

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

### Article Text

1992 Mitsubishi Mirage

For a a a a

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### ARTICLE BEGINNING

1990-92 CHRYSLER MOTORS/MITSUBISHI ENGINES

1.5L & 1.6L 4-Cylinder

Dodge: Colt, Colt 200

Eagle: Summit

Mitsubishi: Mirage, Precis

Plymouth: Colt

### ENGINE IDENTIFICATION

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

**WARNING:** The Timing Belt Installation procedure for the 1.6L DOHC has been revised. See Mitsubishi Technical Service Bulletin TSB-89-11-002 IMPROVED DOHC TIMING BELT INSTALLATION for correct procedure.

Engine may be identified by Vehicle Identification Number (VIN), stamped on a metal pad located near lower left corner of windshield on all models except Precis. On Precis, VIN is stamped on a plate mounted to firewall in engine compartment. Eighth character of VIN identifies engine model.

### ENGINE IDENTIFICATION CODES TABLE

Application	VIN Code
1.5L 4-Cylinder SOHC	
1990 Colt, Colt 200, Mirage & Summit .....	X
1991-92 Colt, Colt 200, Mirage & Summit .....	A
1990-92 Precis .....	J
1.6L 4-Cylinder DOHC	
1990 Colt, Colt 200 & Summit .....	Y
1990-92 Mirage .....	Y

### ADJUSTMENTS

#### VALVE CLEARANCE 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.

1.5L

1) Ensure cylinder head bolts are properly tightened and engine is at normal operating temperature before measuring or

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adjusting valve clearances. See appropriate TORQUE SPECIFICATIONS table at end of article. Remove spark plugs and rocker arm cover. Rotate engine clockwise as viewed from timing belt end of engine.

2) Align notch on crankshaft pulley with "T" mark on timing belt cover and No. 1 cylinder is at TDC of compression stroke. Adjust intake valves of cylinders No. 1 and 2, and exhaust valves of cylinders No. 1 and 3 to specification. See VALVE CLEARANCE SPECIFICATIONS table.

3) Rotate crankshaft clockwise 360 degrees to position cylinder No. 4 at TDC of compression stroke. Adjust intake valves of cylinders No. 3 and 4, and exhaust valves of cylinders No. 2 and 4. Install rocker cover and spark plugs.

### 1.6L

Hydraulic lash adjusters are used; valve adjustment is not necessary.

### VALVE CLEARANCE SPECIFICATIONS

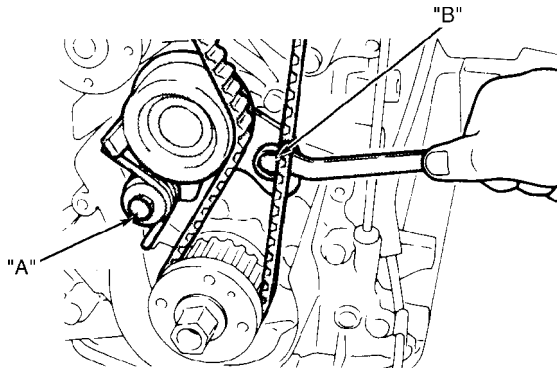
Application	Cold In. (mm)	Hot In. (mm)
Exhaust .....	.007 (.17)	.010 (.25)
Intake .....	.003 (.07)	.006 (.15)

### 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.

### 1.5L

Remove lower timing belt cover. Loosen bolt "A." See Fig. 1. Loosen bolt "B." Rotate crankshaft clockwise enough to put tension on timing belt. Tighten bolt "B," then tighten bolt "A." See appropriate TORQUE SPECIFICATIONS table at end of article.



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Fig. 1: Adjusting Timing Belt Tension (1.5L)  
Courtesy of Mitsubishi Motor Sales of America.

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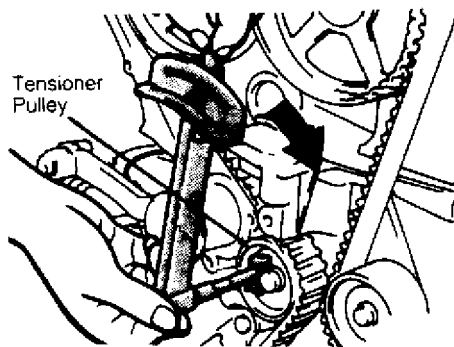
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#### 1.6L

1) Remove lower timing belt cover. Rotate crankshaft 1/4 turn counterclockwise, and then rotate crankshaft clockwise until No. 1 cylinder is at TDC. Loosen center bolt on tensioner pulley. See Fig. 2.

NOTE: If engine is in vehicle, it may be necessary raise engine slightly for clearance.

2) To rotate tensioner pulley, install Socket Wrench (MD998752) into pin holes offset from center of pulley. Using INCH lb. torque wrench and socket wrench, apply 23-25 INCH lbs. (2.6-2.8 N.m) torque to tensioner pulley. With torque applied to tensioner pulley, tighten center bolt to 29-41 ft. lbs. (40-55 N.m).



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Fig. 2: Locating Timing Belt Tensioner Pulley (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

## REMOVAL & INSTALLATION

### FUEL PRESSURE RELEASE

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.

Colt, Colt 200, Mirage & Summit

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

Precis

Disconnect fuel pump harness connector, located at rear of fuel tank. Start engine, and allow it to idle until it stops. Turn ignition off. Disconnect negative battery terminal. Reconnect fuel

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pump harness connector.

### ENGINE

Removal (Colt, Colt 200, Mirage & Summit)

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Remove hood, air cleaner, battery, and battery tray. Drain cooling system. Drain engine oil and transaxle oil. Remove transaxle assembly. See appropriate article in CLUTCHES or TRANSMISSION SERVICING.

2) Remove radiator and heater hoses. Remove radiator. Remove fuel lines, vacuum hoses, and electrical connections from engine.

3) Disconnect accelerator cable. Remove A/C compressor and power steering pump from engine (if equipped), leaving hoses connected. Wire units aside. Disconnect exhaust pipe at manifold.

4) Install engine hoist. Raise engine slightly. Remove all engine mount bolts. Remove engine assembly.

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

Installation

1) To install, reverse removal procedure. Ensure arrow on mounting stoppers (if equipped), located on front upper engine mount bolt (near timing belt cover), faces away from timing belt cover.

2) With engine installed, loosely install all engine mount bolts. With weight of engine on insulators, perform final tightening of mounting bolts and nuts. Replenish all fluids. Adjust all control cables and linkages.

NOTE: On Precis, remove engine and transaxle as a unit.

Removal (Precis)

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Drain transaxle oil. Drain cooling system.

2) Remove battery and air cleaner assembly. Unplug electrical connectors and vacuum hoses from engine and transaxle. On A/T models, mark and disconnect transaxle cooler lines. Plug cooler lines.

3) Disconnect radiator and heater hoses. Remove radiator. Disconnect fuel hoses and accelerator cable. Disconnect A/C compressor and mounting bracket (if equipped).

4) Disconnect speedometer cable at transaxle. On M/T models, disconnect clutch cable, shift control rod, and extension rod. On A/T models, disconnect shift control cable from transaxle.

5) On all models, raise and support vehicle. Disconnect exhaust pipe, and support using wire. Remove underbody cover. Remove lower ball joint-to-lower arm bolts.

6) Insert pry bar between transaxle case and drive axle shaft. Pry drive axle shaft from transaxle. Pull drive axle shaft assembly from transaxle. Support shaft assembly away from body. Plug shaft openings in transaxle.

7) Install engine hoist. Raise engine slightly. Remove front engine support bar from engine. Disconnect rear engine support bar

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from crossmember. Remove front engine mounting bolts and mounting bracket.

8) Raise engine slightly. Remove cover from inside right inner fender panel. Remove transaxle mounting bracket bolts, located near right strut assembly. Remove left mount bolt. Remove engine/transaxle assembly from vehicle while pushing transaxle side downward.

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

#### Installation

To install, reverse removal procedure. With engine installed, loosely install front engine support bar bolts. With weight of engine on insulators, perform final tightening of mounting bolts and nuts. Replenish all fluids. Adjust all control cables and linkages.

### INTAKE MANIFOLD

Removal (Colt, Colt 200, Mirage & Summit)

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. See Fig. 3 or 4. On 1.6L engines, remove ignition coil.

2) On all models, 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) On 1.5L engines, remove thermostat housing. On all engines, remove EGR valve (if equipped). Remove intake manifold and gasket. If necessary, separate throttle body from intake manifold.

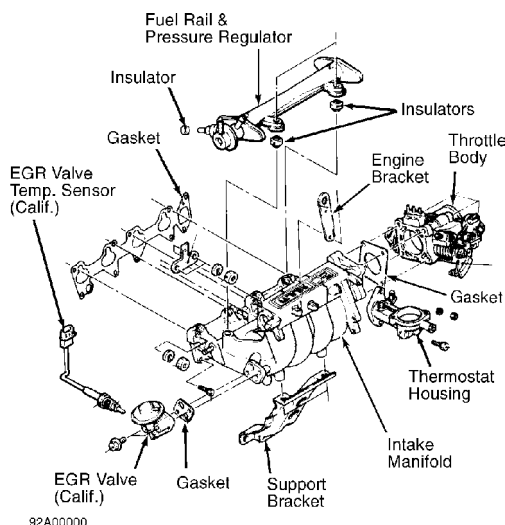


Fig. 3: Exploded View Of Intake Manifold (1.5L Except Precis)  
Courtesy of Chrysler Motors.

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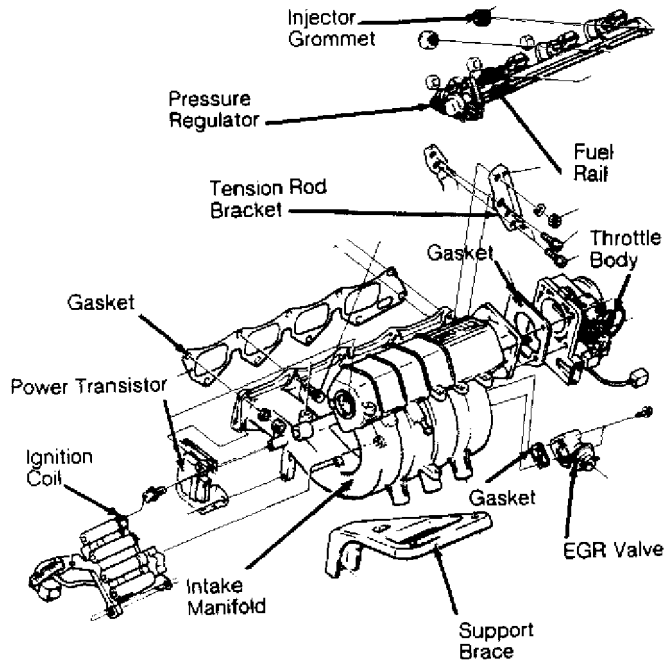
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Fig. 4: Exploded View Of Intake Manifold (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

#### Installation

To install, reverse removal procedure. Use new gaskets, fuel injector grommets, and "O" rings. Adjust all control cables. Replenish all fluids.

#### Removal & Installation (Precis)

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Remove air intake hose, and disconnect accelerator cable. Disconnect necessary coolant hoses, vacuum hoses, and electrical connectors. Remove air intake plenum and gasket.

2) Remove fuel rail with fuel injectors and pressure regulator attached. Take care that fuel injectors do not fall from fuel rail. Remove fuel injector grommets from intake manifold. Remove coolant outlet, gasket, and thermostat. Remove distributor, ignition coil, and intake manifold. To install, reverse removal procedure.

### EXHAUST MANIFOLD

#### Removal

1) On 1.6L models equipped with A/C, remove condenser fan and radiator cooling fan motor assemblies.

2) On all models, disconnect exhaust pipe from manifold. Remove exhaust manifold outer heat shield, oxygen sensor, and engine hanger (if equipped) from manifold. Remove manifold bolts, manifold, gasket, and manifold inner heat shield.

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#### Installation

To install, reverse removal procedure. Use new gaskets and exhaust manifold retaining nuts.

#### CYLINDER HEAD

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

Removal (Colt, Colt 200, Mirage 1.5L & Summit)

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Drain cooling system. Disconnect upper radiator hose, by-pass hose, and heater hoses. Remove spark plugs.

2) Disconnect air intake and breather hoses, accelerator cable, and throttle control cable (A/T models). Disconnect fuel and vacuum lines. Disconnect necessary electrical connections.

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

3) Remove rocker cover and upper timing belt cover. Rotate engine clockwise, as viewed from timing belt end of engine, to align timing marks. Secure timing belt to camshaft sprocket with wire. Remove camshaft sprocket with timing belt installed. Wire sprocket and belt aside, being careful to maintain sprocket and belt relationship.

**CAUTION:** Ensure timing belt does not come off of crankshaft sprocket. DO NOT rotate engine with timing belt disengaged from camshaft. See TIMING BELT.

4) Remove support brace (if equipped) from intake manifold. Disconnect exhaust pipe from exhaust manifold. Loosen cylinder head bolts in sequence, in 2 stages. See Fig. 5. Remove cylinder head and gasket.

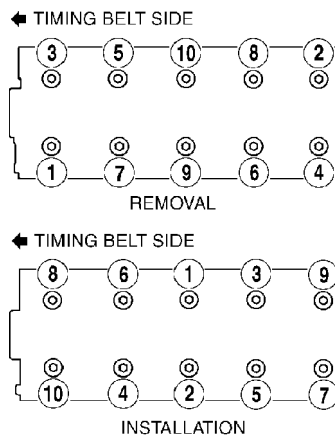


Fig. 5: Cylinder Head Bolt Removal & Installation Sequence (1.5L)  
Courtesy of Chrysler Motors.

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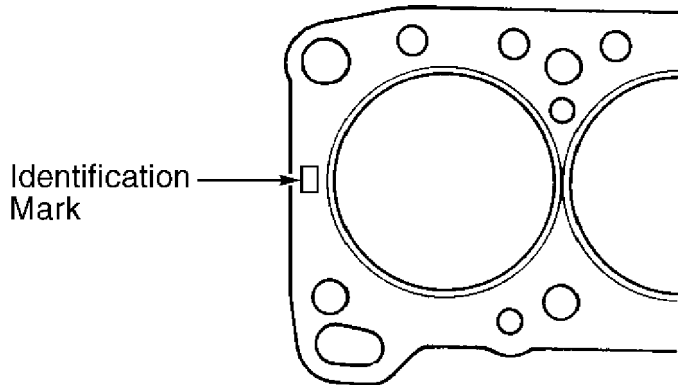
#### Inspection

Inspect cylinder head for warpage. Resurface cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article.

#### Installation

1) Install cylinder head gasket with identification mark toward timing belt, facing up. Install cylinder head. See Fig. 6. DO NOT apply sealant to head gasket. Tighten bolts to specification in sequence, in 2 stages. See Fig. 5. See appropriate TORQUE SPECIFICATIONS table at end of article.

2) Install timing belt and camshaft sprocket in original location. Ensure timing marks are aligned. See TIMING BELT. To complete installation, reverse removal procedure. Refill cooling system. Adjust all control cables.



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Fig. 6: Locating Cylinder Head Gasket ID Mark (Except Precis)  
Courtesy of Chrysler Motors.

#### Removal (Precis)

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Remove air cleaner. Drain coolant. Remove upper radiator hose. Remove distributor and spark plug wires. Remove intake and exhaust manifolds. See INTAKE MANIFOLD and EXHAUST MANIFOLD.

2) Remove fan, spacer, water pump pulley, and upper timing belt cover. Align timing marks. Loosen timing belt tensioner. Move belt tensioner toward water pump. Temporarily tighten tensioner bolt.

CAUTION: Ensure timing belt does not come off of crankshaft sprocket. DO NOT rotate engine with timing belt disengaged from camshaft. See TIMING BELT under REMOVAL & INSTALLATION.

3) Mark location of timing belt on camshaft sprocket for installation reference. Remove timing belt from camshaft sprocket.

4) Remove rocker cover. Using Wrench (09221-11000), loosen head bolts in proper sequence. See Fig. 5. Remove cylinder head.

#### Inspection

Inspect cylinder head for warpage. Resurface cylinder head if



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warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article.

#### Installation

1) Install cylinder head. Use new gasket. DO NOT apply sealant to head gasket. Tighten bolts to specification in proper sequence. See appropriate TORQUE SPECIFICATIONS table at end of article. See Fig. 5.

2) Install timing belt onto camshaft sprocket in original location. Ensure timing marks are aligned. Adjust timing belt. See TIMING BELT under REMOVAL & INSTALLATION. To complete installation, reverse removal procedure.

#### Removal (1.6L)

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Drain cooling system. Remove radiator, accelerator cable, air intake hose, breather hose, PCV hose, and air cleaner.

2) Disconnect necessary coolant hoses, electrical connections, vacuum hoses and fuel lines. Remove center cover and spark plug wires. Remove wiring harness.

3) Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Remove rocker cover and semicircular packing at rear of cover.

4) Disconnect exhaust pipe at manifold. Disconnect tension rod at rear of intake manifold. Using Wrench (MD998051), loosen head bolts in proper sequence, in 2 stages. See Fig. 7. Remove cylinder head and gasket.

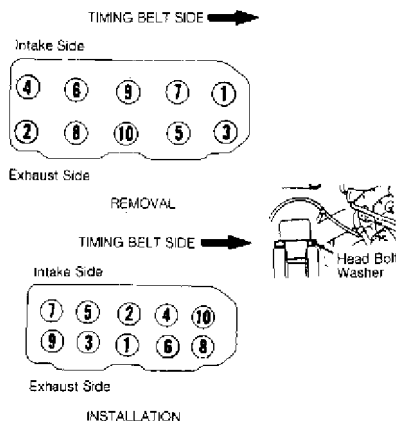


Fig. 7: Cylinder Head Bolt Removal & Installation Sequence (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

#### Inspection

Inspect cylinder head for warpage. Resurface cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article.

#### Installation

1) Install cylinder head. Use new gasket. Ensure

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identification mark on head gasket is toward timing belt side and faces up. See Fig. 6. DO NOT apply sealant to head gasket. Install head bolts and washers. Ensure washers are installed in proper location.

2) Tighten bolts to specification in sequence, in 2 stages. See Fig. 7. To complete installation, reverse removal procedure.

3) Apply sealant to rocker cover sealing areas and sealing areas of packing. See Fig. 8. Apply gasoline to "O" ring on fuel line before connecting fuel line to fuel rail. Adjust all control cables.

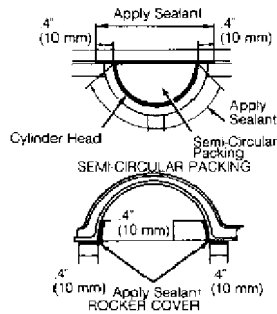


Fig. 8: Applying Sealant To Rocker Cover Sealing Areas (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

### FRONT COVER OIL SEAL

NOTE: FRONT COVER refers to cover at front of cylinder block. Cover contains oil pump, front cover oil seal (crankshaft front seal), and oil filter mount. Manufacturer specifies oil seal removal procedure with front cover removed from engine. See OIL PUMP & FRONT COVER under ENGINE OILING.

### TIMING BELT

WARNING: This applies to the 1.6L DOHC. The Timing Belt Installation procedures has been revised. See Technical Service Bulletin TSB-89-11-002 IMPROVED DOHC TIMING BELT INSTALLATION for correct procedure.

#### Removal (1.5L)

1) Remove protective cover under engine. Support engine. Remove engine mount located near timing belt cover. Remove all drive belts and drive pulleys from crankshaft and water pump.

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

2) Remove timing belt covers and gaskets, noting bolt lengths and locations as they are removed. Rotate engine clockwise to align

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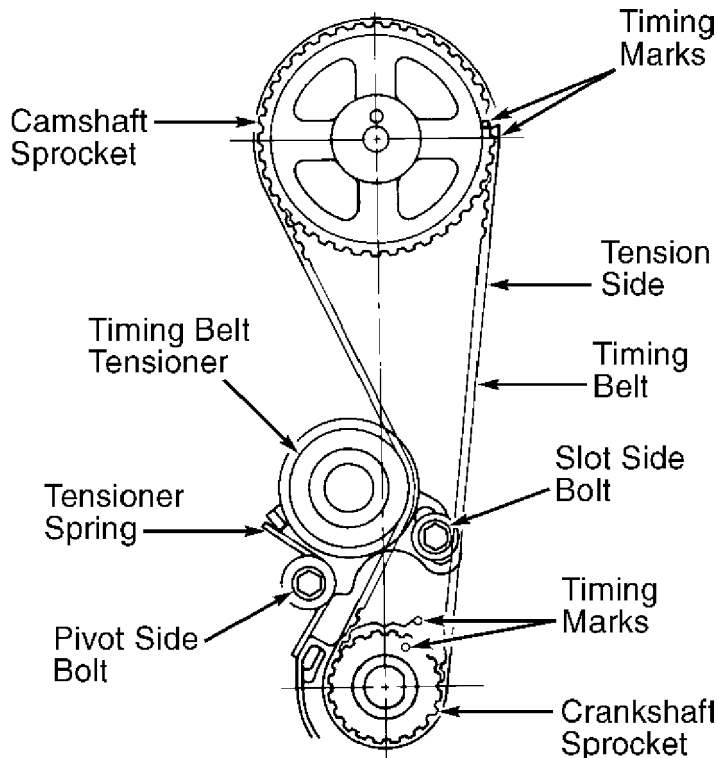
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timing mark on camshaft sprocket with mark on cylinder head. Ensure all timing marks are aligned. See Fig. 9.

3) Place mark on timing belt to indicate direction of belt rotation. Loosen timing belt tensioner bolts. Move tensioner inward toward water pump. Temporarily tighten bolt in slot side of tensioner. Remove timing belt.

4) If removing crankshaft belt sprocket, remove sprocket bolt, sprocket, and flange (located behind sprocket). Note orientation of installed flange.



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Fig. 9: Aligning Timing Marks (1.5L)

Courtesy of Chrysler Motors.

#### Inspection

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

#### Installation

1) Install flange onto crankshaft, with chamfered edge facing away from cylinder block. Install camshaft sprocket. Tighten sprocket bolt to specification. See appropriate TORQUE SPECIFICATIONS table.

2) Install belt tensioner, tension spring, and spacer. Ensure spring is properly engaged against front case. Rotate tensioner toward water pump. Temporarily tighten retaining bolts. Rotate camshaft and crankshaft, ensuring all timing marks are aligned. See Fig. 9.

3) Install timing belt onto crankshaft, in original direction

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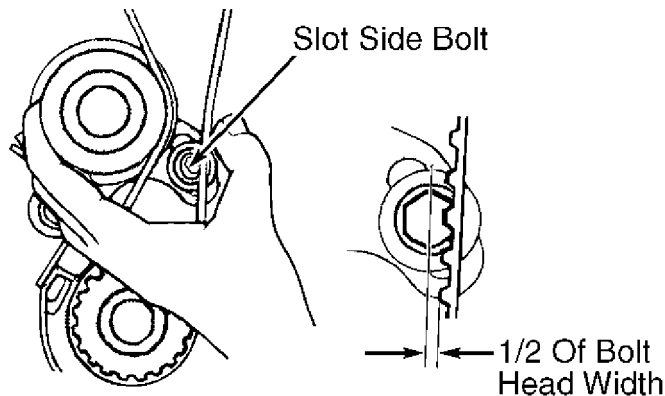
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of rotation. Apply pressure to tension side of belt while installing belt onto camshaft sprocket.

4) Rotate camshaft sprocket in counterclockwise direction to apply tension to belt. Ensure timing marks are aligned. Temporarily install crankshaft pulley to retain timing belt. Adjust timing belt tension. See TIMING BELT ADJUSTMENT under ADJUSTMENTS.

CAUTION: If pivot bolt is tightened before side bolt, belt tensioner may rotate, causing belt to be overtightened.

5) To check belt tension, hold belt tensioner and timing belt together. Apply slight thumb pressure at center point of belt tensioner. Belt cog should reach 1/2 of slot side bolt head width. See Fig. 10. To complete installation, reverse removal procedure.



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Fig. 10: Checking Timing Belt Tension (1.5L)  
Courtesy of Chrysler Motors.

#### Removal (1.6L)

1) Remove cover from under engine. Support engine. Remove engine mount located near timing belt cover. Remove all drive belts, tensioner pulley bracket, and drive pulleys from crankshaft and water pump. See Fig. 11.

2) Remove timing belt covers and gaskets, noting bolt lengths and locations. Remove center cover, breather hose, and PCV hose. Disconnect spark plug wires from spark plugs.

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

3) Remove rocker cover and semicircular packing at rear of rocker cover. Remove rubber plug from rear timing belt cover. Rotate engine clockwise to align all timing marks, and set No. 1 cylinder at TDC of compression stroke. See Fig. 12.

4) Remove automatic tensioner. Place mark on timing belt to indicate direction of belt rotation. Remove timing belt. Remove tensioner pulley, tensioner arm, and idler pulley (if necessary).

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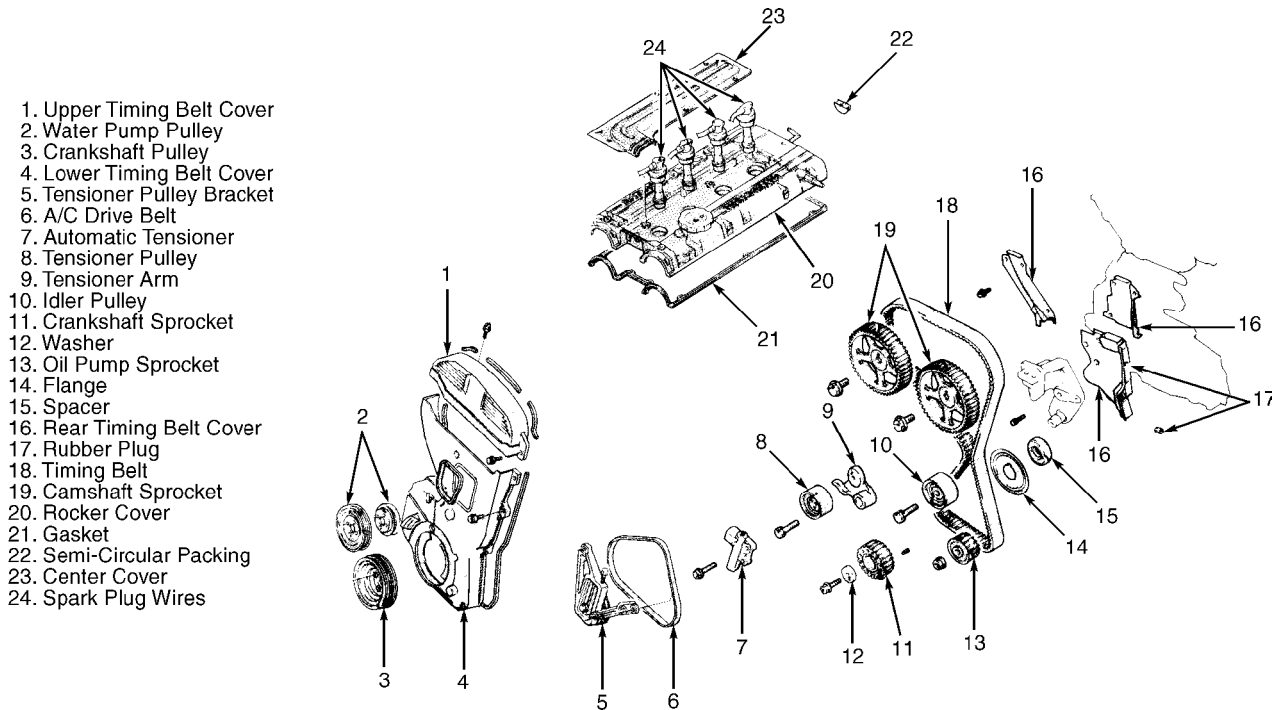
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5) Inspect sprockets for damage. To remove camshaft sprocket, hold hexagonal area of camshaft between camshaft journals No. 2 and 3 while removing camshaft sprocket bolt. Remove sprockets from camshafts.

6) Remove bolt, washer, crankshaft and oil pump sprockets, flange, and spacer. Note orientation of installed flange. Remove rear timing belt covers.



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Fig. 11: Exploded View Of Timing Belt & Components (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

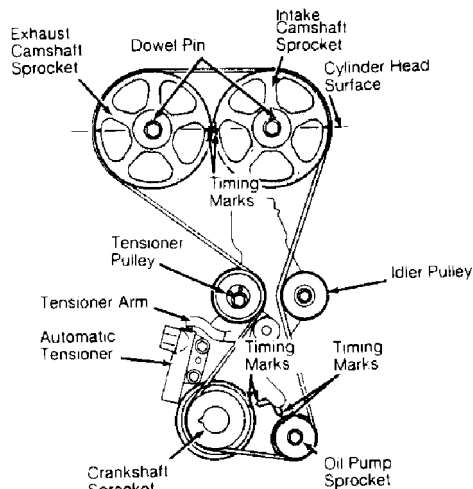


Fig. 12: Aligning Timing Marks (1.6L)  
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#### Inspection

1) Inspect belt teeth for cracks, damage, or oil contamination. Inspect all sprockets for damage. Inspect tensioner pulley and idler pulley for grease leakage or rough rotation. Replace defective components.

2) Inspect automatic tensioner for leaks. Examine end of tensioner rod for wear. Measure distance from end of tensioner rod to tensioner housing. Distance should be .47" (11.9 mm).

3) Examine plug at bottom of tensioner. If plug protrudes past housing, place a washer over plug to prevent it from contacting vise when pushing rod into tensioner housing.

4) Place tensioner assembly in a soft-faced vise. Press rod back into automatic tensioner. Replace tensioner if rod can be pushed easily into automatic tensioner.

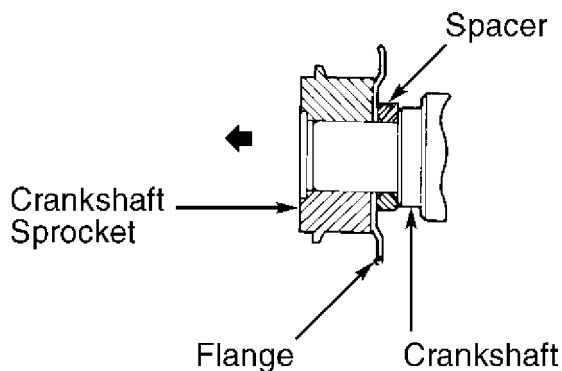
**CAUTION:** Install flange and crankshaft sprocket in correct orientation, to prevent damage to timing belt.

**WARNING:** This applies to the 1.6L DOHC. The Timing Belt Installation procedures has been revised. See Technical Service Bulletin TSB-89-11-002 IMPROVED DOHC TIMING BELT INSTALLATION for correct procedure.

#### Installation

1) Install rear timing belt covers, spacer, flange, crankshaft sprocket, washer, and retaining bolts. Install flange and crankshaft sprocket in proper orientation. See Fig. 13.

2) Install camshaft sprockets. Tighten retaining bolts to specification while holding hexagonal area of camshaft. See appropriate TORQUE SPECIFICATIONS table. Install idler pulley.



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Fig. 13: Installing Flange & Crankshaft Sprocket (1.6L)

Courtesy of Mitsubishi Motor Sales of America.

3) Push automatic tensioner rod into tensioner housing. If plug at bottom of tensioner housing protrudes past housing, place a washer over plug to prevent plug from contacting vise when pushing rod into tensioner housing.

4) Place tensioner assembly in a soft-faced vise. Press rod back into automatic tensioner in small increments until both rod and housing holes are aligned. See Fig. 14. Insert a .055" (1.4 mm)

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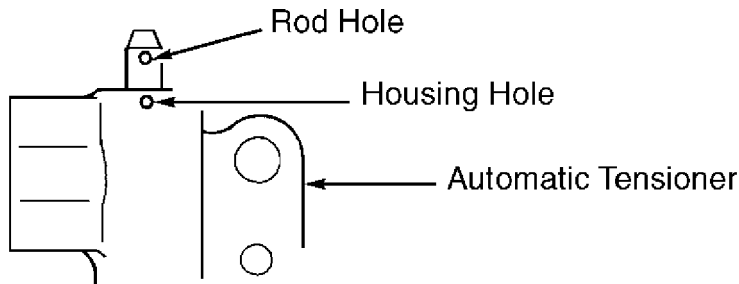
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diameter wire into holes.

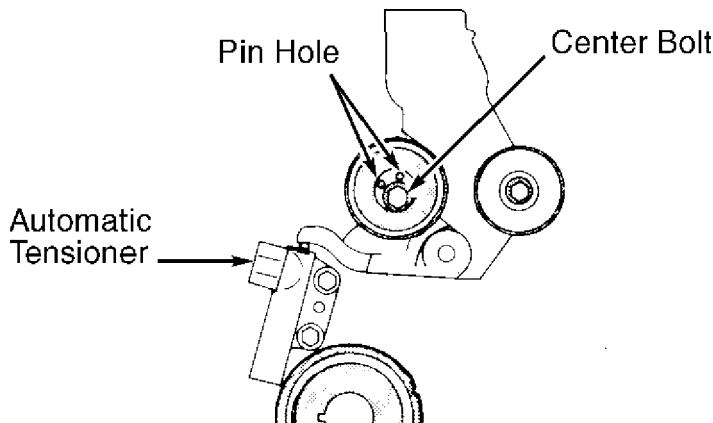


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Fig. 14: Retracting Automatic Tensioner Rod (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

5) Remove automatic tensioner from vise. Install assembly with wire installed. Install tensioner arm. Install tensioner pulley onto tensioner arm, ensuring pin hole of tensioner pulley shaft is to left of center bolt. See Fig. 15. Tighten center bolt.

6) Rotate camshaft sprockets so dowel pins face up, and timing marks on sprockets align. See Fig. 12. Outer marks on sprockets should be aligned with cylinder head surface.



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Fig. 15: Installing Tensioner Pulley (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

7) When exhaust camshaft sprocket is released, camshaft will rotate one tooth in counterclockwise direction. When installing timing belt, compensate for rotation.

8) Rotate crankshaft to align timing marks on crankshaft and oil pump sprockets. If installing old timing belt, install it in original direction of rotation.

9) Install timing belt onto tensioner pulley and crankshaft sprocket. Hold belt in place using left hand. Pull belt around oil pump sprocket. Pull belt around idler pulley.

10) Install timing belt around intake camshaft sprocket. Ensure exhaust timing mark on camshaft sprocket aligns with cylinder head surface. See Fig. 12. Using both hands, install timing belt

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around exhaust camshaft sprocket.

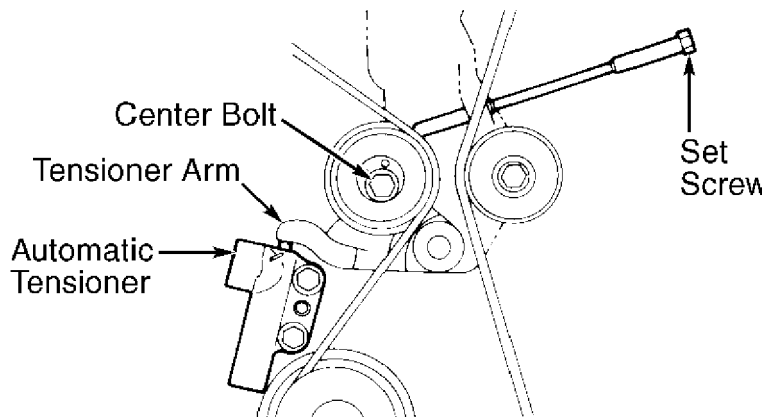
11) Rotate tensioner pulley toward timing belt until belt does not sag. Temporarily tighten center bolt on tensioner pulley. Ensure all timing marks are aligned.

12) To adjust belt tension, rotate crankshaft 1/4 turn counterclockwise, and then rotate clockwise until No. 1 cylinder is at TDC. Loosen center bolt on tensioner pulley.

13) To rotate tensioner pulley, install Socket Wrench (MD998752) into pin holes offset from center of pulley. Using INCH lb. torque wrench and socket wrench, apply torque of 23-25 INCH lbs. (2.6-2.8 N.m) to tensioner pulley. With torque applied to tensioner pulley, tighten tensioner pulley center bolt to 29-41 ft. lbs. (40-55 N.m).

NOTE: If engine is in vehicle, it may be necessary to jack up engine slightly for clearance.

14) Thread Set Screw (MD998738) into left engine support bracket until screw end contacts tensioner arm. See Fig. 16. Turn set screw farther until wire can be removed from automatic tensioner. Remove set screw.



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Fig. 16: Removing Lock Wire From Timing Belt Auto. Tensioner (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

15) Rotate crankshaft clockwise 2 complete revolutions, and leave it in this position for approximately 15 minutes. After 15 minutes, measure distance between tensioner arm and automatic tensioner body (automatic tensioner rod extension). Distance should be .15-.18" (3.8-4.5 mm). Repeat steps 12)-15) until correct distance is obtained.

16) An alternative method can be used if engine is in vehicle, or distance cannot be measured because of lack of clearance. Install Set Screw (MD998738) until it contacts tensioner arm.

17) Turn set screw inward, counting number of turns until tensioner arm contacts tensioner housing. Set screw should rotate 2 1/2 - 3 turns inward if belt tension is correct. Repeat steps 12)-17) until correct number of turns is obtained.

18) Remove set screw. Install rubber plug into rear timing belt cover. To complete installation, reverse removal procedure. Apply



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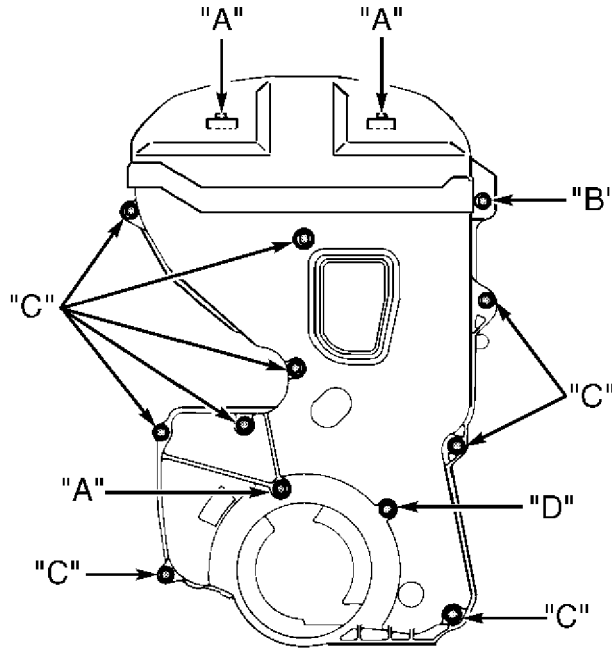
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sealant to appropriate areas on packing and rocker cover before installation. See Fig. 8. Install timing belt cover bolts into proper locations. See Fig. 17.



NOTE: Thread diameter x length indicated in millimeters.

"A" - 6 x 16

"C" - 6 x 20

"B" - 6 x 22

"D" - 6 x 28

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Fig. 17: Installing Timing Belt Cover Bolts (1.6L)

Courtesy of Mitsubishi Motor Sales of America.

### ROCKER ARM & VALVE LASH ADJUSTER

#### Removal (1.5L)

Remove breather and PCV hoses. Remove valve cover. If necessary, remove air cleaner and upper timing belt cover. Unscrew rocker arm shaft retaining bolts evenly in small increments. Remove rocker shaft assemblies.

#### Inspection

Disassemble rocker components. Keep parts in order for reassembly. Inspect components for wear and damage. See VALVE TRAIN under OVERHAUL. Assemble rocker shaft components in original locations. Note identification mark and position of rocker arm offset. See Fig. 18 & 19.

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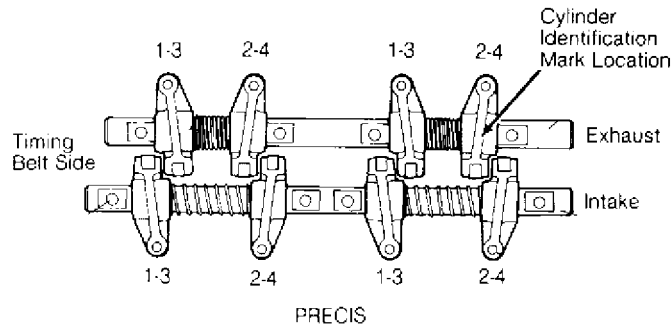
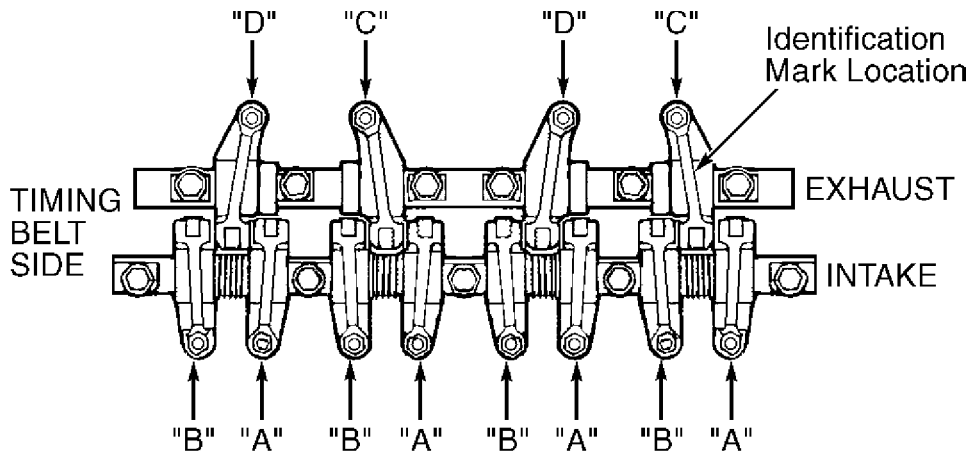


Fig. 18: Installing Rocker Arm Shaft Assembly (1.5L Precis)  
Courtesy of Chrysler Motors.



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Fig. 19: Installing Rocker Arm Shaft Assembly (1.5L Except Precis)  
Courtesy of Chrysler Motors.

#### Installation

1) On 12-valve models, turn camshaft until cam sprocket dowel pin is at 12 o'clock position. On all models, install rocker arm assembly. See Figs. 18 & 19.

2) Tighten rocker arm assembly retaining bolts to specification. See appropriate TORQUE SPECIFICATIONS table at end of article. Adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS. To complete installation, reverse removal procedure.

#### Removal & Installation (1.6L)

Remove camshafts. See CAMSHAFTS under REMOVAL & INSTALLATION. Remove rocker arms and lash adjusters. To install, reverse removal procedure.

#### CAMSHAFTS

Removal (Colt, Colt 200, Mirage 1.5L & Summit)

1) Disconnect spark plug wires. Remove distributor. Remove

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rocker arm cover. Remove timing belt and camshaft sprocket. See TIMING BELT under REMOVAL & INSTALLATION.

2) Remove camshaft oil seal. Remove rocker arms and shafts. See ROCKER ARM & VALVE LASH ADJUSTER under REMOVAL & INSTALLATION. Remove camshaft from cylinder head.

#### Inspection

Measure camshaft journal diameter and lobe height. See CAMSHAFT table under ENGINE SPECIFICATIONS at end of article. Replace camshaft if not within specification. Inspect all contact surfaces for

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Adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

#### Removal (1.6L)

1) Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Remove camshaft sprockets. Remove crank angle sensor from rear of intake camshaft.

CAUTION: Note location and direction of installed bearing caps before removal. Bearing caps No. 2-5 are marked with bearing number and "E" or "I" to indicate exhaust or intake camshaft. No. 1 bearing cap is marked only with "L" to indicate intake camshaft or "R" to indicate exhaust camshaft.

2) Remove front and rear bearing caps. Remove camshaft oil seals. See Fig. 21. Remove remaining bearing caps in sequence: No. 5, 2, 4, and 3. Remove camshafts.

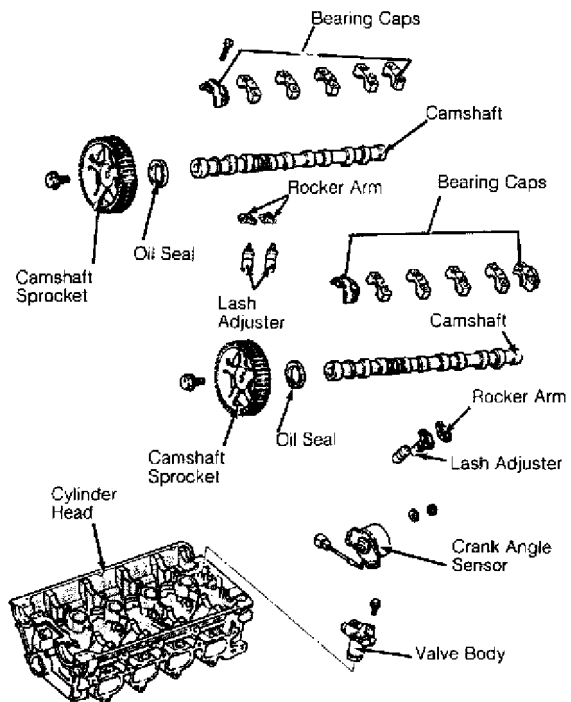


Fig. 21: Exploded View Of Camshaft Assembly (1.6L)

Courtesy of Mitsubishi Motor Sales of America.

#### Inspection

Measure camshaft journal diameter and lobe height for wear. Replace camshaft if journal diameter and lobe height are not within specifications. See CAMSHAFT table under ENGINE SPECIFICATIONS at end of article. Inspect rocker arms for wear.

#### Installation

1) Lubricate camshafts with engine oil. Note intake camshaft has a slit in rear to drive crank angle sensor. Install camshafts with

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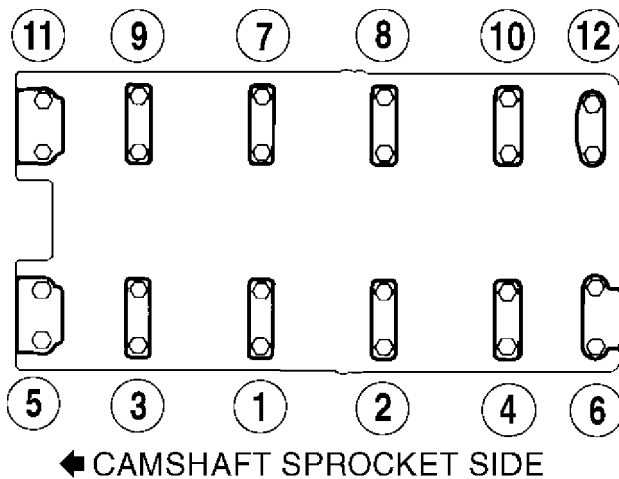
dowel pin for camshaft sprockets at 12 o'clock position.

2) Install bearing caps. Ensure rocker arm is mounted on lash adjuster and valve stem. Tighten bearing cap bolts in sequence to specification in 2 stages. See Fig. 22. See appropriate TORQUE SPECIFICATIONS table at end of article.

3) Install Seal Guide (MD998307) onto camshaft. Coat seal with engine oil, and install onto seal guide. Using Seal Installer (MD998306), install seal into cylinder head.

4) Position dowel pin on intake camshaft sprocket at 12 o'clock position. Align punch mark on crank angle sensor housing with notch in plate. See Fig. 23. Install crank angle sensor onto cylinder head. To complete installation, reverse removal procedure.

**CAUTION:** Install crank angle sensor with punch mark aligned with notch in plate; incorrect fuel injection and ignition timing will result if alignment is incorrect.



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Fig. 22: Camshaft Bearing Cap Bolt Tightening Sequence (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

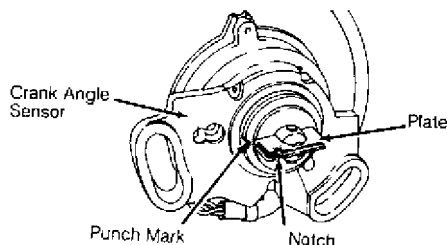


Fig. 23: Installing Crank Angle Sensor (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

## REAR CRANKSHAFT OIL SEAL

### Removal

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Remove transaxle. See appropriate article in CLUTCHES or TRANSMISSION SERVICING. Remove flywheel (M/T) or drive plate (A/T). Remove oil seal case from rear of cylinder block. If necessary, remove oil pan. Remove oil seal from seal case. On 1.6L engines, an oil separator plate is located behind oil seal in oil seal case.

CAUTION: On 1.6L engines, ensure oil separator plate is installed with oil hole located toward oil pan sealing area, at bottom of oil seal case.

#### Installation

1) On 1.6L engines, install oil separator plate into oil seal case. Oil hole in oil separator plate should be located at bottom of oil seal case, toward oil pan sealing surface.

2) Install seal in oil seal case until it bottoms. On 1.5L engines, use Seal Installer (09231-21000 for Precis and MD998011 for all others). On 1.6L engines, use Seal Installer (MD998376). Install oil seal case with new gasket. To complete installation, reverse removal procedure.

## WATER PUMP

#### Removal

Drain cooling system. Disconnect battery. Remove necessary coolant hoses. Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Remove pump mounting bolts. Note bolt lengths and locations. Remove alternator brace and water pump.

#### Installation

To install, reverse removal procedure. Use new gasket and "O" ring. Install "O" ring onto coolant pipe, and apply water to "O" ring. DO NOT apply grease or oil to "O" ring. Install bolts into original locations.

## OIL PAN

#### Removal & Installation

Drain engine oil. Remove oil pan retaining bolts. Using Gasket Cutter (MD998727), cut gasket along sealing surface of cylinder block. Remove oil pan and gasket. To install, reverse removal procedure. Apply a .16" (4 mm) bead of sealant to groove areas in oil pan sealing surfaces before installing.

## OVERHAUL

### CYLINDER HEAD

#### Cylinder Head

Measure cylinder head warpage. Resurface cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article.

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#### Valve Springs

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

#### Valve Stem Oil Seals

Install seals, using valve seal installer to properly position oil seal. On 1.5L engines (except for Precis), use Valve Seal Installer (MD998760). On Precis, use Valve Seal Installer (MD998302). On 1.6L engines, use Valve Seal Installer (MD998737).

#### 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 at end of article.

2) If clearance exceeds service limit, valve guide can be replaced with an oversized valve guide. See OVERSIZED VALVE GUIDE SPECIFICATIONS table.

3) On Precis, remove valve guide from cylinder head, using Valve Guide Remover/Installer (09222-21200). On all other models, use commercial valve guide remover to remove valve guide. On all models, drive valve guide out toward combustion chamber side of cylinder head.

4) Note intake valve guides are shorter than exhaust valve guides. Using valve guide installer, press new valve guide into cylinder head from top. Install valve guide to proper height. Measure guide clearance of new valve guides. Ream valve guide as necessary. Reface valves and seats. See CYLINDER HEAD and OVERSIZED VALVE GUIDE SPECIFICATIONS tables.

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

#### OVERSIZED VALVE GUIDE SPECIFICATIONS (1)

Size Mark	Guide Size In. (mm)	Cylinder Head Bore In. (mm)
Precis		
5 .....	.002 (.05) .....	.4766-.4770 (12.105-12.115)
25 .....	.010 (.25) .....	.4844-.4848 (12.305-12.315)
50 .....	.020 (.50) .....	.4943-.4947 (12.555-12.565)
All Others		
5 .....	.002 (.05) .....	.4744-.4751 (12.050-12.070)
25 .....	.010 (.25) .....	.4823-.4830 (12.250-12.270)
50 .....	.020 (.50) .....	.4921-.4928 (12.500-12.520)

(1) - For installed valve guide height, see CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article.

#### Valve Seats

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1) To replace valve seats, cut valve seat to designated dimension. See Fig. 24. Machine cylinder head to proper dimension. See OVERSIZED VALVE SEAT SPECIFICATIONS table.

2) Heat cylinder head to 480°F (250°C). Press replacement seat into cylinder head. Ensure valve seat height is within specification. Cut valve seat to proper angle to obtain correct seat width.

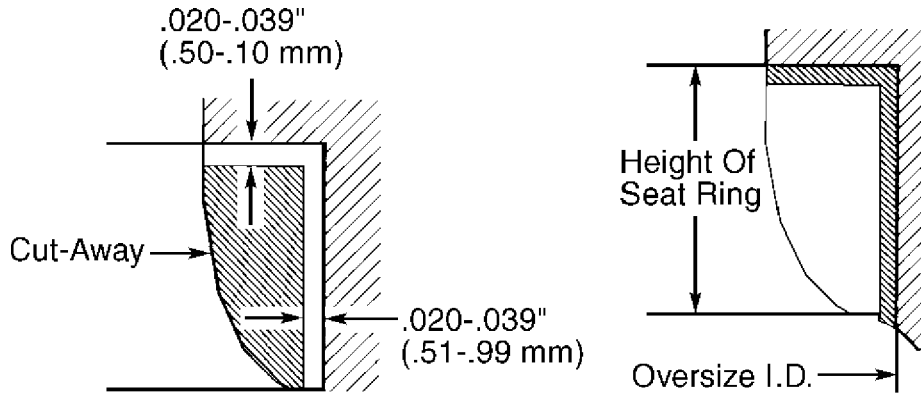


Fig. 24: Cutting Valve Seat & Measuring Installed Height  
Courtesy of Mitsubishi Motor Sales of America.

### Valves

Measure valve stem diameter and margin. Replace valve if measurements are not within specification. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS at end of article.

### OVERSIZED VALVE SEAT SPECIFICATIONS

Size Mark	Seat Size In. (mm)	Cyl. Head Bore In. (mm)	Seat Height In. (mm)
Precis			
Intake			
30	.012	1.429-1.430	.280
**	(.30)	(36.30-36.32)	(7.10)
60	.024	1.441-1.442	.291
**	(.60)	(36.60-36.63)	(7.40)
Exhaust			
30	.012	1.272-1.273	.295
**	(.30)	(32.38-32.33)	(7.49)
60	.024	1.283-1.285	.307
**	(.60)	(32.59-32.64)	(7.79)
1.5L Except Precis			
Intake			
Primary			
30	.012	1.079-1.080	.276-.283
**	(.30)	(27.42-27.44)	(7.00-7.19)
60	.024	1.091-1.092	.287-.295
**	(.60)	(27.72-27.74)	(7.29-7.49)



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Secondary					
30	.....	.012	.....	1.276-1.277	..... .276-.283
**	.....	(.30)	.....	(32.42-32.44)	... (7.01-7.19)
60	.....	.024	.....	1.288-1.289	..... .287-.295
**	.....	(.60)	.....	(32.72-32.74)	... (7.29-7.49)
Exhaust					
30	.....	.012	.....	1.394-1.395	..... .291-.299
**	.....	(.30)	.....	(35.42-35.44)	... (7.39-7.59)
60	.....	.024	.....	1.406-1.407	..... .303-.311
**	.....	(.60)	.....	(35.72-35.74)	... (7.70-7.90)
1.6L					
Intake					
30	.....	.012	.....	1.390-1.391	..... .311-.319
**	.....	(.30)	.....	(35.31-35.33)	... (7.90-8.10)
60	.....	.024	.....	1.402-1.403	..... .323-.331
**	.....	(.60)	.....	(35.60-35.64)	... (8.20-8.40)
Exhaust					
30	.....	.012	.....	1.311-1.312	..... .311-.319
**	.....	(.30)	.....	(32.30-33.32)	... (7.90-8.10)
60	.....	.024	.....	1.323-1.324	..... .323-.331
**	.....	(.60)	.....	(33.60-33.63)	... (8.20-8.40)

## VALVE TRAIN

### Rocker Arm Shaft Assembly (1.5L)

1) Note location of all components for reassembly reference. Remove bolts from shafts, and separate components. On Precis, note lengths of springs. Intake rocker arm springs are longer than exhaust rocker arm springs. On all others, springs are only on intake rocker arm shaft. On all models, inspect components for damage and wear.

2) To install components, reverse removal procedure. Install components into original locations. On Precis, rocker arms are marked "1" or "3" for odd cylinders and "2" or "4" for even cylinders. See Fig. 18 & 19. On all others, rocker arms are marked "A" to "D" for location. See Fig. 25. Ensure large chamfer on rocker arm bore is facing timing belt side of engine.

3) Tighten rocker arm assembly bolts to specification. See appropriate TORQUE SPECIFICATIONS table at end of article. Adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

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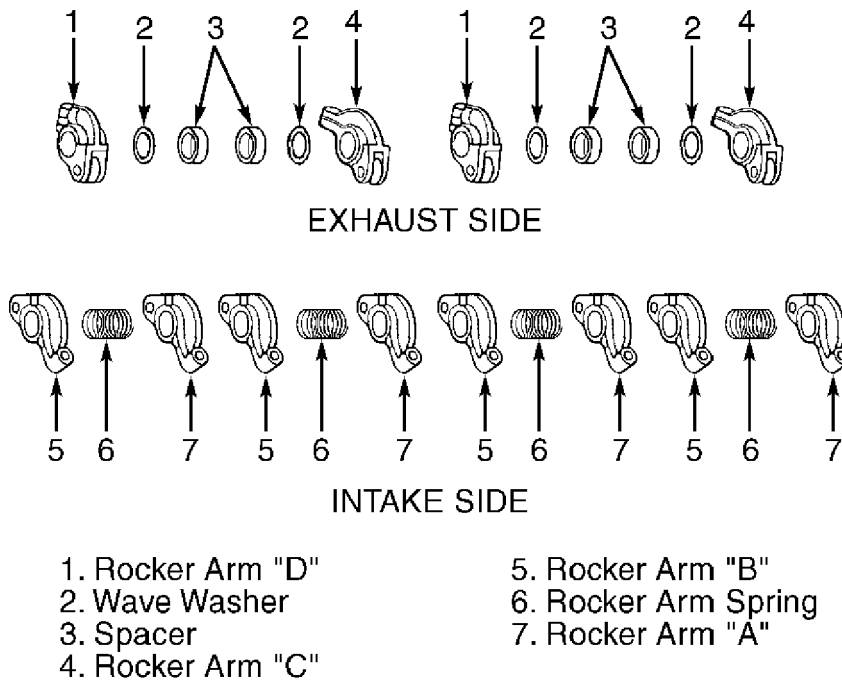
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Fig. 25: Identifying Rocker Arm Components (1.5L Except Precis)  
Courtesy of Chrysler Motors.

## 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 front mark on piston top 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 90-degree angle to piston pin. If piston diameter is not within specification, replace piston. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS at end of article.

2) Measure cylinder 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, rebore cylinder. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS at end of article.

3) If clearance between piston and cylinder bore clearance is not within specification, replace piston and/or machine cylinder bore. See PISTONS, PINS & RINGS table.

### Piston Rings

1) Using inverted piston, push new piston ring to bottom of cylinder bore. Measure piston ring end gap, using a feeler gauge. Repeat for each ring. See PISTONS, PINS & RINGS table under ENGINE

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SPECIFICATIONS at end of article.

2) Clean piston ring grooves thoroughly. Install piston rings with identification mark 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. Align piston ring end gaps properly on piston. See Fig. 26.

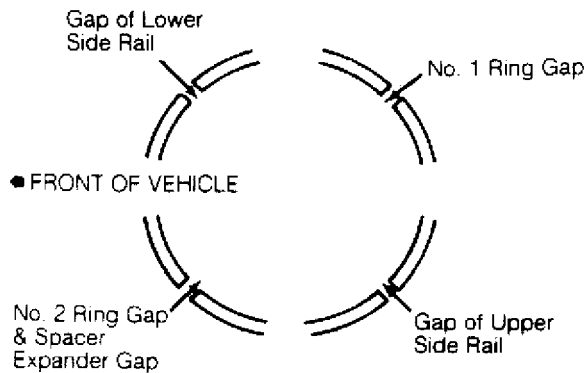


Fig. 26: Positioning Piston Ring Gaps  
Courtesy of Chrysler Motors.

#### Rod Bearings

1) Using Plastigage, measure rod bearing oil clearance. Tighten bearing cap nuts to 15 ft. lbs. (20 N.m), then an additional 1/4 turn. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS and CONNECTING RODS tables under ENGINE SPECIFICATIONS at end of article.

NOTE: Before installing connecting bearing caps, attempt to run nuts down bolts by hand. Replace bolt if nut does not run down smoothly for the entire length.

2) If oil clearance is incorrect, install a new bearing set and again measure oil clearance. If proper oil clearance cannot be obtained by using new bearings, replace crankshaft.

#### Crankshaft & Main Bearings

1) Measure diameters of main and connecting rod bearing journals. Measure journal taper and out-of-round. Measure crankshaft end play. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS at end of article. Replace crankshaft if measurements are not within specification.

2) Using Plastigage, measure main bearing oil clearance. Tighten bearing cap bolts to 37-41 ft. lbs. (50-55 N.m). See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS and CONNECTING RODS tables under ENGINE SPECIFICATIONS at end of article.

3) If oil clearance is incorrect, install a new bearing set and again measure oil clearance. Undersize bearings are available. If proper oil clearance cannot be obtained by using new bearings, replace crankshaft.

4) On 1.5L, install main bearing caps in numerical order,

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according to number stamped on cap. Install bearing caps so arrow on top of cap points toward timing belt end of engine. Tighten main bearing caps in 2 stages to specification, starting at center and working outward. See appropriate TORQUE SPECIFICATIONS table at end of article.

5 ) On 1.6L, install main bearing caps with arrow on top of cap pointing toward timing belt end of engine. "F" stamped on top of cap (next to arrow) indicates front main bearing cap; "R" indicates rear main bearing cap.

#### Thrust Bearing

Replace thrust bearing if crankshaft end play is not within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS at end of article.

#### Cylinder Block

1) Measure cylinder block deck warpage. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS at end of article. If warpage exceeds specification, machine surface. DO NOT remove more than a combined total of .008" (0.20 mm) material from cylinder head and cylinder block gasket 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, rebore cylinders and install oversize pistons. See CYLINDER BLOCK table.

## LUBRICATION

### ENGINE OILING

All 1.5L engines use a crankshaft-driven oil pump located in front cover. See Fig. 27. Oil supply for rocker arms is delivered from oil filter through passage to rear of engine to rear camshaft journal (except on Precis). On Precis, rocker arms are supplied from oil passage delivering oil to center camshaft journal.

1.6L engine uses a timing belt-driven oil pump mounted in front cover. See Fig. 28. Oil is delivered to hydraulic lifters from oil passage at rear of engine.

Pressure relief valve is nonadjustable, and located in front cover (1.5L) or in oil filter bracket (1.6L). See OIL PUMP & FRONT COVER.

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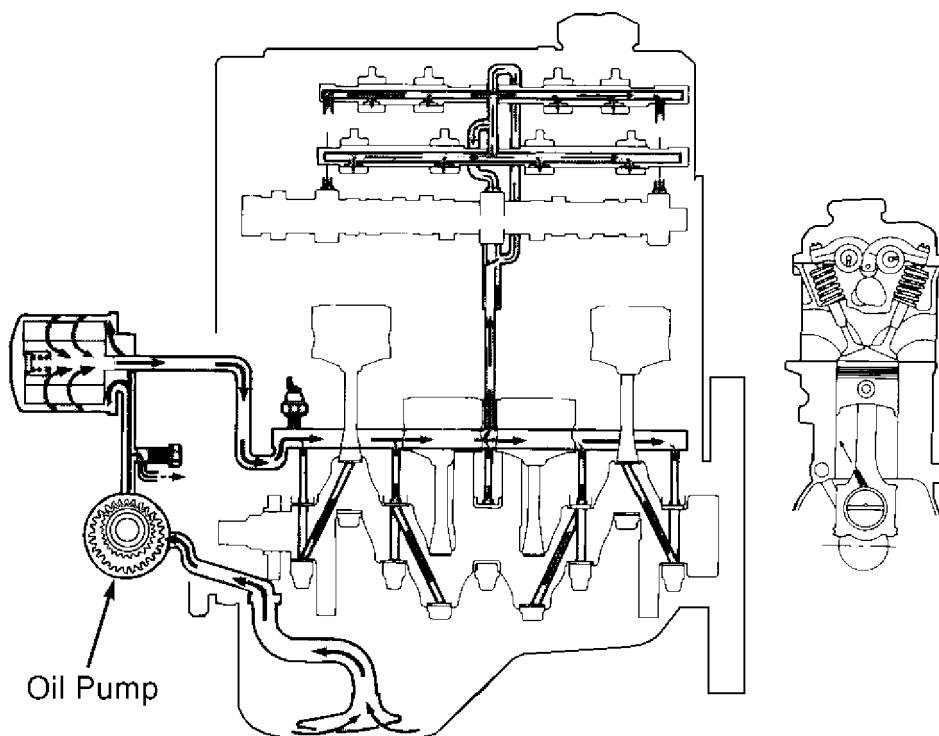
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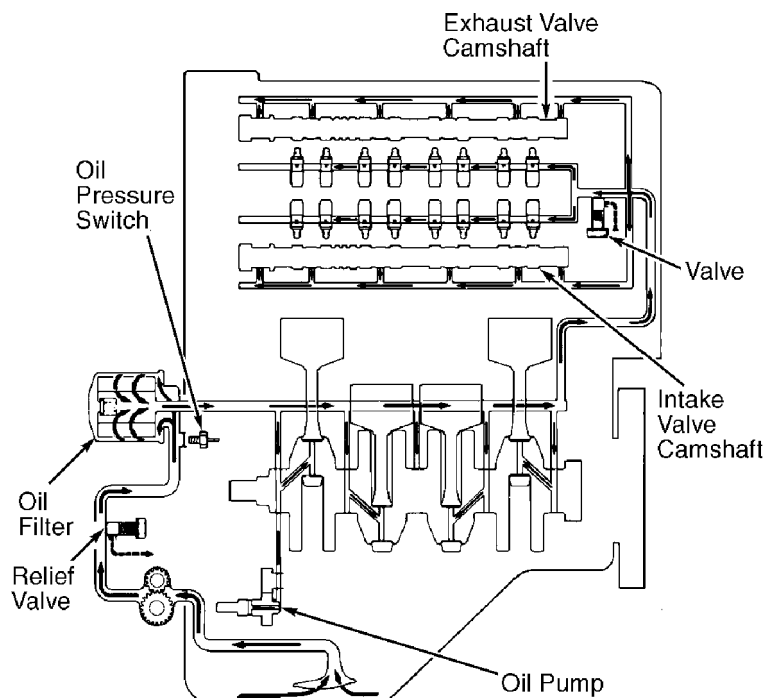
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90B08799

Fig. 27: Engine Oiling System (Precis Shown; Other 1.5L Are Similar)  
Courtesy of Mitsubishi Motor Sales of America.



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Fig. 28: Engine Oiling System (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Crankcase Capacity

See CRANKCASE CAPACITY table.

#### CRANKCASE CAPACITY

Application	(1) Qts. (L)
1.5L .....	3.6 (3.4)
1.6L .....	4.6 (4.4)

(1) - Capacities listed include oil filter change.

Oil Pressure

At curb idle and with oil temperature 167-194°F (75-90°C), normal oil pressure should be at least 11 psi (.77 kg/cm<sup>2</sup>).

#### OIL PUMP & FRONT COVER

Removal (1.5L)

Remove timing belt and crankshaft sprocket. See TIMING BELT under REMOVAL & INSTALLATION. Remove oil filter and oil pressure switch. Remove oil pan, oil screen, and oil filter bracket. Remove front cover and oil pump assembly.

Disassembly & Inspection

1) Remove gear cover. Note and mark direction of installed gear for reassembly reference, using felt pen.

2) Measure clearance between outer gear and cover. Measure clearance between inner gear tip and outer gear (except Precis). On Precis, measure clearance between crescent and gears.

3) On all models, place straightedge across front cover housing. Measure gear end play clearance between each gear and straightedge.

4) Inspect pressure relief valve for freedom of movement in bore. Measure spring tension and free length of relief valve spring. Replace components if not within specifications. See OIL PUMP SPECIFICATIONS table. Inspect oil pan for cracks or damage. Inspect oil screen for clogging.

#### OIL PUMP SPECIFICATIONS

Application	In. (mm)
Precis	
Gear End Play .....	.0016-.0039 (.040-.100)
Inner Gear-To-Crescent .....	.0083-.0126 (.210-.320)
Outer Gear-To-Case .....	.0039-.0079 (.100-.200)
Outer Gear-To-Crescent .....	.0087-.0134 (.220-.340)
Relief Valve Spring	
Free Length .....	1.850 (47.00)
Spring Pressure (1) .....	13.4 @ 1.579 (6.1 @ 40.10)

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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#### 1.5L Except Precis

Gear End Play	.....	(2)	.0016-.0039	(.040-.100)
Inner Gear-To-Outer Gear	Tip	.....	(3)	.0024-.0071 (.060-.180)
Outer Gear-To-Case	.....	(3)	.0039-.0071	(.100-.180)
Relief Valve Spring	Free Length	.....	1.835	(46.60)
	Spring Pressure (1)	.....	13 @ 1.579	(6 @ 40.10)

#### 1.6L

Gear End Play	Drive Gear	.....	(4)	.0031-.0055 (.080-.140)
	Driven Gear	.....	(4)	.0024-.0047 (.060-.120)
Gear Tip-To-Body Clearance	Drive Gear	.....	(4)	.0063-.0083 (.160-.210)
	Driven Gear	.....	(4)	.0051-.0071 (.130-.180)
Relief Valve Spring	Free Length	.....	1.835	(46.60)
	Spring Pressure (1)	.....	13.4 @ 1.579	(6.1 @ 40.10)

(1) - Lbs. @ In. (kg @ mm).

(2) - Wear limit is .0079" (.200 mm).

(3) - Wear limit is .0138" (.350 mm).

(4) - Wear limit is .0098" (.250 mm).

#### Reassembly & Installation

1) Lubricate all components with engine oil. Assemble all components into housing in original locations.

2) Install front cover with new gasket. Install front cover bolts in appropriate locations. See Fig. 29. Tighten to specifications. See appropriate TORQUE SPECIFICATIONS table. Coat outer surface of Seal Guide (MD998285 for Precis and MD998305 for all other models). Install seal guide over end of crankshaft.

3) Slide seal into front cover. Using Seal Installer (MD998375 for Precis and MD998304 for all others), install front seal in front cover. To complete installation, reverse removal procedure.

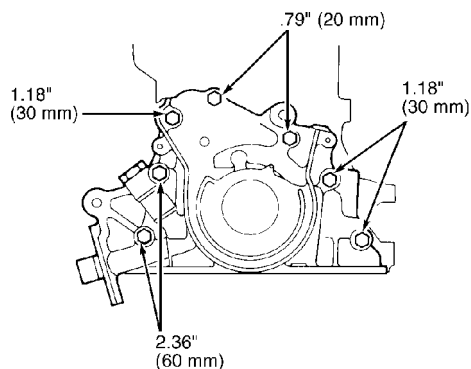


Fig. 29: Installing Front Cover Bolts (1.5L)  
Courtesy of Chrysler Motors.

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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#### Removal (1.6L)

Remove timing belt and crankshaft sprocket. See TIMING BELT under REMOVAL & INSTALLATION. Remove oil filter and oil pressure switch. Remove oil pan, oil screen, and oil filter bracket. Remove front cover and oil pump assembly. Using Plug Cap Wrench (MD998162), remove plug cap.

#### Disassembly & Inspection

1) Measure clearance between tip of gear teeth and front cover. Place straightedge across front cover housing. Measure gear end play clearance between each gear and straightedge.

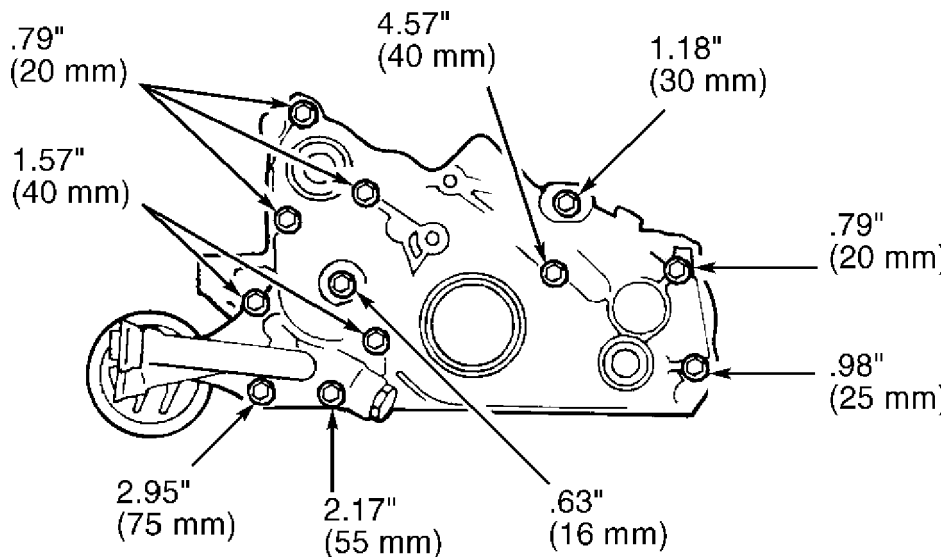
2) Inspect pressure relief valve for freedom of movement in bore. Measure spring tension and free length of relief valve spring. Replace components if not within specifications. See OIL PUMP SPECIFICATIONS table. Inspect oil pan for cracks or damage. Inspect oil screen for clogging.

#### Reassembly & Installation

1) Ensure timing marks are aligned on gears. Install gear cover. Use Seal Installer (MD998375) to install seal in front cover. Coat outer surface of Seal Guide (MD998285) with oil, and install over end of crankshaft.

2) Install front cover with new gasket. Install oil filter bracket. Install proper length front cover bolts in appropriate locations. See Fig. 30. Tighten to specification. See TORQUE SPECIFICATIONS (1.6L) table.

3) Using plug cap wrench, install plug cap. Tighten to specification. To complete installation, reverse removal procedure.



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Fig. 30: Installing Front Cover Bolts (1.6L)  
Courtesy of Mitsubishi Motor Sales of America.

#### TORQUE SPECIFICATIONS



# 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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### 1.5L EXCEPT PRECIS

#### TORQUE SPECIFICATIONS (1.5L EXCEPT PRECIS) TABLE

Application	Ft. Lbs. (N.m)
Camshaft Sprocket Bolt .....	52-74 (70-100)
Connecting Rod Cap Bolt .....	(1)
Crankshaft Pulley Bolt .....	10-11 (14-15)
Crankshaft Sprocket Bolt .....	52-74(100)
Cylinder Head Bolt .....	52-55 (70-75)
Drive Plate-To-Crankshaft Bolt .....	96-103 (130-140)
Exhaust Manifold-To-Engine Bolt .....	11-14 (15-20)
Exhaust Pipe-To-Manifold Bolt .....	29-37 (40-50)
Flywheel-To-Crankshaft Bolt .....	96-103 (130-140)
Intake Manifold Bolt .....	11-15 (15-20)
Intake Manifold Brace Bolt .....	13-18 (18-25)
Main Bearing Cap Bolt .....	37-41 (50-55)
Oil Pressure Switch .....	11-16 (15-22)
Oil Pump Relief Valve Plug .....	29-37 (40-50)
Oil Screen Bolt .....	11-16 (15-22)
Rocker Arm Adjuster Lock Nut .....	10-13 (14-18)
Rocker Arm Shaft Bolt .....	21-25 (28-34)
Throttle Body-To-Intake Manifold Bolt .....	11-16 (15-22)
Timing Belt Tensioner Bolt .....	14-20 (19-27)
Torque Converter-To-Drive Plate Bolt .....	34-38 (46-52)

INCH Lbs. (N.m)

Fuel Rail Bolt .....	84-108 (9-12)
Front Cover Bolt .....	84-132 (9-15)
Oil Pan Bolt .....	48-72 (5-8)
Oil Pump Cover Bolt .....	72-84 (8-9)
Rocker Cover Bolt .....	13-17 (1.5-1.9)
Timing Belt Cover Bolt .....	84-108 (9-12)
Water Pump Pulley Bolt .....	72-84 (8-9)

(1) - First tighten to 15 ft. lbs. (20 N.m), then tighten nut an additional 1/4 turn.

### 1.5L PRECIS

#### TORQUE SPECIFICATIONS (1.5L PRECIS) TABLE

Application	Ft. Lbs. (N.m)
Camshaft Sprocket Bolt .....	48-55 (65-75)
Camshaft Thrust Case Bolt .....	14-20 (19-27)
Connecting Rod Cap Nut .....	24-26 (32-35)
Crankshaft Sprocket Bolt .....	52-74 (70-100)
Cylinder Head Bolt (1)	

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Cold Engine .....	52-55 (70-75)
Hot Engine .....	59-63 (80-85)
Drive Plate Bolt (A/T) .....	96-103 (130-140)
Exhaust Manifold Nut .....	11-15 (15-20)
Flywheel Bolt (M/T) .....	96-103 (130-140)
Front Cover Bolt .....	10-11 (14-15)
Intake Manifold Nut .....	11-15 (15-20)
Main Bearing Cap Bolt .....	37-40 (50-54)
Rocker Arm Shaft Bolt .....	15-20 (20-27)
Timing Belt Tensioner Bolt .....	15-20 (20-27)

INCH Lbs. (N.m)

Camshaft Rear Cover Bolt .....	70-86 (7-10)
Rocker Cover Bolt .....	13-18 (1.5-2.0)
Timing Belt Cover Bolt .....	86-104 (10-12)

(1) - Tighten in sequence. See Fig. 5.

## 1.6L

### TORQUE SPECIFICATIONS (1.6L) TABLE

Application	Ft. Lbs. (N.m)
Automatic Tensioner Bolt .....	15-20 (20-27)
Camshaft Bearing Cap Bolt (1) .....	14-15 (19-20)
Camshaft Sprocket Bolt .....	59-74 (80-100)
Connecting Rod Cap Bolt .....	37-39 (50-53)
Crankshaft Pulley Bolt .....	14-22 (19-30)
Crankshaft Sprocket Bolt .....	81-96 (110-130)
Cylinder Head Bolt (2) .....	66-74 (90-100)
Drive Plate-To-Crankshaft Bolt .....	96-103 (130-140)
Exhaust Manifold-To-Engine Bolt .....	18-22 (24-30)
Exhaust Pipe-To-Manifold Bolt .....	29-37 (40-50)
Flywheel-To-Crankshaft Bolt .....	96-103 (130-140)
Front Cover Bolt	
8 x 30-mm Bolt .....	20-26 (27-35)
Except 8 x 30-mm Bolt .....	15-20 (20-27)
Idler Pulley Bolt .....	26-29 (35-40)
Intake Manifold Bolt	
8-mm Bolt .....	11-15 (15-20)
10-mm Bolt/Nut .....	22-29 (30-40)
Main Bearing Cap Bolt .....	37-41 (50-55)
Oil Filter Bracket Bolt .....	11-16 (15-22)
Oil Pump Cover Bolt .....	11-13 (15-18)
Oil Pump Driven Gear Bolt .....	26-29 (35-40)
Oil Pump Relief Valve Plug .....	29-37 (40-50)
Oil Pump Sprocket Bolt .....	37-44 (50-60)
Oil Screen Bolt .....	11-16 (15-22)
Tensioner Plug Cap .....	14-20 (19-27)

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Tensioner Pulley Bracket Bolt .....	17-20 (23-27)
Tensioner Pulley Center Bolt .....	31-40 (42-54)
Throttle Body-To-Intake Manifold Bolt .....	11-16 (15-22)
Torque Converter-To-Drive Plate Bolt .....	34-38 (46-52)

INCH Lbs. (N.m)

Oil Pan Bolt .....	48-72 (5-8)
Rear Oil Seal Case Bolt .....	84-108 (9-12)
Rocker Cover Bolt .....	24-36 (2-4)
Timing Belt Cover Bolt	
Left Lower Rear Cover Bolt .....	(3)
Except Left Lower Rear Cover Bolt .....	84-108 (9-12)

- (1) - Tighten in sequence. See Fig. 22.  
(2) - Tighten in sequence with engine cold. See Fig. 7.  
(3) - Tighten to 22-29 ft. lbs. (30-40 N.m).

## ENGINE SPECIFICATIONS

### GENERAL ENGINE SPECIFICATIONS

#### GENERAL SPECIFICATIONS TABLE

Application	In. (mm)
1.5L	
Displacement .....	89.6 Cu. In. (1.5L)
Bore .....	2.97 (75.5)
Stroke .....	3.23 (82.0)
Compression Ratio .....	9.4:1
Fuel System .....	PFI
Horsepower @ RPM	
Except Precis .....	92 @ 6000
Precis .....	81 @ 5500
Torque Ft. Lbs. @ RPM	
Except Precis .....	93 @ 3000
Precis .....	91 @ 3000
1.6L	
Displacement .....	97 Cu. In. (1.6L)
Bore .....	3.24 (82.3)
Stroke .....	2.95 (75.0)
Compression Ratio .....	9.2:1
Fuel System .....	PFI
Horsepower @ RPM .....	123 @ 6500
Torque Ft. Lbs. @ RPM .....	101 @ 5000

## CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS SPECIFICATIONS

#### CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS TABLE

# 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Application	In. (mm)
1.5L (Precis)	
Crankshaft End Play	
Standard	.002-.007 (.05-.18)
Service Limit	.010 (.25)
Main Bearings	
Journal Diameter	1.8898 (48.00)
Journal Out-Of-Round	.0004 (.010) Maximum
Journal Taper	.0004 (.010) Maximum
Oil Clearance	.0008-.0028 (.020-.070)
Connecting Rod Bearings	
Journal Diameter	1.6535 (42.000)
Journal Out-Of-Round	.0004 (.010) Maximum
Journal Taper	.0004 (.010) Maximum
Oil Clearance	.0006-.0017 (.015-.045)
1.5L (Except Precis)	
Crankshaft End Play	
Standard	.002-.007 (.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-.0028 (.020-.070)
Service Limit	.0059 (.150)
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-.0024 (.020-.060)
Service Limit	.0059 (.150)
1.6L	
Crankshaft End Play	
Standard	.002-.007 (.05-.18)
Service Limit	.010 (.25)
Main Bearings	
Journal Diameter	2.2441 (57.000)
Journal Out-Of-Round	.0006 (.015)
Journal Taper	.0002 (.005)
Oil Clearance	
Standard	.0008-.0020 (.020-.050)
Service Limit	.004 (.10)
Connecting Rod Bearings	
Journal Diameter	1.7717 (45.000)
Journal Out-Of-Round	.0006 (.015)
Journal Taper	.0002 (.005)
Oil Clearance	
Standard	.0008-.0020 (.020-.050)

# 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Service Limit ..... .004 (.10)

### CONNECTING RODS SPECIFICATIONS

#### CONNECTING RODS TABLE

Application	In. (mm)
Maximum Bend .....	.002 (.05)
Maximum Twist .....	.004 (.10)
Side Play	
Standard .....	.004-.010 (.10-.25)
Service Limit .....	.016 (.40)

### PISTONS, PINS (1) & RINGS SPECIFICATIONS

#### PISTONS, PINS (1) & RINGS TABLE

Application	In. (mm)
1.5L	
Pistons	
Clearance .....	.0008-.0016 (.020-.040)
Diameter (2) .....	2.9713-2.9724 (75.470-75.500)
Rings	
No. 1	
End Gap	
Standard .....	.008-.014 (.20-.35)
Service Limit .....	.031 (.80)
Side Clearance	
Standard .....	.0012-.0028 (.030-.070)
Service Limit	
Except Precis .....	.004 (.10)
Precis .....	.006 (.15)
No. 2	
End Gap	
Standard .....	.008-.014 (.20-.35)
Service Limit .....	.031 (.80)
Side Clearance	
Standard .....	.0008-.0024 (.020-.060)
Service Limit	
Except Precis .....	.004 (.10)
Precis .....	.005 (.13)
No. 3 (Oil)	
End Gap	
Standard .....	.008-.028 (.20-.70)
Service Limit .....	.040 (1.00)
1.6L	
Pistons	
Clearance .....	.0008-.0016 (.020-.040)

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Diameter (2)	.....	3.2390-3.2402	(82.270-82.300)
Rings			
No. 1			
End Gap			
Standard	.....	.010-.016	(.25-.40)
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	.....	.0012-.0028	(.030-.070)
Service Limit	.....	.004	(.10)
No. 3 (Oil)			
End Gap			
Standard	.....	.008-.028	(.20-.70)
Service Limit	.....	.040	(1.00)

(1) - Pin specifications are not available.

(2) - Diameter is measured at specified location and at 90° angle to piston pin. See CYLINDER BLOCK ASSEMBLY under OVERHAUL.

---

## CYLINDER BLOCK SPECIFICATIONS

### CYLINDER BLOCK TABLE

Application	In. (mm)
1.5L	
Cylinder Bore	
Standard Diameter	..... 2.9724-2.9736 (75.500-75.530)
Maximum Taper	..... .0008 (.020)
Maximum Out-Of-Round	..... .0008 (.020)
Minimum Deck Height	..... (1) 10.067 (255.70)
Maximum Deck Warpage	..... (1) .002 (.05)
1.6L	
Cylinder Bore	
Standard Diameter	..... 3.2402-3.2413 (82.300-82.330)
Maximum Taper	..... .0004 (.010)
Maximum Out-Of-Round	..... .0004 (.010)
Minimum Deck Height	..... (1) 10.067 (255.70)
Maximum Deck Warpage	..... (1) .002 (.05)

(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.

**1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]****Article Text (p. 39)**

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**VALVES & VALVE SPRINGS SPECIFICATIONS (1.5L)****VALVES & VALVE SPRINGS (1.5L) TABLE**

Application	In. (mm)
Intake Valves	
Face Angle .....	45°
Minimum Margin	
Standard .....	.040 (1.00)
Service Limit	
Except Precis .....	.020 (.50)
Precis .....	.028 (.70)
Stem Diameter	
Except Precis .....	.259 (6.58)
Precis .....	.260 (6.60)
Exhaust Valves	
Face Angle .....	45°
Minimum Margin	
Standard .....	.059 (1.50)
Service Limit .....	.040 (1.00)
Stem Diameter	
Except Precis .....	.258 (6.55)
Precis .....	.260 (6.60)
Valve Springs	
Free Length	
Except Precis	
Intake	
Standard .....	1.815 (46.10)
Service Limit .....	1.776 (45.10)
Exhaust	
Standard .....	1.843 (46.80)
Service Limit .....	1.803 (45.80)
Precis	
Standard .....	1.756 (44.60)
Service Limit .....	1.717 (43.60)
Installed Height	
Except Precis .....	(1)
Precis	
Standard .....	1.42 (36.0)
Service Limit .....	1.46 (37.0)
Out-Of-Square	
Except Precis	
Standard .....	2°
Service Limit .....	4°
Precis	
Standard .....	1.5°
Service Limit .....	3°

(1) - Information is not available from manufacturer.

## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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### VALVES & VALVE SPRINGS SPECIFICATIONS (1.6L)

#### VALVES & VALVE SPRINGS (1.6L) TABLE

Application	In. (mm)
Intake Valves	
Face Angle .....	45°
Minimum Margin	
Standard .....	.040 (1.00)
Service Limit .....	.028 (.70)
Stem Diameter .....	.259 (6.58)
Exhaust Valves	
Face Angle .....	45°
Minimum Margin	
Standard .....	.059 (1.50)
Service Limit .....	.040 (1.00)
Stem Diameter .....	.257-.258 (6.53-6.55)
Valve Springs	
Free Length	
Standard .....	1.90 (48.3)
Service Limit .....	1.86 (47.2)
Out-Of-Square	
Standard .....	1.5°
Service Limit .....	4.0°

(1) - Information is not available from manufacturer.

### CYLINDER HEAD SPECIFICATIONS

#### CYLINDER HEAD TABLE

Application	In. (mm)
1.5L (Except Precis)	
Cylinder Head Height .....	4.209-4.217 (106.90-107.10)
Maximum Warpage .....	(1) .002 (.05)
Valve Seats	
Intake Valve	
Seat Angle .....	44°
Seat Width .....	.035-.051 (.90-1.30)
Exhaust Valve	
Seat Angle .....	44°
Seat Width .....	.035-.051 (.90-1.30)
Valve Guides	
Valve Guide Installed Height .....	.670 (17.00)
Intake Valve	
Valve Stem-To-Guide Oil Clearance	
Standard .....	.0008-.0020 (.020-.050)



## 1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]

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Service Limit	.....	.004	(.10)
Exhaust Valve			
Valve Stem-To-Guide Oil Clearance			
Standard	.....	.0020-.0035	(.050-.090)
Service Limit	.....	.0059	(.150)
1.5L (Precis)			
Maximum Warp	.....	(1) .002	(.05)
Valve Seats			
Intake Valve			
Seat Angle	.....		45°
Seat Width	.....	.035-.051	(.90-1.30)
Exhaust Valve			
Seat Angle	.....		45°
Seat Width	.....	.035-.051	(.90-1.30)
Valve Guides			
Valve Guide Installed Height	...	.539-.563	(13.7-14.3)
Intake Valve			
Valve Stem-To-Guide Oil Clearance			
Standard	.....	.0012-.0024	(.030-.060)
Service Limit	.....	.004	(.10)
Exhaust Valve			
Valve Stem-To-Guide Oil Clearance			
Standard	.....	.0020-.0035	(.050-.090)
Service Limit	.....	.0059	(.150)
1.6L			
Minimum Cylinder Head Height	.....	5.1929	(131.90)
Maximum Warp	.....	(1) .002	(.05)
Valve Seats			
Intake Valve			
Seat Angle	.....		44°
Seat Width	.....	.035-.051	(.90-1.30)
Exhaust Valve			
Seat Angle	.....		44°
Seat Width	.....	.035-.051	(.90-1.30)
Valve Guides			
Valve Guide Installed Height	.....	.768	(19.5)
Intake Valve			
Valve Stem-To-Guide Oil Clearance			
Standard	.....	.0008-.0019	(.020-.047)
Service Limit	.....	.004	(.10)
Exhaust Valve			
Valve Stem-To-Guide Oil Clearance			
Standard	.....	.0020-.0033	(.050-.085)
Service Limit	.....	.0059	(.150)

(1) - If deck warp 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.

**1.5L 4-CYL - VINS [A,J,X] & 1.6L 4-CYL - VIN [Y]****Article Text (p. 42)**

1992 Mitsubishi Mirage

For a a a a

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Monday, April 01, 2002 10:09AM

**CAMSHAFT TABLE**

Application	In. (mm)
1.5L	
End Play	
Except Precis	(1)
Precis	
Standard	.002-.008 (.05-.20)
Service Limit	.016 (.40)
Journal Diameter	
Except Precis	1.020 (25.90)
Precis	(1)
Lobe Height	
Except Precis	
Intake	
Standard	1.3858 (35.200)
Service Limit	1.3661 (34.700)
Exhaust	
Standard	1.3743 (34.907)
Service Limit	1.3546 (34.407)
Precis	
Intake	
Standard	1.5318 (38.908)
Service Limit	1.5118 (38.400)
Exhaust	
Standard	1.5344 (38.975)
Service Limit	1.5144 (38.465)
Oil Clearance	
Except Precis	
Standard	.0024-.0039 (.060-.0990)
Service Limit	.0055 (.140)
Precis	(1)
1.6L	
End Play	.004-.008 (.10-.20)
Journal Diameter	1.0236 (26.000)
Lobe Height	
Intake	
Standard	1.3858 (35.200)
Service Limit	1.3661 (34.700)
Exhaust	
Standard	1.3743 (34.907)
Service Limit	1.3546 (34.407)
Oil Clearance	.0020-.0035 (.050-.090)

(1) - Information is not available from manufacturer.

**END OF ARTICLE**