

GENERAL INFORMATION

Items			4G13 – Variable-venturi carburettor	4G13 – MPI	4G15 – Variable-venturi carburettor
Total displacement ml			1,299	1,299	1,468
Bore × Stroke mm			71 × 82	71 × 82	75.5 × 82
Compression ratio			9.0	9.5	9.0
Combustion chamber			Semi-spherical type	Semi-spherical type	Semi-spherical type
Camshaft arrangement			SOHC	SOHC	SOHC
Number of valve	Intake		8	8	8
	Exhaust		4	4	4
Valve timing	Intake	Opening	BTDC 14°	BTDC 19°	BTDC 14°
		Closing	ABDC 48°	ABDC 43°	ABDC 48°
	Exhaust	Opening	BBDC 55°	BBDC 60°	BBDC 55°
		Closing	ATDC 13°	ATDC 8°	ATDC 13°
Fuel system			Variable-venturi carburettor	Electronic controlled multipoint fuel injection	Variable-venturi carburettor
Rocker arm			Roller type	Roller type	Roller type
Auto-lash adjuster			Not equipped	Not equipped	Not equipped

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Alternator drive belt tension	Tension N	When checked	392–588	–
		When a used belt is installed	441–539	–
		When a new belt is installed	637–833	–
	Deflection (Reference value) mm	When checked	8.7 – 11.4	–
		When a used belt is installed	9.2 – 10.6	–
		When a new belt is installed	6.6 – 8.3	–
Power steering oil pump and A/C compressor drive belt tension	Tension N	When checked	392 – 588	–
		When a used belt is installed	441–539	–
		When a new belt is installed	637–833	–
	Deflection (Reference value) mm	When checked	9.6 – 12.4	–
		When a used belt is installed	10.2 – 11.6	–
		When a new belt is installed	7.2 – 9.0	–

11A 4G1 ENGINE 1996 – Service Specifications

Items			Standard value	Limit
A/C compressor drive belt tension	Tension N	When checked	392 – 588	–
		When a used belt is installed	441 – 539	–
		When a new belt is installed	637 – 833	–
	Deflection (Reference value) mm	When checked	4.6 – 6.2	–
		When a used belt is installed	5.0 – 5.7	–
		When a new belt is installed	3.4 – 4.3	–
Valve clearance (at hot) mm		Intake valve	0.20	–
		Exhaust valve	0.25	–
Basic ignition timing	4G13 – Variable-venturi carburettor		6° BTDC ± 2°	–
	4G15 – Variable-venturi carburettor		4° BTDC ± 2°	–
	4G13 – MPI		5° BTDC ± 2°	–
Idle speed r/min	Variable-venturi carburettor – M/T		800 ± 50	–
	Variable-venturi carburettor – A/T		850 ± 50	–
	MPI		750 ± 100	–
Idle speed r/min (Vehicle with high altitude compensation system)	At 0 – 500 m above sea level	M/T	850 ± 50	–
		A/T	900 ± 50	–
	At 2600 – 3700 m above sea level	M/T	750 ± 50	–
		A/T	800 ± 50	–
CO contents %	Variable-venturi carburettor		1.5 ± 0.5	–
	MPI		0.5 or less	–
CO contents % (Vehicles with high altitude compensation system)	At 0 – 500 m above sea level		1.5 ± 0.5	–
	At 2600 – 3700 m above sea level		6.5 ± 0.5	–
Compensation pressure (250 – 400 r/min.) kPa	4G13 – Variable-venturi carburettor		1,226	min. 863
	4G15 – Variable-venturi carburettor		1,177	min. 824
	4G13 – MPI		1,226	min. 863
Compression pressure difference of all cylinder kPa			–	max. 100
Intake manifold vacuum kPa			min. 60	–
Cylinder head bolt shank length mm			–	103.2

MAIN

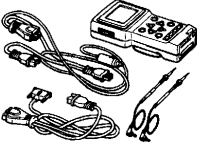
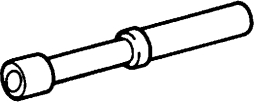
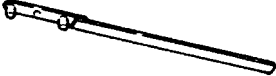
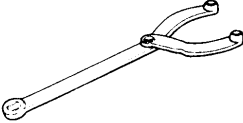
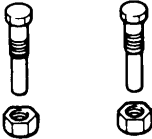
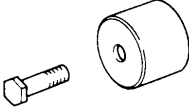

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SEALANT

Item	Specified sealant	Remark
Oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant

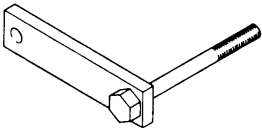
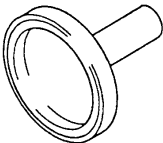
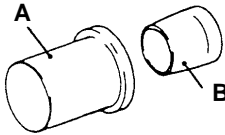
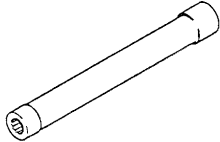
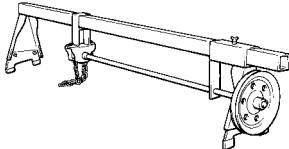
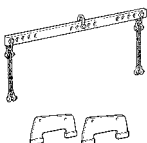
SPECIAL TOOLS

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	Checking the idle speed
	MD998299	MAS driver	Adjustment of mixture adjusting screw <Vehicles for GCC>
	MD998747	Crankshaft pulley holder	Holding the crankshaft pulley
	MB990767	End yoke holder	Holding the camshaft sprocket
	MD998719 or MD998754	Crankshaft pulley holder pin	
	MD998713	Camshaft oil seal installer	Press-in of the camshaft oil seal
	MD998727	Oil pan remover	Removal of oil pan

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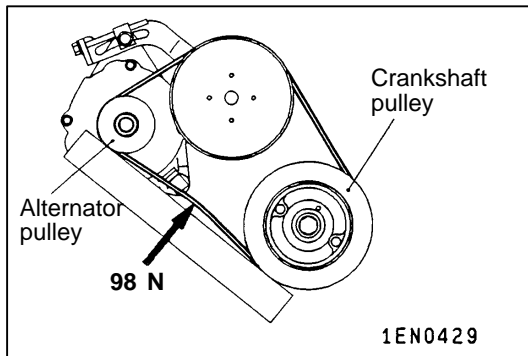
11A 4G1 ENGINE 1996 – Special Tools

Tool	Number	Name	Use
	MD998781	Flywheel stopper	Securing the flywheel <M/T> or drive plate <A/T>
	MD998718	Crankshaft rear oil seal installer	Press-in of the crankshaft rear oil seal
	A: MD998304 B: MD998305	A: Crankshaft front oil seal installer B: Crankshaft front oil seal guide	Press-in of the crankshaft front oil seal
	MB991653	Cylinder head bolt wrench	Cylinder head bolt removal and installation
	General Service Tool MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission
	MB991453	Engine hanger assembly	

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ON-VEHICLE SERVICE <Variable-venturi carburettor>

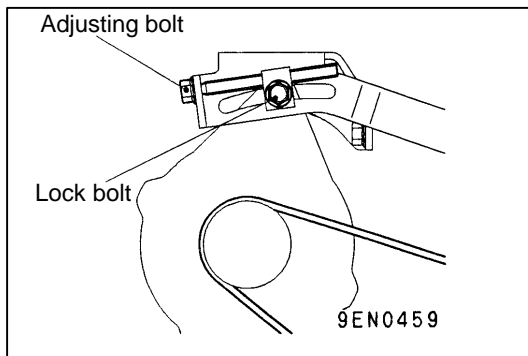
DRIVE BELT TENSION CHECK AND ADJUSTMENT

ALTERNATOR DRIVE BELT TENSION CHECK

Use a belt tension gauge to check that the belt tension is at the standard value at a point half-way between the two pulleys as shown in the illustration. In addition, press this section with a force of 98 N and check that the amount of belt deflection is at the standard value.

Standard value:

Tension N	392 – 588
Deflection (Reference value) mm	8.7 – 11.4



ALTERNATOR DRIVE BELT TENSION ADJUSTMENT

1. Loosen the nut of the alternator pivot bolt.
2. Loosen the lock bolt.
3. Use the adjusting bolt to adjust the belt tension and belt deflection to the standard values.

Standard value:

Items	When a used belt is installed	When a new belt is installed
Tension N	441 – 539	637 – 833
Deflection (Reference value) mm	9.2 – 10.6	6.6 – 8.3

4. Tighten the lock bolt.

Tightening torque: 23 Nm

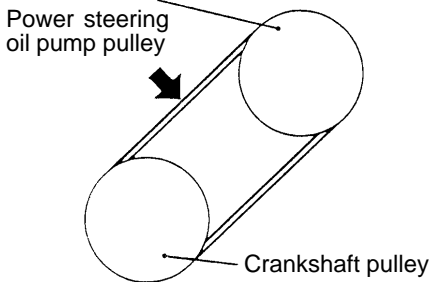
5. Tighten the nut of the alternator pivot bolt.

Tightening torque: 44 Nm

6. Tighten the adjusting bolt.

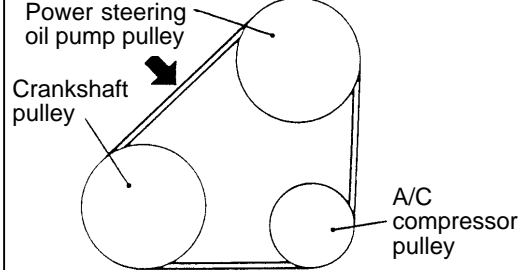
Tightening torque: 9.8 Nm

<Vehicles without A/C>



A01M0020

<Vehicles with A/C>



A01M0021

POWER STEERING OIL PUMP AND AIR CONDITIONER COMPRESSOR DRIVE BELT TENSION CHECK AND ADJUSTMENT

1. Use a belt tension gauge to check that the belt tension is at the standard value at a point half-way between the two pulleys (indicated by an arrow in the illustration). In addition, press this section with a force of 98 N and check that the amount of belt deflection is at the standard value.

Standard value:

Items	When checked	When a used belt is intalled	When a new belt is installed
Tension N	392 – 588	441 – 539	637 – 833
Deflection (Reference value) mm	9.6 – 12.4	10.2 – 11.6	7.2 – 9.0

2. If the tension or deflection is outside the standard value, adjust by the following procedure.

- (1) Loosen power steering oil pump fixing bolts A, B and C.
- (2) Adjust the amount of belt deflection using adjusting bolt D.
- (3) Tighten fixing bolts A, B and C.

Tightening torque:

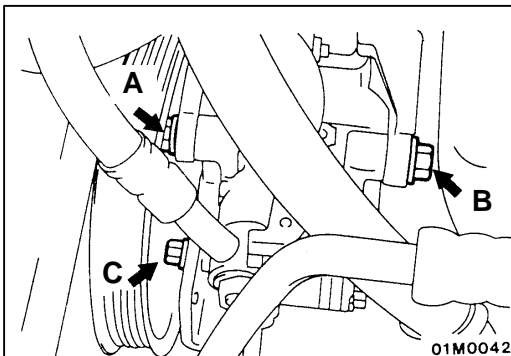
Bolts A and B: 39 Nm

Bolt C: 49 Nm

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

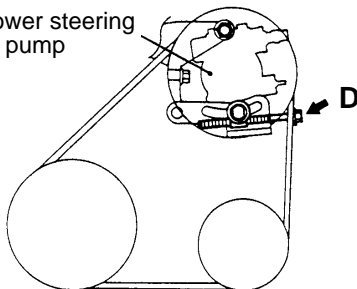
Caution

Check after turning the crankshaft once or more clockwise (right turn).



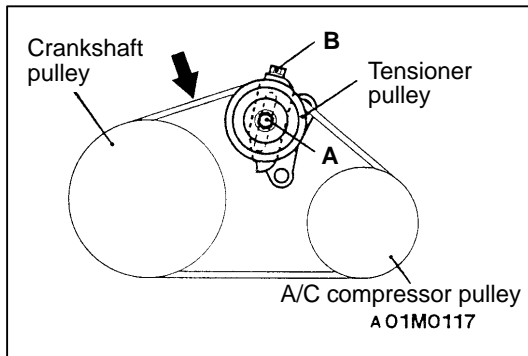
01M0042

Power steering
oil pump



01M0033

00004503



AIR CONDITIONER COMPRESSOR DRIVE BELT TENSION CHECK AND ADJUSTMENT

1. Use a belt tension gauge to check that the belt tension is at the standard value at a point half-way between the two pulleys (indicated by an arrow in the illustration). In addition, press this section with a force of 98 N and check that the amount of belt deflection is at the standard value.

Standard value:

Items	When checked	When a used belt is intalled	When a new belt is installed
Tension N	392 – 588	441 – 539	637 – 833
Deflection (Reference value) mm	4.6 – 6.2	5.0 – 5.7	3.4 – 4.3

2. If the tension or deflection is outside the standard value, adjust by the following procedure.
 - (1) Loosen tensioner pulley fixing nut A.
 - (2) Adjust the amount of belt deflection using adjusting bolt B.
 - (3) Tighten fixing nut A.

Tightening torque: 25 Nm

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

Caution

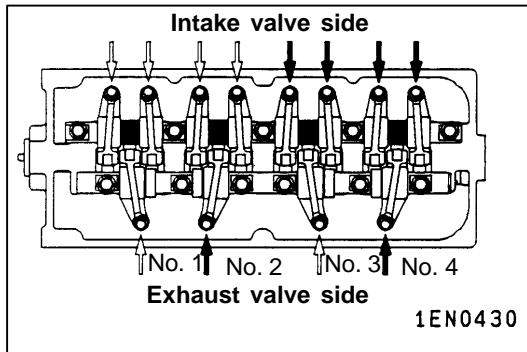
Check after turning the crankshaft once or more clockwise (right turn).

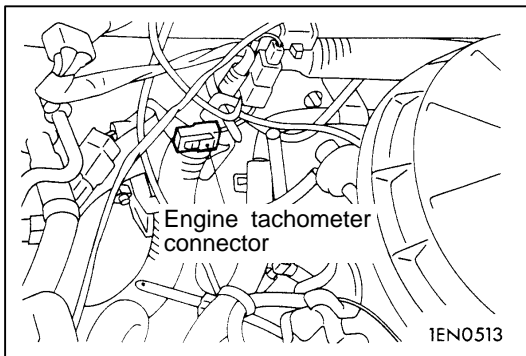
VALVE CLEARANCE CHECK AND ADJUSTMENT

1. Start the engine and allow it to warm up until the engine coolant temperature reaches 80 to 95°C.
2. Remove all spark plugs from the cylinder head for easy inspection.
3. Remove the rocker cover.
4. Turn the crankshaft clockwise until the notch on the pulley is lined up with the "T" mark on the timing indicator.
5. Move the rocker arms on the No. 1 and No. 4 cylinders up and down by hand to determine which cylinder has its piston at the top dead centre on the compression stroke. If both intake and exhaust valve rocker arms have a valve lash, the piston in the cylinder corresponding to these rocker arms is at the top dead centre on the compression stroke.
6. Valve clearance inspection and adjustment can be performed on rocker arms indicated by white arrow mark when the No. 1 cylinder piston is at the top dead centre on the compression stroke, and on rocker arms indicated by black arrow mark when the No. 4 cylinder piston is at the top dead centre on the compression stroke.
7. Measure the valve clearance.
If the valve clearance is not as specified, loosen the rocker arm lock nut and adjust the clearance using a thickness gauge while turning the adjusting screw.

Standard value (hot engine):**Intake valve: 0.20 mm****Exhaust valve: 0.25 mm**

8. While holding the adjusting screw with a screwdriver to prevent it from turning, tighten the lock nut to the specified torque.
9. Turn the crankshaft through 360° to line up the notch on the crankshaft pulley with the "T" mark on the timing indicator.
10. Repeat steps (7) and (8) on other valves for clearance adjustment.
11. Install the rocker cover.
12. Install the spark plugs and tighten to the specified torque.

Tightening torque: 25 Nm



IGNITION TIMING CHECK AND ADJUSTMENT <Vehicles without high altitude compensation system>

1. Before inspection, set the vehicle to the pre-inspection condition.
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.
4. Set up a timing light.
5. Start the engine and run it at idle.
6. Check that engine speed is at 600 – 100 r/min.
7. Check that basic ignition timing is within the standard value.

Standard value:

<4G13> 6° BTDC $\pm 2^{\circ}$

<4G15> 4° BTDC $\pm 2^{\circ}$

8. If not within the standard value loosen distributor mounting bolt and adjust by rotating distributor body.

Caution

If the problem for knocking occurs when petrol with an octane rating of 87 – 89 RON is used, it can be handled by retarding the basic ignition timing by about 2 degrees.

However, the basic ignition timing can be retarded only if exhaust emission regulations have not been established.

9. Tighten the mounting bolt after adjusting.

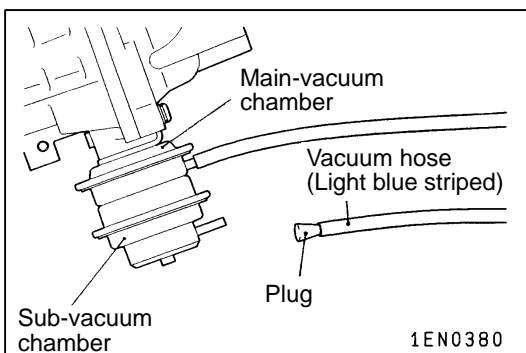
Tightening torque: 12 Nm

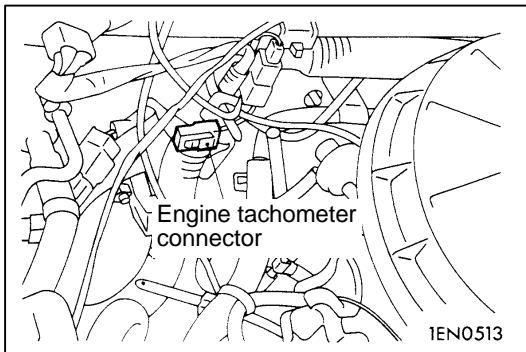
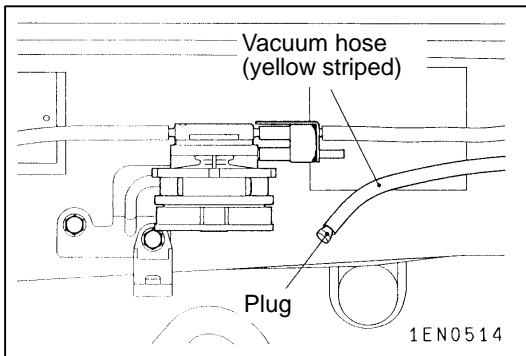
IGNITION TIMING CHECK AND ADJUSTMENT <Vehicles with high altitude compensation system>

NOTE

The altitude will not have any effect on ignition timing inspection and adjustment procedures.

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Disconnect the vacuum hose (light blue striped) from the sub-vacuum chamber of the distributor, and then plug the end of the vacuum hose.





3. Disconnect the vacuum hose (yellow stripe) from the high altitude compensator, and then plug the end of the vacuum hose.

4. Insert a paper clip from the harness side into the 1 pin connector as shown in the illustration at left.
5. Connect a primary voltage-detection type of tachometer to the paper clip.
6. Set up a timing light.
7. Start the engine and run it at idle.
8. Check that engine speed is at 600 – 1000 r/min.
9. Check that basic ignition timing is within the standard value.

Standard value:

<4G13> 6° BTDC \pm 2°

<4G15> 4° BTDC \pm 2°

10. If not within the standard value loosen distributor mounting bolt and adjust by rotating distributor body.

Caution

If the problem for knocking occurs when gasoline with an octane rating of 87 – 89 RON is used, it can be handled by retarding the basic ignition timing by about 2 degrees.

However, the basic ignition timing can be retarded only if exhaust emission regulations have not been established.

11. Tighten the mounting bolt after adjusting.

Tightening torque: 12 Nm

12. Connect a hand vacuum pump to the nipple of the sub-vacuum chamber, and then apply a vacuum of more than 12 kPa.
13. Check that ignition timing is at the standard value at this time.

Standard value:

<4G13> 14° BTDC \pm 4°

<4G15> 12° BTDC \pm 4°

14. Remove the hand vacuum pump, and connect the vacuum hose to the sub-vacuum chamber.

IDLE SPEED AND MIXTURE CHECK AND ADJUSTMENT <Vehicles without high altitude compensation system>

NOTE

- The main jet has been set accurately at factory. Do not disturb the setting unnecessarily.
- If the carburettor has been overhauled or the suction piston, suction chamber sub assembly, etc. including the metering needle have been replaced, or if the main jet has been moved, adjust the idle speed and CO contents <Adjustment procedures when the main jet requires adjustment>.

Caution

Check and adjust with the air cleaner in position.

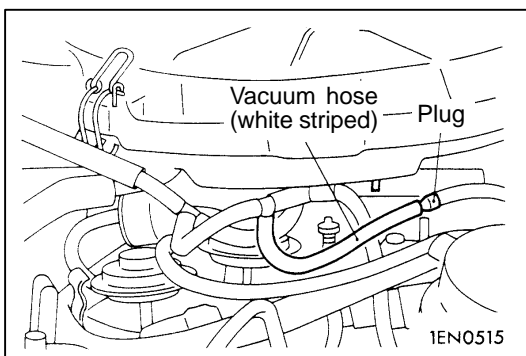
1. Before inspection, set the vehicle to the pre-inspection condition.
2. Set up a timing light and tachometer.
3. Start the engine and run it at idle.
4. Check the basic ignition timing. Adjust if necessary.

Standard value:

<4G13> 6° BTDC $\pm 2^{\circ}$

<4G15> 4° BTDC $\pm 2^{\circ}$

5. Set up a CO tester.



6. Disconnect the vacuum hose (white stripe) from the idle compensator, and then plug the end of the vacuum hose.
7. Allow to idle for three minutes or more.
8. When the CO tester reading has stabilized, check the idle speed and CO contents.

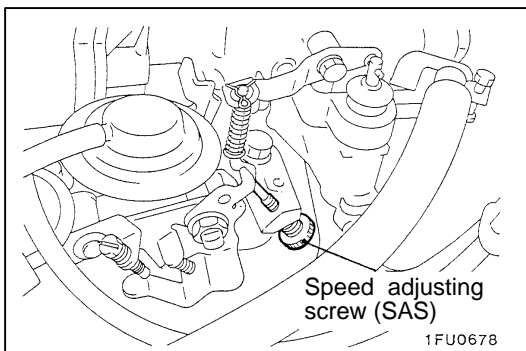
Standard value:

Idle speed

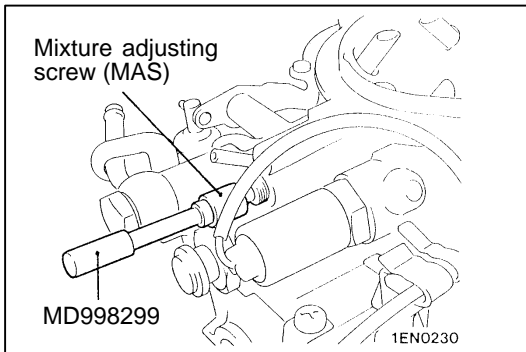
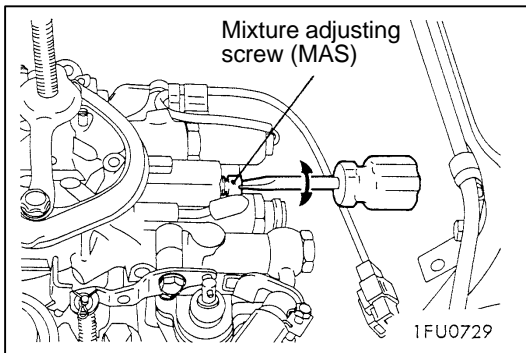
<M/T> 800 ± 50 r/min

<A/T> 850 ± 50 r/min

CO contents $1.5 \pm 0.5\%$



9. If outside the standard value, adjust the idle speed and CO contents by turning the speed adjusting screw (SAS) and the mixture adjusting screw (MAS).

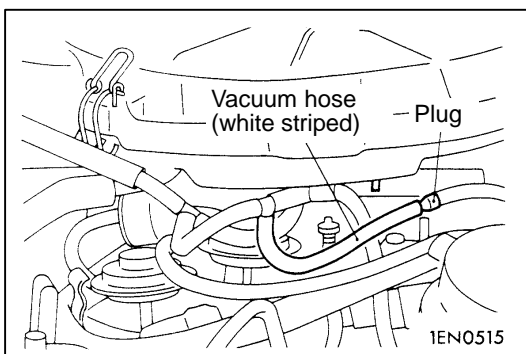


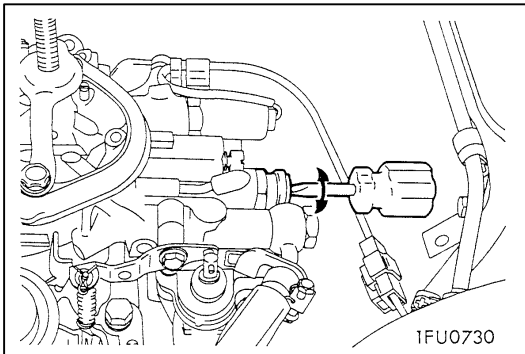
NOTE

The carburettor for GCC vehicles is equipped with an idle limiter cap. For such carburettors, the special tool (MAS driver) is necessary for CO contents adjustment.

<Adjustment procedures when the main jet requires adjustment>

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Set up a timing light and tachometer.
3. Start the engine and run it at idle.
4. Check the basic ignition timing. Adjust if necessary.
5. Set up a CO tester.
6. Disconnect the vacuum hose (white stripe) from the idle compensator, and then plug the end of the vacuum hose.
7. Operate the throttle to adjust the engine speed 3500 r/min.





8. Turn the main jet adjusting screw to adjust CO contents to the standard value.

Standard value: $0.7 \pm 0.2\%$

NOTE

CO contents decreases by turning the main jet adjusting screw clockwise. CO contents increases by turning the main jet adjusting screw anticlockwise.

9. Allow to idle for three minutes or more.
10. When the CO tester reading has stabilized, check the idle speed and CO contents.

Standard value:

Idle speed

<M/T> 800 ± 50 r/min

<A/T> 850 ± 50 r/min

CO contents $1.5 \pm 0.5\%$

11. If outside the standard value, adjust the idle speed and CO contents by turning the speed adjusting screw (SAS) and the mixture adjusting screw (MAS).

IDLE SPEED AND MIXTURE CHECK AND ADJUSTMENT <Vehicles with high altitude compensation system>

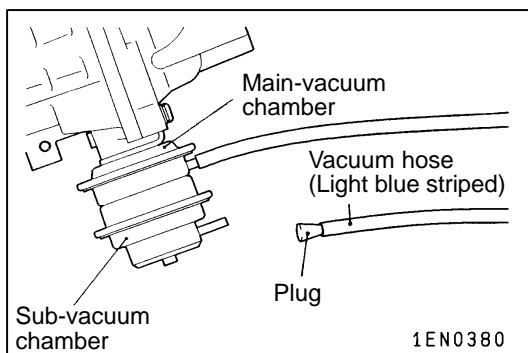
NOTE

- The main jet has been set accurately at factory. Do not disturb the setting unnecessarily.
- If the carburettor has been overhauled or the suction piston, suction chamber sub assembly, etc. including the metering needle have been replaced, or if the main jet has been moved, adjust the idle speed and CO contents <Adjustment procedures when the main jet requires adjustment>.

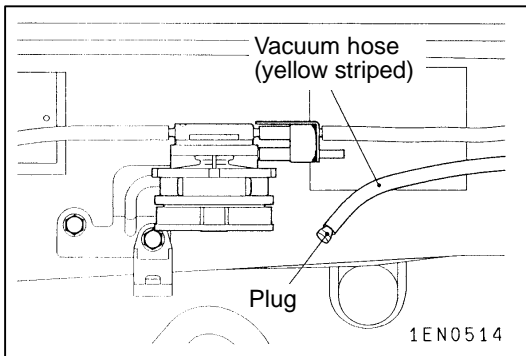
Caution

Check and adjust with the air cleaner in position.

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Set up a timing light and tachometer.



3. Disconnect the vacuum hose (light blue stripe) from the sub-vacuum chamber of the distributor, and then plug the end of the vacuum hose.



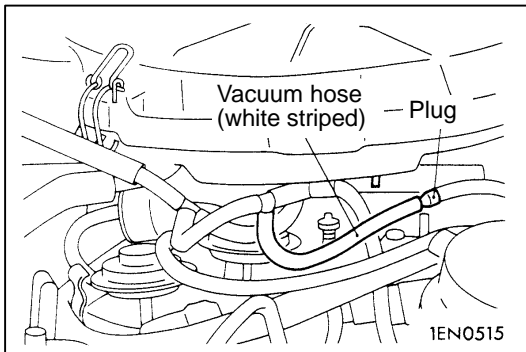
4. Disconnect the vacuum hose (yellow stripe) from the high altitude compensator, and then plug the end of the vacuum hose.
5. Start the engine and run it at idle.
6. Check the basic ignition timing. Adjust if necessary.

Standard value:

<4G13> 6° BTDC $\pm 2^{\circ}$

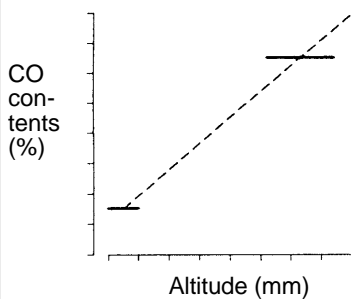
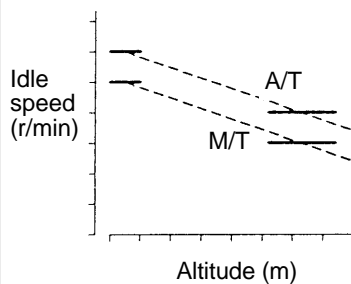
<4G15> 4° BTDC $\pm 2^{\circ}$

7. Set up a CO tester.



8. Disconnect the vacuum hose (white stripe) from the idle compensator, and then plug the end of the vacuum hose.
9. Allow to idle for three minutes or more.

GRAPH 1 --- Compensation guides
— Standard value



1EN0382

10. When the CO tester reading has stabilized, check the idle speed and CO contents.

Standard value:
Idle speed

At 0 – 500 m above sea level

<M/T> 850 ± 50 r/min

<A/T> 900 ± 50 r/min

At 2600 – 3700 m above sea level

<M/T> 750 ± 50 r/min

<A/T> 800 ± 50 r/min

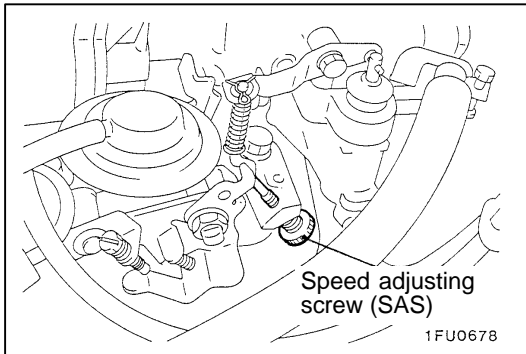
CO contents

At 0 – 500 m above sea level $1.5 \pm 0.5\%$

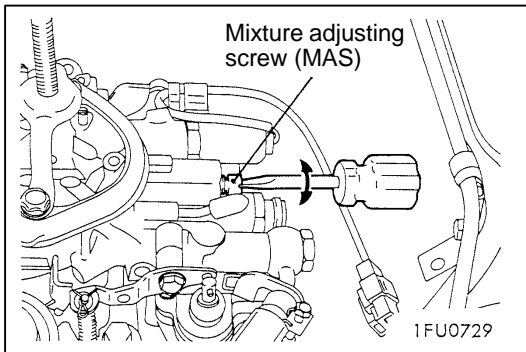
At 2600 – 3700 m above sea level $6.5 \pm 0.5\%$
NOTE

When the idle speed and CO contents are inspected and adjusted in places which are not at altitudes listed above, compensation will be necessary so that they are within the standard value range when measuring them at specified altitude.

Refer to the graph 1 at left for a guide to how much compensation to add.

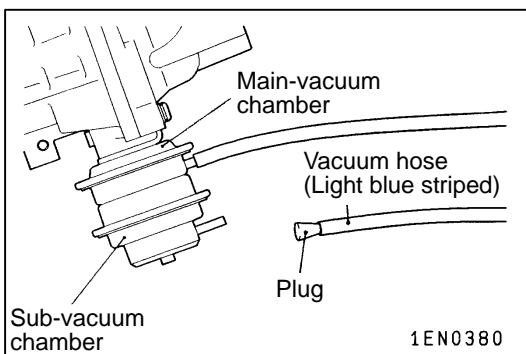


11. If outside the standard value, adjust the idle speed and CO contents by turning the speed adjusting screw (SAS) and the mixture adjusting screw (MAS).

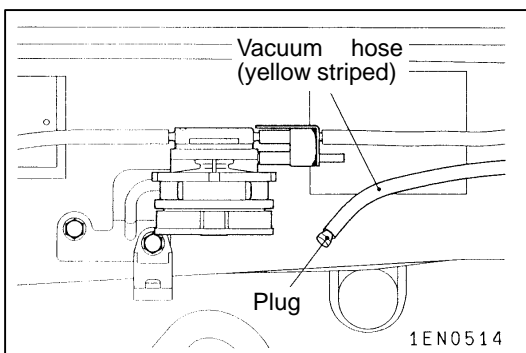


<Adjustment procedures when the main jet requires adjustment>

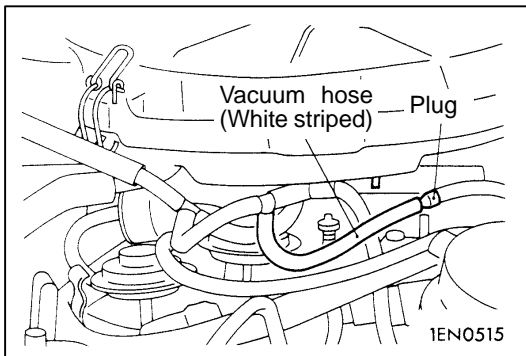
1. Before inspection, set the vehicle to the pre-inspection condition.
2. Set up a timing light and tachometer.



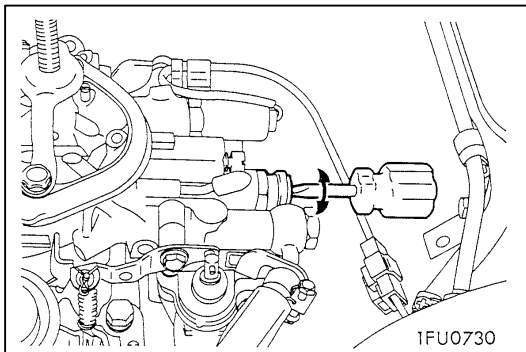
3. Disconnect the vacuum hose (light blue stripe) from the sub-vacuum chamber of the distributor, and then plug the end of the vacuum hose.



4. Disconnect the vacuum hose (yellow stripe) from the high altitude compensator, and then plug the end of the vacuum hose.,
5. Start the engine and run it at idle.
6. Check the basic ignition timing. Adjust if necessary.
7. Set up a CO tester.



8. Disconnect the vacuum hose (white stripe) from the idle compensator, and then plug the end of the vacuum hose.
9. Operate the throttle to adjust the engine speed 3500 r/min.

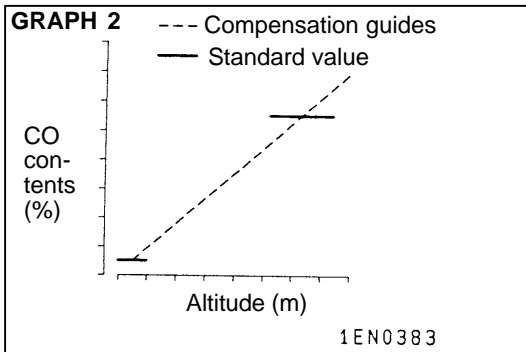


10. Turn the main jet adjusting screw to adjust CO contents to the standard value.

Standard value:

At 0 – 500 m above sea level $0.7 \pm 0.2\%$

At 2600 – 3700 m above sea level $5.5 \pm 0.2\%$



NOTE

- CO contents decreases by turning the main jet adjusting screw clockwise. CO contents increases by turning the main jet adjusting screw anticlockwise.
- When the adjustment is performed in places which are not at altitudes listed above, compensation will be necessary.

Refer to the graph 2 at left for a guide to how much compensation to add.

11. Allow to idle for three minutes or more.
12. When the CO tester reading has stabilized, check the idle speed and CO contents.

Standard value:

Idle speed

At 0 – 500 m above sea level

<M/T> 850 ± 50 r/min

<A/T> 900 ± 50 r/min

At 2600 – 3700 m above sea level

<M/T> 750 ± 50 r/min

<A/T> 800 ± 50 r/min

CO contents

At 0 – 500 m above sea level $1.5 \pm 0.5\%$

At 2600 – 3700 m above sea level $6.5 \pm 0.5\%$

NOTE

When the idle speed and CO contents are inspected and adjusted in places which are not at altitudes listed above, compensation will be necessary so that they are within the standard value range when measuring them at specified altitude.

Refer to [graph 1](#) for a guide to how much compensation to add.

13. If outside the standard value, adjust the idle speed and CO contents by turning the speed adjusting screw (SAS) and the mixture adjusting screw (MAS).

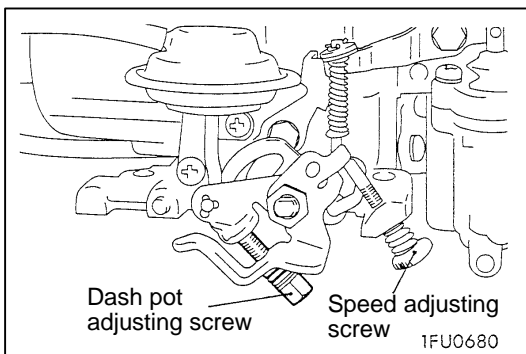
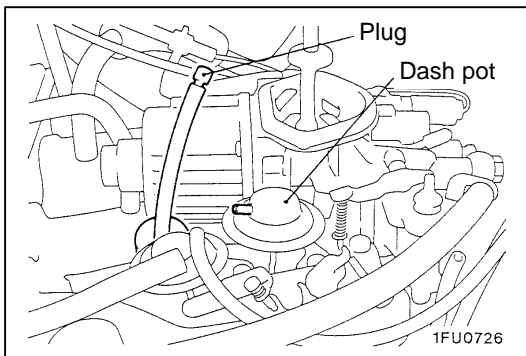
DASH POST CHECK AND ADJUSTMENT

NOTE

Check that the idle speed and the idle mixture are at the specified values.

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Set up a tachometer.
3. Start the engine and run it at idle.
4. Disconnect the vacuum hose from the dash pot and plug the hose end.
5. Increase the engine speed initially to 3500 r/min and then slowly reduce the speed.
6. Check the engine speed (touch speed) at which the engine speed is maintained.

Standard value: 1200 \pm 200 r/min



7. If outside the standard value, adjust the touch speed by turning the dash pot adjusting screw.
8. Unplug the vacuum hose and connect it to the dash pot nipple.
9. Increase the engine speed to 3500 r/min and hold the throttle valve as it is.
10. Measure the time from when the throttle valve is released to when the engine speed drops to the check point speed (dash pot operating time).

Standard value:

Check point speed 1000 r/min

Dash pot operating time 2 – 4 seconds

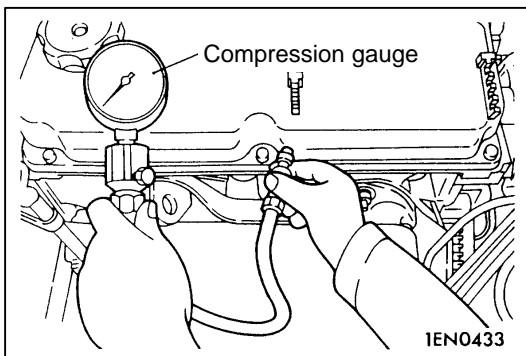
11. If the dash pot operating time is out of standard, adjust it to within the standard limits by increasing or decreasing the touch speed within the standard tolerance.

COMPRESSION PRESSURE CHECK

1. Before inspection, check that the engine oil, starter and battery are normal. In addition, set the vehicle to the pre-inspection condition.
2. Disconnect the spark plug cables.
3. Remove all of the spark plugs.
4. Disconnect the distributor 2-pin connector.
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 (at engine speed of 250–400 r/min):

<4G13> 1,226 kPa

<4G15> 1,177 kPa

Limit (at engine speed of 250–400 r/min):

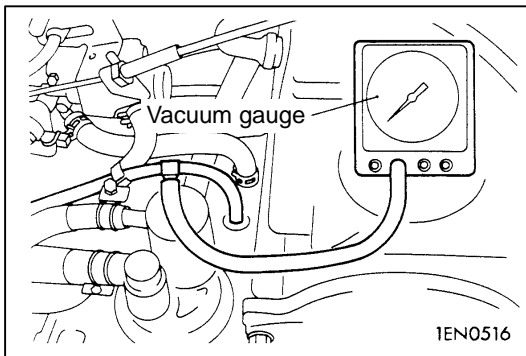
<4G13> min. 863 kPa

<4G15> min. 824 kPa

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

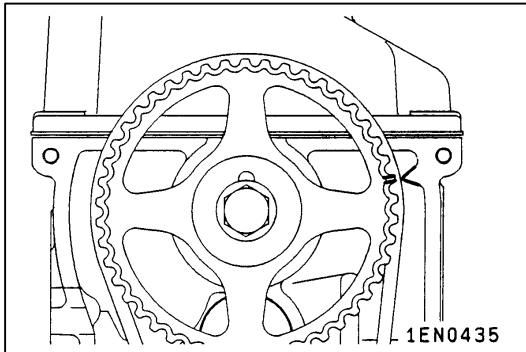
9. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps (7) and (8).
 - (1) If the compression increases after oil is added, the cause of the malfunction is a worn 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 and spark plug cables.



MANIFOLD VACUUM CHECK

1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 to 95°C.
2. Connect a tachometer.
3. Use a three-way union to install a vacuum gauge to the shown nipple on the intake manifold.
4. Start the engine and check that idle speed is within specification. Then read off the vacuum gauge.

Standard value: min. 60 kPa



TIMING BELT TENSION ADJUSTMENT

1. Remove the timing belt upper cover.
2. Turn the crankshaft clockwise to set the No. 1 cylinder to top dead compression centre.

Caution

As the purpose of this procedure is to apply the proper amount of tension to the timing belt by means of the cam drive torque, be sure not to rotate the crankshaft in the opposite direction.

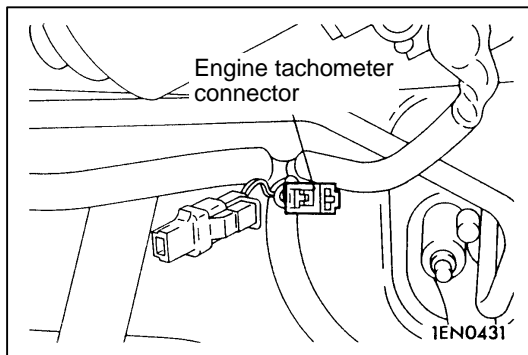
3. Remove the access cover.
4. Loosen the timing belt tensioner fixing bolt to apply tension to the belt by means of the force of the tensioner spring.

Caution

The bolt can be loosened 90°–180°.

If the belt is loosened more than necessary, the bolt may fall in side the cover.

5. Tighten the timing belt tensioner fixing bolt.
6. Install the access cover.
7. Install the timing belt upper cover.

ON-VEHICLE SERVICE <MPI>**DRIVE BELT TENSION CHECK AND ADJUSTMENT****ALTERNATOR DRIVE BELT TENSION CHECK****POWER STEERING OIL PUMP AND AIR
CONDITIONER COMPRESSOR DRIVE BELT TENSION
CHECK AND ADJUSTMENT****AIR CONDITIONER COMPRESSOR DRIVE BELT
TENSION CHECK AND ADJUSTMENT****VALVE CLEARANCE CHECK AND ADJUSTMENT****IGNITION TIMING CHECK AND ADJUSTMENT**

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Insert a paper clip from the harness side into the 1 pin connector as shown.
3. Connect a primary voltage-detection type of tachometer to the paper clip.

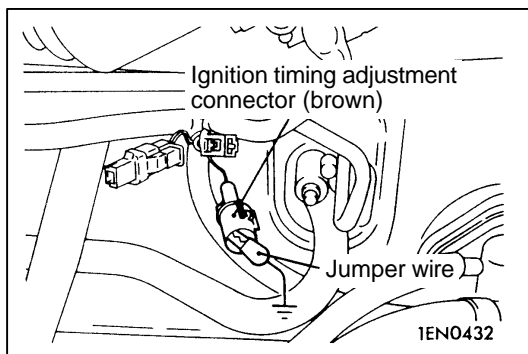
NOTE

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 it at idle.
6. Check that engine idle speed is within the standard value.

Standard value: 750±100 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 $\pm 2^{\circ}$

12. If not within the standard value, loosen distributor mounting bolt and adjust by rotating distributor body.
13. Tighten mounting bolt 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 $\pm 7^{\circ}$, even under normal operating.
2. And it is automatically further advanced by about 5° from 10° BTDC at higher altitudes.

IDLE SPEED CHECK

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Check the basic ignition timing. Adjust if necessary.

Standard value: 5° BTDC $\pm 2^{\circ}$

3. After turning the ignition switch to OFF, install a tachometer or connect the MUT-II.
4. Start the engine and run it at idle.
5. Run the engine at idle for 2 minutes.
6. Check the idle speed. Select item No. 22 and take a reading of the idle speed.

Curb idle speed: 750 \pm 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 CHECK

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Check that the basic ignition timing is within the standard value.

Standard value: 5° BTDC $\pm 2^{\circ}$

3. Turn the ignition switch to OFF, and install a tachometer or 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 at idle.

Standard value:**CO contents: 0.5% 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
 - Evaporative emission control system
 - Compression pressure

NOTE

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

COMPRESSION PRESSURE CHECK

1. Before inspection, check that the engine oil, starter and battery are normal. In addition, set the vehicle to the pre-inspection condition.
2. Disconnect the spark plug cables.
3. Remove all of the spark plugs.
4. Disconnect the distributor 7-pin connector.

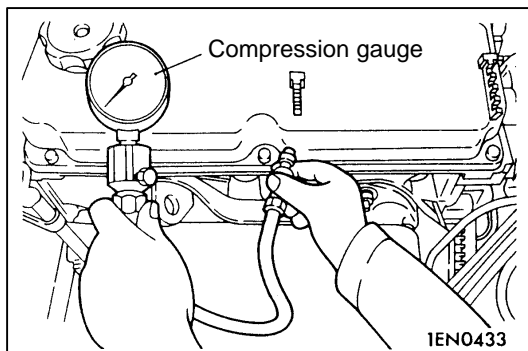
NOTE

Doing this will prevent the engine-ECU from carrying 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 (at engine speed of 250–400 r/min):
1,226 kPa

Limit (at engine speed of 250–400 r/min):
min. 863 kPa

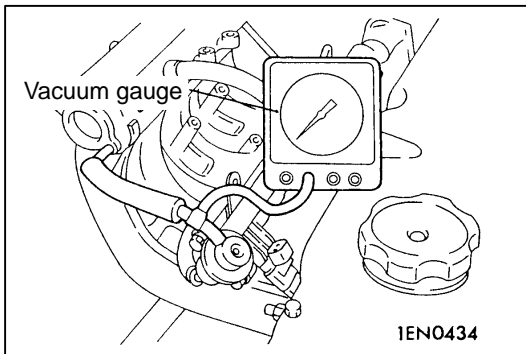
8. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

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

NOTE

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



MANIFOLD VACUUM CHECK

1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 to 95°C.
2. Connect a tachometer.
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 specification. Then read off the vacuum gauge.

Standard value: min. 60 kPa

TIMING BELT TENSION ADJUSTMENT

CRANKSHAFT PULLEY

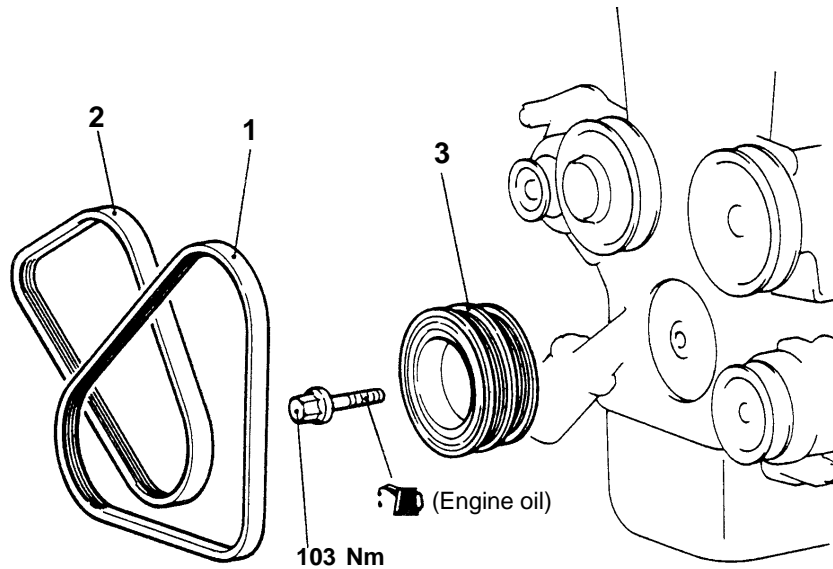
REMOVAL AND INSTALLATION

Pre-removal Operation

- Under Cover Removal

Post-installation Operation

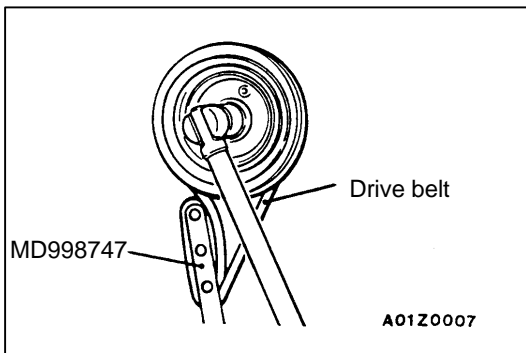
- [Drive Belt Tension Adjustment](#)
- Under Cover Installation



A01M0022

Removal steps

1. Drive belt (Power steering and A/C)
2. Drive belt (Alternator)
3. Crankshaft pulley



REMOVAL SERVICE POINT

◀A▶ CRANKSHAFT PULLEY REMOVAL

Caution

1. This drive belt will get damaged. Do not use the engine's drive belt.
2. Never use a damaged drive belt.

INSTALLATION SERVICE POINT

▶A◀ CRANKSHAFT PULLEY INSTALLATION

When installing the crankshaft bolt, apply the minimum amount of engine oil to the bearing surface and thread of the bolt.

Caution

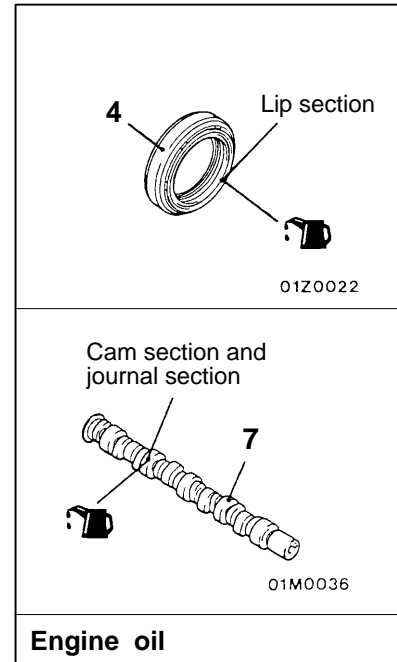
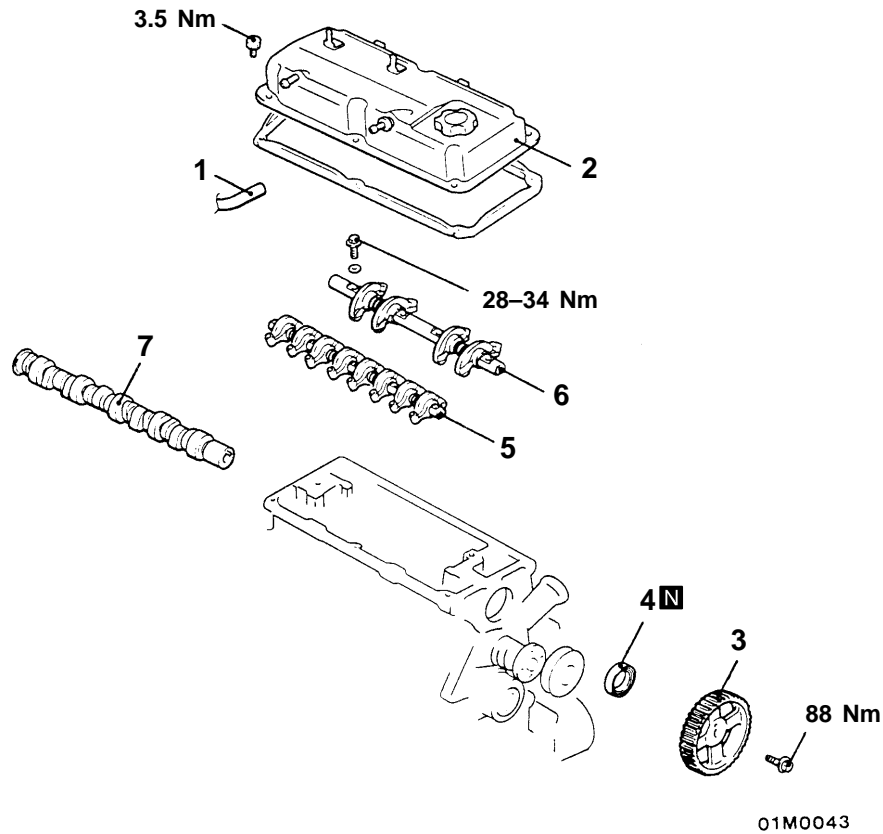
1. This drive belt will get damaged. Do not use the engine's drive belt.
2. Never use a damaged drive belt.

CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

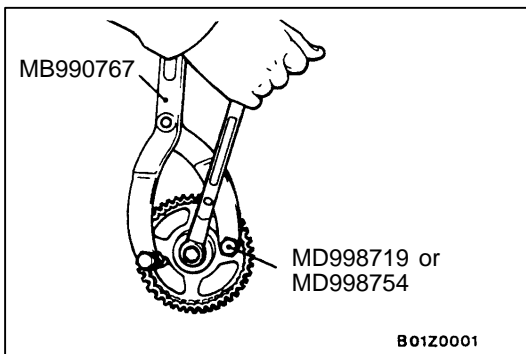
- Air Cleaner Removal and Installation
- [Distributor Removal and Installation](#)
- [Timing Belt Removal and Installation](#)



Removal steps

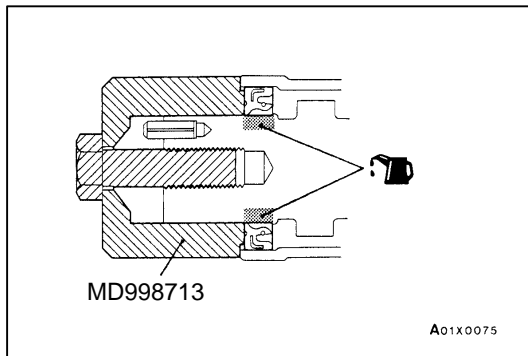
1. PCV hose connection
2. Rocker cover
 - [Valve clearance adjustment](#)
3. Camshaft sprocket
4. Camshaft oil seal

5. Rocker arm and shaft assembly (intake side)
6. Rocker arm and shaft assembly (exhaust side)
7. Camshaft



REMOVAL SERVICE POINT

◀A▶ CAMSHAFT SPROCKET REMOVAL



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

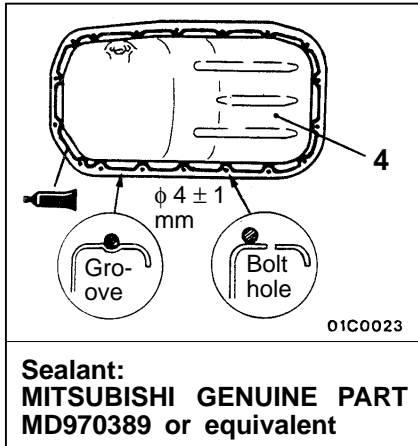
Use the special tool to stop the camshaft sprocket from turning in the same way as was done during removal, and then tighten the bolts to the specified torque.

OIL PAN

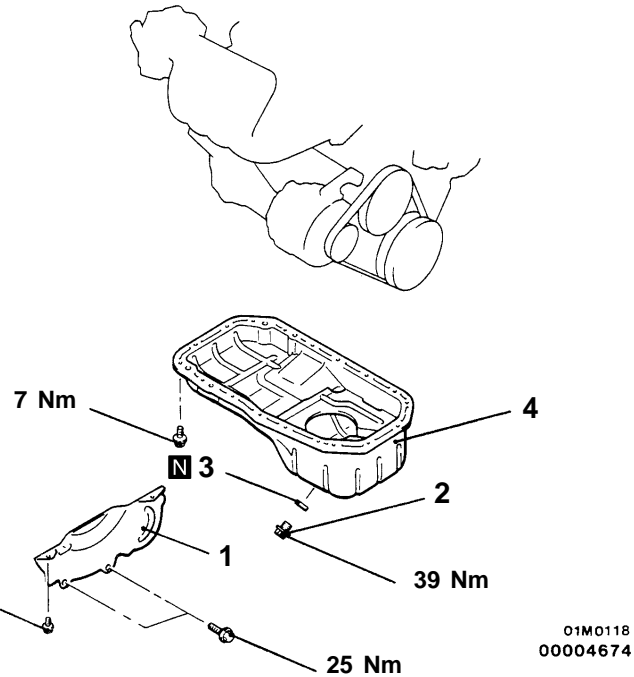
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Engine Oil Draining and Supplying
- Oil Level Gauge Removal and Installation
- Front Exhaust Pipe Removal and Installation



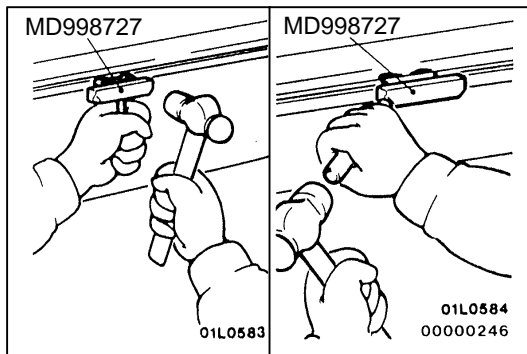
9 Nm <Bolt and washer assembled>
10 Nm <Flange bolt>



Removal steps

1. Bell housing cover
2. Drain plug

3. Drain plug gasket
4. Oil pan



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.

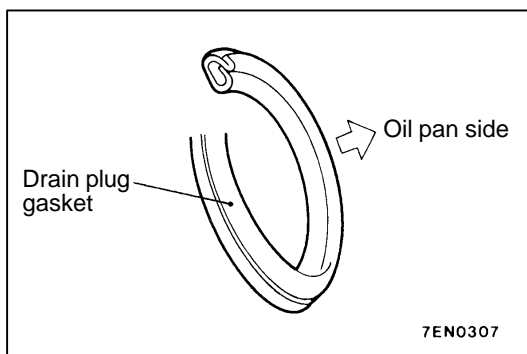
Caution

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

INSTALLATION SERVICE POINT

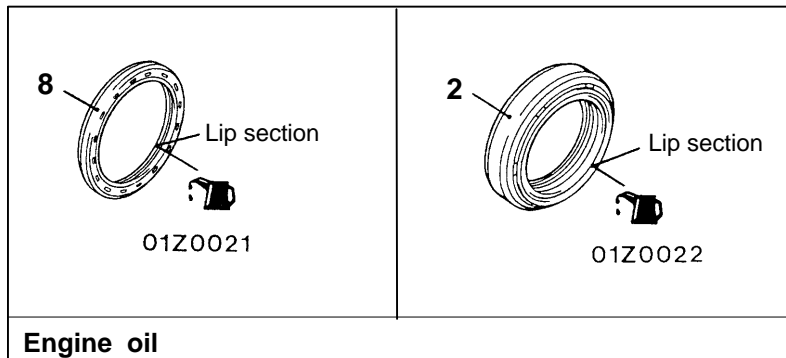
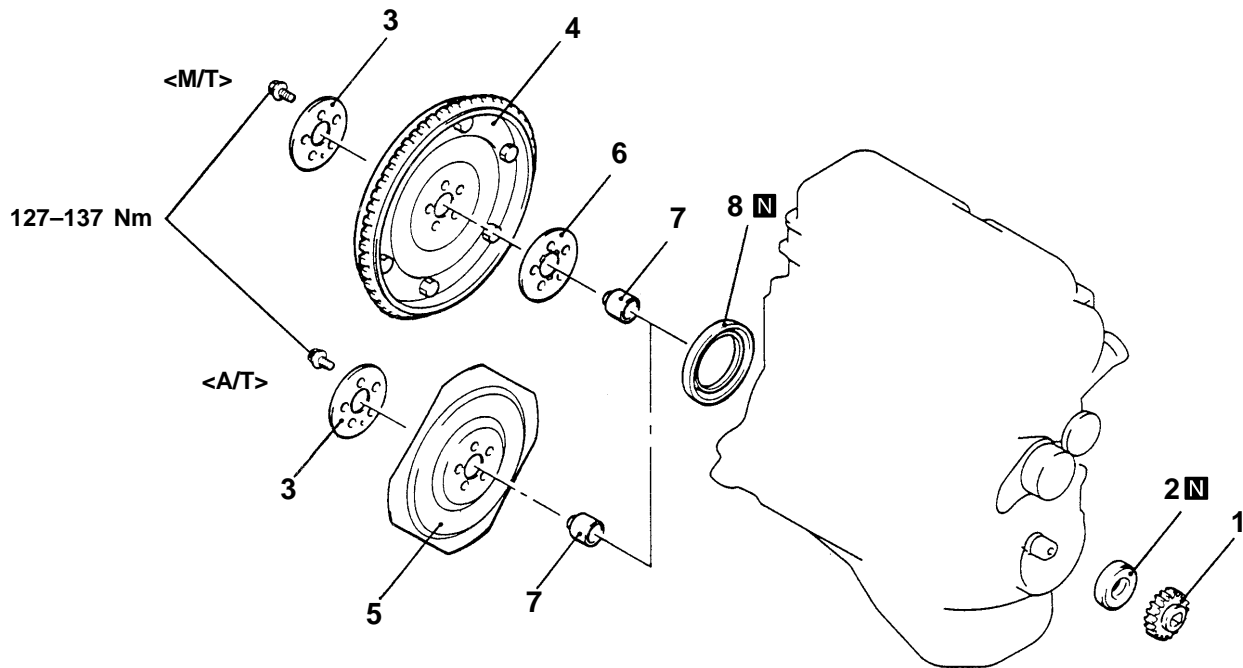
▶A◀ DRAIN PLUG GASKET INSTALLATION

Install the drain plug gasket in the direction so that it faces as shown in the illustration.



CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION



01M0026
00004506

Crankshaft front oil seal removal steps

- Timing belt



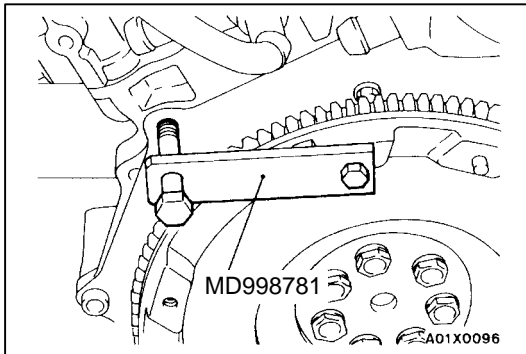
1. Crankshaft sprocket
2. Crankshaft front oil seal



Crankshaft rear oil seal removal steps

- Transmission assembly
- Clutch cover and disc <M/T>

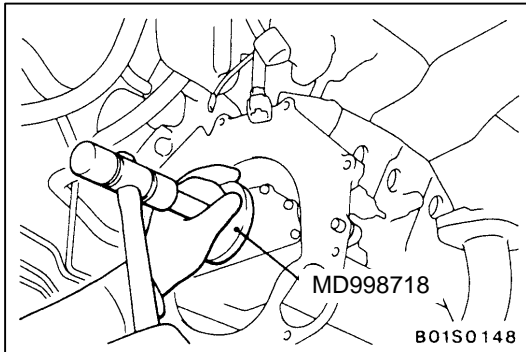
3. Adapter plate
4. Flywheel <M/T>
5. Drive plate <A/T>
6. Adapter plate <M/T>
7. Crankshaft bushing <A/T>
8. Crankshaft rear oil seal



REMOVAL SERVICE POINT

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

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



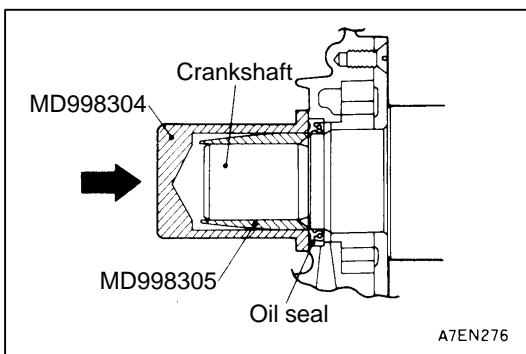
INSTALLATION SERVICE POINTS

▶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 show in the illustration.

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

Use the special tool to hold the flywheel or drive plate in the same manner as removal, and install the bolt.



▶C◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION

1. Apply a small amount of engine oil to the entire circumference of the oil seal lip.
2. Tap the oil seal unit it is flush with the oil seal case.

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

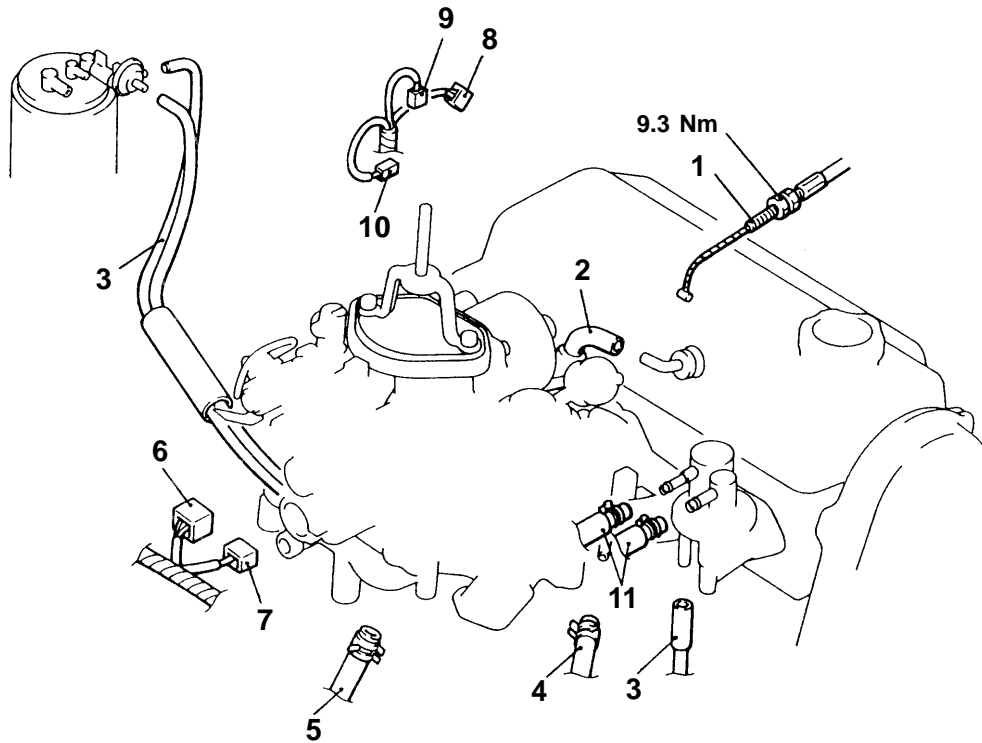
<Carburettor>

Pre-removal Operation

- Engine Oil Draining
- Thermostat Case Assembly Removal

Post-installation Operation

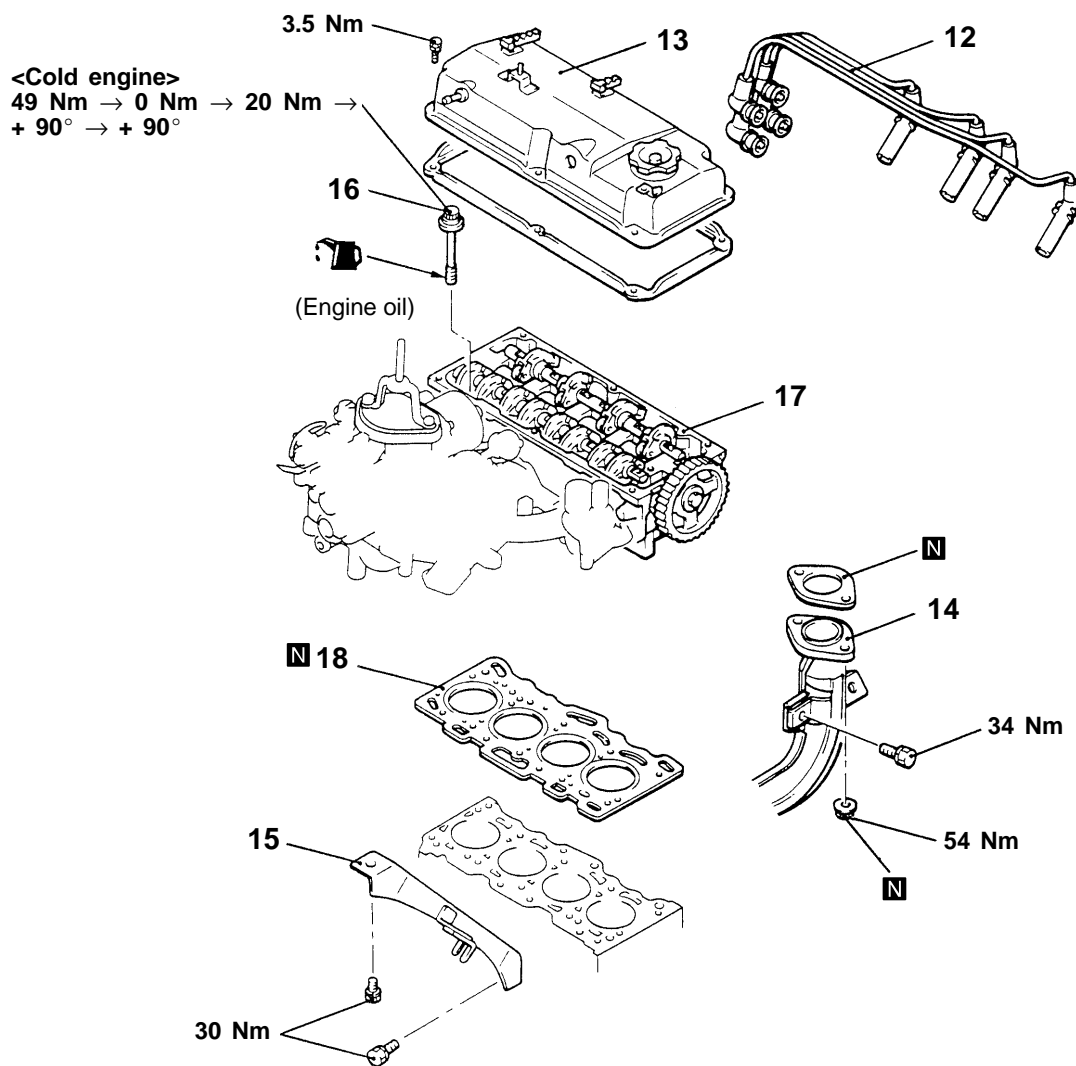
- Thermostat Case Assembly Installation
- Engine Oil Supplying
- Accelerator Cable Adjustment



A01M0125

Removal steps

1. Accelerator cable connection
2. PCV hose
3. Vacuum hose connection
4. Brake booster vacuum hose connection
5. Water hose connection
6. Throttle position sensor connector <A/T>
7. Fuel cut solenoid valve connector
8. Distributor connector
9. Engine coolant temperature gauge unit connector
10. Engine coolant temperature sensor connector <A/T>
11. Fuel hose connector



A01M0124

- 12. Spark plug cables
- 13. Rocker cover
- Timing belt
- 14. Front exhaust pipe connection

- 15. Intake manifold stay
- 16. Cylinder head bolts
- 17. Cylinder head
- 18. Cylinder head gasket

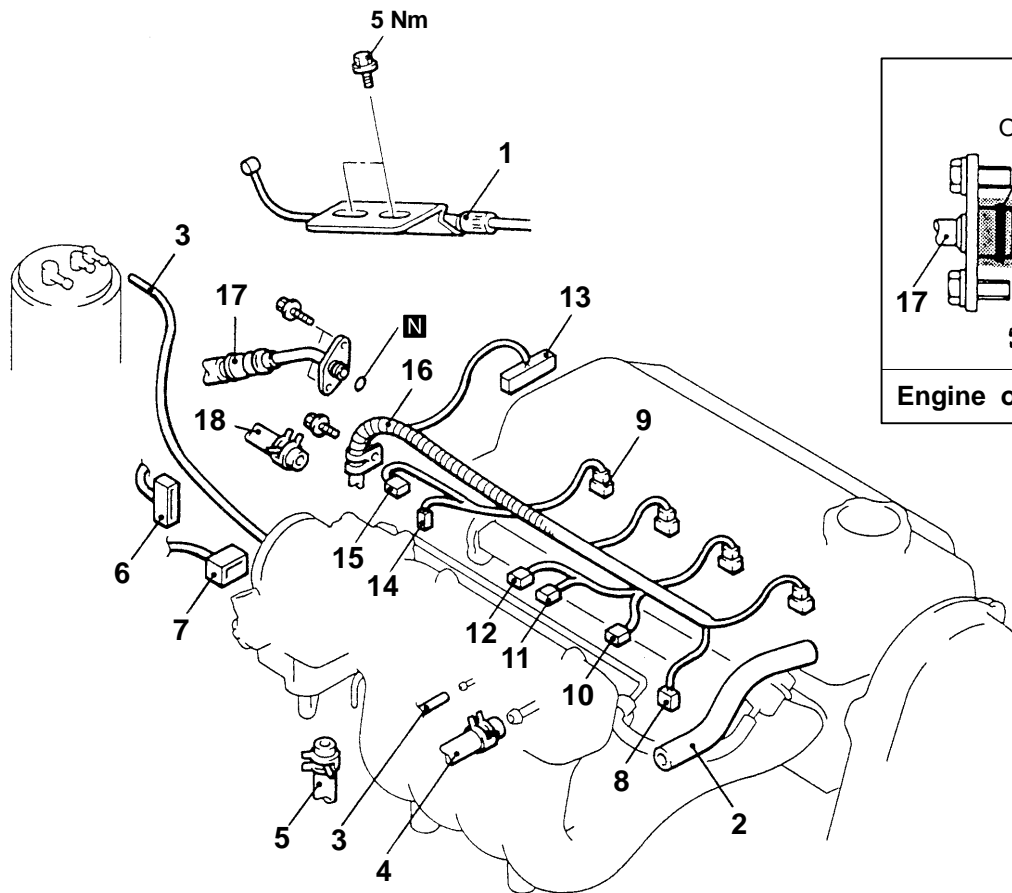
<MPI>

Pre-removal Operation

- Fuel Discharge Prevention
- Engine Oil Draining
- Thermostat Case Assembly Removal

Post-installation Operation

- Thermostat Case Assembly Installation
- Engine Oil Supplying
- Accelerator Cable Adjustment



01M0041

00004507

Removal steps

1. Accelerator cable connection
2. PCV hose
3. Vacuum hose connection
4. Brake booster vacuum hose connection
5. Water hose connection
6. Throttle position sensor connector
7. Idle speed control connector
8. Oxygen sensor connector
9. Injector connector
10. Intake air temperature sensor connector
11. Purge control solenoid valve connector
12. EGR solenoid valve connector
13. Distributor connector
14. Engine coolant temperature gauge unit connector
15. Engine coolant temperature sensor connector
16. Control wiring harness
17. High-pressure fuel hose connection
18. Fuel return hose connection



MAIN

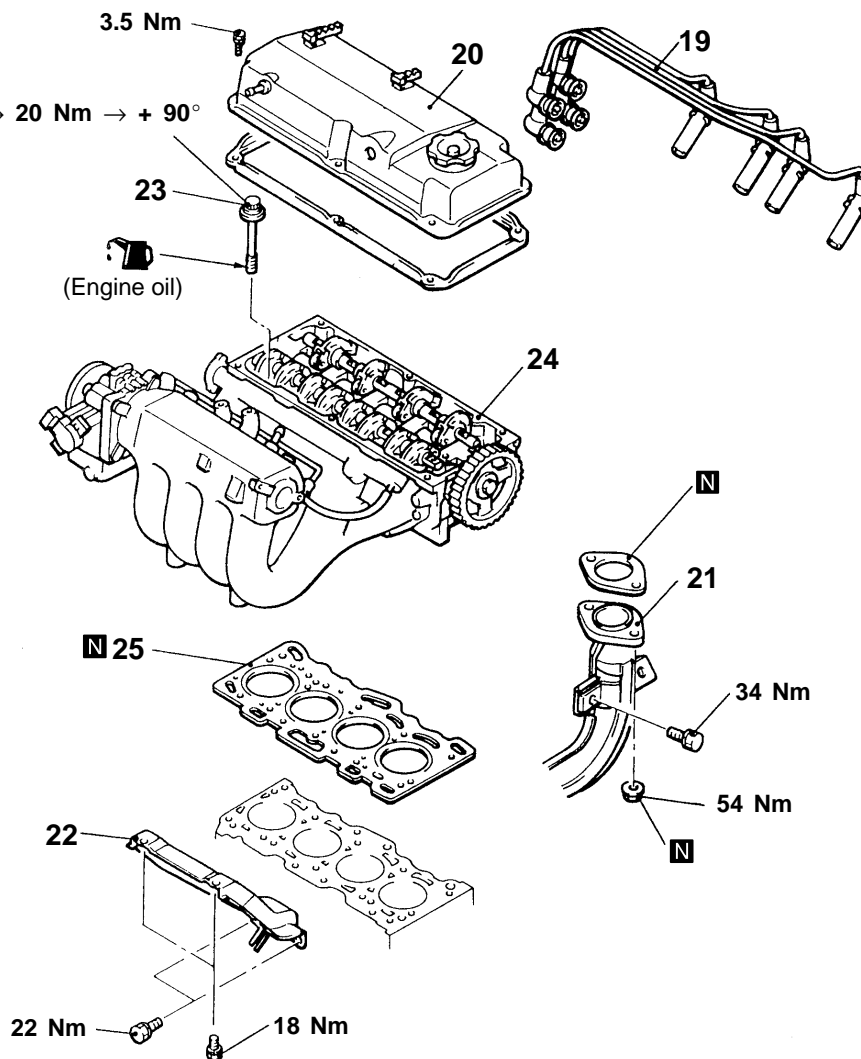
Group
11

4G1
1996

<Cold engine>

49 Nm → 0 Nm → 20 Nm → + 90°

→ + 90°



A01M0038

19. Spark plug cables

20. Rocker cover

• Timing belt

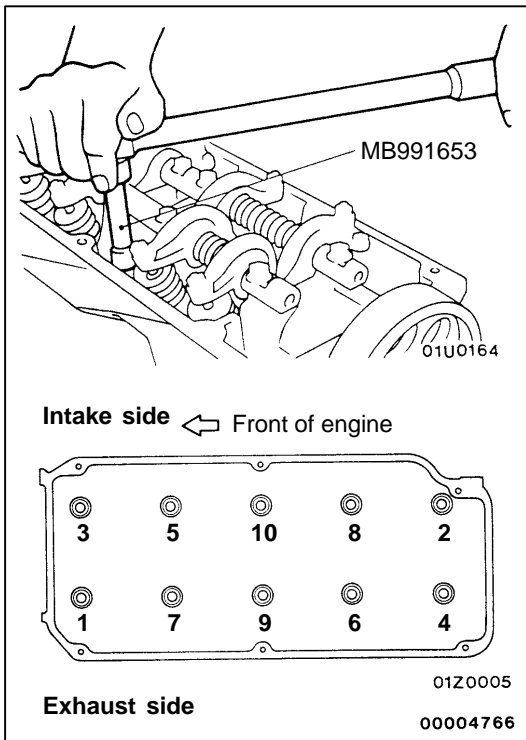
21. Front exhaust pipe connection

22. Intake manifold stay

23. Cylinder head bolts

24. Cylinder head

25. Cylinder head gasket



REMOVAL SERVICE POINT

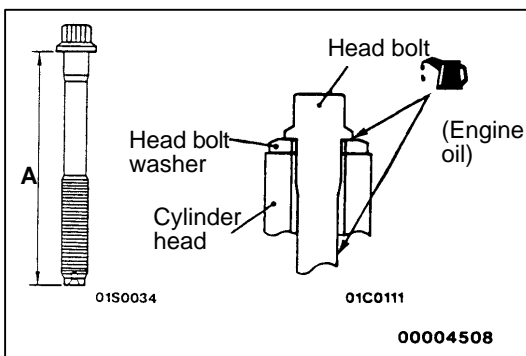
◀A▶ CYLINDER HEAD BOLT REMOVAL

Using the special tool, loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.

INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

1. Wipe off all oil and grease from the gasket mounting surface.
2. Install so that the shapes of the cylinder head holes match the shapes of the respective cylinder head gasket holes.

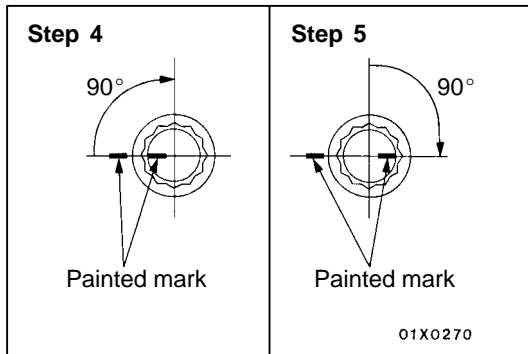
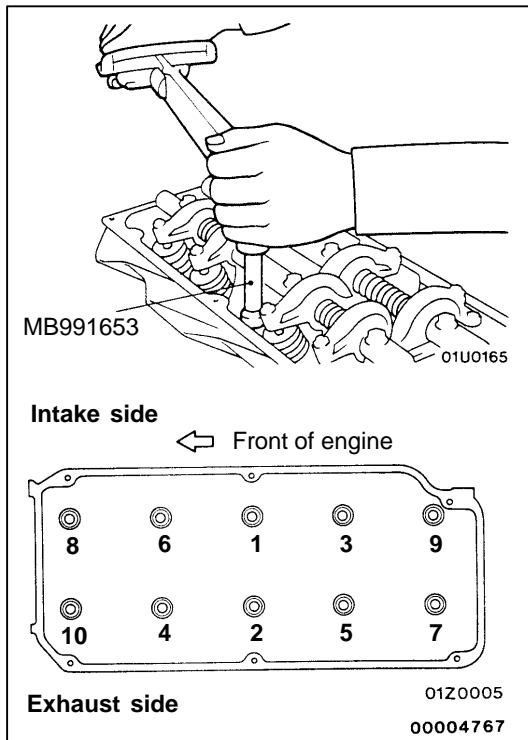


▶B◀ CYLINDER HEAD BOLT INSTALLATION

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): 103.2 mm

2. The head bolt washer should be installed with the burred side caused by tapping out facing upwards.



- Using the special tool, tighten the bolts by the following procedure.

Step	Operation	Remarks
1	Tighten to 49 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 90° of a turn.	In the order shown in the illustration. Mark the head of the cylinder head bolt and cylinder head by paint.
5	Tighten 90° of a turn.	In the order shown in the illustration. Check that the painted mark of the head bolt is lined up with that of the cylinder head.

Caution

- Always make a tightening angle just 90°. If it is less than 90°, the head bolt will be loosened.
- If it is more than 90°, remove the head bolt and repeat the procedure from step 1.

►C◄ HIGH-PRESSURE FUEL HOSE INSTALLATION

- Apply a small amount of new engine oil to the O-ring.

Caution

Do not let any engine oil get into the delivery pipe.

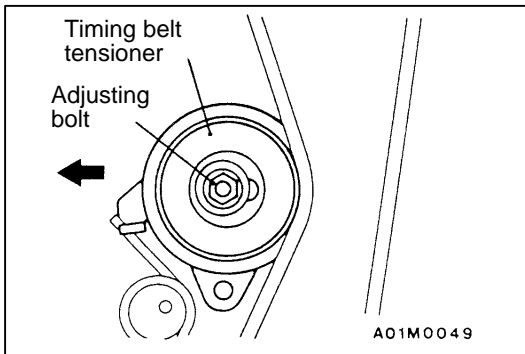
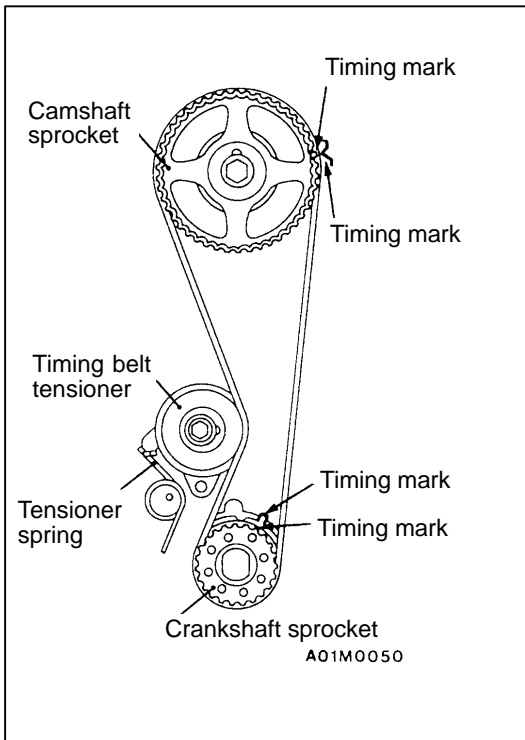
- While turning the high-pressure fuel hose to the right and left, install delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
- If the hose does not turn smoothly, the O-ring is probably being clamped. Disconnect the high-pressure fuel hose and check the O-ring for damage. After this, re-insert the delivery pipe and check that the hose turns smoothly.

◀B▶ TIMING BELT REMOVAL

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

Caution

The crankshaft should always be turned only clockwise.



2. Loosen the adjusting bolt.
3. Move the timing belt tensioner to the water pump side and temporarily tighten the adjusting bolt so that the tensioner does not return.
4. Remove the timing belt.

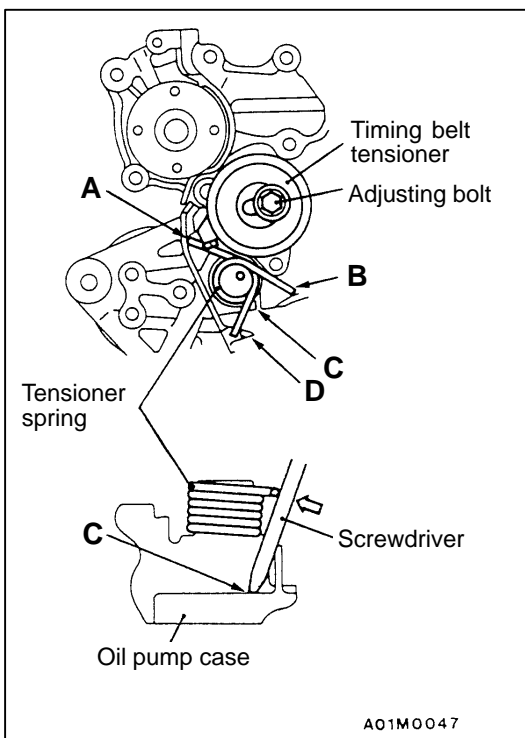
Caution

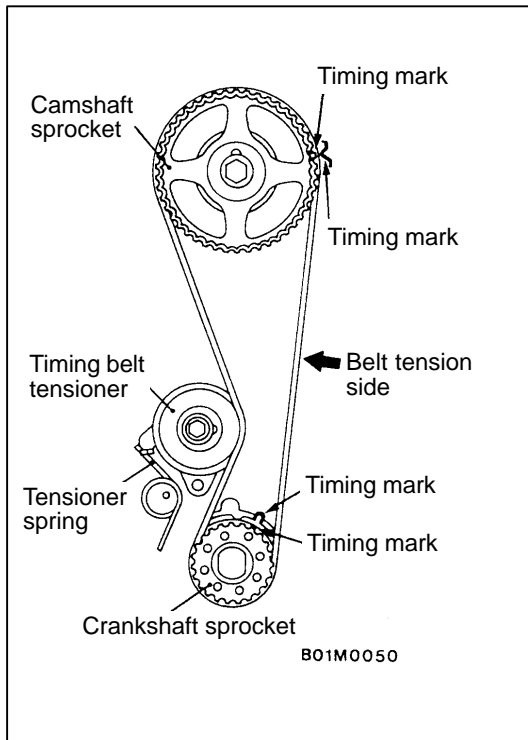
If the timing belt is to be re-used, use chalk to mark the flat side of the belt with an arrow indicating the direction of rotation (right turn).

INSTALLATION SERVICE POINTS

▶A◀ TIMING BELT TENSIONER/TENSIONER SPRING/TIMING BELT INSTALLATION

1. Put the protrusion of the timing belt tensioner on the end (A) of the tensioner spring as shown.
2. Move the timing belt tensioner close to the water pump, and temporarily tighten the adjusting bolt.
3. Put a screwdriver in (C), push the protrusion (B) of the tensioner spring in the shown direction, and place it on the stopper (D) of the oil pump case.

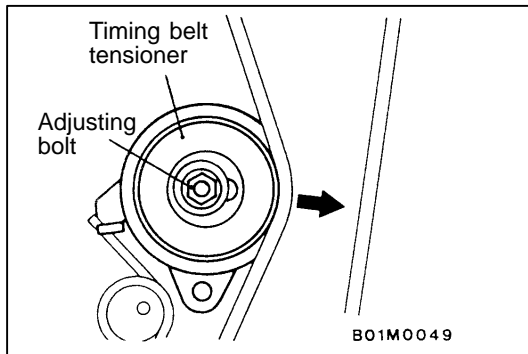




4. Align each of the camshaft sprocket and the crankshaft sprocket timing marks.
5. Install the timing belt in the following order, while making sure that the tension side of the belt is not slackened.
 - (1) Crankshaft sprocket
 - (2) Camshaft sprocket
 - (3) Tensioner pulley

Caution

After installing the timing belt, apply force to turn the camshaft sprocket in the reverse direction, and recheck to be sure that the belt is fully tensioned and that each timing mark is in the proper position.



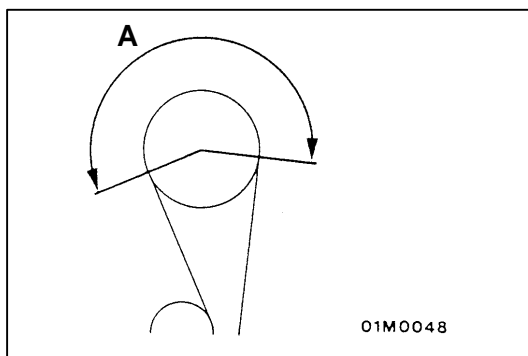
►B◄ TIMING BELT TENSION ADJUSTMENT

1. Initially loosen the adjusting bolt of the timing belt tensioner fixed to the water pump side by 1/2 – 1/4 turn, and use the force of the tensioner spring to apply tension to the belt.
2. Turn the crankshaft in the proper rotation direction (right turn) for two rotations, and recheck to be sure that the timing marks on each sprocket are aligned.

Caution

As the purpose of this procedure is to apply the proper amount of tension to the tension side of the timing belt by using the cam driving torque, turn the crankshaft only by the amount given above. Be sure not to turn the crankshaft in the opposite direction (left turn).

3. After checking to be sure that no belt teeth in the section marked with A are lifted up and that the teeth in each sprocket are engaged, secure the tensioner pulley.



ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

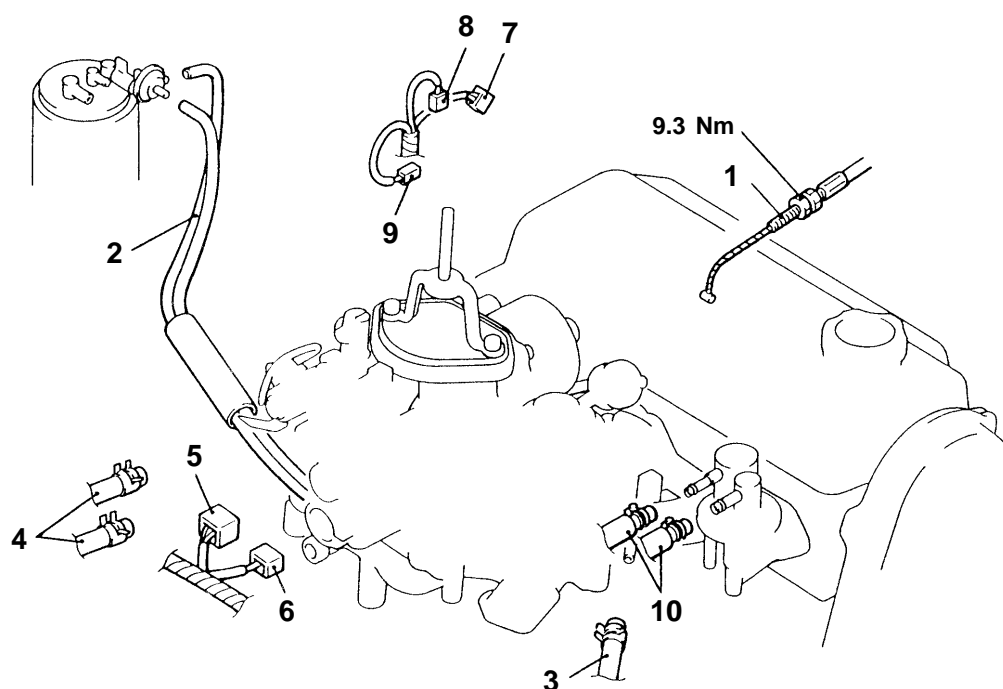
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Pre-removal Operation

- Under Cover Removal
- [Hood Removal](#)
- Air Cleaner Removal
- [Radiator Removal](#)
- [Front Exhaust Pipe Removal](#)

Post-installation Operation

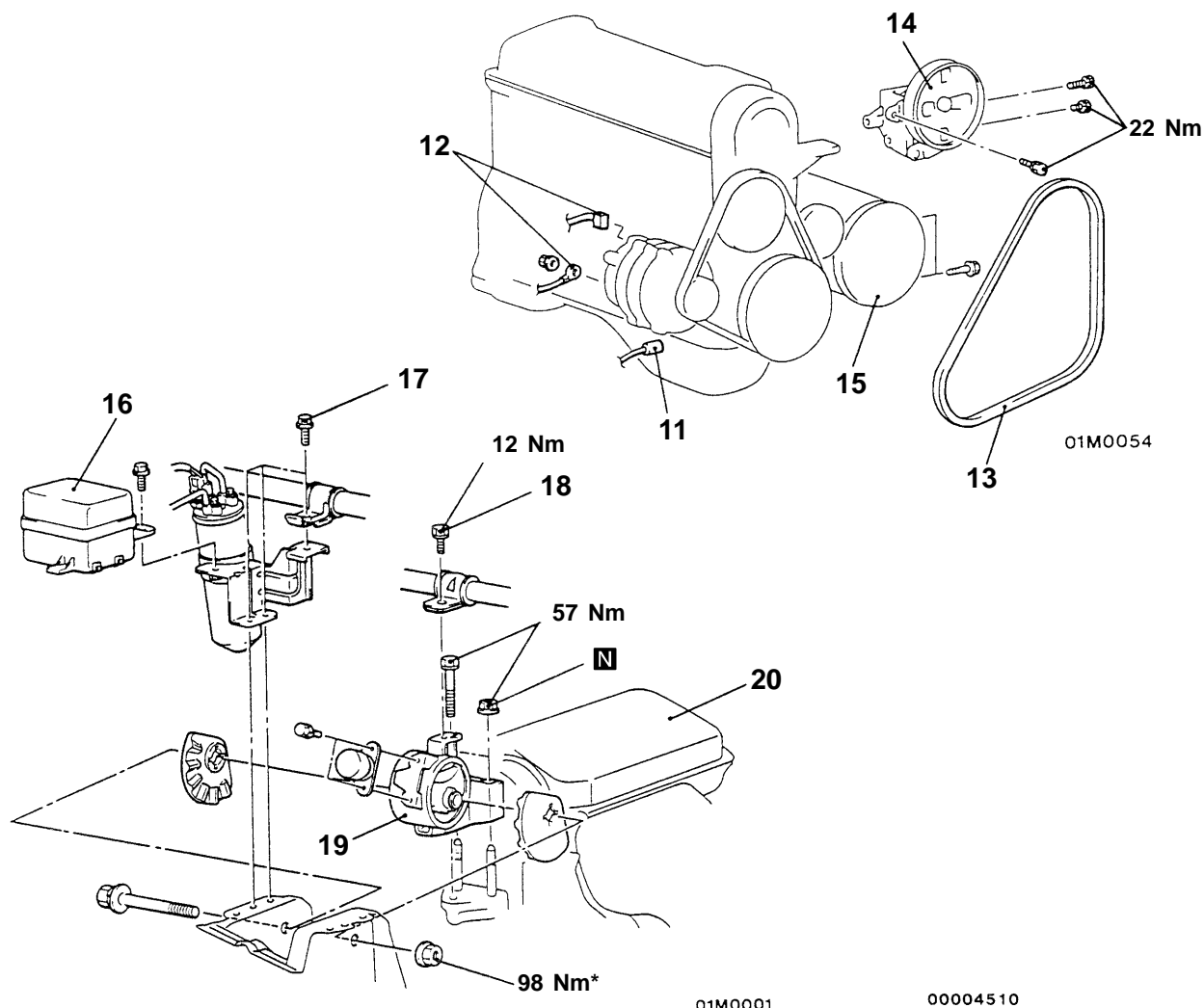
- [Front Exhaust Pipe Installation](#)
- [Radiator Installation](#)
- Air Cleaner Installation
- [Hood Installation](#)
- Under Cover Installation
- [Drive Belt Tension Adjustment](#)
- [Accelerator Cable Adjustment](#)



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Removal steps

1. Accelerator cable connection
2. Vacuum hose connection
3. Brake booster vacuum hose connection
4. Heater hose connection
5. Throttle position sensor connector <A/T>
6. Fuel cut solenoid valve connector
7. Distributor connector
8. Engine coolant temperature gauge unit connector
9. Engine coolant temperature sensor connector <A/T>
10. Fuel hose connection



- 11. Oil pressure switch connector
- 12. Alternator connector
- 13. Drive belt (Power steering and A/C)
- 14. Power steering oil pump and bracket assembly
- 15. Air conditioner compressor
 - Transmission assembly
- 16. Air conditioner relay box
- 17. Air conditioner receiver bracket mounting bolts

- 18. Power steering hose mounting bolt
- 19. Engine mount bracket
- 20. Engine assembly

Caution

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

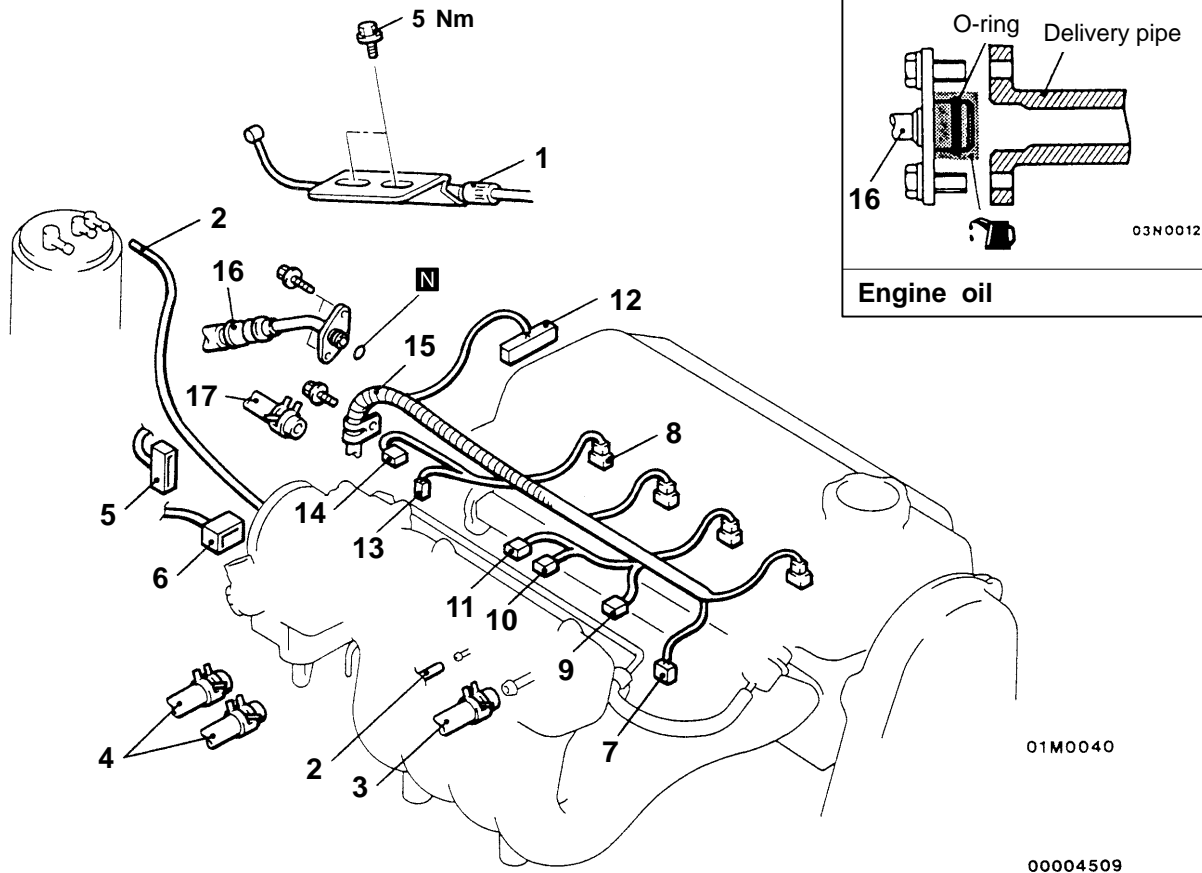
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Pre-removal Operation

- Fuel Discharge Prevention
- Under Cover Removal
- Hood Removal
- Air Cleaner Removal
- Radiator Removal
- Front Exhaust Pipe Removal

Post-installation Operation

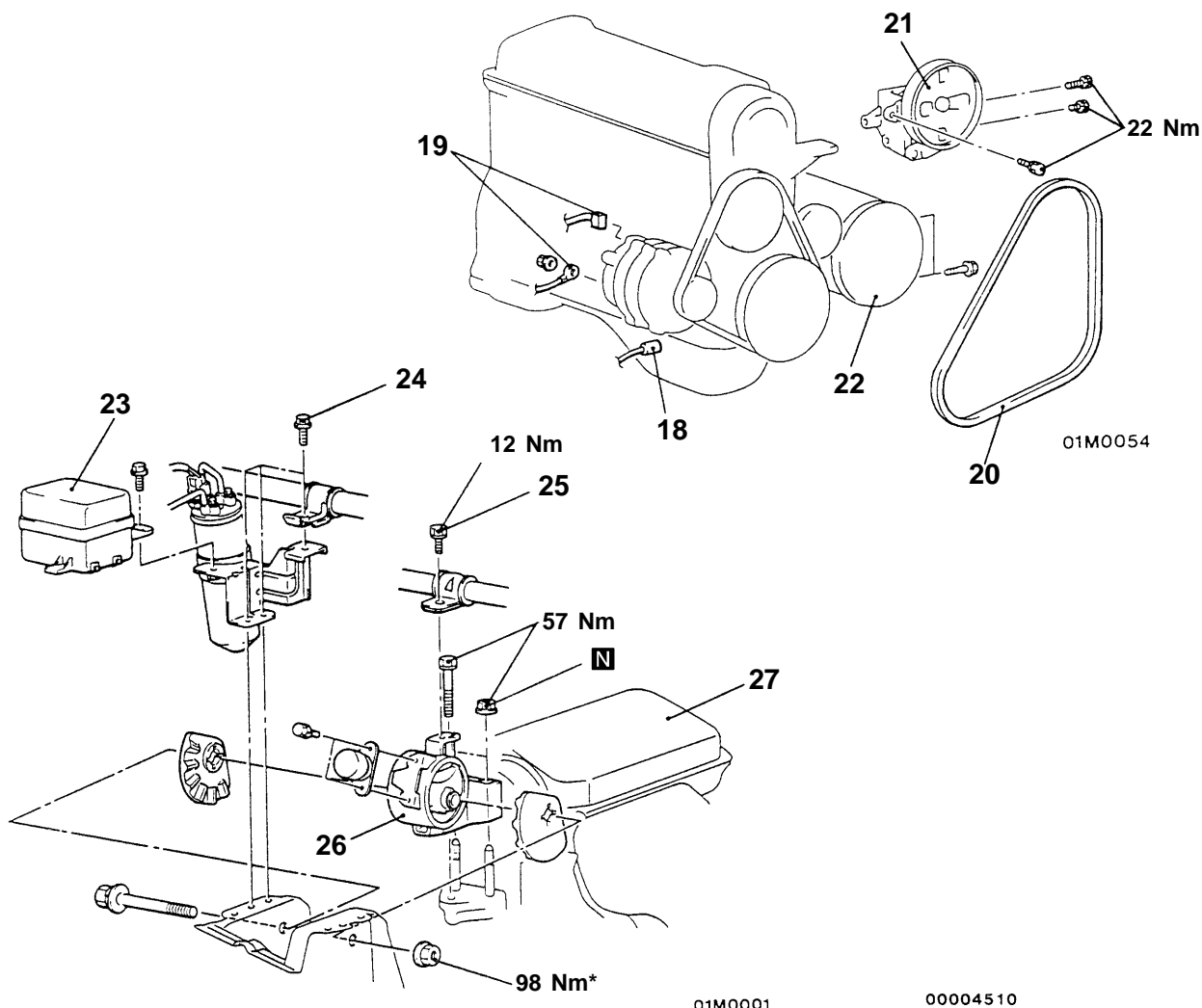
- Front Exhaust Pipe Installation
- Radiator Installation
- Air Cleaner Installation
- Hood Installation
- Under Cover Installation
- Drive Belt Tension Adjustment
- Accelerator Cable Adjustment



Removal steps

1. Accelerator cable connection
2. Vacuum hose connection
3. Brake booster vacuum hose connection
4. Heater hose connection
5. Throttle position sensor connector
6. Idle speed control connector
7. Oxygen sensor connector
8. Injector connector
9. Intake air temperature sensor connector
10. Purge control solenoid valve connector
11. EGR solenoid valve connector
12. Distributor connector
13. Engine coolant temperature gauge unit connector
14. Engine coolant temperature sensor connector
15. Control wiring harness
16. High-pressure fuel hose connection
17. Fuel return hose connection





- 18. Oil pressure switch connector
- 19. Alternator connector
- 20. Drive belt (Power steering and A/C)
- 21. Power steering oil pump and bracket assembly
- 22. Air conditioner compressor
 - Transmission assembly
- 23. Air conditioner relay box
- 24. Air conditioner receiver bracket mounting bolts

- 25. Power steering hose mounting bolt
- 26. Engine mount bracket
- 27. Engine assembly

Caution

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

REMOVAL SERVICE POINTS**◀A▶ POWER STEERING OIL PUMP AND BRACKET ASSEMBLY REMOVAL**

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

NOTE

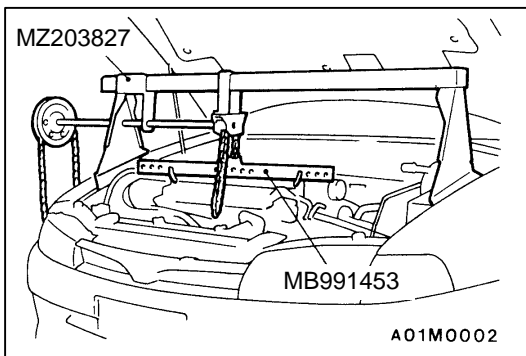
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

◀B▶ A/C COMPRESSOR REMOVAL

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE

Place the removed A/C compressor where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

**◀C▶ ENGINE MOUNT BRACKET REMOVAL**

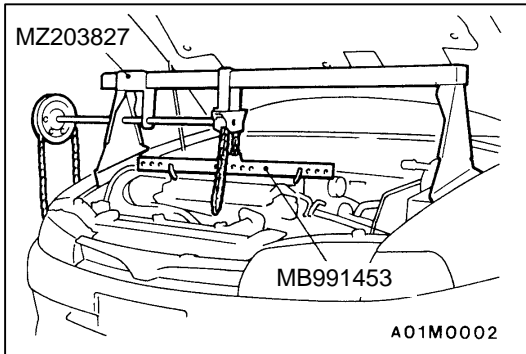
1. Support the engine with a garage jack.
2. Remove the special tool which was attached when the transmission assembly was removed.
3. Hold the engine assembly with a chain block or similar tool.
4. Place a garage jack against the engine oil pan with a piece of wood in between, jack up the engine so that the weight of the engine is no longer being applied to the engine mount bracket, and then remove the engine mount bracket.

◀D▶ ENGINE ASSEMBLY REMOVAL

After checking that all cables, hoses and harness connectors, etc., are disconnected from the engine, lift the chain block slowly to remove the engine assembly upward from the engine compartment.

INSTALLATION SERVICE POINTS**▶A▶ ENGINE ASSEMBLY INSTALLATION**

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



►B◄ ENGINE MOUNT BRACKET INSTALLATION

1. Place a garage jack against the engine oil pan with a piece of wood in between, and install the engine mount bracket while adjusting the position of the engine.
2. Support the engine with the garage jack.
3. Remove the chain block and support the engine assembly with the special tool.

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►C◄ HIGH-PRESSURE FUEL HOSE INSTALLATION

1. Apply a small amount of new engine oil to the O-ring.

Caution

Do not let any engine oil get into the delivery pipe.

2. While turning the fuel high-pressure hose to the right and left, install it to the delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
3. If the hose does not turn smoothly, the O-ring is probably being clamped. Disconnect the high-pressure fuel hose and check the O-ring for damage. After this, re-insert the delivery pipe and check that the hose turns smoothly.