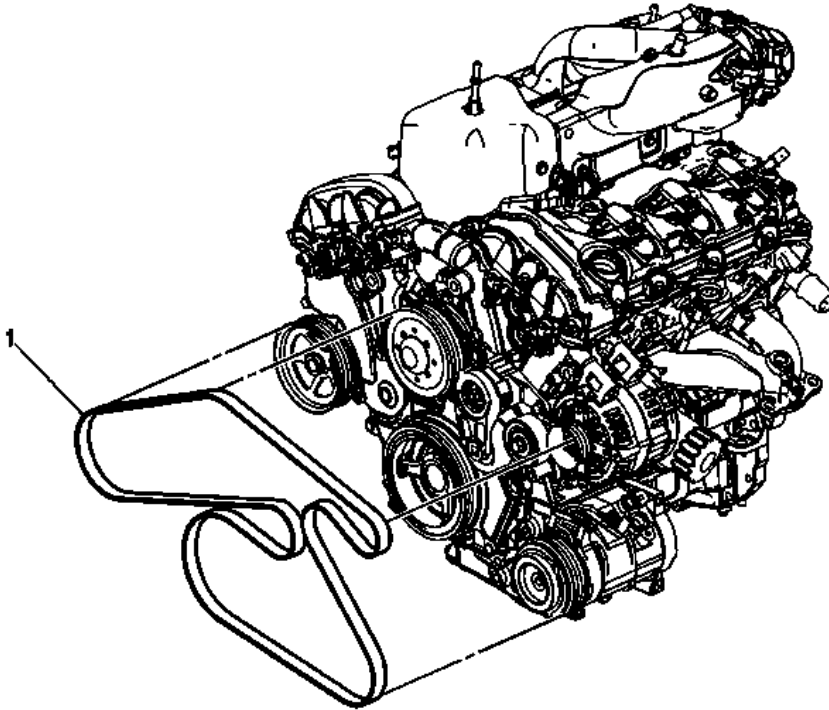


## 2012 Engine

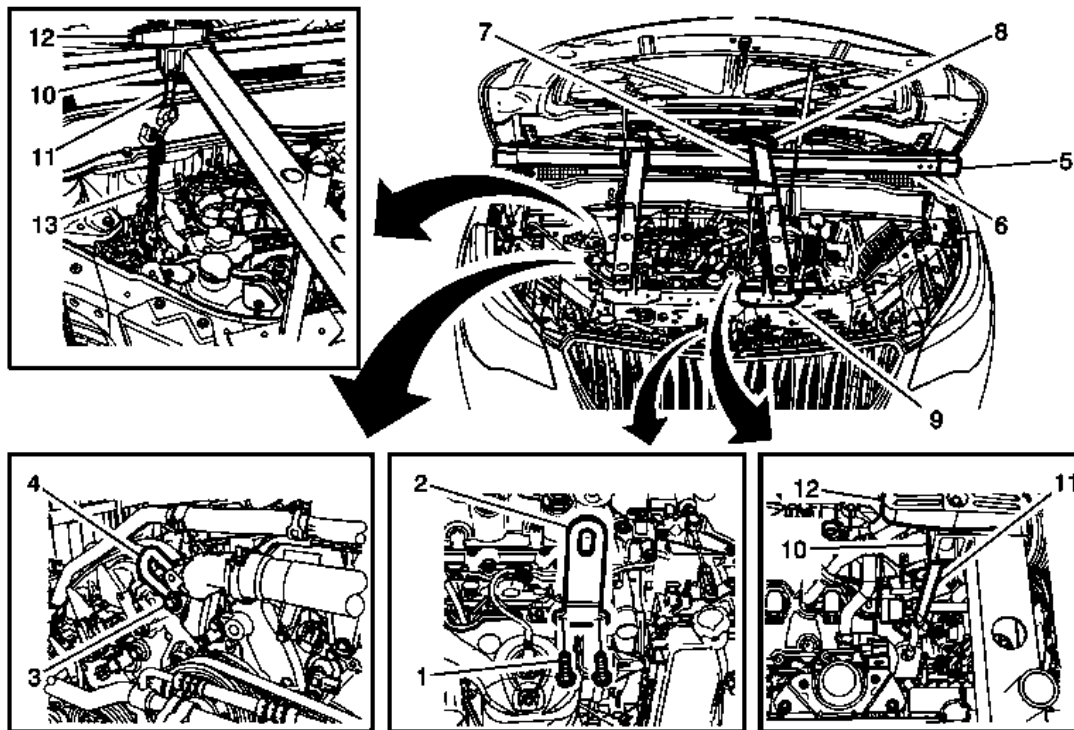
Engine Mechanical - 3.6L - Repair Instructions - On Vehicle - Acadia, Enclave And Traverse

**REPAIR INSTRUCTIONS - ON VEHICLE****DRIVE BELT REPLACEMENT**

**Fig. 1: Identifying Drive Belt Routing**  
Courtesy of GENERAL MOTORS COMPANY

**Drive Belt Replacement**

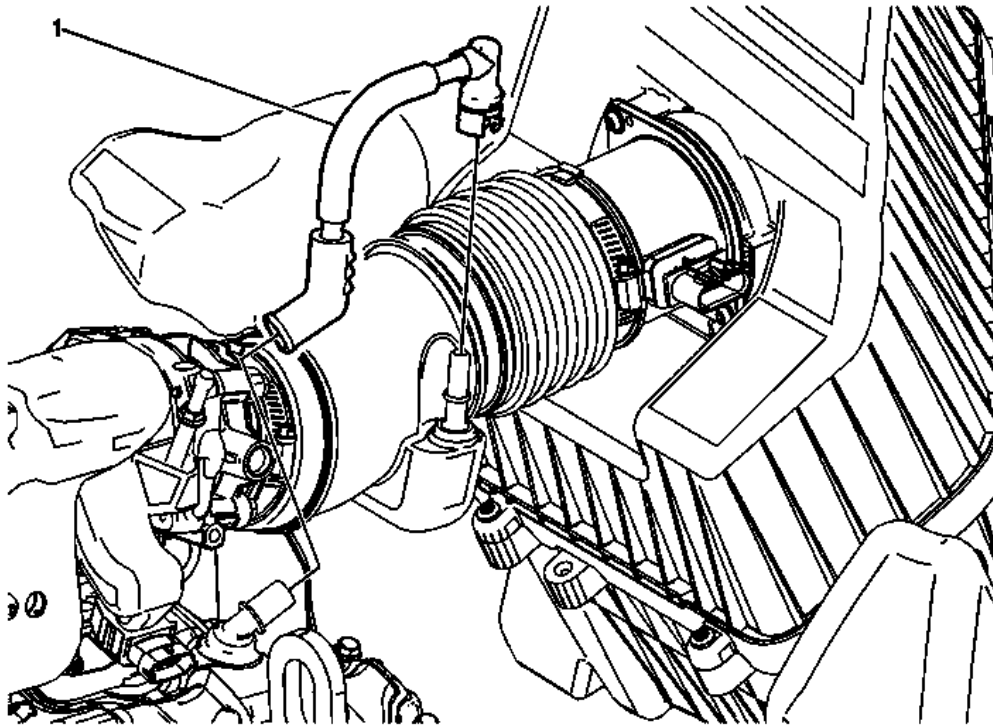
Callout	Component Name
<b>Preliminary Procedure</b>	
<b>1. Remove the front wheelhouse liner. Refer to <u>FRONT WHEELHOUSE FRONT LINER REPLACEMENT (ENCLAVE - ACADIA)</u> or <u>FRONT WHEELHOUSE FRONT LINER REPLACEMENT (TRAVERSE)</u> or <u>FRONT WHEELHOUSE REAR LINER REPLACEMENT (TRAVERSE)</u> .</b>	
<b>2. Rotate the drive belt tensioner clockwise to release the drive belt tension.</b>	
<b>3. Slide the drive belt off of the belt idler pulley.</b>	
<b>4. Slowly release the drive belt tensioner.</b>	
1	Drive Belt

**ENGINE SUPPORT FIXTURE**

**Fig. 4: Engine Support Fixture Components**  
 Courtesy of GENERAL MOTORS COMPANY

**Engine Support Fixture**

Callout	Component Name
<b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li>1. Remove the fuel injector sight shield. Refer to <b><u>Fuel Injector Sight Shield Replacement</u></b>.</li> <li>2. Remove the front compartment sight shields. Refer to <b><u>Front Compartment Sight Shields Replacement (Traverse)</u></b> , <b><u>Front Compartment Sight Shields Replacement (Acadia)</u></b> , <b><u>Front Compartment Sight Shields Replacement (Enclave)</u></b> .</li> </ol>	
<b>Special Tools</b> <ul style="list-style-type: none"> <li>• EN-46114-1 Engine Lift Bracket</li> <li>• EN-36857 Engine Lift Bracket</li> <li>• EN-28467-301 Engine Support Fixture Adapters</li> <li>• J-284678-518 Main Support Beam</li> <li>• EN-28467-2A Radiator Tube Shelf Assembly</li> <li>• EN-28467-1A Cross Bracket</li> <li>• EN-28467-4A Front Support Assembly</li> </ul>	



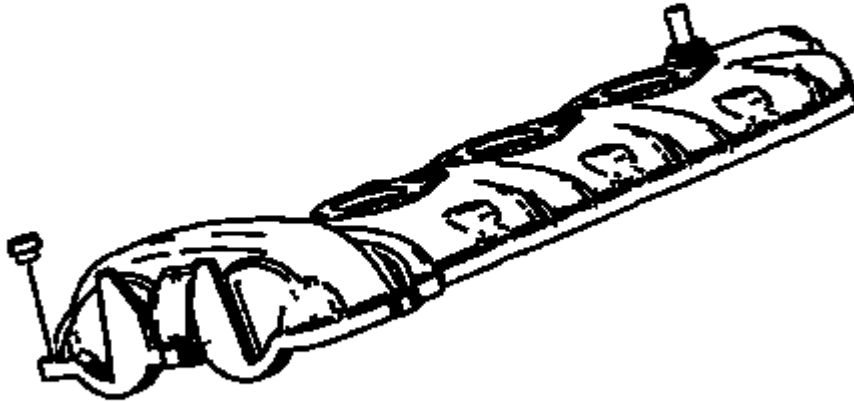
**Fig. 13: Identifying Front Positive Crankcase Ventilation Tube**  
Courtesy of GENERAL MOTORS COMPANY

#### Positive Crankcase Ventilation Tube Replacement - Front

Callout	Component Name
<b>Preliminary Procedure</b> Remove the fuel injector sight shield. Refer to <u>Fuel Injector Sight Shield Replacement</u> .	
1	Positive Crankcase Ventilation Tube <b>Procedure</b> Disconnect the PCV tube quick disconnect. Refer to <u>Plastic Collar Quick Connect Fitting Service</u> .

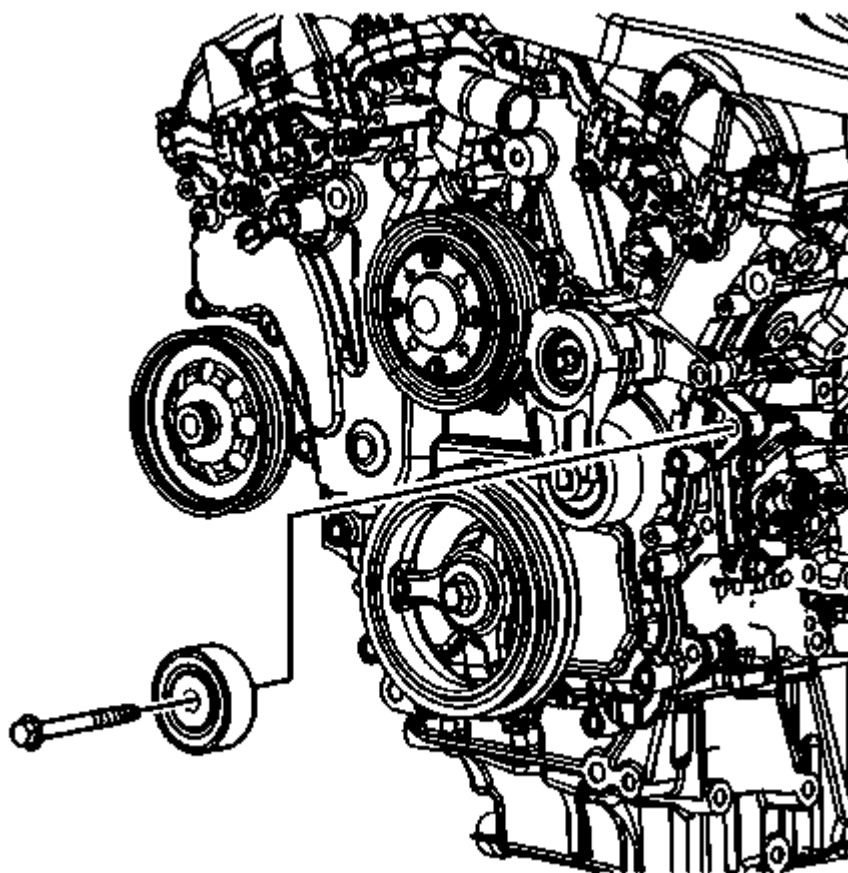
#### POSITIVE CRANKCASE VENTILATION TUBE REPLACEMENT - REAR

##### Removal Procedure



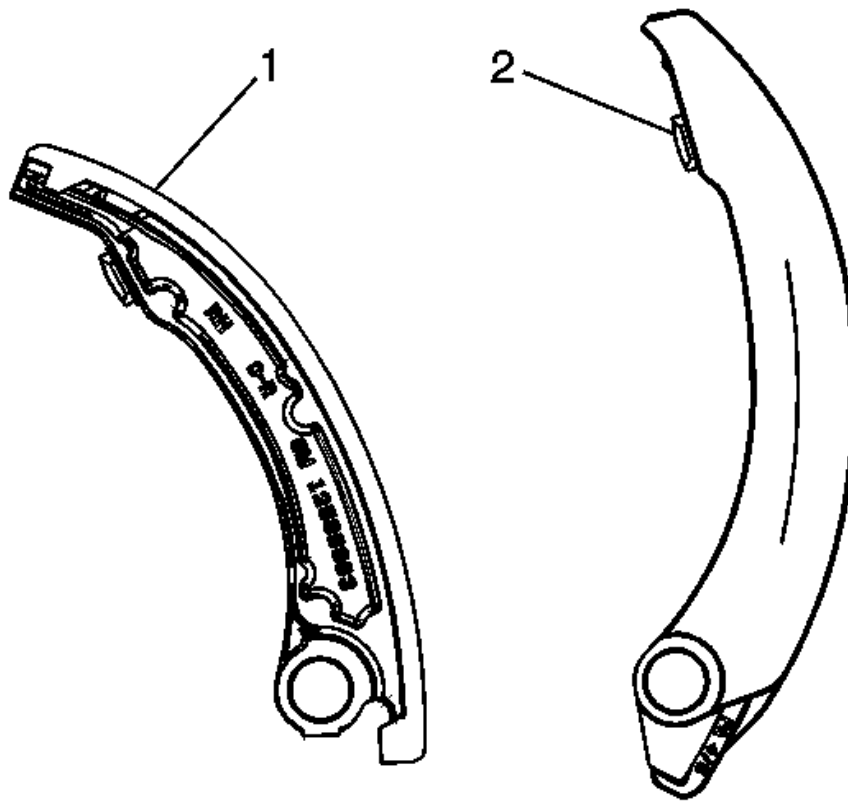
**Fig. 54: Locating Camshaft Cover Bolt Grommets**  
Courtesy of GENERAL MOTORS COMPANY

1. Install new camshaft cover bolt grommets prior to installing the camshaft cover bolts.



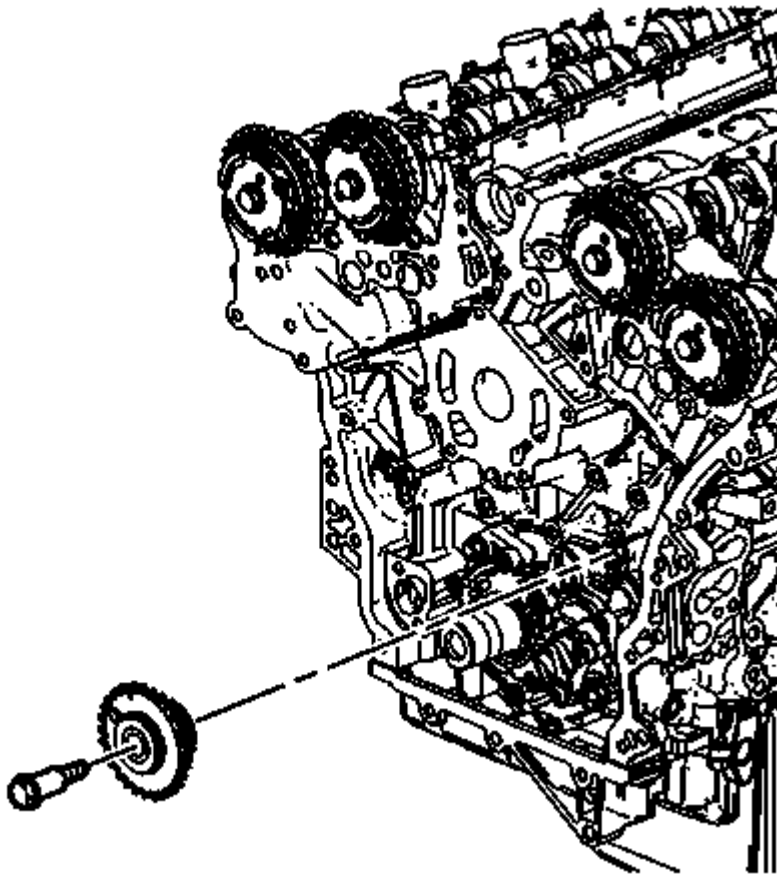
**Fig. 73: Identifying Drive Belt Idler Pulley & Bolt**  
Courtesy of GENERAL MOTORS COMPANY

5. Install the drive belt idler bolt and idler. Refer to **Drive Belt Idler Pulley Installation**
6. Install the crankshaft balancer. Refer to **Crankshaft Balancer Installation** .
7. Install the starter, starter bolts and starter electrical connections.
8. Install the starter heat shield.
9. Install the oil filter.



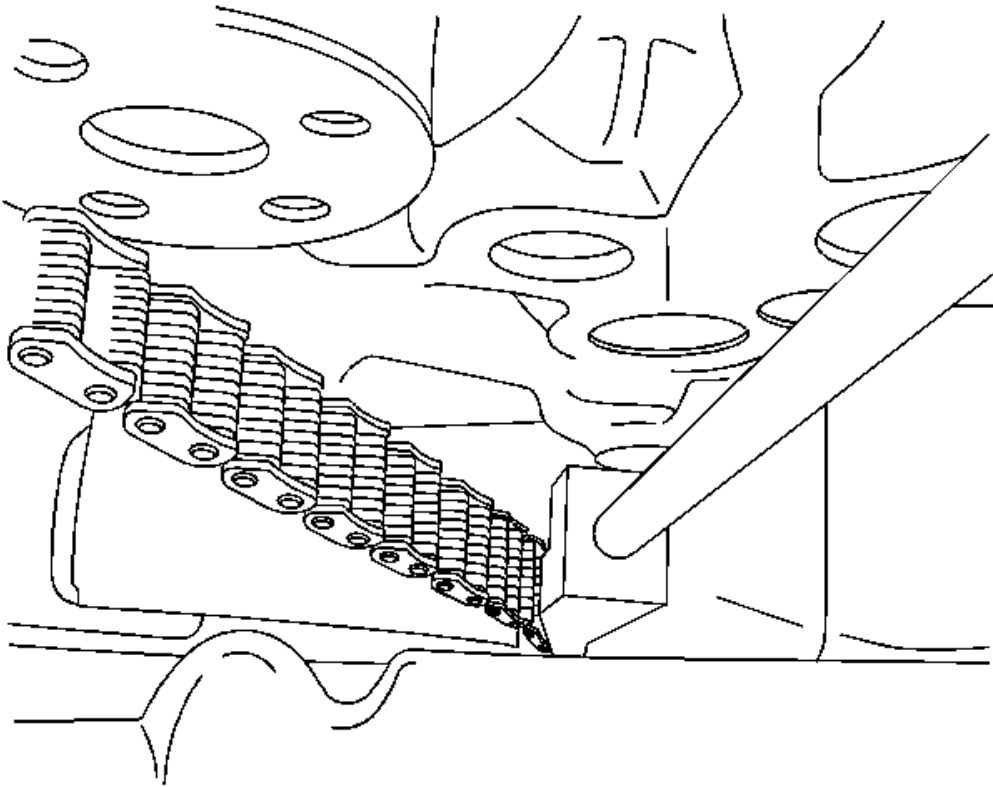
**Fig. 90: Identifying Right Secondary Camshaft Drive Chain Shoe**  
Courtesy of GENERAL MOTORS COMPANY

1. Ensure that the left secondary camshaft drive chain shoe (2) is being installed.



**Fig. 108: View Of Left Camshaft Intermediate Drive Chain Idler Sprocket**  
Courtesy of GENERAL MOTORS COMPANY

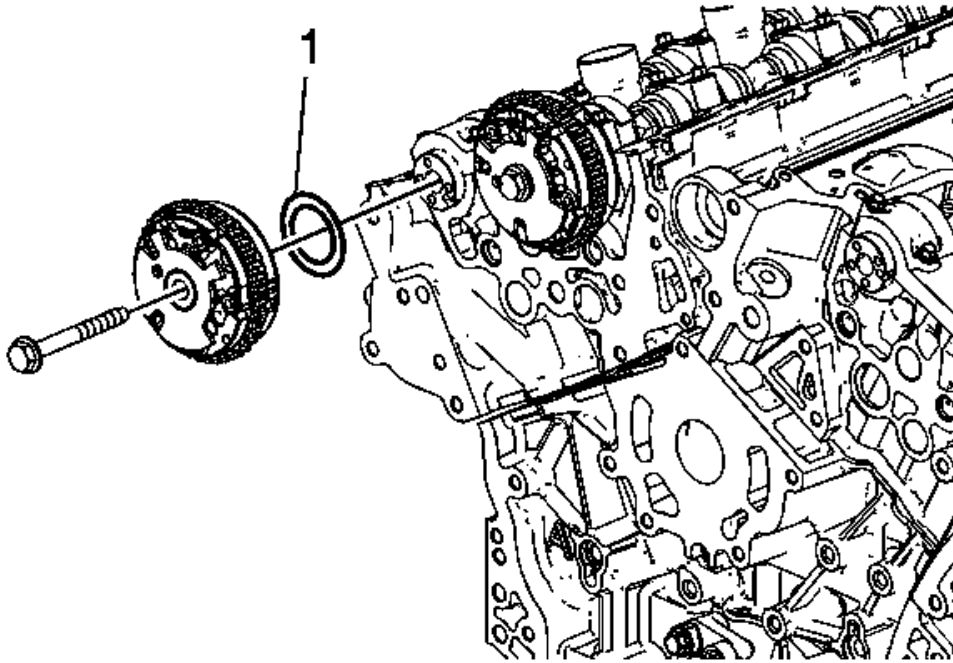
2. Install the right bank camshaft intermediate drive chain idler. Refer to **Timing Chain Idler Sprocket Installation - Right Side** .
3. Install the primary camshaft drive chain. Refer to **Primary Camshaft Intermediate Drive Chain Installation** .
4. Install the primary upper camshaft drive chain guide. Refer to **Primary Timing Chain Guide Installation - Upper** .
5. Install the primary camshaft drive chain tensioner. Refer to **Primary Camshaft Intermediate Drive Chain Tensioner Installation** .
6. Install the right bank secondary camshaft drive chain. Refer to **Secondary Camshaft Intermediate Drive Chain Installation - Right Side** .
7. Install the right bank secondary camshaft drive chain guide. Refer to **Secondary Timing Chain Guide Installation - Right Side** .
8. Install the right bank secondary camshaft drive chain shoe. Refer to **Secondary Camshaft Drive Chain Shoe Installation - Right Side** .
9. Install the right bank secondary camshaft drive chain tensioner. Refer to **Secondary Timing Chain Tensioner Installation - Right Side** .
10. Install the spark plugs. Refer to **Spark Plug Replacement** .
11. Install the engine front cover. Refer to **Engine Front Cover Replacement**.



**Fig. 128: Identifying Wedge Position**  
Courtesy of GENERAL MOTORS COMPANY

19. If possible shine a strong light down from above, between the camshaft position actuators, and see the wedge in overall position as shown in the above graphic.





**Fig. 140: Plastic Thrust Washers**

**Courtesy of GENERAL MOTORS COMPANY**

1. Install plastic camshaft position actuator thrust washer (1) between cylinder head face and camshaft position actuator on assembly.

## SETTING CAMSHAFT TIMING

**IMPORTANT:** Setting the camshaft timing is necessary whenever the camshaft drive system has been disturbed such that the relationship between any chain and sprocket has been lost. Even when only one sprocket is involved, multiple crankshaft rotations will not produce conditions where correct timing can be confirmed.

Follow the left bank secondary camshaft drive chain replacement procedures to reset the camshaft timing. Refer to **Secondary Camshaft Intermediate Drive Chain Replacement - Left Side**.

## CAMSHAFT REPLACEMENT - LEFT SIDE

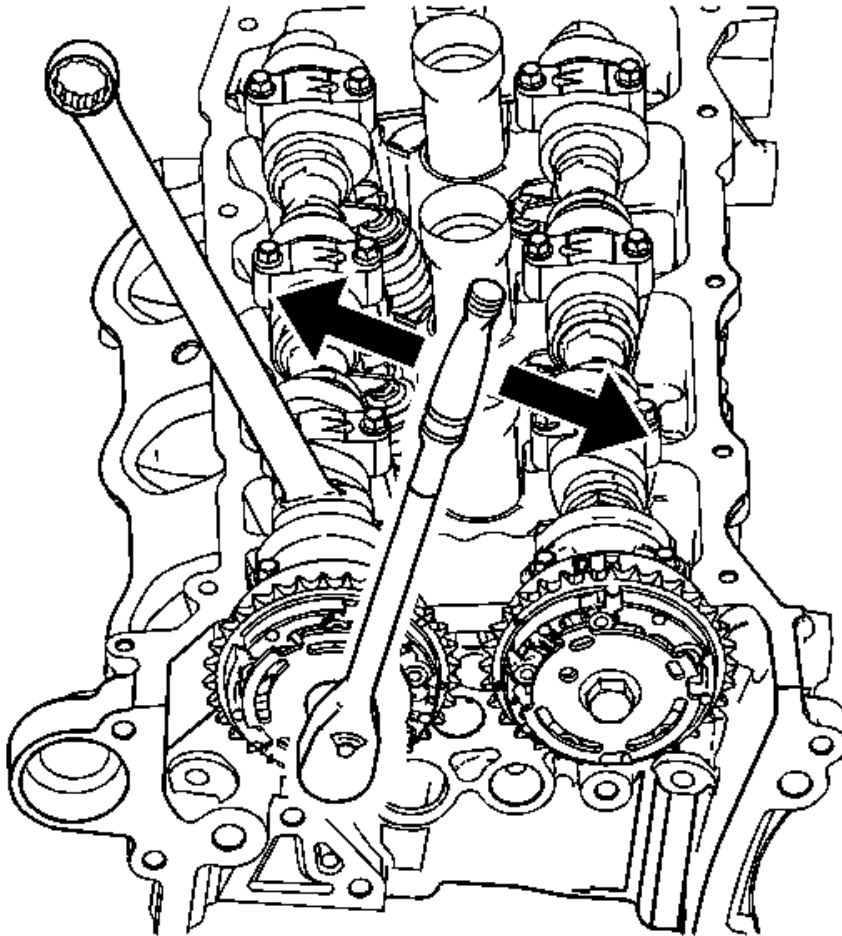
### Special Tools

- **EN-48589** Crankshaft Rotation Socket
- **EN-48383** Timing Chain Retention Tool

For equivalent regional tools, refer to **Special Tools** .

### Removal Procedure

1. Remove the intake manifold. Refer to **Intake Manifold Replacement**.
2. Remove the fuel pump from the cylinder head. Refer to **Fuel Pump Replacement (LLT)** .
3. Remove the left bank camshaft cover. Refer to **Camshaft Cover Replacement - Left Side**.
4. 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** .
5. Remove the camshaft position actuator solenoid. Refer to **Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 2 (Left Side) Intake** .
6. Remove the camshaft position actuator. Refer to **Camshaft Position Actuator Replacement - Bank 2**.
7. Remove the crankshaft balancer. Refer to **Crankshaft Balancer Replacement**.

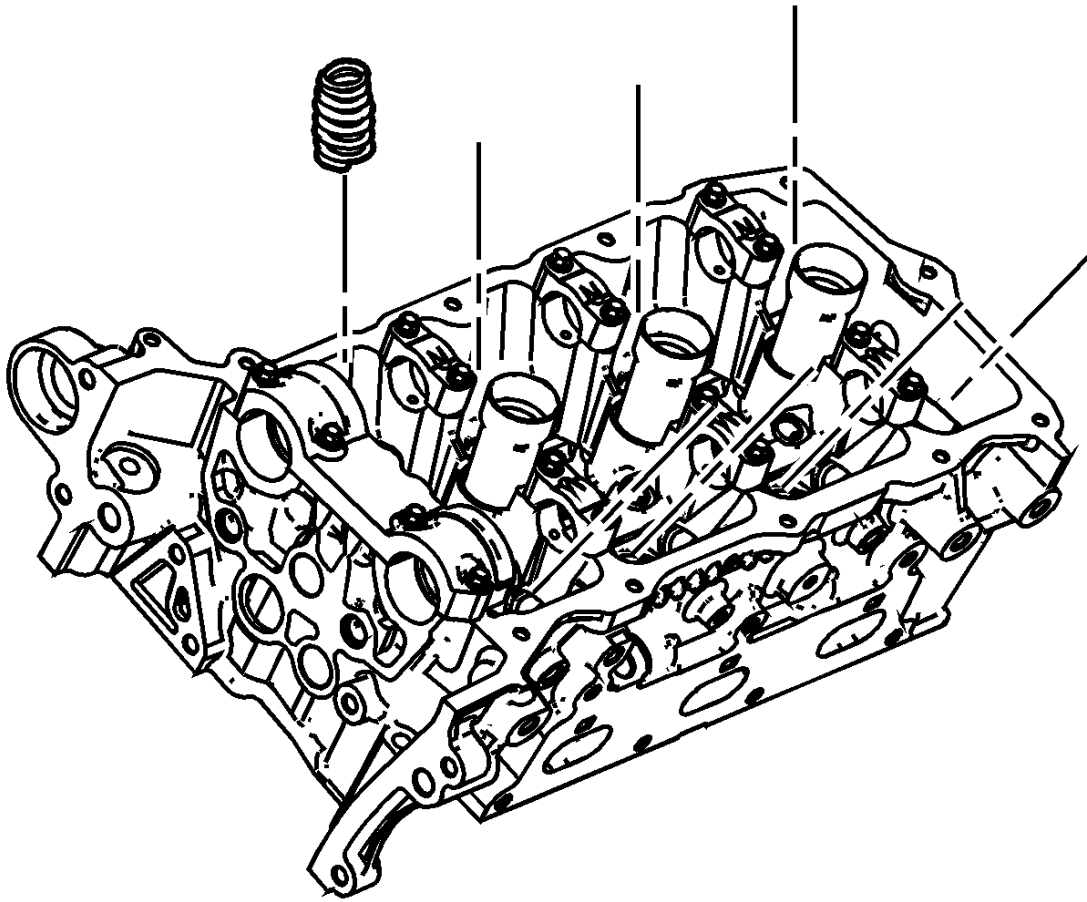


**Fig. 170: Preventing Camshaft/Engine Rotation Using Open-End Wrench**  
Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Refer to Torque Reaction Against Timing Drive Chain Caution .

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

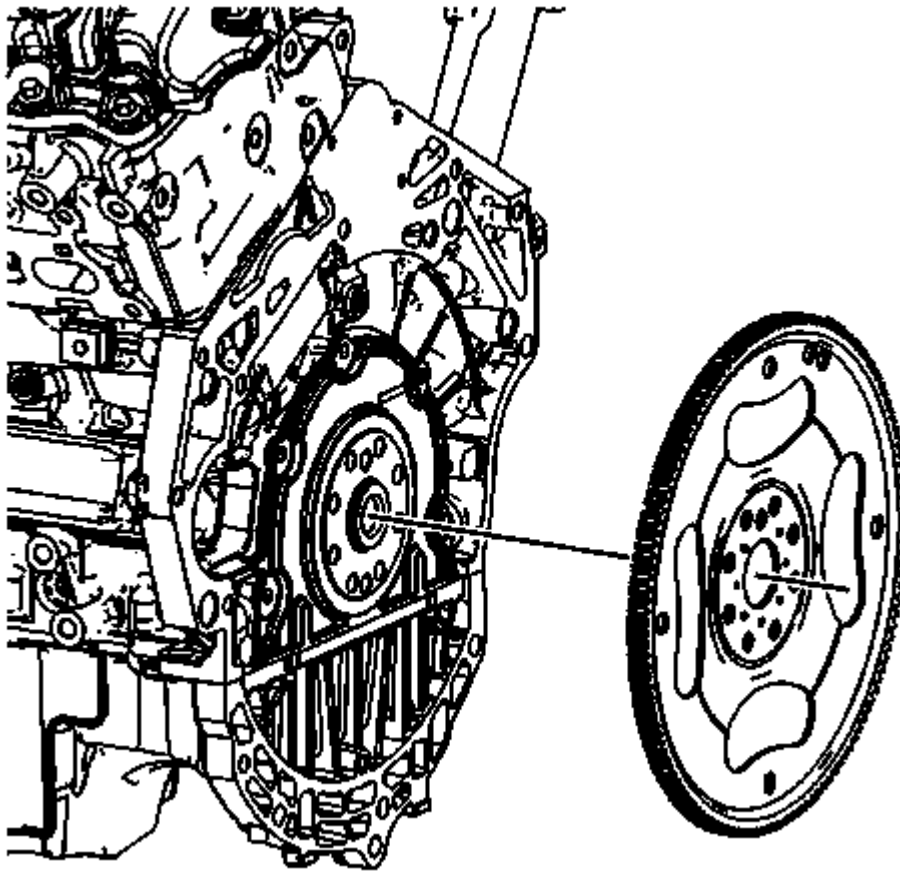
5. Install and tighten the camshaft position actuators. Refer to Camshaft Position Actuator Installation - Right Side Intake , and Camshaft Position Actuator Installation - Right Side Exhaust .
6. Install the intake camshaft position actuator solenoid. Refer to Camshaft Position Actuator Solenoid Valve Solenoid Replacement - Bank 1 (Right Side) Intake .
7. 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 .
8. Install the camshaft cover. Refer to Camshaft Cover Replacement - Right Side.
9. Install the intake manifold. Refer to Intake Manifold Replacement.



**Fig. 185: View Of Valve Spring**

**Courtesy of GENERAL MOTORS COMPANY**

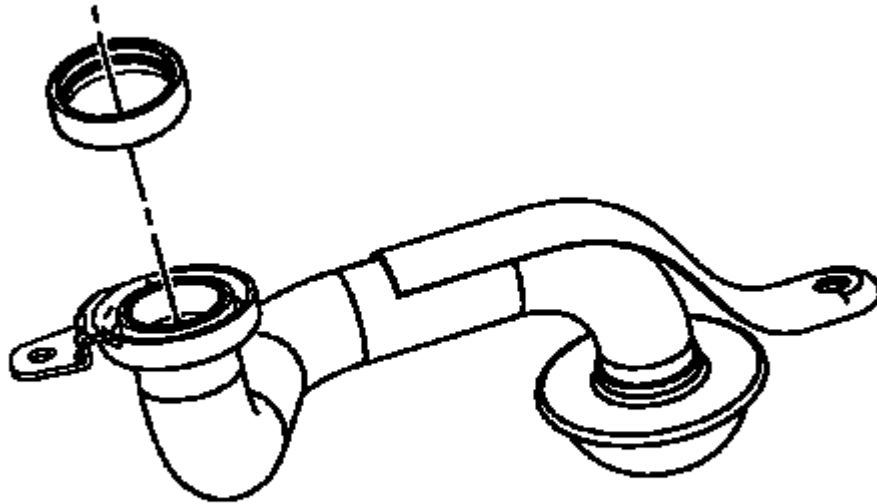
2. Install the valve spring.
3. Install the valve spring retainer.



**Fig. 205: View Of Engine Flywheel**  
Courtesy of GENERAL MOTORS COMPANY

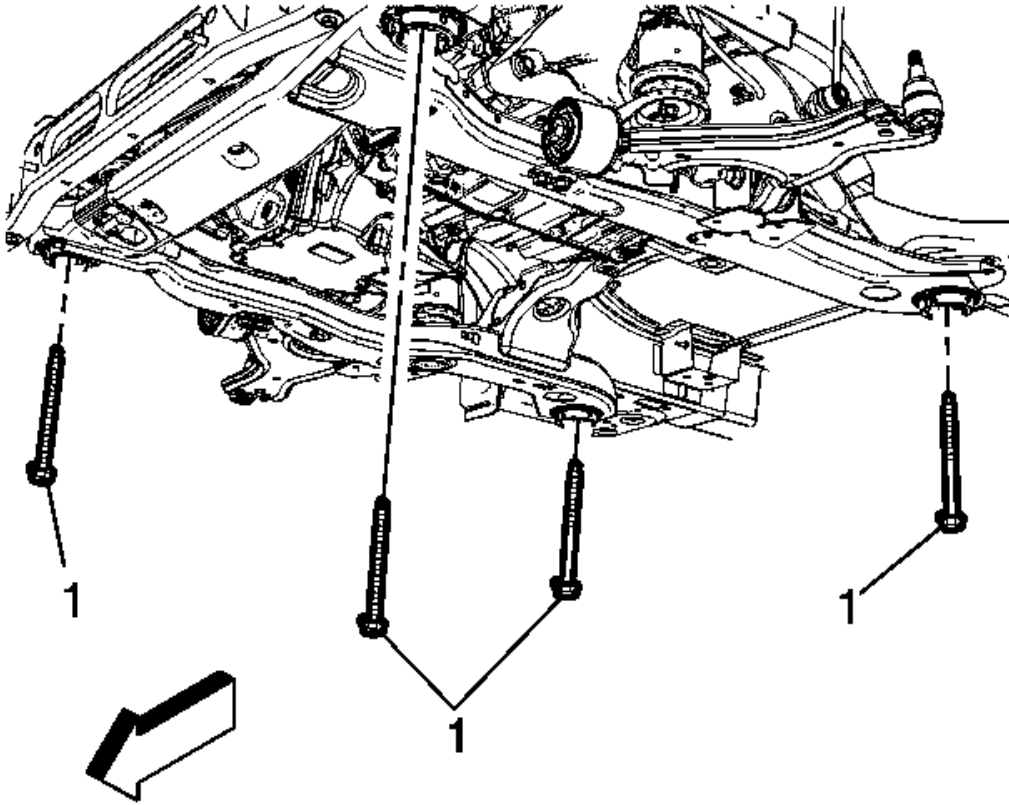
1. Remove the transmission. Refer to **Transmission Replacement (Front Wheel Drive)** , **Transmission Replacement (All Wheel Drive)** .
2. Remove the engine flywheel bolts and flywheel. Refer to **Engine Flywheel Removal** .
3. Clean and inspect the flywheel. Refer to **Engine Flywheel Cleaning and Inspection** , . If the flywheel teeth are damaged, inspect the starter for proper operation. Replace the starter if you find excessive wear or damage to the starter drive. Refer to **Starter Replacement** .

#### **Installation Procedure**



**Fig. 225: Locating Oil Suction Tube Seal**  
**Courtesy of GENERAL MOTORS COMPANY**

1. Install a NEW oil suction tube seal onto the oil suction tube. DO NOT reuse the old oil suction tube seal.



**Fig. 260: Frame-To-Body Bolts**

Courtesy of GENERAL MOTORS COMPANY

18. Install the frame-to-body bolts (1) and tighten to 100 N.m (74 lb ft) + 90 degrees.