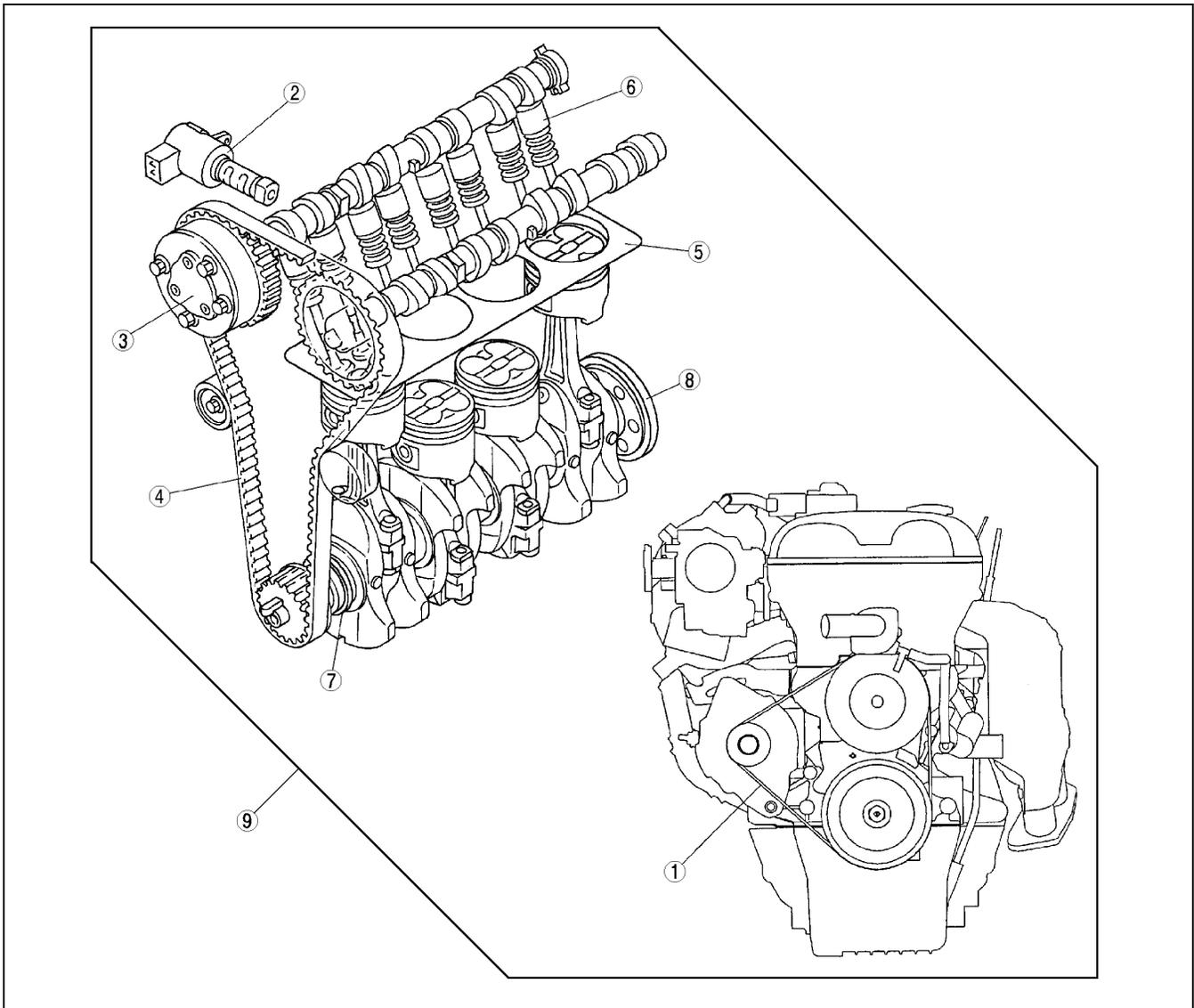


**01-10 MECHANICAL**

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Z5U0110WAZ

1	Drive belt (See 01-10-3 DRIVE BELT INSPECTION) (See 01-10-4 DRIVE BELT ADJUSTMENT)
2	Oil control valve (OCV) (See 01-10-8 OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION) (See 01-10-8 OIL CONTROL VALVE (OCV) INSPECTION)
3	Variable valve timing actuator (See 01-10-9 VARIABLE VALVE TIMING ACTUATOR INSPECTION)
4	Timing belt (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION)

5	Cylinder head gasket (See 01-10-18 CYLINDER HEAD GASKET REPLACEMENT)
6	Tappet and adjustment shim (See 01-10-20 TAPPET AND ADJUSTMENT SHIM REMOVAL/INSTALLATION)
7	Front oil seal (See 01-10-23 FRONT OIL SEAL REPLACEMENT)
8	Rear oil seal (See 01-10-24 REAR OIL SEAL REPLACEMENT)
9	Engine (See 01-10-25 ENGINE REMOVAL/INSTALLATION) (See 01-10-26 ENGINE DISASSEMBLY/ASSEMBLY)

## DRIVE BELT INSPECTION

### Drive Belt Deflection Check

- Verify the drive belt deflection when the engine is cold, or at least 30 min after the engine has stopped. Apply moderate pressure 98 N {10 kgf, 22 lbf} midway between the specified pulleys.
  - If the deflection is not within the specification, adjust it. (See 01-10-4 DRIVE BELT ADJUSTMENT.)

### Deflection

Drive belt	mm {in}		
	*New	Used	Limit
Generator	5.5—7.0 {0.22—0.27}	6.0—7.5 {0.24—0.29}	8.0 {0.31}
P/S, P/S+A/C	7.0—8.0 {0.28—0.31}	9.0—10.0 {0.36—0.39}	11.5 {0.45}

\* : A belt that has been on a running engine for less than **5 min**

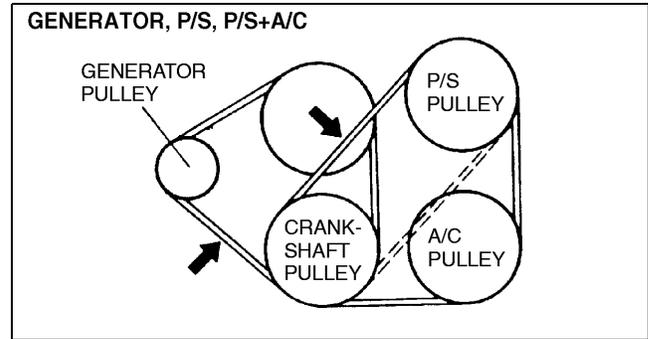
### Drive Belt Tension Check

- Belt tension can be verified in place of belt deflection.
- Verify the drive belt tension when the engine is cold, or at least 30 min after the engine has stopped.
- Using the **SST**, verify the belt tension between any two pulleys.
  - If the tension is not within the specification, adjust it. (See 01-10-4 DRIVE BELT ADJUSTMENT.)

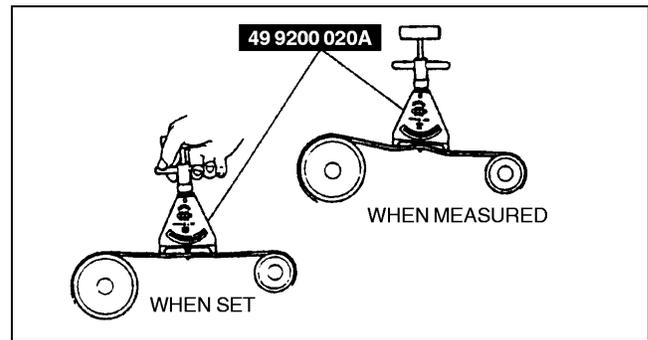
### Tension

Drive belt	N {kgf, lbf}		
	*New	Used	Limit
Generator	491—745 {50—76, 111—167}	491—706 {50—72, 111—158}	343 {35, 77}
P/S, P/S+A/C	588—686 {59—70, 130—154}	422—490 {43—50, 95—111}	245 {25, 55}

\* : A belt that has been on a running engine for less than **5 min**



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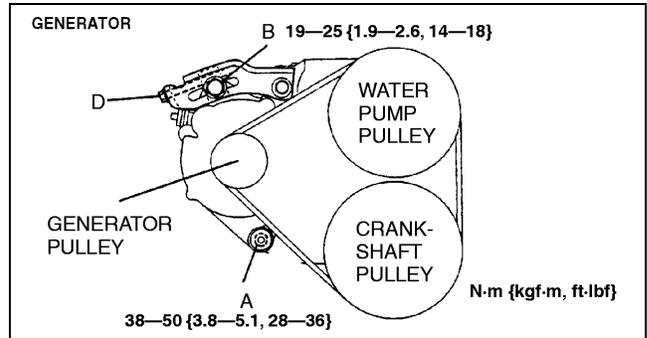
X5U110WA2

# MECHANICAL

## DRIVE BELT ADJUSTMENT

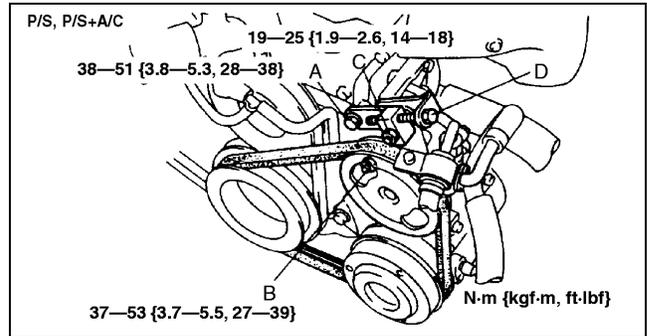
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1. Loosen mounting bolts A, B and nut C.



Y5U110WA0

2. Adjust the belt deflection or tension by turning the adjusting bolt D. (See 01–10–3 DRIVE BELT INSPECTION.)
3. Tighten mounting bolts A, B and nut C.
4. Verify the belt deflection or tension. (See 01–10–3 DRIVE BELT INSPECTION.)

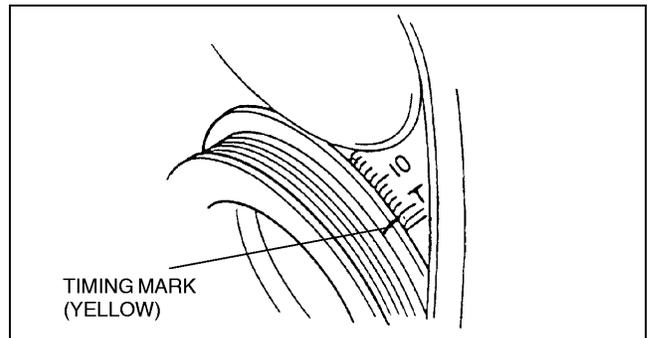


X5U110WA4

## VALVE CLEARANCE INSPECTION

A5U011012010W01

1. Remove the cylinder head cover.
2. Verify that the engine is in cold condition.
3. Measure the valve clearance.
  - (1) Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.



X5U110WA6

- (2) Measure the valve clearance at A in the figure.
- If the valve clearance exceeds the standard, replace the adjustment shim. (See 01-10-5 VALVE CLEARANCE ADJUSTMENT.)

**Standard [Engine cold]**

**IN:** 0.18—0.24 mm {0.008—0.009 in}  
(0.21±0.03 mm {0.008±0.0012 in})

**EX:** 0.28—0.34 mm {0.012—0.013 in}  
(0.31±0.03 mm {0.012±0.0012 in})

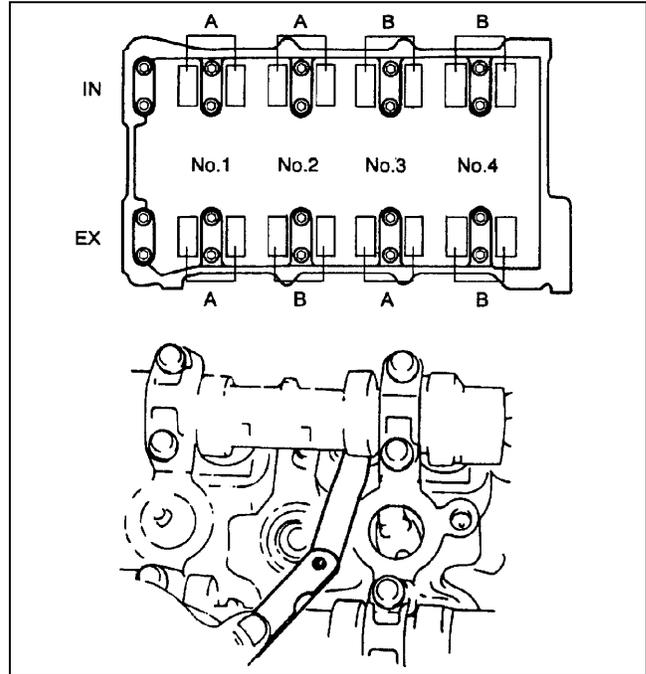
- (3) Turn the crankshaft **360°** clockwise so that the No.4 piston is at TDC of the compression stroke.
- (4) Measure the valve clearance at B in the figure.
- If the valve clearance exceeds the standard, replace the adjustment shim. (See 01-10-5 VALVE CLEARANCE ADJUSTMENT.)

**Standard [Engine cold]**

**IN:** 0.18—0.24 mm {0.008—0.009 in}  
(0.21±0.03 mm {0.008±0.0012 in})

**EX:** 0.28—0.34 mm {0.012—0.013 in} (0.31±0.03 mm {0.012±0.0012 in})

4. Install the cylinder head cover. (See 01-10-15 Cylinder Head Cover Installation Note.)



X5U110WA7

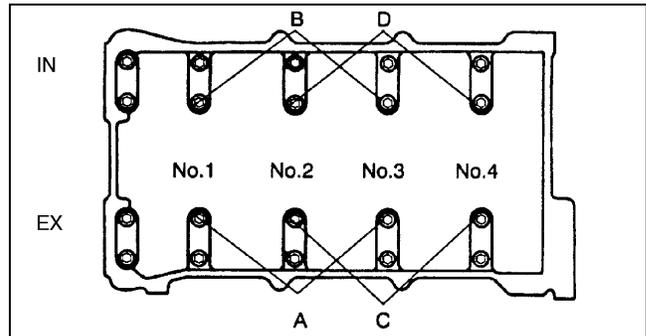
**VALVE CLEARANCE ADJUSTMENT**

A5U011012010W02

**Note**

- Perform this same procedure for all camshafts requiring valve clearance adjustment.

- Turn the crankshaft clockwise so that the cams on the camshaft requiring valve clearance adjustment are positioned straight up.
- Remove the camshaft cap bolts if necessary. Remove only one pair of cap bolts at a time. Install the cap bolts before removing the next pair.
  - A: For EX side No.1, 2, 3 cylinder adjustment shim removal
  - B: For IN side No.1, 2, 3 cylinder adjustment shim removal
  - C: For EX side No.2, 3, 4 cylinder adjustment shim removal
  - D: For IN side No.2, 3, 4 cylinder adjustment shim removal



X5U110WA9

**Note**

- For EX side No.2, 3 cylinder adjustment shim removal, remove bolts either A or C.
- For IN side No.2, 3 cylinder adjustment shim removal, remove bolts either B or D.

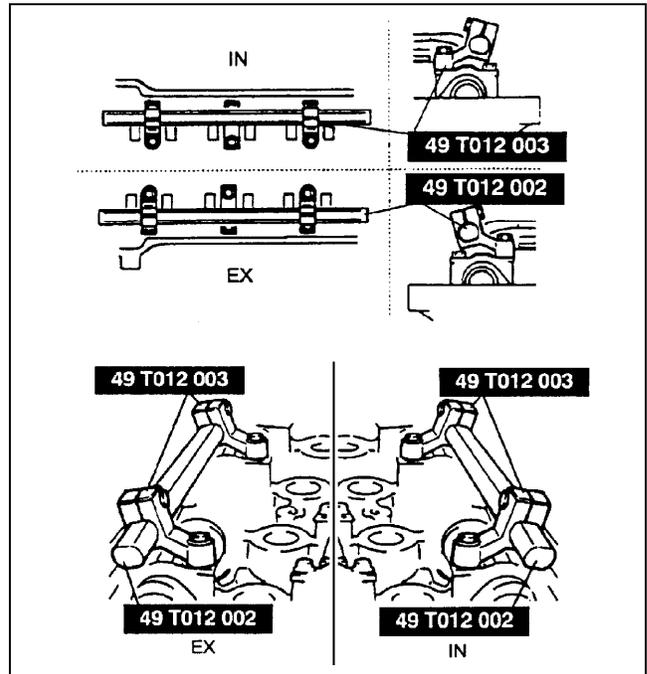
## MECHANICAL

3. Install the **SSTs** on the camshaft using the camshaft cap bolt holes.

### Tightening torque

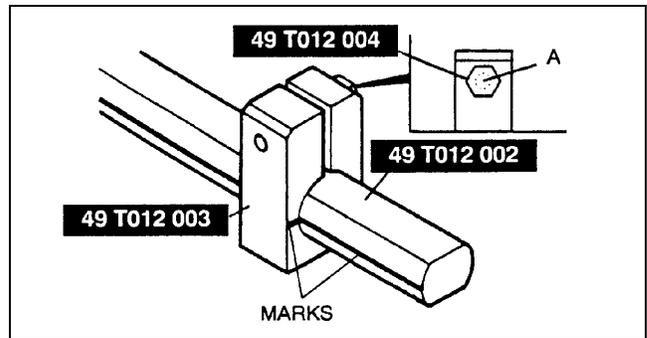
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

4. Align the marks on the **SSTs** (shaft and shaft clamp).



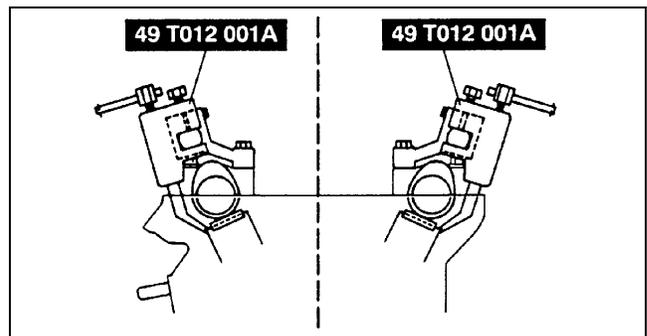
X5U110WAA

5. Tighten bolts A to secure the **SST** (shaft).



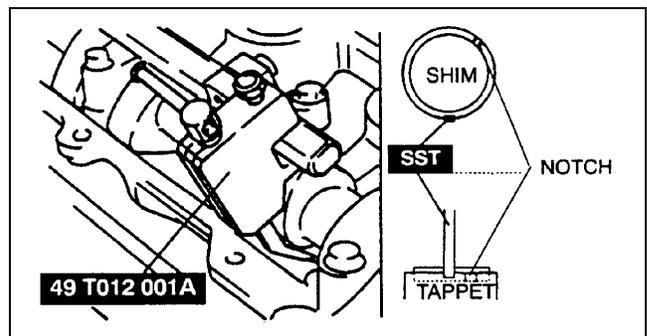
X5U110WAC

6. Face the **SST** (body) outside of the cylinder head, and mount it on the **SST** (shaft) at the point of the adjustment shim to be replaced.



X5U110WAD

7. Face the notch of the tappet so that a small screwdriver can be inserted.
8. Set the **SST** on the tappet by its notch.



X5U110WAE

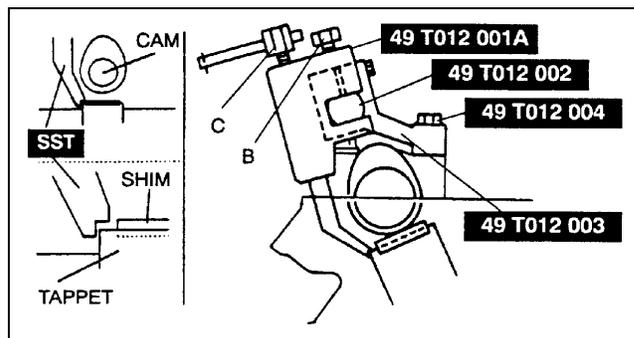
## MECHANICAL

9. Tighten bolt B to secure the **SST** (body).

### Caution

- **Cylinder head can be damaged when the tappet is pressed down.**

10. Tighten bolt C, and press down the tappet.

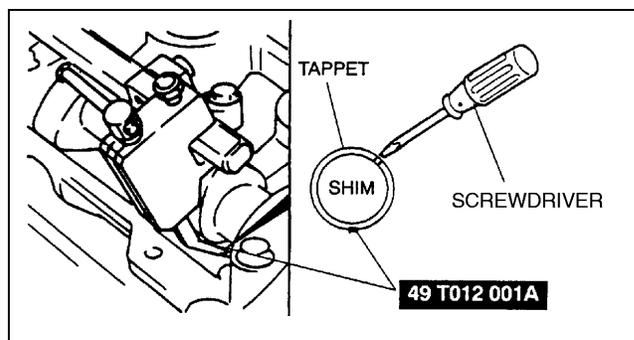


11. Using a fine screwdriver, pry up the adjustment shim through the notch on the tappet.
12. Remove the shim using a magnet.
13. Select a proper adjustment shim.

### New adjustment shim

= Removed shim thickness + Measured valve clearance - Standard valve clearance  
(IN: 0.21 mm {0.008 in}, EX: 0.31 mm {0.012 in})

14. Push the selected shim into the tappet.
15. Loosen bolt C to allow the tappet to move up.
16. Loosen bolt B and remove the **SST** (body).
17. Remove the **SSTs** and tighten the camshaft cap bolts.



**Tightening torque**  
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

18. Verify the valve clearance. (See 01-10-4 VALVE CLEARANCE INSPECTION.)

## COMPRESSION INSPECTION

A5U011002000W01

### Warning

- **Hot engines and engine oil can cause severe burns. Be careful not to burn yourself during removal/installation of each component.**

1. Verify that the battery is fully charged.
2. Charge it again if necessary. (See 01-17-2 BATTERY INSPECTION.)
3. Warm up the engine to the normal operating temperature.
4. Stop the engine and allow it to cool off for about **10 min**.
5. Perform "Fuel Line Safety Procedure". (See 01-14-3 BEFORE REPAIR PROCEDURE.)
6. Leave the fuel pump relay removed.
7. Remove the spark plugs. (See 01-18-3 SPARK PLUG REMOVAL/INSTALLATION.)
8. Disconnect the ignition coil connector.
9. Connect a compression gauge into the No.1 spark plug hole.
10. Fully depress the accelerator pedal and crank the engine.
11. Record the maximum gauge reading.
12. Inspect each cylinder as above.
  - If the compression in one or more cylinders is low or the compression difference between cylinders exceeds the maximum, pour a small amount of clean engine oil into the cylinder and inspect the compression again.
    - If the compression increases, the piston, the piston rings, or cylinder wall may be worn and overhaul is required.
    - If the compression stays low, a valve may be stuck or improperly seated and overhaul is required.
    - If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head is distorted and overhaul is required.

# MECHANICAL

## Compression

kPa {kgf/cm<sup>2</sup>, psi} [rpm]

Item	Engine
	BP
Standard	1363 {13.9, 198} [300]
Minimum	1009 {10.29, 146} [300]
Maximum difference between cylinders	196 kPa {2.0 kgf/cm <sup>2</sup> , 28 psi}

13. Disconnect the compression gauge.
14. Connect the ignition coil connector.
15. Install the fuel pump relay.
16. Install the spark plugs. (See 01-18-3 SPARK PLUG REMOVAL/INSTALLATION.)

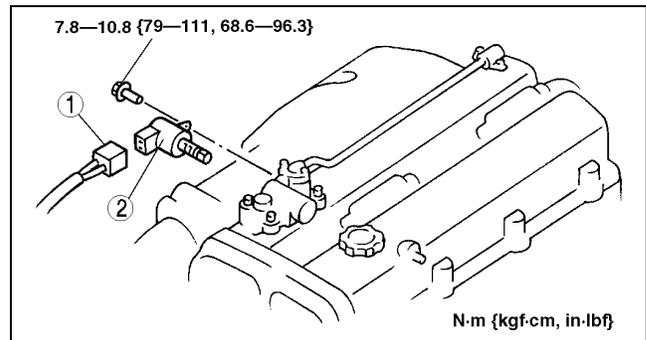
## OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION

A5U011012111W01

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.

1	OCV connector
2	OCV

3. Install in the reverse order of removal.



Z5U0110WA1

## OIL CONTROL VALVE (OCV) INSPECTION

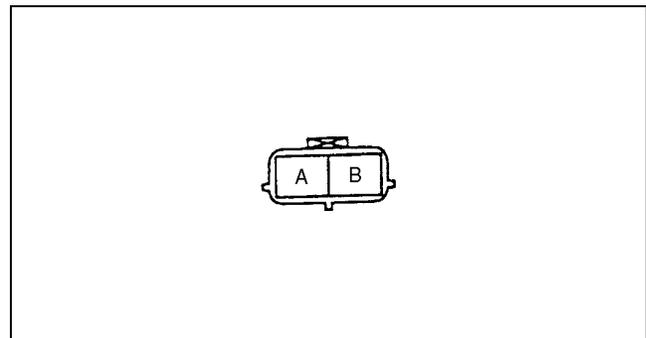
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### Coil Resistance

1. Disconnect the OCV connector.
2. Inspect for continuity between terminals A and B using an ohmmeter.
  - If not as specified, replace the OCV.

### Specification (20°C {68°F})

6.9—7.9 Ω



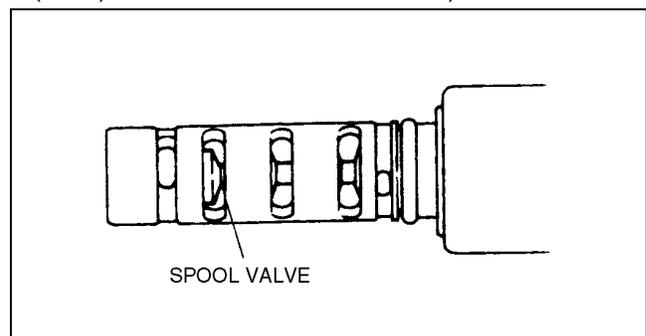
Z5U0110WA2

### Spool Valve Operation

1. Remove the OCV. (See 01-10-8 OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION.)
2. Verify that the spool valve in the OCV is the maximum valve timing retard position.
  - If not as specified, replace the OCV.
3. Verify that the battery is fully charged.
4. Apply battery positive voltage between the OCV terminals and verify that the spool valve operates and moves to the maximum valve timing advance position.
  - If not as specified, replace the OCV.

### Note

- When applying battery positive voltage between the OCV terminals, the connection can be either of the following:
  - Positive battery cable to terminal A, negative battery cable to terminal B.

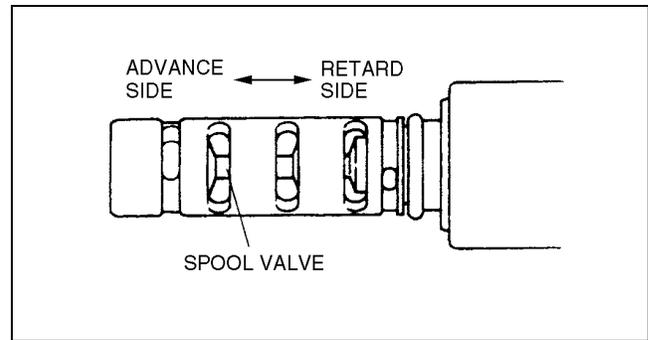


Z5U0110WA3

## MECHANICAL

— Positive battery cable to terminal B, negative battery cable to terminal A.

5. Stop applying battery positive voltage and verify that the spool valve returns to the maximum valve timing retard position.
  - If not as specified, replace the OCV.



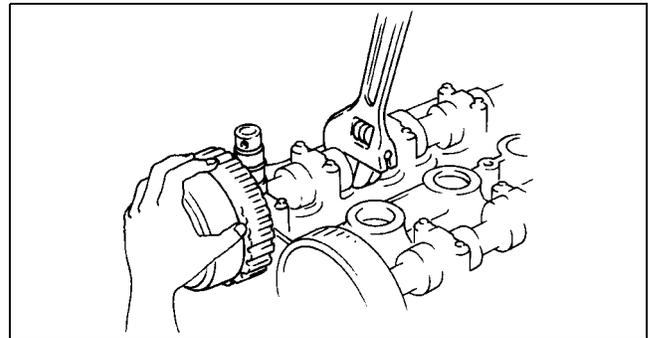
Z5U0110WA4

01-10

### VARIABLE VALVE TIMING ACTUATOR INSPECTION

#### Stopper Pin

1. Disconnect the negative battery cable.
2. Remove the timing belt. (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION.)
3. Hold a hexagonal part of the intake camshaft with an adjustable wrench to prevent the camshaft from rotating. Attempt to rotate the variable timing actuator by hand and verify that it does not move.
  - If the variable valve timing actuator moves, the stopper pin in the variable valve timing actuator is not operating. Replace the variable valve timing actuator.
4. Install in the timing belt. (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION)



Z5U0110WA5

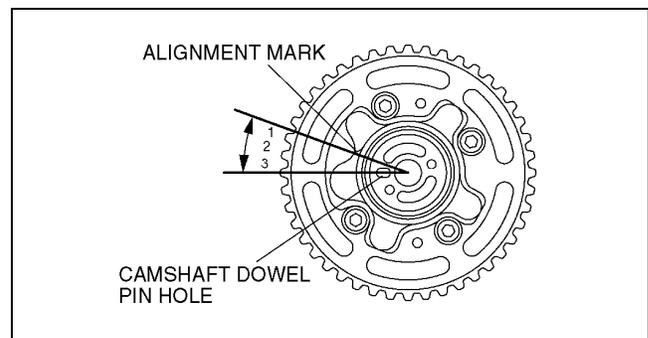
#### Extreme Spark Retard Position

1. Disconnect the negative battery cable.
2. Remove the variable valve timing actuator.

#### Caution

- If engine oil gets on parts, they may not function properly. When removing the variable valve timing actuator, be sure to cover the other parts with a cloth to protect them from the oil.

3. Verify that the camshaft dowel pin hole on the variable valve timing actuator is aligned with the top of the third tooth, by counting back 3 teeth to the sprocket gap which is aligned with the alignment mark.
  - If not as specified, the stopper pin in the variable valve timing actuator is not engaged at the position of maximum valve timing retard. Replace the variable valve timing actuator.
4. Install the variable valve timing actuator.



Z5U0110WA6



## MECHANICAL

1	Upper radiator hose
2	Water hose
3	Oil pipe (See 01-10-11 Oil Pipe Removal Note) (See 01-10-16 Oil Pipe Installation Note)
4	Oil control valve (OCV) case (See 01-10-16 Oil Control Valve (OCV) Case Installation Note)
5	Cylinder head cover (See 01-10-15 Cylinder Head Cover Installation Note)
6	Water pump pulley
7	Crankshaft pulley

8	Plate
9	Pulley lock bolt (See 01-10-11 Pulley Lock Bolt Removal/Installation Note)
10	Pulley boss
11	Timing belt cover (See 01-10-15 Timing Belt Cover Installation Note)
12	Timing belt (See 01-10-11 Timing Belt Removal Note) (See 01-10-13 Timing Belt Installation Note)
13	Tensioner and tensioner spring (See 01-10-12 Tensioner and Tensioner Spring Installation Note)
14	Idler

01-10

### Oil Pipe Removal Note

#### Caution

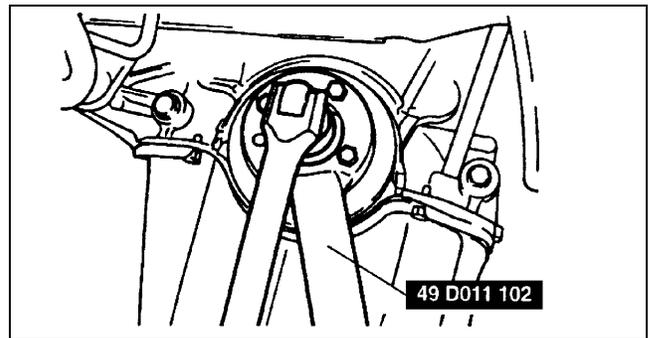
- If the engine oil get spilled on other components, it may cause malfunction of the components. Cover with a rag to prevent engine oil from spilling whenever removing the oil pipe.

#### Note

- Keep the oil pipe of engine side with the bolt removed.

### Pulley Lock Bolt Removal/Installation Note

1. Install **SST** on the pulley boss to prevent the crankshaft from rotating.



X5U110WAT

### Timing Belt Removal Note

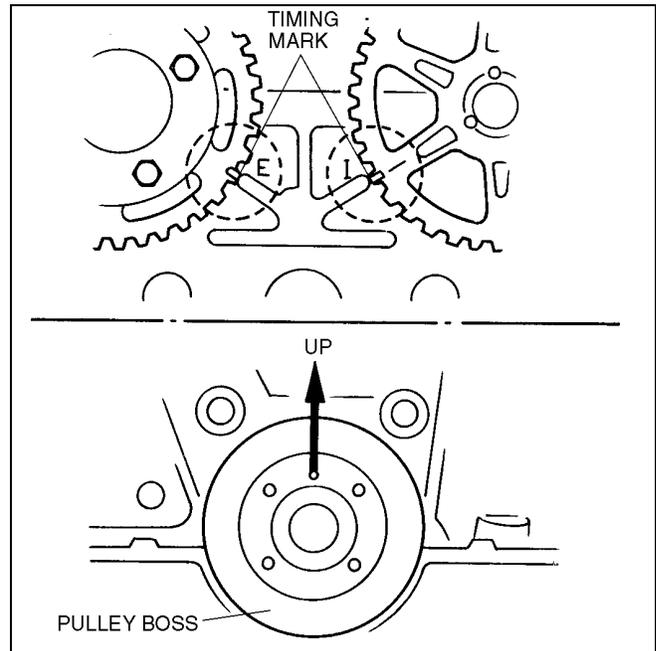
1. Install the pulley boss on the crankshaft to temporarily tighten with pulley lock bolt.

## MECHANICAL

2. Rotate the crankshaft in the appropriate direction to meet the timing mark.

### Note

- It is preferable that the positioning pins of the pulley boss are just above the timing marks.

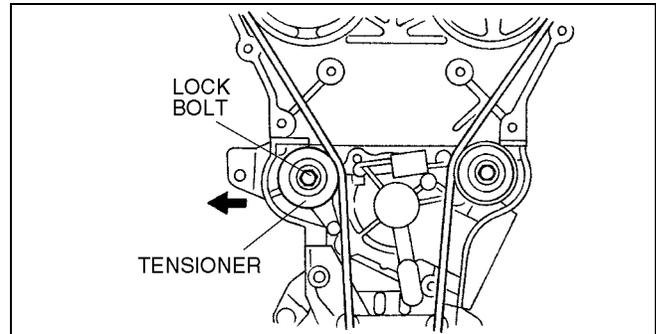


Z5U0110WA8

3. Loosen the tensioner lock bolt and temporarily tighten the tensioner lock bolt while pulling the tensioner to the left.

### Caution

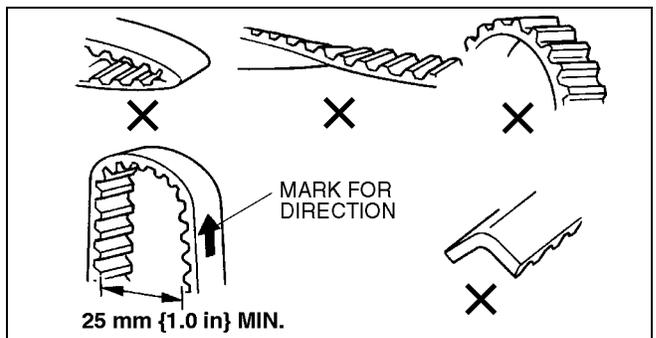
- The following will damage the belt and shorten its life; forcefully twisting it, turning it inside out, or allowing oil or grease on it.



Z5U0110WA9

### Note

- Mark the timing belt rotation on the belt for proper reinstallation.



Z5U0110WAA

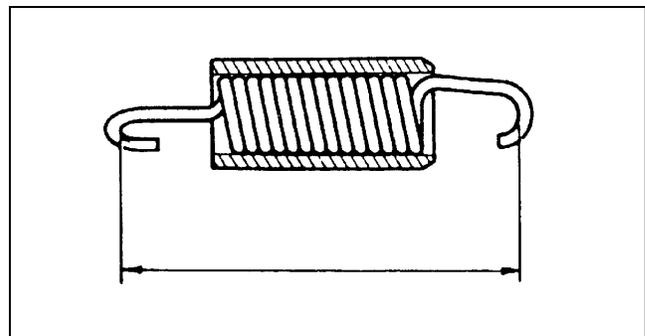
### Tensioner and Tensioner Spring Installation Note

1. Measure the tensioner spring free length.
  - If not within the specification, replace the tensioner spring.

### Free length

59.2 mm {2.31 in}

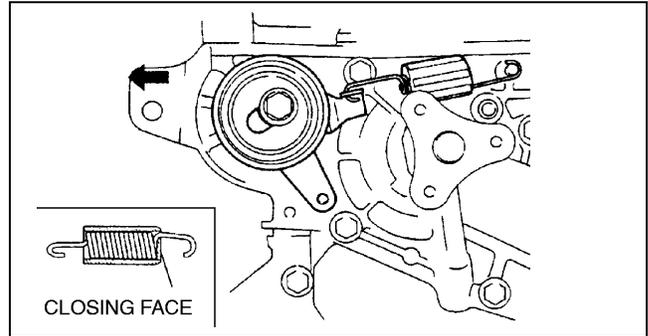
2. Install the tensioner.



X5U110WAN

## MECHANICAL

3. Install the tensioner spring with the damper rubber closing face on the right side.
4. Temporarily secure the tensioner with the spring fully extended.

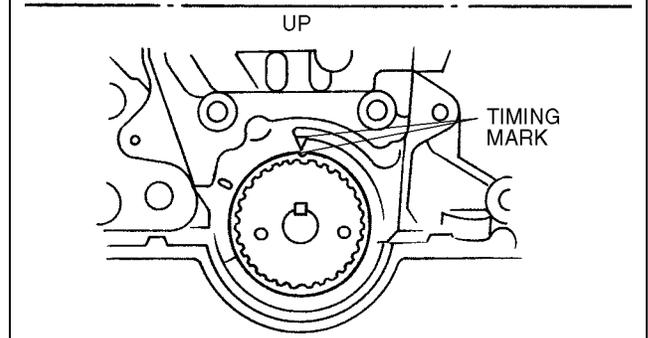
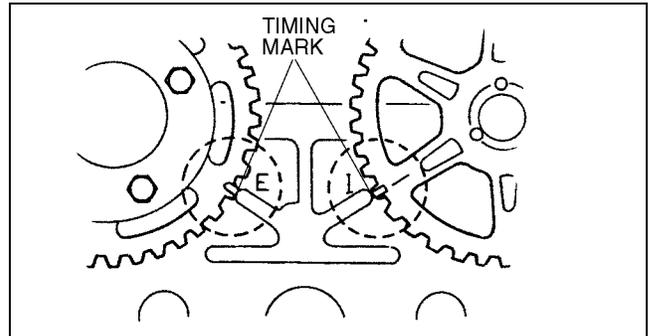


X5U110WAP

01-10

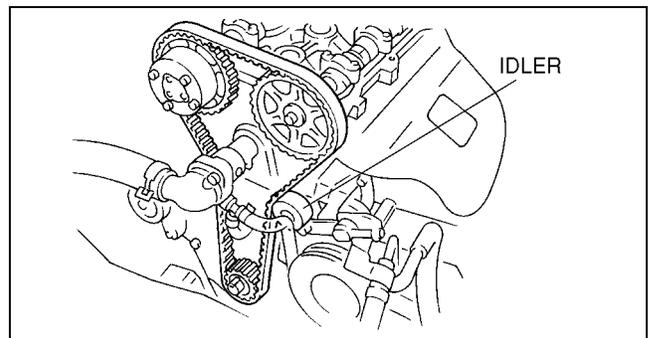
### Timing Belt Installation Note

1. Verify that the timing belt pulley mark and camshaft pulley marks are aligned with the timing marks as shown.



Z5U0110WAB

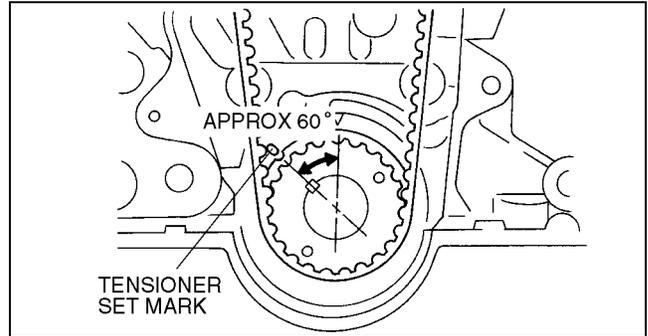
2. Install the timing belt so that there is no looseness at the idler side and between the camshaft pulleys.
3. Install the pulley boss and pulley lock bolt.



Z5U0110WAC

## MECHANICAL

- Turn the crankshaft clockwise **1 and 5/6 times**, and align the timing belt pulley mark with the tensioner set mark for proper timing belt tension adjustment.

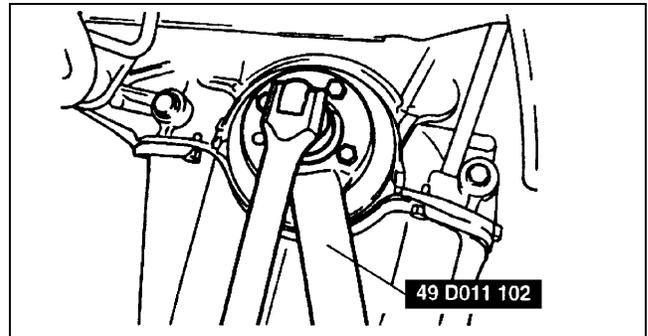


Z5U0110WAD

- Hold the crankshaft using the **SST**, and remove the pulley lock bolt and the pulley boss.
- Verify that the timing belt pulley mark is aligned with the tensioner set mark.
- Loosen the tensioner lock bolt to apply tension to the timing belt.
- Tighten the tensioner lock bolt.

### Caution

- Avoid the tensioner from moving with the tensioner lock bolt as it is turned.

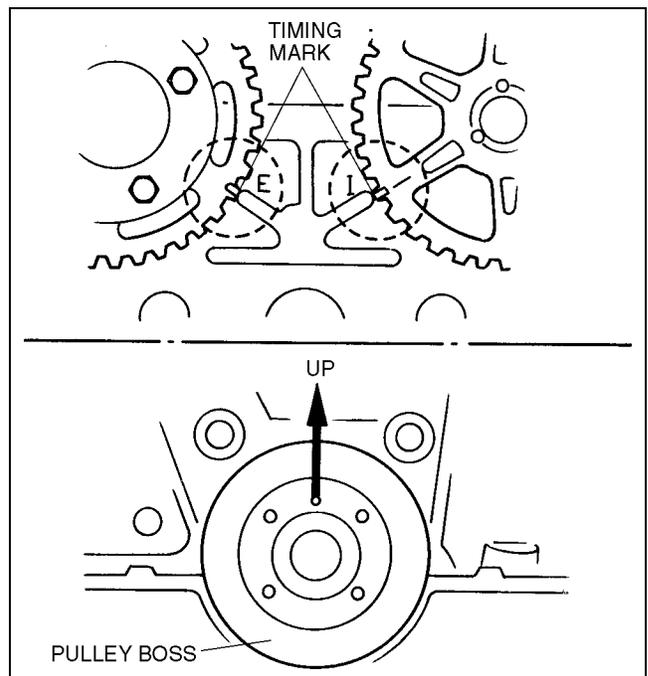


X5U110WAT

- Install the pulley boss and the pulley lock bolt.
- Turn the crankshaft **2 and 1/6 times**, and face the pin on the pulley boss straight up.
- Verify that the camshaft pulley marks are aligned with the timing marks as shown.
  - If not, repeat from "Timing Belt Removal Note". (See 01-10-11 Timing Belt Removal Note.)

### Note

- It is preferable that the positioning pins of the pulley boss are just above the timing marks.



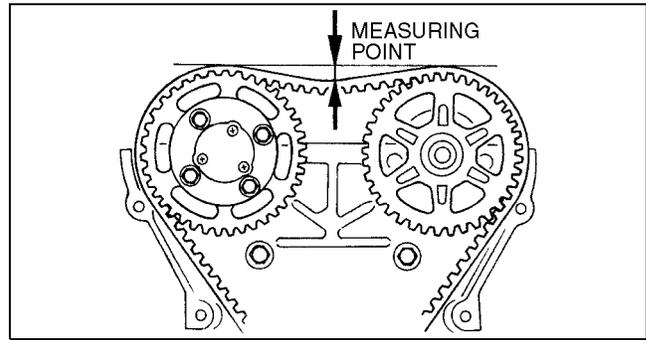
Z5U0110WA8

12. Measure the belt deflection at the point shown in the figure.

- If not as specified, repeat from Step 4.

**Timing belt deflection**

8.5—11.5 mm {0.35—0.45 in}

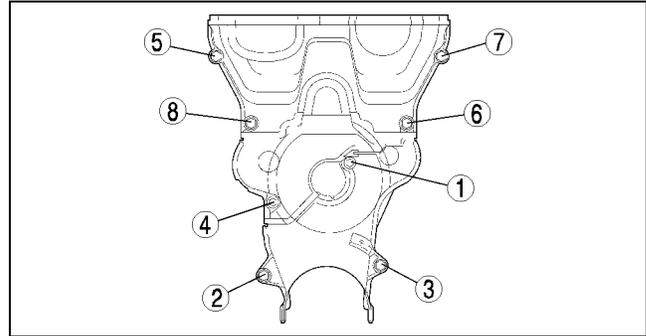


Z5U0110WAE

01-10

**Timing Belt Cover Installation Note**

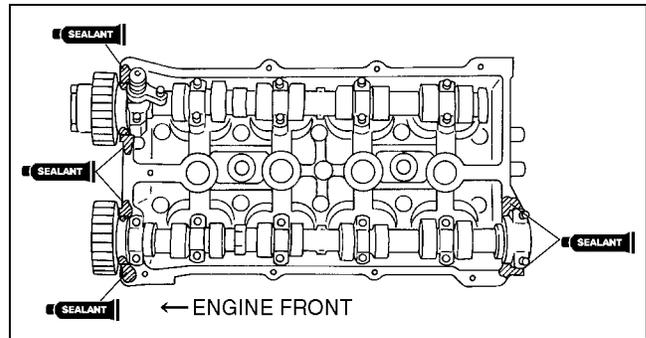
1. Tighten the timing belt cover bolts in the numerical order shown in the figure.



Z5U0110WAF

**Cylinder Head Cover Installation Note**

1. Apply liquid gasket of TB1207B or SH780 to the portions shown in the figure.

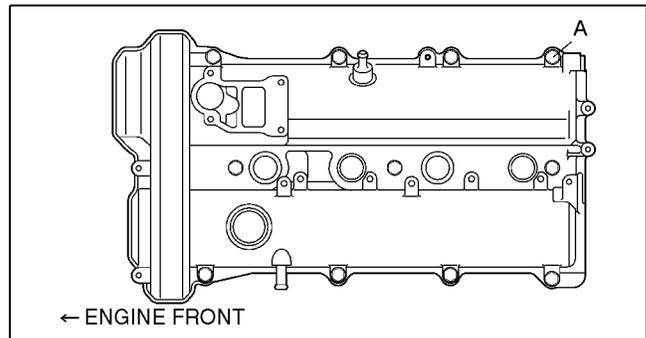


Z5U0110WAG

2. Temporarily tighten the cylinder head cover bolt on the portion A shown in the figure.

**Caution**

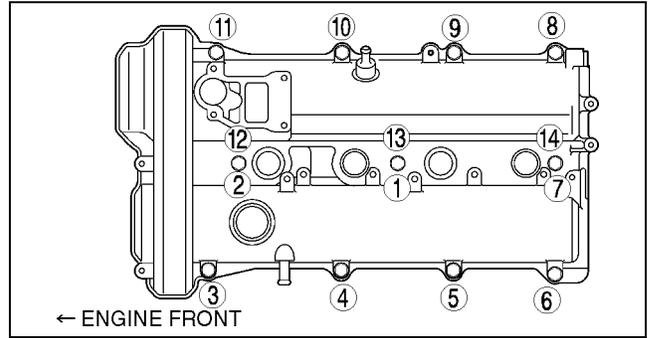
- Do not damage the O-ring while installing the OCV case. If the O-ring of the OCV adapter on camshaft cap is damaged, it may cause hydraulic leakage.



Z5U0110WAH

## MECHANICAL

3. Tighten the cylinder head cover bolts for several times in the numerical order shown in the figure.



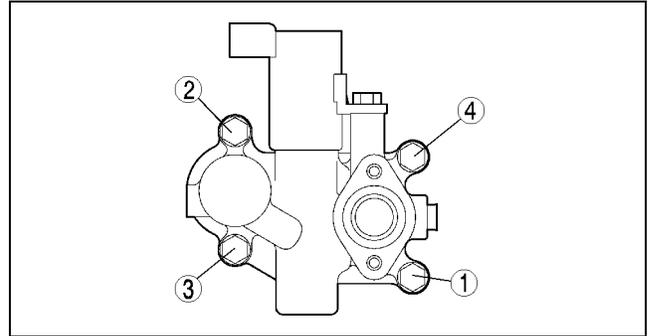
Z5U0110WAI

### Oil Control Valve (OCV) Case Installation Note

1. Tighten the OCV case bolts for several times in the numerical order shown in the figure.

#### Caution

- Do not damage the O-ring while installing the OCV case. If the O-ring of the OCV adapter on camshaft cap is damaged, it may cause hydraulic leakage.



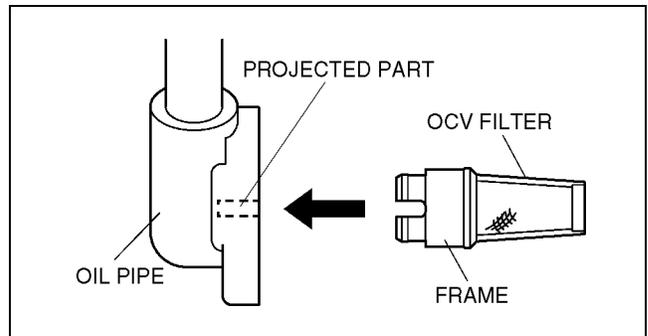
Z5U0110WAI

### Oil Pipe Installation Note

#### Caution

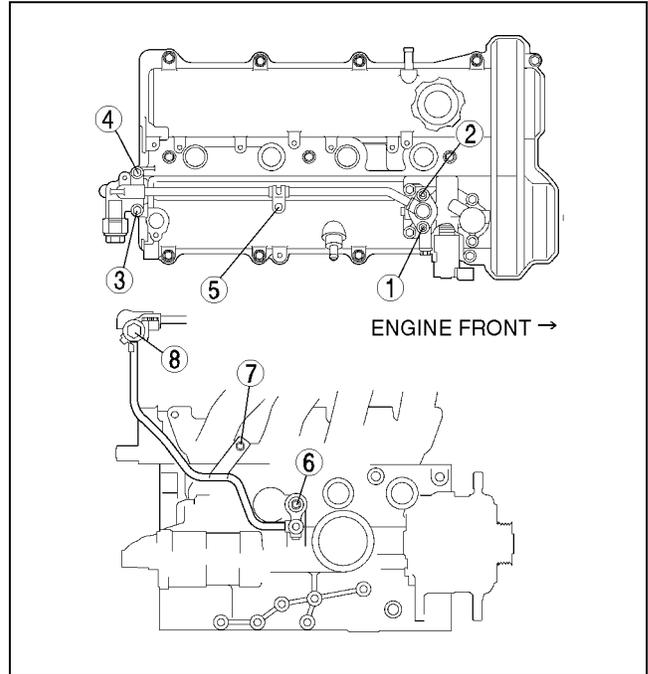
- Perform the following procedures so that there is no load applied on each connection part while installing the oil pipe as it may cause oil leakage.

1. Hold the frame of the OCV filter and install the OCV so as to align with the projected part on flange end of the oil pipe.
2. Apply engine oil to the new washer.
3. Temporarily install the upper and side oil pipe and position the oil pipe.



Z5U0110WAK

4. Tighten the oil pipe bolts for several times in the numerical order shown in the figure.



Z5U0110WAL

5. Tighten the oil pipe bolts for several times on the portion A shown in the figure.

**Tightening torque**

**7.8—10.8 N·m {80—110 kgf·cm, 70—95 in·lbf}**

6. Temporarily tighten the oil pipe bolt on the portion B shown in the figure.

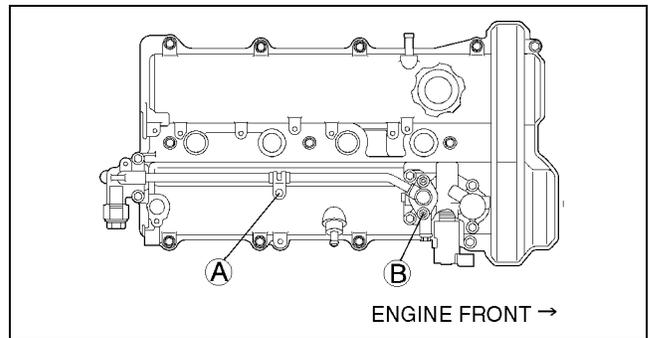
**Tightening torque**

**2.9—6.9 N·m {26—61 kgf·cm, 26—61 in·lbf}**

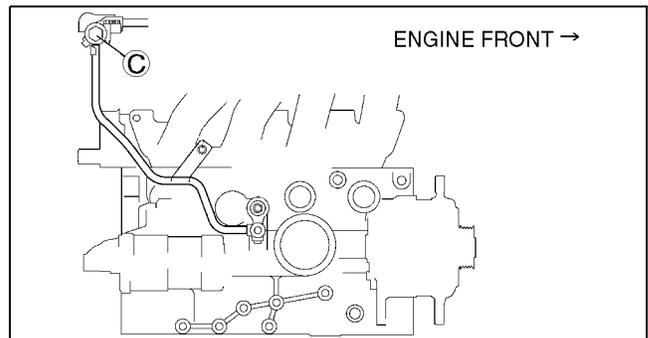
7. Temporarily tighten the oil pipe bolt on the portion C shown in the figure.

**Tightening torque**

**11.8—17.6 N·m {1.2—1.8 kgf·m, 8.7—13 ft·lbf}**



Z5U0110WBZ



Z5U0110WBY

## MECHANICAL

8. Tighten the oil pipe bolts for several times in the numerical order shown in the figure.

### Tightening torque

No. 1, 2, 3, 4, 7: 7.8—10.8 N·m

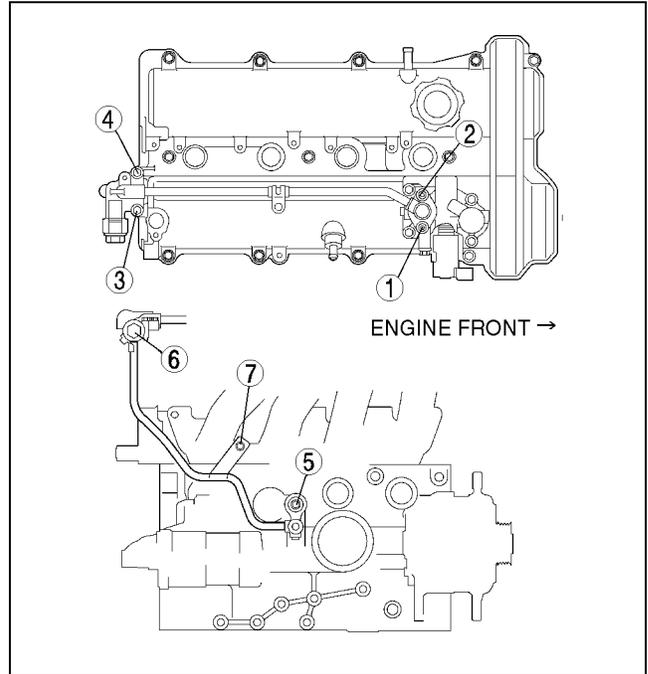
{80—110 kgf·cm, 70—95 in·lbf}

No. 5: 15.7—23.5 N·m

{1.6—2.3 kgf·m, 11.6—17.3 ft·lbf}

No. 6: 34.4—47.0 N·m

{3.5—4.7 kgf·m, 25.4—34.6 ft·lbf}



Z5U0110WBX

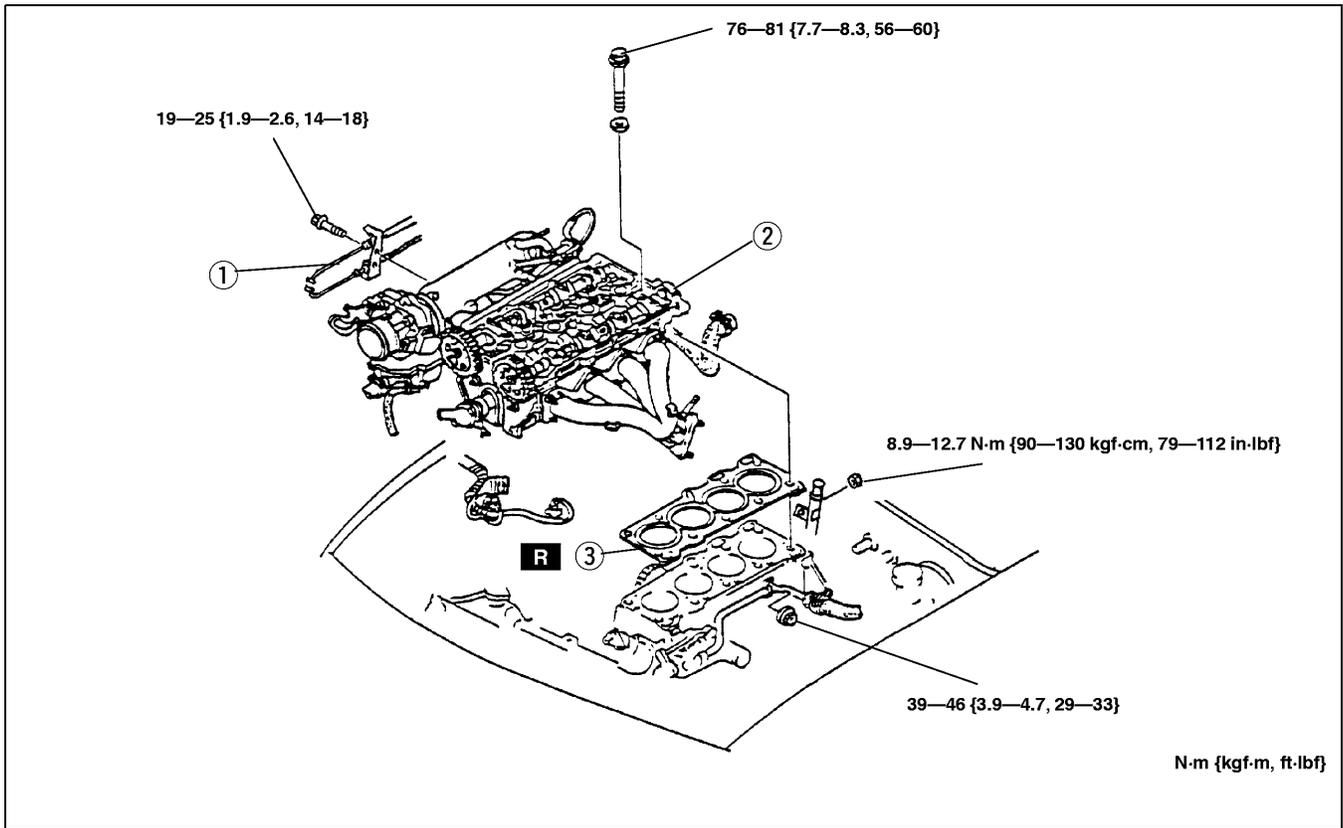
## CYLINDER HEAD GASKET REPLACEMENT

A5U0110100W01

### Warning

- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.
- Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the “Fuel Line Safety Procedure”. (See 01–14–3 BEFORE REPAIR PROCEDURE.)

1. Remove the timing belt. (See 01–10–10 TIMING BELT REMOVAL/INSTALLATION.)
2. Remove the front pipe and exhaust manifold insulator. (See 01–15–1 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
3. Remove the air cleaner.
4. Disconnect the vacuum hose and engine harness connectors.
5. Disconnect the fuel hose. (See 01–14–3 BEFORE REPAIR PROCEDURE.) (See 01–14–3 AFTER REPAIR PROCEDURE.)
6. Remove the intake manifold bracket.
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Verify the engine oil level. (See 01–11–2 ENGINE OIL LEVEL INSPECTION.)
10. Inspect for the engine oil, engine coolant, and fuel leakage.
11. Verify the compression. (See 01–10–7 COMPRESSION INSPECTION.)
12. Start the engine and verify the idle speed. (See 01–10–28 Idle Speed Adjustment.)



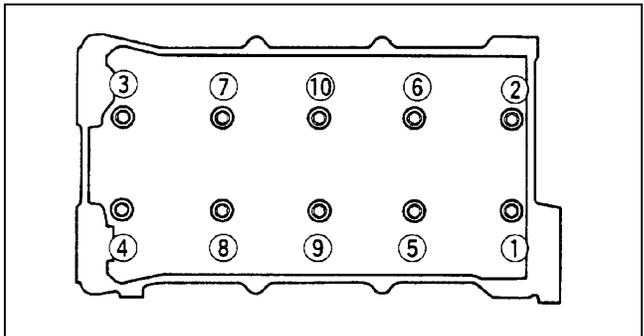
X5U110WAY

1	Accelerator cable bracket
2	Cylinder head (See 01-10-19 Cylinder Head Removal Note) (See 01-10-20 Cylinder Head Installation Note)

3	Cylinder head gasket
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### Cylinder Head Removal Note

- Loosen the cylinder head bolts in two or three steps in the order shown.

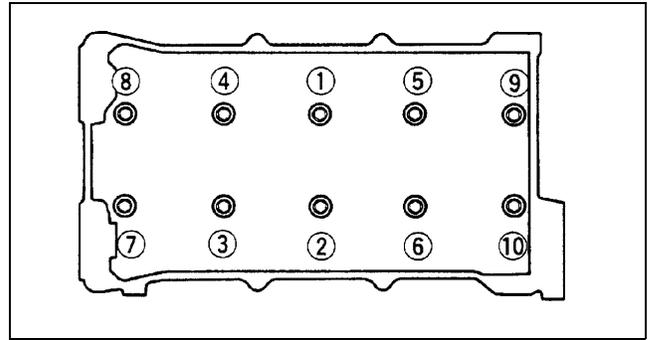


X5U110WAZ

# MECHANICAL

## Cylinder Head Installation Note

1. Tighten the cylinder head bolts in two or three steps in the order shown.

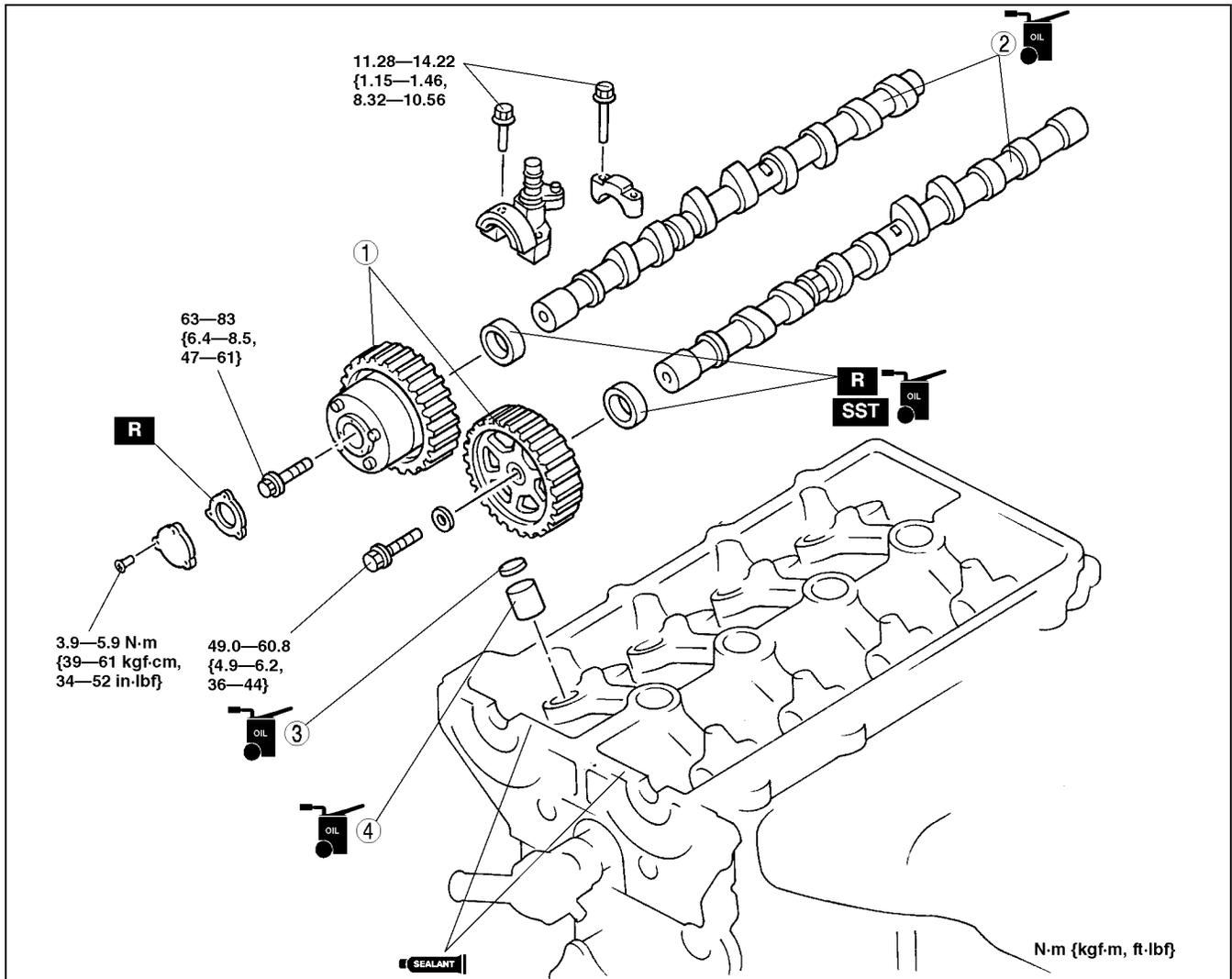


X5U110WB0

## TAPPET AND ADJUSTMENT SHIM REMOVAL/INSTALLATION

A5U011012431W01

1. Disconnect the negative battery cable.
2. Remove the timing belt. (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Inspect the air gap between the crankshaft position sensor.
6. Inspect the engine oil level.
7. Start the engine, and inspect the following and adjust if necessary:
  - Pulley and belt for runout or contact
  - Engine oil and engine coolant for leakage
  - Ignition timing
  - Operation of auxiliary parts



Z5U0110WAO

## MECHANICAL

1	Variable valve timing actuator and Camshaft Pulley (See 01-10-21 Variable Valve Timing Actuator and Camshaft Pulley Removal Note) (See 01-10-22 Variable Valve Timing Actuator and Camshaft Pulley Installation Note)
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2	Camshaft (See 01-10-21 Camshaft Removal Note) (See 01-10-21 Camshaft Installation Note)
3	Adjustment shim
4	Tappet

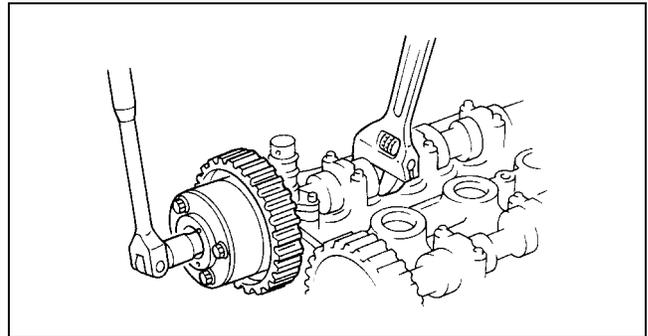
01-10

### Variable Valve Timing Actuator and Camshaft Pulley Removal Note

#### Caution

- If the engine oil get spilled on other components, it may cause malfunction of the components. Cover with a rag to prevent engine oil from spilling whenever removing the blind cap and variable valve timing actuator.

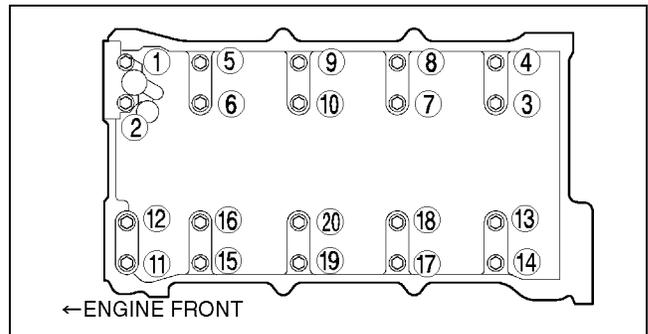
1. Hold the hexagonal part of the camshaft with an adjustable wrench or the like to prevent the camshaft from rotating, and loosen the lock bolt.



Z5U0110WAP

### Camshaft Removal Note

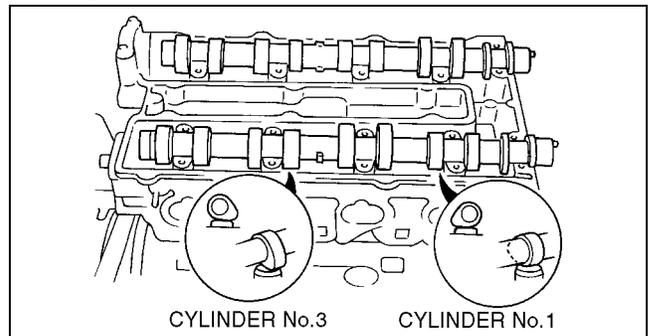
1. Loosen the camshaft cap bolts in two or three steps in the order shown.
2. Remove the camshaft caps.



Z5U0110WAG

### Camshaft Installation Note

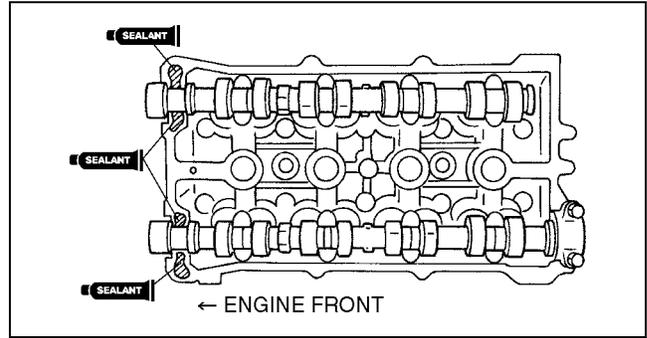
1. Apply engine oil to the camshaft and journal receiving part of cylinder head.
2. Install the camshaft so that the cam projections of cylinder No.1 and 3 face the direction as shown in the figure.



Z5U0110WAR

## MECHANICAL

- Apply liquid gasket of TB1207B or SH780 to the sliding surface of cylinder head shown in the figure so as not to be projected out.
- Install the camshaft cap to its original position.

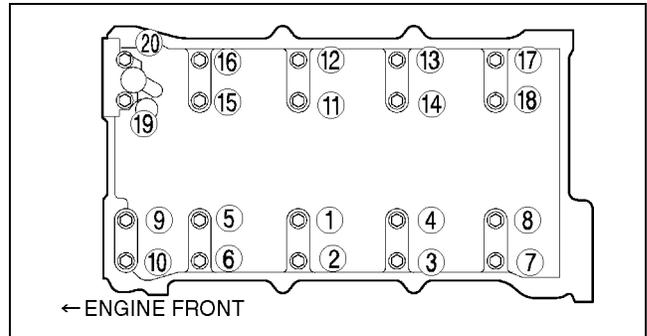


Z5U0110WAS

- Tighten the camshaft cap bolts for several times in the numerical order shown in the figure.

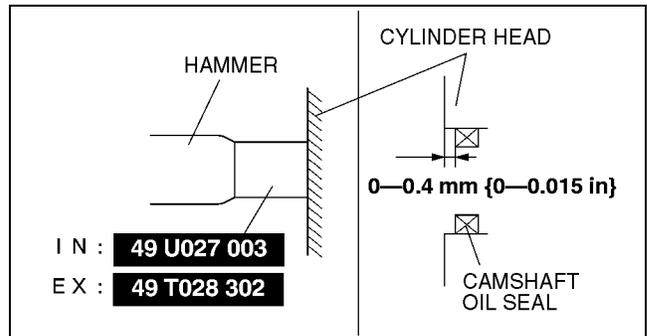
### Caution

- Install the camshaft while keeping horizontally as the camshaft thrust clearance is small. Otherwise, excessive force may be applied on the thrust part and cause burrs to the thrust part of cylinder head. Therefore, confirm that the camshaft lowers horizontally in accordance with tightening the 2 camshaft cap bolts on the No.3 journal part while tightening the camshaft cap bolts.



Z5U0110WAT

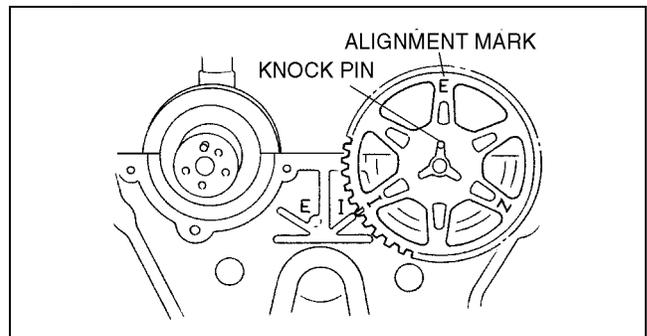
- Apply engine oil to the camshaft oil seal.
- Slightly insert the camshaft oil seal by hand.
- Tap the camshaft oil seal with the **SST**.



Z5U0110WAW

### Variable Valve Timing Actuator and Camshaft Pulley Installation Note

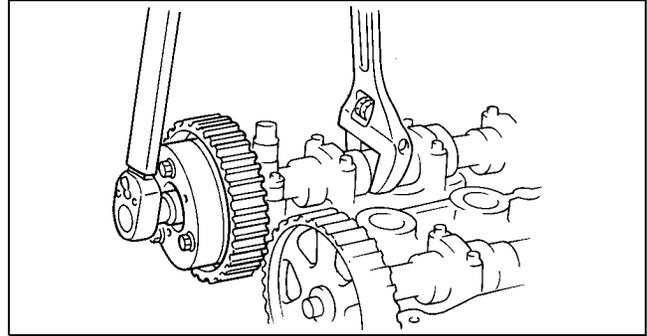
- Rotate the camshaft and face the knock pin to the just above position.
- Install the camshaft so that the alignment mark of camshaft pulley faces to the just above position.
- Install the camshaft so that the knock pin of camshaft is connected with the camshaft knock pin hole of variable valve timing actuator.



Z5U0110WAV

## MECHANICAL

4. Hold the hexagonal part of the camshaft with an adjustable wrench or the like to prevent the camshaft from rotating, and tighten the lock bolt.



Z5U0110WAW

01-10

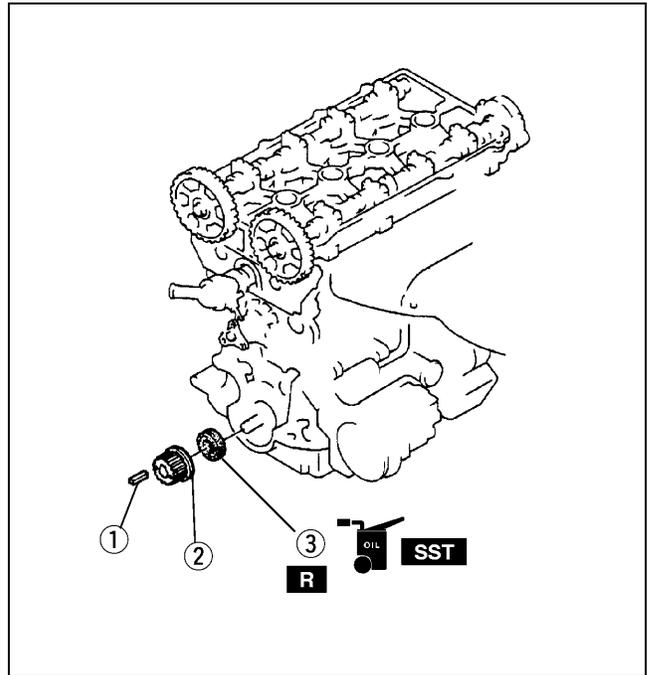
### FRONT OIL SEAL REPLACEMENT

1. Remove the timing belt. (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.

A5U011010602W01

1	Key
2	Timing belt pulley
3	Front oil seal (See 01-10-23 Front Oil Seal Removal Note) (See 01-10-24 Front Oil Seal Installation Note)

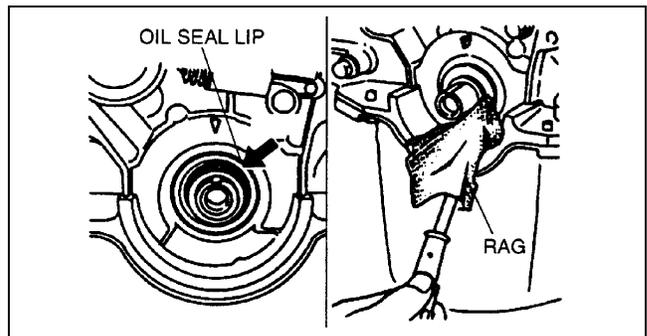
3. Install in the reverse order of removal.



X5U110WBB

### Front Oil Seal Removal Note

1. Cut the oil seal lip using a razor.
2. Remove the oil seal using a screwdriver protected with a rag.

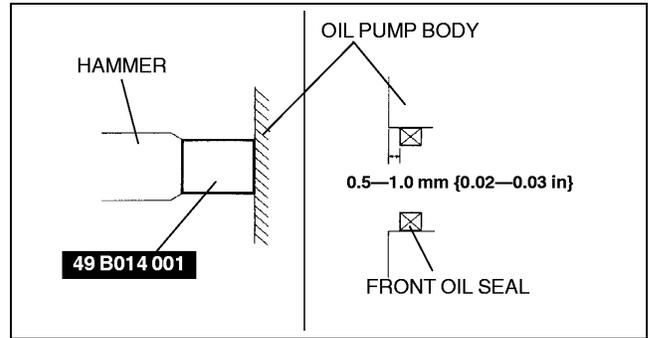


X5U110WBC

# MECHANICAL

## Front Oil Seal Installation Note

1. Apply clean engine oil to the oil seal lip.
2. Push the oil seal slightly in hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.



X5U110WBD

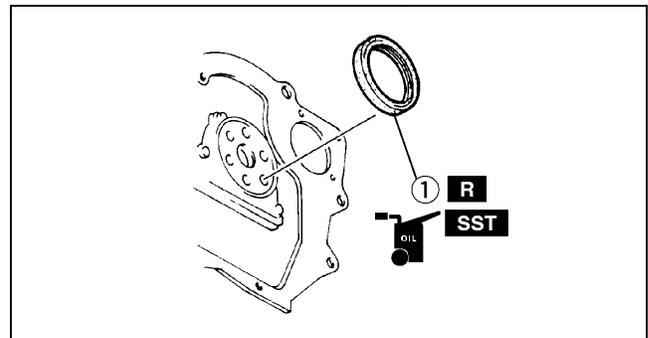
## REAR OIL SEAL REPLACEMENT

A5U011011399W01

1. Remove the flywheel. (MT) (See 05–10–11 CLUTCH UNIT REMOVAL/INSTALLATION.)
2. Remove the drive plate. (AT) (See 05–13–37 DRIVE PLATE REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.

1	Rear oil seal (See 01–10–24 Rear Oil Seal Removal Note) (See 01–10–24 Rear Oil Seal Installation Note)
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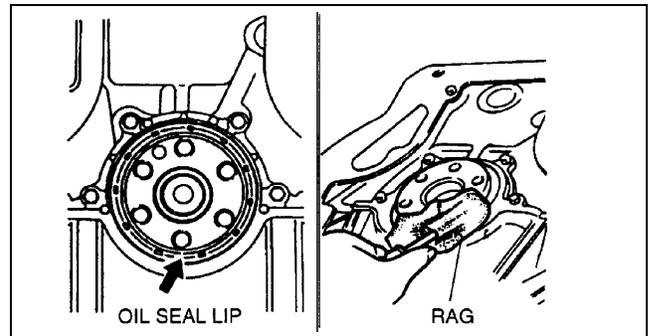
4. Install in the reverse order of removal.



X5U110WBE

## Rear Oil Seal Removal Note

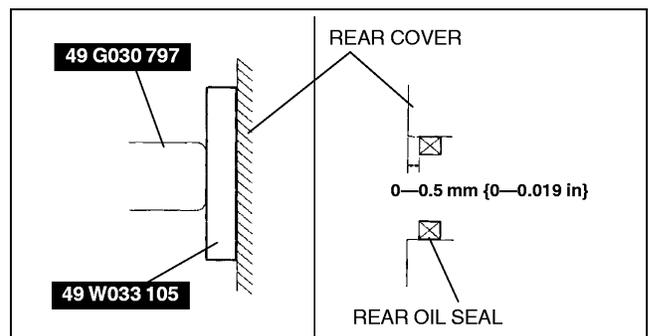
1. Cut the oil seal lip using a razor.
2. Remove the oil seal using a screwdriver protected with a rag.



X5U110WBF

## Rear Oil Seal Installation Note

1. Apply clean engine oil to the new oil seal lip.
2. Push the oil seal slightly in hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.

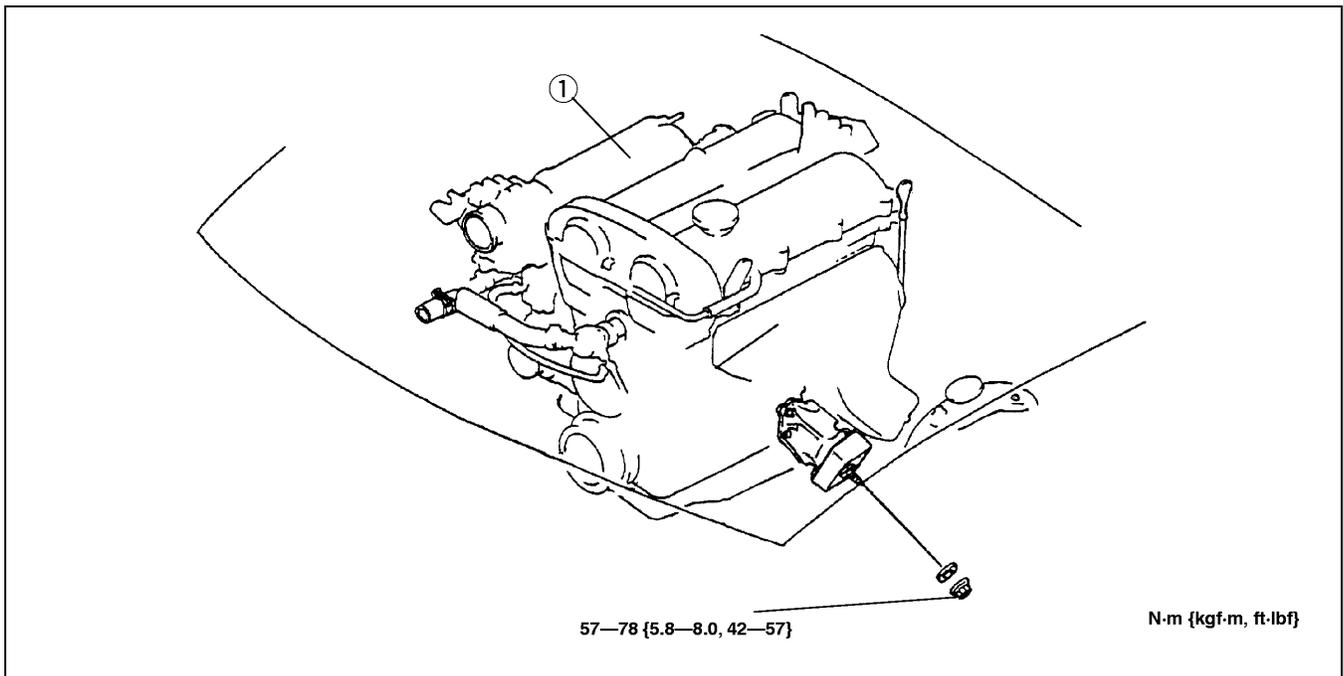


X5U110WBG

### Warning

- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.
- Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the “Fuel Line Safety Procedure”. (See 01-14-3 BEFORE REPAIR PROCEDURE.)

1. Disconnect the negative battery cable.
2. Remove the radiator. (See 01-12-4 RADIATOR REMOVAL/INSTALLATION.)
3. Remove the air cleaner.
4. Disconnect the accelerator cable and bracket.
5. Disconnect the fuel hose. (See 01-14-3 BEFORE REPAIR PROCEDURE.) (See 01-14-3 AFTER REPAIR PROCEDURE.)
6. Disconnect the vacuum hose and engine harness connectors.
7. Disconnect the heater hose.
8. Remove the drive belt. (See 01-10-4 DRIVE BELT ADJUSTMENT.)
9. Remove the P/S oil pump with the oil hose still connected.
10. Position the P/S oil pump so that it is out of the way. (Vehicles with P/S oil pump)
11. Remove the P/S oil pump with the oil hose still connected.
12. Position the A/C compressor so that it is out of the way. (Vehicles with A/C compressor)
13. Remove the transmission. (See 05-11A-4 MANUAL TRANSMISSION REMOVAL/INSTALLATION [M15M-D].) (See 05-13-25 AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION.)
14. Remove in the order indicated in the table.
15. Install in the reverse order of removal.
16. Start the engine and
  - (1) Inspect for the engine oil, engine coolant, transmission oil and fuel leakage.
  - (2) Verify the ignition timing. (See 01-10-27 Ignition Timing Inspection.)
  - (3) Verify the idle speed. (See 01-10-28 Idle Speed Adjustment.)
  - (4) Verify the idle mixture. (See 01-10-29 Idle Mixture Inspection.)
17. Perform a road test.



X5U110WBH

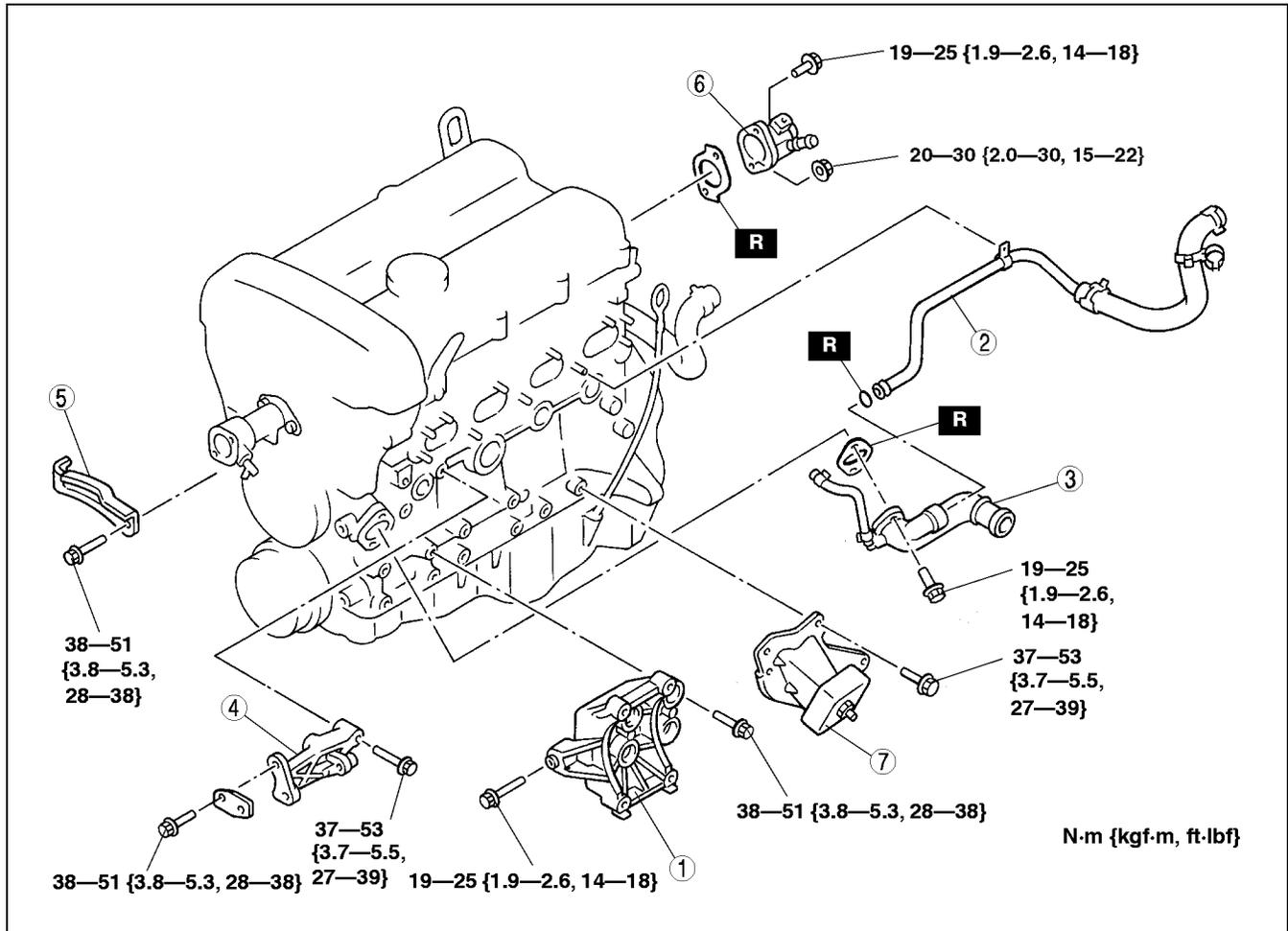
1	Engine
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# MECHANICAL

## ENGINE DISASSEMBLY/ASSEMBLY

A5U011002000W03

1. Remove the oil pressure switch. (See 01-11-3 OIL PRESSURE INSPECTION.)
2. Remove the OCV. (See 01-10-8 OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION)
3. Remove the oil pipe. (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION.)
4. Remove the camshaft position sensor.
5. Remove the crankshaft position sensor.
6. Remove the intake-air system. (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
7. Remove the exhaust system. (See 01-15-1 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
8. Remove the generator.
9. Remove the oil filter. (See 01-11-3 OIL FILTER REPLACEMENT.)
10. Remove the oil cooler.
11. Remove the thermostat. (See 01-12-5 THERMOSTAT REMOVAL/INSTALLATION.)
12. Disassemble in the order indicated in the table.
13. Assemble in the reverse order of disassembly.



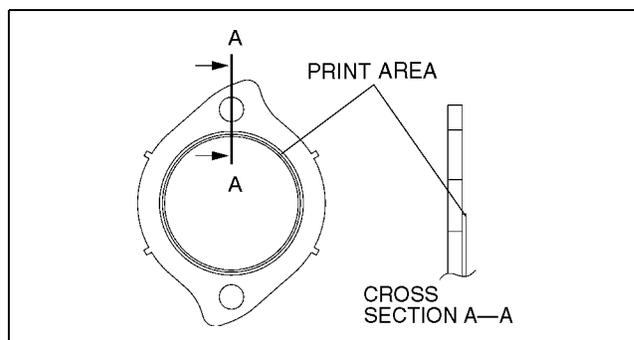
Z5U0110WAX

1	A/C compressor bracket
2	Water bypass pipe
3	Water inlet pipe
4	P/S oil pump bracket

5	Generator strap
6	Water outlet pipe (See 01-10-27 Water Outlet Pipe Installation Note)
7	Engine mount

## Water Outlet Pipe Installation Note

1. Install the water outlet pipe gasket so that the print area faces the cylinder head.



Z5U0110WAY

01-10

## ENGINE TUNE-UP

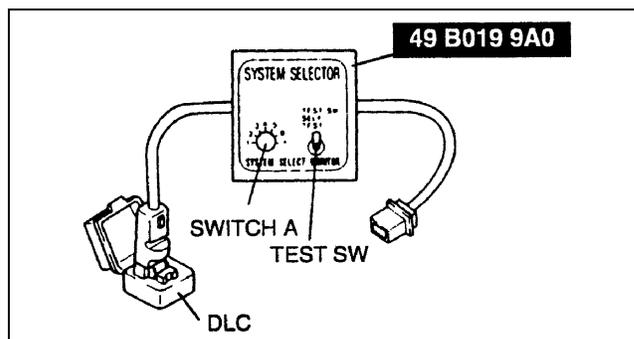
### Engine Tune-up Preparation

1. Warm up the engine to normal operating temperature.
2. Shift transmission into Neutral (MT) or P position (AT).
3. Turn off all electrical loads.
  - Headlight
  - Blower
  - Rear window defroster
4. Verify that the battery is fully charged. (See 01-17-2 BATTERY INSPECTION.)
5. Wait until the electrical fan stops.
6. Connect the **SSTs** (WDS or equivalent) to the DLC-2.
7. Access RPM PID.
8. If using the **SST** (System selector) to turn on the test mode, perform as follows:
  - (1) Connect the **SST** to the DLC.
  - (2) Set switch A to position 1.
  - (3) Set the test switch to SELF TEST.

A5U011002000W04

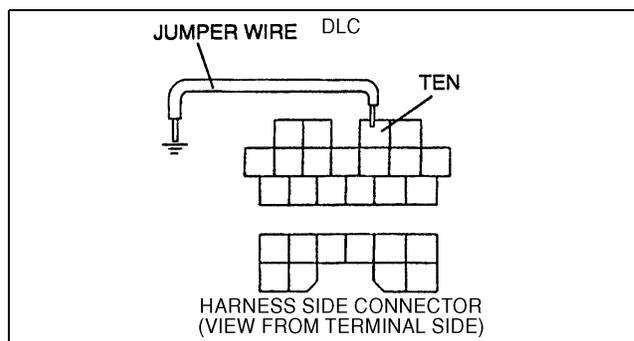
### Caution

- **Connecting to the wrong DLC terminal may possibly cause a malfunction. Carefully connect to the specified terminal only.**



Y5U110WA1

9. If using a jumper wire to turn on the test mode, perform the following:
  - (1) Short the DLC terminal TEN to body GND using a jumper wire.
10. Select "START" to begin.



Y5U110WA2

## Ignition Timing Inspection

1. Perform "Engine Tune-up Preparation".
2. Verify that the idle speed is within the specification.
  - If not as specified, adjust the idle speed. (See 01-10-28 Idle Speed Adjustment.)

### Specification

**750—850 (800 ± 50) rpm**

3. Connect a timing light to the high-tension lead of the No.1 cylinder.

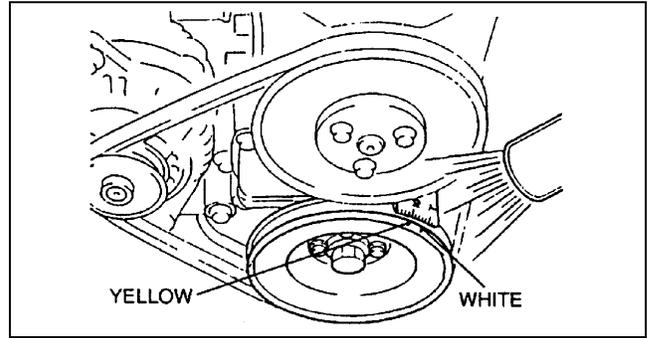
## MECHANICAL

4. Verify that the timing mark (white) on the crankshaft pulley and the T mark on the timing belt cover are aligned.

### Ignition timing

**BTDC 9°—11° (10° ± 1°) (TIMING MARK [YELLOW])**

5. Disconnect **SST** (System selector) or a jumper wire.
6. Press "CANCEL".
7. Verify that the timing mark (yellow) is within the specification.
  - If not as specified, inspect the following.
    - CMP sensor
    - CKP sensor
    - TP sensor
    - ECT sensor
    - Neutral switch (MT)
    - Clutch switch (MT)
    - TR switch (AT)
  - If the devices are normal, replace the PCM.



X5U110WBL

### Specification

**BTDC 6°—18°**

### Idle Speed Adjustment

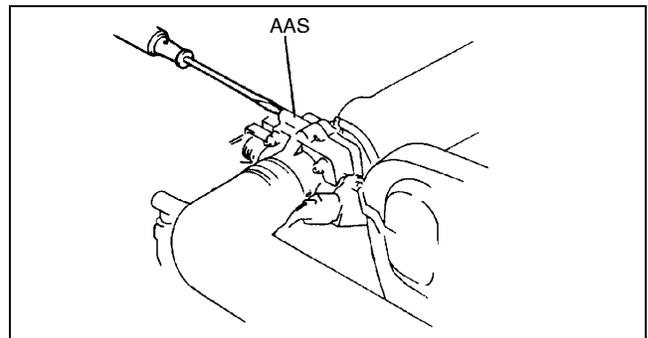
1. Perform "Engine Tune-up Preparation".
2. Verify that the idle speed is within the specification.
  - If not within the specification, adjust the idle speed by turning the AAS.

### Specification

**750—850 (800 ± 50) rpm**

### Caution

- **The AAS is set at the factory and must not be adjusted. Any adjustment will negatively affect the engine performance.**



X5U110WBM

3. Disconnect **SST** (System selector) or a jumper wire.
4. Press "CLEAR" to clear previously selected items.
5. Disconnect the NGS tester.

### Idle-up Speed Inspection

1. Perform "Engine Tune-up Preparation", and "Idle Speed Adjustment".
2. Verify "RPM" PID is selected.
3. Press "START".
4. Verify that the idle speed is normal.
5. Verify that the idle-up speed is within the specification.
  - If not as specified under all load conditions, inspect the IAC valve.
  - If not as specified under some load conditions, inspect related input switches, harnesses and connectors.

Load condition	Idle-up speed (rpm)*1		
	MT	AT	
		N, P position	D range
E/L ON*2	750—850 (800 ± 50)	750—850 (800 ± 50)	700—800 (750 ± 50)
P/S ON*3			
A/C ON*4	950—1050 (1000 ± 50)		

\*1 : Excludes temporary idle speed drop just after the electrical loads (E/L) are turned on.

- \*2 : Headlight is on, fan switch (above 1st), cooling fan are operating, rear window defroster is on.
- \*3 : Steering wheel is fully turned.
- \*4 : A/C switch and fan switch are on.

### Idle Mixture Inspection

1. Perform "Engine Tune-up Preparation".
2. Verify that the idle speed and ignition timing are within the specification.
3. Insert an exhaust gas analyzer to the tailpipe.
4. Verify that the CO and HC concentrations are within the regulation.
  - If not, inspect the following.
    - OBD system
    - HO2S
    - Intake manifold vacuum
    - Fuel line pressure
    - Ignition timing control
  - If the systems are normal, replace the TWC.