

GENERAL MOTORS

3.0L V6

MANUFACTURER'S SUGGESTED SCHEDULED MAINTENANCE

The manufacturer recommends the belt be replaced at 100,000 mile intervals.

REMOVAL & INSTALLATION

CAUTION: This application is an interference engine. Do not rotate camshaft or crankshaft when timing belt is removed, or engine damage may occur.

TIMING BELT

Precautions

1. When servicing timing belt, always turn crankshaft in normal direction of rotation (clockwise).
2. Install timing belt with engine at room temperature.
3. Never remove timing belt without first setting camshaft gears and crankshaft drive gear to TDC and locking them in place.
4. Guide marks on timing belt are to aid in timing belt installation. If guide marks cannot be identified, a new belt must be installed.

NOTE: Using scan tool, check cold start counter (also called a heavy duty register). If there were any cold starts below -20°F (-28°C), visually inspect timing belt for cracks. If there are cracks present, DO NOT reuse the belt. Replace belt. If belt is okay and reused, DO NOT clear the cold start counter.

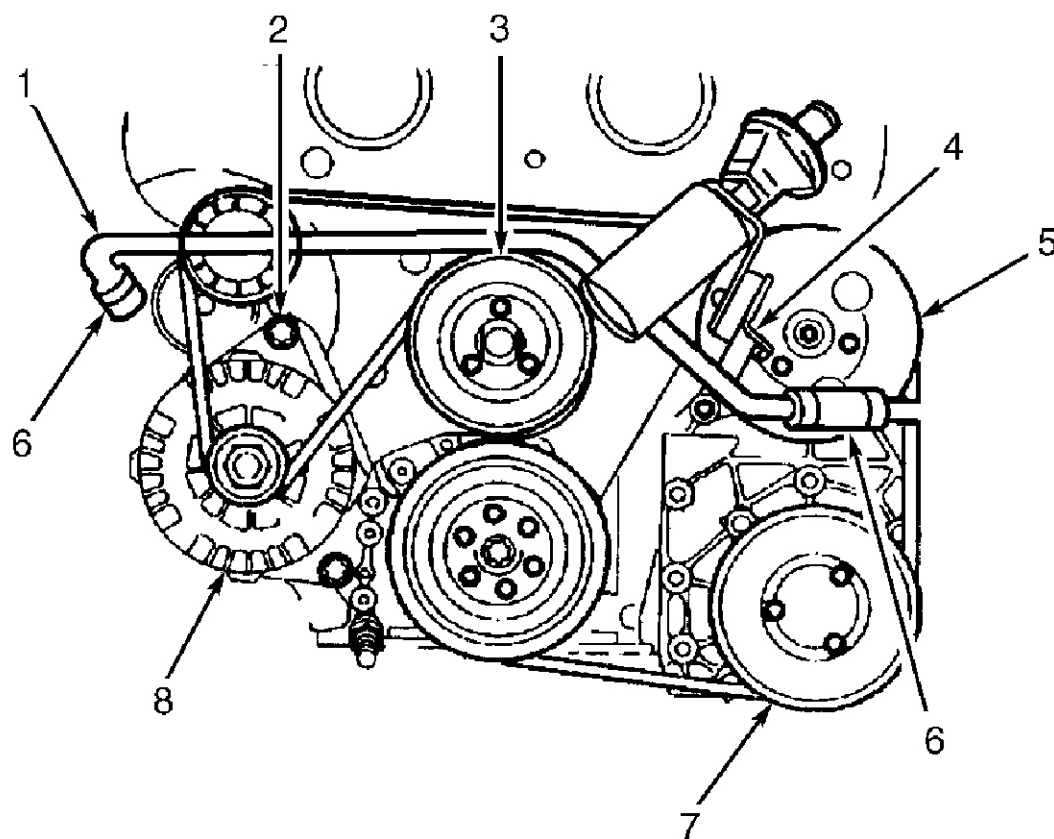
Removal

1. Disconnect negative battery cable. Remove air intake resonator and ducting from throttle body.
2. Raise and support vehicle. Remove lower front splash shield. Remove AIR injection crossover pipe clamps and bushing nut from front cover. See **Fig. 1**. Separate air injection crossover pipe from hoses and front cover.
3. Lower vehicle. Remove air injection crossover pipe from front cover.
4. Loosen, but do not remove, water pump pulley bolts. Loosen, but do not remove, power steering pump pulley bolts. Remove A/C compressor hose strap from AIR injection crossover bracket. Remove accessory drive serpentine belt.
5. Release plastic retaining tabs, and remove wiring harness channel cover from front of engine. Move wiring harness out of way.
6. Remove water pump pulley bolts and pulley. Remove power steering pump pulley bolts and pulley. Remove accessory drive serpentine belt tensioner.
7. Remove front timing belt cover. Remove 6 harmonic balancer-to-crankshaft bolts. Remove harmonic balancer. It is NOT necessary to remove crankshaft center bolt.
8. Rotate crankshaft clockwise to 60 degrees before TDC. See **Fig. 2**. Ensure timing marks are not 180 degrees from TDC.
9. Install Crankshaft Holder (J42069-10) and rotate crankshaft clockwise until holder contacts water pump. See **Fig. 3**. Secure moveable lever of tool to water pump pulley flange. Camshaft timing marks should be aligned with marks on rear cover. See **Fig. 4** or **Fig. 5**. If not aligned, crankshaft is 180 degrees (one half turn) off.
10. To lock camshafts in place, install Camshaft Gear Holders (J42069-1 and J42069-2). See **Fig. 6**. It may be

necessary to loosen timing belt idler pulley and turn eccentric until holder can be inserted.

NOTE: Do not move camshafts with belt removed. Do not remove Camshaft Holders (J42069) with timing belt removed.

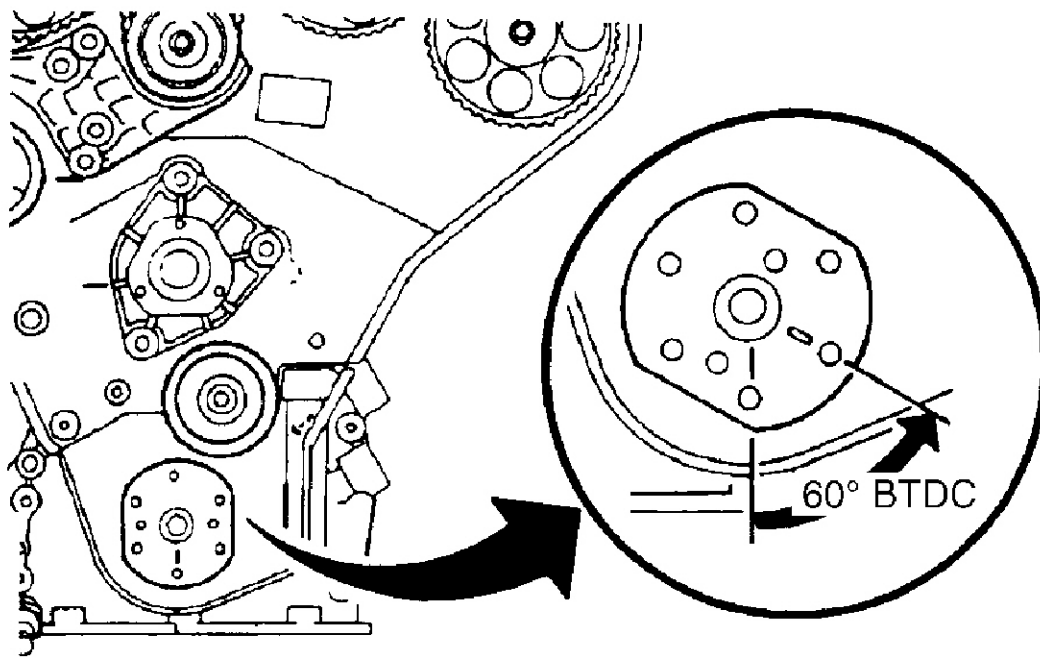
11. Loosen timing belt tensioner and idler pulley bolts. If reusing timing belt, mark belt with arrow to indicate original direction of rotation. Remove timing belt.



- | | |
|-----------------------------|-------------------|
| 1. AIR Crossover Pipe | 5. P/S Pump |
| 2. Generator Upper Bolt | 6. AIR Connectors |
| 3. Water Pump | 7. A/C Compressor |
| 4. AIR Crossover Pipe Mount | 8. Generator |

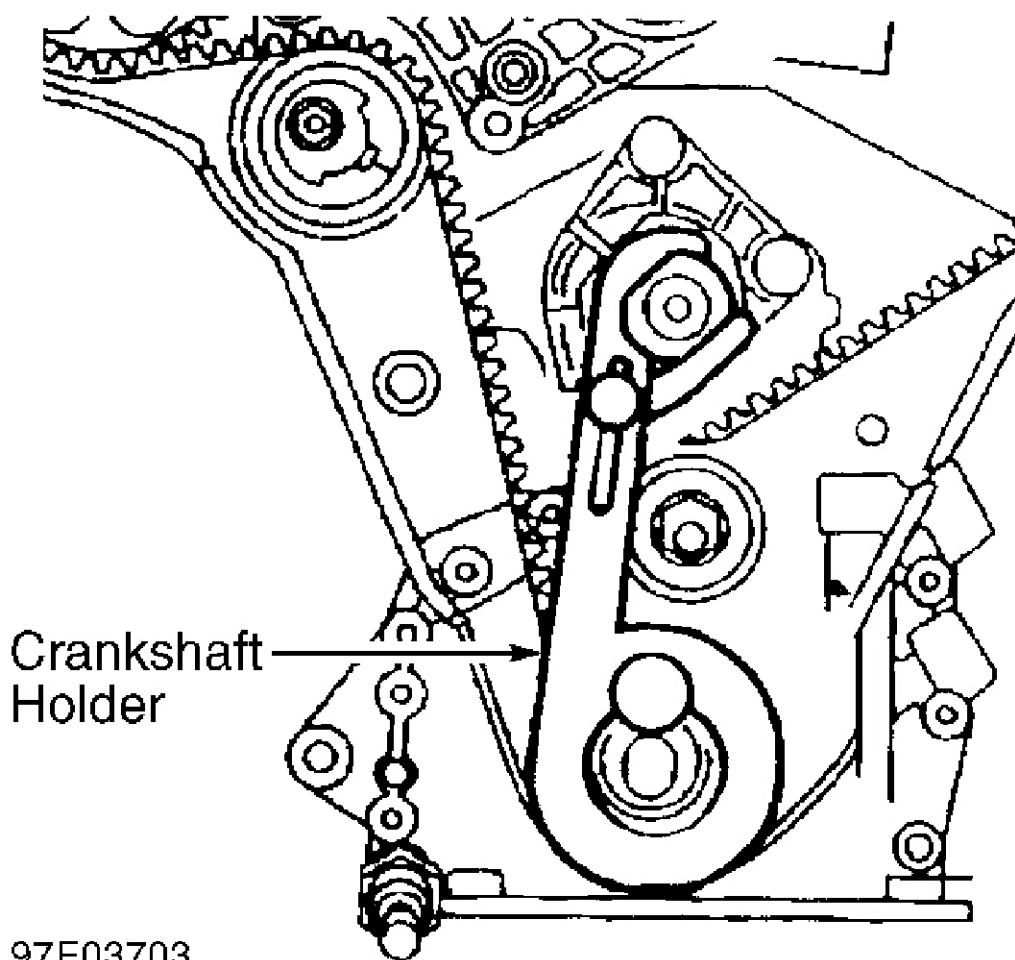
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Fig. 1: Identifying Timing Belt Front Cover Components
Courtesy of GENERAL MOTORS CORP.



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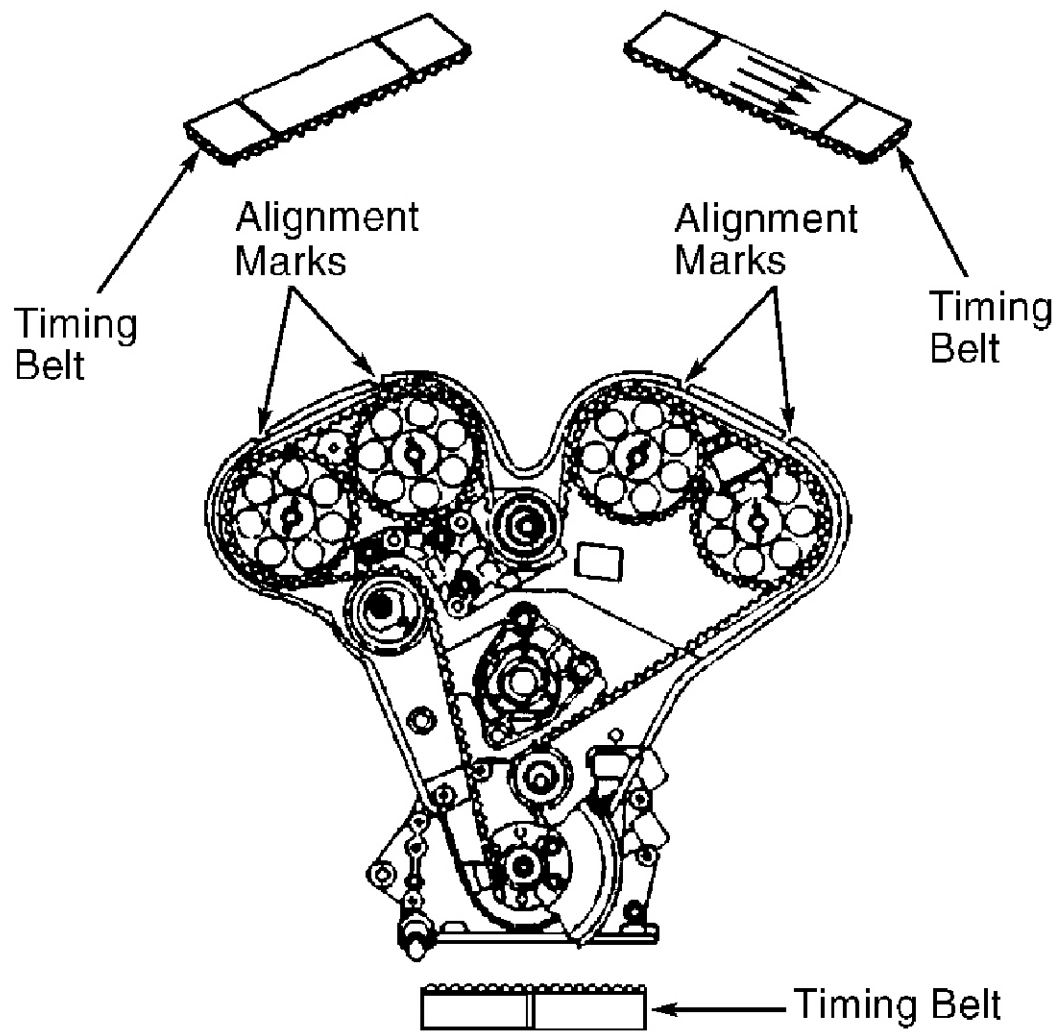
Fig. 2: Positioning Crankshaft At 60 Degrees BTDC
Courtesy of GENERAL MOTORS CORP.



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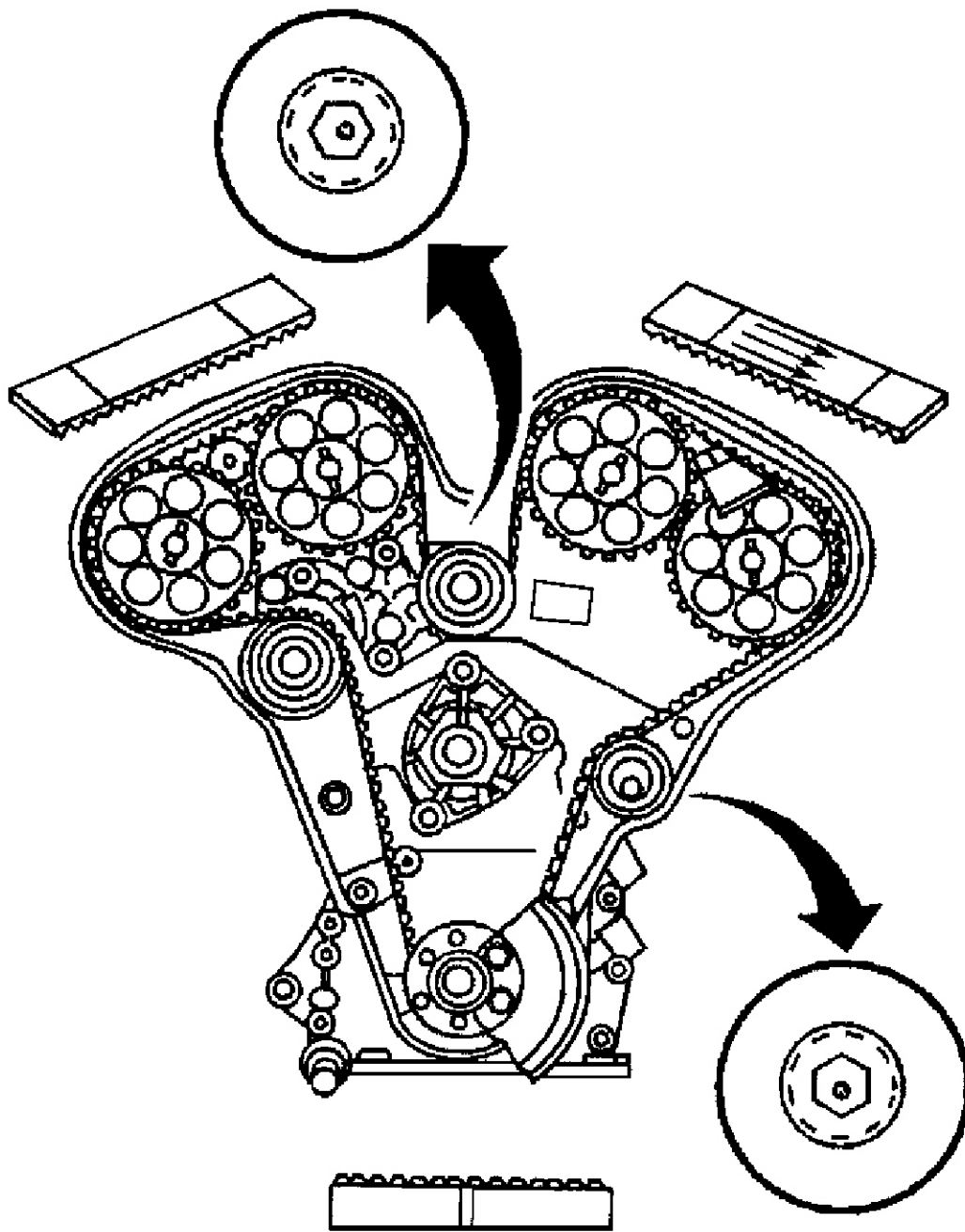
Fig. 3: Installing Crankshaft Holder

Courtesy of GENERAL MOTORS CORP.



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Fig. 4: Aligning Timing Belt Marks With Rear Cover Marks (Up To 1999 Early Design)
Courtesy of GENERAL MOTORS CORP.



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**Fig. 5: Aligning Timing Belt Marks With Rear Cover Marks (From 1999 Late Design)
Courtesy of GENERAL MOTORS CORP.**

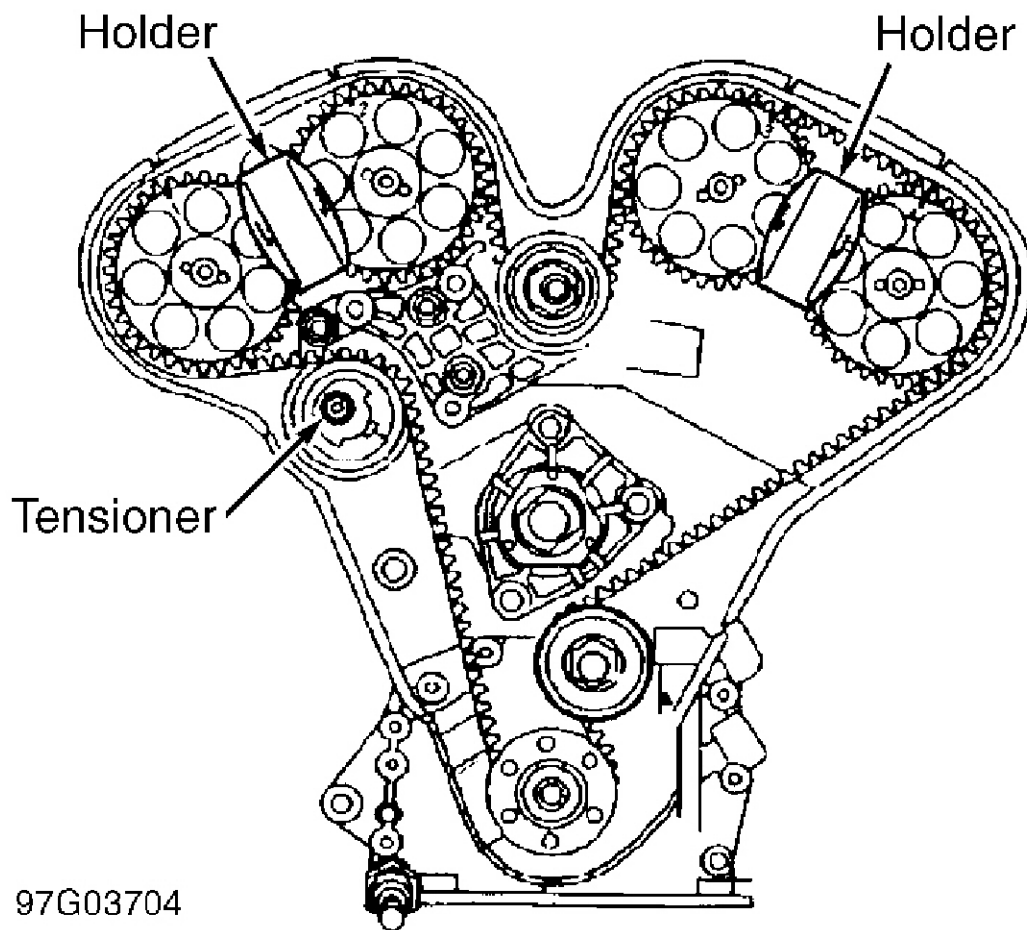


Fig. 6: Installing Camshaft Gear Holders
 Courtesy of GENERAL MOTORS CORP.

Inspection

Check timing belt for excessive wear, cracks, or missing teeth. Inspect timing belt tensioner and idler pulleys for worn bearings. Replace as necessary.

Installation

NOTE: Install timing belt at room temperature. NEW timing belts are marked with direction of rotation arrow and mating marks. Make sure belt is installed with arrows pointing in correct direction of rotation.

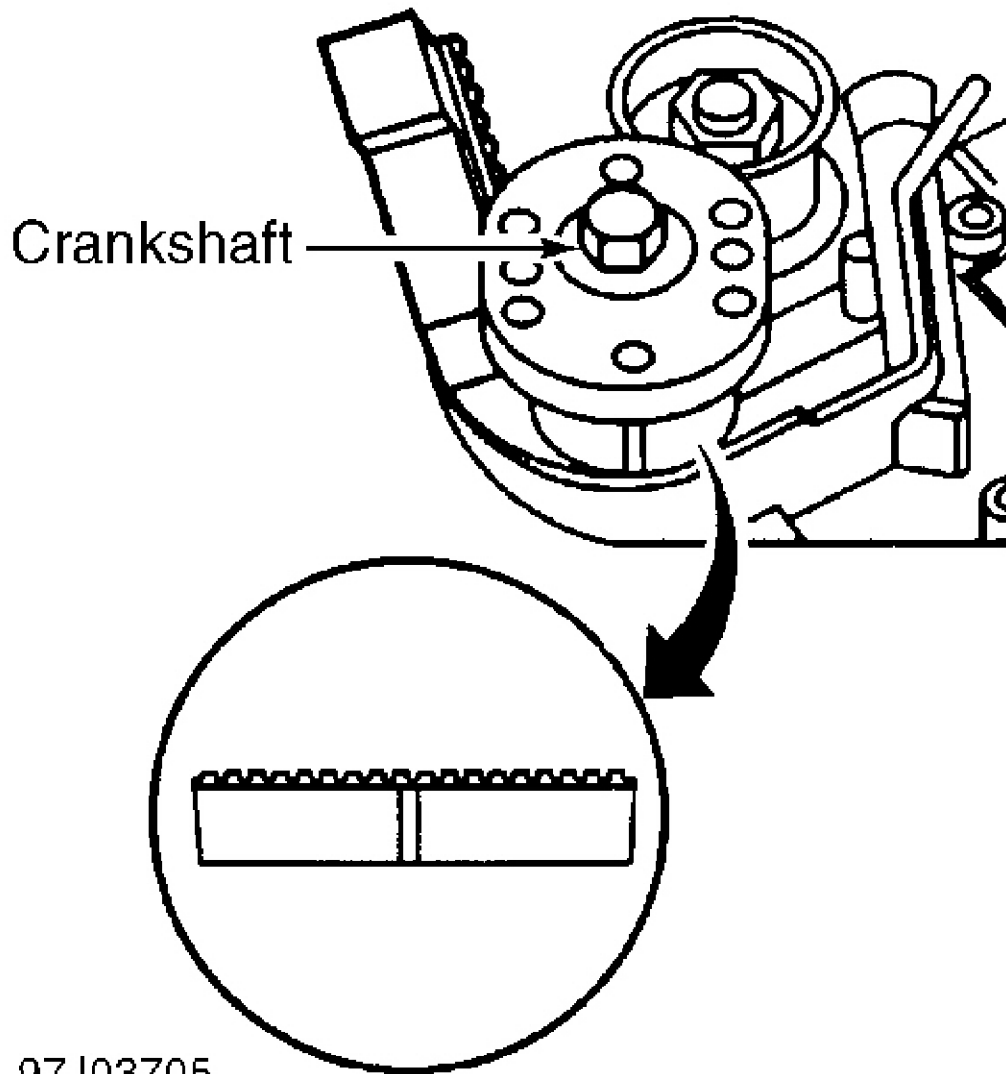
1. To install timing belt, remove crankshaft holder. Raise and support vehicle. Start installation of belt at crankshaft pulley. Install timing belt with double dash marks aligned with oil pump and drive gear marks. See [Fig. 7](#) . Install Timing Belt Holder (J42069-30) or equivalent plastic wedge to hold belt against crankshaft sprocket.

NOTE: Timing belt configuration changed in mid-1999 model year. For both designs, use the marks on each side of the direction of rotation arrows to line up the left (driver's side) camshaft sprockets. For early design (up to mid-1999), use the remaining 3 White marks on the timing belt. For later design (mid-1999 to present), use the remaining 3 Yellow marks on the timing belt. Correct belt application MUST be used on each engine design.

2. Lower vehicle. Route timing belt around tensioner, right bank (passenger's side) camshaft gears, idler pulley,

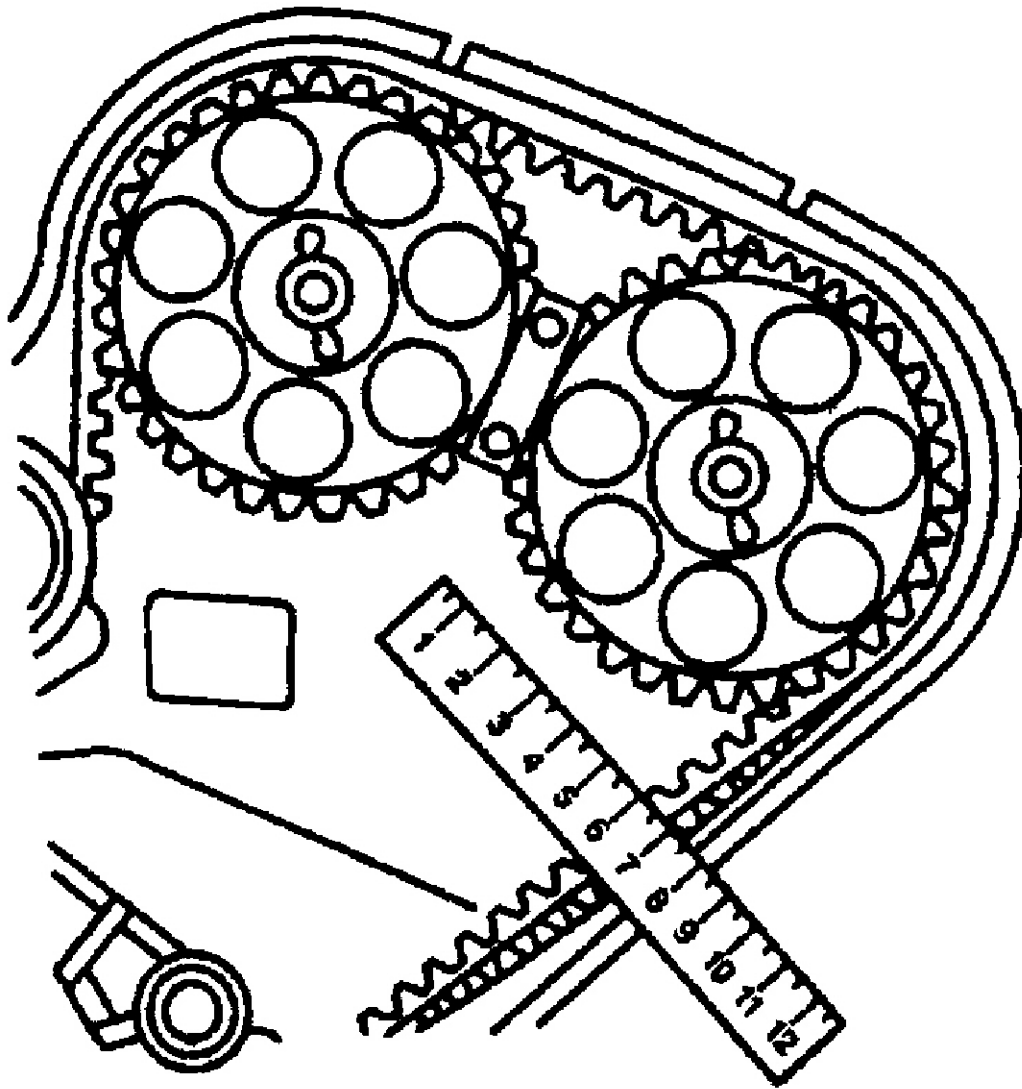
and left bank (driver's side) camshaft pulleys. Ensure timing belt marks are aligned with marks on camshaft sprockets and notches on rear timing belt cover. Keep timing belt taut between idler pulley and left bank camshaft pulleys. See **Fig. 4** or **Fig. 5**.

3. Ensure timing belt tension is taut (no slack). Measure timing belt deflection midway between left bank camshafts (viewed from rear of engine) and left side idler pulley (viewed from rear of engine). See **Fig. 8**. Deflection should be no more than 0.40" (10 mm). If initial timing belt deflection is okay, go to **TIMING BELT TENSION ADJUSTMENT**. If timing belt deflection is not correct, go to **TIMING BELT DEFLECTION ADJUSTMENT**.



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Fig. 7: Aligning Timing Belt Marks On Crankshaft Pulley
Courtesy of GENERAL MOTORS CORP.



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Fig. 8: Measuring Timing Belt Deflection
 Courtesy of GENERAL MOTORS CORP.

Timing Belt Deflection Adjustment

1. If timing belt deflection adjustment is necessary, loosen left (driver's) side idler pulley bolt. (This is NOT the idler pulley positioned between camshaft sprockets in top, center of engine). Turn left idler pulley counterclockwise until high point of eccentric nut is in about 12 o'clock position. See **Fig. 5** . Snug idler pulley bolt while holding eccentric so it does not move. Go to next step.
2. Apply additional tension to timing belt by loosening bolt for idler pulley located between camshaft sprockets (top, center of engine). Rotate high point of eccentric to 9 o'clock position. Tighten idler pulley bolt while holding eccentric so it does not rotate. Go to **TIMING BELT TENSION ADJUSTMENT** .

Timing Belt Tension Adjustment

Loosen timing belt tensioner lock nut. Turn tensioner eccentric counterclockwise to full stop. Turn eccentric back until reference mark is .039" (1 mm) from belt tension setting flange. See **Fig. 9** . Tighten timing belt tensioner lock nut until snug. Lock nut will be final tightened after final adjustments are made. Go to **CHECKING CAMSHAFT SPROCKET ALIGNMENT** .

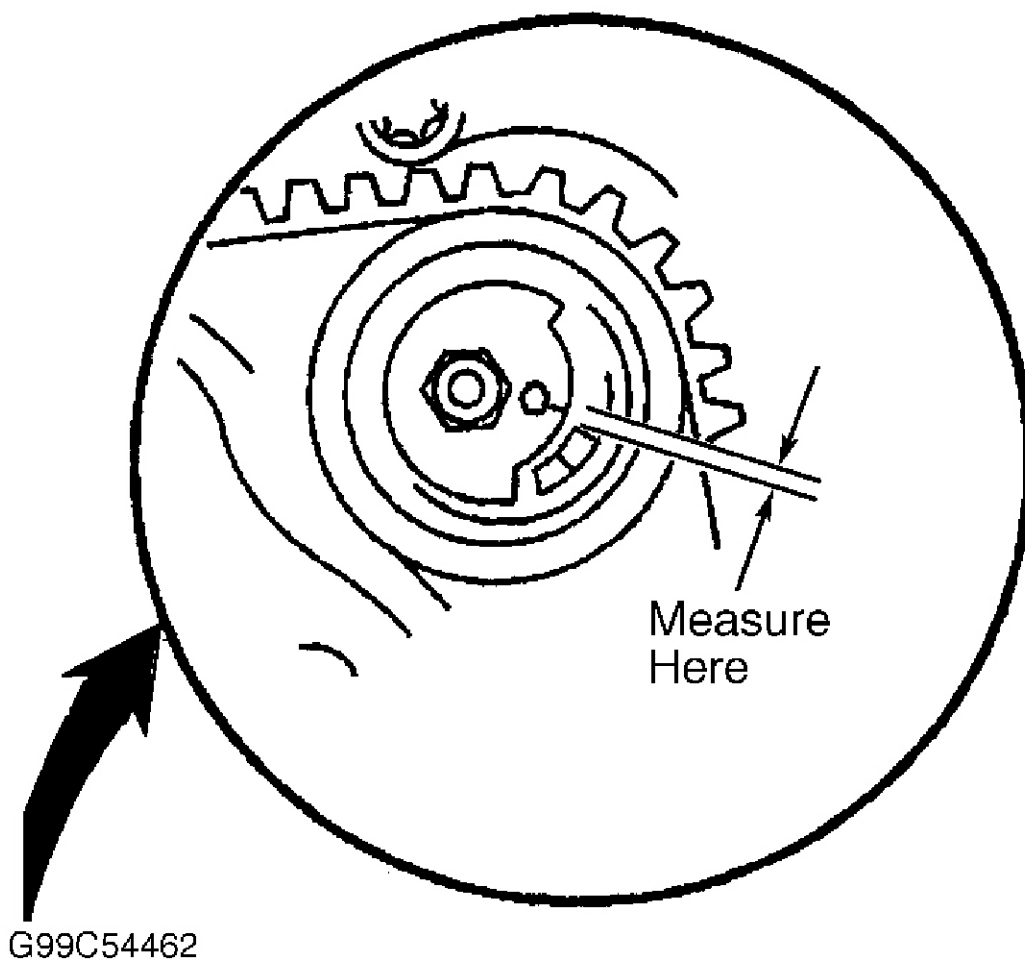


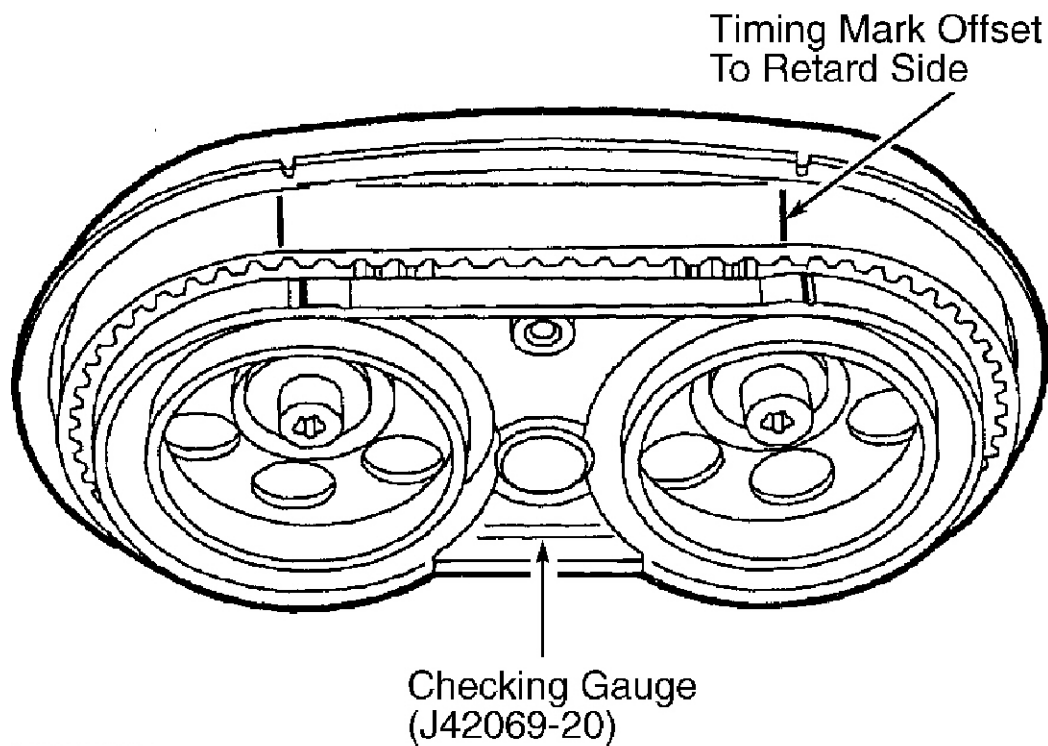
Fig. 9: Adjusting Timing Belt Tension (New Design Engine Shown; Early Design Engine Is Similar)
 Courtesy of GENERAL MOTORS CORP.

Checking Camshaft Sprocket Alignment

1. Ensure timing belt alignment marks are still aligned with reference points on camshaft sprockets and rear timing belt cover. Remove all locking tools from camshafts and timing belt.
2. Rotate crankshaft clockwise 2 revolutions, stopping at 60 degrees before TDC mark. See **Fig. 2** . Install Crankshaft Holder (J42069-10) to crankshaft flange. Secure moveable lever of tool to water pump pulley flange.

NOTE: Alignment marks on timing belt will no longer align with camshaft sprocket marks after one or more crankshaft revolutions.

3. Ensure crankshaft timing mark aligns with mark on oil pump housing. Ensure camshaft timing marks align with notches on rear cover.
4. Use Checking Gauge (J42069-20) to inspect alignment of left bank and right bank camshaft gears. See **Fig. 10** . The reference marks on both sets of camshaft sprockets must match exactly with marks on Checking Gauge (J42069-20).
5. If timing belt readjustment is not necessary, go to **FINAL TIMING BELT TENSIONING & INSTALLATION** . If timing belt readjustment is necessary, go to **TIMING BELT READJUSTMENT (LEFT BANK CAMSHAFTS)** .



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Fig. 10: Installing Checking Gauge On Camshaft Sprockets
 Courtesy of GENERAL MOTORS CORP.

Timing Belt Readjustment (Left Bank Camshafts)

NOTE: When readjusting timing belt tension, Crankshaft Holder (J42069-10) must be in position on engine.

1. If timing belt readjustment is required, always start with left bank (driver's side) camshafts first. Install Checking Gauge (J42069-20) to left bank camshafts.
2. Loosen idler pulley on driver's side of engine. This is idler pulley below camshaft sprockets. Using Wrench (J42069-40) or equivalent, turn idler pulley eccentric COUNTERCLOCKWISE until timing marks on camshaft sprockets and checking gauge are in alignment. High point of idler pulley eccentric should be in about the 12 o'clock position. Tighten idler pulley bolt while holding eccentric from turning.
3. Remove checking gauge and crankshaft holder. Rotate crankshaft clockwise 2 revolutions, stopping at 60 degree BTDC. Install Crankshaft Holder (J42069-10) to crankshaft drive gear. Rotate crankshaft to secure lever of holder to water pump flange. Install Checking Gauge (J42069-20) to left bank camshafts. If camshaft sprockets are now properly aligned, go to **TIMING BELT READJUSTMENT (RIGHT BANK CAMSHAFTS)**. If not, repeat readjustment procedure.

Timing Belt Readjustment (Right Bank Camshafts)

1. If timing belt readjustment is required, always start with left bank (driver's side) camshafts first. Install Checking Gauge (J42069-20) to right bank (passenger's side) camshafts.
2. Loosen bolt on idler pulley that is located in the center and below the left bank and right bank camshafts.
3. Using Wrench (J42069-40) or equivalent, turn idler pulley eccentric COUNTERCLOCKWISE until timing marks on camshaft sprockets and checking gauge are in alignment. High point of idler pulley eccentric should be in about the 9 o'clock position. Tighten idler pulley bolt while holding eccentric from turning.
4. Remove checking gauge and crankshaft holder. Rotate crankshaft clockwise 2 revolutions, stopping at 60 degree BTDC. Install Crankshaft Holder (J42069-10) to crankshaft drive gear. Rotate crankshaft to secure lever of holder to water pump flange. Install Checking Gauge (J42069-20) to right bank camshafts. If

camshaft sprockets are now properly aligned, go to **FINAL TIMING BELT TENSIONING & INSTALLATION** . If not, repeat readjustment procedure.

Final Timing Belt Tensioning & Installation

1. To set final timing belt tension, loosen timing belt tensioner eccentric lock nut. Turn timing belt eccentric counterclockwise to full stop. Turn tensioner back until reference mark is .079-.157" (2-4 mm) ABOVE reference mark on flange. See **Fig. 9** . Tighten tensioner eccentric lock nut to specification. See **TORQUE SPECIFICATIONS** .
2. If timing belt idler pulley bolts were loosened, final tighten them to specification. Inspect high points of timing belt tensioner eccentrics. Left side idler pulley (viewed from rear of engine) eccentric high point should be in about the 12 o'clock position. Top center idler pulley eccentric high point should be in about the 9 o'clock position. See **Fig. 5** .
3. Remove crankshaft holding tool. Rotate crankshaft clockwise 2 revolutions, stopping at 60 degrees before TDC mark. Install Crankshaft Holder (J42069-10) to crankshaft drive gear.
4. Turn crankshaft clockwise until lever of holder firmly contacts water pump pulley flange. Secure moveable lever of tool to water pump pulley flange.
5. Ensure camshaft timing marks align with notches on rear cover and crankshaft timing mark align with mark on oil pump housing. Use Checking Gauge (J42069-20) to inspect alignment of left bank and right bank camshaft gears.
6. Adjust timing belt position, if necessary. Ensure all tools are removed from engine. Install timing belt front cover. Install crankshaft harmonic balancer. Tighten bolt to specification.
7. Install timing belt cover. Install accessory drive belt tensioner. Install water pump and power steering pump pulleys. Install serpentine drive belt.
8. Install air injection crossover pipe to front of engine. Install air intake resonator and ducting. Install engine splash shield.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Camshaft Sprocket Bolt	
Step 1	37 (50)
Step 2	Additional 60 Degrees
Step 3	Additional 15 Degrees
Crankshaft Harmonic Balancer Bolt	15 (20)
Crankshaft Sprocket Center Bolt	
Step 1	184 (250)
Step 2	Additional 45 Degrees
Step 3	Additional 15 Degrees
Generator Bolt	30 (40)
Power Steering Pump Pulley Bolt	15 (20)
Serpentine Drive Belt Tensioner Bolt	30 (40)
Timing Belt Idler Pulley Bolt	30 (40)
Timing Belt Tensioner Bracket Bolt	30 (40)
Timing Belt Tensioner Eccentric Lock Nut	15 (20)

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	INCH Lbs. (N.m)
Timing Belt Front Cover Bolt	71 (8)
Water Pump Pulley Bolt	71 (8)

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