ENGINE <4D5>

Click on the applicable bookmark to selected the required model year.

ENGINE <4D5>

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GENERAL INFORMATION

Items			4D56
Total displacement mL			2,477
Bore x Stroke mm			91.1 x 95.0
Compression ratio			21
Combustion chamber			Vortex chamber type
Camshaft arrangement			SOHC
Number of valve	Intake		4
	Exhaust		4
Valve timing	Intake	Opening	BTDC 20°
	Exhaust	Closing	ABDC 49°
	Intake	Opening	BBDC 55°
	Exhaust	Closing	ATDC 22°
Fuel system			Distribution type injection pump
Rocker arm			Roller type
Adjusting screw			Elephant foot type

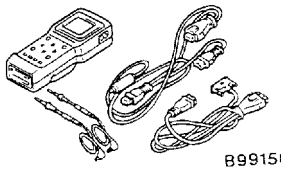
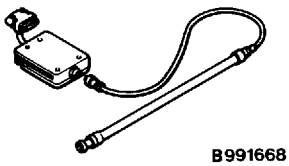
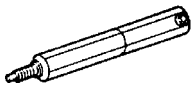
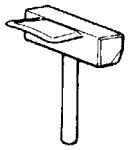
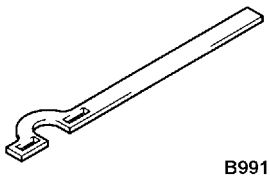
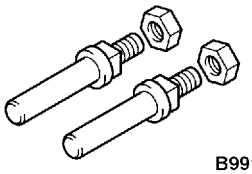
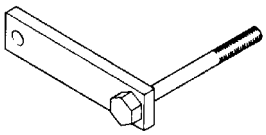
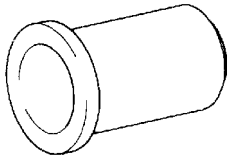
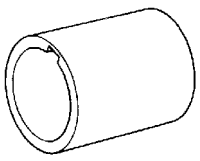
SERVICE SPECIFICATIONS

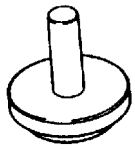
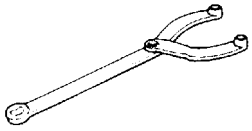
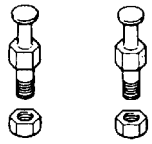
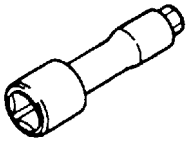
Items		Standard value	Limit
A/C compressor drive belt (When inspection)	Vibration frequency Hz	157 - 176	–
	Tension N	260 - 325	–
	Deflection mm <Reference>	8.0 - 8.5	–
A/C compressor drive belt (When adjustment)	Vibration frequency Hz	157 - 176	–
	Tension N	260 - 325	–
	Deflection mm <Reference>	8.0 - 8.5	–
A/C compressor drive belt (When replacement)	Vibration frequency Hz	192 - 208	–
	Tension N	390 - 450	–
	Deflection mm <Reference>	6.5 - 7.0	–
Valve clearance (at hot) mm		0.25	-
Injection timing (Value indicated on dial gauge mm)		9° ATDC (1 ± 0.03)	-
Idle speed r/min		750 ± 100	-
Compression pressure kPa (at engine speed of 280 r/min)		3,040	Min. 2,256
Compression pressure difference of all cylinder (at engine speed of 280 r/min) kPa		-	Max. 294
Timing belt tension mm		4 - 5	
Timing belt B tension mm		4 - 5	

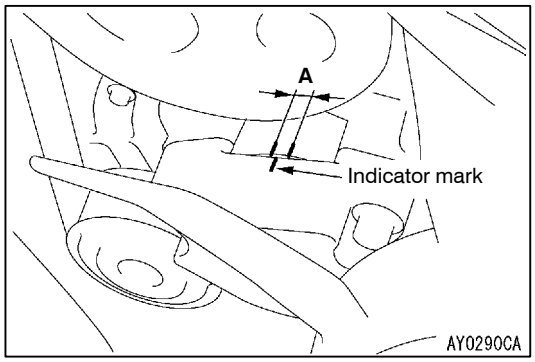
SEALANTS

Items	Specified sealant	Remarks
Oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant
Semi-circular packing and rocker cover gasket seal, and cylinder head seal	3M ATD Part No. 8660 or equivalent	

SPECIAL TOOLS

Tools	Number	Name	Use
 B991502	MB991502	MUT-II sub-assembly	Drive belt tension measurements
 B991668	MB991668	Belt tension meter set	
	MD998384	Prestroke measuring adapter	Adjustment of the injection timing
	MD998727	Oil pan remover	Removal of oil pan
 B991800	MB991800	Crankshaft pulley holder	Holding the crankshaft pulley
 B991802	MB991802	Pin B	
	MD998781	Flywheel stopper	Securing the flywheel
	MD998382	Crankshaft front oil seal installer	Installing the crankshaft front oil seal
	MD998383	Crankshaft front oil seal guide	

Tools	Number	Name	Use
	MD998376	Crankshaft rear oil seal installer	Press-fitting the crankshaft rear oil seal
	MB990767	End yoke holder	Holding the camshaft sprocket
	MD998719	Crankshaft pulley holder pin	
	MD998381	Camshaft oil seal installer	Installing the camshaft oil seal
	MD998051	Cylinder head bolt wrench	Removal and installation of the cylinder head bolt



ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK AND ADJUSTMENT

ALTERNATOR AND POWER STEERING OIL PUMP DRIVE BELT TENSION CHECK

Caution
Perform the check after rotating the engine to the normal direction (one revolution and over).

1. Check that the indicator mark of the auto-tensioner is located within the scope shown as “A” on the tensioner bracket.
2. If the mark is located out of the scope “A,” replace the drive belt.

   NOTE
   Since the auto-tensioner is used, it is not necessary to adjust the tension of the belt.

A/C COMPRESSOR DRIVE BELT TENSION CHECK AND ADJUSTMENT <VEHICLES WITH A/C>

1. Check the drive belt tension by the following procedures.

Standard value:

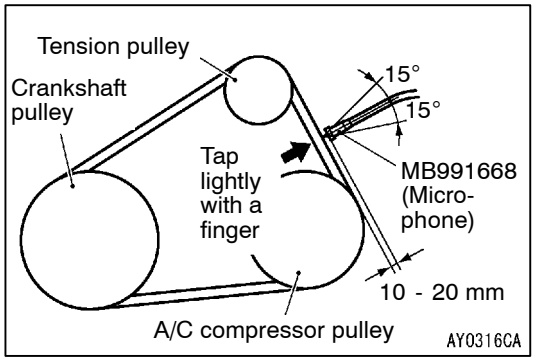
Item	During inspection	During adjustment	During replacement
Vibration frequency Hz	157 - 176	157 - 176	192 - 208
Tension N	260 - 325	260 - 325	390 - 450
Deflection mm <Reference>	8.0 - 8.5	8.0 - 8.5	6.5 - 7.0

<When using MUT-II>

(1) Connect the MUT-II to the special tool (MB991668).
(2) Connect the MUT-II to the diagnosis connector.

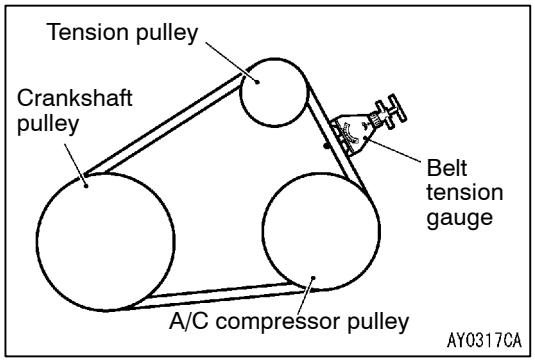
Caution
Always turn the ignition switch to LOCK (OFF) position before disconnecting or connecting the MUT-II.

(3) Turn the ignition switch to ON, and select the "Belt tension measurement" on the menu screen.

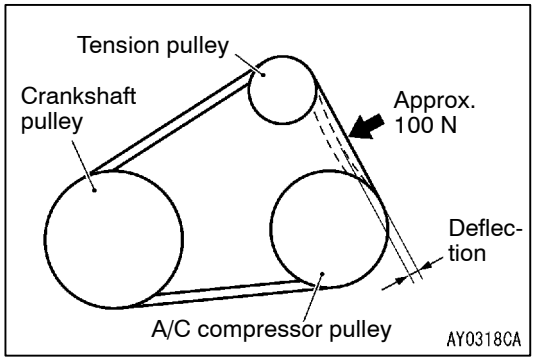


(4) Hold a microphone to the middle of the drive belt between the pulleys (at the place indicated by the arrow), approximately 10 - 20 mm away from the rear surface of the belt and so that it is perpendicular to the belt (within an angle of ±15°).
(5) Gently tap the middle of the belt between the pulleys (the place indicated by the arrow) with your finger as shown in the illustration, and check that the vibration frequency of the belt is within the standard value.

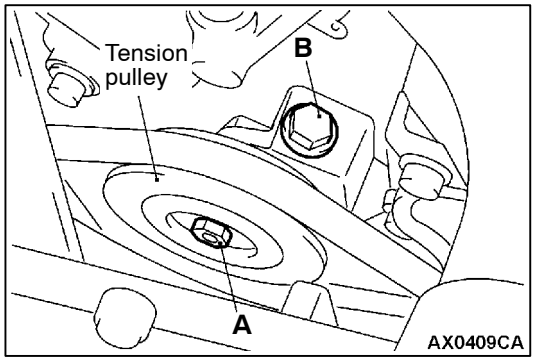
Caution
1) The temperature of the surface of the belt should be as close to normal temperature as possible.
2) Do not allow any contaminants such as water or oil to get onto the microphone.
3) If strong gusts of wind blow against the microphone or if there are any loud sources of noise nearby, the values measured by the microphone may not correspond to actual values.
4) If the microphone is touching the belt while the measurement is being made, the values measured by the microphone may not correspond to actual values.
5) Do not take the measurement while the vehicle's engine is running.



<When using a tension gauge>
Use a belt tension gauge to check that the belt tension is within the standard value.



<When checking the deflection>
Apply approx. 100 N of force to the middle of the drive belt between the pulleys (at the place indicated by the arrow) and check that the amount of deflection is within the standard value.

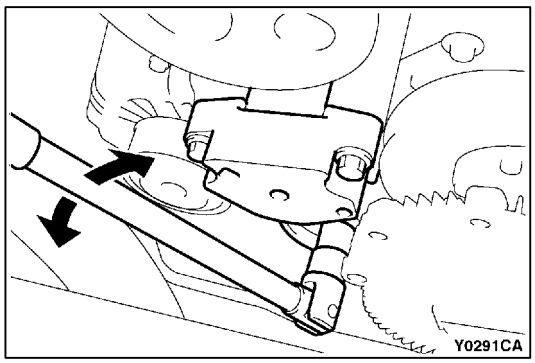


2. If not within the standard value, adjust the belt tension by the following procedure.
   (1) Loosen the tension pulley securing bolt A.
   (2) Use the adjusting bolt B to adjust the belt deflection.
   (3) Tighten the securing bolt A to the specified torque.

   Tightening torque: 44 ± 10 N·m

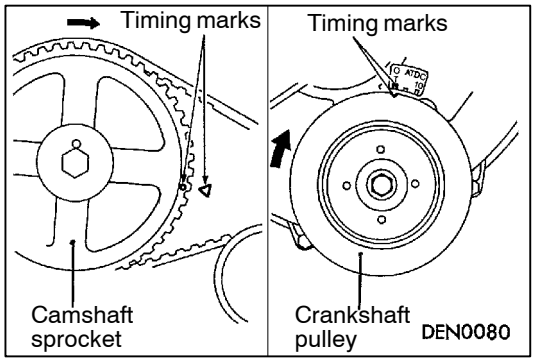
   (4) Check the belt tension, and readjust if necessary.

   Caution
   When checking the belt tension, turn the crankshaft clockwise one turn or more.



AUTO-TENSIONER CHECK

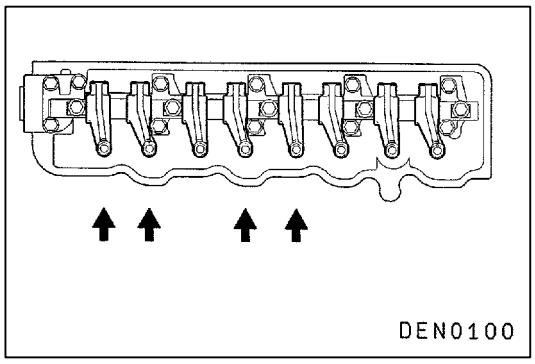
1. Run the engine at idling speed and then stop it to check whether the drive belt is forced out from the width of the auto-tensioner pulley.
2. Remove the alternator and power steering oil pump drive belt. (Refer P.11B-19.)
3. Locate a ring spanner onto the auto-tensioner pulley mounting bolt, and move the tensioner back and forth to confirm there is no stiffness.
4. If some abnormality is found during the above mentioned check (1) and (3), replace the auto-tensioner.
5. Install the alternator and power steering oil pump drive belt. (Refer P.11B-19.)



VALVE CLEARANCE CHECK AND ADJUSTMENT

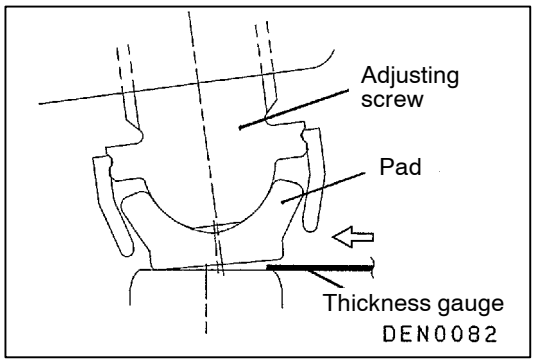
1. Start the engine and allow it to warm up until the engine coolant temperature reaches 80 to 90 °C.
2. Remove the timing belt upper cover.
3. Remove the rocker cover.
4. Align the camshaft sprocket timing marks and set the No. 1 cylinder at top dead centre.

Caution
The crankshaft should always be turned in a clockwise direction.

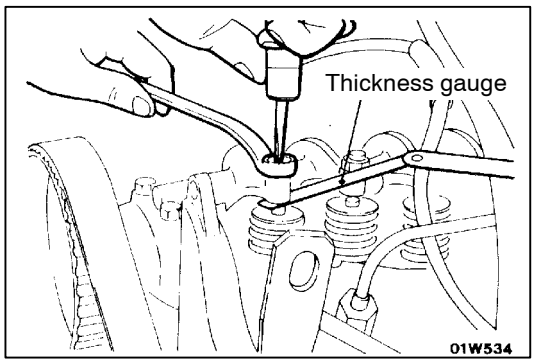


5. Measure the valve clearance at the places indicated by arrows in the illustration.

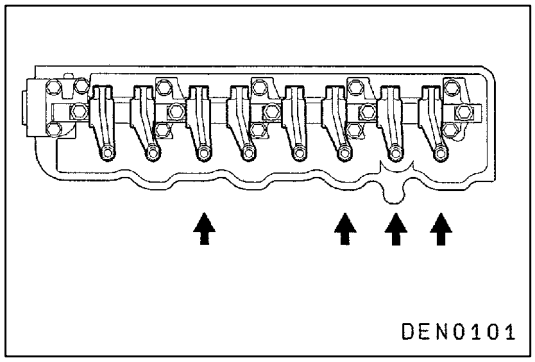
Standard value: 0.25 mm



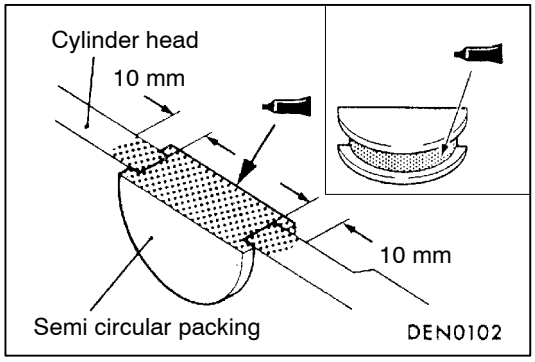
NOTE
Insert the thickness gauge from the centre of the cylinder head towards the outside so that it doesn't touch the pad.



6. If the clearance is outside the standard value, loosen the lock nut of the rocker arm and adjust by turning the adjusting screw while using a thickness gauge to measure the clearance.
7. Tighten the lock nut while holding the adjusting screw with a screwdriver so that it doesn't turn.
8. Turn the crankshaft 360° clockwise to bring No. 4 cylinder to the top dead centre position.



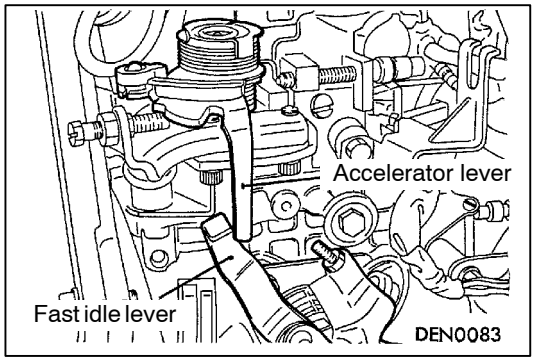
9. Measure the valve clearances at the places indicated by arrows in the illustration. If the clearance is not within the standard value, repeat steps 7 and 8 above.



10. Apply specified sealant to the section of the semi-circular packing shown in the illustration.

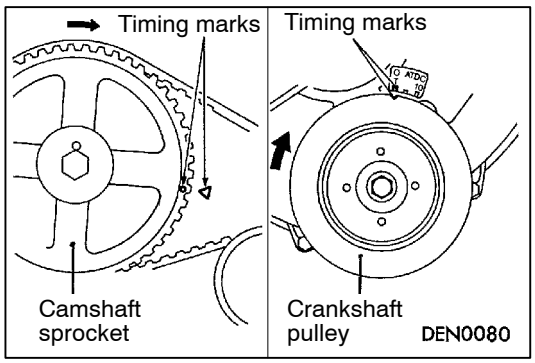
    Specified sealant: 3M ATD Part No. 8660 or equivalent

11. Install the rocker cover.
12. Install the timing belt upper cover.

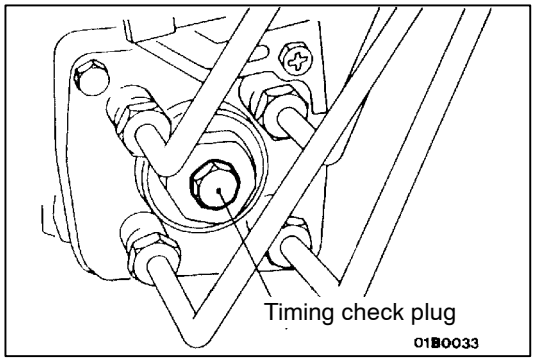


INJECTION TIMING CHECK AND ADJUSTMENT

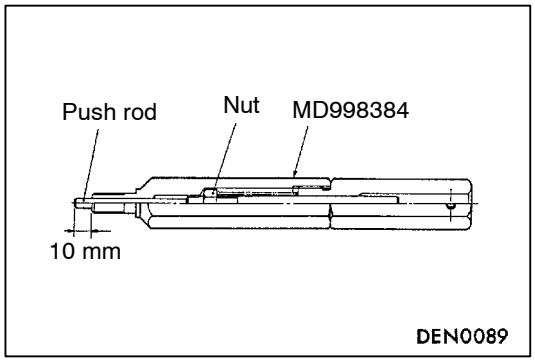
1. Warm up the engine and then check to be sure that the fast idle lever is separated from the accelerator lever.
2. Remove all of the glow plugs.
3. Remove the timing belt upper cover.



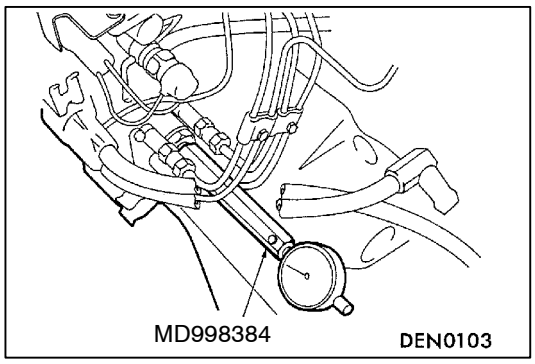
4. Align the timing marks of the camshaft sprocket and set the No. 1 cylinder to the top dead centre position.



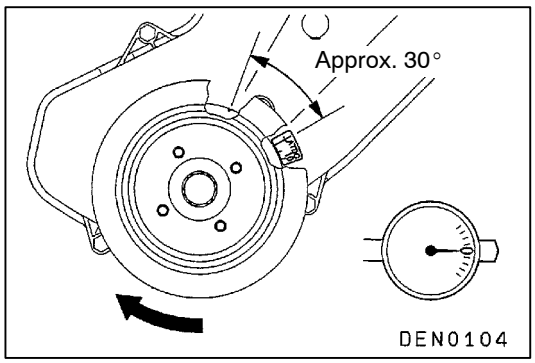
5. Remove the timing check plug at the rear of the injection pump.



6. Before installation of special tool, make sure that push rod is protruding by 10 mm. Protrusion of push rod can be adjusted with an inner nut.
7. Connect the dial gauge to the special tool.

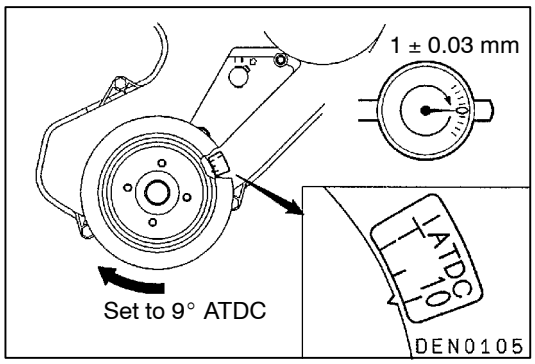


8. Install the special tool to the check plug at the rear of the injection pump.



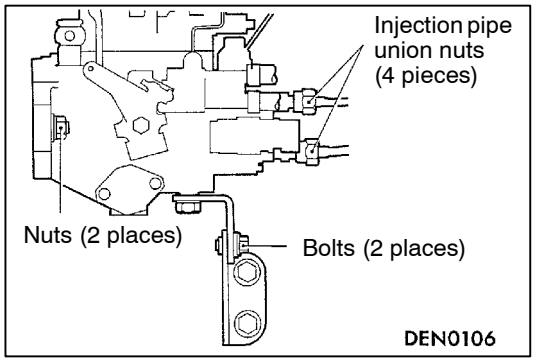
9. Turn the crankshaft clockwise to move the No. 1 cylinder approximately 30° before compression top dead centre.
10. Set the needle of the dial gauge to 0.
11. Check that the needle doesn't move even if the crankshaft is turned slightly (2 - 3°) in both clockwise and counterclockwise direction.

    NOTE
    If the needle moves, the notch is not positioned properly, so once again move the No. 1 cylinder approximately 30° before compression top dead centre.



12. Turn the crankshaft clockwise to align the No. 1 cylinder to 9° ATDC.
13. Check that the value indicated on the dial gauge is at the standard value.

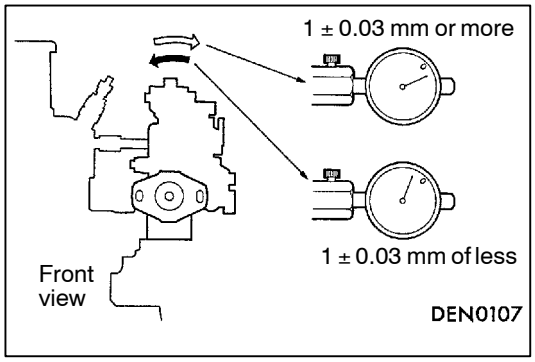
    Standard value: 1 ± 0.03 mm



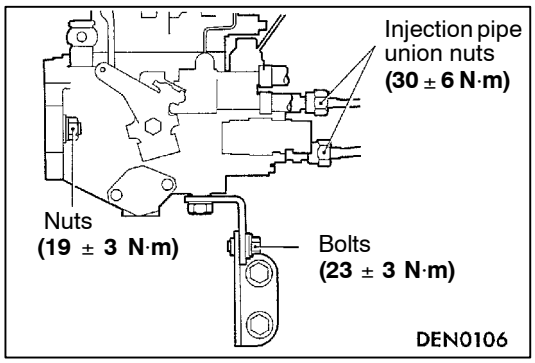
14. If the needle is outside the standard value, adjust the injection timing by the following procedure.
    (1) Loosen the injection pipe union nuts (4 places) on the injection pump. (Do not remove the union nuts.)

    Caution
    When loosening the nuts, hold the delivery valve holders with a spanner so that they don't turn at the same time.

    (2) Loosen the upper mounting nuts and the lower mounting bolts of the injection pump. (Do not remove the nut and bolt.)

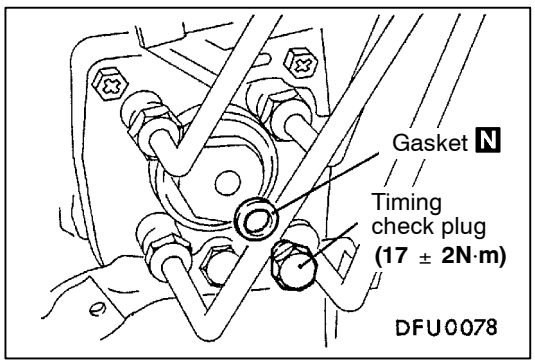


    (3) Tilt the injection pump to the left and right and adjust the needle on the dial gauge so that the display value is uniform.
    (4) Provisionally tighten the mounting nut and bolt of the injection pump.
    (5) Repeat steps 9 - 13 to check if the adjustment has been made correctly.



    (6) Tighten the mounting nuts and bolts to the specified torque.
    (7) Tighten the injection pump union nuts to the specified torque.

    Caution
    When tightening the nuts, hold the delivery valve holders with a spanner so that they don't turn at the same time.

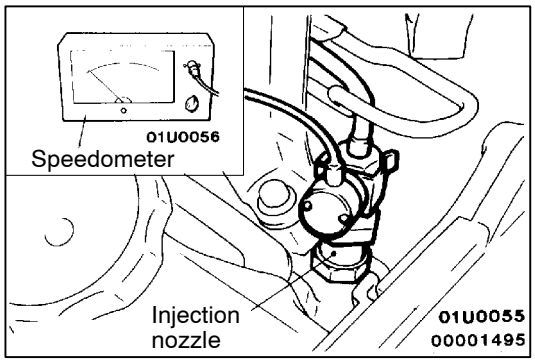


15. Remove the special tool.
16. Install a new gasket to the timing check plug.
17. Tighten the timing check plug to the specified torque.

IDLE SPEED CHECK AND ADJUSTMENT

NOTE
Check that the injection timing is normal

1. Before inspection, set the vehicle to the pre-inspection condition.

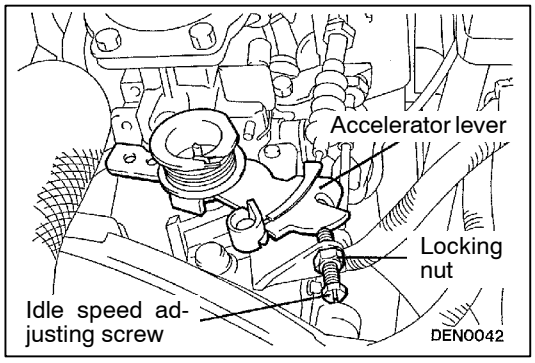


2. Connect the speedometer to the injection nozzle or the injection pipe.

   Caution
   When the speedometer is connected to the injection pipe, the pipe mounting clamps should all be removed.

3. Start the engine and run it at idle.
4. Check the idle speed.

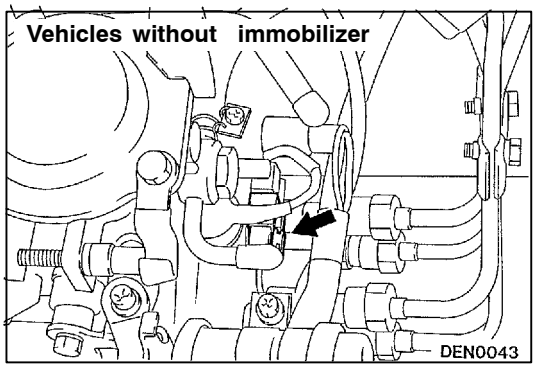
   Standard value: 750 ± 100 r/min



5. If not within the standard value, loosen idle adjusting screw lock nut and adjust the idle speed by rotating adjusting screw. And tighten locking nut.

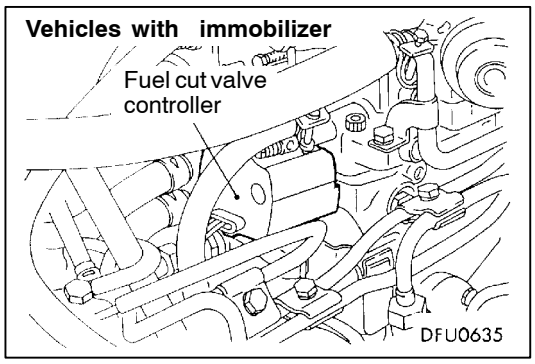
IDLE-UP MECHANISM CHECK AND ADJUSTMENT-FOR A/C

Refer to GROUP 55 - On-vehicle Service.



COMPRESSION PRESSURE CHECK

1. Before inspection, check that the engine oil, starter and battery are normal. In addition, set the vehicle to the pre-inspection condition.
2. Remove all of the glow plugs.

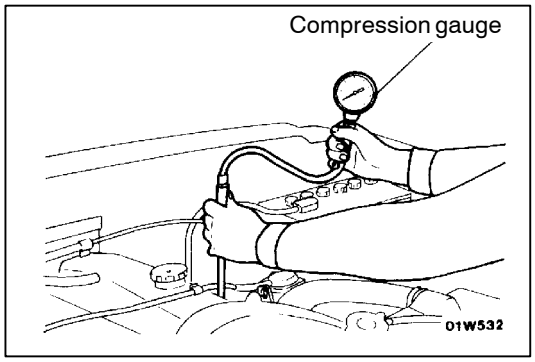


3. Disconnect the fuel cut solenoid valve connector. <Vehicles without immobilizer> Disconnect the fuel cut valve controller connector. <Vehicles with immobilizer>

   NOTE
   Doing this will prevent carrying out fuel injection.

4. Cover the glow plug hole with a shop towel etc., and after the engine has been cranked, check that no foreign material is adhering to the shop towel.

   Caution
   (1) Keep away from the glow plug hole when cranking
   (2) If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from glow plug hole, which is dangerous.



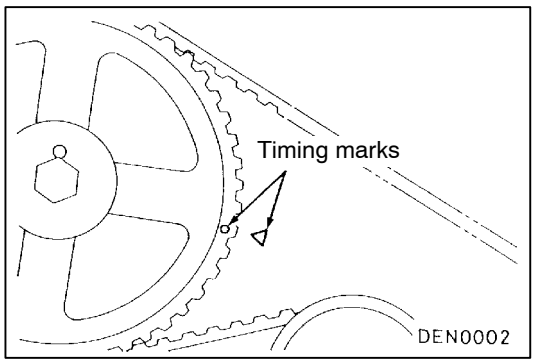
5. Set compression gauge to one of the glow plug holes.
6. Crank the engine and measure the compression pressure.

   Standard value (at engine speed of 280 r/min): 3,040 kPa

   Limit (at engine speed of 280 r/min): min. 2,256 kPa
7. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

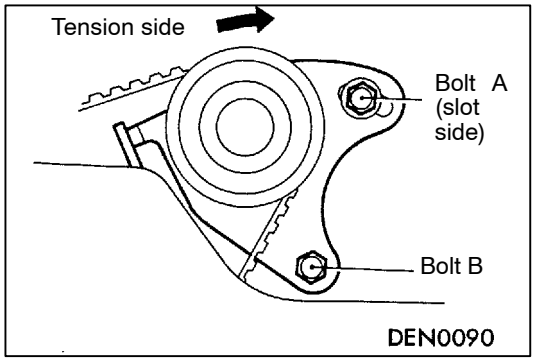
   Limit: max 294 kPa
8. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the glow plug hole, and repeat the operations in steps (6) and (7).
   (1) If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
   (2) If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.
9. Connect the fuel cut solenoid valve connector or fuel cut valve controller connector.
10. Install the glow plugs.

    Tightening torque: 18 ± 2 N·m



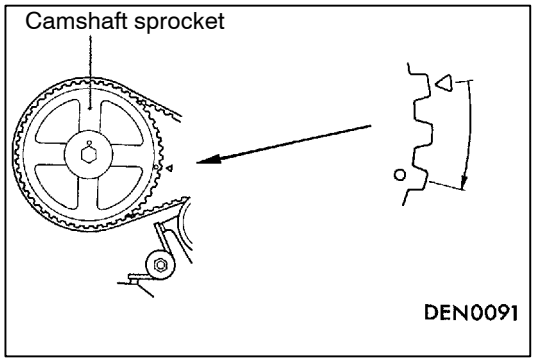
TIMING BELT TENSION ADJUSTMENT

1. Remove the timing belt upper cover.
2. Align the timing mark on the camshaft sprocket with the timing mark on the front upper case to set the No.1 cylinder to top dead centre of its compression stroke.



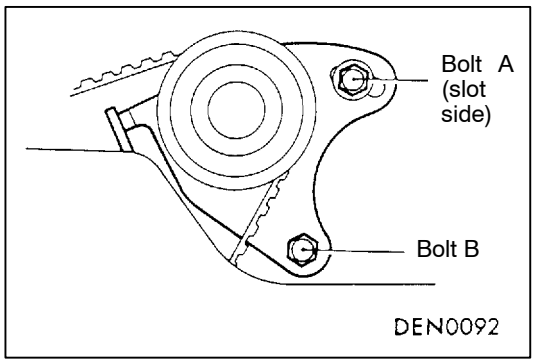
3. Loosen the two tensioner mounting bolts 1 or 2 turns.

   NOTE
   This will allow the tensioner spring to tension the timing belt automatically.



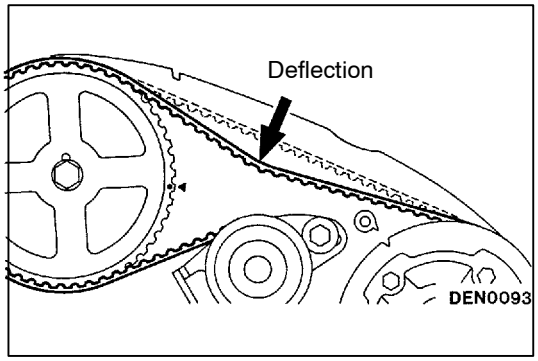
4. Turn the crankshaft clockwise and stop at the second teeth of the camshaft sprocket.

Caution
(1) This will allow the timing belt to be tensioned by a specified amount, so never overturn the crankshaft.
(2) Never turn the crankshaft counterclockwise.



5. To prevent the tensioner bracket from be turned together with the crankshaft, first tighten slot-side bolt A to the specified torque, and then tighten bolt B to the specified torque.

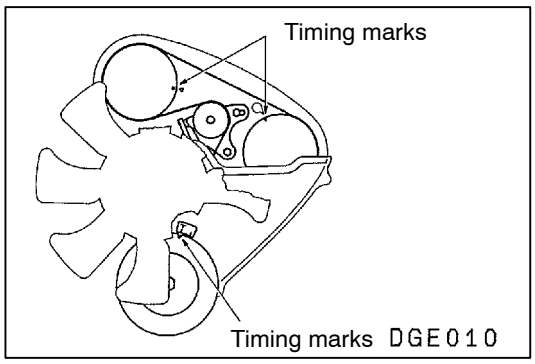
Tightening torque: 26 N·m



6. Turn the crankshaft counterclockwise to align the timing marks. Push down belt at a point halfway with a forefinger to check that defection of belt is up to standard value.

Standard value: 4.0 - 5.0 mm

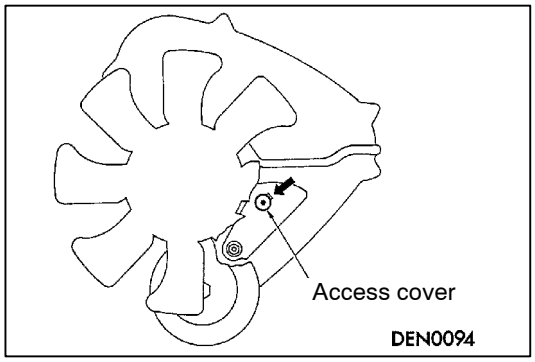
7. Mount the timing belt upper cover.



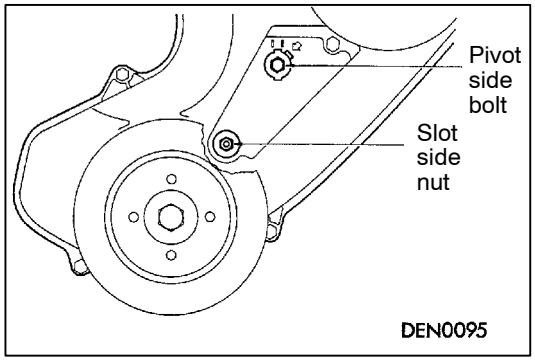
TIMING BELT B TENSION ADJUSTMENT

1. Remove timing belt upper cover.
2. Turn the crankshaft in the clockwise direction and check the timing belt around its entire circumference for abnormalities.
3. Align the timing marks on the sprockets with the timing mark on the front upper case.

Caution
When aligning the timing mark, be sure not to turn the crankshaft in the counterclockwise direction as this can cause improper belt tension.



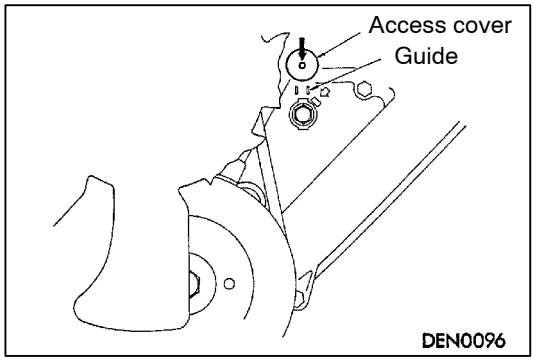
4. Remove the access cover.



5. Loosen the tensioner pivot side bolt 1 mm and slot side nut 1 or 2 turns.

   NOTE
   These works will allow the tensioner spring to tension timing belt B automatically.
6. First tighten tensioner slot side nut, and then tighten pivot side bolt to the specified torque.

   Tightening torque:
   Pivot side bolt 24 ± 4 N·m
   Slot side nut 23 ± 3 N·m

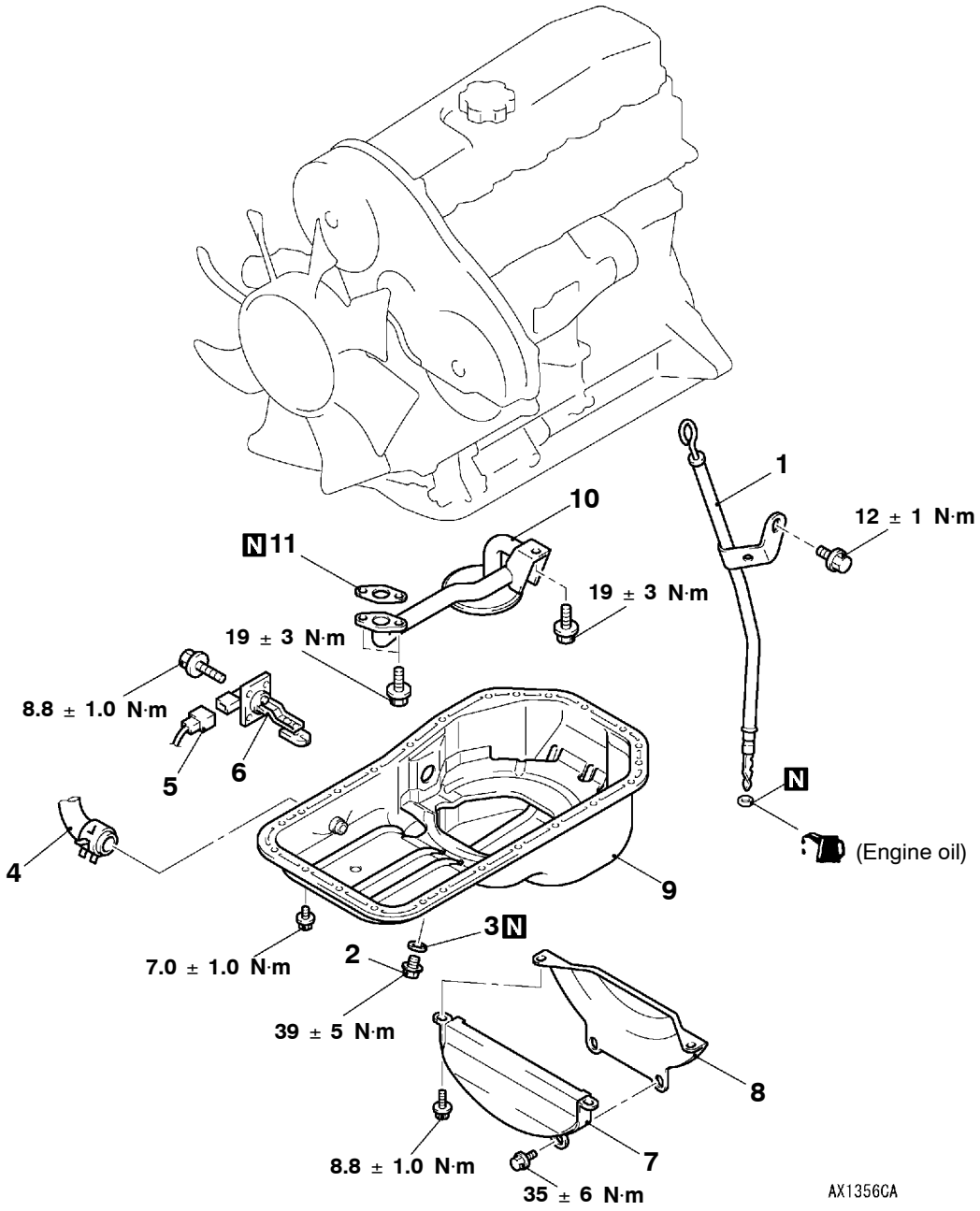


7. Install the access cover while sliding the front lower cover down along the two guides.
8. Install the timing belt upper cover.

OIL PAN AND OIL SCREEN

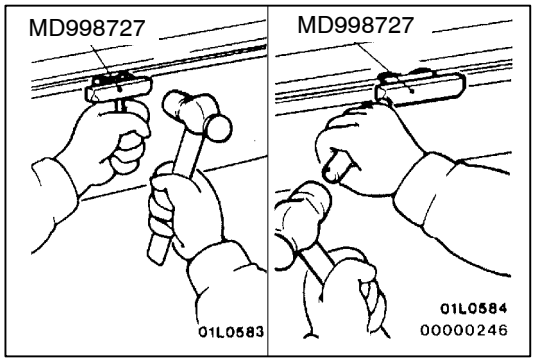
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Skid Plate and Under Cover Removal and Installation
- Engine Oil Draining and Supplying (Refer to GROUP 12 - On-vehicle Service.)
- Differential Gear Oil Draining and Supplying (Refer to GROUP 26 - On-vehicle Service.)
- Front Differential and No.2 Crossmember Assembly Removal and Installation (Refer to GROUP 11A - Oil Pan and Oil Screen.)



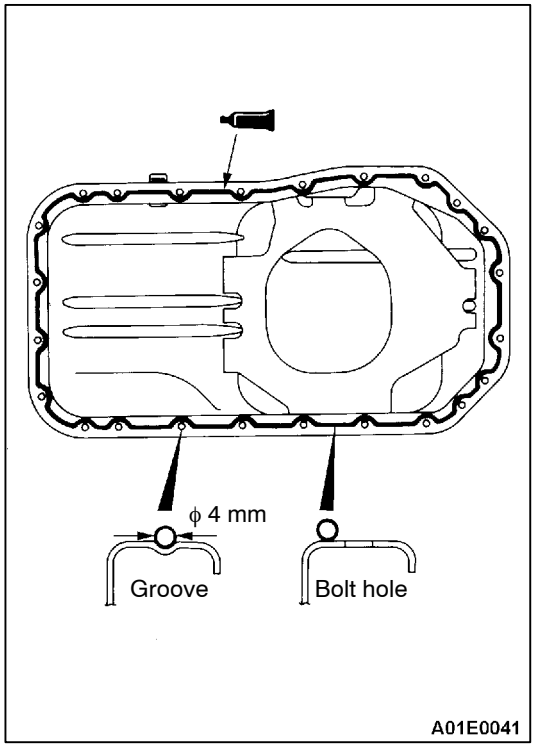
Removal steps

1. Engine oil level gauge and guide assembly
2. Drain plug
▶B◀ 3. Drain plug gasket
4. Alternator vacuum pump oil return hose connection
5. Oil level sensor connector
6. Oil level sensor
7. Space rubber
8. Bell housing cover
◀A▶ ▶A◀ 9. Oil pan
10. Oil screen
11. Oil screen gasket



REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL



INSTALLATION SERVICE POINTS

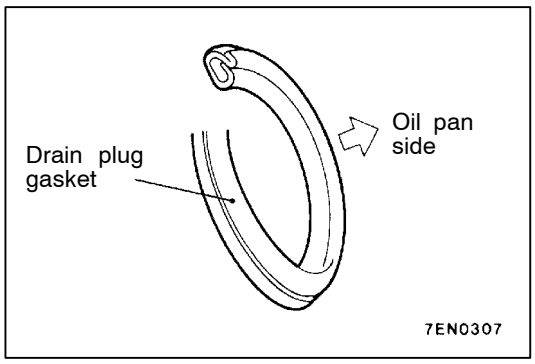
▶A◀ OIL PAN INSTALLATION

1. Remove sealant from oil pan and cylinder block mating surfaces.
2. Degrease the sealant-coated surface and the engine mating surface.
3. Apply a continuous bead of the specified sealant to the oil pan mating surface as shown.

   Specified sealant:
   MITSUBISHI GENUINE PART No. MD970389 or equivalent

   NOTE
   The sealant should be applied in a continuous bead approximately 4 mm in diameter.
4. Assemble oil pan to cylinder block within 15 minutes after applying the sealant.

   Caution
   After installing the oil pan, wait at least 1 hour before starting the engine.



▶B◀ DRAIN PLUG GASKET INSTALLATION

Install a new gasket in the direction so that it faces as shown in the illustration.

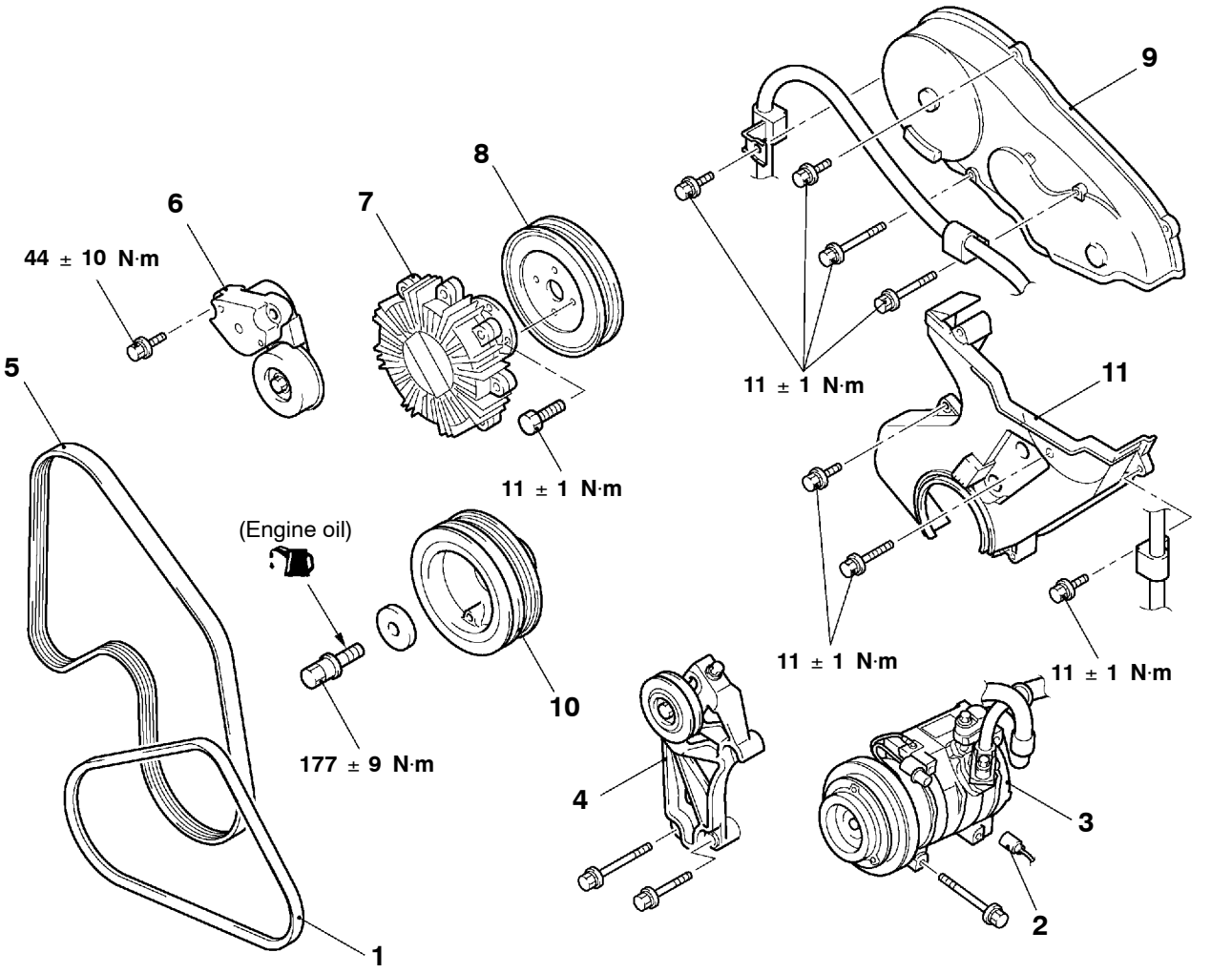
INSPECTION

- Check oil pan for cracks.
- Check oil pan sealant-coated surface for damage and deformation.
- Check oil screen for cracked, clogged or damaged wire net and pipe.

TIMING BELT AND TIMING BELT B

REMOVAL AND INSTALLATION

Post-installation Operation
Drive Belt Tension Check and Adjustment
(Refer to P.11B-5.)



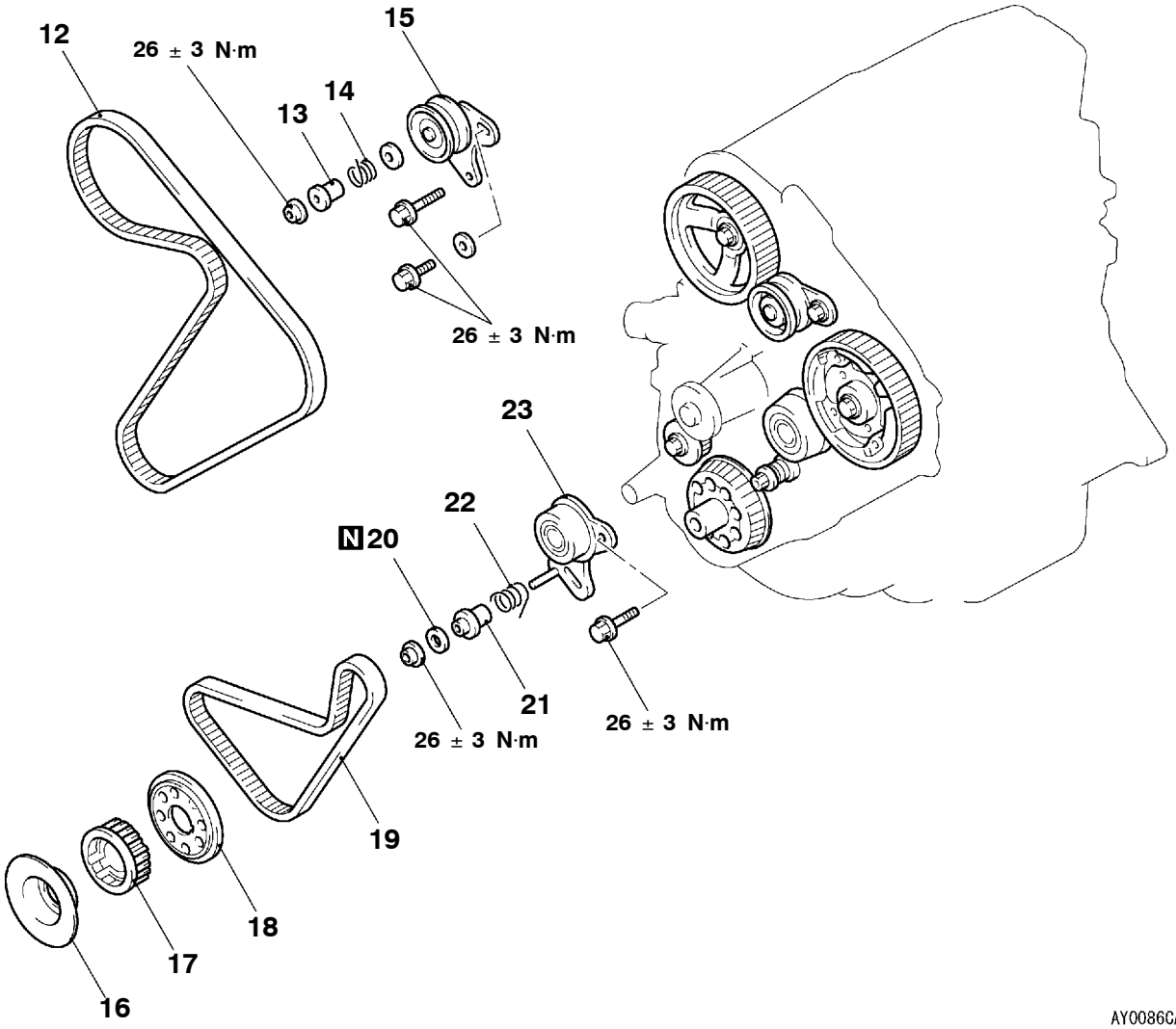
Removal steps

- Radiator upper shroud (Refer to GROUP 14.)

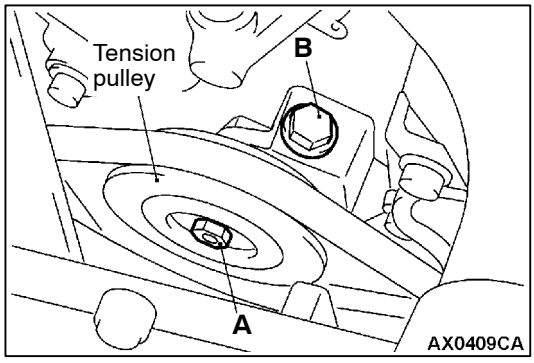
◀A▶ 1. A/C compressor drive belt <Vehicles with A/C>
2. A/C compressor connector <Vehicles with A/C>
◀B▶ 3. A/C compressor <Vehicles with A/C>
4. Tension pulley and tension pulley bracket assembly <Vehicles with A/C>

- Cooling fan (Refer to GROUP 14.)

◀C▶ 5. Alternator and power steering oil pump drive belt
6. Auto-tensioner
7. Fan Clutch
8. Water pump pulley
▶C◀ 9. Timing belt front upper cover
◀D▶ 10. Crankshaft pulley
▶C◀ 11. Timing belt front lower cover



◀E▶ ▶B◀ 12. Timing belt
13. Tensioner spacer
14. Tensioner spring
15. Timing belt tensioner
16. Front flange
17. Crankshaft sprocket
18. Flange
◀F▶ ▶A◀ 19. Timing belt B
20. Gasket
21. Tensioner spacer B
22. Tensioner spring B
23. Timing belt tensioner B



REMOVAL SERVICE POINTS

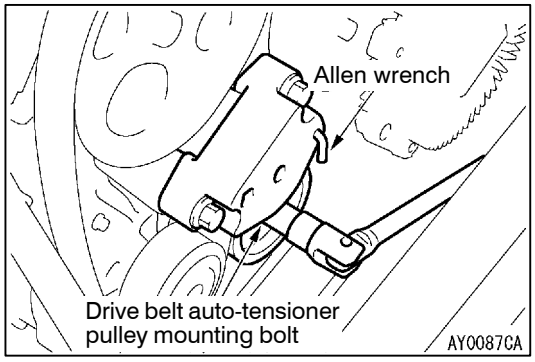
◀A▶ A/C COMPRESSOR DRIVE BELT REMOVAL

1. Loosen the tension pulley securing bolt A.
2. Loose the adjusting bolt B to remove the belt.

Caution
To reuse the drive belt, mark its running direction (clockwise direction) on the belt back side with a chalk.

◀B▶ A/C COMPRESSOR REMOVAL

1. Remove the A/C compressor from the bracket with its refrigerant hoses still attached.
2. Suspend the A/C compressor with a cord out of the way.

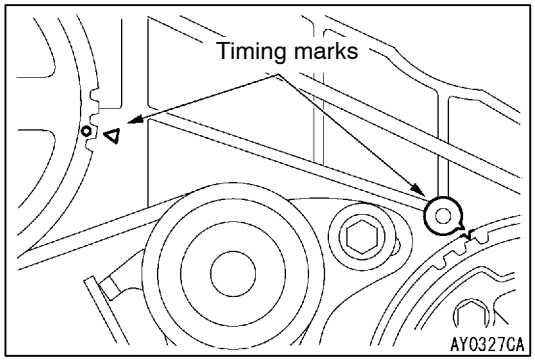


◀C▶ALTERNATOR AND POWER STEERING PUMP DRIVE BELT REMOVAL

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

1. Locate a ring spanner onto the drive belt auto-tensioner pulley mounting bolt, and move the tensioner clockwise until it touches the stopper.
2. Hold the tensioner by inserting an Allen wrench as shown, and remove the drive belt.

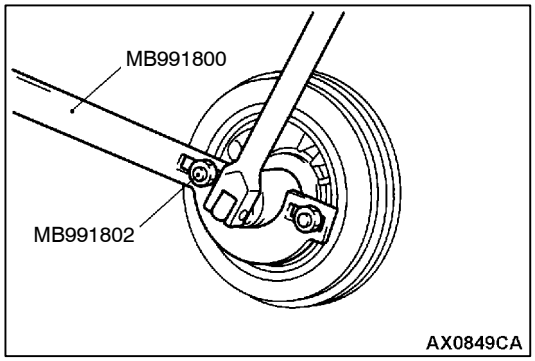
Caution
To reuse the drive belt, mark its running direction (clockwise direction) on the belt back side with a chalk.



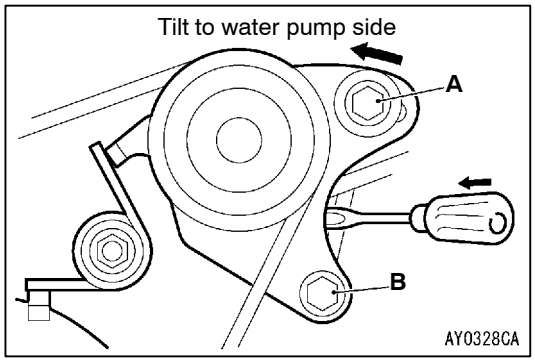
◀D▶ CRANKSHAFT PULLEY REMOVAL

1. Turn the crankshaft clockwise, align the timing marks to set No.1 cylinder to TDC of its compression stroke.

Caution
Never turn the crankshaft anticlockwise.

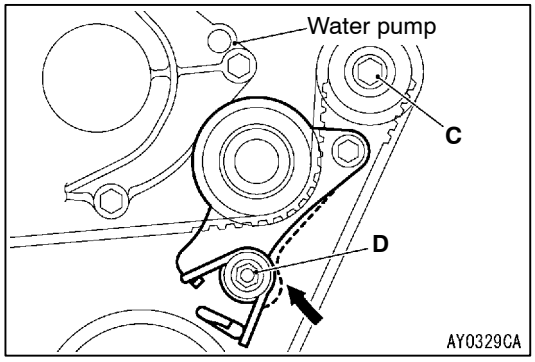


2. Use the special tool to keep crankshaft from turning and remove the bolts.



◀E▶ TIMING BELT REMOVAL

1. When reinstalling timing belt, mark an arrow at the belt to show rotation direction.
2. Loosen the tensioner mounting bolt A and B.
3. Push timing belt tensioner to water pump side and tighten the tensioner mounting bolt A and B. Secure so that tensioner will not move back.

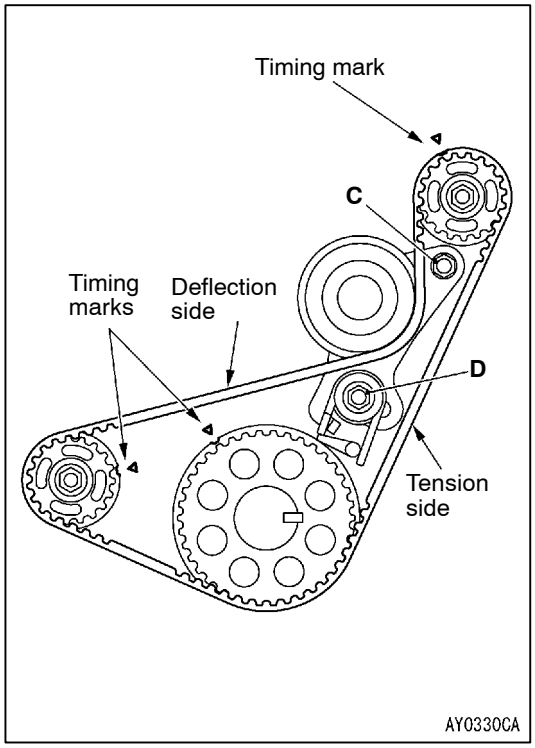


◀F▶ TIMING BELT B REMOVAL

1. When reinstalling timing belt B, mark an arrow at the belt to show rotation direction.
2. Loosen the tensioner mounting bolt C and nut D.
3. Push timing belt tensioner to water pump side and tighten the tensioner mounting bolt C and nut D. Secure so that tensioner will not move back.

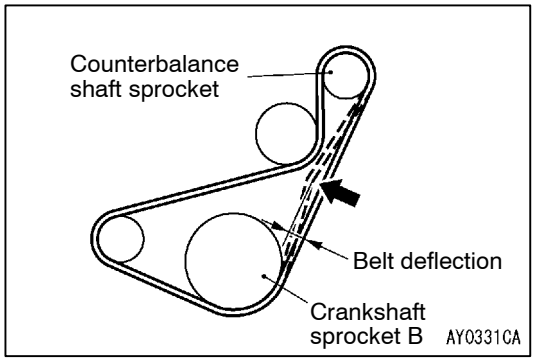
INSTALLATION SERVICE POINTS

▶A◀ TIMING BELT B INSTALLATION



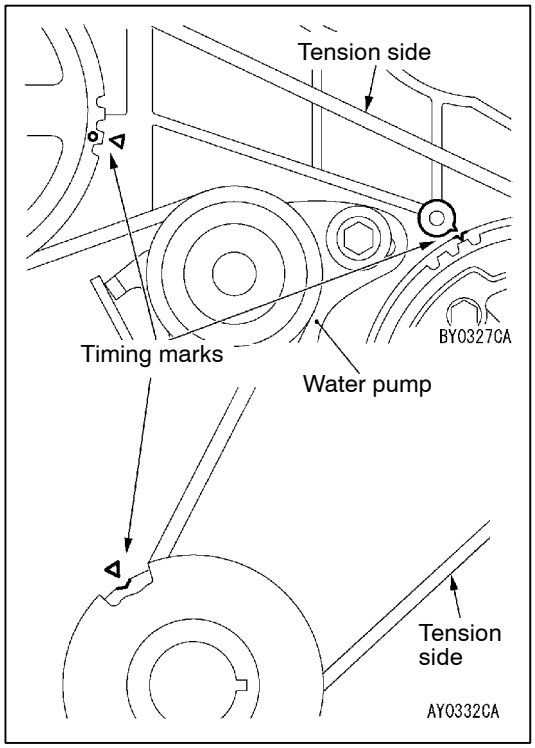
1. Align the timing marks of the 3 sprockets.
2. When reusing timing belt B, make sure the arrow mark is pointing in the same direction as when the belt was removed.
3. Install timing belt B and make sure there is no deflection on the tension side.
4. Press the deflection side of timing belt B with the hand and fully stretch the tensioner side.
5. Make sure that the timing marks are aligned.
6. Loosen the tensioner mounting bolt and nut so that only the pressure of the spring is applied to timing belt B.
7. Tighten the tensioner mounting bolt C and nut D, tightening the nut first. If the bolt is tightened first, the tensioner will move and tension the belt.

   Tightening torque: 26 ± 3 N·m



8. Press in the direction of the arrow in the figure with the index finger to check the amount of deflection.

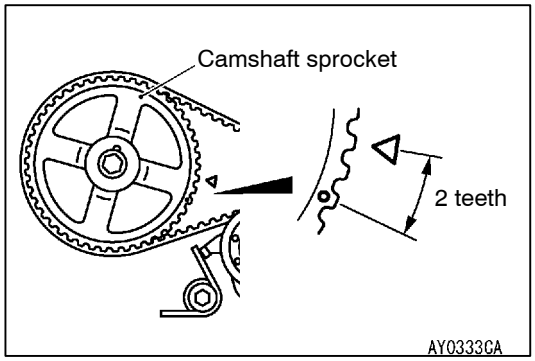
   Standard value: 4 - 5 mm



▶B◀ TIMING BELT INSTALLATION

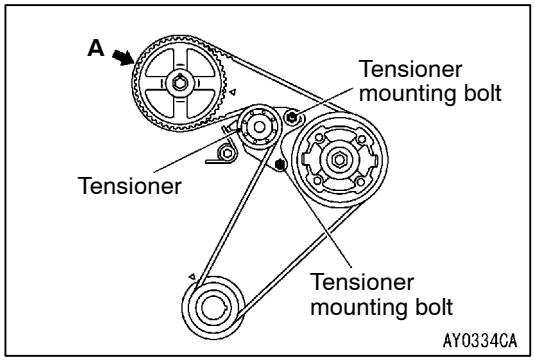
1. Align the timing marks of the 3 sprockets.
2. When reusing timing belt, make sure the arrow mark is pointing in the same direction as when the belt was removed.
3. Install the timing belt to the crankshaft sprocket, to injection pump sprocket, to tensioner and to camshaft sprocket in that order. Being careful not to allow deflection on the tension side of the timing belt.

   Caution
   (1) Engage the belt on the various sprockets while maintaining tension on the belt of tension side.
   (2) Align the injection pump sprocket with the timing mark, hold the sprocket so that is does not turn and engage the belt.
4. Loosen the tensioner mounting bolts and apply tension with the spring.

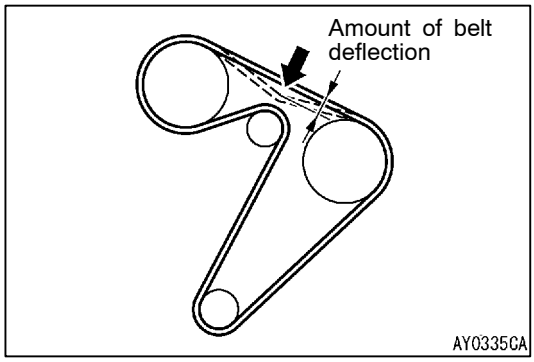


5. Turn the crankshaft clockwise and stop at the second lobe of the camshaft sprocket.

   Caution
   (1) When turning the crankshaft in item (5), strictly observe the specified amount of rotation (2 teeth on the camshaft sprocket) in order to apply a constant force to the tension side of the belt.
   (2) Do not turn the crankshaft counterclockwise.
   (3) Do not touch the belt during adjustment.

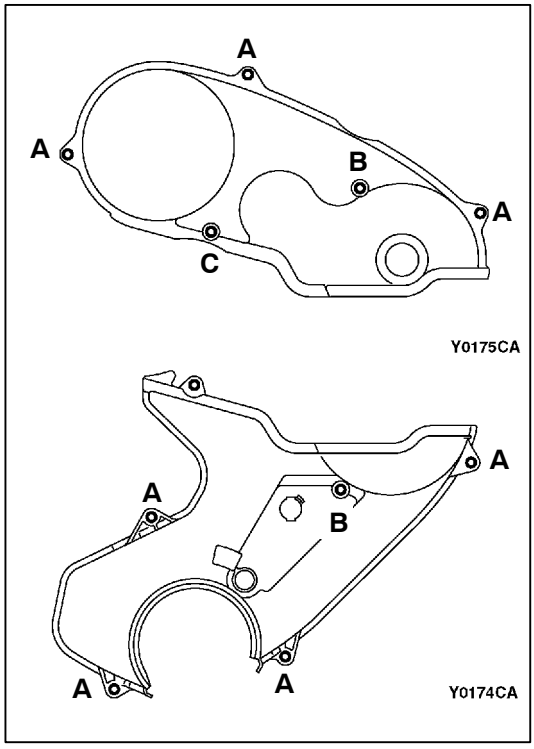


6. Make sure that the part indicated by arrow A does not float upward.
7. Tighten the tensioner mounting bolts, starting with the bolt in the elongated hole. If the lower bolt is tightened first, belt tension will become too tight.
8. Turn the crankshaft anticlockwise and align the timing mark. Next, make sure that the timing marks of all sprockets are aligned.



9. Press on the center of the bolt with an index finger to check the amount of deflection.

   Standard value: 4 - 5 mm



▶C◀ TIMING BELT FRONT LOWER COVER/TIMING BELT FRONT UPPER COVER INSTALLATION

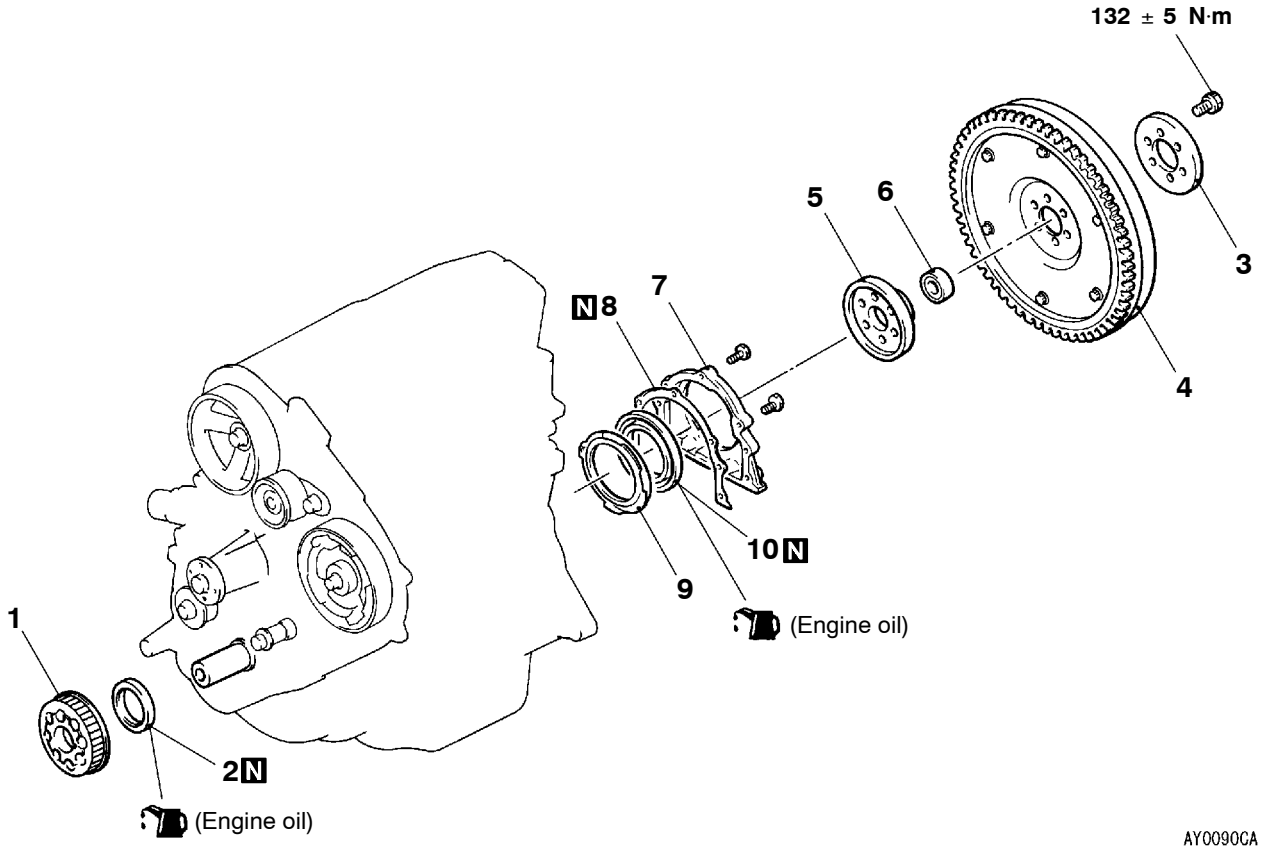
Install the bolts to the timing belt cover at the shown positions.

Name	Symbols	Size mm (d × l)
Flange bolt	A	6 × 22
	B	6 × 50
	C	6 × 60

d=Nominal diameter
l=Nominal length

CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION



Crankshaft front oil seal removal steps

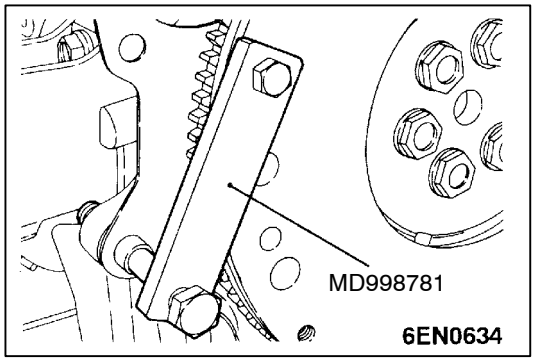
- Timing belt and timing belt B removal and installation (Refer to P.11B-19.)

1. Crankshaft sprocket B
▶D◀ 2. Crankshaft front oil seal

Crankshaft rear oil seal removal steps

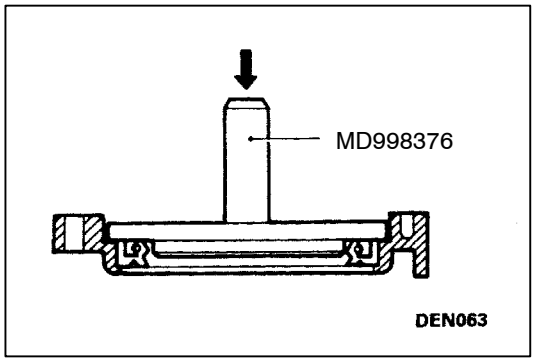
- Transmission assembly (Refer to GROUP 22.)

3. Adapter plate
◀A▶ ▶C◀ 4. Flywheel assembly
5. Crankshaft adaptor
6. Ball bearing
7. Oil seal case
8. Gasket
▶B◀ 9. Oil separator
▶A◀ 10. Crankshaft rear oil seal



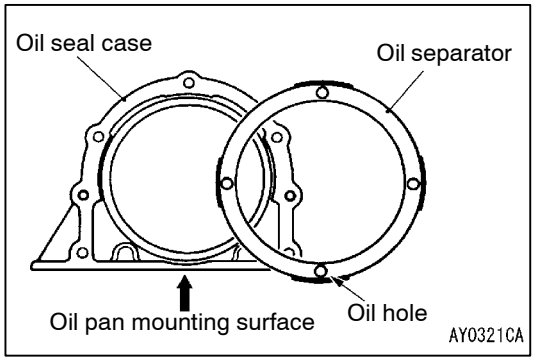
REMOVAL SERVICE POINTS

◀A▶ FLYWHEEL ASSEMBLY REMOVAL



INSTALLATION SERVICE POINTS

▶A◀ CRANKSHAFT REAR OIL SEAL INSTALLATION



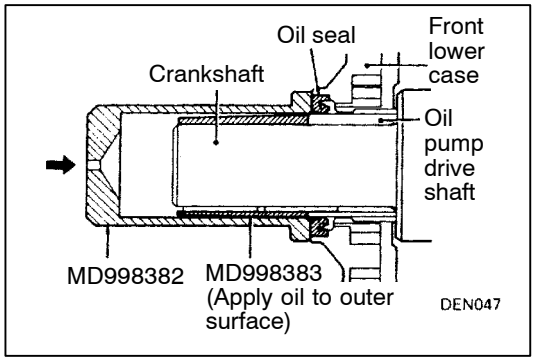
▶B◀ OIL SEPARATOR INSTALLATION

Install the oil separator in such a way that its oil hole come at the case bottom (indicated by an arrow in the illustration).

▶C◀ FLYWHEEL ASSEMBLY INSTALLATION

Use the special tool in the same way as during removal to stop the flywheel assembly from turning, and then tighten the bolt to the specified torque.

Tightening torque: 132 ± 5 N·m



▶D◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION

Apply engine oil to the outside of the special tool (MD998383) and to the oil seal lip, and use the special tool to press-fit the oil seal.

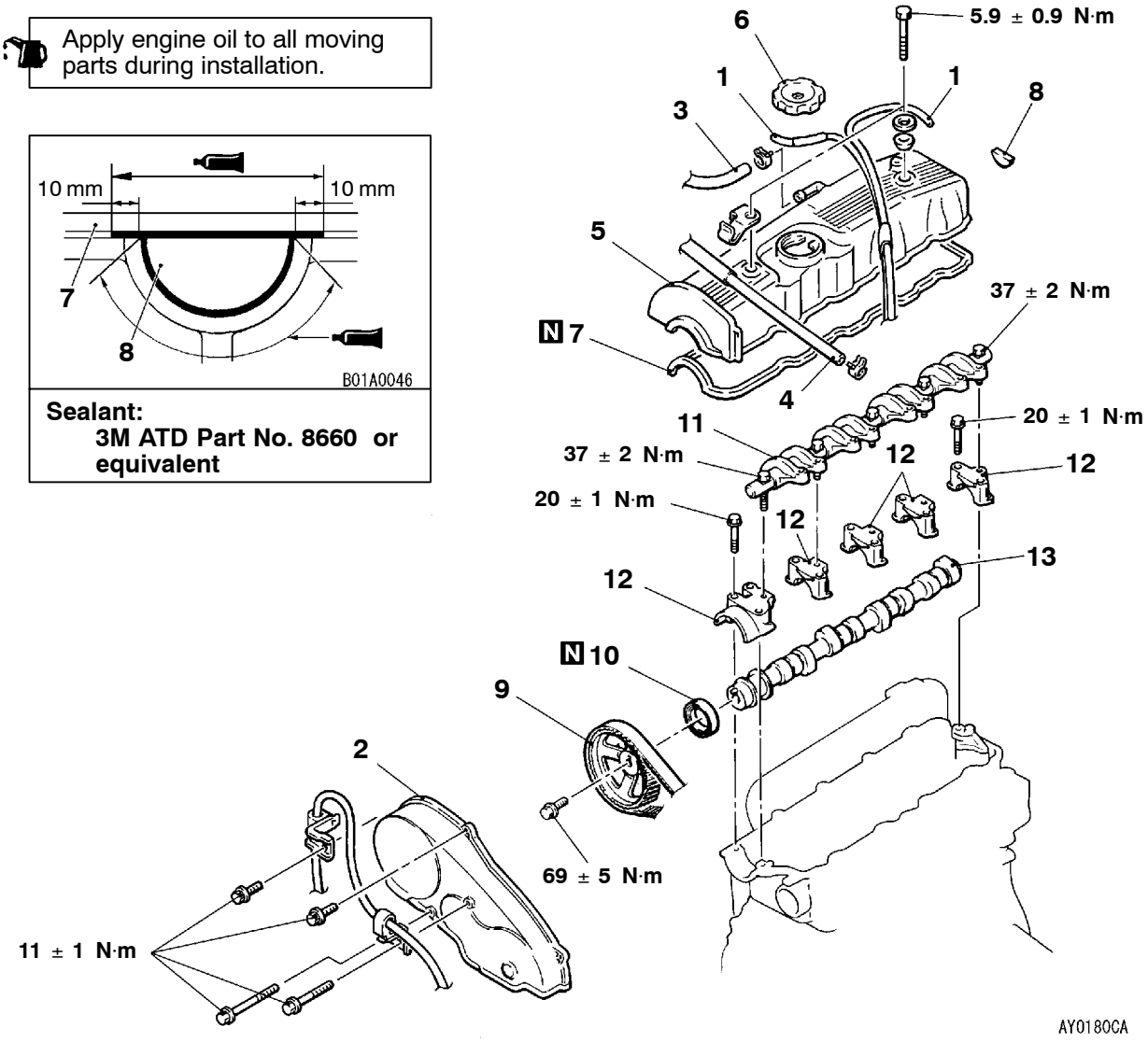
CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Air Pipe and Air Intake Hose Removal and Installation (Refer to GROUP 15 - Intake Manifold and Exhaust manifold, Turbocharger <4D5>.)

Apply engine oil to all moving parts during installation.

Sealant:
3M ATD Part No. 8660 or equivalent



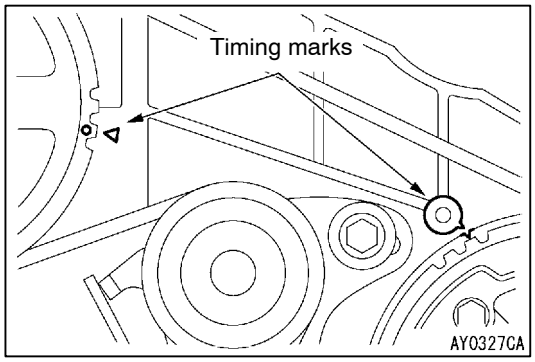
Camshaft removal steps

1. Vacuum hose connection
▶E◀ 2. Timing belt front upper cover
3. Breather hose connection
4. Boost hose connection
5. Rocker cover
6. Oil filler cap
7. Rocker cover gasket
8. Semi-circular packing
   - Valve clearance adjustment (Refer to P.11B-8.)

◀A▶ ▶D◀ 9. Camshaft sprocket
▶C◀ 10. Camshaft oil seal
◀B▶ ▶B◀ 11. Rocker arm and shaft assembly
▶A◀ 12. Camshaft bearing cap
13. Camshaft

Camshaft oil seal removal steps

▶E◀ 2. Timing belt upper cover assembly
◀A▶ ▶D◀ 9. Camshaft sprocket
▶C◀ 10. Camshaft oil seal

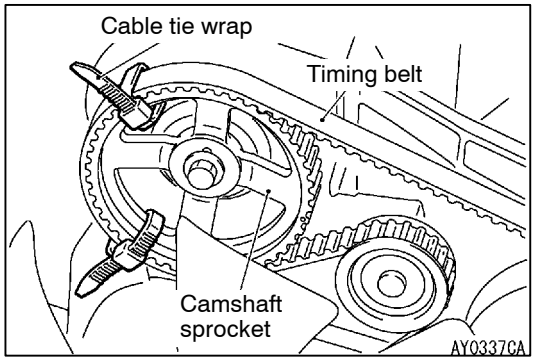


REMOVAL SERVICE POINTS

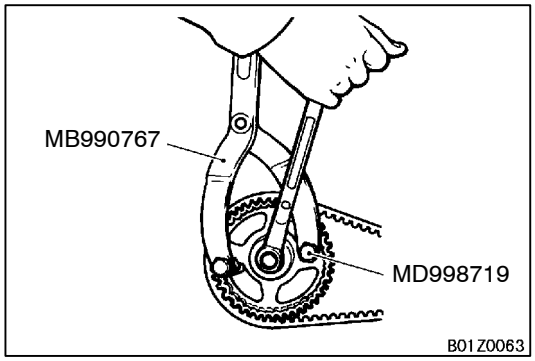
◀A▶ CAMSHAFT SPROCKET REMOVAL

1. Turn the crankshaft clockwise, align the timing marks to set No.1 cylinder to TDC of its compression stroke.

   Caution
   Never turn the crankshaft anticlockwise.



2. Tie the camshaft sprocket and timing belt together with a cable tie wrap so that timing mark is not maladjusted.



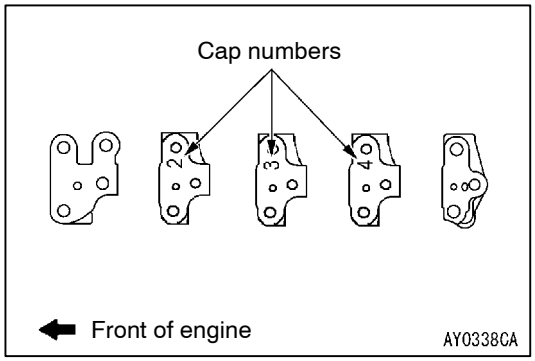
3. Use the special tool to stop the camshaft sprocket from turning, and then remove the camshaft sprocket with the timing belt still attached.

   Caution
   Do not rotate crankshaft after removing camshaft sprocket.

◀B▶ ROCKER ARM AND SHAFT ASSEMBLY REMOVAL

Loosen the rocker arm and shaft assembly mounting bolt, and then remove the rocker arm and shaft assembly with the bolt still attached.

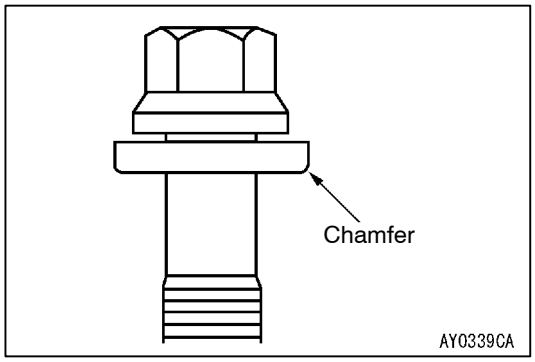
Caution
Never disassemble the rocker arm and shaft assembly.



INSTALLATION SERVICE POINTS

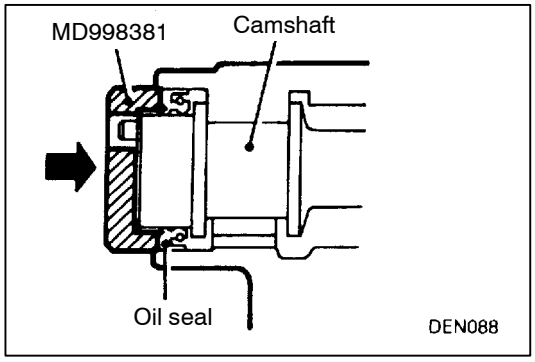
▶A◀ CAMSHAFT BEARING CAP INSTALLATION

The cap numbers are embossed on the top surface of the bearing caps, so install in the order of the numbers. However, no numbers are embossed on bearing caps 1 and 5.



▶B◀ ROCKER ARM AND SHAFT ASSEMBLY INSTALLATION

1. Install the rocker arm and shaft assembly to the bearing caps.
2. Set the washer so that it faces in the direction shown in the illustration, and then install the bolt.



▶C◀ CAMSHAFT OIL SEAL INSTALLATION

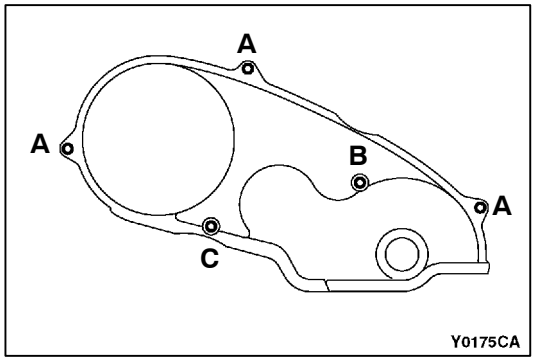
1. Apply a small amount of engine oil to the entire circumference of the oil seal lip and camshaft.
2. Use the special tool to tap in the oil seal.

   NOTE
   The oil seal should be tapped in until the distance from the end of the camshaft to the end of the oil seal is as shown in the illustration.

▶D◀ CAMSHAFT SPROCKET INSTALLATION

1. Use the special tool in the same way as during removal to stop the camshaft sprocket from turning, and then tighten the bolt to the specified torque.

   Tightening torque: 69 ± 5 N·m
2. Remove the cord which binds the camshaft sprocket and timing belt.



▶E◀ TIMING BELT FRONT UPPER COVER INSTALLATION

Install the bolts to the timing timing belt front upper cover at the shown positions.

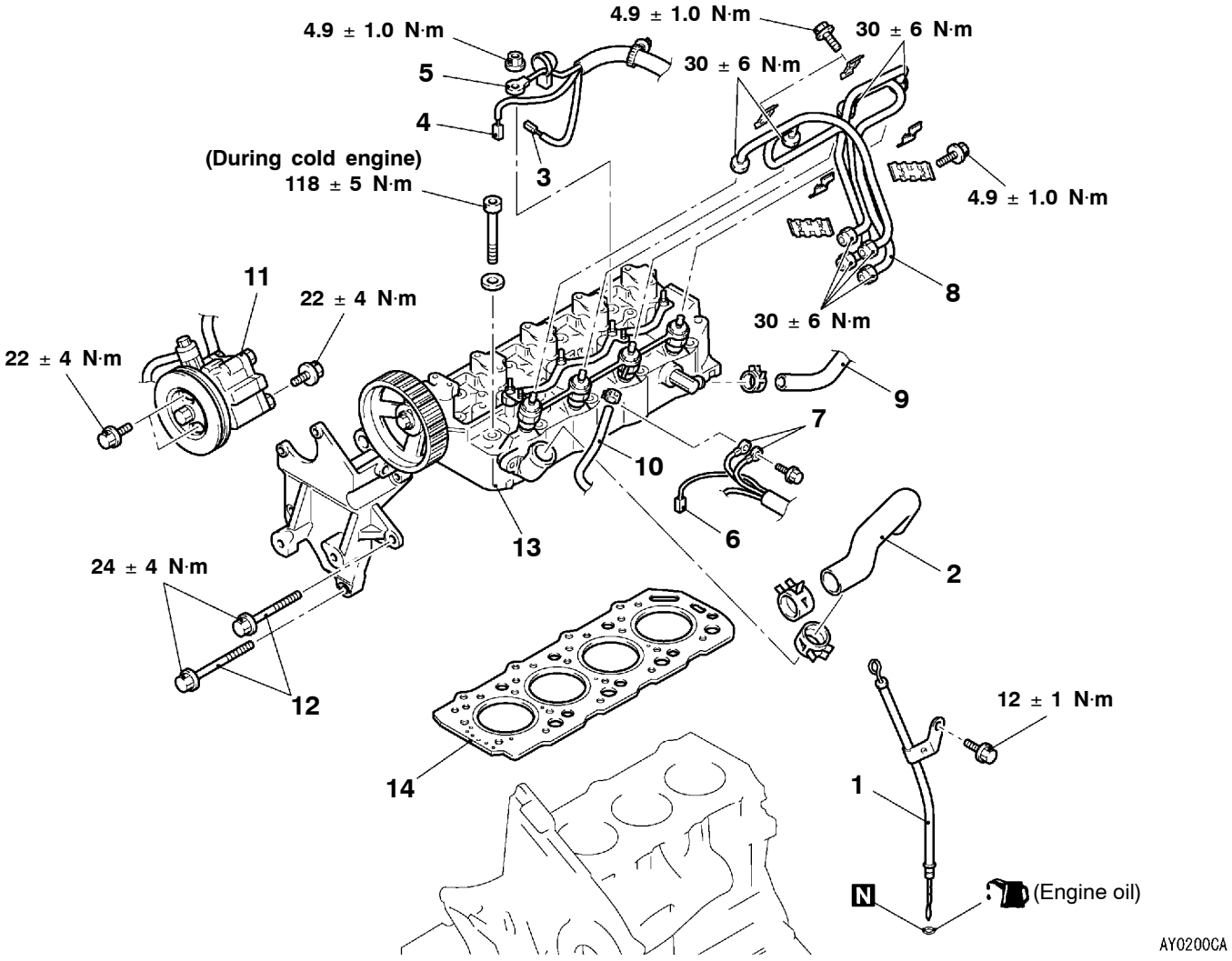
Name	Symbols	Size mm (d × l)
Flange bolt	A	6 × 22
	B	6 × 50
	C	6 × 60

d=Nominal diameter
l=Nominal length

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Cooling Fan and Fan Clutch Assembly Removal and Installation (Refer to GROUP 14.)
- Intake Manifold Removal and Installation (Refer to GROUP15 - Intake Manifold and Exhaust Manifold, Turbocharger <4D5>.)
- Engine Oil Check and Refill (Refer to GROUP 12 - On-vehicle Service.) <Post-installation operation>
- Fuel Line Air-bleeding (Refer to GROUP 13B - On-vehicle Service.) <Post-installation operation>
- Timing Belt Removal and Installation (Refer to P.11B-19.)



Removal steps

1. Oil level gauge guide and oil level gauge assembly
◀A▶ ▶D◀ 2. Radiator upper hose
- Rocker cover (Refer to P.11B-27.)

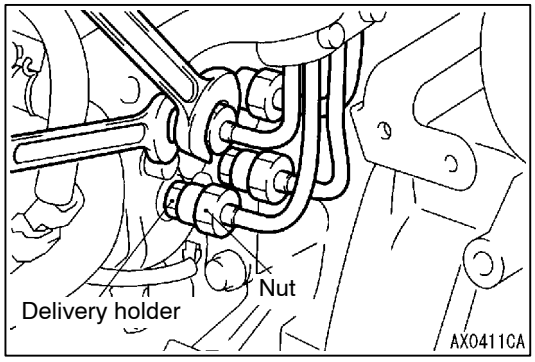
3. Engine coolant temperature switch connector (for A/C compressor control.)
4. Engine coolant temperature switch connector (for condenser fan control.)
5. Glow plug connector
6. Engine coolant temperature gauge unit and sensor connector
7. Earth cable connection
◀B▶ ▶C◀ 8. Fuel injection pipe
9. Heater hose connection
10. Fuel hose connection
- Water pipe assembly C (Refer to GROUP 14.)

◀C▶ 11. Power steering oil pump assembly
12. Power steering oil pump bracket bolt
◀D▶ ▶B◀ 13. Cylinder head assembly
▶A◀ 14. Cylinder head gasket

REMOVAL SERVICE POINTS

◀A▶ RADIATOR UPPER HOSE DISCONNECTION

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



◀B▶ FUEL INJECTION PIPE REMOVAL

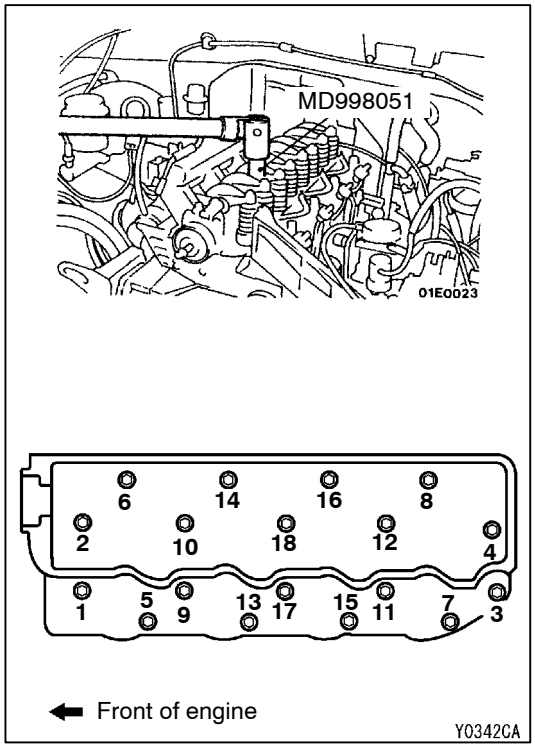
When loosening nuts at both ends of injection pipe, hold the delivery holder (for pump side) and the injection nozzle assembly (for nozzle side) with wrench and loosen nut.

Caution
After disconnecting the injection pipe, plug the opening so that no foreign particles get inside the pump or into the injection nozzle.

◀C▶ POWER STEERING OIL PUMP REMOVAL

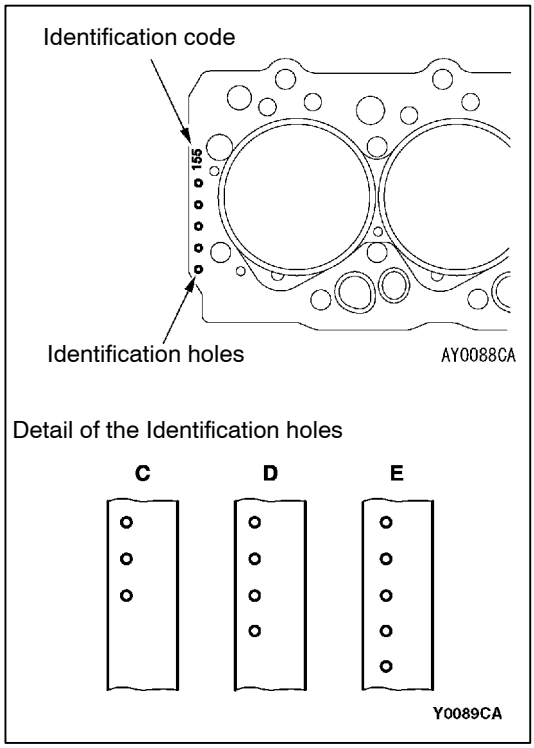
Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.



◀D▶ CYLINDER HEAD ASSEMBLY REMOVAL

Use the special tool to loosen the cylinder head bolts in the shown sequence progressively, and then remove the cylinder head bolts.



INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

To replace the cylinder head gasket only, select a gasket of correct specification according to the table below.

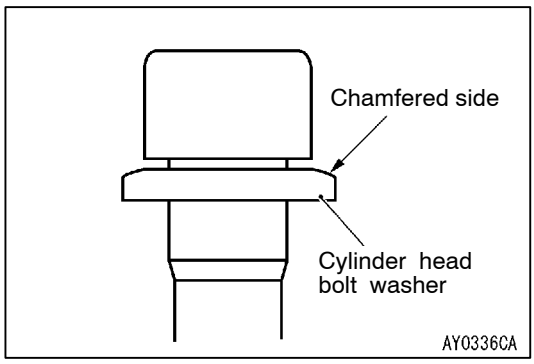
Identification holes specification	Identification code specification	Part number
C (Thickness after tightening the bolts 1.45 mm)	145	MD302891
D (Thickness after tightening the bolts 1.50 mm)	150	MD302892
E (Thickness after tightening the bolts 1.55 mm)	155	MD302893

Caution
The thickness of the original cylinder head gasket is selected according to the protrusion amount of the piston. Therefore, if the piston or the connecting rod is replaced, the protrusion amount may be changed. Always select a correct gasket by measuring the protrusion amount. (For details, refer to the Engine Workshop Manual.)

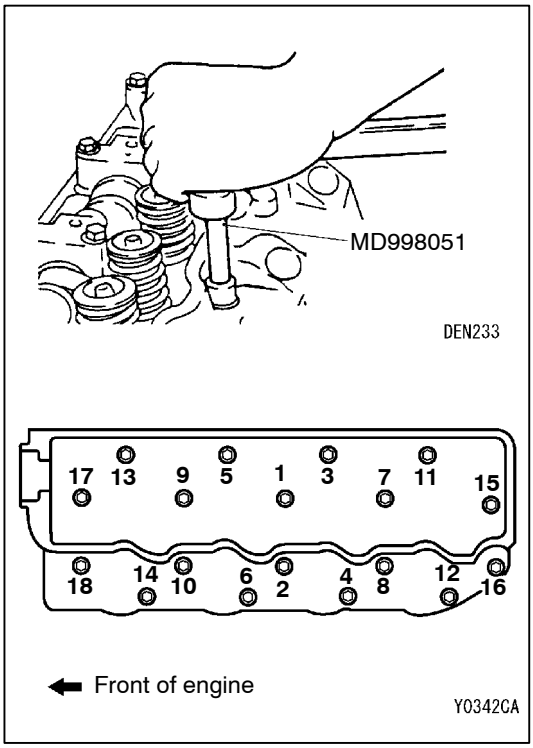
▶B◀ CYLINDER HEAD INSTALLATION

1. Select a cylinder head gasket of correct specification.
2. Clean the cylinder head assembly and the cylinder block mating surfaces with a scraper or a wire brush.

   Caution
   Do not allow foreign material to enter the engine coolant or oil passages and the cylinder.



3. Install the cylinder head bolt washer to the cylinder head bolt so that the washer chamfered side faces as shown.



4. Use the special tool to tighten the cylinder head bolts in the shown sequence progressively, and then install the cylinder head bolts.

   Tightening torque : 132 ± 5 N·m (During cold engine)

▶C◀ RADIATOR UPPER HOSE CONNECTION

To reuse the radiator upper hose, align the mating marks that were made during removal, and then install the hose clamp.

▶D◀ FUEL INJECTION PIPE INSTALLATION

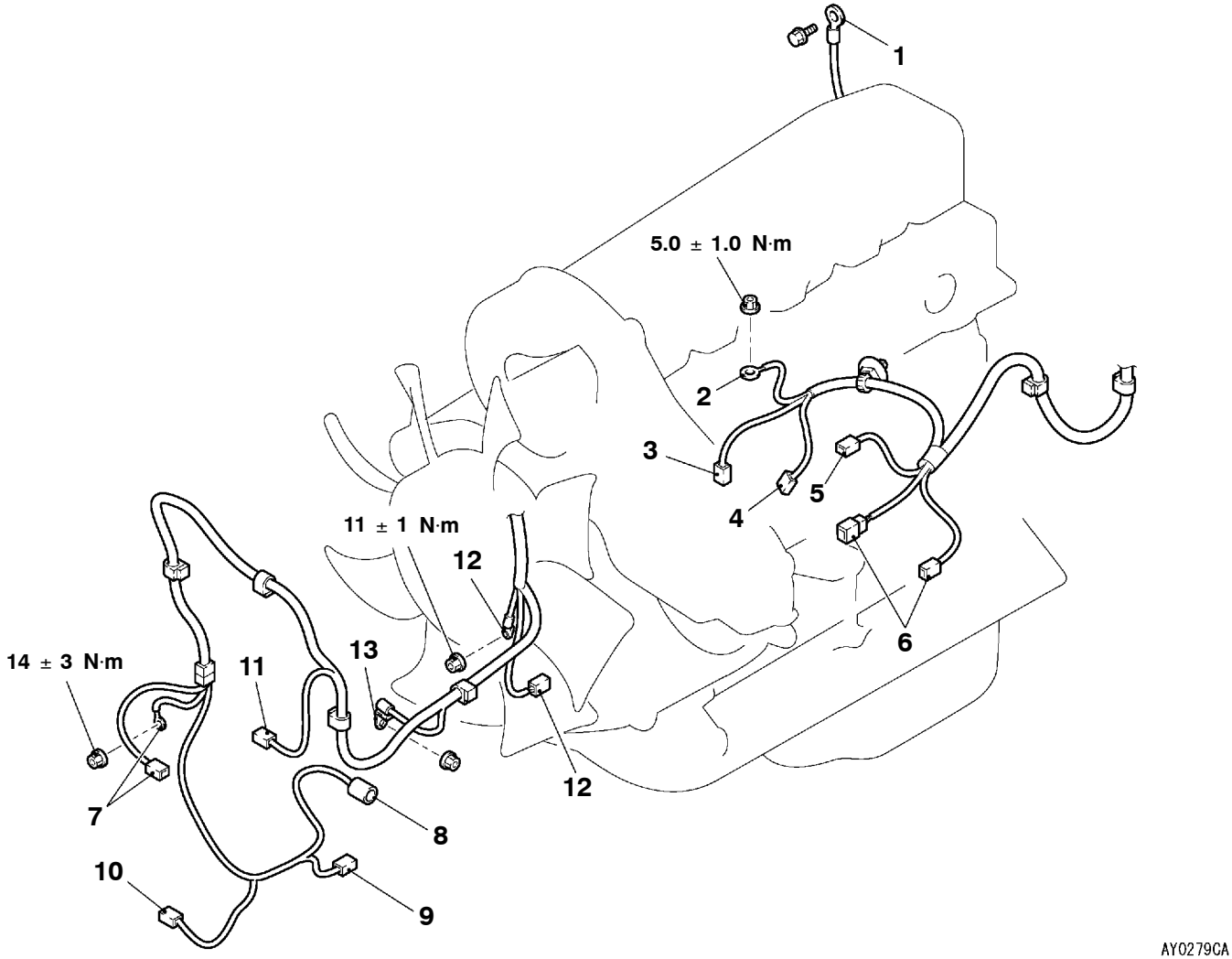
When tightening the nuts at both ends of the fuel injection pipe, hold the delivery holder (for pump side) and the injection nozzle assembly (for nozzle side) with a wrench, and tighten the nuts to the specified torque.

Tightening torque: 30 ± 6 N·m

ENGINE ASSEMBLY

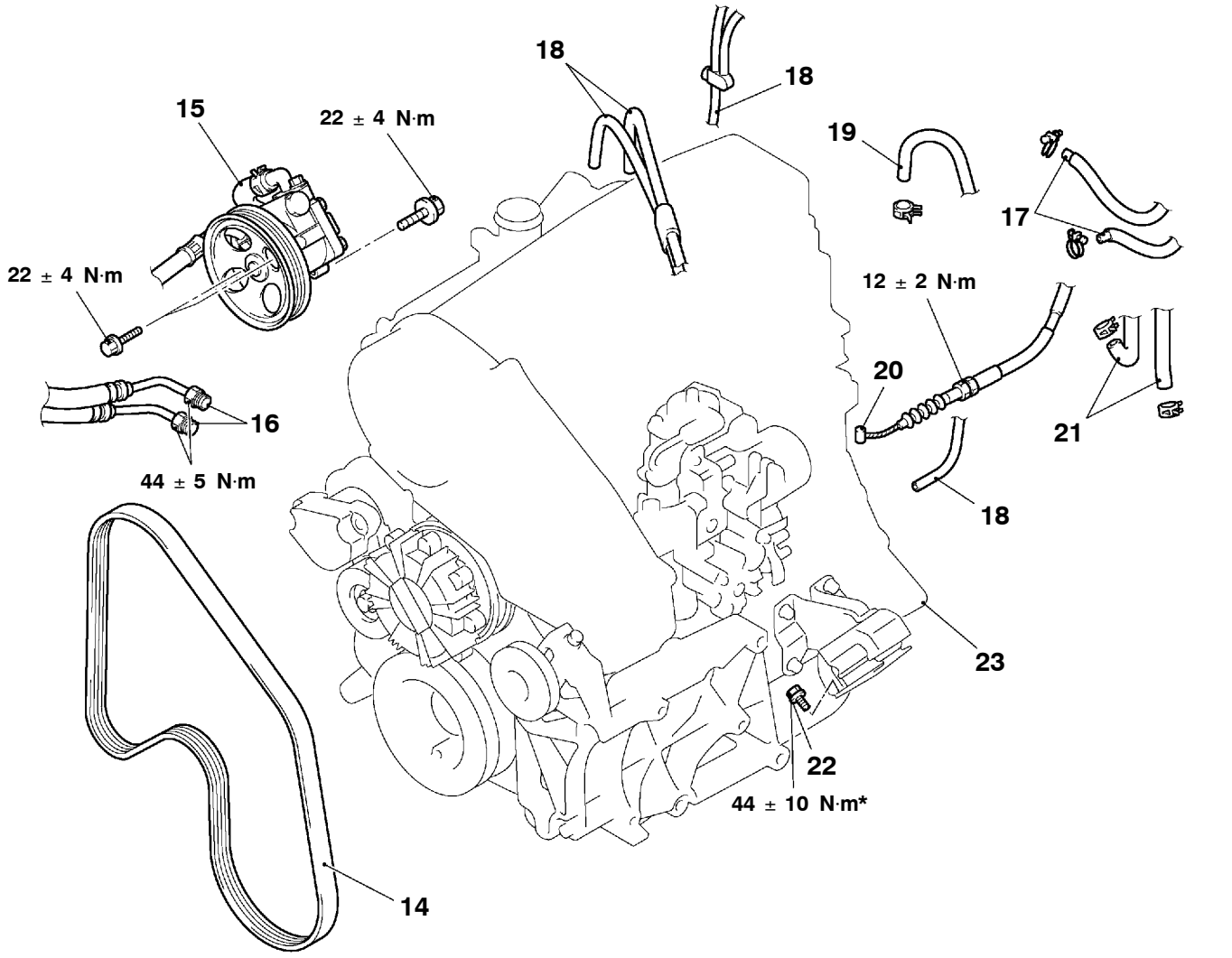
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Hood Removal and Installation (Refer to GROUP 42.)
- Under Cover and Skid Plate Removal and Installation
- Engine Oil Draining and Refilling (Refer to GROUP 12 - On-vehicle Service.)
- Battery and Battery Tray Removal and Installation
- Air Cleaner Removal and Installation (Refer to GROUP 15.)
- Radiator Removal and Installation (Refer to GROUP 14.)
- Accelerator Cable Adjustment (Refer to GROUP 17 - On-vehicle Service.) <Post-installation operation>
- Fuel Line Air-bleeding (Refer to GROUP 13B - On-vehicle Service.) <Post-installation operation>
- Drive Belt Tension Check and Adjustment <Vehicles with A/C> (Refer to P.11B-6.) <Post-installation operation>



Removal steps
1. Earth cable connection
2. Glow plug connector
3. Engine coolant temperature switch connector (for A/C compressor control)
4. Engine coolant temperature switch connector (for condenser fan control)
5. Fuel cut solenoid valve connector
6. Injection pump connector
7. Alternator connector
8. Oil pressure switch connector
9. Engine oil level sensor connector
10. Free-wheeling hub engage switch
11. A/C compressor connector <Vehicles with A/C>
12. Starter connector
    - A/C compressor assembly <Vehicles with A/C> (Refer to P.11B-19.)
13. Earth cable connection

Caution
***: indicates parts which should be temporarily tightened, and then fully tightened with the engine weight applied on the vehicle body.**



AY0280CA

- Cooling fan (Refer to GROUP 14.)

◀A▶ 14. Alternator and power steering oil pump drive belt

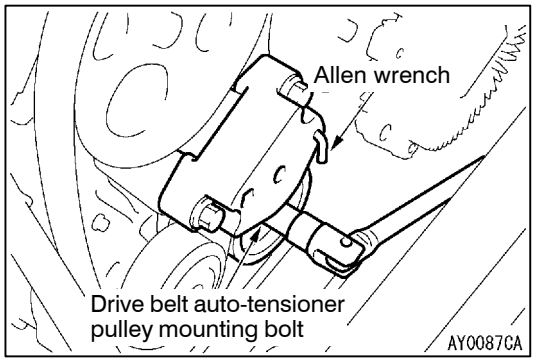
◀B▶ 15. Power steering oil pump assembly

16. Engine oil cooler hoses connection
17. Fuel hoses connections
18. Vacuum hoses connection
19. Brake booster vacuum hose connection <Vehicles with ABS>
20. Accelerator cable connection
21. Heater hoses connection <Vehicles with A/C>

- Transmission assembly (Refer to GROUP 22.)

22. Engine support front insulator attaching bolt

◀C▶ ▶A◀ 23. Engine assembly



REMOVAL SERVICE POINTS

◀A▶ ALTERNATOR AND POWER STEERING PUMP DRIVE BELT REMOVAL

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

1. Locate a ring spanner onto the drive belt auto-tensioner pulley mounting bolt, and move the tensioner clockwise until it touches the stopper.
2. Hold the tensioner by inserting an Allen wrench as shown, and remove the drive belt.

Caution
To reuse the drive belt, mark its running direction (clockwise direction) on the belt back side with a chalk.

◀B▶ POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. Remove the power steering oil pump assembly from the timing gear case with its hoses still attached.
2. Suspend the power steering oil pump with a cord out of the way.

◀C▶ ENGINE ASSEMBLY REMOVAL

1. Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
2. Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

INSTALLATION SERVICE POINT

▶A◀ ENGINE ASSEMBLY INSTALLATION

Install the engine assembly. When doing so, check carefully that all pipes and hoses are connected, and that none are twisted, damaged, etc.

ENGINE <4D5>

CONTENTS

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Outline of Changes 2
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SERVICE SPECIFICATIONS 2
SEALANT 2
SPECIAL TOOLS 3
ON-VEHICLE SERVICE 4
Injection Timing Check and Adjustment 4
Idle Speed Check 4
OIL PAN AND OIL SCREEN 5
TIMING BELT AND TIMING BELT B 7
CYLINDER HEAD GASKET 13

GENERAL

OUTLINE OF CHANGES

Some service procedures have been revised as the following changes have been made to comply to the Emission Regulation Step III.

- Injection timing and idle speed check and adjustment have bee changed as the electronic-controlled fuel injection pump has been introduced.
- The oil pan has a cover in order to reduce noise due to an enhanced engine output.
- A crank angle sensor and crankshaft sensing blade have been added due to the introduction of an electronic-controlled fuel injection pump. Due to this change, the timing belt front lower cover has been reshaped.
- The tightening torque of the cylinder head bolts and the cylinder head gasket have been changed.

GENERAL INFORMATION

Items			4D56
Total displacement mL			2,477
Bore x Stroke mm			91.1 x 95.0
Compression ratio			21
Combustion chamber			Vortex chamber type
Camshaft arrangement			SOHC
Number of valve	Intake		4
	Exhaust		4
Valve timing	Intake	Opening	BTDC 20°
	Exhaust	Closing	ABDC 49°
	Intake	Opening	BBDC 55°
	Exhaust	Closing	ATDC 22°
Fuel system			Electronically controlled type injection pump
Rocker arm			Roller type
Adjusting screw			Elephant foot type

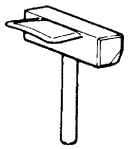
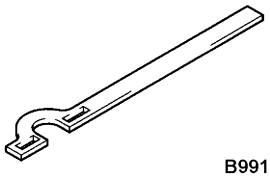
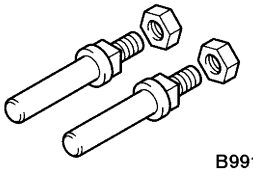
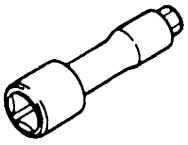
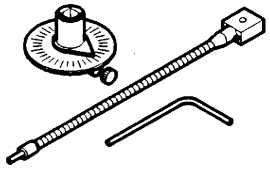
SERVICE SPECIFICATIONS

Items	Standard value
Idle speed r/min	750 ± 30
Timing belt tension mm	4 - 5
Timing belt B tension mm	4 - 5

SEALANT

Items	Specified sealant	Remarks
Oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant

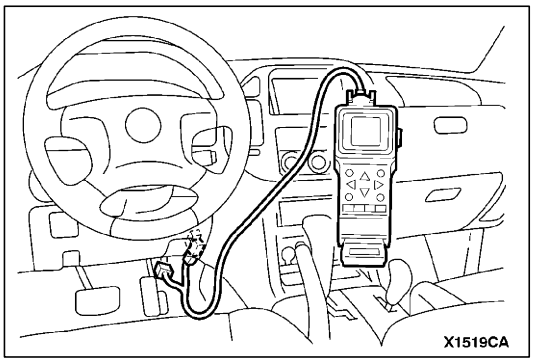
SPECIAL TOOLS

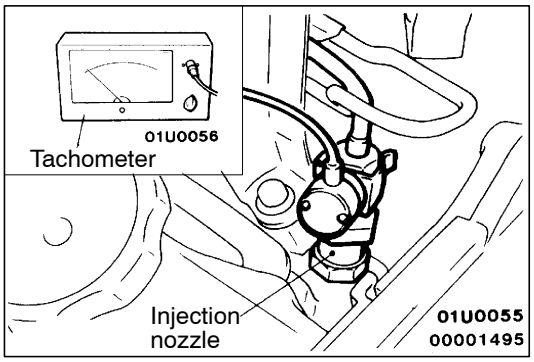
Tools	Number	Name	Use
	MD998727	Oil pan remover	Removal of oil pan
 B991800	MB991800	Crankshaft pulley holder	Holding the crankshaft pulley
 B991802	MB991802	Pin B	
	MD998051	Cylinder head bolt wrench	Removal and installation of the cylinder head bolt
	MB991614	Angle gauge	Tightening of the cylinder head bolts

ON-VEHICLE SERVICE

INJECTION TIMING CHECK AND ADJUSTMENT

The cold start device (wax type) has been discontinued as an electronically controlled injection pump has been used. The other inspection and adjustment procedures are the same as before.





IDLE SPEED CHECK

1. Set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to “LOCK” (OFF) position, and connect the diagnosis connector to the MUT-II.
   If the MUT-II is not used, connect a tachometer to the injection nozzle or the pipe.
3. Start the engine, and let it run at idle.
4. Check the idle speed.

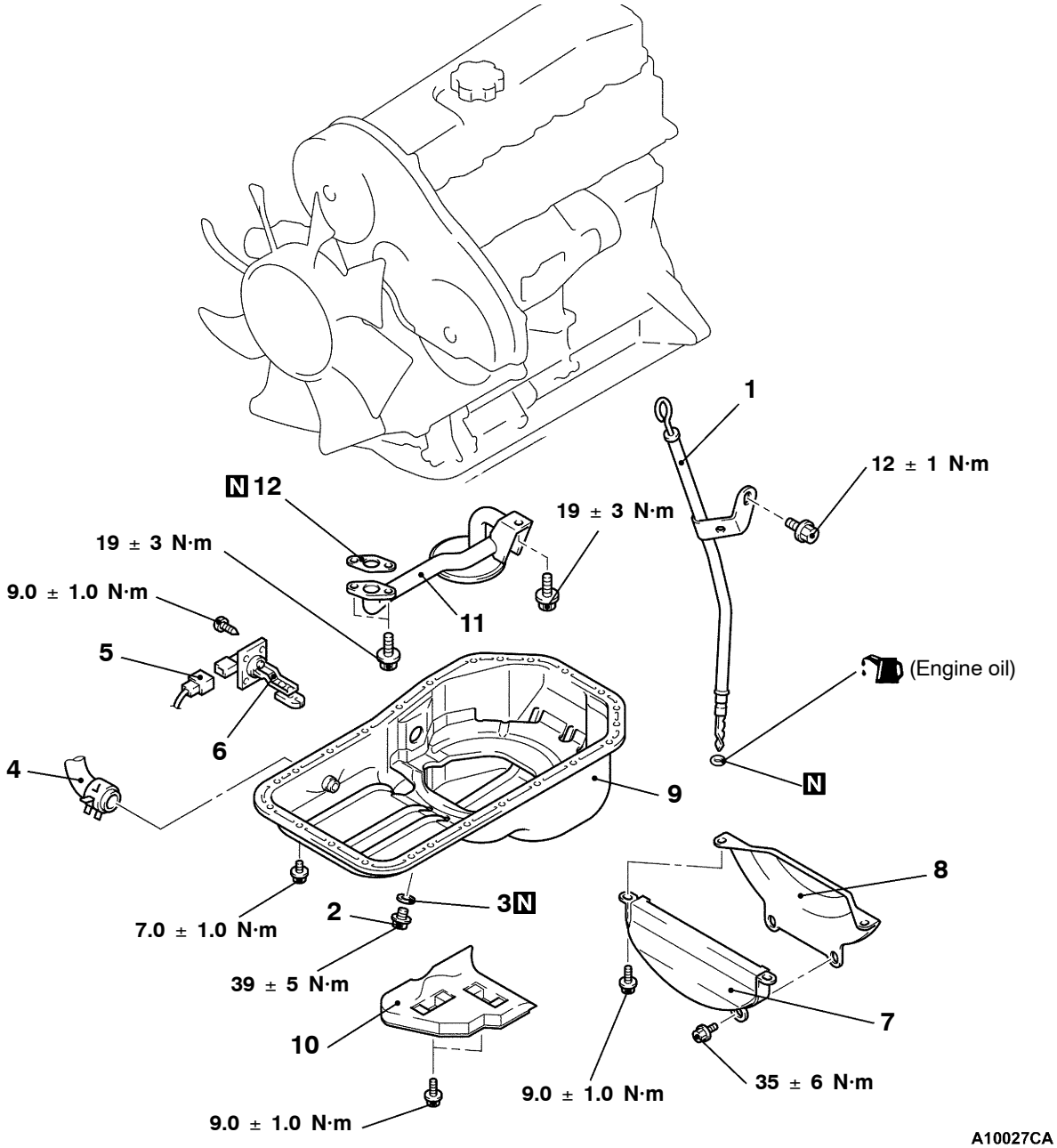
   Standard value: 750 ± 30 r/min
5. If the idle speed is not within the standard value, refer to 13C - Troubleshooting to check the electronic controlled fuel injection system.

   NOTE
   The idle speed is controlled by the engine-ECU.

OIL PAN AND OIL SCREEN

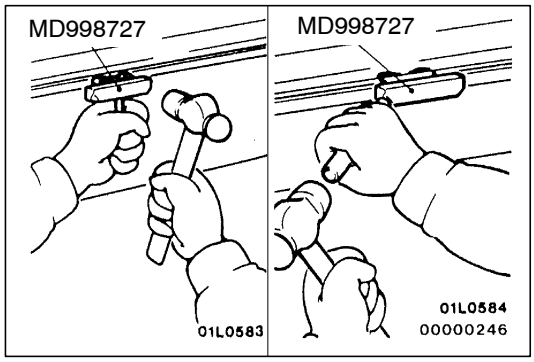
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Skid Plate and Under Cover Removal and Installation.
- Engine Oil Draining and Supplying.
- Differential Gear Oil Draining and Supplying.
- Front Differential and No.2 Crossmember Assembly Removal and Installation.



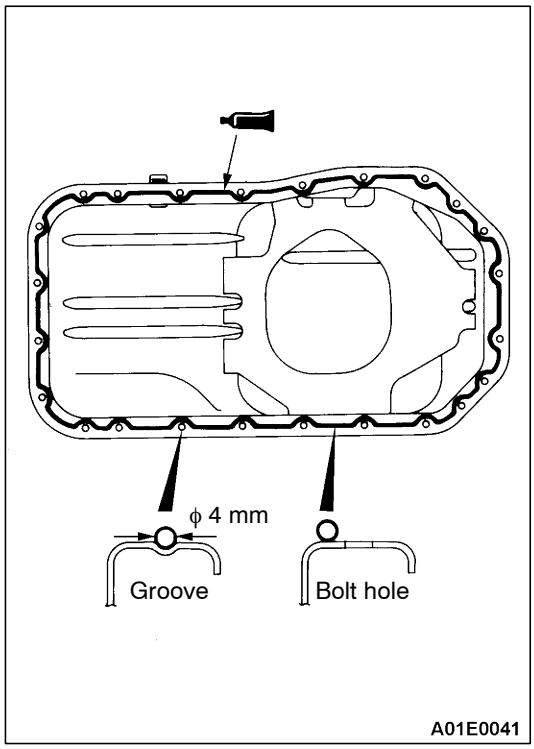
Removal steps

1. Engine oil level gauge and guide assembly
2. Drain plug
▶B◀ 3. Drain plug gasket
4. Alternator vacuum pump oil return hose connection
5. Oil level sensor connector
6. Oil level sensor
7. Space rubber
8. Bell housing cover
◀A▶ ▶A◀ 9. Oil pan
10. Oil pan cover
11. Oil screen
12. Oil screen gasket



REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL



INSTALLATION SERVICE POINTS

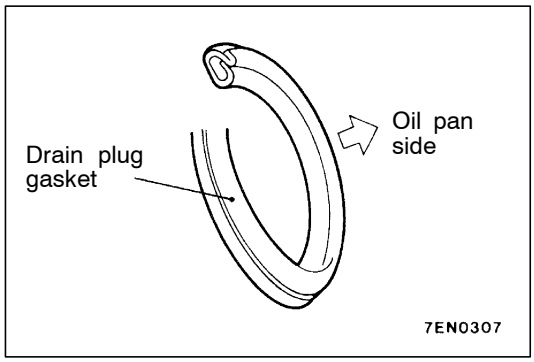
▶A◀ OIL PAN INSTALLATION

1. Remove sealant from oil pan and cylinder block mating surfaces.
2. Degrease the sealant-coated surface and the engine mating surface.
3. Apply a continuous bead of the specified sealant to the oil pan mating surface as shown.

   Specified sealant:
   MITSUBISHI GENUINE PART No. MD970389 or equivalent

   NOTE
   The sealant should be applied in a continuous bead approximately 4 mm in diameter.
4. Assemble oil pan to cylinder block within 15 minutes after applying the sealant.

   Caution
   After installing the oil pan, wait at least 1 hour before starting the engine.



▶B◀ DRAIN PLUG GASKET INSTALLATION

Install a new gasket in the direction so that it faces as shown in the illustration.

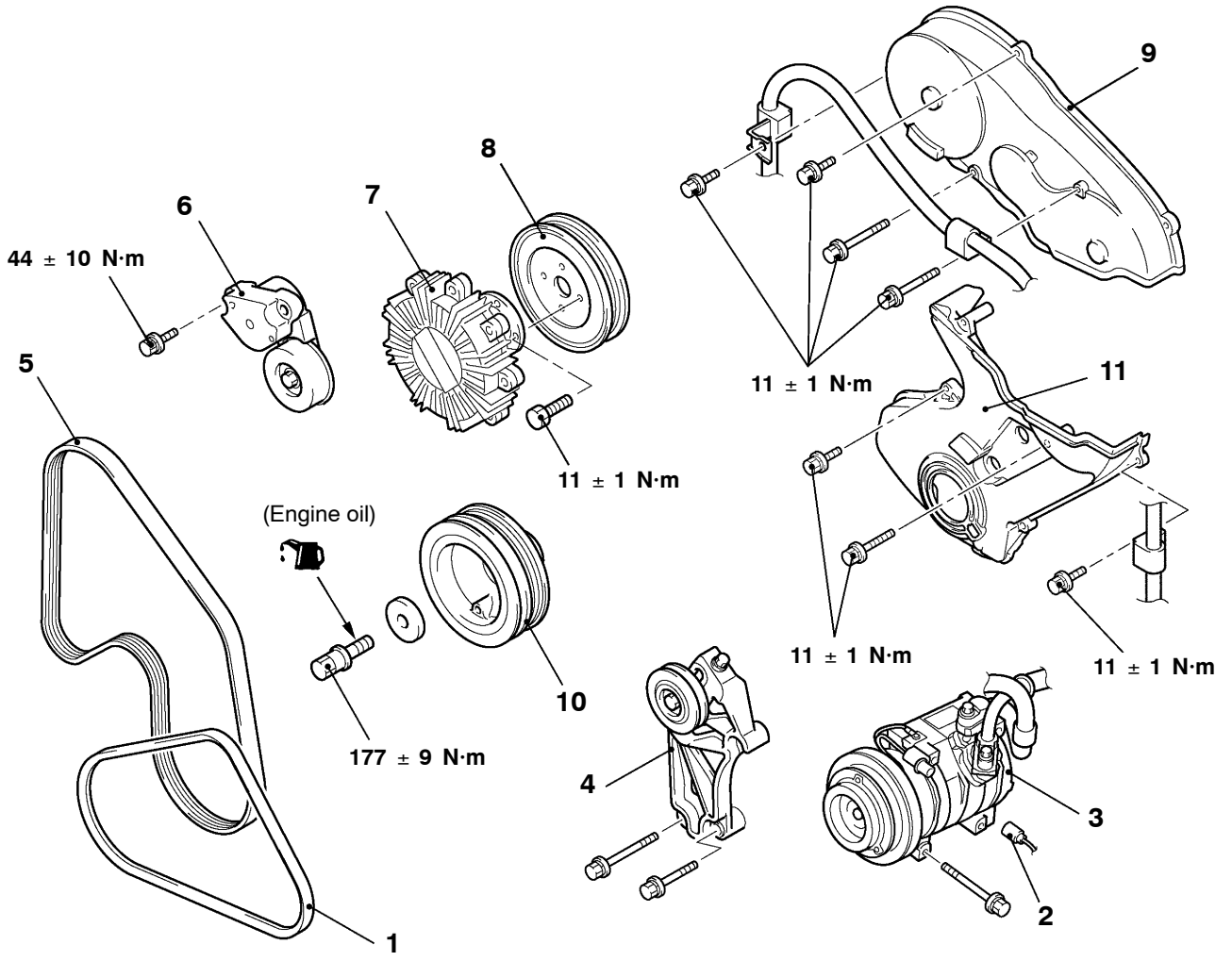
INSPECTION

- Check oil pan for cracks.
- Check oil pan sealant-coated surface for damage and deformation.
- Check oil screen for cracked, clogged or damaged wire net and pipe.

TIMING BELT AND TIMING BELT B

REMOVAL AND INSTALLATION

Post-installation Operation
Drive Belt Tension Check and Adjustment.



Removal steps

- Radiator upper shroud

◀A▶ 1. A/C compressor drive belt <Vehicles with A/C>
2. A/C compressor connector <Vehicles with A/C>

◀B▶ 3. A/C compressor <Vehicles with A/C>
4. Tension pulley and tension pulley bracket assembly <Vehicles with A/C>

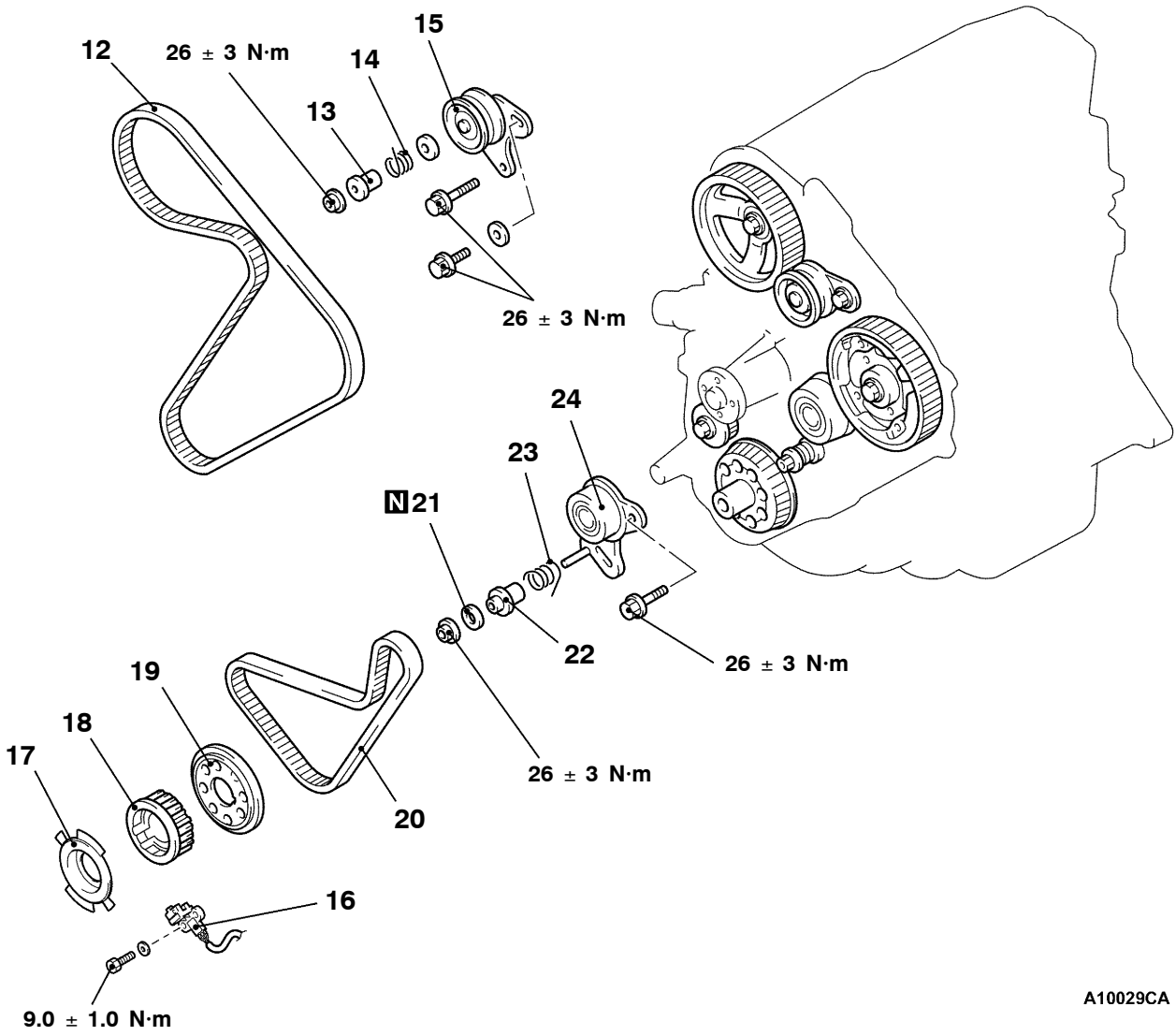
- Cooling fan

◀C▶ 5. Alternator and power steering oil pump drive belt
6. Auto-tensioner
7. Fan Clutch
8. Water pump pulley

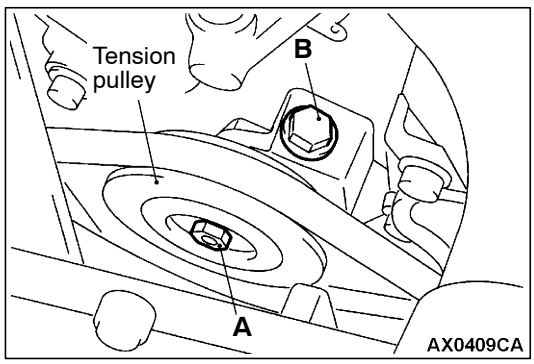
▶C◀ 9. Timing belt front upper cover

◀D▶ 10. Crankshaft pulley

▶C◀ 11. Timing belt front lower cover



◀E▶ ▶B◀ 12. Timing belt
13. Tensioner spacer
14. Tensioner spring
15. Timing belt tensioner
16. Crank angle sensor
17. Crankshaft sensing blade
18. Crankshaft sprocket
19. Flange
◀F▶ ▶A◀ 20. Timing belt B
21. Gasket
22. Tensioner spacer B
23. Tensioner spring B
24. Timing belt tensioner B



REMOVAL SERVICE POINTS

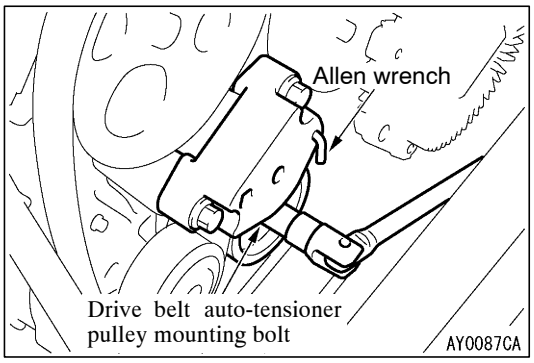
◀A▶ A/C COMPRESSOR DRIVE BELT REMOVAL

1. Loosen the tension pulley securing bolt A.
2. Loose the adjusting bolt B to remove the belt.

Caution
To reuse the drive belt, mark its running direction (clockwise direction) on the belt back side with a chalk.

◀B▶ A/C COMPRESSOR REMOVAL

1. Remove the A/C compressor from the bracket with its refrigerant hoses still attached.
2. Suspend the A/C compressor with a cord out of the way.

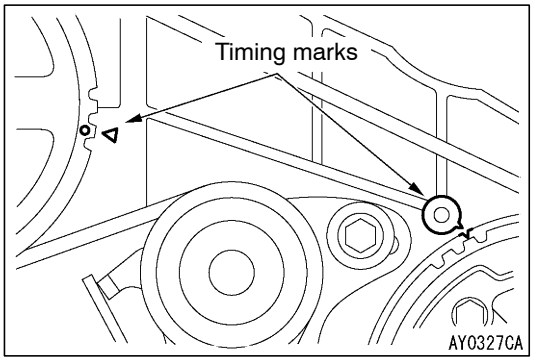


◀C▶ALTERNATOR AND POWER STEERING PUMP DRIVE BELT REMOVAL

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

1. Locate a ring spanner onto the drive belt auto-tensioner pulley mounting bolt, and move the tensioner clockwise until it touches the stopper.
2. Hold the tensioner by inserting an Allen wrench as shown, and remove the drive belt.

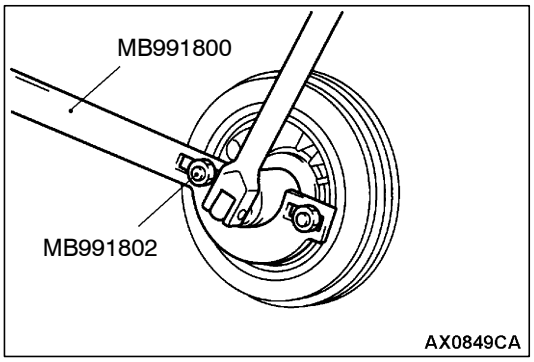
Caution
To reuse the drive belt, mark its running direction (clockwise direction) on the belt back side with a chalk.



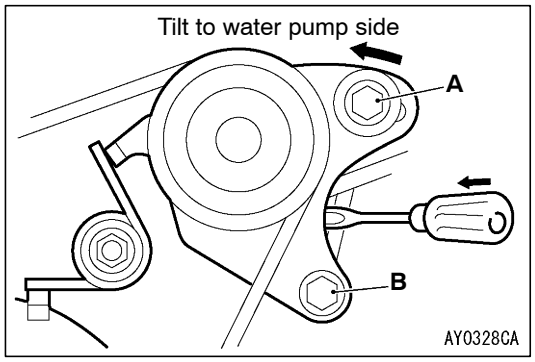
◀D▶ CRANKSHAFT PULLEY REMOVAL

1. Turn the crankshaft clockwise, align the timing marks to set No.1 cylinder to TDC of its compression stroke.

Caution
Never turn the crankshaft anticlockwise.

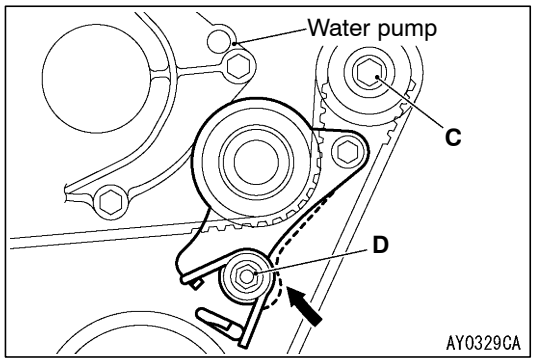


2. Use the special tool to keep crankshaft from turning and remove the bolts.



◀E▶ TIMING BELT REMOVAL

1. When reinstalling timing belt, mark an arrow at the belt to show rotation direction.
2. Loosen the tensioner mounting bolt A and B.
3. Push timing belt tensioner to water pump side and tighten the tensioner mounting bolt A and B. Secure so that tensioner will not move back.

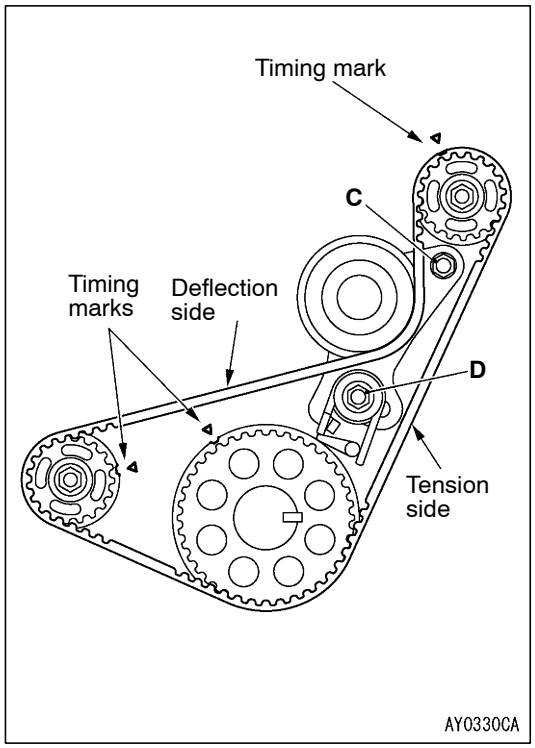


◀F▶ TIMING BELT B REMOVAL

1. When reinstalling timing belt B, mark an arrow at the belt to show rotation direction.
2. Loosen the tensioner mounting bolt C and nut D.
3. Push timing belt tensioner to water pump side and tighten the tensioner mounting bolt C and nut D. Secure so that tensioner will not move back.

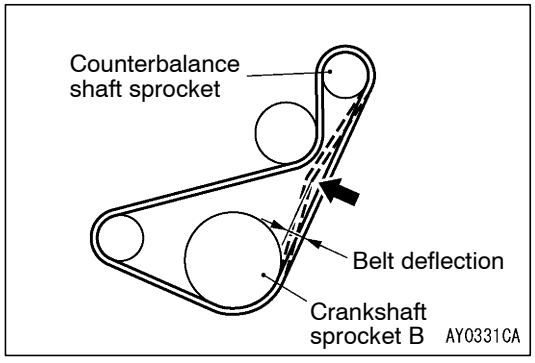
INSTALLATION SERVICE POINTS

▶A◀ TIMING BELT B INSTALLATION



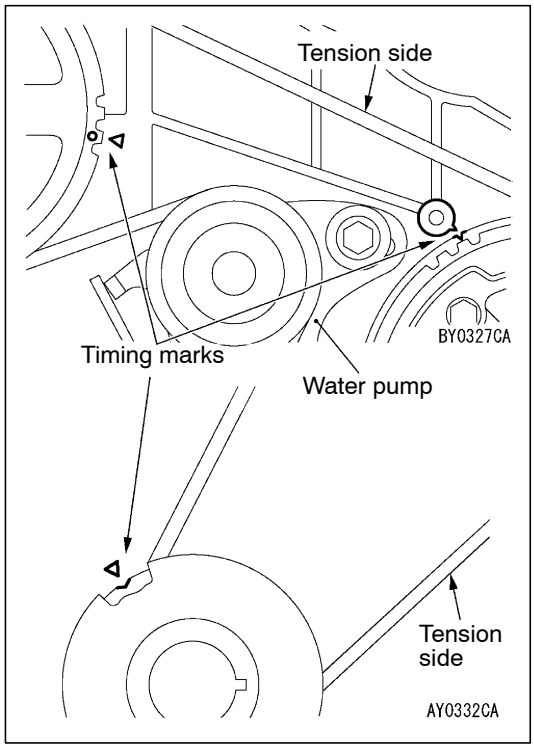
1. Align the timing marks of the 3 sprockets.
2. When reusing timing belt B, make sure the arrow mark is pointing in the same direction as when the belt was removed.
3. Install timing belt B and make sure there is no deflection on the tension side.
4. Press the deflection side of timing belt B with the hand and fully stretch the tensioner side.
5. Make sure that the timing marks are aligned.
6. Loosen the tensioner mounting bolt and nut so that only the pressure of the spring is applied to timing belt B.
7. Tighten the tensioner mounting bolt C and nut D, tightening the nut first. If the bolt is tightened first, the tensioner will move and tension the belt.

   Tightening torque: 26 ± 3 N·m



8. Press in the direction of the arrow in the figure with the index finger to check the amount of deflection.

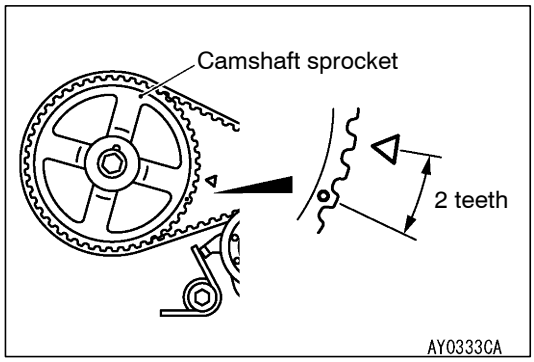
   Standard value: 4 - 5 mm



▶B◀ TIMING BELT INSTALLATION

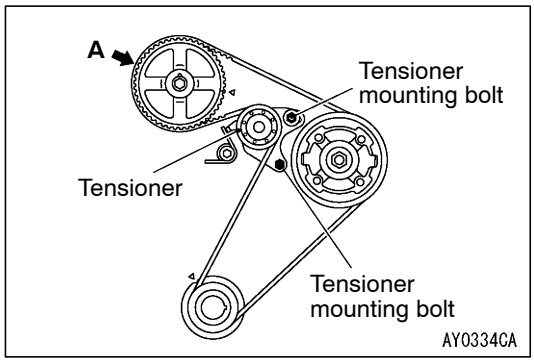
1. Align the timing marks of the 3 sprockets.
2. When reusing timing belt, make sure the arrow mark is pointing in the same direction as when the belt was removed.
3. Install the timing belt to the crankshaft sprocket, to injection pump sprocket, to tensioner and to camshaft sprocket in that order. Being careful not to allow deflection on the tension side of the timing belt.

   Caution
   (1) Engage the belt on the various sprockets while maintaining tension on the belt of tension side.
   (2) Align the injection pump sprocket with the timing mark, hold the sprocket so that is does not turn and engage the belt.
4. Loosen the tensioner mounting bolts and apply tension with the spring.

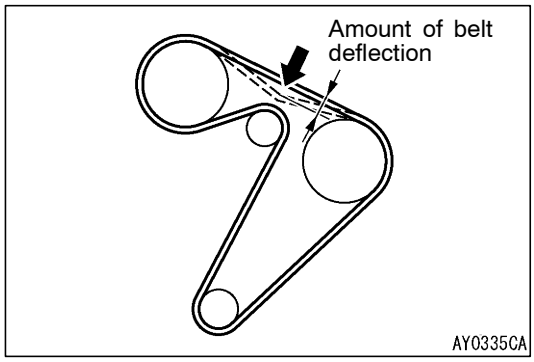


5. Turn the crankshaft clockwise and stop at the second lobe of the camshaft sprocket.

   Caution
   (1) When turning the crankshaft in item (5), strictly observe the specified amount of rotation (2 teeth on the camshaft sprocket) in order to apply a constant force to the tension side of the belt.
   (2) Do not turn the crankshaft counterclockwise.
   (3) Do not touch the belt during adjustment.

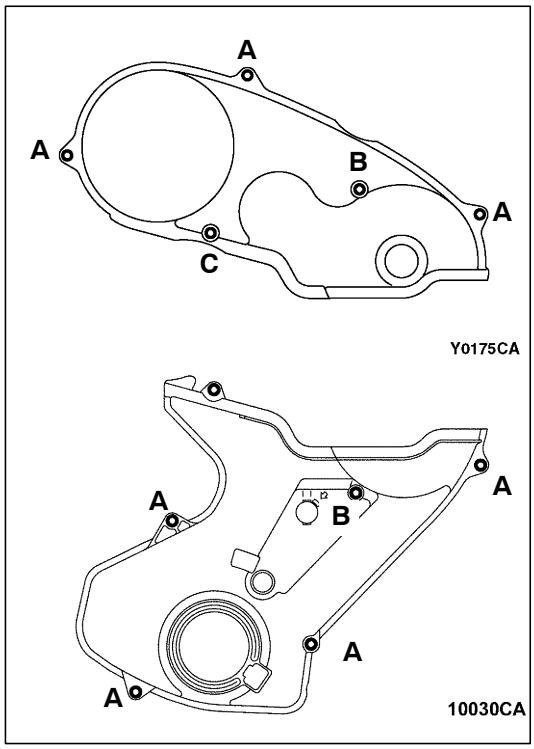


6. Make sure that the part indicated by arrow A does not float upward.
7. Tighten the tensioner mounting bolts, starting with the bolt in the elongated hole. If the lower bolt is tightened first, belt tension will become too tight.
8. Turn the crankshaft anticlockwise and align the timing mark. Next, make sure that the timing marks of all sprockets are aligned.



9. Press on the center of the bolt with an index finger to check the amount of deflection.

   Standard value: 4 - 5 mm



▶C◀ TIMING BELT FRONT LOWER COVER/TIMING BELT FRONT UPPER COVER INSTALLATION

Install the bolts to the timing belt cover at the shown positions.

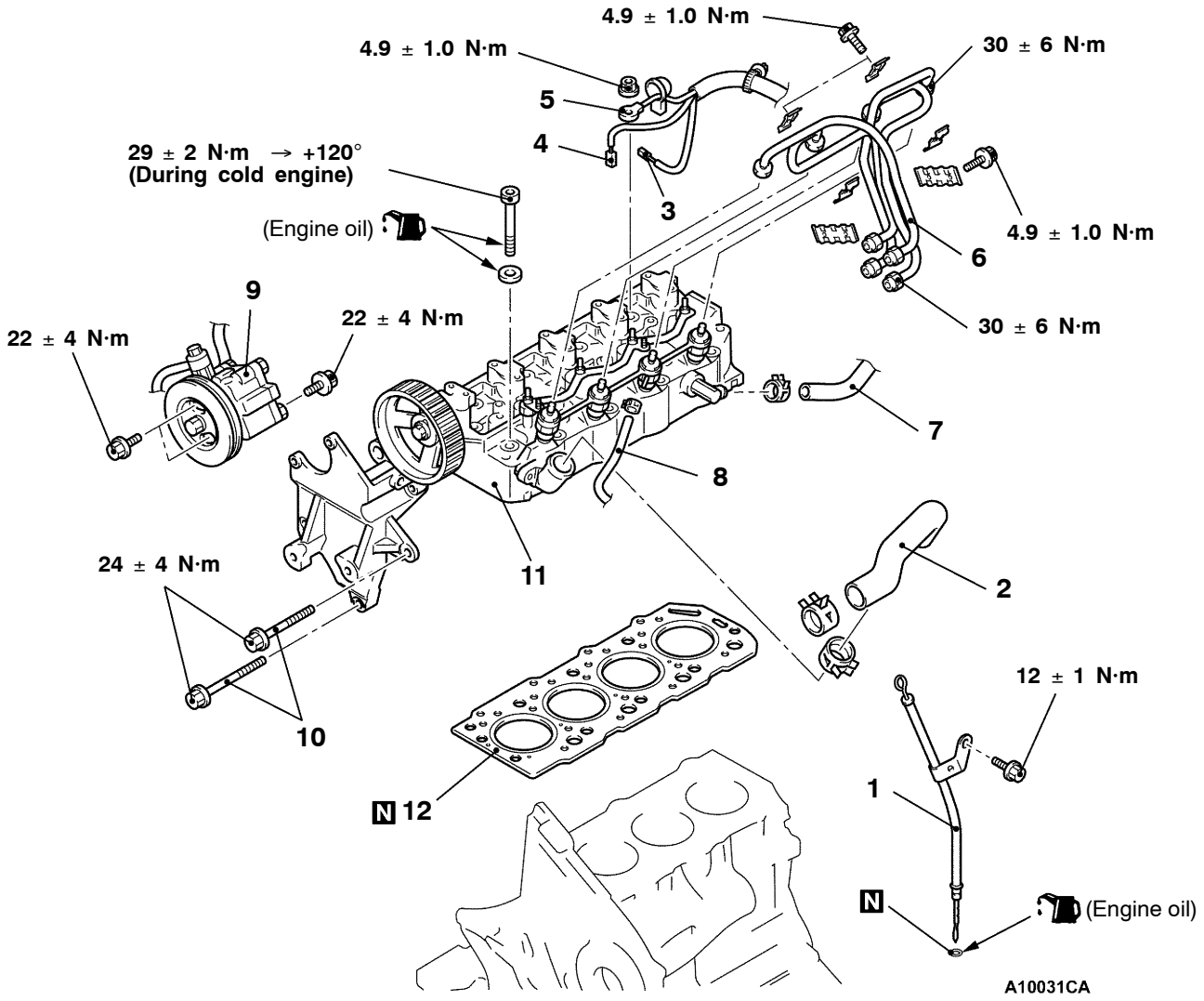
Name	Symbols	Size mm (d × l)
Flange bolt	A	6 × 22
	B	6 × 50
	C	6 × 60

d=Nominal diameter
l=Nominal length

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Cooling Fan and Fan Clutch Assembly Removal and Installation.
- Intake Manifold Removal and Installation (Refer to GROUP15 - Intake Manifold and Exhaust Manifold, Turbocharger <4D5>.)
- Engine Oil Check and Refill.
- Fuel Line Air-bleeding.
- Timing Belt Removal and Installation (Refer to P.11B-6.)



Removal steps

1. Oil level gauge guide and oil level gauge assembly
◀A▶ ▶D◀ 2. Radiator upper hose
- Rocker cover

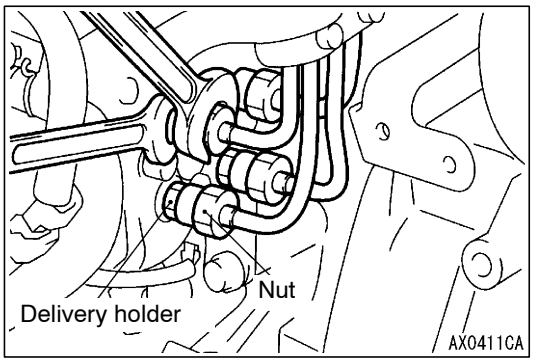
3. Engine coolant temperature switch connector (for A/C compressor control)
4. Engine coolant temperature switch connector (for condenser fan control)
5. Glow plug connector
◀B▶ ▶C◀ 6. Fuel injection pipe
7. Heater hose connection
8. Fuel hose connection
- Water pipe assembly C (Refer to GROUP 14.)

◀C▶ 9. Power steering oil pump assembly
10. Power steering oil pump bracket bolt
◀D▶ ▶B◀ 11. Cylinder head assembly
▶A◀ 12. Cylinder head gasket

REMOVAL SERVICE POINTS

◀A▶ RADIATOR UPPER HOSE DISCONNECTION

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



◀B▶ FUEL INJECTION PIPE REMOVAL

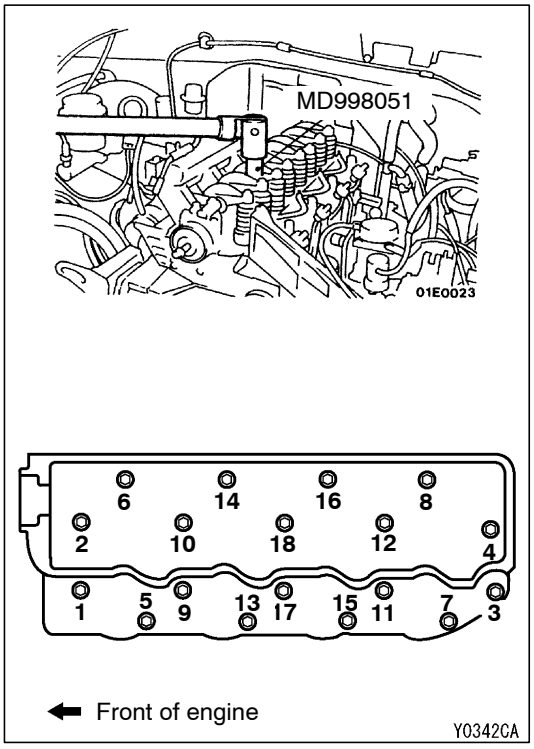
When loosening nuts at both ends of injection pipe, hold the delivery holder (for pump side) and the injection nozzle assembly (for nozzle side) with wrench and loosen nut.

Caution
After disconnecting the injection pipe, plug the opening so that no foreign particles get inside the pump or into the injection nozzle.

◀C▶ POWER STEERING OIL PUMP REMOVAL

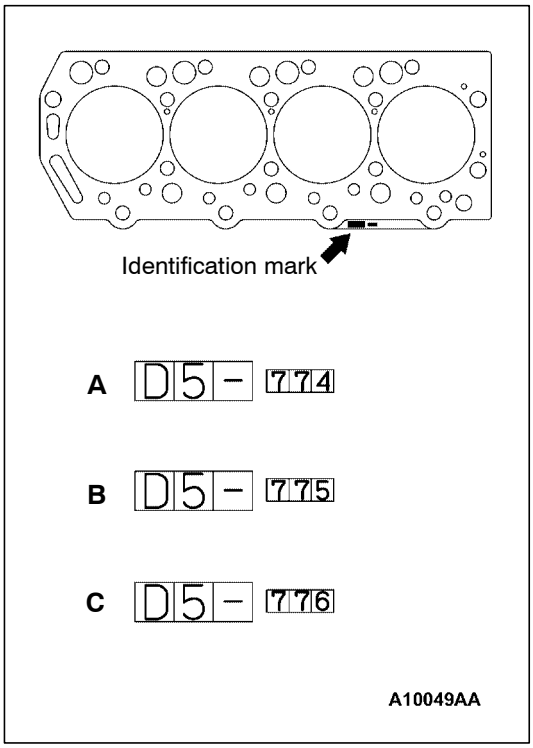
Remove the power steering oil pump from the bracket with the hose attached.

NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.



◀D▶ CYLINDER HEAD ASSEMBLY REMOVAL

Use the special tool to loosen the cylinder head bolts in the shown sequence progressively, and then remove the cylinder head bolts.



INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

When replacing the cylinder head gasket only, confirm the gasket identification mark, and then select a replacement part according to the table below:

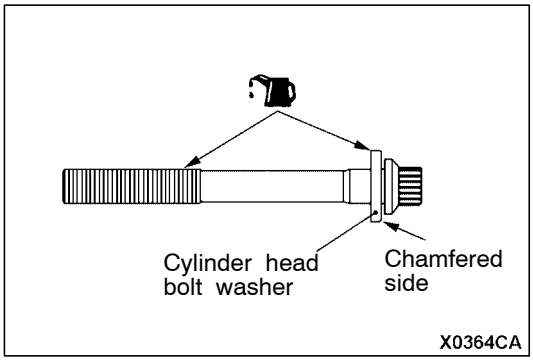
Spec	Identification mark (size)	Parts number
A	D5-774 (fitted thickness 1.45 ± 0.04)	MD377774
B	D5-775 (fitted thickness 1.50 ± 0.04)	MD377775
C	D5-776 (fitted thickness 1.55 ± 0.04)	MD377776

Caution
The thickness of the original cylinder head gasket is selected according to the protrusion amount of the piston. Therefore, if the piston or the connecting rod is replaced, the protrusion amount may be changed. Always select a correct gasket by measuring the protrusion amount. (For details, refer to the Engine Workshop Manual.)

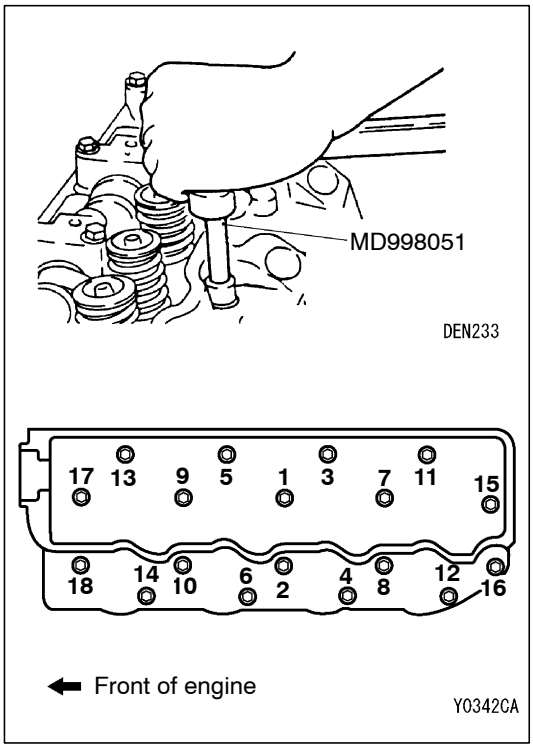
▶B◀ CYLINDER HEAD INSTALLATION

1. Select a cylinder head gasket of correct specification.
2. Clean the cylinder head assembly and the cylinder block mating surfaces with a scraper or a wire brush.

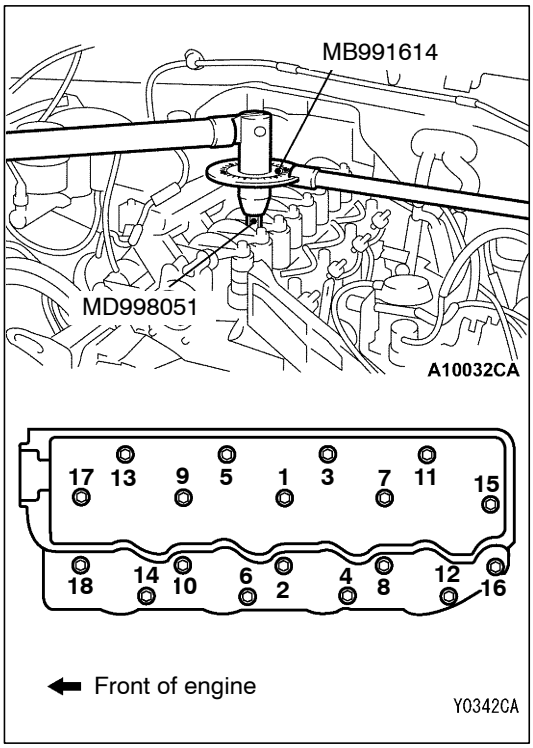
   Caution
   Do not allow foreign material to enter the engine coolant or oil passages and the cylinder.



3. Install the cylinder head bolt washer to the cylinder head bolt so that the washer chamfered side faces as shown.
4. Apply a small amount of engine oil to the cylinder head bolt thread and the washer.



5. Tighten the cylinder head bolts according to the following procedure (angle-tightening procedure.)
   (1) Use the special tool to tighten the cylinder head bolts in the order of the illustrated numbers to 29 ± 2 N·m.



   (2) Place the special tool in a wrench to tighten the cylinder head bolt in the order of the illustrated numbers to 120°.

▶C◀ RADIATOR UPPER HOSE CONNECTION

To reuse the radiator upper hose, align the mating marks that were made during removal, and then install the hose clamp.

▶D◀ FUEL INJECTION PIPE INSTALLATION

When tightening the nuts at both ends of the fuel injection pipe, hold the delivery holder (for pump side) and the injection nozzle assembly (for nozzle side) with a wrench, and tighten the nuts to the specified torque.

Tightening torque: 30 ± 6 N·m

NOTES