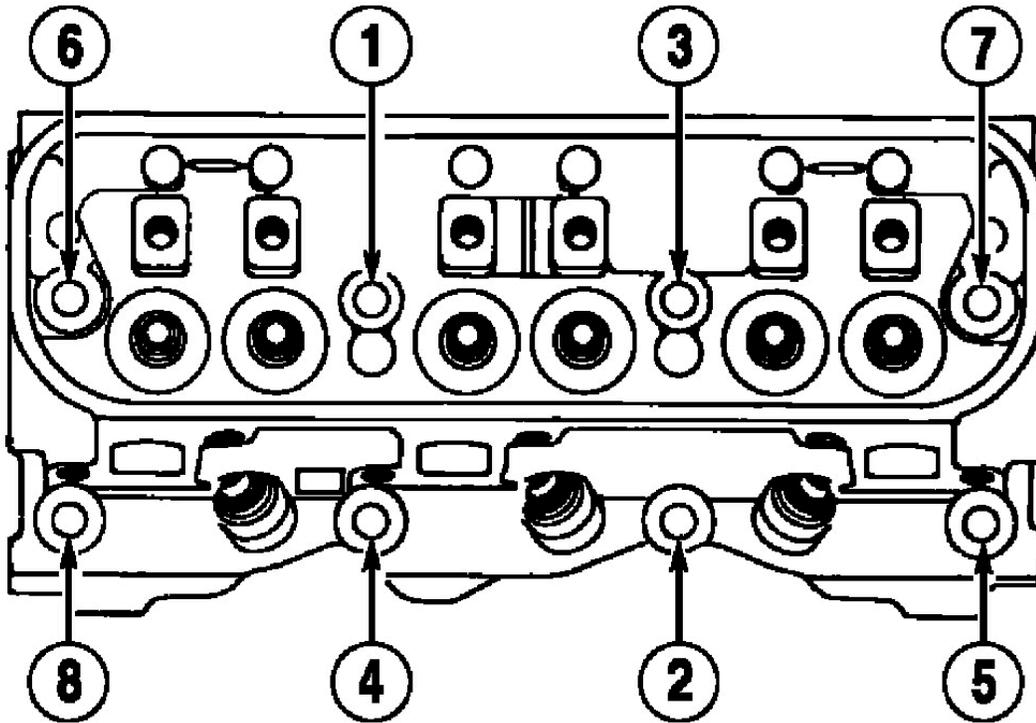


4. To install remaining components, reverse removal procedure. Coat rocker arm bolts with GM Threadlock (12345493) prior to installation.



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Fig. 3: Cylinder Head Bolt Tightening Sequence
Courtesy of GENERAL MOTORS CORP.

FRONT CRANKSHAFT SEAL

Removal

Disconnect negative battery cable. Remove serpentine belt. Raise and support vehicle. Remove right front wheel and inner splash shield. Remove crankshaft balancer bolt and crankshaft balancer. Pry seal from front timing case cover.

Installation

Using Seal Installer (J-35354) and crankshaft balancer bolt, install seal. Remove seal installer. Coat outside surface of crankshaft balancer and seal with oil prior to installation. To install remaining components, reverse removal procedure.

FRONT TIMING CASE COVER

Removal

1. Disconnect negative battery cable. Drain cooling system. Remove serpentine belt. Disconnect heater pipes. Disconnect coolant hoses at case cover.
2. Raise and support vehicle. Remove right front wheel and inner splash shield. Remove crankshaft balancer bolt and crankshaft balancer. Disconnect electrical connections at oil pressure sender, camshaft sensor and crankshaft sensor.
3. Remove oil pan-to-case cover bolts. Remove front timing case cover bolts, case cover and gasket.

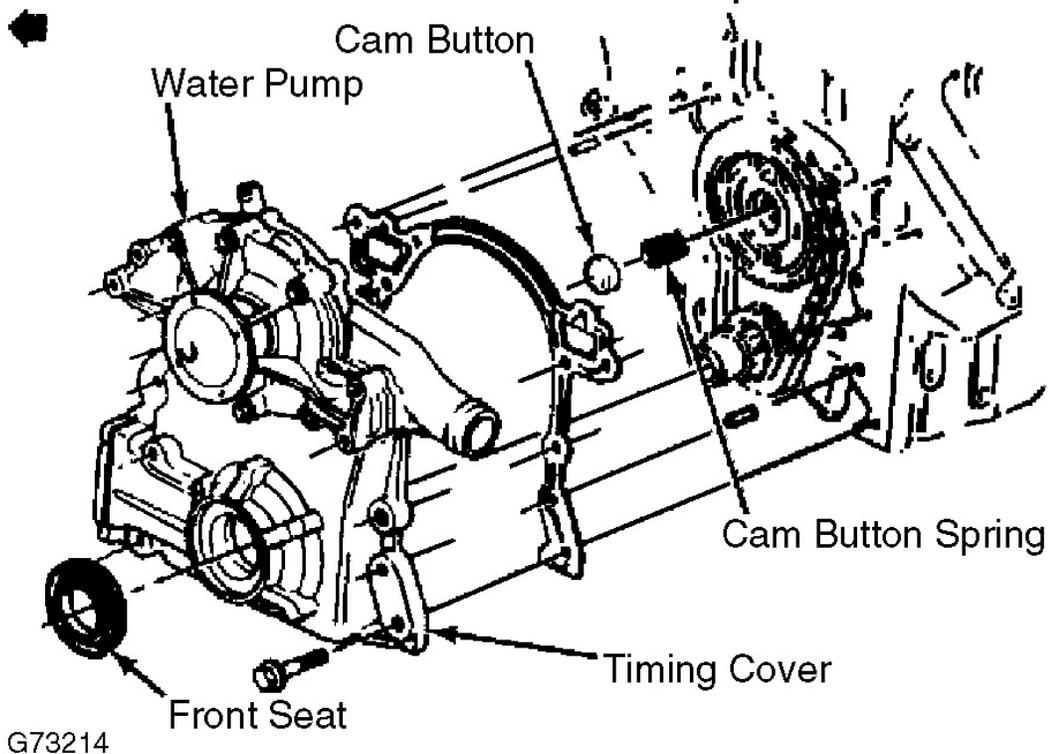
FRONT OF VEHICLE

Fig. 4: Front Timing Case Cover
Courtesy of GENERAL MOTORS CORP.

Installation

1. Inspect timing chain and sprockets for wear. Timing chain in and out movement should not exceed 1" (25.4 mm). Replace if necessary.
2. To install, reverse removal procedure using new gasket. Coat case cover bolts with thread sealant prior to installation. Crankshaft sensor must be adjusted.
3. With crankshaft sensor mounted loosely on mounting pedestal, install sensor and mounting pedestal on

Crankshaft Sensor Adjuster (J-37089). See **Fig. 5**. Install crankshaft sensor adjuster and sensor assembly on crankshaft.

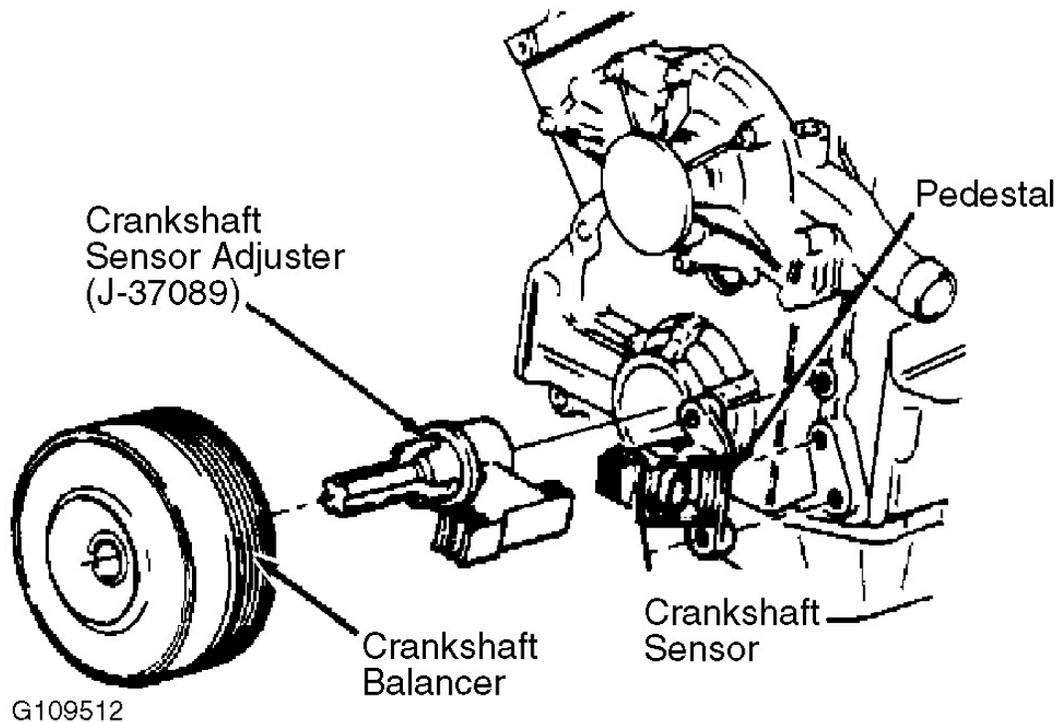


Fig. 5: Adjusting Crankshaft Sensor
 Courtesy of GENERAL MOTORS CORP.

4. Install mounting pedestal-to-cylinder block bolts and tighten to 14-28 ft. lbs. (19-38 N.m). Install sensor-to-mounting pedestal bolts to 30-35 INCH lbs. (3.3-3.9 N.m).
5. Remove crankshaft sensor adjuster from crankshaft. Place sensor adjuster inside the crankshaft balancer. Rotate sensor adjuster. Replace crankshaft balancer if sensor adjuster contacts balancer at any point.
6. To install remaining components, reverse removal procedure. Coat outside surface of crankshaft balancer shaft and seal with oil prior to installation.

TIMING CHAIN & SPROCKETS

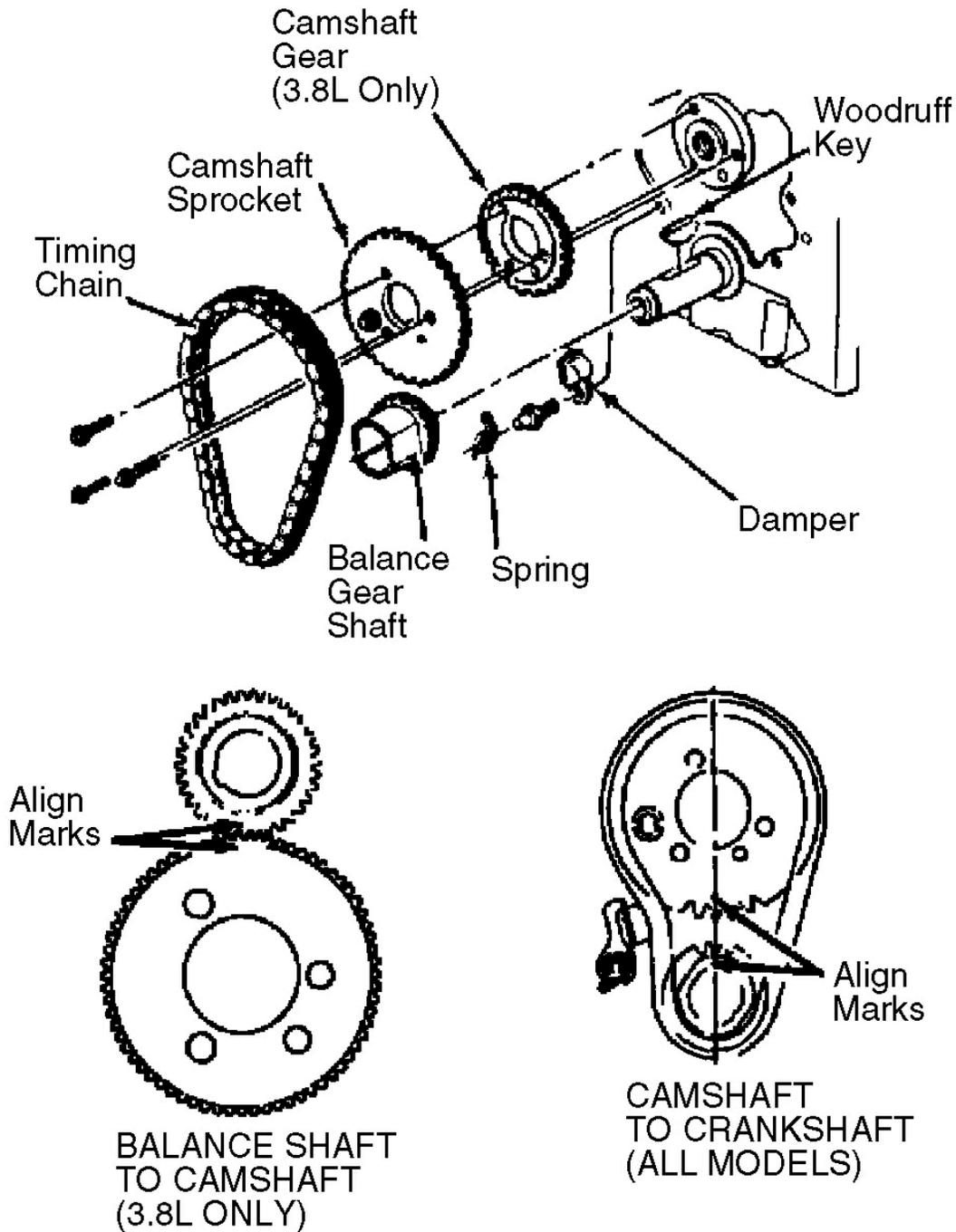
Removal

1. Remove front timing case cover. See FRONT TIMING CASE COVER in this article. Remove camshaft button and spring from front of camshaft. See **Fig. 4**.
2. Inspect timing chain and sprockets for wear. Timing chain in and out movement should not exceed 1" (25.4 mm). Replace if necessary.

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3. Rotate crankshaft and align timing marks on camshaft and crankshaft sprockets. See **Fig. 6**. Remove timing chain damper assembly.
4. Remove camshaft sprocket bolts. Remove camshaft sprocket and timing chain. Remove crankshaft sprocket (if necessary).



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Fig. 6: Timing Chain & Sprockets
Courtesy of GENERAL MOTORS CORP.

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NOTE: If balance shaft has been moved, ensure alignment is correct. See **BALANCE SHAFT** in this article.

Installation

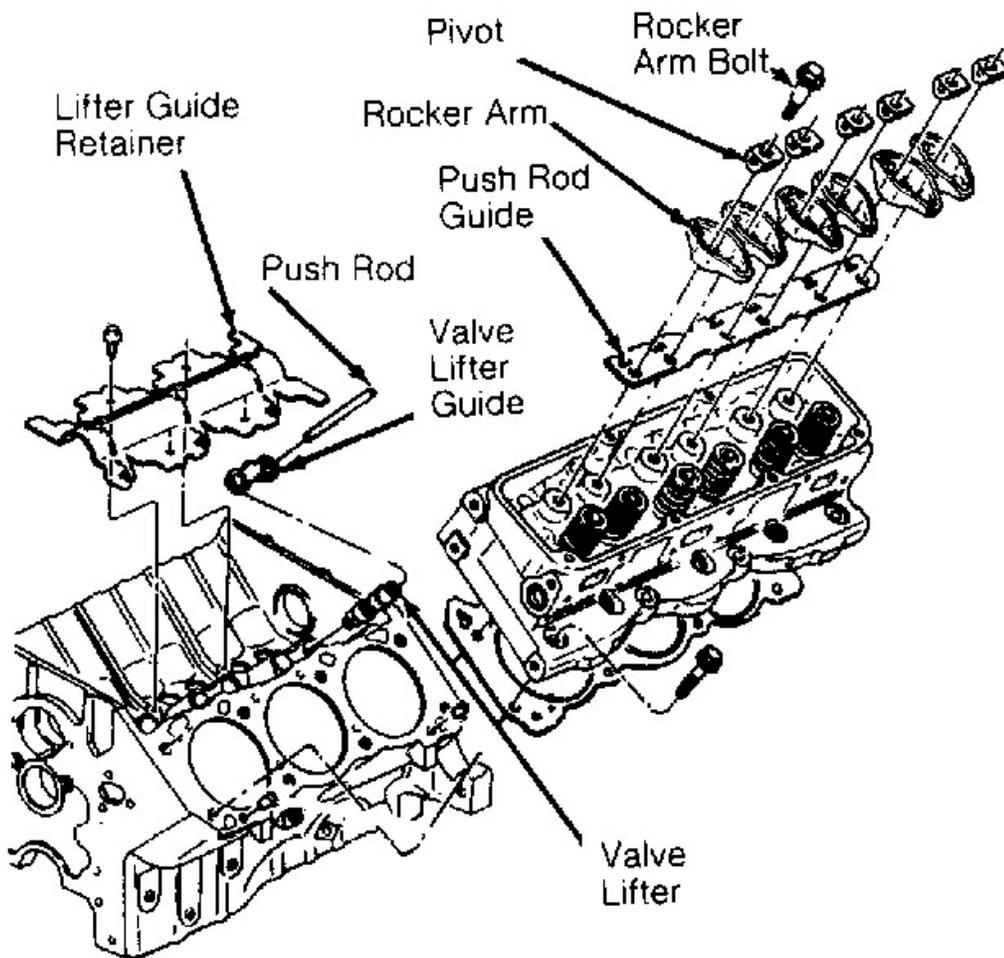
1. If engine has been rotated, rotate crankshaft so No. 1 cylinder is at TDC. Temporarily install camshaft sprocket. Rotate camshaft sprocket so timing mark is downward.
2. Remove camshaft sprocket and install timing chain on camshaft sprocket. Install timing chain and camshaft sprocket. Ensure timing marks are aligned. See **Fig. 6**. Install camshaft sprocket bolts. Install timing chain damper, camshaft button and spring.
3. To install remaining components, reverse removal procedure. Ensure timing marks are aligned.

ROCKER ARMS & PUSH RODS

Removal

1. Disconnect negative battery cable. Remove serpentine belt. For left (front) valve cover removal, remove alternator bracket and spark plug wires.
2. On rear cylinder head applications, disconnect spark plug wires. Remove power steering belt tensioner brace. Remove engine lift bracket assembly and set aside. Remove power steering pump with hoses attached and lay aside. Remove belt tensioner assembly and fuel line heat shield (if equipped).
3. Remove EGR pipe, EGR valve and adapter from throttle body adapter.
4. Remove spark plug wires and valve cover. Remove rocker arm pivot bolts. Remove rocker arms and components. See **Fig. 7**. Mark component location for reassembly reference.

NOTE: Mark location of all valve train components for reassembly reference. Components must be installed in original location.



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Fig. 7: Rocker Arm & Components
Courtesy of GENERAL MOTORS CORP.

Installation

To install, reverse removal procedure. Coat rocker arm bolts with GM Threadlock (12345493) prior to installation. Apply thread sealant to valve cover bolts prior to installation.

VALVE LIFTERS

Removal