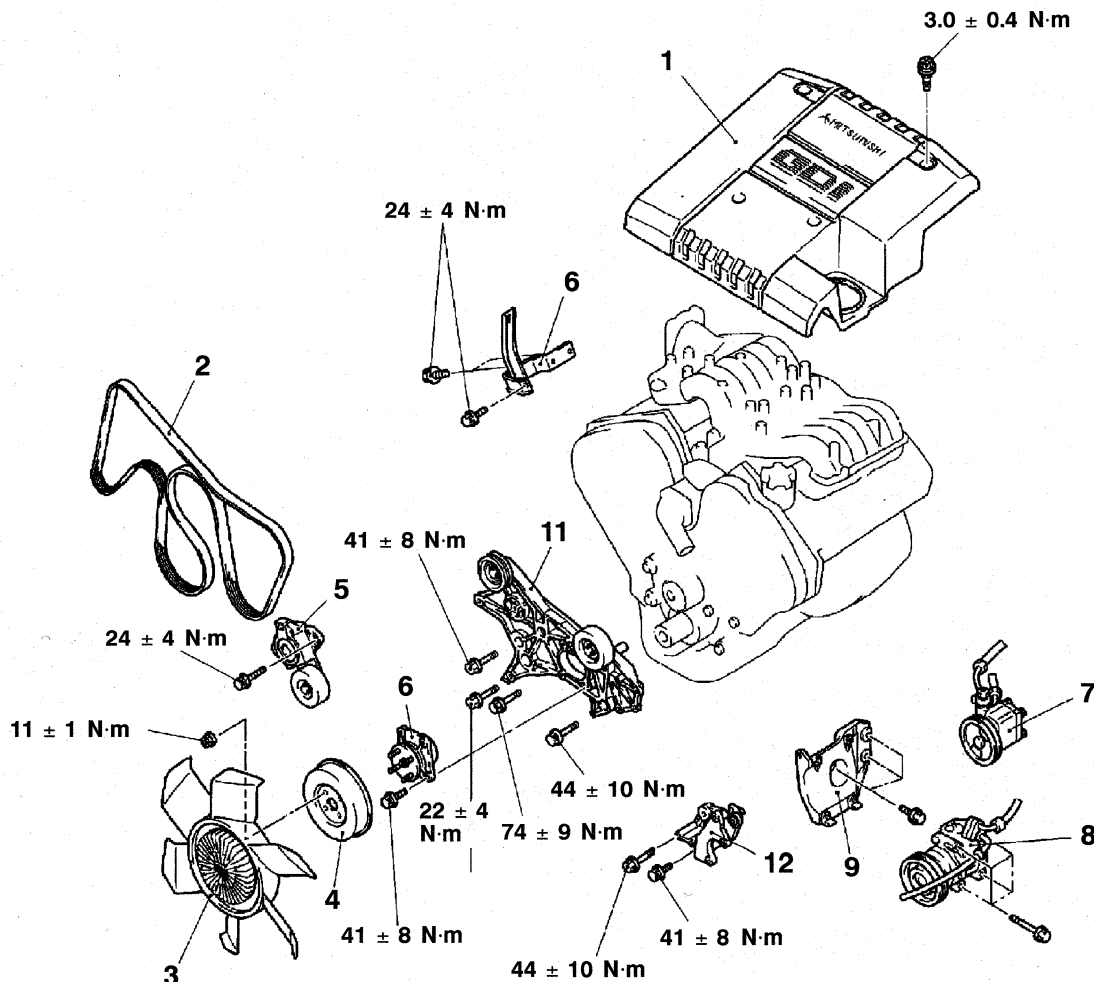


TIMING BELT

REMOVAL AND INSTALLATION

Pre-removal Operation

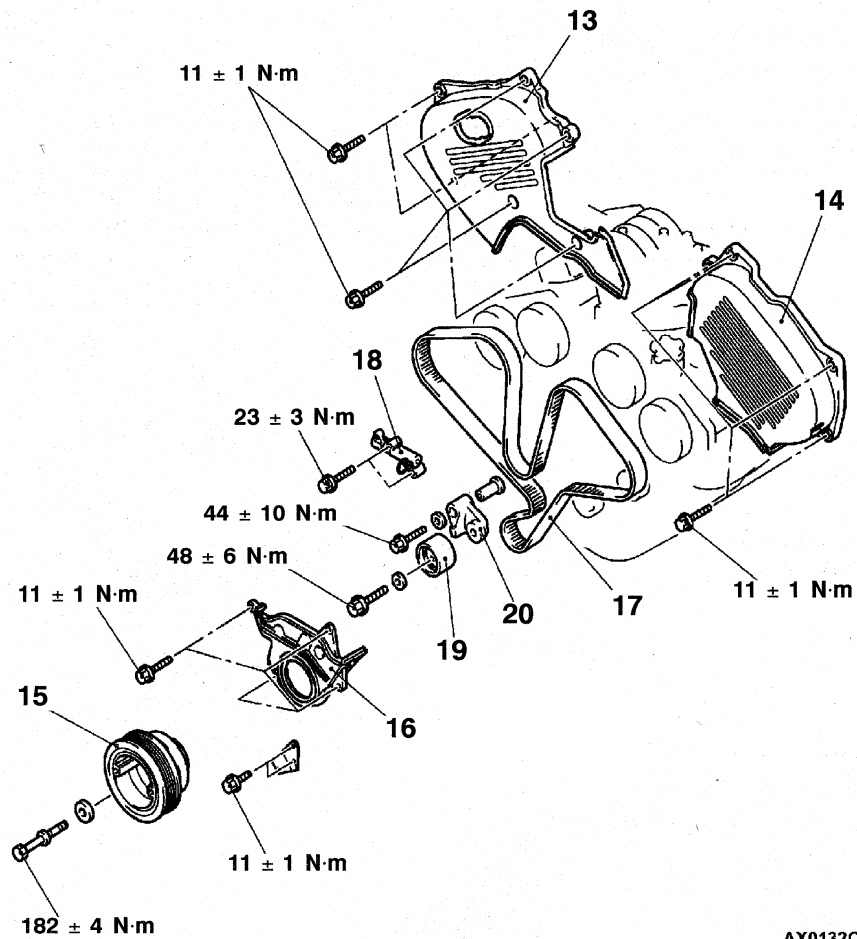
- Skid Plate and Under Cover Removal and Installation
- Battery abd batterytray Removal and Installation
- Air cleaner assembly Removal and Installation (Refer to GROUP 15)
- Shroud assembly Removal and Installation (Refer to GROUP 14 - Cooling Fan.)
- Engine Coolant Draining and Refilling (Refer to GROUP 14 - On-vehicle Service.)



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Removal steps

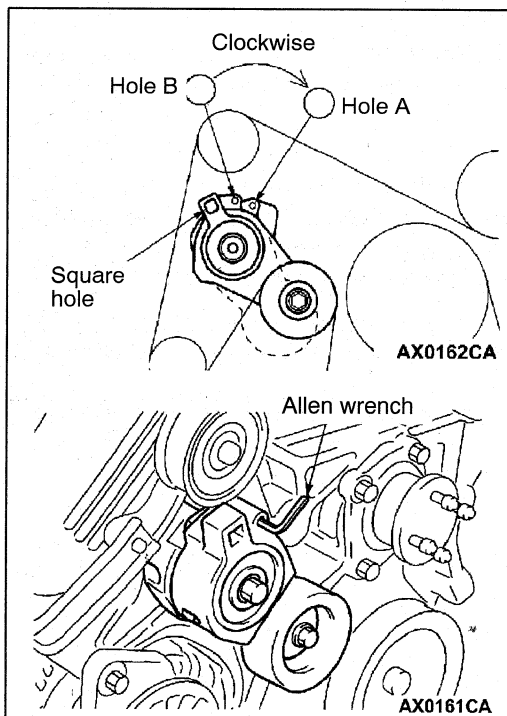
- | | | | |
|-----------------------|--|-----------------------|---|
| <p>▶F◀</p> <p>▶E◀</p> | <p>1. Cover</p> <p>2. Drive belt</p> <p>3. Cooling fan and fan clutch assembly</p> <p>4. Cooling fan pulley</p> <p>5. Drive belt auto-tensioner</p> <p>6. Engine hanger <R.H.></p> <p>● Alternator (Refer to Group16.)</p> | <p>▶B▶</p> <p>▶D▶</p> | <p>7. Power steering oil pump assembly</p> <p>8. A/C compressor assembly</p> <p>9. Compressor bracket</p> <p>10. Cooling fan bracket</p> <p>11. Accessory mount assembly</p> <p>12. Power steering oil pump bracket</p> |
|-----------------------|--|-----------------------|---|



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Removal steps

- | | |
|--|--|
| <p>13. Timing belt upper cover assembly <R.H.></p> <p>14. Timing belt upper cover assembly <L.H.></p> <p>◀C▶ ▶C▶ 15. Crankshaft pulley</p> | <p>◀D▶ ▶B▶ ▶A▶ 16. Timing belt lower cover assembly</p> <p>17. Timing belt</p> <p>18. Auto-tensioner</p> <p>19. Tension pulley</p> <p>20. Tensioner arm assembly</p> |
|--|--|

**REMOVAL SERVICE POINTS****◀A▶ DRIVE BELT AUTO-TENSIONER REMOVAL**

The following operations will be needed due to the introduction of the serpentine drive system with the drive belt auto tensioner.

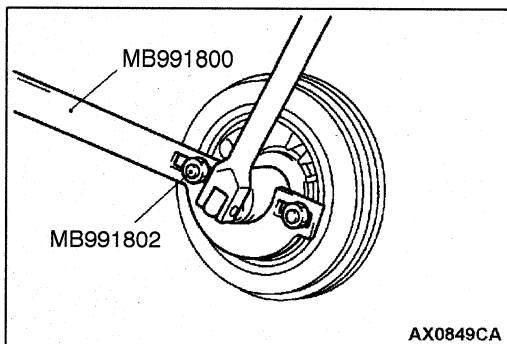
1. Insert a 12.7 mm spinner handle into the square hole on the drive belt auto tensioner, and rotate it clockwise until the tensioner touches the stopper.
2. Align hole B with hole A, and insert a 5.0 mm Allen wrench to hold the tensioner. Then loosen the drive belt, and then remove the drive belt auto tensioner.

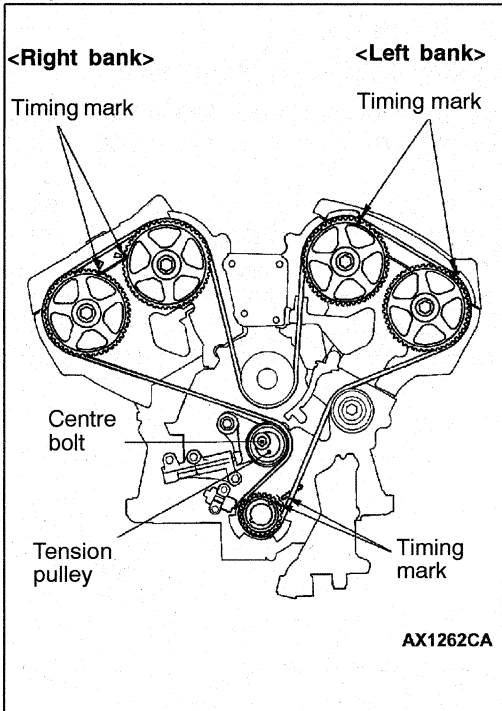
◀B▶ POWER STEERING OIL PUMP ASSEMBLY/A/C COMPRESSOR ASSEMBLY REMOVAL

1. Do not disconnect the hoses to remove the pump and compressor.
2. Support the removed pump and compressor with a wire, etc. so that they will not get in the way while working.

◀C▶ CRANKSHAFT PULLEY REMOVAL

Use special tools to remove the crankshaft pulley from the crankshaft.





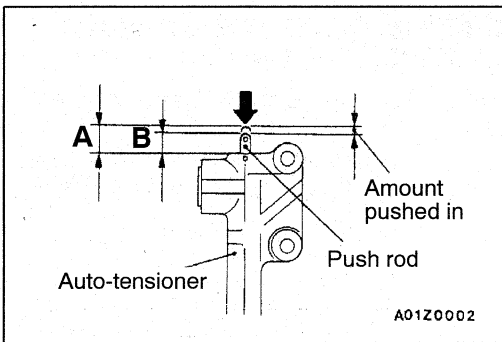
◀D▶ TIMING BELT REMOVAL

1. Turn the crankshaft clockwise to align each timing mark and to set the No. 1 cylinder to compression top dead centre.

Caution

- (1) The camshaft sprocket (right side) can turn easily due to the valve spring force applied, so be careful not to get your fingers caught.
- (2) Never turn the crankshaft anticlockwise.

2. If the timing belt is to be reused, chalk mark the flat side of the belt with an arrow indicating the clockwise direction.
3. Loosen the centre bolt of the tension pulley, and then remove the timing belt.



INSTALLATION SERVICE POINTS

▶A◀ AUTO-TENSIONER INSTALLATION

1. While holding the auto-tensioner by hand, press the end of the push rod against a metal surface (such as the cylinder block) with a force of 98 - 196 Nm and measure how far the push rod is pushed in.

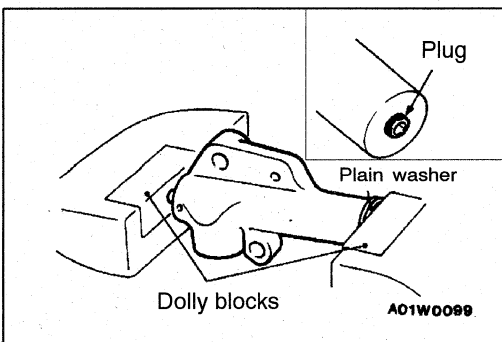
Standard value: Within 1 mm

A: Length when no force is applied

B: Length when force is applied

A - B: Amount pushed in

2. If it is not within the standard value, replace the auto-tensioner.

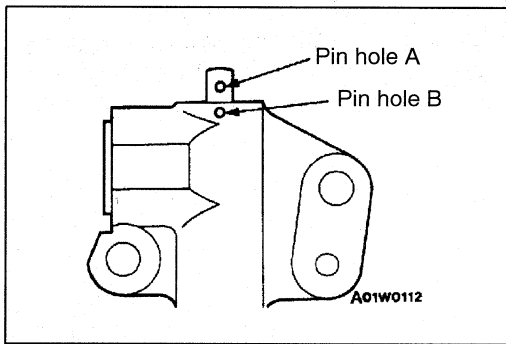


3. Place two dolly blocks in a vice as shown in the illustration, and then place the auto-tensioner in the vice.

Caution

- (1) Place the auto-tensioner perpendicular to the jaws of the vice.

- (2) If there is a plug at the base of the auto-tensioner, insert a plain washer onto the end of the auto-tensioner to protect the plug.



- Slowly compress the push rod of the auto-tensioner until pin hole A in the push rod is aligned with pin hole B in the cylinder.

Caution

Never compress the push rod too fast, or the push rod may be damaged.

- Insert the setting pin into the pin holes once they are aligned.

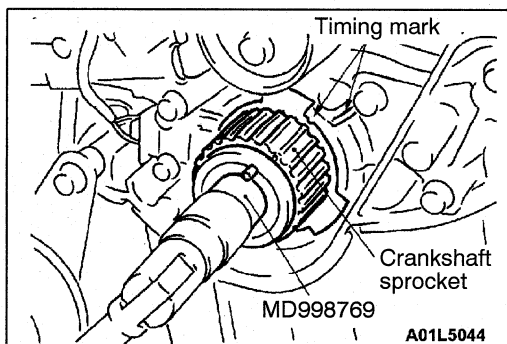
NOTE

If replacing the auto-tensioner, the pin will already be inserted into the pin holes of the new part.

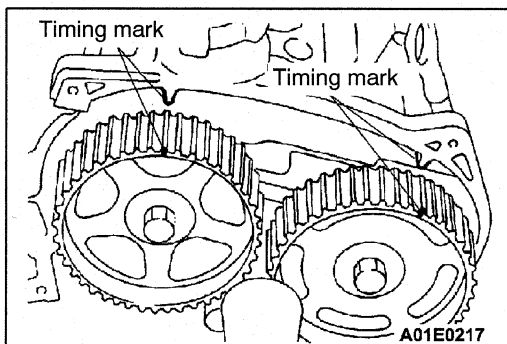
- Install the auto-tensioner to the engine.

Caution

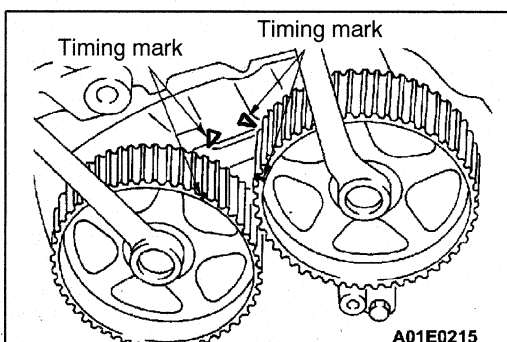
Do not remove the setting pin from the auto-tensioner.

**▶◀ TIMING BELT INSTALLATION**

- Use special tool to align the timing marks on the crankshaft sprocket.



- Align the timing marks on the right bank side crankshaft sprocket.

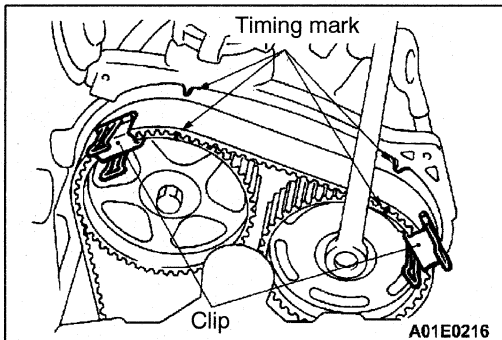


- Align the timing marks on the left bank side crankshaft sprocket, and then hold the sprocket with a wrench as shown.

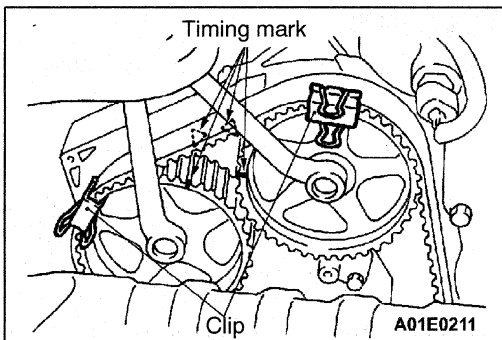
Caution

(1) The left bank side camshaft sprockets will turn readily because of the spring force being applied, so be careful not to get your fingers caught.

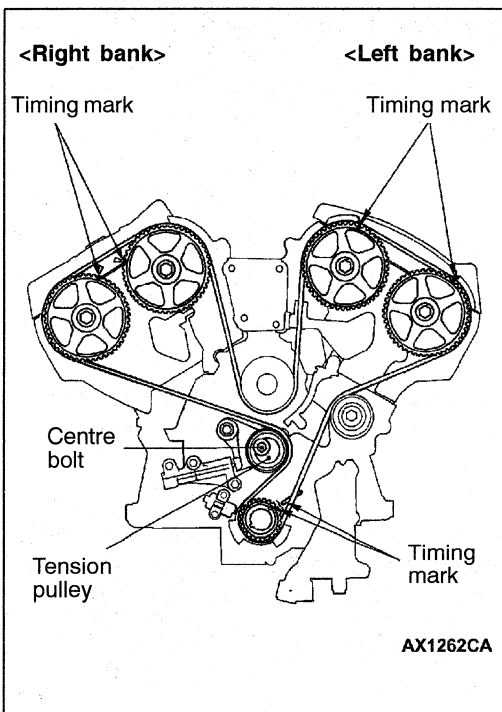
- (2) If the sprocket on one side of the left bank is turned one full revolution while the sprocket timing marks on the opposite side of the left bank are aligned, the intake and exhaust valves will interfere.



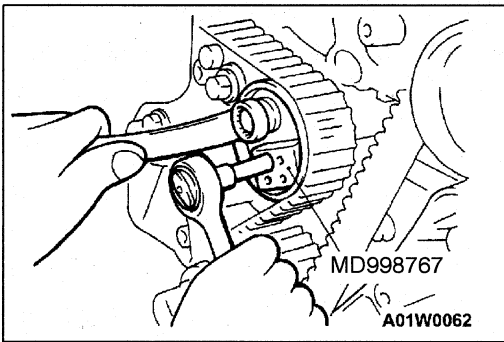
4. Set the timing belt onto the crankshaft sprocket.
5. Set the timing belt onto the idler pulley.
6. Check that the timing marks of the left bank side exhaust camshaft sprocket is aligned, and clamp the timing belt with a clip.
7. Set the timing belt onto the water pump pulley.



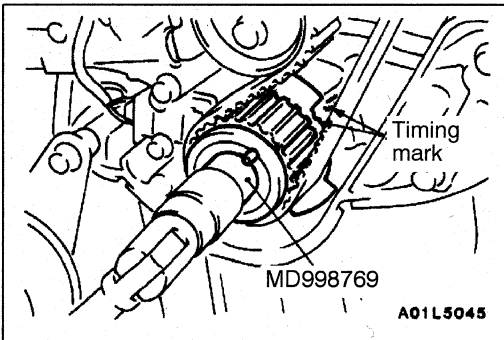
8. Check that the timing marks of the right bank side exhaust camshaft sprocket is aligned, and clamp the timing belt with a clip.
9. Set the timing belt onto the tension pulley.



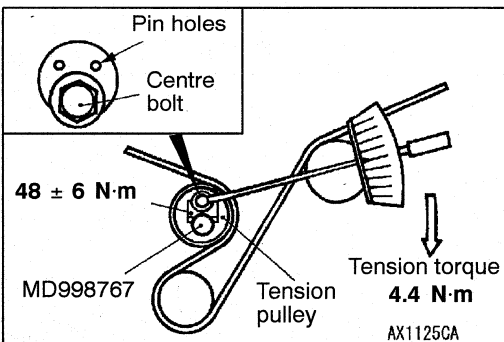
10. Turn the right bank side camshaft sprocket (exhaust side) anticlockwise until the tension side of the timing belt is firmly stretched. Check all timing marks again.



11. Use special tool to push the tensioner pulley into the timing belt, and then temporarily tighten the centre bolt.
12. Loosen all the clips.



13. Use special tool to turn the crankshaft 1/4 turn anticlockwise and then turn it again clockwise until the timing marks are aligned.

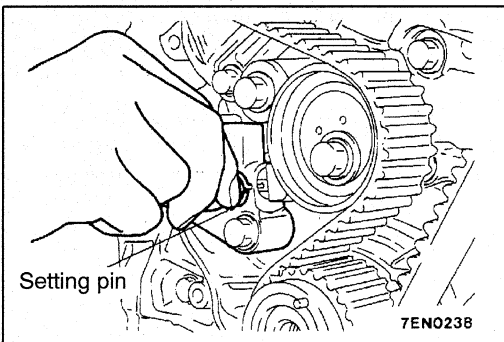


14. Loosen the centre bolt of the tensioner pulley. Use special tool and a torque wrench to apply the standard torque to the timing belt as shown in the illustration. Then tighten the centre bolt to the specified torque.

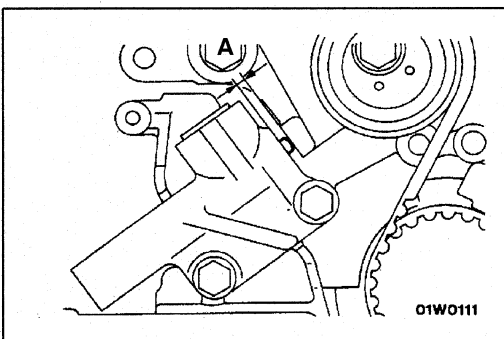
Standard value: 4.4 N·m
 <Timing belt tension torque>

Caution

When tightening the centre bolt, be careful that the tensioner pulley does not turn with the bolt.



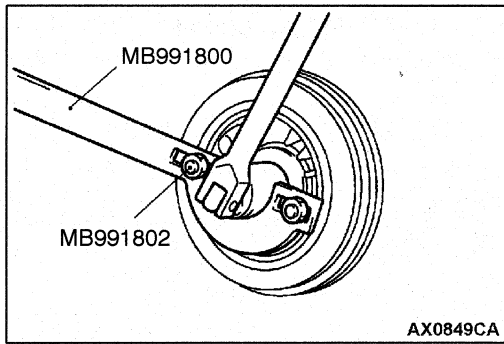
15. Remove the setting pin that has been inserted into the auto-tensioner.
16. Turn the crankshaft two turns clockwise to align the timing marks.



17. Wait for at least five minutes, and then check that the auto-tensioner pushrod extends within the standard value.

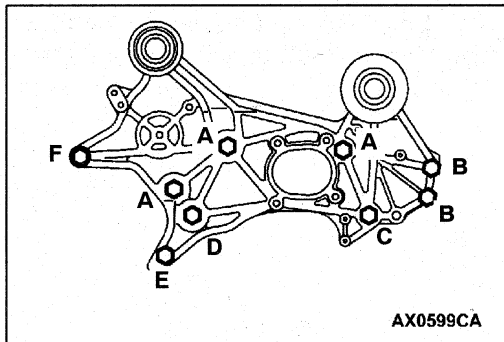
Standard value (A): 3.8 - 5.0 mm

18. If no, repeat the operation in steps (13) to (17) above.
19. Check again that the timing marks of each sprocket are aligned.



►C◄ CRANKSHAFT PULLEY INSTALLATION

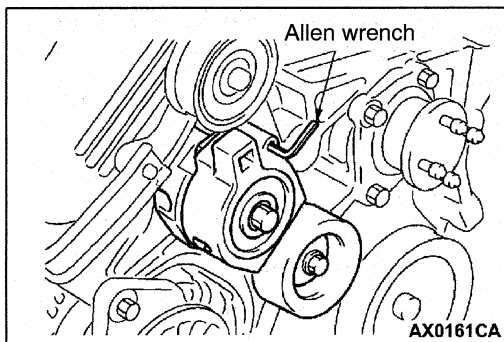
Use special tools MD991800 and MB991802 to install the crankshaft pulley.



►D◄ ACCESSORY MOUNT ASSEMBLY INSTALLATION

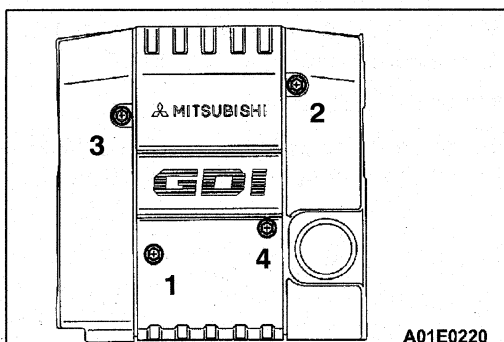
Install the bolts to the shown positions, and tighten them to the specified torque.

Bolt (symbol)	Diameter × length mm	Tightening torque(N·m)
A	10×100	41 ± 8
B	10×30	41 ± 8
C	10×100	44 ± 10
D	12×100	74 ± 9
E	8×30	22 ± 4
F	10×106	44 ± 10



►E◄ DRIVE BELT AUTO TENSIONER INSTALLATION

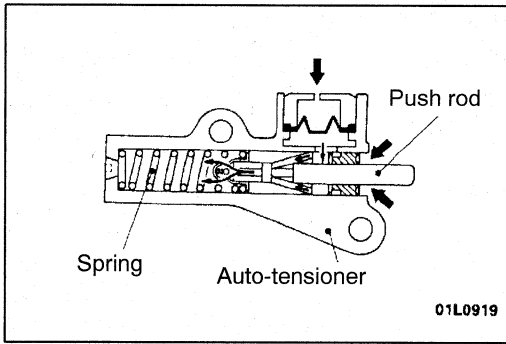
1. Install the drive belt auto tensioner with the Allen wrench inserted.
2. After the drive belt has been installed, remove the Allen wrench while holding the drive belt auto tensioner with a socket wrench drive. Then release the drive belt auto tensioner slowly.



►F◄ ENGINE COVER INSTALLATION

Install the engine cover bolts finger-tight, and tighten them to the specified torque in the order shown.

Tightening torque: 3.0 ± 0.4 N·m



INSPECTION

AUTO-TENSIONER

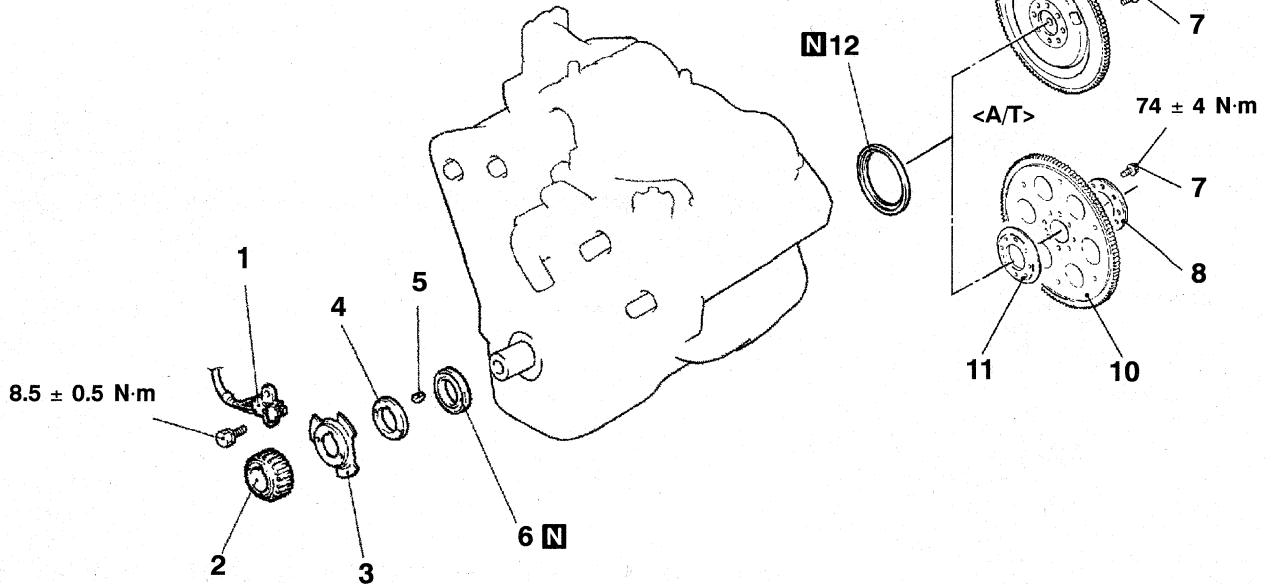
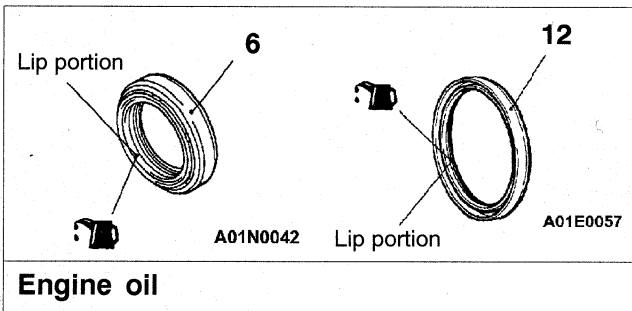
- Check the auto-tensioner for possible leaks.
- Check the push rod for cracks.

CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Timing Belt Removal and Installation (Refer to P.11A-15.)

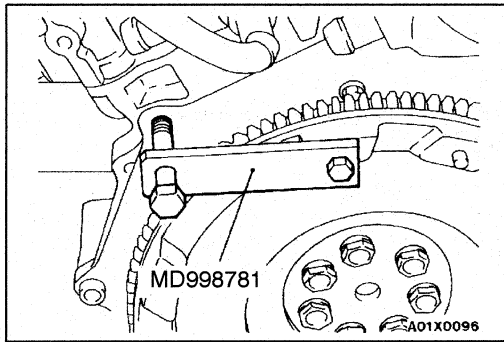


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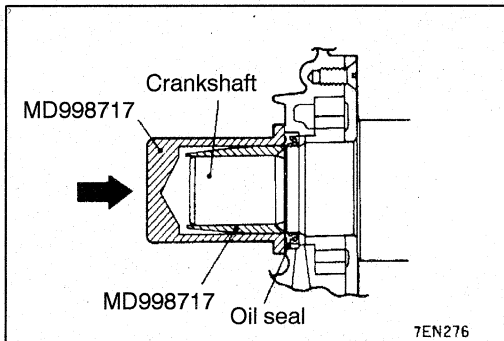
Removal steps

- ▶D◀ 1. Crank angle sensor
- ▶D◀ 2. Crankshaft sprocket
- ▶D◀ 3. Crankshaft sensing blade
- ▶D◀ 4. Crankshaft spacer
- ▶C◀ 5. Key
- ▶C◀ 6. Crankshaft front oil seal

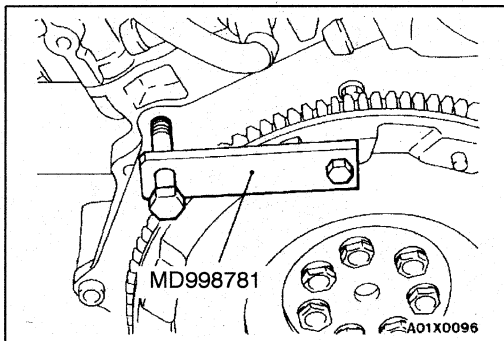
- ▶A◀ ▶B◀ 7. Bolt
- ▶A◀ ▶B◀ 8. Adaptor plate
- ▶A◀ ▶B◀ 9. Flywheel
- ▶A◀ ▶B◀ 10. Drive plate
- ▶A◀ ▶B◀ 11. Crankshaft adaptor
- ▶A◀ ▶B◀ 12. Crankshaft rear oil seal

**REMOVAL SERVICE POINT****◀▶ BOLT REMOVAL**

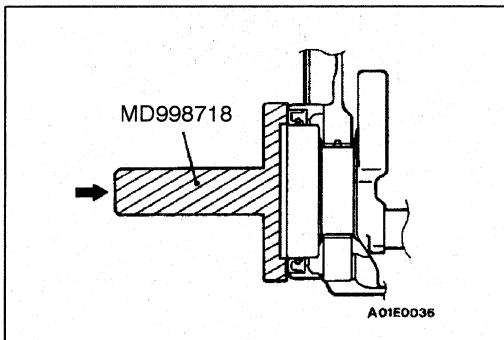
Use special tool to secure the flywheel or drive plate and remove the bolt.

**INSTALLATION SERVICE POINTS****▶▶▶ CRANKSHAFT REAR OIL SEAL INSTALLATION**

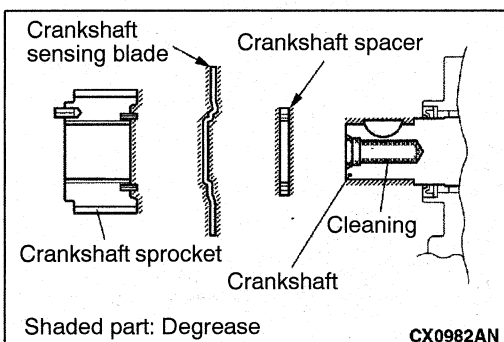
1. Apply a small amount of engine oil to the entire circumference of the oil seal lip.
2. Use special tool to tap in the oil seal as shown in the illustration.

**▶▶▶ BOLT INSTALLATION**

Use special tool in the same way as during removal to install the bolt.

**▶▶▶ CRANKSHAFT FRONT OIL SEAL INSTALLATION**

1. Apply a small amount of engine oil to the oil seal lip and then insert.
2. Using special tool, tap the oil seal into the front case.

**▶▶▶ CRANKSHAFT SPACER/CRANKSHAFT SENSING BLADE/CRANKSHAFT SPROCKET**

To prevent the crankshaft pulley mounting bolt from loosening, degrease or clean the crankshaft, the crankshaft spacer, the crankshaft sensing blade and the crankshaft at the shown positions.

Shaded part: Degrease

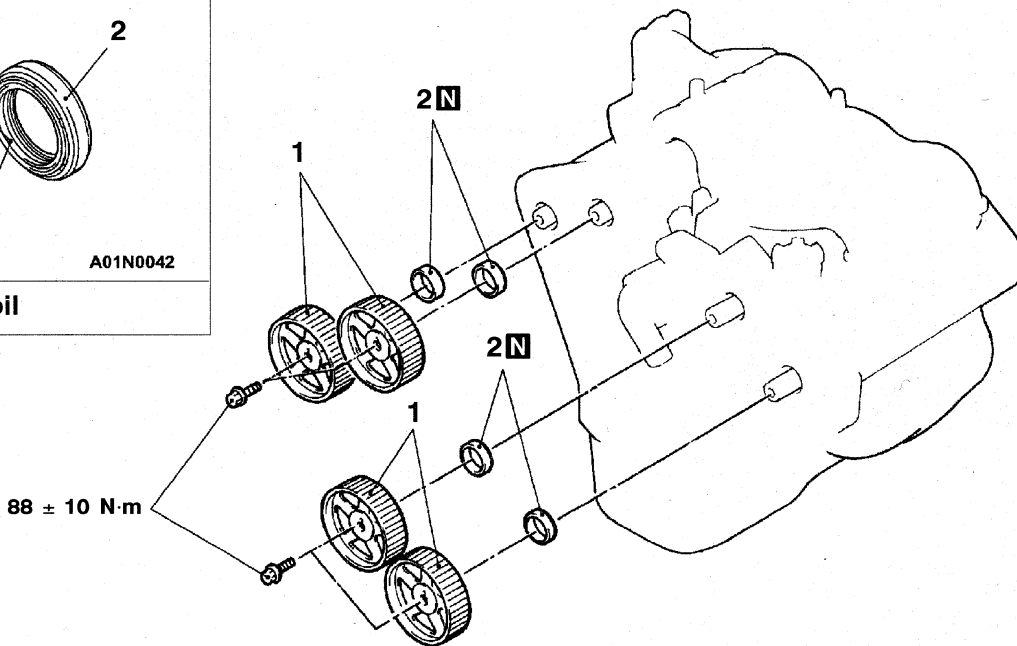
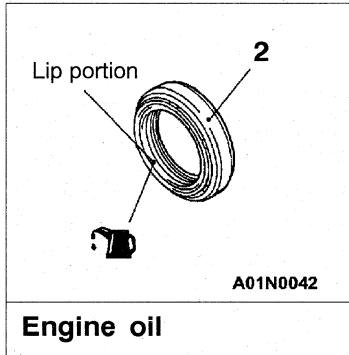
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CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Timing Belt Removal and Installation
(Refer to P.11A-15.)

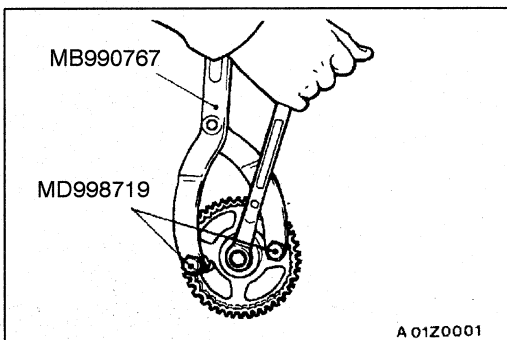


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Removal steps



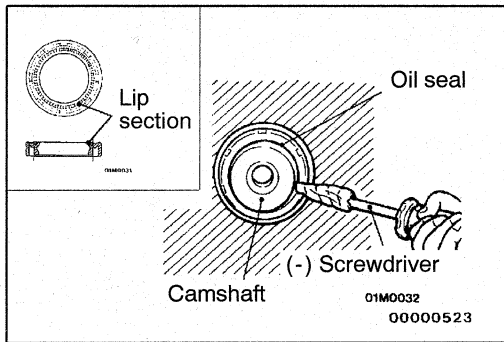
1. Camshaft sprocket
2. Camshaft oil seal



REMOVAL SERVICE POINTS

◀A▶ CAMSHAFT SPROCKET REMOVAL

Use special tools to remove the camshaft sprocket.

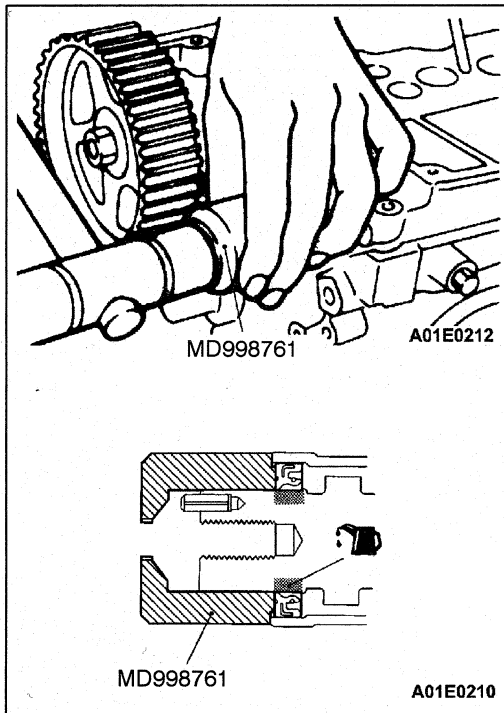


◀B▶ CAMSHAFT OIL SEAL REMOVAL

1. Make a notch in the oil seal lip section with a knife, etc.
2. Cover the end of a flat-tipped screwdriver with a shop towel and insert into the notched section of the oil seal, and pry out the oil seal to remove it.

Caution

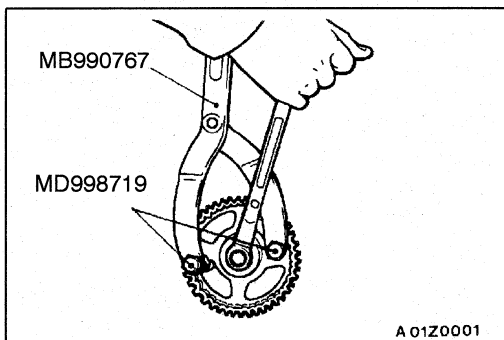
Be careful not to damage the camshaft and the cylinder head.



INSTALLATION SERVICE POINTS

▶A◀ CAMSHAFT OIL SEAL INSTALLATION

1. Apply engine oil to the camshaft oil seal lip.
2. Use special tools to press-fit the camshaft oil seal.



▶B◀ CAMSHAFT SPROCKET INSTALLATION

Use special tools in the same way as during removal to install the camshaft sprocket.

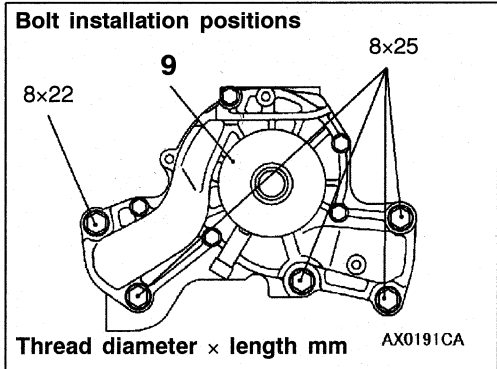
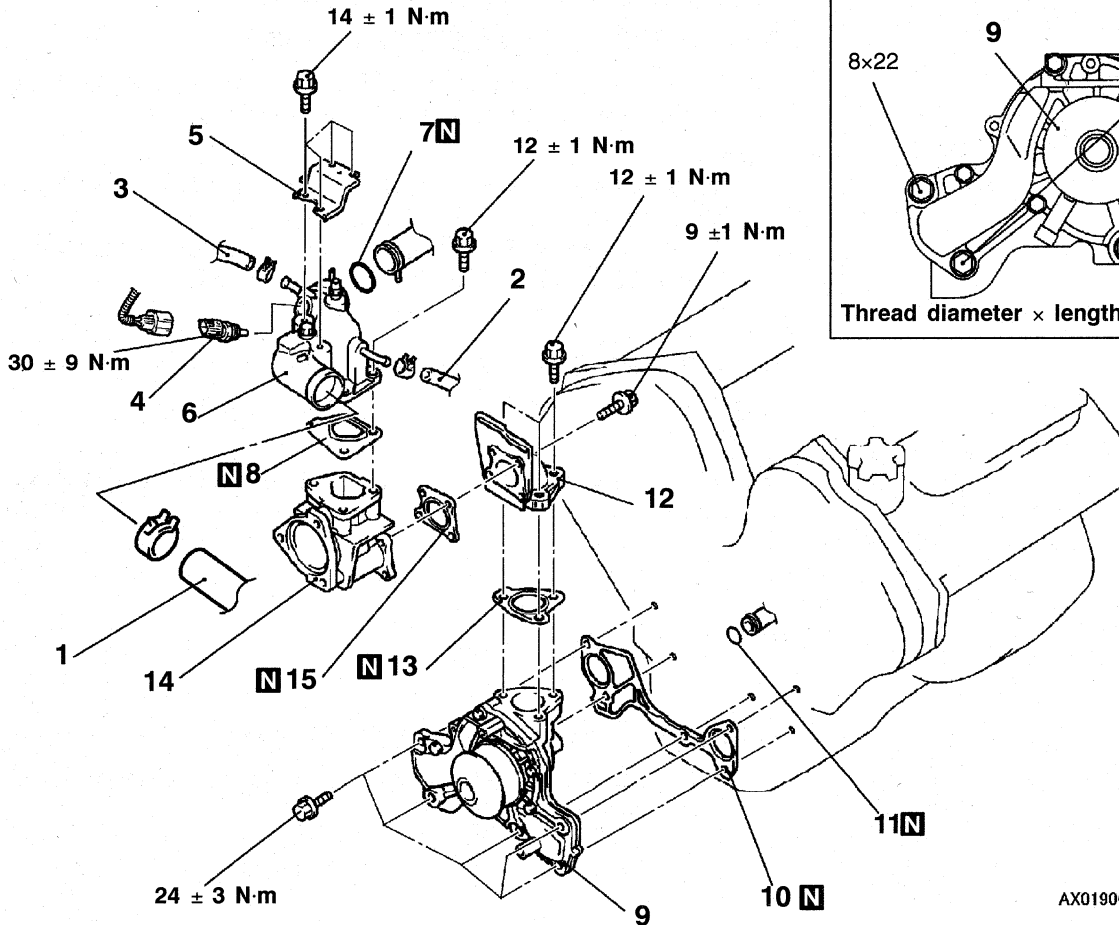
WATER PUMP

REMOVAL AND INSTALLATION

<6G7>

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to P. 14-3.)
- Timing Belt Removal and Installation (Refer to GROUP 11A.)
- Camshaft Sprocket Removal and Installation (Refer to GROUP 11A.)
- Thermostat Removal and Installation (Refer to P.14-7.)

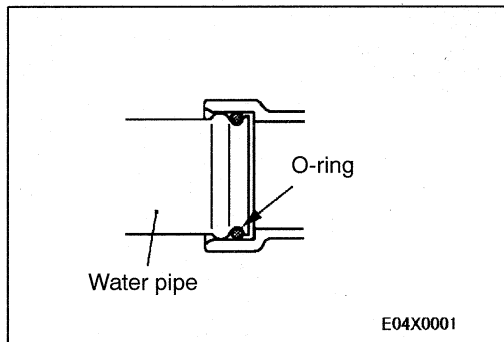


Removal steps

- | | | |
|---------------------------|--|---|
| <p>◀A▶ ▶C▶</p> <p>▶A▶</p> | <ol style="list-style-type: none"> 1. Radiator upper hose connection 2. Water hose 3. Water hose 4. Water temperature sensor 5. Water outlet fitting bracket 6. Water outlet fitting 7. O-ring 8. Gasket | <ol style="list-style-type: none"> 9. Water pump 10. Gasket 11. O-ring 12. Fitting 13. Gasket 14. Thermostat case 15. Gasket |
|---------------------------|--|---|

REMOVAL SERVICE POINT**◀A▶ RADIATOR UPPER HOSE DISCONNECTION**

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

**INSTALLATION SERVICE POINTS****▶A◀ O-RING INSTALLATION <6G7, 4D5>**

Rinse the mounting location of the O-ring and water pipe with water, and install the O-ring and water pipe.

Caution

1. Care must be taken not to permit engine oil or other greases to adhere to the O-ring.
2. When inserting the pipe, check to be sure that there is no sand, dirt, etc. on its inner surface.

▶B◀ O-RING INSTALLATION <4M4>

Apply water around the O-ring before installing it.

Caution

Be careful not to contaminate the O-ring with engine oil or grease.

▶C◀ RADIATOR UPPER HOSE CONNECTION

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.