serpentine - Installation .**



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Fig. 375: Lower Splash Shield

Courtesy of CHRYSLER LLC

7. Install lower splash shield (2) and retaining bolts (1).

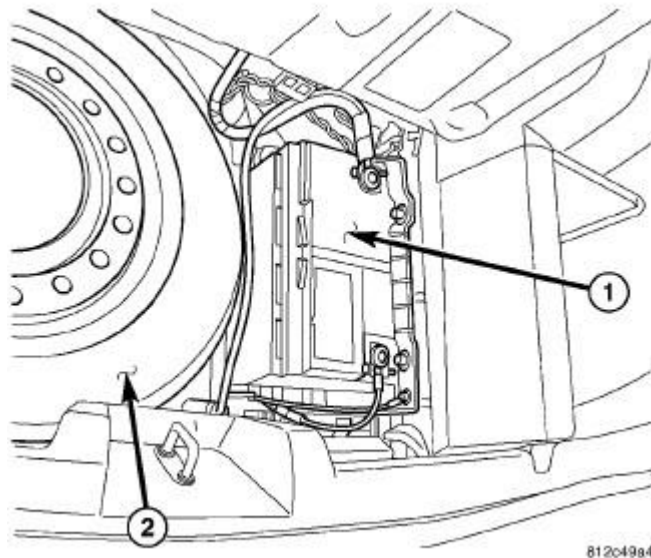


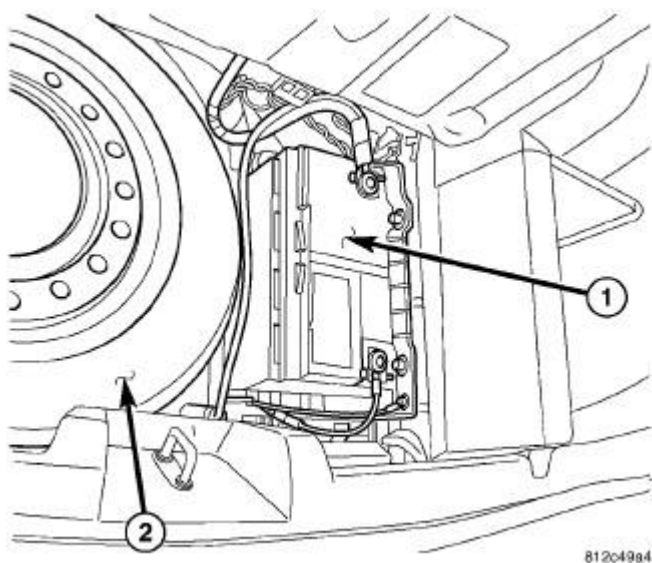
Fig. 376: Locating Battery
Courtesy of CHRYSLER LLC

8. Lower vehicle.
9. Fill cooling system.
10. Connect negative battery (1) cable.

TENSIONER, ENGINE TIMING

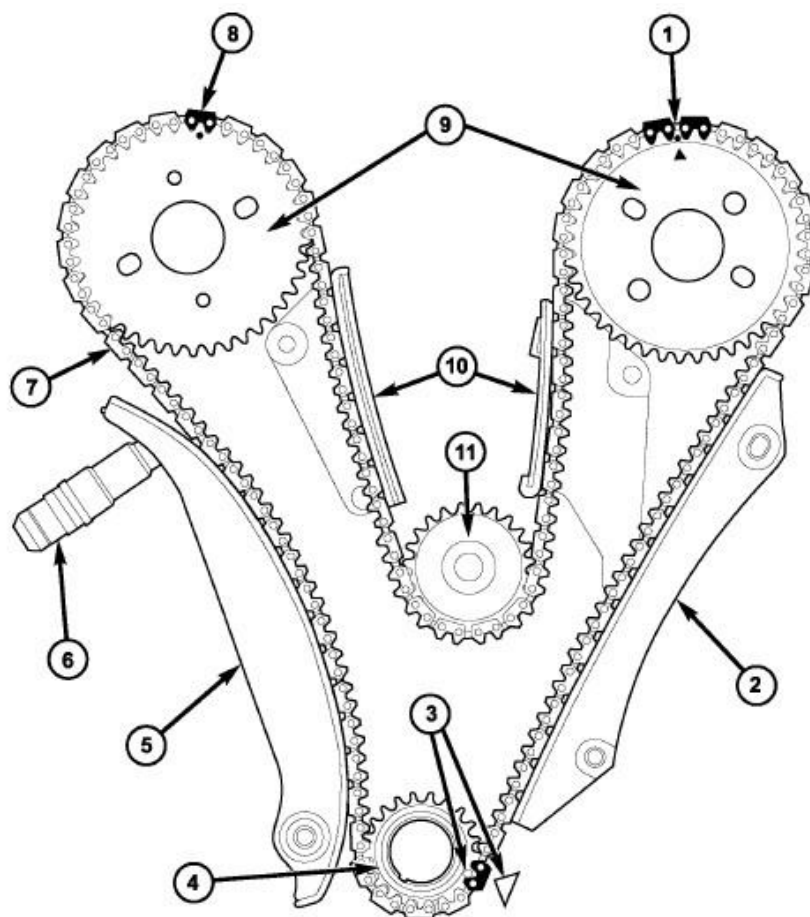
Removal

REMOVAL

**Fig. 377: Locating Battery**

Courtesy of CHRYSLER LLC

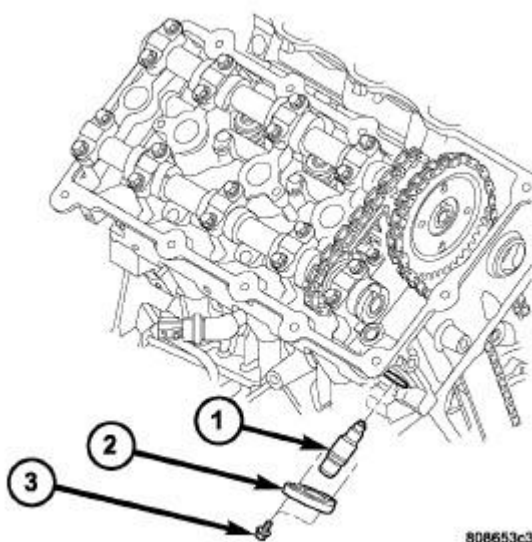
1. Disconnect negative battery (1) cable.
2. Remove timing chain cover. See **Engine/Valve Timing/COVER(S), Engine Timing - Removal**.



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Fig. 378: TIMING CHAIN ALIGNMENT MARKS - PRIMARY
Courtesy of CHRYSLER LLC

3. Align timing marks (1), (3), (8). See Engine/Valve Timing - Standard Procedure.



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Fig. 379: PRIMARY TIMING CHAIN TENSIONER

Courtesy of CHRYSLER LLC

4. Remove timing chain tensioner cover (2).
5. Remove timing chain tensioner (1).

Installation

RESETTING TENSIONER

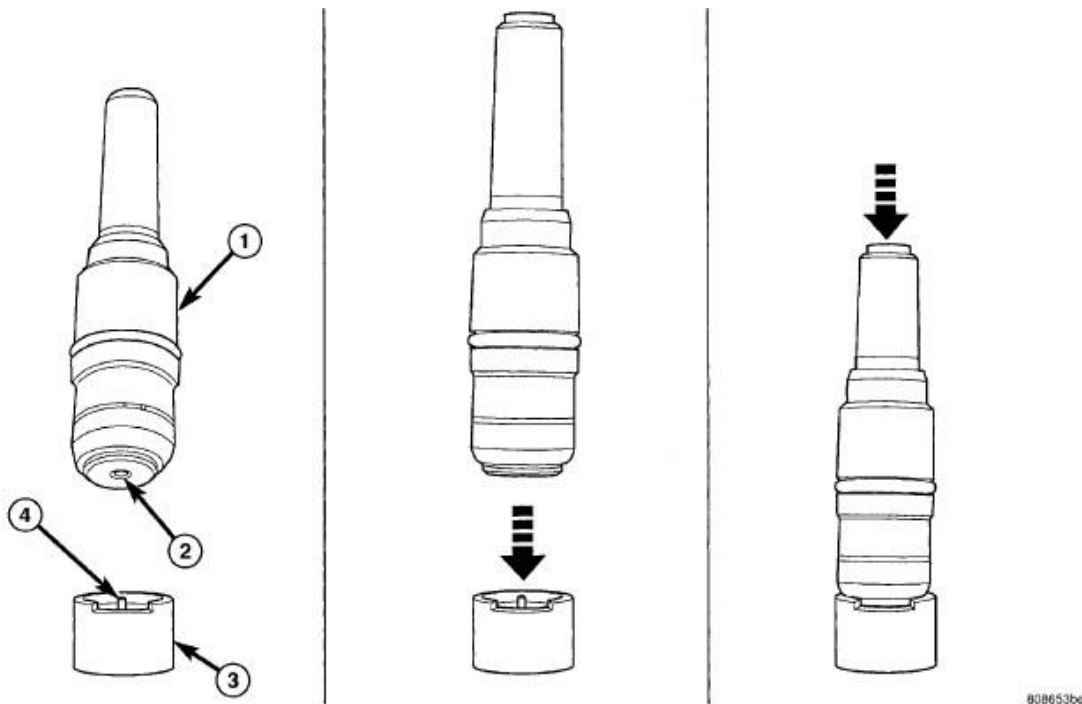


Fig. 380: TIMING CHAIN TENSIONER - OIL PURGING

Courtesy of CHRYSLER LLC

The timing chain tensioner is a spring loaded hydraulic tensioner. To reset the timing chain tensioner, the following procedure must be followed.

1. Purge oil from timing chain tensioner using the following procedure:
 - a. Place the check ball end of tensioner (1) into the shallow end of Special Tool 8186 (3).
 - b. Using hand pressure, slowly depress tensioner (1) until all of the oil is purged out.

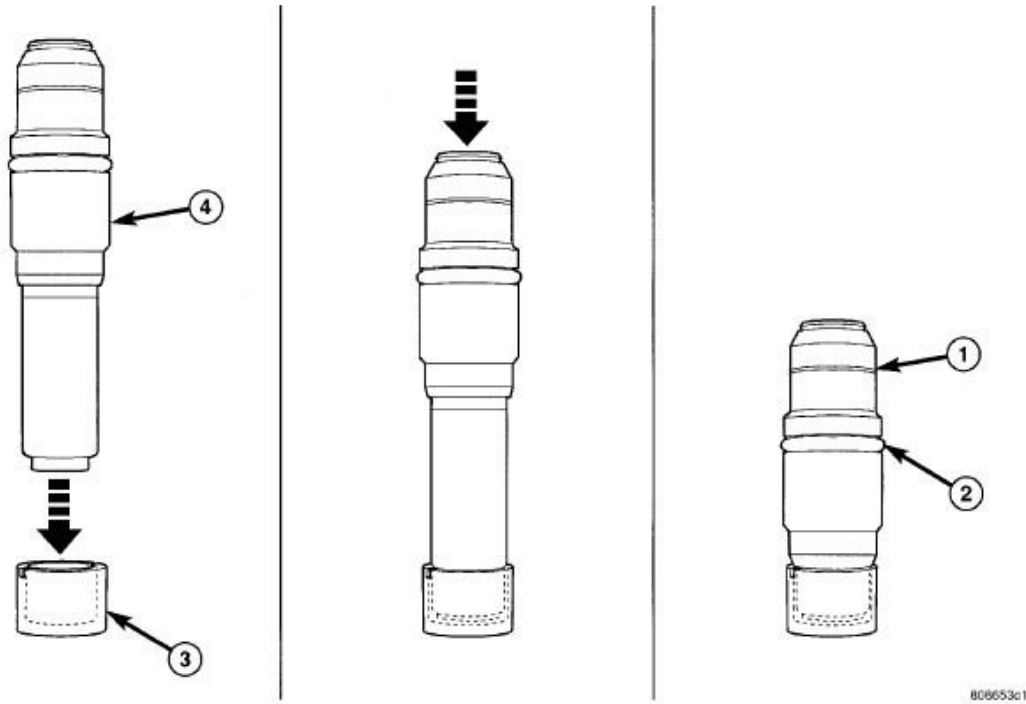


Fig. 381: TIMING CHAIN TENSIONER - RESETTING
Courtesy of CHRYSLER LLC

NOTE: To reset the primary timing chain tensioner, engine oil will first need to be purged from the tensioner.

2. Reset timing chain tensioner (4) using the following procedure:
 - a. Position cylinder plunger into the deeper end of Special Tool 8186 (3).
 - b. Apply a downward force until tensioner (4) is reset.

NOTE: If oil was not first purged from the tensioner, use slight finger pressure to assist the center arm pin of Special Tool 8186 (3) to unseat the tensioner's check ball.

NOTE: Inspect the tensioner O-ring (2) for nicks or cuts and make sure the snap ring (1) is correctly installed, replace as necessary.

TENSIONER-TIMING CHAIN

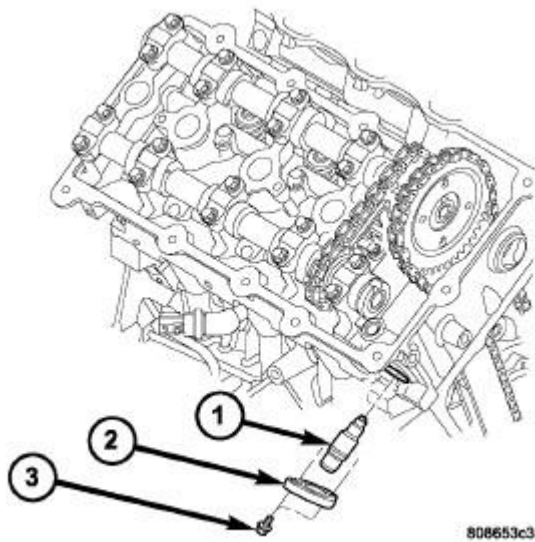


Fig. 382: PRIMARY TIMING CHAIN TENSIONER
Courtesy of CHRYSLER LLC

NOTE: Verify proper timing alignment prior to tensioner installation. See Engine/Valve Timing - Standard Procedure.

1. Reset tensioner. See Engine/Valve Timing/TENSIONER, Engine Timing - Installation.

NOTE: Inspect tensioner O-ring and snap ring, replace as necessary.

2. Install tensioner (1) in cylinder head.

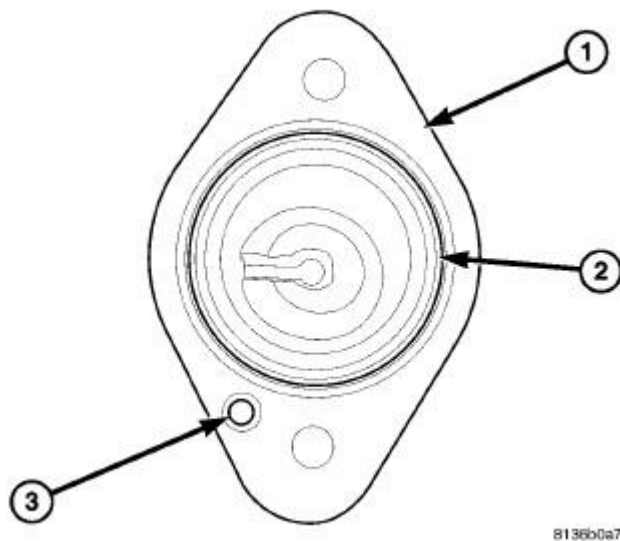


Fig. 383: Tensioner, Dowel Pin & O-Ring

Courtesy of CHRYSLER LLC

NOTE: Tensioner retaining plate dowel pin (3) must be aligned with hole in cylinder head for proper installation.

3. Inspect tensioner retaining plate O-ring (2) and replace as necessary.

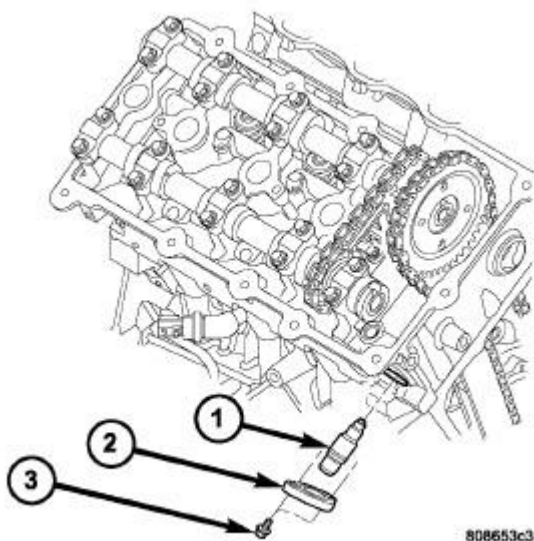


Fig. 384: PRIMARY TIMING CHAIN TENSIONER

Courtesy of CHRYSLER LLC

4. Install tensioner retaining plate (2) and attaching bolts (3). Tighten bolts to 12 N.m (105 in. lbs.).