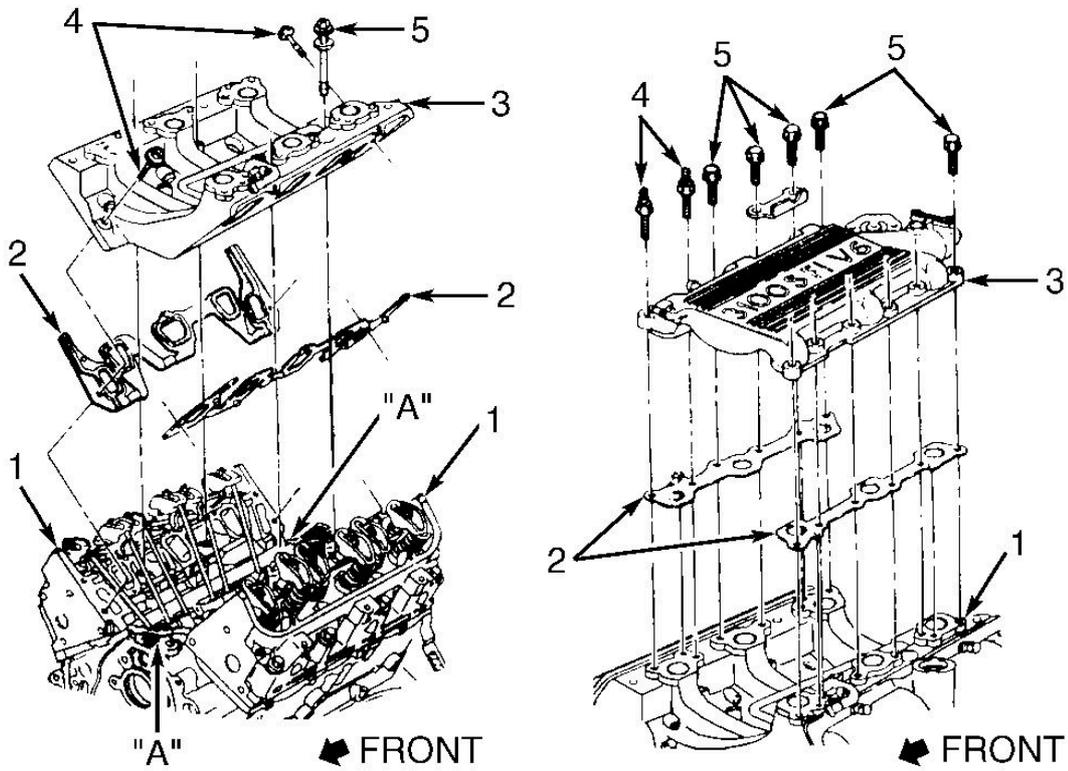


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"A" Apply Sealant

1. Head Assembly
2. Lower Intake Gasket
3. Lower Intake Manifold
4. Bolt
5. Bolt

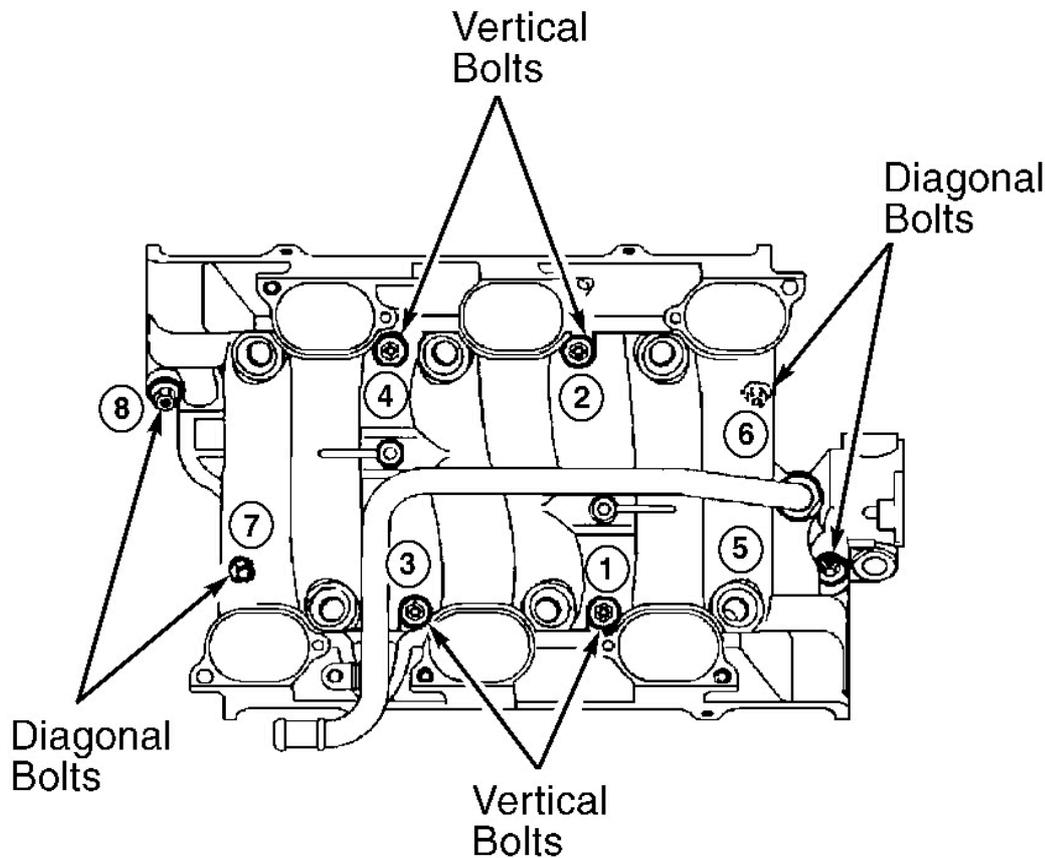
1. Lower Intake Manifold
2. Upper Intake Gasket
3. Upper Intake Manifold
4. Stud
5. Bolt

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Fig. 6: Exploded View Of Intake Manifold Components
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NOTE: Important to torque vertical bolts before tightening diagonal bolts.

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Fig. 7: Lower Intake Manifold Tightening Sequence
Courtesy of GENERAL MOTORS CORP.

EXHAUST MANIFOLD (LEFT)

Removal

Disconnect negative battery cable. Remove air cleaner assembly and duct. Remove engine mount struts between top of radiator panel and left side of engine. Rotate engine rearward to access manifold. Remove heat shield and exhaust crossover pipe. Remove engine mount strut bracket. Remove exhaust manifold and gasket.

Installation

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Reverse removal procedure using NEW gasket. Tighten exhaust manifold fasteners to specification. See **TORQUE SPECIFICATIONS**. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING**.

EXHAUST MANIFOLD (RIGHT)

Removal

1. Disconnect negative battery cable. Remove air cleaner assembly and duct. Remove engine mount struts between top of radiator panel and left side of engine so engine can be rotated forward to access manifold.
2. Remove heat shield and exhaust crossover pipe. Remove oxygen sensor. Rotate engine forward to access manifold. Raise and support vehicle. Disconnect exhaust downpipe. Disconnect EGR tube. Remove oxygen sensor. Remove heat shield, nuts, exhaust manifold and gasket.

Installation

Reverse removal procedure using NEW gasket. Tighten exhaust manifold fasteners to specification. See **TORQUE SPECIFICATIONS**. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING**.

CYLINDER HEAD

Removal (Left)

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Remove upper and lower intake manifolds. See **INTAKE MANIFOLD (UPPER)** and **INTAKE MANIFOLD (LOWER)**. Remove exhaust crossover pipe.
2. Remove rocker arm covers. Remove rocker arm bolts, rocker arms, and push rods. Remove right engine mount strut bracket. Remove oil dipstick tube. Remove spark plug wires and spark plugs. Remove left exhaust manifold. See **EXHAUST MANIFOLD (LEFT)**. Remove and discard cylinder head bolts. Remove cylinder head and gasket.

Removal (Right)

Disconnect negative battery cable. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Remove upper and lower intake manifolds. See **INTAKE MANIFOLD (UPPER)** and **INTAKE MANIFOLD (LOWER)**. Remove exhaust crossover pipe. Remove rocker arm covers.

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Remove rocker arm bolts, rocker arms, and push rods. Remove spark plug wires and spark plugs. Remove fuel line bracket. Remove right exhaust manifold. See **EXHAUST MANIFOLD (RIGHT)**. Remove and discard cylinder head bolts. Remove cylinder head and gasket.

Inspection (Left & Right)

If warpage of cylinder head gasket surface exceeds specification, machine surface. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. DO NOT remove more than .010" (.25 mm) of material from original surface.

Installation (Left & Right)

1. Clean cylinder head bolt threads and cylinder block holes. Install gasket onto cylinder block with THIS SIDE UP mark up (if equipped). Ensure all holes align with cylinder block. Install cylinder head. Apply GM Sealant (1052080) to head bolt threads.
2. Tighten NEW cylinder head bolts to specification in sequence. See **TORQUE SPECIFICATIONS**. See **Fig. 8**. To complete installation, reverse removal procedure. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING**.

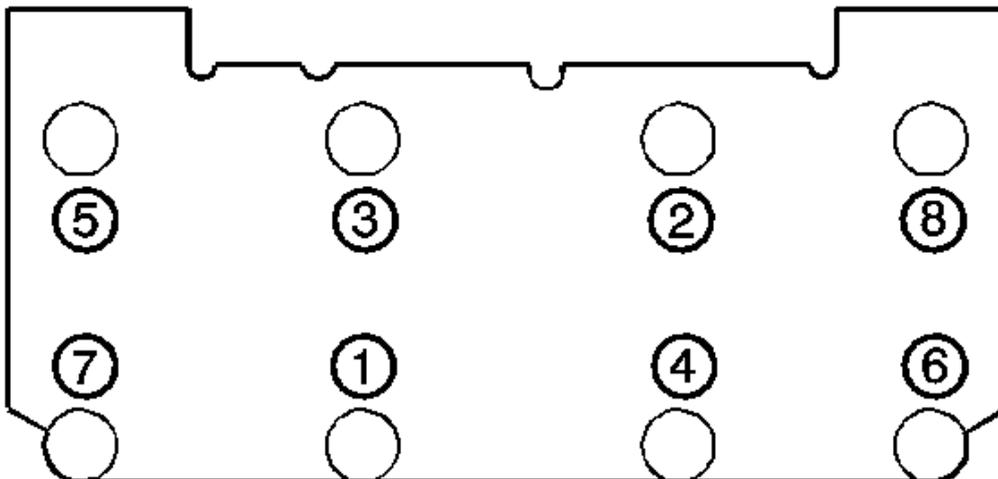


Fig. 8: Cylinder Head Bolt Tightening Sequence
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FRONT COVER

Removal

1. Drain coolant. Drain engine oil. Remove coolant recovery reservoir. Remove crankshaft balancer.
2. Remove drive belt tensioner. Remove power steering pump and lines. Disconnect thermostat by-pass pipe. Disconnect radiator outlet hose from coolant pump. Remove coolant pump pulley.
3. Remove lower crankshaft position sensor. Remove front cover.

Installation

1. Apply RTV sealant to sealing surface of front cover. Install NEW engine front cover gasket. Tighten front cover bolts to specification. See **TORQUE SPECIFICATIONS**. Install NEW front cover oil seal. See **FRONT COVER OIL SEAL**. Apply RTV sealant to keyway in crankshaft and crankshaft damper.
2. Install crankshaft damper using Damper Installer (J-29113). Ensure damper installer threads are inserted at least .2" (5 mm) into crankshaft. To complete installation, reverse removal procedure.

FRONT COVER OIL SEAL

Removal

NOTE: It may be necessary to remove right frame bolts and lower right frame for access to seal.

Remove serpentine drive belt. Raise and support vehicle. Remove right front wheel and inner fender splash shield. Prevent crankshaft from turning, and remove crankshaft balancer bolt. Remove crankshaft balancer with a puller. Remove crankshaft balancer key. Pry seal out of front cover with a large screwdriver.

Installation

Lubricate seal with engine oil. Using Seal Installer (J-35468), install seal with open end toward engine. To complete installation, reverse removal procedure.

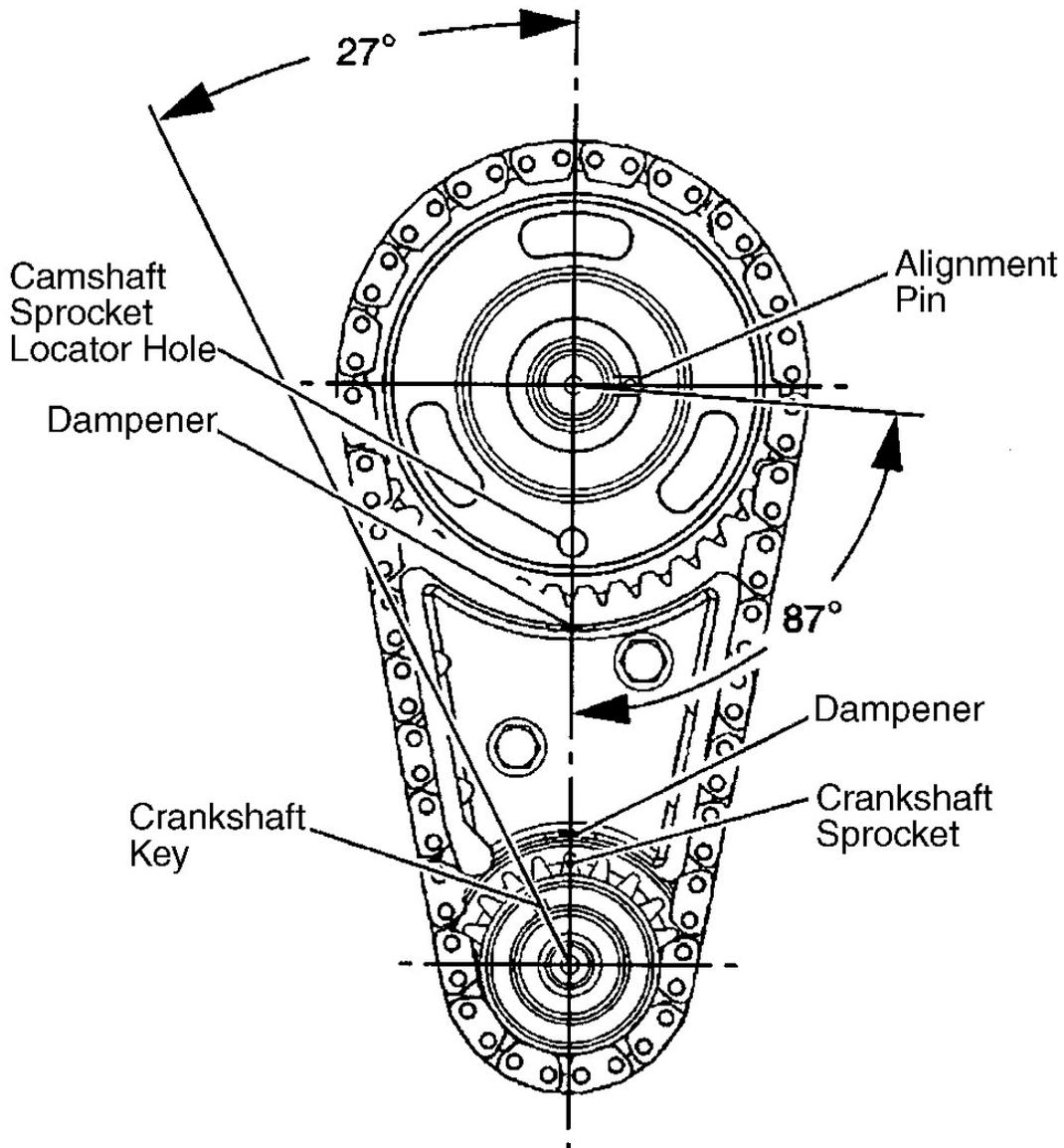
TIMING CHAIN

Removal**NOTE: Tools Required: Crankshaft Sprocket Puller (J-5825-A).**

1. Remove the engine front cover. See **FRONT COVER**.
2. Rotate the crankshaft until the timing marks in the following locations are aligned:
 - The timing chain dampener to the crankshaft sprocket. See **Fig. 9**.
 - The timing chain dampener to the camshaft sprocket locator hole.
3. Remove the camshaft sprocket bolt. See **Fig. 10**.
4. Remove the camshaft sprocket and the timing chain. See **Fig. 11**.
5. Use the crankshaft sprocket puller to remove the camshaft sprocket. See **Fig. 12**.
6. Remove the timing chain dampener bolts. See **Fig. 13**.
7. Remove the timing chain dampener.
8. If necessary remove the camshaft thrust plate bolts. See **Fig. 14**.
9. Remove the camshaft thrust plate.
10. Clean and inspect the timing chain and gears.
 - Inspect the timing chain sprockets for teeth that are worn, broken, or chipped.
 - Inspect the timing chain for binding or stretching.
 - Inspect the timing chain dampener for excessive wear or cracks.
 - Replace the timing chain and sprockets as needed.

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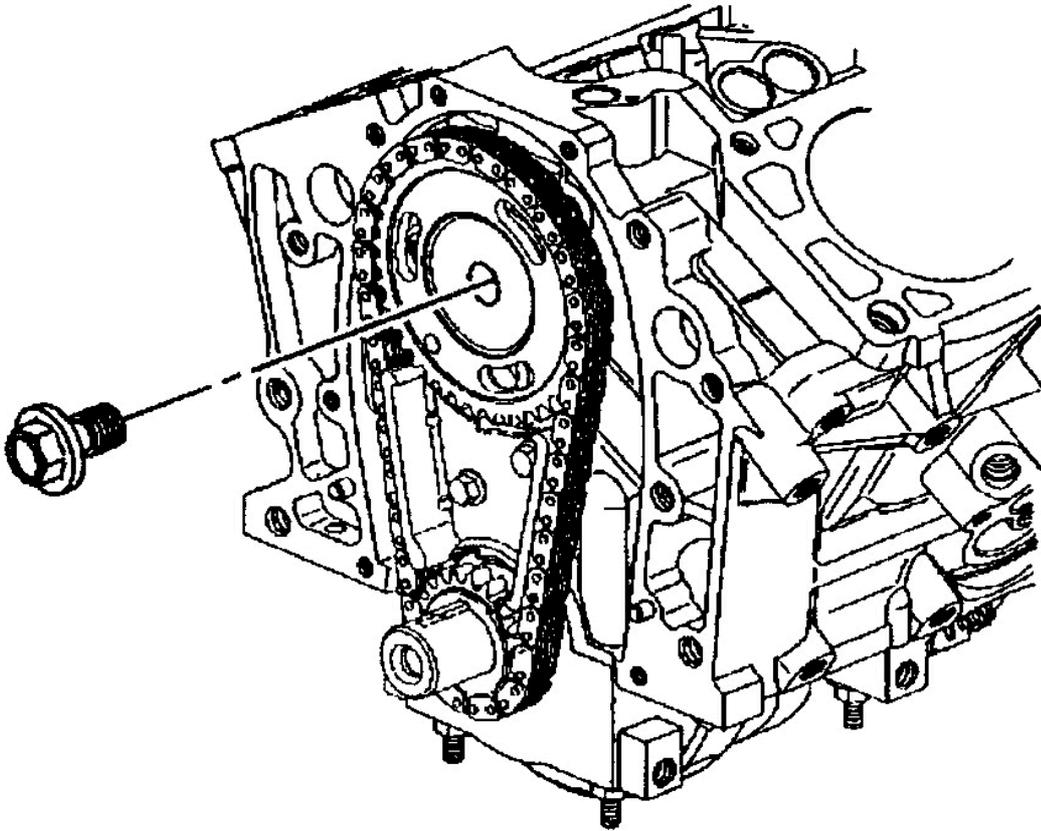


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Fig. 9: Aligning Crankshaft Timing Marks
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Fig. 10: Removing Camshaft Sprocket Bolt
Courtesy of GENERAL MOTORS CORP.