2004 ENGINES

3.5L V6 - Diamante

GENERAL DESCRIPTION

The 6G74 (3.5L) 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). The engine is fired in the order of the 1, 2, 3, 4, 5, and 6 cylinders.

General Specifications

ITEMS			SPECIFICATIONS
Type			V-type, Over Head Camshaft
Number of cylinders			6
Bore mm (in.)			93.0 (3.65)
Stroke mm (in.)			85.8 (3.37)
Piston displacement cm^3 (cu.in.)			3,497 (213.5)
Compression ratio			9.0
Firing order			1-2-3-4-5-6
Valve timing	Intake valve	Opens (BTDC)	13°
		Closes (ABDC)	55°
	Exhaust valve	Opens (BBDC)	51°
		Closes (ATDC)	17°
Valve overlap			30°
Intake valve duration			248°
Exhaust valve duration			248°

DIAGNOSIS

TROUBLE 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
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 to 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.
Noisy valves	Malfunction of lash adjuster	Replace the lash adjuster.
	Thin or diluted engine oil (low 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. 1: Diagnosis
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIAL TOOLS

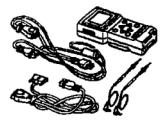
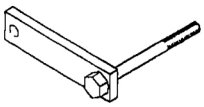
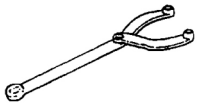
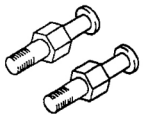
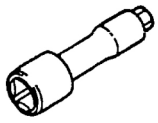
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB991502 Scan tool (MUT-II)	–	Checking of engine idling speed
	ROM pack	–	
	MD998781 Flywheel stopper	–	Drive plate supporting
	MD998718 Crankshaft rear oil seal installer	MD998718-01	Installation of the crankshaft rear oil seal
	MB990767 End yoke holder	MB990767-01	Supporting the sprocket and shaft pulley during removal and installation Use with MD998715
	MD998715 Pulley holding pins	MIT308239	Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled. Use together with MB990767 Camshaft pulley supporting
	MD998769 Crankshaft sprocket spacer	–	Used if the crankshaft needs to be rotated to attach the timing belt, etc.
	MD998051 Wrench, cylinder head bolt	MD998051-01	Loosening and tightening of cylinder head bolt

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Fig. 2: Special Tools (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

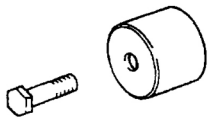
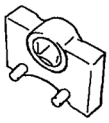
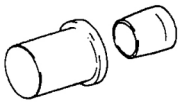
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998713 Camshaft oil seal installer	MD998713-01	Camshaft oil seal installation
	MB991559 Camshaft oil seal installer	–	Press fitting the camshaft oil seal (For left bank)
	MD998767 Tension pulley socket wrench	MD998752-01	Adjustment of the timing belt
	MD998717 Crankshaft front oil seal installer	MD998717-01	Press-fitting of crankshaft front oil seal

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Fig. 3: Special Tools (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK AND ADJUSTMENT

Check the belt tension by using a belt-tension gauge or apply 98 N (22 lbs.) of force to the belt midway between the pulleys as shown in the illustration, and measure the deflection.

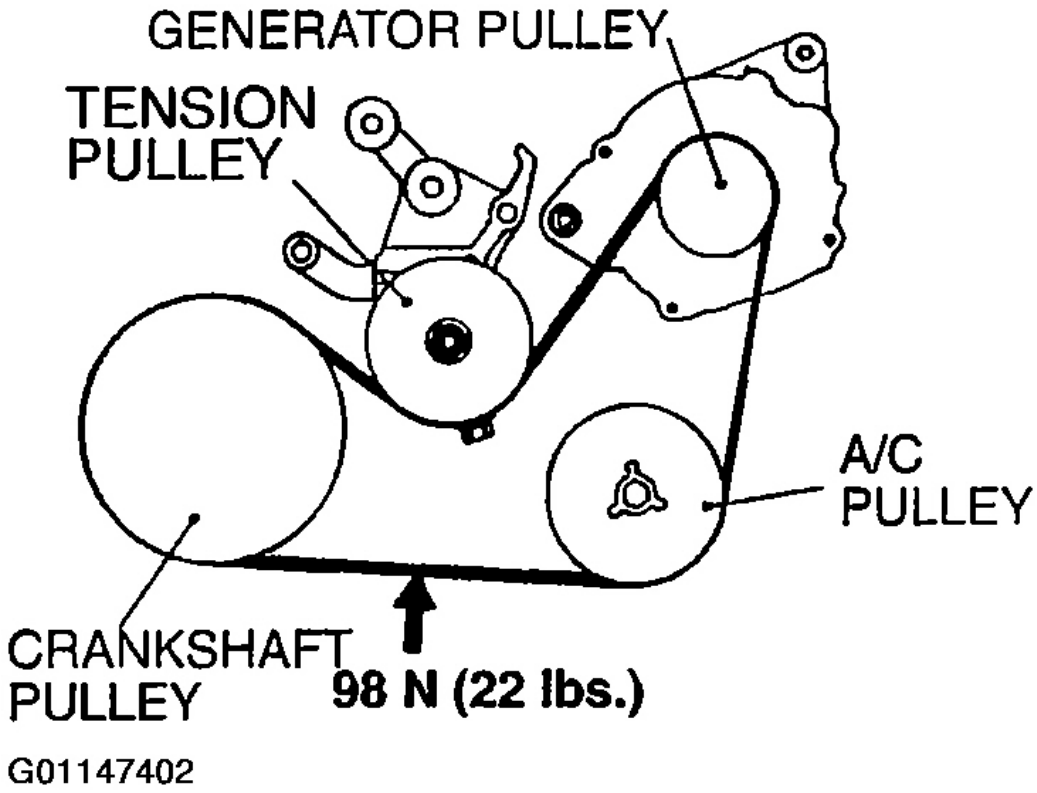

Fig. 4: Checking Belt Deflection
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

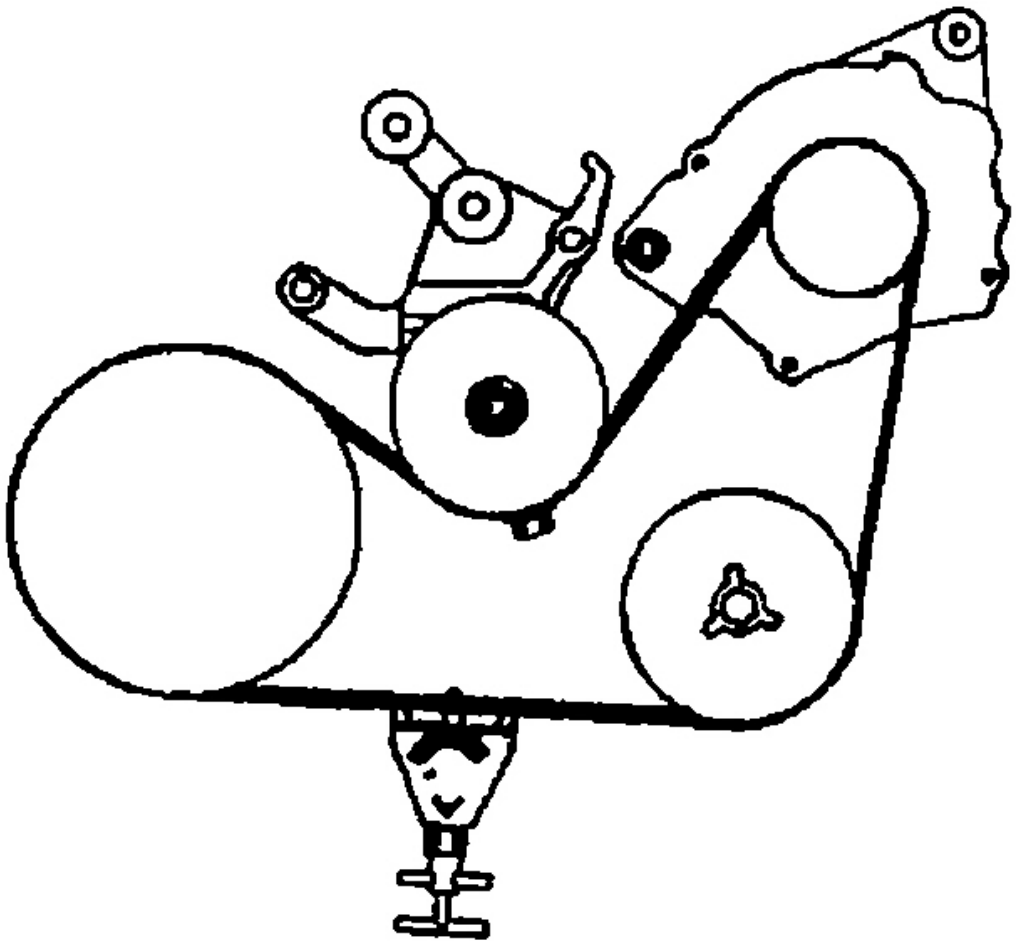

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Fig. 5: Checking Belt Tension
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ITEM		CHECK VALUE	ADJUST-MENT VALUE NEW BELT	ADJUST-MENT VALUE USED BELT
For generator and A/C	Tension N (lbs.)	490-686 (109-152)	784-980 (174-218)	539-637 (120-142)
	Deflection <Reference value> mm (in.)	7.9-9.7 (.31-.38)	6.0-7.2 (.24-.28)	8.2-9.3 (.32-.37)
For power steering	Tension N (lbs.)	373-569 (83-126)	608-804 (135-179)	422-520 (93.8-116)
	Deflection <Reference value> mm (in.)	11.0-14.2 (.43-.56)	8.4-9.3 (.33-.37)	11.7-13.4 (.46-.52)

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Fig. 6: Standard Value
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

GENERATOR AND AIR-CONDITIONING COMPRESSOR DRIVE BELT TENSION ADJUSTMENT

1. Loosen the tension pulley fixing nut.
2. Adjust the belt tension using the adjusting bolt.

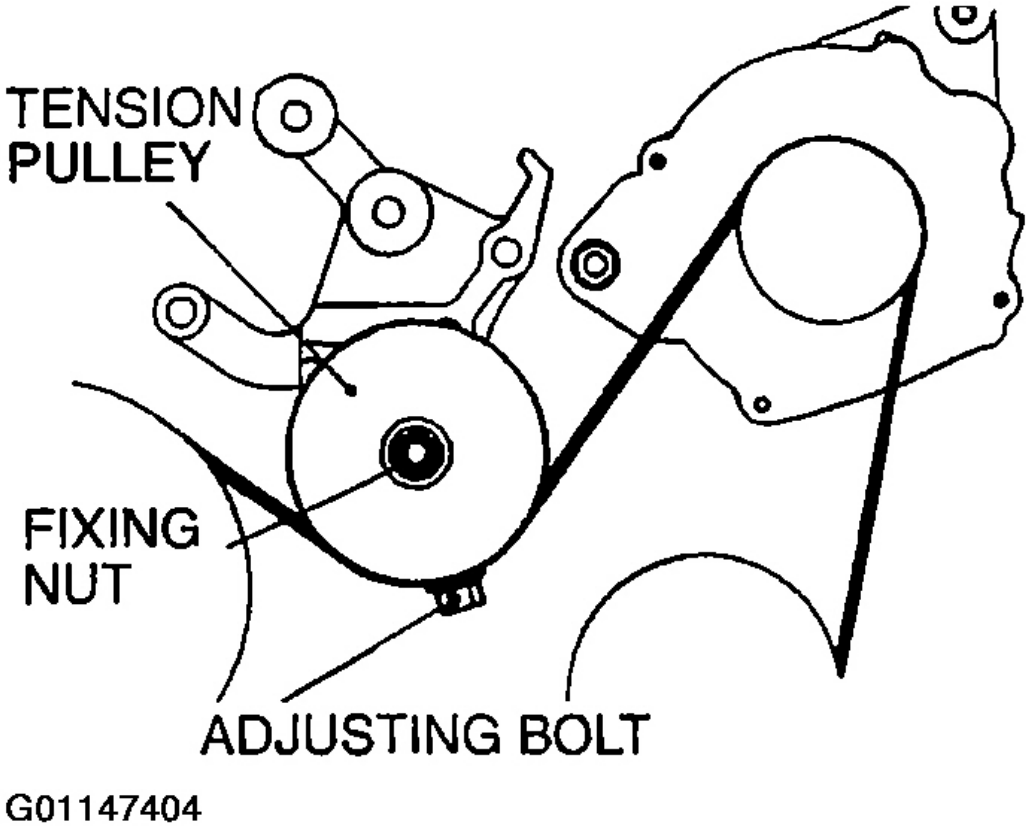


Fig. 7: Locating Adjusting Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Tighten the fixing nut.
4. Crank the engine once or more.
5. Check the belt tension.

POWER STEERING OIL PUMP BELT TENSION ADJUSTMENT

1. Loosen the tension pulley fixing nut.
2. Adjust the belt tension using the adjusting bolt.

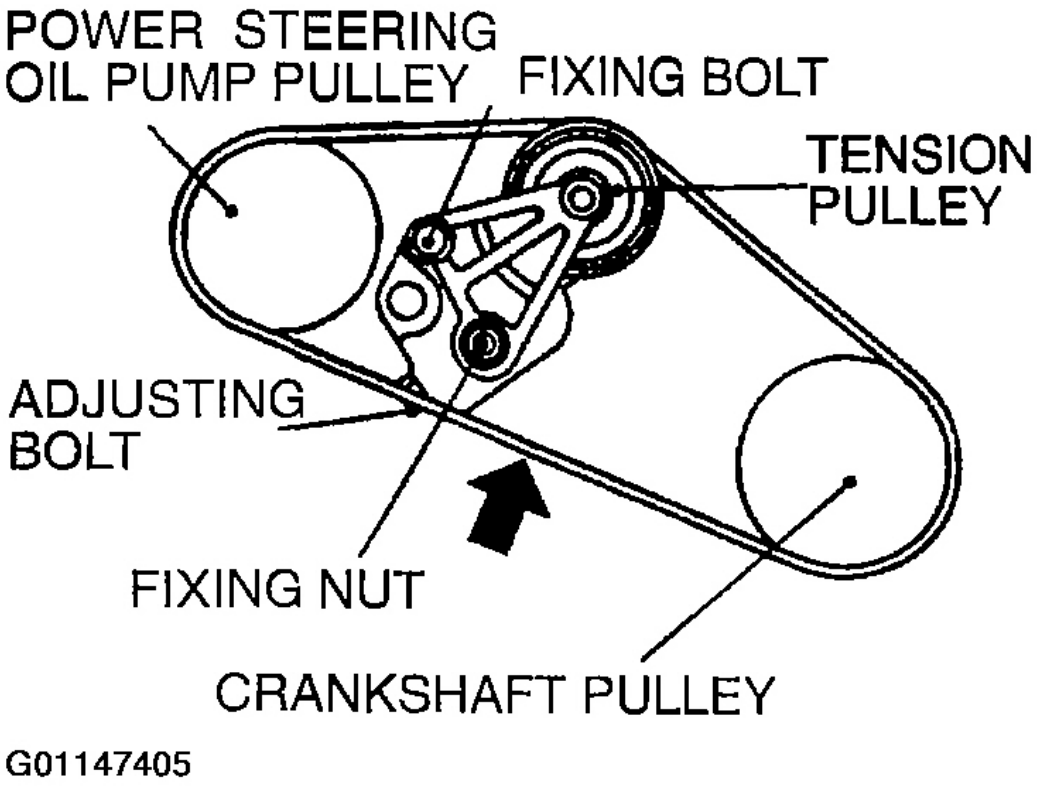


Fig. 8: Locating Adjusting Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Tighten the fixing nut.
4. Crank the engine once or more.
5. Check the belt tension:

IGNITION TIMING CHECK

1. Before inspection, set the vehicle to the following condition.
   - Engine coolant temperature: 80 - 95°C (176 - 203°F)
   - Lights and all accessories: OFF
   - Transmission: Neutral (P range)
2. Insert a paper clip into the No. 3 terminal of the 3-pin connector shown in illustration.

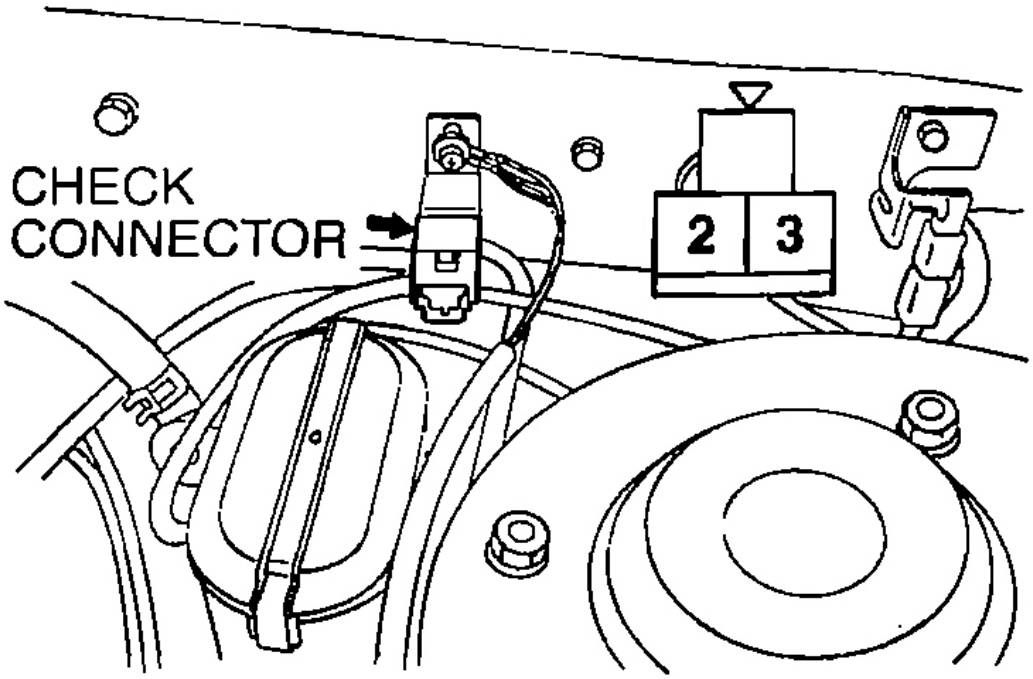


Fig. 9: Locating 3-Pin Connector
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Connect a primary voltage detection type tachometer to the paper clip.
4. Install the timing light.
5. Start the engine and run at idle.
6. Check that the idle speed is about 700 r/min.
7. Turn the ignition switch to OFF.
8. Connect the scan tool to the data link connector.
9. Start the engine and run it at idle.
10. Select the MFI system Actuator Test from the scan tool menu and scroll to item 17 - Basic Ignition Timing.
11. Press the "Y" Key and check that the basic ignition timing is the standard value.

    Standard value: 5° BTDC +/-3°
12. If the ignition timing value is not within the standard value range refer to **ON-VEHICLE INSPECTION OF MFI COMPONENTS** and check the crankshaft position sensor.
13. Check that the idling ignition timing is at the correct value.

    Standard value: Approximately 10° BTDC

NOTE: Ignition timing is variable within about +/- 8°, even under normal operating conditions.

NOTE: And it is automatically further advanced by about 5° from 10° BTDC at higher altitudes.

CURB IDLE SPEED CHECK

1. Before inspection, set the vehicle to the following condition.
   - Engine coolant temperature: 80 - 95°C (176 - 203°F)
   - Lights and all accessories: OFF
   - Transmission: Neutral (P for A/T)
2. Check the basic ignition timing.

   Standard value: 5° BTDC +/-3°
3. After turning the ignition switch to OFF, connect a tachometer or the scan tool to the data link connector (white).

   NOTE: For the procedures for setting the tachometer, refer to IGNITION TIMING CHECK.

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

   Standard value: 700+/-100 r/min

   NOTE: The idle speed is adjusted automatically by the idle air control (IAC) system.

7. If there is a deviation from the standard value, refer to **INSPECTION CHART FOR TROUBLE SYMPTOMS** , and check the MFI components.

IDLE MIXTURE CHECK

1. Before inspection, set the vehicle to the following condition.
   - Engine coolant temperature: 80 - 95°C (176 - 203°F)
   - Lights and all accessories: OFF
   - Transmission: Neutral (P range)
2. Check to be sure that the basic ignition timing is at the standard value.

   Standard value: 5° BTDC +/-3°
3. After turning the ignition switch to OFF, connect a tachometer, or connect the scan tool to the data link connector.

NOTE: For the procedures for setting the tachometer, refer to IGNITION TIMING CHECK.

4. Start the engine and race it at an engine speed of 2,500 r/min for two minutes.
5. Connect a CO and HC tester.
6. Check the CO contents and the HC contents while the engine is idling.

Standard value:

CO contents: 0.5% or less

HC contents: 100 ppm or less

7. If the concentrations are outside the standard values, check the following items.
   - Diagnostic output
   - Closed loop control

     (If closed loop control is being carried out normally, the heated oxygen sensor output signal will vary between 0-400 mV and 600-1,000 mV while the engine is idling.)

   - Fuel pressure
   - Injectors
   - Ignition coil, spark plug cables, spark plugs
   - Evaporative emission control system
   - Compression pressure

NOTE: If the results of the checks for all items are normal but the CO and HC concentrations still exceed the standard values, replace the three-way catalyst.

COMPRESSION PRESSURE CHECK

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

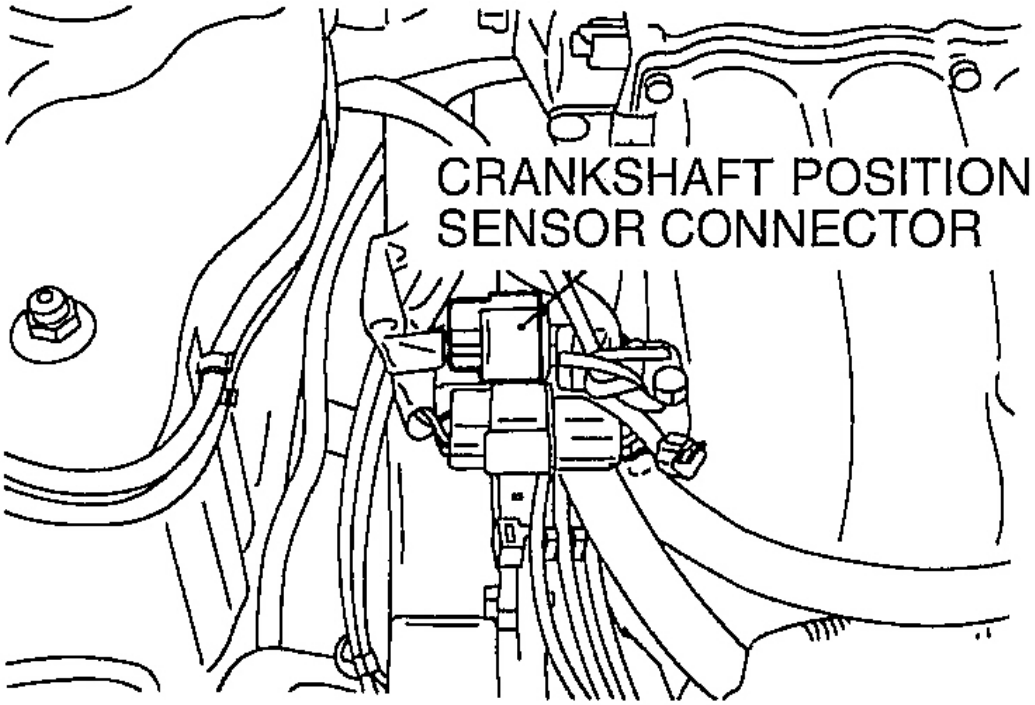


Fig. 10: Locating Crankshaft Position Sensor Connector
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

5. Cover the spark plug hole with a rag, and after the engine has been cranked, check that no foreign material is adhering to the rag.

WARNING: Keep away from the spark plug hole when cranking.

WARNING: Do not let water, oil, fuel, etc. enter the cylinder through cracks, or these heated materials will gush out from the spark plug hole, which is dangerous.

6. Set the compression gauge to a spark plug mounting hole.

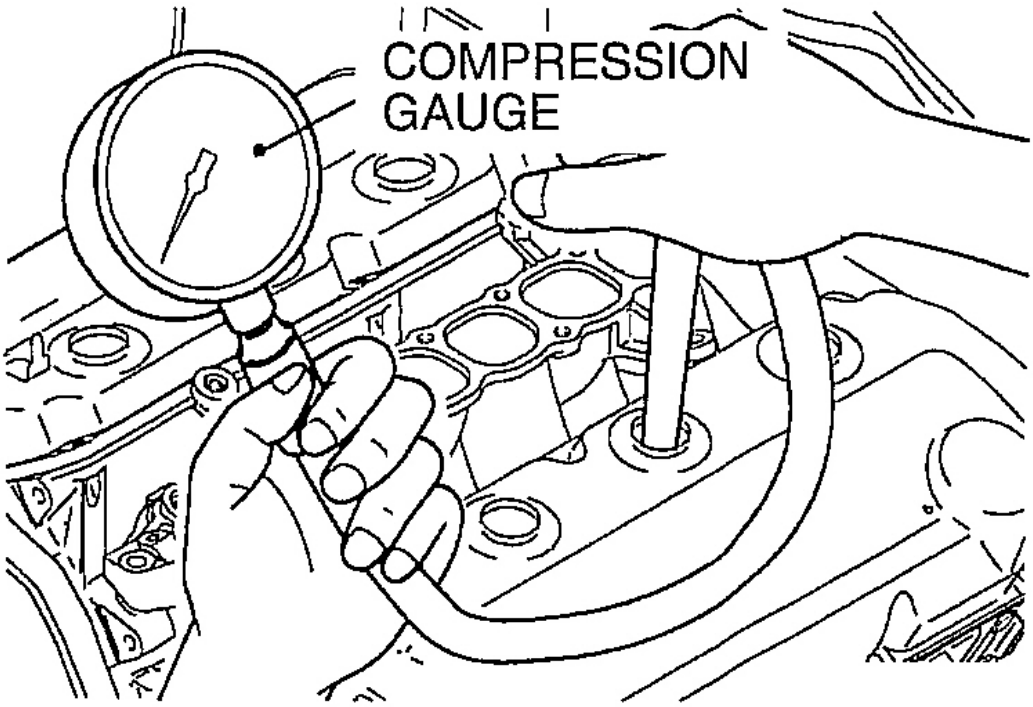


Fig. 11: Checking Compression
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

   Standard value: 1200 kPa (171 psi.)/250-400 r/min

   Limit: min. 890 kPa (127 psi.)/250-400 r/min

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

   Limit: max. 100

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 leaking from the gasket.

10. Reconnect the crankshaft position sensor connector.
11. Reinstall the spark plugs and spark plug cables.
12. Use the scan tool to erase the diagnostic trouble codes, or disconnect the negative battery cable for 10 seconds or more and then reconnect it.

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

MANIFOLD VACUUM CHECK

1. Before inspection, set the vehicle to the following condition.
   - Engine coolant temperature: 80 - 95°C (176 - 203°F)
   - Lights and all accessories: OFF
   - Transmission: Neutral P range
2. Connect a tachometer or connect the scan tool to the data link connector.

NOTE: For the procedures for setting the tachometer, refer to IGNITION TIMING CHECK.

3. Connect a three-way joint to the vacuum hose between the intake manifold plenum and the fuel-pressure regulator, and then connect a vacuum gauge.

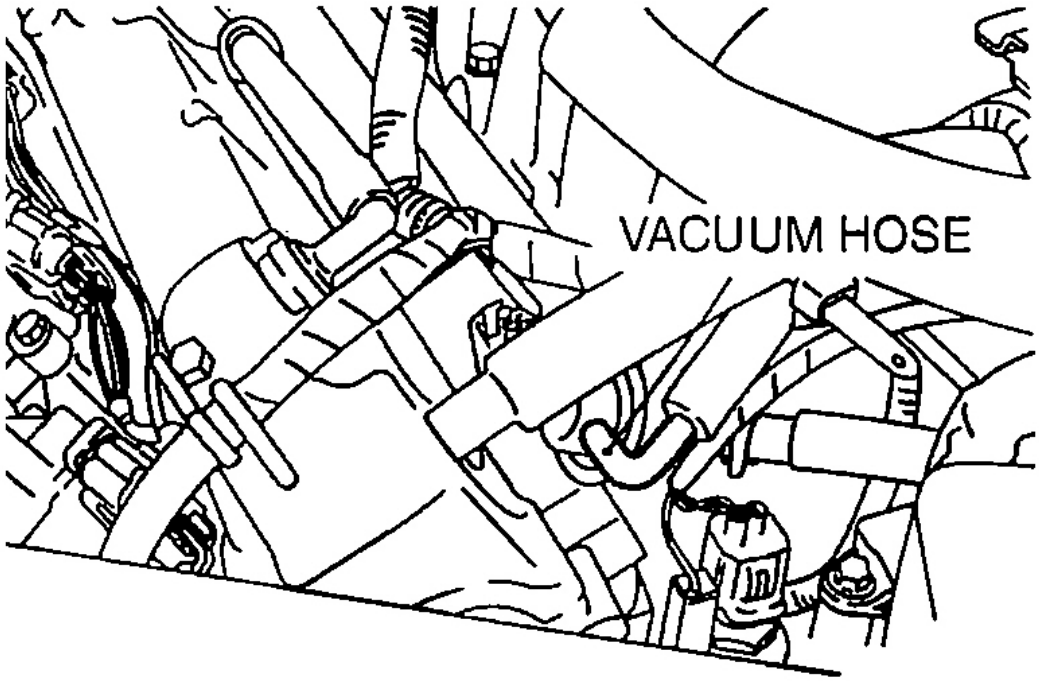


Fig. 12: Locating Vacuum Hose
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Start the engine and check that the idle speed is within the standard value range.

   Take a reading of the vacuum gauge.

   Limit: min. 60 kPa (18 in. Hg)

LASH ADJUSTER CHECK

If an abnormal noise (clattering 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 engine speed, regardless 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, malfunction of 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.

1. Start the engine.
2. Check if 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, malfunction of the lash adjuster is not the cause for the noise. Therefore, investigate other causes. If the abnormal noise does not change with the engine speed, it is probably caused by some parts other than the engine. (In this case, the valve 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, a tapping noise due to worn crankshaft bearing or connecting rod bearing is suspected. (In this case, the lash adjuster is in good condition.)

4. After the engine is warmed up, run it at idle and check for abnormal noise. If the noise is reduced or disappears, clean the lash adjuster (refer to **LASH ADJUSTER CLEANING AND CHECKING**) as the noise may be caused by a seized or sticking 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.
6. If the abnormal noise does not disappear after performing the bleeding air bleeding operation, clean the lash adjuster, (refer to **LASH ADJUSTER CLEANING AND CHECKING**).

BLEEDING THE LASH ADJUSTER SYSTEM

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

NOTE: After being parked for many hours, oil may run out from the oil passage. It takes time before oil is supplied to the lash adjuster, causing air to enter the high pressure chamber.

NOTE: In the above cases, eliminate the abnormal noise by bleeding the lash adjusters as follows:

1. Check the engine oil. Add or change oil if required.

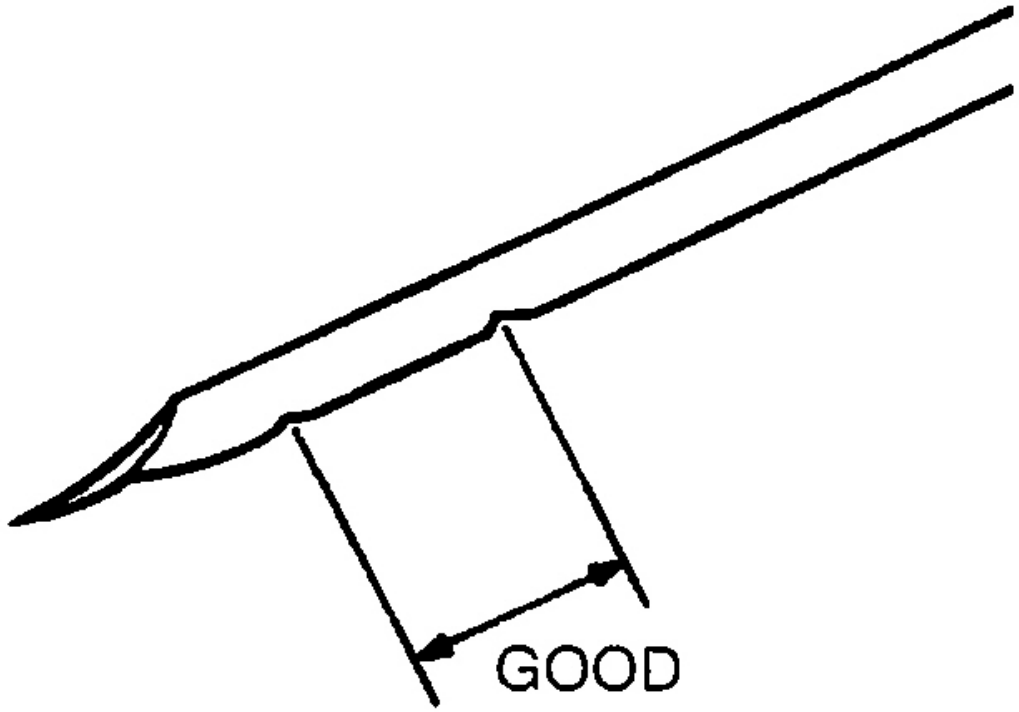


Fig. 13: Checking Engine Oil
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

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

NOTE: If oil mixed with air enters the high pressure chamber inside the lash adjuster from the above causes, air in the high pressure chamber is excessively compressed while the valve is opened, resulting in abnormal noise at closing of the valve. This is the same phenomenon as when the valve clearance has become excessive. The lash adjuster can resume

normal function when air that has entered the lash adjuster is removed.

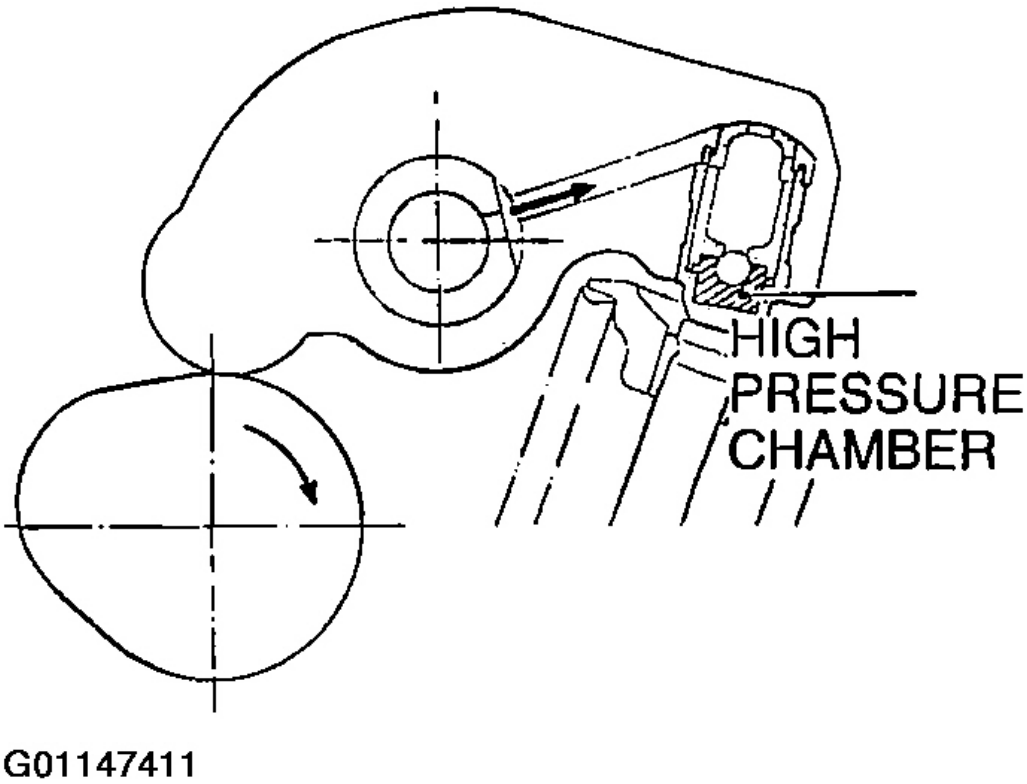


Fig. 14: Identifying High Pressure Chamber
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Idle the engine for 1 to 3 minutes.
3. Repeat the operation pattern shown in illustration at no load to check for abnormal noise.

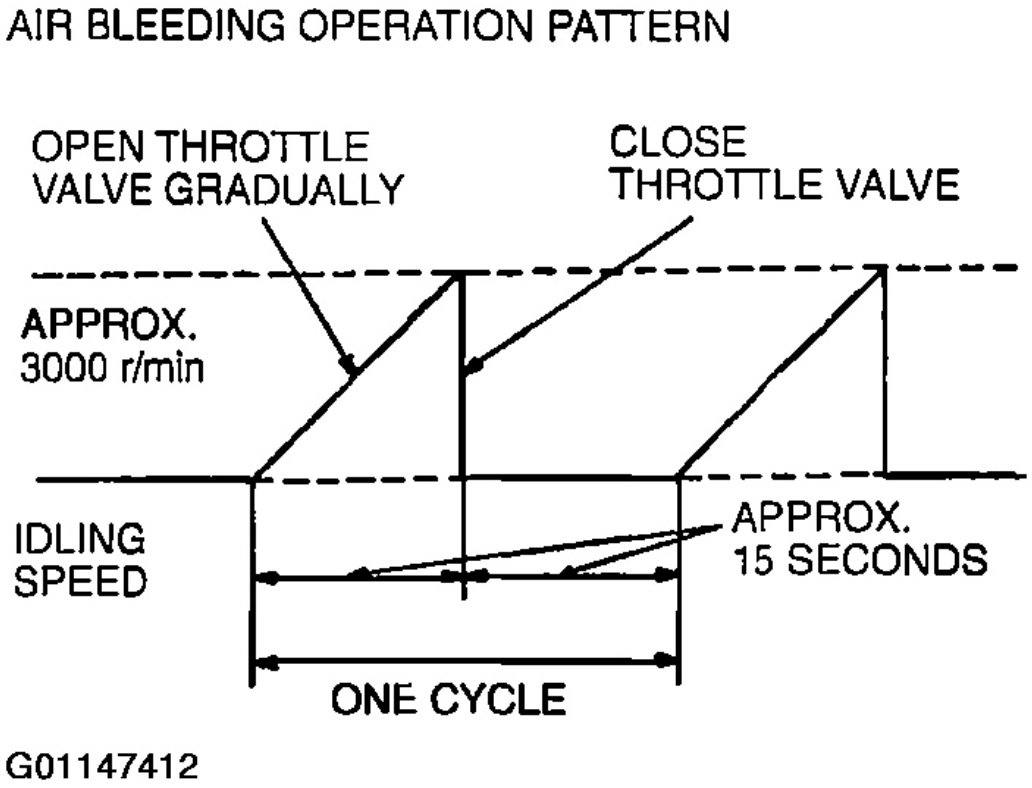


Fig. 15: Air Bleeding Operation Pattern
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

(Typically the abnormal noise is eliminated after repeating the operation 10 to 30 times.

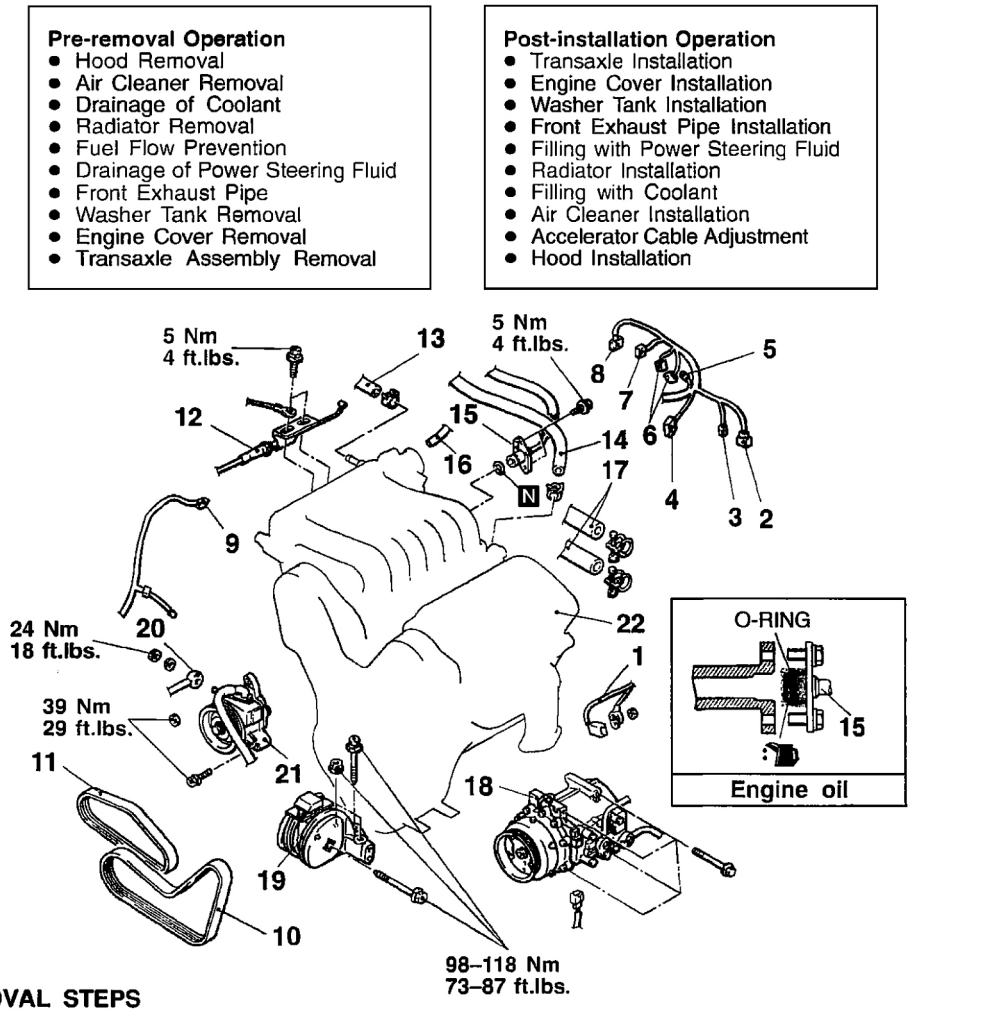
If no change is observed in the abnormal noise after repeating the operation 30 times, it is suspected that the abnormal noise is due to some other factors.)

4. After elimination of abnormal noise, repeat the operation shown at left five more times.
5. Run the engine at idle for 1 to 3 minutes to make sure that the abnormal noise has been eliminated.
6. If abnormal noise is not eliminated, clean the lash adjuster, refer to **LASH ADJUSTER CLEANING AND CHECKING**.

ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

1. GENERATOR CONNECTOR
2. WATER TEMPERATURE CONNECTOR
3. WATER TEMPERATURE GAUGE CONNECTOR
4. INJECTOR HARNESS CONNECTOR
5. CONDENSER CONNECTOR
6. DISTRIBUTOR CONNECTOR
7. ISC SERVO CONNECTOR
8. TPS CONNECTOR
9. CRANK ANGLE SENSOR CONNECTOR
10. DRIVE BELT (FOR GENERATOR AND A/C) ◀B▶
11. DRIVE BELT (FOR POWER STEERING) ◀A▶ ◀C▶
12. CONNECTION OF THE ACCELERATOR CABLE
13. CONNECTION OF BRAKE BOOSTER VACUUM HOSE
14. CONNECTION OF FUEL RETURN HOSE
15. CONNECTION OF FUEL HIGH PRESSURE HOSE
16. CONNECTION OF THE PURGE HOSE
17. CONNECTION OF HEATER HOSE
18. A/C COMPRESSOR ◀A▶
19. ENGINE MOUNT ◀B▶
20. PRESSURE HOSE
21. POWER STEERING OIL PUMP ▶B◀ ▶A◀
22. ENGINE ASSEMBLY

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Fig. 16: Removing & Installing Engine Assembly
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

A: A/C COMPRESSOR/OIL PUMP (POWER STEERING) REMOVAL

Remove the oil pump and air conditioning compressor (with the hose attached).

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

B: ENGINE MOUNT BRACKET

1. Place a garage jack against the engine oil pan through a square bar so that the weight of the engine is not placed on the engine mount bracket.
2. Remove the special tool (used during removal of the transmission assembly).
3. Hold the engine assembly with a chain block.
4. Detach the engine mount bracket.

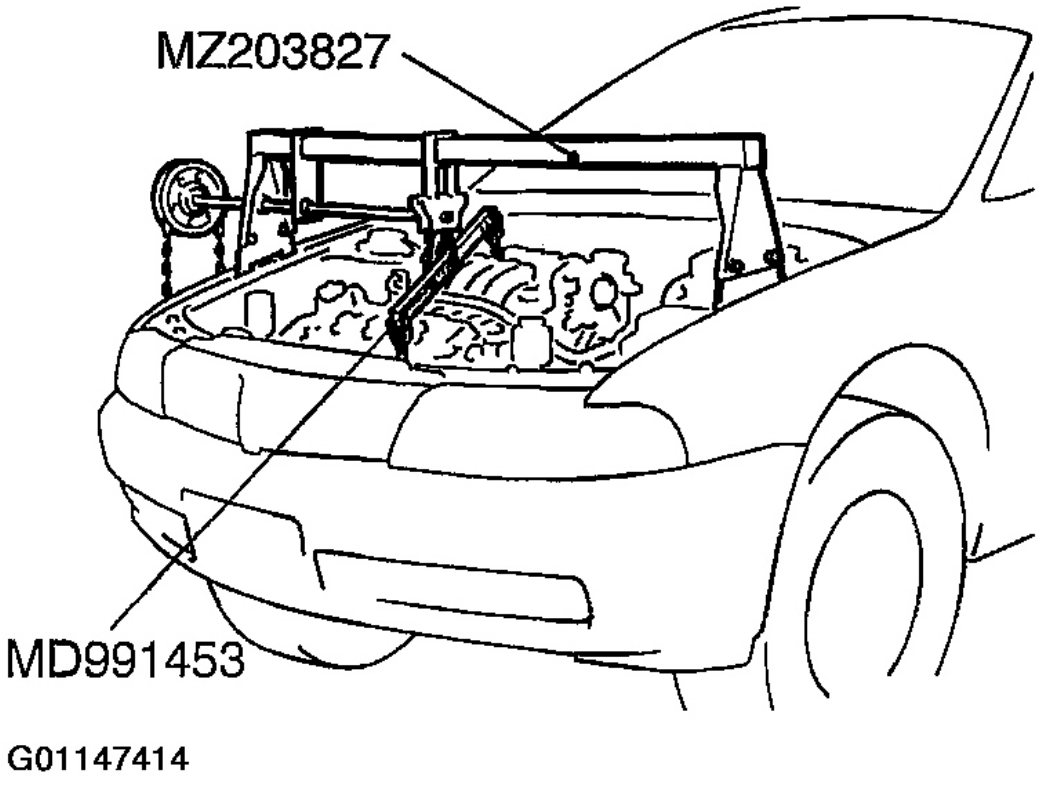


Fig. 17: Supporting Engine Assembly
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

C: ENGINE ASSEMBLY REMOVAL

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

INSTALLATION SERVICE POINTS

A: ENGINE ASSEMBLY INSTALLATION

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

B: PRESSURE HOSE

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

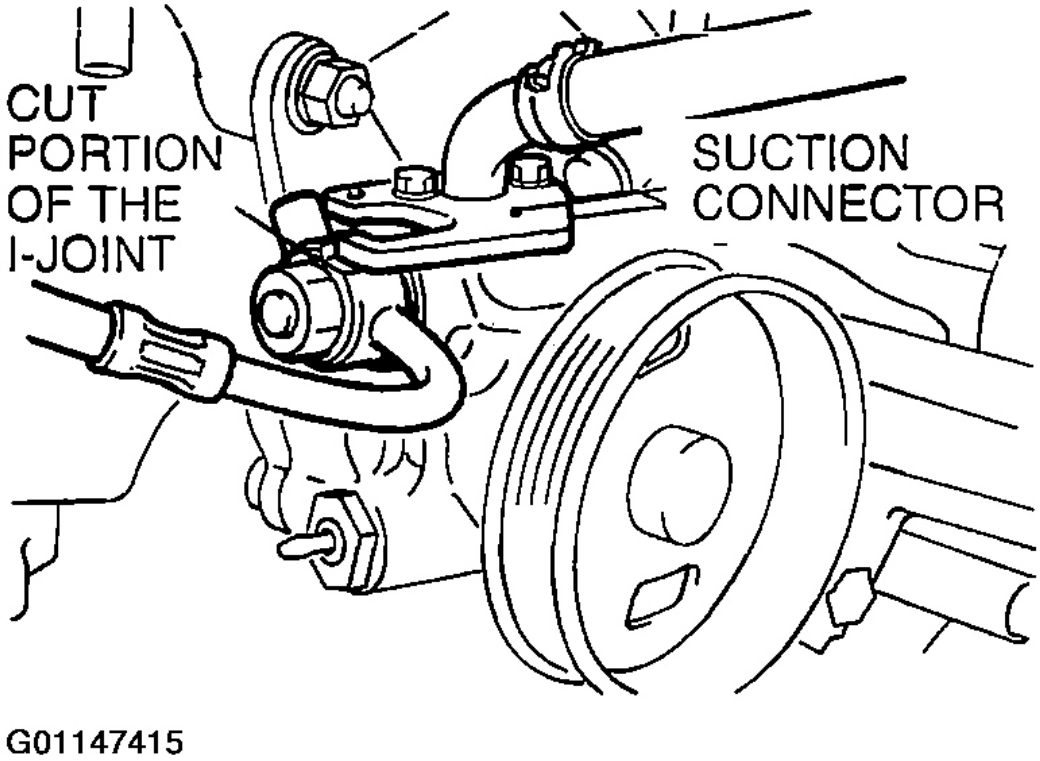


Fig. 18: Installing Pressure Hose
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

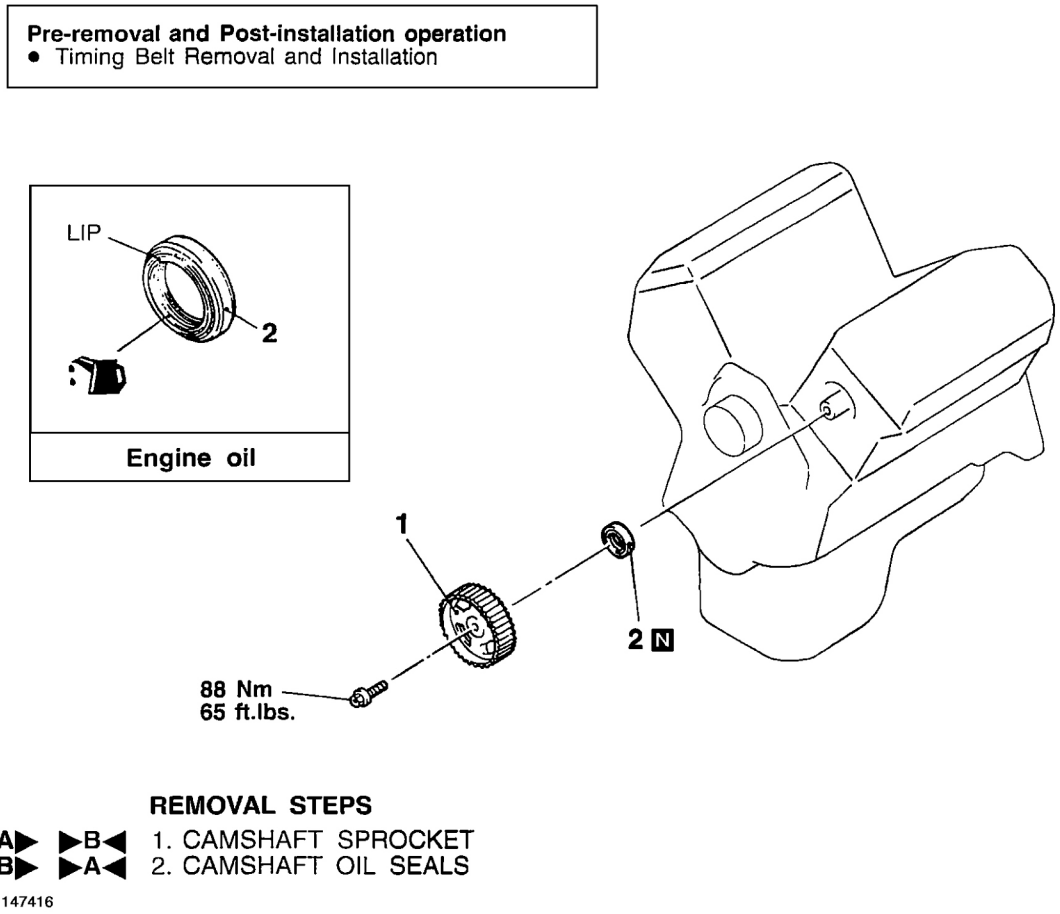


Fig. 19: Removing & Installing Camshaft Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

A: CAMSHAFT SPROCKET REMOVAL

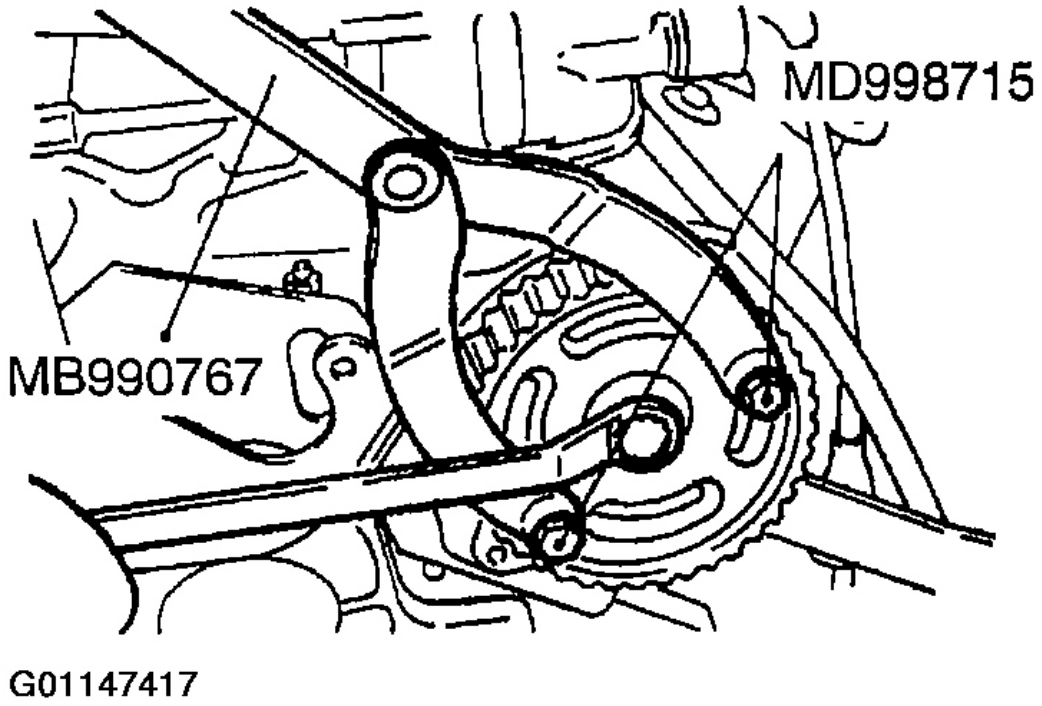


Fig. 20: Removing Camshaft Sprocket
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: CAMSHAFT OIL SEAL REMOVAL

1. Cut out a portion in the camshaft oil seal lip.
2. Cover the tip of a screwdriver with a cloth and apply it to the cutout in the oil seal to pry off the oil seal.

CAUTION: Use care not to damage the camshaft and cylinder head.

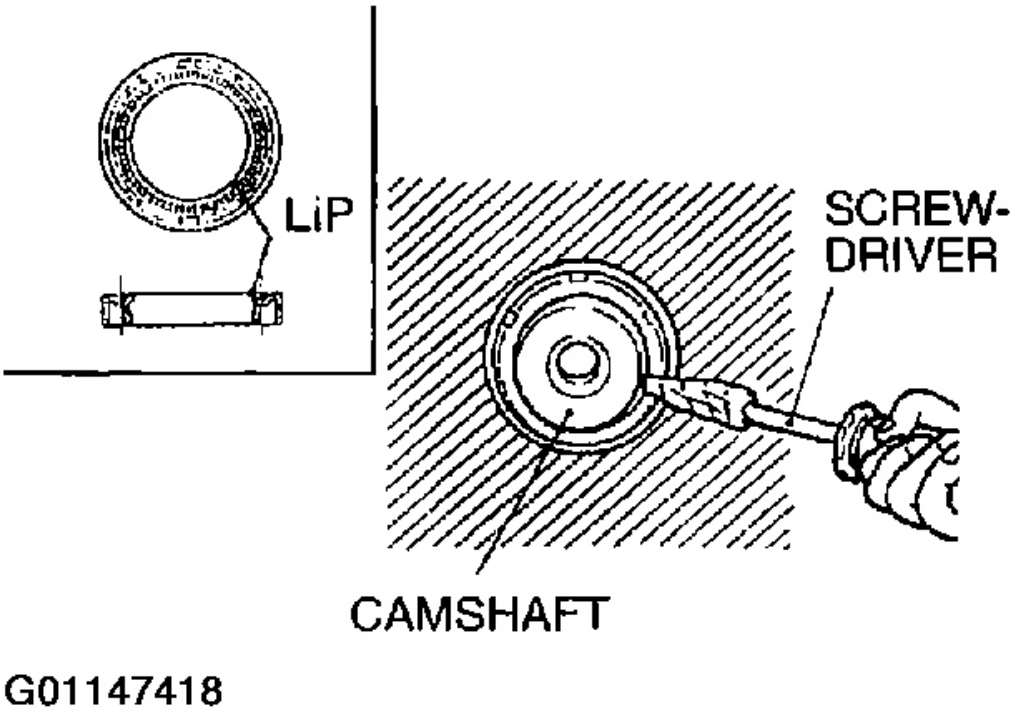


Fig. 21: Removing Camshaft Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: CAMSHAFT OIL SEAL INSTALLATION

Coat engine oil on the whole circumference of the oil seal lip section.

Using the special tool, press-fit the oil seal.

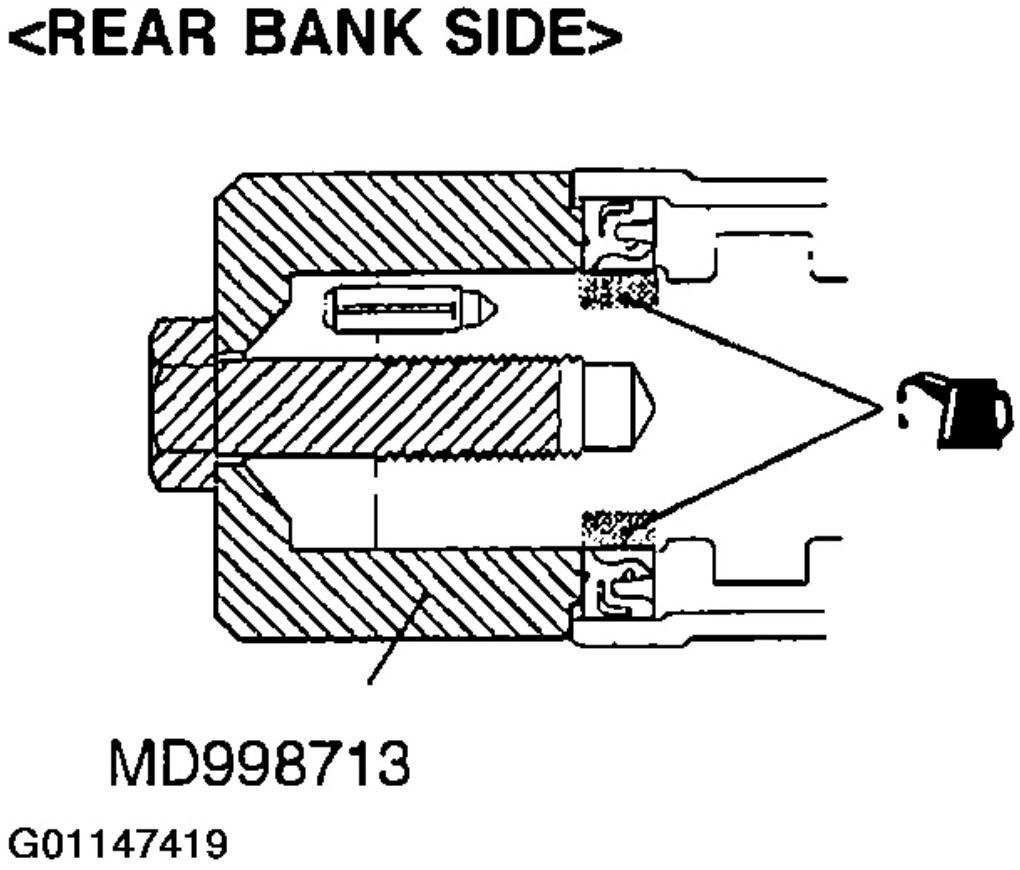


Fig. 22: Lubricating Seal Lip (Rear Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

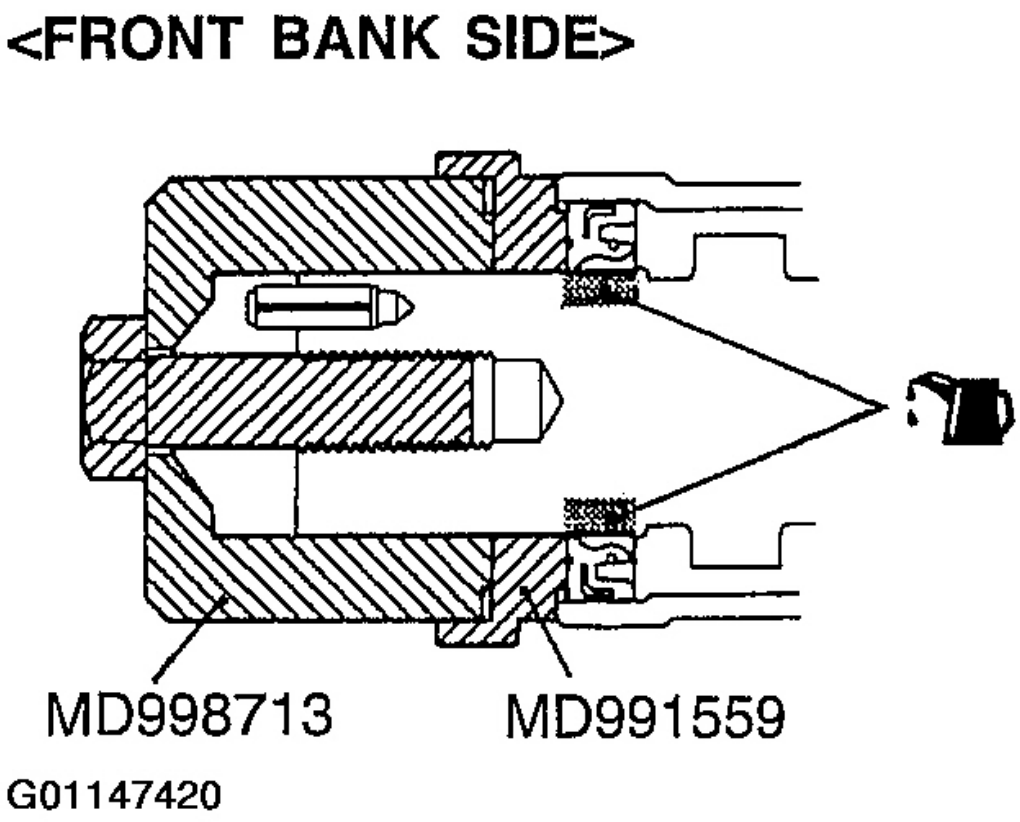


Fig. 23: Lubricating Seal Lip (Front Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: CAMSHAFT SPROCKET INSTALLATION

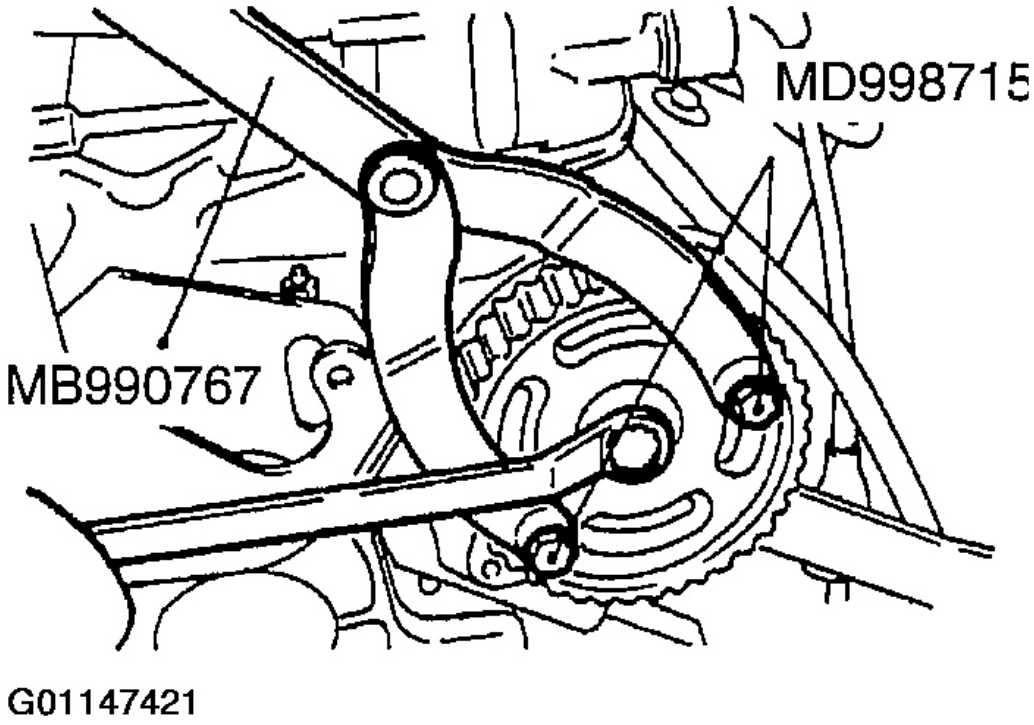


Fig. 24: Installing Camshaft Sprocket
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

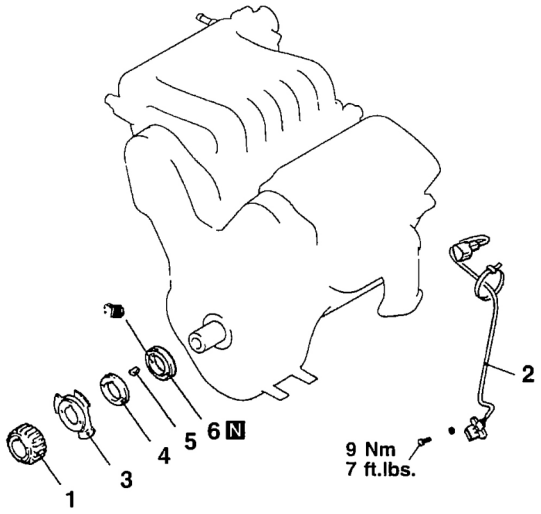
CRANKSHAFT OIL SEALS

FRONT OIL SEAL

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

Pre-removal and Post-installation Operation	Adjustment
• Timing Belt Removal and Installation	• Engine Adjustment



REMOVAL STEPS

1. CRANKSHAFT SPROCKET
2. CRANKSHAFT POSITION SENSOR
3. CRANKSHAFT SENSING BLADE
4. CRANKSHAFT SPACER
5. KEY
6. CRANKSHAFT FRONT OIL SEAL

◀A▶ ▶A◀

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Fig. 25: Removing & Installing Crankshaft Front Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: OIL SEAL REMOVAL

1. Cut out a portion in the crankshaft oil seal lip.
2. Cover the tip of a screwdriver with a cloth and apply it to the cutout in the oil seal to pry off the oil seal.

CAUTION: Take care not to damage the crankshaft and oil pump case.

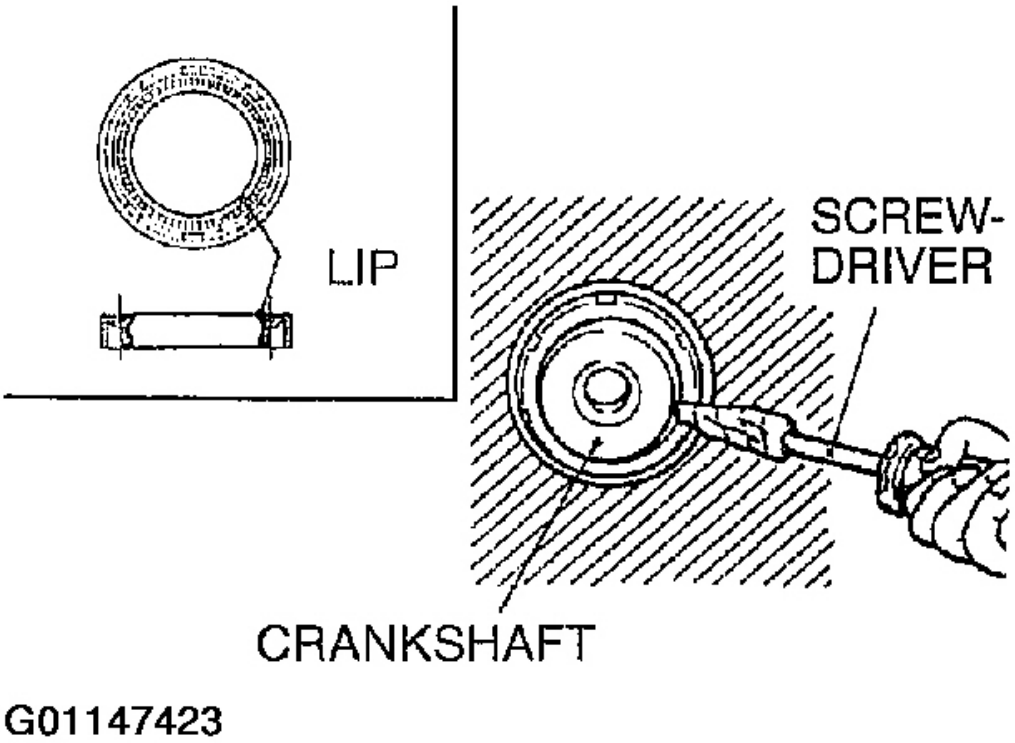


Fig. 26: Removing Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINT

A: OIL SEAL INSTALLATION

Using the special tool, knock the oil seal into the oil pump case.

NOTE: Knock it as far as the surface.

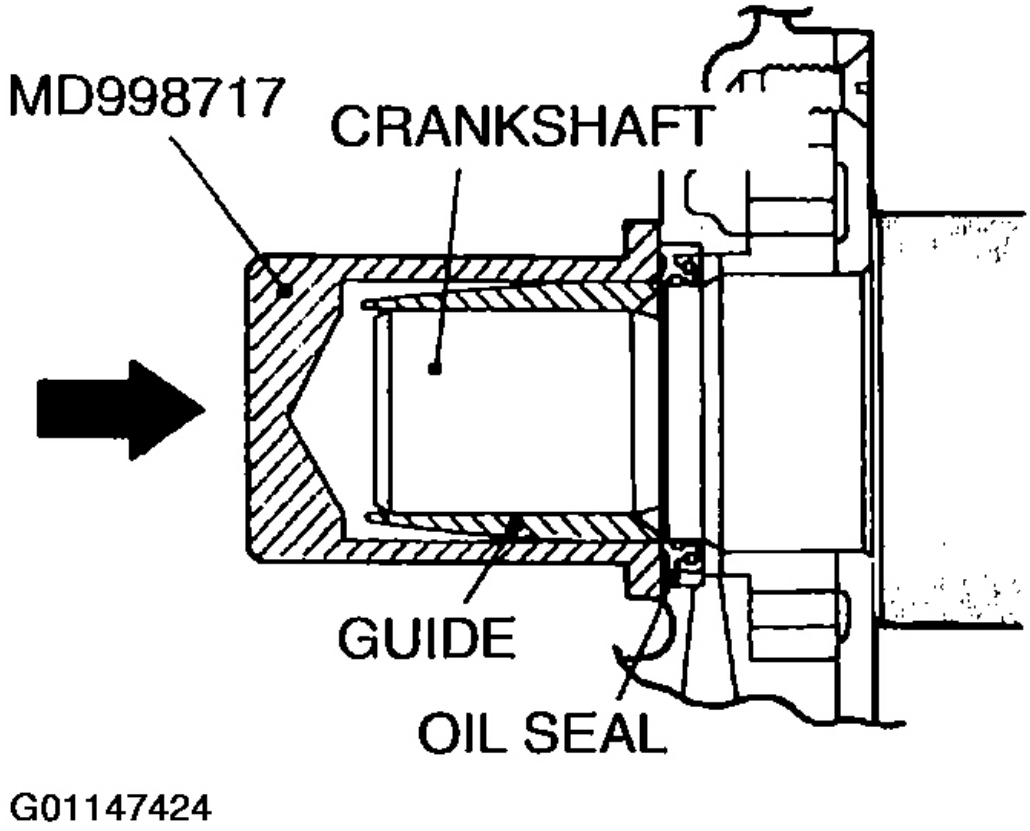


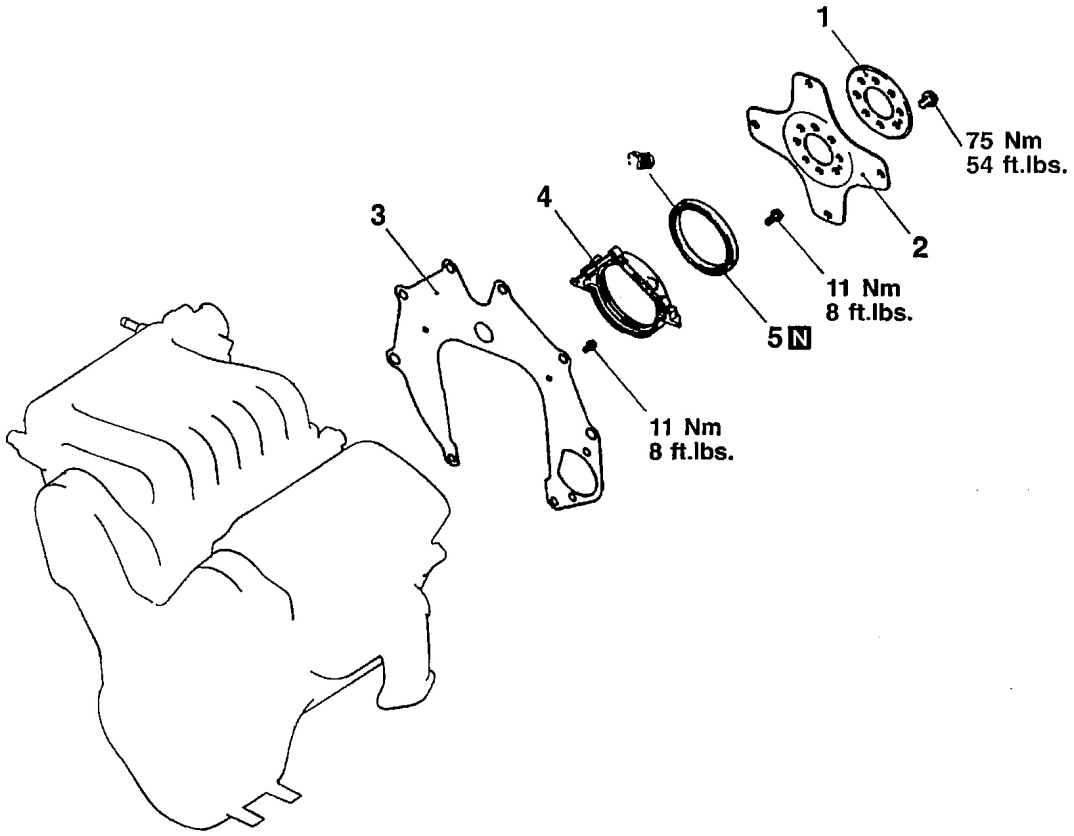
Fig. 27: Installing Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REAR OIL SEAL

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

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



REMOVAL STEPS
1. ADAPTOR PLATE
◀A▶ ▶B◀ 2. DRIVE PLATE
3. REAR PLATE
4. OIL SEAL CASE
◀B▶ ▶A◀ 5. OIL SEAL

G01147425

Fig. 28: Removing & Installing Rear Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

A: DRIVE PLATE ADAPTOR PLATE REMOVAL

Use the special tool to secure the drive plate, and remove the bolt.

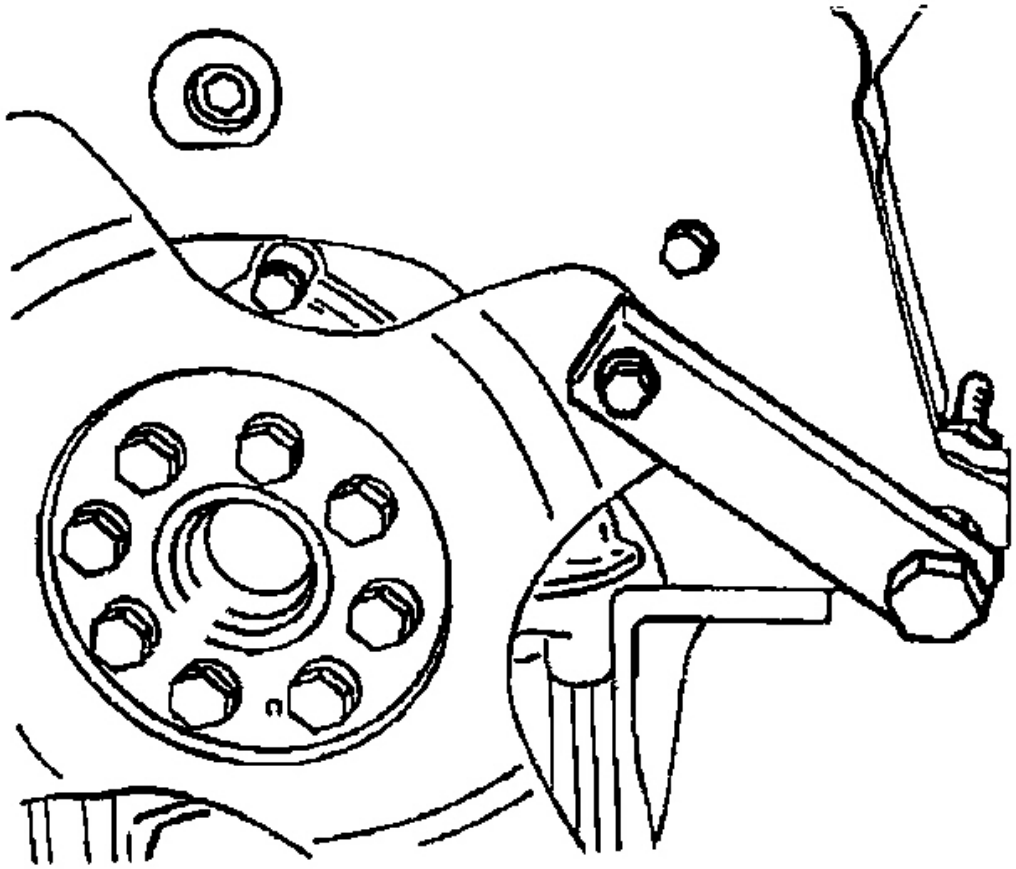


Fig. 29: Holding Drive Plate With Special Tool
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: OIL SEAL REMOVAL

1. Cut out a portion in the crankshaft oil seal lip.
2. Cover the tip of a screwdriver with a cloth and apply it to the cutout in the oil seal to pry off the oil seal.

CAUTION: Take care not to damage the crankshaft and oil seal case.

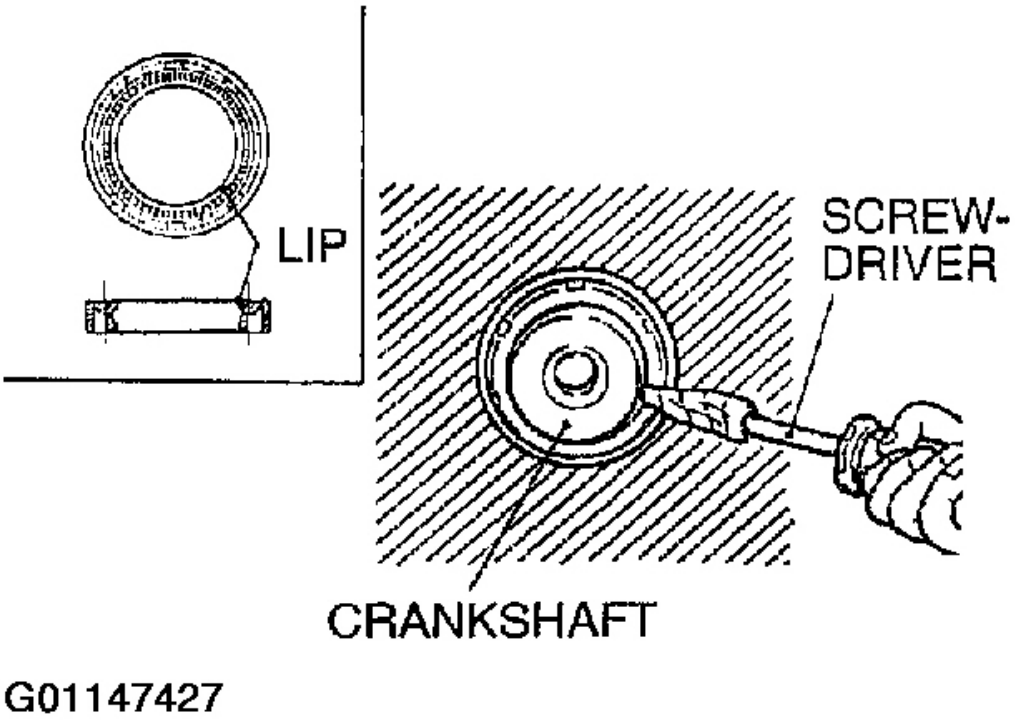


Fig. 30: Removing Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: OIL SEAL INSTALLATION

Using the special tool, press-fit a new crankshaft rear oil seal into the oil seal case.

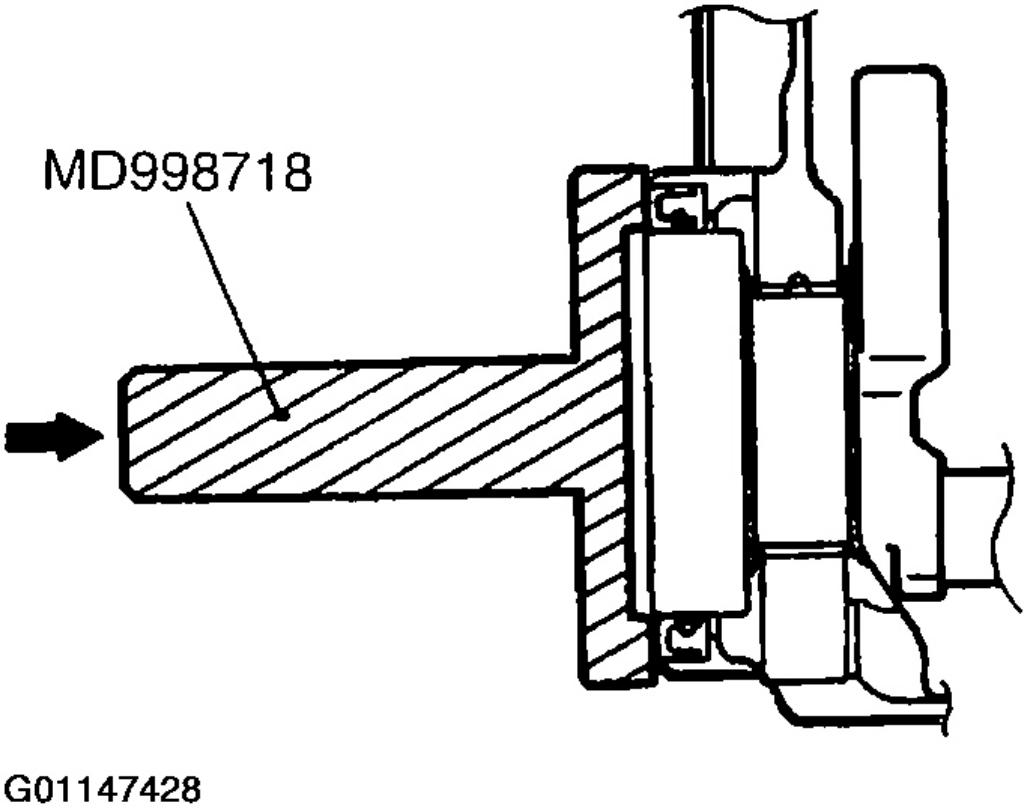


Fig. 31: Installing Oil Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: DRIVE PLATE ADAPTOR PLATE INSTALLATION

Use the special tool to secure the drive plate, and tighten the bolts.

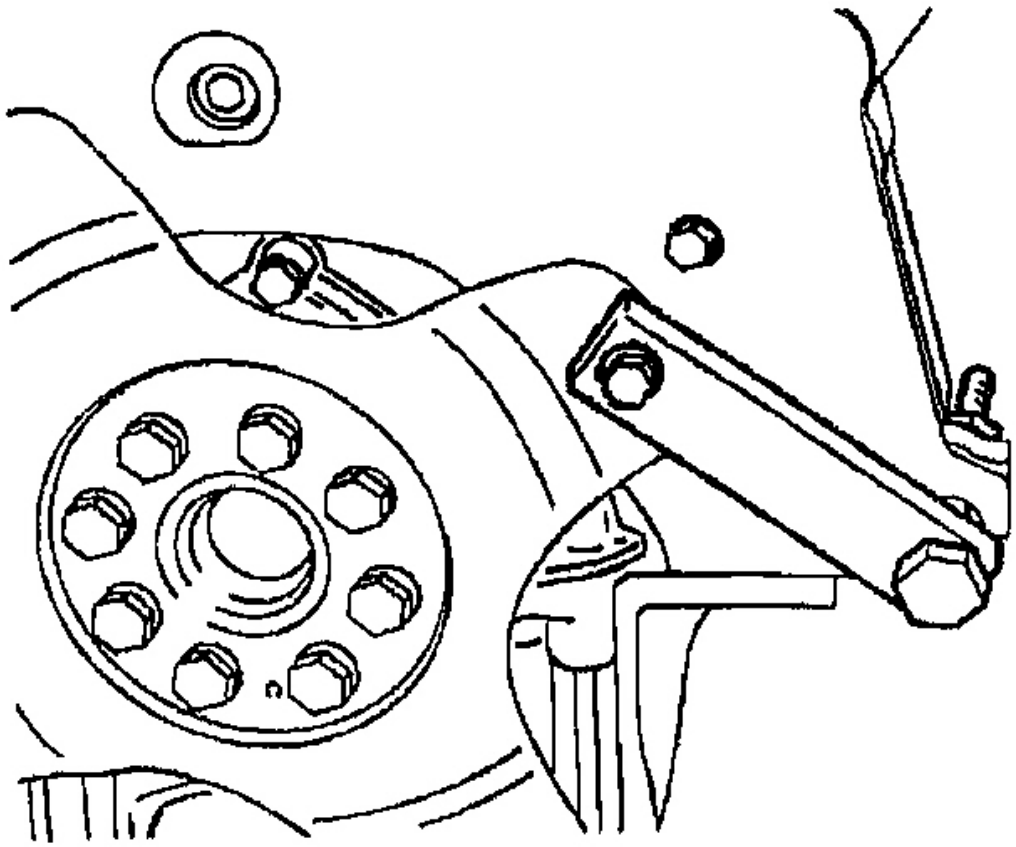


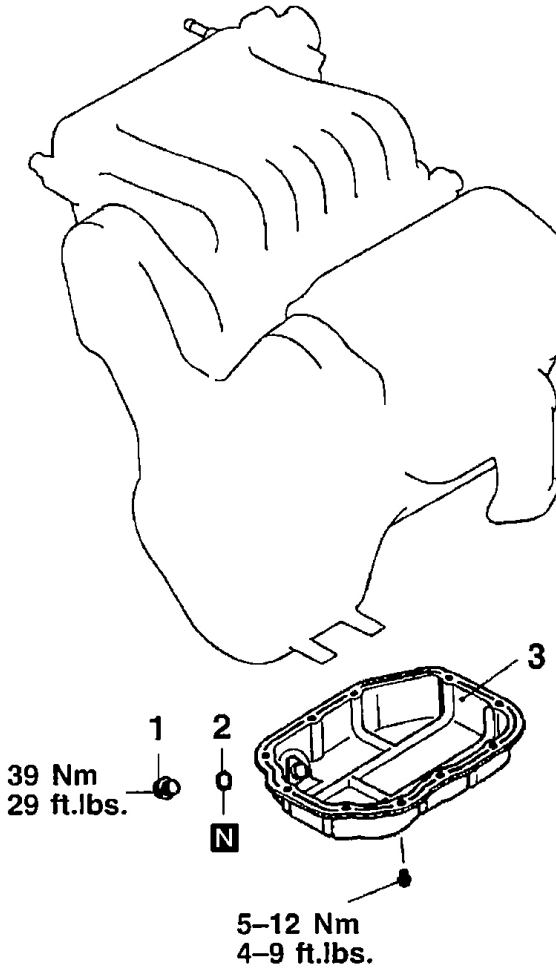
Fig. 32: Holding Drive Plate With Special Tool
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

OIL PAN, LOWER

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

Pre-removal and Post-installation Operation
- Front Exhaust Pipe
- Draining and Filling Engine Oil



REMOVAL STEPS
1. DRAIN PLUG
2. DRAIN PLUG GASKET
◀A▶ ▶A◀ 3. OIL PAN, LOWER

G01147430

Fig. 33: Removing & Installing Lower Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: OIL PAN, LOWER REMOVAL

1. Remove the oil pan, lower installation bolt.
2. Place a wooden block against the oil pan, lower as shown in the figure and remove by tapping with a hammer.

CAUTION: The use of an oil pan remover (MD998727) can damage the oil pan, upper (aluminum made).

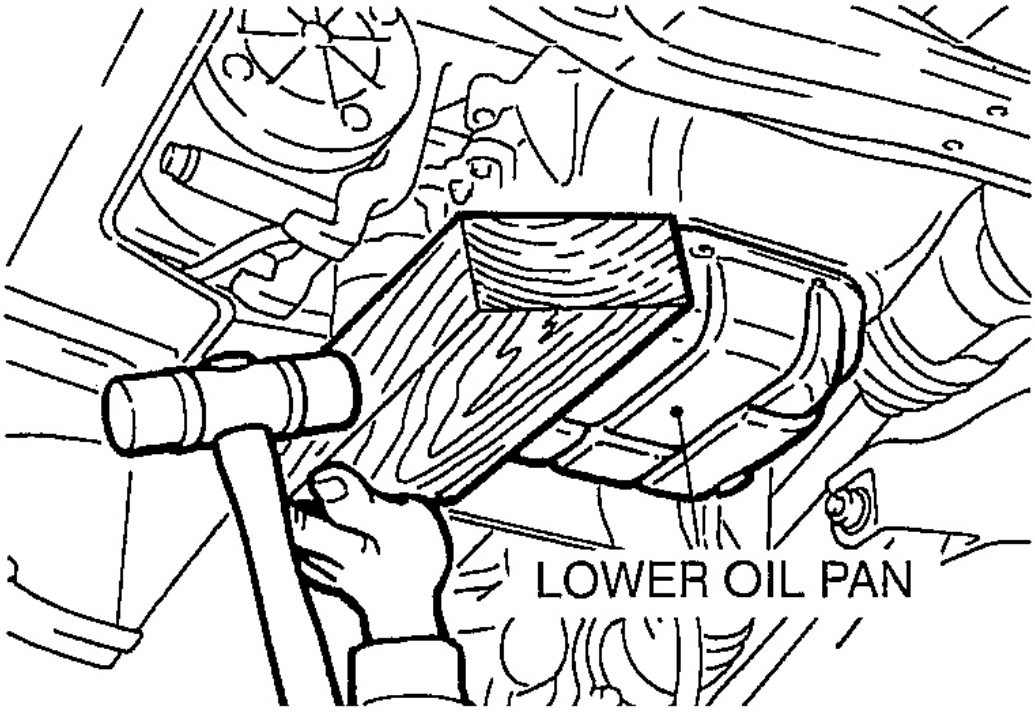
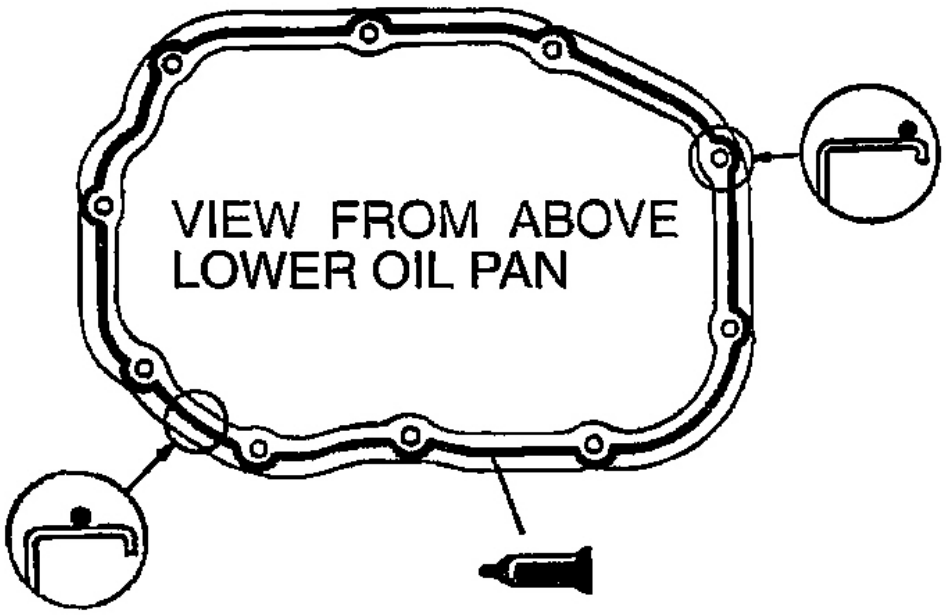


Fig. 34: Removing Lower Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

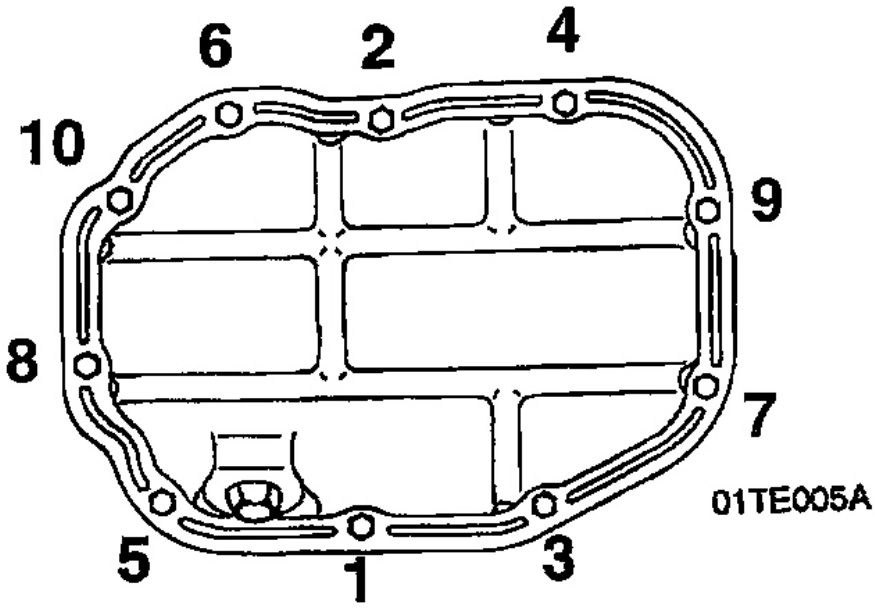
INSTALLATION SERVICE POINT

A: OIL PAN, LOWER INSTALLATION

1. Remove sealant from oil pan and cylinder block mating surfaces.
2. Degrease the sealant-coated surface and the engine mating surface.
3. Apply the specified sealant around the gasket surface of oil pan as specified in illustration.



FLANGE BOLT TIGHTENING SEQUENCE



VIEW FROM THE BOTTOM OF THE LOWER OIL PAN

G01147432

Fig. 35: Applying Sealant To Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent

NOTE: The sealant should be applied in a continuous bead approximately 4 mm (.16 in.) in diameter.

4. Assemble oil pan to cylinder block within 30 minutes after applying the sealant.
5. Tighten the oil pan mounting bolt in the order illustrated (left).

OIL PAN, UPPER

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

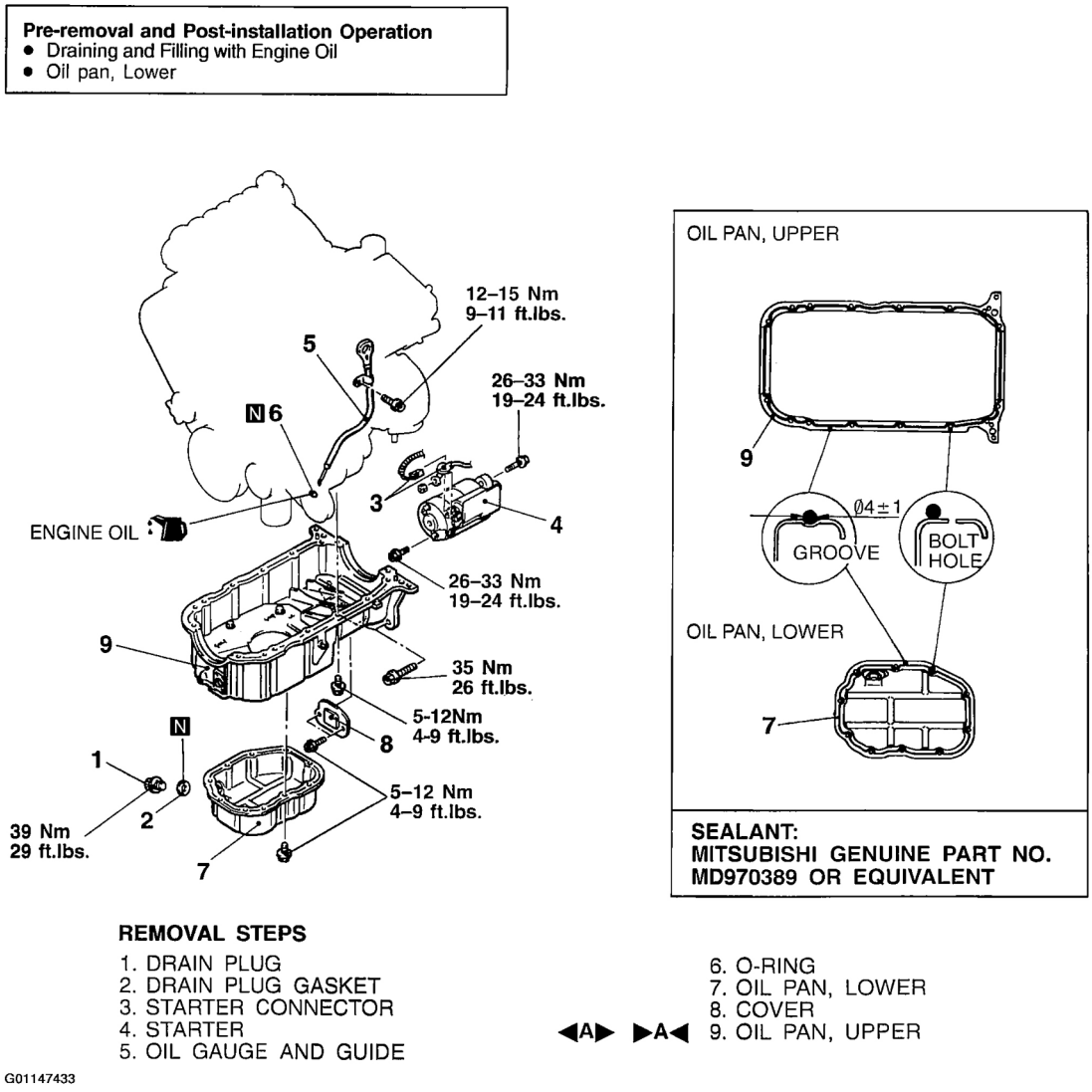


Fig. 36: Removing & Installing Upper Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: OIL PAN, UPPER REMOVAL

1. Detach the bolt (1) shown in illustration.

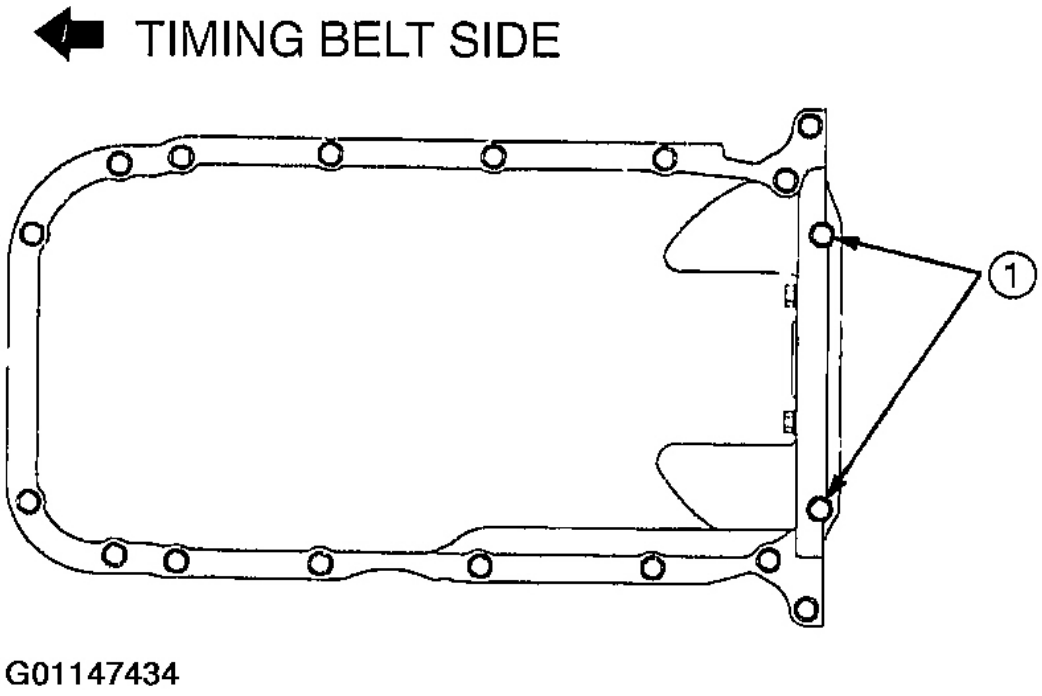
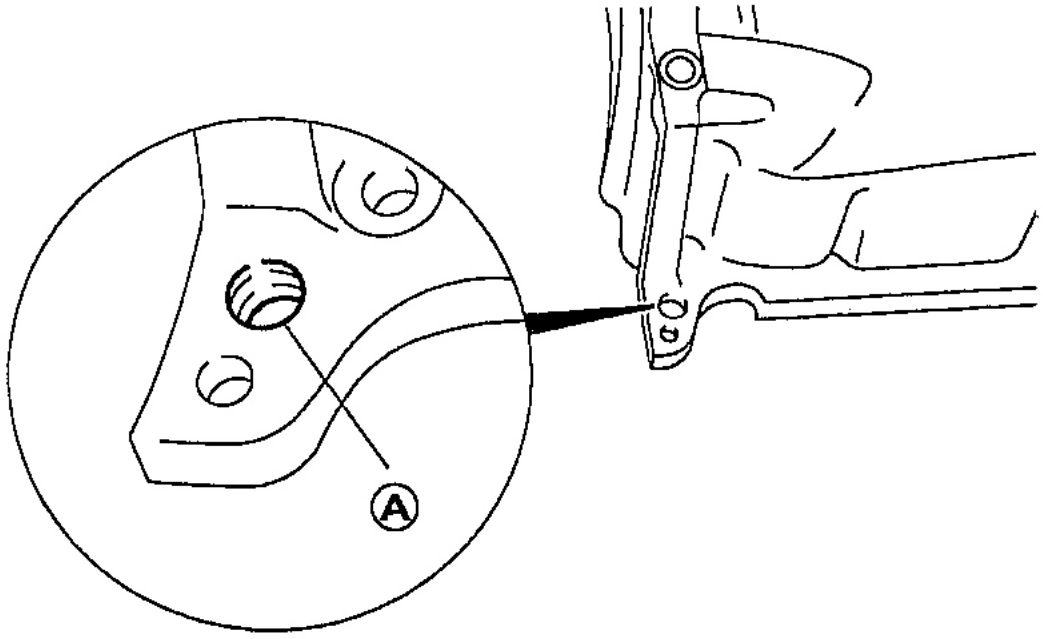


Fig. 37: Identifying Bolt (1)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Detach all other bolts.
3. Screw a bolt into bolt hole (A) shown (at both ends) to remove the oil pan.

CAUTION: The use of an oil pan remover (MD998727) can damage the oil pan, upper (aluminum made).



G01147435

Fig. 38: Identifying Bolt Hole (A)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINT

A: OIL PAN, UPPER INSTALLATION

1. Remove the sealant from the oil pan and cylinder block mating surfaces.
2. Degrease the sealant-coated surface and the engine mating surface.
3. Apply specified sealant around the gasket surface of the oil pan as shown in the illustration.

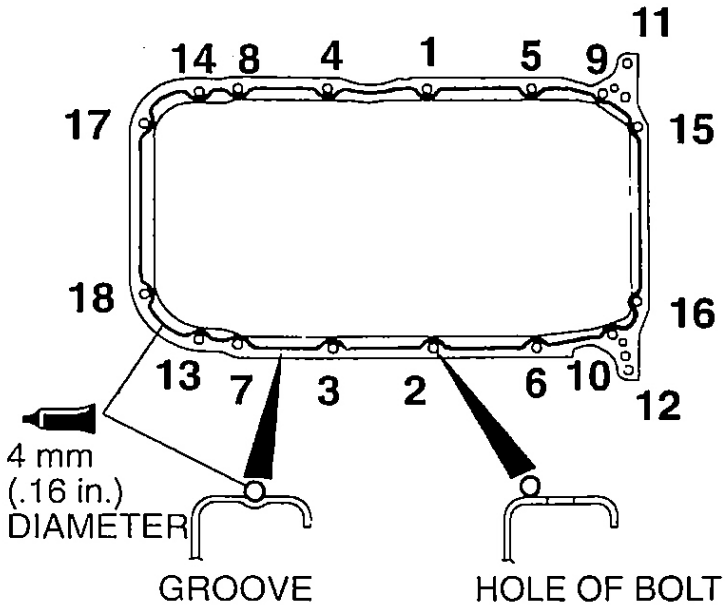
Specified sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent

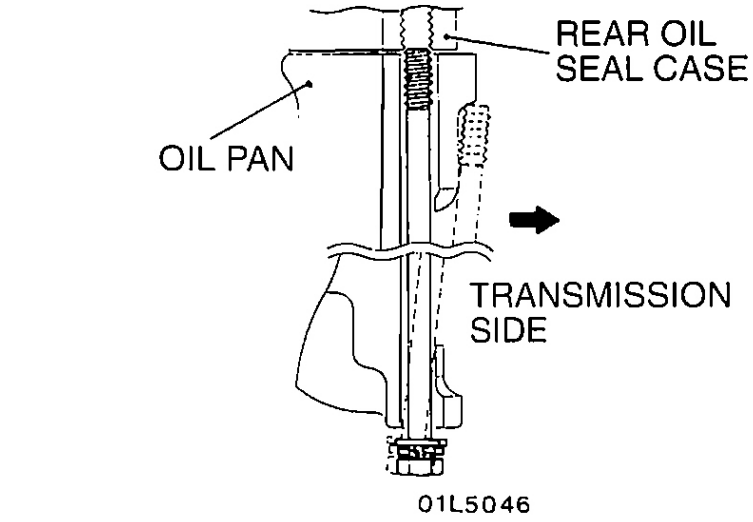
NOTE: The sealant should be applied in a continuous bead approximately 4 mm (.16 in.) in diameter.

4. Install the oil pan to the cylinder block within 30 minutes after applying the sealant.
5. Tighten the oil pan mounting bolts in the order shown in the illustration.

CAUTION: The bolt holes for bolts 15 and 16 in the illustration are cut away on the transmission side, so be careful not to insert these bolts at an

angle.





G01147436

Fig. 39: Installing Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

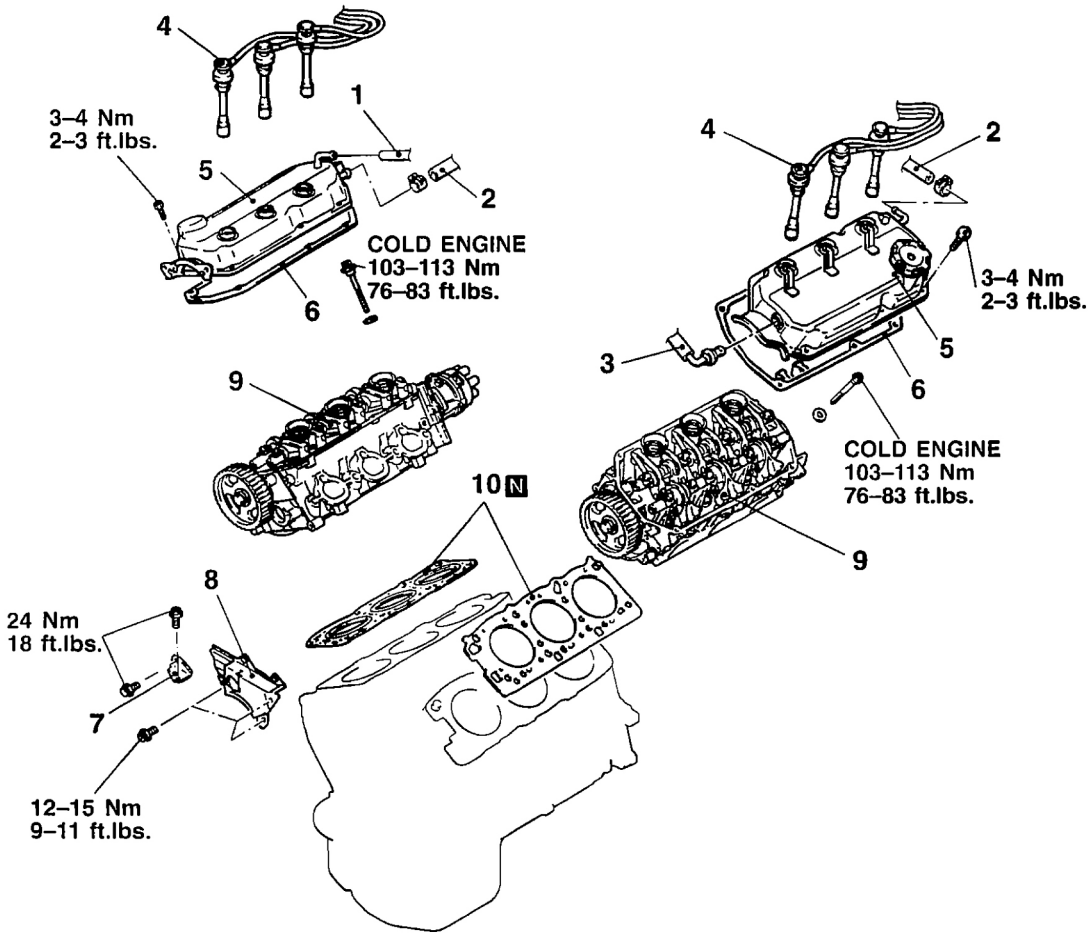
- Check the oil pan for cracks.
- Check the sealant-coated surface of the oil pan for damage and deformation.

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying
- Intake Manifold Removal and Installation
- Exhaust Manifold Removal
- Water Hose Pipe Removal
- Timing Belt Removal and Installation



REMOVAL STEPS

1. BREATHER HOSE
2. BLOW-BY HOSE
3. PVC HOSE
4. SPARK PLUG CABLE
5. ROCKER COVER
6. ROCKER COVER GASKET
7. BRACKET
8. TIMING BELT COVER (REAR CENTER)

◀A▶ ▶B◀ 9. CYLINDER HEAD

▶A◀ 10. CYLINDER HEAD GASKET

G01147437

Fig. 40: Removing & Installing Cylinder Head Gasket
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: CYLINDER HEAD ASSEMBLY REMOVAL

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

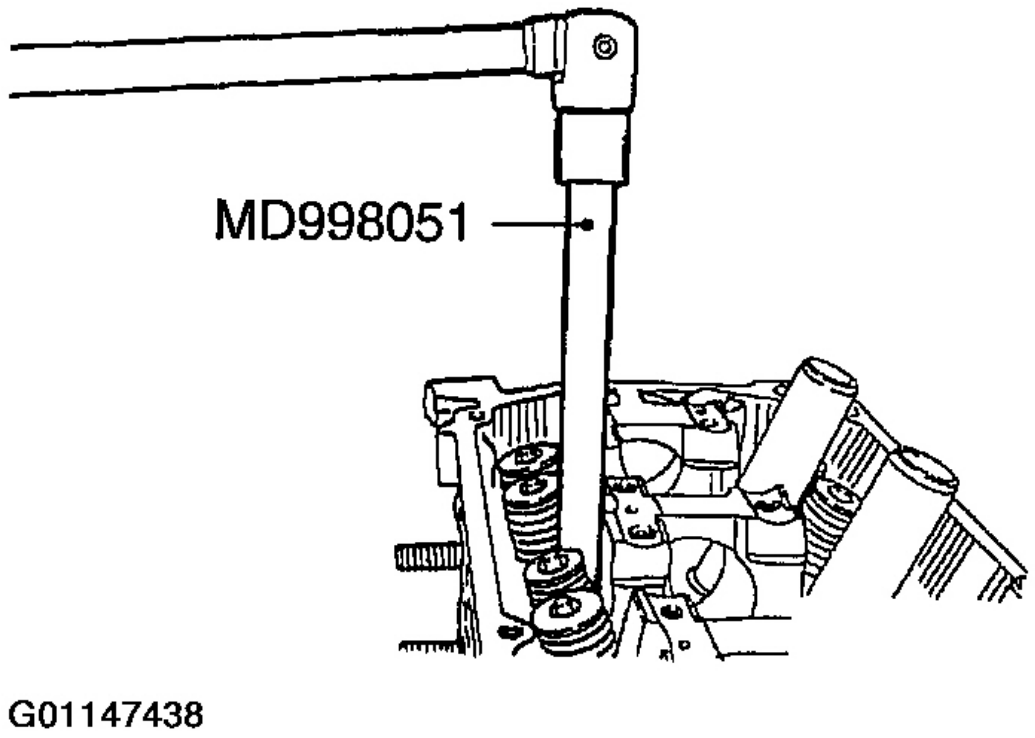


Fig. 41: Removing Cylinder Head Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: CYLINDER HEAD GASKET INSTALLATION

1. Degrease the mounting surface of the cylinder head gasket.
2. Lay the cylinder head gasket on cylinder block with the identification mark at front top.

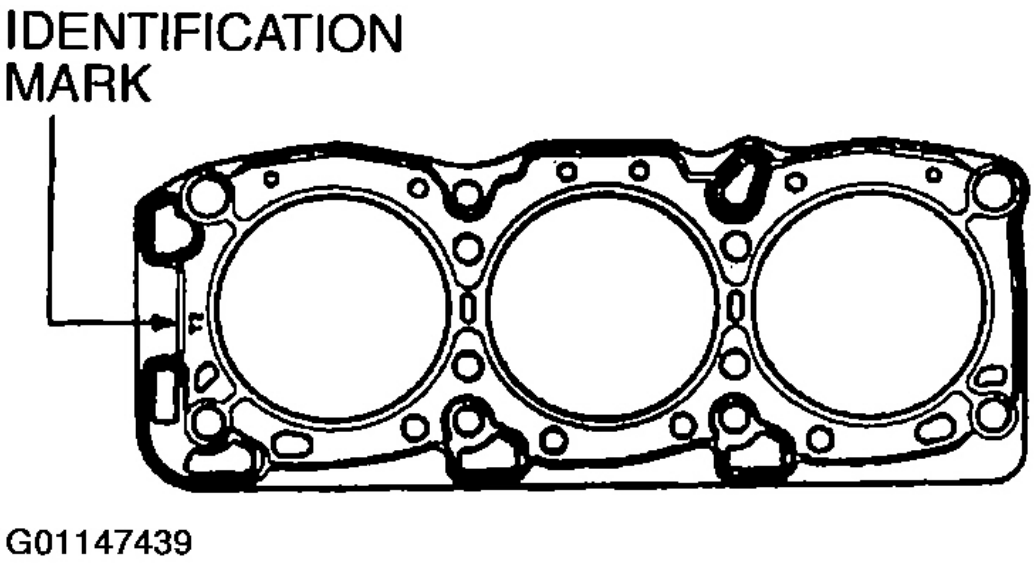


Fig. 42: Locating Identification Mark
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: CYLINDER HEAD ASSEMBLY INSTALLATION

Using the special tool, tighten the bolts in the order shown in two or three steps.

CAUTION: Attach the head bolt washer in the direction shown in the figure.

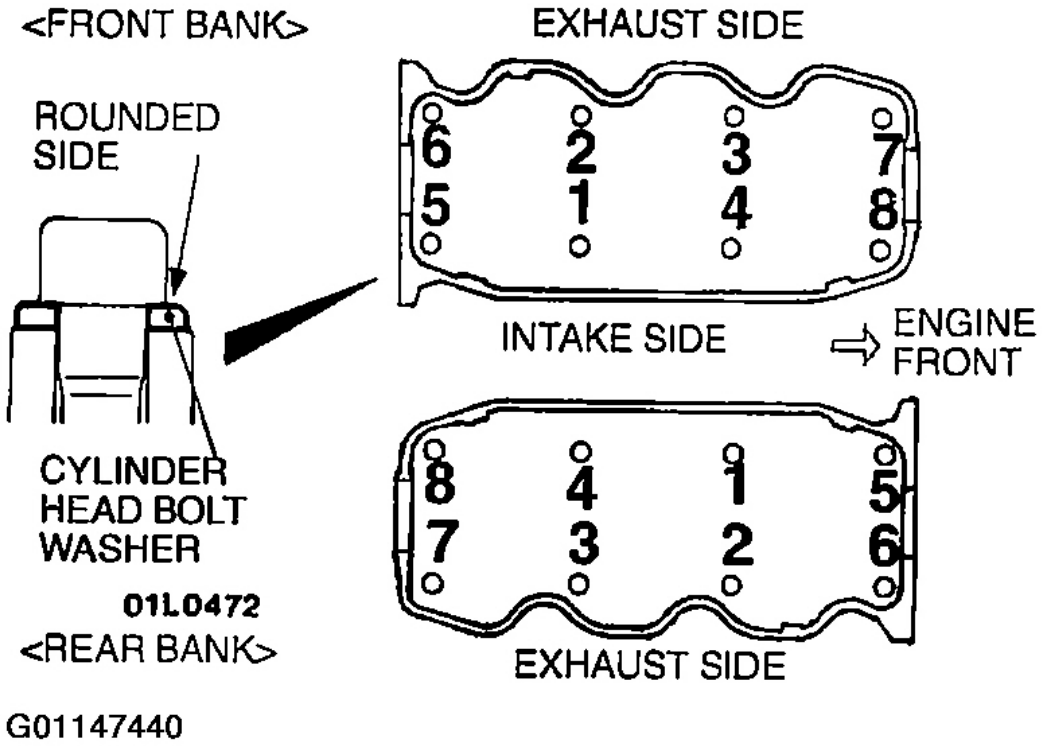


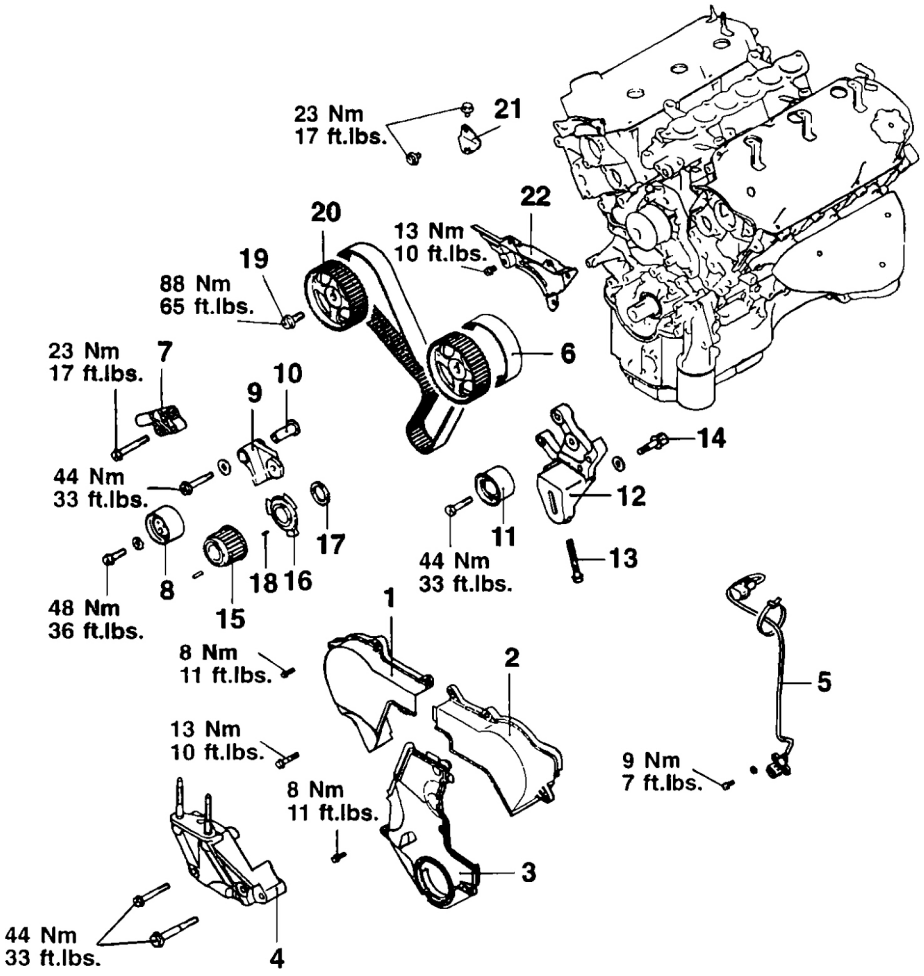
Fig. 43: Cylinder Head Bolt Tightening Sequence
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TIMING BELT

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

Pre-removal and Post-Installation Operation
Removal and installation
- Generator and drive belt
- Crankshaft pulley



REMOVAL STEPS

1. TIMING BELT FRONT UPPER COVER, REAR
2. TIMING BELT FRONT UPPER COVER, FRONT
3. TIMING BELT FRONT LOWER COVER
4. ENGINE SUPPORT BRACKET
5. CRANK ANGLE SENSOR
◀A▶ ▶B◀ ▶A◀ 6. TIMING BELT
7. AUTOMATIC TENSIONER
8. TENSIONER PULLEY
9. TENSIONER ARM
10. SHAFT
11. IDLER PULLEY
12. IDLER PULLEY ADJUSTING BRACKET
13. ADJUSTING BOLT
14. ADJUSTING STUD
15. CRANKSHAFT SPROCKET
16. SENSING BLADE
17. CRANKSHAFT SPACER
18. CRANKSHAFT KEY
19. CAMSHAFT SPROCKET BOLT
20. CAMSHAFT SPROCKET
21. BRACKET
22. TIMING BELT REAR COVER

G01147441

Fig. 44: Removing & Installing Timing Belt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: TIMING BELT REMOVAL

1. Align the timing marks.

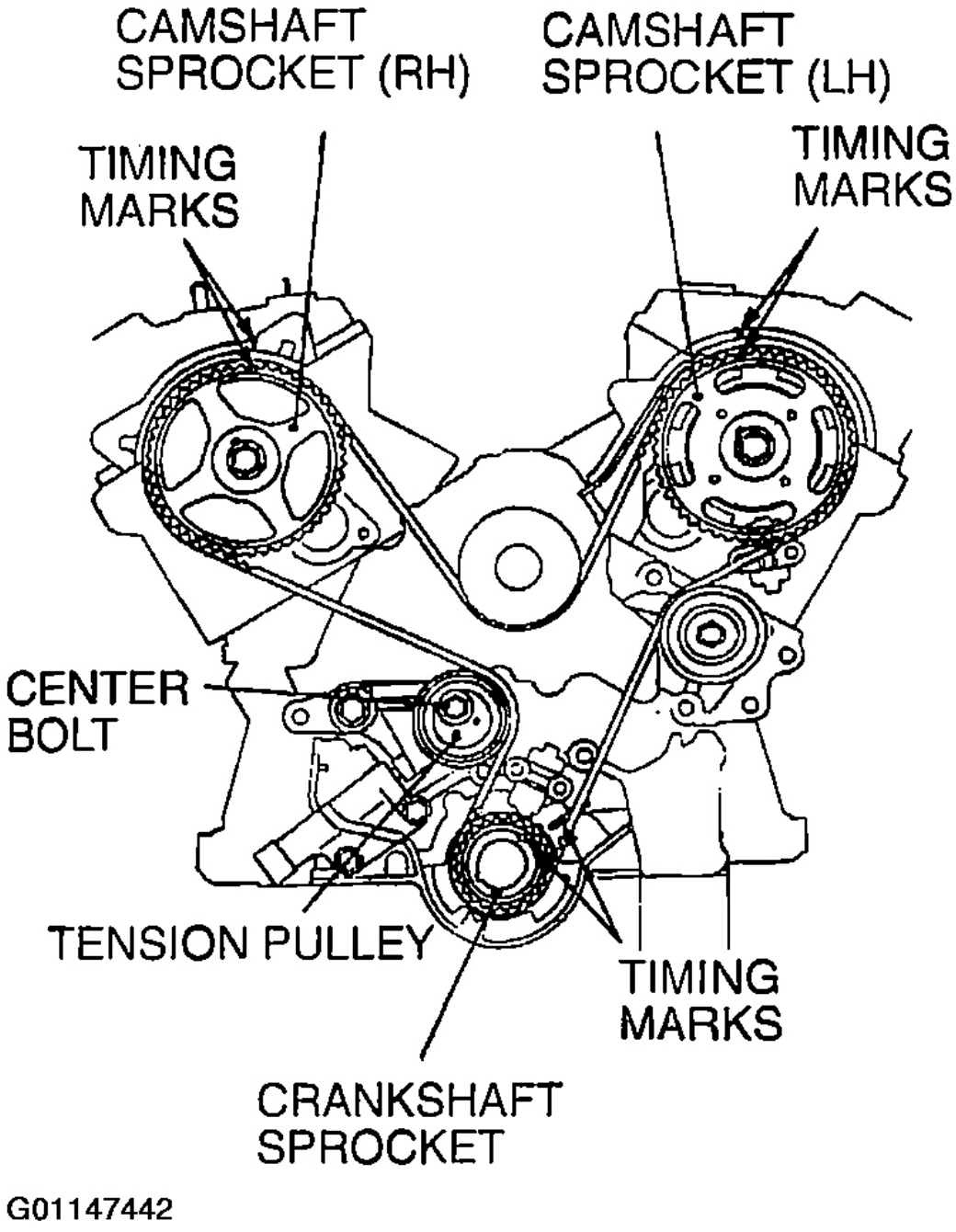


Fig. 45: Aligning Timing Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Loosen the center bolt on the tension pulley to remove the timing belt.

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

INSTALLATION SERVICE POINTS

A: AUTO TENSIONER INSTALLATION

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

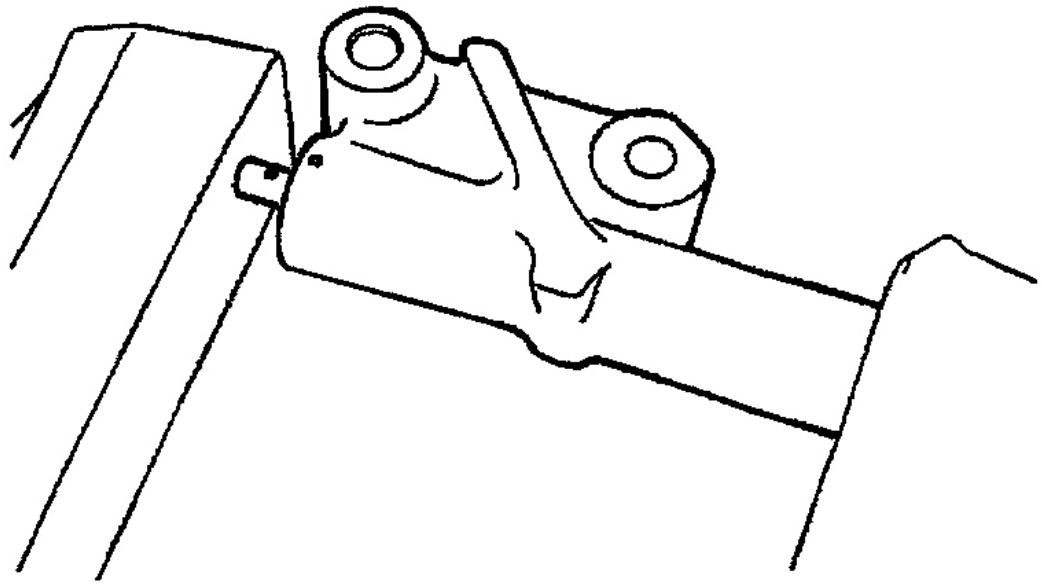


Fig. 46: Compressing Auto Tensioner
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

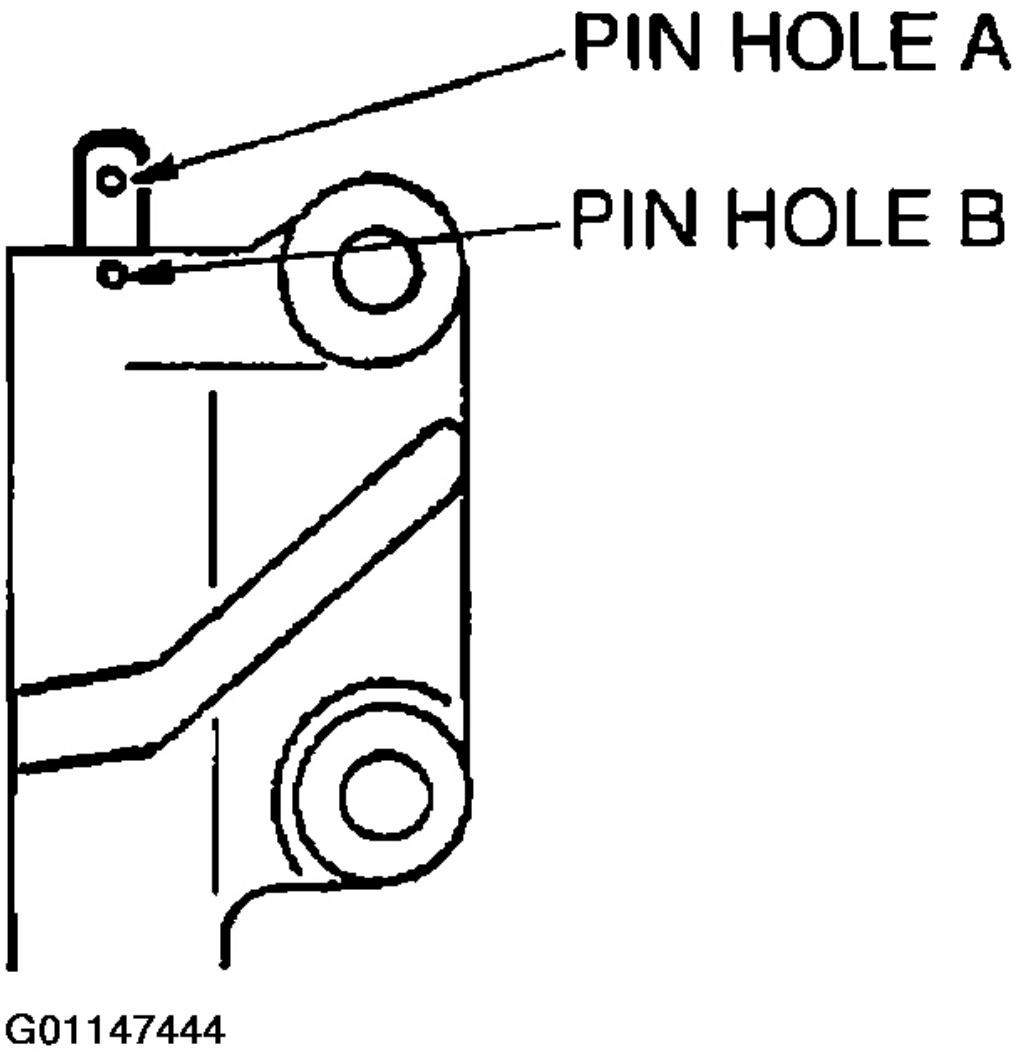


Fig. 47: Identifying Pin Holes
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAUTION: The auto tensioner must be placed at a right angle to the pressing surface of press or vice.

CAUTION: Push in the rod slowly to prevent the push rod from being damaged.

3. Insert a wire [1.4 mm (.055 in.) in diameter] into the pin holes.

NOTE: The wire should be as stiff as possible (such as piano wire, etc.), and should be bent into the shape of an "L".

4. Unclamp the auto tensioner from the vice.

2. Install the auto tensioner.

CAUTION: Leave the wire installed in the auto tensioner.

B: TIMING BELT INSTALLATION

1. Align the timing marks of the camshaft sprockets and crankshaft sprocket.
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. Tension pulley

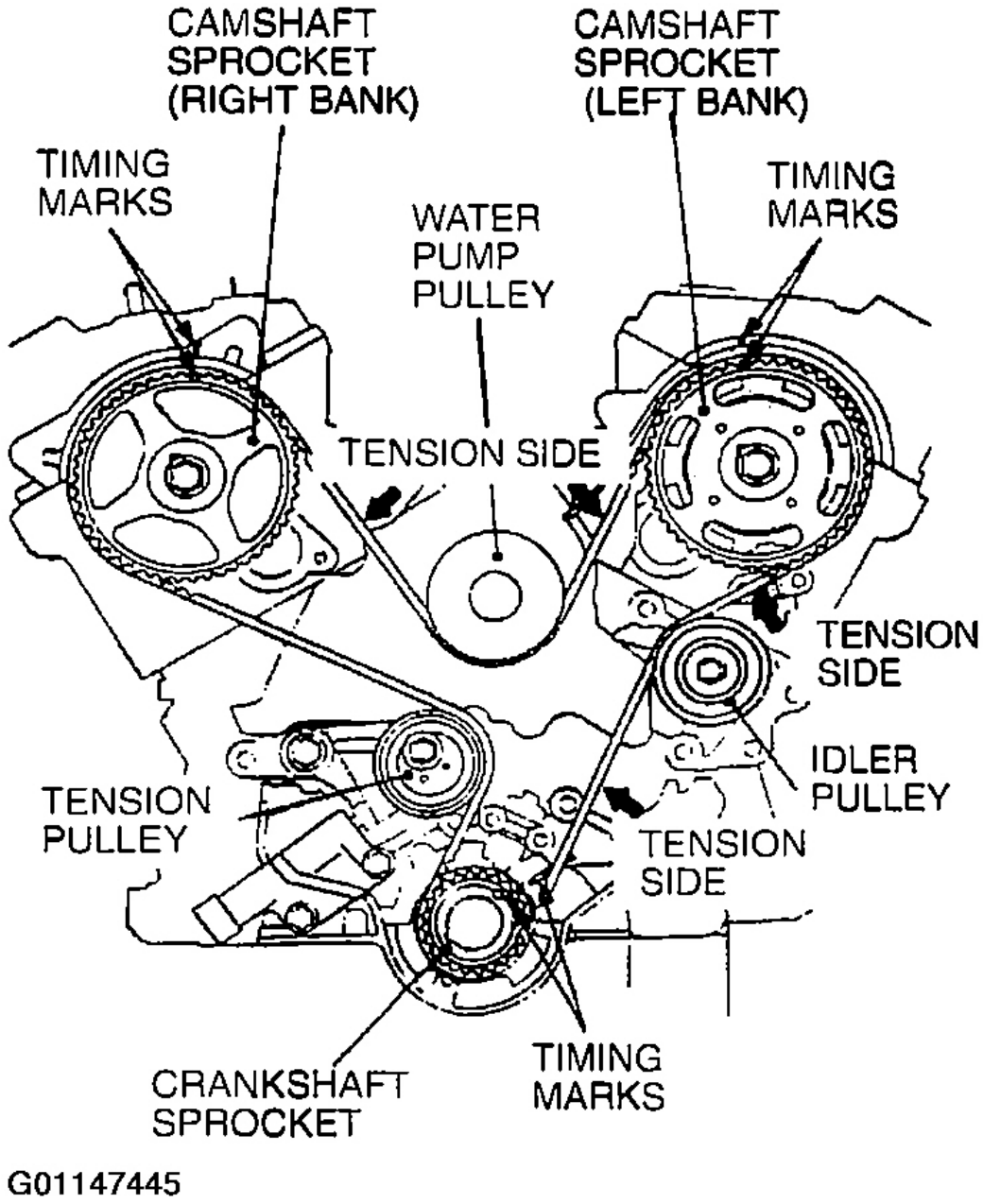


Fig. 48: Installing Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

3. Turn the camshaft sprocket (right bank) counterclockwise until the tension side of the timing belt is firmly stretched, and then check again that all timing marks are aligned.
4. Use the special tool to push the tension pulley into the timing belt, and then temporarily tighten the center bolt.

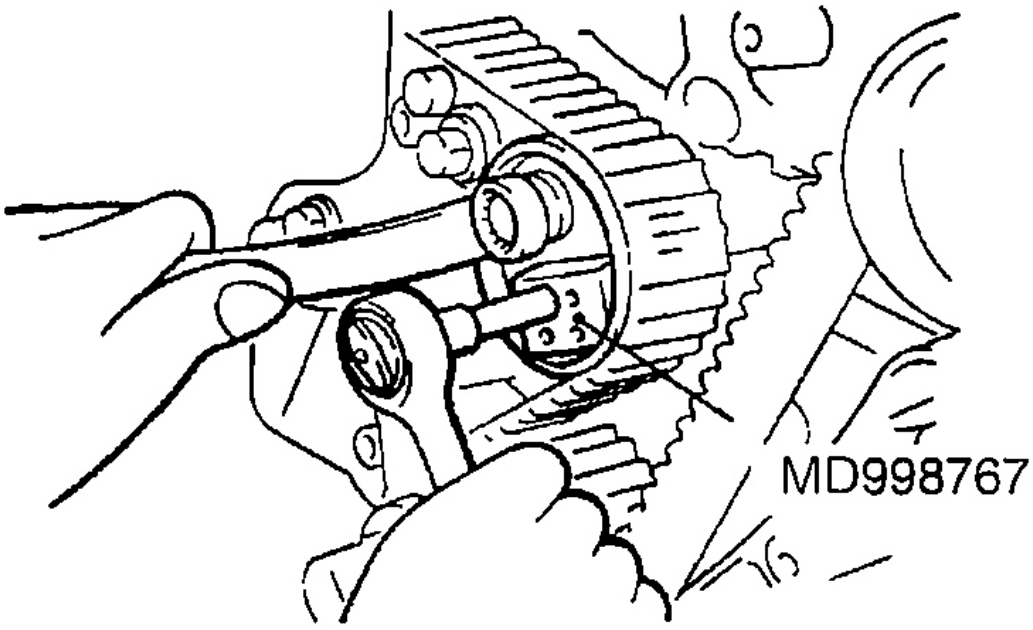


Fig. 49: Using Special Tool To Push Tension Pulley Into Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

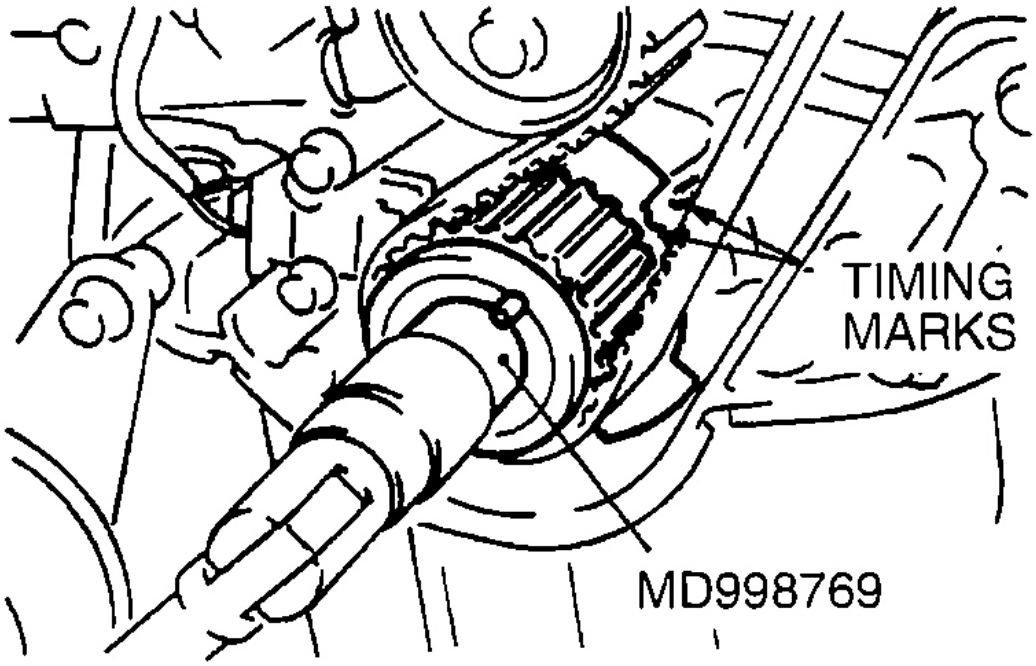


Fig. 50: Aligning Crankshaft Timing Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

6. Loosen the center bolt on the tensioner pulley. Using the special tool and torque wrench, apply tensioning torque to the timing belt and, at the same time, tighten the center bolt to specification.

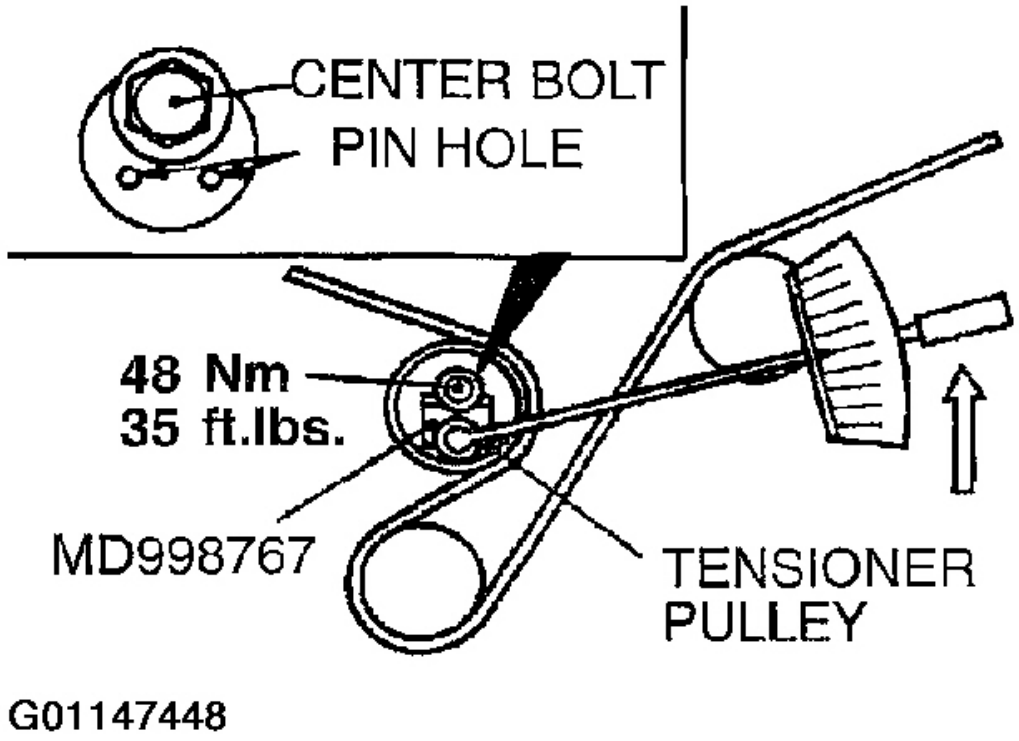


Fig. 51: Applying Tensioning Torque To Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Reference value: 4.4 Nm (3.3 ft. lbs.) (Timing belt tensioning torque)

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

7. Remove the setting pin that has been inserted into the auto tensioner.

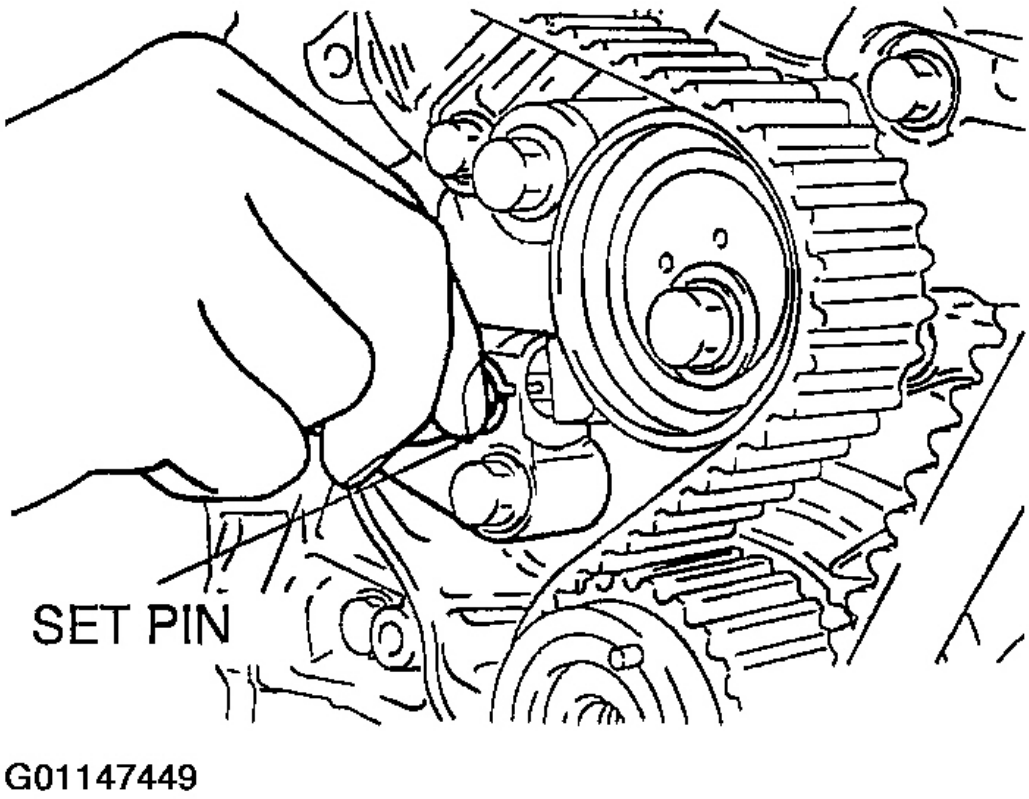


Fig. 52: Removing Setting Pin
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

8. Turn the crankshaft two turns clockwise to align the timing marks.
9. Leave everything in this condition for five minutes or more, and then check that the protrusion of the auto tensioner push rod is within the range of the standard value.

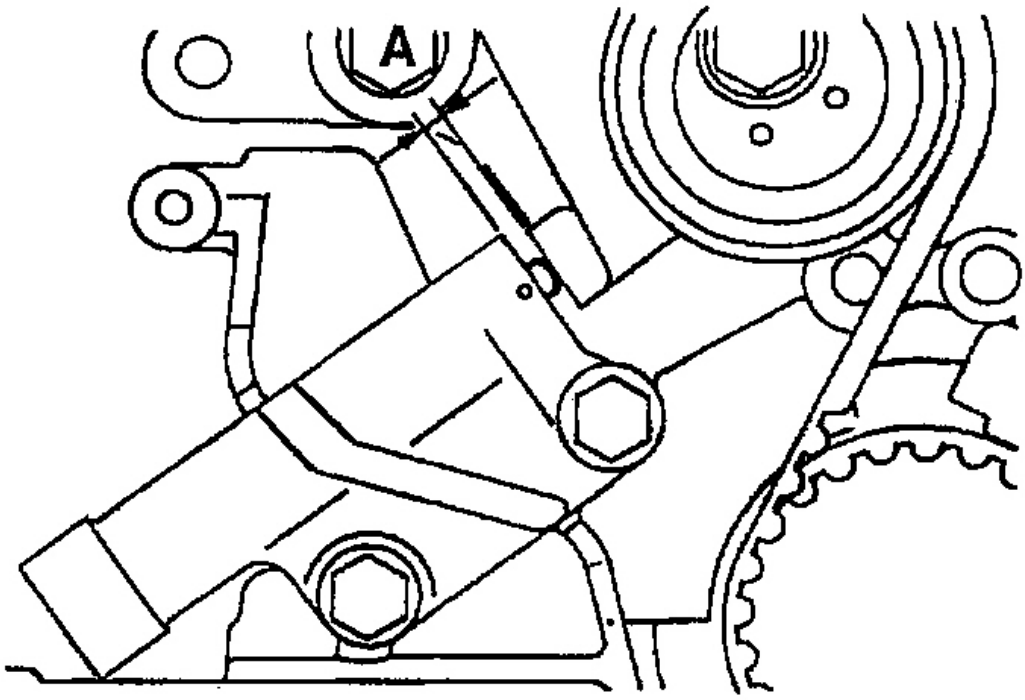


Fig. 53: Checking Protrusion Of Auto Tensioner Push Rod
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value (A): 4.8-6.0 mm (.189-.236 in.)

10. If the protrusion is out of specification, repeat steps (5) to (9).
11. Check again that timing marks on all sprockets are aligned properly.

INSPECTION

AUTO TENSIONER

- Check the auto-tensioner for possible leaks.
- Check the push rod for cracks.

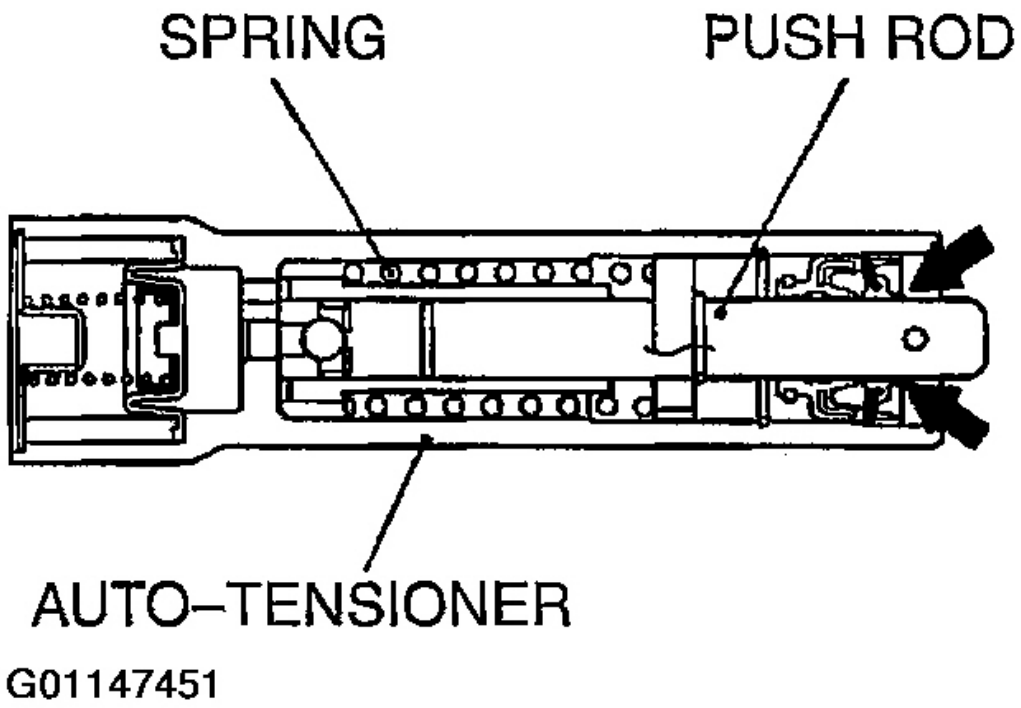


Fig. 54: Checking Auto Tensioner
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

1. Hold the auto tensioner by hand and measure contraction (A) when pressing the tip of the rod on a steel (cylinder block; etc.) with a force of 98-196 N (22-44 lbs.).

   Standard value (A): 1 mm (.04 in.) or less

2. If not within the standard value, replace the auto tensioner.

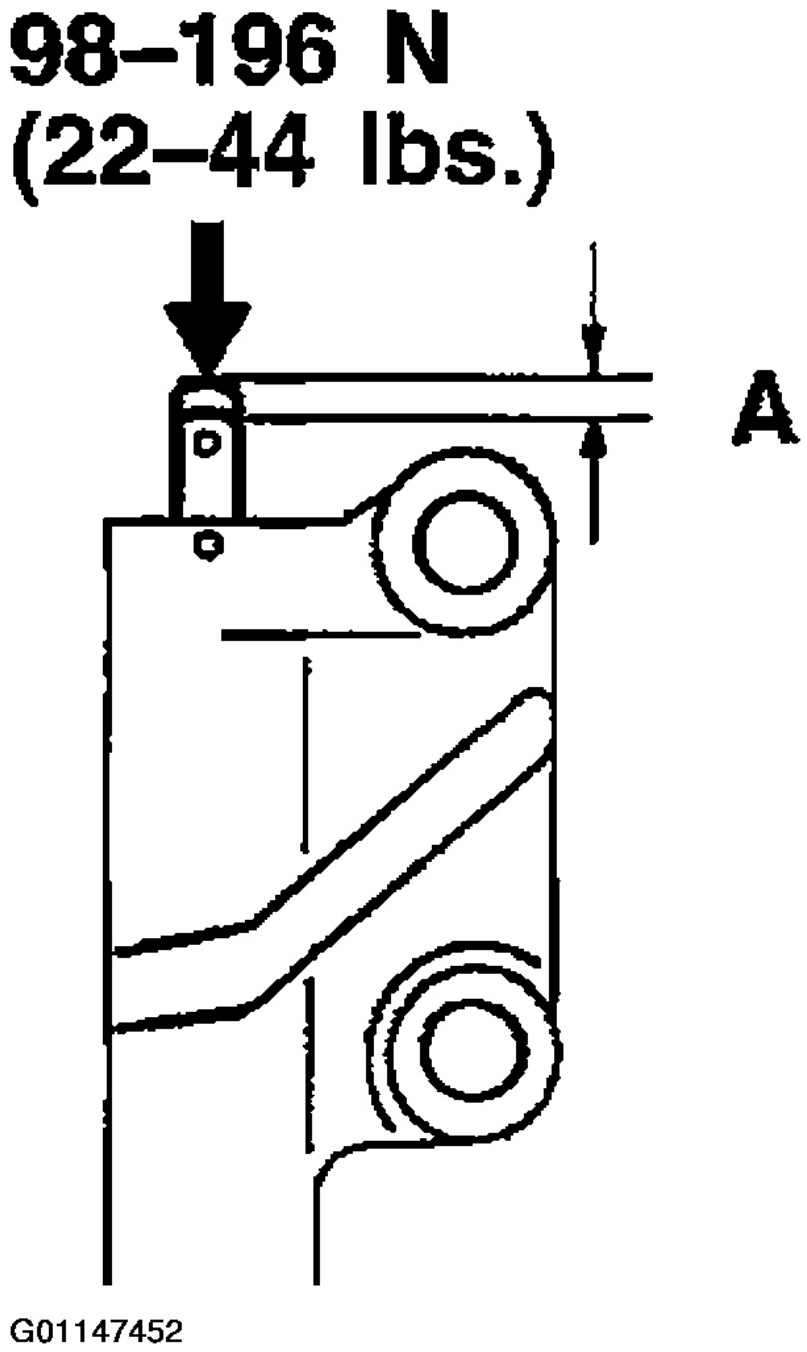


Fig. 55: Measuring Contraction
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

ITEMS	SPECIFICATION
Accelerator cable	5 Nm (4 ft. lbs.)
Automatic tensioner	23 Nm (17 ft. lbs.)
Bracket	24 Nm (18 ft. lbs.)
Camshaft sprocket	88 Nm (65 ft. lbs.)
Crankshaft position sensor	9 Nm (7 ft. lbs.)
Cylinder head < cold engine>	103-113 Nm (76-83 ft. lbs.)
Drive plate	75 Nm (54 ft. lbs.)
Engine mount	98-118 Nm (73-78 ft. lbs.)
Engine support bracket	44 Nm (33 ft. lbs.)
High pressure fuel hose	5 Nm (4 ft. lbs.)
Idler pulley	44 Nm (33 ft. lbs.)
Oil drain plug	39 Nm (29 ft. lbs.)
Oil gauge and guide	12-15 Nm (9-11 ft. lbs.)
Oil pan, lower	5-12 Nm (4-9 ft. lbs.)
Oil pan, upper	5-12 Nm (4-9 ft. lbs.)
Oil seal case	11 Nm (8 ft. lbs.)
Power steering oil pump	39 Nm (29 ft. lbs.)
Power steering pressure hose	24 Nm (18 ft. lbs.)
Rear plate	11 Nm (8 ft. lbs.)
Rocker cover	3-4 Nm (2-3ft. lbs.)
Starter motor	26-33 Nm (19-24 ft. lbs.)
Tensioner arm	44 Nm (33 ft. lbs.)
Tensioner pulley	48 Nm (36 ft. lbs.)
Timing belt cover < rear>	13 Nm (10 ft. lbs.)
Timing belt cover < rear center>	12-15 Nm (9-11 ft. lbs.)
Timing belt front lower cover	8 Nm (11 ft. lbs.)
Timing belt front upper cover, front	8 Nm (11 ft. lbs.)
Timing belt front upper cover, rear	8 Nm (11 ft. lbs.)

SERVICE SPECIFICATIONS

ITEMS			STANDARD VALUE	LIMIT
Drive belt tension N (lbs.)	Generator and A/C compressor V-ribbed type	When checked	490–686 (109–152)	–
		When new belt is installed	784–980 (174–218)	–
		When used belt is installed	539–637 (120–142)	–
	Power steering pump	When checked	373–569 (83–126)	–
		When new belt is installed	608–804 (135–179)	–
		When used belt is installed	422–520 (94–116)	–
Drive belt deflection <Reference value> mm (in.)	Generator and A/C compressor V-ribbed type	When checked	7.9–9.7 (.31–.38)	–
		When new belt is installed	6.0–7.2 (.24–.28)	–
		When used belt is installed	8.2–9.3 (.32–.37)	–
	Power steering pump	When checked	11.0–14.2 (.43–.56)	–
		When new belt is installed	8.4–9.3 (.33–.37)	–
		When used belt is installed	11.7–13.4 (.46–.52)	–
Basic ignition timing at idle			5° BTDC ± 3°	–
Actual ignition timing at curb idle			Approx. 15° BTDC	–
CO contents %			0.5 or less	–
HC contents ppm			100 or less	–
Curb idle speed r/min			700±100	–

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Fig. 56: Service Specifications (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ITEMS		STANDARD VALUE	LIMIT
Compression pressure (250–400 r/min) kPa (psi)		1,200 (171)	min. 890 (127)
Compression pressure difference of all cylinder kPa (psi)		–	max. 100 (14)
Intake manifold vacuum at curb idle kPa (in.Hg)		–	min. 60 (18)
Timing belt	Amount of projection of auto tensioner rod mm (in.) (Distance between the tensioner arm and auto tensioner body)	4.8 – 6 .0 (.189 – .236)	–

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Fig. 57: Service Specifications (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SEALANT

ITEMS	RECOMMENDED SEALANT
Oil pan	MITSUBISHI GENUINE Part No. MD970389 or equivalent

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Fig. 58: Recommended Sealant
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIAL TOOLS

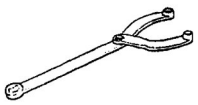
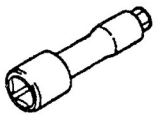
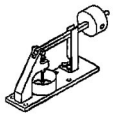
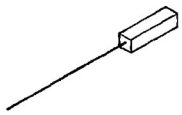
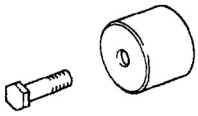
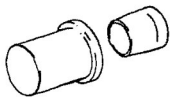
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990767 End yoke holder Use with MD998715	MB990767-01 Use with MIT308239	Holding camshaft sprocket when loosening bolt.
	MB991559 Camshaft oil seal installer adaptor	–	Installation of camshaft oil seal (Left bank) (Use with MD998713)
	MD998051 Cylinder head bolt wrench	MD998051-01	Loosening and tightening cylinder head bolts
	MD998440 Leak-down tester	–	Leak-down test of lash adjuster
	MD998441 Lash adjuster retainer	–	Bleeding of air inside adjuster
	MD998442 Air bleed wire	–	Air bleeding of auto lash adjuster
	MD998443 Lash adjuster holder (8)	MD998443-01	Supporting lash adjuster to prevent it from falling when rocker shaft assembly is removed or installed
	MD998713 Camshaft oil seal installer	MD998713-01	Installation of camshaft oil seal
	MD998717 Crankshaft front oil seal installer	MD998717-01	Installation of crankshaft front oil seal

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Fig. 59: Special Tools (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

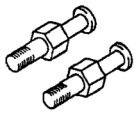
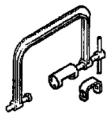
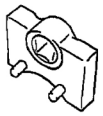
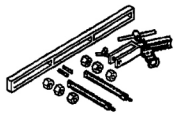
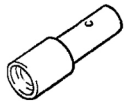
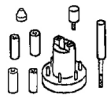
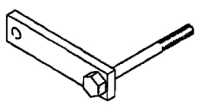
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998718 Crankshaft rear oil seal installer	MD998718-01 Use with MB990938-01	Installation of crankshaft rear oil seal
	MD998715 Pulley holding pins (2)	MIT308239	Holding camshaft sprocket when loosening or torquing bolt
	MD998735 Valve spring compressor	MD998735-01	Removal and installation of valve and related parts
	MD998767 Tension pulley wrench	MD998752-01	Adjustment of timing belt tension
	MD998769 Crankshaft spacer	–	Rotation of crankshaft when installing piston and timing belt
	MD998772 Valve spring compressor	General service tool	Compression of valve spring
	MD998774 Valve stem seal installer	MD998774-01	Installation of valve stem seal
	MD998780 Piston pin setting tool	MIT216941	Removal and installation of piston pin
	MD998781 Flywheel stopper	–	Loosening and tightening crankshaft bolts

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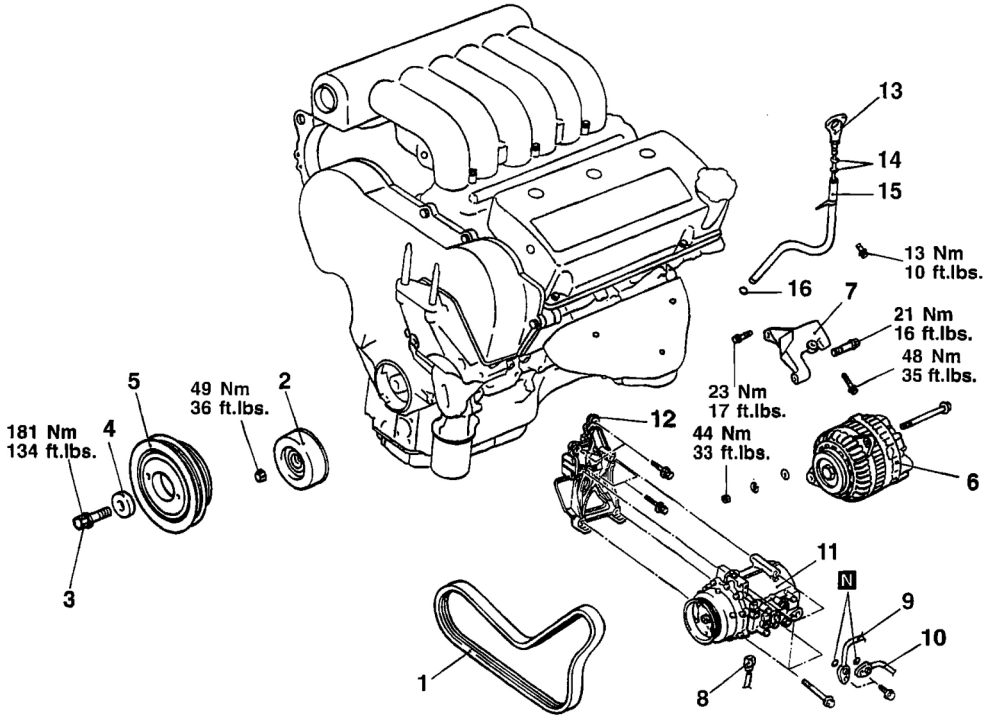
Fig. 60: Special Tools (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

GENERATOR AND DRIVE BELT

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

- ▶B◀ 1. DRIVE BELT
- 2. TENSIONER PULLEY
- ◀A▶ ▶A◀ 3. CRANKSHAFT BOLT
- 4. WASHER
- 5. CRANKSHAFT PULLEY
- 6. GENERATOR
- 7. GENERATOR BRACKET
- 8. HARNESS CONNECTOR
- 9. SUCTION HOSE CONNECTION
- 10. DISCHARGE HOSE CONNECTION
- 11. COMPRESSOR
- 12. COMPRESSOR BRACKET
- 13. DIP STICK
- 14. O–RING
- 15. DIP STICK TUBE
- 16. O–RING

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Fig. 61: Removing & Installing Generator And Drive Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: CRANKSHAFT BOLT LOOSENING

1. Using the special tool, hold the drive plate.
2. Remove the crankshaft bolt.

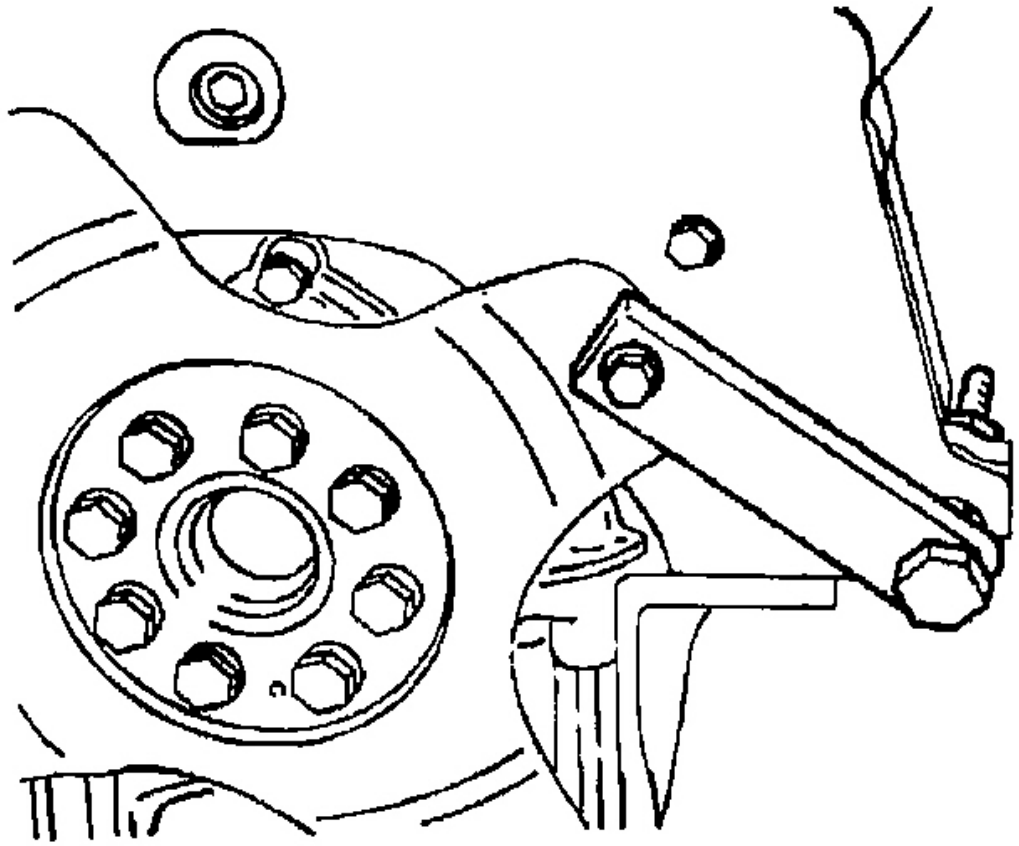

Fig. 62: Holding Drive Plate With Special Tool
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINT

A: CRANKSHAFT BOLT TIGHTENING

1. Using the special tool, hold the drive plate or flywheel.
2. Install the crankshaft bolt.

B: DRIVE BELT TENSION ADJUSTMENT

- Use a belt tension gauge to check belt tension, or check deflection by applying 98 N (22 lbs.) to the shown point.

Standard value:

GENERATOR DRIVE BELT	TENSION N (lbs.)
New	784 – 980 (174 – 218)
Used	539–637 (120 – 142)

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Fig. 63: Generator Drive Belt Tension Specifications
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

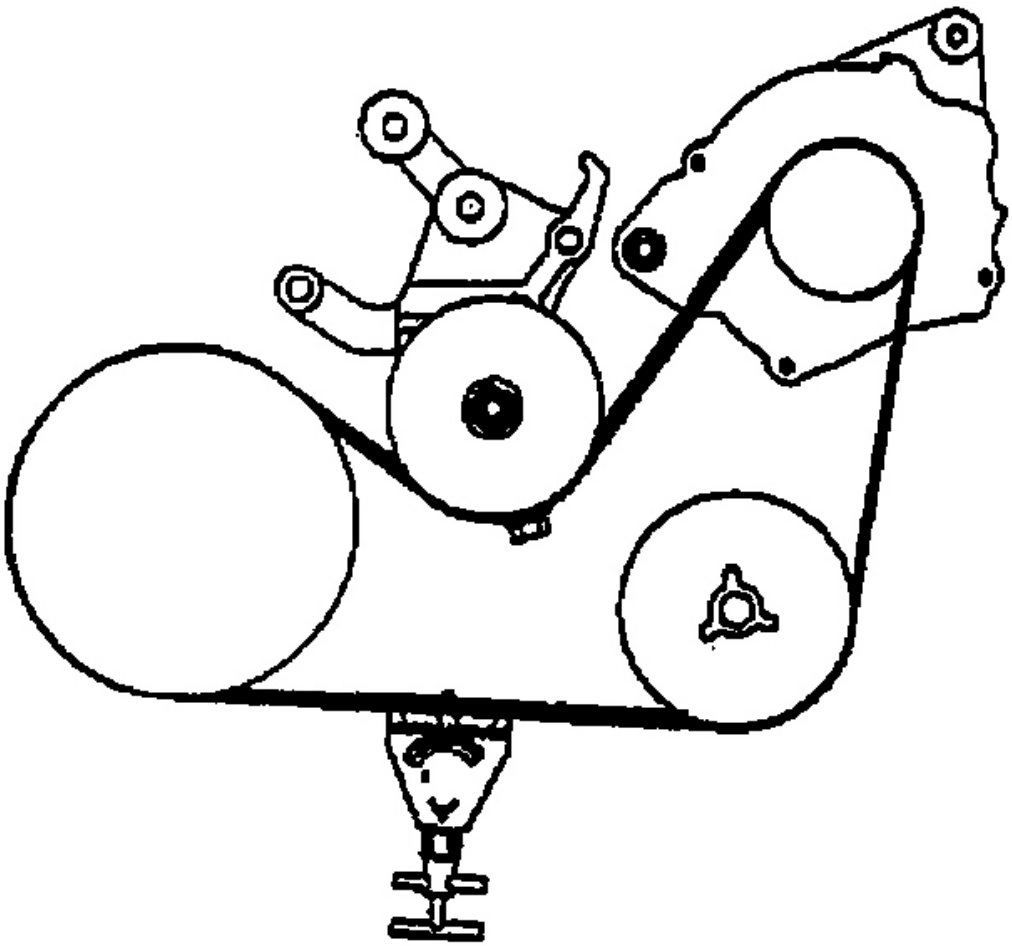

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Fig. 64: Checking Generator Drive Belt Tension
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

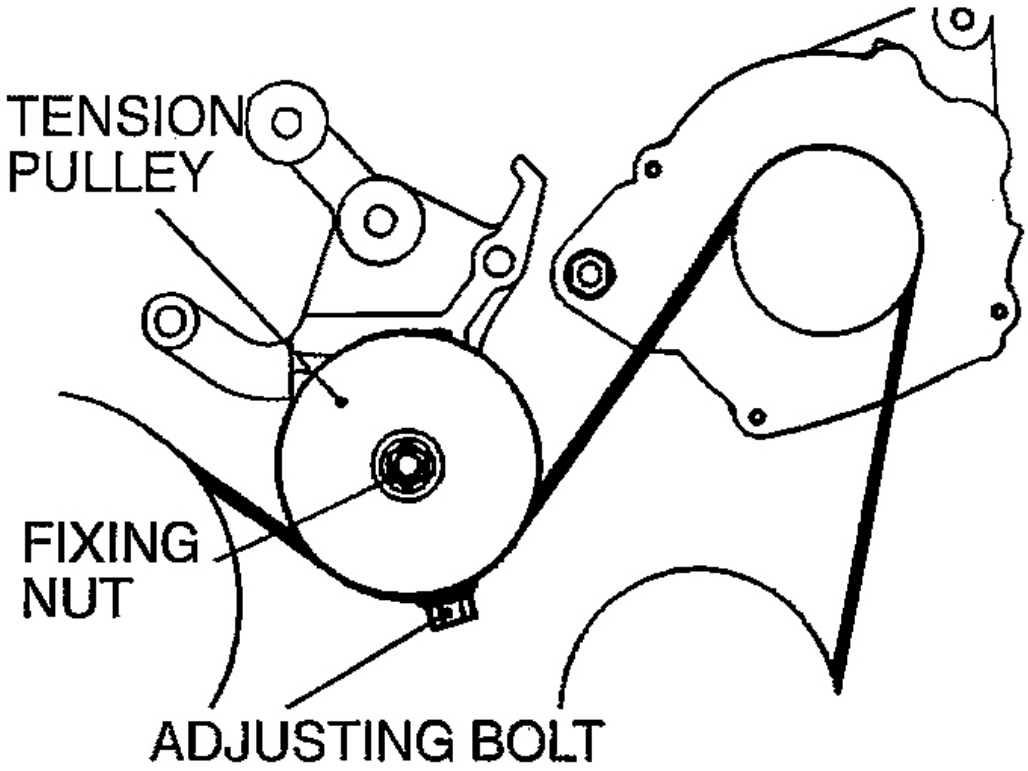

Fig. 65: Locating Adjusting Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value:

GENERATOR DRIVE BELT	DEFLECTION (REFERENCE VALUE) mm (in.)
New	6.0 – 7.2 (.24 – .28)
Used	8.2 –9.3 (.32 – .37)

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Fig. 66: Generator Drive Belt Deflection Specifications

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

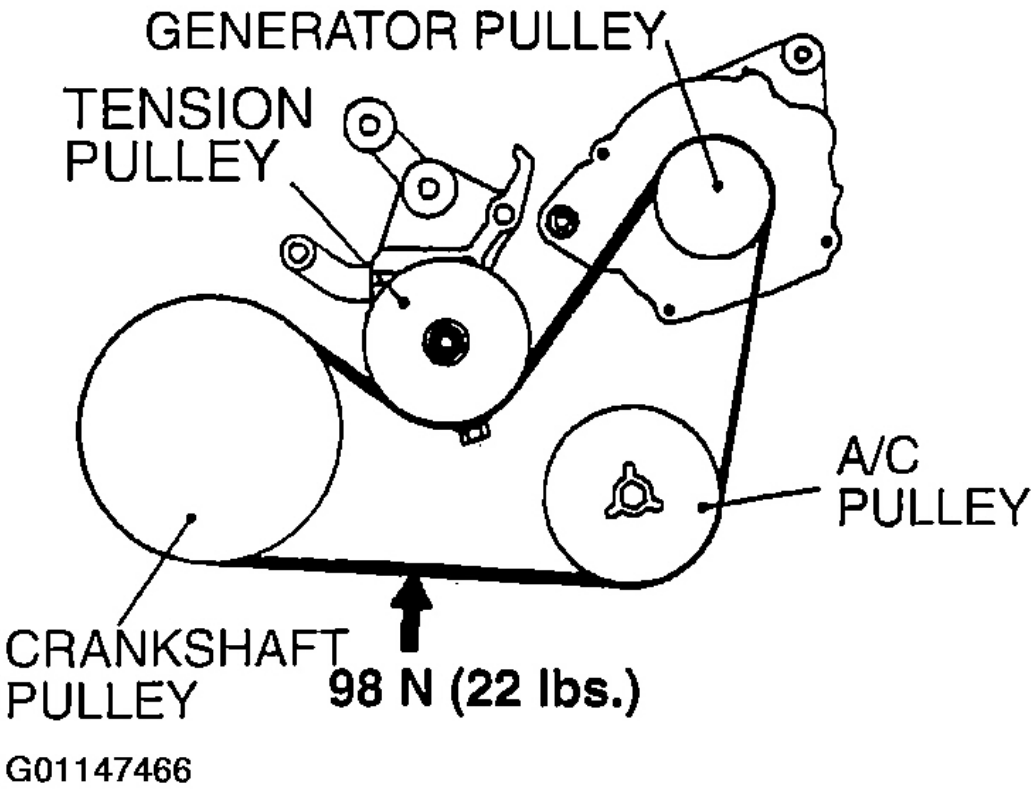
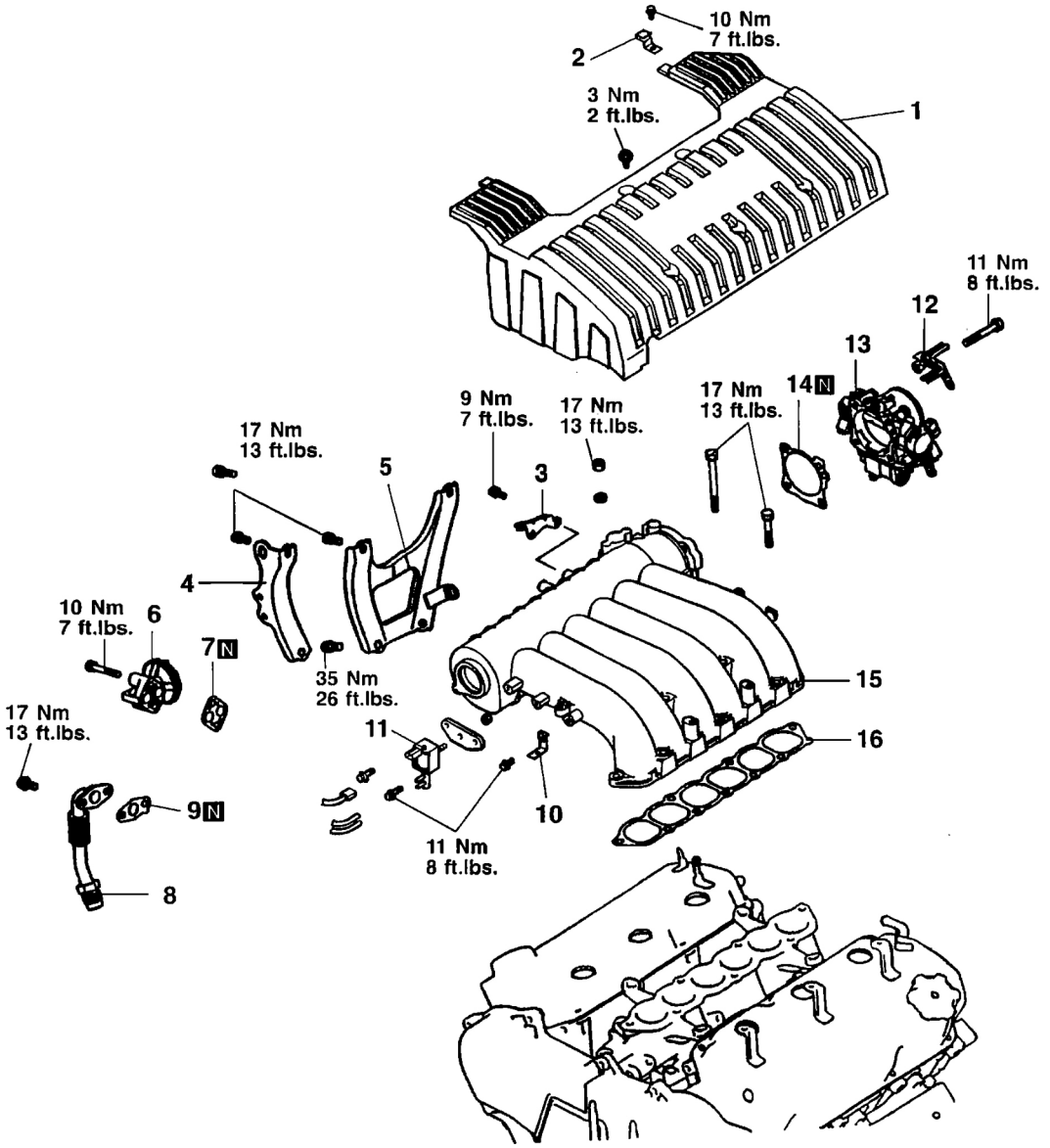


Fig. 67: Checking Generator Drive Belt Deflection
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INTAKE MANIFOLD PLENUM AND THROTTLE BODY

REMOVAL AND INSTALLATION



REMOVAL STEPS

1. ENGINE COVER
2. CLAMP
3. ACCELERATOR CABLE BRACKET
4. INTAKE PLENUM STAY, FRONT
5. INTAKE PLENUM STAY, REAR
6. EGR VALVE
7. EGR VALVE GASKET
8. EGR PIPE
9. EGR PIPE GASKET
10. CONNECTOR BRACKET
11. EVAPORATIVE EMISSION PURGE SOLENOID
12. VACUUM PIPE
13. THROTTLE BODY
14. THROTTLE BODY GASKET
15. INTAKE PLENUM
16. INTAKE PLENUM GASKET

G01147467

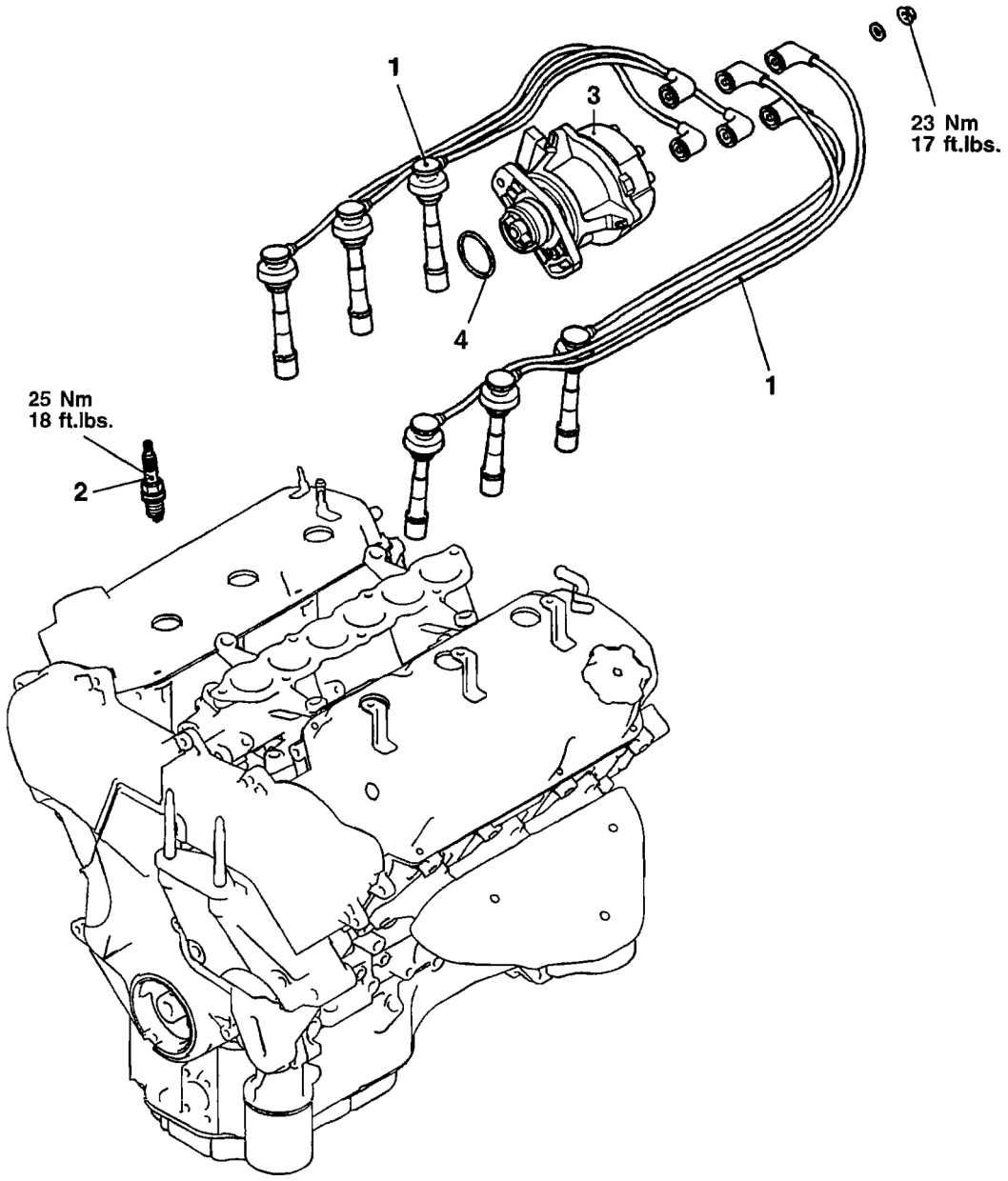
Fig. 68: Removing & Installing Intake Manifold Plenum And Throttle Body
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

IGNITION SYSTEM

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

Pre-removal and Post-installation Operation
Removal and installation
- Intake manifold plenum



REMOVAL STEPS
1. SPARK PLUG CABLES
2. SPARK PLUGS
▶A◀ 3. DISTRIBUTOR
4. O-RING

G01147468

Fig. 69: Removing & Installing Plug Cables & Spark Plugs

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINT

A: DISTRIBUTOR INSTALLATION

1. Align the mark on the distributor housing with that of the coupling and install the distributor.

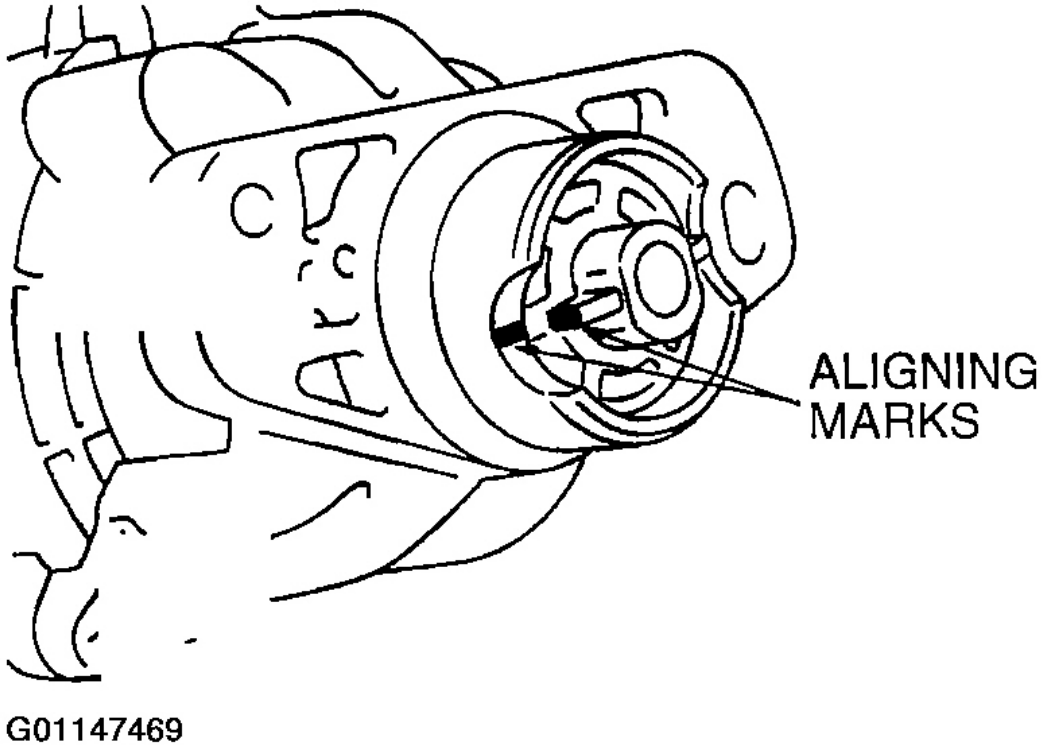


Fig. 70: Aligning Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

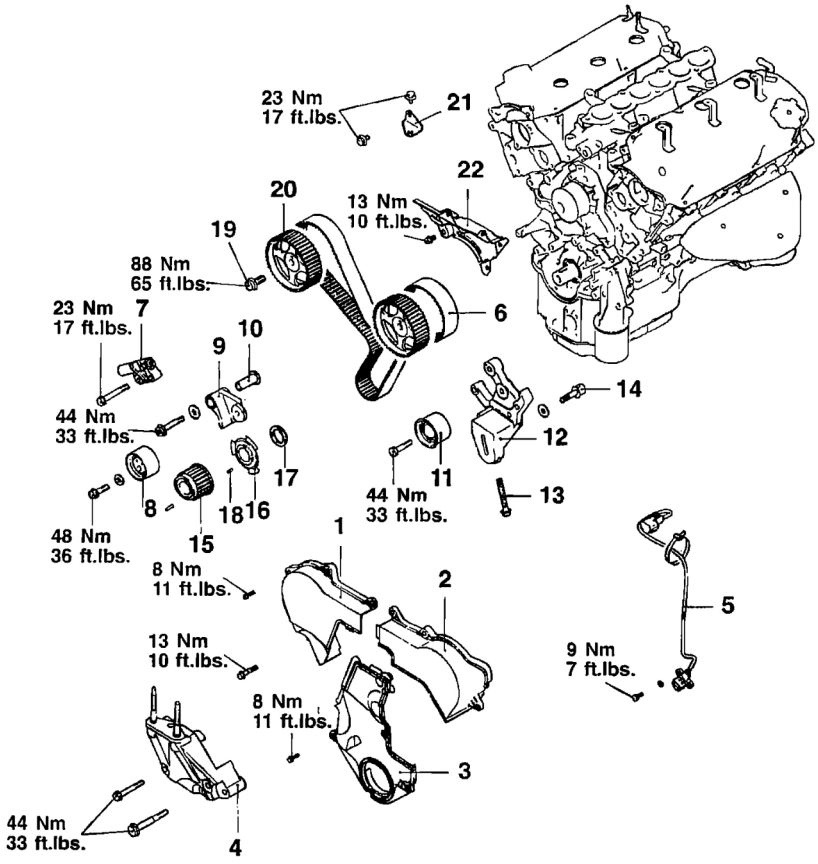
2. Once the engine has been started verify that the ignition timing is correct.

TIMING BELT

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

Pre-removal and Post-installation Operation
Removal and installation
- Crankshaft pulley



REMOVAL STEPS

1. TIMING BELT FRONT UPPER COVER, REAR
2. TIMING BELT FRONT UPPER COVER, FRONT
3. TIMING BELT FRONT LOWER COVER
- ▶D◀ 4. ENGINE SUPPORT BRACKET
5. CRANKSHAFT POSITION SENSOR
- ◀A▶ ▶C◀ ▶B◀ 6. TIMING BELT
7. AUTOMATIC TENSIONER
8. TENSIONER PULLEY
9. TENSIONER ARM
10. SHAFT
11. IDLER PULLEY
12. IDLER PULLEY ADJUSTING BRACKET
13. ADJUSTING BOLT
14. ADJUSTING STUD
15. CRANKSHAFT SPROCKET
16. SENSING BLADE
17. CRANKSHAFT SPACER
18. CRANKSHAFT KEY
- ◀B▶ ▶A◀ 19. CAMSHAFT SPROCKET BOLT
20. CAMSHAFT SPROCKET
21. BRACKET
22. TIMING BELT REAR COVER

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Fig. 71: Removing & Installing Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

A: TIMING BELT REMOVAL

- Mark the belt running direction for reference in reinstallation.

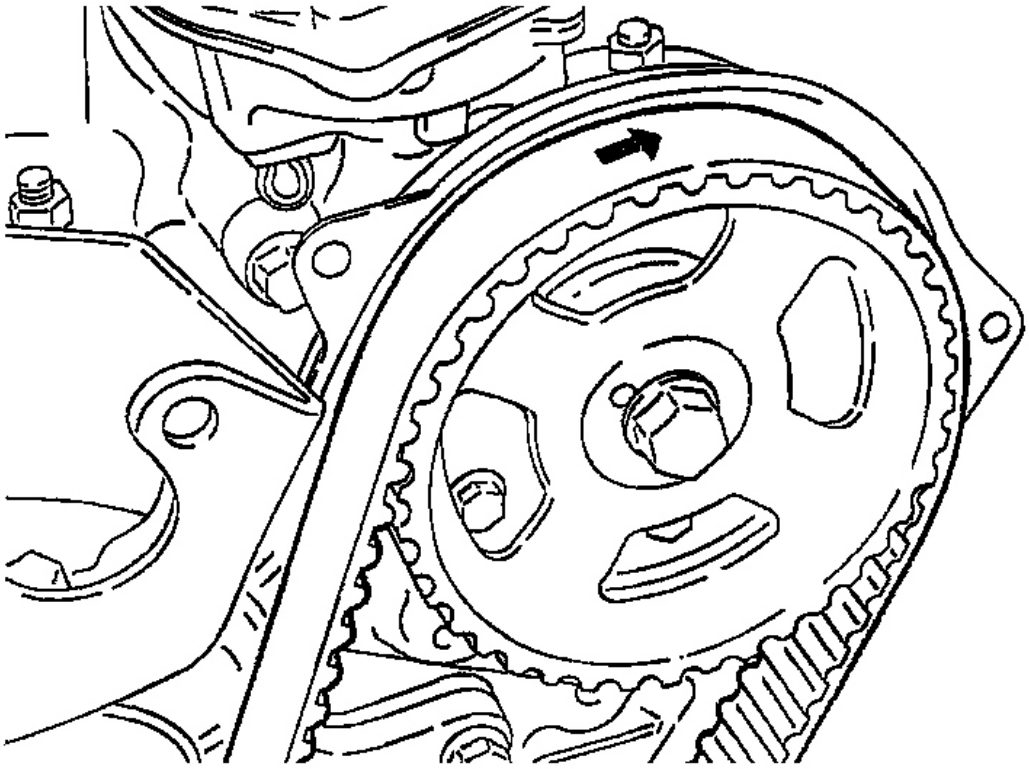

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Fig. 72: Marking Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: Water or oil on the belt shortens its life drastically, so the removed timing belt, sprocket, and tensioner must be kept free from oil and water. Do not immerse parts in cleaning solvent.

NOTE: If there is oil or water on any part, check the front case oil seal, camshaft oil seal and water pump for leaks.

B: CAMSHAFT SPROCKET BOLT LOOSENING

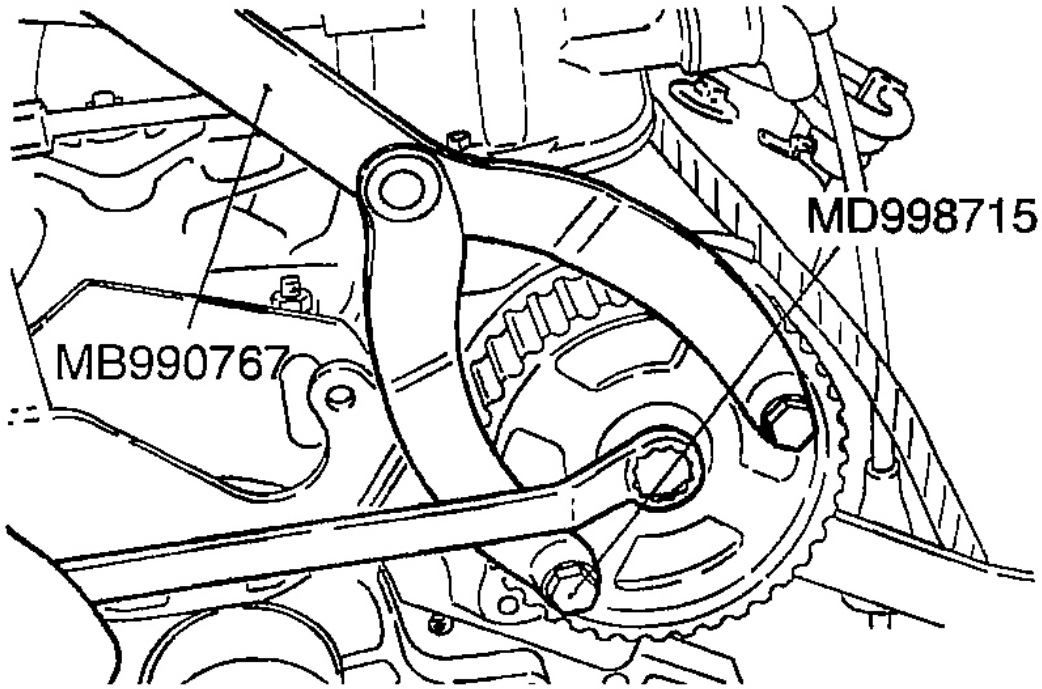

Fig. 73: Loosening Camshaft Sprocket Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: CAMSHAFT SPROCKET BOLT TIGHTENING

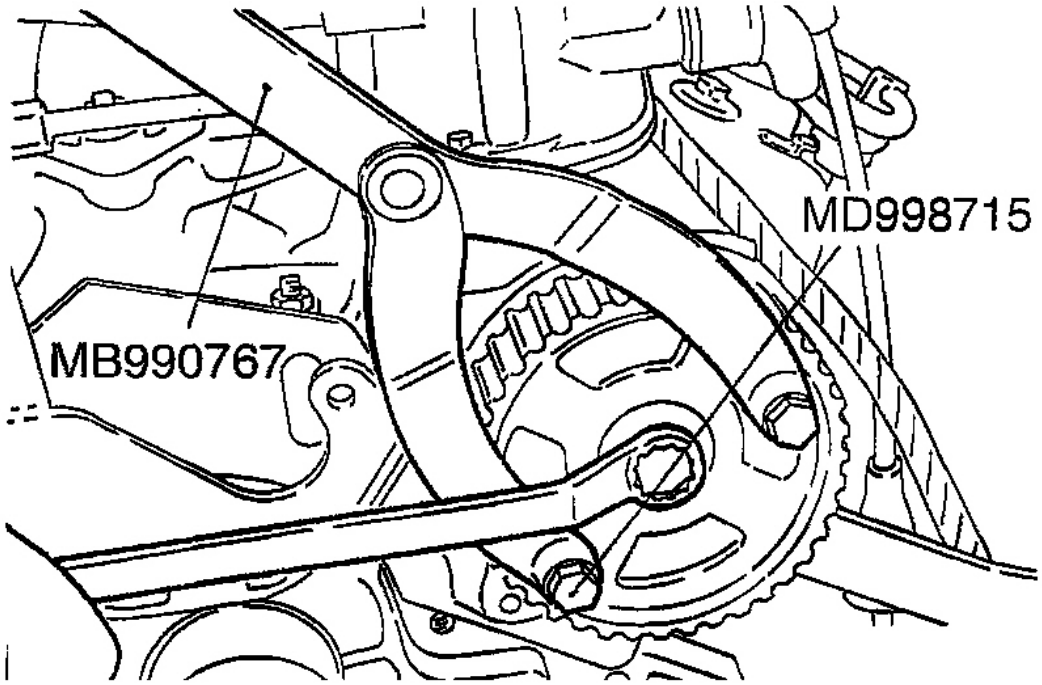

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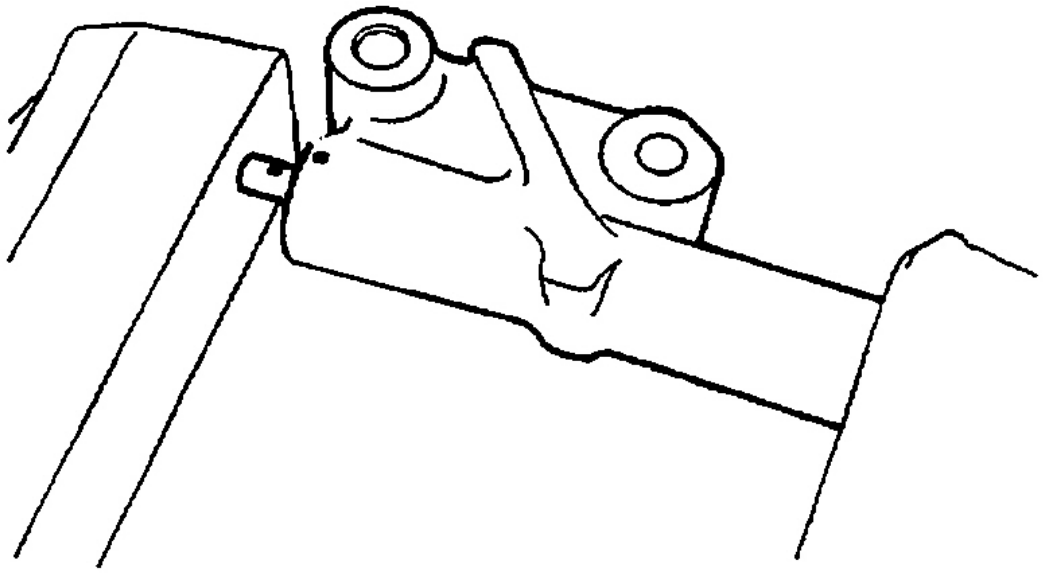
Fig. 74: Tightening Camshaft Sprocket Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: AUTO-TENSIONER INSTALLATION

If the auto-tensioner rod is fully extended, set it in the retracted position with the following procedure.

1. Set the auto-tensioner in a vice.



G01147474

Fig. 75: Setting Auto-Tensioner In Vice
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Slowly close the vice to force the rod in until the set hole (A) of the rod is lined up with the set hole (B) of the cylinder.

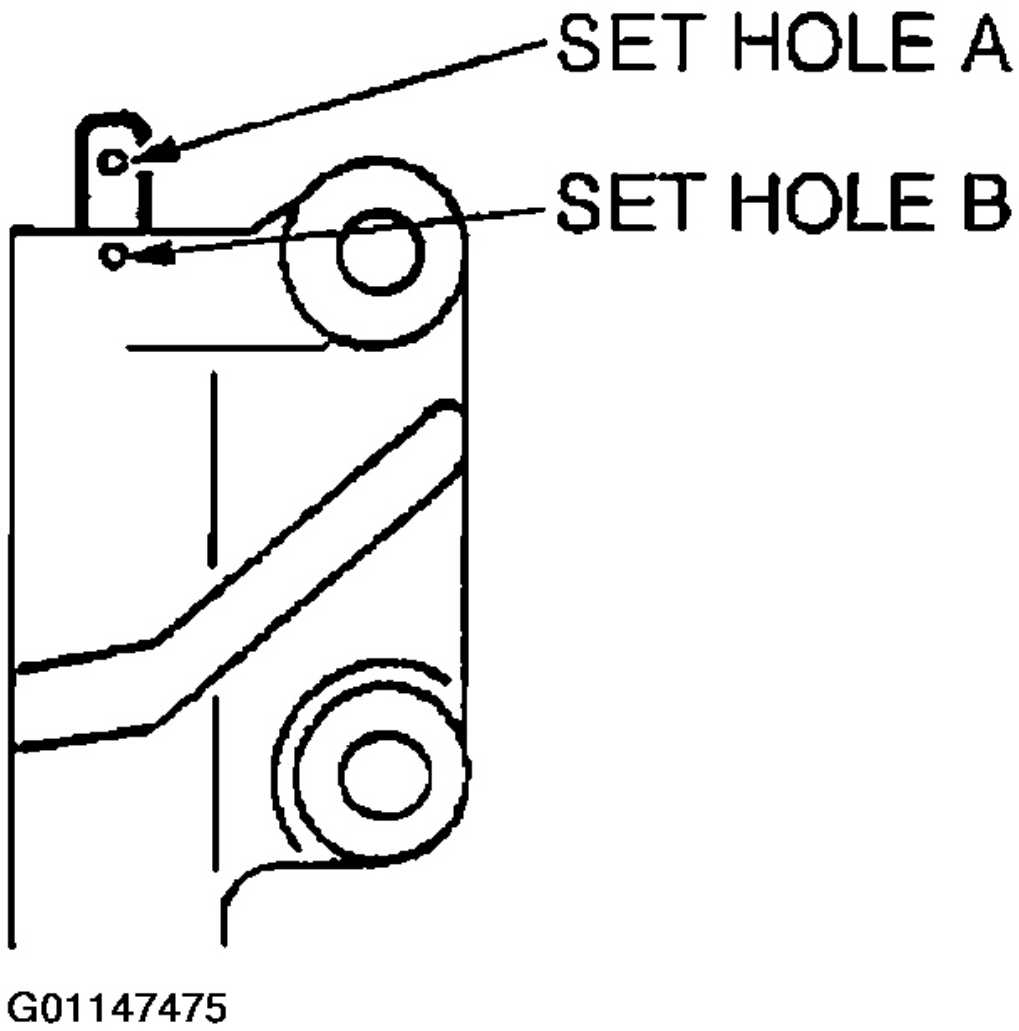


Fig. 76: Identifying Set Holes
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Insert a wire [1.4 mm (.055 in.) in diameter] into the set holes.
4. Remove the auto-tensioner from the vice.
5. Install the auto-tensioner to the engine.

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

C: TIMING BELT INSTALLATION

1. Move the timing mark of the crankshaft sprocket three teeth counterclockwise to slightly lower the piston below the top dead center on the compression stroke of the No. 1 cylinder.

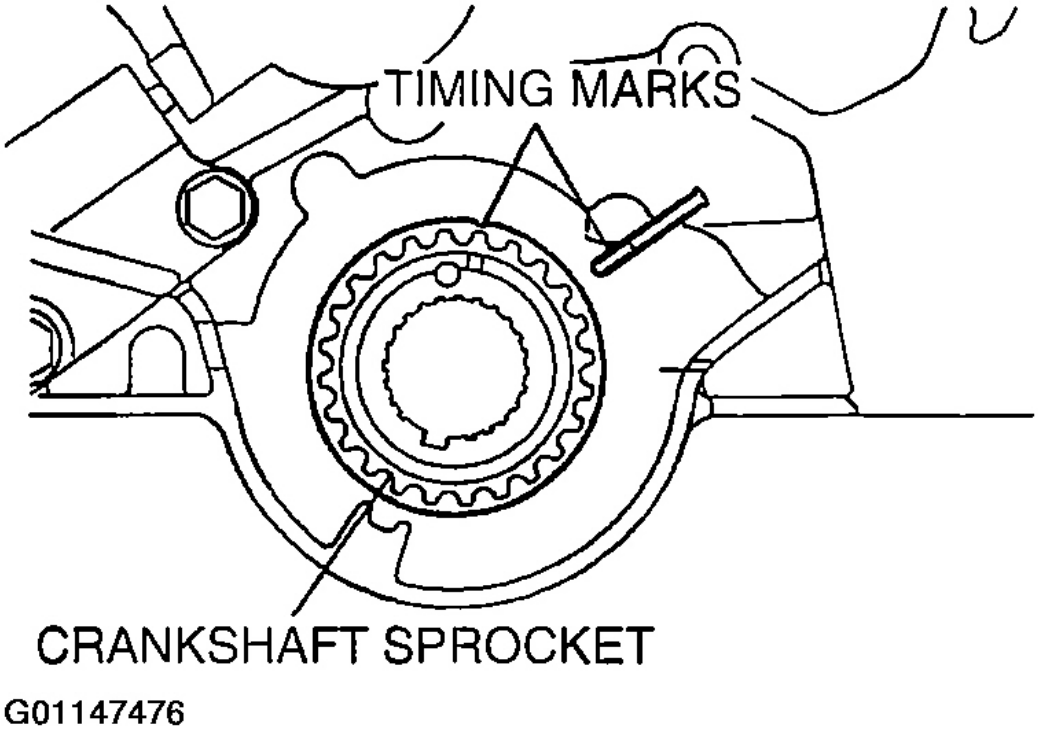


Fig. 77: Moving Timing Mark Of Crankshaft Sprocket 3 Teeth Counterclockwise
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAUTION: If the camshaft sprocket is rotated with the piston at the top dead center on the compression stroke of the No. 1 cylinder, the valve and piston might interfere.

2. Line up the timing marks of the left bank camshaft sprockets.
3. Line up the timing marks of the right bank camshaft sprockets.

CAUTION: Since the camshaft sprocket readily turns because of spring action, use care to make sure that your finger is not caught.

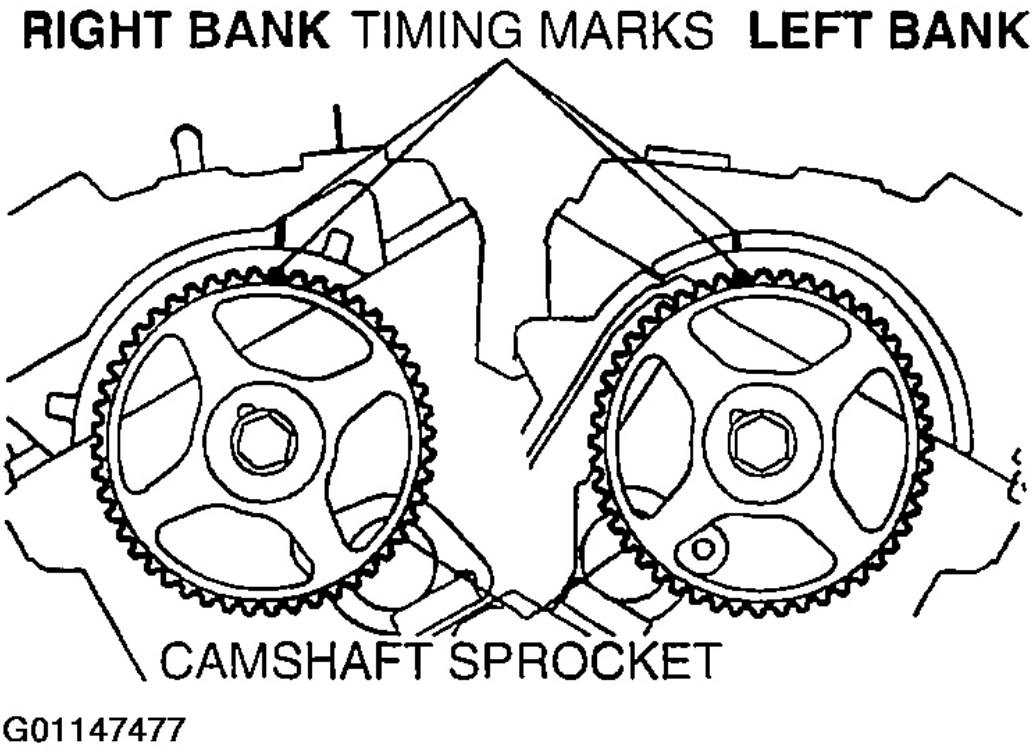


Fig. 78: Aligning Camshaft Timing Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Line up the timing marks of the crankshaft sprocket.

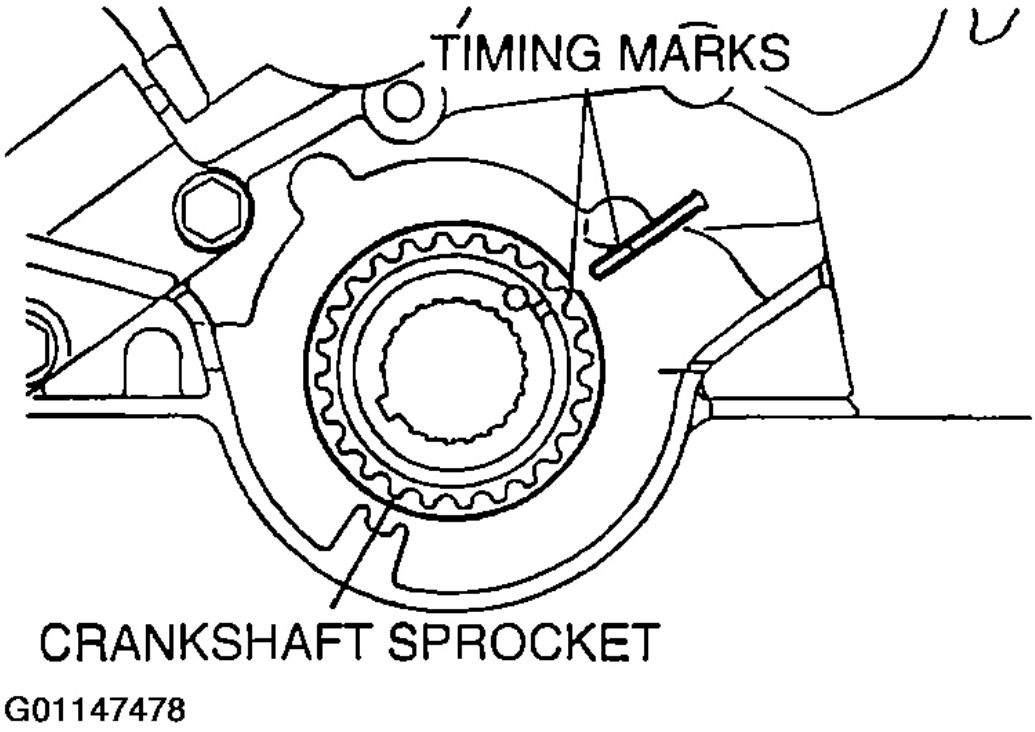


Fig. 79: Aligning Crankshaft Timing Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

5. Install the timing belt on each sprocket in the following sequence.
    1. Install the timing belt on the crankshaft sprocket and then on the idler pulley, while tightening it to prevent slackness.
    2. Install the timing belt on the left bank camshaft sprocket.
    3. Install the timing belt on the water pump pulley, while taking up the slack.
    4. Install the timing belt on the right bank camshaft sprocket.
    5. Install the timing belt on the tensioner pulley.
6. Lightly press the tensioner pulley against the belt and temporarily tighten the center bolt.

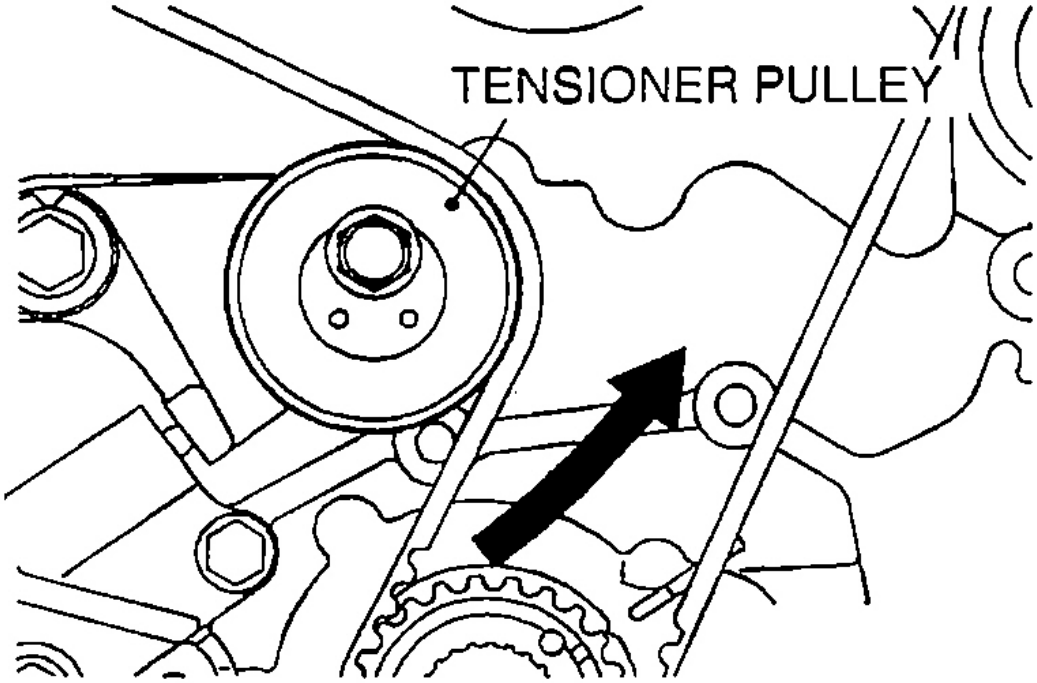


Fig. 80: Lightly Pressing Tensioner Pulley Against Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

7. Check to see that the timing marks of all the sprockets are in alignment.
8. Using special tool to rotate the crankshaft a quarter of a turn counterclockwise. Then rotate it back clockwise to verify that all the timing marks are in alignment.

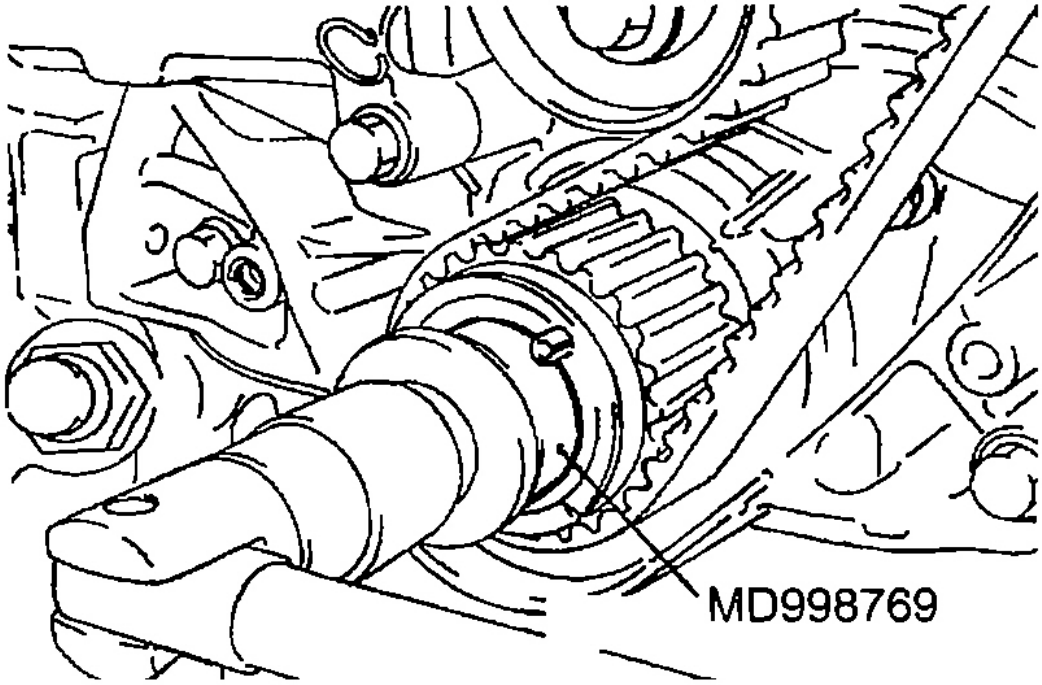


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Fig. 81: Using Special Tool To Rotate Crankshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

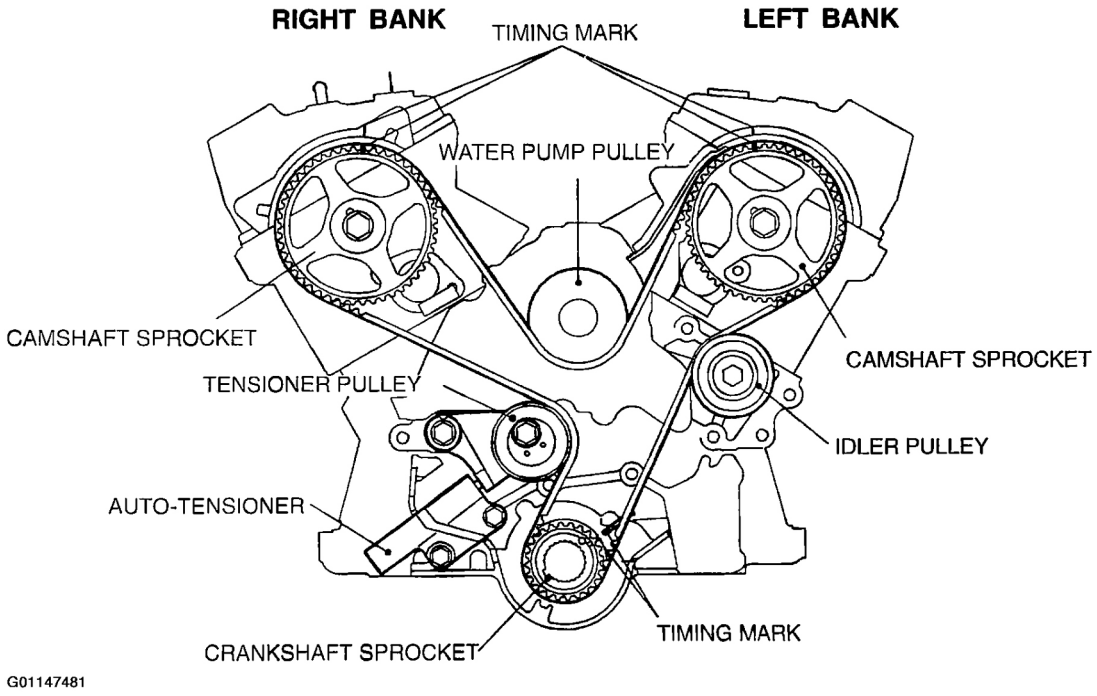


Fig. 82: Aligning Timing Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

9. Loosen the center bolt of the tensioner pulley. Use the special tool and torque wrench to apply the standard tensioning torque to the timing belt. Tighten the center bolt to the specified torque.

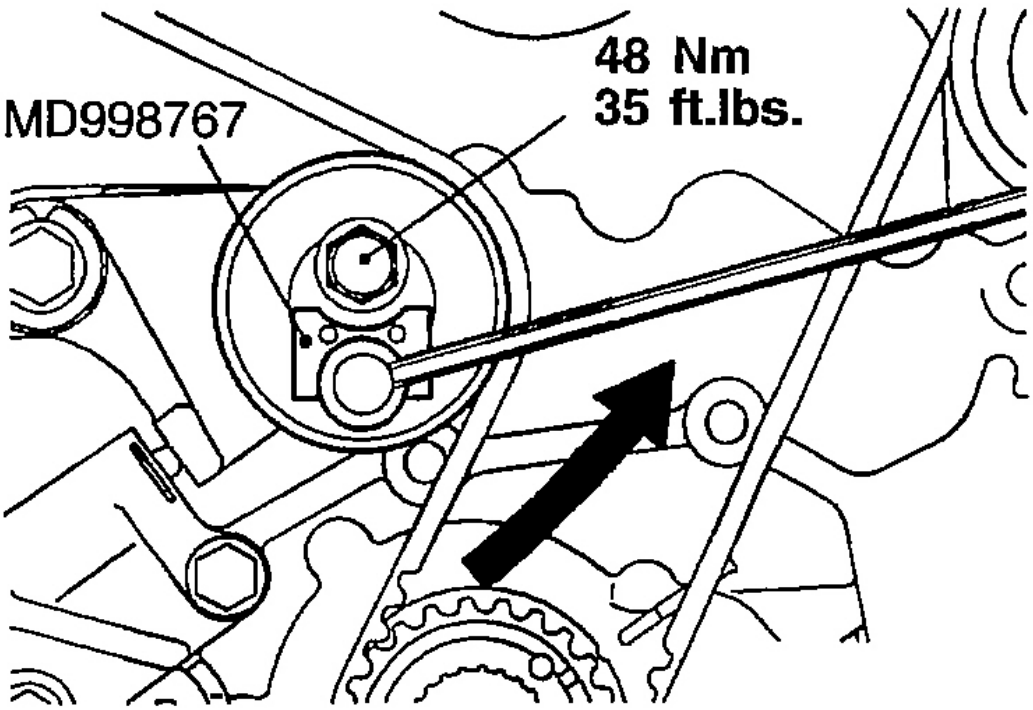


Fig. 83: Applying Standard Tensioning Torque To Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value: 4.4 Nm (3.3 ft. lbs.)

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

10. Remove the setting wire from the auto-tensioner.
11. Rotate the crankshaft two turns clockwise and let it stand for approximately 5 minutes.
12. Check that the auto-tensioner push rod protrusion is within the range of the standard value.

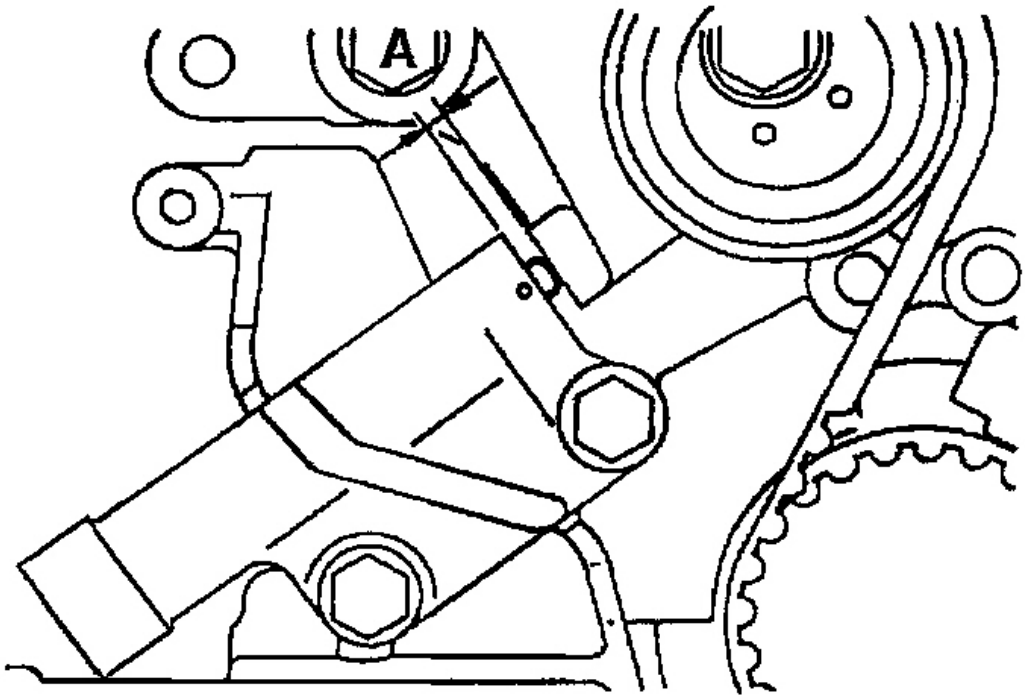


Fig. 84: Checking Auto-Tensioner Push Rod Protrusion
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value (A): 4.8 - 6.0 mm (.189 - .236 in.)

13. If the protrusion is out of specification, repeat steps (8) to (11).
14. Check again that the timing marks on all sprockets are aligned.

D: ENGINE SUPPORT BRACKET

- Tighten bolts to specified torque in the sequence shown in illustration.

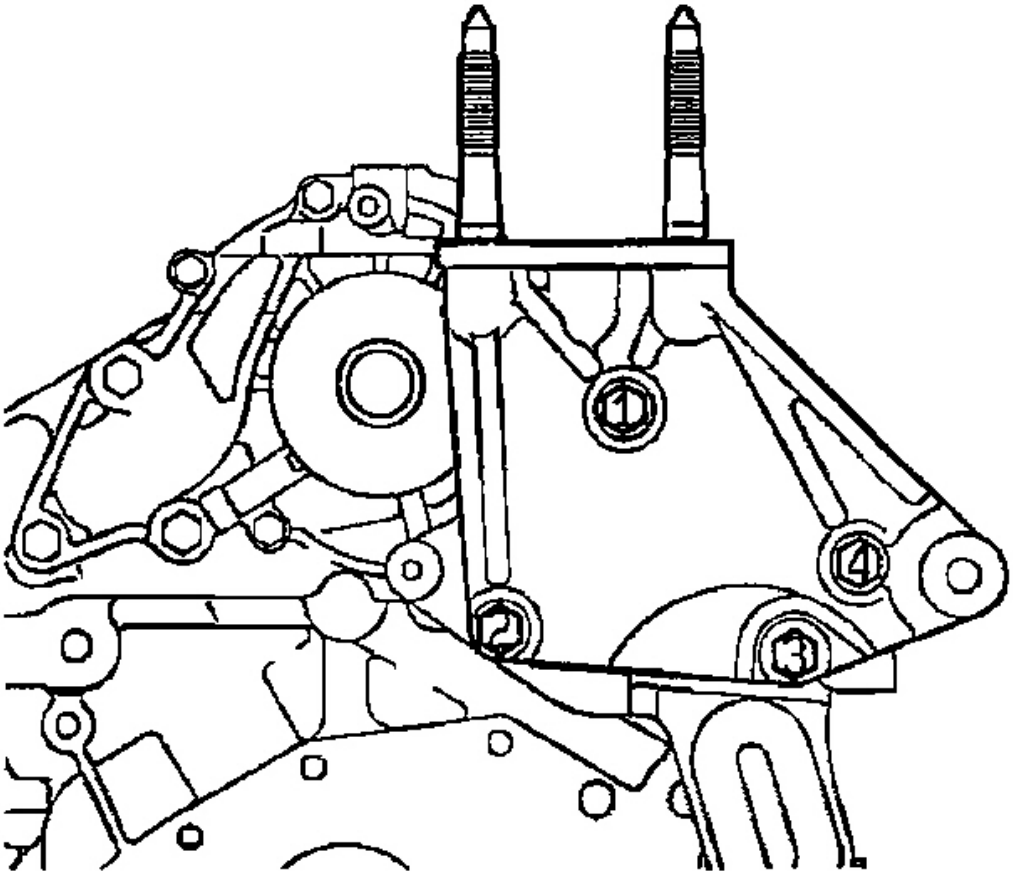


Fig. 85: Engine Support Bracket Bolt Tightening Sequence
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

TIMING BELT

Replace belt if any of the following conditions exist.

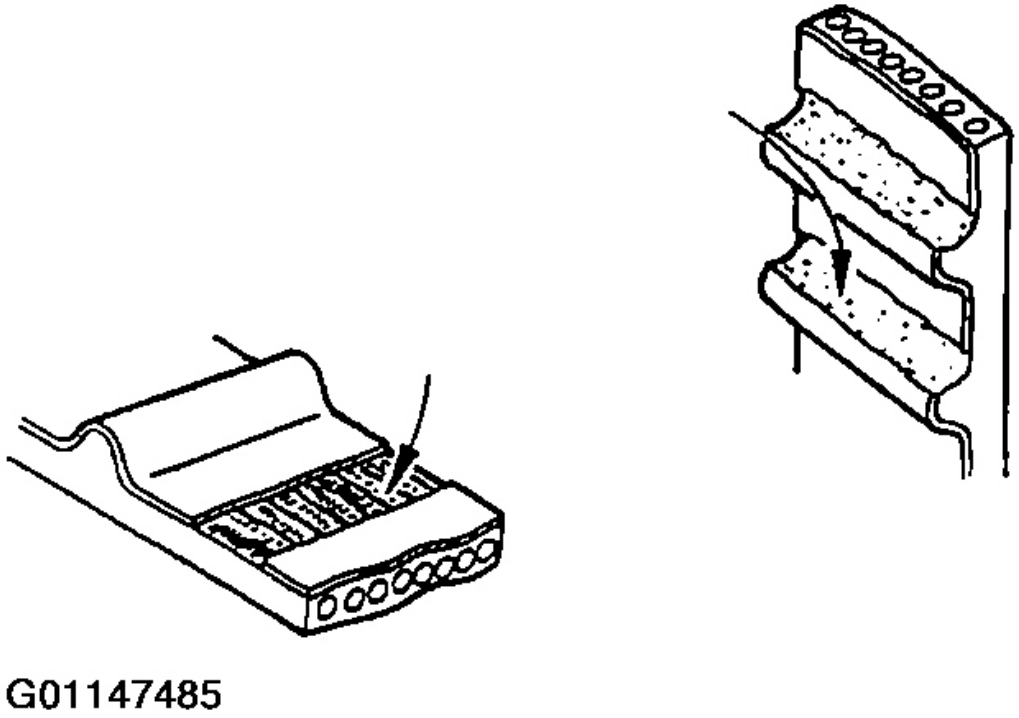


Fig. 86: Inspecting Timing Belt (1 Of 4)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

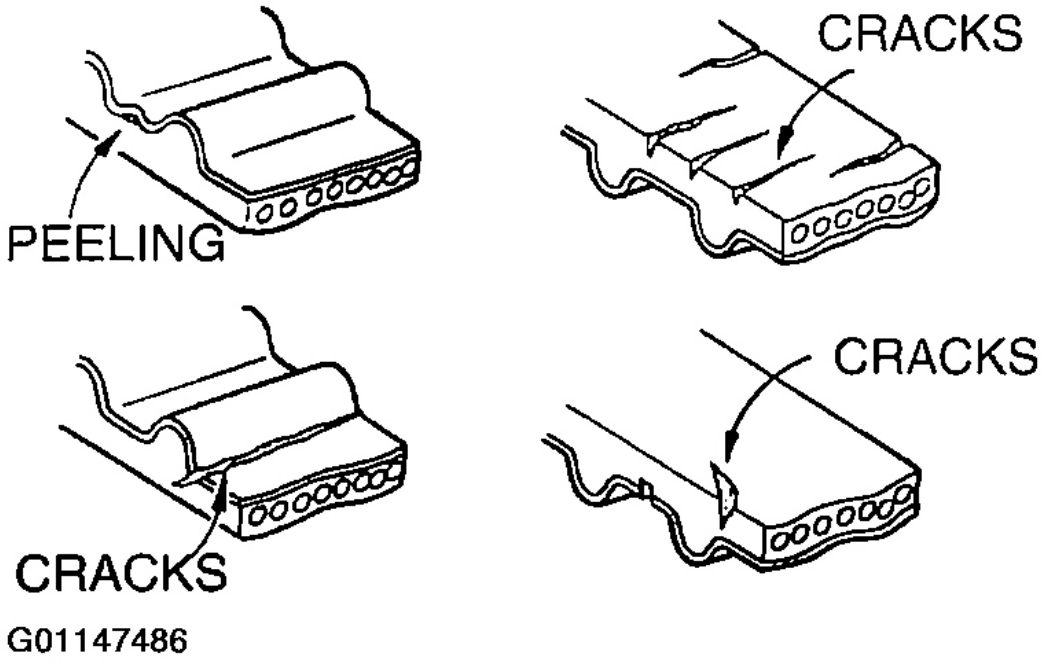


Fig. 87: Inspecting Timing Belt (2 Of 4)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Fig. 88: Inspecting Timing Belt (3 Of 4)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Fig. 89: Inspecting Timing Belt (4 Of 4)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

1. Hardening of back rubber-back side is glossy without resilience and leaves no indent when pressed with fingernail.
2. Cracks on rubber back
3. Cracks or peeling of canvas
4. Cracks on tooth bottom
5. Cracks on side of belt
6. Abnormal wear of belt sides. The sides are normal if they are sharp as if cut by a knife.
7. Abnormal wear on teeth
8. Tooth missing and canvas fiber exposed.

TENSIONER

- Turn the pulley. If it does not rotate smoothly, develops noise or excessive play, replace the timing belt tensioner.

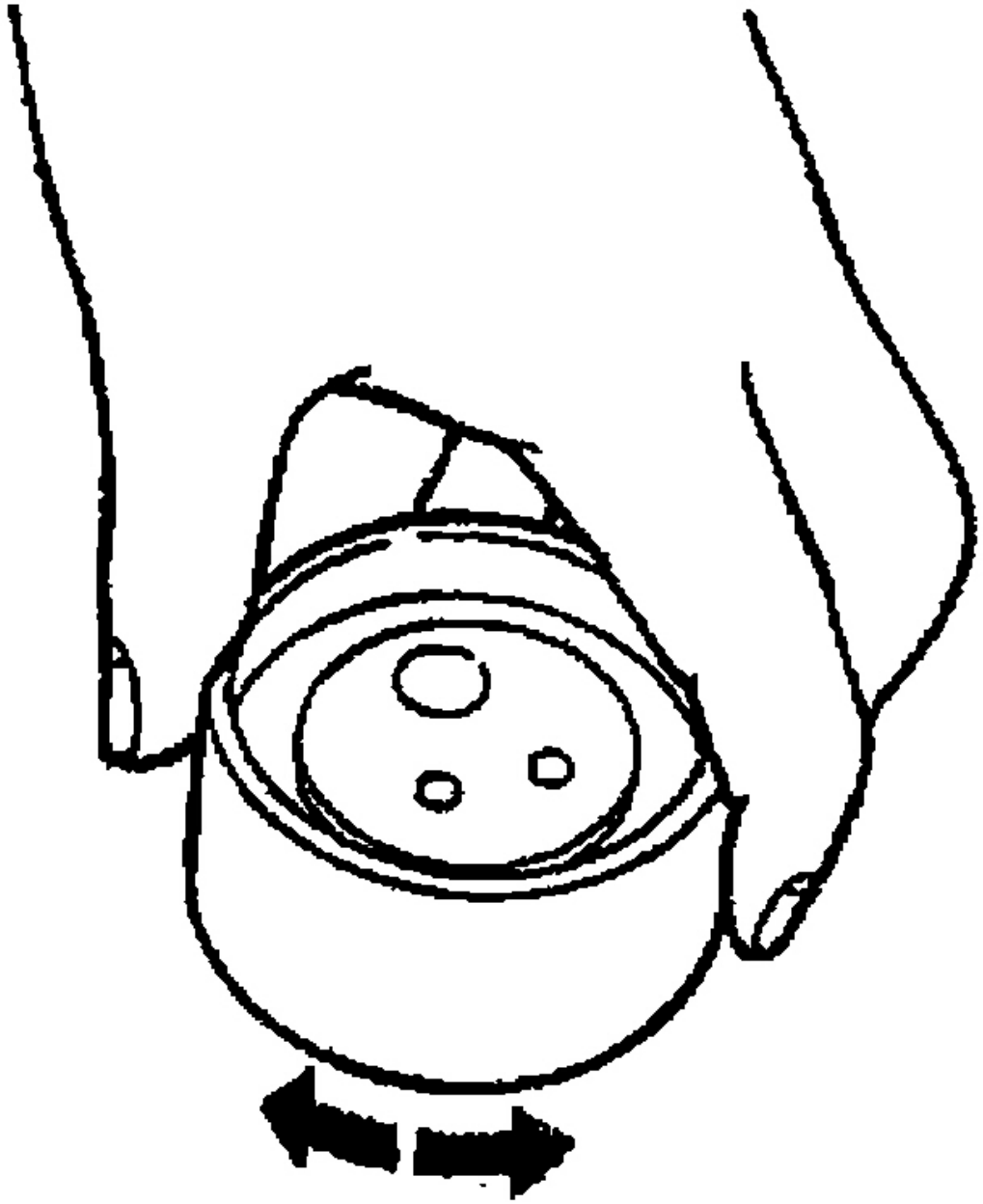


Fig. 90: Checking Tensioner Pulley
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

AUTO-TENSIONER

1. Check for oil leaks. If oil leaks are evident, replace the auto-tensioner.
2. Check the rod end for wear or damage and replace the auto-tensioner if necessary.
3. Measure the rod projection length. If the reading is outside the standard value, replace the auto-tensioner.

   Standard value: 11.7-12.3 mm (.461-.484 in.)

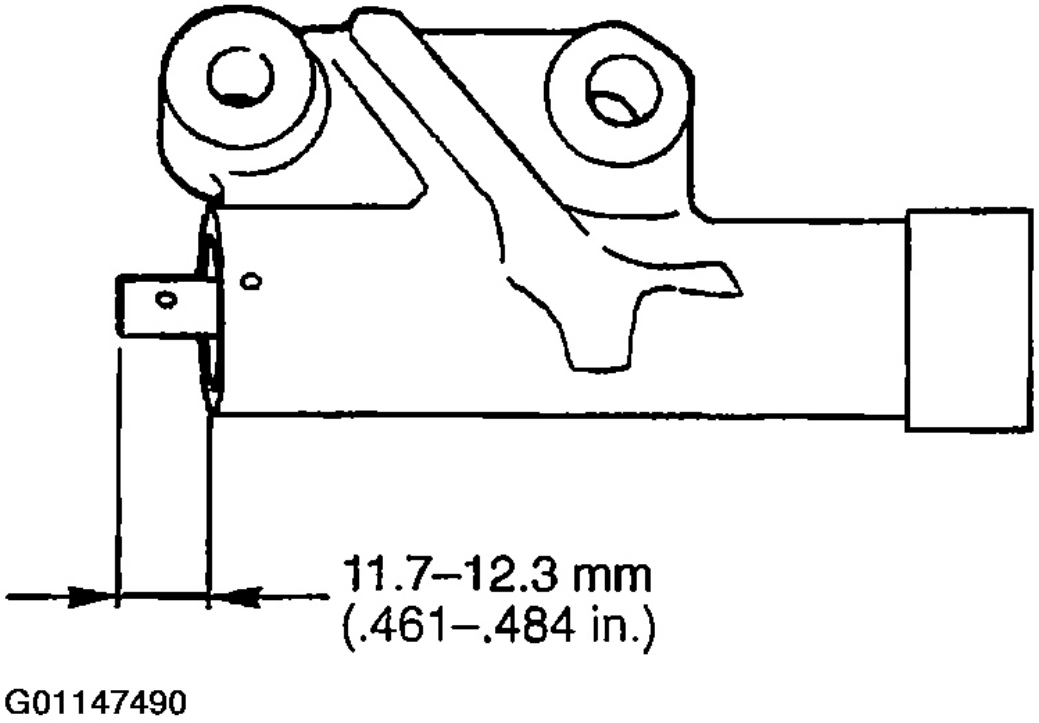


Fig. 91: Measuring Rod Projection Length
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Press the rod with a force of 98 to 196 N (22 to 44 lbs.) and measure the movement of rod.

   If the measured value is more than the standard value, replace the auto-tensioner.

   Standard value: 1 mm (.0393 in.) or less.

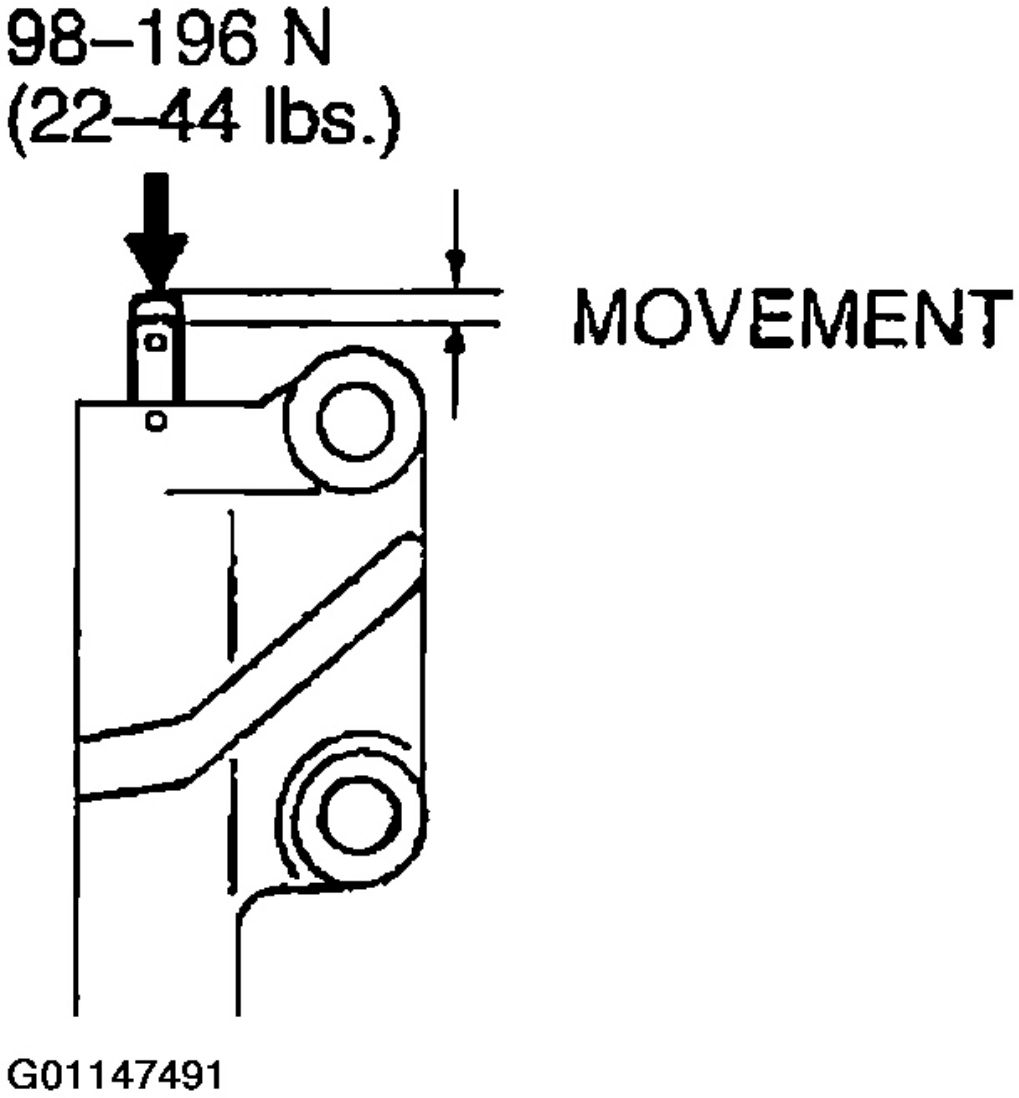
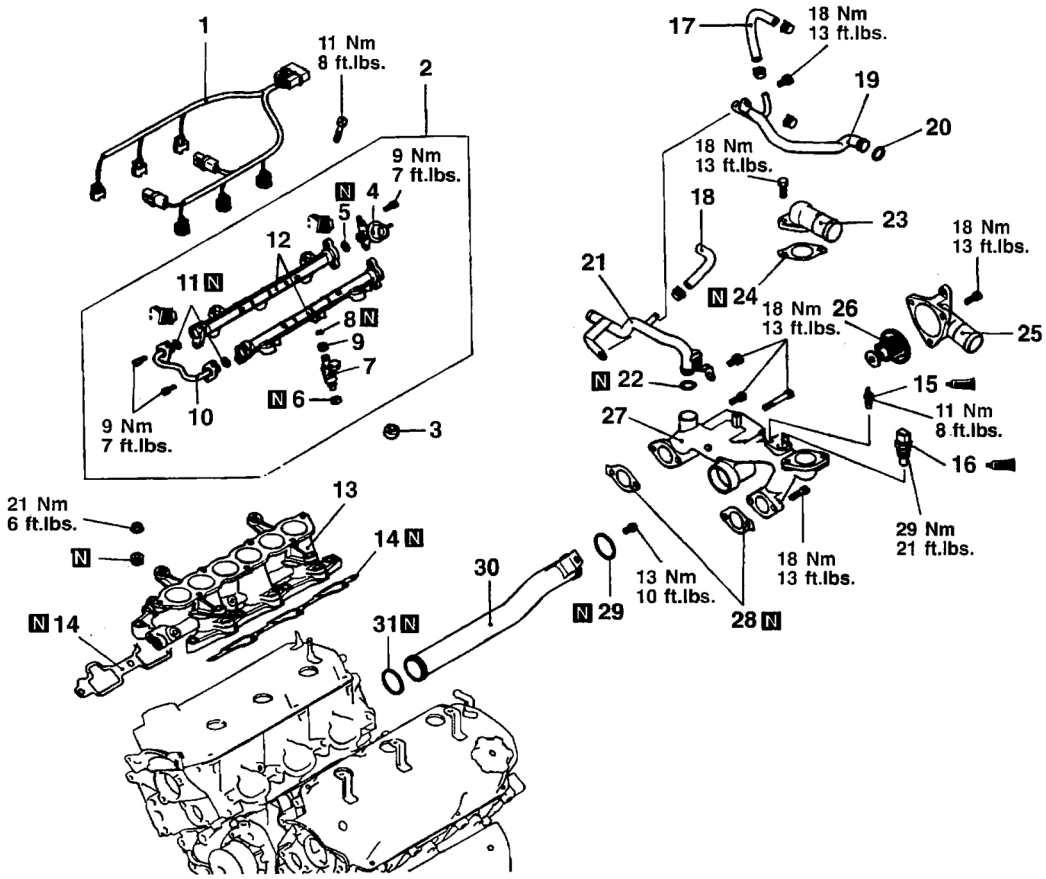


Fig. 92: Measuring Movement Of Rod
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INTAKE MANIFOLD AND FUEL PARTS

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

1. ENGINE HARNESS
2. INJECTOR AND FUEL RAIL
3. INSULATOR
- ▶H◀ 4. FUEL PRESSURE REGULATOR
5. O-RING
6. INSULATOR
- ▶G◀ 7. INJECTOR
8. O-RING
9. GROMMET
10. FUEL PIPE
11. O-RING
12. DELIVERY PIPE
- ▶F◀ 13. INTAKE MANIFOLD
14. INTAKE MANIFOLD GASKET
- ▶E◀ 15. ENGINE COOLANT TEMPERATURE GAUGE UNIT
- ▶D◀ 16. ENGINE COOLANT TEMPERATURE SENSOR
17. WATER HOSE
18. WATER HOSE
- ▶C◀ 19. HEATER INLET PIPE
- ▶A◀ 20. O-RING
- ▶C◀ 21. HEATER INLET PIPE
- ▶A◀ 22. O-RING
23. WATER OUTLET FITTING
24. WATER OUTLET FITTING GASKET
25. WATER INLET FITTING
- ▶B◀ 26. THERMOSTAT
27. THERMOSTAT HOUSING
28. THERMOSTAT HOUSING GASKET
- ▶A◀ 29. O-RING
30. WATER PIPE
- ▶A◀ 31. O-RING

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Fig. 93: Removing & Installing Intake Manifold And Fuel Parts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: O-RING AND WATER PIPE INSTALLATION

- Wet the O-ring (with water) to facilitate assembly.

CAUTION: Keep the O-ring free of oil or grease.

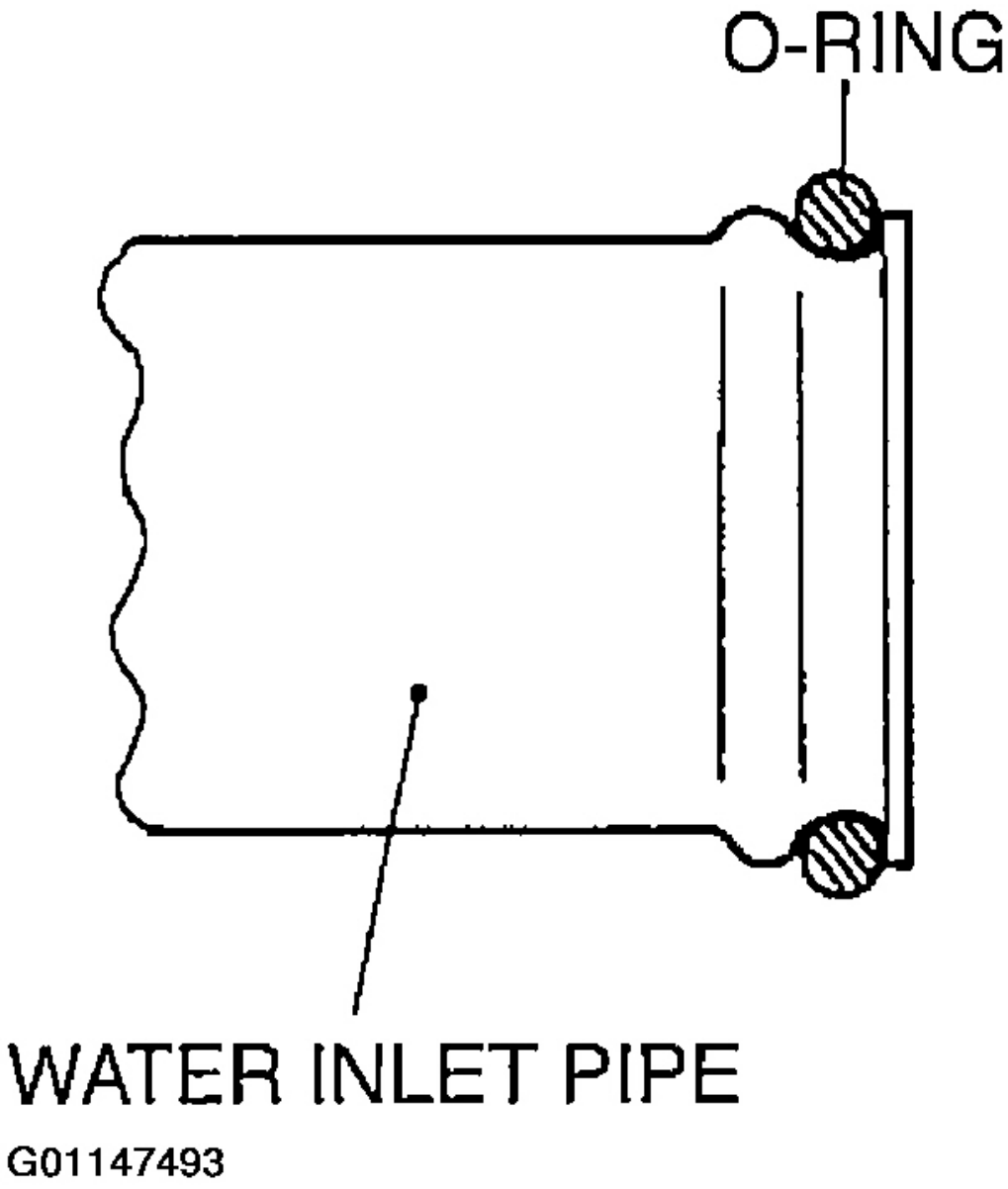


Fig. 94: Identifying O-Ring
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: THERMOSTAT INSTALLATION

- Install the thermostat in the thermostat housing with its jiggle valve located at the top position.

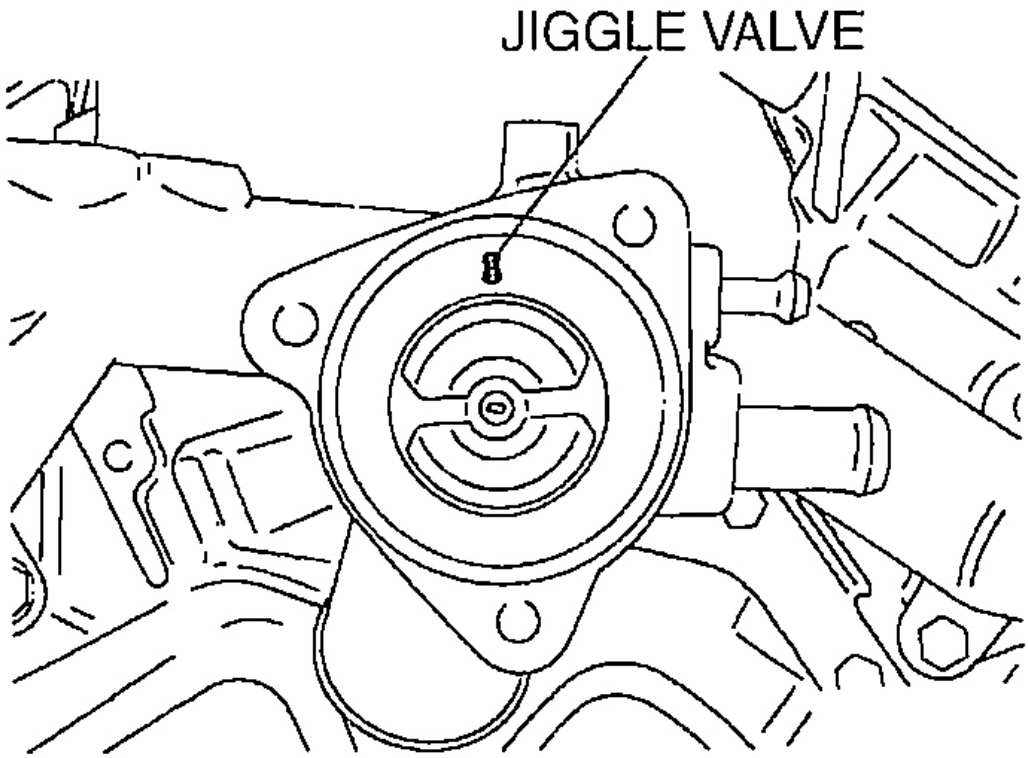


Fig. 95: Installing Thermostat
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

C: HEATER INLET AND OUTLET PIPES

- Attach the outlet and inlet pipes in this order, one on the top of the other.

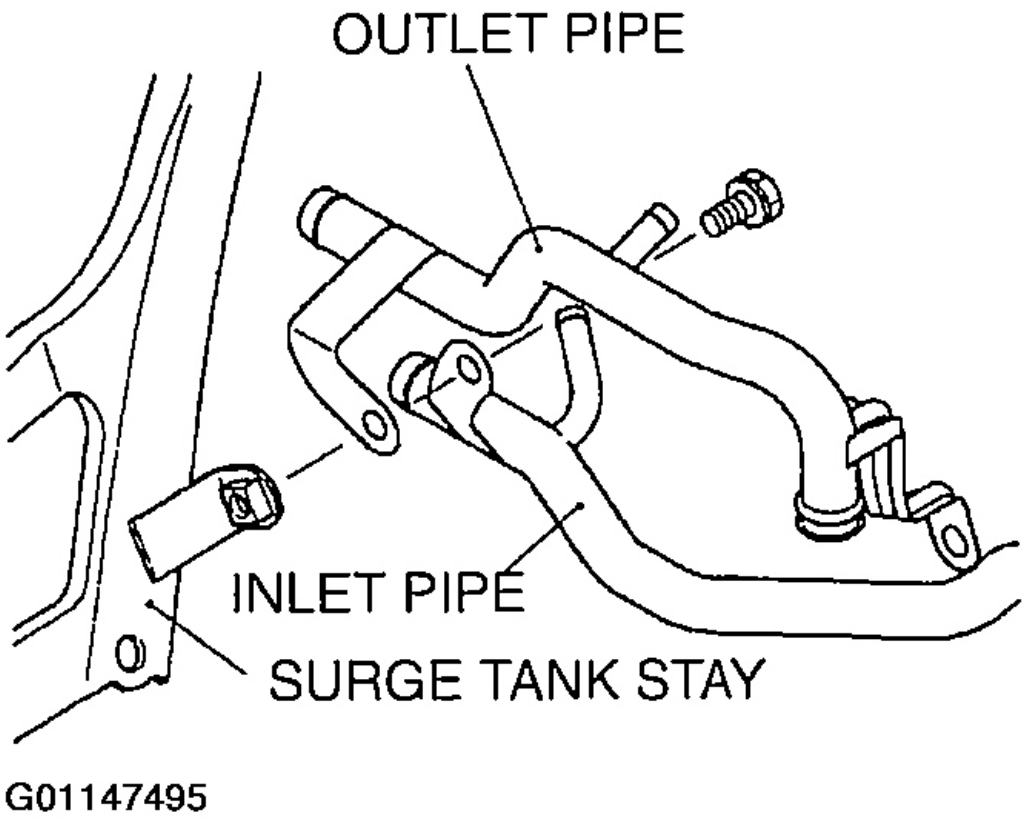


Fig. 96: Installing Heater Inlet & Outlet Pipes
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

D: SEALANT APPLICATION TO ENGINE COOLANT TEMPERATURE SENSOR

Specified sealant: 3M Nut Locking No. 4171 or equivalent

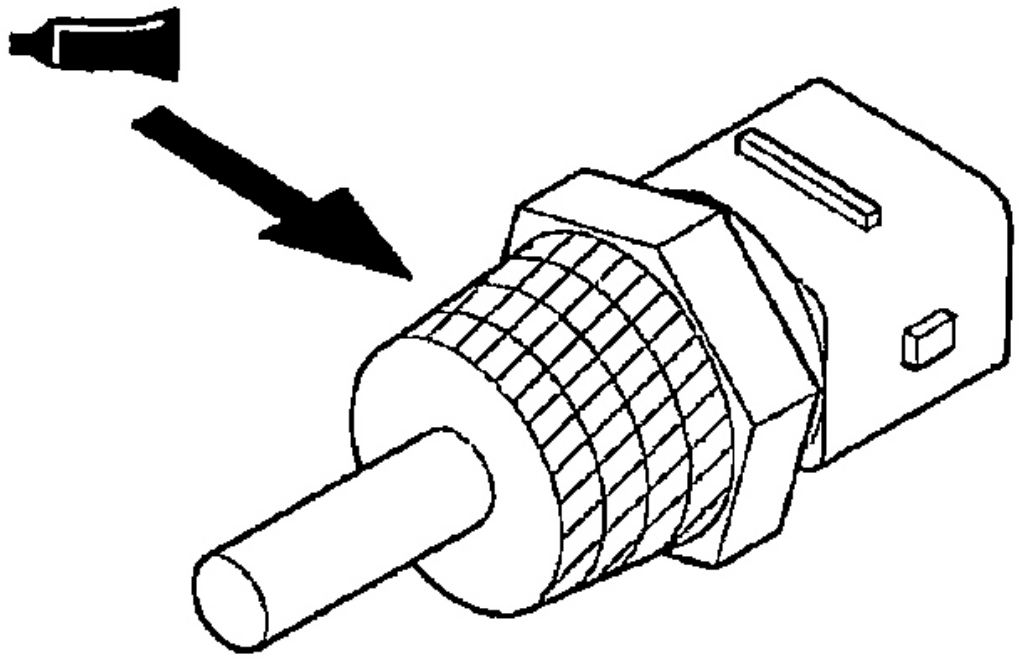


Fig. 97: Applying Sealant To Engine Coolant Temperature Sensor
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

E: SEALANT APPLICATION TO ENGINE COOLANT TEMPERATURE GAUGE UNIT

Specified sealant: 3M Part No. 8660 or equivalent

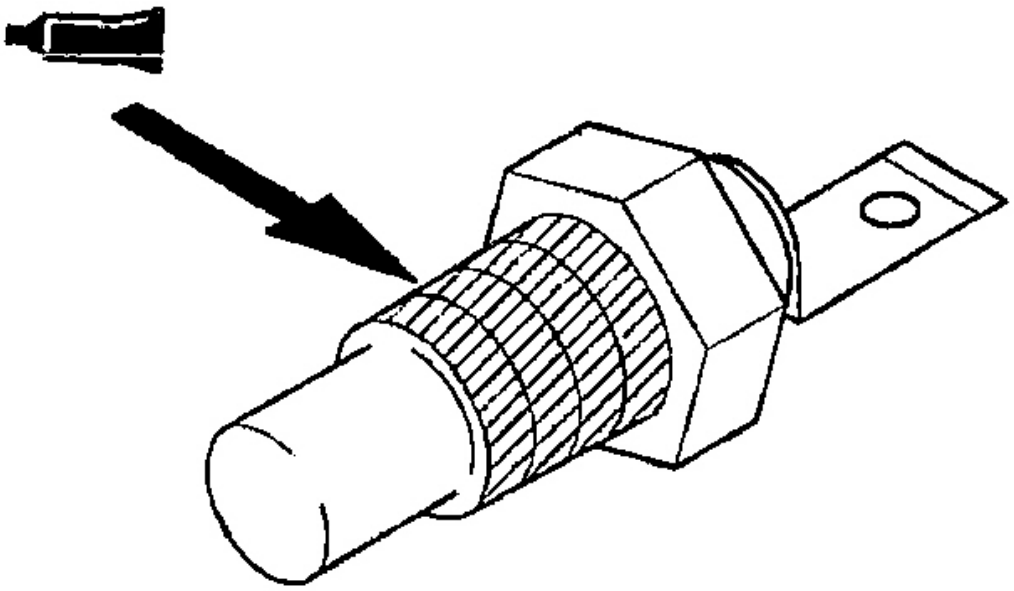


Fig. 98: Applying Sealant To Engine Coolant Temperature Gauge Unit
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

F: INTAKE MANIFOLD INSTALLATION

1. Tighten the nuts on the right bank to 5 - 8 Nm (3.7 - 5.9 ft. lbs.).
2. Tighten the nuts on the left bank to the specified torque. Then tighten the nuts on right bank to the specified torque.
3. Tighten the nuts on the left bank and those on the right bank again in that order.

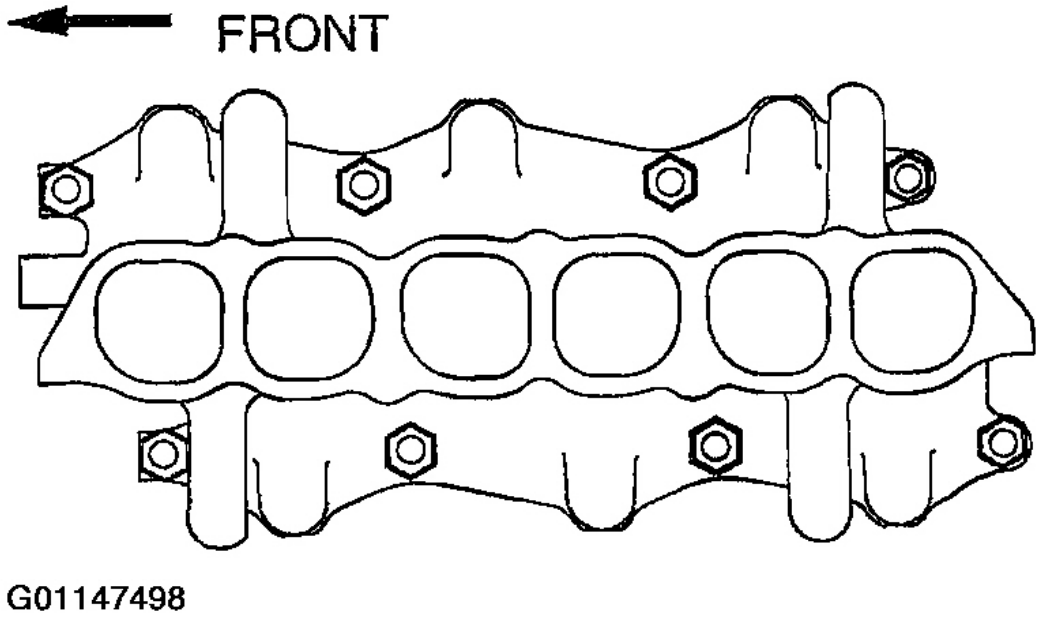


Fig. 99: Installing Intake Manifold
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

G: INJECTOR INSTALLATION

1. Before installing the injector, the rubber O-ring must be lubricated with a drop of new engine oil for easy installation.

CAUTION: Use care not to let the engine oil enter the fuel rail.

2. Insert the injector top end into the fuel rail. Be careful not to damage O-ring during installation.

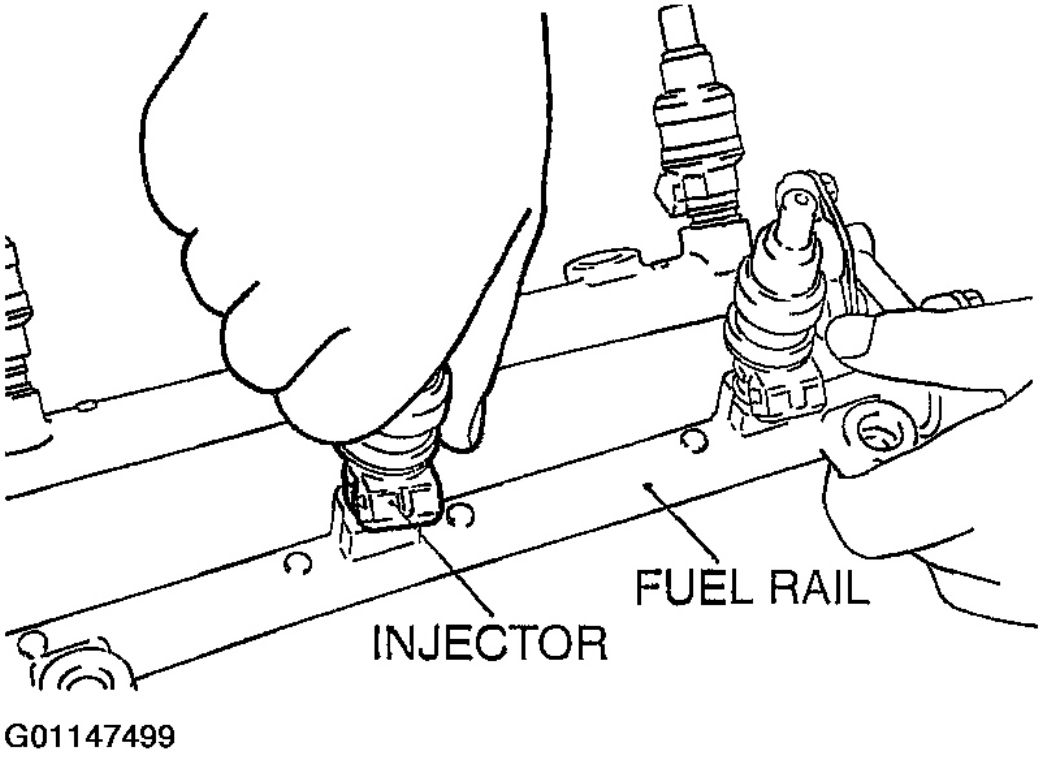


Fig. 100: Installing Injector
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

H: FUEL PRESSURE REGULATOR INSTALLATION

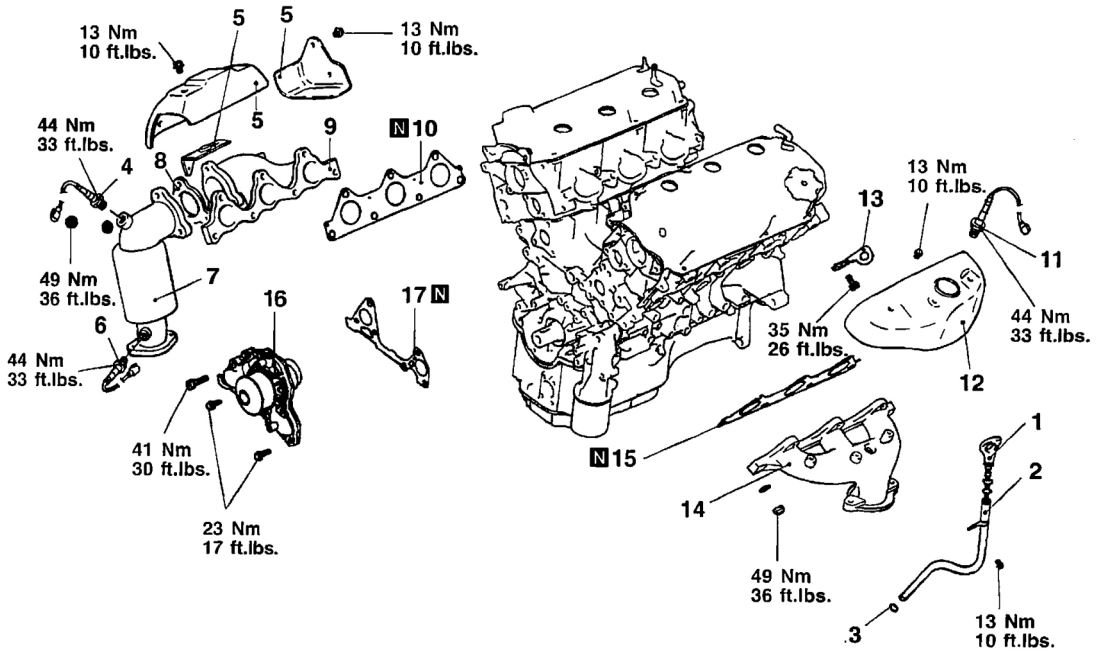
- Before installing the pressure regulator, the O-ring must be lubricated with a drop of new engine oil for easy installation.

CAUTION: Use care not to let the engine oil enter the fuel rail.

EXHAUST MANIFOLD AND WATER PUMP

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

1. OIL LEVEL GAUGE
2. OIL LEVEL GAUGE GUIDE
3. O-RING
4. HEATED OXYGEN SENSOR, REAR UPPER
5. HEAT PROTECTOR, REAR
6. HEATED OXYGEN SENSOR, REAR LOWER
7. CATALYTIC CONVERTER, REAR
8. GASKET
9. EXHAUST MANIFOLD, REAR
- ▶B◀ 10. EXHAUST MANIFOLD GASKET, REAR
11. OXYGEN SENSOR, FRONT UPPER
12. HEAT PROTECTOR, FRONT
13. ENGINE LIFT BRACKET
14. EXHAUST MANIFOLD, FRONT
- ▶B◀ 15. EXHAUST MANIFOLD GASKET, FRONT
- ▶A◀ 16. WATER PUMP
17. WATER PUMP GASKET

G01147500

Fig. 101: Removing & Installing Exhaust Manifold And Water Pump
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: O-RING AND WATER PIPE INSTALLATION

- Wet the O-ring (with water) to facilitate assembly.

CAUTION: Keep the O-ring free of oil or grease.

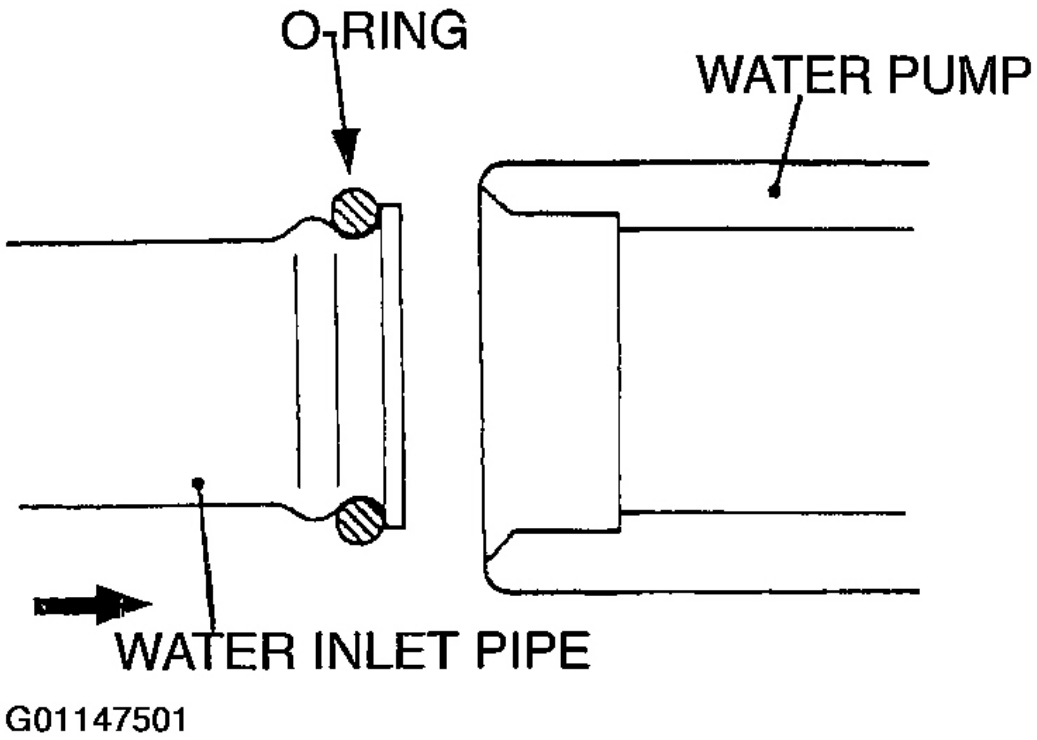


Fig. 102: Installing Water Pipe
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: EXHAUST MANIFOLD GASKET INSTALLATION

- Install gaskets with cylinder number 1, 3 and 5 embossed on their top side to the rear bank and install those with cylinder number 2, 4 and 6 to the front bank.

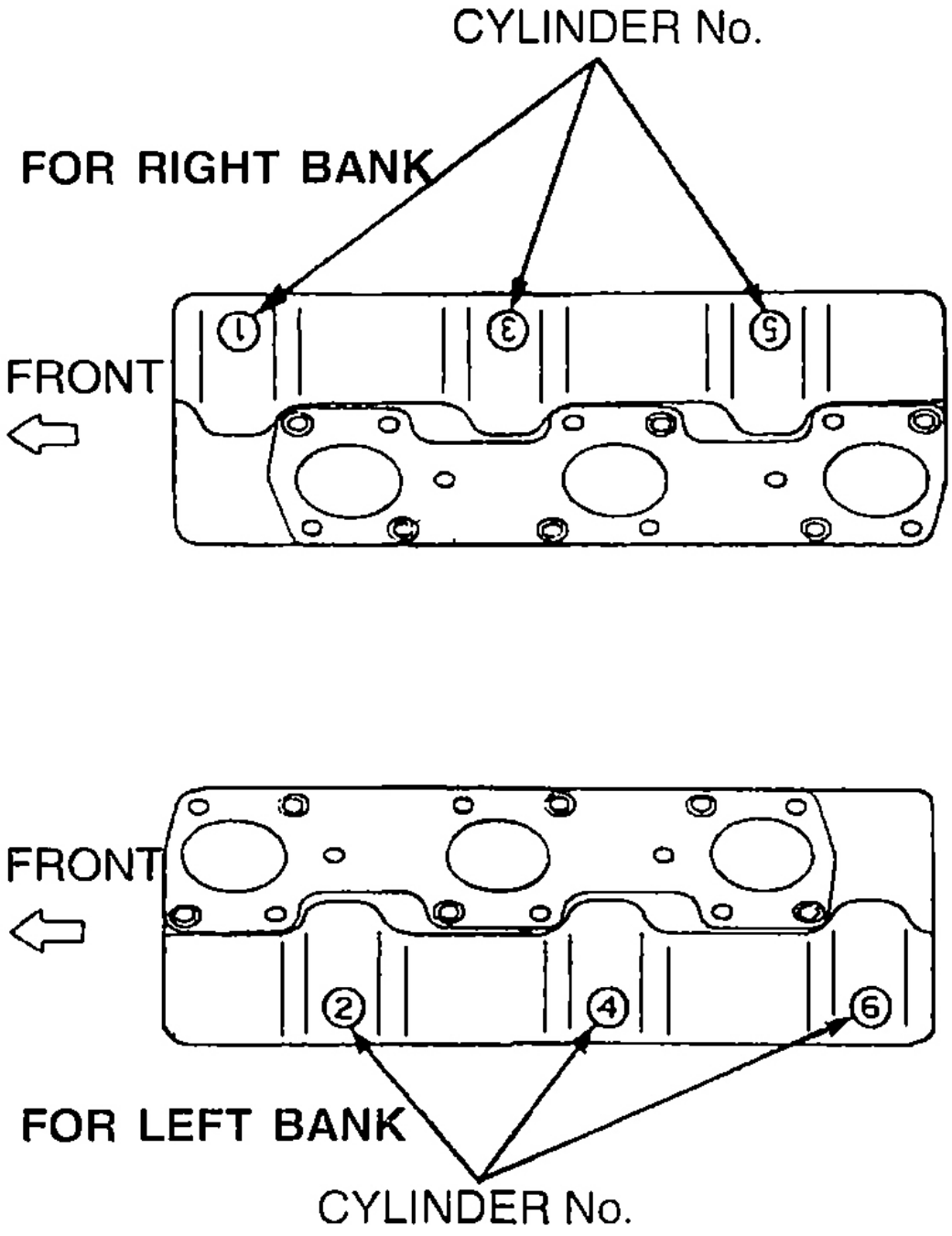


Fig. 103: Installing Exhaust Manifold Gaskets
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ROCKER ARMS AND CAMSHAFT

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

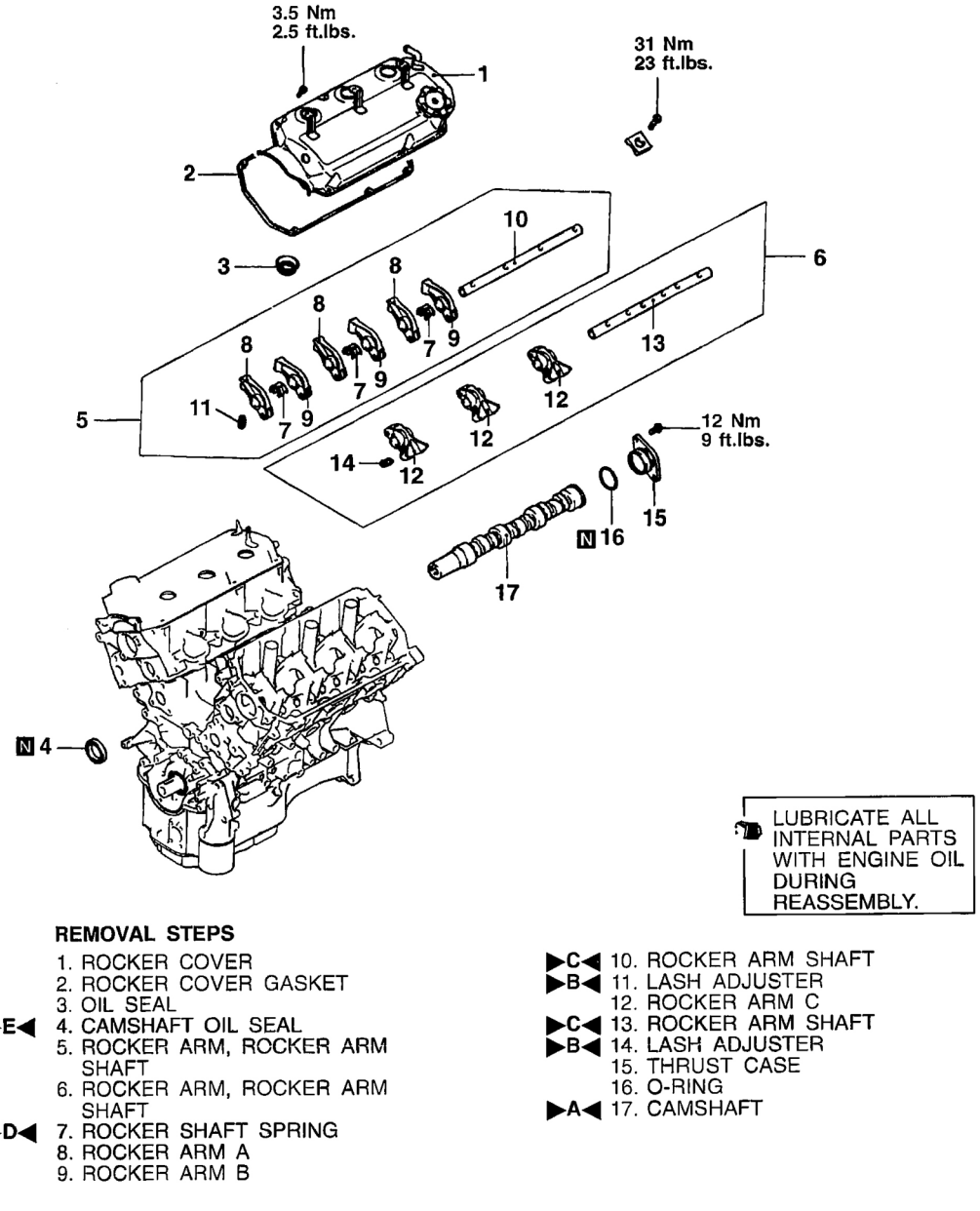


Fig. 104: Removing & Installing Rocker Arms And Camshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: ROCKER ARM, ROCKER ARM SHAFT REMOVAL

1. Install the special tools to the rocker arm to hold the lash adjuster.

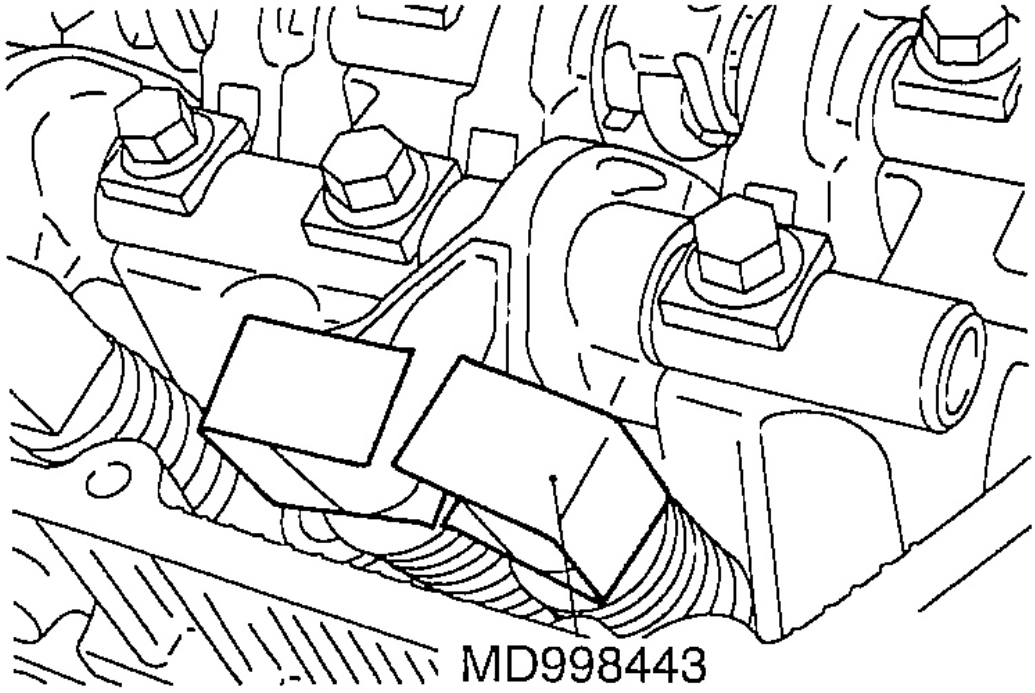


Fig. 105: Installing Special Tools To Rocker Arms
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Loosen the camshaft bearing cap bolt. Do not remove the bolts from the cap.
3. Remove the rocker arm, shaft and bearing cap as an assembly.

NOTE: If the lash adjuster is to be reused, it must be cleaned and checked before installation, refer to LASH ADJUSTER CLEANING AND CHECKING.

INSTALLATION SERVICE POINTS

A: CAMSHAFT INSTALLATION

1. Apply engine oil to the camshaft journals and cams and then install the camshafts.

Use care to prevent confusion of the right and left bank camshafts.

NOTE: The right bank camshaft is identified by a slit 4 mm wide at the rear end of the camshaft.

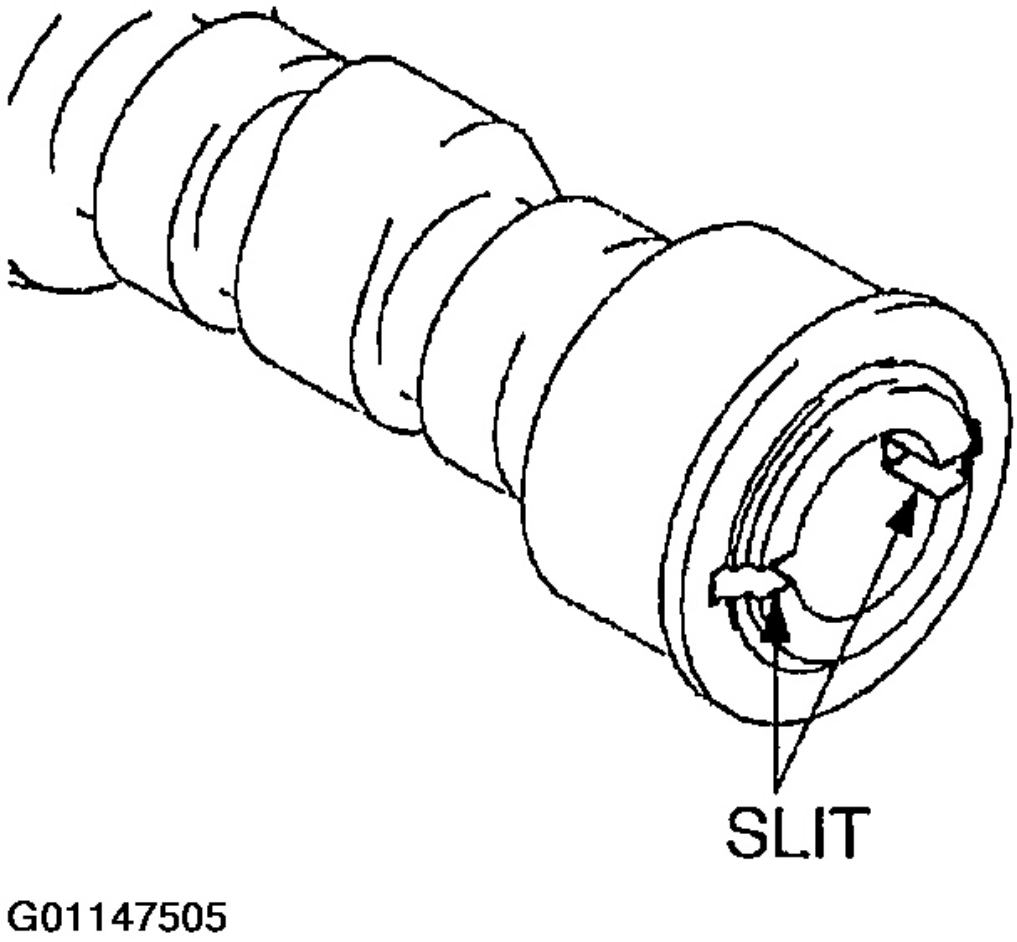


Fig. 106: Identifying Right Bank Camshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Check to see that the dowel pin of the camshaft is located at the position shown in illustration.

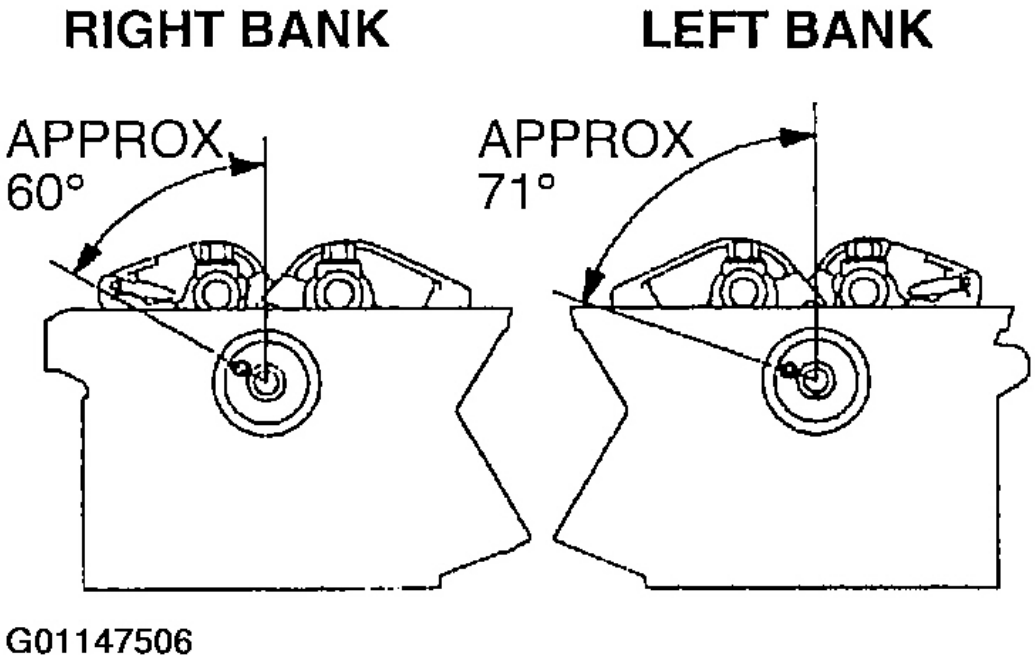


Fig. 107: Positioning Camshafts For Installation
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: LASH ADJUSTER INSTALLATION

NOTE: If the lash adjuster is to be reused, it must be cleaned and checked before installation, refer to LASH ADJUSTER CLEANING AND CHECKING.

- Fit the lash adjuster onto the rocker arm without allowing diesel fuel to spill out. Fit special tool MD998443 to prevent the lash adjuster falling to the floor.

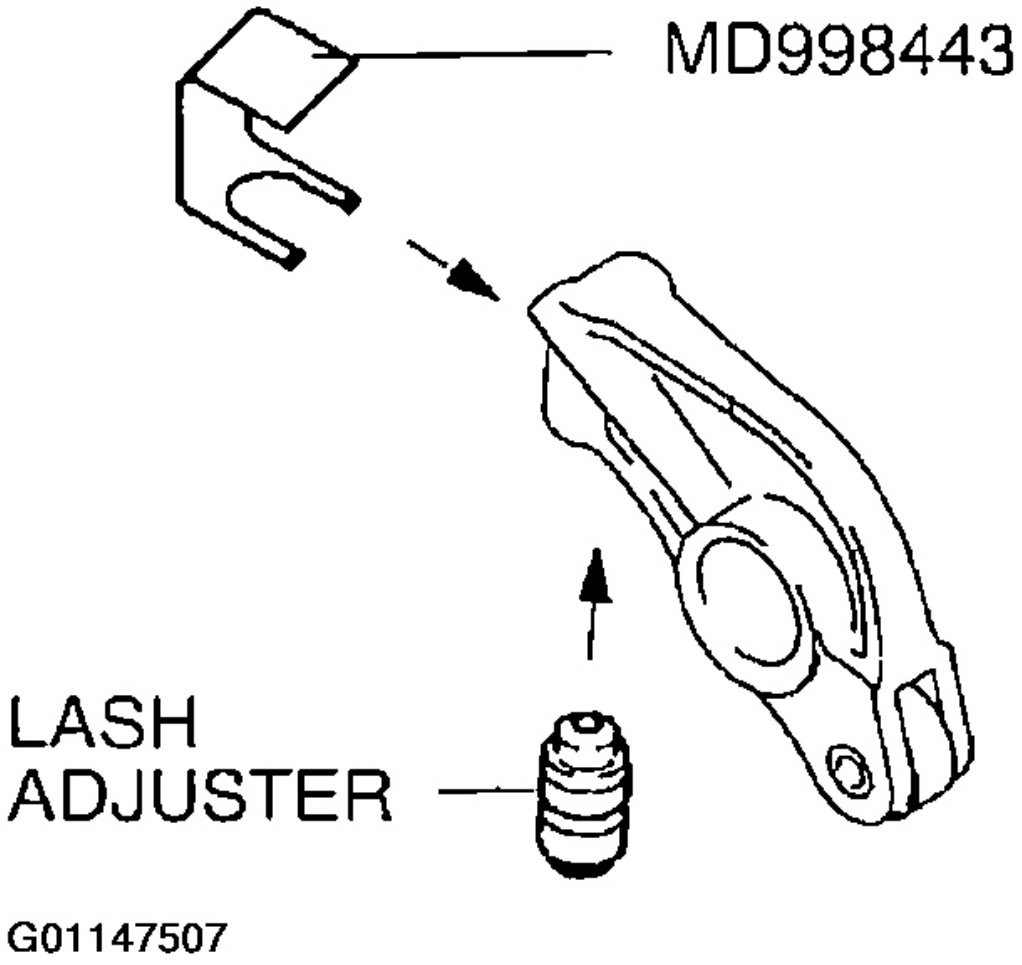


Fig. 108: Installing Lash Adjuster
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

C: ROCKER ARM SHAFT

1. The end with the larger chamfer is at the right on the left bank and at the left on the right bank.

NOTE: Before installing the exhaust rocker arms and rocker arm shaft, mount the rocker shaft spring.

2. The side with the oil holes is on the lower side (cylinder head side).

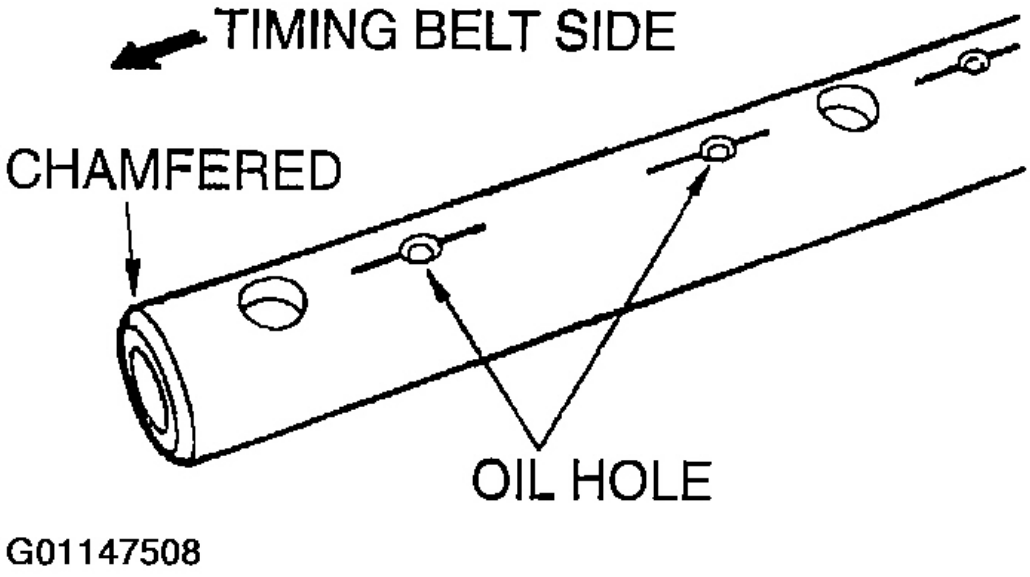


Fig. 109: Installing Rocker Arm Shafts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

D: ROCKER SHAFT SPRING

- Insert the rocker shaft spring at a slant with respect to the spark plug guide and install it normal to the guide.

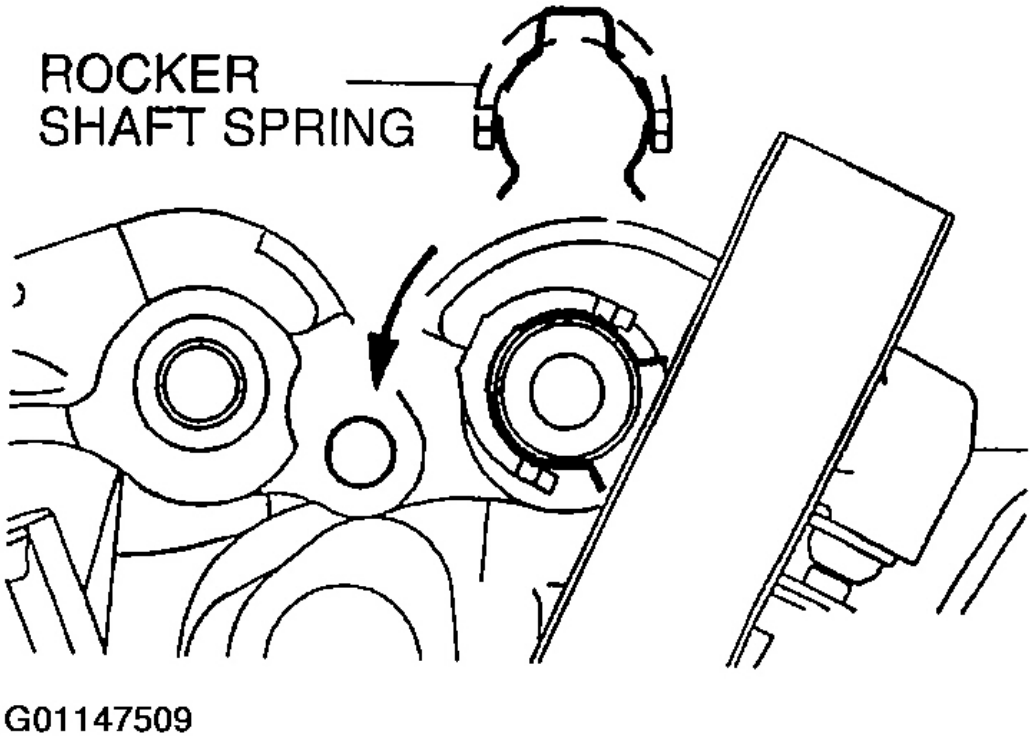


Fig. 110: Installing Rocker Shaft Spring
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

E: CAMSHAFT OIL SEAL INSTALLATION

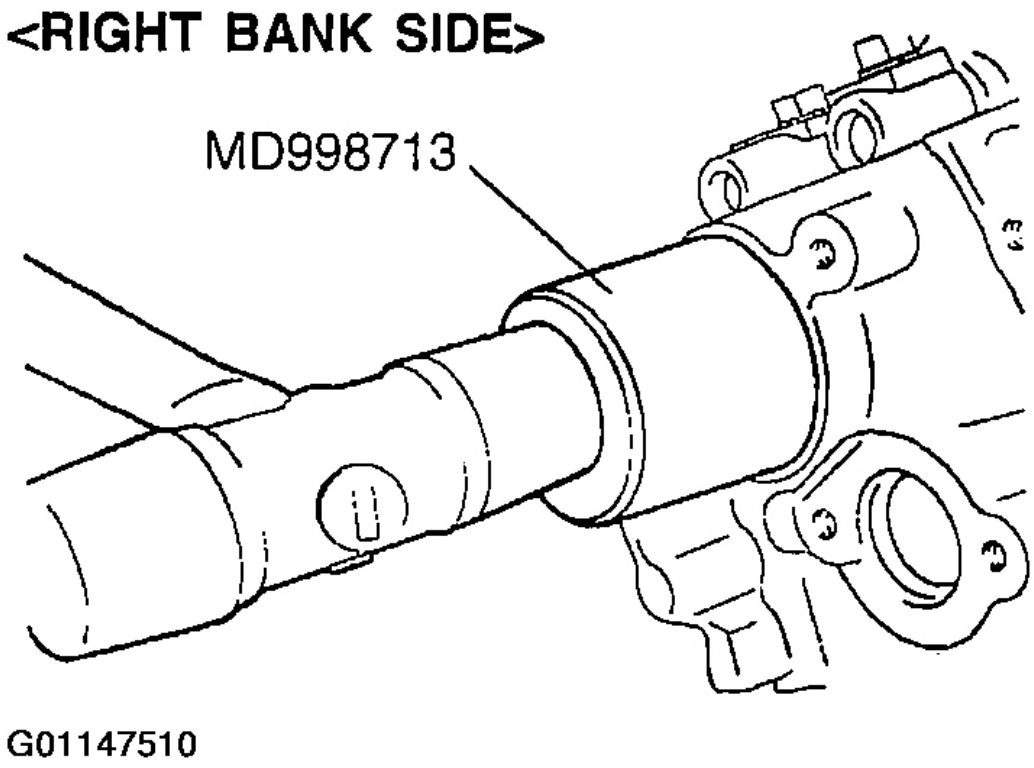


Fig. 111: Installing Camshaft Oil Seal (Right Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

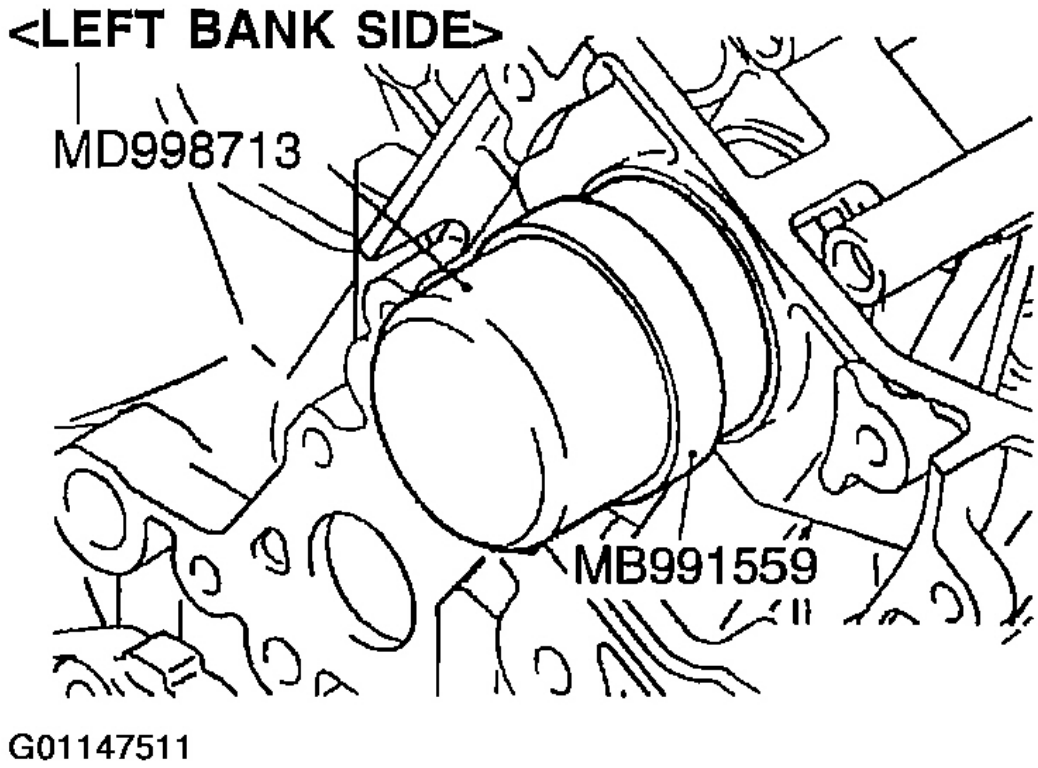


Fig. 112: Installing Camshaft Oil Seal (Left Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

ROCKER ARM SHAFT

- Check the rocker arm mounting portions of the rocker arm shafts for wear or damage. Replace as necessary.

ROCKER ARM

1. Check the roller surface and replace the rocker arm if recesses, damage or heat seizure is observed.
2. Check roller rotation and replace the rocker arm if uneven rotation or roller backlash is observed.
3. Check the inside diameter and replace the rocker arm if damage or seizure is observed.

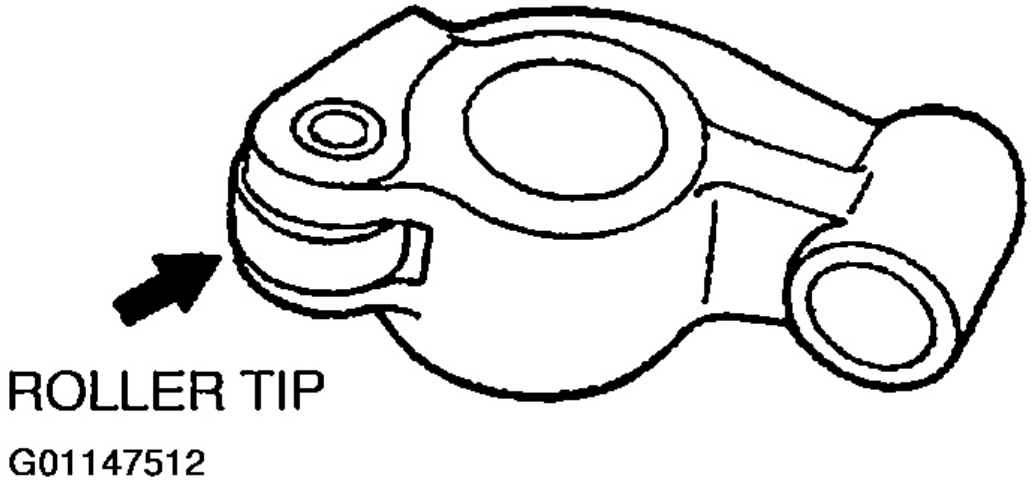
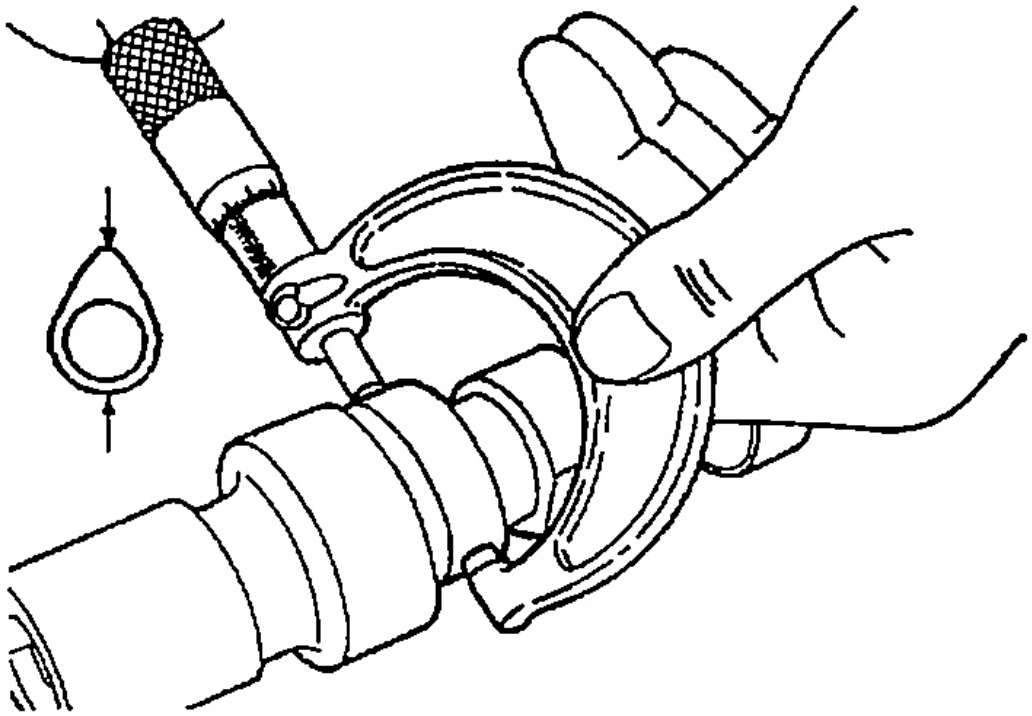


Fig. 113: Identifying Roller
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAMSHAFT

1. Inspect the camshaft bearing journals for damage and binding. If the journals are binding, also check the cylinder head for damage. Also check the cylinder head oil holes for clogging.
2. Check the cam surface for abnormal wear and damage and replace if defective. Also measure the cam height and replace if out of limit.



G01147514

Fig. 114: Measuring Cam Height
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

	STANDARD VALUE	LIMIT
Intake mm (in.)	37.71 (1.484)	37.21 (1.465)
Exhaust mm (in.)	37.14 (1.462)	36.64 (1.442)

G01147513

Fig. 115: Cam Height Specifications
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

LASH ADJUSTER CLEANING AND CHECKING

CAUTION: The lash adjusters are precision-engineered mechanisms. Do not allow them to become contaminated by dirt or other foreign substances.

CAUTION: Do not attempt to disassemble the lash adjusters.

CAUTION: Use only fresh diesel fuel to clean the lash adjusters.

1. Prepare three containers and approximately five liters of diesel fuel. Into each container, pour enough diesel fuel to completely cover a lash adjuster when it is standing upright. Then, perform the following steps with each lash adjuster.

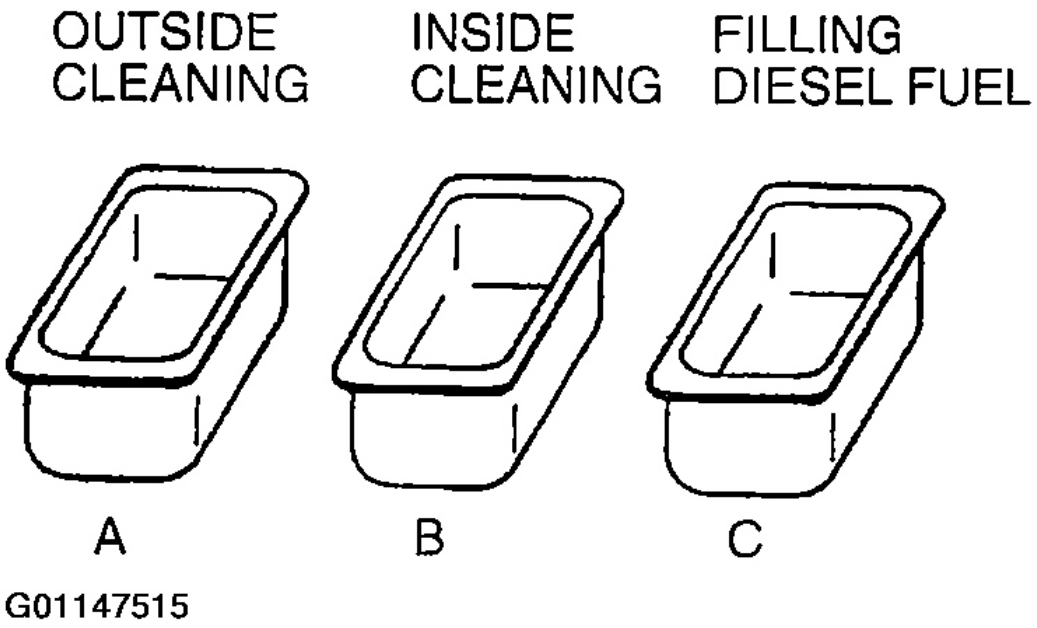


Fig. 116: Identifying Cleaning Containers
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Place the lash adjuster in container A and clean its outside surface.

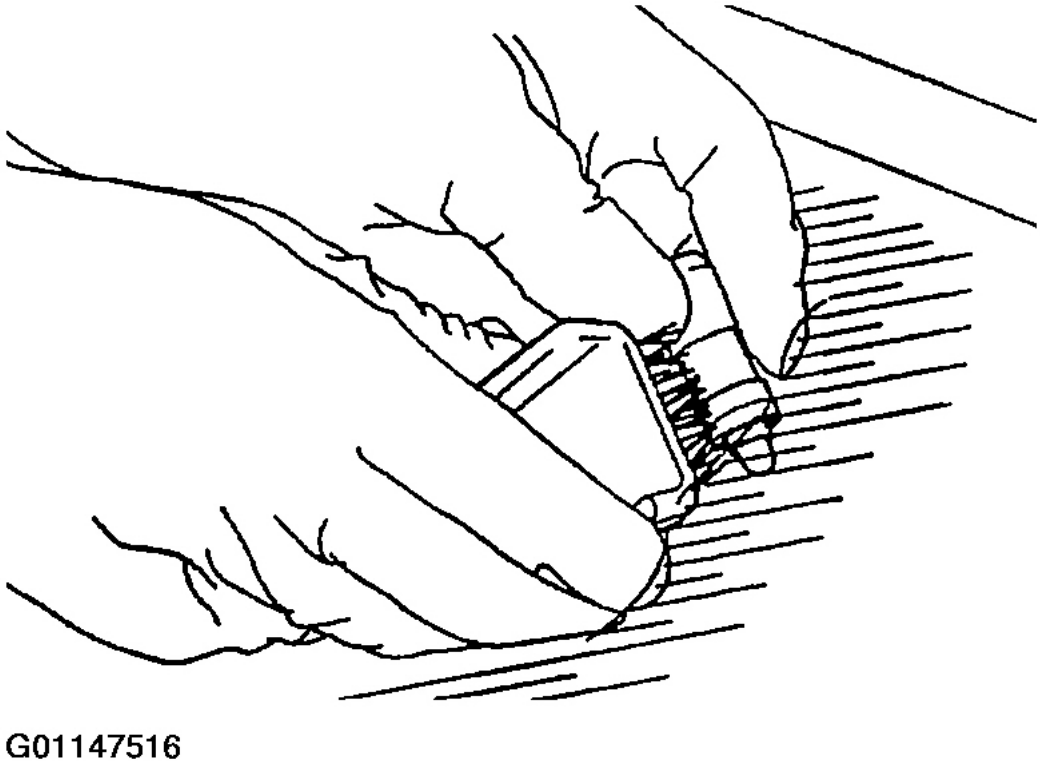


Fig. 117: Cleaning Lash Adjuster Outer Surface
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: Use a nylon brush if deposits are hard to remove.

3. Fit special tool MD998441 onto the lash adjuster.

CAUTION: The steel ball spring is extremely weak, so the lash adjuster's functionality may be lost if the air bleed wire is pushed in hard.

4. While gently pushing down the internal steel ball using special tool MD998442, move the plunger through five to ten strokes until it slides smoothly. In addition to eliminating stiffness in the plunger, this operation will remove dirty oil.

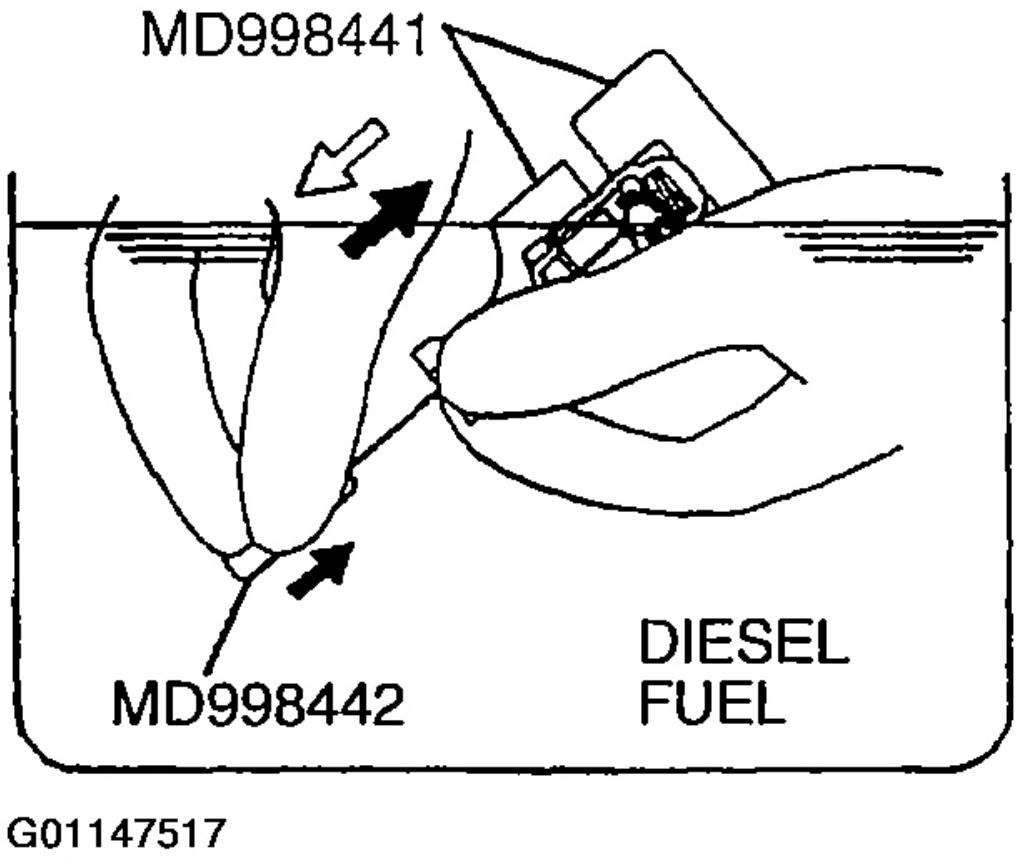


Fig. 118: Eliminating Stiffness In Plunger & Removing Dirty Oil
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: If the plunger remains stiff or the mechanism appears otherwise abnormal, replace the lash adjuster.

5. Remove the lash adjuster from the container. Then, push down the steel ball gently and push the plunger to eliminate diesel fuel from the pressure chamber.

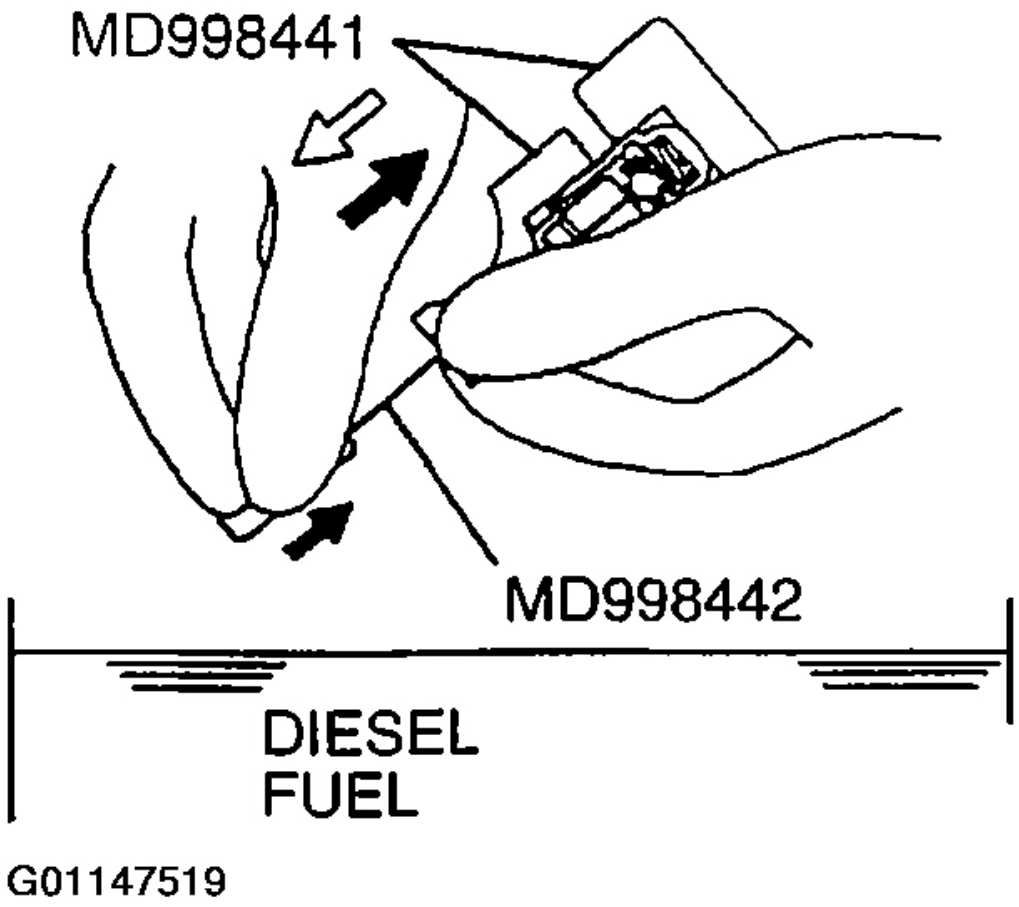


Fig. 119: Removing Diesel Fuel From Pressure Chamber
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

6. Fit special tool MD998441 onto the lash adjuster.

CAUTION: The steel ball spring is extremely weak, so the lash adjuster's functionality may be lost if the air bleed wire is pushed in hard.

7. Place the lash adjuster in container B. Then, gently push down the internal steel ball using special tool MD998442 and move the plunger through five to ten strokes until it slides smoothly. This operation will clean the lash adjuster's pressure chamber.
8. Remove the lash adjuster from the container. Then, push down the steel ball gently and push the plunger to eliminate diesel fuel from the pressure chamber.

CAUTION: Do not use container C for cleaning. If cleaning is performed in container C, foreign matter could enter the pressure chamber when the chamber is filled with diesel fuel.

9. Place the lash adjuster in container C. Then, gently push down the internal steel ball using special tool MD998442

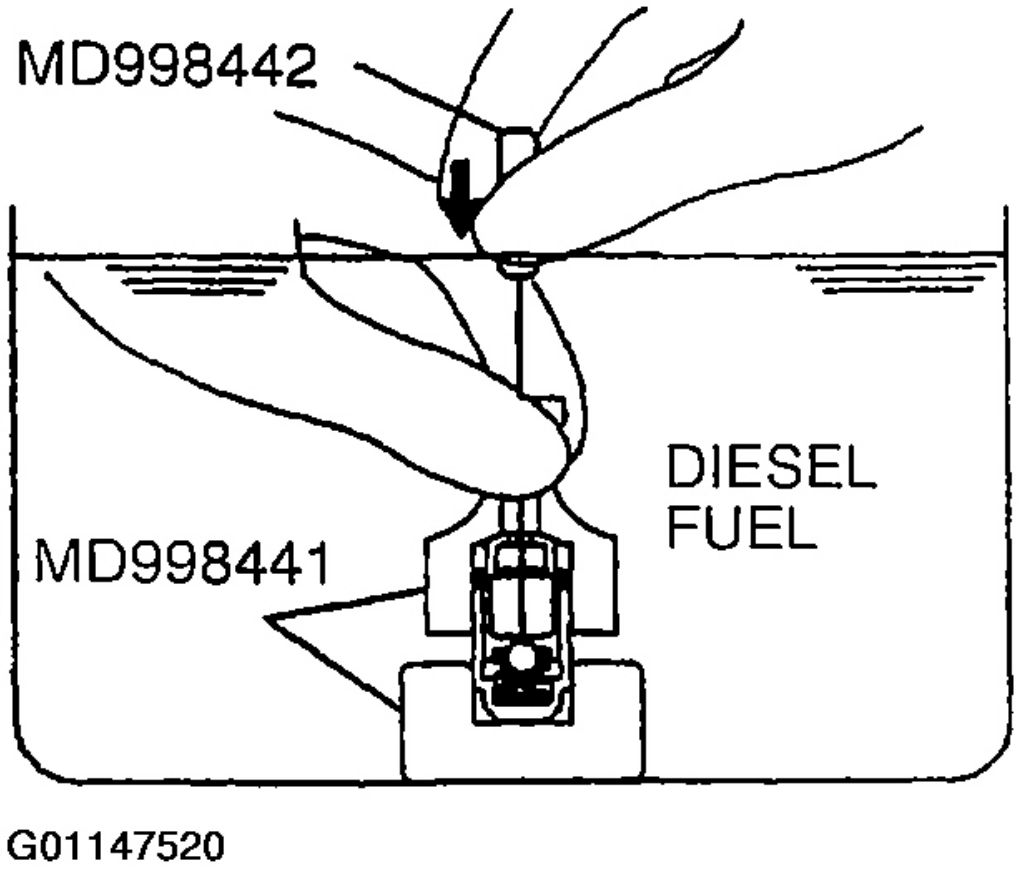


Fig. 120: Pushing Down Internal Steel Ball
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

10. Stand the lash adjuster with its plunger at the top, then push the plunger downward firmly until it moves through its greatest possible stroke. Return the plunger slowly, then release the steel ball and allow the pressure chamber to fill with diesel fuel.
11. Remove special tool MD998441.

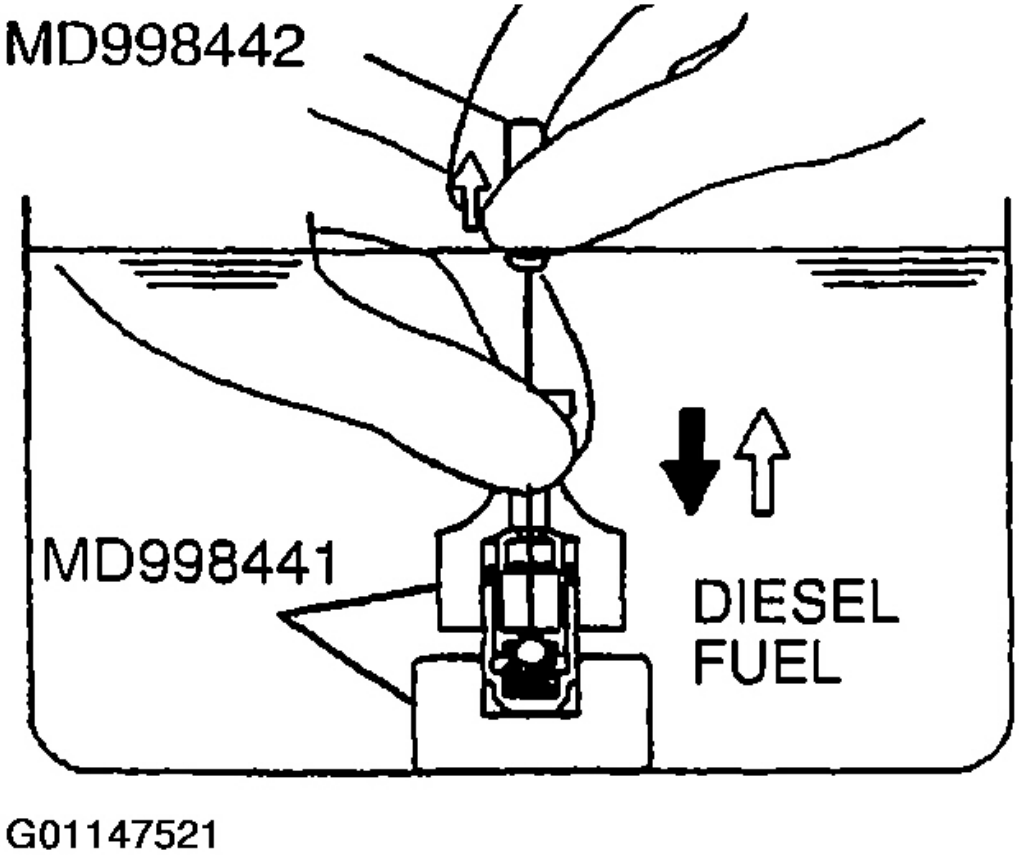


Fig. 121: Filling Pressure Chamber With Diesel Fuel
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

12. Remove the lash adjuster from the container, then stand the lash adjuster with its plunger at the top. Push the plunger firmly and check that it does not move. Also, check that the lash adjuster's height matches that of a new lash adjuster.

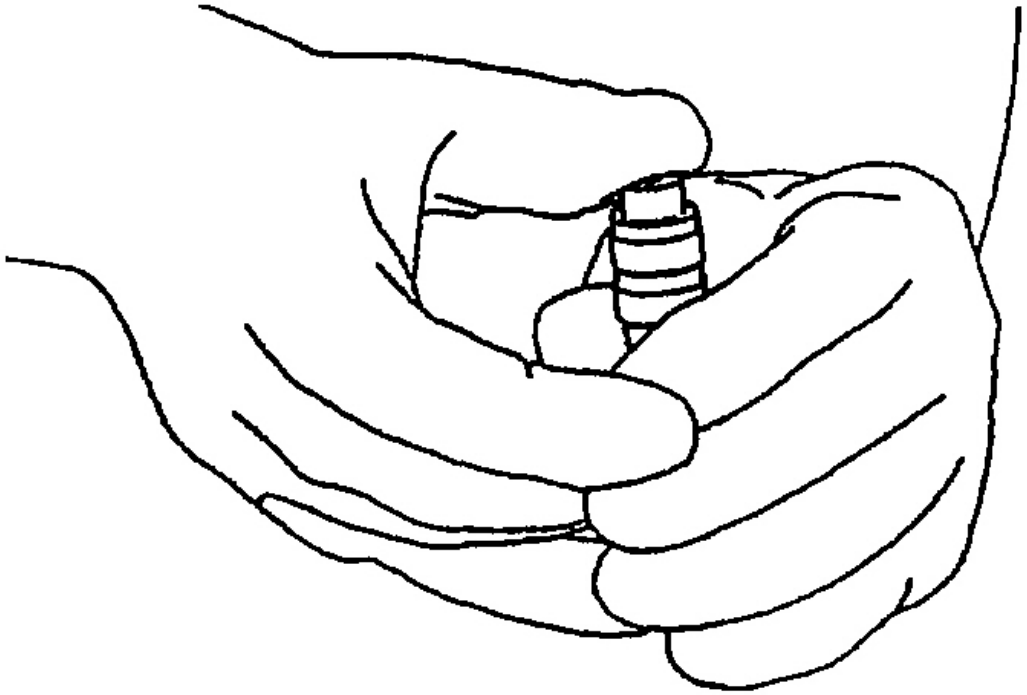


Fig. 122: Checking Plunger
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: If lash adjuster contracts, perform the operations (9) through (12) again to fill it with diesel fuel completely. Replace the lash adjuster if it still contracts after performing these steps.

13. Set the lash adjuster on the special tool MD998440 (leak down tester).

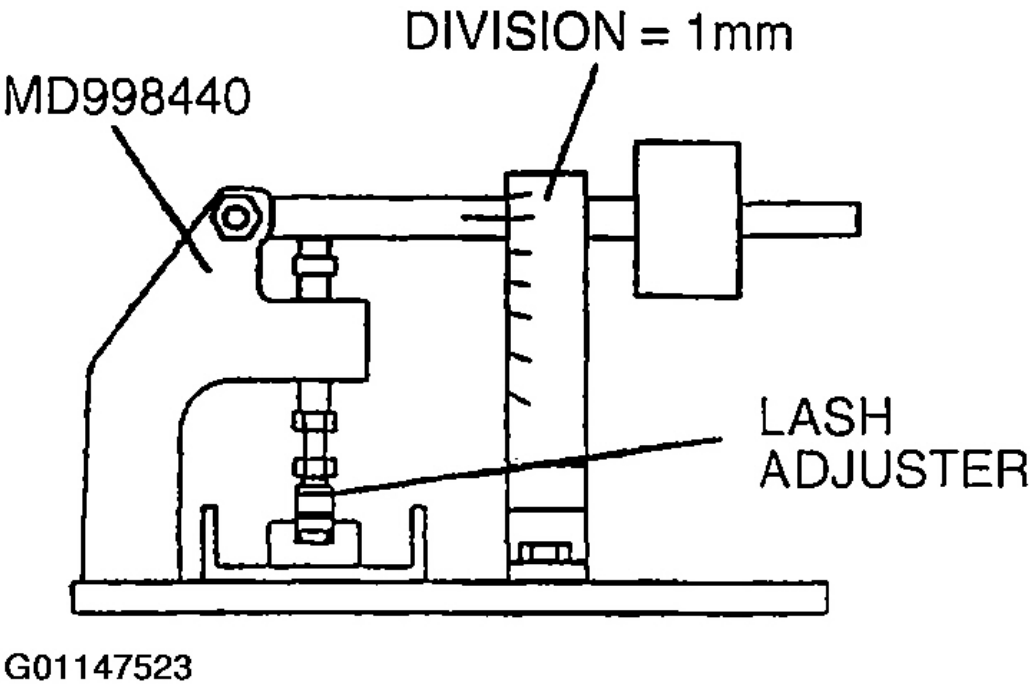


Fig. 123: Setting Lash Adjuster On Special Tool MD998440 (Leak Down Tester)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

14. After the plunger has moved downward slightly [0.2 to 0.5 mm (0.008 - 0.019 in.)], measure the time taken for it to move downward by a further 1 mm (0.04 in.).

    Standard value: 5 - 20 seconds/1 mm (0.04 in.) [with diesel fuel at 15 to 20°C (59 - 68°F)]

    NOTE: Replace the lash adjuster if the time measurement is out of specification.

15. Fit special tool MD998441 onto the lash adjuster.
16. Place the lash adjuster in container C again, then gently push down the internal steel ball using special tool MD998442.

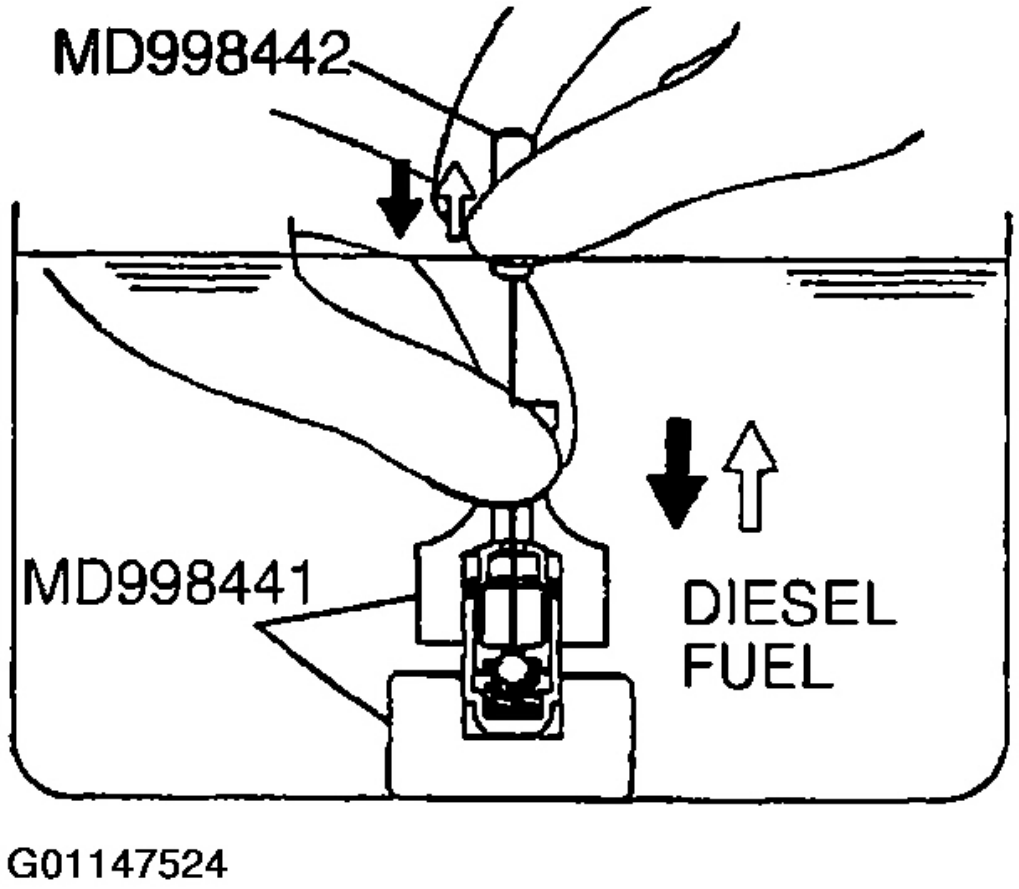


Fig. 124: Pushing Down Internal Steel Ball Using Special Tool MD998442
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

17. Stand the lash adjuster with its plunger at the top, then push the plunger downward firmly until it moves through its greatest possible stroke. Return the plunger slowly, then release the steel ball and allow the pressure chamber to fill with diesel fuel.
18. Remove special tool MD998441.
19. Remove the lash adjuster from the container, then stand the lash adjuster with its plunger at the top. Push the plunger firmly and check that it does not move. Also, check that the lash adjuster's height matches that of a new lash adjuster.

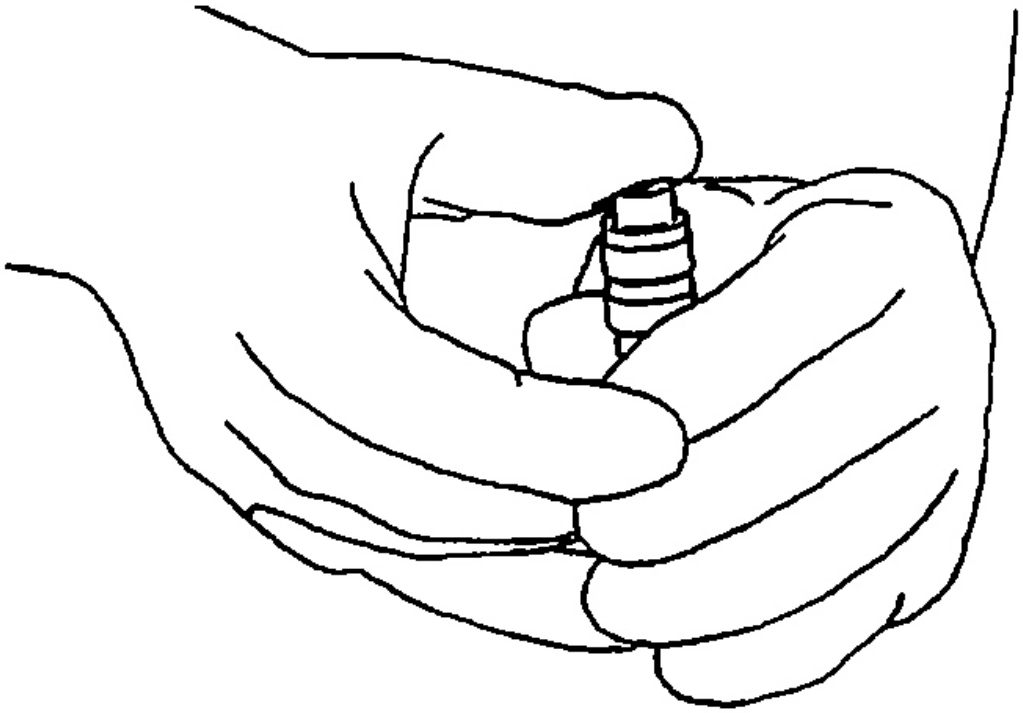


Fig. 125: Checking Lash Adjuster
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

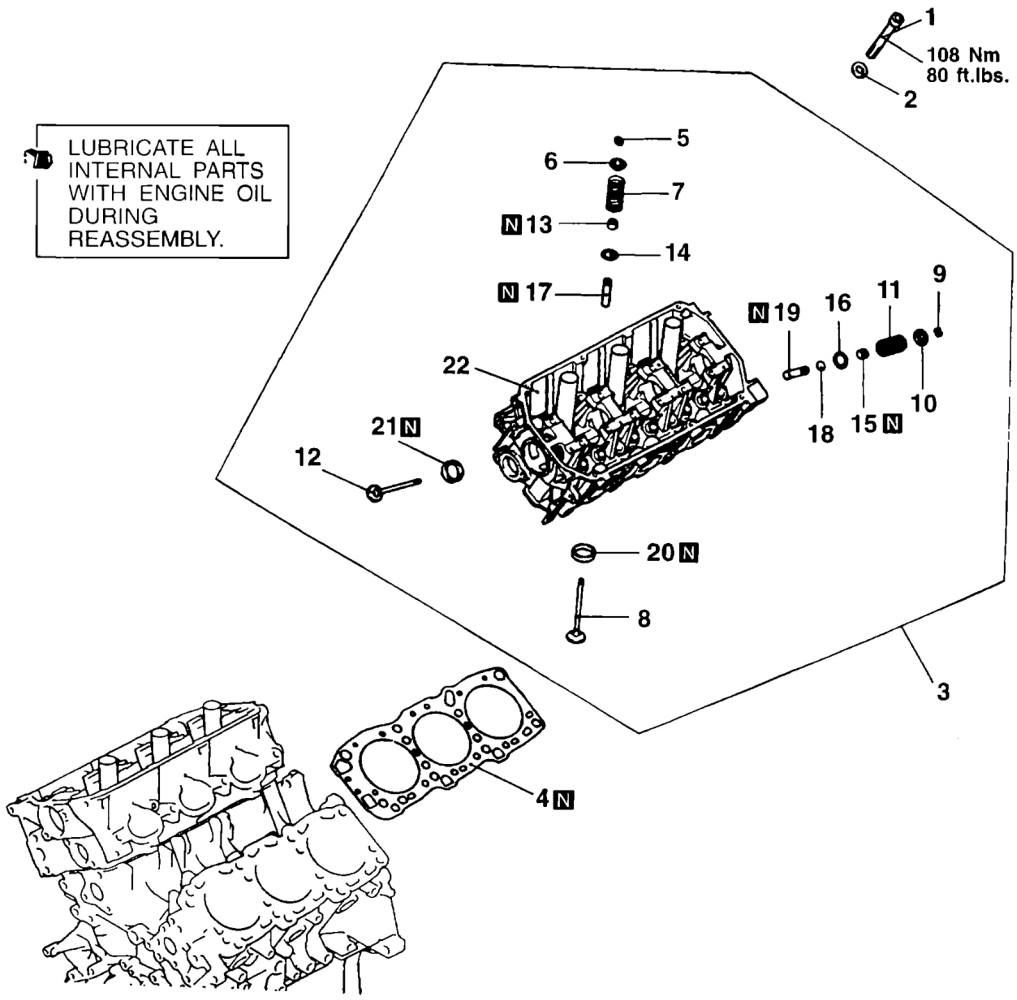
NOTE: If lash adjuster contracts, perform the operations (15) through (19) again to fill it with diesel fuel completely. Replace the lash adjuster if it still contracts after performing these steps.

20. Stand the lash adjuster upright to prevent diesel fuel spilling out. Do not allow the lash adjuster to become contaminated by dirt or other foreign matter. Fit the lash adjuster onto the engine as soon as possible.

CYLINDER HEAD AND VALVES

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

◀A▶ ▶D◀ 1. CYLINDER HEAD BOLT
2. WASHER
3. CYLINDER HEAD ASSEMBLY
4. CYLINDER HEAD GASKET
◀B▶ ▶C◀ 5. RETAINER LOCK
6. VALVE SPRING RETAINER
▶B◀ 7. VALVE SPRING
8. INTAKE VALVE
◀B▶ ▶C◀ 9. RETAINER LOCK
10. VALVE SPRING RETAINER
▶B◀ 11. VALVE SPRING
12. EXHAUST VALVE
◀C▶ ▶A◀ 13. VALVE STEM SEAL
14. VALVE SPRING SEAT
◀C▶ ▶A◀ 15. VALVE STEM SEAL
16. VALVE SPRING SEAT
17. INTAKE VALVE GUIDE
18. SNAP RING
19. EXHAUST VALVE GUIDE
20. INTAKE VALVE SEAT
21. EXHAUST VALVE SEAT
22. CYLINDER HEAD

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Fig. 126: Removing & Installing Cylinder Head And Valves
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

PRECAUTION FOR REMOVED PARTS

- Keep removed parts in order according to the cylinder number and intake/exhaust.

A: CYLINDER HEAD BOLT REMOVAL

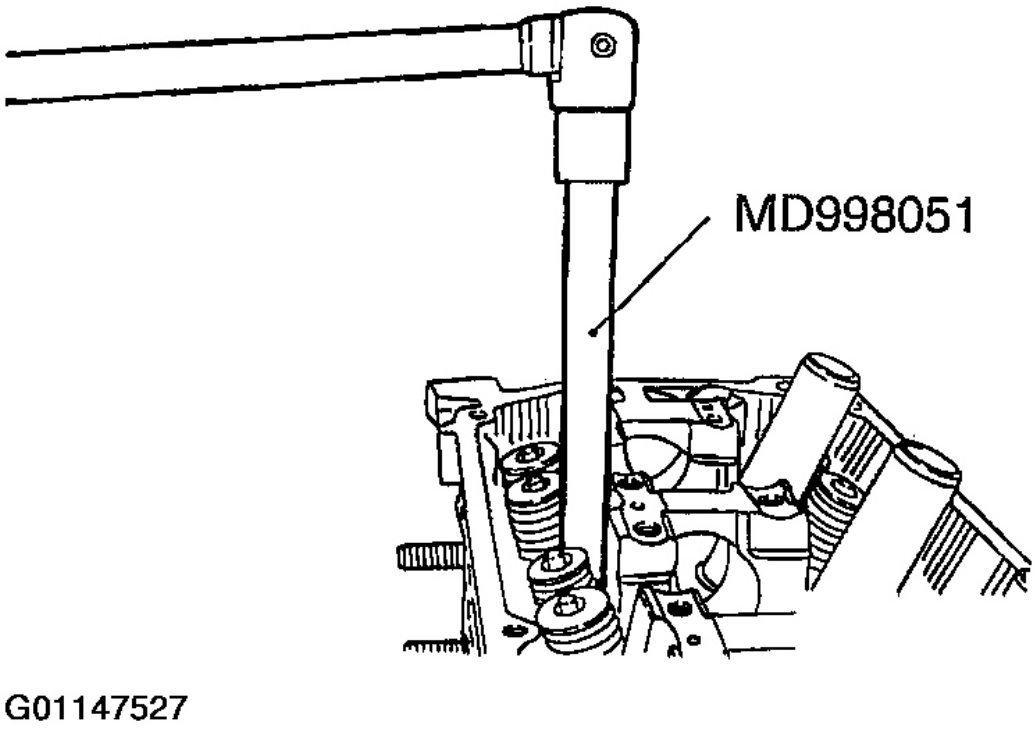

Fig. 127: Removing Cylinder Head Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: RETAINER LOCK REMOVAL

1. Using the special tool, compress the spring.

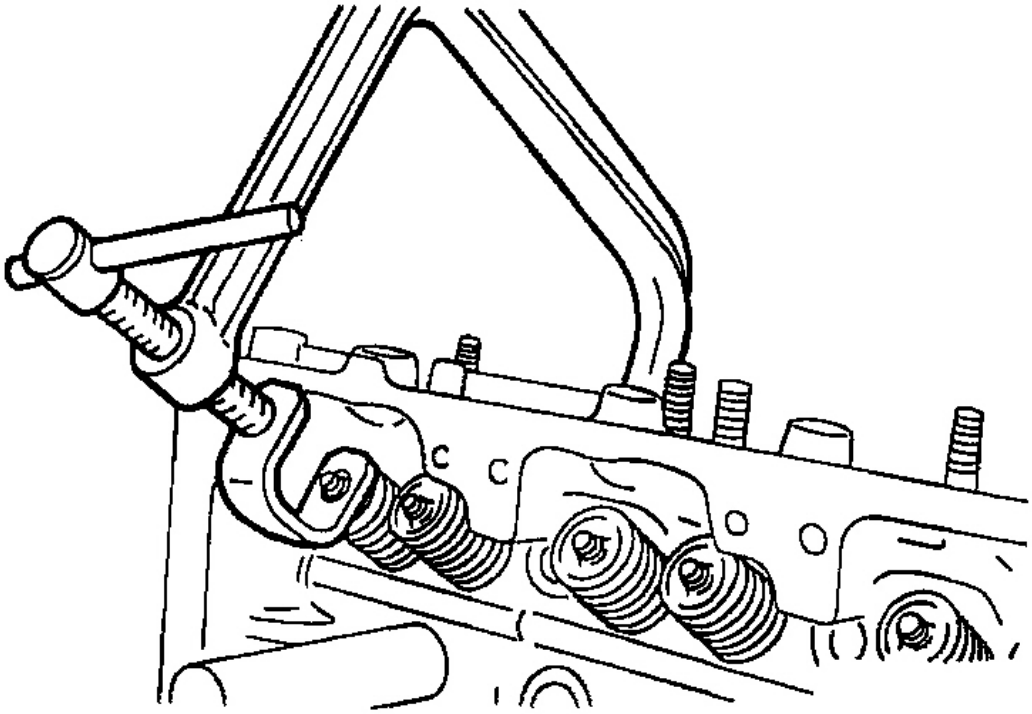

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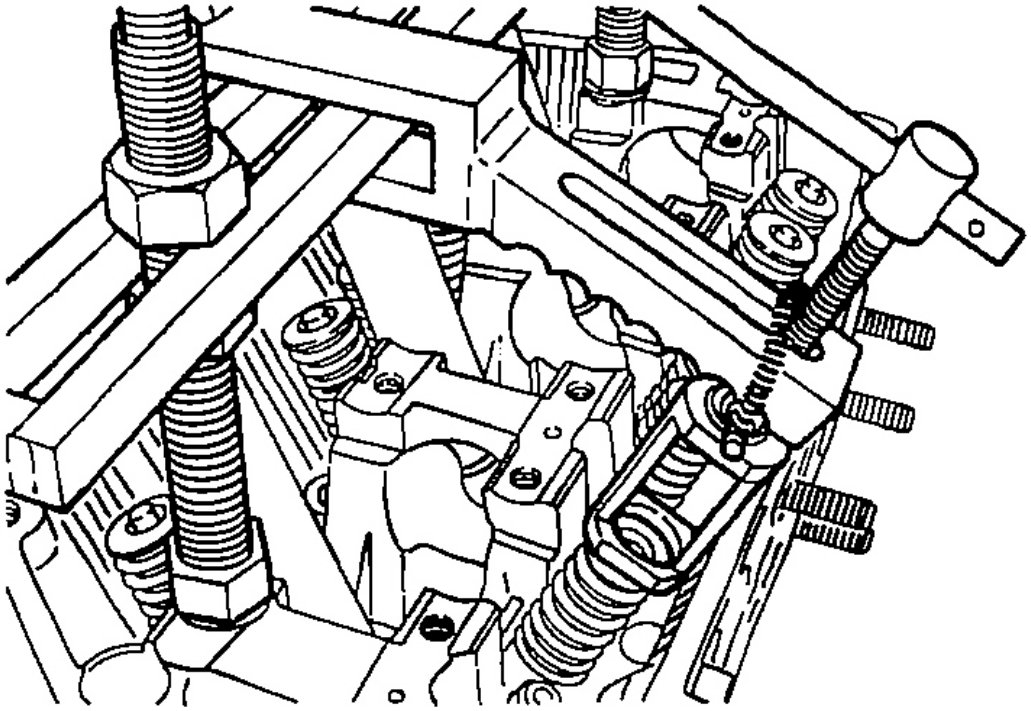
Fig. 128: Using Special Tool MD998735
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Remove the retainer locks.

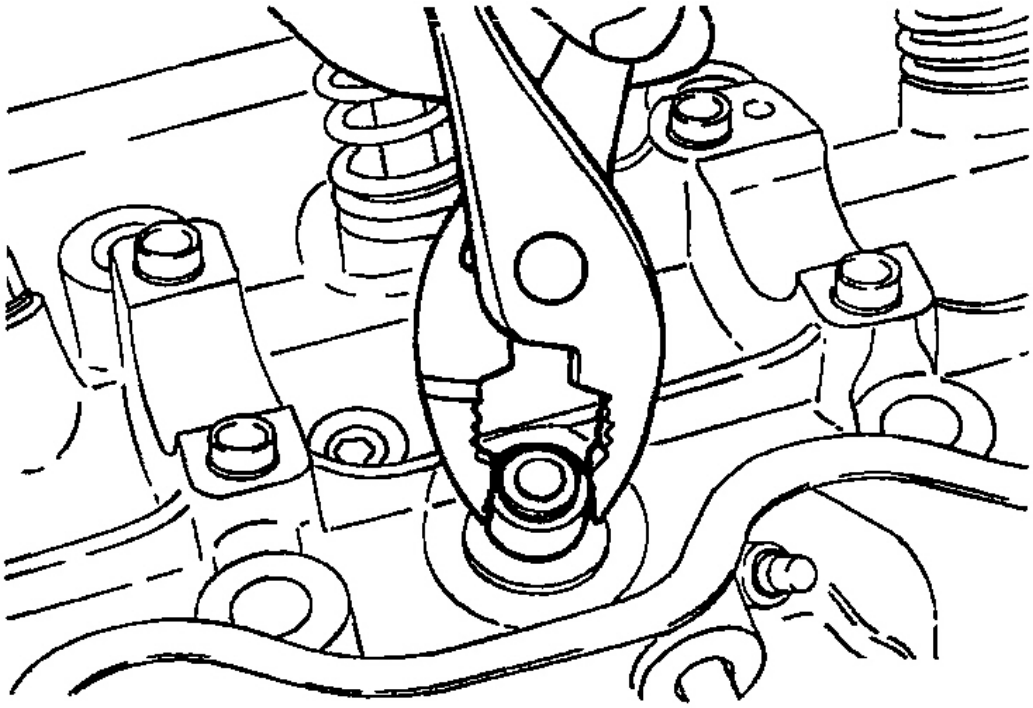


G01147529

Fig. 129: Using Special Tool MD998772
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

C: VALVE STEM SEAL REMOVAL

- Do not reuse removed valve stem seals.



G01147530

Fig. 130: Removing Valve Stem Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: VALVE STEM SEAL INSTALLATION

1. Install the valve spring seat.
2. Using the special tool, install a new stem seal to the valve guide.

CAUTION: Valve stem seals for intake valve and for exhaust valve are different. Be sure to install the correct ones.

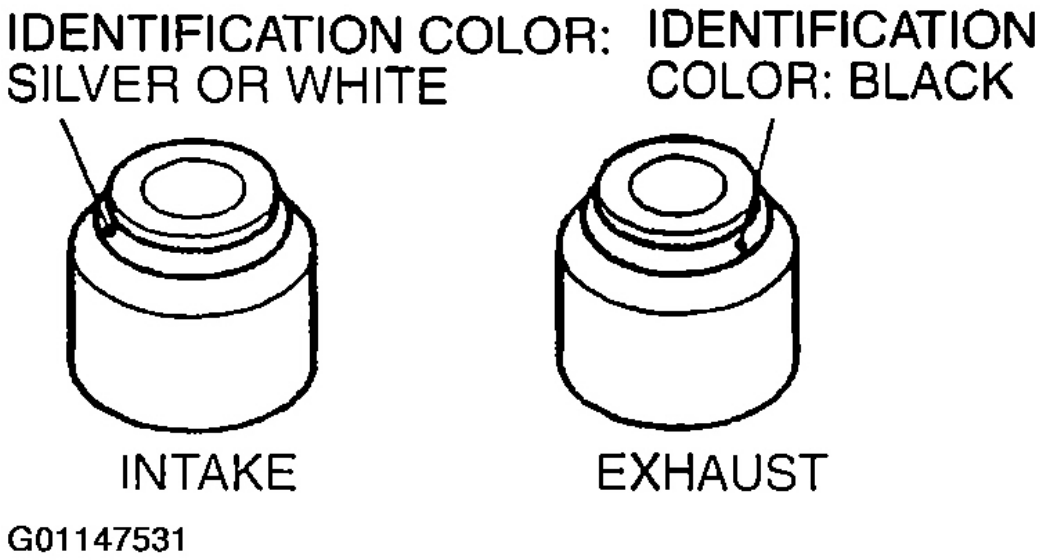


Fig. 131: Identifying Valve Stem Seals
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Valve stem seal identification color
Intake: Silver or White
Exhaust: Black

CAUTION: Do not reuse removed valve stem seal.

CAUTION: Always use the special tool to install the valve stem seal. Improperly installed valve stem seal may cause oil leak.

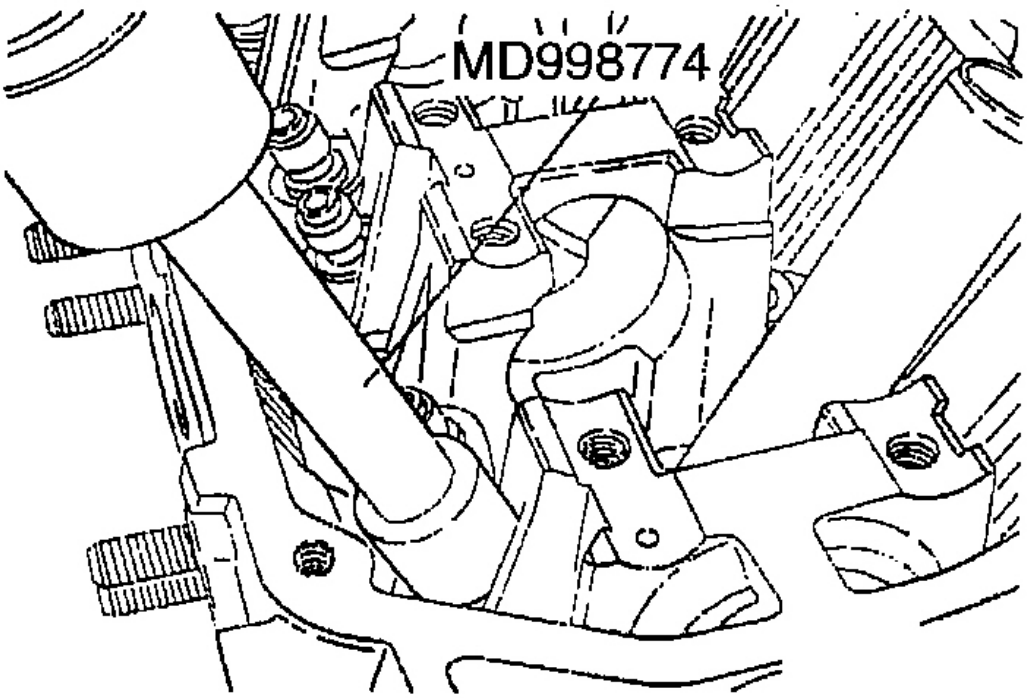


Fig. 132: Installing Valve Stem Seal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: VALVE SPRING INSTALLATION

- Direct the valve spring end with identification color toward the spring retainer.

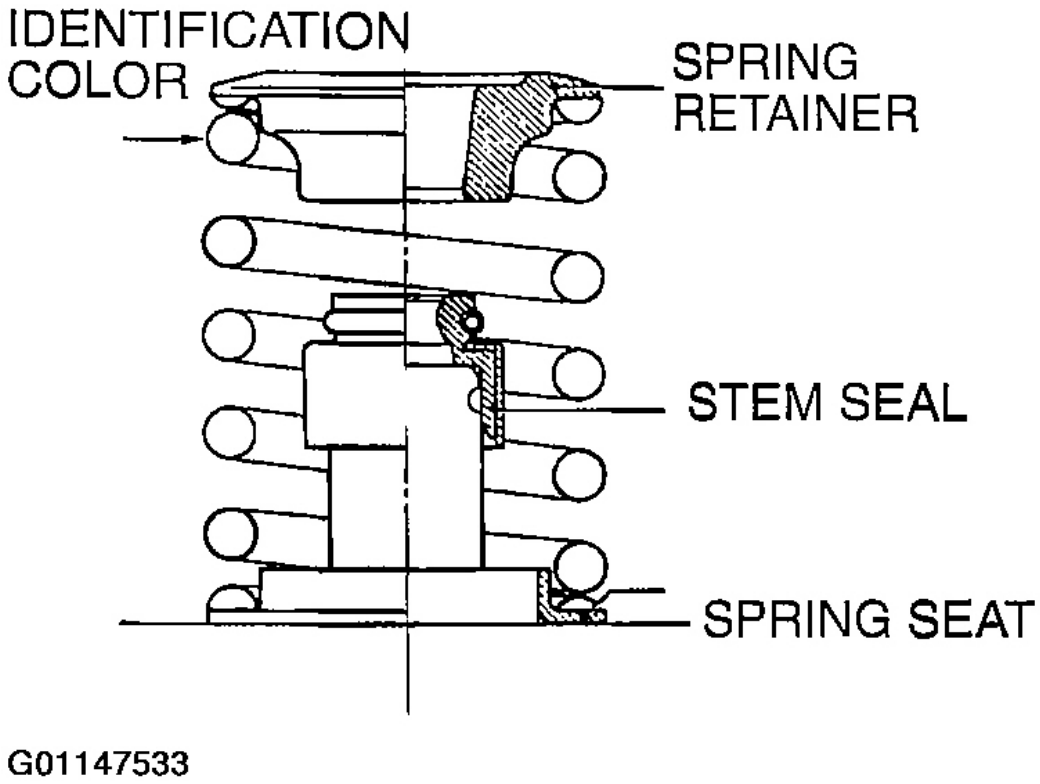


Fig. 133: Installing Valve Spring
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

C: RETAINER LOCK INSTALLATION

- Using the special tool, compress the valve spring and insert the retainer lock into position.

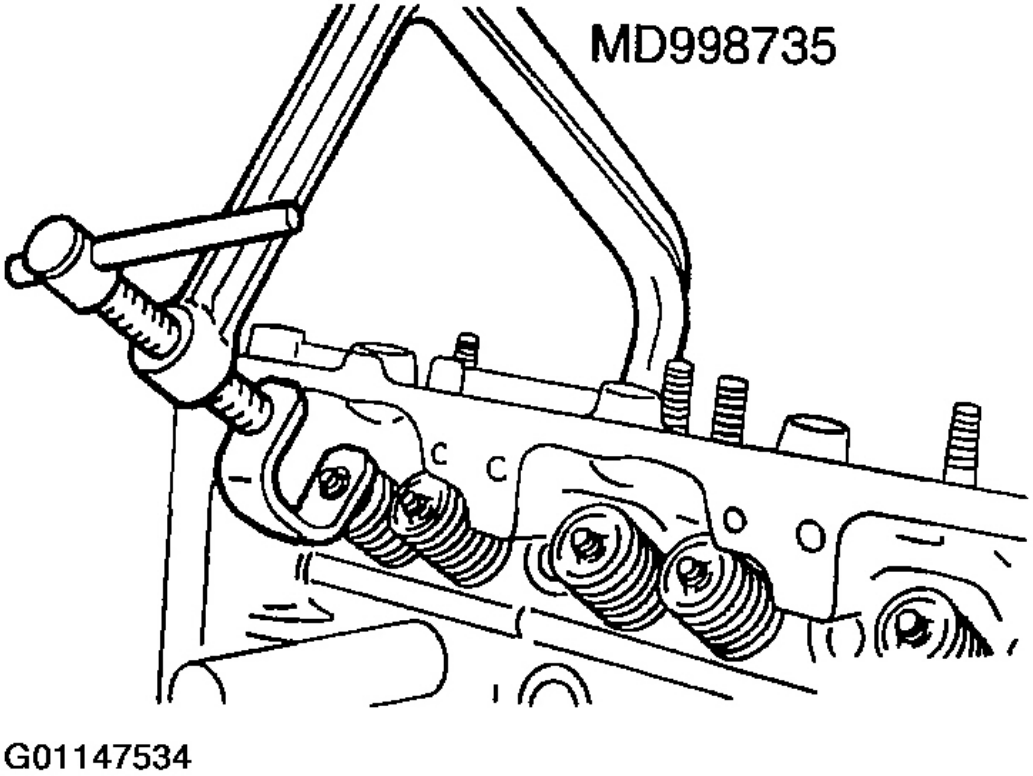
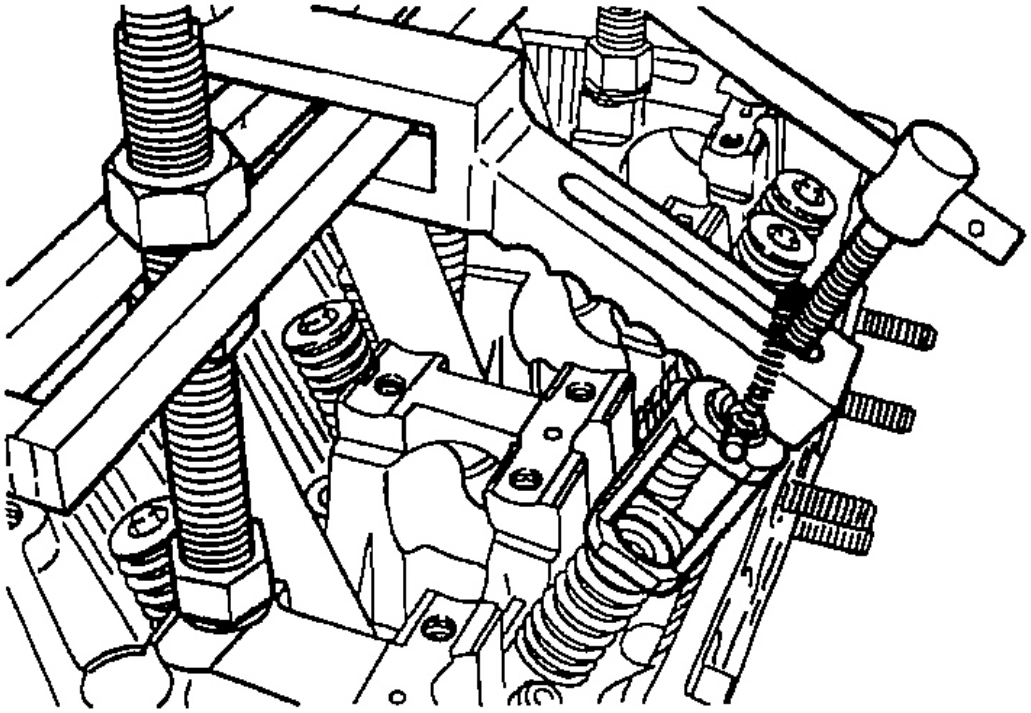


Fig. 134: Using Special Tool MD998735
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G01147535

Fig. 135: Using Special Tool MD998772
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

D: CYLINDER HEAD BOLT INSTALLATION

- Tighten the cylinder head bolts using the special tool in the sequence shown. Each bolt should be tightened in two to three steps, torquing progressively. Tighten to the specified torque in the final sequence.

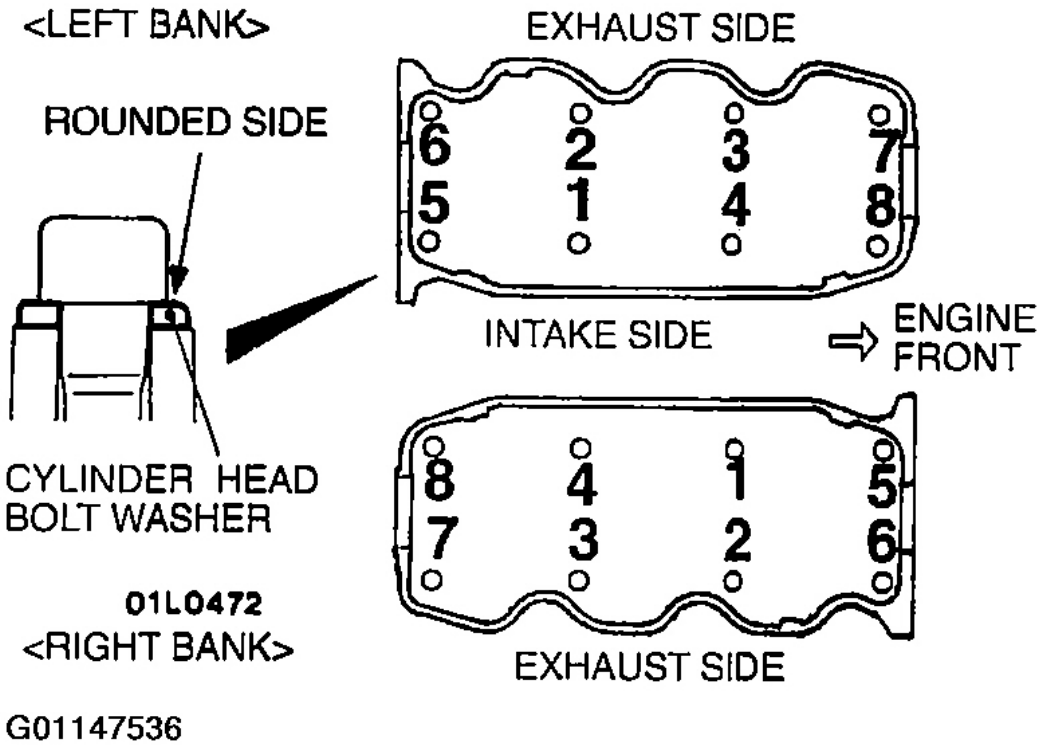


Fig. 136: Installing Cylinder Head Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

CYLINDER HEAD

1. Check the cylinder head gasket surface for flatness by using a straightedge in the directions of A through G shown in the illustration.

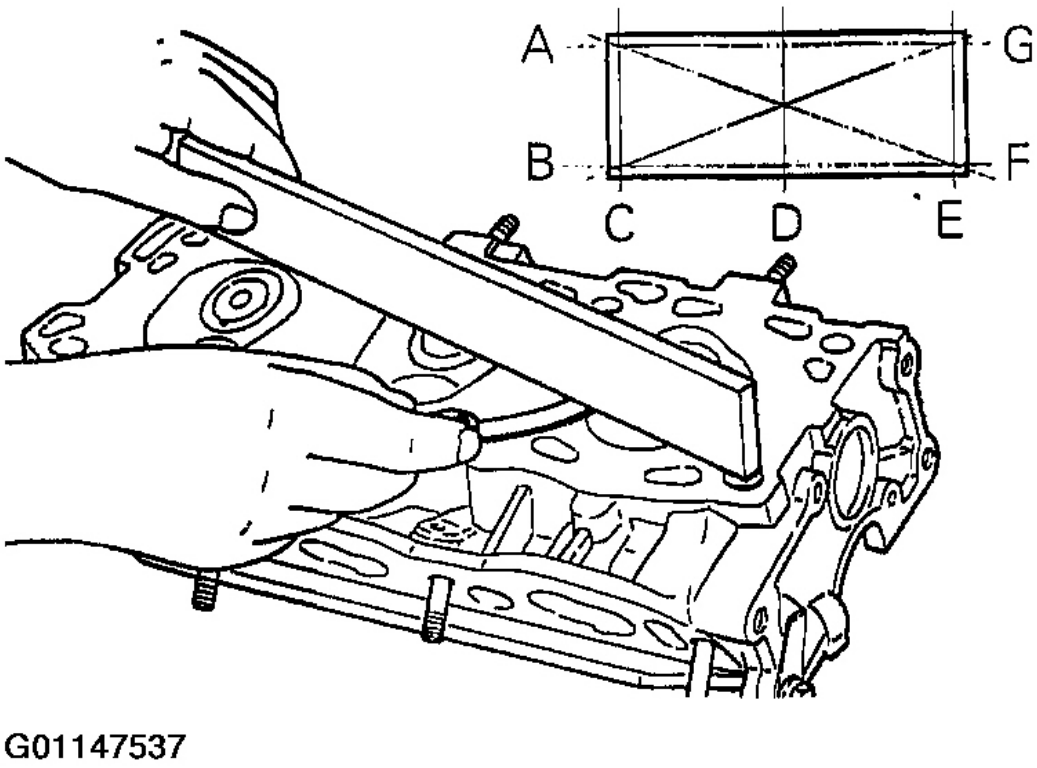


Fig. 137: Checking Cylinder Head Gasket Surface For Flatness
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value: 0.03 mm (.0012 in.)
Limit: 0.2 mm (.008 in.)

2. If the service limit is exceeded, correct to meet the specification.

Grinding limit: *0.2 mm (.008 in.)

* Total resurfacing depth of both cylinder head and cylinder block.

Overall height: 120 mm (4.72 in.)

VALVE

1. If the valve stem is worn (ridge wear) or otherwise damaged, replace. Also replace the valve if the stem end (that contacts the rocker arm lash adjuster) has a dent.

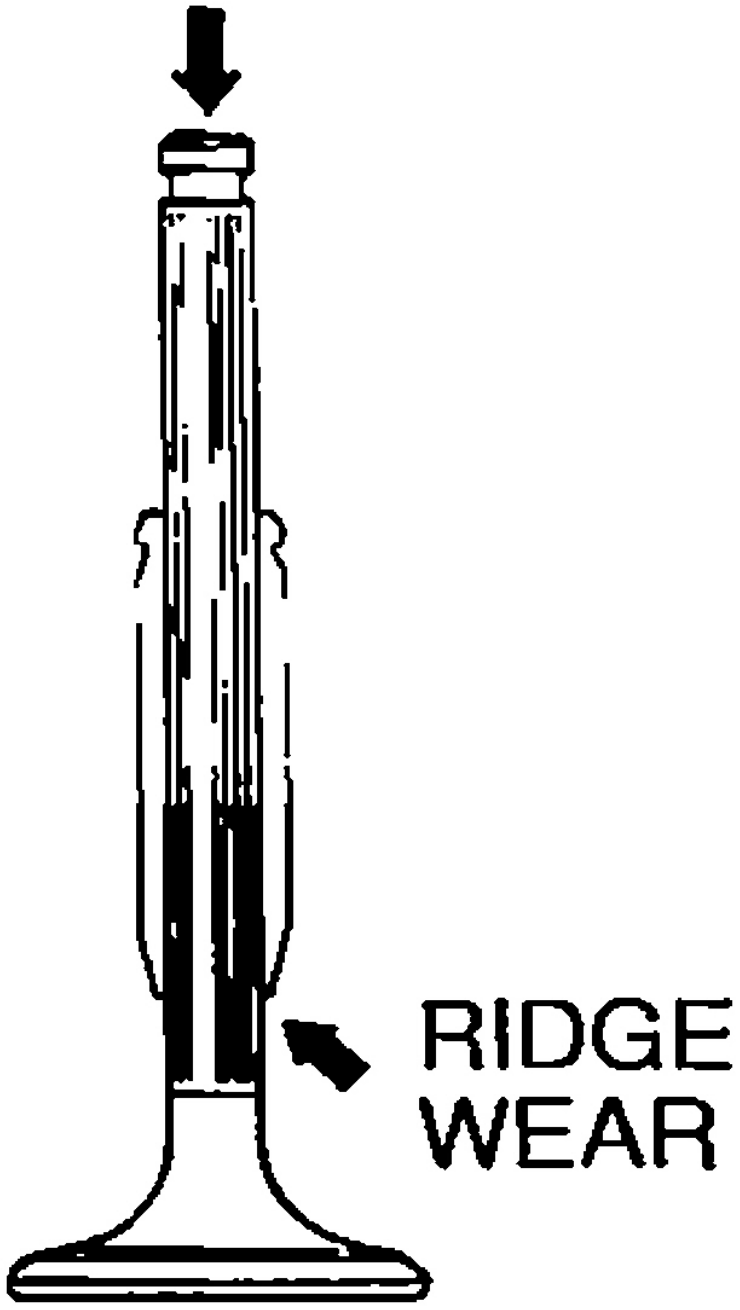


Fig. 138: Identifying Ridge Wear
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Check the valve face for correct contact. If incorrect, reface using a valve refacer. Valve should make a uniform contact with the seat at the center of valve face.

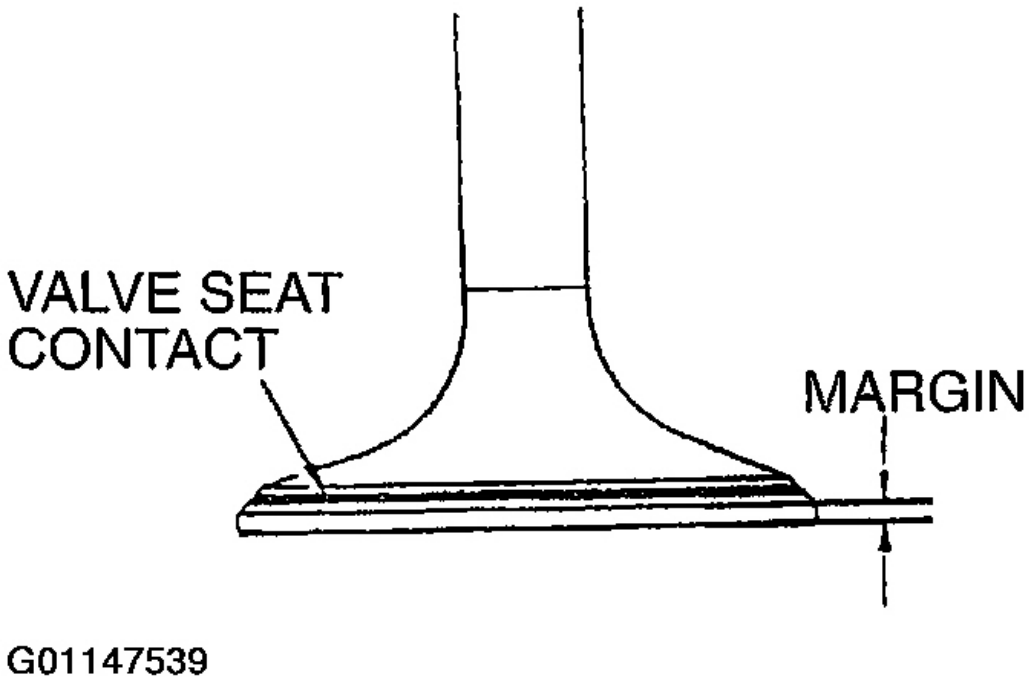


Fig. 139: Checking Valve Face For Correct Contact
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. If the margin exceeds the service limit, replace the valve.
   Standard value
   < Intake>: 1.0 mm (.039 in.)
   < Exhaust>: 1.2 mm (.047 in.)
   Limit
   < Intake>: 0.5 mm (.019 in.)
   < Exhaust>: 1.2 mm (.047 in.)

VALVE SPRINGS

1. Measure the free height of the spring and, if it is smaller than the limit, replace.
   Standard value: 51.0 mm (2.01 in.)
   Limit: 50.0 mm (1.97 in.)

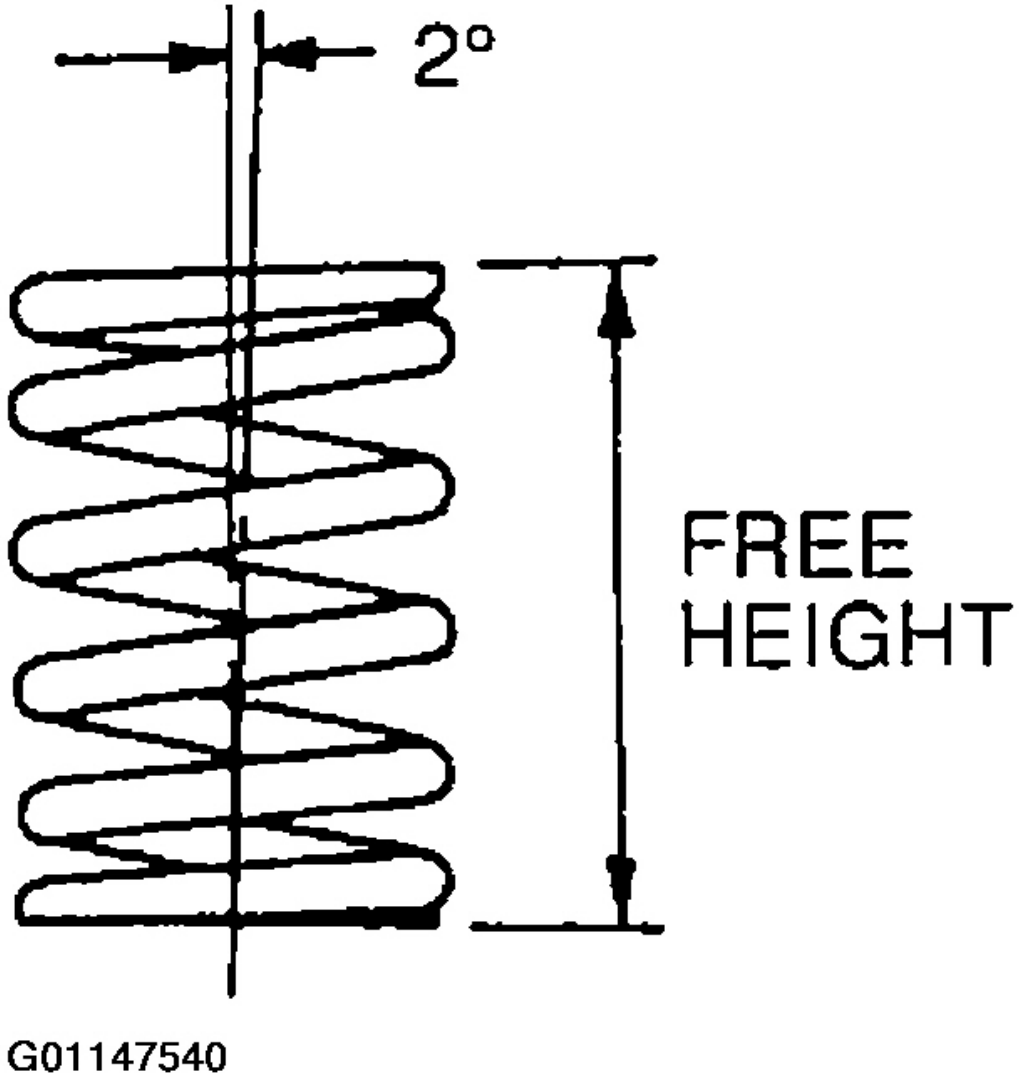


Fig. 140: Measuring Spring Free Height & Squareness
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Measure the squareness of the spring and, if the limit is exceeded, replace as necessary.

   Standard value: 2°

   Limit: Max. 4°

VALVE GUIDES

- Measure the clearance between the valve guide and valve stem. If the limit is exceeded, replace the valve guide or valve, or both.

  Standard value

  < Intake>: 0.02-0.05 mm (.0008-.0020 in.)

  < Exhaust>: 0.04-0.07 mm (.0016-.0028 in.)

  Limit

  < Intake>: 0.10 mm (.004 in.)

  < Exhaust>: 0.15 mm (.006 in.)

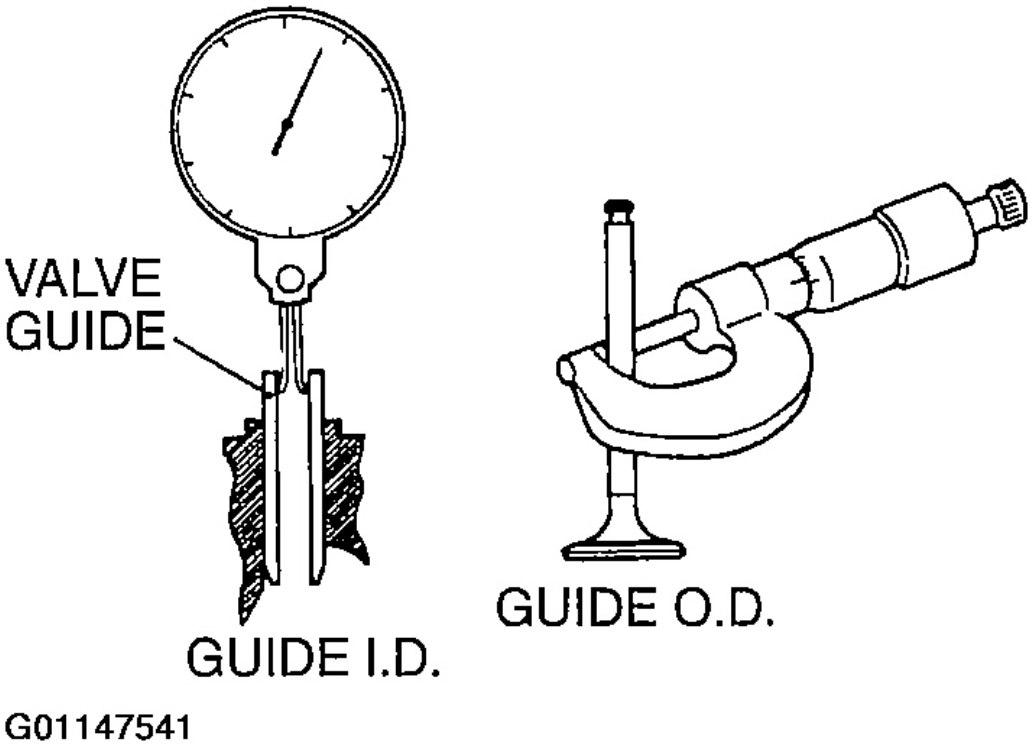


Fig. 141: Measuring Clearance Between Valve Guide & Valve Stem
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

VALVE SEAT RECONDITIONING PROCEDURE

1. Before correcting the valve seat, check for clearance between the valve guide and valve and, if necessary, replace the valve guide.
2. Using the special tool or seat grinder, correct to obtain the specified seat width and angle.

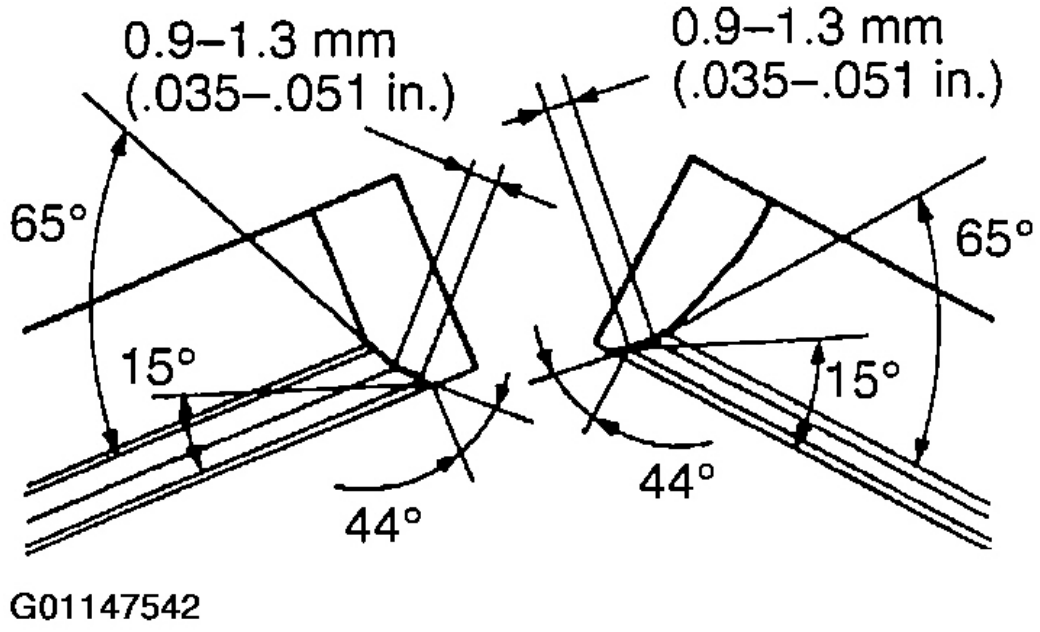


Fig. 142: Correcting Valve Seat Width & Angle
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. After correction, valve and valve seat should be lapped with a lapping compound.

VALVE SEAT REPLACEMENT PROCEDURE

1. Cut the valve seat to be replaced from the inside to thin the wall thickness. Then, remove the valve seat.

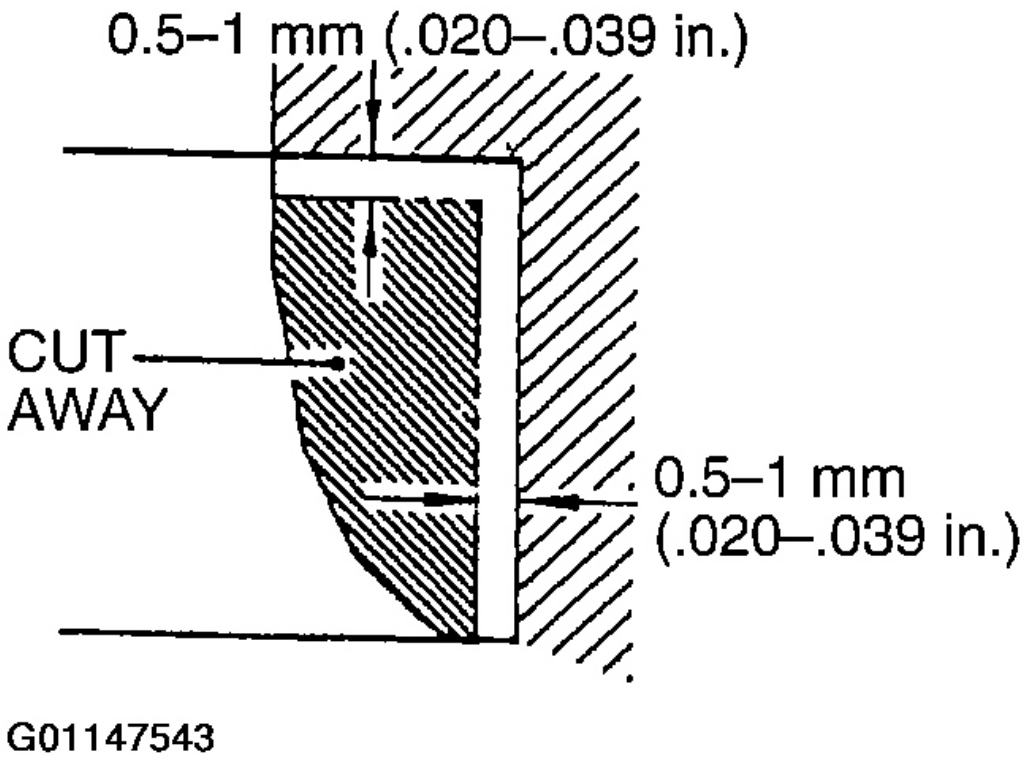


Fig. 143: Cutting Valve Seat
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Rebore the valve seat hole in the cylinder head to a selected oversize valve seat diameter.

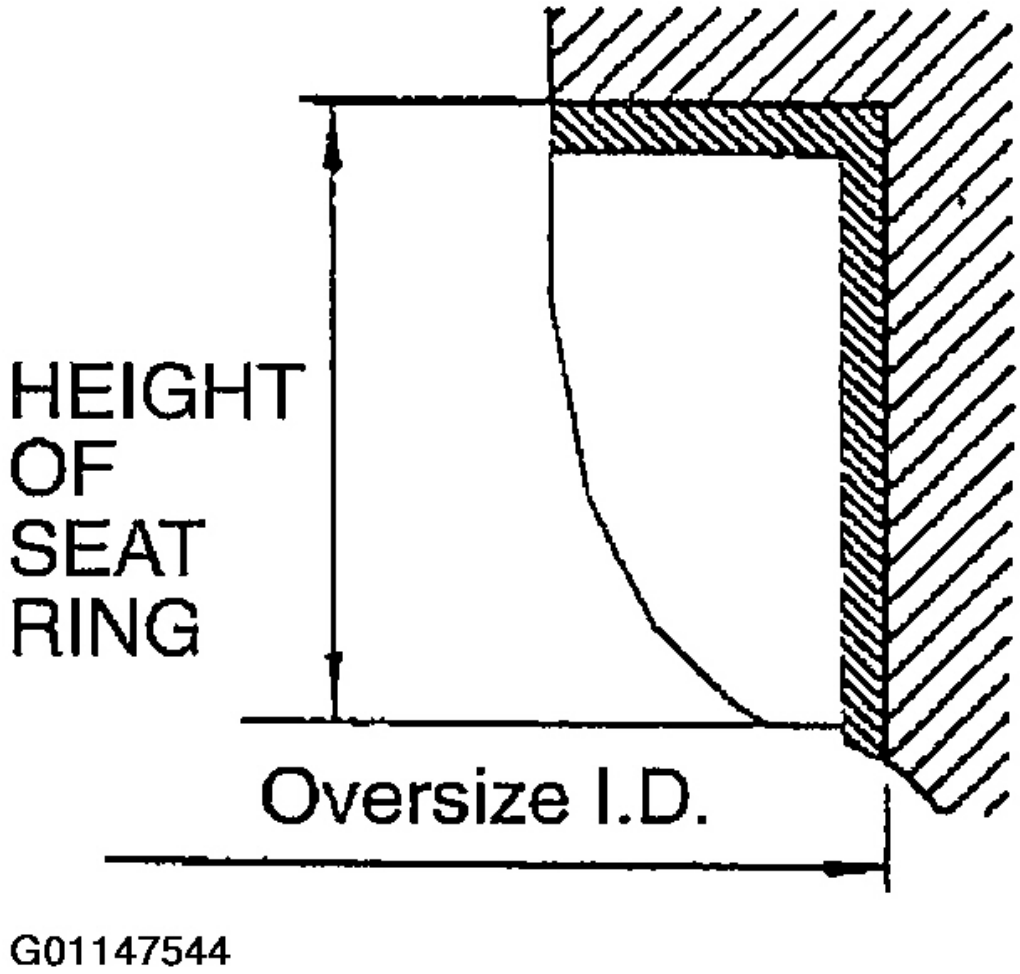


Fig. 144: Boring Valve Seat Hole In Cylinder Head
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Seat ring hole diameter: See REWORK DIMENSIONS.

3. Before fitting the valve seat, either heat the cylinder head up to approximately 250°C (482°F) or cool the valve seat in liquid nitrogen, to prevent the cylinder head bore from galling.
4. Using a valve seat cutter, correct the valve seat to the specified width and angle.

See **VALVE SEAT RECONDITIONING PROCEDURE**.

VALVE GUIDE REPLACEMENT PROCEDURE

1. Remove the snap ring from the exhaust valve guide.

2. Using the press, remove the valve guide toward the cylinder block.
3. Rebore the valve guide hole of the cylinder head so that it may fit to the press-fitted oversize valve guide.

CAUTION: Do not install a valve guide of the same size again.

Valve guide hole diameter: See REWORK DIMENSIONS.

4. Press-fit the valve guide until it protrudes 14 mm (.55 in.) from the cylinder head top surface as shown in the illustration.

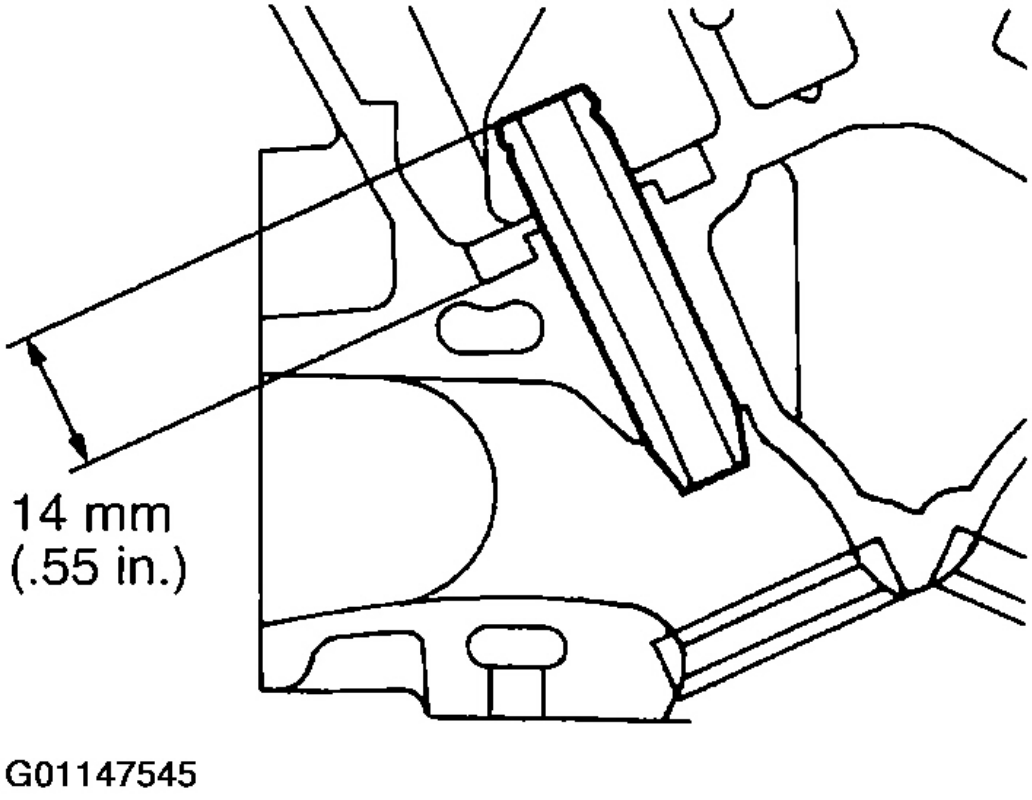


Fig. 145: Installing Valve Guide
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: When press-fitting the valve guide, work from the cylinder head top surface.

NOTE: Pay attention to the difference in length of the valve guides. [intake side:

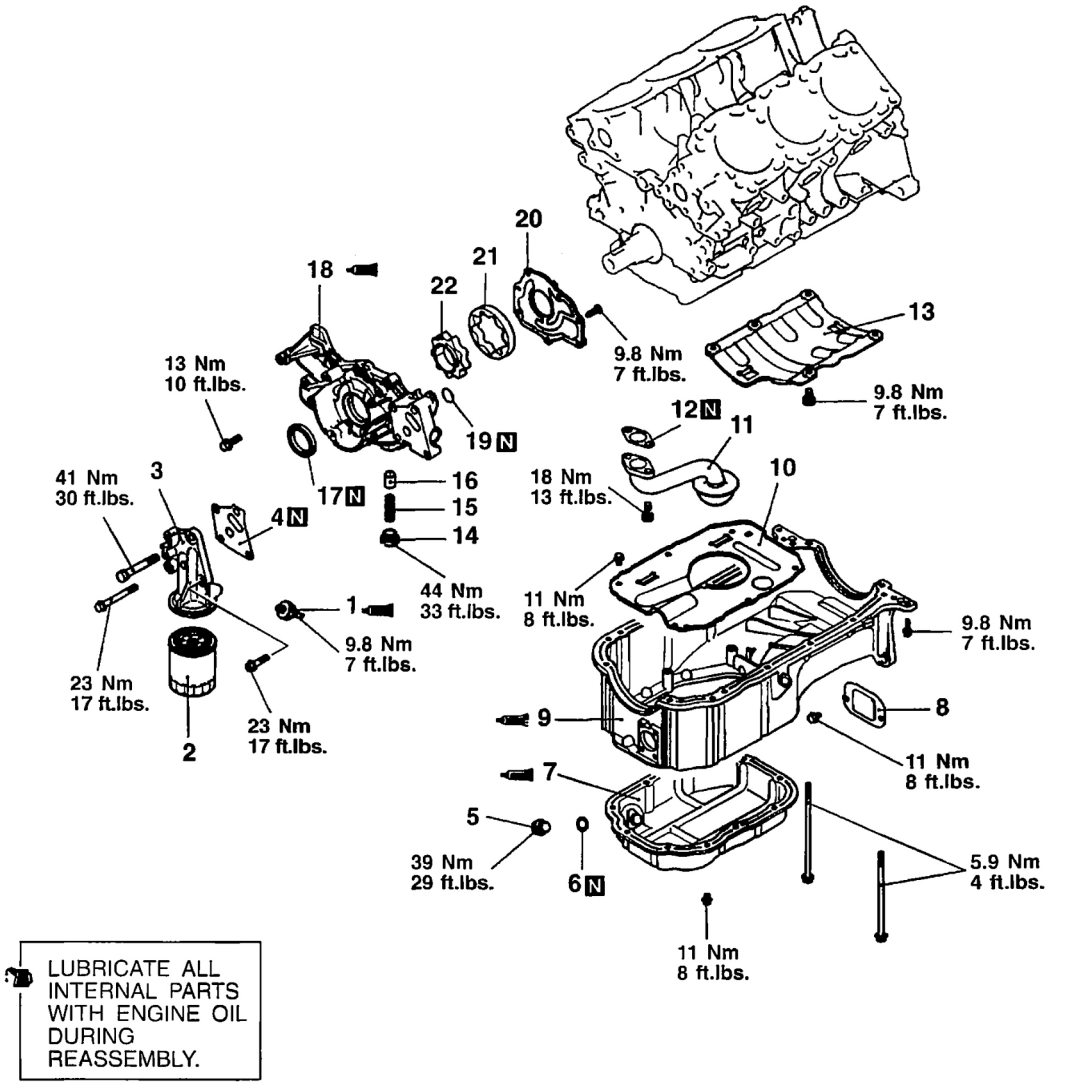
45.5 mm (1.79 in.); exhaust side: 50.5 mm (1.99 in.)]

NOTE: After installing the valve guides, insert new valves in them to check for sliding condition.

OIL PAN AND OIL PUMP

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

- ▶H◀ 1. OIL PRESSURE GAUGE UNIT
- ▶G◀ 2. OIL FILTER
- 3. OIL FILTER BRACKET
- 4. OIL FILTER BRACKET GASKET
- 5. DRAIN PLUG
- ▶F◀ 6. DRAIN PLUG GASKET
- ◀A▶ ▶E◀ 7. OIL PAN, LOWER
- 8. COVER
- ◀B▶ ▶D◀ 9. OIL PAN, UPPER
- 10. BAFFLE PLATE
- 11. OIL SCREEN
- 12. OIL SCREEN GASKET
- 13. BAFFLE PLATE
- 14. PLUG
- 15. RELIEF SPRING
- 16. RELIEF PLUNGER
- ▶C◀ 17. CRANKSHAFT OIL SEAL
- ▶B◀ 18. OIL PUMP CASE
- 19. O-RING
- 20. OIL PUMP COVER
- ◀C▶ ▶A◀ 21. OIL PUMP OUTER ROTOR
- ◀C▶ ▶A◀ 22. OIL PUMP INNER ROTOR

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Fig. 146: Removing & Installing Oil Pan And Oil Pump
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINT

A: OIL PAN, LOWER REMOVAL

1. Remove the oil pan, lower installation bolts.
2. Place a wooden block against the oil pan, lower as shown in the figure and remove by tapping with a hammer.

CAUTION: The use of an oil pan remover (MD998727) can damage the oil pan, upper (aluminum made).

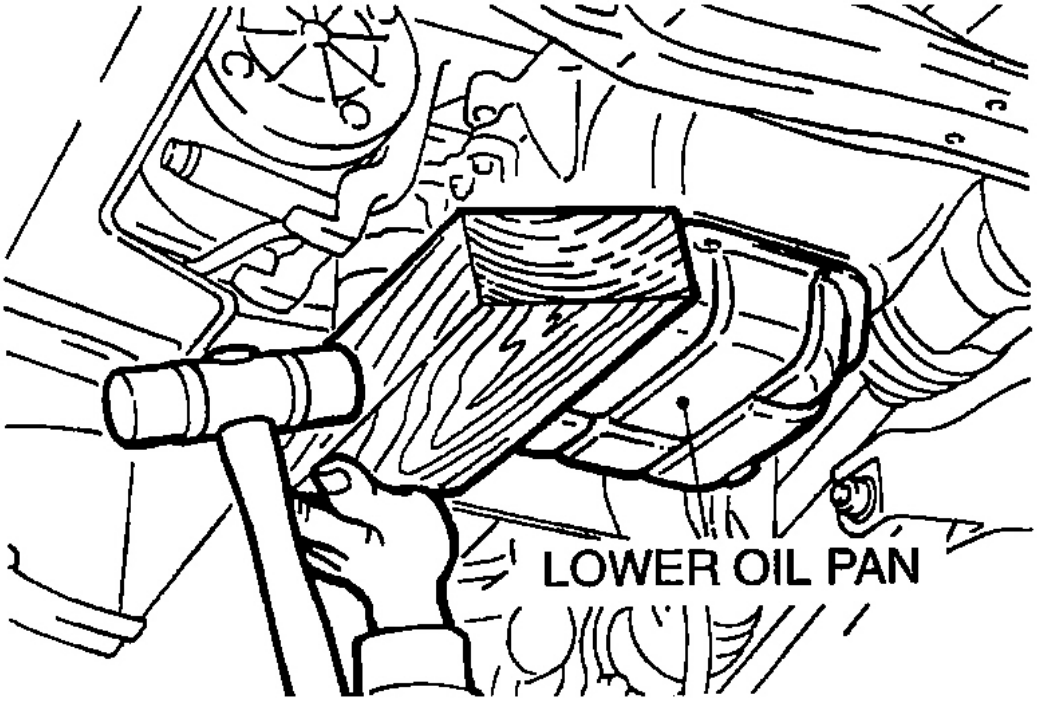


Fig. 147: Removing Lower Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: OIL PAN, UPPER REMOVAL

1. Remove the bolts 1 shown in the illustration.
2. Remove all other bolts.

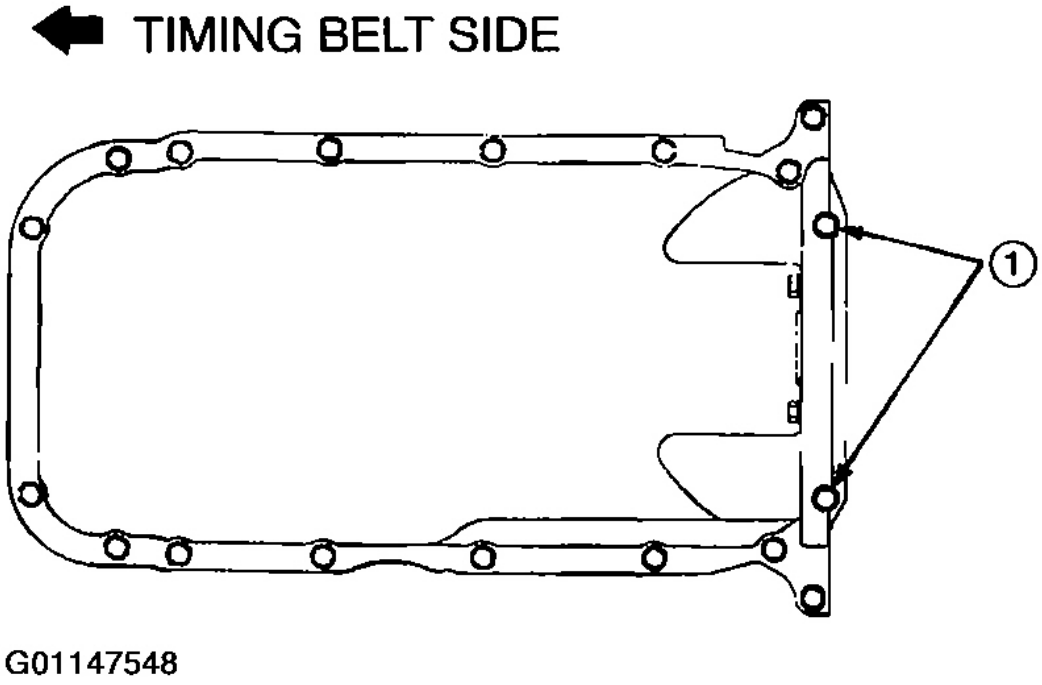
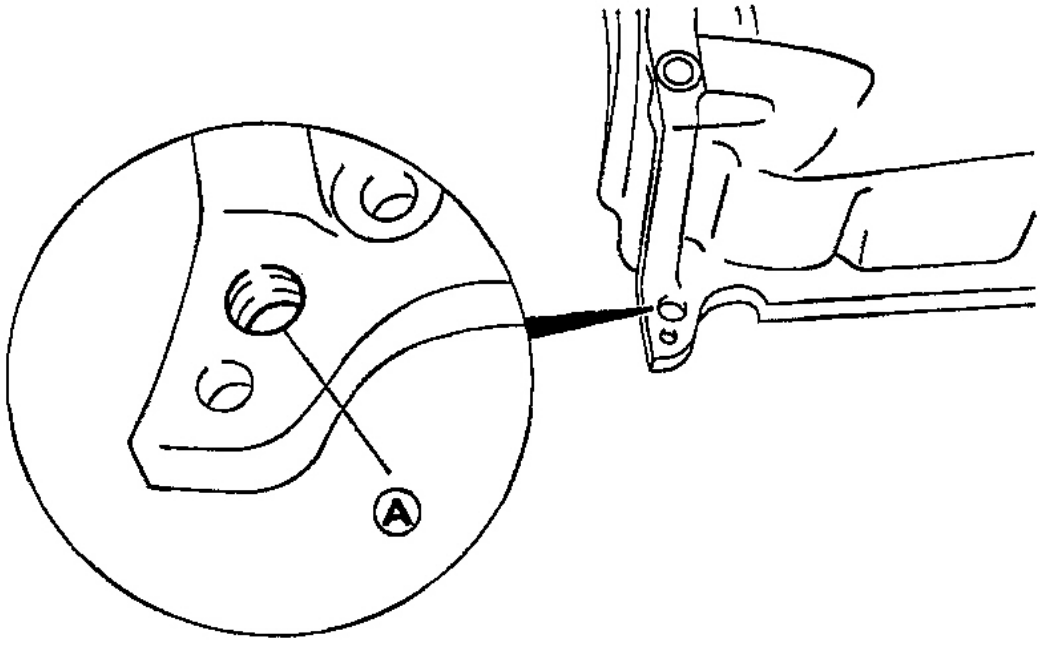


Fig. 148: Identifying Bolts 1
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Thread the bolt into the illustrated bolt hole A (at each end) to float and remove the oil pan.

CAUTION: Do not use a scraper or special tool to remove the oil pan.



G01147549

Fig. 149: Identifying Bolt Hole A
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

C: OUTER ROTOR/INNER ROTOR REMOVAL

- Make alignment dots on the outer and inner rotors for reference in reassembly.

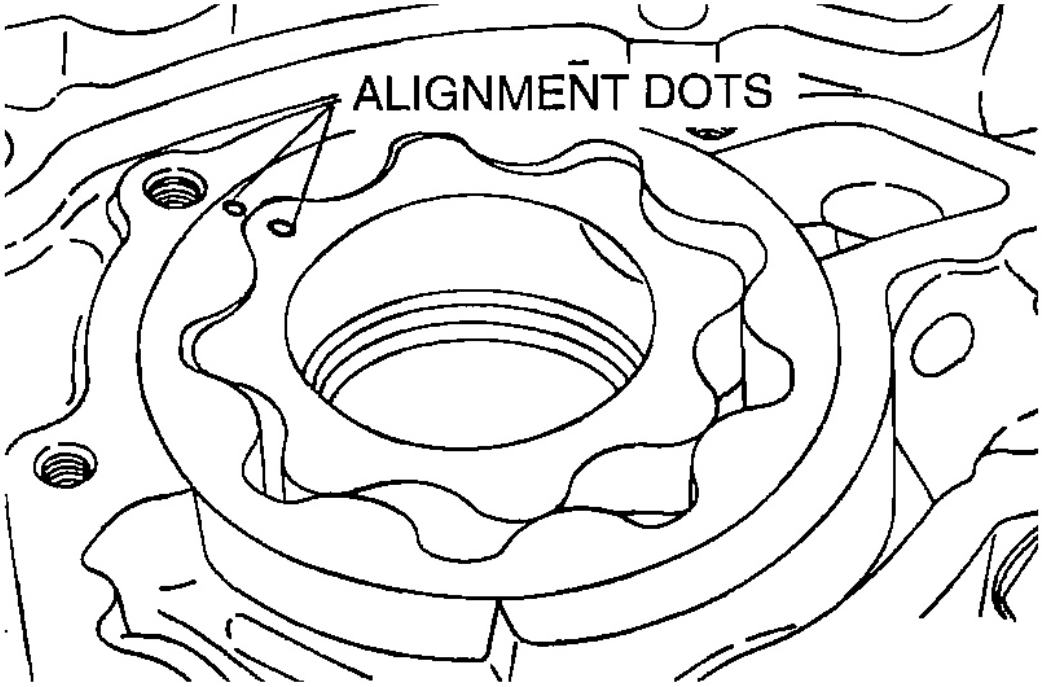


Fig. 150: Marking Rotors
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: INNER ROTOR/OUTER ROTOR INSTALLATION

- Apply engine oil to the rotors. Then, install the rotors ensuring that the alignment dots made at disassembly are properly aligned.

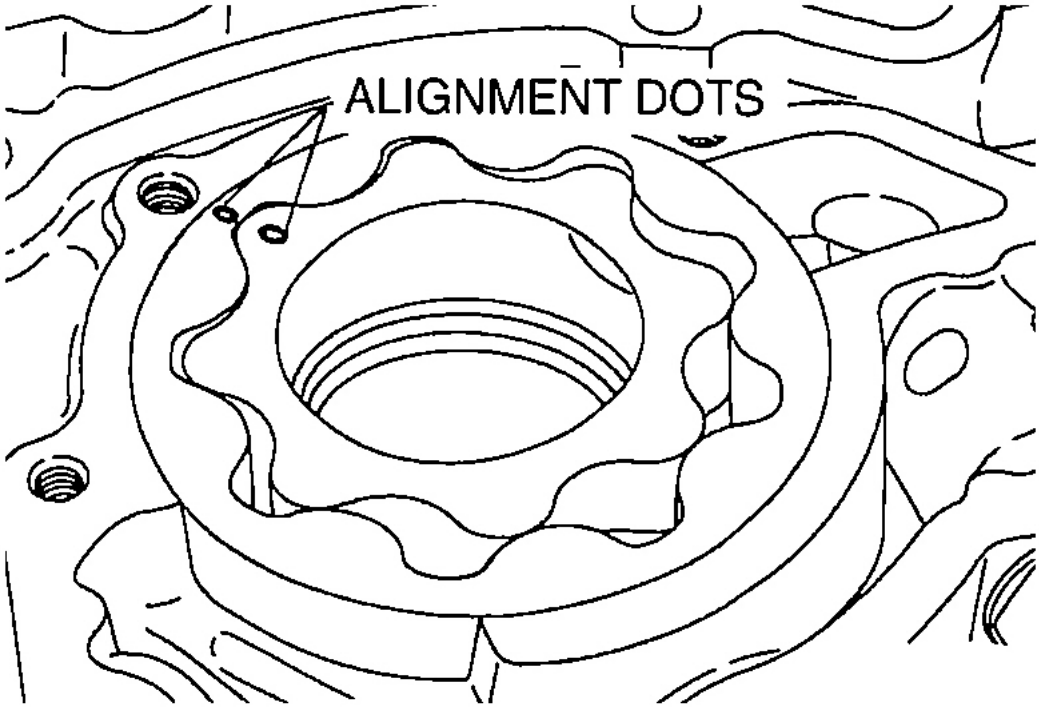
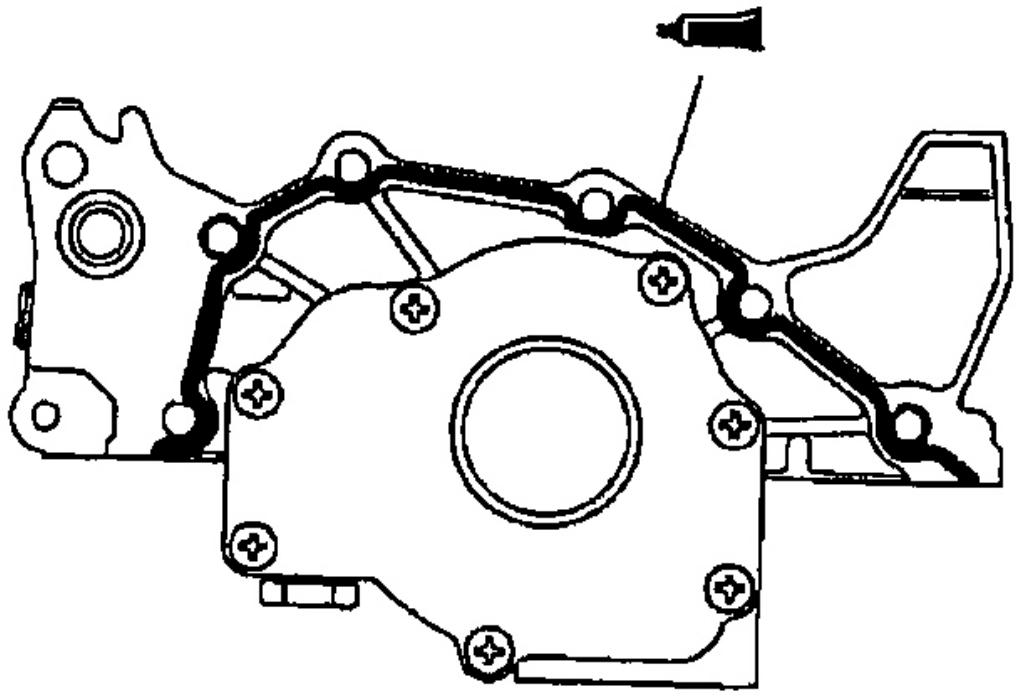


Fig. 151: Installing Rotors
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B: OIL PUMP CASE INSTALLATION

1. Remove the sealant from the cylinder block (oil pump mounting plane) and oil pump
2. Apply a 3 mm (.118 in.) diameter bead of sealant to the oil pump case. Be sure to install the oil pan quickly while the sealant is wet (within 15 minutes).



G01147552

Fig. 152: Applying Sealant To Oil Pump Case
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. After installation, keep the sealed area away from the oil and coolant for approximately 1 hour.

Specified sealant: MITSUBISHI GENUINE Part No. MD970389 or equivalent

C: CRANKSHAFT FRONT OIL SEAL INSTALLATION

- Using the special tool, knock the oil seal into the oil pump case.

NOTE: Knock the seal in until it is fully based.

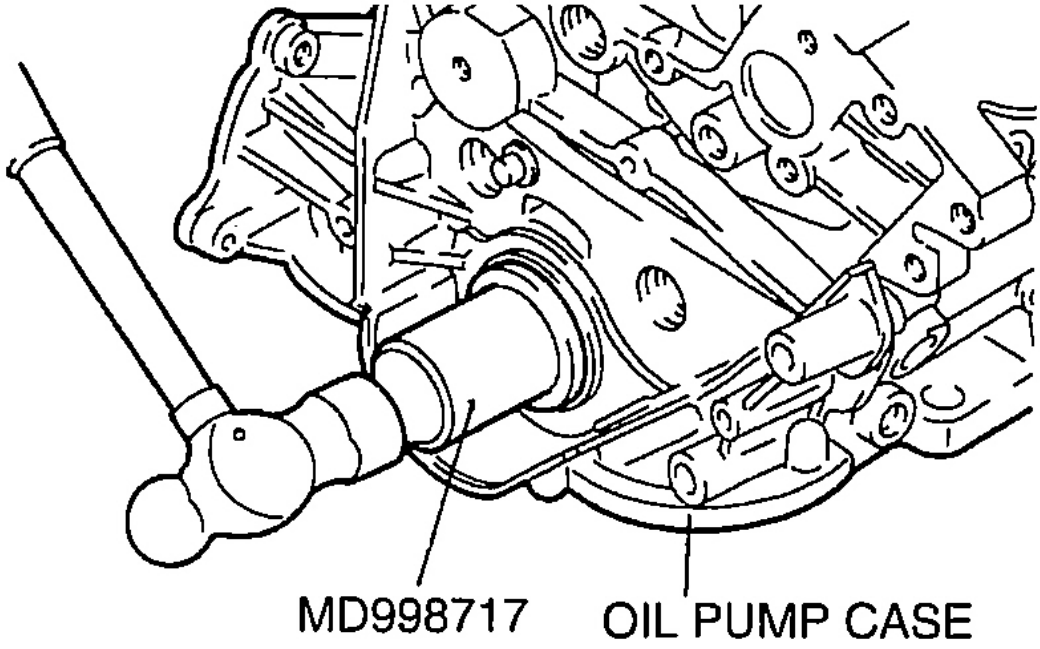


Fig. 153: Installing Oil Seal (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

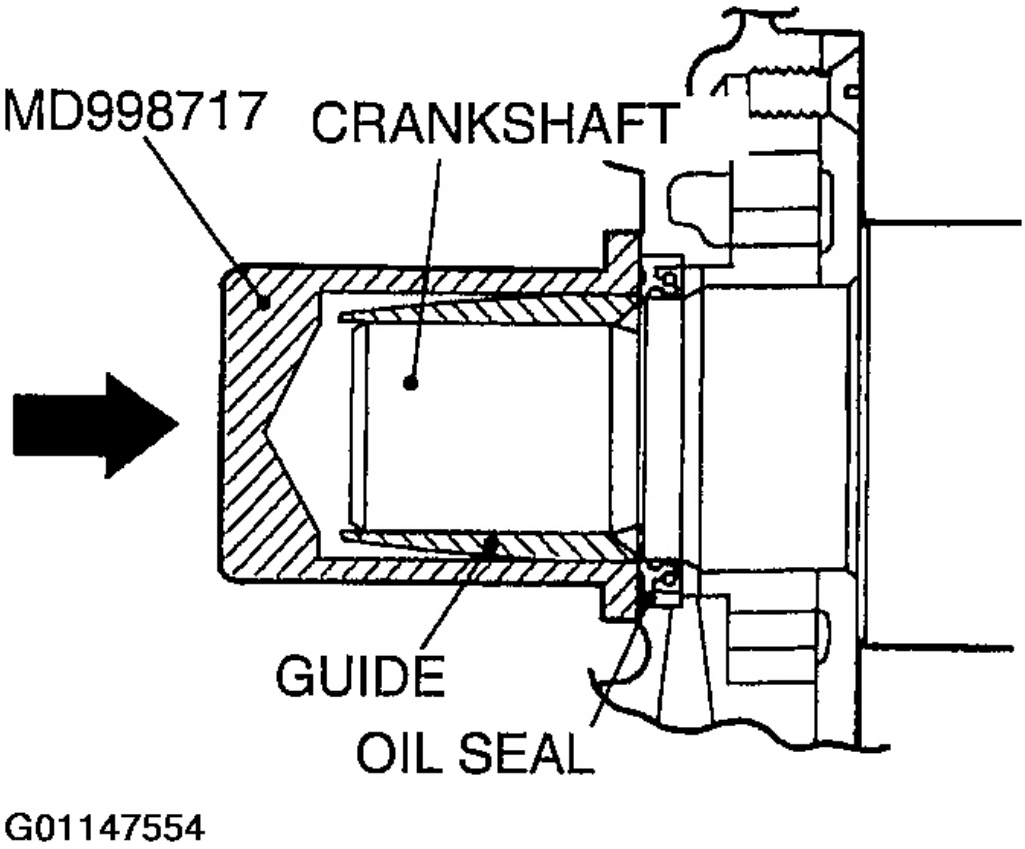


Fig. 154: Installing Oil Seal (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

D: OIL PAN, UPPER INSTALLATION

1. Clean the gasket surfaces of the cylinder block and upper oil pan.
2. Apply a 4 mm (.157 in.) diameter bead of sealant to the oil pump case. Be sure to install the oil pan quickly while the sealant is wet (within 15 minutes).

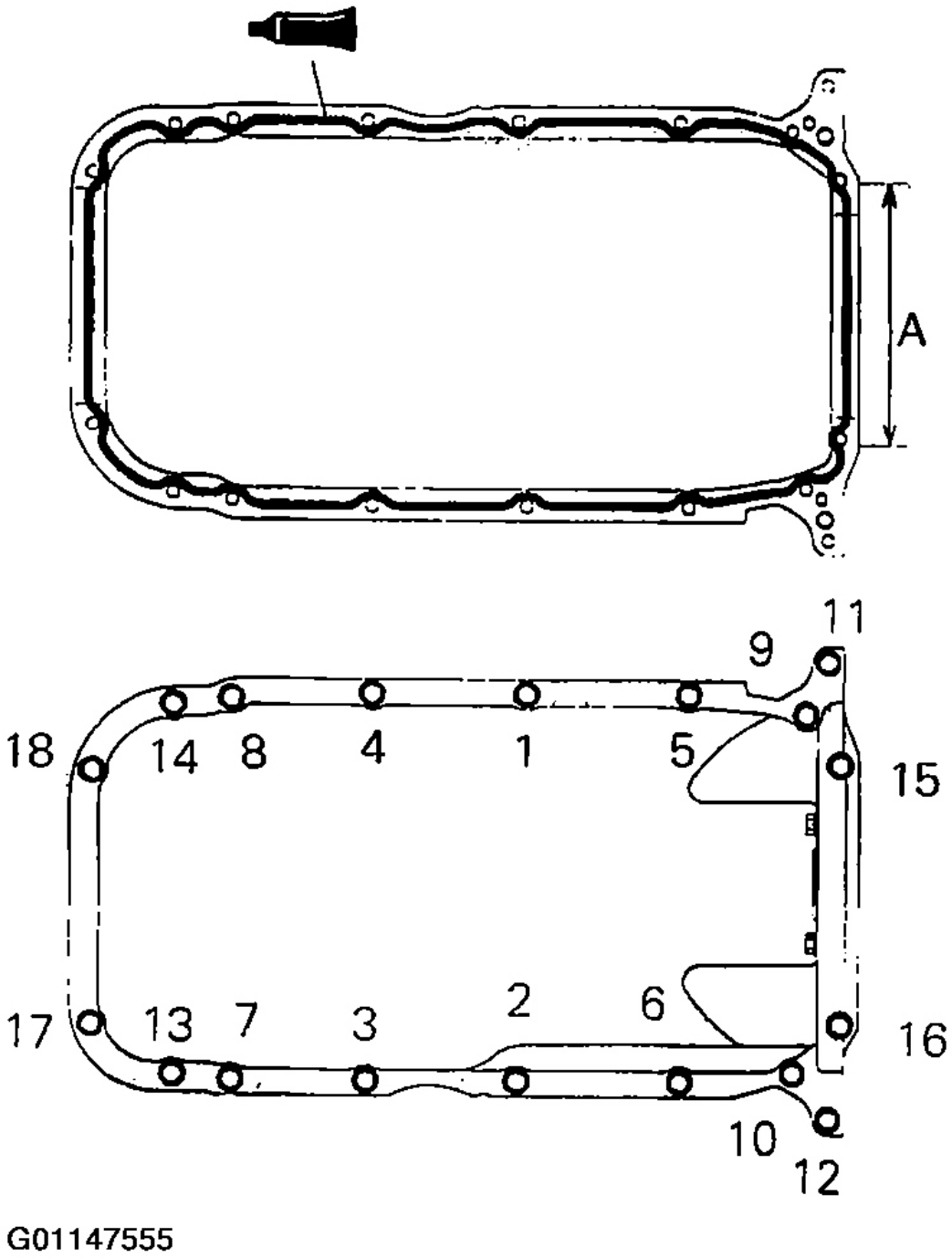


Fig. 155: Applying Sealant
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. After installation, keep the sealed area away from the oil and coolant for approximately 1 hour.

CAUTION: When installing the upper oil pan, be sure not to expel the sealant from the oil pan flange at portion A in the illustration.

Specified sealant: MITSUBISHI GENUINE Part No. MD970389 or equivalent

E: OIL PAN, LOWER INSTALLATION

1. Clean the gasket surfaces of the upper and lower oil pans.
2. Apply a 4 mm (.157 in.) diameter bead of sealant to the oil pump case. Be sure to install the oil pan quickly while the sealant is wet (within 15 minutes).

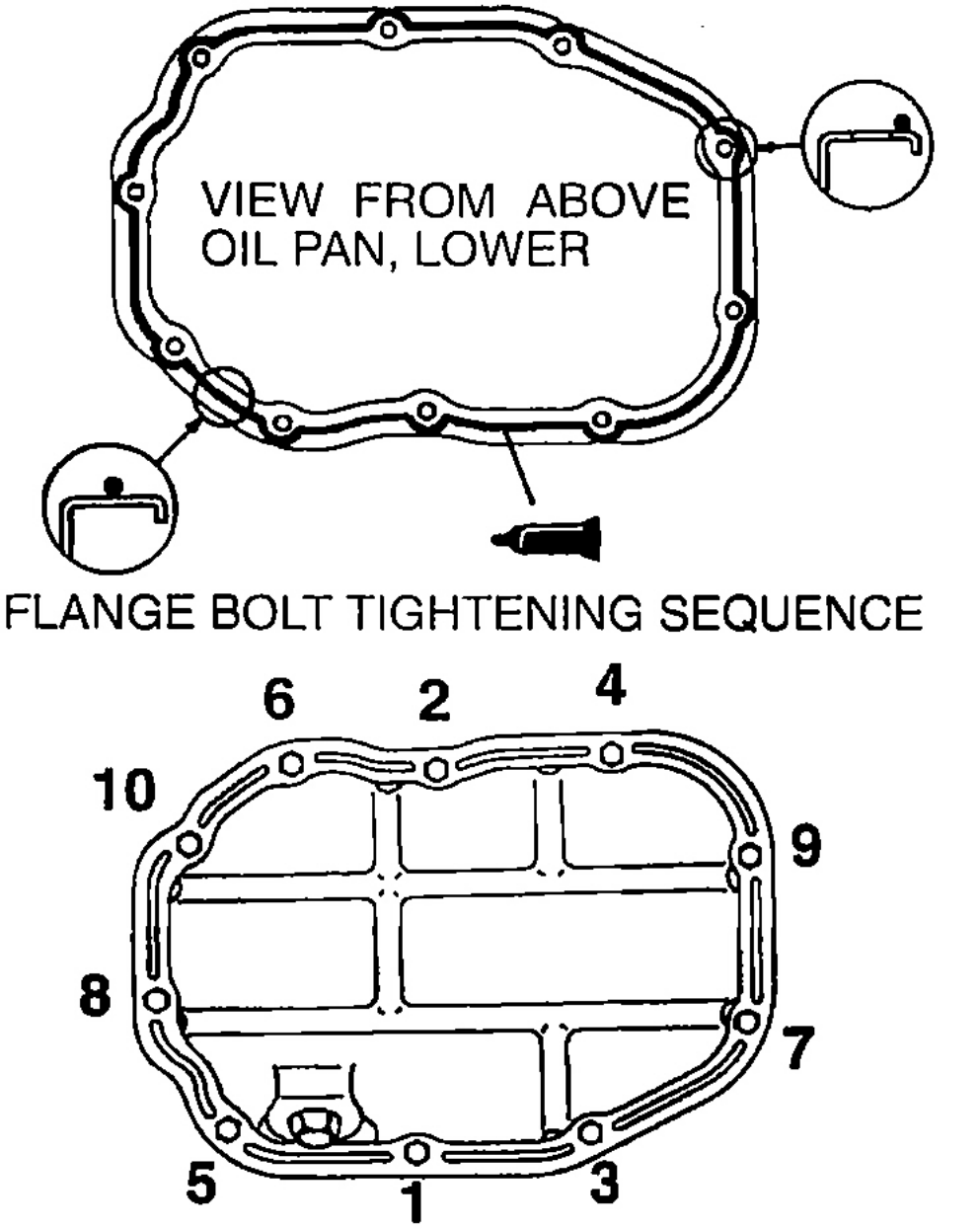


Fig. 156: Applying Sealant
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. After installation, keep the sealed area away from the oil and coolant for approximately 1 hour.

Specified sealant: MITSUBISHI GENUINE Part No. MD970389 or equivalent

F: DRAIN PLUG GASKET INSTALLATION

- Install the drain plug gasket as illustrated.

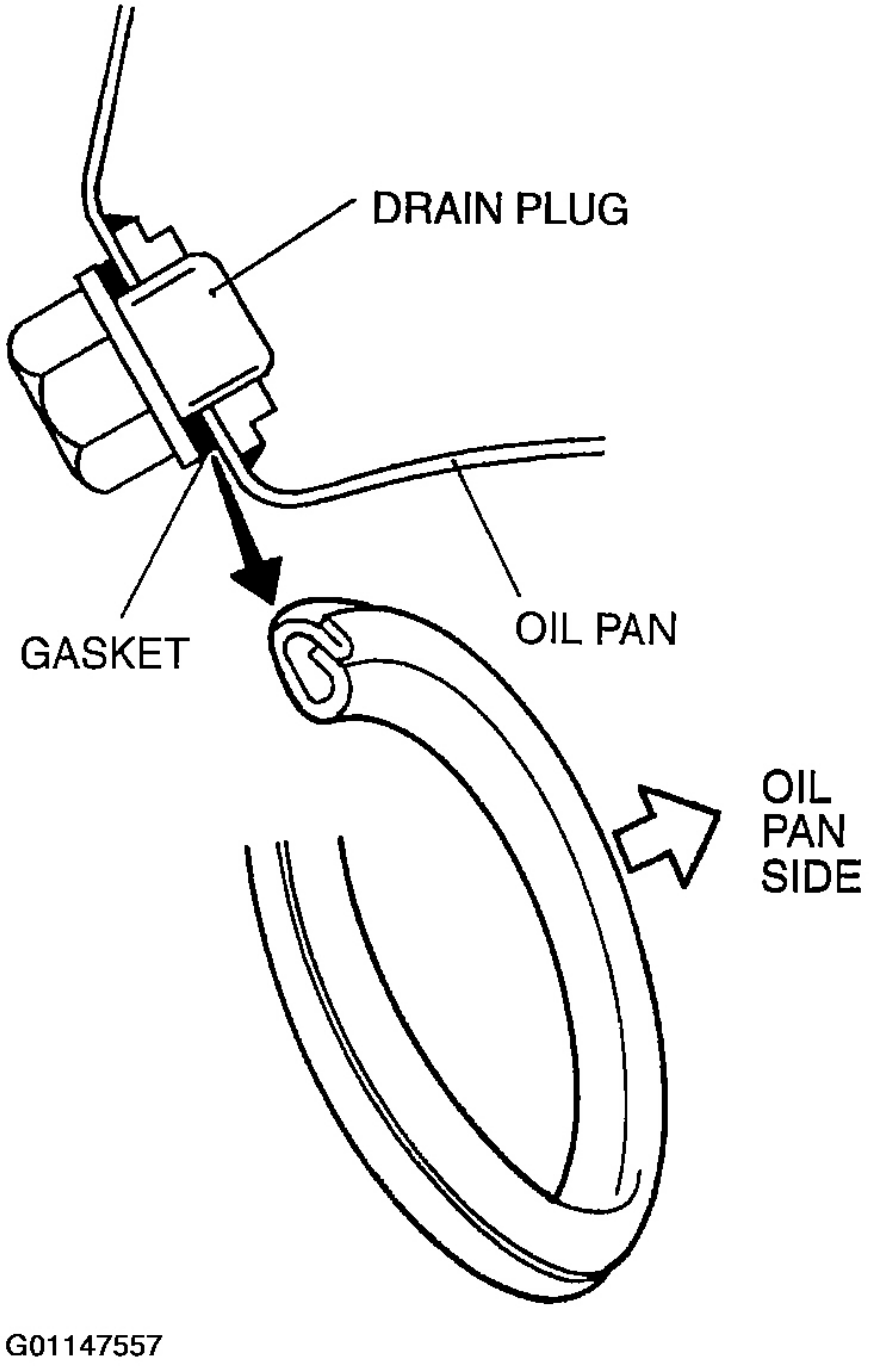


Fig. 157: Installing Drain Plug Gasket
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

G: OIL FILTER INSTALLATION

1. Clean the installation surface of the filter bracket.
2. Apply engine oil to the O-ring of the oil filter.
3. Screw the oil filter on until the O-ring contacts the bracket. Then tighten approximately one turn [14 Nm (10 ft. lbs)].

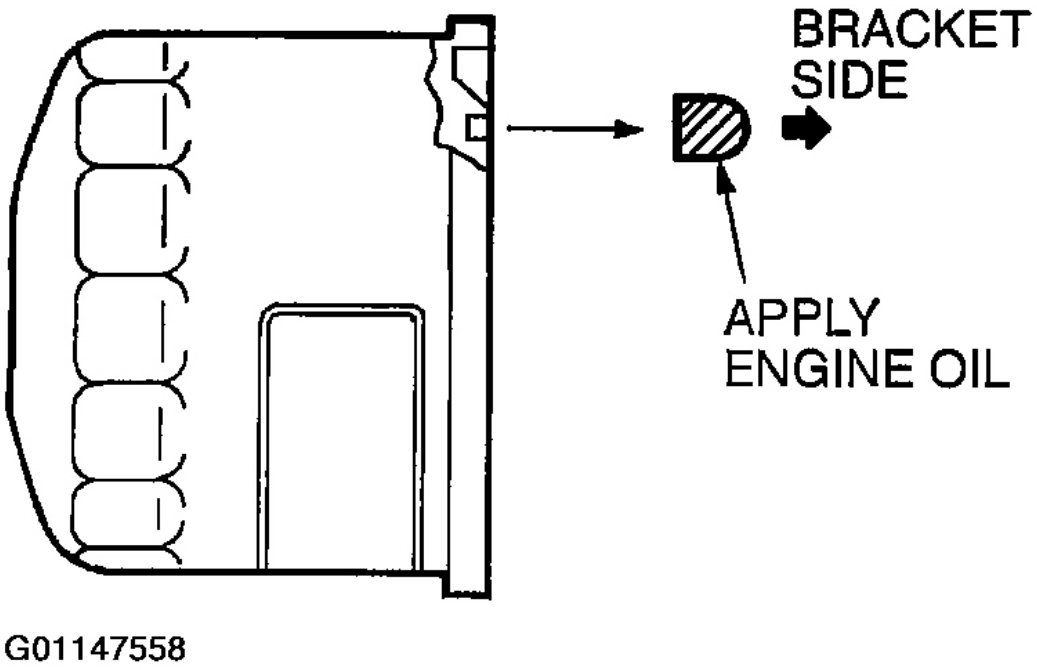


Fig. 158: Installing Oil Filter
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

H: SEALANT APPLICATION TO OIL PRESSURE SWITCH

- Coat the threads of the switch with sealant and install the switch using the special tool.
  Specified sealant: 3M ATD Part No. 8660 or equivalent

  CAUTION: Keep the end of threaded portion clear of sealant.

  CAUTION: Avoid overtightening.

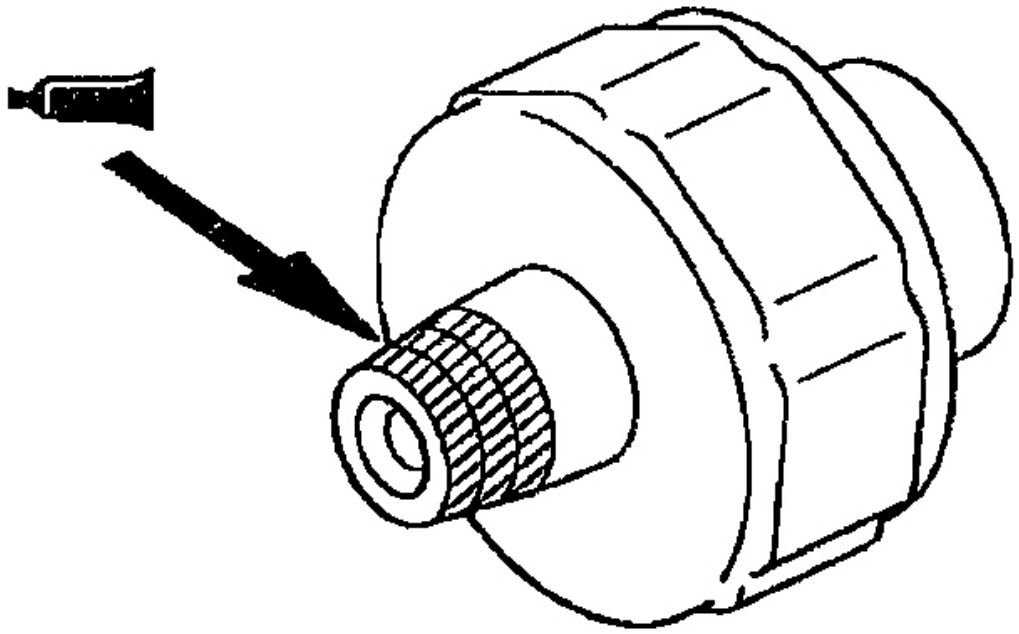


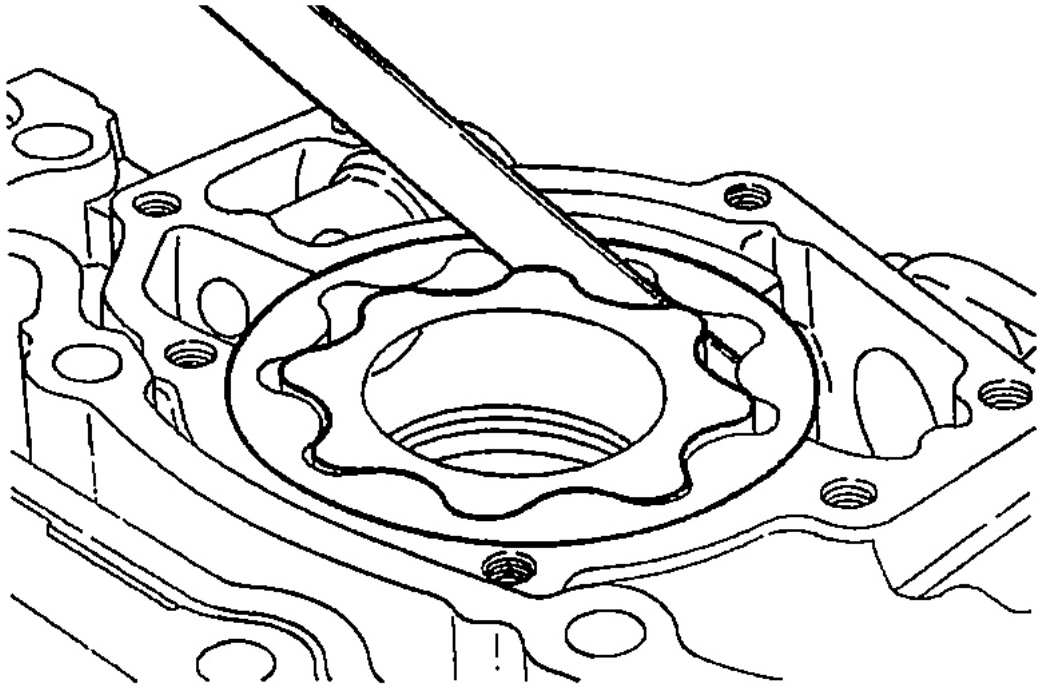
Fig. 159: Applying Sealant To Oil Pressure Switch
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

OIL PUMP

1. Check the tip clearance.

   Standard value: 0.06-0.18 mm (.0024-.0071 in.)

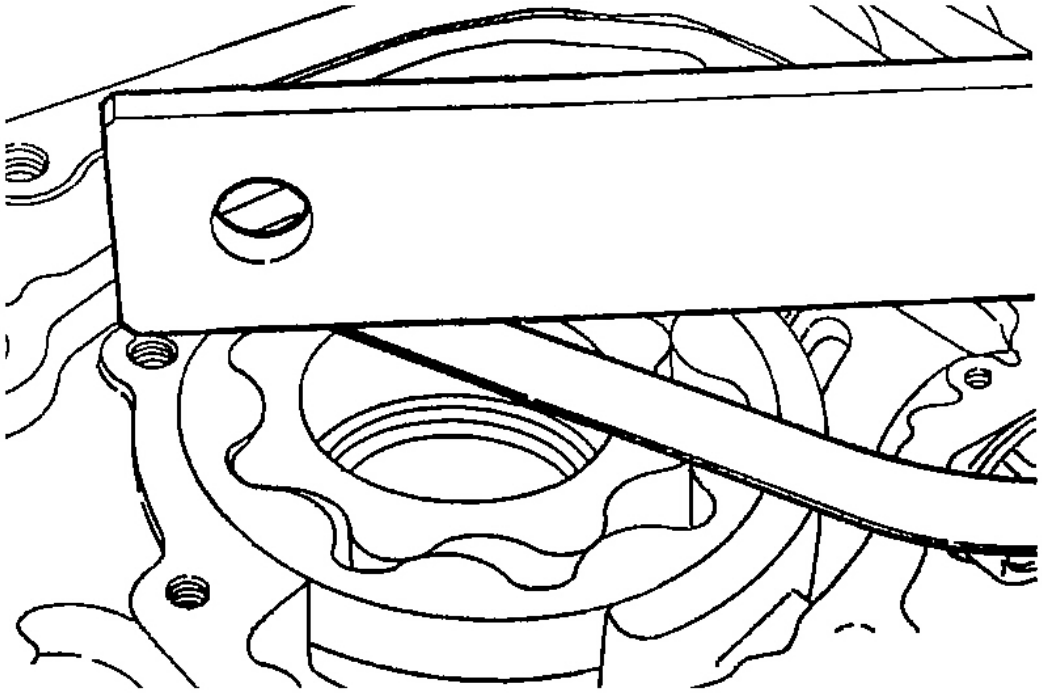


G01147560

Fig. 160: Checking Tip Clearance
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Check the side clearance.

   Standard value: 0.04-0.10 mm (.0016-.0039 in.)



G01147561

Fig. 161: Checking Side Clearance
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Check the body clearance.

   Standard value: 0.10-0.18 mm (.0040-.0070 in.)

   Limit: 0.35 mm (.0138 in.)

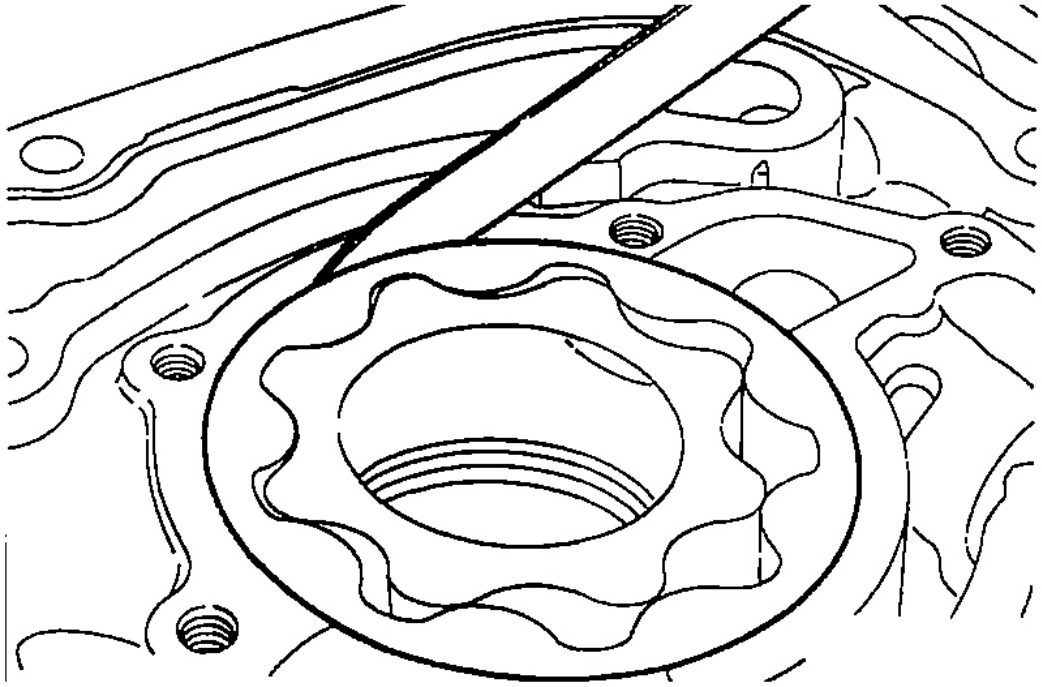
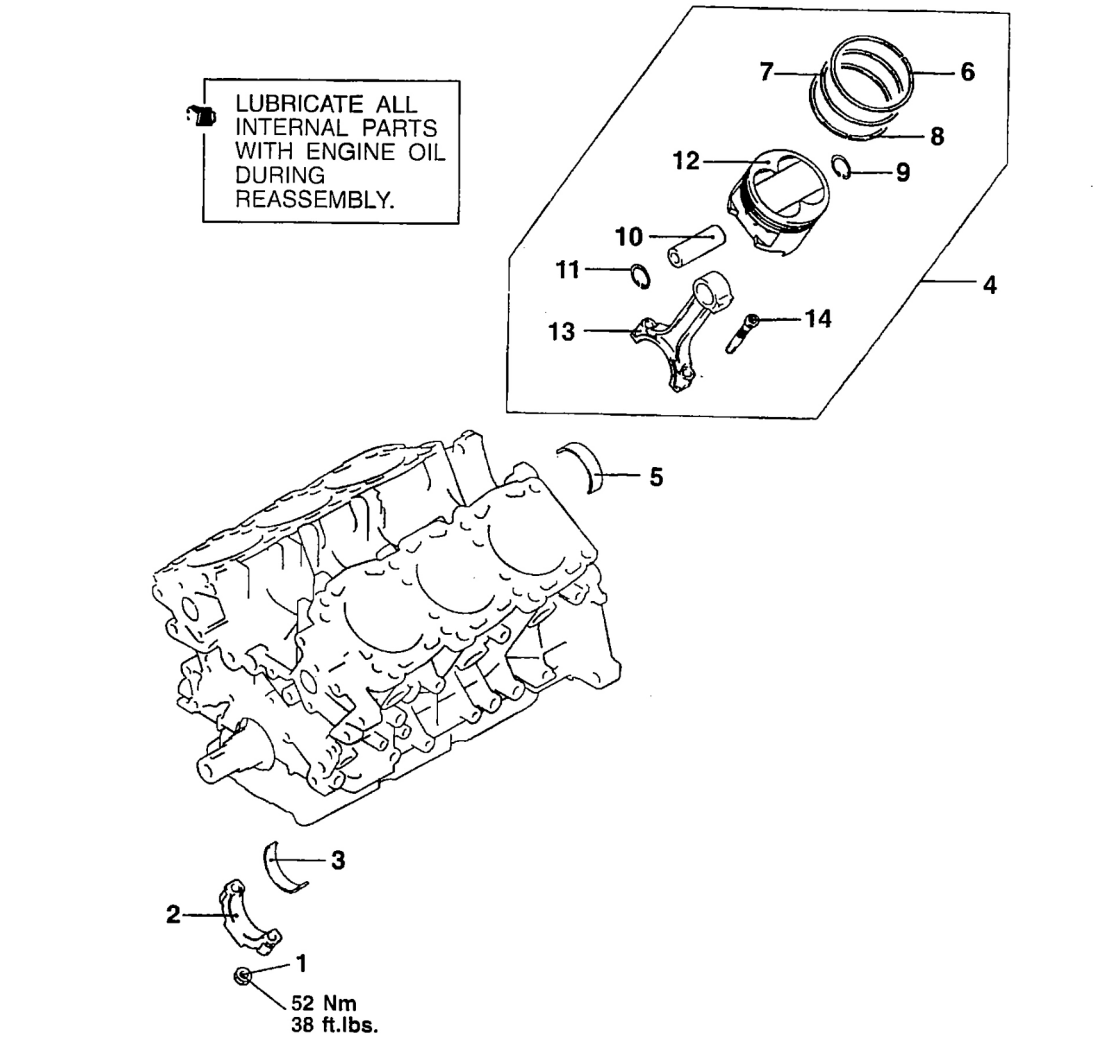


Fig. 162: Checking Body Clearance
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

PISTON AND CONNECTING ROD

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.



REMOVAL STEPS

◀A▶ ▶F◀ 2. CONNECTING ROD CAP
▶E◀ 3. CONNECTING ROD BEARING, LOWER
▶D◀ 4. PISTON AND CONNECTING ROD ASSEMBLY
▶E◀ 5. CONNECTING ROD BEARING, UPPER
▶C◀ 6. PISTON RING NO.1
▶C◀ 7. PISTON RING NO.2
▶B◀ 8. OIL RING
9. SNAP RING
◀B▶ ▶A◀ 10. PISTON PIN
11. SNAP RING
12. PISTON
13. CONNECTING ROD
14. BOLT

Fig. 163: Removing & Installing Piston And Connecting Rod
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

A: CONNECTING ROD CAP REMOVAL

1. Mark the cylinder number on the side of the connecting rod big end for correct reassembly.

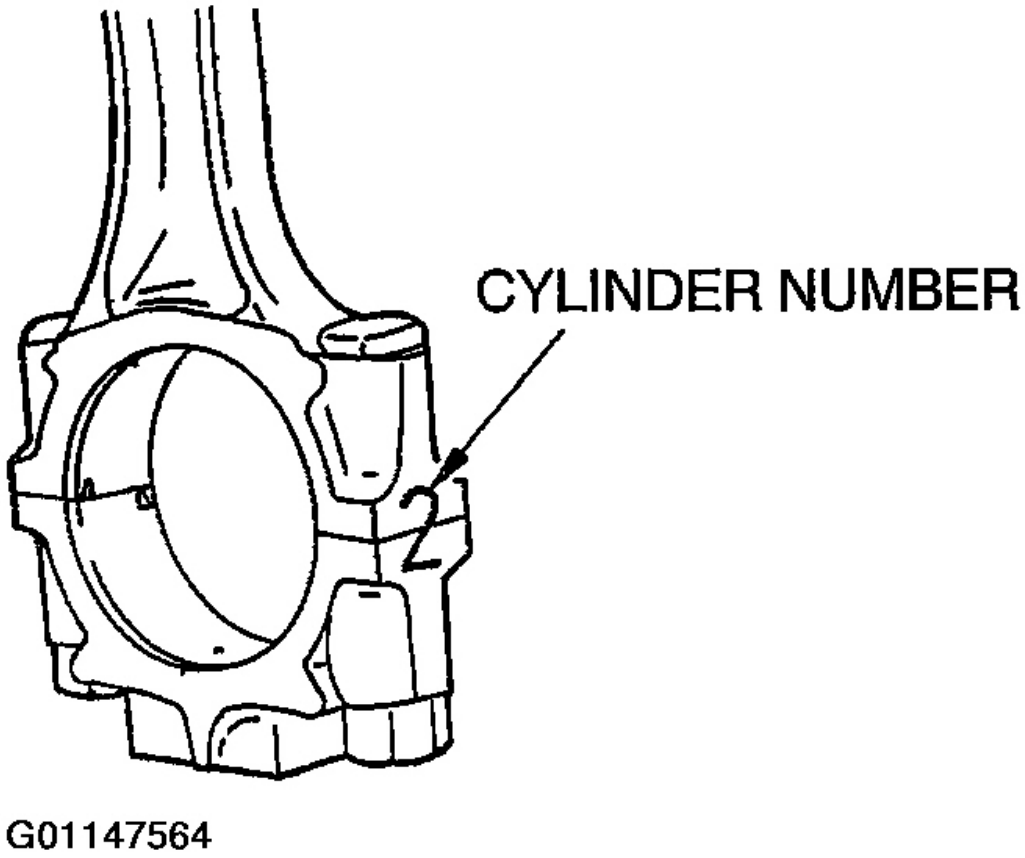


Fig. 164: Marking Connecting Rod
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Keep the removed connecting rods, caps, and bearings in order according to the cylinder number.

B: REMOVAL OF PISTON PIN

1. Remove the snap rings.
2. Heat the piston to approximately 70°C (158°F) and pull out the piston pin.

CAUTION: The clearance between the piston and the piston pin is an almost tight fit at normal temperature. Therefore, be sure to heat the piston before pulling out the piston pin. In addition, note that the piston is hot after heating.

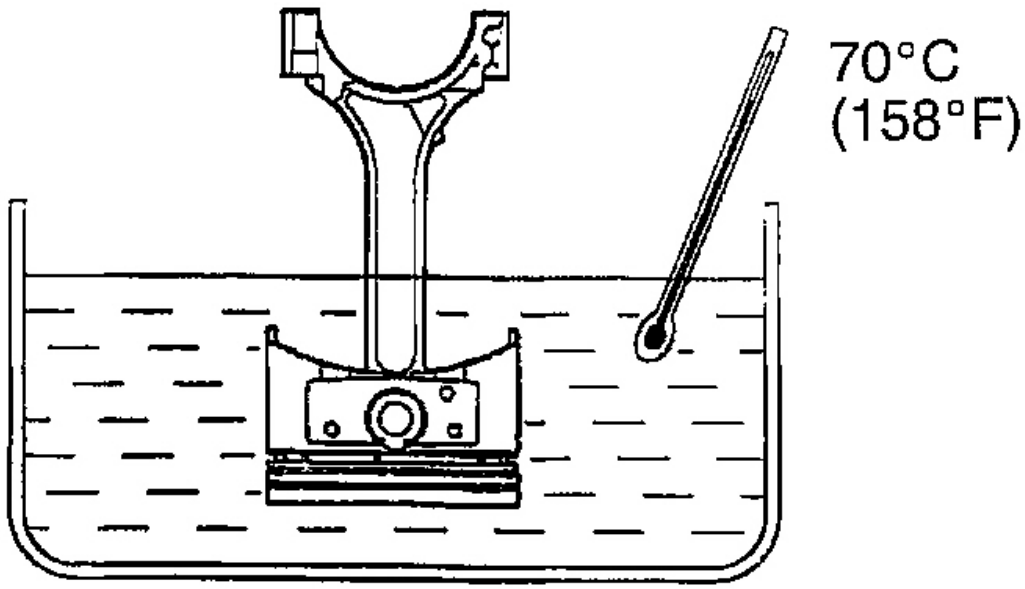


Fig. 165: Removing Piston Pin
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: PISTON PIN INSTALLATION

1. Heat the piston to approximately 70°C (158°F) and set the snap ring on one side first. Be sure to install the snap ring with the shear droop directed toward the inside.
2. With the front mark of the connecting rod and that of the piston located on the same side, insert the piston pin.

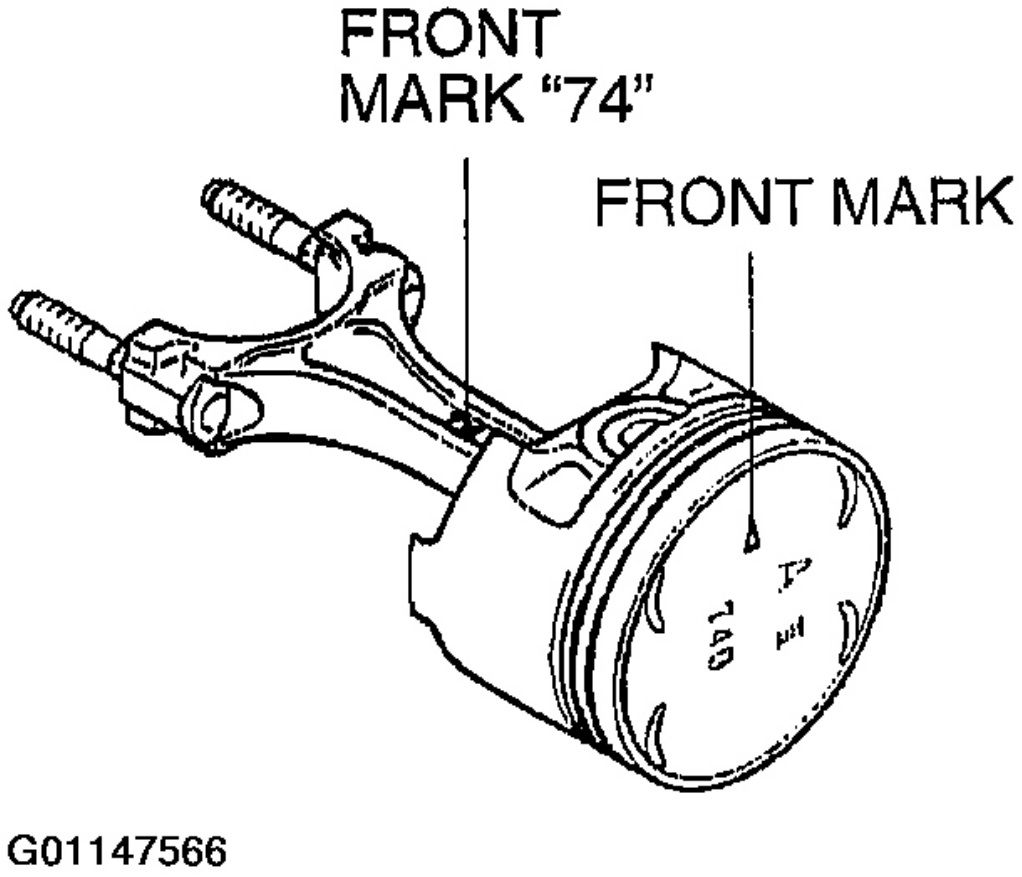


Fig. 166: Identifying Front Mark
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. After insertion of the piston pin, set the other snap ring.

CAUTION: Apply an ample coat of engine oil to the periphery of the piston pin and the hole of the connecting rod small end.

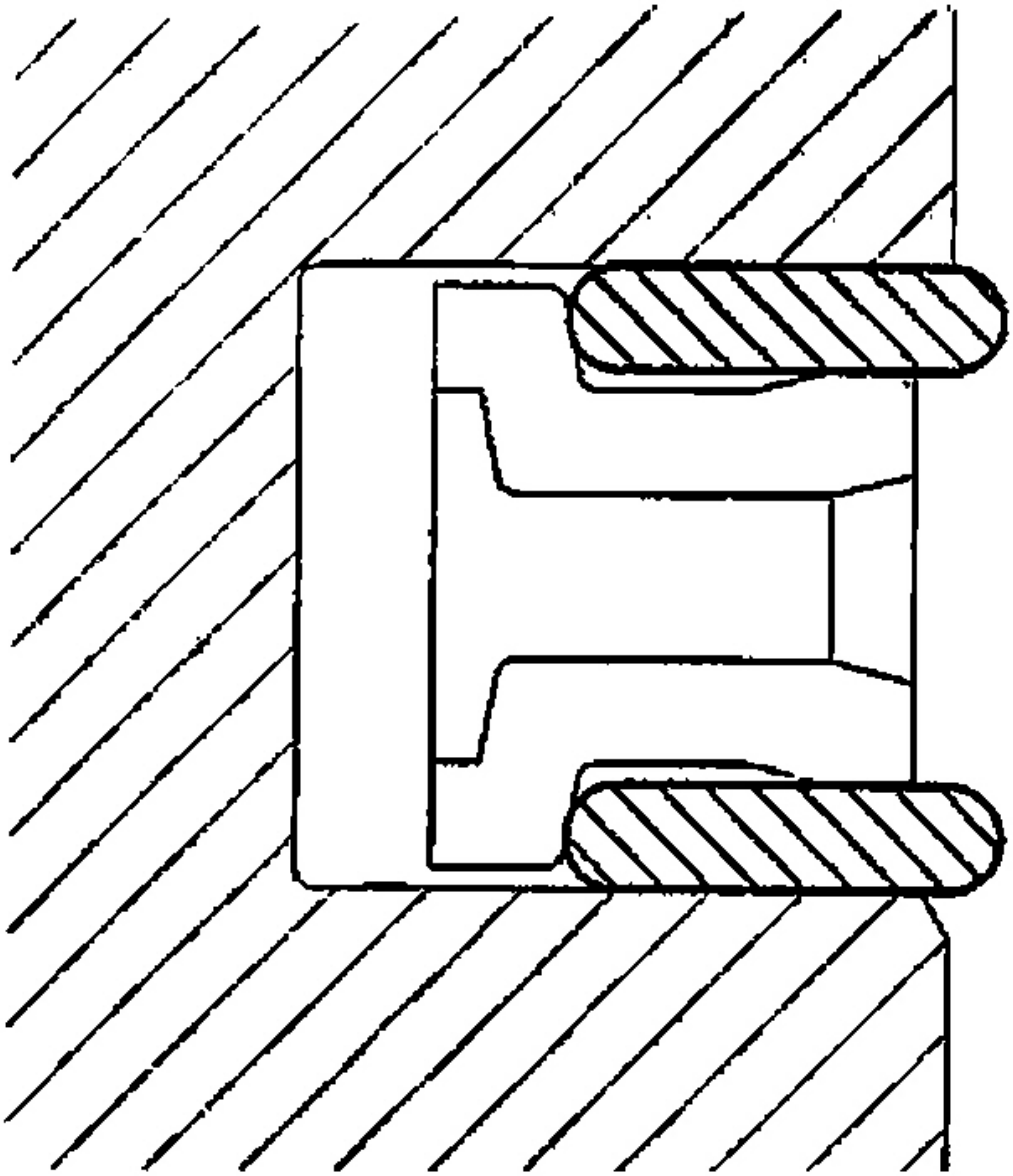
CAUTION: The clearance between the piston and the piston pin is an almost tight fit at normal temperature. Therefore, be sure to heat the piston before inserting the piston pin.

CAUTION: In addition, note that the piston is hot after heating.

B: OIL RING INSTALLATION

1. Fit the oil ring spacer into the piston ring groove.

NOTE: The side rails and spacer may be installed in either direction.



G01147567

Fig. 167: Installing Oil Ring Spacer
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Install the upper side rail. To install the side rail, first fit one end of the rail into the piston groove, then press the remaining portion into the position by finger, as shown in illustration. Use of a ring expander to expand the side rail end gap can break the side rail, unlike other piston rings.

NOTE: Do not use any piston ring expander when installing the side rail.

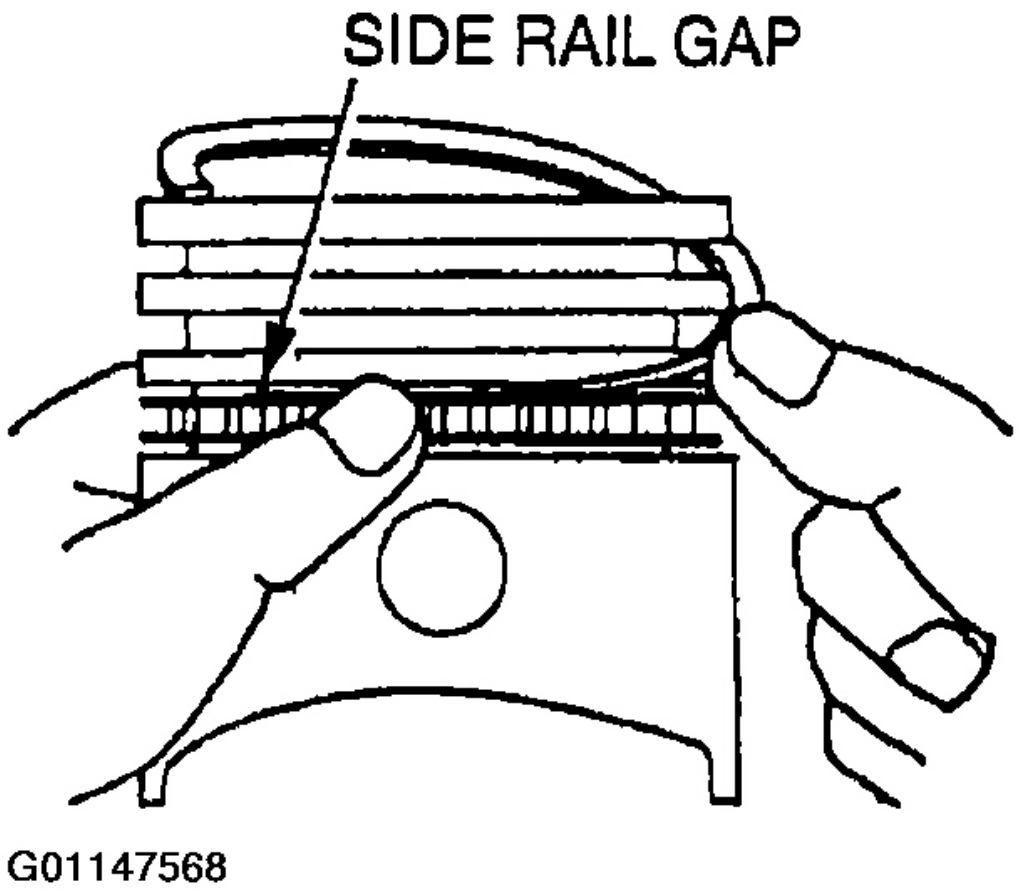


Fig. 168: Installing Side Rails
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Install the lower side rail in the same procedure as described in step (2).
4. Make sure that the side rails move smoothly in either direction.

C: PISTON RING NO. 2/PISTON RING NO. 1 INSTALLATION

- Using a piston ring expander, fit No. 2 and then No. 1 piston ring into position.

NOTE: The ring end is provided with the identification mark.

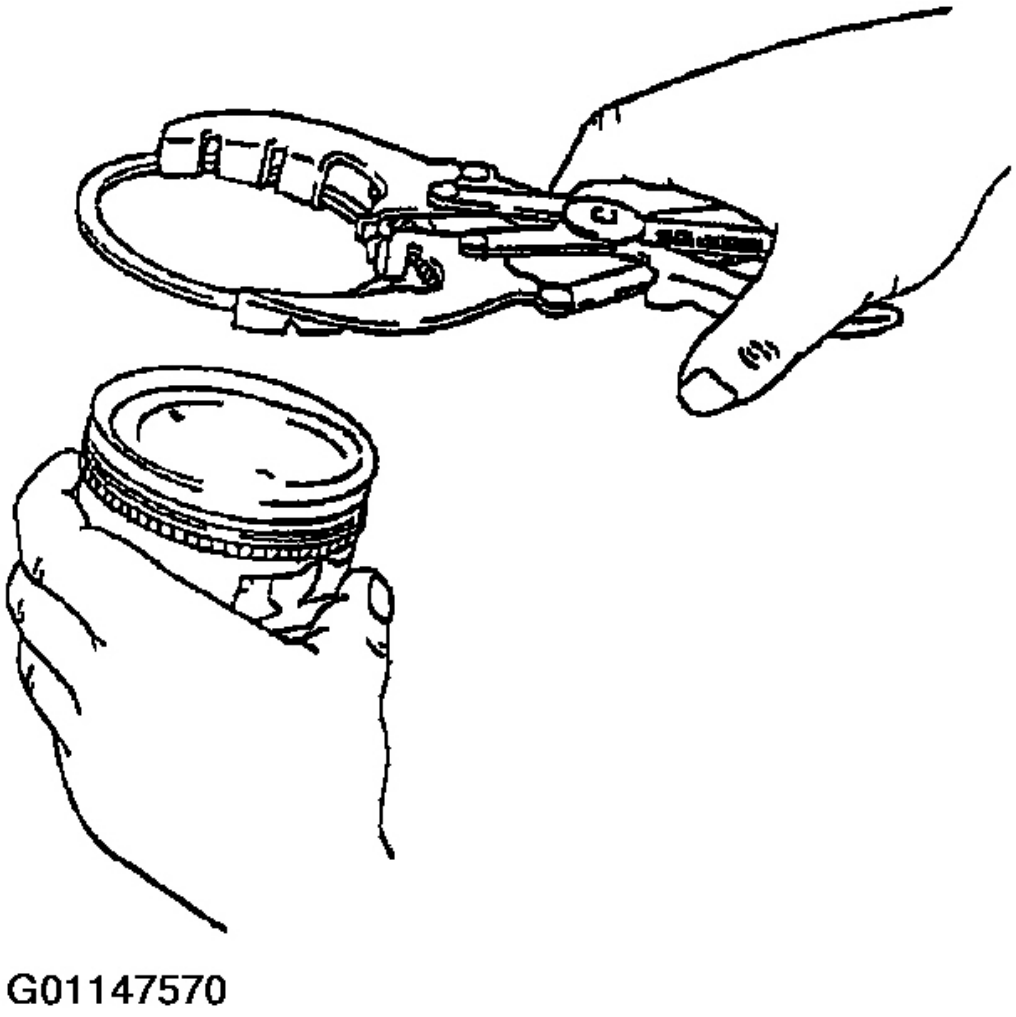


Fig. 169: Installing Piston Rings
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

	IDENTIFICATION MARK
No. 1 ring	T
No. 2 ring	T2

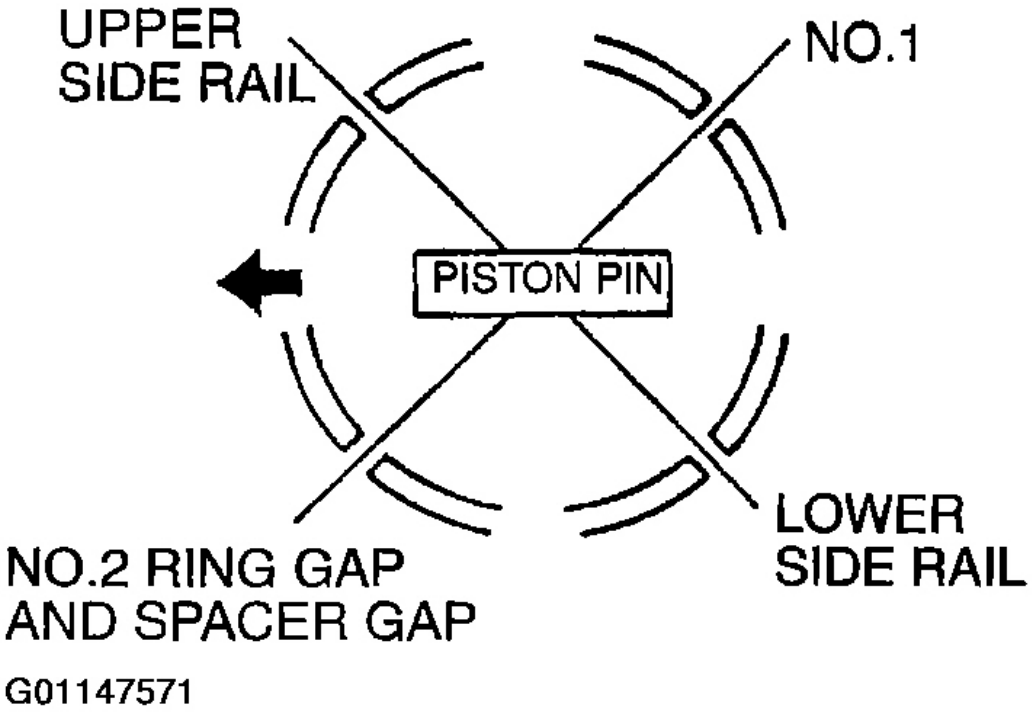
G01147569

Fig. 170: Identifying Piston Rings
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: Install piston rings with identification mark facing up, to the piston crown side.

D: PISTON AND CONNECTING ROD INSTALLATION

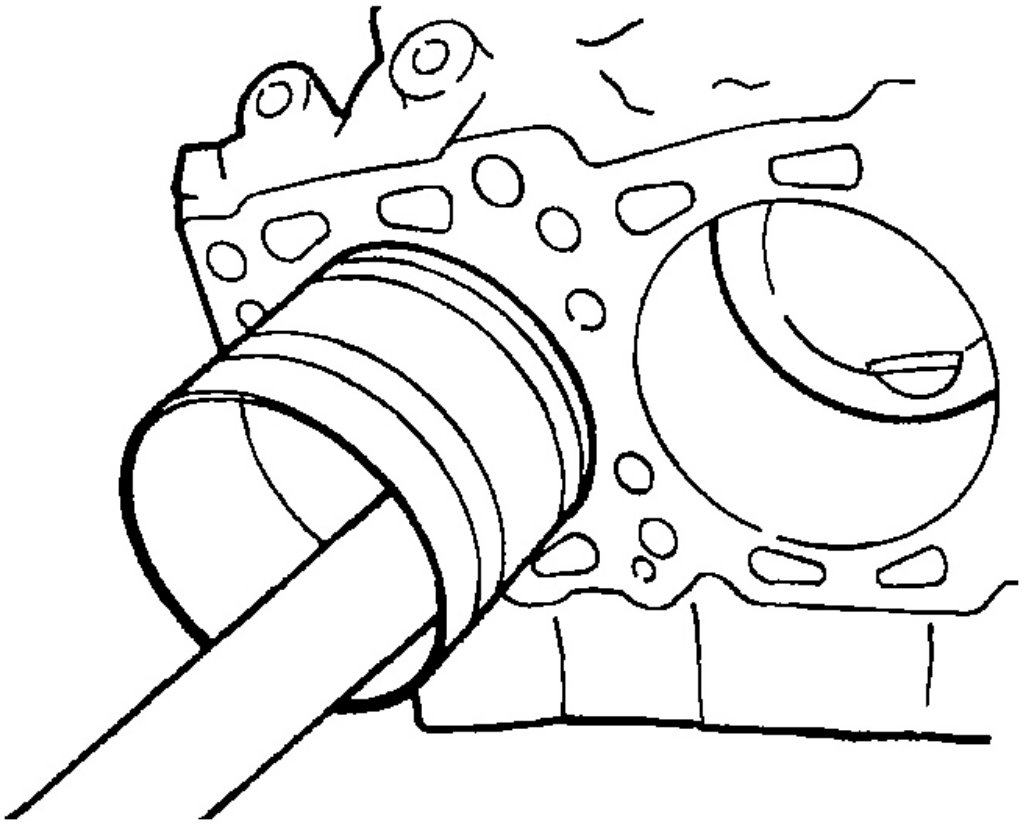
1. Liberally coat the circumference of the piston, piston ring, and oil ring with engine oil.
2. Arrange the piston ring and oil ring gaps (side rail and spacer) as shown in the illustration.



G01147571

Fig. 171: Arranging Ring Gaps
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Rotate the crankshaft so that the crank pin is on the center of the cylinder bore.
4. Use suitable thread protectors on the connecting rod bolts before inserting the piston and connecting rod assembly into the cylinder block. Care must be taken not to nick the crank pin.
5. Using a suitable piston ring compressor tool, install the piston and connecting rod assembly into the cylinder block.



G01147572

Fig. 172: Installing Piston & Connecting Rod Assembly
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAUTION: Install the piston with the front mark (arrow mark) on the top of the piston directed towards the engine front (timing belt side).

E: CONNECTING ROD BEARING INSTALLATION

When the bearing needs replacing, select and install a proper bearing by the following procedure:

1. Measure the crankshaft journal diameter and confirm its classification from the following table. In the case of a bearing supplied as a service part, its identification color is painted at the position shown in the illustration.

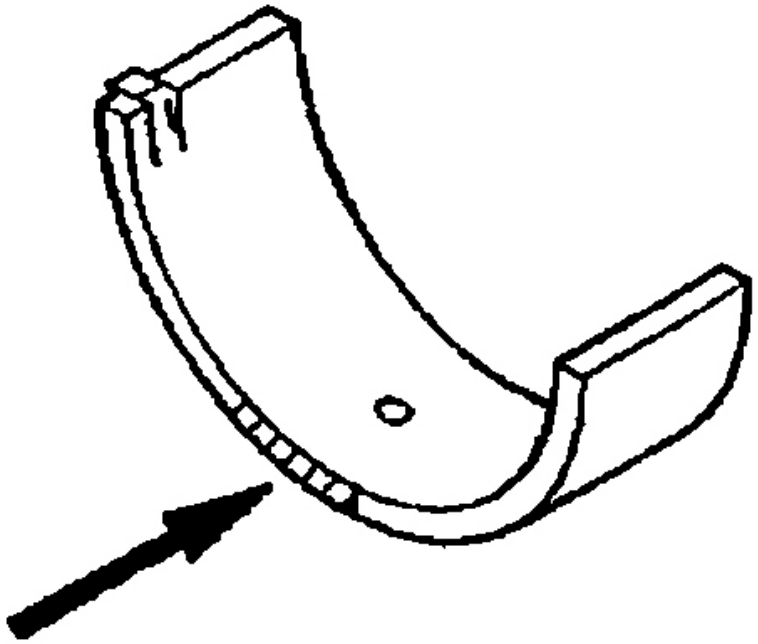


Fig. 173: Locating Bearing Identification Color
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

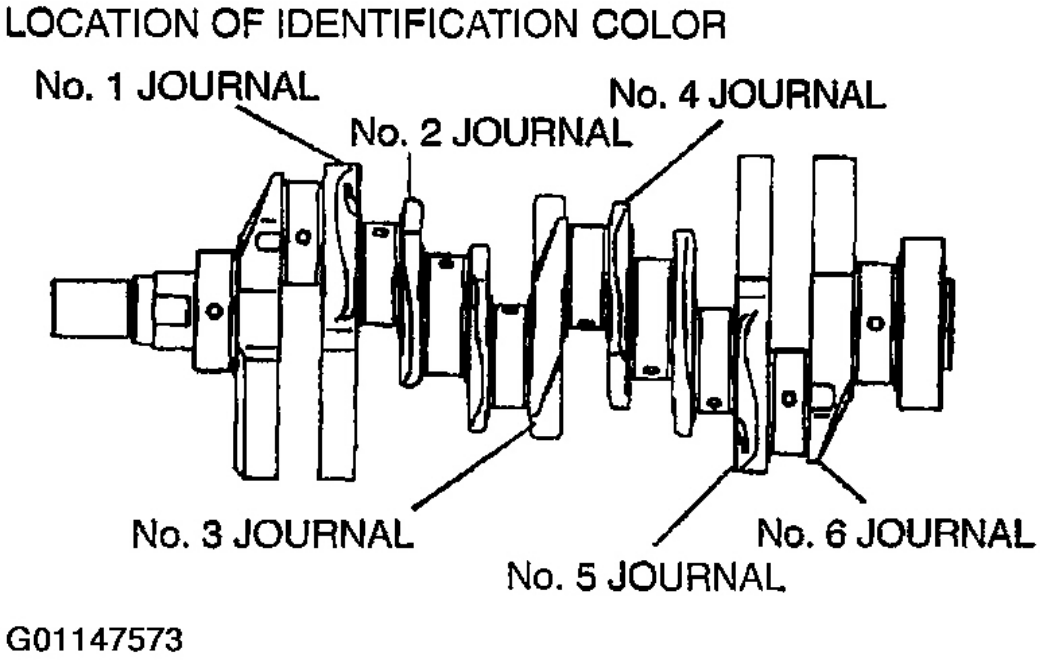


Fig. 174: Locating Identification Colors On Crankshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. The connecting rod identification mark is stamped at the position shown in the illustration.

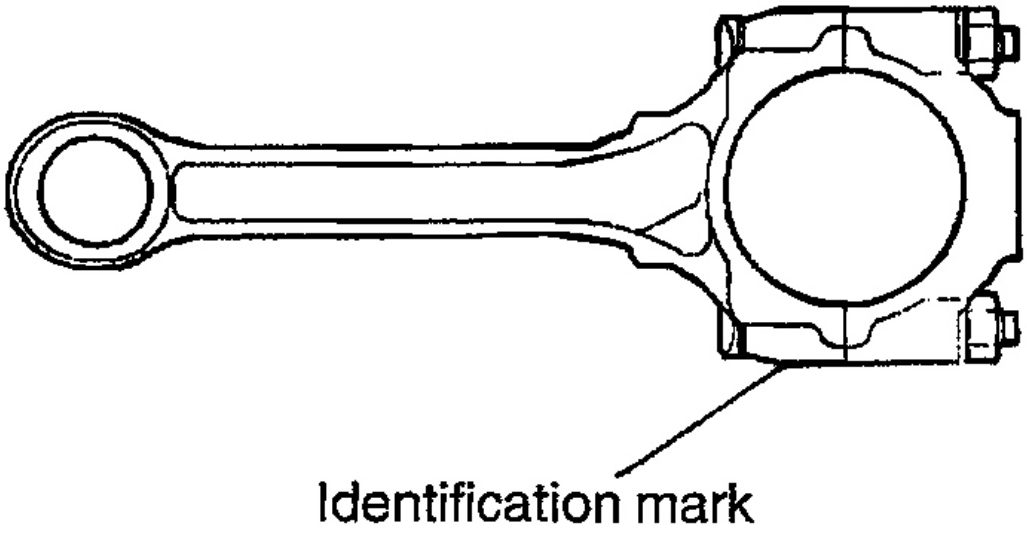


Fig. 175: Locating Connecting Rod Identification Mark
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Select a suitable bearing from the following table in illustration on the basis of the identification data confirmed under items (1) and (2).

CRANKSHAFT			CONNECTING ROD			
Identification mark (color)		Journal O.D. mm (in)	Big end		Bearing	
Production part	Spare part		Identification mark	I.D. mm (in)	Identification color	Thickness mm (in)
None	Yellow	54.994 – 55.000 (2.1651 – 2.1654)	0	58.000 – 58.006 (2.2835 – 2.2837)	Pink	1.483 – 1.486 (0.0575 – 0.0585)
			1	58.006 – 58.012 (2.2837 – 2.2839	Red	1.486 – 1.489 (0.0585 – 0.0586)
			2	58.012 – 58.018 (2.2839 – 2.2842)	Green	1.489 – 1.492 (0.586 – 0.0587)
None	None	54.988 – 54.994 (2.1649 – 2.1651)	0	58.000 – 58.006 (2.2835 – 2.2837)	Red	1.486 – 1.489 (0.0585 – 0.0586)
			1	58.006 – 58.012 (2.2837 – 2.2839)	Green	1.489 – 1.492 (0.0586 – 0.0587)
			2	58.012 – 58.018 (2.2839 – 2.2842)	Black	1.492 – 1.495 (0.0587 – 0.0589)
None	White	54.982 – 54.988 (2.1646 – 2.1649)	0	58.000 – 58.006 (2.2835 – 2.2837)	Green	1.489 – 1.492 (0.0586 – 0.0587)
			1	58.006 – 58.012 (2.2837 – 2.2839)	Black	1.492 – 1.495 (0.0587 – 0.0589)
			2	58.012 – 58.018 (2.2839 – 2.2842)	Brown	1.495 – 1.498 (0.0589 – 0.0590)

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Fig. 176: Connecting Rod Bearing Identification Table
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

F: CONNECTING ROD CAP INSTALLATION

1. Mate the correct bearing cap with the correct connecting rod by checking with the alignment marks made during disassembly. If a new connecting rod is used which has no alignment mark, position the notches for locking the bearing on the same side.

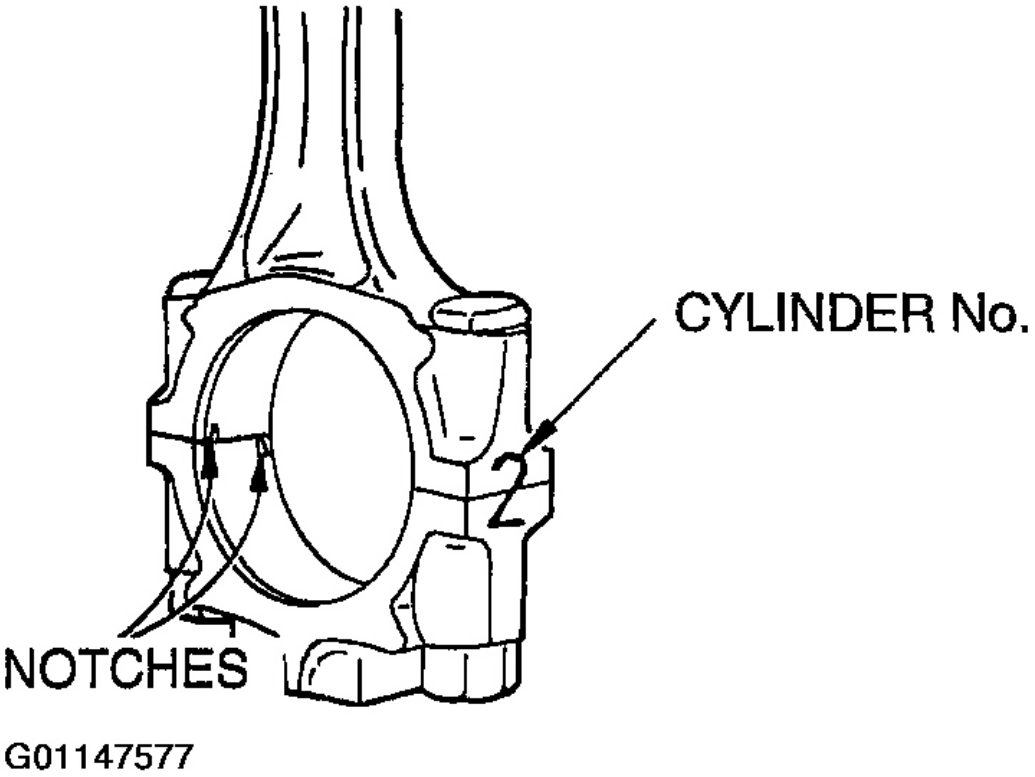

Fig. 177: Installing Connecting Rod Cap
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Check if the thrust clearance in the connecting rod big end is correct.

   Standard value: 0.10-0.25 mm (.0039-.0098 in.)

   Limit: 0.4 mm (.016 in.)

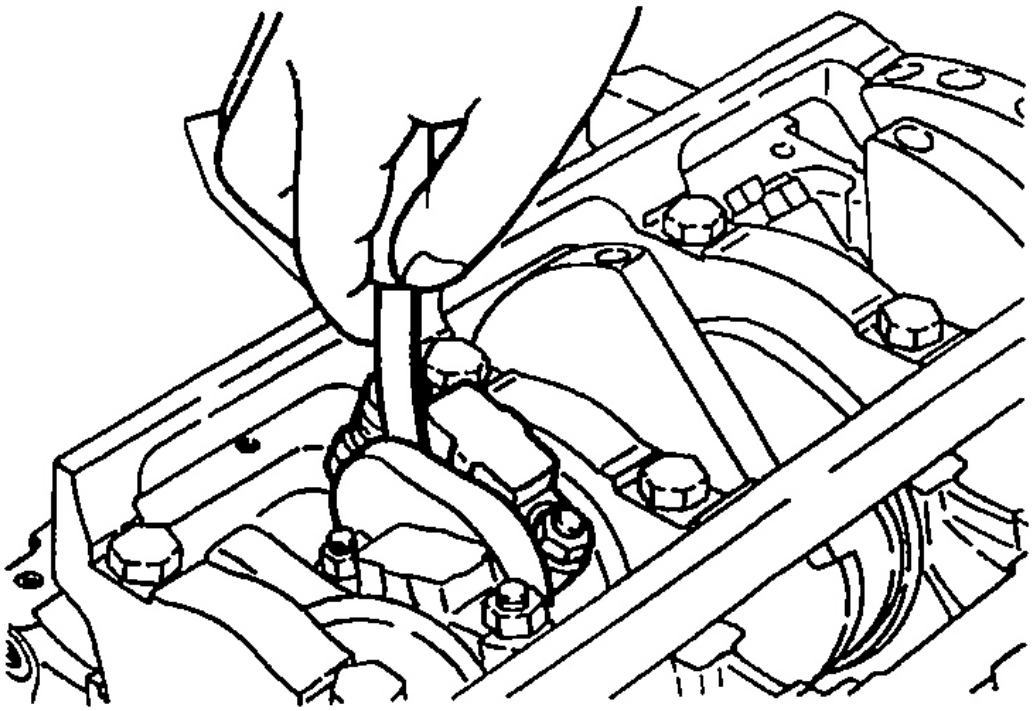

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Fig. 178: Checking Thrust Clearance
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

PISTON

- Replace the piston if scratches or seizure are evident on its surfaces (especially the thrust surface). Replace the piston if it is cracked.

PISTON PIN

1. Insert the piston pin into the piston pin hole with a thumb. You should feel a slight resistance. Replace the piston pin if it can be easily inserted or there is an excessive play.
2. The piston and piston pin must be replaced as an assembly.

PISTON RING

1. Check the piston ring for damage, excessive wear, and breakage and replace if defects are evident. If the piston has been replaced with a new one, the piston rings must also be replaced with new ones.

2. Check for clearance between the piston ring and ring groove. If the limit is exceeded, replace the ring or piston, or both.

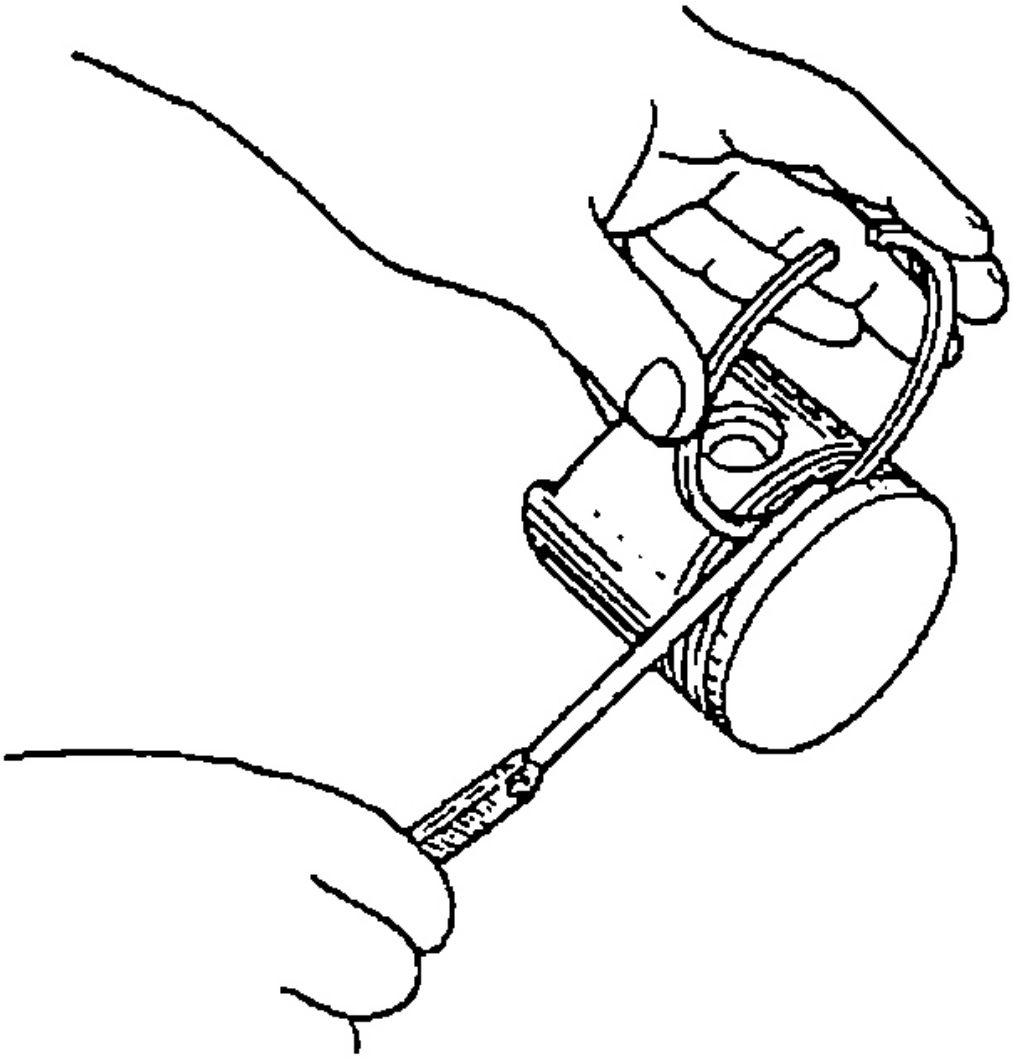

Fig. 179: Checking Clearance Between Piston Ring And Ring Groove
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value:

No. 1: 0.03-0.07 mm (.0012-.0028 in.)

No. 2: 0.02-0.06 mm (.0008-.0024 in.)

Limit: 0.1 mm (.004 in.)

3. Insert the piston ring into the cylinder bore. Force the ring down with a piston, the piston crown being in contact with the ring, to correctly position it at right angles to the cylinder wall. Then, measure the end gap with a feeler gauge.

   If the ring gap is excessive, replace the piston ring.

   Standard value:

   No. 1: 0.30-0.45 mm (.0118-.0177 in.)

   No. 2: 0.45-0.60 mm (.0177-.0236 in.)

   Oil: 0.20-0.60 mm (.0079-.0236 in.)

   Limit:

   No. 1, No. 2: 0.8 mm (.031 in.)

   Oil: 1.0 mm (.039 in.)

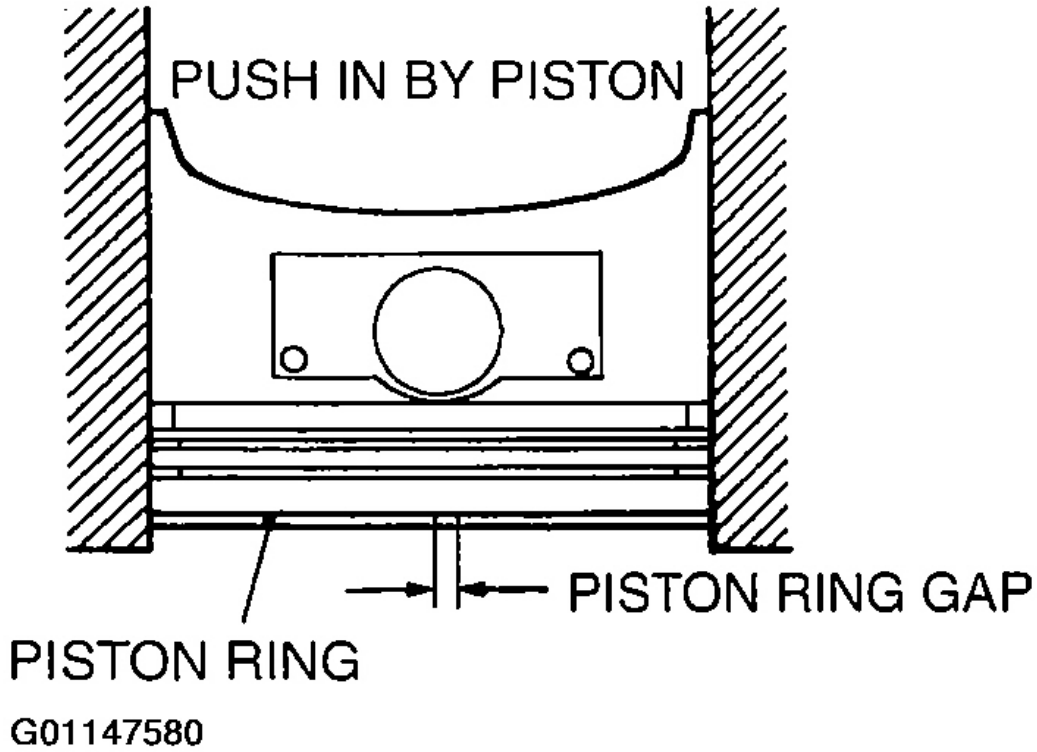

Fig. 180: Checking Ring End Gap
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CRANKSHAFT PIN OIL CLEARANCE (PLASTIGAGE METHOD)

The crankshaft oil clearance can be measured easily by using Plastigage, as follows:

1. Remove oil and grease and any other foreign matters from the crankshaft pin and the bearing inner surface.
2. Install the crankshaft.
3. Cut Plastigage to the same length as the width of the bearing and place it on the pin in parallel with its axis.
4. Gently place the crankshaft bearing cap over it and tighten the bolts to the specified torque.
5. Remove the bolts and gently remove the crankshaft bearing cap.
6. Measure the width of the crushed Plastigage at its widest section by using a scale printed on the Plastigage bag.

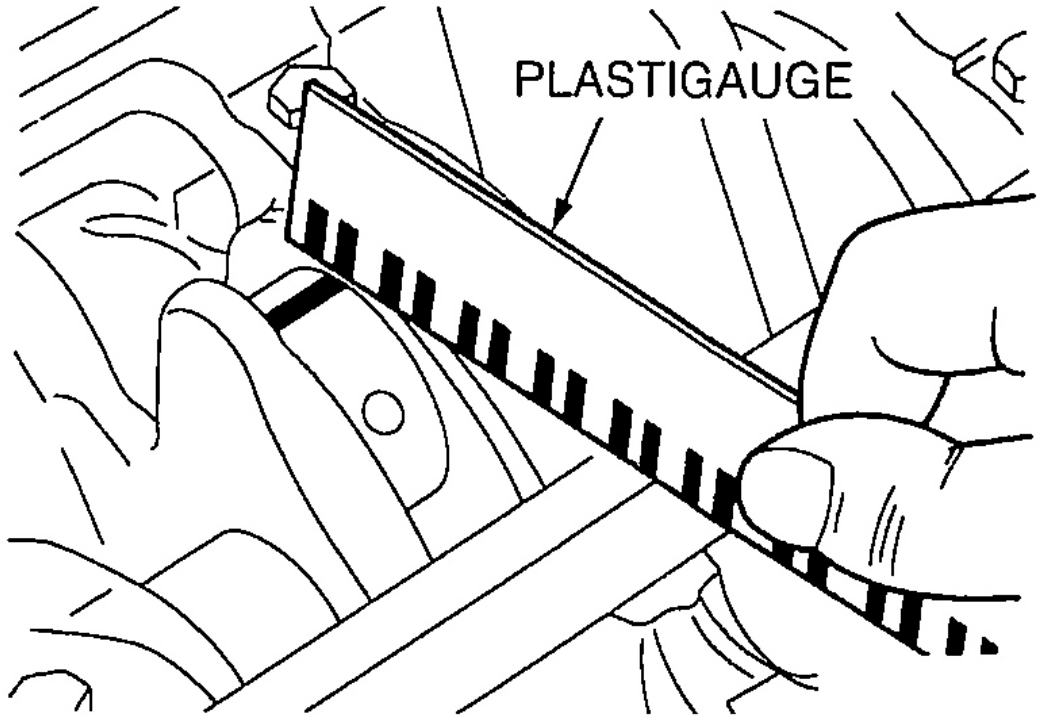

Fig. 181: Measuring Width Of Crushed Plastigage On Crankshaft Pin
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

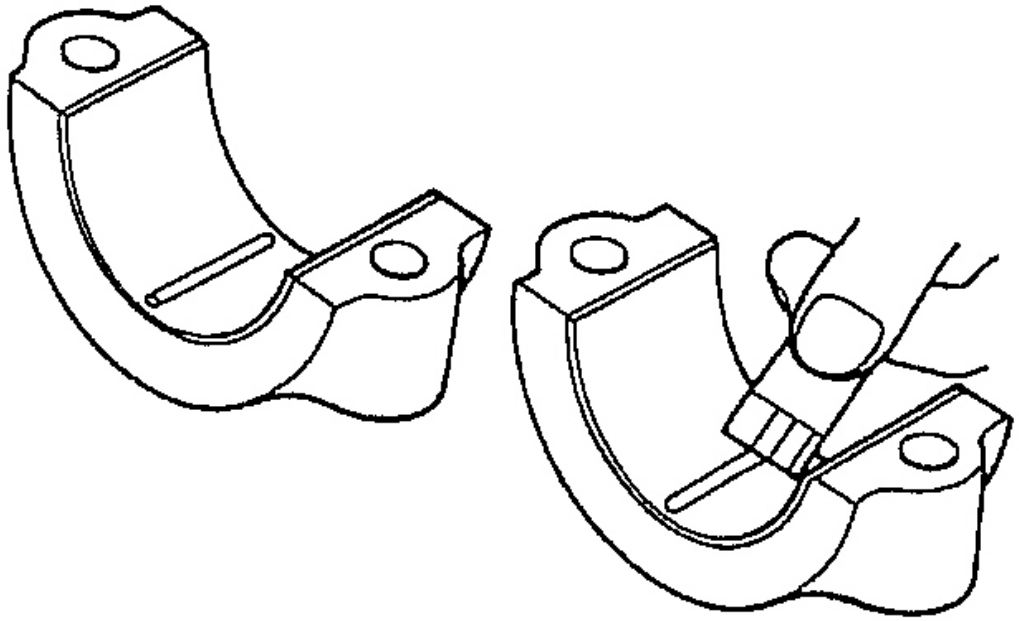

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Fig. 182: Measuring Width Of Crushed Plastigage On Bearing Cap
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value: 0.02-0.05 mm (.0008-.0020 in.)

Limit: 0.1 mm (.004 in.)

CRANKSHAFT AND DRIVE PLATE

REMOVAL AND INSTALLATION

NOTE: The bold directional arrows around letter designations in illustration are covered in SERVICE POINTS for each component.

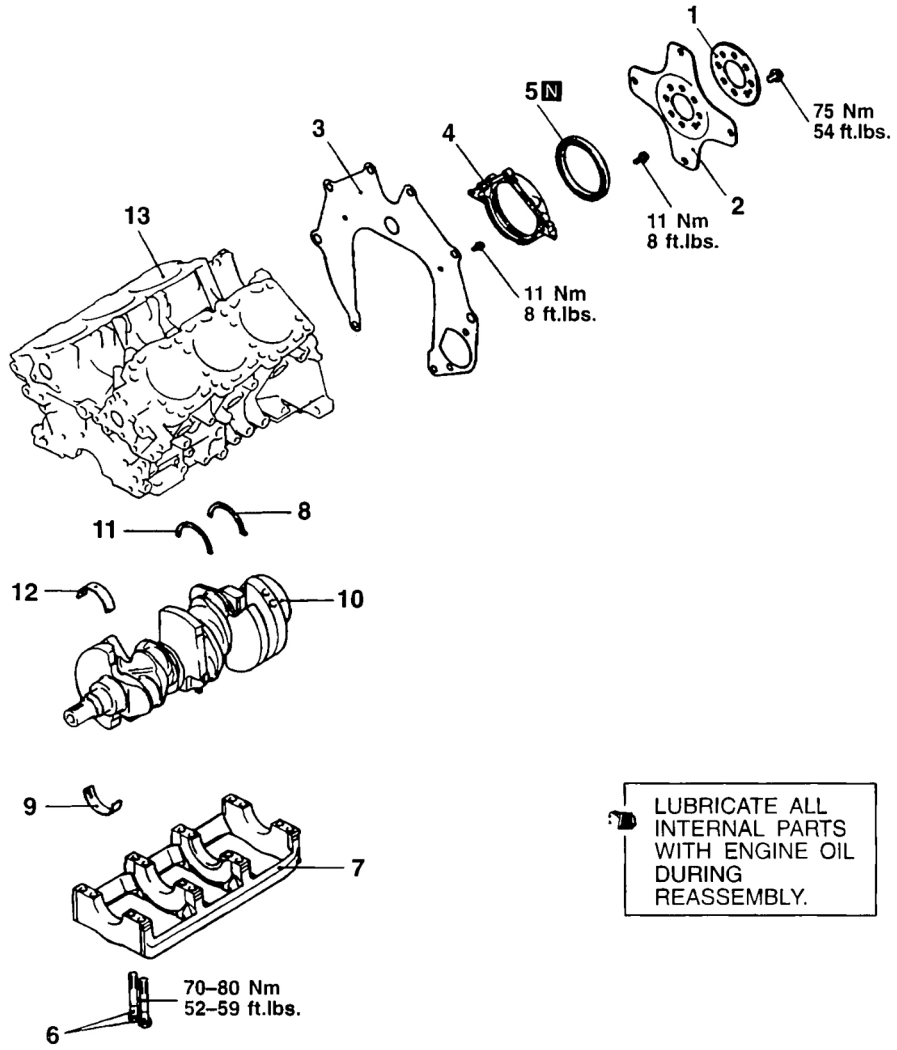

Fig. 183: Removing & Installing Crankshaft And Drive Plate
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

A: CRANKSHAFT BEARING INSTALLATION

When the bearings need replacing, select and install a proper bearing by the following procedure.

1. Measure the crankshaft journal diameter and confirm its classification from the following table. In the

case of a crankshaft supplied as a service part, its identification colors of its journals are painted at the position shown in the illustration.

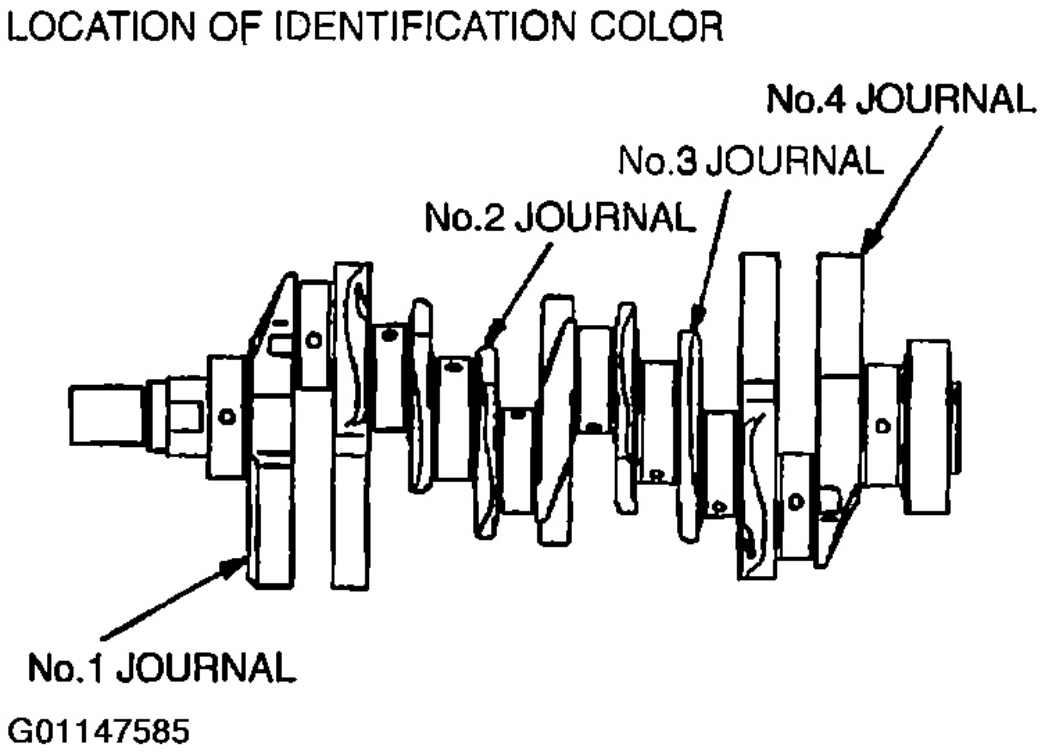

Fig. 184: Locating Identification Colors On Crankshaft Journals
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. The cylinder block bearing bore diameter identification marks are stamped at the position shown in the illustration from front to back, beginning at No. 1.

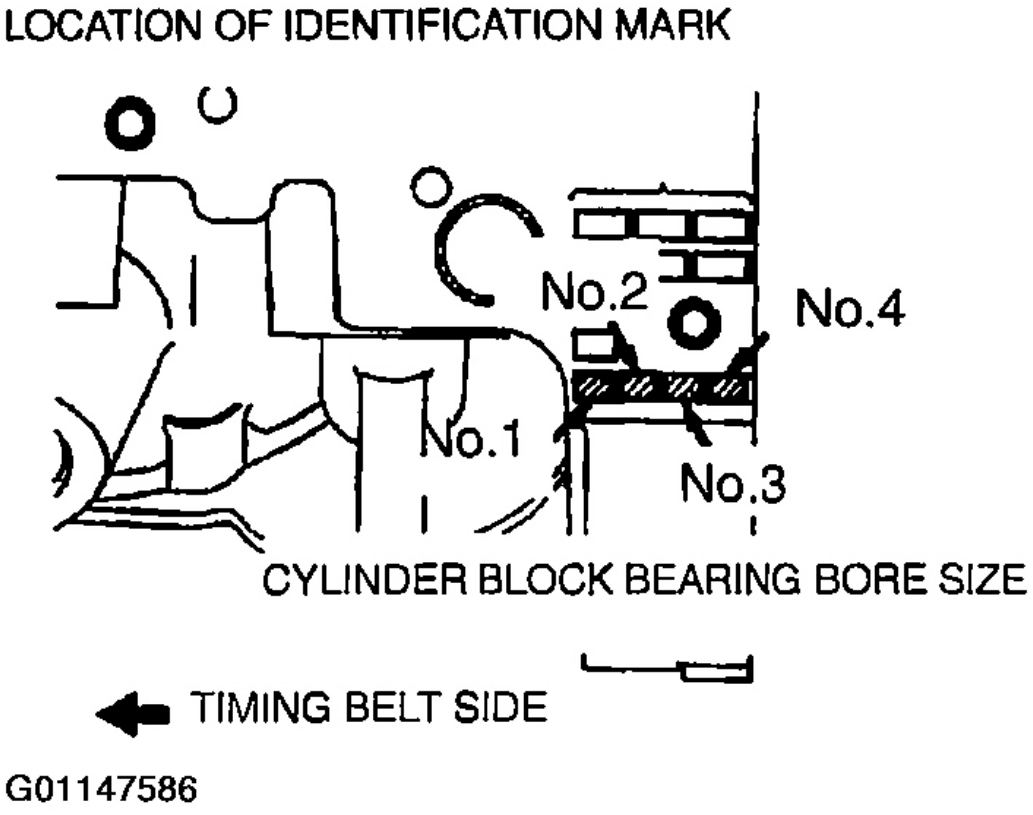

Fig. 185: Locating Cylinder Block Bearing Bore Diameter Identification Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Select the correct bearing from the table shown in illustration on the basis of the identification data confirmed at steps 1 and 2.

Combination of crankshaft journal diameter and cylinder block bearing bore diameter					Bearing identification colour or identification mark (for service part)
Crankshaft journal				Cylinder block bearing bore diameter identification mark	
Classification	Identification colour		O.D. mm (in)		
	Production part	Service part			
1	None	Yellow	63.994 (2.5194) – 64.000 (2.5197)	I	Pink(1)
				II	Red(2)
				III	Green(3)
2	None	None	63.988 (2.5192) – 63.994 (2.5194)	I	Red(2)
				III	Green(3)
				III	Black(4)
3	None	White	63.982 (2.5190) – 63.988 (2.5192)	I	Green(3)
				II	Black(4)
				III	Brown(5)

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Fig. 186: Bearing Identification Table
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Example

1. If the measured value of a crankshaft journal outer diameter is 64.000 mm (2.5197 in.) the journal is classified as "1" in the table.

In case the crankshaft is also replaced by a spare part, check the identification colors of the journals painted on the new crankshaft. If the color is yellow, for example, the journal is classified as "1".

2. Next, check the cylinder block bearing bore identification mark stamped on the cylinder block. If it is "1", read the "Bearing identification color" column to find the identification color of the bearing to be used. In this case, it is "pink".

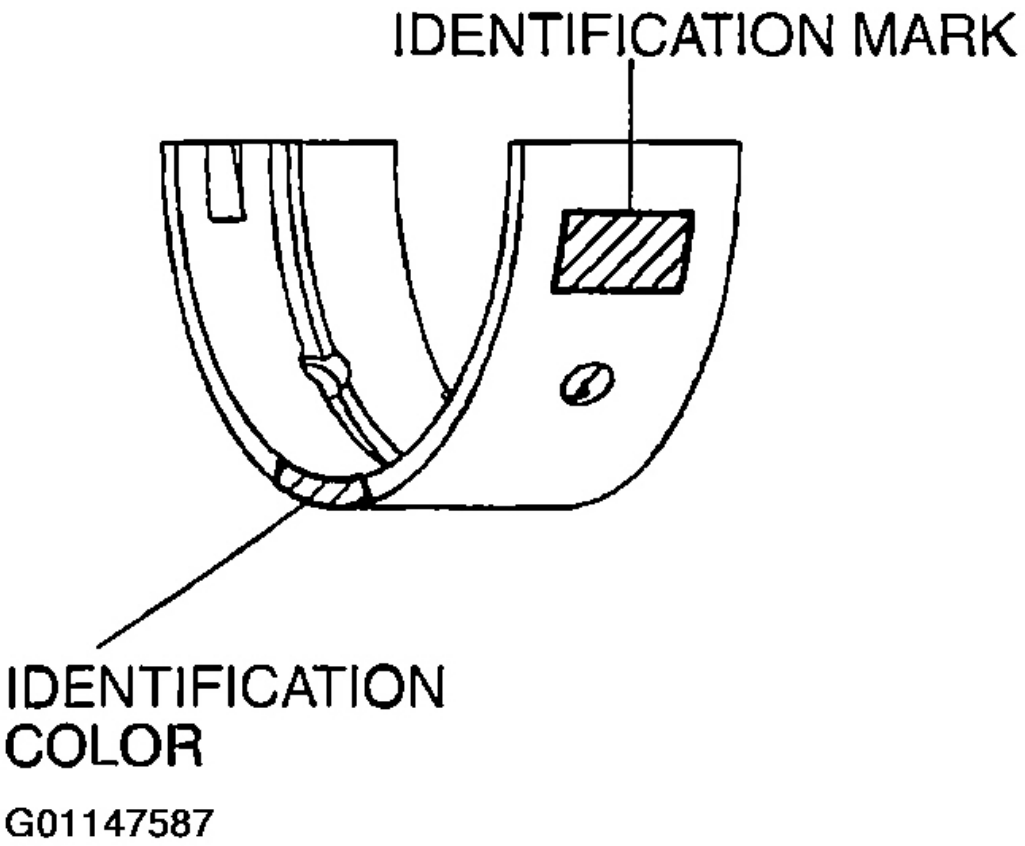

Fig. 187: Locating Identifications Marks On Bearing
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Install the bearing halves with oil groove in the cylinder block side.

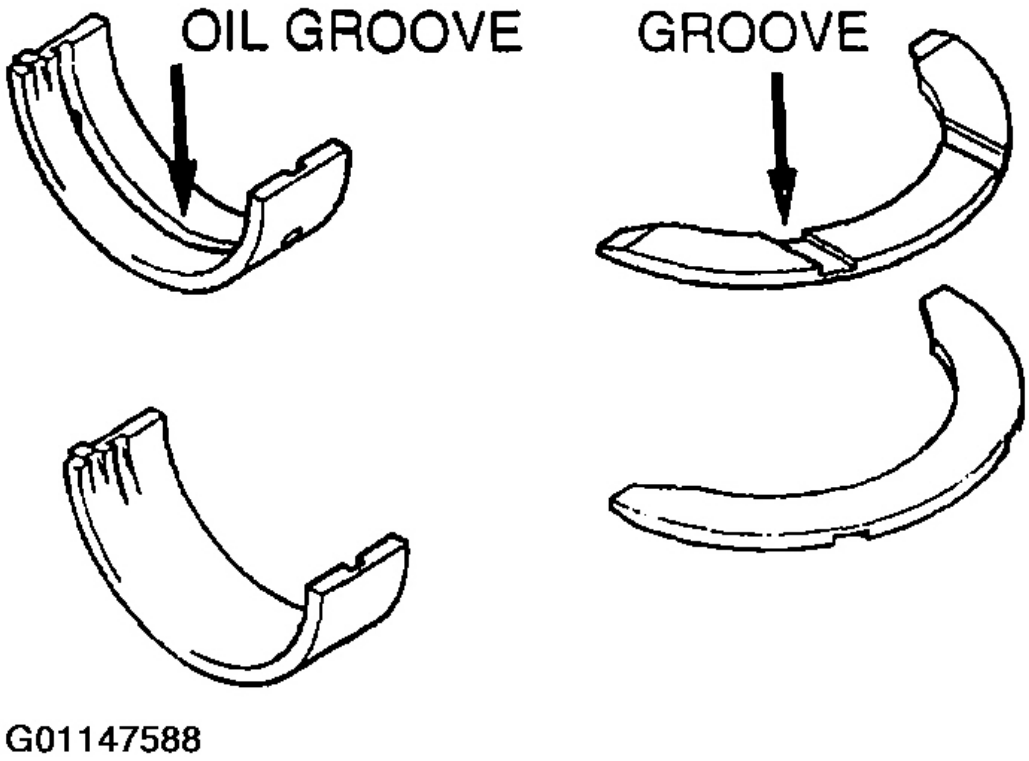

Fig. 188: Identifying Bearing Halves
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

5. Install the bearing halves without oil groove on the bearing cap side.
6. Install the thrust bearings on both sides of the No. 3 bearing with the grooves facing outward.

B: BEARING CAP/BEARING BOLT INSTALLATION

1. Attach the bearing cap on the cylinder block as shown in the illustration.

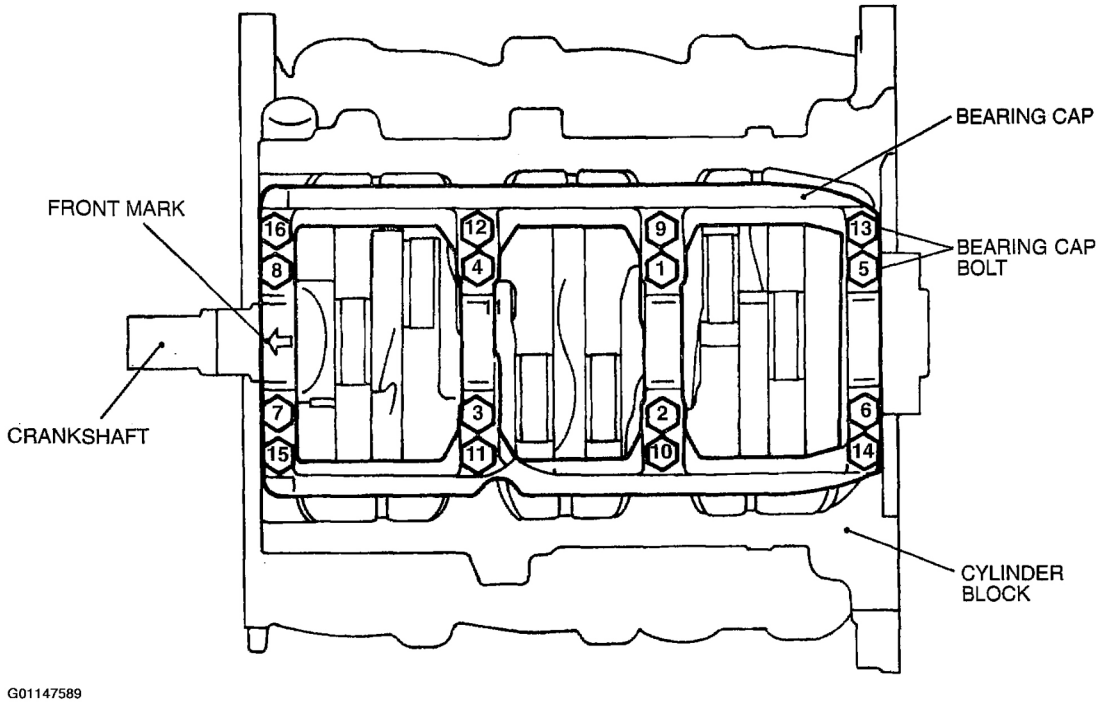

Fig. 189: Installing Bearing Caps & Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Tighten the bearing cap bolts to the specified torque in the sequence shown in the illustration.
3. Check that the crankshaft rotates smoothly.
4. Check the end play. If it exceeds the limit value, replace the thrust bearing.

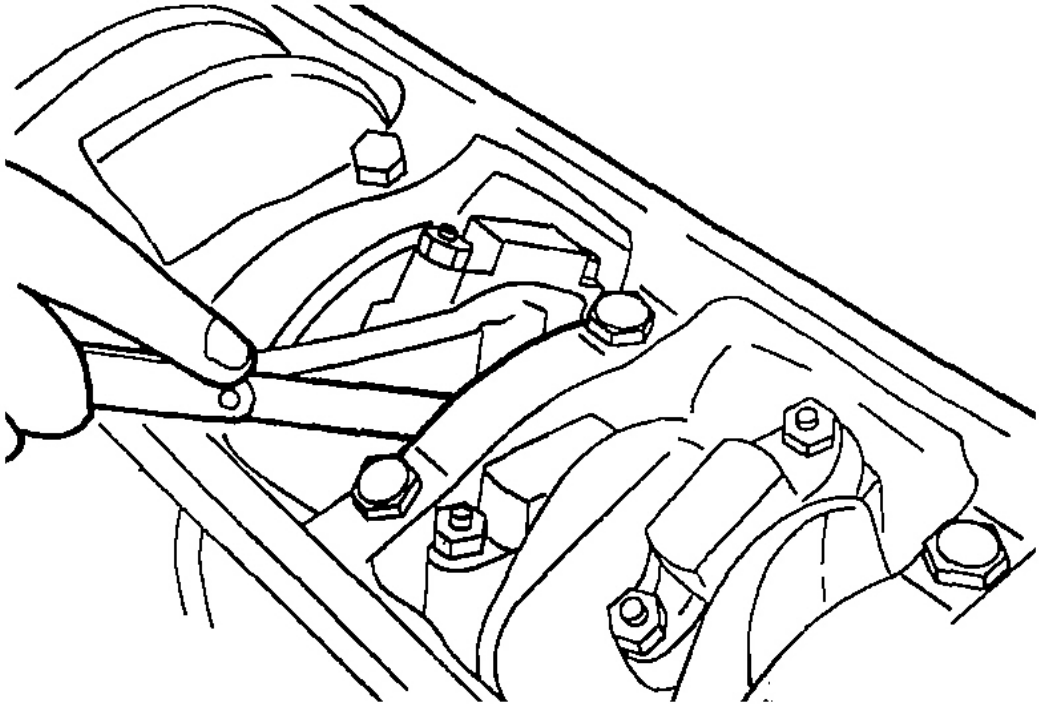

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Fig. 190: Checking End Play
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value: 0.05-0.25 mm (.0020-.0098 in.)

Limit: 0.3 mm (.012 in.)

C: CRANKSHAFT REAR OIL SEAL INSTALLATION

- Using the special tool, press-fit a new crankshaft rear oil seal into the oil seal case.

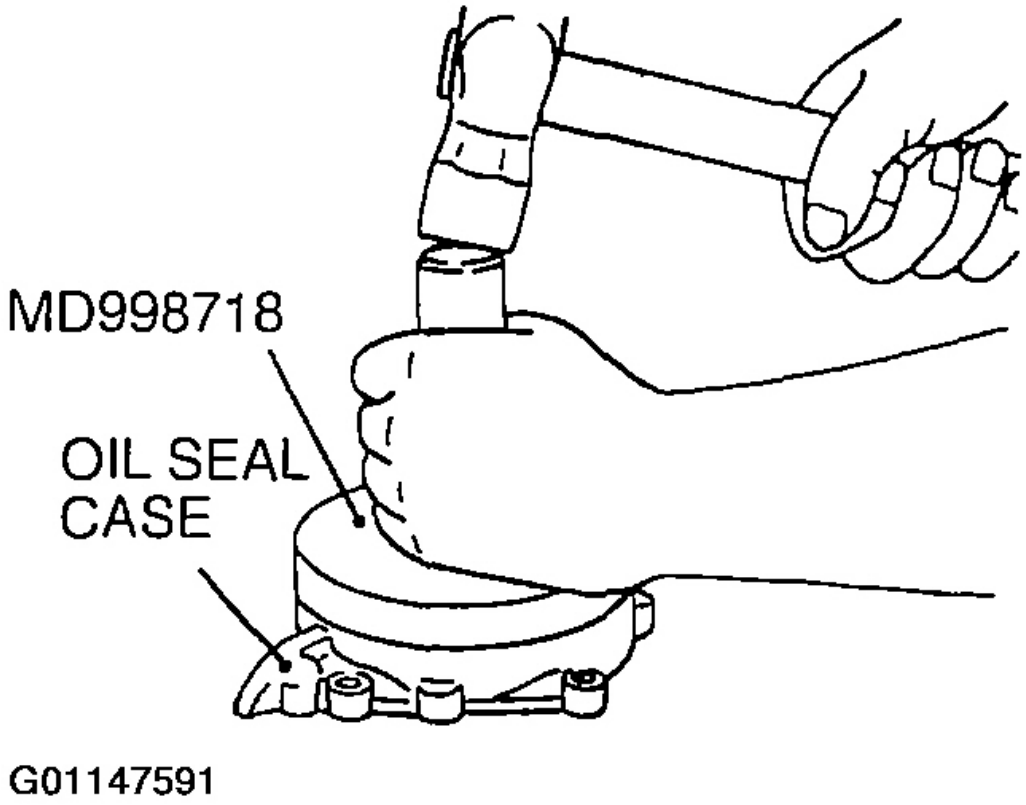

Fig. 191: Installing Crankshaft Rear Oil Seal (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

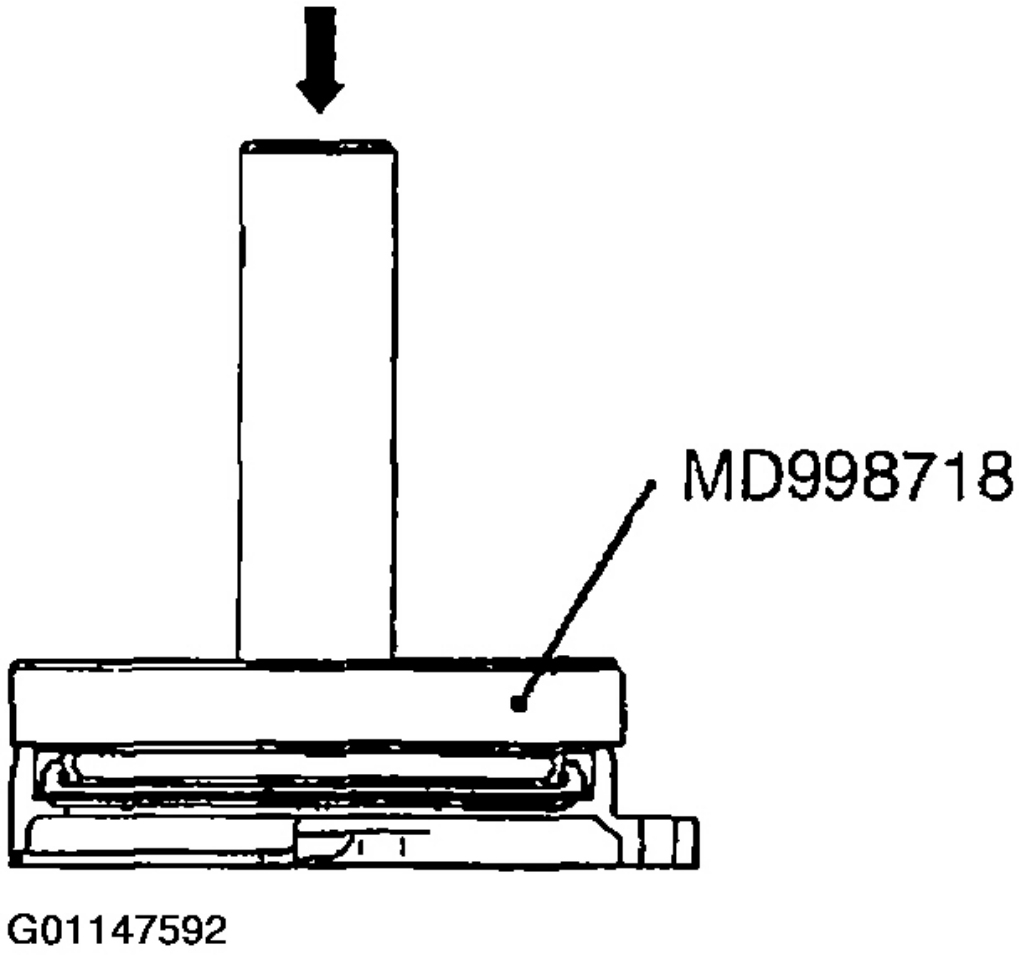

Fig. 192: Installing Crankshaft Rear Oil Seal (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

D: OIL SEAL CASE INSTALLATION

1. Apply specified sealant to the area shown in the illustration.

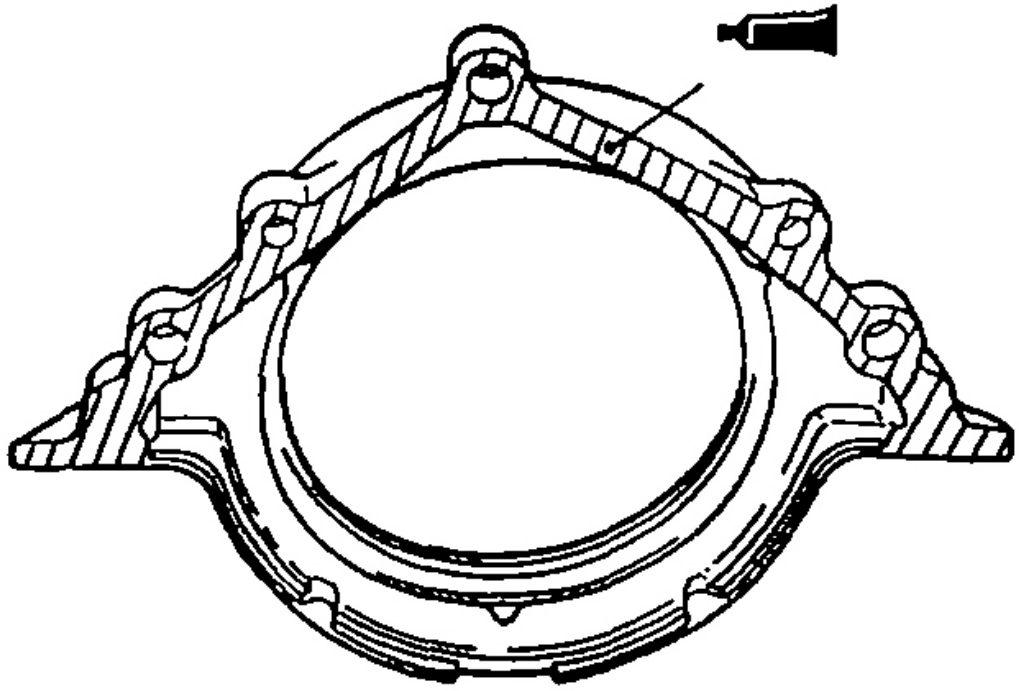

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Fig. 193: Applying Sealant To Oil Seal Case
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Specified sealant: MITSUBISHI GENUINE Part No. MD970389 or equivalent

2. Apply a small amount of engine oil to the entire circumference of the oil seal lip section, and place the oil seal on the cylinder block.

INSPECTION

CRANKSHAFT

If the oil clearance exceeds the limit, replace the bearing, and crankshaft if necessary.

1. Measure the outside diameter of the journals and the inside diameter of the crankshaft bearings. If the difference between them (oil clearance) exceeds the limit, replace the crankshaft bearing and, if necessary, crankshaft.

   Standard value: 0.02-0.04 mm (.0008-.0020 in.)

Limit: 0.1 mm (.004 in.)

CAUTION: Do not attempt an undersize machining of the crankshaft with special surface treatment. This crankshaft can be identified by its dull gray appearance.

CRANKSHAFT JOURNAL OIL CLEARANCE

< PLASTIGAGE METHOD >

The crankshaft oil clearance can be measured easily by using Plastigage, as follows:

1. Remove oil and grease and any other foreign matters from the crankshaft journal and bearing inner surface.
2. Install the crankshaft.
3. Cut Plastigage to the same length as the width of the bearing and place it on the journal in parallel with its axis.

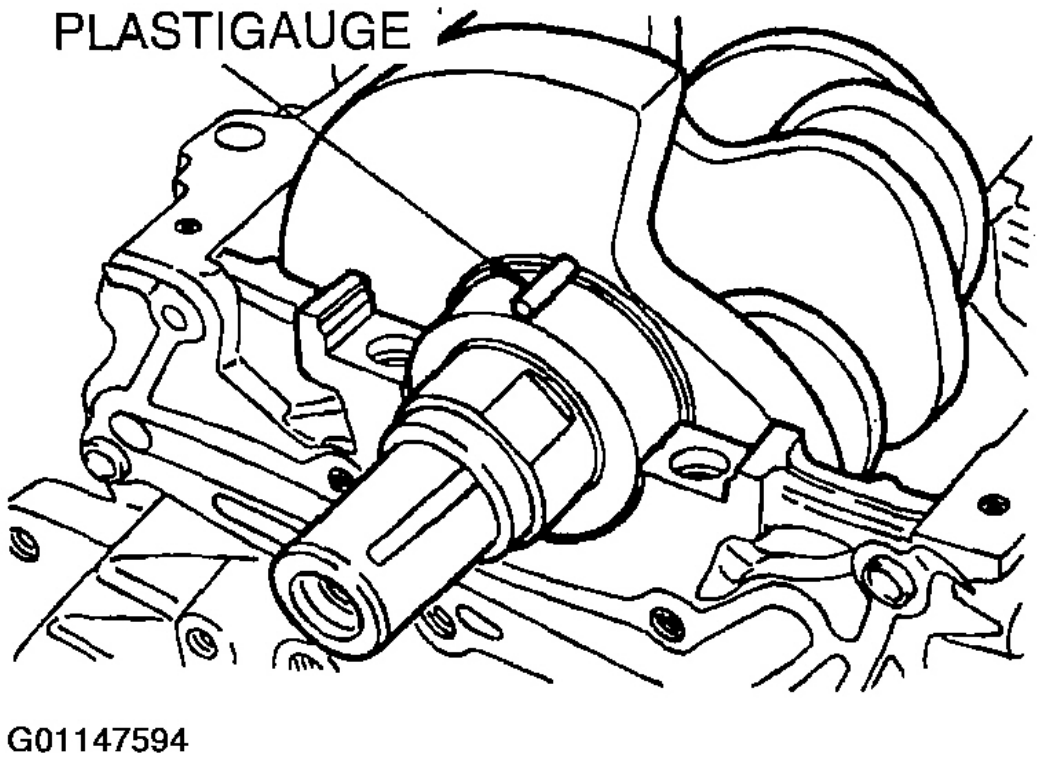

Fig. 194: Checking Crankshaft Oil Clearance With Plastigage (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

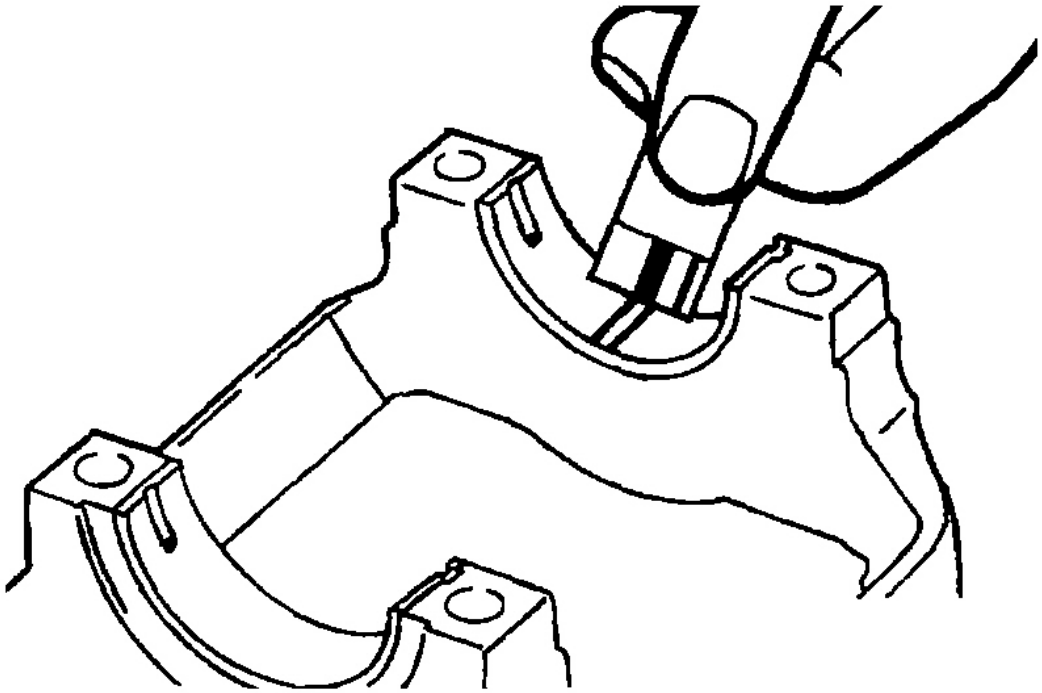

Fig. 195: Checking Crankshaft Oil Clearance With Plastigage (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Gently place the crankshaft bearing cap over it and tighten the bolts to the specified torque.
5. Remove the bolts and gently remove the crankshaft bearing cap.
6. Measure the width of the crushed Plastigage at its widest section by using a scale printed on the Plastigage package.

CYLINDER BLOCK

1. Visually check for scratches, rust, and corrosion. Also use a flaw detecting agent for the check. If defects are evident, correct, or replace.
2. Using a straightedge and feeler gauge, check the flatness of the block top surface. Make sure that the surface is free from gasket pieces and other foreign matter.

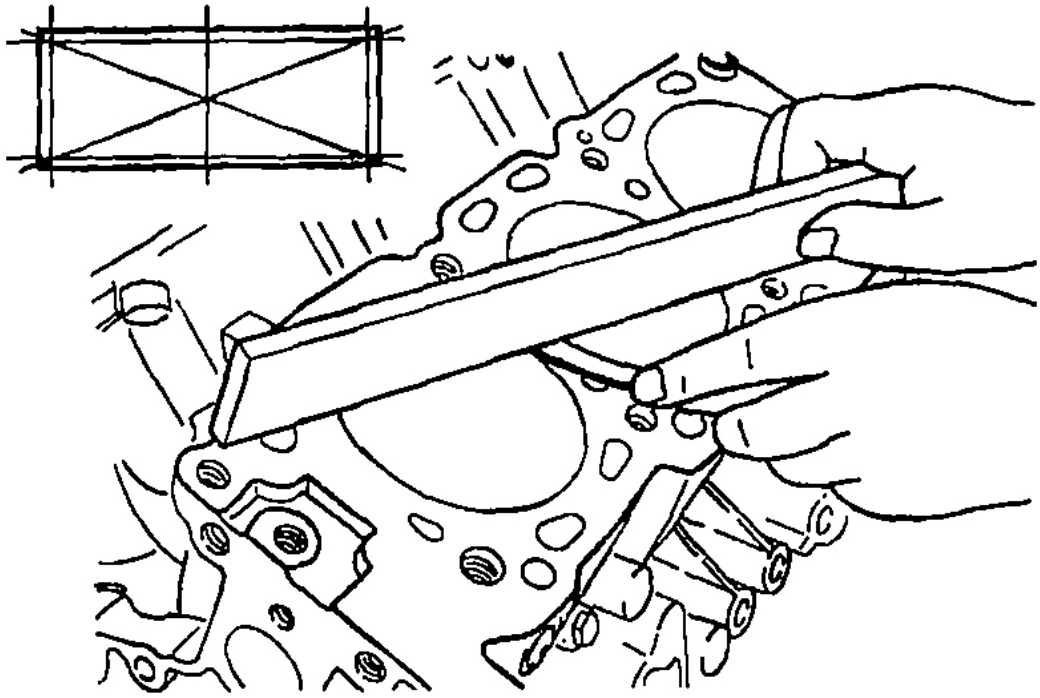

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Fig. 196: Checking Flatness Of Block Top Surface
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value: 0.05 mm (.002 in.)

Limit: 0.1 mm (.004 in.)

3. If distortion is excessive, correct within the allowable limit or replace.
   Grinding limit: 0.2 mm (.008 in.)
   ***Includes/combined with cylinder head grinding.**
   Cylinder block height (when new): 210.4-210.6 mm (8.283-8.291 in.)
4. Check the cylinder walls for scratches and seizure. If defects are evident, correct (rebore to an oversize) or replace.
5. Using a cylinder gauge, measure the cylinder bore and cylindricity. If worn badly, correct by boring the cylinders to an oversize and replace pistons and piston rings. Measure at the points shown in the illustration.

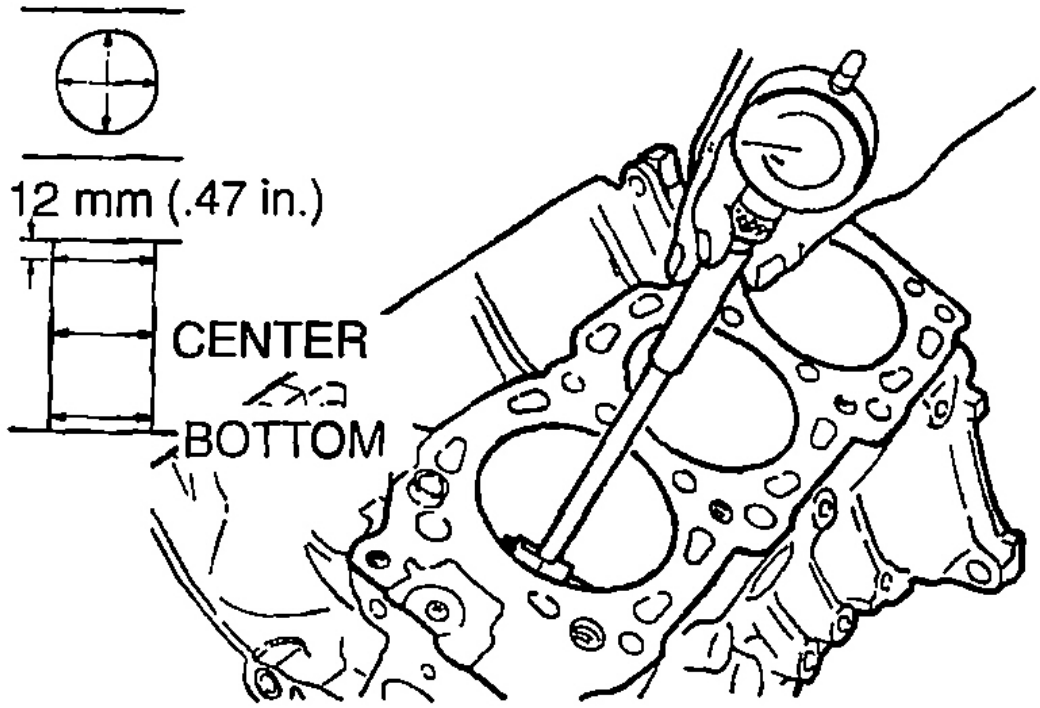

Fig. 197: Measuring Cylinder Bore And Cylindricity
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Standard value:

Cylinder I.D.: 93.0 mm (3.65 in.)
Cylindricity: 0.01 mm (.0004 in.)

BORING CYLINDER

1. Oversize pistons to be used should be determined on the basis of the largest bore cylinder.

Piston size identification

SIZE	IDENTIFICATION MARK
0.50 mm (.02 in.) O.S.	0.50
1.00 mm (.04 in.) O.S.	1.00

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Fig. 198: Piston Size Identification Table
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NOTE: Size mark is stamped on the piston top.

2. Measure the outside diameter of the piston to be used. Measure it in the thrust direction as shown.

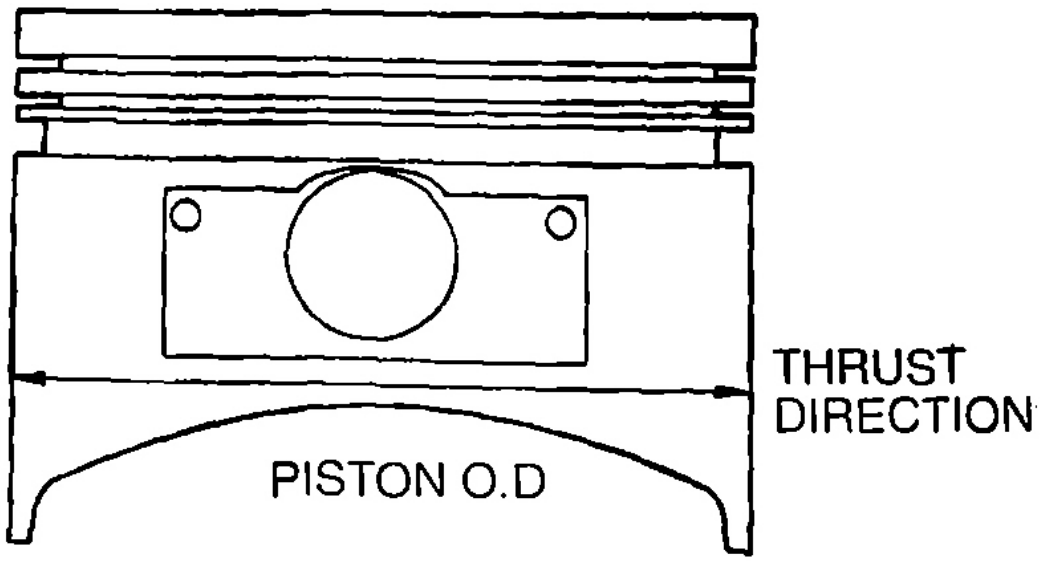

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Fig. 199: Measuring Outside Diameter Of Piston
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Based on the measured piston O.D., calculate the boring finish dimension.

   Boring finish dimension = Piston O.D. + (clearance between piston O.D. and cylinder) - 0.02 mm (.0008 in.) (honing margin)

4. Bore all cylinders to the calculated boring finish dimension.

CAUTION: To prevent distortion that may result from temperature rise during honing, bore cylinders in the order of No. 2, No. 4, No. 6, No. 1, No. 3 and No. 5.

5. Hone to the final finish dimension (piston O.D. + clearance between piston O.D. and cylinder).
6. Check the clearance between the piston and cylinder.
7. **Clearance between piston and cylinder: 0.02-0.04 mm (.0008-.0016 in.)**

NOTE: When boring cylinders, finish all of six cylinders to the same oversize. Do not bore only one cylinder to an oversize.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

ITEMS	Nm	ft. lbs.
Bracket Bolt		
M8	22	16
M10	41	30
M12	75	54
Crankshaft and drive plate		
Drive plate bolt	75	54
Bell housing cover bolt	9	7
Oil seal case bolt	11	8
Bearing cap bolt	93	67
Cylinder head and valve		
Cylinder head bolt	108	80
Exhaust manifold		
Oil level gauge guide bolt	14	10
Heat protector bolt	14	10
Exhaust manifold nut	29	22
Water pump bolt		
M8	24	17
M10	41	30
Generator and drive belt		
Generator bolt	21	15
Tensioner pulley nut	50	36
Generator bracket bolt		
M8	48	36

M10	23	17
Generator pivot nut		
Crankshaft bolt		
Ignition system		
Spark plug	25	18
Distributor nut	23	17
Intake manifold and fuel parts		
Injector and fuel rail bolt	12	9
Fuel pressure regulator bolt	9	7
Fuel pipe bolt	9	7
Heat pipe bolt	18	13
Engine coolant temperature gauge unit	11	8
Engine coolant temperature sensor	30	22
Water outlet fitting bolt	19	14
Water inlet fitting bolt	19	14
Thermostat case bolt	19	14
Water (outlet) pipe bolt	14	10
Intake manifold nut	21	16

FASTENER TIGHTENING SPECIFICATIONS

ITEMS	Nm	ft. lbs.
Intake manifold plenum and throttle body		
Manifold differential pressure sensor bolt	4.9	3.6
Intake manifold plenum bolt and nut	18	13
Vacuum hose assembly bolt	9.8	7
Water outlet fitting bracket bolt	19	14
EGR pipe bolt	18	13
EGR pipe flare nut	59	43
Intake manifold plenum stay bolt		
M8	18	13
M10	36	27
EGR valve bolt	22	16
Bracket bolt	24	18
Throttle body bolt	12	8
Oil pan and oil pump		
Oil pressure switch	10	7
Oil filter bracket bolt		
M8	24	17
M10	40	30
Drain plug	40	30
Oil pan (upper) bolt	6	4

Oil pan lower bolt	11	8
Cover bolt	11	8
Baffle plate bolt		
M6	11	8
M8	9	7
Oil screen bolt	19	14
Plug	45	33
Oil pump case bolt	14	10
Oil pump cover bolt	10	7
Piston and connecting rod		
Connecting rod cap nut	52	38
Rocker arms and camshafts		
Rocker cover bolt	3.5	2.5
Distributor adaptor bolt	23	17
Thrust case bolt	13	9
Rocker arm, rocker arm shaft bolt	31	23
Timing belt		
Crankshaft position sensor bolt	9	7
Auto tensioner bolt	17	24
Tensioner pulley bolt	35	49
Tensioner arm bolt	44	33
Idler pulley bolt	44	33
Camshaft sprocket bolt	88	64

GENERAL SPECIFICATIONS

General Specifications

DESCRIPTIONS			SPECIFICATIONS
Type			60° V, SOHC (per bank)
Number of cylinders			6
Combustion chamber			Pentroof type
Total displacement cm^3 (cu.in.)			3,497 (213.5)
Cylinder bore mm (in.)			93.0 (3.65)
Piston stroke mm (in.)			85.8 (3.37)
Valve timing	Intake valve	Opens (BTDC)	13°
		Closes (ABDC)	55°
	Exhaust valve	Opens (BBDC)	51°
		Closes (ATDC)	17°
Lubrication system			Pressure feed, full-flow filtration
Oil pump type			Trochoid type
Cooling system			Water-cooled forced circulation

Water pump type	Centrifugal impeller type
EGR type	Single type
Injector type and number	Electromagnetic, 6
Injector identification mark	CDH275
Throttle bore mm (in.)	65 (2.56)
Throttle position sensor	Variable resistor type
Closed throttle position switch	Movable contact type, within throttle position sensor

SERVICE SPECIFICATIONS

ITEMS			STANDARD VALUE	LIMIT
Generator and ignition system				
Drive belt	Tension N (lbs.)	New belt	784–980 (174–218)	–
		Used belt	539–637 (120–142)	–
	Deflection mm (in.) (Reference value)	New belt	6.0–7.2 (.24–.28)	–
		Used belt	8.2–9.3 (.32–.37)	–
Fuel and emission parts				
Injector coil resistance Ω			13–16 at 20°C (68°F)	–
Rocker arms and camshaft				
Camshaft	Cam height mm (in.)	Intake	37.71 (1.484)	37.21 (1.465)
		Exhaust	37.14 (1.462)	36.64 (1.442)
Camshaft	Journal diameter mm (in.)		44.93 (1.77)	–
Cylinder head and valve				
Cylinder head	Flatness of gasket surface mm (in.)		0.03 (.0012)	0.2 (.008)
	Grinding limit of gasket surface *Includes/combined with cylinder block grinding mm (in.)		–	*0.2 (.008)
	Overall height mm (in.)		120 (4.72)	–
Valve	Thickness of valve head (margin) mm (in.)	Intake	1.0 (.039)	0.5 (.019)
		Exhaust	1.2 (.047)	0.7 (.028)
	Stem diameter mm (in.)	Intake	6.0 (.236)	–
		Exhaust	6.0 (.236)	–
	Stem to guide clearance mm (in.)	Intake	0.02–0.05 (.0008–.0020)	0.10 (.004)
		Exhaust	0.04–0.07 (.0016–.0028)	0.15 (.006)
Valve face angle			45°–45.5°	–
Valve spring	Free height mm (in.)		51.0 (2.01)	50.0 (1.97)
	Load/installed height N/mm (lbs./in.)		267/44.2 (60/1.740)	–
	Out of squareness		2° or less	Max. 4°
Valve seat	Valve contact width mm (in.)		0.9–1.3 (.035–.051)	–
Valve guide	Inner diameter mm (in.)		6.0 (.315)	–
	Outer diameter mm (in.)		11.0 (.433)	–

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Fig. 200: Service Specifications (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

ITEMS		STANDARD VALUE	LIMIT
Front case, oil pump and oil pan			
Oil pump	Tip clearance mm (in.)	0.06–0.18 (.0024–.0071)	–
	Side clearance mm (in.)	0.04–0.10 (.0016–.0039)	–
	Body clearance mm (in.)	0.10–0.18 (.0039–.0071)	0.35 (.0138)
Piston and connecting rod			
Piston	Outer diameter mm (in.)	93.0 (3.65)	–
Piston ring	Ring to ring groove clearance No. 1 ring mm (in.)	0.03–0.07 (.0012–.0028)	0.1 (.004)
	Ring to ring groove clearance No. 2 ring mm (in.)	0.02–0.06 (.0008–.0024)	0.1 (.004)
	End gap No. 1 ring mm (in.)	0.30–0.45 (.0118–.0177)	0.8 (.031)
	End gap No. 2 ring mm (in.)	0.45–0.60 (.0177–.0236)	0.8 (.031)
	End gap oil ring mm (in.)	0.20–0.60 (.0079–.0236)	1.0 (.039)
Piston pin	Outer diameter mm (in.)	22.0 (.87)	–
	Press-in load	Finger pressure	–
	Press-in temperature	70°C (158°F)	–
Crankshaft	Oil clearance of pin mm (in.)	0.03–0.05 (.0012–.0020)	0.1 (.004)
Connecting rod	Big end side clearance mm (in.)	0.10–0.25 (.0039–.0098)	0.4 (.016)
Crankshaft, and drive plate			
Crankshaft	End play mm (in.)	0.05–0.25 (.0020–.0098)	0.3 (.012)
	Journal outer diameter mm (in.)	64 (2.52)	–
	Pin outer diameter mm (in.)	55 (2.17)	–
	Oil clearance of journal mm (in.)	0.02–0.05 (.0008–.0020)	0.1 (.0039)
Piston	Piston to cylinder clearance mm (in.)	0.02–0.04 (.0008–.0020)	–
Cylinder block	Flatness of gasket surface mm (in.)	0.05 (.002)	0.1 (.004)
	Grinding limit of gasket surface *Includes/combined with cylinder block grinding mm (in.)	–	*0.2 (.008)
	Overall height mm (in.)	210.4–210.6 (8.28–8.29)	–
	Cylinder bore inner diameter mm (in.)	93.0 (3.65)	–

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Fig. 201: Service Specifications (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REWORK DIMENSIONS

ITEMS			STANDARD VALUE	LIMIT
Cylinder head and valve				
Cylinder head	Oversize valve guide hole (both intake and exhaust)	0.05	11.05–11.07 (.4350–.4358)	–
		0.25	11.25–13.32 (.4429–.4457)	–
		0.50	11.50–11.52 (.4528–.4535)	–
	Oversize intake valve seat ring hole mm (in.)	0.3	34.30–34.33 (1.3504–1.3516)	–
		0.6	34.60–34.63 (1.3622–1.3634)	–
	Oversize exhaust valve seat ring hole mm (in.)	0.3	31.80–32.83 (1.2520–1.2531)	–
		0.6	32.10–32.13 (1.2638–1.2650)	–
Crankshaft and drive plate				
Crankshaft	Out of roundness and taper of journal and pin mm (in.)		0.005 (.0002)	–

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Fig. 202: Rework Dimensions
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SEALANT

ITEMS	SPECIFIED SEALANT	QUANTITY
Engine coolant temperature sensor	3M NUT Locking Part No. 4171	As required
Engine coolant temperature gauge unit	3M ATD Part No. 8660	As required
Rocker cover	3M ATD Part No. 8660	As required
Bearing cap	3M NUT Locking Part No. 4171	As required
Oil pressure switch	3M ATD Part No. 8660	As required
Oil pump case	Mitsubishi Genuine Part No. MD970389	As required
Oil pan	Mitsubishi Genuine Part No. MD970389	As required
Oil seal case	Mitsubishi Genuine Part No. MD970389	As required

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Fig. 203: Specified Sealants
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

