

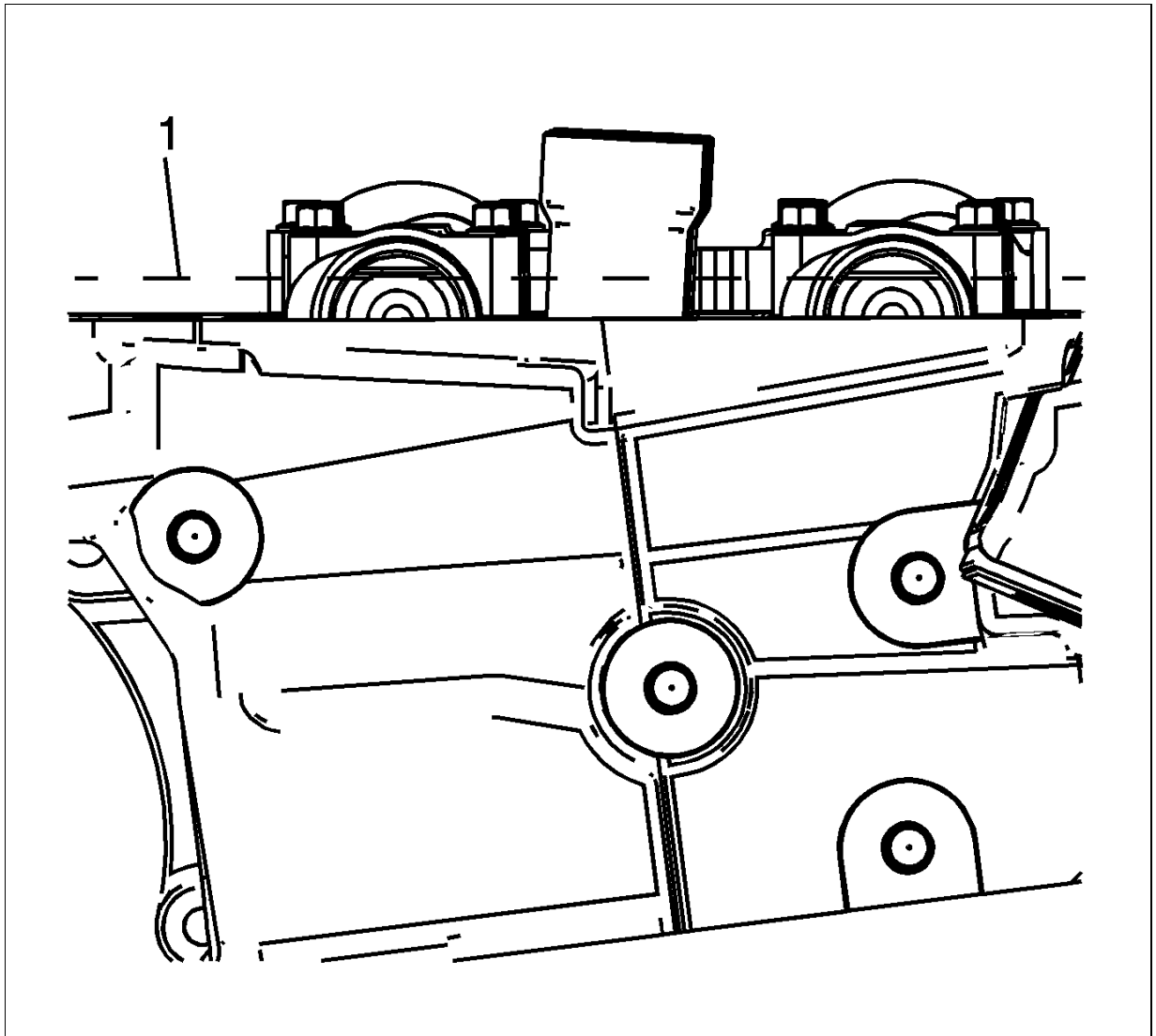
**2006 Cadillac STS 3.6L Eng Base**

ENGINE MECHANICAL - 3.6L (1 OF 5)

**ON-VEHICLE REPAIR INSTRUCTIONS > CAMSHAFT REPLACEMENT - LEFT SIDE >
TOOLS REQUIRED****EN 46108** Timing Chain Retention Tool. See Special Tools .**ON-VEHICLE REPAIR INSTRUCTIONS > CAMSHAFT REPLACEMENT - LEFT SIDE >
REMOVAL PROCEDURE**

1. Remove the upper intake manifold with the lower intake manifold. Refer to Lower Intake Manifold Replacement .
2. Remove the left bank camshaft cover. Refer to Camshaft Cover Replacement - Left Side .
3. Remove the camshaft sensors. Refer to Camshaft Position Sensor Replacement - Bank 2 (Left Side) Exhaust and Camshaft Position Sensor Replacement - Bank 2 (Left Side) Intake .
4. Remove the camshaft position actuator solenoid. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Intake .

Fig 1: Camshaft Flats Parallel With Camshaft Cover Rail

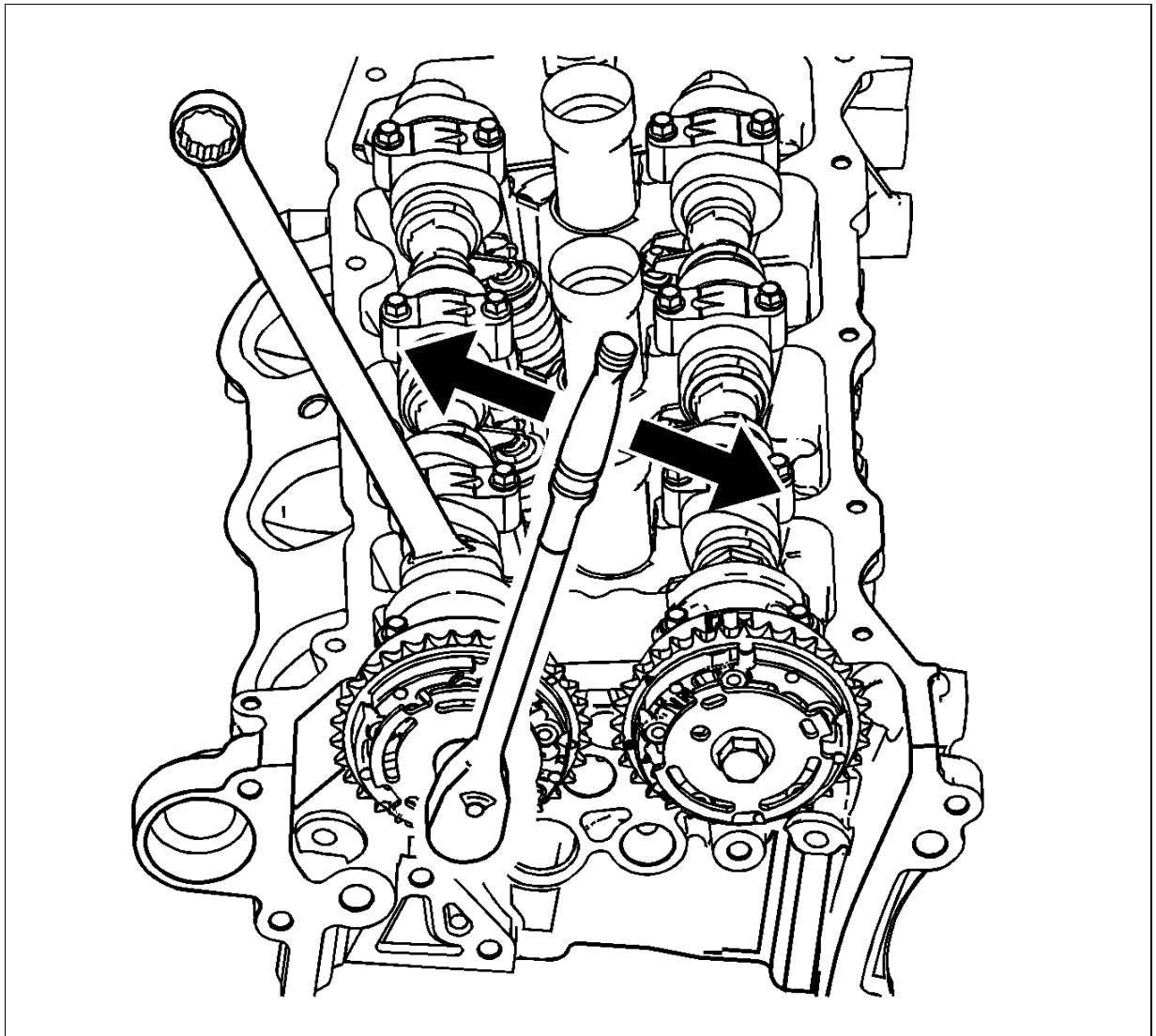


Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** Rotate the crankshaft balancer in a clockwise rotation **ONLY**.

5. Rotate the crankshaft using the crankshaft balancer bolt until the camshafts are in a neutral (low tension) position. The camshaft flats will be parallel with the camshaft cover rail (1).

Fig 2: Preventing Camshaft/Engine Rotation Using Open-End Wrench



Courtesy of GENERAL MOTORS CORP.



NOTE: Refer to Torque Reaction Against Timing Drive Chain Notice .



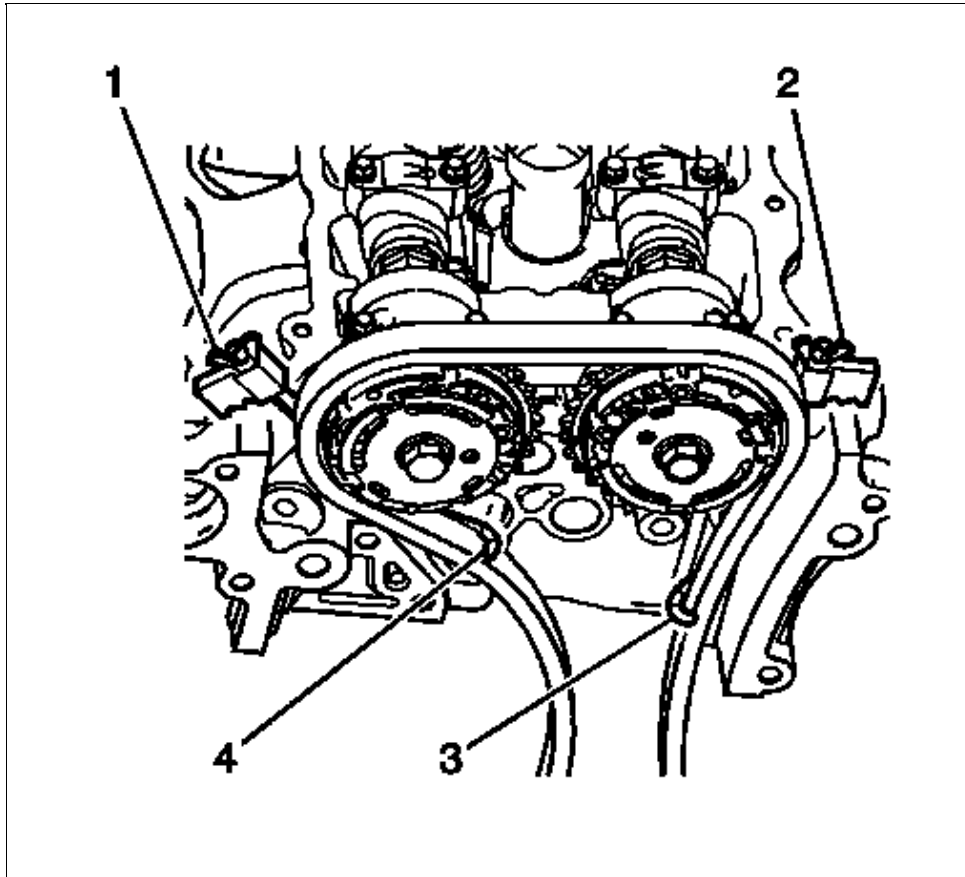
IMPORTANT:

1. Use an open-end wrench at the camshaft hex to prevent camshaft/engine rotation.
2. DO NOT remove the camshaft position actuator bolt at this time.

6. Loosen the camshaft position actuator bolt.

i **IMPORTANT:** Ensure that the tips of the **EN 46108** are fully engaged into the timing chain (3 and 4). See *Special Tools* .

Fig 3: Identifying EN 46108

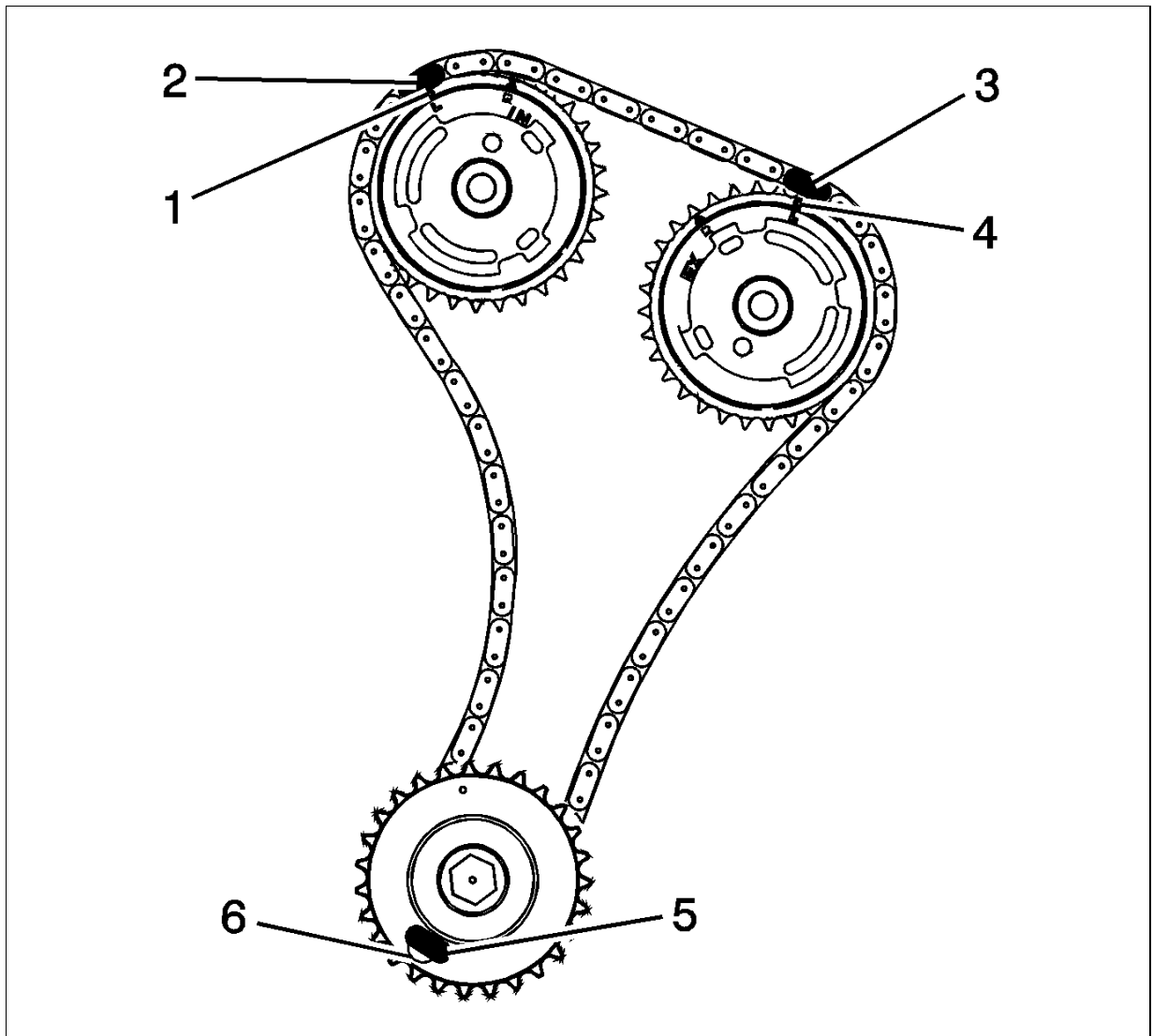


Courtesy of GENERAL MOTORS CORP.

7. Install the **EN 46108** (1 and 2) in order to retain the timing chain. See *Special Tools* .

Firmly tighten the **EN 46108** nuts. See *Special Tools* .

Fig 4: Locating Left Secondary Camshaft Drive Chain Timing Marks



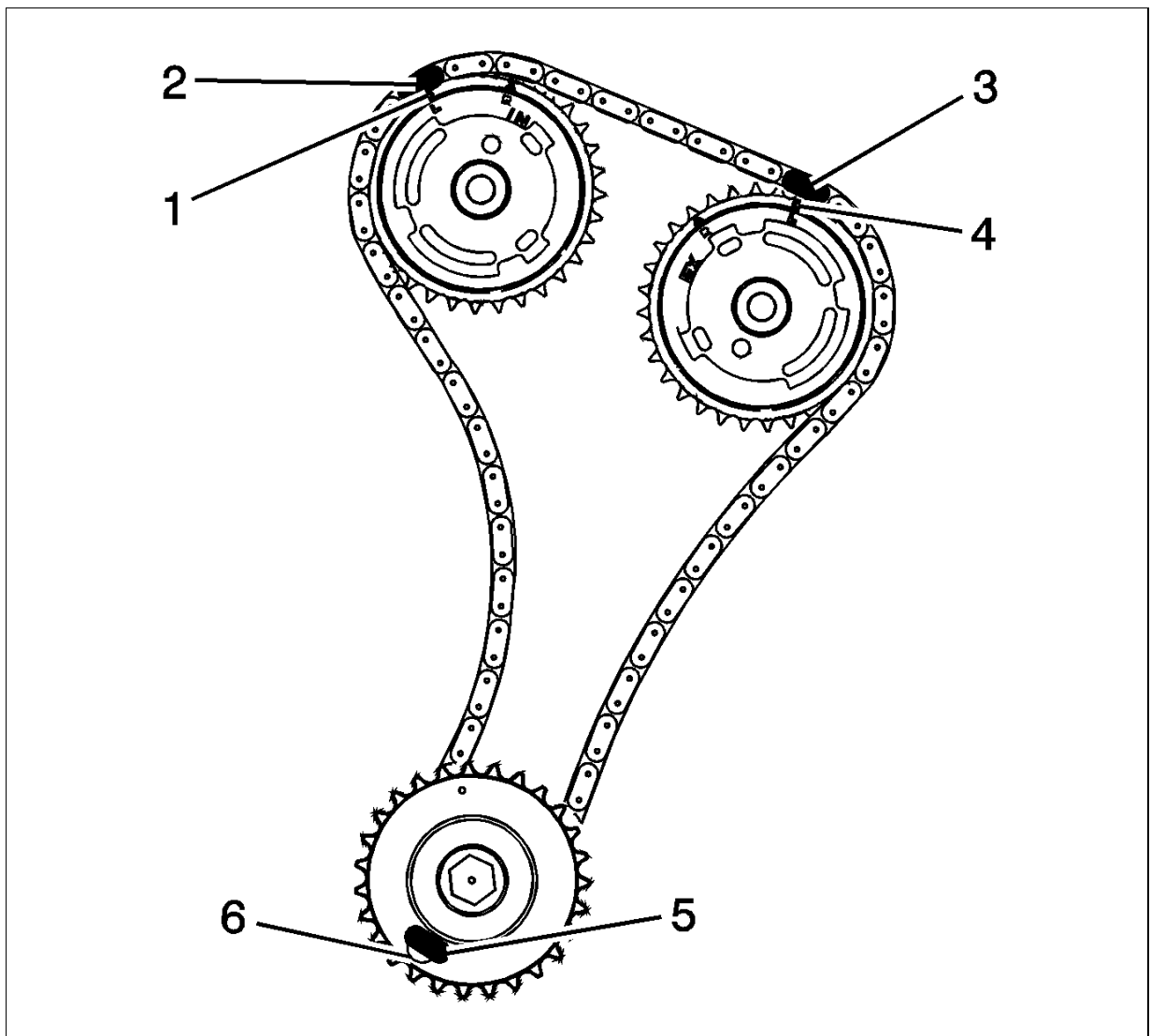
Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** Ensure that the camshaft timing chain and the camshaft position actuators are marked for proper assembly.

8. Mark the timing chain and the respective locations on the camshaft position actuators (1-4).
9. Remove the camshaft position actuator bolt.
10. Remove the camshafts. Refer to Camshaft Removal - Left Side .

ON-VEHICLE REPAIR INSTRUCTIONS > CAMSHAFT REPLACEMENT - LEFT SIDE > INSTALLATION PROCEDURE

Fig 1: Locating Left Secondary Camshaft Drive Chain Timing Marks



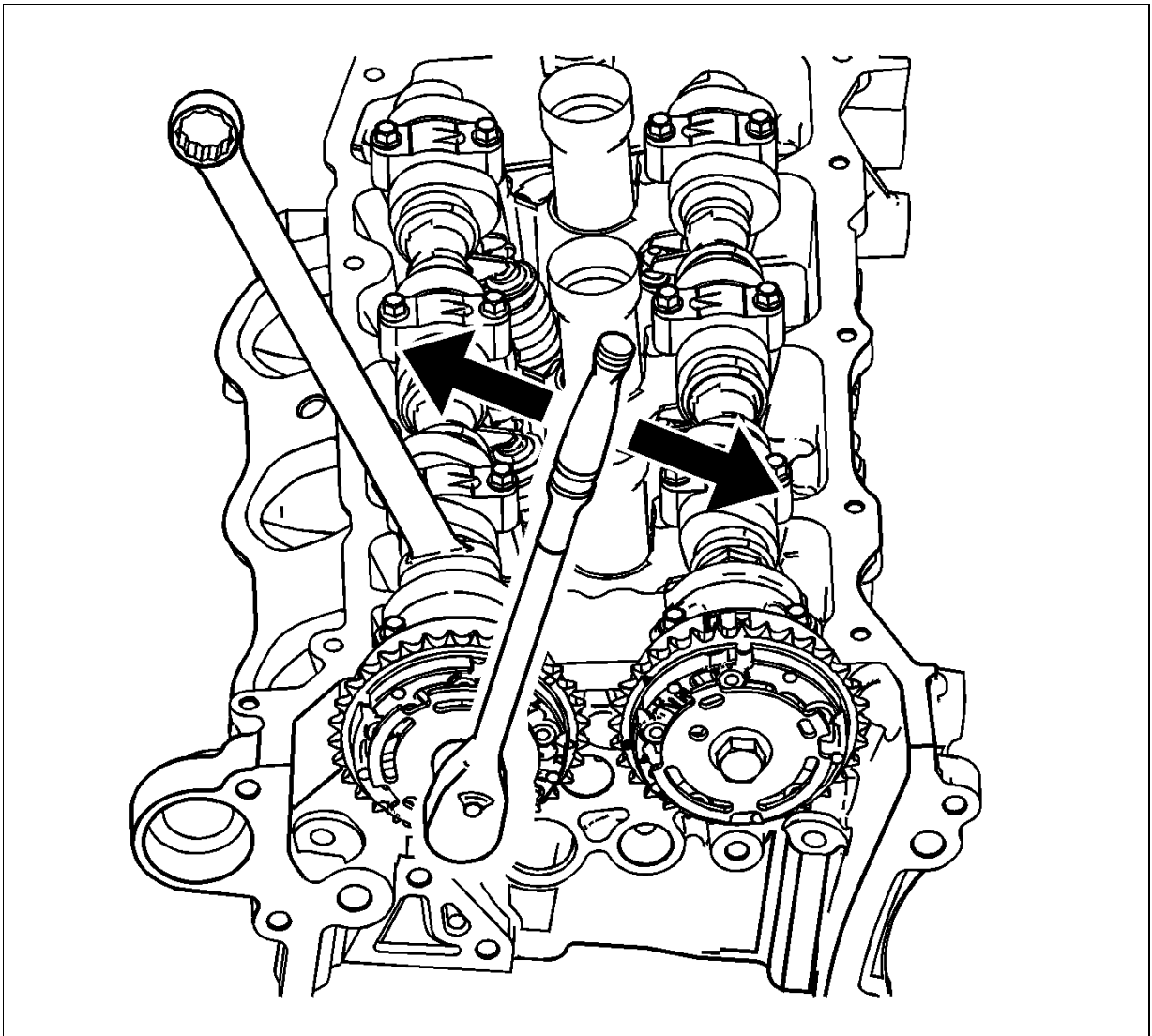
Courtesy of GENERAL MOTORS CORP.

i IMPORTANT:

1. *Ensure that the marks on the camshaft position actuator and the timing chain (1-4) are aligned.*
2. *DO NOT tighten the camshaft position actuator bolt at this time.*

1. Locate the camshafts to the cylinder head and assemble the camshaft actuators to the camshafts.
2. Install the camshafts and the camshaft bearing caps. Refer to Camshaft Installation - Left Side .
3. Remove the **EN 46108** . See Special Tools .

Fig 2: Preventing Camshaft/Engine Rotation Using Open-End Wrench



Courtesy of GENERAL MOTORS CORP.

 **NOTE:** Refer to Torque Reaction Against Timing Drive Chain Notice .

 **IMPORTANT:** Use an open-end wrench at the camshaft hex to prevent camshaft/engine rotation.

4. Install and tighten the camshaft position actuators. Refer to Camshaft Position Actuator Installation - Left Side Intake (Second Design) and Camshaft Position Actuator Installation - Left Side Exhaust (Second Design) .
5. Install the intake camshaft position actuator solenoid. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Intake .
6. Install the camshaft sensors. Refer to Camshaft Position Sensor Replacement - Bank 2 (Left Side)

Exhaust and Camshaft Position Sensor Replacement - Bank 2 (Left Side) Intake .

7. Install the camshaft cover. Refer to Camshaft Cover Replacement - Left Side .
8. Install the upper intake manifold with the lower intake manifold. Refer to Lower Intake Manifold Replacement .

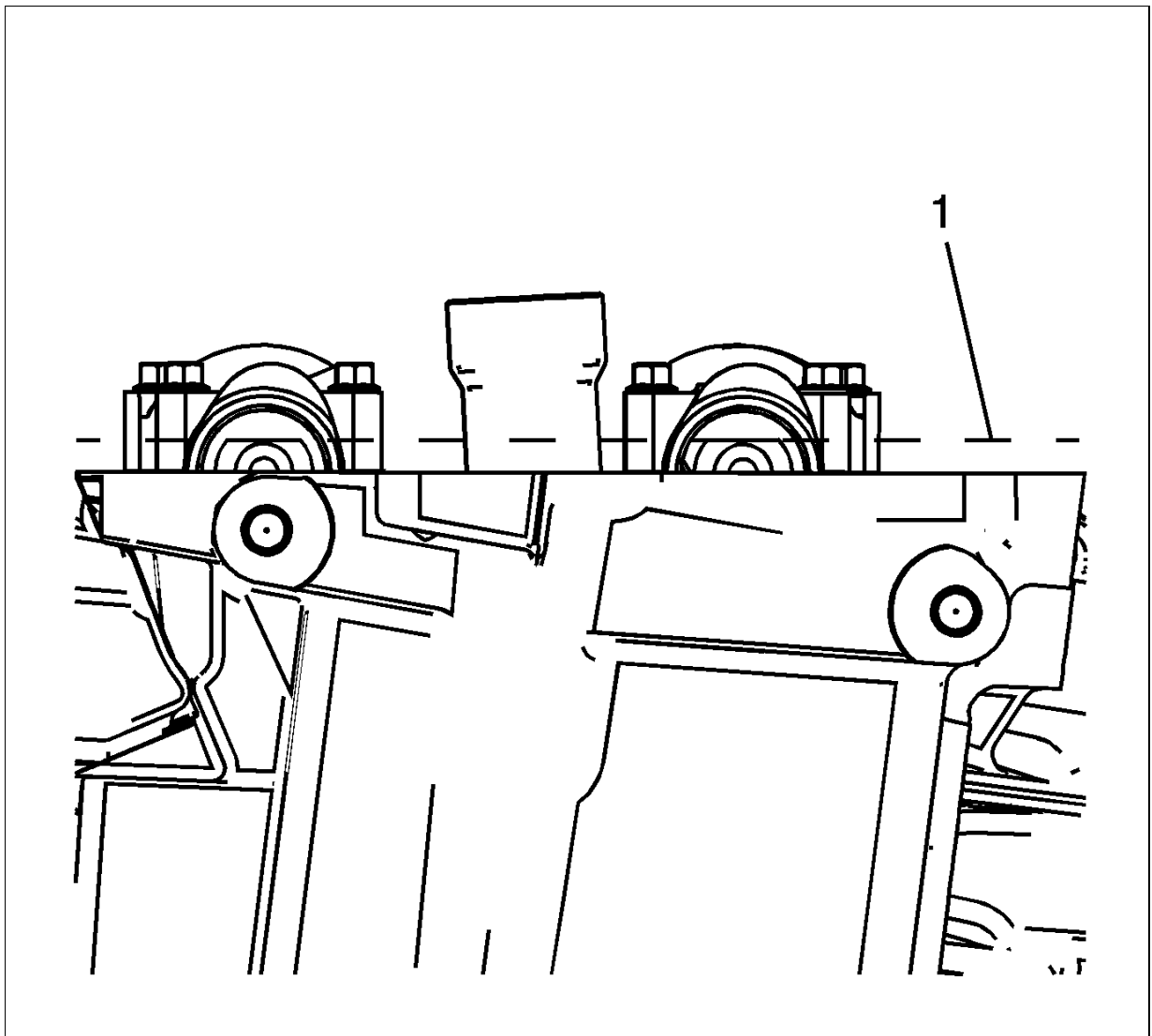
ON-VEHICLE REPAIR INSTRUCTIONS > CAMSHAFT REPLACEMENT - RIGHT SIDE > TOOLS REQUIRED

EN 46108 Timing Chain Retention Tool. See Special Tools .

ON-VEHICLE REPAIR INSTRUCTIONS > CAMSHAFT REPLACEMENT - RIGHT SIDE > REMOVAL PROCEDURE

1. Remove the upper intake manifold with the lower intake manifold. Refer to Lower Intake Manifold Replacement .
2. Remove the camshaft cover. Refer to Camshaft Cover Replacement - Right Side .
3. Remove the camshaft sensors. Refer to Camshaft Position Sensor Replacement - Bank 1 (Right Side) Exhaust and Camshaft Position Sensor Replacement - Bank 1 (Right Side) Intake .
4. Remove the intake camshaft position actuator solenoid. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Intake .

Fig 1: Identifying Camshaft Neutral (Low Tension) Position

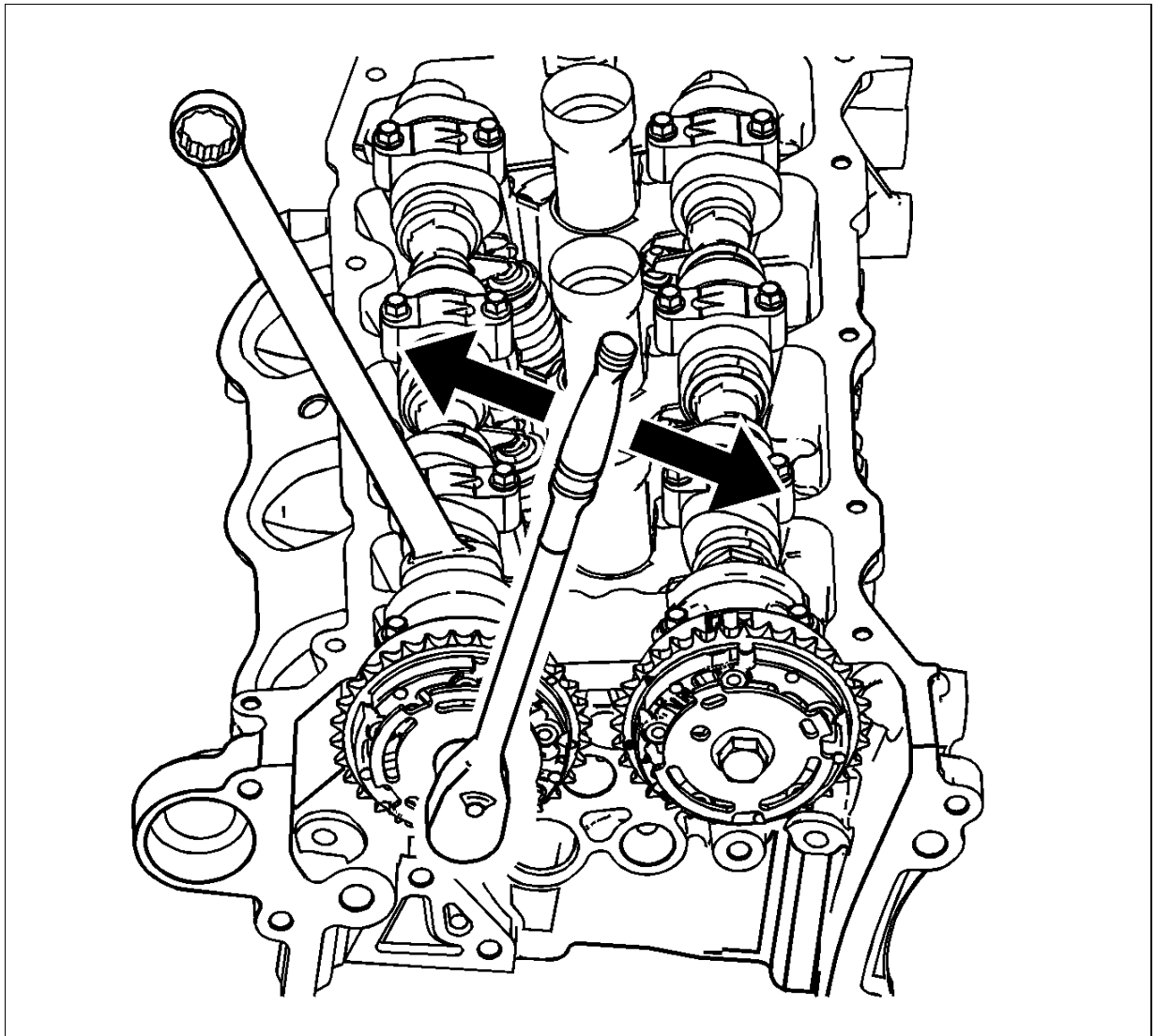


Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** Rotate the crankshaft balancer in a clockwise rotation **ONLY**.

5. Rotate the crankshaft using the crankshaft balancer bolt until the camshafts are in a neutral (low tension) position. The camshaft flats will be parallel with the camshaft cover rail (1).

Fig 2: Preventing Camshaft/Engine Rotation Using Open-End Wrench



Courtesy of GENERAL MOTORS CORP.



NOTE: Refer to Torque Reaction Against Timing Drive Chain Notice .



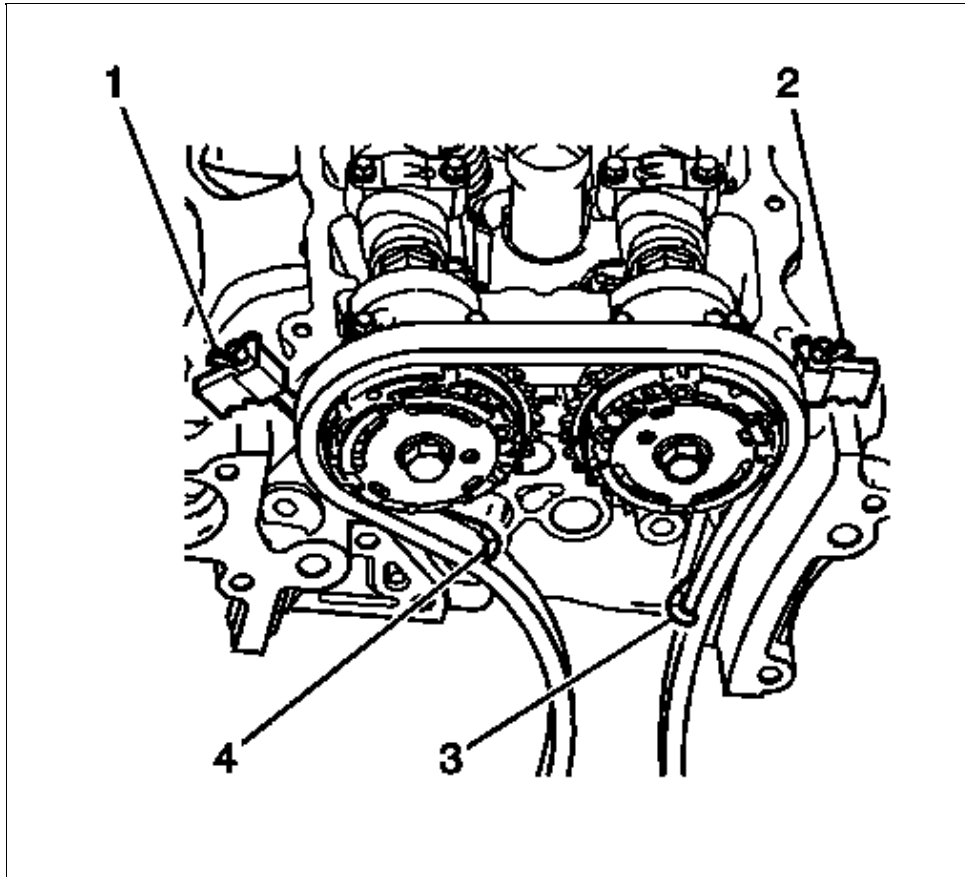
IMPORTANT:

1. Use an open-end wrench at the camshaft hex to prevent camshaft/engine rotation.
2. DO NOT remove the camshaft position actuator bolt at this time.

6. Loosen the camshaft position actuator bolt.

i **IMPORTANT:** Ensure that the tips of the **EN 46108** are fully engaged into the timing chain (3 and 4). See *Special Tools* .

Fig 3: Identifying EN 46108

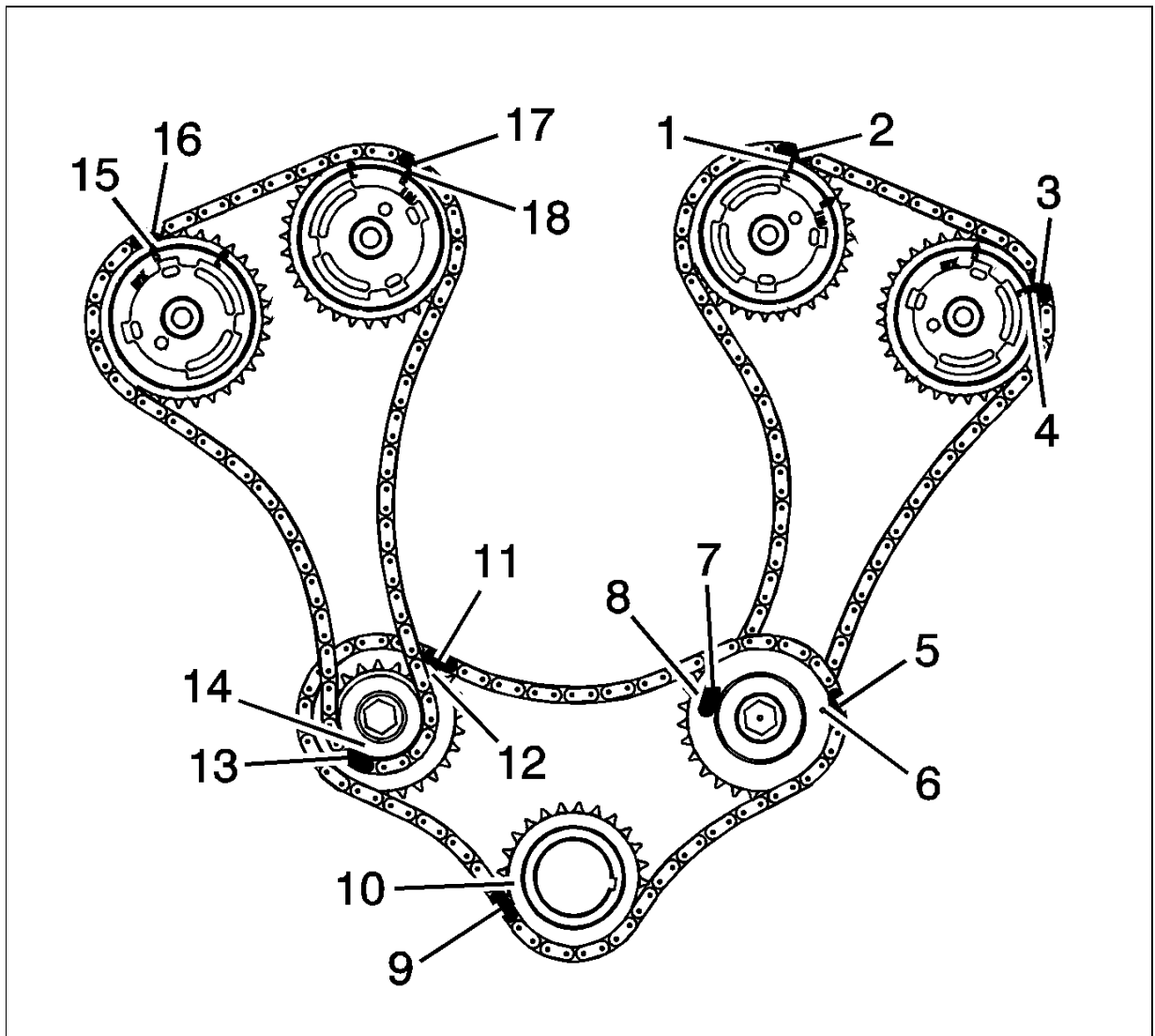


Courtesy of GENERAL MOTORS CORP.

7. Install the **EN 46108** (1 and 2) in order to retain the timing chain. See *Special Tools* .

Firmly tighten the **EN 46108** nuts. See *Special Tools* .

Fig 4: Identifying Timing Chain Marks And Their Respective Locations On Gears, Sprockets And Actuators



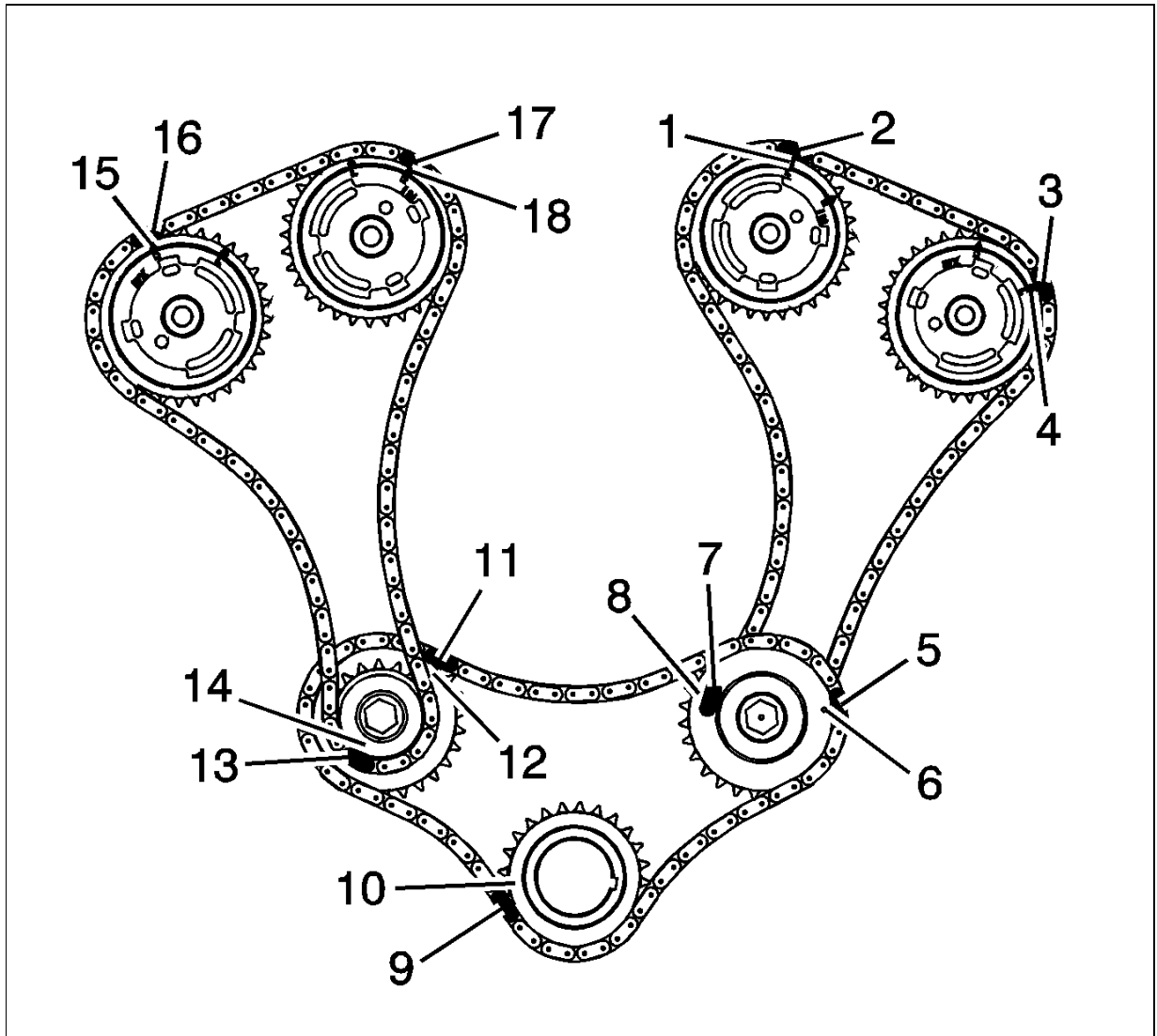
Courtesy of GENERAL MOTORS CORP.

i IMPORTANT: Ensure that the camshaft timing chain and the camshaft position actuators are marked for proper assembly.

8. Mark the timing chain and the respective locations on camshaft position actuators (15-18).
9. Remove the camshaft position actuator bolt.
10. Remove the camshaft bearing caps and the camshaft. Refer to Camshaft Removal - Right Side .

ON-VEHICLE REPAIR INSTRUCTIONS > CAMSHAFT REPLACEMENT - RIGHT SIDE > INSTALLATION PROCEDURE

Fig 1: Identifying Timing Chain Marks And Their Respective Locations On Gears, Sprockets And Actuators



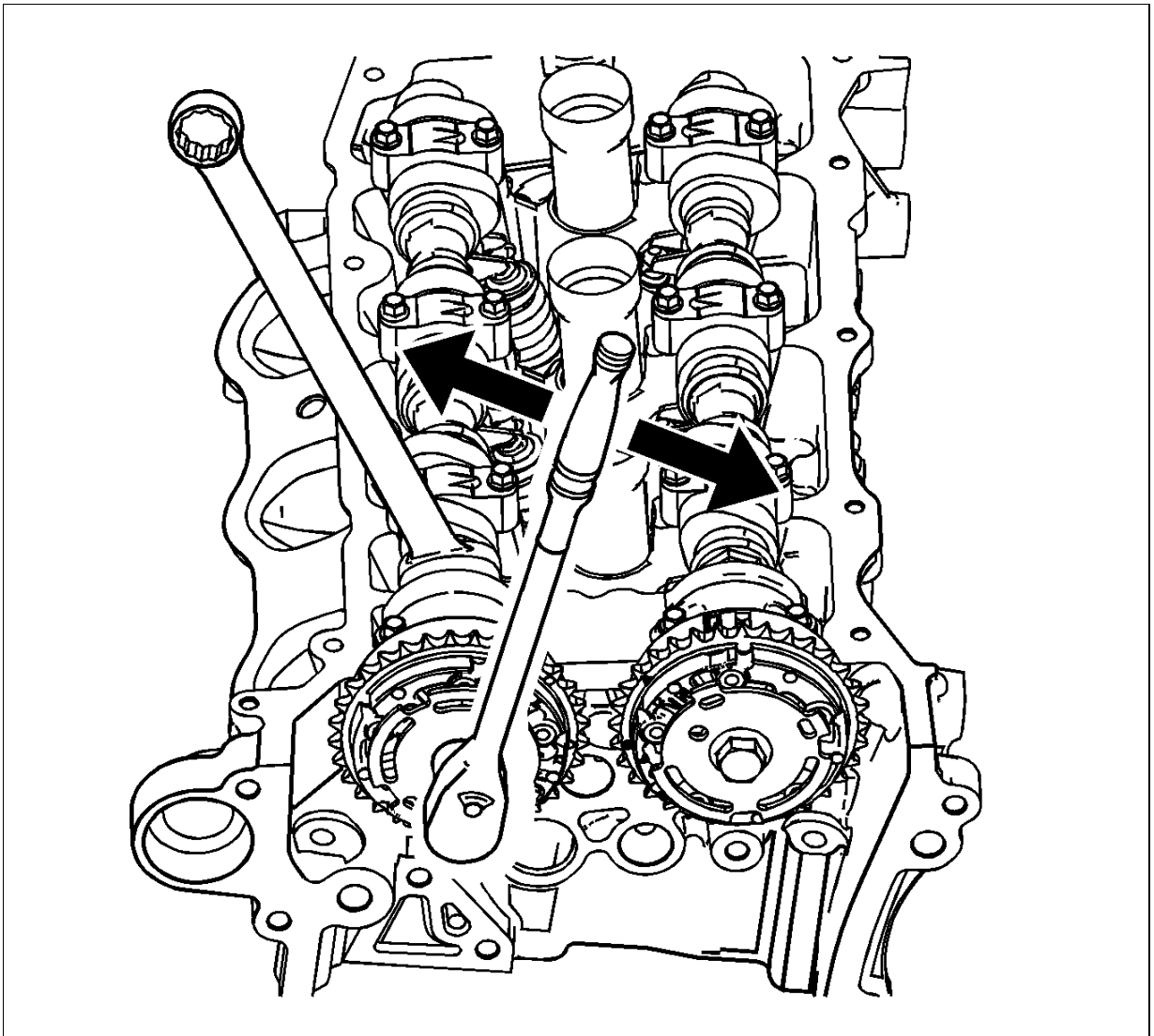
Courtesy of GENERAL MOTORS CORP.

i IMPORTANT:

1. *Ensure that the marks on the camshaft position actuators and the timing chain (15-18) are aligned.*
2. *DO NOT tighten the camshaft position actuator bolt at this time.*

1. Locate the camshafts to the cylinder head and assemble the camshaft actuators to the camshafts.
2. Install the camshafts and the camshaft bearing caps. Refer to Camshaft Installation - Right Side .
3. Remove the **EN 46108** . See Special Tools .

Fig 2: Preventing Camshaft/Engine Rotation Using Open-End Wrench



Courtesy of GENERAL MOTORS CORP.

 **NOTE:** Refer to Torque Reaction Against Timing Drive Chain Notice .

 **IMPORTANT:** Use an open-end wrench at the camshaft hex to prevent camshaft/engine rotation.

4. Install and tighten the camshaft position actuators. Refer to Camshaft Position Actuator Installation - Right Side Intake (Second Design) and Camshaft Position Actuator Installation - Right Side Exhaust (Second Design) .
5. Install the intake camshaft position actuator solenoid. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Intake .
6. Install the camshaft sensors. Refer to Camshaft Position Sensor Replacement - Bank 1 (Right

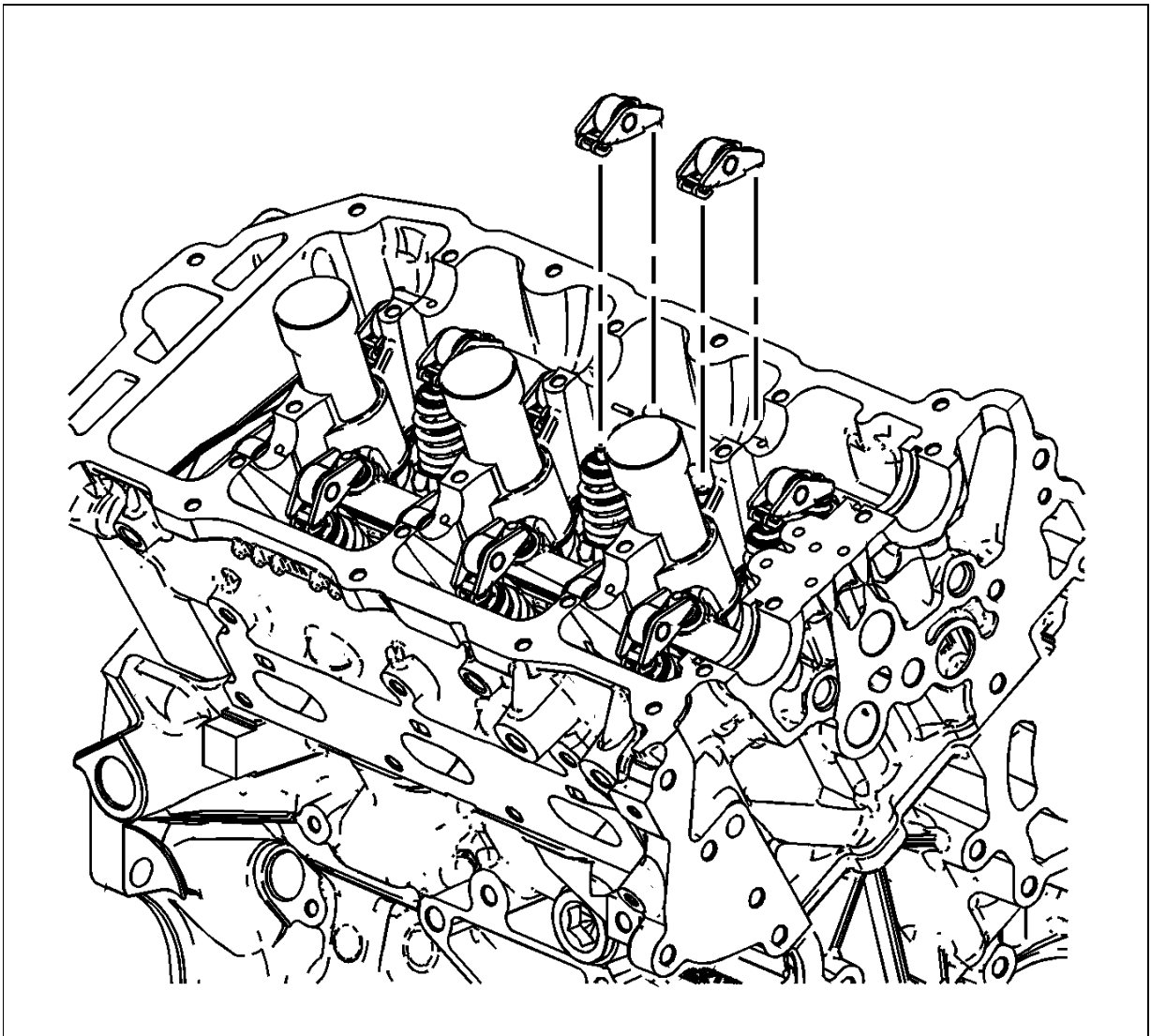
Side) Exhaust and Camshaft Position Sensor Replacement - Bank 1 (Right Side) Intake .

7. Install the camshaft cover. Refer to Camshaft Cover Replacement - Right Side .
8. Install the upper intake manifold with the lower intake manifold. Refer to Lower Intake Manifold Replacement .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE ROCKER ARM REPLACEMENT - LEFT SIDE > REMOVAL PROCEDURE

1. Remove the applicable camshaft(s). Refer to Camshaft Replacement - Left Side .

Fig 1: Identifying Valve Rocker Arms

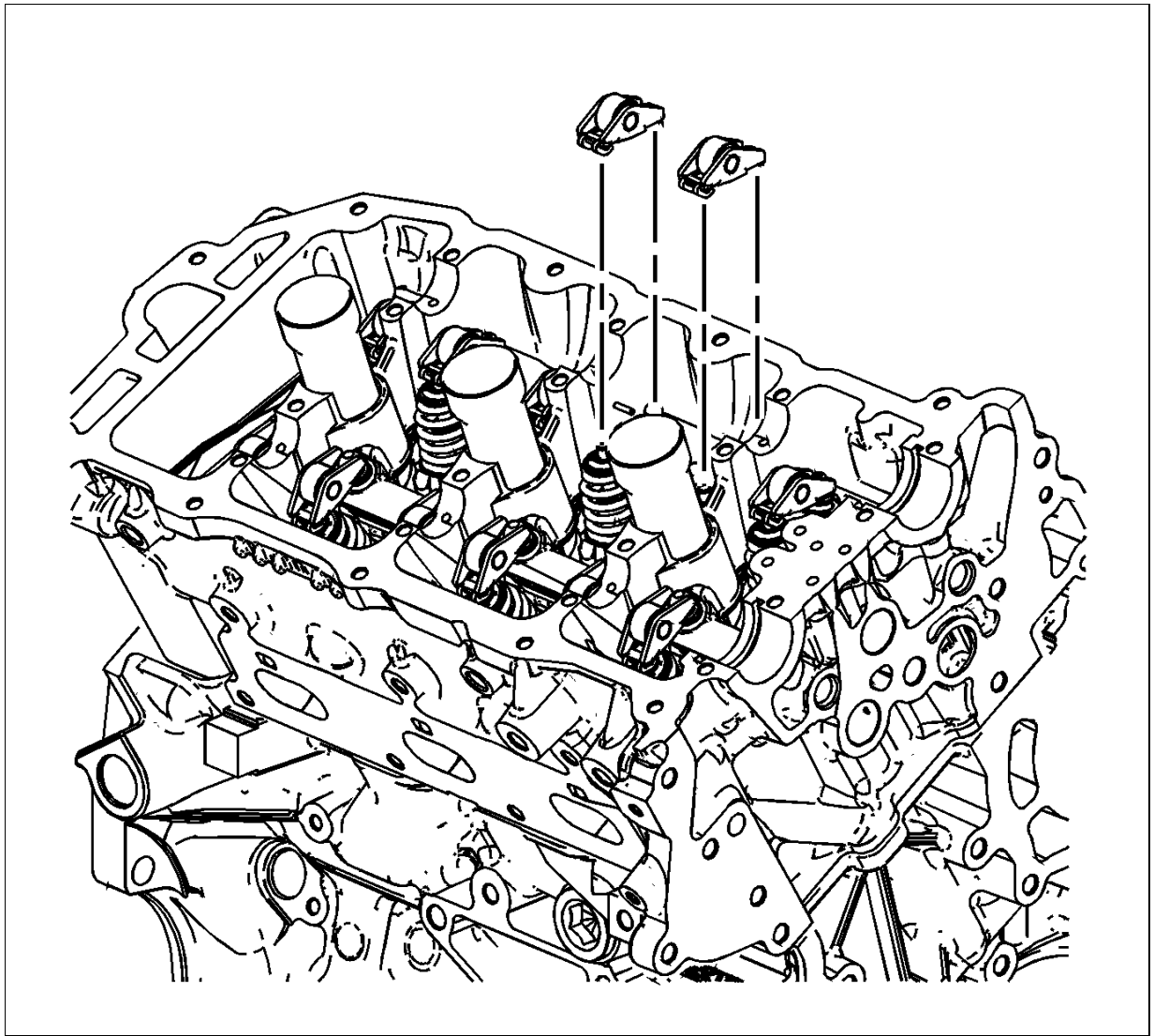


Courtesy of GENERAL MOTORS CORP.

2. Remove the rocker arms. Refer to Valve Rocker Arm Removal - Left Side .
3. Clean and inspect the camshaft(s) and the rocker arm(s). Repair or replace as necessary. Refer to Camshaft Cleaning and Inspection and Valve Lifters Cleaning and Inspection .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE ROCKER ARM REPLACEMENT - LEFT SIDE > INSTALLATION PROCEDURE

Fig 1: Identifying Valve Rocker Arms



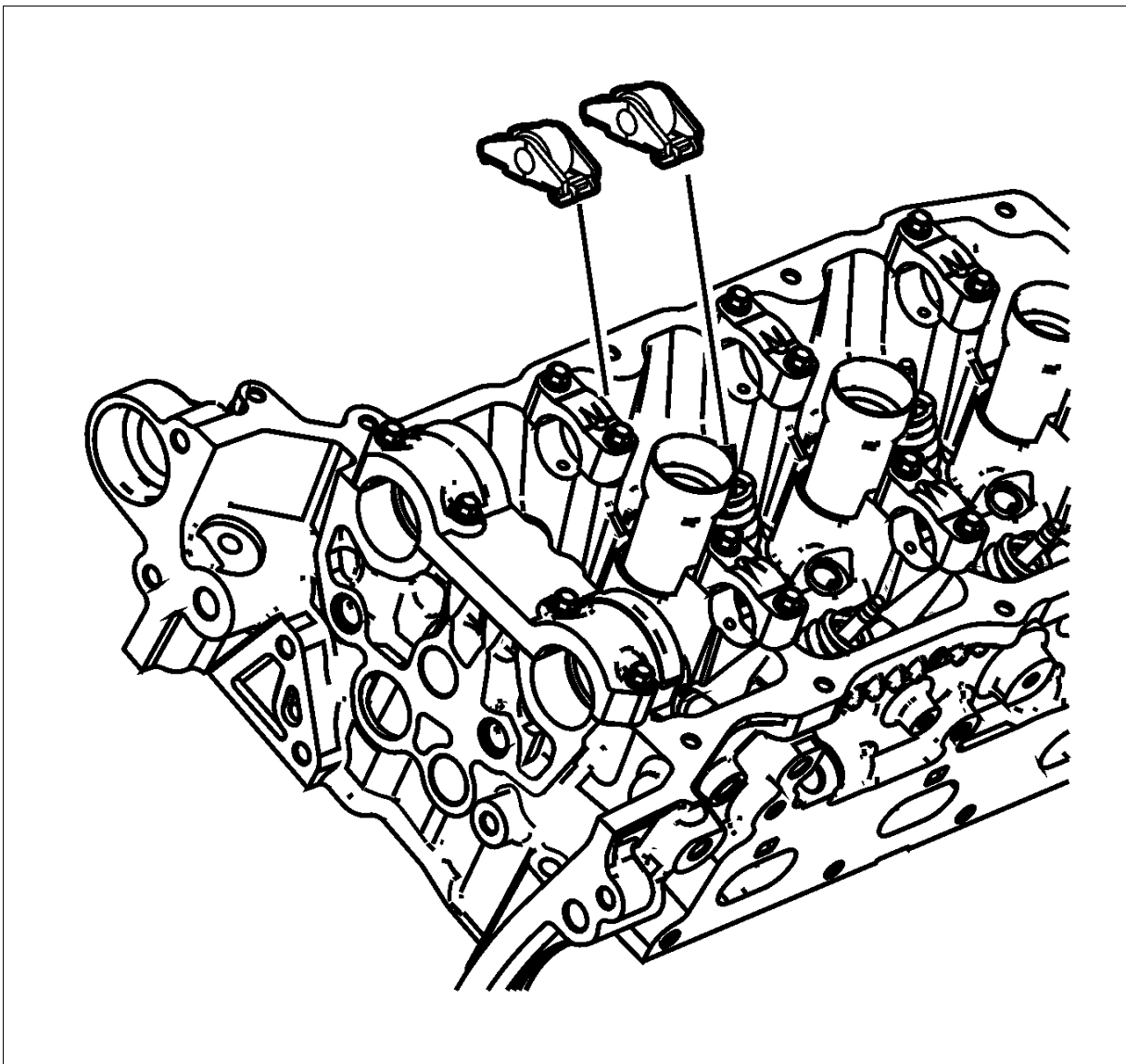
Courtesy of GENERAL MOTORS CORP.

1. Install the rocker arms. Refer to Valve Rocker Arm Installation - Left Side .
2. Install the applicable camshaft(s). Refer to Camshaft Replacement - Left Side .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE ROCKER ARM REPLACEMENT - RIGHT SIDE > REMOVAL PROCEDURE

1. Remove the applicable camshaft(s). Refer to Camshaft Replacement - Left Side .

Fig 1: View Of Valve Rocker Arm

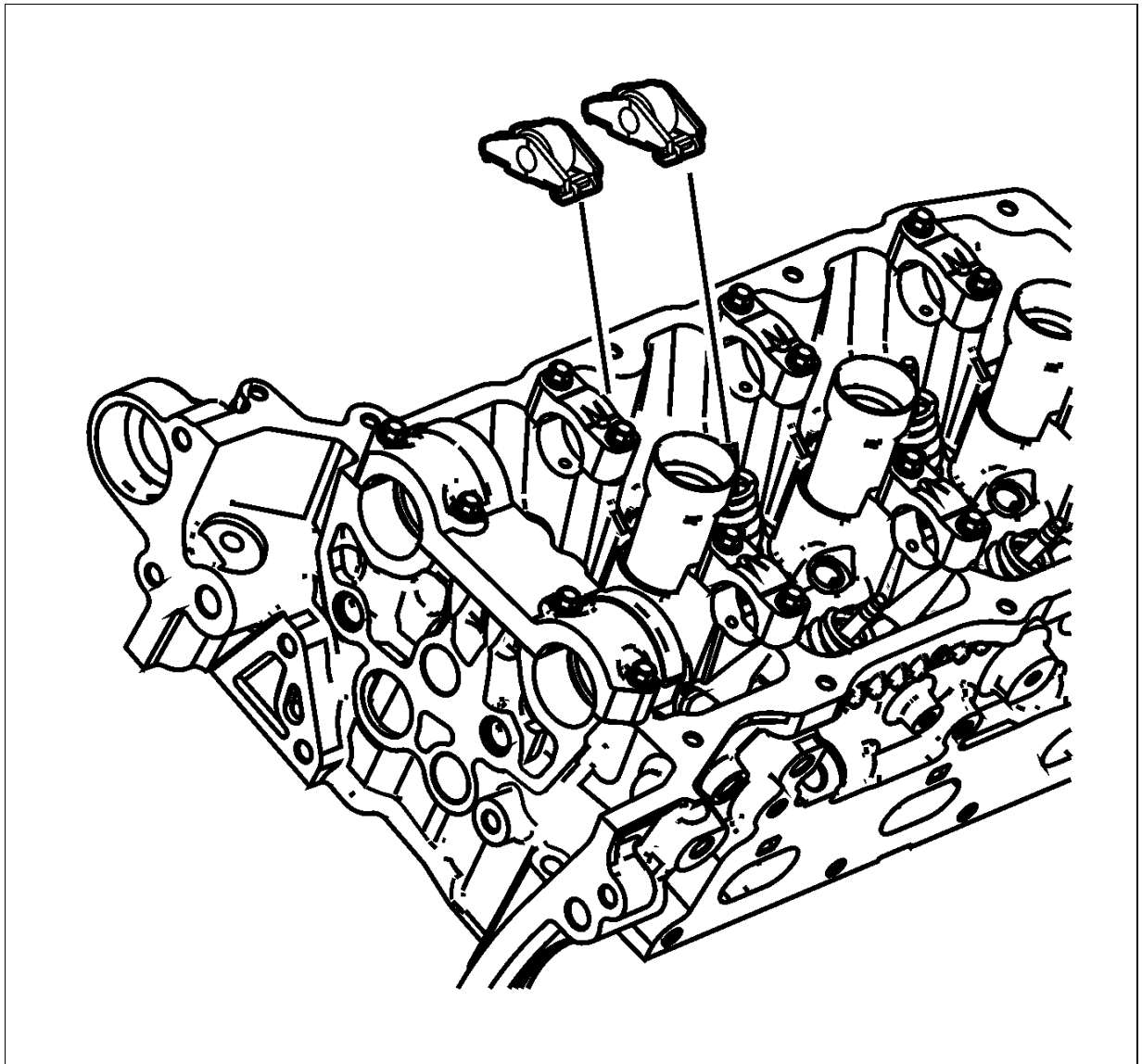


Courtesy of GENERAL MOTORS CORP.

2. Remove the rocker arms. Refer to Valve Rocker Arm Removal - Right Side .
3. Clean and inspect the camshaft(s) and the rocker arm(s). Repair or replace as necessary. Refer to Camshaft Cleaning and Inspection and Valve Lifters Cleaning and Inspection .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE ROCKER ARM REPLACEMENT - RIGHT SIDE > INSTALLATION PROCEDURE

Fig 1: View Of Valve Rocker Arm



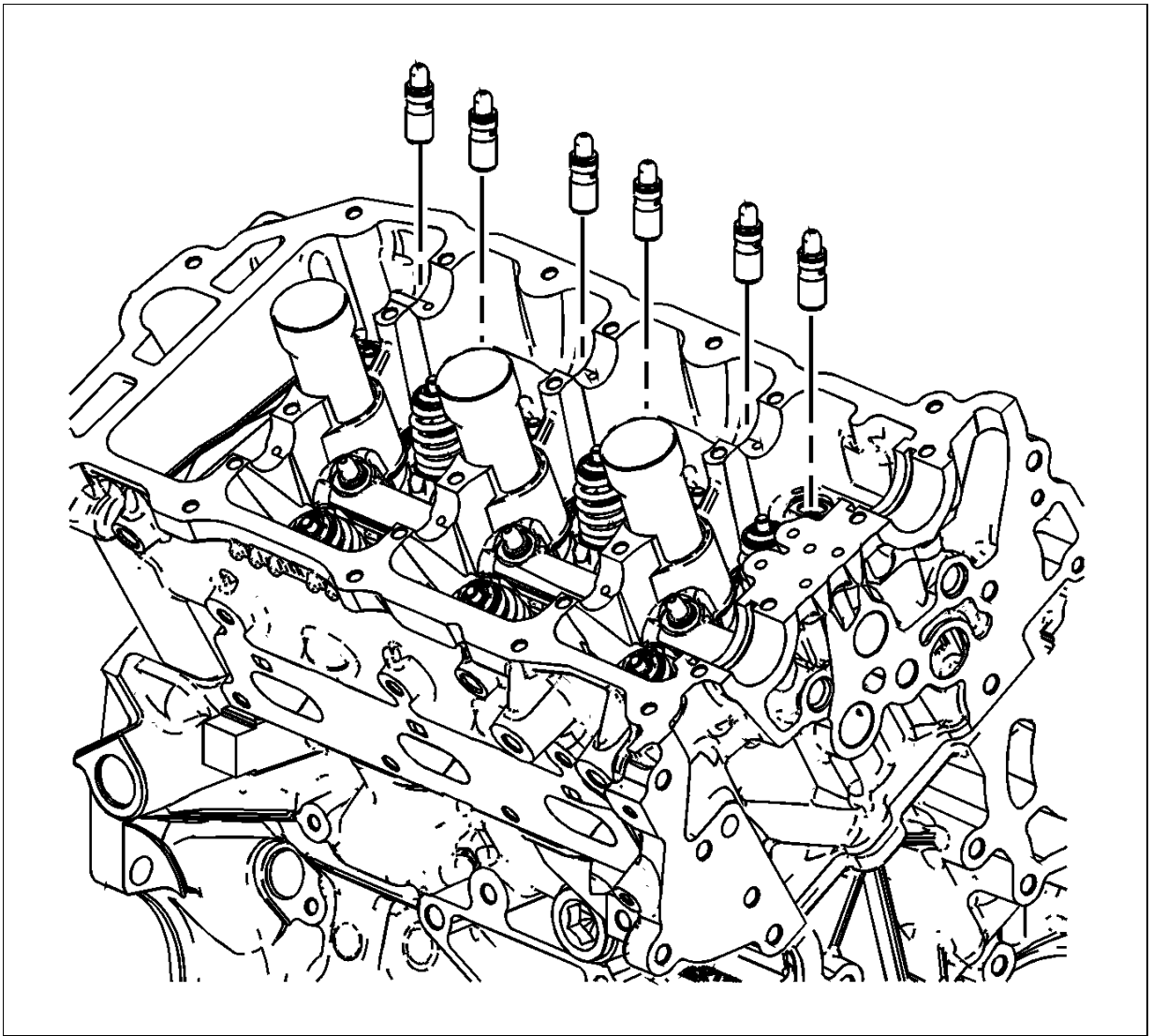
Courtesy of GENERAL MOTORS CORP.

1. Install the rocker arms.
2. Install the applicable camshaft(s). Refer to Valve Rocker Arm Installation - Right Side .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE LIFTER REPLACEMENT - LEFT SIDE > REMOVAL PROCEDURE

1. Remove the applicable camshaft(s). Refer to Camshaft Replacement - Left Side .
2. Remove the rocker arms. Refer to Valve Rocker Arm Removal - Left Side .

Fig 1: Identifying Stationary Hydraulic Lash Adjuster (SHLA)

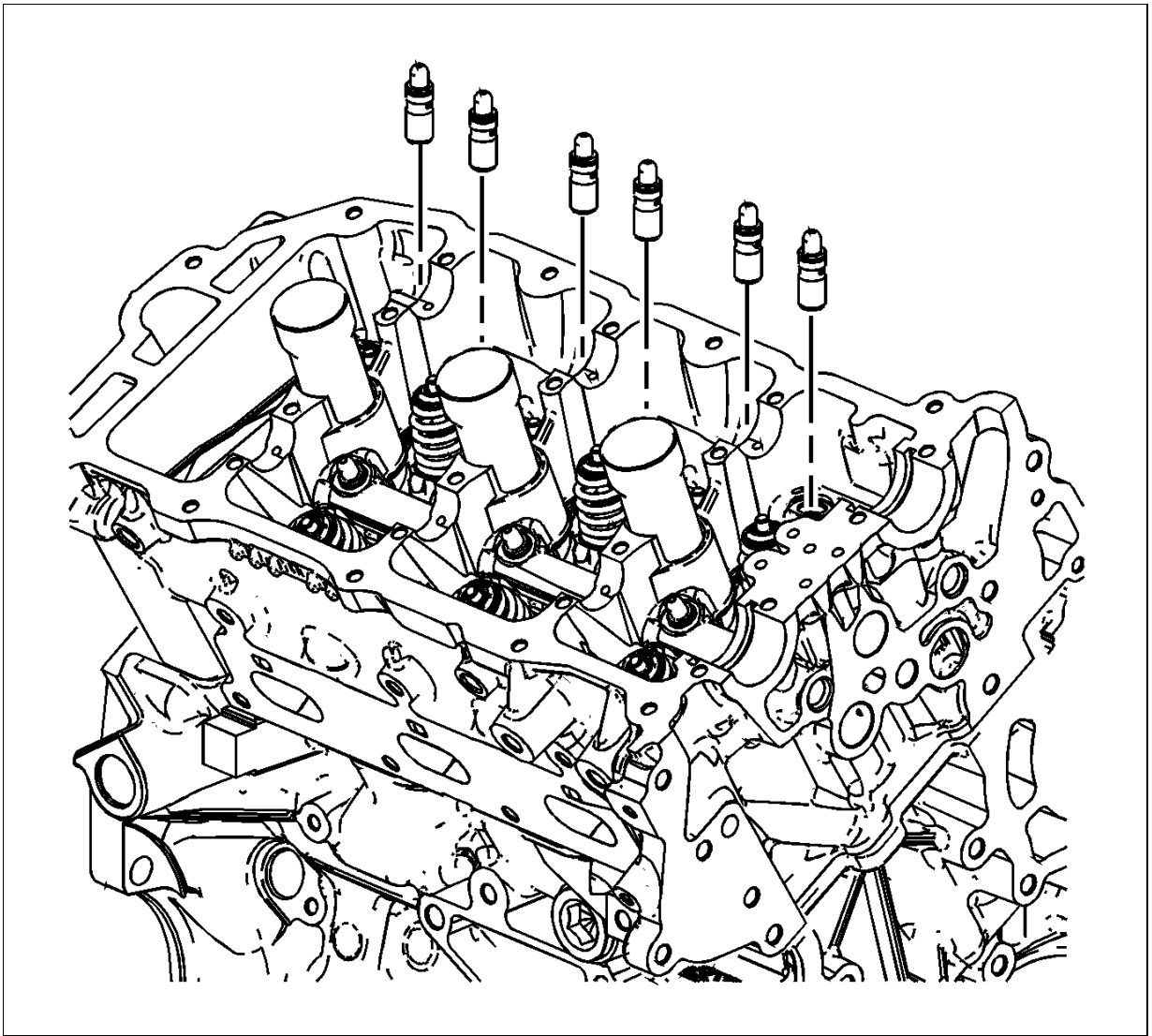


Courtesy of GENERAL MOTORS CORP.

3. Remove the lifters. Refer to Valve Lifter Removal - Left Side .
4. Clean and inspect the camshaft(s), rocker arm(s) and lifter(s). Repair or replace as necessary. Refer to Camshaft Cleaning and Inspection and Valve Lifters Cleaning and Inspection .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE LIFTER REPLACEMENT - LEFT SIDE > INSTALLATION PROCEDURE

Fig 1: Identifying Stationary Hydraulic Lash Adjuster (SHLA)



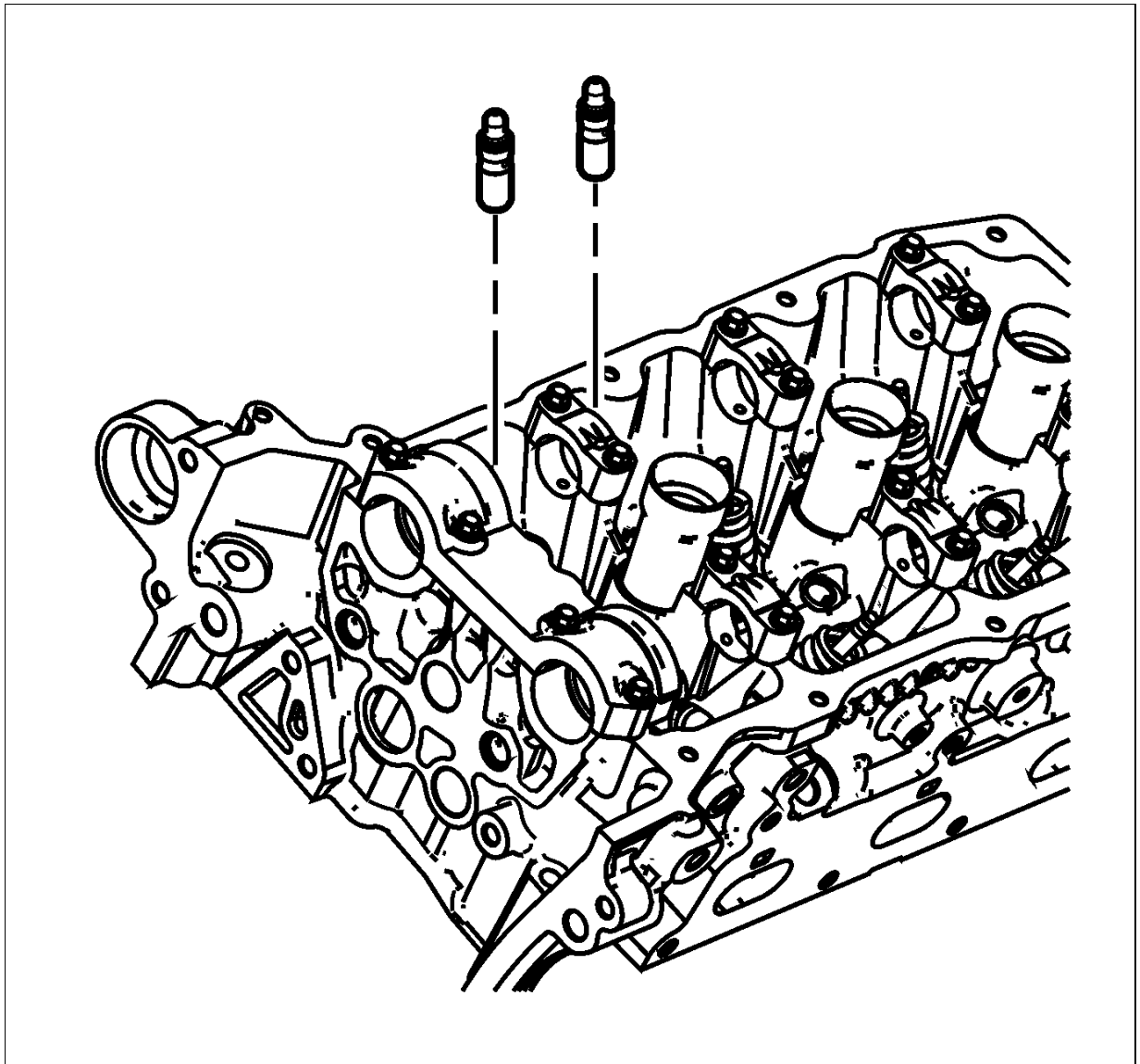
Courtesy of GENERAL MOTORS CORP.

1. Install the lifters. Refer to Valve Lifter Installation - Left Side .
2. Install the rocker arms. Refer to Valve Rocker Arm Installation - Left Side .
3. Install the applicable camshaft(s). Refer to Camshaft Replacement - Left Side .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE LIFTER REPLACEMENT - RIGHT SIDE > REMOVAL PROCEDURE

1. Remove the applicable camshaft(s). Refer to Camshaft Replacement - Right Side .
2. Remove the rocker arms. Refer to Valve Rocker Arm Removal - Right Side .

Fig 1: View Of SHLAs

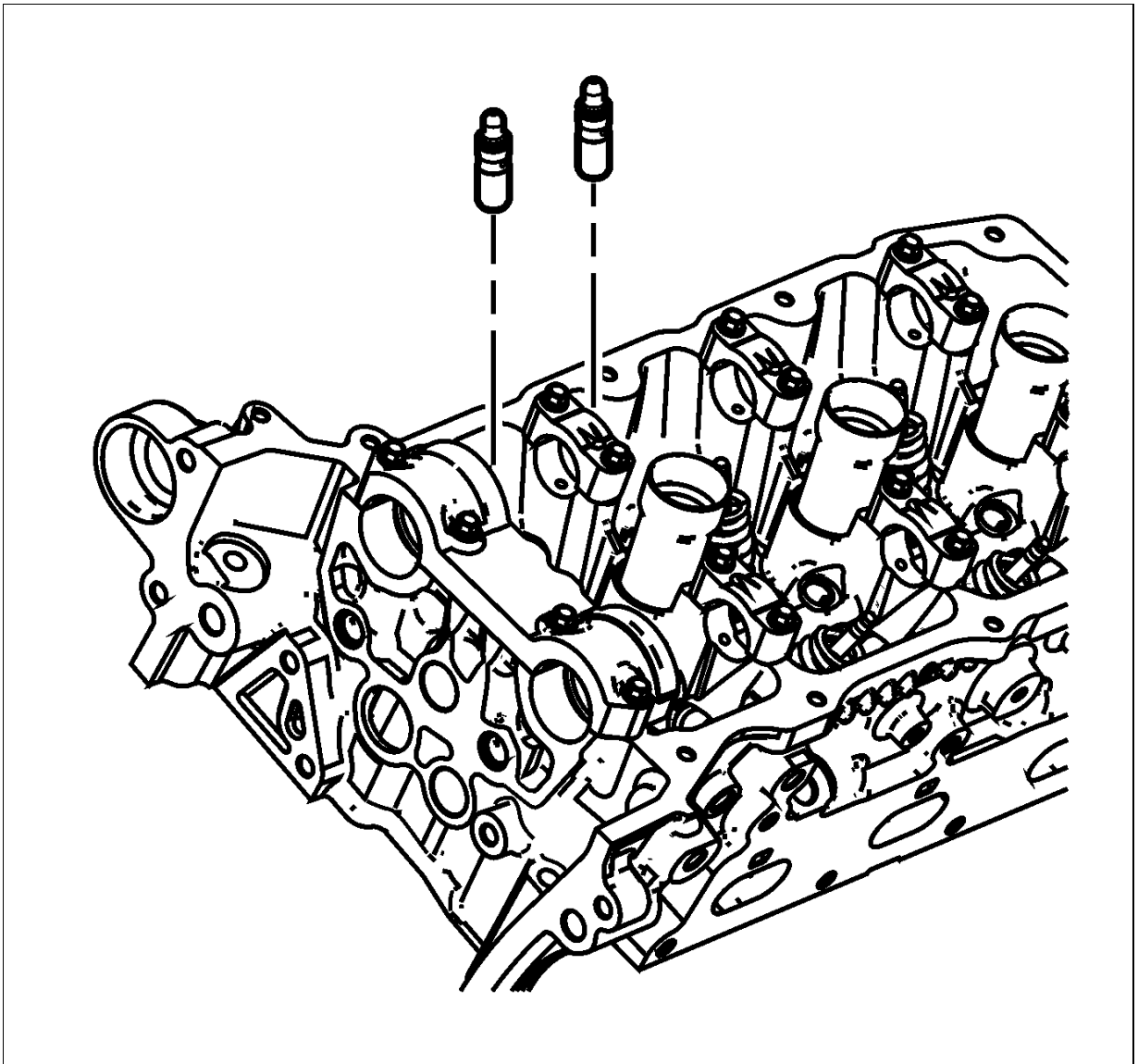


Courtesy of GENERAL MOTORS CORP.

3. Remove the lifters. Refer to Valve Lifter Removal - Left Side .
4. Clean and inspect the camshaft(s) and the rocker arm(s). Repair or replace as necessary. Refer to Camshaft Cleaning and Inspection and Valve Lifters Cleaning and Inspection .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE LIFTER REPLACEMENT - RIGHT SIDE > INSTALLATION PROCEDURE

Fig 1: View Of SHLAs



Courtesy of GENERAL MOTORS CORP.

1. Install the lifters. Refer to Valve Lifter Installation - Right Side .
2. Install the rocker arms. Refer to Valve Rocker Arm Installation - Right Side .
3. Install the applicable camshaft(s). Refer to Camshaft Replacement - Right Side .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE STEM OIL SEAL AND VALVE SPRING REPLACEMENT - LEFT SIDE

Tools Required

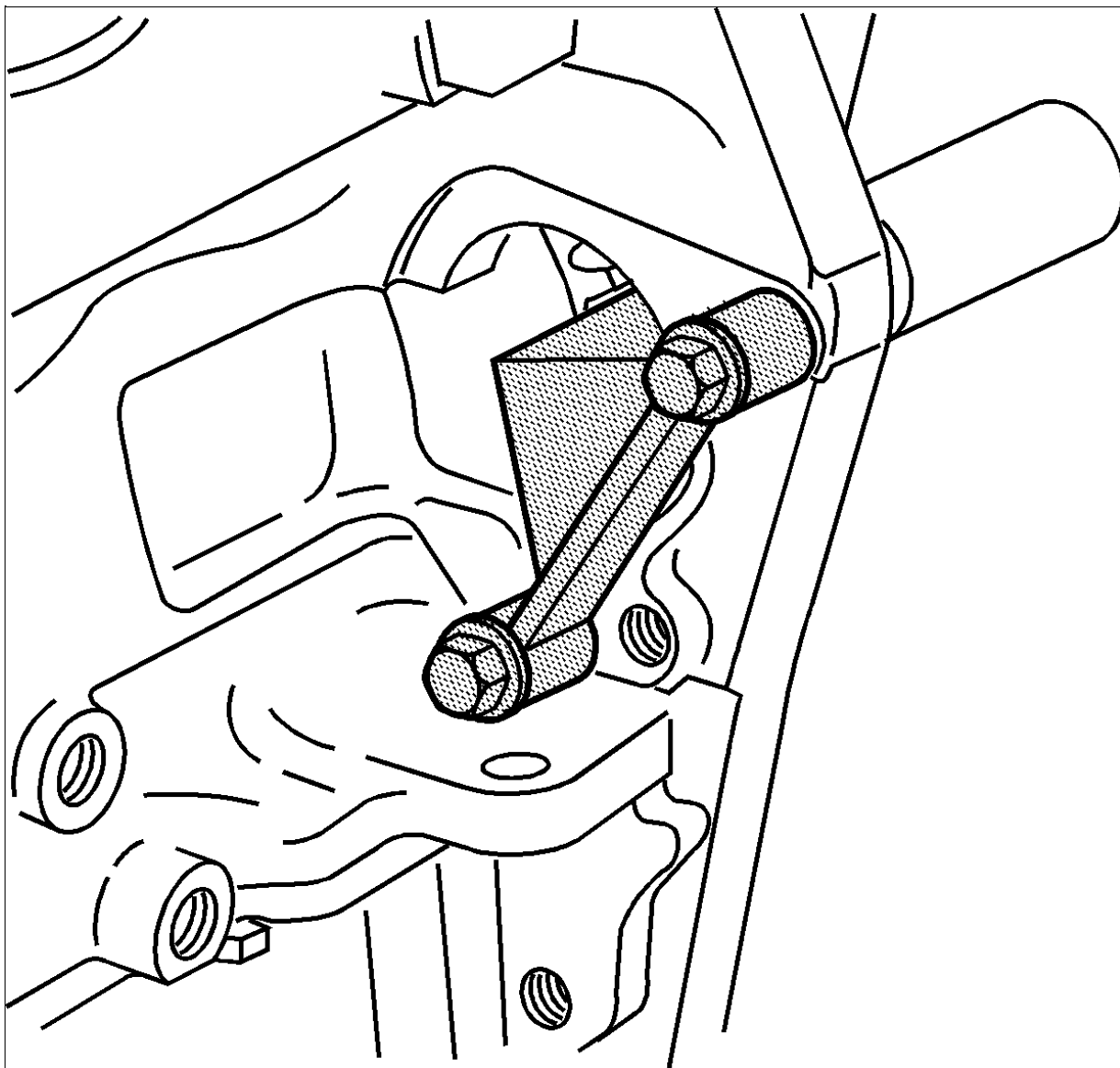
- **EN 46106** Flywheel Holding Tool. See Special Tools .
- **EN 46110** On-Vehicle Valve Spring Compressor. See Special Tools .
- **EN 46116** Valve Stem Seal Remover/Installer. See Special Tools .
- **EN 46117** Valve Stem Key Remover/Installer. See Special Tools .

- **J 39313** Spark Plug Port Adapter. See Special Tools .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE STEM OIL SEAL AND VALVE SPRING REPLACEMENT - LEFT SIDE > REMOVAL PROCEDURE

1. Remove the starter motor. Refer to Starter Motor Replacement (LY7) or Starter Motor Replacement (LH2) or Starter Motor Replacement (LC3) .

Fig 1: View Of Tool EN 46106



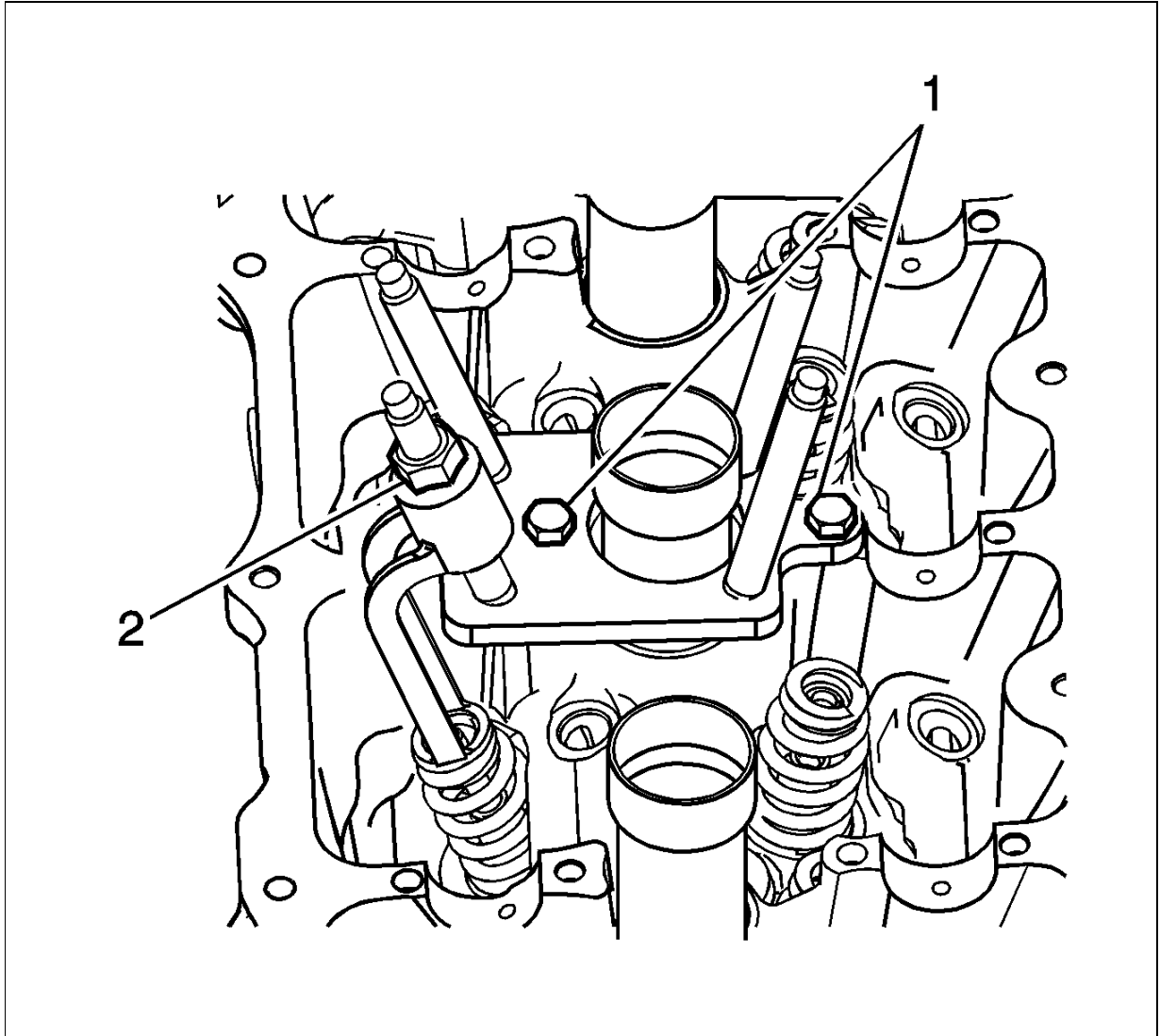
Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** If the **EN 46106** is not installed, the crankshaft may rotate. See Special Tools . If the crankshaft rotates, disassembly and reassembly of the entire camshaft timing system may be required.

2. Install the **EN 46106** in order to prevent crankshaft rotation. See Special Tools .

3. Remove the camshafts and rocker arms. Refer to Camshaft Replacement - Left Side .
4. Remove the spark plug from the applicable cylinder. Refer to Spark Plug Replacement .
5. Install the **J 39313** to the applicable cylinder. See Special Tools .
6. Connect the **J 39313** to a compressed air source. See Special Tools .

Fig 2: View Of Installed Valve Spring Compressor Tool



Courtesy of GENERAL MOTORS CORP.

7. Install the **EN 46110** above the applicable cylinder as shown. See Special Tools .

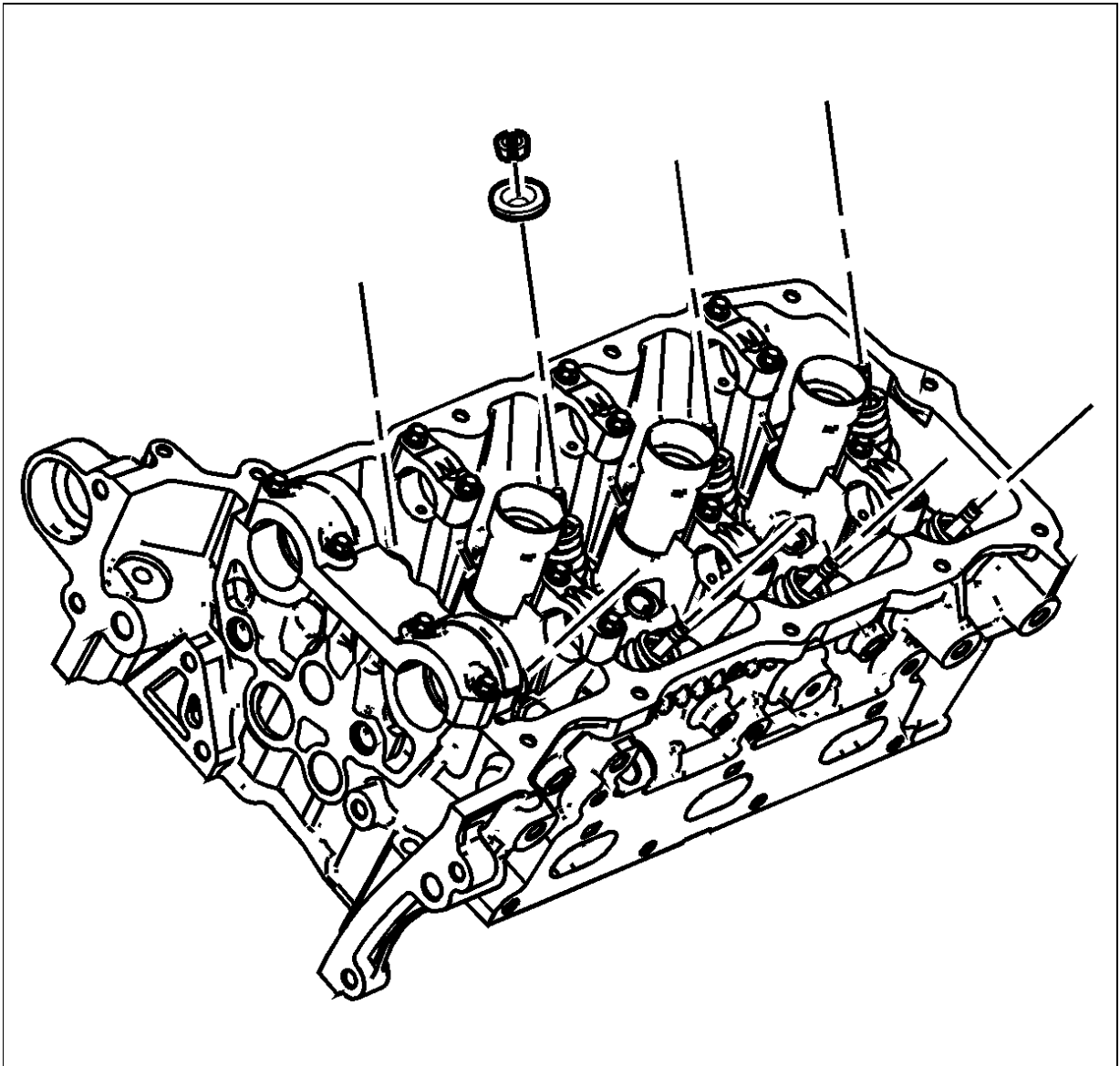
 **CAUTION:** Compressed valve springs have high tension against the valve spring compressor. Valve springs that are not properly compressed by or released from the valve spring compressor can be ejected from the valve spring compressor with intense force. Use care when compressing or releasing the valve spring with the valve spring compressor and when removing or installing the valve stem keys. Failing to use

care may cause personal injury.

 **NOTE:** Do not compress the valve springs less than 24.0 mm (0.943 in). Contact between the valve spring retainer and the valve stem oil seal can cause potential valve stem oil seal damage.

8. Tighten the **EN 46110** valve spring compressor nut (2). See Special Tools .

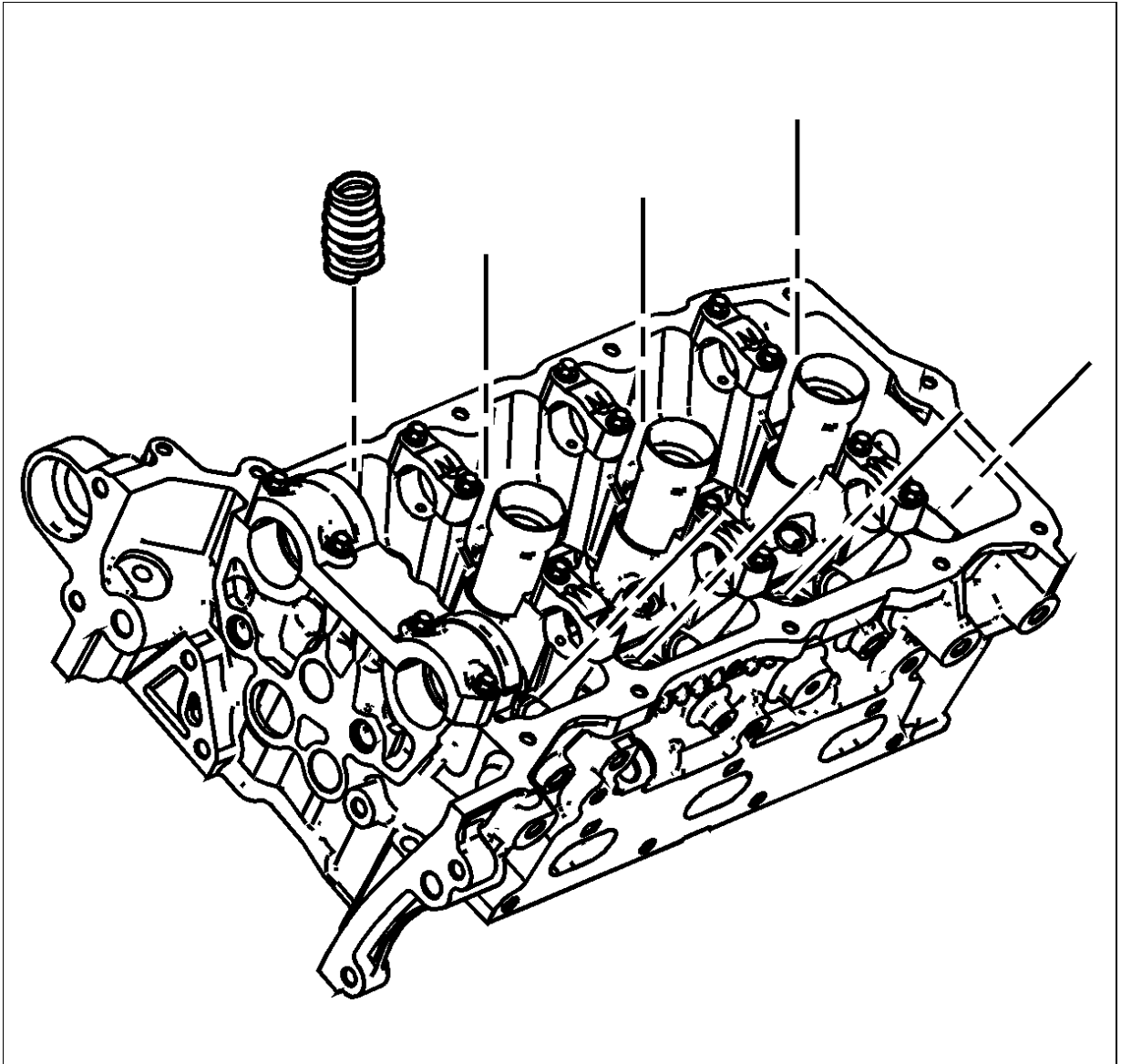
Fig 3: View Of Valve Spring Keepers



Courtesy of GENERAL MOTORS CORP.

9. Using the **EN 46117** , remove the valve keepers. See Special Tools .
10. Loosen the **EN 46110** valve spring compressor nut. See Special Tools .
11. Remove the valve spring retainer.

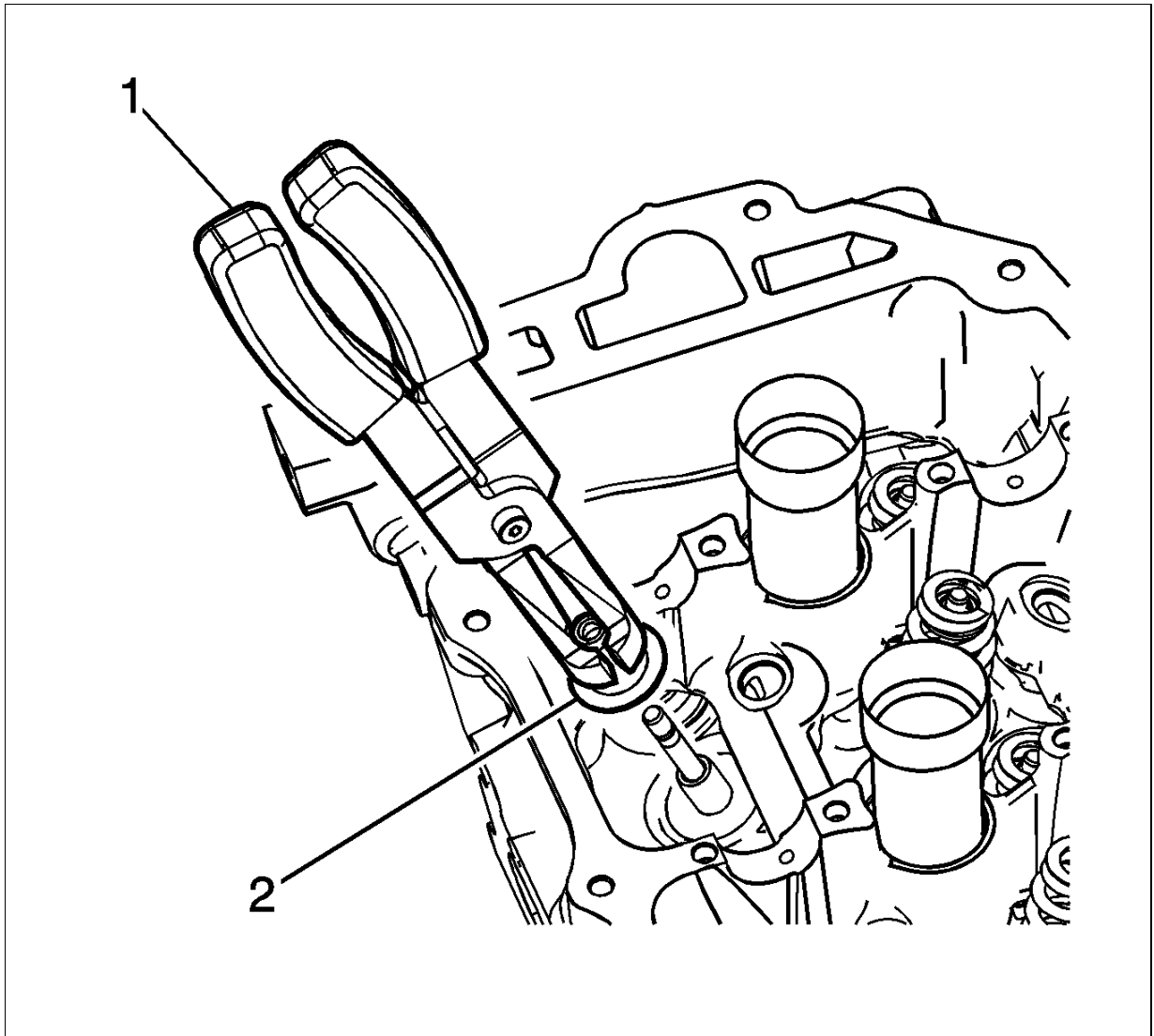
Fig 4: View Of Valve Spring



Courtesy of GENERAL MOTORS CORP.

12. Remove the valve spring.

Fig 5: Removing/Installing Valve Stem Seal

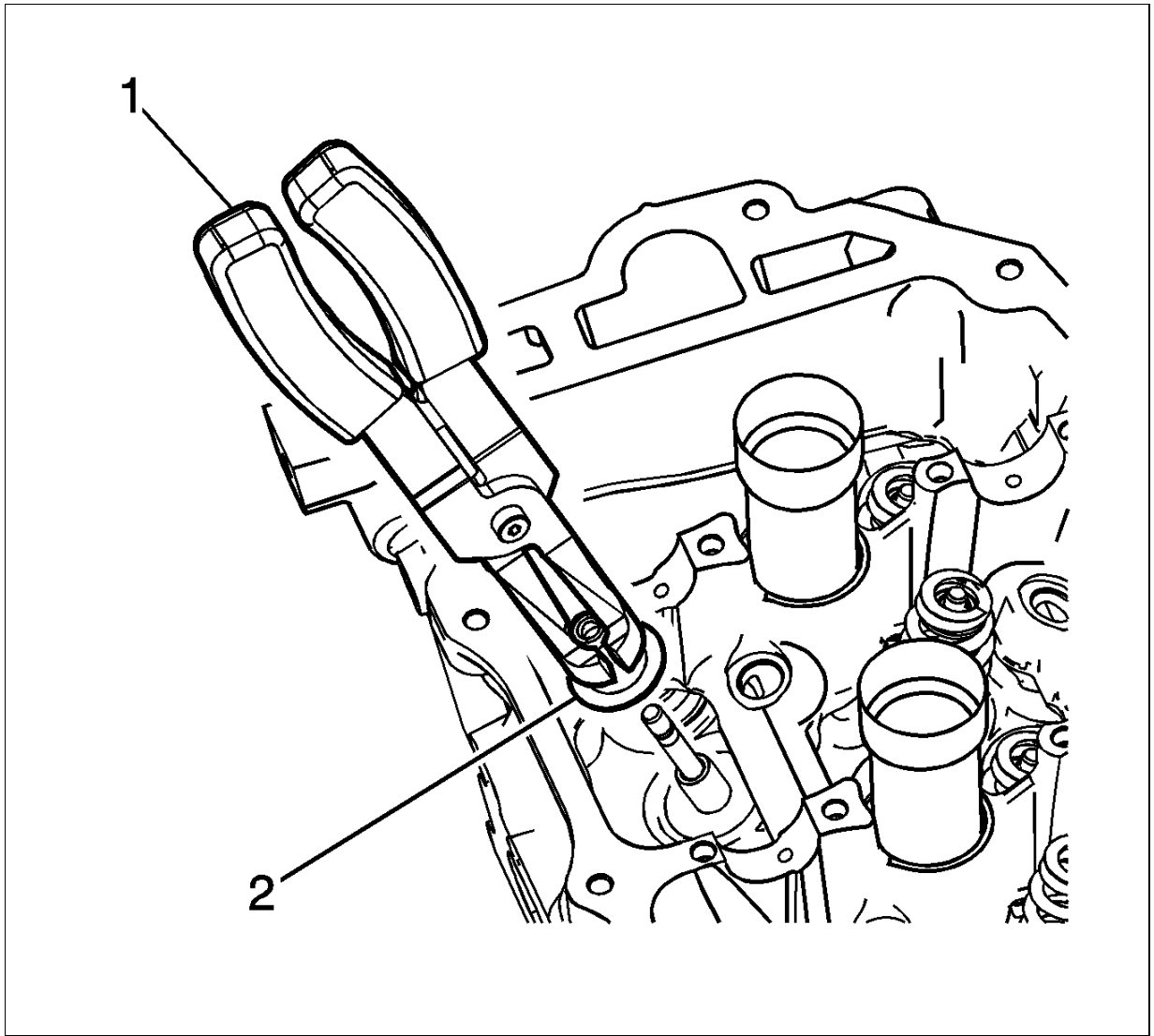


Courtesy of GENERAL MOTORS CORP.

13. Use the **EN 46116** (1) in order to remove the valve stem seal (2). See Special Tools .

**ON-VEHICLE REPAIR INSTRUCTIONS > VALVE STEM OIL SEAL AND VALVE SPRING
REPLACEMENT - LEFT SIDE > INSTALLATION PROCEDURE**

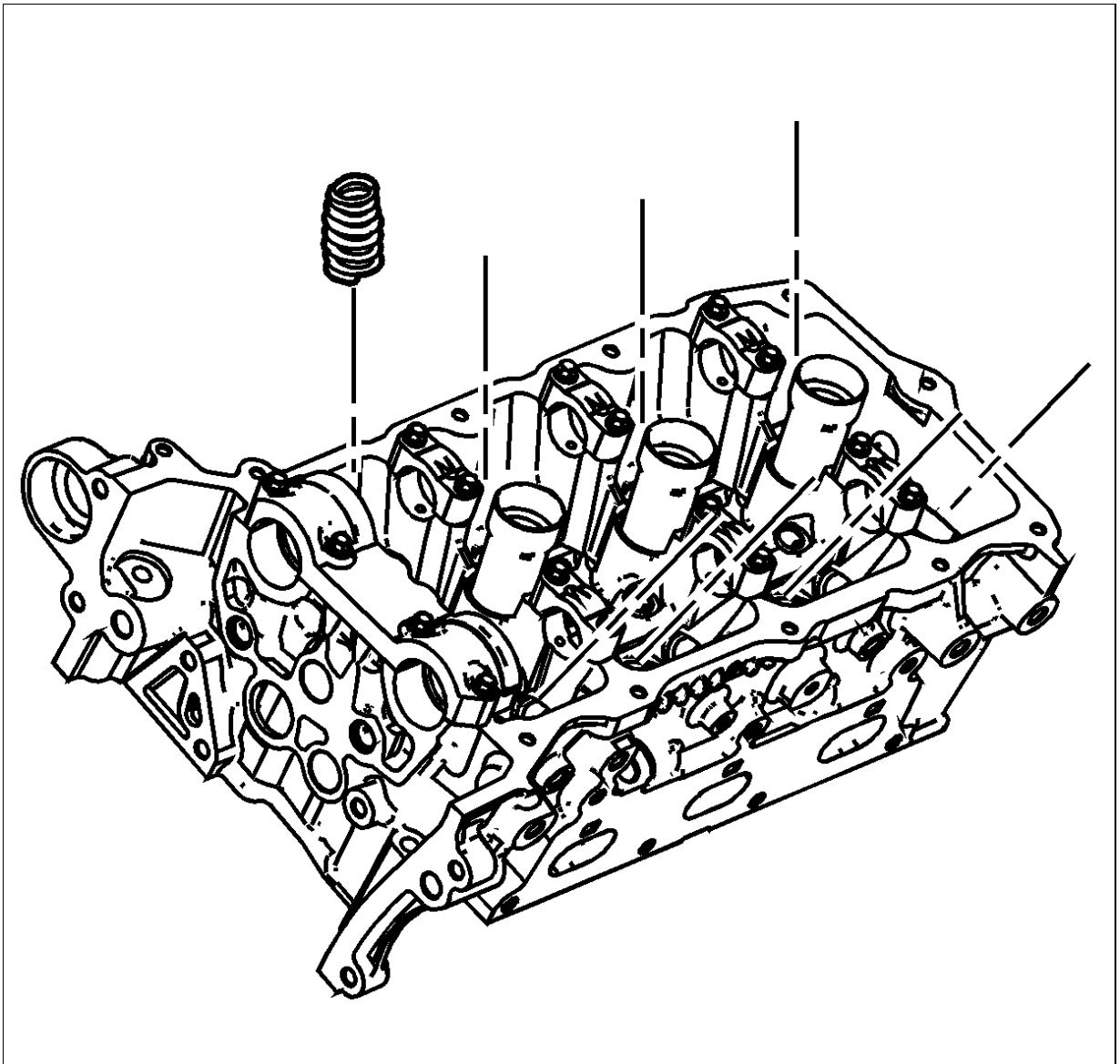
Fig 1: Removing/Installing Valve Stem Seal



Courtesy of GENERAL MOTORS CORP.

1. Use the **EN 46116** (1) in order to install the valve stem seal (2). See Special Tools .

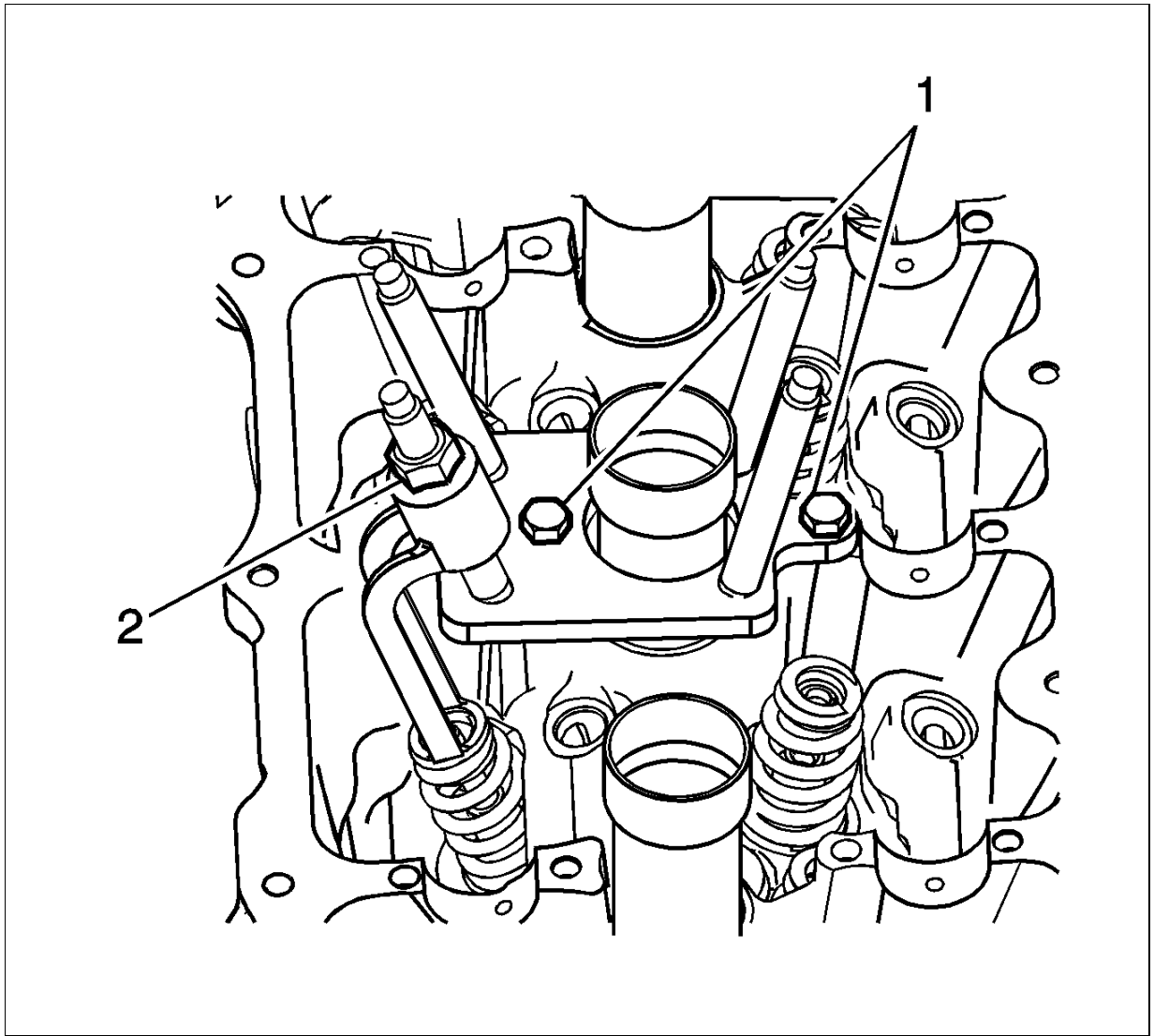
Fig 2: View Of Valve Spring



Courtesy of GENERAL MOTORS CORP.

2. Install the valve spring.
3. Install the valve spring retainer.

Fig 3: View Of Installed Valve Spring Compressor Tool

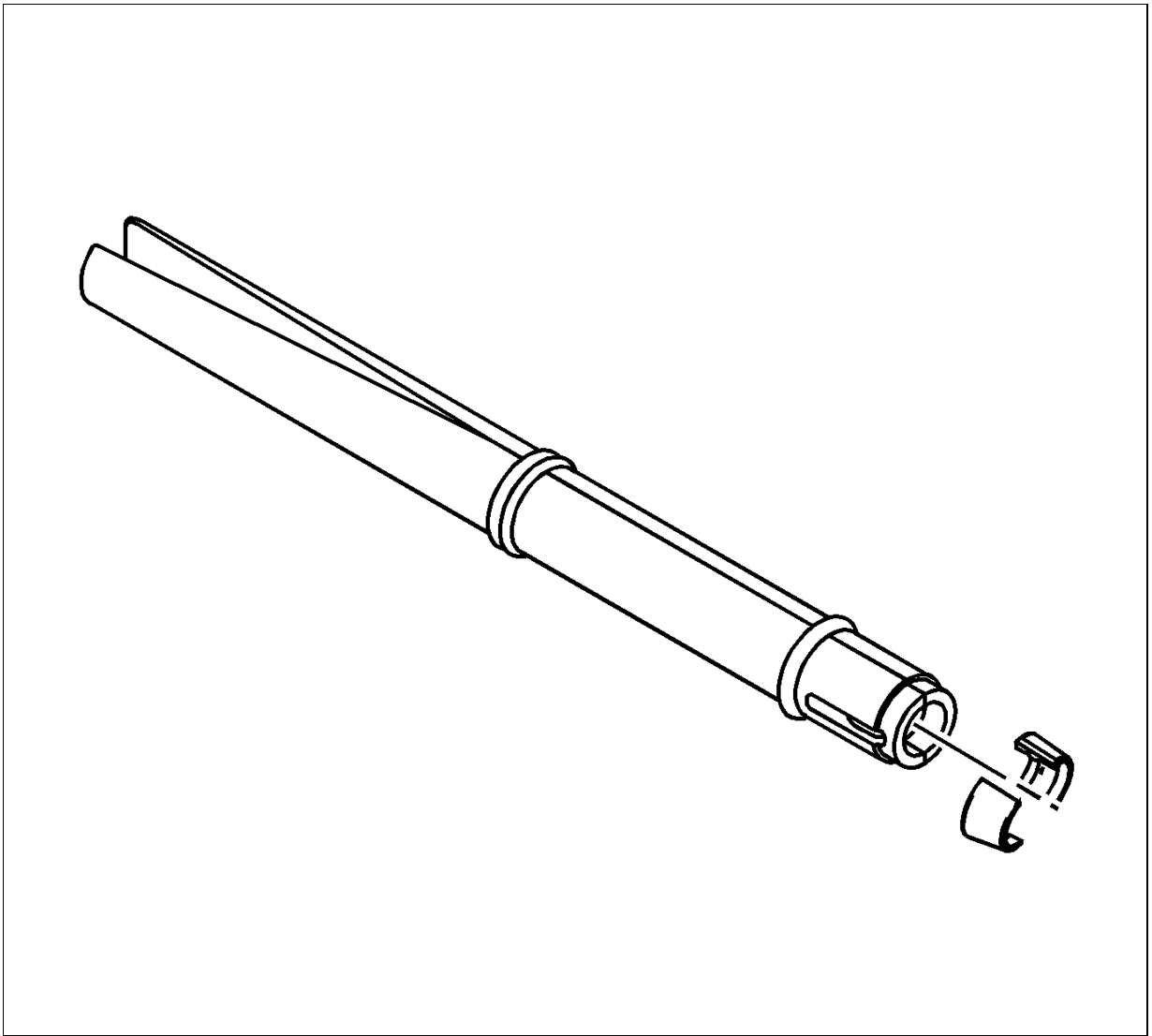


Courtesy of GENERAL MOTORS CORP.

4. Install the **EN 46110** above the applicable valve spring as shown. See Special Tools .

Tighten the **EN 46110** valve spring compressor nut (2). See Special Tools .

Fig 4: Installing Valve Keepers With EN 46117

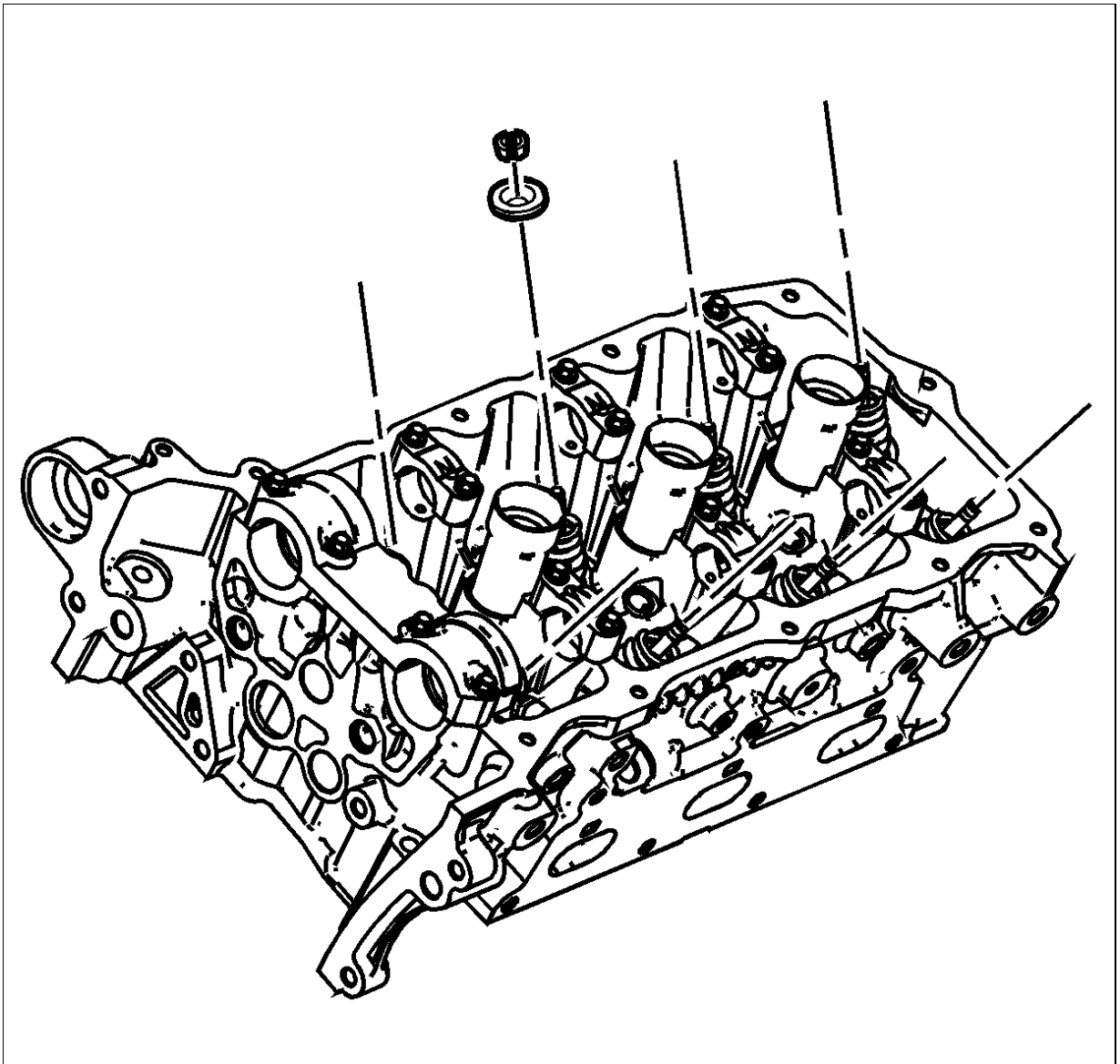


Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** Ensure proper directional placement of valve keepers in the **EN 46117** . See Special Tools . The valve keepers must be installed with the tapered end towards the valve stem seal.

5. With the spring compressed, install the valve keepers into the **EN 46117** . See Special Tools .

Fig 5: View Of Valve Spring Keepers



Courtesy of GENERAL MOTORS CORP.

6. Install the valve spring keepers.
7. Remove the **EN 46110** . See Special Tools .
8. Disconnect the **J 39313** from the compressed air source. See Special Tools .
9. Remove the **J 39313** . See Special Tools .
10. Install the spark plugs. Refer to Spark Plug Replacement .
11. Install the rocker arms and camshafts. Refer to Camshaft Replacement - Left Side .
12. Remove the **EN 46106** in order to prevent crankshaft rotation. See Special Tools .
13. Install the starter motor. Refer to Starter Motor Replacement (LY7) or Starter Motor Replacement (LH2) or Starter Motor Replacement (LC3) .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE STEM OIL SEAL AND VALVE SPRING

REPLACEMENT - RIGHT SIDE

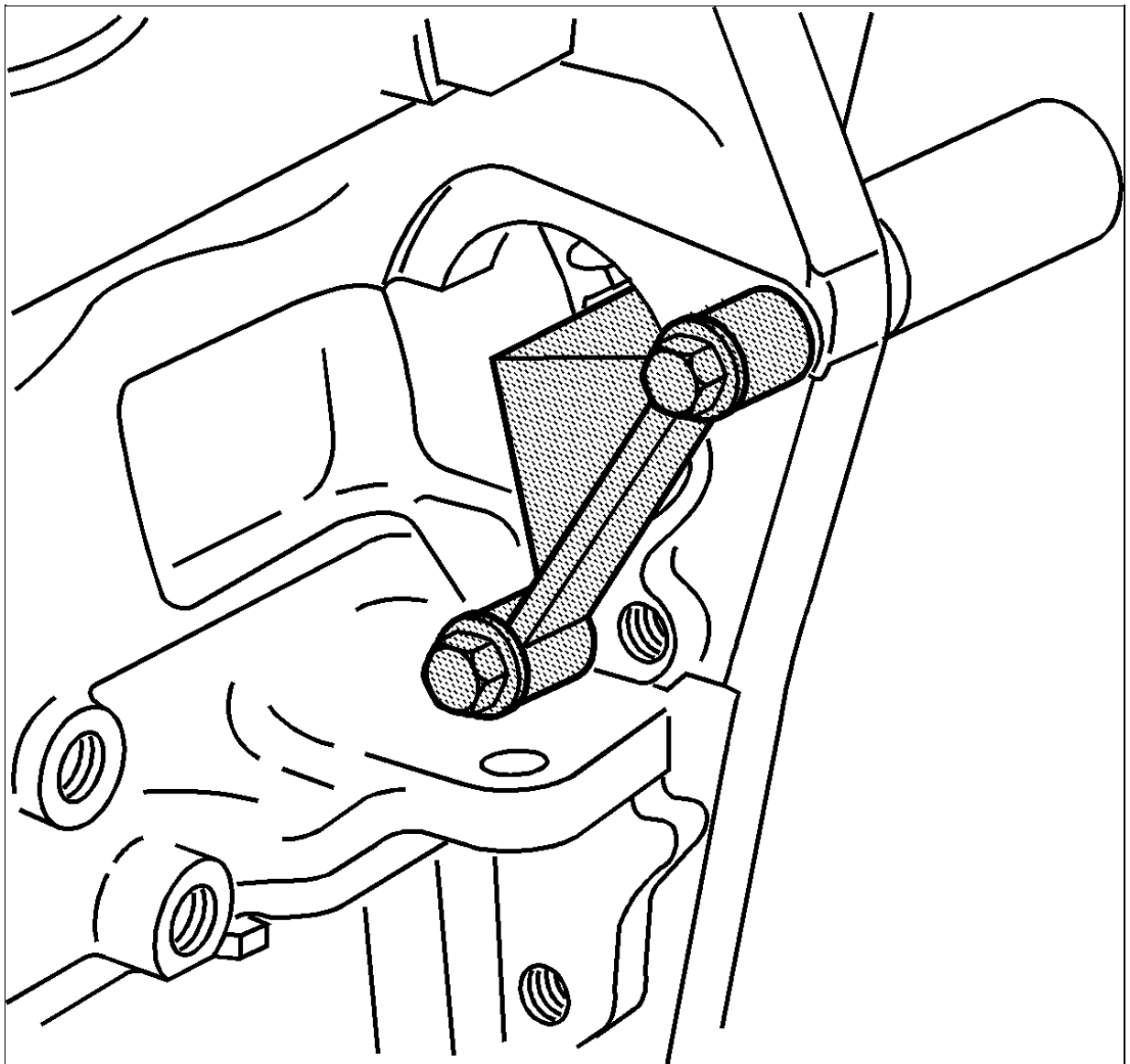
Tools Required

- **EN 46106** Flywheel Holding Tool. See Special Tools .
- **EN 46110** On-Vehicle Valve Spring Compressor. See Special Tools .
- **EN 46116** Valve Stem Seal Remover/Installer. See Special Tools .
- **EN 46117** Valve Stem Key Remover/Installer. See Special Tools .
- **J 39313** Spark Plug Port Adapter. See Special Tools .

ON-VEHICLE REPAIR INSTRUCTIONS > VALVE STEM OIL SEAL AND VALVE SPRING REPLACEMENT - RIGHT SIDE > REMOVAL PROCEDURE

1. Remove the starter motor. Refer to Starter Motor Replacement (LY7) or Starter Motor Replacement (LH2) or Starter Motor Replacement (LC3) .

Fig 1: View Of Tool EN 46106

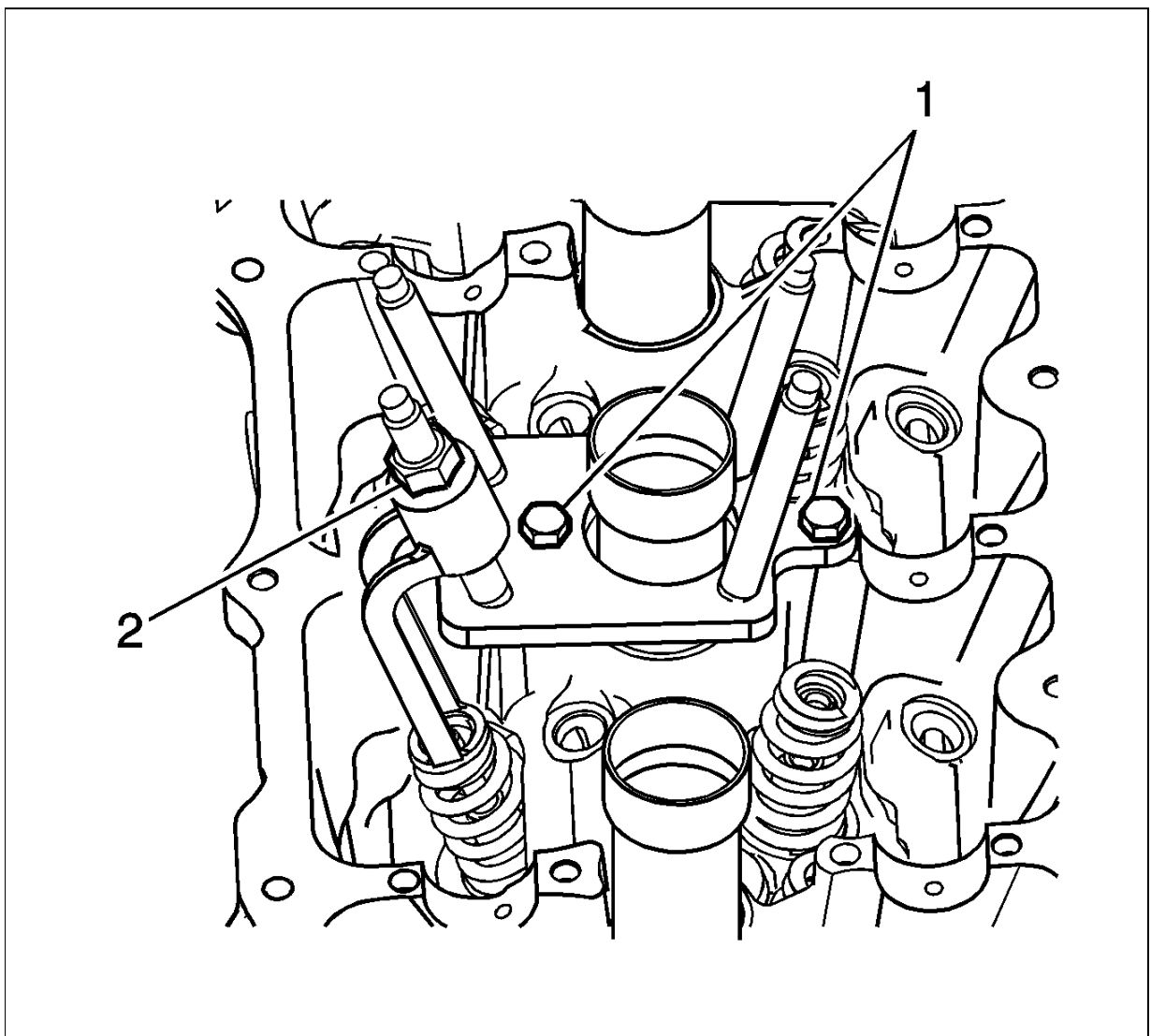


Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** If the **EN 46106** is not installed, the crankshaft may rotate. See Special Tools . If the crankshaft rotates, disassembly and reassembly of the entire camshaft timing system may be required.

2. Install the **EN 46106** in order to prevent crankshaft rotation. See Special Tools .
3. Remove the camshafts and rocker arms. Refer to Camshaft Replacement - Right Side .
4. Remove the spark plug from the applicable cylinder. Refer to Spark Plug Replacement .
5. Install the **J 39313** to the applicable cylinder. See Special Tools .
6. Connect the **J 39313** to a compressed air source. See Special Tools .

Fig 2: View Of Installed Valve Spring Compressor Tool



Courtesy of GENERAL MOTORS CORP.

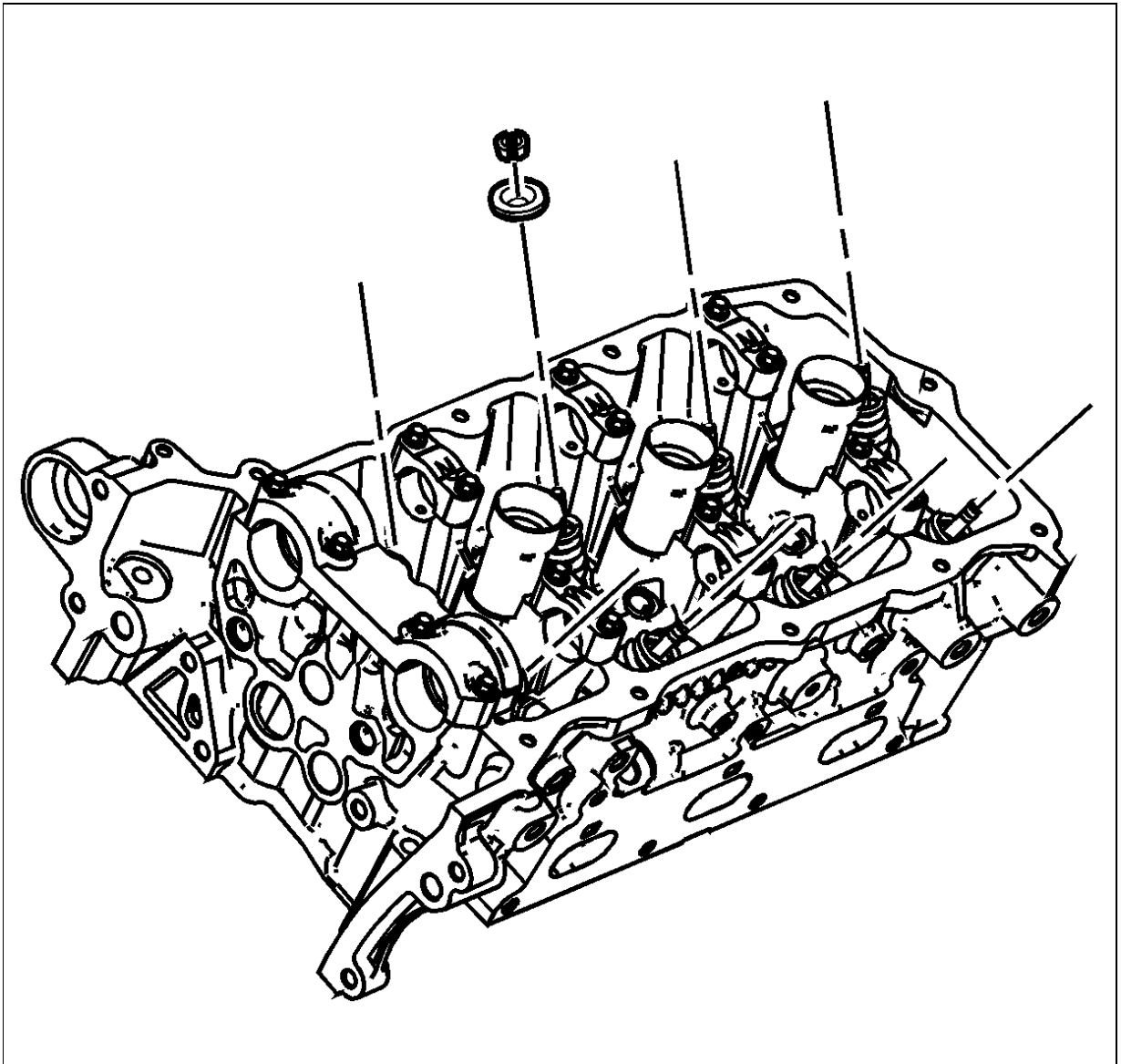
7. Install the **EN 46110** above the applicable cylinder as shown. See Special Tools .

 **CAUTION:** *Compressed valve springs have high tension against the valve spring compressor. Valve springs that are not properly compressed by or released from the valve spring compressor can be ejected from the valve spring compressor with intense force. Use care when compressing or releasing the valve spring with the valve spring compressor and when removing or installing the valve stem keys. Failing to use care may cause personal injury.*

 **NOTE:** *Do not compress the valve springs less than 24.0 mm (0.943 in). Contact between the valve spring retainer and the valve stem oil seal can cause potential valve stem oil seal damage.*

8. Tighten the **EN 46110** valve spring compressor nut (2). See Special Tools .

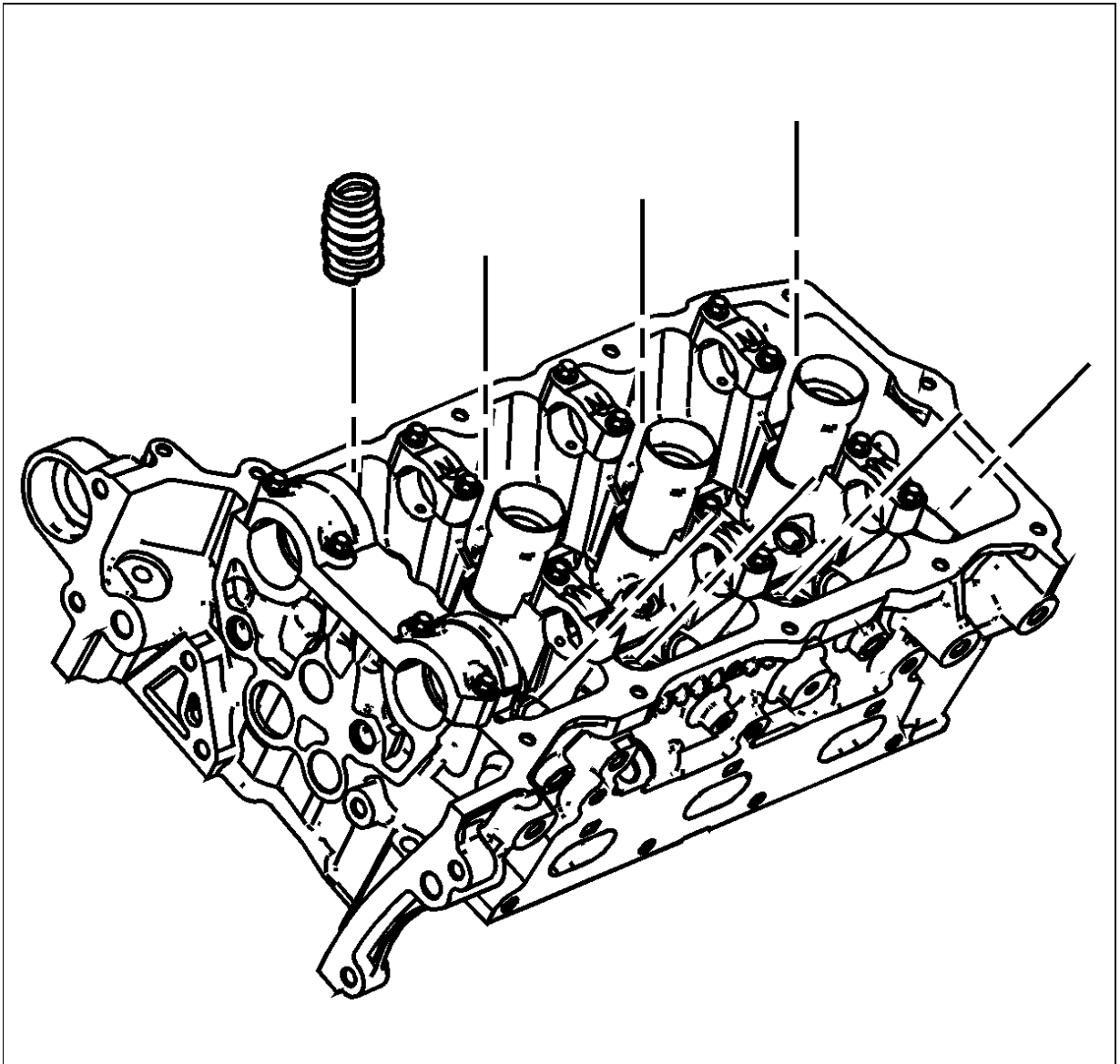
Fig 3: View Of Valve Spring Keepers



Courtesy of GENERAL MOTORS CORP.

9. Using the **EN 46117** remove the valve keepers. See Special Tools .
10. Loosen the **EN 46110** valve spring compressor nut. See Special Tools .
11. Remove the valve spring retainer.

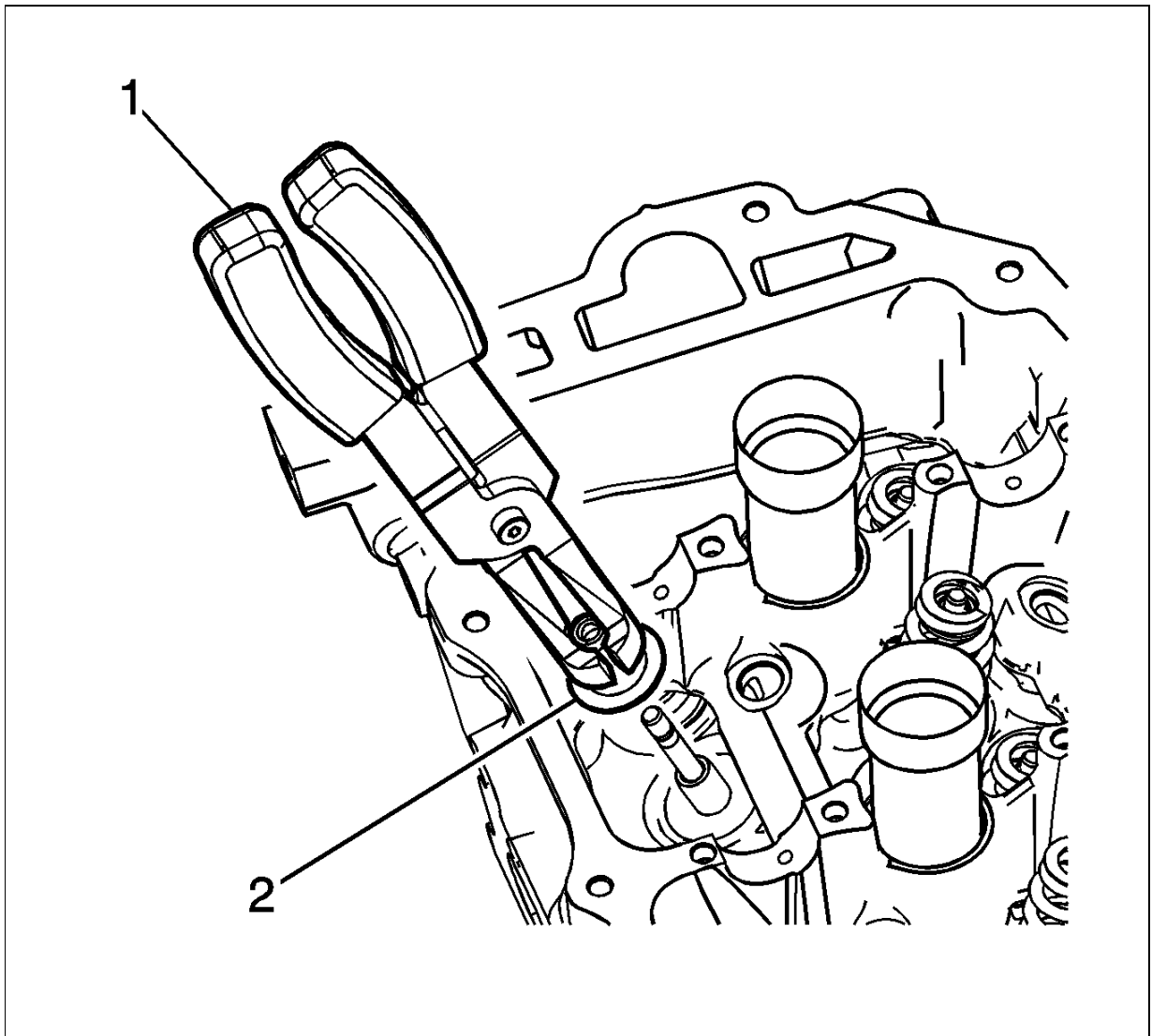
Fig 4: View Of Valve Spring



Courtesy of GENERAL MOTORS CORP.

12. Remove the valve springs.

Fig 5: Removing/Installing Valve Stem Seal

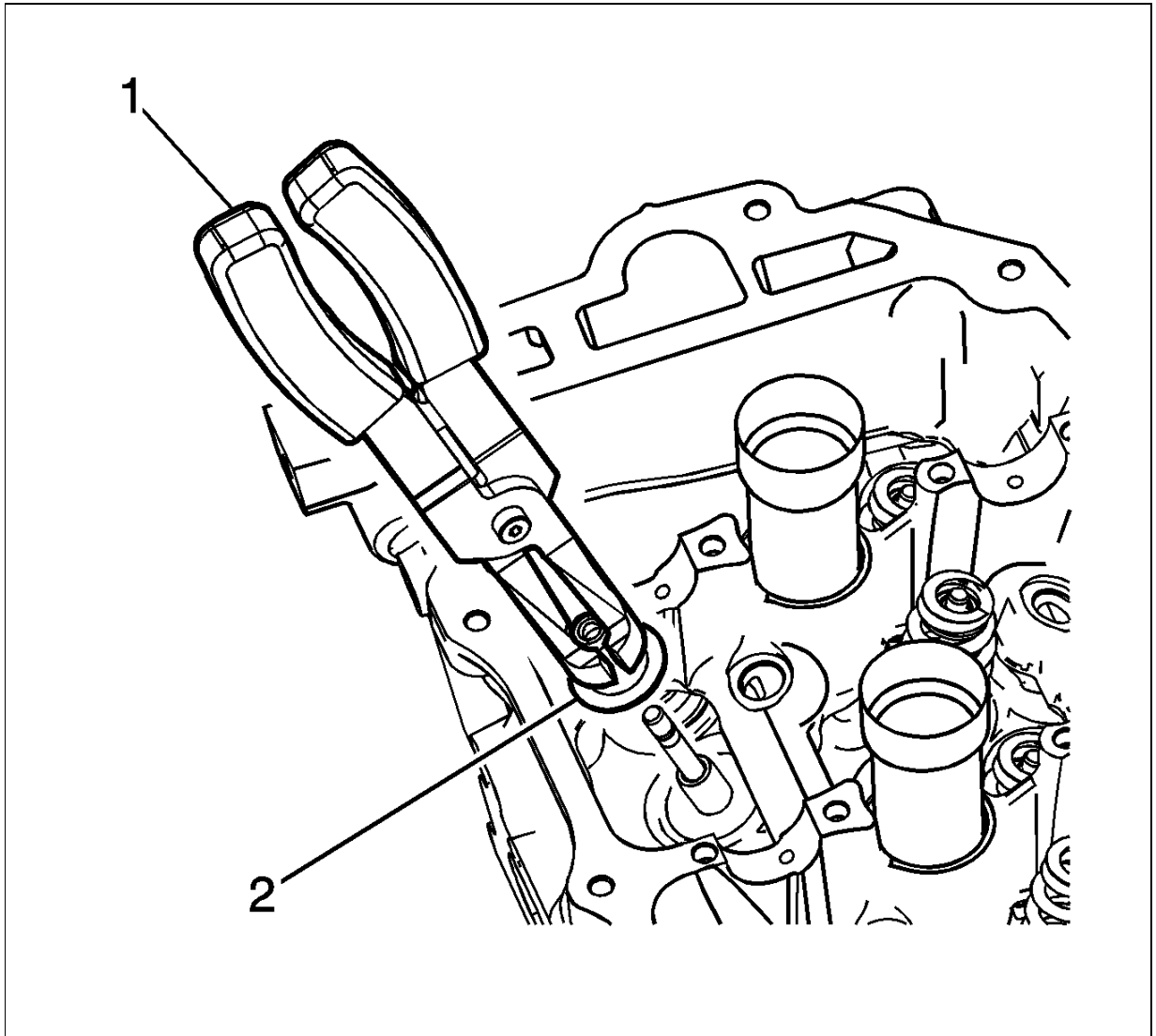


Courtesy of GENERAL MOTORS CORP.

13. Use the **EN 46116** (1) in order to remove the valve stem seal (2). See Special Tools .

**ON-VEHICLE REPAIR INSTRUCTIONS > VALVE STEM OIL SEAL AND VALVE SPRING
REPLACEMENT - RIGHT SIDE > INSTALLATION PROCEDURE**

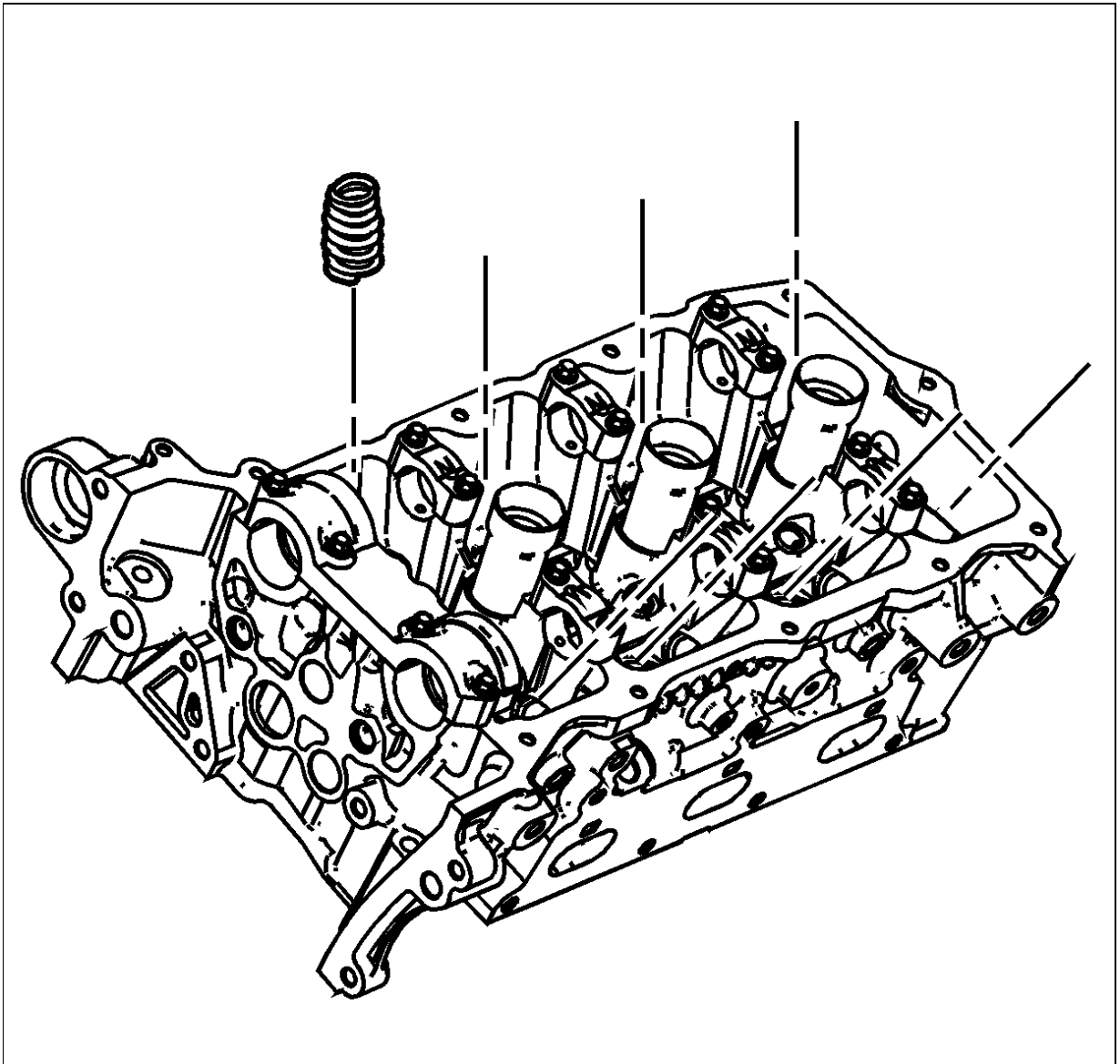
Fig 1: Removing/Installing Valve Stem Seal



Courtesy of GENERAL MOTORS CORP.

1. Use the **EN 46116** (1) in order to install the valve stem seals (2). See Special Tools .

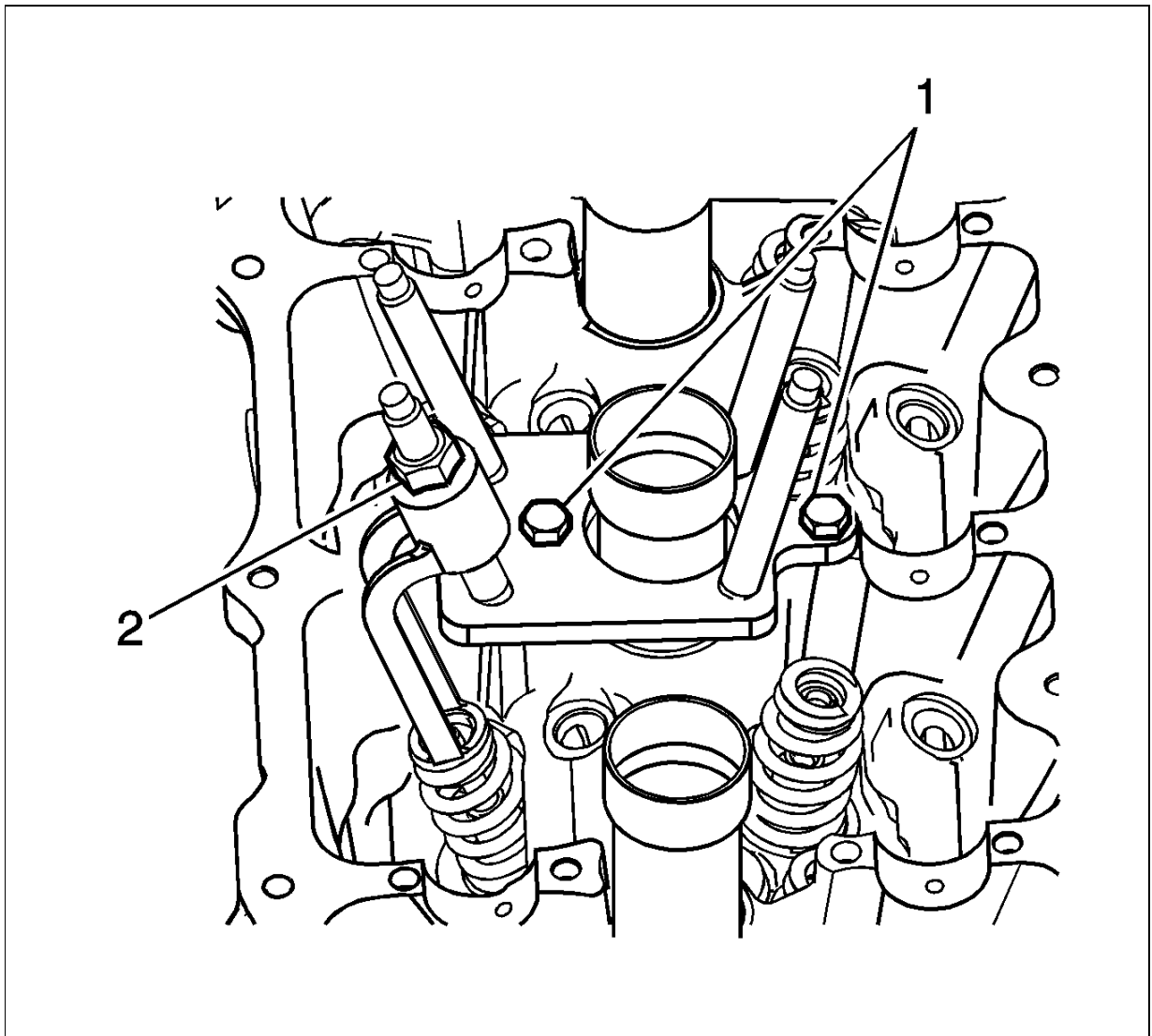
Fig 2: View Of Valve Spring



Courtesy of GENERAL MOTORS CORP.

2. Install the valve spring.
3. Install the valve spring retainer.

Fig 3: View Of Installed Valve Spring Compressor Tool

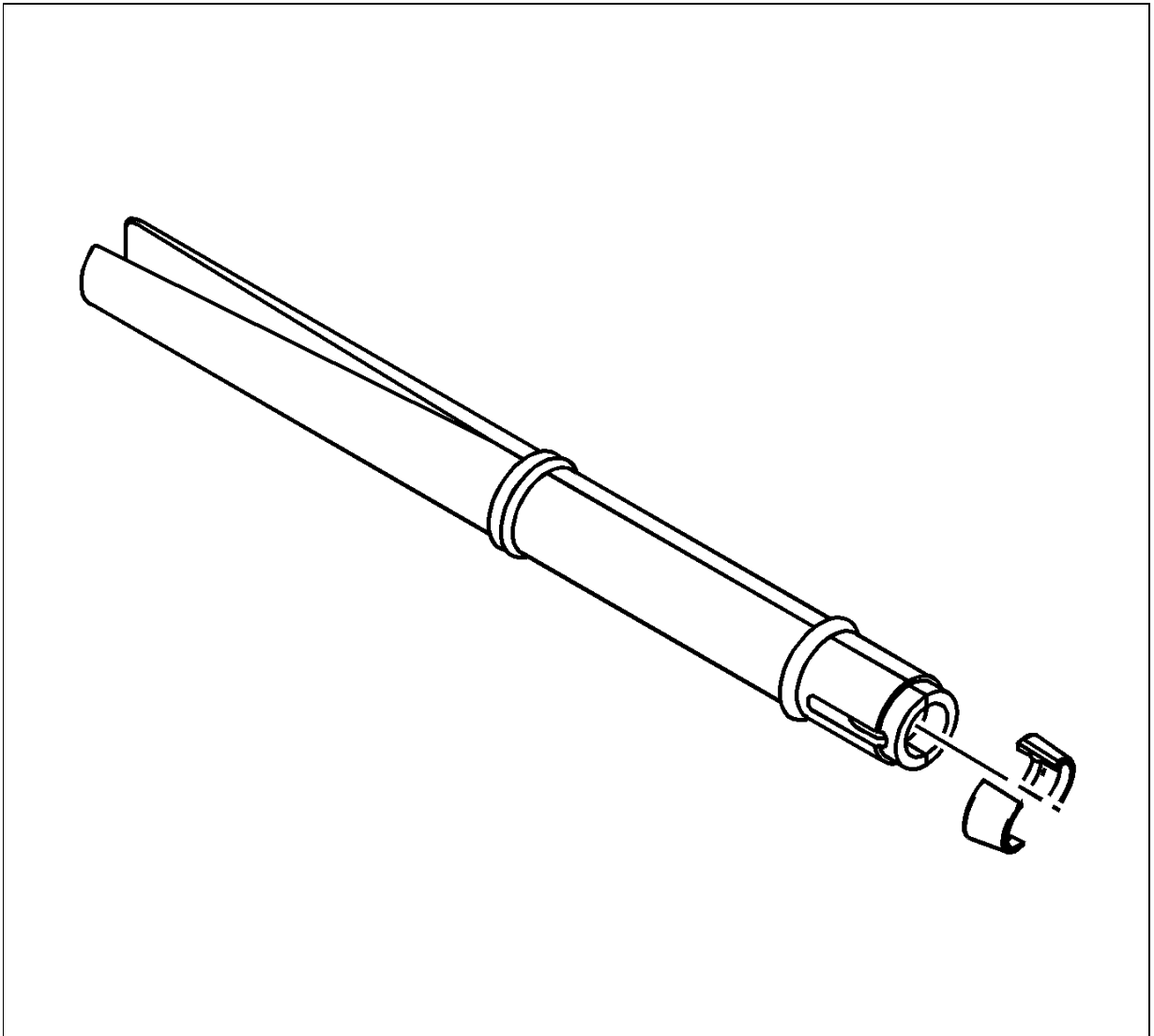


Courtesy of GENERAL MOTORS CORP.

4. Install the **EN 46110** above the applicable valve spring as shown. See Special Tools .

Tighten the **EN 46110** valve spring compressor nut (2). See Special Tools .

Fig 4: Installing Valve Keepers With EN 46117

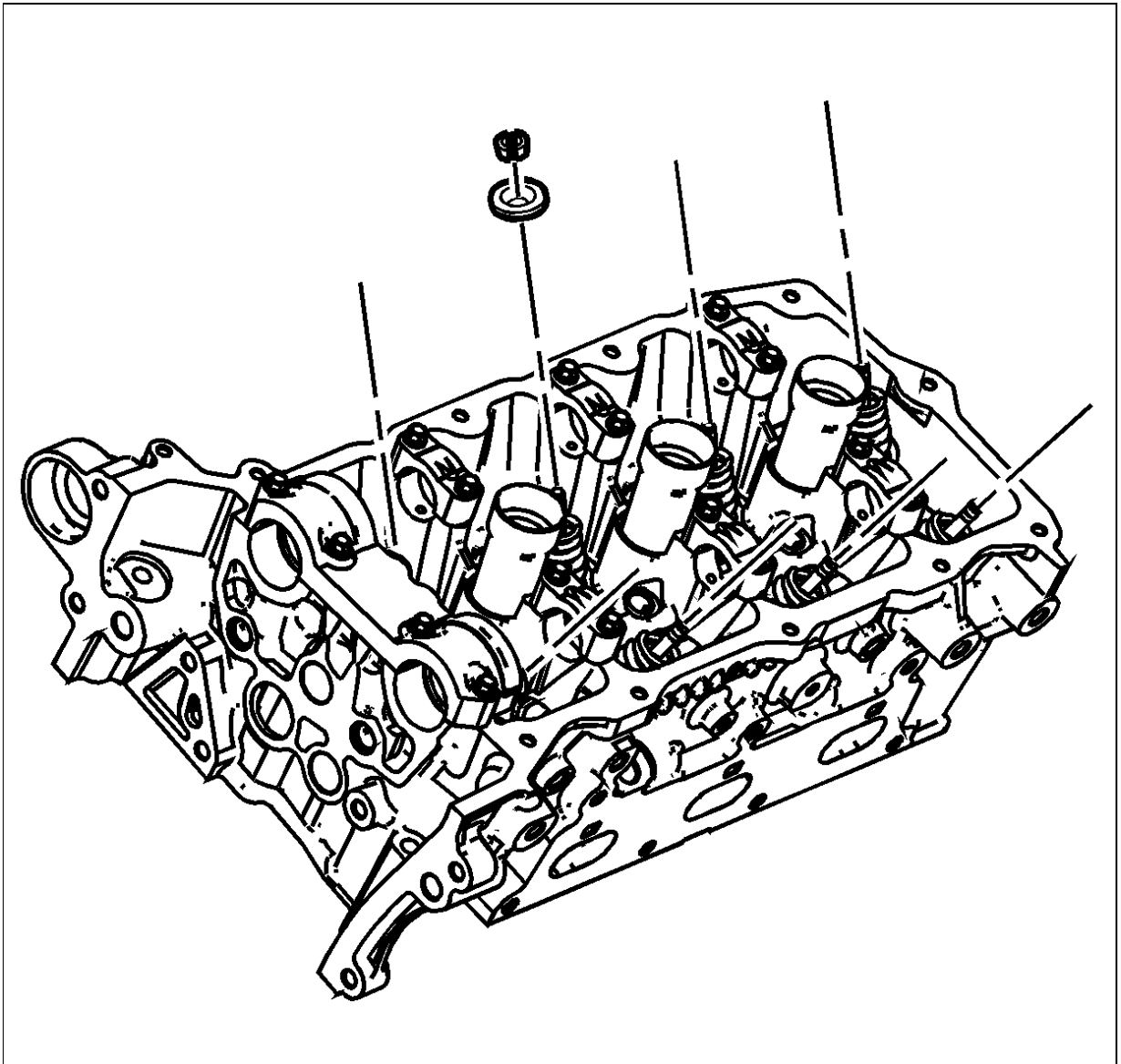


Courtesy of GENERAL MOTORS CORP.

i **IMPORTANT:** *Ensure proper directional placement of valve keepers in the **EN 46117** . See Special Tools . The valve keepers must be installed with the tapered end towards the valve stem seal.*

5. With the spring compressed, install the valve keepers into the **EN 46117** . See Special Tools .

Fig 5: View Of Valve Spring Keepers



Courtesy of GENERAL MOTORS CORP.

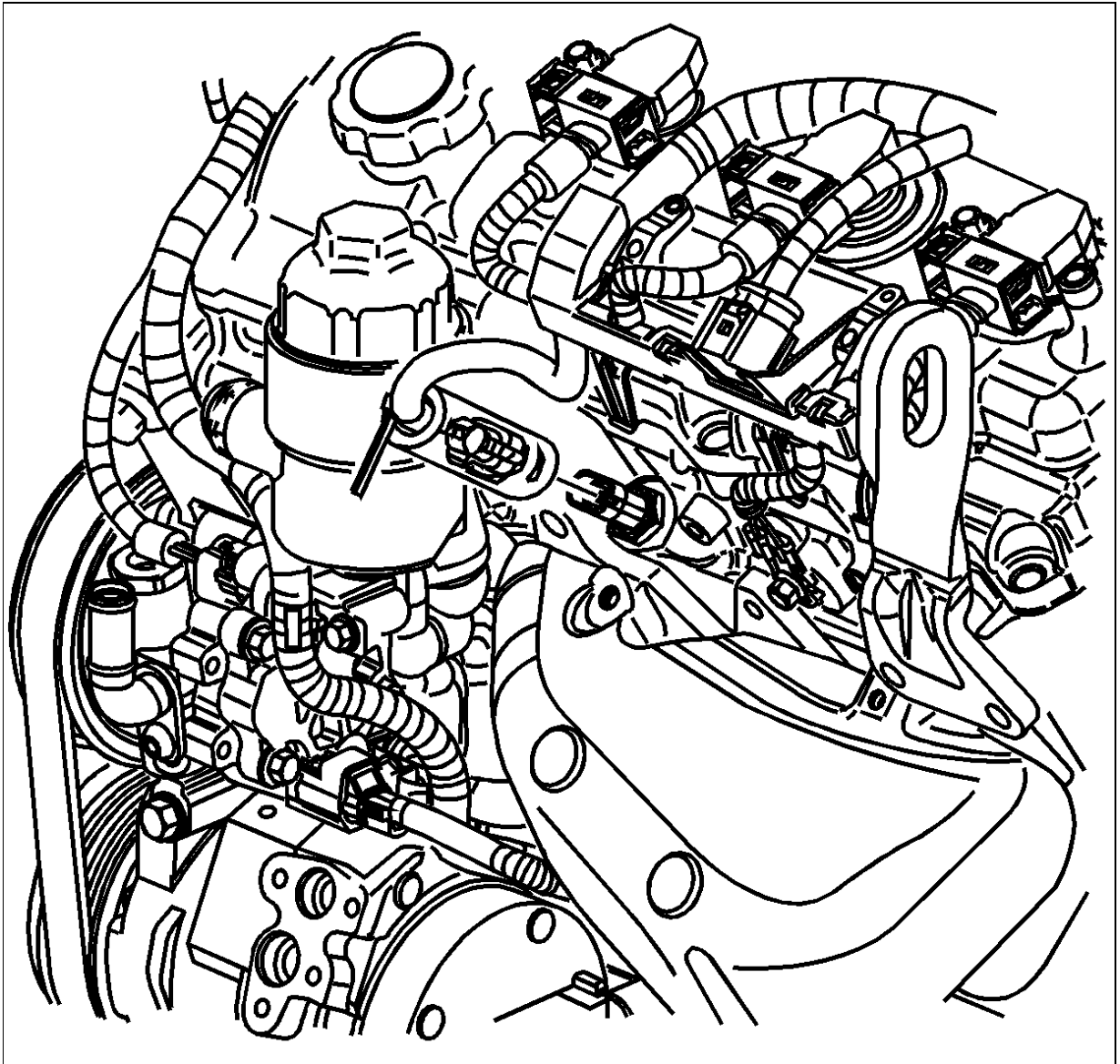
6. Install the valve spring keepers.
7. Remove the **EN 46110** . See Special Tools .
8. Disconnect the **J 39313** from the compressed air source. See Special Tools .
9. Remove the **J 39313** . See Special Tools .
10. Install the spark plugs. Refer to Spark Plug Replacement .
11. Install the rocker arms and camshafts. Refer to Camshaft Replacement - Right Side .
12. Remove the **EN 46106** . See Special Tools .
13. Install the starter motor. Refer to Starter Motor Replacement (LY7) or Starter Motor Replacement (LH2) or Starter Motor Replacement (LC3) .

ON-VEHICLE REPAIR INSTRUCTIONS > CYLINDER HEAD REPLACEMENT - LEFT SIDE >

REMOVAL PROCEDURE

1. Remove the left bank secondary timing chain. Refer to Secondary Camshaft Drive Chain Replacement - Left Side .
2. Remove the oil level indicator. Refer to Oil Level Indicator and Tube Replacement .

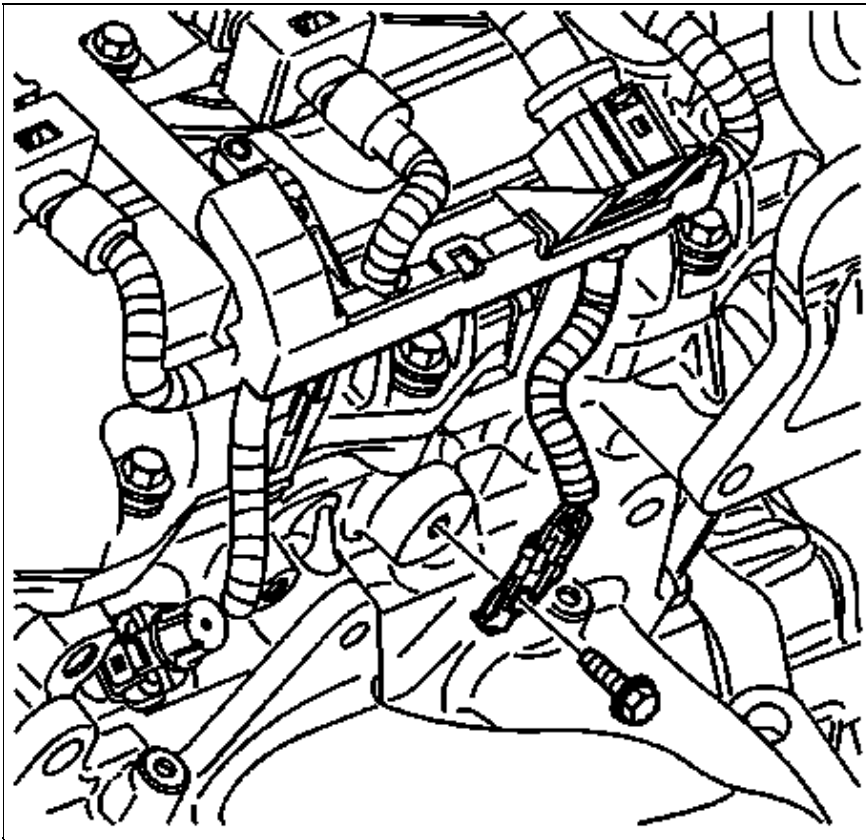
Fig 1: View Of Coolant Temperature Sensor And Electrical Connector



Courtesy of GENERAL MOTORS CORP.

3. Remove the heat shield from the coolant temperature sensor and disconnect the coolant temperature sensor electrical connector.

Fig 2: View Of Left Cylinder Head Wiring Harness Ground Bolt



Courtesy of GENERAL MOTORS CORP.

4. Remove the wiring harness ground from the cylinder head.
5. Disconnect the wiring harness electrical connector located at the side of the cylinder head.
6. Remove the wiring harness connector bracket from the side of the cylinder head.

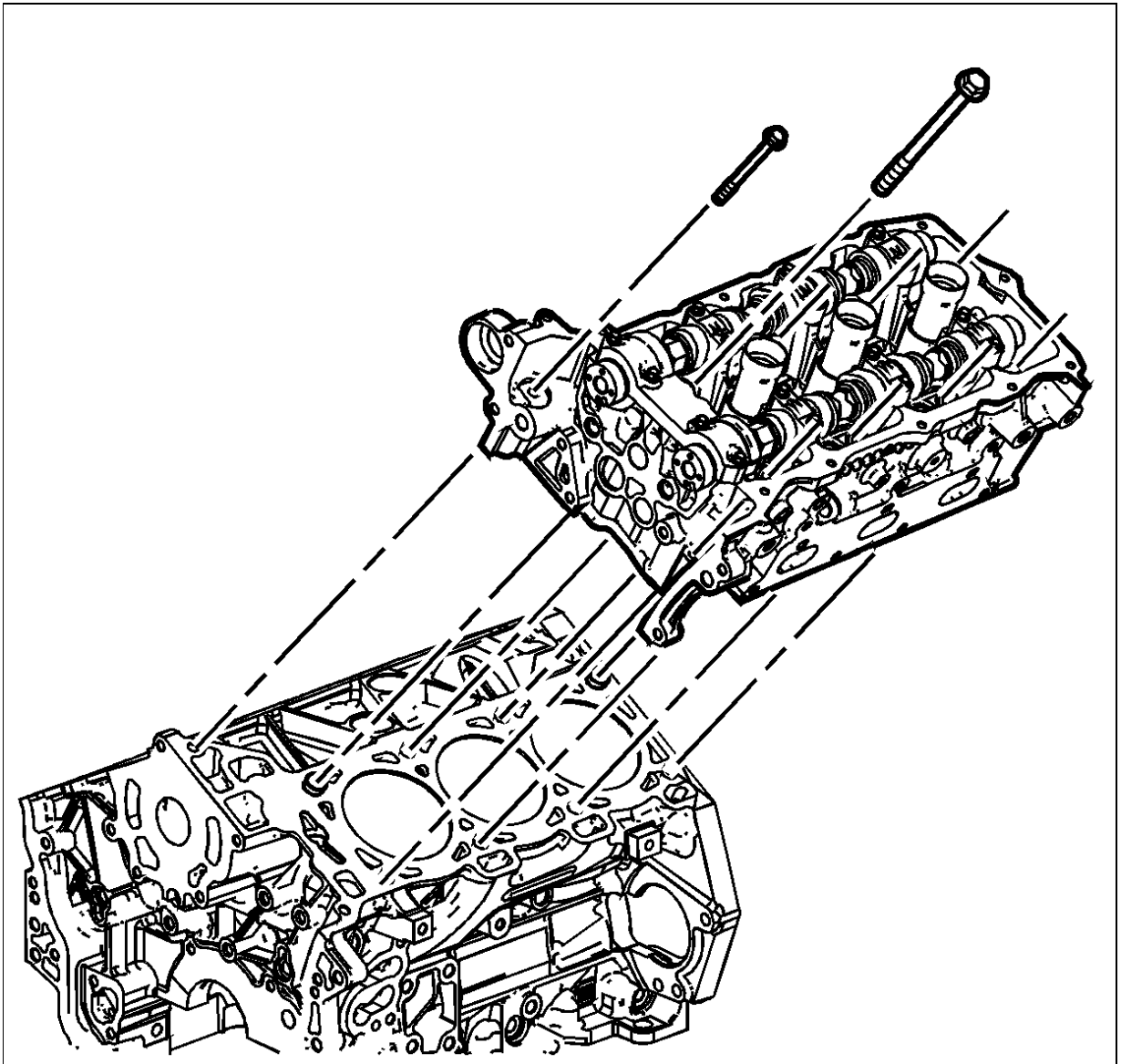
i **IMPORTANT:** DO NOT disconnect the power steering pipes and/or hoses.

7. Remove the power steering pump bolts. Refer to Power Steering Pump Removal .
8. Remove the surge tank hose from the bracket at the rear of the cylinder head.
9. Remove the wiring harness bracket from the rear of the cylinder head.
10. Remove the catalytic converter. Refer to Catalytic Converter Replacement - Left Side (LY7) .
11. Remove the oil level indicator. Refer to Oil Level Indicator and Tube Replacement .

i **IMPORTANT:** Do not remove the oil filter adapter.

12. Remove the oil filter adapter upper bolt.

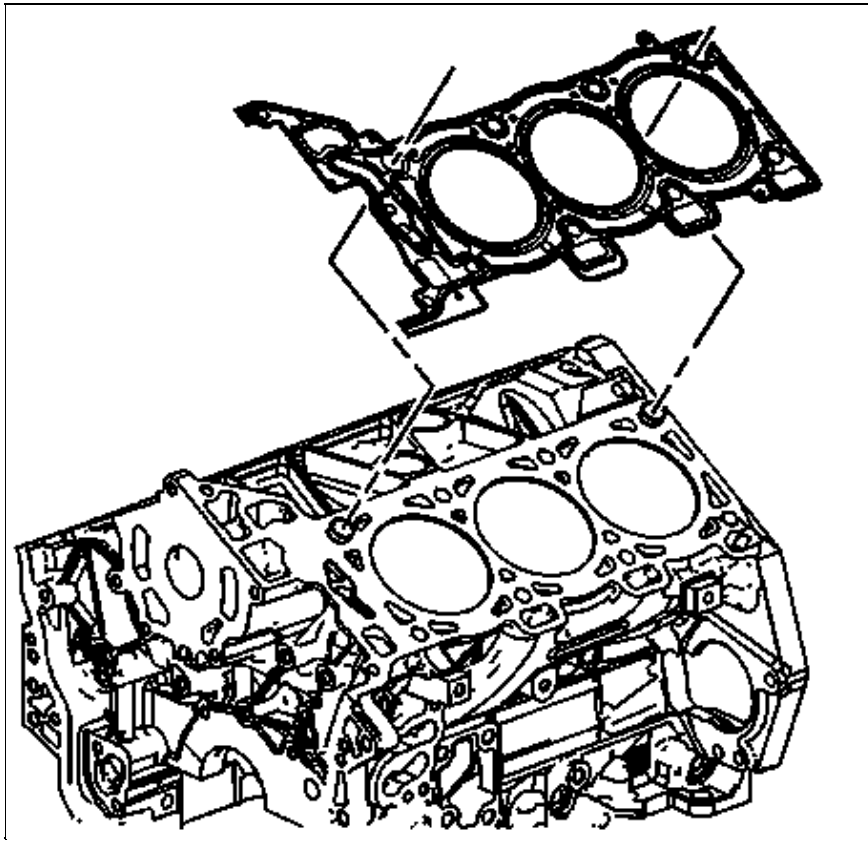
Fig 3: View Of Left Cylinder Head



Courtesy of GENERAL MOTORS CORP.

13. Remove the cylinder head with the exhaust manifold. Refer to Cylinder Head Removal - Right Side .

Fig 4: View Of Left Cylinder Head Gasket



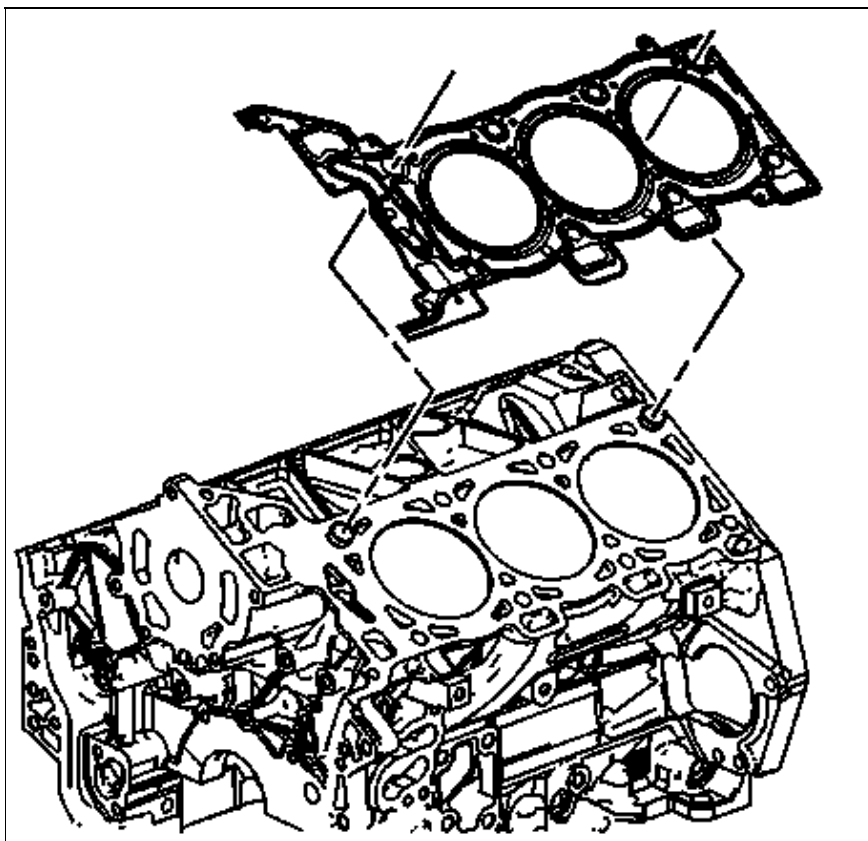
Courtesy of GENERAL MOTORS CORP.

14. Remove and discard the cylinder head gasket.
15. Clean and inspect the cylinder head and the engine block sealing surfaces. Refer to Cylinder Head Cleaning and Inspection and Engine Block Cleaning and Inspection .
16. If necessary, perform the following steps:
 1. Remove the exhaust manifold from the cylinder head. Refer to Exhaust Manifold Removal - Left Side .
 2. Disassemble the cylinder head. Refer to Cylinder Head Disassemble .

ON-VEHICLE REPAIR INSTRUCTIONS > CYLINDER HEAD REPLACEMENT - LEFT SIDE > INSTALLATION PROCEDURE

1. If necessary, perform the following steps:
 1. Assemble the cylinder head. Refer to Cylinder Head Assemble .
 2. Install the exhaust manifold to the cylinder head. Refer to Exhaust Manifold Installation - Left Side .

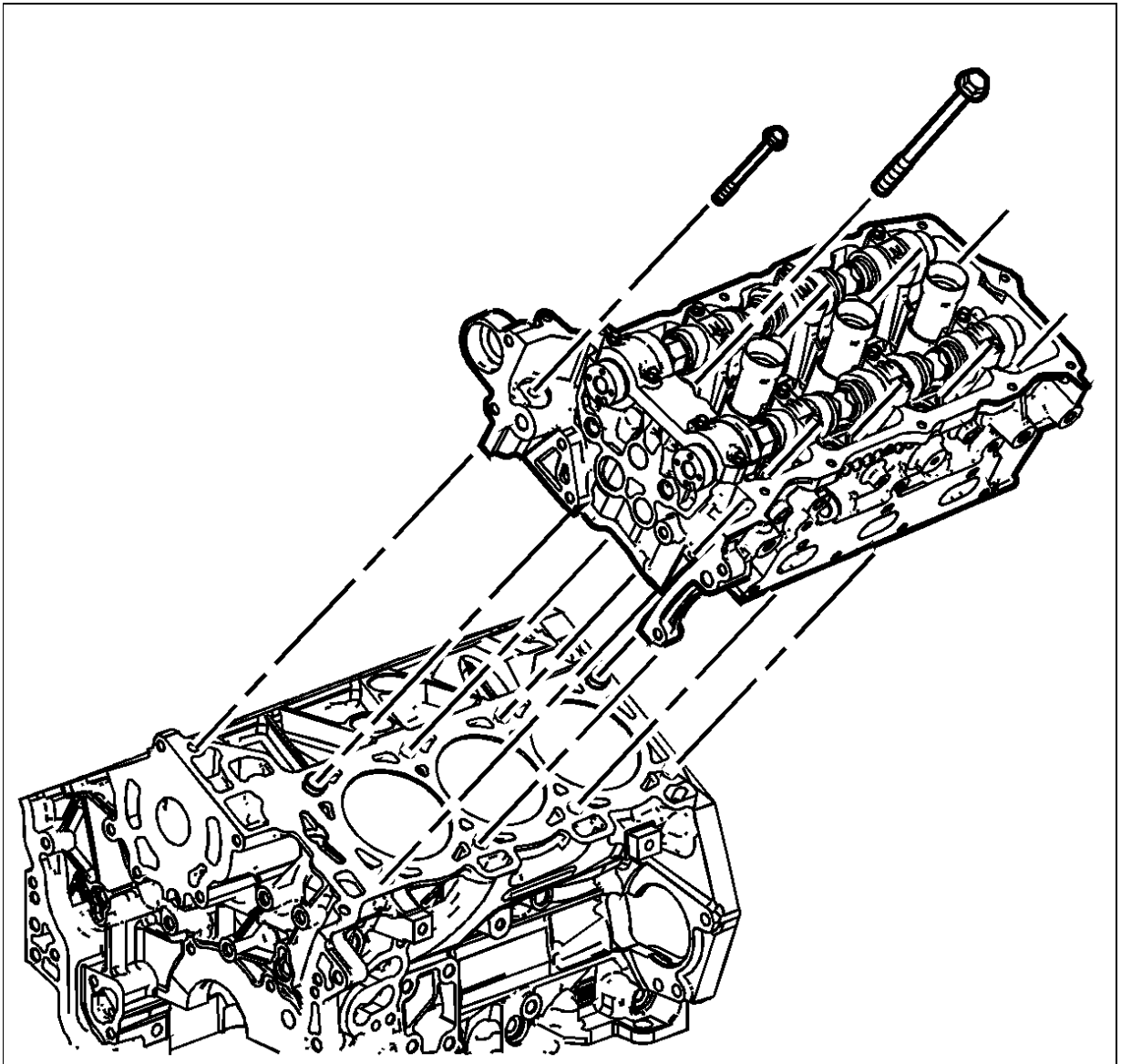
Fig 1: View Of Left Cylinder Head Gasket



Courtesy of GENERAL MOTORS CORP.

2. Install a NEW cylinder head gasket.

Fig 2: View Of Left Cylinder Head

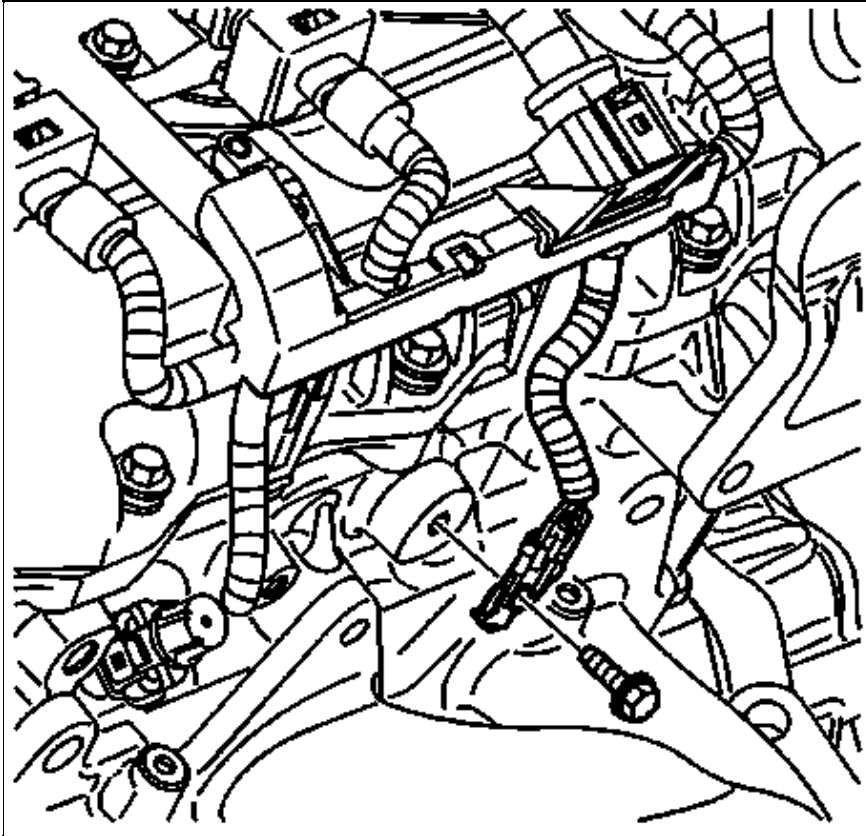


Courtesy of GENERAL MOTORS CORP.

3. Carefully install the cylinder head with the exhaust manifold to the engine. Refer to Cylinder Head Installation - Left Side .
4. Install the oil filter adapter upper bolt. Refer to Oil Filter Adapter Installation .
5. Install the oil level indicator. Refer to Oil Level Indicator and Tube Replacement .
6. Install the catalytic converter to the exhaust manifold. Refer to Catalytic Converter Replacement - Left Side (LY7) .
7. Install the wiring harness bracket to the rear of the cylinder head.
8. Install the surge tank hose to the bracket at the rear of the cylinder head.
9. Install the power steering pump bolts. Refer to Power Steering Pump Installation .
10. Install the wiring harness connector bracket from the side of the cylinder head.

11. Disconnect the wiring harness electrical connector located at the side of the cylinder head.

Fig 3: View Of Left Cylinder Head Wiring Harness Ground Bolt



Courtesy of GENERAL MOTORS CORP.

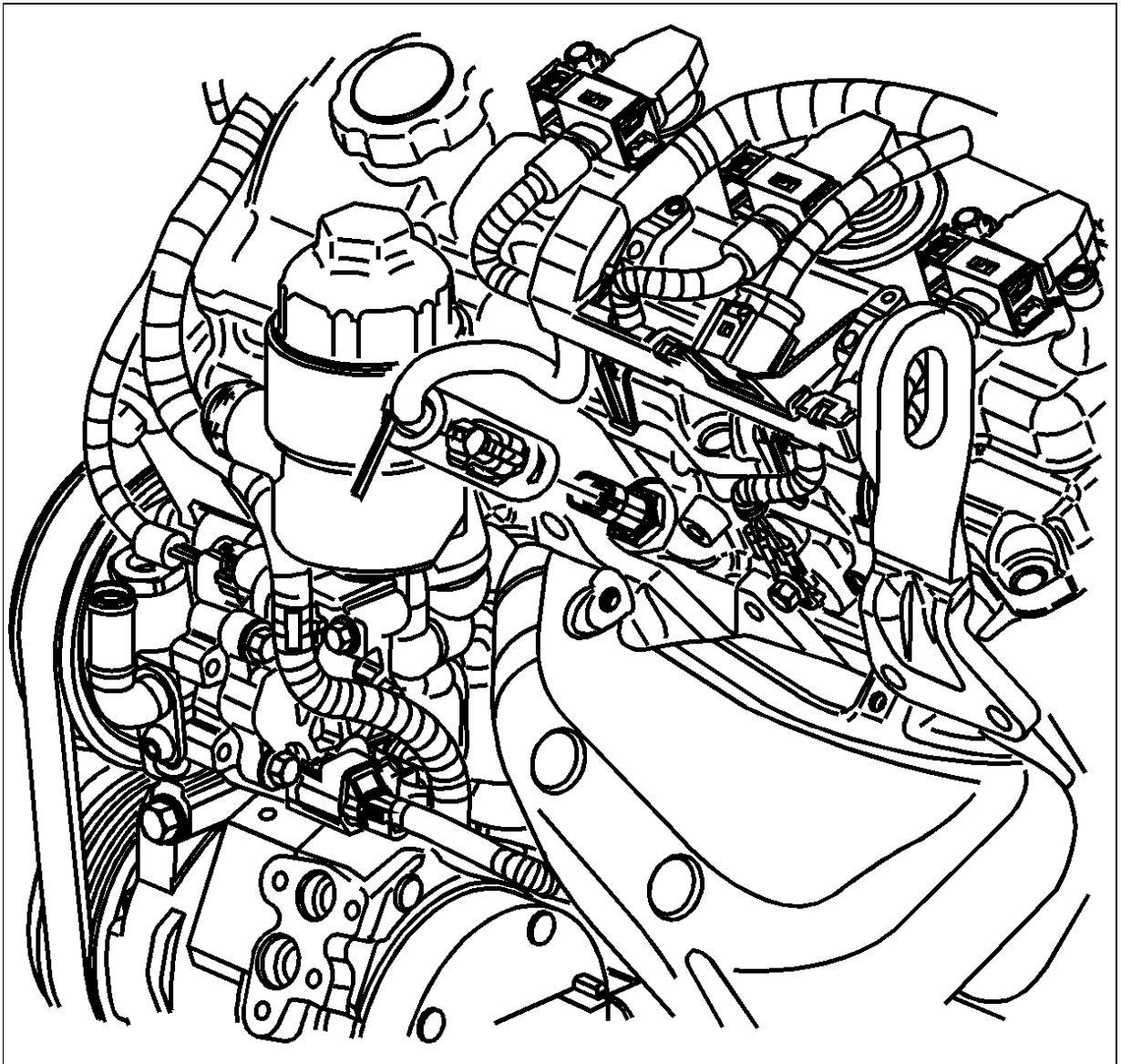


NOTE: Refer to Fastener Notice .

12. Install the wiring harness ground to the cylinder head.

Tighten: Tighten the wiring harness ground bolt to 10 N.m (89 lb in).

Fig 4: View Of Coolant Temperature Sensor And Electrical Connector



Courtesy of GENERAL MOTORS CORP.

13. Install the coolant temperature sensor electrical connector heat shield.
14. Install the oil level indicator. Refer to Oil Level Indicator and Tube Replacement .
15. Install the left bank secondary timing chain. Refer to Secondary Camshaft Drive Chain Replacement - Left Side .