

2001-02 ENGINES**3.5L V6 - Diamante****ON-VEHICLE SERVICE****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.

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°

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Fig. 1: 3.5L Engine General Description
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

DIAGNOSIS

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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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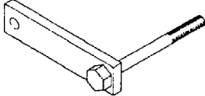
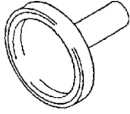
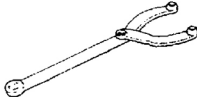
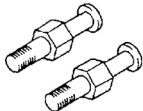
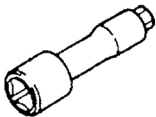
Fig. 2: Diagnosing 3.5L Engine

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIAL TOOLS

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

TOOL	TOOL NUMBER AND NAME	SUPERSESSON	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

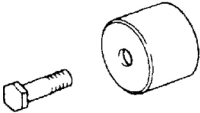
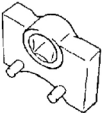
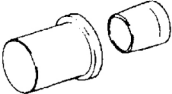
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Fig. 3: Identifying Special Tools (1 Of 2)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

TOOL	TOOL NUMBER AND NAME	SUPERSESION	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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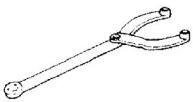
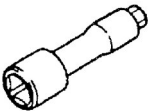
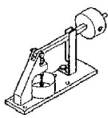
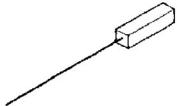
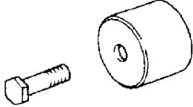
Fig. 4: Identifying Special Tools (2 Of 2)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SPECIAL TOOLS (ENGINE OVERHAUL)

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

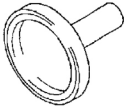
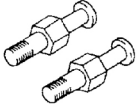
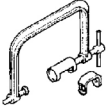
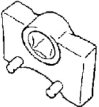
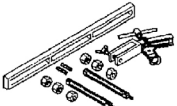
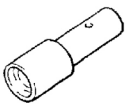
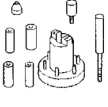
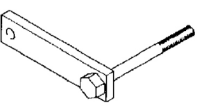
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB990767 End yoke holder Use with MD998715	MB990767-01 Use with MIT308239	Holding camshaft sprocket when loosening bolt.
	MB991559 Camshaft oil seal installer adaptor	-	Installation of camshaft oil seal (Left bank) (Use with MD998713)
	MD998051 Cylinder 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 (B)	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. 5: Identifying Special Tools For Engine Overhaul (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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2001-02 ENGINES 3.5L V6 - Diamante

TOOL	TOOL NUMBER AND NAME	SUPERSESION	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. 6: Identifying Special Tools For Engine Overhaul (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

COMPONENT ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK AND ADJUSTMENT

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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.

Standard value:

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. 7: Identifying Drive Belt Standard Values & Adjustments
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

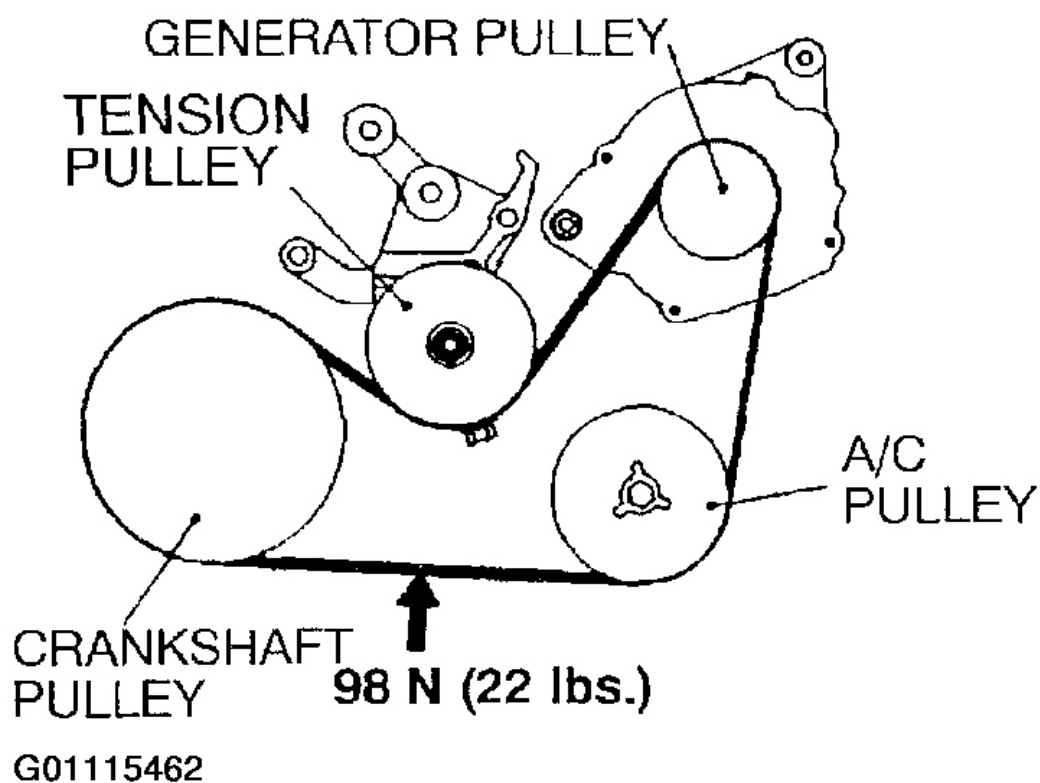
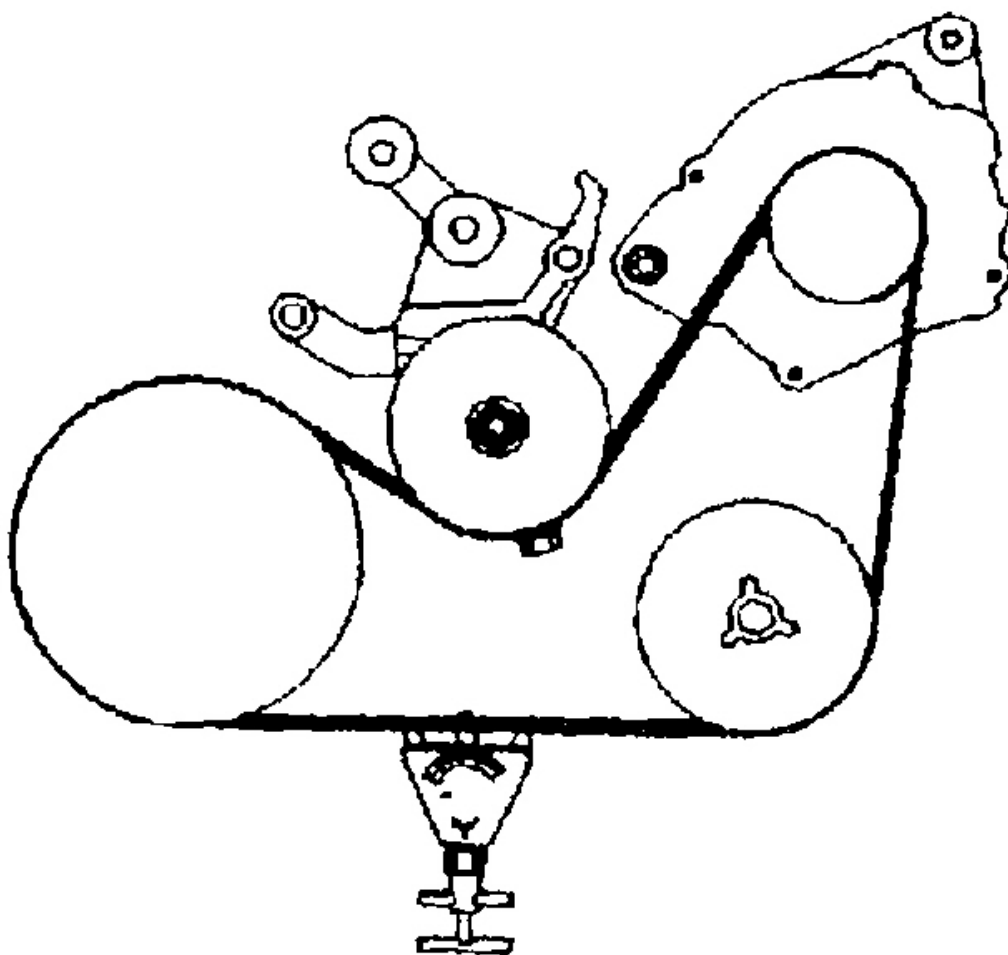


Fig. 8: Checking Drive Belt Tension

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



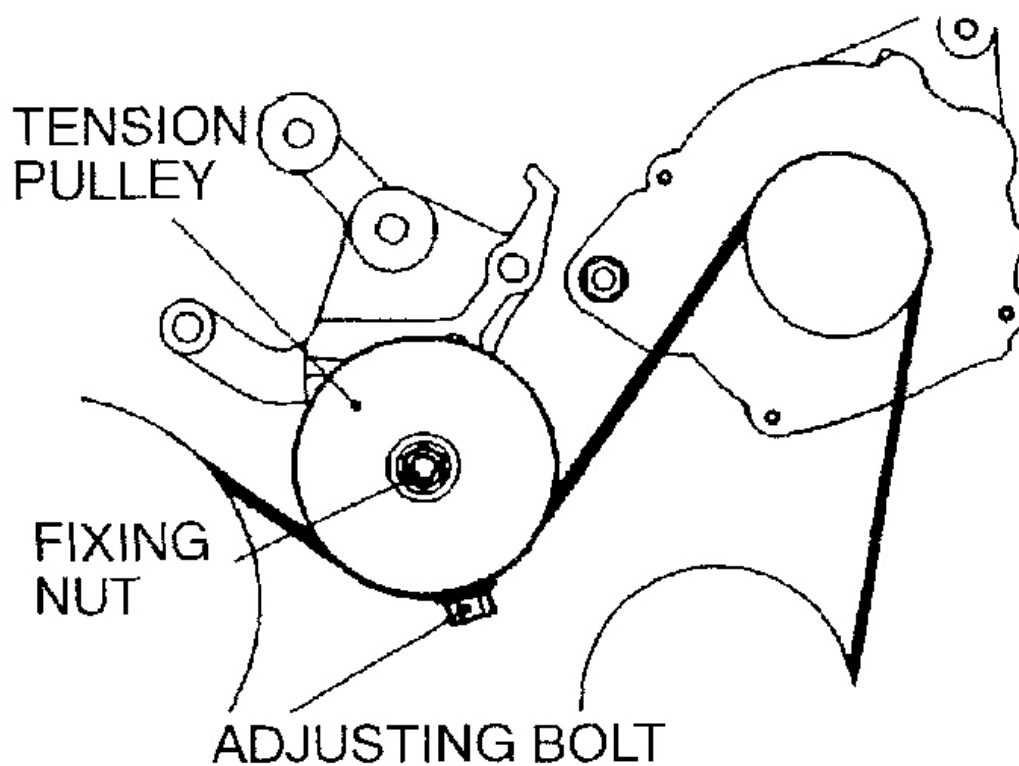
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Fig. 9: Measuring Drive Belt Deflection

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

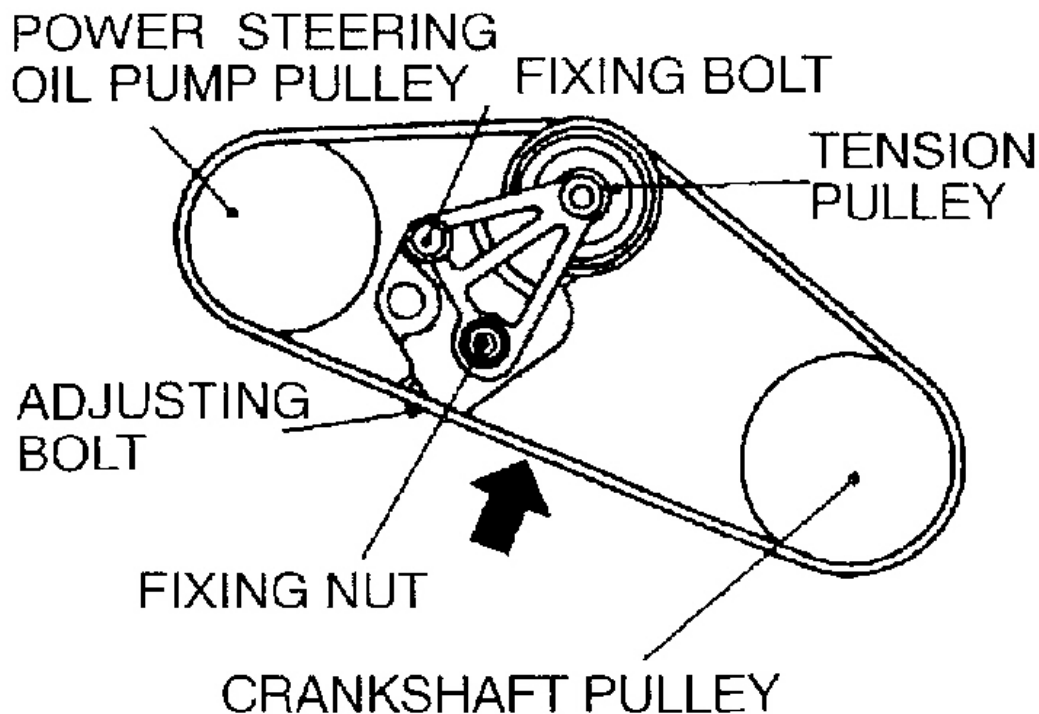


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Fig. 10: Adjusting Generator & Air Conditioning Compressor Drive Belt Tension
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

POWER STEERING OIL PUMP BELT TENSION ADJUSTMENT

1. Loosen the tension pulley fixing nut.
2. Adjust the belt tension using the adjusting bolt.
3. Tighten the fixing nut.
4. Crank the engine once or more.
5. Check the belt tension.



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Fig. 11: Adjusting Power Steering Oil Pump Belt Tension
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

IGNITION TIMING CHECK

See **CHECKING IGNITION TIMING** in ON-VEHICLE ADJUSTMENTS article in ENGINE PERFORMANCE.

CURB IDLE SPEED CHECK

See **CURB (SLOW) IDLE SPEED** in ON-VEHICLE ADJUSTMENTS article in ENGINE PERFORMANCE.

IDLE MIXTURE CHECK

See **IDLE MIXTURE** in ON-VEHICLE ADJUSTMENTS article in ENGINE PERFORMANCE.

COMPRESSION PRESSURE CHECK

See **ENGINE COMPRESSION** in SERVICE & ADJUSTMENT SPECIFICATIONS article in ENGINE PERFORMANCE.

MANIFOLD VACUUM CHECK

1. Before inspection, set the vehicle to the following condition.

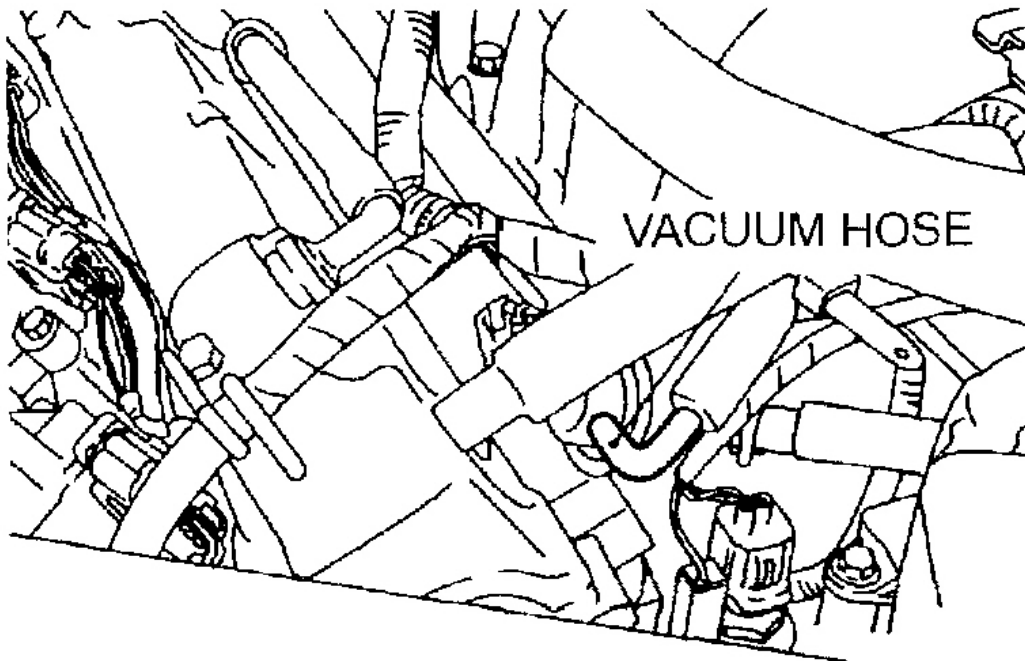
- Engine coolant temperature: 80-95°C (176-203°F)
- Lights and all accessories: OFF
- Transmission: Neutral P range

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

2. Connect a tachometer or connect the scan tool to the data link connector.
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.
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)



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Fig. 12: Connecting 3-Way Joint To Vacuum Hose

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

LASH ADJUSTER 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 generated is rarely eliminated by continuing the warming-up of the engine at idle speed.

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.

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 as the noise may be caused by a seized or sticking lash adjuster. See **LASH ADJUSTER CLEANING AND CHECKING**. 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. See **BLEEDING THE LASH ADJUSTER SYSTEM**.
6. If the abnormal noise does not disappear after performing the bleeding air bleeding operation, clean the lash adjuster. See **LASH ADJUSTER CLEANING AND CHECKING**.

BLEEDING THE LASH ADJUSTER SYSTEM

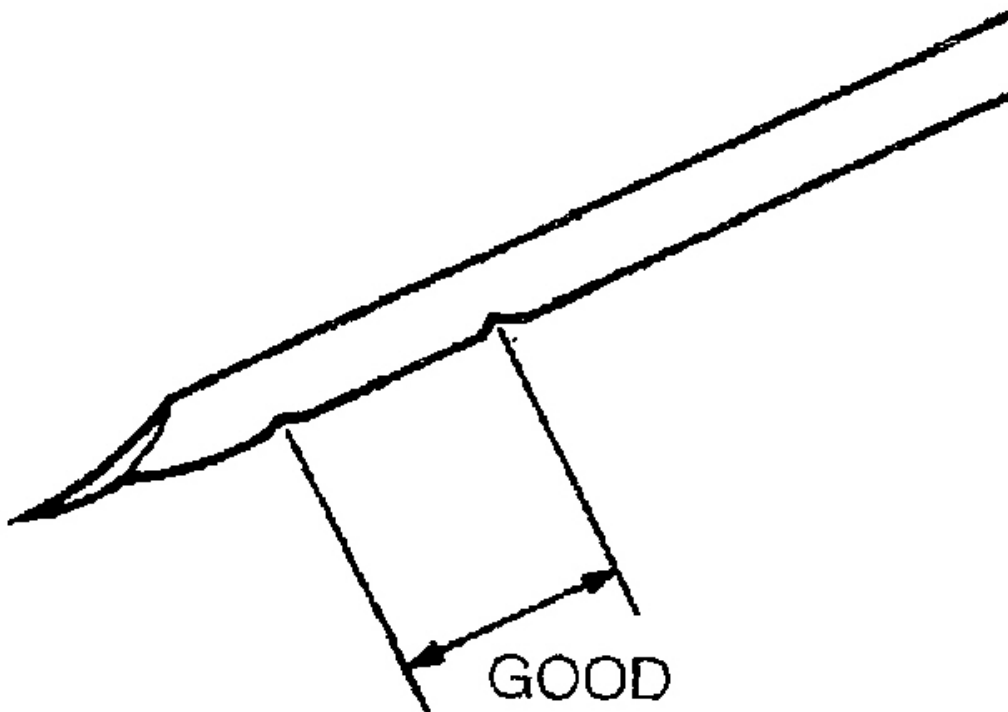
NOTE: Parking the vehicle on a grade for a long time may leak oil from the lash adjuster, causing air to enter the high pressure chamber when starting the engine.

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.



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Fig. 13: Checking Engine Oil

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

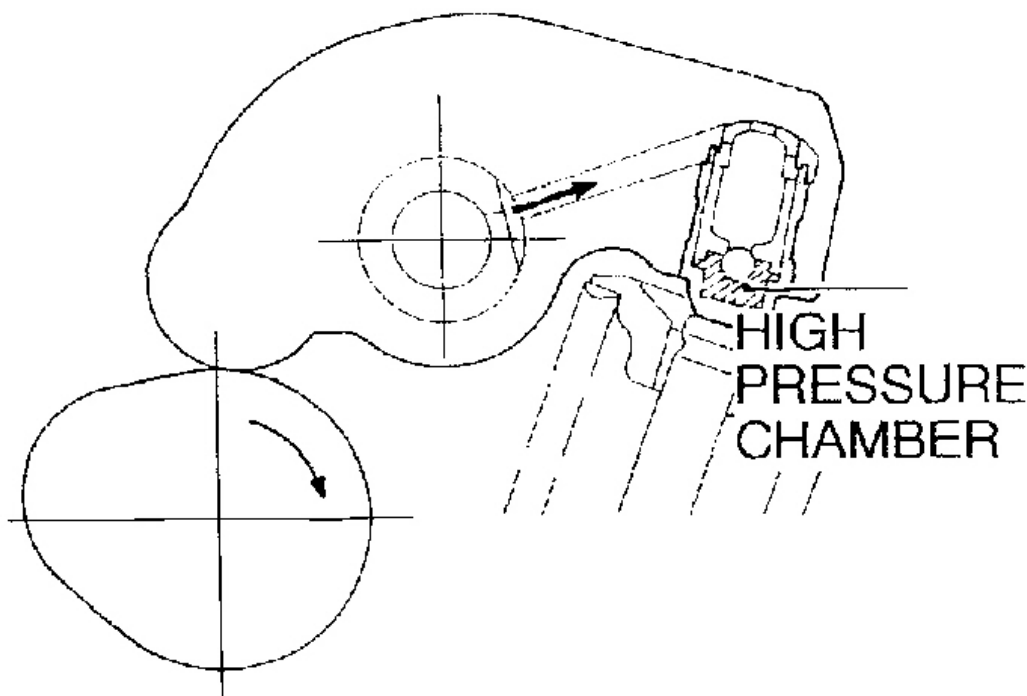
NOTE: If the engine oil level is low, air is sucked from the oil screen, causing air to enter the oil passage.

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.



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Fig. 14: Locating High Pressure Chamber

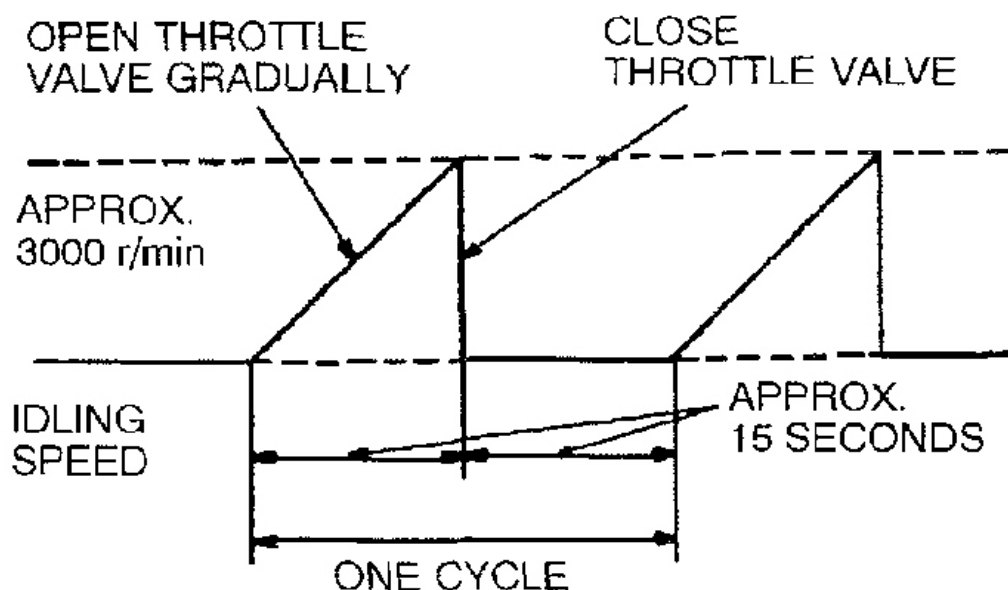
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Idle the engine for 1 to 3 minutes.
3. Repeat the operation pattern shown to check for abnormal noise.

(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.)

AIR BLEEDING OPERATION PATTERN



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Fig. 15: Identifying Air Bleeding Operation Pattern

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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. See **LASH ADJUSTER CLEANING AND CHECKING**.

ENGINE ASSEMBLY**REMOVAL AND INSTALLATION**

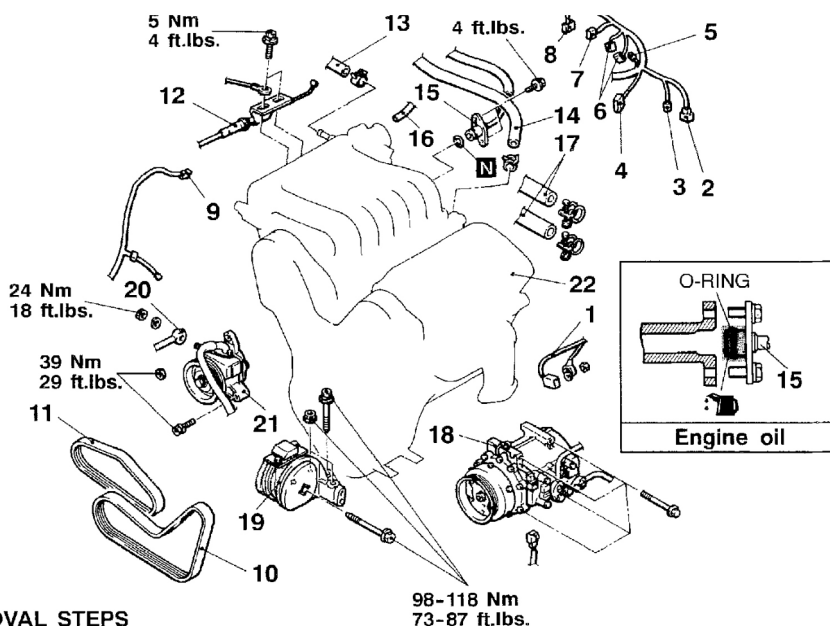
For engine assembly removal procedures, follow numbered steps in illustration. See **Fig. 16**. For engine assembly installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing engine. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINTS**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.

Pre-removal Operation

- Hood Removal
- Air Cleaner Removal
- Drainage of Coolant
- Radiator Removal - See ENGINE COOLING article.
- Fuel Flow Prevention
- Drain Power Steering Fluid
- Front Exhaust Pipe
- Washer Tank Removal
- Engine Cover Removal
- Transaxle Assembly Removal - See F4A51 OVERHAUL article.

Post-installation Operation

- Transaxle Installation - See F4A51 OVERHAUL article.
- Engine Cover Installation
- Washer Tank Installation
- Front Exhaust Pipe Installation
- Filling with Power Steering Fluid
- Radiator Installation - See ENGINE COOLING article.
- Filling with Coolant
- Air Cleaner Installation
- Accelerator Cable Adjustment
- Hood Installation

**REMOVAL STEPS**

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

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

REMOVAL SERVICE POINTS**< A >A/C COMPRESSOR/OIL PUMP (POWER STEERING) REMOVAL**

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.

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

< 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.

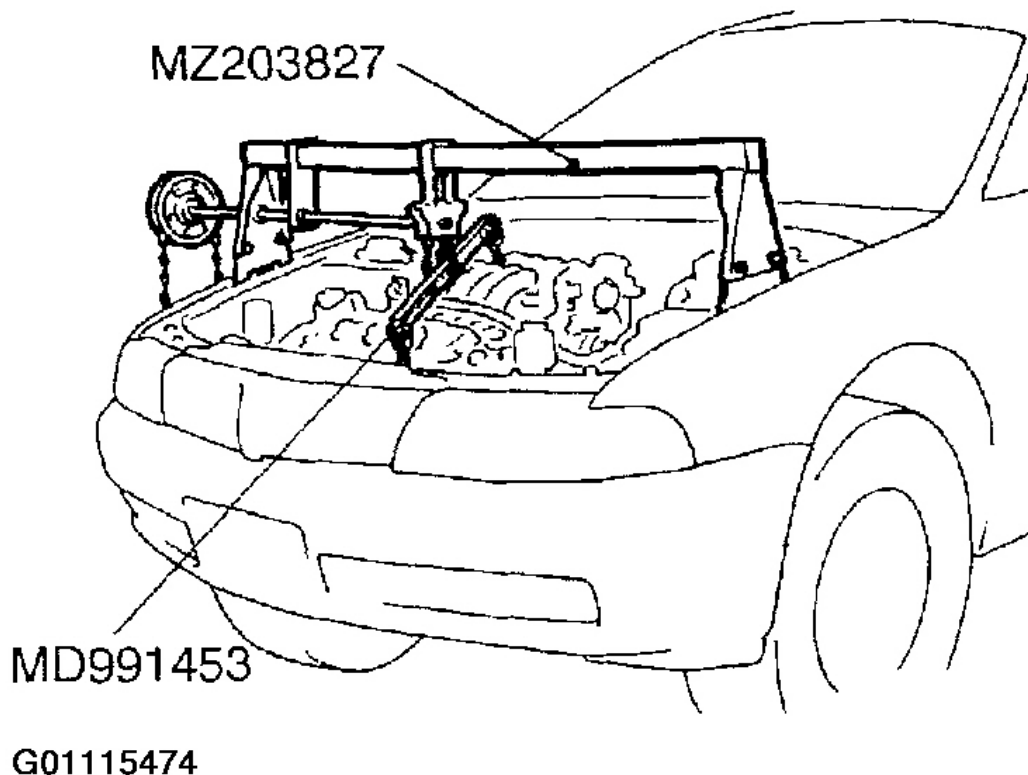


Fig. 17: Removing Engine Mount Bracket

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

< C > ENGINE ASSEMBLY REMOVAL

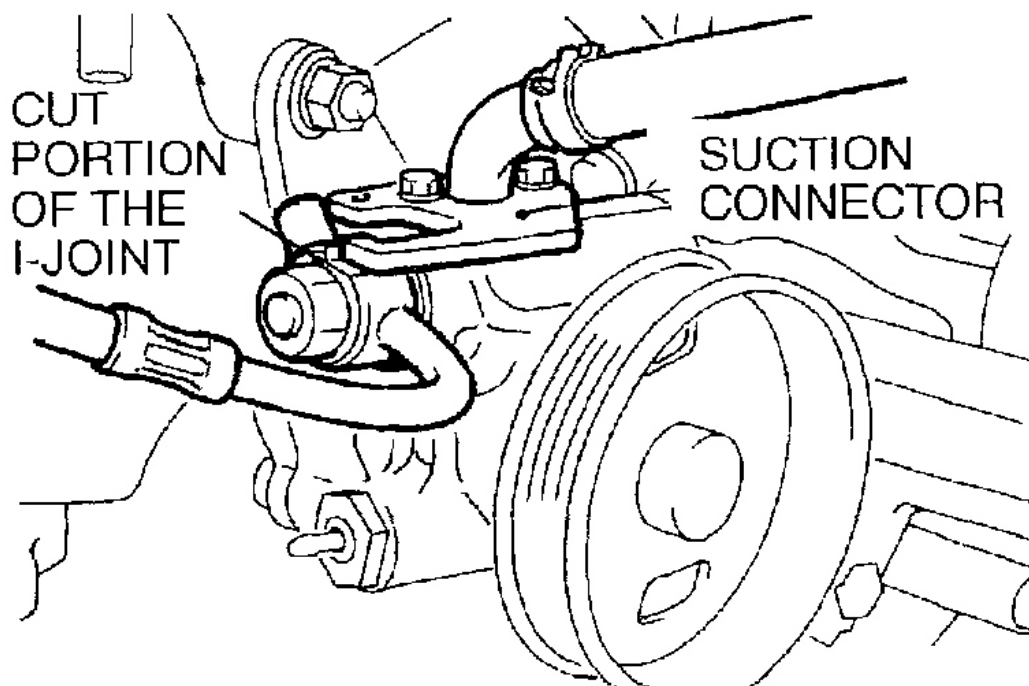
1. Check that all cables, hoses, harness connectors, etc. are disconnected from the engine.
2. Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

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

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



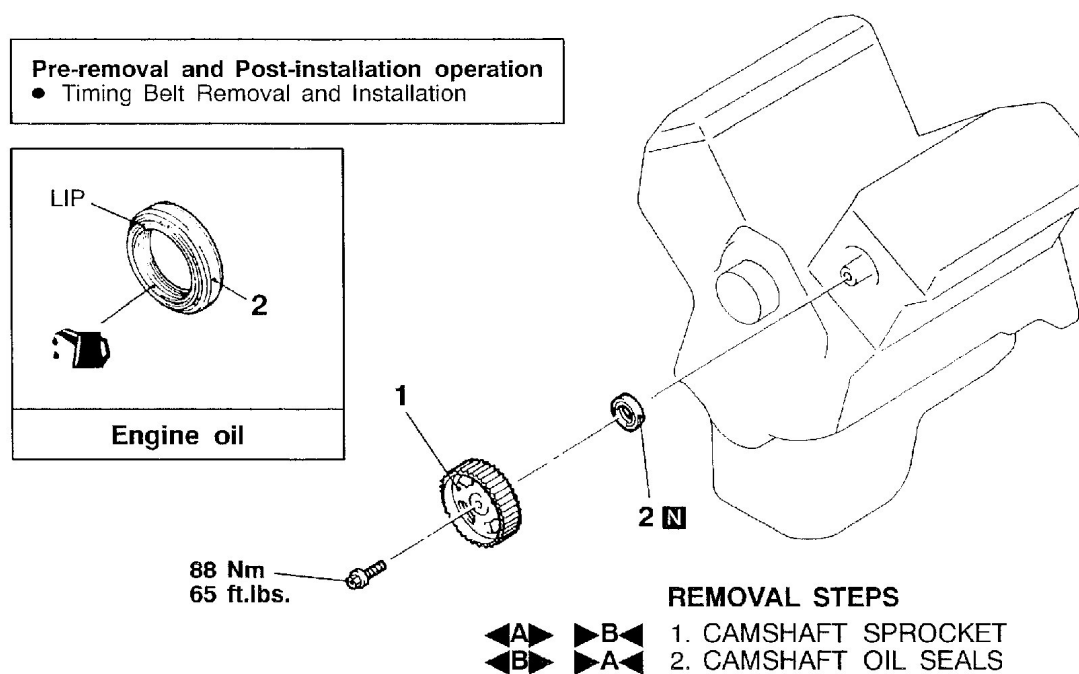
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Fig. 18: Installing Power Steering Pressure Hose
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAMSHAFT OIL SEAL**REMOVAL AND INSTALLATION**

For camshaft oil seal removal procedures, follow numbered steps in illustration. See **Fig. 19**. For camshaft oil seal installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing camshaft oil seal. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See

REMOVAL SERVICE POINTS. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS.**



G01115476

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

REMOVAL SERVICE POINTS

< A > CAMSHAFT SPROCKET REMOVAL

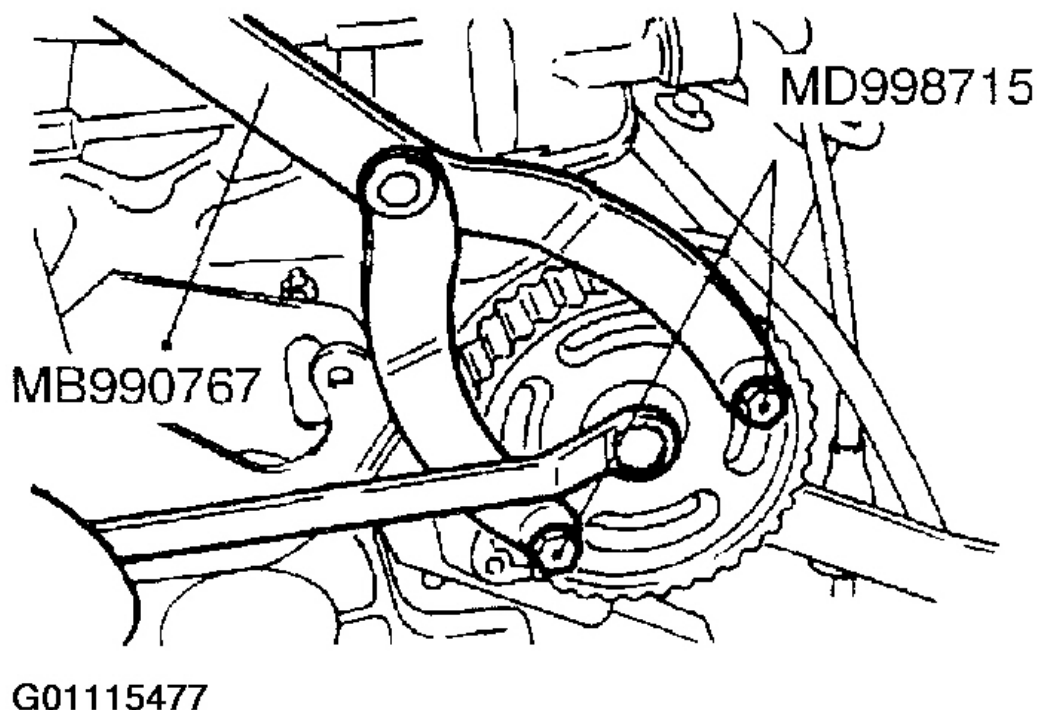


Fig. 20: Removing Camshaft Sprocket

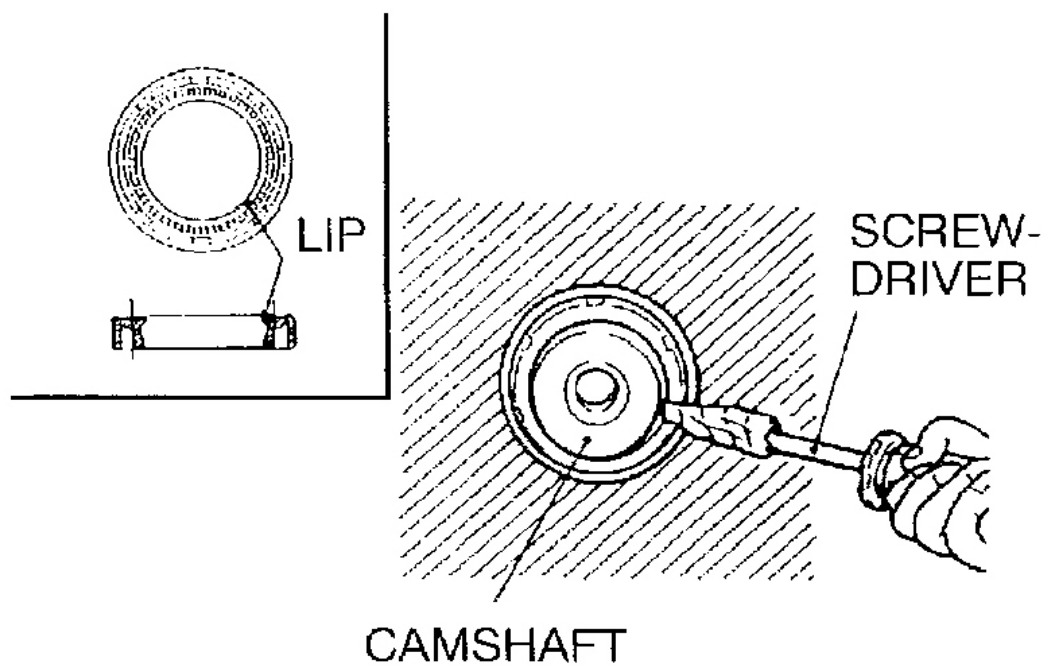
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

< B > CAMSHAFT OIL SEAL REMOVAL

1. Cut out a portion in the camshaft oil seal lip.

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

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.



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Fig. 21: Removing Camshaft Oil Seal

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

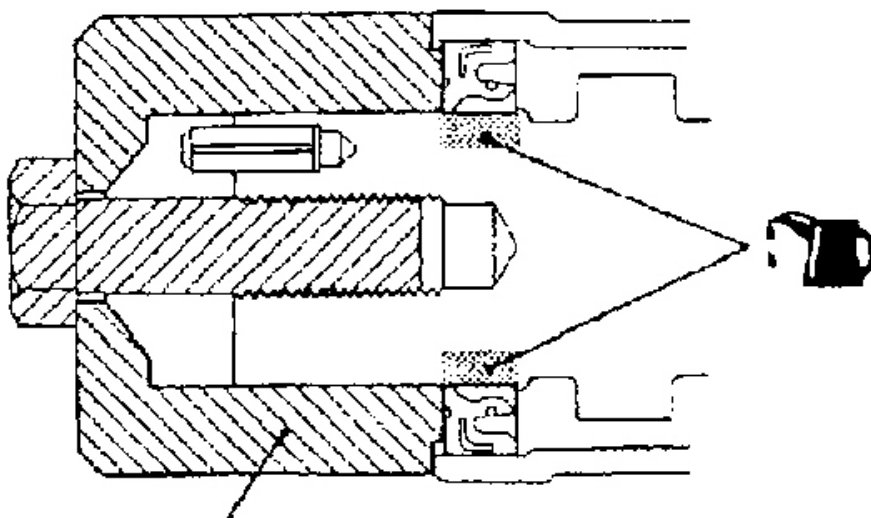
INSTALLATION SERVICE POINTS

> 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.

<REAR BANK SIDE>



MD998713

G01115479

Fig. 22: Installing Camshaft Oil Seal (Rear Bank)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

<FRONT BANK SIDE>

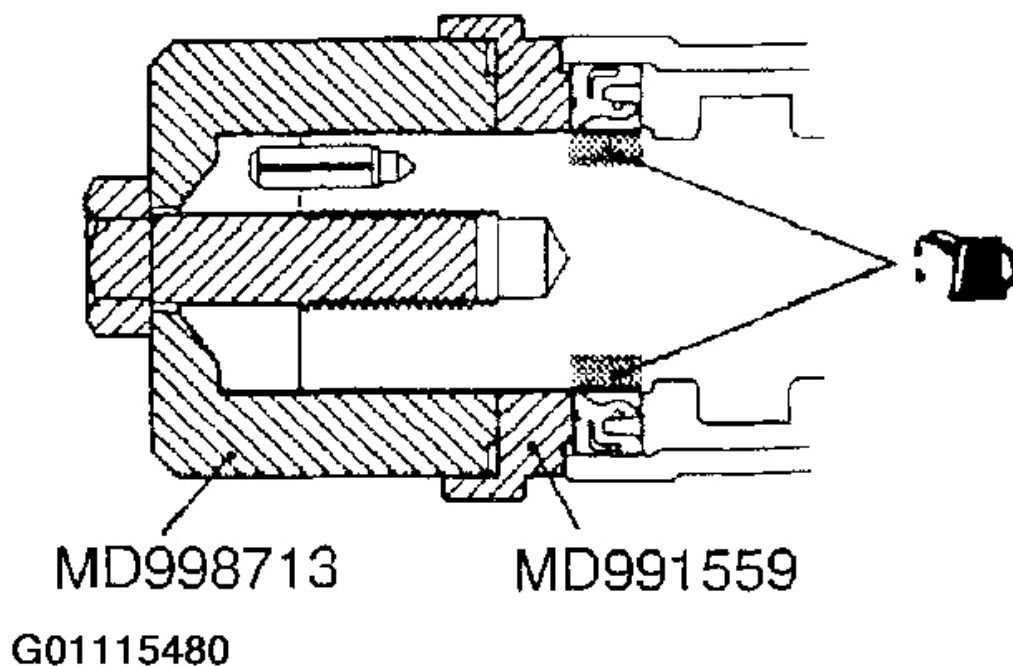


Fig. 23: Installing Camshaft Oil Seal (Front Bank)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> B < CAMSHAFT SPROCKET INSTALLATION

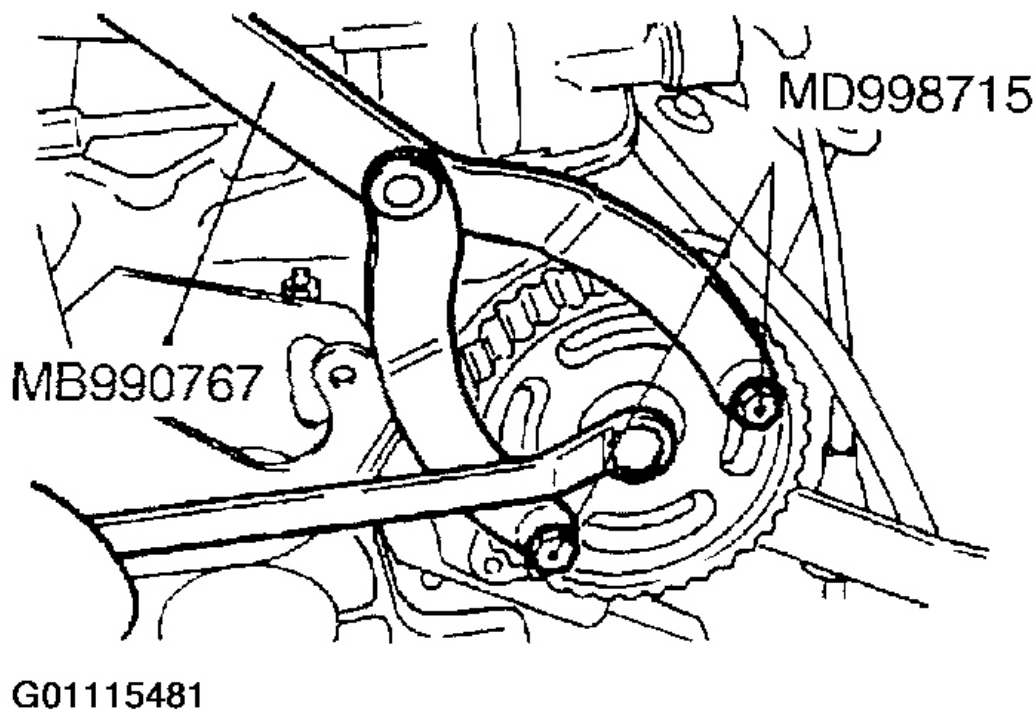


Fig. 24: Installing Camshaft Sprocket

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CRANKSHAFT OIL SEALS

REMOVAL AND INSTALLATION (FRONT OIL SEAL)

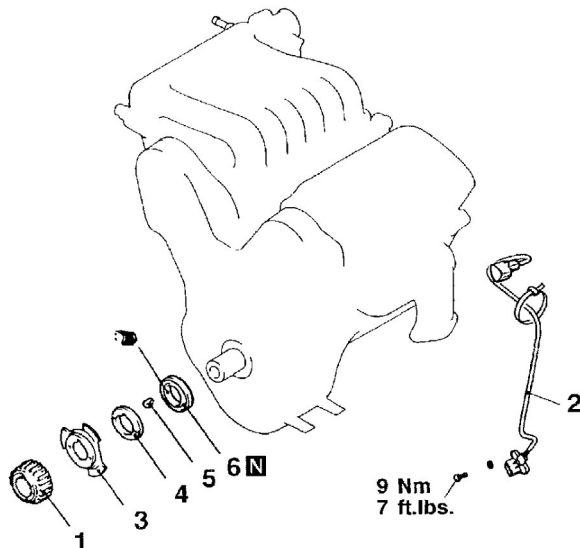
For crankshaft oil seal removal procedures, follow numbered steps in illustration. See **Fig. 25**. For crankshaft oil seal installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing crankshaft oil seal. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINT**.

Pre-removal and Post-installation Operation

- Timing Belt Removal and Installation

Adjustment

- Engine Adjustment



REMOVAL STEPS

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

G01115482

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

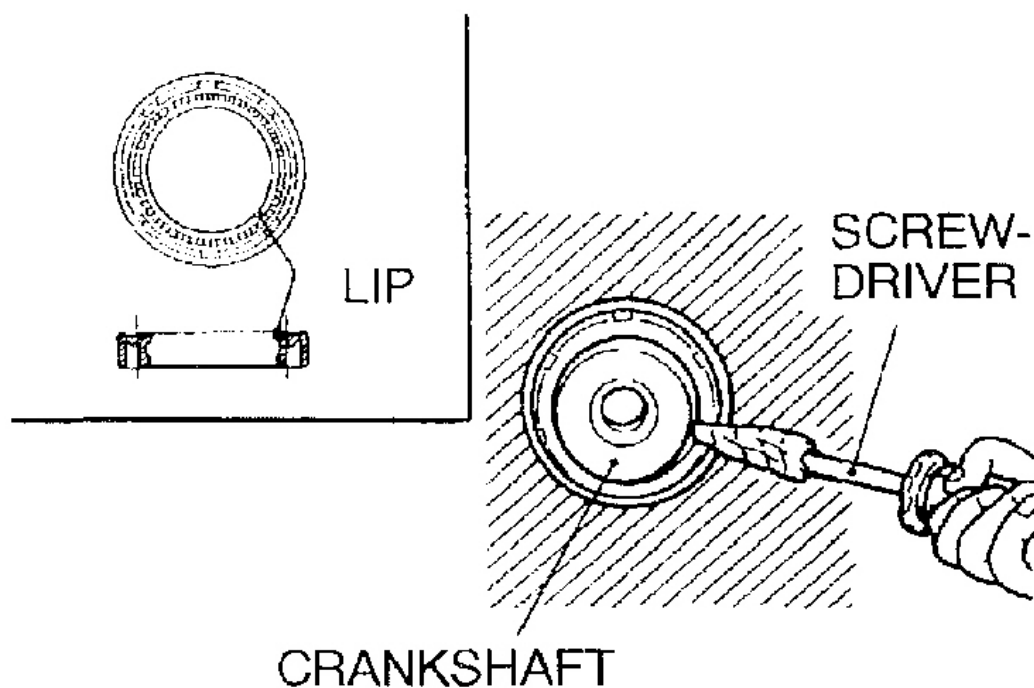
REMOVAL SERVICE POINT

< A > OIL SEAL REMOVAL

1. Cut out a portion in the crankshaft oil seal lip.

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

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.



G01115483

Fig. 26: Removing Front Oil Seal

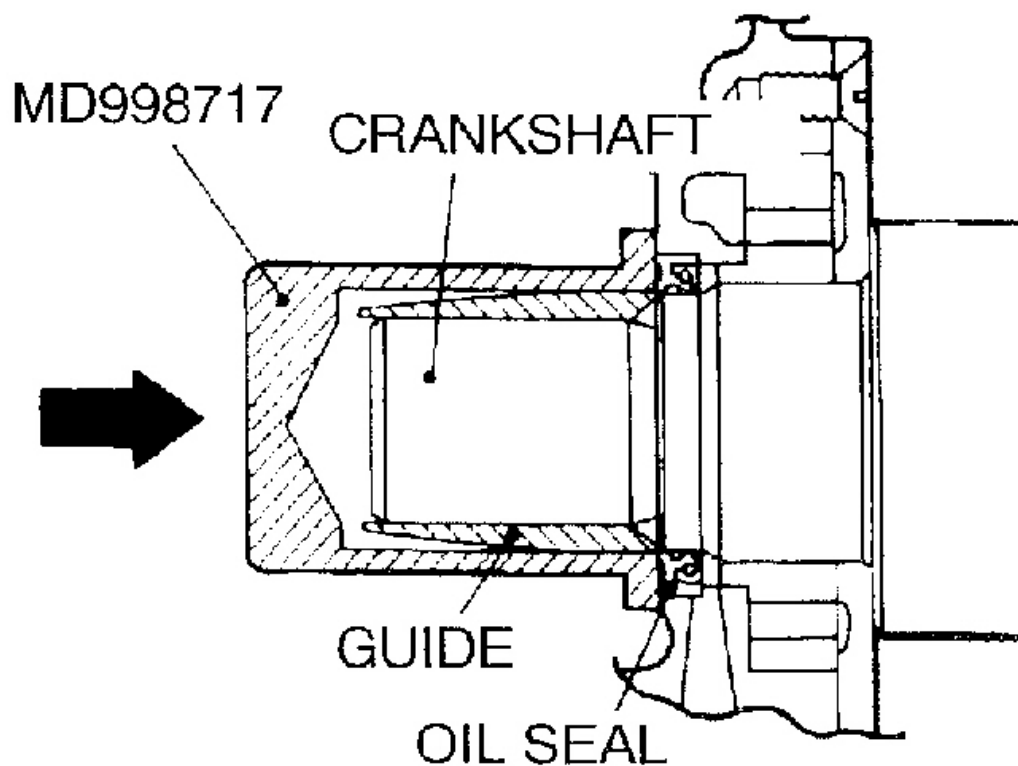
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINT

> A < OIL SEAL INSTALLATION

NOTE: **Knock it as far as the surface.**

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



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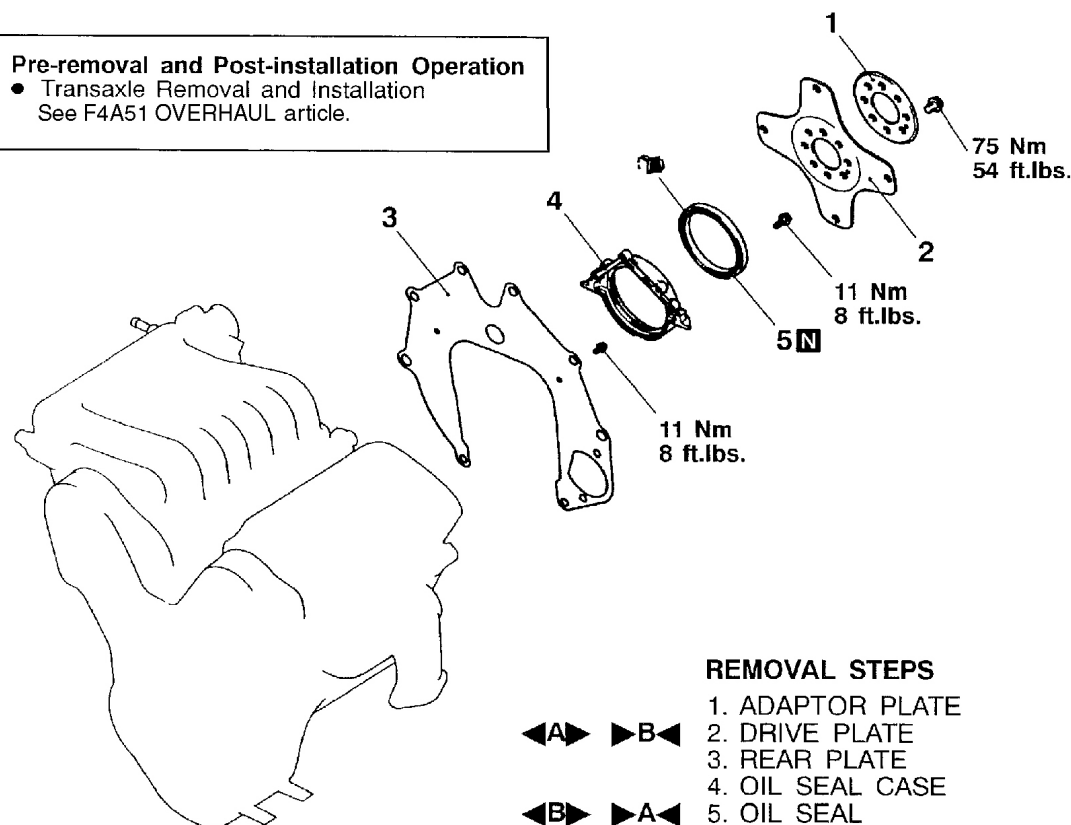
Fig. 27: Installing Front Oil Seal

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Transaxle Removal and Installation
See F4A51 OVERHAUL article.



G01115485

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.

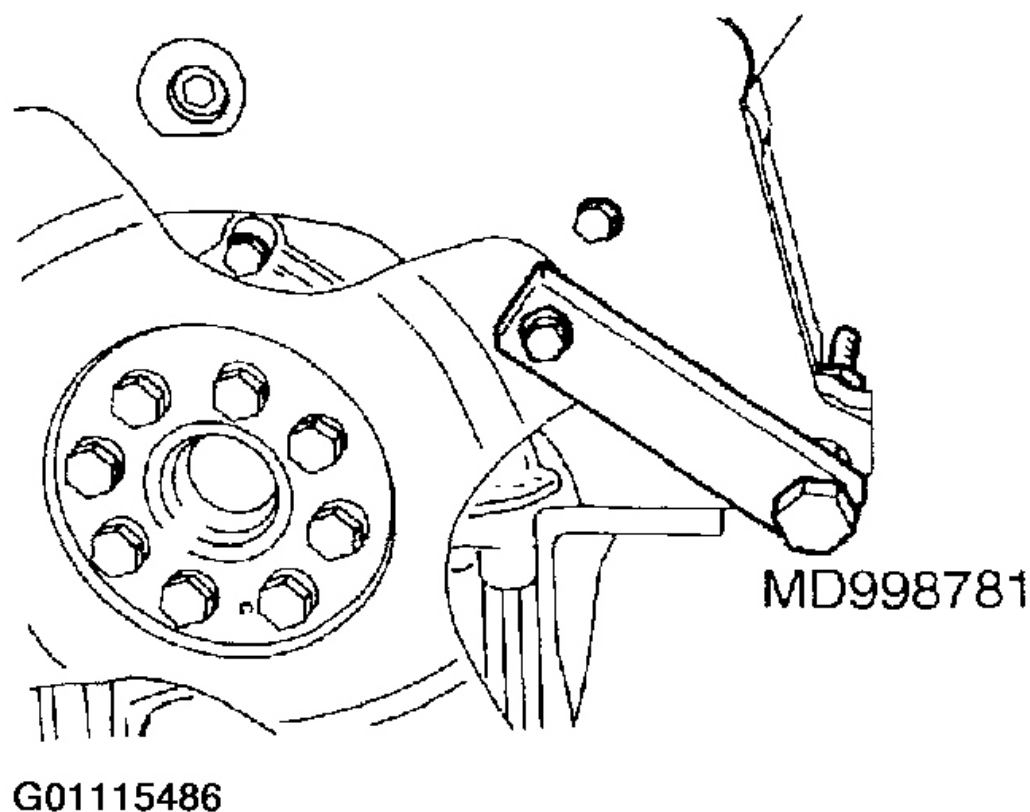


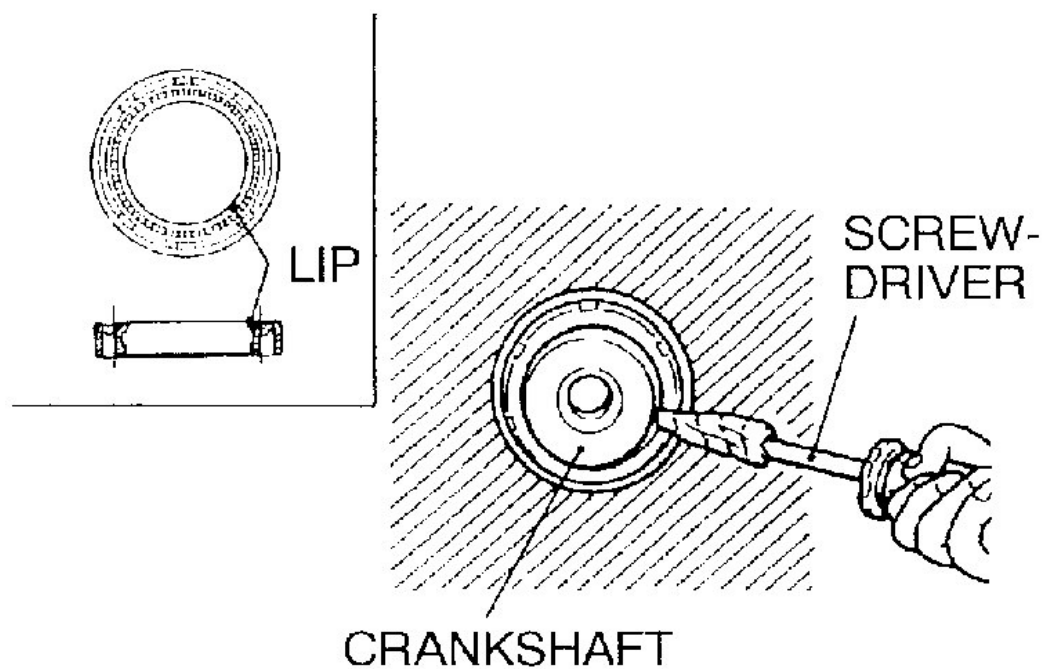
Fig. 29: Removing Drive Plate Adaptor Plate
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

< B > OIL SEAL REMOVAL

1. Cut out a portion in the crankshaft oil seal lip.

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

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.



G01115487

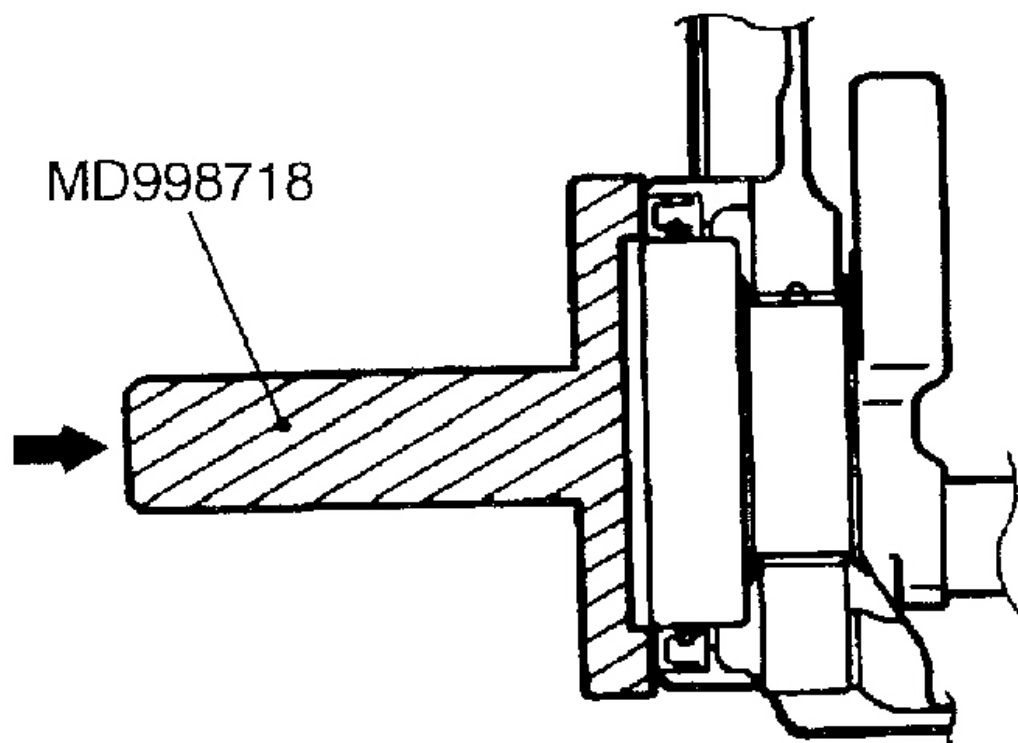
Fig. 30: Removing Rear Oil Seal

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.



G01115488

Fig. 31: Installing Rear 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.

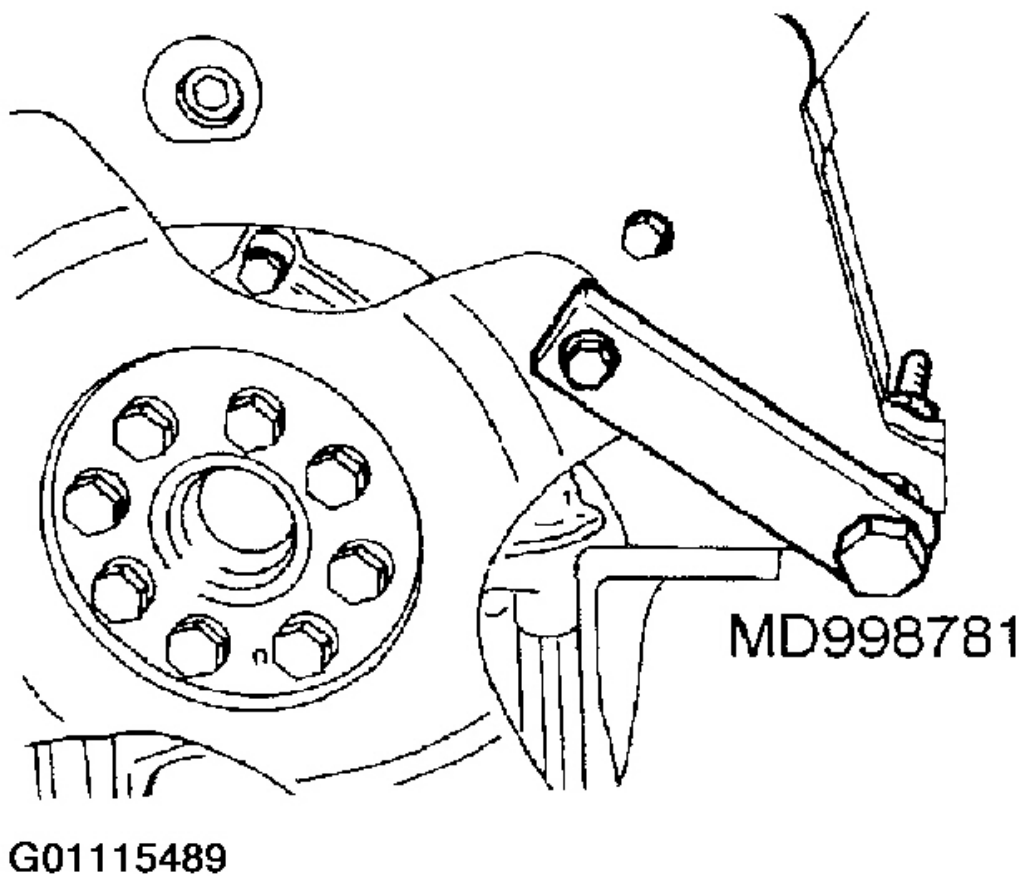


Fig. 32: Installing Drive Plate Adaptor Plate

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

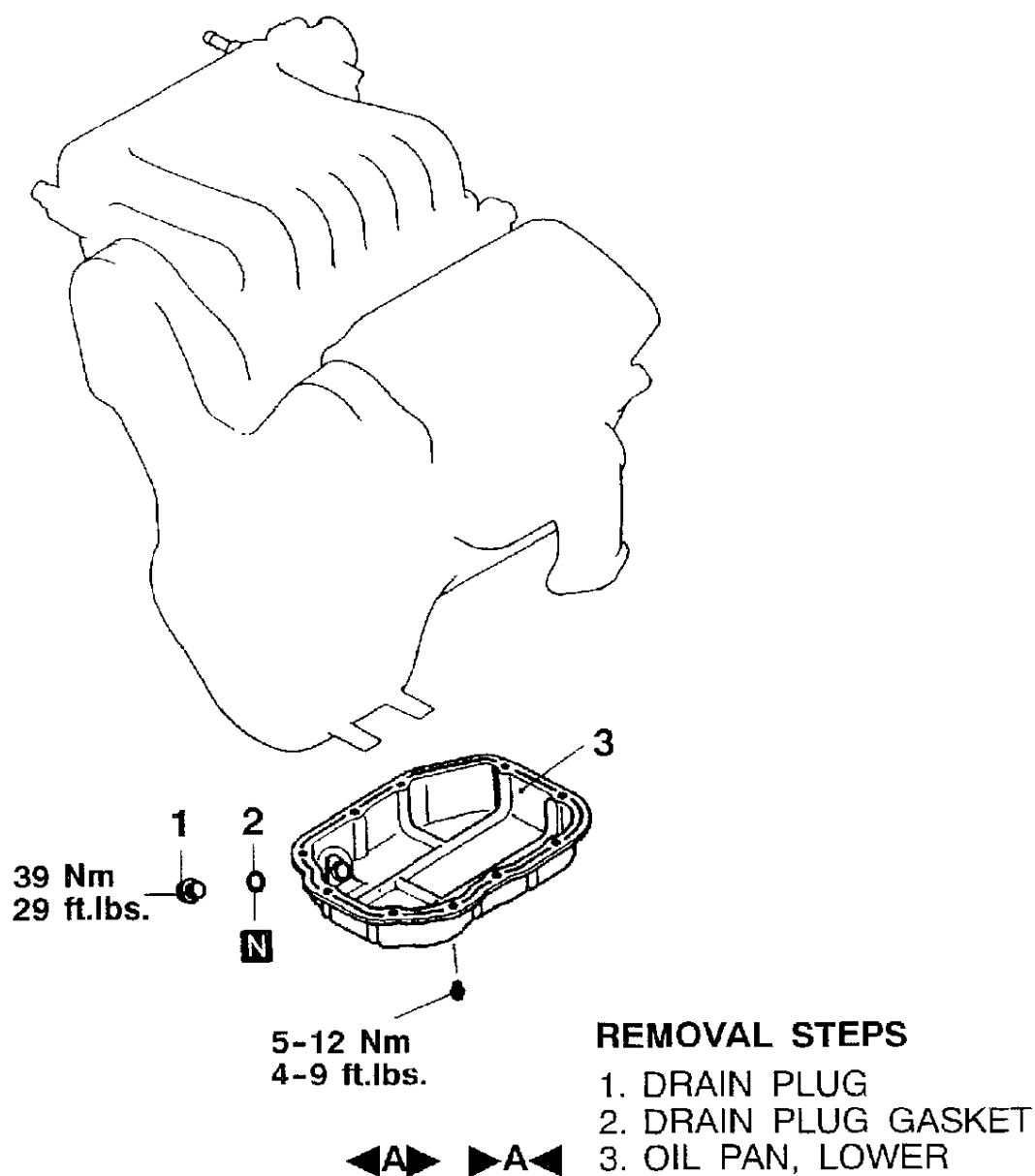
OIL PAN, LOWER

REMOVAL AND INSTALLATION

For oil pan, lower removal procedures, follow numbered steps in illustration. See **Fig. 33**. For oil pan, lower installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing oil pan, lower. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINT**.

Pre-removal and Post-installation Operation

- Front Exhaust Pipe
- Drain and Fill with Engine Oil



G01115490

Fig. 33: Removing & Installing Oil Pan (Lower)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

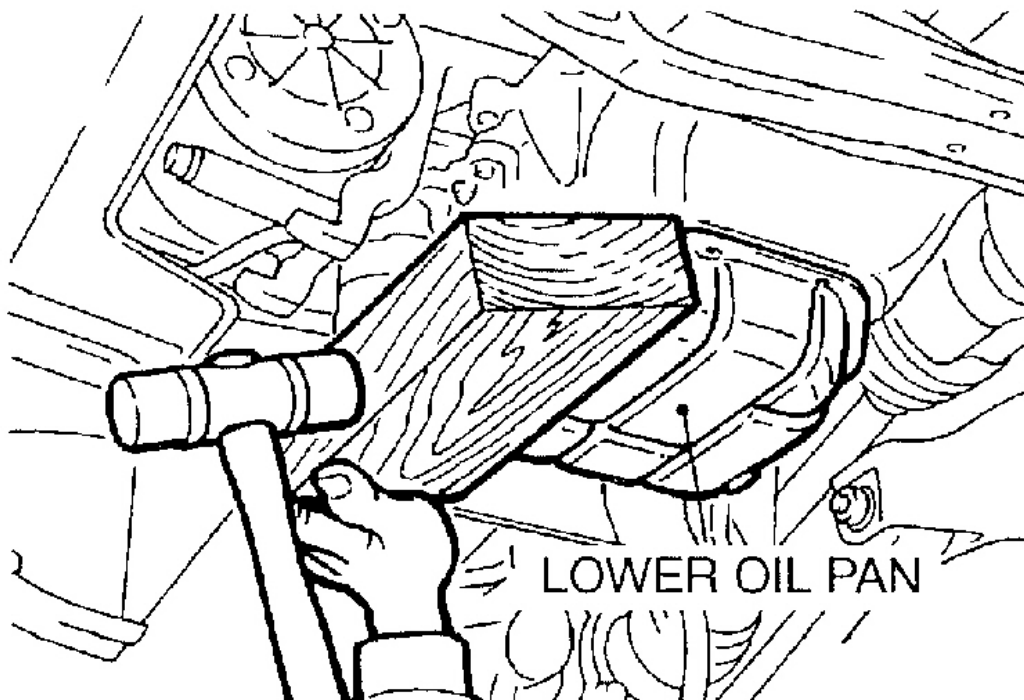
REMOVAL SERVICE POINT

< A > OIL PAN, LOWER REMOVAL

1. Remove the oil pan, lower installation bolt.

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

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



G01115491

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.

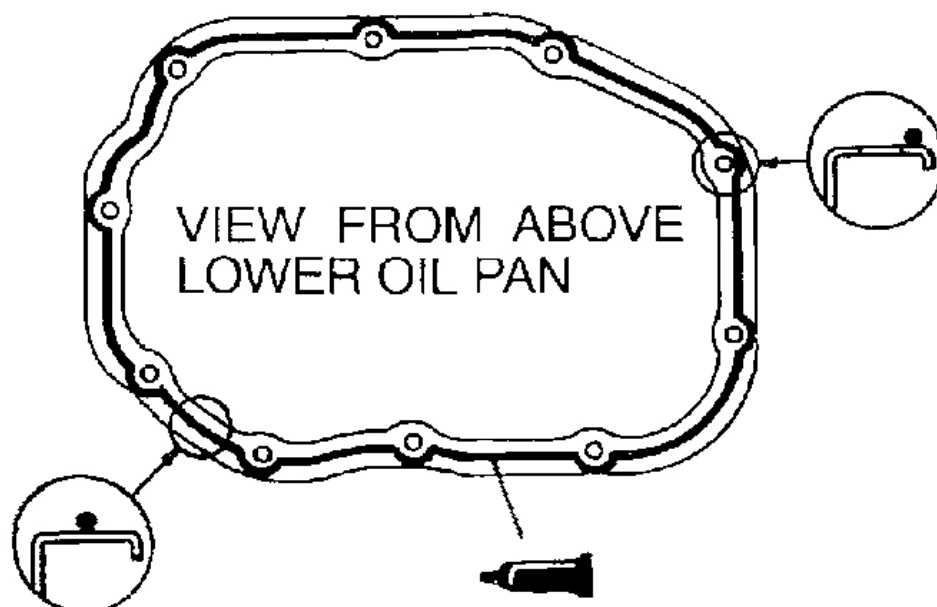
NOTE: **The sealant should be applied in a continuous bead approximately 4 mm (.16 in.) in diameter.**

3. Apply the specified sealant around the gasket surface of oil pan as specified in illustration below.

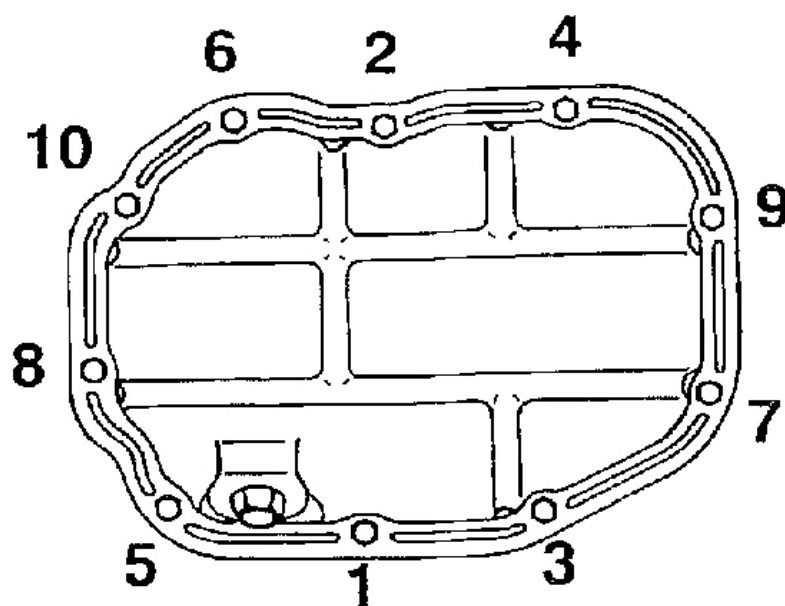
Specified sealant:

MITSUBISHI GENUINE PART No. MD970389 or equivalent

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.



FLANGE BOLT TIGHTENING SEQUENCE



VIEW FROM THE BOTTOM OF THE LOWER
OIL PAN

G01115492

Fig. 35: Installing Lower Oil Pan

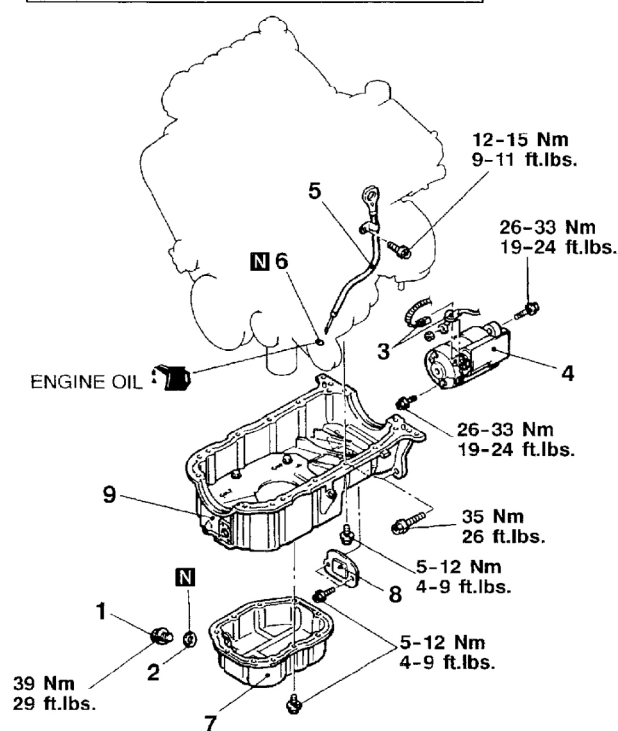
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

OIL PAN, UPPER**REMOVAL AND INSTALLATION**

For oil pan, upper removal procedures, follow numbered steps in illustration. See **Fig. 36**. For oil pan, upper installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing oil pan, upper. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINT**.

Pre-removal and Post-installation Operation

- Drain and Fill with Engine Oil
- Oil pan, Lower

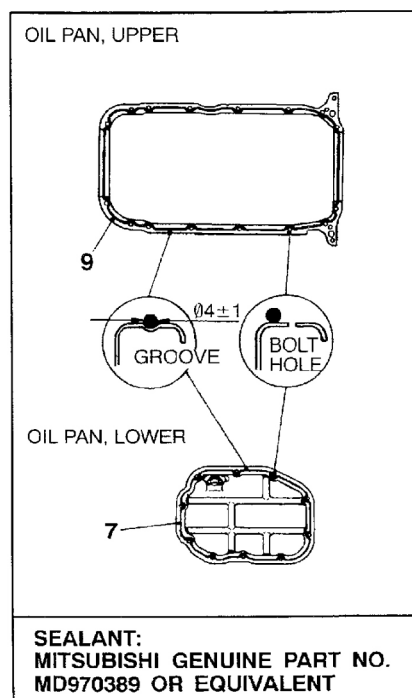
**REMOVAL STEPS**

1. DRAIN PLUG
2. DRAIN PLUG GASKET
3. STARTER CONNECTOR
4. STARTER
5. OIL GAUGE AND GUIDE

6. O-RING
7. OIL PAN, LOWER
8. COVER
9. OIL PAN, UPPER



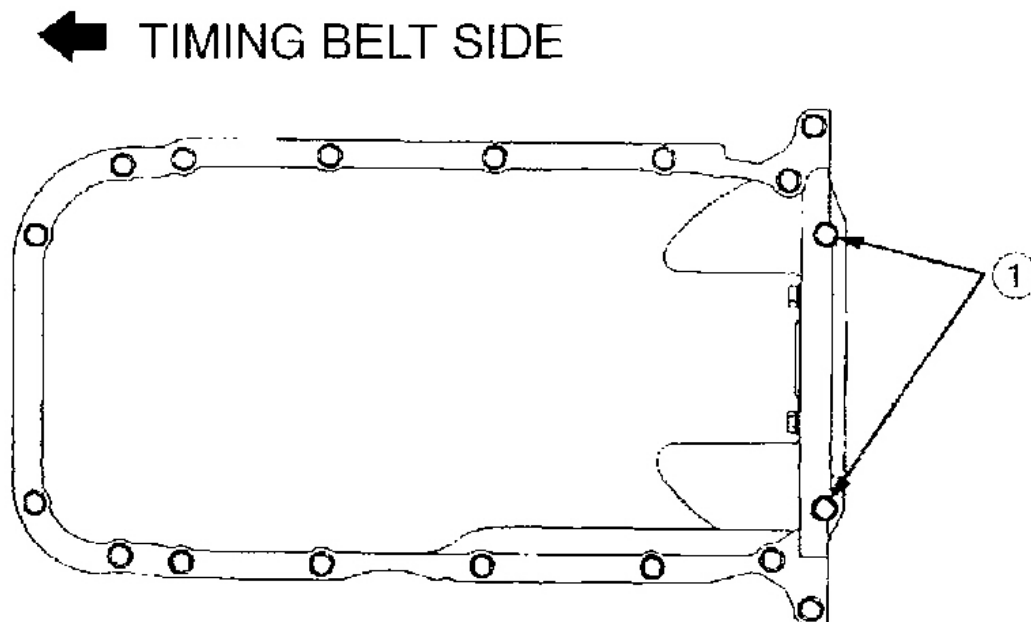
G01115493

**Fig. 36: Removing & Installing Rear Oil Pan**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

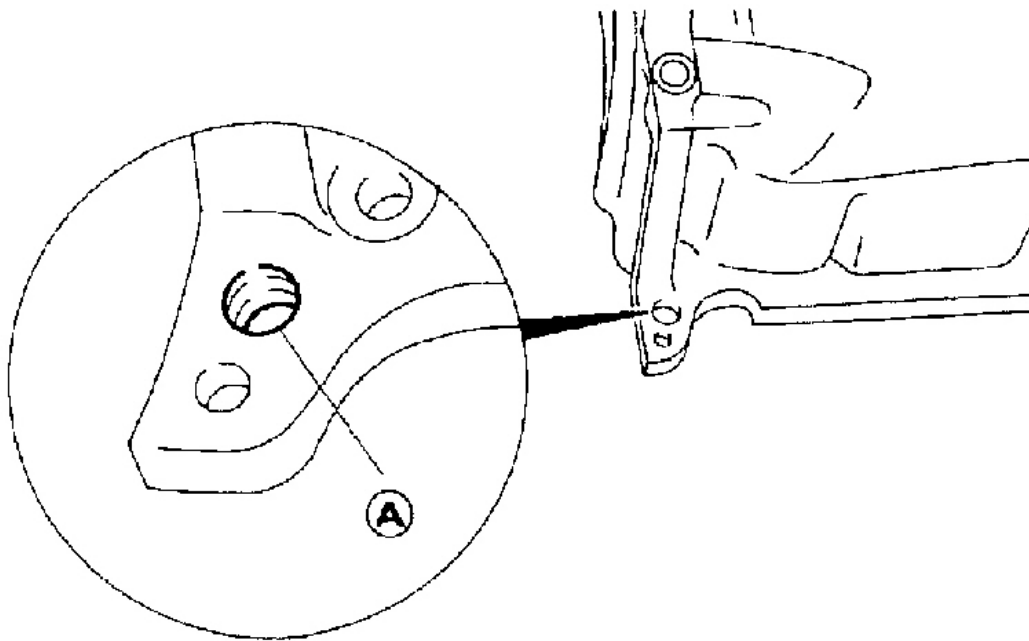
REMOVAL SERVICE POINT**< A > OIL PAN, UPPER REMOVAL**

1. Detach the bolt (1) shown in illustration.
2. Detach all other bolts.

**G01115494****Fig. 37: Detaching Bolts****Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

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

3. Screw a bolt into bolt hole (A) shown (at both ends) to remove the oil pan.



G01115495

Fig. 38: Removing Oil Pan

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.

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

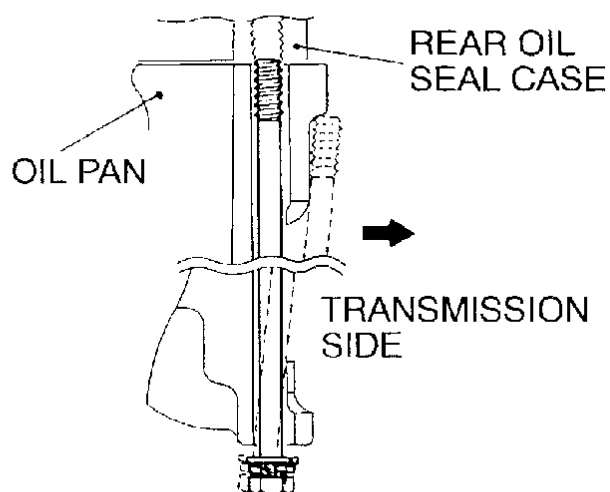
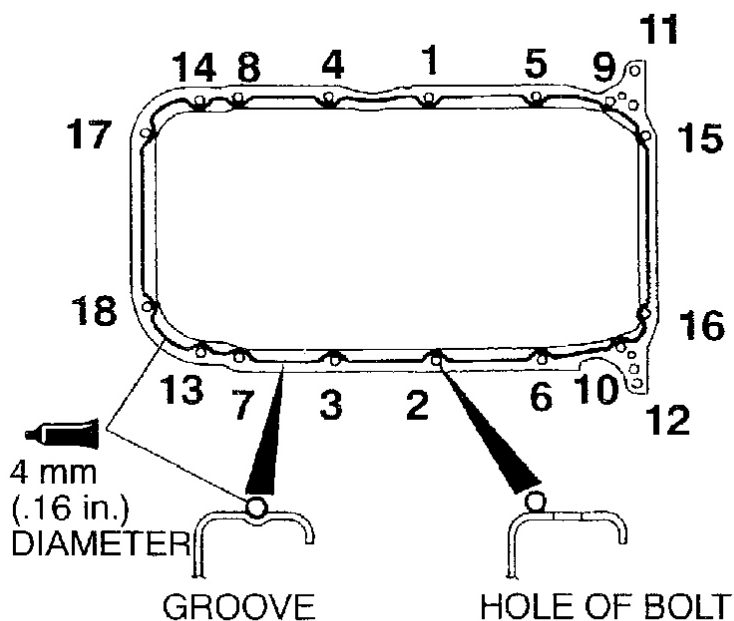
3. Apply specified sealant around the gasket surface of the oil pan as shown in the illustration below.

Specified sealant:**mitsubishi GENUINE PART No. MD970389 or equivalent**

4. Install the oil pan to the cylinder block within 30 minutes after applying the sealant.

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.

5. Tighten the oil pan mounting bolts in the order shown in the illustration.



G01115496

Fig. 39: Installing Oil Pan

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

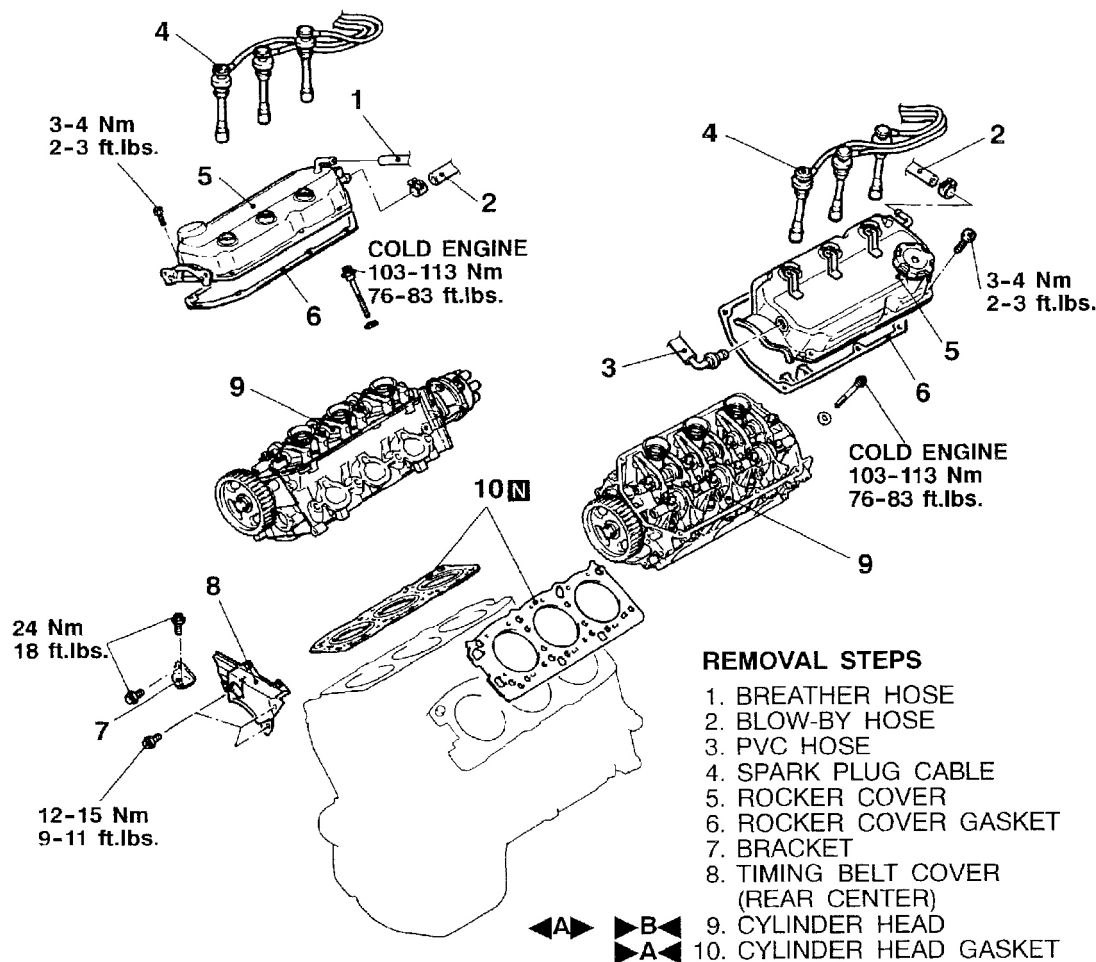
- Check the oil pan for cracks.
- Check the sealant-coated surface of the oil pan for damage and deformation.

CYLINDER HEAD GASKET**REMOVAL AND INSTALLATION**

For cylinder head gasket removal procedures, follow numbered steps in illustration. See **Fig. 40**. For cylinder head gasket installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing cylinder head gasket. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.

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



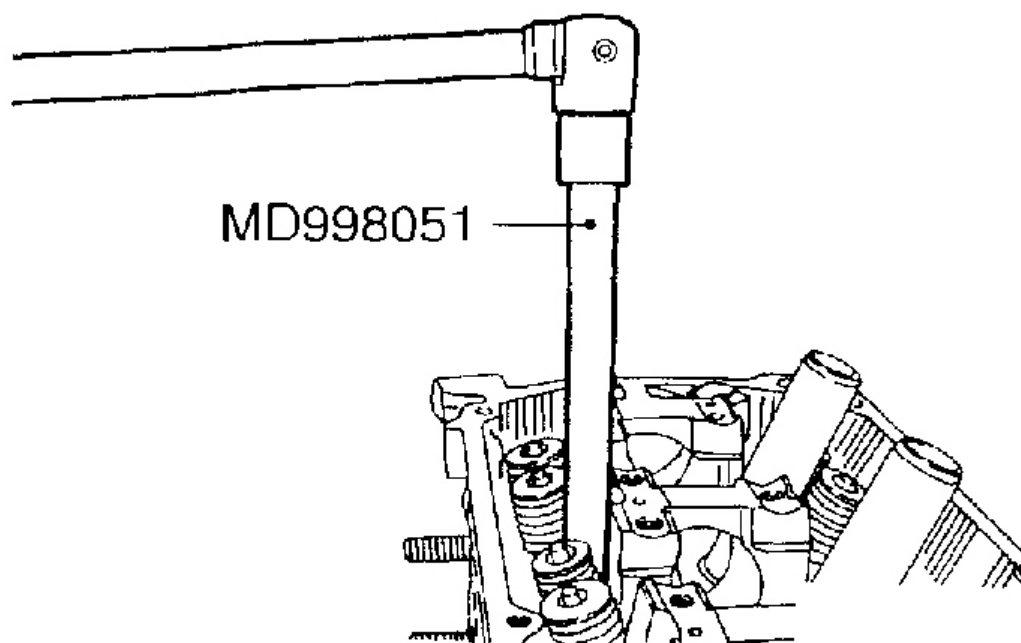
G01115497

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.



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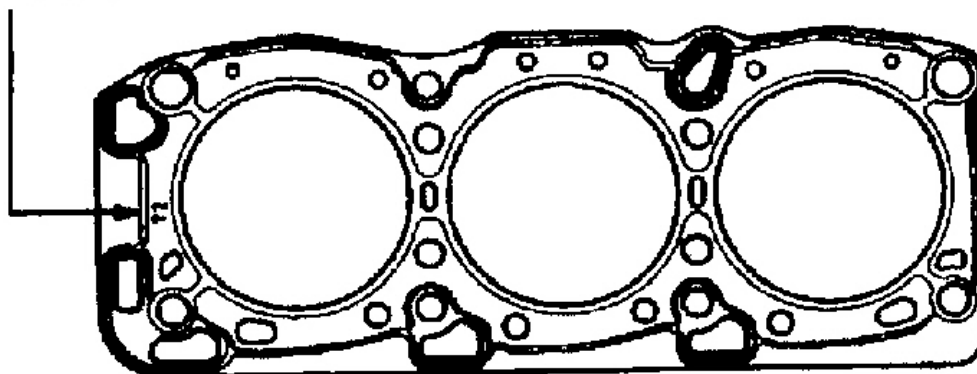
Fig. 41: Removing Cylinder Head Assembly
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

IDENTIFICATION
MARK



G01115499

Fig. 42: Installing Cylinder Head Gasket

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> B < CYLINDER HEAD ASSEMBLY INSTALLATION

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

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

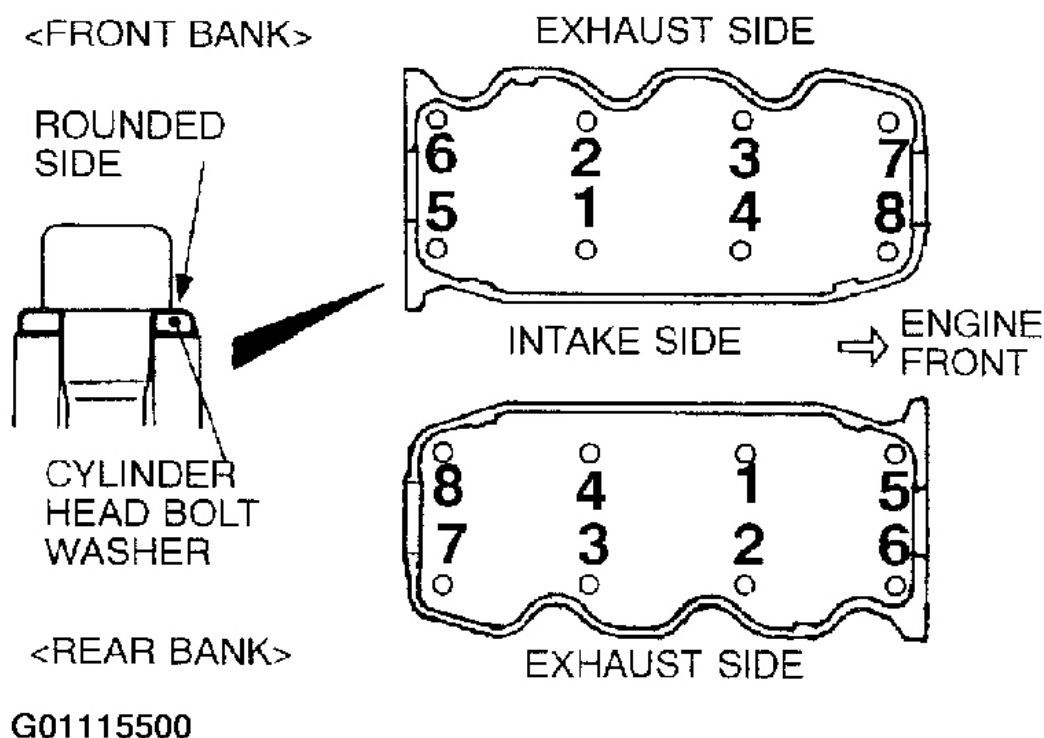


Fig. 43: Installing Cylinder Head Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TIMING BELT (MECHANICAL)

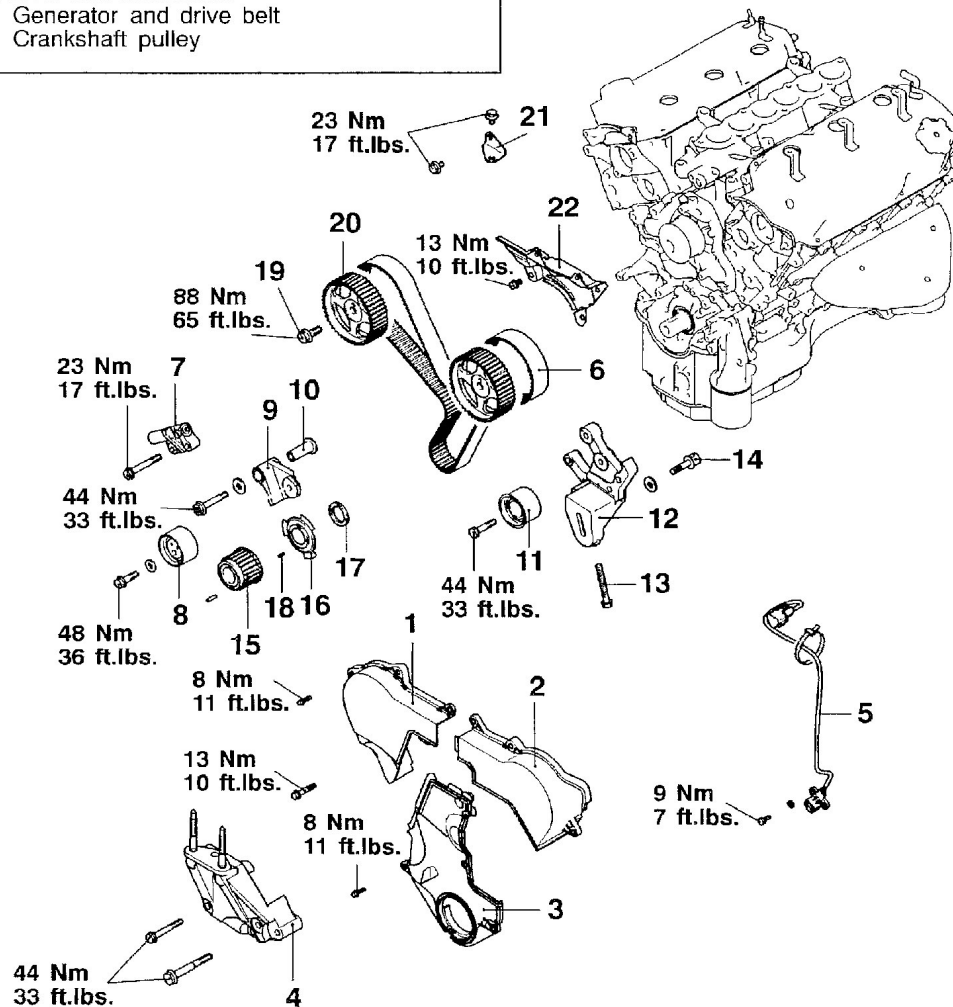
REMOVAL AND INSTALLATION

For timing belt (mechanical) removal procedures, follow numbered steps in illustration. See **Fig. 44**. For timing belt (mechanical) installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing timing belt (mechanical). Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.

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
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

G01115501

Fig. 44: Removing & Installing Timing Belt (Mechanical)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

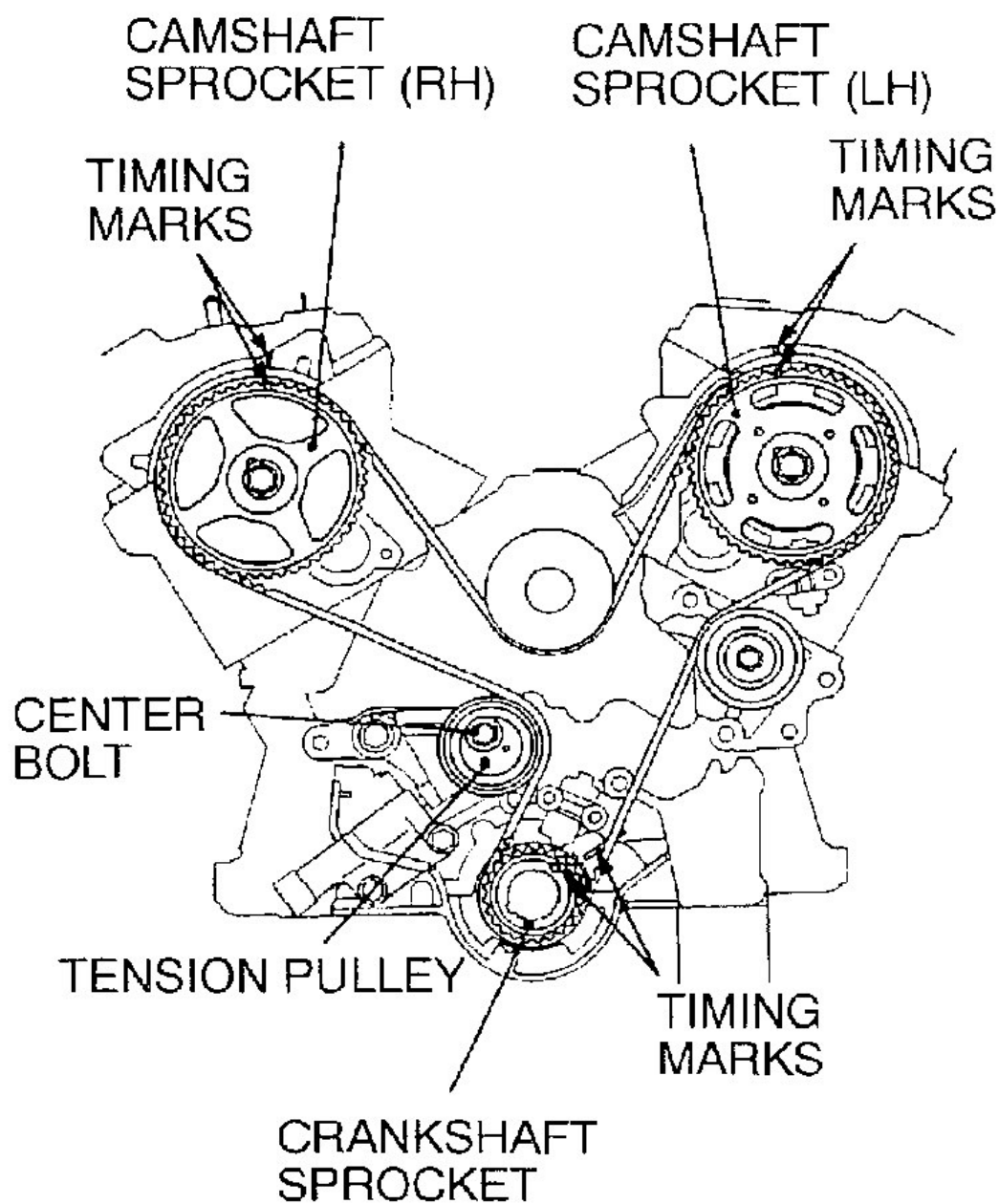
REMOVAL SERVICE POINT

< A > TIMING BELT REMOVAL

1. Align the timing marks.

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.

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



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Fig. 45: Removing Timing Belt (Mechanical)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

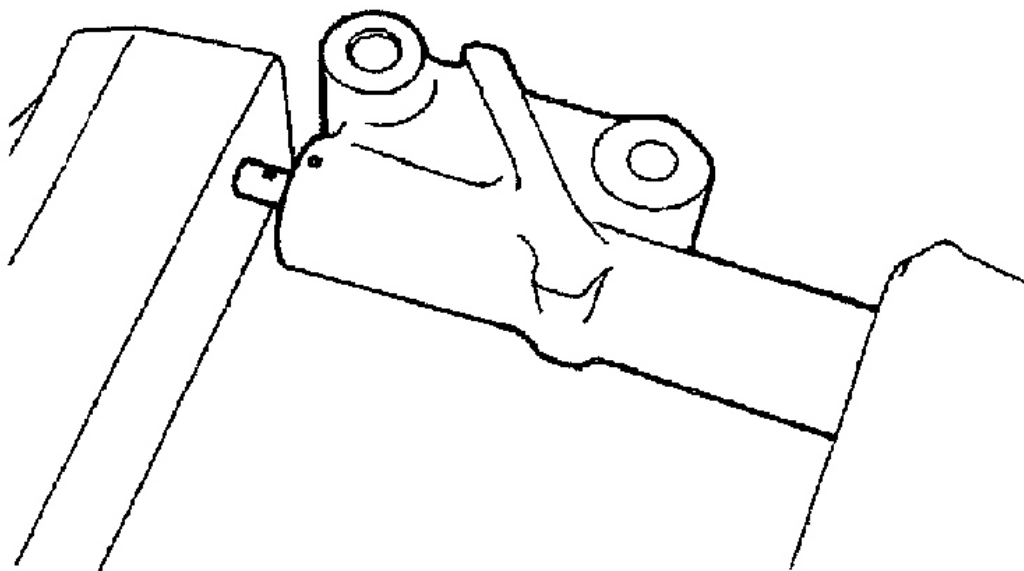
> A < AUTO TENSIONER INSTALLATION

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.

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.

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



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

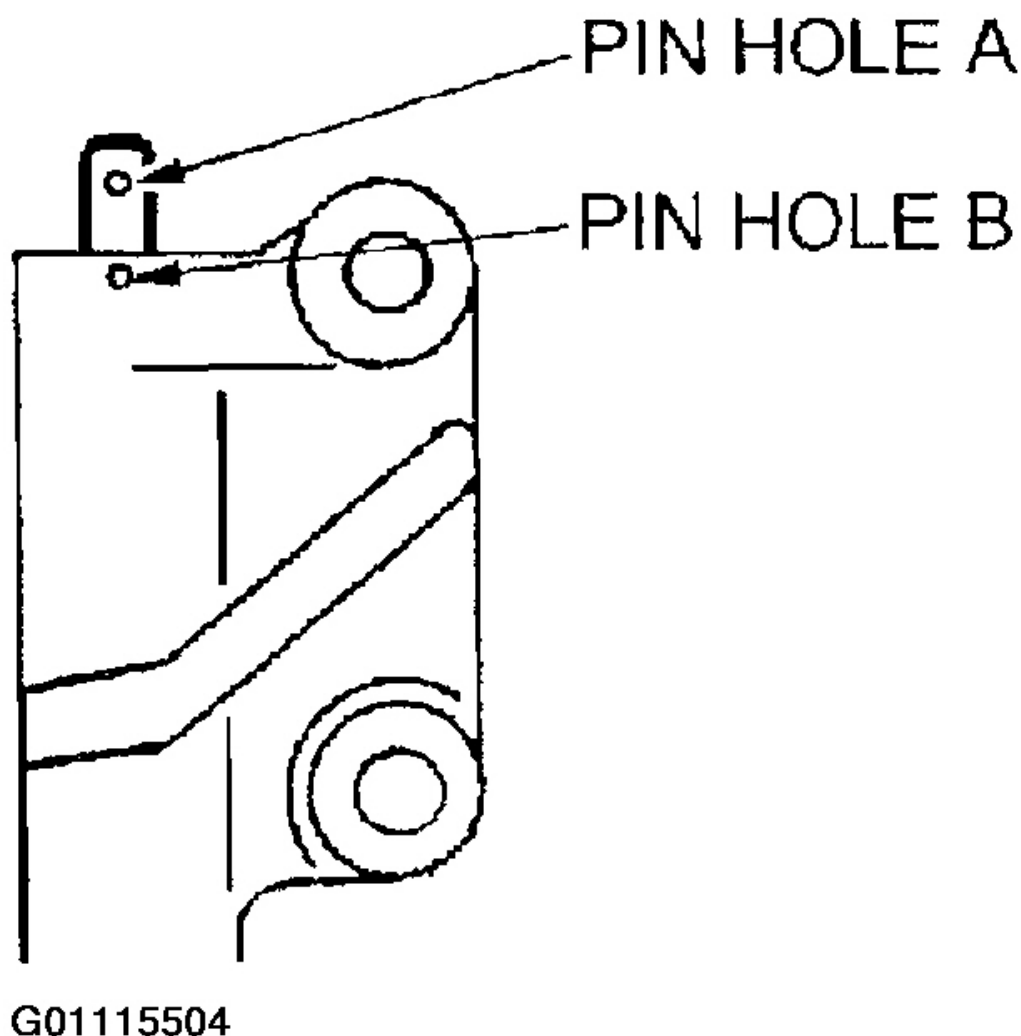


Fig. 47: Aligning Pin Holes

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

CAUTION: Leave the wire installed in the auto tensioner.

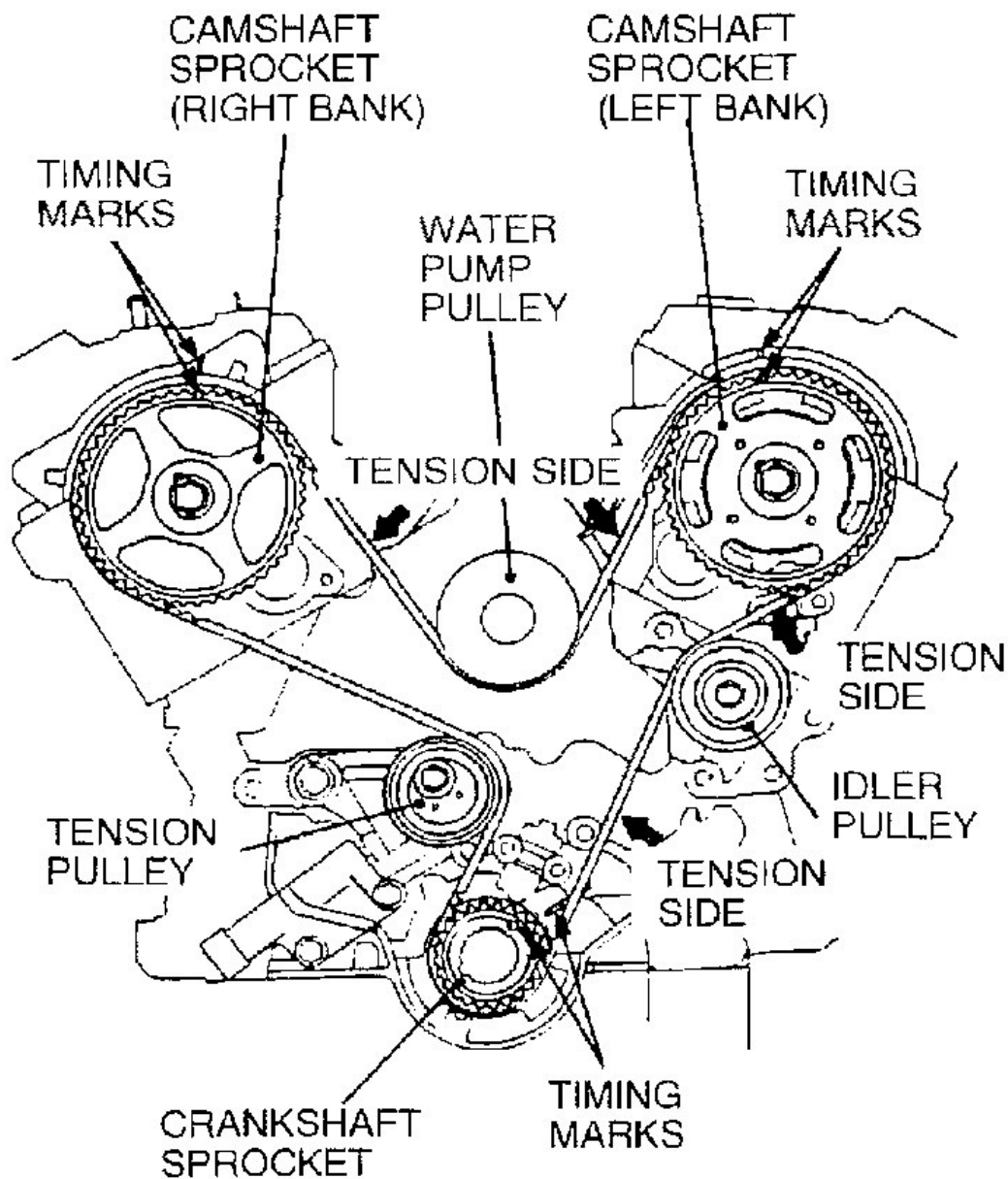
2. Install the auto tensioner.

> B < TIMING BELT INSTALLATION

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

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

2. Install the timing belt by the following procedure so that there is no deflection in the timing belt between each sprocket and pulley.
 1. Crankshaft sprocket
 2. Idler pulley
 3. Camshaft sprocket (left bank)
 4. Water pump pulley
 5. Camshaft sprocket (right bank)
 6. Tension pulley



G01115505

Fig. 48: Installing Timing Belt (Mechanical)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

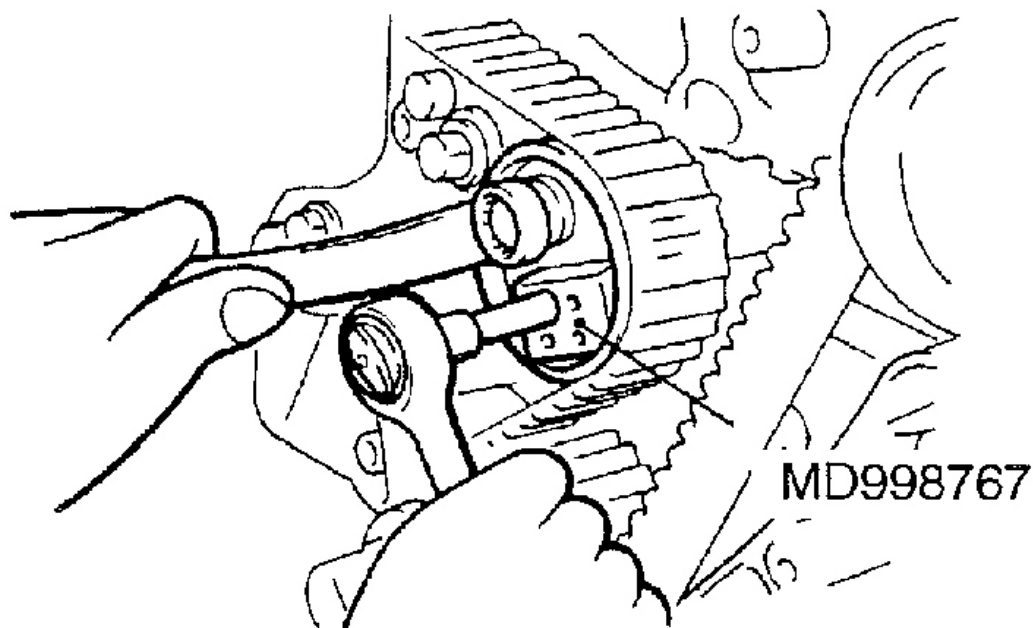


Fig. 49: Using Special Tool To Push Tension Pulley Into Timing Belt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

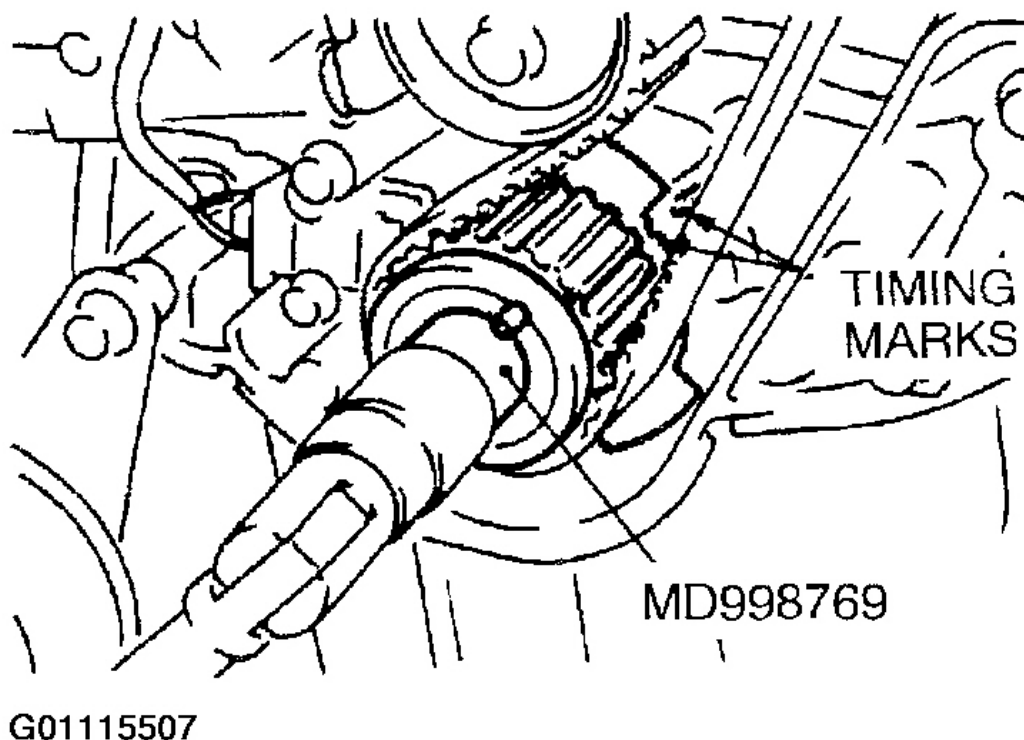


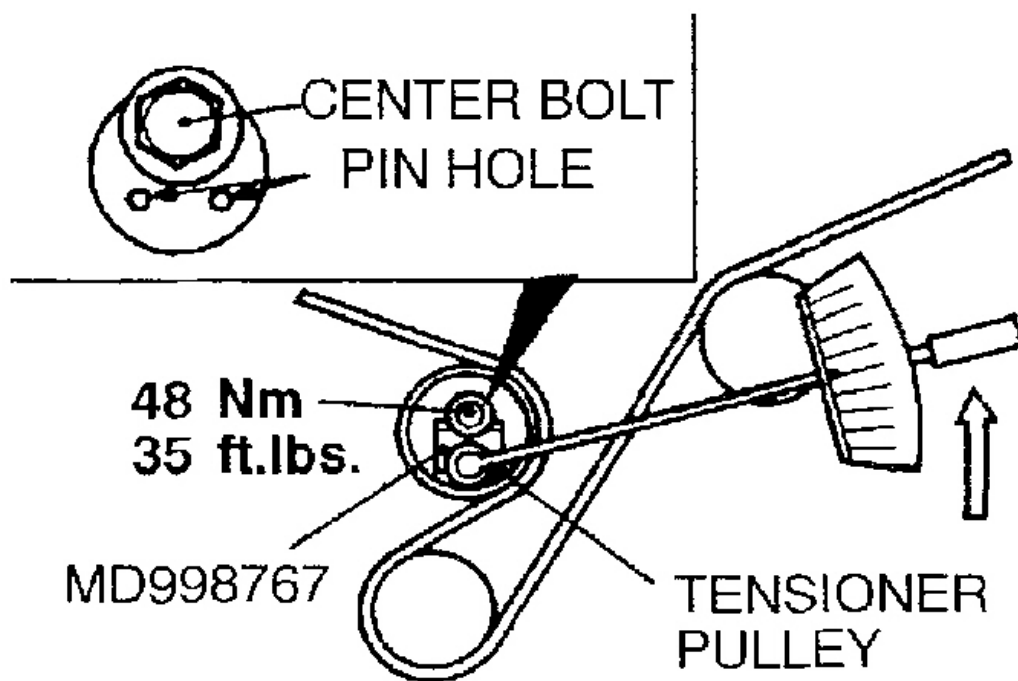
Fig. 50: Using Special Tools To Align Timing Marks

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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.

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

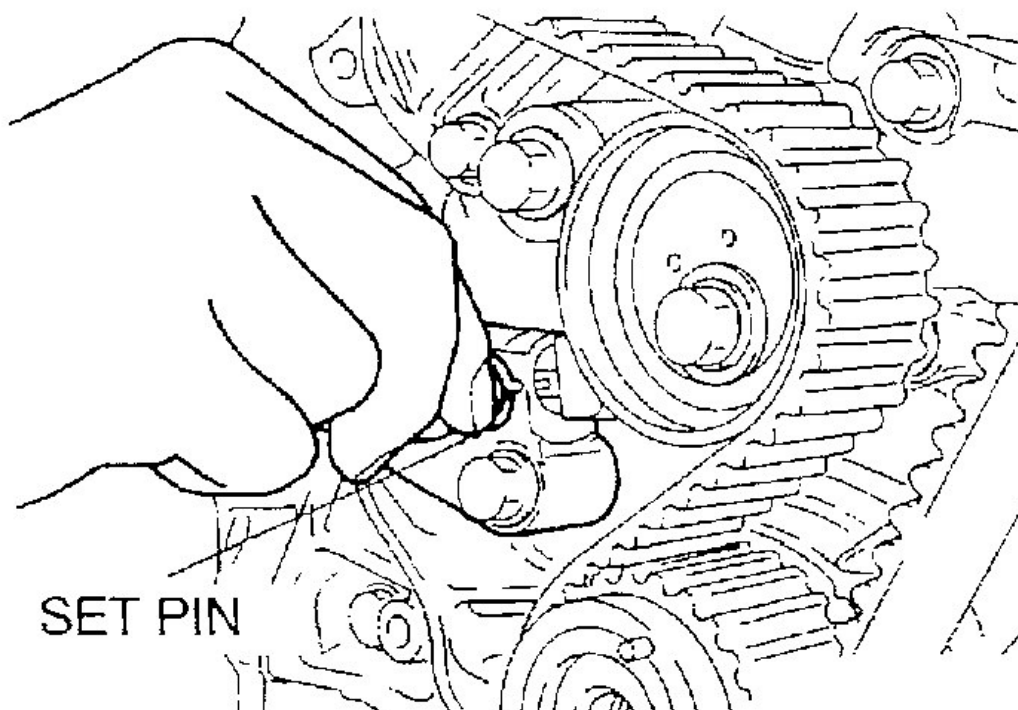


G01115508

Fig. 51: Tightening Timing Belt Center Bolt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

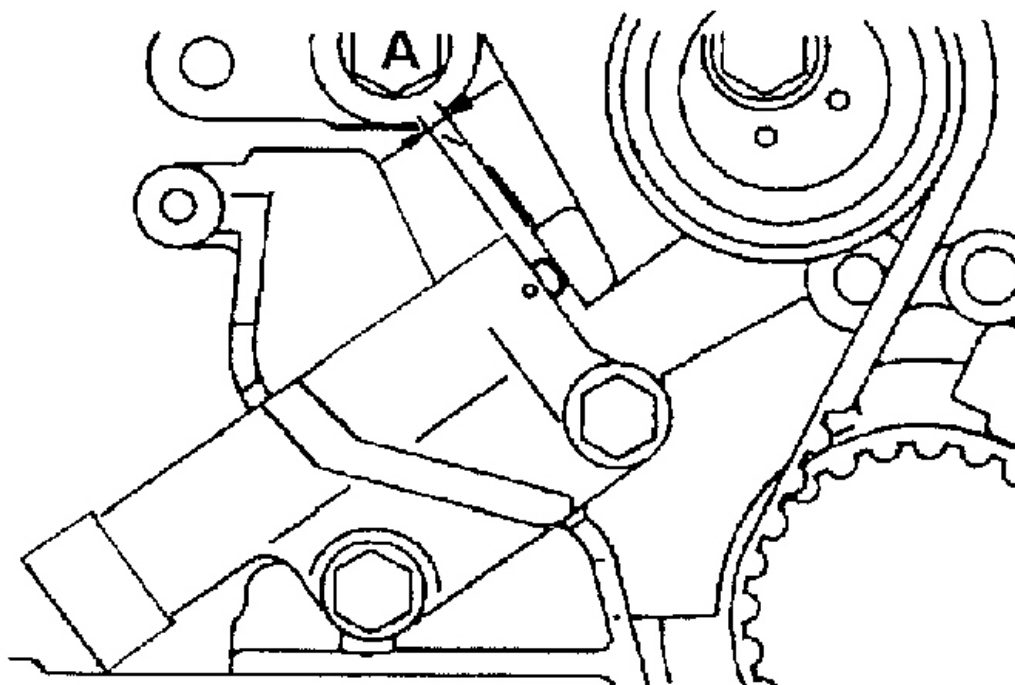


G01115509

Fig. 52: Removing Setting Pin From Auto Tensioner
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.

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



G01115510

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

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.

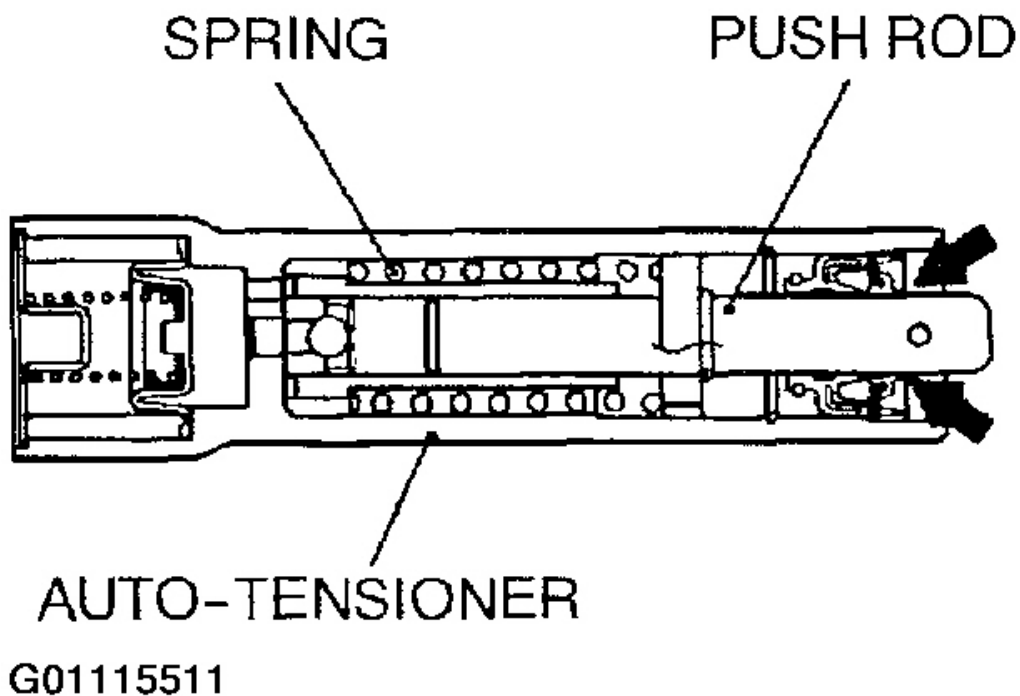


Fig. 54: Inspecting Auto Tensioner

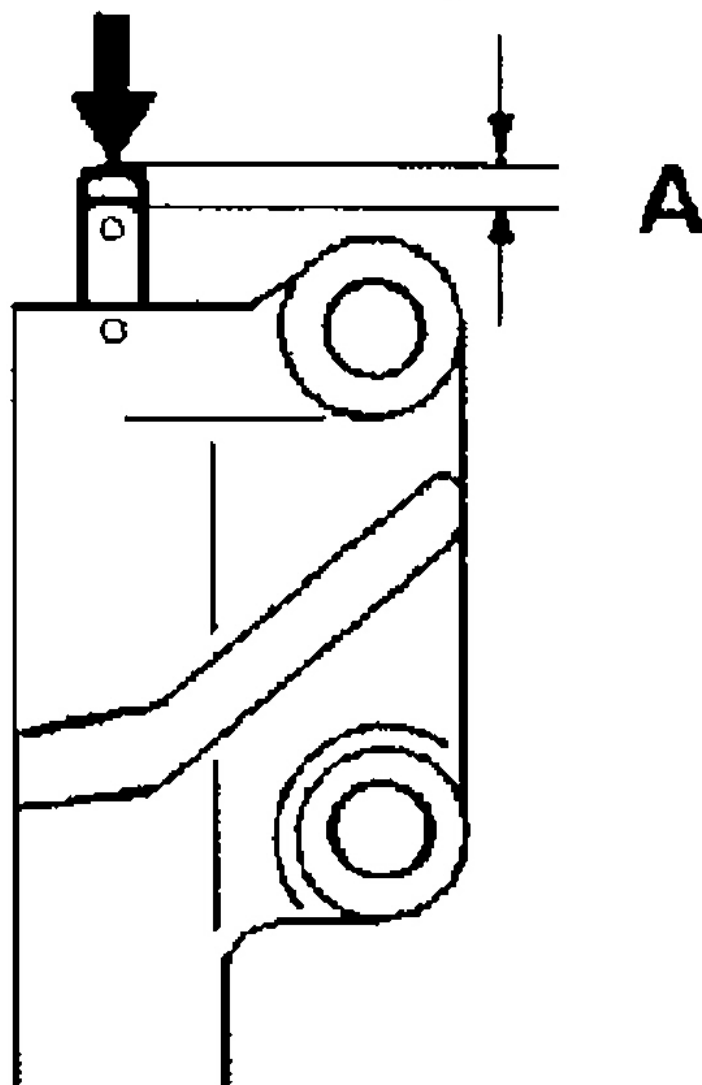
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

**98-196 N
(22-44 lbs.)**



G01115512

Fig. 55: Measuring Auto Tensioner Contraction

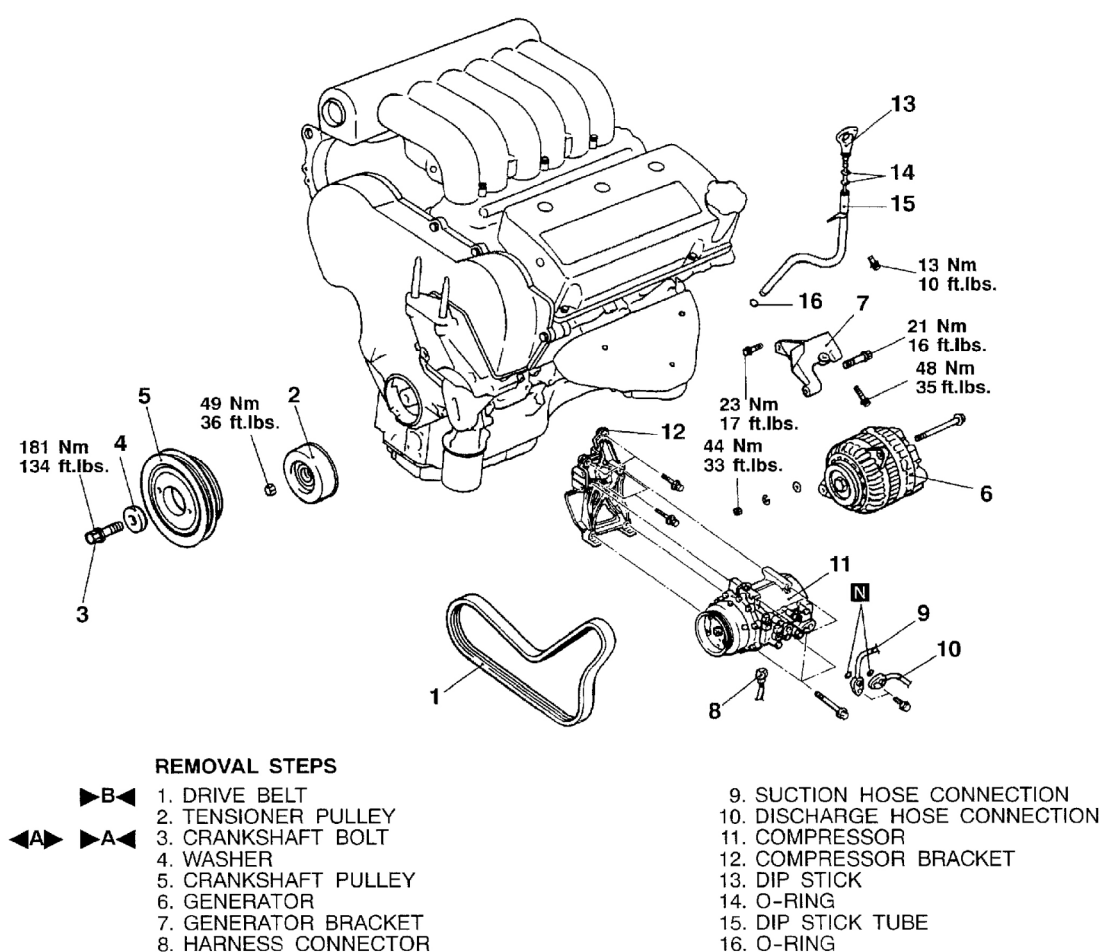
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

OVERHAUL

GENERATOR AND DRIVE BELT

REMOVAL AND INSTALLATION

For generator and drive belt removal procedures, follow numbered steps in illustration. See **Fig. 56**. For generator and drive belt installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing generator and drive belt. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINT**.



G01115518

Fig. 56: Removing & Installing Generator & 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.

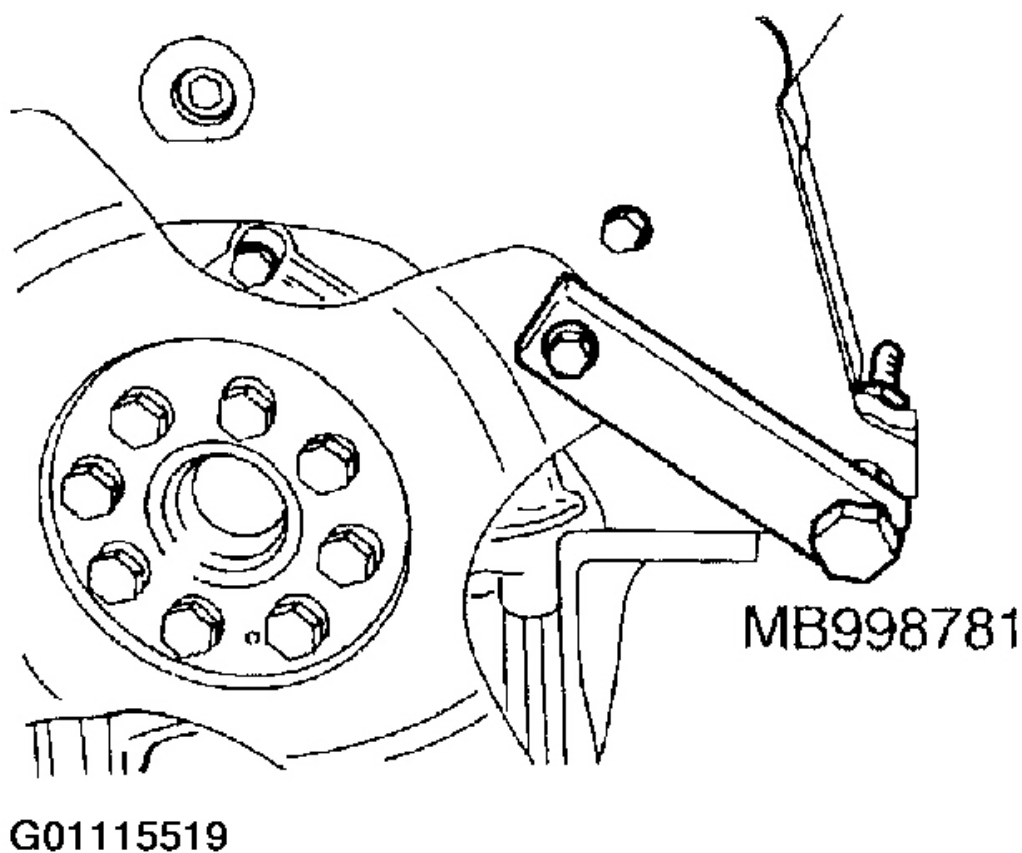


Fig. 57: Loosening Crankshaft Bolt

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.

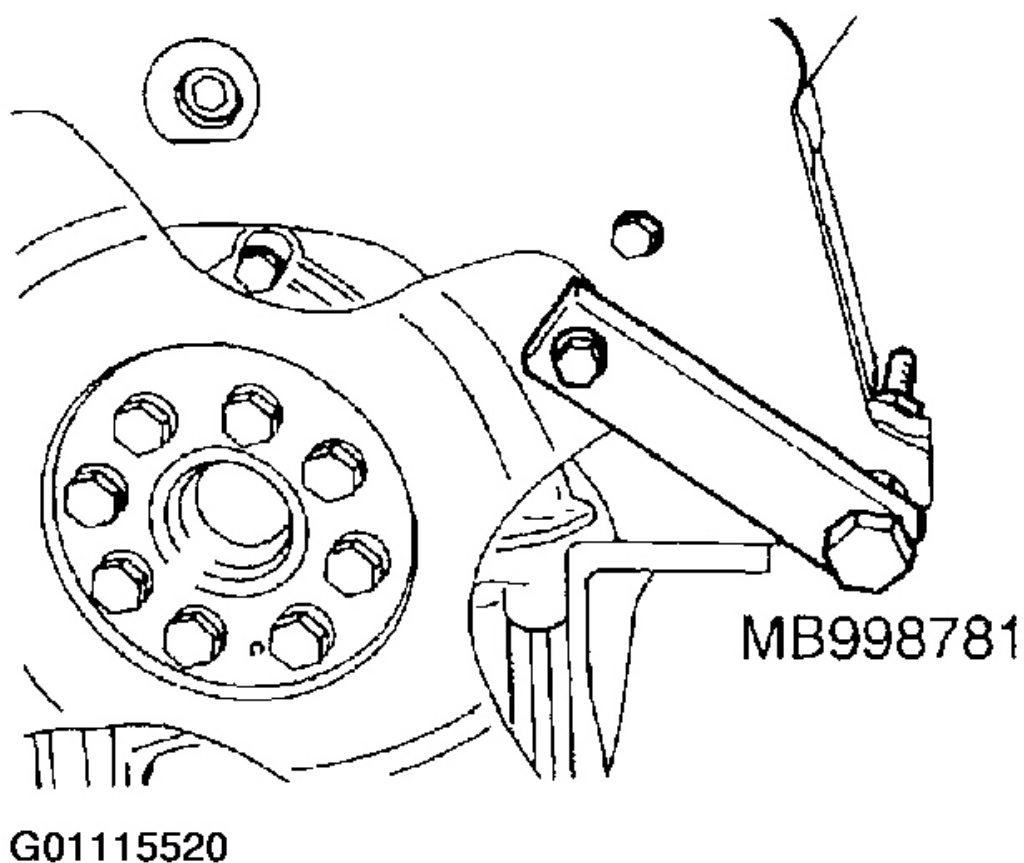


Fig. 58: Tightening Crankshaft Bolt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> B < DRIVE BELT TENSION ADJUSTMENT

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

Standard value:

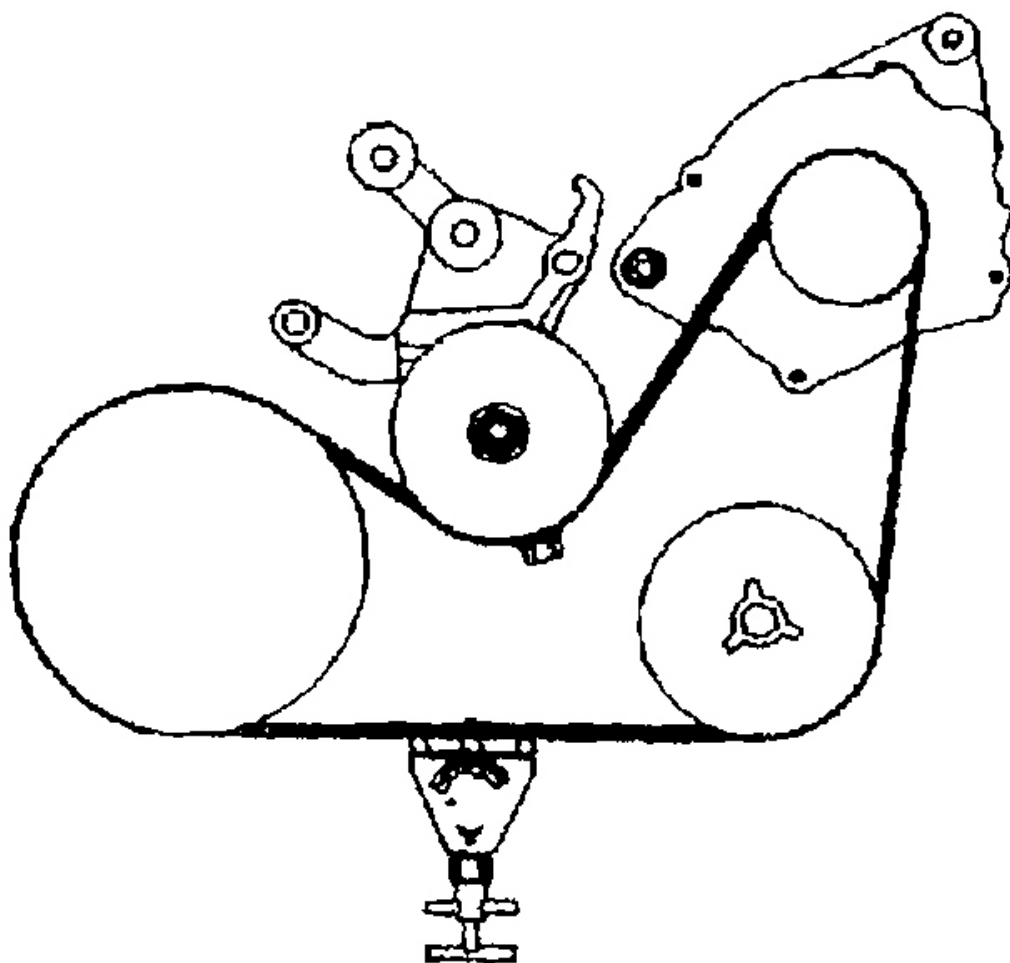
2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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

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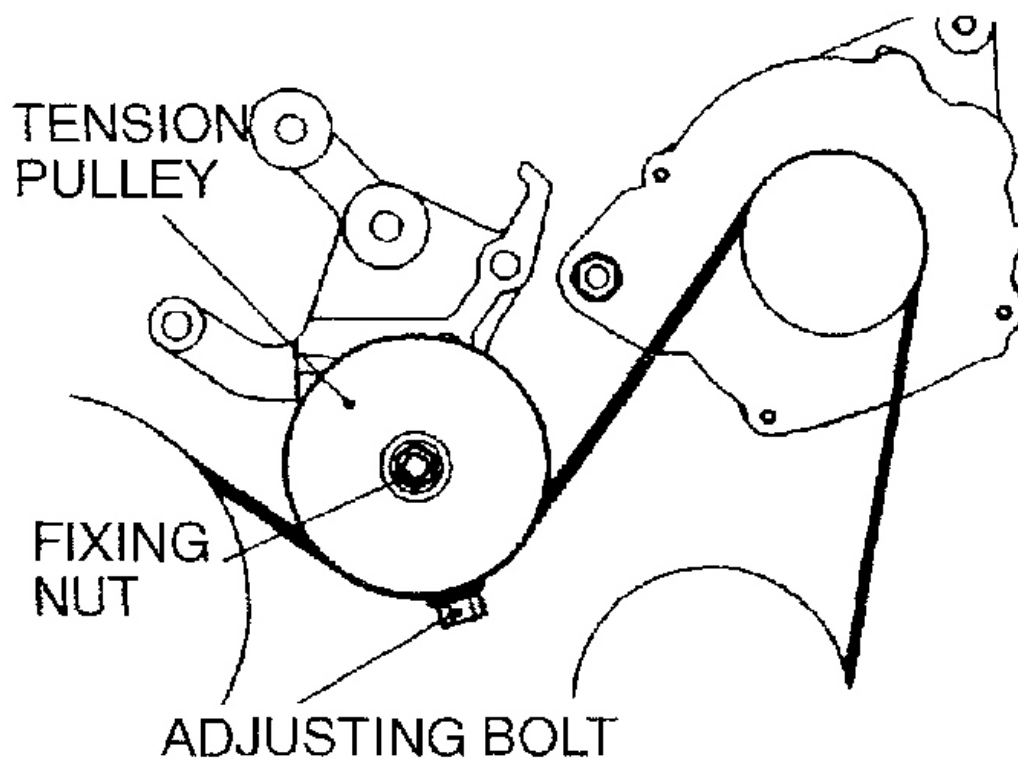
Fig. 59: Identifying Standard Drive Belt Tension**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**



G01115522

Fig. 60: Checking Drive Belt Tension

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G01115523

Fig. 61: Adjusting Drive Belt Tension

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)

G01115524

Fig. 62: Identifying Standard Drive Belt Deflection

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

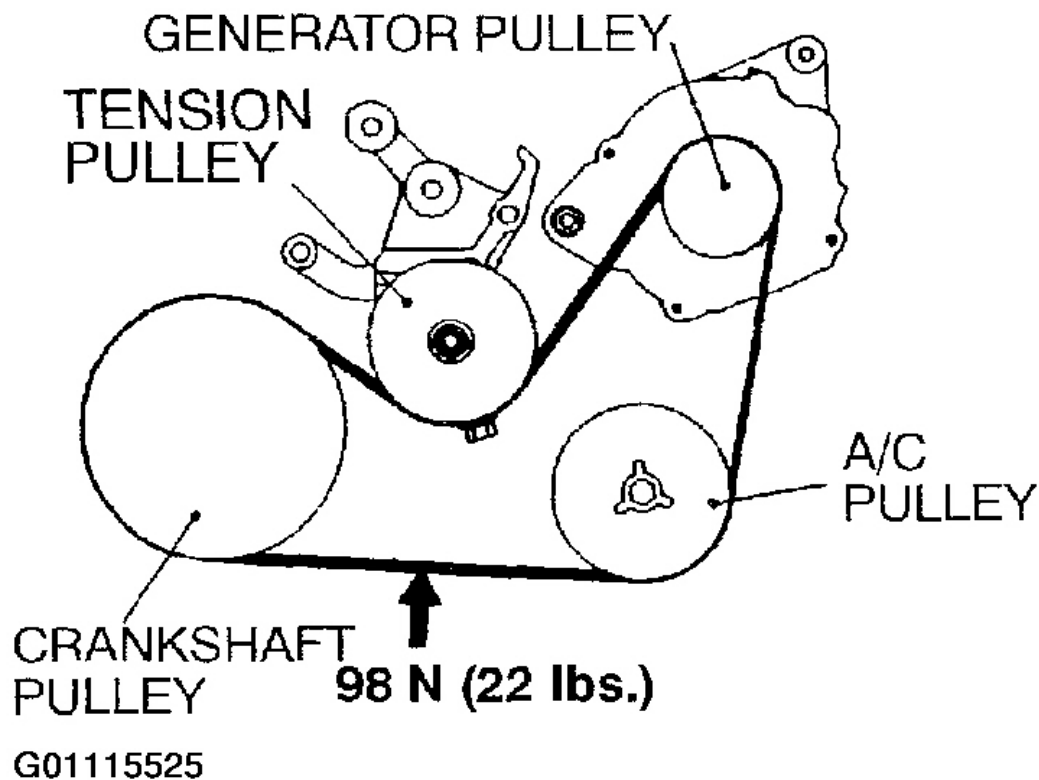


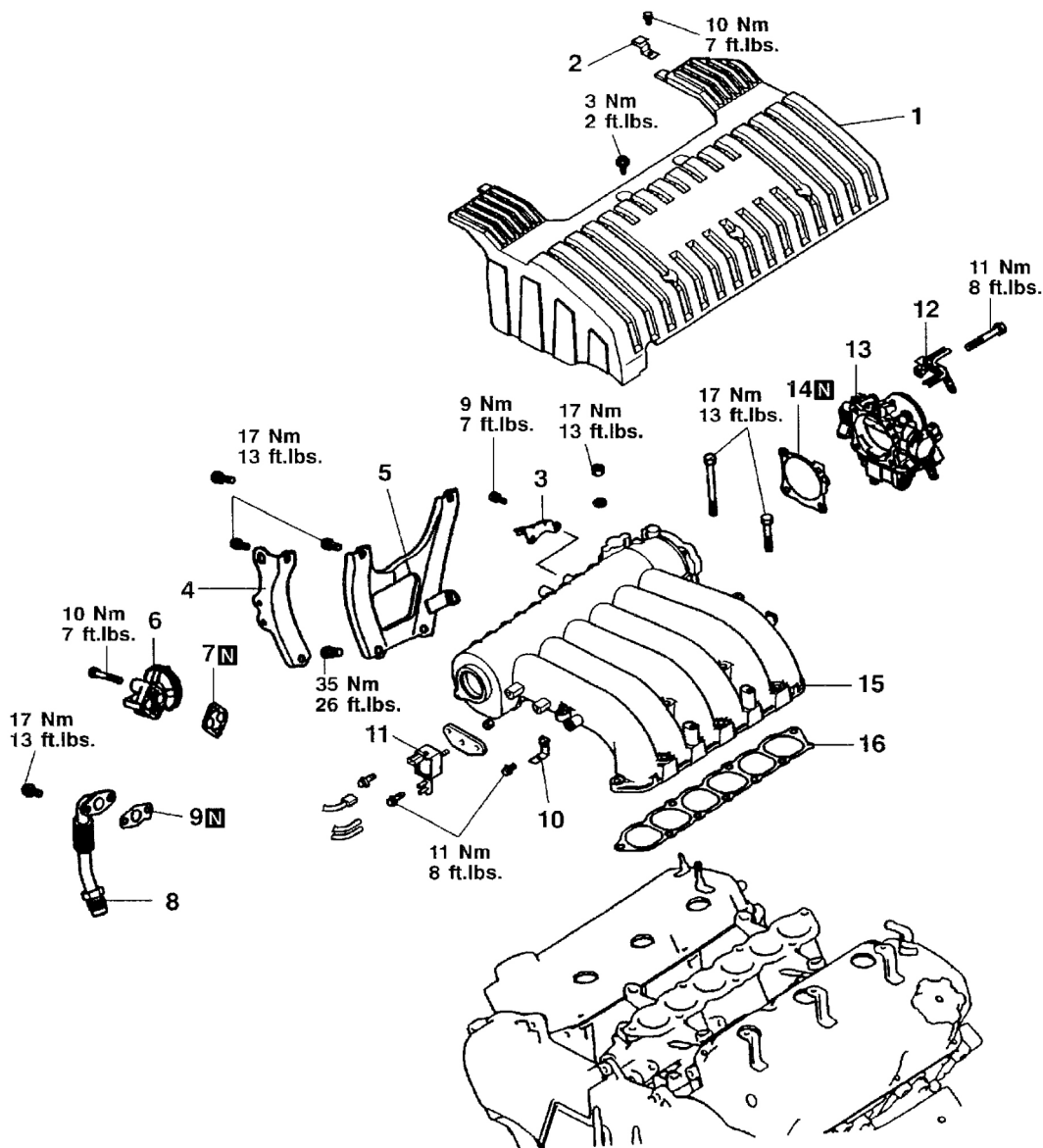
Fig. 63: Checking Drive Belt Deflection

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INTAKE MANIFOLD PLENUM AND THROTTLE BODY

REMOVAL AND INSTALLATION

For intake manifold plenum and throttle body removal procedures, follow numbered steps in illustration. See **Fig. 64**. For intake manifold plenum and throttle body installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing intake manifold plenum and throttle body.



REMOVAL STEPS

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

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Fig. 64: Removing & Installing Intake Manifold Plenum & Throttle Body
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

IGNITION SYSTEM

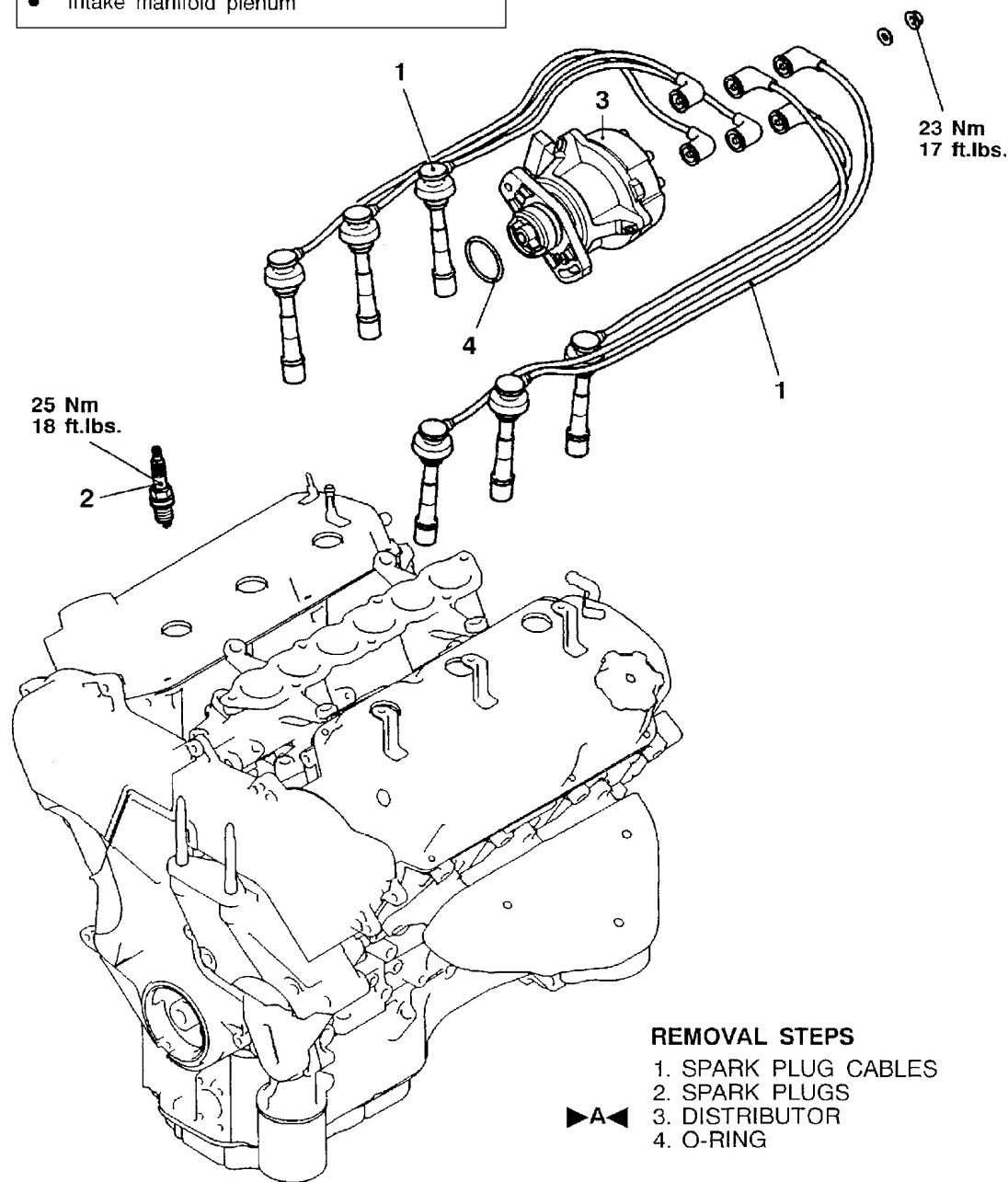
REMOVAL AND INSTALLATION

For ignition system removal procedures, follow numbered steps in illustration. See **Fig. 65**. For ignition system installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing ignition system. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINT**.

Pre-removal and Post-installation Operation

Removal and installation

- Intake manifold plenum



G01115527

Fig. 65: Removing & Installing Ignition System

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

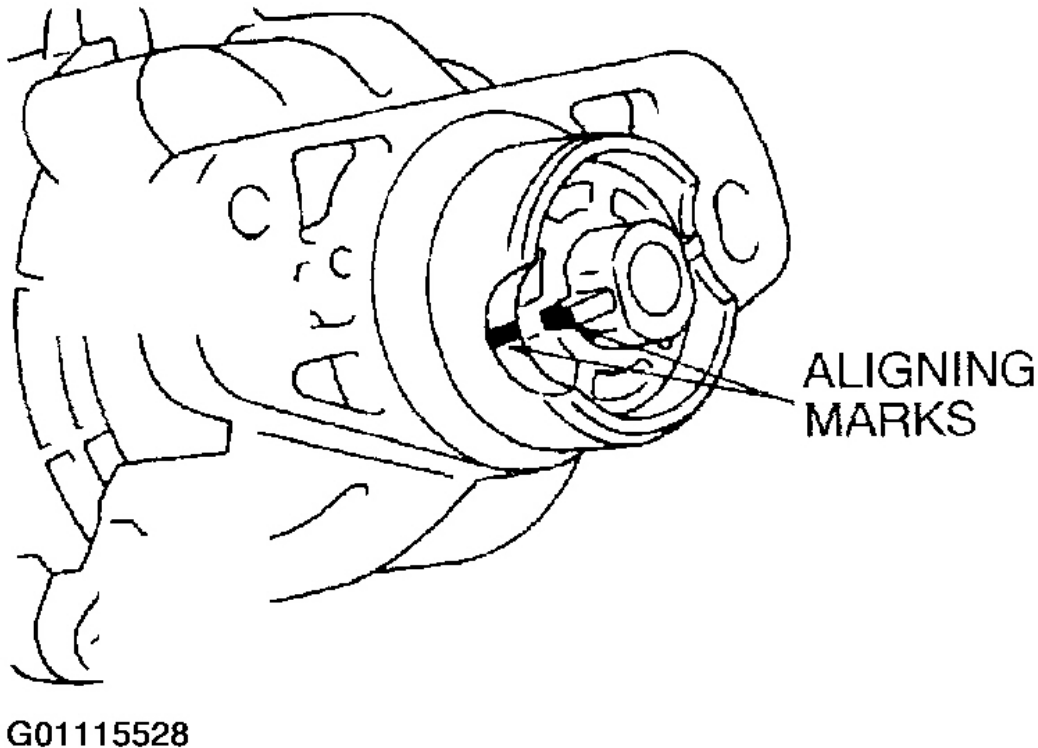


Fig. 66: Installing Distributor

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TIMING BELT (OVERHAUL)

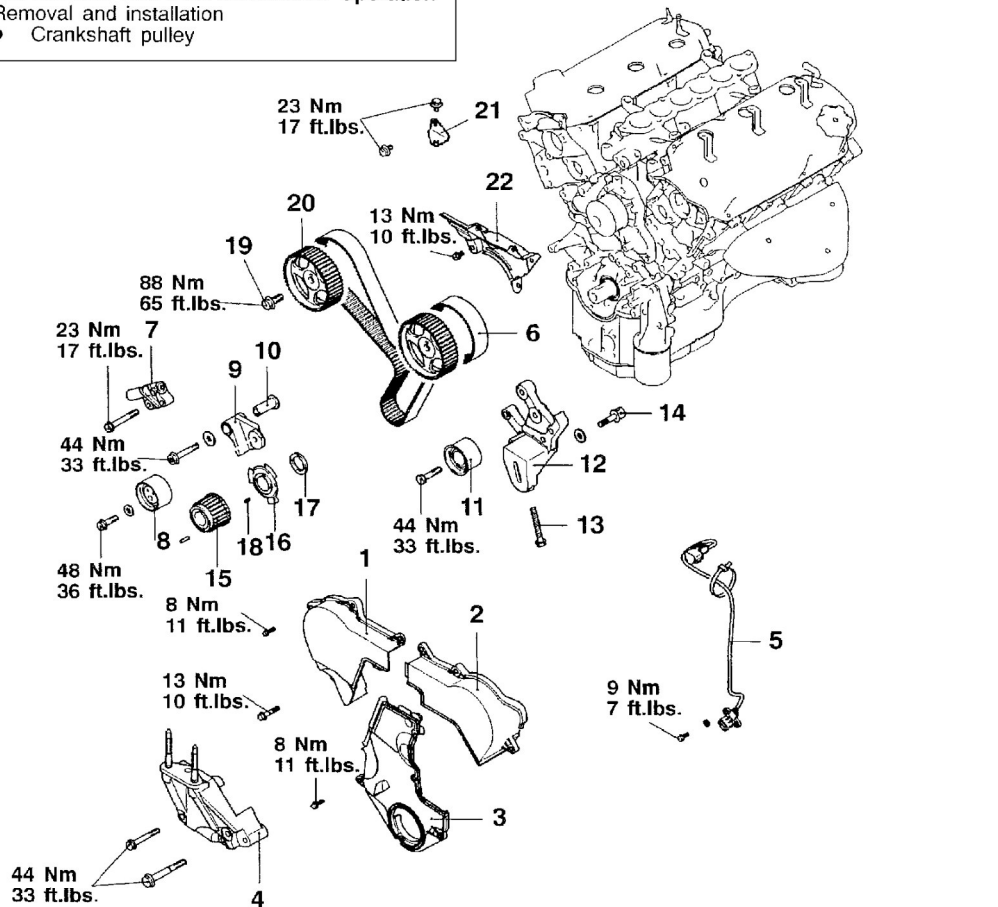
REMOVAL AND INSTALLATION

For timing belt (overhaul) removal procedures, follow numbered steps in illustration. See **Fig. 67**. For timing belt (overhaul) installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing timing belt (overhaul). Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINTS**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.

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
4. ENGINE SUPPORT BRACKET
5. CRANKSHAFT POSITION SENSOR
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

►D◄

◄A► ◄C►
◄B►

◄B► ►A◄

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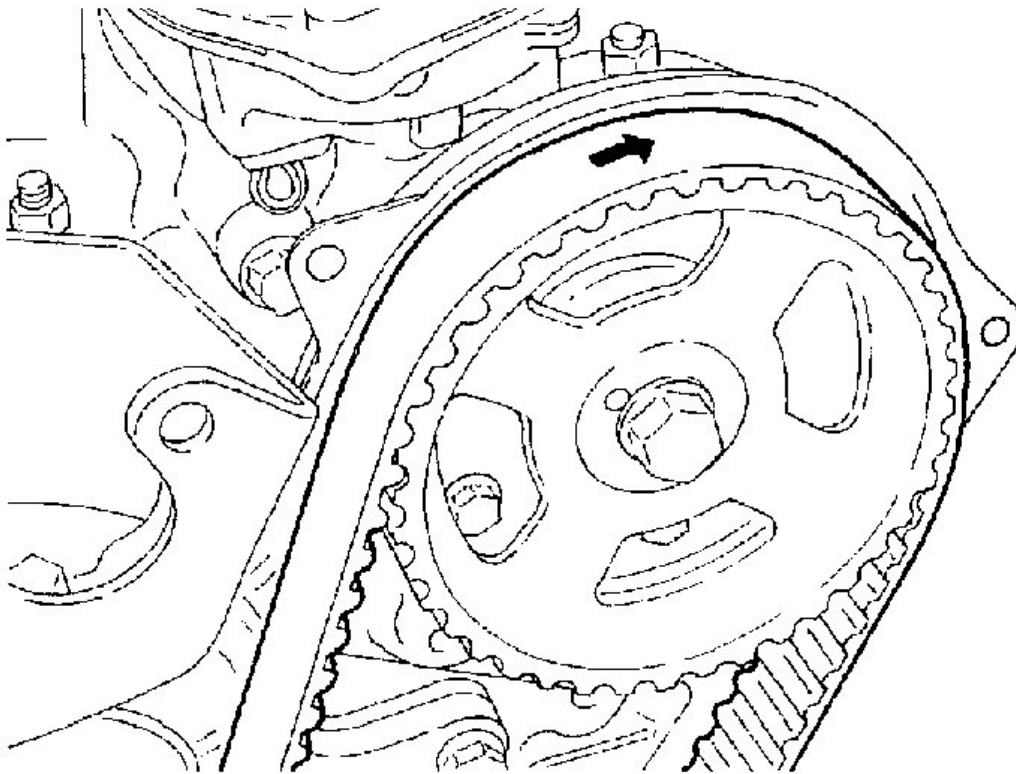
Fig. 67: Removing & Installing Timing Belt (Overhaul)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REMOVAL SERVICE POINTS

< A > TIMING BELT REMOVAL

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.



G01115530

Fig. 68: Marking Belt Running Direction

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

1. Mark the belt running direction for reference in re-installation.

< B > CAMSHAFT SPROCKET BOLT LOOSENING

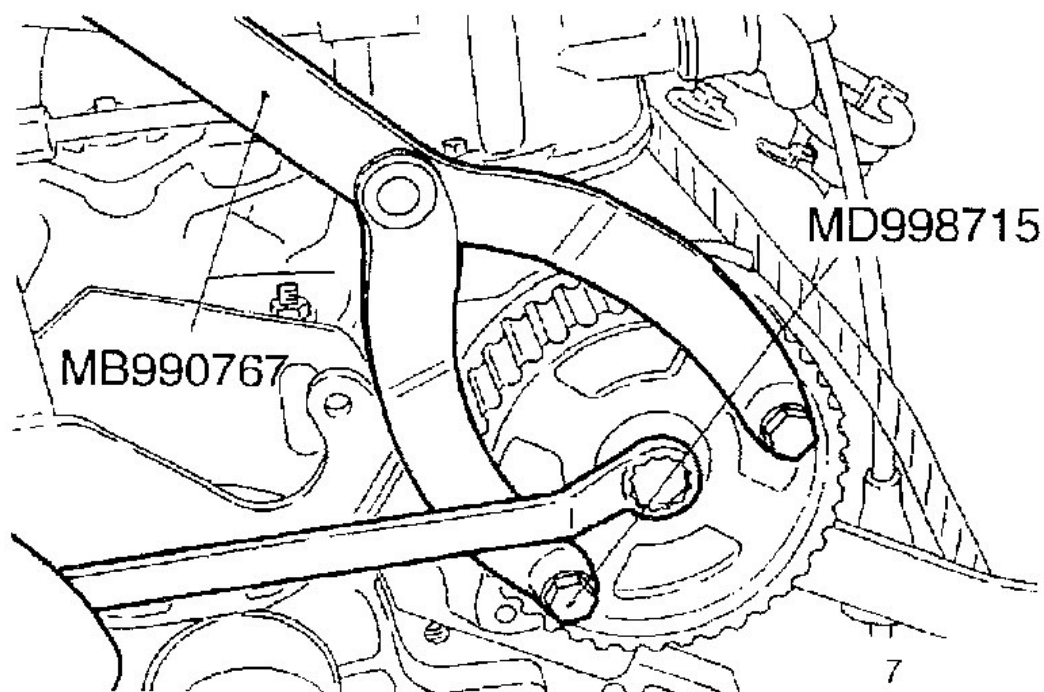


Fig. 69: Loosening Camshaft Sprocket Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

> A < CAMSHAFT SPROCKET BOLT TIGHTENING

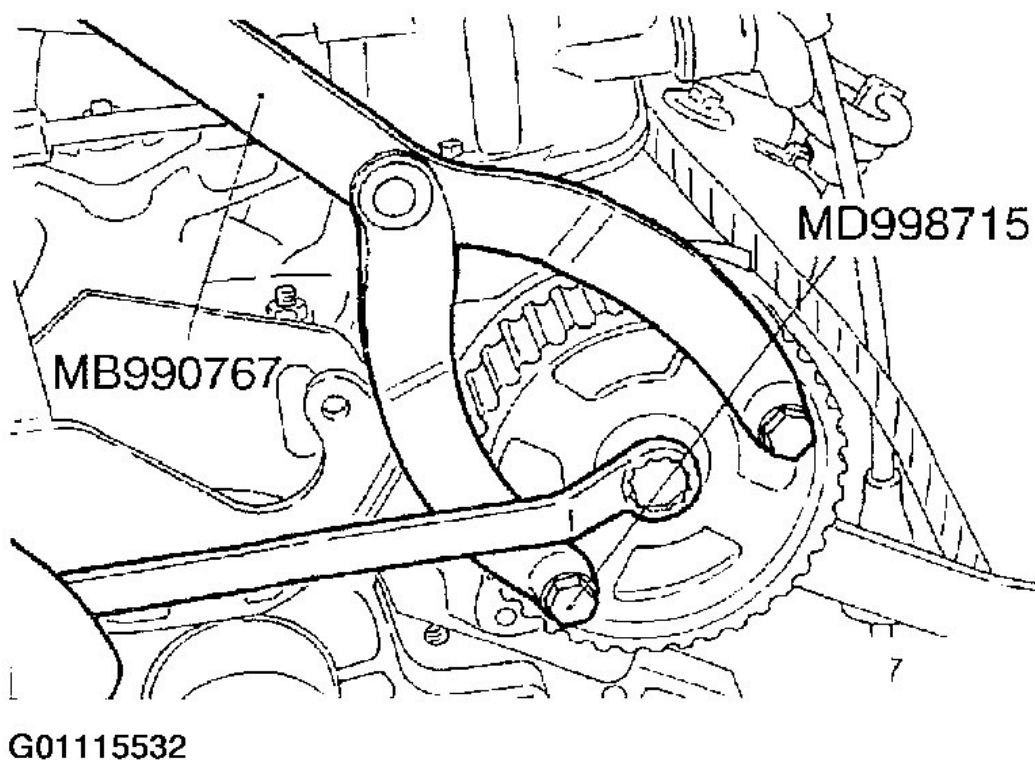
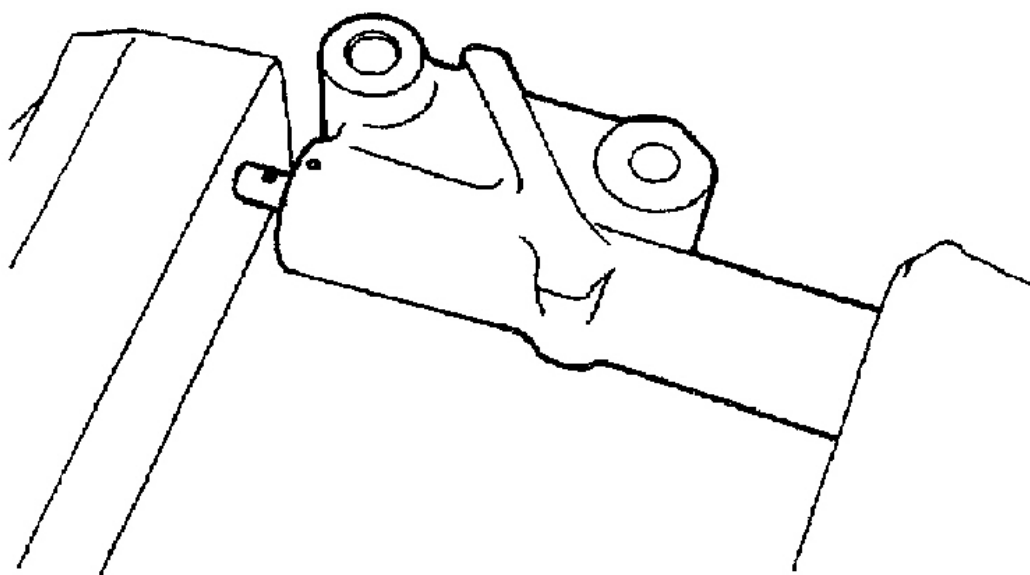


Fig. 70: Tightening Camshaft Sprocket Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> 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.



G01115533

Fig. 71: Setting Auto-Tensioner In A 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.

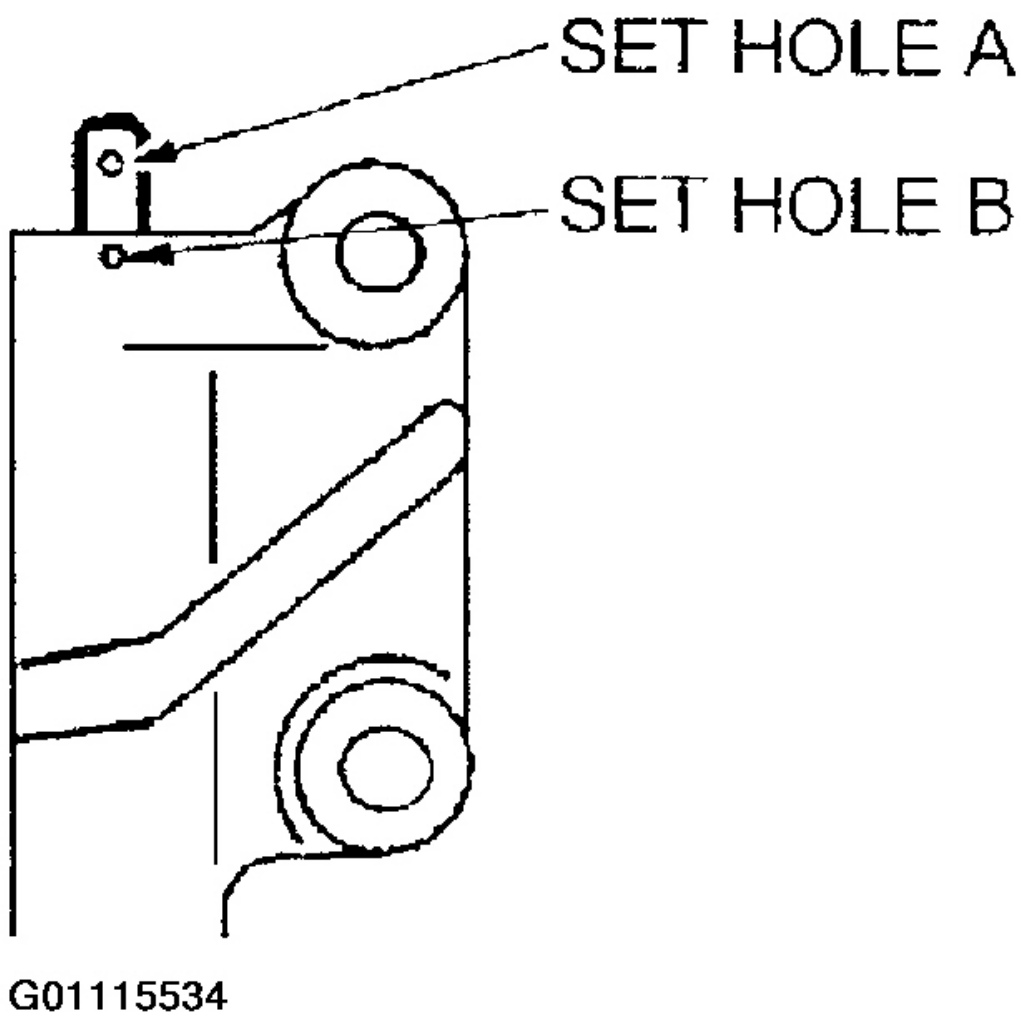


Fig. 72: Aligning Set Holes

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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

4. Remove the auto-tensioner from the vice.
5. Install the auto-tensioner to the engine.

> C < **TIMING BELT INSTALLATION**

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.

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.

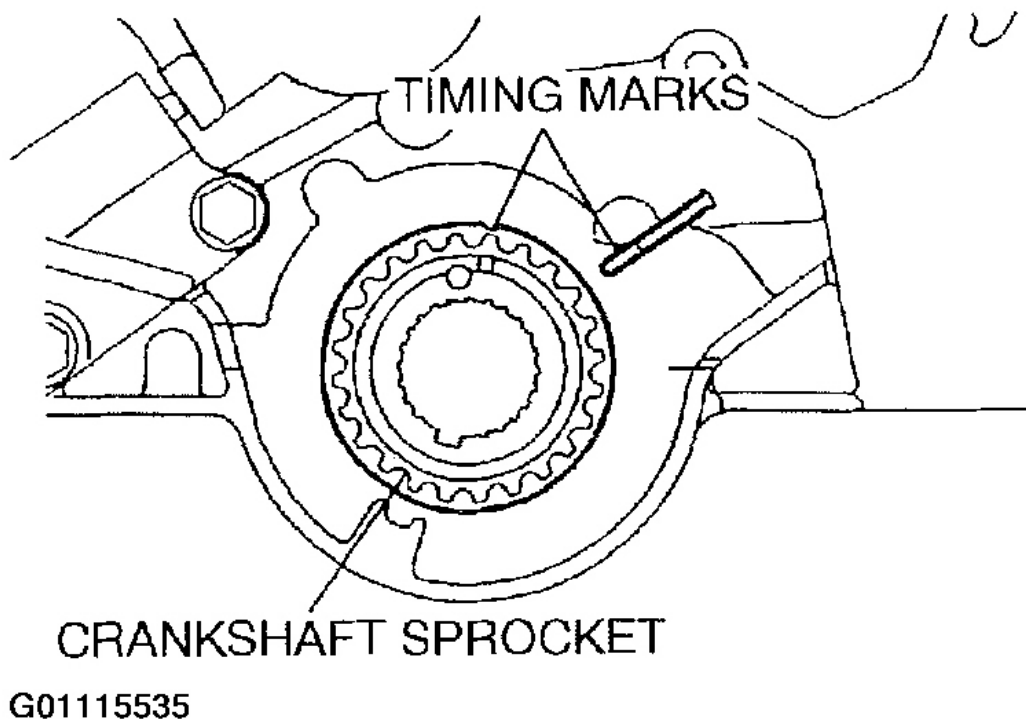
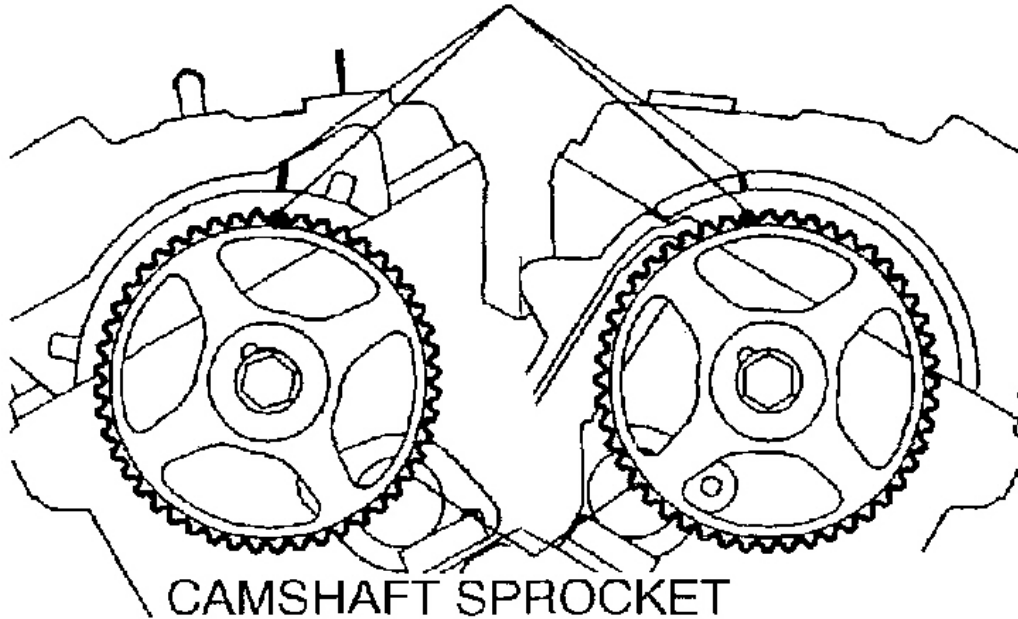


Fig. 73: Lowering Piston Below Top Dead Center On Compression Stroke
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Line up the timing marks of the left 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.

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

RIGHT BANK TIMING MARKS LEFT BANK

G01115536

Fig. 74: Aligning Camshaft Sprocket Timing Marks**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

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

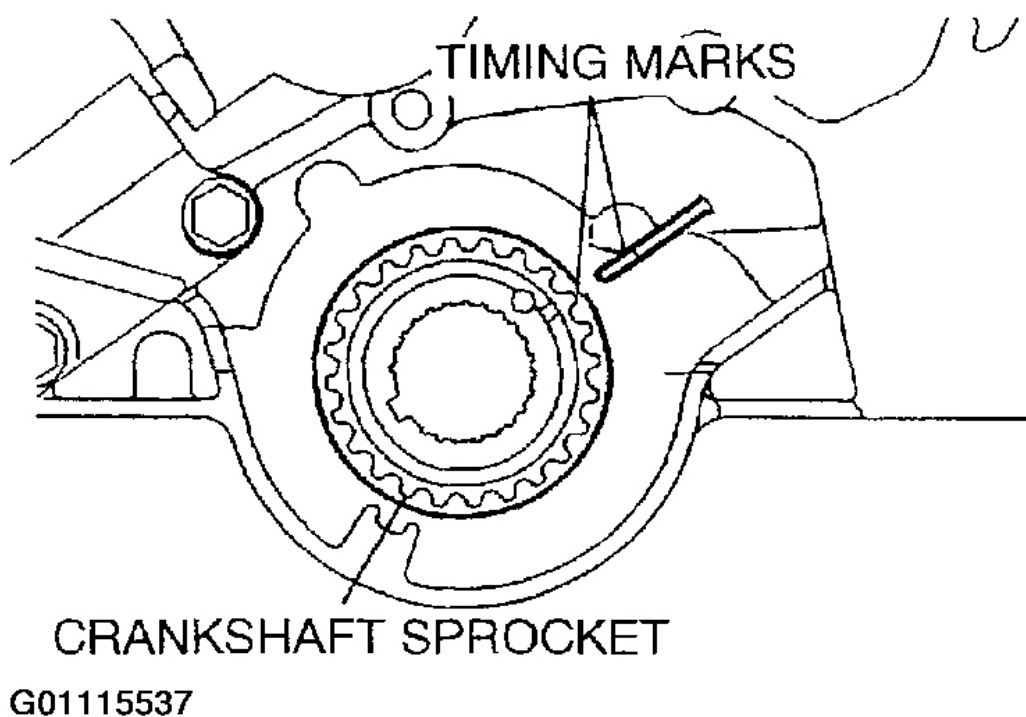
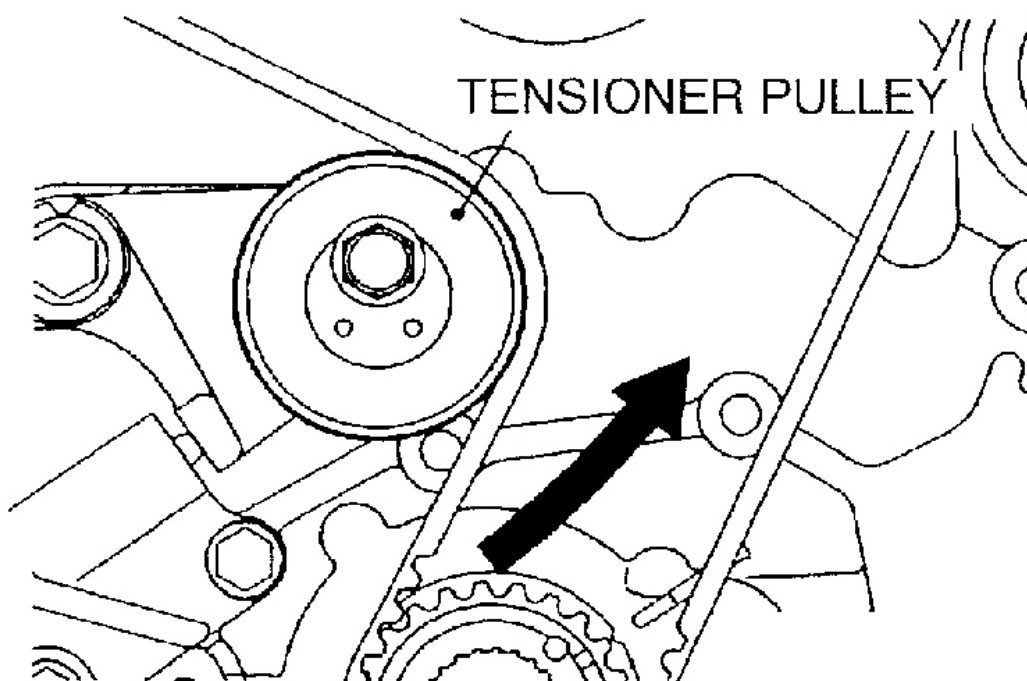


Fig. 75: Aligning Crankshaft Sprocket Timing Marks

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

6. Lightly press the tensioner pulley against the belt and temporarily tighten the center bolt.
7. Check to see that the timing marks of all the sprockets are in alignment.



G01115538

Fig. 76: Pressing Tensioner Pulley Against Belt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

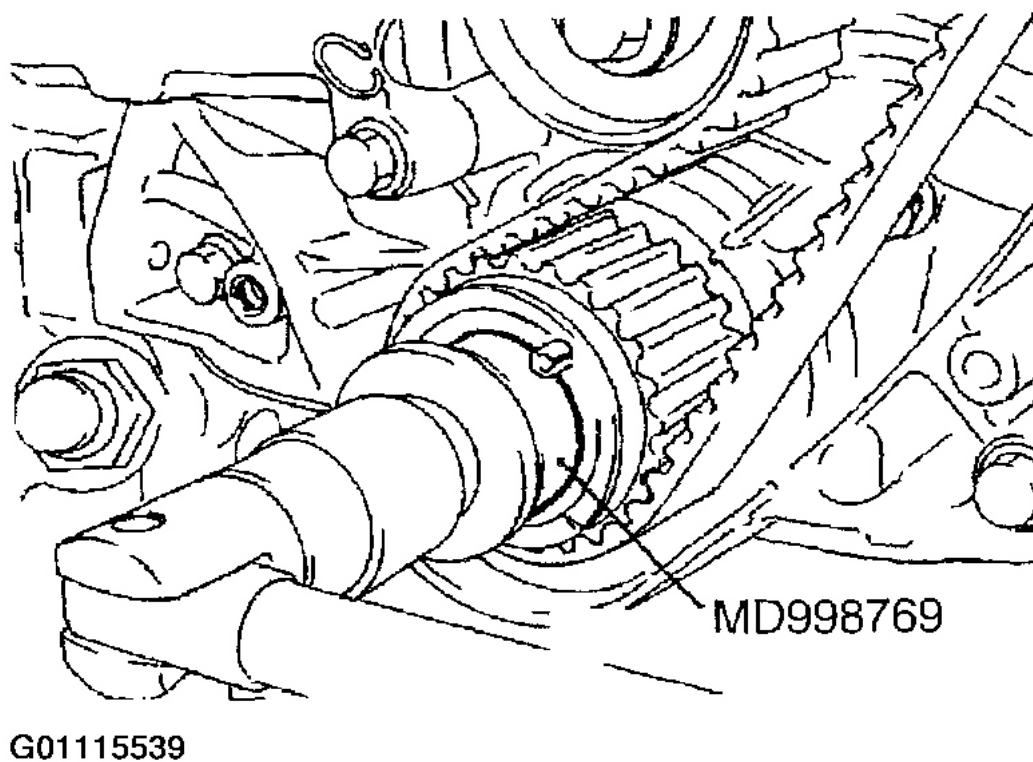
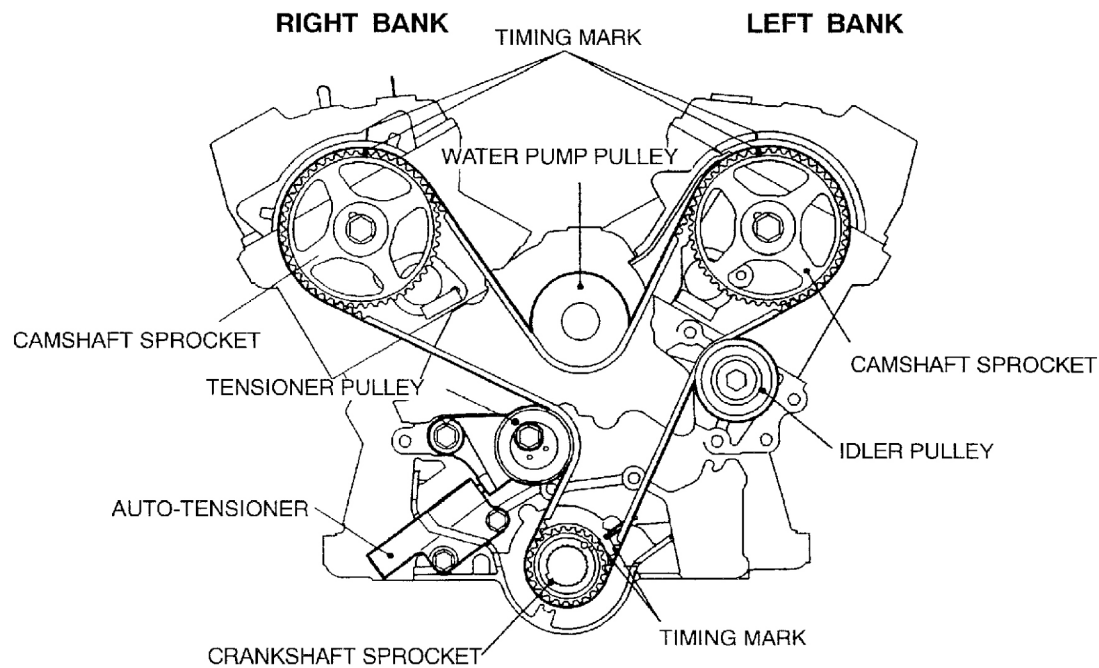


Fig. 77: Rotating Crankshaft

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G01115540

Fig. 78: Verifying Timing Mark Alignment

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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.

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

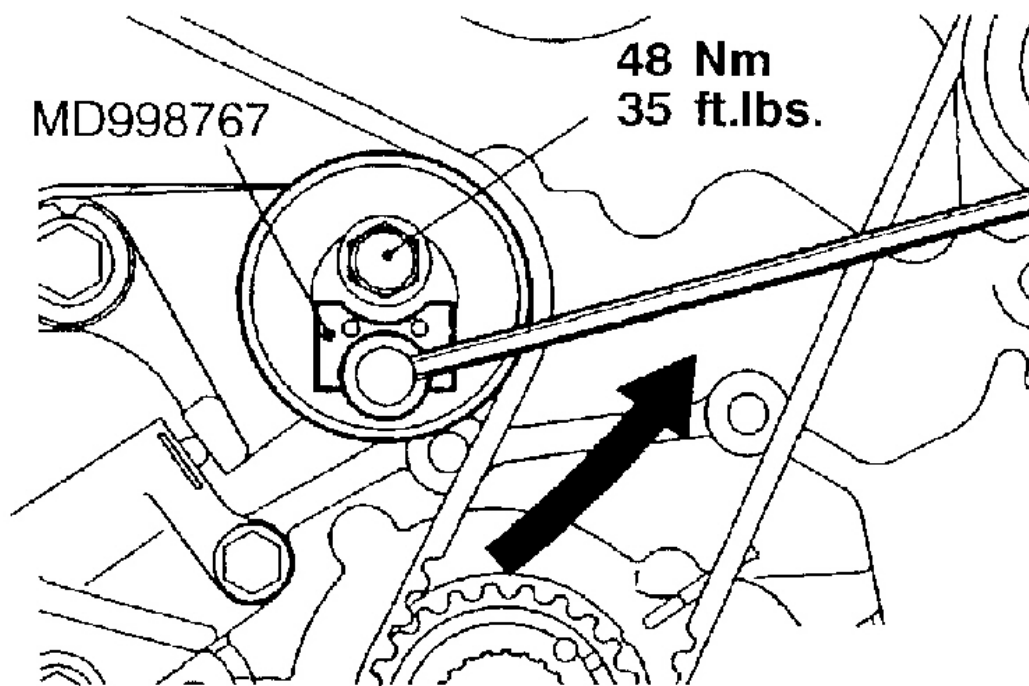


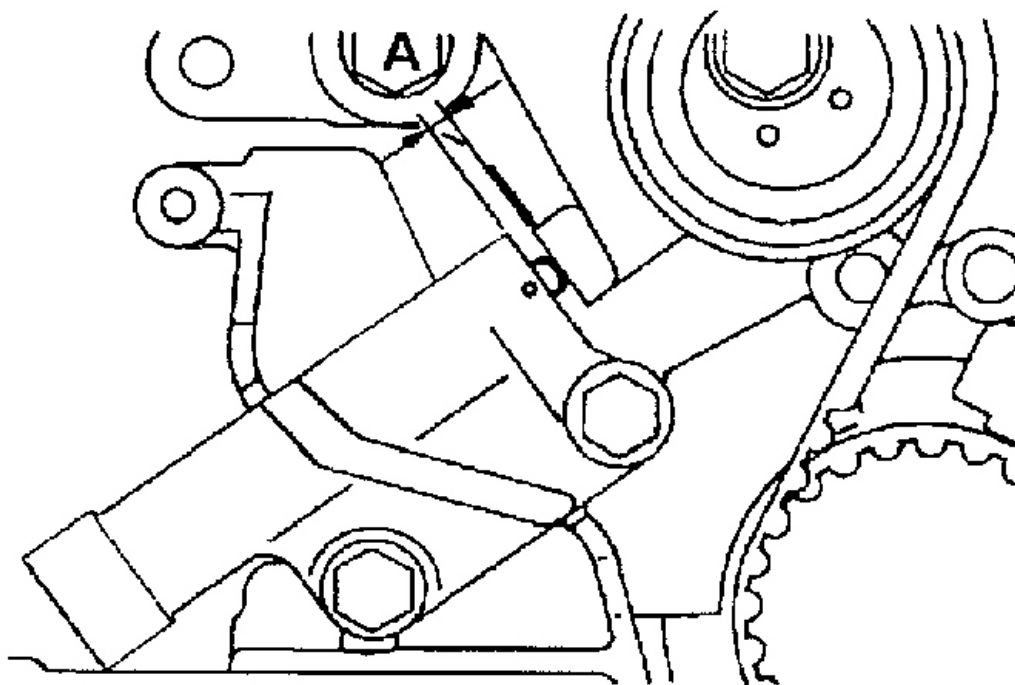
Fig. 79: Tightening Timing Belt

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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.

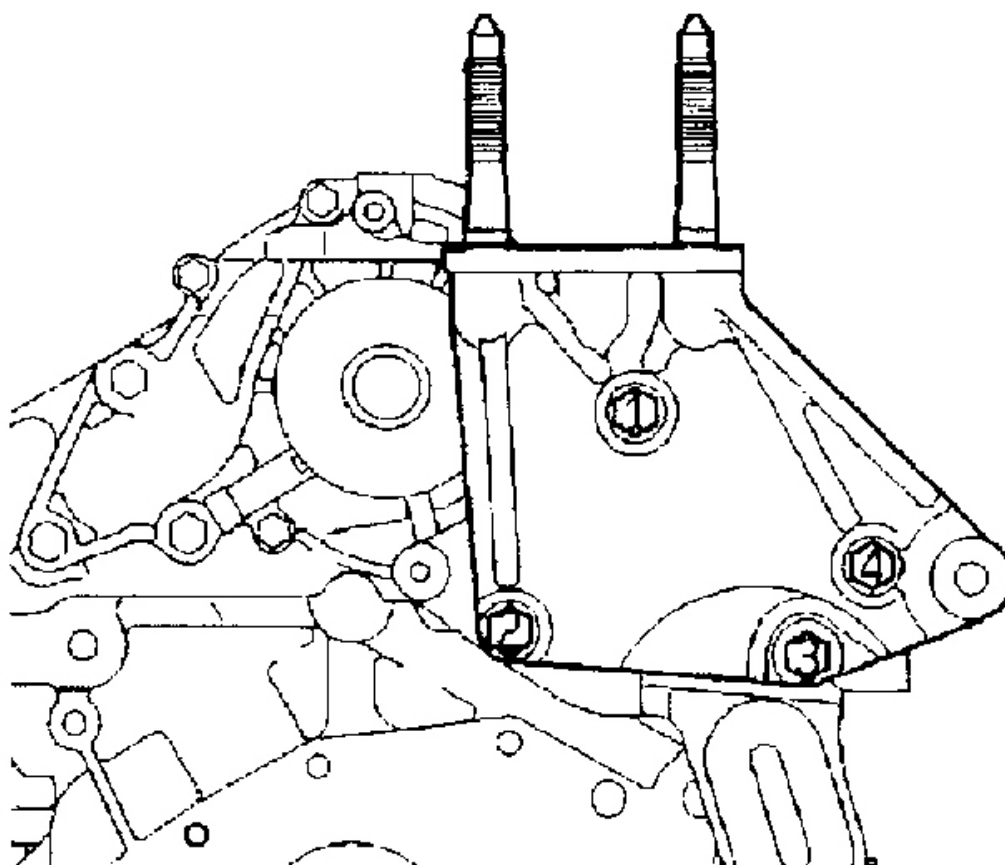


G01115542

Fig. 80: Checking Auto-Tensioner Pushrod Protrusion
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> D < ENGINE SUPPORT BRACKET

1. Tighten bolts to specified torque in the sequence shown.



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Fig. 81: Installing Engine Support Bracket

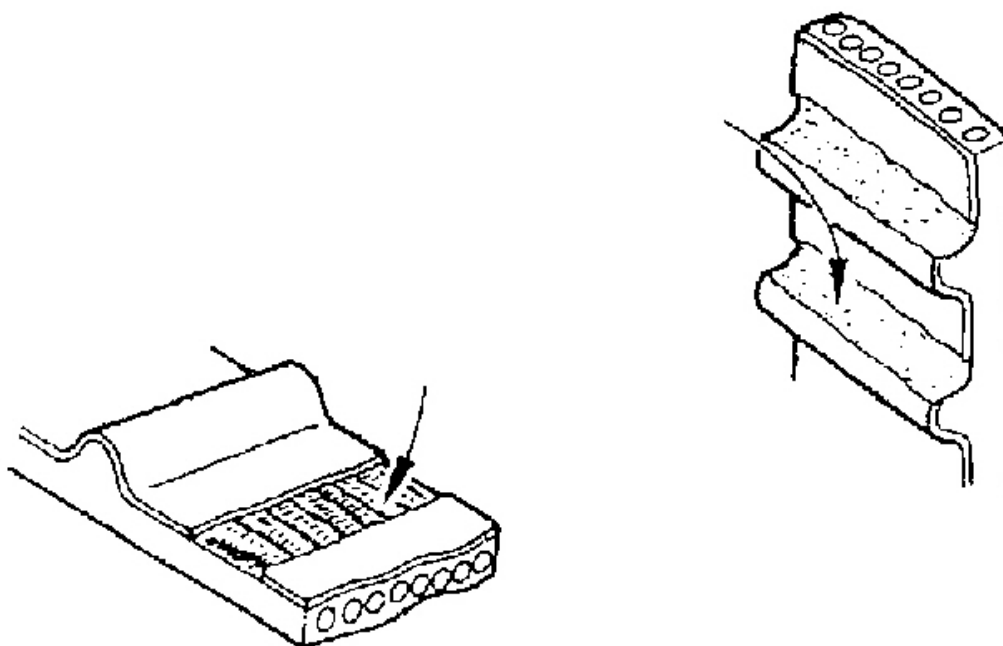
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION

TIMING BELT

Replace belt if any of the following conditions exist.

1. Hardening of back rubber-back side is glossy without resilience and leaves no indent when pressed with fingernail.



G01115544

Fig. 82: Checking Timing Belt Resilience

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2. Cracks on rubber back
3. Cracks or peeling of canvas
4. Cracks on tooth bottom
5. Cracks on side of belt

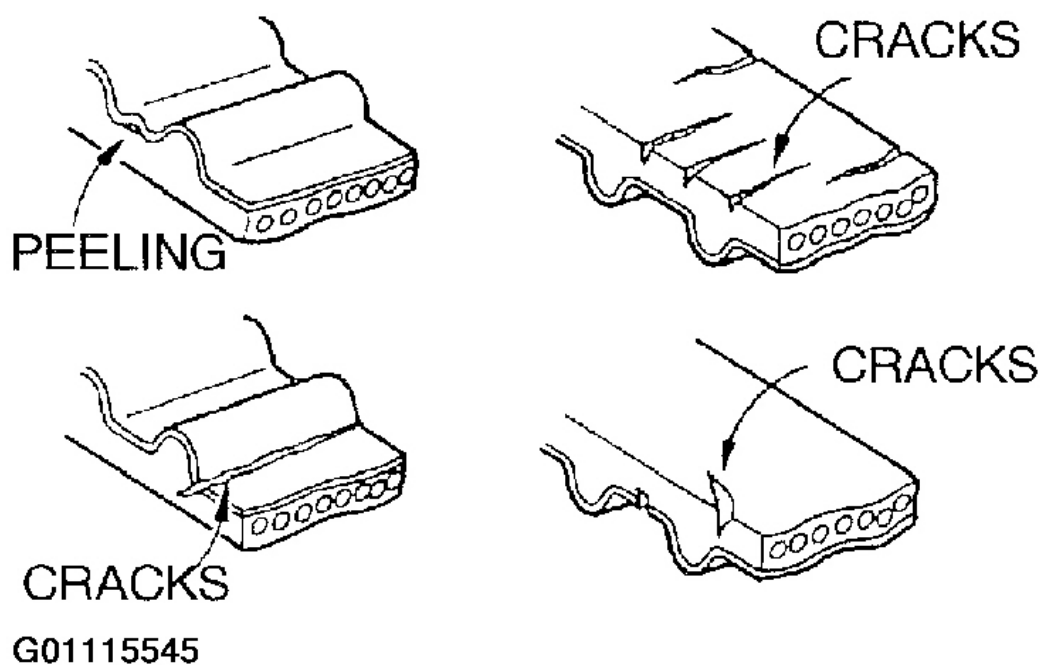


Fig. 83: Checking Timing Belt For Cracks

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

6. Abnormal wear of belt sides. The sides are normal if they are sharp as if cut by a knife.

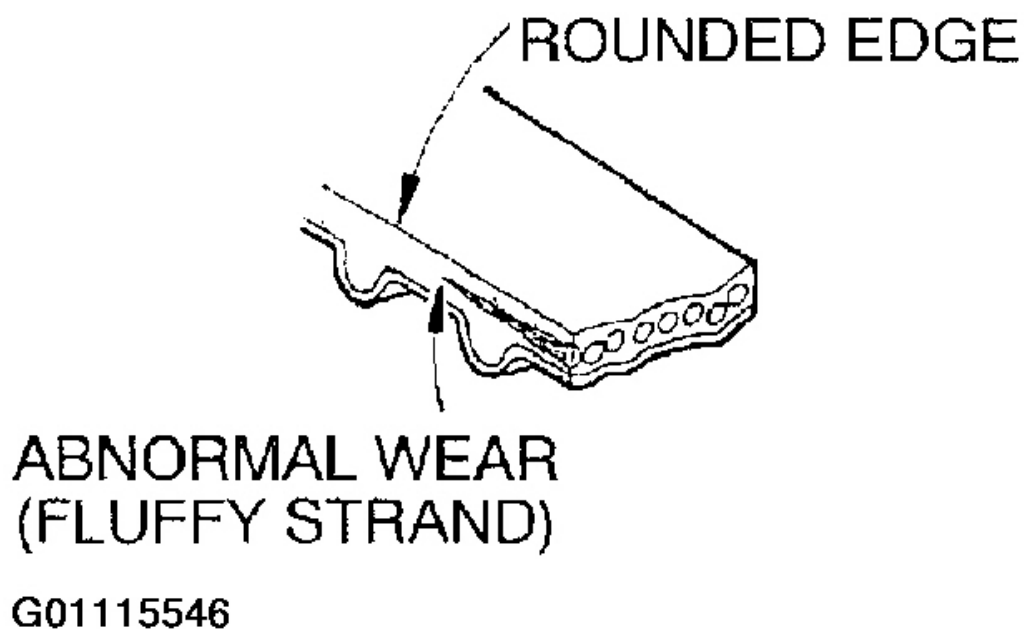
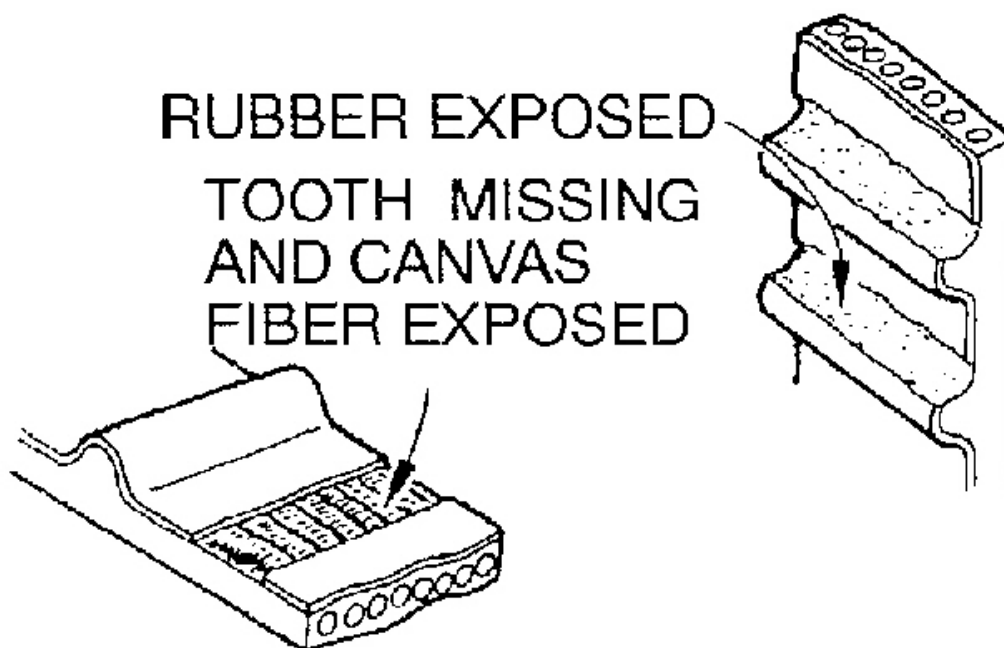


Fig. 84: Checking Timing Belt For Abnormal Wear Of Belt Sides
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

7. Abnormal wear on teeth
8. Tooth missing and canvas fiber exposed.

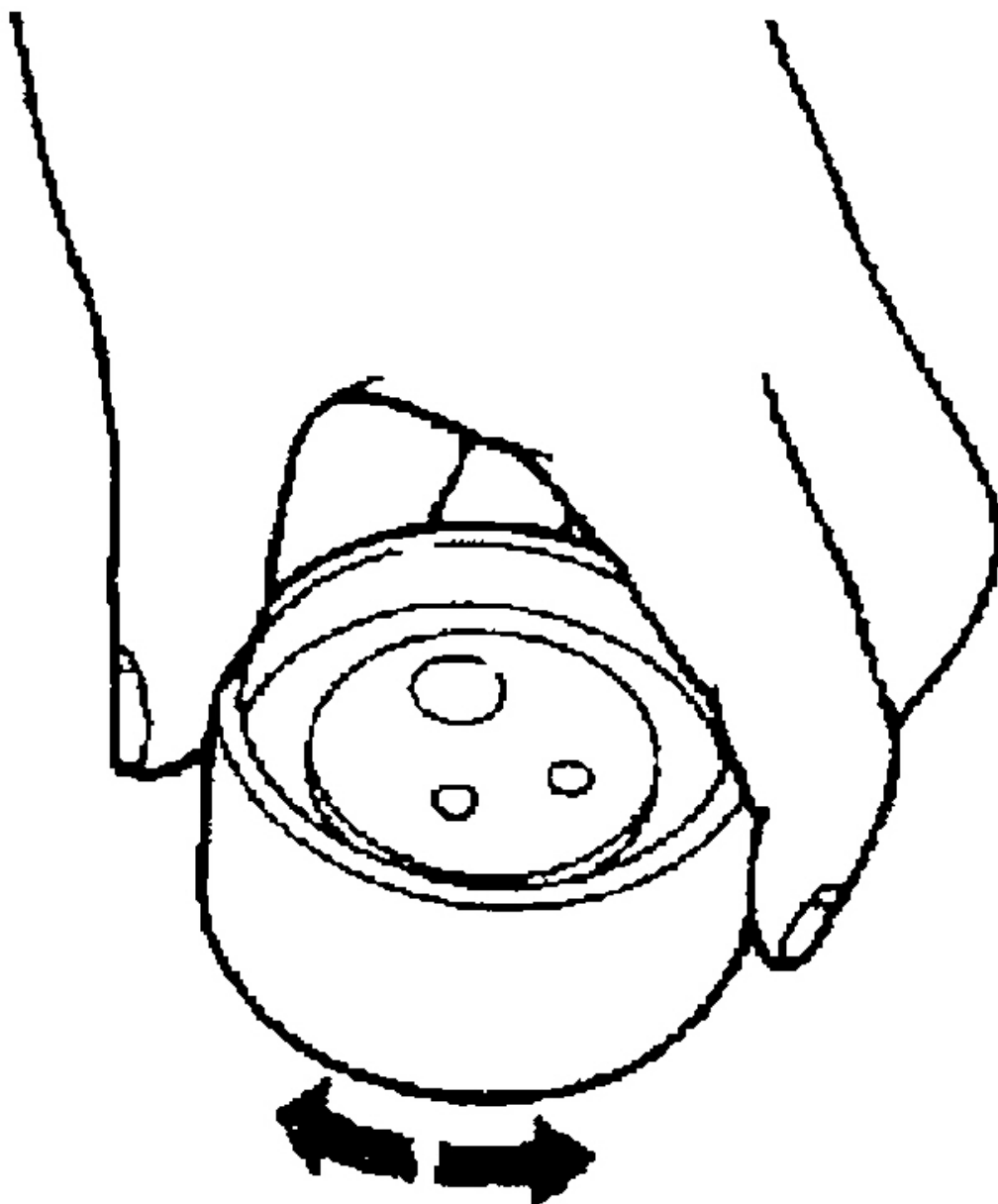


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Fig. 85: Checking Timing Belt For Abnormal Wear, Missing Teeth Or Exposed Canvas
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TENSIONER

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



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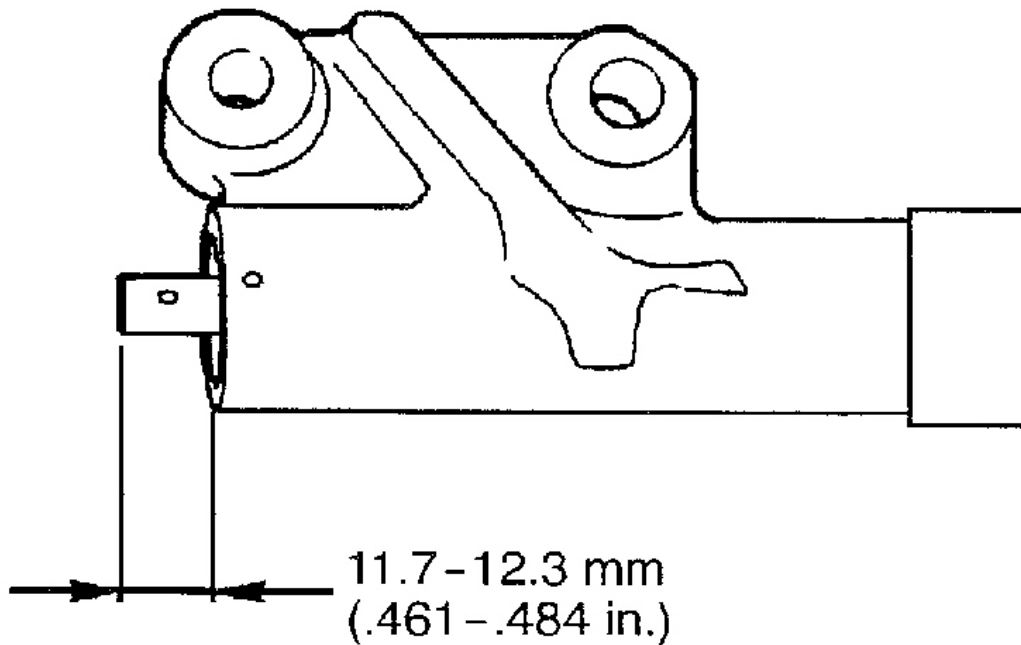
Fig. 86: Checking Pulley Rotation

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.)



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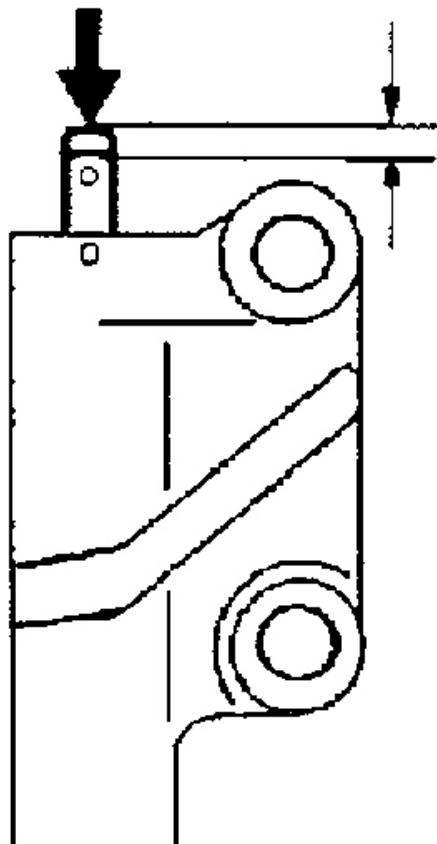
Fig. 87: Checking Auto-Tensioner Rod Projection Length
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

98-196 N
(22-44 lbs.)



MOVEMENT

G01115550

Fig. 88: Measuring Rod Movement

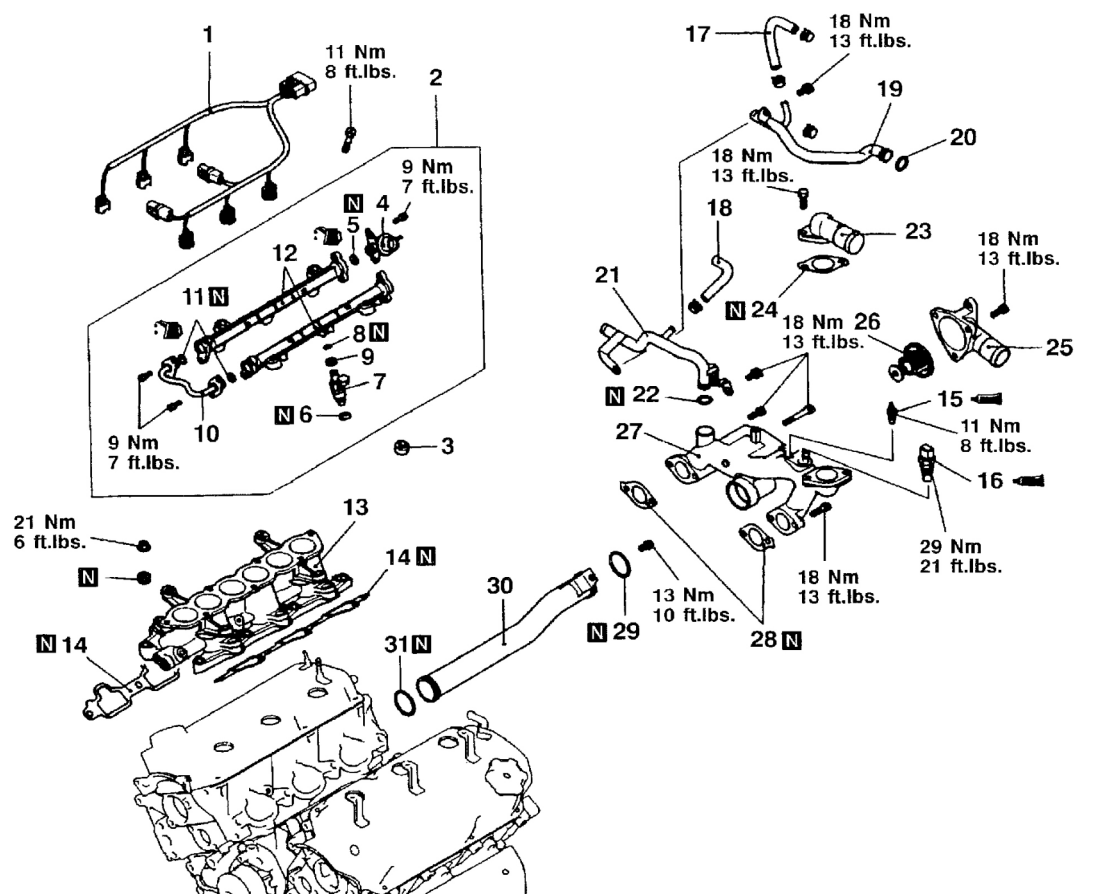
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INTAKE MANIFOLD AND FUEL PARTS

REMOVAL AND INSTALLATION

For intake manifold and fuel parts removal procedures, follow numbered steps in illustration. See **Fig. 89**. For intake manifold and fuel parts installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing intake manifold and fuel parts. Letters with arrows pointing towards letter refer to service points to be observed while performing that

step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



REMOVAL STEPS

- 1. ENGINE HARNESS
- 2. INJECTOR AND FUEL RAIL
- 3. INSULATOR
- ▶H◀ 4. FUEL PRESSURE REGULATOR
- ▶G◀ 5. O-RING
- 6. INSULATOR
- 7. INJECTOR
- 8. O-RING
- 9. GROMMET
- 10. FUEL PIPE
- 11. O-RING
- ▶F◀ 12. DELIVERY PIPE
- ▶F◀ 13. INTAKE MANIFOLD
- ▶E◀ 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
- ▶B◀ 25. WATER INLET FITTING
- 26. THERMOSTAT
- 27. THERMOSTAT HOUSING
- ▶A◀ 28. THERMOSTAT HOUSING GASKET
- ▶A◀ 29. O-RING
- 30. WATER PIPE
- ▶A◀ 31. O-RING

G01115551

Fig. 89: Removing & Installing Intake Manifold & Fuel Parts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

> A < O-RING AND WATER PIPE INSTALLATION

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

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

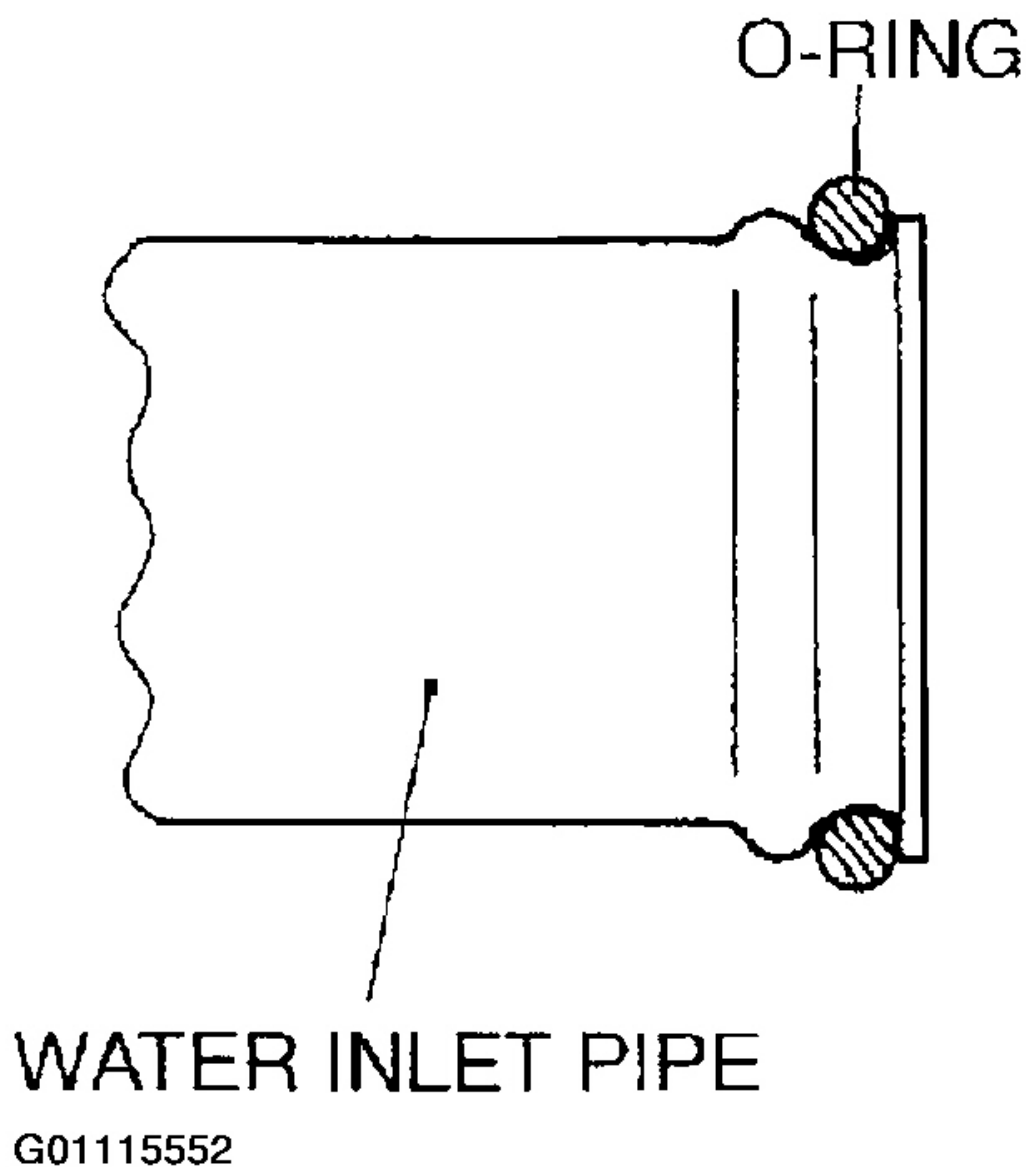


Fig. 90: Installing O-Ring & Water Pipe

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.

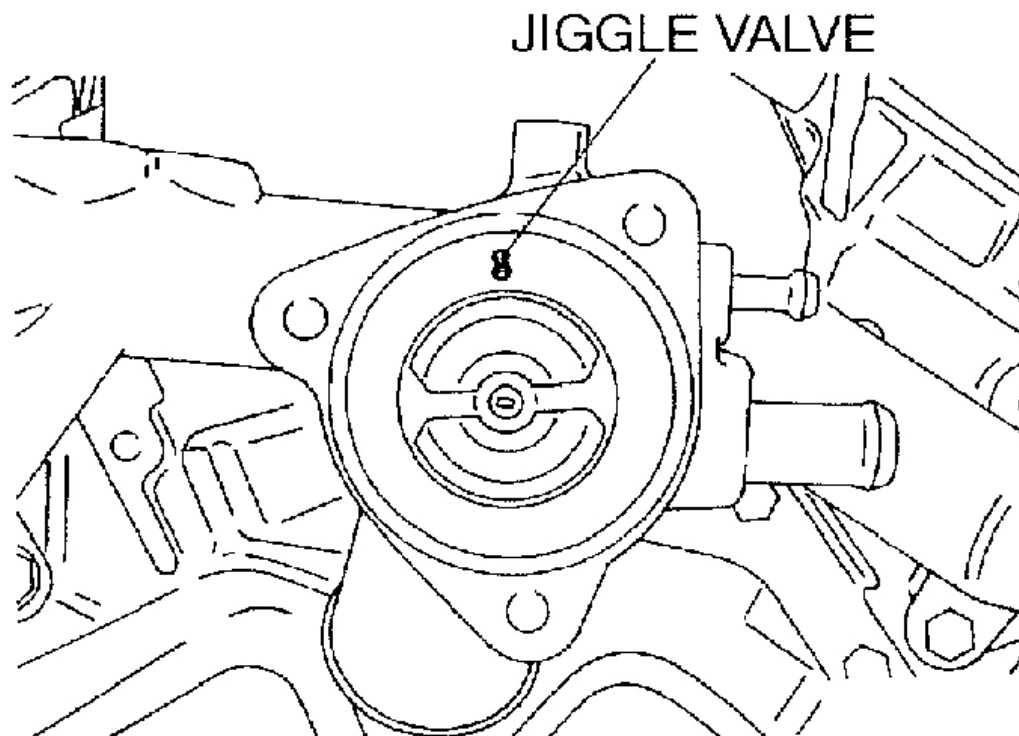


Fig. 91: Installing Thermostat

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.

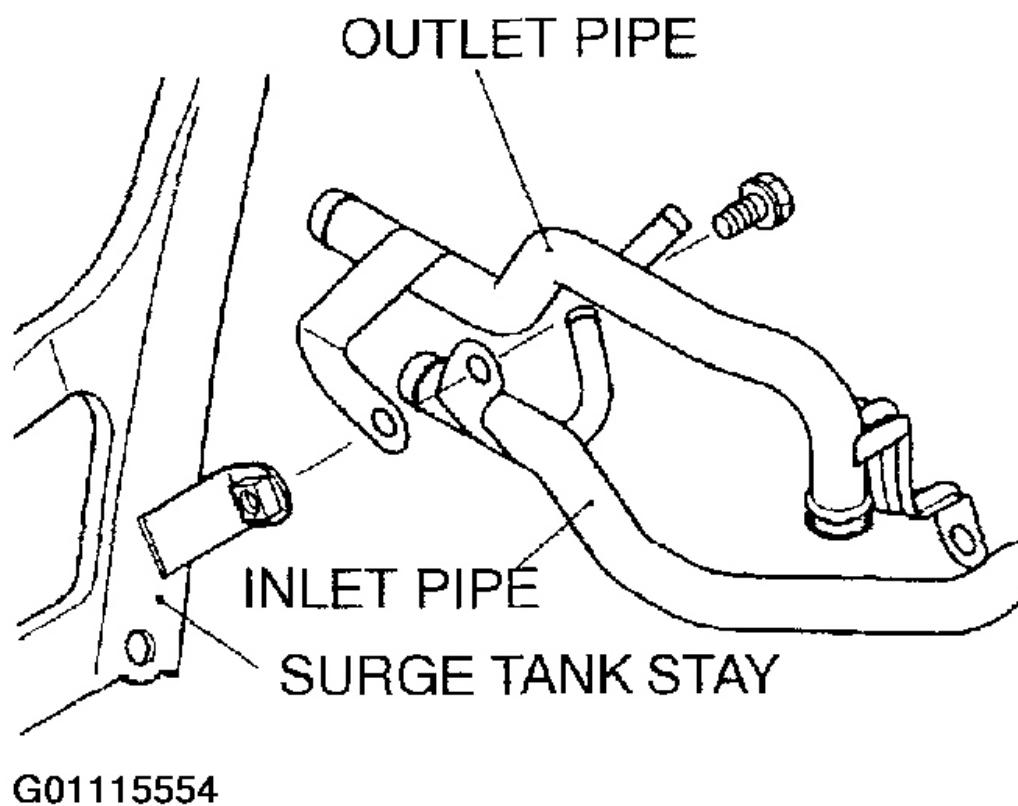
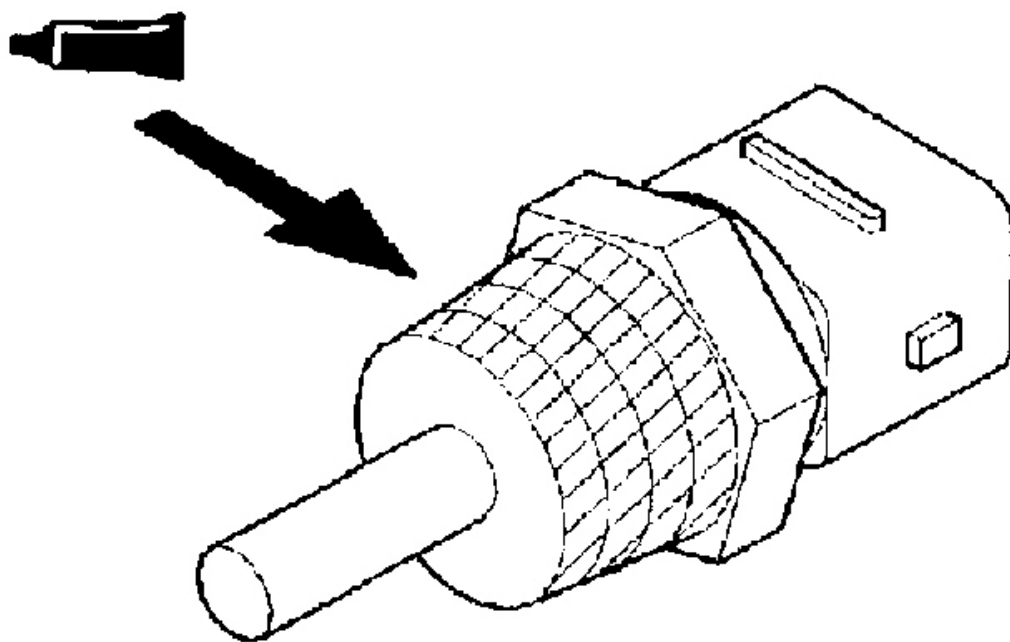


Fig. 92: Installing Heater Inlet & Outlet Pipes
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> D < SEALANT APPLICATION TO ENGINE COOLANT TEMPERATURE SENSOR

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

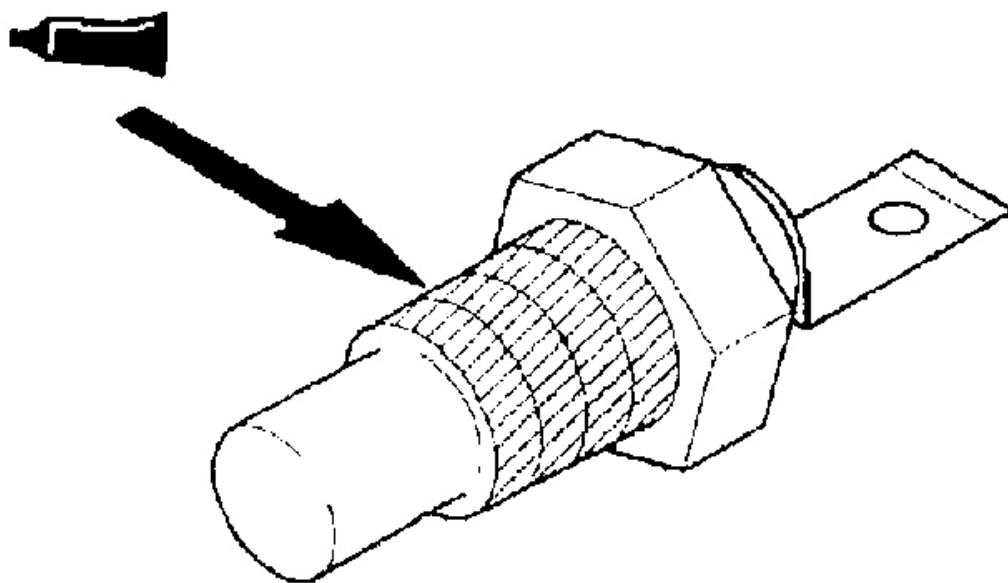


G01115555

Fig. 93: 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



G01115556

Fig. 94: 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.

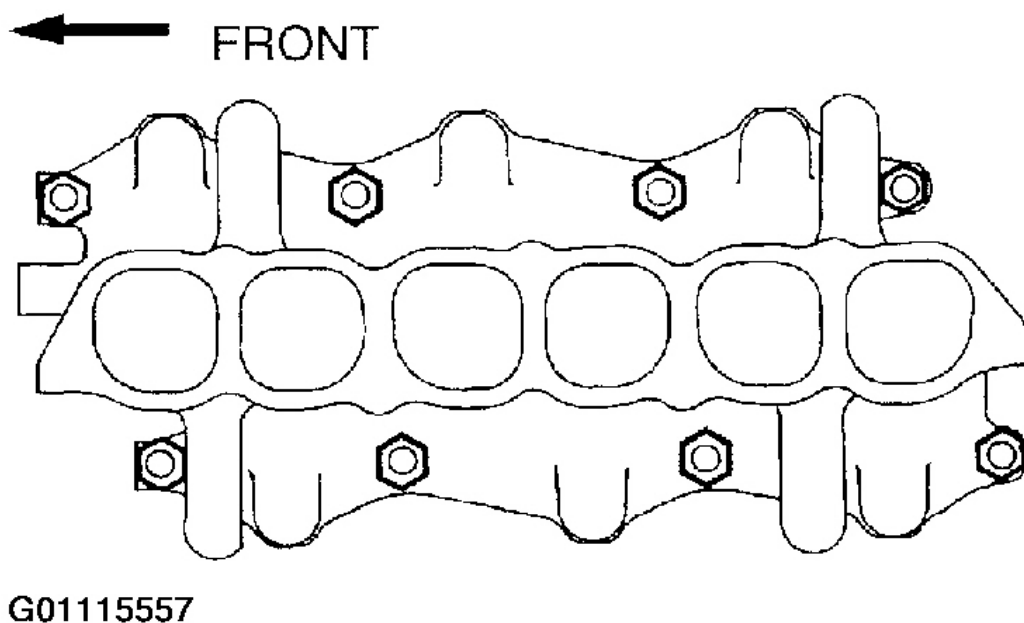


Fig. 95: Installing Intake Manifold

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> G < INJECTOR INSTALLATION

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

1. Before installing the injector, the rubber O-ring must be lubricated with a drop of new engine oil for easy installation.
2. Insert the injector top end into the fuel rail. Be careful not to damage O-ring during installation.

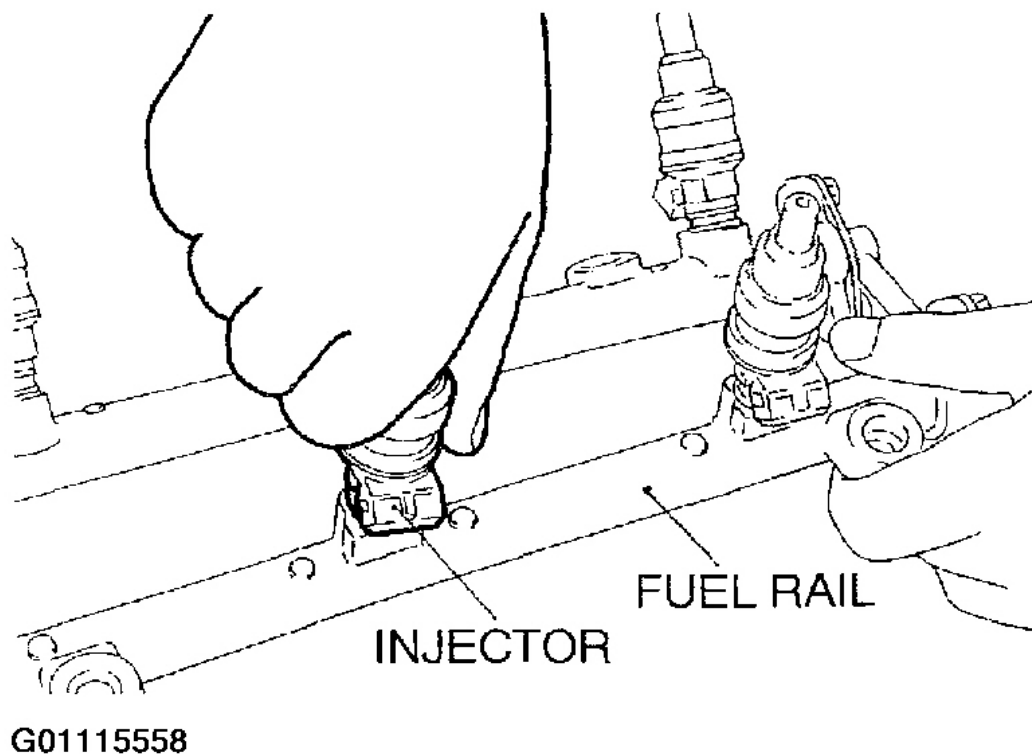


Fig. 96: Installing Injector

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> H < FUEL PRESSURE REGULATOR INSTALLATION

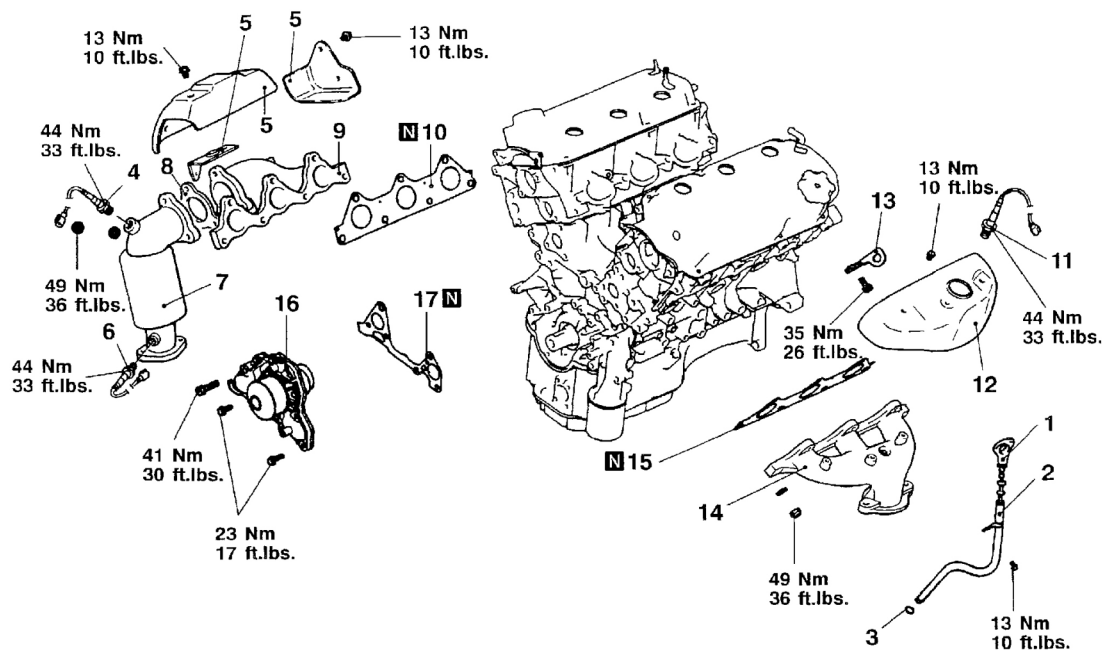
CAUTION: Use care not to let the engine oil enter the fuel rail.

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

EXHAUST MANIFOLD AND WATER PUMP

REMOVAL AND INSTALLATION

For exhaust manifold and water pump removal procedures, follow numbered steps in illustration. See **Fig. 97**. For exhaust manifold and water pump installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing exhaust manifold and water pump. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



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
- ▶B◀ 14. EXHAUST MANIFOLD, FRONT
- ▶B◀ 15. EXHAUST MANIFOLD GASKET, FRONT
- ▶A◀ 16. WATER PUMP
17. WATER PUMP GASKET

G01115559

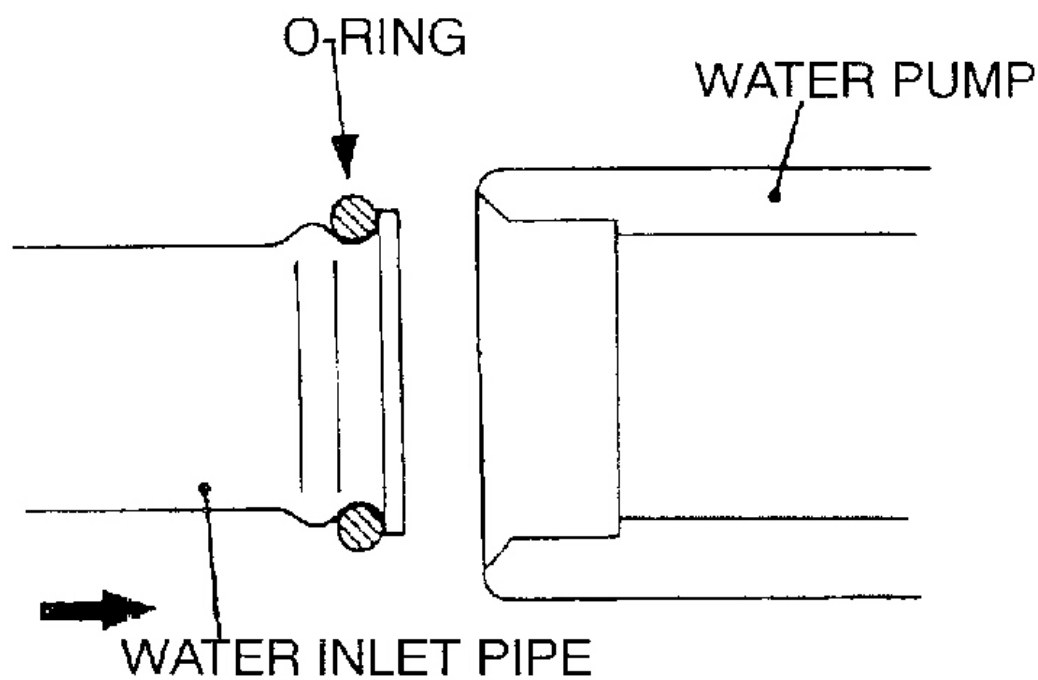
Fig. 97: Removing & Installing Exhaust Manifold & Water Pump
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

> A < O-RING AND WATER PIPE INSTALLATION

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

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

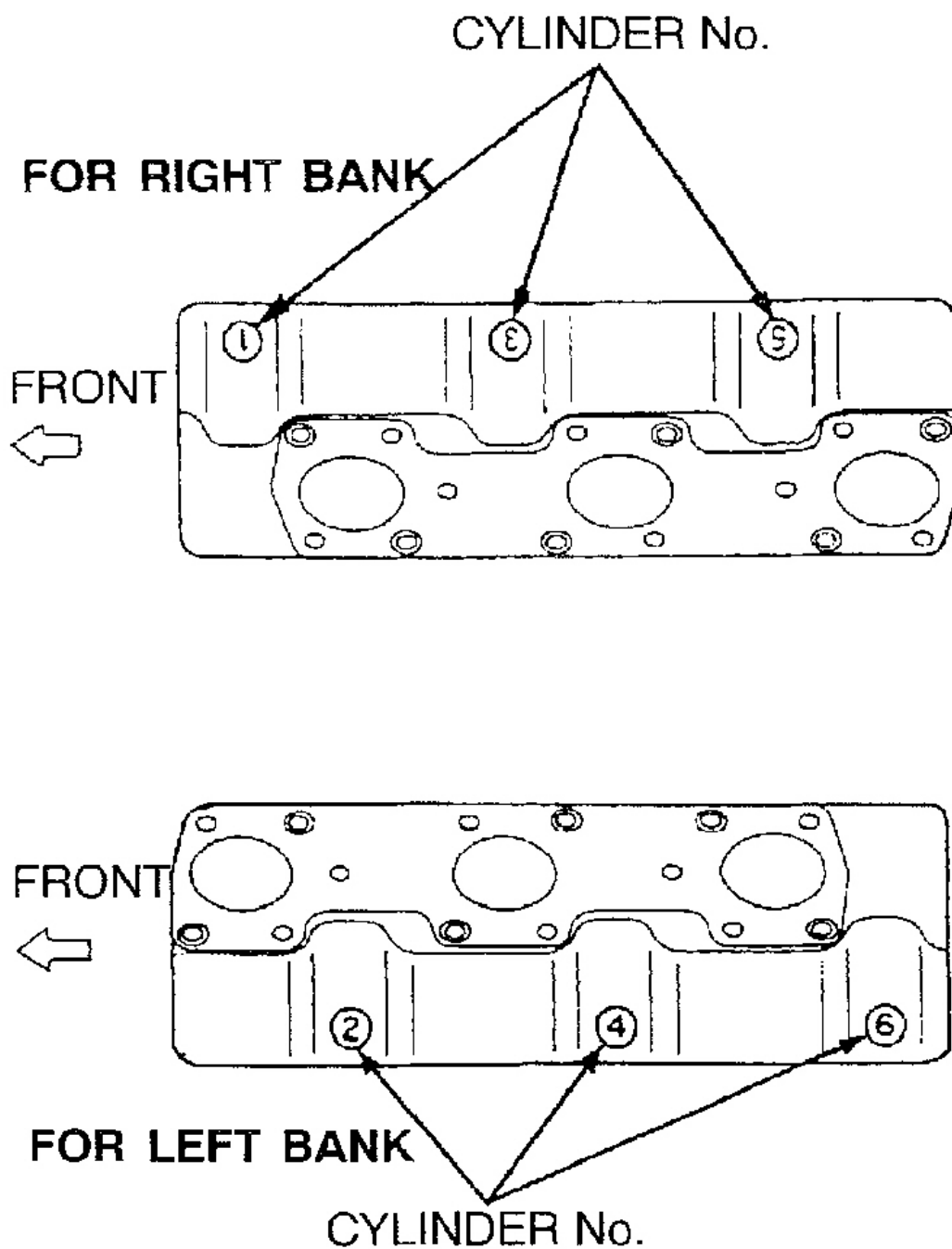


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Fig. 98: Installing O-Ring & Water Pipe
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> 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.



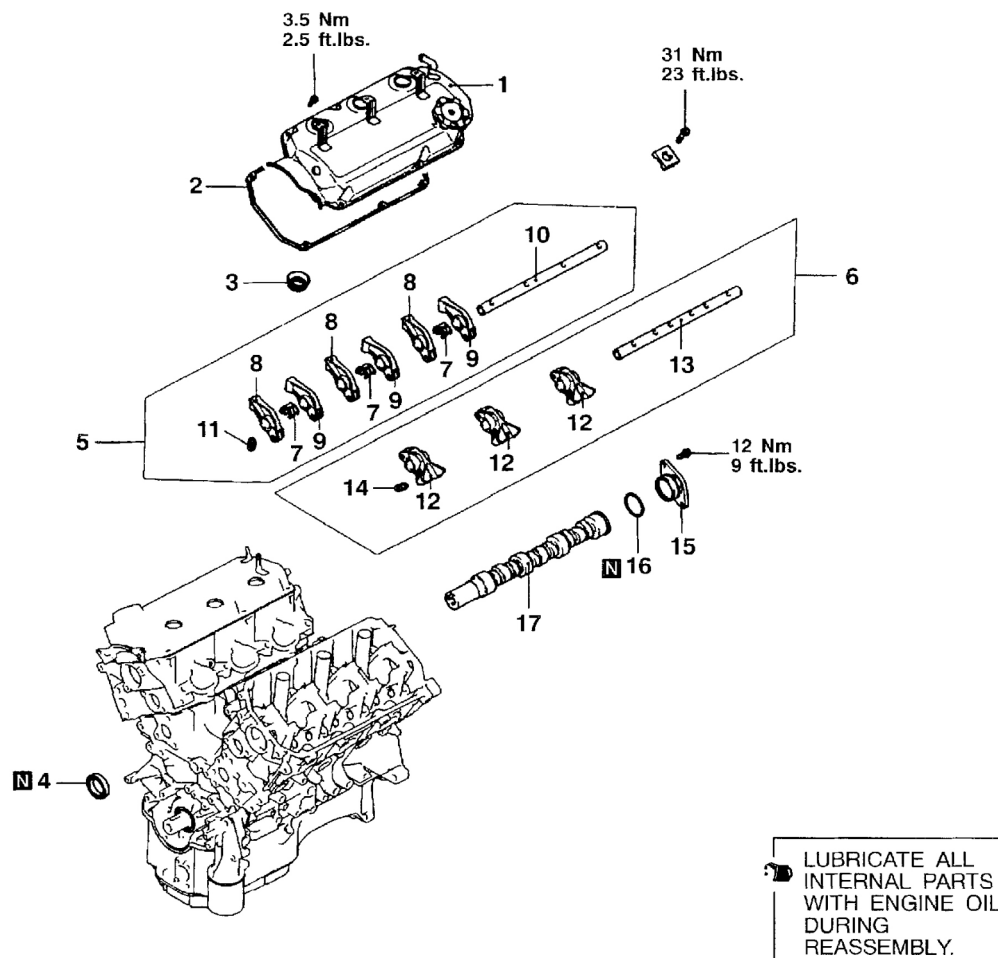
G01115561

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

ROCKER ARMS AND CAMSHAFT

REMOVAL AND INSTALLATION

For rocker arms and camshaft removal procedures, follow numbered steps in illustration. See **Fig. 100**. For rocker arms and camshaft installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing rocker arms and camshaft. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



REMOVAL STEPS

1. ROCKER COVER
2. ROCKER COVER GASKET
3. OIL SEAL
4. CAMSHAFT OIL SEAL
5. ROCKER ARM, ROCKER ARM SHAFT
6. ROCKER ARM, ROCKER ARM SHAFT
7. ROCKER SHAFT SPRING
8. ROCKER ARM A
9. ROCKER ARM B

10. ROCKER ARM SHAFT
11. LASH ADJUSTER
12. ROCKER ARM C
13. ROCKER ARM SHAFT
14. LASH ADJUSTER
15. THRUST CASE
16. O-RING
17. CAMSHAFT

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Fig. 100: Removing & Installing Rocker Arms & Camshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

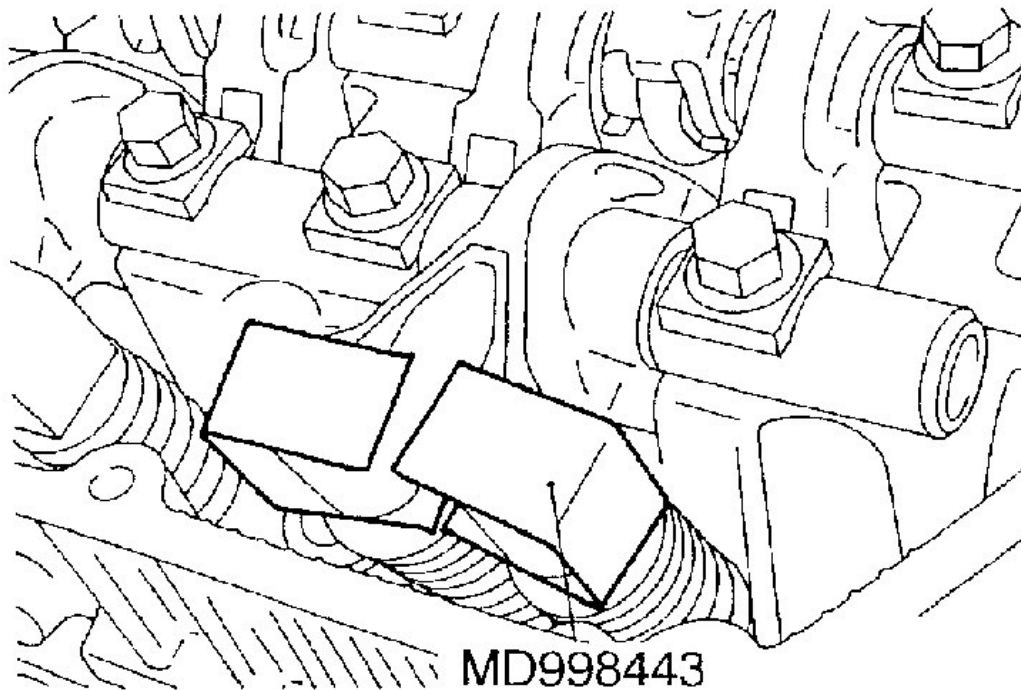
REMOVAL SERVICE POINT

< A > ROCKER ARM, ROCKER ARM SHAFT REMOVAL

1. Install the special tools to the rocker arm to hold the lash adjuster.
2. Loosen the camshaft bearing cap bolt. Do not remove the bolts from the cap.

NOTE: If the lash adjuster is to be re-used, it must be cleaned and checked before installation, see LASH ADJUSTER CLEANING AND CHECKING.

3. Remove the rocker arm, shaft and bearing cap as an assembly.



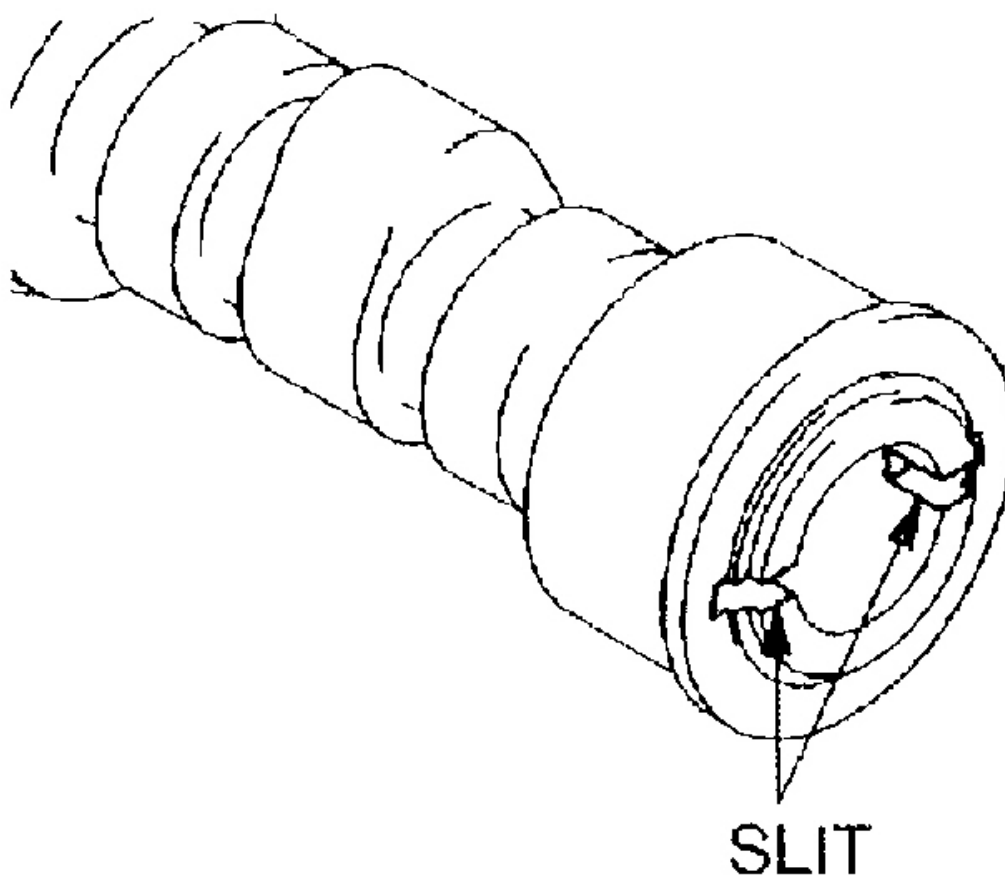
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Fig. 101: Removing Rocker Arm, Shaft & Bearing Cap As An Assembly
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

> A < CAMSHAFT INSTALLATION

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



G01115564

Fig. 102: Identifying Right Bank Camshaft

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

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

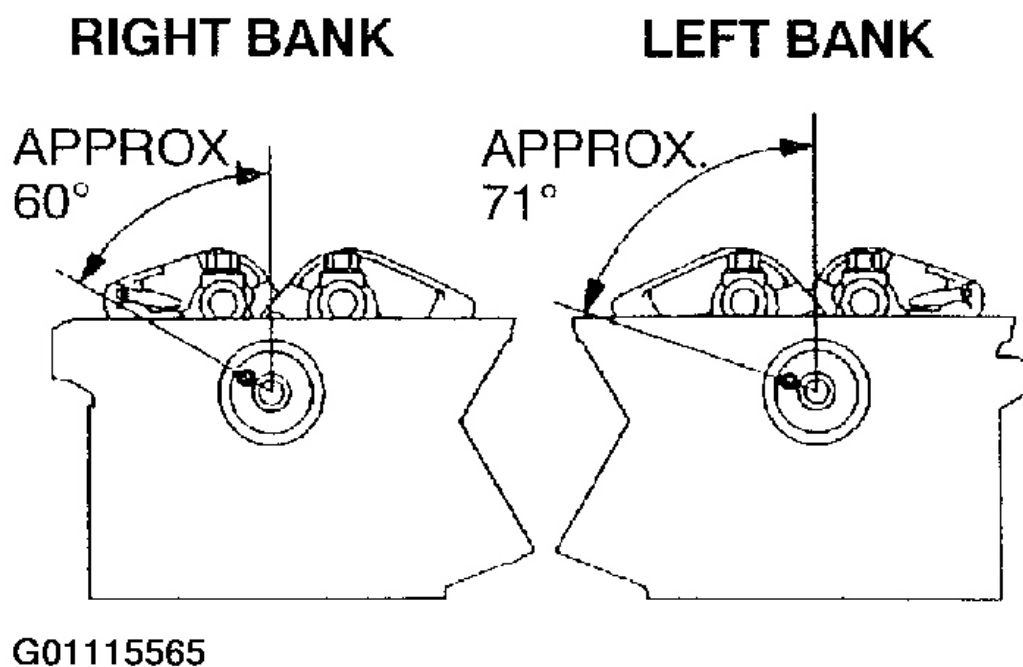


Fig. 103: Checking Dowel Pin Location

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> B < LASH ADJUSTER INSTALLATION

NOTE: If the lash adjuster is to be re-used, it must be cleaned and checked before installation, see 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.

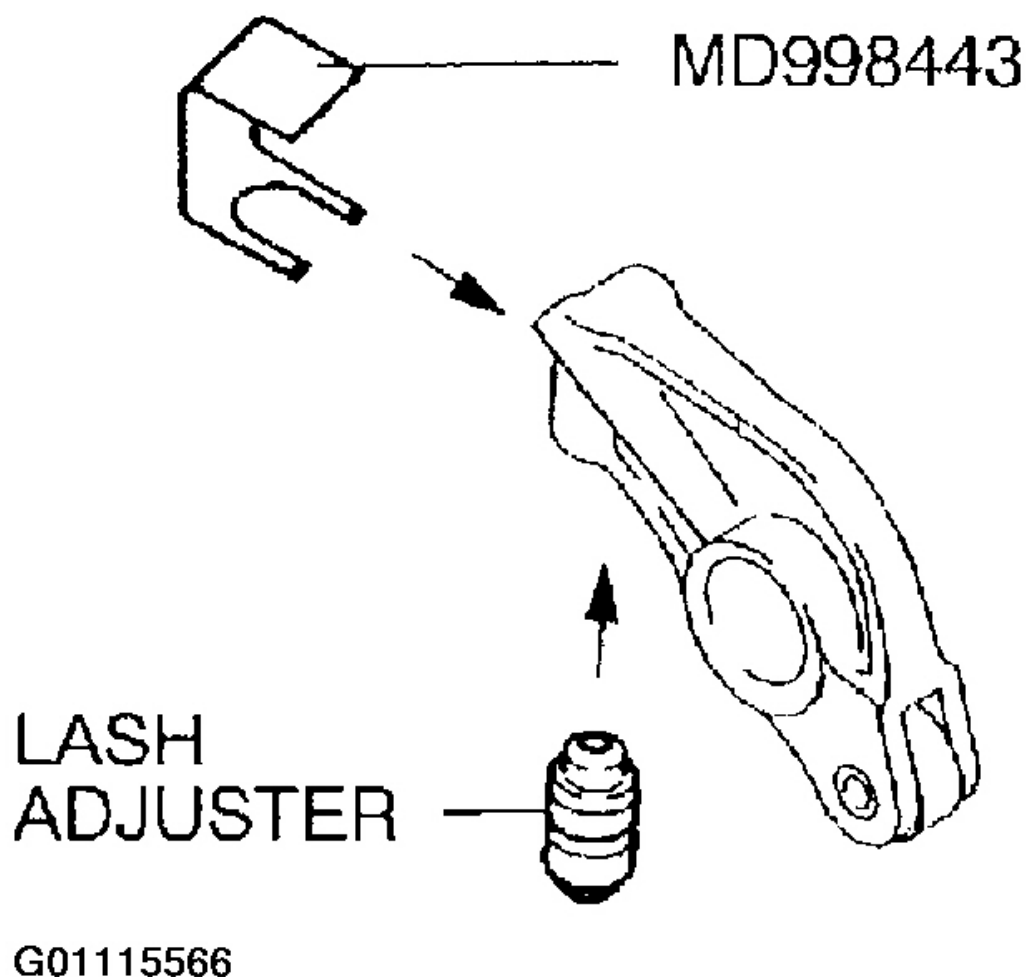


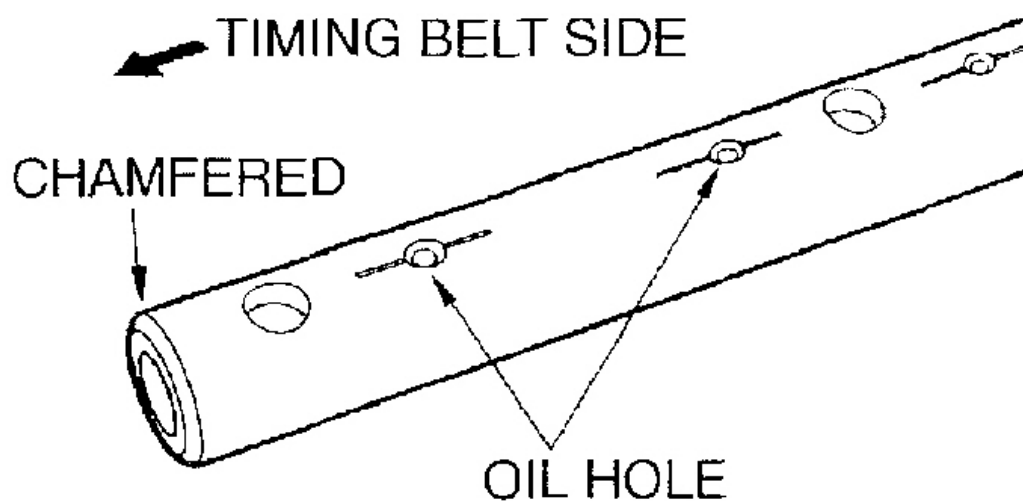
Fig. 104: Installing Lash Adjuster

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> C < ROCKER ARM SHAFT

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

1. The end with the larger chamfer is at the right on the left bank and at the left on the right bank.
2. The side with the oil holes is on the lower side (cylinder head side).



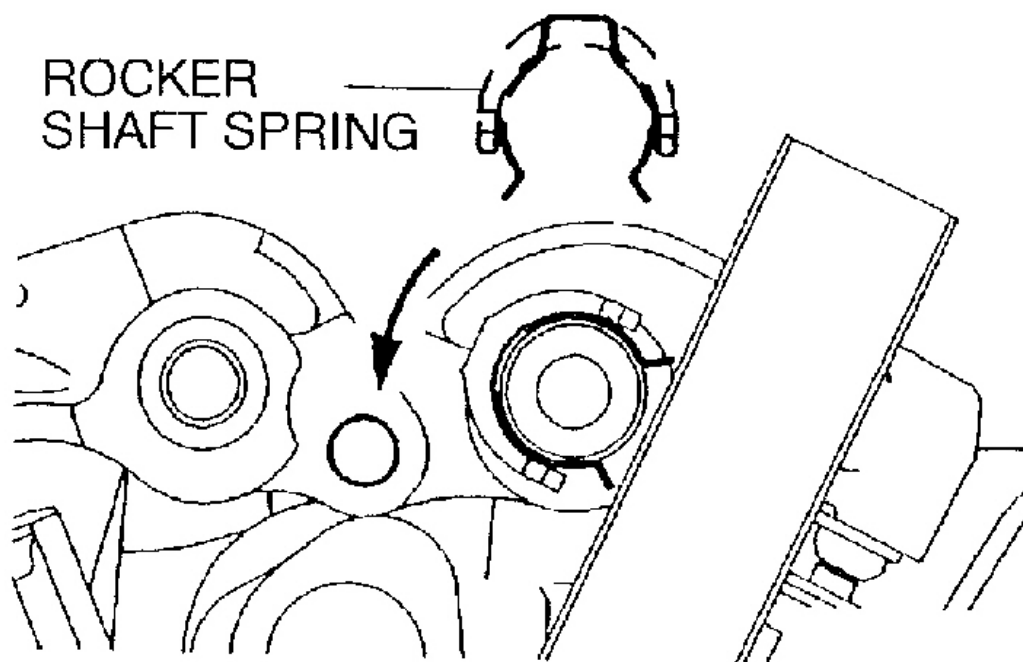
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Fig. 105: Identifying Lower Side (Cylinder Head Side)

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.



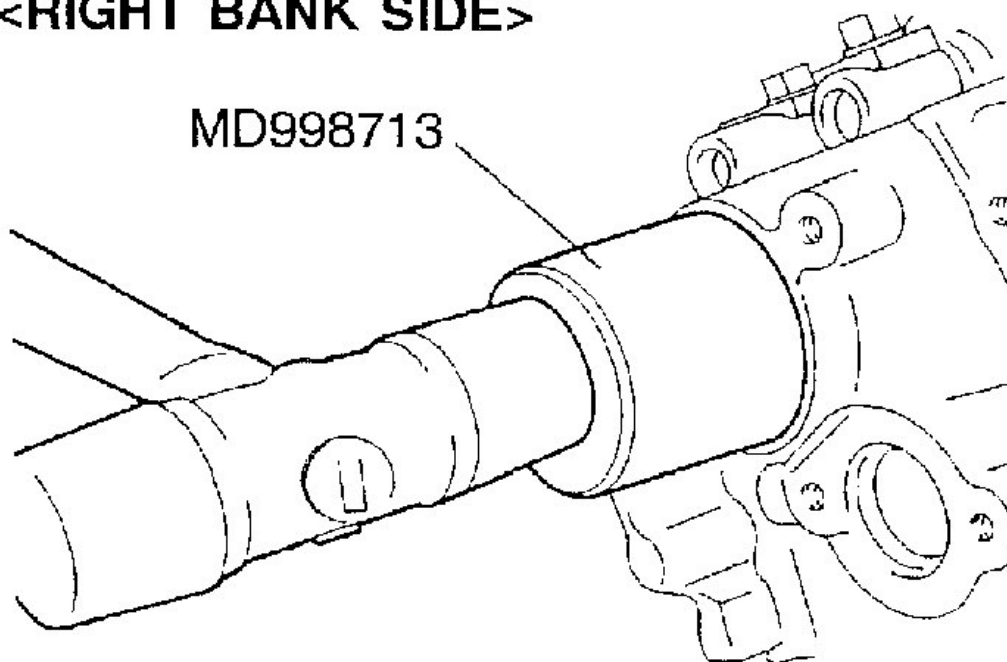
G01115568

Fig. 106: Installing Rocker Shaft Spring
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> E < CAMSHAFT OIL SEAL INSTALLATION

<RIGHT BANK SIDE>

MD998713



G01115569

Fig. 107: Installing Camshaft Oil Seal (Right Bank)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

<LEFT BANK SIDE>

MD998713

MB991559

G01115570

Fig. 108: Installing Camshaft Oil Seal (Left Bank)

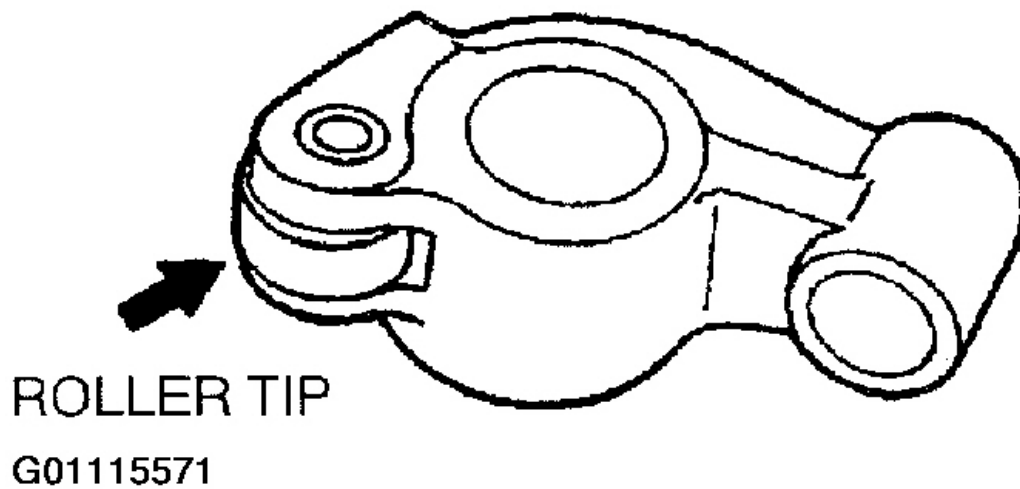
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

**Fig. 109: Checking Roller Surface**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

CAMSHAFT

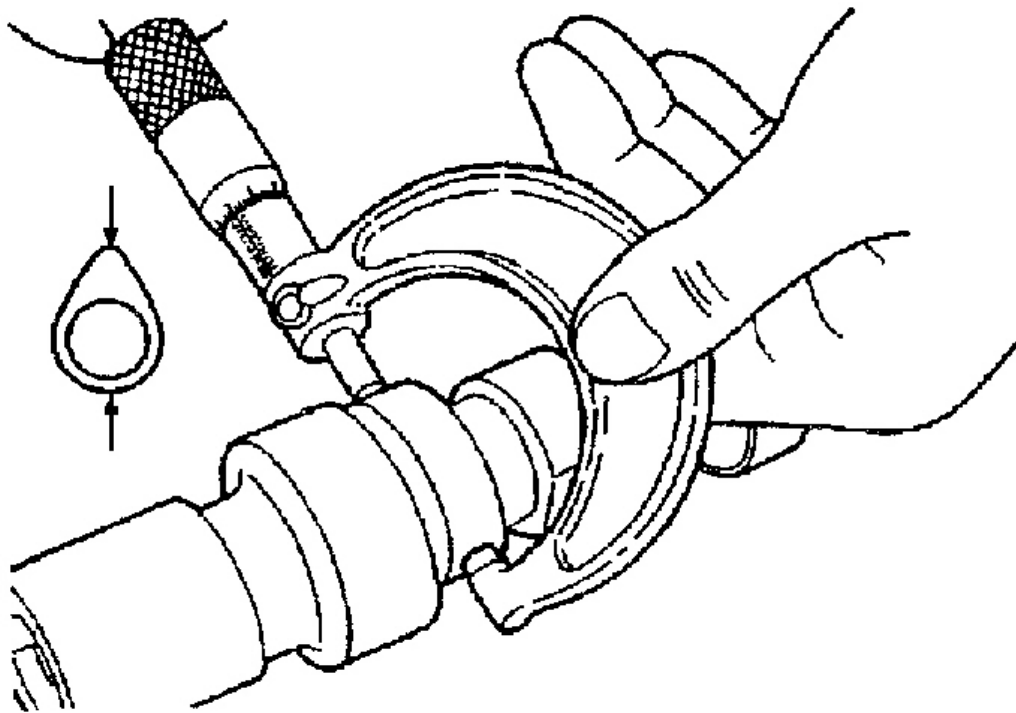
1. Inspect the camshaft bearing journals for damage and binding. If the journals are binding, also check the cylinder head for damage. Also check the cylinder head oil holes for clogging.
2. Check the cam surface for abnormal wear and damage and replace if defective. Also measure the cam height and replace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

	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)

G01115572

Fig. 110: Identifying Camshaft Standard Values

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 111: Measuring Cam Height

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

LASH ADJUSTER CLEANING AND CHECKING

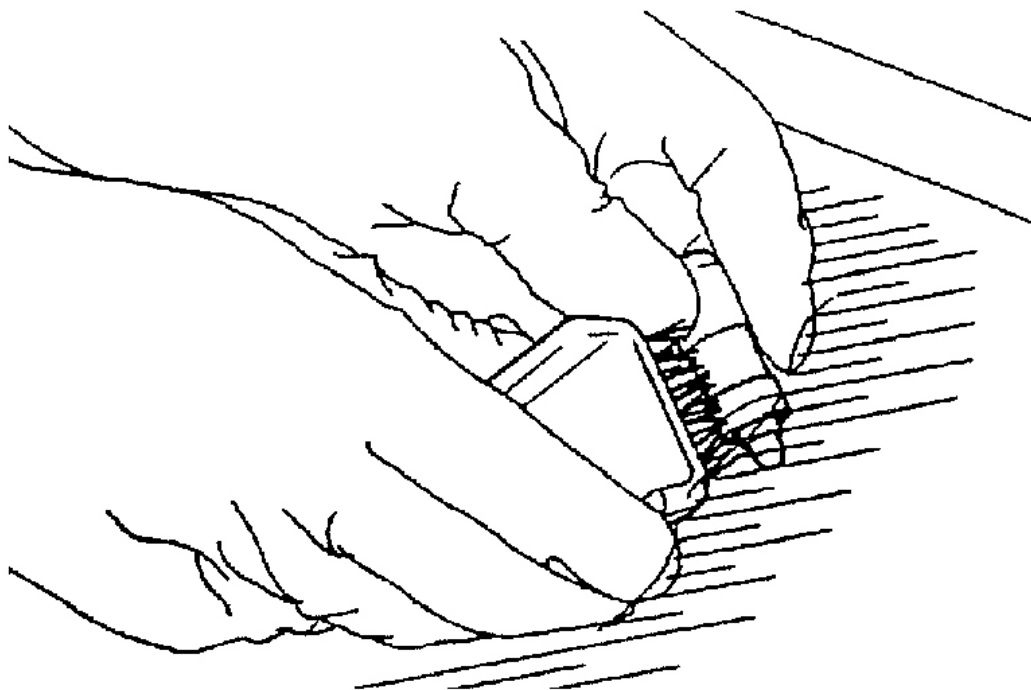
CAUTION: The lash adjusters are precision-engineered mechanisms. Do not allow them to become contaminated by dirt or other foreign substances.

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.

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



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Fig. 112: Using Nylon Brush To Remove Hard Deposits
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

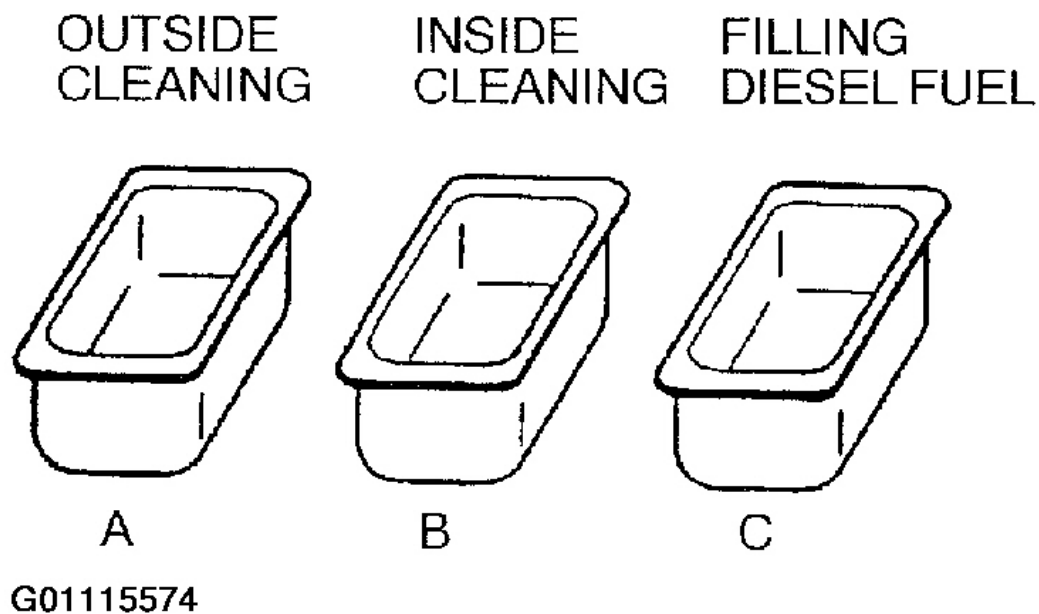


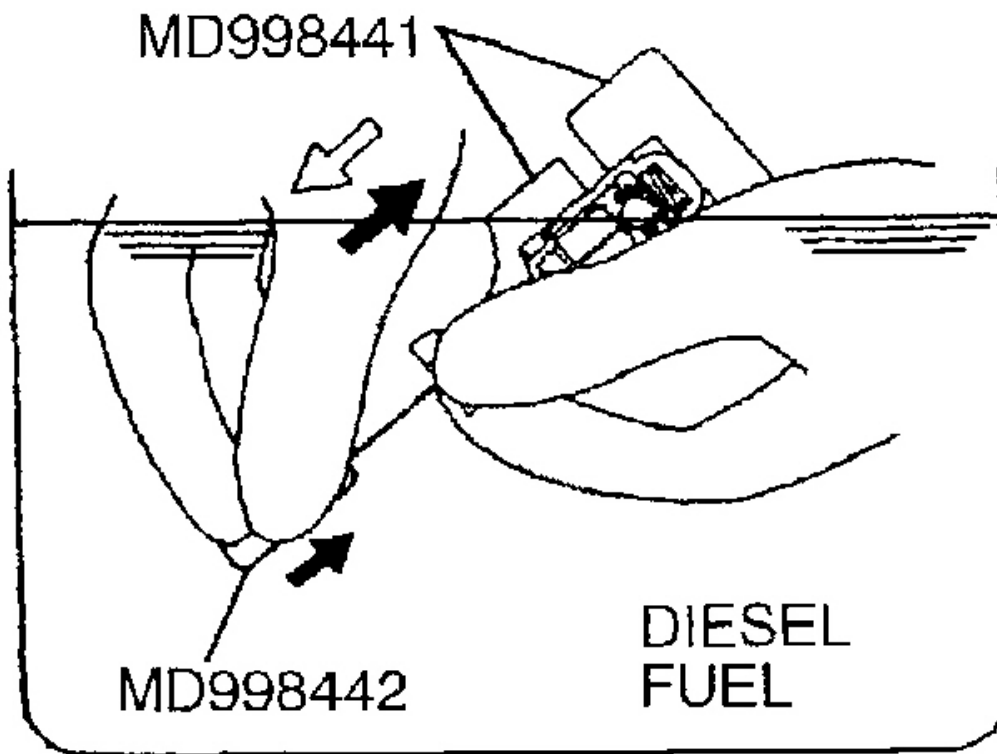
Fig. 113: Preparing Three Containers For Cleaning Components
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

2. Place the lash adjuster in container A and clean its outside surface.
3. Fit special tool MD998441 onto the lash adjuster.

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

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.
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.

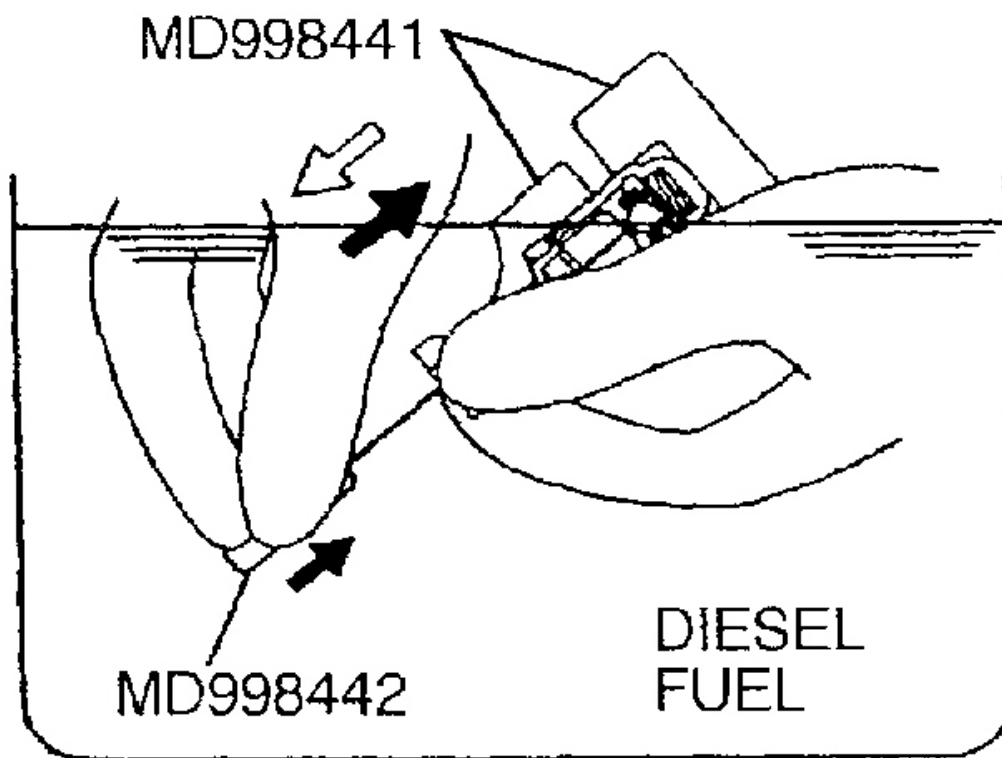


G01115576

Fig. 114: Fitting Special Tool MD998441 Onto Lash Adjuster
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

6. Fit special tool MD998441 onto the lash adjuster.
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.



G01115577

Fig. 115: Fitting Special Tool MD998441 Onto Lash Adjuster
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

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.

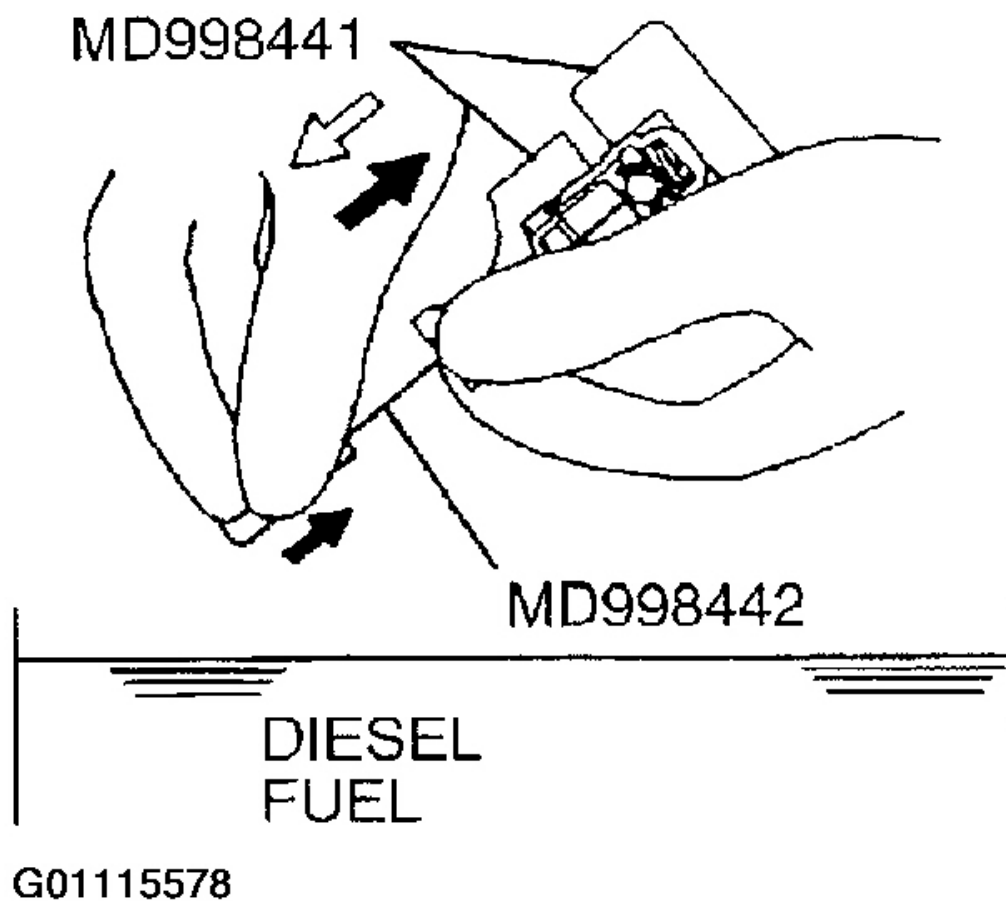
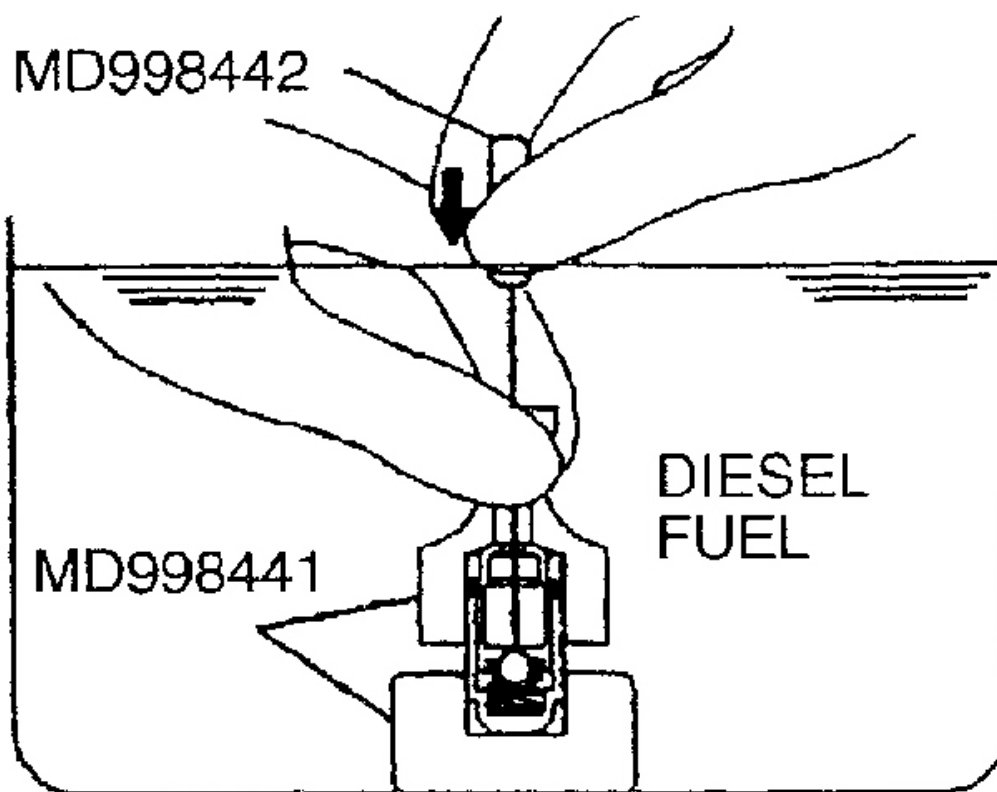


Fig. 116: Removing Diesel Fuel From Pressure Chamber

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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



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Fig. 117: Pushing Internal Steel Ball Using Special Tool MD998442
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.

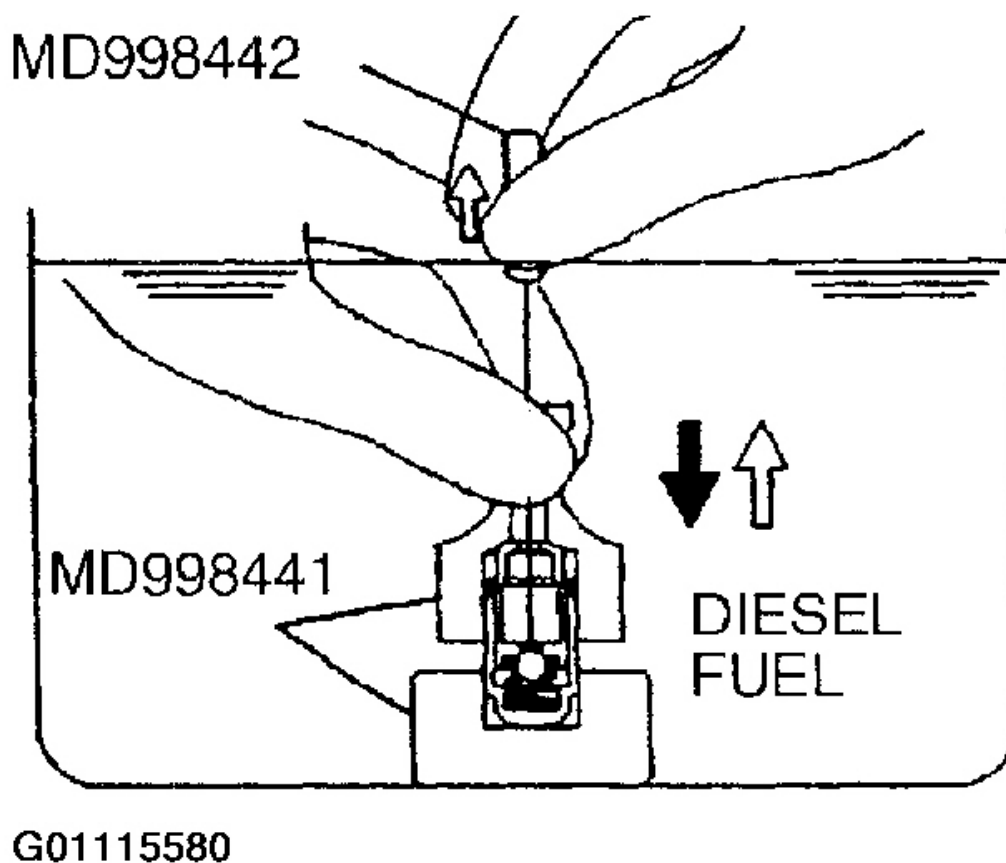
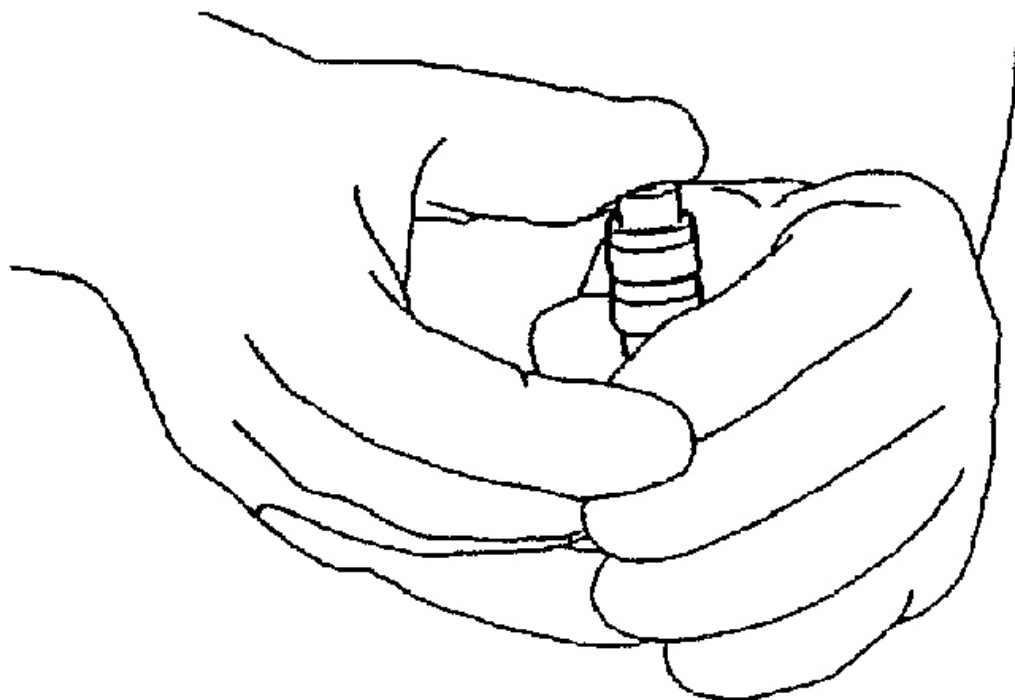


Fig. 118: Releasing Steel Ball To Allow Pressure Chamber To Fill With Diesel Fuel
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.



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Fig. 119: Checking Plunger

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

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

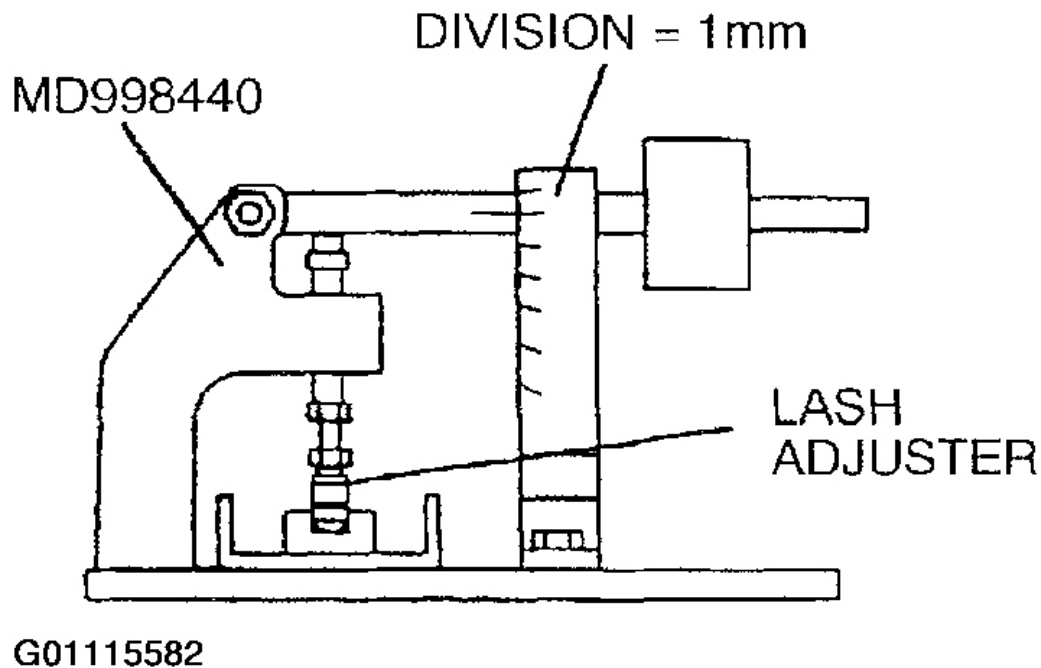


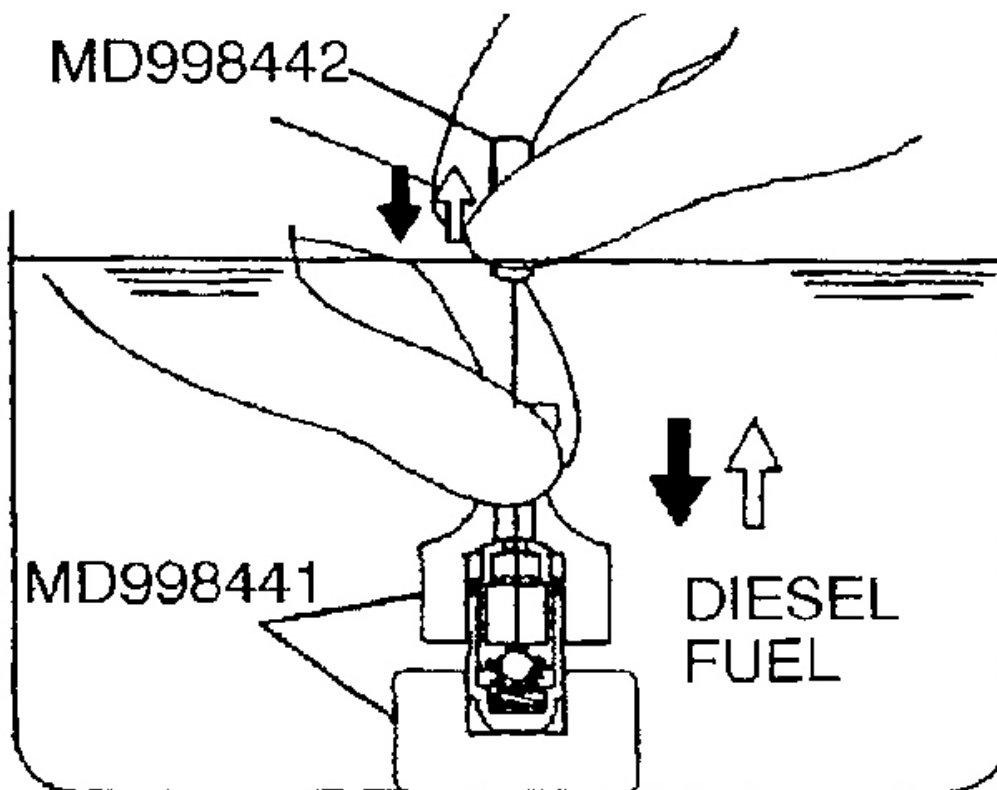
Fig. 120: Checking Lash Adjuster Leak Down Time

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)]

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.
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.

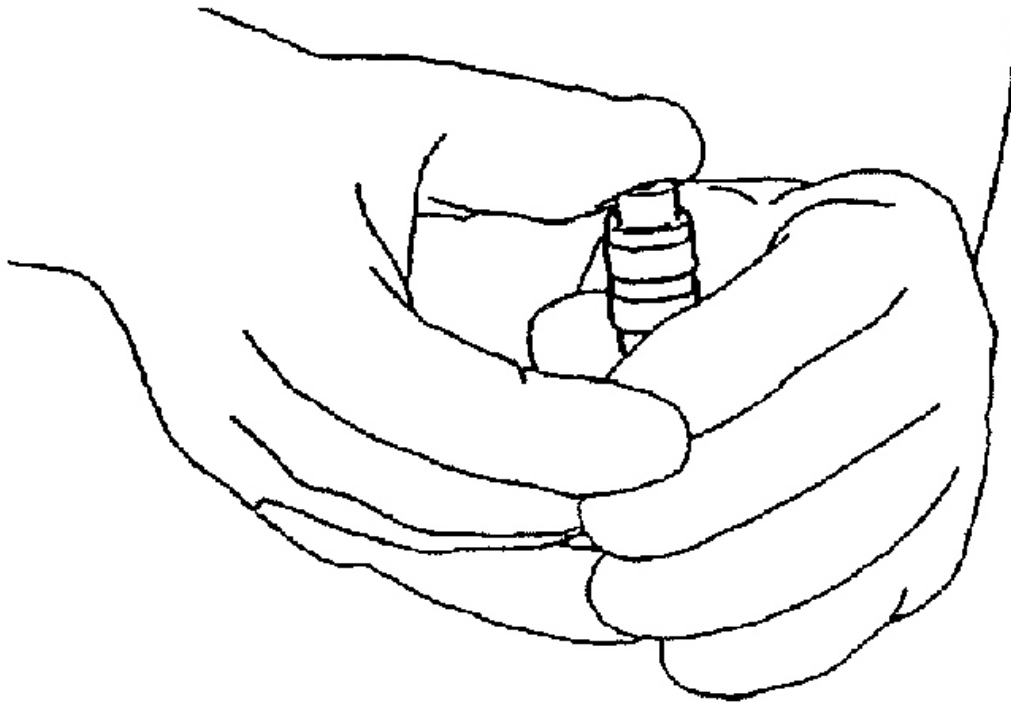


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Fig. 121: Allowing Pressure Chamber To Fill With Diesel Fuel
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

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.
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.



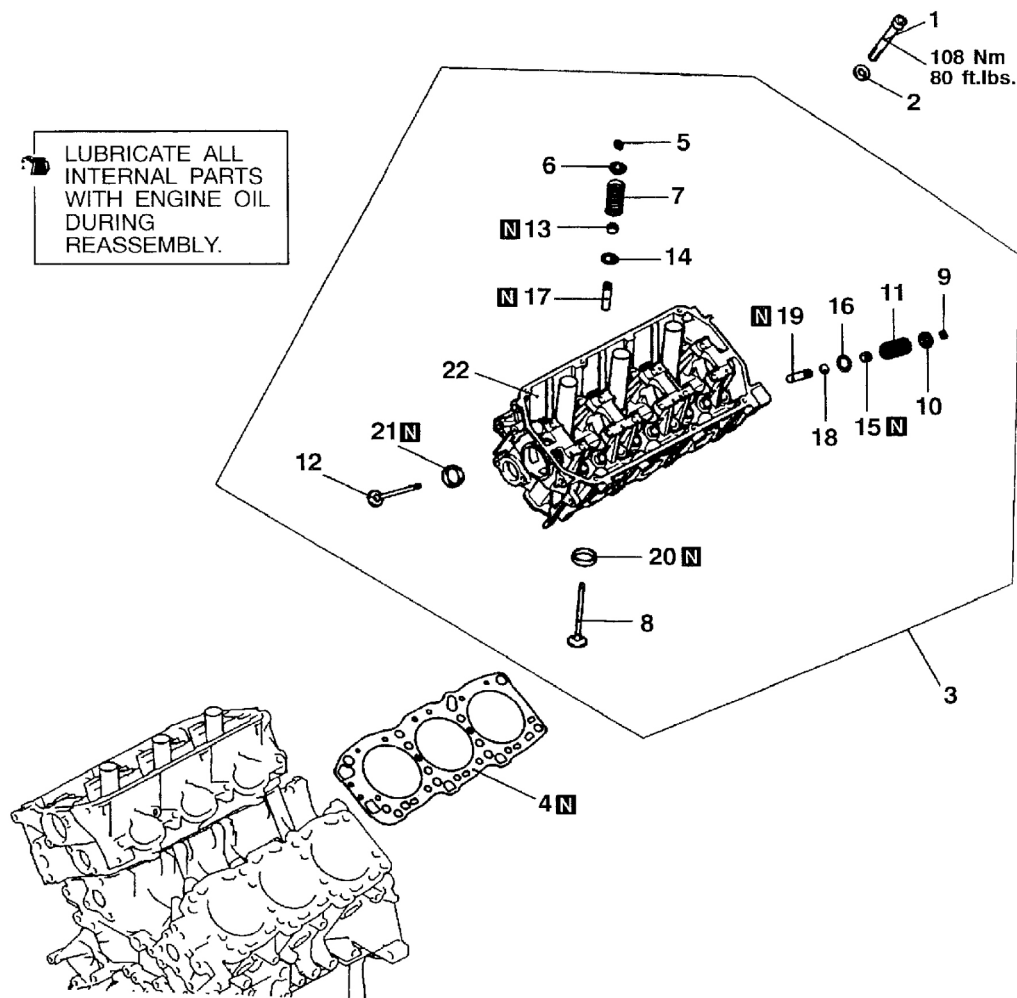
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Fig. 122: Checking Lash Adjuster Height

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CYLINDER HEAD AND VALVE**REMOVAL AND INSTALLATION**

For removal procedures, follow numbered steps in illustration. See rocker arms and camshaft **Fig. 123**. For rocker arms and camshaft installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing rocker arms and camshaft. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINTS**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



REMOVAL STEPS

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

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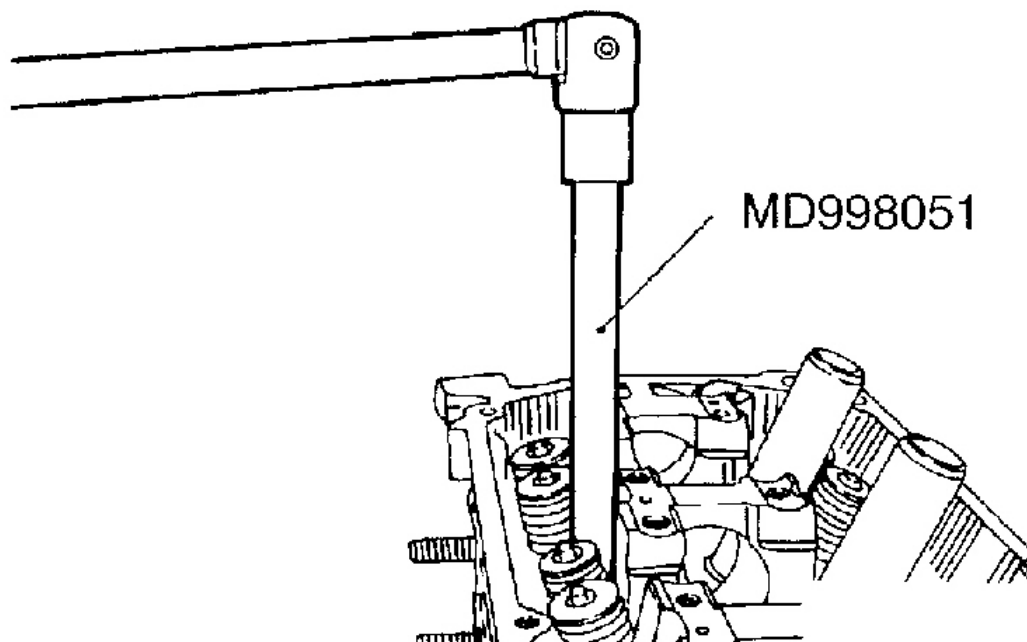
Fig. 123: Removing & Installing Rocker Arms & Camshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

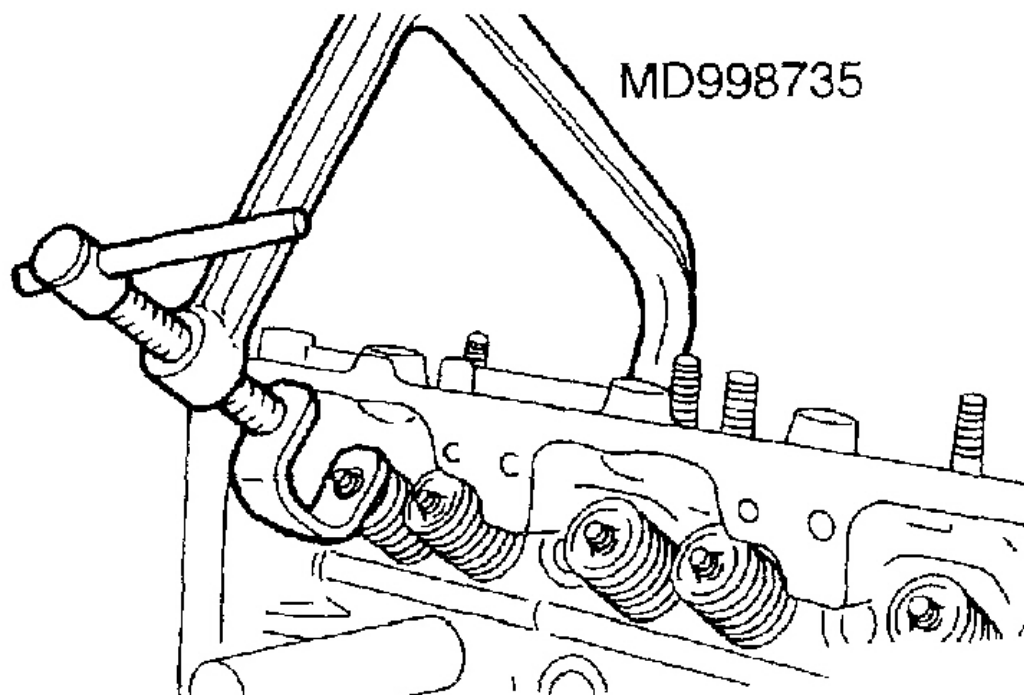


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Fig. 124: Removing Cylinder Head Bolt
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

B RETAINER LOCK REMOVAL

1. Using the special tool, compress the spring.
2. Remove the retainer locks.



G01115587

Fig. 125: Compressing Spring

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

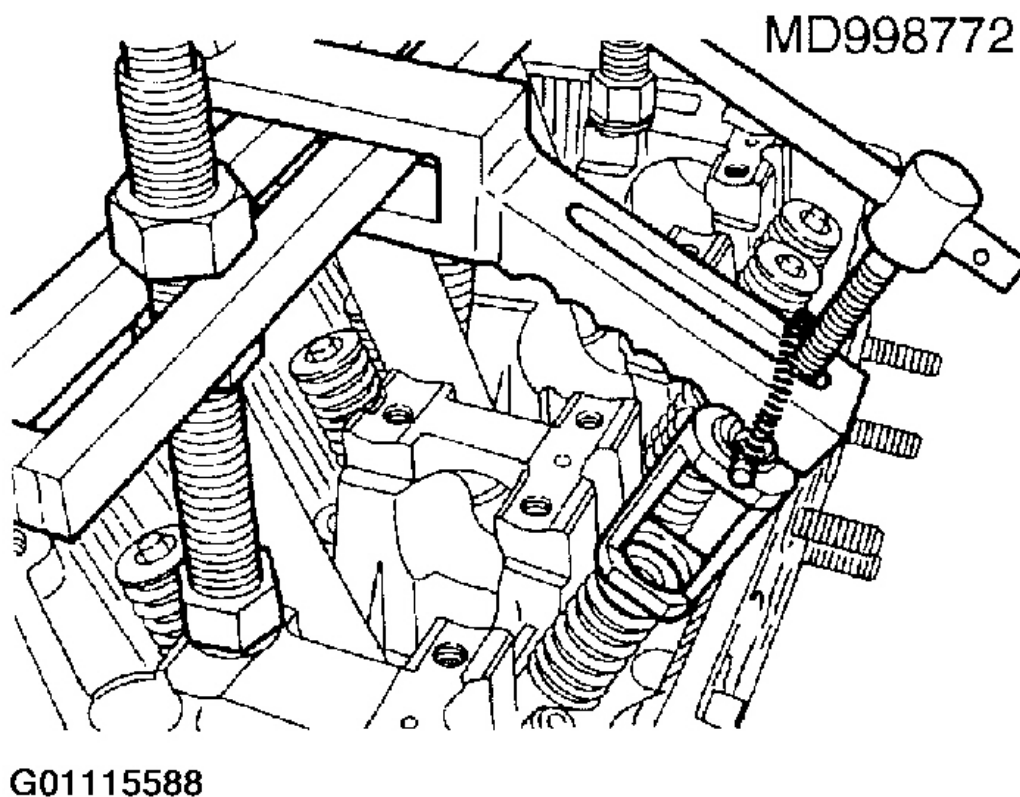
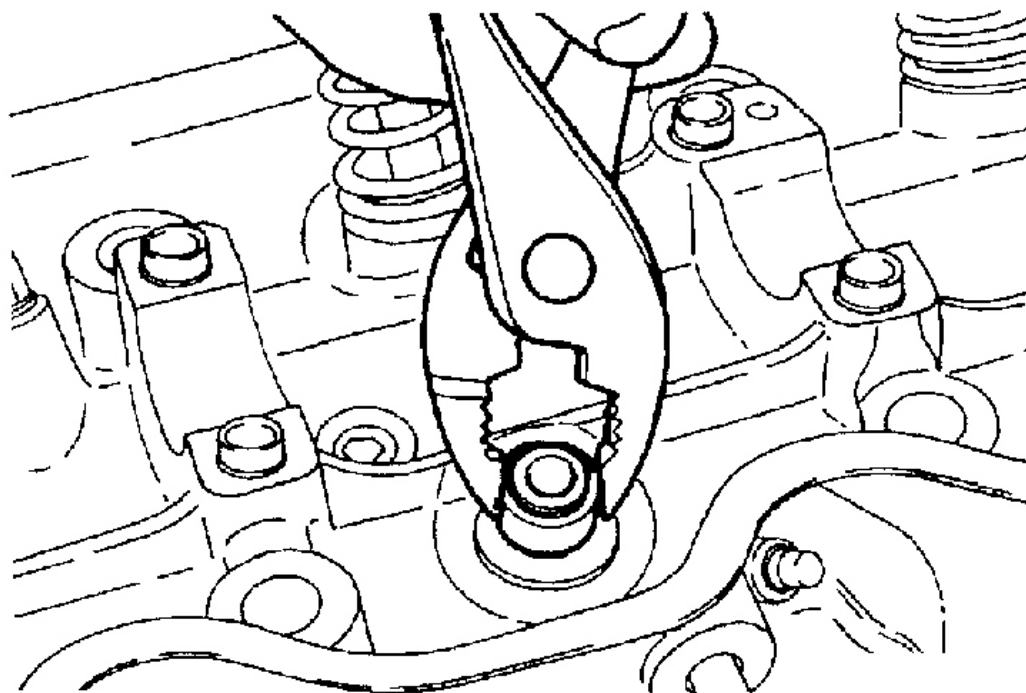


Fig. 126: Removing Retainer Lock
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

< C > VALVE STEM SEAL REMOVAL

Do not reuse removed valve stem seals.



G01115589

Fig. 127: Removing Valve Stem Seal

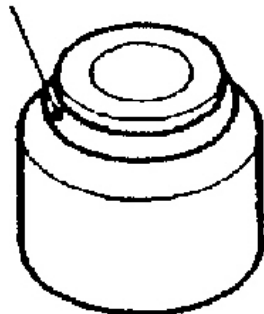
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

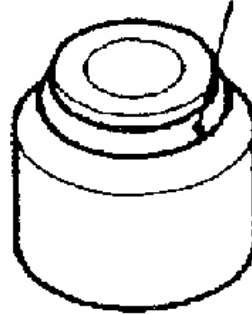
> A < VALVE STEM SEAL INSTALLATION

1. Install the valve spring seat.

IDENTIFICATION COLOR: SILVER OR WHITE IDENTIFICATION COLOR: BLACK



INTAKE



EXHAUST

G01115590

Fig. 128: Identifying Valve Stem Seals

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

CAUTION: Do not reuse removed valve stem seal.

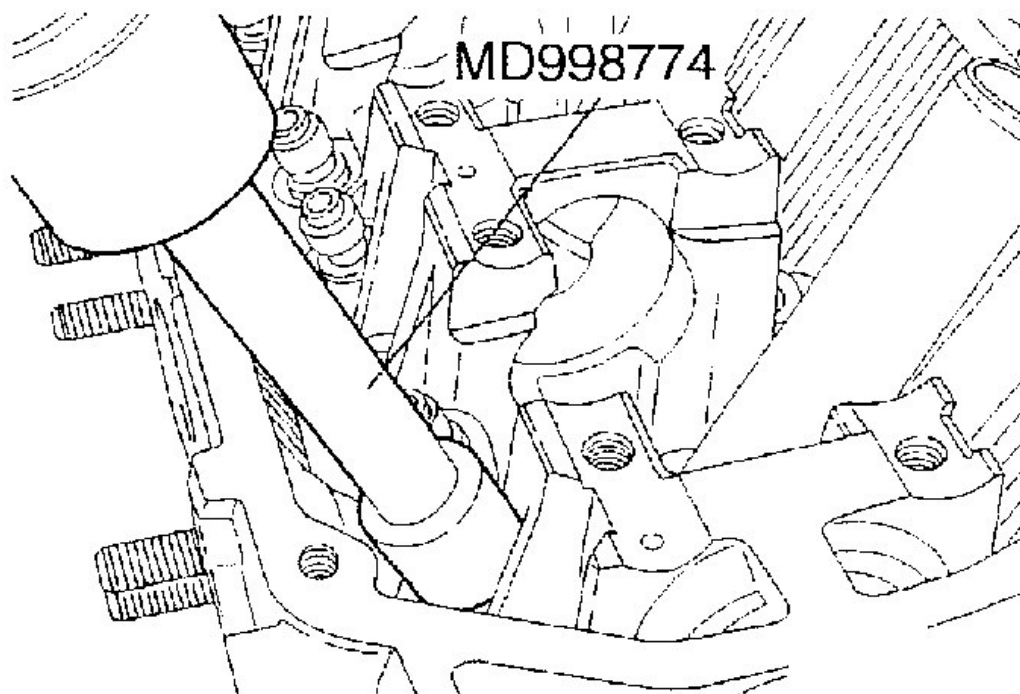
CAUTION: Always use the special tool to install the valve stem seal. Improperly installed valve stem seal may cause oil leak.

2. Using the special tool, install a new stem seal to the valve guide.

Valve stem seal identification color

Intake: Silver or White

Exhaust: Black



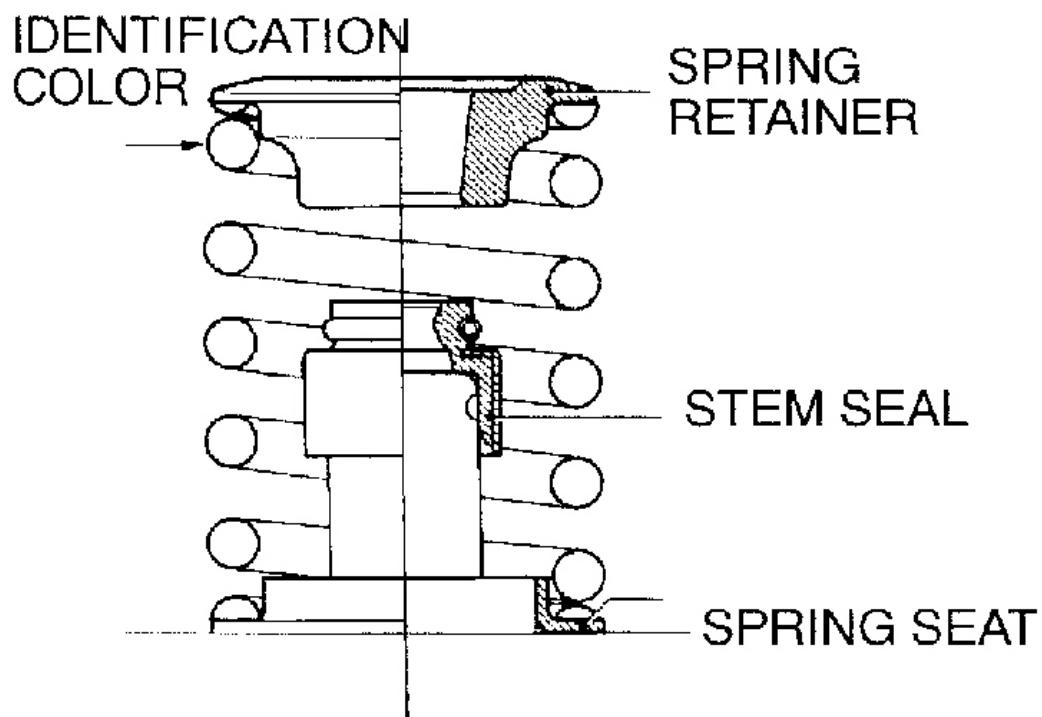
G01115591

Fig. 129: 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.



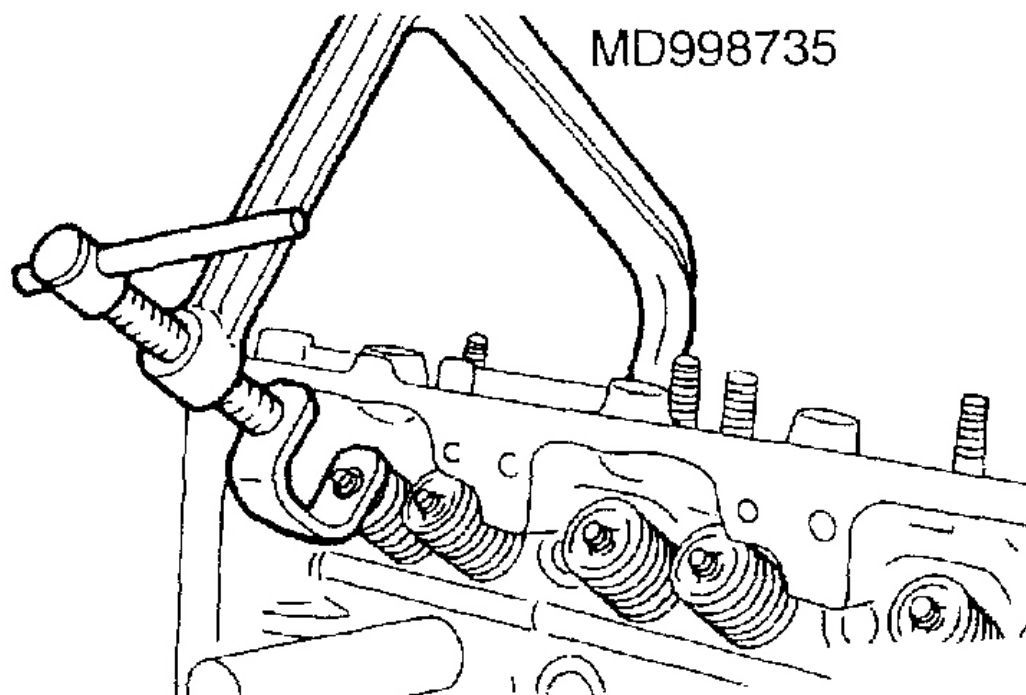
G01115592

Fig. 130: 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.



G01115593

Fig. 131: Compressing Valve Spring

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

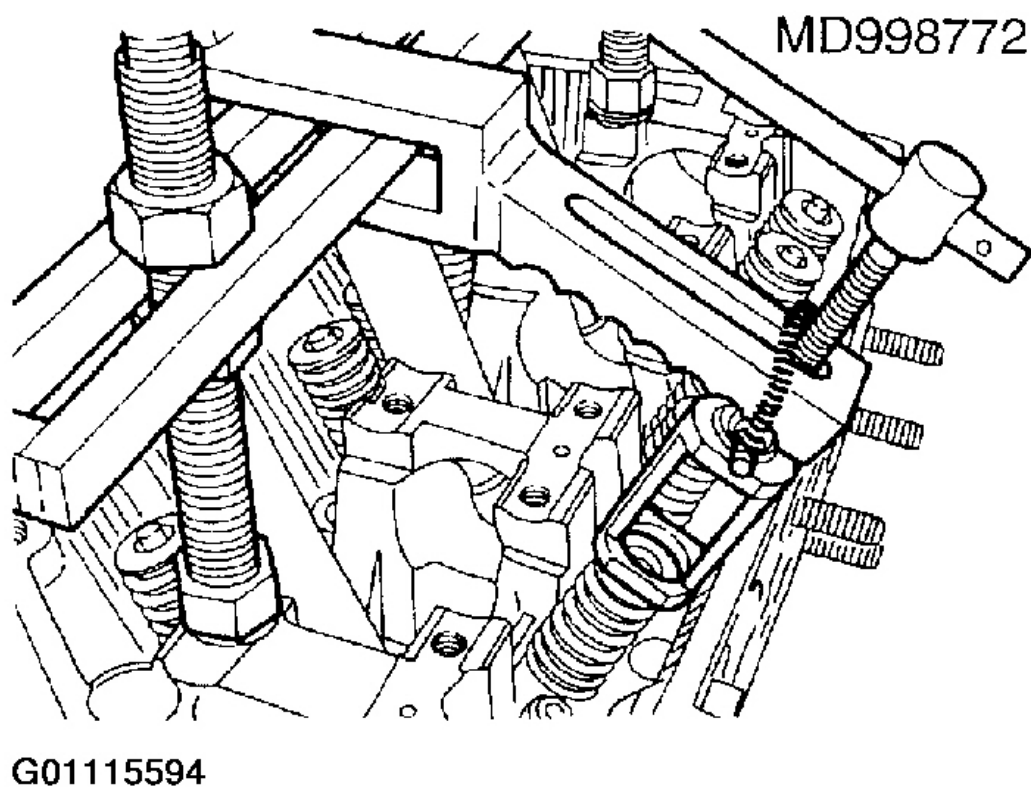
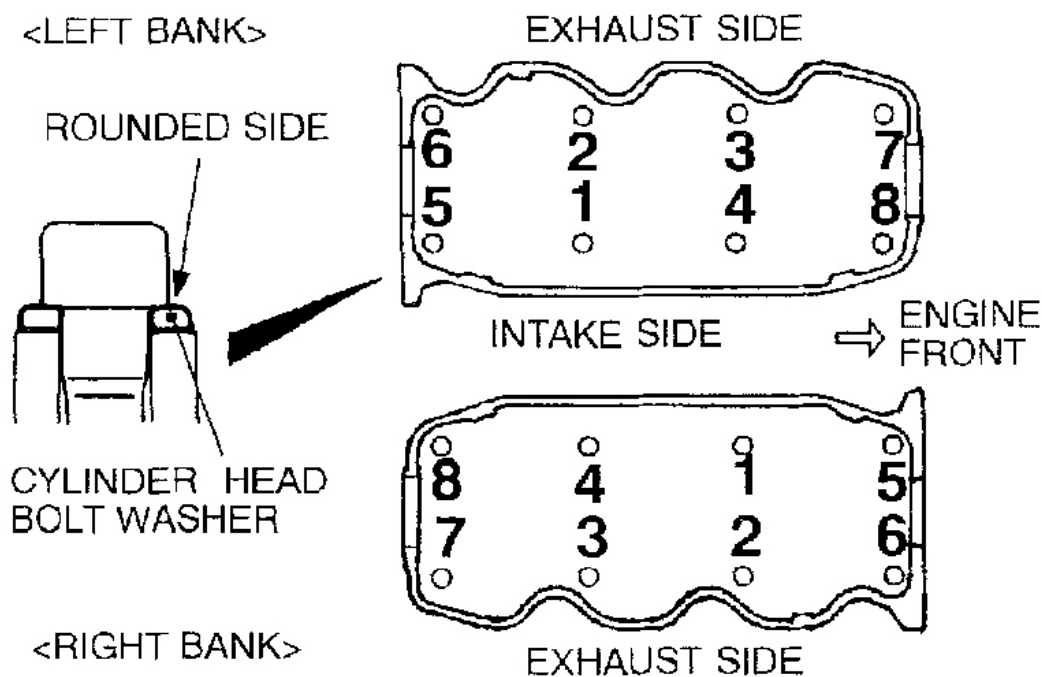


Fig. 132: Installing Retainer Lock

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.



G01115595

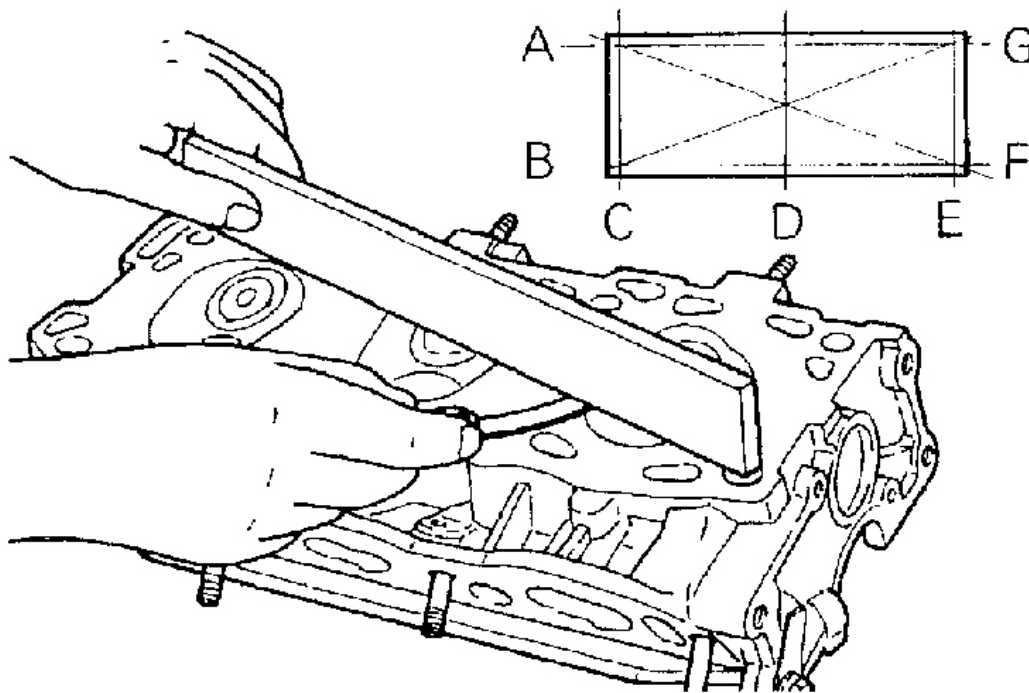
Fig. 133: Installing Cylinder Head Bolt

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.

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



G01115596

Fig. 134: Inspecting Cylinder Head

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

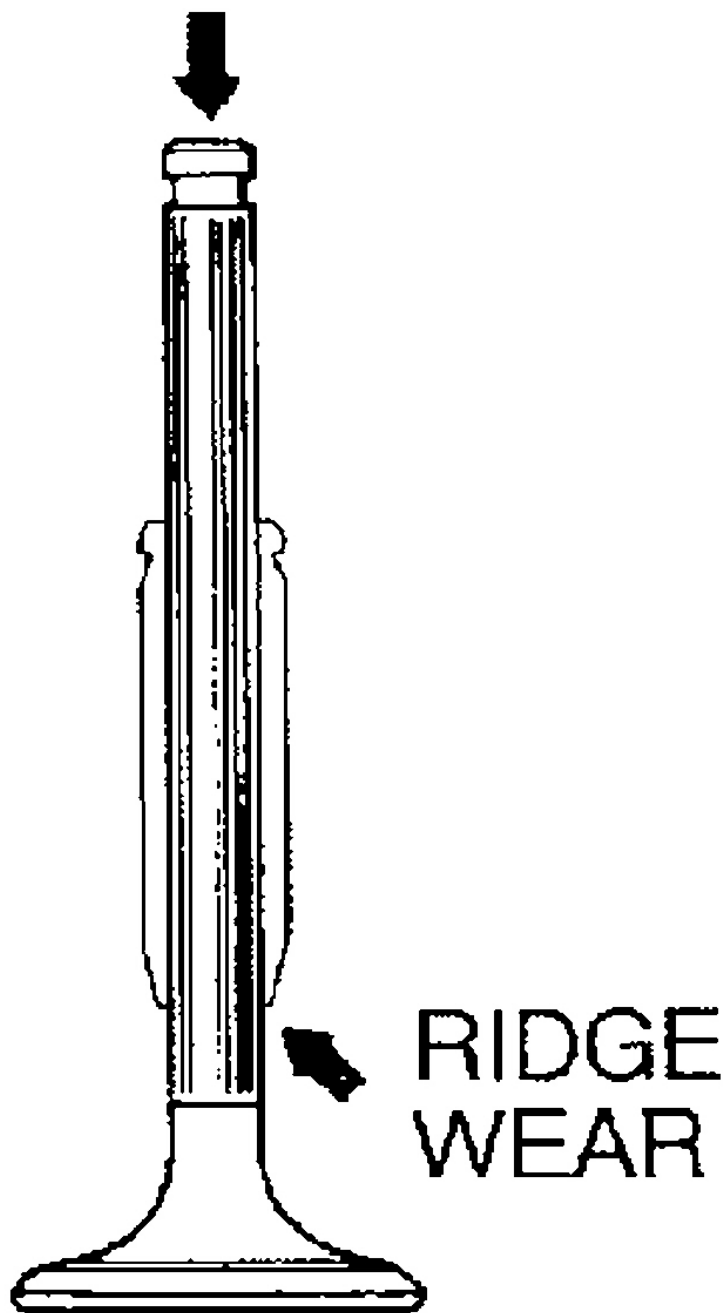
2. If the service limit is exceeded, correct to meet the specification.

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.



G01115597

Fig. 135: Inspecting Valve Stem

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.

3. If the margin exceeds the service limit, replace the valve.

Standard value

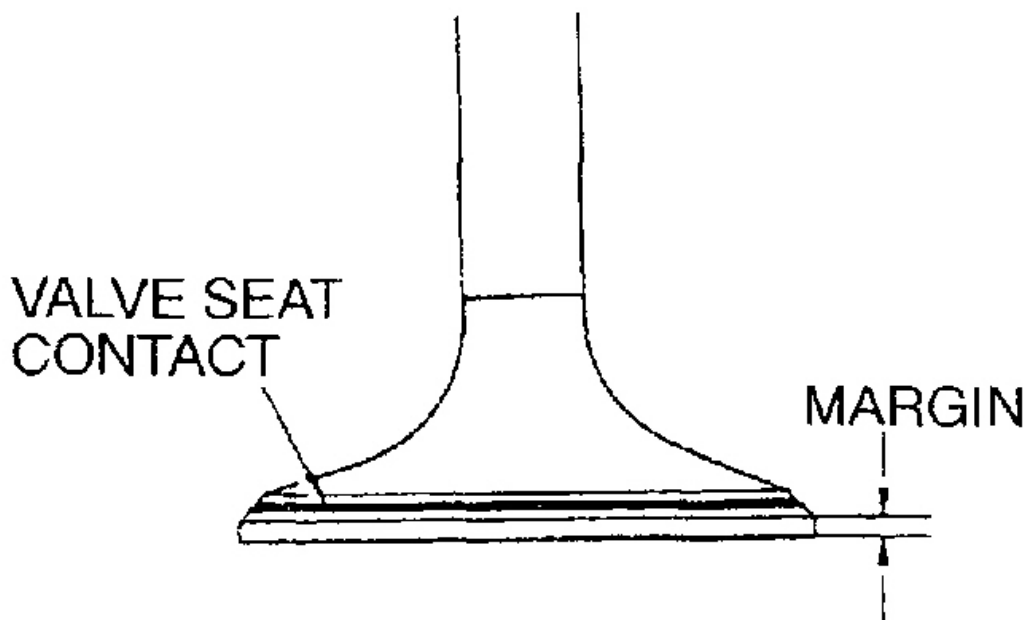
< Intake >1.0 mm (.039 in.)

< Exhaust >1.2 mm (.047 in.)

Limit

< Intake >0.5 mm (.019 in.)

< Exhaust >1.2 mm (.047 in.)



G01115598

Fig. 136: Checking Valve Face For Correct Contact
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

VALVE SPRINGS

1. Measure the free height of the spring and, if it is smaller than the limit, replace.

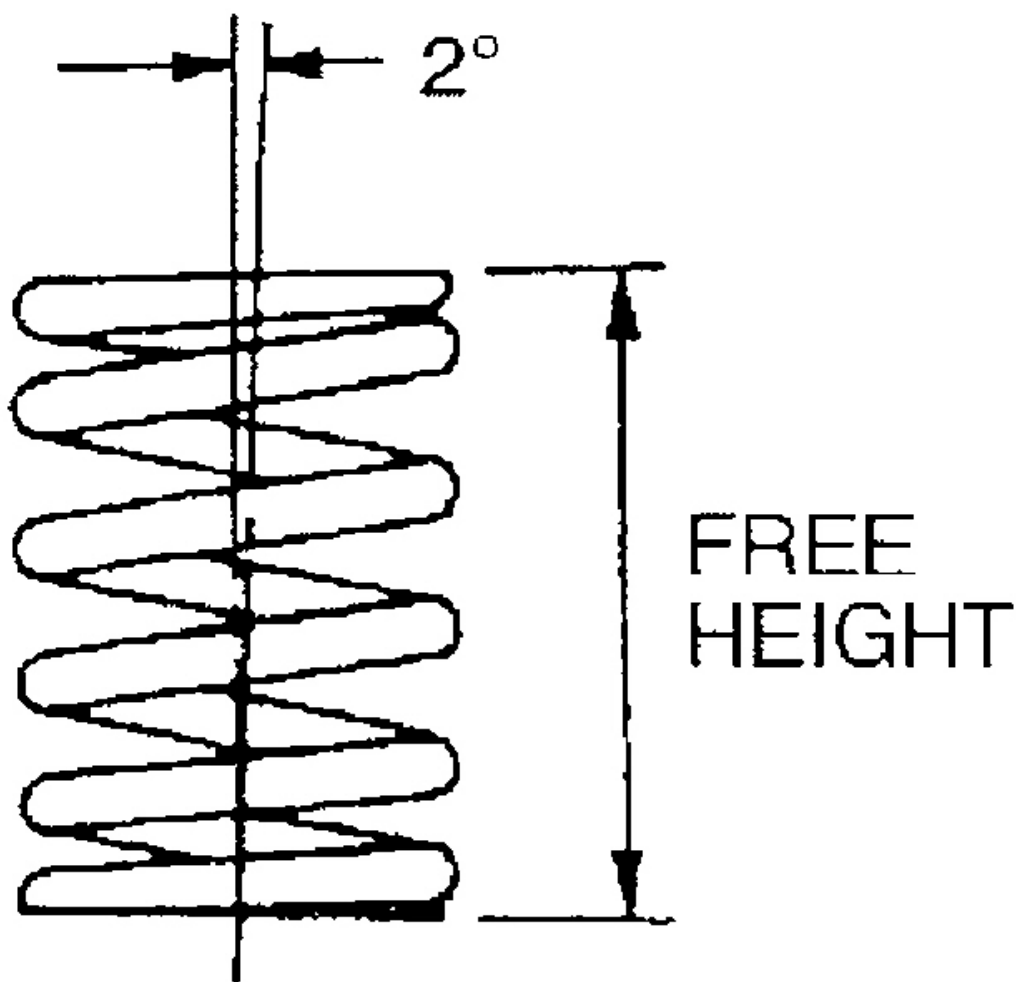
Standard value 51.0 mm (2.01 in.)

Limit 50.0 mm (1.97 in.)

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

Standard value: 2°

Limit: Max. 4°



G01115599

Fig. 137: Inspecting Valve Springs

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

VALVE GUIDES

1. 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.)

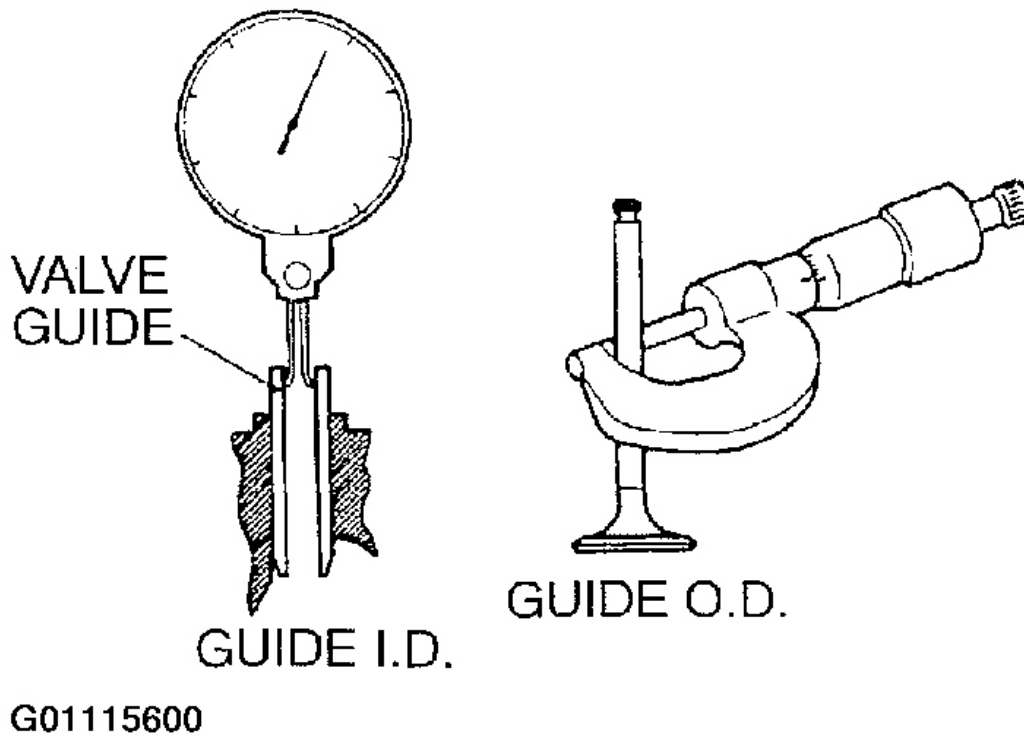


Fig. 138: Measuring Clearance Between Valve Guide & Valve Stem
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

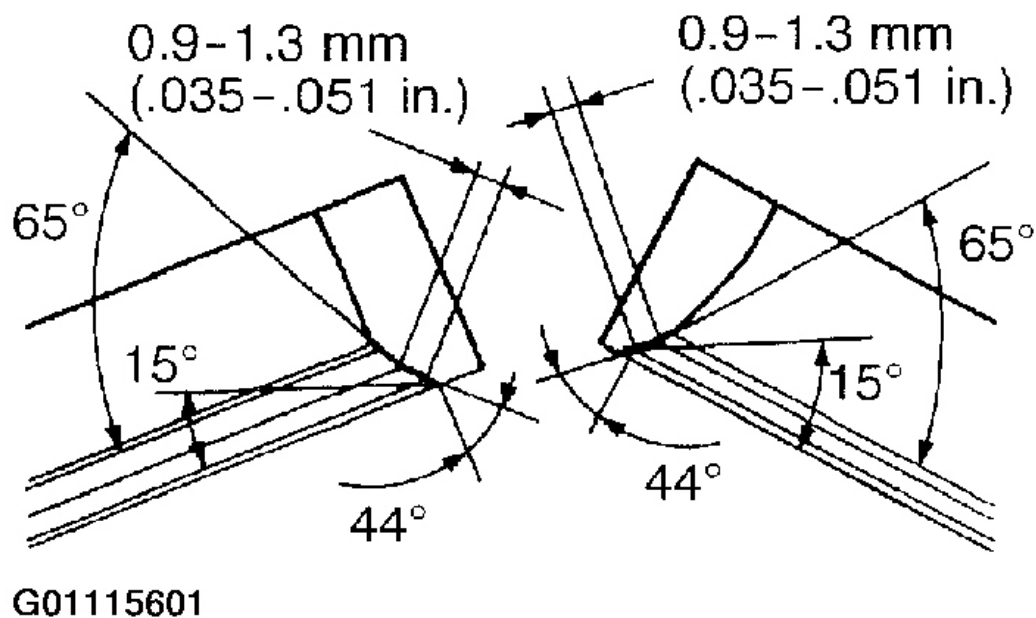
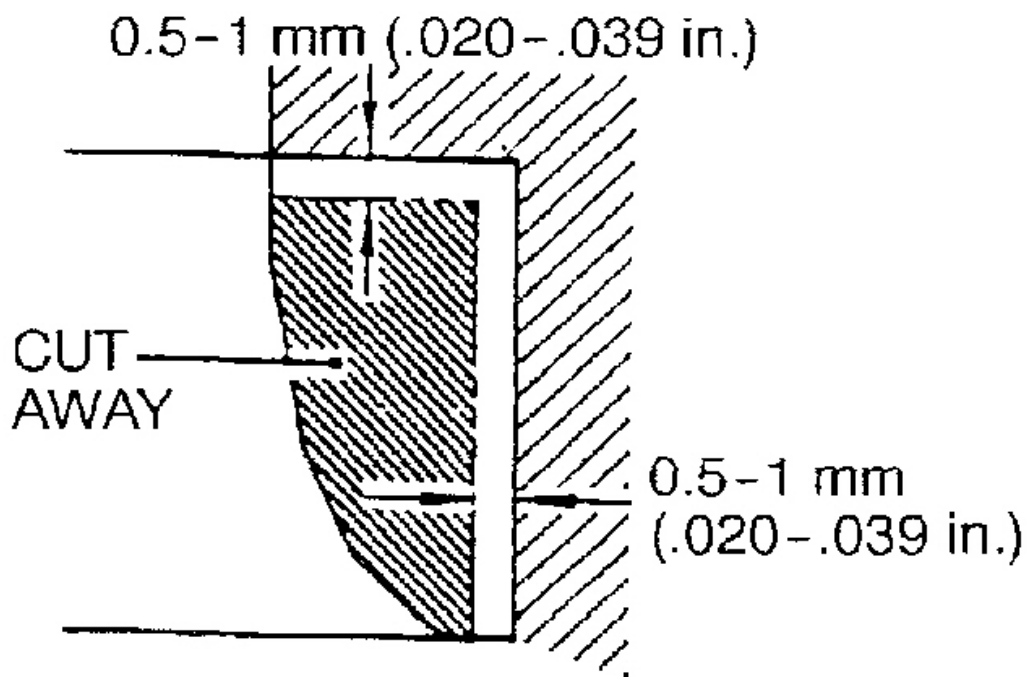


Fig. 139: Reconditioning Valve Seat

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.



G01115602

Fig. 140: Cutting Valve Seat

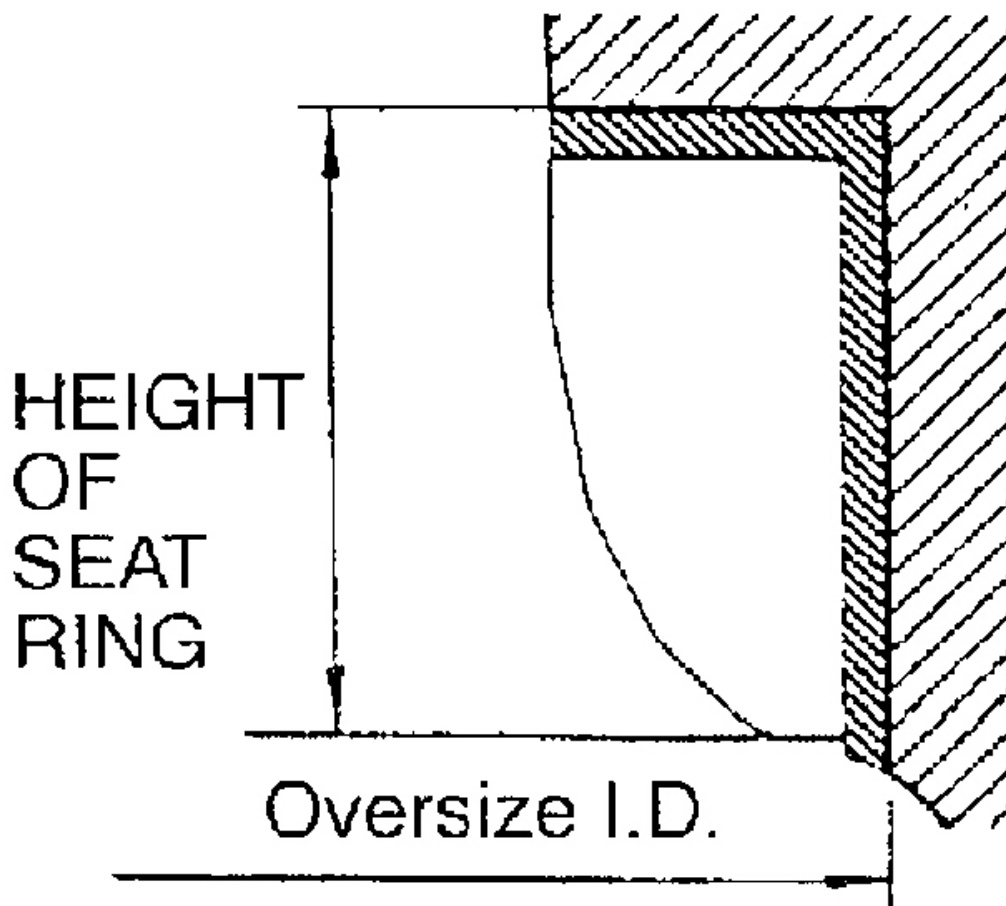
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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.



G01115603

Fig. 141: Boring Valve Seat Hole

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

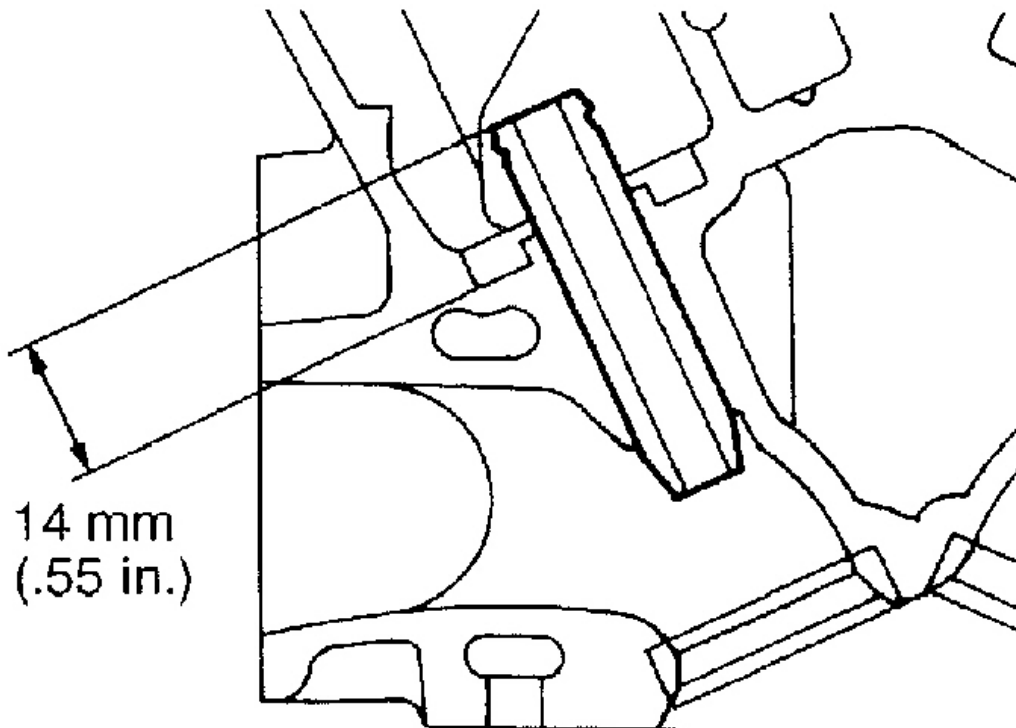
CAUTION: Do not install a valve guide of the same size again.

3. Rebore the valve guide hole of the cylinder head so that it may fit to the press-fitted oversize valve guide.

Valve guide hole diameter:

See REWORK DIMENSIONS.

- 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.



G01115604

Fig. 142: Press Fitting Valve Guide

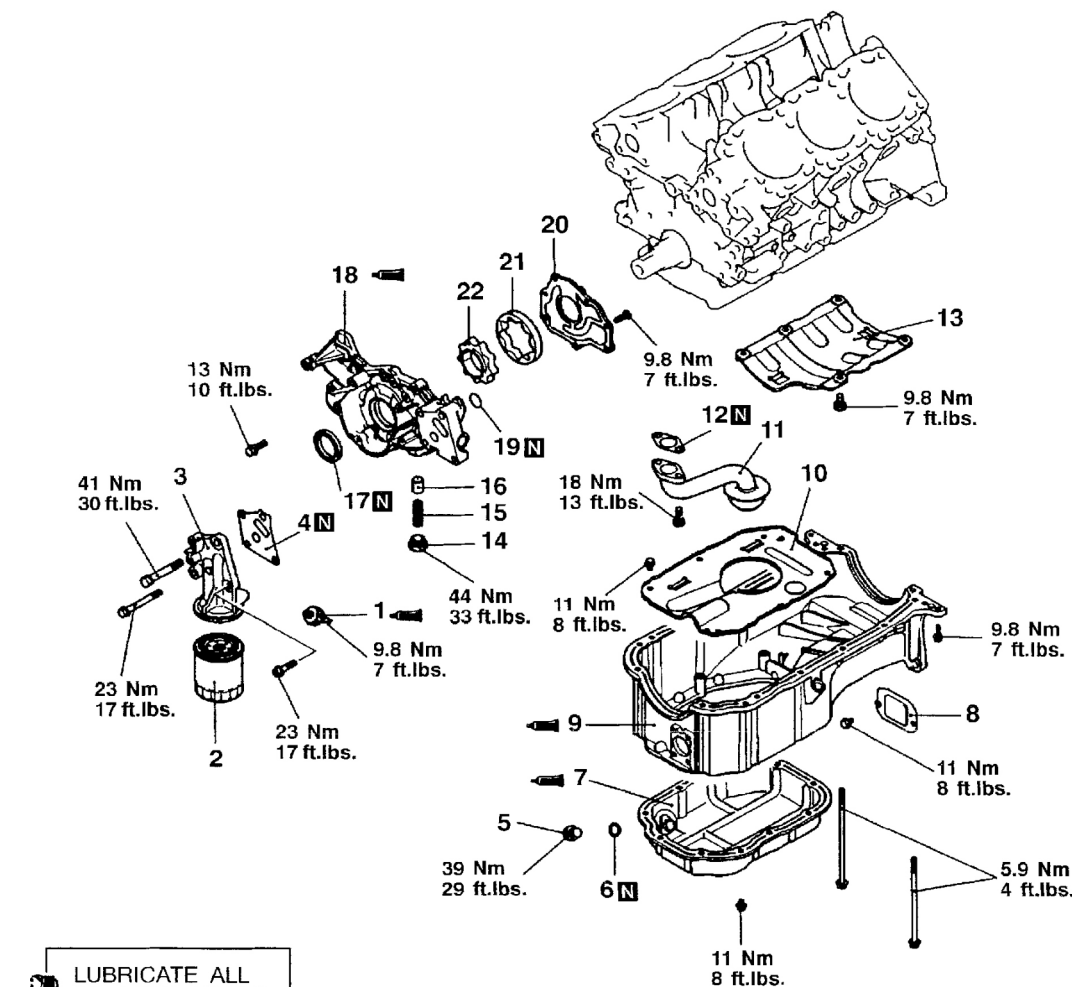
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

OIL PAN AND OIL PUMP

REMOVAL AND INSTALLATION

For removal procedures, follow numbered steps in illustration. See oil pan and oil pump **Fig. 143**. For oil pan and oil pump installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing oil pan and oil pump. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINT**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



LUBRICATE ALL
INTERNAL PARTS
WITH ENGINE OIL
DURING
REASSEMBLY.

REMOVAL STEPS

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

G01115605

Fig. 143: Removing & Installing Oil Pan & Oil Pump
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

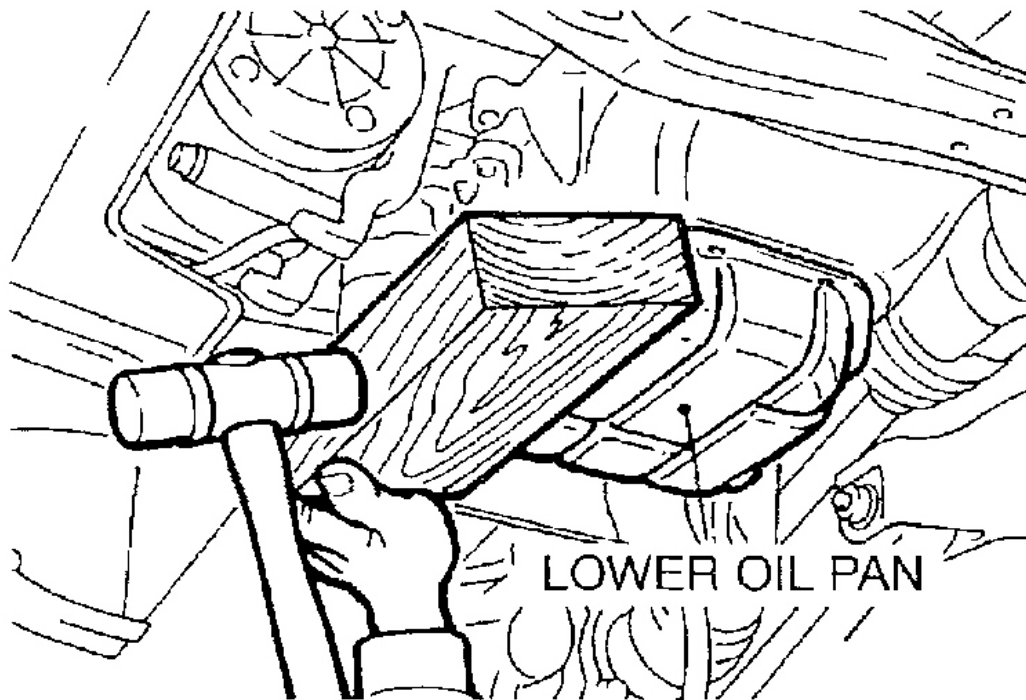
REMOVAL SERVICE POINT

< A > OIL PAN, LOWER REMOVAL

1. Remove the oil pan, lower installation bolts.

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

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



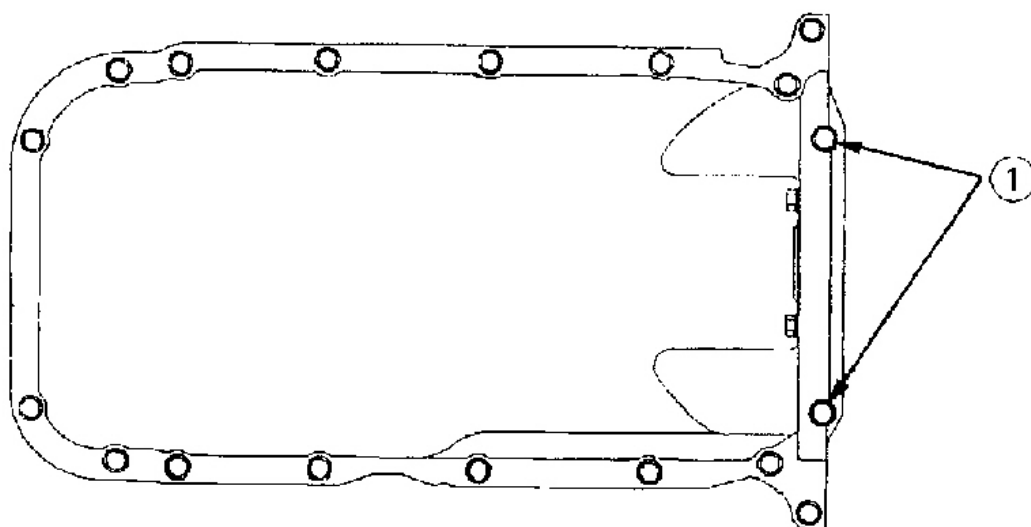
G01115606

Fig. 144: Placing Wooden Block Against Oil Pan
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

< B > OIL PAN, UPPER REMOVAL

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

← TIMING BELT SIDE



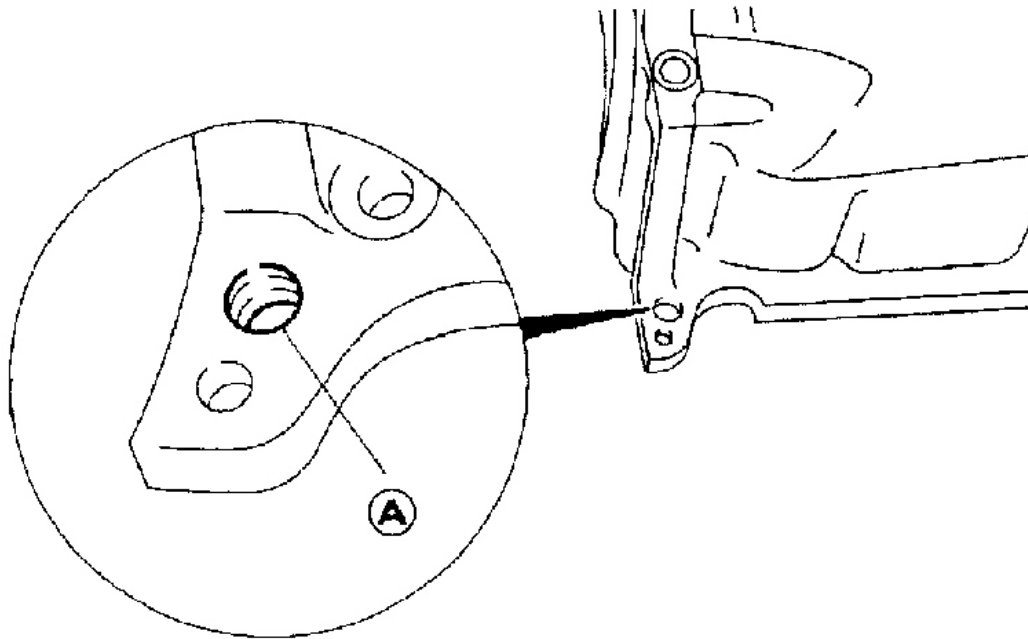
G01115607

Fig. 145: Removing Bolts

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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



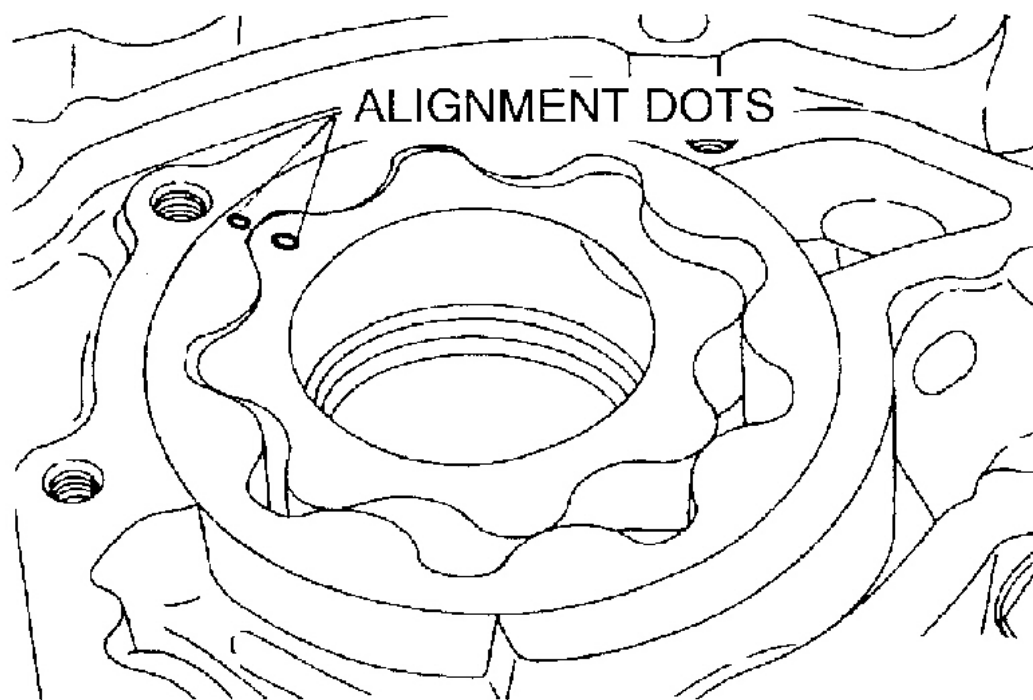
G01115608

Fig. 146: Removing Upper Oil Pan

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.



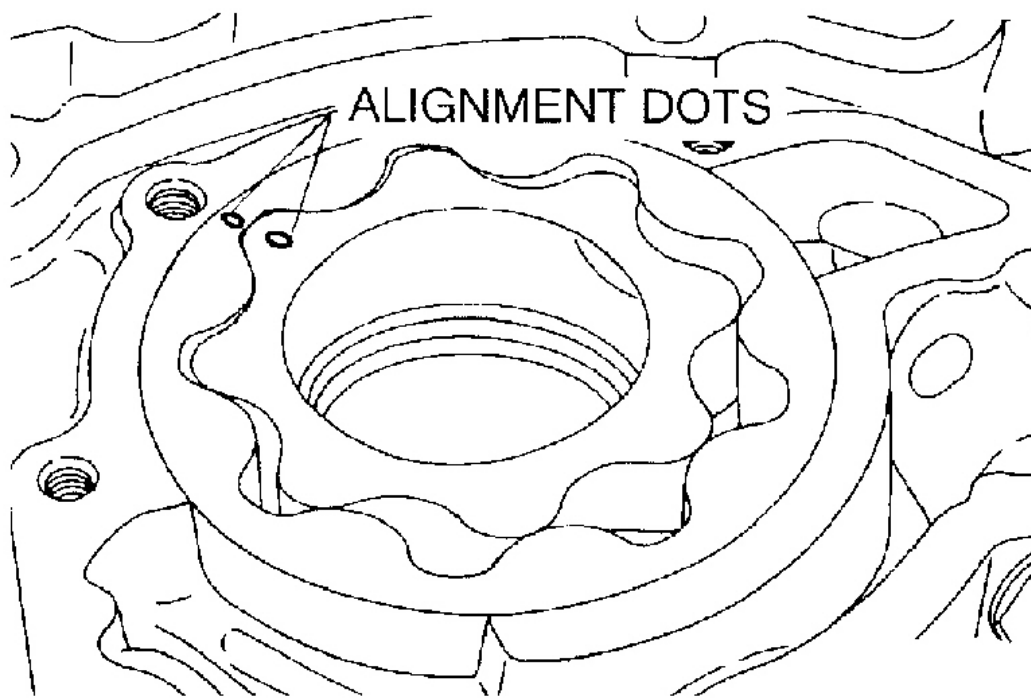
G01115609

Fig. 147: Making Alignment Dots On Inner & Outer 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.



G01115610

Fig. 148: Installing Inner/Outer Rotor

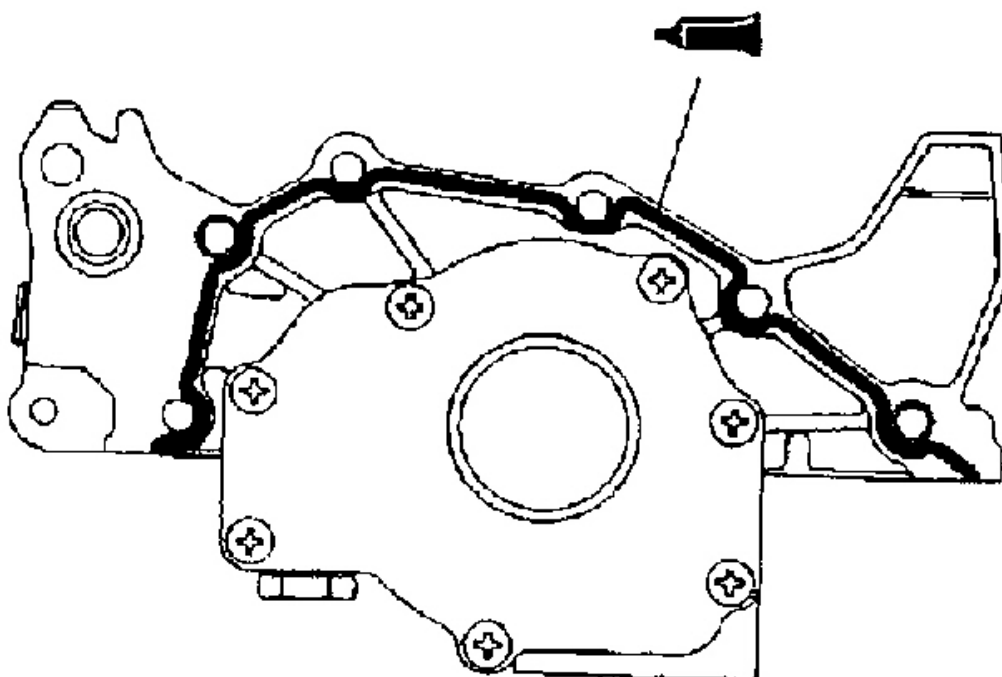
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

Specified sealant:

mitsubishi GENUINE Part No. MD970389 or equivalent



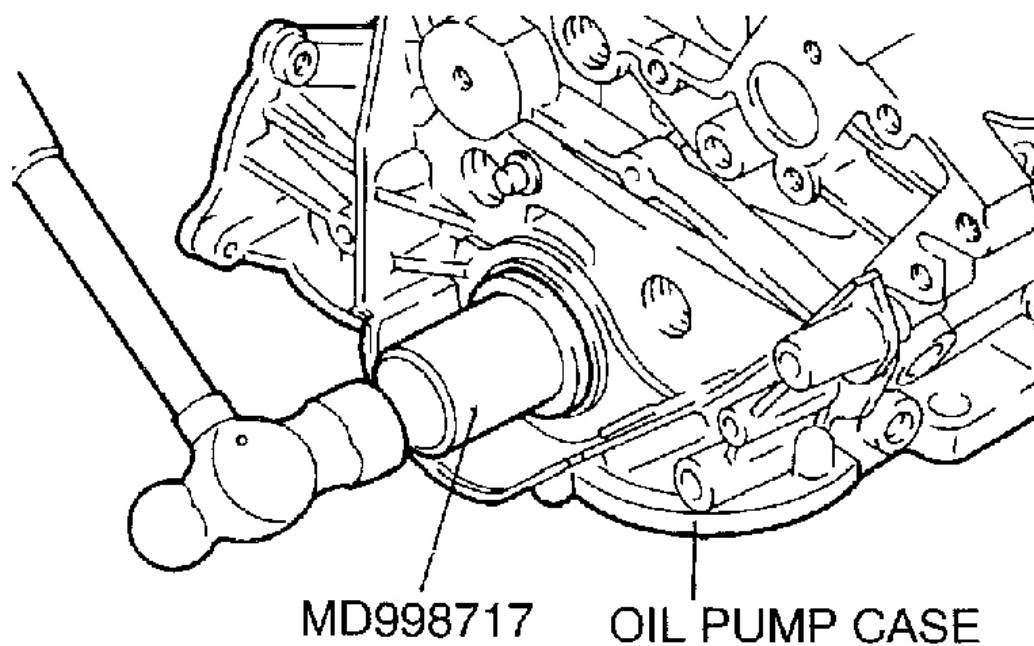
G01115611

Fig. 149: Installing Oil Pump Case
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> C < CRANKSHAFT FRONT OIL SEAL INSTALLATION

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

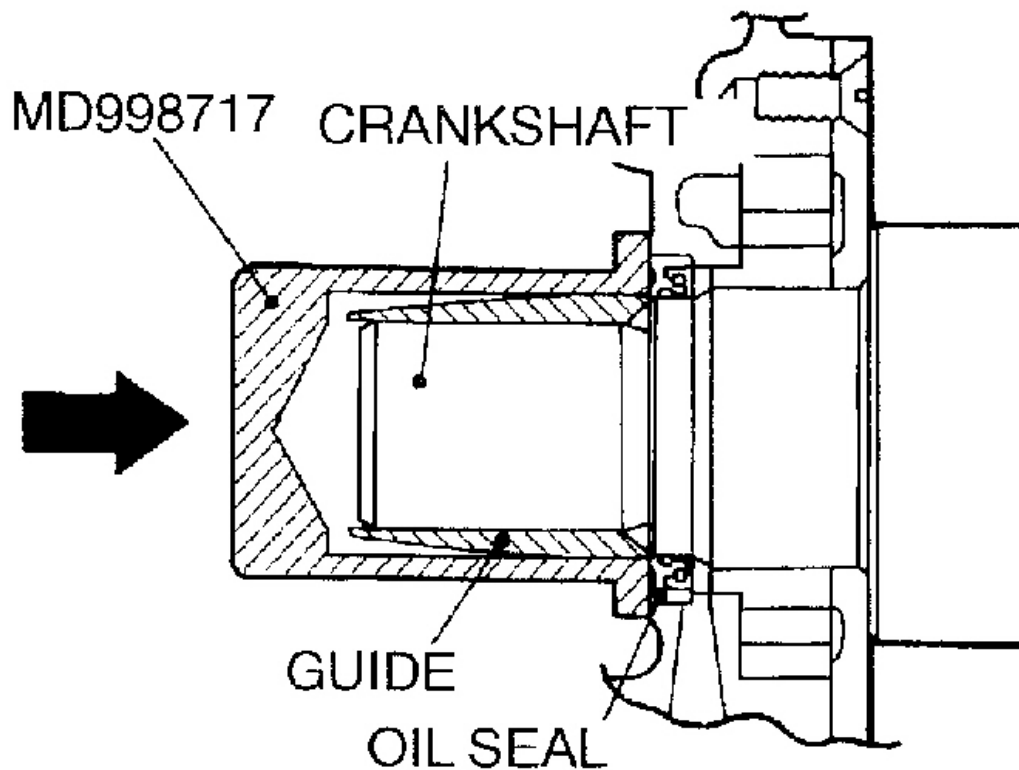
1. Using the special tool, knock the oil seal into the oil pump case.



G01115612

Fig. 150: Installing Special Tool MD998717

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G01115613

Fig. 151: Knocking Oil Seal Into Oil Pump Case
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> D < OIL PAN, UPPER INSTALLATION

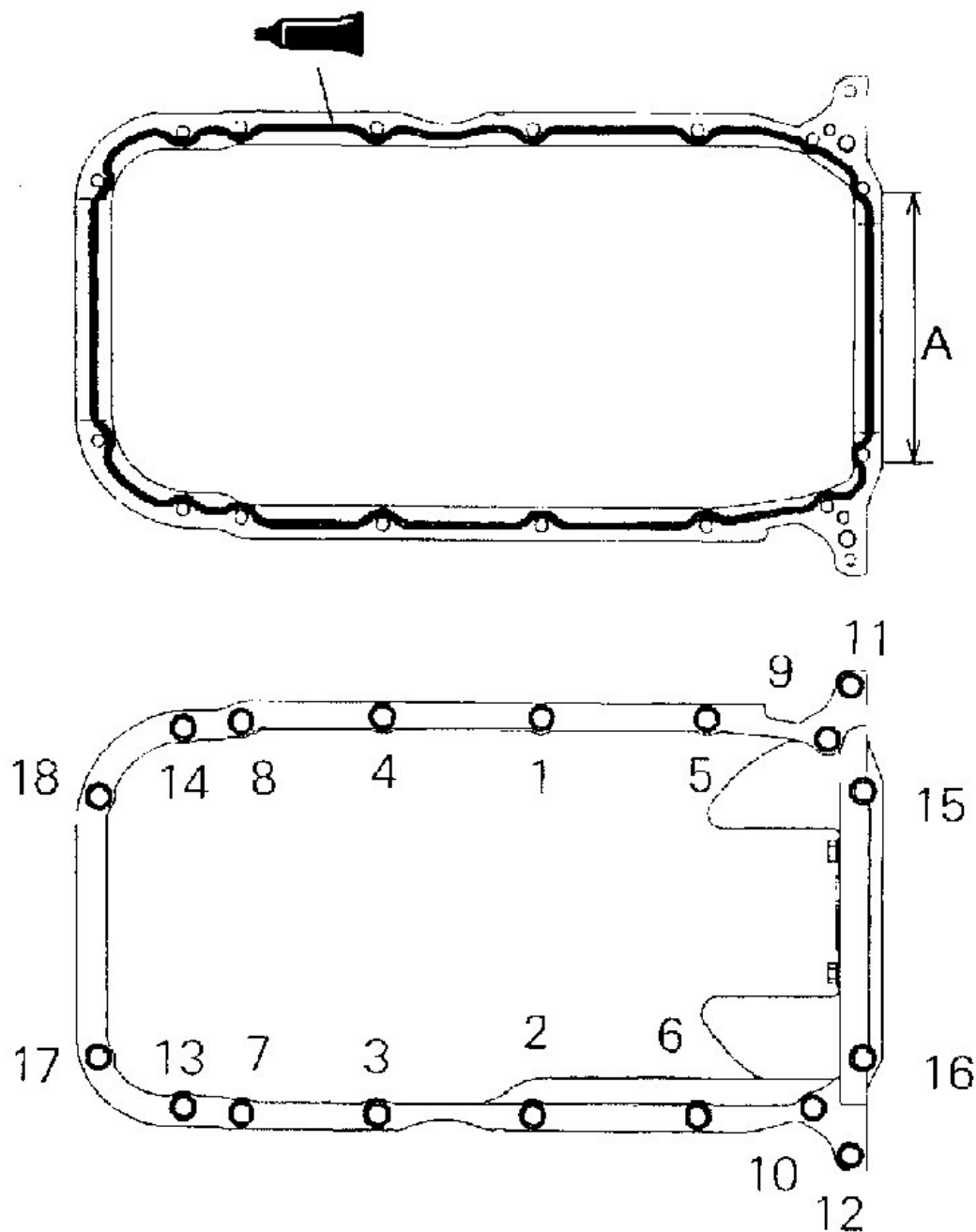
1. Clean the gasket surfaces of the cylinder block and upper oil pan.
2. Apply a 4 mm (.157 in.) diameter bead of sealant to the oil pump case. Be sure to install the oil pan quickly while the sealant is wet (within 15 minutes).

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.

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

Specified sealant:

MITSUBISHI GENUINE Part No. MD970389 or equivalent



G01115614

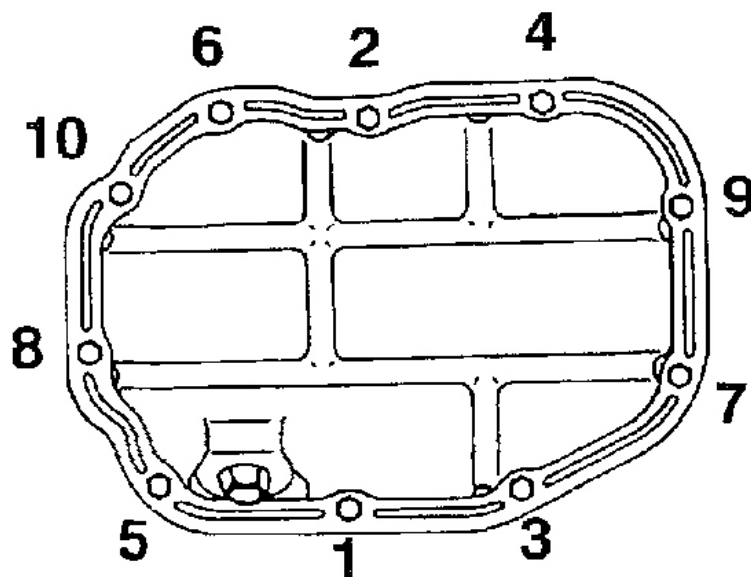
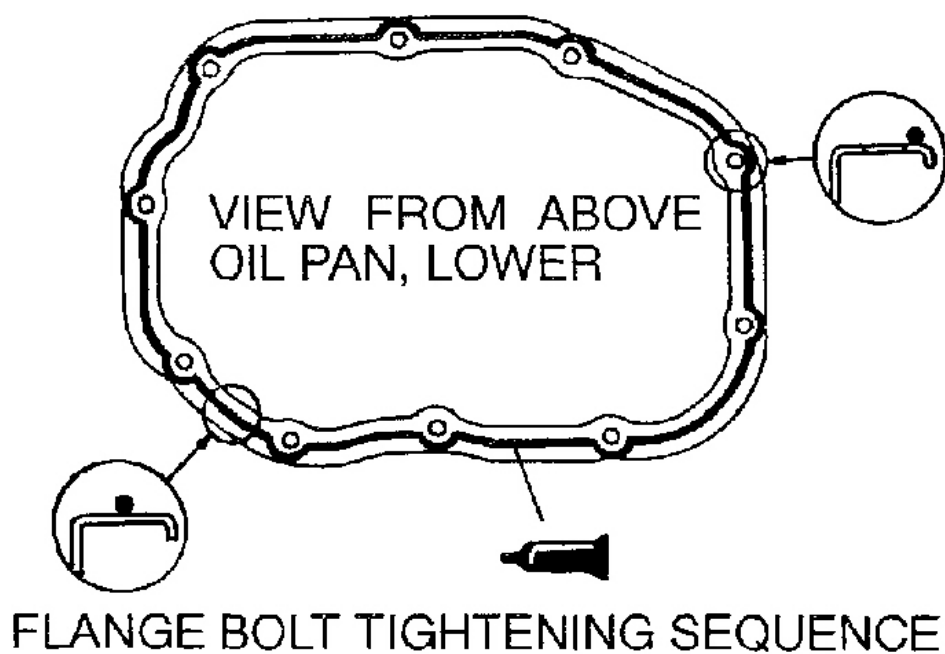
Fig. 152: Installing Upper Oil Pan

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

Specified sealant:**MAZDA GENUINE Part No. MD970389 or equivalent**



VIEW FROM THE BOTTOM OF THE OIL PAN,
LOWER

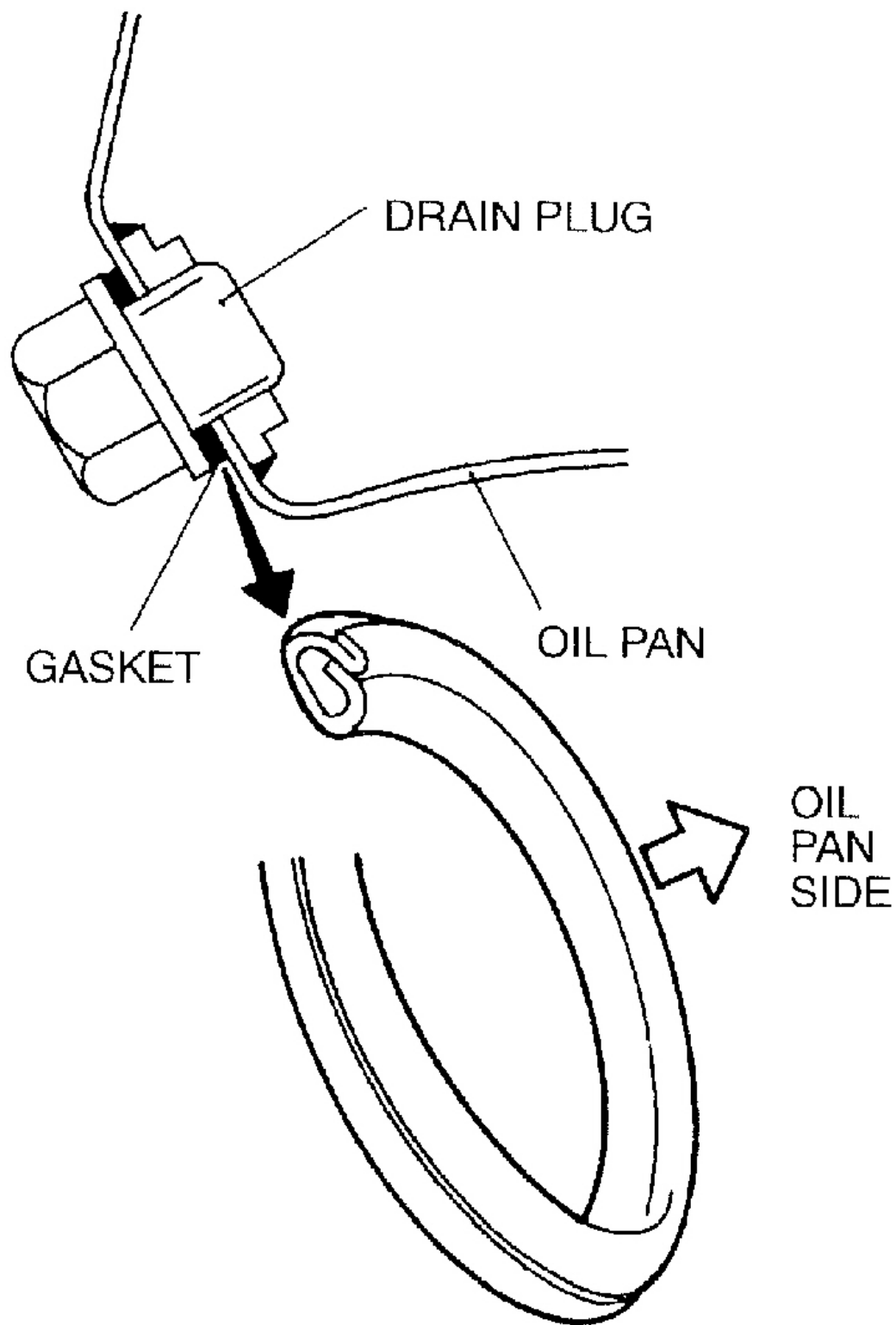
G01115615

Fig. 153: Installing Lower Oil Pan

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> F < DRAIN PLUG GASKET INSTALLATION

Install the drain plug gasket as illustrated.



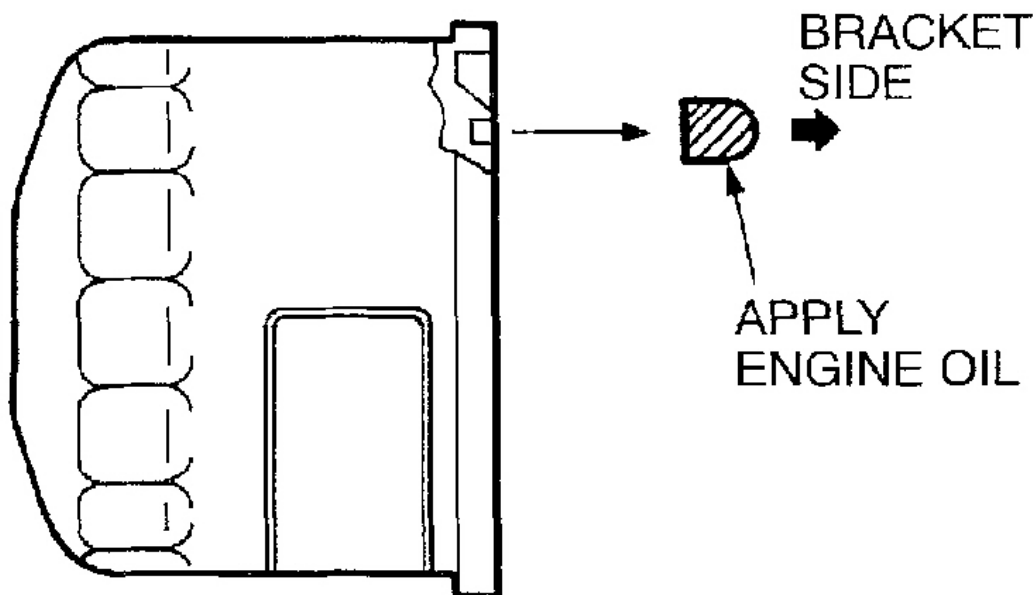
G01115616

Fig. 154: 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)].



G01115617

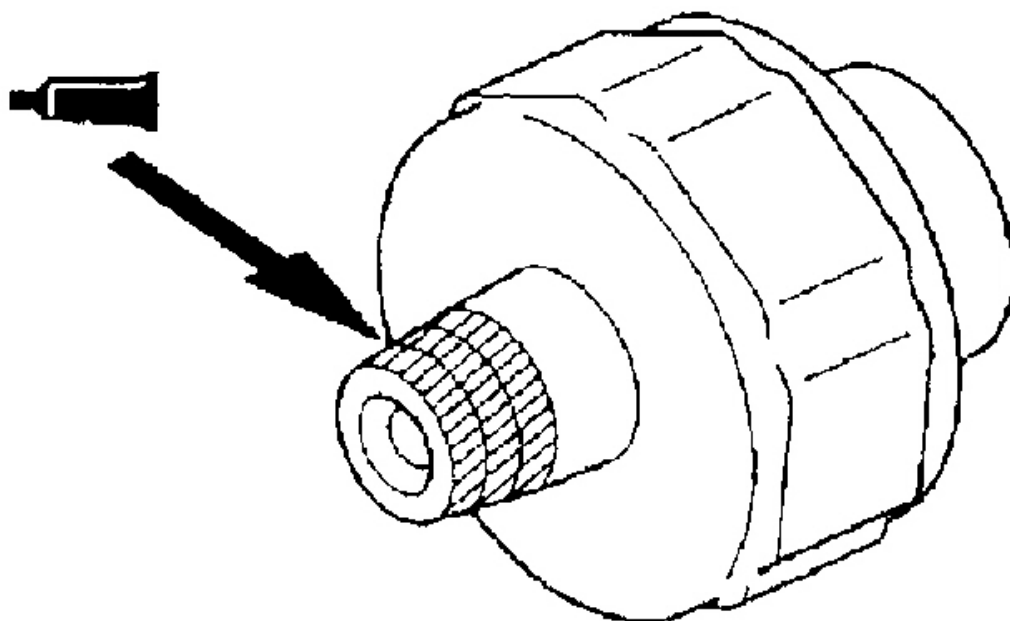
Fig. 155: Installing Oil Filter

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> H < SEALANT APPLICATION TO OIL PRESSURE SWITCH**CAUTION: Keep the end of threaded portion clear of sealant.****CAUTION: Avoid overtightening.**

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



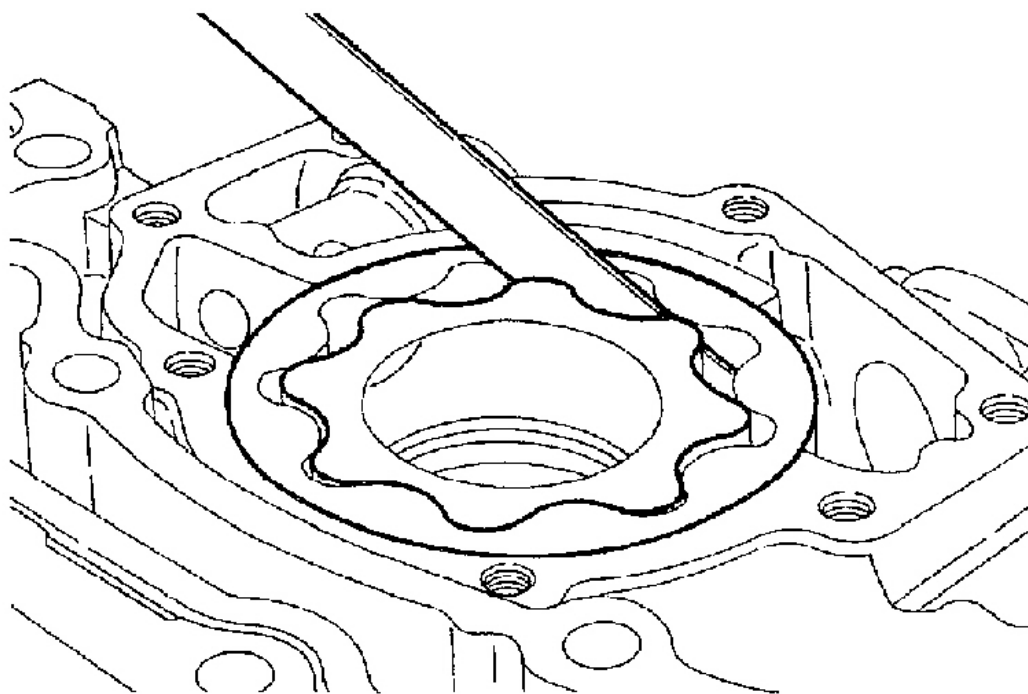
G01115618

Fig. 156: 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.)



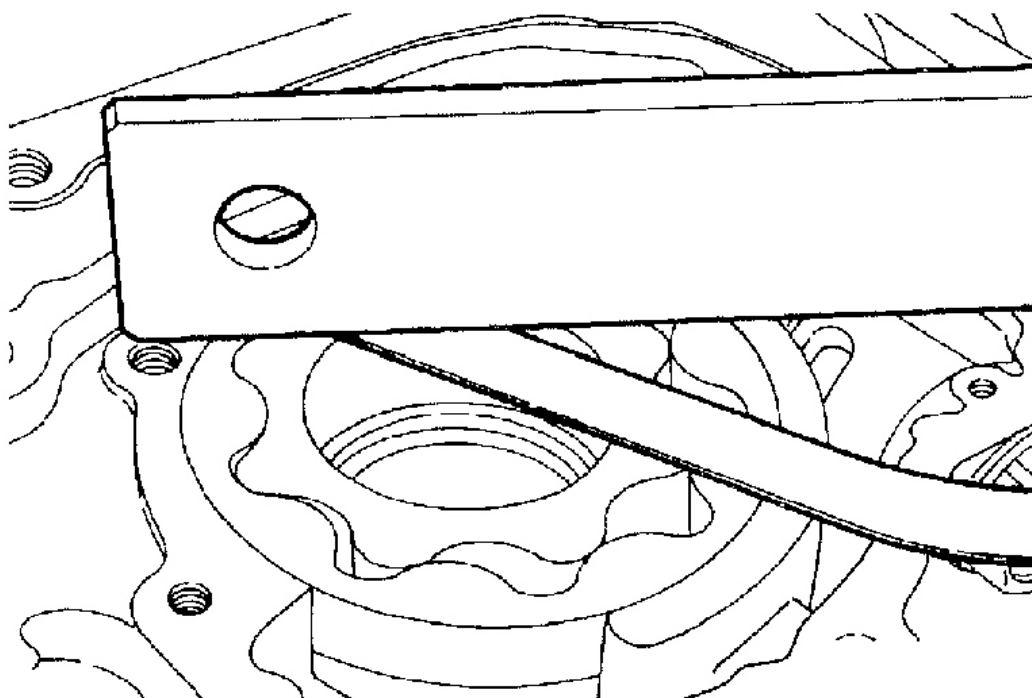
G01115619

Fig. 157: 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.)



G01115620

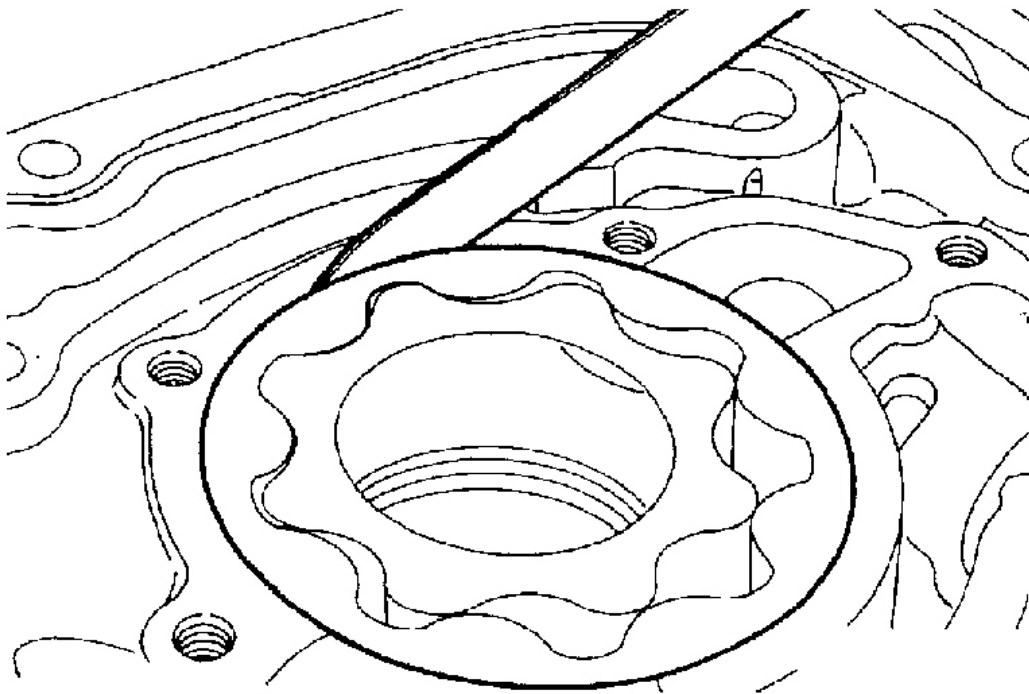
Fig. 158: Checking Side Clearance

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.)



G01115621

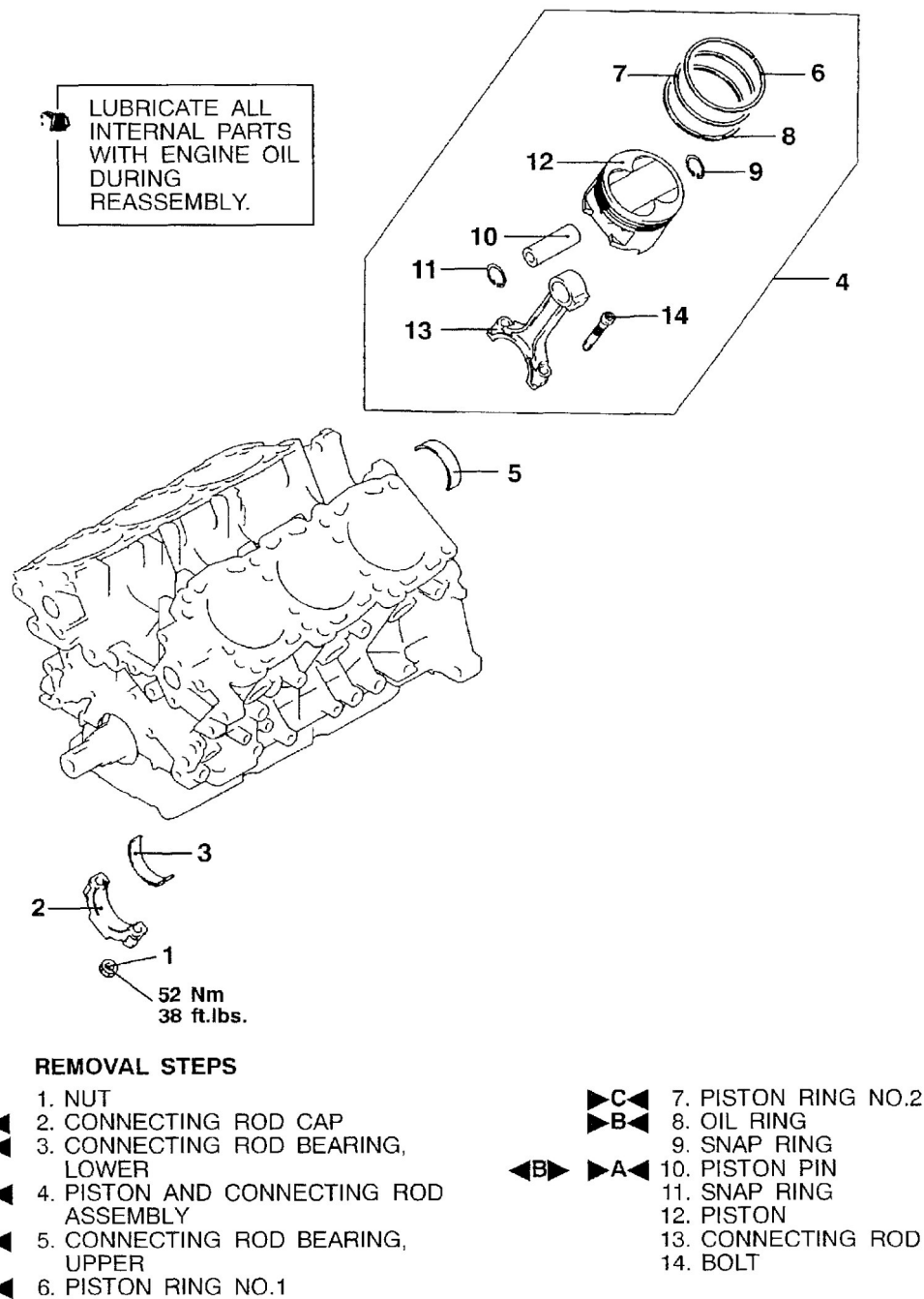
Fig. 159: Checking Body Clearance

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

PISTON AND CONNECTING ROD

REMOVAL AND INSTALLATION

For removal procedures, follow numbered steps in illustration. See piston and connecting rod **Fig. 160**. For piston and connecting rod installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing piston and connecting rod. Letters with arrows pointing away from letter refer to service points to be observed while performing that step of the removal procedure. See **REMOVAL SERVICE POINTS**. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



G01115622

Fig. 160: Removing & Installing Piston & 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.
2. Keep the removed connecting rods, caps, and bearings in order according to the cylinder number.

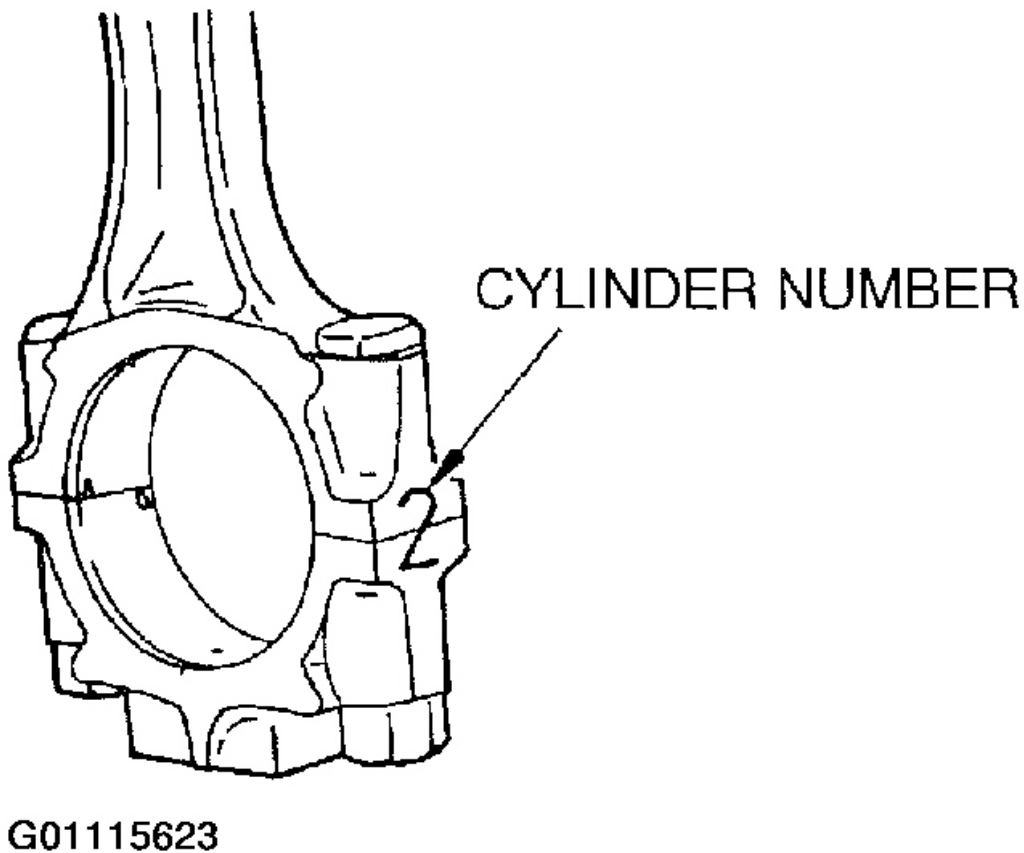


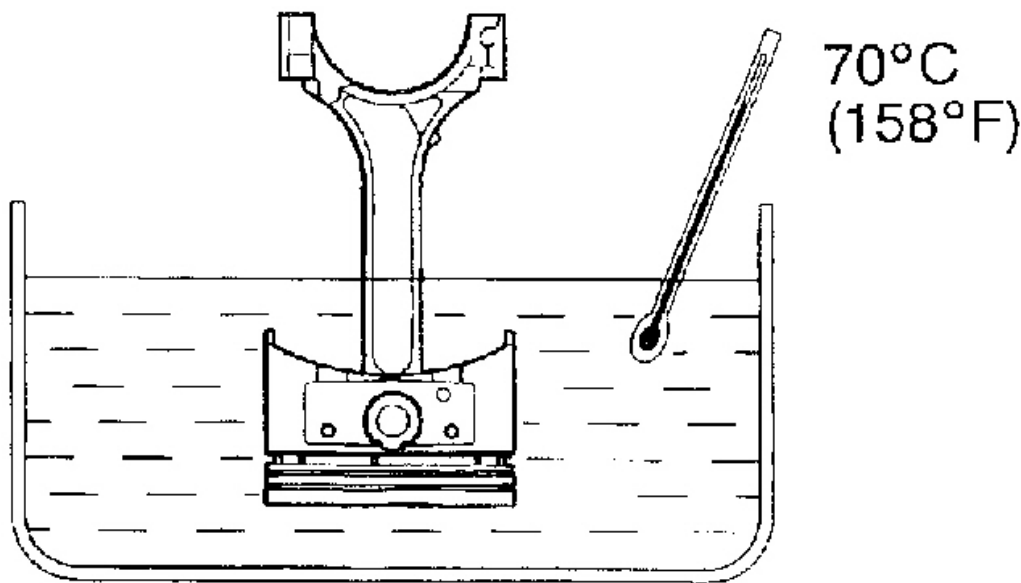
Fig. 161: Marking Cylinder Number On Connecting Rod
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

< B > REMOVAL OF PISTON PIN

1. Remove the snap rings.

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.

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



G01115624

Fig. 162: Heating Piston To Remove Piston Pin
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSTALLATION SERVICE POINTS

> A < PISTON PIN INSTALLATION

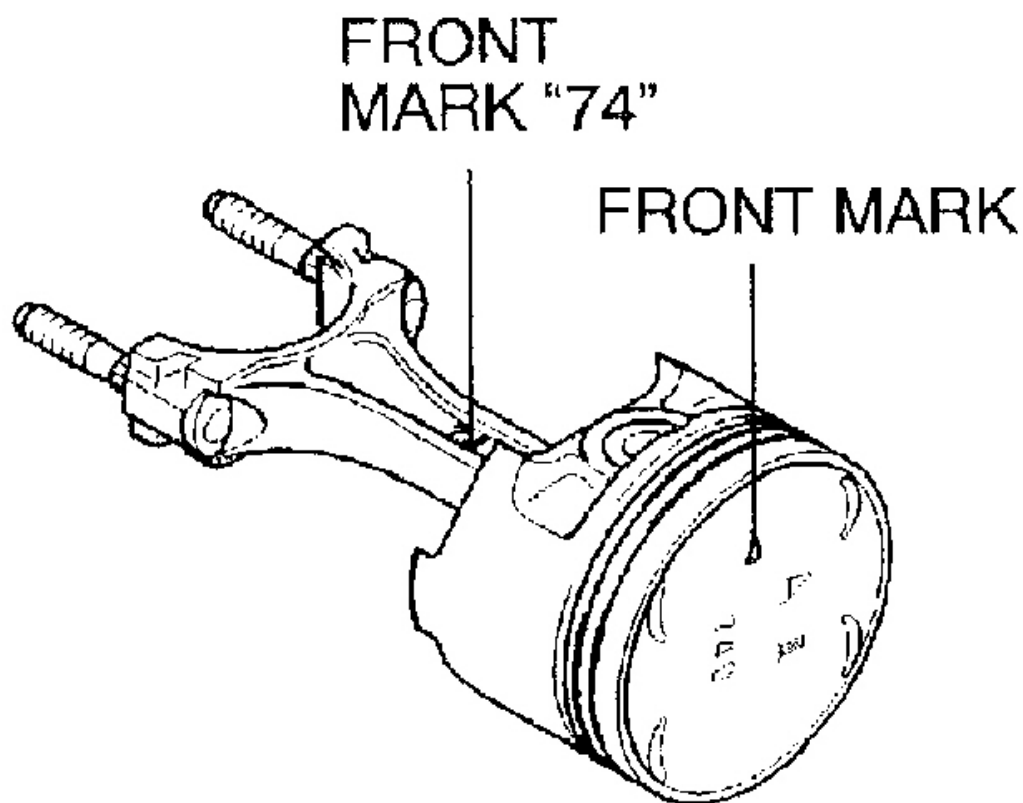
1. Heat the piston to approximately 70°C (158°F) and set the snap ring on one side first. Be sure to install the snap ring with the shear droop directed toward the inside.
2. With the front mark of the connecting rod and that of the piston located on the same side, insert the piston pin.

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.

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



G01115625

Fig. 163: Installing Piston Pin

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> B < OIL RING INSTALLATION

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

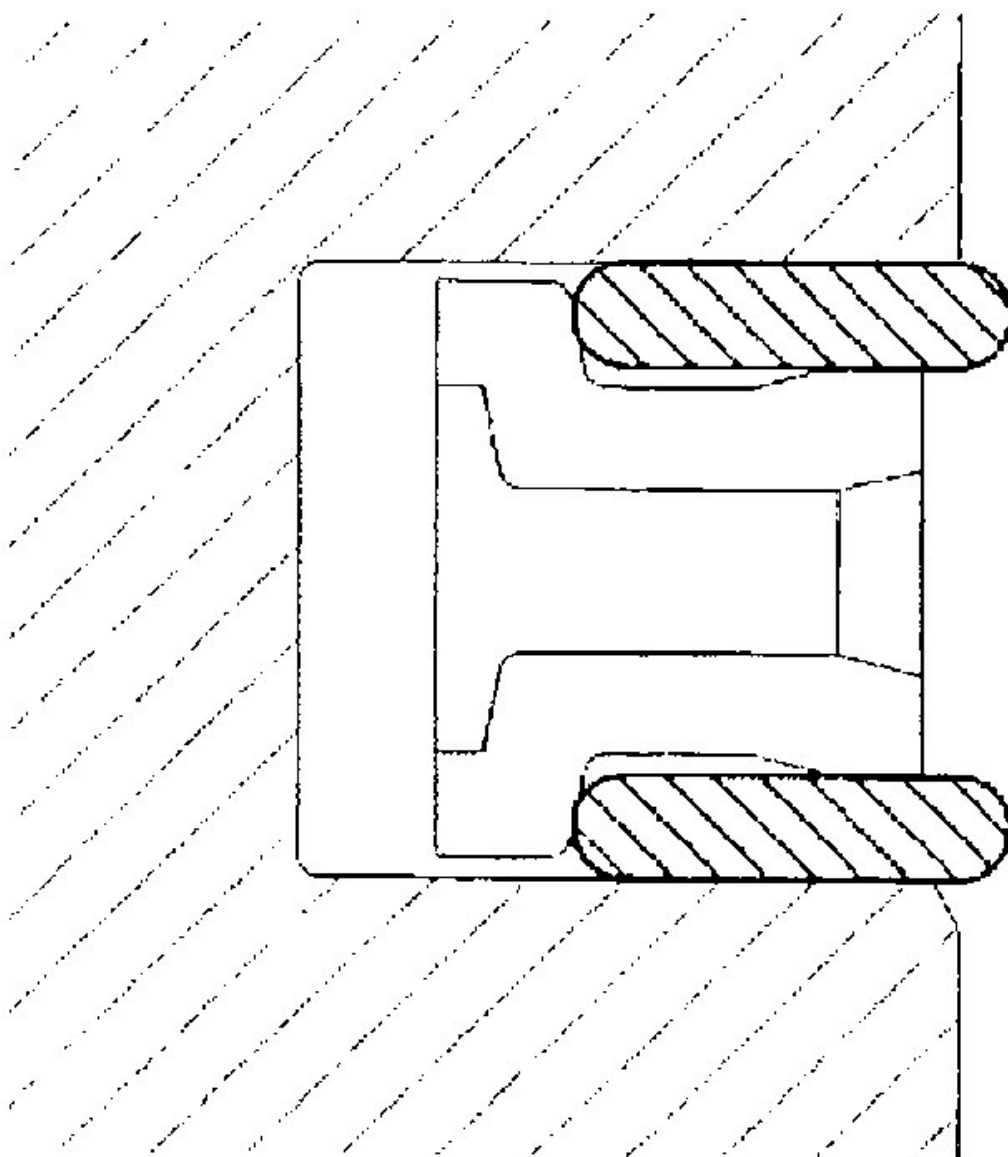


Fig. 164: Fitting Oil Ring Spacer Into Piston Ring Groove
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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

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. See illustration below.

Use of a ring expander to expand the side rail end gap can break the side rail, unlike other piston rings.

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.

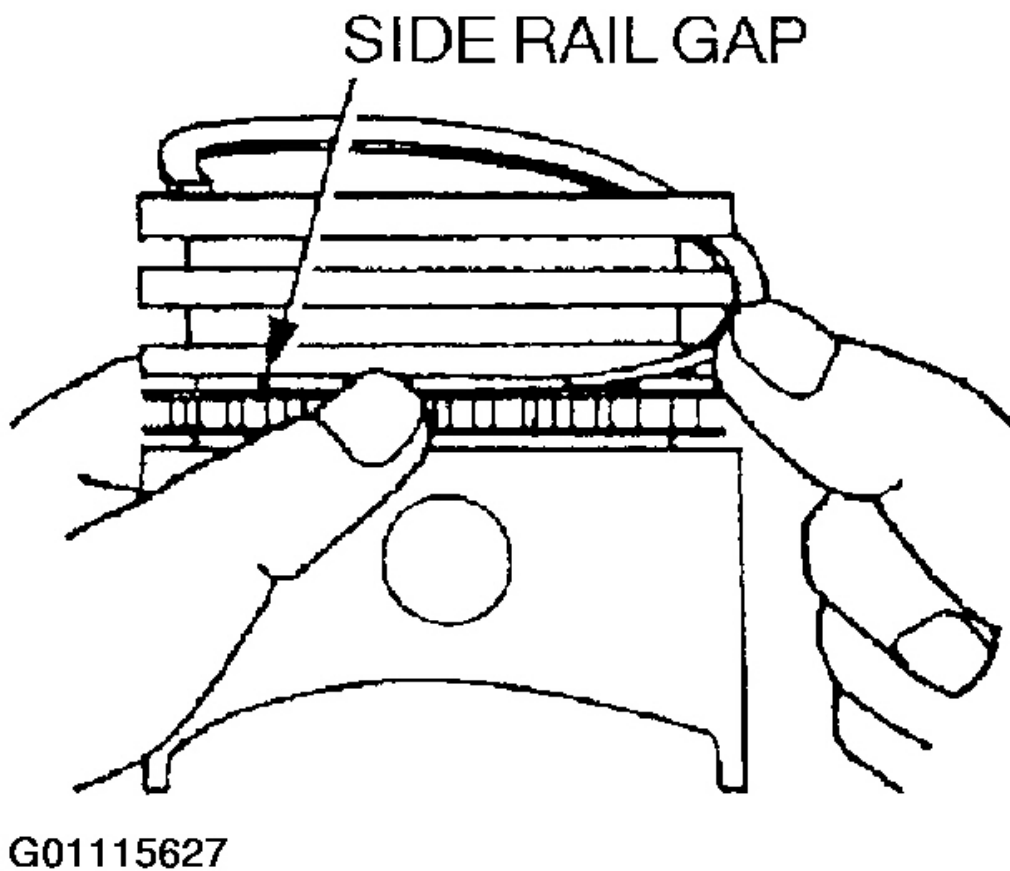


Fig. 165: Installing Lower Side Rail

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> C < PISTON RING NO.2/PISTON RING NO. 1 INSTALLATION

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

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

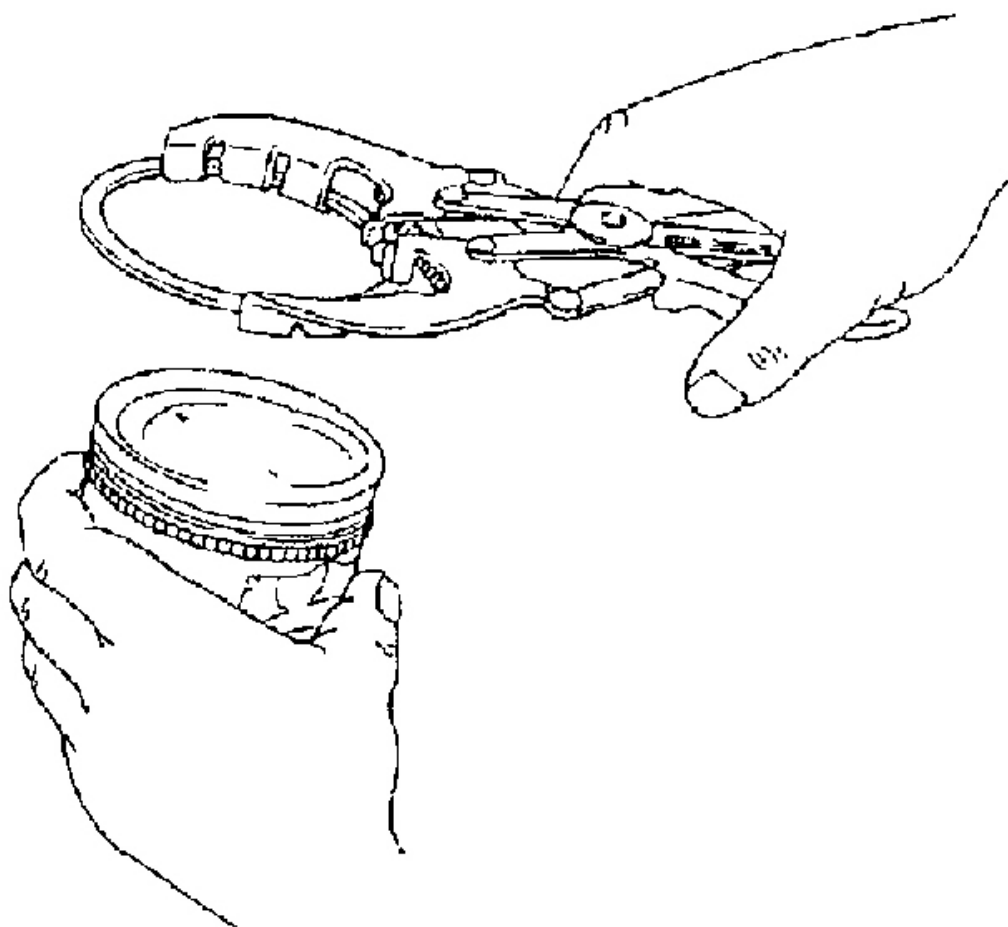
NOTE: Install piston rings with identification mark facing up, to the piston crown side.

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

G01115628

Fig. 166: Identifying Piston Marks

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G01115629

Fig. 167: Installing Piston Rings

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> 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 below.
3. Rotate the crankshaft so that the crank pin is on the center of the cylinder bore.

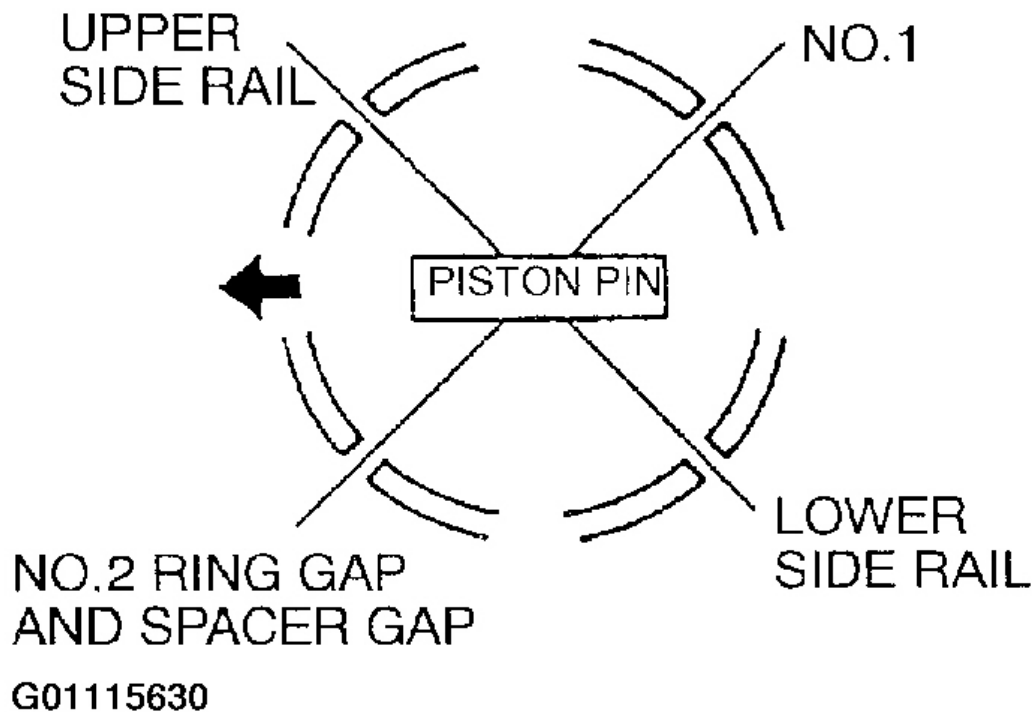


Fig. 168: Arranging Piston Ring & Oil Ring Gaps

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

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

5. Using a suitable piston ring compressor tool, install the piston and connecting rod assembly into the cylinder block.

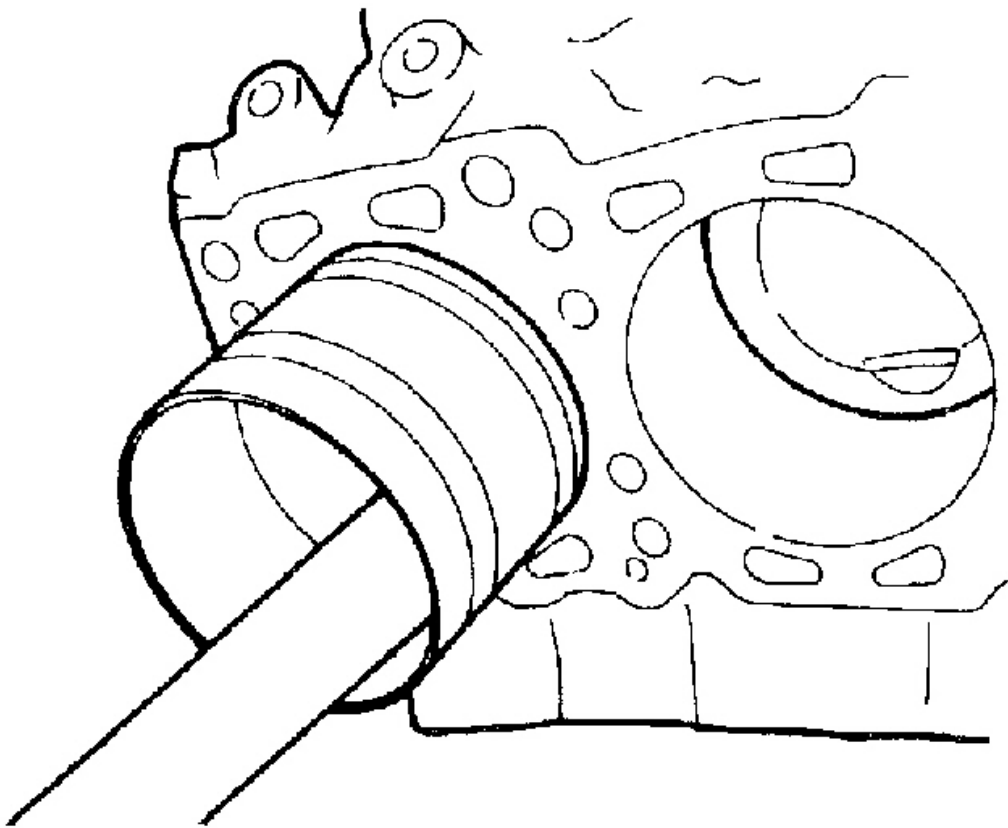
**G01115631**

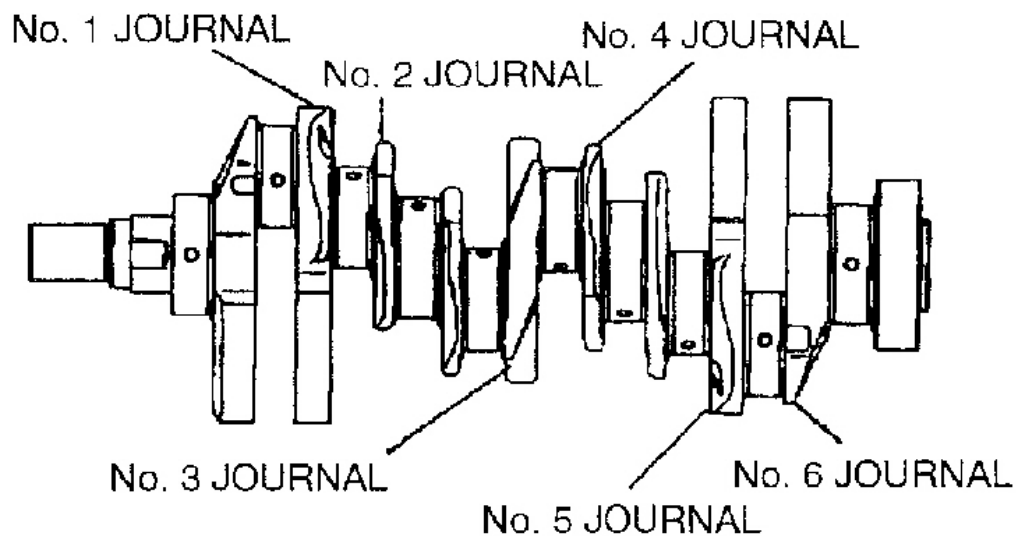
Fig. 169: Installing Piston & Connecting Rod
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> 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 below.
2. The connecting rod identification mark is stamped at the position shown in the illustration.
3. Select a suitable bearing from the following table on the basis of the identification data confirmed under items (1) and (2).

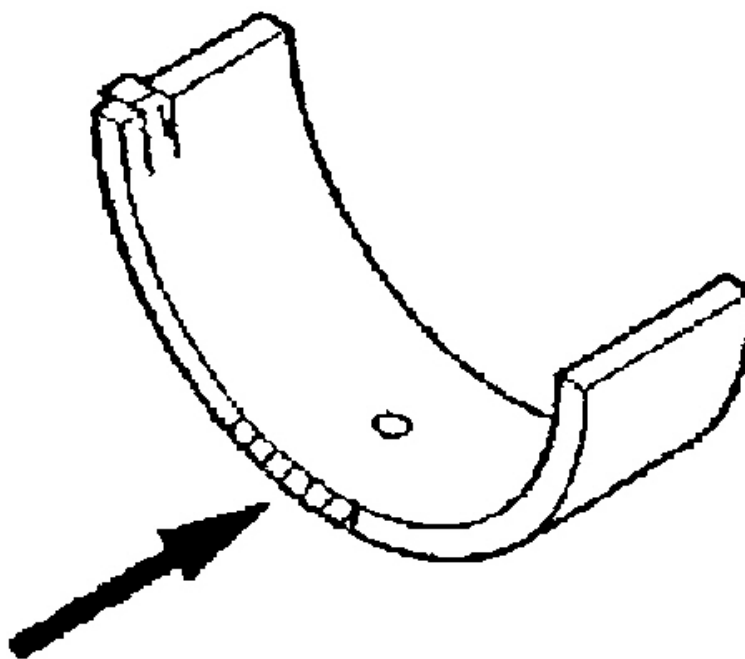
LOCATION OF IDENTIFICATION COLOR



G01115632

Fig. 170: Locating Identification Color

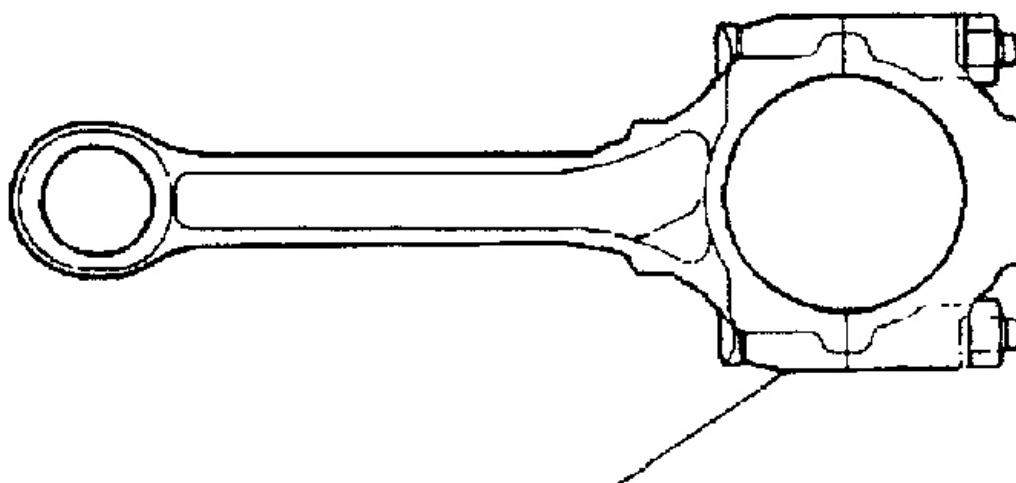
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



Identification colour

G01115633

Fig. 171: Locating Identification Color On Supplied Service Part
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



Identification mark

G01115634

Fig. 172: Locating Connecting Rod Identification Mark
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2002 Mitsubishi Diamante VR-X

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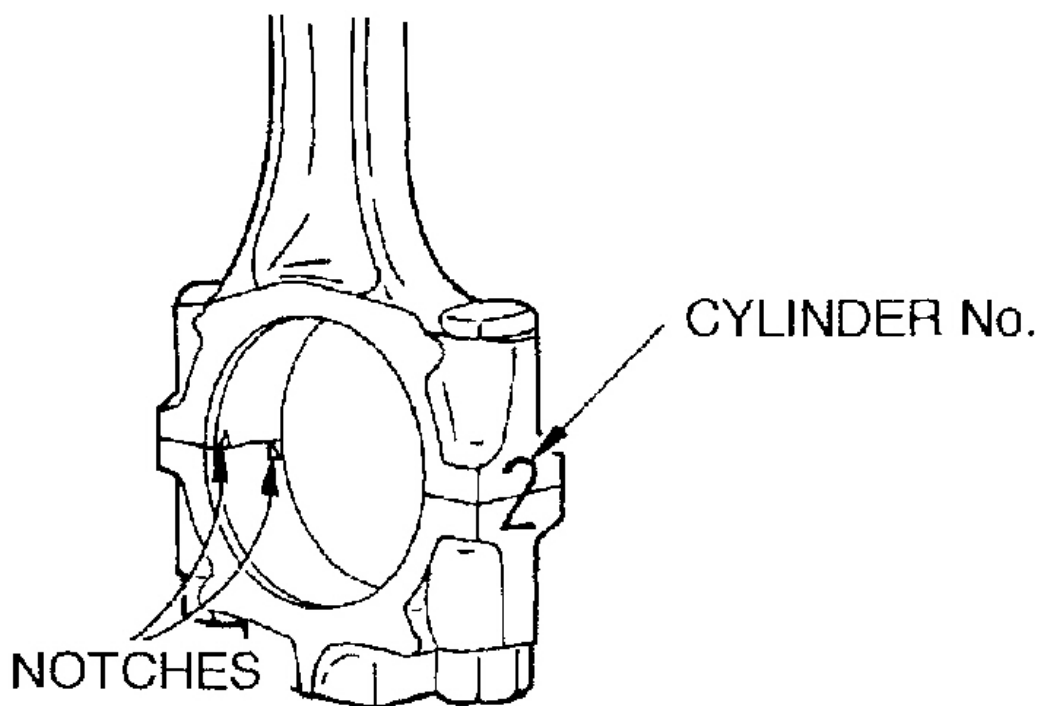
CRANKSHAFT			CONNECTING ROD			
Identification mark (color)		Journal O.D. mm (in)	Big end		Bearing	
Production part	Spare part		Identification mark	I.D. mm (in)	Identification color	Thickness mm (in)
None	Yellow	54.994 – 55.000 (2.1651 – 2.1654)	0	58.000 – 58.006 (2.2835 – 2.2837)	Pink	1.483 – 1.486 (0.0575 – 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)

G01115635

Fig. 173: Crankshaft & Connecting Rod Classification Table
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> F < CONNECTING ROD CAP INSTALLATION

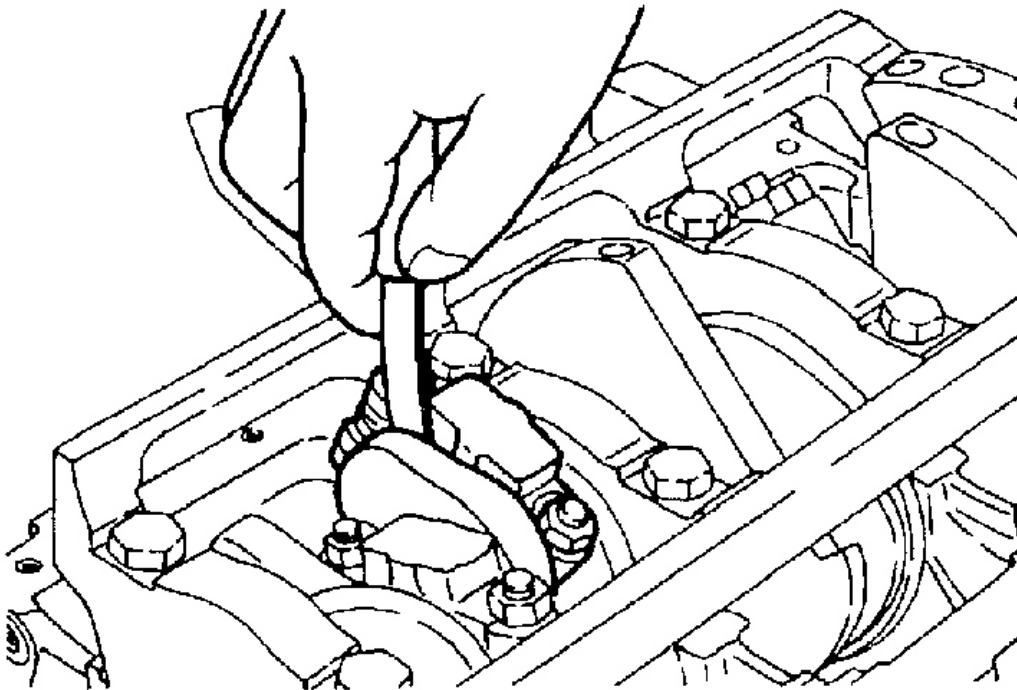
1. Mate the correct bearing cap with the correct connecting rod by checking with the alignment marks made during disassembly. If a new connecting rod is used which has no alignment mark, position the notches for locking the bearing on the same side.



G01115636

Fig. 174: Locating Connecting Rod Notches For Locking Bearing
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.)



G01115637

Fig. 175: 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

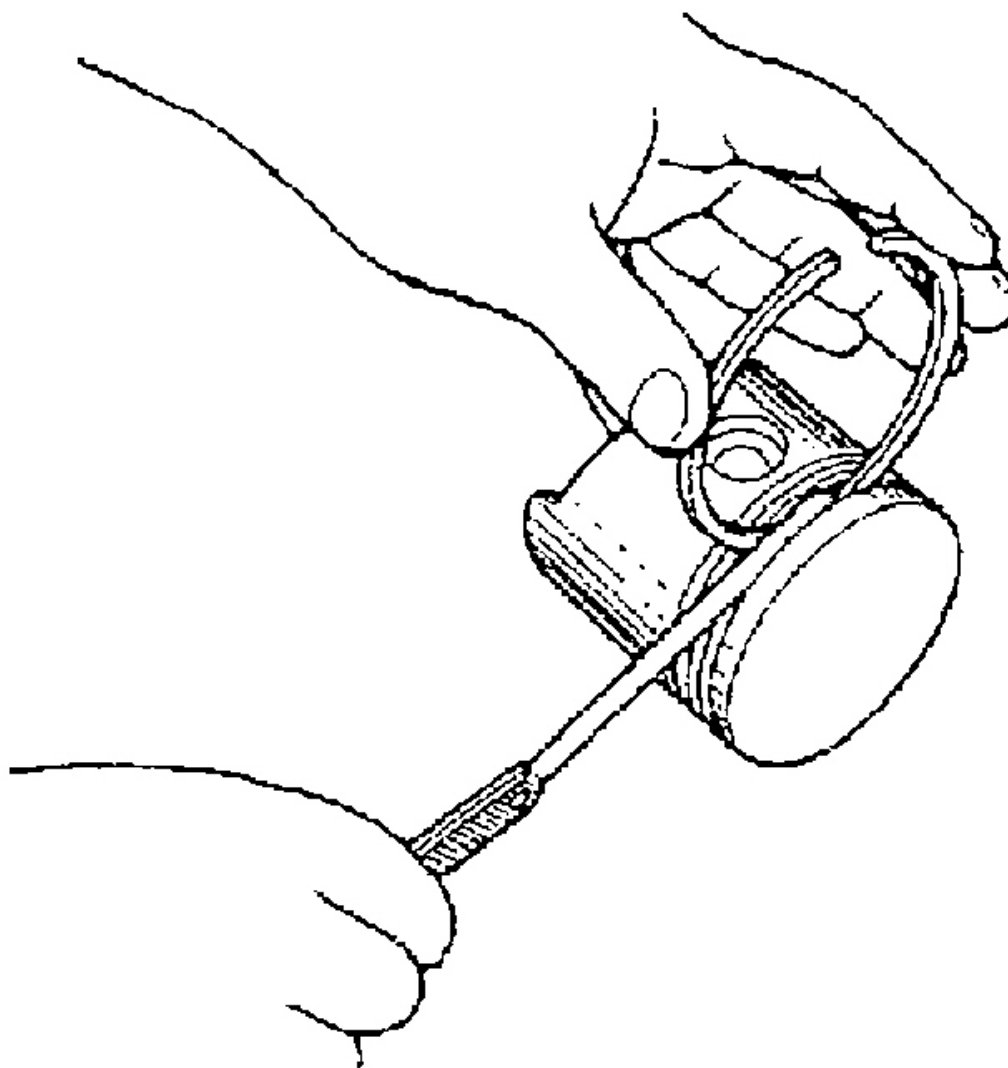
piston, or both.

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.)



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Fig. 176: Checking Piston Ring & Ring Groove Clearance
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.)

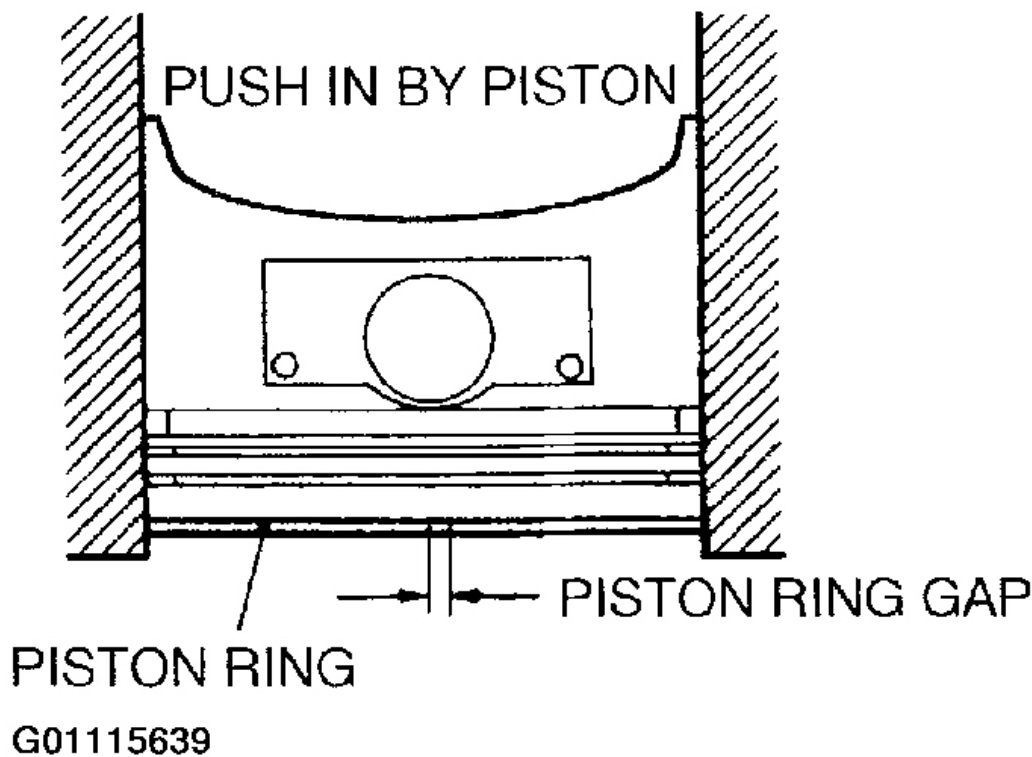


Fig. 177: Measuring Piston Ring End Gap

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

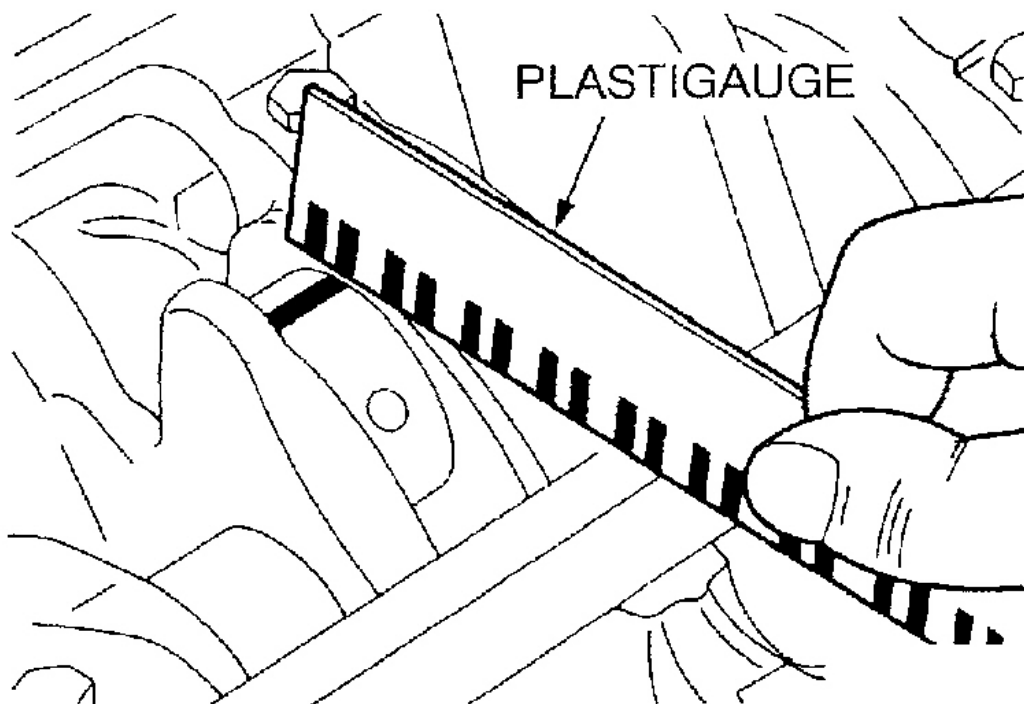
CRANKSHAFT PIN OIL CLEARANCE (PLASTIGAUGE METHOD)

The crankshaft oil clearance can be measured easily by using Plastigauge, 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 Plastigauge 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 Plastigauge at its widest section by using a scale printed on the Plastigauge bag.

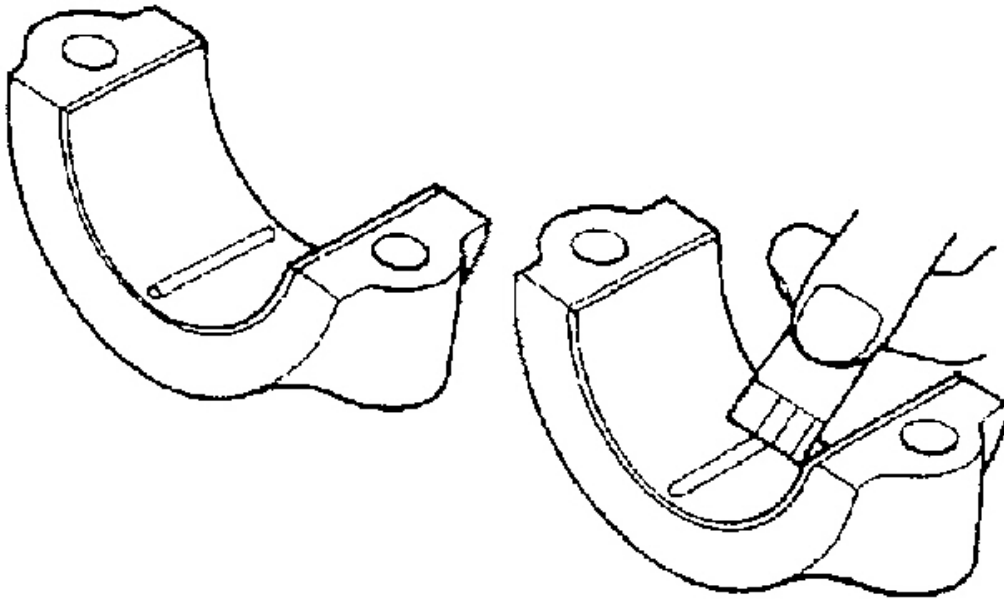
Standard value: 0.02-0.05 mm (.0008-.0020 in.)

Limit: 0.1 mm (.004 in.)



G01115640

Fig. 178: Locating Plastigauge At Crankshaft
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



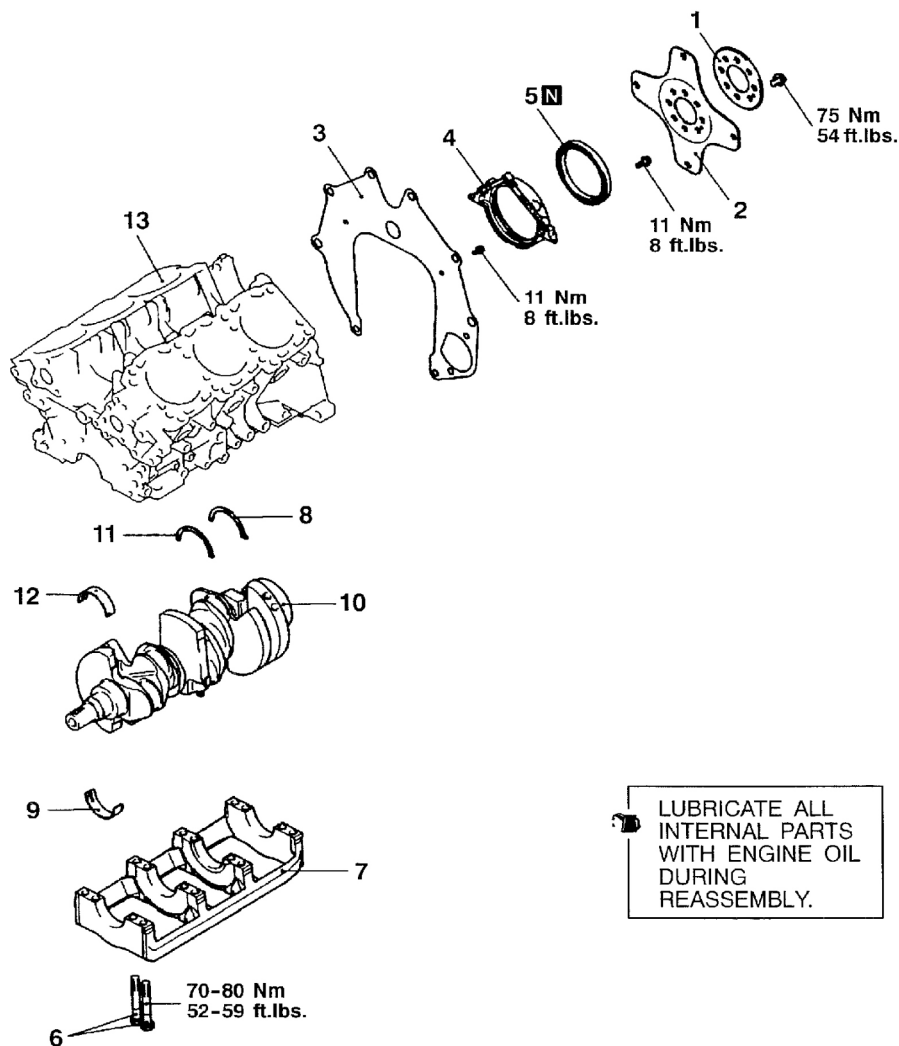
G01115641

Fig. 179: Measuring Width Of Crushed Plastigauge
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CRANKSHAFT AND DRIVE PLATE

REMOVAL AND INSTALLATION

For removal procedures, follow numbered steps in illustration. See crankshaft and drive plate **Fig. 180**. For crankshaft and drive plate installation procedures, follow numbers steps in illustration in reverse order. Letters in illustration refer to service point to observe while removing and installing crankshaft and drive plate. Letters with arrows pointing towards letter refer to service points to be observed while performing that step of the installation procedure. See **INSTALLATION SERVICE POINTS**.



LUBRICATE ALL
INTERNAL PARTS
WITH ENGINE OIL
DURING
REASSEMBLY.

REMOVAL STEPS

1. ADAPTOR PLATE
2. DRIVE PLATE
3. REAR PLATE
4. OIL SEAL CASE
5. CRANKSHAFT REAR OIL SEAL
6. BEARING CAP BOLT
7. BEARING CAP

8. THRUST BEARING A
9. CRANKSHAFT BEARING, LOWER
10. CRANKSHAFT
11. THRUST BEARING B
12. CRANKSHAFT BEARING, UPPER
13. CYLINDER BLOCK

G01115642

Fig. 180: Removing & Installing Crankshaft & 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 below.

LOCATION OF IDENTIFICATION COLOR

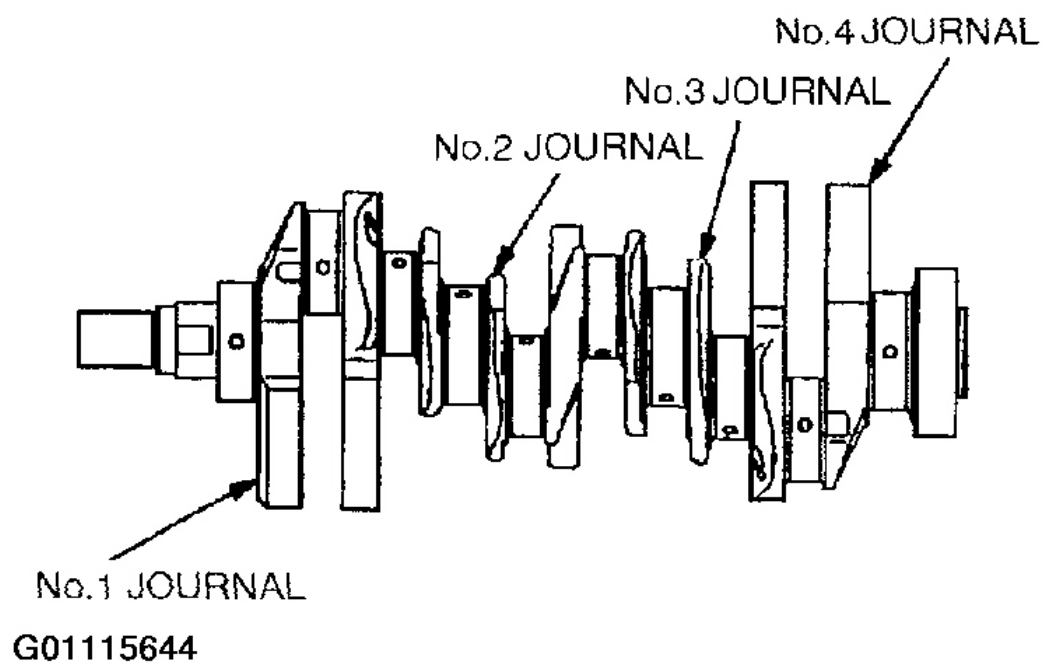


Fig. 181: Locating Identification Color Of Crankshaft Journal
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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)	I	Pink(1)
			-	II	Red(2)
			64.000 (2.5197)	III	Green(3)
2	None	None	63.988 (2.5192)	I	Red(2)
			-	III	Green(3)
			63.994 (2.5194)	III	Black(4)
3	None	White	63.982 (2.5190)	I	Green(3)
			-	II	Black(4)
			63.988 (2.5192)	III	Brown(5)

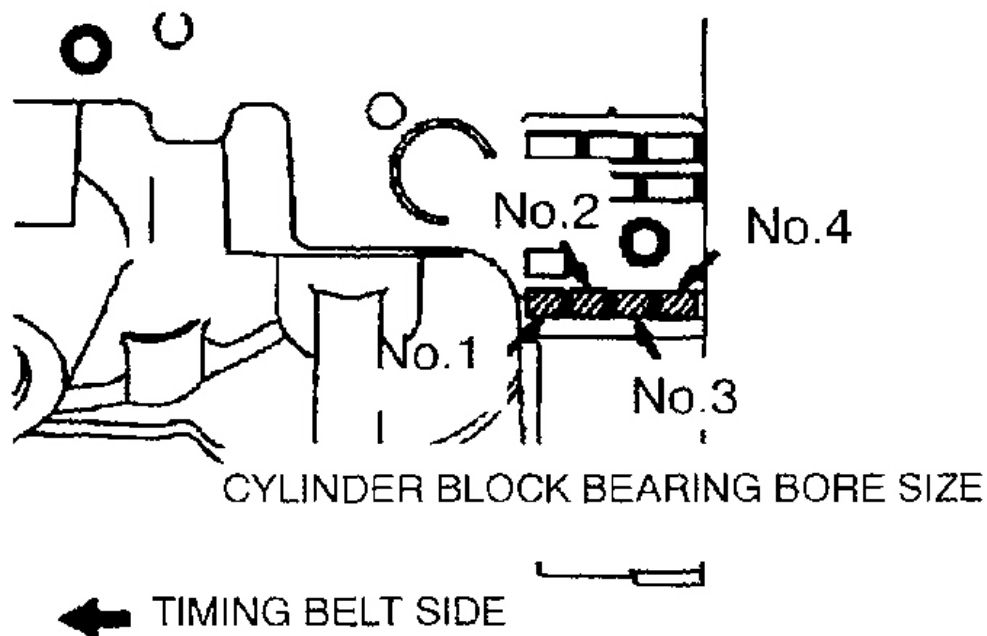
G01115643

Fig. 182: Crankshaft Bearing Classification Table

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

LOCATION OF IDENTIFICATION MARK



G01115645

Fig. 183: Locating Cylinder Block Bearing Bore Diameter Marks
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

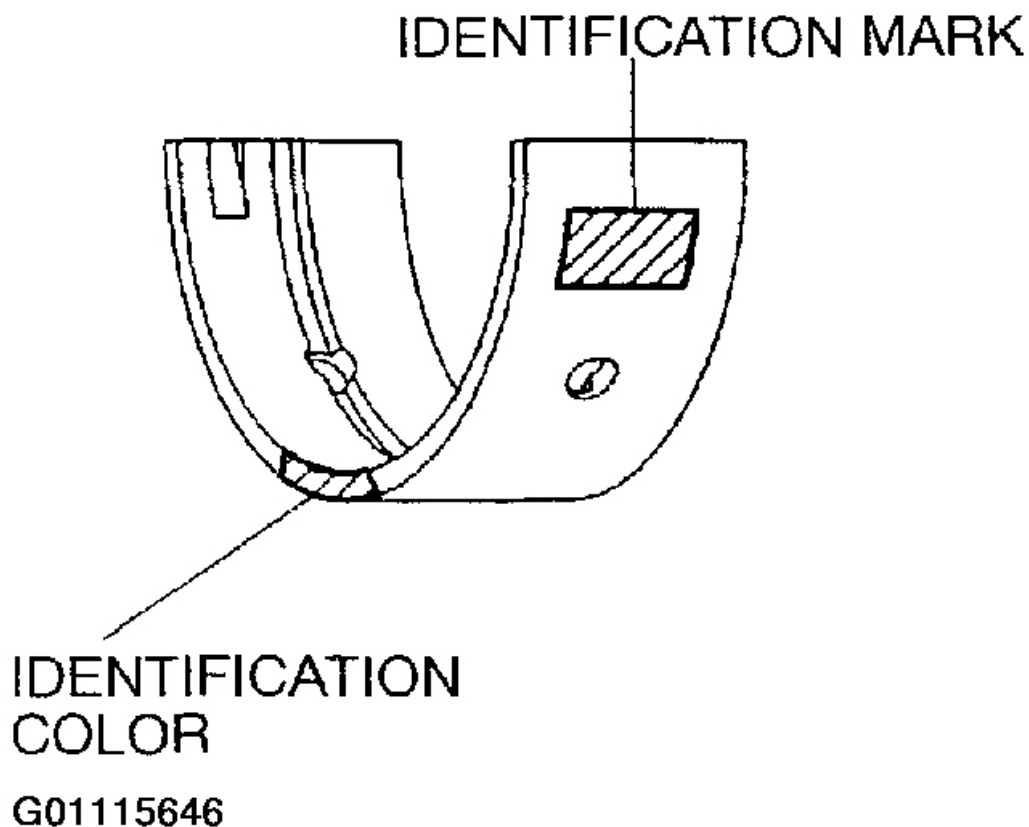


Fig. 184: Locating Identification Mark & Color
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

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".

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

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.

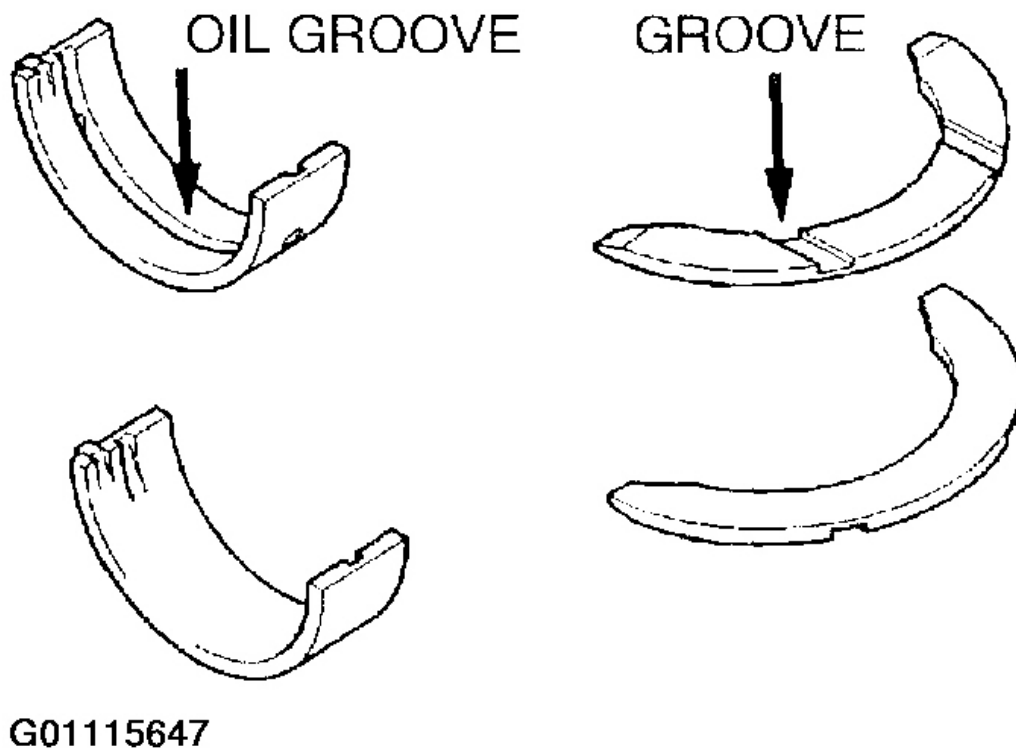
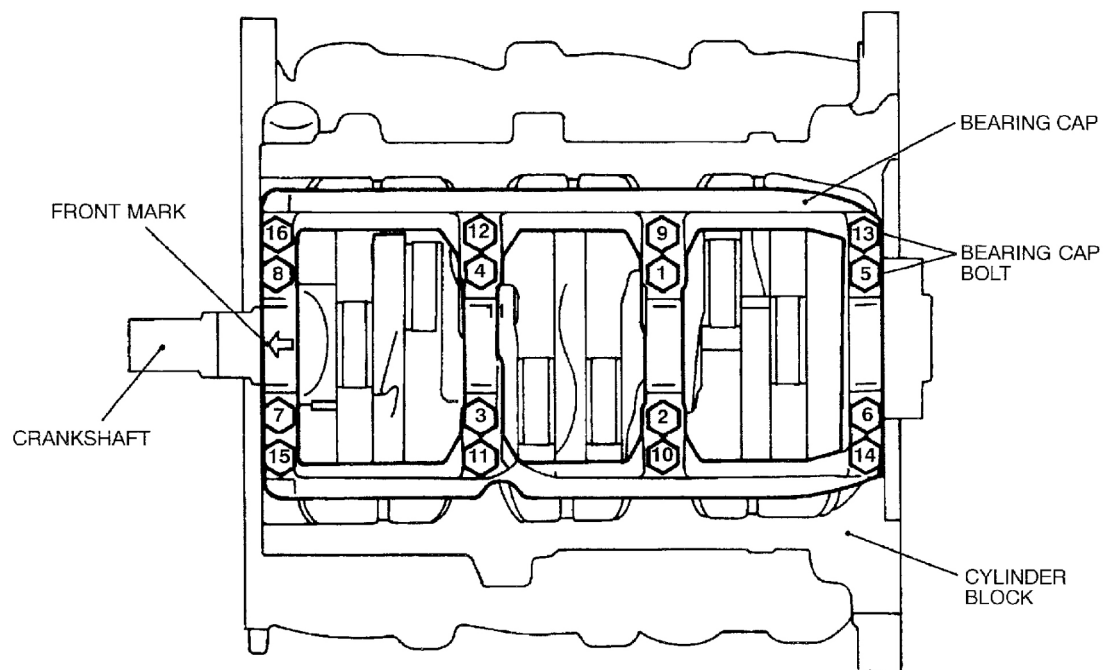


Fig. 185: Installing Bearing Halves

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> B < BEARING CAP/BEARING BOLT INSTALLATION

1. Attach the bearing cap on the cylinder block as shown in the illustration.
2. Tighten the bearing cap bolts to the specified torque in the sequence shown in the illustration.
3. Check that the crankshaft rotates smoothly.



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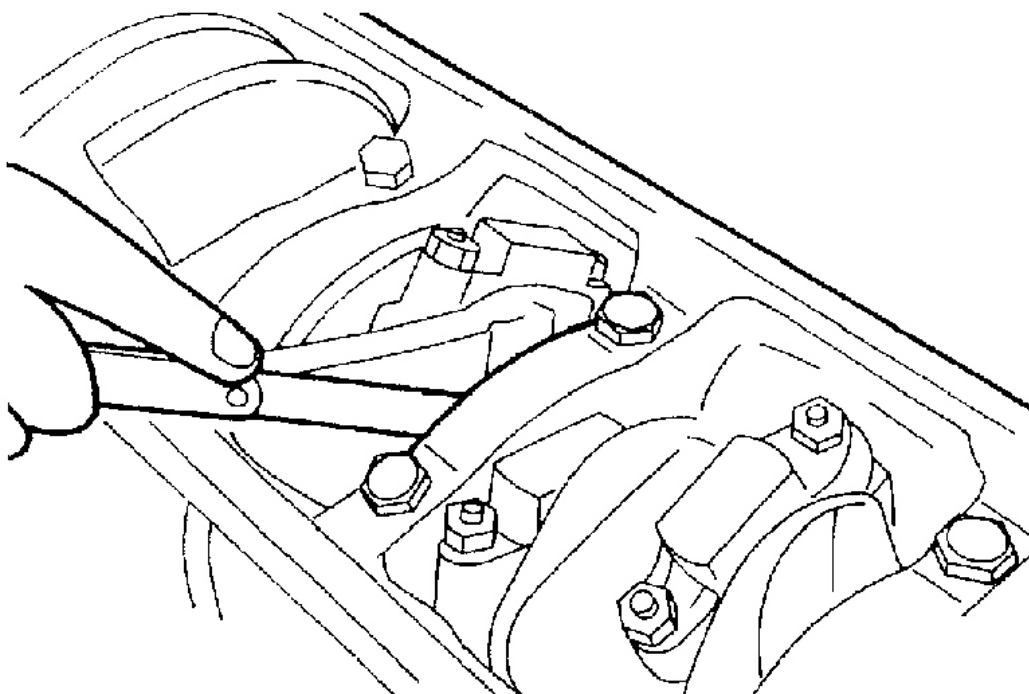
Fig. 186: Installing Bearing Cap & Bolts

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

4. Check the end play. If it exceeds the limit value, replace the thrust bearing.

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

Limit: 0.3 mm (.012 in.)



G01115649

Fig. 187: Checking End Play

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

> C < CRANKSHAFT REAR OIL SEAL INSTALLATION

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

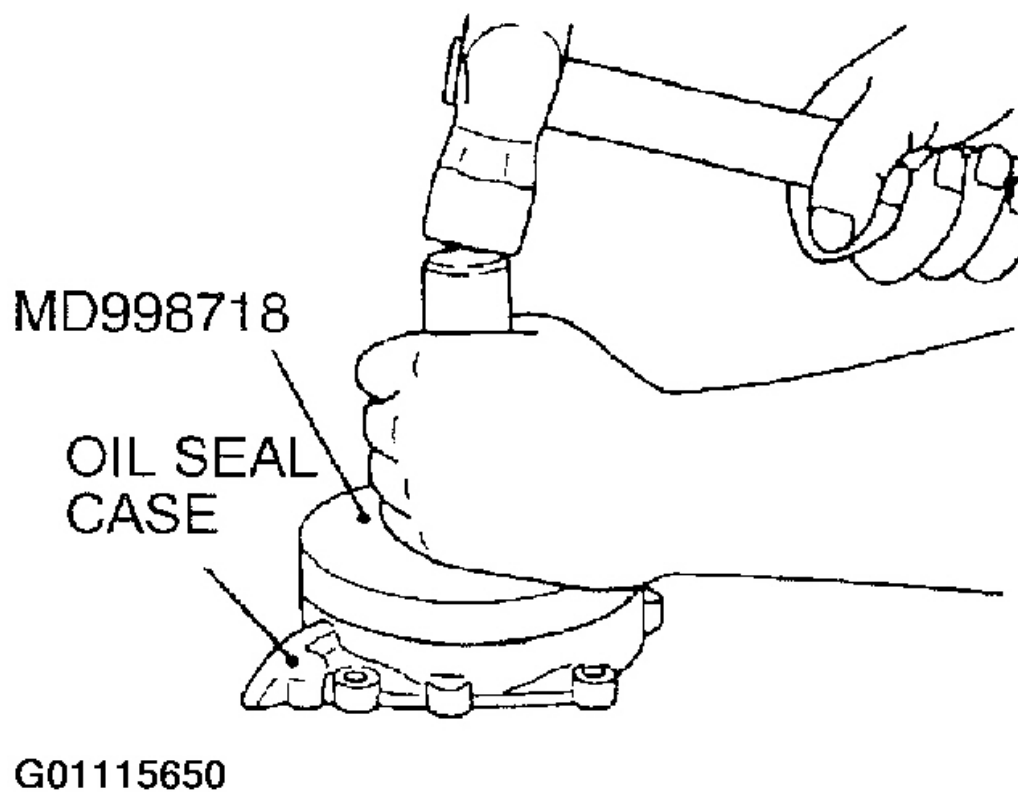


Fig. 188: Installing Special Tool MD998718
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

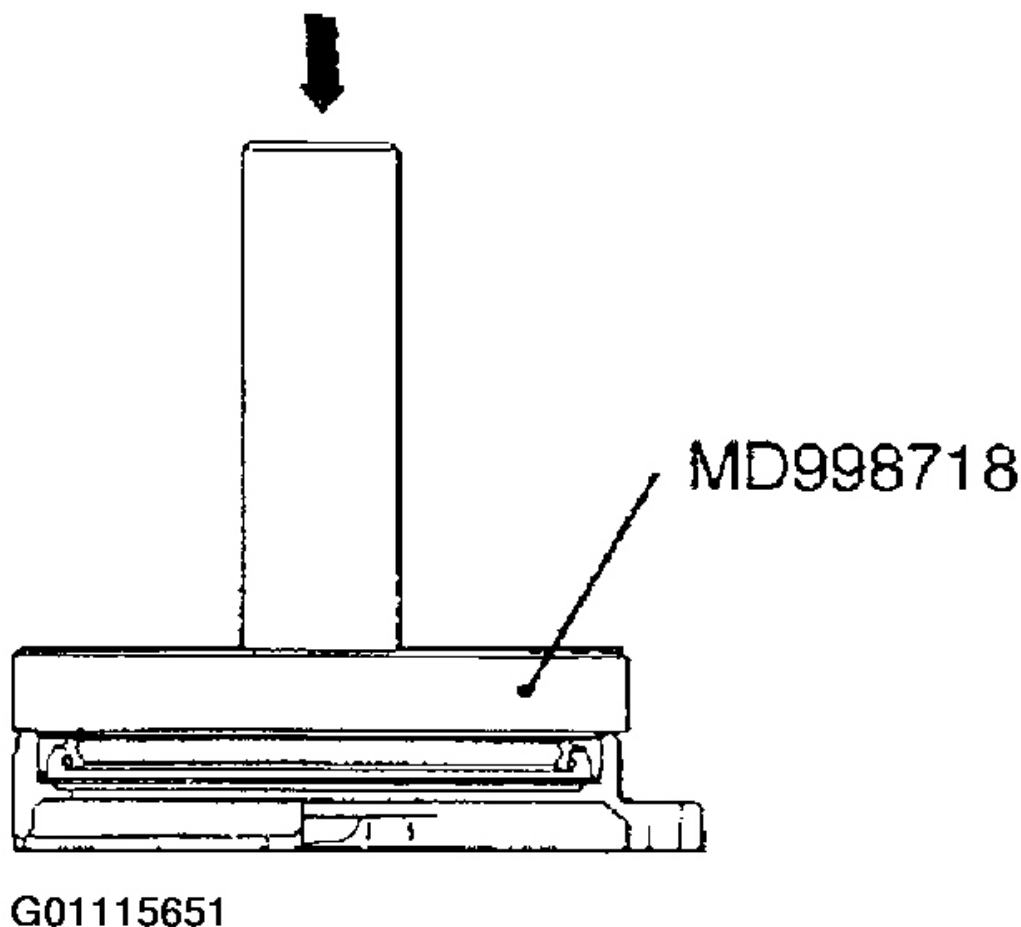


Fig. 189: Press-Fitting Crankshaft Rear Oil Seal Into Oil Seal Case
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

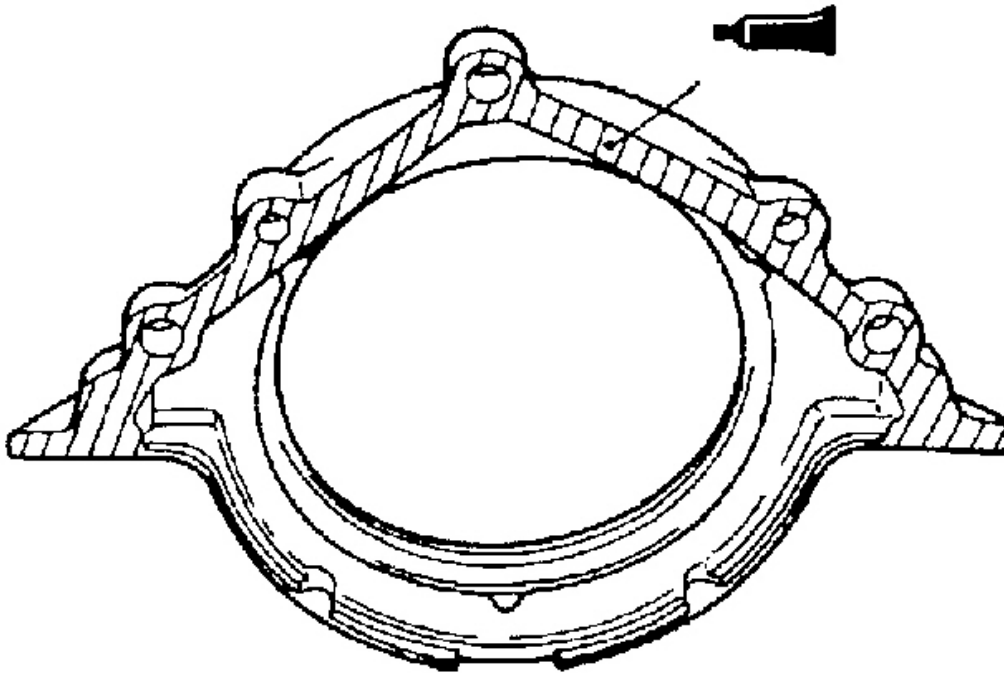
> D < OIL SEAL CASE INSTALLATION

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

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.



G01115652

Fig. 190: Applying Sealant

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

INSPECTION**CRANKSHAFT**

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

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

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.

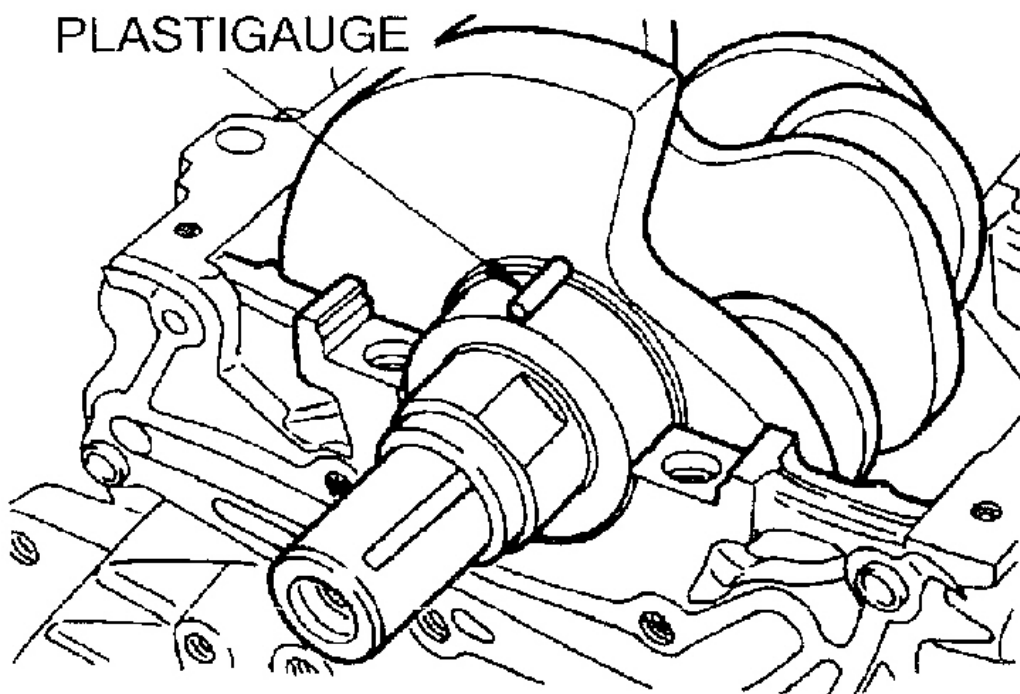
Standard value: 0.02-0.04 mm (.0008-.0020 in.)

Limit: 0.1 mm (.004 in.)

CRANKSHAFT JOURNAL OIL CLEARANCE < PLASTIGAUGE METHOD >

The crankshaft oil clearance can be measured easily by using Plastigauge, 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 Plastigauge to the same length as the width of the bearing and place it on the journal in parallel with its axis.

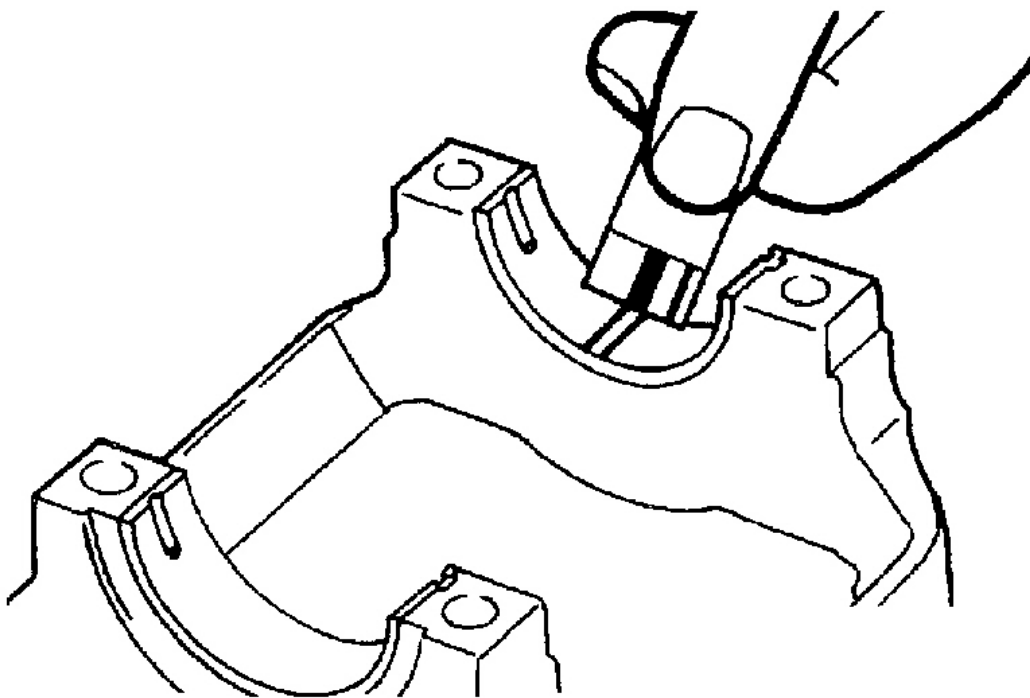


G01115653

Fig. 191: Locating Plastigauge At Crankshaft

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 Plastigauge at its widest section by using a scale printed on the Plastigauge package.



G01115654

Fig. 192: Measuring Width Of Crushed Plastigauge

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

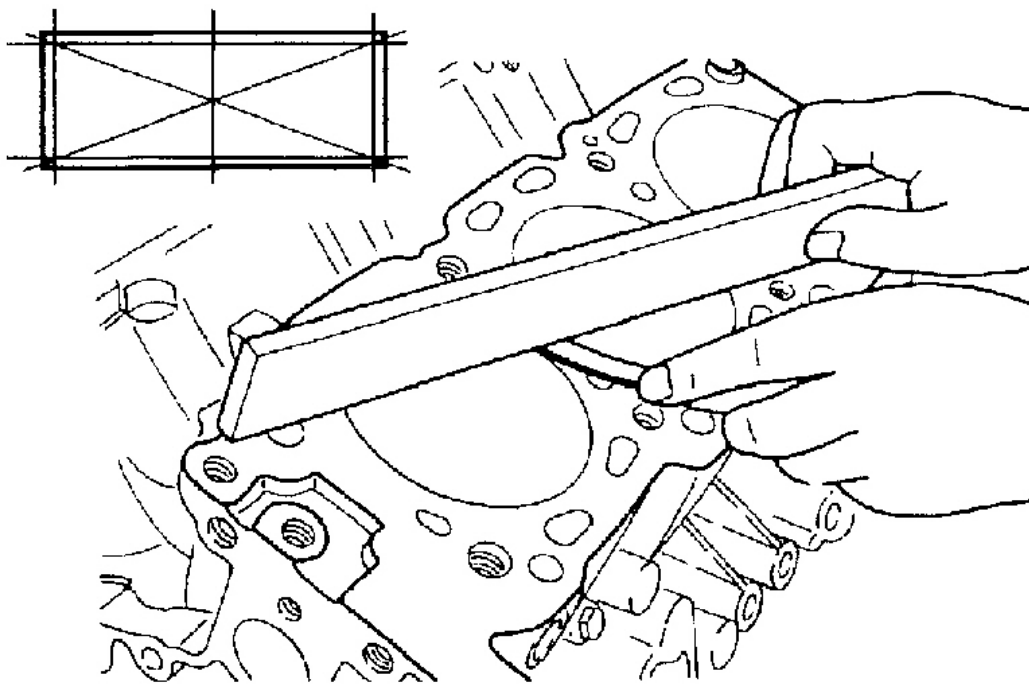
CYLINDER BLOCK

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.

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.)**



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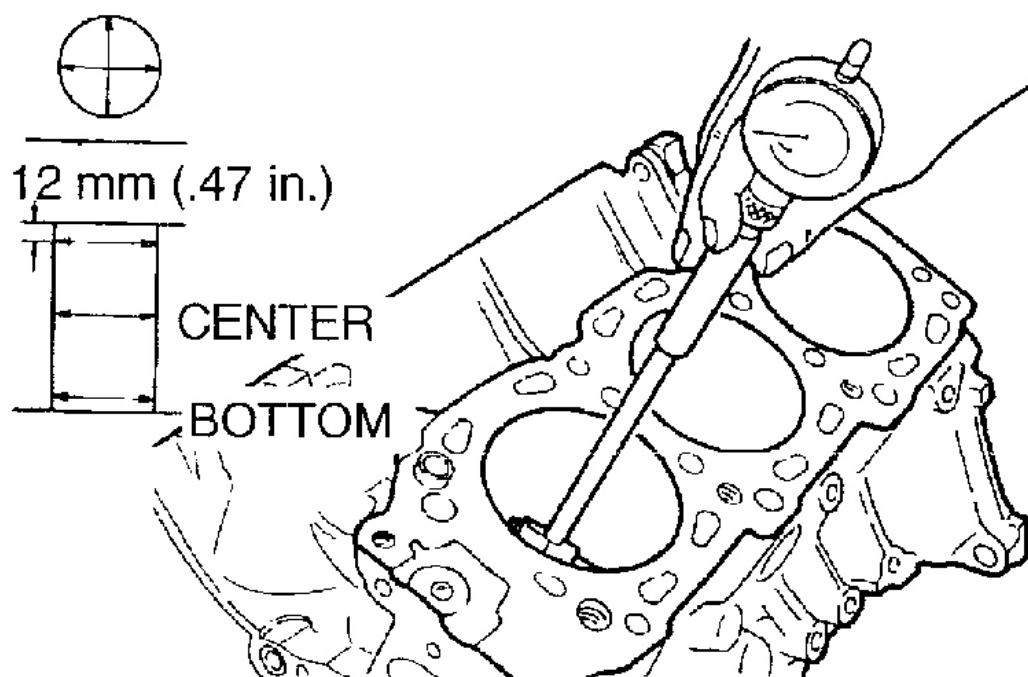
Fig. 193: Checking Flatness Of Cylinder Block Top Surface
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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.

Standard value:

Cylinder I.D.: 93.0 mm (3.65 in.)

Cylindricity: 0.01 mm (.0004 in.)



G01115656

Fig. 194: Measuring Cylinder Bore & Cylindricity
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

BORING CYLINDER

NOTE: Size mark is stamped on the piston top.

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

G01115657

Fig. 195: Piston Size Identification Table
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

Piston size identification

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

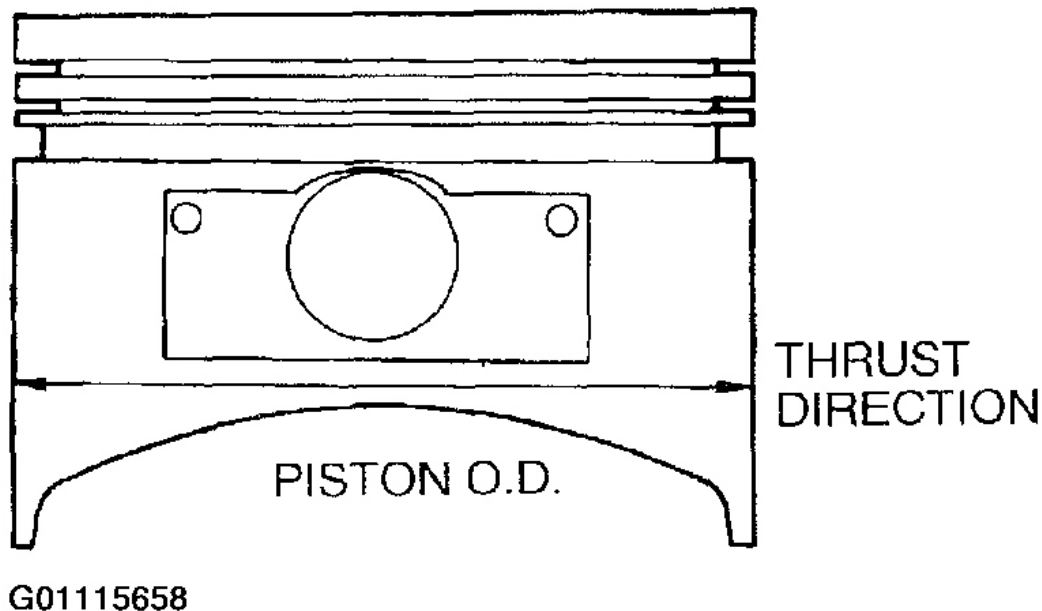


Fig. 196: Measuring Thrust Direction

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)

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.

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

Clearance between piston and cylinder:

0.02-0.04 mm (.0008-.0016 in.)

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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 SPECIFICATION****TORQUE SPECIFICATIONS**

Application	Ft. Lbs. (N.m)
Accelerator Cable	4 (5)
Automatic Tensioner	17 (23)
Baffle Plate Bolt	
M6	8 (11)
M8	7 (9)
Bell Housing Cover Bolt	7 (9)
Bracket Bolt	
M8	16 (22)
M10	30(41)
M12	54 (75)
Camshaft Sprocket	65 (88)
Connecting Rod Cap Nut	38 (52)
Crankshaft Bearing Cap Bolt ⁽¹⁾	67 (93)
Crankshaft Bolt	134 (182)
Crankshaft Position Sensor	7 (9)
Cylinder Head Bolts ⁽²⁾	83 (113)
Distributor Nut/Adapter Bolt	17 (23)
Drive Plate	54 (75)
EGR Pipe Bolt	13 (18)
EGR Pipe Flare Nut	43 (59)
EGR Valve Bolt	16 (22)
Engine Coolant Temperature Gauge Unit	8 (11)
Engine Coolant Temperature Sensor	22 (30)
Engine Mount	78 (118)
Engine Support Bracket	33 (44)
Exhaust Manifold Heat Shield	10 (14)
Exhaust Manifold Nut	22 (29)
Fuel Pipe Bolt	7 (9)
Fuel Pressure Regulator Bolt	7 (9)
Generator	15 (21)
Generator Bracket	
M8	36 (48)
M10	17 (23)

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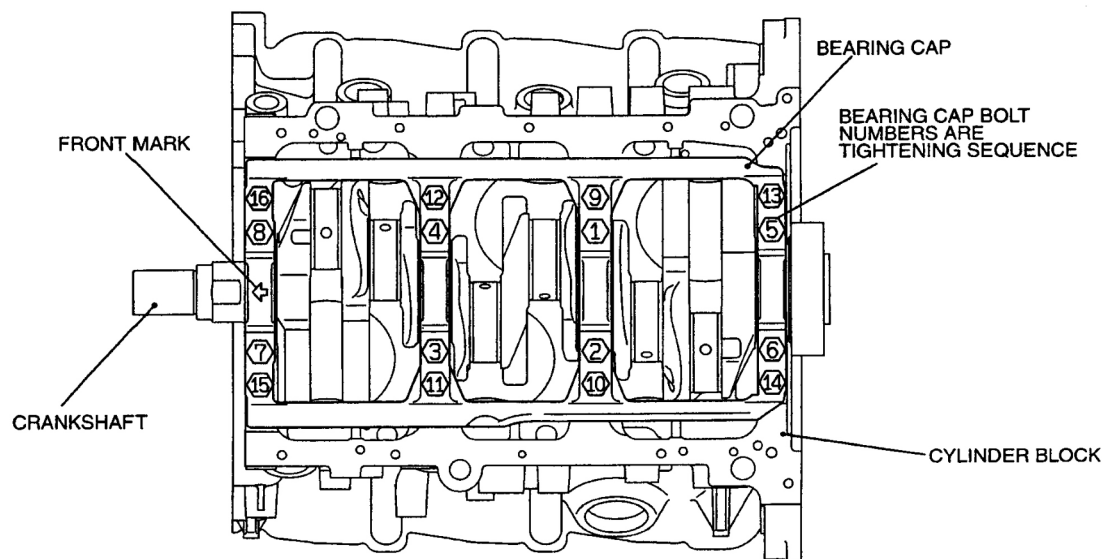
2001-02 ENGINES 3.5L V6 - Diamante

Generator & Drive Belt Tensioner Pulley Nut	36 (50)
Generator Pivot Nut	32 (44)
Heat Pipe Bolt	13 (18)
High Pressure Fuel Hose	4 (5)
Idler Pulley	33 (44)
Injector/Fuel Rail Bolt	9 (12)
Intake Manifold Differential Pressure Sensor Bolt	4 (5)
Intake Manifold Nut	16 (21)
Intake Manifold Plenum Bolt/Nut	
M8	13 (18)
M10	27 (36)
Intake Manifold Plenum Bracket Bolt	18 (24)
Knock Sensor	17 (23)
Oil Drain Plug	29 (39)
Oil Filter Bracket Bolt	
M8	17 (24)
M10	30 (40)
Oil Gauge/Guide	11 (15)
Oil Pan ⁽³⁾	
Lower	8 (11)
Upper	7 (9)
Oil Pan Cover Bolt	8 (11)
Oil Pan Drain Plug	33 (45)
Oil Pump Case Bolt	10 (14)
Oil Pump Cover Bolt	7 (10)
Oil Pressure Switch	7 (10)
Oil Seal Case	8 (11)
Oil Screen	14 (19)
Power Steering Oil Pump	29 (39)
Power Steering Pressure Hose	18 (24)
Rear Plate	8 (11)
Rocker Arm, Rocker Arm Shaft Bolt	23 (31)
Rocker Cover	3 (4)
Spark Plug	18 (25)
Starter Motor	24 (33)
Tensioner Arm	33 (44)
Tensioner Pulley	36 (48)
Thermostat Case Bolt	14 (19)
Throttle Body Bolt	8 (12)
Thrust Case Bolt	23 (31)
Timing Belt Cover - Rear	10 (13)

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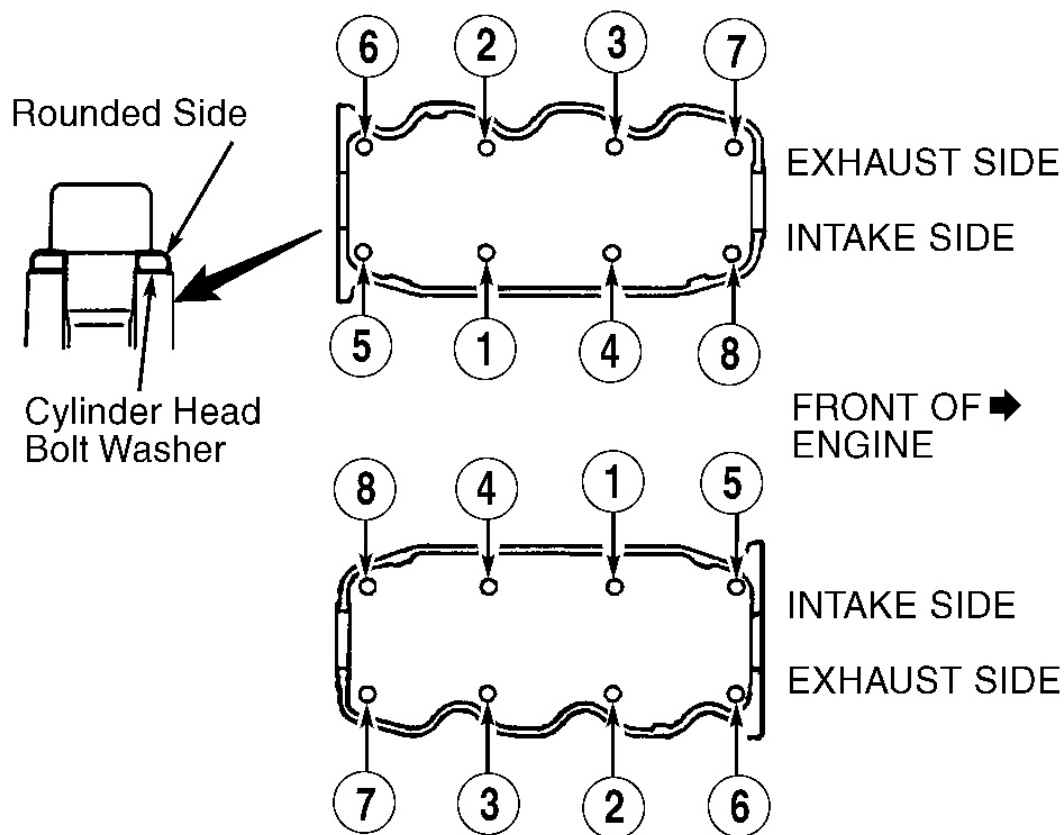
2001-02 ENGINES 3.5L V6 - Diamante

	11 (15)
Vacuum Hose Assembly Bolt	7 (10)
Water Inlet Fitting Bolt	14 (19)
Water Outlet Fitting Bolt	14 (19)
Water Outlet Pipe Bolt	10 (14)
Water Pump	
M8	17 (24)
M10	30 (41)
INCH Lbs. (N.m)	
Timing Belt Cover (Front Lower)	11 (8)
Timing Belt Cover (Front Upper)	11 (8)
Timing Belt Cover (Rear Upper)	11 (8)
(1) Tighten according to sequence. See Fig. 197 .	
(2) Tighten according to sequence. See Fig. 198 .	
(3) Tighten according to sequence. See Fig. 199 .	



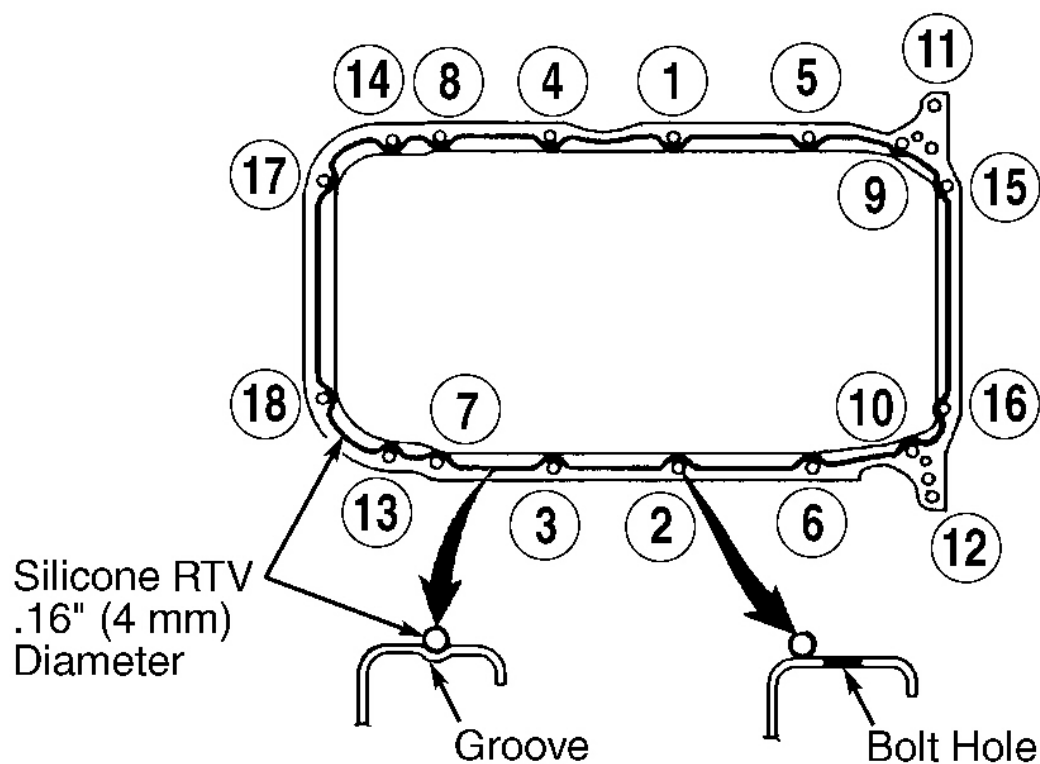
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Fig. 197: Crankshaft Main Bearing Cap Bolt Tightening Sequence
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

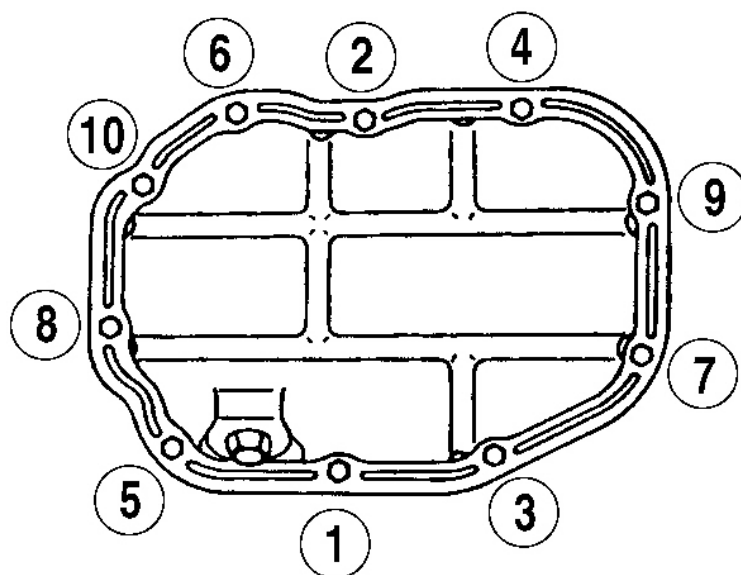


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Fig. 198: Cylinder Head Bolt Tightening Sequence
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA



UPPER OIL PAN



LOWER OIL PAN

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Fig. 199: Oil Pan Bolt Tightening Sequences

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

GENERAL SPECIFICATIONS**Engine Overhaul 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
{{1}}	{{2}}	{{3}}	{{4}}
Throttle bore mm (in.)			65 (2.56)
Throttle position sensor			Variable resistor type
Closed throttle position switch			Movable contact type, within throttle position sensor

REWORK DIMENSIONS

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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. 200: Engine Overhaul Rework Specifications
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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. 10° 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. 201: Identifying Engine Mechanical Service Specifications (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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. 202: Identifying Engine Mechanical Service Specifications (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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. 203: Engine Overhaul Service Specifications (1 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

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. 204: Engine Overhaul Service Specifications (2 Of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SEALANT

2002 Mitsubishi Diamante VR-X

2001-02 ENGINES 3.5L V6 - Diamante

ITEMS	RECOMMENDED SEALANT
Oil pan	mitsubishi genuine Part No. MD970389 or equivalent

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Fig. 205: Identifying Engine Mechanical Sealant Specification
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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. 206: Engine Overhaul Sealant Specifications
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.