

2005 Mitsubishi Eclipse Spyder GS

2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder

2005 ENGINE

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GENERAL DESCRIPTION

The 6G72 (3.0L) engine is a six-cylinder engine. The cylinder numbers are assigned as 1 - 3 - 5 for the right bank and 2 - 4 - 6 for the left bank from the front of the engine (timing belt side). This engine is fired in the order of the 1, 2, 3, 4, 5 and 6 cylinders.

ITEMS			SPECIFICATIONS
Type			V-type, overhead camshaft
Number of cylinders			6
Bore mm (in)			91.1 (3.59)
Stroke mm (in)			76.0 (2.99)
Total displacement cm ³ (cu. in)			2,972 (181.4)
Compression ratio <without IMT>			9.0
Compression ratio <with IMT>			10.0
Firing order			1 – 2 – 3 – 4 – 5 – 6
Valve timing <without IMT>	Intake valve	Opens (BTDC)	15°
		Closes (ABDC)	53°
	Exhaust valve	Opens (BBDC)	53°
		Closes (ATDC)	15°
Valve timing <with IMT>	Intake valve	Opens (BTDC)	7°
		Closes (ABDC)	61°
	Exhaust valve	Opens (BBDC)	61°
		Closes (ATDC)	15°
Lubrication system			Pressure feed, full-flow filtration
Oil pump type			Trochoid type

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Fig. 1: Items Specifications Chart

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ENGINE DIAGNOSIS

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SYMPTOMS	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
Drop in engine oil pressure	Engine oil level is too low	Check the engine oil level.
	Malfunction of engine oil pressure switch	Replace the engine 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 to the correct viscosity.
	Stuck (opened) oil relief valve	Repair the relief valve.
	Excessive bearing clearance	Replace the bearings.
Engine oil pressure too high	Stuck (closed) oil relief valve	Repair the relief valve.
Noisy valves	Malfunction of lash adjuster (including entry of air into high pressure chamber)	Check the lash adjuster.
	Thin or diluted engine oil (low engine oil pressure)	Change the engine oil.
	Worn or damaged valve stem or valve guide	Replace the valve and/or the guide.
Connecting rod noise/main bearing noise	Insufficient oil supply	Check the engine oil level.
	Thin or diluted engine oil	Change the engine oil.
	Excessive bearing clearance	Replace the bearings.

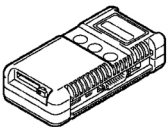
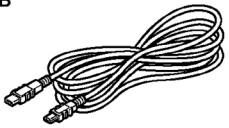
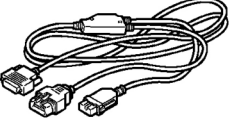
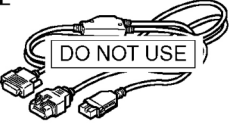
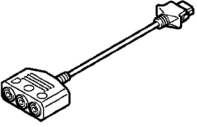
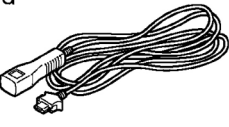
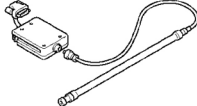
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Fig. 2: Engine Diagnosis Reference Chart
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIAL TOOLS

2005 Mitsubishi Eclipse Spyder GS

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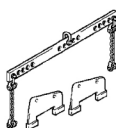
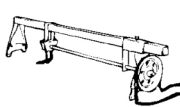
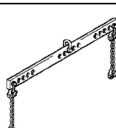
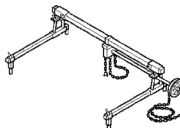
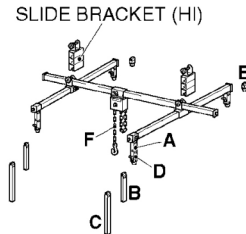
TOOL	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
A  B  C  D  E  F  G 	MB991958 Scan tool (MUT-III sub assembly) A: MB991824 Vehicle communication interface (V.C.I.) B: MB991827 MUT-III USB cable C: MB991910 MUT-III main harness A (Vehicles with CAN communication system) D: MB991911 MUT-III main harness B (Vehicles without CAN communication system) E: MB991914 MUT-III main harness C (for Chrysler models only) F: MB991825 MUT-III measurement adapter G: MB991826 MUT-III trigger harness	MB991824-KIT <i>NOTE: G: MB991826 MUT-III trigger harness is not necessary when pushing V.C.I. ENTER key.</i>	• Ignition timing check • Curb idle speed check • Idle mixture check CAUTION If you connect MUT-III main harness A to a vehicle without CAN communication system to use the MUT-III, a pulse signal may interfere with the simulated vehicle speed lines, thus causing the MUT-III inoperative. Therefore, use the MUT-III main harness B (MB991911) instead.
	MB991668 Belt tension meter set	Tool not available	Drive belt tension check [used together with scan tool (MUT-III sub assembly)]

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Fig. 3: Special Tools Description Chart (1 Of 4)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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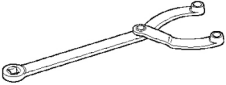
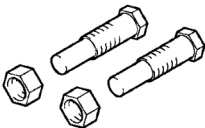
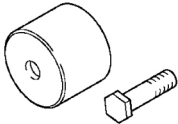
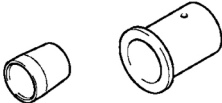
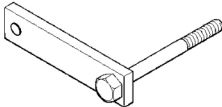
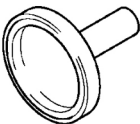
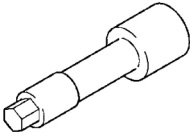
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB991453 Engine hanger attachment set	MZ203827-01	When an engine lifer is used: Supporting the engine assembly during remove and installation of the transaxle
	GENERAL SERVICE TOOL MZ203827 Engine lifter	MZ203827-01	
	MB991454 Engine hanger balancer	MZ203827-01	When the engine hanger is used: Supporting the engine assembly during remove and installation of the transaxle <i>NOTE: Special tool MB991454 is a part of engine hanger attachment set MB991453.</i>
	MB991895 Engine hanger	Tool not available	
 SLIDE BRACKET (HI)	MB991928 Engine hanger	Tool not available	
	A: MB991929 Joint (50) ×2 B: MB991930 Joint (90) ×2 C: MB991931 Joint (140) ×2 D: MB991932 Foot (standard) ×4 E: MB991933 Foot (short) ×2 F: MB991934 Chain and hook assembly		
	MD998443 Lash adjuster holder (8)	MD998443-01	Supporting of the lash adjuster to prevent it from falling when rocker shaft assembly is removed or installed

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Fig. 4: Special Tools Description Chart (2 Of 4)
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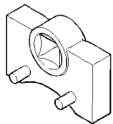
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990767 End yoke holder	MB990767-01	Holding the camshaft sprocket and crankshaft pulley when loosening and tightening bolt
	MD998715 Crankshaft pulley holder pin	MIT308239	
	MD998713 Camshaft oil seal installer	MD998713-01	Camshaft oil seal installation
	MB991559 Camshaft oil seal installer adapter	Tool not available	Camshaft oil seal installation (left bank side) (Use with MD998713)
	MD998717 Crankshaft front oil seal installer	MD998717-01	Crankshaft front oil seal installation
	MD998781 Flywheel stopper	General service tool	Flywheel <M/T> or drive plate <A/T> supporting
	MD998718 Crankshaft rear oil seal installer	MD998718-01	Crankshaft rear oil seal installation
	MD998051 Cylinder head bolt wrench	MD998051-01 or General service tool	Cylinder head bolt loosening and tightening

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Fig. 5: Special Tools Description Chart (3 Of 4)
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TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998767 Tensioner pulley socket wrench	MD998752-01	Timing belt tension adjustment
	MD998769 Crankshaft sprocket spacer	General service tool	Used if the crankshaft needs to be rotated to attach the timing belt, etc.

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Fig. 6: Special Tools Description Chart (4 Of 4)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK AND ADJUSTMENT

Refer to **8. DRIVE BELT (FOR THE GENERATOR, WATER PUMP, .**

IGNITION TIMING CHECK

Required Special Tool:

MB991958: Scan Tool (MUT-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: MUT-III USB Cable
- MB991911: MUT-III Main Harness B

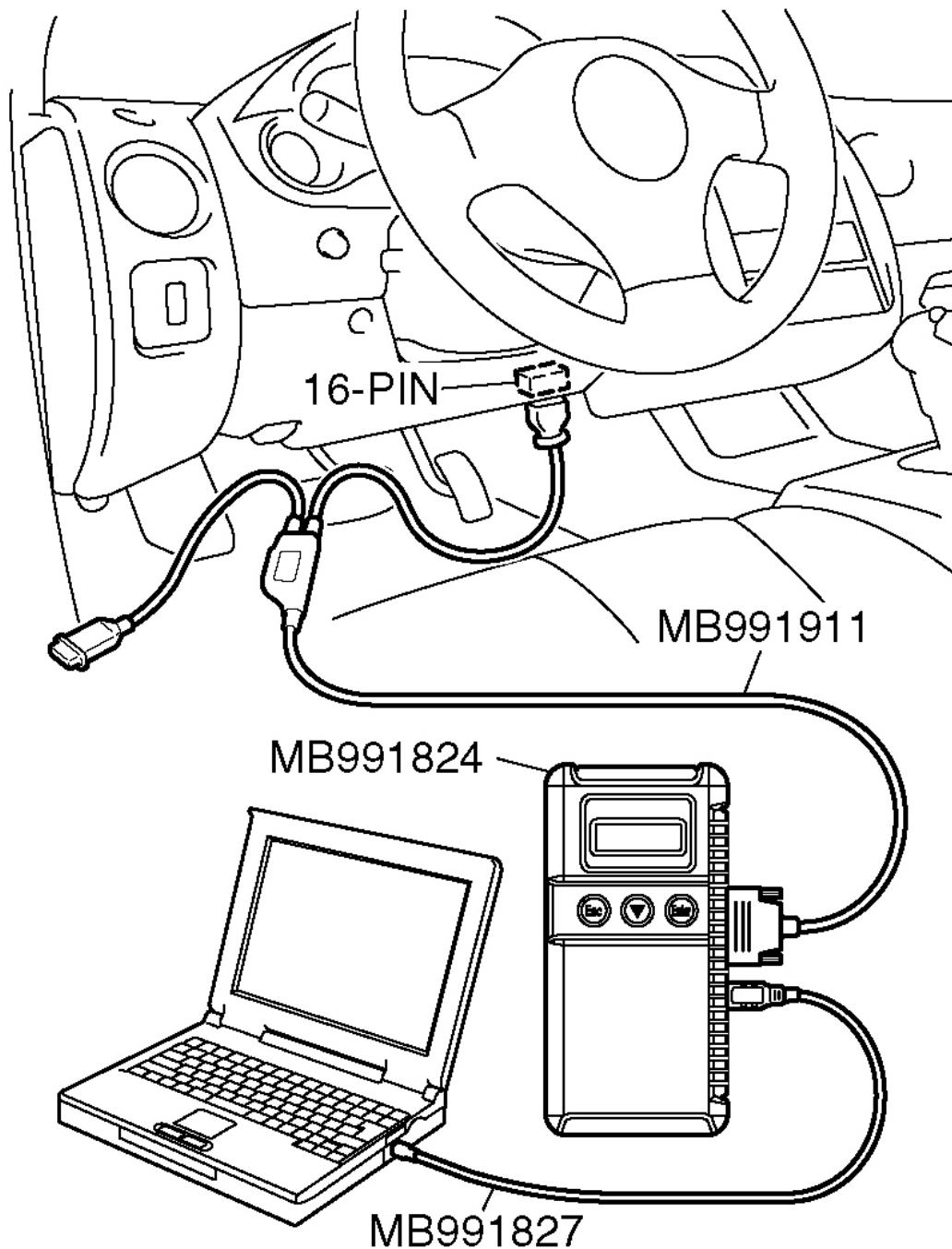
1. Before inspection, set the vehicle in the following condition:

- Engine coolant temperature: 80 - 95° C (176 - 203° F)
- Lights and all accessories: OFF
- Transaxle: Neutral (P range on vehicles with A/T)

NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.

CAUTION: To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



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Fig. 7: Connecting Scan Tool To Data Link Connector

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.
6. Select scan tool MB991958 actuator test "item number 17."
7. Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC +/- 3°

8. If the basic ignition timing is not within the standard value, check the following items:
 - Diagnostic 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 MB991958 (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 15° BTDC

NOTE: Ignition timing fluctuates about +/-7° 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**Required Special Tool:**

MB991958: Scan Tool (MUT-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: MUT-III USB Cable
- MB991911: MUT-III Main Harness B

1. Before inspection, set the vehicle in the following condition:
 - Engine coolant temperature: 80 - 95°C (176 - 203°F)
 - Lights and all accessories: OFF

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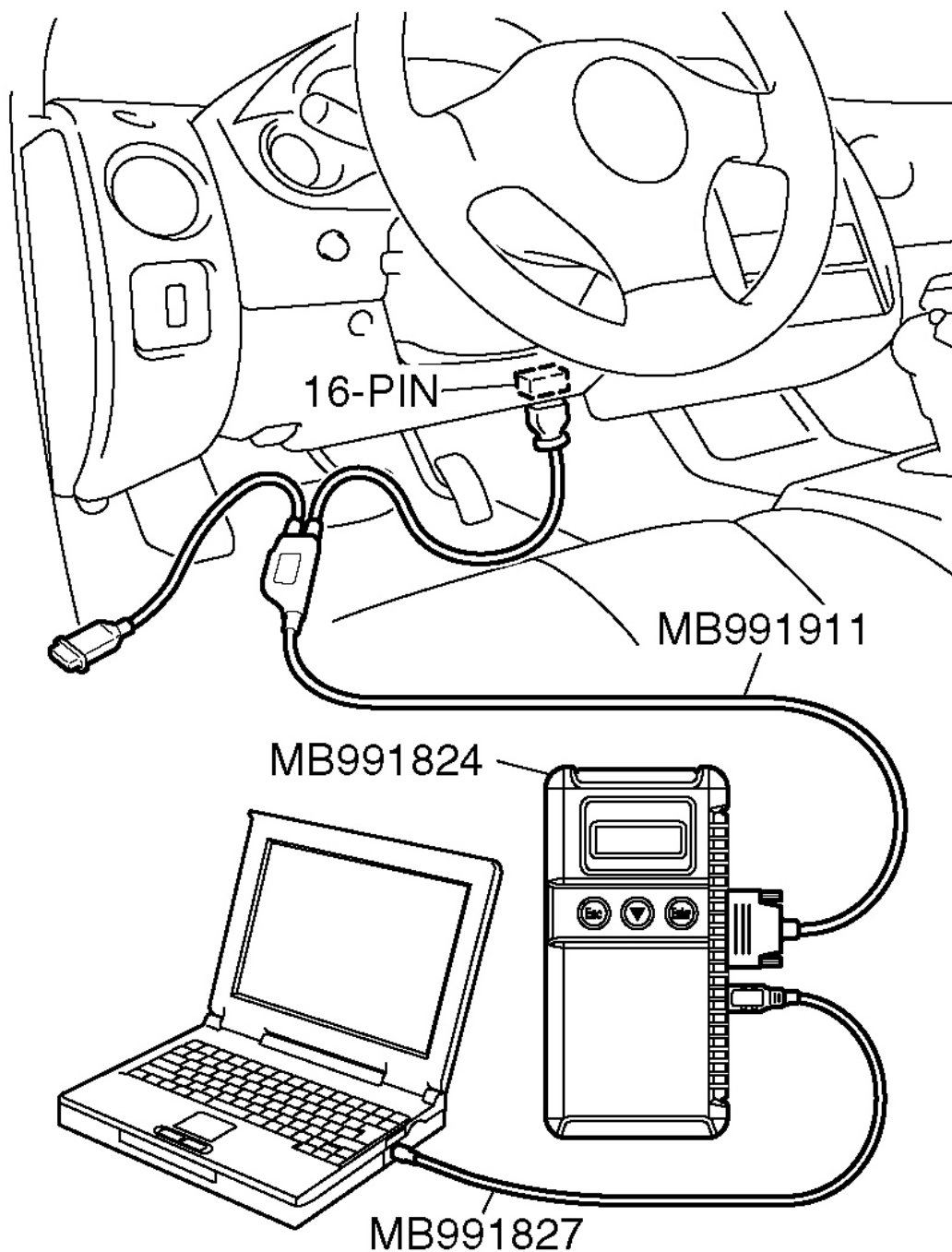
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- Transaxle: Neutral (P range on vehicles with A/T)

NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.

CAUTION: To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



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Fig. 8: Connecting Scan Tool To Data Link Connector
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

Standard value: 5° BTDC +/- 3°

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

Standard value:

CO contents: 0.5% or less

HC contents: 100 ppm or less

7. If the CO and HC contents do not remain inside the standard value, check the following items:

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.**

- Diagnostic 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 pressures
- Injector
- Ignition coil, spark plug cable, spark plug
- EGR system and EGR valve leak
- Evaporative emission system
- Compression pressure

CURB IDLE SPEED CHECK

Required Special Tool:

MB991958: Scan Tool (MUT-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: MUT-III USB Cable
- MB991911: MUT-III Main Harness B

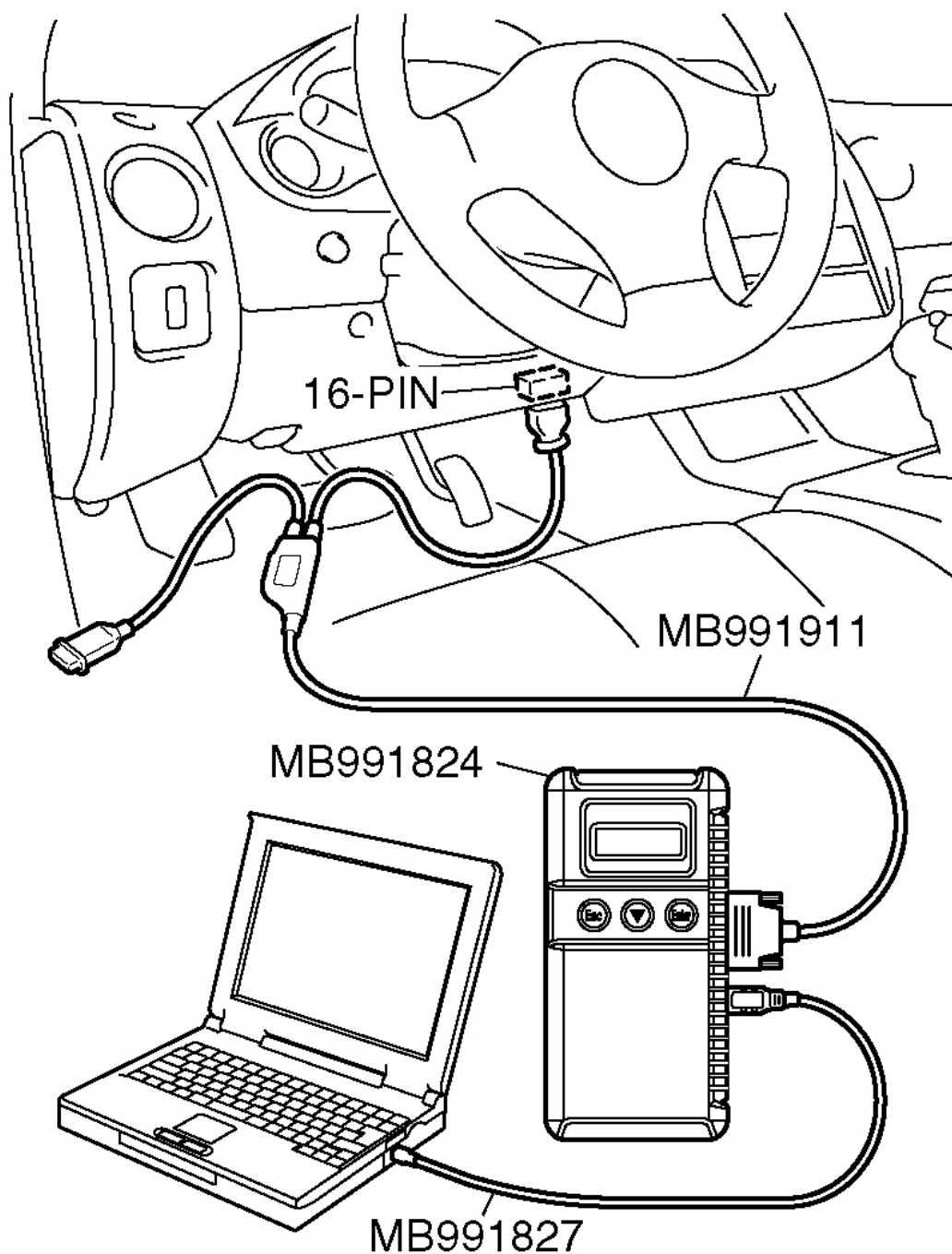
1. Before inspection, set the vehicle in the following condition:
 - Engine coolant temperature: 80 - 95°C (176 - 203°F)
 - Lights and all accessories: OFF

- Transaxle: Neutral (P range on vehicles with A/T)

NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.

CAUTION: To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

2. Connect scan tool MB991958 to the data link connector.



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Fig. 9: Connecting Scan Tool To Data Link Connector
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Check the basic ignition timing.

Standard value: 5° BTDC +/- 3°

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

Curb idle speed: 700 +/- 100 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 **SYMPTOM CHART** .

COMPRESSION PRESSURE CHECK

Required Special Tool:

MB991958: Scan Tool (MUT-III Sub Assembly)

- MB991824: V.C.I.
- MB991827: MUT-III USB Cable
- MB991911: MUT-III Main Harness B

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

NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.

2. Disconnect the spark plug cables.
3. Remove all of the spark plugs.
4. Disconnect the crankshaft position sensor connector.

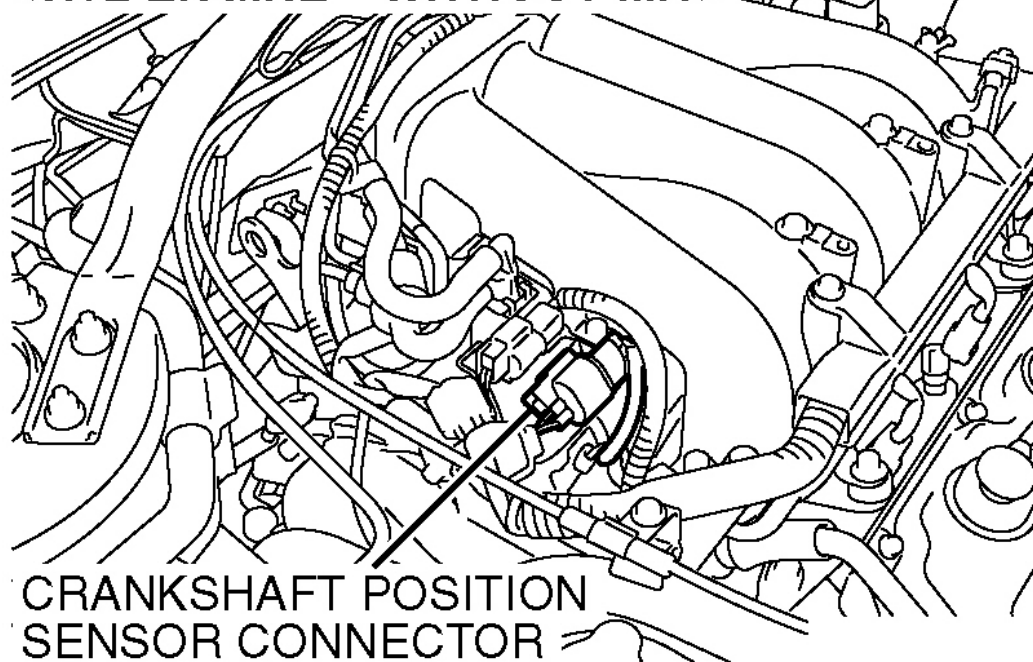
NOTE: Doing this will prevent the engine control module from carrying out ignition and fuel injection.

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.

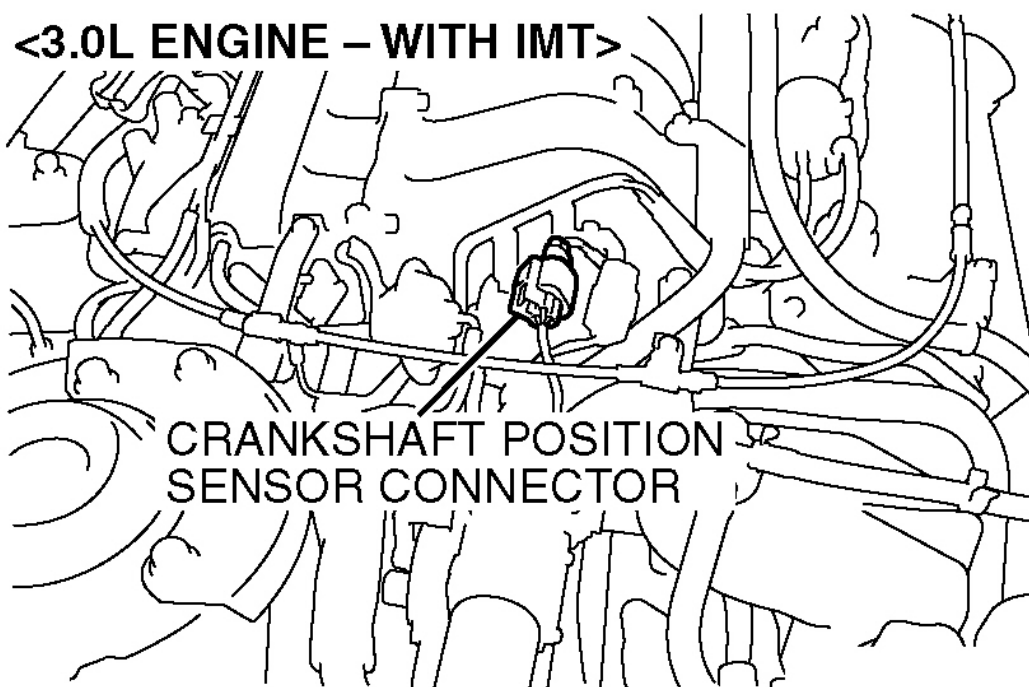
5. Cover the spark plug hole with a shop towel etc., during cranking. After the engine has been cranked, check for foreign material adhering to the shop towel.

<3.0L ENGINE – WITHOUT IMT>



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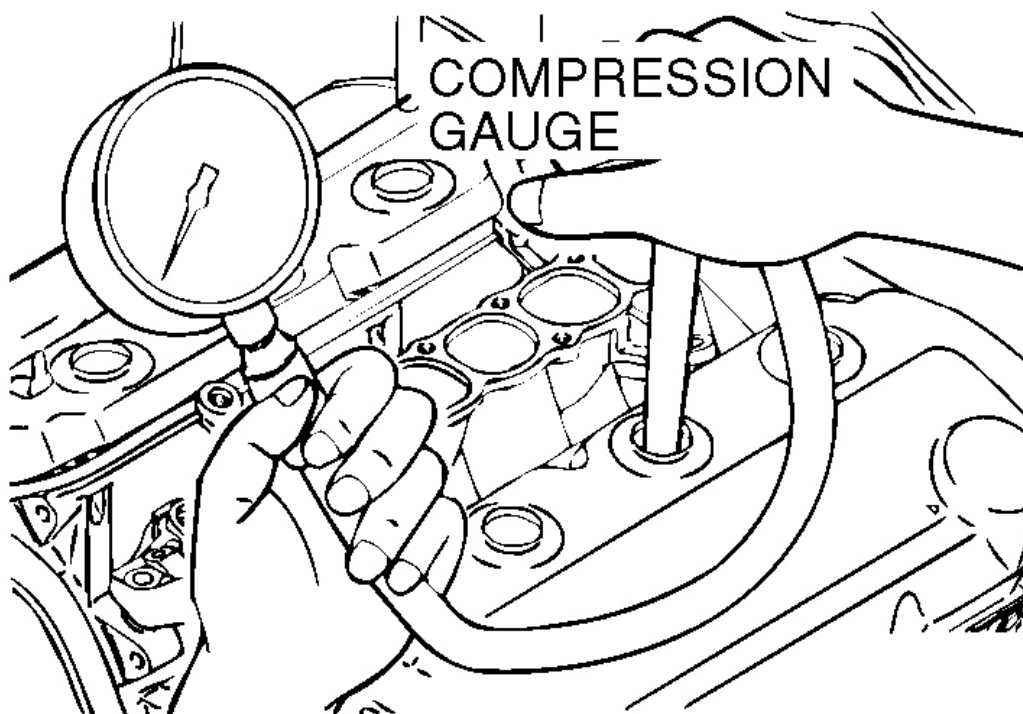
Fig. 10: Locating Crankshaft Position Sensor Connector (Without IMT)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 11: Locating Crankshaft Position Sensor Connector (With IMT)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

6. Set compression gauge to one of the spark plug holes.



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Fig. 12: Setting Compression Gauge To Spark Plug Holes
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

7. Crank the engine with the throttle valve fully open and measure the compression pressure.

< without IMT >

Standard value (at engine speed of 250 - 400 r/min): 824 kPa (119 psi)

Minimum limit (at engine speed of 250 - 400 r/min): 575 kPa (83 psi)

< with IMT >

Standard value (at engine speed of 250 r/min): 1,470 kPa (212 psi)

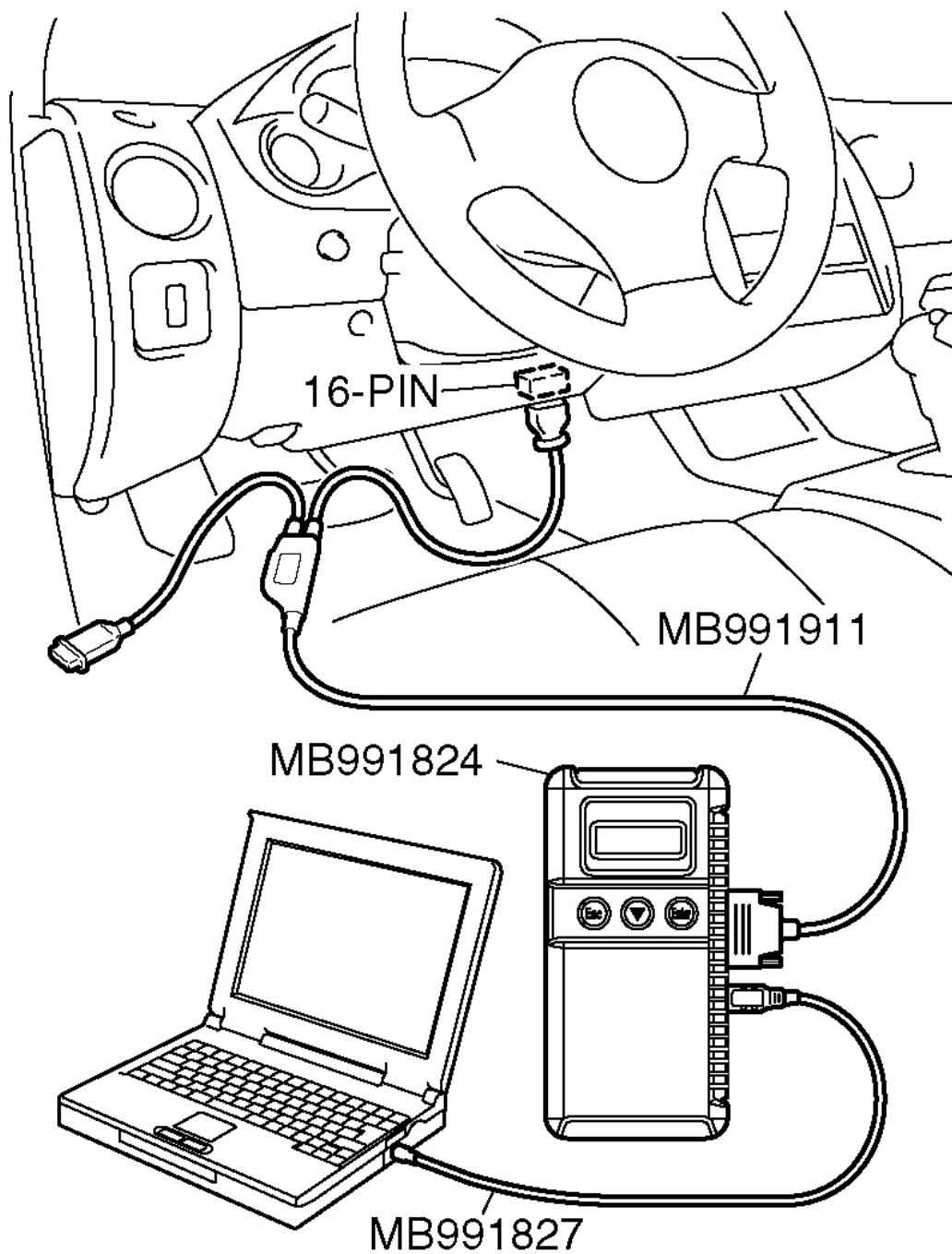
Minimum limit (at engine speed of 250 r/min): 1,029 kPa (149 psi)

8. 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)

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 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 MB991958 to erase the diagnostic trouble codes.

NOTE: **This will erase the diagnostic trouble code resulting from the distributor connector being disconnected.**



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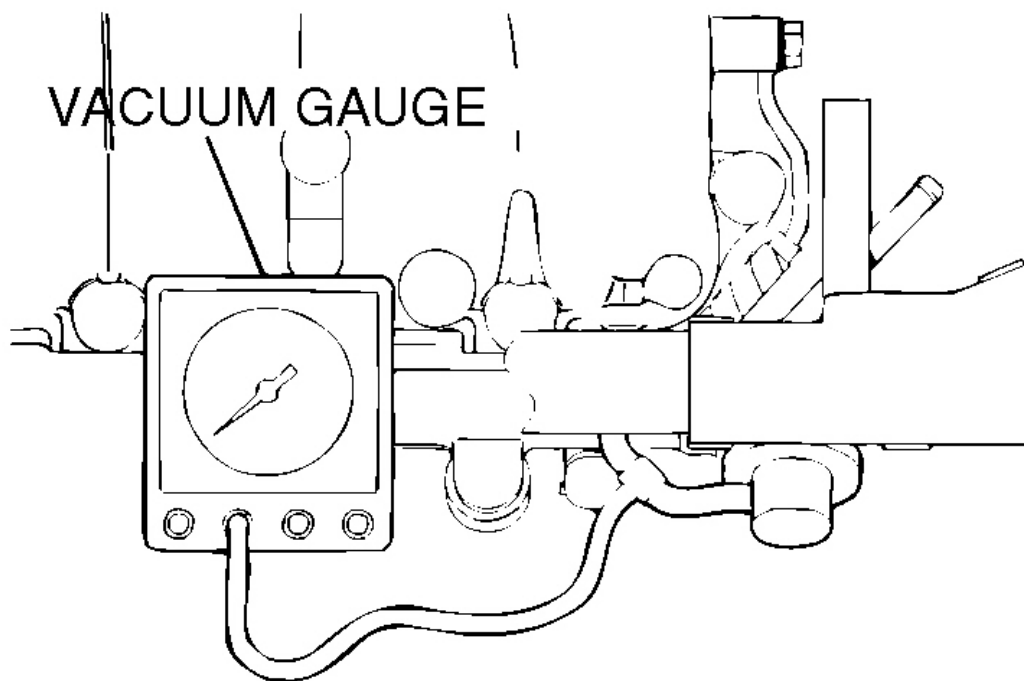
Fig. 13: Erasing Diagnostic Trouble Codes Using Scan Tool MB991958
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

MANIFOLD VACUUM CHECK

1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 - 95°C (176 - 203°F).
2. Connect an engine 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 +/- 100 r/min

Minimum limit: 60 kPa (18 in Hg)



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Fig. 14: Checking Manifold Vacuum

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

LASH ADJUSTER CHECK

If an abnormal noise (chattering noise) suspected to be caused by malfunction of the lash adjuster is produced immediately after starting the engine and does not disappear, 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 continuing the warming-up of 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.)

3. 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 **INSPECTION** .) As it is suspected that the noise is due to seizure 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 **MANIFOLD VACUUM CHECK** .)
6. If the abnormal noise does not disappear after air bleeding operation, clean the lash adjuster (refer to **INSPECTION** .)

Bleeding lash adjuster system

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

NOTE: After parking for many hours, oil may run out 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 and add or change oil if 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 a large quantity of air.

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

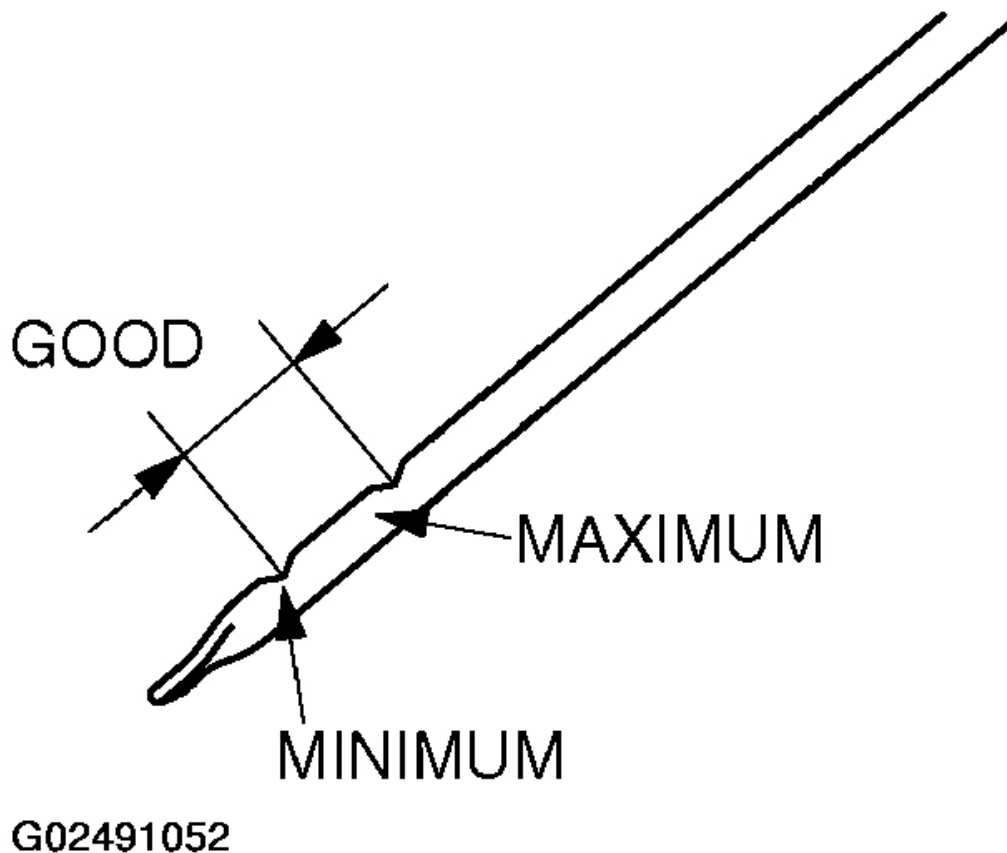


Fig. 15: Identifying Correct Oil Level

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: If air mixed with oil enters the high pressure chamber inside the lash adjuster from the above causes, air in the high pressure chamber is compressed excessively while the valve is opened, resulting in an abnormal noise when the valve closes. 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.

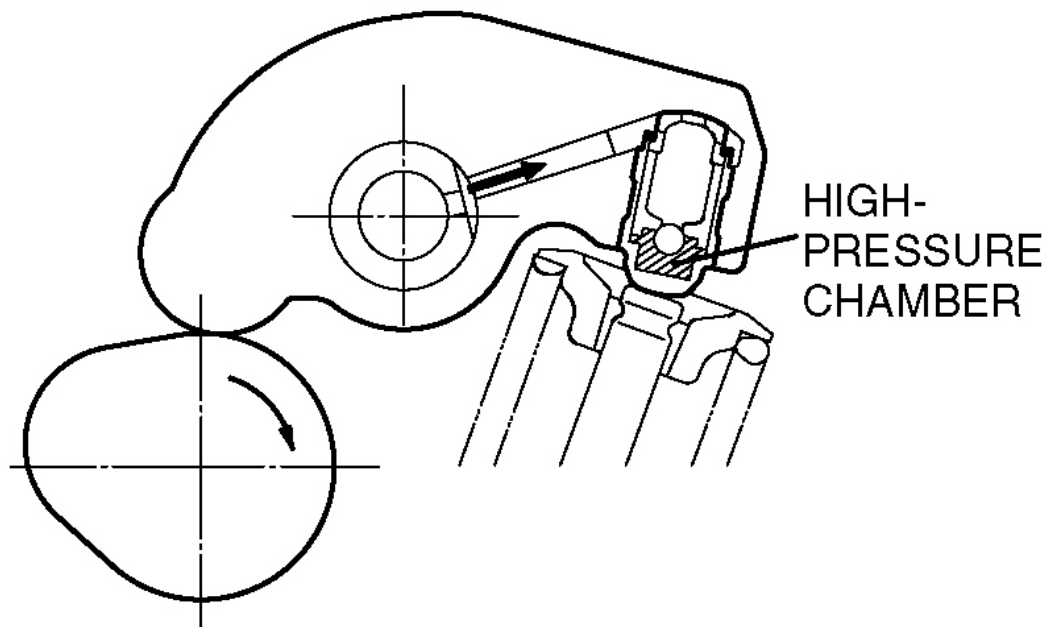
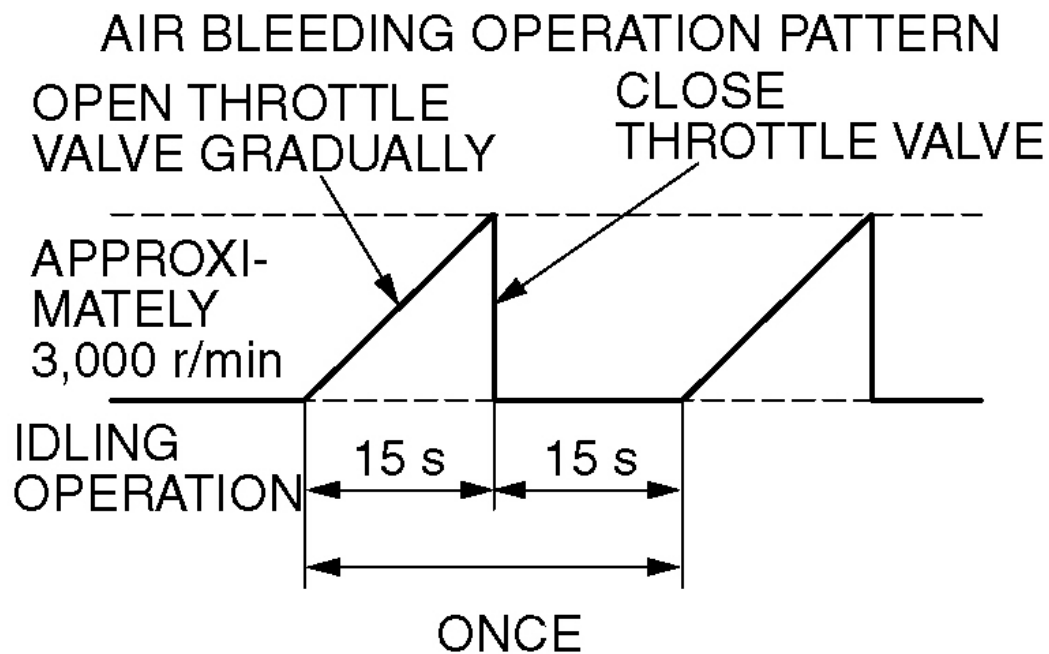
**G02491053**

Fig. 16: Air Mixed With Oil Enters High Pressure Chamber
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.



G02491054

Fig. 17: Air Bleeding Operation Pattern

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

VEHICLE WITH OUT INTAKE MANIFOLD TUNING (IMT) SYSTEM>

CAUTION: *: Indicates parts which should be temporarily tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

2005 Mitsubishi Eclipse Spyder GS

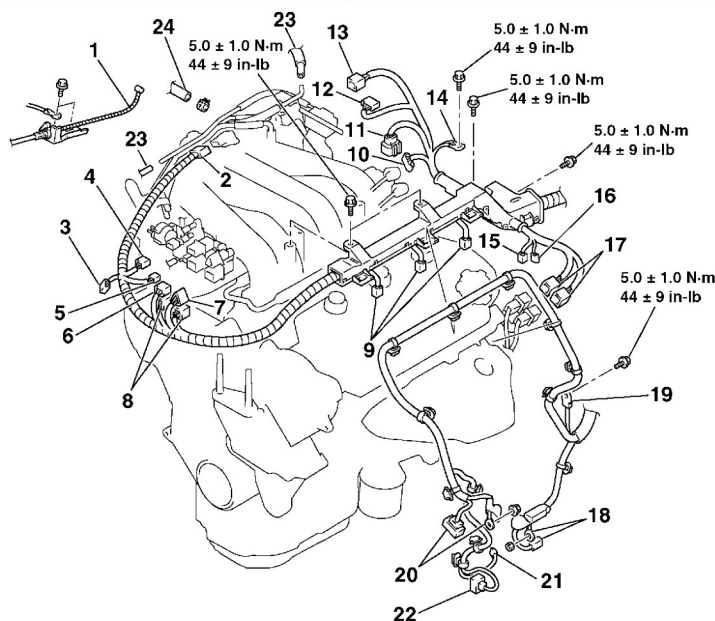
2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder

Pre-removal Operation

- Hood Removal
- Fuel Line Pressure Reduction
- Engine Coolant Draining
- Strut Tower Bar Removal
- Air Cleaner Removal
- Reserve Tank and Radiator Removal
- Front Exhaust Pipe Removal

Post-installation Operation

- Front Exhaust Pipe Installation
- Reserve Tank and Radiator Installation
- Air Cleaner Installation
- Strut Tower Bar Installation
- Drive Belt Tension Adjustment
- Engine Coolant Refilling
- Accelerator Cable Adjustment
- Hood Installation



REMOVAL STEPS

1. ACCELERATOR CABLE CONNECTION
2. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR
3. CONTROL WIRING HARNESS AND POWER STEERING WIRING HARNESS COMBINATION CONNECTOR
4. EGR VACUUM REGULATOR SOLENOID VALVE CONNECTOR
5. EVAPORATIVE EMISSION PURGE SOLENOID VALVE CONNECTOR
6. KNOCK SENSOR CONNECTOR
7. CRANKSHAFT POSITION SENSOR CONNECTOR
8. RIGHT BANK HEATED OXYGEN SENSOR CONNECTOR
9. INJECTOR CONNECTOR
10. DISTRIBUTOR CONNECTOR
11. CONTROL WIRING HARNESS AND INJECTOR WIRING HARNESS COMBINATION CONNECTOR

REMOVAL STEPS (Continued)

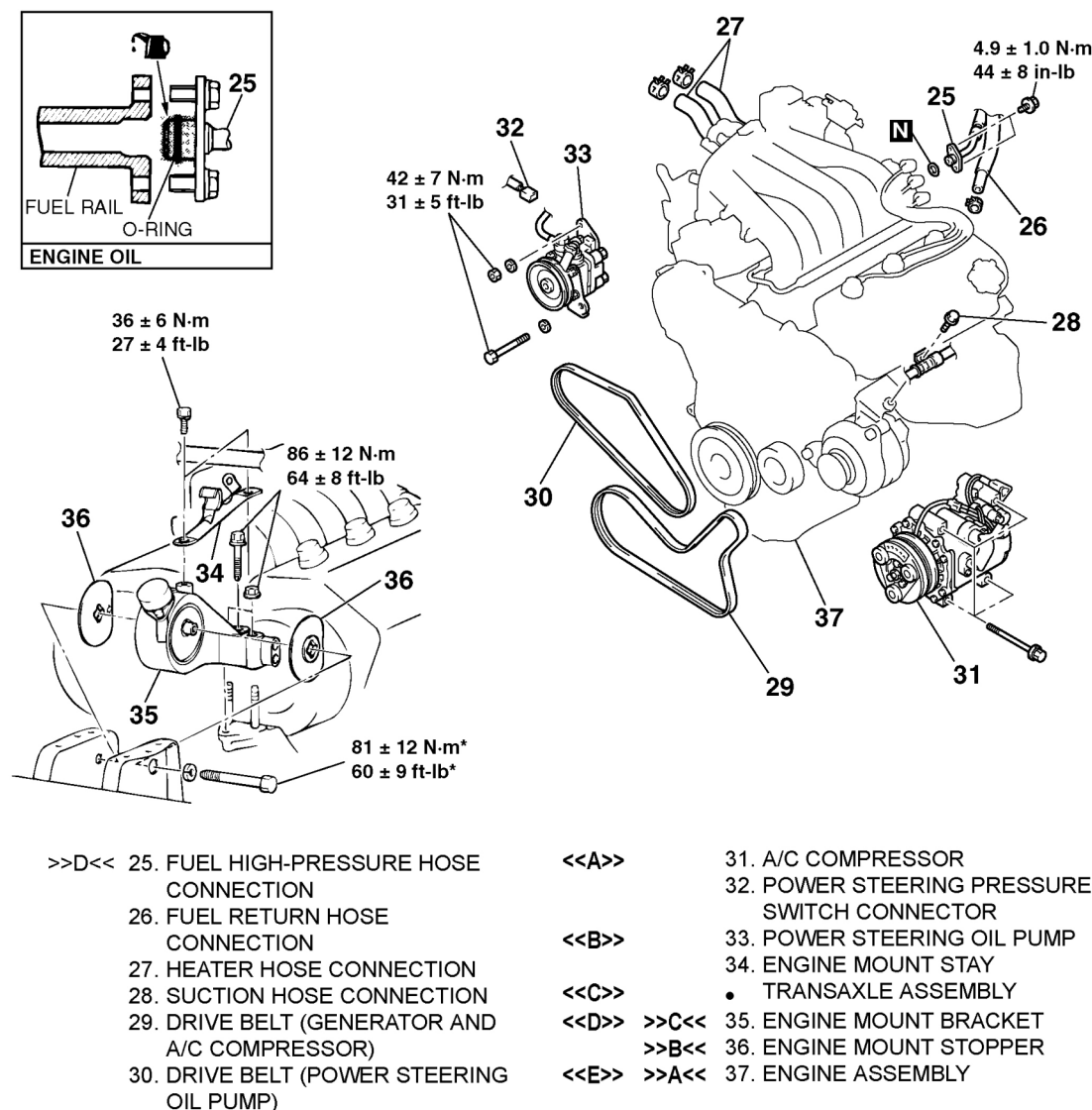
12. THROTTLE POSITION SENSOR CONNECTOR
13. IDLE AIR CONTROL MOTOR CONNECTOR
14. GROUND WIRE CONNECTION
15. ENGINE COOLANT TEMPERATURE GAUGE UNIT CONNECTOR
16. ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR
17. LEFT BANK HEATED OXYGEN SENSOR CONNECTOR
18. STARTER CONNECTOR
19. GROUND WIRE CONNECTION
20. GENERATOR CONNECTOR
21. ENGINE OIL PRESSURE SWITCH CONNECTOR
22. A/C COMPRESSOR CONNECTOR
23. VACUUM HOSE CONNECTION
24. BRAKE BOOSTER VACUUM HOSE CONNECTION

G02491055

Fig. 18: Removing/Installing Engine Assembly (Without IMT System) (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2005 Mitsubishi Eclipse Spyder GS

2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder



G02491056

Fig. 19: Removing/Installing Engine Assembly Components And Torque Specifications (Without IMT System) (2 Of 2)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Required Special Tools:

- MB991453: Engine Hanger Attachment Set
- MZ203827: Engine Lifter
- MB991454: Engine Hanger Balancer (MB991453, part of the engine hanger attachment set)
- MB991895: Engine Hanger
- MB991928: Engine Hanger

< VEHICLE WITH INTAKE MANIFOLD TUNING (IMT) SYSTEM >

2005 Mitsubishi Eclipse Spyder GS

2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder

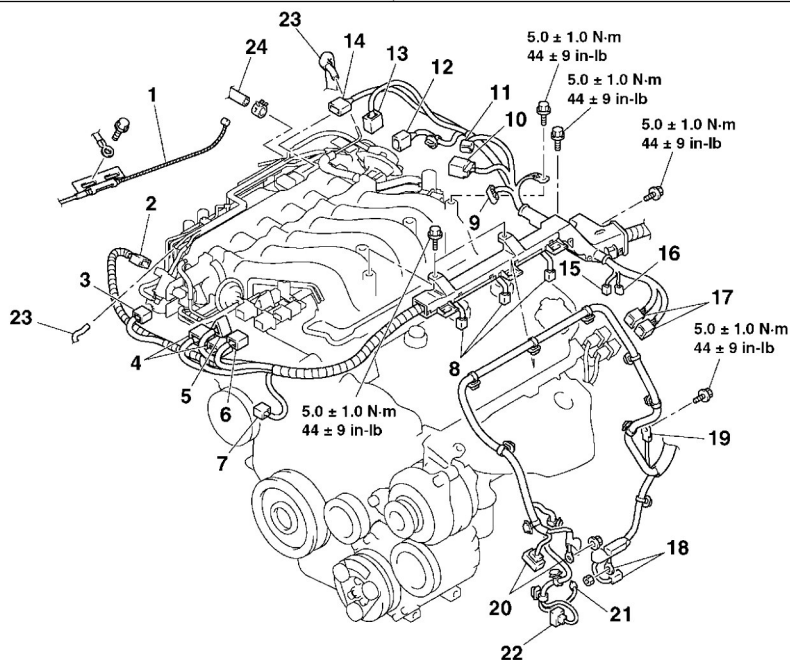
CAUTION: *: Indicates parts which should be temporarily tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

Pre-removal Operation

- Hood Removal
- Fuel Line Pressure Reduction
- Engine Coolant Draining
- Strut Tower Bar Removal
- Air Cleaner Removal
- Reserve Tank and Radiator Removal
- Front Exhaust Pipe Removal

Post-installation Operation

- Front Exhaust Pipe Installation
- Reserve Tank and Radiator Installation
- Air Cleaner Installation
- Strut Tower Bar Installation
- Drive Belt Tension Adjustment
- Engine Coolant Refilling
- Accelerator Cable Adjustment
- Hood Installation



REMOVAL STEPS

1. ACCELERATOR CABLE CONNECTION
2. EGR VACUUM REGULATOR SOLENOID VALVE CONNECTOR
3. VARIABLE INDUCTION SOLENOID VALVE CONNECTOR
4. RIGHT BANK HEATED OXYGEN SENSOR CONNECTOR
5. CRANKSHAFT POSITION SENSOR CONNECTOR
6. KNOCK SENSOR CONNECTOR
7. CONTROL WIRING HARNESS AND POWER STEERING WIRING HARNESS COMBINATION CONNECTOR
8. INJECTOR CONNECTOR
9. DISTRIBUTOR CONNECTOR
10. CONTROL WIRING HARNESS AND INJECTOR WIRING HARNESS COMBINATION CONNECTOR
11. PURGE SOLENOID VALVE CONNECTOR

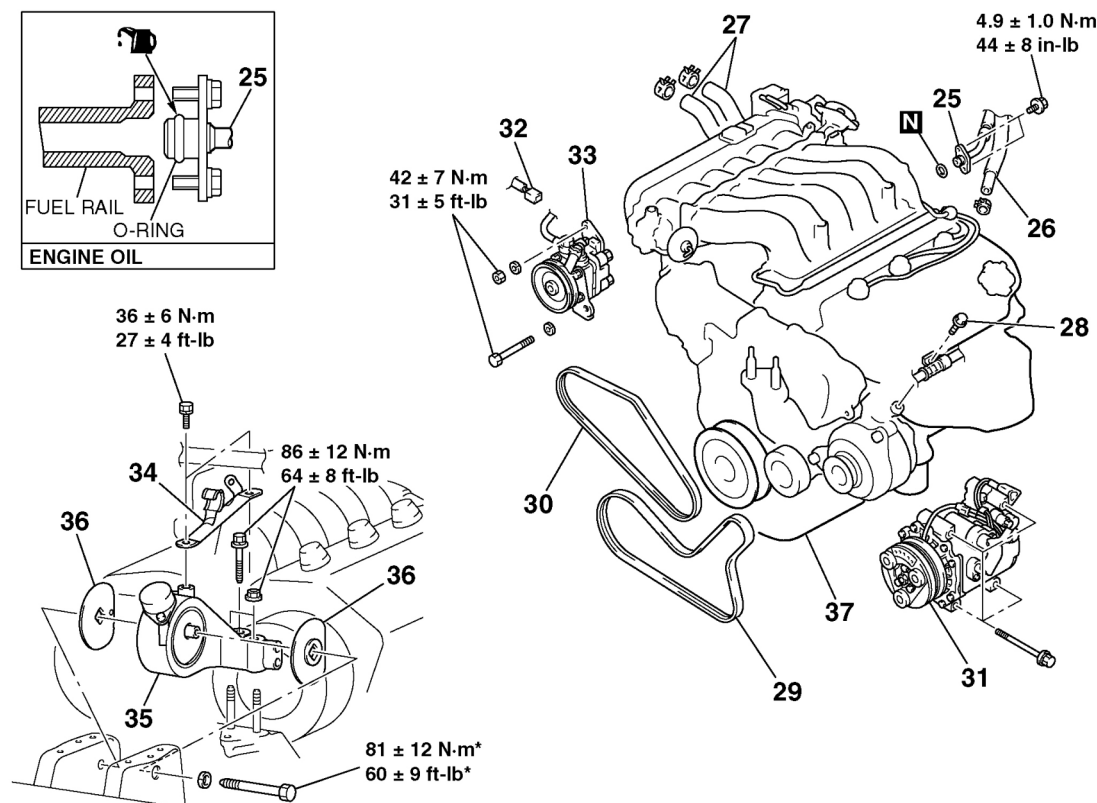
REMOVAL STEPS (Continued)

12. IDLE AIR CONTROL MOTOR CONNECTOR
13. THROTTLE POSITION SENSOR CONNECTOR
14. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR
15. ENGINE COOLANT TEMPERATURE GAUGE UNIT CONNECTOR
16. ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR
17. LEFT BANK HEATED OXYGEN SENSOR CONNECTOR
18. STARTER CONNECTOR
19. GROUND WIRE CONNECTION
20. GENERATOR CONNECTION
21. ENGINE OIL PRESSURE SWITCH CONNECTOR
22. A/C COMPRESSOR CONNECTOR
23. VACUUM HOSE CONNECTION
24. BRAKE BOOSTER VACUUM HOSE CONNECTION

G02491057

Fig. 20: Removing/Installing Engine Assembly Components And Torque Specifications (With IMT System) (1 Of 2)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



- >>D<< 25. FUEL HIGH-PRESSURE HOSE CONNECTION
 26. FUEL RETURN HOSE CONNECTION
 27. HEATER HOSE CONNECTION
 28. SUCTION HOSE CONNECTION
 29. DRIVE BELT (GENERATOR AND A/C COMPRESSOR)
 30. DRIVE BELT (POWER STEERING OIL PUMP)

<<A>>

<>

<<C>>

<<D>>

<<E>>

31. A/C COMPRESSOR
 32. POWER STEERING PRESSURE SWITCH CONNECTOR
 33. POWER STEERING OIL PUMP
 34. ENGINE MOUNT STAY
 • TRANSAXLE ASSEMBLY
 35. ENGINE MOUNT BRACKET
 36. ENGINE MOUNT STOPPER
 37. ENGINE ASSEMBLY

G02491058

Fig. 21: Removing/Installing Engine Assembly Components And Torque Specifications (With IMT System) (2 Of 2)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Required Special Tools:

- MB991453: Engine Hanger Attachment Set
- MZ203827: Engine Lifter
- MB991454: Engine Hanger Balancer (MB991453, part of the engine hanger attachment set)

- MB991895: Engine Hanger
- MB991928: Engine Hanger

REMOVAL SERVICE POINTS**<< A >> A/C COMPRESSOR REMOVAL**

Remove the A/C compressor from the compressor bracket with the hose 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.

<< B >> POWER STEERING OIL PUMP REMOVAL

Remove the power steering oil pump 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.

<< C >> 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 damaged.

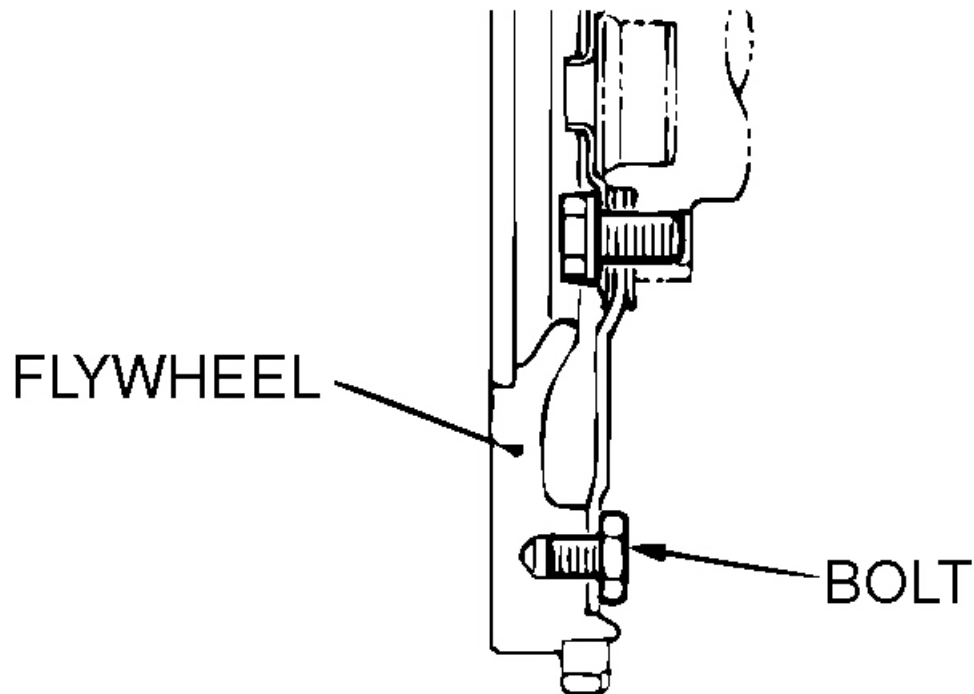
1. < Engine lifter MZ203827 is used >

Remove the transaxle assembly.

< M/T >: Refer to **TRANSAXLE ASSEMBLY** .

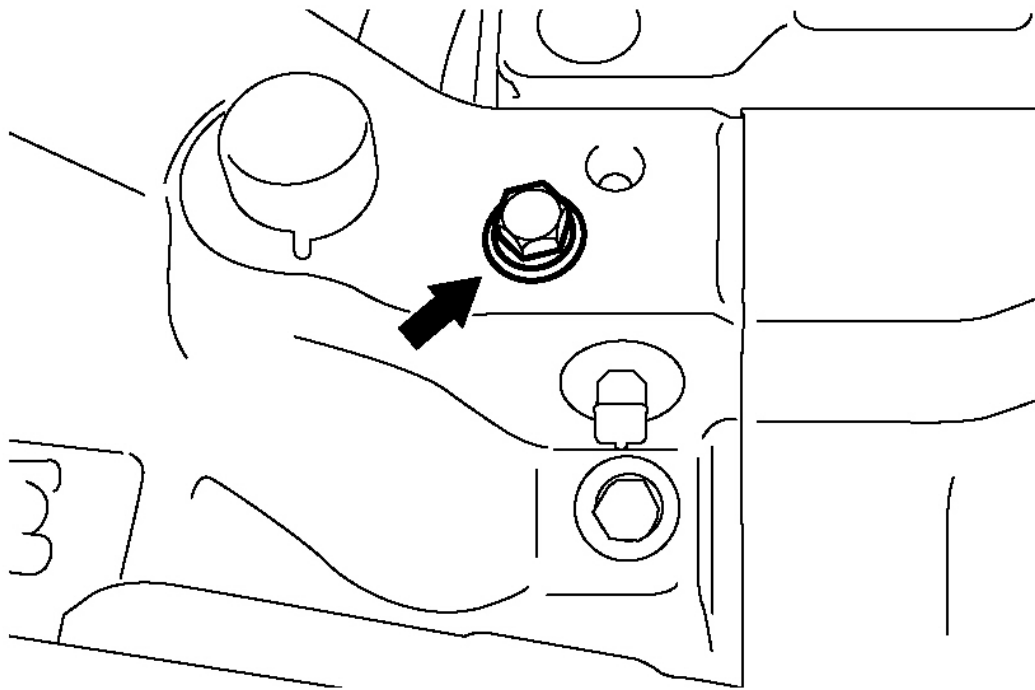
< A/T >: Refer to **TRANSAXLE ASSEMBLY** .

<M/T>

**G02491059****Fig. 22: Identifying Flywheel****Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

2. < Engine hanger MB991895 or MB991928 is used >
 1. Loosely fit the two radiator support upper insulator mounting bolts to the vehicle body.
 2. Remove the transaxle assembly.

< M/T >: Refer to **TRANSAXLE ASSEMBLY** .< A/T >: Refer to **TRANSAXLE ASSEMBLY** .

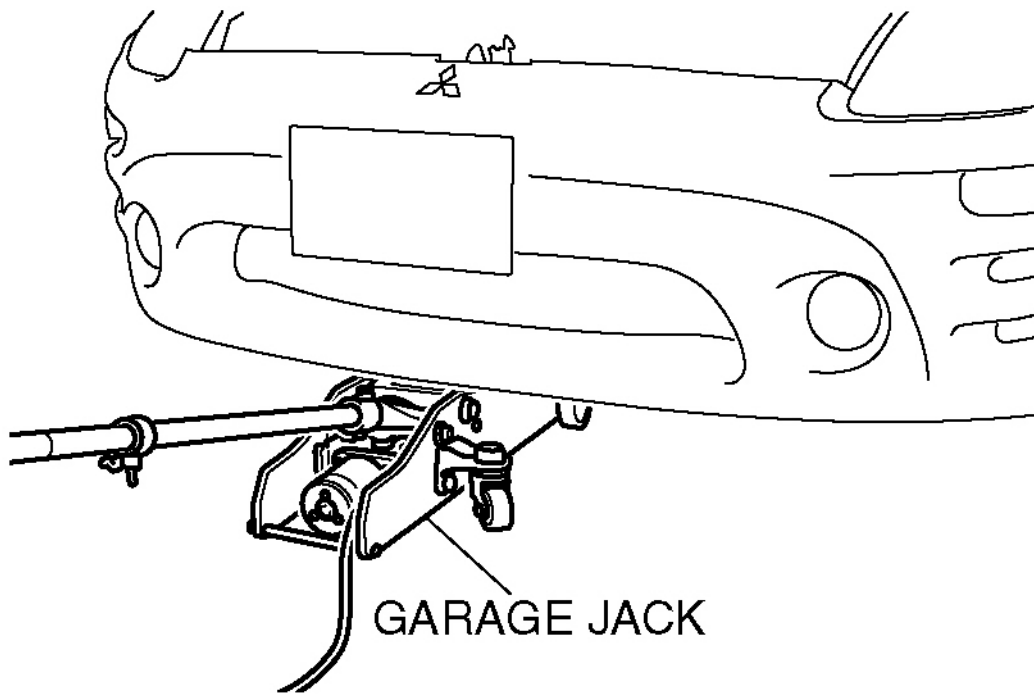


G02491060

Fig. 23: Identifying Radiator Support Upper Insulator Mounting Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

<< D >> ENGINE MOUNT BRACKET REMOVAL

1. Support the engine with a garage jack.



G02491061

Fig. 24: Supporting Engine With Garage Jack
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. < Engine lifter MZ203827 is used >

Remove special tools MB991453 and MZ203827 which were attached when the transaxle assembly was removed.

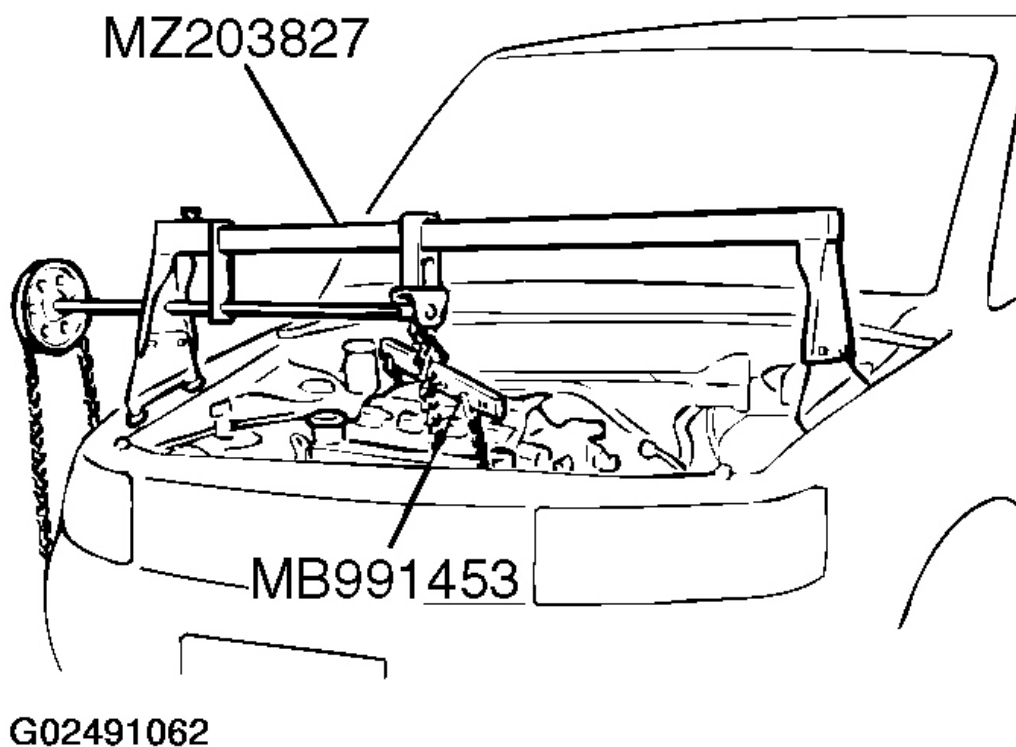


Fig. 25: Removing Special Tools

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. < Engine hanger MB991895 is used >

Remove special tools MB991454 and MB991895 which were attached when the transaxle assembly was removed.

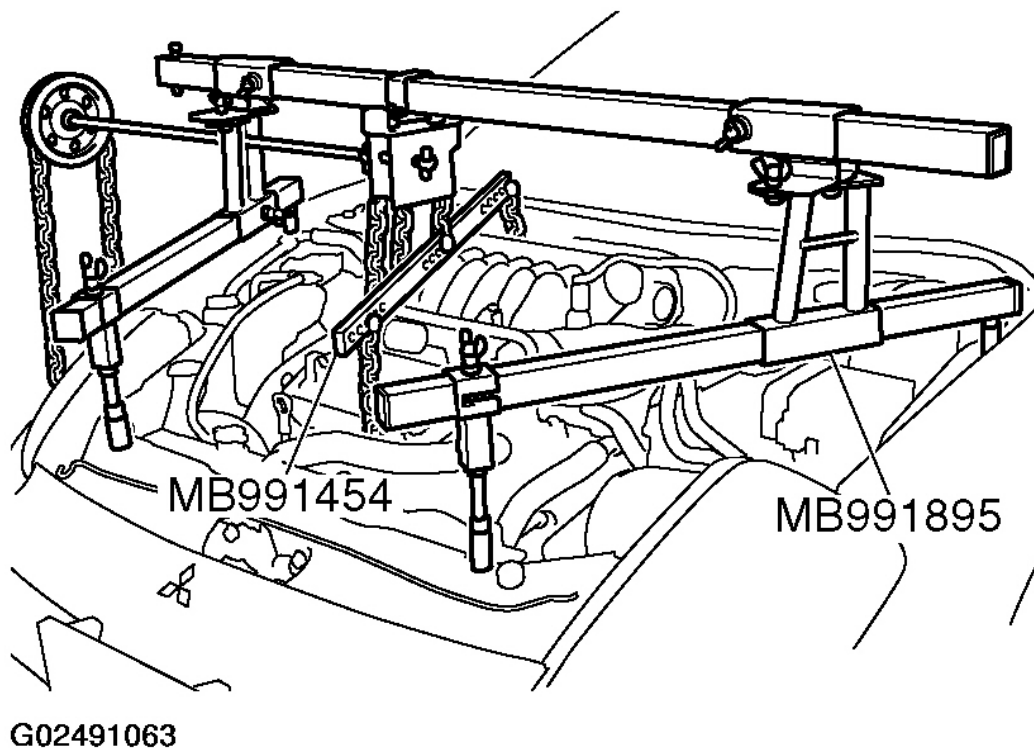


Fig. 26: Removing Special Tools

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. < Engine hanger MB991928 is used >

Remove special tools MB991454 and MB991928 which were attached when the transaxle assembly was removed.

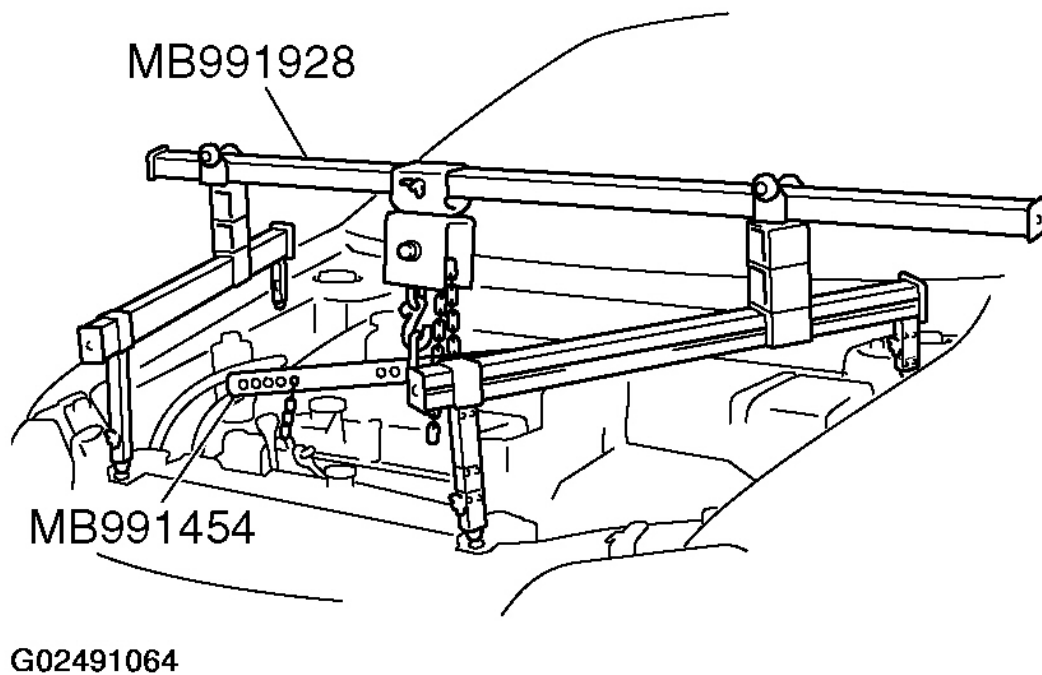
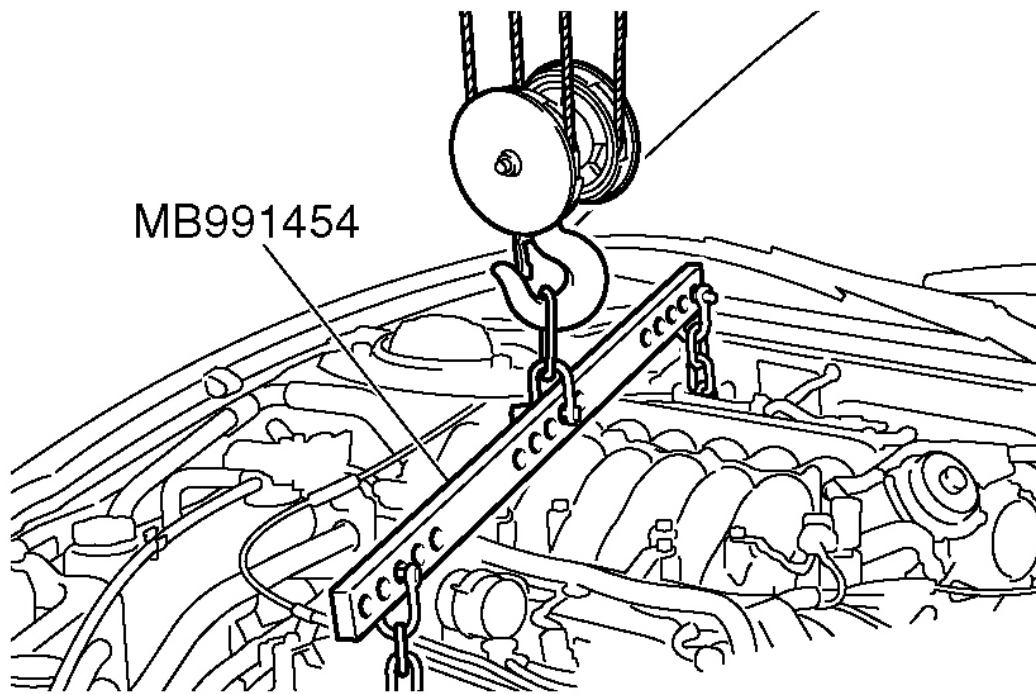


Fig. 27: Removing Transaxle Assembly Using Special Tools MB991454 And MB991928
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

5. Hold the engine assembly with a chain block or similar tool.
6. Place a garage jack against the engine oil pan with a piece of wood in between, jack up the engine so that the weight of the engine is no longer being applied to the engine mount bracket, and then remove the engine mount bracket.

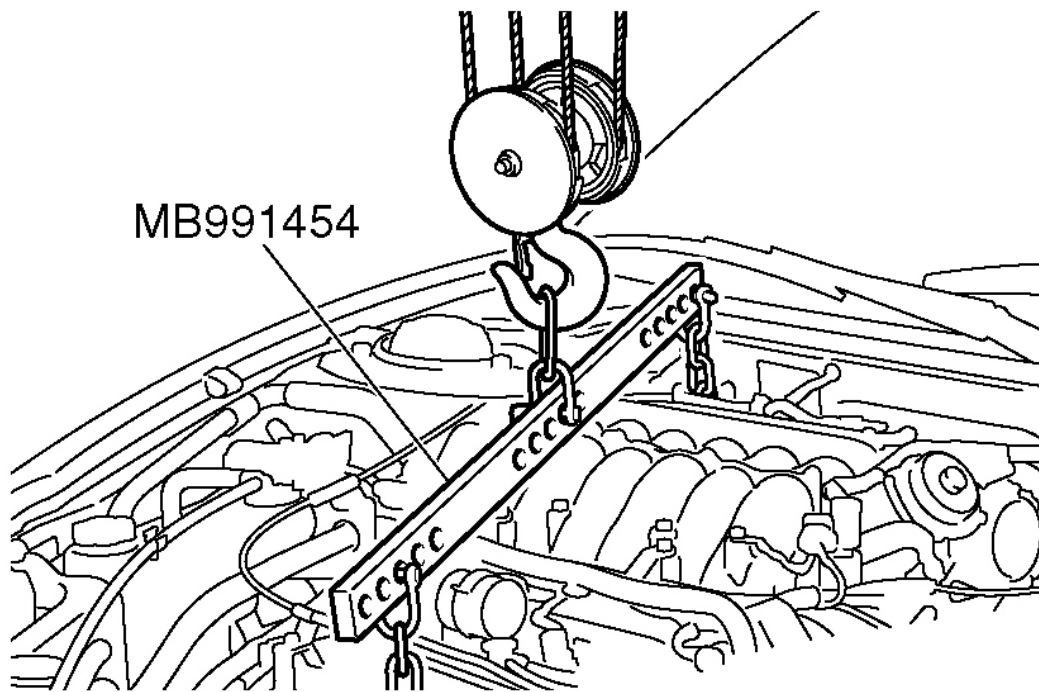


G02491065

Fig. 28: Holding Engine Assembly With Chain Block
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

<< E >> ENGINE ASSEMBLY REMOVAL

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



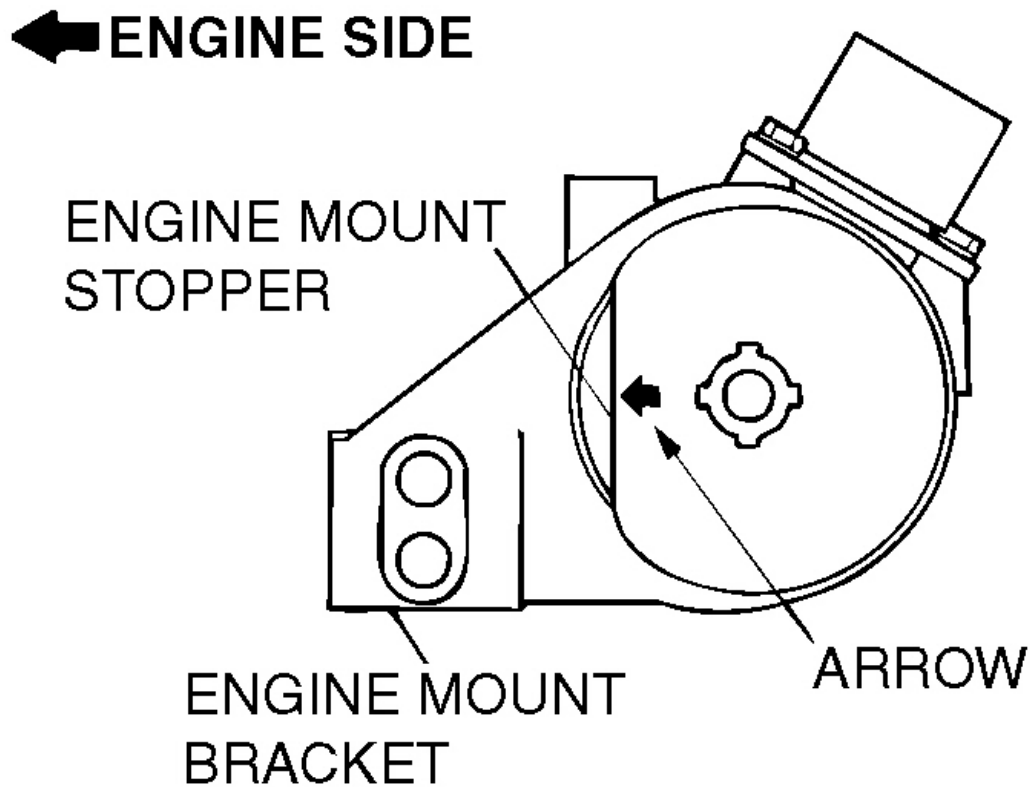
G02491066

Fig. 29: Removing Engine Assembly**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.****INSTALLATION SERVICE POINTS****>> A << ENGINE ASSEMBLY INSTALLATION**

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

>> B << ENGINE MOUNT STOPPER INSTALLATION

Clamp the engine mount stopper so that the arrow points in the direction as shown in the diagram.

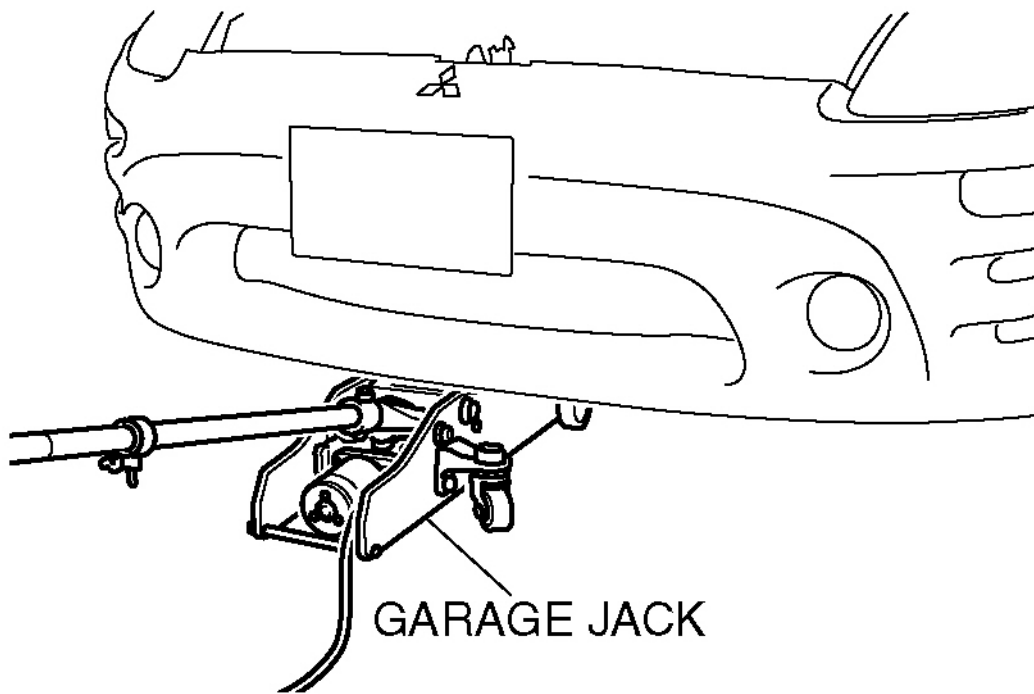


G02491067

Fig. 30: Identifying Engine Mount Stopper Installation Position
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> C << ENGINE MOUNT BRACKET INSTALLATION

1. Place a garage jack against the engine oil pan with a piece of wood in between, and install the engine mount bracket while adjusting the position of the engine.
2. Support the engine with the garage jack.

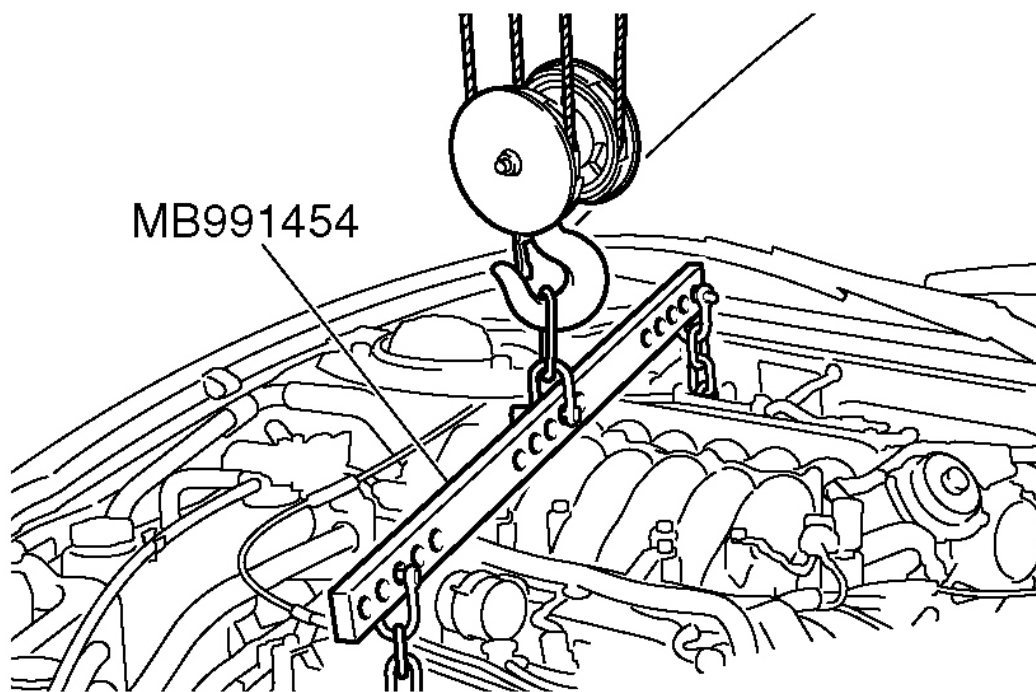


G02491068

Fig. 31: Supporting Engine With Garage Jack
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. < Engine lifter MZ203827 is used >

Remove the chain block and support the engine assembly with special tools MB991453 and MZ203827.



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Fig. 32: Removing Chain Block

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

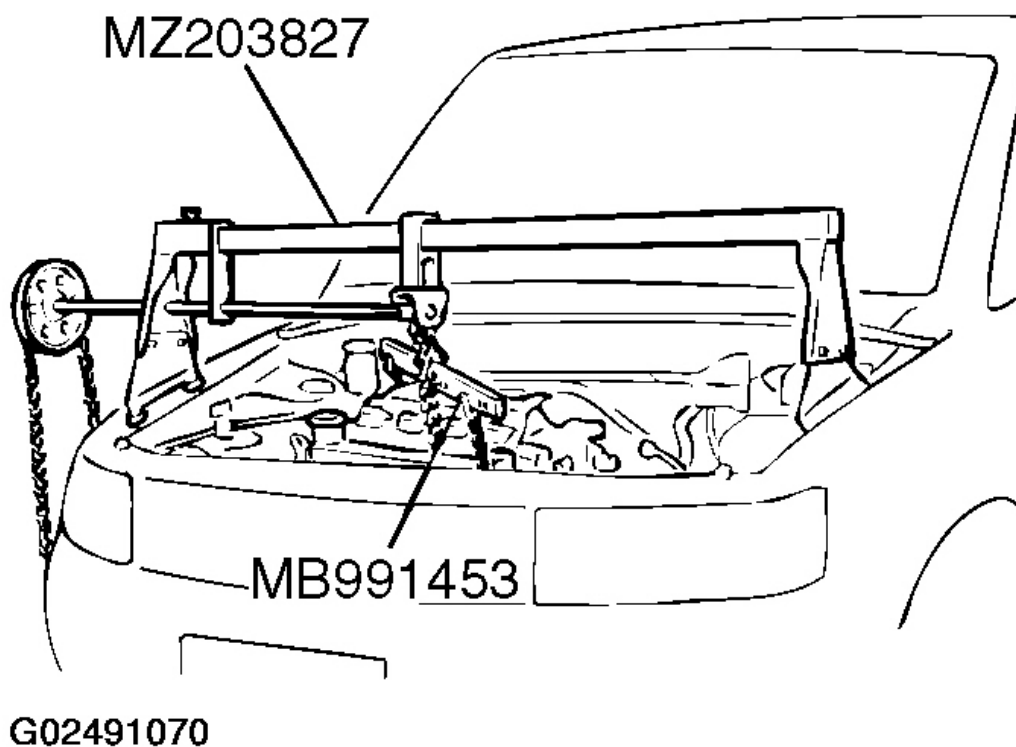
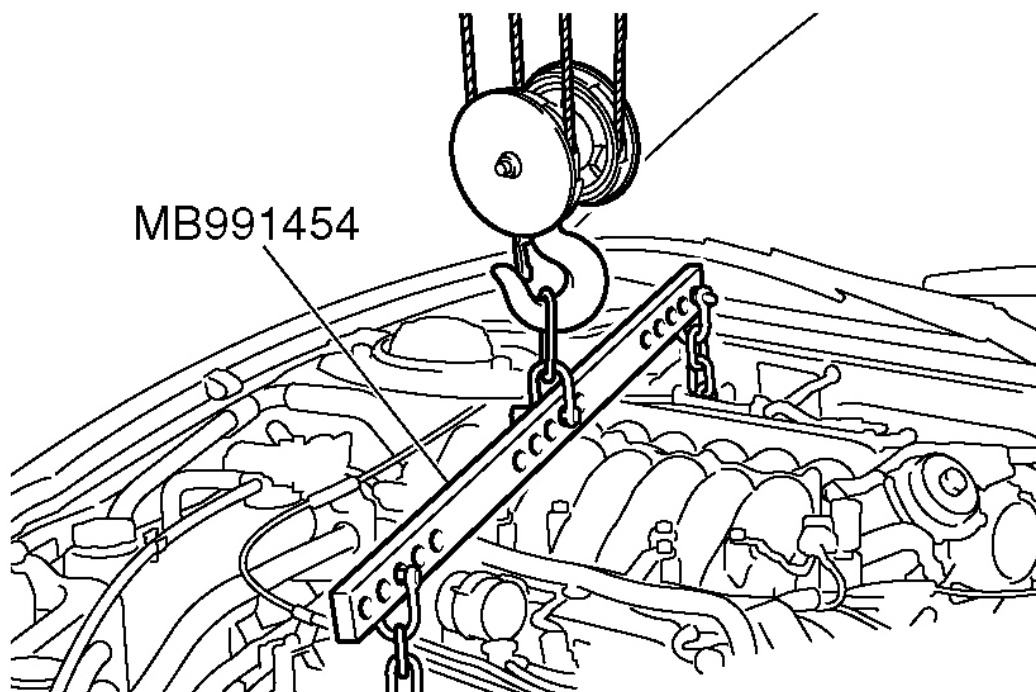


Fig. 33: Supporting Engine Assembly With Special Tools MB991453 And MZ203827
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. < Engine hanger MB991895 is used >

Remove the chain block and support the engine assembly with special tools MB991895.



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Fig. 34: Removing Chain Block

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

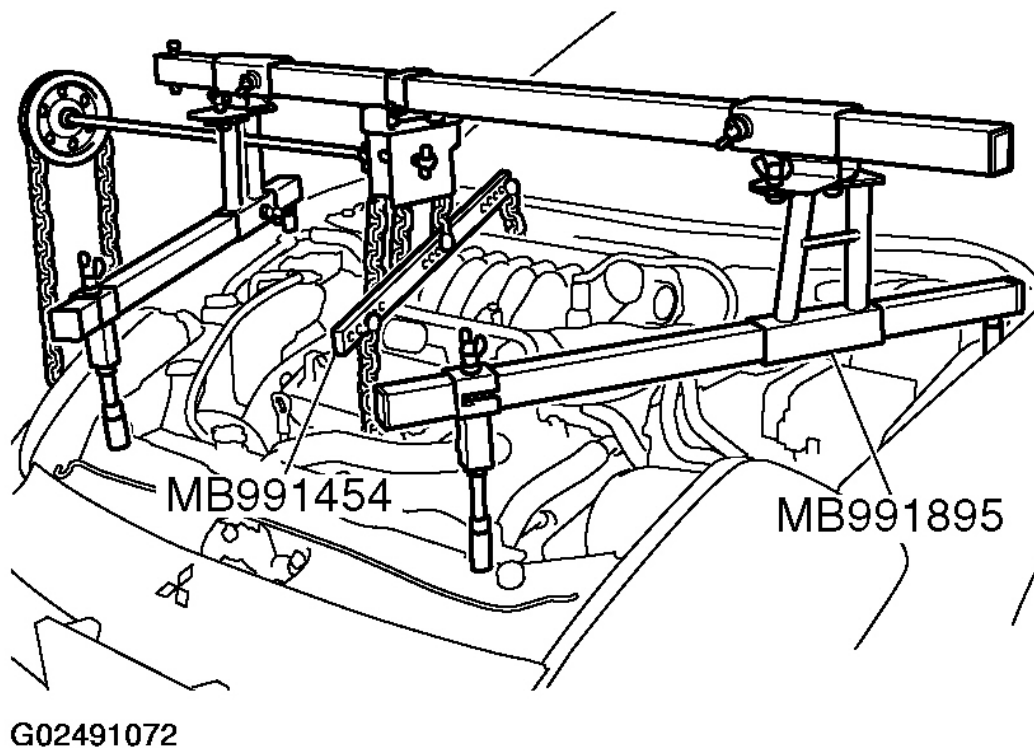


Fig. 35: Supporting Engine Assembly With Special Tools MB991895
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

5. < Engine hanger MB991928 is used >

1. Assemble the engine hanger (special tool MB991928). Set following parts the base hanger.
 - Slide bracket (HI)
 - Foot (standard) (MB991932)
 - Foot (short) (MB991933)
 - Joint (50) (MB991929)
 - Joint (90) (MB991930)
 - Joint (140) (MB991931)

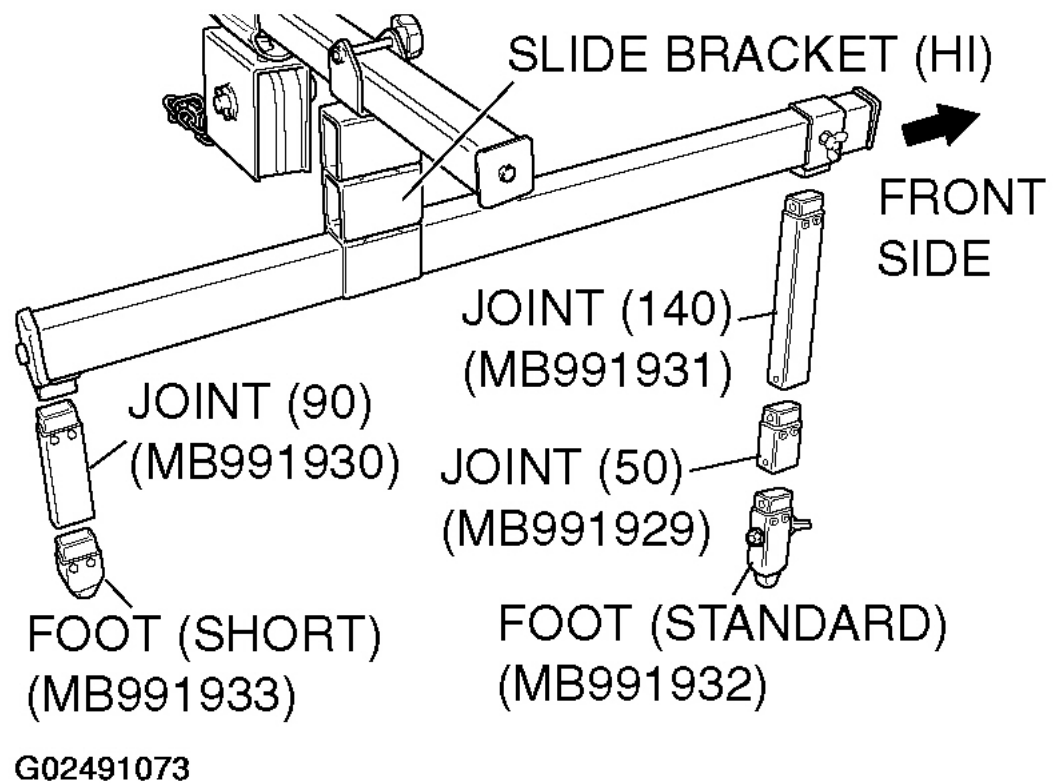


Fig. 36: Assembling Engine Hanger

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Remove the chain block and support the engine assembly with special tools MB991895.

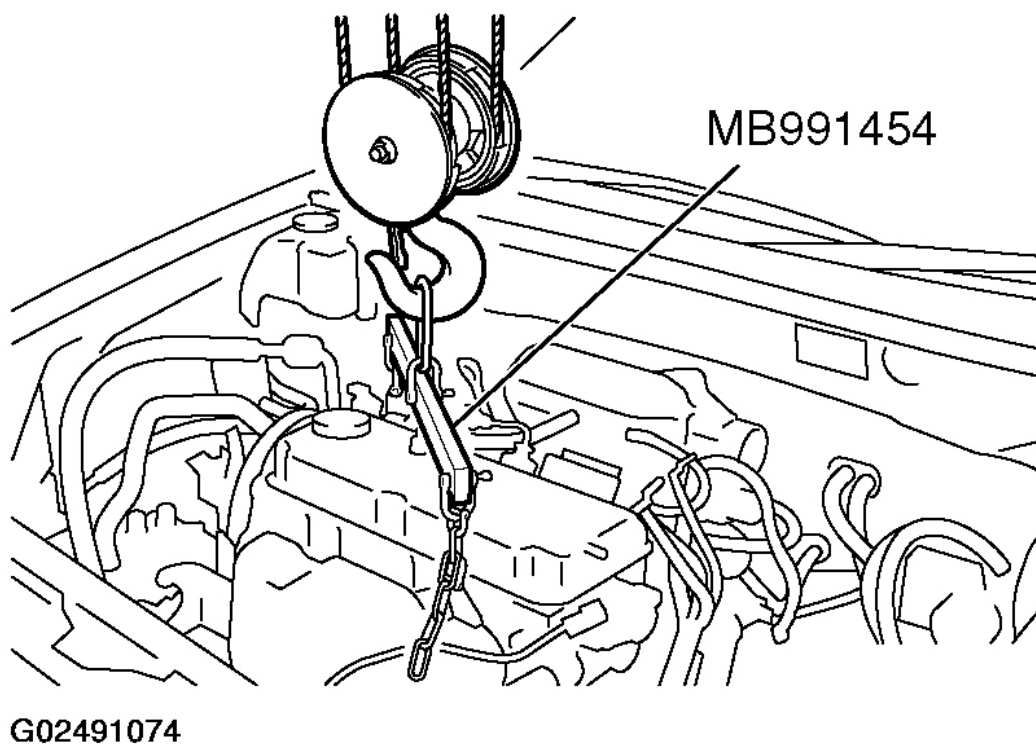
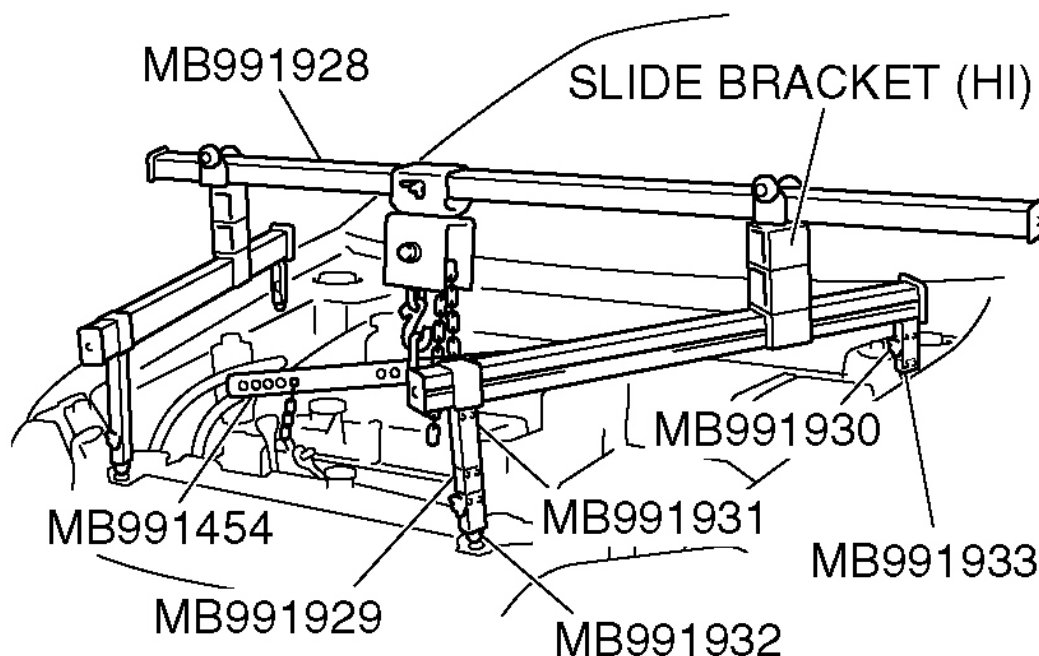


Fig. 37: Removing Chain Block

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G02491075

Fig. 38: Supporting Engine Assembly With Special Tools
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> D << FUEL HIGH-PRESSURE HOSE INSTALLATION

CAUTION: Do not allow engine oil to enter the fuel rail.

1. Apply a small amount of new engine oil to the O-ring.
2. Turning the fuel high-pressure hose to the right and left, install it to the fuel rail, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
3. If the hose does not turn smoothly, the O-ring may be clamped. Disconnect the fuel high-pressure hose and check the O-ring for damage.
4. Re-insert the fuel rail and check that the hose turns smoothly.

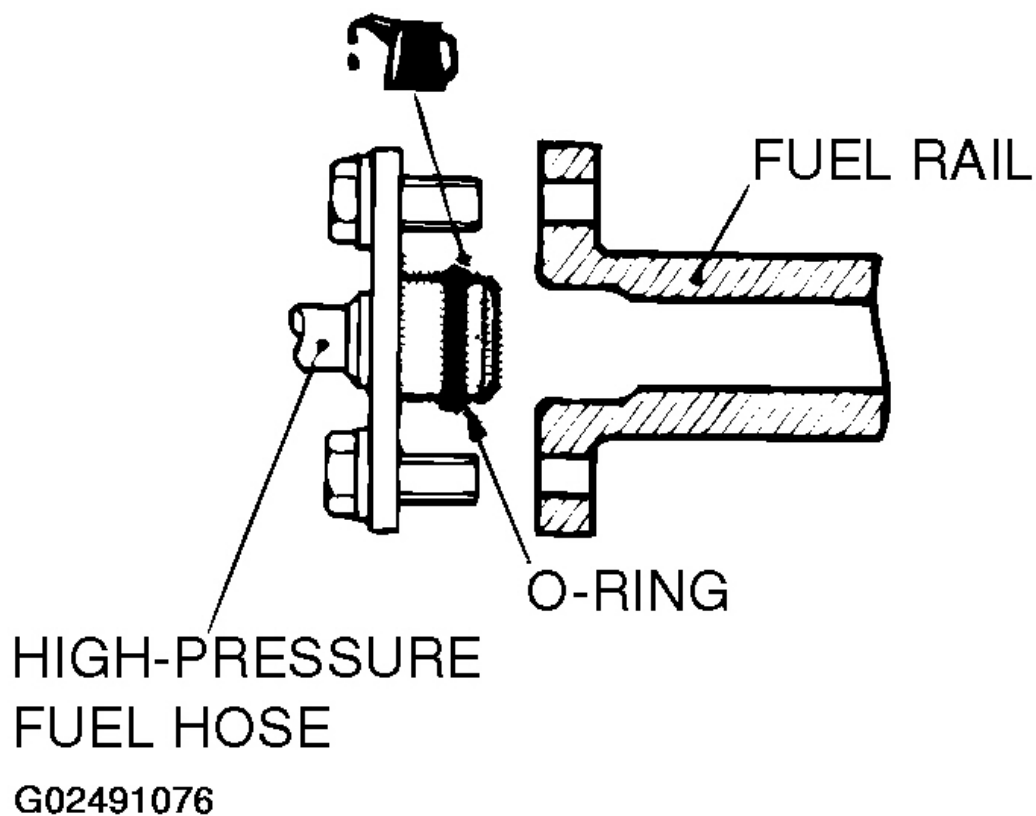


Fig. 39: Installing High-Pressure Fuel Hose

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

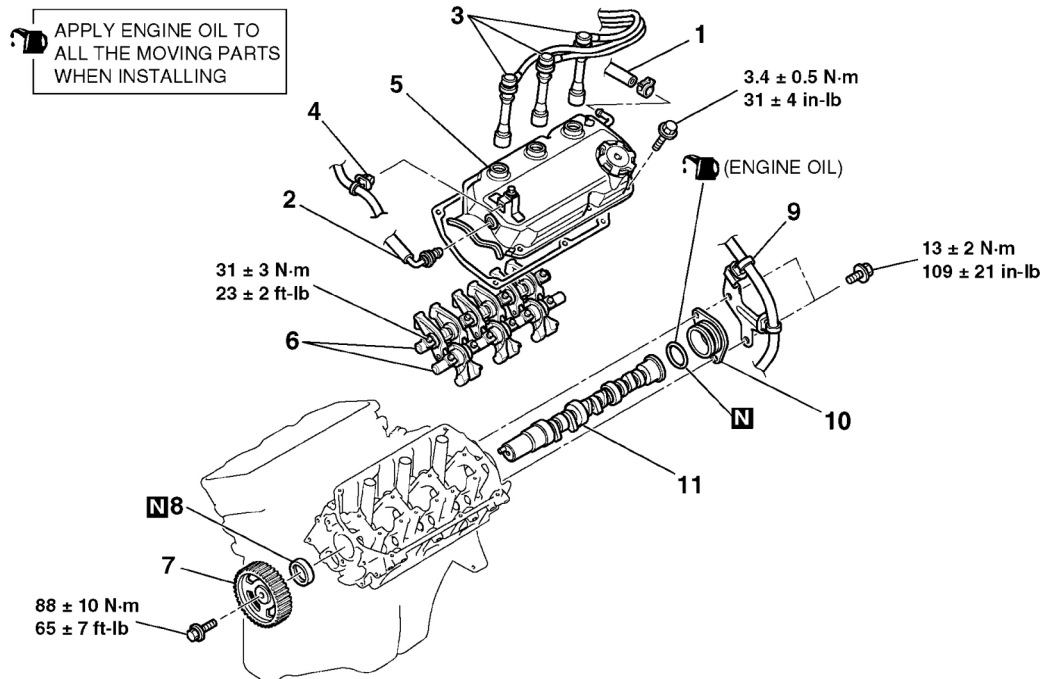
LEFT BANK

2005 Mitsubishi Eclipse Spyder GS

2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder

<LEFT BANK>

Pre-removal and Post-installation Operation
Timing Belt Removal and Installation.



- CAMSHAFT REMOVAL STEPS**
- THERMOSTAT HOUSING ASSEMBLY
 - 1. BLOW-BY HOSE CONNECTION
 - 2. PCV HOSE CONNECTION
 - 3. SPARK PLUG CABLE
 - 4. BATTERY CABLE CONNECTION
 - 5. ROCKER COVER

- CAMSHAFT REMOVAL STEPS**
- 6. ROCKER ARM AND SHAFT ASSEMBLY
 - 7. CAMSHAFT SPROCKET
 - 9. BATTERY CABLE AND HARNESS BRACKET
 - 10. THRUST CASE
 - 11. CAMSHAFT
- CAMSHAFT OIL SEAL REMOVAL STEPS**
- 7. CAMSHAFT SPROCKET
 - 8. CAMSHAFT OIL SEAL

G02491077

Fig. 40: Removing/Installing Camshaft And Camshaft Oil Seal Components (Left Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Required Special Tools:

- MB990767: End Yoke Holder
- MB991559: Camshaft Oil Seal Installer Adapter
- MD998443: Lash Adjuster Holder (8)
- MD998713: Camshaft Oil Seal Installer
- MD998715: Crankshaft Pulley Holder Pin

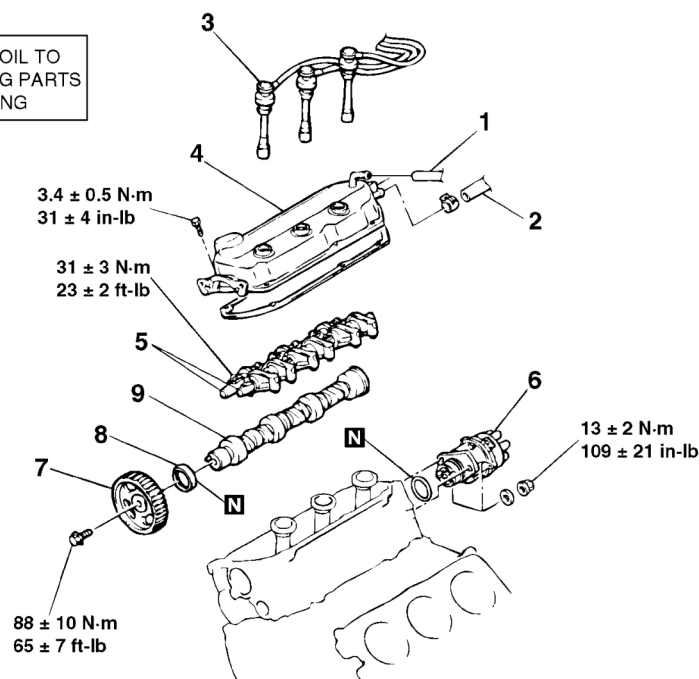
RIGHT BANK

<RIGHT BANK>

Pre-removal and Post-installation Operation
Timing Belt Removal and Installation



APPLY ENGINE OIL TO
ALL THE MOVING PARTS
WHEN INSTALLING



CAMSHAFT REMOVAL STEPS

- INTAKE MANIFOLD PLENUM
- 1. BREATHER HOSE CONNECTION
- 2. BLOW-BY HOSE CONNECTION
- 3. SPARK PLUG CABLE
- 4. ROCKER COVER

<<A>> >>D<<

<> >>B<<

<> >>B<<

>>A<<

CAMSHAFT REMOVAL STEPS

- 5. ROCKER ARM AND SHAFT ASSEMBLY
- 6. DISTRIBUTOR
- 7. CAMSHAFT SPROCKET
- 9. CAMSHAFT
- CAMSHAFT OIL SEAL
- REMOVAL STEPS
- 7. CAMSHAFT SPROCKET
- 8. CAMSHAFT OIL SEAL

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Fig. 41: Removing/Installing Camshaft And Camshaft Oil Seal Components (Right Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Required Special Tools:

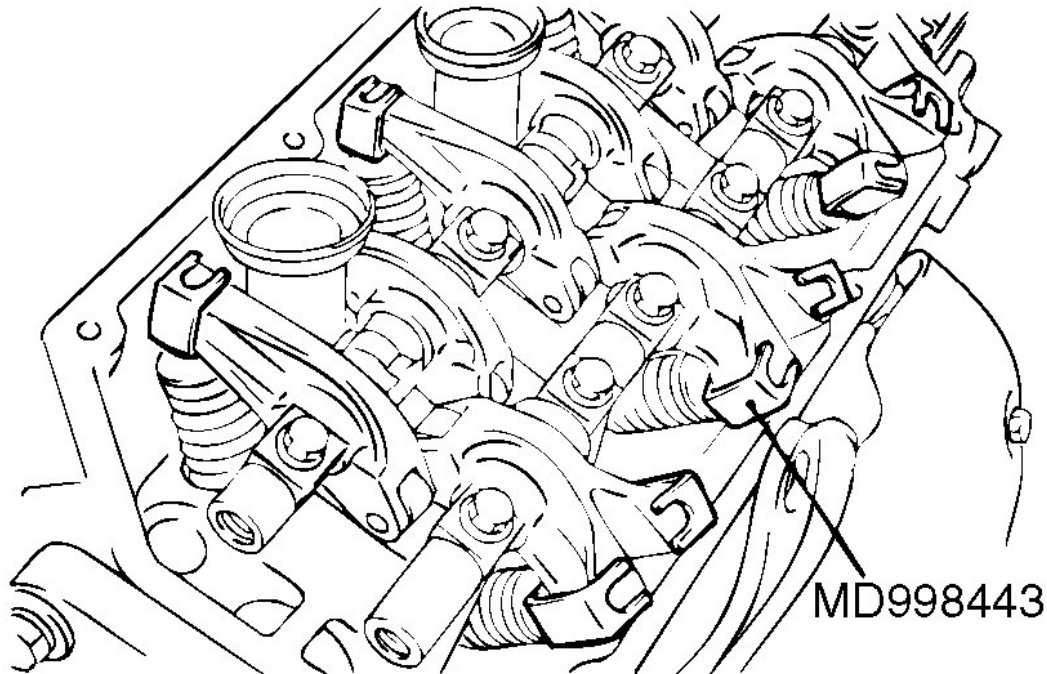
- MB990767: End Yoke Holder
- MD998443: Lash Adjuster Holder (8)
- MD998713: Camshaft Oil Seal Installer
- MD998715: Crankshaft Pulley Holder Pin

REMOVAL SERVICE POINTS

<< A >> ROCKER ARM AND SHAFT ASSEMBLY REMOVAL

1. Install special tool MD998443 as shown in the illustration so that the lash adjusters will not fall out.

CAUTION: Never disassemble the rocker arm and shaft assembly.



G02491079

Fig. 42: Installing Special Tool MD998443

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

<< B >> CAMSHAFT SPROCKET REMOVAL

1. Use special tools MB990767 and MD998715 to loosen the camshaft sprocket mounting bolt.
2. Remove the camshaft sprocket.

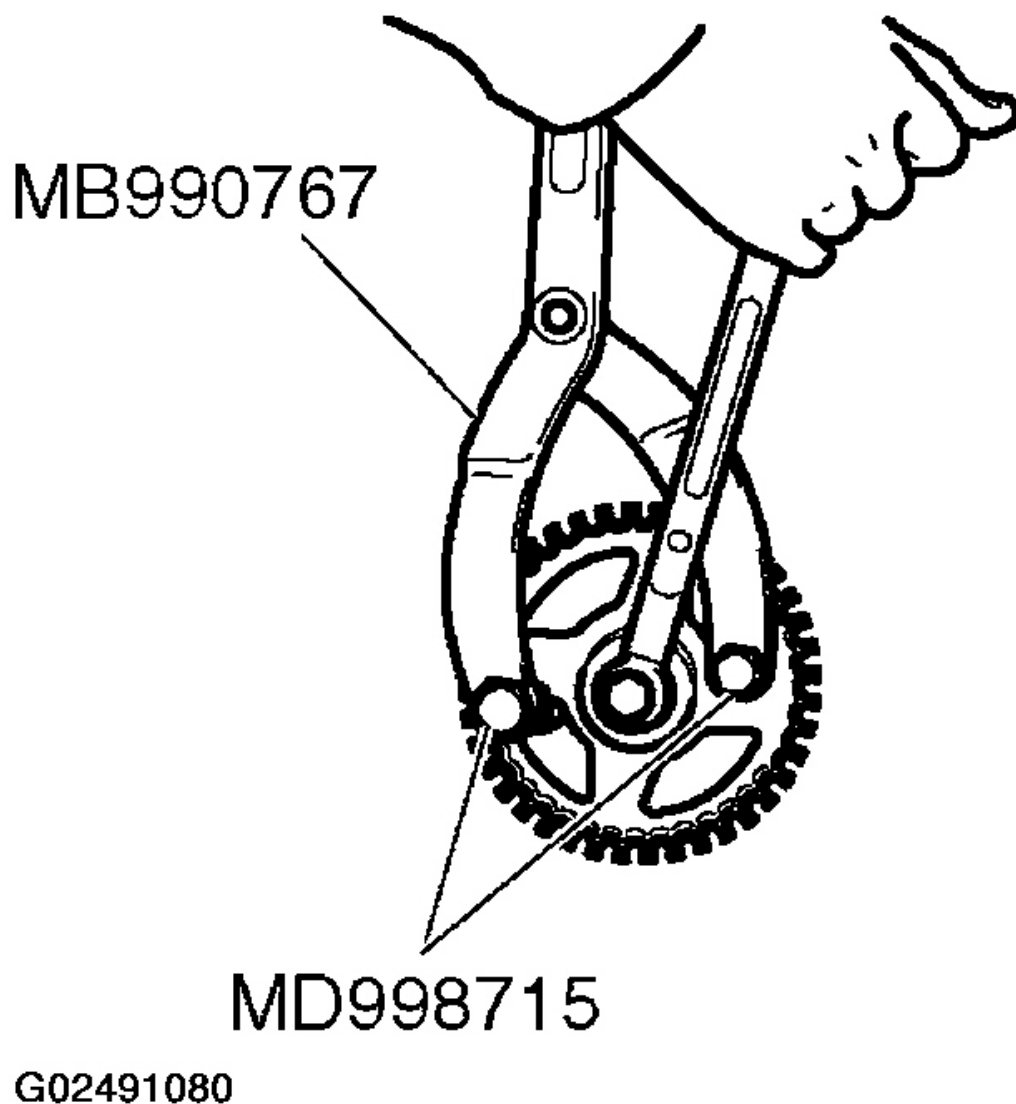
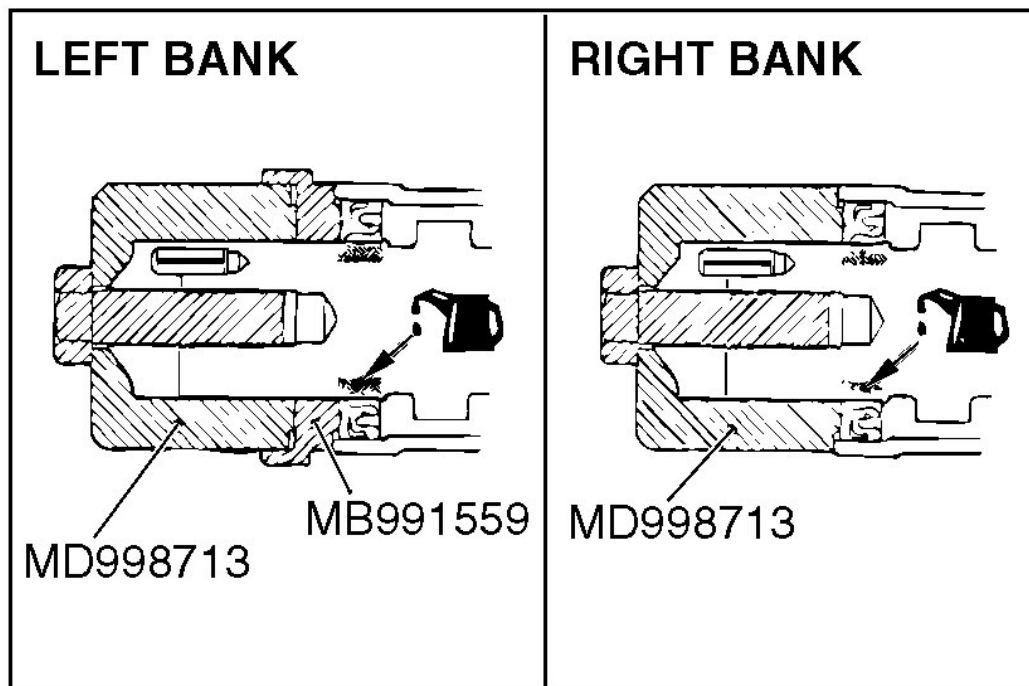


Fig. 43: Loosening Camshaft Sprocket Mounting Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

>> A << CAMSHAFT OIL SEAL INSTALLATION

1. Apply engine oil to the camshaft oil seal lip.
2. Use special tools MB991559 and MD998713 to press-fit the camshaft oil seal.



G02491081

Fig. 44: Installing Camshaft Oil Seal (Left And Right Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> B << CAMSHAFT SPROCKET INSTALLATION

1. Install the camshaft sprocket.
2. Use special tools MB990767 and MD998715 to tighten the camshaft sprocket mounting bolt to the specified torque.

Tightening torque: 88 +/- 10 N.m (65 +/- 7 ft-lb)

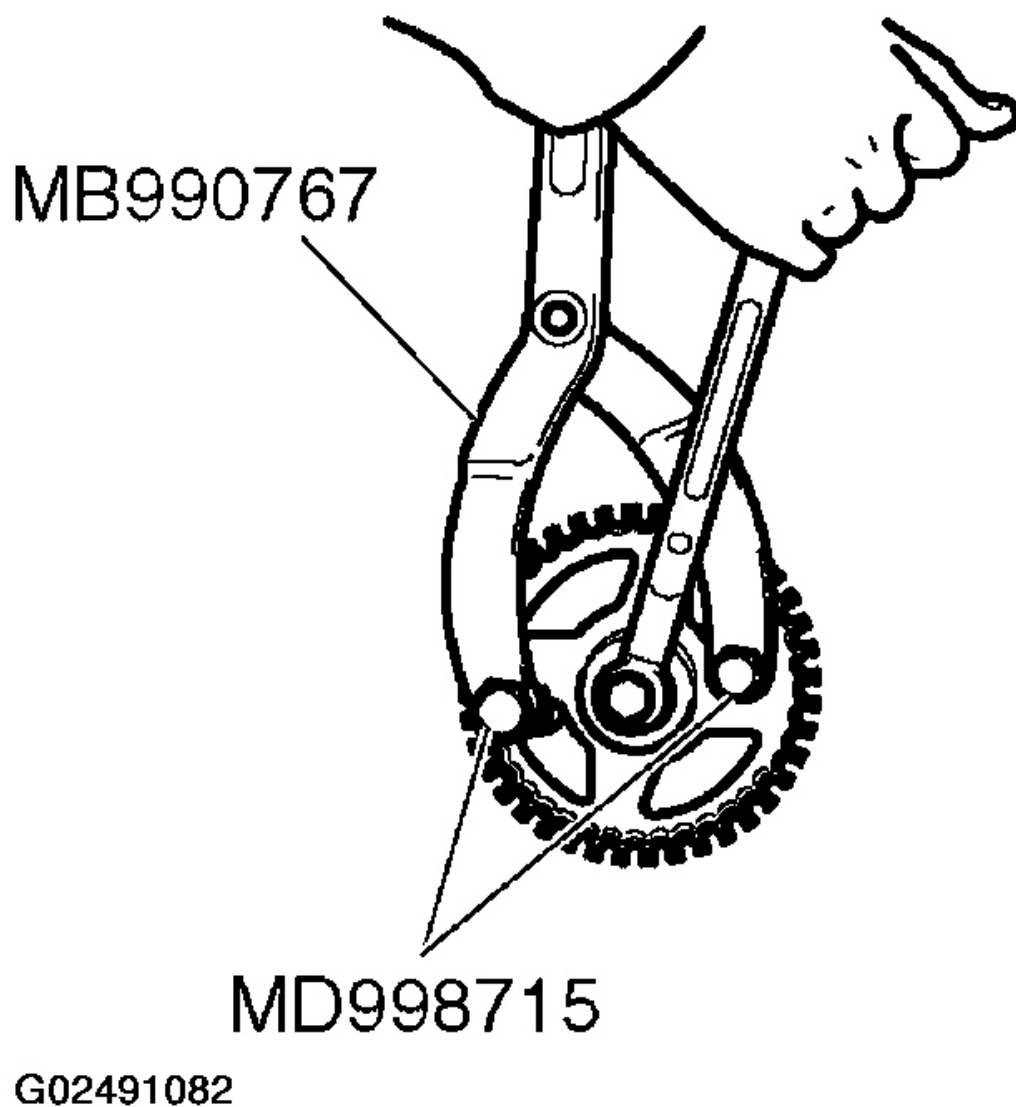
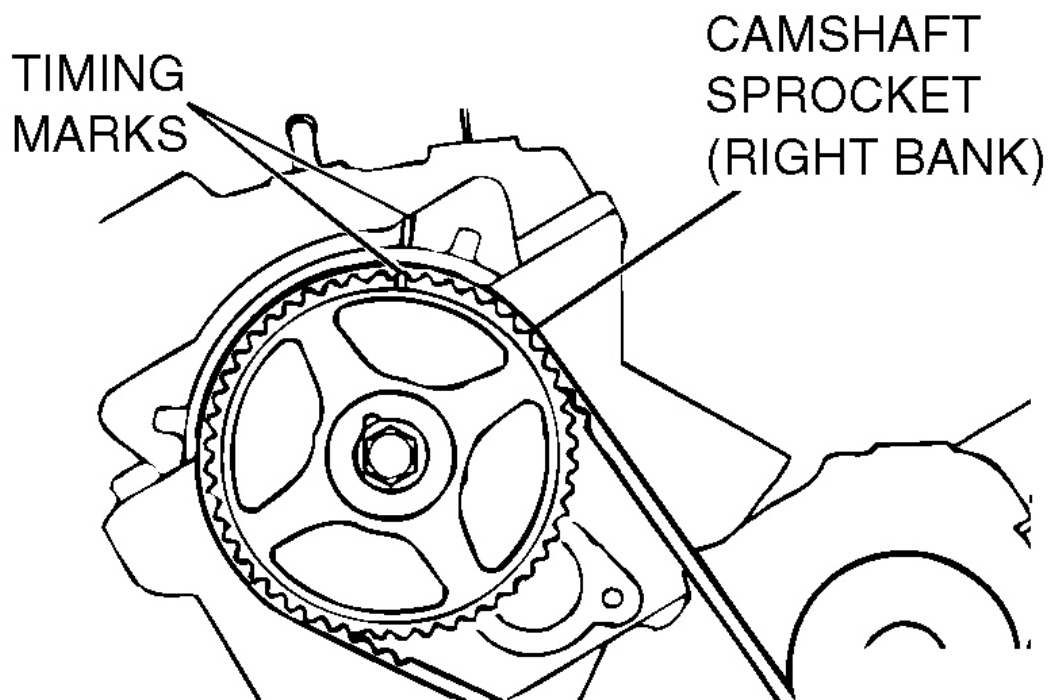


Fig. 45: Tightening Camshaft Sprocket Mounting Bolt Using Special Tools MB990767 And MD998715

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> C << DISTRIBUTOR INSTALLATION

1. Align the timing mark of the camshaft sprocket (right bank) with that of the cylinder head.



G02491083

Fig. 46: Aligning Camshaft Sprocket Timing Mark With Cylinder Head
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Align the mating marks on the distributor housing and coupling, then install the distributor to the engine.

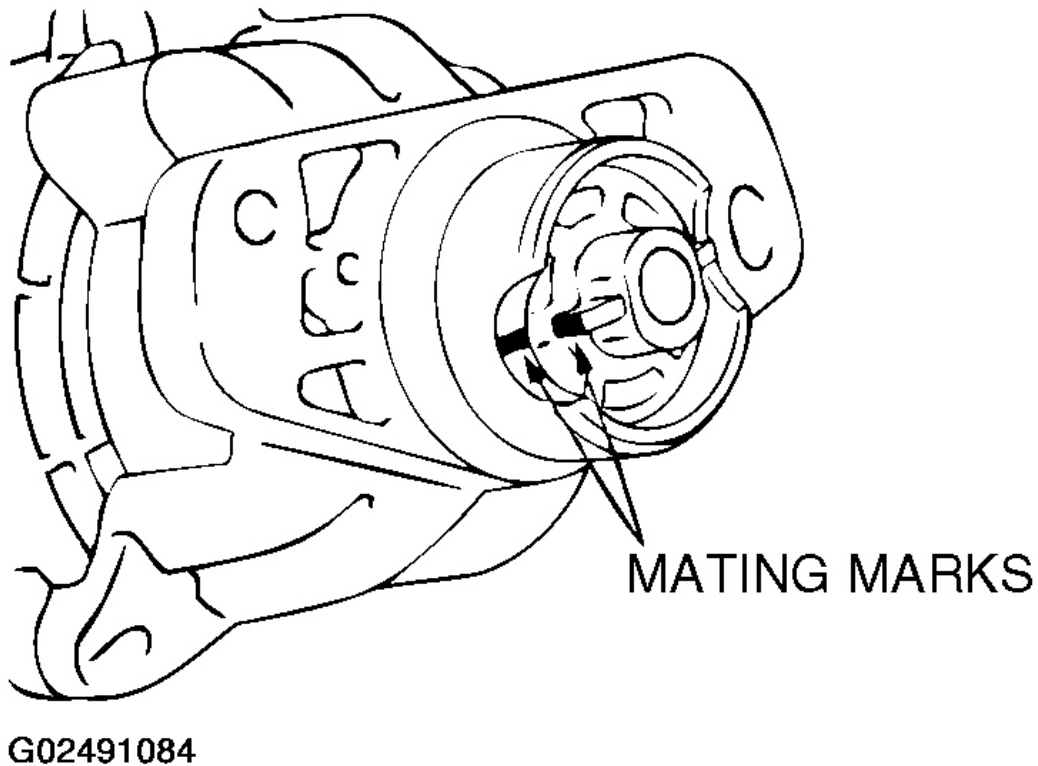
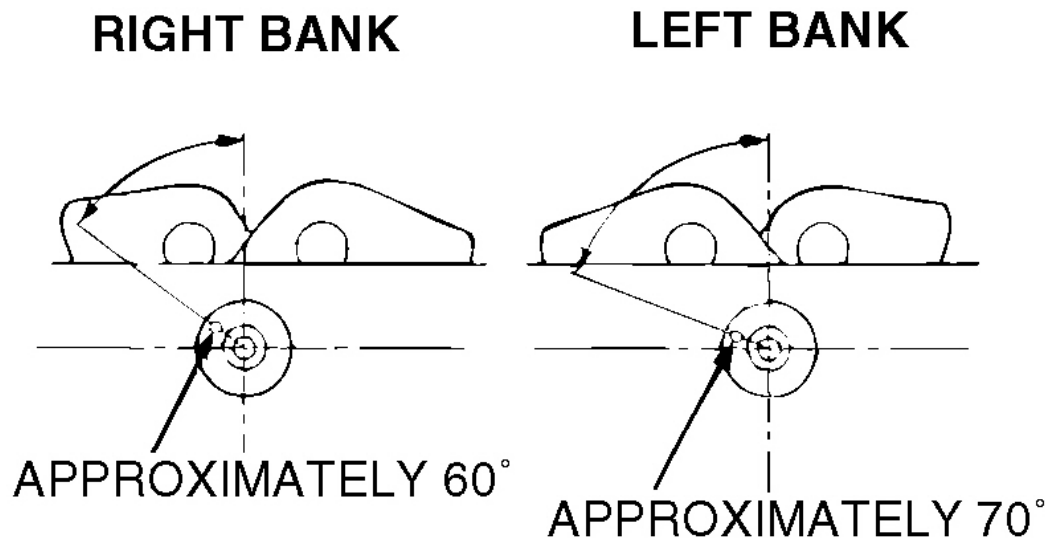


Fig. 47: Aligning Mating Marks On Distributor Housing And Coupling
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> D << ROCKER ARM AND SHAFT ASSEMBLY INSTALLATION

1. Rotate the camshaft until the dowel pin on its front end is located as shown in the illustration.

NOTE: Placing the camshaft in the illustrated position minimizes the amount of cam lift, making it easier to install the rocker arm and shaft assembly.



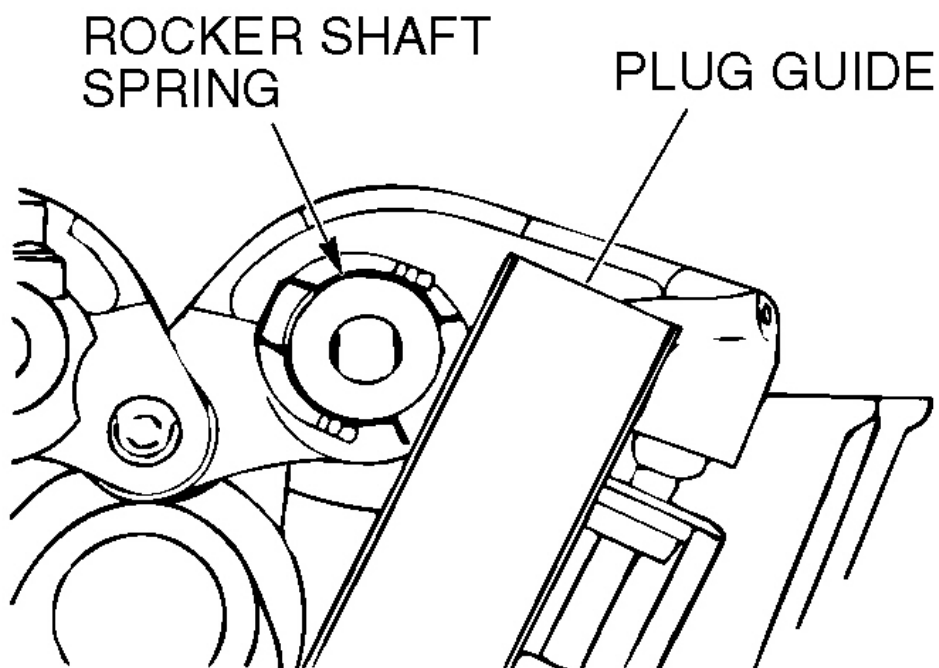
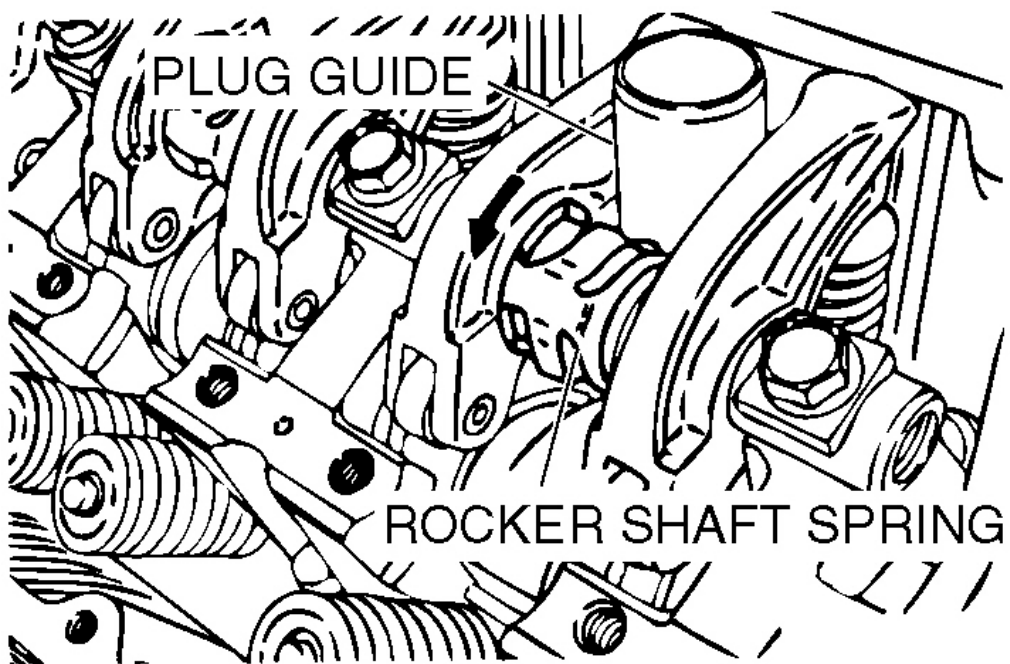
G02491085

Fig. 48: Identifying Rocker Arm And Shaft Assembly Installation Angle

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Temporarily tighten the rocker shaft with the bolts so that all rocker arms on the inlet valve side do not push the valves.
3. Position the rocker shaft spring so that it takes a right angle against the plug guide.

NOTE: Set the rocker shaft spring before installing the rocker arm and shaft assembly on the exhaust side.



G02491086

Fig. 49: Identifying Rocker Shaft Spring Position**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

4. Tighten the rocker arm and shaft assembly mounting bolts to the specified torque.

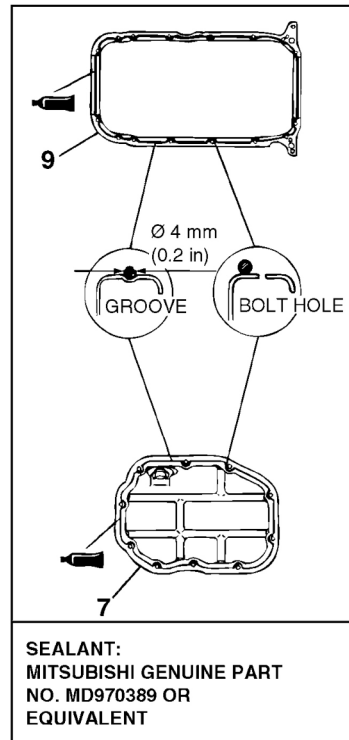
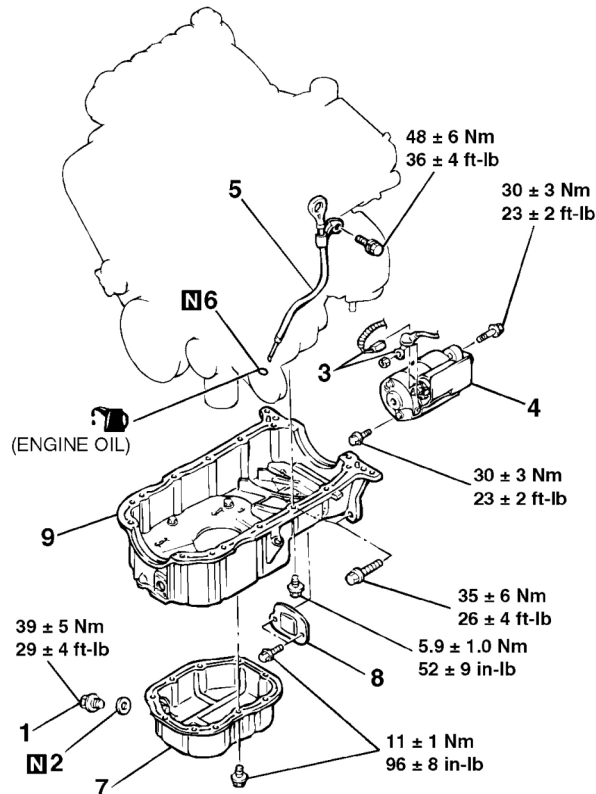
Tightening torque: 31 +/- 3 N.m (23 +/- 2 ft-lb)

5. Remove special tool MD998443.

OIL PAN**REMOVAL AND INSTALLATION**

Pre-removal and Post-installation operation

- Engine Oil Draining and Refilling
- Front Exhaust Pipe Removal and Installation



LOWER OIL PAN REMOVAL STEPS

- <<A>> >>C<< >>B<<
1. DRAIN PLUG
 2. DRAIN PLUG GASKET
 7. LOWER OIL PAN

UPPER OIL PAN REMOVAL STEPS

- >>C<<
1. DRAIN PLUG
 2. DRAIN PLUG GASKET
 3. STARTER CONNECTOR

UPPER OIL PAN REMOVAL STEPS (Continued)

- <<A>> >>B<< <> >>A<<
4. STARTER
 5. OIL DIPSTICK AND DIPSTICK GUIDE
 6. O-RING
 7. LOWER OIL PAN
 8. OIL PAN BOLT HOLE COVER
 9. UPPER OIL PAN

G02491087

Fig. 50: Removing/Installing Oil Pan

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

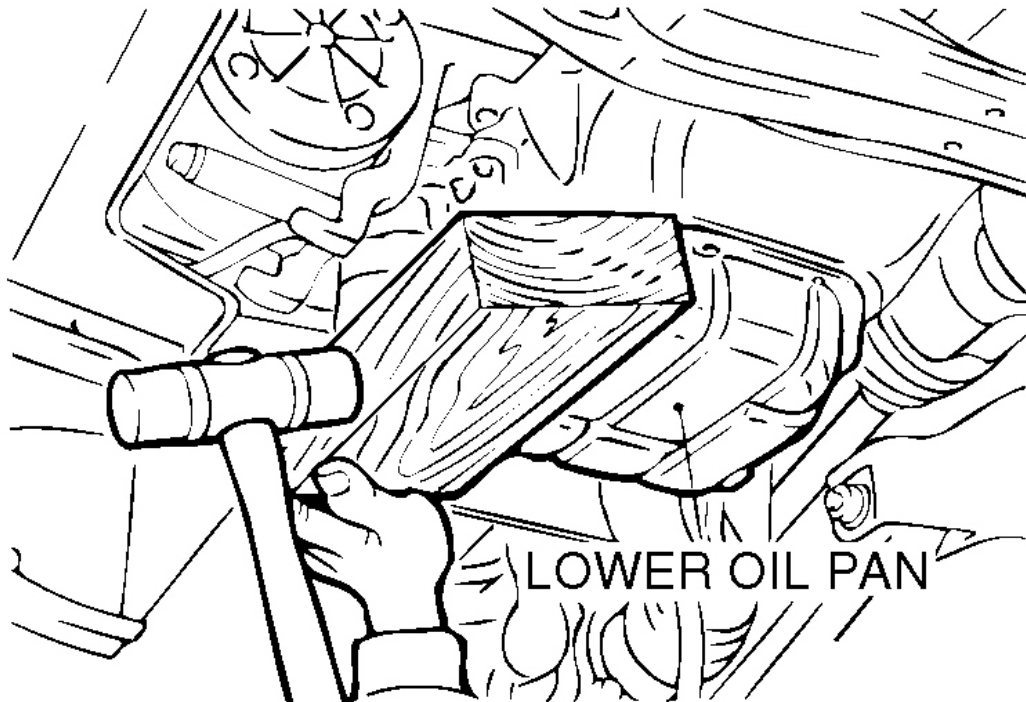
REMOVAL SERVICE POINTS

<< A >> LOWER OIL PAN REMOVAL

1. Remove the oil pan, lower mounting bolts.

CAUTION: Do not use the oil pan FIPG cutter (MD998727). It will damage the upper oil pan.

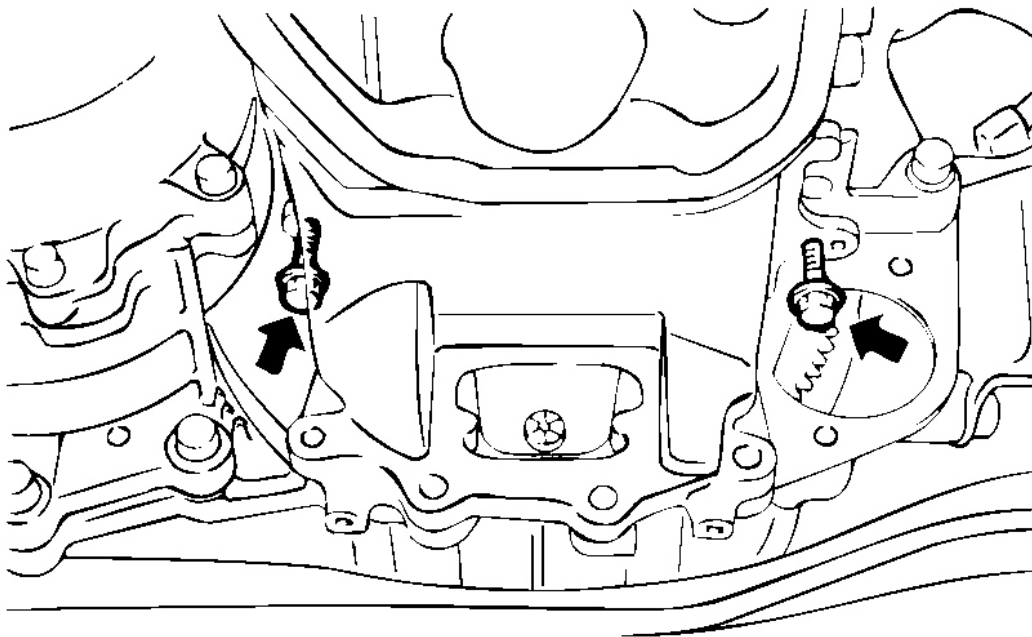
2. Place a wooden block against the lower oil pan as shown in the illustration and remove by tapping with a hammer.



G02491088

Fig. 51: Removing Lower Oil Pan**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.****<< B >> UPPER OIL PAN REMOVAL**

1. Remove the upper oil pan mounting bolts.
2. Screw the bolts (M10) securing the upper oil pan to the transaxle assembly in the illustrated bolt holes, then remove the upper oil pan.



G02491089

Fig. 52: Identifying Upper Oil Pan Mounting Bolts

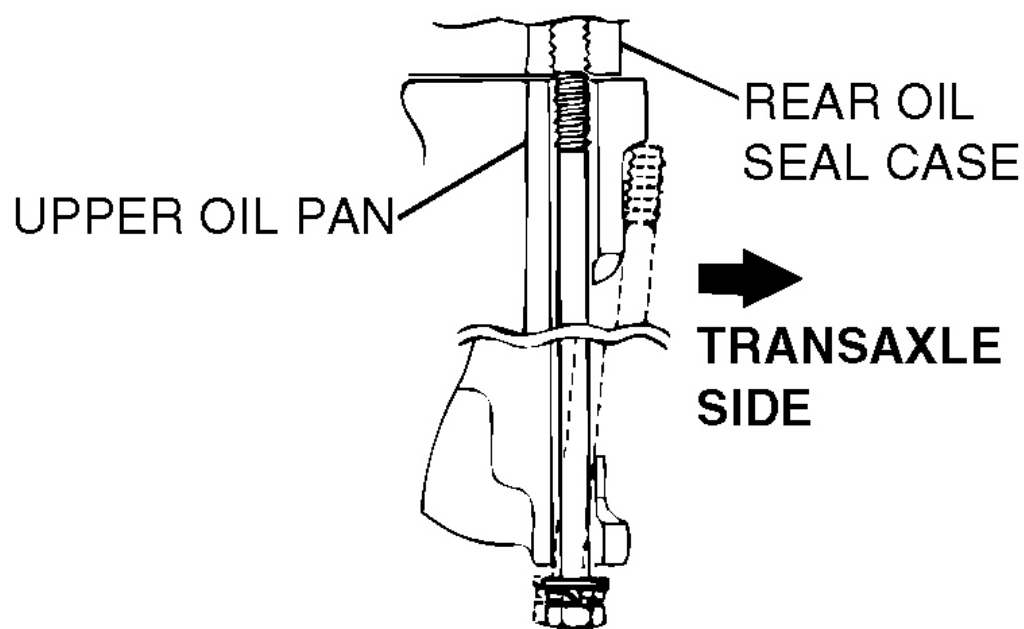
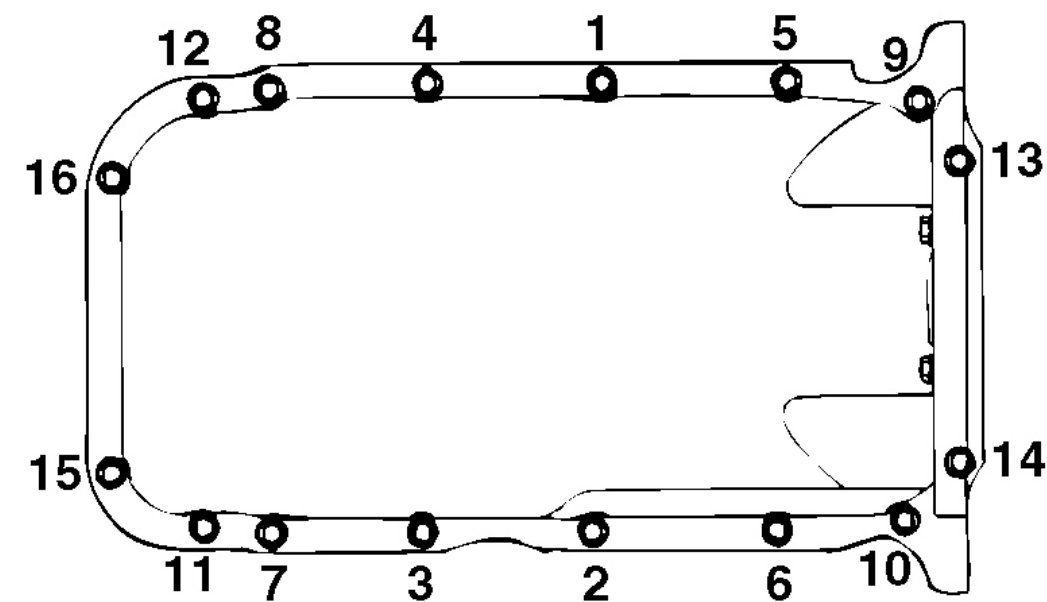
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

>> A << UPPER OIL PAN INSTALLATION

CAUTION: The bolt holes for bolts 13 and 14 in the illustration are cut away on the transaxle side. Be careful not to insert these bolts at an angle.

Tighten the oil pan, upper mounting bolts in the order shown.



G02491090

Fig. 53: Identifying Upper Oil Pan Mounting Bolts Tightening Order
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> B << LOWER OIL PAN INSTALLATION

Tighten the lower oil pan mounting bolts in the order shown.

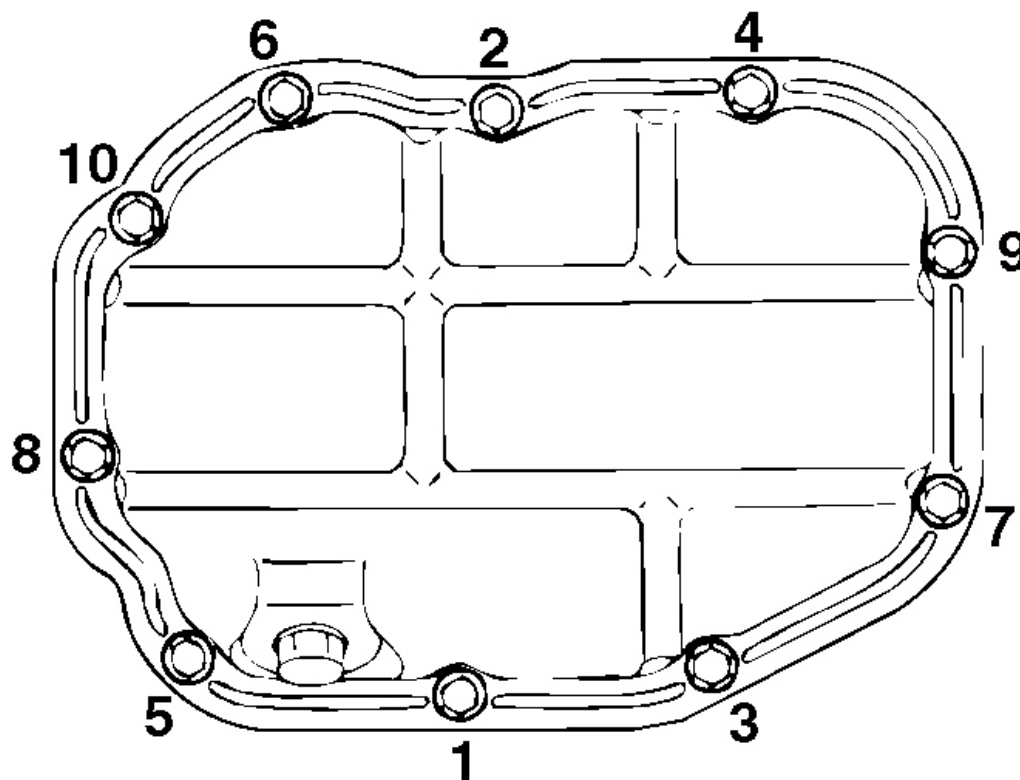
**G02491091**

Fig. 54: Identifying Lower Oil Pan Mounting Bolts Tightening Sequence
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> C << DRAIN PLUG GASKET INSTALLATION

Replace the gasket with a new gasket. Install the new gasket in the direction shown in the illustration.

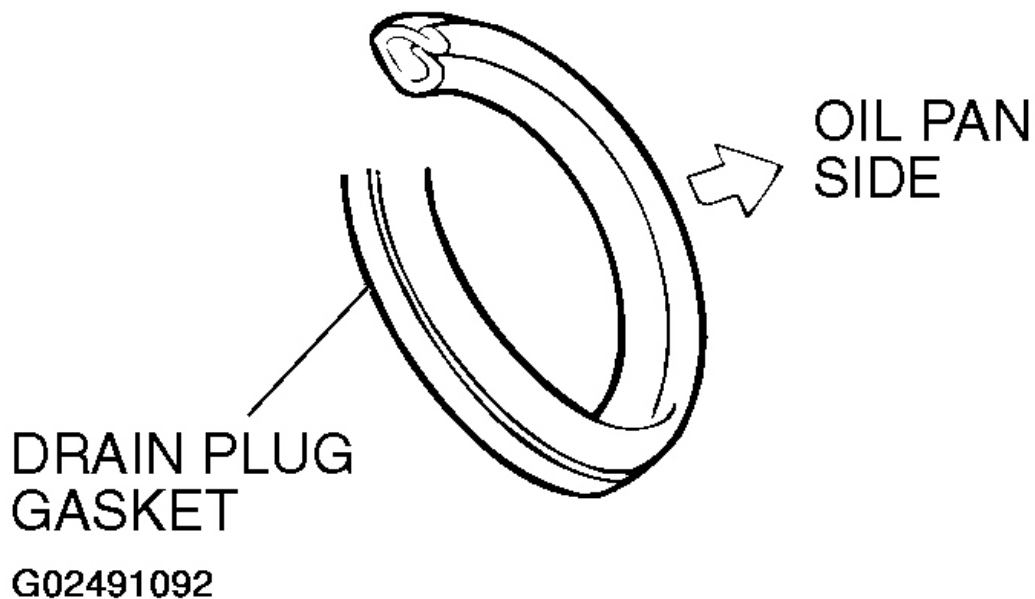


Fig. 55: Installing Drain Plug Gasket

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

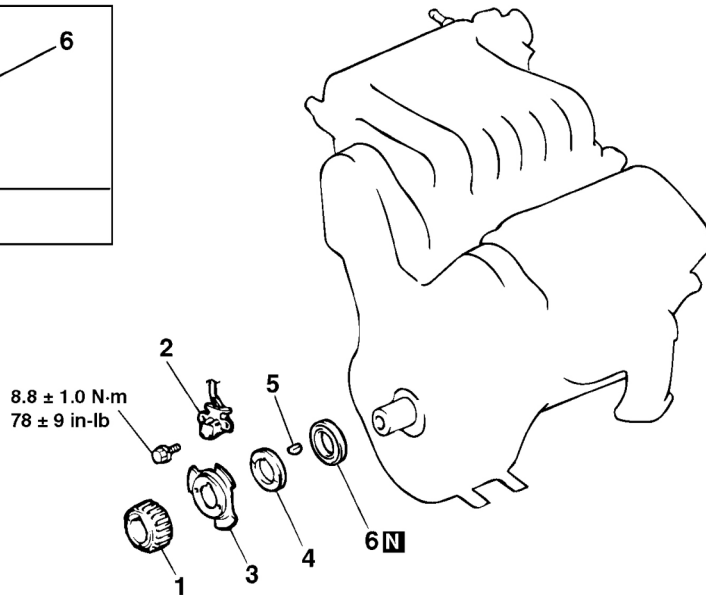
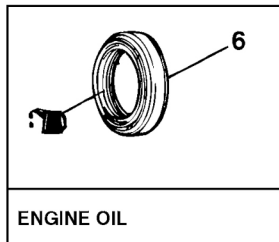
OIL PAN INSPECTION

- Check the oil pan for cracks.
- Check the oil pan sealant-coated surface for damage and deformation.

CRANKSHAFT FRONT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation Timing Belt Removal and Installation



- REMOVAL STEPS**
- >>B<< 1. CRANKSHAFT SPROCKET
2. CRANKSHAFT POSITION
SENSOR
>>B<< 3. CRANKSHAFT SENSING
BLADE

- REMOVAL STEPS (Continued)**
- >>B<< 4. CRANKSHAFT SPACER
5. KEY
>>A<< 6. CRANKSHAFT FRONT OIL
SEAL

G02491093

Fig. 56: Removing/Installing Crankshaft Front Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

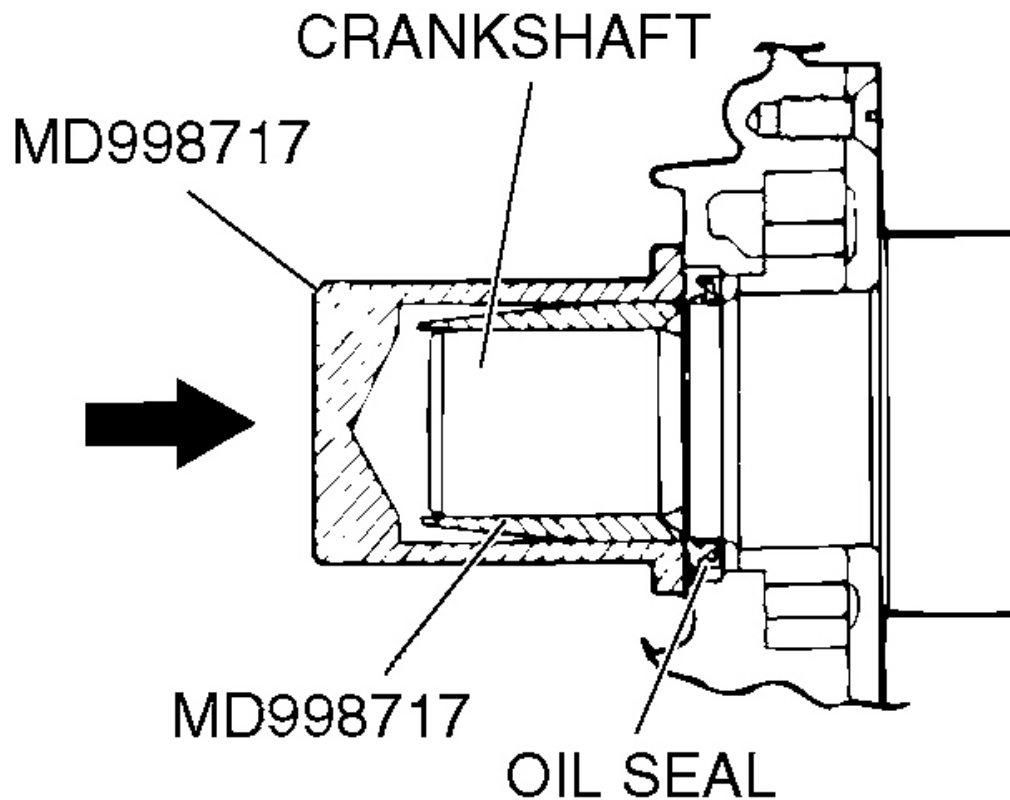
Required Special Tool:

- 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.



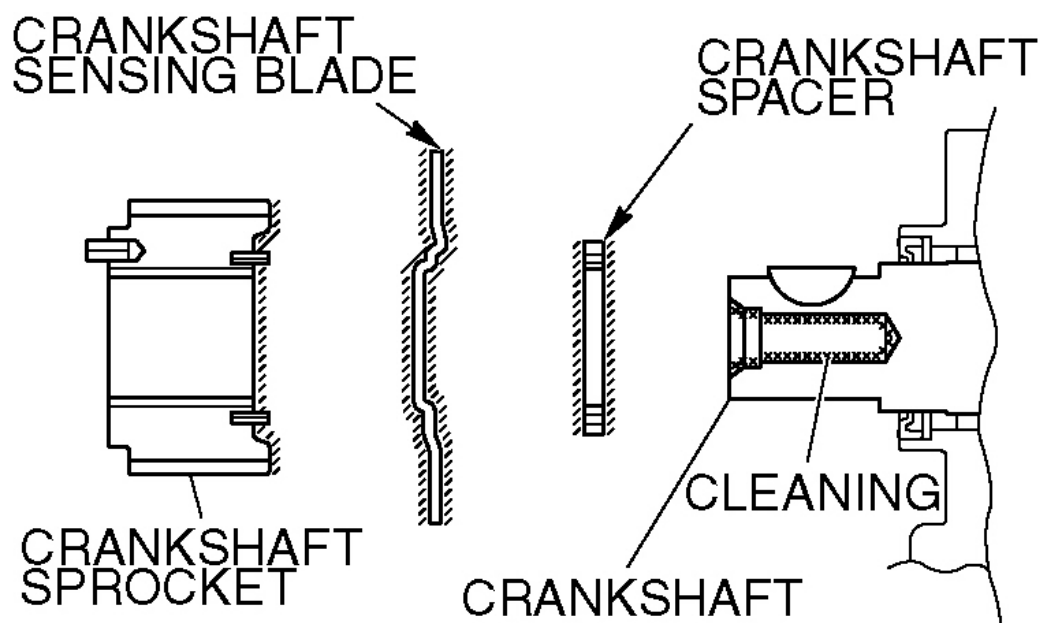
G02491094

Fig. 57: Installing Crankshaft Front Oil Seal

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> B << CRANKSHAFT SPACER/CRANKSHAFT SENSING BLADE/CRANKSHAFT SPROCKET INSTALLATION

To prevent the crankshaft pulley mounting bolt from loosening, degrees or clean the crankshaft, the crankshaft spacer, the crankshaft sensing blade and the crankshaft at the shown positions.



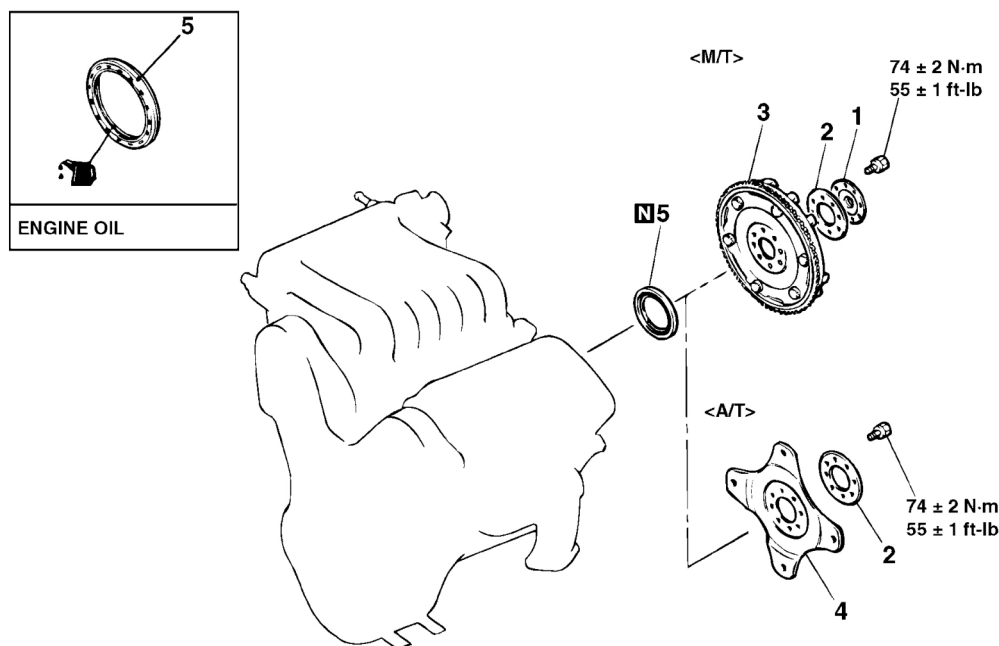
SHADED PART : DEGREASE

G02491095

Fig. 58: Installing Crankshaft Spacer/Crankshaft Sensing Blade/Crankshaft Sprocket
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CRANKSHAFT REAR OIL SEAL

REMOVAL AND INSTALLATION



<<A>>

REMOVAL STEPS

- TRANSAXLE ASSEMBLY
- CLUTCH COVER AND CLUTCH DISC <M/T> (REFER TO GROUP 21B, CLUTCH P.21B-2.)

<>

>>B<<

REMOVAL STEPS (Continued)

1. PLATE <M/T>
2. ADAPTER PLATE
3. FLYWHEEL <M/T>
4. DRIVE PLATE <A/T>
5. CRANKSHAFT REAR OIL SEAL

G02491096

Fig. 59: Removing/Installing Crankshaft Rear Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Required Special Tools:

- MD998718: Crankshaft Rear Oil Seal Installer
- MD998781: Flywheel Stopper

REMOVAL SERVICE POINTS

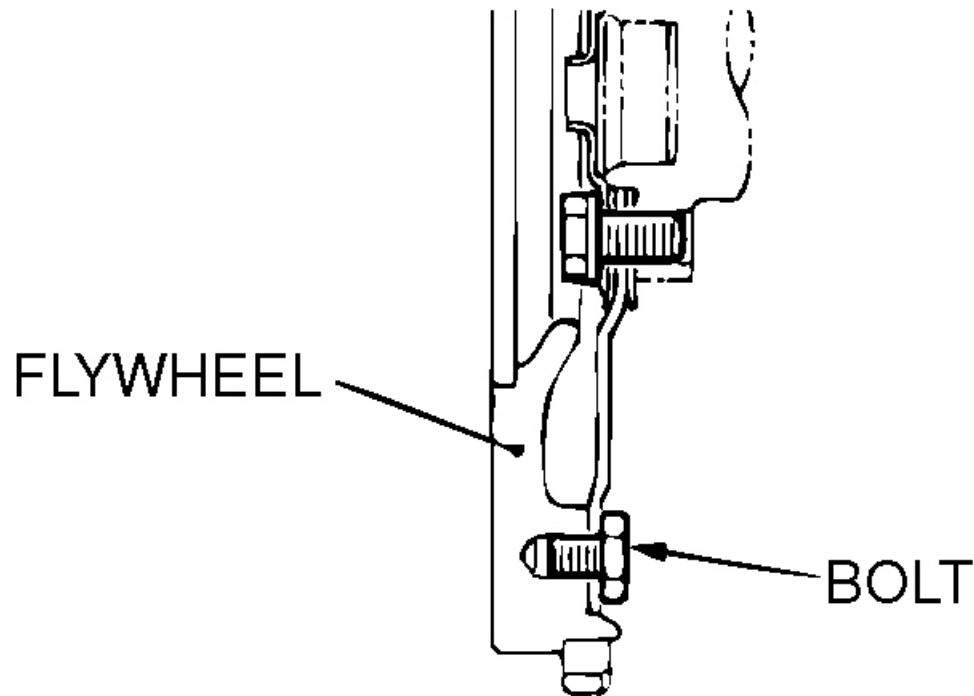
<< A >> TRANSAXLE ASSEMBLY REMOVAL

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 damaged.

< M/T > : Refer to TRANSAXLE ASSEMBLY .

< A/T >: Refer to TRANSAXLE ASSEMBLY .

<M/T>



G02491097

Fig. 60: Identifying Flywheel Mounting Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

<< B >> PLATE M/T/ADAPTER PLATE/FLYWHEEL M/T/DRIVE PLATE A/T REMOVAL

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

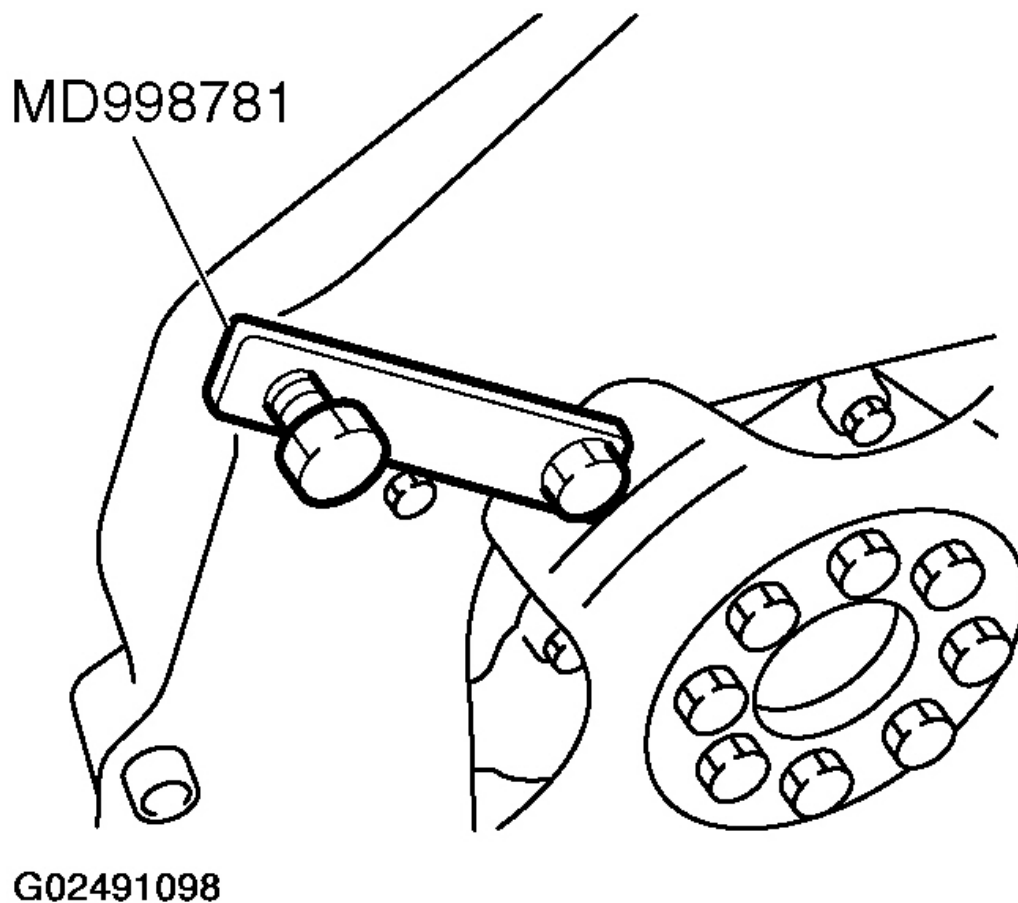
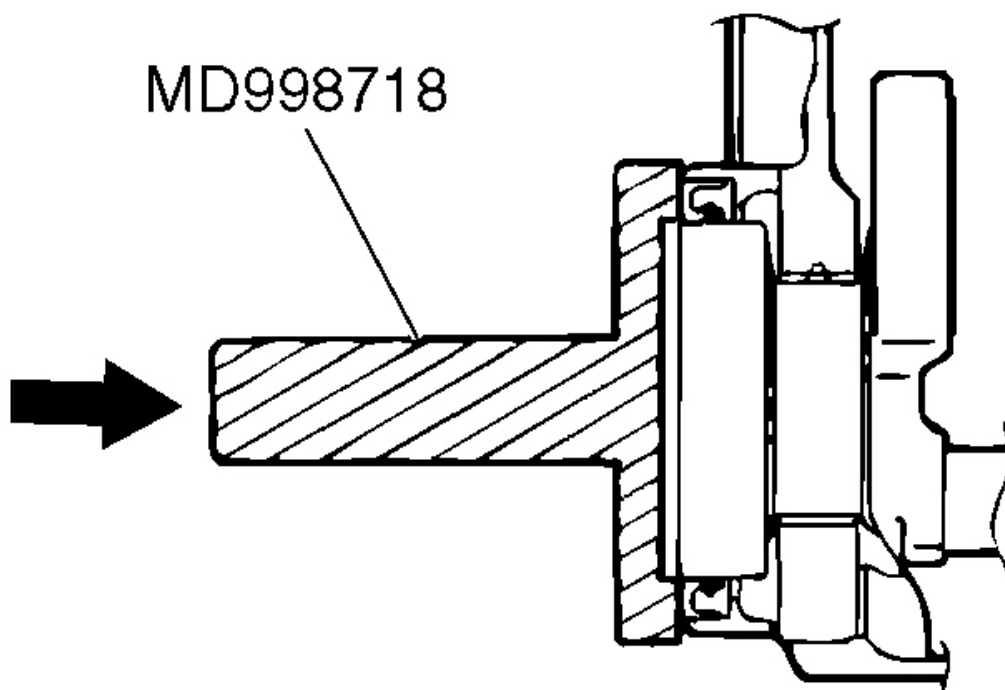


Fig. 61: Securing Flywheel Using Special Tool MD998781
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.



G02491099

Fig. 62: Installing Crankshaft Rear Oil Seal Using Special Tool MD998718
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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

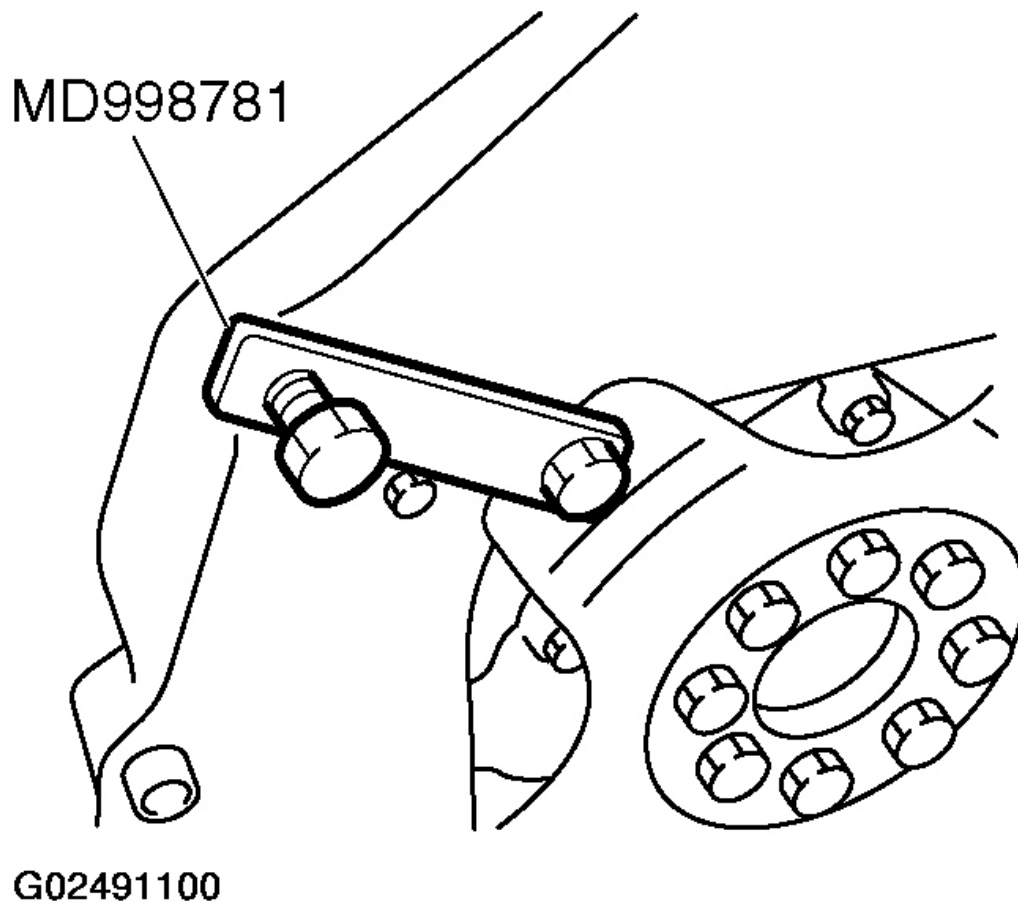


Fig. 63: Securing Flywheel Using Special Tool MD998781
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CYLINDER HEAD GASKET

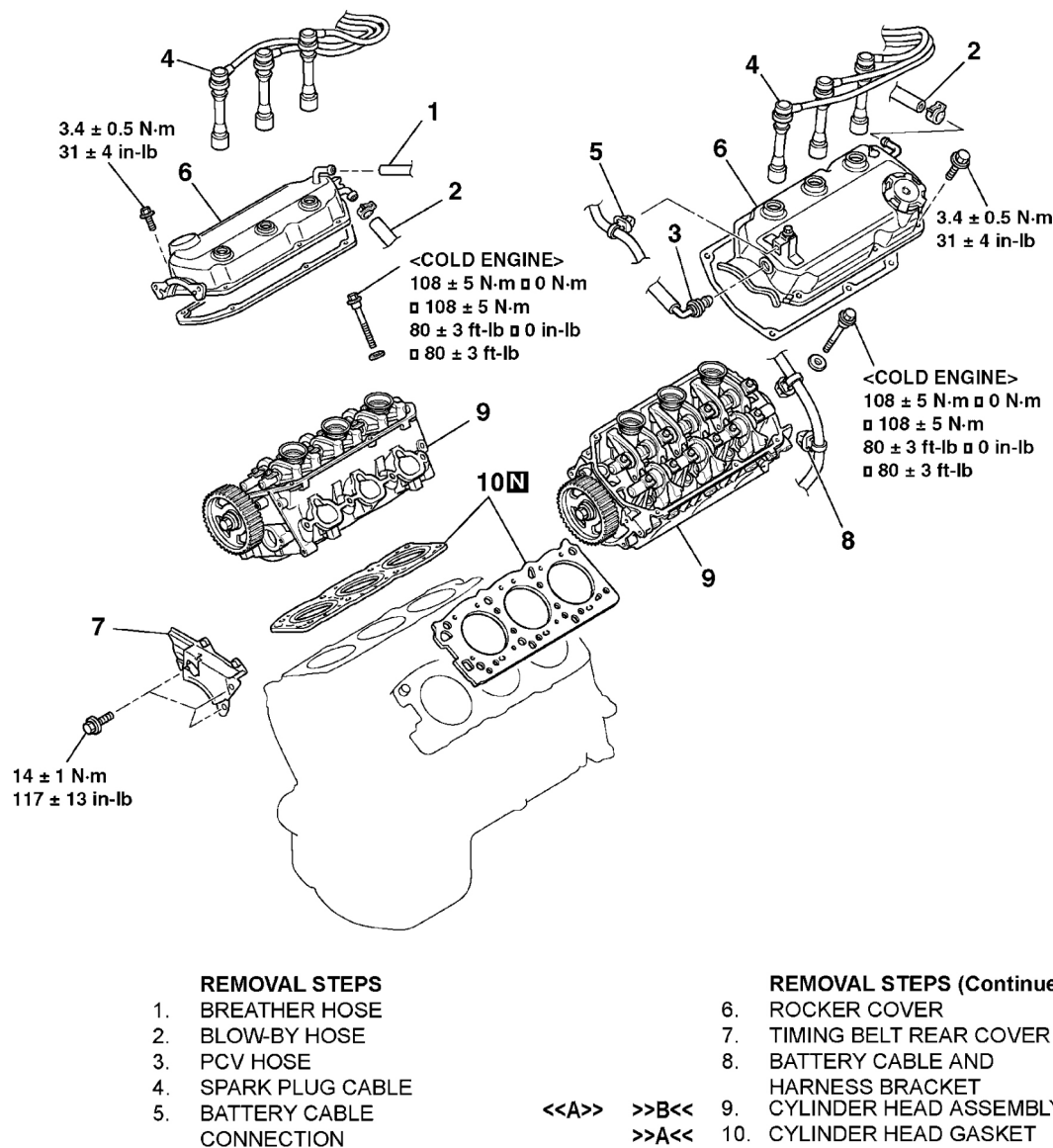
REMOVAL AND INSTALLATION

2005 Mitsubishi Eclipse Spyder GS

2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling
- Timing Belt Removal and Installation
- Generator Removal and Installation
- Intake Manifold Removal and Installation
- Exhaust Manifold Removal and Installation
- Water Inlet Pipe Removal and Installation



G02491101

Fig. 64: Removing/Installing Cylinder Head Gasket
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Required Special Tool:

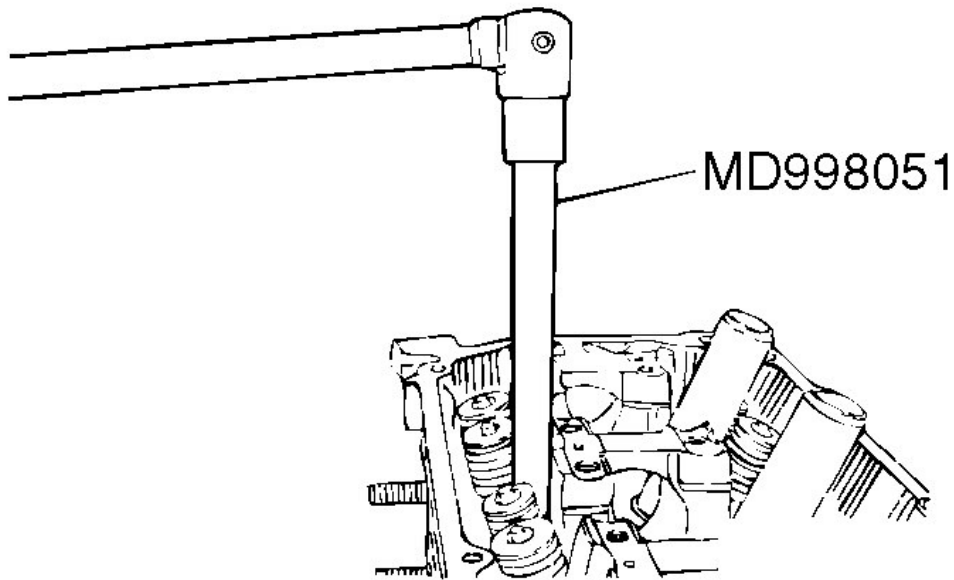
- MD998051: Cylinder Head Bolt Wrench

REMOVAL SERVICE POINT**<< A >> CYLINDER HEAD ASSEMBLY REMOVAL**

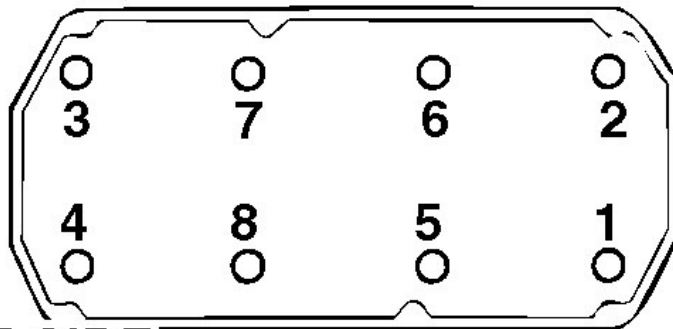
Using special tool MD998051, loosen the cylinder head bolts in two or three steps in the order of the numbers shown in the illustration, then remove the cylinder head assembly.

2005 Mitsubishi Eclipse Spyder GS

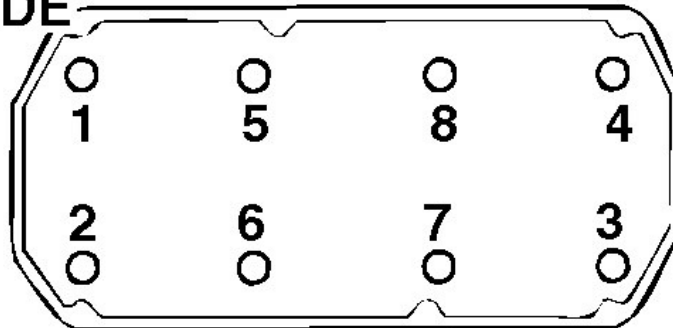
2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder



EXHAUST SIDE



INTAKE SIDE



EXHAUST SIDE

G02491102

Fig. 65: Identifying Cylinder Head Bolts Removal Sequence
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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 INSTALLATION

CAUTION: Be careful that no foreign material gets into the cylinder, coolant passages or oil passages. Engine damage may result.

1. Use a scraper to clean the gasket surface of the cylinder head assembly.

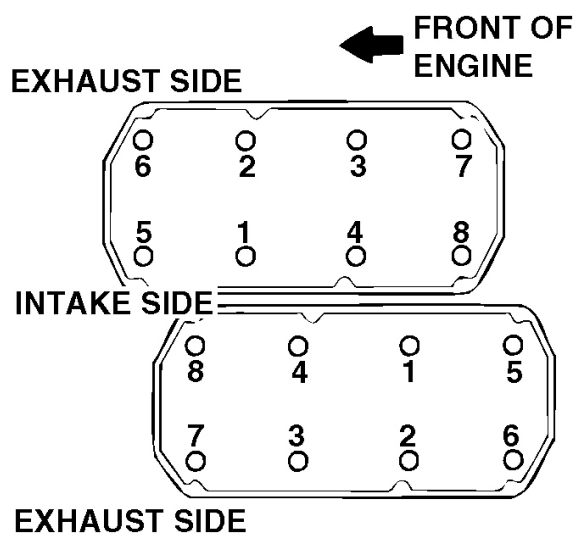
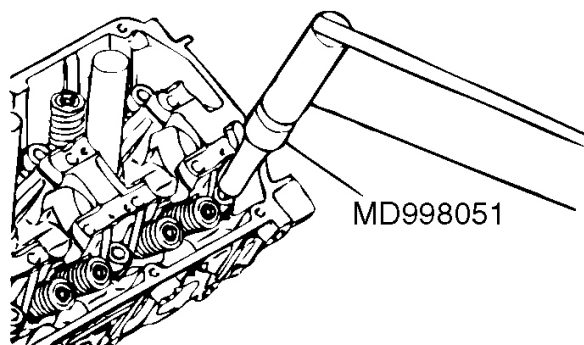
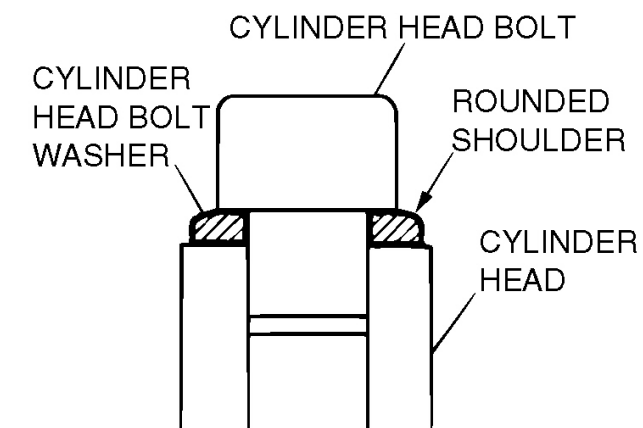
CAUTION: Attach the cylinder head bolt washer in the direction shown in the illustration.

2. Using special tool MD998051 and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration. (in two or three steps)

Tightening torque: 108 +/- 5 N.m (80 +/- 3 ft-lb)

3. Loosen the mounting bolts in the reverse sequence to that shown.
4. Tighten the mounting bolts progressively in the shown sequence to the specified torque again.

Tightening torque: 108 +/- 5 N.m (80 +/- 3 ft-lb)



G02491103

Fig. 66: Installing Cylinder Head

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TIMING BELT

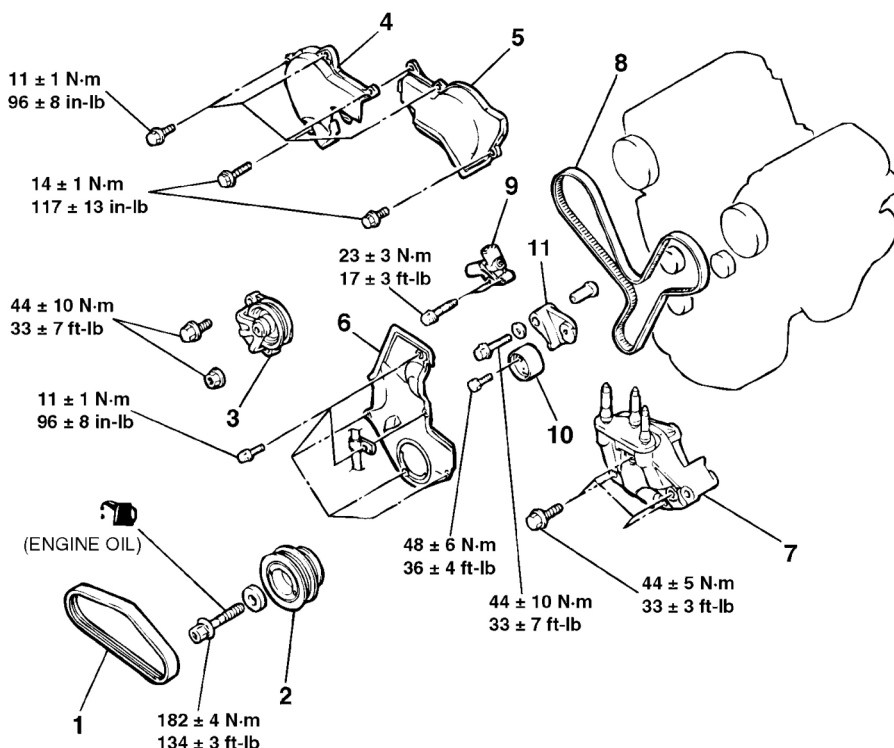
REMOVAL AND INSTALLATION

Pre-removal Operation

- Generator Removal
- Engine Mount Bracket Removal

Post-installation Operation

- Engine Mount Bracket Installation
- Generator Installation
- Drive Belt Tension Adjustment



REMOVAL STEPS

1. DRIVE BELT (POWER STEERING OIL PUMP)
2. CRANKSHAFT PULLEY
3. TENSIONER PULLEY ASSEMBLY (POWER STEERING OIL PUMP)
4. TIMING BELT FRONT UPPER COVER, RIGHT
5. TIMING BELT FRONT UPPER COVER, LEFT

REMOVAL STEPS (Continued)

6. TIMING BELT FRONT LOWER COVER
7. ENGINE SUPPORT BRACKET, RIGHT
8. TIMING BELT
9. AUTO-TENSIONER
10. TENSIONER PULLEY
11. TENSIONER ARM

G02491104

Fig. 67: Removing/Installing Timing Belt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

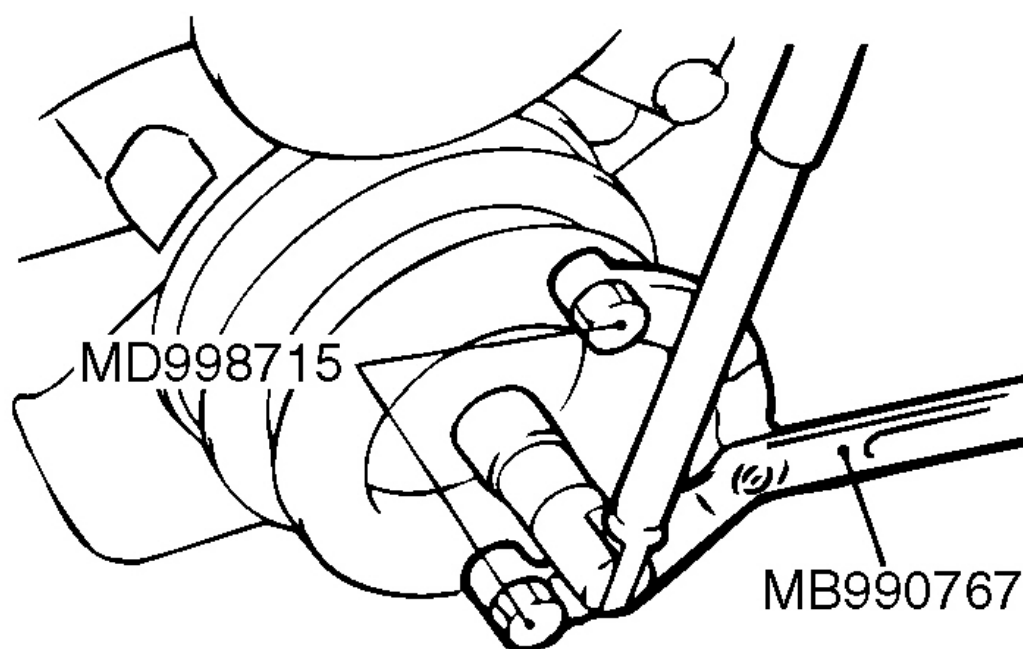
Required Special Tools:

- MB990767: End Yoke Holder
- MD998715: Crankshaft Pulley Holder Pin
- MD998767: Tensioner Pulley Socket Wrench
- MD998769: Crankshaft Sprocket Spacer

REMOVAL SERVICE POINTS**<< A >> CRANKSHAFT PULLEY REMOVAL**

CAUTION: Use only the specified special tools, or a damaged pulley damper could result.

Use special tools MB990767 and MD998715 to remove the crankshaft pulley from the crankshaft.



G02491105

Fig. 68: Removing Crankshaft Pulley

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> B << TIMING BELT REMOVAL

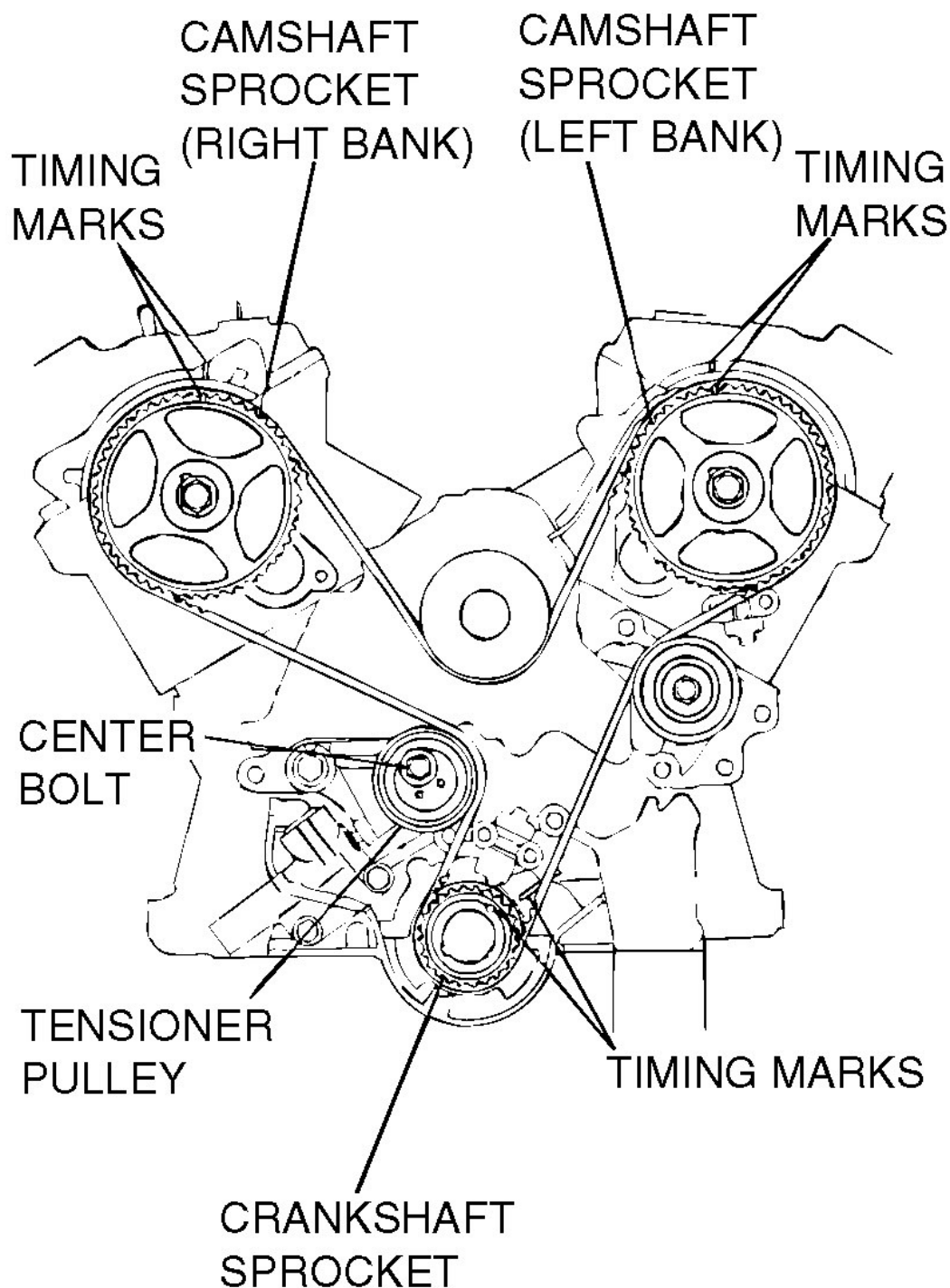
CAUTION: Never turn the crankshaft counterclockwise.

1. Turn the crankshaft clockwise to align each timing mark and to set the number 1 cylinder to compression top dead center.
2. If the timing belt is to be reused, chalk an arrow on the flat side of the belt, indicating the clockwise

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direction.



G02491106

Fig. 69: Identifying Timing Marks

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Loosen the center bolt of the tensioner pulley, then remove the timing belt.

INSTALLATION SERVICE POINTS

<< A >> AUTO-TENSIONER INSTALLATION

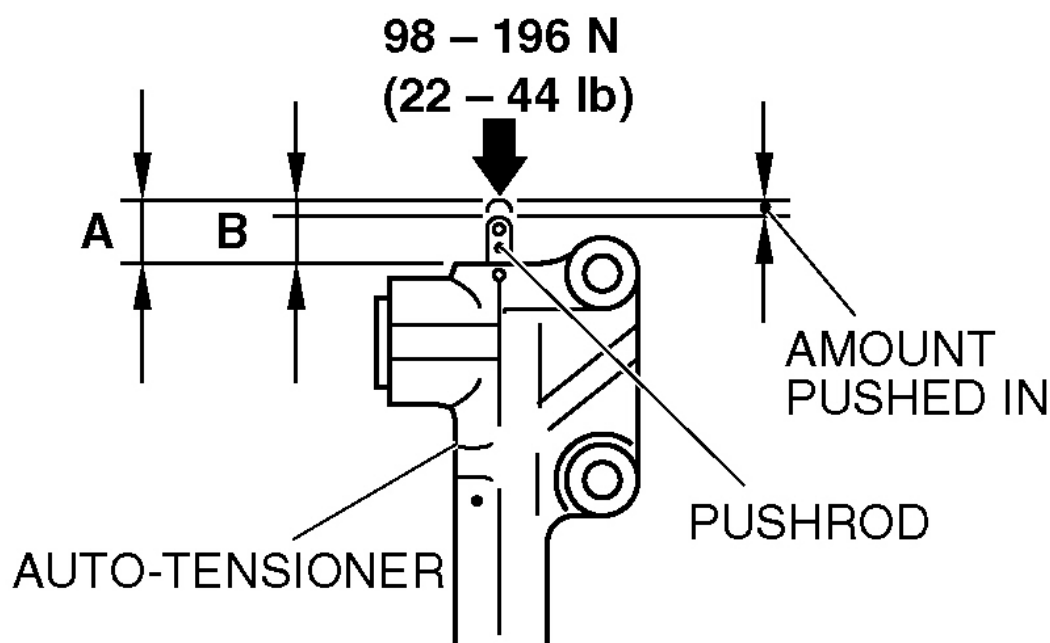
1. While holding the auto-tensioner with your hand, press the end of the pushrod against a metal surface (such as the cylinder block) with a force of 98 - 196 N (22 - 44 pound) and measure how far the pushrod is pushed in.

Standard value: Within 1 mm (0.04 inch)

A: Length when no force is applied

B: Length when force is applied

A - B: Amount pushed in



G02491107

Fig. 70: Identifying Pushrod Pushed In Distance

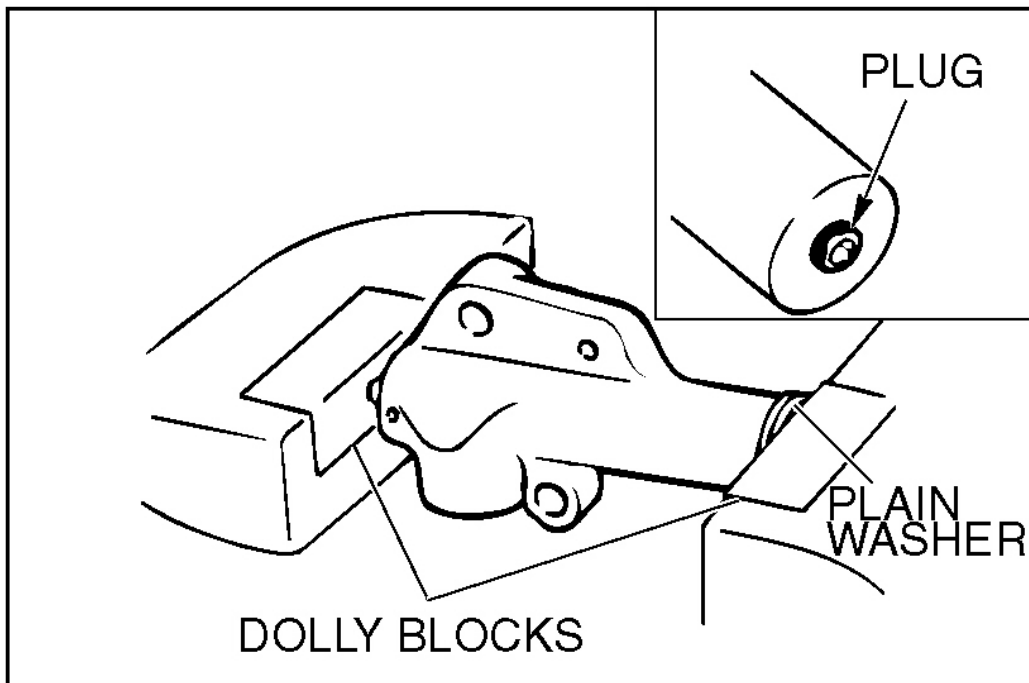
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. If it is not within the standard value range, replace the auto-tensioner.

CAUTION:

- Place the auto-tensioner perpendicular to the jaws of the vice.
- If there is a plug at the base of the auto-tensioner, insert a plain washer onto the end of the auto-tensioner to protect the plug.

3. Place two blocks in a vice as shown in the illustration, and then place the auto-tensioner in the vice.



G02491108

Fig. 71: Placing Blocks & Auto-Tensioner In Vice

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAUTION: Never compress the pushrod too fast, or it may be damaged.

4. Slowly compress the pushrod of the auto-tensioner until pin hole A in the pushrod is aligned with pin hole B in the cylinder.

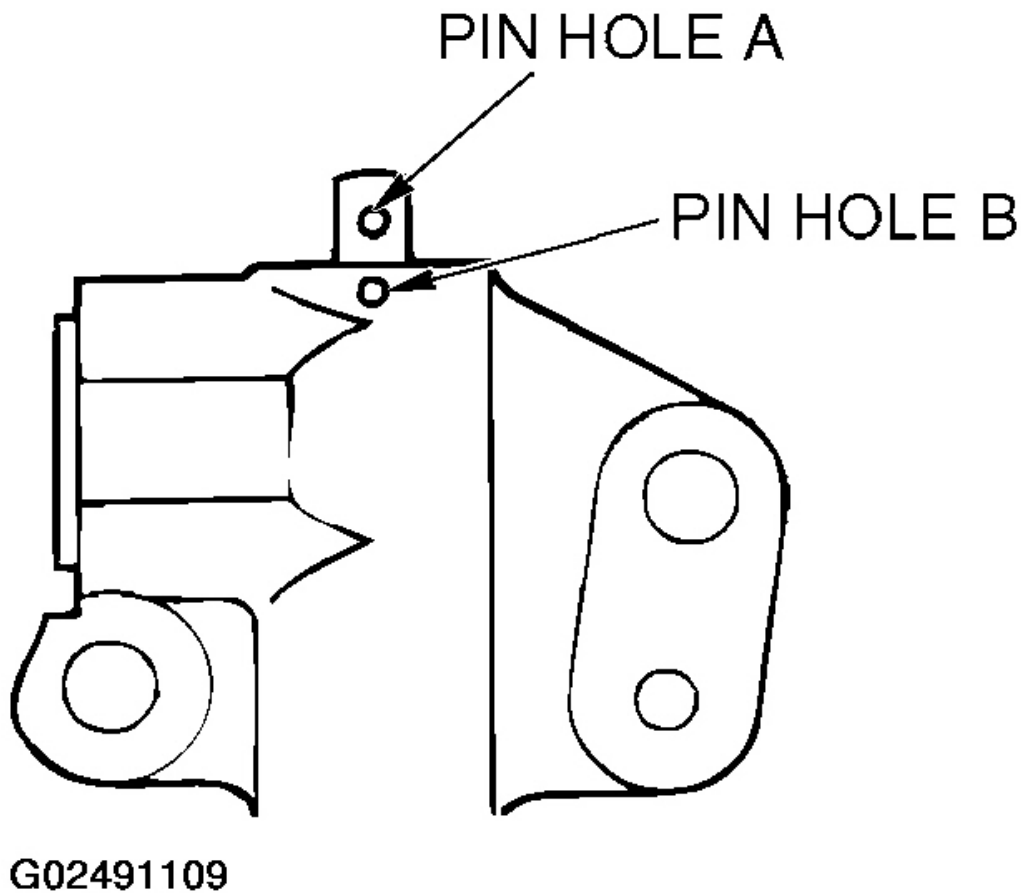


Fig. 72: Identifying Pin Holes

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

5. Insert the setting pin into the pin holes once they are aligned.

NOTE: If replacing the auto-tensioner, the pin will already be inserted into the pin holes of the new part.

CAUTION: Do not remove the setting pin from the auto-tensioner.

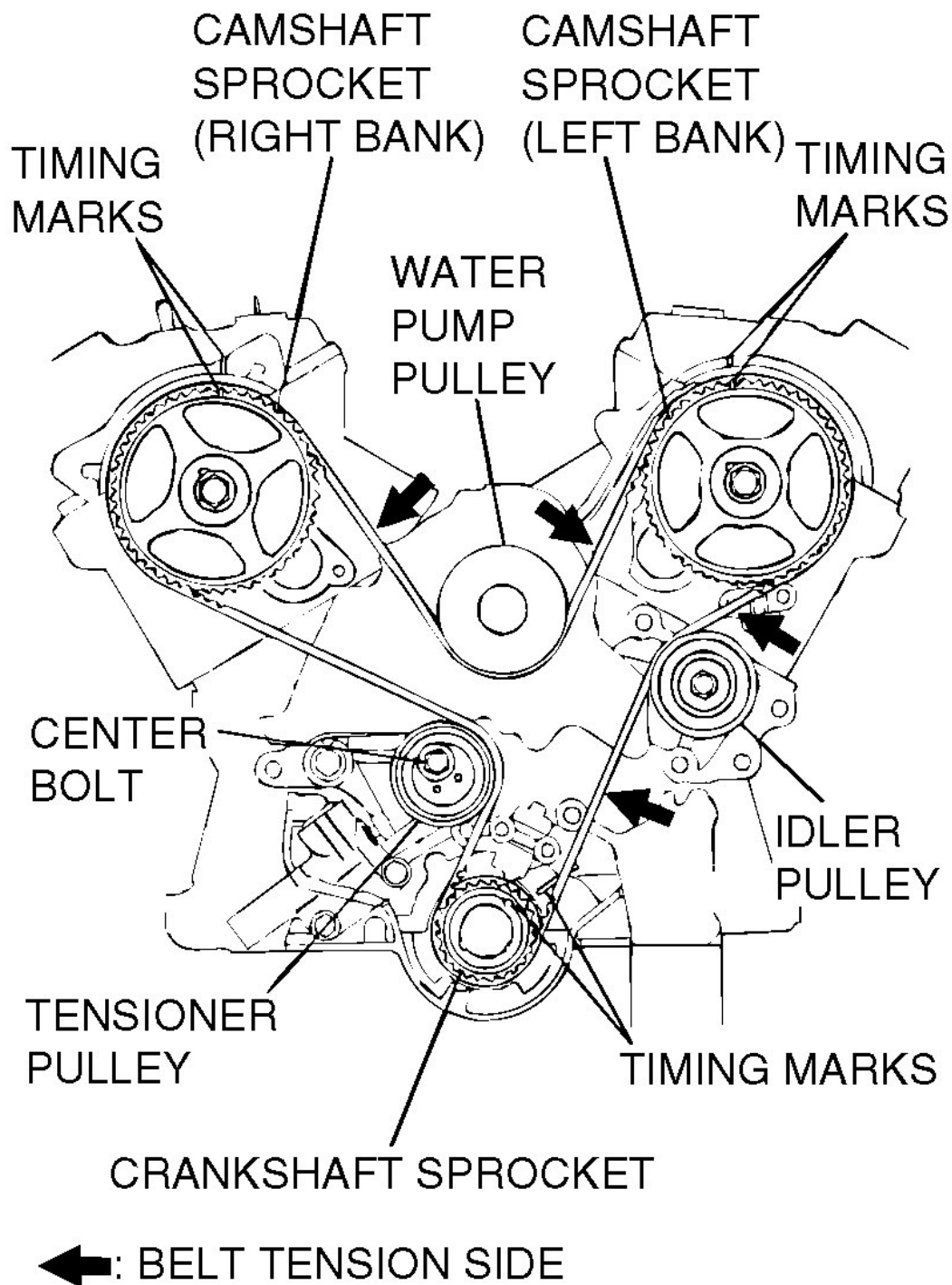
6. Install the auto-tensioner to the engine.

<< B >> TIMING BELT INSTALLATION

1. Align the timing marks on the camshaft sprockets with those on the rocker cover and the timing mark on the crankshaft sprocket with that on the engine block as shown in the illustration.

CAUTION: The camshaft sprocket (right bank) can turn easily due to the spring force applied, so be careful not to get your fingers caught.

2. Install the timing belt by the following procedure so that there is no deflection in the timing belt between each sprocket and pulley.
 1. Crankshaft sprocket
 2. Idler pulley
 3. Camshaft sprocket (Left bank)
 4. Water pump pulley
 5. Camshaft sprocket (Right bank)
 6. Tensioner pulley
3. Turn the camshaft sprocket (Right bank) counterclockwise until the tension side of the timing belt is firmly stretched. Check all the timing marks again.

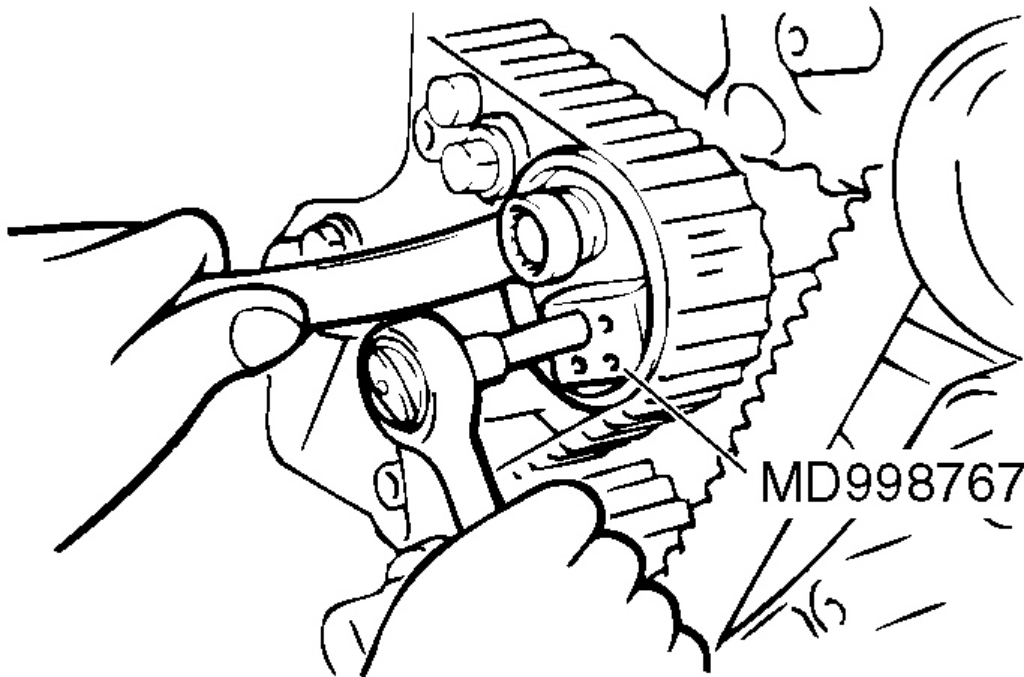


G02491110

Fig. 73: Aligning Timing Marks

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Use special tool MD998767 to push the tensioner pulley into the timing belt, then temporarily tighten the center bolt.

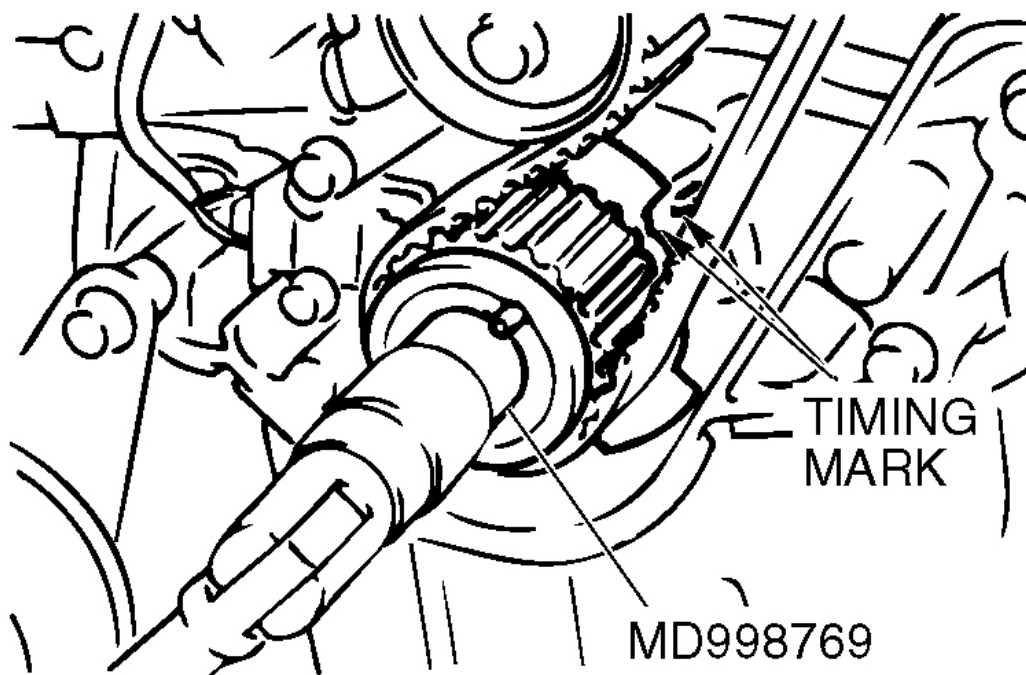


G02491111

Fig. 74: Tightening Center Bolt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

5. Use special tool MD998769 to turn the crankshaft 1/4 turn counterclockwise, then turn it again clockwise until the timing marks are aligned.



G02491112

Fig. 75: Aligning Timing Marks

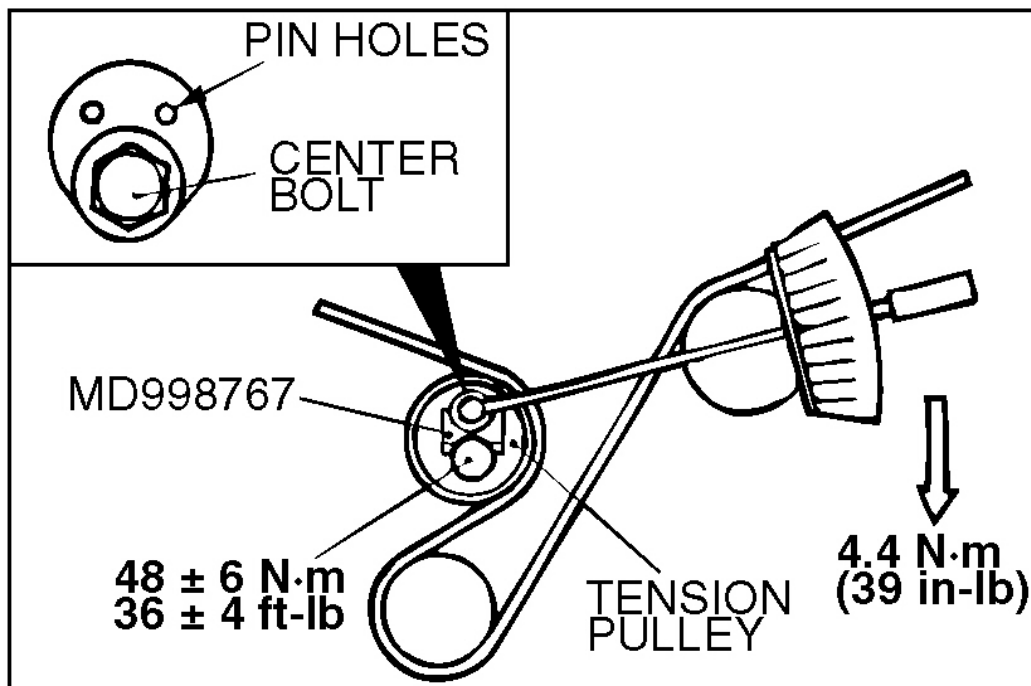
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAUTION: When tightening the center bolt, be careful that the tensioner pulley does not turn with the bolt.

6. Loosen the center bolt of the tensioner pulley. Use special tool MD998767 and a torque wrench to apply the tension torque to the timing belt as shown in the illustration. Then tighten the center bolt to the specified torque.

Standard value: 4.4 N.m (39 in-lb) Timing belt tension torque

Tightening torque: 48 +/- 6 N.m (36 +/- 4 ft-lb)



G02491113

Fig. 76: Loosening Tensioner Pulley Center Bolt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

7. Remove the setting pin that has been inserted into the auto-tensioner.
8. Turn the crankshaft clockwise twice to align the timing marks.
9. Wait for at least five minutes, then check that the auto-tensioner pushrod extends within the standard value range.

Standard value (A): 3.8 - 5.0 mm (0.15 - 0.20 inch)

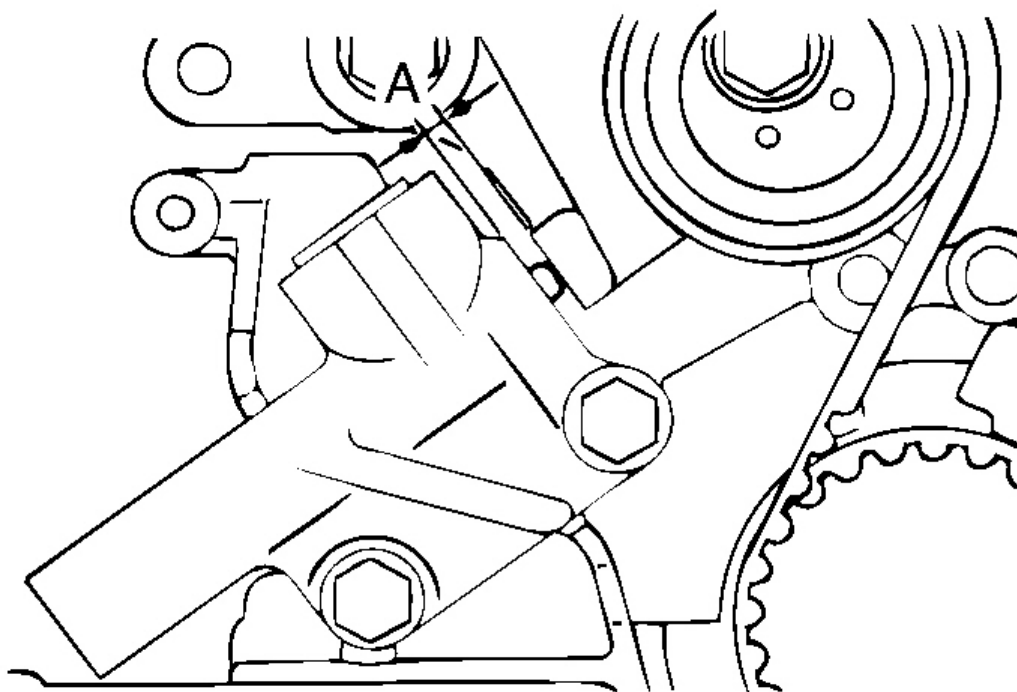
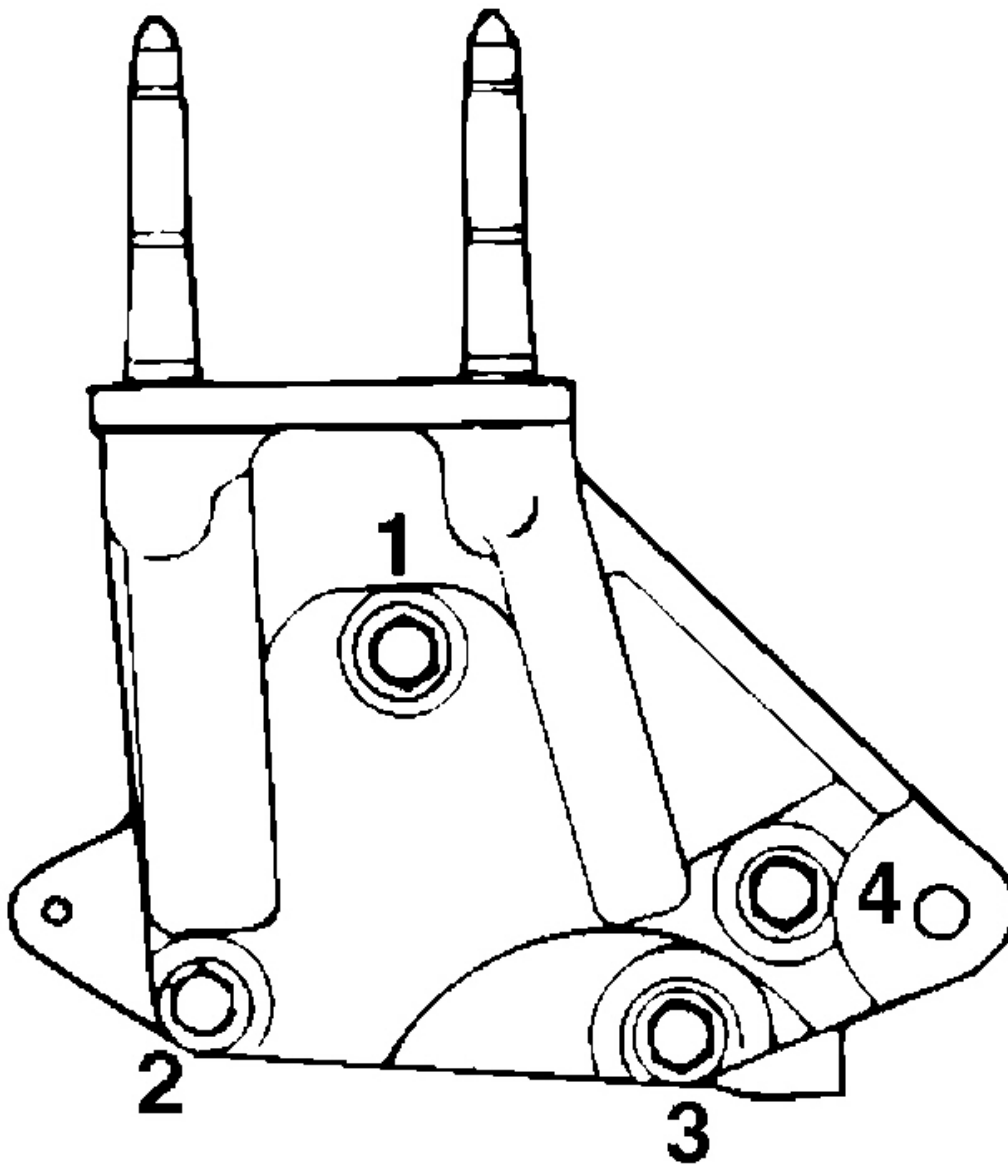
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Fig. 77: Identifying Auto-Tensioner Pushrod Extension Range
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

10. If not, repeat the operation in steps (5) to (9) above.
11. Check again that the timing marks of the sprockets are aligned.

>> C << ENGINE SUPPORT BRACKET, RIGHT INSTALLATION

Tighten the right engine support bracket mounting bolts in the order shown in the illustration.

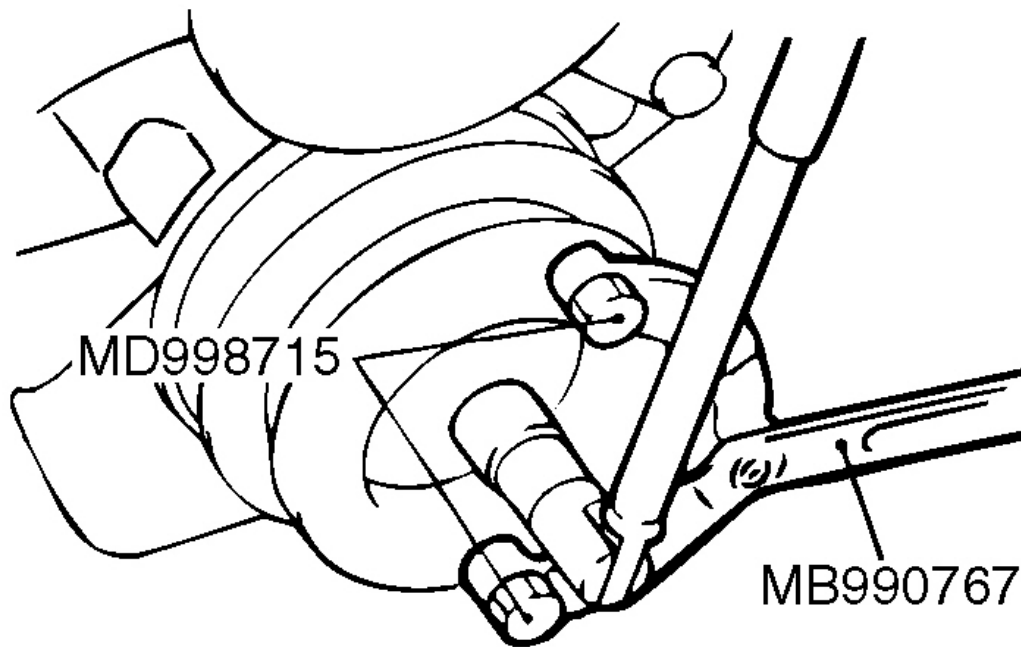


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Fig. 78: Identifying Right Engine Support Bracket Bolt Tightening Sequence
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

>> D << CRANKSHAFT PULLEY INSTALLATION

Use special tools MB990767 and MD998715 to install the crankshaft pulley.



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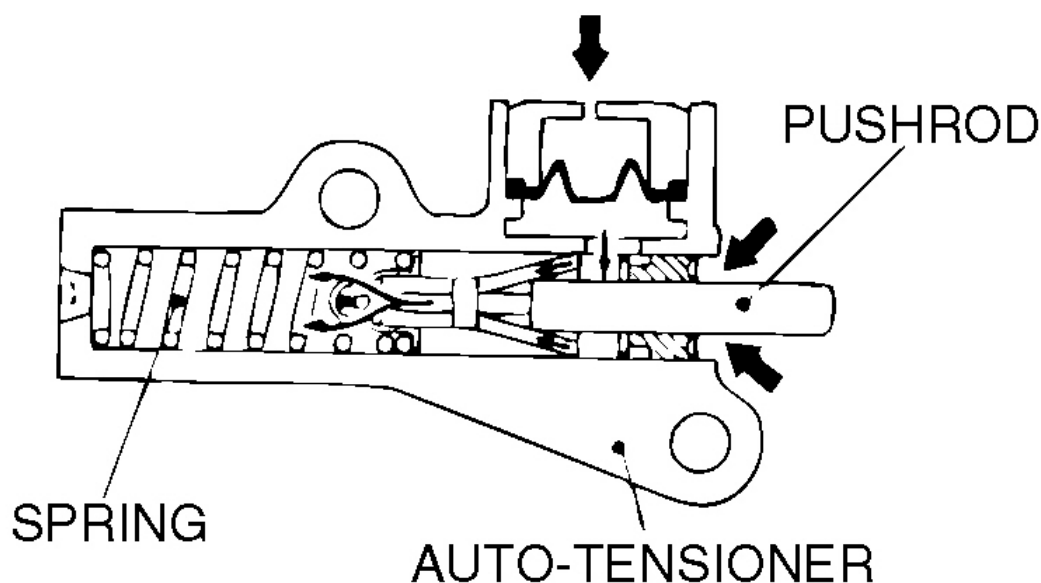
Fig. 79: Installing Crankshaft Pulley

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

AUTO-TENSIONER

- Check the auto-tensioner for possible leaks.
- Check the pushrod for cracks.



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Fig. 80: Checking Auto-Tensioner

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

ITEM		SPECIFICATION
Auto-tensioner attaching bolt		23 ± 3 N.m (17 ± 3 ft-lb)
Camshaft sprocket attaching bolt		88 ± 10 N.m (65 ± 7 ft-lb)
Camshaft thrust case attaching bolt		13 ± 2 N.m (109 ± 21 in-lb)
Control wiring harness protector attaching bolt		5.0 ± 1.0 N.m (44 ± 9 in-lb)
Crankshaft bolt		182 ± 4 N.m (134 ± 3 ft-lb)
Crankshaft position sensor attaching bolt		8.8 ± 1.0 N.m (78 ± 9 in-lb)
Cylinder head bolt <cold engine>		108 ± 5 N.m --> 0 N.m --> 108 ± 5 N.m (80 ± 3 ft-lb --> 0 in-lb --> 80 ± 3 ft-lb)
Distributor attaching nut		13 ± 2 N.m (109 ± 21 in-lb)
Drive plate bolt <A/T>		74 ± 2 N.m (55 ± 1 ft-lb)
Engine mount bracket attaching bolt	M10	86 ± 12 N.m (64 ± 8 ft-lb)
	M12	81 ± 12 N.m (60 ± 9 ft-lb)

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Engine mount bracket attaching nut		86 ± 12 N.m (64 ± 8 ft-lb)
Engine mount stay attaching bolt		36 ± 6 N.m (27 ± 4 ft-lb)
Engine support bracket right attaching nut		44 ± 5 N.m (33 ± 3 ft-lb)
Flywheel plate bolt <M/T>		74 ± 2 N.m (55 ± 1 ft-lb)
Fuel high-pressure hose attaching bolt		4.9 ± 1.0 N.m (44 ± 8 in-lb)
Ground wire attaching bolt		5.0 ± 1.0 N.m (44 ± 9 in-lb)
Lower oil pan attaching bolt		11 ± 1 N.m (96 ± 8 in-lb)
Oil dipstick guide attaching bolt		48 ± 6 N.m (36 ± 4 ft-lb)
Oil pan bolt hole cover attaching bolt		11 ± 1 N.m (96 ± 8 in-lb)
Oil pan drain plug		39 ± 5 N.m (29 ± 4 ft-lb)
Power steering oil pump attaching bolt		42 ± 7 N.m (31 ± 5 ft-lb)
Rocker arm and shaft assembly attaching bolt		31 ± 3 N.m (23 ± 2 ft-lb)
Rocker cover attaching bolt		3.4 ± 0.5 N.m (31 ± 4 in-lb)
Starter attaching bolt		30 ± 3 N.m (23 ± 2 ft-lb)
Tensioner pulley assembly attaching bolt and nut		44 ± 10 N.m (33 ± 7 ft-lb)
Timing belt front lower cover attaching bolt		11 ± 1 N.m (96 ± 8 in-lb)
Timing belt front upper cover attaching bolt	M6	11 ± 1 N.m (96 ± 8 in-lb)
	M8	14 ± 1 N.m (117 ± 13 in-lb)
Timing belt rear cover attaching bolt		14 ± 1 N.m (117 ± 13 in-lb)
Timing belt tensioner arm attaching bolt		44 ± 10 N.m (33 ± 7 ft-lb)
Timing belt tensioner pulley attaching bolt		48 ± 6 N.m (36 ± 4 ft-lb)
Upper oil pan attaching bolt	M6	5.9 ± 1.0 N.m (52 ± 9 in-lb)
	M10	35 ± 6 N.m (26 ± 4 ft-lb)

GENERAL SPECIFICATIONS

General Specifications - 3.0L Engine

ITEMS	SPECIFICATIONS
Generator	
Type	Positive battery positive voltage sensing
Identification number	A3TB3491ZC
Part No.	MD373093
Rated output V/A	12/85
Voltage regulator	Electronic built-in type
Starter Motor	
Type	Reduction drive with planetary gear
Identification number	M0T80784
Part No.	MD363633
Rated output kW/V	1.2/12
No. of pinion teeth	8
Distributor	

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Type		Contact pointless with built-in ignition coil
Advance mechanism		Electronic
Firing order		1-2-3-4-5-6
Ignition Col		
Type		Molded single-coil built in distributor
Spark Plugs		
Without IMT system	NGK	FR5EI
With IMT system	NGK	FR6EI
	DENSO	K20PSR-B8

SERVICE SPECIFICATIONS

ITEMS			STANDARD VALUE	LIMIT
Generator				
Regulated voltage (Ambient temperature at voltage regulator)		-20°C (-4°F)	14.2 – 15.4	—
		20°C (68°F)	13.9 – 14.9	—
		60°C (140°F)	13.4 – 14.5	—
		80°C (176°F)	13.1 – 14.5	—
Generator output line voltage drop (at 30 A) V			—	Maximum 0.3
Output current			—	70% of normal output
Field coil resistance Ω			Approximately 2 – 5	—
Brush protrusion length mm (in)			—	Minimum 2 (0.08)
Starter motor				
Free running characteristics	2.4L Engine	Terminal voltage V	11	—
		Current A	90	—
		Speed r/min	2,400 or more	—
	3.0L Engine	Terminal voltage V	11	—
		Current A	90	—
		Speed r/min	2,800 or more	—
Pinion gap mm (in)			0.5 – 2.0 (0.02 – 0.07)	—
Commutator run-out mm (in)			0.05 (0.002)	Minimum 0.1 (0.004)
Commutator diameter mm (in)			29.4 (1.16)	Minimum 28.8 (1.13)
Undercut depth mm (in)			0.5 (0.02)	Minimum 0.2 (0.008)
Ignition parts				
Ignition primary coil resistance at 20°C (68°F) Ω	3.0L Engine		0.56 – 0.68	—
Ignition secondary coil resistance at 20°C (60°F) kΩ	2.4L Engine		8.5 – 11.5	—
	3.0L Engine		9.4 – 12.8	—
Spark plug gap mm (in)	2.4L Engine		1.0 – 1.1 (0.039 – 0.043)	—
	3.0L Engine		0.7 – 0.8 (0.028 – 0.031)	1.2 (0.047)
Resistor wire resistance kΩ			—	Maximum 19

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Fig. 81: Service Specifications Chart (1 of 2)

2005 Mitsubishi Eclipse Spyder GS

2005 ENGINE Engine Mechanical (3.0L) - Eclipse & Eclipse Spyder

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SERVICE SPECIFICATIONS (2 Of 2)

ITEM	STANDARD VALUE	LIMIT
Basic ignition timing at idle	5°BTDC +/- 3°	-
Actual ignition timing at idle	Approximately 15° BTDC	-
CO content %	0.5 or less	-
HC contents ppm	100 or less	-
Curb idle speed r/min	700 +/- 100	-
Compression pressure (250 - 400 r/min) kPa (psi) without IMT	824 (119)	Minimum 575 (83)
Compression pressure (250 r/min) kPa (psi) with IMT	1,470 (212)	Minimum 1,029 (149)
Compression pressure difference of all cylinder kPa (psi)	-	98 (14)
Intake manifold vacuum at curb idle kPa (in Hg)	-	Minimum 60 (18)
Auto-tensioner pushrod movement mm (in)	Within 1.0 (0.04)	-
Auto-tensioner rod protrusion mm (in)	3.8 - 5.0(0.15 - 0.20)	-

SEALANT**SEALANT SPECIFICATIONS**

ITEM	SPECIFIED SEALANT
Oil pan	MITSUBISHI GENUINE Sealant Part No. MD970389 or equivalent