

FRONT COVER & TIMING CHAIN

Removal

1. Disconnect negative battery cable. Raise and support vehicle. Drain engine oil. Remove right front wheel and splash shield. Put a block of wood between cradle and engine torque strut at bottom front end of engine. See **Fig. 2**.
2. Remove mount from upper front end of engine, allowing engine to rest on wood block. Remove accessory drive belt and tensioner. Remove accessory belt idler. Remove cylinder head cover.
3. Replace silicone isolators on cylinder head cover screws if deteriorated. Remove power steering pump (leave hoses attached). Remove A/C compressor (leave hoses attached). Raise and support vehicle. Drain engine oil. Remove right front wheel and splash shield.
4. Remove support bracket between intake manifold and engine block. Remove front balancer/pulley using a 3-jaw puller. Disconnect exhaust pipe from exhaust manifold. Install Crankshaft Gear Retainer (SA9104E) onto end of crankshaft, with flat side toward crankshaft gear (sprocket). Crankshaft gear retainer holds crankshaft gear in place during removal of front cover.

CAUTION: If crankshaft gear is not held in place, timing chain guide will be damaged.

5. Remove 4 bolts from front end of oil pan. Using RTV Cutter (SA9123E), cut RTV sealant between oil pan and front cover. Spray penetrating oil onto front cover dowel pins. Remove front cover bolts (one bolt is located above accessory drive belt pulley). Pry front cover from engine block.

WARNING: During timing chain removal, camshaft(s) may turn. Keep fingers and tools away from sprockets and chain.

6. To prevent pistons from hitting valves, turn crankshaft 90 degrees clockwise as viewed from front of engine until timing mark and keyway are aligned with split line of main bearing cap. Remove timing chain tensioner, guides and chain. While using a 7/8" (21 mm) wrench to keep camshaft(s) from turning, remove camshaft sprocket bolt(s). Remove camshaft sprocket(s).

Installation

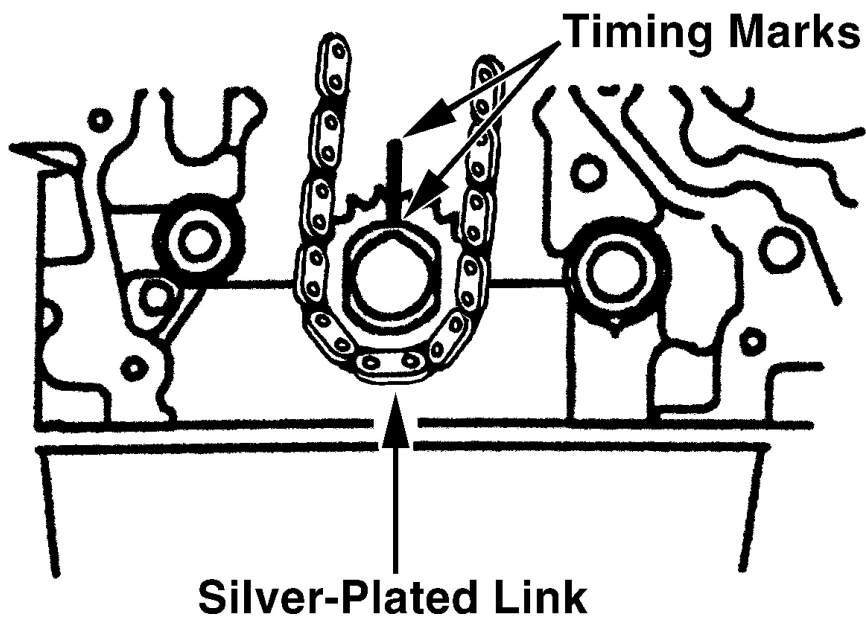
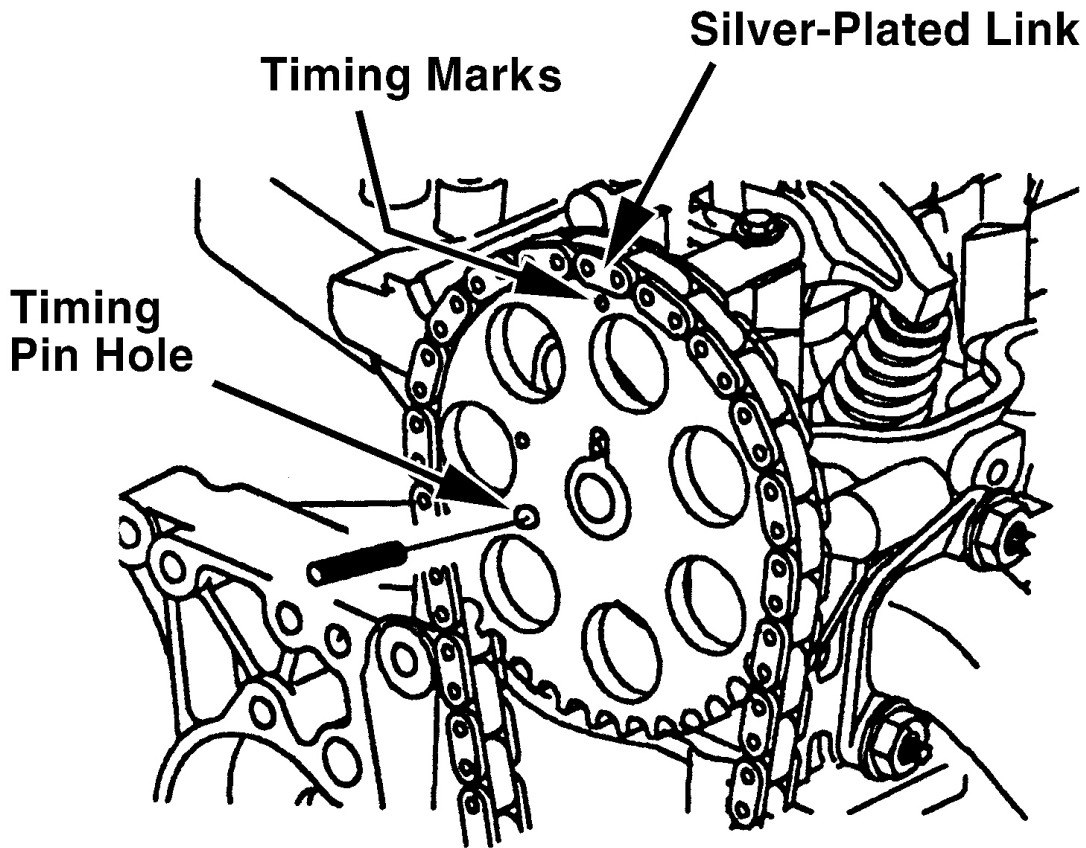
1. To prevent pistons from hitting valves, ensure timing mark and keyway on crankshaft are aligned with split line of main bearing cap. Install camshaft sprocket(s) with the letters FRT (front) facing away from cylinder head. Use a 7/8" (21 mm) wrench to keep camshaft(s) from turning.
2. Install and tighten camshaft sprocket bolt(s) to specification. Rotate camshaft(s) until a 3/16" (4.8 mm) drill bit can be inserted through timing pin hole(s) and into cylinder head. See **Fig. 5** or **Fig. 6**.
3. Rotate crankshaft counterclockwise as viewed from front of engine until timing marks at crankshaft sprocket are aligned. Install timing chain, aligning Silver-plated chain links with timing mark(s) on camshaft sprocket(s) and bottom tooth (or teeth) of crankshaft sprocket. See **Fig. 5** or **Fig. 6**.
4. Install fixed chain guide. Slack part of chain should be on tensioner side of cylinder block. Chain should be tight against fixed chain guide. Install pivoting chain guide. Retract tensioner plunger, and pin ratchet

lever by inserting a 1/8" (3.2 mm) drill bit into lever locking hole. Install tensioner.

5. Remove drill bits from camshaft sprockets and tensioner. Check timing mark alignment. If oil pump and pressure regulator were removed from front cover, install them using special procedures. See **OIL PUMP** under ENGINE OILING. If front seal was removed, press new seal into front cover using Seal Installer (SA9104E).

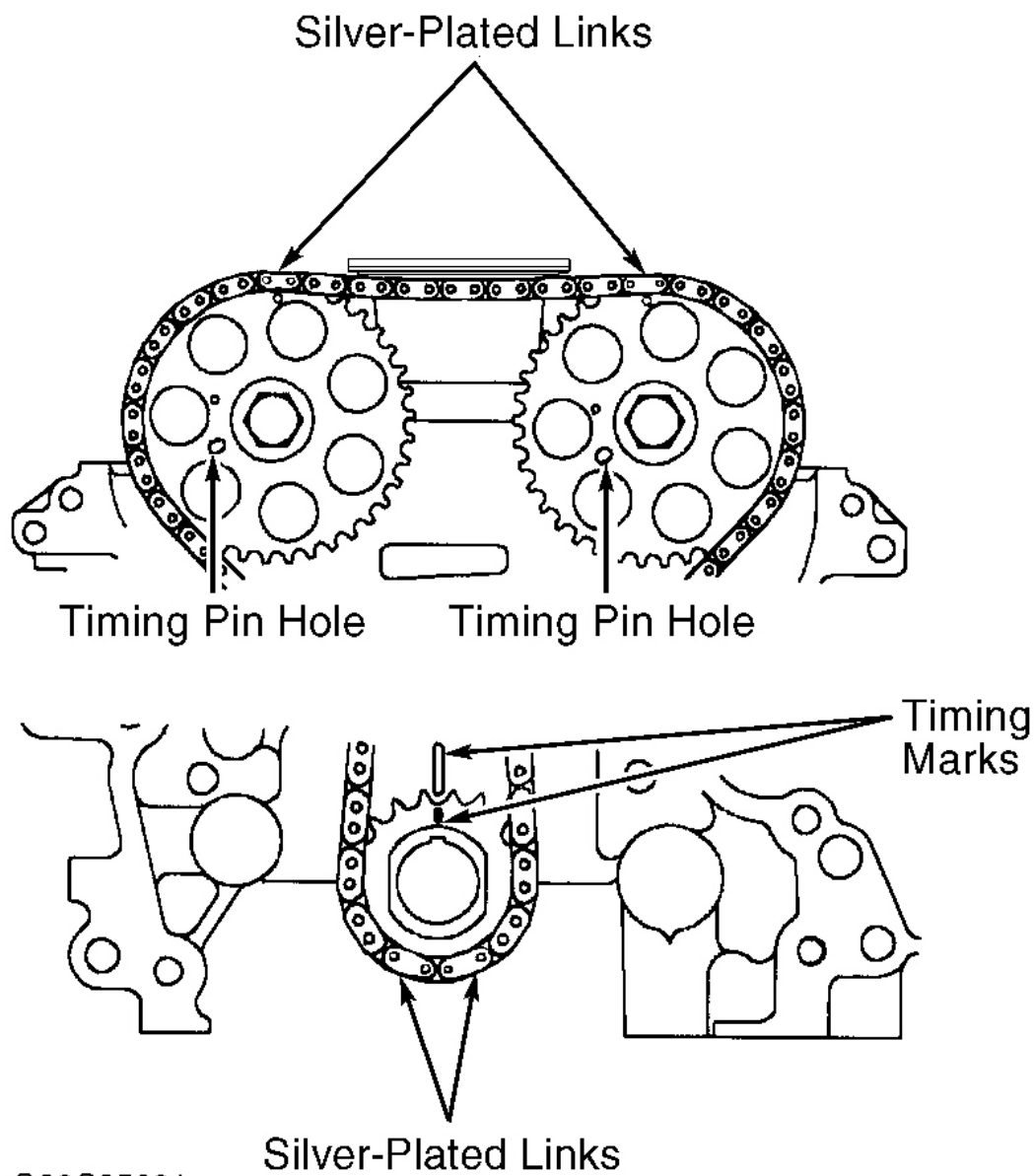
CAUTION: DO NOT allow RTV sealant to clog oil passage holes, including drain-back hole at bottom of oil seal.

6. Install new oil pressure seal (pump outlet) and suction seal (pump inlet) into cavities in cylinder block. Apply a .16" (4 mm) bead of RTV sealant to oil pan sealing surface. Apply a .08" (2 mm) bead of RTV sealant to front cover sealing surface. Apply RTV sealant to bolt hole at top center of front cover. Apply extra RTV sealant to "T" joints (corners of components). Install front cover immediately.
7. Install Crankshaft Gear Retainer (SA9104E) to align oil pump drive gear. Tighten front cover bolts to specification. See **TORQUE SPECIFICATIONS** . Ensure drain-back hole at bottom of front cover oil seal is not clogged (pump 6-12 squirts of engine oil through hole).
8. Install cylinder head cover. If silicone isolators are deteriorated, replace them. Tighten cylinder head cover bolts to specification (start at center and work outward). To complete installation, reverse removal procedure. Fill cooling system and crankcase. Check for leaks.



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Fig. 5: Installing Timing Chain (SOHC)
Courtesy of GENERAL MOTORS CORP.



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Fig. 6: Installing Timing Chain (DOHC)
Courtesy of GENERAL MOTORS CORP.