

8. Cylinder Head

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Service Information

- Camshaft lubricating oil is fed through oil passages in the cylinder head. Clean the oil passages before assembling the cylinder head.
- Clean all disassembled parts with clean solvent and dry them by blowing them off compressed air before inspection.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their proper locations.
- Take care not to damage the cylinder walls and pistons.
- If valve seat cutting is required, a commercially available cutting set is recommended.

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Troubleshooting

- Engine top-end problems usually affect engine performance. These can be diagnosed by a compression or leak down test, or by tracing noises to the top-end with a sounding rod or stethoscope.
- If performance is poor at low speeds, check for white smoke in the crankcase breather tube. If the tube is smokey, check for a seized piston ring.

Compression too low, hard starting or poor performance at low speed

- Valves
 - Incorrect valve clearance
 - Burned or bent valves
 - Incorrect valve timing
 - Broken valve spring
 - Uneven valve seating
 - Sticking valve
- Cylinder head
 - Leaking or damaged head gasket
 - Warped or cracked cylinder head

Excessive noise

- Incorrect valve clearance
- Sticking or broken valve spring
- Damaged or worn camshaft
- Loose or damaged timing belt
- Weak or damaged belt tensioner
- Damaged timing belt pulleys

Rough idle

- Low cylinder compression

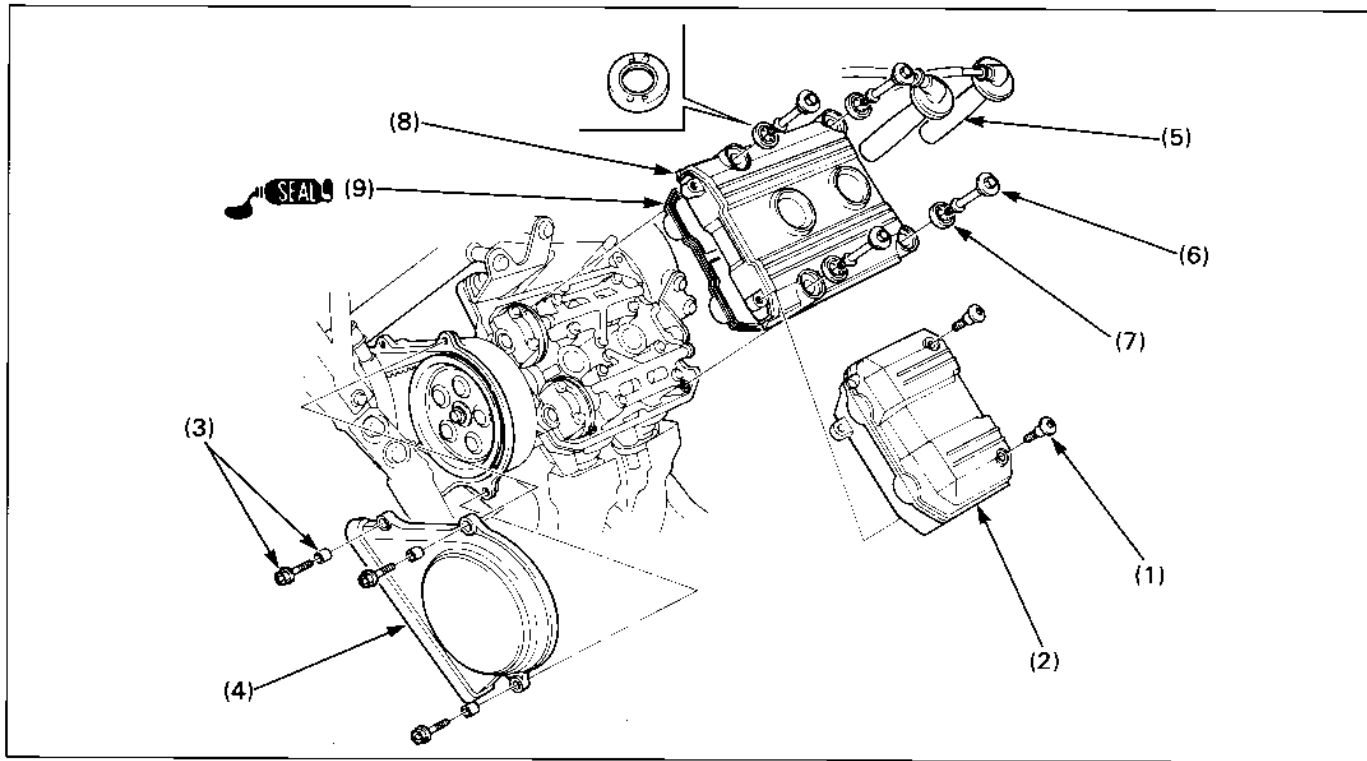
Compression too high, overheating or knocking

- Excessive carbon build-up in cylinder head or combustion chamber

Excessive smoke

- Worn valve stem or valve guide
- Damaged stem seal

Cylinder Head Cover Removal/Installation

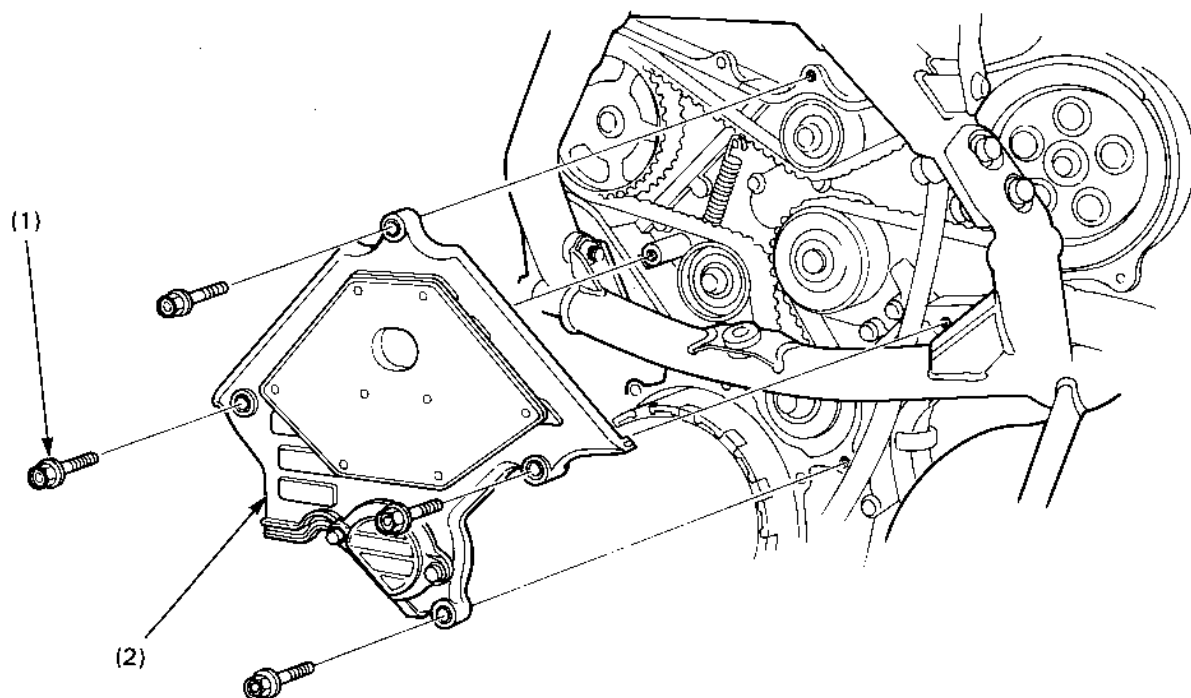


Requisite Service

- Upper fairing removal/installation (page 2-9)

Procedure	Q'ty	Remarks
Removal Order		Installation is in the reverse order of removal.
(1) Bolt	2	
(2) Front head cover	1	
(3) Bolt/collar	3/3	
(4) Reduction holder cover	1	
(5) Spark plug cap	2	
(6) Cylinder head cover bolt	4	
(7) Washer	4	Install with the "UP" mark facing up.
(8) Cylinder head cover	1	The right head cover has the oil filler cap.
(9) Gasket	1	

Timing Belt Cover Removal/Installation

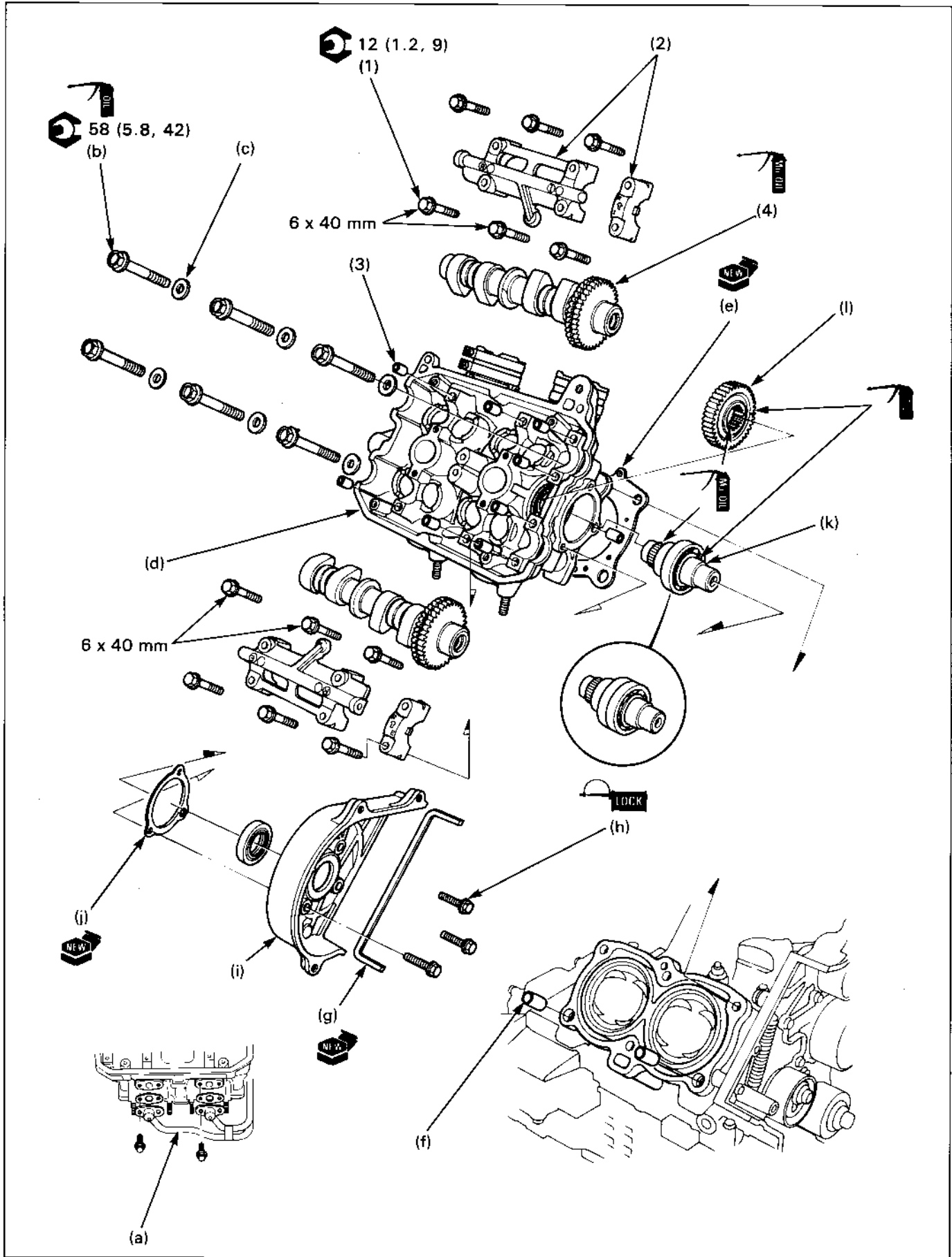


Requisite Service

- Radiator removal/installation (page 6-5)
- Reduction holder cover removal/installation (page 8-2)
- Clutch cover removal/installation (page 9-6)

Procedure		Q'ty	Remarks
Removal Order			Installation is in the reverse order of removal.
(1)	Bolt	4	
(2)	Timing belt cover	1	

Cylinder Head Removal/Installation



NOTE

- The camshaft can be removed with the timing belt driven pulley installed and without removing the carburetors and exhaust pipe. The timing belt driven pulley, carburetors and exhaust pipe must be removed to remove the cylinder head.
- Before removing the right cylinder camshaft, align the index line on the driven pulley with the index mark on the reduction holder. Before removing the left cylinder camshaft, align the punch mark on the driven pulley with the index mark on the reduction holder.
- For camshaft installation, see page 8-6.

Requisite Service

- Cylinder head cover removal/installation (page 8-2)
- Timing belt driven pulley removal/installation (page 8-10)
- Carburetor removal/installation (page 5-3)
- Exhaust pipe removal/installation (page 2-18)

Procedure		Q'ty	Remarks
	Removal Order		Installation is in the reverse order of removal.
(1)	Camshaft holder bolt 6 x 40 mm	4	Install in the positions shown on page 8-4
	6 x 45 mm	8	
(2)	Camshaft holder	4	Installation (page 8-6) At installation, apply molybdenum disulfide oil to the bearing and lobe surfaces (see page 8-6)
(3)	Dowel pin	8	
(4)	Camshaft	2	
(a)	Air injection pipe (U.S.A only)	2	
(b)	Cylinder head bolt	6	
(c)	Washer	6	
(d)	Cylinder head	1	
(e)	Cylinder head gasket	1	
(f)	Dowel pin	2	
(g)	Cam reduction holder gasket	1	
(h)	Bolt	3	
(i)	Cam reduction holder	1	
(j)	Gasket	1	
(k)	Cam reduction gear shaft	1	<ul style="list-style-type: none"> • The shaft for the right cylinder has a single bearing and the one for the left cylinder has a double bearing. • Align the wide tooth with the wide groove (punch mark) of the reduction gear.
(l)	Cam reduction gear	1	

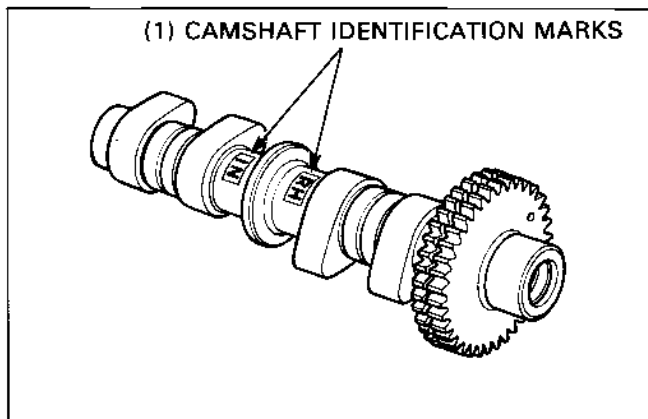
Cylinder Head

Camshaft Installation

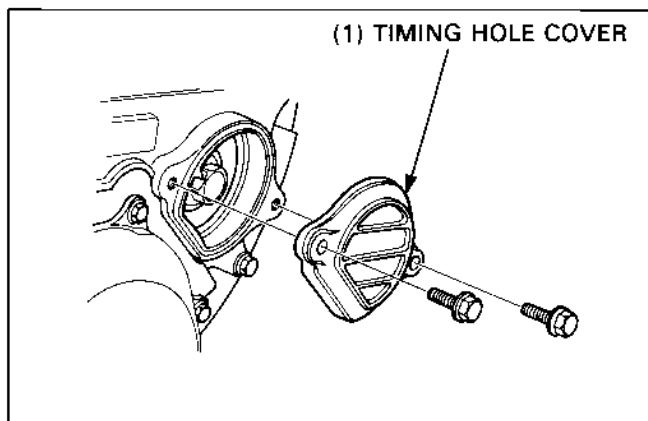
Lubricate the camshaft journals, cam lobes and driven gears with a mixture of engine oil and molybdenum disulfide grease in a 1:1 ratio.

NOTE

- Each camshaft has the identification marks shown below.
 - Right intake camshaft: RH IN
 - Right exhaust camshaft: RH EX
 - Left intake camshaft: LH IN
 - Left exhaust camshaft: LH EX

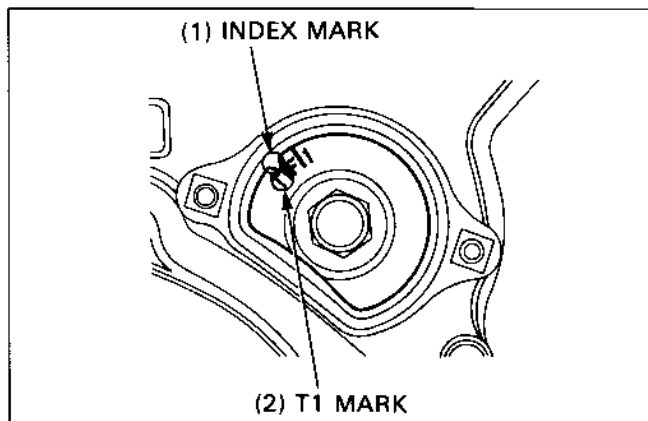


Remove the two bolts and timing hole cover.

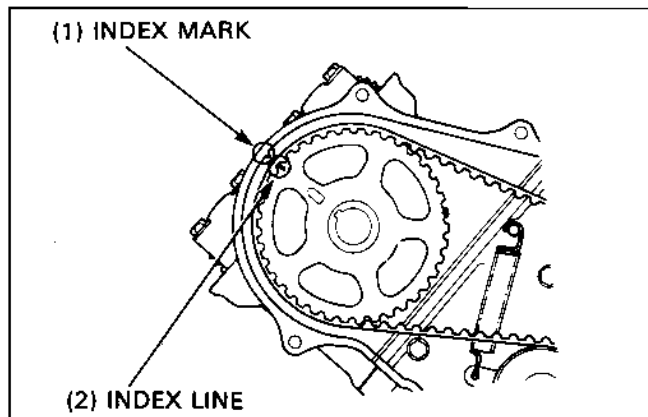


Right cylinder head:

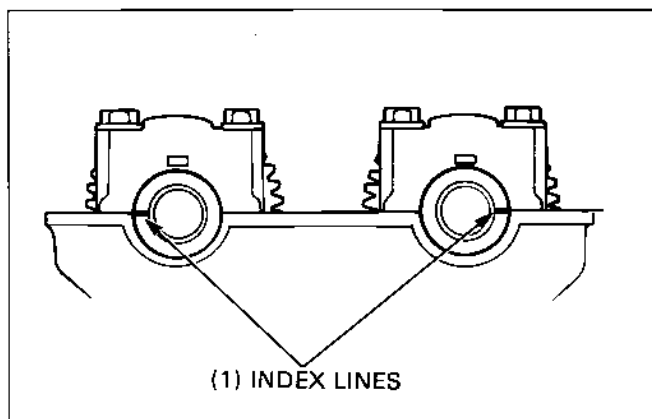
Turn the crankshaft clockwise and align the T1 Mark on the drive pulley guide plate with the Index Mark on the timing cover.



Make sure that the Index Line on the driven pulley aligns with the Index Mark on the reduction holder. If not, turn the crankshaft clockwise one full turn and realign the T1 Mark with the Index Mark.



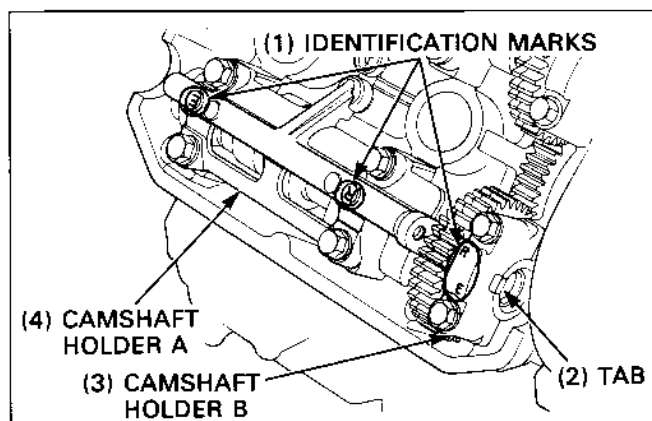
Install the intake and exhaust camshafts so that the Index Lines on the end of the shafts are facing outward and that they align with the top of the cylinder head as shown.



Install the dowel pins and camshaft holders.

NOTE

- Each camshaft holder has the identification marks shown below.
 - Right intake camshaft holder: R I
 - Right exhaust camshaft holder: R E
 - Left intake camshaft holder: L I
 - Left exhaust camshaft holder: L E
- Install camshaft holder B with its tab facing out as shown.

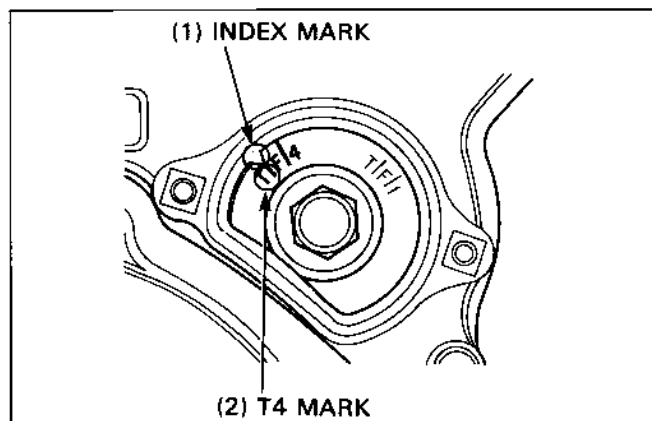


Left cylinder head:

Turn the crankshaft clockwise and align the T4 Mark on the drive pulley guide plate with the Index Mark on the timing belt cover.

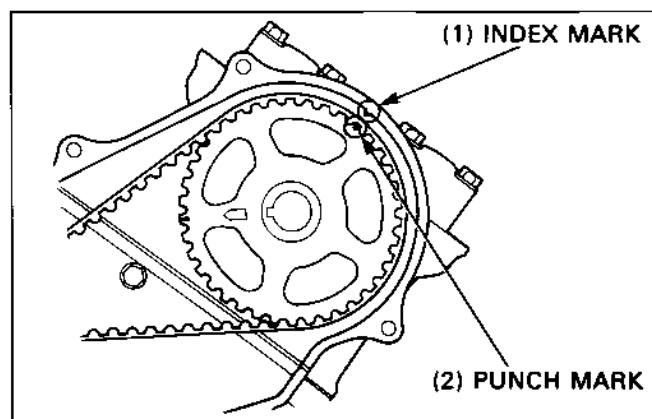
NOTE

- If the right camshaft has been removed, install it first, then turn the crankshaft clockwise 1-1/4 turns (450 degrees) and align the T4 Mark with Index Mark.

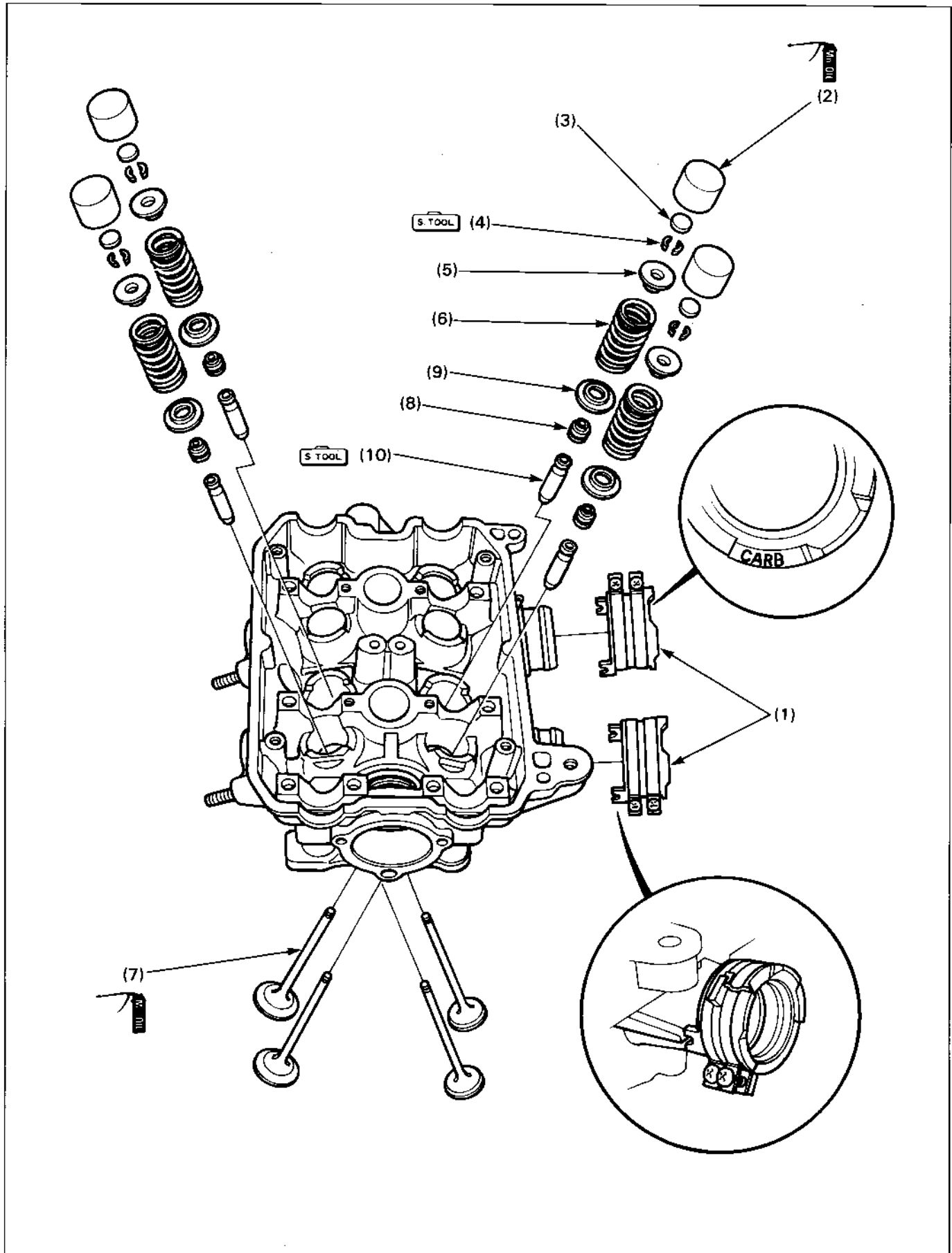


Make sure that the Punch Mark on the driven pulley aligns with the Index Mark on the reduction holder. If not, turn the crankshaft clockwise one full turn and realign the T4 Mark with the Index Mark.

Install the intake and exhaust camshafts, and camshaft holders in the same manner as the right camshaft installation.



Cylinder Head Disassembly/Assembly



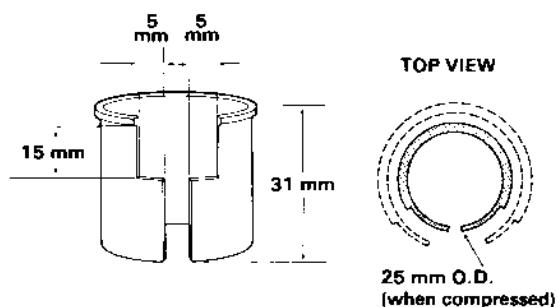
NOTE

- The valve lifter and valve adjusting shim can be removed with the cylinder head installed. Refer to page 3-5 for the shim replacement.
- Mark all parts during disassembly so they can be placed back in their original position.

Requisite Service

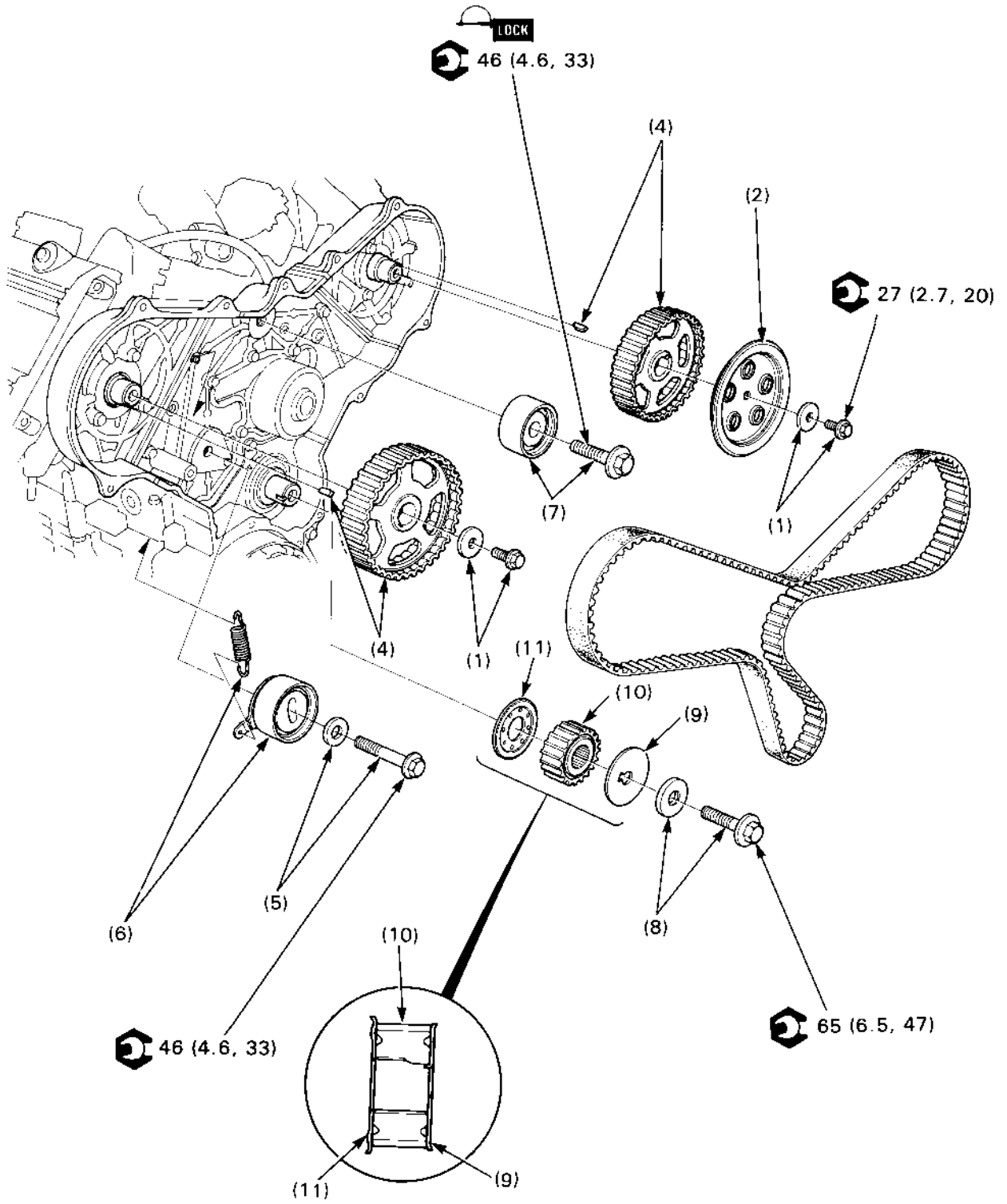
- Cylinder head removal/installation (page 8-4)

Procedure	Q'ty	Remarks
(1) Disassembly Order Carburetor insulator	2	Assembly is in the reverse order of disassembly. Install with the "CARB" mark facing to the carburetor and align the grooves with the lugs on the cylinder head.
(2) Valve lifter	8	NOTE: • Remove using a handlapping tool. Do not damage the cylinder head bucket sliding surface.
(3) Valve adjusting shim	8	
(4) Valve spring cotter	16	Use valve spring compressor (07757-0010000) with valve spring compressor attachment (07959-KM30101) and tappet hole protector (07HMG-MR70001) Not Available in U.S.A., to make equivalent tool, see below.
(5) Valve spring retainer	8	
(6) Valve spring	8	Install with the narrow pitch end facing down.
(7) Valve	8	
(8) Valve stem seal	8	
(9) Valve spring seat	8	
(10) Valve guide	8	Use valve guide driver (07HMD-ML00100 or 07HMD-ML00101).



Tappet hole protector; an equivalent tool can be made from a plastic 35 mm film container using the measurements shown above.

Timing Belt Pulley Removal/Installation



NOTE

- Perform the timing belt service while the engine is cold.

Requisite Service

- Timing belt cover removal/installation (page 8-3)
- Spark plug removal/installation

Procedure		Q'ty	Remarks
	Removal Order		Installation is in the reverse order of removal.
(1)	Drive pulley bolt/washer	2/2	Hold the drive pulley bolt when loosening and tightening the driven pulley bolt.
(2)	Driven pulley guide	1	
(3)	Timing belt	1	Removal/installation (page 8-12)
(4)	Driven pulley/woodruff key	2/2	
(5)	Timing belt tensioner bolt/washer	1/1	
(6)	Tensioner roller/spring	1/1	
(7)	Idle pulley bolt/pulley	1/1	
(8)	Drive pulley bolt/washer	1/1	Hold the crankshaft by placing the transmission in 5th gear and applying the rear brake when loosening and tightening the drive pulley bolt.
(9)	Guide plate A	1	Install with the groove aligned with the woodruff key on the crankshaft.
(10)	Drive pulley	1	
(11)	Guide plate B	1	Install the guide plates with the flat side toward the drive pulley.

Timing Belt Removal/Installation

NOTE

- Perform this service while the engine is cold.
- For easy servicing, remove the spark plugs.

CAUTION

- **Be careful not to contaminate the timing belt with oil etc.**
- **Do not bend the timing belt excessively.**

Removal

Hold the crankshaft and remove the left driven pulley bolt, washer and guide.

Loosen the timing belt tensioner bolt 1/4—1/2 turn. Release the tensioner by turning the crankshaft counterclockwise while holding the right driven pulley, and temporarily tightening the tensioner bolt.

Turn the crankshaft clockwise and align the T1 Mark on the drive pulley guide plate with the Index Mark on the crankcase.

CAUTION

- **When align the T1 Mark with the Index Mark, be sure that the Punch Mark on the drive pulley guide plate aligns with the Projection on the crankcase, too.**

Remove the timing belt from the pulleys.

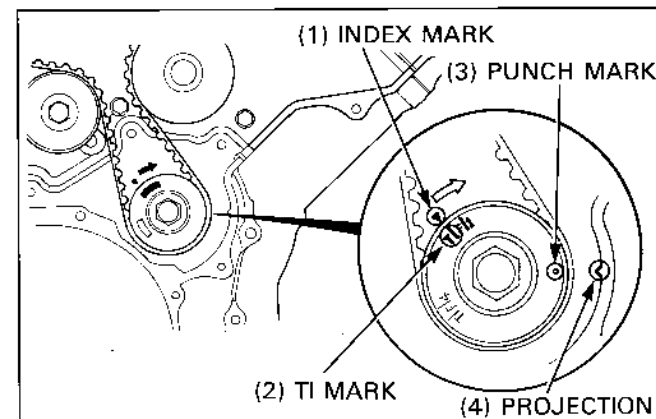
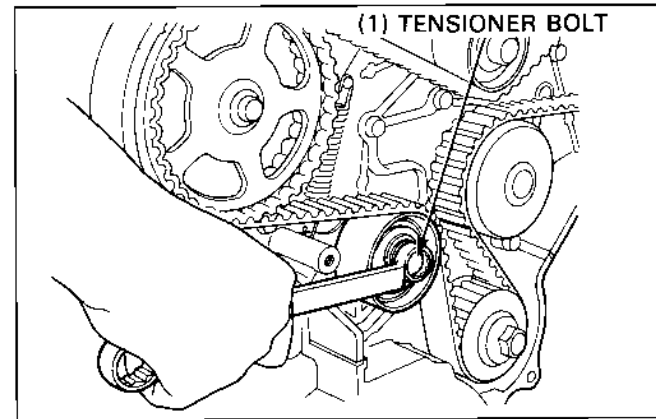
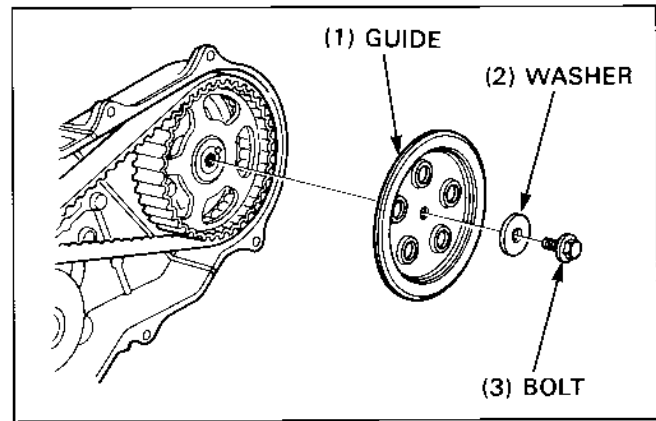
CAUTION

- **Do not turn the camshafts after removing the timing belt or you may damage the valves and piston domes.**

Installation

NOTE

- When the camshafts are removed, install the camshaft first (page 8-6), then install the timing belt.
- Before installing the timing belt, move the tensioner pulley to the fully released position and temporarily tighten the tensioner bolt.



Align the T1 Mark on the drive pulley guide plate with the Index Mark on the crankcase.

CAUTION

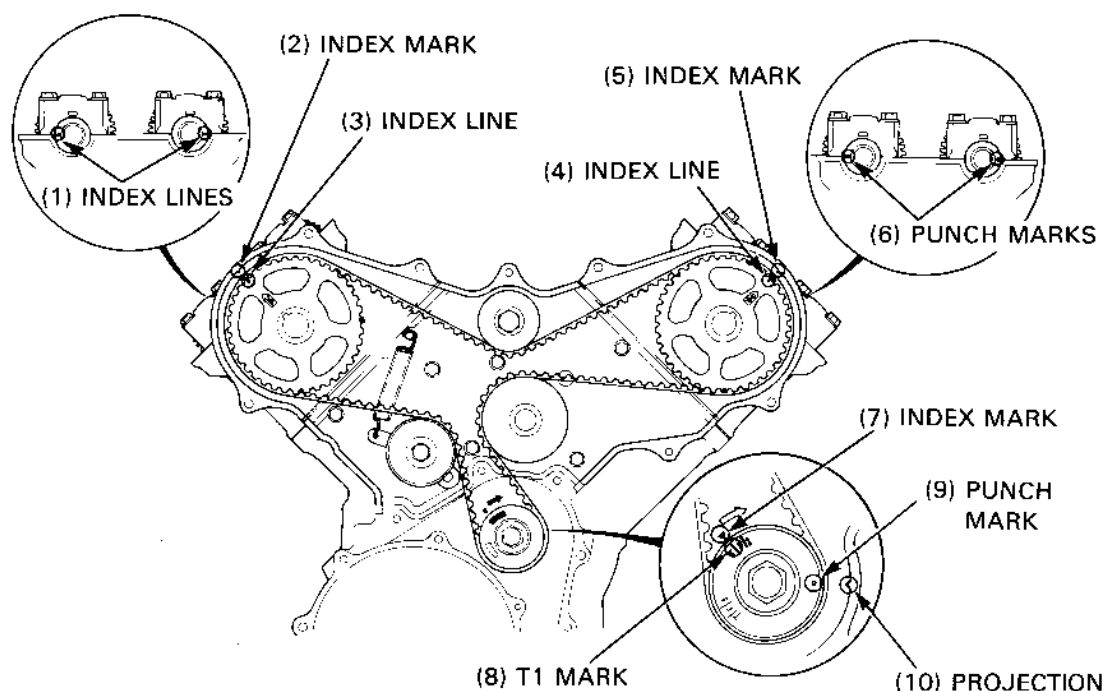
- When align the T1 Mark with the Index Mark, be sure that the Punch Mark on the drive pulley guide plate aligns with the Projection on the crankcase, too.

Align the Index Lines on the driven pulley with the Index Marks of the reduction holders.

NOTE

- When the Index Line is aligned with the Index Mark:
 - on right cylinder head, the Index Lines on the camshaft end are facing outward and align with the top of the cylinder head.
 - on left cylinder, the Punch Marks on the camshaft end are facing outward and align with the top of the cylinder head.

Install the timing belt on the drive pulley, next on the left driven pulley, then on the right driven pulley.



Install the left driven pulley guide, washer and bolt, and tighten the bolt while holding the crankshaft.

Torque: 27 N·m (2.7 kg-m, 20 ft-lb)

Loosen the timing belt tensioner bolt to apply the tension to the belt. Then turn the crankshaft 2 to 4 full turns to stabilize the belt run, and tighten the bolt.

Torque: 46 N·m (4.6 kg-m, 33 ft-lb)

When installing a new belt, apply initial tension to the belt as follows:

Cylinder Head

Loosen the tensioner bolt.

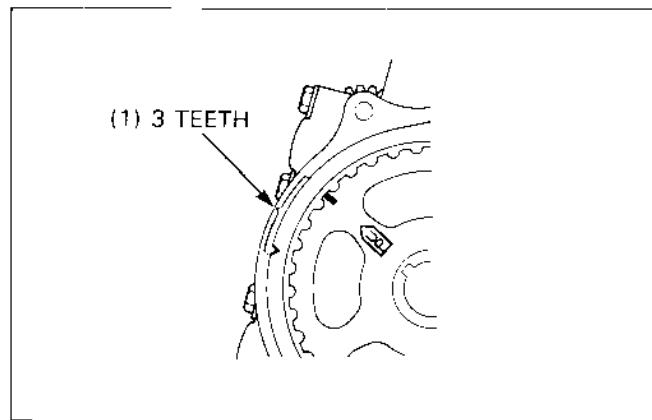
Turn the crankshaft clockwise 2 to 4 full turns, and align the T1 Mark with the Index Mark. (The Index Lines on the driven pulleys must align with the Index Marks.)

CAUTION

- When align the T1 Mark with the Index Mark, be sure that the Punch Mark on the drive pulley guide plate aligns with the Projection on the crankcase, too.















Then turn the crankshaft clockwise 3 teeth further and tighten the tensioner bolt.

Torque: 46 N·m (4.6 kg-m, 33 ft-lb)



Symbols

The symbols used throughout this manual show specific service procedures. If supplementary information is required pertaining to these symbols, it would be explained specifically in the text without the use of the symbols.

	<p>Replace the part(s) with new one(s) before assembly.</p>
	<p>Use special tool</p>
	<p>Use optional tool. Use the same procedure you use to order parts.</p>
 <p>10 (1.0, 7.2)</p>	<p>Torque specification. 10 N·m (1.0 kg-m, 7.2 ft-lb)</p>
	<p>Use recommended engine oil, unless otherwise specified.</p>
	<p>Use molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1 : 1).</p>
	<p>Use multi-purpose grease (Lithium based multi-purpose grease NLGI #2 or equivalent)</p>
	<p>Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent) Example: Molykote® BR-2 plus manufactured by Dow Corning, U.S.A. Multi-purpose M-2 manufactured by Mitsubishi Oil Japan</p>
	<p>Use molybdenum disulfide paste (containing more than 40% molybdenum disulfide, NLGI #2 or equivalent) Example: Molykote® G-n Paste manufactured by Dow Corning, U.S.A. Honda Moly 60 (U.S.A. only) Rocol ASP manufactured by Rocol Limited, U.K. Rocol Paste manufactured by Sumico Lubricant, Japan</p>
	<p>Use silicone grease</p>
	<p>Apply a locking agent. Use a middle strength locking agent unless otherwise specified.</p>
	<p>Apply sealant</p>
	<p>Use brake fluid, DOT 3 or DOT 4. Use the recommended brake fluid, unless otherwise specified.</p>
	<p>Use Fork or Suspension Fluid.</p>