## **GROUP 11A**

## ENGINE MECHANICAL

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#### **GENERAL DESCRIPTION**

M1111000100196

The 4G94 (2.0L) engine is an in-line four-cylinder engine. The cylinder numbers are assigned as 1-2-3-4 from the front of the engine (timing belt side). This engine's firing order is 1, 3, 4, 2.

ITEMS	rems		SPECIFICATIONS
Туре	Туре		In-line SOHC
Number of cylinde	ers	4	
Bore mm (in)			81.5 (3.21)
Stroke mm (in)			95.8 (3.77)
Engine displaceme	ent cm <sup>3</sup> (cu. in)		1,999 (122.0)
Compression ratio	)		9.5
Firing order			1-3-4-2
Valve timing	Intake valve	Opens (BTDC)	2°
		Closes (ABDC)	58°
	Exhaust valve	Opens (BBDC)	58°
		Closes (ATDC)	10°
Lubrication	1	1	Pressure feed full-flow filtration
Oil pump type			Trochoid type

#### **ENGINE DIAGNOSIS**

M1111000700154

SYMPTOM	PROBABLE CAUSE	REMEDY	
Compression is too low	Blown cylinder head gasket	Replace the gasket.	
	Worn or damaged piston rings	Replace the rings.	
	Worn piston or cylinder	Repair or replace the piston and/or the cylinder block.	
	Worn or damaged valve seat	Repair or replace the valve and/or the seat ring.	
	Worn or damaged valve guide	Replace the valve guide.	
Drop in oil pressure	Engine oil level is too low	Check the engine oil level.	
	Malfunction of oil pressure switch	Replace the oil pressure switch.	
	Clogged oil filter	Install a new filter.	
	Worn oil pump gears or cover	Replace the gears and/or the cover.	
	Thin or diluted engine oil	Change the engine oil. Be sure to use the correct viscosity.	
	Stuck (open) oil relief valve	Repair the relief valve.	
	Excessive bearing clearance	Replace the bearings.	
Oil pressure too high	Stuck (closed) oil relief valve	Repair the relief valve.	

SYMPTOM	PROBABLE CAUSE	REMEDY
Noisy valves	Malfunction of lash adjuster (including entry of air into high pressure chamber)	Check the lash adjuster.
	Thin or diluted engine oil (low oil pressure)	Change the engine oil. Be sure to use the correct viscosity.
	Worn or damaged valve stem or valve guide	Replace the valve and/or the guide.
Connecting rod noise/main	Insufficient oil supply	Check the engine oil level.
bearing noise	Low oil pressure	Refer to oil pressure drop symptoms above.
	Thin or diluted engine oil	Change the engine oil. Be sure to use the correct viscosity.
	Excessive bearing clearance	Replace the bearings.
Noisy timing belt	Incorrect belt tension	Adjust the belt tension and/or replace the timing belt.
Excessive engine rolling and vibration	Loose engine roll stopper (Front, Rear) Loose transaxle mount bracket Loose engine mount bracket Loose center member	Retighten.
	Broken transaxle mount insulator Broken engine mount insulator Broken engine roll stopper insulator	Replase.

## **SPECIAL TOOLS**

M1111000600384

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
B991502	MB991502 Scan tool (MUT-II)	MB991496-OD	Ignition timing check     Idle speed check
B990767	MB990767 End yoke holder	MB990767-01	<ul> <li>Holding the camshaft sprocket</li> <li>Holding the crankshaft pulley</li> </ul>
D998719	MD998719 Crankshaft pulley holder pin	General service tool	

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
D998713	MD998713 Camshaft oil seal installer	MD998713-01	Installation of the camshaft oil seal
D998727	MD998727 Oil pan remover	MD998727-01	Remove of oil pan
	MD998304 Crankshaft front oil seal installer	MD998304-01	Installation of the crankshaft front oil seal
MD998305	MD998305 Crankshaft front oil seal guide	MD998305-01	
D998781	MD998781 Flywheel stopper	General service tool	Securing the drive plate
B991654	MB991653 Cylinder head bolt wrench	General service tool	Removal and installation of the cylinder head bolt
B991454AC	MB991454 Engine hanger	MZ203827-01	Supporting the engine assembly while removing and installing the transaxle assembly.  NOTE:  1. Conventional engine
Z203830	MB991895 Engine hanger	General service tool	lifter MZ203827 can also be used.  2. Engine hanger MB991454 is a part of engine hanger assembly MB991453.

#### ON VEHICLE SERVICE

## DRIVE BELT TENSION CHECK AND ADJUSTMENT

M1111003100203

Refer to GROUP 00, Maintenance Service – Drive Belts (Check Condition) P.00-37.

#### **IGNITION TIMING CHECK**

M1111001700180

#### Required Special Tool:

MB991502: Scan Tool (MUT-II)

- 1. Before inspection, set vehicles to the following conditions:
- Engine coolant temperature: 80 95°C (176 203°F)
- Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with A/T)

#### **⚠** CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

- 2. Connect scan tool MB991502 to the data link connector.
- 3. Set up a timing light.
- 4. Start the engine and run it at idle.
- 5. Check that the idle speed is approximately 700 r/min.
- Select scan tool MB991502 MFI actuator test "item number 17."
- 7. Check that basic ignition timing is within the standard value.

#### Standard value: $5^{\circ}$ BTDC $\pm 3^{\circ}$

- 8. If the basic ignition timing is not within the standard value, check the following items:
  - Is the MFI system diagnostic trouble code is output
- Timing belt cover and crankshaft position sensor installation conditions
- Crankshaft sensing blade condition

#### **⚠** CAUTION

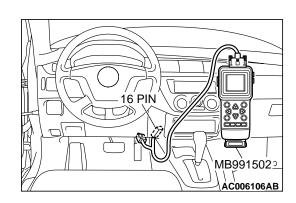
If the actuator test is not canceled, the forced drive will continue for 27 minutes. Driving in this state could lead to engine failure.

- 9. Press the clear key on scan tool MB991502 (select forced-drive stop mode), and cancel the actuator test.
- 10. Check that the actual ignition timing is at the standard value.

#### Standard value: Approximately 8° BTDC

NOTE: Ignition timing fluctuates about  $\pm 7^{\circ}$  Before Top Dead Center, even under normal operating condition.

NOTE: It is automatically further advanced by about 5° to 10° Before Top Dead Center at higher altitudes.



#### **IDLE MIXTURE CHECK**

M1111002100136

#### **Required Special Tool:**

MB991502: Scan Tool (MUT-II)

- 1. Before inspection, set vehicles to the following conditions:
- Engine coolant temperature: 80 95°C (176 203°F)
- · Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with A/T)



To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

- 2. Connect scan tool MB991502 to the data link connector.
- 3. Confirm basic ignition timing is within the standard value. (Refer to Ignition Timing Check P.11A-5.)

Standard value:  $5^{\circ}$  BTDC  $\pm 3^{\circ}$ 

- 4. Increase engine speed to 2,500 r/min for 2 minutes.
- 5. Set the CO/HC tester.
- 6. Check the CO and HC contents at idle.

Standard value:

CO contents: 0.5 % or less HC contents: 100 ppm or less

- 7. If the CO and HC contents do not remain inside the standard value, check the following items:
  - If the MFI system diagnostic trouble code is output
  - Closed-loop control (When the closed-loop control is carried out normally, the output signal of the heated oxygen sensor changes between 0 – 400 mV and 600 – 1,000 mV at idle.)
  - Fuel pressure
  - Injector(s)
  - Ignition coil, spark plug cable, spark plug
  - EGR system and EGR valve leak
  - Evaporative emission control system
  - Compression pressure

NOTE: Replace the catalytic converter when the CO and HC contents do not remain inside the standard value, even though the result of the inspection is normal for all items.

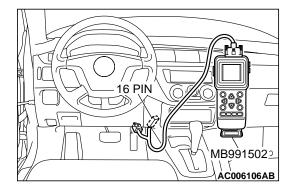
#### **CURB IDLE SPEED CHECK**

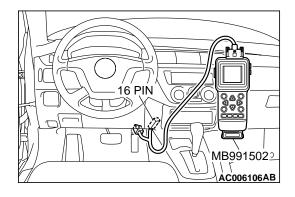
M1111003500308

#### Required Special Tool:

MB991502: Scan Tool (MUT-II)

- 1. Before inspection's set vehicles to the following conditions:
- Engine coolant temperature: 80 95°C (176 203°F)
- · Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with A/T)





#### **⚠** CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

- 2. Connect scan tool MB991502 to the data link connector.
- 3. Confirm basic ignition timing is within the standard value. (Refer to Ignition Timing Check P.11A-5.)

Standard value:  $5^{\circ}$  BTDC  $\pm 3^{\circ}$ 

- Start the engine.
- 5. Run the engine at idle for 2 minutes.
- 6. Check the idle speed. Select MFI service data item number 22 and take a reading of the idle speed.

Curb idle speed:  $700 \pm 100 \text{ r/min}$ 

NOTE: The idle speed is controlled automatically by the idle air control system.

7. If the idle speed is outside the standard value, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Symptom Chart P.13Ab-22.

#### **COMPRESSION PRESSURE CHECK**

M1111002600153

- Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following conditions:
- Engine coolant temperature: 80 95°C (176 203°F)
- Lights, and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with A/T)
- 2. Disconnect the spark plug cables.
- Remove all of the spark plugs.
- 4. Disconnect the crankshaft position sensor connector.

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

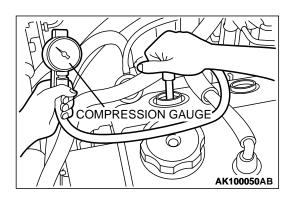
#### **⚠ WARNING**

Keep your distance from the spark plug hole when cranking. Oil, fuel, etc., may spray out from the spark plug hole and may cause serious injury.

- 5. Cover the spark plug holes with a shop towel etc. Crank the engine for a few seconds to clear debris from a round the spark plug holes. After the engine has been cranked, check for foreign material adhering to the shop towel.
- 6. Install the 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 200 r/min): 1,618 kPa (234 psi)

Minimum limit (at engine speed of 200 r/min): 1,176 kPa (170 psi)



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

Limit: 98 kPa (14 psi)

- 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 6 to 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 crankshaft position sensor connector.
- 11. Install the spark plugs and spark plug cables.
- 12. Use the scan tool to erase the diagnostic trouble codes.

NOTE: This will erase the diagnostic trouble code resulting from the crankshaft position sensor connector being disconnected.

NOTE: If the negative (–) cable has been disconnected from the battery terminal in order to erase the diagnostic trouble code, operate the engine at idle for approximately 10 minutes after restarting.

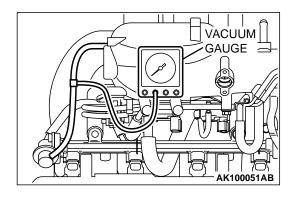
#### MANIFOLD VACUUM CHECK

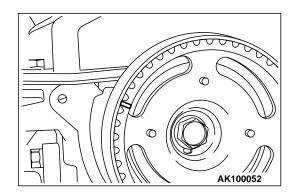
M1111002700161

- Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following conditions:
- Engine coolant temperature: 80 95°C (176 203°F)
- Lights, and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with A/T)
- 2. Connect a tachometer.
- 3. Attach a tee-fitting union to the vacuum hose between the fuel pressure regulator and the intake manifold plenum, and connect a vacuum gauge.
- 4. Start the engine and check that idle speed is within specification. Then check the vacuum gauge reading.

Idle speed: 700  $\pm$  100 r/min

Minimum limit: 60 kPa (18 in Hg)





#### TIMING BELT TENSION ADJUSTMENT

M1111002800038

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

#### **⚠** 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 counterclockwise.

- 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

Loosen the bolt 1/4 to 1/2 turn. If the belt is loosened more than necessary, the bolt may fall inside the cover.

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

#### LASH ADJUSTER CHECK

M1111002900187

If an abnormal noise (chattering noise) is heard by malfunction of the lash adjuster immediately after starting the engine and does not disappear, it might be the lash adjusters. Perform the following check.

NOTE: An abnormal noise due to malfunction of the lash adjuster is produced immediately after starting the engine and changes with the engine speed, irrespective of the engine load. If, the abnormal noise is not produced immediately after starting the engine or does not change with the engine speed, or it changes with the engine load, the lash adjuster is not the cause for the abnormal noise.

NOTE: When the lash adjuster is malfunctioning, the abnormal noise is rarely eliminated by running the engine at idle speed. However, the abnormal noise may disappear only when seizure is caused by oil sludge in the engine whose oil is not maintained properly.

- 1. Start the engine.
- 2. Check if the abnormal noise produced immediately after starting the engine changes with the change in the engine speed.
  - If the abnormal noise is not produced immediately after starting the engine or it does not change with the engine speed, the lash adjuster is not the cause for the noise. Therefore, investigate other causes. The abnormal noise is probably caused by some other parts than the engine proper if it does not change with the engine speed. (In this case, the lash adjuster is in good condition.)
- With the engine idling, change the engine load (shift from N to D range, for example) to make sure that there is no change in the level of abnormal noise.

If there is a change in the level of abnormal noise, suspect a tapping noise due to worn crankshaft bearing or connecting rod bearing. (In this case, the lash adjuster is in good condition.)

4. After completion of warm-up, run the engine at idle to check for abnormal noise.

If the noise is reduced or disappears, clean the lash adjuster (Refer to GROUP 11B – Engine overhaul – Rocker Arms and Camshaft – Inspection P.11B-21.) It is suspected that the noise is due to collapse of the lash adjuster. If there is no change in the level of the abnormal noise, proceed to step 5.

- 5. Run the engine to bleed the lash adjuster system. (Refer to.)
- If the abnormal noise does not disappear after air bleeding operation, clean the lash adjuster (Refer to GROUP 11B – Engine overhaul – Rocker Arms and Camshaft – Inspection P.11B-21.)

#### Bleeding lash adjuster system

NOTE: Parking the vehicle on a grade for a long time may drain oil from the lash adjuster, causing air to enter the high pressure chamber when starting the engine.

NOTE: After parking for many hours, oil may drain from the oil passage and take time before oil is supplied to the lash adjuster, causing air to enter the high pressure chamber.

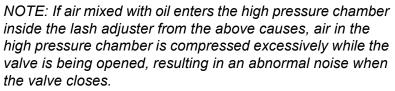
NOTE: In the above cases, abnormal noise can be eliminated by bleeding the lash adjuster system.

1. Check engine oil. Add or change oil as required.

NOTE: If the engine oil level is low, air is sucked from the oil screen, causing air to enter the oil passage.

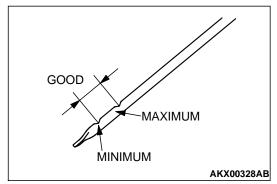
NOTE: If the engine oil level is higher than specification, oil may be stirred by the crankshaft, causing oil to be mixed with air creating aerated (foaming) oil.

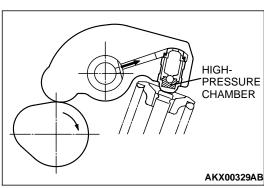
NOTE: If oil is deteriorated, air is not easily separated from oil, increasing the quantity of air contained in oil.

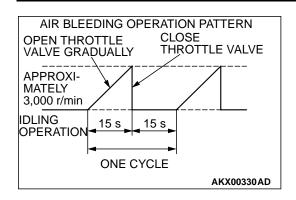


This is the same phenomenon as that observed when the valve clearance has become excessive. The lash adjuster can resume normal function when air entered the lash adjuster is removed.

2. Idle the engine for one to three minutes to warm it up.







- 3. Repeat the operation pattern, shown in left figure, at no load to check for abnormal noise. (Usually the abnormal noise is eliminated after repetition of the operation 10 to 30 times. If, however, no change is observed in the level of abnormal noise after repeating the operation more than 30 times, suspect that the abnormal noise is due to some other factors.)
- 4. After elimination of abnormal noise, repeat the operation shown in left figure five more times.
- 5. Run the engine at idle for one to three minutes to make sure that the abnormal noise has been eliminated.

#### **ENGINE ASSEMBLY**

#### REMOVAL AND INSTALLATION

M1112001000537

#### **⚠** CAUTION

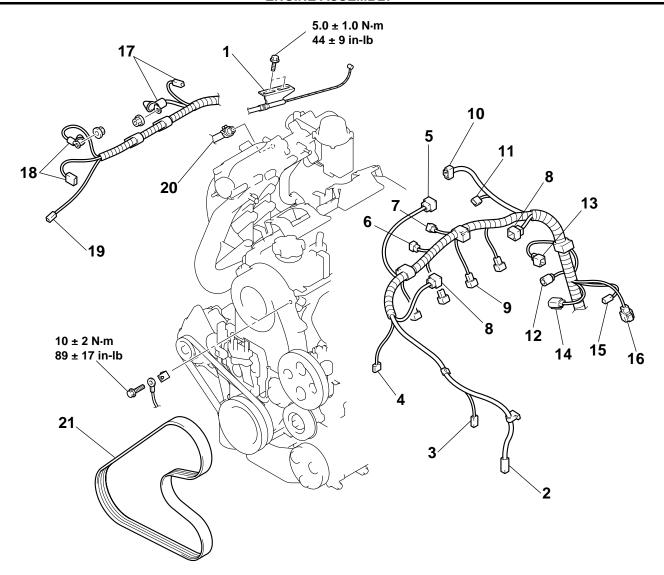
\*: Indicates parts which should be temporarily tightened, and then fully tightened after installing the engine into the vehicle.

#### **Pre-removal Operation**

- Fuel Line Pressure Reduction [Refer to GROUP 13A, Onvehicle Service – Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines) P.13Aa-17.]
- Under Cover Removal
- Engine Oil Draining [Refer to GROUP 00, Maintenance Service – Engine Oil (Change) P.00-41.]
- Engine Coolant Draining [Refer to GROUP 00, Maintenance Service Engine Coolant (Change) P.00-45.]
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-4.)
- Hood Removal (Refer to GROUP 42, Hood P.42-7.)
- Radiator Removal (Refer to GROUP 14, Radiator P.14-25.)
- Front Exhaust Pipe Removal (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-9.)
- · Battery and Battery Tray Removal

#### **Post-installation Operation**

- Front Exhaust Pipe Installation (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-9.)
- Radiator Installation (Refer to GROUP 14, Radiator P.14-25.)
- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-4.)
- Drive Belt Tension Adjustment [Refer to GROUP 00, Maintenance Service – Drive Belts (Check Condition) P.00-37.]
- Engine Oil Refilling [Refer to GROUP 00, Maintenance Service – Engine Oil (Change) P.00-41.]
- Engine Coolant Refilling [Refer to GROUP 00, Maintenance Service – Engine Coolant (Change) P.00-45.]
- Accelerator Cable Adjustment (Refer to GROUP 17, Onvehicle Service Accelerator Cable Check and Adjustment P.17-4.)
- Hood Installation (Refer to GROUP42, Hood P.42-7.)
- Battery and Battery Tray Installation

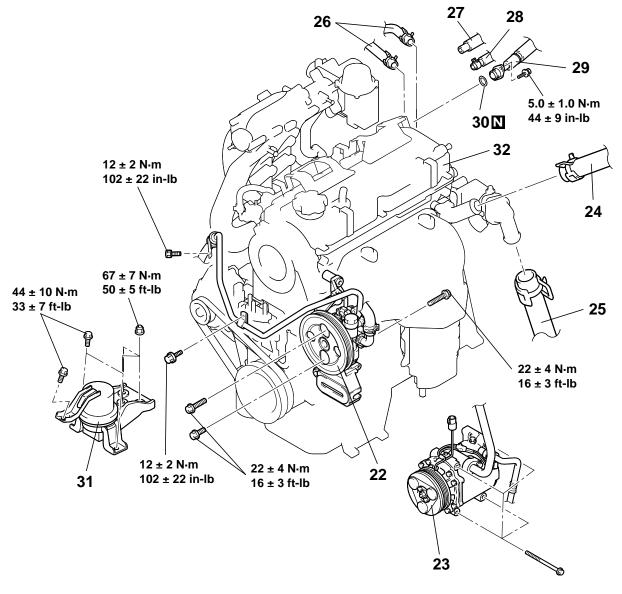


#### **REMOVAL STEPS**

- 1. ACCELERATOR CABLE CONNECTION
- 2. A/C COMPRESSOR CONNECTOR
- 3. POWER STEERING OIL PRESSURE SWITCH CONNECTOR
- 4. CRANK ANGLE SENSOR CONNECTOR
- 5. MANIFOLD DIFFERENTIAL PRESSURE SENSOR CONNECTOR
- 6. EVAPORATIVE EMISSION PURGE SOLENOID CONNECTOR
- 7. EGR SOLENOID VALVE CONNECTOR
- 8. IGNITION COIL CONNECTOR
- 9. INJECTOR CONNECTOR
- 10. THROTTLE POSITION SENSOR CONNECTOR

## REMOVAL STEPS (Continued)

- 11. IDLE CONTROL MOTOR CONNECTOR
- 12. ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR
- 13. CAMSHAFT POSITION SENSOR CONNECTOR
- 14. KNOCK SENSOR CONNECTOR
- 15. ENGINE COOLANT TEMPERATURE GAUGE UNIT CONNECTOR
- 16. HEATED OXYGEN SENSOR CONNECTOR
- 17. STARTER CONNECTOR
- 18. ALTERNATOR CONNECTOR
- 19. OIL PRESSURE SWITCH CONNECTOR
- 20. BRAKE BOOSTER VACUUM HOSE CONNECTION
- 21. POWER STEERING OIL PUMP AND A/C COMPRESSOR DRIVE BELT



							AC100307AB
< <a>&gt;&gt;</a>		22.	POWER STEERING OIL PUMP			27.	PURGE HOSE CONNECTION
			AND BRACE ASSEMBLY			28.	FUEL RETURN HOSE
< <b>&gt;</b>		23.	A/C COMPRESSOR				CONNECTION
< <c>&gt;&gt;</c>	>>D<<	24.	RADIATOR UPPER HOSE		>>C<<	29.	HIGH-PRESSURE FUEL HOSE
			CONNECTION				CONNECTION
< <c>&gt;&gt;</c>	>>D<<	25.	RADIATOR LOWER HOSE		>>C<<	30.	O-RING
			CONNECTION	< <d>&gt;&gt;</d>		•	TRANSAXLE ASSEMBLY
		•	RADIATOR ASSEMBLY (REFER	< <e>&gt;&gt;</e>	>>B<<	31.	ENGINE MOUNT INSULATOR
			TO GROUP 14 P.14-25.				AND BRACKET ASSEMBLY
		26.	HEATER HOSE CONNECTION	< <f>&gt;&gt;</f>	>>A<<	32.	ENGINE ASSEMBLY

#### **Required Special Tools:**

MB991454: Engine Hanger

• MB991895: Engine Hanger

#### REMOVAL SERVICE POINTS

## <<A>> POWER STEERING OIL PUMP AND BRACE ASSEMBLY REMOVAL

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

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

#### <<B>> A/C COMPRESSOR REMOVAL

Remove the compressor from the compressor bracket with the hose still attached.

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

## <<C>> RADIATOR UPPER HOSE/RADIATOR LOWER HOSE REMOVAL

After alignment marks are made on radiator hoses and hose clamps, remove hoses.

#### <<D>> TRANSAXLE ASSEMBLY REMOVAL

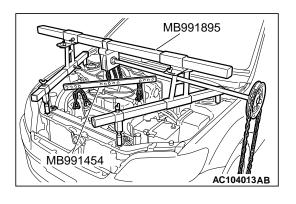
#### **⚠** CAUTION

Do not remove the flywheel mounting bolt shown by the arrow. If this bolt is removed, the flywheel will become out of balance and man be come damaged.

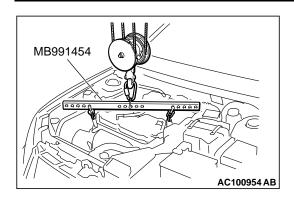
<M/T>: Refer to GROUP 22A P.22A-12. <A/T>: Refer to GROUP 23A P.23Aa-30.

## <<E>> ENGINE MOUNT INSULATOR AND BRACKET ASSEMBLY REMOVAL

- 1. Support the engine with a floor jack.
- 2. Remove special tools MB991895 which was attached when the transaxle assembly was removed.



## ENGINE MECHANICAL ENGINE ASSEMBLY



- 3. Hold the engine assembly with special tool MB991454 and chain block or similar tool.
- 4. Place a garage jack against the engine oil pan with a piece of wood in between so as to not damage the oil pan. Jack up the engine so that the weight of the engine is no longer being applied to the engine mount insulator and bracket. Remove the engine mount insulator and bracket.

#### <<F>> ENGINE ASSEMBLY REMOVAL

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

#### INSTALLATION SERVICE POINTS

#### >>A<< ENGINE ASSEMBLY INSTALLATION

Install the engine assembly, checking that the cables, hoses, and harness connectors are clamped.

## >>B<< ENGINE MOUNT INSULATOR AND BRACKET INSTALLATION

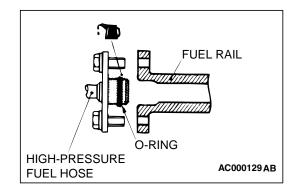
- Place a garage jack against the engine oil pan with a piece of wood in between so as to not damage the oil pan. Install the engine mount bracket while adjusting the position of the engine.
- 2. Support the engine with the garage jack.
- 3. Remove the chain block and support the engine assembly with the special tools.

#### >>C<< O-RING/HIGH-PRESSURE FUEL INSTALLATION

#### **⚠** CAUTION

Do not allow any engine oil to enter the fuel rail.

- 1. Apply a small amount of new engine oil to the O-ring.
- 2. While turning the high-pressure fuel hose to the right and left, slide it into the fuel rail. Be careful not to damage the Oring. After installing, check that the hose turns smoothly.
- 3. If the hose does not turn smoothly, the O-ring is probably binding. Disconnect the high-pressure fuel hose and check the O-ring for damage. Replace if necessary.
- 4. Re-insert the fuel rail and confirm the hose turns smoothly.



## >>D<< RADIATOR LOWER HOSE/RADIATOR UPPER HOSE INSTALLATION

1. Slide the hose onto the water inlet fitting and thermostat case.

2. Align the marks on the radiator hose and hose clamp mader during removal when installing.

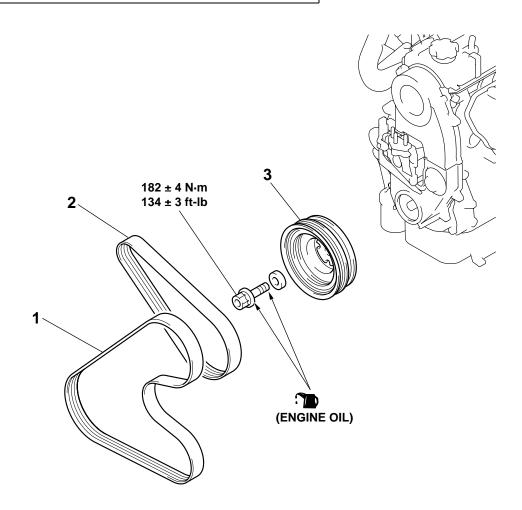
#### **CRANKSHAFT PULLEY**

#### **REMOVAL AND INSTALLATION**

M1112001600250

#### **Pre-removal and Post-installation Operation**

- Under Cover Removal and Installation
- Drive Belt Tension Check and Adjustment (Refer to P.11A-5.)



AC100305AB

#### **REMOVAL STEPS**

POWER STEERING OIL PUMP **DRIVE BELT** 

#### 2.

#### **REMOVAL STEPS (Continued)**

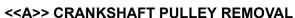
ALTERNATOR DRIVE BELT >>A<< 3. CRANKSHAFT PULLEY

#### **Required Special Tools:**

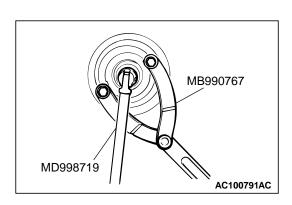
• MB990767: End Yoke Holder

MD998719: Crankshaft Pulley Holder





Use special tools MD998719 and MB990767 to remove the crankshaft pulley.



#### **INSTALLATION SERVICE POINT**

#### >>A<< CRANKSHAFT PULLEY INSTALLATION

- 1. Clean the tapped holes on crankshaft to eliminate oil fouled, etc.
- 2. Apply engine oil at the contact surfaces and threads on crankshaft bolts.
- 3. Use the same special tool as in the removal procedure to retain crankshaft pulley, and tighten crankshaft bolts to the specified torque.

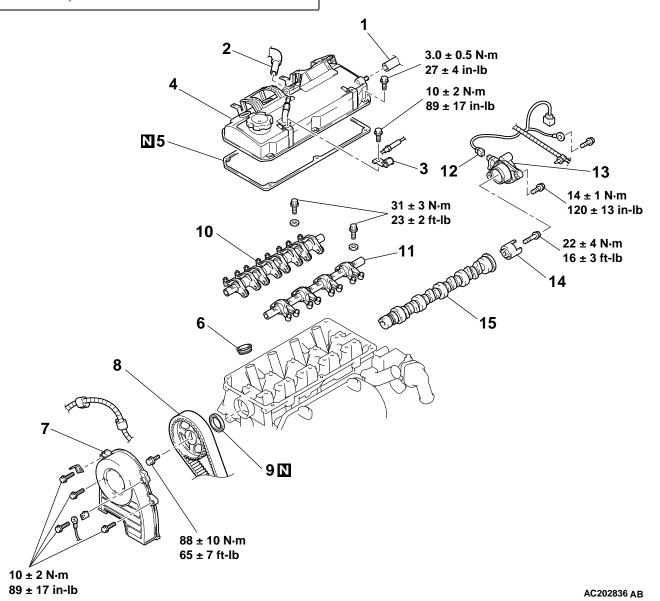
#### CAMSHAFT AND CAMSHAFT OIL SEAL

#### REMOVAL AND INSTALLATION

M1112001900392

#### **Pre-removal and Post-installation Operation**

- Air Cleaner Removal and Installation (Refer to GROUP 15
- Ignition Coil Removal and Installation (Refer to GROUP 16 P.16-35.)



#### REMOVAL STEPS

- <<B>> **BREATHER HOSE** 1. CONNECTION <<B>>
- 2. **PCV HOSE CONNECTION**
- ACCELERATOR CABLE CLAMP 3.
- 4. **ROCKER COVER**
- 5. ROCKER COVER GASKET
- SPARK PLUG GUIDE
- 7. TIMING BELT FRONT UPPER COVER
- <<A>>> **CAMSHAFT SPROCKET** >>B<< 8. >>A<< CAMSHAFT OIL SEAL

#### **REMOVAL STEPS (Continued)**

- 10. INTAKE ROCKER ARM AND SHAFT ASSEMBLY
- 11. EXHAUST ROCKER ARM AND SHAFT ASSEMBLY
- 12. CAMSHAFT POSITION SENSOR CONNECTOR
- 13. CAMSHAFT POSITION SENSOR **SUPPORT**
- 14. CAMSHAFT POSITION SENSOR SENSING CYLINDER
- 15. CAMSHAFT

#### **Required Special Tools:**

- MB990767: End Yoke Holder
- MD998713: Camshaft Oil Seal Installer
- MD998719: Crankshaft Pulley Holder Pin

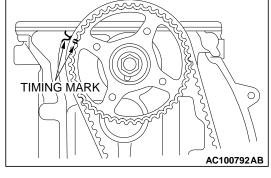
#### REMOVAL SERVICE POINTS

#### <<A>> CAMSHAFT SPROCKET REMOVAL

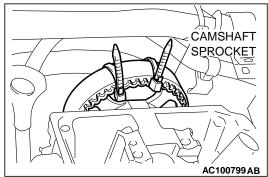
#### **⚠** CAUTION

Always turn the crankshaft in the forward direction (clockwise).

1. Turn the crankshaft in the forward direction (clockwise) to align the timing mark so that No.1 cylinder is at TDC on the compression stroke.



Secure the camshaft sprocket and the timing belt with tiewraps to prevent slippage between the camshaft sprocket and the timing belt.

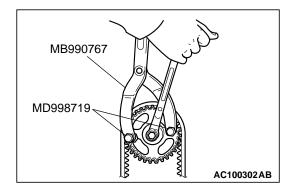


3. Use the special tools MB990767 and MD998719 to stop the camshaft sprocket from turning.



Do not turn the crankshaft after the camshaft sprocket is removed.

4. Remove the camshaft sprocket.



#### <<B>> ROCKER ARM AND SHAFT ASSEMBLY REMOVAL

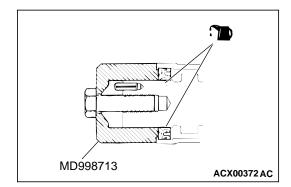
#### **⚠** CAUTION

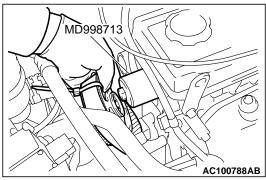
Never disassemble the rocker arm and shaft assembly. Loosen the rocker arm and shaft assembly mounting bolt, and then remove the rocker arm and shaft assembly with the bolt still attached.

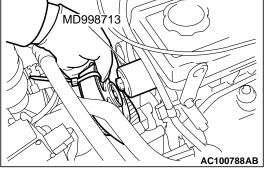
#### **INSTALLATION SERVICE POINTS**

#### >>A<< CAMSHAFT OIL SEAL INSTALLATION

- 1. Apply engine oil to the camshaft oil seal lip.
- 2. Use special tool MD998713 to install the camshaft oil seal.

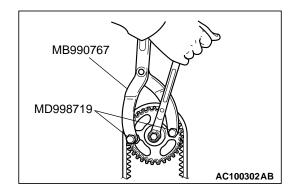






#### >>B<< CAMSHAFT SPROCKET INSTALLATION

Use special tools MD998719 and MB990767 in the same way as during removal to install the camshaft sprocket.



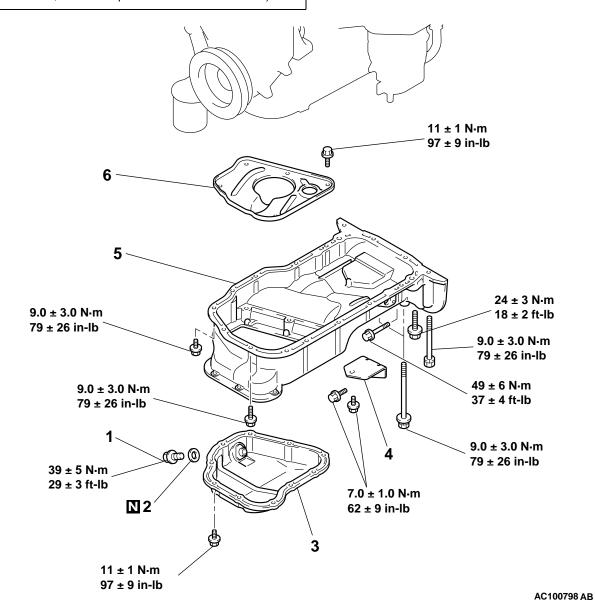
### **OIL PAN**

#### **REMOVAL AND INSTALLATION**

M1112002800406

#### Pre-removal and Post-installation operation

- Under Cover Removal and Installation
- Engine Oil Draining and Refilling [Refer to GROUP 00, Maintenance Service Engine Oil (Change) P.00-41.]
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-9.)



#### **REMOVAL STEPS**

DRAIN PLUG

>>C<< 2. DRAIN PLUG GASKET <<**A>>>B<<** 3. LOWER OIL PAN

1.

#### REMOVAL STEPS (Continued)

>>**A**<< 4. COVER

<<B>> >>A<< 5. UPPER OIL PAN

6. BAFFLE PLATE

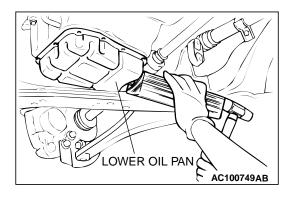
#### REMOVAL SERVICE POINTS

#### <<A>> LOWER OIL PAN REMOVAL

#### **↑** CAUTION

Do not use oil pan remover (MD998727) because the upper oil pan is aluminum.

Use a wood block and hammer tapping against the lower oil pan to loosen it.

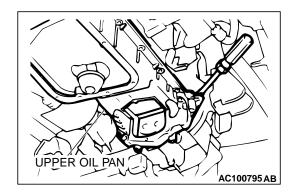


#### <<B>> UPPER OIL PAN REMOVAL

#### **⚠** CAUTION

Do not use oil pan remover (MD998727) because the upper oil pan is aluminum.

When individual mounting bolts are remove, insert a pry bar into the gap (as shown in the figure) between upper oil pan and cylinder block, and pry off upper oil pan.

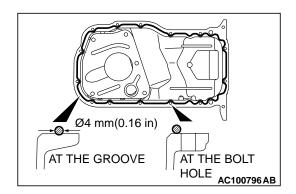


#### INSTALLATION SERVICE POINTS

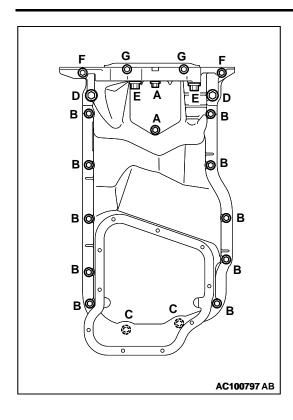
#### >>A<< UPPER OIL PAN INSTALLATION

- With scraper or wire brush, etc., remove residual gasket sealant from the attached on upper oil pan and cylinder block.
- 2. Apply sealant on the mounting surface of upper oil pan without any gap as indicated in the figure, and install oil pan on cylinder block.

Specified sealant: MITSUBISHI GENUINE PART MD970389 or equivalent

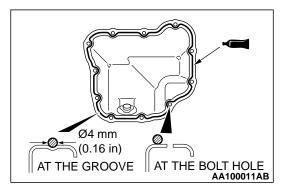


## ENGINE MECHANICAL OIL PAN



3. Using the letter symbols in the table below, install the upper oil pan using the correct bolt. Refer to the table for proper torque.

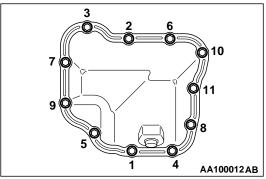
Designation	Symbol	Qty	Diameter × length mm (in)	Tightening torque
Flange Bolt	А	2	6 × 10 (0.2 × 0.4)	7.0 ± 1.0 N·m (62 ± 9 in-lb)
	В	10	6 × 18 (0.2 × 0.7)	9.0 ± 3.0 N·m (79 ± 26 in-lb)
	С	2	6 × 22 (0.2 × 0.9)	
	D	2	8 × 40 (0.3 × 1.6)	24 ± 3 N·m (18 ± 2 ft-lb)
	E	2	10 × 40 (0.4 × 1.6)	49 ± 6 N·m (37 ± 4 ft-lb)
Bolts with Washers	F	2	6 × 50 (0.2 × 2.0)	9.0 ± 3.0 N·m (79 ± 26 in-lb)
	G	2	6 × 127 (0.2 × 5.0)	



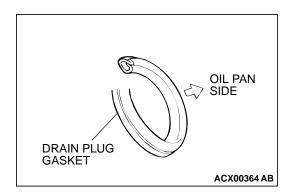
#### >>B<< LOWER OIL PAN INSTALLATION

- 1. With scraper or wire brush, etc., remove residual gasket sealant from the attached on lower oil pan.
- 2. Apply sealant on the mounting surface of lower oil pan without any gap as indicated in the figure, and install lower oil pan to the upper oil pan.

Specified sealant: MITSUBISHI GENUINE PART MD970389 or equivalent



3. According to the sequence specified in the figure, tighten mounting bolts of lower oil pan to the specified torque.



#### >>C<< DRAIN PLUG GASKET INSTALLATION

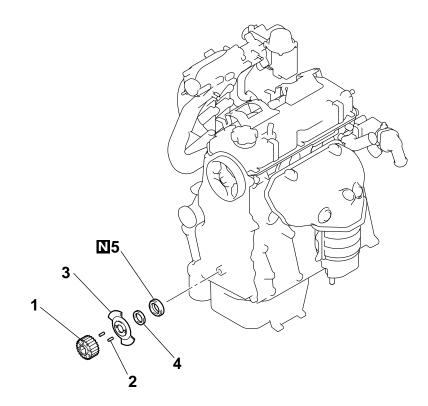
Gasket should be replaced with a new one, and install it in the direction specified in the figure.

Specified torque: 11  $\pm$  1 N·m (97  $\pm$  9 in-lb)

#### **CRANKSHAFT OIL SEAL**

#### REMOVAL AND INSTALLATION <FRONT OIL SEAL>

M1112003400359



#### AC100955 AB

#### **REMOVAL STEPS**

- TIMING BELT (REFER TO P.11A-35.)
- CRANK ANGLE SENSOR (REFER TO GROUP 16, CRANK ANGLE SENSOR P.16-36.)

#### **REMOVAL STEPS (Continued)**

- >>B<< 1. CRANKSHAFT SPROCKET
- >>B<< 2. SPRING PIN
- >>B<< 3. CRANKSHAFT SENSING BLADE
- >>B<< 4. CRANKSHAFT SPACER
- >>A<< 5. CRANKSHAFT FRONT OIL SEAL

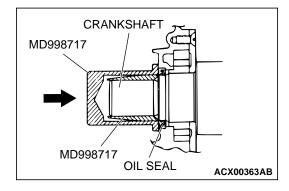
#### **Required Special Tool:**

• MD998717: Crankshaft Front Oil Seal Installer

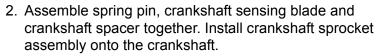
#### INSTALLATION SERVICE POINTS

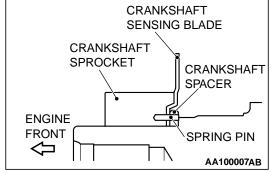
#### >>A<< CRANKSHAFT FRONT OIL SEAL INSTALLATION

- 1. Apply a small amount of engine oil to the oil seal lip and then insert.
- 2. Using special tool MD998717, tap the oil seal into the front case



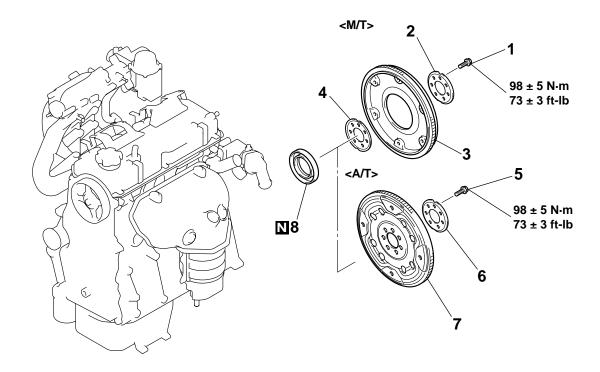
# >>B<< CRANKSHAFT SPACER/CRANKSHAFT SENSING BLADE/SPRING PIN/CRANKSHAFT SPROCKET INSTALLATION 1. Remove oil and lubricant from the mounting surfaces on crankshaft, crankshaft spacer, crankshaft sensing blade and crankshaft sprocket.





#### REMOVAL AND INSTALLATION <REAR OIL SEAL>

M1112003700350



AC100955 AB

#### **REMOVAL STEPS**

- OIL PAN (REFER TO P.11A-22.)
- TRANSAXLE ASSEMBLY (M/T: REFER TO GROUP 22A, TRANSAXLE ASSEMBLY P.22A-12.)(A/T: REFER TO GROUP 23A, TRANSAXLE ASSEMBLY P.23Aa-30.)
- CLUTCH COVER AND DISC <M/li>
   T> (REFER TO GROUP 21B, CLUTCH P.21B-2.)

#### REMOVAL STEPS (Continued)

- FLYWHEEL BOLT <M/T>
   ADAPTER PLATE <M/T>
- 3. FLYWHEEL ASSEMBLY <M/T>
- 4. ADAPTER PLATE <M/T>
- 6. ADAPTER PLATE <A/T>
- 7. DRIVE PLATE <A/T>
- >>A<< 8. CRANKSHAFT REAR OIL SEAL

#### **Required Special Tools:**

• MD998718: Crankshaft rear oil seal installer

• MD998781: Flywheel stopper

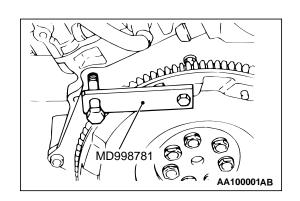
>>B<<

>>B<<

#### REMOVAL SERVICE POINT

## <<A>> FLYWHEEL BOLT <M/T>/DRIVE PLATE BOLT <A/T> REMOVAL

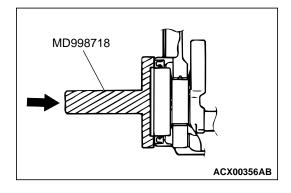
Use the special tool MD998781 to secure the flywheel or drive plate, and remove the bolts.



#### **INSTALLATION SERVICE POINTS**

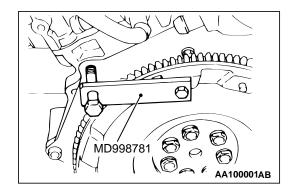
#### >>A<< CRANKSHAFT REAR OIL SEAL INSTALLATION

- 1. Apply a small amount of engine oil to the entire circumference of the oil seal lip.
- 2. Use special tool MD998718 to tap in the oil seal as shown in the illustration.



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

Use the special tool MD998781 to hold the flywheel or drive plate in the same manner as removal. Then install the bolts.



#### CYLINDER HEAD GASKET

#### **REMOVAL AND INSTALLATION**

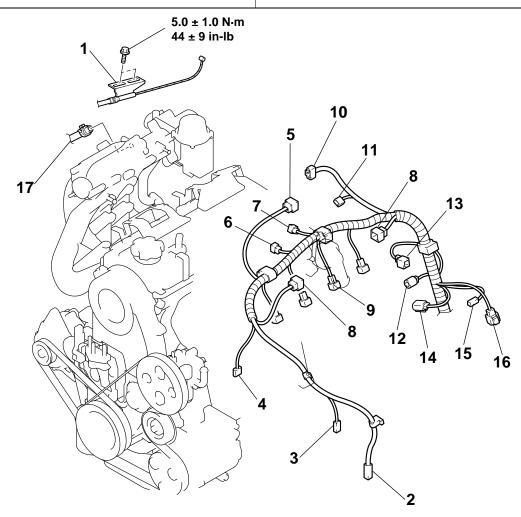
M1112004000473

#### **Pre-removal Operation**

- Fuel Line Pressure Releasing (Refer to GROUP 13A, On-vehicle Service P.13Aa-17.)
- Engine Coolant Draining and Refilling [Refer to GROUP 00, Maintenance Service – Engine Coolant (Change) P.00-45.]
- Under Cover Removal
- Air Cleaner Removal (Refer to GROUP 15 P.15-4.)
- Exhaust Manifold Removal (Refer to GROUP 15 P.15-7.)
- Water Hose and Pipe Removal (Refer to GROUP 14 P.14-31.)

#### **Post-installation Operation**

- Water Hose and Pipe Installation (Refer to GROUP 14 P.14-31.)
- Exhaust Manifold Installation (Refer to GROUP 15 P.15-7.)
- Air Cleaner Installation (Refer to GROUP 15 P.15-4.)
- Engine Coolant Draining and Refilling [Refer to GROUP 00, Maintenance Service Engine Coolant (Change) P.00-45.]
- Accelerator Cable Adjustment (Refer to GROUP 17, Onvehicle Service P.17-4.)
- Under Cover Installation



#### **REMOVAL STEPS**

- ACCELERATOR CABLE CONNECTION
- 2. A/C COMPRESSOR CONNECTOR
- 3. POWER STEERING OIL PRESSURE SWITCH CONNECTOR
- 4. CRANK ANGLE SENSOR CONNECTOR

## REMOVAL STEPS (Continued)

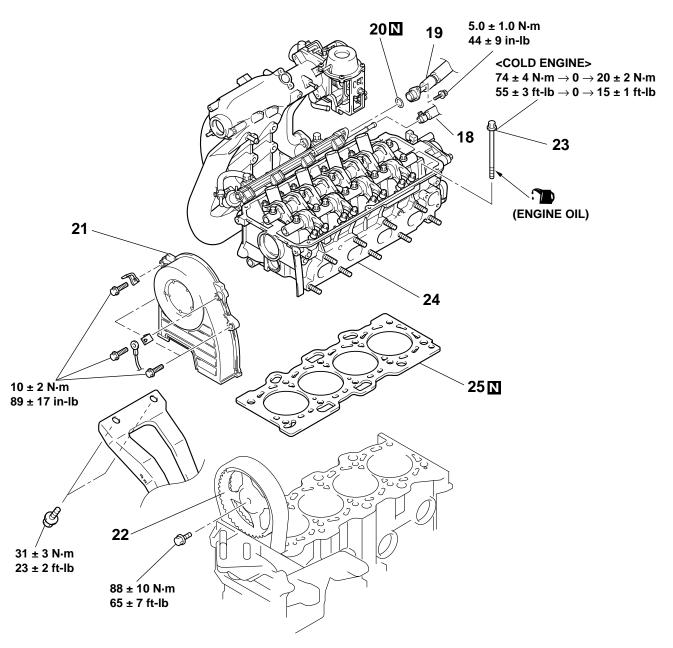
- 5. MANIFOLD DIFFERENTIAL PRESSURE SENSOR CONNECTOR
- 6. EVAPORATIVE EMISSION PURGE SOLENOID CONNECTOR
- 7. EGR SOLENOID VALVE CONNECTOR
- 8. IGNITION COIL CONNECTOR
- 9. INJECTOR CONNECTOR

#### **REMOVAL STEPS (Continued)**

- 10. THROTTLE POSITION SENSOR CONNECTOR
- 11. IDLE CONTROL MOTOR CONNECTOR
- 12. ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR
- 13. CAMSHAFT POSITION SENSOR CONNECTOR

#### **REMOVAL STEPS (Continued)**

- 14. KNOCK SENSOR CONNECTOR
- 15. ENGINE COOLANT
  TEMPERATURE GAUGE UNIT
  CONNECTOR
- 16. HEATED OXYGEN SENSOR CONNECTOR
- 17. BRAKE BOOSTER VACUUM HOSE CONNECTION



#### **REMOVAL STEPS**

18. PURGE HOSE CONNECTION

>>D<< 19. HIGH-PRESSURE FUEL HOSE CONNECTION

>>**D**<< 20. O-RING

21. TIMING BELT FRONT UPPER COVER

#### AC101591 AB

#### **REMOVAL STEPS (Continued)**

<<a>>>C<</a>> >>C<</a>< 22. CAMSHAFT SPROCKET <<B>>>B<</a> 23. CYLINDER HEAD BOLTS

>>**B**<< 24. CYLINDER HEAD ASSEMBLY >>**A**<< 25. CYLINDER HEAD GASKET

#### **Required Special Tools:**

- MB991653: Cylinder Head Bolt Wrench
- MB990767: End Yoke Holder

MD998719: Crankshaft Pulley Holder Pin

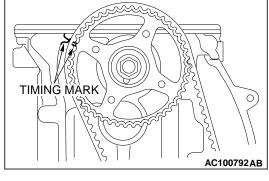
#### **REMOVAL SERVICE POINTS**

#### <<A>> CAMSHAFT SPROCKET REMOVAL

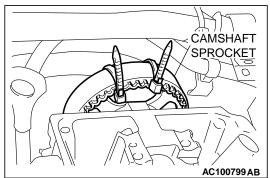
#### **⚠** CAUTION

Always turn the crankshaft in the forward direction (clockwise).

1. Turn the crankshaft in the forward direction (clockwise) to align the timing mark so that number 1 cylinder is at TDC on the compression stroke.



Secure the camshaft sprocket and the timing belt with tiewraps to prevent slippage between the camshaft sprocket and the timing belt.

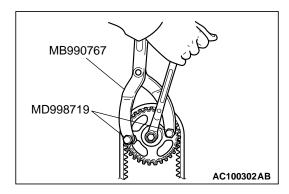


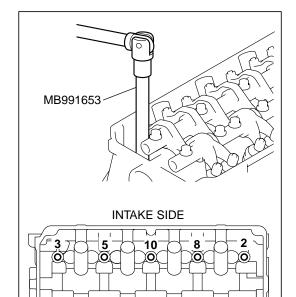
3. Use special tools MB990767 and MD998719 to stop the camshaft sprocket from turning.



Do not turn the crankshaft after the camshaft sprocket is removed.

4. Remove the camshaft sprocket.





**EXHAUST SIDE** 

AC100951 AB

#### <<B>> CYLINDER HEAD BOLTS REMOVAL

#### **⚠** CAUTION

Be careful not to damage or deform the plug guides when removing the cylinder head bolts. Plug guides cannot be replaced separately.

Using special tool MB991653, loosen the bolts in two or three steps in the order of the numbers shown in the illustration, then remove the bolts. Remove the cylinder head assembly.

#### INSTALLATION SERVICE POINTS

#### >>A<< CYLINDER HEAD GASKET INSTALLATION

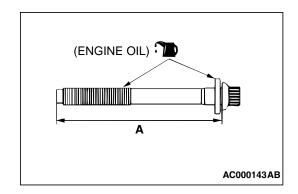
- 1. Wipe off all oil and grease from the gasket mounting surface.
- 2. Match the shapes of the cylinder head holes with their respective cylinder head gasket holes.

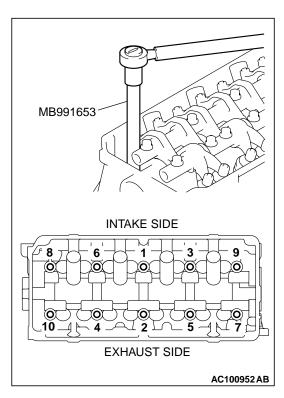
## >>B<< CYLINDER HEAD ASSEMBLY/CYLINDER HEAD BOLTS INSTALLATION

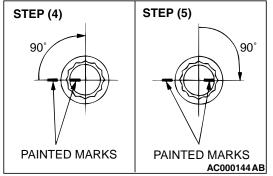
1. Before installing the cylinder head bolts, check if length (A) is within limits. If it is outside the limit, replace the bolts.

Limit (A): 96.4 mm (3.8 inches)

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



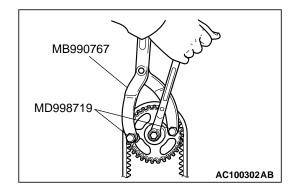






- Always tighten cylinder head bolts at a 90 degree angle.
- If it is less than 90 degree angle, the bolt will loosen.
- If it is more than 90 degree angle, remove the head bolt and repeat the procedure from step 1.
- 3. Using special tool MB991653, tighten the bolts by the following procedure.

STEP	OPERATION	REMARKS
(1)	Tighten to $74 \pm 4$ N·m (55 $\pm$ 3 ft-lb)	Tighten in the order shown in the illustration.
(2)	Fully loosen.	Loosen in the reverse order of that shown in the illustration.
(3)	Tighten to $20 \pm 2$ N·m (15 $\pm$ 1 ft-lb)	Tighten in the order shown in the illustration.
(4)	Apply paint tighten 90°	Mark the head of the cylinder head bolt and cylinder head with a paint mark. Tighten in the order shown in the illustration.
(5)	Tighten 90°	Tighten in the order shown in the illustration. Check that the painted mark of the head bolt is aligned with that of the cylinder head.



#### >>C<< CAMSHAFT SPROCKET INSTALLATION

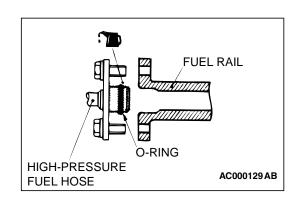
Use special tools MD998719 and MB990767 in the same way as during removal to install the camshaft sprocket.

## >>D<< O-RING/HIGH-PRESSURE FUEL HOSE INSTALLATION



Do not allow engine oil to enter the fuel rail.

- 1. Apply a small amount of new engine oil to the O-ring.
- 2. While turning the high-pressure fuel hose to the right and left, slide it into the fuel rail. Be careful not to damage the Oring. After installing, check that the hose turns smoothly.
- 3. If the hose does not turn smoothly, the O-ring is probably binding. Disconnect the high-pressure fuel hose and check the O-ring for damage.
- 4. Re-insert the fuel rail and confirm the hose turns smoothly.



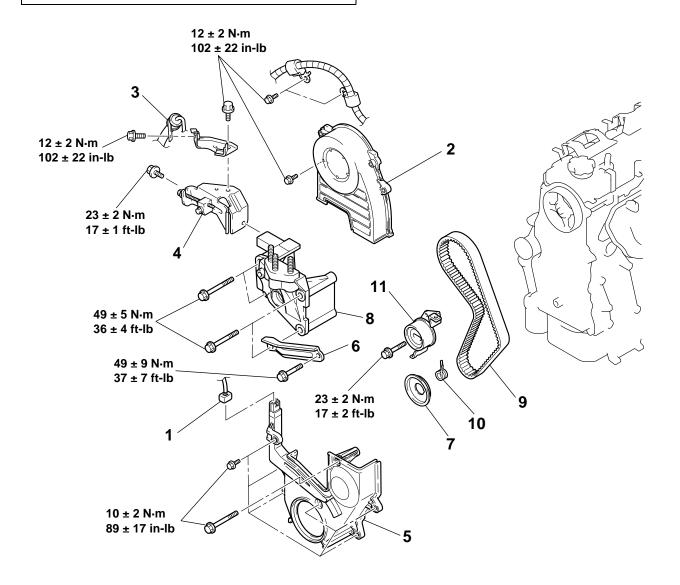
#### TIMING BELT

#### REMOVAL AND INSTALLATION

M1112004300474

#### **Pre-removal and Post-installation Operation**

- Under Cover (L.H) Removal and Installation
- Engine Mount Bracket Removal (Refer to GROUP 32, Engine Mounting P.32-4.)
- Crankshaft Pulley Removal and Installation (Refer to P.11A-17.)



#### AC100310 AB

#### **REMOVAL STEPS**

- CRANKSHAFT POSITION SENSOR CONNECTION
- 2. TIMING BELT FRONT UPPER COVER
- 3. POWER STEERING HOSE CLAMP
- 4. GENERATOR BELT TENSION ADJUSTMENT BRACKET
- 5. TIMING BELT LOWER COVER

#### **REMOVAL STEPS (Continued)**

- 6. POWER STEERING OIL PUMP BRACKET STAY
- >>**C**<< 7. FLANGE
  - 8. ENGINE SUPPORT BRACKET
- >>**B**<< TIMING BELT TENSION ADJUSTMENT
- <<**A>> >>A**<< 9. TIMING BELT
  - 10. TENSIONER SPRING
  - 11. TIMING BELT TENSIONER

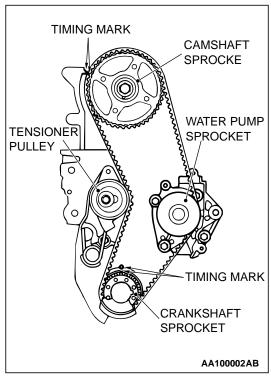
#### REMOVAL SERVICE POINT

#### <<A>> TIMING BELT REMOVAL

#### **⚠** CAUTION

The crankshaft should always be turned only clockwise.

1. Turn the crankshaft clockwise (right turn) to align each timing mark and to set the number 1 cylinder at compression top dead center.

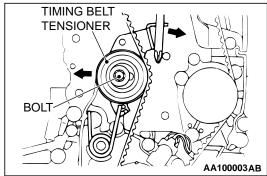


2. Loosen the tension pulley fixing bolt.

#### **⚠** CAUTION

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

- 3. Place a screwdriver against the tensioner pulley and pry it fully back in the direction of the arrow.
- 4. Temporarily tighten the tensioner pulley bolt.
- 5. Remove the timing belt.



#### **INSTALLATION SERVICE POINTS**

#### >>A<< TIMING BELT INSTALLATION

#### **⚠** CAUTION

After installing the timing belt, try to rotate the camshaft sprocket in the reverse direction. Recheck to be sure that the belt is fully tensioned and that each timing mark is in the proper position.

- 1. With the timing belt tensioner pulley bolt loosened, use a screwdriver to pry the tensioner pulley as close to the engine mount as possible. Then temporarily tighten tensioner bolt.
- Align each of the camshaft and 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 loose.
  - (1) Crankshaft sprocket
  - (2) Water pump sprocket
  - (3) Camshaft sprocket
  - (4) Tensioner pulley



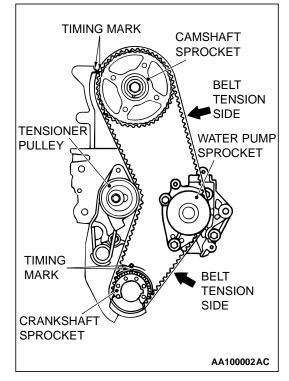
1. Initially loosen the fixing bolt of the tensioner pulley fixed to the engine mount side by 1/4-1/2 turn, and use the force of the tensioner spring to apply tension to the belt.

#### **⚠** CAUTION

AA100004AB

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 below. Be sure not to turn the crankshaft in the opposite direction (counter clockwise).

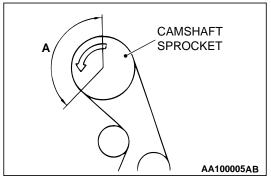
2. Turn the crankshaft in the proper rotation direction (clockwise) for two rotations, and recheck to be sure that the timing marks on each sprocket are aligned.



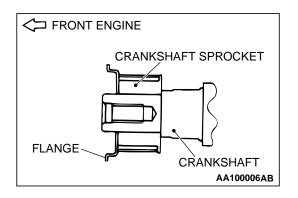
TIMING BELT

**TENSIONER** 

**BOLT** 



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



#### >>C<< FLANGE INSTALLATION

Install the flange as shown in the illustration.

#### **SPECIFICATIONS**

#### **SERVICE SPECIFICATIONS**

M1111000300394

ITEM	STANDARD VALUE	LIMIT
Actual ignition timing at idle	Approximately 8° BTDC	_
Auto-tensioner pushrod movement mm (in)	Within 1 (0.04)	_
Auto-tensioner rod protrusion mm (in)	3.8 – 4.5 (0.15 – 0.18)	_
Basic ignition timing at idle	5° BTDC ± 3°	_
CO content %	0.5 or less	_
Compression pressure (200 r/min) kPa (psi)	1,618 (234)	Minimum 1,176 (170)
Compression pressure difference of all cylinder kPa (psi)	_	98 (14)
Curb idle speed r/min	700 ± 100	_
Cylinder head bolt shank length mm (in)	_	99.4 (3.91)
HC contents ppm	100 or less	_
Intake manifold vacuum at curb idle kPa (in Hg)	_	Minimum 60 (18)
Timing belt B tension mm (in)	5 – 7 (0.2 – 0.3)	_

#### **FASTENER TIGHTENING SPECIFICATIONS**

M1112005800074

ITEM	SPECIFICATION
Accelerator cable clamp attaching bolt	10 ± 2 N·m (89 ± 17 in-lb)
Bell housing cover bolt	9.0 ± 1.0 N⋅m (80 ± 9 in-lb)
Bracket bolt	21 ± 4 N·m (16 ± 2 ft-lb)
Camshaft position sensor sensing cylinder attaching bolt	22 ± 4 N·m (16 ± 3 ft-lb)
Camshaft position sensor support attaching bolt	14 ± 1 N·m (120 ± 13 in-lb)
Camshaft sprocket attaching bolt	88 ± 10 N·m (65 ± 7 ft-lb)
Crankshaft pulley attaching bolt	128 ± 7 N·m (95 ± 5 ft-lb)
Cylinder head attaching bolt	$49 \pm 2 \text{ N·m} \rightarrow 0 \text{ N·m} \rightarrow 20 \pm 2 \text{ N·m}$ $\rightarrow +90^{\circ} \rightarrow +90^{\circ}$ $(37 \pm 1 \text{ ft-lb} \rightarrow 0 \text{ in-lb} \rightarrow 15 \pm 1 \text{ ft-lb}$ $\rightarrow +90^{\circ} \rightarrow +90^{\circ})$

## ENGINE MECHANICAL SPECIFICATIONS

ГЕМ		SPECIFICATION	
Drive plate attaching bolt <a t=""></a>	132 ± 5 N⋅m (98 ± 3 ft-lb)		
Engine mount insulator to frame bolt	Engine mount insulator to frame bolt		
Engine mount bracket to engine nut		67 ± 7 N·m (50 ± 5 ft-lb)	
Front exhaust pipe nut		50 ± 10 N⋅m (37 ± 7 ft-lb)	
Flywheel attaching bolt <m t=""></m>		132 ± 5 N⋅m (98 ± 3 ft-lb)	
Generator nut		14 ± 3 N·m (124 ± 26 in-lb)	
Ground wire attaching bolt		9.0 ± 2.0 N·m (80 ± 17 in-lb)	
High-pressure fuel hose attaching bolt		5.0 ± 1.0 N·m (44 ± 9 in-lb)	
Intake manifold stay attaching bolt		18 ± 2 N·m (13 ± 2 ft-lb)	
Oil level gauge and guide bolt	il level gauge and guide bolt		
Oil pan attaching bolt	M6	5.0 ± 1.0 N·m (44 ± 9 in-lb)	
	M8	24 ± 1 N·m (17 ± 1 ft-lb)	
Oil pan drain plug		39 ± 5 N·m (29 ± 3 ft-lb)	
Power steering oil pump attaching bolt	M8	22 ± 4 N·m (16 ± 3 ft-lb)	
	M10	40 ± 5 N·m (30 ± 3 ft-lb)	
Pressure hose attaching bolt		12 ± 2 N·m (107 ± 17 in-lb)	
Pressure tube attaching bolt		12 ± 2 N·m (102 ± 22 in-lb)	
Rocker arm and shaft assembly attaching bolt		31 ± 3 N·m (23 ± 2 ft-lb)	
Rocker cover attaching bolt		3.5 ± 0.5 N⋅m (31 ± 4 in-lb)	
Transaxle stay to oil pan bolt		23 ± 4 N·m (17 ± 3 ft-lb)	
Transaxle stay to bell housing cover bolt	48 ± 6 N·m (36 ± 4 ft-lb)		
Timing belt tensioner attaching bolt	23 ± 3 N·m (17 ± 2 ft-lb)		
Timing belt lower cover attaching bolt	11 ± 1 N·m (98 ± 8 in-lb)		
Timing belt front upper cover attaching bolt		11 ± 1 N·m (98 ± 8 in-lb)	
Water pump pulley bolt		9.8 ± 2.0 N·m (80 ± 17 in-lb)	

**NOTES**