
SECTION 1B2

M161 ENGINE MECHANICAL

CAUTION: Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in LOCK unless other-wise noted.

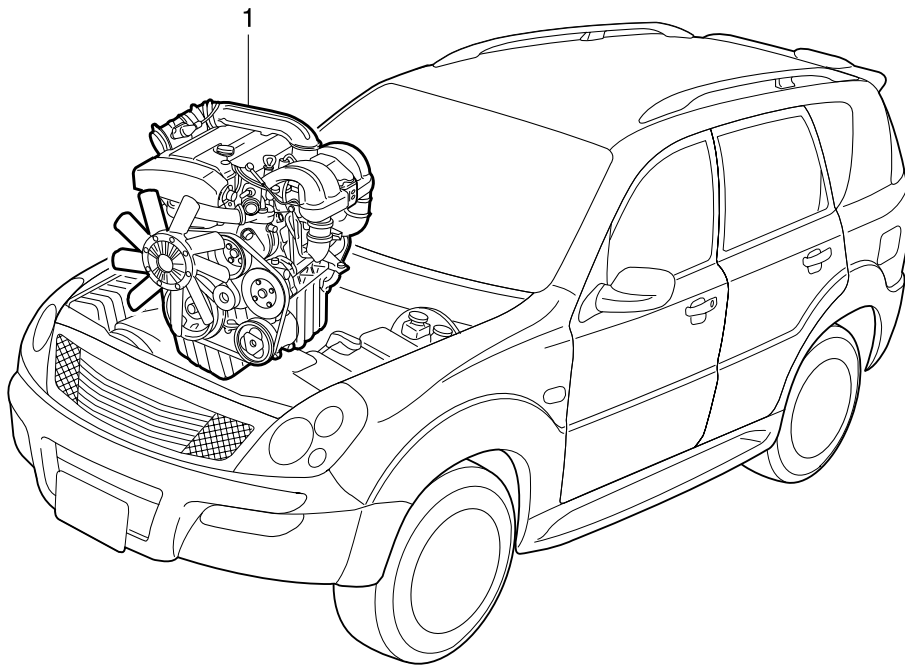
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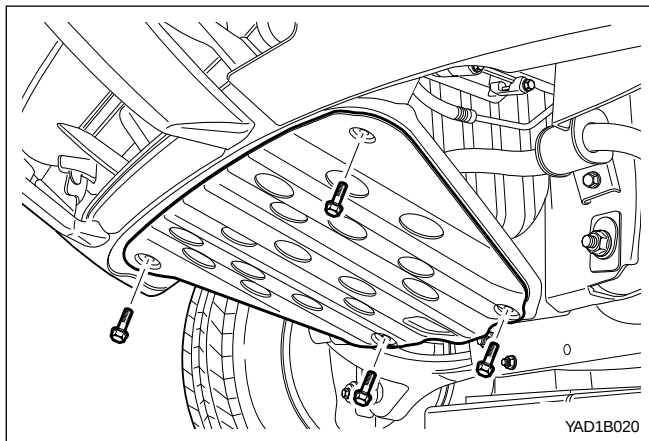
MAINTENANCE AND REPAIR

ON-VEHICLE SERVICE

ENGINE ASSEMBLY



YAD1B4S0

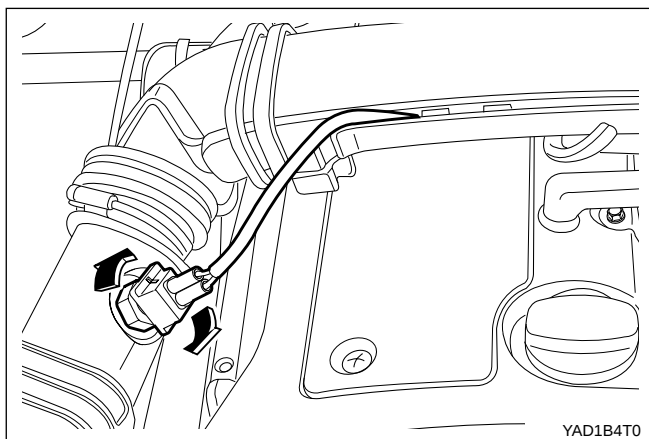


Removal & Installation Procedure

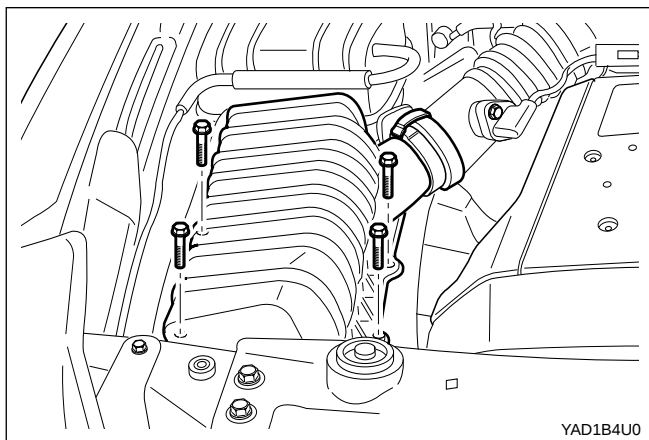
1. Disconnect the negative terminal of battery.
2. Remove the hood.
3. Remove the under cover.

Installation Notice

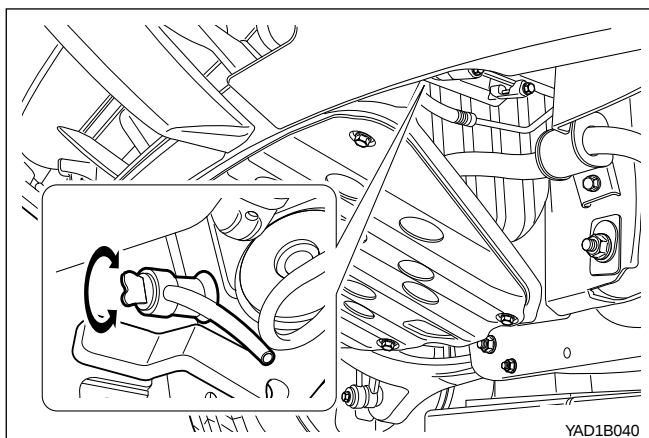
Tightening Torque	28 - 47 N•m (21 - 35 lb-ft)
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4. Disconnect the coupling of HFM sensor and remove the air cleaner cross pipe.

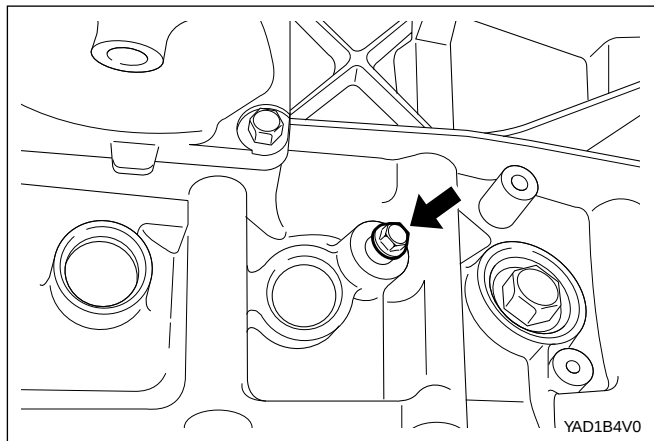


5. Remove the air cleaner cover. Remove the mounting bolts and air cleaner housing and element assembly.



6. Loosen the radiator drain cock and drain the coolant.

Notice: Open the coolant reservoir cap.

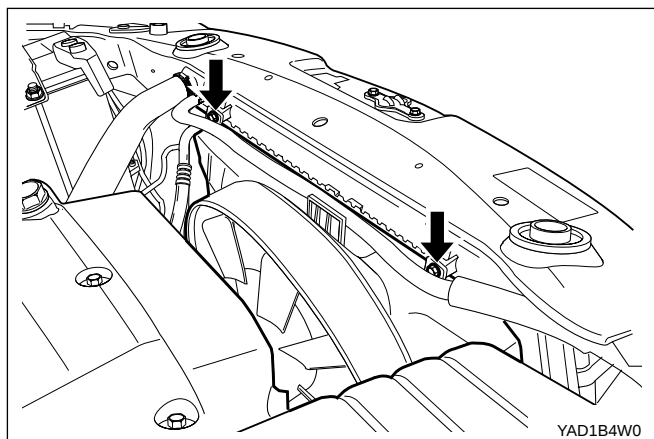


7. Loosen the cylinder block drain plug and then drain the coolant completely.

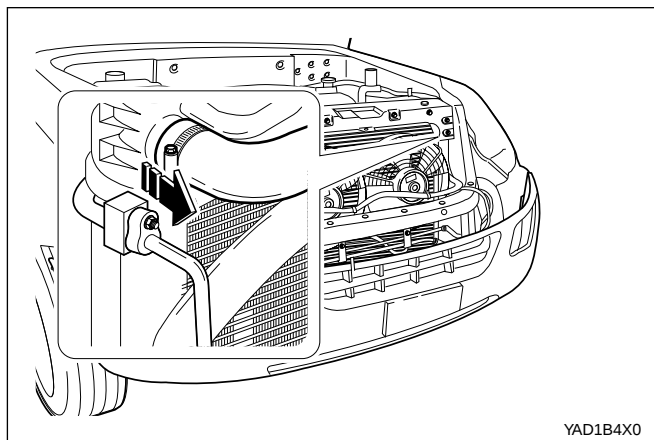
Installation Notice

Tightening Torque	5 N•m (26 lb-ft)
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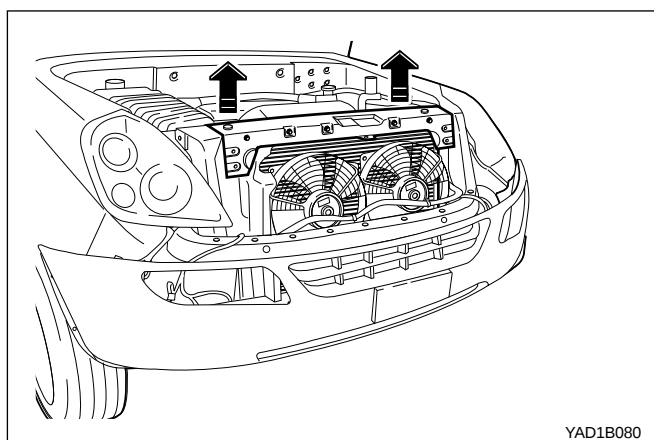
Notice: Replace the seal before installation of the drain plug.



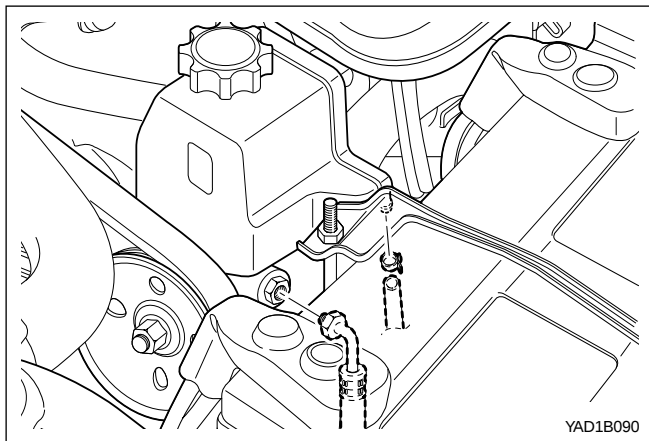
8. Remove the cooling fan shroud. Refer to *Section 1D2, Engine Cooling*.



9. Disconnect the each hose from radiator.

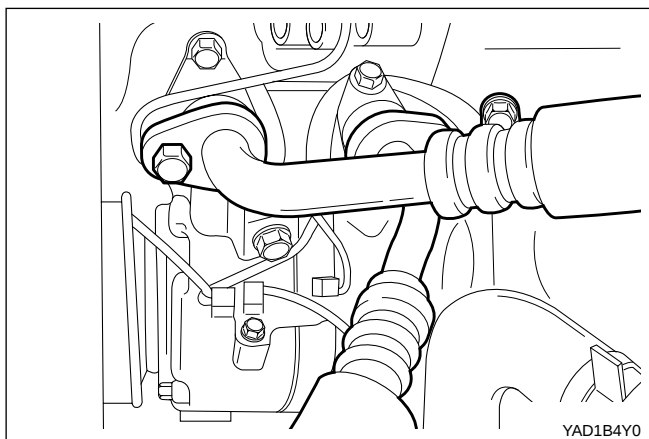


10. Remove the upper mounting bolts of radiator and then remove the radiator.

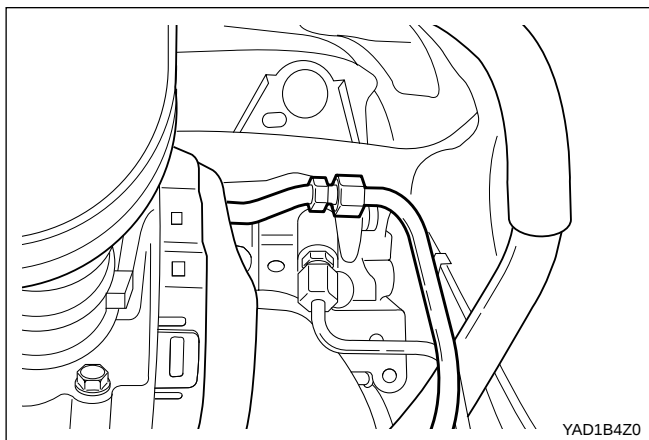


11. Remove the hydraulic pipe of power steering.

Notice: Completely drain the oil.



12. Discharge the refrigerant from A/C system, and disconnect the discharge pipe and suction pipe from the compressor.

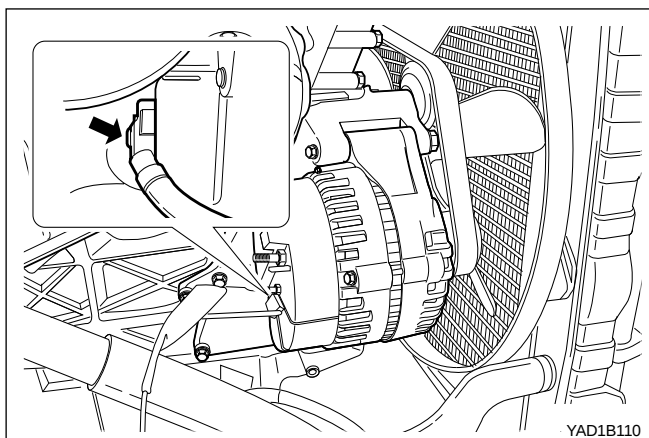


13. Remove the fuel feed and return line.

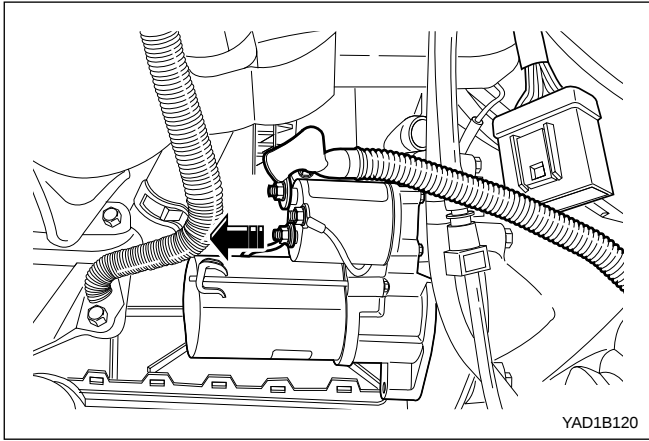
Notice: Before removing the fuel lines, release the pressure in the fuel system.

Installation Notice

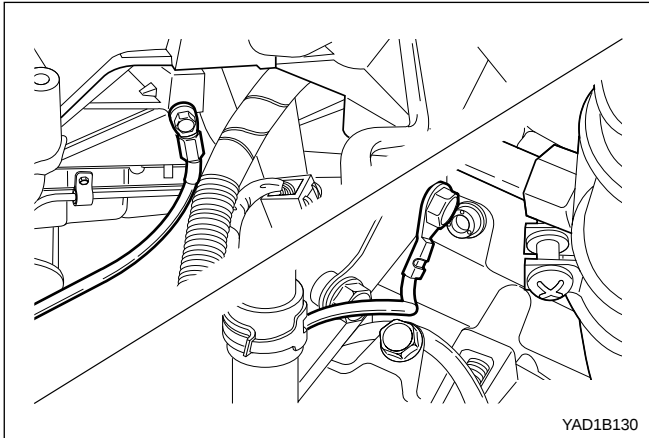
Tightening Torque	21 - 25 N•m (15 - 18 lb-ft)
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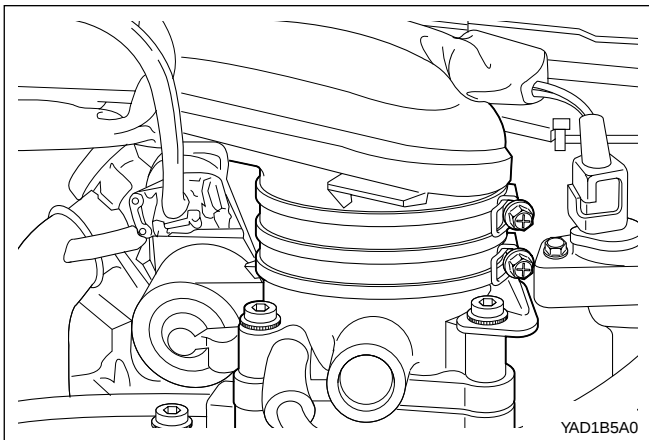
14. Disconnect the terminals from the generator.



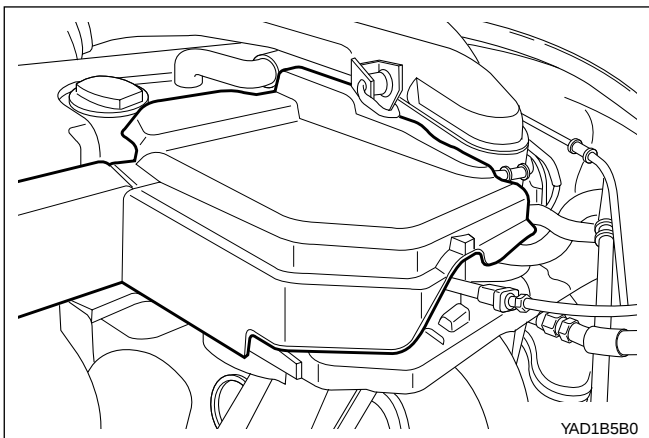
15. Disconnect the terminals from starter motor and remove the starter motor.
16. Disconnect the engine main harness ground.



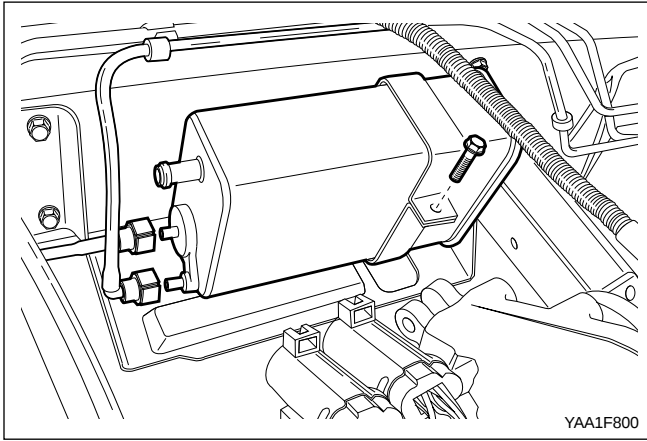
17. Disconnect the engine ground wire.



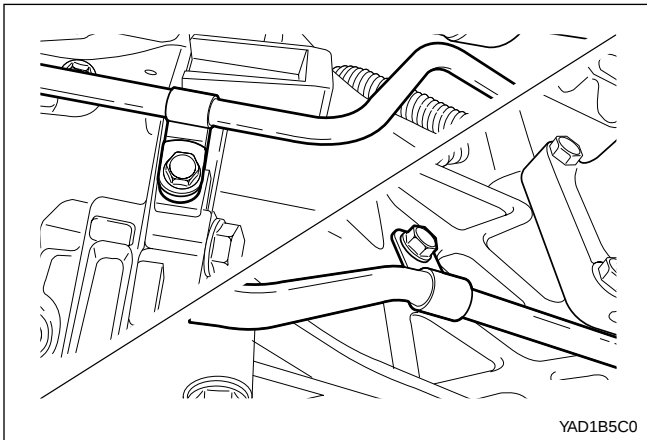
18. Disconnect following sensors connector.
 - HFM sensor.
 - Coolant temperature sensor.
 - Knock sensor.
 - Camshaft and crankshaft sensors.



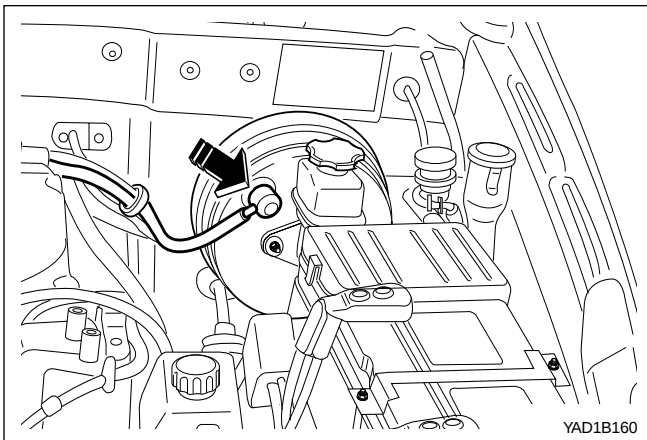
19. After removing the ignition coil cover, disconnect the ignition coil connector.
20. Remove the harness cover and disconnect the 4 injection valve connectors. Disconnect the main harness.



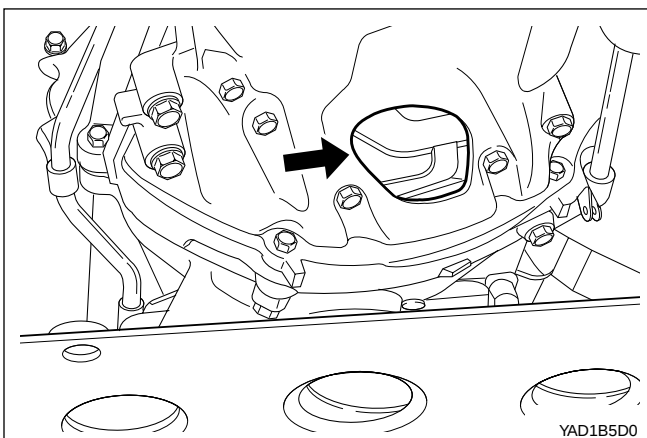
21. Separate the hose toward engine from canister purge solenoid valve and canister. Refer to *Section 1F2, Engine Control*.



22. Remove the automatic transmission oil cooler line retaining bolts from the automatic transmission side and oil pan side.
23. Remove the automatic transmission oil cooler line retaining bolts from engine side and oil pan side.



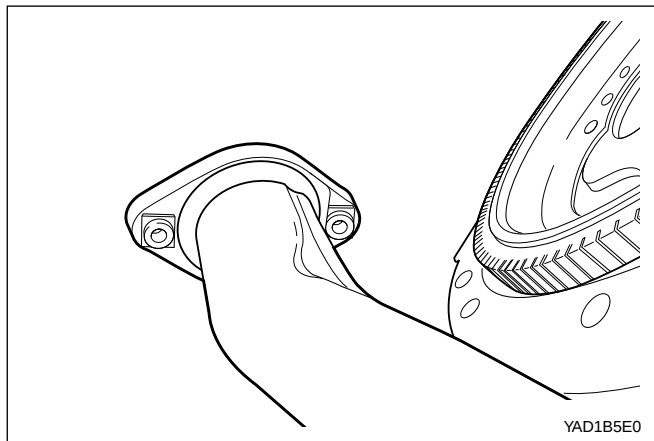
24. Separate the vacuum hose for brake booster.
25. Separate the other vacuum hoses.



26. By rotating the crankshaft from the front of engine, remove the 6 torque converter mounting bolts from the engine ring gear plate.

Installation Notice

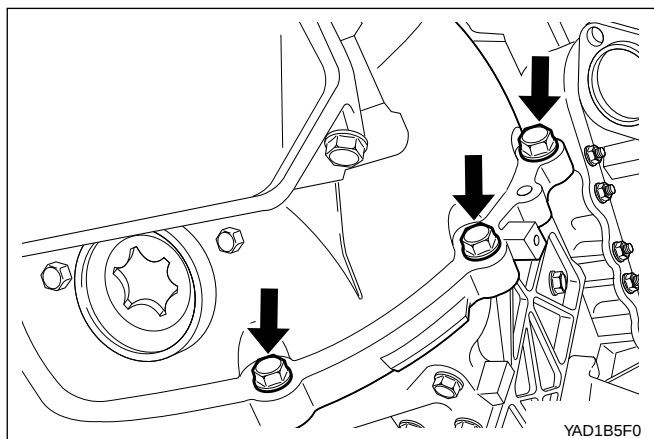
Tightening Torque	42 N•m (31 lb-ft)
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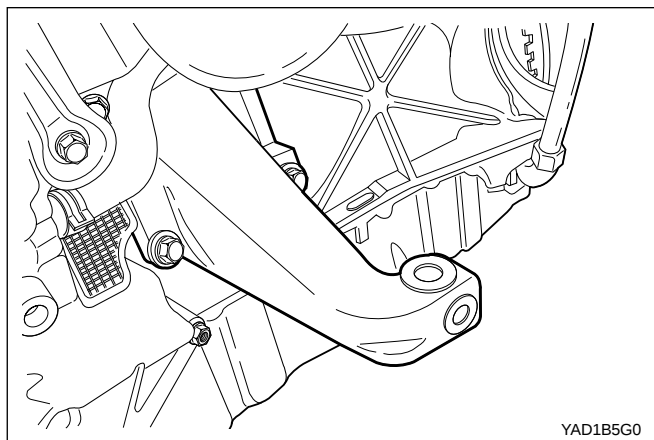
27. Remove the exhaust manifold and exhaust pipe.

Installation Notice

Tightening Torque	30 N•m (22 lb-ft)
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28. Remove the transmission. Refer to Section 5A, Automatic Transmission.

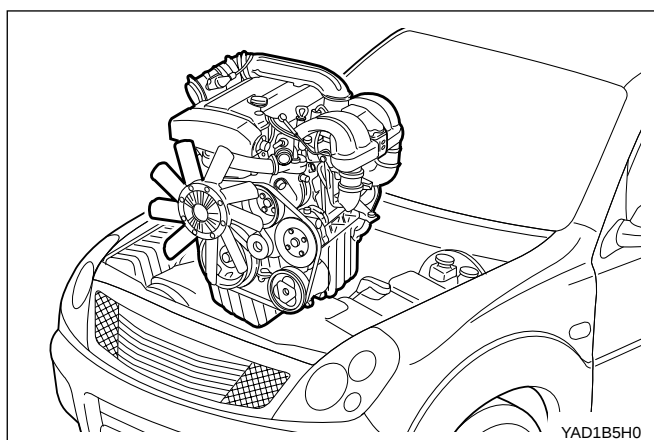


29. Install a chain to the bracket of engine, by using a hoist or crane.

30. Remove the engine mount nuts.

Installation Notice

Tightening Torque	70 N•m (52 lb-ft)
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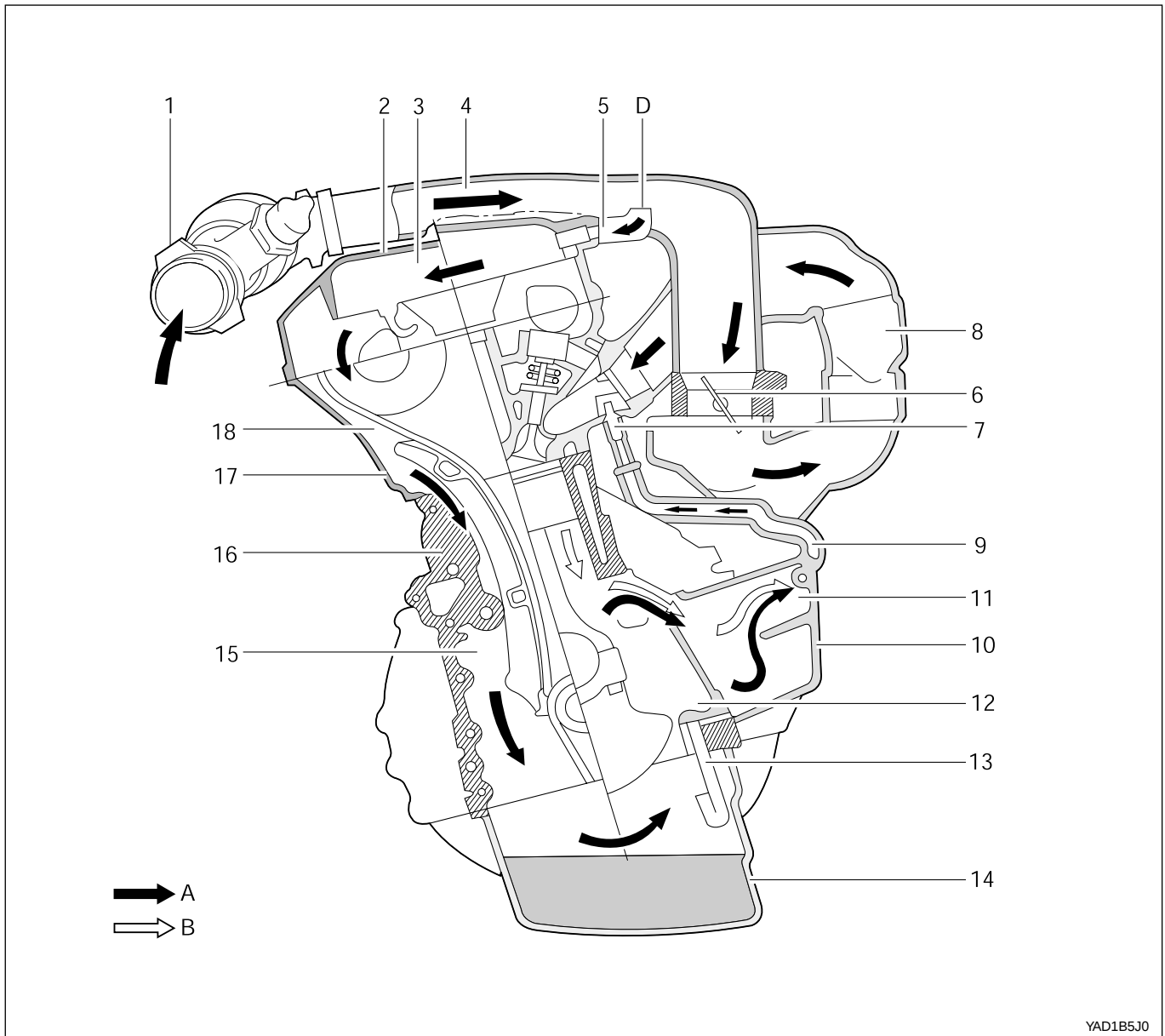


31. Carefully separate the engine assembly from the vehicle.

32. Installation should follow the removal procedure in the reverse order.

CRANKCASE VENTILATION SYSTEM

Operation at Idling and Mid- Load



YAD1B5J0

- | | |
|---|--|
| 1 HFM Sensor | 11 Oil Separation Chamber (Mid-Load at Idling) |
| 2 Cylinder Head Cover | 12 Crank Chamber |
| 3 Oil Separation Chamber (Full-Load or Over Mid-Load) | 13 Oil Return Pipe |
| 4 Intake Air Duct (Cross Pipe) | 14 Oil Pan |
| 5 Vent Line (Full-Load or Over Mid-Load) | 15 Timing Gear Case Cover |
| 6 Throttle Valve | 16 Crankcase |
| 7 Restrictor, Diameter 1.1mm (Mid-Load at Idling) | 17 Chain Housing |
| 8 Intake Manifold | A Fresh Air |
| 9 Vent Line (Mid-Load at Idling) | B Blow-By Gas |
| 10 Air Conditioner Bracket | D Vent Connection |

Operation at Idling and Mid- Load

- The throttle valve (6) is closed or very partially opened, and the vacuum pressure in intake manifold is high.

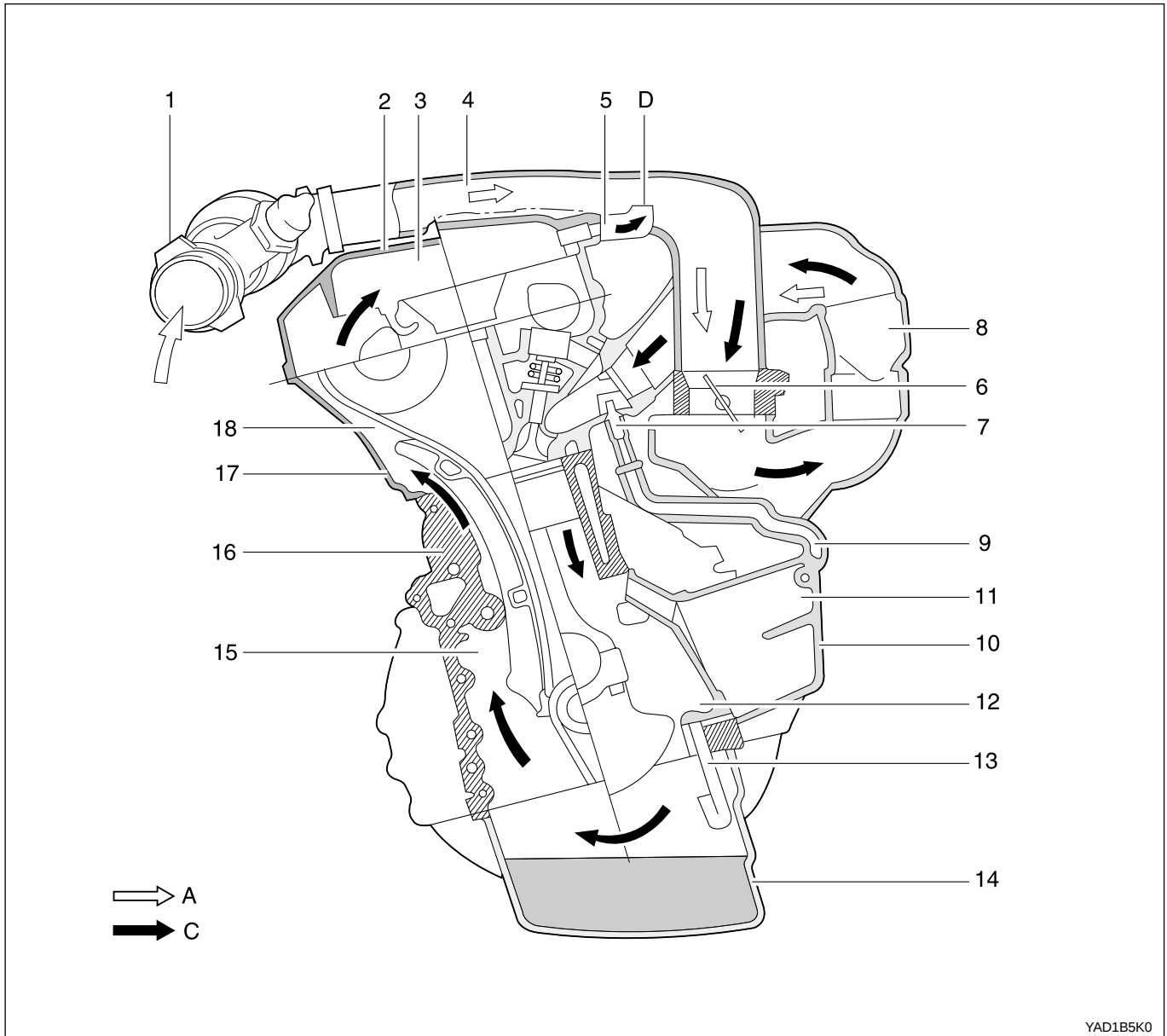
The blow-by gas and the fresh air that is additionally supplied through the vent connection (D) in the crank-case in partial load gets supplied to the combustion chamber from the crank chamber (12) through the oil separation chamber (11), air-conditioner bracket (10), vent line (9), and restrictor (7) mounted to the cylinder head.

The circulated engine oil returns to the oil pan through the oil return pipe (13) at the bottom of oil separation chamber (11).

The fresh air gets supplied to the crank chamber (12) through the HFM sensor (1), intake air duct (4), vent line (5), oil separation chamber (3), chain housing (17), and the timing gear case cover (15).

The additional supply of the fresh air is needed to prevent from forming the residues of the engine oil.

Operation When Full- Load at Partial Load



- 1 HFM Sensor
- 2 Cylinder Head Cover
- 3 Oil Separation Chamber (Full-Load or Over Mid-Load)
- 4 Intake Air Duct (Cross Pipe)
- 5 Vent Line (Full-Load or Over Mid-Load)
- 6 Throttle Valve
- 7 Restrictor, Diameter 1.1mm (Mid-Load at Idling)
- 8 Intake Manifold
- 9 Vent Line (Mid-Load at Idling)
- 10 Air Conditioner Bracket

- 11 Oil Separation Chamber (Mid-Load at Idling)
- 12 Crank Chamber
- 13 Oil Return Pipe
- 14 Oil Pan
- 15 Timing Gear Case Cover
- 16 Crankcase
- 17 Chain Housing
- A Fresh Air
- C Blow-By Gas
- D Vent Connection

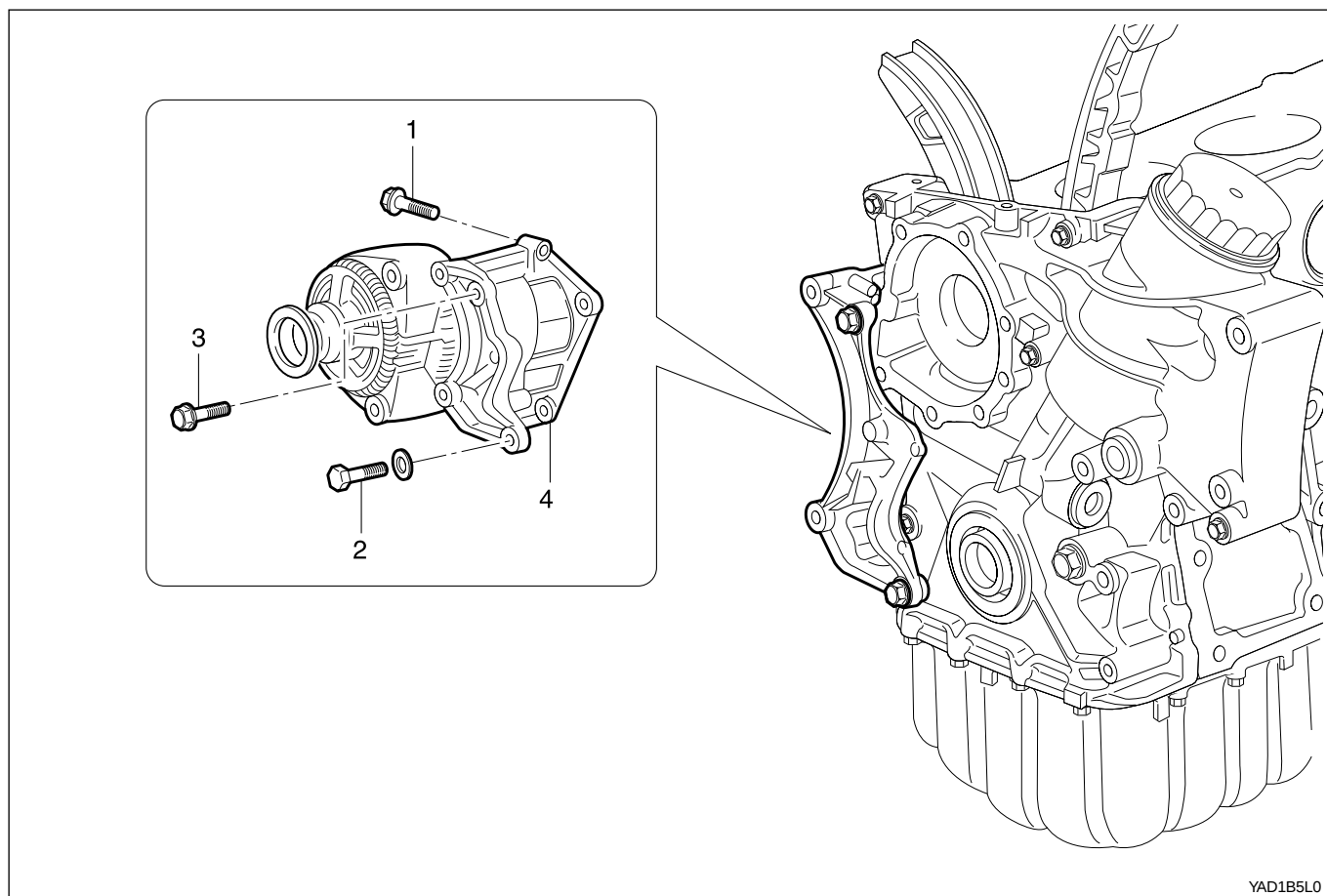
Operation When Full- Load at Partial Load

- The throttle valve (6) is partially opened or fully opened.

The air flows very rapidly through the vent line (5) s connection (D) and the intake air duct when full load at partial load.

Consequently, most of the low-by gases are supplied to the combustion chamber through the timing gear case cover (15), chain housing (17), oil separation chamber (3), vent line (5), throttle valve (6), and intake manifold (8).

GENERATOR



YAD1B5L0

- | | |
|---|---|
| 1 Bolt (M8 X 40, 3 pieces) | 3 Bolt (M8 X 85, 1 piece) |
| 22.5 - 27.5 N•m (16.6 - 20.3 lb-ft) | 22.5 - 27.5 N•m (16.6 - 20.3 lb-ft) |
| 2 Bolt (M8 X 70, 2 pieces) | 4 Generator Bracket |
| 22.5 - 27.5 N•m (16.6 - 20.3 lb-ft) | |

Removal & Installation Procedure

1. Disconnect the negative battery cable.
2. Remove the drive belt.
3. Remove the generator.
4. Unscrew the generator carrier bolts and remove the carrier.

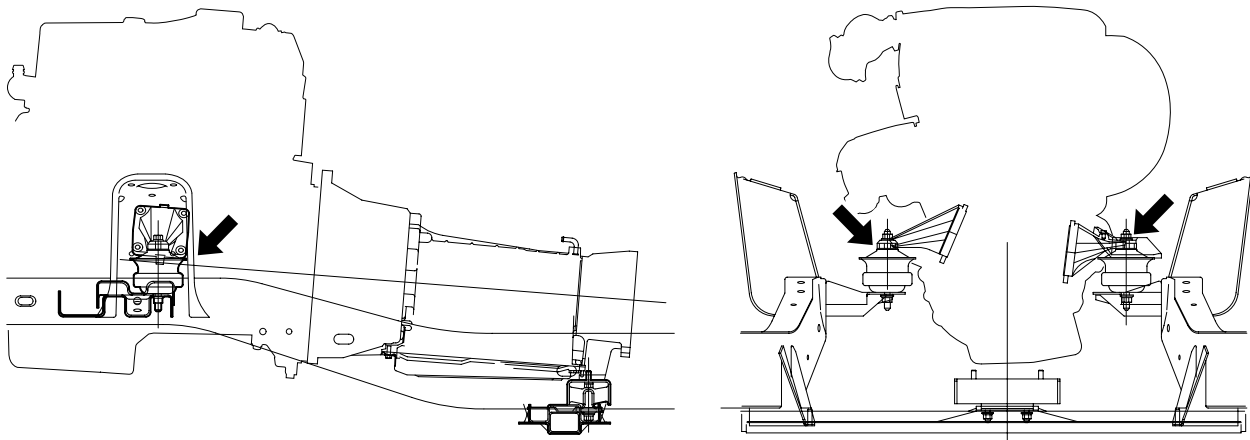
Installation Notice

Tightening Torque	70 N•m (52 lb-ft)
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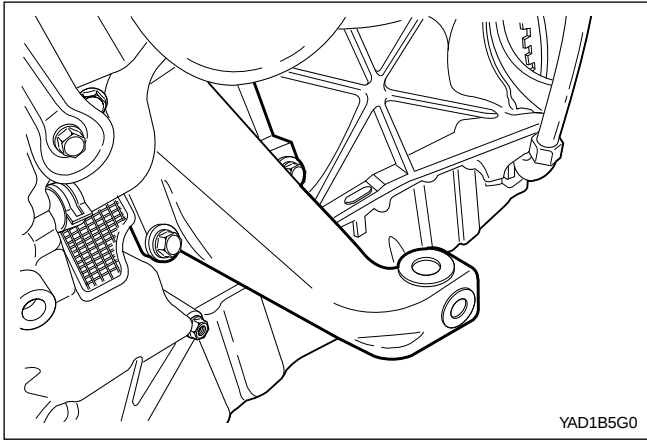
Notice: Apply 3 Nm of torque when mounting the bolt (1) ; apply 25 Nm of torque when mounting the bolts (2), and (3) ; and then tighten the bolt (1) with 25 Nm of torque.

5. Installation should follow the removal procedure in the reverse order.

ENGINE MOUNT



YAD1B5M0

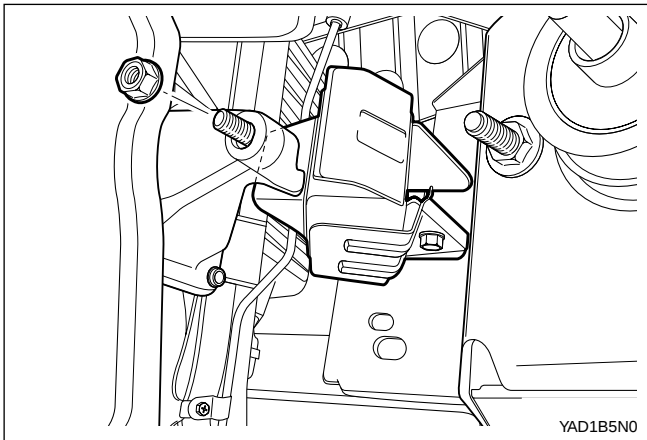


Removal & Installation Procedure

1. Unscrew the upper engine mount nuts and remove the engine.

Installation Notice

Tightening Torque	70 N•m (52 lb-ft)
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2. Unscrew the lower nuts.

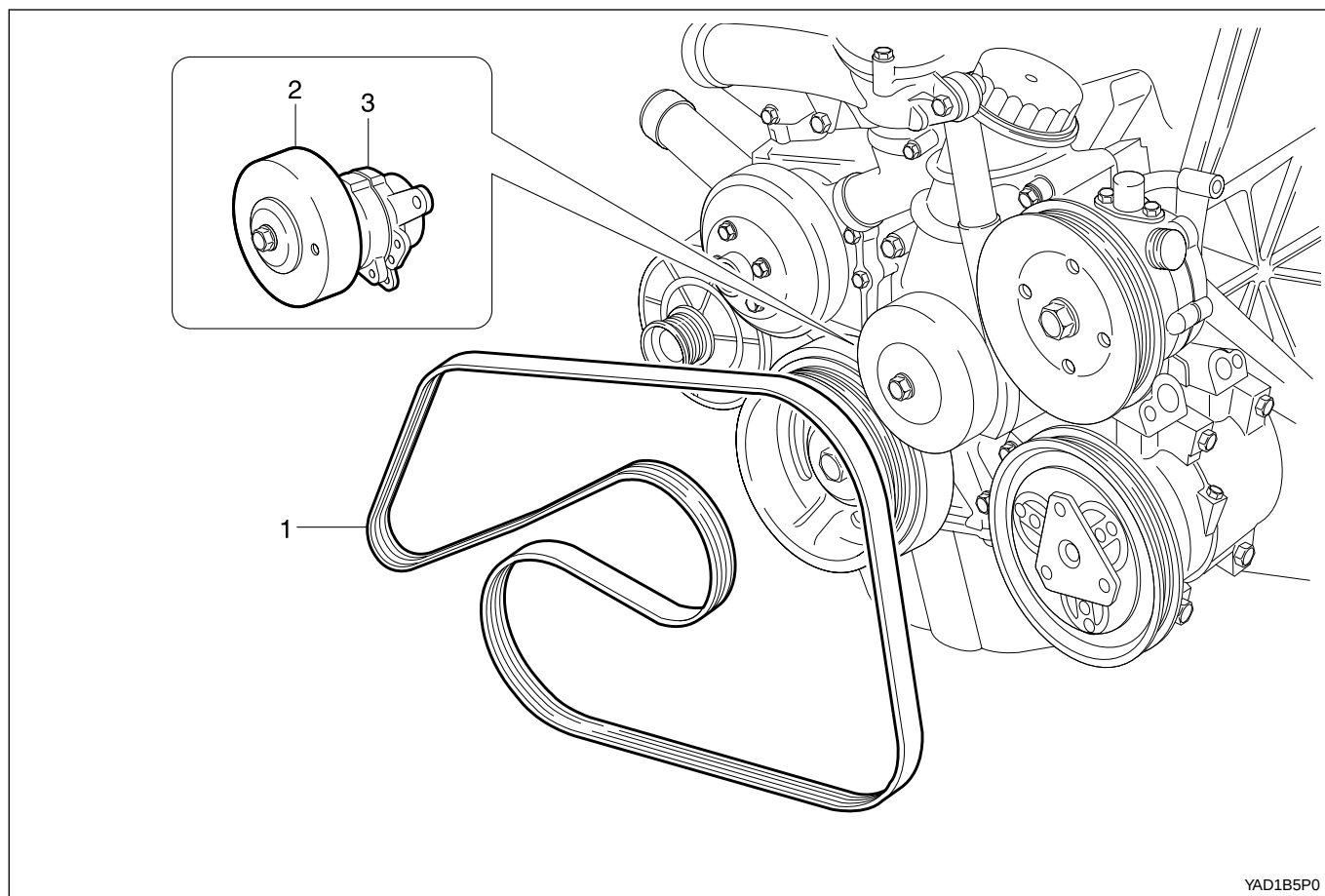
Installation Notice

Tightening Torque	38 N•m (28 lb-ft)
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3. Remove the hydraulic engine mounting insulator.
4. Installation should follow the removal procedure in the reverse order.

POLY V - BELT

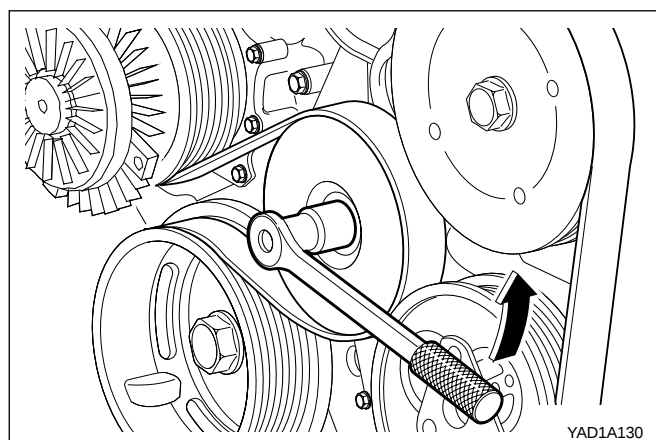
Preceding Work: Removal of cooling fan



YAD1B5P0

- 1 Poly V-Belt (2,155 mm)
- 2 Belt Tensioning Pulley

- 3 Belt Tensioner



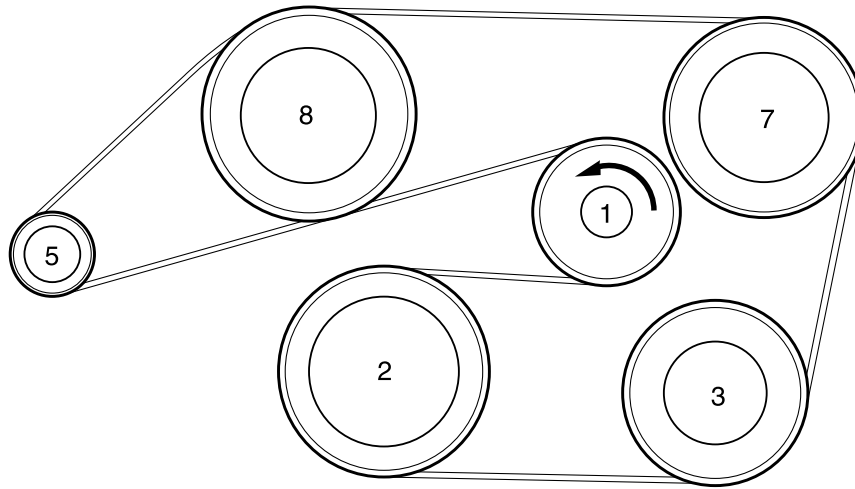
YAD1A130

Removal & Installation Procedure

1. Release the belt tension by turning the stud on the cap with 12 sided wrench or spanner counterclock-wise.
2. Remove the poly v-belt.

Notice: Check the belt for damage and tensioning pulley bearing point for wear and replace them if necessary.

3. Install the belt after prying the tensioning pulley.

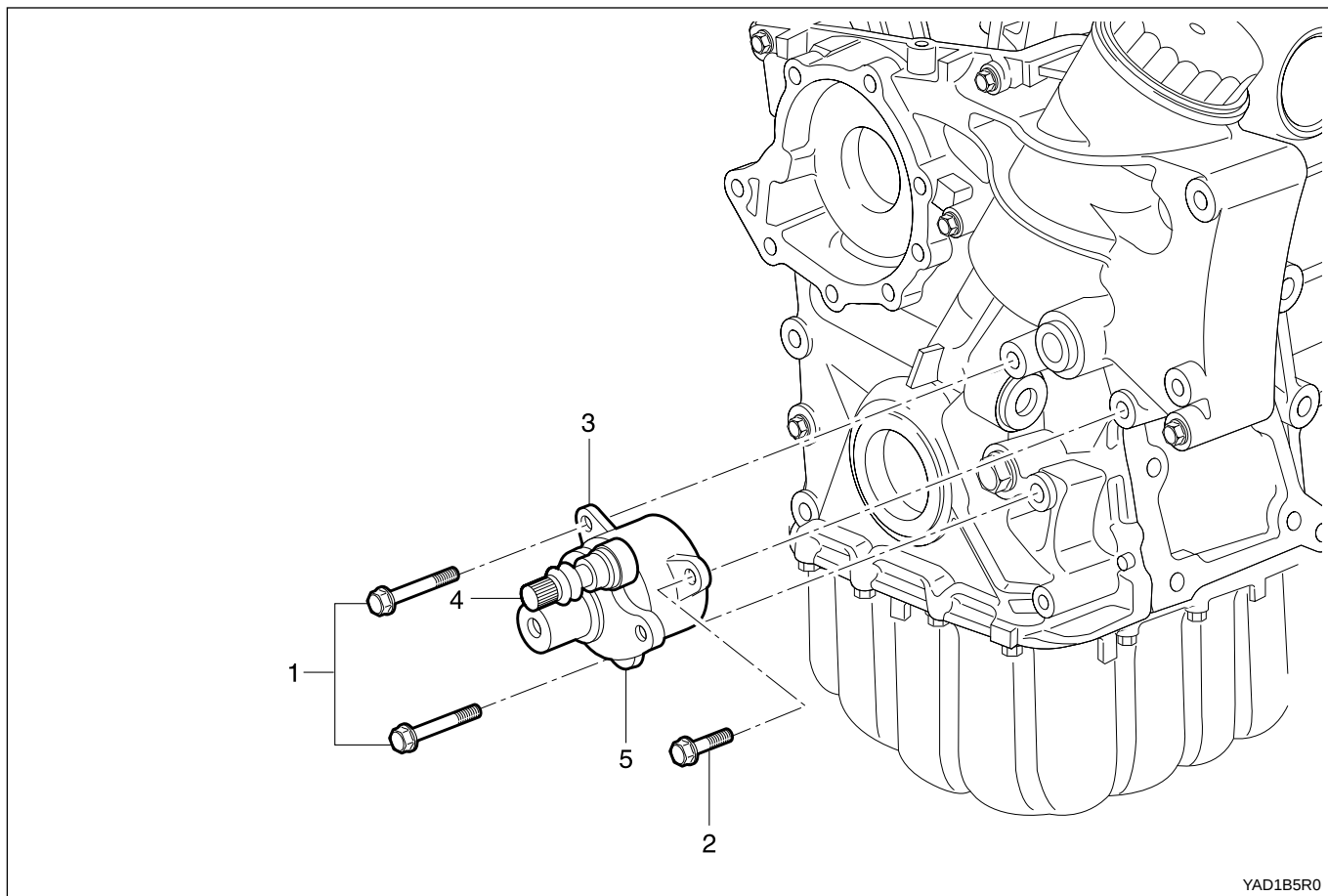
Poly V - Belt Arrangement

YAD1B5Q0

- | | |
|--------------------------|------------------------------|
| 1 Belt Tensioning Pulley | 5 Generator Pulley |
| 2 Crankshaft Belt Pulley | 7 Power Steering Pump Pulley |
| 3 A/C Compressor Pulley | 8 Water Pump Pulley |

TENSIONING DEVICE

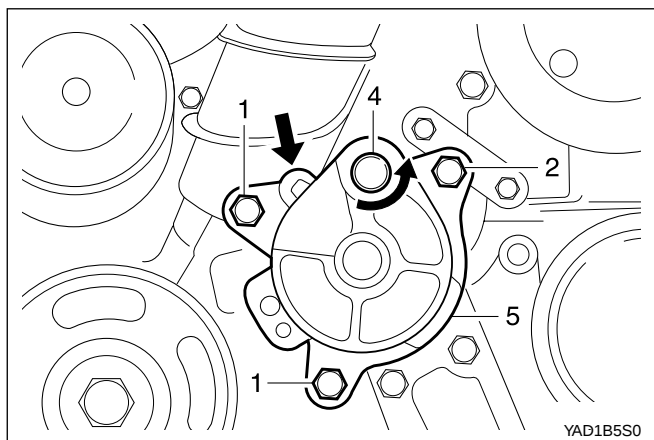
Preceding Work: Removal of tensioning device shock absorber



YAD1B5R0

- 1 Bolt (M8 x 75, 2 pieces) +
Washer 22.5 - 27.5 N•m (16.6 - 0.3 lb-ft)
- 2 Bolt (M8 x 25, 1 pieces) +
Washer 22.5 - 27.5 N•m (16.6 - 0.3 lb-ft)

- 3 Tensioning Device
- 4 Stud bolt
- 5 Tensioning Arm



YAD1B5S0

Removal & Installation Procedure

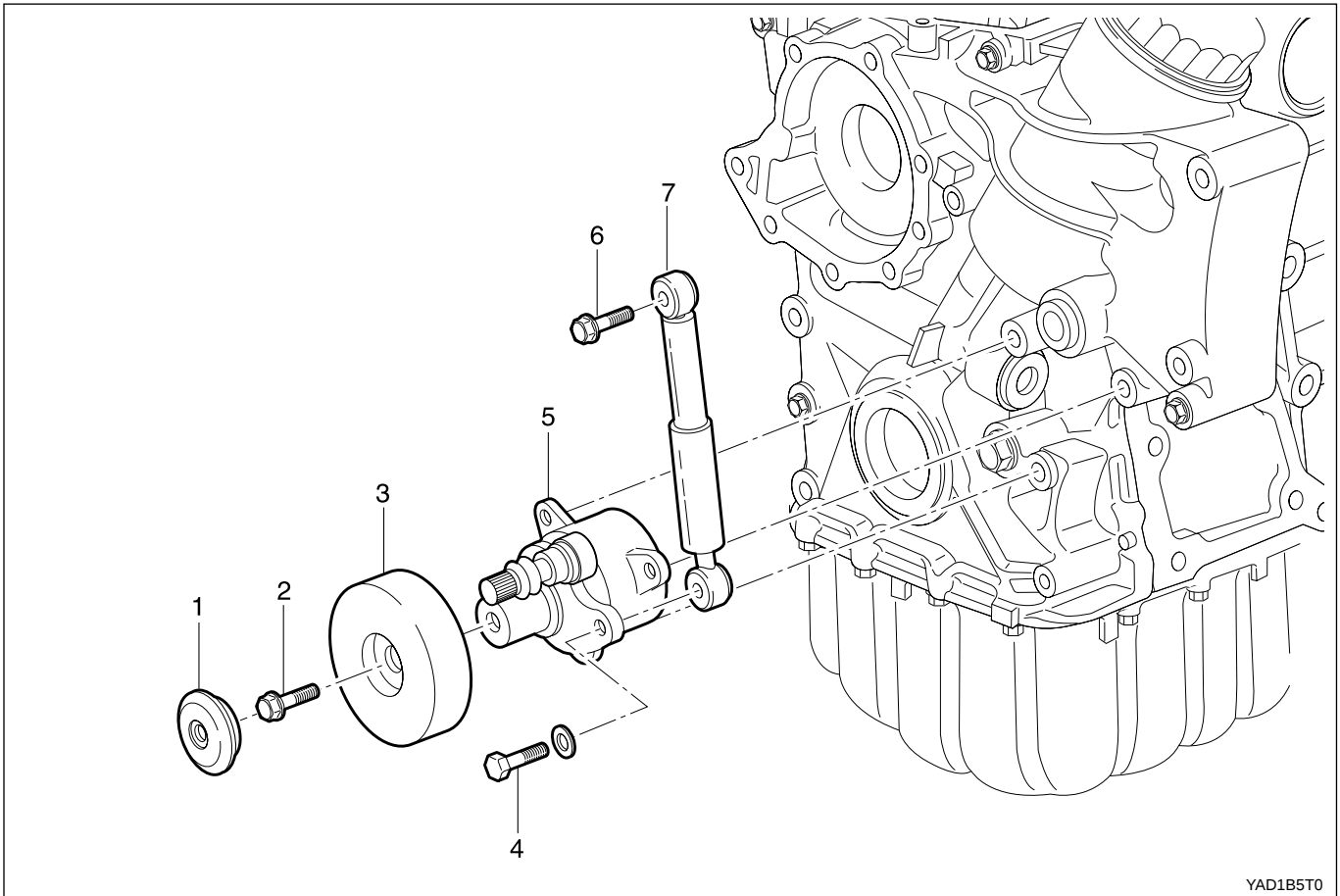
1. Turn the stud bolt to counterclockwise.
2. Insert the pin (111 589 01 15 00) into the hole in tensioning arm.
3. Unscrew the bolts (1, 2) and remove the tensioning device.

Installation Notice

Tightening Torque	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
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4. Installation should follow the removal procedure in the reverse order.

TENSIONING DEVICE SHOCK ABSORBER



YAD1B5T0

- | | |
|---|---|
| 1 End Cover | 5 Tensioning Device |
| 2 Bolt..... 40.5 - 9.5 N•m (29.9 - 6.5 lb-ft) | 6 Bolt (M8 X 35) + Washer |
| 3 Tensioning Pulley | 22.5 - 7.5 N•m (16.6 - 0.3 lb-ft) |
| 4 Bolt (M8 X 25) + Washer | 7 Shock Absorber |
| 22.5 - 7.5 N•m (16.6 - 0.3 lb-ft) | |

Removal & Installation Procedure

1. Remove the end cover (1).
2. Remove the bolt (2) and remove the tensioning pulley (3).

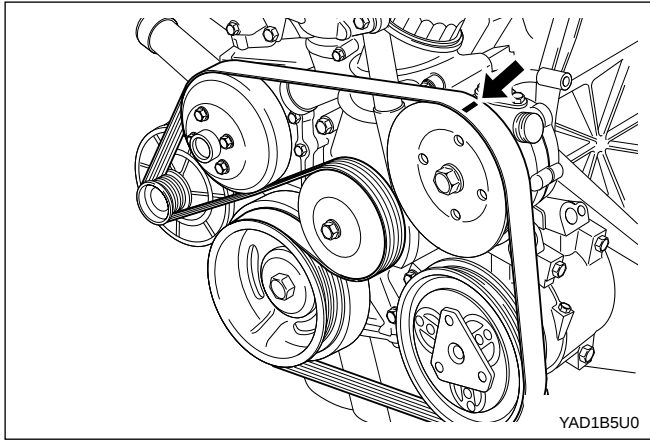
Installation Notice

Tightening Torque	40.5 - 49.5 N•m (29.9 - 36.5 lb-ft)
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3. Unscrew the bolts (4,6) and remove the shock absorber (7).

Installation Notice

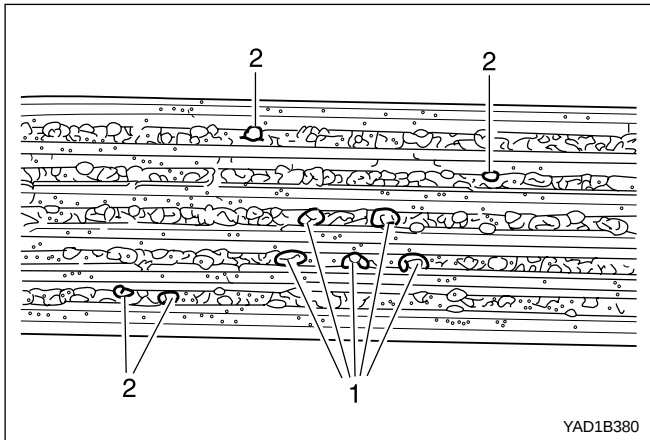
Tightening Torque	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
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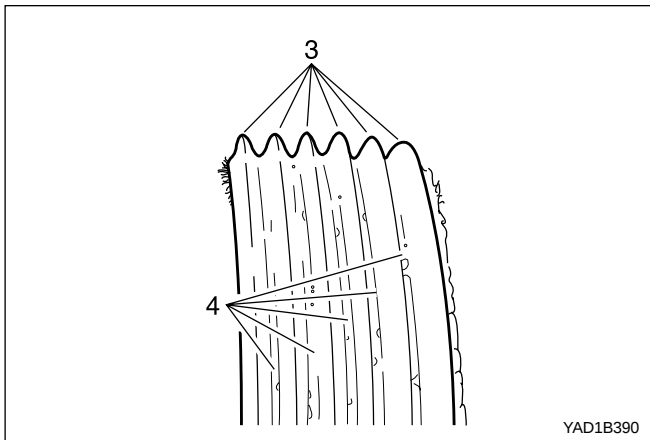
POLY V - BELT INSPECTION

- Make marks on the belt with chalk.
- Rotate the engine and check the belt for damage.

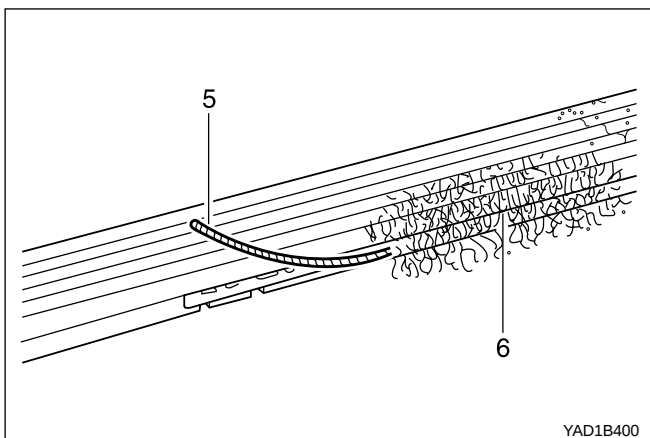
Notice: If one of the following types of damages is found, replace the belt.



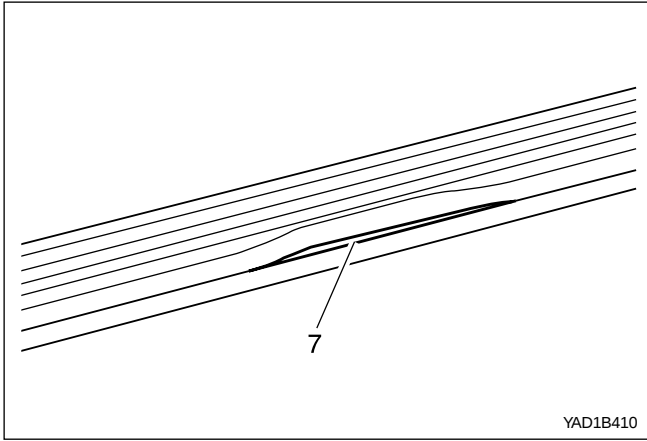
1. Rubber lumps in the base of rib.
2. Dirt or grit ingrained.



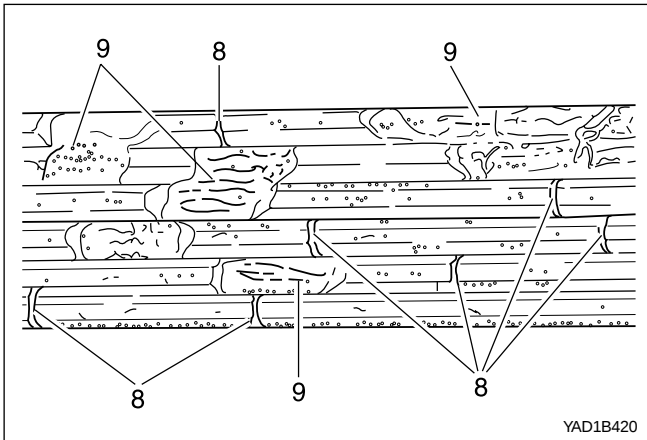
3. Pointed rib.
4. Belt cord visible in the base of rib.



5. Cord torn out at the side.
6. Outer cords frayed.

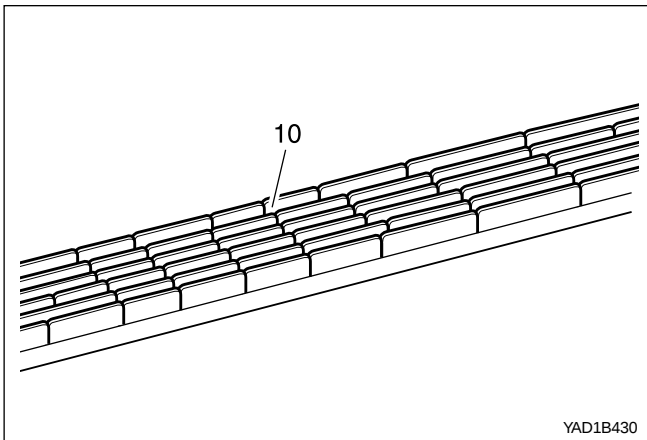


7. Rib detached from the base of belt.

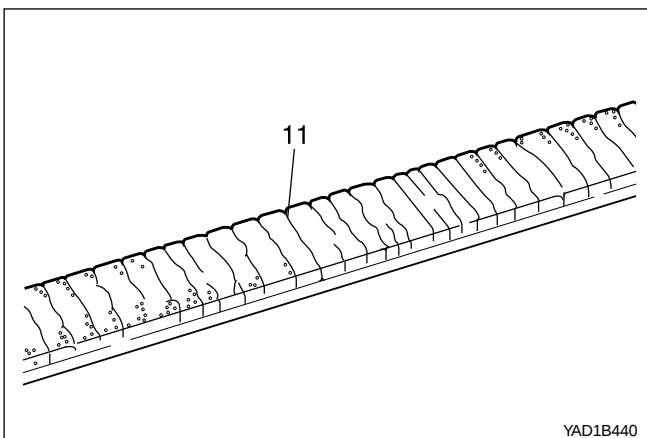


8. Splits across the rib.

9. Sections of rib torn out.



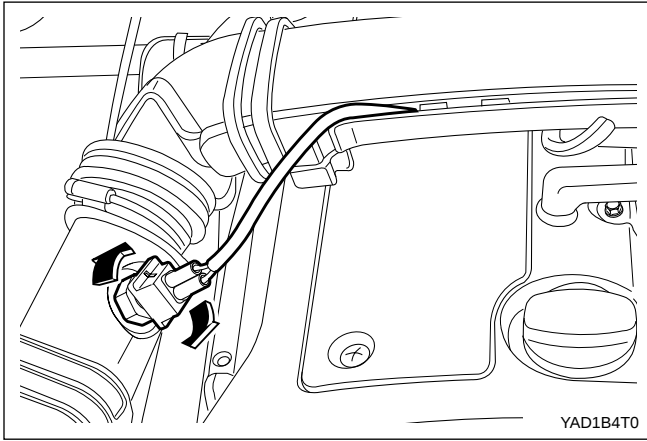
10. Splits across several ribs.



11. Splits across the back of the belt.



- | | |
|---|-----------------------|
| 1 Spark Plug Cover | 4 Cylinder Head Cover |
| 2 Spark Plug Connector | 5 Gasket..... Replace |
| 3 Bolt (M6 X 45 : 4 pieces, M6 X 60 : 6 pieces) | |
| 9 - 11 N•m (80 - 97 lb-in) | |

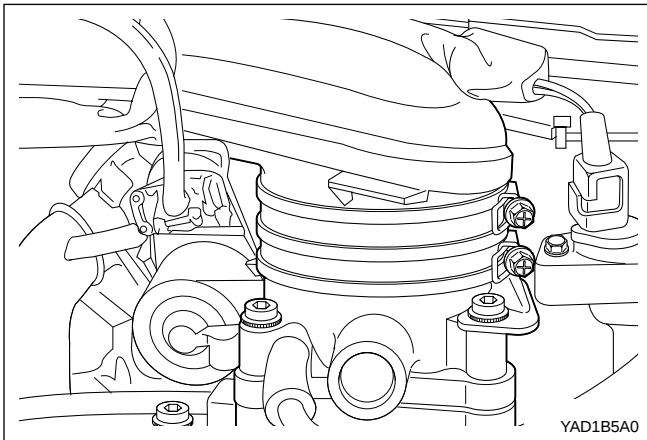


Removal & Installation Procedure

1. Remove the intake air duct.

Installation Notice

Tightening Torque	9 - 11 N•m (80 - 97 lb-ft)
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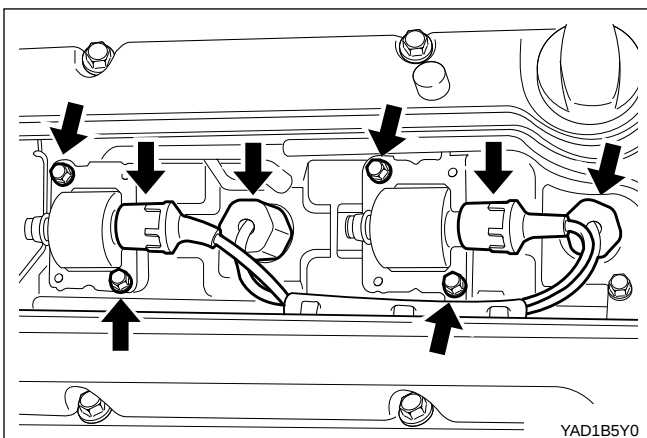
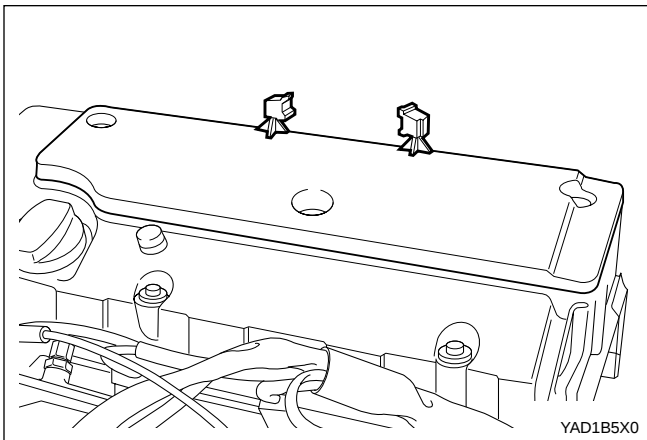


2. Remove the spark plug cover.

Installation Notice

Tightening Torque	9 - 11 N•m (80 - 97 lb-ft)
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Notice: Release 3 screws from the spark plug cover and remove the cover for M161 Engine coil.



3. Remove the spark plug connector and ignition cable.
4. Unscrew the bolts (3) and remove the head cover and the gasket.

Installation Notice

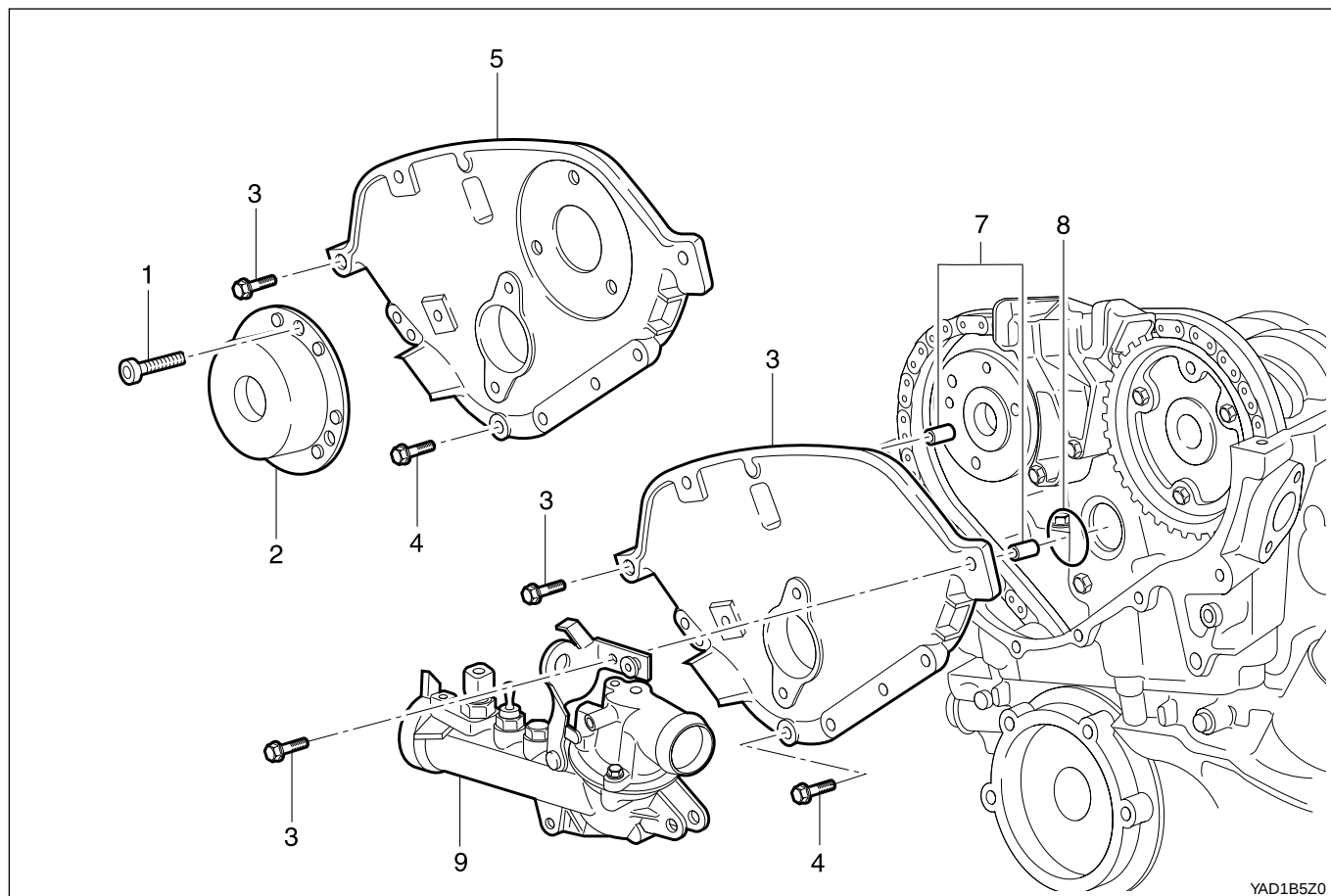
Tightening Torque	9 - 11 N•m (80 - 97 lb-ft)
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Notice: Replace the gasket with a new one if necessary.

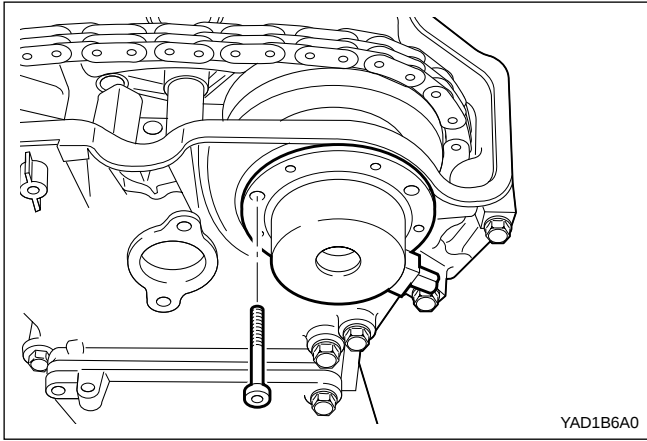
5. Installation should follow the removal procedure in the reverse order.
6. Check for oil leaks by operating the engine.

CYLINDER HEAD FRONT COVER

Preceding Work: Removal of cylinder head cover
 Removal of thermostat housing assembly
 Removal of engine hanger bracket



- | | |
|---|--------------------------------|
| 1 Bolt (M6 X 16, 3 pieces)
..... 9 - 11 N•m (80 - 97 lb-in) | 5 Front Cover (E23 : M161.973) |
| 2 Camshaft Adjuster | 6 Front Cover (E20 : M161.943) |
| 3 Bolt (M8 X 35, 2 pieces)
..... 22.5 - 27.5 N•m (16.6 - 20.3 lb-ft) | 7 Sleeve |
| 4 Bolt (M6 X 22, 6 pieces)
..... 9 - 11 N•m (80 - 97 lb-in) | 8 O-Ring Replace |
| | 9 Thermostat Housing. |

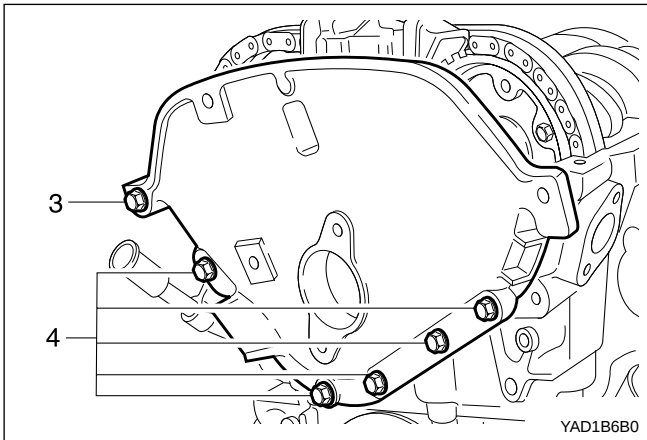


Removal & Installation Procedure

1. Disconnect the camshaft adjuster connector and remove the camshaft adjuster (E23 engine only).

Installation Notice

Tightening Torque	9 - 11 N•m (80 - 97 lb-ft)
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2. Remove the cylinder head front cover.

Installation Notice

Tightening Torque (3)	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
Tightening Torque (4)	9 - 11 N•m (80 - 97 lb-in)

Apply the sealant at the mating surface of the cylinder head and the front cover.

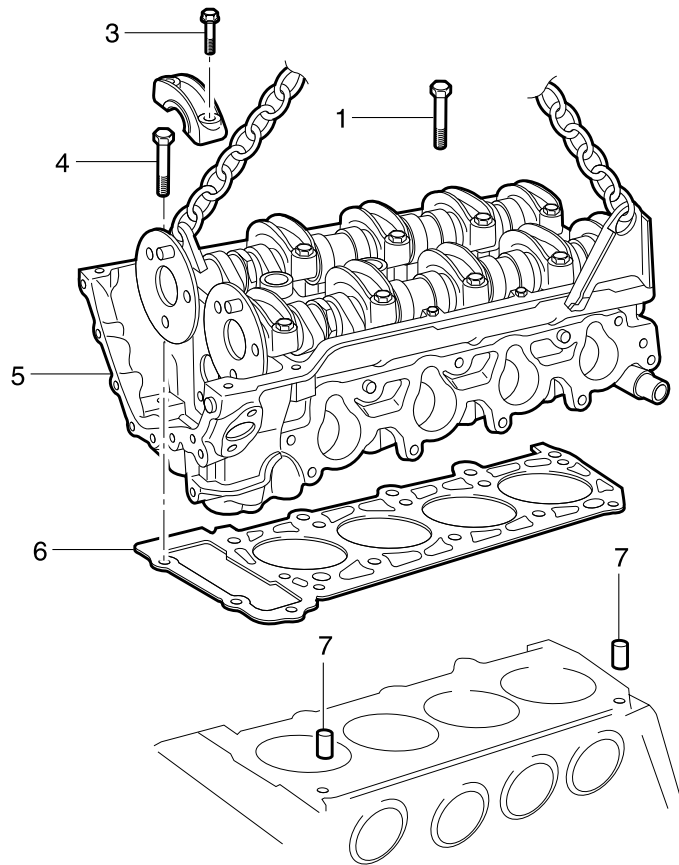
3. Remove the O-Ring.

Notice: Replace the O-ring with new one and apply the sealant.

4. Installation should follow the removal procedure in the reverse order.

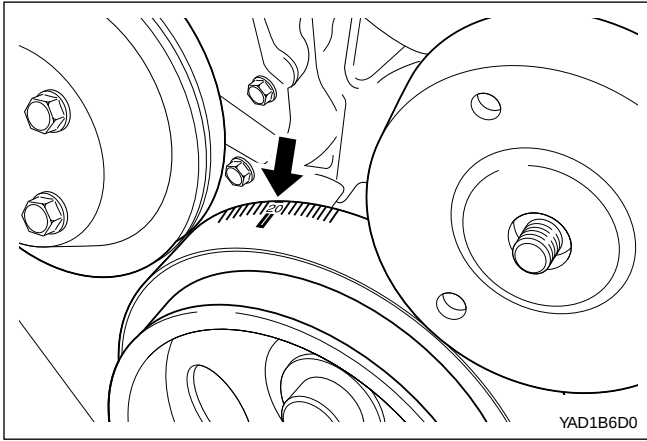
CYLINDER HEAD

Preceding Work: Removal of cylinder head cover
 Removal of cylinder head front cover
 Removal of intake manifold
 Removal of cylinder head lower line (intake manifold side)



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- | | | | |
|---|---|---|-------------------------|
| 1 | Cylinder Head Bolt (M12 X 100, 10 pieces) | 4 | Camshaft Bearing cap |
| | 1st step 55 N•m (41 lb-ft) | 5 | Cylinder Head |
| | 2nd step 90 ° rotation added | 6 | Gasket..... Replace |
| | 3rd step 90 ° rotation added | 7 | Dowel Sleeve Note |
| 3 | Bolt (M8 X 35, 4 pieces) | | |
| | 22.5 - 27.5 N•m (16.6 - 0.3 lb-ft) | | |

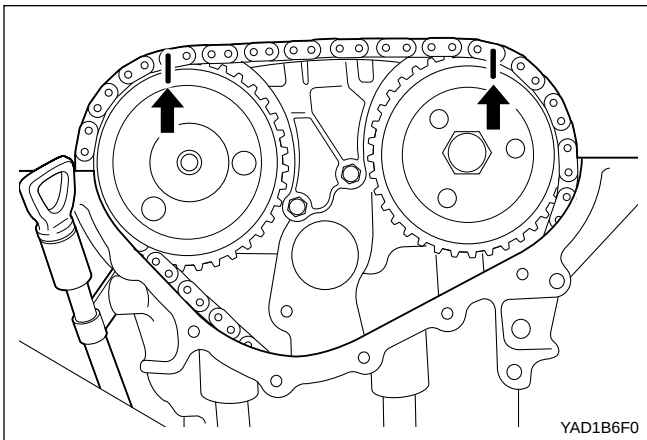
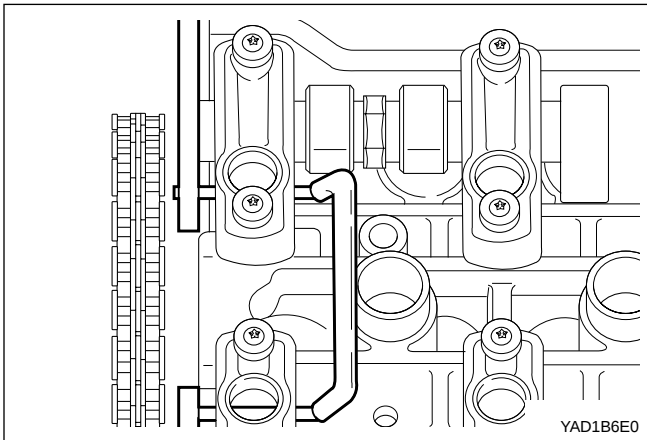


Tools Required

- 617 589 00 10 00 Allen Wrench Socket
- 116 589 20 33 00 Sliding Hammer
- 116 589 01 34 00 Threaded Pin
- 111 589 03 15 00 Holding Pin

Removal & Installation Procedure

1. Rotate the crankshaft so that the piston of number 1 cylinder is at ATDC 20.
2. Put the holding pin 111 589 03 15 00 into the camshaft bearing cap (number 1, 6).



3. Put the alignment marks (arrows) on the timing chain and camshaft sprocket.
4. Remove the chain tensioner.

Installation Notice

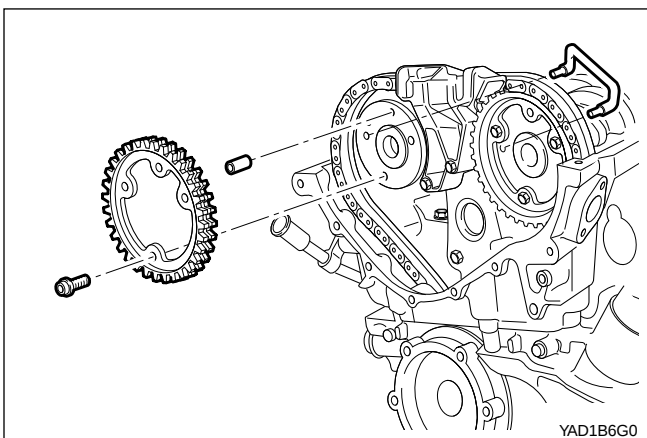
Tightening Torque	72 - 88 N•m (53 - 65 lb-ft)
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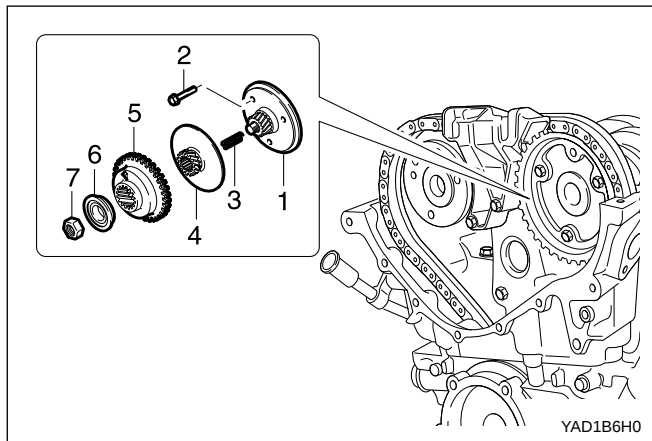
5. Remove the exhaust camshaft sprocket.

Installation Notice

Tightening Torque	1st step: 18 - 22 N•m (13 - 16 lb-ft)
	2nd step: 60° ± 5°

Notice: The flange bolt is designed to be used only once, so always replace with new one.





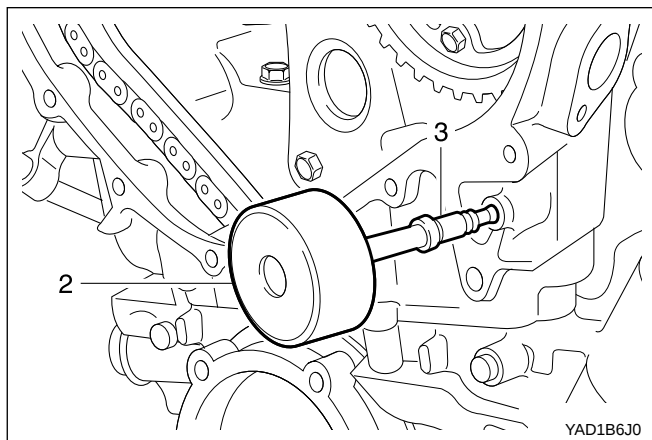
6. Remove the intake camshaft sprocket (E20 engine).
7. Remove the camshaft adjuster (E23, M161.970 engine).

Installation Notice (Flange Bolt)

Tightening Torque	1st step: 18 - 22 N•m (13 - 16 lb-ft)
	2nd step: 60° ± 5°

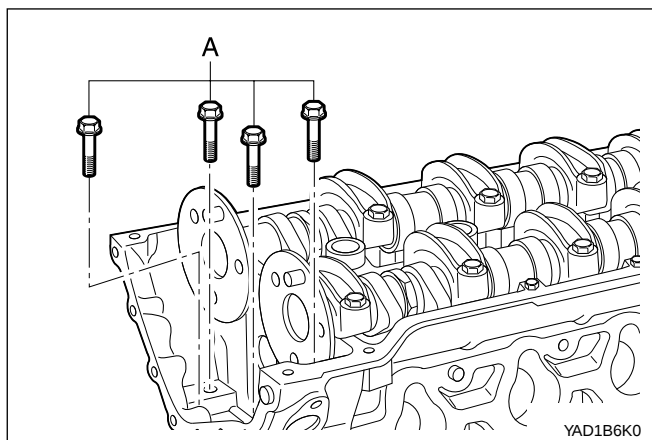
Notice: The flange bolt is designed to be used only once, so always replace with new one.

- 1 Flange Shaft
- 2 Flange Bolt
- 3 Compression Spring
- 4 Adjust Piston
- 5 Camshaft Sprocket
- 6 Seal Cover
- 7 Nut



8. Remove the guide rail pin using the sliding hammer 116 589 20 33 00 (02) and the threaded pin 116 589 01 34 00 (03).

Notice: Apply the sealant on guide rail pin when installation.

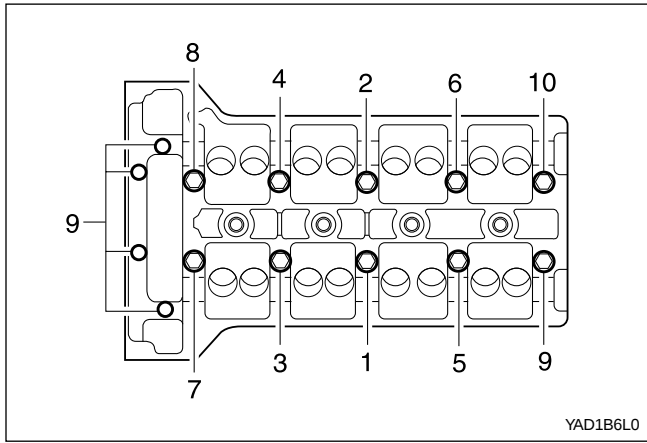


9. Unscrew the bolts (A).

Installation Notice

Tightening Torque	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
-------------------	--

Bolt (A) : (M8 X 35, 4 pieces)



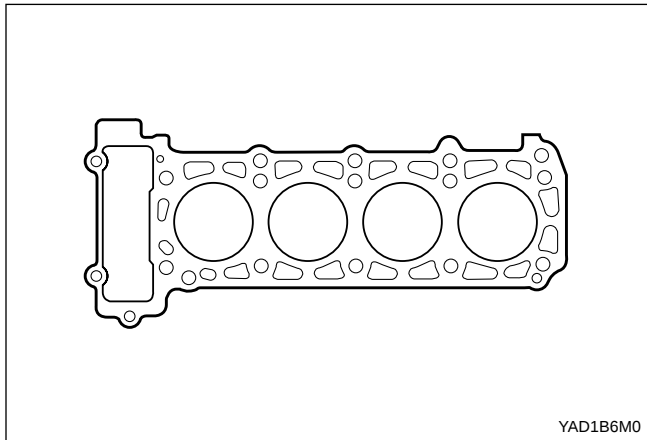
10. Remove the cylinder head bolts in the reverse order of the numerics (No.10 → No.1) using allen wrench socket 617 589 00 10 00.

Installation Notice

Tighten the bolts as numerical order with specified torque (No.1 → No.10).

Tightening Torque	1st step: 55 N•m(41 lb-ft)
	2nd step: +90°
	3rd step: +90°

Notice: Operate during engine cooling.

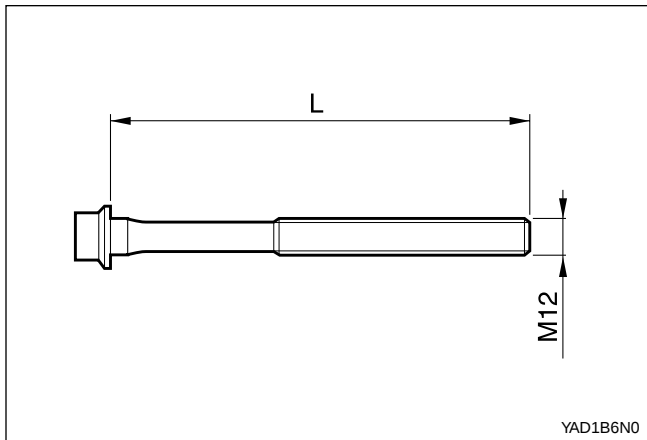


11. Remove the No. 1 bearing cap of the exhaust camshaft.

Installation Notice

Tightening Torque	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
-------------------	--

12. Carefully remove the cylinder head.
13. Check the cylinder head mating surface and clean the crankcase head bolt mounting hole.
14. Replace the cylinder head gasket with new one.



15. Check the length of the cylinder head bolt.

Installation Notice

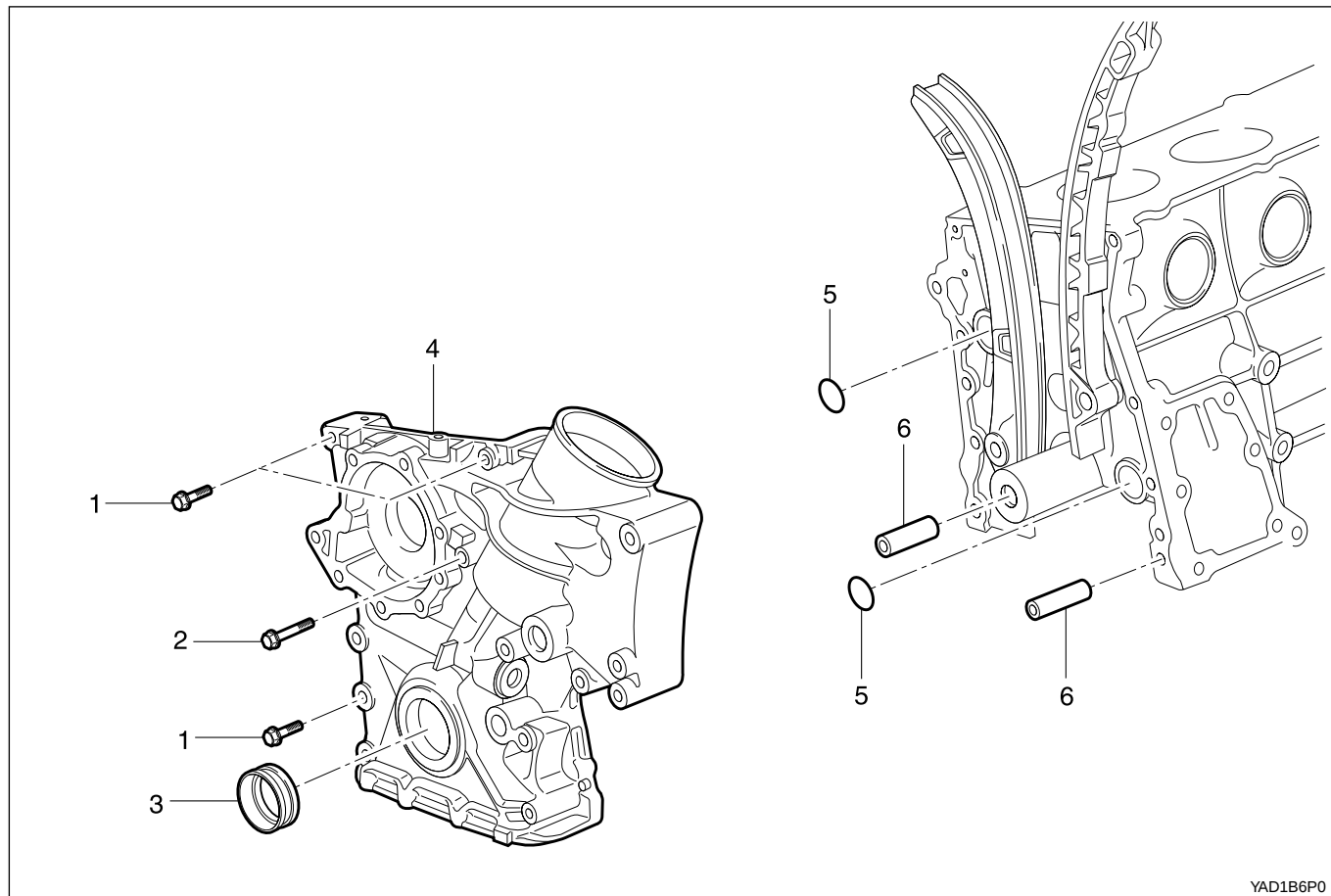
Length (L)	When New 100 mm
	Max. Length 105 mm

Notice: Replace the bolt if the measured length exceed the max. length.

16. Installation should follow the removal procedure in the reverse order.

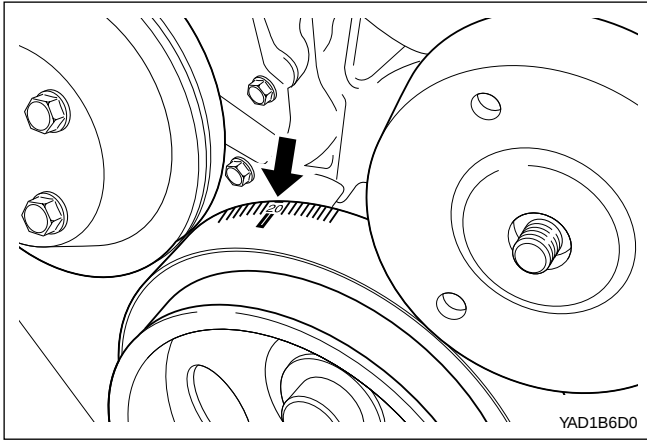
TIMING GEAR CASE COVER

Preceding Work: Removal of viscous clutch
Removal of cylinder head front cover
Removal of tensioning device
Removal of water pump
Removal of oil filter element
Removal of oil pan
Removal of generator bracket



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- | | |
|---|--------------------------|
| 1 Bolt (M8 X 60, 3 pieces) | 3 Seal |
| 22.5 - 27.5 N•m (16.6 - 20.3 lb-ft) | 4 Timing Gear Case Cover |
| 2 Bolt (M8 X 75, 1 piece) | 5 O-Ring |
| 22.5 - 27.5 N•m (16.6 - 20.3 lb-ft) | 6 Sleeve. |



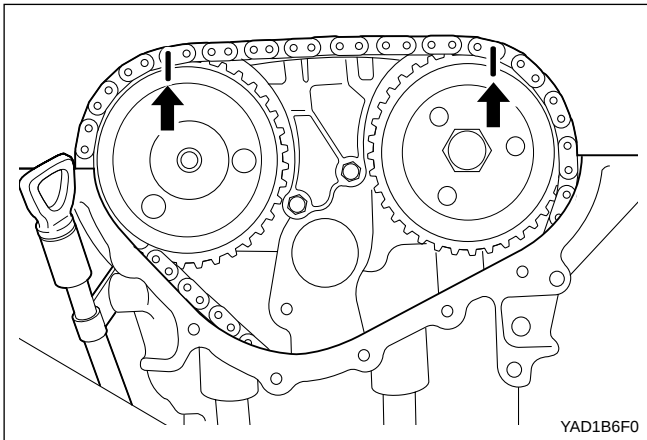
Tools Required

116 589 20 33 00 Sliding Hammer

116 589 01 34 00 Threaded Pin

Removal & Installation Procedure

1. Remove the power steering belt pulley and A/C compressor bracket.
2. Remove the oil line from power steering pump.
3. Rotate the crankshaft so that the piston of number, cylinder is at ATDC 20 °.



4. Put the alignment marks (arrows) on the timing chain and camshaft sprocket.
5. Remove the chain tensioner.

Installation Notice

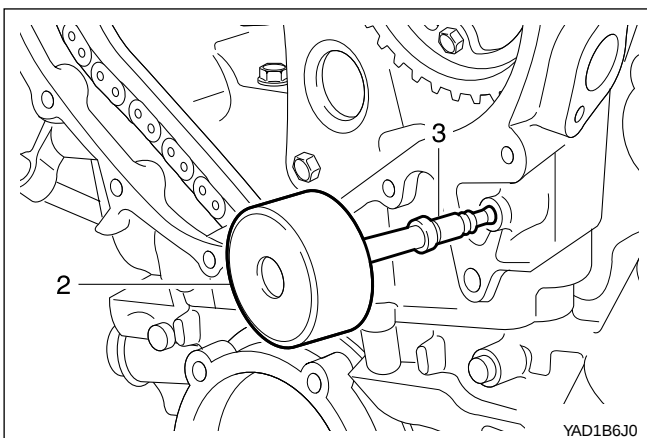
Tightening Torque	72 - 88 N•m (53 - 65 lb-ft)
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6. Remove the intake and exhaust camshaft sprocket (remove the camshaft adjuster assembly in E23 engine).

Installation Notice

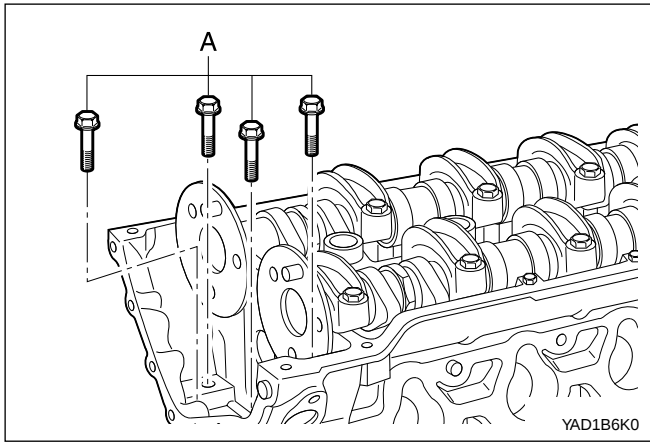
Tightening Torque	1st step: 18 - 22 N•m (13 - 16 lb-ft)
	2nd step: 60° ± 5°

Notice: The flange bolt is designed to be used only once, so always replace with new one.



7. Remove the guide rail pin using the sliding hammer 116 589 20 33 00 (02) and the threaded pin 116 589 01 34 00 (03).

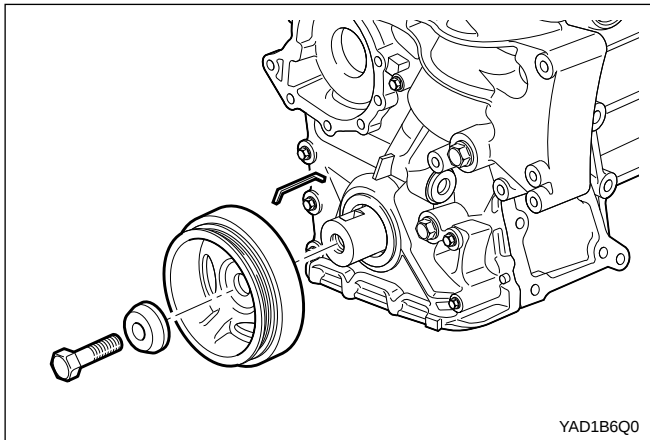
Notice: Apply the sealant on guide rail pin when installation.



8. Unscrew the bolts (A).

Installation Notice

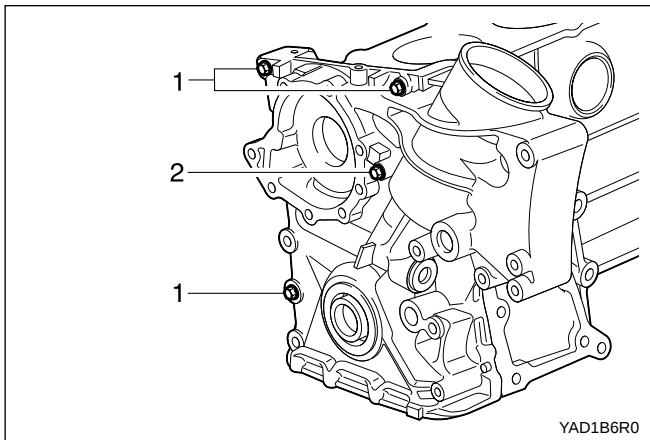
Tightening Torque	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
-------------------	--



9. Remove the belt pulley and vibration damper.

Installation Notice (Center Bolt)

Tightening Torque	1st step: 200 + 20 N•m (148 + 15 lb-ft)
	2nd step: 90° ± 10°



10. Unscrew the bolts (1, 2) on timing gear case cover and remove the timing gear case cover.

Installation Notice

Tightening Torque	22.5 - 27.5 N•m (16.6 - 20.3 lb-ft)
-------------------	--

Notice: Be careful not to damage the cylinder head gas-ket.

11. Remove the radial shaft seal.

Notice: Installation note replace the seal with new one.

12. Clean the timing gear case cover and crankcase sealing surface.

13. Replace the O-ring with new one and apply the sealant on the sealing surface.

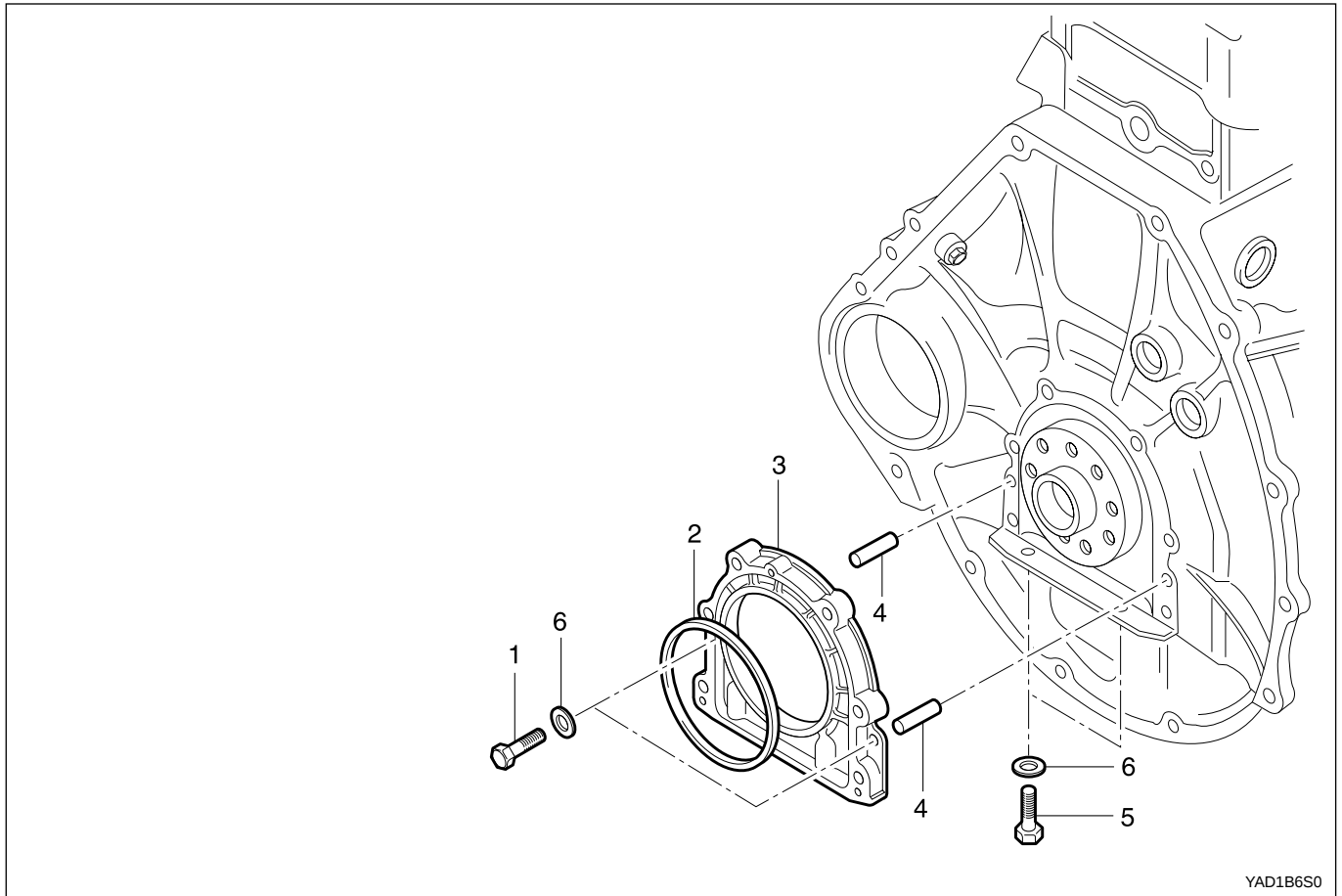
Notice: Be careful not to stain the oil chamber of chain tensioner with the sealant.

14. Installation should follow the removal procedure in the reverse order.

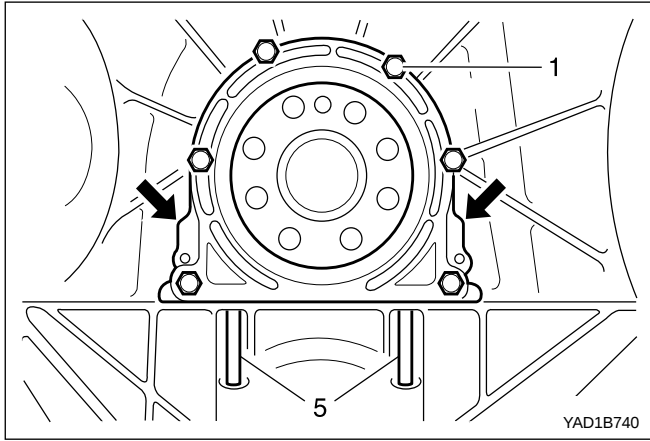
15. Warm up the engine and check for oil leaks.

CRANKSHAFT SEALING REAR COVER

Preceding Work: Removal of the automatic transmission drive plate or flywheel



- | | |
|--|--|
| 1 Bolt (M6 x 20, 6 pieces)
..... 9 - 11 N•m (80 - 97 lb-in) | 4 Sleeve |
| 2 Radial Shaft Seal | 5 Bolt (M6 x 85, 2 pieces)
..... 9 - 11 N•m (80 - 97 lb-in) |
| 3 Rear Cover | 6 Washer |



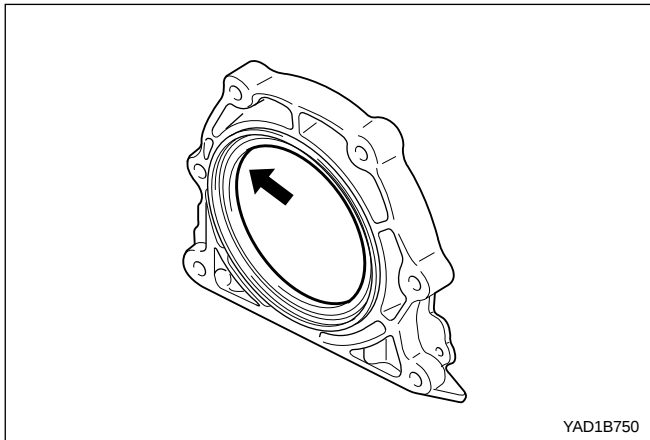
Tools Required

601 589 03 43 00 Crankshaft Rear Seal Installer

Removal & Installation Procedure

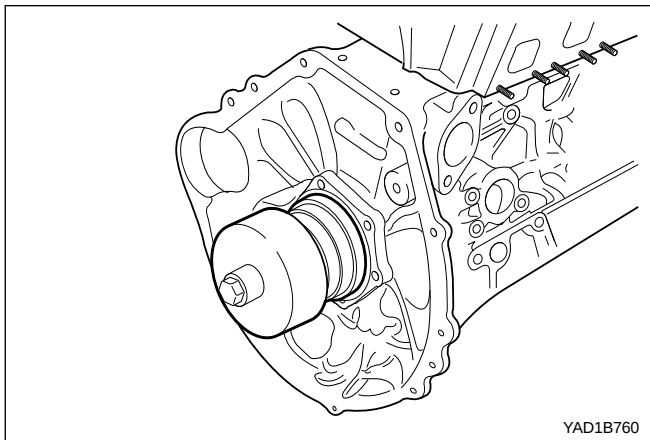
1. Unscrew the bolts (1) and (5) and remove the closing cover by pulling the rear cover lug (arrows).

Notice: Be careful not to damage the oil pan gasket.

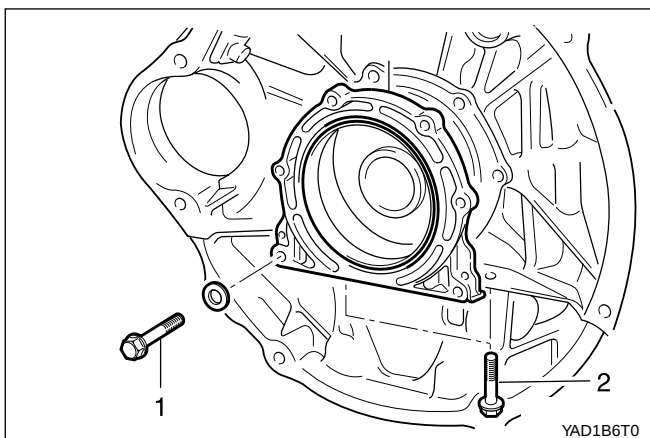


2. Clean the sealing surface of the crankcase and the rear sealing cover.
3. Check the radial shaft seal and replace it if necessary.
4. Apply the Loctite 573 to the rear cover sealing surface.
5. Apply the engine oil to the dust lip of the radial shaft seal.

Notice: Do not use the grease.



6. Install the crankshaft rear radial seal and the crankshaft sealing rear cover, using crankshaft rear seal installer 601 589 03 43 00.



7. Install the crankshaft sealing rear cover mounting bolts and remove the crankshaft rear seal installer 601 589 03 43 00.

Installation Notice

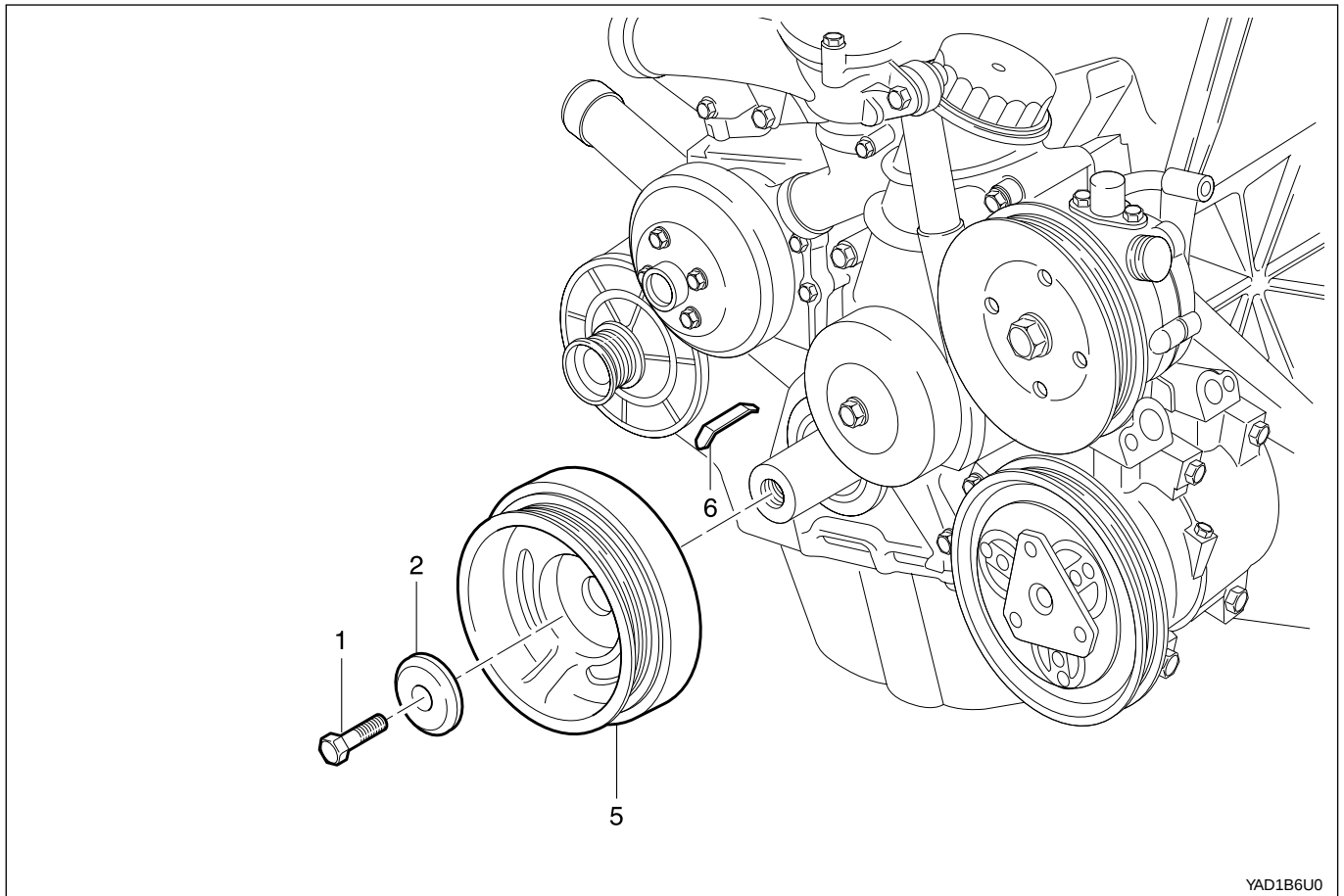
Tightening Torque

9 - 11 N•m
(80 - 97 lb-ft)

8. Installation should follow the removal procedure in the reverse order.

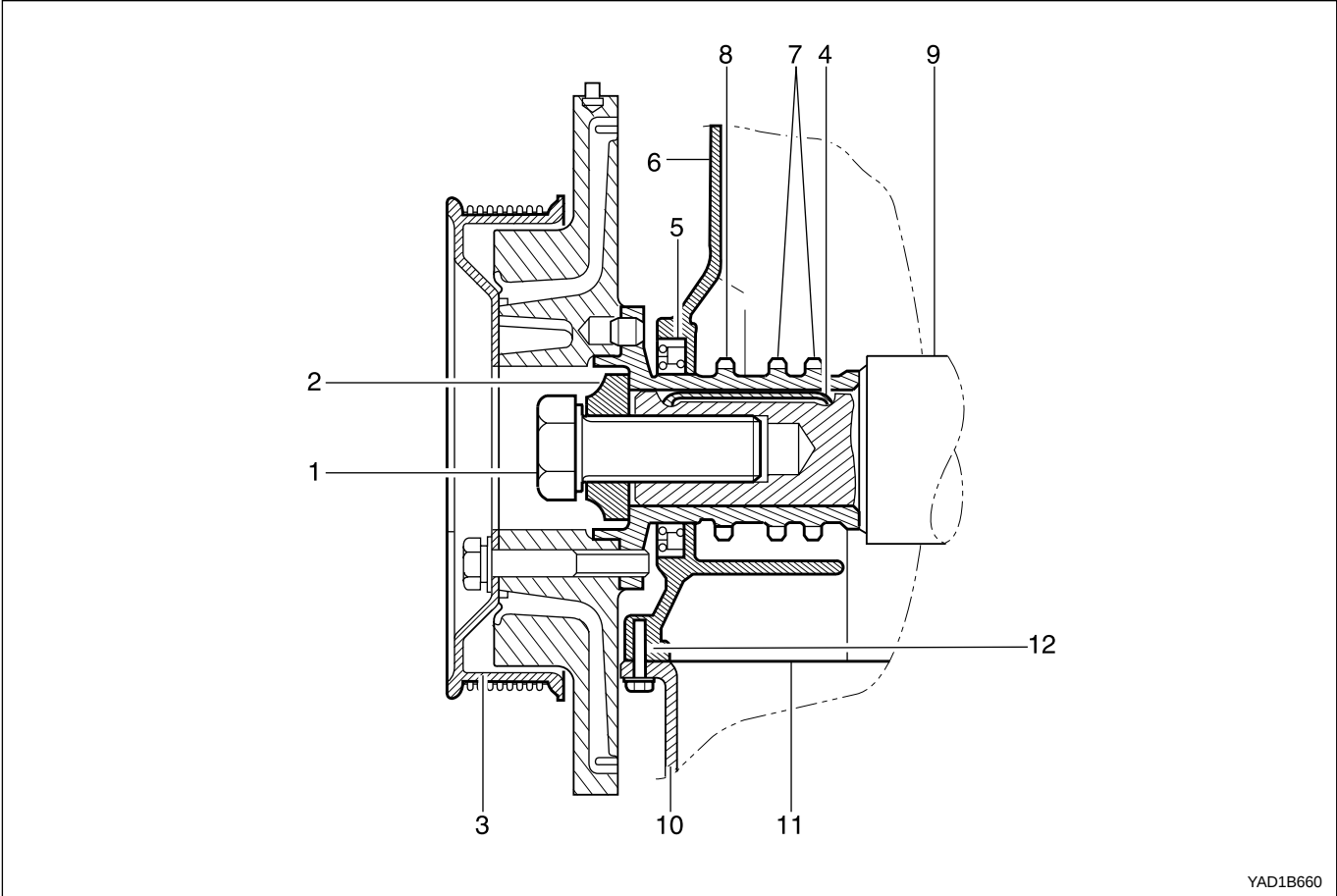
BELT PULLEY AND VIBRATION DAMPER

Preceding Work: Removal of cooling fan and viscous clutch
Removal of fan shroud
Removal of drive belt



- | | | | |
|-------|--------------------------------------|---|---------------------------|
| 1 | Vibration Damper Center | 2 | Vibration Damper Disk |
| | 1st step 200+20 N•m (148 + 15 lb-ft) | 5 | Vibration Damper Assembly |
| | 2nd step 90 °+ 10 °rotation added | 6 | Key |

Components

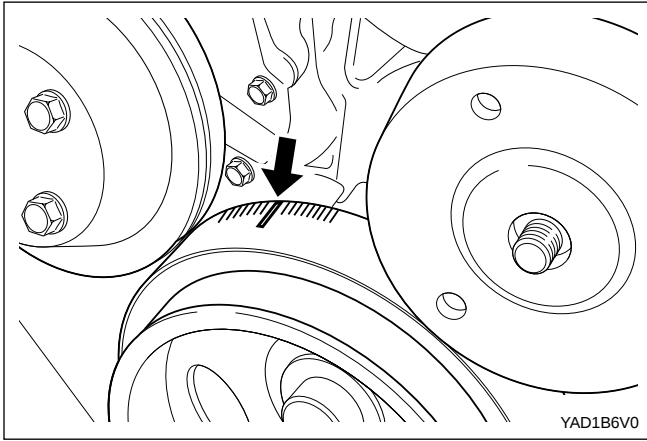


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- | | |
|--|---|
| 1 Center Bolt (M18 x 50) | 7 Crankshaft Sprocket (Camshaft Driven) |
| 2 Center Bolt Washer | 8 Crankshaft Sprocket (Oil Pump Driven) |
| 3 Vibration Damper and Pulley Assembly | 9 Crankshaft |
| 4 Key | 10 Oil Pan |
| 5 Crankshaft Front Seal | 11 Oil Pan Gasket |
| 6 Timing Gear Case Cover | 12 Oil Pan Mounting Bolt (M6 x 22) |

Service Data Standard

Permissble Deviation of The Vibration Damper	Radial Runout	0.6 mm
	Axial Ruout	0.6 mm

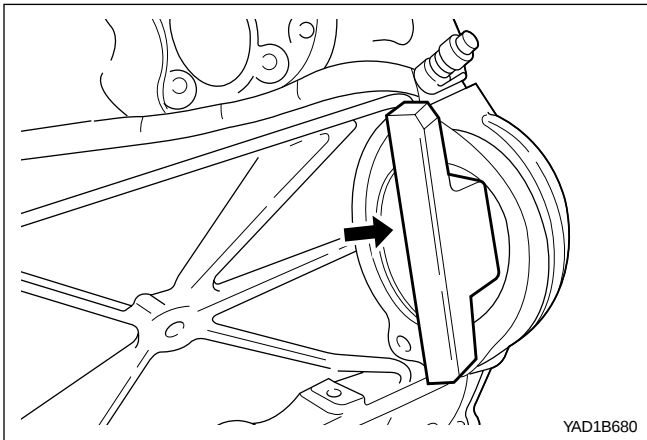


Tools Required

602 589 00 40 00 Engine Lock

Removal & Installation Procedure

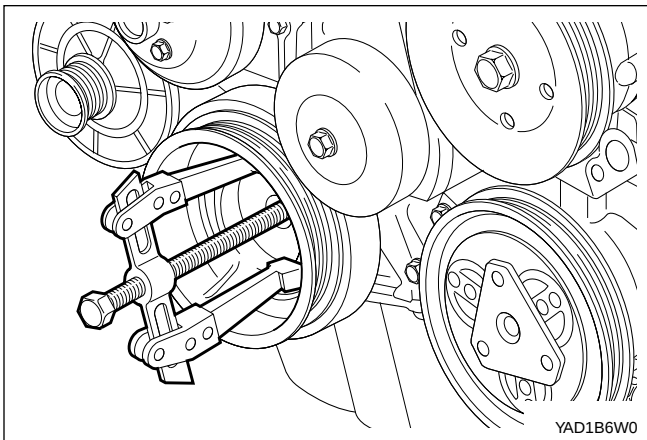
1. Adjust the piston of number 1 cylinder to the TDC.



2. Remove the start motor and install the engine lock 602 589 00 40 00 to the flywheel ring gear.
3. Remove the vibration damper center bolt.

Installation Notice

Tightening Torque	1st step: 200 + 20 N•m (148 + 15 lb-ft)
	2nd step: 90° + 10°

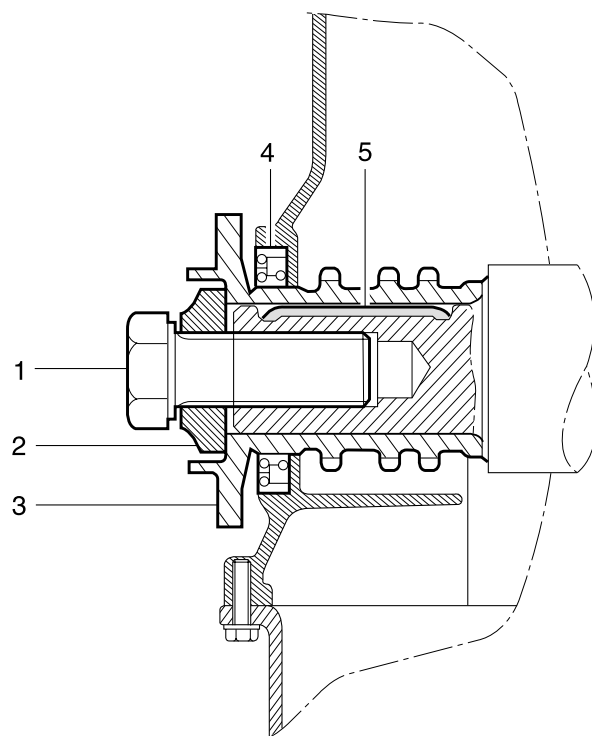


4. Remove the vibration damper assembly using the puller.
5. Installation should follow the removal procedure in the reverse order.

Notice: If possible, don't separate the vibration damper and the pulley.

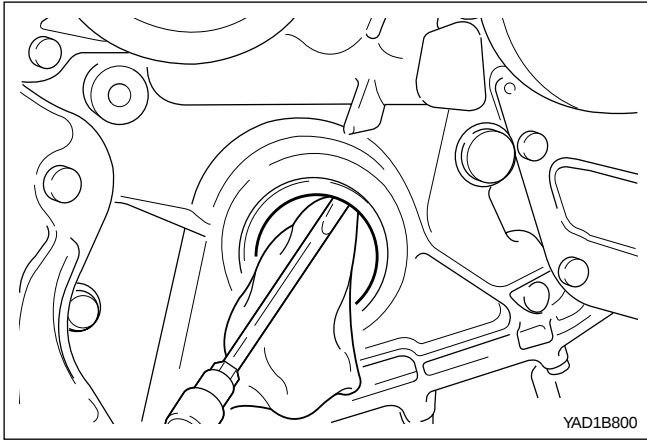
CRANKSHAFT FRONT RADIAL SEAL

Preceding Work: Removal of belt pulley and vibration damper



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- | | |
|--|-----------------------------------|
| 1 Center Bolt (M18 x 50) | 3 Crankshaft Front Seal Installer |
| 1st step 200 + 20 45 N•m (148 +15 lb-ft) | 4 Crankshaft Front Seal |
| | 5 Key |
| 2 Center Bolt Washer | |
| | 2nd step 90 ° + 10 ° |

**Tools Required**

601 589 03 14 00 Crankshaft Front Seal Installer

Replacement Procedure

1. Remove the radial seal with a screw driver.

Notice: Use a clean cloth not to damage the radial seal mounting hole and the crankshaft.

2. Coat the radial sealing lip with engine oil.
3. Using the crankshaft front seal installer 601 589 03 14 00, assemble the radial seal.
4. Align the sleeve groove and the woodruff key and tighten the center bolt until the center bolt and the damper disk stop in the movement.

Installation Notice

Tightening Torque	1st step: 200 + 20 N•m (148 + 15 lb-ft)
	2nd step: 90° ± 10°

5. Remove the crankshaft front seal installer 601 589 03 14 00, and install the belt pulley and the vibration damper.
6. Check for leaks while operating the engine.