

(9) Coat the threads of the timing cover retaining bolts and studs with Loctite 242 or equivalent sealant and install the bolts finger tight.

(10) Remove the guide stud, install the remaining bolt and tighten the bolts and studs to the specified torque.

(11) If the sump gasket has separated from the cylinder block, apply a 2–3 mm bead of RTV 732 or equivalent sealant over the timing cover and rear main bearing cap joints. Apply a thin bead of sealant to the sump mating face directly below the timing cover joints.

(12) Install and tighten the sump bolts to the specified torque. Bend the lock tabs on the rear sump bolts.

(13) Install and adjust the crank angle sensor as described in the Fuel and Engine Management section.

(14) Prior to installing the crankshaft pulley, apply RTV 732 or equivalent sealant to the keyway. Install and tighten the retaining bolt to draw the pulley onto the crankshaft.

(15) Check the serviceability of the heater pipe O ring and renew if necessary. Apply petroleum jelly to the O ring and install the heater pipe to the timing cover.

(16) Install the support brace as previously described.

(17) On models equipped with a manual transmission, adjust the clutch pedal height as described in the Clutch section.

(18) Tighten the steering gear retaining bolts and nuts to the torque specified in the Steering section.

(19) Ensure that all hose clamps are securely tightened.

(20) Fill the engine with the correct grade and amount of oil.

(21) Fill the cooling system as described in the Cooling and Heating Systems section.

NOTE: If the cooling system is not filled as described in the Cooling and Heating Systems section, engine overheating may result.

(22) Fill the power steering reservoir with fluid and bleed the system as described in the Steering section.

(23) Ensure that all wiring connections are clean, dry and secure.

(24) Raise the tensioner and install the drive belt. If necessary, refer to the illustration in the Engine Tune-up section.

(25) Start the engine and check for oil, coolant and exhaust leaks and rectify as necessary.

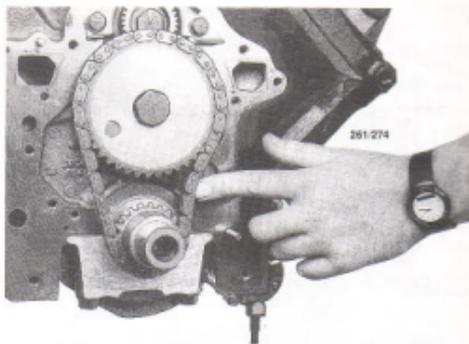
11. TIMING CHAIN, SPROCKETS AND BALANCE SHAFT GEARS

Special Equipment Required:

To Install — Angle gauge

TO REMOVE AND INSTALL

(1) Remove the timing cover from the engine as previously described.



Checking the timing chain movement.

(2) Hold the timing chain damper away from the timing chain and move the chain in and out between the camshaft and crankshaft sprockets. If the movement exceeds Specifications, renew the timing chain and inspect the sprockets for wear.

(3) Measure the balance shaft gear backlash using the following procedure:

(a) Mount a dial gauge to the cylinder block and position the plunger against the face of a balance shaft gear tooth.

(b) Partially rotate the balance shaft gear until all clearance is removed and zero the dial gauge.

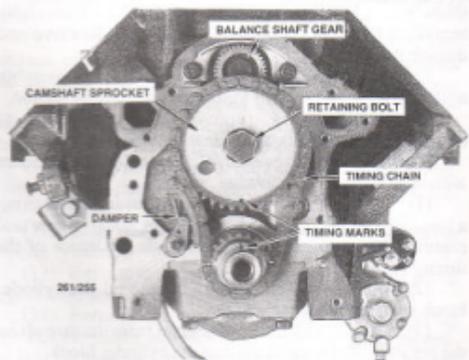
(c) Rotate the balance shaft gear in the opposite direction and note the dial gauge reading.

Repeat the above procedure at three points, turning the balance shaft 90° between each point.

(d) If the backlash exceeds Specifications at any point, renew the camshaft and balance shaft gears.

(4) Rotate the crankshaft until the timing marks on the camshaft and crankshaft sprockets are aligned as shown in the illustration.

(5) Remove the camshaft sprocket retaining bolt.



View of the camshaft timing marks correctly aligned.

Hold the timing chain damper away from the timing chain and remove the camshaft sprocket and timing chain from the engine.

NOTE: After removing the timing chain, do not attempt to turn the crankshaft or camshaft as damage to the pistons or valves may result.

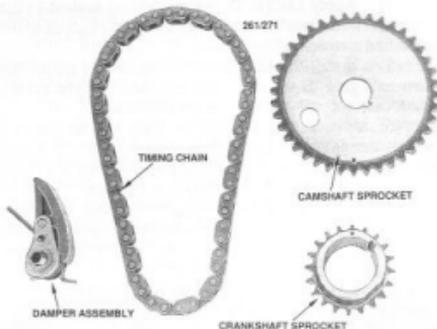
(6) Slide the crankshaft sprocket from the crankshaft. A puller is not necessary to remove the crankshaft sprocket, however if the sprocket is difficult to remove, carefully lever against the sprocket with a large screwdriver.

(7) Remove the bolt and withdraw the timing chain damper assembly from the engine.

(8) If necessary, remove the balance shaft gears as follows:

(a) Slide the camshaft gear from the camshaft and remove the key from the end of the camshaft.

(b) Using a T30 Torx socket, remove one of the screws retaining the camshaft thrust washer to the cylinder block.



Timing chain, sprockets and damper assembly.

(12) Inspect the sprockets and gears for worn or damaged teeth. Renew the sprockets or gears as necessary.

(13) Inspect the key and the corresponding keyway for signs of wear or damage. Renew the worn or damaged components as necessary.

(14) Inspect the timing chain links for wear or stretch. Renew the timing chain as necessary.

Installation is a reversal of the removal procedure with attention to the following points:

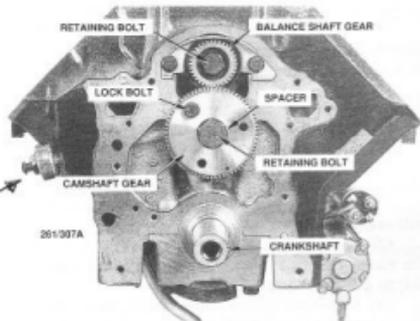
(1) Where necessary, install the gear to the balance shaft ensuring that the slot in the gear aligns with the pin in the balance shaft.

(2) Following the procedure used previously when removing the balance shaft gear, install the camshaft gear and a lock bolt to prevent the balance shaft rotating.

(3) Apply Loctite 242 or equivalent sealant to the threads of the balance shaft gear retaining bolt and tighten the bolt as follows:

(a) Tighten the bolt to a torque of 18 – 22 Nm.

(b) Using an angle gauge, tighten the bolt an additional 35°.



Method of preventing the balance shaft turning when removing the retaining bolt.

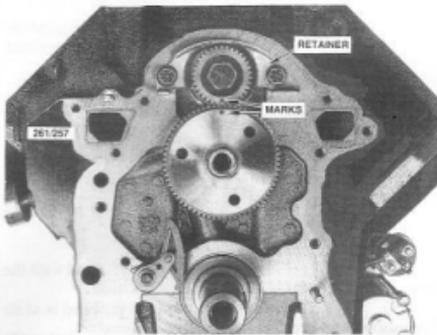
(c) Install the camshaft gear to the camshaft so that one of the holes in the face of the gear is aligned with the vacant thrust washer retaining screw hole and install a 5/16 UNC x 30 mm bolt finger tight.

(d) Install a 12 mm thick spacer with an inside diameter of approximately 25 mm to the end of the camshaft. Install the camshaft sprocket retaining bolt finger tight.

(9) Remove the balance shaft gear retaining bolt and withdraw the gear from the balance shaft.

(10) Remove the lock bolt and the retaining bolt and withdraw the gear from the camshaft.

(11) Clean all components in cleaning solvent and where available, dry with compressed air. Remove all sealant from the threads on the camshaft sprocket and balance shaft gear retaining bolts.



Balance shaft timing marks correctly aligned.