

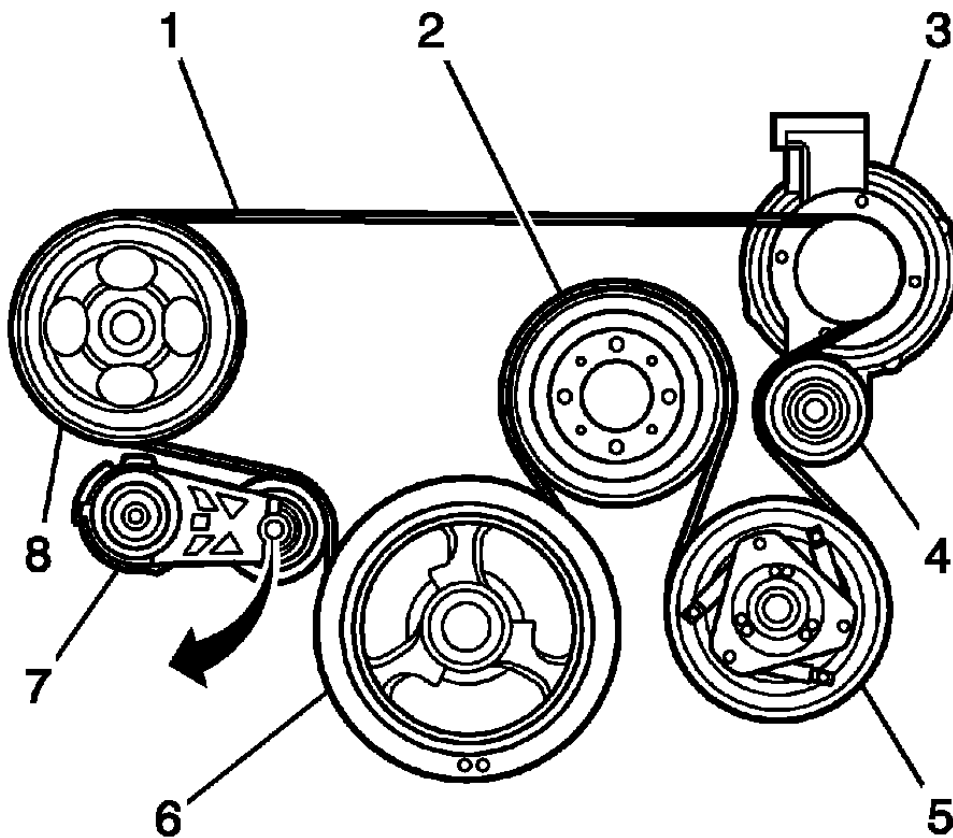
## 2012 Engine

### Engine Mechanical - 2.9L - Repair Instructions - On Vehicle - Canyon, Colorado

## REPAIR INSTRUCTIONS - ON VEHICLE

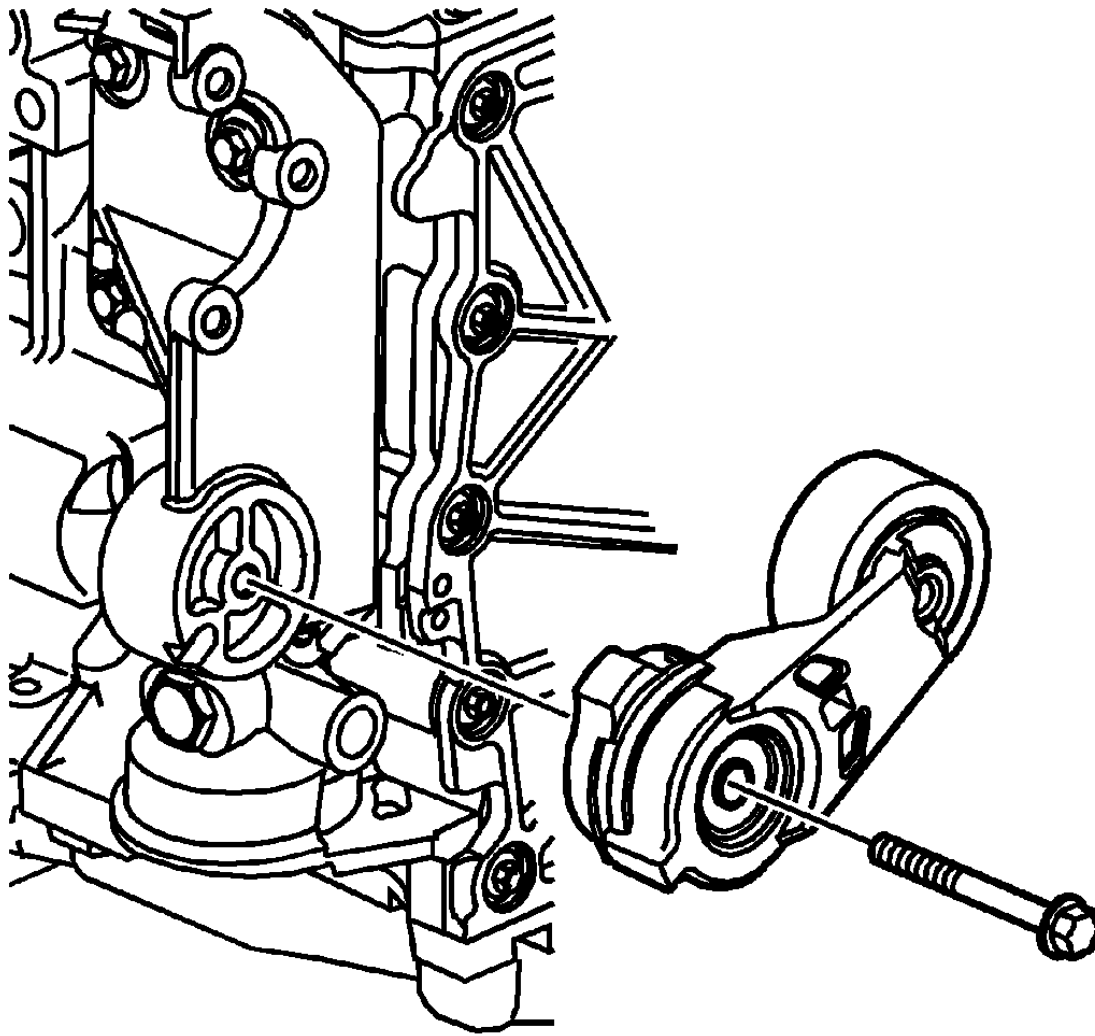
### DRIVE BELT REPLACEMENT

#### Removal Procedure



**Fig. 1: View Of Drive Belt Routing & Pulleys (With A/C)**  
Courtesy of GENERAL MOTORS COMPANY

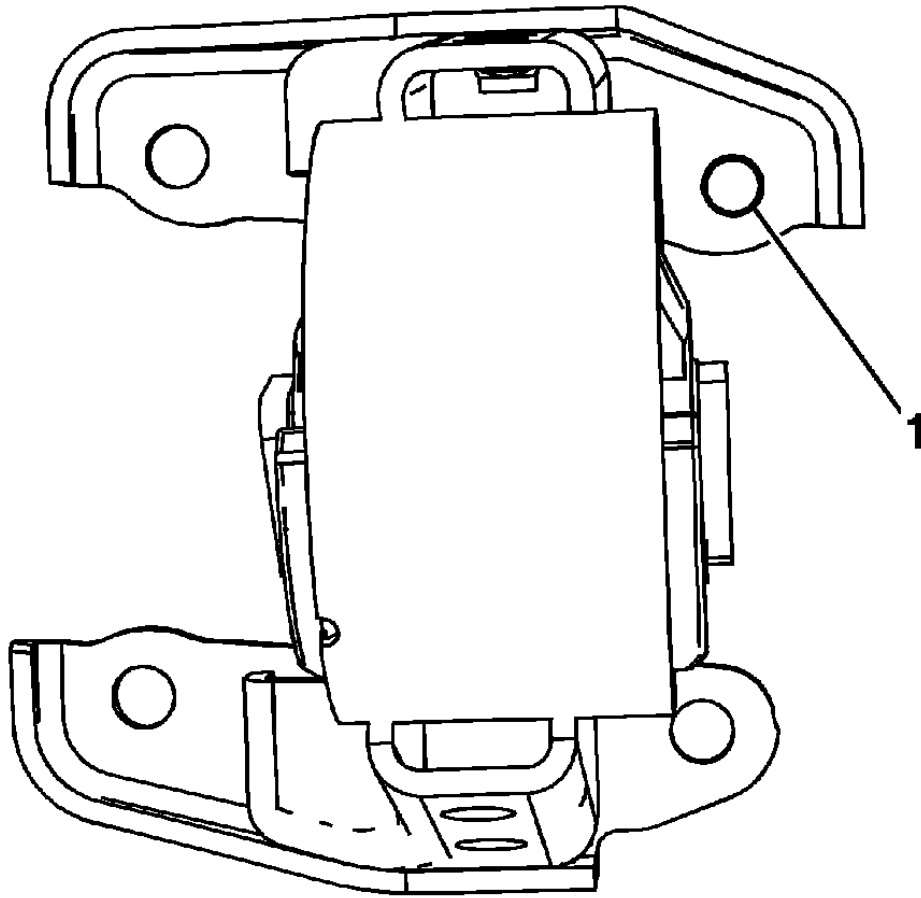
1. Install a 3/8 inch breaker bar into the drive belt tensioner (7) and rotate the tensioner (7) clockwise, enough to relieve the tension on the drive belt (1).
2. Slide the drive belt (1) from the water pump pulley (2).
3. Allow the drive belt tensioner (7) to return to the relaxed position.
4. Remove the drive belt (1) from the remaining pulleys.



**Fig. 3: View Of Drive Belt Tensioner**  
Courtesy of GENERAL MOTORS COMPANY

1. Remove the drive belt. Refer to **Drive Belt Replacement**.
2. Inspect the drive belt. Change the drive belt as necessary.
3. Using a wrench loosen and remove the drive belt tensioner bolt.
4. Remove the drive belt tensioner.

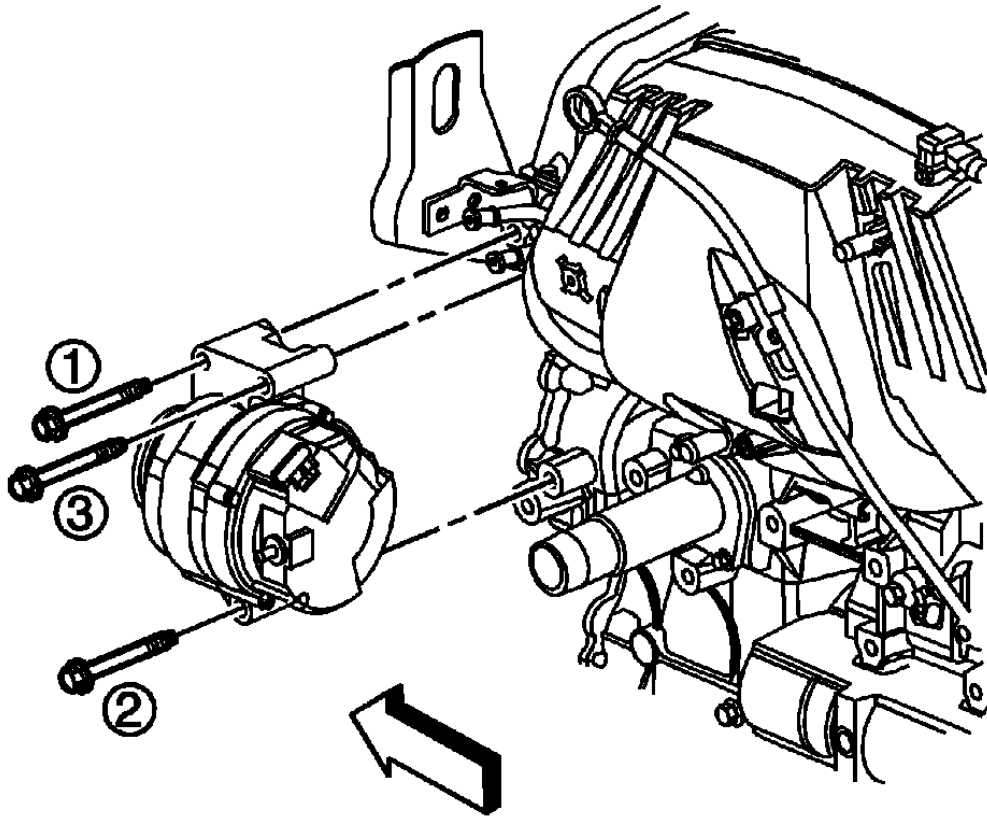
#### **Installation Procedure**



**Fig. 10: Locating Installation Start Bolt - Left**  
Courtesy of GENERAL MOTORS COMPANY

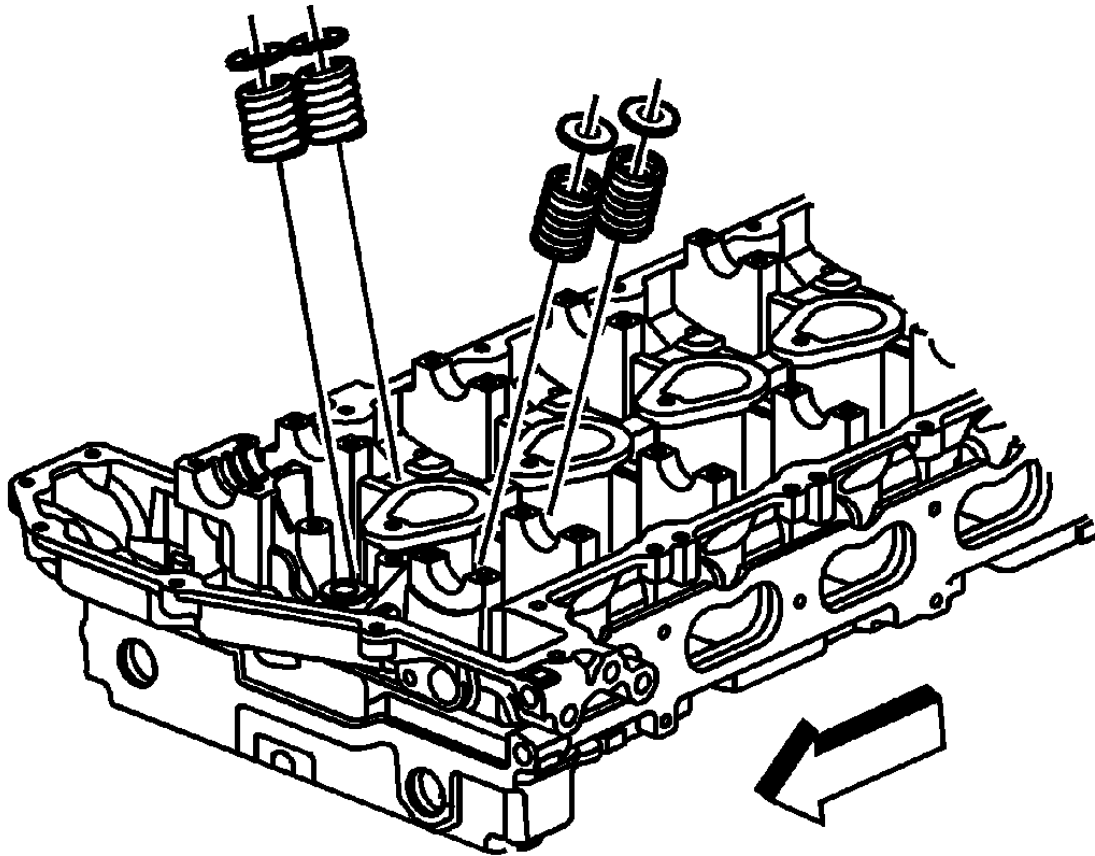
**CAUTION: Refer to Fastener Caution .**

3. To aid in the installation of the bolts, start a bolt in position (1) first. Tighten the bolts to 50 N.m (37 lb ft).
4. Lower the engine.



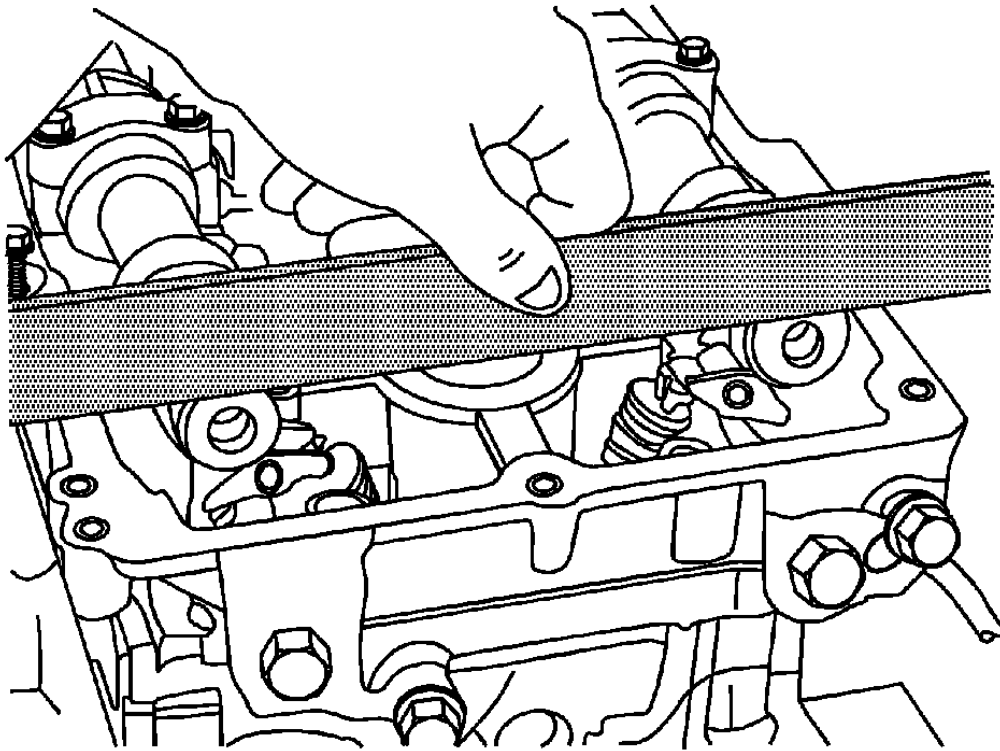
**Fig. 21: Generator Mounting Bolt Tightening Sequence**  
Courtesy of GENERAL MOTORS COMPANY

4. Install the generator bolts and tighten in sequence to 50 N.m (37 lb ft).



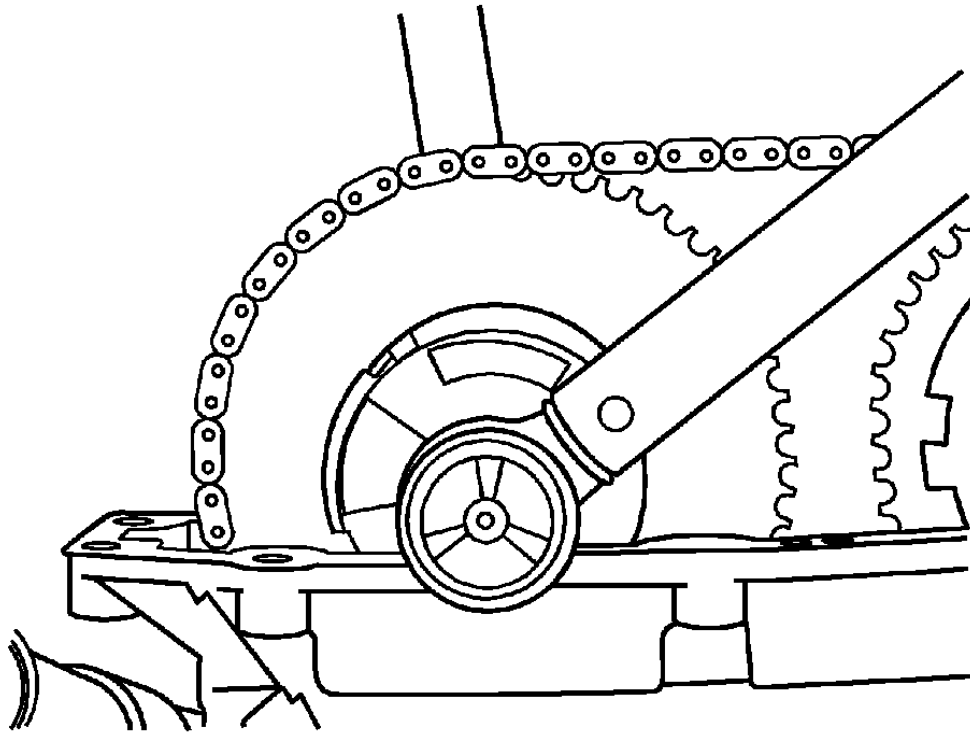
**Fig. 48: View Of Valve Springs & Retainers**  
Courtesy of GENERAL MOTORS COMPANY

14. Remove the valve spring retainer and valve spring.



**Fig. 66: Checking For TDC Position**  
**Courtesy of GENERAL MOTORS COMPANY**

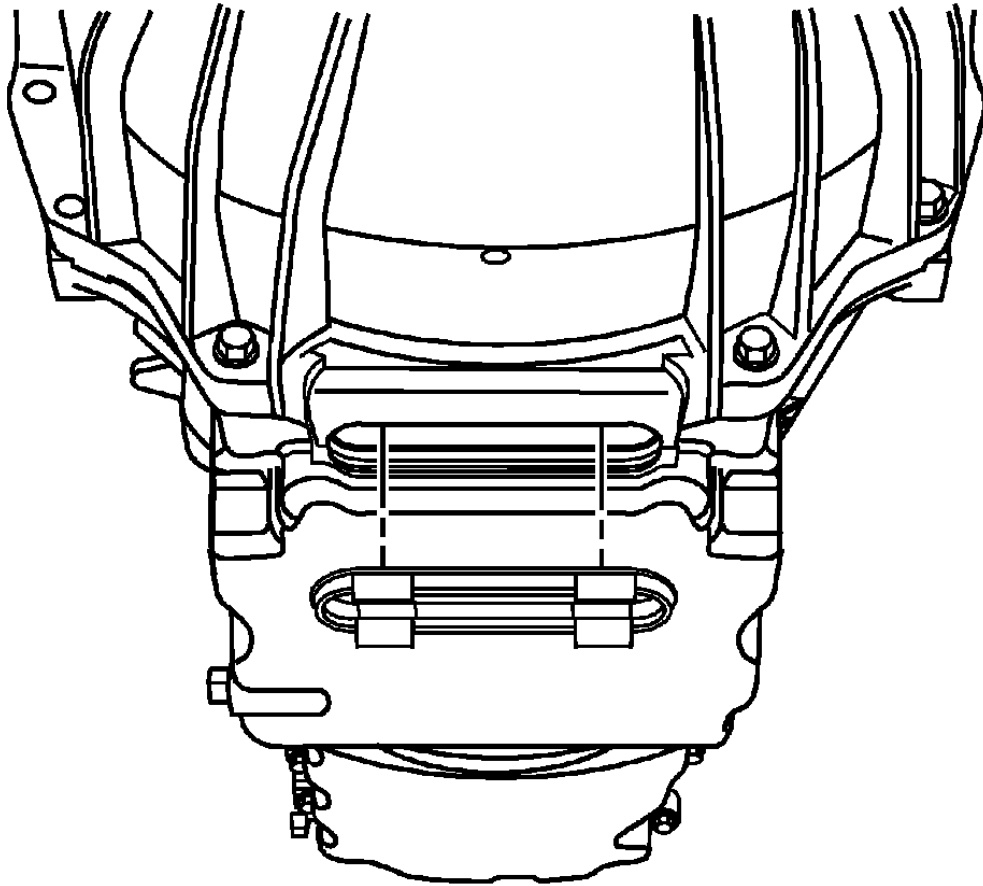
39. First Method (continued) - When the piston is at TDC, the flats at the rear of the camshafts will be facing up and level when using a straight edge across the camshaft flats.



**Fig. 87: Exhaust Camshaft Sprocket Bolt**  
Courtesy of GENERAL MOTORS COMPANY

11. Tighten the new exhaust camshaft actuator sprocket bolt.

Using **J 45059** angle meter , tighten the exhaust camshaft actuator sprocket bolt to 25 N.m (18 lb ft) plus 135 degrees.



**Fig. 103: View Of Service Slot Plug**  
Courtesy of GENERAL MOTORS COMPANY

6. Install the service slot plug.
7. Lower the vehicle.
8. Install the drive belt. Refer to **Drive Belt Replacement**.
9. Install the radiator. Refer to **Radiator Replacement**.

## **CRANKSHAFT FRONT OIL SEAL REPLACEMENT**

### **Tools Required**

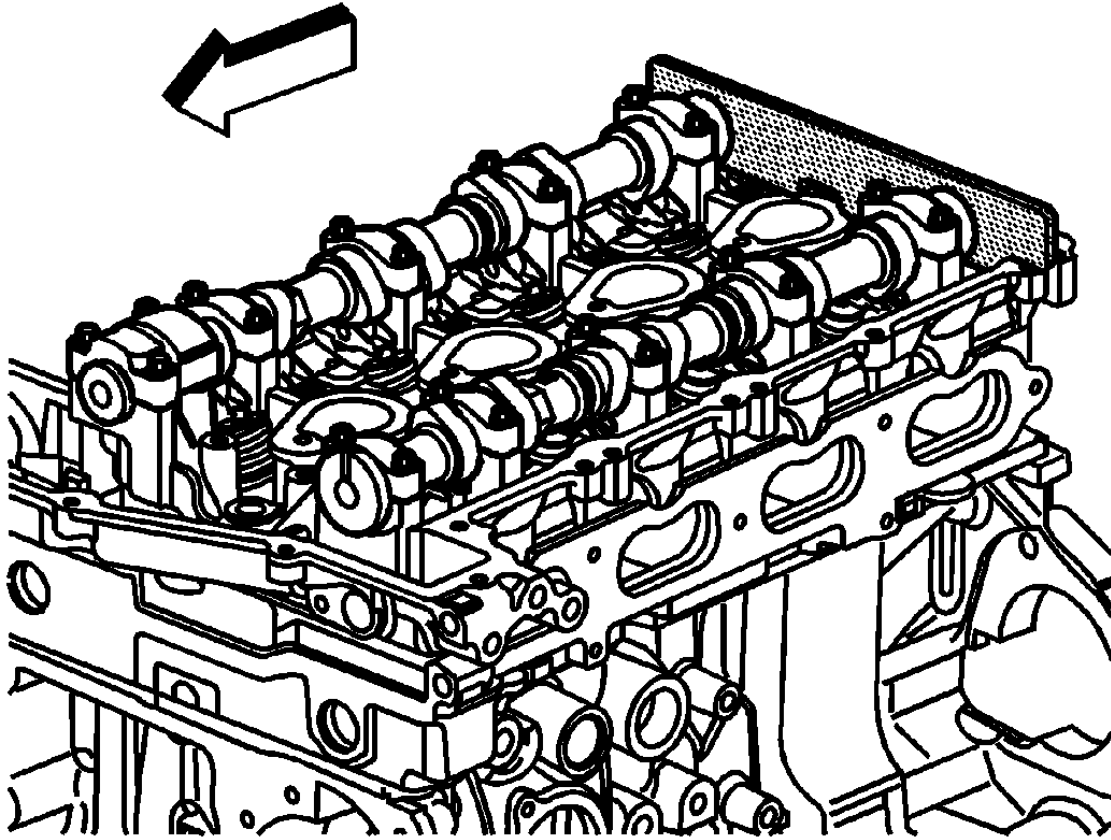
**J 45951** Front Seal Installer

### **Removal Procedure**

1. Remove the crankshaft balancer. Refer to **Crankshaft Balancer Replacement**.



## Removal Procedure



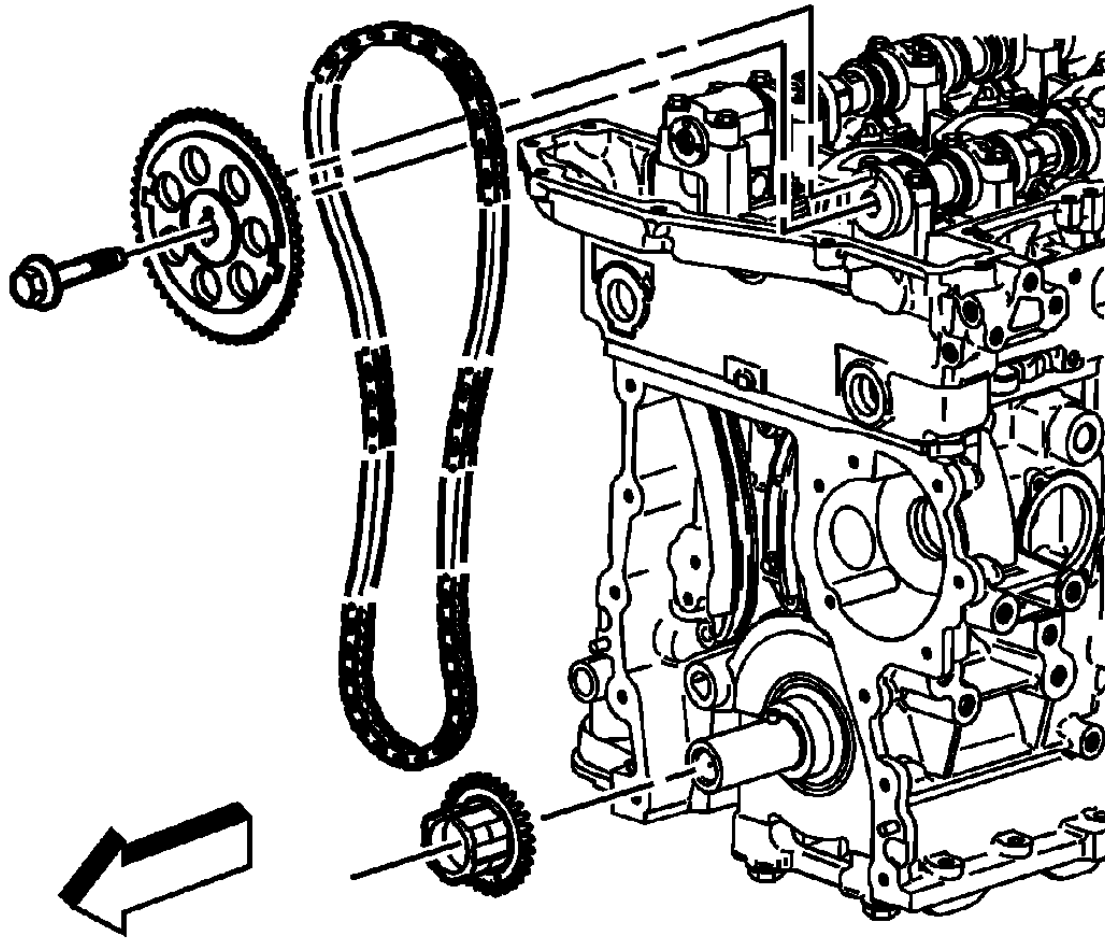
**Fig. 119: Camshaft Holding Tool**

Courtesy of GENERAL MOTORS COMPANY

1. Remove the camshaft cover. Refer to **Camshaft Cover Replacement**.
2. Rotate the crankshaft in the engine rotational direction clockwise, until the #1 piston is at top dead center (TDC) on the compression stroke.
3. Using the timing mark on the intake camshaft sprocket as a reference, make a mark on the timing chain link adjacent to it.

**WARNING:** Refer to **Camshaft Holding Tool Warning** .

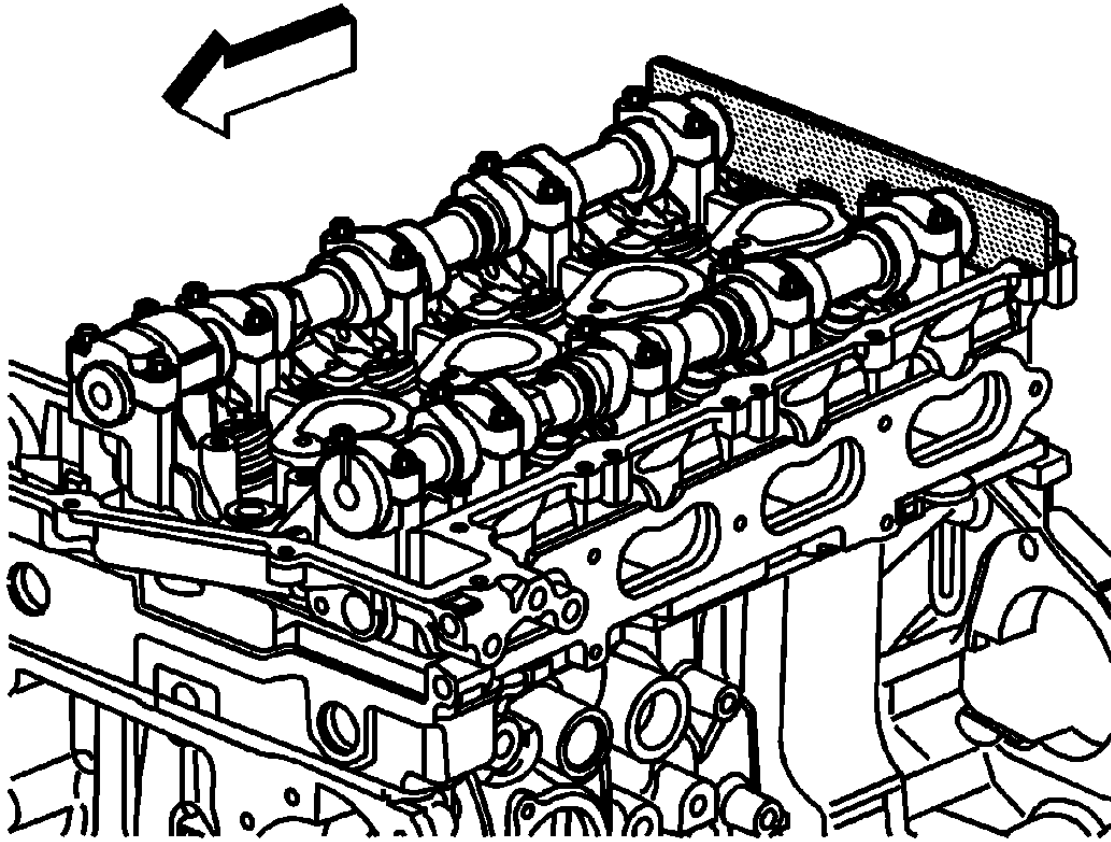
4. Install the **J 44221** camshaft holding tool to the rear of the camshafts.



**Fig. 130: View Of Timing Chain & Sprockets**  
Courtesy of GENERAL MOTORS COMPANY

11. Remove and discard the intake camshaft sprocket bolt.
12. Remove the intake camshaft sprocket.
13. Remove the timing chain.
14. Remove the crankshaft sprocket.

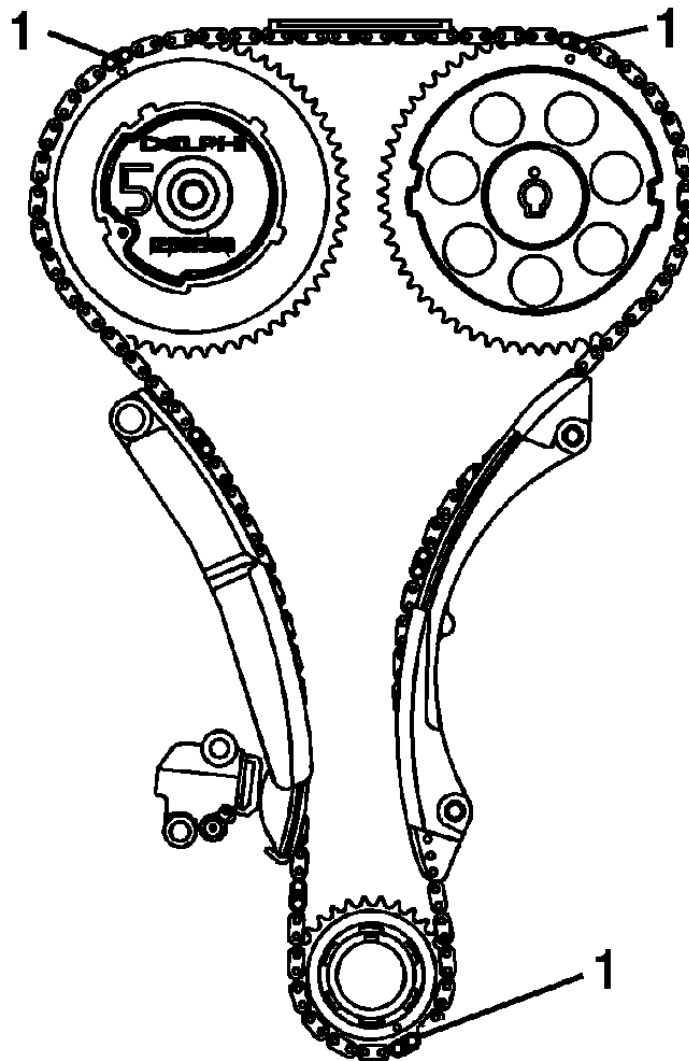
#### **Installation Procedure**



**Fig. 136: Camshaft Holding Tool**

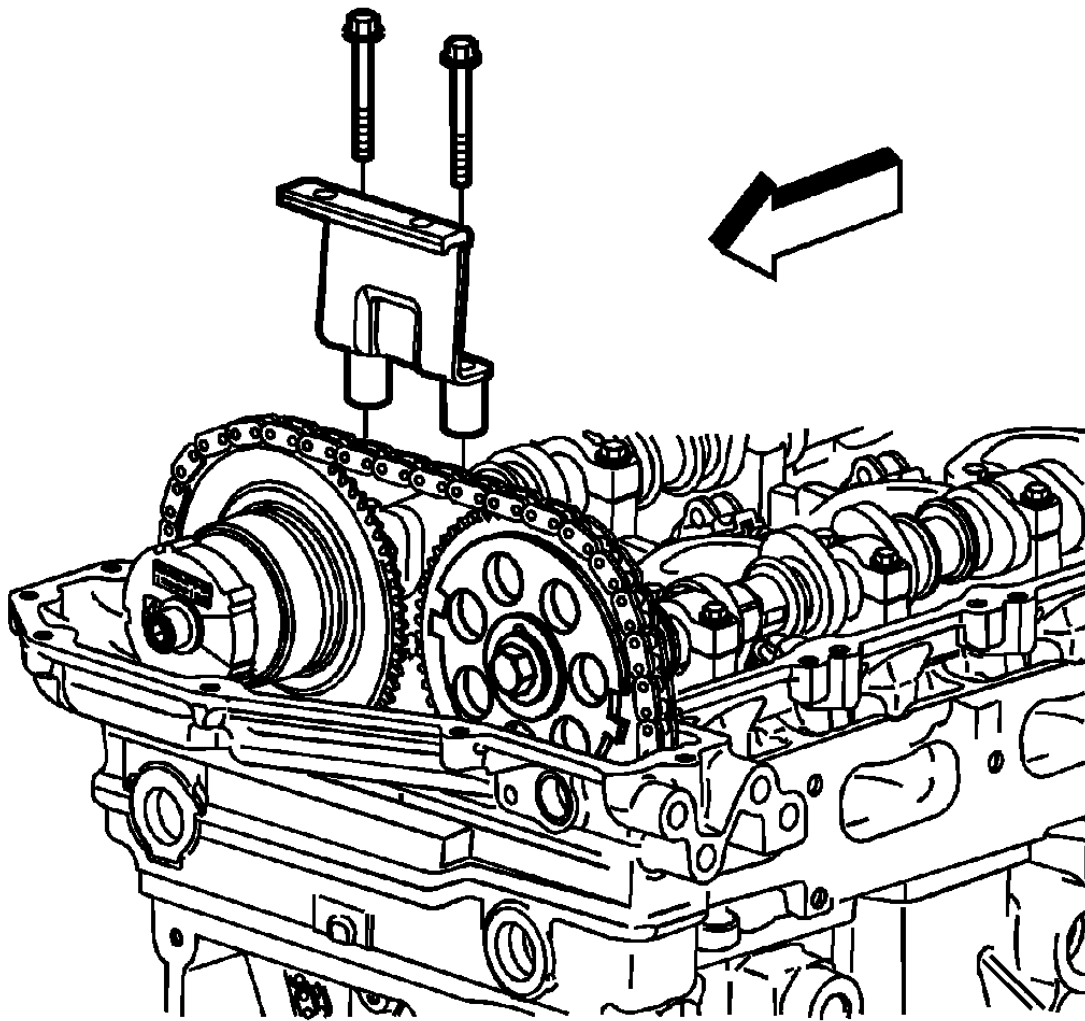
Courtesy of GENERAL MOTORS COMPANY

12. Remove the **J 44221** camshaft holding tool from the camshafts.



**Fig. 150: Identifying Chain Alignment Links**  
Courtesy of GENERAL MOTORS COMPANY

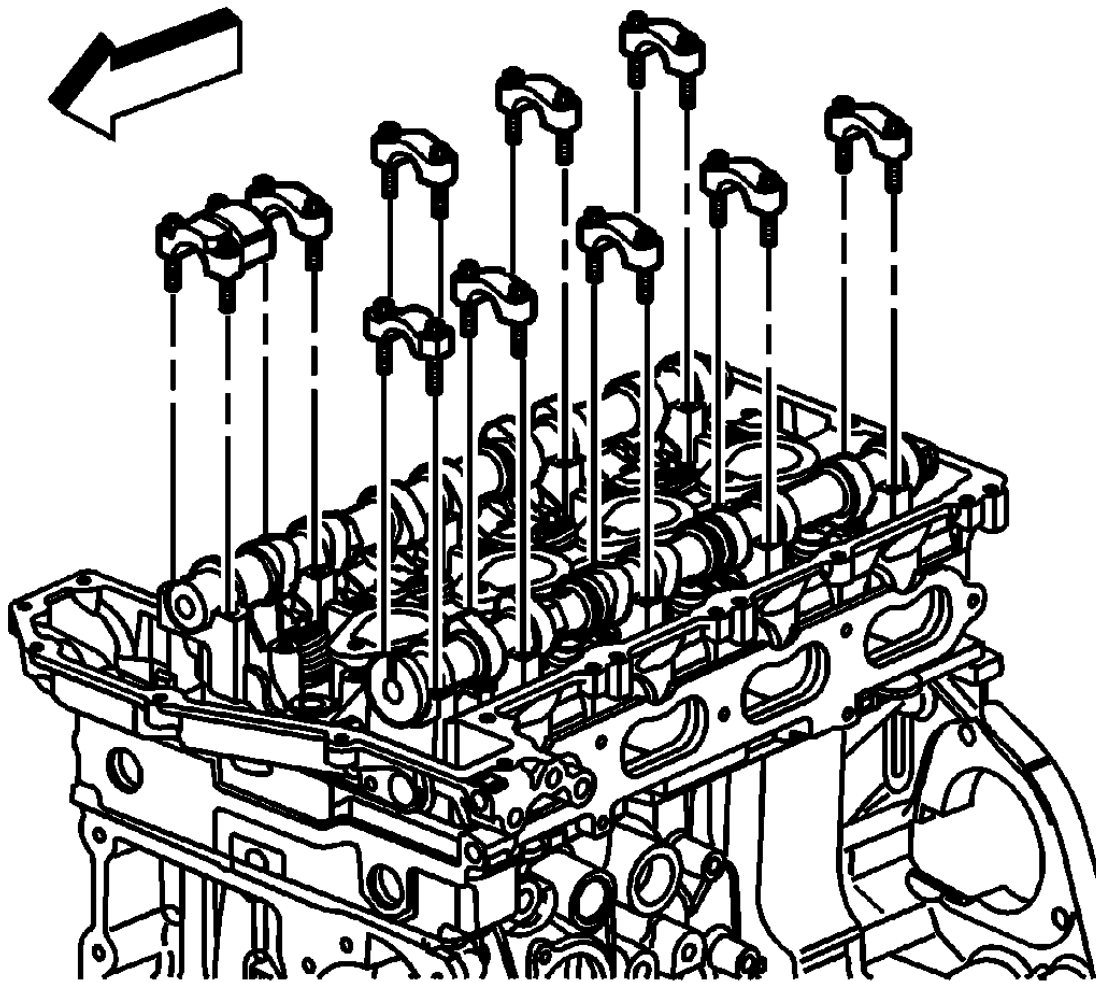
5. Using the timing marks on the following as a reference, make a mark on the timing chain links (1) adjacent to them:
- The exhaust camshaft position actuator sprocket
  - The intake camshaft sprocket
  - The crankshaft sprocket



**Fig. 161: View Of Upper Timing Chain Guide**  
Courtesy of GENERAL MOTORS COMPANY

1. Remove the camshaft cover. Refer to **Camshaft Cover Replacement**.
2. Remove the upper timing chain guide bolts.
3. Remove the upper timing chain guide from the cylinder head.

**Installation Procedure**

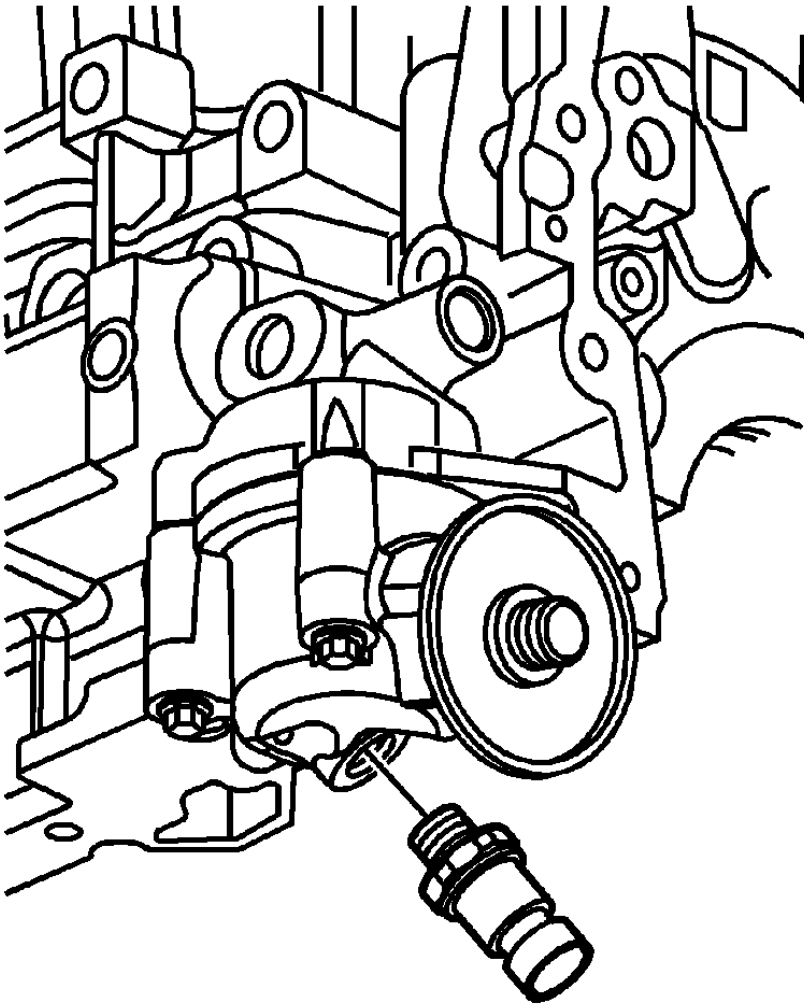


**Fig. 169: View Of Camshaft Cap Bolts**  
Courtesy of GENERAL MOTORS COMPANY

8. Alternately loosen the camshaft cap bolts a few turns at a time until all valve spring pressure has been released.

**NOTE:** Place the camshaft caps in a rack to ensure the caps are installed in the same location from which they were removed.

9. Remove the camshaft caps.
10. Remove the **J 44221** camshaft holding tool from the camshafts.



**Fig. 192: View Of Engine Oil Pressure Switch**  
Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Refer to Component Fastener Tightening Caution .

1. Install the engine oil pressure switch and tighten to 20 N.m (15 lb ft).