

## 2001 ENGINES

## 1.5L &amp; 1.8L 4-Cylinder

## ENGINE IDENTIFICATION

**NOTE:** For repair procedures not covered in this article, see **ENGINE OVERHAUL PROCEDURES** article in **GENERAL INFORMATION**.

Engine can be identified by Vehicle Identification Number (VIN) stamped on a metal tag located near lower left corner of windshield. The eighth character of VIN identifies engine. See **ENGINE IDENTIFICATION CODES**. The tenth character of VIN identifies model year ("X" for 1999; "Y" for 2000; "1" for 2001).

## ENGINE IDENTIFICATION CODES

| Application | Engine Model | Engine Code |
|-------------|--------------|-------------|
| 1.5L        | 4G15         | A           |
| 1.8L        | 4G93         | C           |

## ADJUSTMENTS

## VALVE CLEARANCE ADJUSTMENT

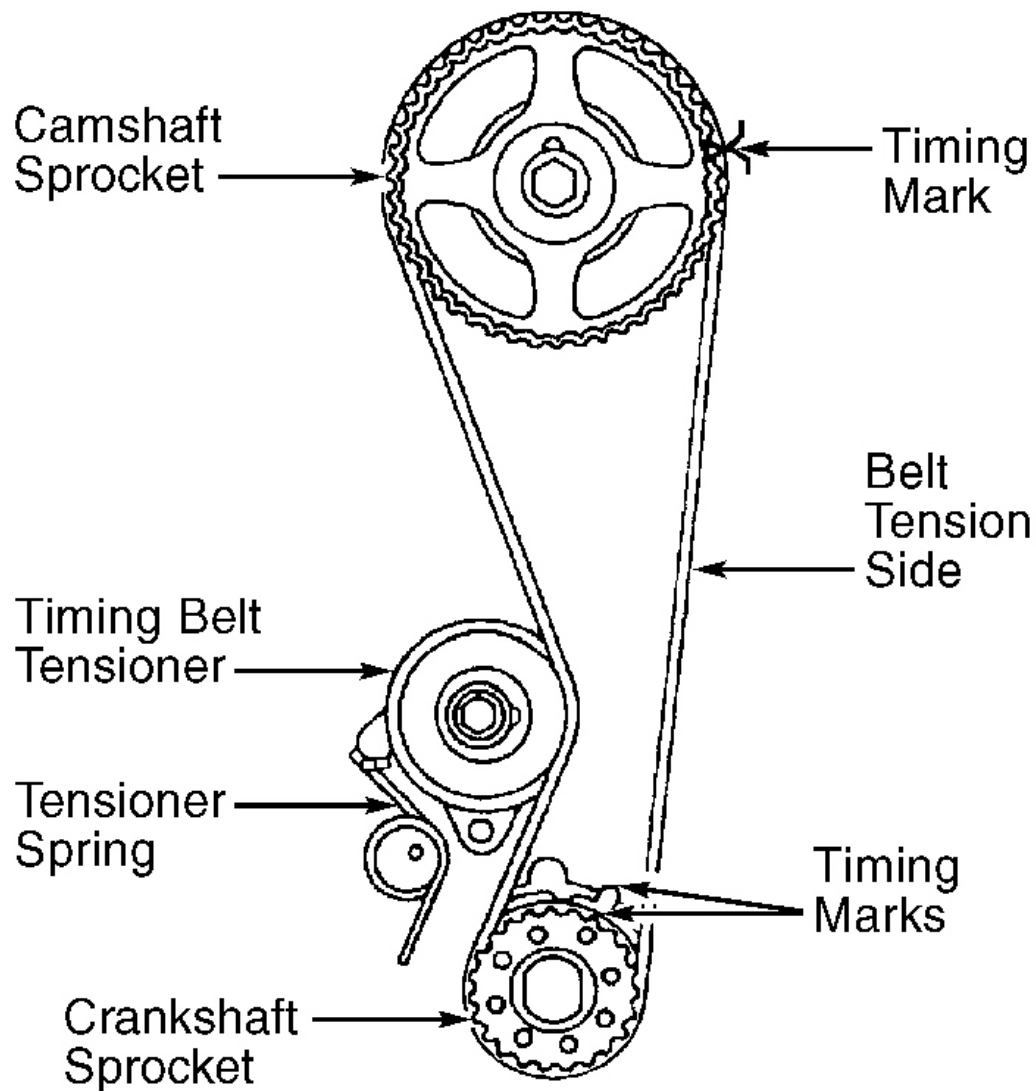
**NOTE:** Hydraulic valve lash adjusters are used and valve clearances are not adjustable.

## TIMING BELT ADJUSTMENT

**CAUTION:** Rotate engine only in direction of normal rotation, clockwise (as viewed from timing belt end of engine). Counterclockwise rotation may cause timing belt to slip or jump timing.

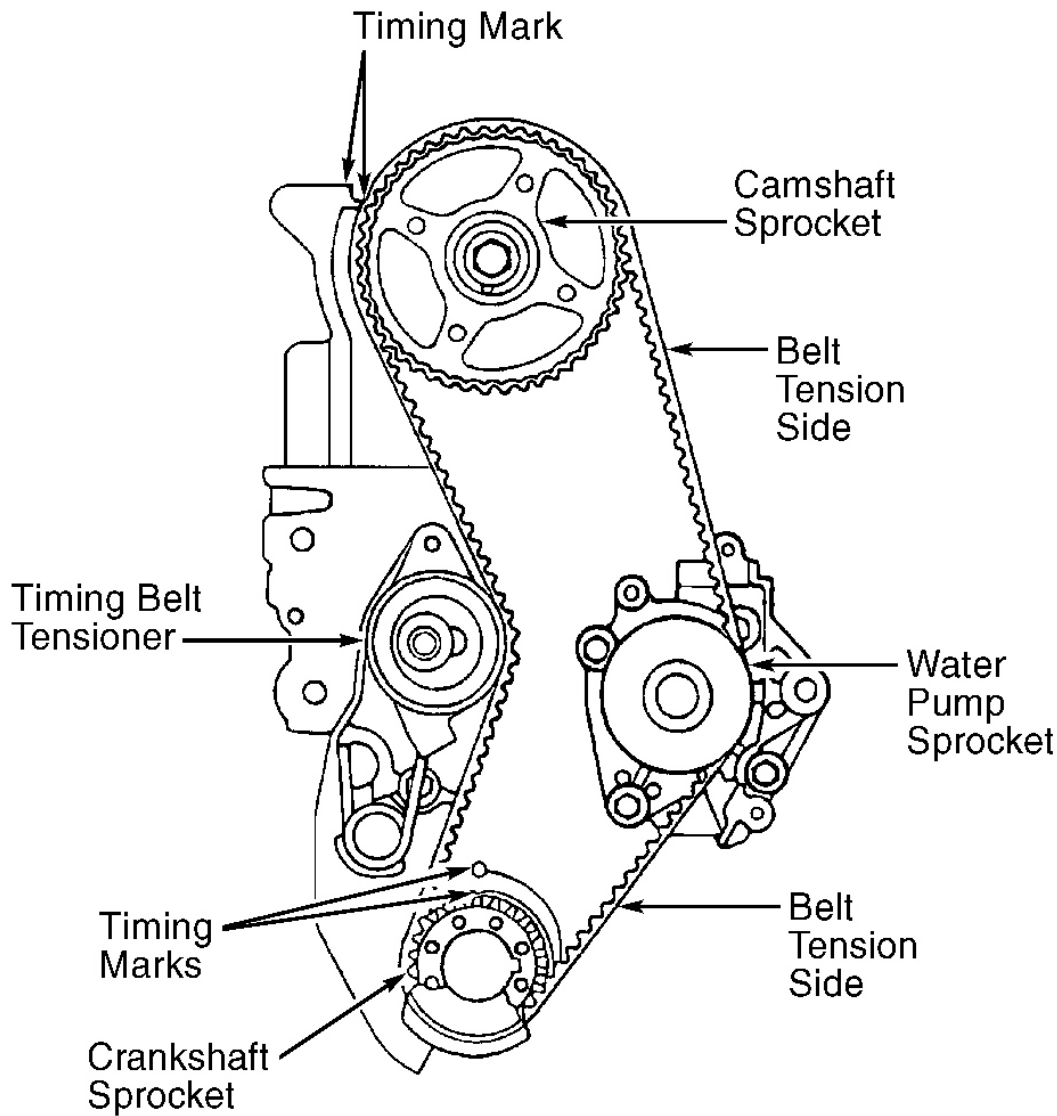
**CAUTION:** DO NOT loosen timing belt tensioner more than 1/2 turn, or bolt may fall inside cover.

Remove timing belt upper cover. Rotate crankshaft clockwise 2 rotations, and align timing marks. Loosen timing belt tensioner adjusting bolt 1/4-1/2 turn. Allow tensioner spring to apply tension to timing belt. See **Fig. 1** or **Fig. 2**. Tighten timing belt tensioner bolt. See **TORQUE SPECIFICATIONS**.



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**Fig. 1: Timing Belt Routing & Timing Mark Location (1.5L)**  
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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**Fig. 2: Timing Belt Routing & Timing Mark Location (1.8L)**  
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

## TROUBLE SHOOTING

To trouble shoot engine mechanical components, see appropriate table in TROUBLE SHOOTING article in GENERAL INFORMATION.

## REMOVAL & INSTALLATION

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle.

**NOTE:** For reassembly reference, label all electrical connectors, vacuum hoses and fuel lines before removal. Also, place mating marks on engine hood and other major assemblies before removal.

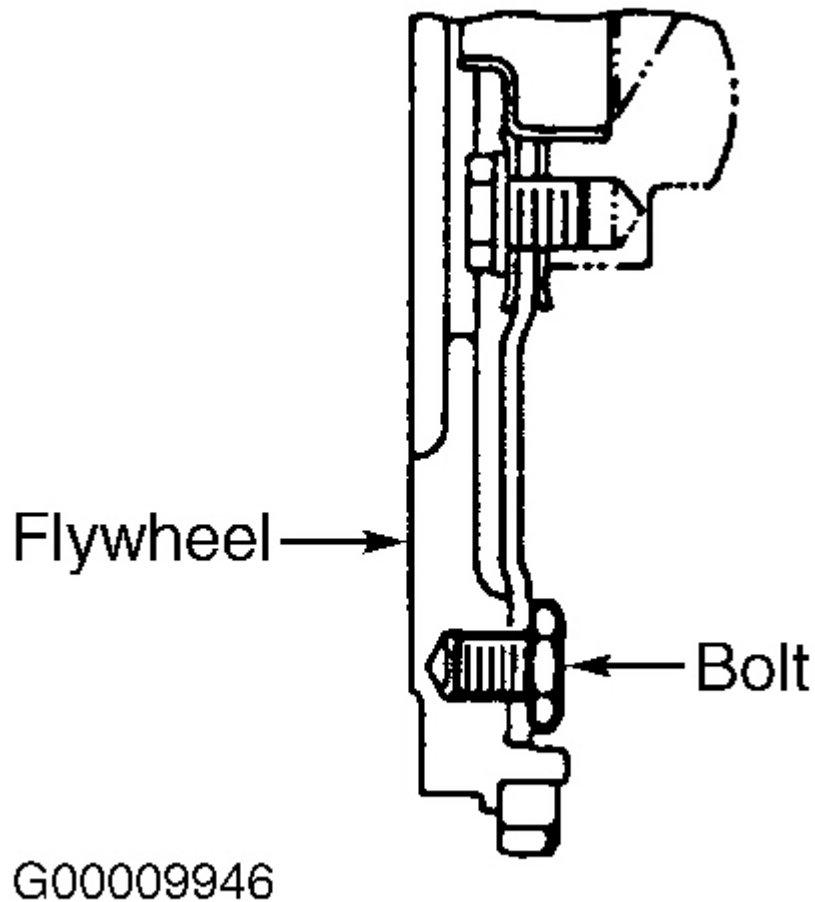
## **FUEL PRESSURE RELEASE**

Remove rear seat cushion and raise carpet. Disconnect fuel pump harness connector. Start engine, and allow it to idle until engine stalls. Turn ignition off. Disconnect negative battery cable. Reconnect fuel pump harness connector, and install rear seat cushion.

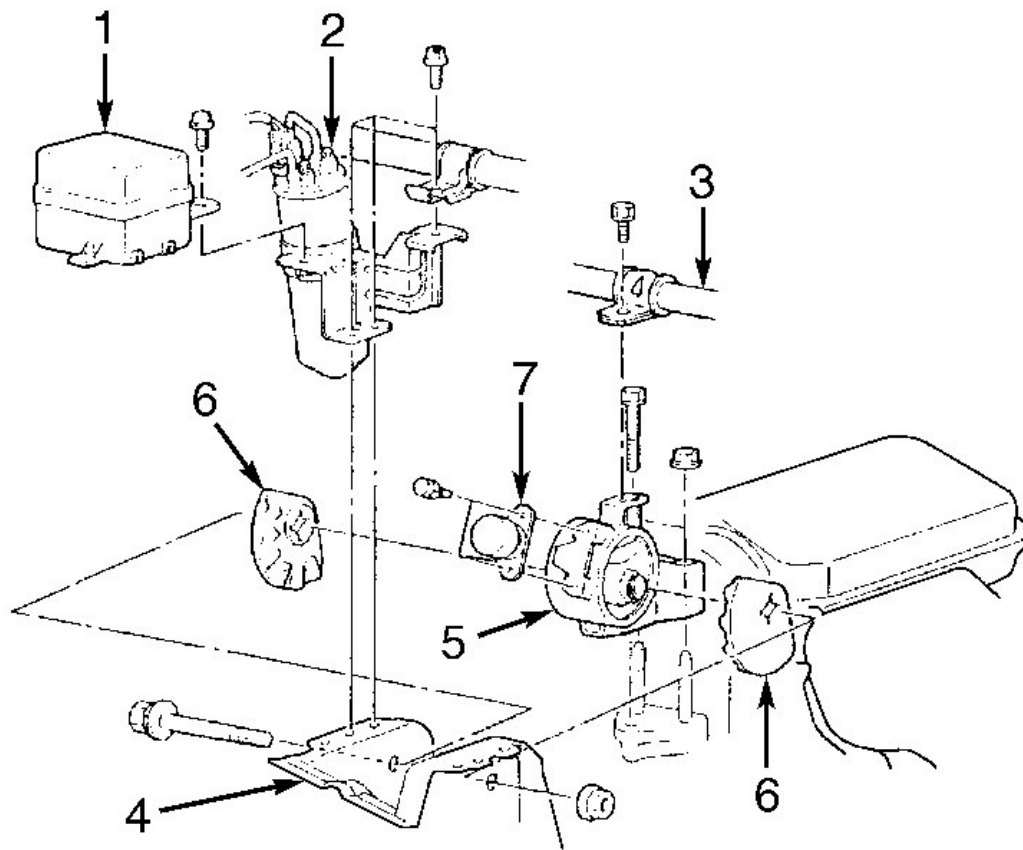
## **ENGINE**

### **Removal**

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Remove hood, air cleaner, battery and battery tray. Drain cooling system. Raise and support vehicle. Remove engine under cover (if equipped). Drain engine oil and transaxle oil. Disconnect exhaust pipe at manifold. Remove transaxle assembly. For M/T, see appropriate article in CLUTCHES. For A/T, see TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. On manual transmission models, DO NOT remove flywheel bolt shown. See **Fig. 3**. If bolt is removed, flywheel will become out of balance and damaged.
2. Disconnect radiator hoses and heater hoses. Remove radiator. Disconnect fuel lines, vacuum hoses and electrical connections from engine. Disconnect accelerator cable and remove bracket.
3. Remove drive belts. Remove A/C compressor, power steering pump and mounting brackets. Leaving hoses attached, wire units aside. Remove A/C relay box. Remove A/C receiver mounting bracket bolts. Remove power steering hose bracket bolt.
4. Install engine hoist. Raise engine slightly. Remove front engine mount bracket. See **Fig. 4**. Remove all engine mounting bolts. Remove engine assembly.



**Fig. 3: Side View Of Flywheel Mounting Bolt (M/T)**  
**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA**



1. A/C Relay Box
2. A/C Receiver
3. Power Steering Hose
4. Engine Mount Insulator
5. Engine Mount Bracket
6. Engine Mount Stopper
7. Dynamic Damper (1.8L)

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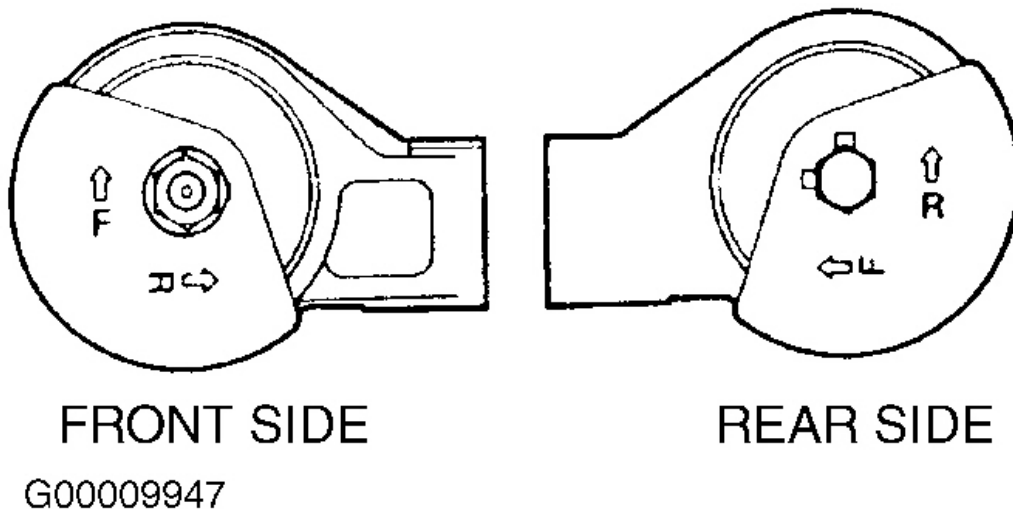
**Fig. 4: Exploded View Of Engine Mounts**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

**CAUTION:** Replace axle shaft retainer rings whenever axle shafts are removed from transaxle.

**Installation**

1. To install, reverse removal procedure. Ensure arrows on mount stoppers are pointing in the proper direction. See **Fig. 5**. Install front mount stopper with "F" arrow pointing up. Install rear mount stopper with "R" arrow pointing up.
2. When installing engine, install all engine mounting bolts, but DO NOT tighten. With weight of engine on mounts, perform final tightening of mounting bolts and nuts. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**. Refill all fluids. Adjust all control cables and linkages.

**Fig. 5: Installing Engine Mount Stoppers**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

**INTAKE MANIFOLD****Removal**

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Remove or disconnect all control cables, electrical connectors, coolant hoses, vacuum hoses and support brackets from intake manifold and throttle body as necessary.
2. Remove fuel supply and return lines from fuel rail. Remove fuel rail with fuel injectors and pressure regulator attached. Ensure fuel injectors do not fall from fuel rail as it is removed.
3. Remove thermostat housing. Remove EGR valve. Remove intake manifold and gasket. If necessary, separate throttle body from intake manifold.

**Installation**

To install, reverse removal procedure. Use NEW gaskets, fuel injector grommets and "O" rings. Adjust all control cables. Refill cooling system.

## EXHAUST MANIFOLD

### Removal

Disconnect exhaust pipe from manifold. Remove exhaust manifold heat shield and engine hanger. On 1.8L engines, remove engine-to-manifold support brackets. Remove oil dipstick tube. On all engines, remove manifold bolts, exhaust manifold and gasket.

### Installation

To install, reverse removal procedure. Use NEW gaskets and "O" rings. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

## CYLINDER HEAD

**NOTE:** On all models, cylinder head can be removed with intake and exhaust manifolds attached.

### Removal (1.5L)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Disconnect upper radiator hose, by-pass hose and heater hoses. Remove spark plugs. Remove distributor cap and spark plug wires.
2. Disconnect air intake and breather hoses. Disconnect accelerator cable and throttle control cable (A/T models). Remove accelerator cable bracket. Disconnect all necessary fuel lines, vacuum hoses and electrical connections from cylinder head and manifolds.

**CAUTION: DO NOT rotate engine counterclockwise (as viewed from timing belt end of engine). Always rotate engine clockwise.**

3. Remove rocker arm cover and upper timing belt cover. Align timing marks by rotating engine clockwise (as viewed from timing belt end of engine). Remove camshaft sprocket. Disconnect exhaust pipe from exhaust manifold.

**CAUTION: DO NOT rotate engine with timing belt disengaged from camshaft.**

4. Remove support brackets from intake and exhaust manifolds. Using Cylinder Head Bolt Socket (MB991653), loosen cylinder head bolts in 2-3 steps, and in sequence. See **Fig. 16**. Remove cylinder head and gasket.

### Inspection (1.5L)

Inspect cylinder head for warpage. Resurface cylinder head if warpage exceeds specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Measure length of cylinder head bolts from bottom of bolt head. If bolt length exceeds 4.06" (103.2 mm), replace bolt.

**Installation (1.5L)**

1. Clean all gasket surfaces. Install NEW cylinder head gasket so cylinder head holes match respective cylinder head gasket holes. Install cylinder head. DO NOT apply sealant onto head gasket. Apply oil onto threads of head bolts and onto burred side of head bolt washers. Install head bolts and washers, with the burred side of washer facing up. Tighten bolts in sequence to specification, in a 5-step process. See **Fig. 16**. See **TORQUE SPECIFICATIONS**.
2. Install timing belt and camshaft sprocket. Ensure timing marks are aligned. See **Fig. 1**. To complete installation, reverse removal procedure. Apply gasoline onto "O" ring on fuel line before installing into fuel delivery pipe. Refill cooling system. Adjust all control cables.

**Removal (1.8L)**

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Disconnect upper radiator hose from thermostat housing. Disconnect all necessary fuel lines, vacuum hoses, coolant hoses, cables and electrical connectors. Remove ignition coil and spark plug wires.

**CAUTION: DO NOT rotate engine counterclockwise (as viewed from timing belt end of engine).**

2. Remove rocker arm cover. Support timing belt end of engine from below. Remove engine mount at timing belt end of engine. Remove timing belt upper cover. Rotate crankshaft clockwise (as viewed from timing belt end of engine) and align all timing marks. See **Fig. 2**. Remove power steering pump and bracket. Leaving hoses attached, suspend pump and bracket aside.
3. Remove timing belt. See **TIMING BELT**. Remove timing belt rear cover. Disconnect exhaust pipe from exhaust manifold. Remove intake manifold support bracket.
4. Remove spark plug guide oil seals. Using Cylinder Head Bolt Socket (MD991653), remove cylinder head bolts in 2-3 steps, and in sequence. See **Fig. 16**. Remove cylinder head and gasket.

**CAUTION: Ensure not to damage or deform spark plug guide oil seals. Spark plug guide oil seals cannot be replaced by themselves.**

**Inspection (1.8L)**

Inspect cylinder head for warpage. Resurface cylinder head if warpage exceeds specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Measure length of cylinder head bolts from bottom of bolt head. If bolt length exceeds 3.80" (96.4 mm), replace bolt.

**Installation (1.8L)**

1. Clean all gasket surfaces. Install NEW cylinder head gasket so cylinder head holes match respective cylinder head gasket holes. DO NOT apply sealant onto head gasket. Apply oil onto threads of head bolts

and onto burred side of head bolt washers. Install head bolts and washers, with burred side of washer facing up. Tighten cylinder head bolts in sequence to specification in a 5-step process. See **Fig. 16**. See **TORQUE SPECIFICATIONS**.

2. To complete installation, reverse removal procedure. Apply gasoline to "O" ring on fuel line before installing into fuel delivery pipe. Refill cooling system. Adjust all control cables.

## **CRANKSHAFT FRONT COVER OIL SEAL**

### **Removal**

Front cover contains oil pump and oil filter mount. See **OIL PUMP & FRONT COVER** under ENGINE OILING. Support engine using a floor jack and wooden block. Remove front engine mount and bracket. Remove all drive belts. Remove crankshaft pulley. Remove timing belt and sprocket. Remove spacer. See **TIMING BELT**. Remove crankshaft front oil seal.

### **Installation**

To install, reverse removal procedure. Coat NEW oil seal lip with oil. On 1.5L engines, install front seal using Seal Guide (MD998305) and Seal Driver (MD998304). On 1.8L engines, install front seal using Seal Installer Set (MD998717). On all engines, tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

## **TIMING BELT**

### **Removal (1.5L)**

1. Remove all drive belts. Remove water pump pulley. Using a floor jack and wooden block, support engine. Remove front engine mount and bracket. Removing power steering pump and mounting bracket. Leaving hoses attached, suspend power steering pump and bracket aside. Remove oil dipstick tube. Remove upper timing belt cover. Rotate engine clockwise and align timing marks. See **Fig. 1**.

**CAUTION: DO NOT rotate engine counterclockwise (as viewed from timing belt end of engine). If reusing timing belt, place reference mark on timing belt indicating direction of rotation before removing.**

2. Remove crankshaft pulley. Remove lower timing belt cover. Loosen timing belt tensioner adjusting bolt. Move tensioner inward toward water pump and temporarily tighten tensioner adjusting bolt. Remove timing belt.

### **Inspection (1.5L)**

Inspect belt teeth for cracks, damage or oil contamination. Inspect all sprockets for damage. Examine belt tensioner for roughness when pulley is rotated. Replace components if defective.

### **Installation (1.5L)**

1. Install timing belt around crankshaft sprocket first, then camshaft sprocket, and then tensioner pulley, ensuring there is no slack on tension side of timing belt. Apply counterclockwise force to camshaft

sprocket to ensure timing belt is fully tensioned. Ensure all timing marks are aligned.

2. Loosen tensioner adjusting bolt to apply tension to timing belt. Rotate crankshaft clockwise 2 revolutions and ensure all timing marks are aligned. See **Fig. 1**. Install timing belt covers. Install oil dipstick tube. Install crankshaft pulley.
3. Install front engine mount with "F" arrow pointing up. See **Fig. 5**. To complete installation, reverse removal procedure. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

### Removal (1.8L)

1. Remove all drive belts. Remove water pump pulley. Using a floor jack and wooden block, support engine. Remove front engine mount and bracket. Remove generator adjusting bracket. Remove power steering pump and mounting bracket. Leaving hoses attached, suspend power steering pump and bracket aside.

**CAUTION: DO NOT rotate crankshaft counterclockwise (as viewed from timing belt end of engine).**

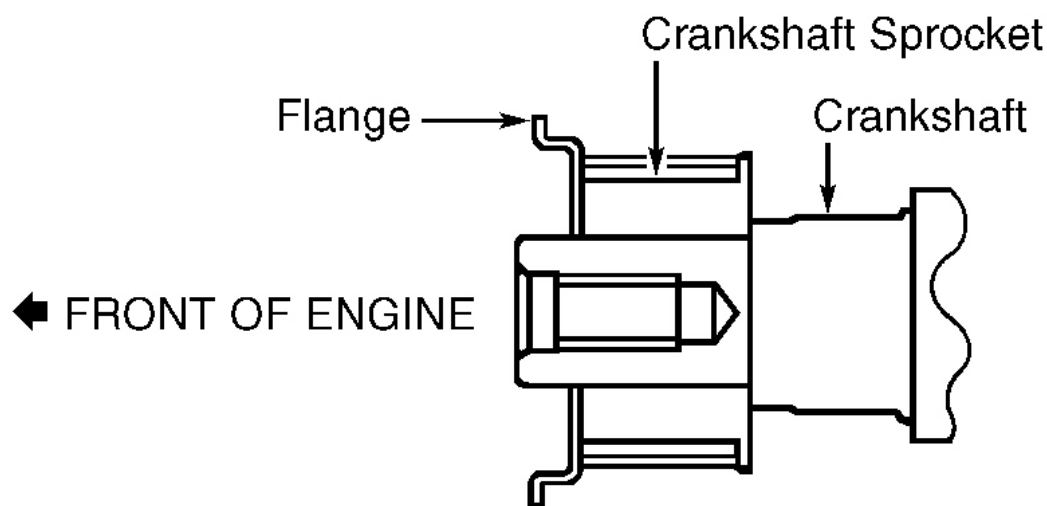
2. Rotate crankshaft clockwise (as viewed from timing belt end of engine) until cylinder No. 1 is at TDC of compression stroke, and timing marks are aligned. See **Fig. 2**. Remove crankshaft pulley. Remove crankshaft flange. Remove timing belt covers.
3. Loosen timing belt tensioner adjusting bolt. Using a screwdriver, move tensioner away from timing belt. Tighten bolt to secure tensioner. Remove timing belt.

### Inspection (1.8L)

Check belt teeth for cracks, damage and oil contamination. Inspect all sprockets for damage. Check belt tensioner for roughness in tensioner rotation. Replace components if damaged.

### Installation (1.8L)

1. Align timing marks. Install timing belt around crankshaft sprocket first, then water pump, then camshaft sprocket, and tensioner pulley last. Loosen timing belt tensioner to apply spring pressure to timing belt. Ensure all timing marks are aligned.
2. Tighten timing belt tensioner bolt. Apply counterclockwise force to camshaft sprocket and ensure there is no slack in timing belt. Rotate crankshaft clockwise (as viewed from timing belt end of engine), 2 complete revolutions, ensuring timing marks are still aligned.
3. Install crankshaft flange. See **Fig. 6**. To complete installation, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.



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**Fig. 6: Installing Crankshaft Flange (1.8L)**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

**ROCKER ARM & VALVE LASH ADJUSTER****Removal**

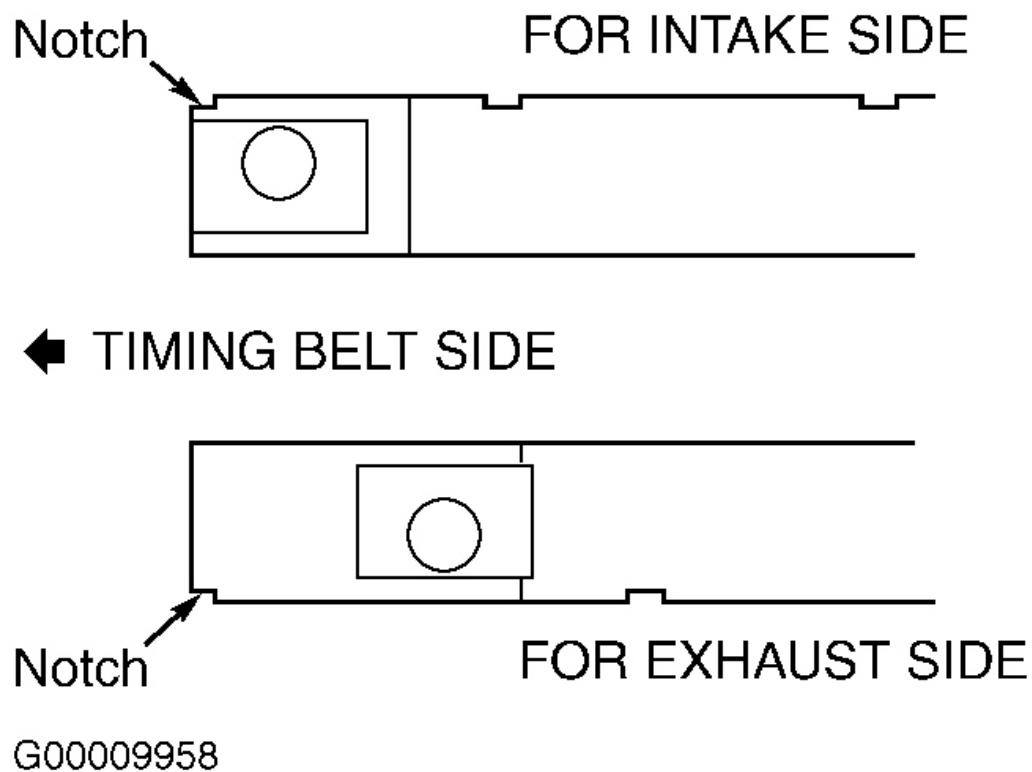
Remove breather and PCV hoses. Remove rocker arm cover and gasket. Install Lash Adjuster Holders (MD998443) onto rocker arms to secure lash adjusters during removal and installation. Loosen rocker arm shaft retaining bolts evenly, and in small increments. Remove rocker shaft assemblies.

**Inspection**

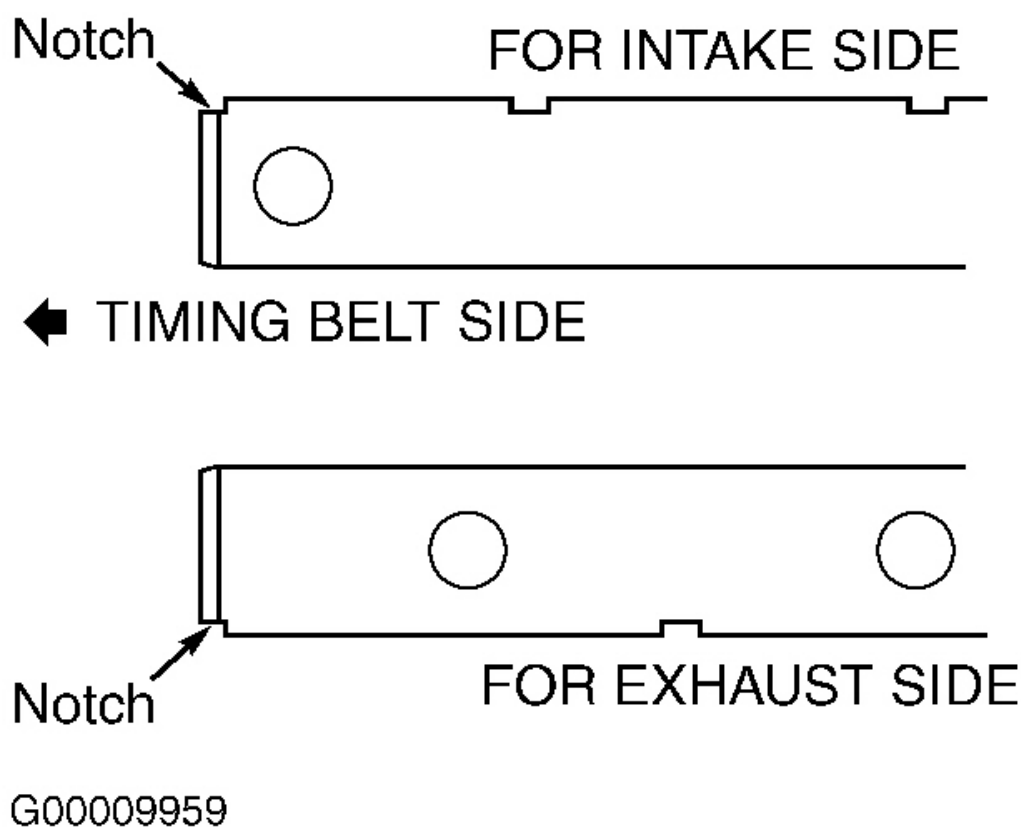
Disassemble rocker arm components. Keep parts in order for reassembly. Inspect components for wear and damage. See **VALVE TRAIN** under OVERHAUL. Clean valve lash adjusters in diesel fuel. Submerge valve lash adjusters in diesel fuel, and using a wire .020" (.5 mm) in diameter, gently push steel ball plunger down 5-10 times. After cleaning, allow valve lash adjusters to remain in clean diesel fuel until installation. Assemble rocker arm components in original locations. Install lash adjusters onto rocker arms, without spilling diesel fuel from adjusters. Install lash adjuster holders.

**Installation**

Install rocker arm assembly with notched side of rocker arm shaft toward timing belt. See **Fig. 7** or **Fig. 8**. Ensure rocker arms are against rocker arm shaft mounting bosses before tightening. Tighten rocker arm assembly retaining bolts in 2-3 steps, and to specification. See **TORQUE SPECIFICATIONS**. Remove lash adjuster holders. To complete installation, reverse removal procedure.



**Fig. 7: Installing Rocker Arm Shafts (1.5L)**  
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA



**Fig. 8: Installing Rocker Arm Shafts (1.8L)**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

## CAMSHAFTS

### Removal (1.5L)

1. Remove air cleaner. Remove spark plug wires and distributor cap. Remove distributor. Remove PCV and breather hoses from rocker arm cover. Remove rocker arm cover. Remove timing belt. See **TIMING BELT**. Using End Yoke Holder (MB990767) to hold camshaft, remove camshaft sprocket.
2. Remove camshaft oil seal. Remove rocker arms shaft assemblies. See **ROCKER ARM & VALVE LASH ADJUSTER**. Remove camshaft from cylinder head.

### Inspection (1.5L)

Measure camshaft journal diameter and lobe height. See **CAMSHAFT** table under ENGINE SPECIFICATIONS. Replace camshaft if not within specification. Inspect rocker arms and shafts for wear or damage. Inspect all contact surfaces for wear or damage.

**Installation (1.5L)**

Coat camshaft journals and lobes with oil and install camshaft. Coat camshaft seal lip with oil. Using Seal Driver (MD998713), install oil seal into cylinder head. Install rocker arm shaft assemblies. See **ROCKER ARM & VALVE LASH ADJUSTER**. To complete installation, reverse removal procedure. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

**Removal (1.8L)**

1. Remove air cleaner. Remove spark plug wires and distributor cap. Remove distributor. Remove PCV and breather hoses from rocker arm cover. Remove rocker arm cover. Remove upper timing belt cover. Rotate crankshaft clockwise (as viewed from timing belt end of engine) until cylinder No. 1 is at TDC of compression stroke.
2. Ensure all timing marks are aligned. See **Fig. 2**. Remove timing belt. See **TIMING BELT**. Using End Yoke Holder (MB990767) to hold camshaft, remove camshaft sprocket. Remove oil seal. Remove camshaft position sensor support and sensing cylinder.
3. Remove spark plug guide oil seals. Install Lash Adjuster Holders (MD998443) onto rocker arms to secure lash adjusters during removal and installation. Loosen rocker arm shaft retaining bolts evenly, and in small increments. Remove rocker arm assemblies. Remove camshaft.

**Inspection (1.8L)**

1. Inspect rocker arms and shafts for wear and damage. Check distributor drive gear for tooth damage and wear. Replace components as necessary.
2. Check camshaft journal diameter and lobe height. Replace camshaft if journal diameter and lobe height are not within specification. See **CAMSHAFT** table under ENGINE SPECIFICATIONS.

**Installation (1.8L)**

1. Coat camshaft lobes and camshaft bearing journals with oil. Install camshaft into cylinder head. Tighten camshaft bearing cap bolts to specification. See **TORQUE SPECIFICATIONS**. Coat lip of NEW camshaft oil seal with oil. Install seal into cylinder head using Seal Driver (MD998713).
2. Reassemble rocker arm assemblies, ensuring rocker arms are installed in original locations. Install lash adjuster holders. Install rocker arm assemblies. Remove lash adjuster holders. To complete installation, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

**REAR CRANKSHAFT OIL SEAL****Removal**

Remove transaxle. For A/T, see TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. For M/T, see appropriate article in CLUTCHES. Remove flywheel (M/T) or drive plate (A/T). DO NOT remove the flywheel bolt shown. See **Fig. 3**. If bolt is removed, flywheel will become out of balance and damaged. Remove crankshaft bushing. Remove rear crankshaft oil seal.

**Installation**

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Coat NEW seal lip with oil. Install seal. On 1.5L engines, use Seal Driver (MD998011). On 1.8L engines, use Seal Driver (MD998776) and Handle (MD990938). To complete installation, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

### WATER PUMP

#### Removal

Drain cooling system. Disconnect battery. Remove necessary coolant hoses. Remove timing belt. See **TIMING BELT**. On 1.5L engines, remove generator adjusting bracket. On 1.8L engines, remove rear timing belt cover. On all engines, remove water pump mounting bolts, noting bolt lengths and locations. Remove water pump.

#### Installation

Apply an even bead of silicone sealant onto water pump gasket mating surface. Install water pump. Be sure to install bolts into original locations. To complete installation, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**. Refill cooling system.

### OIL PAN

#### Removal & Installation

Raise and support vehicle. Drain engine oil. Remove oil dipstick tube. Disconnect exhaust pipe from manifold. Remove transaxle brace and bell housing cover. Remove oil pan retaining bolts. Using Oil Pan Remover (MD998727), separate oil pan from cylinder block. Remove oil pan. To install, reverse removal procedure. Apply an even bead of silicone sealant onto oil pan sealing surface, inside of bolt holes. Install oil pan. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

## OVERHAUL

### CYLINDER HEAD

#### Cylinder Head

Measure cylinder head warpage. Resurface cylinder head if warpage exceeds specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

#### Valve Springs

Measure valve spring free length and out-of-square dimensions. Replace valve springs if not within specification. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS. Install all valve springs with painted end of valve spring toward rocker arm.

#### Valve Stem Oil Seals

Install NEW valve stem seals, using Valve Seal Installer (MD998760 for 1.5L or MD998774 for 1.8L).

**CAUTION: DO NOT install valve guide with same diameter valve guide removed.**

## 2001 Mitsubishi Mirage LS

2001 ENGINES 1.5L & 1.8L 4-Cylinder

### Valve Guides

1. Measure valve stem diameter. Replace valve if stem diameter is not within specification. Measure valve stem oil clearance. See **CYLINDER HEAD** and **VALVES & VALVE SPRINGS** tables under ENGINE SPECIFICATIONS.
2. If clearance exceeds service limit, valve guide can be replaced with an oversized valve guide. See **OVERSIZE VALVE GUIDE SPECIFICATIONS (1.5L)** or **OVERSIZE VALVE GUIDE SPECIFICATIONS (1.8L)** table.
3. Using a press, push valve guide out toward combustion chamber. Re-bore valve guide hole in cylinder head to match oversize valve guide to be used. DO NOT install a valve guide the same size as the one removed.

**NOTE:** Intake valve guides are shorter than exhaust valve guides.

4. Using a press, install NEW valve guide into cylinder head from top side of head. Install valve guide to proper height. Measure oil clearance of NEW valve guides. Ream valve guide if necessary. Re-face valves and seats. See **OVERSIZE VALVE GUIDE SPECIFICATIONS (1.5L)** or **OVERSIZE VALVE GUIDE SPECIFICATIONS (1.8L)** table. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

### OVERSIZE VALVE GUIDE SPECIFICATIONS (1.5L) <sup>(1)</sup>

| Size Mark | Guide Size - In. (mm) | Cylinder Head Bore - In. (mm) |
|-----------|-----------------------|-------------------------------|
| 5         | .002 (.05)            | .4744-.4751 (12.050-12.068)   |
| 25        | .010 (.25)            | .4823-.4830 (12.250-12.268)   |
| 50        | .020 (.50)            | .4921-.4928 (12.500-12.518)   |

(1) For installed valve guide height, see **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

### OVERSIZE VALVE GUIDE SPECIFICATIONS (1.8L) <sup>(1)</sup>

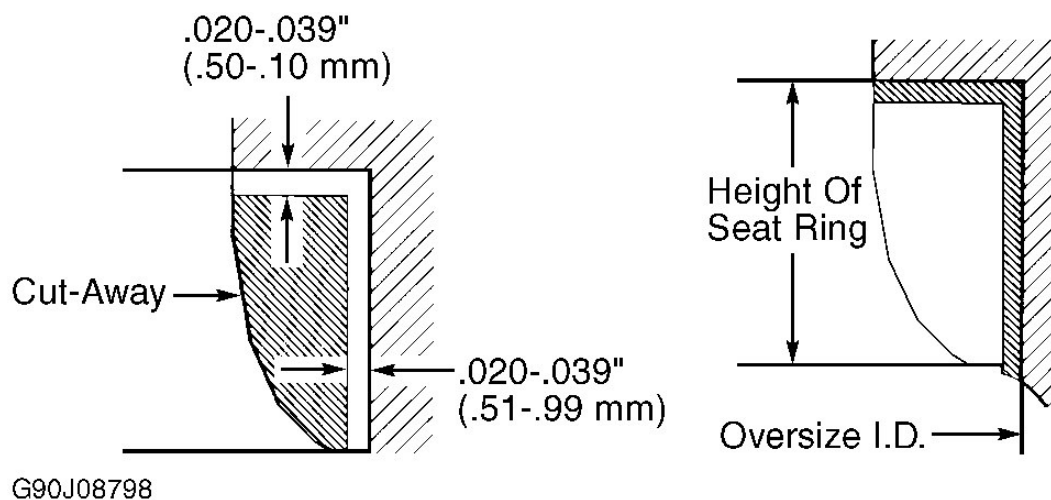
| Size Mark | Guide Size - In. (mm) | Cylinder Head Bore - In. (mm) |
|-----------|-----------------------|-------------------------------|
| 5         | .002 (.05)            | .4350-.4358 (11.05-11.07)     |
| 25        | .010 (.25)            | .4429-.4437 (11.25-11.27)     |
| 50        | .020 (.50)            | .4528-.4535 (11.50-11.52)     |

(1) For installed valve guide height, see **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

### Valve Seats

1. To remove valve seats, cut valve seat from the inside to reduce wall thickness. Remove valve seat. Re-bore valve seat hole to designated dimension. See **Fig. 9**. See **OVERSIZED VALVE SEAT SPECIFICATIONS** table.
2. Cool NEW oversize valve seat in a freezer before pressing replacement seat into cylinder head. Press NEW oversize valve seat into cylinder head. Ensure NEW valve seat bottoms in combustion chamber.

Cut valve seat to correct angle and seat width. See **Fig. 9**. See **VALVES AND VALVE SPRINGS** table under ENGINE SPECIFICATIONS.



**Fig. 9: Cutting Valve Seat & Measuring Installed Height**  
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

#### Valves

Measure valve stem diameter. Measure valve head margin. Measure valve length. Replace valve if measurements are not within specification. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS.

#### OVERSIZED VALVE SEAT SPECIFICATIONS

| Size Mark | Seat Size - In. (mm) | Cyl. Head Bore - In. (mm)     |
|-----------|----------------------|-------------------------------|
| 1.5L      |                      |                               |
| Intake    |                      |                               |
| Primary   |                      |                               |
| 30        | .012 (.30)           | 1.0748-1.0758 (27.300-27.325) |
| 60        | .024 (.60)           | 1.0866-1.0876 (27.600-27.625) |
| Secondary |                      |                               |
| 30        | .012 (.30)           | 1.2717-1.2726 (32.300-32.325) |
| 60        | .024 (.60)           | 1.2835-1.2844 (32.600-32.625) |
| Exhaust   |                      |                               |
| 30        | .012 (.30)           | 1.3898-1.3907 (35.300-        |

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|         |            |                               |
|---------|------------|-------------------------------|
|         |            | 35.325)                       |
| 60      | .024 (.60) | 1.4016-1.4026 (35.600-35.625) |
| 1.8L    |            |                               |
| Intake  |            |                               |
| 30      | .012 (.30) | 1.2520-1.2531 (31.800-31.830) |
| 60      | .024 (.60) | 1.2638-1.2650 (32.100-31.130) |
| Exhaust |            |                               |
| 30      | .012 (.30) | 1.1535-1.1543 (29.300-29.320) |
| 60      | .024 (.60) | 1.1654-1.1661 (29.600-29.620) |

**VALVE TRAIN****Rocker Arm Assembly**

1. Note location of all components for reassembly reference. Remove breather and PCV hoses from rocker arm cover. Remove rocker arm cover. Install Lash Adjuster Holders (MD998443) on rocker arms to secure lash adjusters during removal and installation. Loosen rocker arm shaft retaining bolts evenly, and in small increments. Remove rocker arm shaft assemblies. Inspect components for damage and wear.

**NOTE:**        **Springs are only on intake rocker arm shaft.**

2. To install components, reverse removal procedure. Install components into original locations. Install rocker arm assembly with notched side of rocker arm shaft toward timing belt. See **Fig. 7** or **Fig. 8**.
3. Before installing lash adjusters, clean lash adjusters in diesel fuel. Submerge lash adjusters in clean diesel fuel, and using a small wire, push steel ball plunger down 5-10 times to clean internal components of lash adjusters. Install lash adjusters trying not to spill diesel fuel from adjusters. Install lash adjuster holders.
4. Ensure rocker arms are against rocker arm shaft mounting bosses before tightening. Tighten rocker arm assembly bolts to specification, and in several steps. See **TORQUE SPECIFICATIONS**. Remove lash adjuster holders.

**CYLINDER BLOCK ASSEMBLY****Piston & Rod Assembly**

Mark piston and rod assembly with corresponding cylinder number before removal. Install piston and rod assembly into cylinder block, with mark on top of piston pointing toward timing belt side of engine.

**Fitting Pistons**

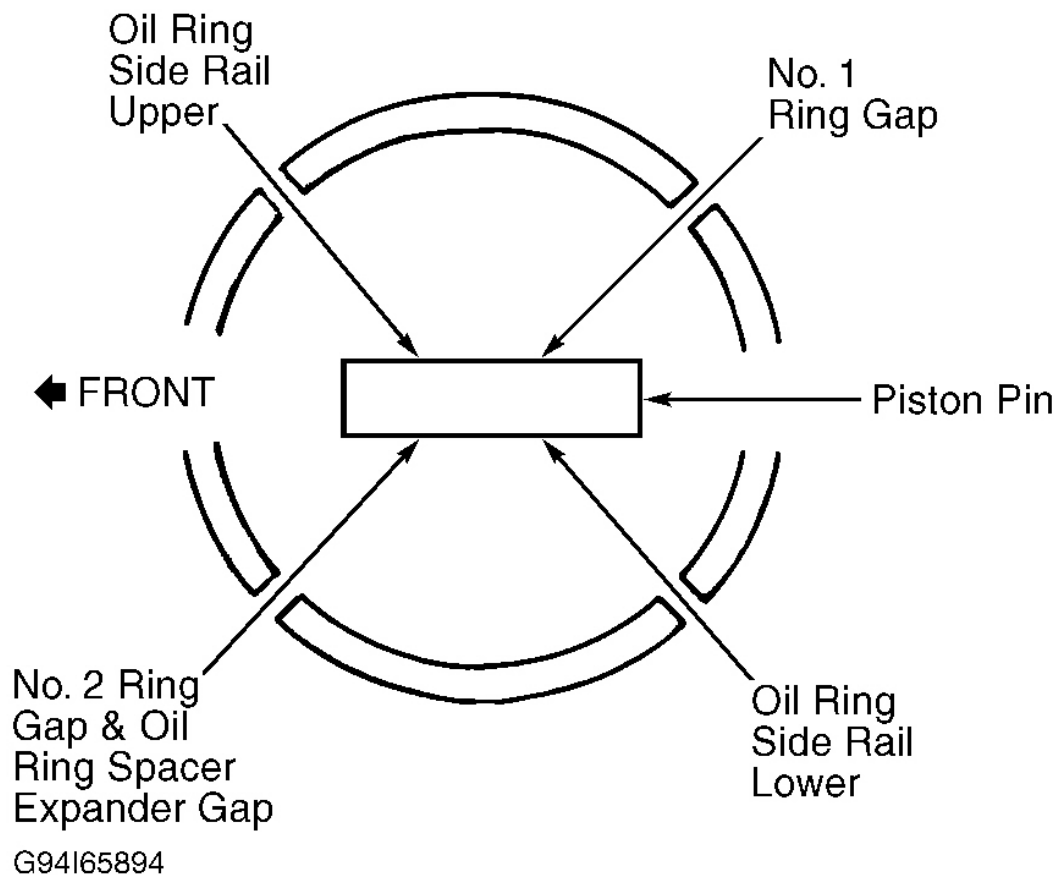
1. Measure piston skirt diameter .08" (2 mm) above bottom of highest point on piston skirt, at a 90-degree angle to piston pin. If piston diameter is not within specification, replace piston. See **PISTONS, PINS &**

**RINGS** table under ENGINE SPECIFICATIONS.

2. Measure cylinder bore diameter in 3 places: .47" (12 mm) from top of bore, .47" (12 mm) from bottom of bore, and near center of bore. If cylinder diameter or taper is not within specification, re-bore cylinder block. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS.
3. If clearance between piston and cylinder bore is not within specification, replace piston and/or machine cylinder bore. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
4. Two different oversize pistons are available, .20" (.50 mm) and .40" (1.0 mm) over. Size mark is stamped on top of piston.

#### **Piston Rings**

1. Using inverted piston, push NEW piston ring into bottom of cylinder bore. Using feeler gauge, measure piston ring end gap. Repeat for each ring. If end gap is not within specification, replace piston ring. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
2. Clean piston ring grooves thoroughly. Install piston rings with identification mark on ring facing toward top of piston. DO NOT use ring expander to install oil ring side rails. Measure piston ring side clearance between ring and ring land.
3. If ring lands are excessively worn, replace piston. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Stagger piston ring end gaps properly on piston before installing. See **Fig. 10**.
4. If re-boring cylinder block, oversize ring sets are available in .20" (.50 mm) and .40" (1.00 mm) over. Piston rings are marked numerically and with a color code on top side of ring indicating oversize size, "50" (Blue) or "100" (Yellow).



**Fig. 10: Positioning Piston Ring Gaps**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

#### Rod Bearings

1. Using Plastigage, measure rod bearing oil clearance. On 1.5L engines, tighten bearing cap nuts to 12 ft. lbs. (17 N.m), and then an additional 1/4 turn. On 1.8L engines, tighten to 15 ft. lbs. (20 N.m), and then an additional 1/4 turn.
2. If oil clearance is not within specification, install a NEW bearing set and measure oil clearance again. If proper oil clearance cannot be obtained by using NEW bearings, replace crankshaft. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** and **CONNECTING RODS** tables under ENGINE SPECIFICATIONS.

**NOTE:** Before installing connecting rod bearing caps, attempt to run nuts down studs by hand. Replace stud if nut does not run down smoothly for entire length.

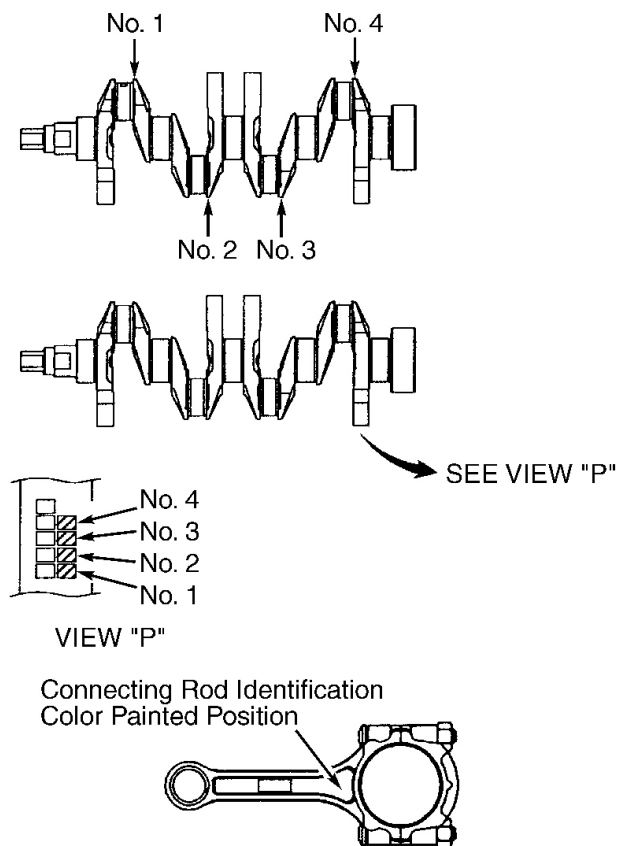
**NOTE:** Rod bearing cap nuts use the plastic area tightening method. Replace nut

**if plastic area on nut is damaged.**

3. On 1.5L engines, when replacing rod bearings, crankshaft and/or connecting rods, select NEW rod bearings according to color code identification marks on crankshaft and connecting rods. Using the 2 color codes, select bearings using hart provided. See **Fig. 11**. Rod bearings are marked with corresponding color codes. See **Fig. 12**.

## 2001 Mitsubishi Mirage LS

2001 ENGINES 1.5L & 1.8L 4-Cylinder

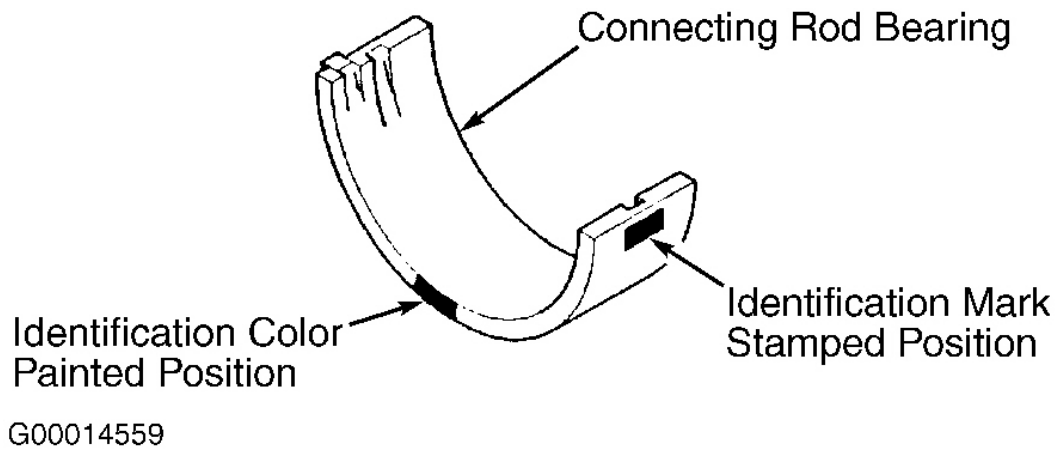


| Crankshaft pin O.D.  |                     | Connecting rod big end I.D. | Connecting rod bearing |                      |
|----------------------|---------------------|-----------------------------|------------------------|----------------------|
| Identification color | Identification mark | Identification color        | Identification mark    | Identification color |
| Yellow               | I                   | White                       | 1                      | Yellow               |
|                      |                     | None                        | 1                      | Yellow               |
|                      |                     | Yellow                      | 2                      | None                 |
| None                 | II                  | White                       | 1                      | Yellow               |
|                      |                     | None                        | 2                      | None                 |
|                      |                     | Yellow                      | 3                      | Blue                 |
| White                | III                 | White                       | 2                      | None                 |
|                      |                     | None                        | 3                      | Blue                 |
|                      |                     | Yellow                      | 3                      | Blue                 |

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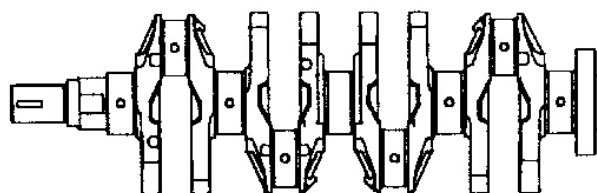
**Fig. 11: Selecting Rod Bearings (1.5L)**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

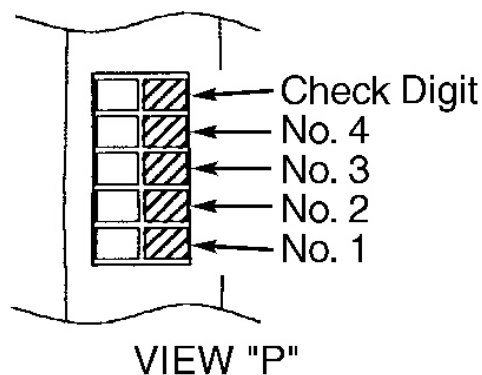


**Fig. 12: Locating Rod Bearing Color Code (1.5L & 1.8L)**  
**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA**

4. On 1.8L engines, when replacing rod bearings, crankshaft and/or connecting rods, select NEW rod bearings according to color code identification marks on crankshaft. Select NEW rod bearings using crankshaft color code and chart provided. See **Fig. 13**. Rod bearings are marked with corresponding color codes. See **Fig. 12**



SEE VIEW "P"



| Crankshaft pin<br>O.D. | Connecting rod bearing |                      |
|------------------------|------------------------|----------------------|
| Identification<br>mark | Identification mark    | Identification color |
| 1                      | S1                     | Brown                |
| 2                      | S2                     | Black                |
| 3                      | S3                     | Green                |

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**Fig. 13: Selecting Rod Bearings (1.8L)**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

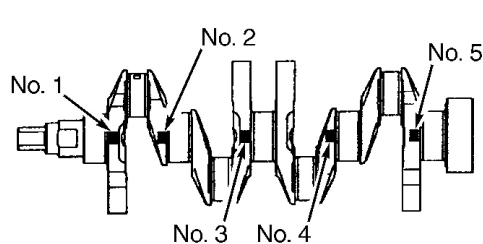
**Crankshaft & Main Bearings**

**NOTE:** Crankshaft journals are fillet-rolled and cannot be re-ground to undersized dimensions.

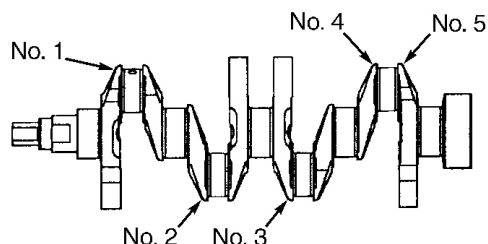
1. On 1.8L engines, mark main bearing cap location before removal. On all engines, measure main bearing oil clearance using Plastigage. Measure main bearing journal diameters. Measure journal taper and out-of-round. Measure crankshaft end play. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** and **CONNECTING RODS** tables under ENGINE SPECIFICATIONS.
2. If oil clearance is not within specification, install a NEW bearing set and measure oil clearance again. Undersize bearings are available. If proper oil clearance cannot be obtained by using NEW bearings, replace crankshaft.
3. On 1.5L engines, install main bearing caps in numerical order, according to number stamped on cap. Install bearing caps so arrow on top of cap points toward timing belt end of engine. On 1.8L engines, install main bearing caps in their original location, and with arrow on top of cap pointing toward timing belt end of engine. Tighten main bearing caps to specification in 2 stages, starting at center and working outward. See **TORQUE SPECIFICATIONS**.
4. On 1.5L engines, when replacing main bearings, crankshaft and/or cylinder block, select NEW main bearings according to color codes on crankshaft and cylinder block. Select NEW main bearings using color codes from crankshaft and cylinder block. See **Fig. 14**.
5. On 1.8L engines, when replacing main bearings, crankshaft and/or cylinder block, select NEW main bearings according to color codes on crankshaft and cylinder block. Select NEW main bearings using color codes from crankshaft and cylinder block. See **Fig. 15**. Tighten main bearing cap bolts in sequence to specification. See **Fig. 17** and **TORQUE SPECIFICATIONS (1.8L)**.

# 2001 Mitsubishi Mirage LS

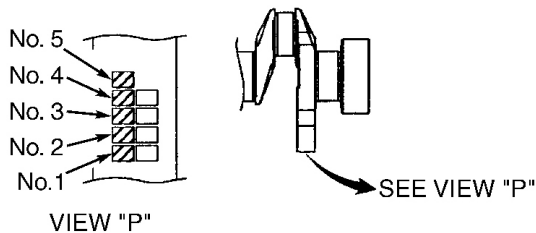
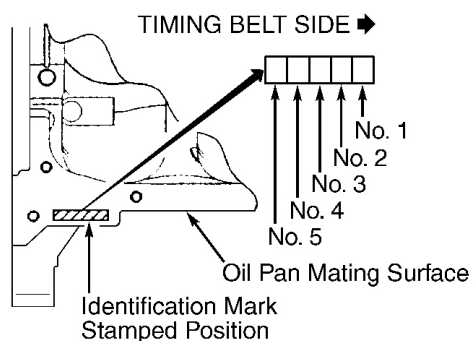
2001 ENGINES 1.5L & 1.8L 4-Cylinder



COLOR CODE POSITIONS (TYPE 1)



COLOR CODE POSITIONS (TYPE 2)



IDENTIFICATION MARK POSITIONS

| Crankshaft journal O.D. |                     | Cylinder block bearing bore I.D. | Crankshaft bearing  |
|-------------------------|---------------------|----------------------------------|---------------------|
| Identification color    | Identification mark | Identification mark              | Identification mark |
| Yellow                  | 1                   | 0                                | 1                   |
|                         |                     | 1                                | 2                   |
|                         |                     | 2                                | 3                   |
| None                    | 2                   | 0                                | 2                   |
|                         |                     | 1                                | 3                   |
|                         |                     | 2                                | 4                   |
| White                   | 3                   | 0                                | 3                   |
|                         |                     | 1                                | 4                   |
|                         |                     | 2                                | 5                   |

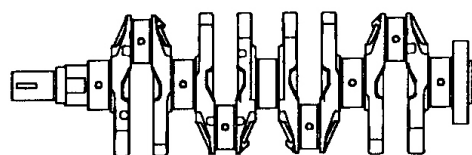
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**Fig. 14: Selecting Main Bearings (1.5L)**

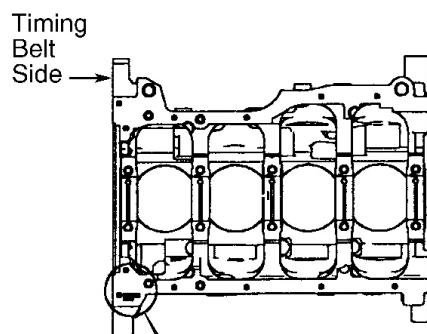
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

# 2001 Mitsubishi Mirage LS

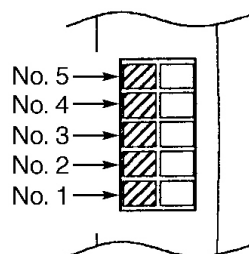
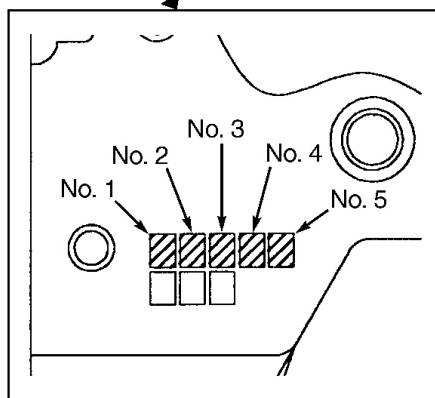
2001 ENGINES 1.5L & 1.8L 4-Cylinder



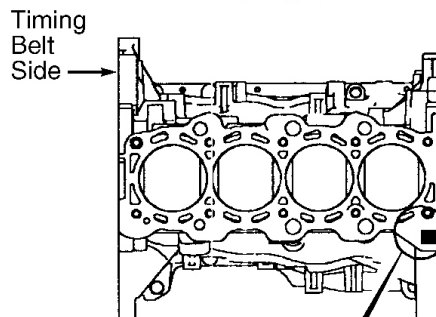
SEE VIEW "P"



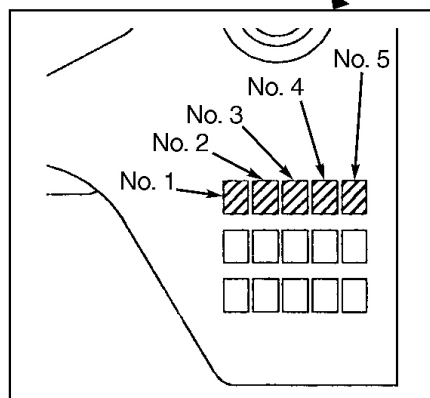
OIL PAN VIEW



VIEW "P"



CYLINDER HEAD VIEW  
(REFERENCE)



| Crankshaft journal O.D. | Cylinder block bearing bore I.D. | Crankshaft bearing  |                      |
|-------------------------|----------------------------------|---------------------|----------------------|
| Identification mark     | Identification mark              | Identification mark | Identification color |
| 1                       | 0                                | S1                  | Brown                |
|                         | 1                                | S2                  | Black                |
|                         | 2                                | S3                  | Green                |
| 2                       | 0                                | S2                  | Black                |
|                         | 1                                | S3                  | Green                |
|                         | 2                                | S4                  | Yellow               |
| 3                       | 0                                | S3                  | Green                |
|                         | 1                                | S4                  | Yellow               |
|                         | 2                                | S5                  | Red                  |

**Fig. 15: Selecting Main Bearings (1.8L)**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

**Thrust Bearing**

Replace thrust bearing if crankshaft end play is not within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS. Thrust bearings are located on No. 3 main bearing journal. On 1.5L engines, replace main bearings if end play is not within specification. On 1.8L engines, replace thrust plate if end play is not within specification.

**Cylinder Block**

1. Measure cylinder block deck surface for warp. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS. If warp exceeds specification, machine surface within limits, or replace cylinder block. DO NOT remove more than a combined total of .008" (0.20 mm) material from cylinder block and cylinder head mating surfaces.
2. Measure cylinder bore diameter in 3 places: .47" (12 mm) from top of bore, .47" (12 mm) from bottom of bore, and near center of bore. If cylinder bore diameter or taper is not within specification, re-bore cylinders and install oversize pistons. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS.
3. When re-boring cylinder block, to prevent distortion caused by increased heat during boring, bore cylinders in the following order: No. 2, No. 4, No. 1 and No. 3.

**NOTE:** When re-boring cylinders, finish all 4 cylinders to the same oversize. DO NOT bore only one cylinder to an oversize dimension.

**ENGINE OILING****ENGINE LUBRICATION SYSTEM**

Both engines use a crankshaft-driven oil pump located in front cover. The pressure relief valve, also located in front cover, is not adjustable. See **OIL PUMP & FRONT COVER**.

**Crankcase Capacity**

On 1.5L engines, crankcase capacity is 3.5 qts. (3.3L); on 1.8L engines, capacity is 4.0 qts. (3.8L). Capacities listed include oil filter change.

**Oil Pressure**

Information is not available from manufacturer.

**OIL PUMP & FRONT COVER****Removal**

Remove timing belt. See **TIMING BELT** under REMOVAL & INSTALLATION. Remove oil filter, oil pan

## 2001 Mitsubishi Mirage LS

2001 ENGINES 1.5L & 1.8L 4-Cylinder

and oil screen. Remove crankshaft pulley and sprocket. Remove front cover and oil pump assembly.

### Disassembly & Inspection

1. Remove gear cover. Using a felt pen, mark direction of gears for reassembly reference.
2. Measure clearance between outer gear and cover. Measure clearance between inner gear and outer gear.
3. Place straightedge across front cover housing and measure gear end play clearance between each gear and straightedge.
4. Inspect pressure relief valve for freedom of movement in bore. Replace components if not within specifications. See **OIL PUMP SPECIFICATIONS** table. Inspect oil pan for damage. Inspect oil screen for clogging.

### OIL PUMP SPECIFICATIONS

| Application                         | Specification                   |
|-------------------------------------|---------------------------------|
| Inner Gear-To-Outer Gear            | .0024-.0071" (.060-.180 mm)     |
| Outer Gear-To-Case                  |                                 |
| 1.5L                                | (1) .0016-.0039" (.040-.100 mm) |
| 1.8L                                | (1) .0039-.0071" (.100-.180 mm) |
| Gear End Play                       | .0016-.0039" (.040-.100 mm)     |
| (1) Wear limit is .0138" (.350 mm). |                                 |

### Reassembly & Installation

1. Lubricate all components with engine oil. Assemble all components into housing in original locations.
2. Apply a bead of silicone sealant onto gasket surface of front cover. Install front cover bolts in appropriate locations and tighten to specification. See **TORQUE SPECIFICATIONS**.
3. Coat seal lip and outer surface of Seal Guide (MD998305) with clean engine oil. Install seal guide over end of crankshaft. Slide seal over seal guide. Using Seal Driver (MD998304), install front seal into front cover. To complete installation, reverse removal procedure.

## TORQUE SPECIFICATIONS

### 1.5L

#### TORQUE SPECIFICATIONS (1.5L)

| Application            | Ft. Lbs. (N.m) |
|------------------------|----------------|
| Camshaft Sprocket Bolt | 65 (88)        |
| Connecting Rod Cap Nut | (1)            |
| Crankshaft Pulley Bolt | 76 (103)       |
| Cylinder Head Bolt (2) |                |

**2001 Mitsubishi Mirage LS**

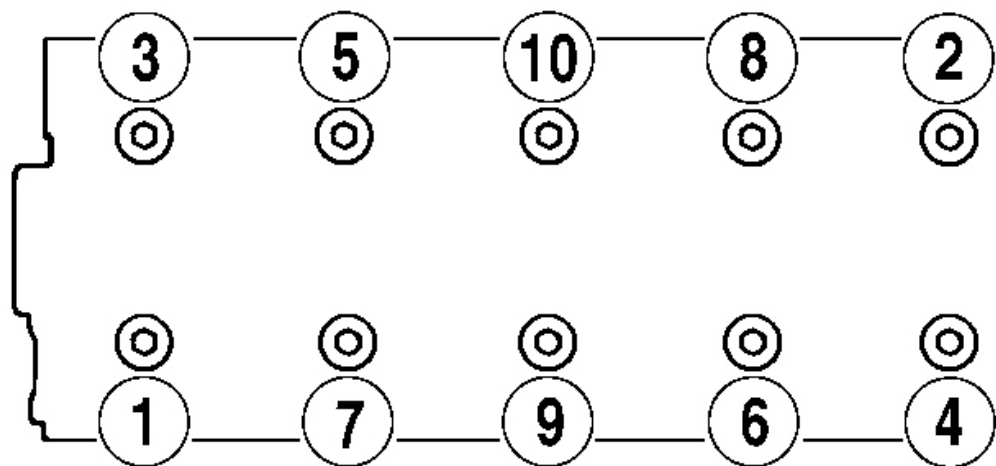
2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

|                                       |                     |
|---------------------------------------|---------------------|
| Step 1                                | 36 (49)             |
| Step 2                                | Fully Loosen        |
| Step 3                                | 14 (19)             |
| Step 4                                | Additional 1/4 turn |
| Step 5                                | Additional 1/4 turn |
| Drive Plate-To-Crankshaft Bolt (A/T)  | 94-101 (127-137)    |
| Engine Support Bracket                | 26 (35)             |
| Exhaust Manifold-To-Engine Bolt       | 13 (18)             |
| Flywheel-To-Crankshaft Bolt (M/T)     | 94-101 (127-137)    |
| Intake Manifold Bolt                  | 13 (18)             |
| Intake Manifold Brace Bolt            | 15 (20)             |
| Main Bearing Cap Bolt                 | 38 (52)             |
| Oil Pressure Switch                   | 13 (18)             |
| Oil Pump Relief Valve Plug            | 32 (44)             |
| Oil Screen Bolt                       | 13 (18)             |
| Rocker Arm Shaft Bolt                 | 23 (31)             |
| Throttle Body-To-Intake Manifold Bolt | 13 (18)             |
| Timing Belt Tensioner Bolt            | 17 (23)             |
| <b>INCH Lbs. (N.m)</b>                |                     |
| Bellhousing Cover Bolt                | 80 (9)              |
| Front Cover Bolt                      | 115 (13)            |
| Fuel Rail Bolt                        | 97 (11)             |
| Oil Pan Bolt                          | 62 (7)              |
| Oil Pump Internal Cover Bolt          | 89 (10)             |
| Rocker Cover Bolt                     | 30 (3.4)            |
| Timing Belt Cover Bolt                | 97 (11)             |
| Water Pump Pulley Bolt                | 80 (9)              |

(1) First tighten to 13 ft. lbs. (17 N.m), then tighten nut an additional 1/4 turn.

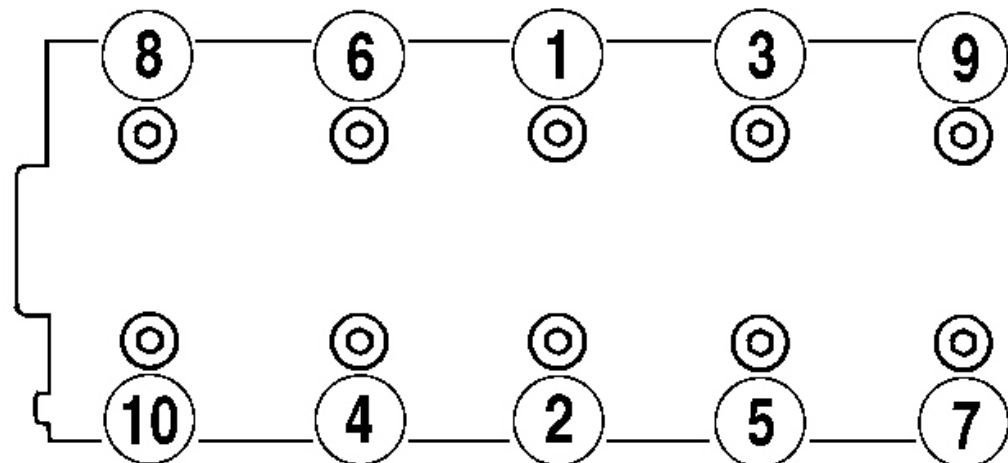
(2) Tighten bolts in sequence. See **Fig. 16**

## ← TIMING BELT SIDE



REMOVAL

## ← TIMING BELT SIDE



INSTALLATION

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**Fig. 16: Cylinder Head Bolt Removal & Installation Sequence**  
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

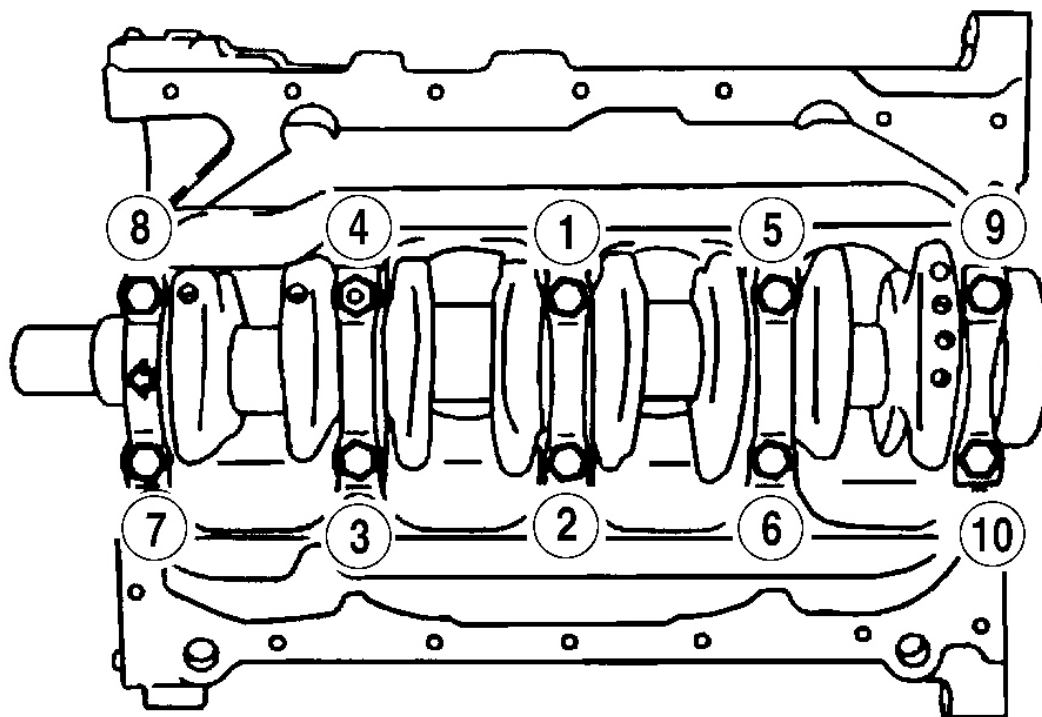
1.8L

**2001 Mitsubishi Mirage LS**

2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

**TORQUE SPECIFICATIONS (1.8L)**

| <b>Application</b>                                                                                                                                                                                                                                                                                                                         | <b>Ft. Lbs. (N.m)</b>  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Camshaft Sprocket Bolt                                                                                                                                                                                                                                                                                                                     | 65 (88)                |
| Connecting Rod                                                                                                                                                                                                                                                                                                                             | (1)                    |
| Crankshaft Pulley Bolt                                                                                                                                                                                                                                                                                                                     | 131-139 (177-188)      |
| Cylinder Head Bolt <sup>(2)</sup>                                                                                                                                                                                                                                                                                                          |                        |
| Step 1                                                                                                                                                                                                                                                                                                                                     | 55 (74)                |
| Step 2                                                                                                                                                                                                                                                                                                                                     | Fully Loosen           |
| Step 3                                                                                                                                                                                                                                                                                                                                     | 15 (20)                |
| Step 4                                                                                                                                                                                                                                                                                                                                     | Additional 1/4 turn    |
| Step 5                                                                                                                                                                                                                                                                                                                                     | Additional 1/4 turn    |
| Engine Support Bracket Bolt                                                                                                                                                                                                                                                                                                                | 36 (49)                |
| Exhaust Manifold Nut/Bolt                                                                                                                                                                                                                                                                                                                  |                        |
| 8-mm Bolt                                                                                                                                                                                                                                                                                                                                  | 13 (18)                |
| 10-mm Bolt                                                                                                                                                                                                                                                                                                                                 | 21 (29)                |
| Flywheel/Drive Plate Bolt                                                                                                                                                                                                                                                                                                                  | 69-76 (93-103)         |
| Intake Manifold Bolt                                                                                                                                                                                                                                                                                                                       | 15 (20)                |
| Main Bearing Cap Bolt                                                                                                                                                                                                                                                                                                                      | (3)                    |
| Oil Pick-Up Tube Nut                                                                                                                                                                                                                                                                                                                       | 14 (19)                |
| Oil Pump Internal Cover Bolt                                                                                                                                                                                                                                                                                                               | (4)                    |
| Rocker Arm Shaft Bolt                                                                                                                                                                                                                                                                                                                      | 23 (31)                |
| Throttle Body Bolt                                                                                                                                                                                                                                                                                                                         | 14 (19)                |
| Timing Belt Tensioner Bolt                                                                                                                                                                                                                                                                                                                 | 18 (24)                |
| Water Pump Bolt                                                                                                                                                                                                                                                                                                                            | 18 (24)                |
|                                                                                                                                                                                                                                                                                                                                            | <b>INCH Lbs. (N.m)</b> |
| Bellhousing Cover Bolt                                                                                                                                                                                                                                                                                                                     | 80 (9)                 |
| Front Cover Bolt                                                                                                                                                                                                                                                                                                                           | 106 (12)               |
| Fuel Rail Bolt                                                                                                                                                                                                                                                                                                                             | 106 (12)               |
| Oil Pan Bolt/Nut                                                                                                                                                                                                                                                                                                                           | 62 (7)                 |
| Rocker Arm Adjusting Nut                                                                                                                                                                                                                                                                                                                   | 80 (9)                 |
| Rocker Arm Cover Bolt                                                                                                                                                                                                                                                                                                                      | 30 (3.4)               |
| Timing Belt Cover Bolt                                                                                                                                                                                                                                                                                                                     | 97 (11)                |
| <p>(1) First tighten nut to 15 ft. lbs. (20 Nm), then tighten nut an additional 1/4 turn.</p> <p>(2) Tighten bolts in sequence. See <b>Fig. 16</b>.</p> <p>(3) Tighten bolt to 18 ft. lbs. (24 N.m), and then tighten an additional 1/4 turn. See <b>Fig. 17</b> for tightening sequence.</p> <p>(4) Tighten to 89 INCH lbs. (10 N.m).</p> |                        |



G00013815

**Fig. 17: Main Bearing Cap Tightening Sequence (1.8L Only)**  
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

## ENGINE SPECIFICATIONS

### GENERAL SPECIFICATIONS

#### GENERAL SPECIFICATIONS

| Application       | Specification       |
|-------------------|---------------------|
| 1.5L              |                     |
| Displacement      | 86.6 Cu. In. (1.5L) |
| Bore              | 2.97" (75.5 mm)     |
| Stroke            | 3.23" (82.0 mm)     |
| Compression Ratio | 9.0:1               |
| Fuel System       | MFI                 |
| 1.8L              |                     |
| Displacement      | 112 Cu. In. (1.8L)  |
| Bore              | 3.19" (81.0 mm)     |
| Stroke            | 3.50" (89.0 mm)     |

**2001 Mitsubishi Mirage LS**

2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

|                   |         |
|-------------------|---------|
| Compression Ratio | 9.5:1   |
| Fuel System       | MFI/SFI |

**CRANKSHAFT, MAIN BEARINGS & CONNECTING ROD BEARINGS SPECIFICATIONS****CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS**

| Application             | In. (mm)                |
|-------------------------|-------------------------|
| <b>1.5L</b>             |                         |
| Crankshaft              |                         |
| End Play                |                         |
| Standard                | .0020-.0071 (.05-.18)   |
| Service Limit           | .010 (.25)              |
| Main Bearings           |                         |
| Journal Diameter        | 1.8898 (48.00)          |
| Journal Out-Of-Round    | .0006 (.015) Maximum    |
| Journal Taper           | .0006 (.015) Maximum    |
| Oil Clearance           |                         |
| Standard                | .0008-.0016 (.020-.040) |
| Service Limit           | .004 (.10)              |
| Connecting Rod Bearings |                         |
| Journal Diameter        | 1.6535 (42.000)         |
| Journal Out-Of-Round    | .0006 (.015) Maximum    |
| Journal Taper           | .0006 (.015) Maximum    |
| Oil Clearance           |                         |
| Standard                | .0008-.0016 (.020-.040) |
| Service Limit           | .004 (.10)              |
| <b>1.8L</b>             |                         |
| Crankshaft End Play     |                         |
| Standard                | .002-.010 (.05-.25)     |
| Service Limit           | .016 (.04)              |
| Main Bearings           |                         |
| Journal Diameter        | 1.9685 (50.00)          |
| Journal Out-Of-Round    | .0006 (.015)            |
| Journal Taper           | .0002 (.005)            |
| Oil Clearance           |                         |
| Standard                | .0008-.0016 (.020-.040) |
| Service Limit           | .004 (.10)              |
| Connecting Rod Bearings |                         |
| Journal Diameter        | 1.771 (45.00)           |
| Journal Out-Of-Round    | .0006 (.015)            |
| Journal Taper           | .0002 (.005)            |

**2001 Mitsubishi Mirage LS**

2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

**Oil Clearance**

|               |                         |
|---------------|-------------------------|
| Standard      | .0008-.0016 (.020-.040) |
| Service Limit | .004 (.10)              |

**CONNECTING RODS SPECIFICATIONS****CONNECTING RODS**

| <b>Application</b>                     | <b>In. (mm)</b>       |
|----------------------------------------|-----------------------|
| Maximum Bend                           | (1) .002 (.05)        |
| Maximum Twist                          | (1) .0039 (.10)       |
| Side Play                              |                       |
| Standard                               | .0039-.0098 (.10-.25) |
| Service Limit                          | .016 (.40)            |
| (1) Per 3.937" (100 mm) of rod length. |                       |

**PISTONS, PISTON PINS & PISTON RINGS SPECIFICATIONS****PISTONS, PINS & RINGS**

| <b>Application</b>      | <b>In. (mm)</b>         |
|-------------------------|-------------------------|
| 1.5L                    |                         |
| Pistons                 |                         |
| Clearance               | .0008-.0016 (.020-.040) |
| Diameter <sup>(1)</sup> | 2.97 (75.5)             |
| Rings                   |                         |
| No. 1                   |                         |
| End Gap                 |                         |
| Standard                | .008-.014 (.20-.35)     |
| Service Limit           | .031 (.80)              |
| Side Clearance          |                         |
| Standard                | .0012-.0028 (.030-.070) |
| Service Limit           | .004 (.10)              |
| No. 2                   |                         |
| End Gap                 |                         |
| Standard                | .014-.020 (.35-.50)     |
| Service Limit           | .031 (.80)              |
| Side Clearance          |                         |
| Standard                | .0008-.0024 (.020-.060) |
| Service Limit           | .004 (.10)              |
| No. 3 (Oil)             |                         |
| End Gap                 |                         |
| Standard                | .008-.020 (.20-.50)     |

## 2001 Mitsubishi Mirage LS

2001 ENGINES 1.5L & 1.8L 4-Cylinder

|                                                                                                                                         |                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Service Limit                                                                                                                           | .004 (.10)              |
| 1.8L                                                                                                                                    |                         |
| Pistons                                                                                                                                 |                         |
| Clearance                                                                                                                               | .0008-.0016 (.020-.040) |
| Diameter                                                                                                                                | 3.19 (81.0)             |
| Pins                                                                                                                                    |                         |
| Rod Fit                                                                                                                                 | (2)                     |
| Rings                                                                                                                                   |                         |
| No. 1                                                                                                                                   |                         |
| End Gap                                                                                                                                 |                         |
| Standard                                                                                                                                | .0098-.0157 (.250-.400) |
| Service Limit                                                                                                                           | .031 (.80)              |
| Side Clearance                                                                                                                          |                         |
| Standard                                                                                                                                | .0012-.0028 (.030-.070) |
| Service Limit                                                                                                                           | .004 (.10)              |
| No. 2                                                                                                                                   |                         |
| End Gap                                                                                                                                 |                         |
| Standard                                                                                                                                | .0157-.0217 (.400-.550) |
| Service Limit                                                                                                                           | .031 (.80)              |
| Oil Ring                                                                                                                                |                         |
| Standard                                                                                                                                | .0007-.0024 (.020-.060) |
| Service Limit                                                                                                                           | .004 (.10)              |
| Oil Ring Side Rail                                                                                                                      | .0007-.0024 (.200-.600) |
| (1) Diameter is measured at specified location and at 90-degree angle to piston pin. See <b>CYLINDER BLOCK ASSEMBLY</b> under OVERHAUL. |                         |
| (2) Pins are installed using a hydraulic press, Base (MIT310134) and Press Pin (MIT48143).                                              |                         |

### CYLINDER BLOCK SPECIFICATIONS

#### CYLINDER BLOCK

| Application          | In. (mm)                       |
|----------------------|--------------------------------|
| 1.5L                 |                                |
| Cylinder Bore        |                                |
| Standard Diameter    | 2.9724 (75.500)                |
| Maximum Taper        | .0004 (.010)                   |
| Maximum Out-Of-Round | .0004 (.010)                   |
| Minimum Deck Height  | <sup>(1)</sup> 10.078 (256.00) |
| Maximum Deck Warpage | <sup>(1)</sup> .008 (.20)      |
| 1.8L                 |                                |
| Cylinder Bore        |                                |
|                      |                                |

**2001 Mitsubishi Mirage LS**

2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

|                                                                                                                                                                                                  |                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Standard Diameter                                                                                                                                                                                | 3.1889 (81.000)                |
| Maximum Taper                                                                                                                                                                                    | .0004 (.010)                   |
| Maximum Out-Of-Round                                                                                                                                                                             | .0004 (.010)                   |
| Deck Height                                                                                                                                                                                      | <sup>(1)</sup> 10.373 (263.50) |
| Maximum Deck Warpage                                                                                                                                                                             | <sup>(1)</sup> .004 (.10)      |
| (1) If deck warpage exceeds specification, machine deck surface. DO NOT remove more than a combined total of .008" (.20 mm) material from original surfaces of cylinder head and cylinder block. |                                |

**ENGINE VALVES & VALVE SPRINGS SPECIFICATIONS****VALVES & VALVE SPRINGS**

| Application      | Specification     |
|------------------|-------------------|
| <b>1.5L</b>      |                   |
| Intake Valves    |                   |
| Face Angle       | 45-45.5°          |
| Minimum Margin   |                   |
| Standard         | .040" (1.00 mm)   |
| Service Limit    | .020" (.50 mm)    |
| Stem Diameter    | .260" (6.60 mm)   |
| Exhaust Valves   |                   |
| Face Angle       | 45-45.5°          |
| Minimum Margin   |                   |
| Standard         | .059" (1.50 mm)   |
| Service Limit    | .040" (1.00 mm)   |
| Stem Diameter    | .260" (6.60 mm)   |
| Valve Springs    |                   |
| Free Length      |                   |
| Intake           |                   |
| Standard         | 1.815" (46.10 mm) |
| Service Limit    | 1.795" (45.60 mm) |
| Exhaust          |                   |
| Standard         | 1.843" (46.80 mm) |
| Service Limit    | 1.822" (46.30 mm) |
| Installed Height | 1.57" (40 mm)     |
| Out-Of-Square    |                   |
| Standard         | 2°                |
| Service Limit    | 4°                |
| <b>1.8L</b>      |                   |
| Intake Valves    |                   |
| Face Angle       | 45-45.5°          |
| Minimum Margin   | .039" (1.0 mm)    |

**2001 Mitsubishi Mirage LS**

2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

|                  |                 |
|------------------|-----------------|
| Stem Diameter    | .236" (6.0 mm)  |
| Exhaust Valves   |                 |
| Face Angle       | 45-45.5°        |
| Minimum Margin   | .051" (1.3 mm)  |
| Stem Diameter    | .236" (6.0 mm)  |
| Valve Springs    |                 |
| Free Length      | 2.00" (50.9 mm) |
| Installed Height | 1.74" (44.2 mm) |
| Out-Of-Square    |                 |
| Standard         | 2° Maximum      |
| Service Limit    | 4°              |

**CYLINDER HEAD SPECIFICATIONS****CYLINDER HEAD**

| Application                       | Specification                   |
|-----------------------------------|---------------------------------|
| 1.5L                              |                                 |
| Cylinder Head Height (New)        | 4.720-4.728" (119.90-120.10 mm) |
| Maximum Warpage                   | <sup>(1)</sup> .003" (.008 mm)  |
| Valve Seats                       |                                 |
| Intake Valve                      |                                 |
| Seat Angle                        | 45-45.5°                        |
| Seat Width                        | .035-.051" (.90-1.30 mm)        |
| Exhaust Valve                     |                                 |
| Seat Angle                        | 45-45.5°                        |
| Seat Width                        | .035-.051" (.90-1.30 mm)        |
| Valve Guides                      |                                 |
| Valve Guide Installed Height      | .669" (17.00 mm)                |
| Intake Valve                      |                                 |
| Valve Stem-To-Guide Oil Clearance |                                 |
| Standard                          | .0008-.0020" (.020-.050 mm)     |
| Service Limit                     | .004" (.10 mm)                  |
| Exhaust Valve                     |                                 |
| Valve Stem-To-Guide Oil Clearance |                                 |
| Standard                          | .0020-.0035" (.050-.090 mm)     |
| Service Limit                     | .006" (.150 mm)                 |
| 1.8L                              |                                 |
| Cylinder Head Height (New)        | 4.720-4.728" (119.90-120.10 mm) |
| Maximum Warpage                   | <sup>(1)</sup> .0012" (.03 mm)  |
| Valve Seats                       |                                 |
| Intake Valve                      |                                 |

**2001 Mitsubishi Mirage LS**

2001 ENGINES 1.5L &amp; 1.8L 4-Cylinder

|                                                                                                                                                                                             |                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Seat Angle                                                                                                                                                                                  | 45-45.5°                   |
| Seat Width                                                                                                                                                                                  | .0354-.0512" (.90-1.30 mm) |
| Exhaust Valve                                                                                                                                                                               |                            |
| Seat Angle                                                                                                                                                                                  | 45-45.5°                   |
| Seat Width                                                                                                                                                                                  | .0354-.0512" (.90-1.30 mm) |
| Valve Guides                                                                                                                                                                                |                            |
| Intake Valve                                                                                                                                                                                |                            |
| Valve Stem-To-Guide Oil Clearance                                                                                                                                                           |                            |
| Standard                                                                                                                                                                                    | .0008-.0020" (.02-.05 mm)  |
| Service Limit                                                                                                                                                                               | .004" (.10 mm)             |
| Exhaust Valve                                                                                                                                                                               |                            |
| Valve Stem-To-Guide Oil Clearance                                                                                                                                                           |                            |
| Standard                                                                                                                                                                                    | .0020-.0035" (.05-.09 mm)  |
| Service Limit                                                                                                                                                                               | .006" (.150 mm)            |
| (1) If deck warpage exceeds specification, machine surface. DO NOT remove more than a combined total of .008" (.20 mm) material from original surfaces of cylinder head and cylinder block. |                            |

**CAMSHAFT SPECIFICATIONS****CAMSHAFT**

| Application                      | In. (mm)      |
|----------------------------------|---------------|
| 1.5L                             |               |
| End Play                         | (1)           |
| Journal Diameter                 | (1)           |
| Lobe Height                      |               |
| Intake (Primary & Secondary)     |               |
| Standard                         | 1.527 (38.78) |
| Service Limit                    | 1.507 (38.28) |
| Exhaust                          |               |
| Standard                         | 1.539 (39.10) |
| Service Limit                    | 1.52 (38.6)   |
| Oil Clearance                    |               |
| Standard                         | (1)           |
| Service Limit                    | (1)           |
| 1.8L                             |               |
| End Play                         | (1)           |
| Journal Diameter                 | (1)           |
| Lobe Height                      |               |
| Standard (Intake & Exhaust)      | 1.462 (37.15) |
| Service Limit (Intake & Exhaust) | 1.442 (36.65) |

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2001 ENGINES 1.5L & 1.8L 4-Cylinder

Oil Clearance

(1)

(1) Information is not available from manufacturer.