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NOTE
THE GROUPS MARKED BY ARE NOT IN THIS MANUAL.

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4G6

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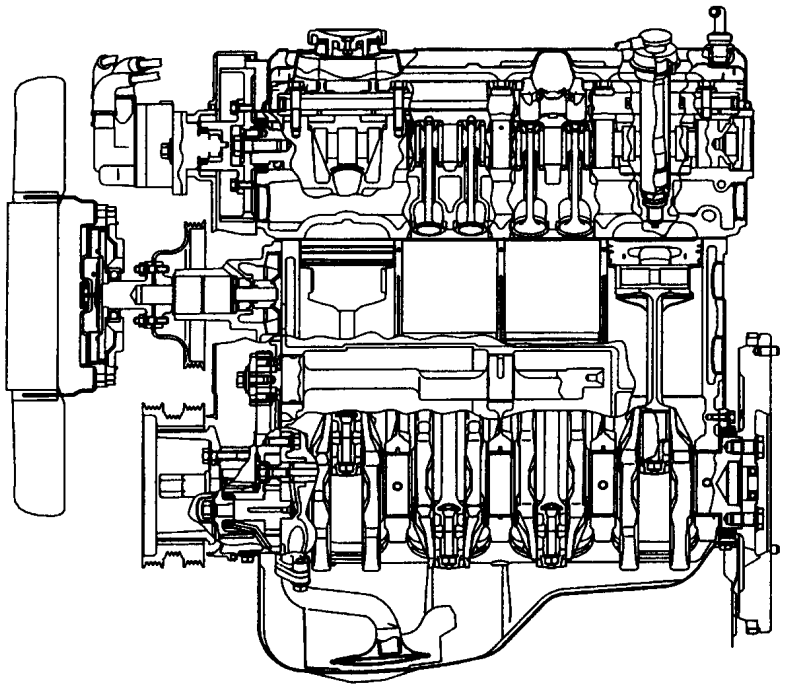
GENERAL INFORMATION

120002638

Items		4G63	4G64
Total displacement mℓ		1,997	2,351
Bore × Stroke mm		85.0×88.0	86.5×100.0
Compression ratio		9.5	9.5
Combustion chamber		Pentroof type	Pentroof type
Camshaft arrangement		SOHC	SOHC
Number of valve	Intake	8	8
	Exhaust	8	8
Valve timing	Intake	Opening BTDC 11°, Closing ABDC 53°	Opening BTDC 18°, Closing ABDC 58°
	Exhaust	Opening BBDC 63°, Closing ATDC 21°	Opening BBDC 58°, Closing ATDC 18°
Fuel system		Electronic controlled carburettor or electronic controlled multipoint fuel injection	Electronic controlled multipoint fuel injection
Rocker arm		Roller type	Roller type
Auto-lash adjuster		Equipped	Equipped
Oil level sensor		Equipped	Equipped

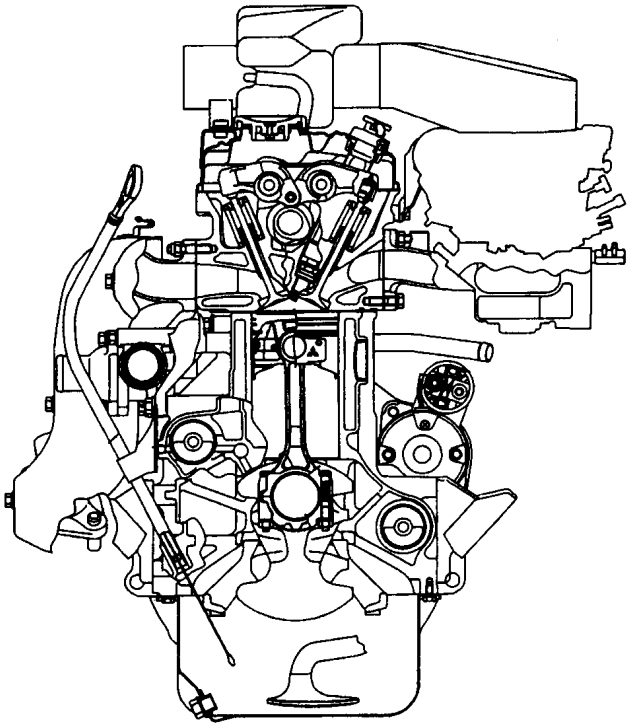
SECTIONAL VIEW

120000994



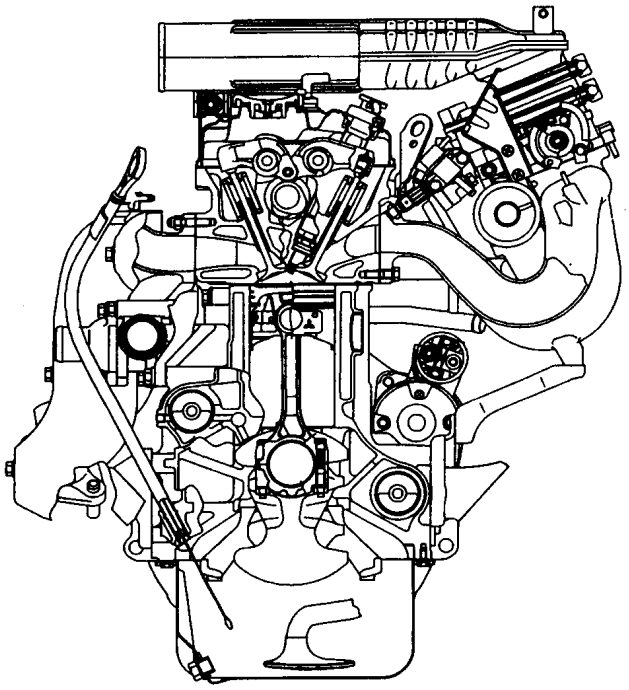
6EN1000

Electronic controlled carburettor



6EN1001

Electronic controlled multipoint fuel injection



6EN1002

SERVICE SPECIFICATIONS

120002639

Items			Standard value	Limit
Drive belt deflection mm	Alternator	When checked	7.0–9.0	–
		When a new belt is installed	5.5–7.5	–
		When a used belt is installed	7.5–8.5	–
	Power steering oil pump	When checked	5.5–7.5	–
		When a new belt is installed	4.0–6.0	–
		When a used belt is installed	6.0–7.0	–
	A/C compressor	When checked	4.5–6.5	–
		When a new belt is installed	3.5–4.5	–
		When a used belt is installed	5.0–6.0	–
Basic ignition timing	Carburettor		0° BTDC±2°	–
	MPI		5° BTDC±2°	–
Ignition timing	MPI		Approx. 10° BTDC	–
Curb idle speed r/min	Carburettor		800±50	–
	MPI		750±100	–
CO contents %	MPI		0.5 or less	–
HC contents ppm	MPI		100 or less	–
Idle-up engine speed for ABS r/min			1600 $^{+50}_{-300}$	–
Compression pressure (at engine speed of 250–400 r/min.) kPa			1,320	Min. 1,000
Compression pressure difference of all cylinder kPa			–	Max. 100
Intake manifold vacuum kPa			–	Min. 60
Cylinder head bolt shank length mm			–	99.4
Timing belt tension torque Nm			3.5	–
Timing belt B tension mm			5–7	–
Push rod pushed-in amount			Within 1.0	
Auto tensioner rod protrusion amount (special tool screw-in amount) turns			2.5–3	–

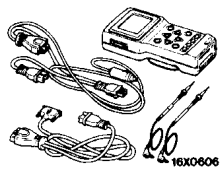
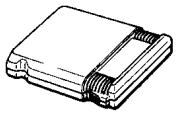
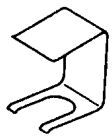
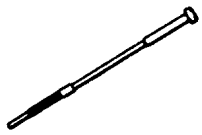
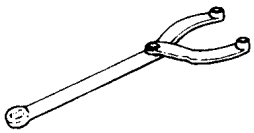
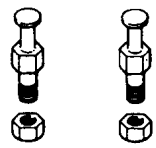
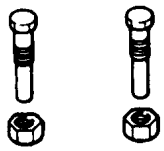
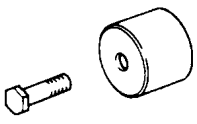
SEALANT

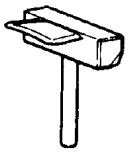
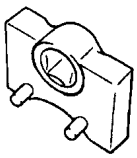
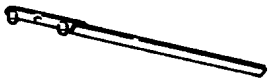
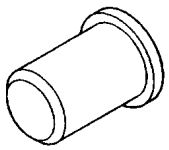
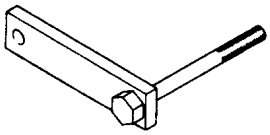
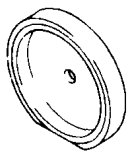
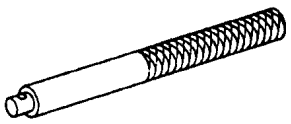
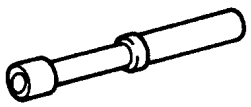
120002446

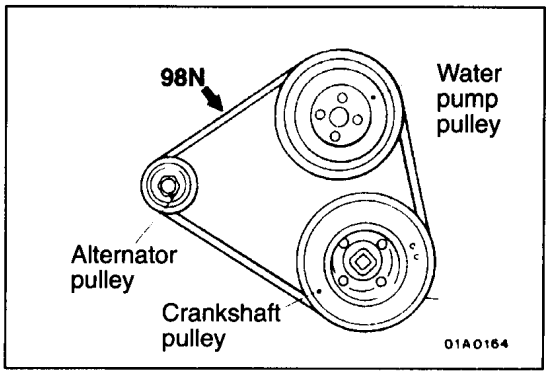
Items	Specified sealant	Remarks
Oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant

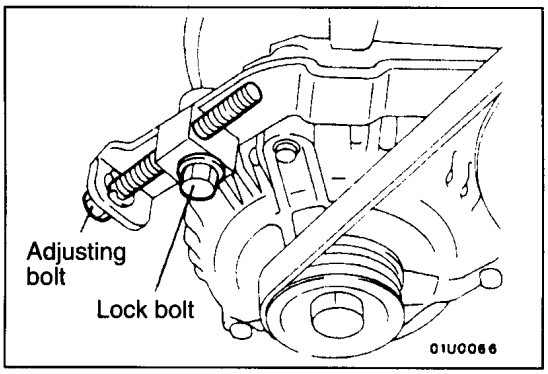
SPECIAL TOOLS

120002640

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	• Checking of the engine idle speed <MPI> • Erasure of diagnosis trouble code <MPI>
 16X0607	–	ROM pack	
	MD998443	Auto-lash adjuster holder	Supporting of auto-lash adjuster
	MD998738	Adjusting screw	• Holding of the auto tensioner • Timing belt tension adjustment
	MB990767	End yoke holder	Supporting of camshaft sprocket
	MD998719	Crankshaft pulley holder pin	
	MD998754	Crankshaft pulley holder pin	
	MD998713	Camshaft oil seal installer	Press-in of the camshaft oil seal

Tool	Number	Name	Use
	MD998727	Oil pan remover	Removal of the oil pan
	MD998767	Tensioner pulley socket wrench	Timing belt tension adjustment
	MD998747	Crankshaft pulley holder	Supporting of crankshaft sprocket
	MD998375	Crankshaft front oil seal installer	Press-fitting the crankshaft front oil seal
	MD998781	Fly wheel stopper	Securing the flywheel <M/T> or drive plate <A/T>
	MD998776	Crankshaft rear oil seal installer	Press-fitting the crankshaft rear oil seal
	MB990938	Handle	
	MB991531	Engine hanger	Engine removal and installation
	MD998299	MAS screwdriver	Adjustment of mixture adjusting screw





SERVICE ADJUSTMENT PROCEDURES <CARBURETTOR>

120002641

DRIVE BELT TENSION INSPECTION AND ADJUSTMENT

ALTERNATOR DRIVE BELT TENSION INSPECTION

Pull or push at the center of the belt between the water pump pulley and the alternator pulley with a force of 98 N. Then measure the drive belt deflection.

Standard value: 7.0–9.0 mm

ALTERNATOR DRIVE BELT TENSION ADJUSTMENT

120000995

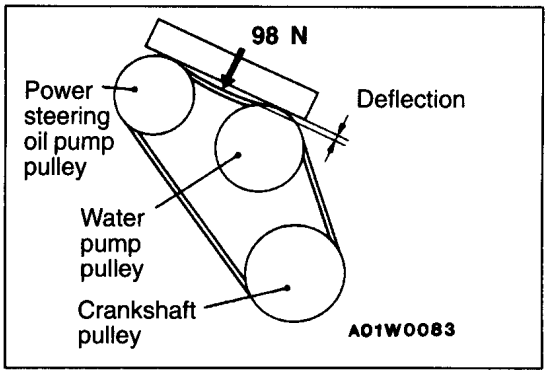
1. Loosen the nut of the alternator pivot bolt.
2. Loosen the lock bolt.
3. Turn the adjusting bolt to adjust the belt deflection to the standard value.

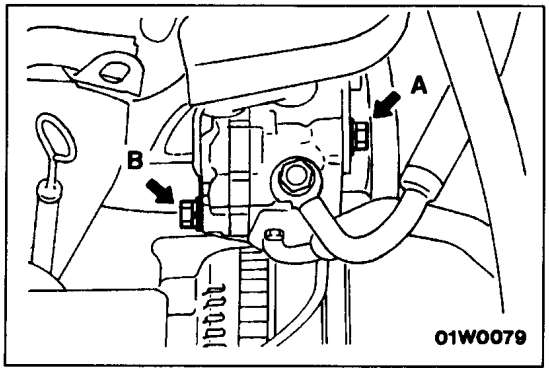
   Standard value:
   Used belt 7.5–8.5 mm
   New belt 5.5–7.5 mm
4. Tighten the nut of the alternator pivot bolt.

   Tightening torque: 22 Nm
5. Tighten the lock bolt.

   Tightening torque: 22 Nm
6. Tighten the adjusting bolt.

   Tightening torque: 9.8 Nm
7. Turn the crankshaft one or more turns clockwise, and then check the belt deflection or belt tension.





POWER STEERING OIL PUMP DRIVE BELT TENSION INSPECTION

120000996

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 98 N as shown in the figure.
Measure drive belt deflection amount.

Standard value: 5.5–7.5 mm

POWER STEERING OIL PUMP DRIVE BELT TENSION ADJUSTMENT

120002447

1. Loosen power steering oil pump fixing bolt (A, B).
2. Move power steering oil pump, tension belt moderately and adjust tension.

   Standard value:

   If used belt (with correct tension) is used: 6.0–7.0 mm

   If a new belt is used: 4.0–6.0 mm
3. Tighten fixing bolt A.

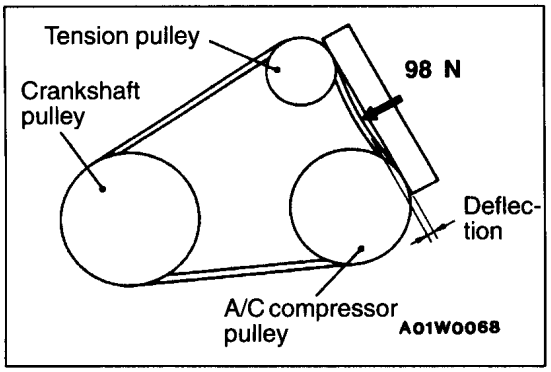
   Tightening torque: 39 Nm

4. Tighten the remaining fixing bolts B.

   Tightening torque: 24 Nm

5. Check the belt deflection amount and readjust if necessary.

   Caution
   Turn the crankshaft one or more turns in the clockwise direction and then check the belt tension.

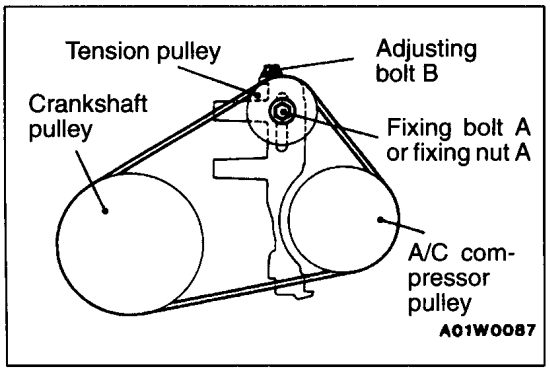


A/C COMPRESSOR DRIVE BELT TENSION INSPECTION

120000998

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 98 N as shown in the figure.
Measure drive belt deflection amount.

Standard value: 4.5 – 6.5 mm



A/C COMPRESSOR DRIVE BELT TENSION ADJUSTMENT

120002448

1. Loosen tension pulley fixing bolt A <Dual A/C> or fixing nut A <Single A/C>.
2. Adjust belt tension with adjusting bolt B.

   Standard value:

   If used belt (with correct tension) is used: 5.0–6.0 mm

   If a new belt is used: 3.5–4.5 mm

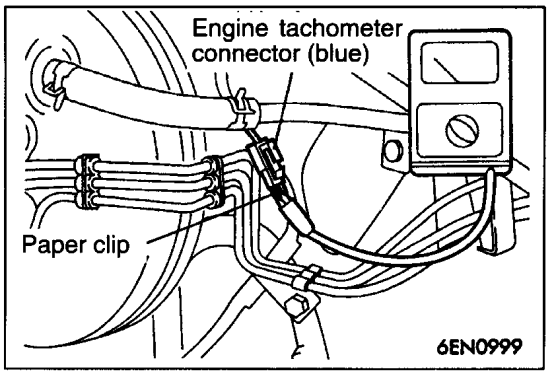
3. Tighten fixing bolt A <Dual A/C> or fixing nut A <Single A/C>.
4. Check the belt deflection amount and readjust if necessary.

   Caution
   Turn the crankshaft one or more turns in the clockwise direction and then check the belt tension

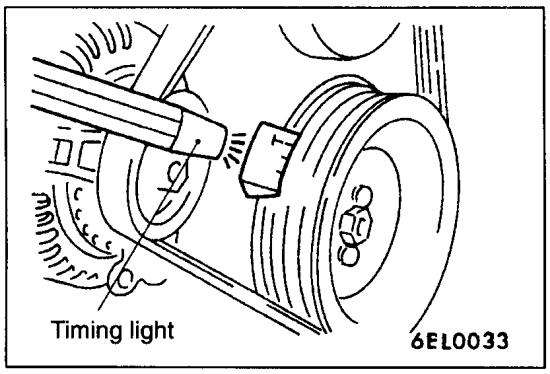
IGNITION TIMING INSPECTION AND ADJUSTMENT

120002642

1. Before inspection and adjustment, set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral

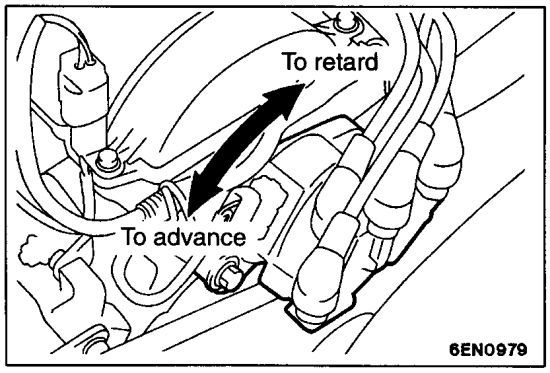


2. Insert a paper clip from the harness side into the 1-pin connector (blue) as shown in the illustration at left.
3. Connect a primary-voltage-detection type of tachometer to the paper clip.
4. Set up a timing light.
5. Start the engine and run at idle.
6. Check that the engine speed is at 600 – 900 r/min.



7. Check that basic ignition timing is within the standard value.

   Standard value: 0° BTDC±2°



8. If not within the standard value, loosen distributor fixing bolts and adjust by rotating distributor body.
9. Tighten the mounting bolts after adjusting.

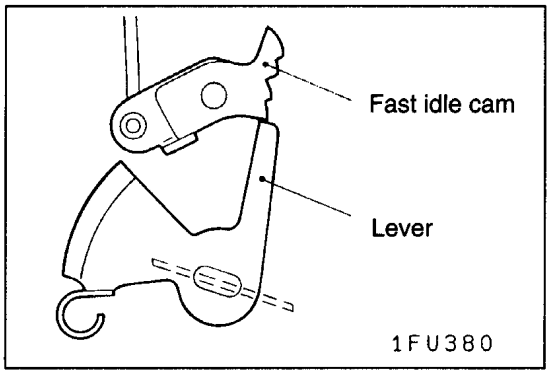
   Tightening torque: 12 Nm

IDLE SPEED INSPECTION AND ADJUSTMENT

120002643

Caution
The improper setting (throttle value opening) will increase exhaust gas temperature at deceleration, reducing catalyst life greatly and deteriorating exhaust gas cleaning performance. It also has effect on fuel consumption and engine braking.

1. Set the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Set up a timing light and tachometer.
   For information regarding the tachometer installation method, refer to P. 11D-9.



3. Depress accelerator pedal once to release the fast idle.

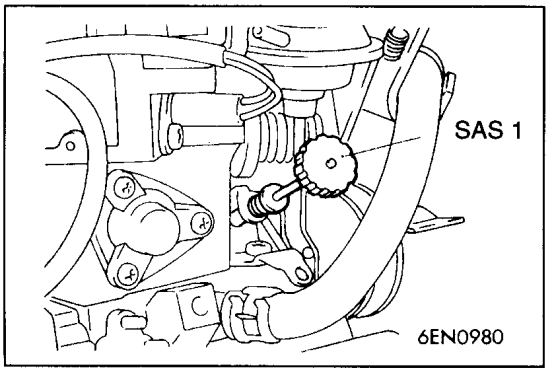
   NOTE
   Depressing the accelerator pedal separates the lever from the fast idle cam.

4. Start the engine and run at idle.
5. Check the ignition timing. Adjust if necessary.

   Standard value: 0°BTDC±2°

6. Race the engine 2–3 times up to 2,000–3,000 r/min.
7. Check the idle speed.

   Curb idle speed: 800±50 r/min



8. If the idle speed is outside the standard value, turn speed adjusting screw 1 (SAS 1) to adjust the idle speed.

IDLE FEEDBACK CHECK

120002644

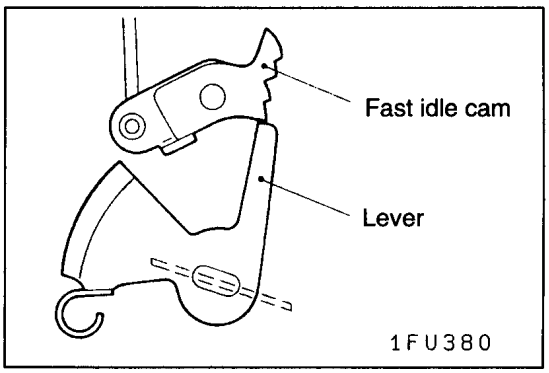
In case an idle condition check is required for some reason (for example when overhauling carburettor), the following procedure should be followed.

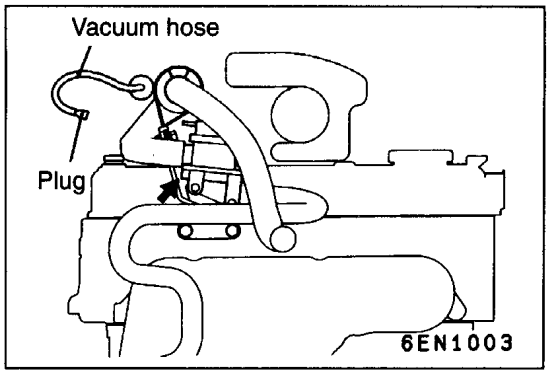
1. Set the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Set up a timing light and tachometer.
   For information regarding the tachometer installation method, refer to P. 11D-9.
3. Depress accelerator pedal once to release the fast idle.

   NOTE
   Depressing the accelerator pedal separates the lever from the fast idle cam.

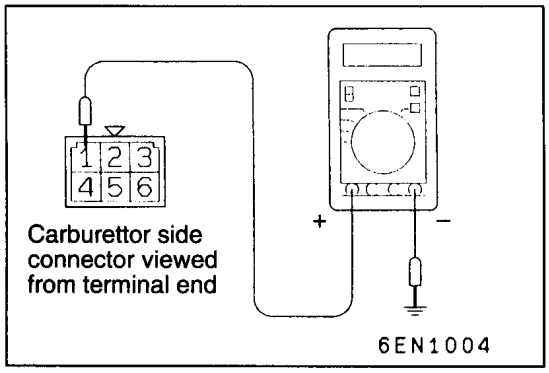
4. Start the engine and run at idle.
5. Check the ignition timing. Adjust if necessary.

   Standard value: 0°BTDC±2°





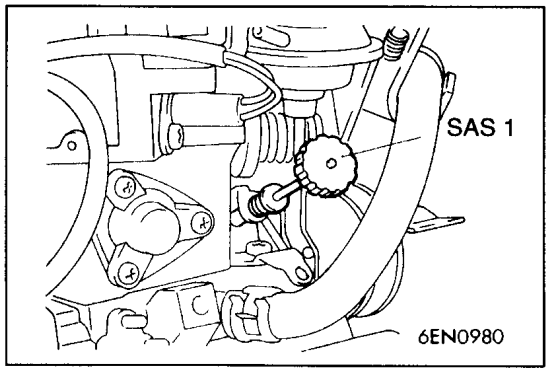
6. Disconnect the vacuum hose from the secondary air control valve, and plug the end of the hose.



7. Connect the positive terminal of an analogue type voltmeter to the negative terminal of the feedback solenoid valve (FBSV) while connecting the negative terminal of the voltmeter to the vehicle body as the earth.

   Caution
   The feedback solenoid valve connector must not be disconnected.

8. Race the engine at a speed of 2,000–3,000 r/min for 10 seconds or more.



9. Immediately after racing the engine (step 8. above), check the movement of the voltmeter pointer while the engine is running at idle. If the pointer is swinging between 2 and 12 volts, the system is operating normally.

   NOTE
   If necessary, turn the idle speed adjusting screw 1 (SAS 1) to adjust the curb idle speed.

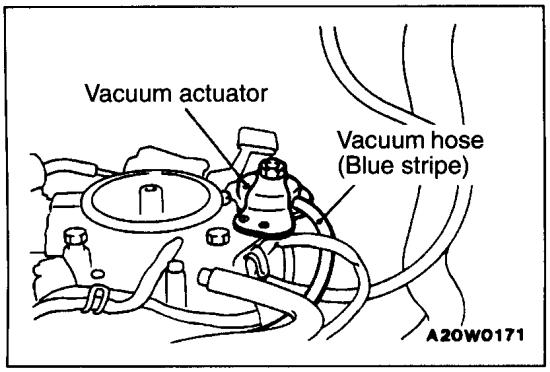
10. If the pointer is not swinging between 2 and 12 volts, check each part of the fuel system.
    (a) If there is a malfunction, repair or replace the part and repeat steps 8 and 9.
    (b) If there is no malfunction, clean the jets of the carburettor and repeat steps 8 and 9.
11. If the system is not working correctly, replace the throttle body of carburettor and repeat steps 8 and 9.
12. If the system is not working correctly even after replacing the throttle body, replace the carburettor assembly.
13. Remove the plug from the end of the vacuum hose, and then connect the vacuum hose to the secondary air control valve.

IDLE-UP MECHANISM INSPECTION AND ADJUSTMENT – FOR ABS

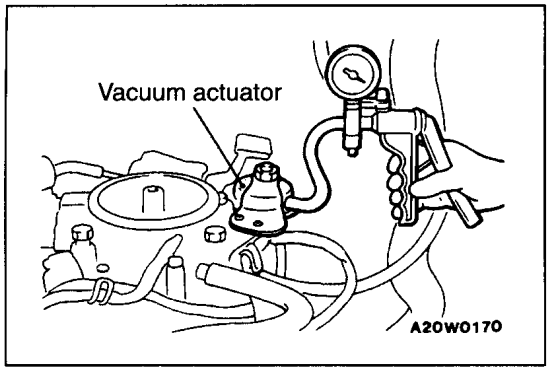
120002645

(1) Set the vehicles in the following condition.
- Engine coolant temperature: 80–95°C
- Lamps and all accessories: OFF
- Transmission: Neutral

(2) Inspect and adjust the idle speed. (Refer to P. 11D-9.)



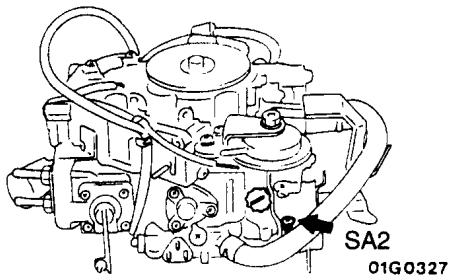
(3) Remove the vacuum hose (for anti-skid brake: blue) from the vacuum actuator.



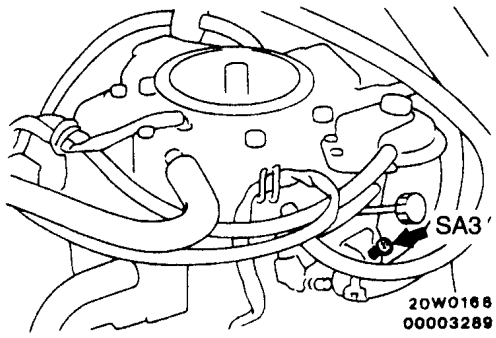
(4) Connect a hand vacuum pump to the nipple of the removed vacuum hose.
(5) Set up a tachometer. (Refer to P. 11D-9.)
(6) Start the engine and run at idle.
(7) Apply the negative pressure of 87kPa and check the engine speed.

Standard value: 1,600 $^{+50}_{-300}$ r/min

<Vehicles without A/C>



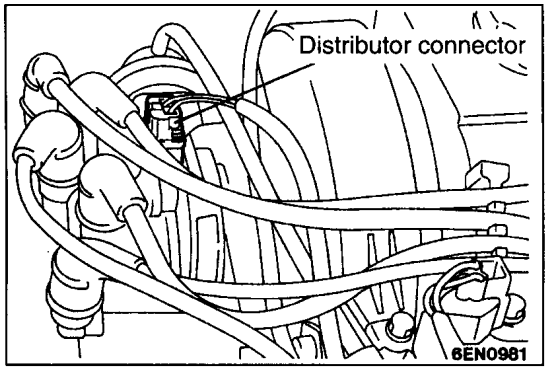
<Vehicles with A/C>



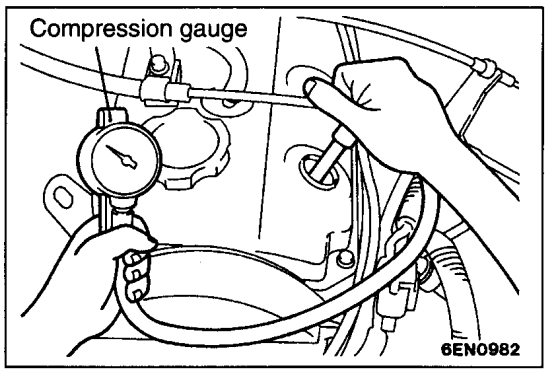
(8) If the engine speed is outside the standard value, adjust by turning the speed adjusting screw (SA2 <Vehicles without A/C> or SA3 <Vehicles with A/C>).

COMPRESSION PRESSURE INSPECTION 120001610

1. Check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Disconnect the spark plug cables.
3. Remove all of the spark plugs.
4. Disconnect the distributor connector.
5. Cover the spark plug hole with a rag etc., and after the engine has been cranked, check that no foreign material is adhering to the rag.



Caution
1. **Keep away from the spark 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 the spark plug hole, which is dangerous.**



6. Set compression gauge to one of the spark plug holes.
7. Crank the engine with the throttle valve fully open and measure the compression pressure.

Standard value:
1,320 kPa (at engine speed of 250–400 r/min)

Limit:
Min. 1,000 kPa (at engine speed of 250–400 r/min)

8. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

Limit: Max. 100 kPa

9. 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 spark plug hole, and repeat the operations in steps 7 and 8.
   (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.
10. Connect the distributor connector.
11. Install the spark plugs.

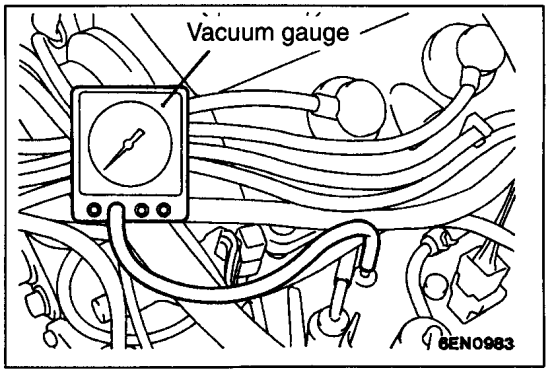
    Tightening torque: 25 Nm

12. Install the spark plug cables.

INTAKE MANIFOLD VACUUM INSPECTION

120002646

1. Set the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Set up a timing light and tachometer.
   For information regarding the tachometer installation method, refer to P. 11D-9.

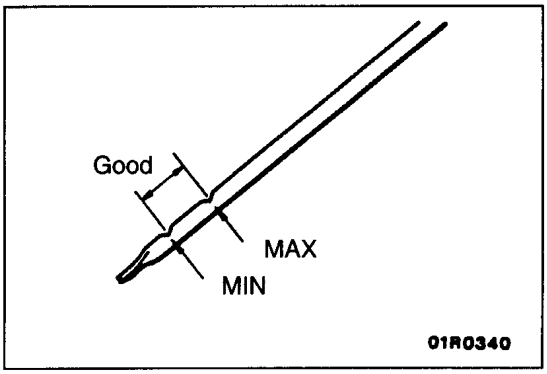


3. Set the vacuum gauge at illustrated position on the intake manifold.
4. Check that the idle speed is at the standard value.

   Standard value: 800±50 r/min

5. Check the manifold vacuum.

   Limit: Min. 60 kPa

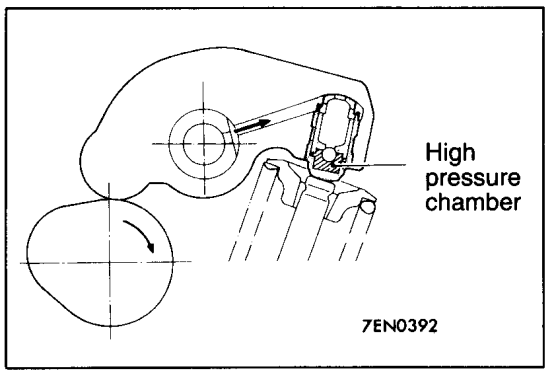


LASH ADJUSTER CHECK 120002008

NOTE
If an abnormal noise (rattling noise) probably caused by the lash adjusters is heard and the noise does not stop, check as follows.

1. Check the engine oil, and if required, refill or change it.

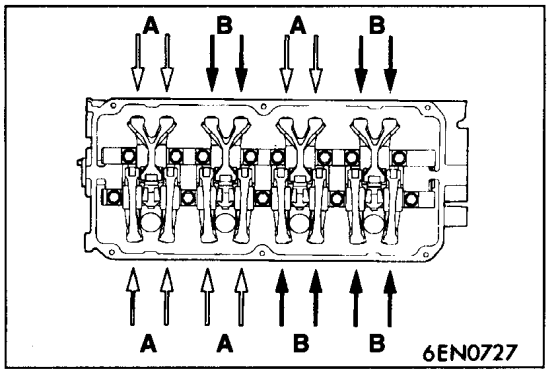
   NOTE
   - If the amount of the engine oil is insufficient, air will be sucked in from the oil strainer and mix in the oil passage.
   - If the amount of the engine oil is more than the specified amount, it will be stirred by the crank to make a lot of air mix in the oil.
   - If the oil is deteriorated, it will not easily separate from air and the amount of air mixed in the oil will increase.



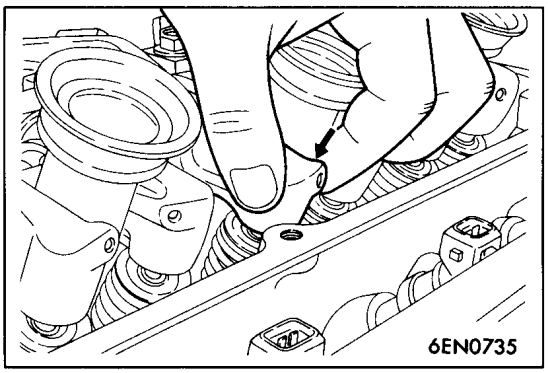
If the air which has mixed in the oil due to the above causes enters the high pressure chamber in the lash adjusters, the air in the high pressure chamber will be pressurized during opening of the valve, which causes the lash adjusters to shrink excessively, and an abnormal noise will be generated when the valve is closed. This is the same phenomenon as the one when the valve clearance has been excessively adjusted by mistake.
In this case, if the air which has entered the lash adjusters is bled, things will be normalized.

2. Start the engine and perform gentle racing * several times. (less than 10 times.)
   If the abnormal noise stops by racing, the air is bled from the high pressure chamber of the lash adjusters and the function of the lash adjusters is normalized.
   * After raising the engine speed from idling to 3,000 r/min. gradually (in 30 seconds), drop the speed gradually (in 30 seconds) to idling.

   NOTE
   - If the vehicle is parked on a slope for a long time, the oil in the lash adjusters will be decreased and air may enter the high pressure chamber when the vehicle is started.
   - After the vehicle is parked for a long time, air may enter the high pressure chamber because the oil in the oil passage will be gone and it will take a time before the oil is supplied to the lash adjusters.



3. If an abnormal noise does not stop by racing, check the lash adjusters according to the following procedures.
   (1) Stop the engine.
   (2) Set the No. 1 cylinder of the engine to the compression top dead centre.
   (3) Push the rocker arm indicated by the arrow mark "A" as shown in the illustration at left and check whether or not the arm lock goes down.
   (4) Turn slowly the crank shaft 360° clockwise.
   (5) Check the rocker arm indicated by the arrow mark "B" as shown in the illustration at left same as above (3).



(6) If the rocker arm can be lowered easily when the part of the rocker arm which is directly above the top of the lash adjuster is pressed, the lash adjuster is defective and should be replaced with a new part. Furthermore, when replacing the lash adjuster, bleed all of the air from the lash adjuster and then install. After this, check to be sure that there is no abnormality by carrying out the inspection in steps (1) to (5).

NOTE
- A leak-down test can be carried out to accurately determine whether the lash adjuster is defective or not.
- For the procedures for the leak-down test and air bleeding of the lash adjuster, refer to the Engine Workshop Manual.

Furthermore, if the rocker arm feels extremely stiff and cannot be lowered when it is pressed, the lash adjuster is normal, so investigate for some other cause of the abnormality.

SERVICE ADJUSTMENT PROCEDURES <MPI>

120002647

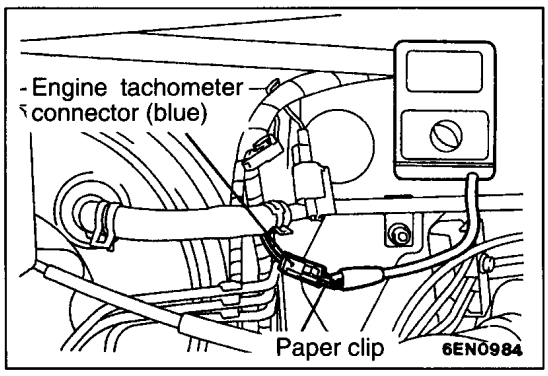
DRIVE BELT TENSION INSPECTION AND ADJUSTMENT

Refer to P. 11D-7.

IGNITION TIMING INSPECTION AND ADJUSTMENT

120002648

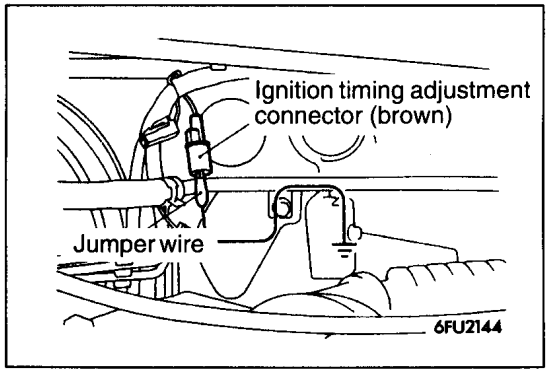
1. Before inspection and adjustment, set vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)



2. Insert a paper clip from the harness side into the 1-pin connector as shown in the illustration at left.
3. Connect a primary-voltage-detection type of tachometer to the paper clip.

   NOTE
   Do not use the MUT-II.
   If tested with the MUT-II connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.

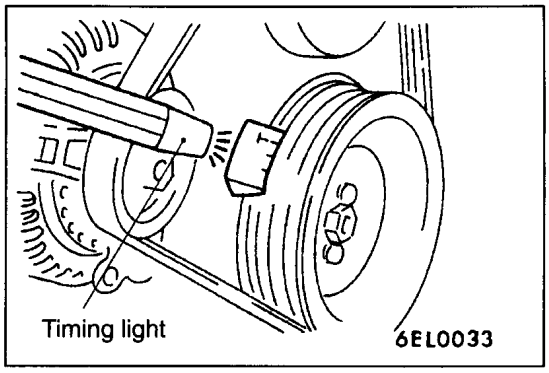
4. Set up a timing light.
5. Start the engine and run at idle.
6. Check that the idle speed is approximately 750 r/min.
7. Turn the ignition switch to OFF.
8. Remove the waterproof connector from the ignition timing adjustment connector (brown).
9. Connect the jumper wire with the clip to the ignition timing adjustment terminal, and earth this to the body as illustrated.

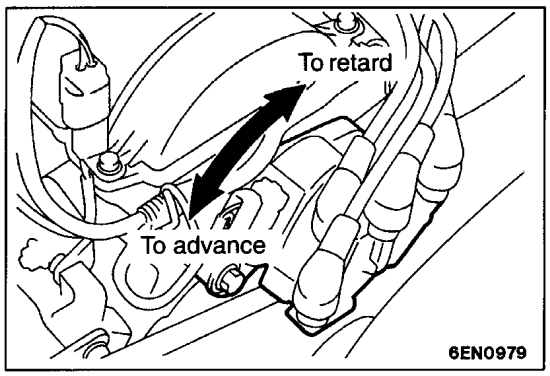


   NOTE
   Earthing this terminal sets the engine to the basic ignition timing.

10. Start the engine and run it at idle.
11. Check that basic ignition timing is within the standard value.

    Standard value: 5° BTDC±2°





12. If not within the standard value, loosen distributor fixing bolts and adjust by rotating distributor body.
13. Tighten mounting bolts after adjusting.

    Tightening torque: 12 Nm

14. Stop the engine, remove the jumper wire from the ignition timing adjustment connector (brown), and return the connector to its original condition.
15. Start the engine and check that ignition timing at the standard value.

    Standard value: Approx. 10° BTDC

    NOTE
    1. Ignition timing is variable within about ±7°, even under normal operation.
    2. And it is automatically further advanced by about 5° from 10° BTDC at higher altitudes.

16. Attach a sealing tape to the fitting nut only for vehicles for Switzerland.

    NOTE
    Sealing tape is attached to all new vehicles.

IDLE SPEED INSPECTION 120002649

1. Set vehicles in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Check the basic ignition timing. Adjust if necessary.

   Standard value: 5° BTDC ±2°

3. Turn the ignition switch to OFF and connect the MUT-II to the diagnosis connector.
4. Start the engine.
5. Run it at idle for 2 minutes.
6. Check the curb idle speed.

   Standard value: 750±100 r/min

   NOTE
   The idle speed is controlled automatically by the idle speed control (ISC) system.

7. If the idle speed is outside the standard value, inspect the MPI components by referring to GROUP 13A – Troubleshooting.

IDLE MIXTURE INSPECTION 120002650

1. Set vehicles in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Check that the basic ignition timing is within the standard value.

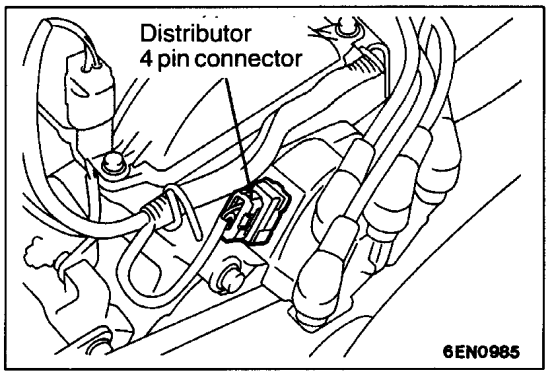
   Standard value: 5° BTDC ±2°
3. Turn the ignition switch to OFF and connect the MUT-II to the diagnosis connector.
4. Start the engine and run it at 2,500 r/min for 2 minutes.
5. Set the CO, HC tester.
6. Check the CO contents and the HC contents at idle.

   Standard value
   CO contents: 0.5% or less
   HC contents: 100 ppm or less
7. If there is a deviation from the standard value, check the following items:
   - Diagnosis output
   - Closed-loop control (When the closed-loop control is normal, the output signal of the oxygen sensor changes between 0–400 mV and 600–1,000 mV at idle.)
   - Combustion pressure
   - Injector
   - Ignition coil, spark plug cable, spark plug
   - Leak in the EGR system and in the EGR valve
   - Evaporative emission control system
   - Compression pressure

   NOTE
   Replace the three-way catalyst when the CO and HC contents are not within the standard value, even though the result of the inspection is normal on all items.

COMPRESSION PRESSURE INSPECTION 120002651

1. Check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Disconnect the spark plug cables.
3. Remove all of the spark plugs.

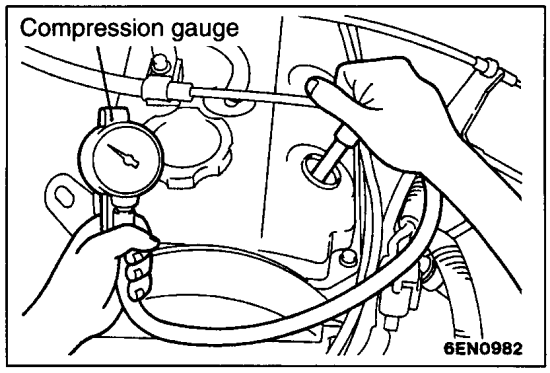


4. Disconnect the distributor 4 pin connector.

   NOTE
   Doing this prevent the engine control unit to carry out ignition and fuel injection.

5. Cover the spark 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 spark 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 the spark plug hole, which is dangerous.**



6. Set compression gauge to one of the spark plug holes.
7. Crank the engine with the throttle valve fully open and measure the compression pressure.

   Standard value:
   1,320 kPa (at engine speed of 250–400 r/min)
   Limit:
   Min. 1,000 kPa (at engine speed of 250–400 r/min)

8. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

   Limit: Max. 100 kPa

9. 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 spark plug hole, and repeat the operations in steps 7 and 8.
   (1) If the compression increases after oil is added, the cause 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.
10. Connect the distributor connector.
11. Install the spark plugs.

    Tightening torque: 25 Nm

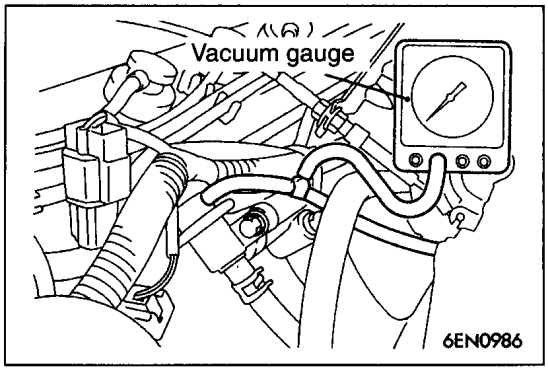
12. Install the spark plug cables.
13. Use the MUT-II to erase the diagnosis codes.

NOTE
This will erase the problem code resulting from the distributor connector being disconnected.

INTAKE MANIFOLD VACUUM INSPECTION

120002652

1. Set the vehicles in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral (P range on vehicles with A/T)
2. Turn the ignition switch to OFF and connect the MUT-II to the diagnosis connector.



3. Attach a three-way union to the vacuum hose between the fuel pressure regulator and the air intake plenum, and connect a vacuum gauge.
4. Start the engine and check that idle speed is within the standard value.

   Standard value: 750±100 r/min
5. Check the manifold vacuum.

   Limit: Min. 60 kPa

LASH ADJUSTER CHECK

120002653

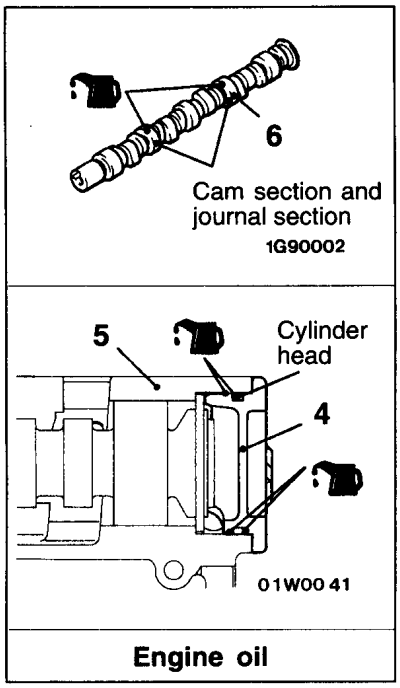
Refer to P. 11D-15.

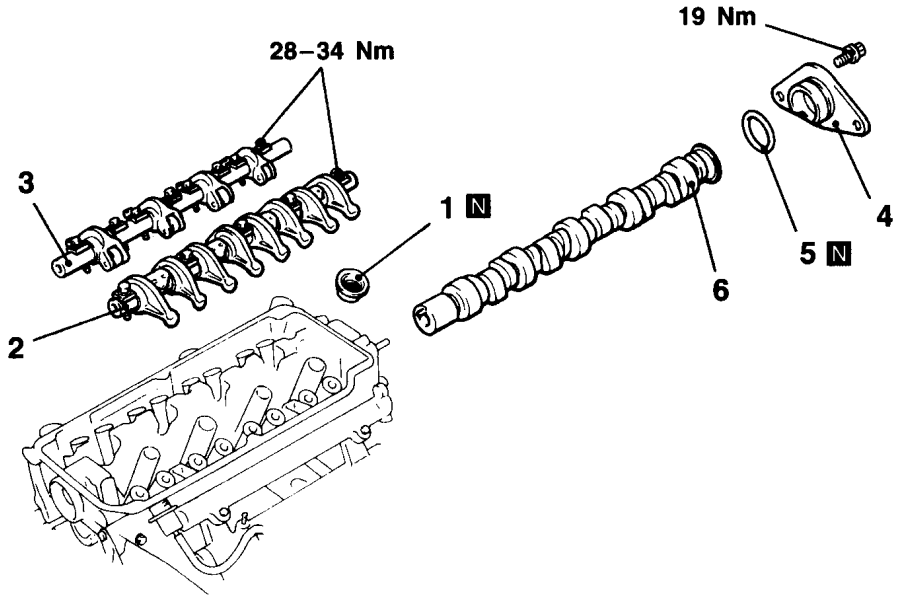
CAMSHAFT

120002449

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Cylinder Head Assembly Removal and Installation (Refer to P.11D-29.)



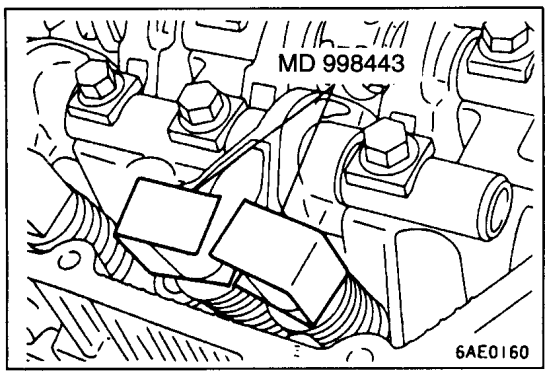


01W0039

00000850

Removal steps

1. Oil seal
◀A▶ ▶A◀ 2. Rocker arm and shaft assembly (Intake side)
◀A▶ ▶A◀ 3. Rocker arm and shaft assembly (Exhaust side)
4. Thrust case
5. O-ring
6. Camshaft

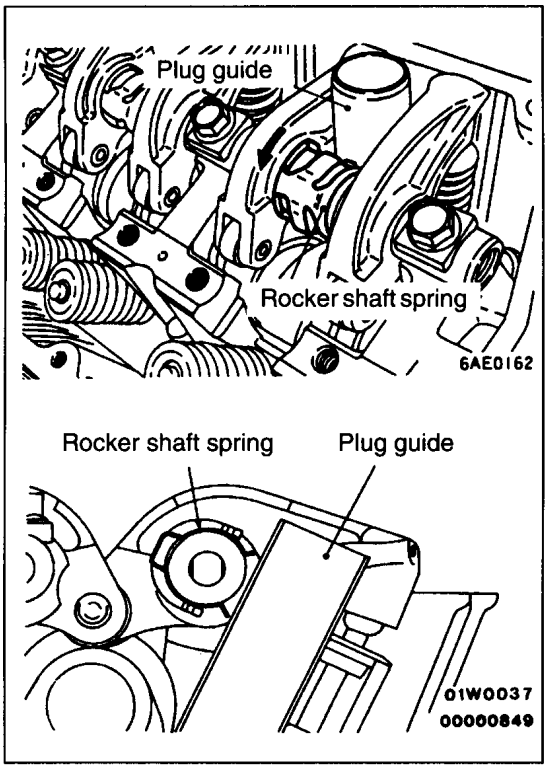


REMOVAL SERVICE POINT

◀A▶ ROCKER ARM AND SHAFT ASSEMBLY REMOVAL

(1) Before removing the rocker arm and shaft assembly, install the special tools as shown in the illustration so that the lash adjusters will not fall out.
(2) 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 POINT

▶A◀ ROCKER ARM AND SHAFT ASSEMBLY INSTALLATION

(1) Temporarily tighten the rocker shaft with the bolt so that all rocker arms on the inlet valve side do not push the valves.
(2) Fit the rocker shaft spring from the above and position it so that it is right angles to the plug guide.

NOTE
Install the rocker shaft spring before installing the rocker arm and rocker arm shaft on the exhaust side.

(3) Tighten the rocker arm and shaft assembly mounting bolt to the specified torque.

Tightening torque: 28–34 Nm

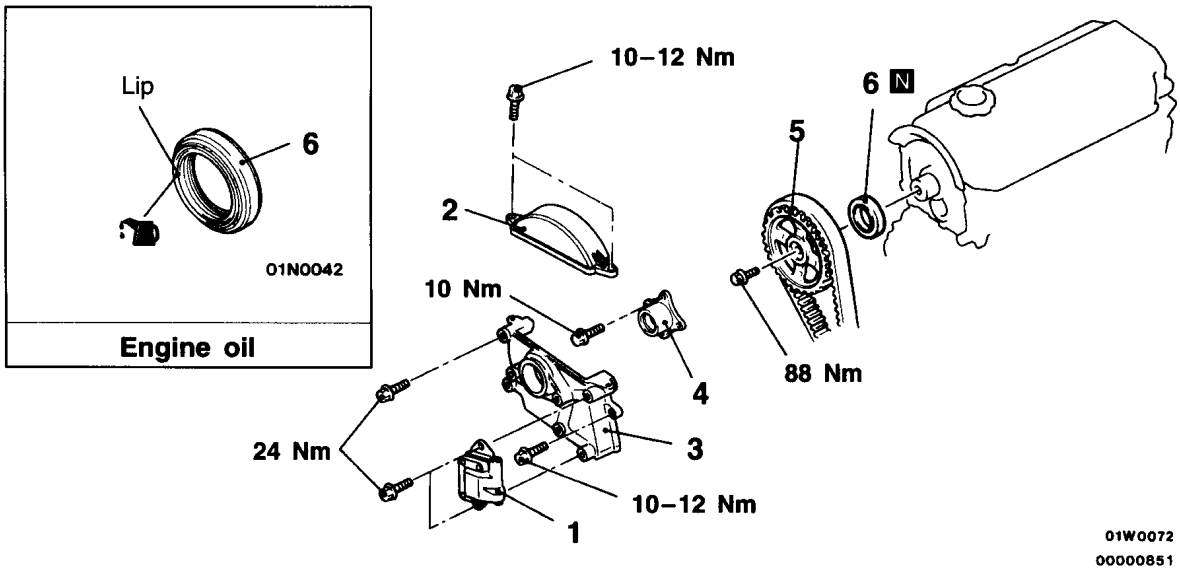
(4) Remove the special tool for fixing the lash adjuster.

CAMSHAFT OIL SEAL

120000227

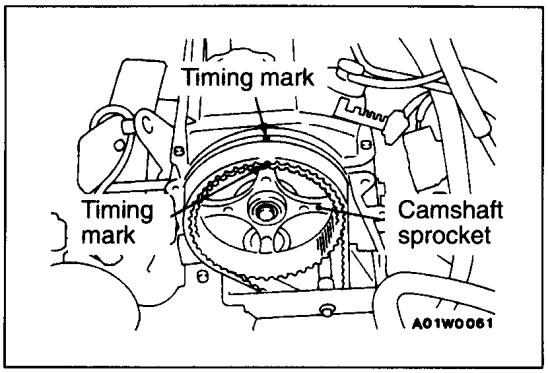
REMOVAL AND INSTALLATION

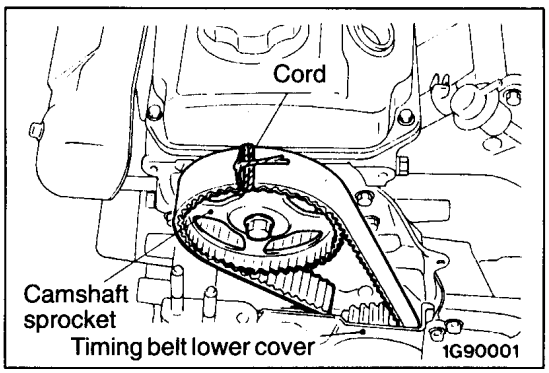
Pre-removal and Post-installation Operation
- Distributor Removal and Installation



Removal steps

1. Ignition coil
2. Timing belt upper cover assembly
3. Distributor bracket
▶C◀ 4. Camshaft sprocket spacer
◀A▶ ▶B◀ 5. Camshaft sprocket
◀B▶ ▶A◀ 6. Camshaft oil seal





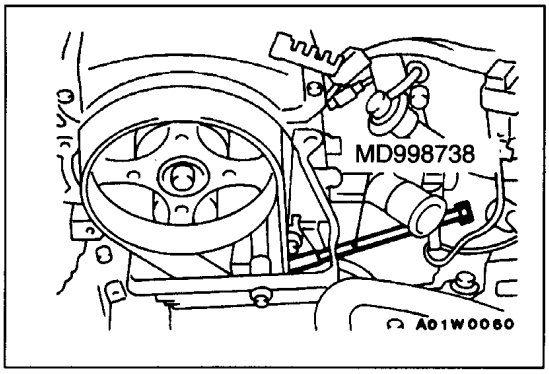
REMOVAL SERVICE POINTS

◀A▶ CAMSHAFT SPROCKET REMOVAL

(1) Rotate the crankshaft in the forward (right) direction and align the timing mark.

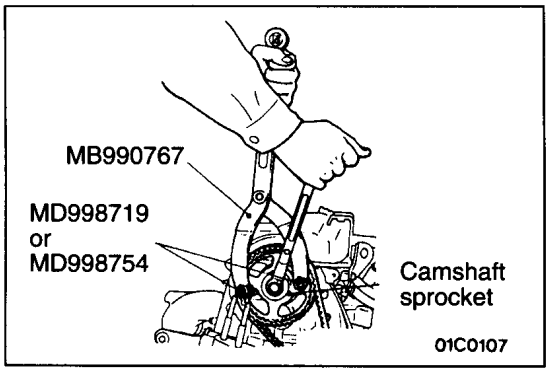
Caution
The crankshaft must always be rotated in the forward direction only.

(2) Tie the camshaft sprocket and timing belt with a cord so that the position of the camshaft sprocket will not move with respect to the timing belt.



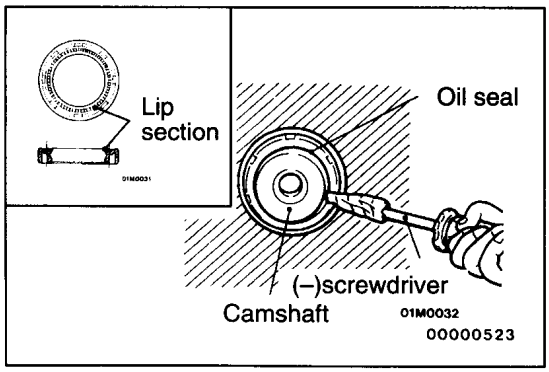
(3) Insert the special tool into the rubber plug hole in the timing belt cover assembly rear and turn it gently. Stop turning the special tool when it can no longer be turned gently.

NOTE
This work will make the end of the special tool touch the tensioner arm. So the auto tensioner will stop and the timing belt tension will not vary.



(4) Use the special tool to remove the camshaft sprocket with the timing belt attached.

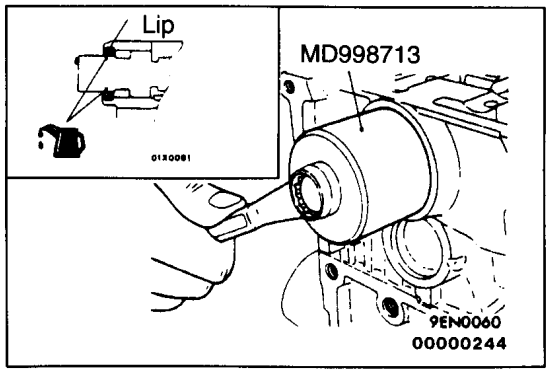
Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.



◀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 (–) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

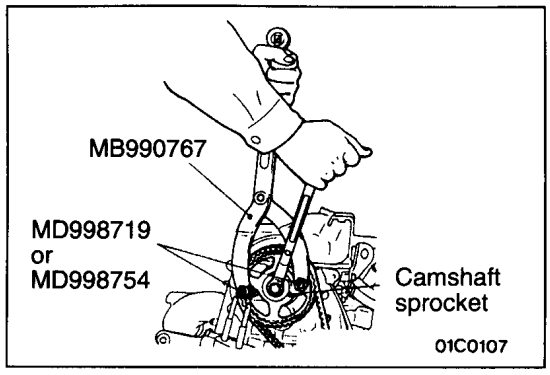
Caution
Be careful not to damage the camshaft and the cylinder head.



INSTALLATION SERVICE POINTS

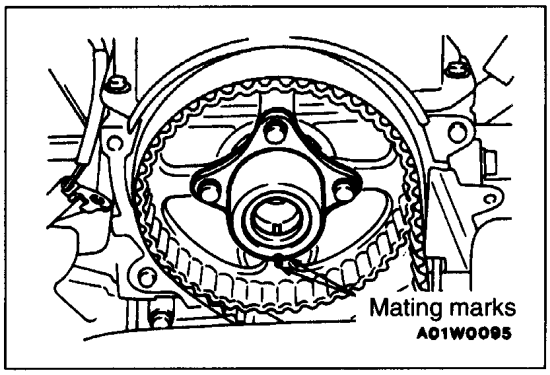
▶A◀ CAMSHAFT OIL SEAL INSTALLATION

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



▶B◀ CAMSHAFT SPROCKET INSTALLATION

(1) Use the special tool to stop the camshaft sprocket from turning, and then install the camshaft sprocket bolt.
(2) Remove the special tool from the rubber plug hole.
(3) Remove the cord which binds the camshaft sprocket and timing belt.



▶C◀ CAMSHAFT SPROCKET SPACER INSTALLATION

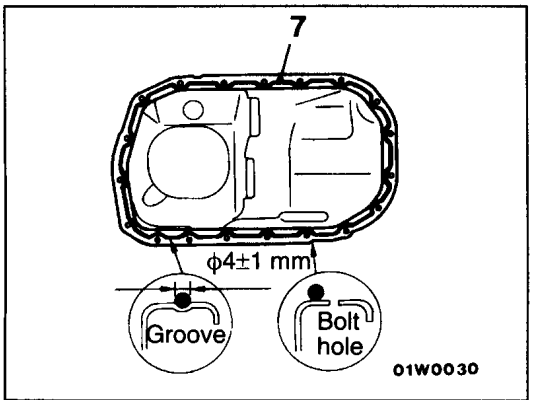
Align the mating marks on the camshaft sprocket and the camshaft sprocket spacer (groove), and then install them.

OIL PAN, OIL SCREEN

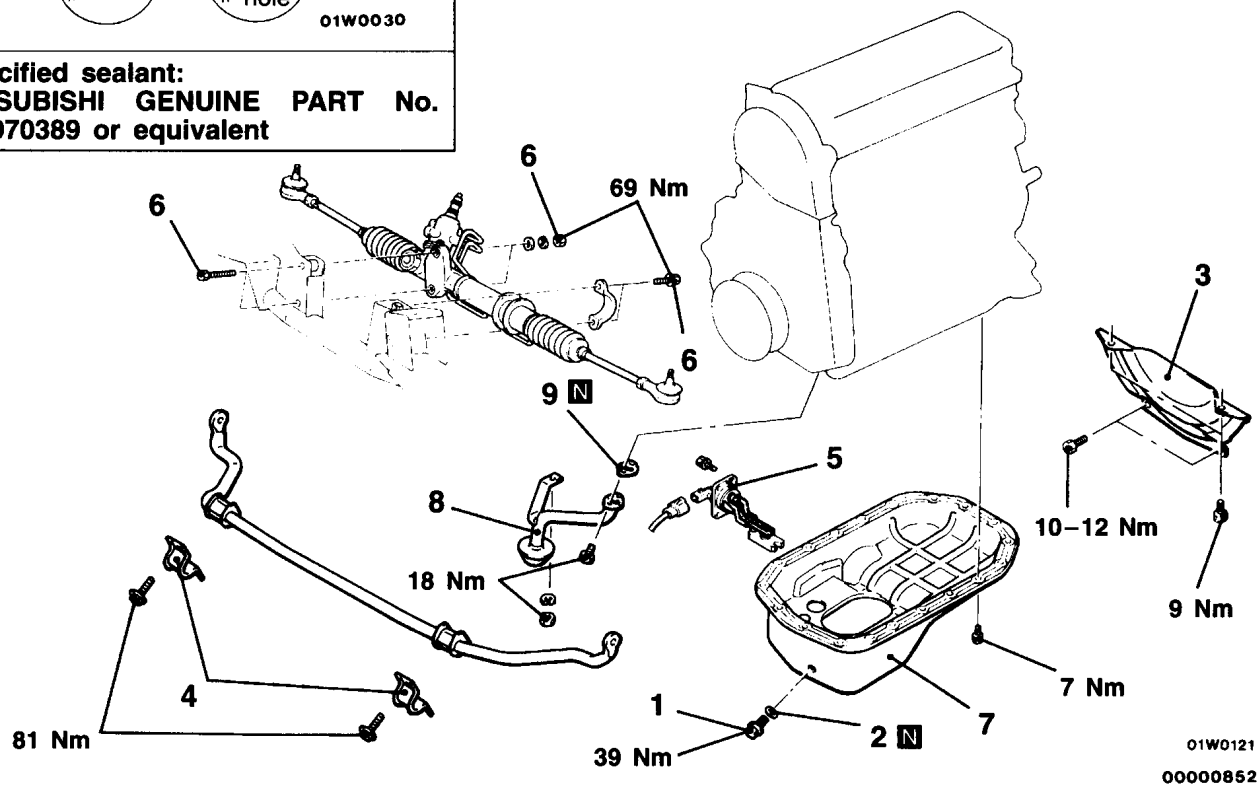
120002450

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
(1)Under Cover Removal and Installation (Refer to GROUP 42 – Under Cover.)
(2)Engine Oil Draining and Refilling (Refer to GROUP 12 – Service Adjustment Procedures.)
(3)Hood Removal and Installation <4WD> (Refer to GROUP 42 – Hood.)

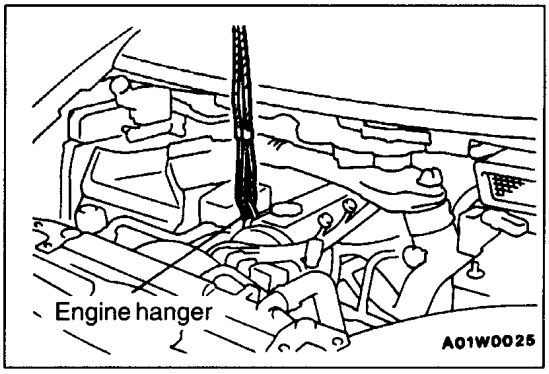


Specified sealant:
MITSUBISHI GENUINE PART No. MD970389 or equivalent



Removal steps

1. Drain plug
▶C◀ 2. Gasket
3. Bell housing cover
▶B◀ 4. Clamp
5. Engine oil level sensor
6. Steering gear and linkage mounting bolts and nuts <2WD>
◀A▶ • Suspend the engine assembly. <4WD>
◀B▶ ▶A◀ 7. Oil pan
8. Oil screen
9. Gasket

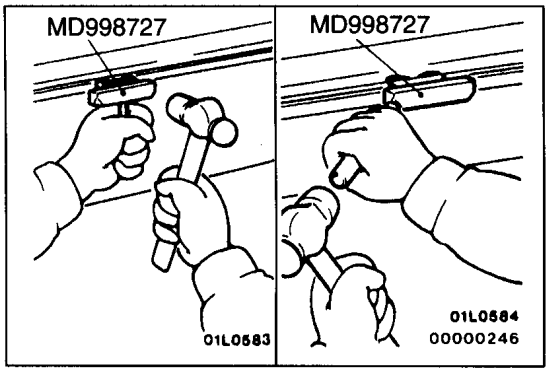


REMOVAL SERVICE POINTS

◀A▶ SUSPEND THE ENGINE ASSEMBLY <4WD>

Hook a chain onto the engine hanger and then use a chain block to raise the engine until there is no load on the engine mount insulators.

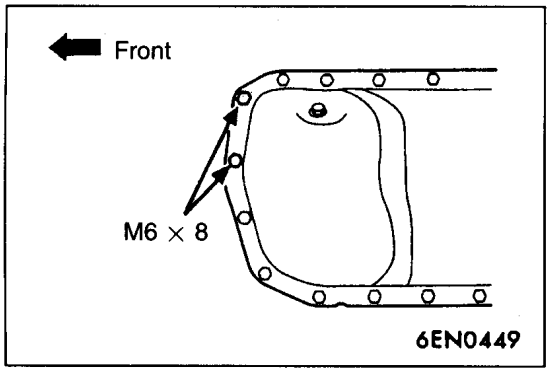
Caution
Be careful not to damage the engine mount insulators.



◀B▶ OIL PAN REMOVAL

After removing the oil pan mounting bolts, remove the oil pan with the special tool and a brass bar.

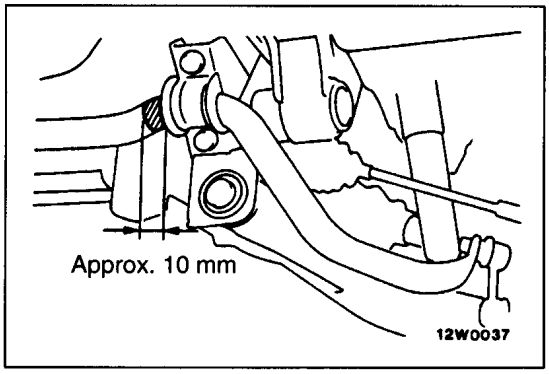
Caution
Perform this slowly to avoid deformation of the oil pan flange.



INSTALLATION SERVICE POINTS

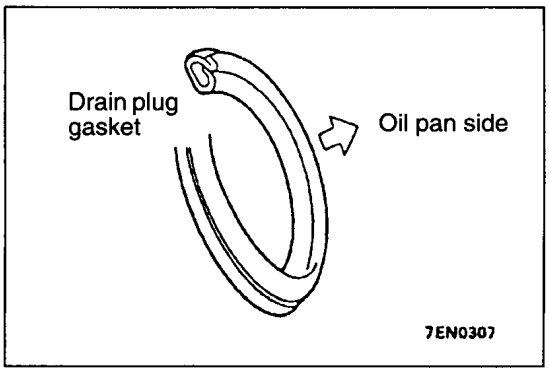
▶A◀ OIL PAN INSTALLATION

Be careful when installing, as the bolts indicated in the illustration have different lengths from the other bolts.



▶B◀ CLAMP INSTALLATION

Install the clamp so that the coloured part on the stabilizer bar meets the indicated distance.



▶C◀ GASKET INSTALLATION

Replace the gasket with a new gasket, and install it in the direction shown in the illustration.

CYLINDER HEAD GASKET

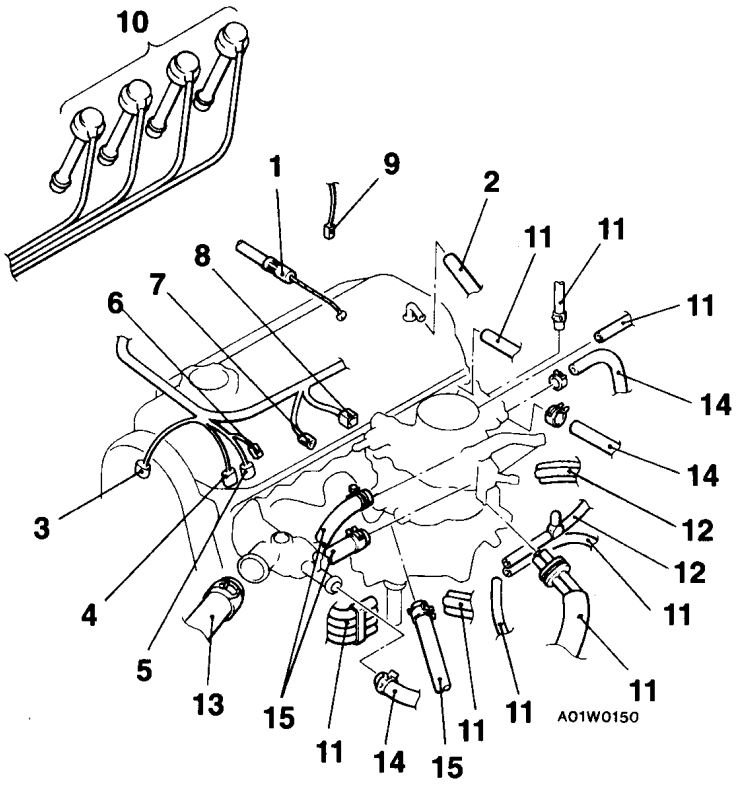
120002451

REMOVAL AND INSTALLATION

<Electronic controlled carburettor>

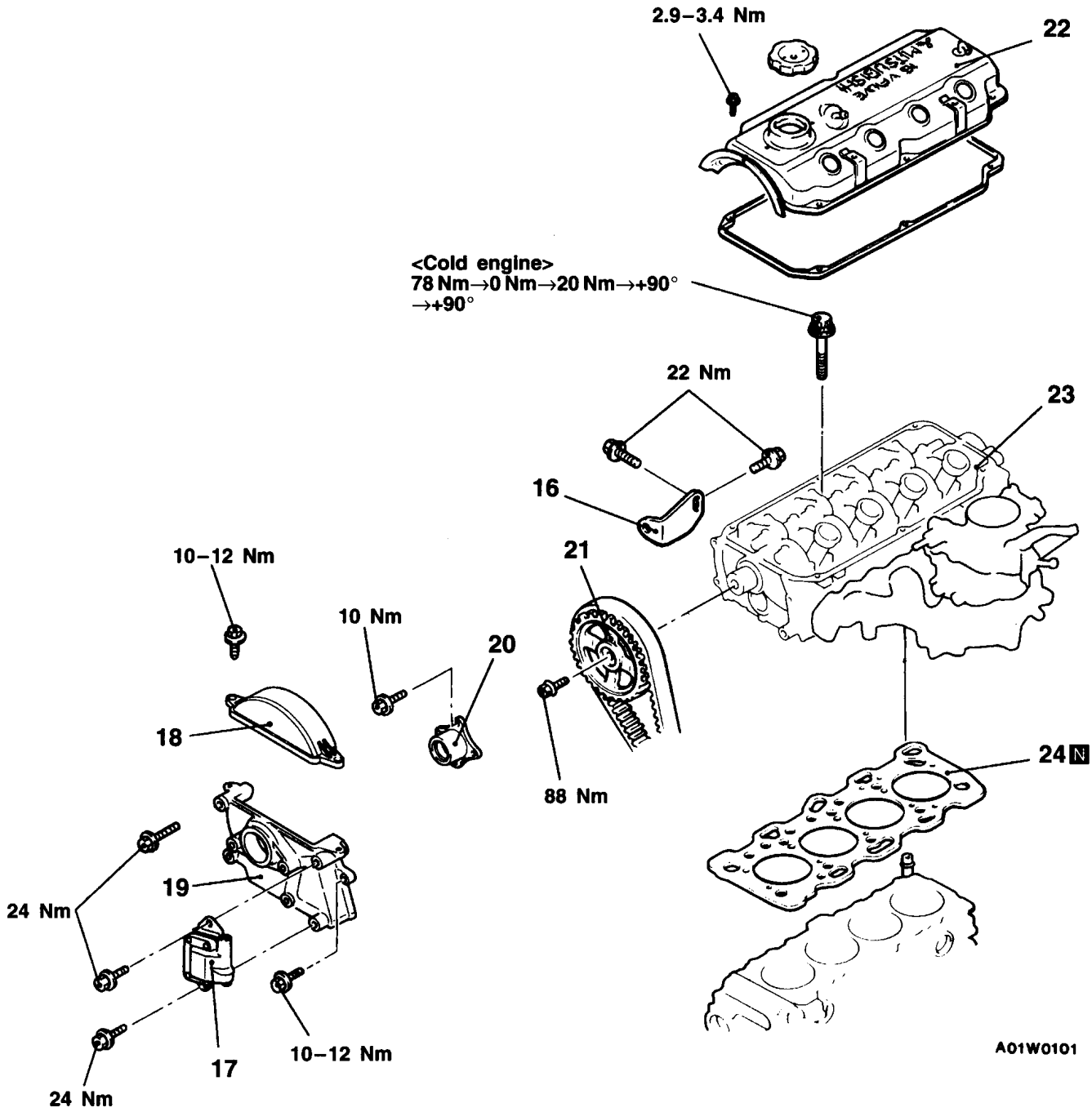
Pre-removal Operation
(1)Engine Coolant Draining (Refer to GROUP 14 – Service Adjustment Procedures.)
(2)Battery and Battery Tray Removal
(3)Air Cleaner Assembly Removal (Refer to GROUP 15 – Air Cleaner.)
(4)Distributor Removal
(5)Exhaust Manifold Removal (Refer to GROUP 15 – Exhaust Manifold.)

Post-installation Operation
(1)Exhaust Manifold Installation (Refer to GROUP 15 – Exhaust Manifold.)
(2)Distributor Installation
(3)Air Cleaner Assembly Installation (Refer to GROUP 15 – Air Cleaner.)
(4)Battery and Battery Tray Installation
(5)Engine Coolant Refilling (Refer to GROUP 14 – Service Adjustment Procedures.)
(6)Accelerator Cable Adjustment (Refer to GROUP 13F – Service Adjustment Procedures.)
(7)Throttle Cable Adjustment (Refer to GROUP 23 – Service Adjustment Procedures.)



Removal steps

1. Accelerator cable connection
2. PCV hose connection
3. Ignition coil connector
4. Engine coolant temperature sensor connector
5. Engine coolant temperature switch connector (for A/C)
6. Noise capacitor connector
7. Throttle position sensor connector
8. Solenoid valve connector
9. Engine coolant temperature gauge connector
10. Spark plug cable
11. Vacuum hose connection
12. VRV hose
13. Radiator upper hose connection
14. Water hose connection
15. Fuel hose connection

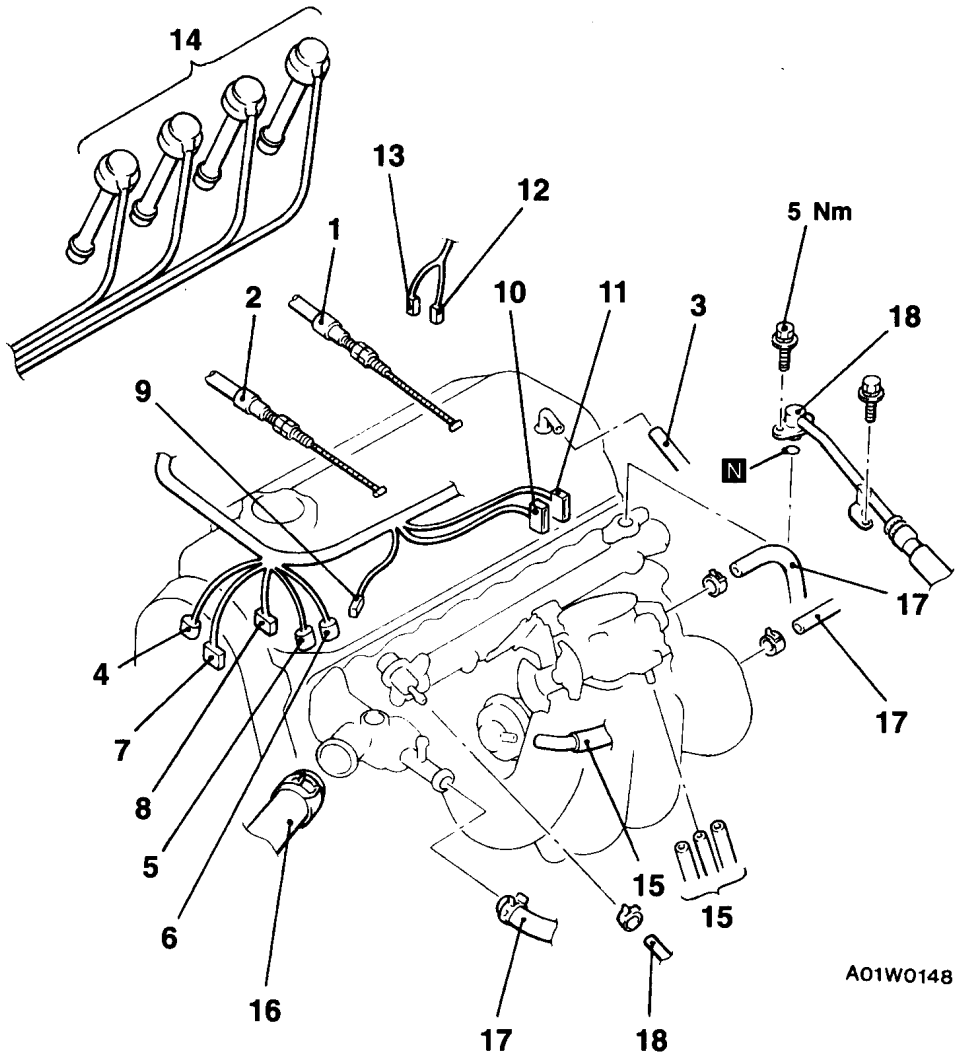


16. Power steering pump mount bracket
17. Ignition coil
18. Timing belt upper cover assembly
19. Distributor bracket
▶D◀ 20. Camshaft sprocket spacer
◀A▶ ▶C◀ 21. Camshaft sprocket
22. Rocker cover
◀B▶ ▶B◀ 23. Cylinder head assembly
▶A◀ 24. Cylinder head gasket

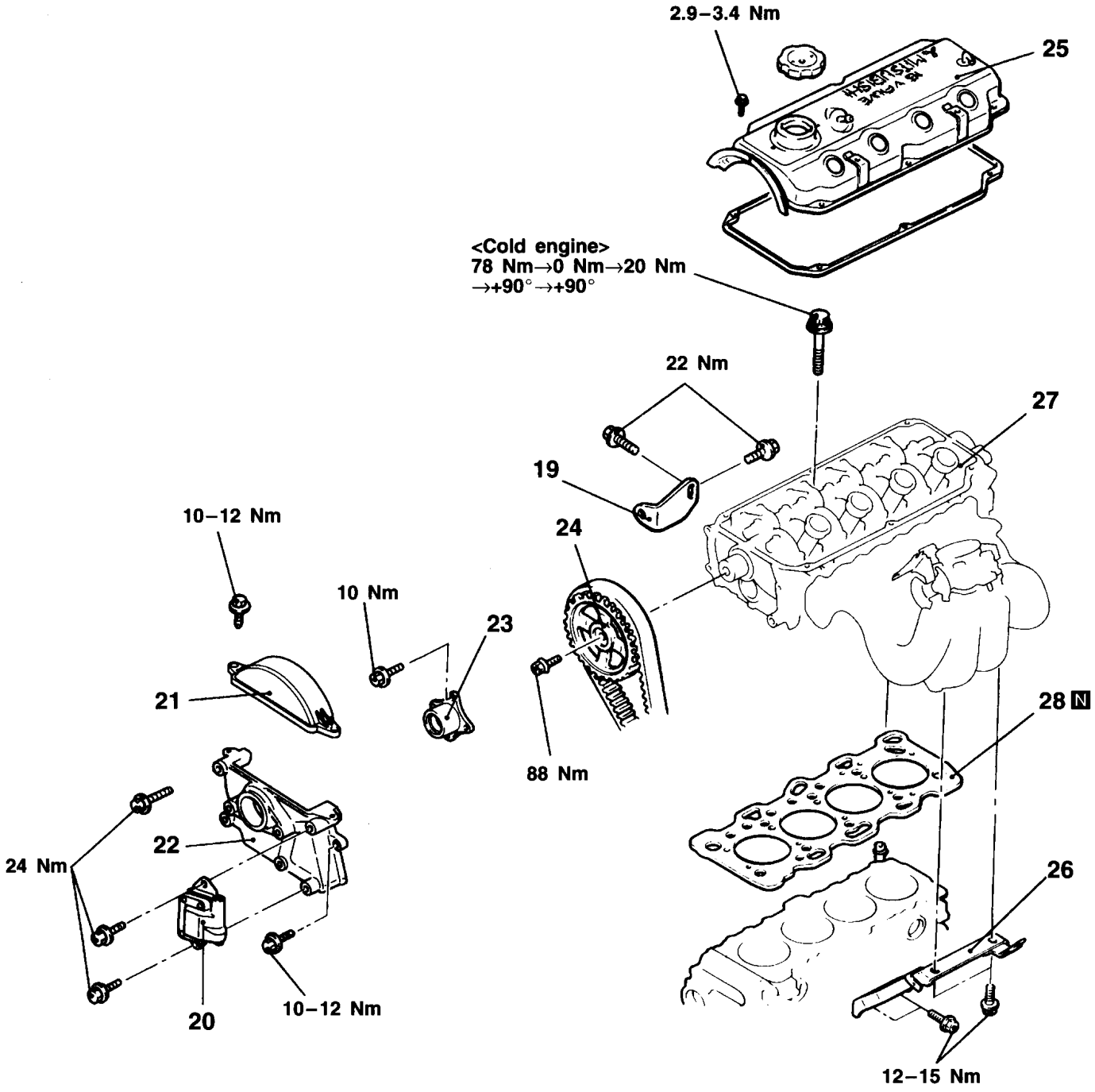
<MPI>

Pre-removal Operation
(1)Engine Coolant Draining (Refer to GROUP 14 – Service Adjustment Procedures.)
(2)Fuel Line Pressure Releasing (Refer to GROUP 13A – Service Adjustment Procedures.)
(3)Battery and Battery Tray Removal
(4)Air Cleaner Assembly Removal (Refer to GROUP 15 – Air Cleaner.)
(5)Distributor Removal
(6)Exhaust Manifold Removal (Refer to GROUP 15 – Exhaust Manifold.)

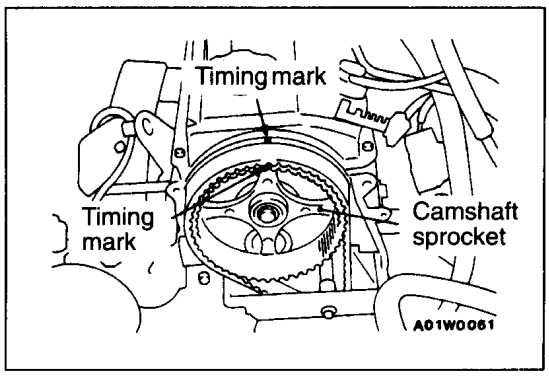
Post-installation Operation
(1)Exhaust Manifold Installation (Refer to GROUP 15 – Exhaust Manifold.)
(2)Distributor Installation
(3)Air Cleaner Assembly Installation (Refer to GROUP 15 – Air Cleaner.)
(4)Battery and Battery Tray Installation
(5)Engine Coolant Refilling (Refer to GROUP 14 – Service Adjustment Procedures.)
(6)Accelerator Cable Adjustment (Refer to GROUP 13F – Service Adjustment Procedures.)
(7)Throttle Cable Adjustment (Refer to GROUP 23 – Service Adjustment Procedures.)



Removal steps
1. Accelerator cable connection
2. Throttle cable connection <A/T>
3. PCV hose connection
4. Ignition coil connector
5. Engine coolant temperature sensor connector
6. Engine coolant temperature switch connector (for A/C)
7. Power transistor connector
8. Engine harness connector
9. Noise capacitor connector
10. Throttle position sensor connector
11. Idle speed control servo motor connector
12. Engine coolant temperature gauge connector
13. Engine coolant temperature switch connector (for A/T)
14. Spark plug cable
15. Vacuum hose connection
16. Radiator upper hose connection
17. Water hose connection
18. Fuel hose connection



19. Power steering pump mount bracket
20. Ignition coil
21. Timing belt upper cover assembly
22. Distributor bracket
▶D◀ 23. Camshaft sprocket spacer
◀A▶ ▶C◀ 24. Camshaft sprocket
25. Rocker cover
26. Intake manifold stay
◀B▶ ▶B◀ 27. Cylinder head assembly
▶A◀ 28. Cylinder head gasket

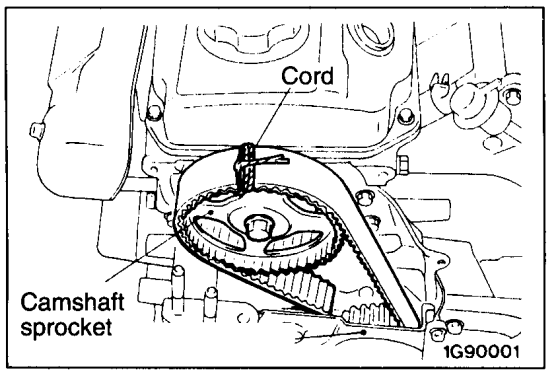


REMOVAL SERVICE POINTS

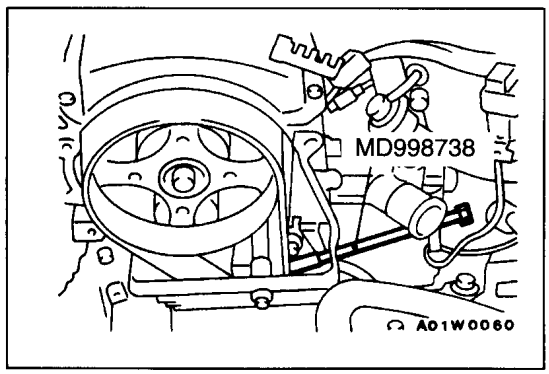
◀A▶ CAMSHAFT SPROCKET REMOVAL

(1) Rotate the crankshaft in the forward (right) direction and align the timing mark.

Caution
The crankshaft must always be rotated in the forward direction only.

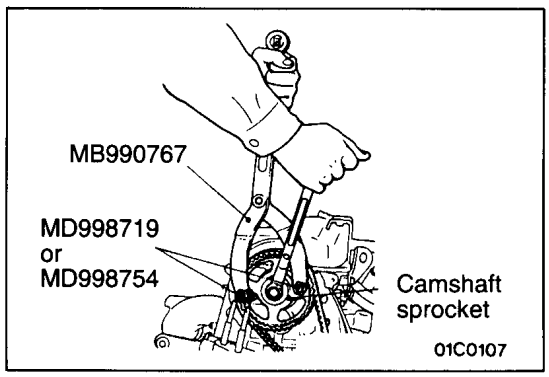


(2) Tie the camshaft sprocket and timing belt with a cord so that the position of the camshaft sprocket will not move with respect to the timing belt.



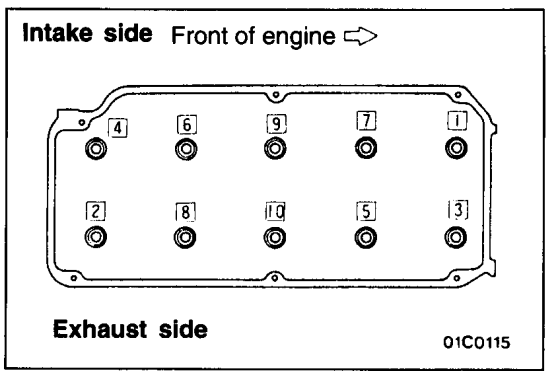
(3) Insert the special tool into the rubber plug hole in the timing belt cover assembly rear and turn it gently. Stop turning the special tool when it can no longer be turned gently.

NOTE
This work will make the end of the special tool touch the tensioner arm. So the auto tensioner will stop and the timing belt tension will not vary.



(4) Use the special tool to remove the camshaft sprocket with the timing belt attached.

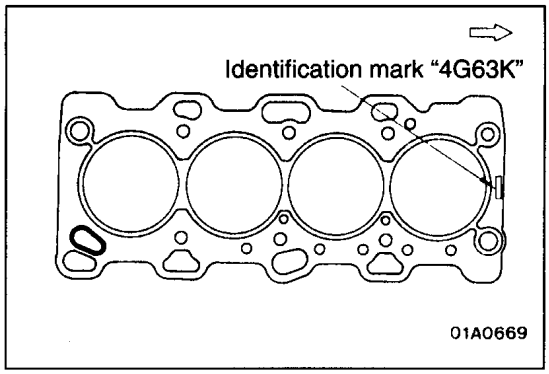
Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.



◀B▶ CYLINDER HEAD ASSEMBLY REMOVAL

Loosen the bolts in the order shown in the illustration (in 2 or 3 cycles), remove them and then remove the cylinder head assembly.

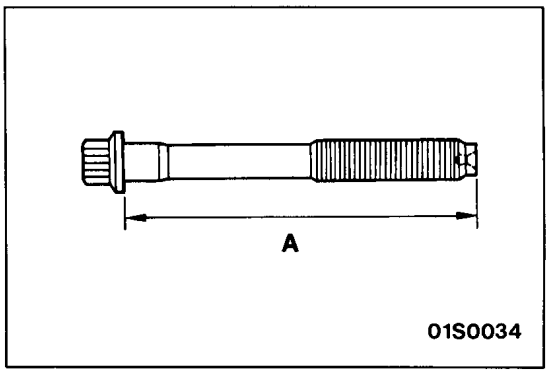
Caution
Because the plug guides cannot be replaced by themselves, be careful not to damage or deform the plug guides when removing the cylinder head bolts.



INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

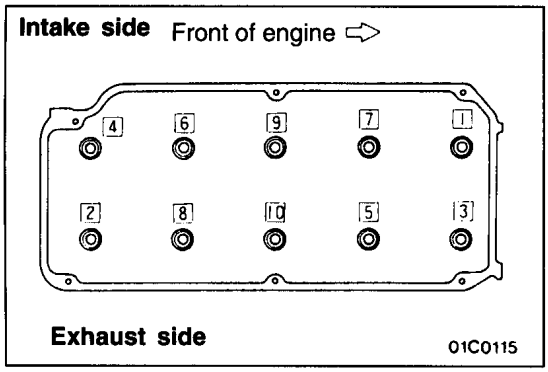
(1) Wipe off all oil and grease from the gasket mounting surface.
(2) Install the gasket to the cylinder block with the identification mark facing upwards.



▶B◀ CYLINDER HEAD ASSEMBLY INSTALLATION

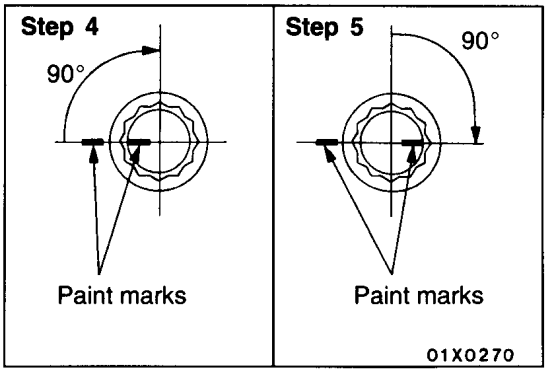
(1) When installing the cylinder head bolts, the length below the head of the bolts should be within the limit. If it is outside the limit, replace the bolts.

Limit (A):Within 99.4 mm



(2) Tighten the bolts by the following procedure.

Step	Operation	Remarks
1	Tighten to 78 Nm.	Carry out in the order shown in the illustration.
2	Fully loosen.	Carry out in the reverse order of that shown in the illustration.
3	Tighten to 20 Nm.	Carry out in the order shown in the illustration.
4	Tighten by 90°	Carry out in the order shown in the illustration.
5	Tighten by 90°	Carry out in the order shown in the illustration.

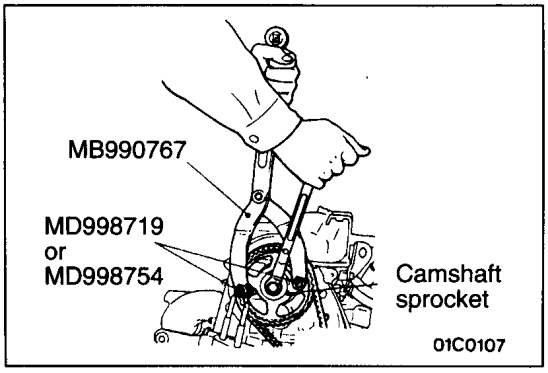


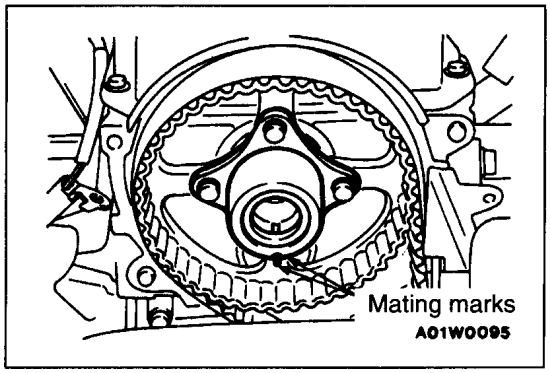
Caution

1. **It is possible that the tightening angle less than 90° doesn't assure enough tightness. Be careful about the tightening angle.**
2. **If the angle is not within the specified value, remove the bolt and redo by step 1.**

▶C◀ CAMSHAFT SPROCKET INSTALLATION

(1) Use the special tool to stop the camshaft sprocket from turning, and then install the camshaft sprocket bolt.
(2) Remove the special tool from the rubber plug hole.
(3) Remove the cord which binds the camshaft sprocket and timing belt.





▶D◀ CAMSHAFT SPROCKET SPACER INSTALLATION

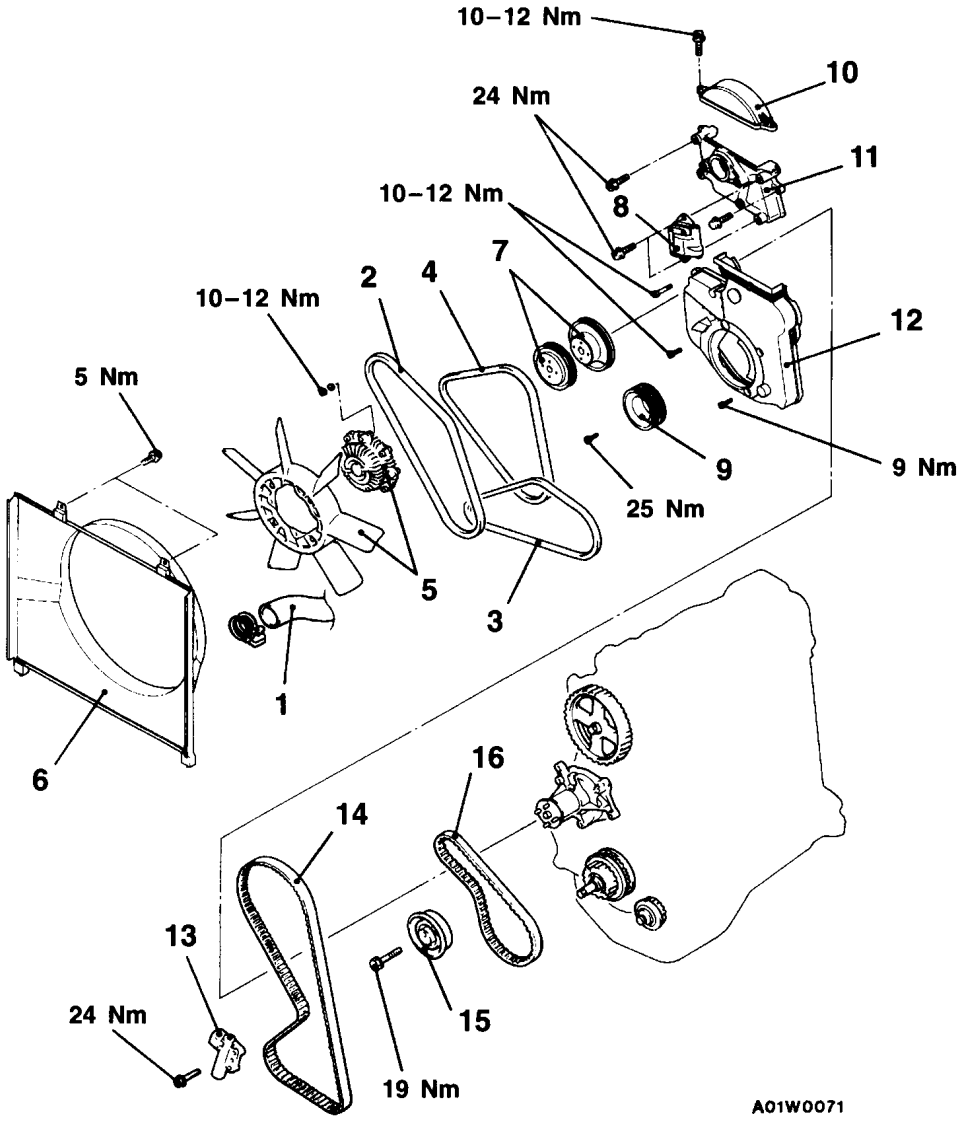
Align the mating marks on the camshaft sprocket and the camshaft sprocket spacer (groove), and then install them.

TIMING BELT, TIMING BELT B

120002452

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
(1)Engine Coolant Draining and Refilling (Refer to GROUP 14 – Service Adjustment Procedures.)
(2)Distributor Removal and Installation



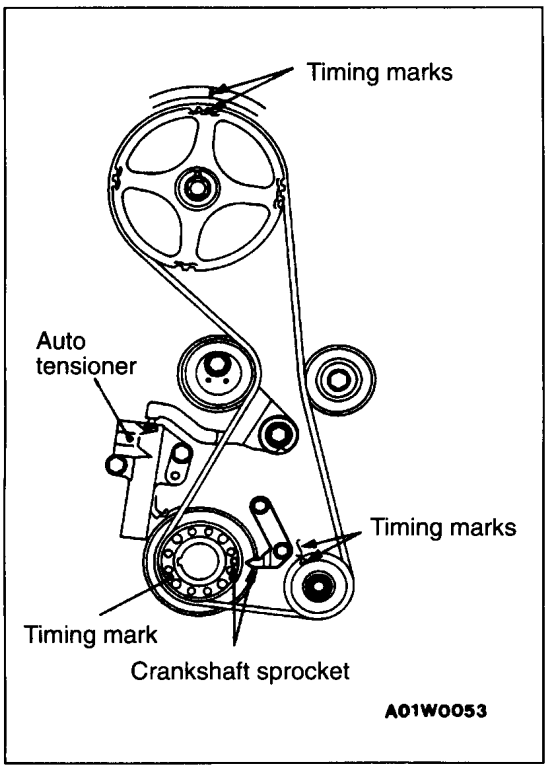
Removal steps

1. Connection for radiator upper hose
2. Drive belt (Power steering oil pump)
3. Drive belt (A/C compressor)
4. Drive belts (Alternator)
◀A▶ 5. Cooling fan and clutch assembly
◀A▶ 6. Radiator shroud assembly
7. Water pump pulley
8. Ignition coil
9. Crankshaft pulley
10. Timing belt upper cover assembly
11. Distributor bracket
12. Timing belt lower cover assembly
▶E◀ • Timing belt tension adjustment
◀B▶ ▶D◀ 13. Auto tensioner
◀C▶ ▶C◀ 14. Timing belt
▶B◀ • Timing belt B tension adjustment
15. Timing belt B tensioner
◀C▶ ▶A◀ 16. Timing belt B

REMOVAL SERVICE POINTS

◀A▶ COOLING FAN AND CLUTCH ASSEMBLY/RADIATOR SHROUD ASSEMBLY REMOVAL

Remove the mounting nuts and bolts, and then remove the cooling fan and clutch assembly and the radiator shroud assembly as a set.

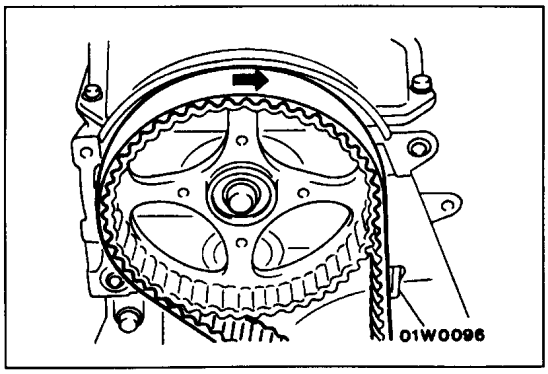


◀B▶ AUTO TENSIONER REMOVAL

(1) Turn the crankshaft clockwise (right turn) to align each timing marks and to set the No. 1 cylinder to compression top dead centre.

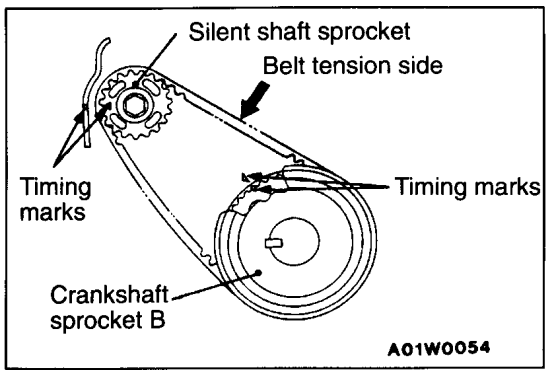
Caution
Never turn the crankshaft anticlockwise.

(2) Remove the auto tensioner.



◀C▶ TIMING BELT/TIMING BELT B REMOVAL

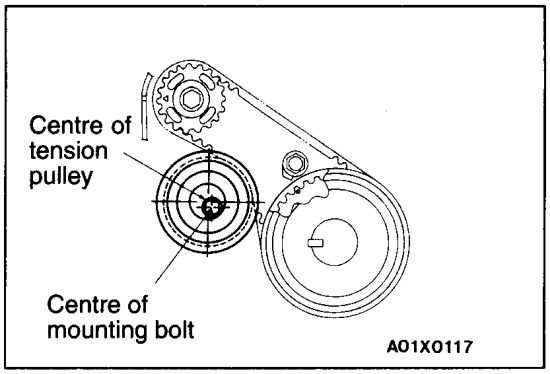
Caution
If the belt is to be re-used, chalk the belt with an arrow indicating the clockwise direction of rotation.



INSTALLATION SERVICE POINTS

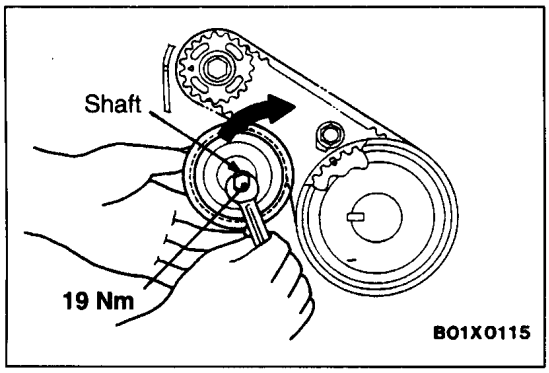
▶A◀ TIMING BELT B INSTALLATION

(1) Ensure that crankshaft sprocket "B" timing marks and the silent shaft sprocket timing marks are aligned.
(2) Fit timing belt "B" over crankshaft sprocket B and the silent shaft sprocket. Ensure that there is no slack in the belt.



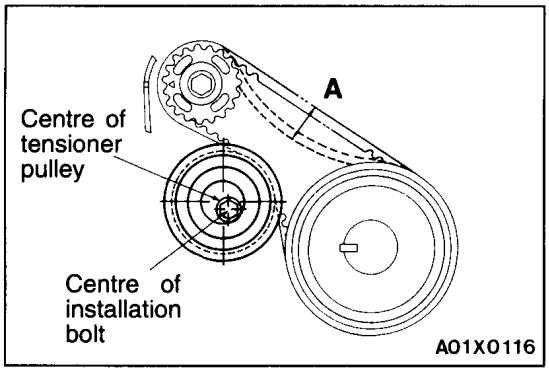
▶B◀ TIMING BELT B TENSION ADJUSTMENT

(1) Temporarily fix the timing belt "B" tensioner such that the centre of the tensioner pulley is to the left and above the centre of the installation bolt, and temporarily attach the tensioner pulley so that the flange is toward the front of the engine.



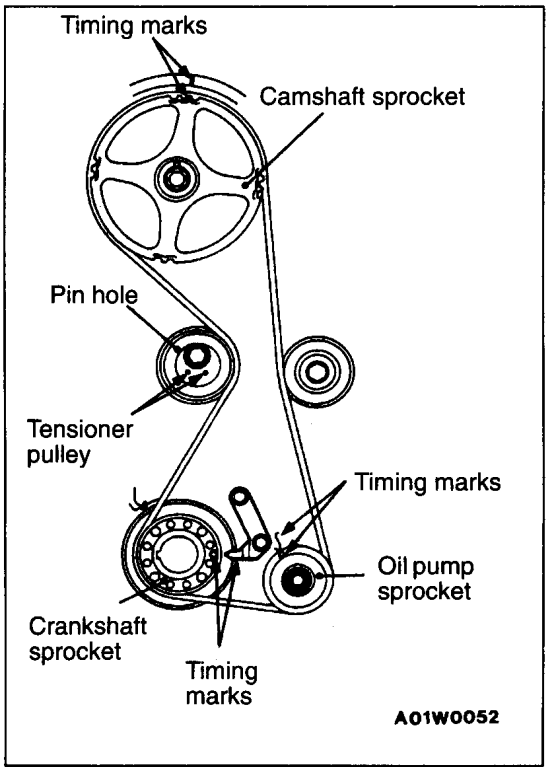
(2) Holding the timing belt "B" tensioner up with your finger in the direction of the arrow, apply pressure on the timing belt so that the tension side of the belt is taut. Now tighten the bolt to fix the tensioner.

Caution
When tightening the bolt, ensure that the tensioner pulley shaft does not rotate with the bolt. Allowing it to rotate with the bolt can cause excessive tension of the belt.



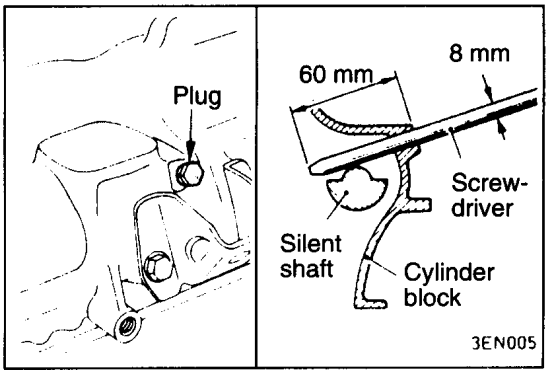
(3) To ensure that the tension is correct, depress the belt (point A) with a finger. Adjust the belt tension if it is incorrect.

Standard value:5–7 mm

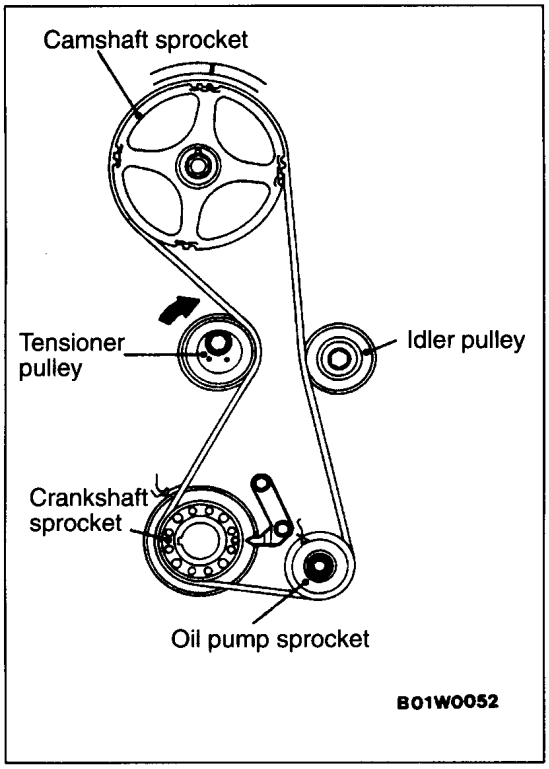


▶C◀ TIMING BELT INSTALLATION

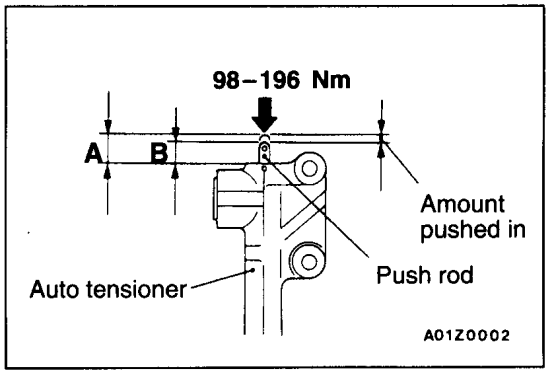
(1) Check that the timing marks of the camshaft sprocket, crankshaft sprocket and oil pump sprocket are all aligned. Also, temporarily tighten the tensioner pulley so that the pin holes are to the left of the bolt as shown in the illustration.



(2) After aligning the timing marks on the oil pump sprocket, remove the cylinder block plug and insert a Philips screwdriver with a diameter of 8 mm, and check to be sure that the screwdriver goes in 60 mm or more. If the screwdriver will only go in 20–25 mm before striking the silent shaft, turn the sprocket once, realign the timing mark and check that the screwdriver goes in 60 mm or more. The screwdriver should not be taken out until the timing belt is installed.



(3) Install the timing belt by the following procedure.
   (a) Place the timing belt onto the tensioner pulley and crankshaft sprocket, and hold it with your left hand so that it doesn't slip.
   (b) While pulling the timing belt with your right hand, place it onto the oil pump sprocket.
   (c) Place the timing belt onto the idler pulley and camshaft sprocket.
   (d) Push the tensioner pulley in the direction shown by the arrow to apply tension to the timing belt, and then tighten the tensioner pulley fixing bolt.

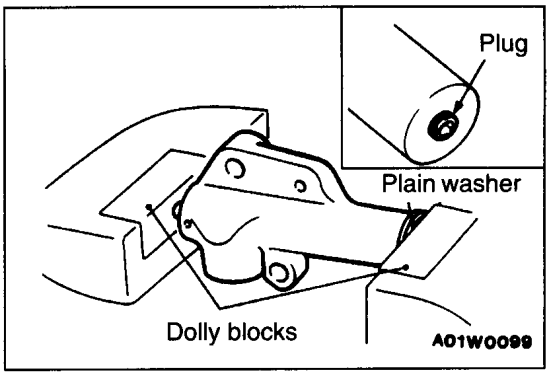


▶D◀ AUTO TENSIONER INSTALLATION

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

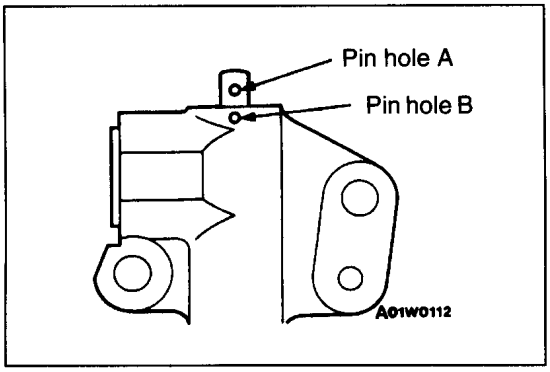
Standard value: Within 1mm
A: Length when no force is applied
B: Length when force is applied
A-B: Amount pushed in

(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 tensionner 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.

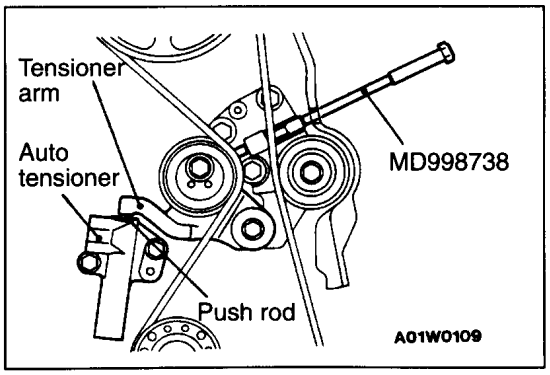


(4) Slowly compress the push rod of the auto tensioner until pin hole A in the push rod is aligned with pin hole B in the cylinder.

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

(5) 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.

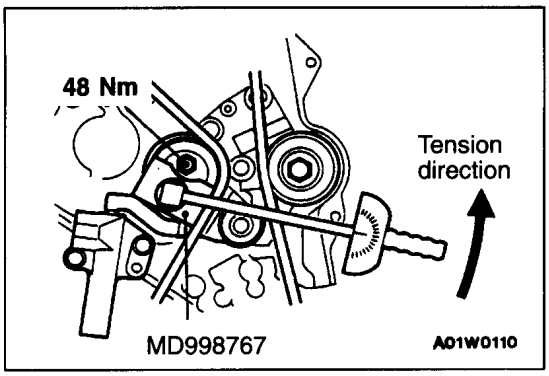


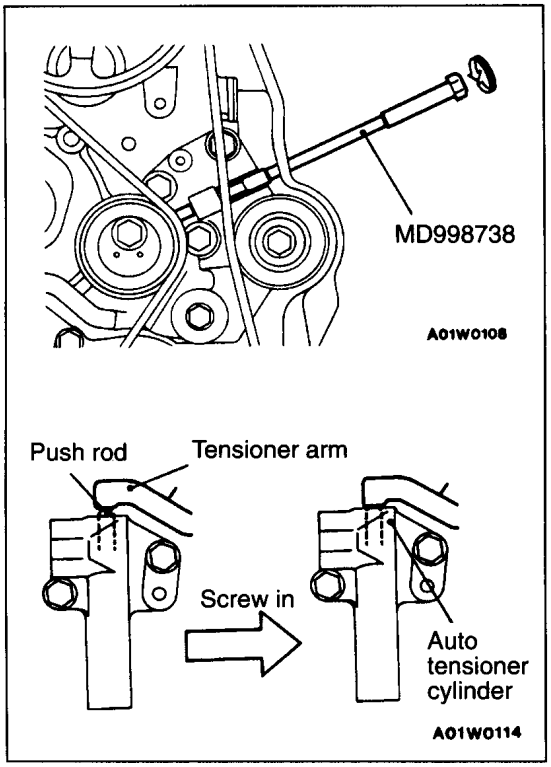
(6) Install the auto tensioner to the engine.

Caution
Do not remove the setting pin from the auto tensionner.

(7) Remove the rubber plug from the timing belt cover assembly rear. Then screw in the special tool by hand until the tensioner arm is touching the auto tensioner push rod.

Caution
Do not use a spannner or the like to turn the special tool, otherwise the auto tensionner setting pin may be broken. Turn the special tool by hand only.





▶E◀ TIMING BELT TENSION ADJUSTMENT

(1) After turning the crankshaft 1/4 of a revolution in the anticlockwise direction, turn it in the clockwise direction until the timing marks are aligned.

(2) Loosen the tension pulley fixing bolt, and then use the special tool and a torque wrench to tighten the fixing bolt to the specified torque while applying tension to the timing belt.

Standard value:3.5 Nm <Timing belt tension torque>

Caution
When tightening the fixing bolt, make sure that the tension pulley does not turn with the bolt.

(3) Remove the setting pin that has been inserted into the auto tensioner, and then remove the special tool.

(4) Turn the crankshaft two turns clockwise, and wait for approximately 15 minutes.

(5) Insert the special tool again and turn it by hand until the end of the special tool touches the tensioner arm.

(6) Once the end touches, keep turning the special tool until the auto tensioner push rod retracts and the tensioner arm contacts the auto tensioner cylinder.

Caution
Turn the special tool slowly 1/4 of a turn at a time.

(7) Check that the amount by which the special tool has been screwed in is within the standard value range.

Standard value:2.5–3 turns

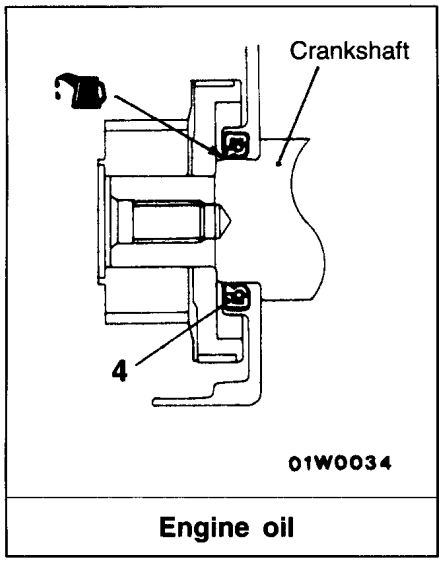
(8) Remove the special tool and install the rubber plug.

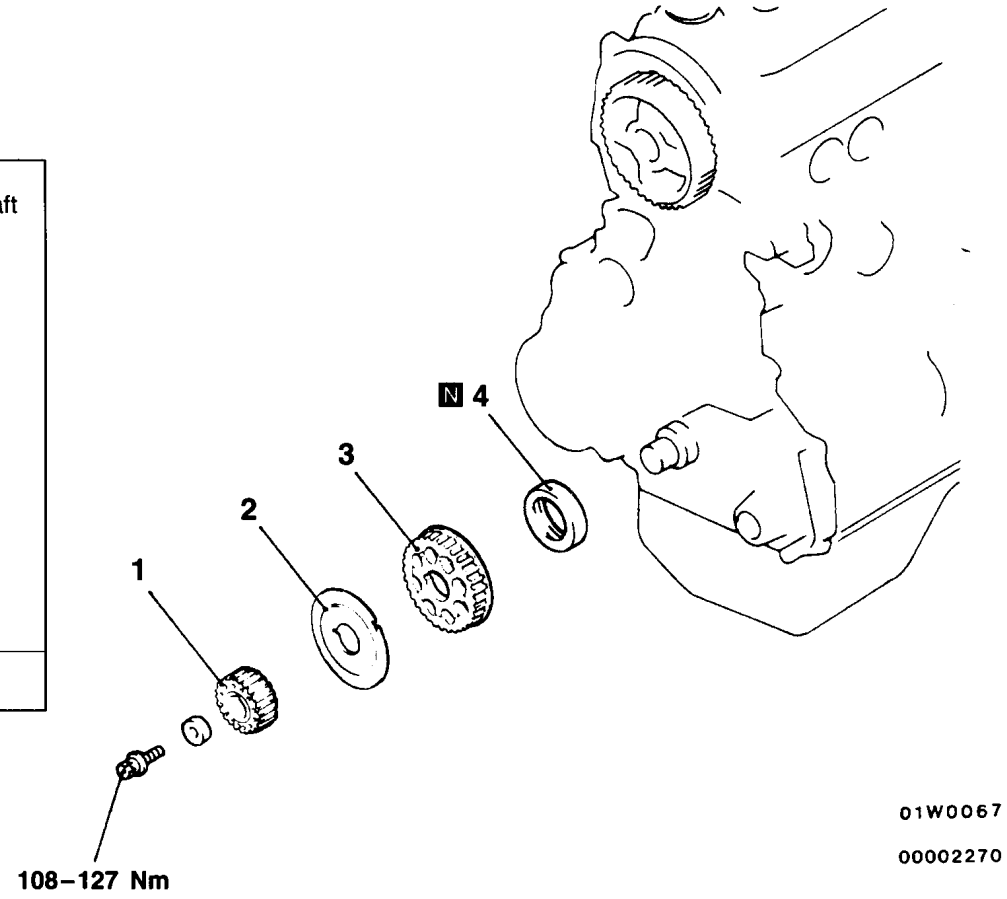
CRANKSHAFT FRONT OIL SEAL

120002453

REMOVAL AND INSTALLATION

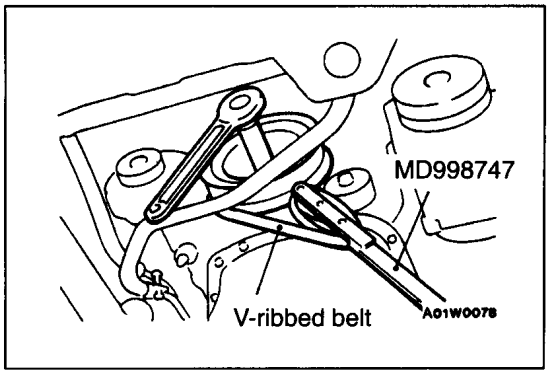
Pre-removal and Post-installation Operation
- Timing Belt, Timing Belt B Removal and Installation (Refer to P.11D-36.)





Removal steps

◀A▶ ▶B◀ 1. Crankshaft sprocket
▶B◀ 2. Flange
▶B◀ 3. Crankshaft sprocket B
▶A◀ 4. Crankshaft front oil seal



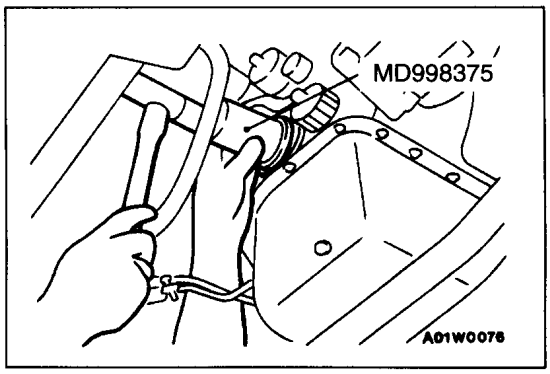
REMOVAL SERVICE POINT

◀A▶ CRANKSHAFT SPROCKET REMOVAL

(1) Temporarily install the crankshaft pulley, and then use the V-ribbed belt and the special tool to stop the crankshaft pulley from turning.

Caution
(1) Do not use the vehicle's V-ribbed belt, or the belt may be damaged.
(2) Do not use a damaged V-ribbed belt.

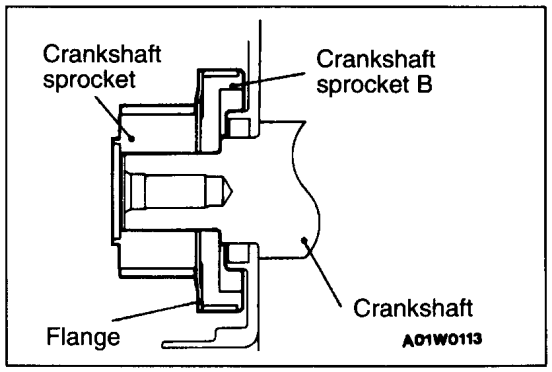
(2) Loosen the crankshaft sprocket bolt, and then remove the sprocket.



INSTALLATION SERVICE POINTS

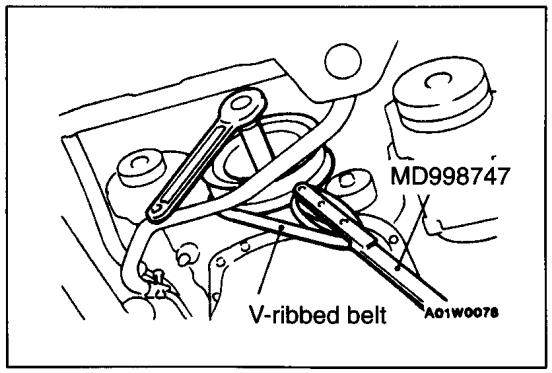
▶A◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION

(1) Apply engine oil to the entire circumference of the oil seal lip.
(2) Press-fit the oil seal until it is flush with the front case.



▶B◀ CRANKSHAFT SPROCKET B/FLANGE/CRANKSHAFT SPROCKET INSTALLATION

(1) Install the crankshaft sprocket B, flange and the crankshaft sprocket so that they face as shown in the illustration.



(2) Temporarily install the crankshaft pulley, and then use the V-ribbed belt and the special tool to stop the crankshaft pulley from turning.

Caution
(1) Do not use the vehicle's V-ribbed belt, or the belt may be damaged.
(2) Do not use a damaged V-ribbed belt.

(3) Tighten the crankshaft sprocket bolt to the specified torque.

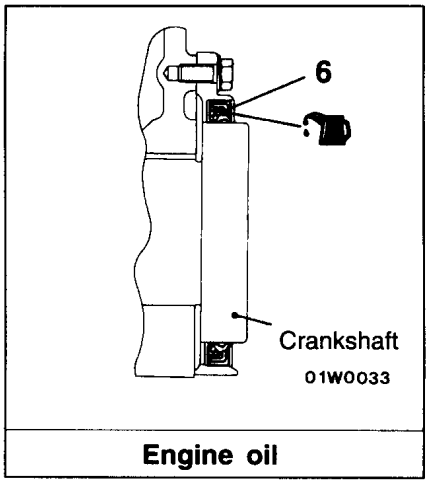
Specified torque:108–127 Nm

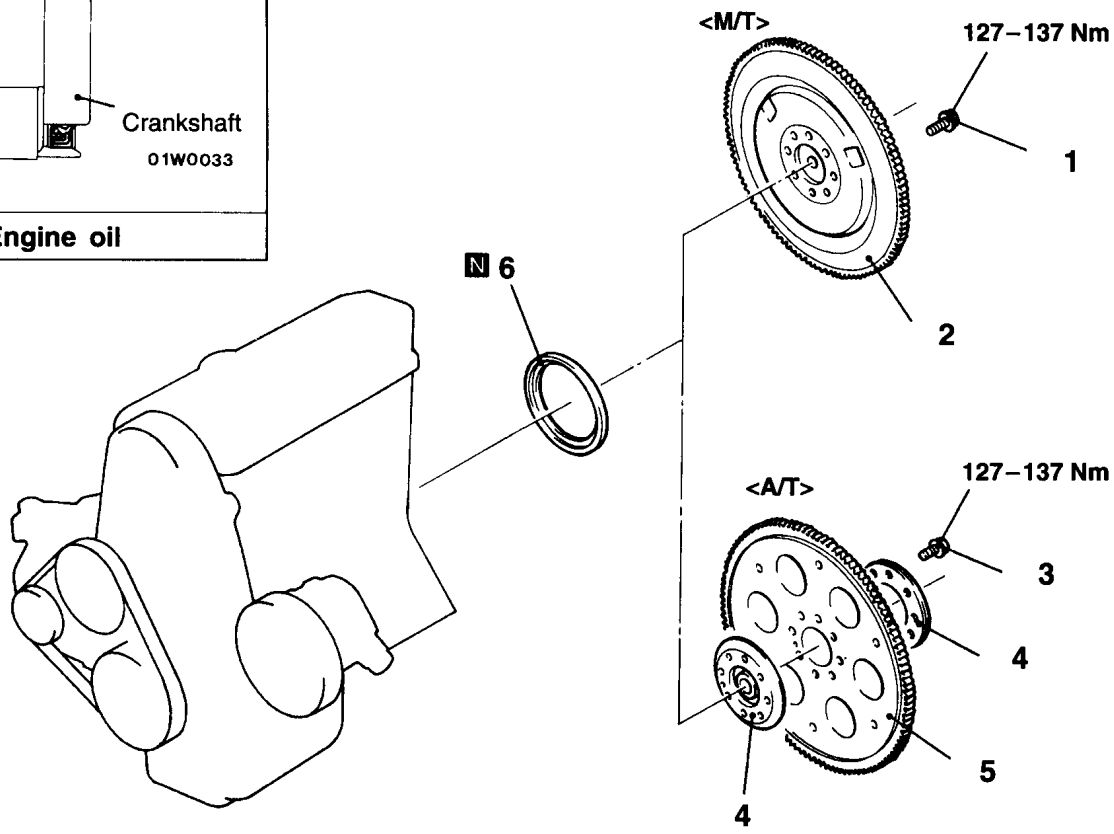
CRANKSHAFT REAR OIL SEAL

120000232

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Transmission Assembly Removal and Installation
  (M/T: Refer to GROUP 22 – Transmission assembly.)
  (A/T: Refer to GROUP 23 – Transmission assembly.)





Removal steps

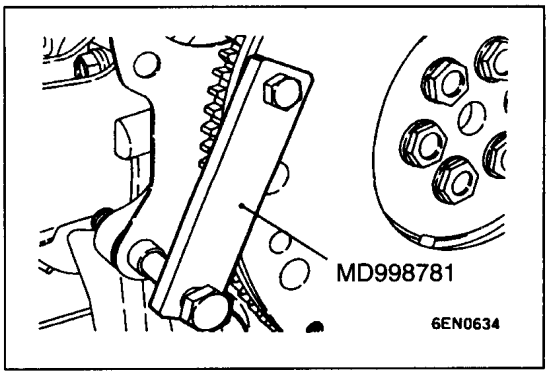
<M/T>

- Clutch cover and clutch disc

◀A▶ ▶B◀ 1. Flywheel bolt
2. Flywheel
▶A◀ 6. Crankshaft rear oil seal

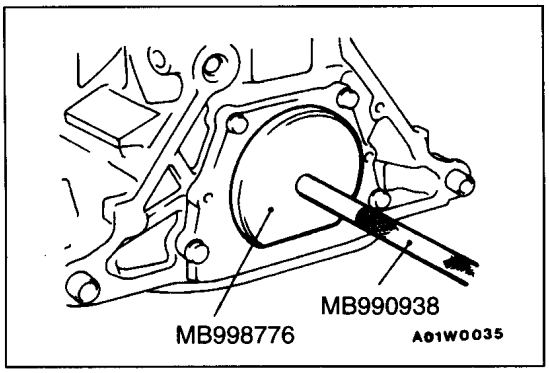
<A/T>

◀A▶ ▶B◀ 3. Drive plate bolt
4. Adaptor plate
5. Drive plate
▶A◀ 6. Crankshaft rear oil seal



REMOVAL SERVICE POINT

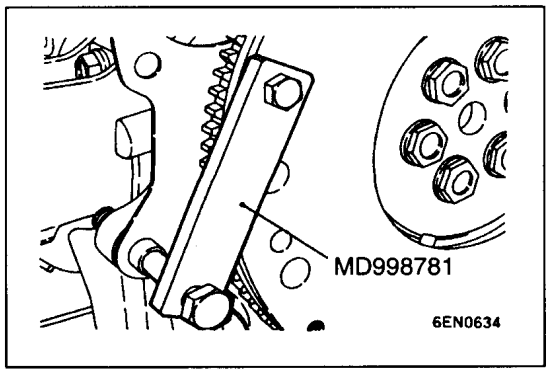
◀A▶ FLYWHEEL BOLT <M/T>/DRIVE PLATE BOLT <A/T> REMOVAL



INSTALLATION SERVICE POINTS

▶A◀ CRANKSHAFT REAR OIL SEAL INSTALLATION

(1) Apply a small amount of engine oil to the entire circumference of the oil seal lip.
(2) Tap in the oil seal as shown in the illustration.



▶B◀ DRIVE PLATE BOLT <A/T>/FLYWHEEL BOLT <M/T> INSTALLATION

ENGINE ASSEMBLY

120002454

REMOVAL AND INSTALLATION

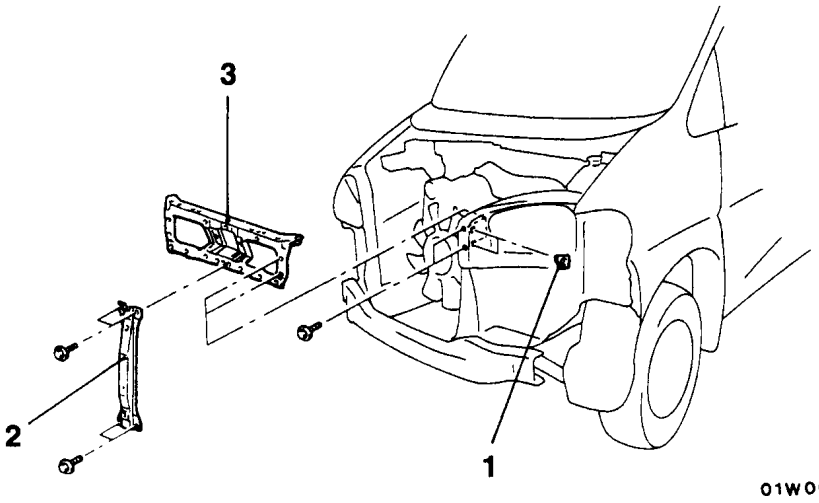
Pre-removal Operation

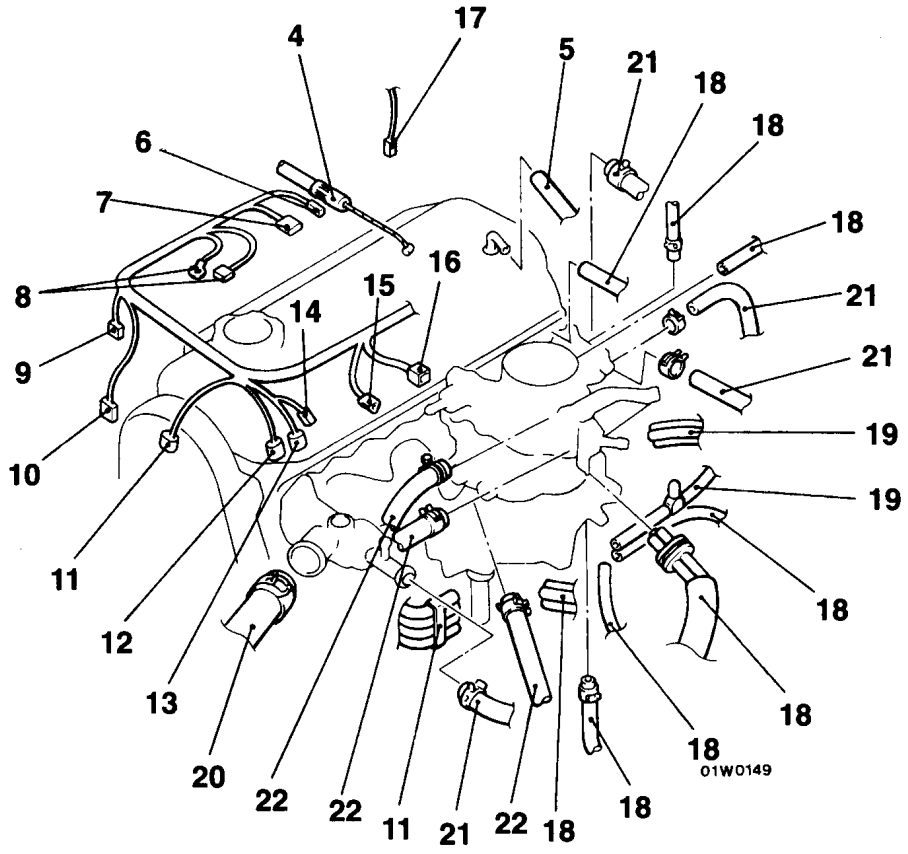
(1) Hood, Hood Latch Removal
(Refer to GROUP 42 – Hood.)
(2) Under Cover Removal
(Refer to GROUP 42 – Under Cover.)
(3) Fuel Line Pressure Releasing <4G64>
(Refer to GROUP 13F – Service Adjustment Procedures.)
(4) Engine Coolant Draining
(Refer to GROUP 14 – Service Adjustment Procedures.)
(5) Engine Oil Draining
(Refer to GROUP 12 – Service Adjustment Procedures.)
(6) Air Cleaner Assembly Removal
(Refer to GROUP 15 – Air Cleaner.)
(7) Reed Valve Assembly Removal
<Vehicles with electronic controlled carburettor>
(Refer to GROUP 15 – Exhaust Manifold.)
(8) Battery and Battery Tray Removal
(9) Transmission Assembly Removal
(M/T: Refer to GROUP 22 – Transmission Assembly.)
(A/T: Refer to GROUP 23 – Transmission Assembly.)
(10) Wiper Motor and Linkage Removal
(Refer to GROUP 51 – Windshield Wiper and Washer.)
(11) Front Bumper Removal
(Refer to GROUP 51 – Front Bumper.)
(12) Front Condenser and Condenser Fan Motor Assembly Removal
(Refer to GROUP 55 – Front Condenser and Condenser Fan Motor Assembly.)
(13) Radiator Removal
(Refer to GROUP 14 – Radiator.)
(14) Headlamp (L.H.) Removal
(Refer to GROUP 54 – Headlamp.)
(15) A/C Compressor Removal
(Refer to GROUP 55 – A/C Compressor.)

Post-Installation Operation

(1) A/C Compressor Installation
(Refer to GROUP 55 – A/C Compressor.)
(2) Headlamp (L.H.) Installation
(Refer to GROUP 54 – Headlamp.)
(3) Radiator Installation
(Refer to GROUP 14 – Radiator.)
(4) Front Condenser and Condenser Fan Motor Assembly Installation
(Refer to GROUP 55 – Front Condenser and Condenser Fan Motor Assembly.)
(5) Front Bumper Installation
(Refer to GROUP 51 – Front Bumper.)
(6) Wiper Motor and Linkage Installation
(Refer to GROUP 51 – Windshield Wiper and Washer.)
(7) Transmission Assembly Installation
(M/T: Refer to GROUP 22 – Transmission Assembly.)
(A/T: Refer to GROUP 23 – Transmission Assembly.)
(8) Reed Valve Assembly Installation
<Vehicles with electronic controlled carburettor>
(Refer to GROUP 15 – Exhaust Manifold.)
(9) Air Cleaner Assembly Installation
(Refer to GROUP 15 – Air Cleaner.)
(10) Battery and Battery Tray Installation
(11) Engine Oil Refilling
(Refer to GROUP 12 – Service Adjustment Procedures.)
(12) Engine Coolant Refilling
(Refer to GROUP 14 – Service Adjustment Procedures.)
(13) Drive Belt Tension Adjustment
(Refer to P.11I-7.)
(14) Throttle Cable Adjustment <A/T>
(Refer to GROUP 23 – Service Adjustment Procedures.)
(15) Accelerator Cable Adjustment
(Refer to GROUP 13F – Service Adjustment Procedures.)
(16) Under Cover Installation
(Refer to GROUP 42 – Under Cover.)
(17) Hood, Hood Latch Installation
(Refer to GROUP 42 – Hood.)

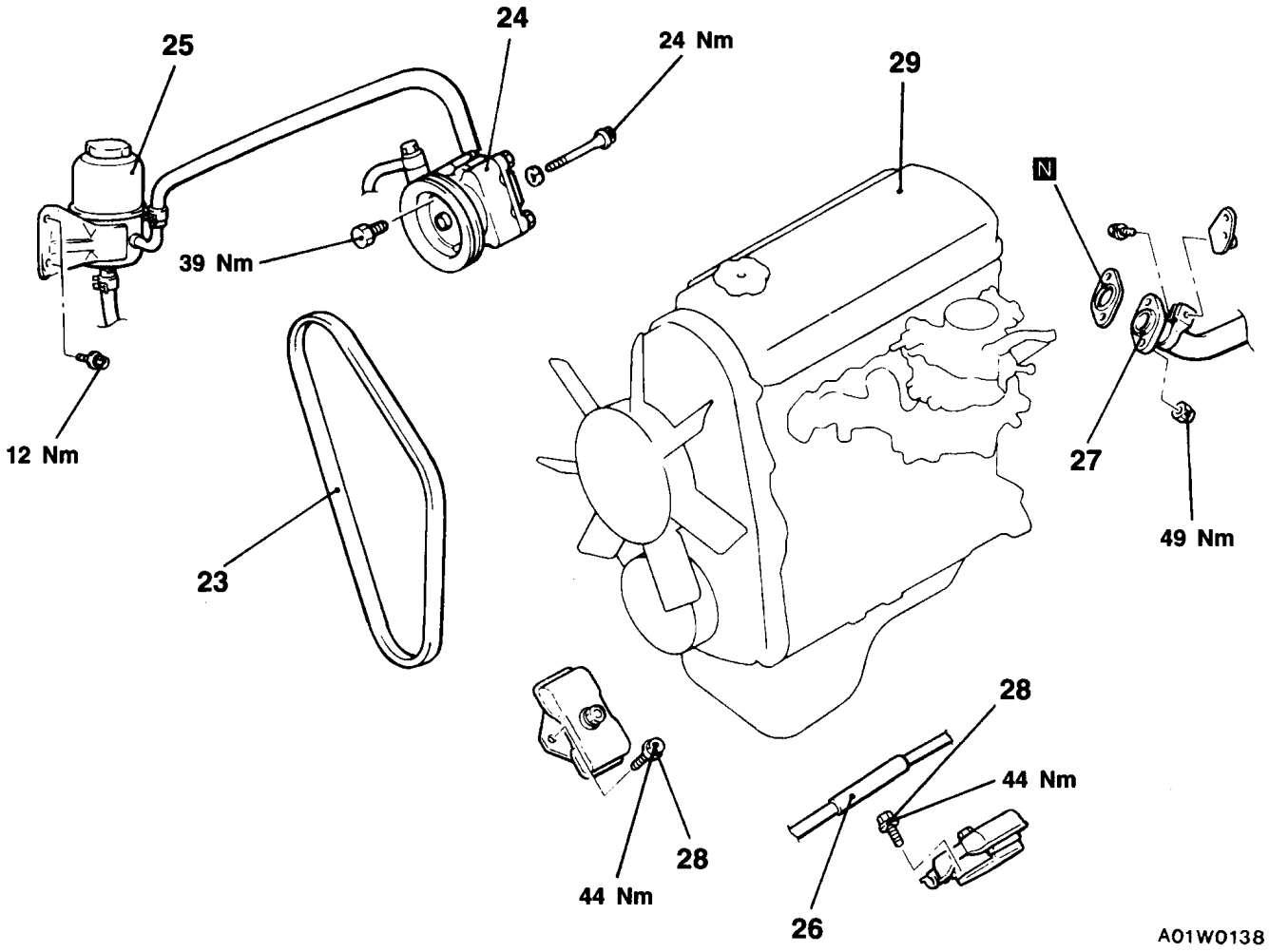
<Electronic controlled carburettor>





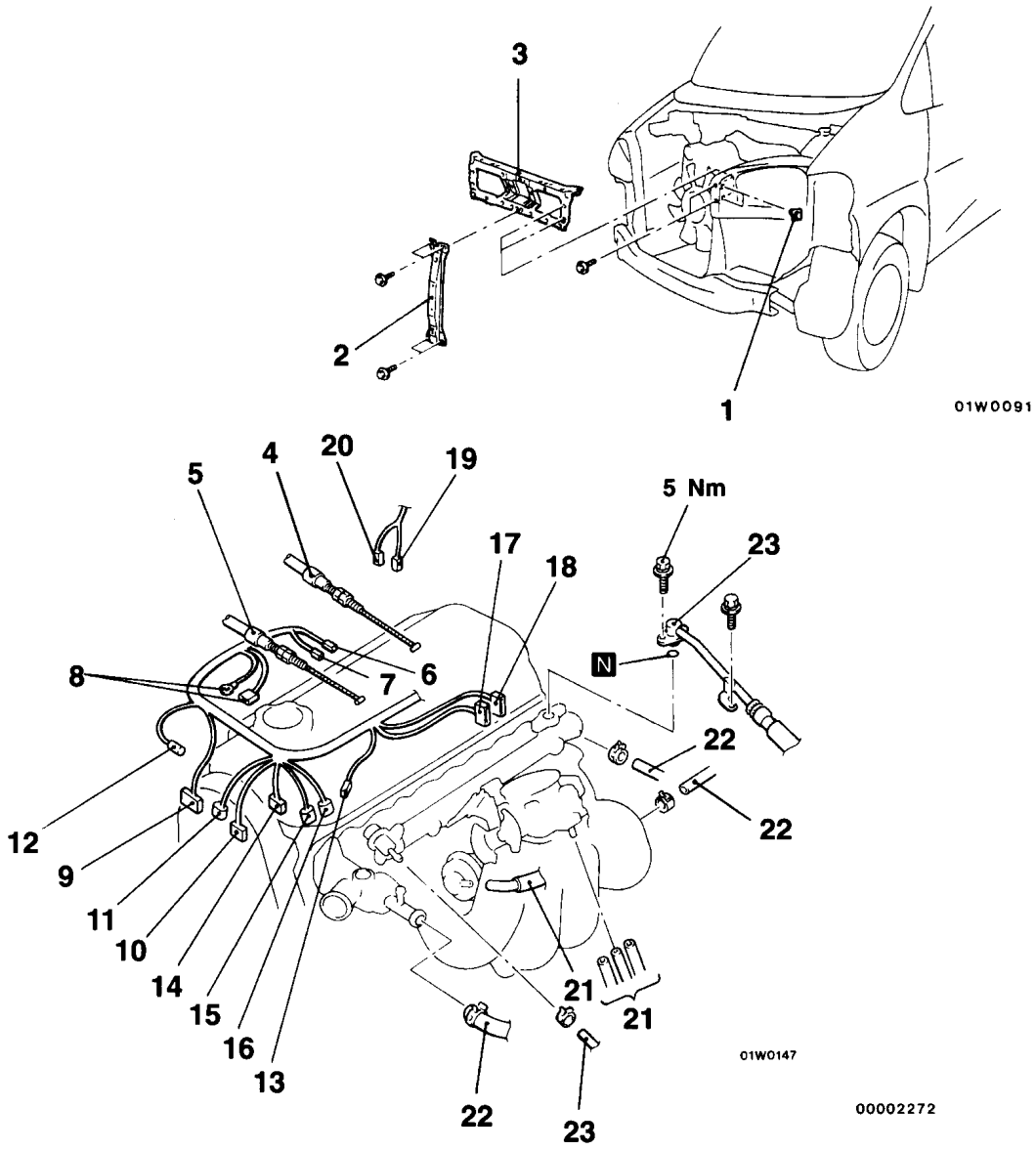
Removal steps

1. Grommet
2. Hood lock stay
3. Front end upper bar centre
4. Accelerator cable connection
5. PCV hose connection
6. Engine oil pressure switch connector
7. Engine oil level sensor connector
8. Alternator connector
9. Oxygen sensor connector
10. Distributor connector
11. Ignition coil connector
12. Engine coolant temperature sensor connector
13. Engine coolant temperature switch connector (for A/C)
14. Noise capacitor connector
15. Throttle position sensor connector
16. Solenoid valve connector
17. Engine coolant temperature gauge connector
18. Vacuum hose connection
19. VRV hose
22. Radiator upper hose connection
21. Water hose connection
22. Fuel hose connection



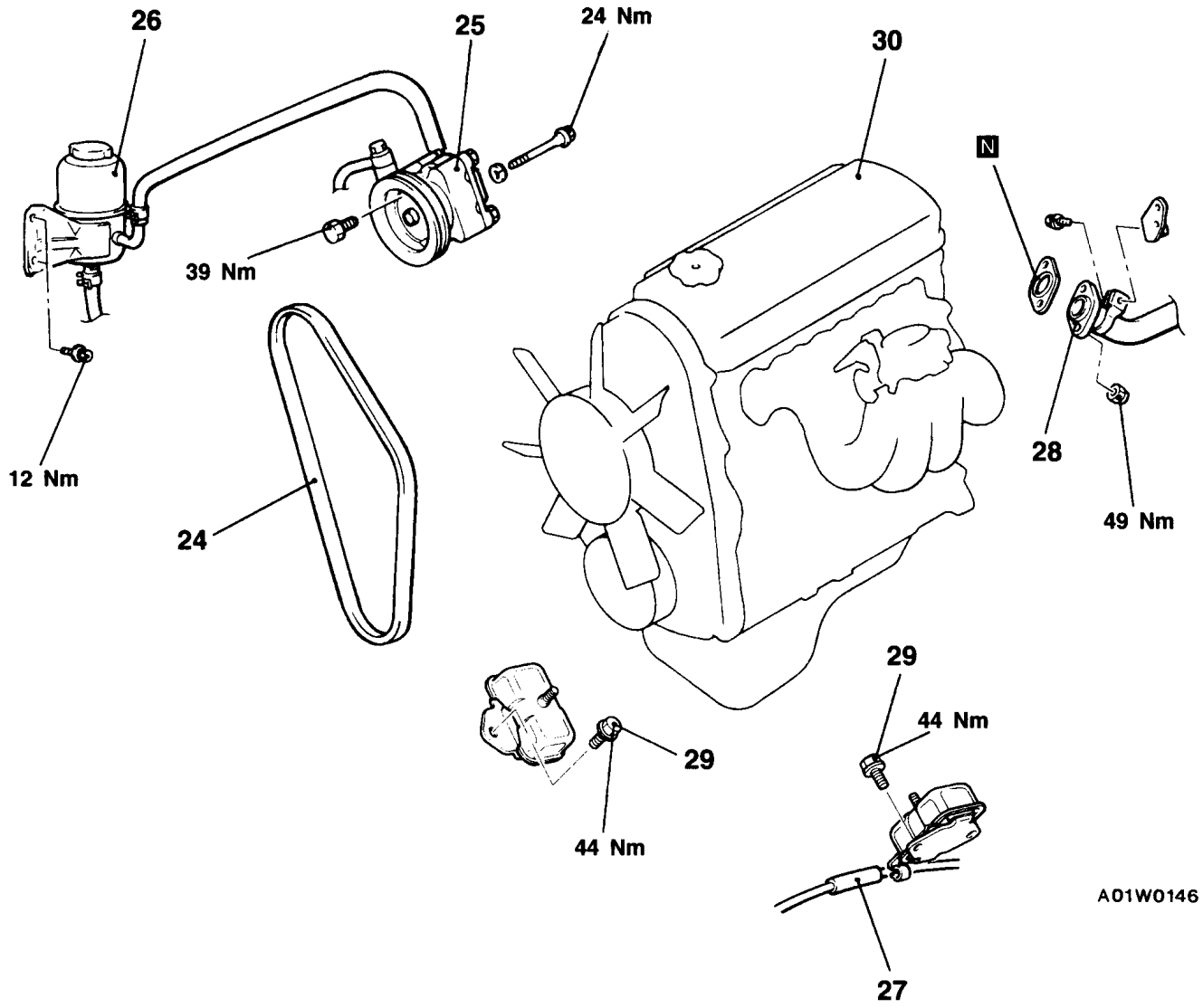
23. Drive belt (Power steering)
◀A▶ 24. Power steering oil pump assembly
◀A▶ 25. Power steering oil reservoir assembly
26. Clutch cable connection
27. Exhaust pipe connection
28. Engine support front insulator bolts
◀B▶ ▶A◀ 29. Engine assembly

<MPI>



Removal steps

1. Grommet
2. Hood lock stay
3. Front end upper bar centre
4. Accelerator cable connection
5. Throttle cable connection <A/T>
6. Engine oil pressure switch connector
7. Engine oil level sensor connector
8. Alternator connector
9. Distributor connector
10. Power transistor connector
11. Ignition coil connector
12. Power steering oil pressure switch connector
13. Noise capacitor connector
14. Engine harness connector
15. Engine coolant temperature sensor connector
16. Engine coolant temperature switch connector (for A/C)
17. Throttle position sensor connector
18. Idle speed control servo motor
19. Engine coolant temperature gauge connector
20. Engine coolant temperature switch connector (for A/T)
21. Vacuum hose connection
22. Water hose connection
23. Fuel hose connection



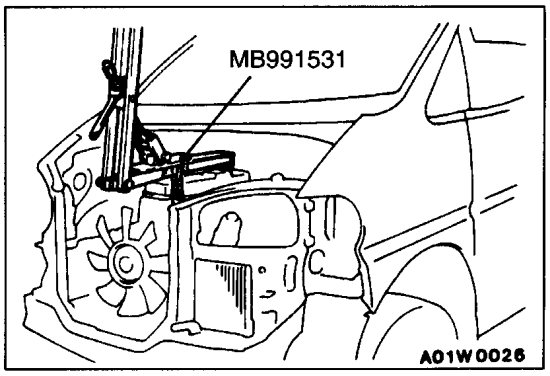
24. Drive belt (Power steering)
◀A▶ 25. Power steering oil pump assembly
◀A▶ 26. Power steering oil reservoir assembly
27. Clutch cable connection
28. Exhaust pipe connection
29. Engine support front insulator bolts
◀B▶ ▶A◀ 30. Engine assembly

REMOVAL SERVICE POINTS

◀A▶ POWER STEERING OIL PUMP ASSEMBLY/POWER STEERING OIL RESERVOIR ASSEMBLY REMOVAL

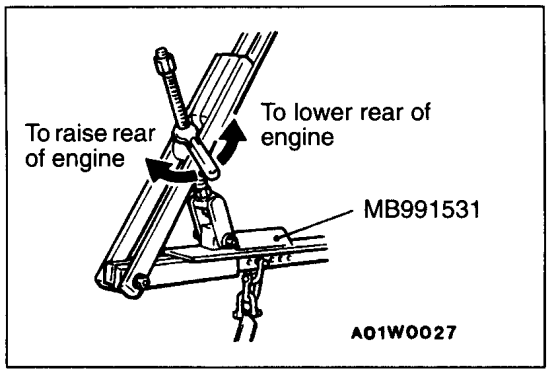
Remove the power steering oil pump assembly and power steering oil reservoir assembly from the bracket with the hose attached.

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



◀B▶ ENGINE ASSEMBLY REMOVAL

(1) Check that all cables, hoses and harness connectors have been disconnected from the engine.
(2) Hang the special tool on a chain block or similar tool, and then attach the special tool to the engine hanger.



(3) Turn the wrench on the special tool to tilt the engine assembly. Then raise the engine assembly slowly to remove from the front engine compartment.

INSTALLATION SERVICE POINT

▶A◀ ENGINE ASSEMBLY INSTALLATION

Install the engine assembly while checking to be sure that the cables, hoses, and harness connectors are not clamped.

4D5

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120002654

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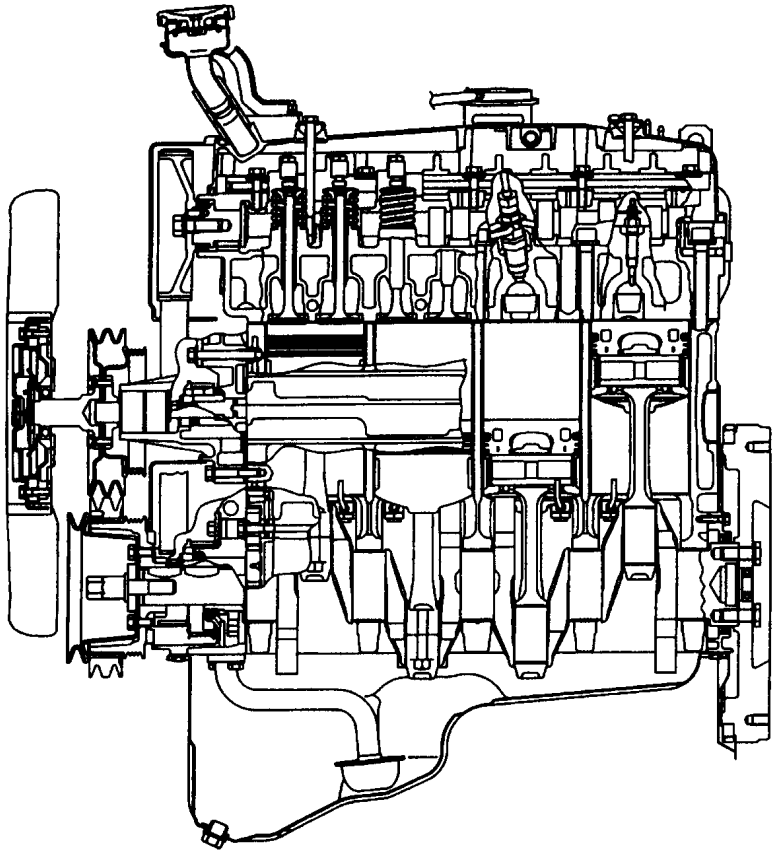
ENGINE ASSEMBLY 33

GENERAL INFORMATION

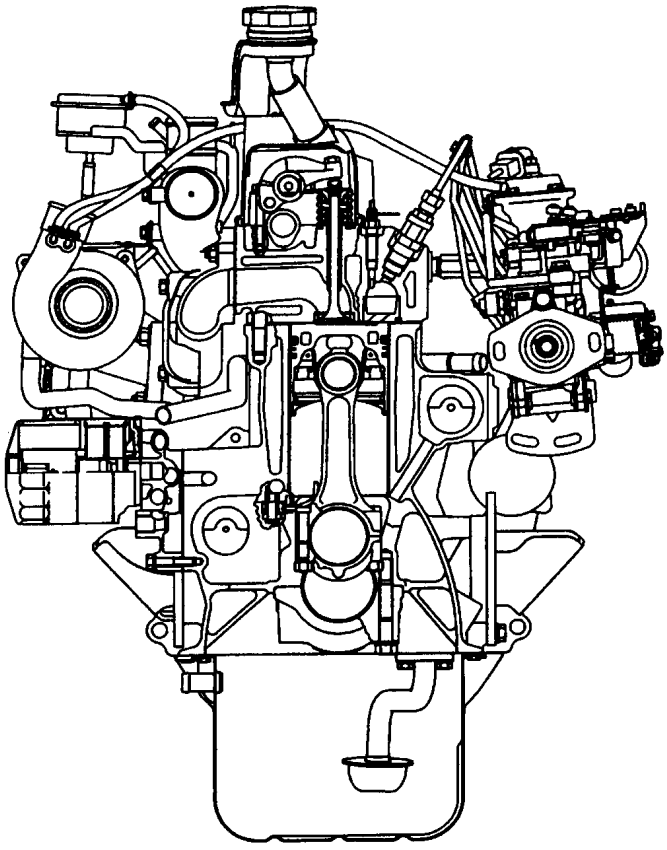
120000335

Items		4D56
Total displacement mℓ		2,476
Bore × Stroke mm		91.1×95.0
Compression ratio		21
Combustion chamber		Vortex chamber type
Camshaft arrangement		SOHC
Number of valve	Intake	4
	Exhaust	4
Valve timing	Intake	Opening BTDC20°, Closing ABDC49°
	Exhaust	Opening BBDC55°, Closing ATDC22°
Fuel system		Distribution type injection pump
Rocker arm		Roller type
Adjusting screw		Elephant foot type

SECTIONAL VIEW



DEN0110



DEN0111

SERVICE SPECIFICATIONS

120002655

Items			Standard value	Limit
Drive belt deflection mm	Alternator	Deflection (for each belt)	13–16	–
	Power steering oil pump	When checked	8.0–12.0	–
		When a new belt is installed	6.0–8.0	–
		When a used belt is installed	9.0–11.0	–
	A/C compressor	When checked	5.5–7.5	–
		When a new belt is installed	4.0–5.0	–
		When a used belt is installed	6.0–7.0	–
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	–
Idle up engine speed for ABS r/min			1,900±100	–
Compression pressure kPa			3,040	Min. 2,200
Compression pressure difference of all cylinder (at engine speed of 280 r/min) kPa			–	Max. 300
Timing belt tension mm			4–5	–
Timing belt B tension mm			4–5	–

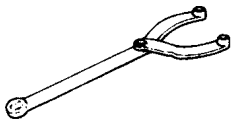
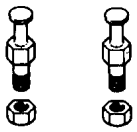
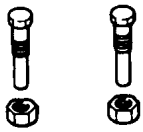
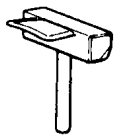
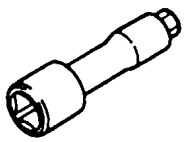
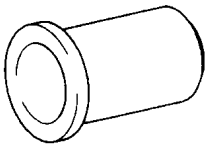
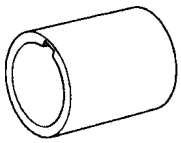
SEALANTS

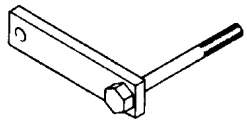
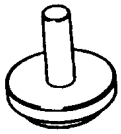
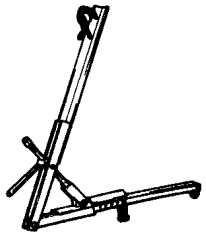
120002455

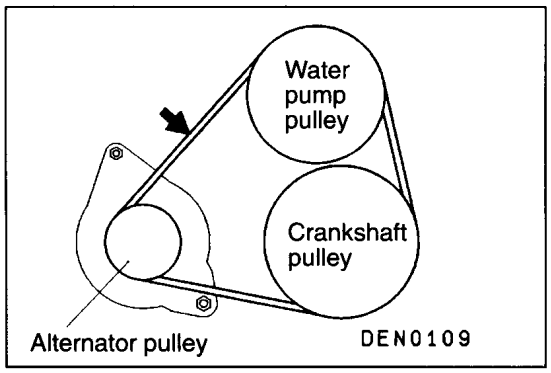
Items	Specified sealant	Remarks
Oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant
Semi-circular packing and rocker cover seal, and cylinder head seal	3M ATD Part No. 8660 or equivalent	

SPECIAL TOOLS

120000338

Tool	Number	Name	Use
	MD998384	Prestroke measuring adapter	Adjustment of the injection timing
	MD998721	Crankshaft pulley holder	Holding the crankshaft pulley
	MB990767	End yoke holder	Holding the camshaft sprocket
	MD998719	Crankshaft pulley holder pin	
	MD998754	Crankshaft pulley holder pin	
	MD998381	Camshaft oil seal installer	Installing the camshaft oil seal
	MD998727	Oil pan remover	Removal of oil pan
	MD998051	Cylinder head bolt wrench	Removal and installation of the cylinder head bolt
	MD998382	Crankshaft front oil seal installer	Installing the crankshaft front oil seal
	MD998383	Crankshaft front oil seal guide	

Tool	Number	Name	Use
	MD998781	Flywheel stopper	Securing the flywheel <M/T> or drive plate <A/T>
	MD998376	Crankshaft rear oil seal installer	Press-fitting the crankshaft rear oil seal
	MB991531	Engine hanger	Engine removal and installation



SERVICE ADJUSTMENT PROCEDURES

120000339

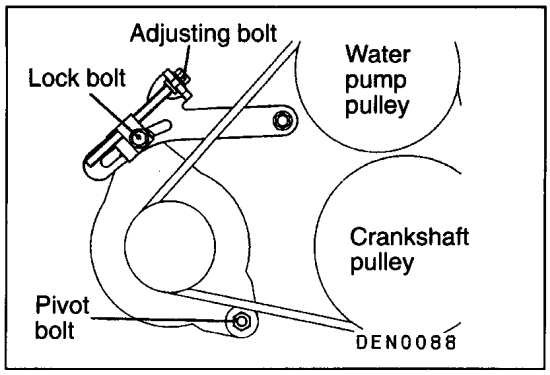
DRIVE BELTS TENSION INSPECTION AND ADJUSTMENT

ALTERNATOR DRIVE BELT TENSION INSPECTION

1. Check the tension by pushing at the centre of the belt between pulleys with a force of 98 N as shown in the figure. Measure drive belt deflection.

   Standard value:
   Alternator 13–16 mm (for each belt)

2. If the tension is not within the standard value range, adjust the belt tension.



ALTERNATOR DRIVE BELT TENSION ADJUSTMENT

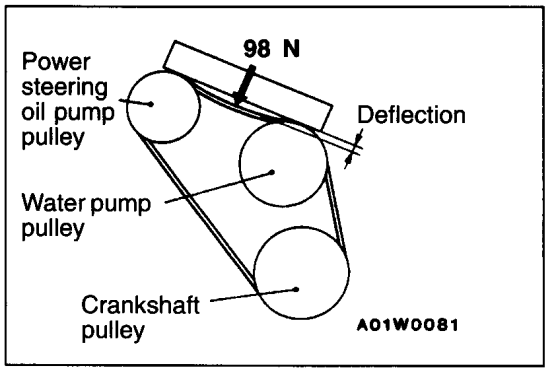
120002029

1. Loosen the nut on the alternator pivot bolt.
2. Loosen the lock bolt.
3. Turn the adjusting bolt to adjust the belt so that the amount of deflexion is at the standard value.
4. Tighten the lock nut.

   Tightening torque: 13 Nm
5. Tighten the nut on the alternator pivot bolt.

   Tightening torque: 22 Nm
6. Turn the crankshaft one or more turns in the clockwise direction, and then check the belt tension.

   Caution
   Always replace the two V-belts together as a set, and do not apply any oil to the belts.

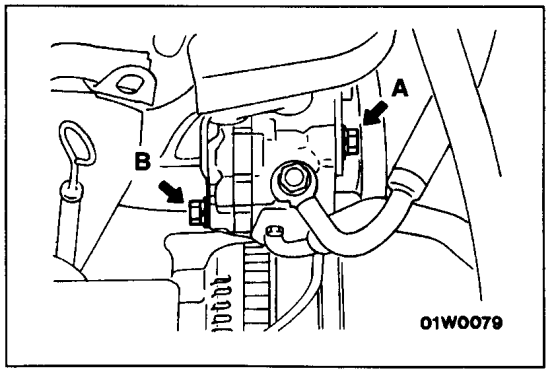


POWER STEERING OIL PUMP BELT TENSION INSPECTION

120002030

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 98 N as shown in the figure.
Measure drive belt deflection amount.

Standard value: 8.0–12.0 mm



POWER STEERING OIL PUMP BELT TENSION ADJUSTMENT

120002456

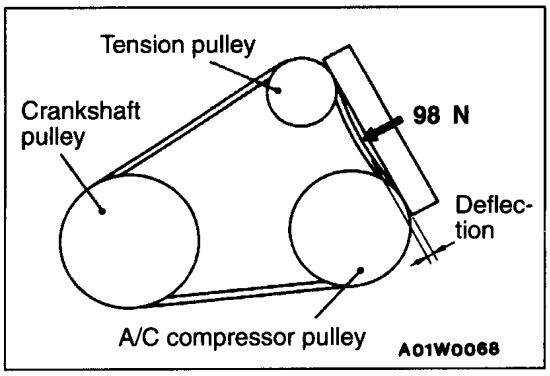
1. Loosen power steering oil pump fixing bolt.
2. Move power steering oil pump, tension belt moderately and adjust tension.

   Standard value:
   If used belt (with correct tension) is used;
   9.0–11.0 mm
   If a new belt is used;
   6.0–8.0 mm
3. Tighten fixing bolt A.

   Tightening torque: 39 Nm
4. Tighten the remaining fixing bolt B.

   Tightening torque: 24 Nm
5. Check the amount of belt deflection and readjust if necessary.

   Caution
   Turn the crankshaft one or more turns in the clockwise direction, and then check the belt tension.

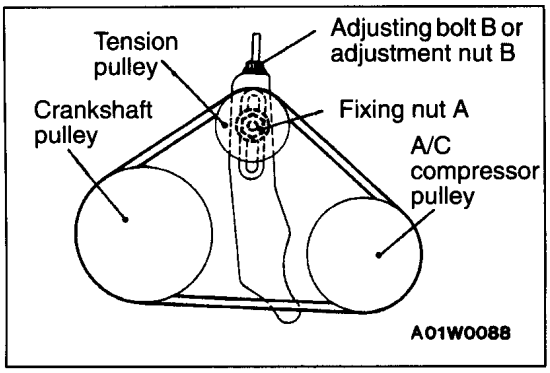


A/C COMPRESSOR BELT TENSION INSPECTION

120002457

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 98 N as shown in the figure.
Measure drive belt deflection amount.

Standard value: 5.5–7.5 mm



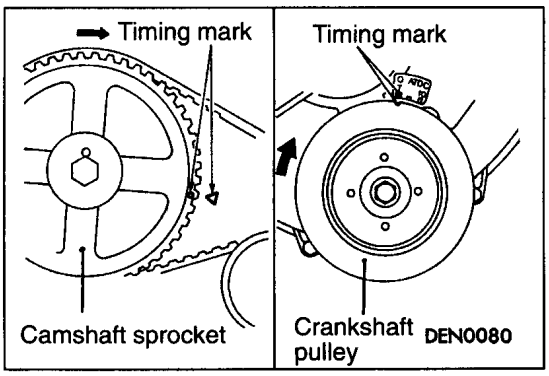
A/C COMPRESSOR BELT TENSION ADJUSTMENT

120002033

1. Loosen tension pulley fixing nut A.
2. Adjust belt tension with adjusting bolt B <single A/C> or adjusting nut B <Dual A/C>.

   Standard value:
   If used belt (with correct tension) is used;
   6.0–7.0 mm
   If a new belt is used;
   4.0–5.0 mm
3. Tighten fixing nut A.
4. Check the amount of belt deflection and readjust if necessary.

   Caution
   Turn the crankshaft one or more turns in the clockwise direction, and then check the belt tension.

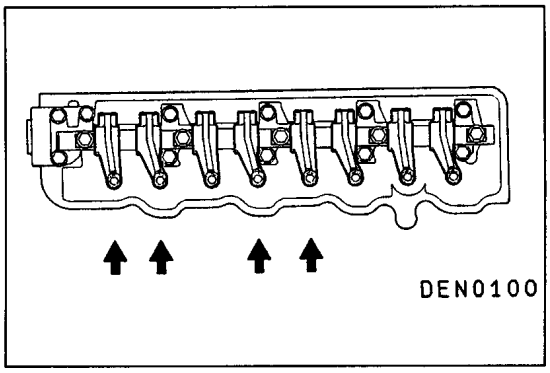


VALVE CLEARANCE INSPECTION AND ADJUSTMENT

120002034

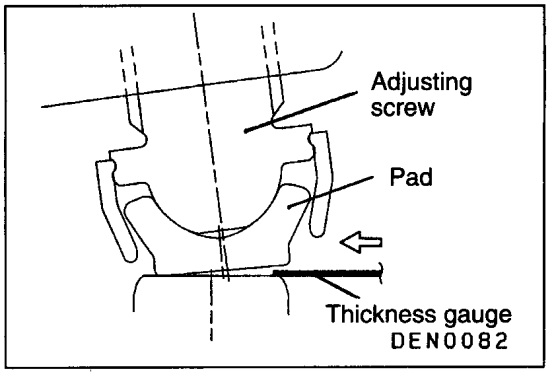
1. Start the engine and allow it to warm up until the engine coolant temperature reaches 80 to 90°C.
2. Remove the timing belt upper cover.
3. Remove the rocker cover.
4. Align the camshaft sprocket timing marks and set the No. 1 cylinder at top dead centre.

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

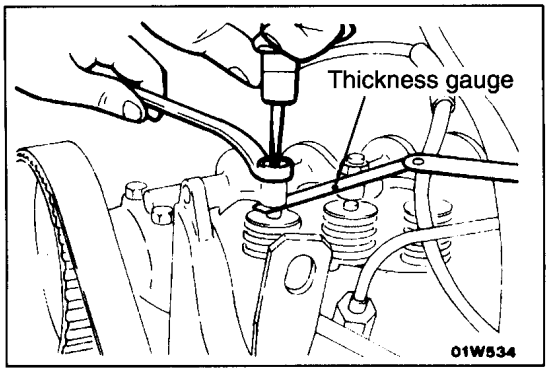


5. Measure the valve clearance at the places indicated by arrows in the illustration.

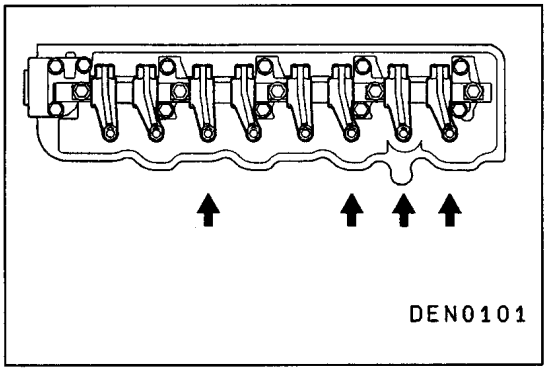
   Standard value: 0.25 mm



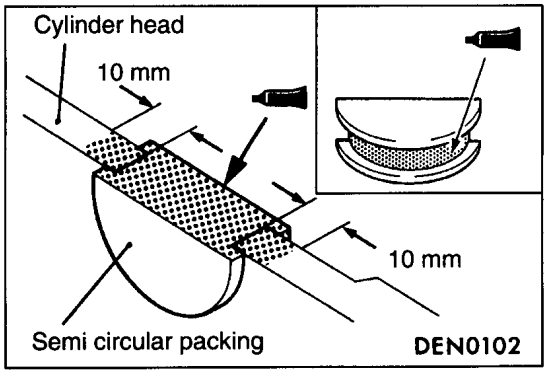
NOTE
Insert the thickness gauge from the centre of the cylinder head towards the outside so that it doesn't touch the pad.



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.

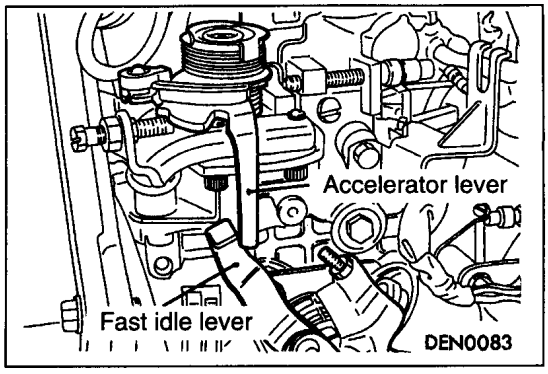


9. Measure the valve clearances at the places indicated by arrows in the illustration. If the clearance is not within the standard value, repeat steps 7 and 8 above.



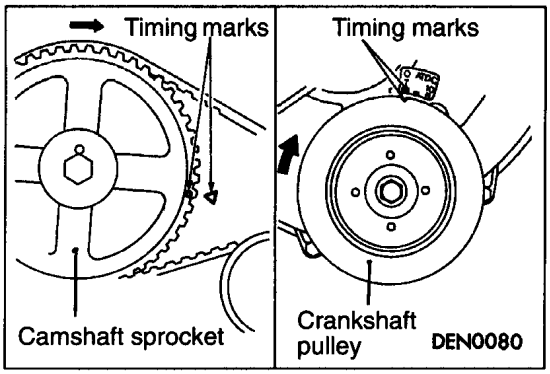
10. Apply specified sealant to the section of the semi-circular packing shown in the illustration.

    Specified sealant: 3M ATD Part No. 8660 or equivalent
11. Install the rocker cover.
12. Install the timing belt upper cover.

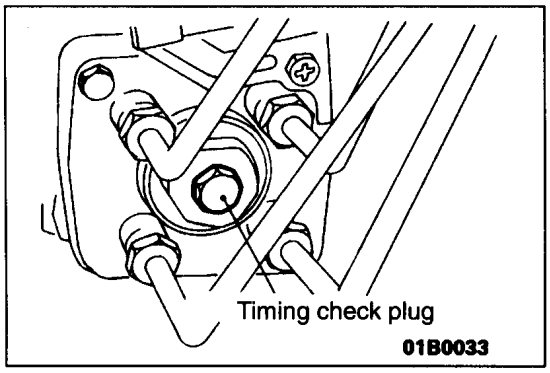


INJECTION TIMING INSPECTION AND ADJUSTMENT 120002035

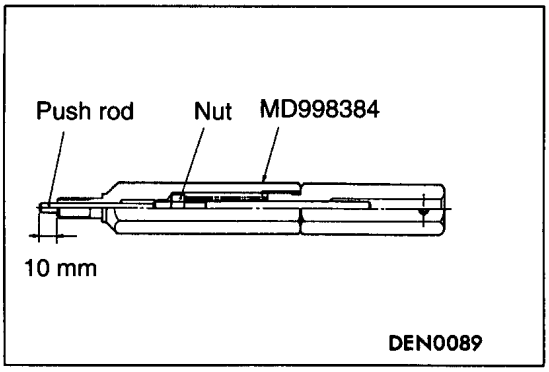
1. Warm up the engine and then check to be sure that the fast idle lever is separated from the throttle lever.
2. Remove all of the glow plugs.
3. Remove the timing belt upper cover.



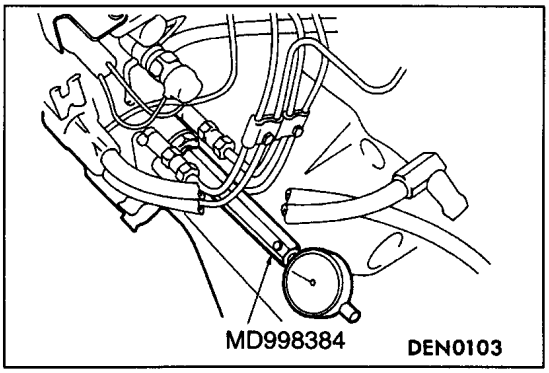
4. Align the timing marks of the camshaft sprocket and set the No. 1 cylinder to the top dead centre position.



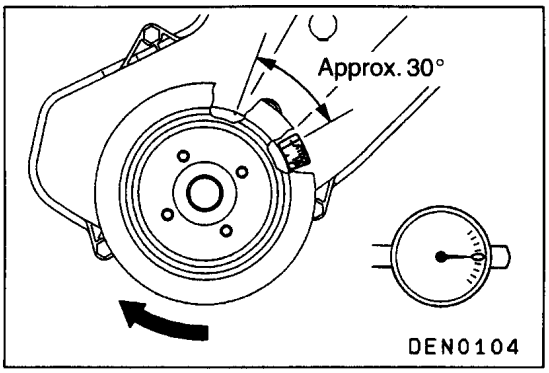
5. Remove the timing check plug at the rear of the injection pump.



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.

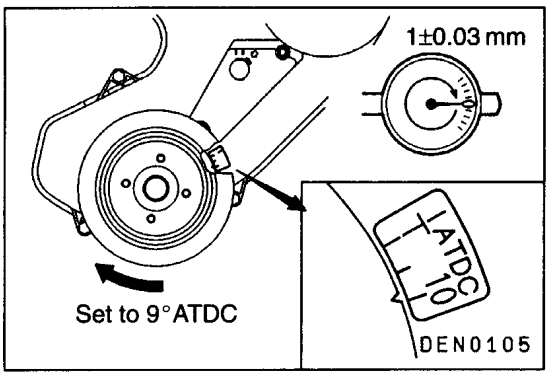


8. Install the special tool to the check plug at the rear of the injection pump.



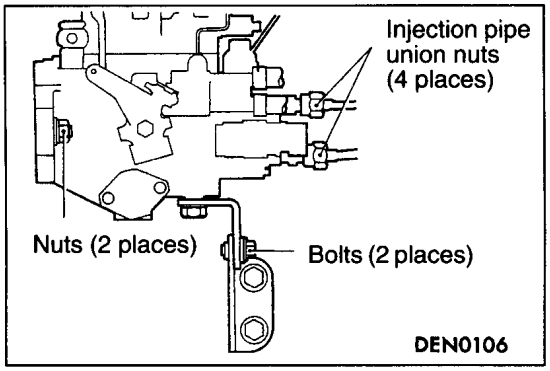
9. Turn the crankshaft clockwise to move the No. 1 cylinder approximately 30° before compression top dead centre.
10. Set the needle of the dial gauge to 0.
11. Check that the needle doesn't move even if the crankshaft is turned slightly (2–3°) in both clockwise and anti-clockwise direction.

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.

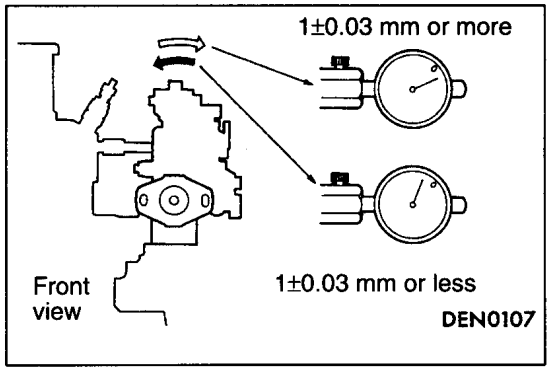
    Standard value: 1±0.03 mm

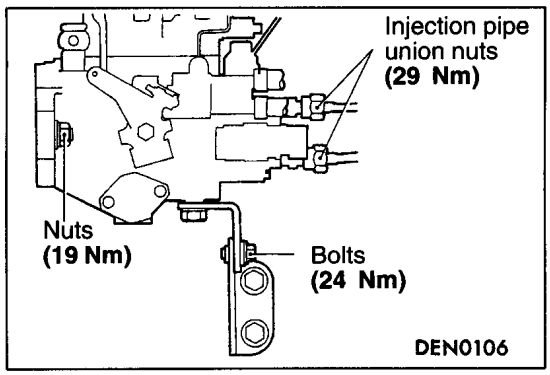


14. If the needle is outside the standard value, adjust the injection timing by the following procedure.
    (1) Loosen the injection pipe union nuts (4 places) on the injection pump. (Do not remove the union nuts.)

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

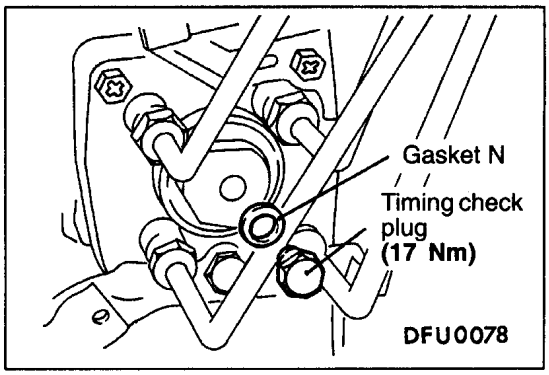
    (2) Loosen the upper mounting nuts and the lower mounting bolts of the injection pump. (Do not remove the nut and bolt.)
    (3) Tilt the injection pump to the left and right and adjust the needle on the dial gauge so that the display value is uniform.
    (4) Provisionally tighten the mounting nut and 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.



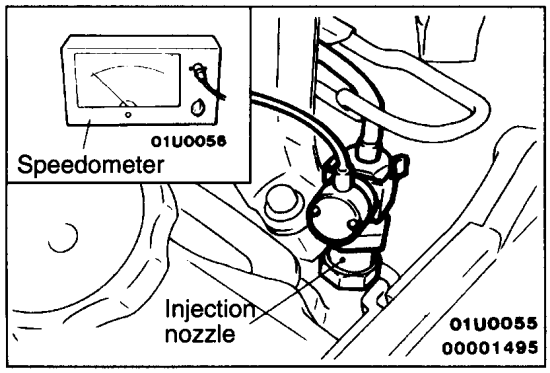
15. Remove the special tool.
16. Install a new gasket to the timing check plug.
17. Tighten the timing check plug to the specified torque.

IDLE SPEED INSPECTION AND ADJUSTMENT

120002036

NOTE
Check that the injection timing is normal.

1. Set the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral

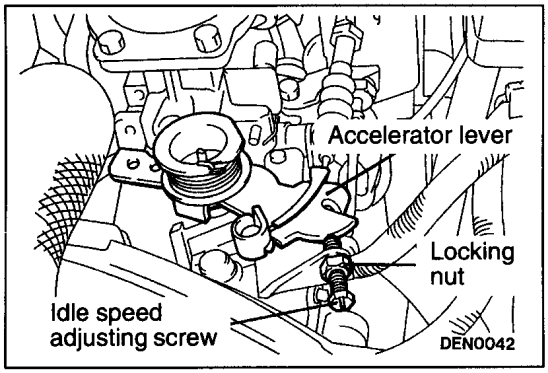


2. Connect the speedometer to the injection nozzle or the injection pipe.

   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.

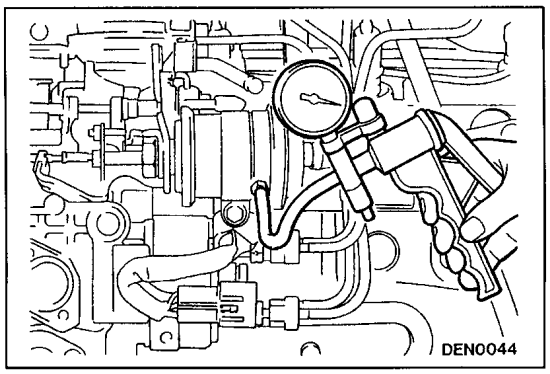
IDLE-UP MECHANISM INSPECTION AND ADJUSTMENT – FOR A/C

120002037

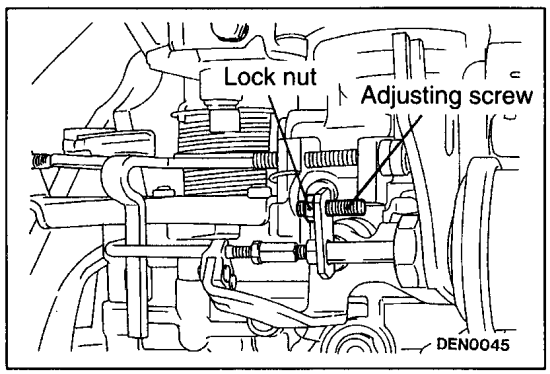
Refer to GROUP 55 – Service Adjustment Procedures.

IDLE-UP MECHANISM INSPECTION AND ADJUSTMENT – FOR ABS 120001565

1. Set the vehicles in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral



2. Inspect and adjust the idle speed.
3. Disconnect the vacuum hose (for anti-skid brakes: blue stripe) from the idle-up actuator.
4. Connect a hand vacuum pump to the nipple of the removed vacuum hose.
5. Connect the speedometer.
6. Start the engine and run it at idle.



7. Check the engine speed when a negative pressure of 87 kPa is applied.

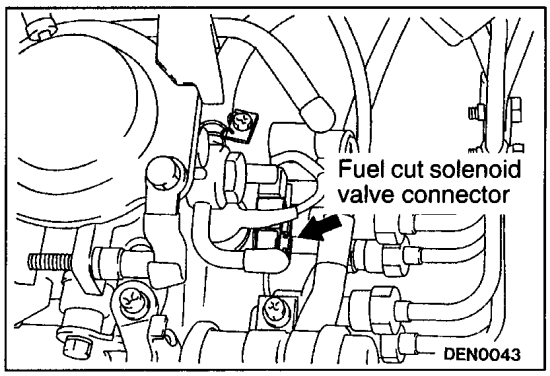
   Standard value: 1, 900±100 r/min

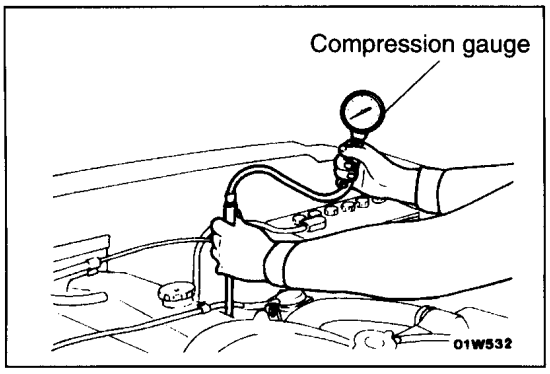
8. If the engine speed is outside the standard value, loosen the lock nut on the actuator rod and adjust by turning the adjusting screw.
9. Tighten the lock nut while making sure that the adjusting screw doesn't turn.

COMPRESSION PRESSURE INSPECTION 120002038

1. Check that the engine oil, starter and battery are normal. Also, set the vehicle in the following condition.
   - Engine coolant temperature: 80–95°C
   - Lamps and all accessories: OFF
   - Transmission: Neutral
2. Remove all of the glow plugs.

   Caution
   Be careful not to subject the glow plugs to any shock.





3. Disconnect the fuel cut solenoid valve connector.

   NOTE
   Doing this will stop carrying out fuel injection.
4. Cover the glow plug holes with a rag etc., and after the engine has been cranked, check that no foreign material is adhering to the rag.

   Caution
   1. **Keep away from the glow plug holes when cranking.**
   2. **If compression is measured while water, oil, fuel, etc., that has come from cracks is inside the cylinder, these materials will become heated and will gush out from the glow plug hole, which is dangerous.**
5. Set the compression gauge to one of the glow plug holes.
6. Crank the engine and measure the compression pressure.

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

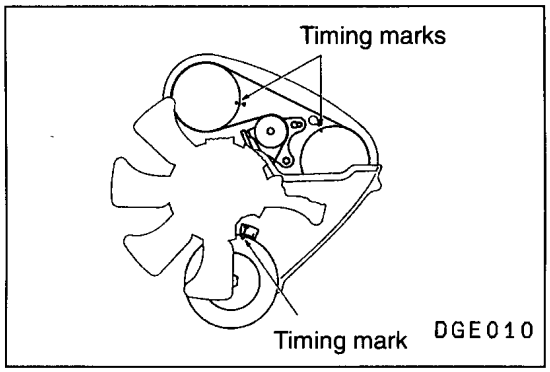
   Limit:
   Min. 2,200 kPa (at engine speed of 280 r/min)
7. Measure the compression for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

   Limit: Max. 300 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 or pressure is leaking from the gasket.
9. Connect the fuel cut solenoid valve connector.
10. Install the glow plugs.

    Tightening torque: 18 Nm

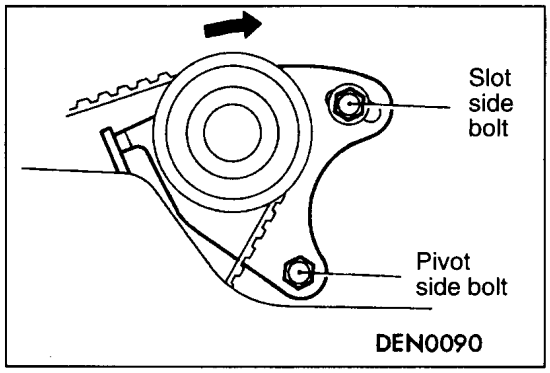
TIMING BELT TENSION ADJUSTMENT 120002039

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.

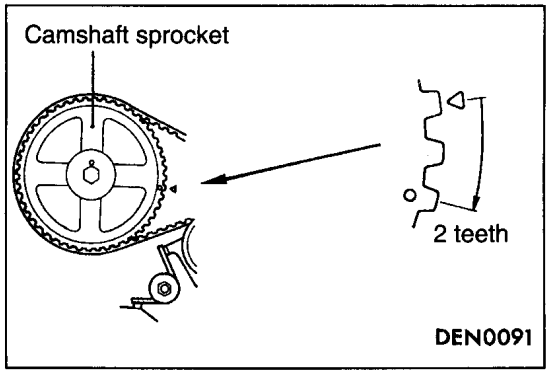


3. Align the timing mark on the sprockets with the timing mark on the front upper case.

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

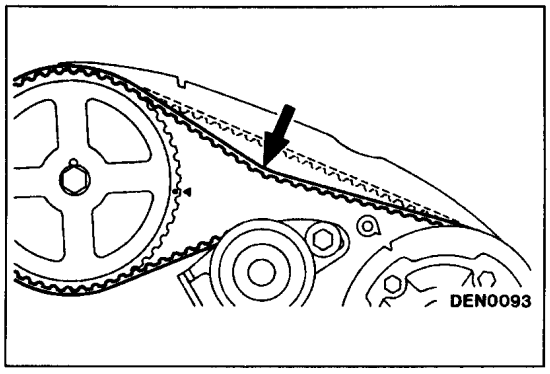


4. Loosen the tensioner pivot side bolt 1 turn and slot side bolt 1 or 2 turns.



5. Turn the crankshaft clockwise and stop at the second lobe of the camshaft sprocket.
6. First tighten tensioner slot side bolt, and then tighten pivot side bolt to the specified torque.

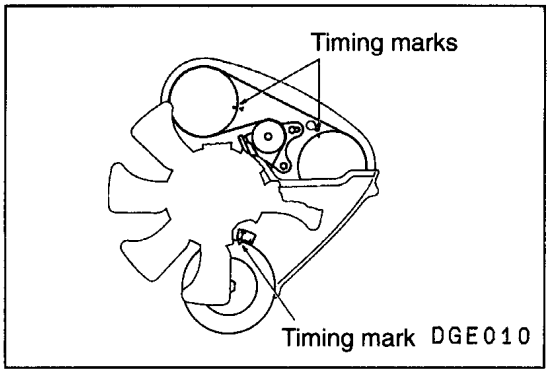
Tightening torque: 26 Nm



7. Turn the crankshaft anti-clockwise to align the timing marks.
8. Push down belt at a point halfway with a forefinger to check that tension of belt is up to standard value.

Specified value: 4–5 mm

9. Mount the timing belt upper cover.



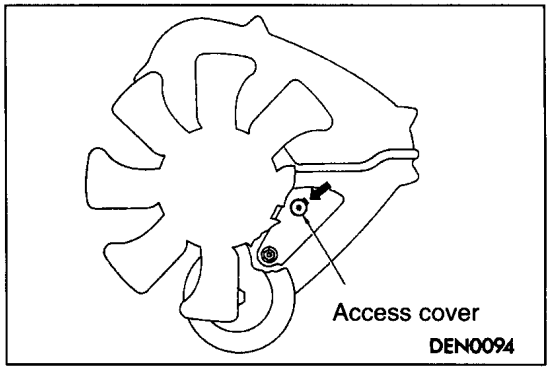
TIMING BELT "B" TENSION ADJUSTMENT

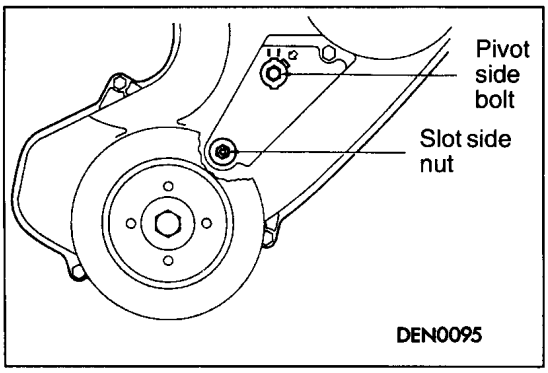
120002040

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.

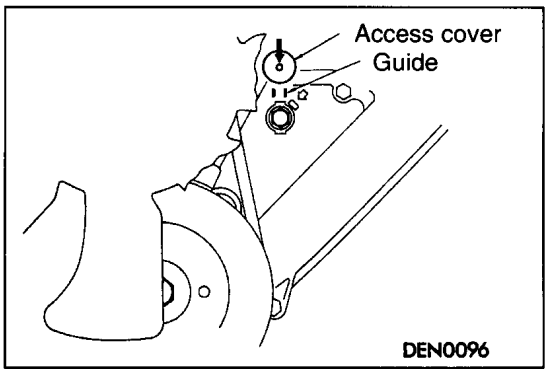
4. Remove the access cover.





5. Loosen the tensioner pivot side bolt 1 turn and slot side nut 1 or 2 turns.
6. First tighten tensioner slot side nut, and then tighten pivot side bolt to the specified torque.

Tightening torque:
Pivot side bolt 24 Nm
Slot side nut 26 Nm



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

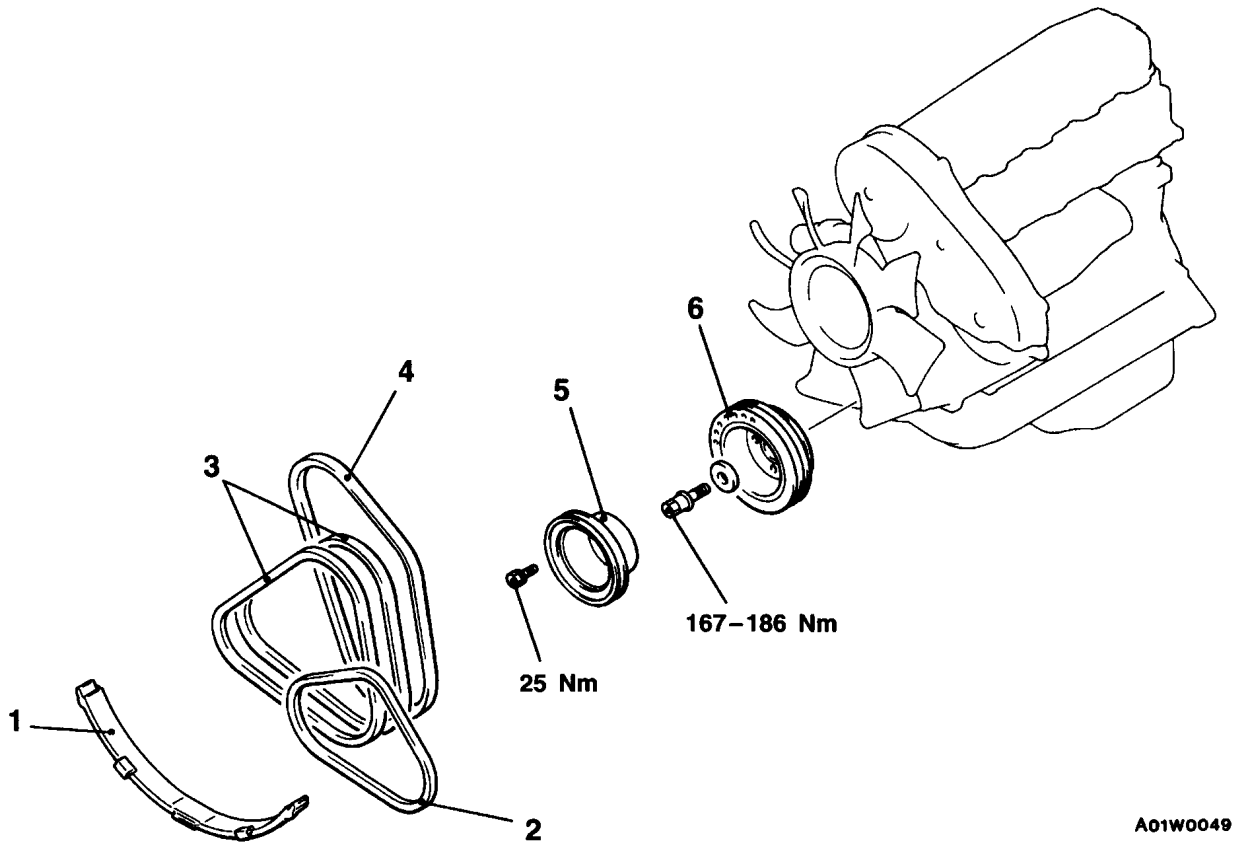
CRANKSHAFT PULLEY

120000340

REMOVAL AND INSTALLATION

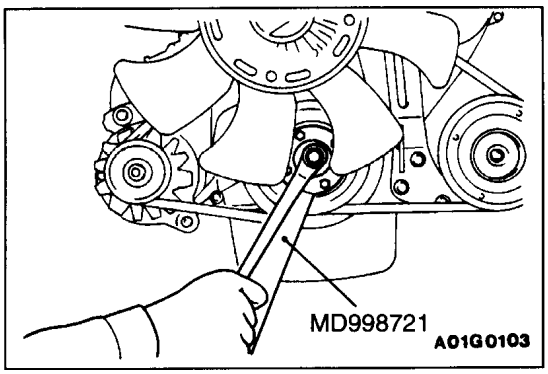
Pre-removal Operation
- Under Cover Removal (Refer to GROUP 42– Under Cover.)

Post-Installation Operations
(1)Drive Belt Tension Adjustment (Refer to P.11I-6.)
(2)Under Cover Installation (Refer to GROUP 42– Under Cover.)



Removal steps
1. Radiator shroud cover
2. Drive belt (A/C compressor)
3. Drive belt (Alternator)
4. Drive belt (Power steering oil pump)

◀A▶ ▶A◀ 5. Crankshaft pulley
6. Crankshaft pulley (A/C compressor)



REMOVAL AND INSTALLATION SERVICE POINT

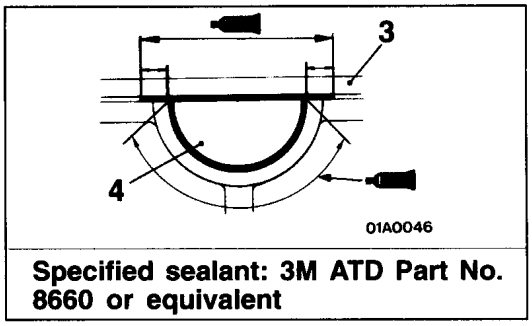
◀A▶▶A◀ **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**

CAMSHAFT, CAMSHAFT OIL SEAL

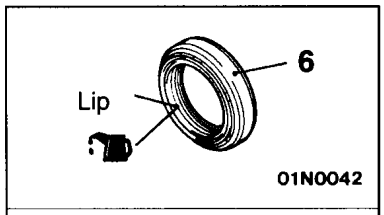
120002458

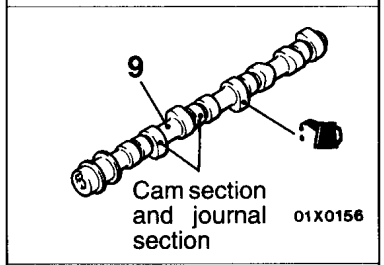
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Intercooler Removal and Installation (Refer to GROUP 15 – Intercooler.)

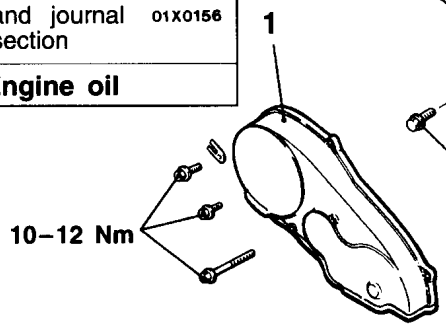


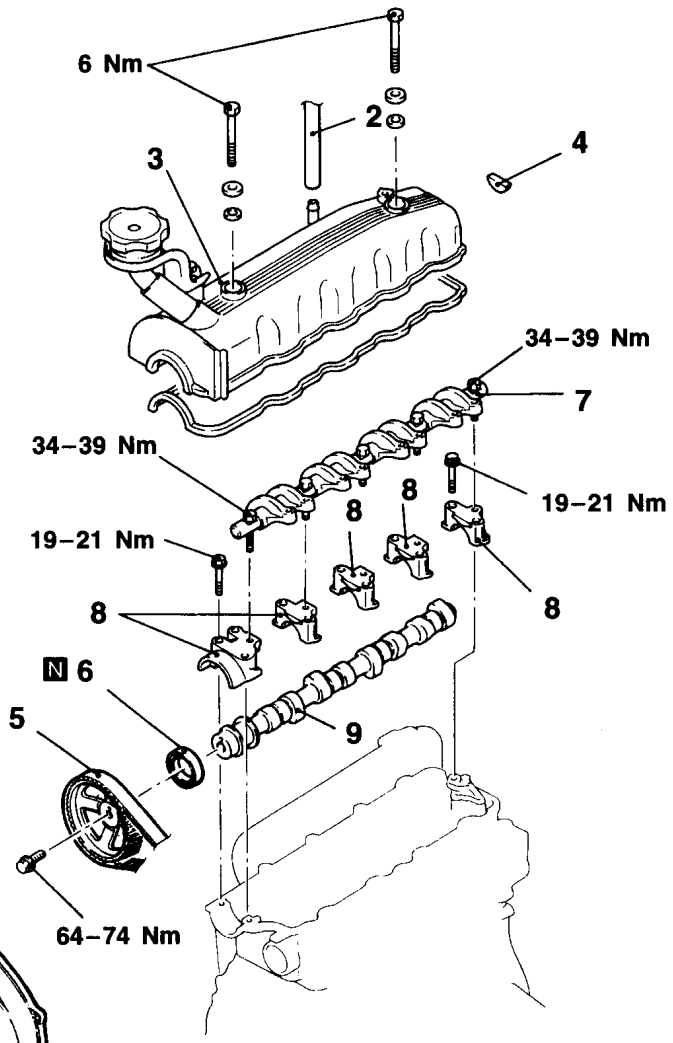
Specified sealant: 3M ATD Part No. 8660 or equivalent





Engine oil



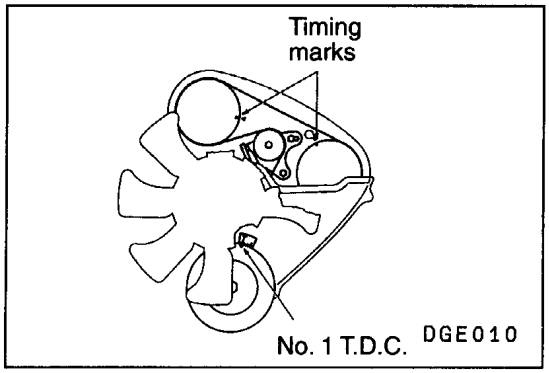


Camshaft removal steps

1. Timing belt upper cover assembly
2. Breather hose connection
3. Rocker cover
4. Semi-circular packing
5. Camshaft sprocket ◀A▶ ▶D◀ ◀B▶ ▶C◀
6. Camshaft oil seal ◀B▶ ▶C◀ ◀C▶ ▶B◀
7. Rocker arm and shaft assembly ▶A◀
8. Camshaft bearing cap
9. Camshaft

Camshaft oil seal removal steps

1. Timing belt upper cover assembly
5. Camshaft sprocket ◀A▶ ▶D◀ ◀B▶ ▶C◀
6. Camshaft oil seal

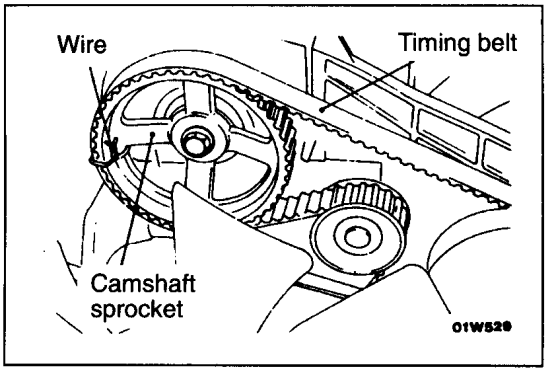


REMOVAL SERVICE POINTS

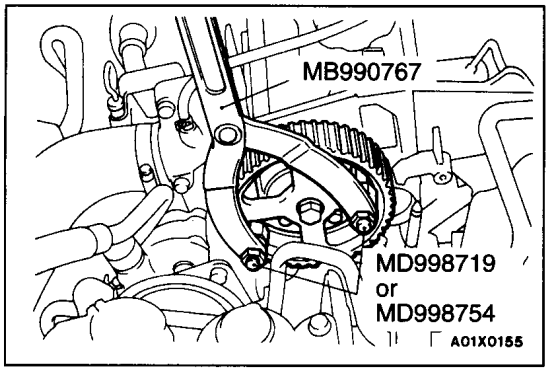
◀A▶ CAMSHAFT SPROCKET REMOVAL

(1) Rotate crankshaft clockwise (to the right) and align timing marks.

Caution
Never turn the crankshaft anticlockwise.

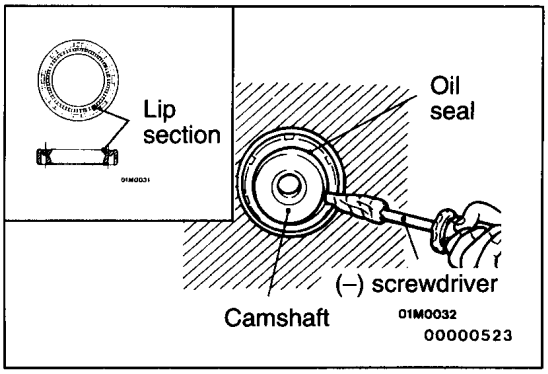


(2) Tie the camshaft sprocket and timing belt together with wire so that timing mark is not maladjusted.



(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▶ CAMSHAFT OIL SEAL REMOVAL

(1) Make a notch on the oil seal lip section with a knife, etc.

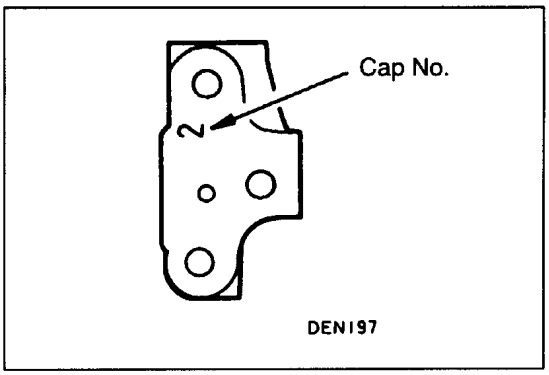
(2) Cover the end of a (–) screwdriver with a rag and insert it into the notched section of the oil seal, and lever out the oil seal to remove it.

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

◀C▶ 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.



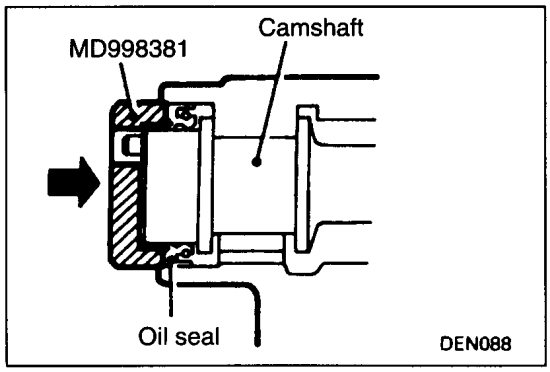
INSTALLATION SERVICE POINTS

▶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

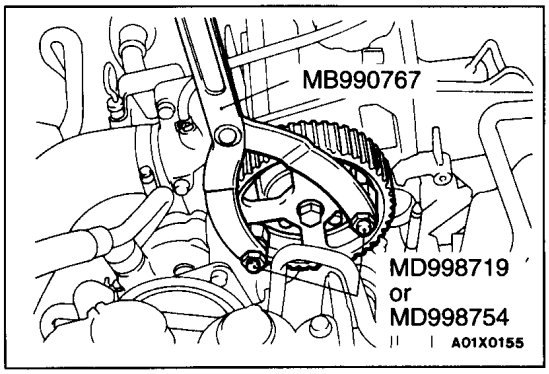
(1) Install the rocker arm and shaft assembly to the bearing caps.
(2) Check the valve clearance and adjust if necessary. (Refer to P.11I-8.)



▶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

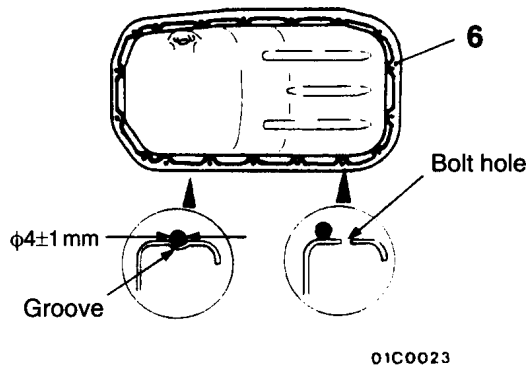
(1) Use the special tool to stop the camshaft sprocket from turning, and then install the camshaft sprocket bolt.
(2) Remove the cord which binds the camshaft sprocket and timing belt.

OIL PAN, OIL SCREEN

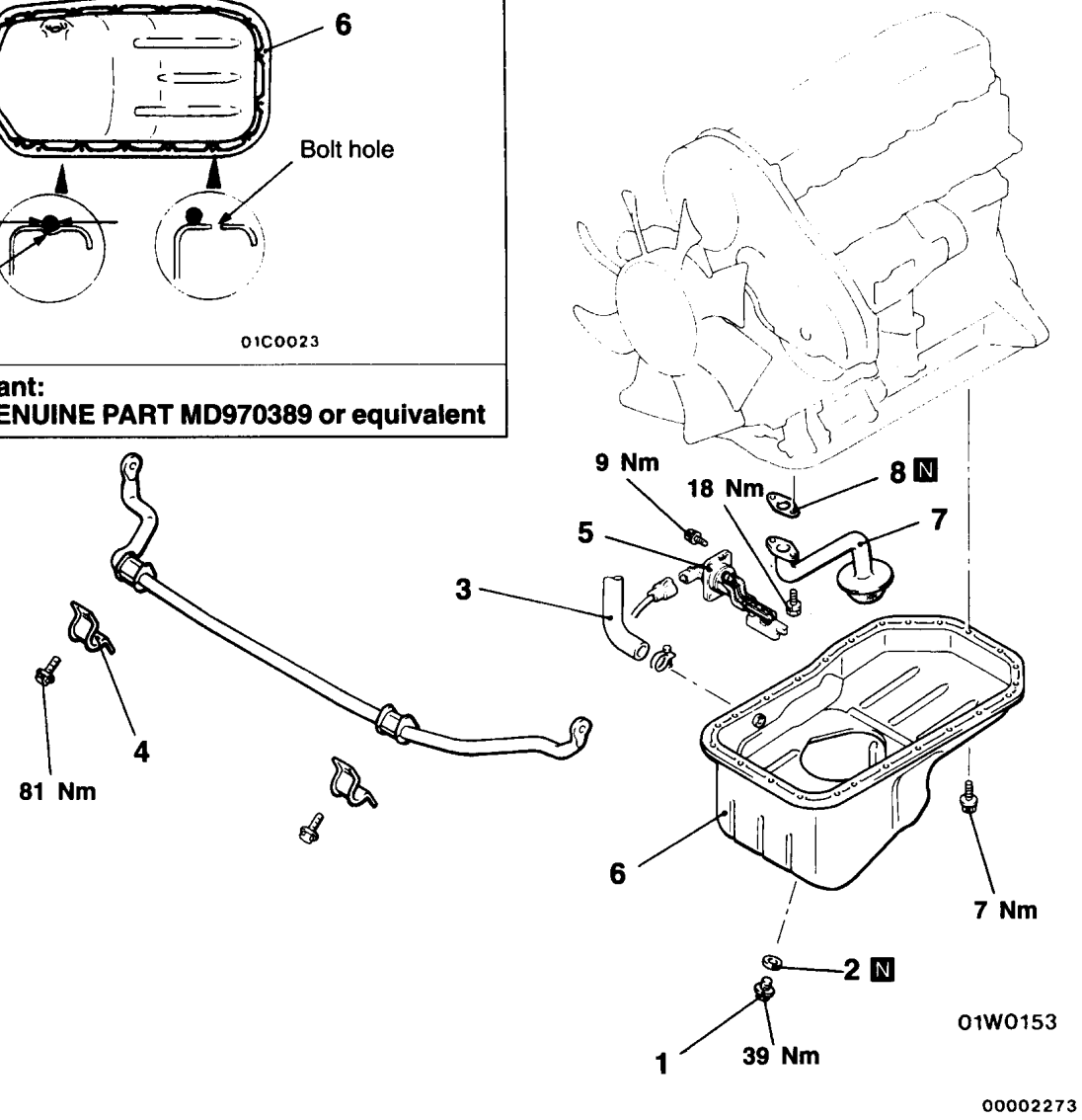
120002459

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
(1)Under Cover Removal and Installation (Refer to GROUP 42– Under Cover.)
(2)Engine Oil Draining and Supplying (Refer to GROUP 12 – Service Adjustment Procedures.)

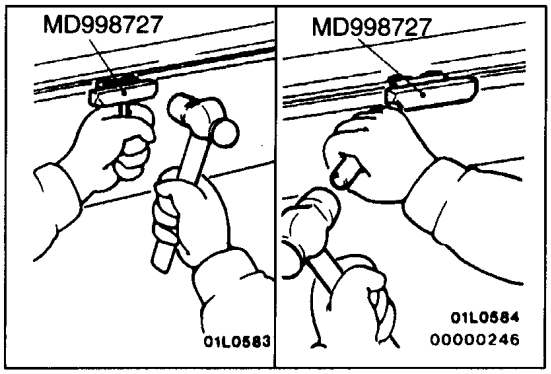


Specified sealant:
MITSUBISHI GENUINE PART MD970389 or equivalent



Removal steps

1. Drain plug
▶B◀ 2. Gasket
3. Oil hose connection
▶A◀ 4. Clamp
5. Oil level sensor assembly
◀A▶ 6. Oil pan
7. Oil screen
8. Gasket

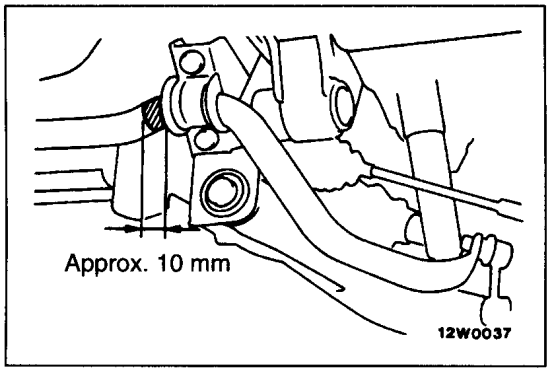


REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL

After removing the oil pan mounting bolts, remove the oil pan with the special tool and a brass bar.

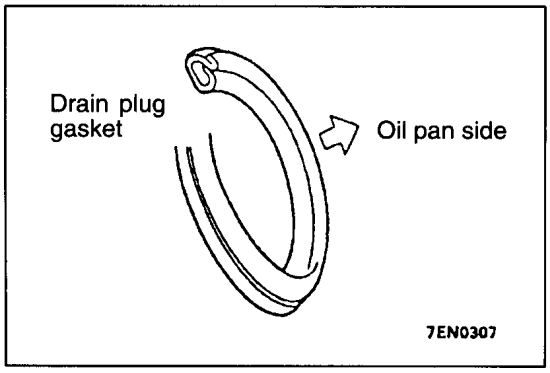
Caution
Perform this slowly to avoid deformation of the oil pan flange.



INSTALLATION SERVICE POINTS

▶A◀ CLAMP INSTALLATION

Install the clamp so that the coloured part on the stabilizer bar meets the indicated distance.



▶B◀ GASKET INSTALLATION

Replace the gasket with a new gasket, and install it in the direction shown in the illustration.

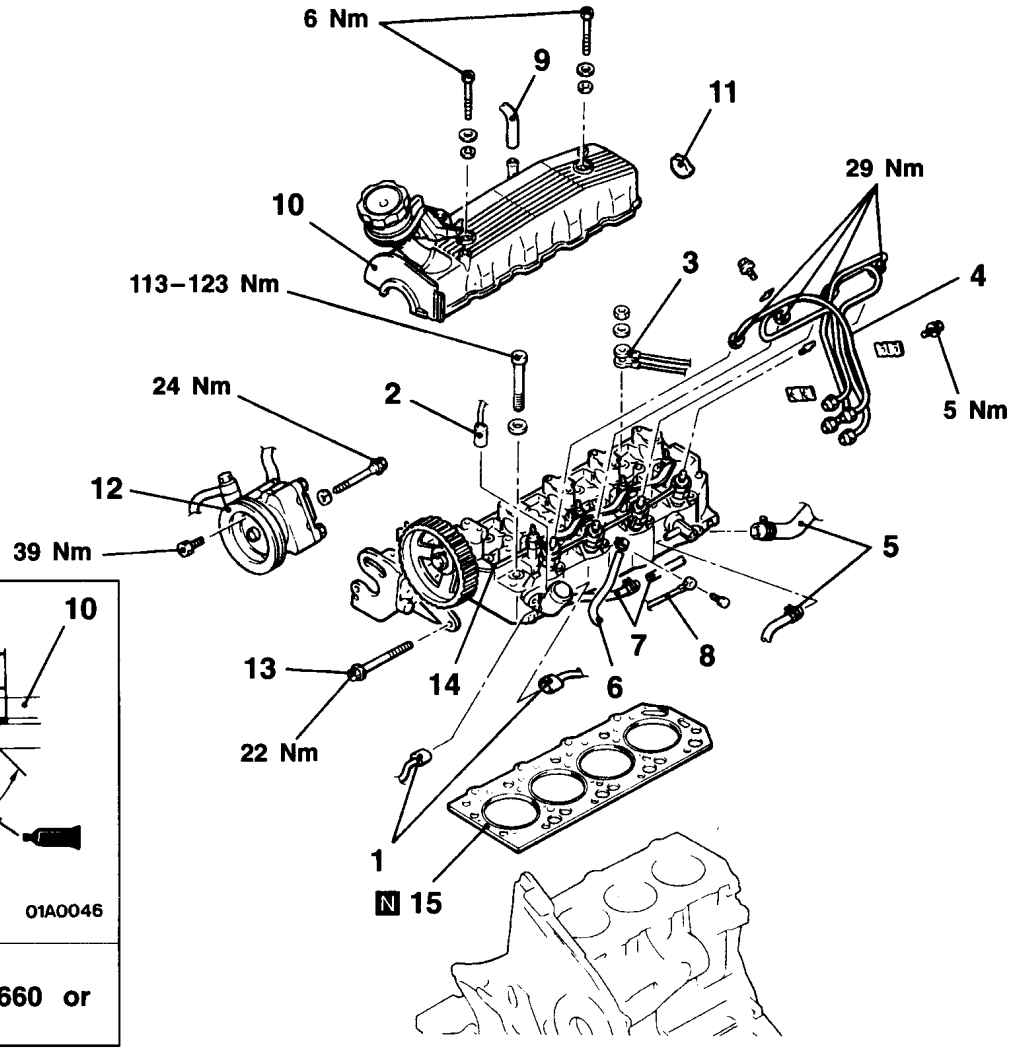
CYLINDER HEAD GASKET

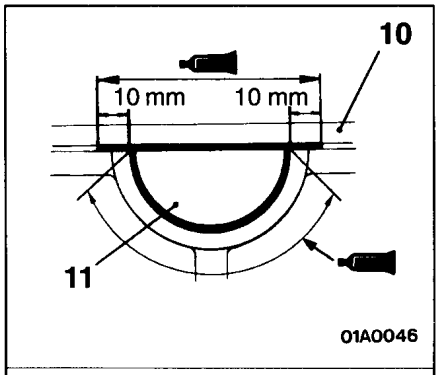
120002460

REMOVAL AND INSTALLATION

Pre-removal Operation
(1)Intake and Exhaust Manifold, Turbocharger Removal (Refer to GROUP 15 – Intake and Exhaust Manifold, Turbocharger.)
(2)Timing Belt Removal (Refer to P.11I-26.)

Post-installation Operation
(1)Timing Belt Installation (Refer to P.11I-26.)
(2)Intake and Exhaust Manifold, Turbocharger Installation (Refer to GROUP 15 – Intake and Exhaust Manifold, Turbocharger.)
(3)Evacuation of Air from Fuel Line (Refer to GROUP 13E – Service Adjustment Procedures.)

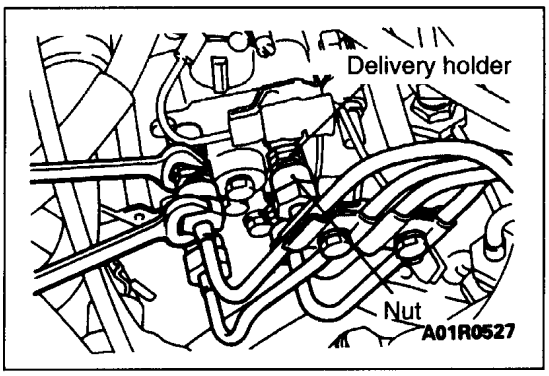




Specified sealant:
3M ATD Part No. 8660 or equivalent

Removal steps

1. Engine coolant temperature switch connector (for A/C)
2. Engine coolant temperature gauge connector
3. Glow plug connector
◀A▶ ▶C◀ 4. Fuel injection pipe
5. Heater hose connection
6. Fuel hose connection
7. Water hose connection
8. Earth cable connection
9. Breather hose connection
10. Rocker cover
11. Semi-circular packing
◀B▶ 12. Power steering oil pump assembly
13. Power steering oil pump bracket bolt
◀C▶ ▶B◀ 14. Cylinder head assembly
▶A◀ 15. Cylinder head gasket



REMOVAL SERVICE POINTS

◀A▶ FUEL INJECTION PIPE REMOVAL

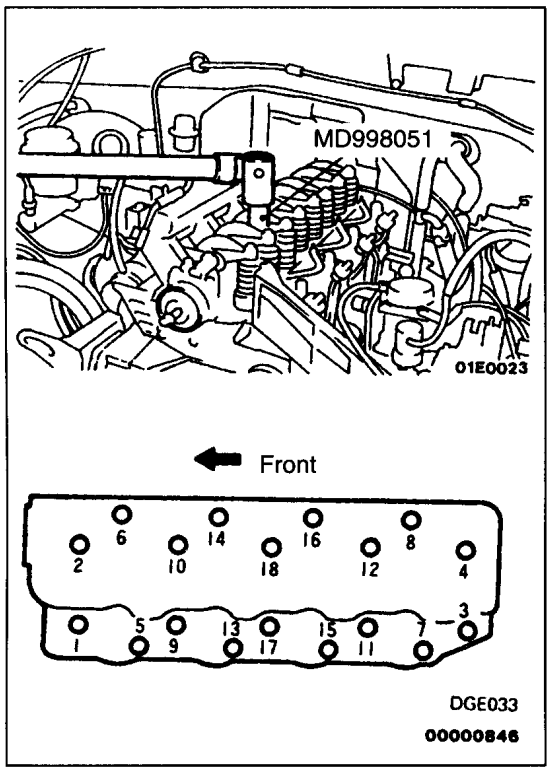
When loosening nuts at both ends of injection pipe, hold the other side (pump side-delivery holder, nozzle side-nozzle holder) with wrench and loosen nut.

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

◀B▶ POWER STEERING OIL PUMP REMOVAL

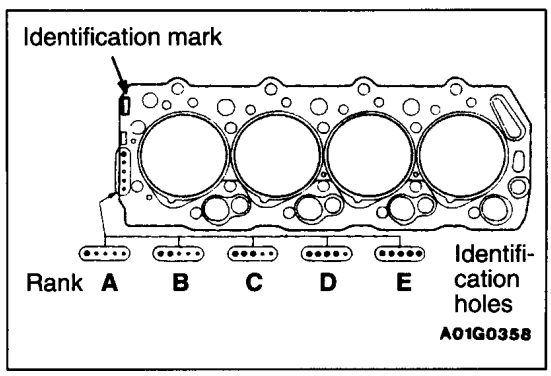
Remove the power steering oil pump from the bracket with the hose attached.

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.



◀C▶ CYLINDER HEAD REMOVAL

Use the special tool to tighten each bolt 2 – 3 times in the order shown in the illustration.



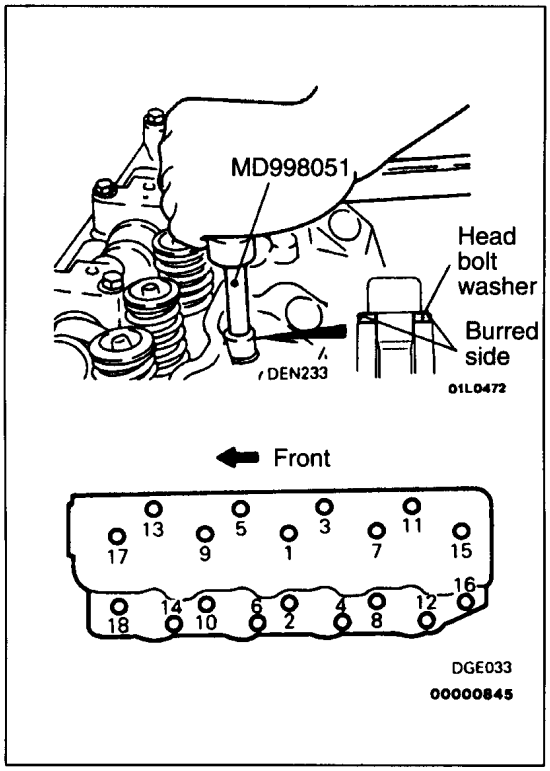
INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

(1) Wipe off any oil or grease from the gasket mounting surface.
(2) Check the rank from the number of identification holes on the cylinder head gasket that was removed, and select a cylinder head gasket of the same rank.

NOTE
The ranks are listed in the parts catalogue.

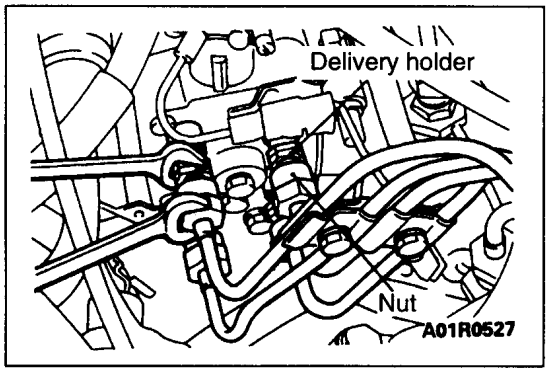
(3) Place the cylinder head gasket on top of the cylinder block so that the identification mark is facing upwards as in the illustration.



▶B◀ CYLINDER HEAD INSTALLATION

Use the special tool to tighten each bolt 2 – 3 times in the order shown in the illustration.

Caution
The head bolt washer should be installed so that the burred side is facing upwards.



▶C◀ FUEL INJECTION PIPE INSTALLATION

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

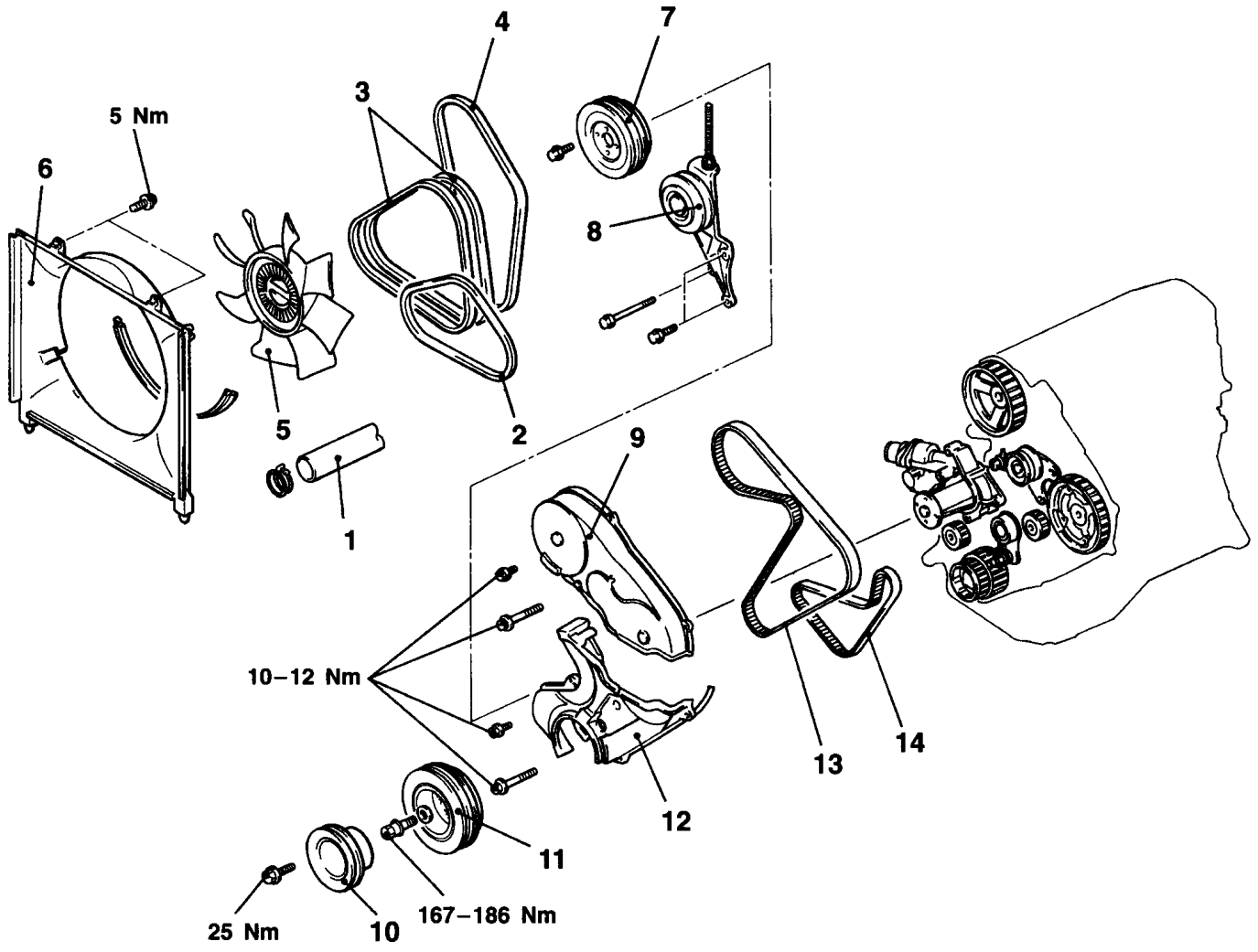
Tightening torque: 29 Nm

TIMING BELT/TIMING BELT B

120002461

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
(1) Engine Coolant Draining (Refer to GROUP 12 – Service Adjustment Procedures.)
(2) Intercooler Removal and Installation (Refer to GROUP 15 – Intercooler.)



A01W0065

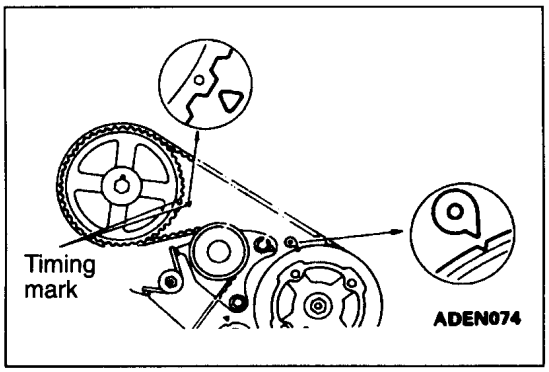
Removal steps

1. Radiator upper hose connection
2. Drive belt (A/C compressor)
3. Drive belts (Alternator)
4. Drive belt (Power steering oil pump)
◀A▶ 5. Cooling fan and clutch assembly
◀A▶ 6. Radiator shroud assembly
7. Water pump pulley
8. A/C tensioner pulley assembly (Refer to GROUP 55 – Compressor and Tension Pulley.)
9. Timing belt upper cover assembly
10. Crankshaft pulley (A/C compressor)
◀B▶ ▶C◀ 11. Crankshaft pulley
12. Timing belt lower cover assembly
◀C▶ ▶B◀ 13. Timing belt
◀D▶ ▶A◀ 14. Timing belt B

REMOVAL SERVICE POINTS

◀A▶ COOLING FAN AND CLUTCH ASSEMBLY/ RADIATOR SHROUD ASSEMBLY REMOVAL

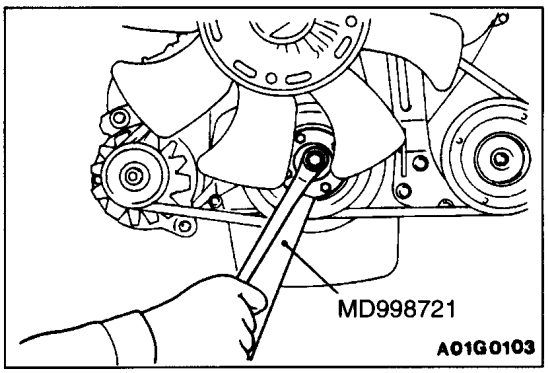
Remove the mounting nuts and bolts, and then remove the cooling fan and clutch assembly and the radiator shroud assembly as a set.



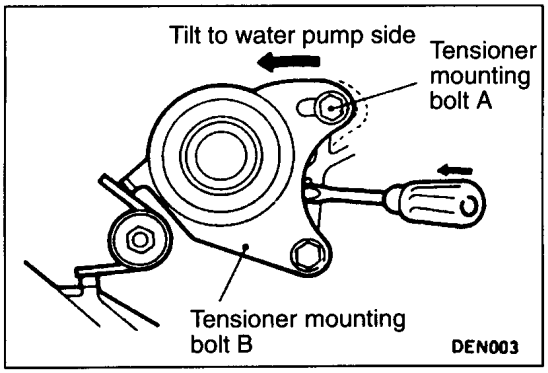
◀B▶ CRANKSHAFT PULLEY REMOVAL

(1) Position the No. 1 cylinder at compression TDC and remove the crankshaft pulley.

NOTE
The No. 1 cylinder is at compression TDC when the marks are aligned as shown in the figure.

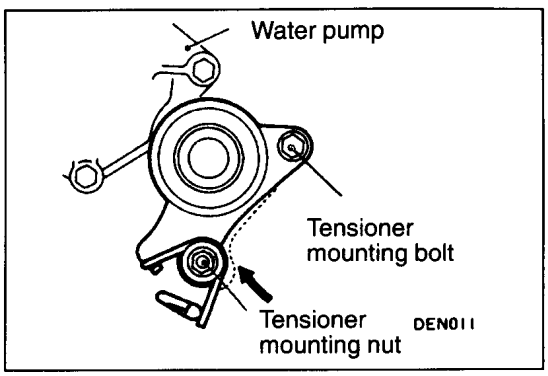


(2) Use the special tool to keep crankshaft from turning and remove the bolts.



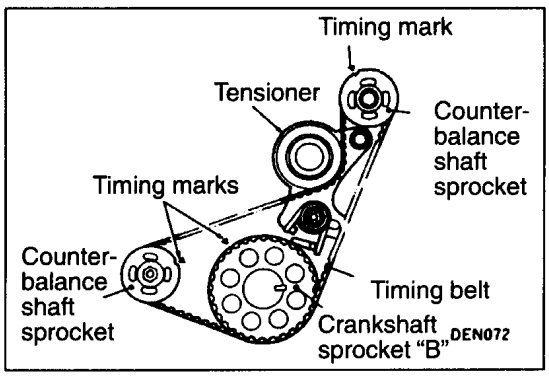
◀C▶ TIMING BELT REMOVAL

(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.



◀D▶ TIMING BELT B REMOVAL

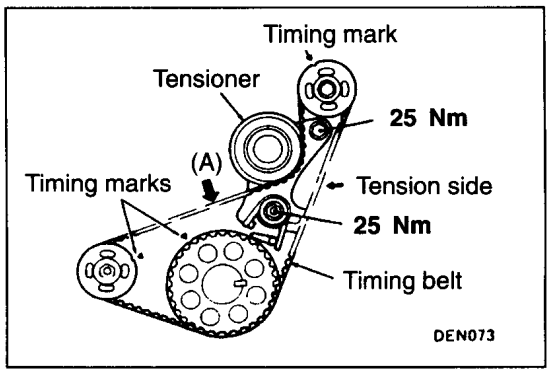
(1) When reinstalling timing belt B, mark an arrow at the belt to show rotation direction.
(2) Loosen the tensioner mounting bolt and nut.
(3) Push timing belt tensioner to water pump side and tighten the tensioner mounting bolt and nut. Secure so that tensioner will not move back.



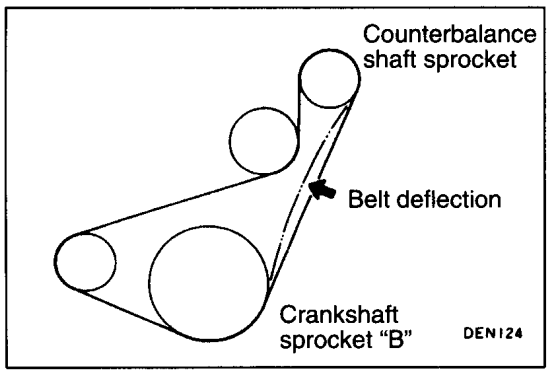
INSTALLATION SERVICE POINTS

▶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.

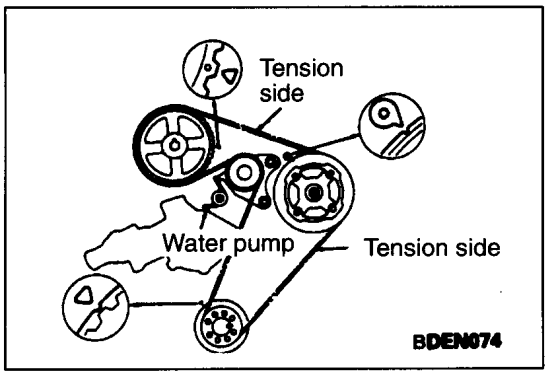


(3) Install timing belt B and make sure there is no deflection on the tension side.
(4) Press the deflection side of timing belt B (indicated by arrow (A)) a finger hand and fully stretch the tensioner side.
(5) Make sure that the timing marks are aligned.
(6) Loosen the tensioner mounting bolt and nut so that only the pressure of the spring is applied to timing belt B.
(7) Tighten the tensioner mounting nut and then tighten the bolt. If the bolt is tightened first, the tensioner will move and tension the belt.



(8) Press in the direction of the arrow in the figure with a finger to check the amount of deflection.

Standard value: 4–5 mm

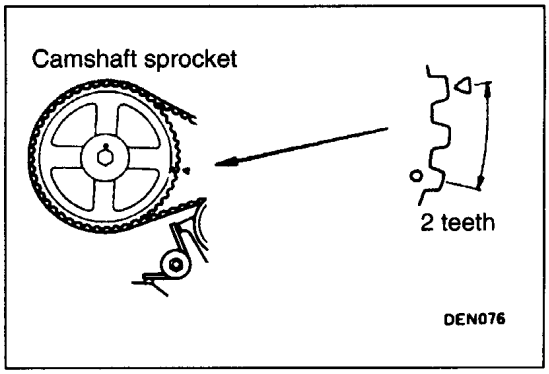


▶B◀ TIMING BELT INSTALLATION

(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, using care not to allow defection 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 it does not turn and engage the belt.**

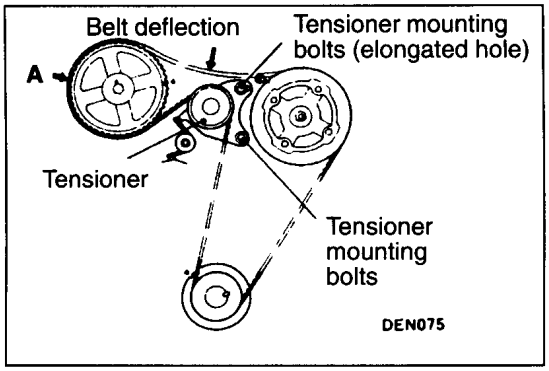
(4) Loosen the tensioner mounting bolts and apply tension with the spring.



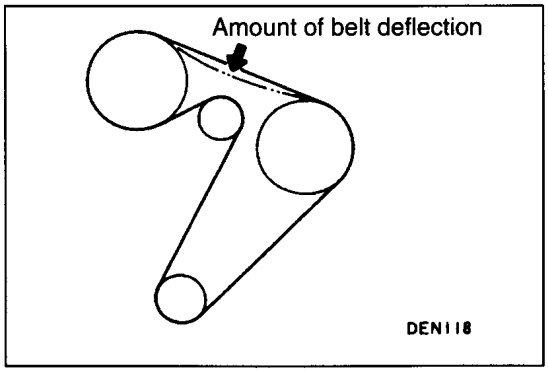
(5) Turn the crankshaft clockwise and stop at the second lobe of the camshaft sprocket.

Caution

1. **When turning the crankshaft, 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.**

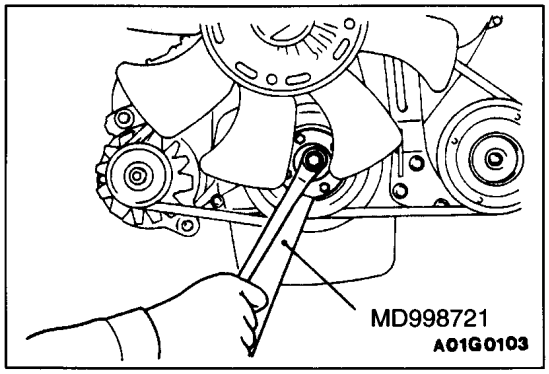


(6) Inspect to make sure that the part indicated by arrow A does not float upward.
(7) Tighten the tensioner mounting bolts, starting with the bolt in the elongated hole. If the lower bolt is tightened first, belt tension will become too tight.



(8) Turn the crankshaft anticlockwise and align the timing mark. And make sure that the timing marks of all sprockets are aligned.
(9) Press on the centre of the belt with an index finger to check the amount of deflection.

Standard value: 4–5 mm



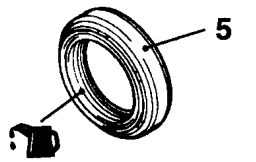
▶C◀ CRANKSHAFT PULLEY INSTALLATION

CRANKSHAFT FRONT OIL SEAL

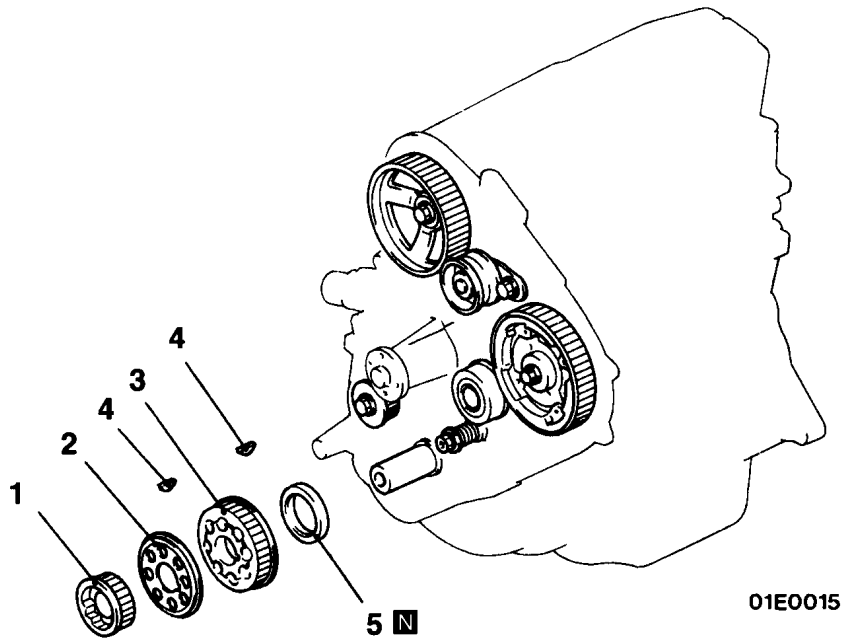
120000345

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
- Timing Belt and Timing Belt "B" Removal and Installation (Refer to p.11I-26.)



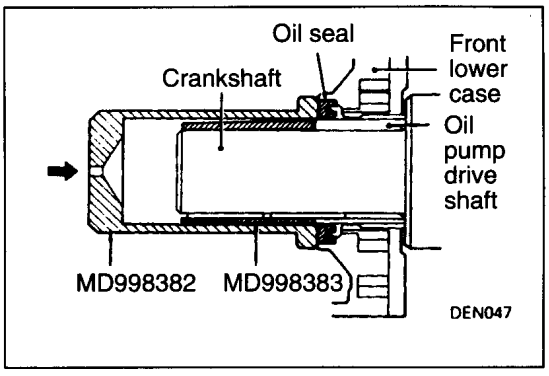
Engine oil



00000868

Removal steps
1. Crankshaft sprocket
2. Flange
3. Crankshaft sprocket B
4. Key

▶A◀ 5. Crankshaft front oil seal



INSTALLATION SERVICE POINT

▶A◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION

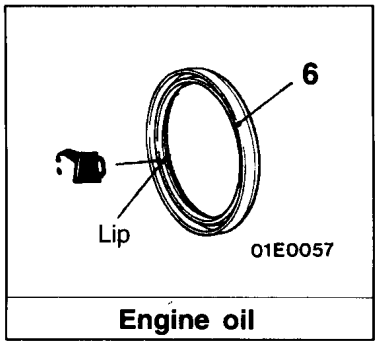
Apply engine oil to the entire circumference of the oil seal lip, and then tap in the oil seal until it is flush with the front lower case.

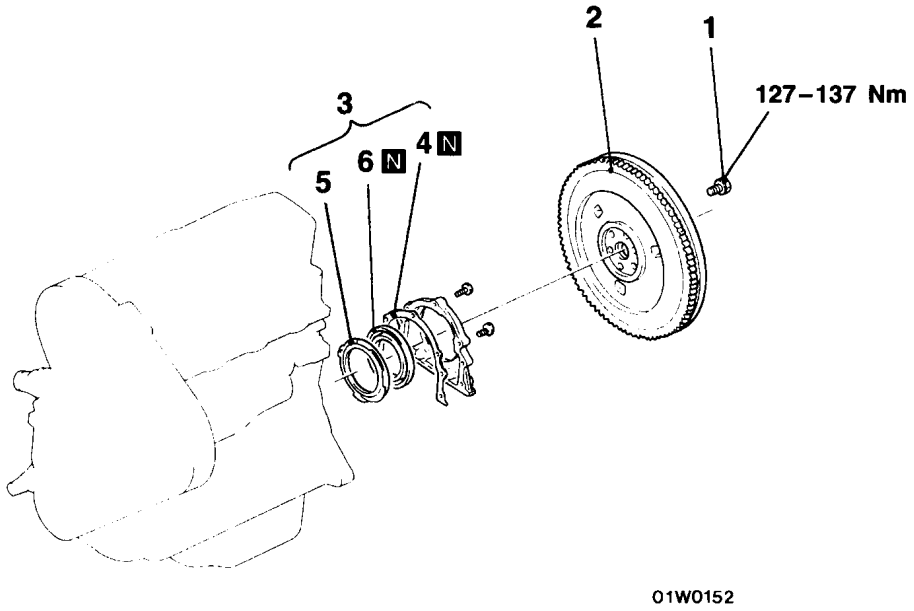
CRANKSHAFT REAR OIL SEAL

120002462

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
- Transmission Assembly Removal and Installation (Refer to GROUP 22 – Transmission Assembly.)



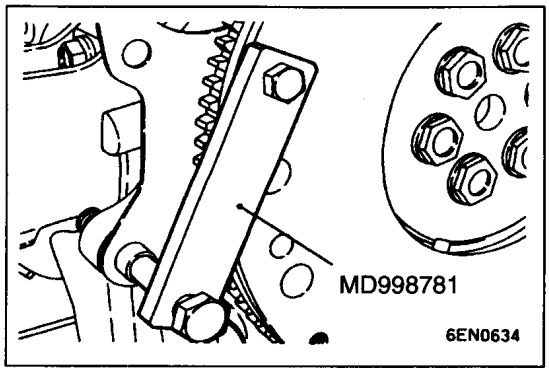


00002274

Removal steps

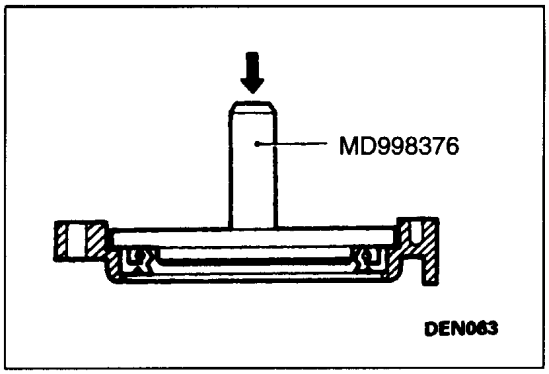
- Clutch cover and clutch disc

◀A▶ ▶C◀ 1. Flywheel bolt
2. Flywheel
3. Oil seal case assembly
4. Gasket
▶B◀ 5. Oil separator
▶A◀ 6. Crankshaft rear oil seal



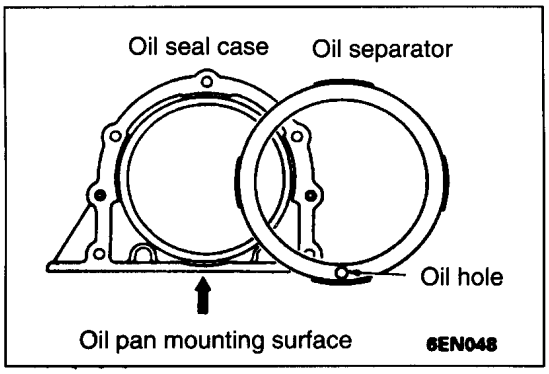
REMOVAL SERVICE POINT

◀A▶ FLYWHEEL BOLT REMOVAL



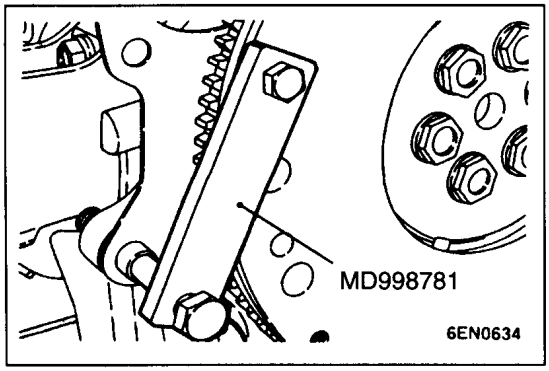
INSTALLATION SERVICE POINTS

▶A◀ CRANKSHAFT REAR OIL SEAL INSTALLATION



▶B◀ OIL SEPARATOR INSTALLATION

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



▶C◀ FLYWHEEL BOLT INSTALLATION

ENGINE ASSEMBLY

120002463

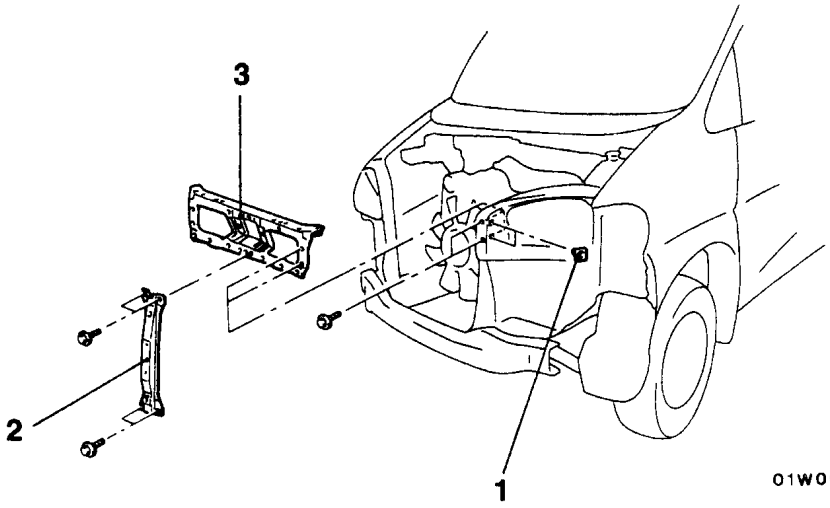
REMOVAL AND INSTALLATION

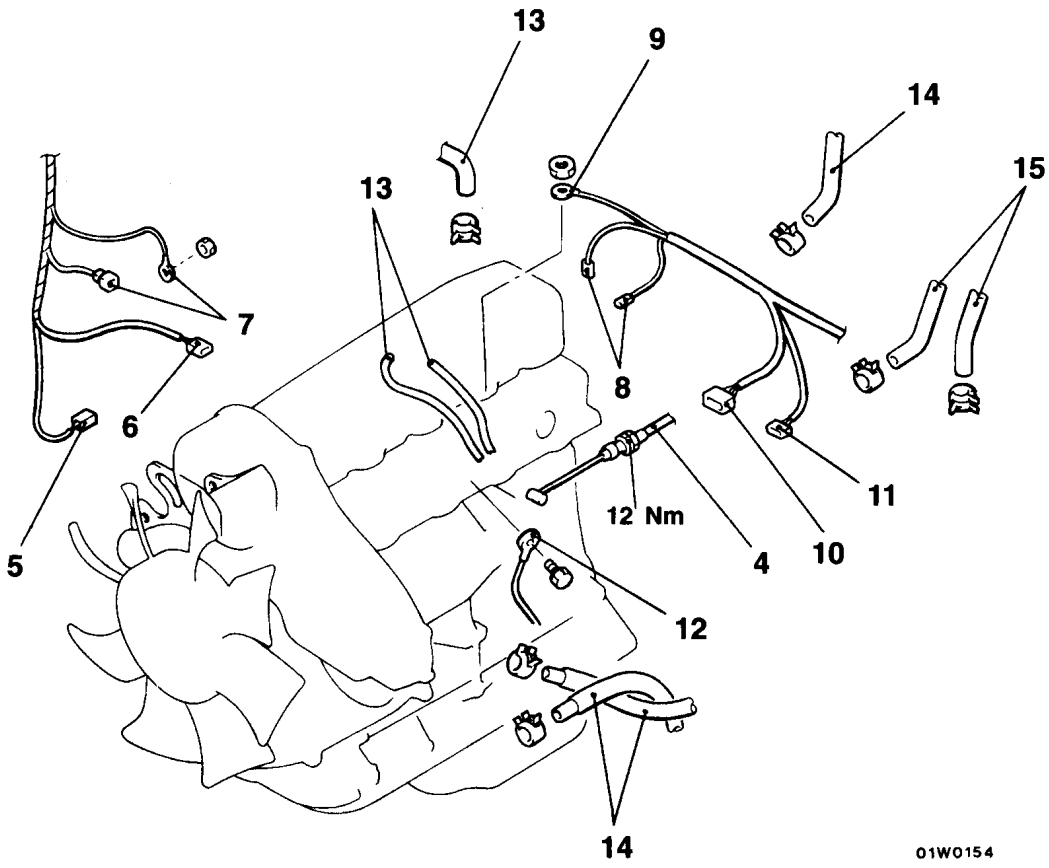
Pre-removal Operation

(1) Hood, Hood Latch Removal
(Refer to GROUP 42– Hood.)
(2) Under Cover Removal
(Refer to GROUP 42– Under Cover.)
(3) Engine Coolant Draining
(Refer to GROUP 14 – Service Adjustment Procedures.)
(4) Engine Oil Draining
(Refer to GROUP 12 – Service Adjustment Procedures.)
(5) Intercooler Removal
(Refer to GROUP 15 – Intercooler.)
(6) Air Cleaner Assembly Removal
(Refer to GROUP 15 – Air Cleaner.)
(7) Battery and Battery Tray Removal
(8) Transmission Assembly Removal
(M/T: Refer to GROUP 22 – Transmission Assembly.)
(A/T: Refer to GROUP 23 – Transmission Assembly.)
(9) Wiper Motor and Linkage Removal
(Refer to GROUP 51 – Windshield Wiper and Washer.)
(10) Front Bumper Removal
(Refer to GROUP 51 – Front Bumper.)
(11) Front Condenser and Condenser Fan Motor Assembly Removal
(Refer to GROUP 55 – Front Condenser and Condenser Fan Motor Assembly.)
(12) Radiator Removal
(Refer to GROUP 14 – Radiator.)
(13) Headlamp (L. H.) Removal
(Refer to GROUP 54 – Headlamp.)
(14) A/C Compressor Removal
(Refer to GROUP 55 – A/C Compressor.)

Post-Installation Operation

(1) A/C Compressor Installation
(Refer to GROUP 55 – A/C Compressor.)
(2) Headlamp (L. H.) Installation
(Refer to GROUP 54 – Headlamp.)
(3) Radiator Installation
(Refer to GROUP 14 – Radiator.)
(4) Front Condenser and Condenser Fan Motor Assembly Installation
(Refer to GROUP 55 – Front Condenser and Condenser Fan Motor Assembly.)
(5) Front Bumper Installation
(Refer to GROUP 51 – Front Bumper.)
(6) Wiper Motor and Linkage Installation
(Refer to GROUP 51 – Windshield Wiper and Washer.)
(7) Transmission Assembly Installation
(Refer to GROUP 22 – Transmission Assembly.)
(8) Air Cleaner Assembly Installation
(Refer to GROUP 15 – Air Cleaner.)
(9) Intercooler Installation
(Refer to GROUP 15 – Intercooler)
(10) Engine Oil Refilling
(Refer to GROUP 12 – Service Adjustment Procedures.)
(11) Engine Coolant Refilling
(Refer to GROUP 14 – Service Adjustment Procedures.)
(12) Drive Belt Tension Adjustment
(Refer P.11I-6.)
(13) Accelerator Cable Adjustment
(Refer to GROUP 13F – Service Adjustment Procedures.)
(14) Evacuation of Air from Fuel Line
(Refer to GROUP 13E – Service Adjustment Procedures.)
(15) Battery and Battery Tray Installation
(16) Under Cover Installation
(Refer to GROUP 42– Under Cover.)
(17) Hood, Hood Latch Installation
(Refer to GROUP 42– Hood.)

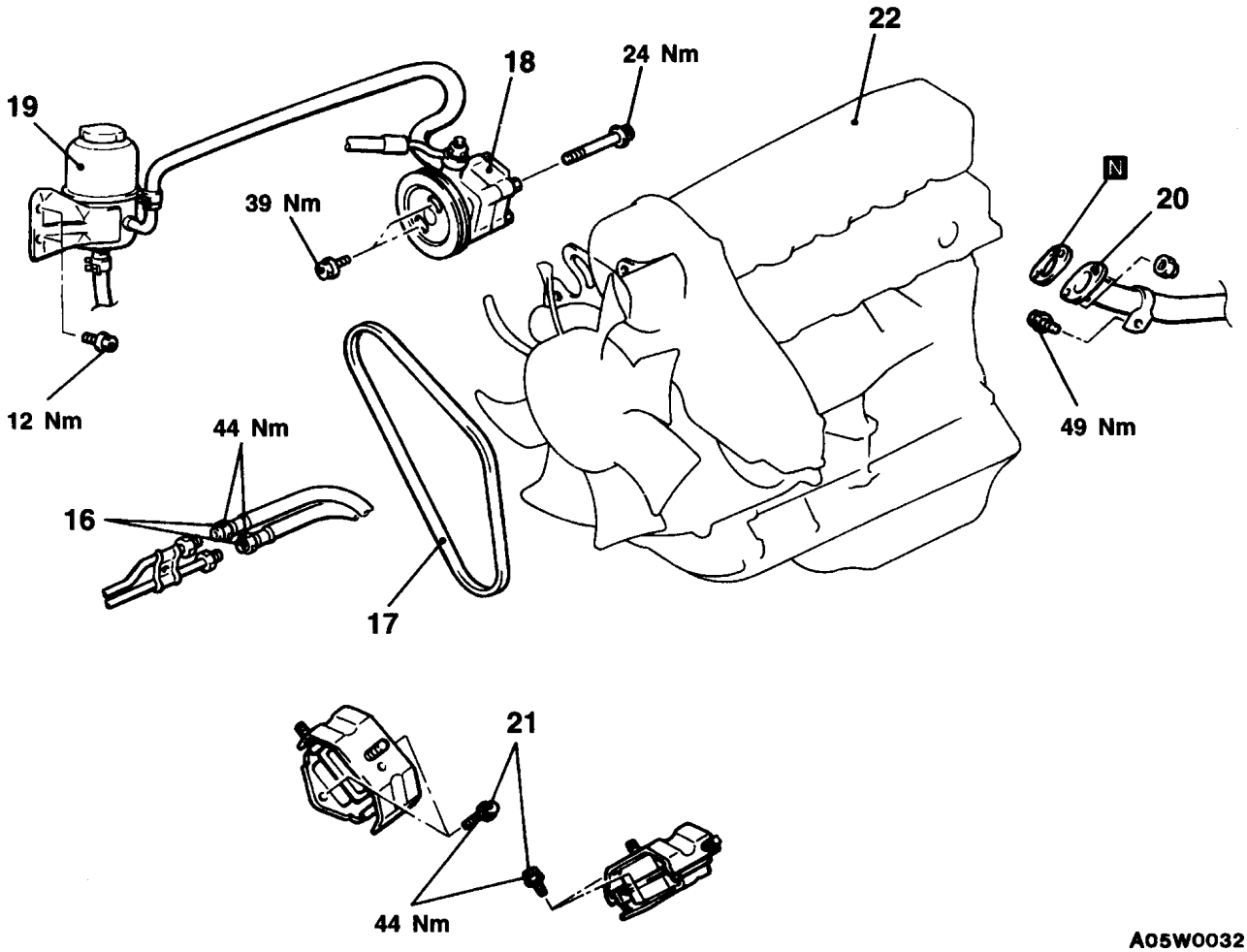




00002275

Removal steps

1. Grommet
2. Hood lock stay
3. Front end upper bar center
4. Accelerator cable
5. Engine oil level sensor connector
6. Engine oil pressure switch connector
7. Alternator connector
8. Engine coolant temperature switch connector (for A/C)
9. Glow plug connector
10. Lever position sensor connector
11. Sensor connector
12. Earth cable connection
13. Vacuum hose connection
14. Water hose connection
15. Fuel hose connection



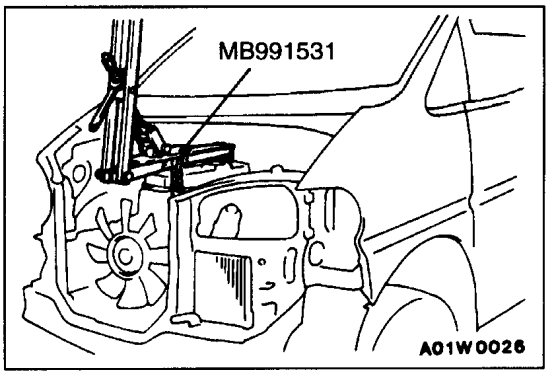
16. Engine oil cooler hose connection
17. Drive belt (Power steering)
◀A▶ 18. Power steering oil pump assembly
◀A▶ 19. Power steering oil reservoir assembly
20. Exhaust pipe connection
21. Engine support front insulator bolt
▶B◀ ▶A◀ 22. Engine assembly

REMOVAL SERVICE POINTS

◀A▶ POWER STEERING OIL PUMP ASSEMBLY/POWER STEERING OIL RESERVOIR ASSEMBLY REMOVAL

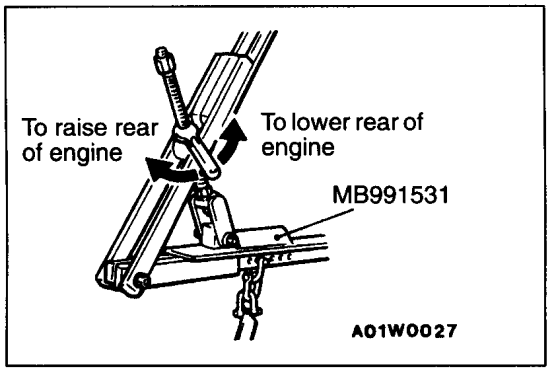
Remove the power steering oil pump assembly and power steering oil reservoir assembly from the bracket with the hose attached.

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



◀B▶ ENGINE ASSEMBLY REMOVAL

(1) Check that all cables, hoses and harness connectors have been disconnected from the engine.
(2) Hang the special tool on a chain block or similar tool, and then attach the special tool to the engine hanger.



(3) Turn the wrench on the special tool to tilt the engine assembly. Then raise the engine assembly slowly to remove from the front engine compartment.

INSTALLATION SERVICE POINT

▶A◀ ENGINE ASSEMBLY INSTALLATION

Install the engine assembly while checking to be sure that the cables, hoses, and harness connectors are not clamped.