ENGINE

CONTENTS

E11AA-

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ADDED

NOTES

SPECIFICATIONS

GENERAL SPECIFICATIONS

E11CA--

Items		4G93		4D65
		Vehicles with catalytic converter	Vehicles without catalytic converter	
Total displacement	cm^3 (cu. in.)	1,834 (111.9)	1,834 (111.9)	1,796 (109.6)
Bore x Stroke	mm (in.)	81 x 89 (3.19 x 3.50)	81 x 89 (3.19 x 3.50)	80.6 x 88.0 (3.173 x 3.465)
Compression ratio		10.0	9.5	22.2
Firing order		1-3-4-2	1-3-4-2	–
Injection order		–	–	1-3-4-2
Combustion chamber		Pentroof type	Pentroof type	Swirl type
Valve mechanism		Single camshaft	Single camshaft	Single camshaft
Camshaft drive by		Cogged belt	Cogged belt	Cogged belt
Valve timing				
Intake	Open	BTDC 11°	BTDC 18°	BTDC 20°
	Close	ABDC 61°	ABDC 50°	ABDC 48°
Exhaust	Open	BBDC 55°	BBDC 58°	BBDC 54°
	Close	ATDC 17°	ATDC 10°	ATDC 22°
Rocket arm		Roller follower type	Roller follower type	Roller follower type
Lash adjuster		Not-equipped	Not-equipped	Not-equipped

SERVICE SPECIFICATIONS

E11CB--

Items		4G63	4G64	4D68
Total displacement	cm^3 (cu. in.)	1,997 (121.9)	2,350 (143.4)	1,998 (121.9)
Bore x Stroke	mm (in.)	85 x 88 (3.35 x 3.46)	86.5 x 100 (3.41 x 3.94)	82.7 x 93.0 (3.26 x 3.66)
Compression ratio		10.0	9.5	22.4
Firing order		1-3-4-2	1-3-4-2	–
Injection order		–	–	1-3-4-2
Combustion chamber		Pentroof type	Pentroof type	Swirl type
Valve mechanism		Single camshaft	Single camshaft	Single camshaft
Camshaft drive by		Cogged belt	Cogged belt	Cogged belt
Valve timing				
Intake	Open	BTDC 11°	BTDC 18°	BTDC 20°
	Close	ABDC 53°	ABDC 58°	ABDC 48°
Exhaust	Open	BBDC 63°	BBDC 58°	BBDC 54°
	Close	ATDC 21°	ATDC 18°	ATDC 22 °
Rocker arm		Roller follower type	Roller follower type	Roller follower type
Lash adjuster		Equipped	Equipped	Not-equipped

SERVICE SPECIFICATIONS

E11CB--

Items	4G93		4D65	
	Vehicles with catalytic converter	Vehicles without catalytic converter		
Standard value				
Drive belt deflection mm (in.)				
Alternator				
When checked	8.5–12 (0.34–0.47)	8.5–12 (0.34–0.47)	7–10 (0.28–0.39)	
When a new belt installed	7.0–8.5 (0.28–0.34)	7.0–8.5 (0.28–0.34)	–	
When used belt installed	9.5 (0.37)	9.5 (0.37)	–	
Power steering oil pump <Except 4G93 models equipped with air conditioner>				
When a new belt installed	7.5–9.0 (0.295–0.354)	7.5–9.0 (0.295–0.354)	4.5–6.5 (0.177–0.256)	
When used belt installed	9.5–11.5 (0.374–0.453)	9.5–11.5 (0.374–0.453)	6.0–9.0 (0.236–0.354)	
Air conditioner compressor			ⓐ section	ⓑ section
When a new belt installed	5.5–6.0 (0.217–0.236)	5.5–6.0 (0.217–0.236)	6.0–7.0 (0.236–0.276)	4.0–4.5 (0.157–0.177)
When used belt installed	6.8–7.6 (0.268–0.299)	6.8–7.6 (0.268–0.299)	8.0–9.5 (0.315–0.374)	5.0–6.0 (0.197–0.236)
Drive belt tension N (kg, lbs.)				
Power steering oil pump <Vehicle without air conditioner>				
When a new belt installed	650–850 (65–85, 143–187)	650–850 (65–85, 143–187)	–	
When used belt installed	400–600 (40–60, 88–132)	400–600 (40–60, 88–132)	–	
Air conditioner compressor				
When a new belt installed	750–800 (75–80, 165–176)	750–800 (75–80, 165–176)	500–600 (50–60, 110–132)	
When used belt installed	500–630 (50–63, 110–139)	500–630 (50–63, 110–139)	300–400 (30–40, 66–88)	
Basic ignition timing	5° ± 2° BTDC	5° ± 2° BTDC	–	
Injection timing	–	–	7° ATDC	
[Dial gauge reading mm (in.)]			[0.97–1.03 (0.038–0.041)]	
Idle speed r/min.	800 ± 100	700 ± 100	750 ± 100	
Idle mixture	–	1.5 ± 0.5	–	
Compression pressure kPa (kg/cm², psi) (250-400r/min.)	1,450 (14.5, 206)	1,400 (14.0, 199)	2,700 (27, 384)	
Intake manifold vacuum kPa (mmHg, in. Hg)	69 (520, 20)	69 (520, 20)	–	
Valve clearance (at hot) mm (in.)				
Intake	0.20 (0.008)	0.20 (0.008)	0.25 (0.010)	
Exhaust	0.30 (0.012)	0.30 (0.012)	0.25 (0.010)	

Items	4G93		4D65
	Vehicles with catalytic converter	Vehicles without catalytic converter	
Limit			
Compression pressure kPa (kg/cm², psi) (250-400r/min.)	1,040 (10.4, 148)	1,000 (10.0, 142)	1,920 (19.2, 273)
Compression pressure difference of all cylinder kPa (kg/cm², psi)	max. 100 (1.0, 14)	max. 100 (1.0, 14)	300 (3.0, 43)
Nominal length of cylinder head bolt mm(in.)	96.4 (3.795)	96.4 (3.795)	–

Items	4G63, 4G64	4D68	
Standard value			
Drive belt deflection mm (in.)			
Alternator			
When checked	9.0–11.5 (0.35–0.45)	7–10 (0.28–0.39)	
When a new belt installed	7.5–9.0 (0.30–0.35)	–	
When used belt installed	10.0 (0.39)	–	
Power steering oil pump			
When checked	6.0–9.0 (0.24–0.35)	7–10 (0.28–0.39)	
When a new belt installed	–	4.5–6.5 (0.177–0.256)	
When used belt installed	–	6.0–9.0 (0.236–0.354)	
Air conditioner compressor		ⓐ section	ⓑ section
When checked	8.0 (0.31)	–	7.0–8.0 (0.28–0.31)
When a new belt installed	5.0–5.5 (0.20–0.22)	6.0–7.0 (0.236–0.276)	4.0–4.5 (0.157–0.177)
When used belt installed	6.0–7.0 (0.24–0.28)	8.0–9.5 (0.315–0.374)	5.0–6.0 (0.197–0.236)
Drive belt tension N(kg, lbs.)			
Air conditioner compressor			
When a new belt installed	–	500–600 (50–60, 110–132)	
When used belt installed	–	300–400 (30–40, 66–88)	
Basic ignition timing	5° ± 2° BTDC	–	
Injection timing	–	9° ATDC	
[Dial gauge reading mm (in.)]		[0.97–1.03 (0.038–0.041)]	
Idle speed r/min.	800±100	750±100	
Compression pressure kPa (kg/cm², psi) (250-400r/min.)	1,350 (14.0, 199)*1, 1,300 (13.5, 192)*2	3,500 (35.0, 49 8)	
Intake manifold vacuum kPa (mmHg, in.Hg)	69 (520, 20)*1, 71 (530, 21)*2	–	
Valve clearance (at hot) mm (in.)			
Intake	–	0.25 (0.010)	
Exhaust	–	0.25 (0.010)	

*1: 4G63 engine
*2: 4G64 engine

ADDED

Items	4G63, 4G64	4D68
Limit		
Compression pressure kPa (kg/cm²,psi) (250-400r/min.)	1,022 (10.6, 151)*1, 984 (10.2, 145)*2	2,560 (25.6, 364)
Compression pressure difference of all cylinder kPa (kg/cm², psi)	max. 100 (1.0, 14)	300 (3.0, 43)
Nominal length of cylinder head bolt mm(in.)	99.4 (3.91)	–

*1: 4G63 engine
*2: 4G64 engine

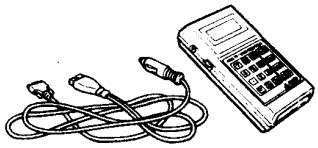
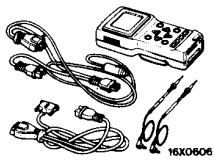
SEALANTS

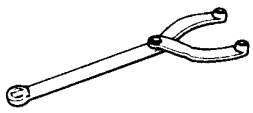
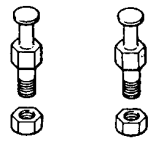
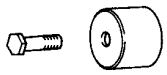
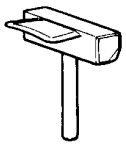
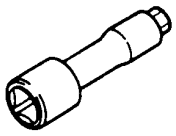
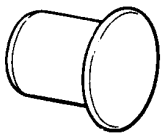
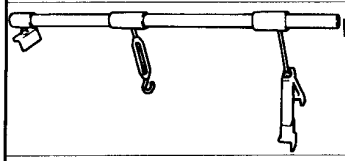
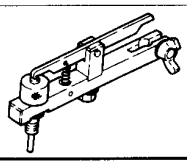
E11CE--

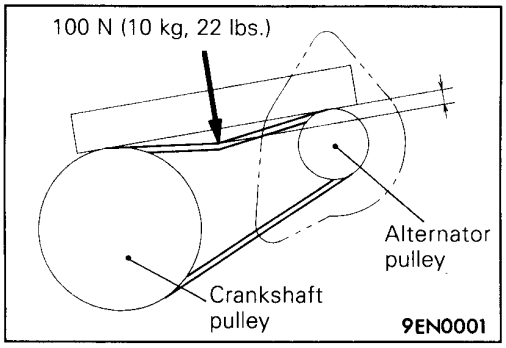
Engine	Items	Specified sealant	Remarks
4G93 4G63 4G64	Oil pan and cylinder block Thermostat case assembly and cylinder block seal	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant
4D65, 4D68	Oil pan and cylinder block	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant
	Semi-circular packing and rocker cover seal, and cylinder head seal	3M ATD Part No. 8660 or equivalent	Semi-drying sealant

SPECIAL TOOLS

E11DA--

Item	Number	Name	Use
	MB991341	Multi-use tester (MUT) sub assembly	Up to 1993 models Idle speed inspection
	For the number, refer to GROUP 00 – Precautions Before Service.	ROM pack	
 16X0606	MB991502	MUT-II sub assembly	All models Idle speed inspection
 16X0607		ROM pack	

Tool	Number	Name	Use
	MB990767	End yoke holder	• Removal and installation of camshaft sprocket • Removal and installation of crankshaft pulley <4G93> • Removal and installation of crankshaft sprocket <4D65>
	MD998719	Pin	Removal of camshaft sprocket
	MD998713	Camshaft oil seal installer	Press-in of the camshaft oil seal <4G93>
	MD998364	Camshaft oil seal installer	Press-in of the camshaft oil seal <4D65>
	MD998727	Oil pan gasket cutter	Removal of oil pan
	MD998051	Cylinder head bolt wrench	Removal and installation of cylinder head bolt <4D65>
	MB991193	Plug	Prevent transfer oil from flowing out and to prevent entry of foreign substances
	MB991191	Engine hanger assembly	Removal and installation of engine assembly
	MD998389	Prestroke measuring adapter	Adjustment of the injection timing <4D65>



ENGINE <4G93>

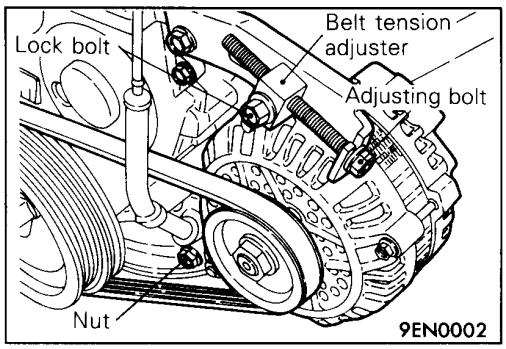
SERVICE ADJUSTMENT PROCEDURES

ALTERNATOR DRIVE BELT TENSION INSPECTION AND ADJUSTMENT E11FQBI

ALTERNATOR DRIVE BELT TENSION INSPECTION

Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 100 N (10 kg, 22 lbs.) as shown in the figure.
Measure drive belt deflection amount.

Standard value: 8.5–12 mm (0.34–0.47 in.)



ALTERNATOR DRIVE BELT TENSION ADJUSTMENT

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

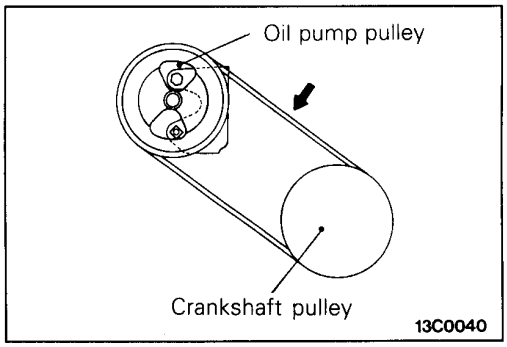
Standard value:
If used belt (with correct tension) is use 9.5 mm (0.37 in.)
If a new belt is used 7.0–8.5 mm (0.28–0.34 in.)

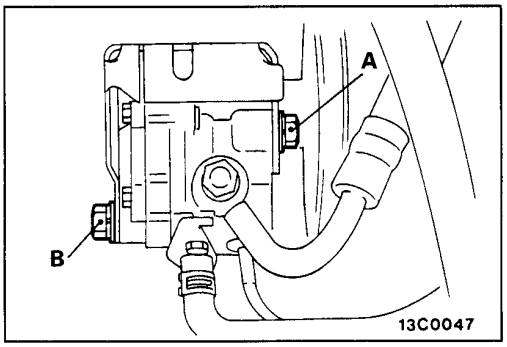
(4) Tighten the lock bolt.

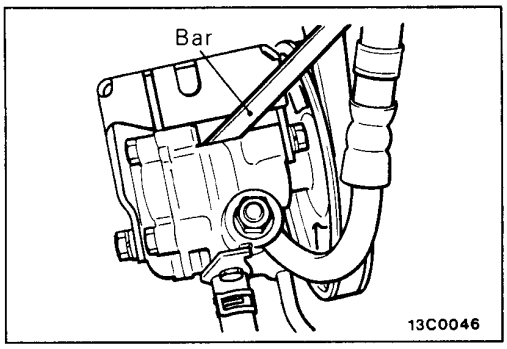
Tightening torque: 23 Nm (2.3 kgm, 17 ft.lbs.)

(5) Tighten the nut of the alternator pivot bolt.

Tightening torque: 45 Nm (4.5 kgm, 33 ft.lbs.)







POWER STEERING OIL PUMP DRIVE BELT TENSION INSPECTION AND ADJUSTMENT <Vehicles without Air Conditioner>

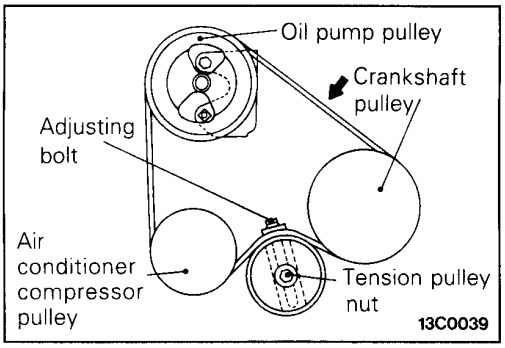
1. Press in the V-ribbed belt at the illustrated position with about 100 N (10 kg, 22 lbs.) and measure deflection.
   Use a belt tension gauge to check that the belt tension is at the standard value.

Standard value

	Deflection mm (in.)	Tension N (kg, lbs.)
When belt tension is readjusted	9.5–11.5 (0.374–0.453)	400–600 (40–60, 88–132)
When new belt is installed	7.5–9.0 (0.295–0.354)	650–850 (65–85, 143–187)

2. If the deflection is out of the standard values, adjust the belt tension using the following procedures.
   (1) Loosen bolts A and B (for holding the oil pump).
   (2) Place a bar or similar object against the body of the oil pump, and, while manually providing the suitable amount of tension, adjust the amount of flexion of the belt.
   (3) Tighten bolts A and B in that order.
   (4) Check the amount of flexion of the belt; readjust if necessary.

   Caution
   The check should be made after turning the engine one time or more in the regular direction of rotation (to the right).



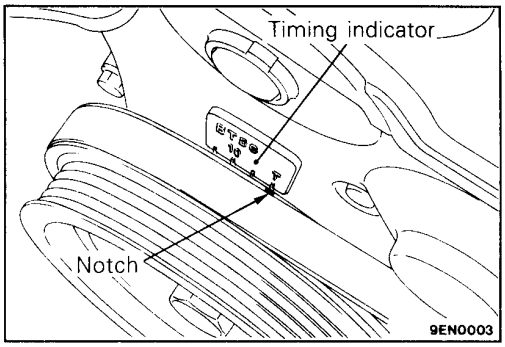
POWER STEERING OIL PUMP AND AIR CONDITIONER COMPRESSOR DRIVE BELT TENSION INSPECTION AND ADJUSTMENT <Vehicles with Air Conditioner>

1. Press in the V-ribbed belt at the illustrated position with about 100 N (10 kg, 22 lbs.) and measure deflection.
   Use a belt tension gauge to check that the belt tension is at the standard value.

Standard value:

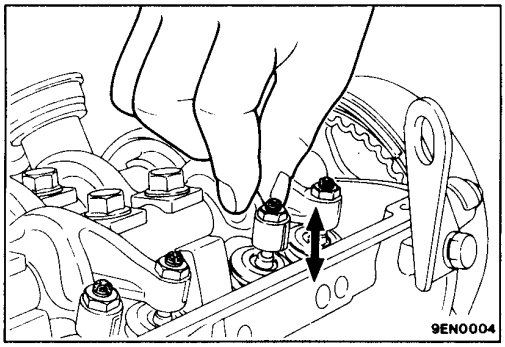
	Deflection mm (in.)	Tension N (kg, lbs.)
When belt tension is readjusted	6.8–7.6 (0.268–0.299)	500–630 (50–63, 110–139)
When new belt is installed	5.5–6.0 (0.217–0.236)	750–800 (75–80, 165–176)

2. If the deflection is out of the standard values, loosen the tension pulley nut and adjust the belt tension with adjusting bolt.

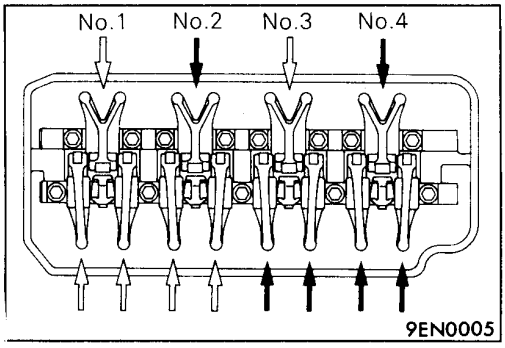


VALVE CLEARANCE INSPECTION AND ADJUSTMENT E11FDAW

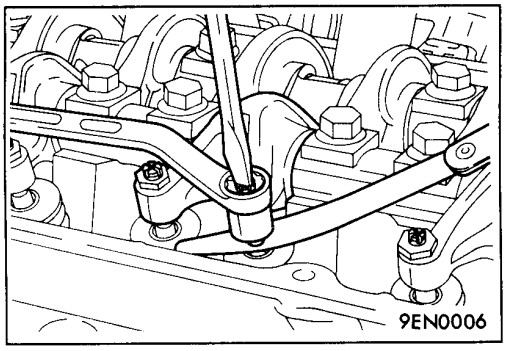
(1) Start the engine and allow it to warm up until the engine coolant temperature reaches 80 to 95°C (176 to 203°F).
(2) Remove all spark plugs from the cylinder head for easy inspection.
(3) Remove the rocker cover.
(4) Turn the crankshaft clockwise until the notch on the pulley is lined up with the "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 ⇩ when the No. 1 cylinder piston is at the top dead centre on the compression stroke, and on rocker arms indicated by solid arrows ⬇ 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 (0.008 in.)**
Exhaust valve	**0.30 mm (0.012 in.)**

(8) While holding the adjusting screw with a screwdriver to prevent it from turning, tighten the lock nut to the specified torque.

Tightening torque: 9 Nm (0.9 kgm, 7 ft.lbs.)

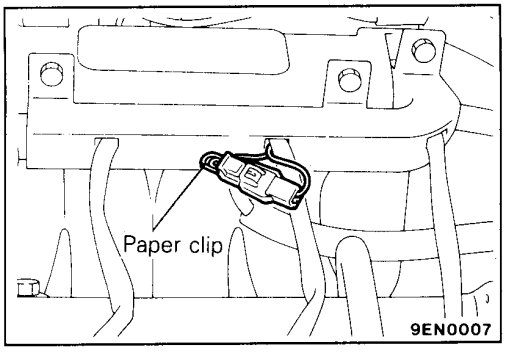
(9) Turn the crankshaft through 360° to line up the notch on the crankshaft pulley with the "T" mark on the timing indicator.

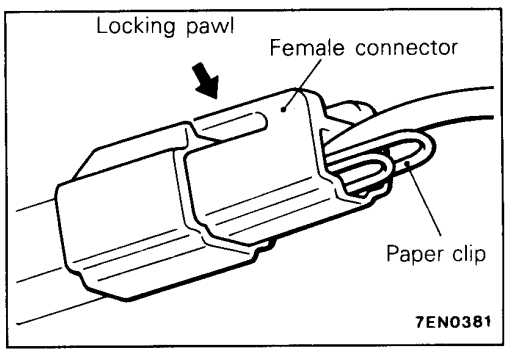
(10) Repeat steps (7) and (8) on other valves for clearance adjustment.

(11) Install the rocker cover.

(12) Install the spark plugs and tighten to the specified torque.

Tightening torque: 25 Nm (2.5 kgm, 18 ft.lbs.)



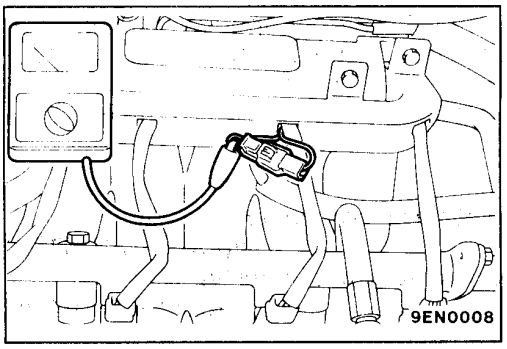


IGNITION TIMING INSPECTION AND ADJUSTMENT E11FUBG

(1) Before inspection and adjustment set vehicle in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicles with A/T)
- Steering wheel: Straight forward position.

(2) Insert a paper clip from the harness side into the 1 pin connector as shown in the illustration at left.
The connector should not be disconnected.

Caution
Insert the paper clip as in the illustration at left along the terminal from the opposite side of the locking pawl on the female connector.

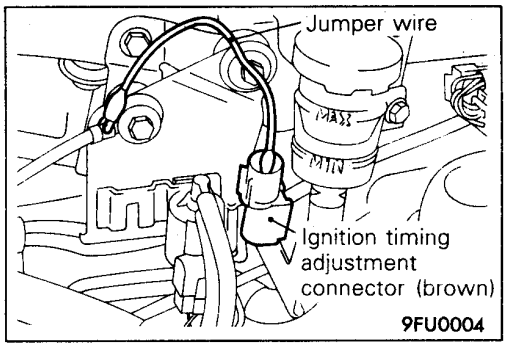


(3) Connect a primary-voltage-detection type of tachometer to the paper clip.

NOTE
Do not use the Multi-use tester (MUT) or MUT-II.
If tested with the MUT or 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 engine idle speed is within the standard value.

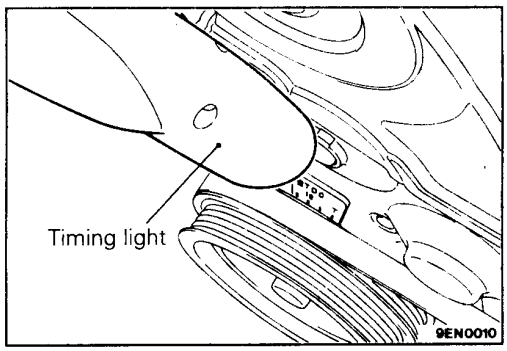
Standard value:
Vehicles with catalytic converter
800 ± 100 r/min.
Vehicles without catalytic converter
700 ± 100 r/min.



(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.

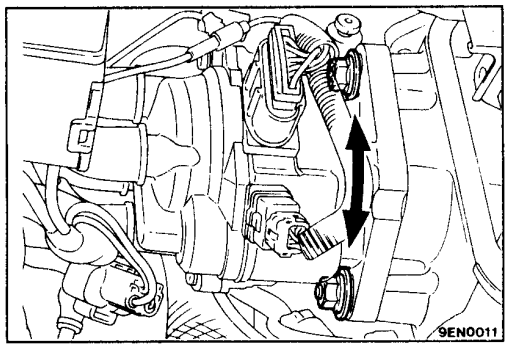
NOTE
Grounding this terminal sets the engine to the basic ignition timing.

(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 nut and adjust by rotating distributor body.

NOTE
The ignition timing will be advanced if the distributor is turned in a clockwise direction, and retarded if it is turned in a anticlockwise direction.

(13) Tighten mounting nut after adjusting.

Tightening torque: 12 Nm (1.2 kg, 9 ft.lbs.)

(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:
Vehicles with catalytic converter
approx. 10° BTDC
Vehicles without catalytic converter
approx. 5° BTDC

NOTE
1. Ignition timing is variable within about ±7°, even under normal operating.
2. And it is automatically further advanced by about 5° from 10° (5° for vehicles without catalytic converter) BTDC at higher altitudes.

(16)Sealing tape is to be attached to the fitting nut only for vehicles for Switzerland.

NOTE
Sealing tape is attached to all vehicles when new.

IDLE SPEED INSPECTION <Vehicles with Catalytic Converter> E11FXDB

(1) Before inspection and adjustment set vehicles in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicles with A/T)
- Steering wheel: Straight forward position

(2) Check the basic ignition timing. Adjust if necessary.

Standard value: 5° BTDC ± 2°

(3) After the ignition switch to OFF, connect the multi-use tester (MUT) or MUT-II to the diagnosis connector. (white).
(4) Start the engine and run it at idle.
(5) Run the engine at idle for 2 minutes.
(6) Check the idle speed.

Curb idle speed: 800 ± 100 r/min.

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

(7) If there is a deviation from the standard value, refer to GROUP 13 – Check Chart Classified by Problem Symptoms, and check the MPI components.

IDLE SPEED AND MIXTURE INSPECTION AND ADJUSTMENT <Vehicles without Catalytic Converter>

(1) Before inspection and adjustment set vehicles in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicles with A/T)
- Steering wheel: Straight forward position

(2) Check the ignition timing. Adjust if necessary.

Standard value: 5° BTDC ± 2°

(3) After the ignition switch to OFF, connect the multi-use tester (MUT) or MUT-II to the diagnosis connector.

NOTE
For the method of installing the tachometer, refer to P.11-8, 9.

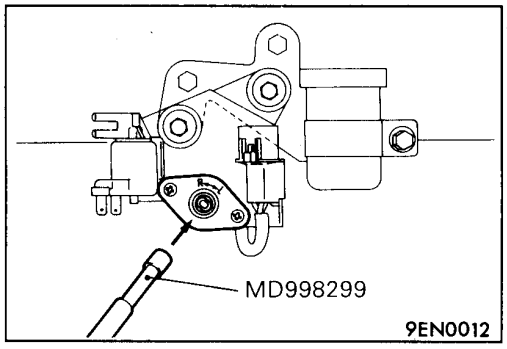
(4) Start the engine and run it at idle.
(5) Run the engine at idle for 2 minutes.
(6) Check the idle speed.

Curb idle speed: 700 ± 100 r/min.

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

(7) If there is a deviation from the standard value, refer to GROUP 13 – Check Chart Classified by Problem Symptoms, and check the MPI components.
(8) Set the CO tester.
(9) Run the engine for more than 10 seconds at 2,000 to 3,000 r/min.
(10) Check the idle mixture.

Standard value: 1.5 ± 0.5%



(11) If there is a deviation from the standard value, set the idle mixture to the specified value by adjusting the idle mixture adjusting screw (variable resistor).
Use the special tool (MAS screwdriver) to turn the mixture adjusting screw.

COMPRESSION PRESSURE INSPECTION E11FGAO

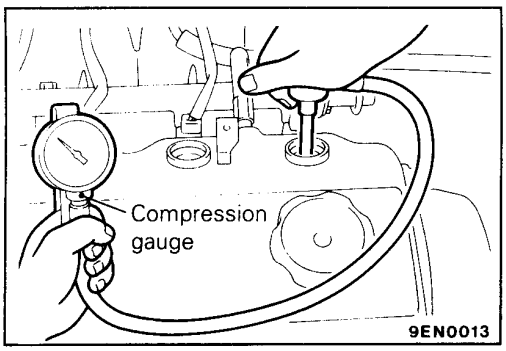
(1) Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicle with A/T)
- Steering wheel: Straight forward position

(2) Disconnect the spark plug cables.
(3) Remove all of the spark plugs.
(4) Disconnect the distributor 6 pin connector.

NOTE
Doing this will prevent the engine control unit from carrying out ignition and fuel injection.

(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 (at engine speed of 250–400 r/min.):
Vehicles with catalytic converter
1,450 kPa (14.5 kg/cm², 206 psi)
Vehicles without catalytic converter
1,400 kPa (14.0 kg/cm²,199 psi)
Limit (at engine speed of 250–400 r/min.):
Vehicles with catalytic converter
min. 1,040 kPa (10.4 kg/cm², 148 psi)
Vehicles without catalytic converter
min. 1,000 kPa (10.0 kg/cm²,142 psi)

(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 (1.0 kg/cm², 14 psi)

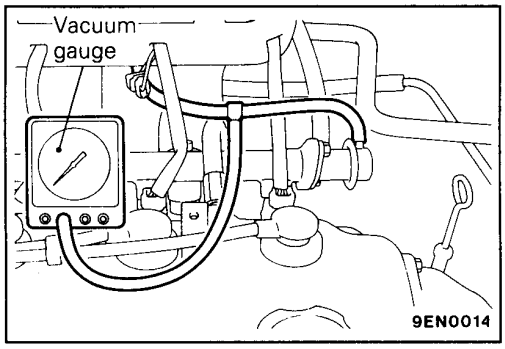
(9) If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps (7) and (8).
   ① If the compression increases after oil is added, the cause of the malfunction is a worn 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 multi-use tester (MUT) or MUT-II to erase the self-diagnosis codes.

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



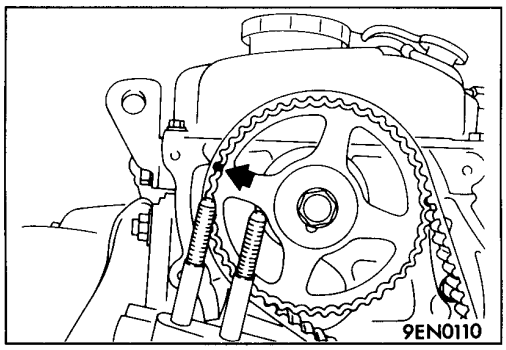
MANIFOLD VACUUM INSPECTION E11FWAZ

(1) Start the engine and allow it to warm up until the temperature of the coolant reaches 80 to 95°C (176 to 203°F).
(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. The read off the vacuum gauge.

Standard value:
Approx. 69 kPa (520 mmHg, 20 in.Hg)

(5) If not within specification, refer to following chart for cause and repair.

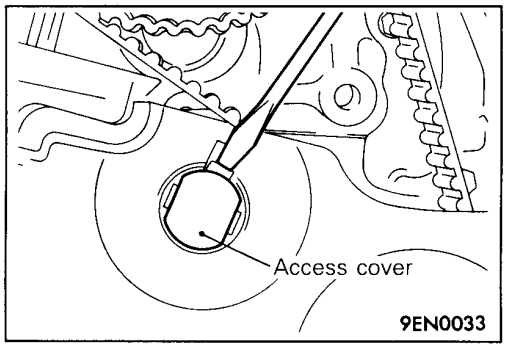
Symptom	Probable cause	Remedy
Vacuum gauge reads under standard value but pointer is stable.	• Delayed ignition timing. • Incorrect valve clearance.	• Adjust ignition timing. • Adjust valve clearance.
Vacuum gauge pointer fluctuates slowly.	• Idle mixture concentration too rich.	• Check MPI system
Vacuum gague reading decreases irregularly.	• Idle mixture concentration too lean.	• Check MPI system.
Vacuum gauge pointer decreases about 4.0–21.3 kPa (30–160 mmHg, 1.18–6.30 in.Hg) intermittently.	• Burned, warped or pitted valves.	• Install new valves.
Vacuum gauge pointer suddenly decreases about 33.3 kPa (250 mmHg, 9.84 in.Hg) from standard value and then returns.	• Blow cylinder head gasket.	• Install new cylinder head gasket.



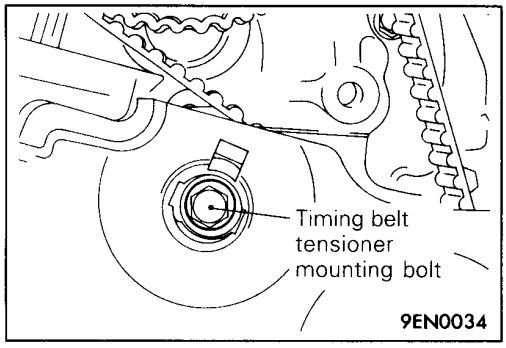
TIMING BELT TENSION ADJUSTMENT E11FFDH

(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.

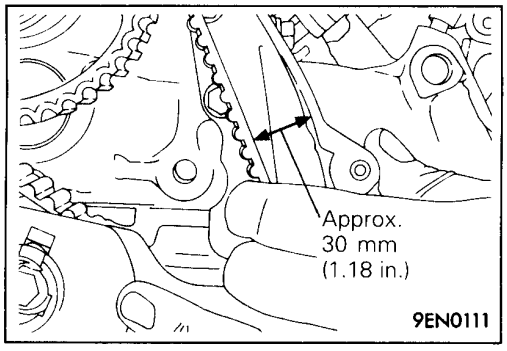


(3) Remove the access cover.



(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 80°–200°.
If the bolt is loosened more than necessary, the bolt may fall inside the cover.



(5) Tighten the timing belt tensioner fixing bolt.
(6) Check that the clearance between the timing belt and the under cover is at the standard value as shown in the illustration.

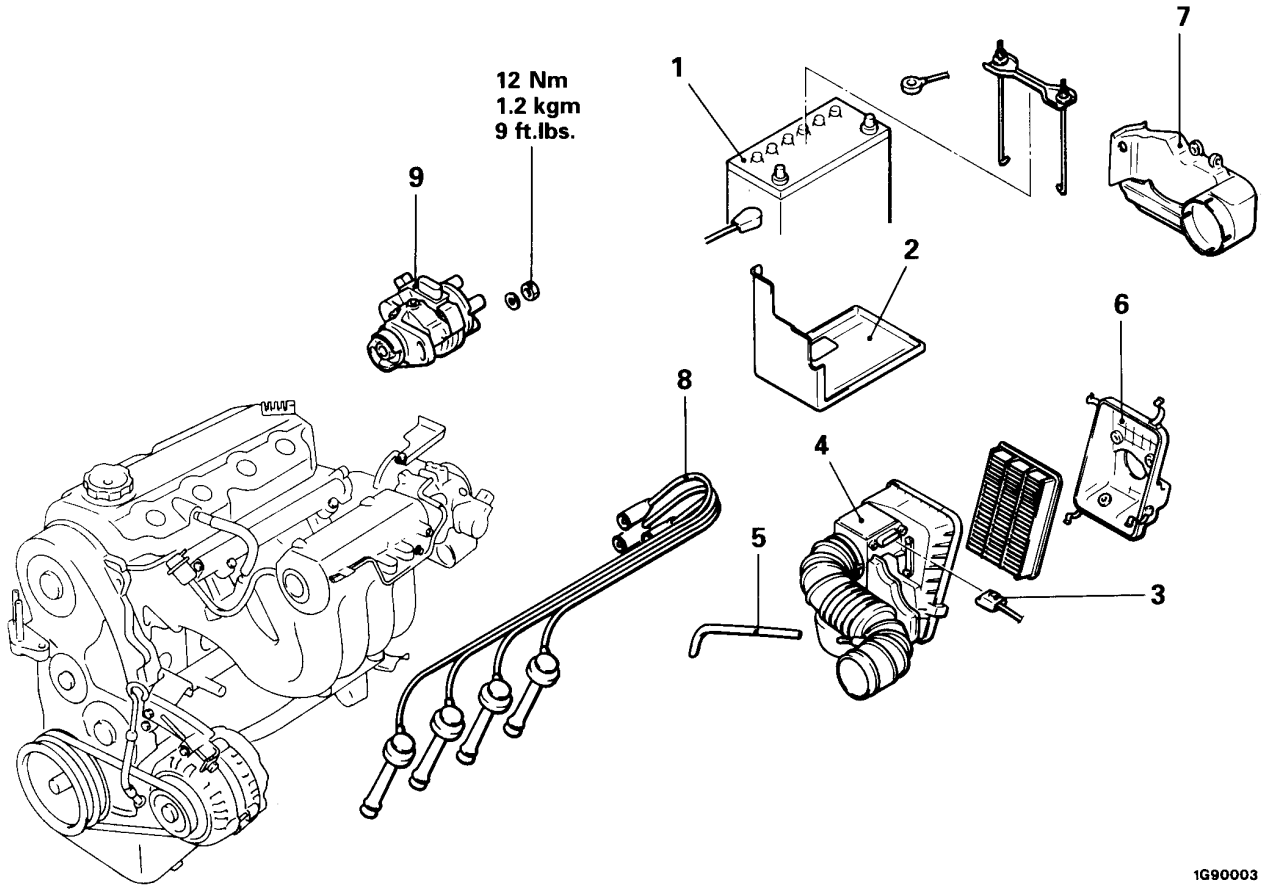
Standard value: approx. 30 mm (1.18 in.)

(7) Install the access cover.
(8) Install the timing belt upper cover.

CAMSHAFT AND CAMSHAFT OIL SEAL

E11HA--

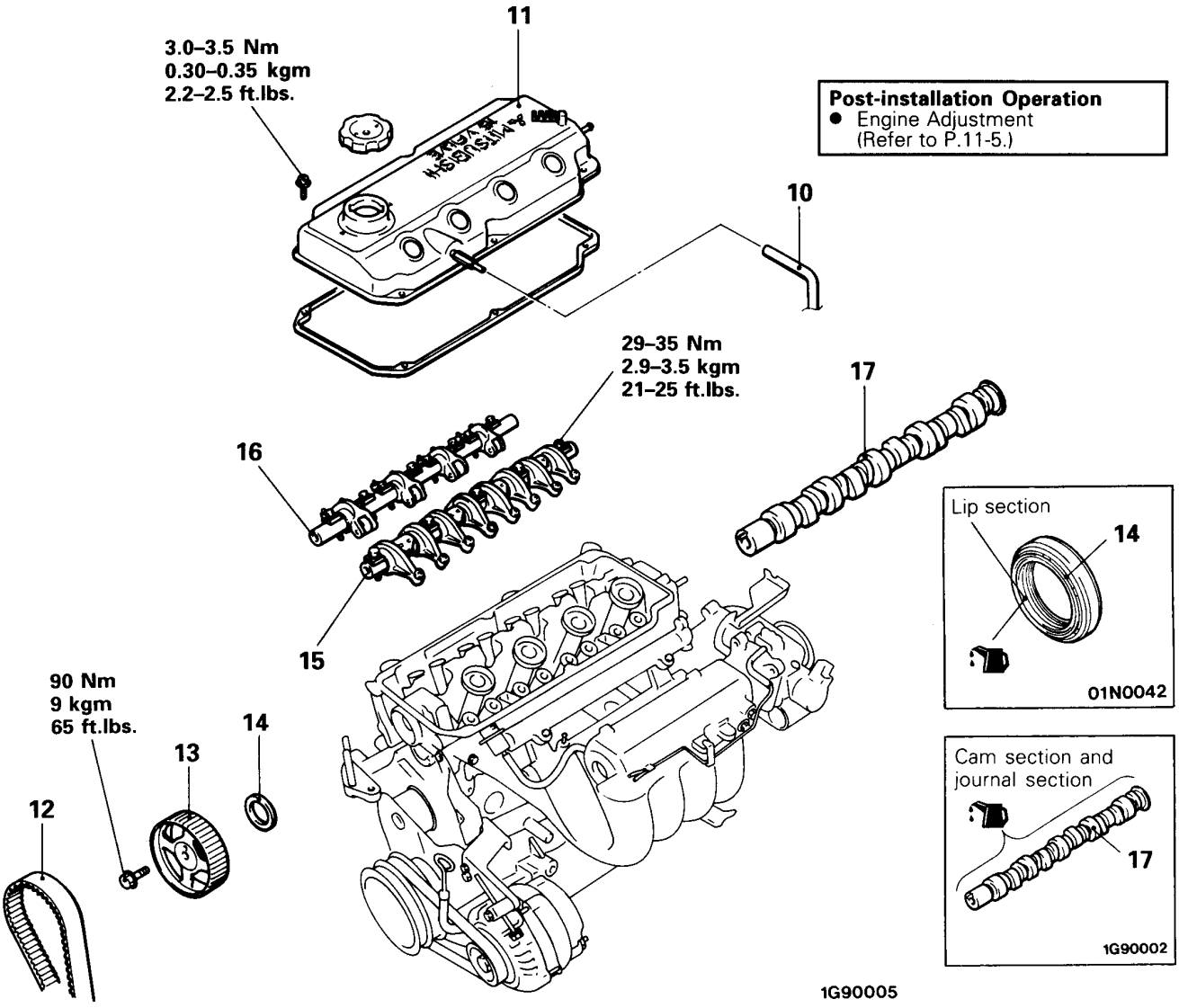
REMOVAL AND INSTALLATION



Removal steps

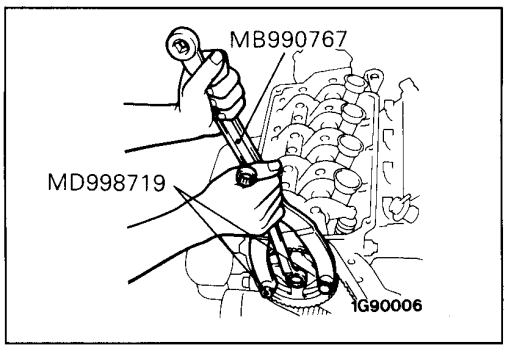
1. Battery
2. Battery cover
3. Air flow sensor connector
4. Air cleaner case cover assembly
5. Breather hose connection
6. Air cleaner case
7. Air intake duct
8. Spark plug cable

◆◆ 9. Distributor



Removal steps

10. PCV hose connection
11. Rocker cover
    - ● Valve clearance adjustment (Refer to P.11-7.)
12. Timing belt (Refer to P.11-27.)
13. Camshaft sprocket
14. Camshaft oil seal
15. Rocker arms and rocker arm shaft assembly (Intake side)
16. Rocker arms and rocker arm shaft assembly (Exhaust side)
17. Camshaft



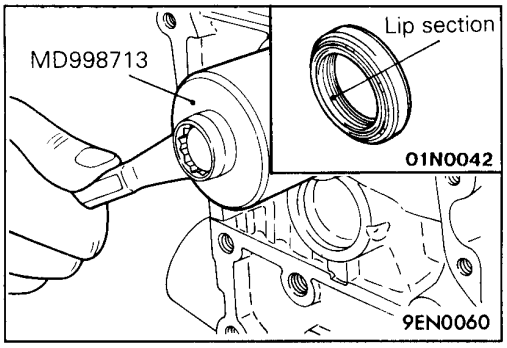
SERVICE POINTS OF REMOVAL E11HBAL

13. REMOVAL OF CAMSHAFT SPROCKET

Use the special tool to remove the camshaft sprocket.

15. REMOVAL OF ROCKER ARMS AND ROCKER ARM SHAFT ASSEMBLY (INTAKE SIDE)/16. ROCKER ARMS AND ROCKER ARM SHAFT ASSEMBLY (EXHAUST SIDE)

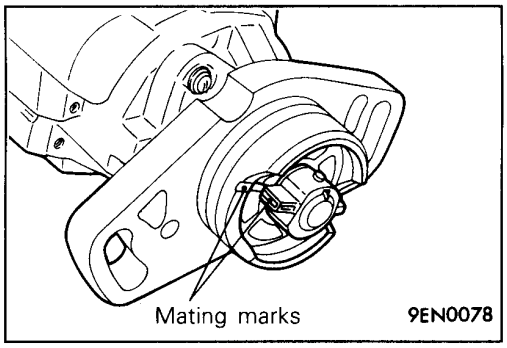
Caution
Do not disassemble the rocker arms and rocker arm shaft assembly.



SERVICE POINTS OF INSTALLATION E11HCAM

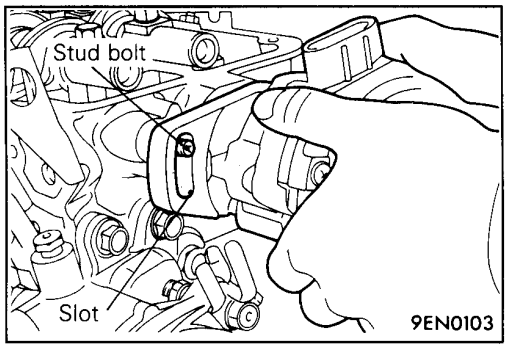
14. INSTALLATION OF CAMSHAFT OIL SEAL

Use the special tool to press-fit the camshaft oil seal.



9. INSTALLATION OF DISTRIBUTOR ASSEMBLY

(1) Turn the crankshaft to bring No. 1 cylinder to the top dead center on compression stroke.
(2) Align the mating marks on the distributor housing with that of the coupling key.

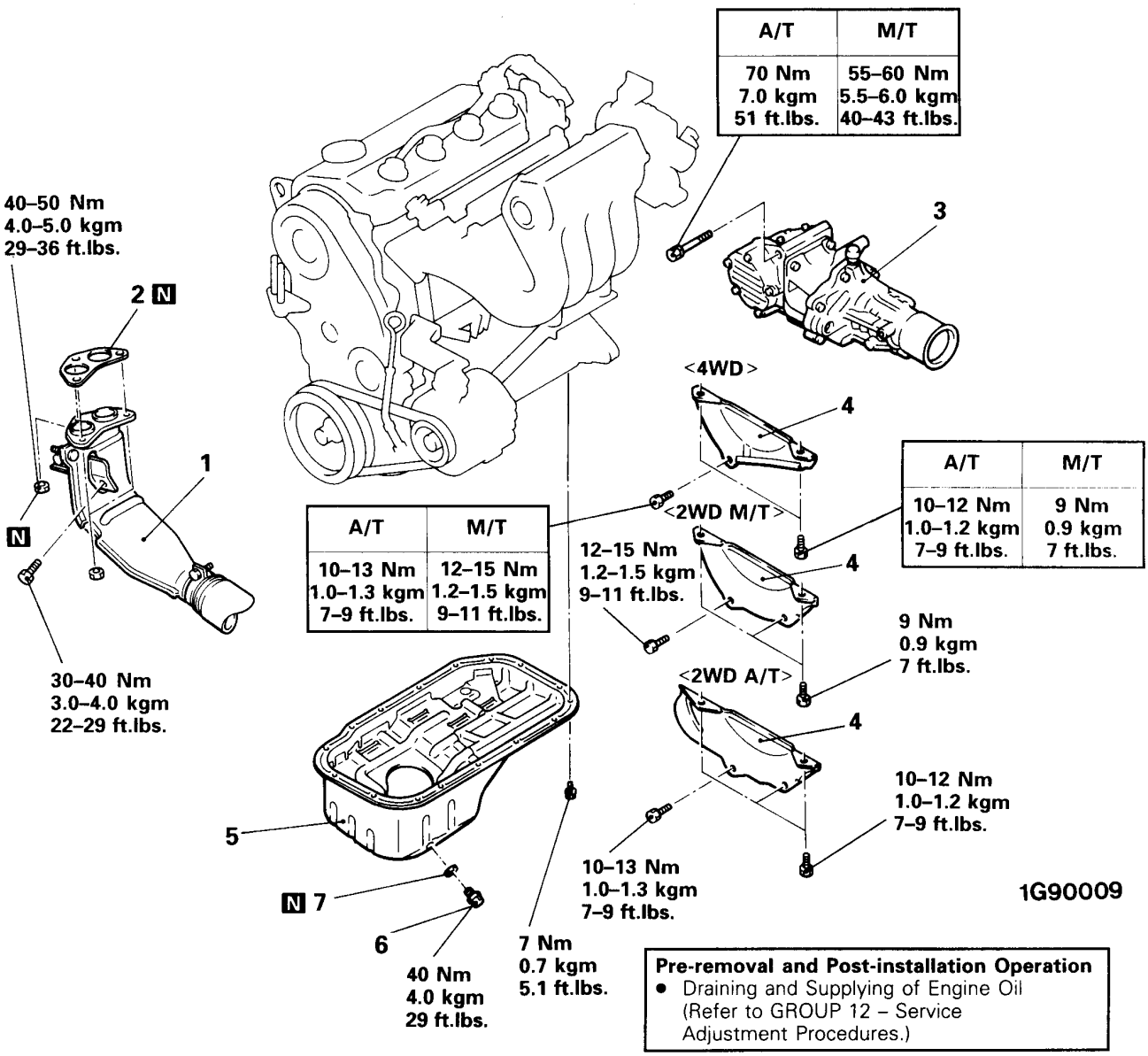


(3) Install the distributor assembly on the engine while aligning the stud bolt used for securing the distributor with the slot in the mounting flange of the distributor.

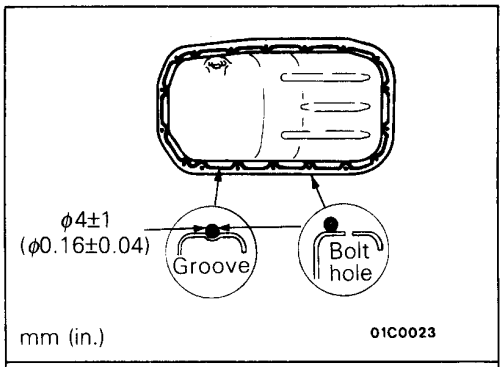
OIL PAN

E11KA--

REMOVAL AND INSTALLATION

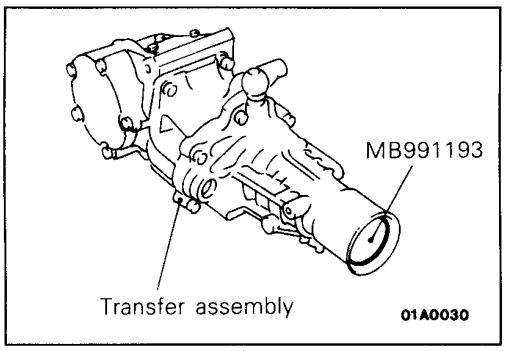


Pre-removal and Post-installation Operation
- Draining and Supplying of Engine Oil (Refer to GROUP 12 – Service Adjustment Procedures.)



Specified sealant:
MITSUBISHI GENUINE PART MD970389 or equivalent

Removal steps
1. Front exhaust pipe
2. Gasket
3. Transfer assembly
4. Bell housing cover
5. Oil pan
6. Drain plug
7. Drain plug gasket



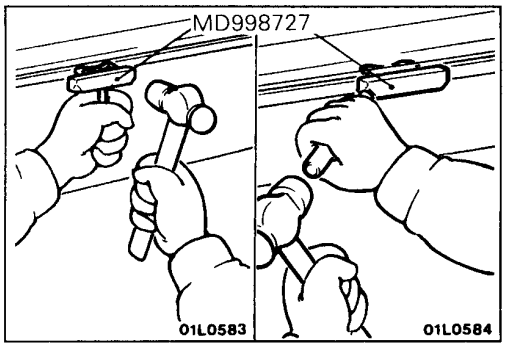
SERVICE POINTS OF REMOVAL E11KBBM

3. REMOVAL OF TRANSFER ASSEMBLY

(1) With the propeller shaft still installed, remove the transfer mounting bolt.
(2) Insert a flat-tipped screwdriver between the transfer and transmission to remove the transfer from the center shaft.
(3) Remove the transfer from the propeller shaft.

Caution
Do not lower the rear end of the transfer, as this will cause the transfer oil to flow out.

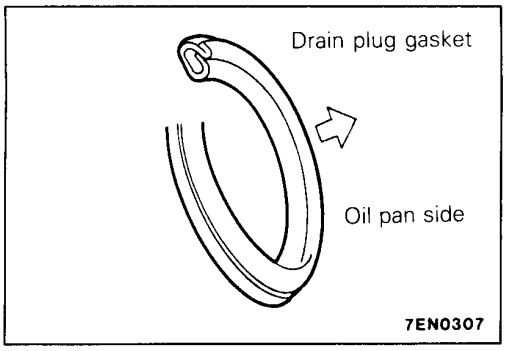
(4) After removing the transfer assembly, insert the special tool to prevent transfer oil from flowing out.
(5) Suspend the propeller shaft from the vehicle body with wire, etc.



5. REMOVAL OF OIL PAN

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

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



SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF DRAIN PLUG GASKET

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

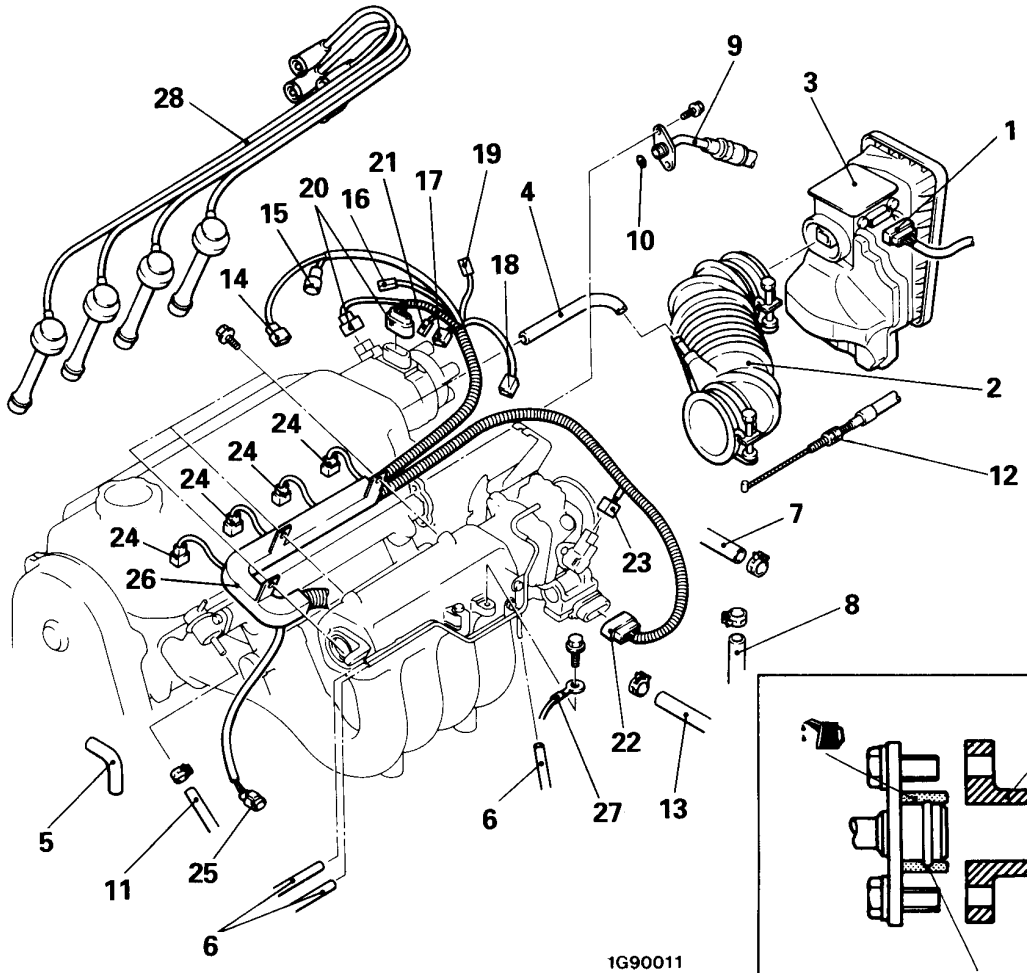
CYLINDER HEAD GASKET

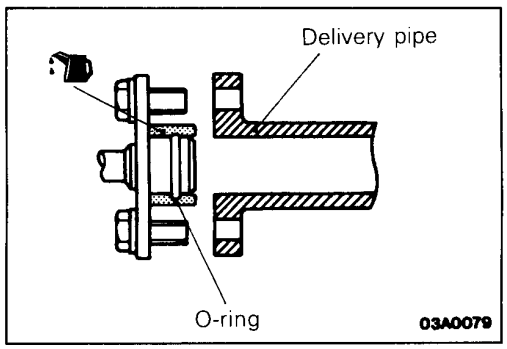
E11JA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Bleeding of Residual Fuel Pressure (Refer to GROUP 13 – Service Adjustment Procedures.)

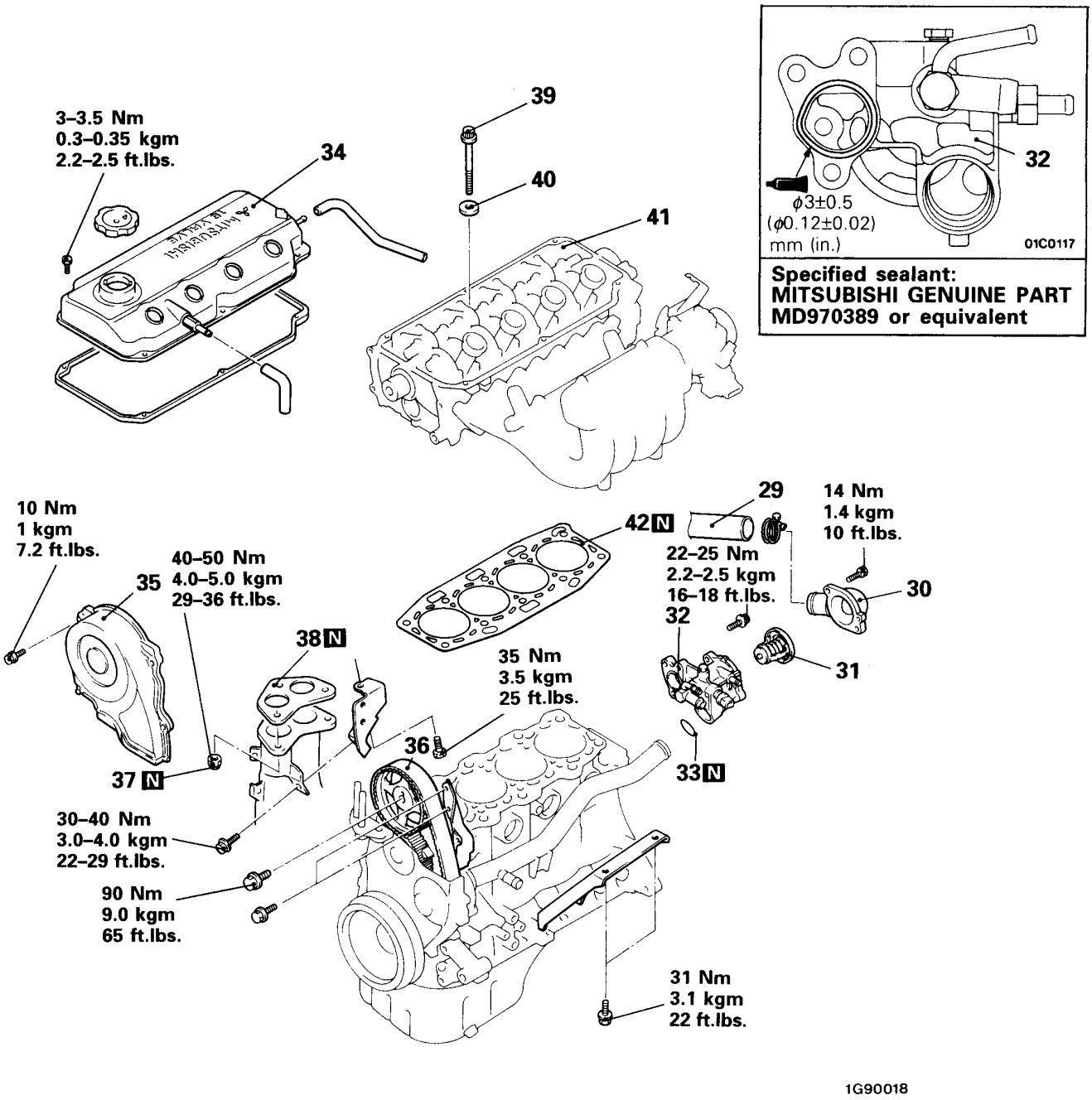
Pre-installation Operation
- Supplying of Coolant (Refer to GROUP 14 – Service Adjustment Procedures)
- Engine Adjustment (Refer to P.11-5.)





Removal steps

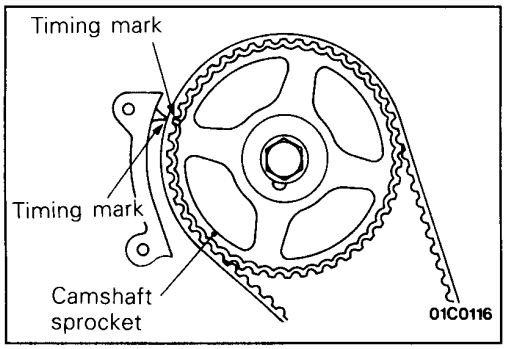
1. Air flow sensor connector
2. Air intake hose
3. Air cleaner case cover
4. Breather hose connection
5. PCV hose
6. Vacuum hose connection
7. Water hose connection (Thermostat case → throttle body)
8. Water hose connection (Throttle body → water inlet fitting)
9. Fuel high pressure hose connection
10. O-ring
11. Fuel return hose connection
12. Accelerator cable connection
13. Brake booster vacuum hose connection
14. Engine coolant temperature switch
15. Oxygen sensor connector
16. Oil pressure switch connector
17. Water temperature gauge unit connector
18. Engine coolant temperature sensor
19. Engine coolant temperature switch <for condenser fan>
20. Distributor connector
21. Condenser connector
22. Idle speed control connector
23. TPS connector
24. Injector connector
25. Detonation sensor connector
26. Control harness assembly
27. Earth wire
28. Spark plug cable



Specified sealant:
MITSUBISHI GENUINE PART MD970389 or equivalent

Removal steps

29. Connection for radiator upper hose
30. Water inlet fitting
◆◆ 31. Thermostat
◆◆ 32. Thermostat case assembly
33. O-ring
34. Rocker cover
35. Timing belt upper cover
◆◆ 36. Camshaft sprocket
37. Self-locking nuts
38. Gasket
◆◆ 39. Cylinder head bolt
◆◆ 40. Washer
◆◆ ◆◆ 41. Cylinder head assembly
◆◆ 42. Cylinder head gasket

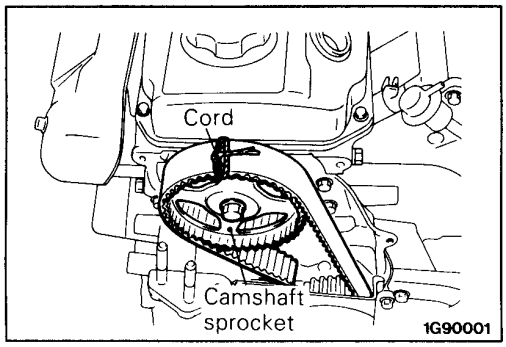


SERVICE POINTS OF REMOVAL E11JBAZ

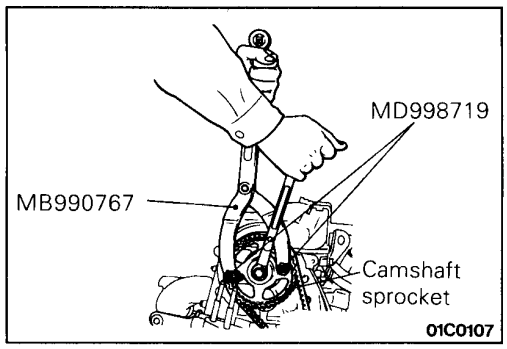
36. REMOVAL OF CAMSHAFT SPROCKET

(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.

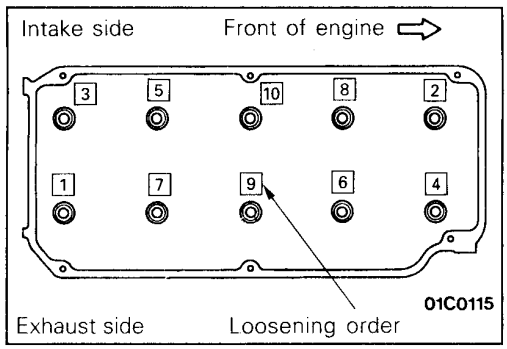


(2) Tie the camshaft sprocket and timing belt with a cord so that the position of the camshaft sprocket will not move with respect to the timing belt.



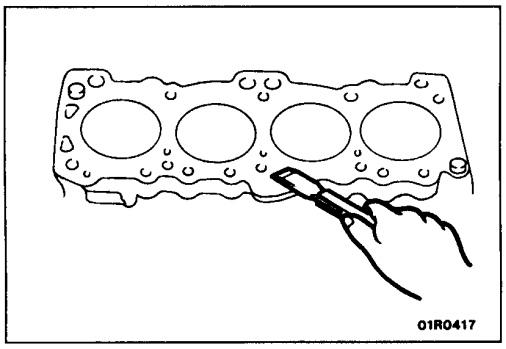
(3) Use the special tool to remove the camshaft sprocket with the timing belt attached.

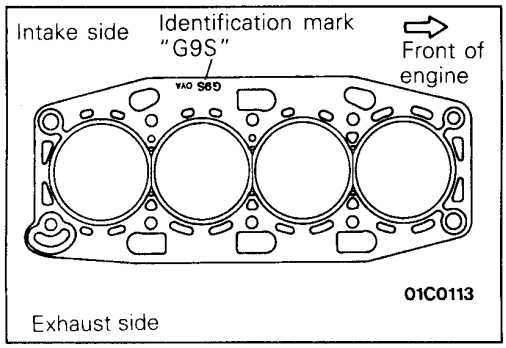
Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.



41. REMOVAL OF CYLINDER HEAD ASSEMBLY

Loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.





SERVICE POINTS OF INSTALLATION E11JDCV

42. INSTALLATION OF CYLINDER HEAD GASKET

(1) Use a scraper or gasket remover to remove the gasket adhering to the cylinder block.

Caution
When doing this, be careful not to let any foreign substances such as gasket scraps enter the cylinder or the coolant and oil passages.

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

Caution
The cylinder head gasket is easy to mis-install, so be sure to check it. If it is mis-installed, malfunctions such as no oil rising to the cylinder head will occur.

41. INSTALLATION OF CYLINDER HEAD ASSEMBLY/40. WASHER/39. CYLINDER HEAD BOLT

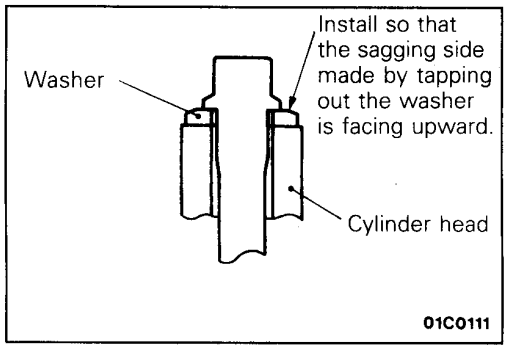
(1) Use a scraper or gasket remover to remove the gasket adhering to the cylinder head assembly.

Caution
When doing this, be careful not to let any foreign substances such as gasket scraps enter the cylinder or the coolant and oil passages.

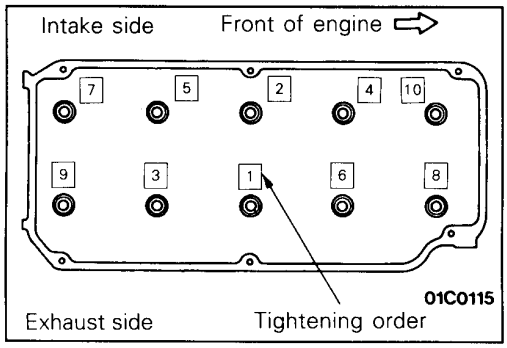
(2) When installing the cylinder head bolts, the length below the head of the bolts should be within the standard value. If it is outside the standard value, replace the bolts.

Limit: within 96.4 mm (3.795 in.)

(3) Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.

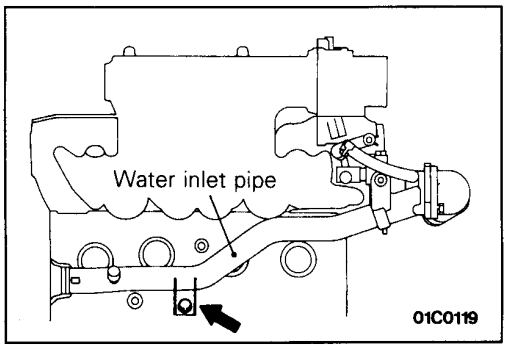


(4) Install so that the sagging side made by tapping out the washer is facing upward.



(5) Tighten using the angular tightening method.

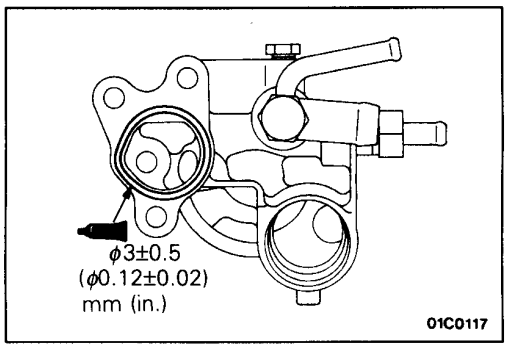
Procedure	Operation contents	Remarks
①	Tighten to 75 Nm (7.5 kgm, 54 ft.lbs.)	Carry out in the order shown in the illustration.
②	Fully loosen.	Carry out in the reverse order to that shown in the illustration.
③	Tighten to 20 Nm (2 kgm, 14 ft.lbs.)	Carry out in the order shown in the illustration.
④	Tighten by 1/4 turn (90°).	Carry out in the order shown in the illustration.
⑤	Tighten by 1/4 turn (90°).	Carry out in the order shown in the illustration.



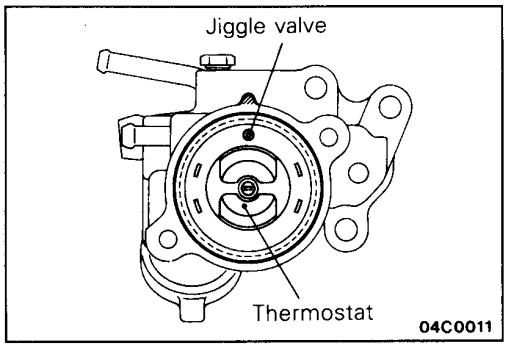
32. INSTALLATION OF THERMOSTAT CASE ASSEMBLY

(1) Loosen the water inlet pipe bolt shown in the illustration.
(2) Apply specified sealant to the thermostat case assembly as shown in the illustration.

Specified sealant: MITSUBISHI GENUINE PART MD970389 or equivalent



(3) Apply a small amount of water to the O-ring of the water inlet pipe, and press the thermostat case assembly onto the water inlet pipe.
(4) Install the thermostat case assembly mounting bolt.
(5) Tighten the water inlet pipe bolt.

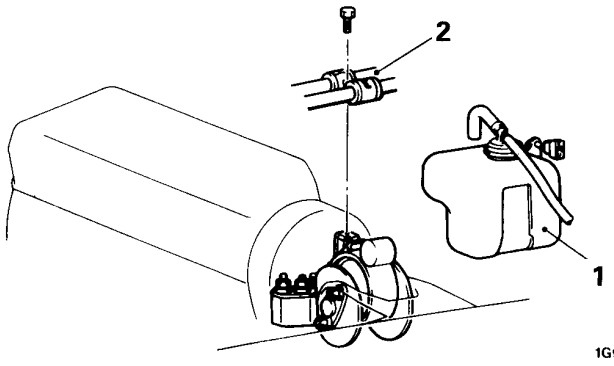


31. INSTALLATION OF THERMOSTAT

Install the thermostat so that the jiggle valve is at the top.

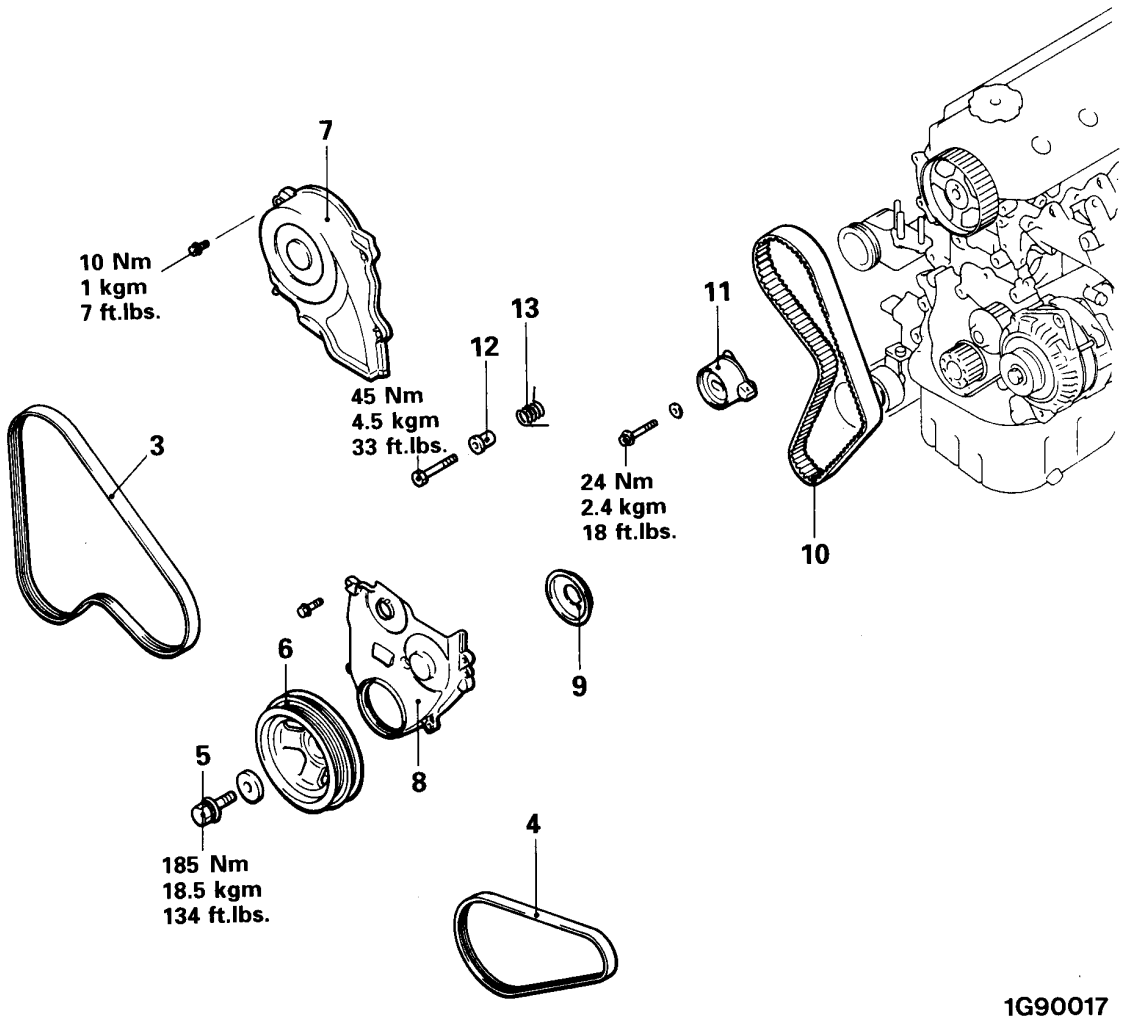
TIMING BELT

REMOVAL AND INSTALLATION



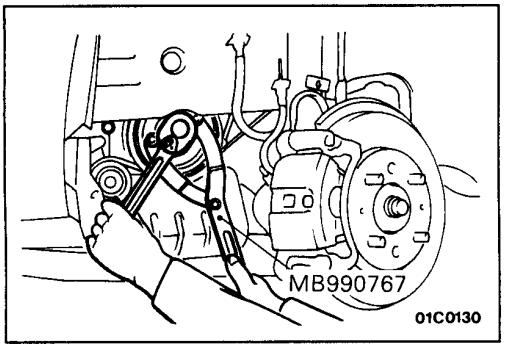
Pre-removal Operation
- Removal of the Under Cover

Post-installation Operation
- Adjustment of Drive Belt Tension (Refer to P.11-5.)
- Installation of the Under Cover



Removal steps

1. Condense tank
2. Clamp section of Air conditioner and Power steering hose
3. Drive belt (Power steering, Air conditioner)
4. Drive belt (Alternator)
5. Crankshaft bolt
6. Crankshaft pulley
7. Timing belt upper cover
8. Timing belt lower cover
9. Flange
- Adjustment of timing belt tension
10. Timing belt
11. Timing belt tensioner
12. Tensioner spacer
13. Tensioner spring

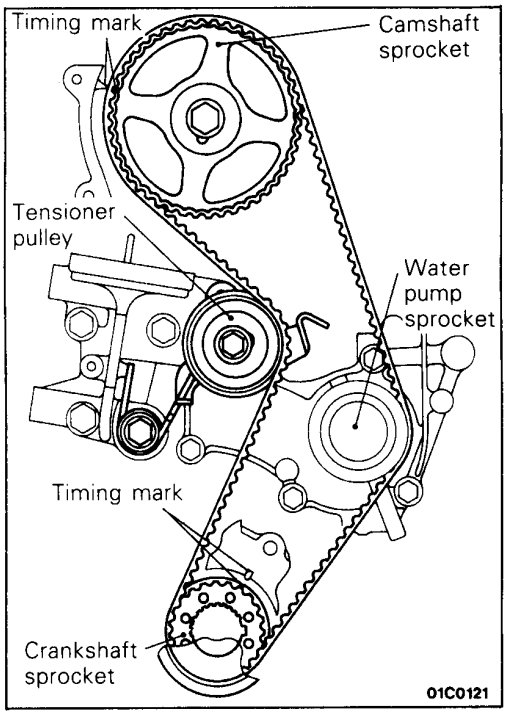


SERVICE POINTS OF REMOVAL E11GBHA

5. REMOVAL OF CRANKSHAFT BOLT /6. CRANKSHAFT PULLEY

Use the special tool to stop the crankshaft pulley from turning, and remove the crankshaft bolt.

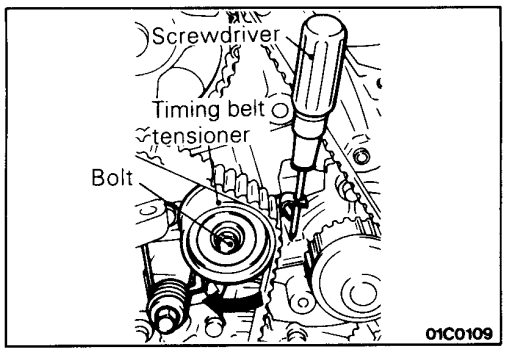
Caution
Hold the special tool securely so that it doesn't move.



10. REMOVAL OF TIMING BELT

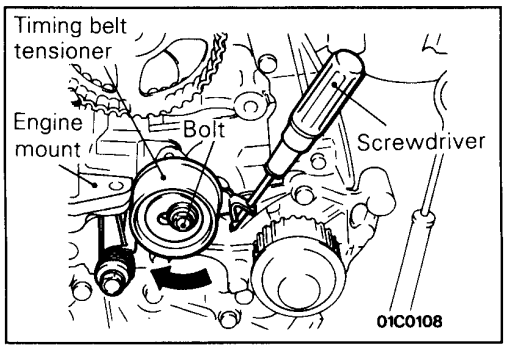
(1) Turn the crankshaft clockwise (right turn) to align each timing mark and to set the No. 1 cylinder at compression top dead centre.

Caution
The crankshaft should always be turned only clockwise.



(2) Loosen the timing belt tensioner bolt.
(3) Set a screwdriver to the timing belt tensioner and press it fully back in the direction of the arrow.
(4) Provisionally tighten the timing belt tensioner bolt.
(5) Remove the timing belt.

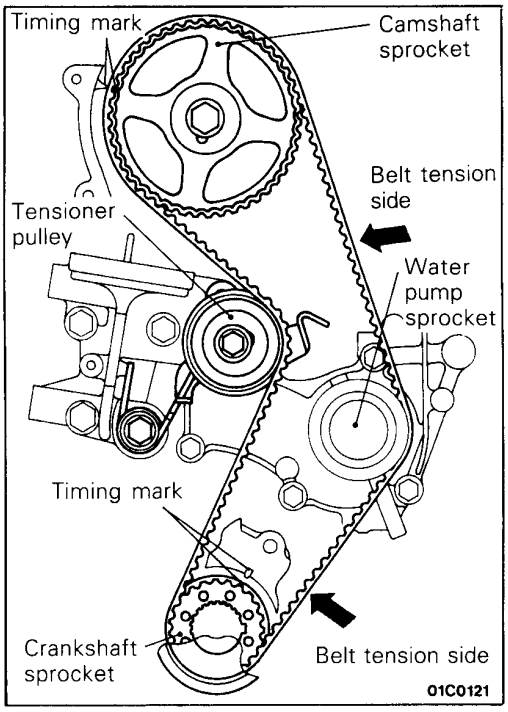
Caution
If the timing belt is to be re-used, use chalk to mark the flat side of the belt with an arrow indicating the direction of rotation (right turn).



SERVICE POINTS OF INSTALLATION E11GDHA

10. INSTALLATION OF TIMING BELT

(1) With the timing belt tensioner bolt loosened, use a screwdriver to fully turn the timing belt tensioner as close to the engine mount as possible, and then provisionally tighten the tensioner bolt.



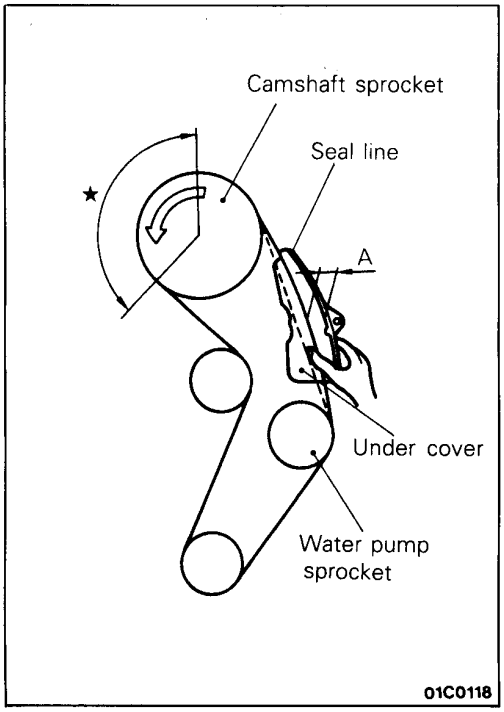
(2) Align each of the camshaft sprocket and the crankshaft sprocket timing marks.
(3) Install the timing belt in the following order, while making sure that the tension side of the belt is not slackened.
   ① Crankshaft sprocket
   ② Water pump sprocket
   ③ Camshaft sprocket
   ④ Tensioner pulley

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.

• ADJUSTMENT OF TIMING BELT TENSION

(1) Initially loosen the fixing bolt of the tensioner pulley fixed to the engine mount 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.

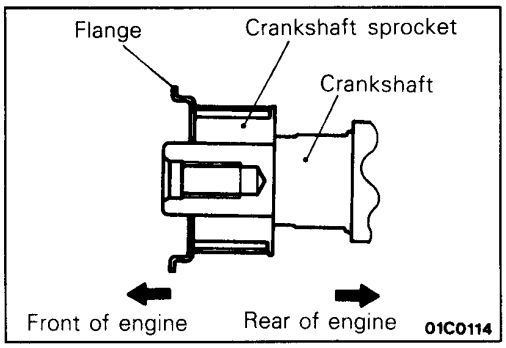
Caution
As the purpose of this procedure is to apply the proper amount of tension to the tension side of the timing belt by using the cam driving torque, turn the crankshaft only by the amount given above. Be sure not to turn the crankshaft in the opposite direction (left turn).



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

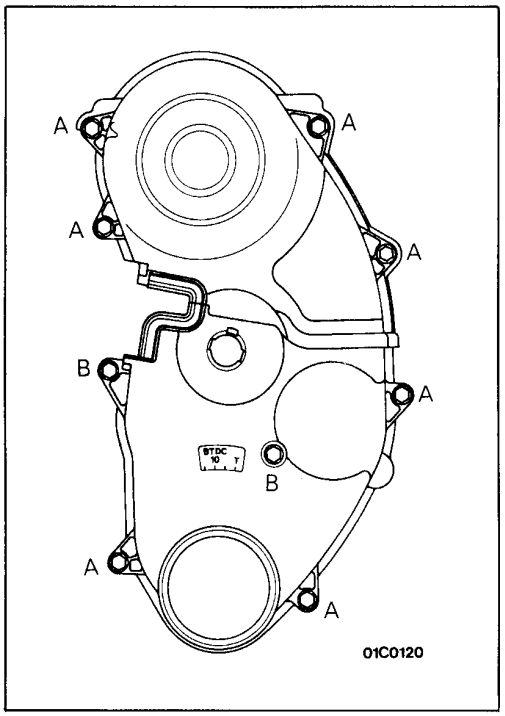
(4) Lastly, lightly clamp the centre of the span between the camshaft sprocket and the water pump sprocket on the belt tension side with your thumb and forefinger as shown in the illustration, and check to be sure that the clearance A between the reverse surface of the belt and the inside of the under cover seal line is at the standard value.

Standard value: approx. 30 mm (1.18 in.)



9. INSTALLATION OF FLANGE

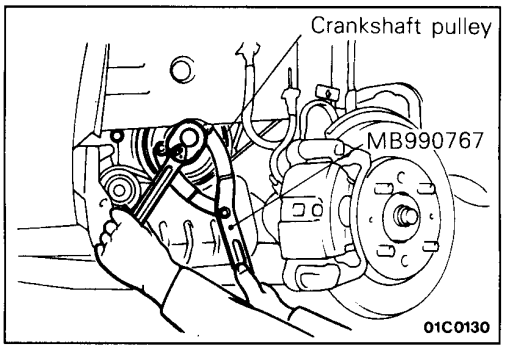
Install the flange as shown in the illustration.



8. INSTALLATION OF TIMING BELT LOWER COVER/7. TIMING BELT UPPER COVER

Install the bolts, being careful not to mistake the bolt sizes.

A bolt: 6 ×18 (0.24 × 0.72)
B bolt: 6 × 30 (0.24 × 1.18)
[diameter × length mm (in.)]



6. INSTALLATION OF CRANKSHAFT PULLEY/5. CRANKSHAFT BOLT

(1) Apply engine oil to the bearing surface and to the thread section of the crankshaft bolt.
(2) Use the special tool to stop the crankshaft pulley from turning, and install the crankshaft bolt.

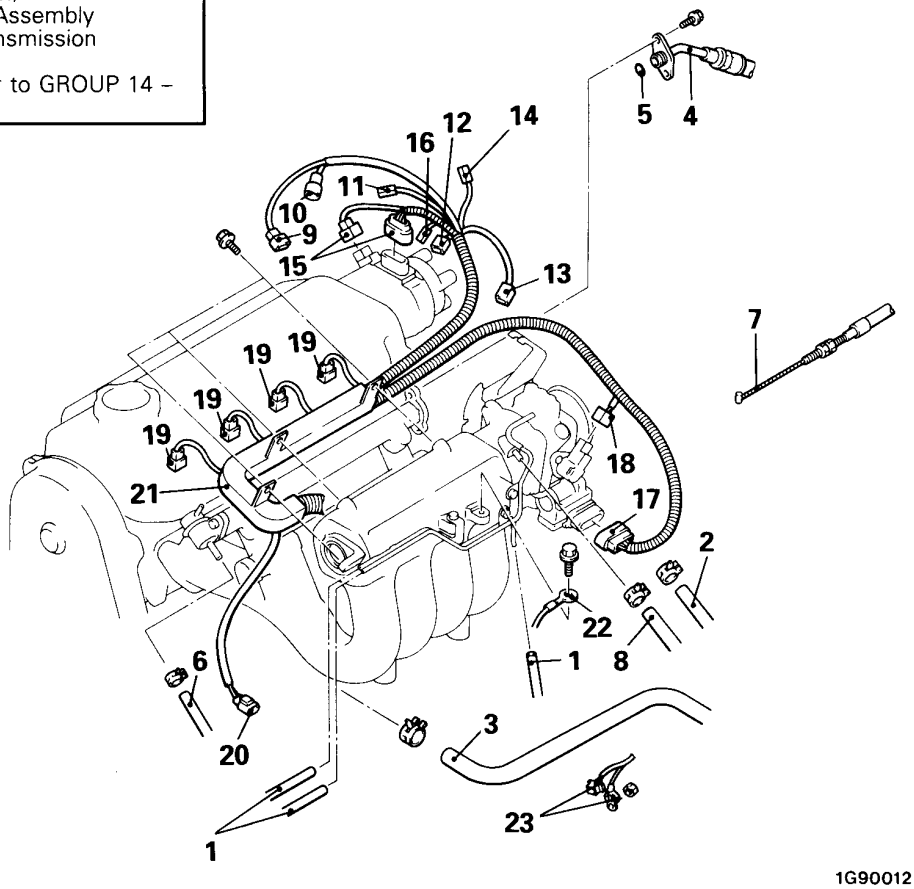
Caution
Hold the special tool securely so that it doesn't move.

ENGINE ASSEMBLY

E11TA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Releasing of Fuel Line Pressure (Refer to GROUP 13 – Service Adjustment Procedures.)
- Removal of the Hood
- Draining of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of the Transmission Assembly (Refer to GROUP 22, 23 – Transmission Assembly.)
- Removal of the Radiator (Refer to GROUP 14 – Radiator.)



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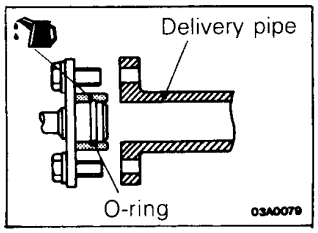
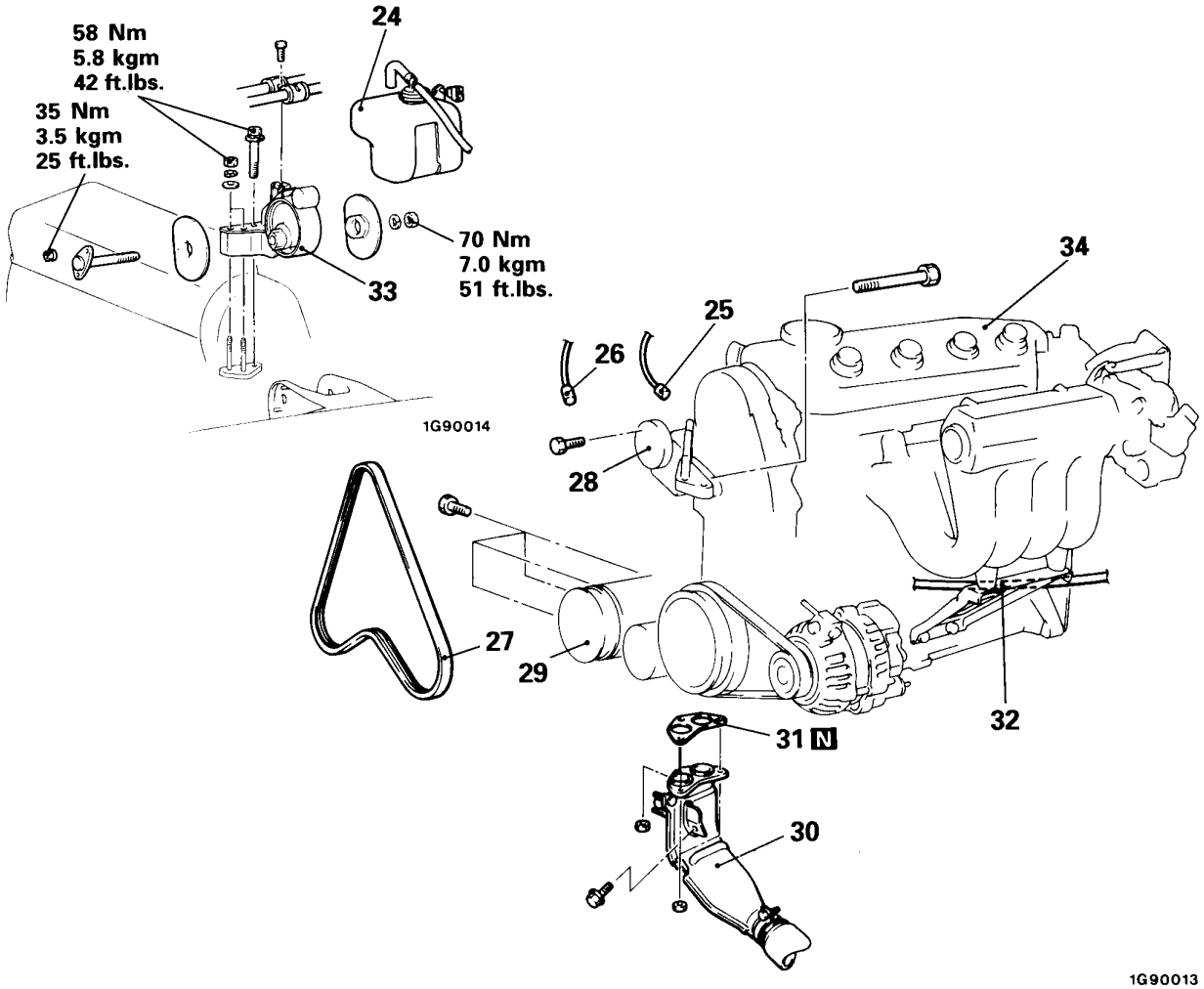


Removal steps

1. Vacuum hose connection
2. Heater hose connection (Thermostat housing → heater unit)
3. Heater hose connection (Heater unit → Water inlet pipe)
4. Fuel high pressure hose connection
5. O-ring
6. Fuel return hose connection
7. Accelerator cable connection
8. Brake booster vacuum hose connection
9. Engine coolant temperature switch
10. Oxygen sensor connector
11. Oil pressure switch connector
12. Water temperature gauge unit connector
13. Engine coolant temperature sensor
14. Engine coolant temperature switch <for condenser fan>
15. Distributor connector
16. Condenser connector
17. Idle speed control connector
18. TPS connector
19. Injector connector
20. Detonation sensor connector
21. Control harness assembly
22. Earth wire
23. Alternator harness connection

Post-installation Operation
- Installation of the Radiator (Refer to GROUP 14 – Radiator.)
- Installation of the Transmission Assembly (Refer to GROUP 22, 23 – Transmission Assembly.)
- Supplying of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Installation of the Hood
- Accelerator Cable Adjustment (Refer to GROUP 13 – Service Adjustment Procedures.)
- V-ribbed Belt Tension Adjustment of Power Steering Oil Pump and Air Conditioner Compressor (Refer to P.11-6.)



Removal steps

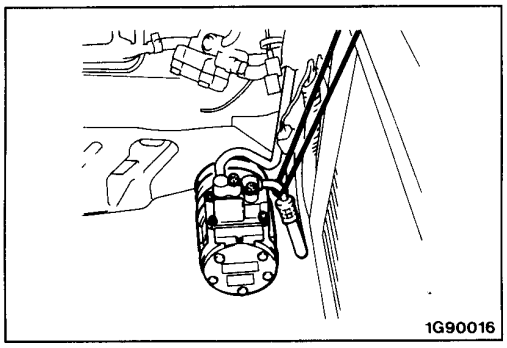
24. Condense tank
25. Power steering oil pressure switch connector
26. Air conditioner compressor connector
27. V-ribbed belt
28. ◆◆ Power steering oil pump connection
29. ◆◆ Air conditioner compressor connection
30. Front exhaust pipe connection
31. Gasket
32. Starter and alternator harness clamp
33. ◆◆ ◆◆ Engine mount bracket
34. ◆◆ ◆◆ Engine assembly

SERVICE POINTS OF REMOVAL E11TBAN

28. REMOVAL OF POWER STEERING OIL PUMP

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

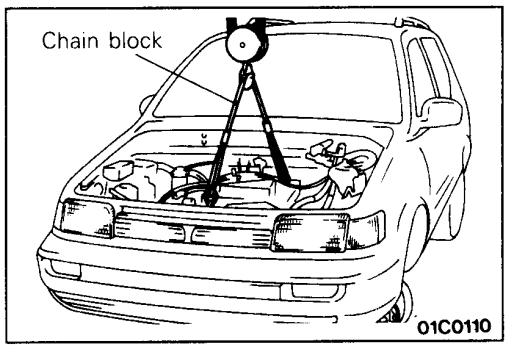
NOTE
Place the removed power steering oil pump in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.



29. REMOVAL OF AIR CONDITIONER COMPRESSOR <VEHICLES WITH AIR CONDITIONER>

Disconnect the air conditioner compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE
Place the removed air conditioner compressor in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.



33. REMOVAL OF ENGINE MOUNT BRACKET

(1) Support the engine with a garage jack.
(2) Remove the engine hanger assembly. (Special tool attached when removing the transmission assembly)
(3) Hold the engine assembly with a chain block, etc.
(4) Place the garage jack against the engine oil pan with a piece of wood in between, and after raising the engine until there is no weight on the engine mount brackets, remove the engine mount brackets.

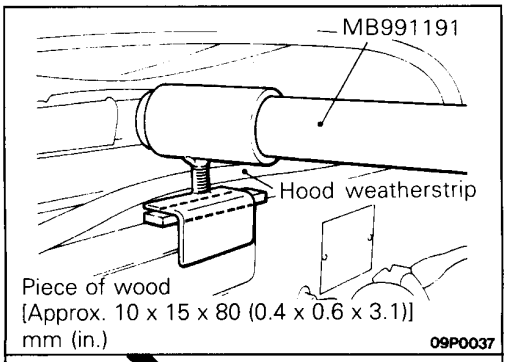
34. REMOVAL OF ENGINE ASSEMBLY

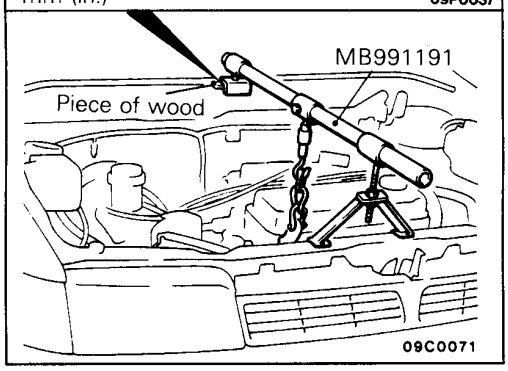
After checking that all cables, hoses and harness connectors, etc., are disconnected from the engine, lift the chain block slowly to remove the engine assembly upward from the engine compartment.

SERVICE POINTS OF INSTALLATION E11TDAQ

34. INSTALLATION OF ENGINE ASSEMBLY

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

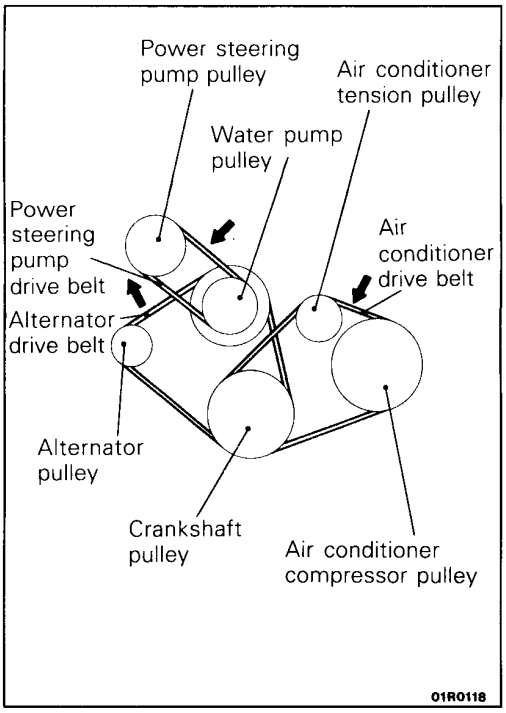


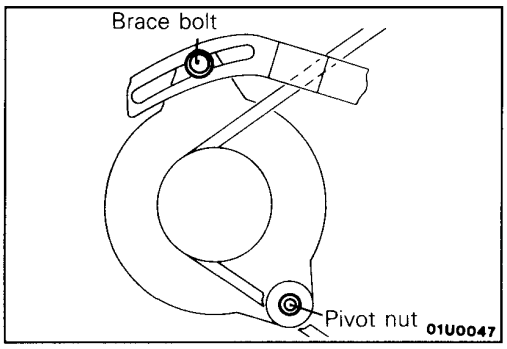


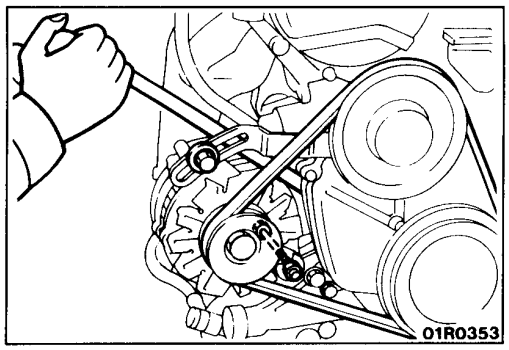
33. INSTALLATION OF ENGINE MOUNT BRACKET

(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 a garage jack.
(3) Remove the chain block and support the engine assembly with the engine hanger assembly (special tool).

Caution
Always insert a piece of wood between the engine hanger assembly and the front deck.
In addition, do not clamp the hood weatherstrip between the front deck and the piece of wood.







ENGINE <4D65, 4D68>

SERVICE ADJUSTMENT PROCEDURES

DRIVE BELT TENSION INSPECTION AND ADJUSTMENT

E11FQBJ

1. Check belt for damage or wear. Confirm that belt is fitted correctly in the pulley groove.

   NOTE
   If the belt "squeals" or slips, check belt for friction, damage or breaks and check pulley contact surface for damage.

2. Check the tension by pulling or pushing at the centre of the belt between pulleys with a force of 100 N (10 kg, 22 lbs.) as indicated in the figure. Measure drive belt tension.

   Standard value:

Alternator		**7–10 mm (0.28–0.39 in.)**
Power steering oil pump	**<4D65>**	**6–9 mm (0.24–0.35 in.)**
	<4D68>	**5.5–8.0 mm (0.22–0.31 in.)**
Air conditioner compressor		**7–8 mm (0.28–0.31 in.)**

ALTERNATOR DRIVE BELT TENSION ADJUSTMENT

(1) Loosen the alternator brace bolt and pivot nut.

(2) Move the alternator and adjust the belt deflection to the standard value by pulling or pushing at the midway of the belt between pulleys with a force of 100 N (10 kg, 22 lbs.).

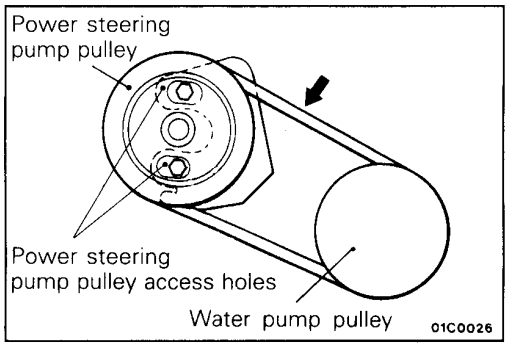
Standard value: 7–10 mm (0.28–0.39 in.)

(3) Tighten the alternator brace bolt.

Tightening torque: 14 Nm (1.4 kgm, 10 ft.lbs.)

(4) Tighten the alternator pivot nut.

Tightening torque: 23 Nm (2.3 kgm, 17 ft.lbs.)

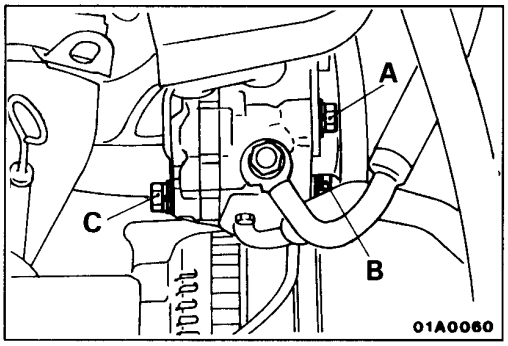


POWER STEERING OIL PUMP DRIVE BELT TENSION ADJUSTMENT

1. Apply 100 N (10 kg, 22 lbs.) of pressure to the centre of the belt between the pulleys as shown in the illustration, and check that the amount of deflection is at the standard value.

Standard value

Item		When installing a new belt	When retightening a used belt
Deflection amount mm (in.)	<4D65>	4.5–6.5 (0.177–0.256)	6.0–9.0 (0.236–0.354)
	<4D68>	4.5–5.5 (0.177–0.217)	6.0–7.0 (0.236–0.276)

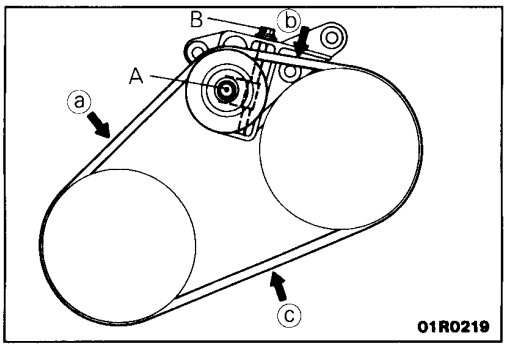


2. If the amount of deflection is outside the standard value, adjust by the following procedure.
   (1) Set a tool to the center bolt of the engine crankshaft pulley, and turn the crankshaft pulley to align the power steering pump pulley access holes with the positions of the fixing bolts A and B.
   (2) Loosen the power steering pump fixing bolts (A, B and C).
   (3) Adjust the belt tension by using a tyre lever or similar tool to move the power steering pump body.
   (4) While keeping the belt at the appropriate tension, tighten fixing bolt A.

   NOTE
   To prevent the access holes of the power steering pump pulley from becoming misaligned, it is better to first insert the tool when adjusting the belt tension.

   (5) Tighten the remaining fixing bolts.
   (6) Check the belt tension and readjust if necessary.

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



AIR CONDITIONER COMPRESSOR DRIVE BELT TENSION ADJUSTMENT

1. Apply 100 N (10 kg, 22 lbs.) of pressure to the centres (a) or (b) of the belt between the pulleys as shown in the illustration, and check that the amount of deflection is at the standard value.

Standard value

Items	When installing a new belt		When retightening a used belt	
	(a)	(b)	(a)	(b)
Deflection amount. mm (in.)	6.0–7.0 (0.236–0.276)	4.0–4.5 (0.157–0.177)	8.0–9.5 (0.315–0.374)	5.0–6.0 (0.197–0.236)

Use a belt tension gauge to check that the belt tension at (c) in the illustration is at the standard value.

Standard value

Items	When installing a new belt	When retightening a used belt
Tension N (kg, lbs.)	500–600 (50–60, 110–132)	300–400 (30–40, 60–88)

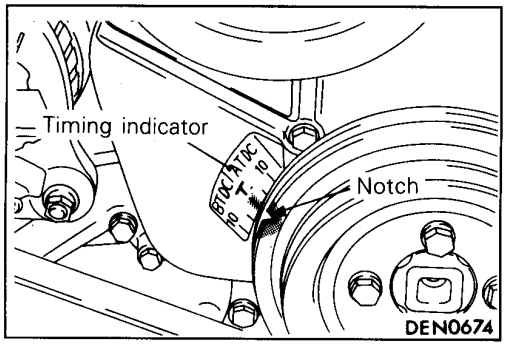
3. If the amount of deflection or the tension is outside the standard value, adjust by the following procedure.
   (1) Loosen tension pulley fixing bolt A.
   (2) Adjust the amount of belt deflection using adjusting bolt B.
   (3) Tighten fixing bolt A.
   (4) Check the amount of belt deflection and tension, and readjust if necessary.

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

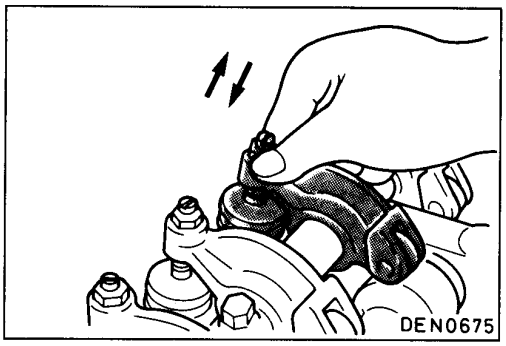
VALVE CLEARANCE INSPECTION AND ADJUSTMENT

E11FDAX

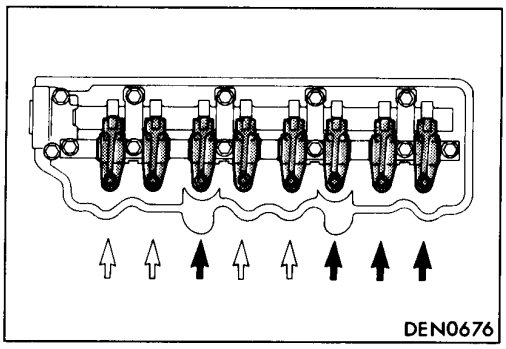
(1) Start the engine and allow it to warm up until the engine coolant temperature reaches 80 to 95°C (176 to 203°F).
(2) Remove all glow plugs from the cylinder heads for easy inspection. (Refer to GROUP 16 – Glow System.)
(3) Remove the rocker cover.



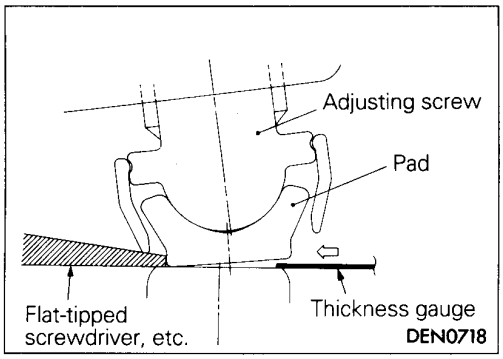
(4) Turn the crankshaft clockwise until the notch on the pulley is lined up with the "T" mark on the timing indicator.



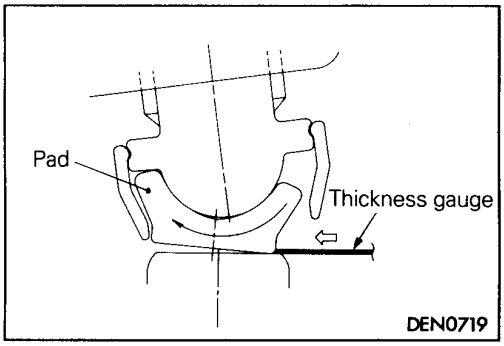
(5) Move the rocker arms on the No. 1 and No. 4 cylinders up and down by hand to determine which cylinder has its piston at the top dead centre on the compression stroke. If both intake and exhaust valve rocker arms have a valve lash, the piston in the cylinder corresponding to these rocker arms is at the top dead centre on the compression stroke.



(6) Valve clearance inspection and adjustment can be performed on rocker arms indicated by white arrows ⇩ when the No. 1 cylinder piston is at the top dead centre on the compression stroke, and on rocker arms indicated by solid arrows ⬇ when the No. 4 cylinder piston is at the top dead centre on the compression stroke.
(7) Measure the valve clearance.

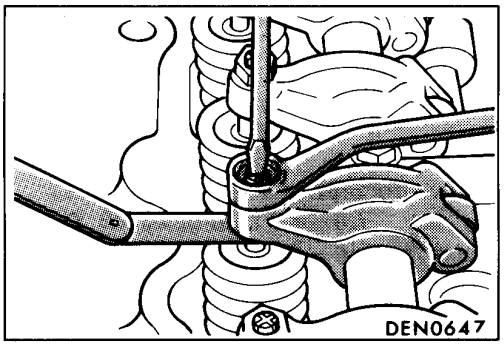


NOTE
<4D68>
When inserting the thickness gauge, push the pad from the opposite side from the thickness gauge insertion side with a flat-tipped screwdriver or similar tool to make a gap, and then insert the thickness gauge.



When you try to insert the thickness gauge, if the pad is not pushed with a flat-tipped screwdriver or similar tool and no gap is made, the pad will tilt as shown in the illustration and the thickness gauge will not be able to be inserted.

NOTES



(8) 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.

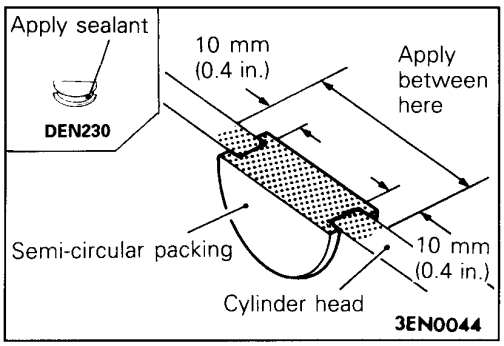
Standard value:

Intake valve	**0.25 mm (0.010 in.)**
Exhaust valve	**0.25 mm (0.010 in.)**

(9) While holding the adjusting screw with a screwdriver to prevent it from turning, tighten the lock nut securely.

(10) Turn the crankshaft through 360° to line up the notch on the crankshaft pulley with the "T" mark on the timing indicator.

(11) Repeat steps (6) and (7) on other valves for clearance adjustment.



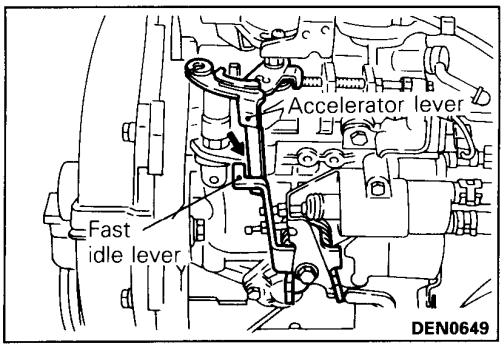
(12) Apply a coating of the specified sealant to the semi-circular packing and cylinder head to surfaces.

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

(13) Install the rocker cover.

(14) Install the glow plugs and tighten to the specified torque.

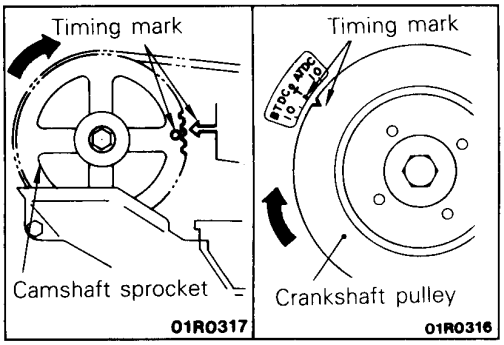
Tightening torque: 18 Nm (1.8 kgm, 13 ft.lbs.)



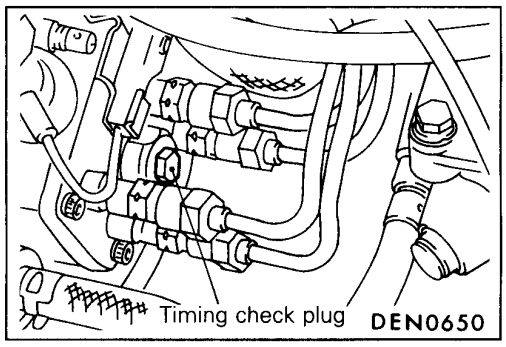
INJECTION TIMING ADJUSTMENT E11FVAK

(1) After warming up the engine, check to be sure that the fast idle lever is separated from the accelerator lever.

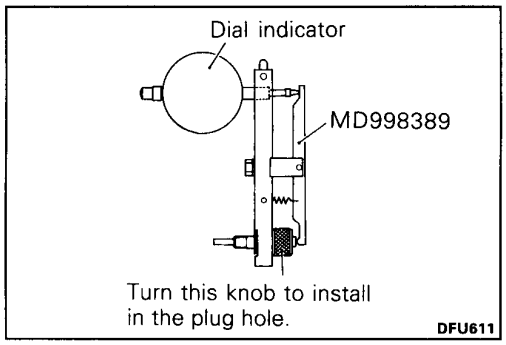
(2) To make the crankshaft turn more easily, remove the four glow plugs.



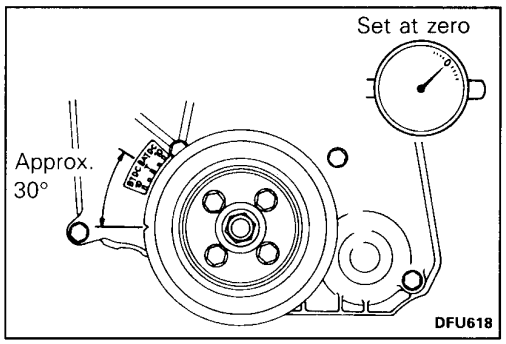
(3) Turn the crankshaft clockwise (right turn) to align each timing mark and to set the No. 1 cylinder at compression top dead centre.



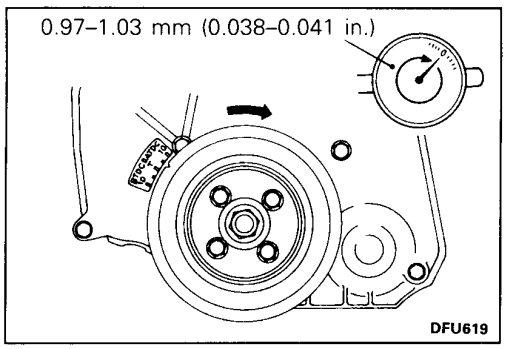
(4) Remove the timing check plug installed at the rear of the injection pump.



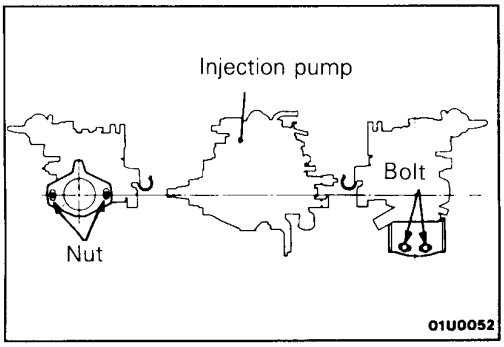
(5) Install the special tool to the rear of the injection pump.
(6) Install a dial gauge to the special tool.

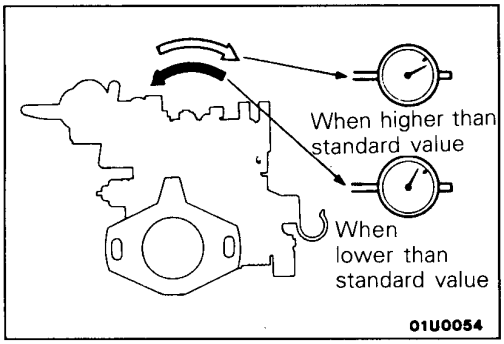


(7) Turn the crankshaft clockwise to move the No. 1 cylinder approximately 30° before compression top dead centre.
(8) Set the needle of the dial gauge to 0.
(9) Check to be sure that the needle doesn't move even if the crankshaft is turned slightly (2–3°) both clockwise and anti-clockwise.
(10) If the needle moves, the injection pump plunger is lifted, so reset it by turning the crankshaft to a position where the needle doesn't move.



(11) Turn the crankshaft pulley clockwise to align the crankshaft pulley notch to 7° ATDC <4D65>, or 9° ATDC <4D68>.
(12) Take a reading of the value displayed on the dial gauge.
Standard value: 1 ± 0.03 mm



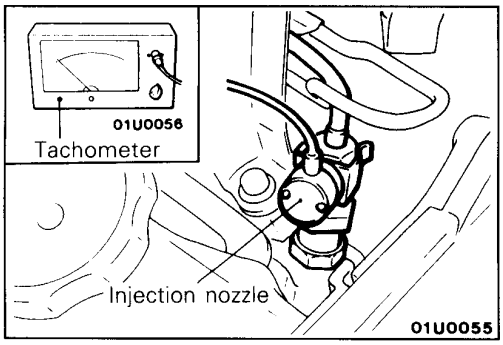


(13) If the value is outside the standard value, adjust the injection timing by the following procedure.
① Loosen the four injection pipe union nuts on the injection pump side. (Do not remove the union nuts.)
When loosening the nuts, hold the delivery valve holders with a spanner so that they don't turn at the same time.
② Loosen the two injection pump mounting nuts and the two injection pump mounting bolts. (Do not remove the nuts and bolts.)
③ Tilt the injection pump to the left and right and adjust so that the value displayed on the dial gauge is at the standard value.
④ Temporarily tighten the two mounting nuts and bolts of the injection pump.
⑤ Repeat steps (7) – (12) to check if the adjustment has been made correctly.
⑥ Securely tighten the injection pump mounting nuts and bolts.
⑦ Securely tighten the injection pipe union nuts.
When tightening the nuts, hold the delivery valve holders with a spanner so that they don't turn at the same time.
(14) Remove the special tool.
(15) After replacing the gasket with a new gasket, securely tighten the timing check plug.

ENGINE IDLE SPEED INSPECTION AND ADJUSTMENT E11FXDC

NOTE
Carry out inspection and adjustment of the idle speed after checking that the injection timing is normal.

(1) Before inspection and adjustment set vehicle in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral

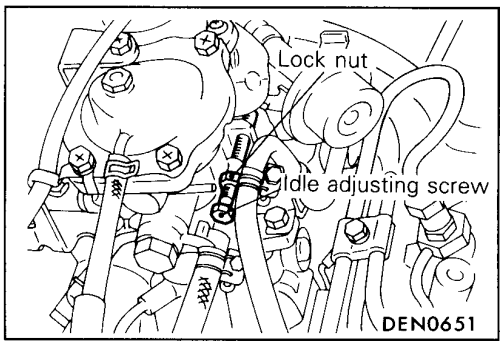


(2) Connect a tachometer to the injection nozzle or the injection pipe.

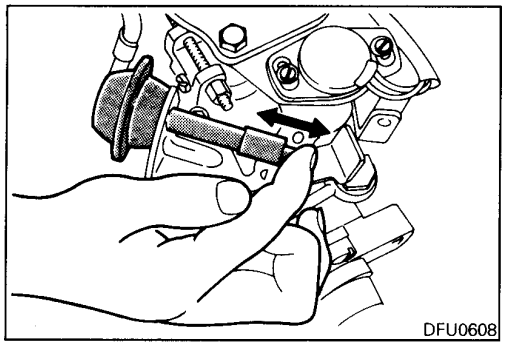
Caution
When the tachometer is connected to the injection pipe, the pipe mounting clamps should all be removed.

(3) Check the idle speed.

Standard value: 750 ± 100 r/min.



(4) If the idle speed is outside the standard value, loosen the lock nut on the idle adjusting screw and adjust by turning the idle adjusting screw.
After adjustment, securely tighten the lock nut.



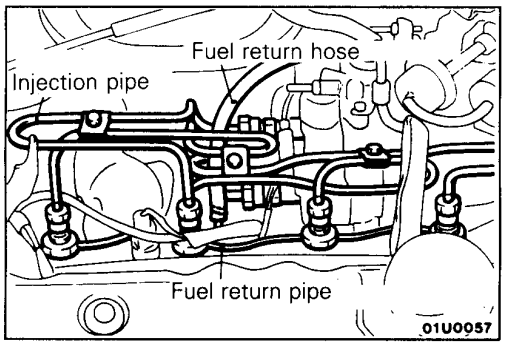
INSPECTION OF DASH POT <4D65> EFFYAI

(1) Push the dash pot rod with a finger, and make sure that there is some resistance when it moves.

NOTE
1. It is functioning properly if it offers greater resistance to moving if pushed with greater pressure.
2. A defective diaphragm or check valve is suspected if the rod moves without resistance when pushed.

(2) Make sure that the rod returns quickly to its original position when finger pressure is released from the rod.

NOTE
A defective check valve is suspected if the rod returns too slowly.



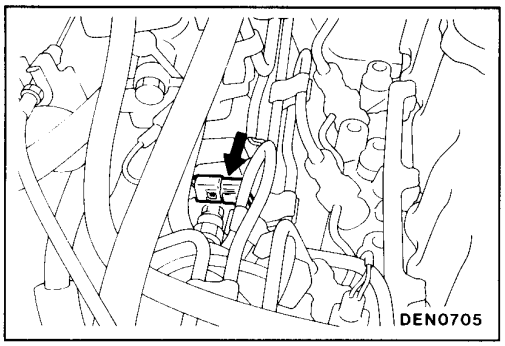
COMPRESSION PRESSURE INSPECTION E11FGAP

(1) Check to be sure that the engine oil, starting motor and battery are in the normal condition.
(2) Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 to 95°C (176 to 203°F).
(3) Remove the injection pipes.
(4) Remove the fuel return hose.
(5) Hold the hexagonal section of the fuel return pipe with a wrench, and remove the nut that fastens the pipe to each injection nozzle.
(6) Remove the fuel return pipe and gasket.
(7) Using a deep socket wrench, remove all the injection nozzles.

NOTE
Attach a tag indicating the cylinder number to each nozzle that has been removed.

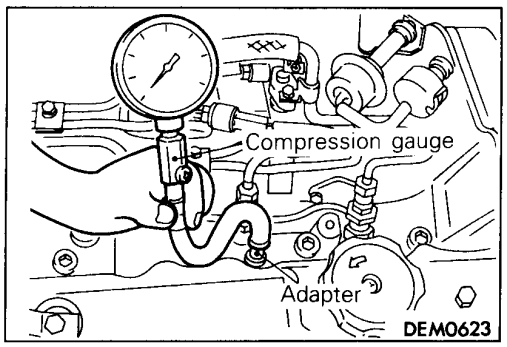
(8) Remove the holder gasket and nozzle gasket from the injection nozzle hole in the cylinder head.
(9) Disconnect the fuel cut solenoid valve connector.

NOTE
This will stop fuel injection from being carried out.



(10) Cover the injection nozzle mounting hole with a rag, and after the engine has been cranked, check that no foreign material is adhering to the rag.

Caution
1. **Keep away from the injection nozzle mounting hole 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 injection nozzle mounting hole, which is dangerous.**



(11) Attach the adapter to the injection nozzle hole and connect a compression gauge to the adapter.
(12) Crank the engine and measure the compression pressure.

Standard value (at engine speed of 250 r/min.):
<4D65> 2,700 kPa (27 kg/cm, 384 psi)
<4D68> 3,500 kPa (35 kg/cm, 498 psi)
Limit (at engine speed of 250 r/min.):
<4D65> min. 1,920 kPa (19.2 kg/cm, 273 psi)
<4D68> min. 2,560 kPa (25.6 kg/cm, 364 psi)

(13)Measure the compression of all the cylinders, and check that the pressure differences between each cylinder are below the limit.

Limit: max. 300 kPa (3.0 kg/cm, 43 psi)

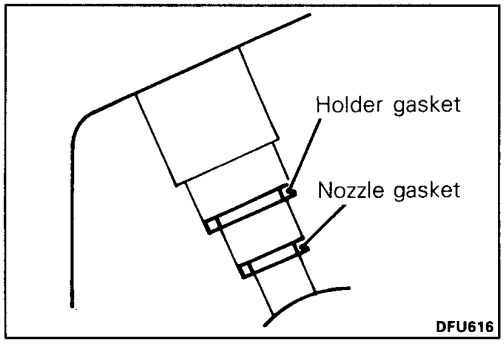
(14)If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the injection nozzle mounting hole, and repeat the operations in steps (11) to (13).

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.

(15)Connect the fuel cut solenoid valve connector.

For information regarding the servicing procedures for these causes of malfunction, refer to the ENGINE AND TRANSMISSION MANUAL.



(16)Clean nozzle holder installation area of the cylinder head.

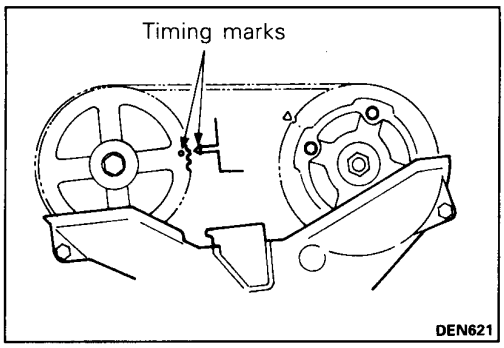
(17)Fit a new nozzle gasket and holder gasket into the nozzle holder hole in the cylinder head.

(18)Install the injection nozzles in their correct position referring to the cylinder numbers indicated on the tags that were attached to each nozzle at the time of removal. Tighten the nozzles to specified torque.

Tightening torque: 55 Nm (5.5 kgm, 40 ft.lbs.)

(19)Install the gaskets and fuel return pipe.

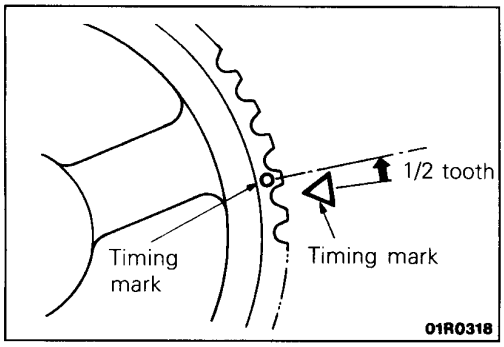
(20)Install the injection pipes.



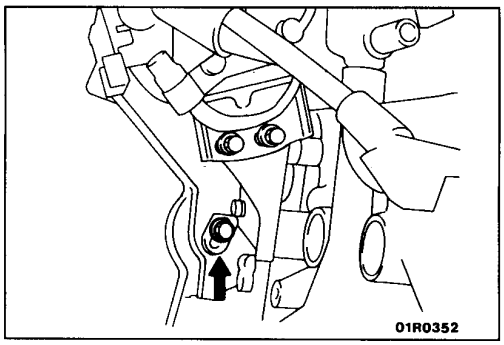
TIMING BELT ADJUSTMENT E11FFDI

(1) Turn crankshaft clockwise to bring No. 1 cylinder piston to top dead centre on compression stroke.

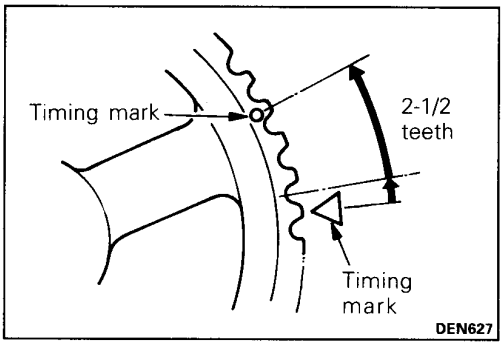
Caution
For aligning the timing marks, never turn the crankshaft anticlockwise as it could cause inadequate belt tension.



(2) Turn the crankshaft anticlockwise by a distance equivalent to 1/2 tooth of the camshaft sprocket in order to correct looseness of the belt at the idler side.



(3) Using a long extension, loosen the installation bolt of the timing belt tensioner (from the engine rear) by 1/6 to 1/2 turn, taking advantage of the force of the tensioner spring to provide tension to the belt.



(4) In addition, turn the crankshaft anticlockwise by a distance equivalent to 2-1/2 teeth.

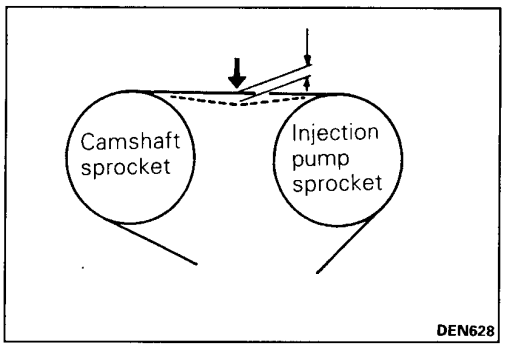
NOTE
When the setting is as described above, the camshaft will be slightly past compression top dead centre of the No. 1 cylinder, and the looseness of the timing belt will be at the tension side.

Caution
Do not rotate the crankshaft clockwise, because the tensioner side will become stretched and the adjustment will be unsuitable.

(5) Tighten the timing belt tensioner at the specified torque.
(6) Turn the crankshaft clockwise and align the timing mark.
(7) Using the index finger, press between the camshaft sprocket and the injection pump and sprocket, and check whether or not the amount of flexion is within the standard value range or not.

Standard value range: 4.0–5.0 mm (0.16–0.20 in.)

If there is a deviation from the standard value range, repeat steps (2) to (5).



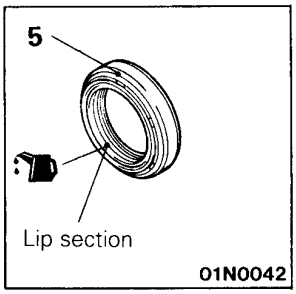
CAMSHAFT AND CAMSHAFT OIL SEAL

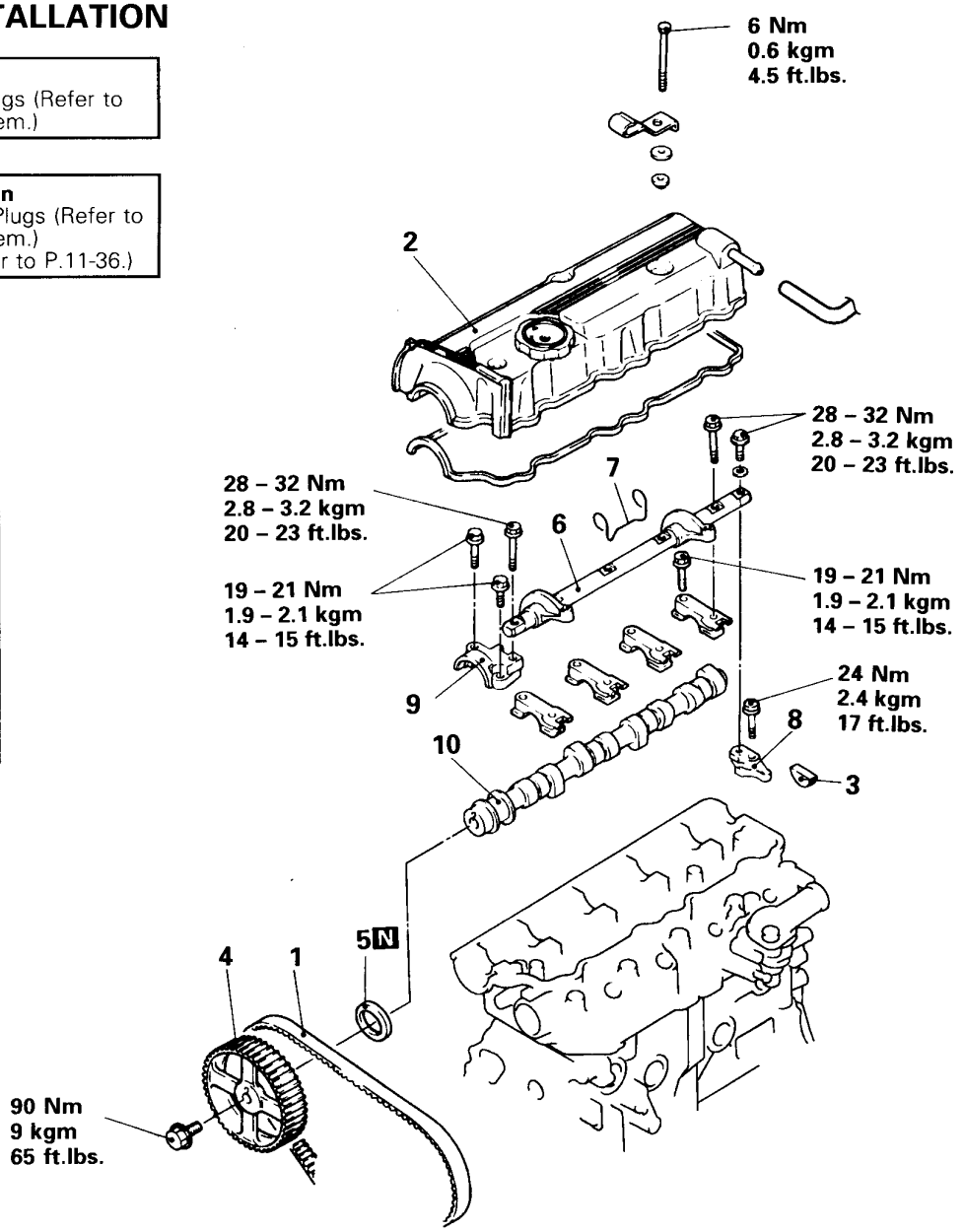
E11HA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of the Glow Plugs (Refer to GROUP 16 – Glow System.)

Post-installation Operation
- Installation of the Glow Plugs (Refer to GROUP 16 – Glow System.)
- Engine Adjustment (Refer to P.11-36.)

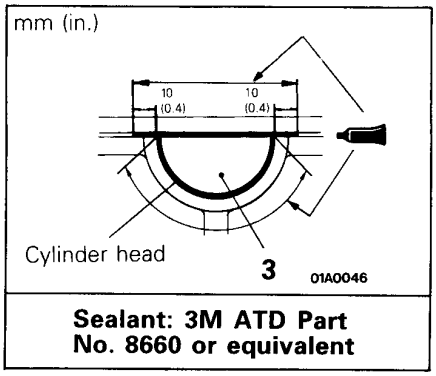




01A0389

Removal steps

1. Timing belt (Refer to P.11-56.)
2. Rocker cover
3. Semi-circular packing
4. Camshaft sprocket
- ◆◆ 5. Oil seal
- ◆◆ 6. Rocker arms and rocker arm shaft
- ◆◆ 7. Rocker arm spring
8. Rocker shaft support
- ◆◆ 9. Camshaft bearing cap
10. Camshaft

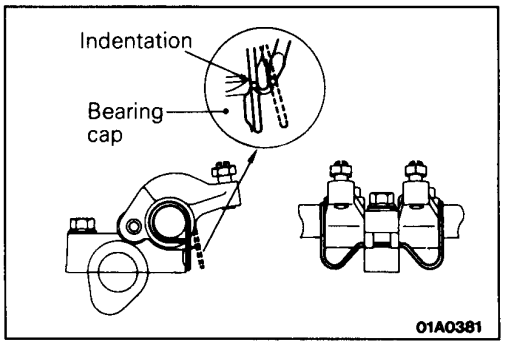


Sealant: 3M ATD Part No. 8660 or equivalent

SERVICE POINTS OF INSTALLATION E11HCBE

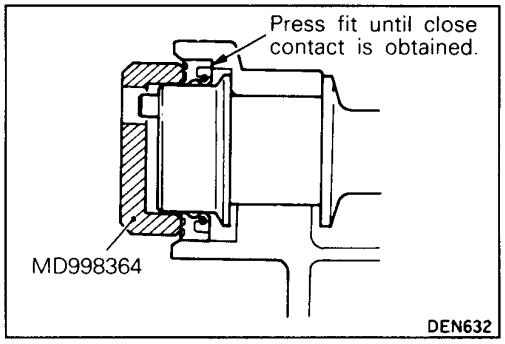
9. INSTALLATION OF CAMSHAFT BEARING CAP

Install in order of numbers stamped on top of camshaft bearing caps. Install No. 1 cap on camshaft sprocket side. For your information, No. 1 and No. 5 caps have no number stamps.



7. INSTALLATION OF ROCKER ARM SPRING/6. ROCKER ARMS AND ROCKER ARM SHAFT

(1) Install the rocker arm and the rocker arm spring to the rocker arm shaft.
(2) Install the bearing cap to the rocker arm shaft assembly.
(3) Attach the rocker arm spring at the indentation in the bearing cap.
(4) Check the valve clearance; adjust if necessary. (Refer to P.11-39)



5. INSTALLATION OF OIL SEAL

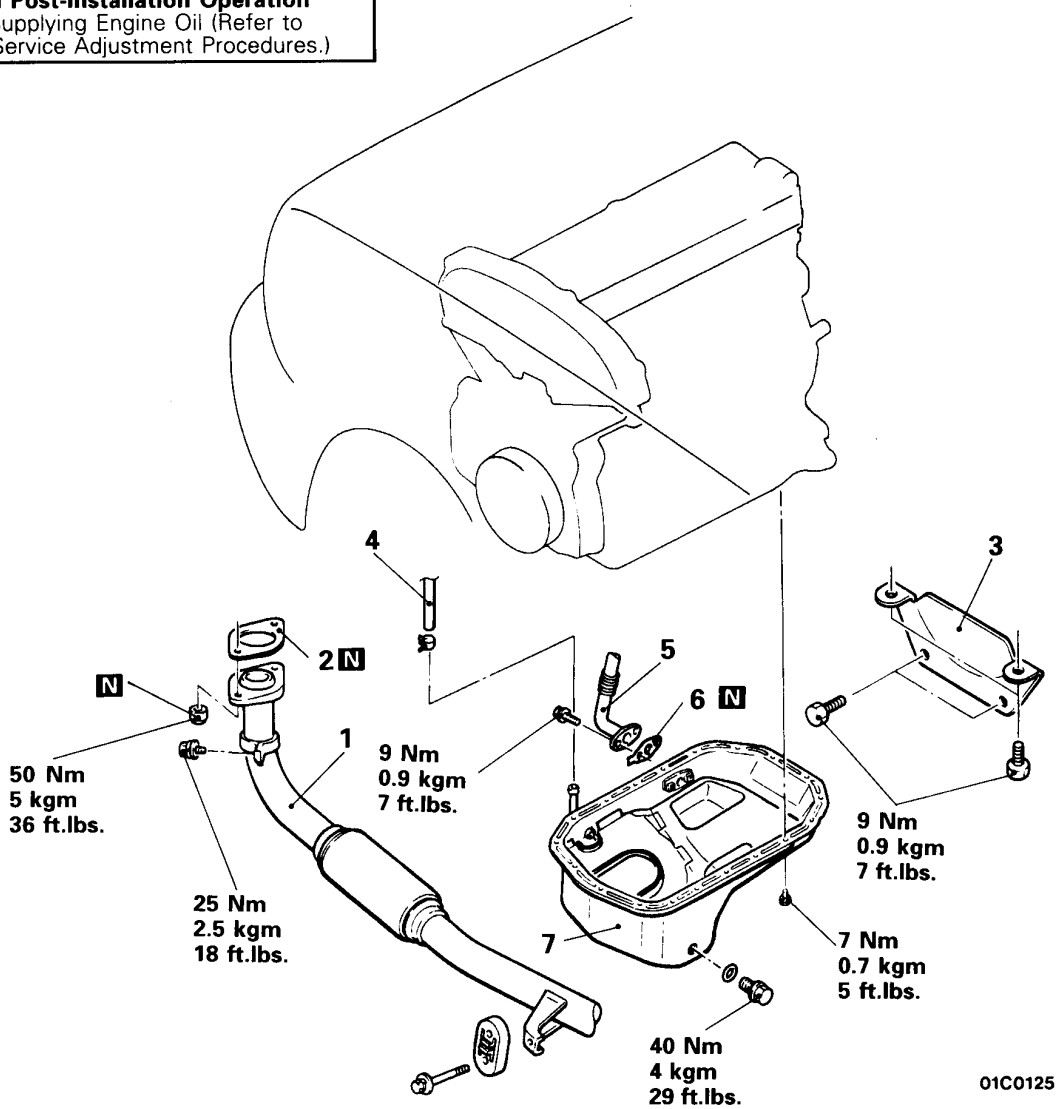
Using the special tool (oil seal installer), tap the oil seal into the cylinder head.

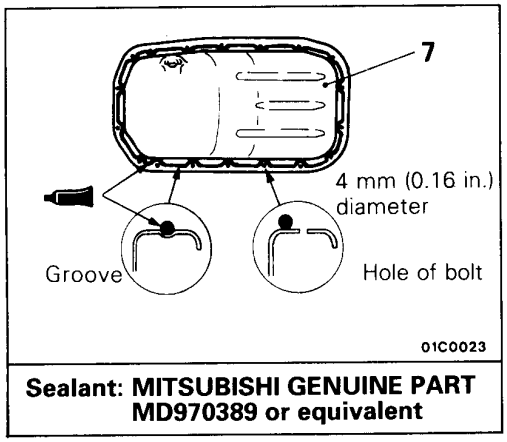
OIL PAN

E11KA–

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying Engine Oil (Refer to GROUP 12 – Service Adjustment Procedures.)



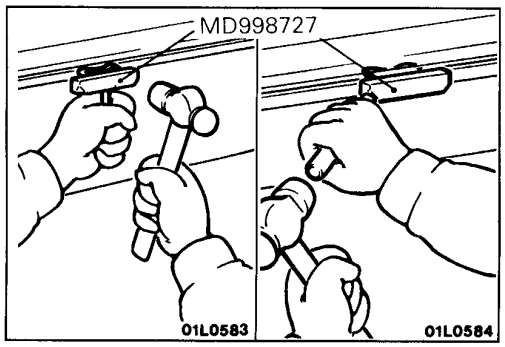


Sealant: MITSUBISHI GENUINE PART MD970389 or equivalent

Removal steps

1. Front exhaust pipe
2. Gasket
3. Bell housing cover
4. Connection for oil drain hose
5. Oil return pipe
6. Gasket
7. Oil pan

◆◆



SERVICE POINTS OF REMOVAL E11KBBN

7. REMOVAL OF OIL PAN

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

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

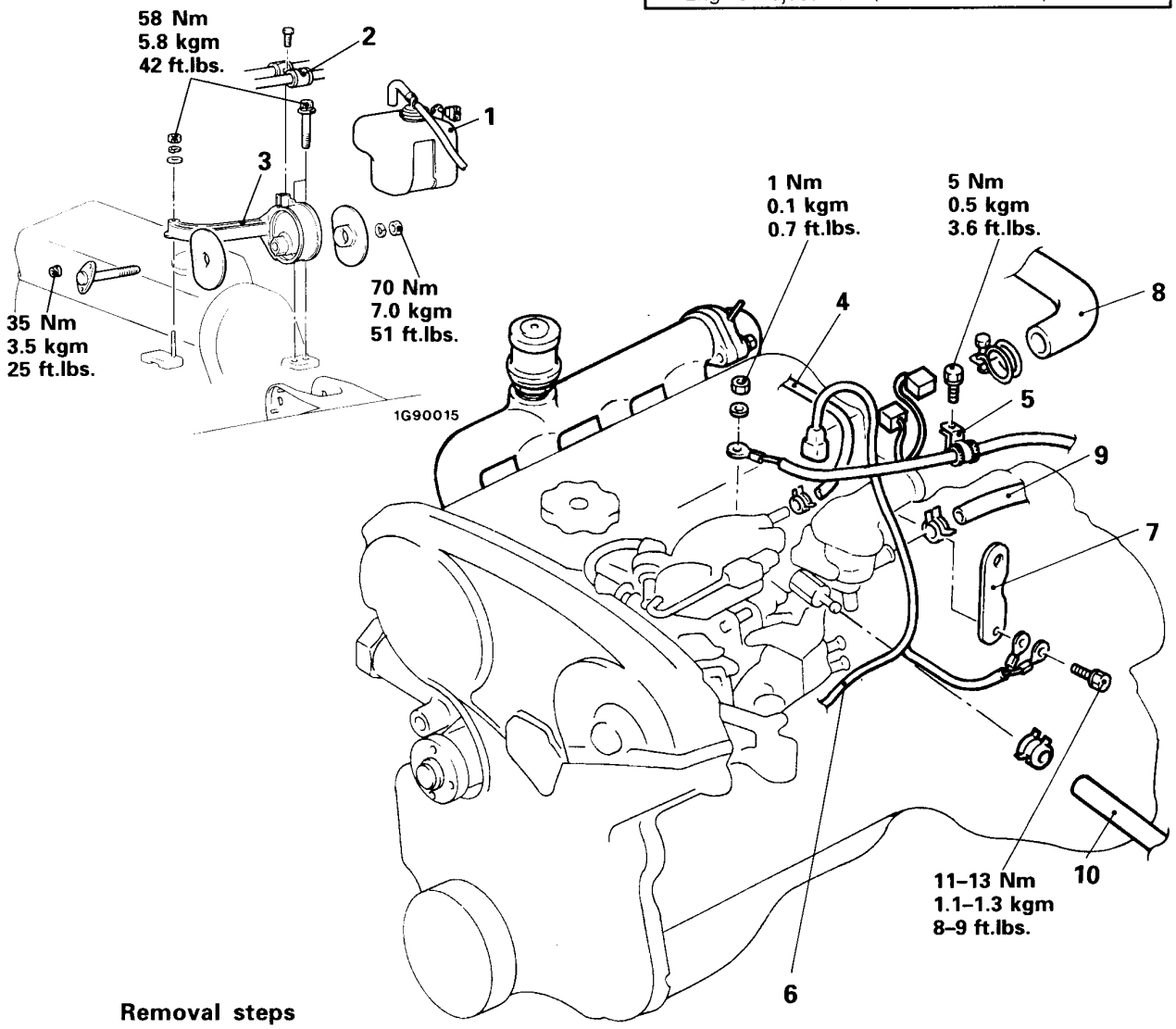
CYLINDER HEAD GASKET <4D65>

E11JA- -

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of the Radiator (Refer to GROUP 14 – Radiator.)
- Removal of the Glow Plugs (Refer to GROUP 16 – Glow System.)

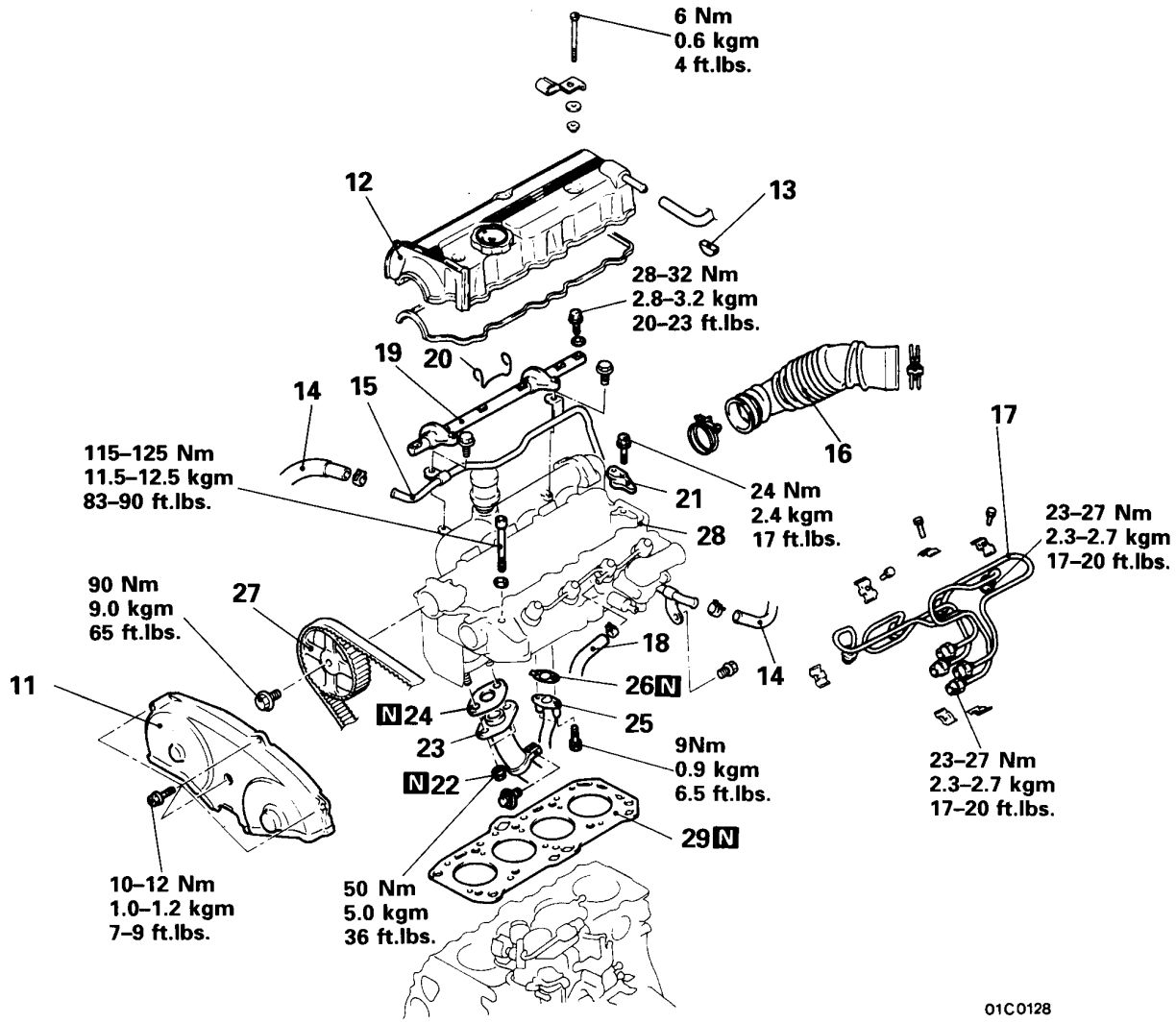
Post-installation Operation
- Installation of the Glow Plugs (Refer to GROUP 16 – Glow System.)
- Installation of the Radiator (Refer to GROUP 14 – Radiator.)
- Supplying of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Engine Adjustment (Refer to P.11-36.)



Removal steps

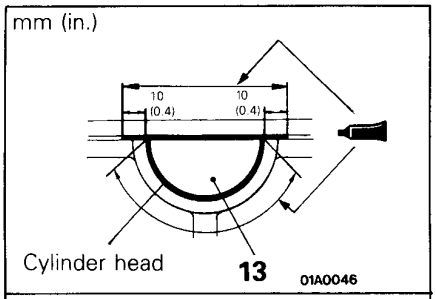
1. Condense tank
2. Power steering hose and air conditioner hose clamp part
◆◆ 3. Engine mount bracket
4. Connection for boost hose
5. Connection for control harness
6. Connection for fuel injection pump harness
7. Engine hanger
8. Radiator upper hose
9. Water hose
10. Water hose

01C0122

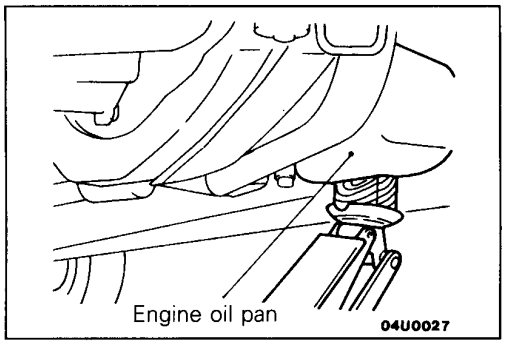


Removal steps

11. Timing belt front upper cover
12. Rocker cover
13. Semi-circular packing
14. Connection for brake booster vacuum hose
15. Brake booster vacuum pipe
16. Connection for air hose
17. Injection pipes assembly
18. Connection for fuel return hose
19. ◆◆ Rocker arms and rocker arm shaft
20. ◆◆ Rocker arm spring
21. Rocker shaft support
22. Self-locking nut
23. Connection for front exhaust pipe
24. Gasket
25. Connection for oil return pipe
26. Gasket
27. ◆◆ Camshaft sprocket
28. ◆◆ ◆◆ Cylinder head assembly
29. ◆◆ Cylinder head gasket



Sealant: 3M ATD Part No. 8660 or equivalent



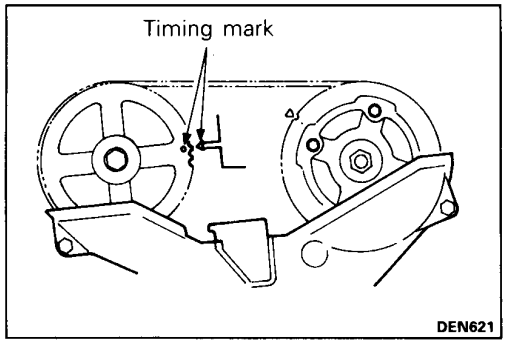
SERVICE POINTS OF REMOVAL E11JBBD

3. REMOVAL OF ENGINE MOUNT BRACKET

(1) Place a wooden block against the engine oil pan and then jack up the vehicle.

Caution
Jack up carefully, taking care not to apply a load to the various parts.

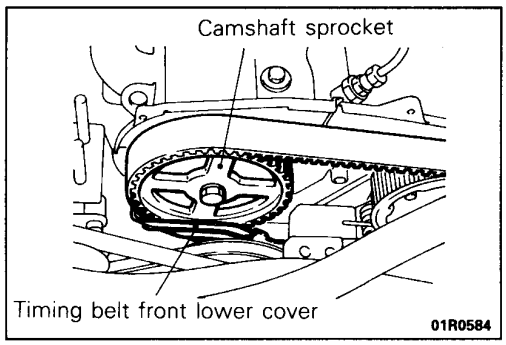
(2) Remove the engine mount bracket.



27. REMOVAL OF CAMSHAFT SPROCKET

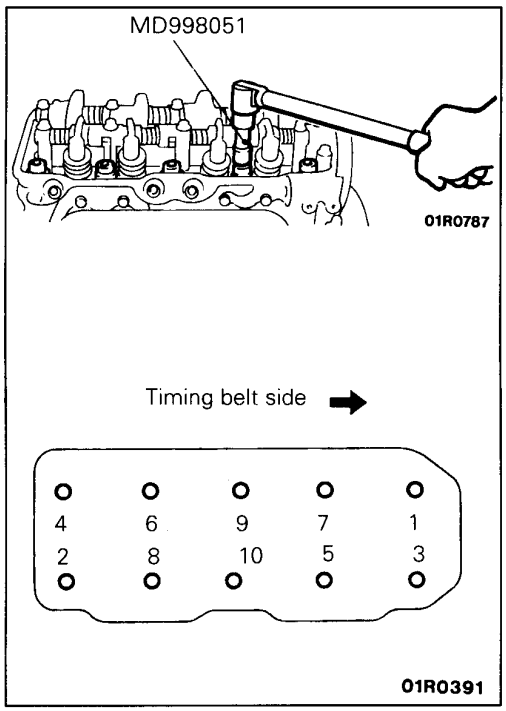
(1) Rotate the crankshaft clockwise and align the timing mark.

Caution
The crankshaft must always be rotated clockwise only.



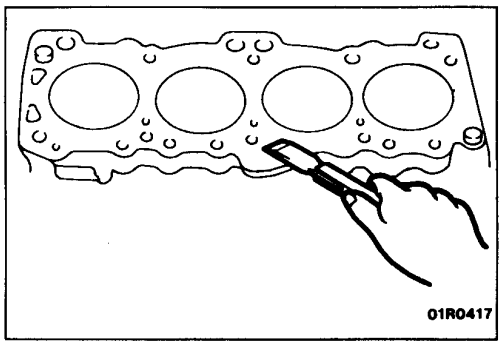
(2) Remove the camshaft sprocket (with the timing belt attached), and place on the timing belt front lower cover.

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



28. REMOVAL OF CYLINDER HEAD ASSEMBLY

Using the special tool, after loosening the bolts in the order shown in the figure (in 2 or 3 cycles), remove, and then remove the cylinder head assembly.

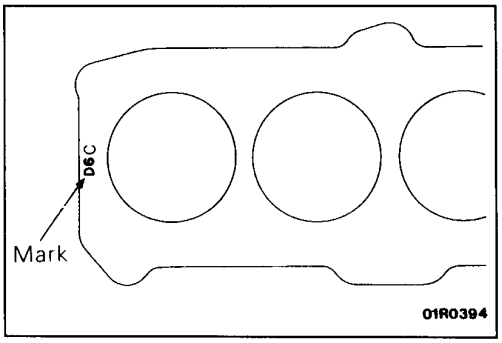


SERVICE POINTS OF INSTALLATION E11JDBJ

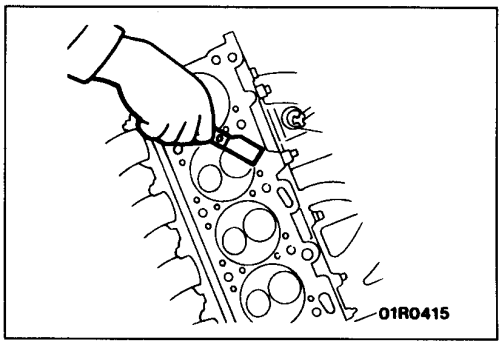
29. INSTALLATION OF CYLINDER HEAD GASKET

(1) Use a scraper to remove the cylinder head gasket from the cylinder block.

Caution
Take care that no foreign material gets into the cylinder, or into coolant or oil passages.



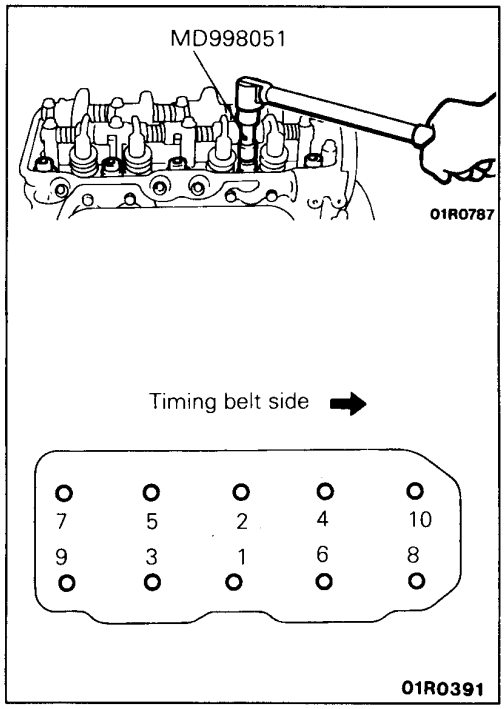
(2) The cylinder head gasket has an identification mark for each engine; take care that the installation is correct.
(3) Place the cylinder head gasket on the cylinder block so that the identification mark is at the upper surface.



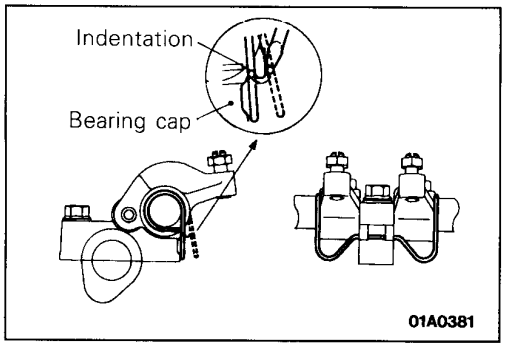
28. INSTALLATION OF CYLINDER HEAD ASSEMBLY

(1) Use a scraper to remove the cylinder head gasket from the cylinder head assembly.

Caution
Take care that no foreign material gets into the coolant or oil passages.



(2) Using the special tool, tighten the bolts in the order shown in the figure (in 2 or 3 cycles).



20. INSTALLATION OF ROCKER ARM SPRING /19. ROCKER ARMS AND ROCKER ARM SHAFT

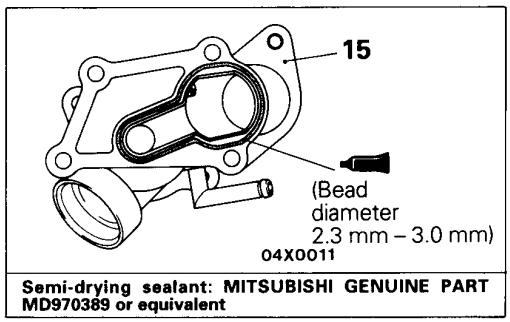
(1) Install the rocker arm and the rocker arm spring to the rocker arm shaft.
(2) Install the bearing cap to the rocker arm shaft assembly.
(3) Attach the rocker arm spring at the indentation in the bearing cap.
(4) Check the valve clearance; adjust if necessary. (Refer to P.11-39.)

CYLINDER HEAD GASKET <4D68>

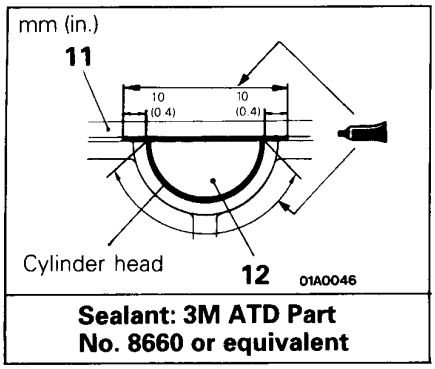
E11JA--

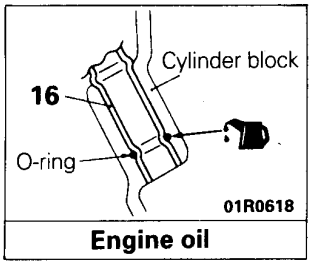
REMOVAL AND INSTALLATION

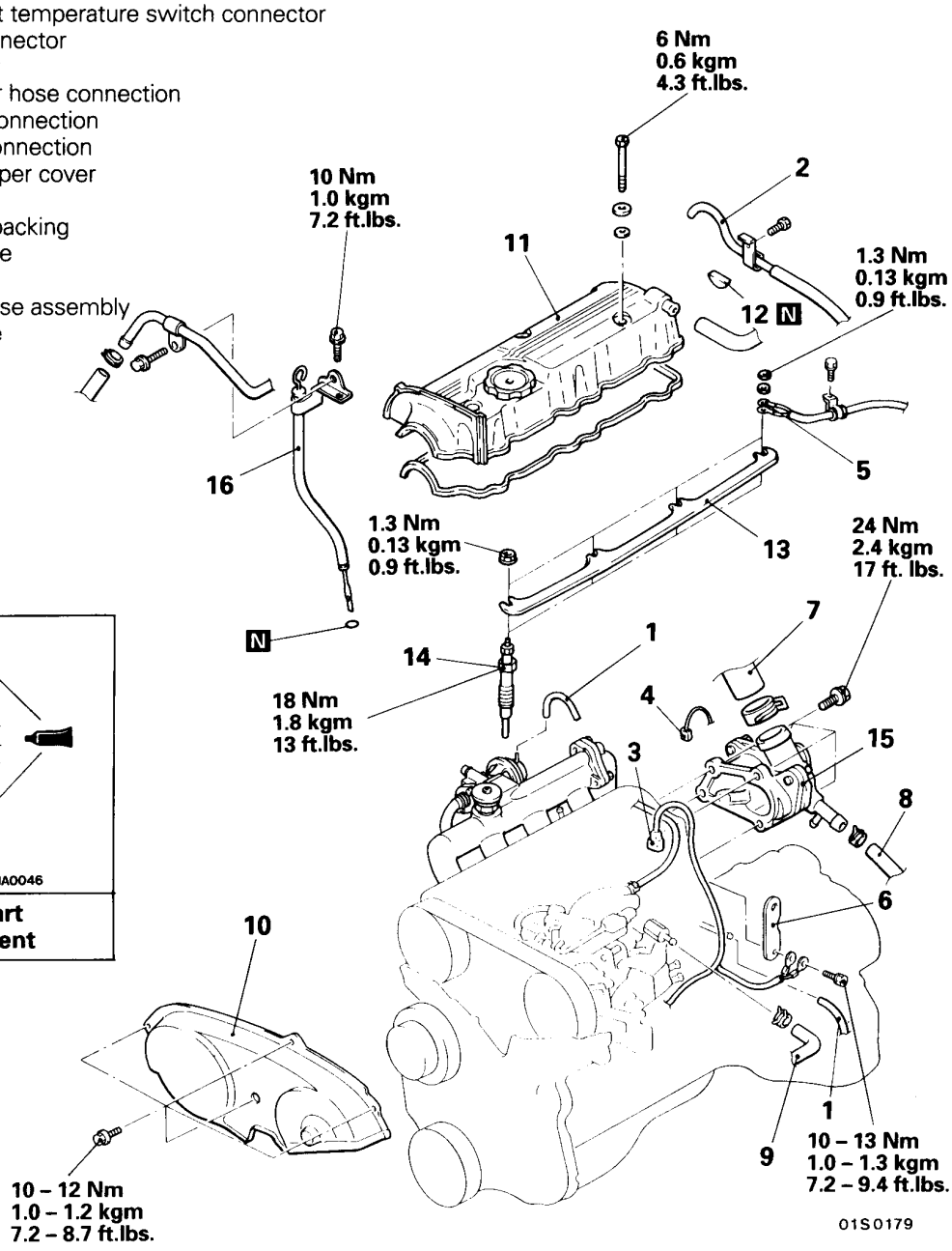
Pre-removal and Post-installation Operation
- Draining and Supplying of the Coolant
- Draining and Supplying of the Engine Oil
- Removal and Installation of the Air Cleaner Assembly and Intake Air Hose.

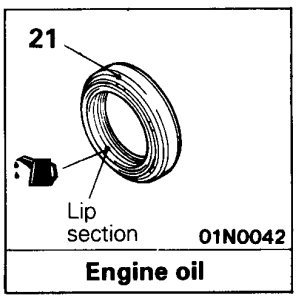


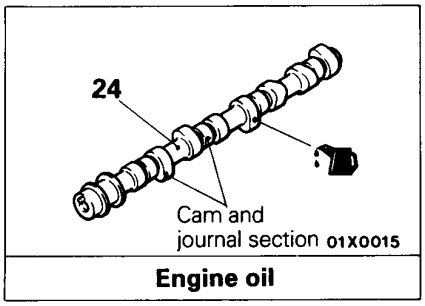
Removal steps
1. Vacuum hose connection (For EGR)
2. Vacuum hose connection (For boost compensator)
3. Engine coolant temperature gauge and sensor connector
4. Engine coolant temperature switch connector
5. Glow plug connector
6. Engine hanger
7. Radiator upper hose connection
8. Heater hose connection
9. Water hose connection
10. Timing belt upper cover
11. Rocker cover
12. Semi-circular packing
13. Glow plug plate
14. Glow plug
15. ◆◆ Thermostat case assembly
16. Oil level gauge

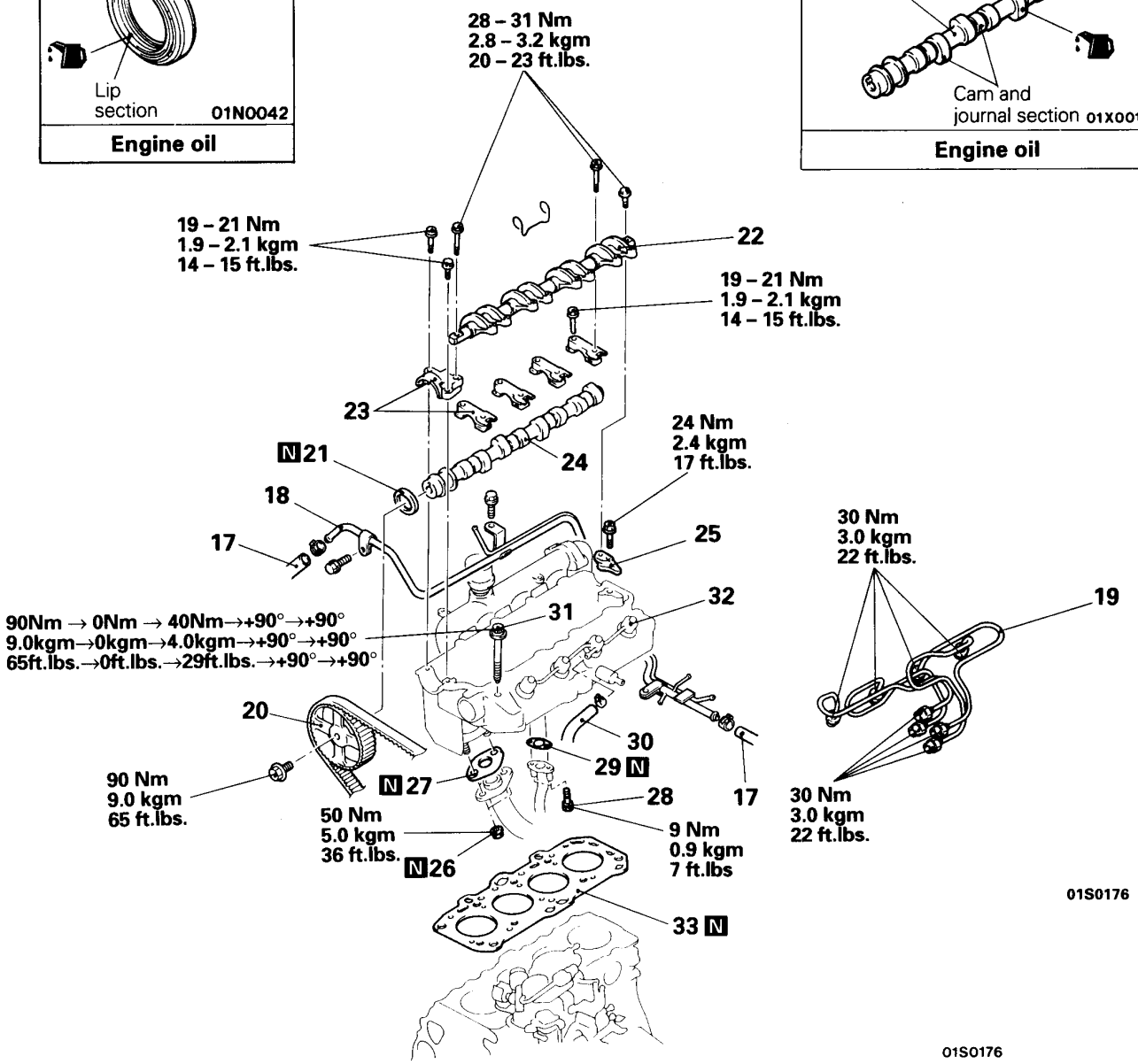




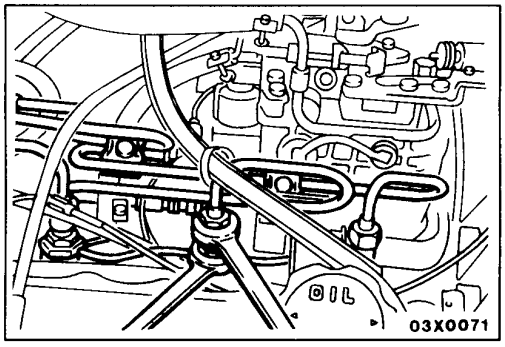








17. Brake booster vacuum hose
18. Brake booster vacuum pipe
◆◆ 19. Injection pipe
◆◆ 20. Camshaft sprocket
◆◆ 21. Camshaft oil seal
◆◆ 22. Rocker arm and shaft assembly
◆◆ 23. Camshaft bearing cap
24. Camshaft
25. Rocker shaft support
26. Self-locking nut
27. Gasket
28. Bolt
29. Gasket
30. Fuel return hose connection
◆◆ 31. Cylinder head bolt
32. Cylinder head assembly
◆◆ 33. Cylinder head gasket



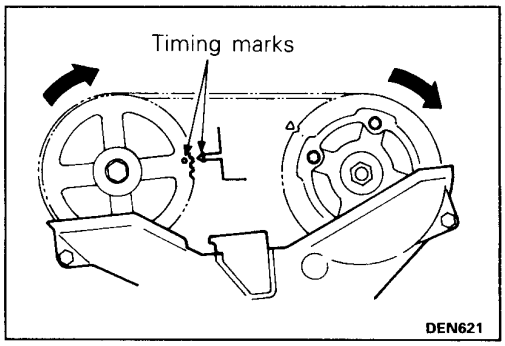
SERVICE POINTS OF REMOVAL

E11JBBH

19. DISCONNECTION OF INJECTION PIPE

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.

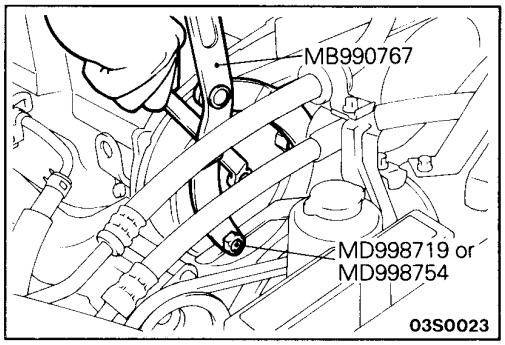
Caution
After disconnecting the injection pipe, plug the opening so that no foreign particles get inside the pump or into the injection nozzle.



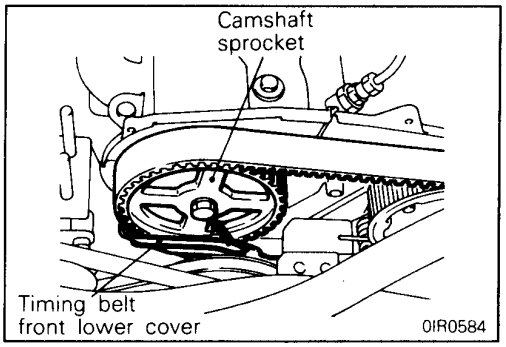
20. REMOVAL OF CAMSHAFT SPROCKET

(1) Rotate the crankshaft clockwise and check that the camshaft sprocket's timing mark and the injection sprocket's timing mark are aligned.

Caution
The crankshaft must always be rotated clockwise.



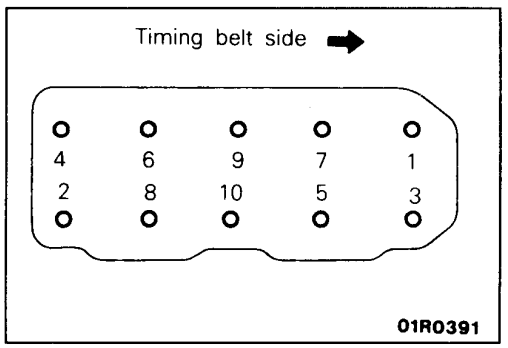
(2) Use the special tool to remove the camshaft sprocket bolt.



(3) Remove the camshaft sprocket with the timing belt still attached, and place it on the timing belt lower cover.

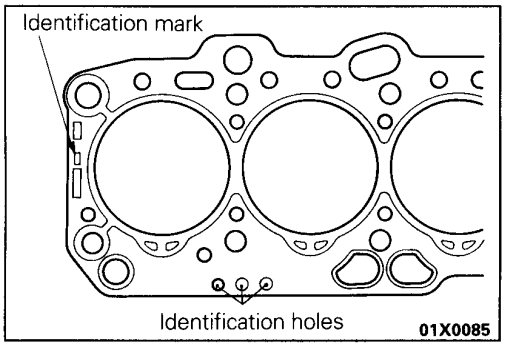
NOTE
At this time, tie the timing belt and camshaft sprocket and also the timing belt and injection pump sprocket together with cord or similar so that they do not become unmeshed.

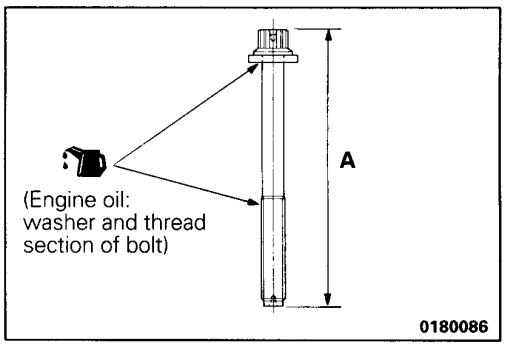
Caution
After removing the camshaft sprocket, be sure not to rotate the crankshaft.

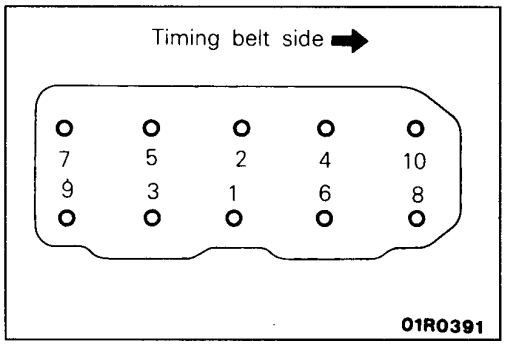


31. REMOVAL OF CYLINDER HEAD BOLT

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







SERVICE POINTS OF INSTALLATION E11JDCV

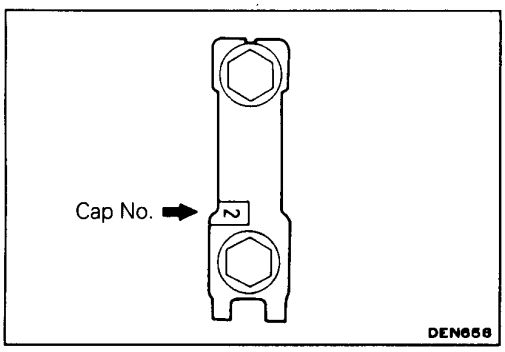
33. INSTALLATION OF CYLINDER HEAD GASKET

(1) Wipe off any oil or grease from the gasket mounting surface.
(2) Check the number of identification holes on the cylinder head gasket that was removed, and select a cylinder head gasket with the same number of identification holes.
(3) Place the cylinder head gasket on top of the cylinder block so that the identification mark is facing upwards as in the illustration.

31. INSTALLATION OF CYLINDER HEAD BOLT

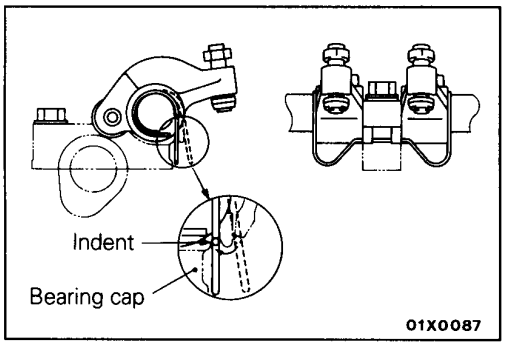
(1) When installing the cylinder head bolts, the length below the head of the bolts should be within the standard value. If it is outside the standard value, replace the bolts.
Limit: Within 119.7 mm (4.713 in.)
(2) Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.
(3) Tighten the bolts in order by the following procedure.

Procedure	Operation contents	Remarks
①	Tighten to 90 Nm (9.0 kgm, 65 ft.lbs.)	Carry out in the order shown in the illustration.
↓ ②	Fully loosen.	Carry out in the reverse order to that shown in the illustration.
↓ ③	Tighten to 40 Nm (4.0 kgm, 29 ft.lbs.)	Carry out in the order shown in the illustration.
↓ ④	Tighten by 1/4 turn (90°)	Carry out in the order shown in the illustration.
↓ ⑤	Tighten by 1/4 turn (90°)	Carry out in the order shown in the illustration.



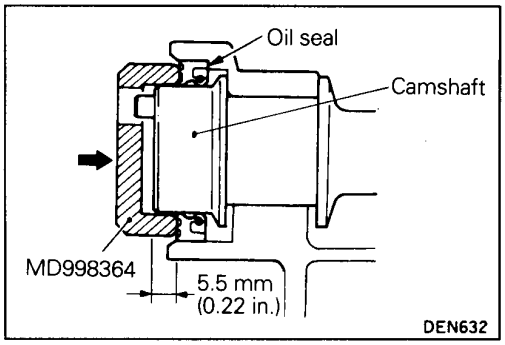
23. INSTALLATION OF CAMSHAFT BEARING CAP

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.



22. INSTALLATION OF ROCKER ARM AND SHAFT ASSEMBLY

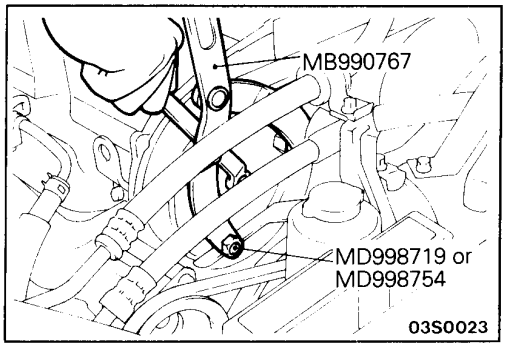
(1) Install the rocker arm and shaft assembly to the bearing caps.
(2) Set the rocker arm springs into the bearing cap indents.
(3) Check the valve clearance and adjust if necessary. (Refer to P.11 – 39.)



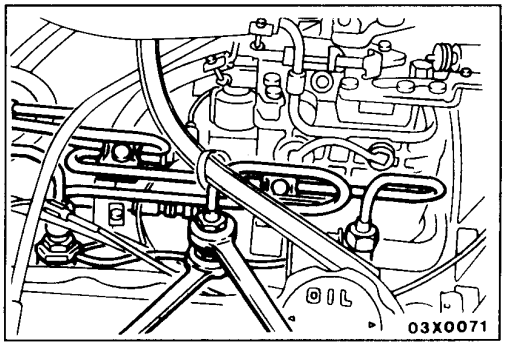
21. INSTALLATION OF CAMSHAFT OIL SEAL

(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.

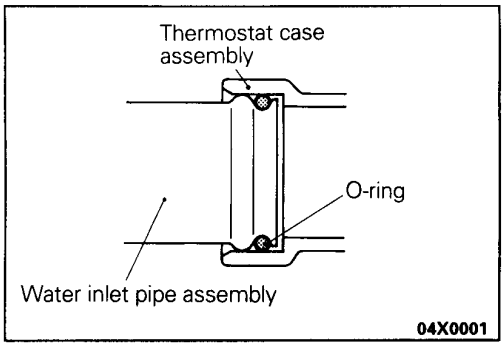


20. INSTALLATION OF CAMSHAFT SPROCKET



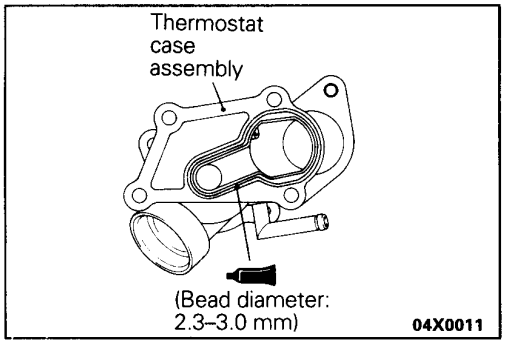
19. INSTALLATION OF INJECTION PIPE

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.



15. INSTALLATION OF THERMOSTAT CASE ASSEMBLY

(1) Insert the O-ring into the groove of the water inlet pipe assembly and rinse the outside of the O-ring with water.



(2) Apply specified sealant to the sections of the thermostat case assembly shown in the illustration.

Semi-drying sealant: MITSUBISHI GENUINE PART MD 970389 or equivalent

(3) After rinsing the inside of the thermostat case assembly hole with water, install the thermostat case assembly and the water inlet pipe.

(4) Tighten the thermostat case assembly mounting bolts.

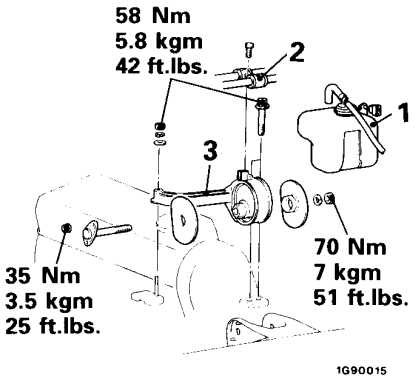
TIMING BELT <4D65>

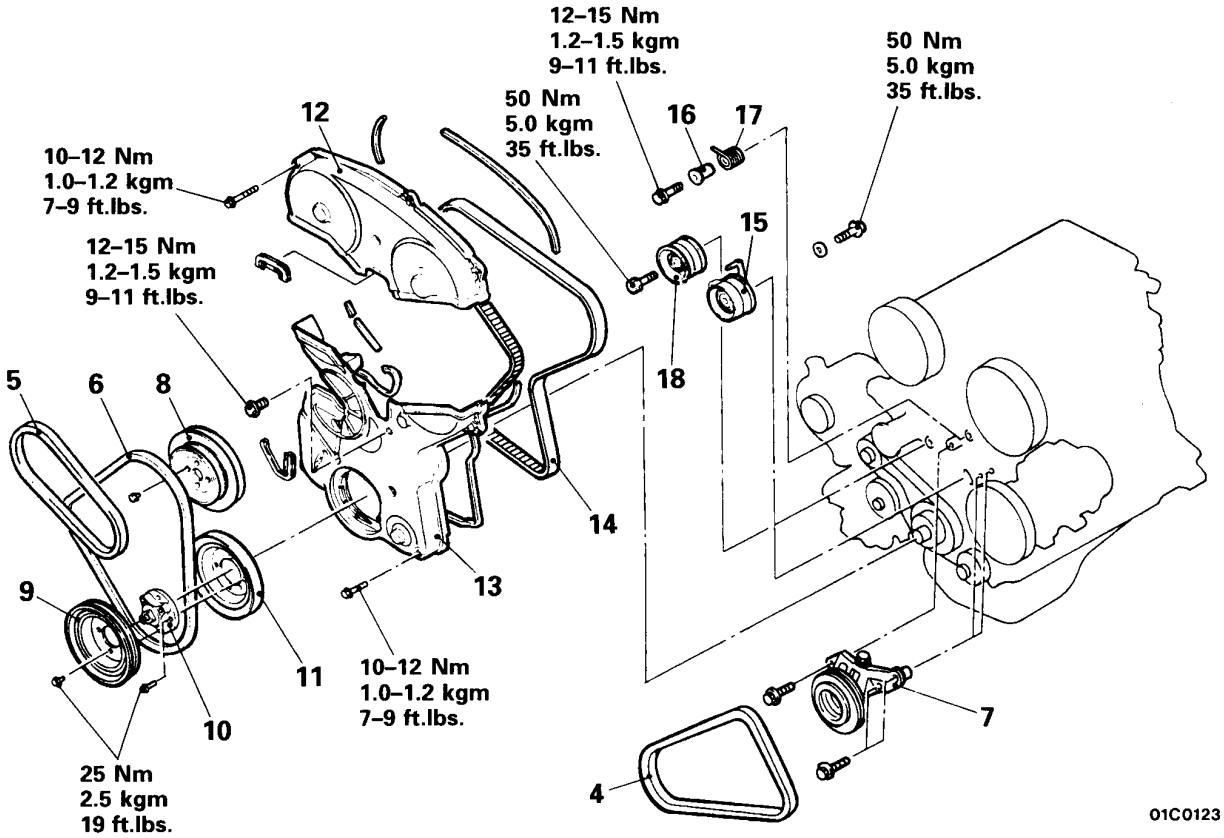
E11GA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of the Under Cover
- Removal of the Glow Plugs (Refer to GROUP 16 – Glow System.)

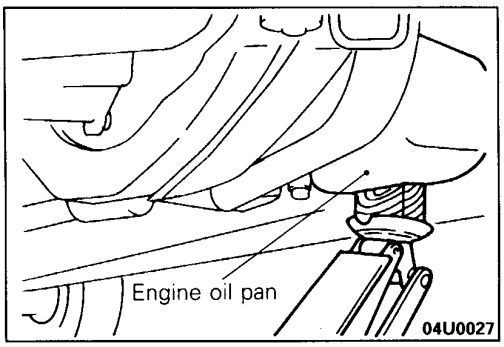
Post-installation Operation
- Installation of the Glow Plugs (Refer to GROUP 16 – Glow System.)
- Installation of the Under Cover
- Engine Adjustment (Refer to P.11-36.)





Removal steps

1. Condense tank
2. Power steering hose and air conditioner hose clamp part
3. ◆◆ Engine mounting bracket
4. Drive belt (Air conditioner)
5. Drive belt (Power steering)
6. Drive belt (Alternator)
7. Tensioner pulley bracket
8. ◆◆ Water pump pulley
9. Crankshaft pulley
10. Adapter
11. Damper pulley
12. ◆◆ Timing belt front upper cover
13. ◆◆ Timing belt front lower cover
- ◆◆ • Adjustment of valve clearance (Refer to P.11-39)
- ◆◆ • Adjustment of timing belt tension
14. ◆◆ ◆◆ Timing belt
15. Timing belt tensioner
16. Tensioner spacer
17. Tensioner spring
18. Timing belt idler



SERVICE POINTS OF REMOVAL E11GBDO

3. REMOVAL OF ENGINE MOUNT BRACKET

(1) Place a wooden block against the engine oil pan and then jack up the vehicle.

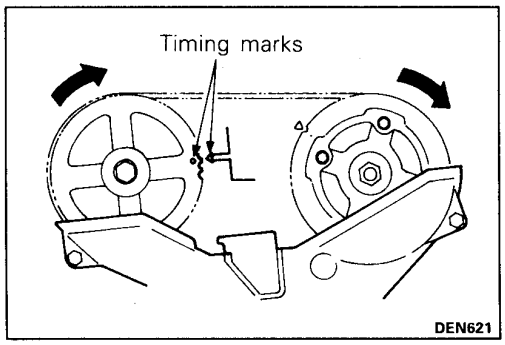
Caution
Jack up carefully, taking care not to apply a load to the various parts.

(2) Remove the engine mount bracket.

8. REMOVAL OF WATER PUMP PULLEY

(1) Previously loosen the water pump pulley mounting bolt before removing the drive belt.
(2) Place a piece of wood against the engine oil pan and jack it up to widen the clearance, and then remove the water pump pulley.

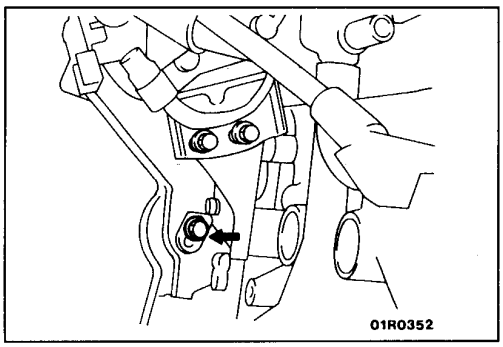
Caution
Be careful not to apply too much of a load to each part.



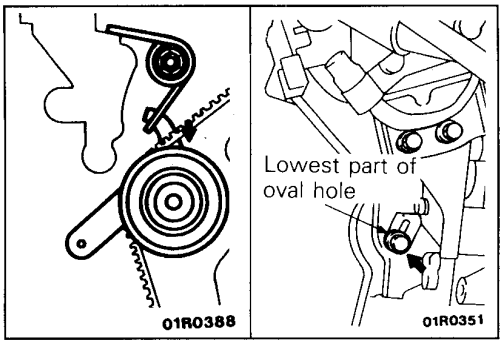
14. REMOVAL OF TIMING BELT

(1) Turn the crankshaft clockwise and align the timing marks.

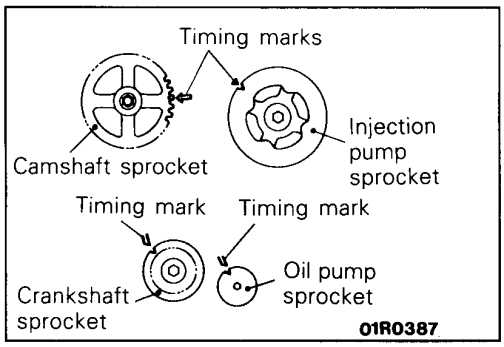
Caution
The crankshaft must always be turned clockwise.



(2) Using a long extension, loosen the installation bolt of the timing belt tensioner (from the engine rear).



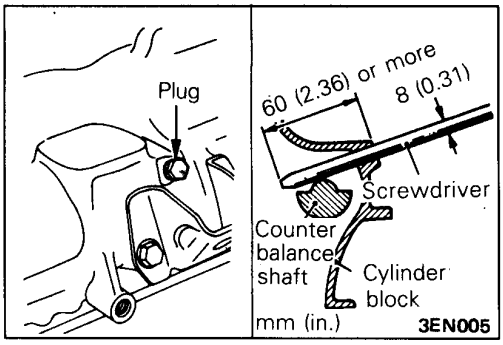
(3) Move the timing belt tensioner downward and loosely tighten the bolt so that the tensioner doesn't return; then remove the timing belt.
If the timing belt is to be re-used, use chalk to mark (on its flat side) an arrow indicating the clockwise direction.



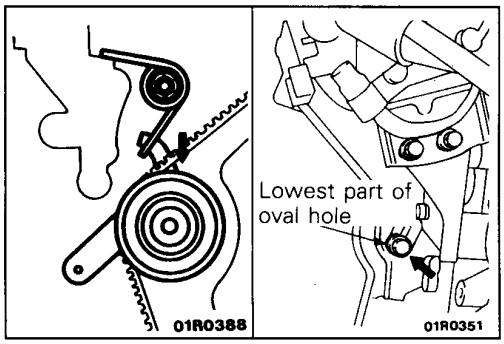
SERVICE POINTS OF INSTALLATION E11GDDM

14. INSTALLATION OF TIMING BELT

(1) Ensure that the timing marks of the camshaft sprocket, the injection pump sprocket, the crankshaft sprocket, and the oil pump sprocket are all aligned.

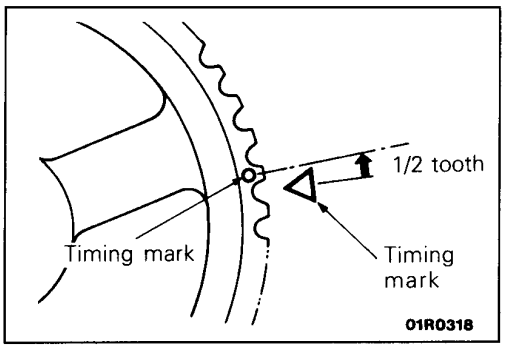


(2) After aligning the timing mark on the oil pump sprocket, remove the cylinder block plug and insert a Phillips screwdriver with a diameter of 8 mm (0.31 in.), and check that the screwdriver goes in 60 mm (2.36 in.) or more. If the screwdriver will only go 20–25 mm (0.79–0.98 in.) as it strikes against the counter balance shaft, turn the sprocket once, realign the timing mark and check that the screwdriver goes in 60 mm (2.36 in.) or more.
The screwdriver should not be taken out until the timing belt is installed.



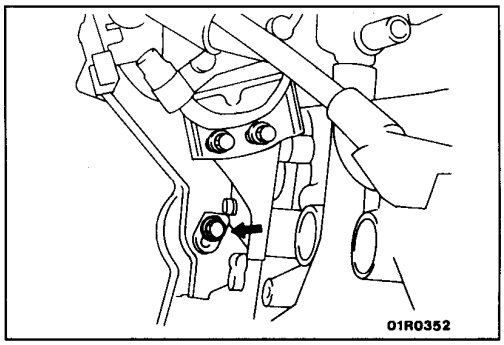
(3) Move the timing belt tensioner downward and loosely tighten the bolt so that the tensioner doesn't return.
(4) Install the timing belt onto the crankshaft sprocket, the timing belt idler, the camshaft sprocket, the injection pump sprocket, and the oil pump sprocket in that order.
(5) Remove the screwdriver and install the plug.

Caution
If the timing belt is reused, install so that the arrow marked on it at the time of removal is pointing in the clockwise direction.

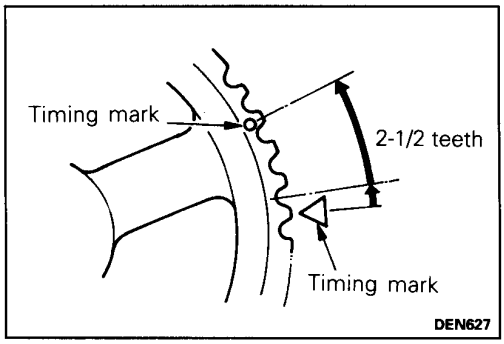


- **ADJUSTMENT OF TIMING BELT TENSION**

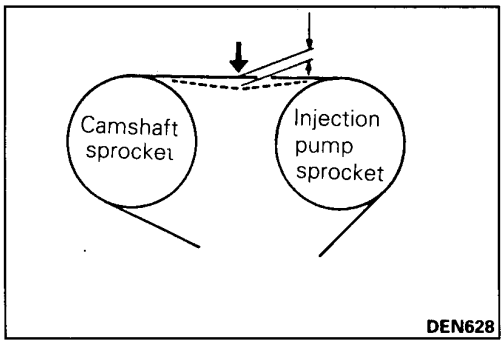
(1) Turn the crankshaft anticlockwise by a distance equivalent to 1/2 tooth of the camshaft sprocket in order to correct looseness at the timing belt idler side.



(2) Loosen (by 1/6 to 1/2 turn) the tensioner installation bolt previously secured provisionally, taking advantage of the force of the tensioner spring to provide tension to the belt.

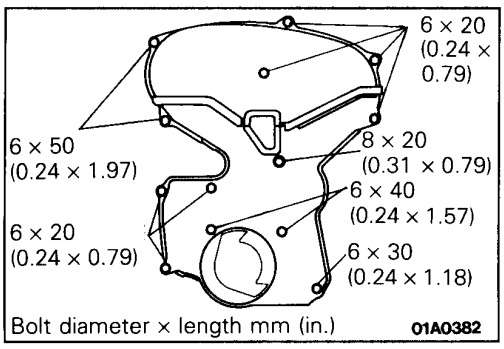


(3) In addition, turn the crankshaft anticlockwise by a distance equivalent to 2-1/2 teeth.
(4) Tighten the timing belt tensioner at the specified torque.
(5) Turn the crankshaft clockwise and align the timing mark.



(6) Using the index finger, press between the camshaft sprocket and the injection pump and sprocket, and check whether or not the amount of flexion is within the standard value range or not.

Standard value range: 4–5 mm (0.16–0.20 in.)



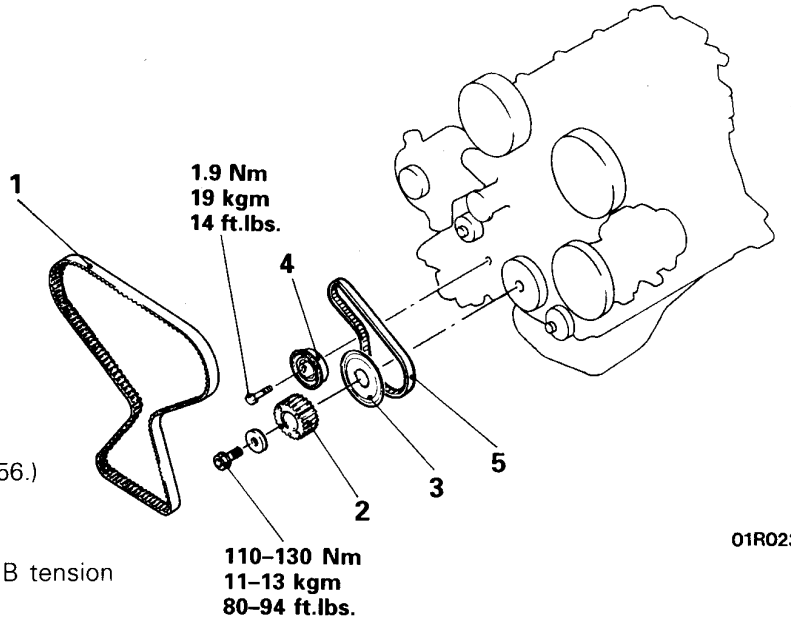
13. INSTALLATION OF TIMING BELT FRONT LOWER COVER/12. TIMING BELT FRONT UPPER COVER

Note that the timing belt lower and upper cover attaching bolts differ in size from one place to another.

TIMING BELT B <4D65>

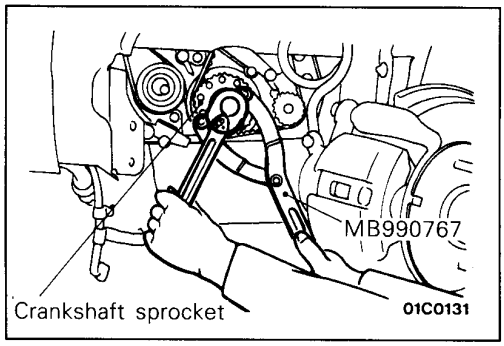
E11IA--

REMOVAL AND INSTALLATION



Removal steps

1. Timing belt (Refer to P.11-56.)
2. Crankshaft sprocket
3. Flange
4. Timing belt B tensioner
   - Adjustment of timing belt B tension
5. Timing belt B



SERVICE POINTS OF REMOVAL

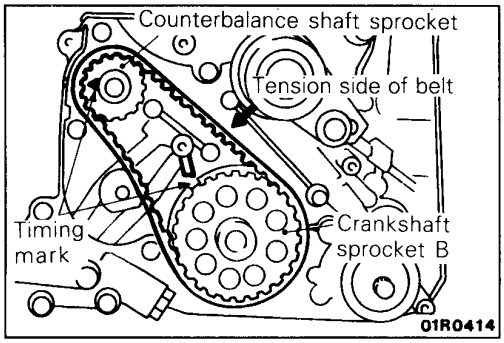
E11IBAF

2. REMOVAL OF CRANKSHAFT SPROCKET

Removal the crankshaft sprocket by using the special tool.

5. REMOVAL OF TIMING BELT "B"

NOTE
If the timing belt "B" is to be re-used, use chalk to mark (on its flat side) an arrow indicating the clockwise direction.

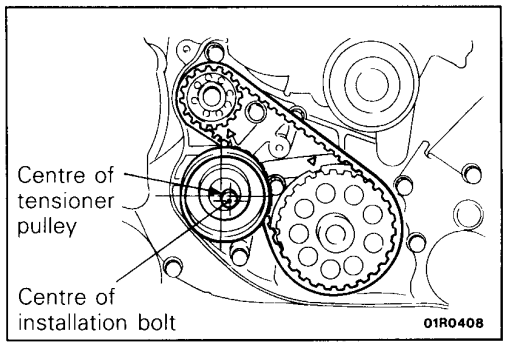


SERVICE POINTS OF INSTALLATION

E11IDAF

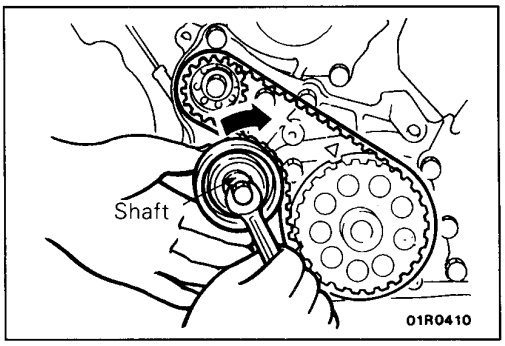
5. INSTALLATION OF TIMING BELT "B"

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



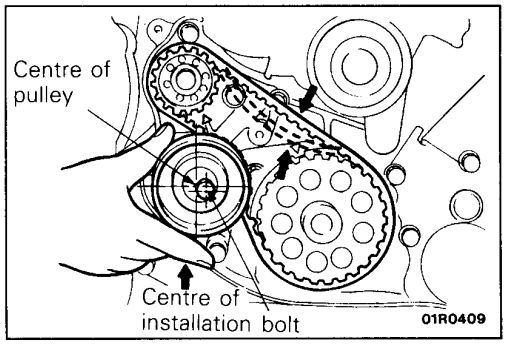
- **ADJUSTMENT OF TIMING BELT "B" TENSION** E11FFBG

(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.



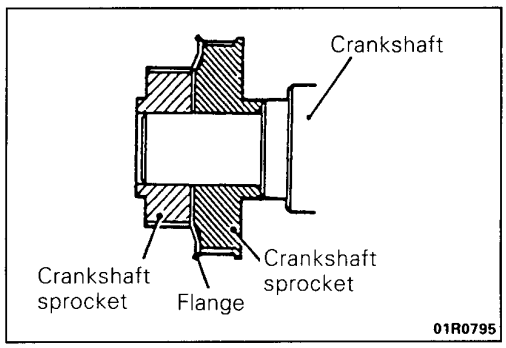
(2) Holding the timing belt "B" tensioner up with your finger in the direction of the arrow, place pressure on the timing belt so that the tension side of the belt is taut. Now tighten the bolt to fix the tensioner.

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.



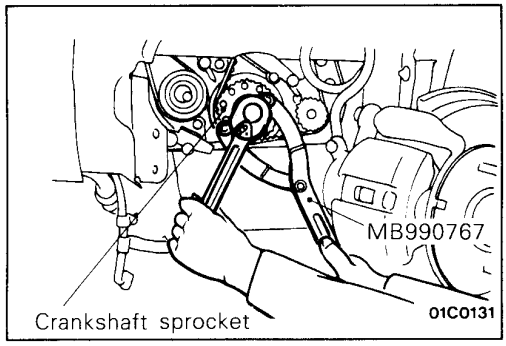
(3) Check to ensure that when centre of span on tension side is depressed with index finger in direction of arrow, tension of belt is up to specification.

Standard value: 5–7 mm (0.20–0.28 in.)



3. INSTALLATION OF FLANGE

When installing, be sure the direction is correct.



2. INSTALLATION OF CRANKSHAFT SPROCKET

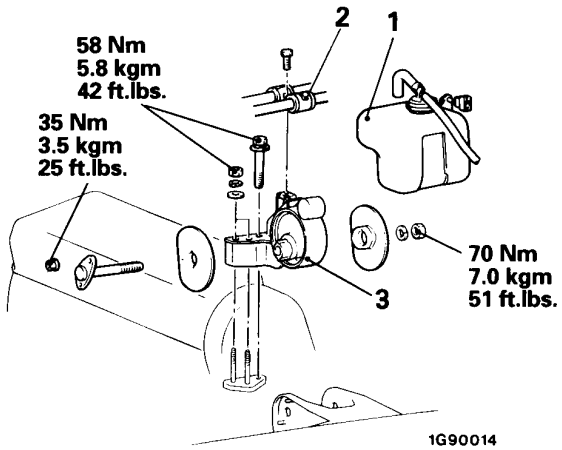
Install the crankshaft sprocket by using the special tool.

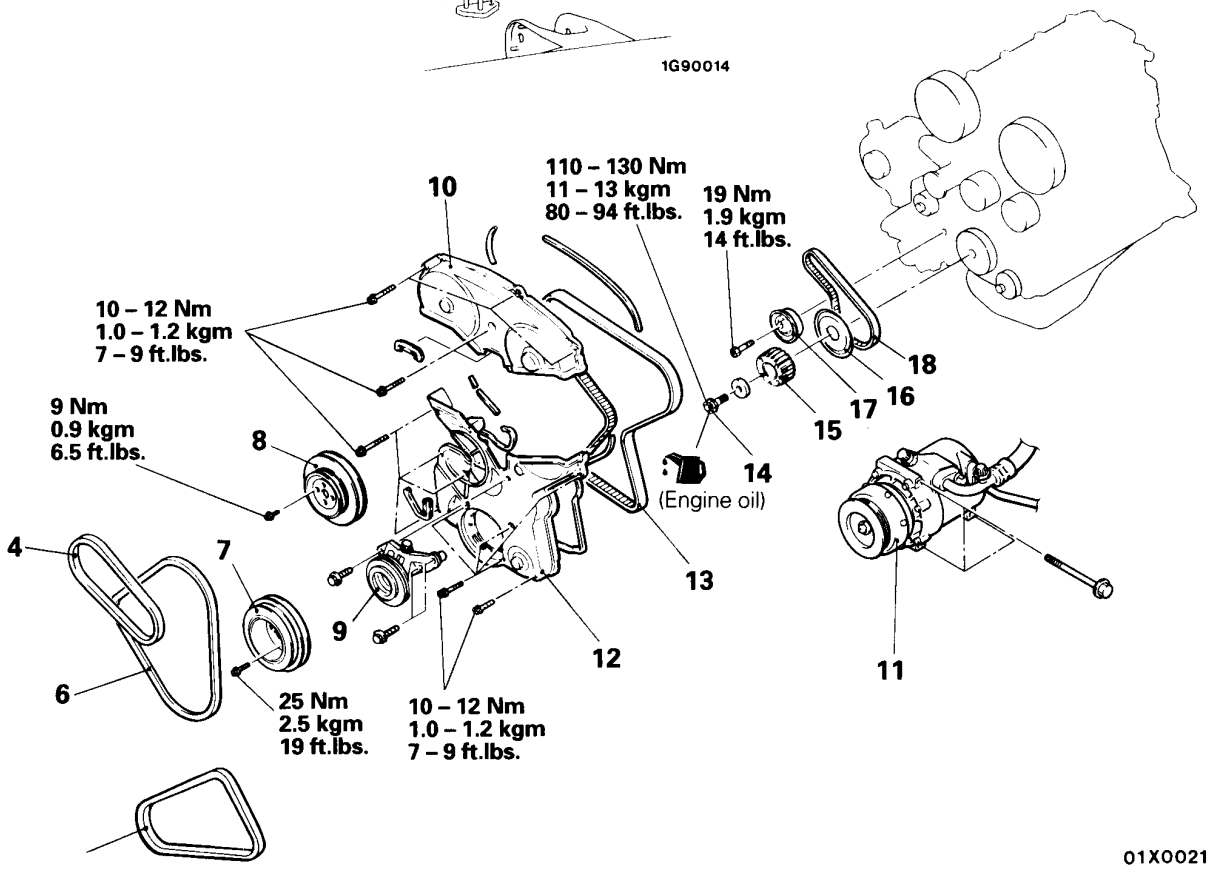
TIMING BELT AND TIMING BELT B <4D68>

E11GA --

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of the Under Cover





Timing belt removal steps

1. Condense tank
2. Power steering hose and air conditioner hose clamp part
3. Engine mounting bracket (Refer to P.11 – 57)
   - Drive belt tension adjustment (Refer to P.11 – 36)
4. Drive belt (For power steering)
5. Drive belt (For air conditioner)
6. Drive belt (For alternator)
7. Crankshaft pulley
8. Water pump pulley
9. Tensioner pulley assembly
10. Timing belt upper cover
11. Air conditioner compressor
12. Timing belt lower cover
    - Timing belt tension adjustment (Refer to P. 11 – 45)
13. Timing belt (Refer to P. 11 – 57)

Timing belt B removal steps

13. Timing belt (Refer to P. 11 – 57)
14. Crankshaft bolt
15. Crankshaft sprocket (Refer to P.11 – 60)
16. Flange
    - Timing belt B tension adjustment (Refer to P.11 – 61)
17. Timing belt B tensioner
18. Timing belt B (Refer to P. 11 – 60)

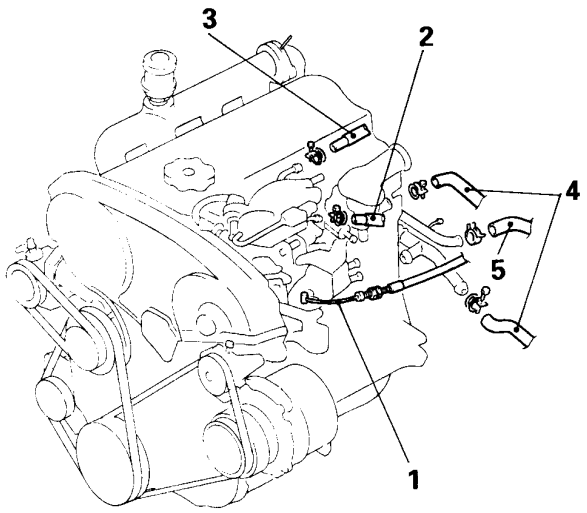
ENGINE ASSEMBLY <4D65>

E11TA--

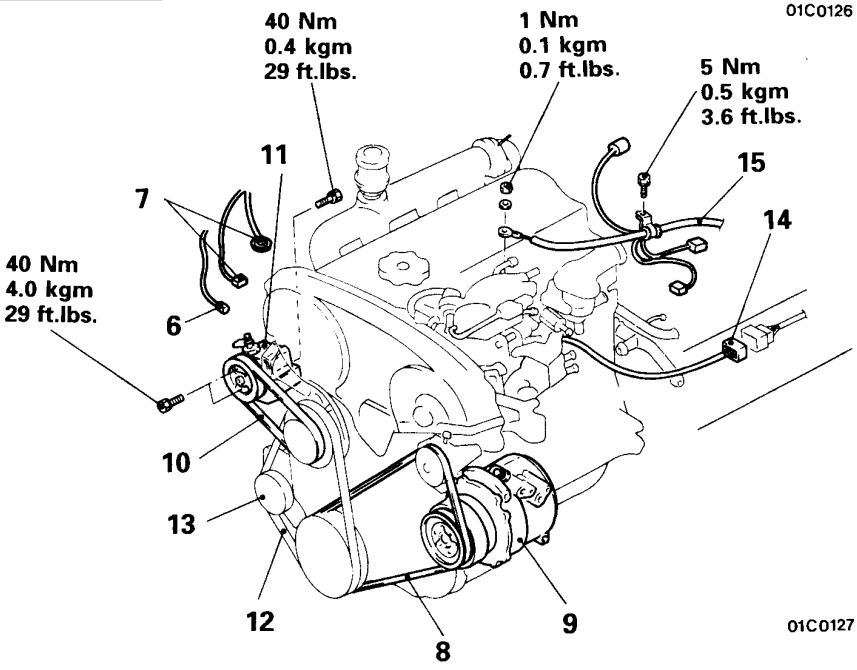
REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of the Hood
- Draining of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of the Radiator (Refer to GROUP 14 – Radiator.)
- Removal of the Transmission Assembly (Refer to GROUP 22 – Transmission Assembly.)

Post-installation Operation
- Installation of the Transmission Assembly (Refer to GROUP 22 – Transmission Assembly.)
- Installation of the Radiator (Refer to GROUP 14 – Radiator.)
- Supplying of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Installation of the Hood
- Adjustment of accelerator cable (Refer to GROUP 13 – Service Adjustment Procedures.)
- Adjustment of drive belt tension (Refer to P.11-36.)



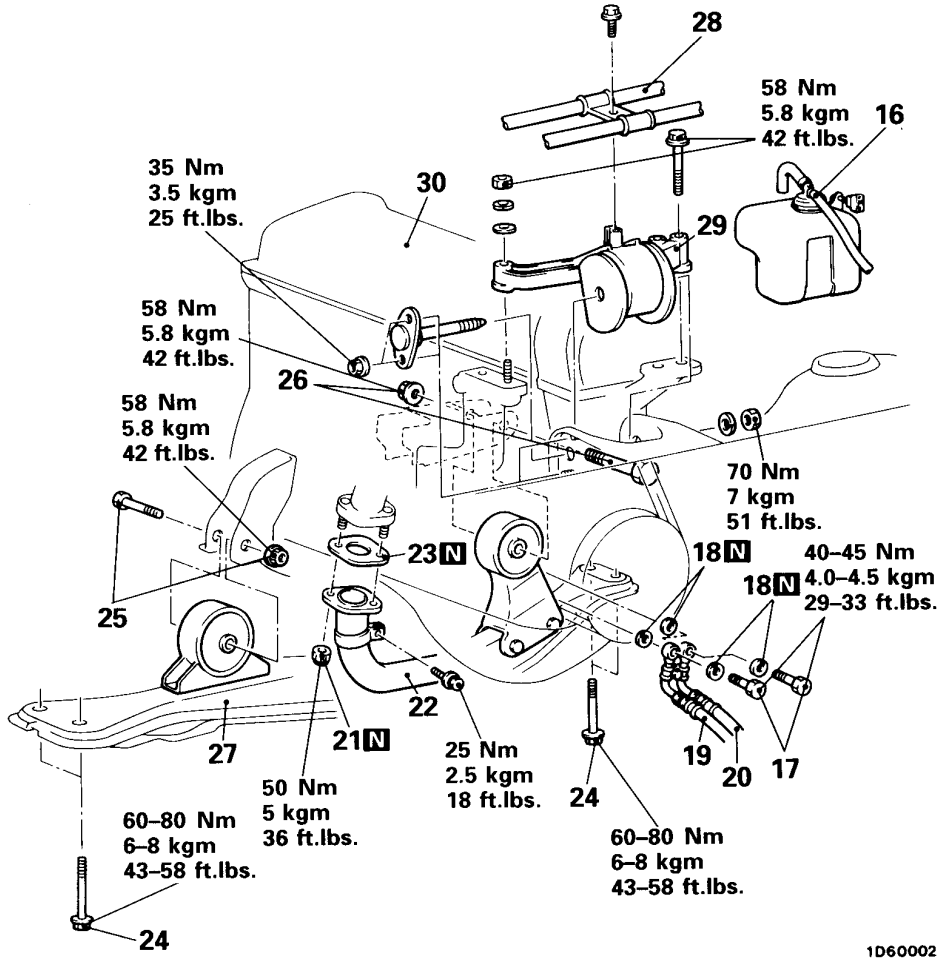
01C0126



01C0127

Removal steps

1. Connection for accelerator cable
2. Connection for fuel return hose
3. Connection for fuel main hose
4. Connection for heater hose
5. Connection for brake booster vacuum hose
6. Connection for oil pressure switch
7. Connection for alternator
8. V-belt (Air conditioner)
9. ◆◆ Air conditioner compressor
10. V-belt (Power steering)
11. ◆◆ Power steering oil pump
12. V-belt (Alternator)
13. Alternator
14. Connection for fuel injection pump harness
15. Connection for control harness



Removal steps

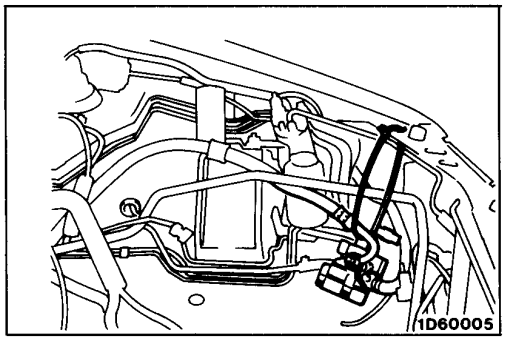
16. Condense tank
17. Eye bolt
18. Gasket
19. Engine oil feed hose and tube assembly
20. Engine oil return hose and tube assembly
21. Self-locking nut
22. Connection for front exhaust pipe
23. Gasket
◆◆ 24. Center member mounting bolt
25. Front roll stopper connection
26. Rear roll stopper connection
27. Center member assembly
28. Power steering hose and air conditioner hose clamp part
◆◆ ◆◆ 29. Engine mount bracket
◆◆ ◆◆ 30. Engine assembly

SERVICE POINTS OF REMOVAL E11TBAO

9. REMOVAL OF THE AIR CONDITIONER COMPRESSOR

Disconnect the connection of the air conditioner compressor, and then remove the compressor (with the hose attached) from the compressor bracket.

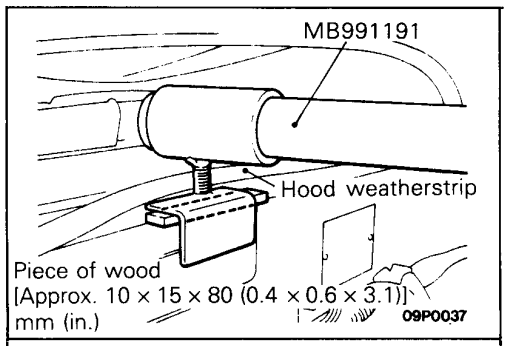
NOTE
Suspend the removed air conditioner compressor (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.



11. REMOVAL OF POWER STEERING OIL PUMP

Remove the oil pump (with the hose attached).

NOTE
Suspend the removed oil pump (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

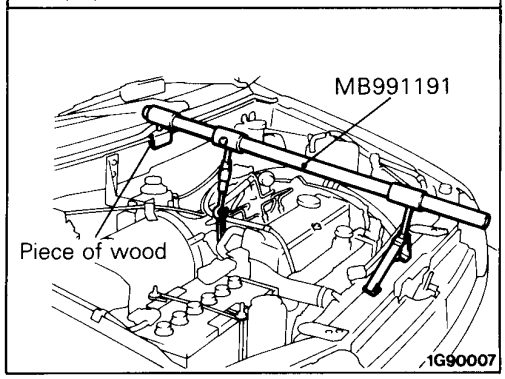


24. REMOVAL OF CENTER MEMBER MOUNTING BOLT

- **ENGINE ASSEMBLY SUPPORT**

(1) Set the engine hanger assembly (special tool) to the body to support the engine assembly.

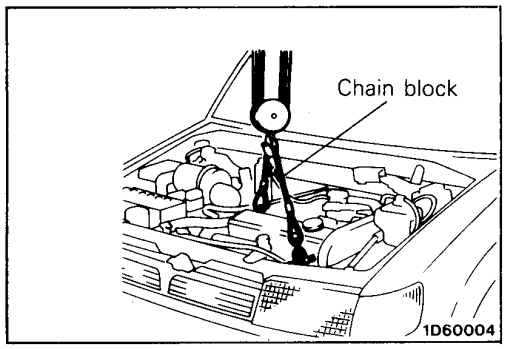
Caution
Always insert a piece of wood between the engine hanger assembly support and the front deck.
In addition, do not clamp the hood weather-strip between the front deck and the piece of wood.



(2) Remove the center member mounting bolt.

29. REMOVAL OF ENGINE MOUNT BRACKET

(1) Support the engine with a garage jack.
(2) Remove the engine hanger assembly.
(3) Hold the engine assembly with a chain block, etc.
(4) Place the garage jack against the engine oil pan with a piece of wood in between, and after raising the engine until there is no weight on the engine mount brackets, remove the engine mount brackets.



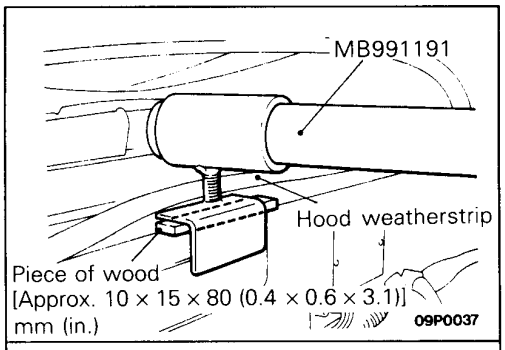
30. REMOVAL OF ENGINE ASSEMBLY

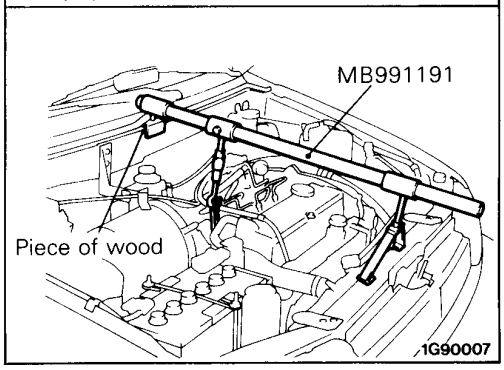
(1) Check to be sure that all cables, hoses, harness connectors, etc. are disconnected from the engine.
(2) Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

SERVICE POINTS OF INSTALLATION E11TDAP

30. INSTALLATION OF ENGINE ASSEMBLY

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





29. INSTALLATION OF ENGINE MOUNT BRACKET

(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 a garage jack.
(3) Remove the chain block and support the engine assembly with the engine hanger assembly (special tool).

Caution
Always insert a piece of wood between the engine hanger assembly and the front deck.
In addition, do not clamp the hood weatherstrip between the front deck and the piece of wood.

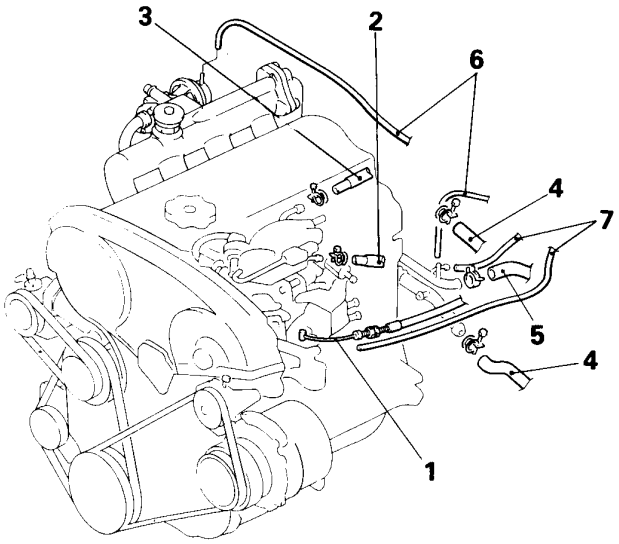
ENGINE ASSEMBLY <4D68>

E11TA--

REMOVAL AND INSTALLATION

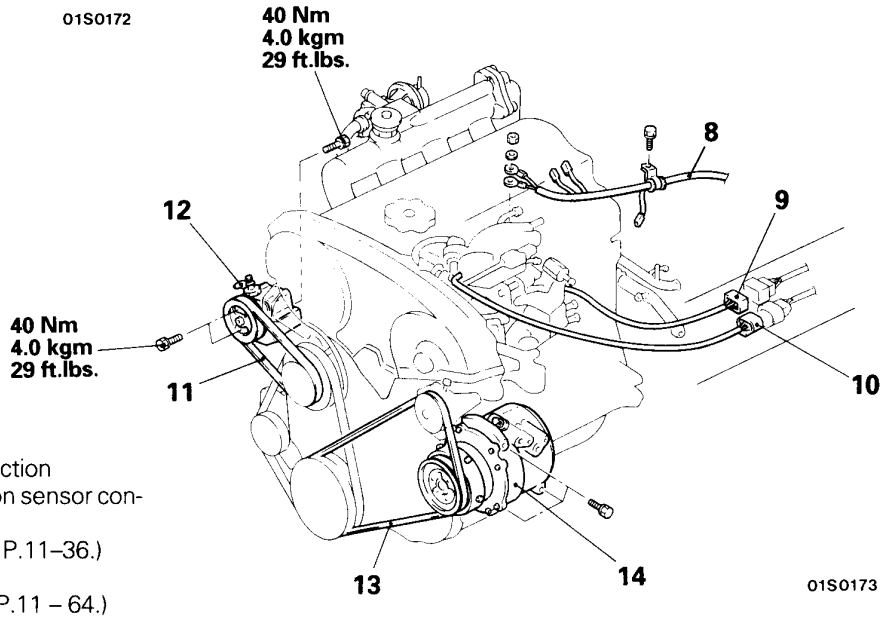
Pre-removal Operations
(1) Removal of Hood (Refer to GROUP 42 – Hood.)
(2) Prevention of Fuel Flow (Refer to GROUP 13 – Service Adjustment Procedures.)
(3) Draining of Engine Coolant
(4) Removal of Transmission Assembly (Refer to GROUPS 22 and 23 – Transmission Assembly.)
(5) Removal of Radiator Assembly (Refer to GROUP 14 – Radiator.)

Post-installation Operations
(1) Installation of Radiator Assembly (Refer to GROUP 14 – Radiator.)
(2) Installation of Transmission Assembly (Refer to GROUPS 22 and 23 – Transmission Assembly.)
(3) Supplying of Engine Coolant
(4) Adjustment of Accelerator Cable (Refer to GROUP 13 – Service Adjustment Procedures.)
(5) Air Bleeding of Fuel Line (Refer to GROUP 13 – Service Adjustment Procedures.)
(6) Installation of Hood (Refer to GROUP 42 – Hood.)



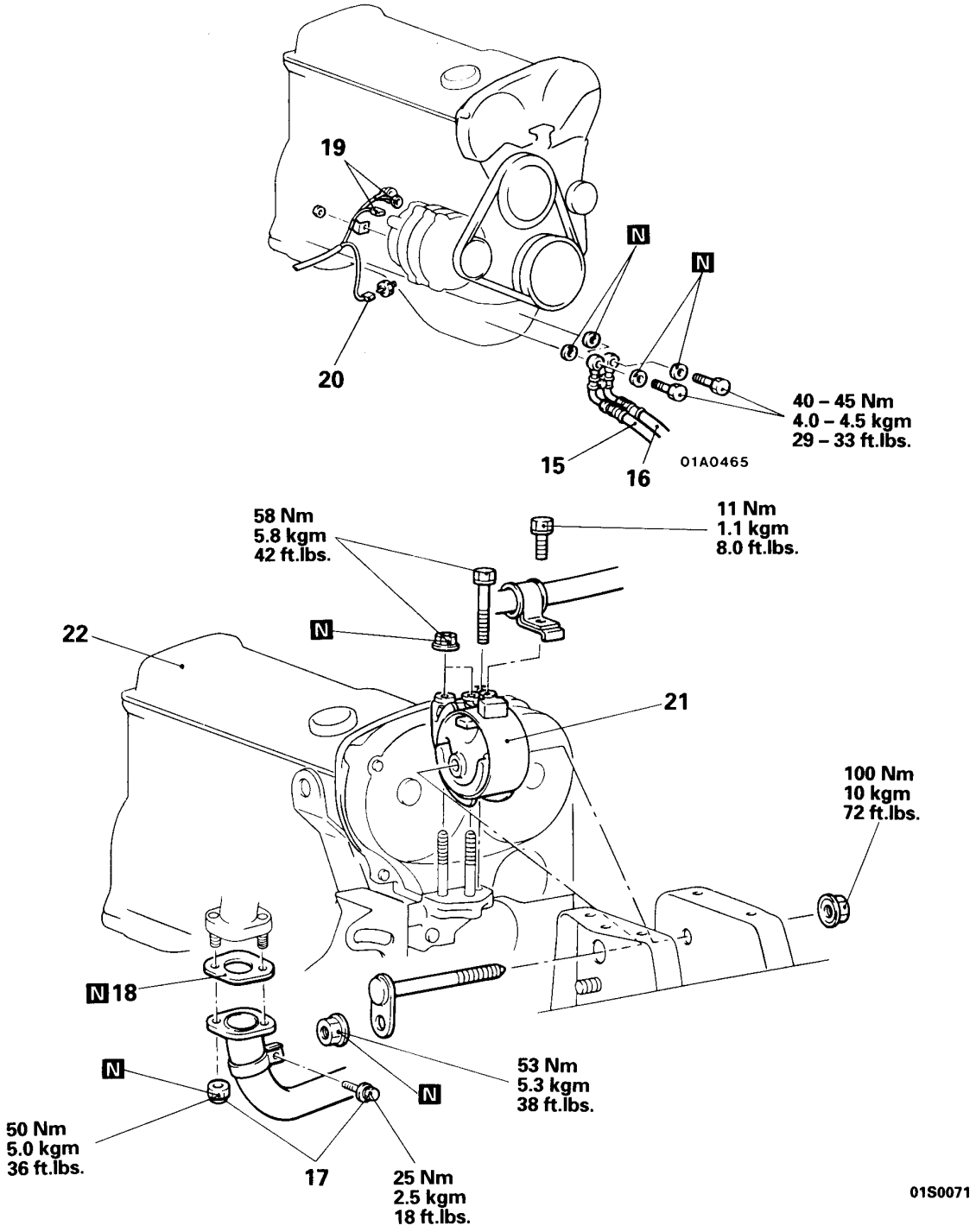
01S0172

Removal steps
1. Accelerator cable connection
2. Fuel hose (return) connection
3. Fuel hose (main) connection
4. Heater hose connection
5. Brake booster vacuum hose connection
6. EGR vacuum hose connection <T/C>
7. Connection of vacuum hose for air conditioner idle-up solenoid valve



01S0173

8. Control harness connection
9. Fuel injection pump harness connection
10. Connection of lever (throttle) position sensor connector
    • Adjustment of drive belts (Refer to P.11–36.)
11. Power steering drive belt
12. Power steering oil pump (Refer to P.11 – 64.)
13. Air conditioner drive belt
14. Air conditioner compressor (Refer to P. 11 – 64.)



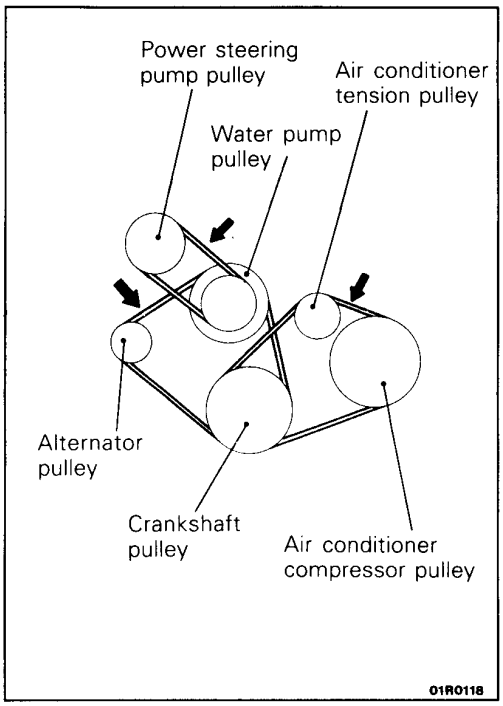
15. Engine oil feed hose connection
16. Engine oil return hose connection
17. Self-lock nut and bolt
18. Gasket
19. Alternator connector
20. Oil pressure switch connector
21. Engine mount bracket (Refer to P.11 – 64.)
22. Engine assembly (Refer to P.11 – 65.)

ENGINE <4G63, 4G64>

SERVICE ADJUSTMENT PROCEDURES

DRIVE BELT TENSION ADJUSTMENT E11FQBR

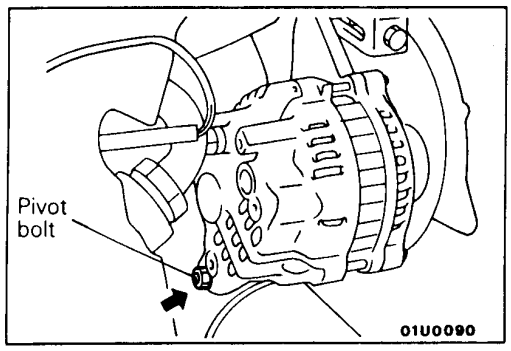
(1) Check that the belts are not damaged.



(2) Apply 100N (10 kg, 22 lbs.) force to the belt back midway between the pulleys as shown in the figure, measure the deflection or, by using a belt-tension gauge, check the belt's tension.

Standard value:

Items		Check value	Adjustment value	
			New belt	Used belt
For alternator	Deflection mm (in.)	9.0 – 11.5 (0.35 – 0.45)	7.5 – 9.0 (0.30 – 0.35)	10 (0.39)
For air conditioner compressor	Deflection mm (in.)	Approx. 8.0 (0.31)	5.0 – 5.5 (0.20 – 0.22)	6.0 – 7.0 (0.24 – 0.28)
For power steering pump	Deflection mm (in.)	6.0 – 9.0 (0.24 – 0.35)	—	—

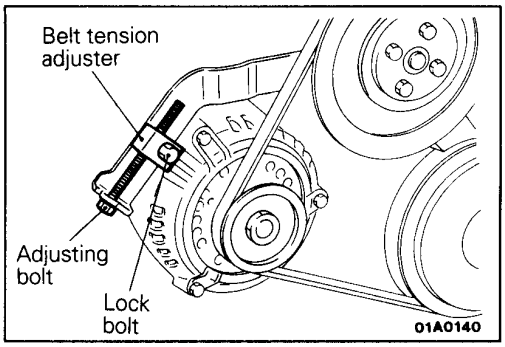


TENSION ADJUSTMENT OF THE ALTERNATOR DRIVE BELT

Caution

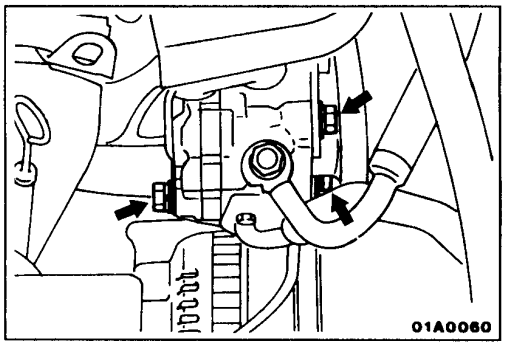
1. **Before checking, turn the engine one time or more.**
2. **If the belt tension is too strong, it is possible that the alternator or water pump bearing is damaged.**
   If the belt tension is too weak, however, sounds of its slipping will be heard, and the belt's service life will be reduced.

1. Loosen the alternator pivot nut.



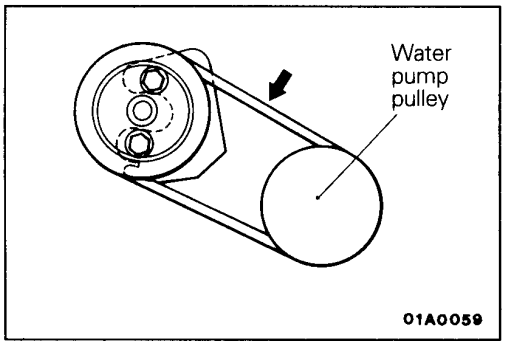
2. Loosen the lock bolt of the belt tension adjuster.
3. Using the adjustment bolt, adjust the belt tension to specified.
4. Tighten the lock bolt.
5. Tighten the alternator pivot nut.
6. Check the deflection or the tension of the belt; readjust if necessary.

   NOTE
   Even for a new belt, the adjustment value for a used belt should be used to make the adjustment if the belt has been used for as long as five minutes or more.

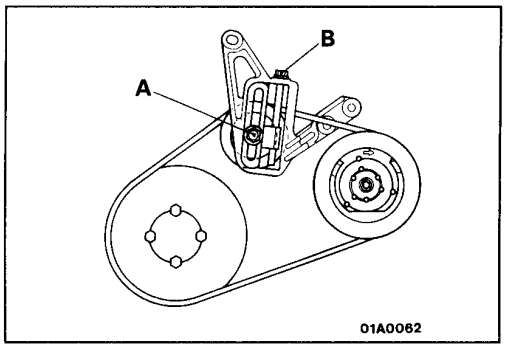


DEFLECTION ADJUSTMENT OF POWER STEERING OIL PUMP DRIVE BELT

1. Loosen power steering oil pump fixing bolt.



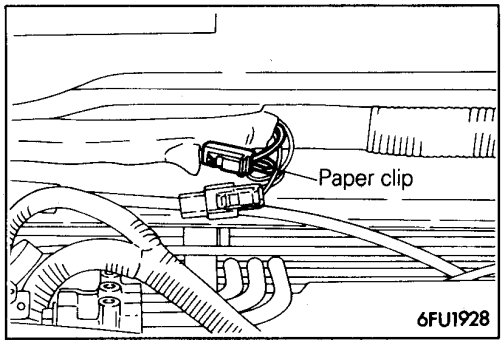
2. Move power steering pump, tension belt moderately and adjust deflection.
3. Tighten fixing bolts.
4. Run the engine one time or more.
5. Check the belt deflection. Readjust, if necessary.



TENSION ADJUSTMENT OF THE AIR CONDITIONER COMPRESSOR DRIVE BELT

1. Loosen tension pulley fixing bolt A.
2. Adjust belt deflection with adjusting bolt B.
3. Tighten fixing bolt A.
4. Run the engine one time or more.
5. Check the belt tension. Readjust, if necessary.

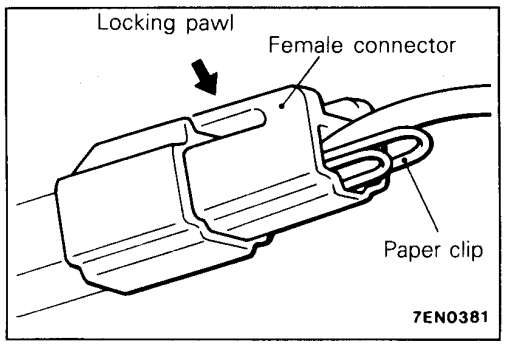
   NOTE
   Even for a new belt, the adjustment value for a used belt should be used to make the adjustment if the belt has been used for as long as five minutes or more.



IGNITION TIMING INSPECTION AND ADJUSTMENT

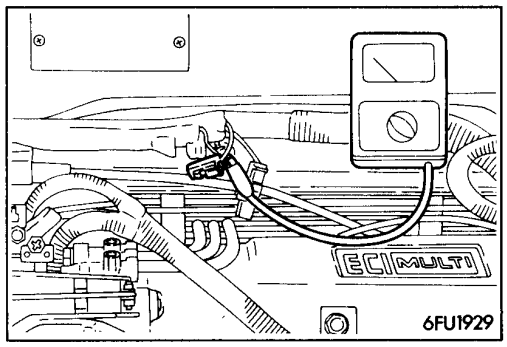
E11FUBL

(1) Before inspection and adjustment set vehicle in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan 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.
The connector should not be disconnected.

Caution
Insert the paper clip as in the illustration at left along the terminal from the opposite side of the locking pawl on the female connector.

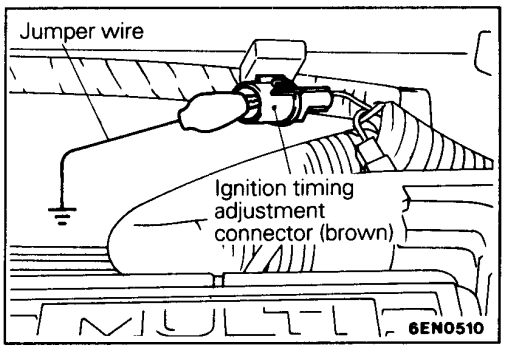


(3) Connect a primary-voltage-detection type of tachometer to the paper clip.

NOTE
Do not use the Multi-use tester (MUT) or MUT-II.
If tested with the MUT or 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 engine idle speed is within the standard value.

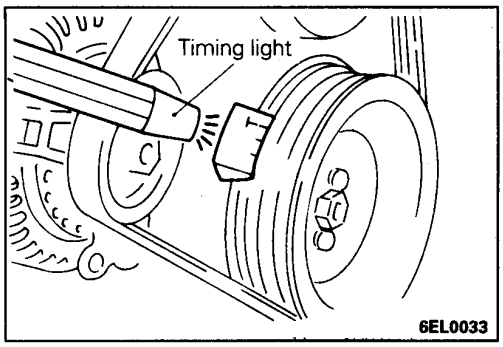
Standard value: 750 ± 100 r/min.



(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.

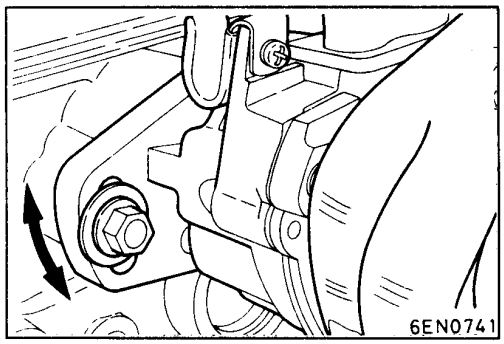
NOTE
Grounding this terminal sets the engine to the basic ignition timing.

(10) Start the engine and run it at idle.



(11)Check that basic ignition timing is within the standard value.

Standard value: approx. 5° BTDC ± 2°



(12)If not within the standard value, loosen distributor fixing nut and adjust by rotating distributor body.

(13)Tighten mounting nut after adjusting.

Tightening torque: 12 Nm (1.2 kg, 9 ft.lbs.)

(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 operating.
2. And it is automatically further advanced by about 5° from 10° BTDC at higher altitudes.

(16)Sealing tape is to be attached to the fitting nut only for vehicles for Switzerland.

NOTE

Sealing tape is attached to all vehicles when new.

IDLE SPEED INSPECTION E11FXGDG

(1) Before inspection and adjustment set vehicles in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicles with A/T)

(2) Check the basic ignition timing. Adjust if necessary.

Standard value: BTDC ±2°

(3) After turning the ignition switch to OFF, connect the multi-use tester (MUT) or MUT-II to the diagnosis connector.

(4) Start the engine and run it at idle.

(5) Run the engine at idle for 2 minutes.

(6) Check the idle speed.

Curb idle speed: 750 ± 100 r/min.

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

(7) If there is a deviation from the standard value, refer to GROUP 13 – Check Chart Classified by Problem Symptoms, and check the MPI components.

COMPRESSION PRESSURE INSPECTION E11FGAU

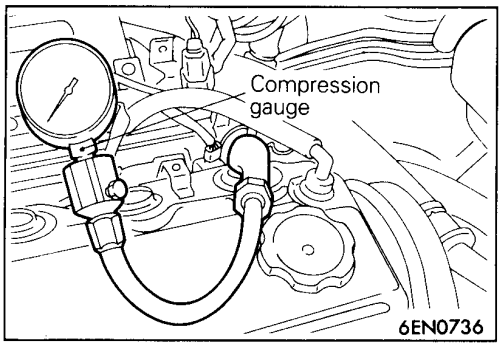
(1) Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral (P range on vehicle with A/T)

(2) Disconnect the spark plug cables.
(3) Remove all of the spark plugs.
(4) Disconnect the distributor 6 pin connector.

NOTE
Doing this will prevent the engine control unit 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.):
<4G63> : 1,350 kPa (14.0 kg/cm², 199 psi)
<4G64> : 1,300 kPa (13.5 kg/cm², 192 psi)
Limit (at engine speed of 250-400 r/min.):
<4G63> : min. 1,022 kPa (10.6 kg/cm², 151 psi)
<4G64> : min. 984 kPa (10.2 kg/cm², 145 psi)

(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 (1.0 kg/cm², 14 psi)

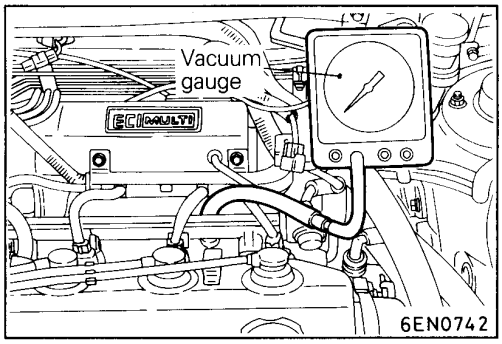
(9) If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps (7) and (8).
   ① If the compression increases after oil is added, the cause of the malfunction is a worn 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 multi-use tester (MUT) or MUT-II to erase the self-diagnosis codes.

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



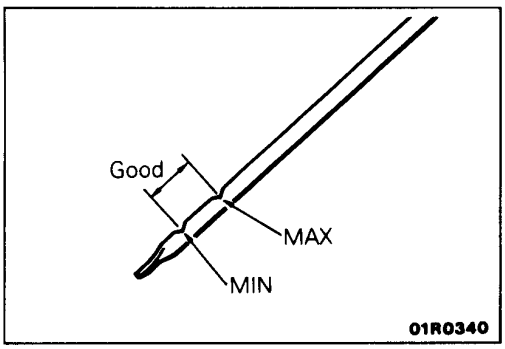
MANIFOLD VACUUM INSPECTION E11FWBF

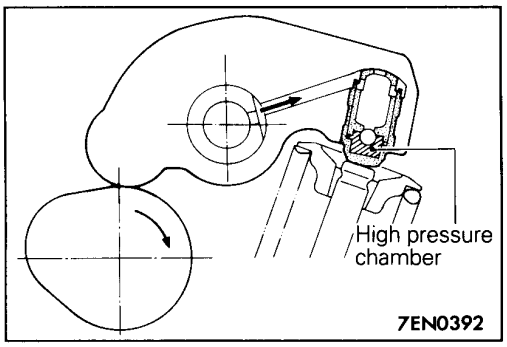
(1) Start the engine and allow it to warm up until the temperature of the coolant reaches 80 to 95°C (176 to 203°F).
(2) Connect a tachometer.
(3) Attach a three-way union to the vacuum hose between the fuel pressure regulator and the air intake plenum, and connect a vacuum gauge.
(4) Start the engine and check that idle speed is within specification. The read off the vacuum gauge.

Standard value:
<4G63> : Approx. 69 kPa (520 mmHg, 20 in.Hg)
<4G64> : Approx. 71 kPa (530 mmHg, 21 in.Hg)

(5) If not within specification, refer to following chart for cause and repair.

Symptom	Probable cause	Remedy
Vacuum gauge reads under standard value but pointer is stable.	• Delayed ignition timing. • Incorrect valve clearance.	• Adjust ignition timing. • Adjust valve clearance.
Vacuum gauge pointer fluctuates slowly.	• Idle mixture concentration too rich.	• Check MPI system
Vacuum gague reading decreases irregularly.	• Idle mixture concentration too lean.	• Check MPI system.
Vacuum gauge pointer decreases about 4.0–21.3 kPa (30–160 mmHg, 1.18–6.30 in.Hg) intermittently.	• Burned, warped or pitted valves.	• Install new valves.
Vacuum gauge pointer suddenly decreases about 33.3 kPa (250 mmHg, 9.84 in.Hg) from standard value and then returns.	• Blow cylinder head gasket.	• Install new cylinder head gasket.





LASH ADJUSTERS CHECK E11FBAP

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, refuel or replace 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 room in the lash adjusters, the air in the high pressure room 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.

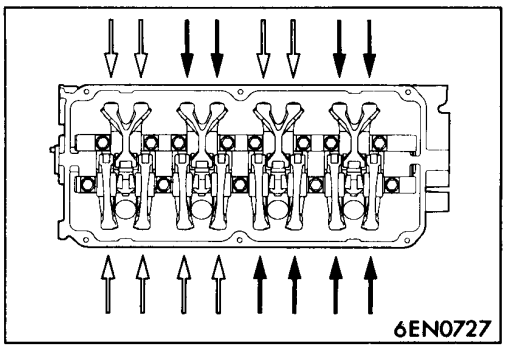
In this case, if the air which has entered the lash adjusters is bled, things will be normalized.

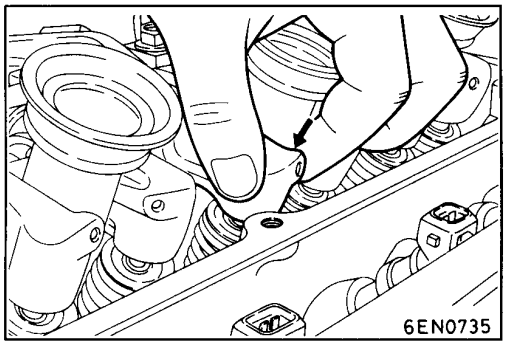
(2) Start the engine and perform gentle racing several times (less than 10 times.)

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 3000 rpm gradually (in 30 seconds), drop the speed gradually (in 30 seconds) to idling.

NOTE
- If the vehicle is parked on a slope for long, 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 long, 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 center.
③ Push the rocker arm indicated by the arrow mark (⇦) 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 (←) 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.
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.

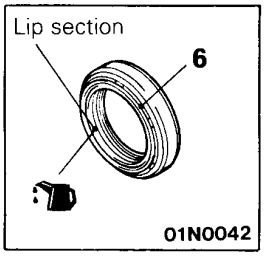
CAMSHAFT AND CAMSHAFT OIL SEAL

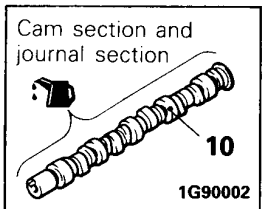
E11HA--

REMOVAL AND INSTALLATION

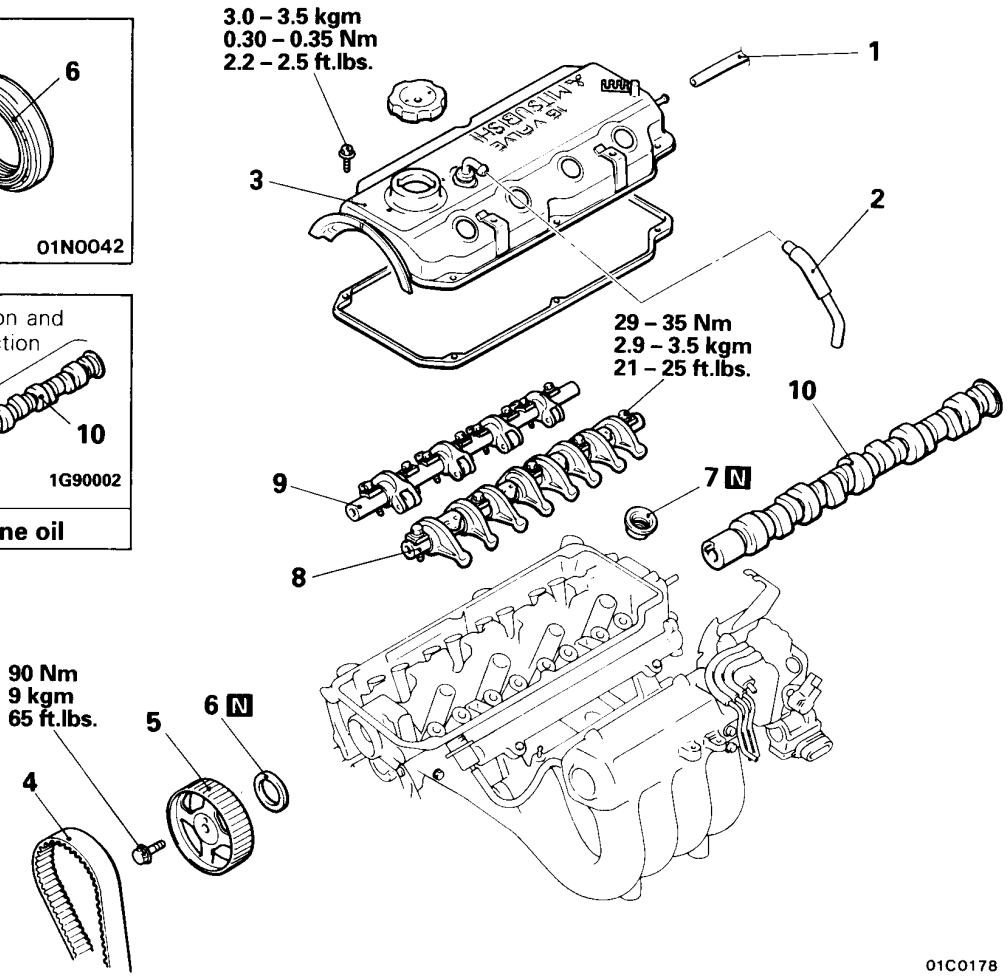
Pre-removal Operation
- Removal of Distributor (Refer to GROUP 16 – Distributor.)
- Removal of Timing Belt Cover (Refer to P. 11-86.)

Post-installation Operation
- Installation of Distributor (Refer to GROUP 16 – Distributor.)
- Installation of Timing Belt Cover (Refer to P.11-86.)



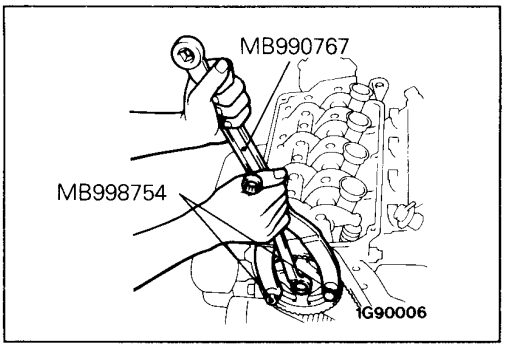


Engine oil



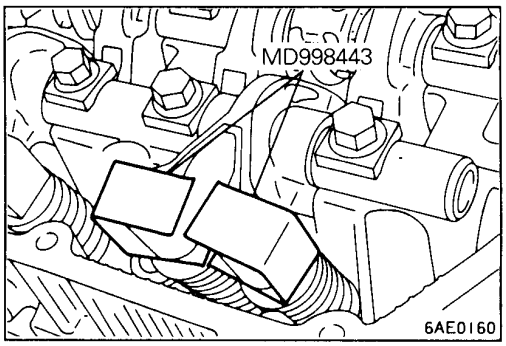
Removal steps

1. Breather hose connection
2. PCV hose connection
3. Rocker cover
4. Timing belt (Refer to P.11 – 86.)
5. Camshaft sprocket
6. Camshaft oil seal
7. Oil seal
8. Rocker arms and rocker arm shaft assembly (Intake side)
9. Rocker arms and rocker arm shaft assembly (Exhaust side)
10. Camshaft



SERVICE POINTS OF REMOVAL E11HBAL

5. REMOVAL OF CAMSHAFT SPROCKET

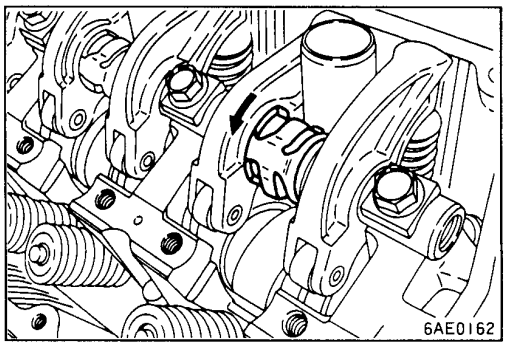


8. REMOVAL OF ROCKER ARMS AND ROCKER ARM SHAFT ASSEMBLY (INTAKE SIDE) /9. ROCKER ARMS AND ROCKER ARM SHAFT ASSEMBLY (EXHAUST SIDE)

Before removing the rocker arm and shaft assembly, use the special tool to ensure that the auto-lash adjuster doesn't fall out.

Caution
Do not disassemble the rocker arm and shaft assembly.

SERVICE POINTS OF INSTALLATION E11HCAM

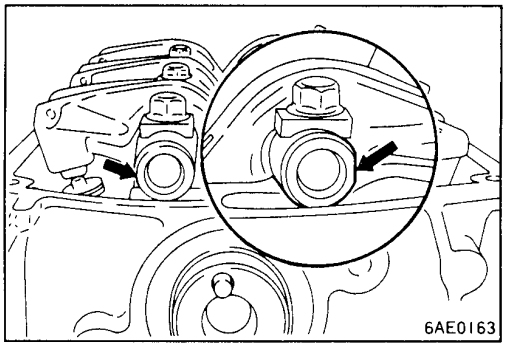


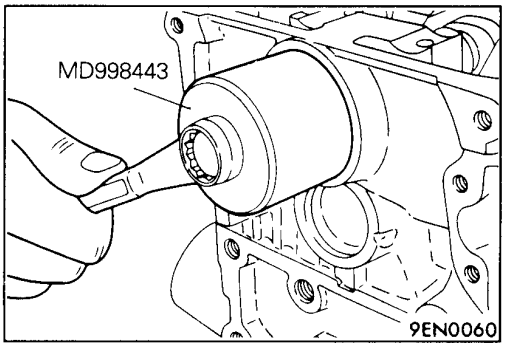
9. INSTALLATION OF ROCKER ARMS AND ROCKER ARM SHAFT ASSEMBLY (EXHAUST SIDE)/8. ROCKER ARMS AND ROCKER ARM SHAFT ASSEMBLY (INTAKE SIDE)

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

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

(3) Remove the special tool for fixing the lash adjuster.
(4) Confirm that the rocker arm shaft notch is in the direction shown in the diagram.





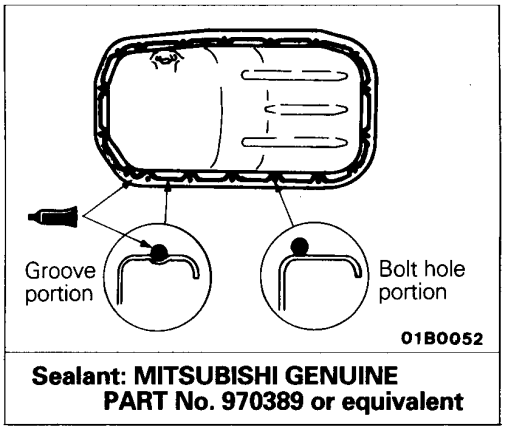
6. INSTALLATION OF CAMSHAFT OIL SEAL

OIL PAN AND OIL SCREEN

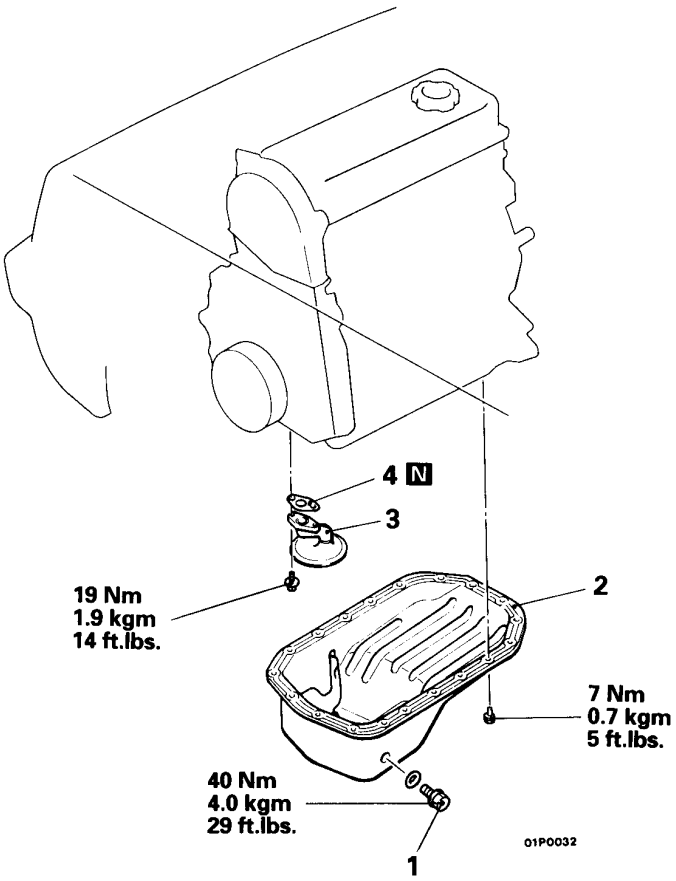
E11KA--

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Refilling of Engine Oil (Refer to GROUP 00 – Maintenance Service.)

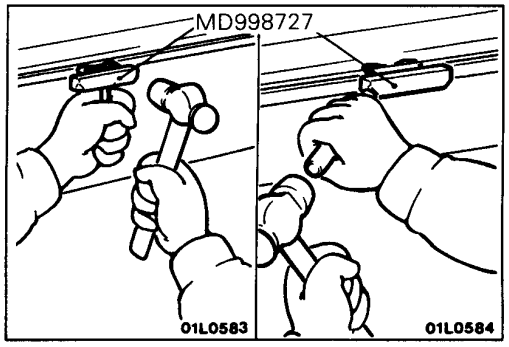


Sealant: MITSUBISHI GENUINE PART No. 970389 or equivalent



Removal steps

1. Drain plug
2. Oil pan
3. Oil screen
4. Oil screen gasket



SERVICE POINTS OF REMOVAL

E11KBBP

2. REMOVAL OF OIL PAN

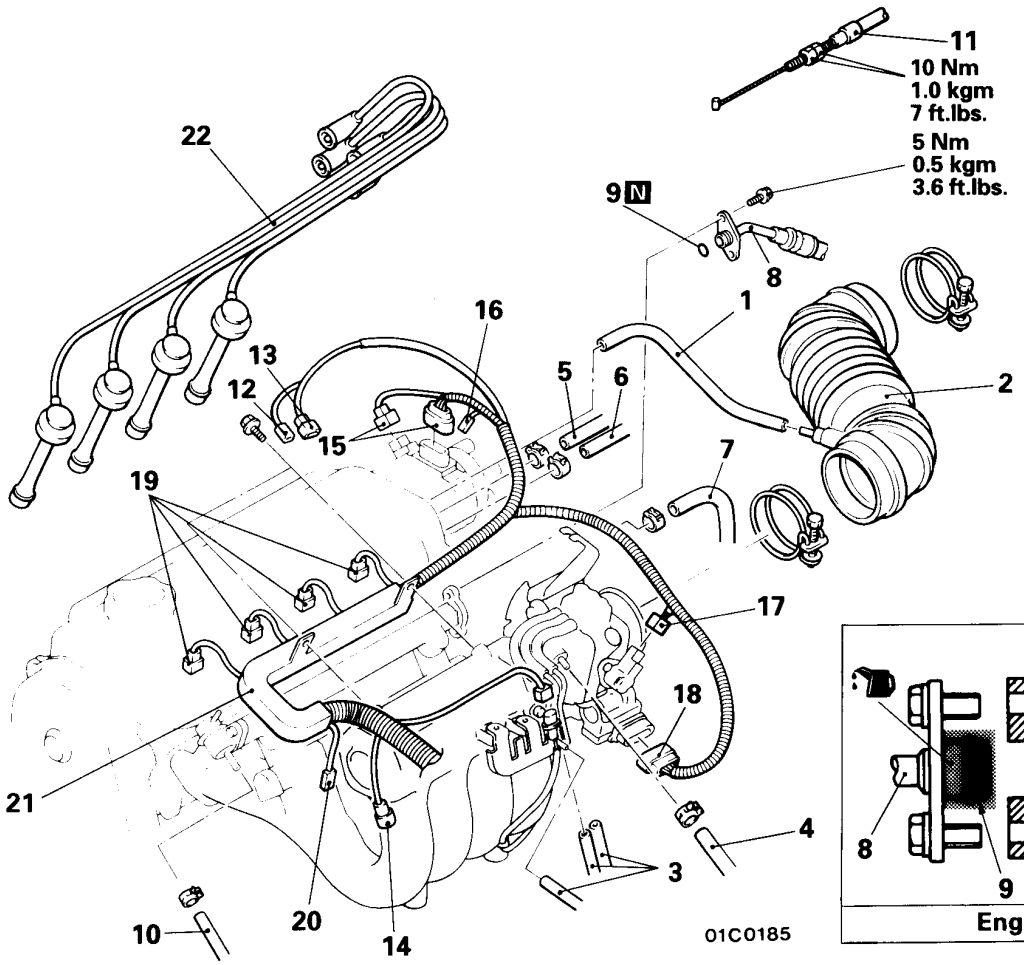
CYLINDER HEAD GASKET

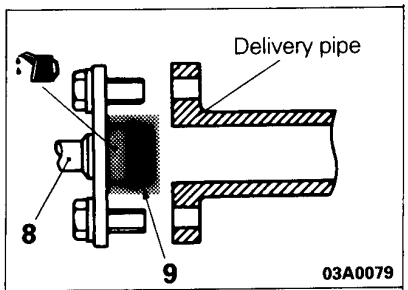
E11JA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Releasing of Fuel Line Pressure (Refer to GROUP 13 – Service Adjustment Procedures.)
- Draining of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Draining of the Engine Oil

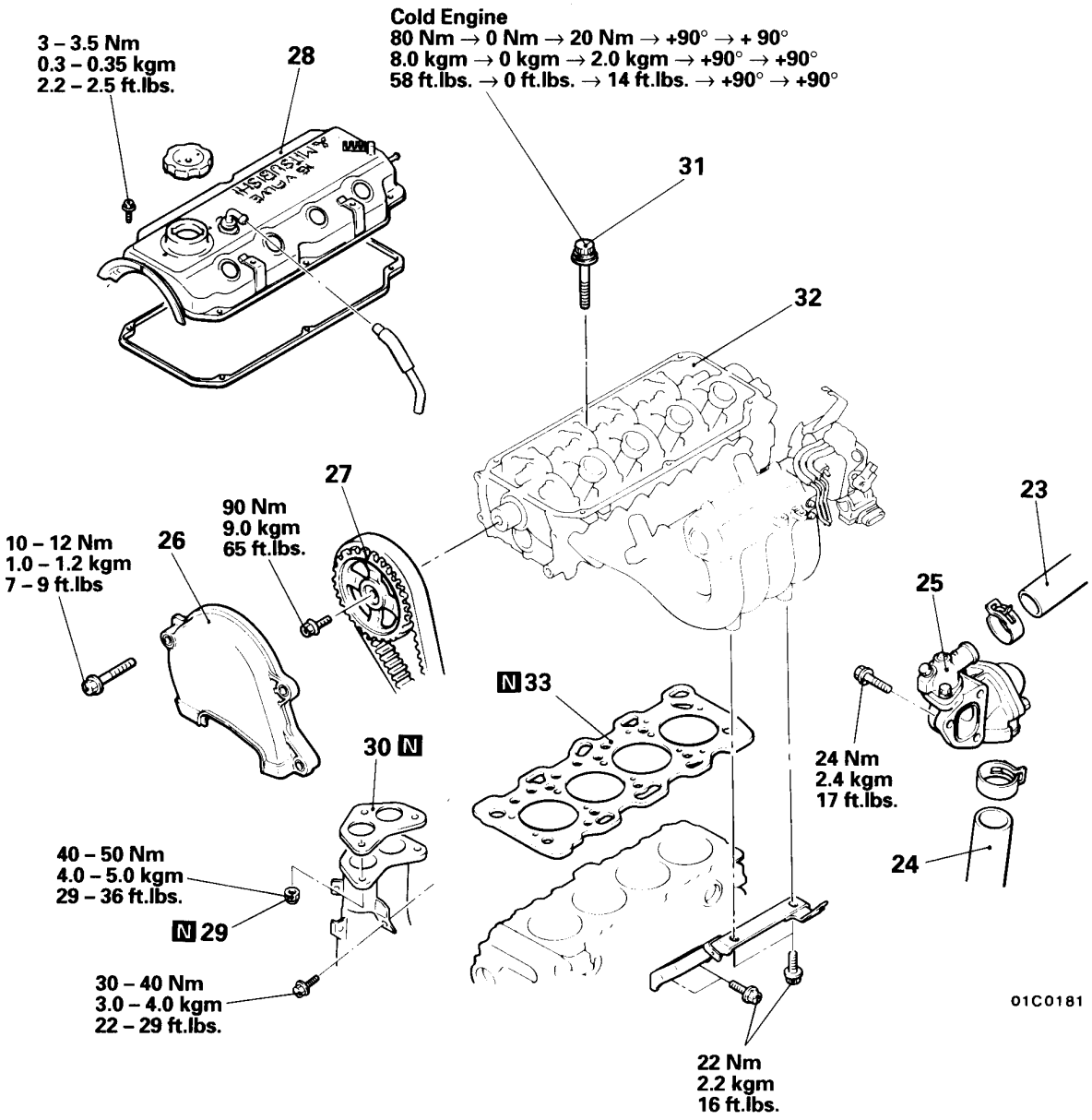
Post-installation Operation
- Supplying of the Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Supplying of the Engine Oil
- Accelerator Cable Adjustment (Refer to GROUP 13 – Service Adjustment Procedures.)

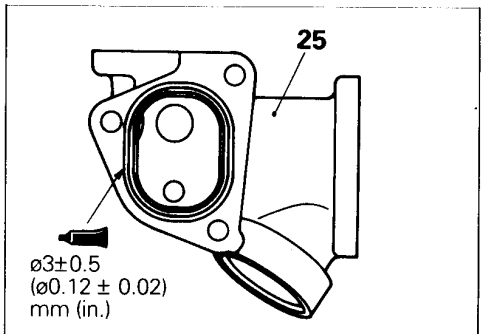




Engine oil

Removal steps
1. Breather hose
2. Air intake hose
3. Vacuum hose connection
4. Brake booster vacuum hose connection
5. Water hose connection (cylinder head → throttle body)
6. Heater hose connection (cylinder head → heater unit)
7. Water hose connection (throttle body → water inlet pipe)
8. Fuel high pressure hose connection
9. O-ring
10. Fuel return hose connection
11. Accelerator cable connection
12. Engine coolant temperature gauge unit connector
13. Engine coolant temperature sensor connector
14. Oxygen sensor connector
15. Distributor connector
16. Condenser connector
17. TPS connector
18. ISC connector
19. Injector connector
20. Air conditioning compressor connector
21. Control harness
22. Spark plug cable

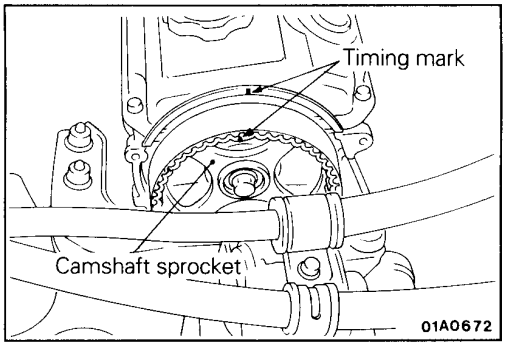




Specified sealant:
MITSUBISHI GENUINE PART
MD970389 or equivalent

Removal steps

23. Connection for radiator upper hose
24. Connection for radiator lower hose
◆◆ 25. Water inlet fitting, thermostat and thermostat case assembly
26. Timing belt upper cover
◆◆ 27. Camshaft sprocket
28. Rocker cover
29. Self-locking nuts
30. Gasket
◆◆ 31. Cylinder head bolt
◆◆ ◆◆ 32. Cylinder head assembly
◆◆ 33. Cylinder head gasket

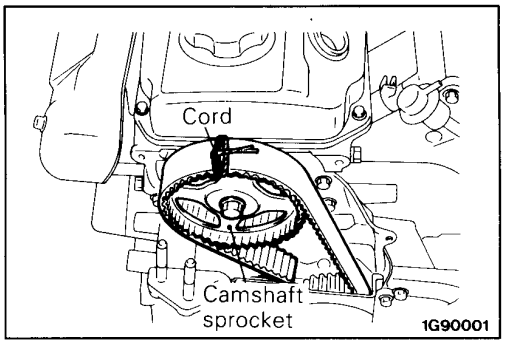


SERVICE POINTS OF REMOVAL E11JBBE

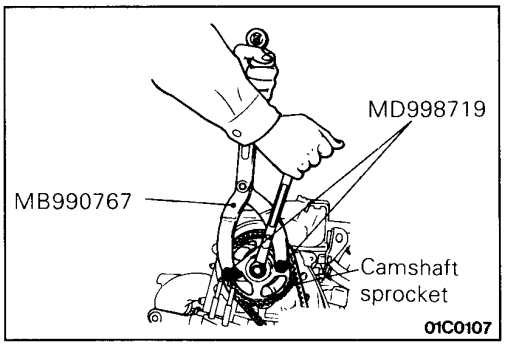
27. REMOVAL OF CAMSHAFT SPROCKET

(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.

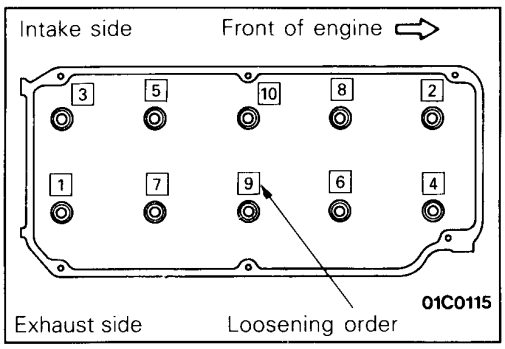


(2) Tie the camshaft sprocket and timing belt with a cord so that the position of the camshaft sprocket will not move with respect to the timing belt.



(3) 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.



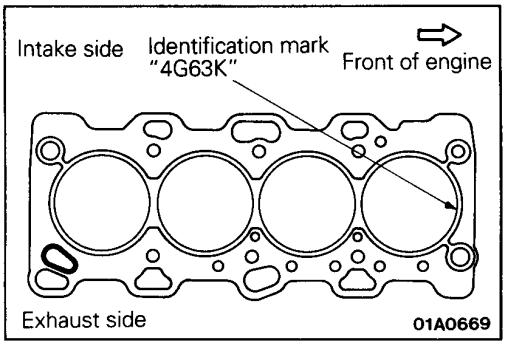
32. REMOVAL OF CYLINDER HEAD ASSEMBLY

Loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.

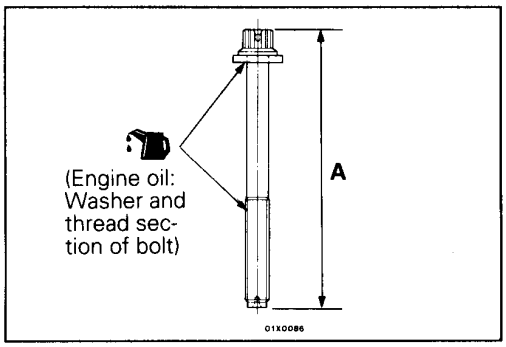
SERVICE POINTS OF INSTALLATION E11JDCY

33. INSTALLATION OF CYLINDER HEAD GASKET

(1) Wipe off any oil or grease from the gasket mounting surface.



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



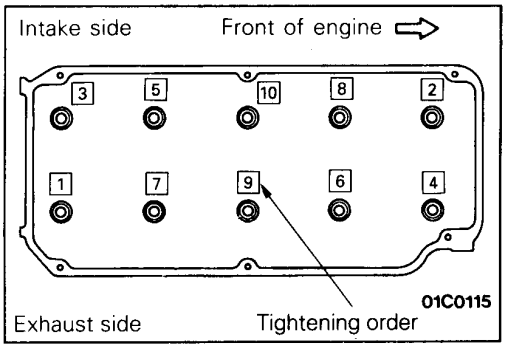
32. INSTALLATION OF CYLINDER HEAD ASSEMBLY / 31. CYLINDER HEAD BOLT

(1) When installing the cylinder head bolts, check that the shank length of each bolt meets the limit. If the limit is exceeded, replace the bolt

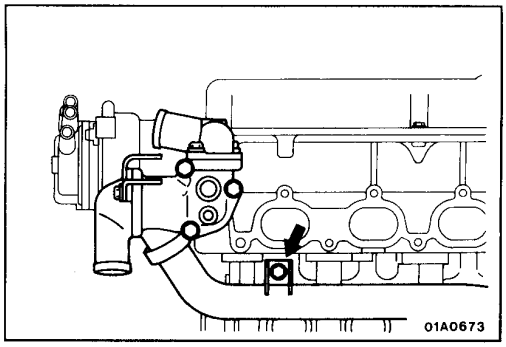
Limit: Max. 99.4 mm (3.91 in.)

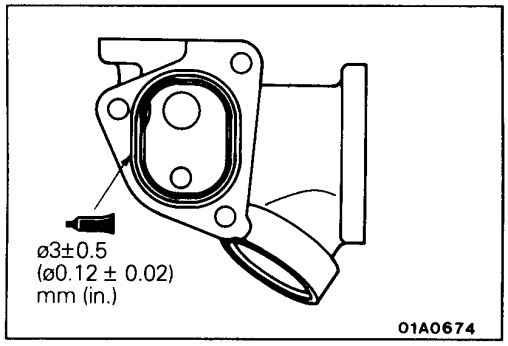
(2) Apply engine oil to the threaded part of the bolt and the washer.

(3) Tighten the bolts in order by the following procedure.



Procedure	Operation contents	Remarks
①	Tighten to 80 Nm (8.0 kgm, 58 ft.lbs.)	Carry out in the order shown in the illustration.
↓		
②	Fully loosen.	Carry out in the reverse order to that shown in the illustration.
↓		
③	Tighten to 20 Nm (2 kgm, 14 ft.lbs.)	Carry out in the order shown in the illustration.
↓		
④	Tighten by 1/4 turn (90°)	Carry out in the order shown in the illustration.
↓		
⑤	Tighten by 1/4 turn (90°)	Carry out in the order shown in the illustration.





25. INSTALLATION OF WATER INLET FITTING, THERMOSTAT AND THERMOSTAT CASE ASSEMBLY

(1) Loosen the water inlet pipe bolt shown in the illustration.
(2) Apply specified sealant to the thermostat case assembly as shown in the illustration.

Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent

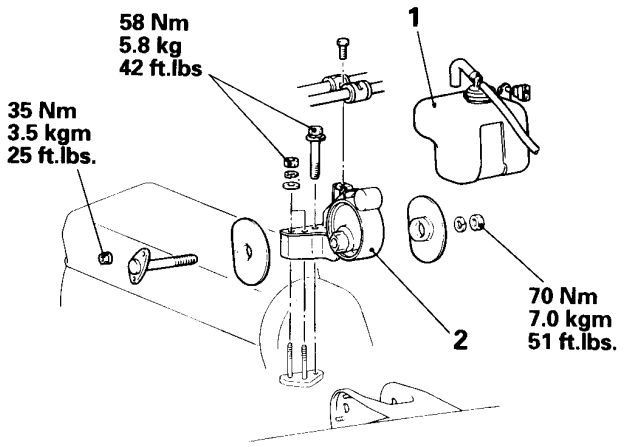
(3) Apply a small amount of water to the O-ring of the water inlet pipe, and press the thermostat case assembly onto the water inlet pipe.
(4) Install the thermostat case assembly mounting bolt.
(5) Tighten the water inlet pipe bolt.

TIMING BELT

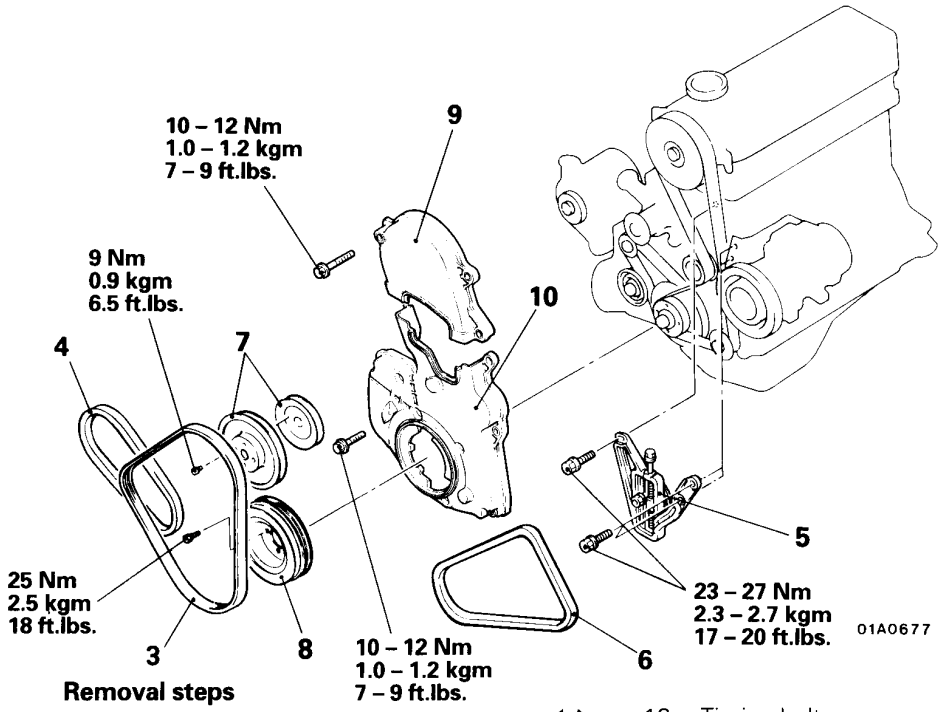
E11GA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of under cover



1G90014

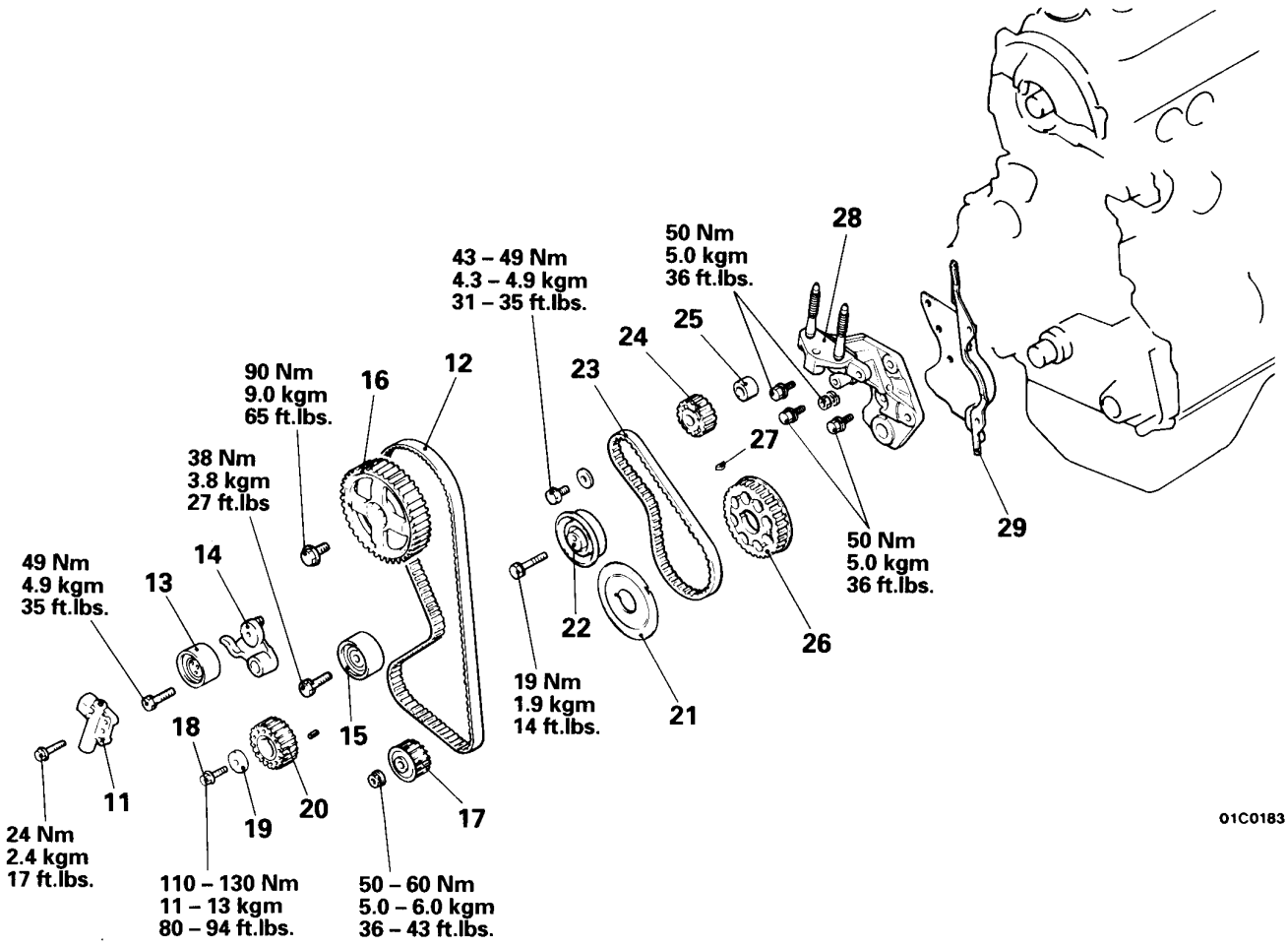


01A0677

Removal steps

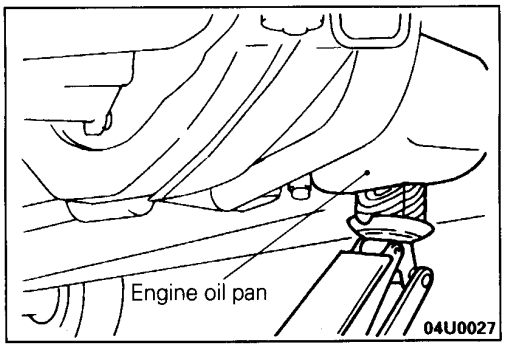
1. Condense tank
2. ◆◆ Engine mount bracket
3. Drive belt (alternator)
4. Drive belt (power steering)
5. Tensioner pulley bracket
6. Drive belt (air conditioner)
7. Water pump pulley
8. Crankshaft pulley
9. Timing belt front upper cover
10. Timing belt front lower cover
11. ◆◆ Auto tensioner
12. ◆◆ Timing belt
13. Tensioner pulley
14. Tensioner arm
15. Idle pulley
16. ◆◆ Camshaft sprocket
17. ◆◆ Oil pump sprocket
18. Crankshaft sprocket bolt
19. Special washer
20. Crankshaft sprocket
21. Flange
22. Timing belt tensioner "B"
23. ◆◆ Timing belt "B"
24. Right silent shaft sprocket
25. Spacer
26. Crankshaft sprocket "B"
27. Key
28. Left engine support bracket
29. Timing belt under cover

Post-installation Operation
- Installation of under cover



Installation steps

29. Timing belt under cover
◆◆ 28. Left engine support bracket
27. Key
◆◆ 26. Crankshaft sprocket "B"
◆◆ 25. Spacer
24. Right silent shaft sprocket
22. Timing belt tensioner "B"
◆◆ 23. Timing belt "B"
◆◆ • Adjustment of timing belt "B" tension
◆◆ 21. Flange
◆◆ 20. Crankshaft sprocket
19. Special washer
18. Crankshaft sprocket bolt
17. Oil pump sprocket
16. Camshaft sprocket
15. Idle pulley
◆◆ 11. Auto tensioner
14. Tensioner arm
◆◆ 13. Tensioner pulley
◆◆ 12. Timing belt
◆◆ • Adjustment of timing belt tension
◆◆ 10. Timing belt front lower cover
◆◆ 9. Timing belt front upper cover
8. Crankshaft pulley
7. Water pump pulley
6. Drive belt (air conditioner)
5. Tensioner pulley bracket
4. Drive belt (power steering)
• Adjustment of drive belt tension (Refer to P.11 – 68)
3. Drive belt (alternator)
2. Engine mount bracket
1. Condense tank



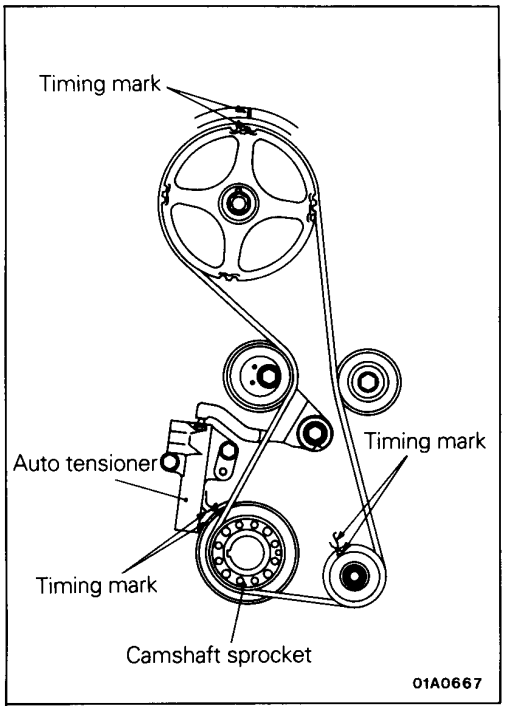
SERVICE POINTS OF REMOVAL E11GBHA

2. REMOVAL OF ENGINE MOUNT BRACKET

(1) With a wooden block placed against the oil pan part of the engine, jack up the vehicle.

Caution
Jack up gently, so as not to apply a load to the various parts.

(2) Remove the engine mount bracket.

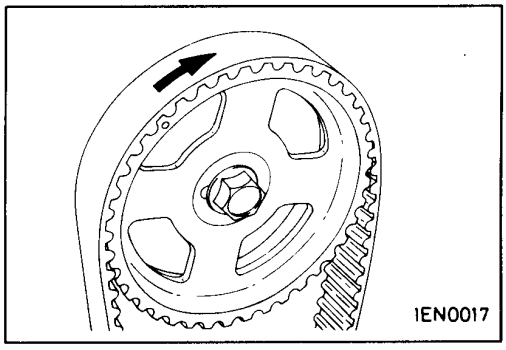


11. REMOVAL OF AUTO TENSIONER

(1) Turn the crankshaft clockwise and align the timing marks so as to bring the No. 1 cylinder to compression top-dead-centre position.
At this time the timing marks of the camshaft sprocket and the upper surface of the cylinder head should coincide, and the dowel pin of the camshaft sprocket should be at the upper side.

Caution
The crankshaft must always be rotated clockwise.

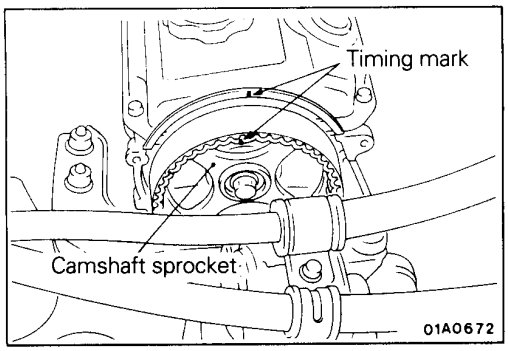
(2) Remove the auto tensioner.



12. REMOVAL OF TIMING BELT

Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.

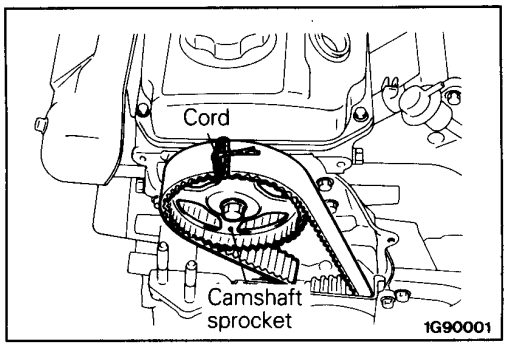
Caution
Water or oil on the belt shorten its life drastically, so the removed timing belt, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.
If there is oil or water on each part, check the front case oil seals, camshaft oil seal and water pump for leaks.



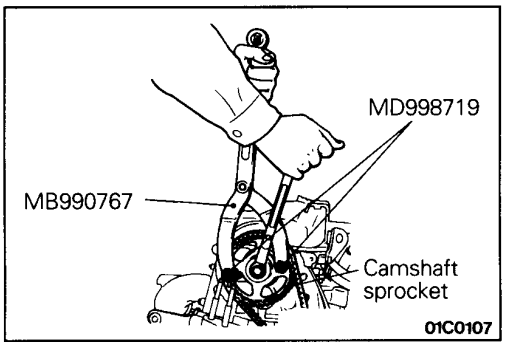
16. REMOVAL OF CAMSHAFT SPROCKET

(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.

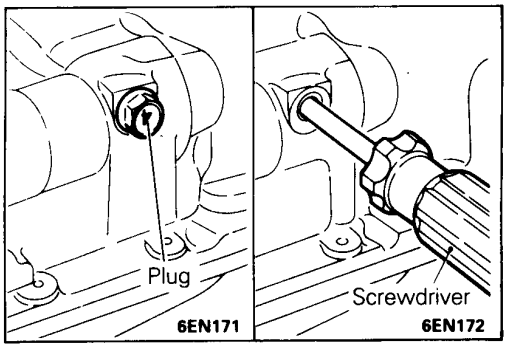


(2) Tie the camshaft sprocket and timing belt with a cord so that the position of the camshaft sprocket will not move with respect to the timing belt.



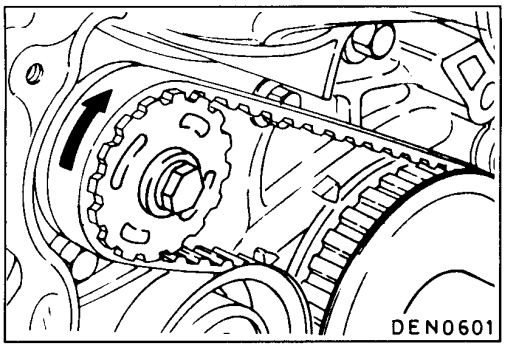
(3) Use the special tool to remove the camshaft sprocket with the timing belt attached.

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



17. REMOVAL OF OIL PUMP SPROCKET

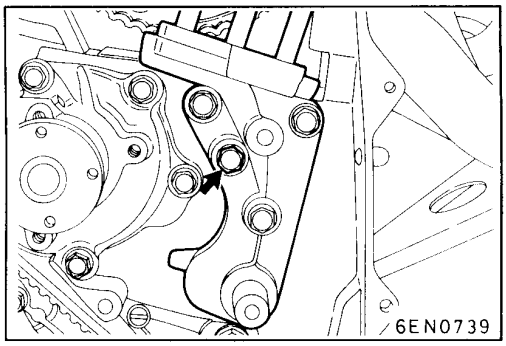
(1) Remove the plug on the side of the cylinder block.
(2) Insert a Phillips screwdriver [shank diameter 8 mm (.31 in.)] to block the left silent shaft.
(3) Remove the oil pump sprocket nut.
(4) Remove the oil pump sprocket.



23. REMOVAL OF TIMING BELT "B" E11GDHB

Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.

Caution
Water or oil on the belt shorten its life drastically, so the removed timing belt, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.
If there is oil or water on each part, check the front case oil seals, camshaft oil seal and water pump for leaks.

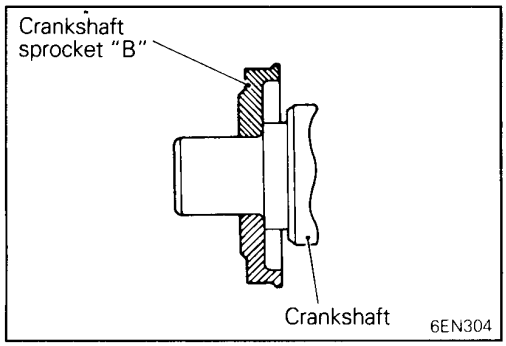


SERVICE POINTS OF INSTALLATION E11GDHB

28. INSTALLATION OF LEFT ENGINE SUPPORT BRACKET

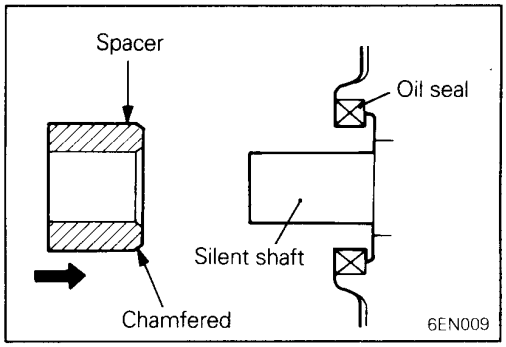
After applying specified sealant to the bolt indicated by an arrow in the illustration, tighten the bolt.

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



26. INSTALLATION OF CRANKSHAFT SPROCKET "B"

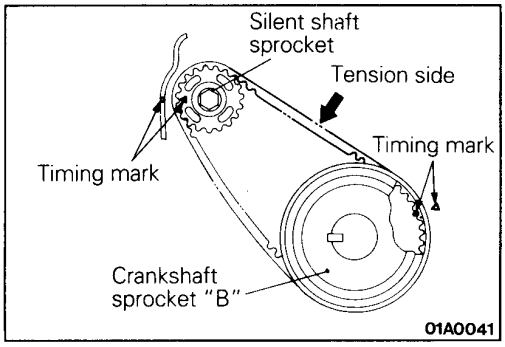
Install the crankshaft sprocket "B" as shown while paying attention to its direction.



25. INSTALLATION OF SPACER

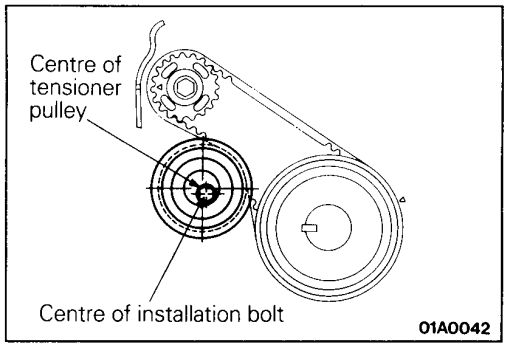
(1) Apply a thin coat of engine oil to the outer circumference of the spacer.
(2) Install the spacer with the chamfered end facing the oil seal.

NOTE
If the spacer is installed adversely, the oil seal may be damaged, resulting in the oil leaks.



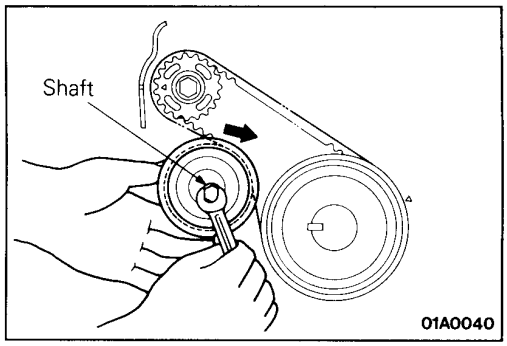
23. INSTALLATION OF TIMING BELT "B"

(1) Ensure that crankshaft sprocket "B" timing mark and the silent shaft sprocket timing mark 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.



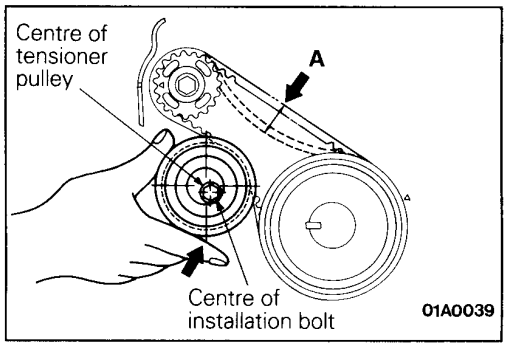
● **ADJUSTMENT OF TIMING BELT "B" TENSION**

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



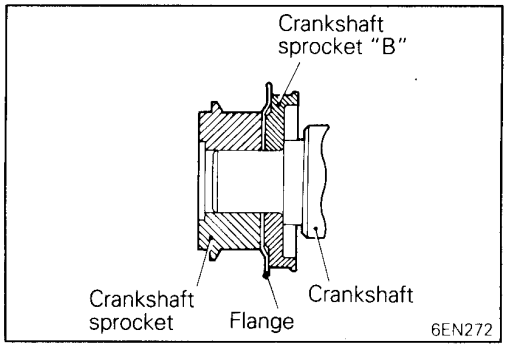
(2) Holding the timing belt "B" tensioner up with your finger in the direction of the arrow, place pressure on the timing belt so that the tension side of the belt is taut. Now tighten the bolt to fix the tensioner.

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 on the belt.



(3) To ensure that the tension is correct, depress the belt (point A) with a finger. If not, adjust.

Standard value: 5 – 7 mm (0.20 – 0.28 in.)



21. INSTALLATION OF FLANGE

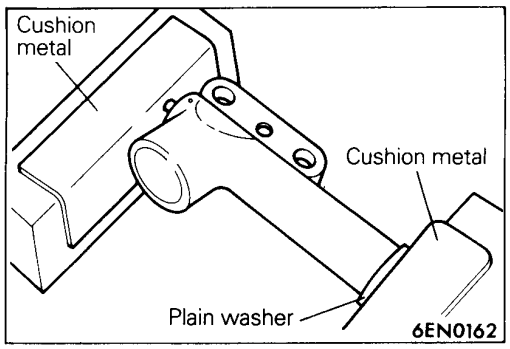
Install the flange in correct direction as shown.

Caution
Pay special attention to the direction of the flange. If it is installed in the wrong direction, a broken timing belt could result.

20. INSTALLATION OF CRANKSHAFT SPROCKET

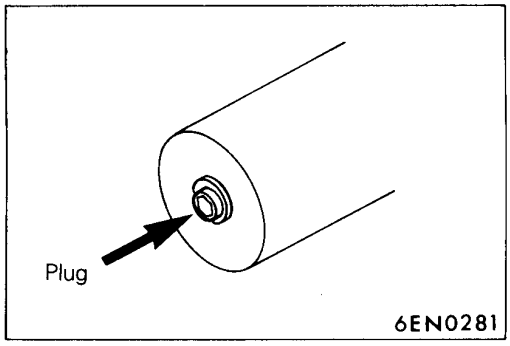
Install the crankshaft sprocket in the correct direction as shown.

Caution
Pay special attention to the direction of the flange. If it is installed in the wrong direction, a broken timing belt could result.

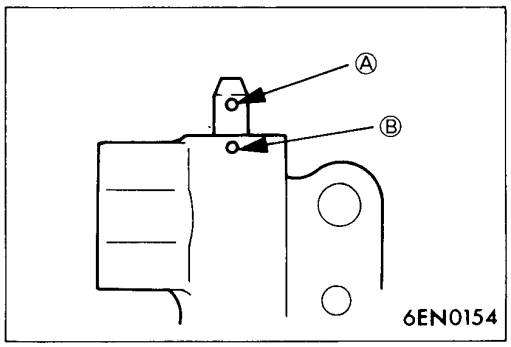


11. INSTALLATION OF AUTO TENSIONER

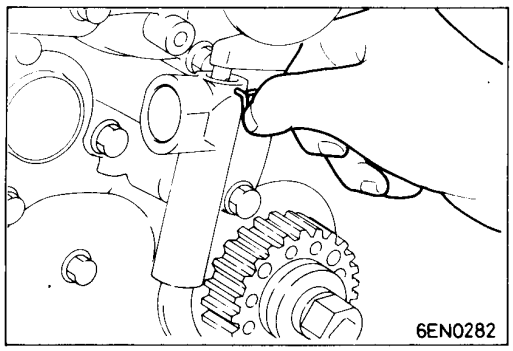
(1) If the auto tensioner rod is in its fully extended position, reset it as follows.
① Keep the auto tensioner level and, in that position, clamp it in the vise with soft jaws.



If the plug at the bottom of the auto tensioner protrudes, surround it with a plain washer as illustrated to prevent the plug from being in direct contact with the vise.

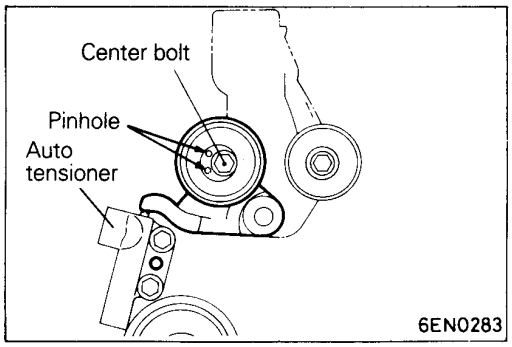


② Push in the rod little by little with the vise until the set hole Ⓐ in the rod is aligned with that Ⓑ in the cylinder.
③ Insert a wire [1.4 mm (0.06 in.) in diamter] into the set holes.
④ Unclamp the auto tensioner from the vise.



(2) Install the auto tensioner.

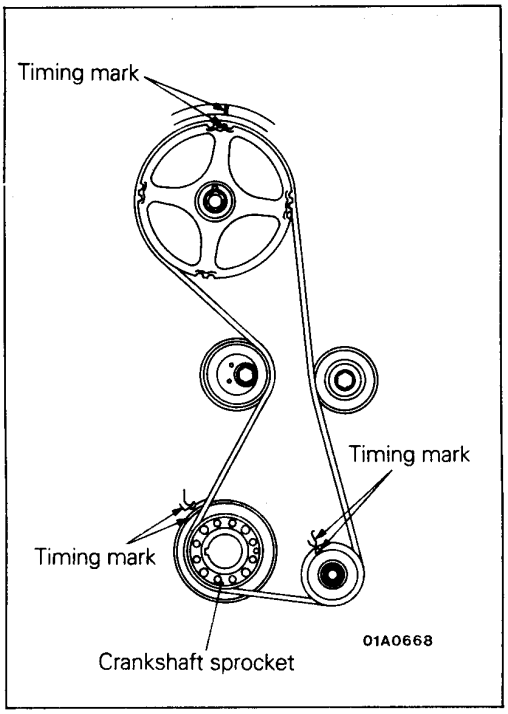
Caution
Leave the wire installed in the auto tensioner.



13. INSTALLATION OF TENSIONER PULLEY

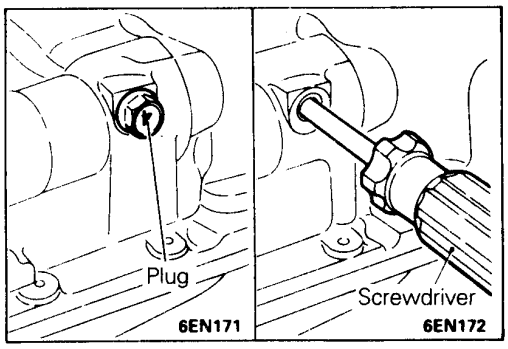
(1) Install the tensioner pulley onto the tensioner arm.
(2) Locate the pinhole in the tensioner pulley shaft to the left of the center bolt. Then, tighten the center bolt finger-tight.

Caution
Leave the wire installed in the auto tensioner.



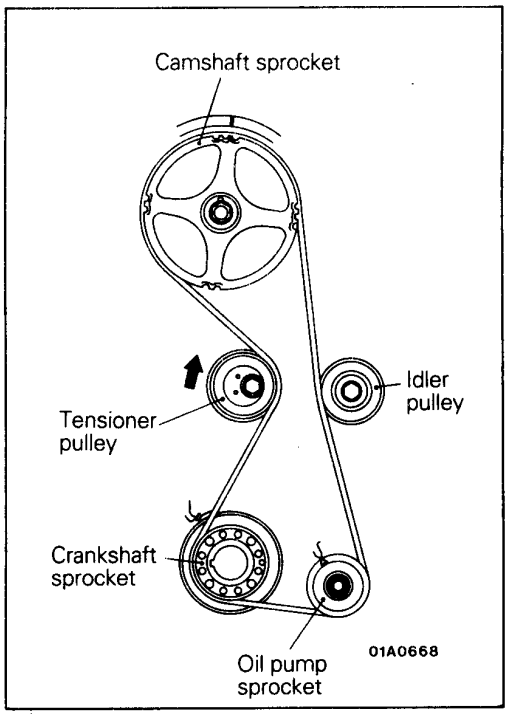
12. INSTALLATION OF TIMING BELT

(1) Ensure that the timing marks of the camshaft sprocket, the crankshaft sprocket, and the oil pump sprocket are all aligned.

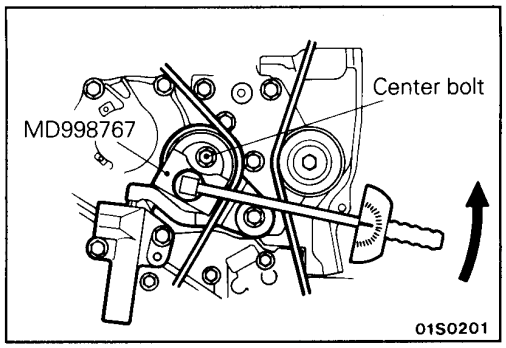


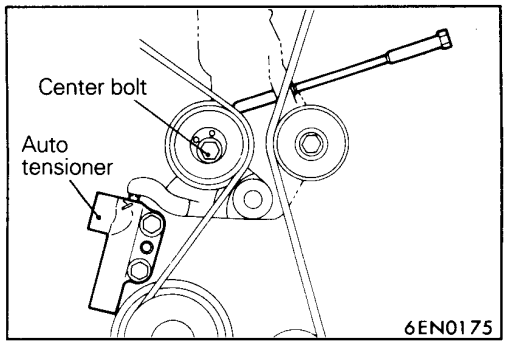
(2) Remove the plug on the cylinder block and insert a Phillips screwdriver [shank diameter 8 mm (0.31 in.)] through the hole.
If it can be inserted as deep as 60 mm (2.4 in.) or more, the timing marks are correctly aligned. If the inserted depth is only 20 – 25 mm (0.8 – 1.0 in.), turn the oil pump sprocket one turn and realign timing marks. Then check to ensure that the screwdriver can be inserted 60 mm (2.4 in.) or more. Keep the screwdriver inserted until the installation of the timing belt is finished.

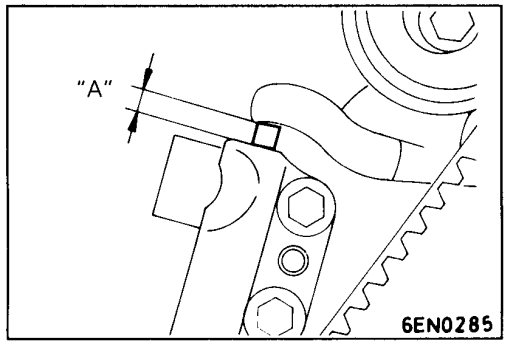
NOTE
Step (2) is performed to ensure that the oil pump sprocket is correctly positioned with reference to the silent shafts.



(3) Install the timing belt around sprockets as follows.
① Install the timing belt around the tensioner pulley and crankshaft sprocket and secure the timing belt onto the tensioner pulley with your left hand.
② Pulling the belt with your right hand, install it around the oil pump sprocket.
③ Install the belt around the idler pulley.
④ Turn the camshaft sprocket one tooth clockwise to align its timing mark with the cylinder head top surface (see illustration in step ①). Then, pulling the belt with both hands, install it around the camshaft sprocket.
⑤ Gently raise the tensioner pulley as shown by the arrow, so that the belt does not sag, and temporarily tighten the center bolt.







● ADJUSTMENT OF TIMING BELT TENSION

(1) After turning the crankshaft 1/4 turn counterclockwise, turn it clockwise to move the No. 1 cylinder to top dead center.

(2) Loosen the center bolt, and then, as shown in the illustration, attach the special tool and a torque wrench and apply a torque of 3.6 Nm (0.36 kgm, 2.6 ft.lbs.). If the body interferes with the special tool and the torque wrench, use a jack to slightly raise the engine assembly.

NOTE
Use a torque wrench that is capable of measurement within a range of 0–5 Nm (0–0.5 kgm, 0–2.2 ft.lbs.).

(3) Holding the tensioner pulley with the special tool and torque wrench, tighten the center bolt to specification.

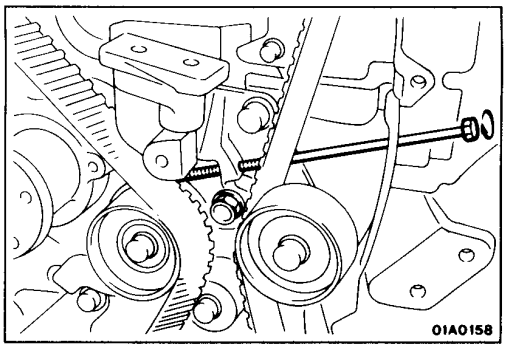
(4) Screw the tool into the engine left support bracket until its end makes contact with the tensioner arm. At that point, screw the tool in some more and then remove the set wire attached to the auto tensioner.

(5) Remove the tool.

(6) Rotate the crankshaft two complete turns clockwise and leave it as is for about 15 minutes. Then, measure the auto tensioner protrusion "A" (distance between the tensioner arm and auto tensioner body) to ensure that it is up to specification.

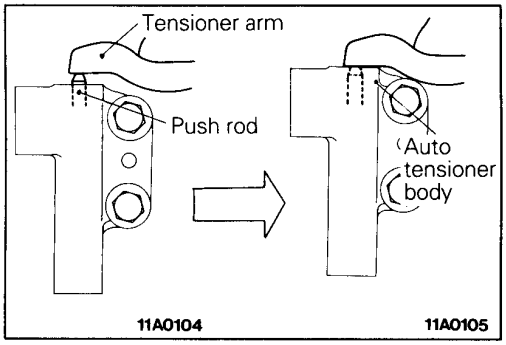
Standard value: 3.8 – 4.5 mm (0.15 – 0.18 in.)

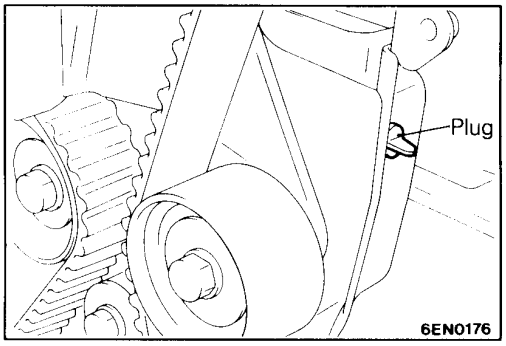
If it is out of specification, repeat steps (1) through (5) until the specified value is obtained.



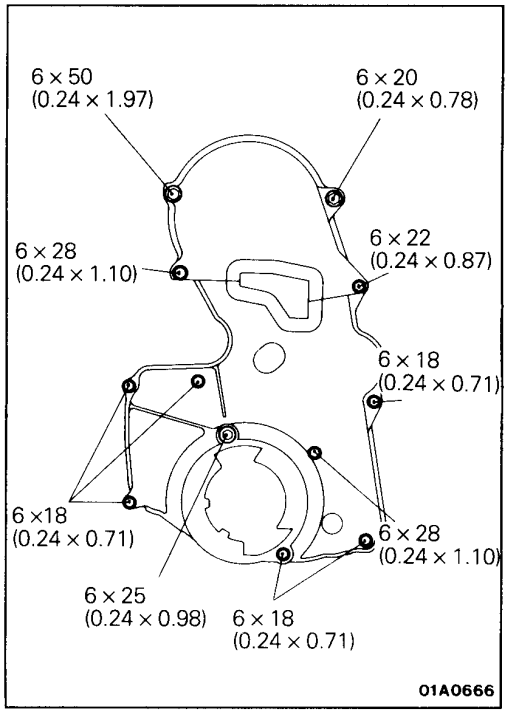
(7) If the clearance between the tensioner arm and the auto tensioner body cannot be measured (when the engine is being mounted, etc.), the following procedures can be used to substitute for the ordinary method of measurement.
① Screw in the tool until it contacts the tensioner arm.
② From that point of contact, further screw in the tool, screwing it in until the push rod of the auto tensioner body is caused to move backward and the tensioner arm contacts the auto tensioner body.
Check to be sure that the amount that tool has been screwed in (when the push rod moves backward) is the standard value.

Standard value: 2.5 – 3 turns





(8) Install the rubber plug to the timing belt rear cover.



10. INSTALLATION OF TIMING BELT LOWER COVER/ 9. TIMING BELT UPPER COVER

The dimensions of the installation bolts for the timing covers differ according to the installation location, so be sure not to install the bolts in the incorrect locations.

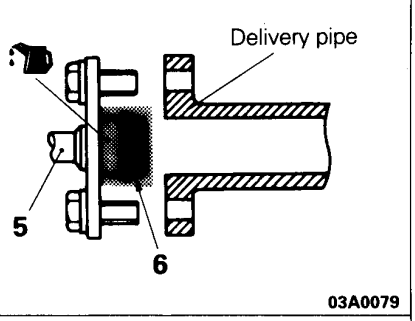
ENGINE ASSEMBLY

E11TA--

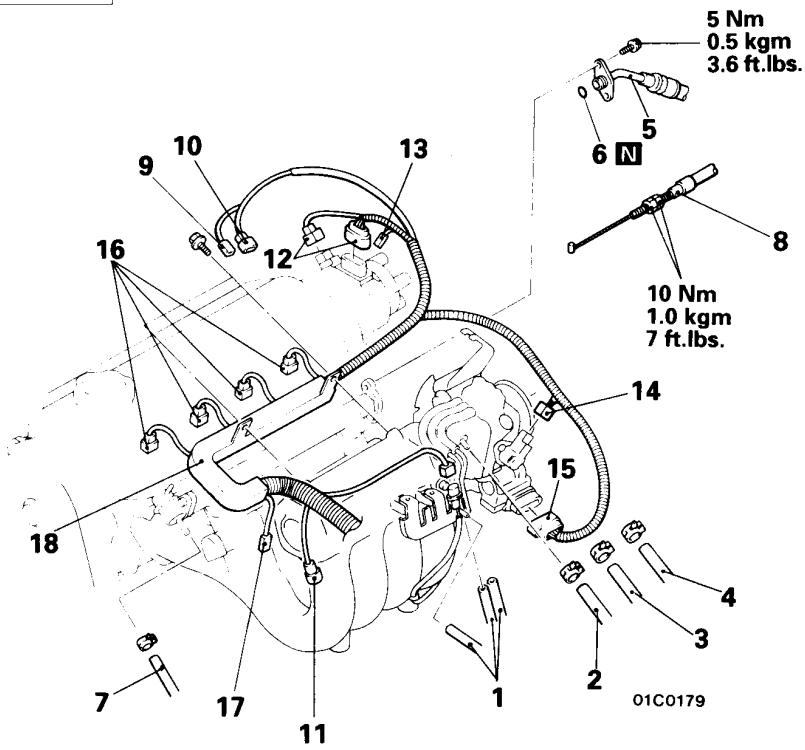
REMOVAL AND INSTALLATION

Pre-removal Operation
- Eliminating Fuel Pressure in Fuel Line (Refer to GROUP 13 – Service Adjustment Procedures.)
- Removal of the Hood (Refer to GROUP 42 – Hood.)
- Draining of the Coolant (Refer to GROUP 00 – Service Adjustment Procedures.)
- Removal of the Transmission (Refer to GROUP 22, 23–Transmission.)
- Removal of the Radiator (Refer to GROUP 14 – Radiator.)

Post-installation Operation
- Installation of the Radiator (Refer to GROUP 14 – Radiator.)
- Installation of the Transmission (Refer to GROUP 22, 23 – Transmission.)
- Refilling of the Coolant (Refer to GROUP 00 – Service Adjustment Procedures.)
- Installation of the Hood (Refer to GROUP 42 – Hood.)

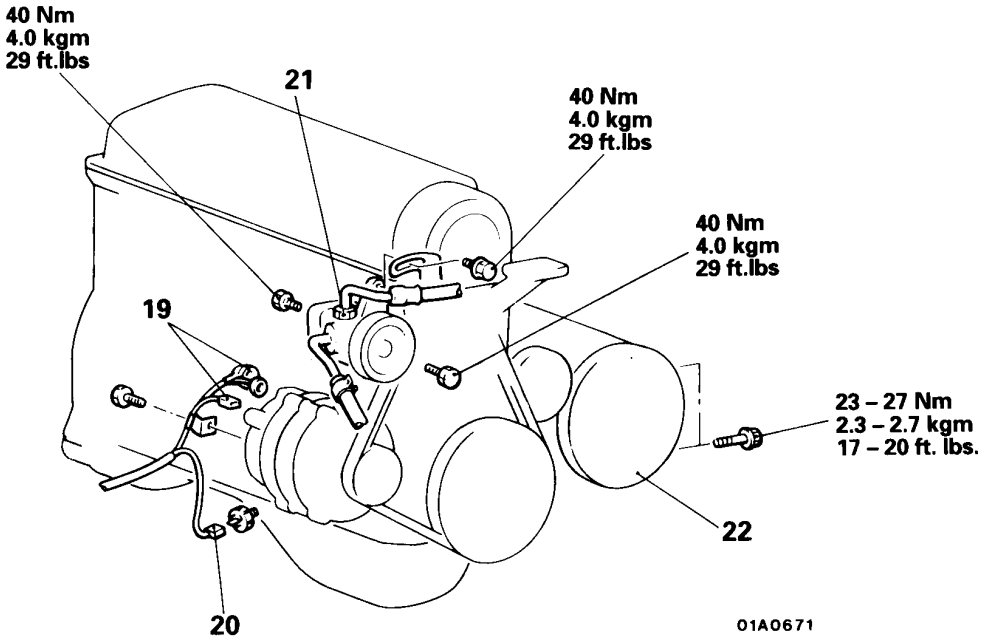


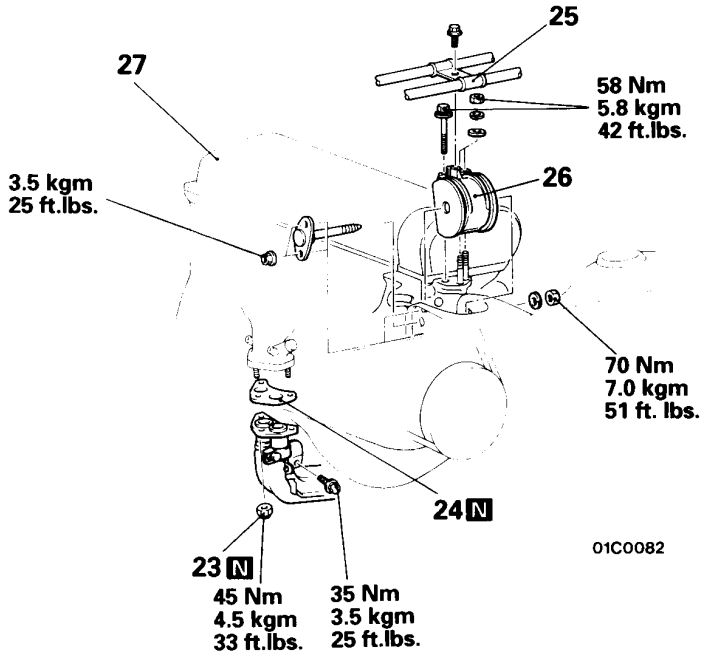
Engine oil



Removal steps

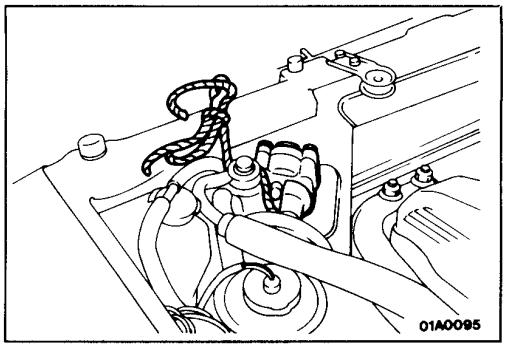
1. Vacuum hose connection
2. Brake booster vacuum hose connection
3. Heater hose connection (cylinder head → heater unit)
4. Heater hose connection (Heater unit → water inlet pipe)
5. Fuel high pressure hose connection
6. O-ring
7. Fuel return hose connection
8. Accelerator cable connection
9. Engine coolant temperature gauge unit connector
10. Engine coolant temperature sensor connector
11. Oxygen sensor connector
12. Distributor connector
13. Condenser connector
14. TPS connector
15. ISC connector
16. Injector connector
17. Air conditioning compressor connector
18. Control harness





Removal steps

19. Connection for alternator
20. Connection for oil pressure switch
    - Drive belt tension adjustment (Refer to P.11 – 68.)
21. Power steering oil pump
22. Air conditioner compressor
23. Self-locking nuts
24. Gasket
25. Clamp of pressure hose (Power steering) and high pressure hose (Air conditioner)
26. Engine mount bracket
27. Engine assembly



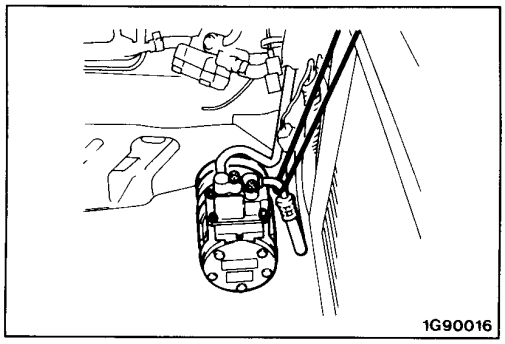
SERVICE POINTS OF REMOVAL

21. REMOVAL OF POWER STEERING OIL PUMP

Remove the oil pump (with the hose attached).

NOTE

Suspend the removed oil pump (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

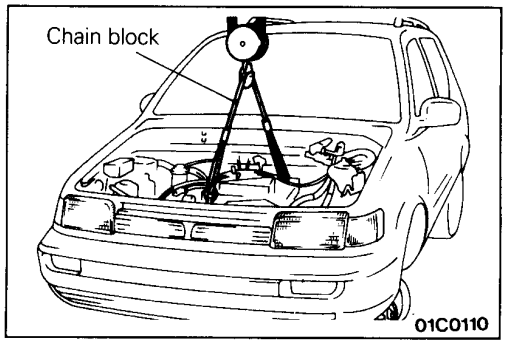


22. REMOVAL OF AIR CONDITIONER COMPRESSOR

Disconnect the connection of the air conditioner compressor, and then remove the compressor (with the hose attached) from the compressor bracket.

NOTE

Suspend the removed air conditioner compressor (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.



26. REMOVAL OF ENGINE MOUNT BRACKET

(1) Support the engine with a garage jack.
(2) Hold the engine assembly with a chain block, etc.
(3) Place the garage jack against the engine oil pan with a piece of wood in between, and after raising the engine until there is no weight on the engine mount brackets, remove the engine mount brackets.

27. REMOVAL OF ENGINE ASSEMBLY

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

SERVICE POINTS OF INSTALLATION

27. INSTALLATION OF ENGINE ASSEMBLY

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

26. INSTALLATION OF ENGINE MOUNT BRACKET

(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 a garage jack.
(3) Remove the chain block and support the engine assembly with the special too.