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Year	Make	Model	Engine	Trans
2007	Mazda	3	L4-2.3L	A

TOC Zone: 22 - Engine

Component/Path: Timing Components
Camshaft Gear/Sprocket

Info Type: 26 - Service and Repair

Additional Info:

Problem: need to set the vvt on timing belt timing.


Notes

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2007 Mazda 3 L4-2.0L

[Vehicle Level](#) → [Engine, Cooling and Exhaust](#) → [Engine](#) → [Timing Chain](#) → [Service and Repair](#) ←

Service and Repair

TIMING CHAIN REMOVAL/INSTALLATION [LF, L3]

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".

1. Remove the following parts.

- (1) Plug hole plate
- (2) Plug hole plate bracket
- (3) Accelerator cable and bracket
- (4) Battery cover

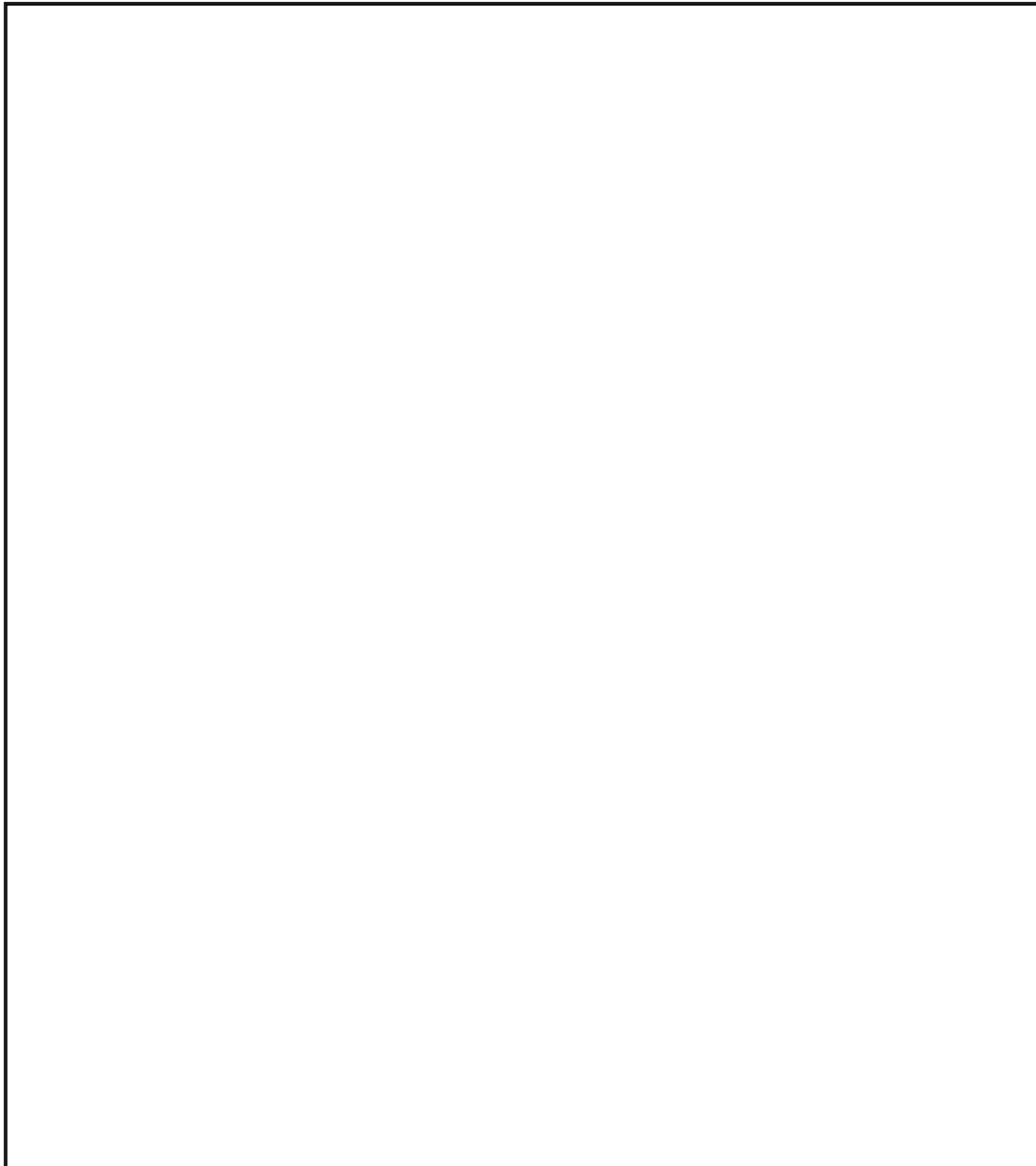
2. Disconnect the negative battery cable.

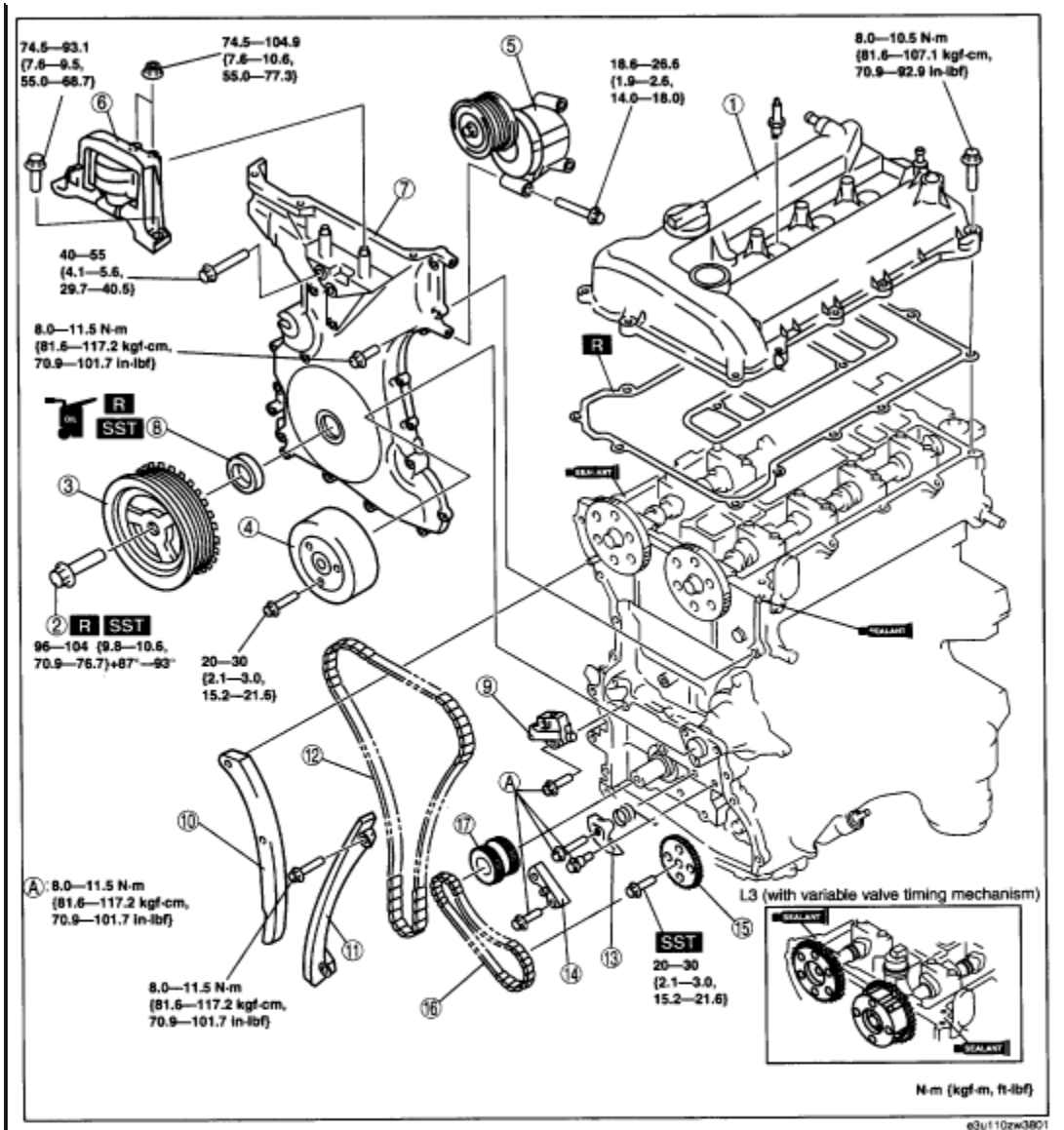
3. Remove the following parts.

- (1) Ignition coils
- (2) Front wheel and tire (RH)
- (3) Under cover and splash shields
- (4) Crankshaft position (CKP) sensor
- (5) [Drive belt](#)
- (6) A/C compressor with the oil hose still connected and position the A/C compressor so that it is out of the way
- (7) Coolant reserve tank with the hose still connected and position the coolant

reserve tank so that it is out of the way

4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Start the engine.
7. Inspect the following and adjust if necessary.
 - Pulley and belt for runout and contact
 - Leakage of engine oil
 - [Ignition timing](#), [idle speed](#), and amount of CO and HC (See ENGINE TUNE-UP [LF, L3].) [See: Tune-up and Engine Performance Checks\Testing and Inspection](#)
 - Engine-driven accessories operation





1	Dipstick
2	Cylinder head cover
3	Crankshaft pulley lock bolt
4	Crankshaft pulley
5	Water pump pulley
6	Drive belt auto tensioner

7	No.3 engine mount rubber and No.3 engine joint bracket
8	Engine front cover
9	Front oil seal

Zoom

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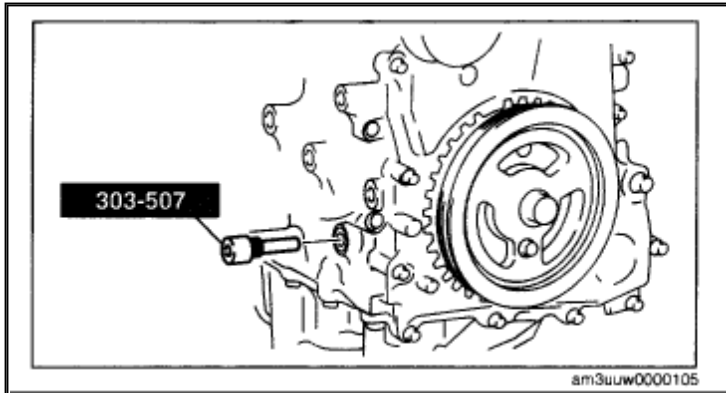
10	Chain tensioner
11	Tensioner arm
12	Chain guide
13	Timing chain
14	Oil pump chain tensioner

15	Oil pump chain guide
16	Oil pump sprocket
17	Oil pump chain
18	Crankshaft sprocket

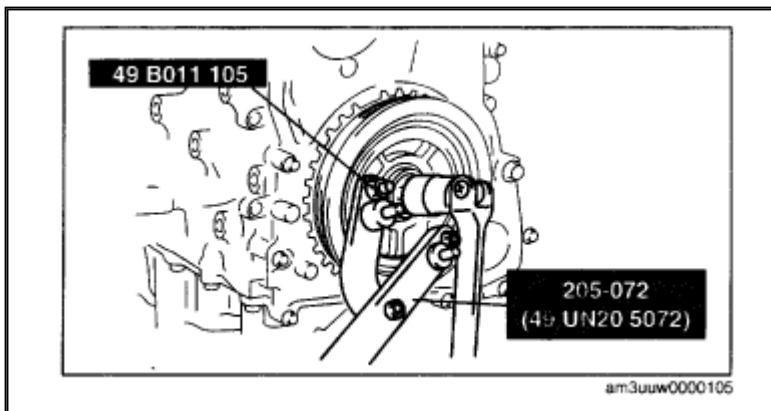
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Crankshaft Pulley Lock Bolt Removal Note

1. Remove the cylinder block lower blind plug.
2. Install the SST.

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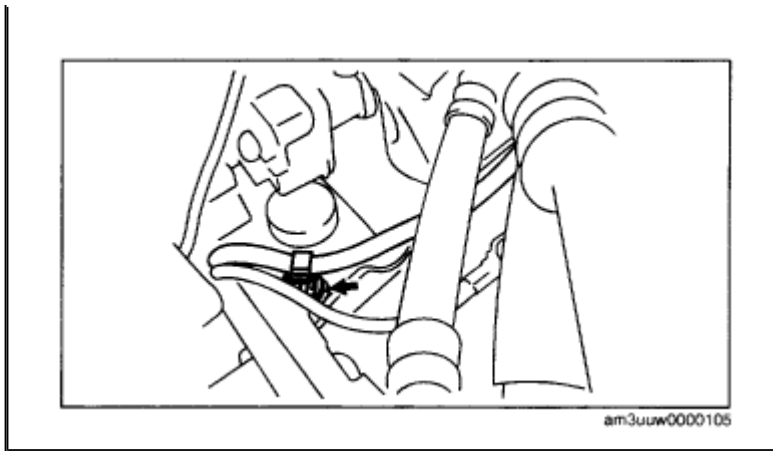
3. Turn the [crankshaft](#) clockwise the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the SST).

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4. Hold the crankshaft pulley using the SSTs.

No.3 [Engine Mount](#) Rubber Removal Note

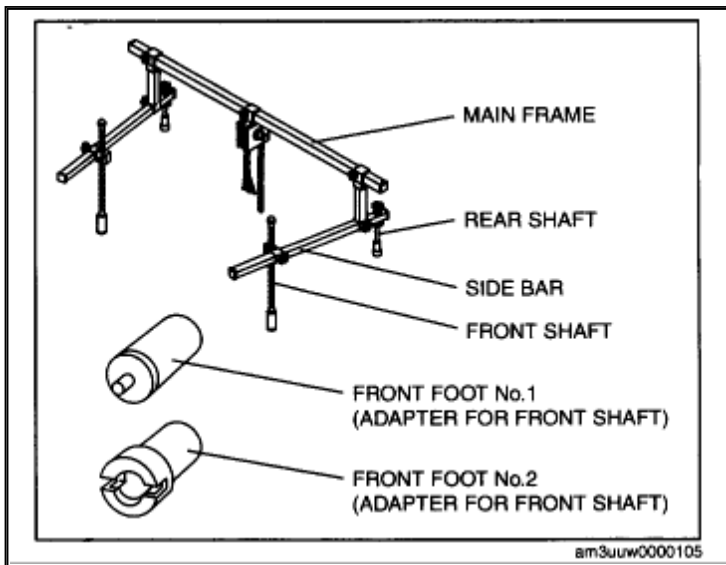




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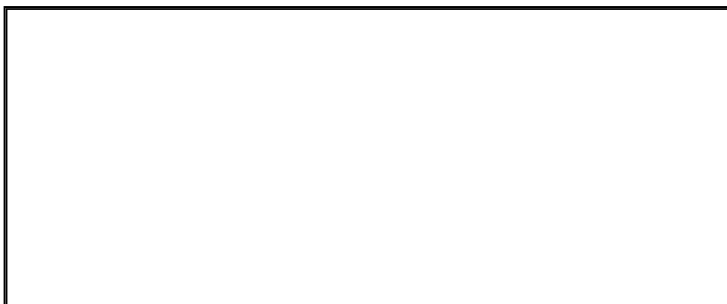
1. To install the front shaft (RH) of the SST (49 C017 5A0), remove the clip shown the figure.

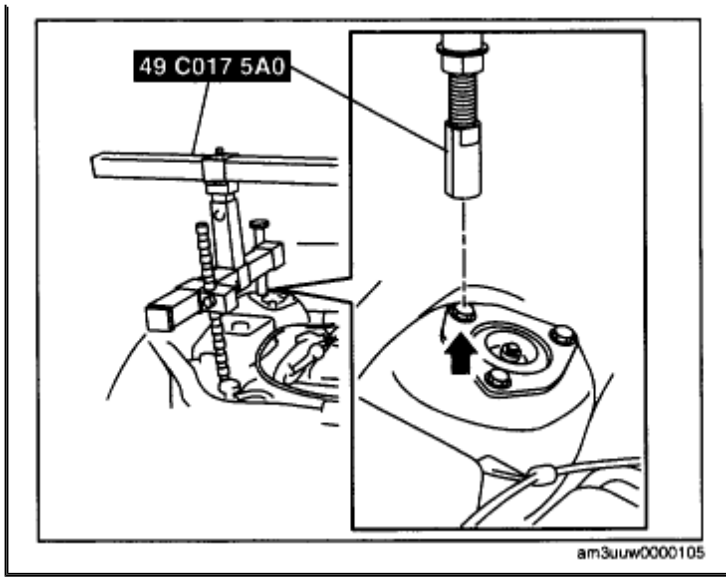


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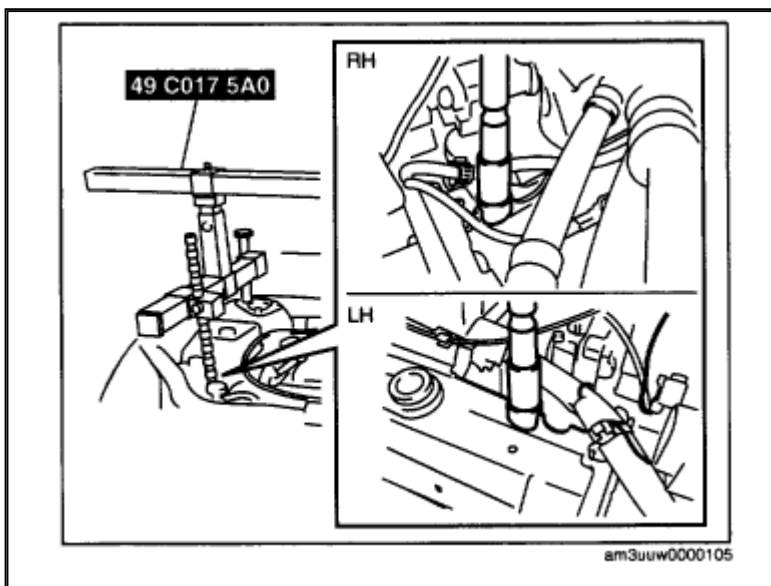
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2. Install the SST using the following procedure. **Caution: Refer to the SST instruction manual for the basic handling procedure.**



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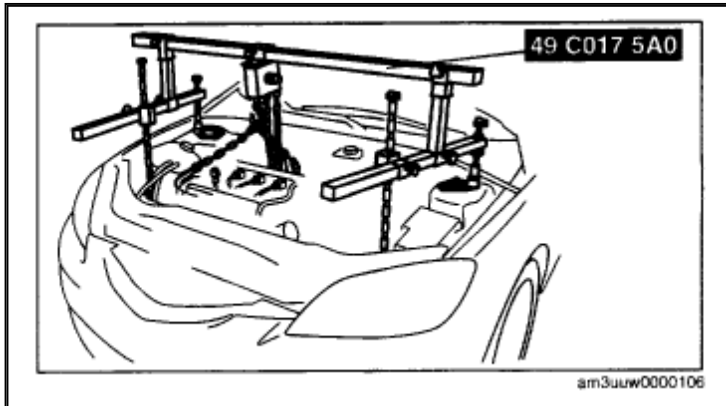
- (1) Install the right rear shaft of the SST to the bolt of the right shock absorber as shown in the figure.
- (2) Install the left rear shaft of the SST to the bolt of the left shock absorber. (identical position to the right side)

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- (3) Install front foot No.2 to the left/right front shaft of the SST, then align the

groove of the front shaft of the SST with the folded up part of the vehicle as shown in the figure.

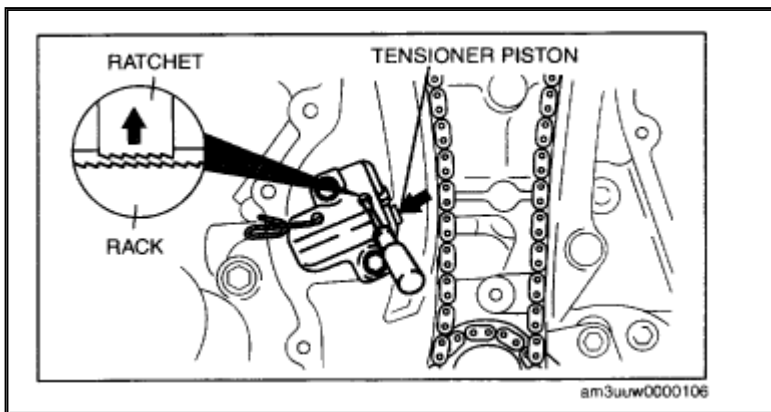
- (4) Adjust the positions of the SST side bars so that they are the same height (left and right) and horizontal.
 - (5) Make sure each joint is securely tightened.
3. Suspend the engine using the SST.



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Chain Tensioner Removal Note

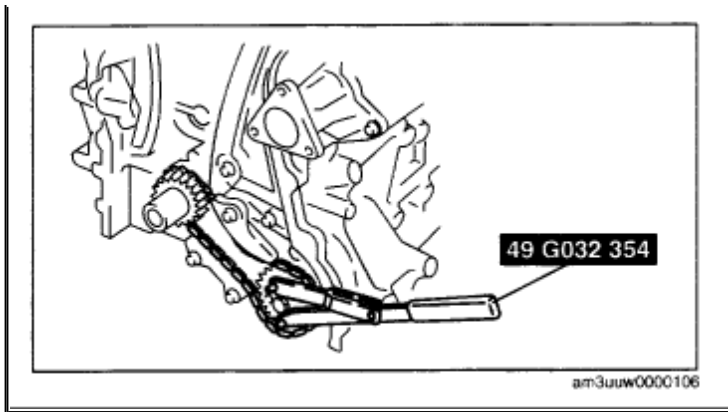


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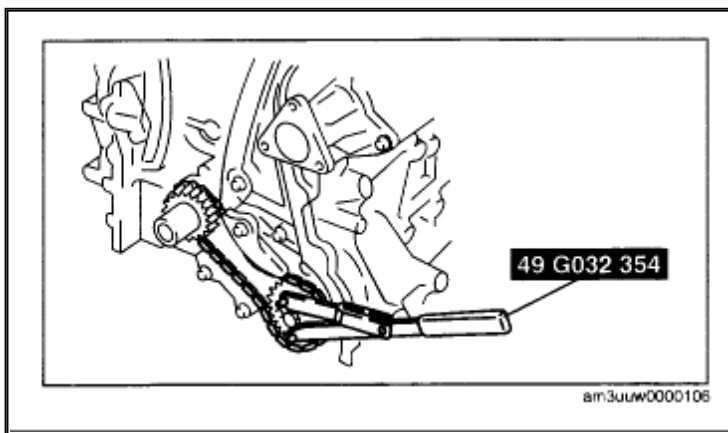
1. Unlock the chain tensioner ratchet using a suitable screw driver or equivalent tool.
2. Slowly compress the tensioner [piston](#).
3. Hold the tensioner [piston](#) using a **1.5 mm (0.059 in)** wire or paper clip.

[Oil Pump Sprocket Removal Note](#)

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1. Hold the [oil pump](#) sprocket using the SST.

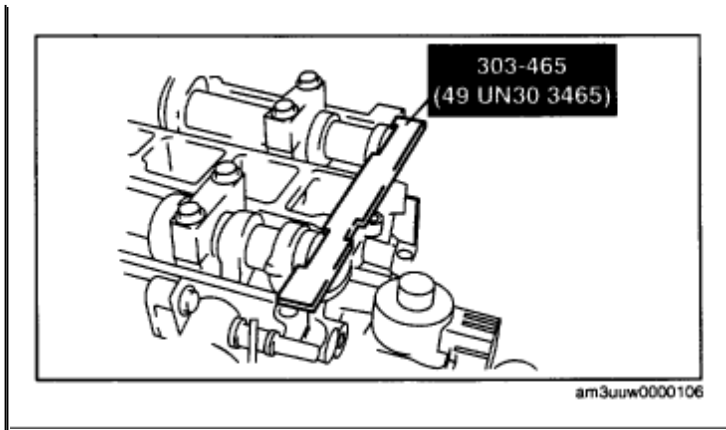
[Oil Pump Sprocket Installation Note](#)

[Zoom](#)[Sized for Print](#)

1. Hold the [oil pump](#) sprocket using the SST.

Timing Chain Installation Note



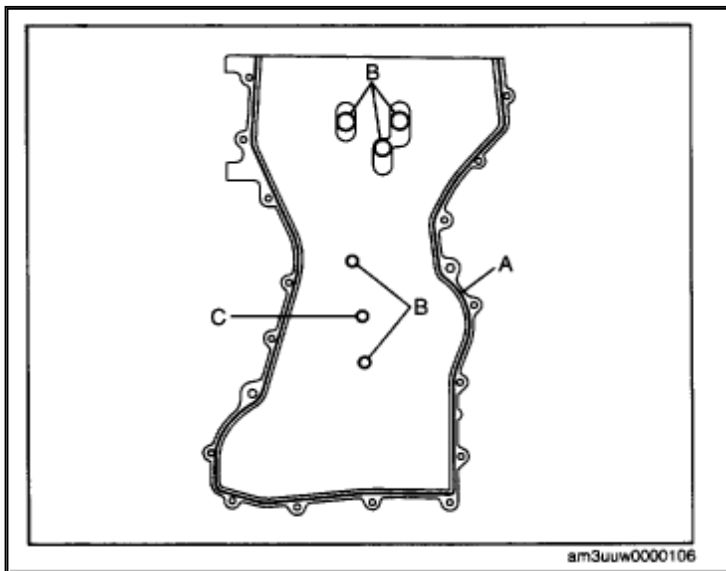


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1. Install the SST to the [camshaft](#) as shown in the figure.
2. Install the timing chain.
3. Remove the retaining wire or paper clip from the auto tensioner to apply tension to the timing chain.

Engine Front Cover Installation Note



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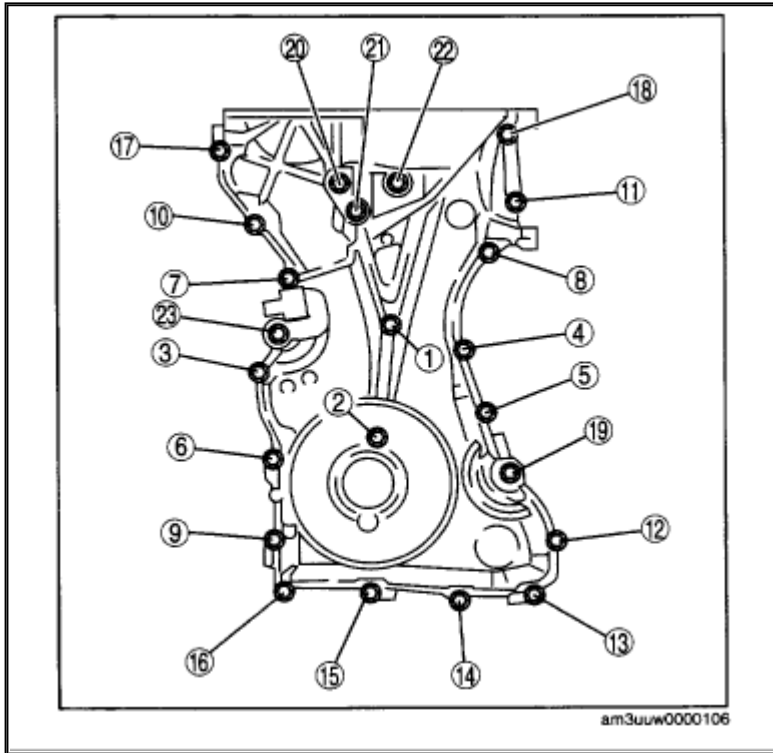
1. Apply silicone sealant to the engine front cover as shown in the figure.
Caution:
 - Install the engine front cover within 10 min of applying the silicone sealant.
 - Silicone sealant is not need in area C as indicated below due to an existing.

- They are oil and a thing without adhesion of dust to a seal side.

Thickness

A: 2.2 - 3.2 mm (0.087 - 0.125 in)

B: 1.5 - 2.5 mm (0.059 - 0.098 in)



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Bolt No.	Tightening torque
1-18	8.0-11.5 N·m {81.6-117.2 kgf·cm, 70.9-101.7 in·lbf}
19-22	40-55 N·m {4.1-5.6 kgf·m, 29.7-40.5 ft·lbf}
23	20-30 N·m {2.1-3.0 kgf·m, 14.8-22.1 ft·lbf}

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2. Install the engine front cover bolts in the order shown in the figure.

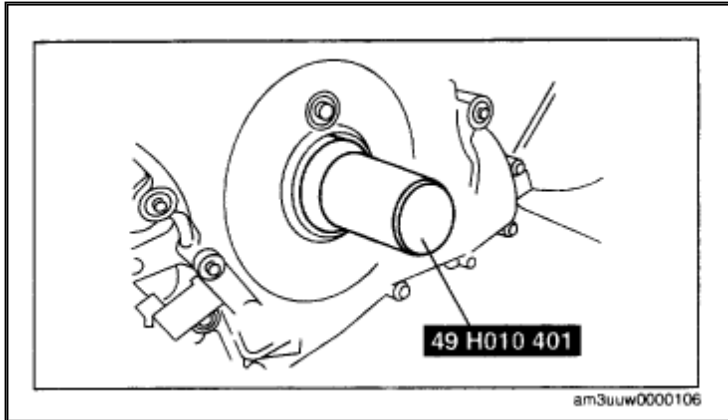
Bolt No.	Tightening torque
1-18	8.0-11.5 N·m {81.6-117.2 kgf·cm, 70.9-101.7 in·lbf}
19-22	40-55 N·m {4.1-5.6 kgf·m, 29.7-40.5 ft·lbf}
23	20-30 N·m {2.1-3.0 kgf·m, 14.8-22.1 ft·lbf}

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Front Oil Seal Installation Note

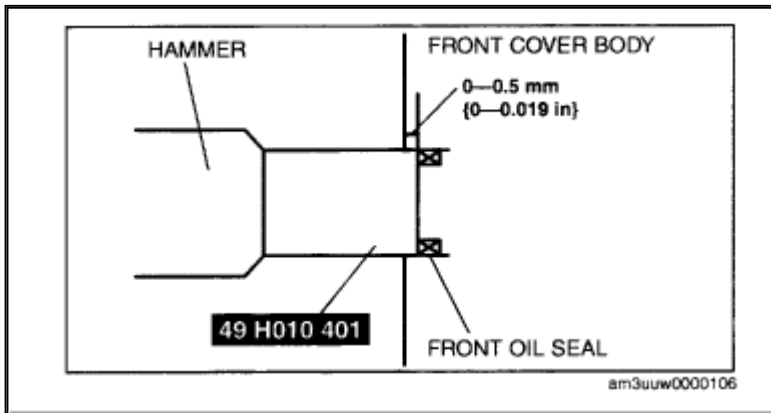
1. Apply clean engine oil to the oil seal.
2. Push the oil seal slightly in by hand.



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3. Compress the oil seal using the SST and a hammer.



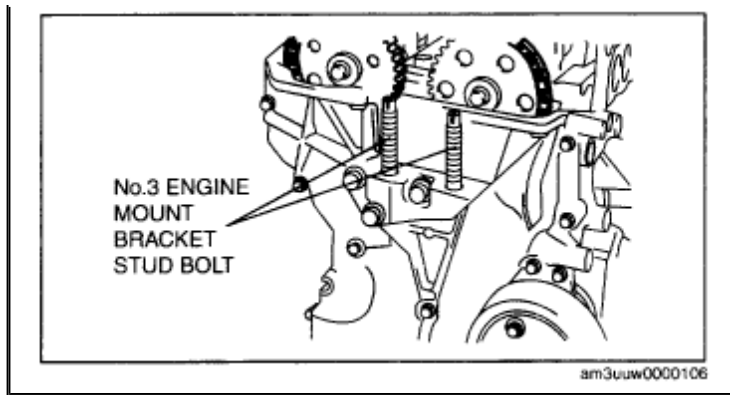
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Front oil seal press-in amount **0 - 0.5 mm (0 - 0.019 in)**

No.3 [Engine Mount](#) Rubber and No.3 Engine Mount Bracket Installation Note

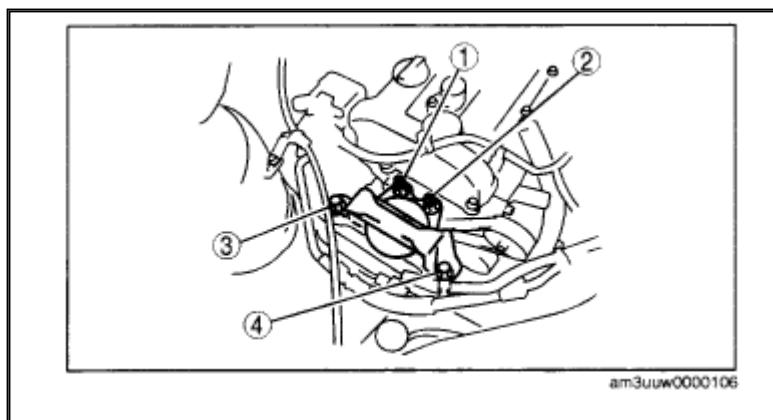




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1. Tighten the stud bolt of the No.3 engine mount bracket. Tightening torque **7.0 - 13 Nm (71.4 - 132.5 kgf-cm, 62.0 - 115.0 in-lbf)** **Note:** Tightening stud bolt when the nut of No.3 [engine mount](#) nut is loosened.
2. Hand-tighten the No.3 [engine mount](#) rubber and No.3 engine mount bracket.



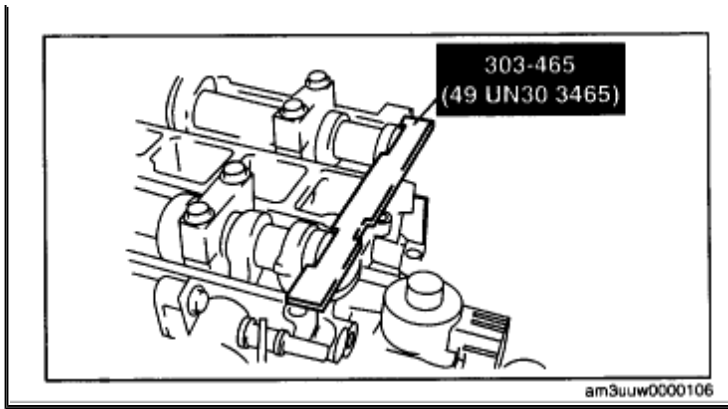
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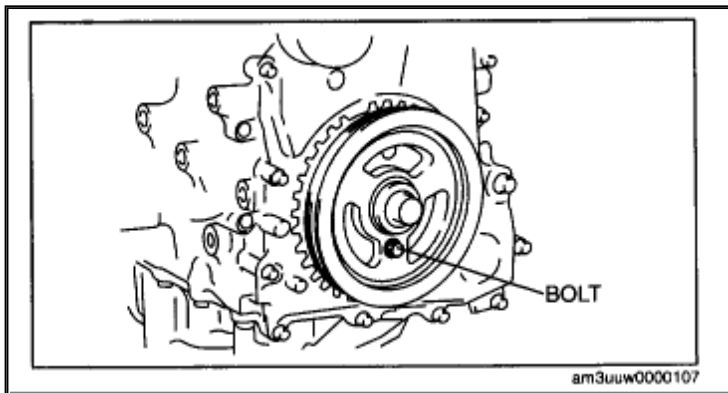
3. Tighten the bolts and nuts in the order as shown in the figure. Tightening torque Nuts: **74.5 - 104.9 Nm (7.6 - 10.6 kgf-m, 55.0 - 77.3 ft-lbf)** Bolts: **74.5 - 93.1 Nm (7.6 - 9.5 kgf-m, 55.0 - 68.7 ft-lbf)**

Crankshaft Pulley Lock Bolt Installation Note

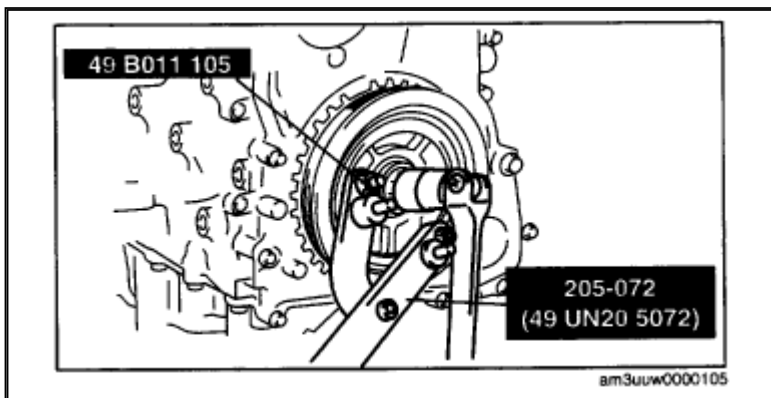


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1. Install the SST to the [camshaft](#) as shown in the figure.

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2. Install the M6 x 1.0 bolt in by hand.
3. Turn the [crankshaft](#) clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the SST).

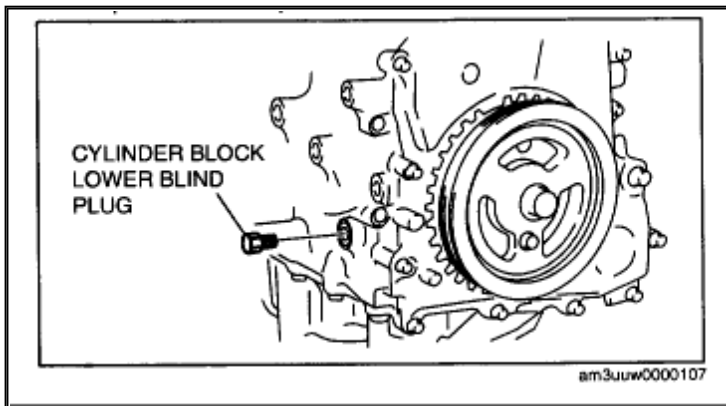
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4. Hold the crankshaft pulley using the SST.
5. Tighten the crankshaft pulley lock bolt in the order shown with the following two steps using the SST (49 D032 316). Tightening torque

(1) **96 - 104 Nm (9.8 - 10.6 kgf-m, 70.9 - 76.7 ft-lbf)**

(2) **87° - 93°**

6. Remove the M6 x 1.0 bolt.
7. Remove the SST from the [camshaft](#).
8. Remove the SST from the [cylinder block lower blind plug](#).
9. Rotate the [crankshaft](#) clockwise two turns until the TDC position.
 - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.

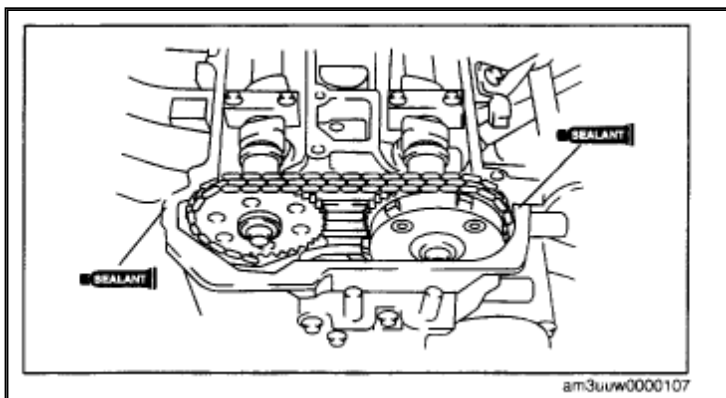


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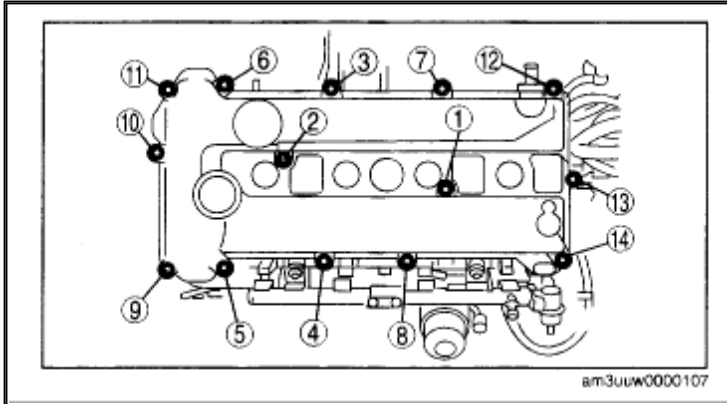
10. Install the cylinder block lower blind plug. Tightening torque **18 - 22 Nm (1.9 - 2.2 kgf-m, 13.3 - 16.2 ft-lbf)**

Cylinder Head Cover Installation Note



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1. Apply silicone sealant to the mating faces as shown in the figure. **Caution: Install the cylinder head cover within 10 min of applying the silicone sealant.** Thickness **4.0 - 7.0 mm (0.16 - 0.24 in)**
2. Install the cylinder head cover with a new gasket.

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3. Tighten the bolts in the order shown in the figure. Tightening torque **8.0 - 10.5 Nm (81.6 - 107.1 kgf-cm, 70.9 - 92.9 in-lbf)**

2007 Mazda 3 L4-2.0L

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Variable Valve Timing Control System Operation Inspection

Variable Valve Timing Control System Operation Inspection When idling cannot be continued

1. Remove the oil control valve (OCV) and verify that the spool valve is at maximum retard position.
2. Connect the oil control valve (OCV).
3. Turn the ignition switch to the ON position.
4. Verify that the spool valve is at maximum retard position.
 - If the spool valve is stuck in the advance direction, inspect for the following:
 - Short circuit in wiring harnesses or connectors between the oil control valve (OCV) and the PCM.
5. Inspect the variable valve timing actuator. (See VARIABLE VALVE TIMING ACTUATOR INSPECTIONS, L3].)

When idling can be continued

1. Disconnect oil control valve (OCV) connector.
2. Warm up the engine and idle it.
3. Apply battery voltage to the oil control valve (OCV) and verify that the engine idles roughly or stalls.
 - If the engine idles roughly or stalls, inspect the [timing chain](#) component (valve timing deviation).
 - If the engine does not idle roughly or stalls, go to the next step.
4. Remove the oil control valve (OCV) and perform spool valve operation inspection. (See OIL CONTROL VALVE (OCV) INSPECTION[LF, L3].)
 - If not as specified, inspect the following:
 - Oil control valve (OCV)
 - Harnesses and connectors between oil control valve (OCV) and PCM open or short.
 - If as specified, inspect the following hydraulic passages for clogging or

leakage or both:

- Oil pressure switch
- Oil control valve (OCV) [camshaft](#)
- Camshaft internal passage

5. If they are normal, replace the camshaft pulley (with built-in variable valve timing actuator).

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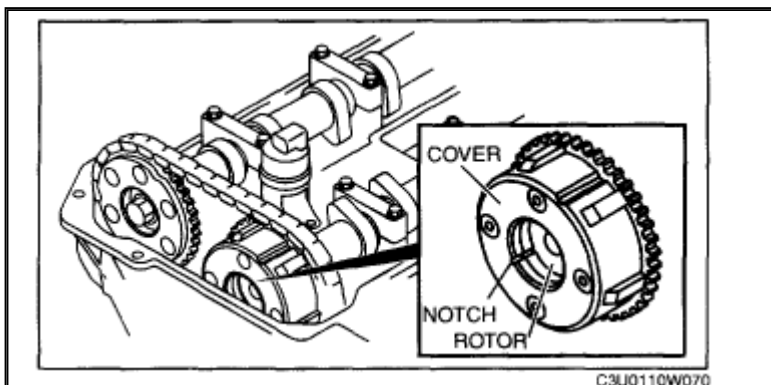
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Variable Valve Timing Actuator Inspection

VARIABLE VALVE TIMING ACTUATOR INSPECTION [LF, L3]

Caution: Variable valve timing actuator can not be disassembled it is a precision unit.

1. Disconnect the negative battery cable.
2. Remove the following parts.
 - Plug hole plate
 - Ignition coils
 - Oil control valve connector
 - Ventilation hose
 - Cylinder head cover
3. Confirm that notch of the rotor and bump of the cover at the variable valve timing actuator are aligned and fitted.
 - If the notch and the bump are not aligned, turn the [crankshaft](#) clockwise two rotations. Verify that the bump and the notch are aligned.
 - If the bump and notch are still not aligned, replace the variable valve timing actuator.
 - If, when turning the [crankshaft](#), there is a hitting noise from the variable valve timing actuator each time the cam passes the fully lifted position, it means that the actuator is not secured. Replace the actuator.



Zoom

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4. Install the following parts.

- Cylinder head cover
- Ventilation hose
- Oil control valve connector
- Ignition coils
- Plug hole plate

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Service and Repair**VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [LF, L3]**

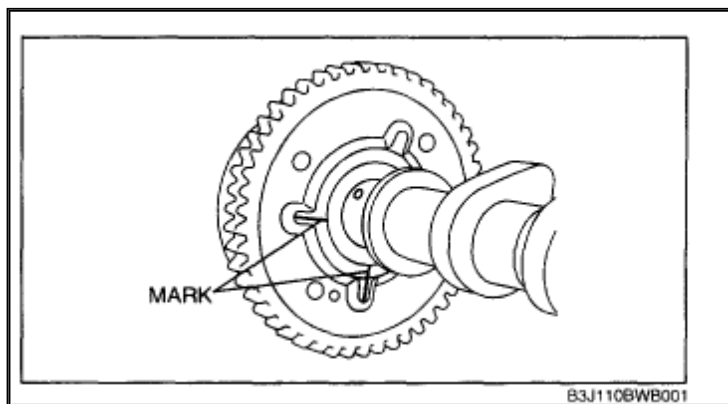
Caution: Variable valve timing actuator can not be disassembled because it is a precision unit.

Note: Intake camshaft sprocket is integrated with the variable valve timing actuator and cannot be disassembled.

1. Follow the [valve clearance](#) adjustment procedure from 1 to 12 and remove the intake [camshaft](#) and variable valve timing actuator as a single unit.
2. Remove the variable valve timing actuator.

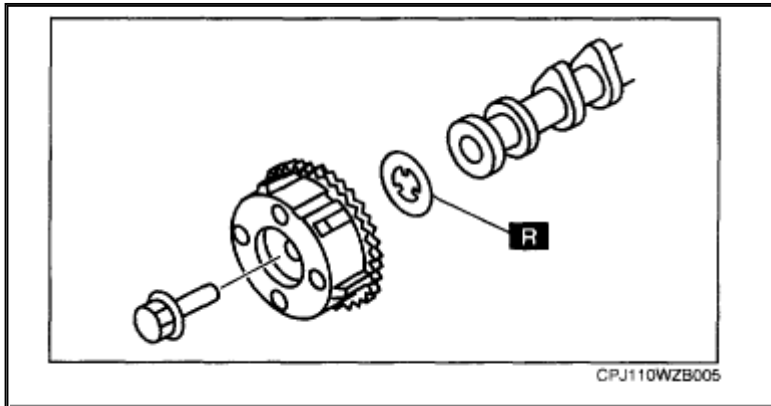
- (1) Mark the [camshaft](#) and variable valve timing actuator as shown in the figure to make sure they are installed in their original position.

Note: Do not add scratch marks to the [camshaft](#) thrust area.

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- (2) Secure the [camshaft](#) in a vise.

- (3) Loosen the variable valve timing actuator tightening bolt.



Zoom

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3. Install a new washer.
 4. Install the variable valve timing actuator.
- (1) Secure the [camshaft](#) in a vise.
 - (2) Align the marks of the [camshaft](#) and variable valve timing actuator.

Caution: When the variable valve timing actuator is replaced with a new one, mark it in the same location as the old one.

- (3) Tighten variable valve timing actuator tightening bolt.

Tightening torque **69 - 75 Nm (7.1 - 7.6 kgf-m, 50.9 - 55.3 ft-lbf)**

5. Follow the [valve clearance](#) adjustment procedure from 16 to 33 and install the intake [camshaft](#) and variable valve timing actuator.

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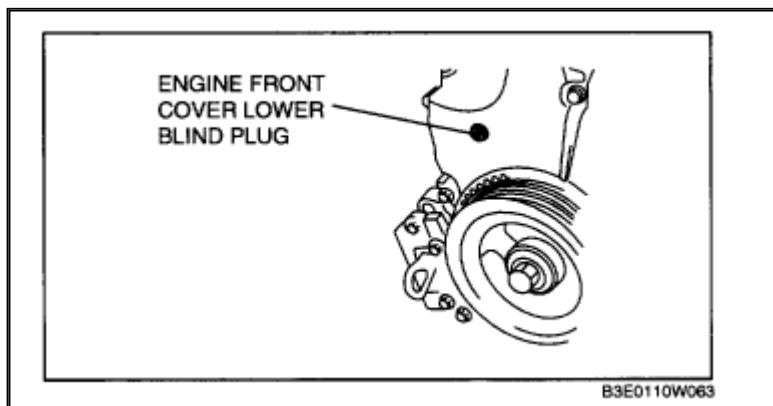
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Adjustments

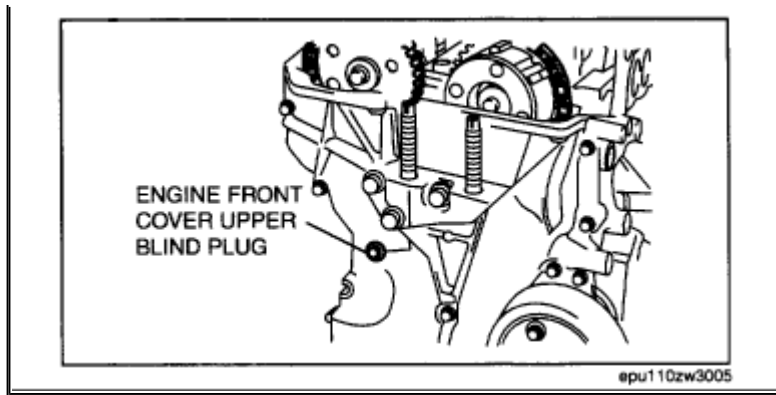
VALVE CLEARANCE ADJUSTMENT [LF, L3]

1. Remove the plug hole plate.
2. Remove the battery cover.
3. Disconnect the negative battery cable.
4. Disconnect the wiring harness.
5. Disconnect the OCV connector.
6. Remove the following parts.

- (1) Front wheel and tire (RH)
- (2) Engine under cover and splash shield (RH)
- (3) Ignition coils
- (4) Ventilation hose
- (5) Cylinder head cover



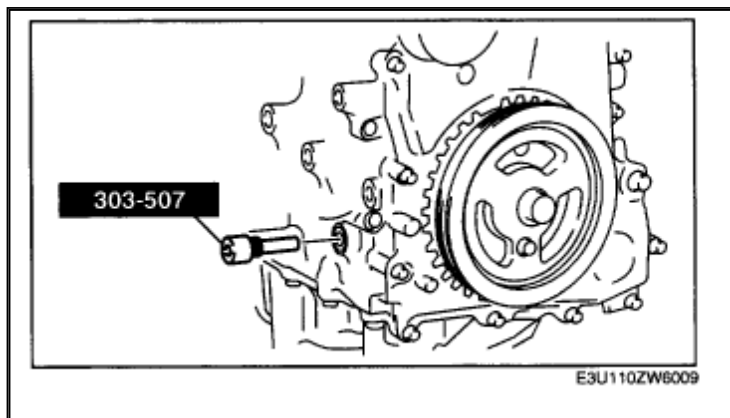
- (6) Engine front cover lower blind plug



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- (7) Engine front cover upper blind plug.
- (8) Cylinder block lower blind plug.

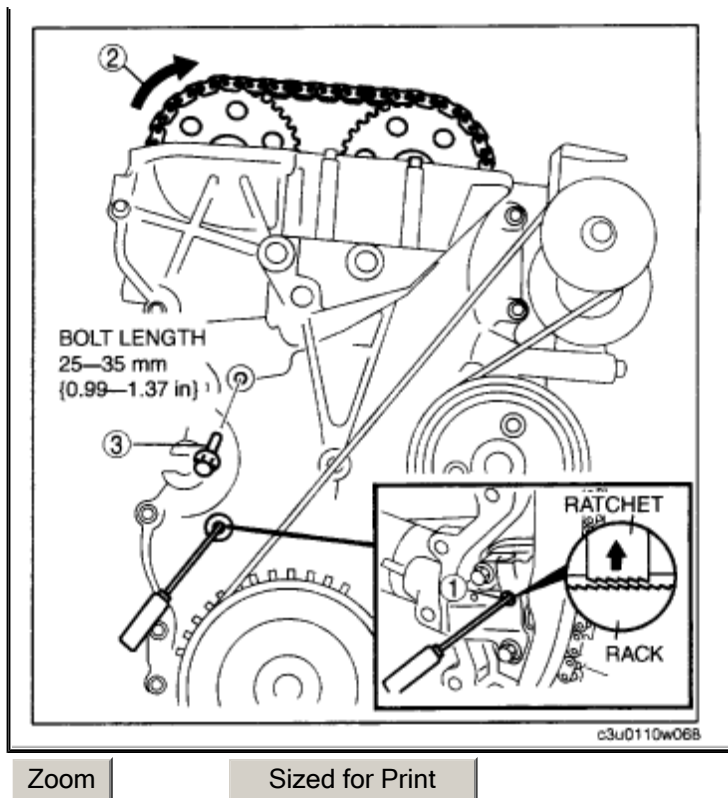


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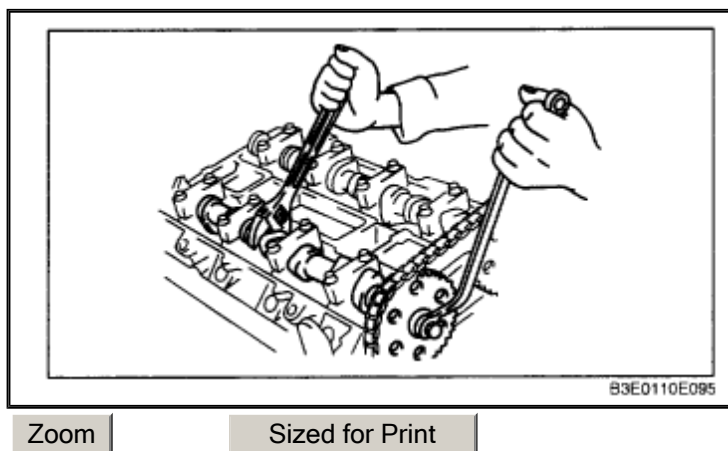
7. Install the SST as shown in the figure.
8. Turn the crankshaft clockwise the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the SST).



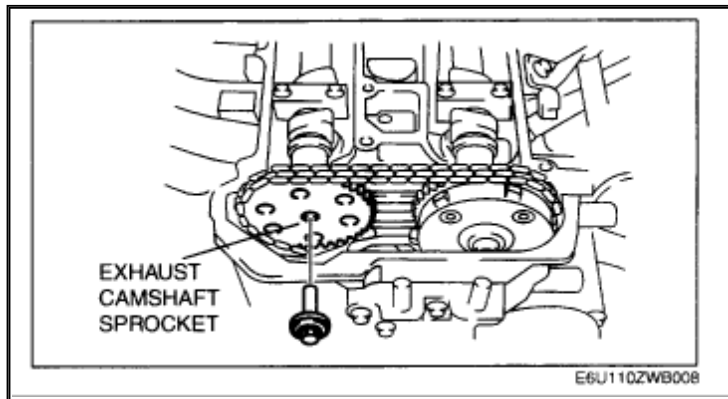


9. Loosen the timing chain.

- (1) Unlock the chain tensioner ratchet using a suitable screwdriver or equivalent tool.
- (2) Turn the exhaust camshaft clockwise using a suitable wrench on the cast hexagon and loosen the timing chain.
- (3) Placing the suitable bolt (M6 X 1.0 length **25 mm - 35 mm (0.99 - 1.37 in)**) at the engine front cover upper blind plug, secure the chain guide at the position where the tension is released.



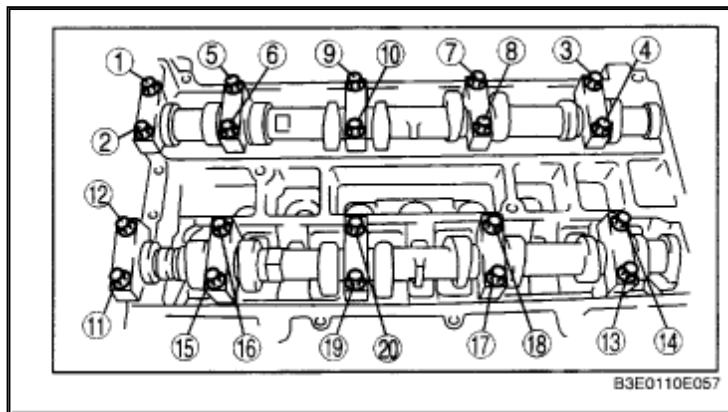
10. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.



Zoom

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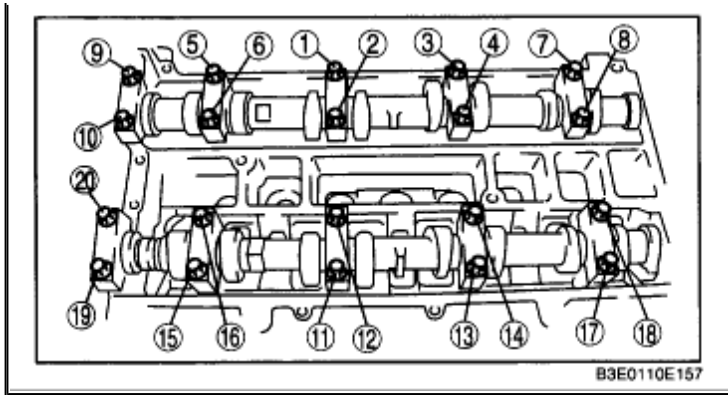
11. Remove the exhaust camshaft sprocket.



Zoom

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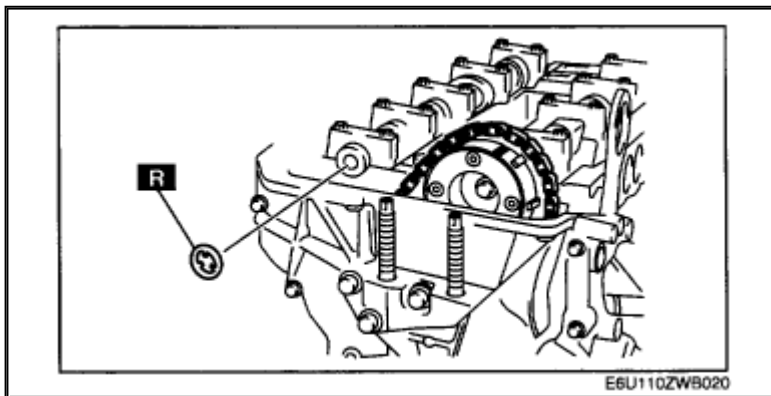
12. Loosen the camshaft cap bolts in 2-3 passes in the order shown in the figure. **Note:** The cylinder head and the camshaft caps are numbered to be reassembled in their original position correctly. When removed, keep the caps with the cylinder head they were removed from. Do not mix the caps.
13. Remove the camshaft.
14. Remove the tappet.
15. Select proper adjustment shim. New adjustment shim = Removed shim thickness + Measured valve clearance - Standard valve clearance (IN: **0.25 mm (0.0098 in)**, EX: **0.30 mm (0.0118 in)**) Standard [Engine cold] IN: **0.22 - 0.28 mm (0.0087 - 0.0110 in)** EX: **0.27 - 0.33 mm (0.0107 - 0.0129 in)**
16. Install the camshaft with No.1 cylinder aligned with the TDC position.

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17. Tighten the camshaft cap bolts in the order shown with the following two steps. Tightening torque

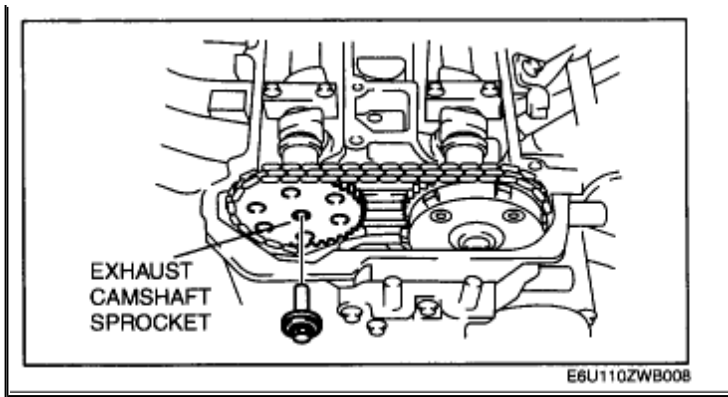
(1) **5.0 - 8.0 Nm (51.0 - 81.5 kgf-cm, 44.3 - 70.8 in-lbf)**

(2) **14 - 17 Nm (1.43 - 1.73 kgf-m, 10.4 - 12.5 ft-lbf)**

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18. Install a new washer.

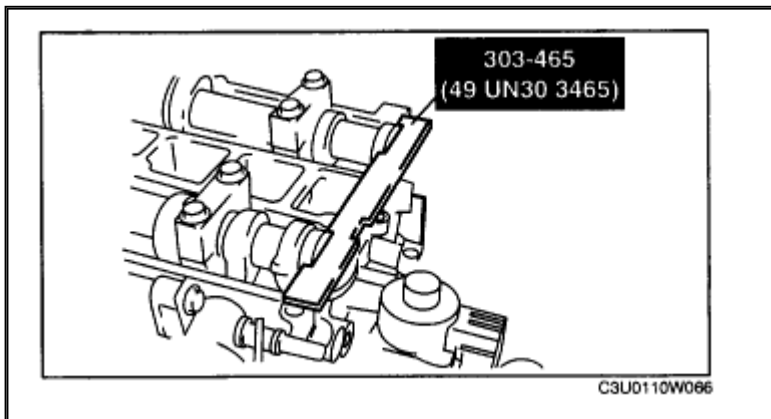




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19. Install the exhaust camshaft sprocket. **Note:** Do not tighten the bolt for the camshaft sprocket during this step. First confirm the valve timing, then tighten the bolt.

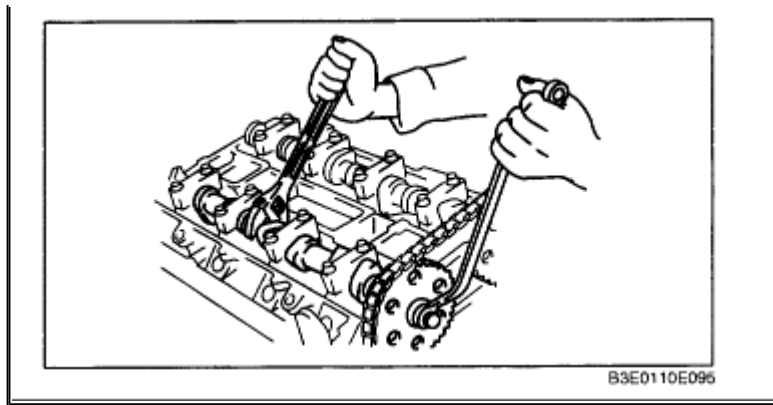


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20. Install the SST to the camshaft as shown in the figure.
 21. Remove the (M6 X 1.0 length **25 mm - 35 mm (0.99 - 1.37 in)**) bolt from the engine front cover to apply tension to the timing chain.
 22. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight is attached to the SST).





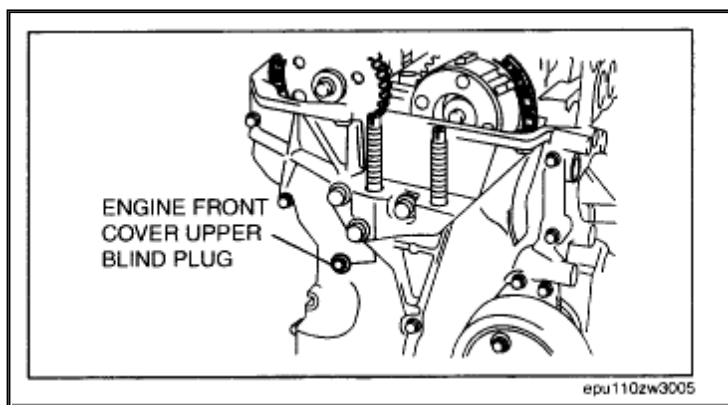
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23. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.
24. Tighten the exhaust camshaft sprocket lock bolt. Tightening torque **69 - 75 Nm (7.1 - 7.6 kgf-m, 50.9 - 55.3 ft-lbf)**
25. Remove the SST from the camshaft.
26. Remove the SST from the block lower blind plug.
27. Rotate the crankshaft clockwise two turns until the TDC position.

- If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 14.

28. Apply silicone sealant to the engine front cover upper blind plug.
29. Install the following parts.

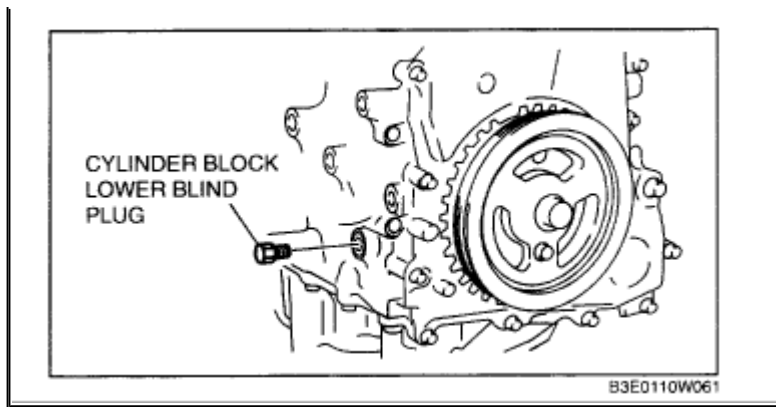


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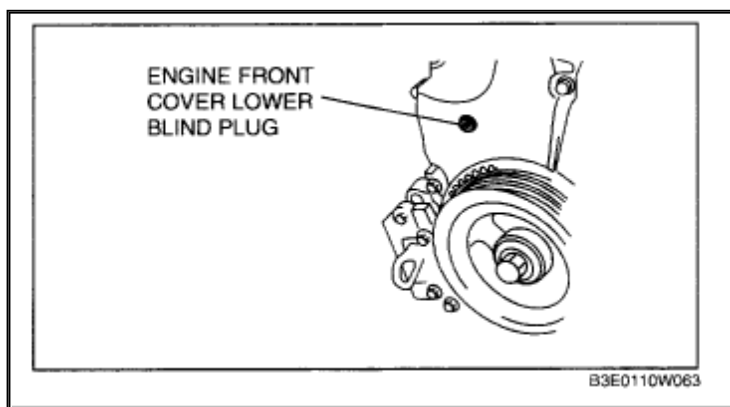
- (1) Engine front cover upper blind plug.

Tightening torque **8.0 - 11.5 Nm (82 - 117 kgf-cm, 71 - 101 in-lbf)**

[Zoom](#)[Sized for Print](#)

(2) Cylinder block lower blind plug.

Tightening torque **18 - 22 Nm (1.9 - 2.2 kgf-m, 13.3 - 16.2 ft-lbf)**

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(3) New engine front cover lower blind plug.

Tightening torque **10 - 14 N-m (102 - 142 kgf-m, 89 - 123 in-lbf)**

- (4) Cylinder head cover.
- (5) Ventilation hose.
- (6) Ignition coils.
- (7) Engine under cover and splash shield (RH).

(8) Front wheel and tire (RH).

30. Connect the OCV connector.
31. Connect the wiring harness.
32. Connect the negative battery cable.
33. Install the battery cover.
34. Install the plug hole plate.

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