

2.4L 4-CYL VIN [G]

1998 Mitsubishi Galant

1997-98 ENGINES
Mitsubishi 2.4L 4-Cylinder
Eclipse Spyder GS, Galant

* PLEASE READ THIS FIRST *

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

ENGINE IDENTIFICATION

Vehicle Identification Number (VIN) is stamped on a metal plate located at upper left corner of instrument panel, near windshield. The eighth character of VIN identifies engine, and tenth character identifies model year ("V" for 1997; "W" for 1998). Engine model code and serial number are stamped on right front side of cylinder block.

ENGINE IDENTIFICATION CODES

Application	Engine Model	Engine Code
SOHC (16-Valve)	4G64	G

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

Hydraulic lash adjusters are used. Valve adjustment is not required.

REMOVAL & INSTALLATION

* PLEASE READ THIS FIRST *

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 connector near fuel tank. Start engine, and allow to idle until engine stalls. Turn ignition off. Reconnect fuel pump connector. Disconnect negative battery cable before disconnecting fuel lines.

ENGINE

CAUTION: To prevent fire hazard, release residual pressure in fuel system before disconnecting fuel lines.

Removal

1) Drain cooling system. Remove hood. Release fuel pressure from fuel system. See FUEL PRESSURE RELEASE.

2) Drain engine oil and transaxle oil. Remove transaxle. On M/T models, see CLUTCH article in the POWERTRAIN category. On A/T models, see TRANSMISSION REMOVAL & INSTALLATION - A/T article in AUTOMATIC TRANSMISSION SERVICING.

3) On all models, remove radiator and cooling fan assembly. Disconnect all necessary electrical connectors, vacuum hoses, fuel hoses and cables. Leaving hoses connected, remove power steering pump and A/C compressor, and support aside.

4) Disconnect exhaust pipe from exhaust manifold. Using lifting device, support weight of engine. Remove upper engine mount bracket assembly. Raise engine slightly. Ensure all cables, hoses and electrical harnesses are disconnected from engine. Lift engine upward from engine compartment.

Installation

To install, reverse removal procedure. Ensure all hoses and wires are cleared when lowering engine assembly into engine compartment. Perform final tightening of mounting bolts and nuts with weight of engine on insulators. See TORQUE SPECIFICATIONS. Refill all fluids, and adjust all cables and linkages.

INTAKE MANIFOLD

Removal

1) Release fuel pressure from fuel system. See FUEL PRESSURE RELEASE. Disconnect negative battery cable. Disconnect air intake hose from air intake pipe.

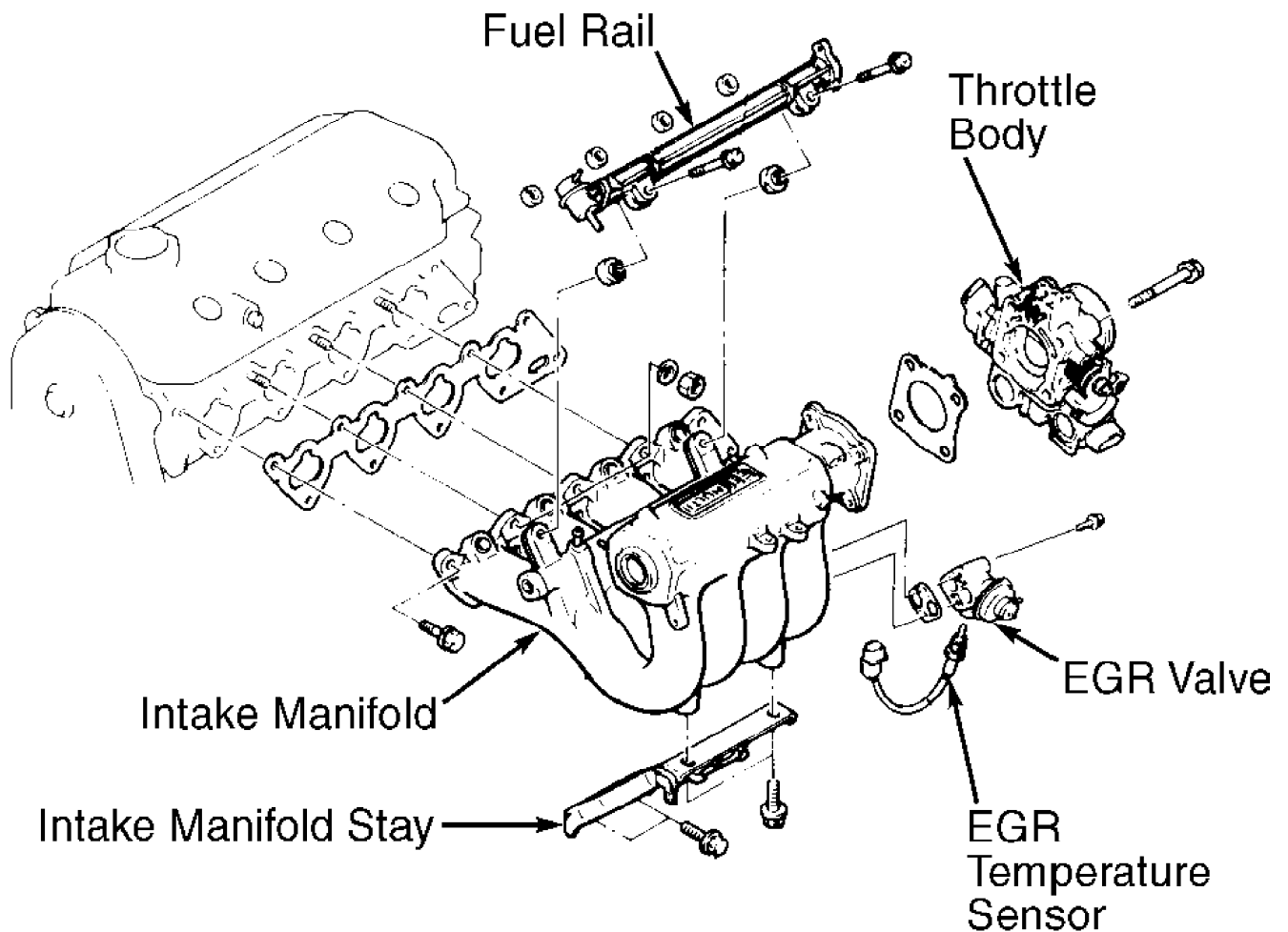
2) Drain cooling system. Disconnect all necessary electrical connectors, vacuum hoses, coolant hoses, fuel hoses and cables from intake manifold, injectors and throttle body. See Fig. 1.

3) Remove air intake pipe and throttle body. Remove air intake plenum from intake manifold. Remove fuel delivery pipe with fuel injectors and pressure regulator attached. DO NOT allow fuel injectors to fall from delivery pipe during removal.

4) Remove intake manifold-to-cylinder block support brace. Remove intake manifold-to-cylinder head bolts. Remove intake manifold and gasket. If necessary, remove remaining components from intake manifold.

Installation

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



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Fig. 1: Exploded View Of Intake Manifold & Related Components
 Courtesy of Mitsubishi Motor Sales of America.

EXHAUST MANIFOLD

Removal

Remove exhaust manifold heat shield. Disconnect exhaust pipe and gasket from manifold. Remove oxygen sensor. Remove exhaust manifold.

Installation

To install, reverse removal procedure. Use NEW gaskets and exhaust pipe-to-manifold nuts.

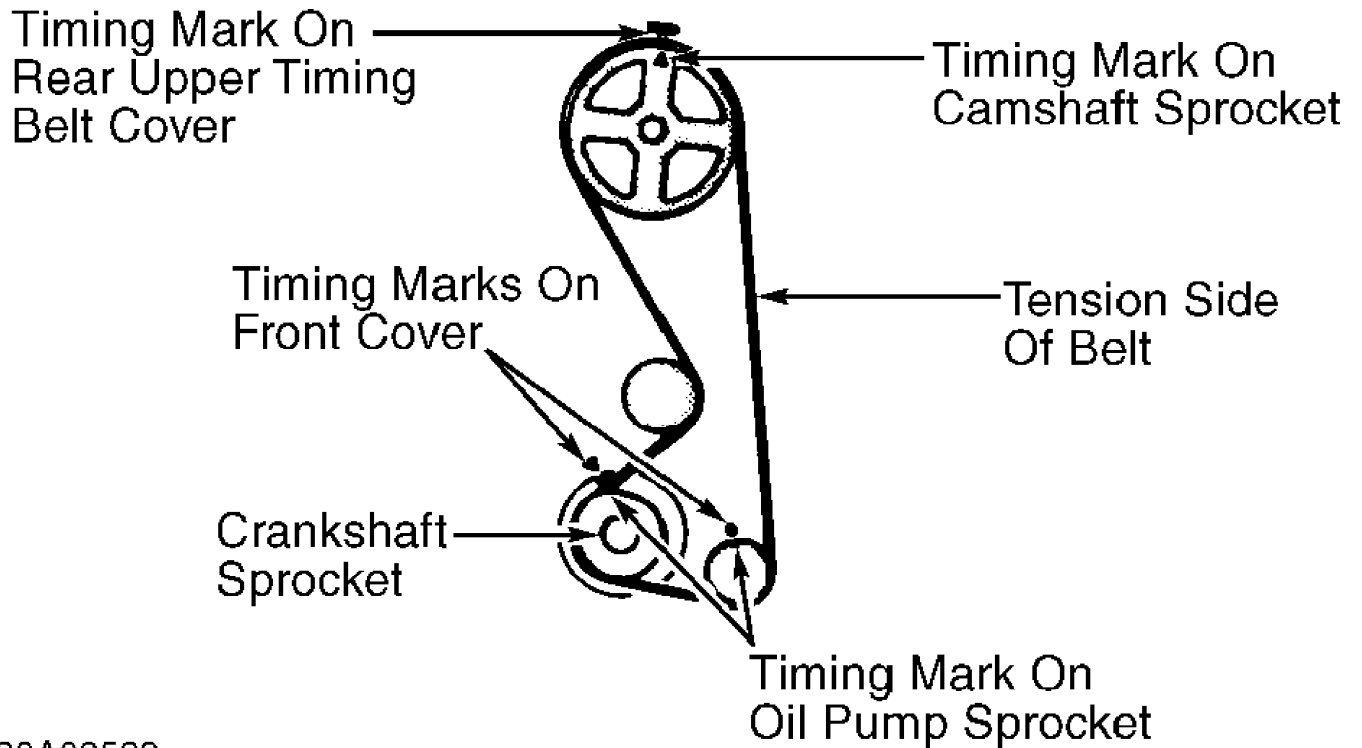
CYLINDER HEAD

Removal

- 1) Release fuel pressure from fuel system. See FUEL PRESSURE RELEASE.
- 2) Drain cooling system. Drain engine oil. Remove air intake hose and pipe from top of rocker cover. Disconnect all necessary electrical connectors, vacuum hoses, coolant hoses, fuel hoses and cables.
- 3) Remove power steering and A/C pumps (with hoses connected if possible), and support aside. Disconnect exhaust pipe from exhaust

manifold. Remove upper front timing belt cover.

4) Turn crankshaft to TDC of compression stroke on cylinder No. 1 by aligning mark on cylinder head with mark on camshaft sprocket. See Fig. 2. Remove rocker cover.

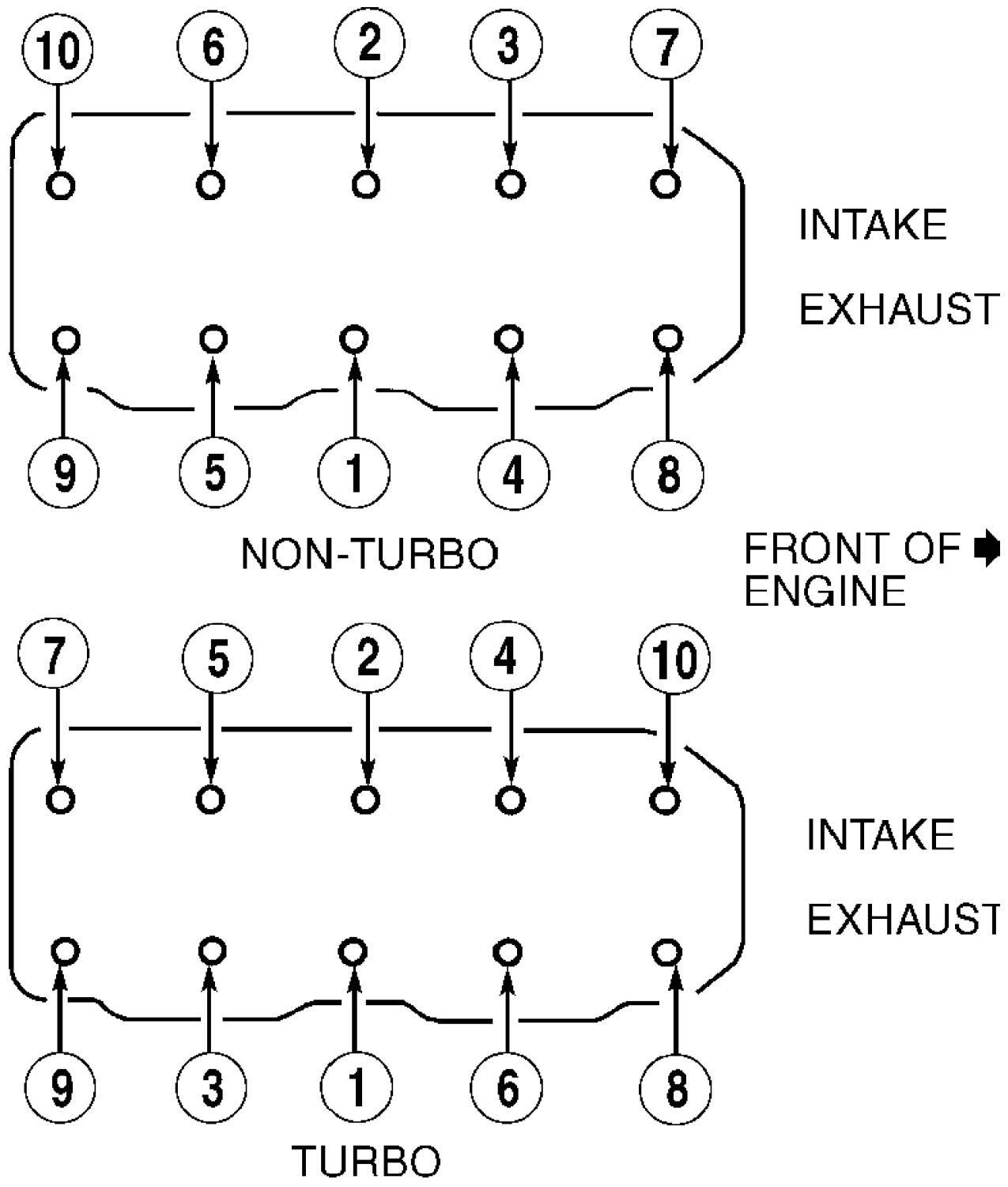


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Fig. 2: Aligning Front Timing Belt
Courtesy of Mitsubishi Motor Sales of America.

5) Remove distributor cap. Mark rotor-to-distributor position. Mark distributor-to-cylinder head position. Remove distributor. Mark timing belt in alignment with timing mark on camshaft sprocket. Secure timing belt to camshaft sprocket with plastic tie-wraps to maintain correct position. Remove camshaft sprocket bolt.

6) Slide camshaft sprocket (with belt attached) off camshaft. DO NOT turn crankshaft. Loosen cylinder head bolts in 2-3 steps, in proper sequence. See Fig. 3. Remove cylinder head and gasket.



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Fig. 3: Cylinder Head Bolt Removal & Installation Sequence
 Courtesy of Mitsubishi Motor Sales of America.

Inspection
 Inspect cylinder head for warpage at deck surface. Resurface

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

Installation

1) Install cylinder head using NEW gasket. Ensure identification mark at timing belt end of gasket faces upward. DO NOT apply sealant to head gasket. Apply engine oil to cylinder head bolt threads and washers. Install and tighten cylinder head bolts in 2-3 steps, to specification in proper sequence. See Fig. 3. See TORQUE SPECIFICATIONS.

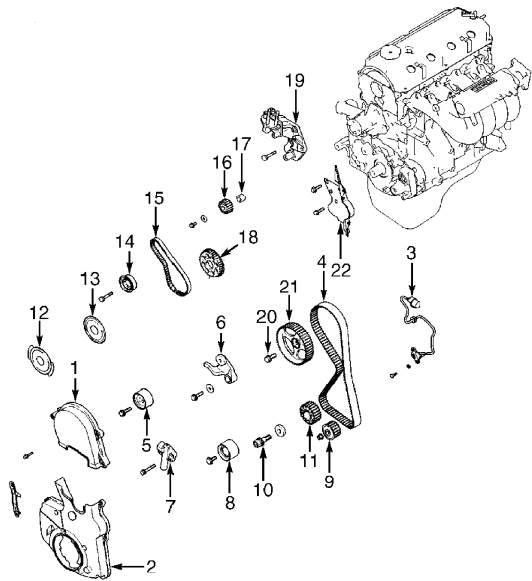
2) To complete installation, reverse removal procedure. Apply sealant to contact surfaces of semi-circular packing. Adjust all control cables. Fill cooling system. Refill with engine oil

FRONT COVER OIL SEAL

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

TIMING BELT

CAUTION: To prevent engine damage, DO NOT rotate crankshaft counterclockwise (as viewed from timing belt end of engine).



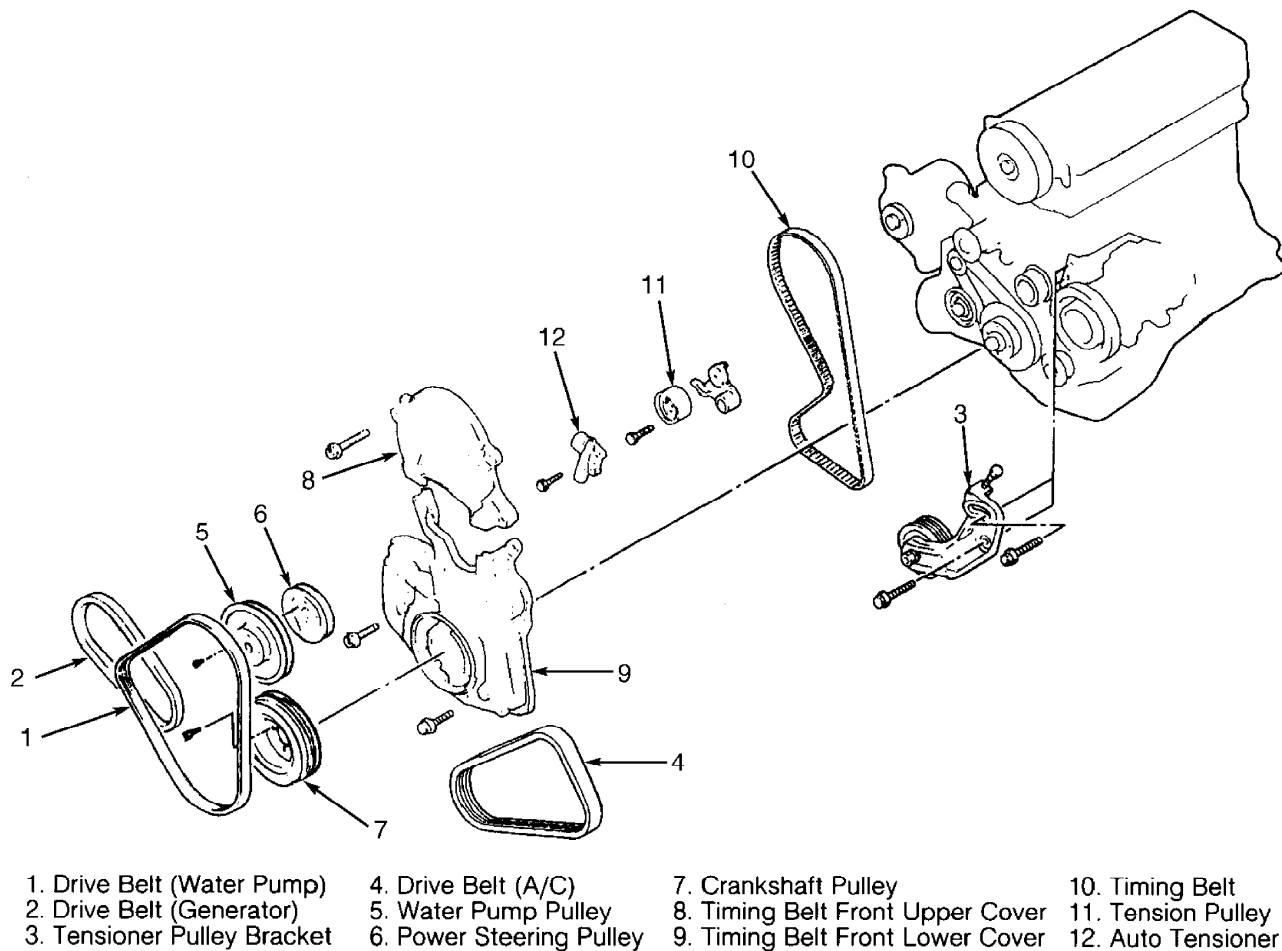
- | | |
|----------------------------|-----------------------------------|
| 1. Timing Belt Upper Cover | 12. Crankshaft Sensing Blade |
| 2. Timing Belt Lower Cover | 13. Flange |
| 3. Crankshaft Angle Sensor | 14. Tensioner "B" |
| 4. Timing Belt | 15. Timing Belt "B" |
| 5. Tensioner Pulley | 16. Counterbalance Shaft Sprocket |
| 6. Tensioner Arm | 17. Spacer |
| 7. Auto Tensioner | 18. Crankshaft Sprocket "B" |
| 8. Idler Pulley | 19. Engine Support Bracket |
| 9. Oil Pump Sprocket | 20. Camshaft Sprocket Bolt |
| 10. Crankshaft Bolt | 21. Camshaft Sprocket |
| 11. Crankshaft Sprocket | 22. Timing Belt Rear Cover |

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Fig. 4: Exploded View Of Timing Belts & Related Components
Courtesy of Mitsubishi Motor Sales of America.

Removal

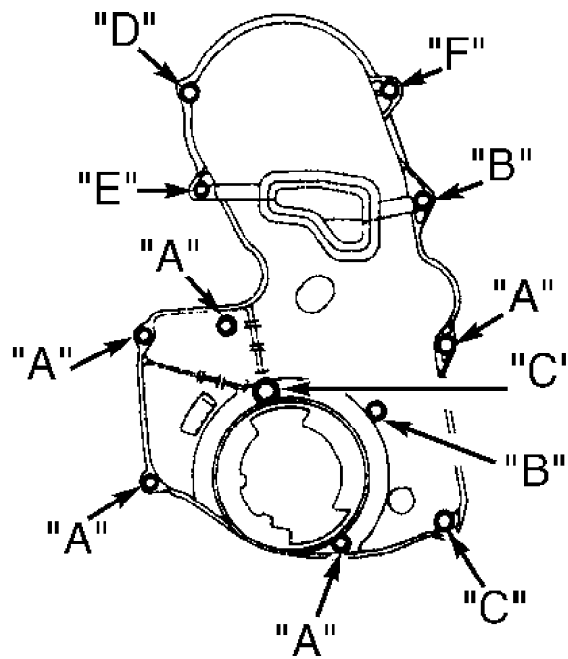
1) Remove A/C and power steering hose mounting bracket, and

oxygen sensor connector bracket from upper engine mount. Remove all drive belts and drive pulleys from crankshaft and water pump. See Figs. 4 and 5.



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 Fig. 5: Exploded View Of Drive Belts & Pulleys
 Courtesy of Mitsubishi Motor Sales of America.

2) Remove drive belt tensioner. Remove upper and lower timing belt covers. Note bolt lengths and locations. See Figs. 4 and 6. Remove crankshaft sprocket bolt access cover, crankshaft sprocket bolt and washer.



Bolt	Size (mm)
"A"	6 x 18 (Flange Bolt)
"B"	6 x 25 (Flange Bolt)
"C"	6 x 25 (Loose Washer)
"D"	8 x 50 (Flange Bolt)
"E"	8 x 35 (Flange Bolt)
"F"	8 x 28 (Flange Bolt)

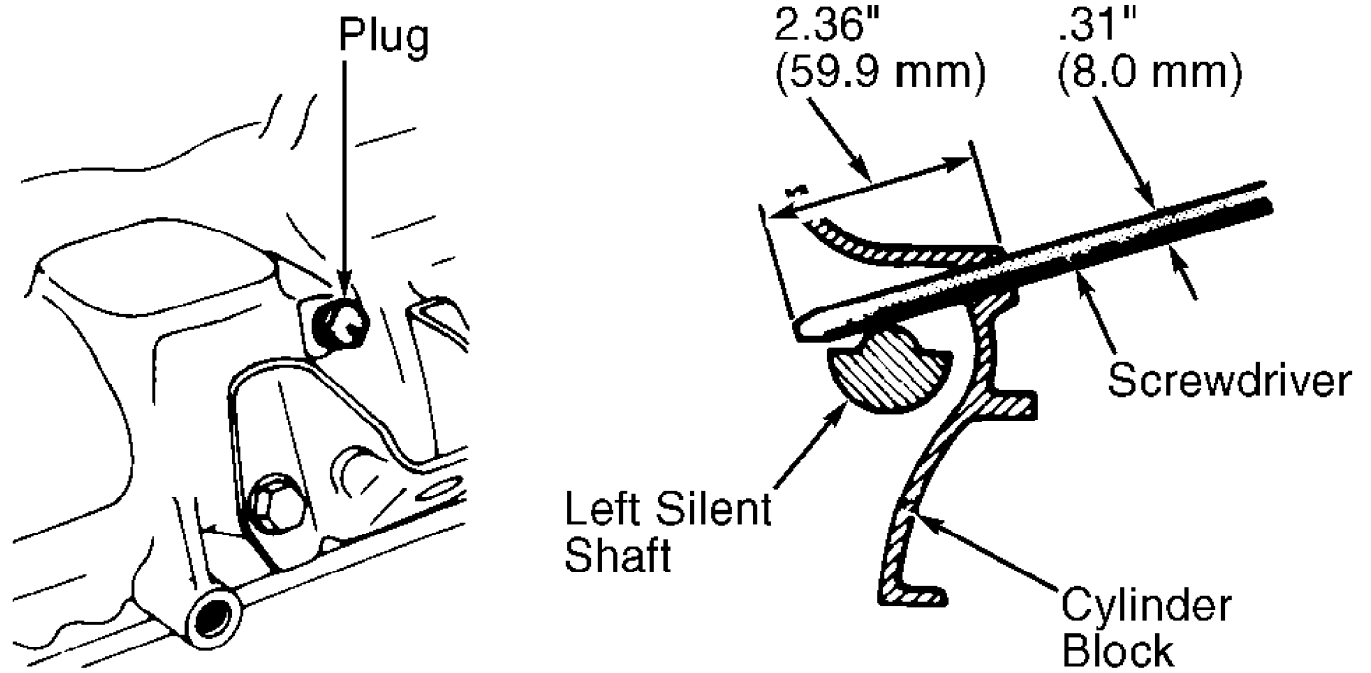
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Fig. 6: Locating Timing Cover Bolts
 Courtesy of Mitsubishi Motor Sales of America.

3) Rotate crankshaft clockwise (as viewed from timing belt end of engine) until cylinder No. 1 is at TDC of compression stroke. Align timing mark on camshaft sprocket with timing mark on cylinder head. See Fig. 2. Loosen timing belt tensioner bolt, and move tensioner toward water pump. Tighten bolt to secure tensioner. Remove front timing belt and camshaft sprocket.

CAUTION: DO NOT rotate crankshaft counterclockwise (as viewed from timing belt end of engine). If timing belt is to be reused, mark direction of rotation with chalk before removing.

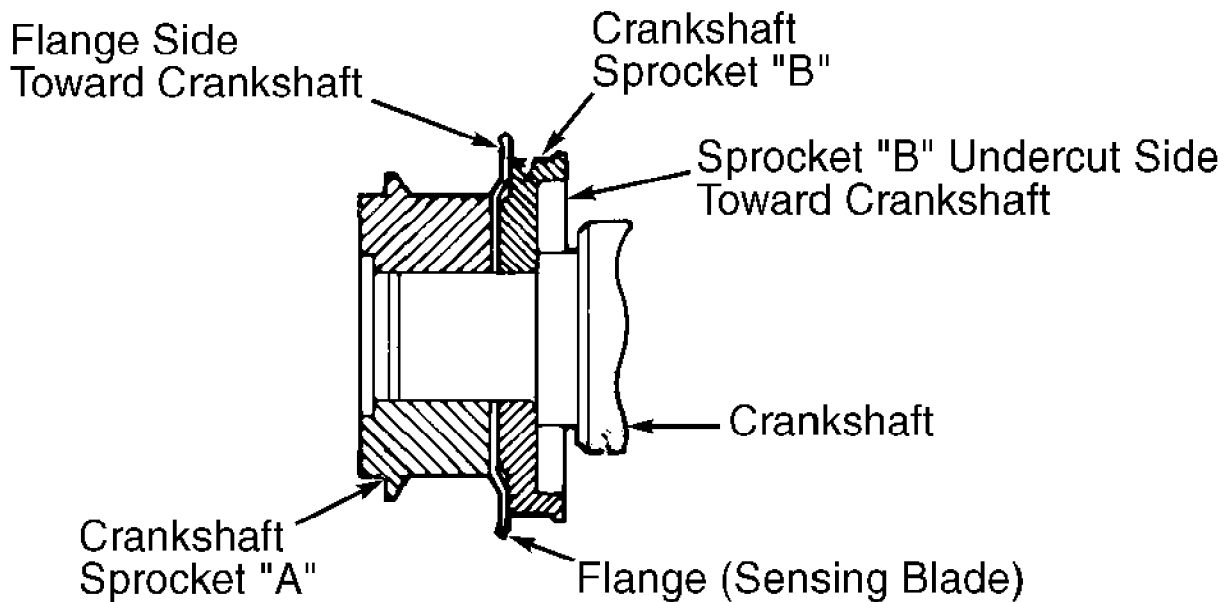
4) If oil pump sprocket removal is necessary, remove left silent shaft access plug from cylinder block. Insert a .31" (8 mm) diameter Phillips screwdriver to block left silent shaft. Ensure screwdriver can be inserted at least 2.36" (59.9 mm). DO NOT remove screwdriver until timing belt is installed. See Fig. 7. Remove oil pump sprocket nut and sprocket.



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Fig. 7: Holding Silent Shaft In Stationary Position
 Courtesy of Mitsubishi Motor Sales of America.

5) Remove front crankshaft sprocket and crankshaft sensing blade. Note direction and order of installation. See Fig. 8. Remove rear timing belt tensioner assembly. Remove rear timing belt.

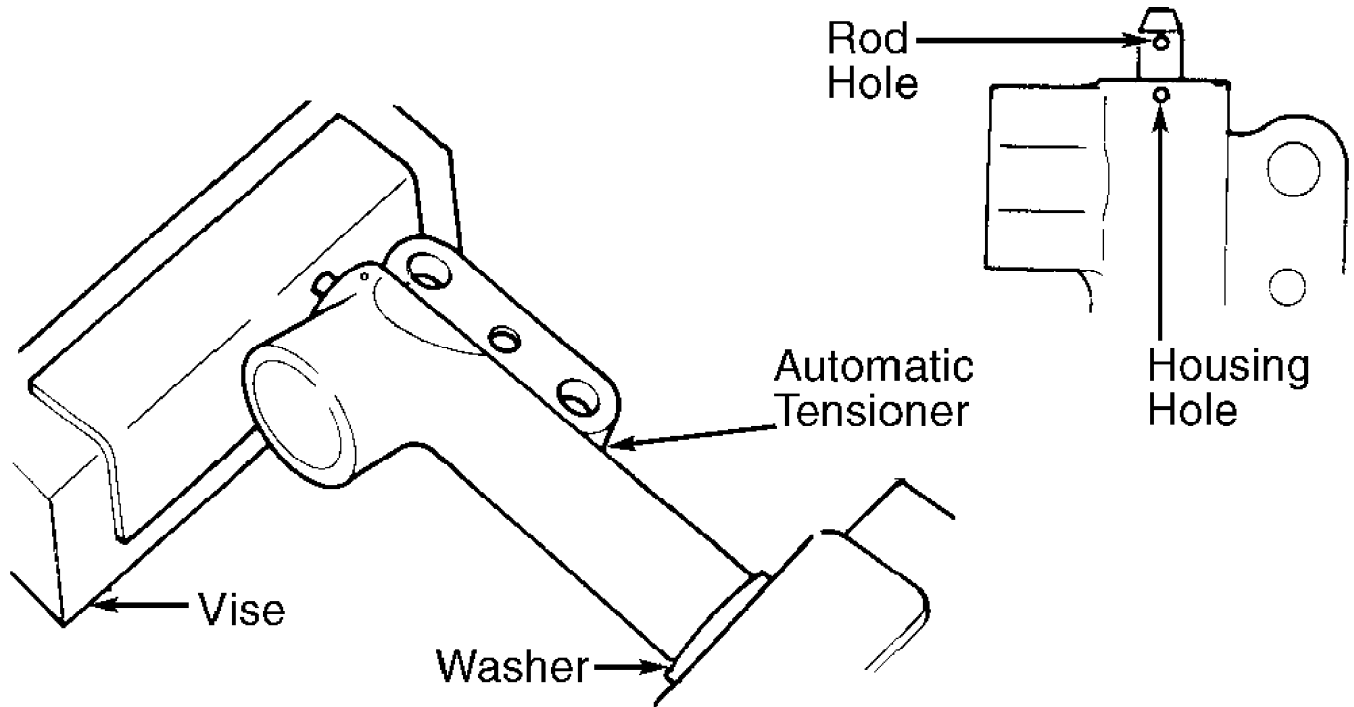


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Fig. 8: Locating Crankshaft Sprockets & Sensing Blade
 Courtesy of Mitsubishi Motor Sales of America.

Inspection
 Check belt teeth for cracks, damage and contamination.

Inspect sprockets for damage. Check belt tensioner for leakage or roughness in rotation. Using a vise, slowly force push rod of auto tensioner shaft into tensioner until a set pin can be passed through pin holes to lock rod into tensioner. See Fig. 9. Replace components as necessary.

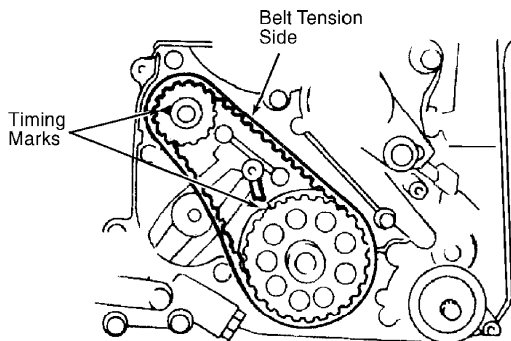


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Fig. 9: Retracting Automatic Tensioner Rod
Courtesy of Mitsubishi Motor Sales of America.

Installation

1) Install rear crankshaft sprocket and flange (sensing blade) onto crankshaft. See Fig. 8. Lubricate and install right silent shaft spacer and sprocket. Ensure chamfered side of spacer is installed into silent shaft seal. If reused, install rear timing belt in original direction of rotation. Ensure timing marks are aligned. See Fig. 10.

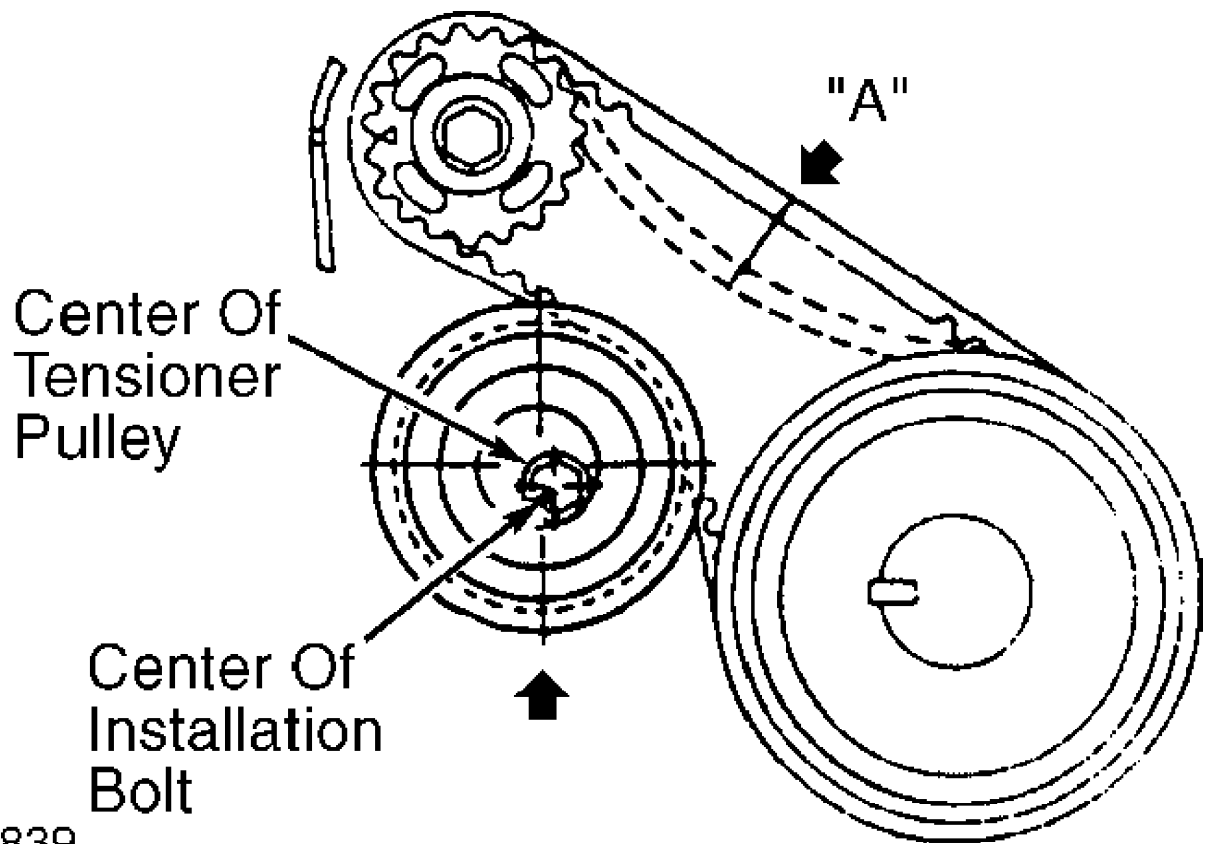


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Fig. 10: Aligning Rear Timing Belt
Courtesy of Mitsubishi Motor Sales of America.

2) Install rear timing belt tensioner. Hold tensioner tightly against belt while tightening bolt. Depress belt between sprockets to

ensure deflection is .20-28" (5-7 mm). See Fig. 11. Adjust as necessary.



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Fig. 11: Checking Rear Timing Belt Tension
Courtesy of Mitsubishi Motor Sales of America.

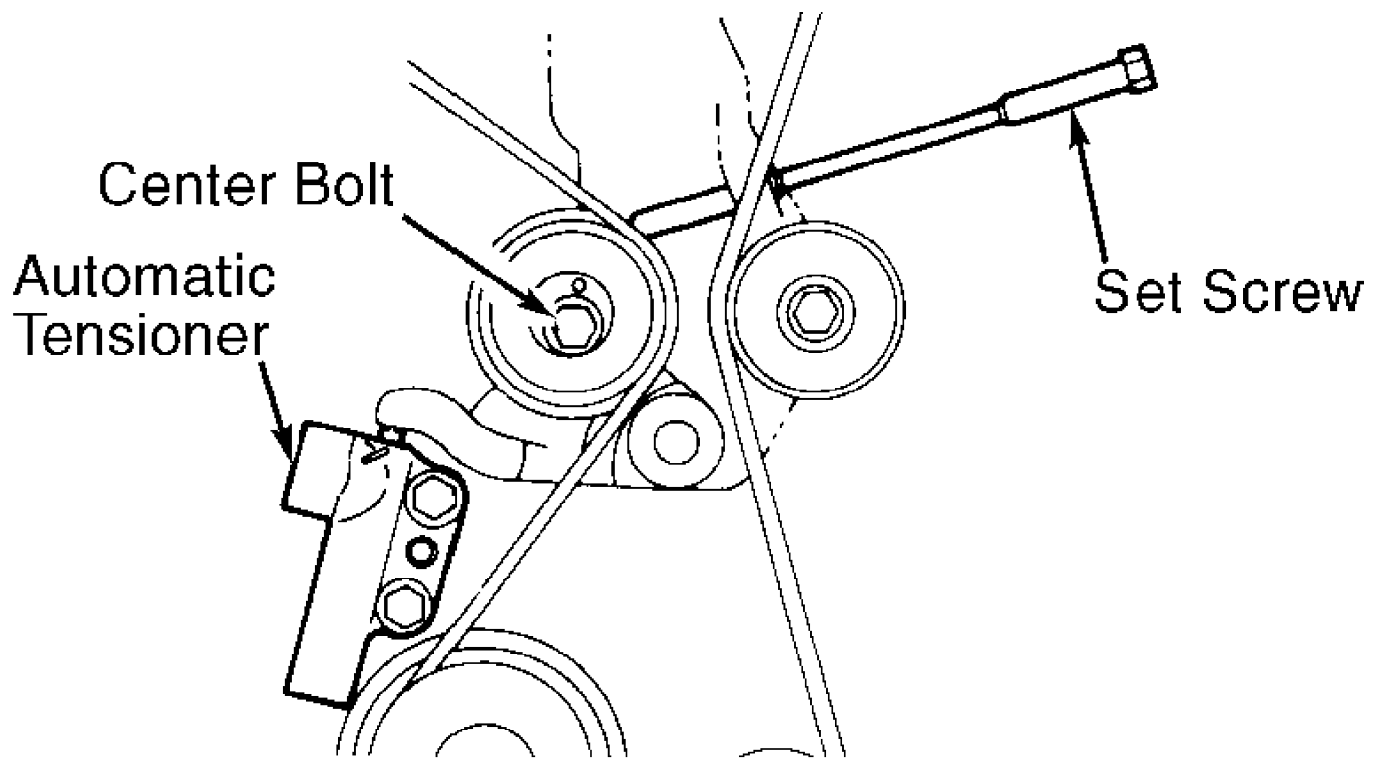
3) Install crankshaft front sprocket. Install oil pump sprocket. Hold left silent shaft using a .31" (8 mm) diameter Phillips screwdriver through access hole. See Fig. 7. Ensure screwdriver can be inserted at least 2.36" (59.9 mm).

4) Remove screwdriver if it cannot be inserted at least 2.36" (59.9 mm), and rotate oil pump sprocket one revolution. Align timing mark. Insert screwdriver, and ensure it can be inserted at least 2.36" (59.9 mm).

5) DO NOT remove screwdriver until timing belt is installed. Install camshaft sprocket. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

6) Align timing marks on camshaft sprocket, crankshaft sprocket and oil pump sprocket. Install timing belt to crankshaft sprocket, oil pump sprocket and camshaft sprocket in that order, so there is no slack in belt tension. If belt is reused, ensure original direction of rotation is maintained.

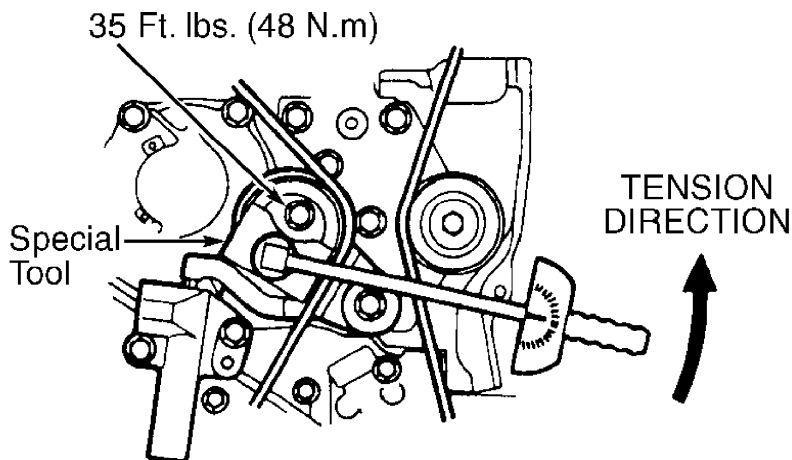
7) Set tension pulley with pin holes at bottom. Press tension pulley lightly against timing belt and lightly tighten fixing bolt. Install a long set screw into left engine support bracket until screw end makes contact with tensioner arm. At that point, turn set screw in more, and then remove set pin locking auto tensioner. Remove set screw from engine support. Tighten center bolt to 35 ft. lbs. (48 N.m). See Fig. 12.



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Fig. 12: Setting Auto Tensioner
 Courtesy of Mitsubishi Motor Sales of America.

8) After turning crankshaft 1/4 revolution in counterclockwise direction, turn crankshaft in clockwise direction until timing marks are aligned. Loosen tension pulley bolt. Using Special Tool (MD998767) and a torque wrench, apply 31 INCH lbs. (3.5 N.m) of tension to belt in a counterclockwise direction. Tighten pulley bolt to 35 ft. lbs. (48 N.m) while applying tension to timing belt. See Fig. 13.



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Fig. 13: Checking Front Timing Belt Tension
 Courtesy of Mitsubishi Motor Sales of America.

CAUTION: When tightening pulley bolt, ensure tension pulley does not turn with bolt.

9) Turn crankshaft in clockwise direction 2 revolutions until timing marks are aligned. Let engine stand 15 minutes and then measure protrusion of auto-tensioner rod. If protrusion is not .150-.177" (3.8-4.5 mm), repeat steps 8) and 9). Ensure timing marks of all sprockets are aligned properly. To complete installation, reverse removal procedure.

ROCKER ARM & VALVE LASH ADJUSTER

CAUTION: DO NOT rotate crankshaft if timing belt has been removed. DO NOT rotate crankshaft counterclockwise (as viewed from timing belt end of engine).

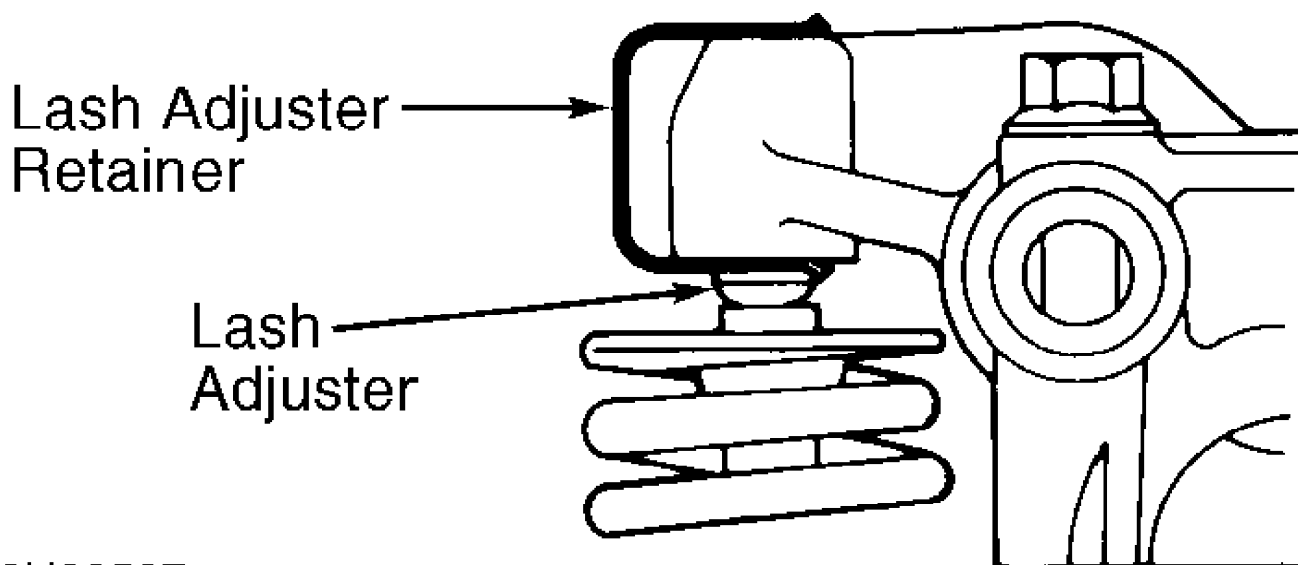
Removal

1) Remove valve cover. Remove upper front timing belt cover. Rotate crankshaft clockwise (as viewed from timing belt end of engine) until cylinder No. 1 is at TDC of compression stroke and timing mark on camshaft sprocket aligns with timing mark on cylinder head. See Fig. 2.

2) Mark timing belt in alignment with timing mark on camshaft sprocket. Secure belt to sprocket with plastic tie-wraps. Remove camshaft sprocket bolt. Slide camshaft sprocket and belt off camshaft.

NOTE: Check lash adjuster free play before rocker arm removal. See INSPECTION procedure.

3) Install Lash Adjuster Retainer (MD998443) on rocker arm to prevent adjuster from falling out of rocker arm. See Fig. 14. Uniformly loosen rocker shaft mounting bolts, and remove rocker shaft assembly. Remove camshaft and oil seal. If removing lash adjusters from rocker arms, mark for installation reference.



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Fig. 14: Installing Lash Adjuster Retainers
Courtesy of Mitsubishi Motor Sales of America.

Inspection

1) Before removing rocker arms from engine, insert a small wire through rocker arm bleed hole and into lash adjuster. With wire lightly holding lash adjuster internal check ball down, move rocker arm up and down to check for free play. If no free play is present,

replace adjuster.

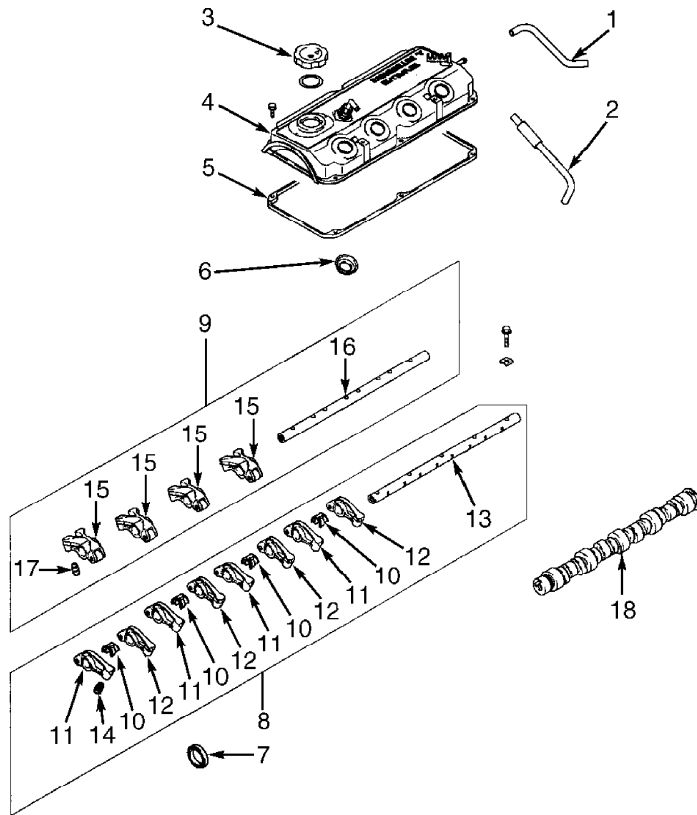
2) Inspect rocker arms and shafts for wear and damage. Check distributor drive for tooth damage and wear. Replace components as necessary.

3) 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) Lubricate camshaft lobes and camshaft bearing journals, and install camshaft into cylinder head. Install lash adjusters in rocker arms (if removed). Install lash adjuster retainers.

2) Ensure rocker arm components are installed in original location. Ensure notch in each rocker shaft is positioned outboard. Fit intake rocker shaft springs at right angles to spark plug guides before installing exhaust rocker shaft. See Fig. 15 To complete installation, reverse removal procedure.



- | | |
|------------------------|--------------------------------|
| 1. Breather Hose | 10. Rocker Shaft Spring |
| 2. PCV Hose | 11. Rocker Arm "A" |
| 3. Oil Filler Cap | 12. Rocker Arm "B" |
| 4. Rocker Cover | 13. Rocker Arm Shaft (Intake) |
| 5. Rocker Cover Gasket | 14. Lash Adjuster |
| 6. Oil Seal | 15. Rocker Arm "C" |
| 7. Oil Seal | 16. Rocker Arm Shaft (Exhaust) |
| 8. Rocker Arms & Shaft | 17. Lash Adjuster |
| 9. Rocker Arms & Shaft | 18. Camshaft |

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Fig. 15: Identifying Rocker Arm Shaft Components
Courtesy of Mitsubishi Motor Sales of America.

CAMSHAFT

Removal & Installation

1) Remove accelerator cable, connection for breather hose and connection for PCV hose. Remove spark plug loom and rocker cover. Remove distributor. Remove timing belt. See TIMING BELT.

2) Remove camshaft sprocket. Remove camshaft oil seal. Remove intake and exhaust rocker arm and shaft assemblies. See ROCKER ARM & VALVE LASH ADJUSTER. Remove camshaft from head. To install, reverse removal procedure.

SILENT SHAFTS & BEARINGS

Removal

Remove front cover and oil pump. See OIL PUMP & FRONT COVER under ENGINE OILING. Remove silent shafts from cylinder block.

NOTE: Rear bearing(s) cannot be removed unless front bearings have been removed from block.

Inspection

1) Inspect silent shaft and bearings for damage. Check oil holes for clogging. Check silent shaft journal for signs of seizure or damage. Replace components as necessary.

2) If bearings need replacing, use indicated puller. See SILENT SHAFT BEARING TOOL table.

NOTE: Install rear bearings before installing front bearings.

Installation

1) Coat bearing outer area with engine oil before installing. Mount rear silent shaft bearing on indicated installer. See SILENT SHAFT BEARING TOOL table.

2) Ensure oil hole in bearing aligns with oil hole in cylinder block. Note left rear bearing does not have oil hole. Install rear bearings in cylinder block.

3) Repeat procedure for front bearings. Install front bearing on bearing installer. Ensure ratchet ball on bearing installer engages in oil hole of bearing. Coat outer area of bearing with engine oil.

4) Place bearing installer over guide pins, and drive bearing into cylinder block. Install balance shafts in original location. To complete installation, reverse removal procedure.

SILENT SHAFT BEARING TOOL

Application	Tool No.
Remover	MIT304204
Front Bearing Adapter	MD998371
Rear Bearing Adapter	MD998372
Installer	MD991603
Front & Rear Bearing Adapter	MD998705

REAR CRANKSHAFT OIL SEAL

Removal

1) Remove transaxle. On M/T models, see CLUTCH article in the POWERTRAIN category. On A/T models, see TRANSMISSION REMOVAL & INSTALLATION - A/T article in AUTOMATIC TRANSMISSION SERVICING.

2) On all models, remove flywheel or drive plate. Remove rear main oil seal case and gasket from rear of cylinder block. Remove oil seal from seal case.

Installation

Coat seal lip with oil. Using Seal Installer (MD998776), install seal in seal case until it bottoms. Install seal case and gasket. Install flywheel or drive plate. To complete installation, reverse removal procedure.

WATER PUMP

CAUTION: Note length and location of bolts during removal. Different length bolts are used and must be installed in original location.

Removal

Drain cooling system. Remove necessary coolant hoses. Remove timing belt. See TIMING BELT. Remove water pump mounting bolts. Note bolt length and location. Remove water pump.

Installation

To install, reverse removal procedure using NEW gasket and "O" ring. Install "O" ring on coolant pipe, and apply water to "O" ring. DO NOT apply grease or oil to "O" ring. Ensure bolts are installed in original location.

OIL PAN

Removal

Drain engine oil. Disconnect exhaust pipe at manifold. Remove oil pan bolts. Using Gasket Cutter (MD998727), cut gasket along sealing surface of cylinder block. Remove oil pan and gasket. Clean oil pan and block gasket surfaces.

Installation

To install, apply sealant to oil pan flange at timing chain case and rear seal case areas. Install oil pan and gaskets. To complete installation, reverse removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

OVERHAUL

CYLINDER HEAD

Cylinder Head

Inspect cylinder head for warpage at deck surface. Resurface cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS.

Valve Springs

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

Valve Stem Oil Seals

DO NOT reuse oil seals. Install valve spring seat before installing oil seals. To provide proper positioning of oil seal, install NEW oil seals using Valve Seal Installer (MD998774).

Valve Guides

Ensure valve stem diameter is within specification. Check valve stem clearance. Clearance should be within specification. See VALVES & VALVE SPRINGS and CYLINDER HEAD tables under ENGINE SPECIFICATIONS. If clearance

exceeds service limits, replace valve guide with an oversized valve guide.

Valves

Ensure valve stem diameter and margin are within specification. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS.

Valve Seat

See ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION article in the GENERAL INFORMATION section.

Valve Seat Correction Angles

See ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION article in the GENERAL INFORMATION section.

VALVE TRAIN

Rocker Arm Shaft Assembly

1) For reassembly reference, note location and order of assembly for all components. Remove bolts from shafts, and separate components.

2) Inspect components for wear and damage. Install components in original location when assembling shaft assembly. See Fig. 15. Tighten rocker arm assembly bolts to specification. See TORQUE SPECIFICATIONS.

Lash Adjusters

Before installing lash adjuster, submerge lash adjuster in oil. Use a small wire to hold down internal check valve. Pump plunger up and down 4 or 5 times to bleed air from lash adjuster.

CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

1) Mark piston and rod assembly with corresponding cylinder number before removing. Center piston pin in piston. Measure and record piston pin installation depth. Use Piston Pin Removal and Installation Set (MD998780) with hydraulic press to remove piston pin.

2) Piston pin should be easily pushed into piston. If looseness or resistance is encountered, replace piston and pin as a set. Check connecting rod for damage and excessive bend and twist. See CONNECTING RODS table under ENGINE SPECIFICATIONS.

3) Position piston, piston pin and rod on press. Ensure front mark on piston will face timing belt side of engine when installed. Using piston pin removal and installation set, install piston pin into piston and rod to depth recorded in step 1). Ensure piston pin is centered in piston.

Fitting Pistons

1) Measure piston skirt diameter at 90-degree angle to piston pin. If piston diameter is not within specification, replace piston. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS.

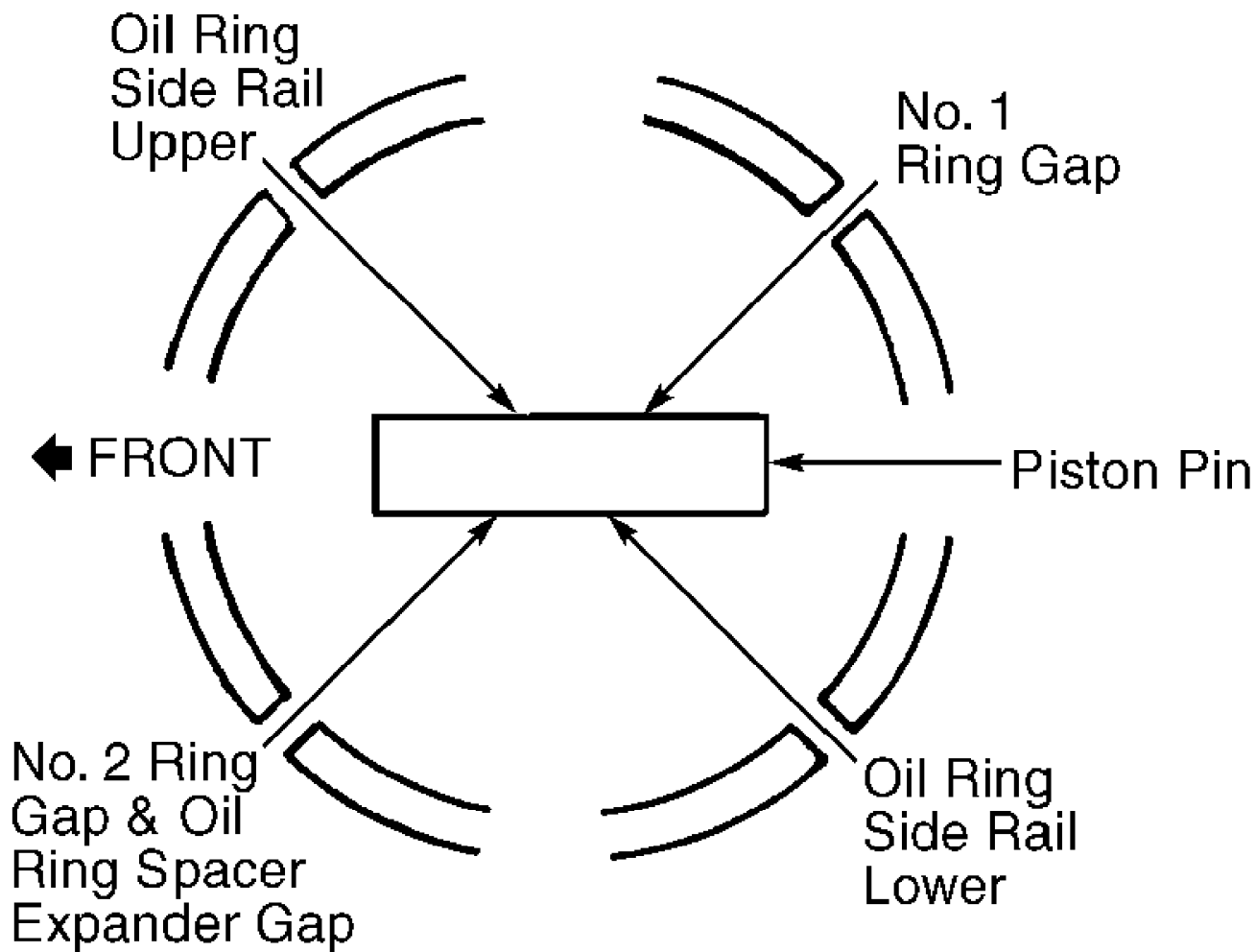
2) Measure cylinder bore diameter at 3 places: near top of bore, bottom of bore and center of bore. If cylinder bore diameter or taper is not within specification, machine cylinder bore. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS.

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

Piston Rings

Ensure ring end gap and side clearance are within

specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS. DO NOT use a ring expander to install oil ring side rails. Properly position ring end gaps around circumference of piston before installing. See Fig. 16.



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Fig. 16: Positioning Piston Ring Gaps
 Courtesy of Mitsubishi Motor Sales of America.

Rod Bearings

Note position of connecting rod in relation to bearing cap before removing. Ensure bearing oil clearance and side play are within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS and CONNECTING RODS tables under ENGINE SPECIFICATIONS.

Crankshaft & Main Bearings

Check diameter of crankshaft main bearing journals and connecting rod bearing journals. Check journals for taper and out-of-round. Check crankshaft end play. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS.

Thrust Bearing

Replace thrust bearing if crankshaft end play is not within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table

under ENGINE SPECIFICATIONS.

Cylinder Block

1) Check cylinder block head surface for warpage. If warpage exceeds specification, machine surface. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS. DO NOT remove more than a combined total .008" (0.20 mm) material from original surfaces of cylinder head or cylinder block.

2) Check cylinder bore wear and taper. Measure cylinder bore diameter at 3 places: near top of bore, bottom of bore and center of bore. If cylinder bore diameter or taper is not within specification, machine cylinder bore to next oversize. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

Oil pressure is provided by a front cover mounted oil pump, driven by the left silent shaft. Pressure relief valve is not adjustable, and is located either in filter bracket. See Fig. 17.

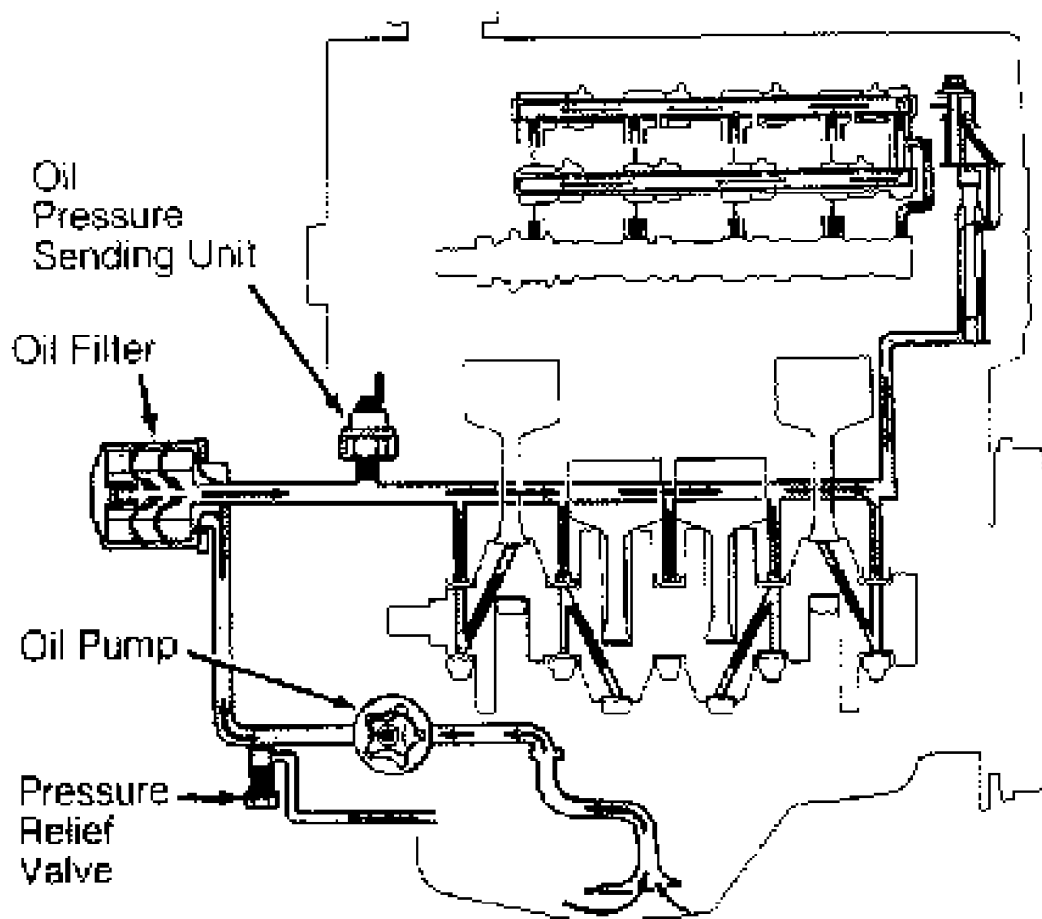


Fig. 17: Engine Oiling System
Courtesy of Mitsubishi Motor Sales of America.

Application	(1) Qts. (L)
SOHC 16 Valve	4.5 (4.3)

(1) - Includes oil filter.

Oil Pressure

Oil pressure should be at least 11.4 psi (.80 kg/cm²) at curb idle, and oil temperature should be 167-194°F (75-90°C).

OIL PUMP & FRONT COVER

Removal & Disassembly

1) Remove timing belt and crankshaft sprocket. See TIMING BELT under REMOVAL & INSTALLATION. Remove oil filter, oil pressure switch, oil pan and oil screen.

2) Remove oil filter bracket, front cover and oil pump assembly. Using Plug Cap Wrench (MD998162), remove plug cap located on front of front cover. Remove rear cover. Mark direction of oil pump gear installation for reassembly reference.

Inspection

1) Place straightedge across front cover housing and measure side clearance between each gear and straightedge. Check clearance between tip of gear teeth of both gears and front cover.

2) Ensure pressure relief valve moves without restriction in bore. Replace components if damaged or not within specification. See OIL PUMP SPECIFICATIONS table.

OIL PUMP SPECIFICATIONS

Application	Specification
Gear Side Clearance	
Drive Gear .....	.0031-.0055" (.080-.140 mm)
Driven Gear .....	.0024-.0047" (.060-.120 mm)
Gear-To-Front Cover Clearance	
Drive Gear .....	.0031-.0055" (.080-.140 mm)
Driven Gear .....	.0024-.0047" (.060-.120 mm)

Reassembly & Installation

1) Lubricate oil pump gears with engine oil, and install. Ensure timing marks are aligned. Install oil pump cover, and tighten bolts to specification. See TORQUE SPECIFICATIONS.

2) If crankshaft oil seal was removed, use Seal Installer (MD998375) to install seal in front cover. Use a socket of proper diameter to install silent shaft oil seals.

3) Position Oil Seal Guide (MD998285) over front of crankshaft. Lubricate crankshaft oil seal and oil seal guide with engine oil. Install front cover with NEW gasket, and temporarily tighten bolts. Install oil filter bracket. Ensure correct length bolts are installed.

4) To complete installation, reverse removal procedure. Install plug cap using NEW "O" ring, and tighten to specification. Apply thread sealant to oil pressure switch threads before installing. Tighten all bolts to specification. See TORQUE SPECIFICATIONS.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
A/C Tensioner Pulley Bracket Bolt	17-20 (23-27)
Camshaft Sprocket Bolt	66 (90)
Connecting Rod Nut	14.5 + 90° (20 + 90°)
Crankshaft Pulley Bolt	18 (25)
Crankshaft Sprocket Bolt	89 (120)
Cylinder Head Bolt	(1)
Engine Support Bracket Bolt	33 (45)
Exhaust Manifold Nut	
M8	21 (28)
M10	22 (30)
Exhaust Pipe-To-Manifold Nut	36 (49)
Flywheel/Drive Plate Bolt	100 (135)
Front Cover Bolt	18 (24)
Intake Manifold Bolt/Nut	13 (18)
Intake Manifold Stay Bolt	23 (31)
Main Bearing Cap Bolt	18 + 90° (25 + 90°)
Oil Filter Bracket Bolt	14 (19)
Oil Pump Cover Bolt	13 (17)
Oil Pump Pick-Up Tube Bolt	14 (19)
Oil Pump Sprocket Nut	41 (55)
Oxygen Sensor	41 (55)
Plug Cap	18 (24)
Power Steering Pump Bolts	30 (40)
Rear Tensioner Retaining Bolt	14 (19)
Rocker Arm Assembly Bolts	29 (32)
Silent Shaft Sprocket Bolt	34 (46)
Throttle Body Bolt	14 (19)
Timing Belt Cover Bolt	
M8 Flange	10 (14)
Timing Belt Tensioner Bolt	35 (47)
Water Pump Bolt	10 (14)

INCH Lbs. (N.m)

Crankshaft Position Sensor Nut	89 (10)
Distributor Nut	97 (11)
Fuel Rail Bolt	97 (11)
Oil Pan Bolt	62 (7)
Oil Pressure Switch	62 (7)
Oil Pump Cover Screw	89 (10)
Rear Crankshaft Oil Seal Case Bolt	97 (11)
Throttle Body Bolt	97 (11)
Timing Belt Cover Bolt	
M6 Flange	97 (11)
M6 Loose Washer	89 (10)
Valve Cover Bolt	29 (3.3)
Water Pump Pulley Bolt	71 (8)

(1) - Tighten head bolts to 58 ft. lbs. (78 N.m), in correct sequence. See Fig. 3. Completely loosen head bolts and then tighten in sequence to 15 ft. lbs. (20 N.m). Next, tighten in sequence an added 90-degrees. Then, in sequence, tighten another 90-degrees.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Specification
Displacement	143.4 Cu. In. (2.4L)
Bore	3.41" (86.5 mm)
Stroke	3.94" (100.0 mm)
Compression Ratio	9.5:1
Fuel System	MFI
Horsepower @ RPM	
California	138 @ 5500
Federal	141 @ 5500
Torque Ft. Lbs. @ RPM	
California	148 @ 3000
Federal	148 @ 3000

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

Application	In. (mm)
Crankshaft End Play	
Standard .....	.0020-.0071 (.050-.180)
Wear Limit .....	.0098 (.25)
Main Bearings	
Journal Diameter	2.24 (57.0)
Oil Clearance	
Standard .....	.0008-.0016 (.020-.040)
Wear Limit .....	.004 (.10)
Connecting Rod Bearings	
Journal Diameter	1.77 (45.0)
Oil Clearance	
Standard .....	.0008-.0016 (.020-.040)
Wear Limit .....	.004 (.10)

CONNECTING RODS

CONNECTING RODS

Application	In. (mm)
Side Play	
Standard .....	.0039-.0098 (.010-.250)
Wear Limit .....	.016 (.40)

PISTONS, PINS & RINGS

PISTONS, PINS & RINGS

Application	In. (mm)
Pistons	
Clearance .....	.0008-.0016 (.020-.040)
Diameter	3.4051 (86.490)
Pins	
Rod Fit	(1)
Rings	
No. 1	
End Gap	

Standard	.....	.0098-.0138	(.250-.350)
Wear Limit	.....	.031	(.79)
Side Clearance			
Standard	.....	.0012-.0028	(.030-.070)
Wear Limit	.....	.004	(.10)
No. 2			
End Gap			
Standard	.....	.0157-.0217	(.400-.550)
Wear Limit	.....	.031	(.79)
Side Clearance			
Standard	.....	.0012-.0028	(.030-.070)
Wear Limit	.....	.004	(.10)
No. 3 (Oil)			
End Gap			
Standard	.....	.0039-.0157	(.100-.400)
Wear Limit	.....	.039	(.99)

(1) - Press fit with load of 1653-3858 lbs. (750-1750 kg).

CYLINDER BLOCK

CYLINDER BLOCK

Application	In. (mm)
Cylinder Bore	
Standard Diameter	..... 3.41 (86.5)
Maximum Taper	..... .0004 (.010)
Maximum Out-Of-Round	..... .0004 (.010)
Deck Height	..... 11.41-11.42 (289.9-290.1)
Maximum Deck Warp	..... (1) .002 (.05)

(1) - Combined maximum total resurface limit of cylinder head and cylinder block is .008" (.20 mm).

VALVES & VALVE SPRINGS

VALVES & VALVE SPRINGS

Application	Specification
Intake Valves	
Face Angle	..... 45-45.5 °
Minimum Margin	
Standard	..... .039" (1.00 mm)
Wear Limit	..... .020" (.50 mm)
Stem Diameter	..... .236" (6.0 mm)
Exhaust Valves	
Face Angle	..... 45-45.5 °
Minimum Margin	
Standard	..... .047" (1.20 mm)
Wear Limit	..... .028" (0.70 mm)
Stem Diameter	..... .232" (5.9 mm)
Valve Springs	
Free Length	..... 2.01" (51.0 mm)
Installed Height	..... 1.74" (44.2 mm)
Out-Of-Square	
Standard	..... Less Than 2 °
Wear Limit	..... 4 °

CYLINDER HEAD

CYLINDER HEAD

Application	Specification
Cylinder Head Height	4.720-4.728" (119.90-120.10 mm)
Maximum Warpage	(1) .0020" (.050 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 Stem-To-Guide Oil Clearance	
Intake Valve	
Standard	0008-.0020" (.020-.050 mm)
Wear Limit .....	.0040" (.10 mm)
Exhaust Valve	
Standard .....	.001-.003" (.030-.070 mm)
Wear Limit .....	.006" (.15 mm)

(1) - Combined maximum total grind limit of cylinder head and cylinder block is .008" (.20 mm).

CAMSHAFT

CAMSHAFT (1)

Application	In. (mm)
Journal Diameter	1.77 (44.93)
Lobe Height	
Intake Valve ID Mark	
1 & 2	1.452-1.472 (36.89-37.39)
Exhaust Valve ID Mark	
1 & 2	1.46-1.48 (36.97-37.47)

(1) - Camshaft identification (ID) mark is stamped on end opposite camshaft sprocket.
