

CYLINDER HEAD

DESCRIPTION

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The cylinder head is a one-piece design and is made from aluminum alloy and silicon.

Two, ductile cast iron, overhead camshafts in a camshaft housing; they are operated by a belt and gears.

The four valves per cylinder, parallel and vertical, are positioned in the valve guides and are controlled by rocker arms operated by camshaft cams and kept in contact with the valves through hydraulic tappets.

Valve guides are press-fitted in the cylinder head seats. A special reamer is used to produce the inner diameter after fitting.

Unlike cylinder heads with ante-chambers, the entire combustion process takes place in the combustion chamber on the piston.

The gasket between the cylinder head and crankcase is made of metal. No cylinder head tightening is required throughout the life of the engine.

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Remove air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .

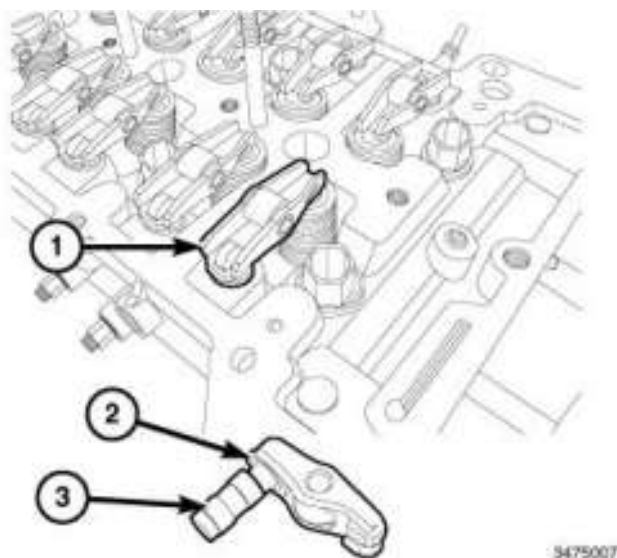


Fig. 73: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

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

NOTE: Number the position of each rocker arm and lifter as it is removed.

4. Remove all the rocker arm (1) and lifters (3).
5. Remove the intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL** .
6. Remove the exhaust manifold. Refer to **MANIFOLD, EXHAUST, REMOVAL** .
7. Remove the EGR cooler manifold assembly. Refer to **COOLER, EGR, REMOVAL** .

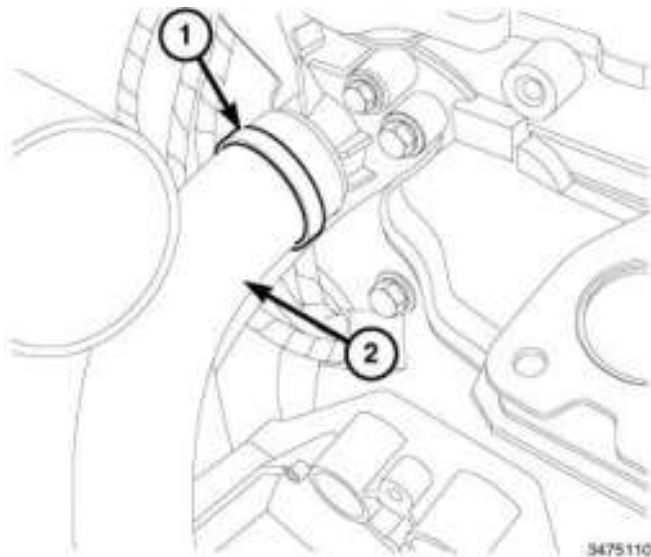


Fig. 74: Upper Radiator Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

8. Using the (special tool #10288, Pliers, Hose Clamp) to release clamp (1) and remove the upper radiator hose (2) at engine.

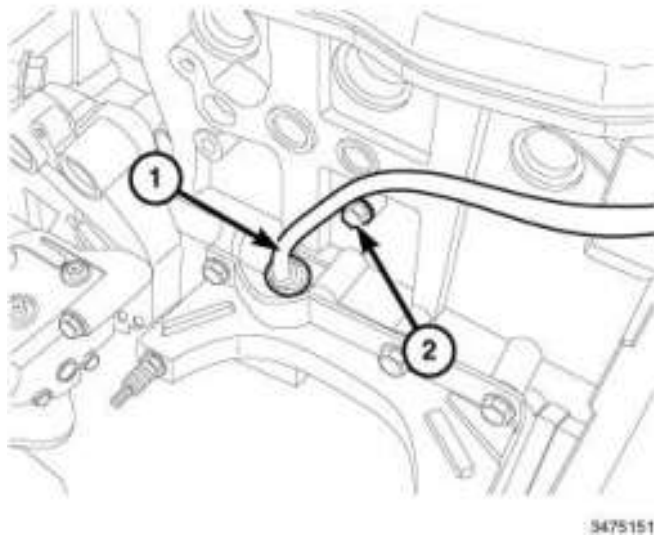


Fig. 75: Engine Oil Dipstick Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Remove bolt (2) and the engine oil dipstick tube (1).

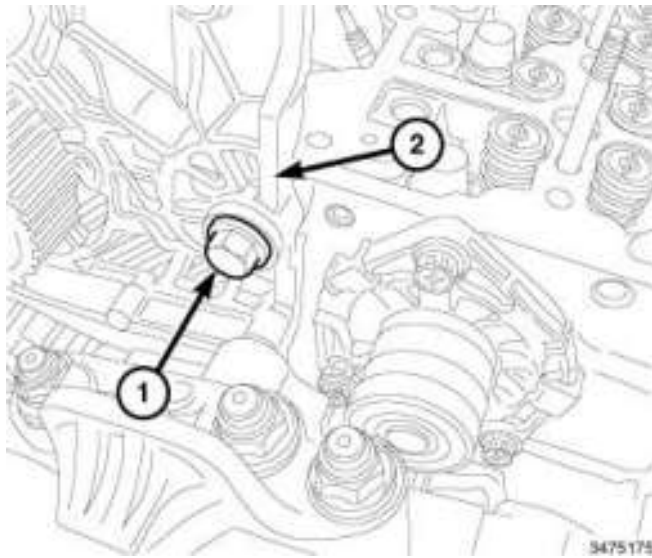


Fig. 76: Fuel Injection Pump Mounting Bracket & Bolt
 Courtesy of CHRYSLER GROUP, LLC

10. Remove bolt (1) and the fuel injection pump mounting bracket (2) from the cylinder head.
11. Remove power steering pump and support bracket.

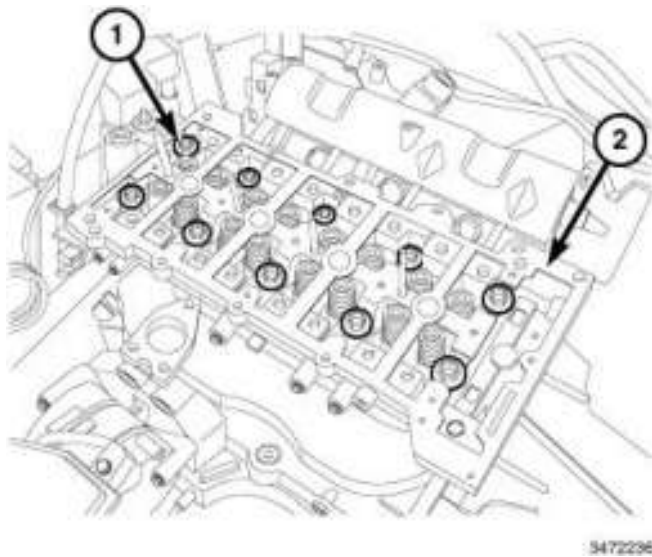


Fig. 77: Cylinder Head Assembly & Bolts
 Courtesy of CHRYSLER GROUP, LLC

12. Remove bolts (1) and the cylinder head assembly (2).

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. Refer to **ENGINE - STANDARD PROCEDURE** . Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

INSPECTION

NOTE: Cylinder head cannot be resurfaced.

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

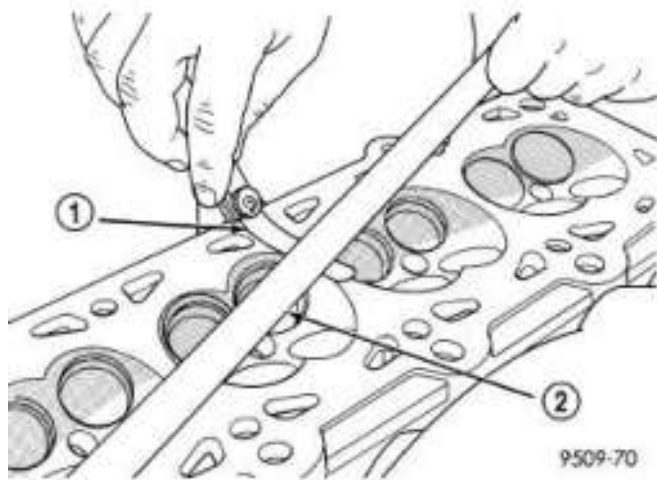


Fig. 78: Checking Cylinder Head Flatness
Courtesy of CHRYSLER GROUP, LLC

1 - FEELER GAUGE
2 - STRAIGHT EDGE

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

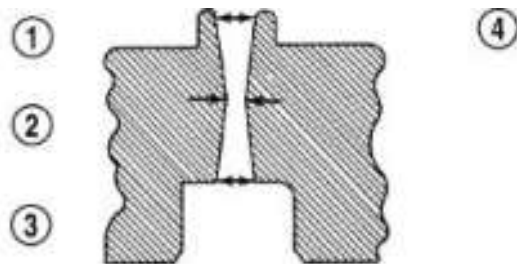


Fig. 79: Checking Wear on Valve Guide-Typical
Courtesy of CHRYSLER GROUP, LLC

1 - TOP

2 - MIDDLE
 3 - BOTTOM
 4 - CUT AWAY VIEW OF VALVE GUIDE MEASUREMENT LOCATIONS

2. Inspect camshaft bearing journals for scoring.
3. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
4. Using a small hole gauge and a micrometer, measure valve guides in 3 places top (1), middle (2), and bottom (3). Replace guides if they are not within specification. Refer to **SPECIFICATIONS - 2.0L DIESEL ENGINE** .
5. Check valve guide height.
6. Prior to installing cylinder head, the cylinder block should be checked for flatness.

INSTALLATION

INSTALLATION

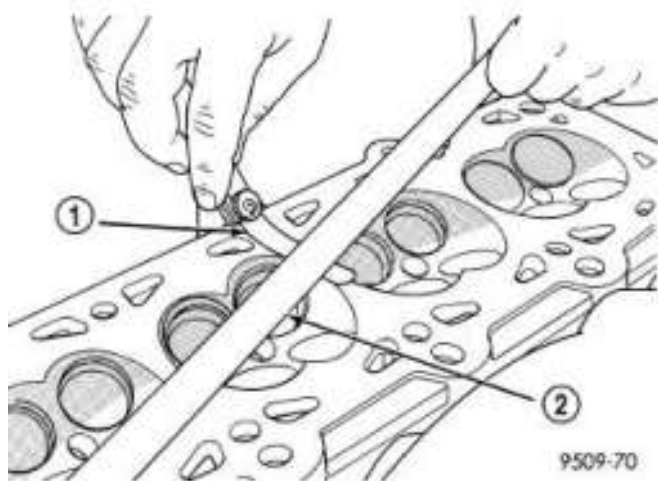


Fig. 80: Checking Cylinder Head Flatness
 Courtesy of CHRYSLER GROUP, LLC

NOTE: If piston or connecting rods have been replaced, measure piston projection to ensure proper head gasket selection. Refer to **ENGINE BLOCK - STANDARD PROCEDURE** .

1. Clean the old gasket from the cylinder head and engine block. Refer to **ENGINE - STANDARD PROCEDURE** .
2. Check that the flatness of the cylinder head lower surface corresponds to the recommended values.

Cylinder Head	Value
Engine cylinder head lower surface flatness	0.1 mm (0.004 in.)
Cylinder head nominal height	107 +/- 0.05

NOTE: The locating dowel pins between the engine block and cylinder head are shorter (12.5 mm) than the dowel pins between the cylinder head and the camshaft housing. Take great care not to reverse them as this

could impair engine operation.

3. If removed, install the engine block dowel pins.
4. Use a new gasket that is the same thickness as the one removed. If this is not the case, the thickness of the new cylinder head gasket must be determined by checking piston protrusion. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**.
5. Position the first cylinder at TDC; rotate the crankshaft a further two teeth of the toothed drive pulley to lower the pistons, thereby preventing any resistance of the valves while fitting the cylinder head.

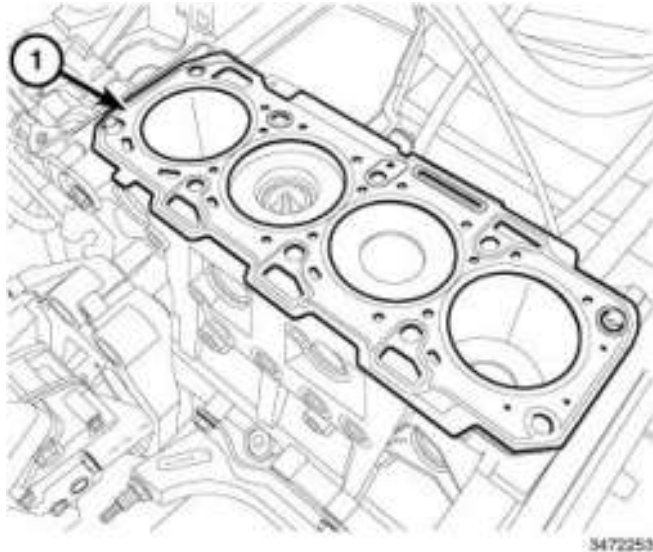


Fig. 81: Cylinder Head Gasket
Courtesy of CHRYSLER GROUP, LLC

6. Install the cylinder head gasket (1).

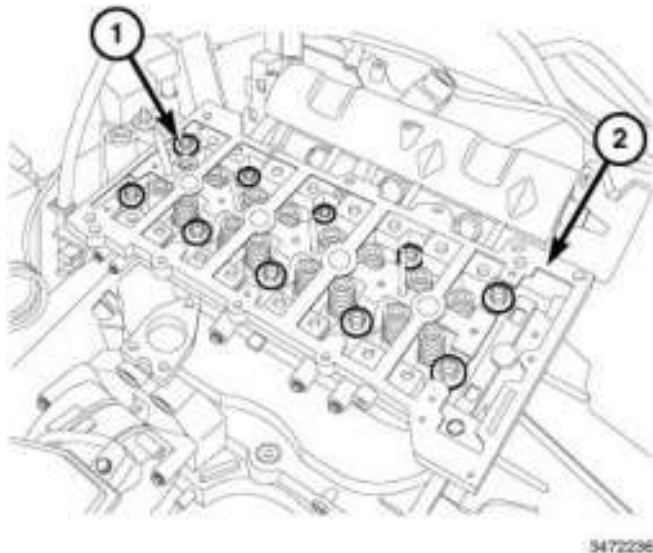


Fig. 82: Cylinder Head Assembly & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the cylinder head bolts more than four times because they undergo permanent lengthening whenever they are tightened. If the

previous tightening torque is unknown, a replacement is necessary.

7. Install the cylinder head (2) onto the engine block and tighten the bolts (1) finger tight.

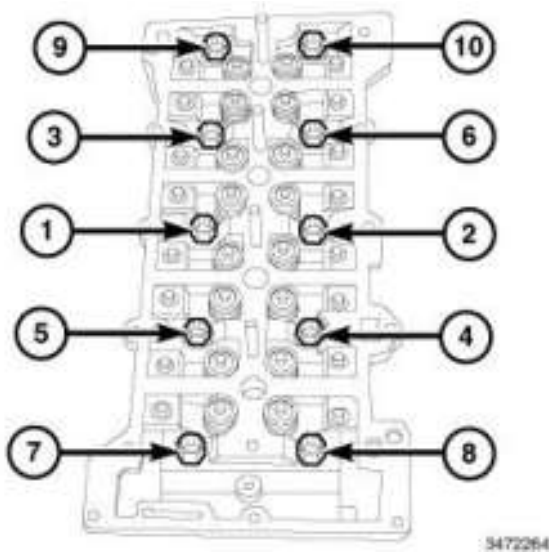


Fig. 83: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

8. Tighten the cylinder head bolts in the following order shown in illustration to:
 - a. Tighten bolts to 62 N.m (46 ft. lbs.).
 - b. Tighten bolts to 69 N.m (51 ft. lbs.).
 - c. Tighten bolts an additional 90° turn.
 - d. Tighten bolts an additional 90° turn.
 - e. Tighten bolts an additional 90° turn.

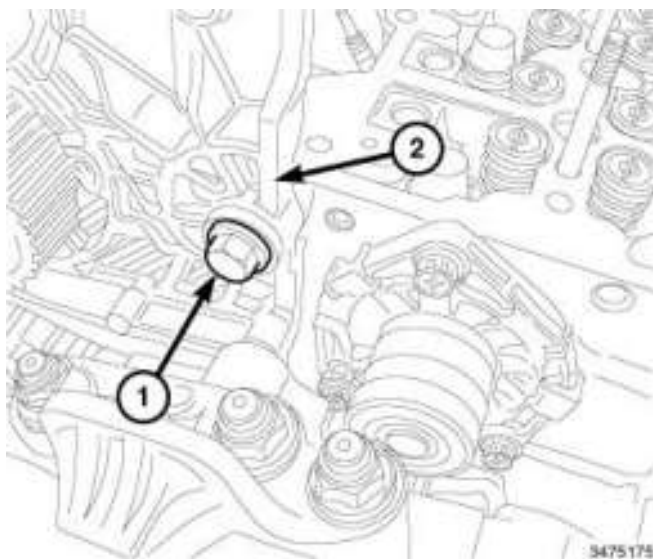


Fig. 84: Fuel Injection Pump Mounting Bracket & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Install the power steering pump support bracket. Tighten bolts to 30 N.m (22 ft. lbs.).

10. Install the fuel injection pump and mounting bracket (2) to the cylinder head. Tighten bolt (1) to 25 N.m (18 ft. lbs.).

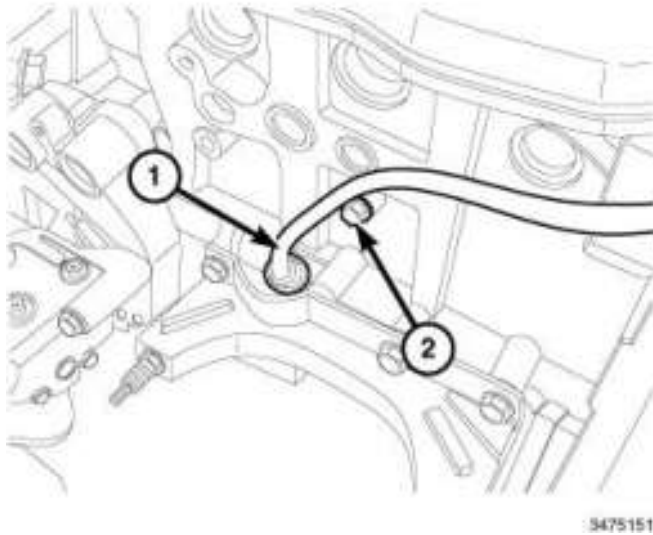


Fig. 85: Engine Oil Dipstick Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

11. Install the oil dipstick tube (1). Tighten bolt (2) to 9 N.m (80 in. lbs.).

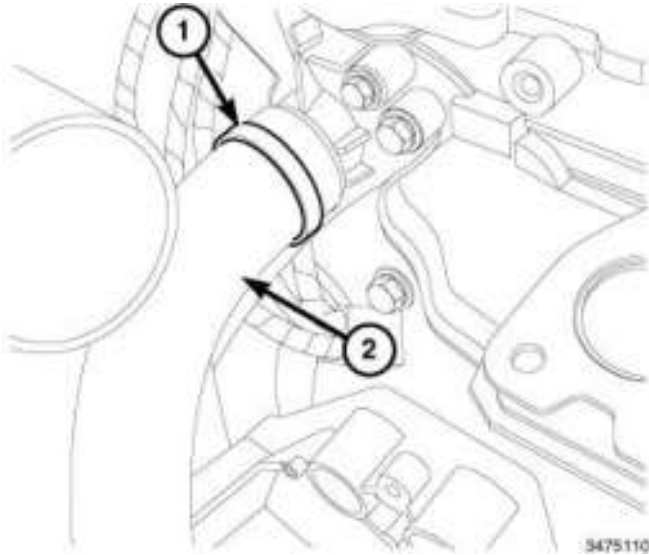


Fig. 86: Upper Radiator Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

12. Install the upper radiator (2) hose at engine. Using the (special tool #10288, Pliers, Hose Clamp) lock the clamp (1).
13. Install the EGR cooler manifold. Refer to **COOLER, EGR, INSTALLATION** .
14. Install exhaust manifold. Refer to **MANIFOLD, EXHAUST, INSTALLATION** .
15. Install intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION** .

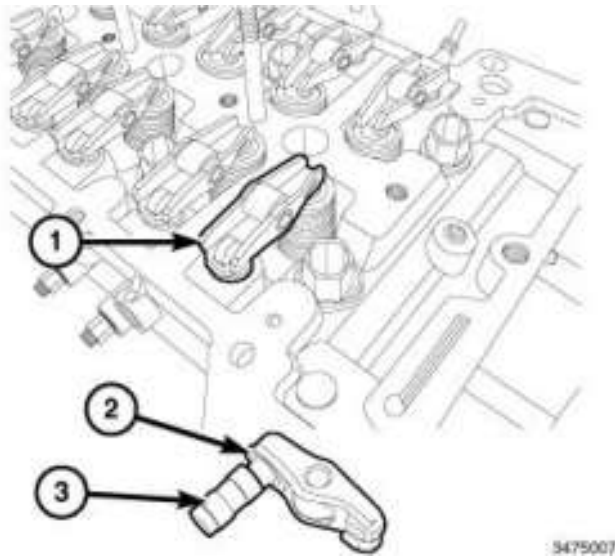


Fig. 87: Rocker Arm, Retaining Clip & Lifter
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Install the lifters and rocker arm into the original location as noted from removal.

16. Install all the lifters (3) and rocker arms (1) back into their original location.
17. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
18. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
19. Install new oil filter and fill with oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
20. Install air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .
21. Connect the negative battery cable.
22. Start engine and check for leaks.

CAMSHAFT, ENGINE

DESCRIPTION

DESCRIPTION

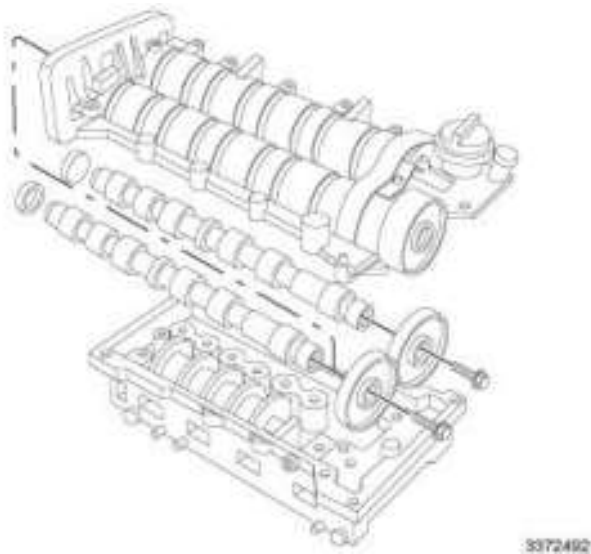


Fig. 88: Camshaft Assembly
 Courtesy of CHRYSLER GROUP, LLC

The exhaust camshaft is controlled directly by the timing belt and transmits power to the inlet camshaft by means of a pair of straight toothed gears.

The exhaust camshaft also controls the vacuum unit fitted on the gears side.

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .

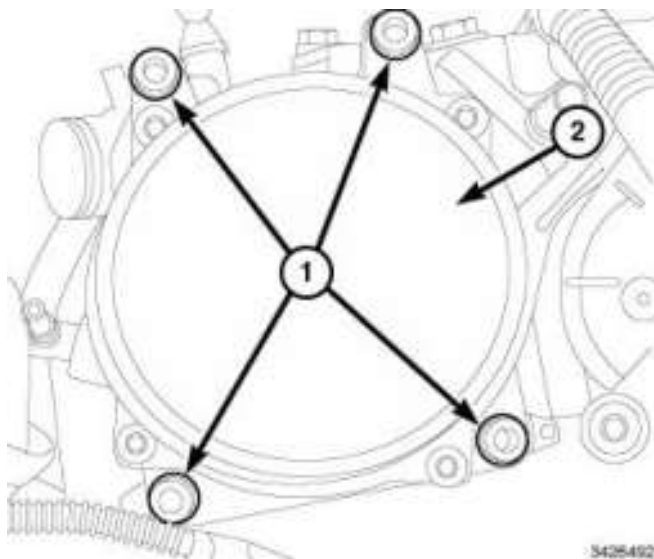


Fig. 89: Vacuum Pump & Bolts
 Courtesy of CHRYSLER GROUP, LLC

3. Remove bolts (1) and the vacuum pump (2).

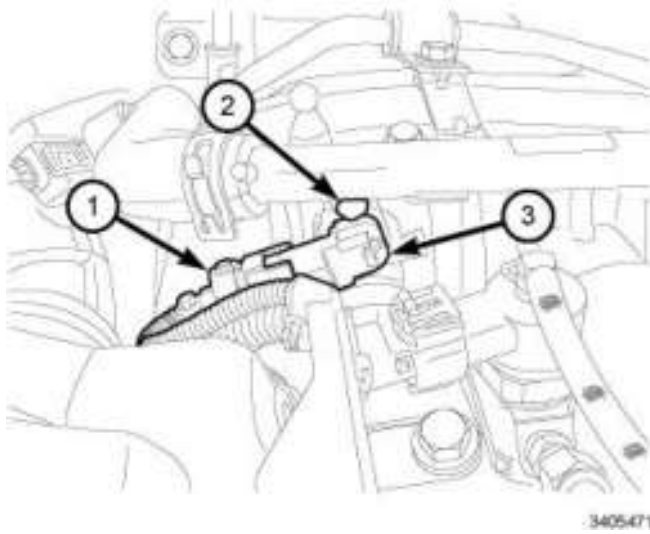


Fig. 90: Camshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolt (2) and the camshaft position sensor (3).

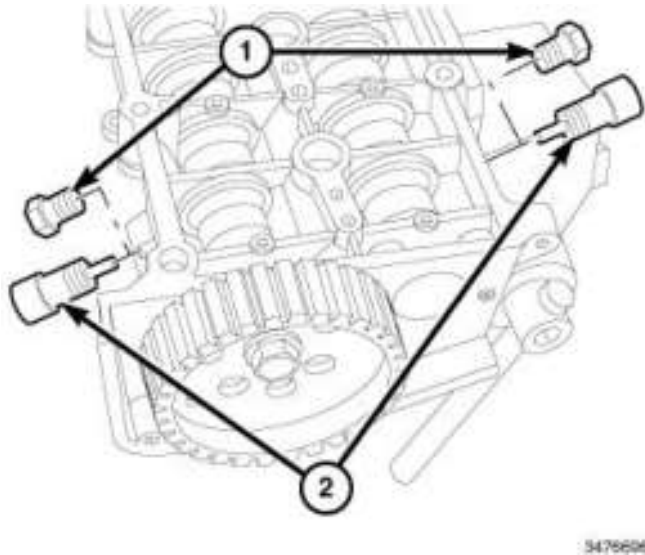
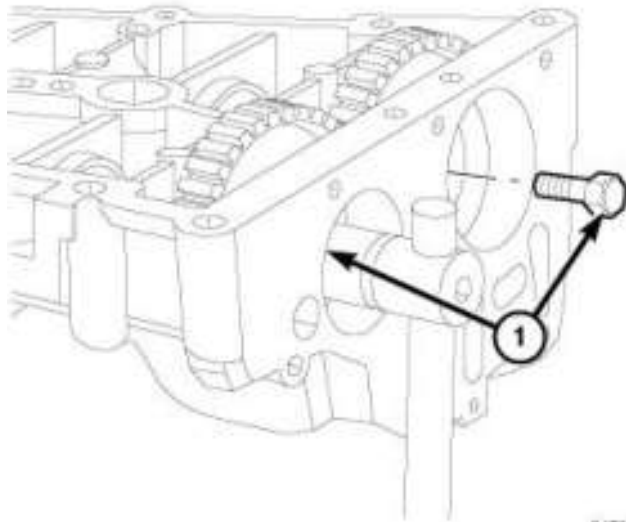


Fig. 91: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

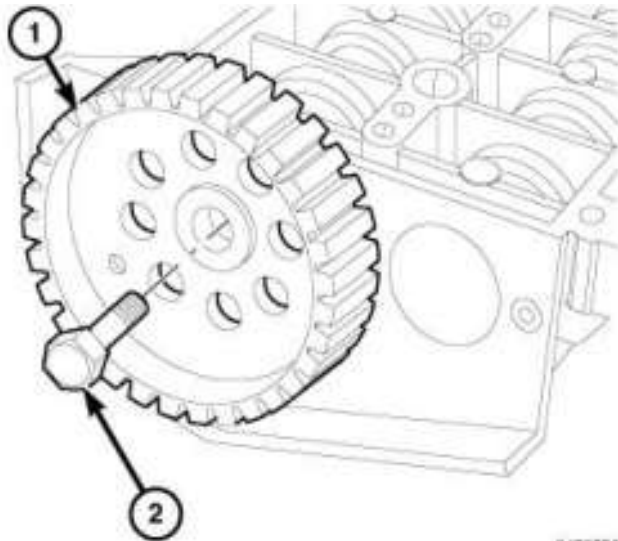
5. Remove plugs (1) and install the Camshaft Timing Tools (2) (special tool #20132, Tool, Timing Belt Locking) into the camshaft housing.



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Fig. 92: Camshaft Gear Bolts
Courtesy of CHRYSLER GROUP, LLC

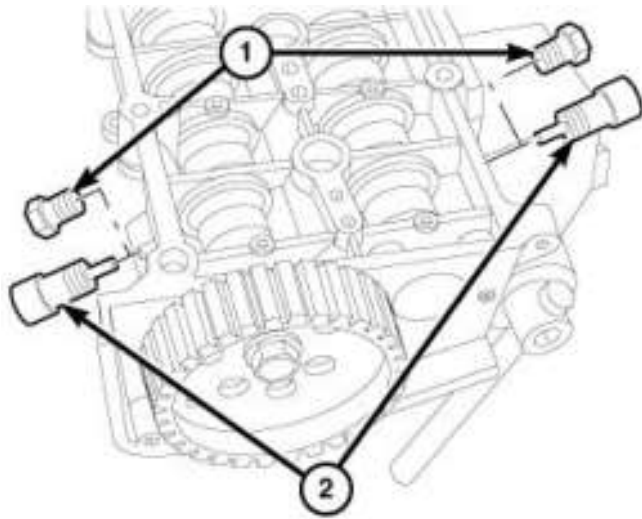
6. Remove the bolts (1) securing the camshaft gears.



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Fig. 93: Camshaft Timing Belt Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

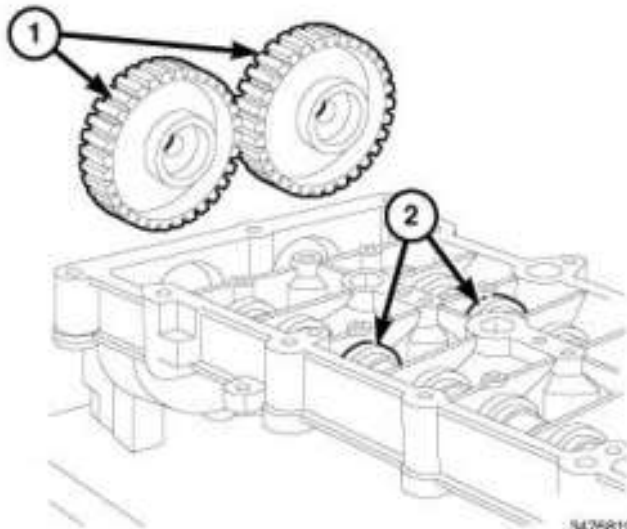
7. Using the Counter Torque Tool (3) (special tool #6847, Holder, Camshaft Sprocket) and Pins (2) (special tool #20127, Pins, Camshaft Pulley Remover/Installer) to hold camshaft sprocket (1) remove bolt (2) and the camshaft timing belt sprocket (1).



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Fig. 94: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

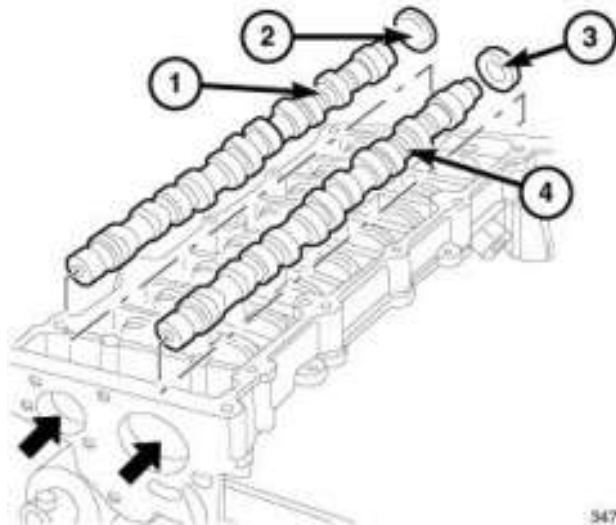
8. Remove the Camshaft Timing Tools (2) (special tool #20132, Tool, Timing Belt Locking).



3475819

Fig. 95: Camshaft Gears & Camshafts
Courtesy of CHRYSLER GROUP, LLC

9. Withdraw the camshafts (2) as far as necessary and remove the camshaft gears (1).



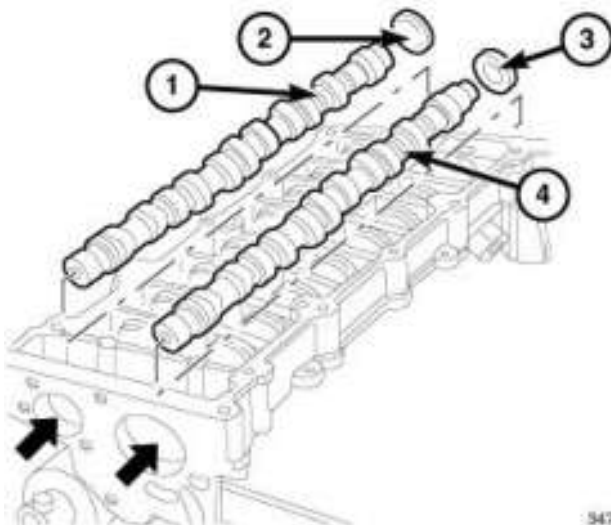
3475021

Fig. 96: Intake Camshaft, Plug, Exhaust Camshaft & Oil Seal
 Courtesy of CHRYSLER GROUP, LLC

10. Using a suitable drift, extract the intake camshaft (1) and plug (2).
11. Using a suitable drift, extract the exhaust camshaft (4) and the oil seal (3).

INSTALLATION

INSTALLATION



3475021

Fig. 97: Intake Camshaft, Plug, Exhaust Camshaft & Oil Seal
 Courtesy of CHRYSLER GROUP, LLC

1. Lubricate the camshaft bearings with clean engine oil.
2. Install the camshafts (1 and 4) in their housings.

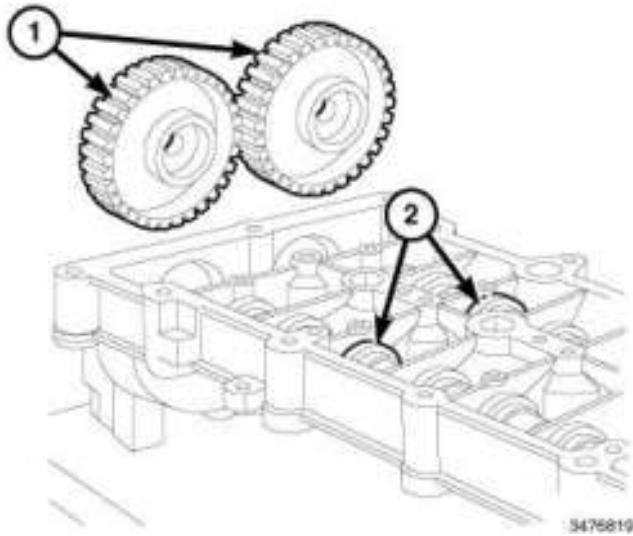


Fig. 98: Camshaft Gears & Camshafts
Courtesy of CHRYSLER GROUP, LLC

3. Install the camshaft gears (1) in their housings and secure them without tightening the bolts.

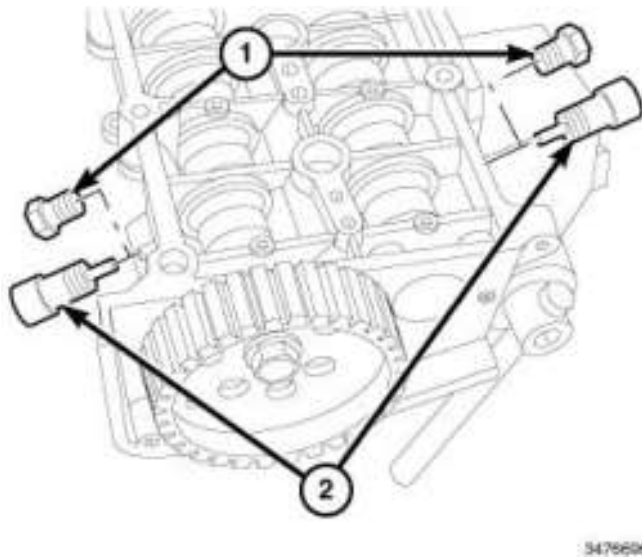
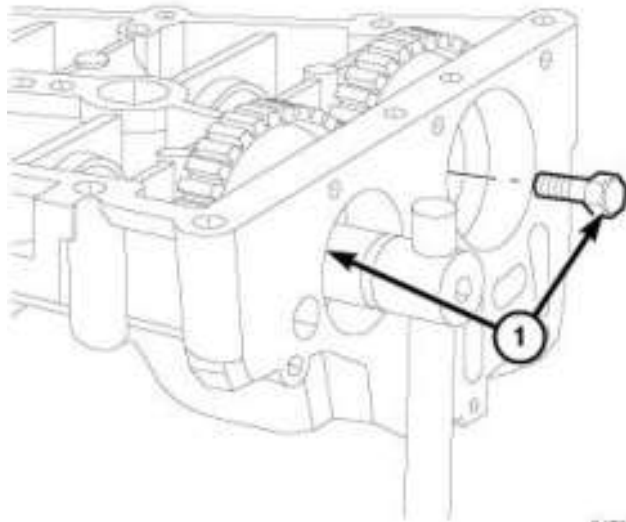


Fig. 99: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

NOTE: Check that the tools are correctly fitted in the housings in the camshafts.

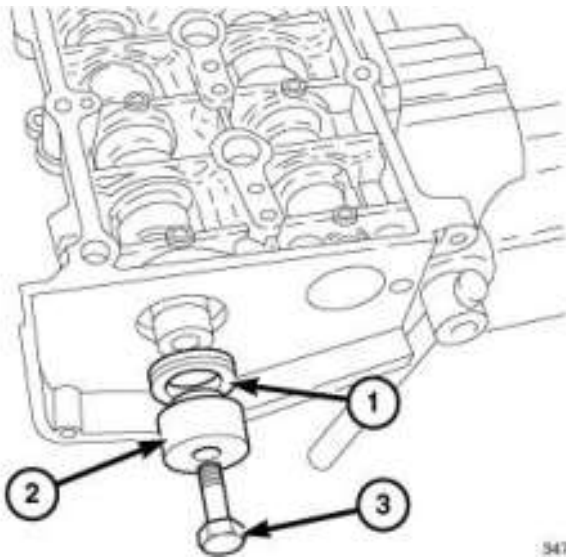
4. Install the Camshaft Timing Shaft Tools (2) (special tool #20132, Tool, Timing Belt Locking) into the camshaft housing.



5475670

Fig. 100: Camshaft Gear Bolts
Courtesy of CHRYSLER GROUP, LLC

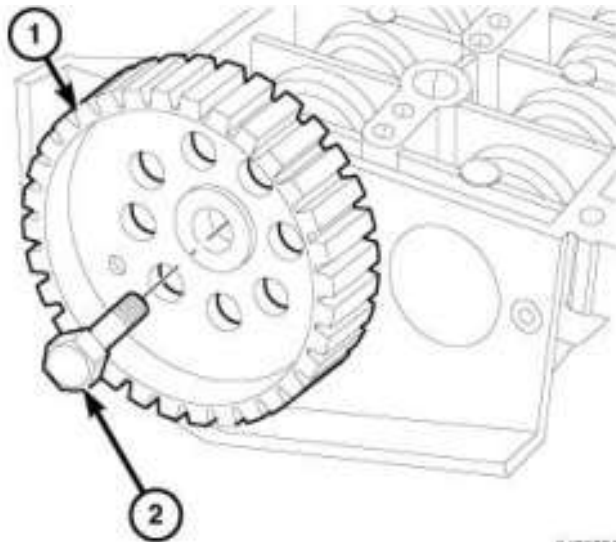
5. Tighten the camshaft gear bolts to 30 N.m (22 ft. lbs.) plus an additional 40° turn.



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Fig. 101: Camshaft Oil Seal, Fitting Tool & Bolt
Courtesy of CHRYSLER GROUP, LLC

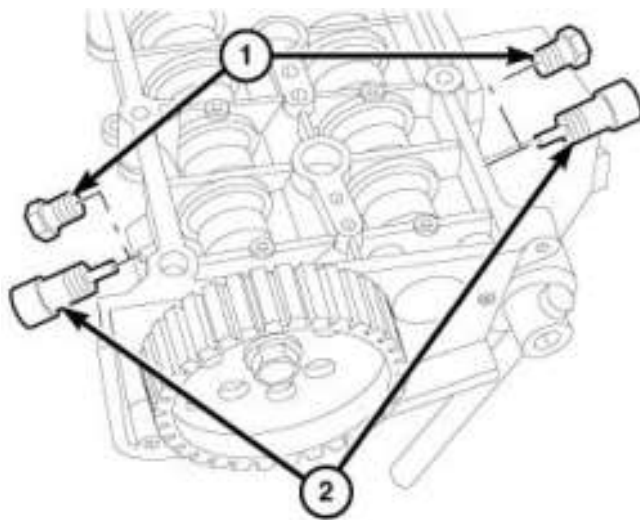
6. Using the Fitting Tool (2) (special tool #20131, Installer, Camshaft Oil Seal) position new camshaft seal (1) onto Fitting Tool (2) and install the camshaft oil seal (1) by drawing in the seal using the bolt (3).
7. Remove the Fitting Tool (2).



3476756

Fig. 102: Camshaft Timing Belt Sprocket & Bolt
 Courtesy of CHRYSLER GROUP, LLC

8. Install the camshaft sprocket (1) and tighten bolt finger tight (2).
9. Using the Counter Torque Tool (3) (special tool #6847, Holder, Camshaft Sprocket) and Pins (2) (special tool #20127, Pins, Camshaft Pulley Remover/Installer) to hold camshaft sprocket (1) and tighten the bolt (4) to 30 N.m (22 ft. lbs.) plus an additional 40° turn.



3476696

Fig. 103: Plugs & Camshaft Timing Tools
 Courtesy of CHRYSLER GROUP, LLC

10. Install the inlet side camshaft plug (1).
11. Place the exhaust side camshaft timing belt sprocket in its housing and secure it without tightening the bolt.
12. Remove the Camshaft Timing Shaft Tools (2) (special tool #20132, Tool, Timing Belt Locking).

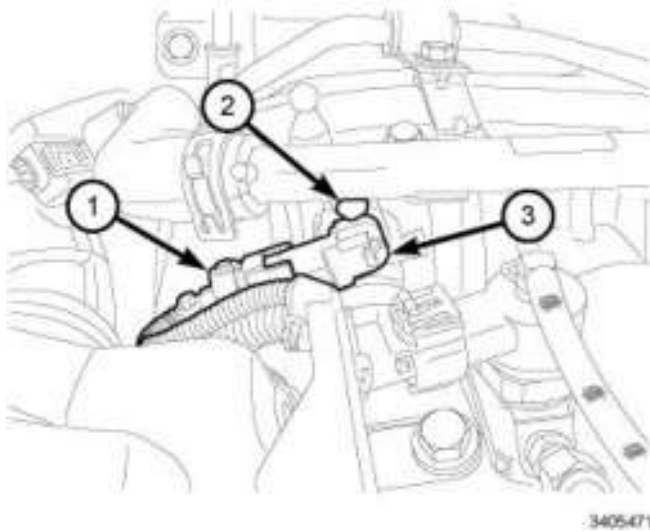


Fig. 104: Camshaft Position Sensor, Connector & Bolt
 Courtesy of CHRYSLER GROUP, LLC

13. Install the camshaft position sensor (3). Tightening bolt (2) to 9 N.m (80 in. lbs.).

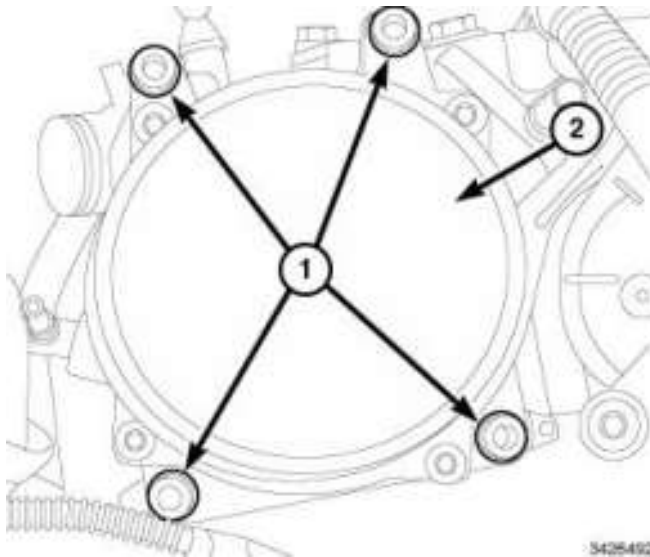


Fig. 105: Vacuum Pump & Bolts
 Courtesy of CHRYSLER GROUP, LLC

14. Using a new gasket, position driver gear on rear of pump and install vacuum pump (2). Tighten bolts (1) to 18 N.m (159 in. lbs.).
15. Using a new gasket, install the engine oil filler. Tighten the bolts to 8 N.m 71 in. lbs.).
16. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
17. Connect negative battery cable.

COVER(S), CYLINDER HEAD

REMOVAL

REMOVAL

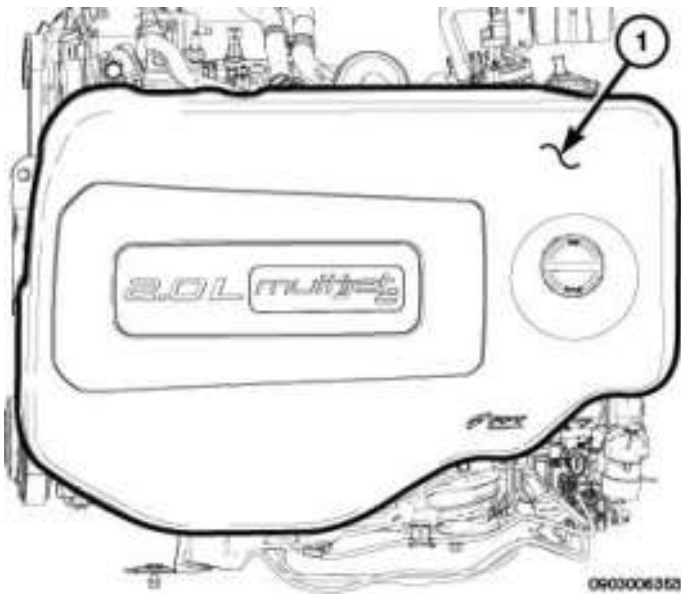


Fig. 106: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

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

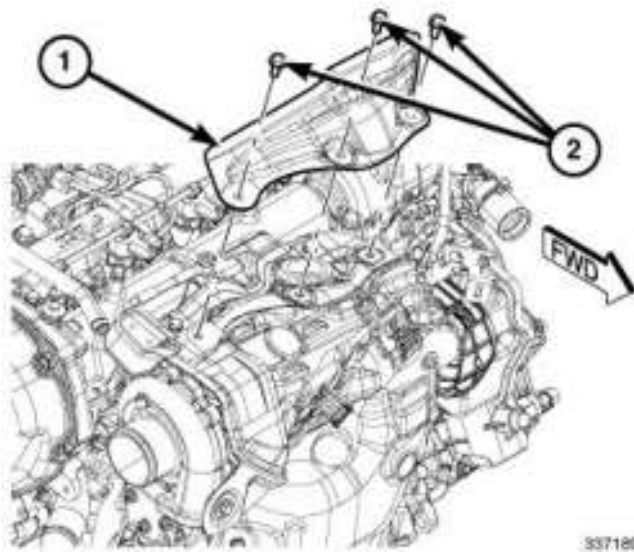


Fig. 107: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

3. Remove the upper turbocharger heat shield (1).

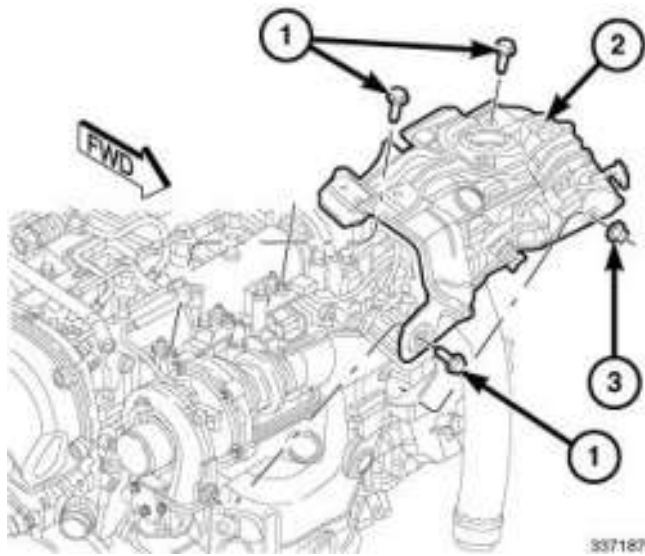


Fig. 108: Turbocharger Heat Shield & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts (1), the nut (3), and the turbocharger heat shield (2).

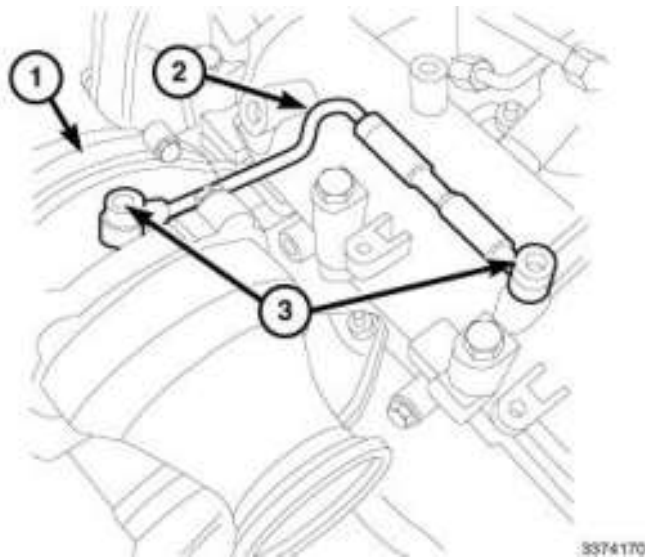
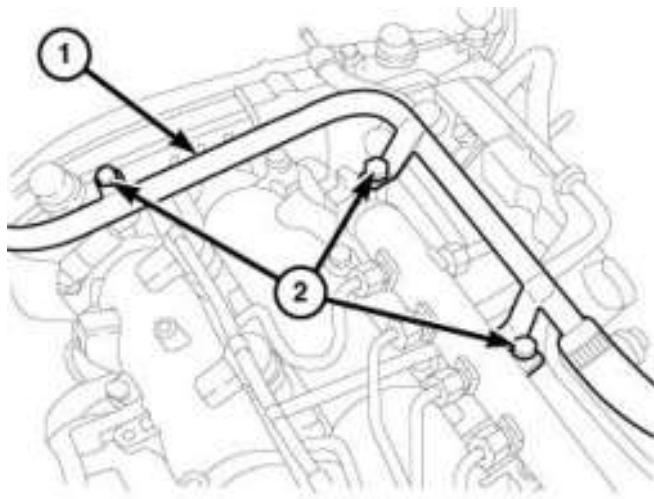


Fig. 109: Turbocharger, Oil Feed Line & Banjo Bolts
 Courtesy of CHRYSLER GROUP, LLC

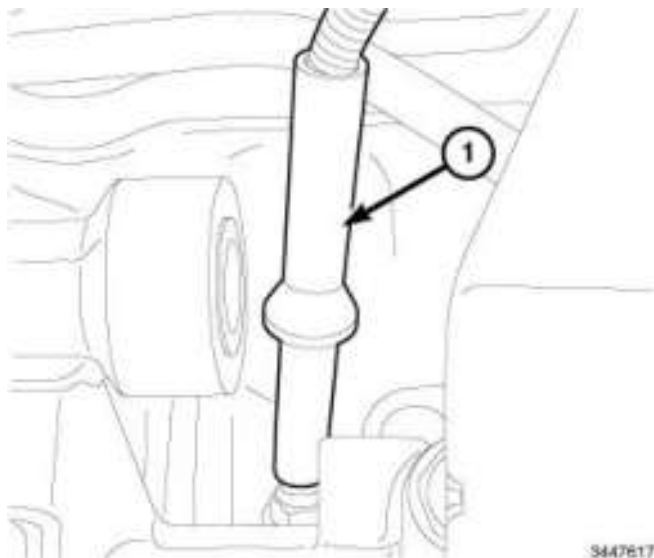
5. Remove Banjo bolts (3) and the engine oil feed line (2) to the turbocharger (3).
6. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.



3374607

Fig. 110: Oil Vapor Recovery Pipe & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Using the (special tool #10288, Pliers, Hose Clamp) loosen band clamp and disconnect hose from vapor recovery pipe.
8. Remove bolts (2) securing the engine oil vapor recovery pipe (1) to the camshaft housing.
9. Remove the screws securing the engine oil recovery pipe to the air chamber.



3447617

Fig. 111: Glow Plug Harness Connector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the glow plug wire harness connector (1) from each glow plug.
11. Remove the bolts, and release the degassing pipe retaining clip and remove the intake chamber reinforcement bracket.

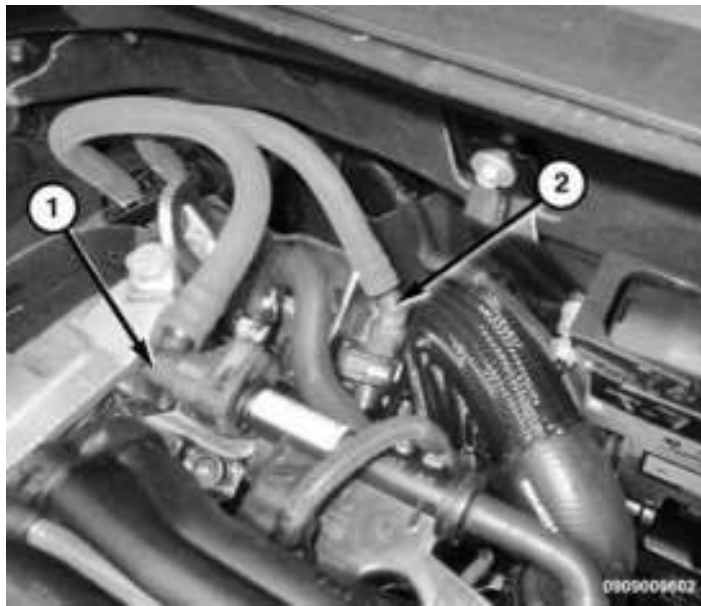


Fig. 112: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the fuel supply (2) line quick-connect fittings at fuel injection pump. Refer to **FITTING, QUICK CONNECT**.
13. Disconnect the fuel return line (1) near the fuel injection pump.
14. Detach the fuel line routing clips.
15. Remove the fuel injectors. Refer to **INJECTOR(S), FUEL, REMOVAL**.

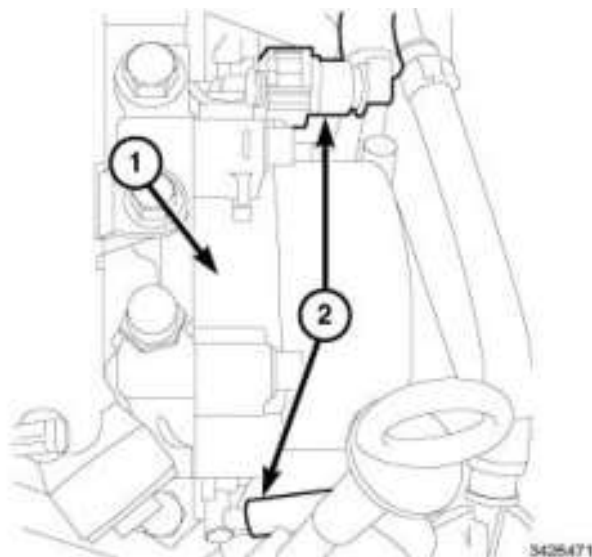


Fig. 113: Vacuum Pump & Vacuum Lines
Courtesy of CHRYSLER GROUP, LLC

16. Remove the vacuum lines (2) at vacuum pump (1).

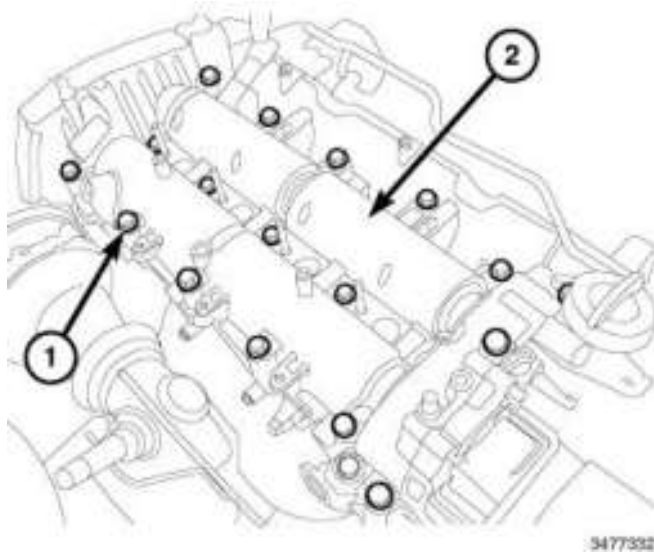


Fig. 114: Cylinder Head Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Remove the bolts (1) and the cylinder head cover (2).
18. Remove and discard the gasket.

INSTALLATION

INSTALLATION

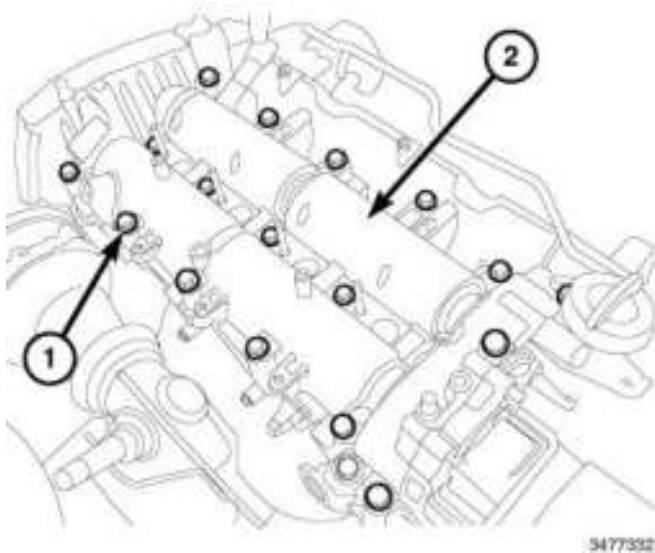


Fig. 115: Cylinder Head Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Clean sealing surfaces. Refer to **ENGINE - STANDARD PROCEDURE**.
2. Install new cylinder head cover gasket.
3. Install cylinder head cover (2). Tighten bolts (1) to 25 N.m (18 ft. lbs.).

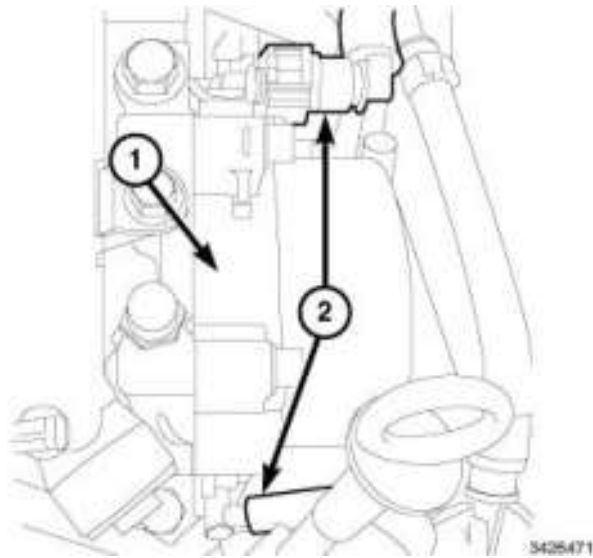


Fig. 116: Vacuum Pump & Vacuum Lines
 Courtesy of CHRYSLER GROUP, LLC

4. Install the vacuum lines (2) to the vacuum pump (1).

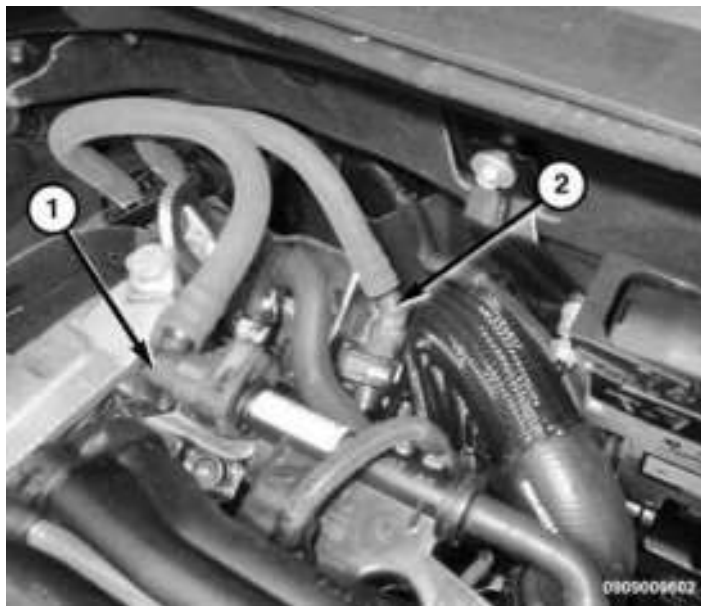
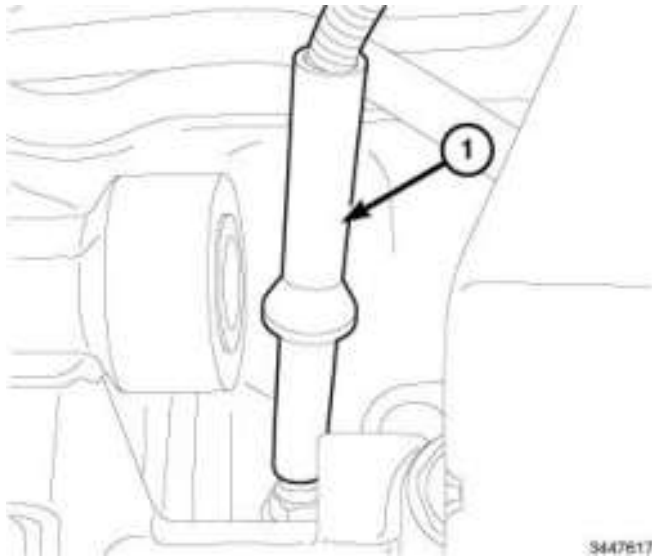


Fig. 117: Fuel Supply & Return Line Quick-Connect Fittings
 Courtesy of CHRYSLER GROUP, LLC

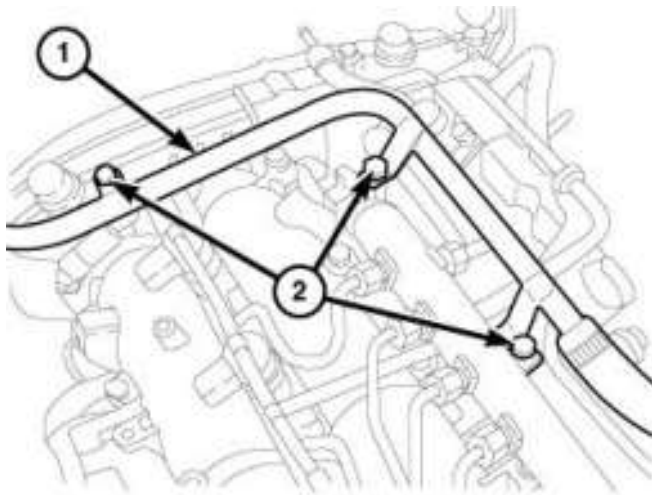
5. Install the fuel injectors. Refer to **INJECTOR(S), FUEL, INSTALLATION** .
6. Attach the fuel line routing clips.
7. Connect the fuel return line (1) near the fuel injection pump.
8. Connect the fuel supply (2) line quick-connect fittings at fuel injection pump.



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Fig. 118: Glow Plug Harness Connector
 Courtesy of CHRYSLER GROUP, LLC

9. Install the intake chamber reinforcement bracket and the degassing pipe retaining clip and securely tighten bolt.
10. Disconnect the glow plug wire harness connector (1) from each glow plug.



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Fig. 119: Oil Vapor Recovery Pipe & Bolts
 Courtesy of CHRYSLER GROUP, LLC

11. Install the screws securing the engine oil recovery pipe to the air chamber and securely tighten.
12. Install the bolts (2) securing the engine oil vapor recovery pipe (1) to the camshaft housing.
13. Connect the hose to the vapor recovery pipe
14. Using the (special tool #10288, Pliers, Hose Clamp) to crimp band clamp.

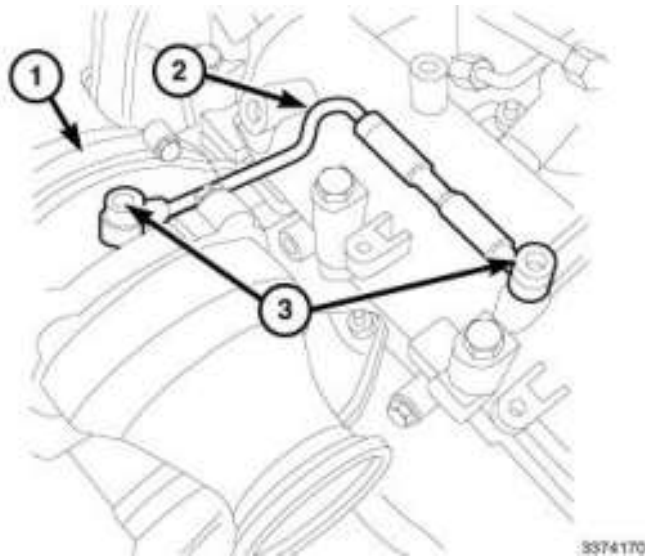


Fig. 120: Turbocharger, Oil Feed Line & Banjo Bolts
 Courtesy of CHRYSLER GROUP, LLC

15. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION.**
16. Install the engine oil feed line (2) to the turbocharger (3). Tighten the Banjo bolts (3) to 18 N.m (159 in. lbs.).

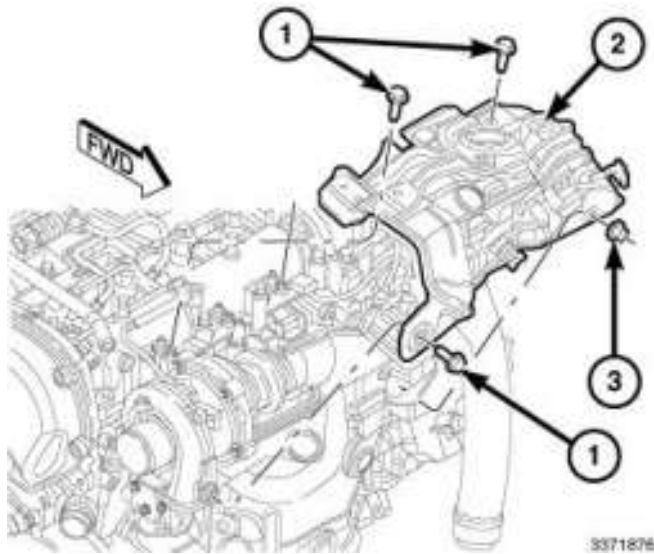


Fig. 121: Turbocharger Heat Shield & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

17. Install the turbo heat shield. Tighten the bolts (1) to 12 N.m (106 in. lbs.) and the nut (3) to 8 N.m (71 in. lbs.).

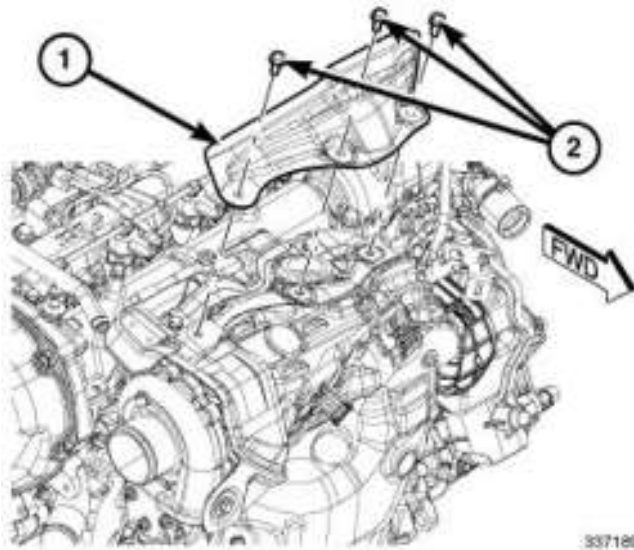


Fig. 122: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
 Courtesy of CHRYSLER GROUP, LLC

18. Install the upper turbo heat shield (2) Tighten the bolts (1) to 12 N.m (106 in. lbs.).

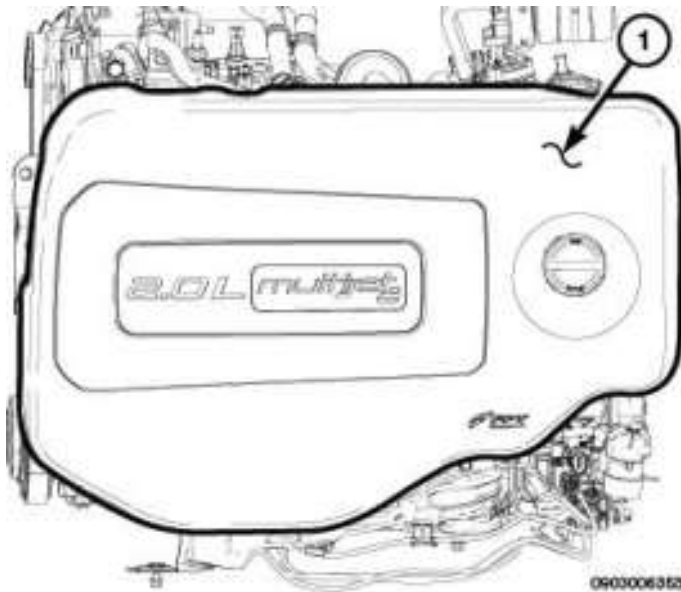


Fig. 123: Engine Cover
 Courtesy of CHRYSLER GROUP, LLC

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

LIFTER(S), HYDRAULIC

REMOVAL

REMOVAL

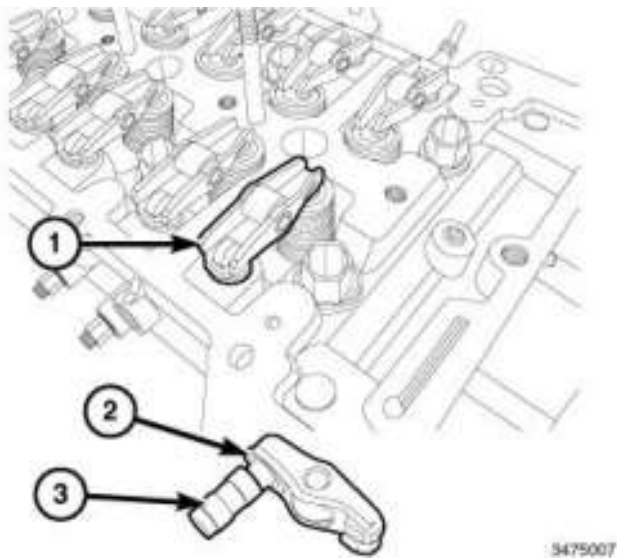


Fig. 124: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the rocker arm and lifter. Refer to **ROCKER ARM, VALVE, REMOVAL** .
3. Remove retaining clip (2) and separate the rocker arm (1) from lifter (3).

INSTALLATION

INSTALLATION

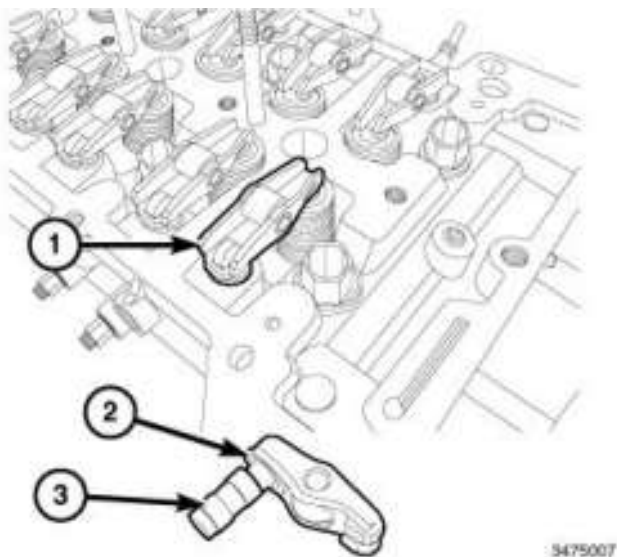


Fig. 125: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

1. Assemble the rocker arm (1) to the lifter (3) and install the retaining clip (2).
2. Install the rocker arm and lifter. Refer to **ROCKER ARM, VALVE, INSTALLATION** .
3. Connect the negative battery cable.

ROCKER ARM, VALVE

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the cylinder head cover. Refer to COVER(S), CYLINDER HEAD, REMOVAL.

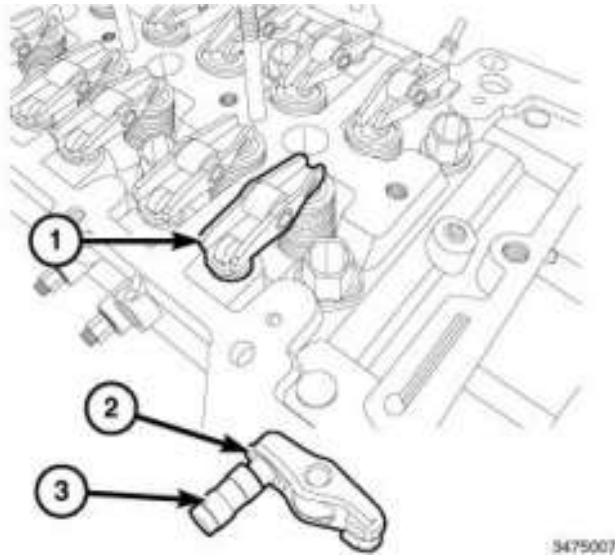


Fig. 126: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

NOTE: Label the order in which the rocker arms were removed.

3. Remove the rocker arm and lifter assembly (1).

INSTALLATION

INSTALLATION

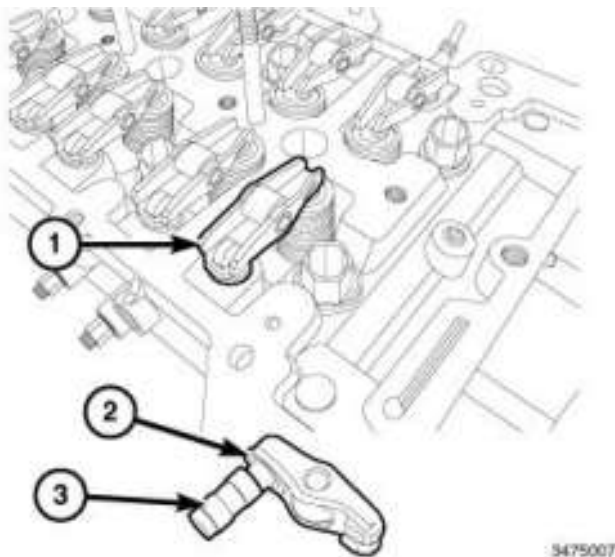


Fig. 127: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

1. Install the rocker arm and lifter assembly back to its original location as noted during the removal process.
2. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
3. Connect the negative battery cable.

SEAL(S), CAMSHAFT

REMOVAL

REMOVAL

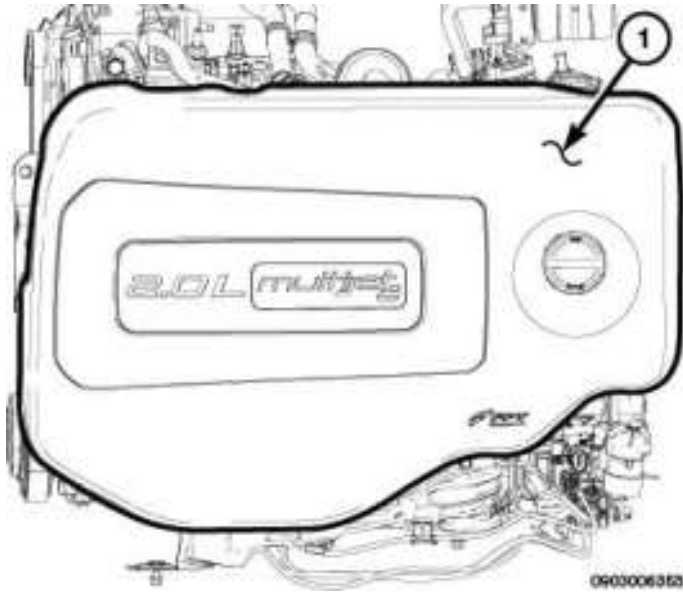


Fig. 128: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover (1).
2. Remove the camshaft timing belt sprocket. Refer to **BELT AND SPROCKETS, TIMING, REMOVAL**.

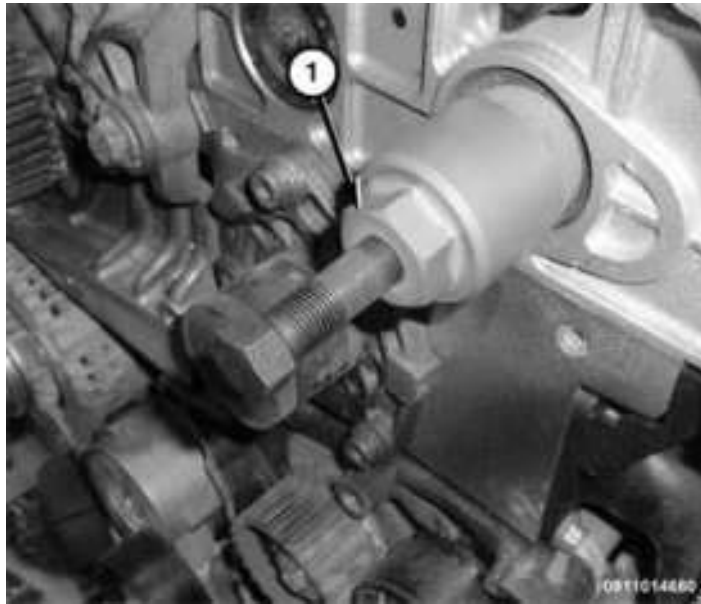


Fig. 129: Seal Remover Tool
 Courtesy of CHRYSLER GROUP, LLC

- Using the (special tool #10498, Remover, Seal) Tool (1), remove the camshaft oil seals.

INSTALLATION

INSTALLATION

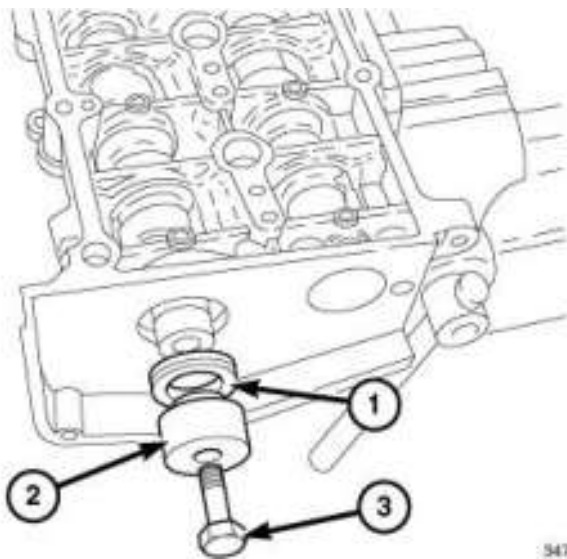


Fig. 130: Camshaft Oil Seal, Fitting Tool & Bolt
 Courtesy of CHRYSLER GROUP, LLC

- Using the Fitting Tool (2) (special tool #20131, Installer, Camshaft Oil Seal), position new camshaft seal (1) onto Fitting Tool (2) and install the camshaft oil seal (1) by drawing in the seal using the bolt (3).
- Remove the Fitting Tool.
- Install the camshaft timing belt sprocket. Refer to **BELT AND SPROCKETS, TIMING, INSTALLATION.**

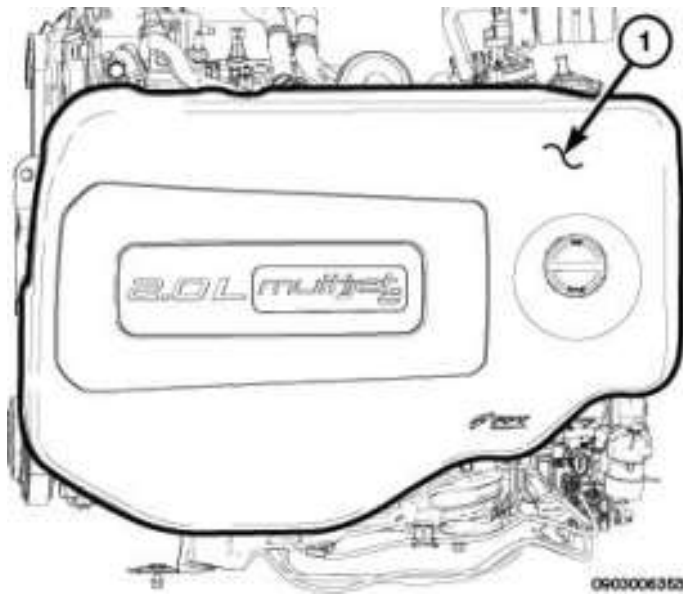


Fig. 131: Engine Cover
 Courtesy of CHRYSLER GROUP, LLC

4. Install the engine cover (1).

SPRING(S), VALVE

REMOVAL

REMOVAL

1. Disconnect negative battery cable.
2. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .
3. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

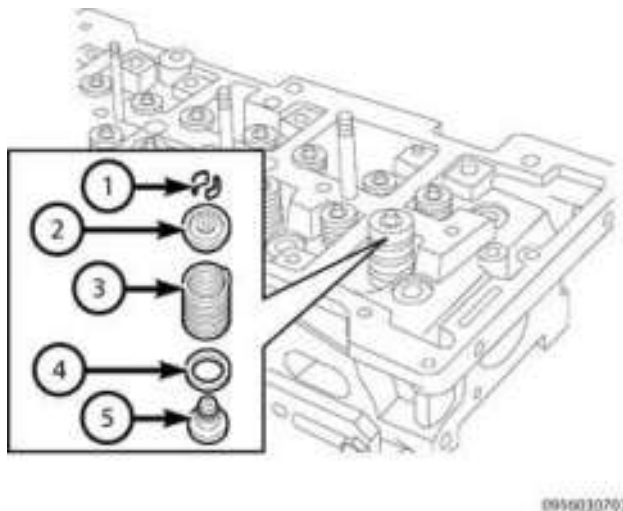


Fig. 132: Valve Spring Components
 Courtesy of CHRYSLER GROUP, LLC

4. Compress the valve spring (3) and remove the valve keepers (1).

5. Remove the valve upper shim (2).
6. Remove the valve spring (3).
7. Remove the lower shim (4) (exhaust valve only).
8. Repeat procedure for each cylinder as necessary.

INSTALLATION

INSTALLATION

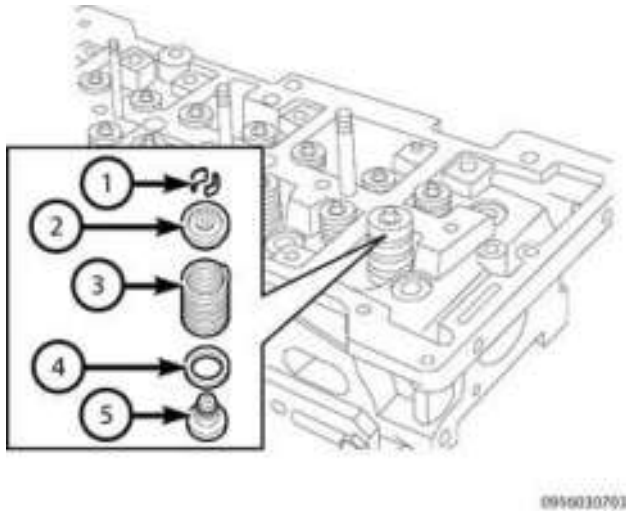


Fig. 133: Valve Spring Components

Courtesy of CHRYSLER GROUP, LLC

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

1. Install the lower shim (4) (exhaust valve only).
2. Install valve spring (3).
3. Install valve upper shim (2).
4. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

NOTE: Ensure that the valve keepers are seated properly.

5. Compress valve spring (3) and install valve keepers (1).
6. Repeat procedure for each cylinder as necessary.
7. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION**.
8. Connect negative battery cable.

VALVES, INTAKE AND EXHAUST

REMOVAL

REMOVAL

NOTE: As a good practice, determine if the valve faces or valve seats require servicing. Measuring the valve height on a known good valve. If the replacement or refinished valve height is greater than the measurement of the known good valve height, machine enough material from the stem of the valves to give you the valve height of the good valve.

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

1. Disconnect the negative battery cable.
2. Remove the cylinder head. Refer to **CYLINDER HEAD, REMOVAL** .
3. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

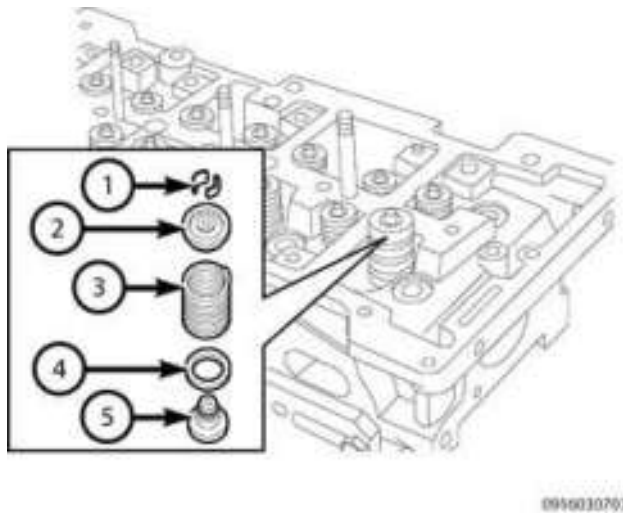


Fig. 134: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

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

4. Compress the valve spring (3) and remove the valve keepers (1).
5. Remove the valve upper shim (2).
6. Remove the valve spring (3).
7. Remove the lower shim (4) (exhaust valve only).

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

8. Remove valve stem seal (5).
9. Repeat steps 3 through 7 for each valve as necessary.
10. Remove the valves and replace as necessary.

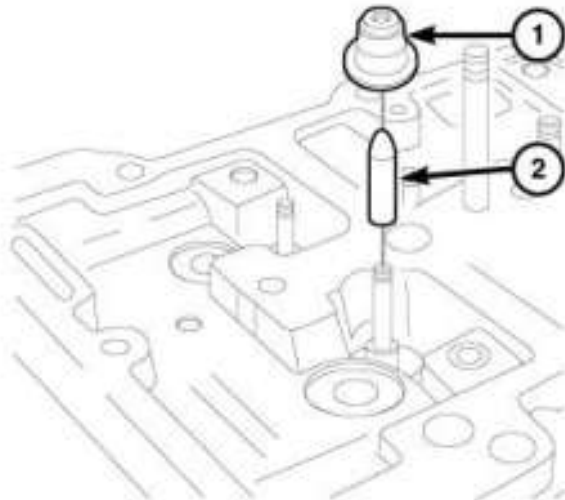
INSTALLATION

INSTALLATION

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

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

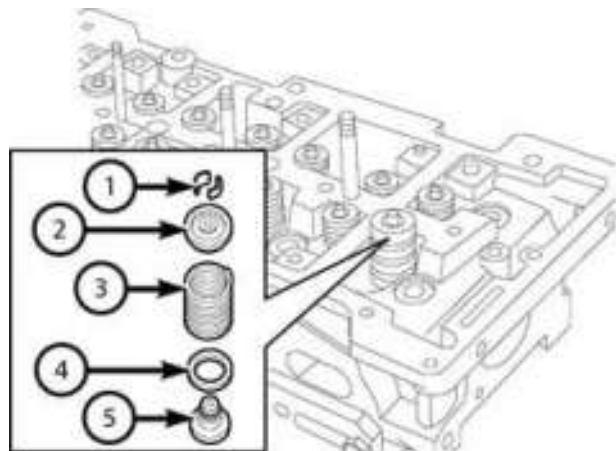
1. Install valves in their original position in the cylinder head.



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Fig. 135: Valve Stem Seal & Fitting Tool
Courtesy of CHRYSLER GROUP, LLC

2. Install the valve seal Fitting Tool (2) onto valve stem.
3. Install valve stem seal (1).
4. Remove the valve seal Fitting Tool (2) from the valve stem.



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Fig. 136: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

5. Install the lower shim (4) (exhaust valve only).
6. Install the valve spring (3).
7. Install the valve upper shim (2).
8. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

NOTE: Ensure that the valve keepers are seated properly.

9. Compress the valve spring (3) and install the valve keepers (1).
10. Repeat steps 3 through 10 for each valve as necessary.
11. Install the cylinder head. Refer to **CYLINDER HEAD, INSTALLATION** .
12. Connect the negative battery cable.