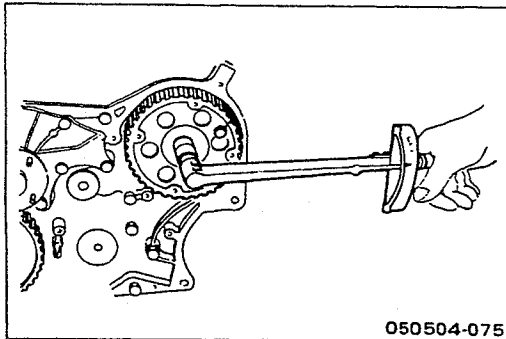


- 3) Install the injection pump rear bracket ④ and the rear bracket bolts ⑤ to the cylinder body.
- 4) Install the rear bracket bolts ⑥ to the injection pump bracket.
Do not tighten the bolts.
The rear bracket bolts ⑤ and ⑥ will be finally tightened to the specified torque after the injection pump nuts.
- 5) Tighten the injection pump nuts to the specified torque.

Injection Pump Nut and Bracket Bolt Torque

Torque	kg·m(lb.ft/N·m)
	1.5 ± 0.5 ($10.8 \pm 3.6/14.70 \pm 4.90$)

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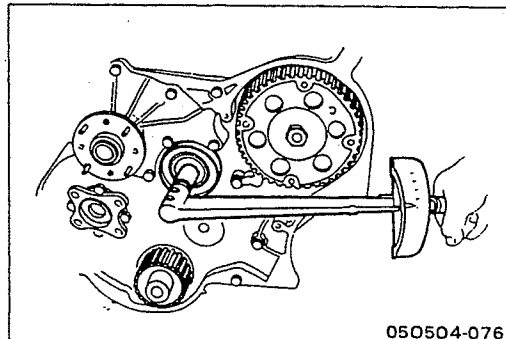
▲ Injection Pump Timing Pulley (For Belt Drive)

- 1) Align the timing pulley with the pump shaft key.
- 2) Install the stopper bolt to the timing pulley.
This will prevent the timing pulley from turning.
- 3) Tighten the timing pulley nut to the specified torque.

Injection Pump Timing Pulley Nut Torque	kg·m(lb.ft/N·m)
	6.5 ± 0.5 ($47.0 \pm 3.6/63.77 \pm 4.90$)

- 4) Remove the stopper bolt from the injection pulley.

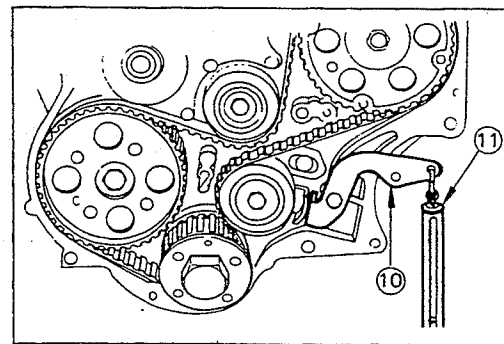
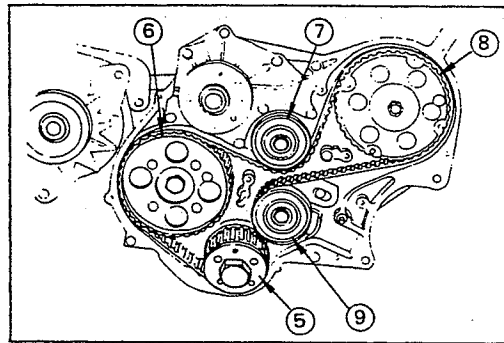
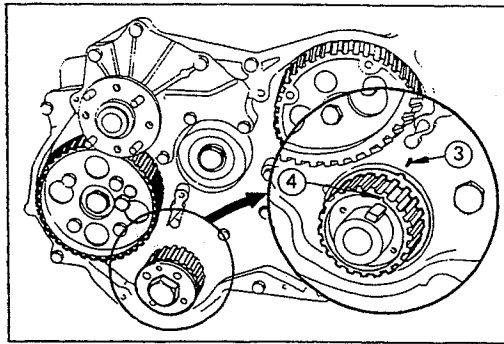
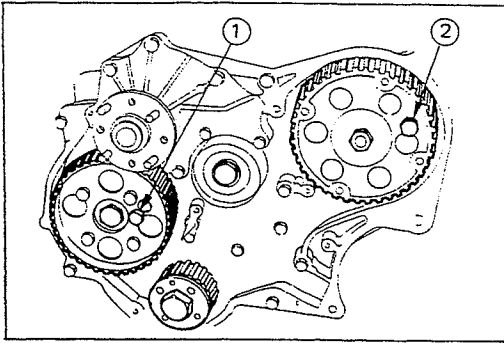
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▲ Tension Idler (For Belt Drive)

- 1) Install the tensioner idler to the timing belt.
- 2) Tighten the tensioner idler to the specified torque.

Tensioner Idler Bolt Torque	kg·m(lb.ft/N·m)
	7.7 ± 1.0 ($55.7 \pm 7.2/75$)



▲ Timing Belt (For Belt Drive)

▲ Timing Belt Tensioner (For Belt Drive)

▲ Timing Belt Tension Adjusting Lever (For Belt Drive)

1) Check that the stopper bolts are properly installed to the camshaft timing pulley ① and the injection pump timing pulley ②.

2) Check that the timing pulley housing mark ③ and the crankshaft timing pulley mark ④ are aligned.
The No. 1 cylinder should be at TDC on the compression stroke.

Rotate the crankshaft damper pulley clockwise to align the marks.

3) Install the timing belt to the crankshaft timing pulley ⑤, the camshaft timing pulley ⑥, the tensioner idler ⑦, and the injection timing pulley ⑧.

Follow the numerical order.

4) Install the timing belt tensioner ⑨ to the timing pulley housing.

5) Temporarily tighten the tensioner bolt.

The tensioner should move freely.

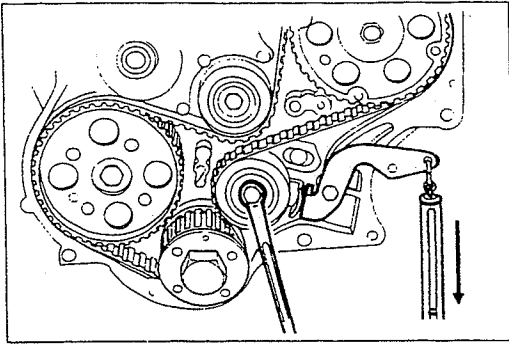
Note:

The timing belt is easily damaged. Be careful.

6) Set the tensioner adjusting lever ⑩ to the timing pulley housing.

7) Remove the stopper bolts from the camshaft timing pulley and the injection pump timing pulley.

8) Attach the spring balancer ⑪.



- 9) Adjust the timing belt tension by pulling straight down on the spring balancer with the specified force.

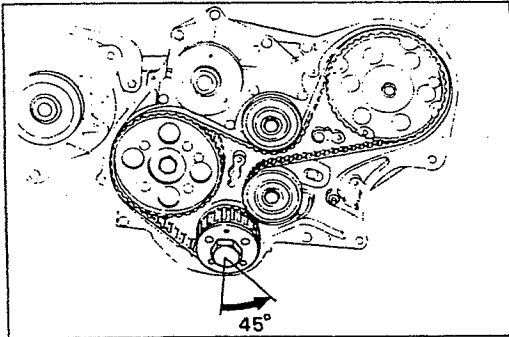
Tension Adjusting Lever Force	kg(lb/N)
10 - 12	(22.1 - 26.5/98.1 - 117.7)

Note:

Timing belt tension must be adjusted.

Failure to adjust the timing belt tension will result in timing belt damage.

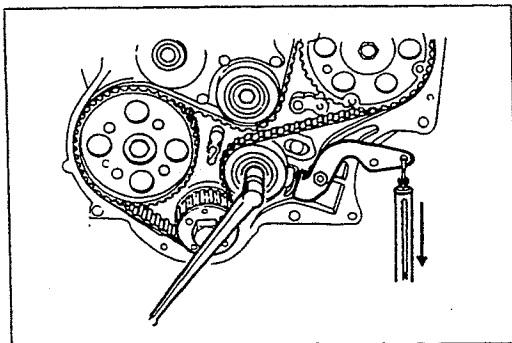
- 10) Tighten the tension bolt.



- 11) Rotate the crankshaft 45 degrees counterclockwise.

Note:

Never rotate the crankshaft clockwise when adjusting the timing belt.



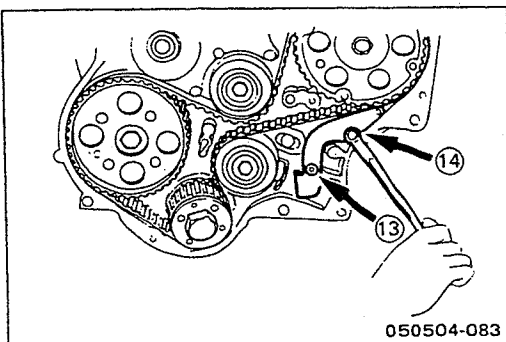
- 12) Readjust the timing belt tension.

Refer to Step 9

This will remove any remaining timing belt slack.

- 13) Tighten the tensioner bolt to the specified torque.

Tensioner Bolt Torque	kg·m(lb.ft/N·m)
7.7 ± 1.0	(55.7 ± 7.2/75.5 ± 9.8)

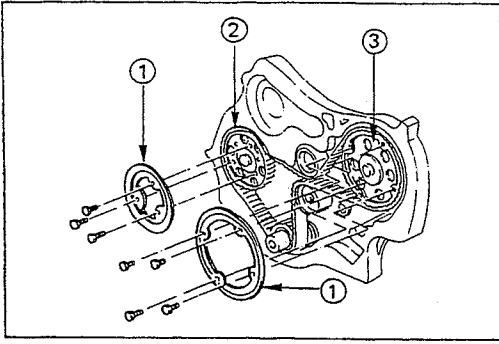


- 14) Tighten the tension adjusting lever nut (13) and bolt (14).

Note:

If on-vehicle timing belt replacement is performed, the crankshaft must not be allowed to turn.

If the crankshaft is allowed to turn, piston and valv damage will result.

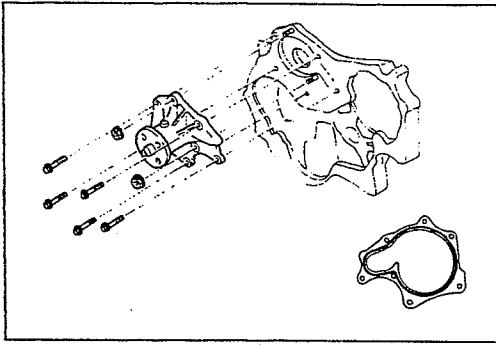


▲ Camshaft Timing Pulley Flange (For Belt Drive)

▲ Injection Pump Timing Pulley Flange (For Belt Drive)

- 1) Install the timing pulley flange ① to the camshaft ② and injection pump timing pulley ③.
- 2) Tighten the timing pulley flange bolts to the specified torque.

Timing Pulley Flange Bolt Torque	kg·m(lb.ft/N·m)
	1.9 ± 0.5 ($13.7 \pm 3.6/18.62 \pm 4.90$)



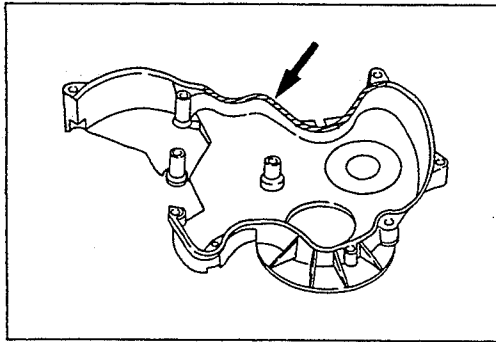
▲ Water Pump

- 1) Apply the recommended liquid gasket or its equivalent to the water pump at the position shown in the illustration.

Do not apply an excessive amount of liquid gasket.

- 2) Tighten the water pump bolts to the specified torque.

Water Pump Bolt Torque	kg·m(lb.ft/N·m)
	2.0 ± 0.5 ($14.5 \pm 3.6/19.60 \pm 4.90$)



▲ Timing Pulley Housing Lower Cover (For Belt Drive)

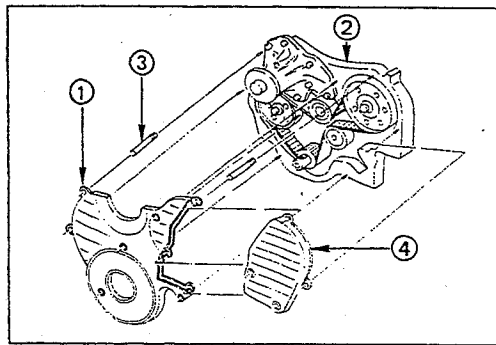
▲ Timing Pulley Housing Upper Cover (For Belt Drive)



- 1) Apply the recommended liquid gasket or its equivalent to the timing pulley lower cover.
- 2) Install the lower cover ① to the timing pulley housing ②.

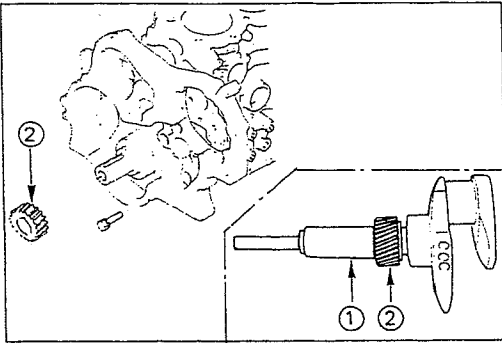
Use the lower cover guide bolts ③ to prevent the liquid gasket from running.

- 3) Install the upper cover ④ to the lower cover and pulley housing.
- 4) Tighten the timing cover bolts to the specified torque a little at a time in the sequence shown in the illustration.



Timing Pulley Cover Bolt Torque	kg·m(lb.ft/N·m)
	0.8 ± 0.2 ($5.8 \pm 1.4/7.84 \pm 1.96$)

- 5) Remove the lower cover guide pin.

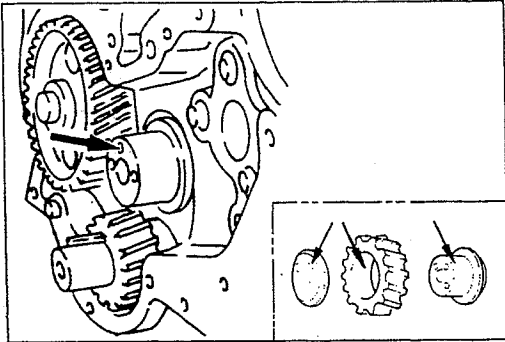


▲ Crankshaft Timing Gear (For Gear Drive)

- 1) Install the crankshaft gear.
- 2) Use the crankshaft gear installer ① to install the crankshaft gear ②.

The crankshaft gear timing mark ("X-X") must be facing outward.

Crankshaft Gear Installer: 9-8522-0020-0



▲ Idler Gear Shaft (For Gear Drive)

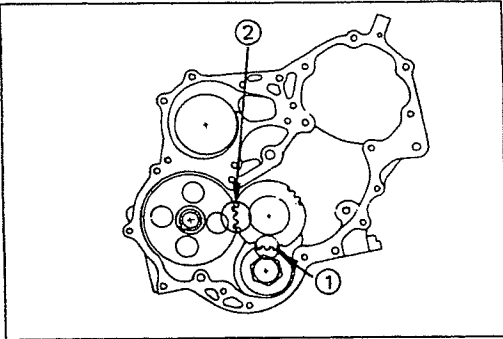
▲ Idler Gear "A" (For Gear Drive)

- 1) Apply engine oil to the idler gear and the idler gear shaft.

The idler gear shaft oil hole must be facing up.

- 2) Position the idler gear setting marks "X" and "Y" so that they are facing the front of the engine.

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- 3) Align the idler gear "X" setting mark with the crankshaft timing gear ① "X-X" setting mark.

- 4) Align the idler gear "Y" setting mark with the camshaft timing gear ② "Y-Y" setting mark.

- 5) Install the thrust collar and bolts to the cylinder body through the shaft.

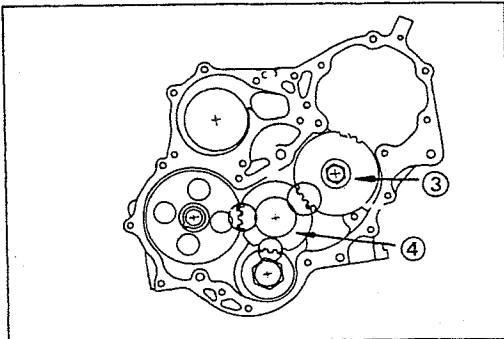
The thrust collar oil hole must be facing up, and the thrust collar chamfered must be outward.

- 6) Tighten the idler gear bolt to the specified torque.

Idler Gear "A" Bolt Torque kg-m(lb.ft/N-m)

1.9 ± 0.5 (13.7 ± 3.6/18.62 ± 4.90)

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▲ Idler Gear "B" and Shaft (For Gear Drive)

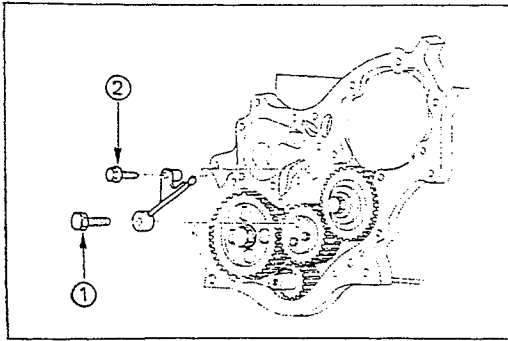
- 1) Apply engine oil to the idler gear and the idler gear shaft.

- 2) Align the idler gear "B" ③ "Z" setting mark with the idler gear "A" ④ "Z-Z" setting mark.

- 3) Tighten the idler gear bolt to the specified torque.

Idler Gear "B" Bolt Torque kg-m(lb.ft/N-m)

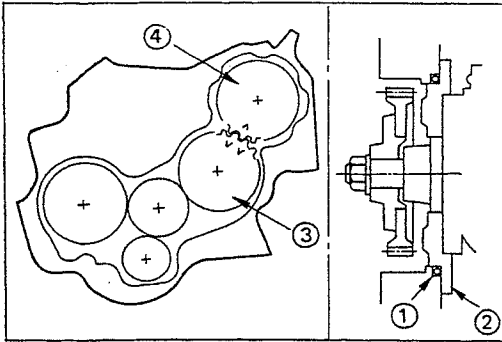
7.7 ± 1.0 (55.7 ± 7.2/75.46 ± 9.80)



▲ Timing Gear Oil Pipe (For Gear Drive)

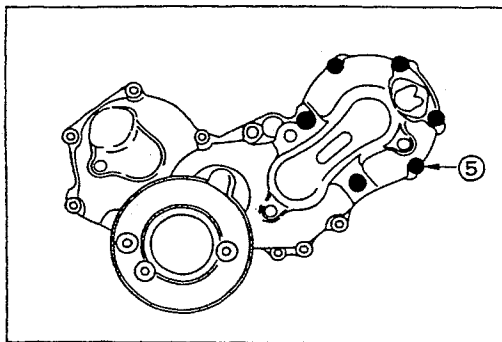
- 1) Install the oil pipe to the timing gear case and idler gear "A".
- 2) Tighten the oil pipe eye bolt ① and bolt ② to the specified torque.

Eye Joint and Bolt Torque	kg·m(lb.ft/N·m)
	$1.25 \pm 0.25 (9.0 \pm 1.8/12.25 \pm 2.45)$

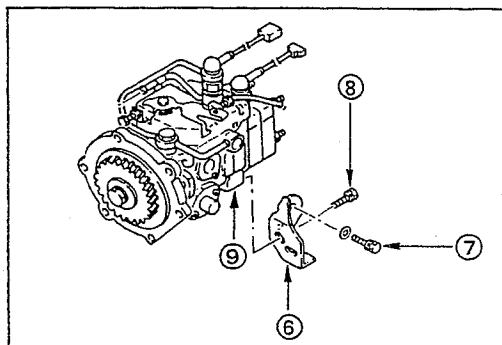


▲ Injection Pump (For Gear Drive)

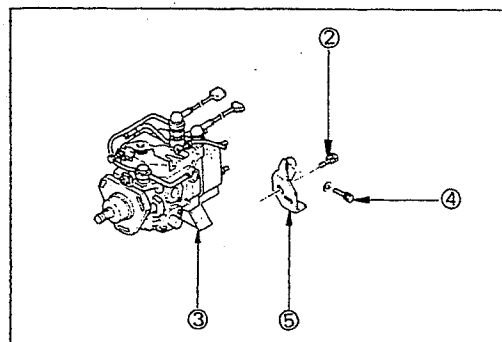
- 1) Install the O-ring ① to the injection pump flange ②.
- 2) Install the injection pump to the timing gear case. Align the idler gear "B" ③ "V-V" mark with the injection pump timing gear ④ "V" mark.



- 3) Temporarily tighten the six injection pump nuts ⑤. The injection pump nuts will be finally tightened after the injection pump rear bracket bolts.



- 4) Install the injection pump rear bracket ⑥ and the rear bracket bolts ⑦ to the cylinder body.
- 5) Install the rear bracket bolts ⑧ to the injection pump bracket ⑨. Do not tighten the bolts. The rear bracket bolts ⑦ and ⑧ will be finally tightened to the specified torque after the injection pump nuts.

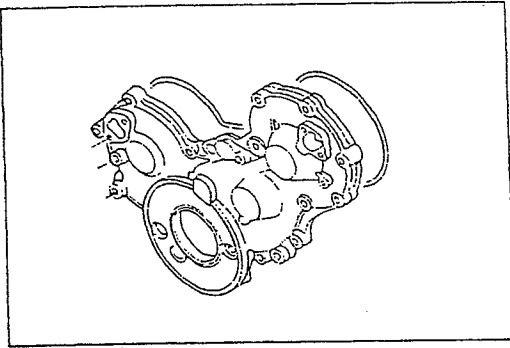


- 6) Tighten the injection pump nuts to the specified torque.

Injection Pump Nut Torque	kg·m(lb.ft/N·m)
	$1.5 \pm 0.5 (10.8 \pm 3.6/14.70 \pm 4.90)$

- 7) Tighten the injection pump bracket bolts to the specified torque.

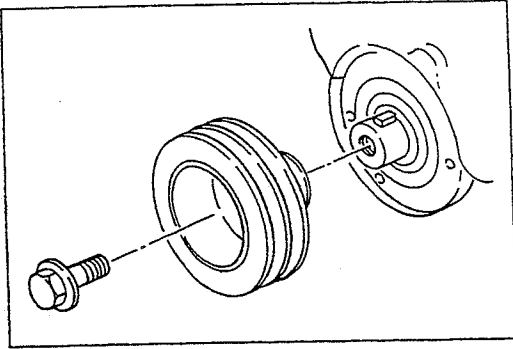
Injection Pump Bracket Bolt Torque	kg·m(lb.ft/N·m)
	$1.5 \pm 0.5 (10.8 \pm 3.6/14.70 \pm 4.90)$



▲ Timing Gear Case Cover (For Gear Drive)

- 1) Align the gear case with the timing gear case knock pin and then install the timing gear case cover.
- 2) Tighten the gear case cover bolts to the specified torque.

Gear Case cover Bolt Torque	kg·m(lb.ft/N·m)
	1.9 ± 0.5 ($13.7 \pm 3.6/18.62 \pm 4.90$)



▲ Crankshaft Damper Pulley (For Gear Drive)

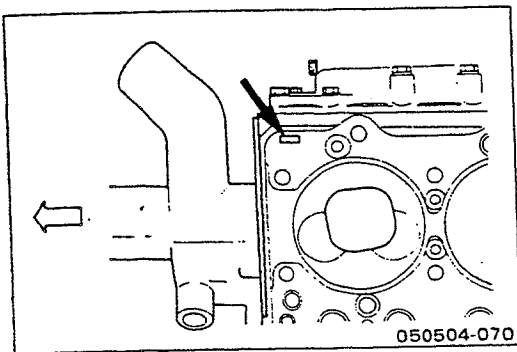
Tighten the crankshaft damper pulley bolt to the specified torque.

Note:

Hold the flywheel ring gear stationary to prevent the crankshaft from turning when tightening the damper pulley.

Crankshaft Damper Pulley Bolt Torque	kg·m(lb.ft/N·m)
	19.0 ± 1.9 ($137.4 \pm 13.7/186.20 \pm 18.62$)

Take care not to damage the crankshaft damper pulley boss.



▲ Cylinder Head Gasket

The cylinder head gasket "TOP" mark must be facing up.



Note:

For all 4JB1 engines, measure the piston head projection and select the appropriate head gasket.

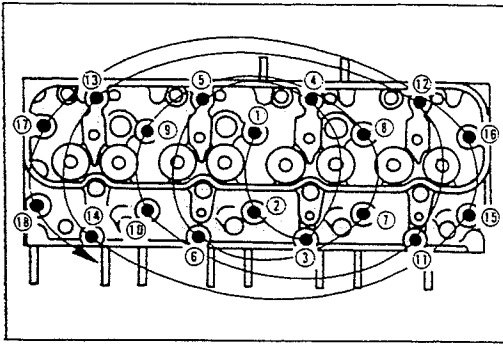
Refer to "INSPECTION AND REPAIR", "Cylinder Head Gasket Selection".



▲ Cylinder Head

- 1) Align the cylinder body dowels and the cylinder head dowel holes.
- 2) Carefully place the cylinder head on the cylinder head gasket.
- 3) Apply a coat of engine oil to the cylinder head bolts and setting faces.



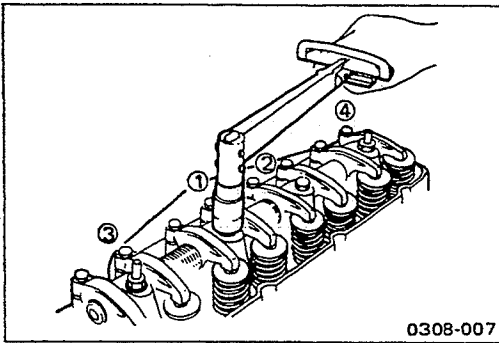


- Tighten the cylinder head bolts in two steps using the Angular Tightening Method for all 4JB1. Follow the numerical sequence shown in the illustration.

Cylinder Head Bolt Torque		kg ·m(lb.ft/N ·m)
		1st Step
All 4JB1		5.0 ± 0.5 ($36.2 \pm 3.6/49.00 \pm 4.90$)
		2nd Step
		$120^\circ + 30^\circ$ $- 0^\circ$

Cylinder Head Bolt Torque		kg ·m(lb.ft/N ·m)
4JA1	New bolt	8.7 ± 0.5 ($62.9 \pm 3.6/85.26 \pm 4.90$)
	Used bolt	10.5 ± 0.5 ($75.9 \pm 3.6/102.90 \pm 4.90$)

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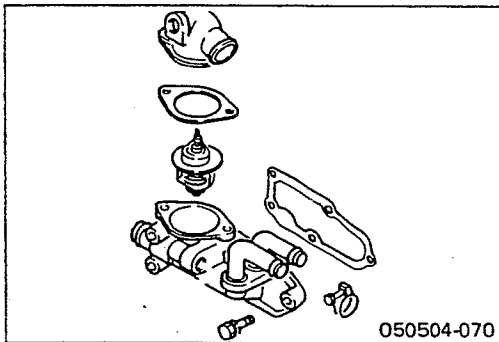


▲ Rocker Arm Shaft and Rocker Arm

- Tighten the rocker arm shaft bracket bolts in the numerical order shown in the illustration.

Rocker Arm Shaft Bracket Bolt Torque		kg·m(lb.ft/N·m)
		5.5 ± 0.5 ($37.8 \pm 3.6/53.96 \pm 4.90$)

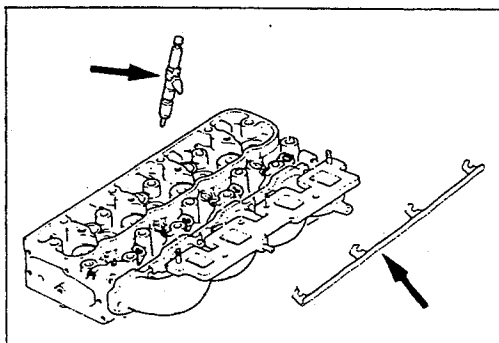
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▲ Thermostat Housing

- Install the thermostat housing.
- Tighten the thermostat housing bolts to the specified torque.

Thermostat Housing Bolt Torque		kg·m(lb.ft/N·m)
		1.9 ± 0.5 ($13.7 \pm 3.6/18.64 \pm 4.90$)



▲ Glow Plug and Glow Plug Connector

- Install the glow plugs to the cylinder head.
- Tighten the glow plugs to the specified torque.

Glow Plug Torque		kg·m(lb.ft/N·m)
		2.25 ± 0.25 ($16.3 \pm 1.8/22.07 \pm 2.45$)

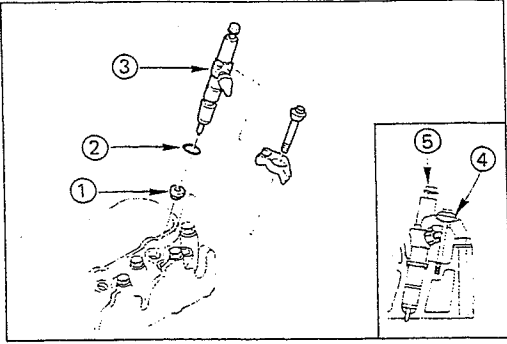
- Install the glow plug connector.
- Tighten the glow plug connector to the specified torque.

Glow Plug Connector Torque		kg·m(lb.ft/N·m)
		0.13 ± 0.2 ($0.94 \pm 1.4/1.27 \pm 1.96$)

Note:

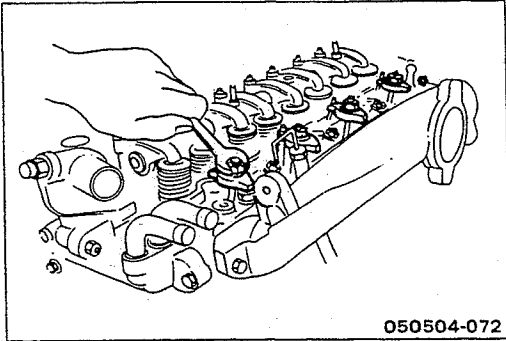
Glow plugs in good condition may be reused.

If glow plug replacement is required, the glow plugs must be replaced as a set. Never replace just one glow plug.



▲ Injection Nozzle Holder

- 1) Install the injection nozzle gasket ① and the O-ring ② to the injection nozzle holder ③.
Be sure that the O-ring fits snugly in the injection nozzle groove.
- 2) Apply engine oil to the cylinder head nozzle holder hole.
- 3) Install the nozzle holder together with the nozzle holder bracket ④ to the cylinder head.

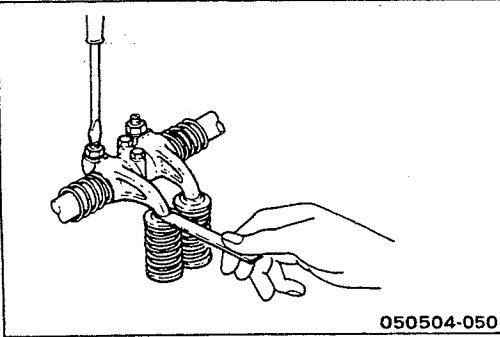


Nozzle Holder Bracket Bolt Torque kg-m(lb.ft/N-m)
 $3.8 \pm 0.6 (27.5 \pm 4.3/37.24 \pm 5.88)$

- 4) Tighten the holder nut with washer ⑤ to the specified torque.

Injection Nozzle Holder Nut Torque kg-m(lb.ft/N-m)
 $3.8 \pm 0.6 (26.0 \pm 4.3/37.24 \pm 5.88)$

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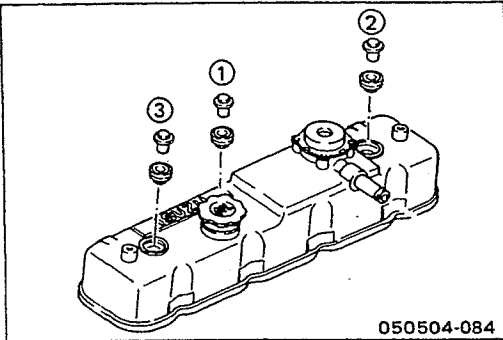
Note on Valve Clearance Adjustment

Valve clearances must be adjusted before the cylinder head cover is reinstalled.

Refer to "Valve Clearance Adjustment" in the "Servicing" Section of this Manual.

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▲ Cylinder Head Cover



- 1) Apply engine oil to the rocker arm and the valve spring.
- 2) Install the cylinder head cover gasket to the head cover.

Check to see that the head cover gasket has no loose areas.

- 3) Tighten the cylinder head cover nuts in the numerical order shown in the illustration.

Cylinder Head Cover Bolt Torque kg-m(lb.ft/N-m)
 $1.3 \pm 0.5 (9.4 \pm 3.6/12.74 \pm 4.90)$