2013 ENGINE

Engine Mechanical - 2.4L (LEA) - Orlando

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS (LAF, LEA OR LUK)

Fastener Tightening Specifications (LAF, LEA or LUK)

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	22 N.m	16 lb ft
Air Pump Assembly Bolt	22 N.m	16 lb ft
Balance Shaft Bearing Carrier to Block Bolt	10 N.m	89 lb in
Balance Shaft Chain Guide Bolt, Adjustable	10 N.m	89 lb in
Balance Shaft Chain Guide Bolt, Fixed	12 N.m	106 lb in
Balance Shaft Chain Tensioner	10 N.m	89 lb in
Block Core Plug	35 N.m	26 lb ft
Block Heater Bolt	10 N.m	89 lb in
Cam Cover to Cylinder Head Bolt	10 N.m	89 lb in
Cam Cover to Ground Cable Bolt	10 N.m	89 lb in
Cam Cover to Ground Cable Stud	10 N.m	89 lb in
Camshaft		
• Camshaft Bearing Cap Bolt	10 N.m	89 lb in
• Camshaft Position Actuator Solenoid Valve Bolt	10 N.m	89 lb in
• Camshaft Position Sensor Bolt	10 N.m	89 lb in
• Exhaust Camshaft Position Actuator - First Pass	30 N.m	22 lb ft
• Exhaust Camshaft Position Actuator - Final Pass	100 degrees	
• Intake Camshaft Position Actuator - First Pass	30 N.m	22 lb ft
• Intake Camshaft Position Actuator - Final Pass	100 degrees	
• Intake Camshaft Rear Cap Bolt	10 N.m	89 lb in
Connecting Rod Bolt		
• First Pass	25 N.m	18 lb ft
• Final Pass	100 degrees	
Crankshaft Balancer Bolt		
• First Pass	150 N.m	111 lb ft
• Final Pass	100 degrees	

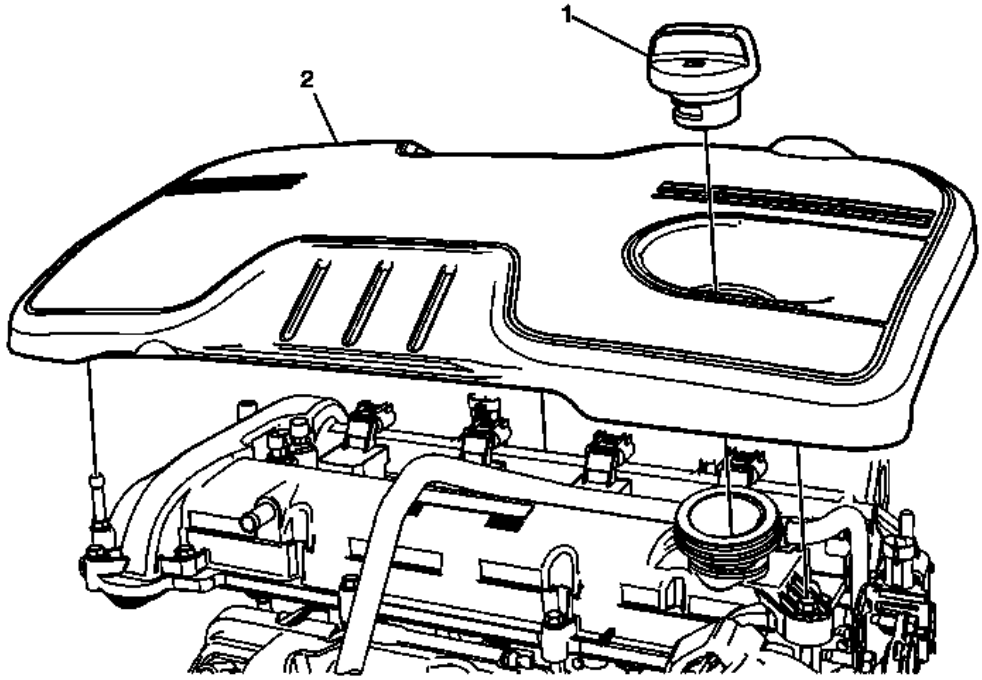

Fig. 1: Identifying Bolt Size & Locations On Engine Block - Front View
Courtesy of GENERAL MOTORS COMPANY

Engine Block - Front View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385-850							MM	(IN)	MM	(IN)
1	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73
2	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04
3	M10 x 1.5	215	211	212	213	214	24.5	0.96	19.5	0.77
4	M6 x 1	205	201	202	203	204	20	0.787	16	0.63

Engine Block - Back View

Strategy Based Diagnostics

1. Perform the **Diagnostic System Check - Vehicle** before using the symptom tables, if applicable.
2. Review the system operations in order to familiarize yourself with the system functions. Refer to **Disassembled Views**, **Engine Component Description (LAF, LEA, or LUK)** and **Lubrication Description**.

All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system condition. The diagnostic flow is the place to start when repairs are necessary.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the engine.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Check for the correct oil level, proper oil viscosity, and correct filter application.
- Verify the exact operating conditions under which the concern exists. Note factors such as engine RPM, ambient temperature, engine temperature, amount of engine warm-up time, and other specifics.
- Compare the engine sounds, if applicable, to a known good engine and make sure you are not trying to correct a normal condition.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Base Engine Misfire without Internal Engine Noises**
- **Base Engine Misfire with Abnormal Internal Lower Engine Noises**
- **Base Engine Misfire with Abnormal Valve Train Noise**
- **Base Engine Misfire with Coolant Consumption**
- **Base Engine Misfire with Excessive Oil Consumption**
- **Engine Noise on Start-Up, but Only Lasting a Few Seconds**
- **Upper Engine Noise, Regardless of Engine Speed**
- **Lower Engine Noise, Regardless of Engine Speed**
- **Engine Noise Under Load**
- **Engine Will Not Crank - Crankshaft Will Not Rotate**
- **Engine Compression Test**
- **Oil Consumption Diagnosis**

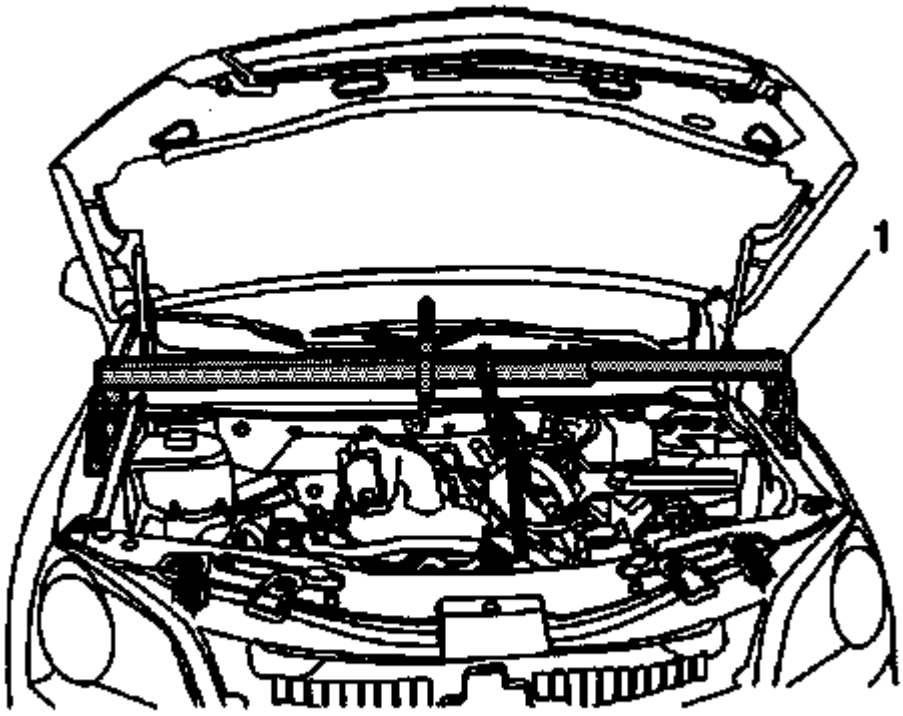

Fig. 31: Drive Belt Tensioner & Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the drive belt tensioner notch fits into the engine front cover hole (3).

1. Install the drive belt tensioner (2).

CAUTION: Refer to Fastener Caution .

2. Install the drive belt tensioner bolt (1) and tighten to 45 N.m (33 lb ft).
3. Install the drive belt. Refer to **Drive Belt Replacement**.

ENGINE OIL PRESSURE SWITCH REPLACEMENT

- **EN-45059** Angle Meter
- **EN-48749** Timing Chain Retention Tool
- **EN-48953** Camshaft Actuator Locking Tool

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

Removal Procedure

1. Remove the spark plugs. Refer to **Spark Plug Replacement** .
2. Remove the upper timing chain guide. Refer to **Timing Chain Upper Guide Replacement**.
3. Remove the front wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement** .
4. Remove the Fuel Pump. Refer to **Fuel Pump Replacement** .

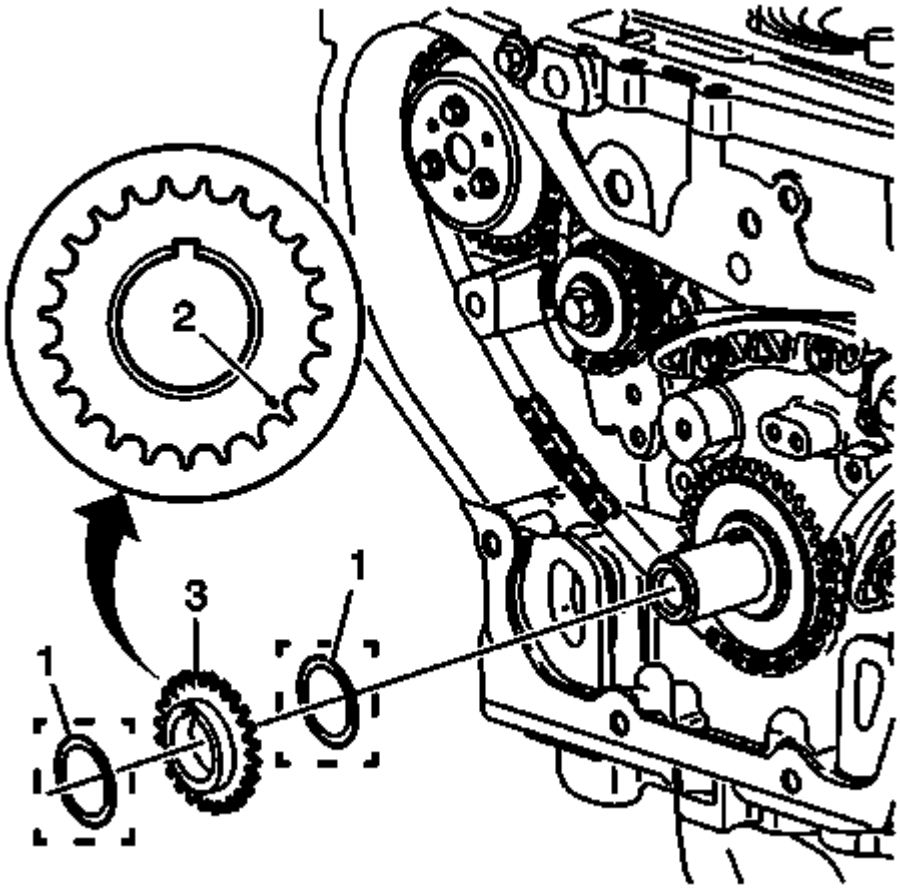

Fig. 71: Rear Bearing Block & Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove the 3 rear bearing block bolts (1) and remove the rear bearing block (2).

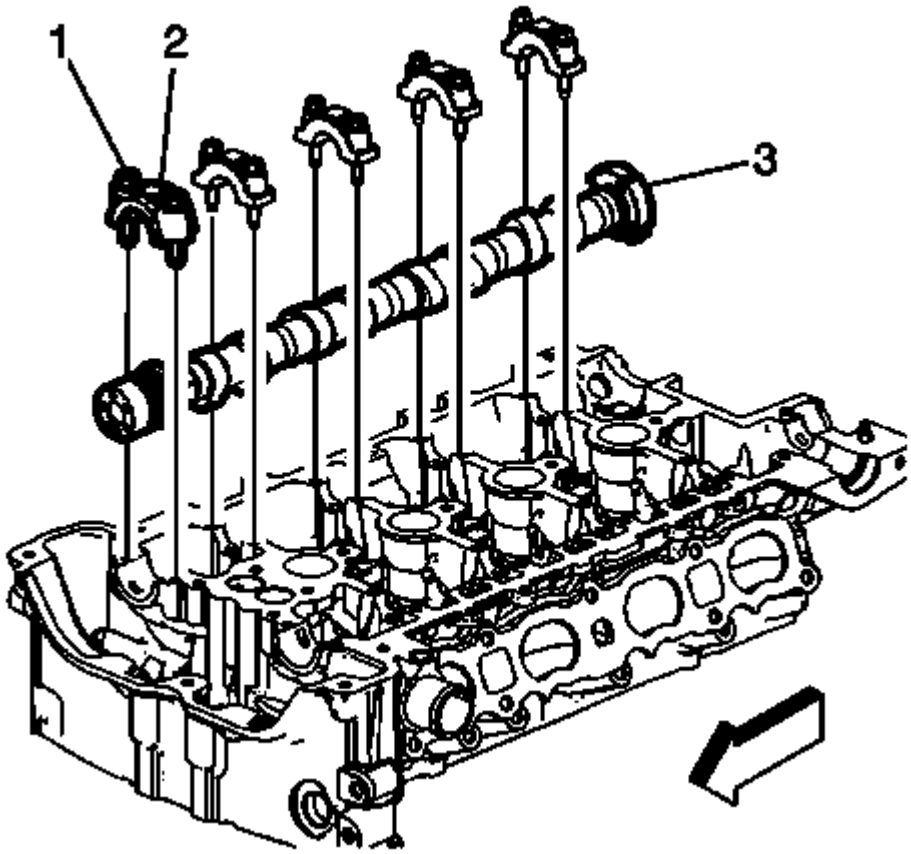

Fig. 127: Balancer Chain Guide & Bolts - Lower
Courtesy of GENERAL MOTORS COMPANY

2. Remove the 2 balancer chain guide bolts (2) and the balancer chain guide (1).

Installation Procedure

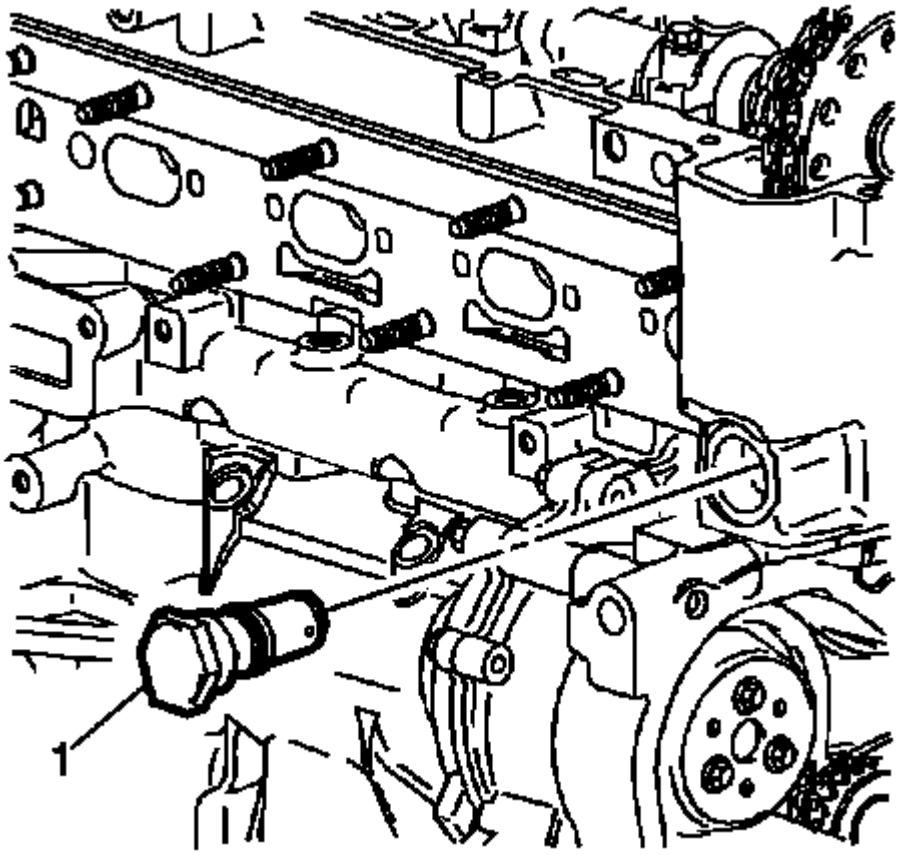

Fig. 160: Camshaft Intake Actuator & Bolt
Courtesy of GENERAL MOTORS COMPANY

17. Remove and DISCARD the camshaft position intake actuator bolt (1).
18. Remove the intake camshaft actuator (2) from the camshaft while also removing the actuator from the timing chain.

Installation Procedure

1. Mark the new intake camshaft actuator at the same point as the old intake camshaft actuator.

NOTE: **Ensure the timing chain and the camshaft position actuator is the marked point.**

Ensure that the intake camshaft actuator fully fits in the intake camshaft.

2. Rotate the intake camshaft clockwise with a open ended wrench slightly to fit the intake camshaft actuator in the intake camshaft.

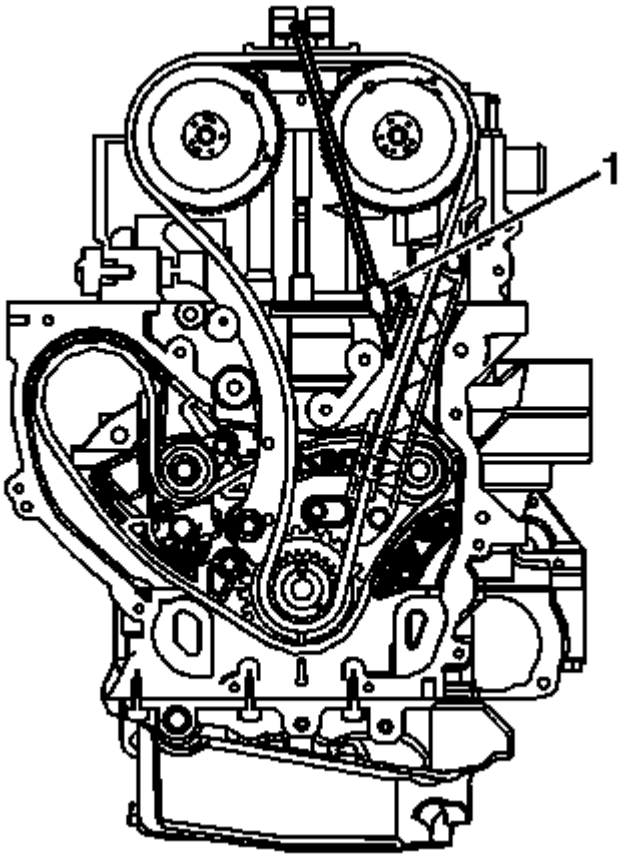

Fig. 209: Flywheel Holding Tool
Courtesy of GENERAL MOTORS COMPANY

3. Remove the **EN-43653** holding tool (1) from the starter assembly location.
4. Install the manual transmission. Refer to **Transmission Replacement** .
5. Install the starter. Refer to **Starter Replacement** .

AUTOMATIC TRANSMISSION FLEX PLATE REPLACEMENT

Special Tools

- **EN-43653** Flywheel Holding Tool
- **EN-45059** Angle Meter

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

Removal Procedure

1. Remove the automatic transmission. Refer to **Transmission Replacement** .

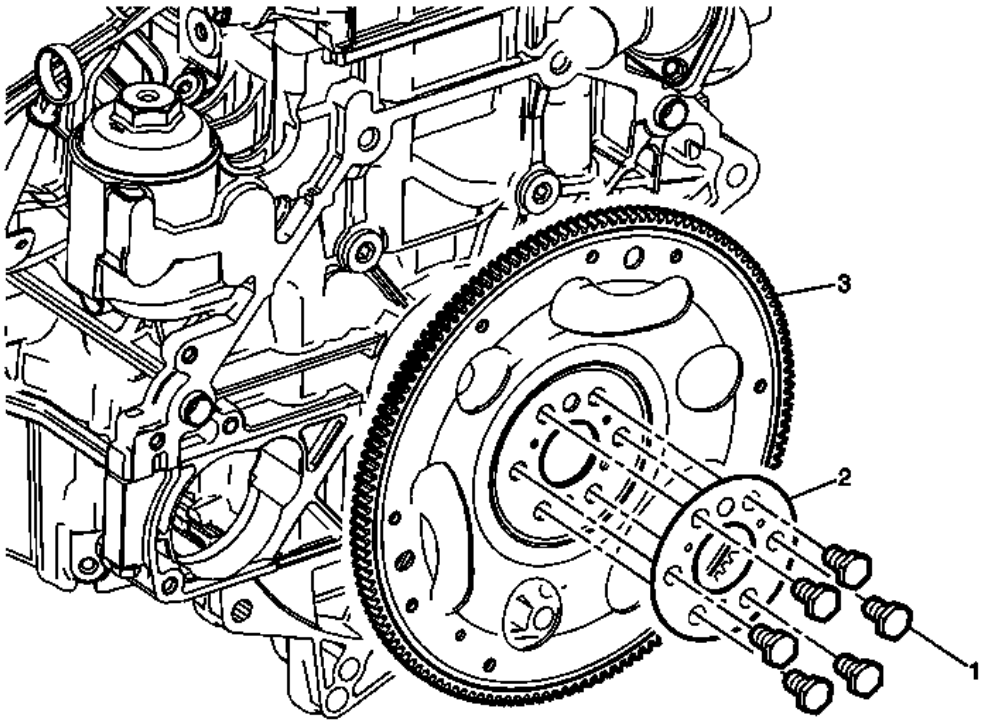

Fig. 251: Rear Frame Reinforcement Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Install the rear frame reinforcement bolts (1, 2) and tighten to 160 N.m (118 lb ft).

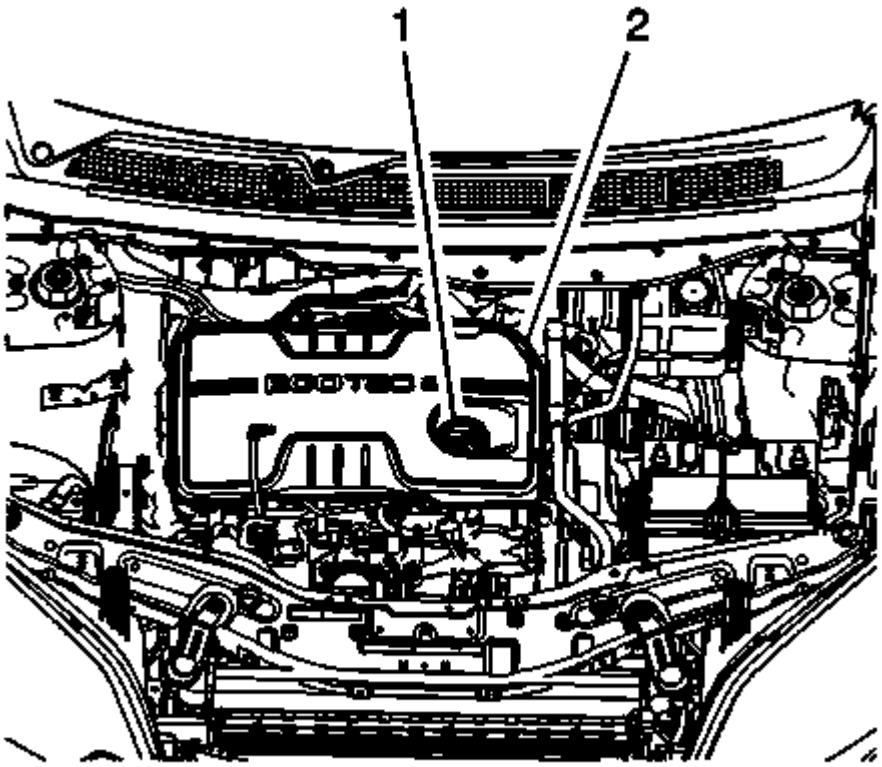

Fig. 297: Fuel Rail Harness Connector Bracket And Intake Manifold Insulator
Courtesy of GENERAL MOTORS COMPANY

15. Remove the fuel rail harness connector bracket bolt (1) and intake manifold insulator bolt.
16. Remove the intake manifold insulator (2).

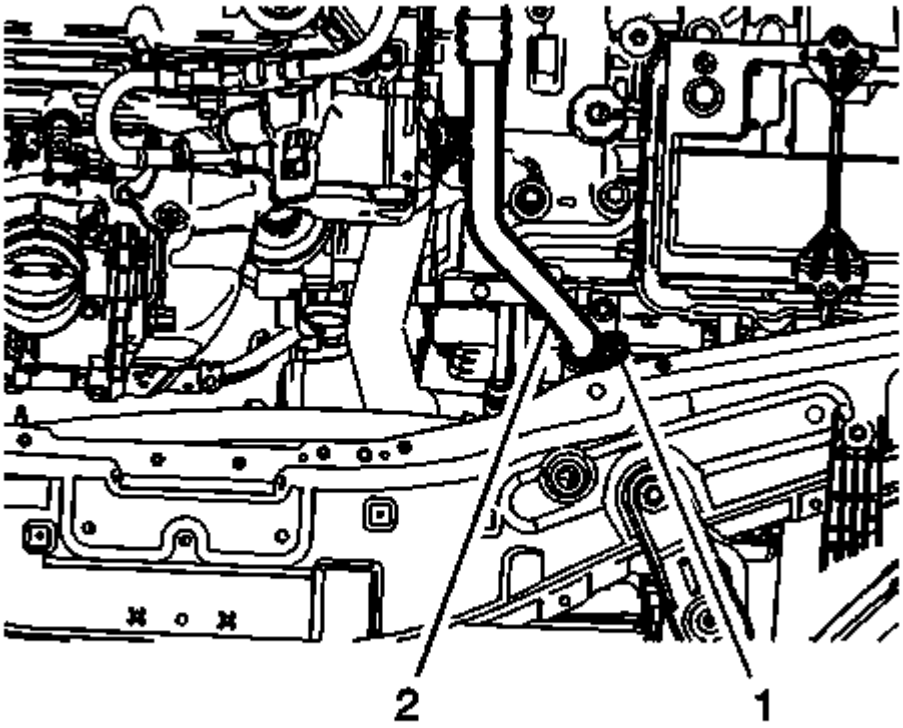

Fig. 301: Removing Fuel Rail Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: **EN-49248 will assist in the proper removal of the fuel rail assembly. Ensure that the following conditions are met:**

- **Turn the handles simultaneously in order to pull the fuel rail straight out along the fuel injector axis.**
- **DO NOT twist when pulling out on the fuel rail and injector assembly.**

7. Using **EN-49248** remover , remove the fuel rail assembly (1).

CAMSHAFT COVER REMOVAL (LAF, LEA OR LUK)

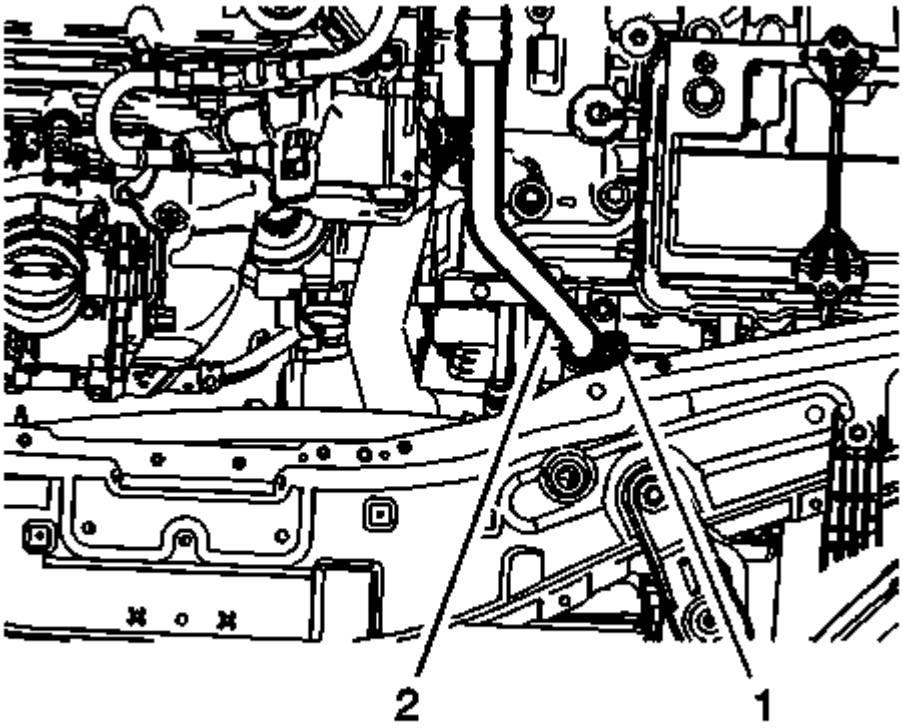

Fig. 334: Balance Shaft Drive Chain And Sprocket
Courtesy of GENERAL MOTORS COMPANY

NOTE: It may ease removal of the balance shaft drive chain to get all of the slack in the chain between the crankshaft and water pump sprockets.

9. Remove the balance shaft drive chain (1).
10. Remove the balance shaft drive sprocket (2).

BALANCE SHAFT REMOVAL

NOTE: This procedure is not used in Europe.

Special Tools

EN-43650 Balancer Shaft Bearing Remover and Installer

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

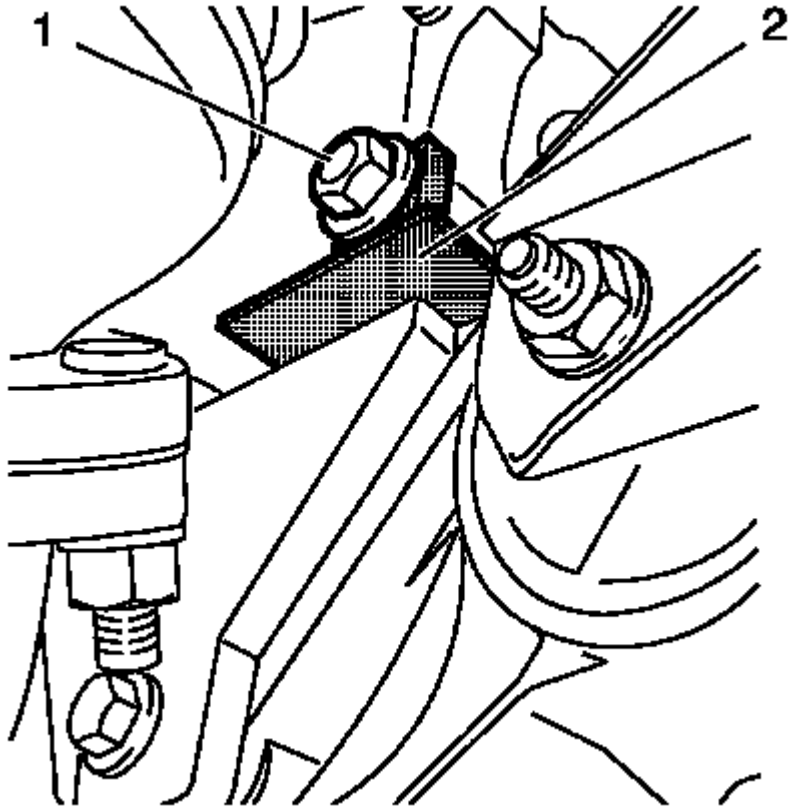

Fig. 407: Bearing Caps
Courtesy of GENERAL MOTORS COMPANY

18. Clean the sealant from the rear cap mating surface with **EN-28410** remover. Care must be used to avoid gouging or scraping the sealing surfaces.
19. Inspect the intake camshaft bearing rear cap (1) for damage.
20. Inspect the rear bearing mating surfaces for damage.
21. Inspect the camshaft bearing caps (2) for damage.
22. Inspect the camshaft front bearing caps (3) for damage.

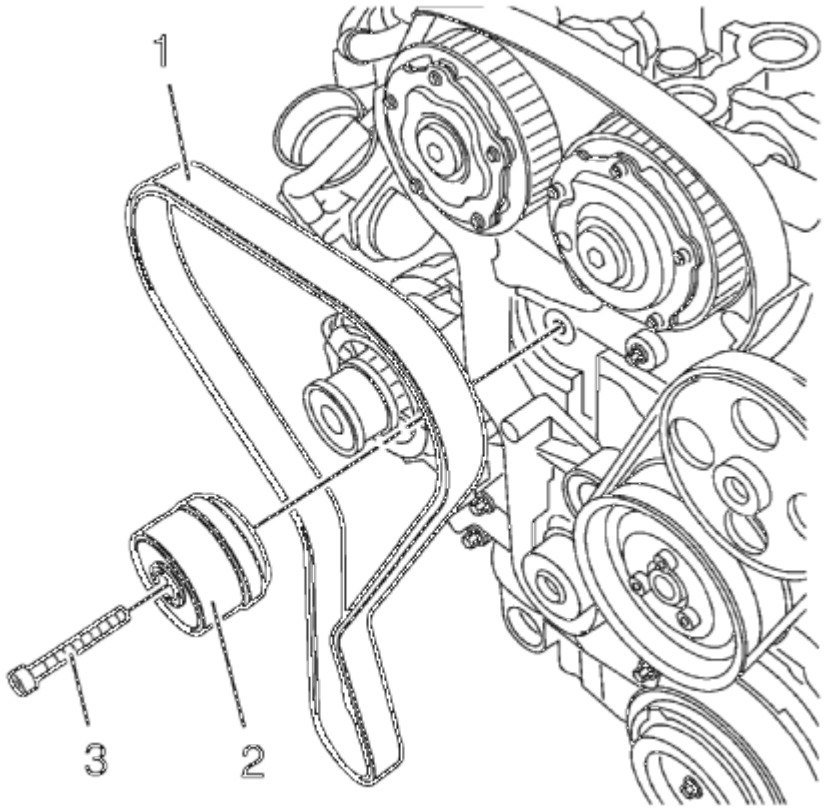

Fig. 436: Proper Injector Retainer Installation
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Ensure the fuel injector retainer is properly installed. Failure to completely install the retainers may degrade fuel injection system performance or cause system malfunction.

21. Inspect each installed fuel injector retainer, and ensure the retainer is fully seated on the fuel rail and fuel injector bushing flanges (1). The flanges on each side and at the top of the fuel injector should seat completely into the window on the retainer.

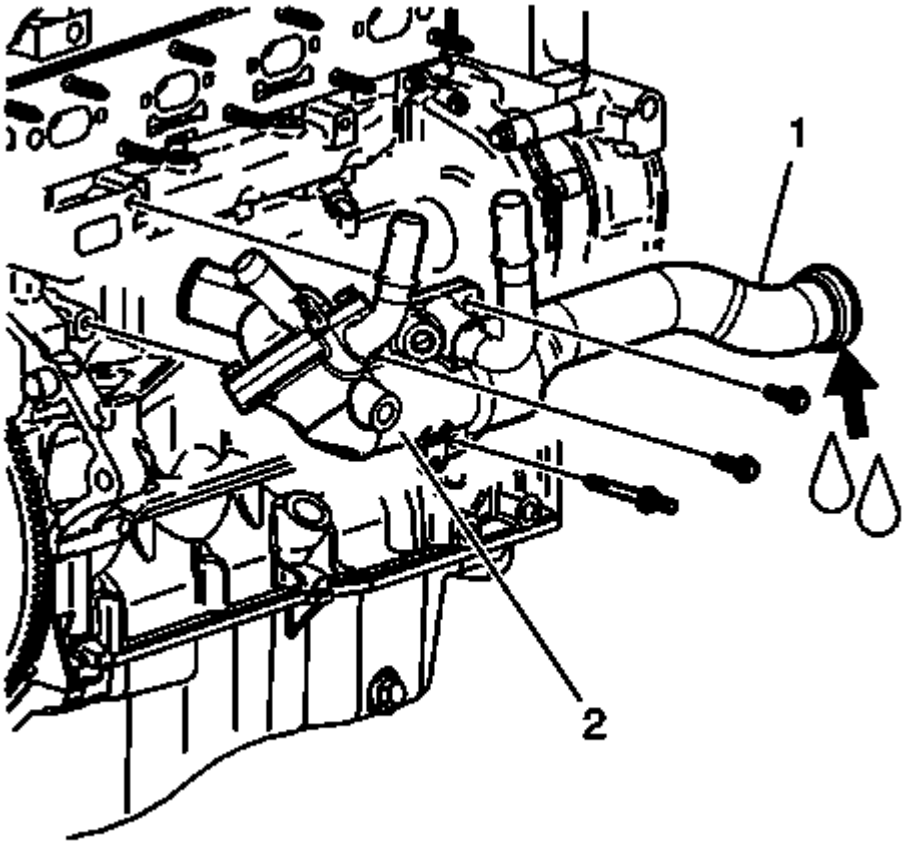

Fig. 518: Water Feed Tube And Thermostat Housing
Courtesy of GENERAL MOTORS COMPANY

6. Install the water feed tube (1).
7. Lubricate the feed tube O-ring with antifreeze.
8. Install the water feed tube by twisting and pushing toward the water pump. Take care not to tear or damage the O-ring.
9. Install the thermostat housing (2) to block bolts and stud and tighten to 10 N.m (89 lb in).