

1999-2000 ENGINES

3.0L V6

ENGINE IDENTIFICATION

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

Engine may be identified by Vehicle Identification Number (VIN) stamped on a metal pad located near lower left corner of windshield. The eighth character of VIN identifies engine, and tenth character identifies model year. Engine model number is stamped on front upper edge of cylinder block, below cylinder head, or on vehicle information plate on firewall. Engine serial number is stamped near the engine model number.

ENGINE IDENTIFICATION CODES

Application	Engine Model	Engine Code
Eclipse	6G72	H
Galant	6G72	L
Montero Sport	6G72	H
3000GT		
SOHC	6G72	H
DOHC Non-Turbo	6G72	J
DOHC Turbo	6G72	K

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

NOTE: All engines are equipped with hydraulic lash adjusters. Adjustment is not required.

TROUBLE SHOOTING

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

REMOVAL & INSTALLATION

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

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

major assemblies before removal.**FUEL PRESSURE RELEASE**

1. To relieve fuel pressure, remove fuel pump cover in luggage compartment. Disconnect fuel pump harness connector at fuel tank. Start engine. After engine stalls, turn ignition switch to OFF position. Disconnect negative battery terminal. Reconnect fuel pump harness.
2. Wrap shop towels around fuel return and high pressure hoses to prevent fuel splashing on engine. Disconnect fuel return hose and high pressure fuel hose to drain any residual fuel.

ENGINE**Removal (Eclipse & Galant)**

1. Remove hood. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Remove air cleaner assembly. Remove heater and radiator hoses. Remove radiator. Remove front exhaust pipe.
2. Label and disconnect all vacuum hoses. Label and unplug all electrical connections and harnesses from engine. Remove starter, oil pressure switch and generator connectors. Cover fuel hose with shop towel, and disconnect high pressure fuel hose. Disconnect fuel return hose. Remove accessory drive belts. Remove A/C compressor from compressor bracket with hose attached.
3. Remove power steering oil pump from engine with hose attached. Remove engine mount bracket and engine mount stopper. Ensure all hoses and wires are disconnected, and set aside. Attach engine hoist to engine. Remove engine from engine compartment.

Installation (Eclipse & Galant)

To install, reverse removal procedure. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

Removal (Montero Sport)

1. Remove hood. Drain cooling system. Remove radiator. Remove skid plate and splash shields. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Remove battery. Remove cruise control actuator and linkage (if equipped).
2. Remove air cleaner ducts. Remove accessory drive belts. Remove and support A/C compressor and power steering pump, leaving hoses connected. On A/T models, remove throttle cable connection. Disconnect oil cooler hoses. Cover fuel hose with shop towel, and disconnect high pressure fuel hose and "O" ring. Disconnect fuel return hose.
3. Label and disconnect all vacuum hoses. Disconnect cooling system hoses. Label and unplug all electrical connections from engine. Remove heat shield from motor mounts. Remove motor mount bolts. Ensure all hoses and wires are disconnected and set aside.
4. Disconnect exhaust pipe from exhaust manifolds. Remove engine support front stopper. Attach engine hoist to engine. Support transmission. Disconnect engine from transmission. Remove engine. Remove engine support front insulator.

Installation (Montero Sport)

To install, reverse removal procedure. Install and lubricate NEW "O" rings on fuel lines. Install NEW exhaust gaskets and nuts. See appropriate table under **TORQUE SPECIFICATIONS**. Replenish fluids.

CAUTION: DO NOT allow foreign material into turbocharger air intake hoses or pipes.

Removal (3000GT)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Remove hood. Remove cruise control vacuum pump and linkage. On turbo models, remove necessary turbo air intake hoses and pipes. On all other models, remove air cleaner hoses.
2. On all models, drain cooling system. Drain engine oil and transaxle oil. Remove heater hoses and radiator hoses. Remove transaxle assembly. On M/T models, see appropriate article in CLUTCHES. On A/T models, see TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING.
3. Remove radiator. Label and disconnect all vacuum hoses. Label and unplug all electrical connections and harnesses from engine. Remove accessory drive belts.
4. Remove and support A/C compressor and power steering pump. DO NOT disconnect hoses from compressor or pump. Cover fuel hose with shop towel, and disconnect high pressure fuel hose and "O" ring. Disconnect fuel return hose.
5. On turbo models, disconnect oil cooler and vacuum hoses. On all models, remove motor mount bolts and brackets. Ensure all hoses and wires are disconnected and set aside. Attach engine hoist to engine. Remove engine.

Installation (3000GT)

To install, reverse removal procedure. Install and lubricate NEW "O" rings on fuel lines. Install NEW exhaust gaskets and nuts. See appropriate table under **TORQUE SPECIFICATIONS**. Replenish fluids.

INTAKE MANIFOLD

CAUTION: Fuel system is under pressure. Fuel pressure must be released before disconnecting fuel lines. See FUEL PRESSURE RELEASE.

Removal (Eclipse & Galant)

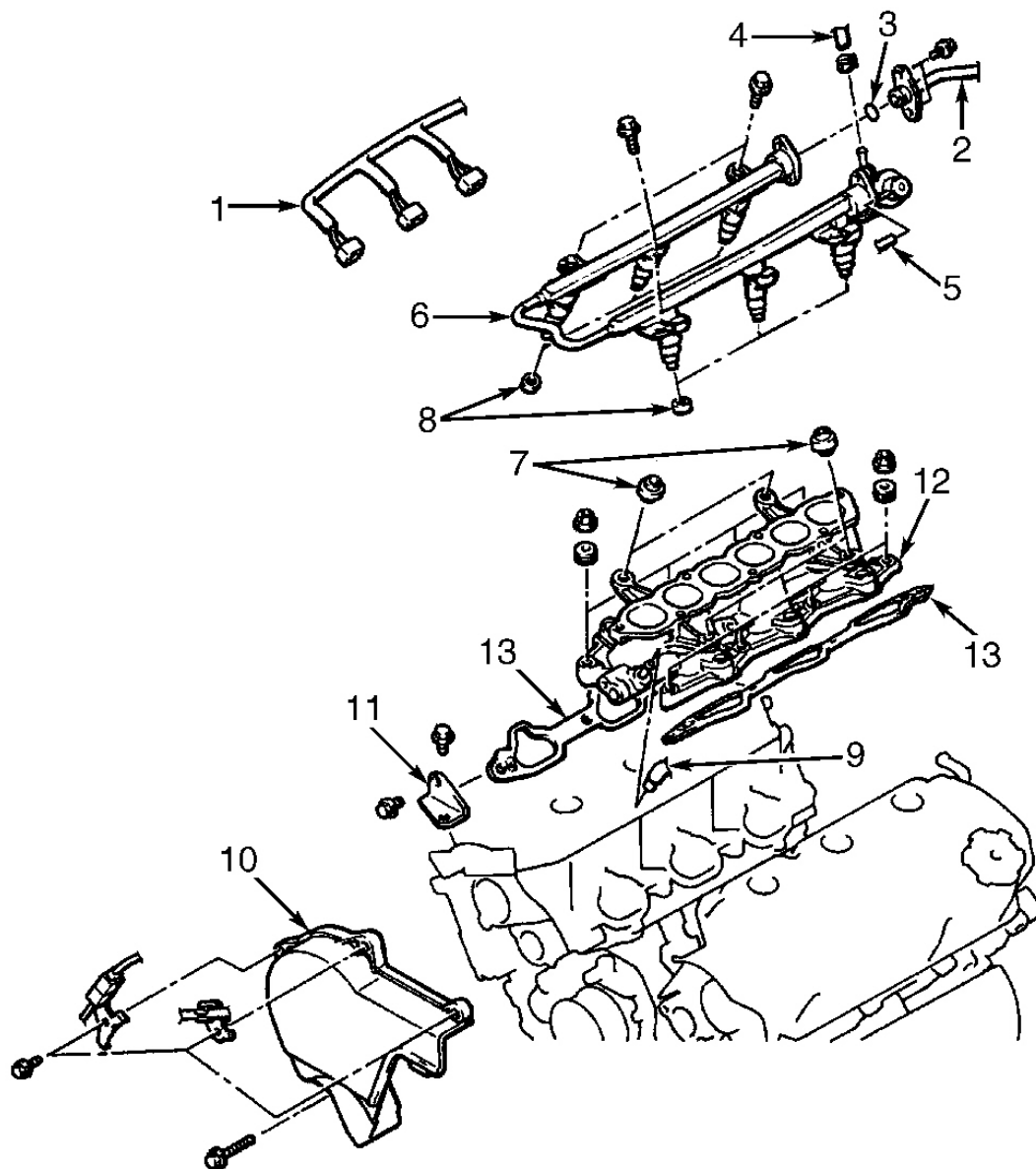
1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Drain engine coolant. Remove air cleaner assembly. Remove throttle body.
2. Label and disconnect all cables, vacuum hoses, cooling system hoses and electrical connections. Remove EGR valve and EGR pipe connection. Remove power steering drive belt. Remove power steering oil pump bracket stay. Remove front and rear intake manifold plenum stay.
3. Remove engine mount stay. Remove intake manifold plenum gasket. Remove manifold differential pressure sensor. Remove injector connector. Remove high-pressure fuel hose connection. Remove "O"

ring and fuel return hose.

4. Remove fuel rail with injectors and pressure regulator attached. See **Fig. 1**. Remove insulators and PCV hose. Remove right front timing belt upper cover. Remove intake manifold and gasket.

Removal (Montero Sport)

1. Release fuel pressure. **FUEL PRESSURE RELEASE**. Drain cooling system. Remove ignition coils and ignition power transistor. Remove EGR valve and gasket (if equipped).
2. Remove manifold differential pressure sensor. Remove EGR pipe and gasket. Remove intake manifold stay. Remove water outlet fitting bracket. Remove throttle body and gasket. Remove air intake fitting.
3. Remove air intake fitting gasket. Remove water pump bracket. Remove upper intake manifold. See **Fig. 2**. Remove intake manifold plenum gasket.
4. Label and disconnect all cables, vacuum hoses, cooling system hoses and electrical connections. Remove fuel pressure regulator, fuel injectors, fuel rails and insulators. Remove "O" ring and grommet. Remove fuel rail and "O" ring. Remove lower intake manifold and gasket.

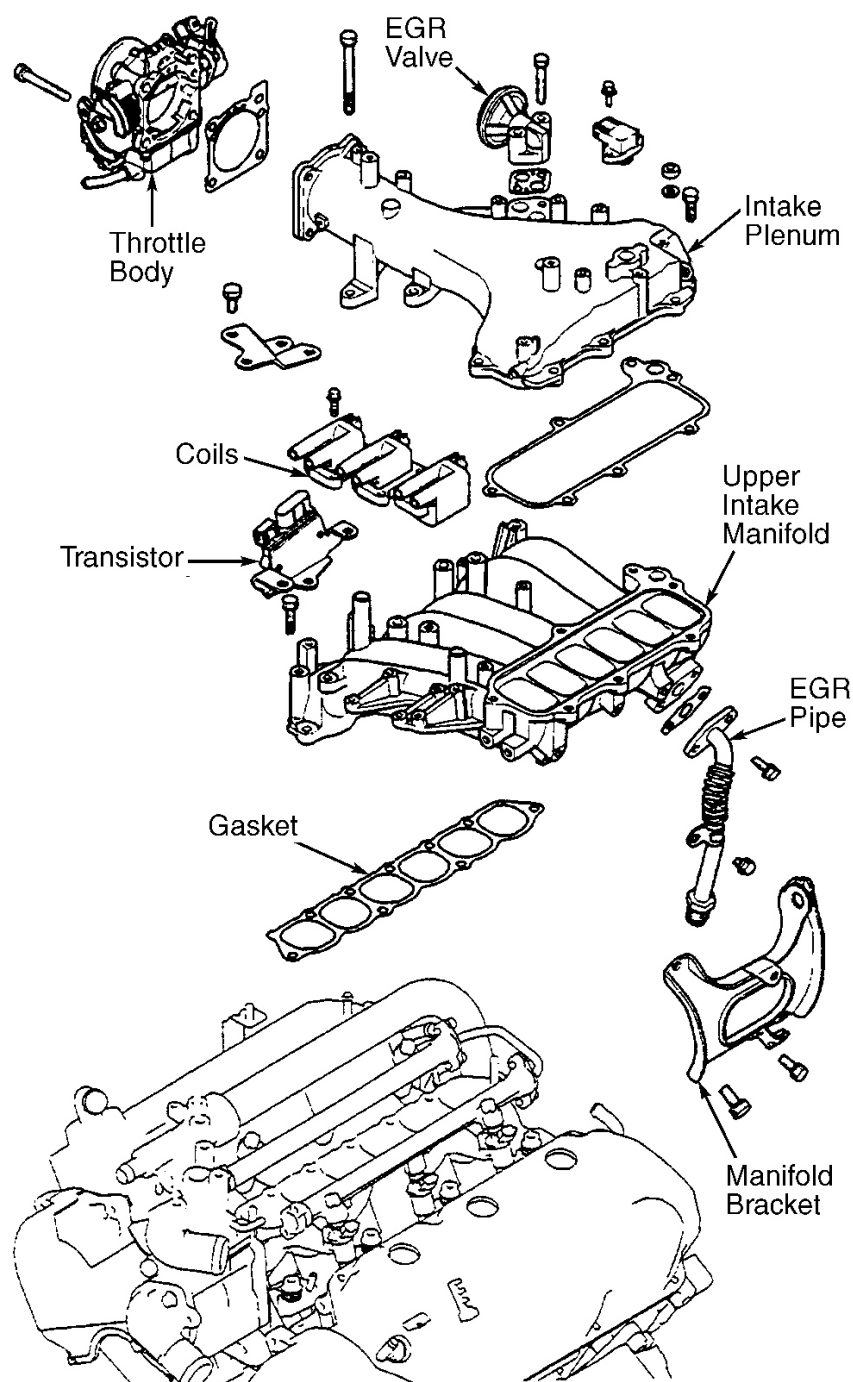


- | | |
|--|-----------------------------------|
| 1. Fuel Injector Connectors | 7. Insulators |
| 2. High-Pressure Fuel Line | 8. Insulators |
| 3. "O" Ring | 9. PCV Hose |
| 4. Fuel Return Hose | 10. Front Upper Timing Belt Cover |
| 5. Vacuum Hose | 11. Bracket |
| 6. Fuel Rail, Injector
& Pressure Regulator | 12. Intake Manifold |
| | 13. Gasket |

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Fig. 1: Exploded View Of Intake Manifold & Components (Eclipse & Galant)

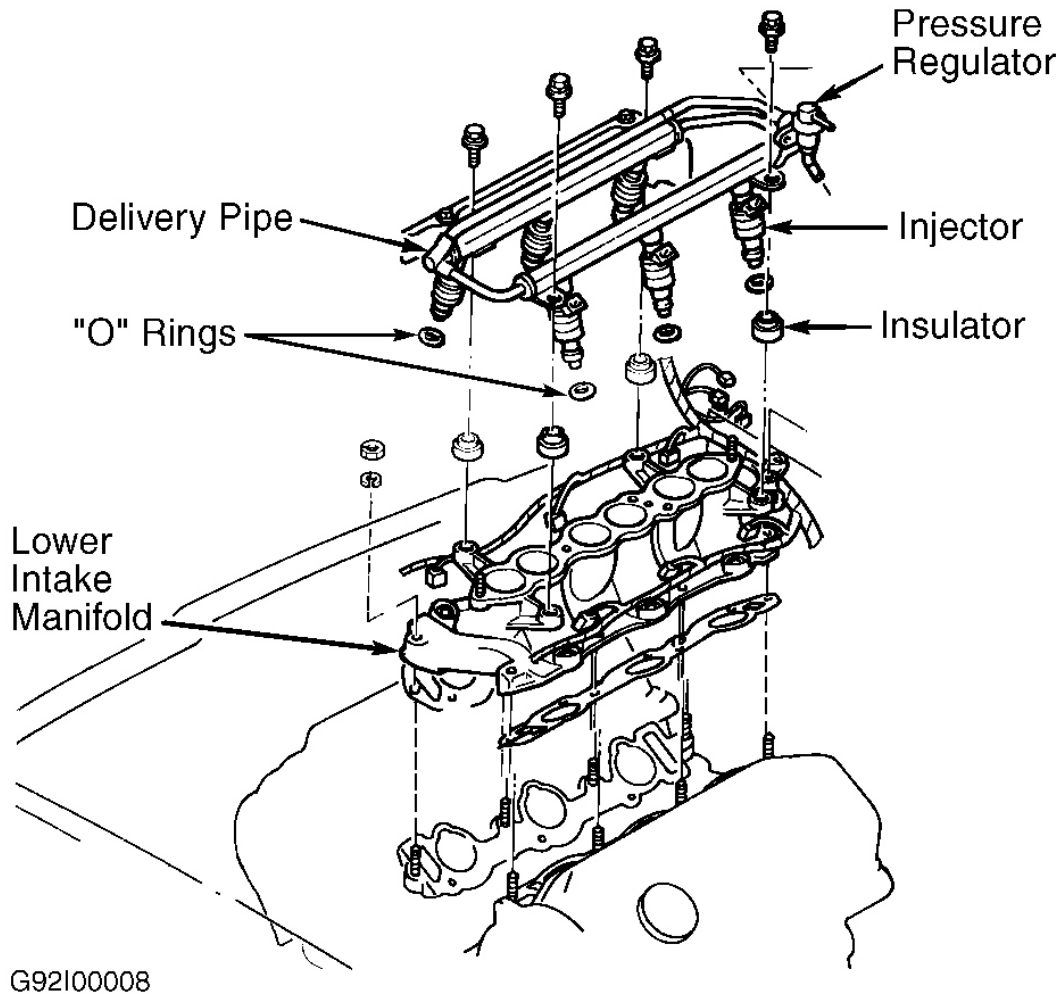
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 2: Exploded View Of Upper Intake Manifold Components (Montero Sport Shown; Others are Similar)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

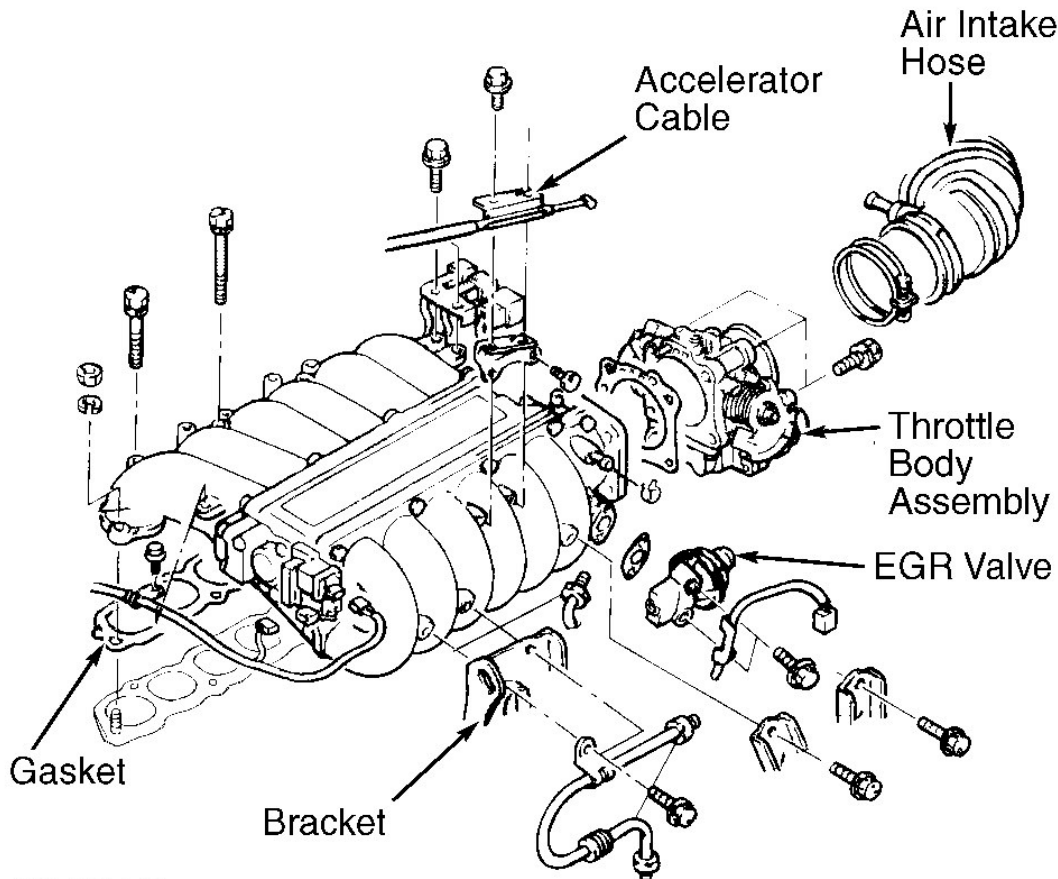


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Fig. 3: Exploded View Of Lower Intake Manifold (Typical)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Removal (3000GT - DOHC Non-Turbo)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Remove air intake hose. Remove EGR tube. Remove both intake plenum braces. Remove EGR valve. Remove throttle body. Remove accelerator cable bracket. Drain coolant. Label and disconnect all vacuum hoses, cooling system hoses and electrical connections. Remove intake plenum.
2. Disconnect high pressure fuel hose and fuel return hose. Remove timing belt upper cover. Disconnect fuel injector wiring harness connectors. Remove fuel injectors, fuel rails and insulators. Remove retaining nuts and intake manifold. See **Fig. 3** and **Fig. 4**.



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Fig. 4: Exploded View Of Upper Intake Manifold Components (3000GT - DOHC Without Turbo)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Removal (3000GT - DOHC Turbo)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Remove air intake hose. Label and disconnect all vacuum hoses, cooling system hoses and electrical connections. Remove turbo air pipe. Remove EGR tube. Remove EGR valve. Remove throttle body. Remove intake plenum and gasket.
2. Disconnect high pressure fuel hose and fuel return hose. Remove timing belt upper cover. Disconnect fuel injector wiring harness connectors. Remove fuel injectors, fuel rails and insulators. Remove retaining nuts and intake manifold. See **Fig. 3** and **Fig. 5**.

Removal (3000GT - SOHC)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Drain cooling system. Remove air intake hose. Remove throttle body. Remove EGR valve and tube. Remove intake manifold plenum stay connection. Remove plenum bolts and nuts. Remove intake manifold plenum and gasket.

2. Remove wiring harness connector. Remove fuel pressure regulator, fuel injectors, fuel rails and grommets. Remove coolant and heater hoses. Remove coolant outlet fitting and thermostat. Remove retaining nuts and lower intake manifold.

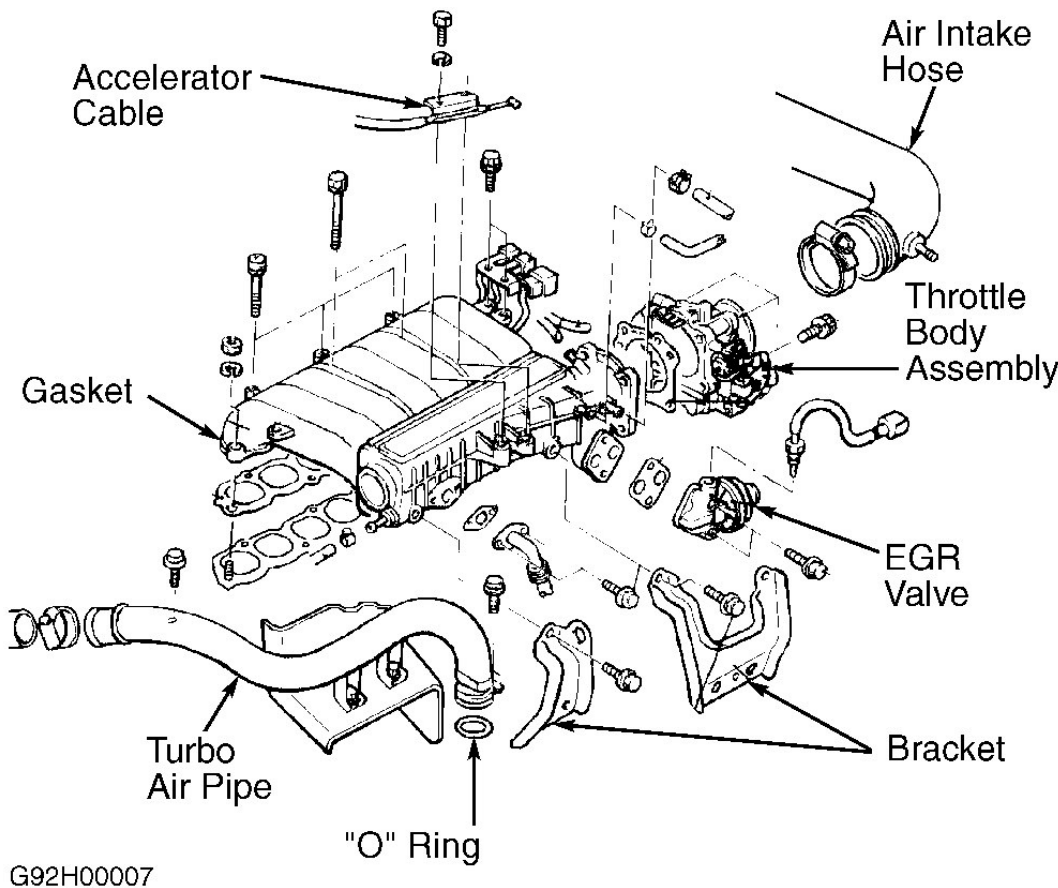


Fig. 5: Exploded View Of Upper Intake Manifold Components (3000GT - SOHC & DOHC With Turbo)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Installation (All Models)

Clean all gasket mating surfaces. Inspect for damage and cracks on all mounting surfaces. To install, reverse removal procedure using NEW gaskets and "O" rings. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

TURBOCHARGER

CAUTION: DO NOT allow foreign material into turbocharger air intakes or coolant and oil passages.

Removal (Front)

1. Drain coolant. Remove radiator. Remove right transaxle brace. Disconnect exhaust pipe from turbocharger. Remove all air intake ducts. Note match marks and installation depth on air pipes and hoses for reinstallation reference. Remove accessory drive belt. Remove generator. Remove A/C compressor and bracket, leaving hoses connected, and support aside.
2. Remove oxygen sensor. Remove dipstick assembly. Remove turbocharger heat shield. Disconnect turbo coolant feed and return lines. Disconnect turbocharger oil feed and return lines. Remove turbocharger assembly.

Removal (Rear)

1. Drain coolant. Remove battery. Disconnect accelerator cable at bracket and throttle body. Disconnect exhaust pipe from turbocharger. Remove all air intake pipes and heat shields. Note match marks and installation depth on air pipes and hoses for installation reference. Disconnect accelerator cable at pedal.
2. Remove clutch booster vacuum hose. Remove oxygen sensor. Remove EGR tube. Remove turbocharger heat shield. Disconnect turbocharger coolant feed and return lines. Disconnect turbocharger oil feed and return lines. Remove turbocharger assembly.

Installation (Front & Rear)

Inject clean engine oil into turbocharger through oil pipe installation hole. To complete installation, reverse removal procedure. Align match marks, and install air ducts and hoses to proper depth.

EXHAUST MANIFOLD**Removal (Eclipse & Galant)**

Remove right and left bank heat protectors. Remove left bank exhaust manifold and gasket. On federal models, remove exhaust manifold stay. On all models, remove EGR pipe. Remove right bank heat upper protector. Remove left bank exhaust manifold.

Removal (Montero Sport)

Disconnect exhaust pipes from manifolds. Lower exhaust pipes. Remove air cleaner. Remove battery and battery tray. Remove engine oil dipstick assembly. Remove EGR tube and gasket, if equipped. Remove heat shields. Remove front intake manifold plenum bracket. Remove exhaust manifolds and gaskets.

Removal (3000GT - DOHC Non-Turbo)

Remove exhaust pipe, main muffler and catalytic converter. Remove drive belt and generator assembly. Remove oil gauge guide. Remove heat protector. Remove front exhaust manifold and gasket. Remove EGR pipe. Remove rear exhaust manifold.

Removal (3000GT - DOHC Turbo)

Remove turbocharger assembly. Remove heat protectors from both manifolds. Remove front exhaust manifold. Remove exhaust manifold stay. Remove gasket. Remove rear exhaust manifold and gasket.

Removal (3000GT - SOHC)

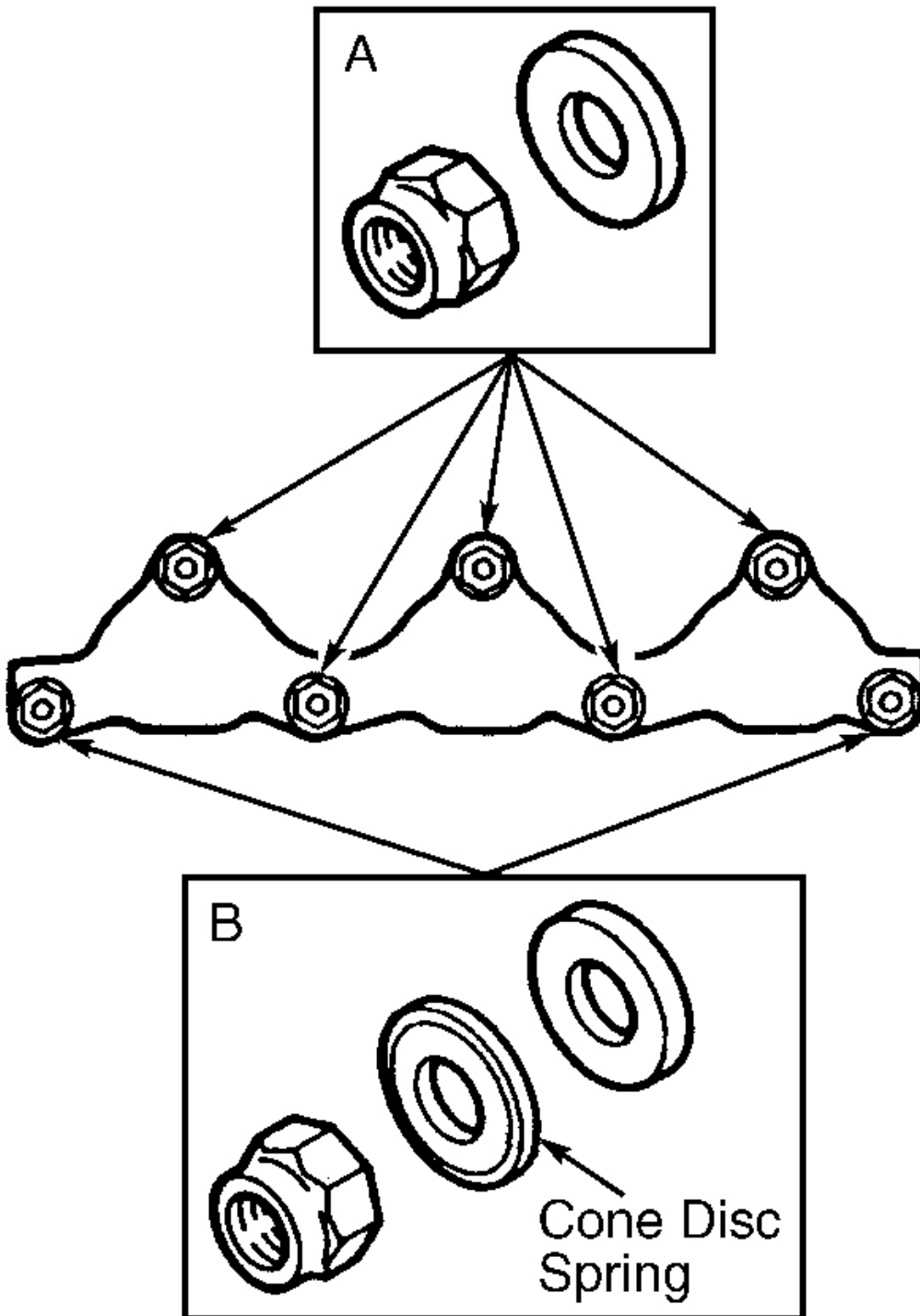
1. Remove turbocharger(s), if equipped. See **TURBOCHARGER**. On front manifold, remove drive belt and generator. Remove oil dipstick assembly. On rear manifold, remove EGR tube, if equipped.

NOTE: **Note locations and orientation of exhaust manifold washers for installation reference. DO NOT mix these fasteners.**

2. On all manifolds, remove exhaust pipe-to-manifold nuts. Lower exhaust pipe. Remove heat shield. Remove exhaust manifold nuts and washers. Remove exhaust manifold and gasket.

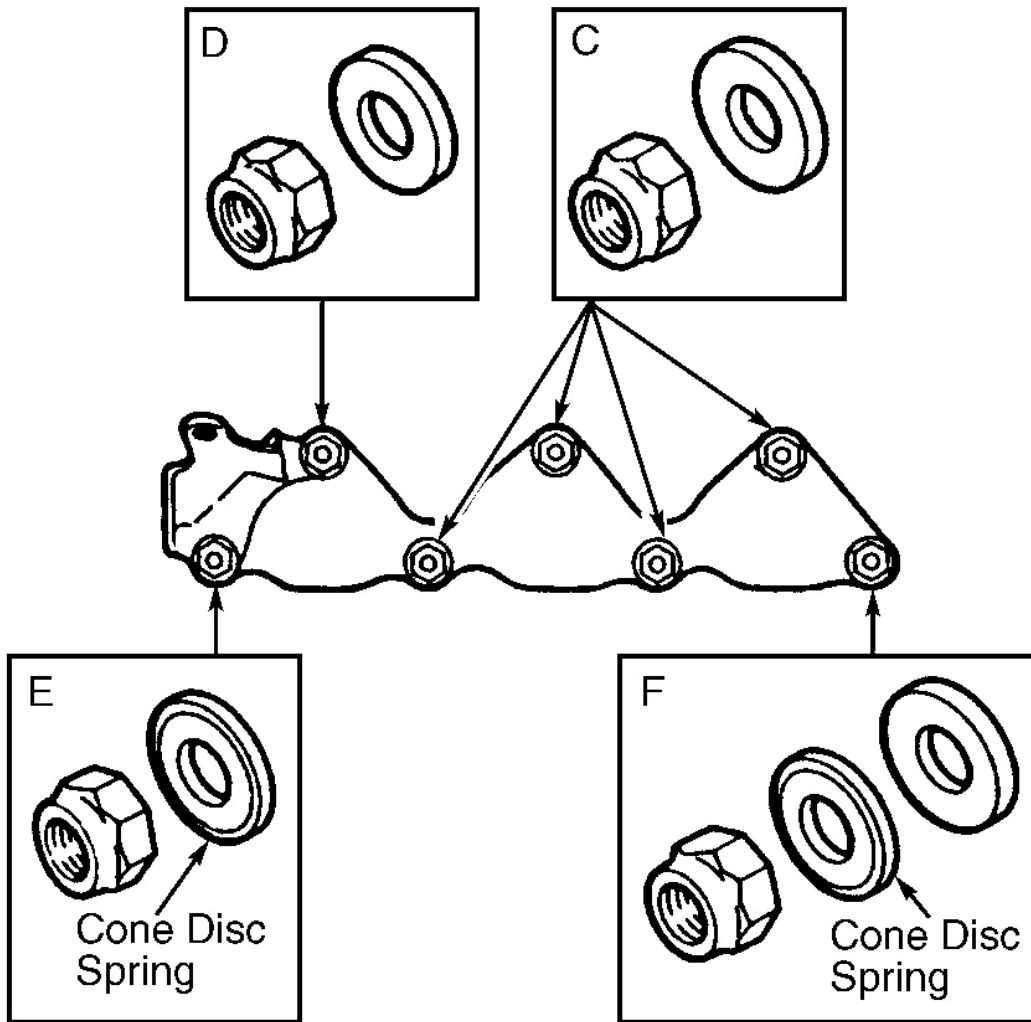
Installation (All Models)

To install, reverse removal procedure. Install NEW gaskets. Lubricate NEW dipstick tube "O" ring with engine oil before installation. Install manifold nuts and washers in original locations. On 3000GT, tighten nuts "A"-"F" in sequence. See **Fig. 6** and **Fig. 7** . See **TORQUE SPECIFICATIONS**. On Montero Sport, tighten nuts to specification.



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Fig. 6: Locating Rear Exhaust Manifold Bolts (3000GT - DOHC Turbo)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 7: Locating Front Exhaust Manifold Bolts (3000GT - DOHC Turbo)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

CYLINDER HEAD

Removal (DOHC)

1. Drain cooling system. Remove intake manifolds and brackets. See **INTAKE MANIFOLD**. Remove turbocharger(s), if equipped. See **TURBOCHARGER**. Remove exhaust manifolds. See **EXHAUST MANIFOLD**.

2. Remove spark plug wires and ignition coils. Remove rocker cover and gasket. Remove timing belt and timing belt inner covers. See **TIMING BELT**. Remove intake camshaft sprockets.
3. Remove heater hose and water hoses. Remove radiator hose. Remove thermostat housing. Remove water inlet pipe. Using Socket (MD998051), loosen cylinder head bolts evenly in 2 or 3 stages. Remove cylinder head and gasket. For installation reference, note orientation of washers under cylinder head bolts.

Inspection (DOHC)

Measure cylinder head height. Measure warpage at gasket and manifold surfaces. Resurface head if warpage exceeds specification. See **CYLINDER HEAD (DOHC)** table under ENGINE SPECIFICATIONS. After resurfacing, re-measure cylinder head height. Replace cylinder head if not within specification.

Installation (DOHC)

1. Ensure mating surfaces are clean and dry. Note identification mark located on front of head gasket. Install head gasket with identification mark toward timing belt side of engine, facing upward. Align all holes in head gasket.
2. Install cylinder head. Install cylinder head bolt washers with chamfered side toward bolt head. Using proper sequence, tighten bolts to specification in 2 or 3 stages. See **Fig. 8**. See **TORQUE SPECIFICATIONS**.
3. To reinstall camshaft sprocket, hold hexagonal area of camshaft with wrench while tightening sprocket bolt. Tighten rocker cover bolts in a crisscross pattern. Start at 4 corners of rocker cover and work toward center.

NOTE: **Rocker cover bolts are color-coded. Front cylinder bank bolts are Black, and rear cylinder bank bolts are Green.**

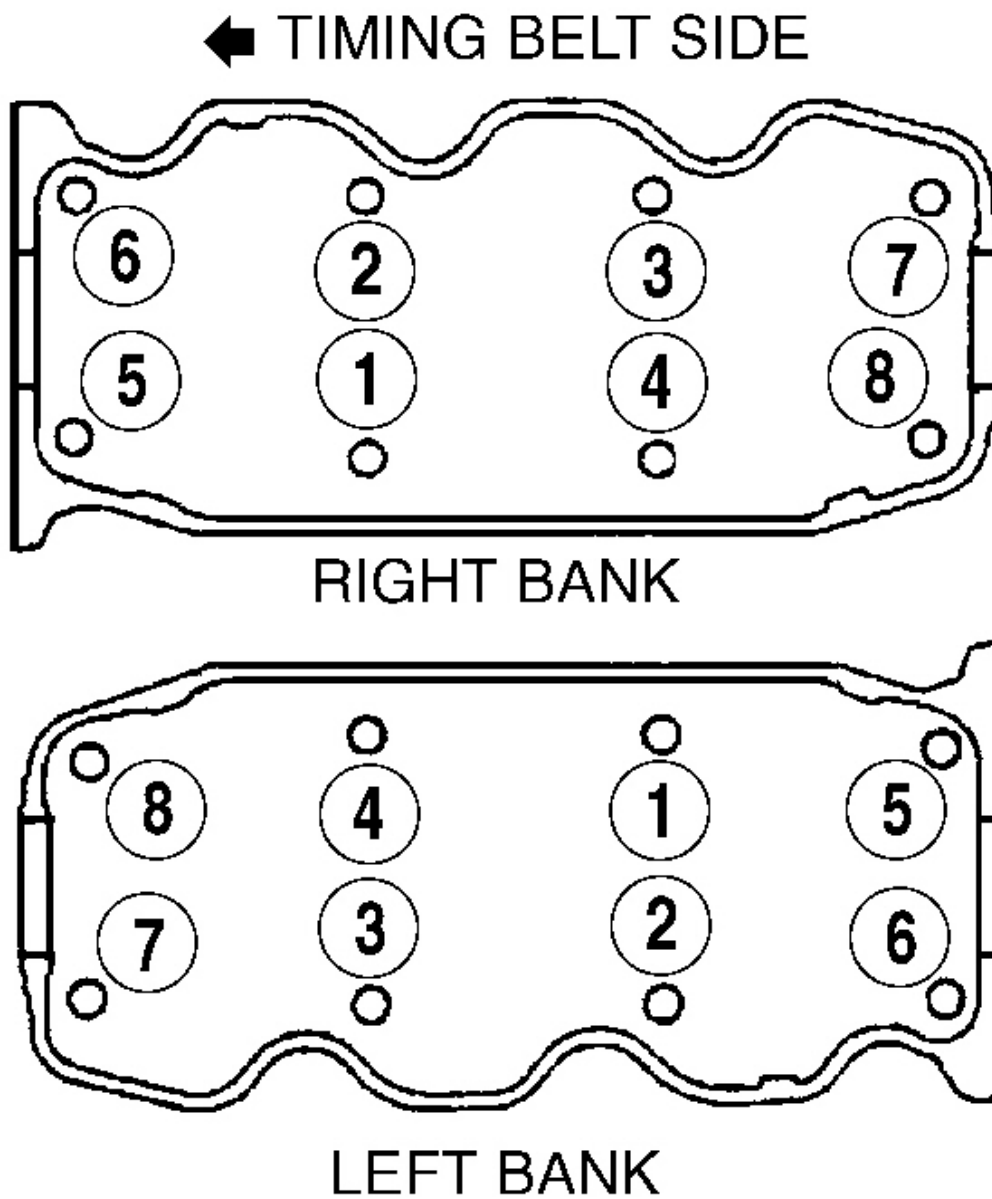
4. To complete installation, reverse removal procedure. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

Removal (SOHC)

1. Drain cooling system. Remove exhaust manifolds. See **EXHAUST MANIFOLD**. Remove intake manifolds and brackets. See **INTAKE MANIFOLD**.
2. Remove timing belt outer covers, camshaft sprockets, timing belt, and timing belt inner covers. See **TIMING BELT**. Remove accessory bracket bolts from front of cylinder head. Remove vacuum pipe assembly. Remove rocker cover and gasket.

NOTE: **To prevent cylinder head warpage and cracking, loosen cylinder head bolts in 2 or 3 stages in reverse order of installation sequence. See Fig. 8.**

3. Using Socket (MD998051), remove cylinder head bolts. Remove cylinder head and camshaft assemblies. Note orientation of washers under cylinder head bolts.



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Fig. 8: Cylinder Head Bolt Installation Sequence

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Inspection (SOHC)

Measure cylinder head height. Measure warpage at gasket and manifold surfaces. Resurface head if warpage exceeds specification. See **CYLINDER HEAD (SOHC)** table under ENGINE SPECIFICATIONS. Replace cylinder head if not within specification after resurfacing.

Installation (SOHC)

1. Ensure mating surfaces are clean and dry. Note identification mark located on front of head gasket. Install head gasket with identification mark toward timing belt side of engine, facing upward.
2. Install cylinder head. Install cylinder head bolt washers with chamfered side toward bolt head. Using proper sequence, tighten bolts to specification in 2 or 3 stages. See **Fig. 8**. See **TORQUE SPECIFICATIONS**.
3. Apply sealant to rocker cover sealing surfaces before installation. See **Fig. 9**. Align rocker cover gasket projections with notches in rocker cover. Lubricate all "O" rings with engine oil before installation. Install NEW "O" rings onto distributor adapter and oil dipstick tube.
4. Lubricate camshaft area with oil prior to installing distributor adapter. To complete installation, reverse removal procedure. Tighten bolts and nuts to specification. See **TORQUE SPECIFICATIONS**. After engine reaches normal operating temperature, allow engine to cool. Retighten cylinder head bolts to specification.

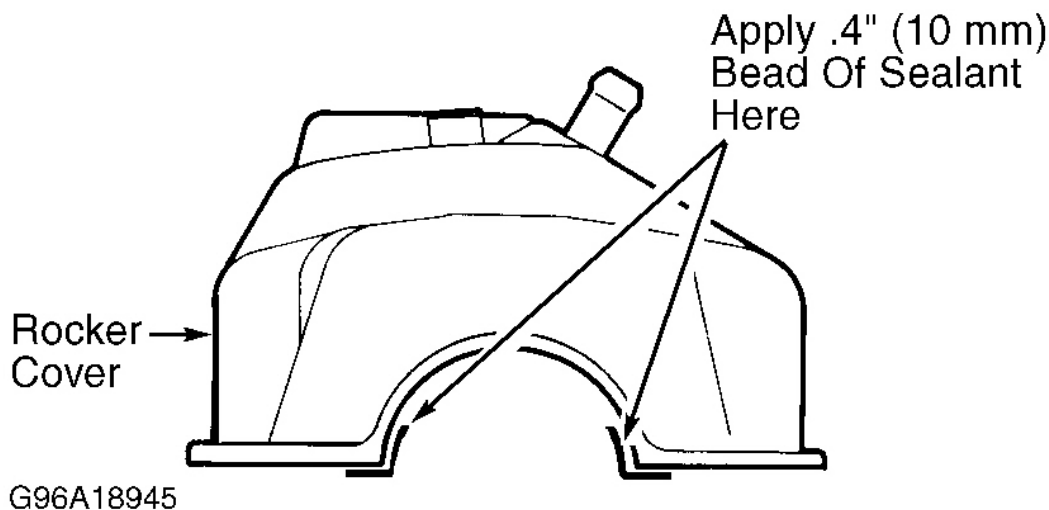


Fig. 9: Applying Sealant To Rocker Cover (SOHC)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

FRONT CRANKSHAFT OIL SEAL

Removal & Installation

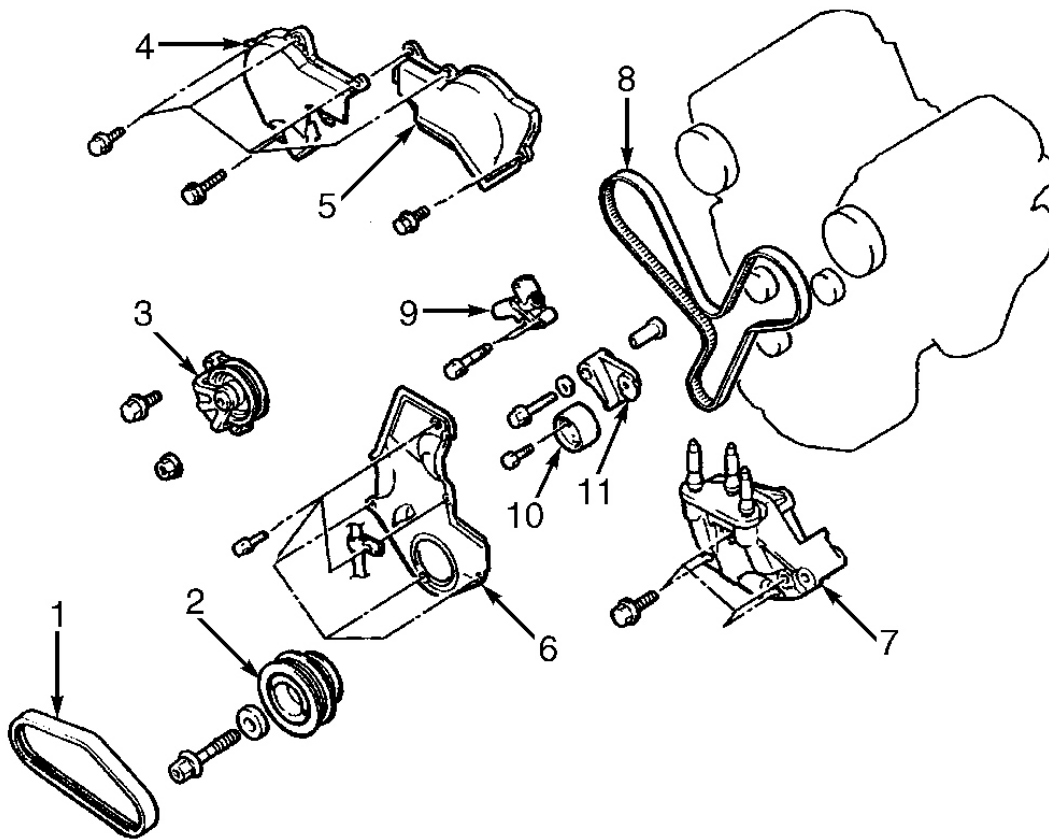
Remove timing belt and crankshaft sprocket. See **TIMING BELT**. Pry oil seal from oil pump. Before installation, coat seal lip with grease. Using Seal Driver (MD998717), install seal in oil pump. Install remaining

components. See **TORQUE SPECIFICATIONS.**

TIMING BELT

Removal (Eclipse & Galant)

1. Remove generator. Remove engine mount bracket. Remove power steering and oil pump drive belt. Using Crankshaft Pulley Holder Pin (MD998715) and Tensioner Wrench (MD998767), remove crankshaft pulley from crankshaft. See [Fig. 10](#).
2. Remove power steering pump. Remove right and left front timing belt covers. Remove timing belt front lower cover. Remove right engine support bracket. Turn crankshaft clockwise. Align timing marks with No. 1 cylinder at TDC of compression stroke. See [Fig. 16](#).
3. If reusing timing belt, place arrow on belt to indicate belt running direction. Loosen tensioner pulley center bolt. Remove timing belt and tensioner. Remove tensioner pulley and tensioner arm.



- | | |
|---|--|
| 1. Drive Belt
(Power Steering Oil Pump) | 5. Left Front Upper Timing
Belt Cover |
| 2. Crankshaft Pulley | 6. Front Lower Timing Belt Cover |
| 3. Tensioner Pulley Assembly
(Power Steering Oil Pump) | 7. Right Engine Support Bracket |
| 4. Right Front Upper Timing
Belt Cover | 8. Timing Belt |
| | 9. Auto-Tensioner |
| | 10. Tensioner Pulley |
| | 11. Tensioner Arm |

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Fig. 10: Exploded View Of Timing Belt Components (Eclipse & Galant)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Installation (Eclipse & Galant)

1. Install belt tensioner arm and tensioner pulley. While holding auto tensioner, press end of push rod against cylinder block with a force of 22-44 lbs. (98-196 N). Measure push rod distance "B". See **Fig. 11**. Distance should be .039" (1.0 mm) or less. If measurement is not within specification, replace auto tensioner.
2. Position auto tensioner in vise. Slowly compress push rod of auto tensioner until pin hole "A" in pushrod aligns with pin hole "B" in cylinder. See **Fig. 12**. Insert setting pin into pin holes once aligned. Install auto

tensioner in engine.

3. Align camshaft sprocket, rocker cover and crankshaft sprocket timing marks. See **Fig. 16**. Install timing belt so there is no deflection in timing belt between each sprocket and pulley. Turn camshaft sprocket counterclockwise until tension side of timing belt is stretched. Recheck timing marks.
4. Using Tensioner Wrench (MD998767), push tensioner pulley into timing belt. Temporarily tighten center bolt. Using Crankshaft Pulley Spacer (MD998769), turn crankshaft 1/4 turn counterclockwise. Turn crankshaft until timing marks align.
5. Loosen center bolt of tensioner pulley. Using tensioner wrench and torque wrench, apply tension torque to timing belt. Timing belt tension torque should be 39 INCH lbs. (4.4 N.m). Tighten center bolt to 35 ft. lbs. (48 N.m). Remove installed setting pin. Turn crankshaft clockwise 2 complete revolutions to align timing marks. Wait five minutes and ensure auto tensioner pushrod extends .15-.20" (3.8-5.0 mm). If auto-tensioner push rod is not within specification, repeat steps 4 and 5. Recheck timing marks.
6. Install right engine support bracket, and tighten right mounting bolts in sequence. See **Fig. 13**. To complete installation, reverse removal procedure. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

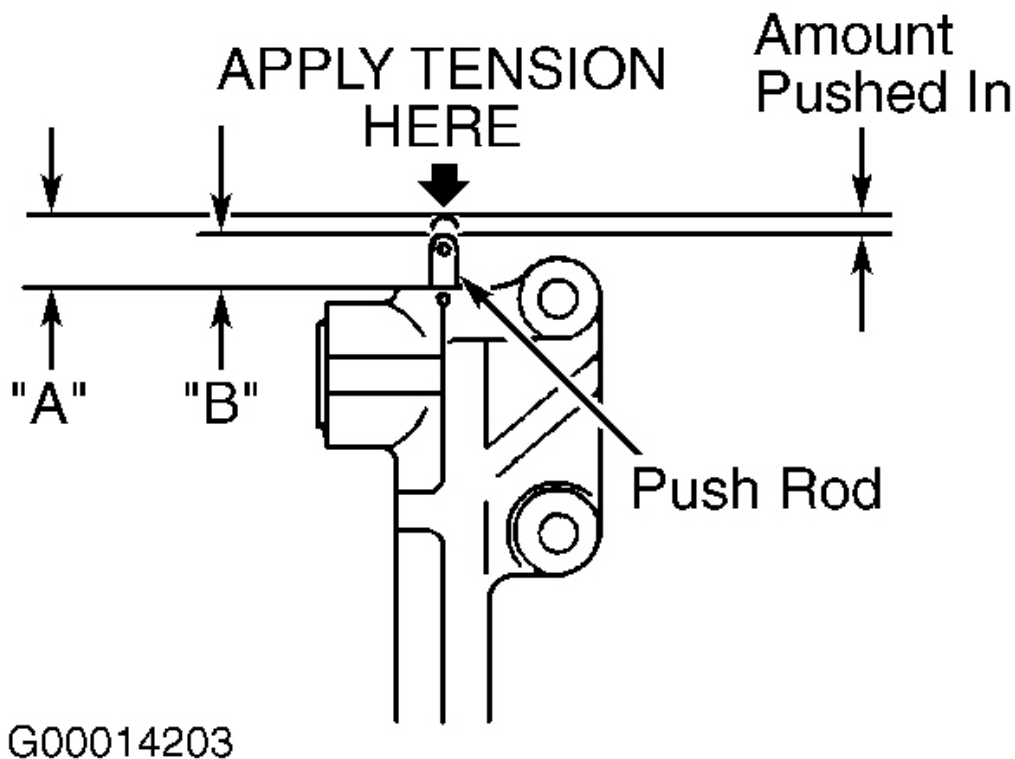


Fig. 11: Measuring Push Rod Clearance

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

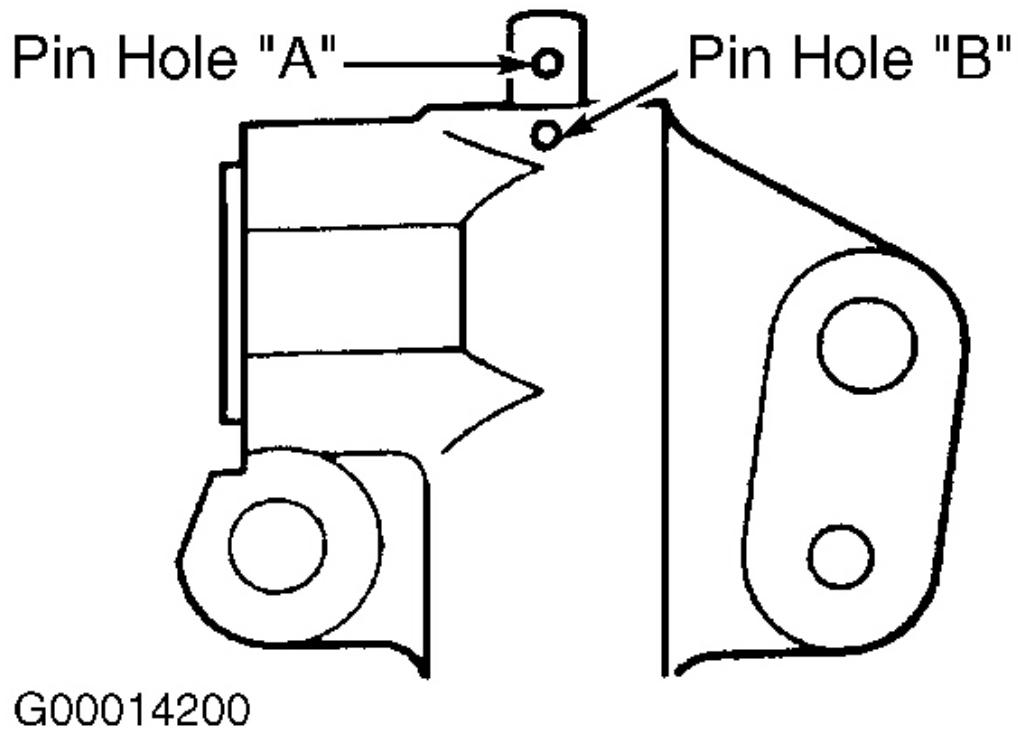
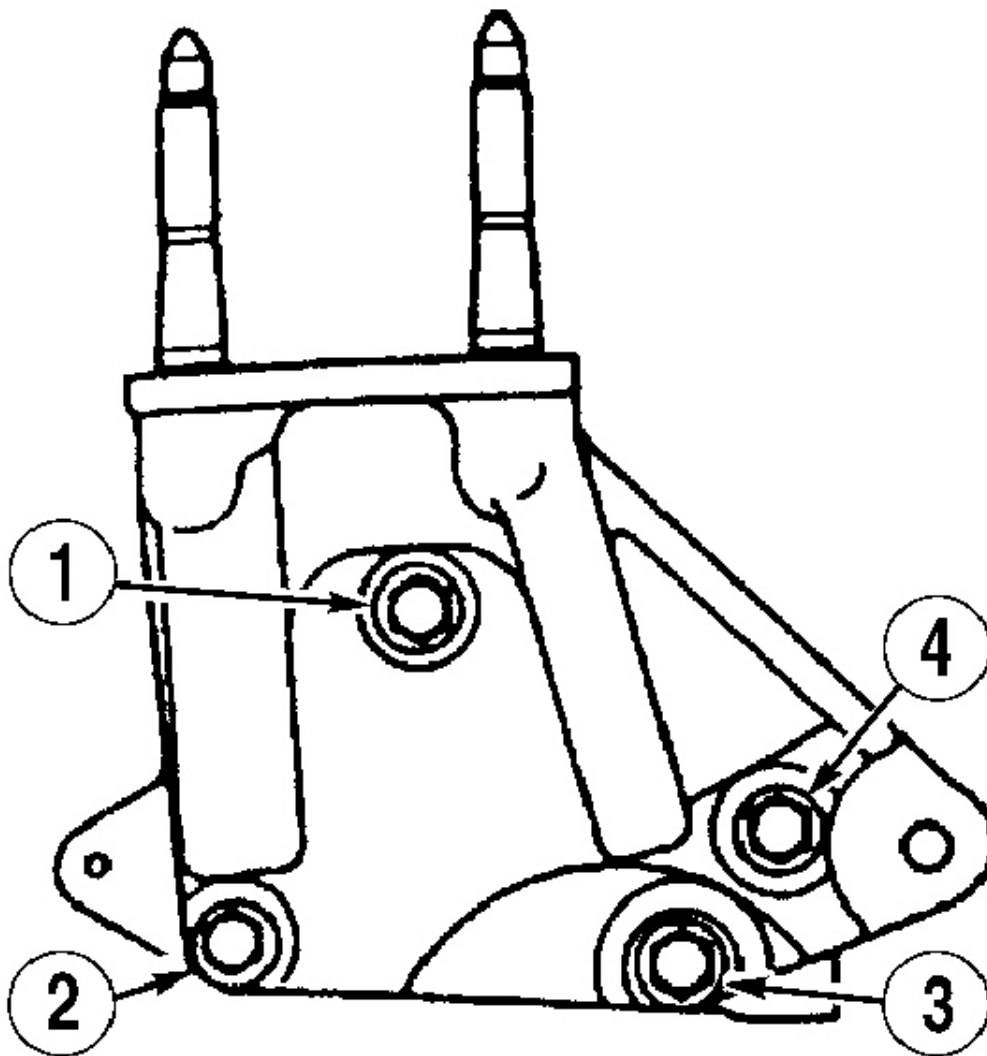


Fig. 12: Identifying Auto Tensioner Pin Holes
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 13: Right Engine Support Bracket Removal & Installation Sequence (Eclipse & Galant)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Removal (Montero Sport)

1. Drain cooling system. Disconnect upper radiator hose. Remove upper radiator shroud. Remove cooling fan and fan clutch assembly. Remove cooling fan pulley. Remove drive belts. Remove power steering pump, leaving hoses connected. Set power steering pump aside.

2. Remove power steering pump brackets. Remove A/C tensioner pulley and mounting bracket. Remove A/C compressor with hoses connected, and remove mounting bracket. Remove cooling fan bracket assembly. Note location and length of bolts for reassembly reference. Remove right engine support bracket. See **Fig. 14**.
3. Remove upper timing belt cover and gasket. See **Fig. 15**. Remove lower timing belt cover and gasket. Using Holder (MB990767) and Holder Pin (MD998715), remove crankshaft pulley.
4. Rotate crankshaft to align all timing marks. See **Fig. 16**. Loosen belt tensioner bolt, and rotate belt tensioner counterclockwise to relieve belt tension.
5. If reusing timing belt, place arrow on belt to indicate direction of belt rotation. Remove timing belt and belt tensioner. If camshaft sprocket requires removal, install Holder (MB990767) and Holder Pin (MD998715) onto camshaft sprocket. Remove retaining bolt and camshaft sprocket.

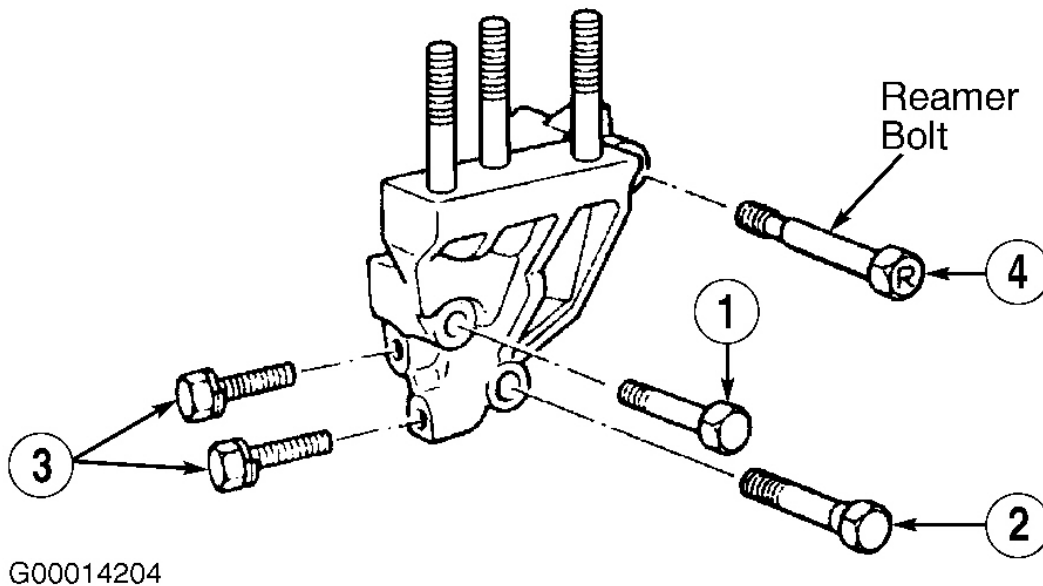


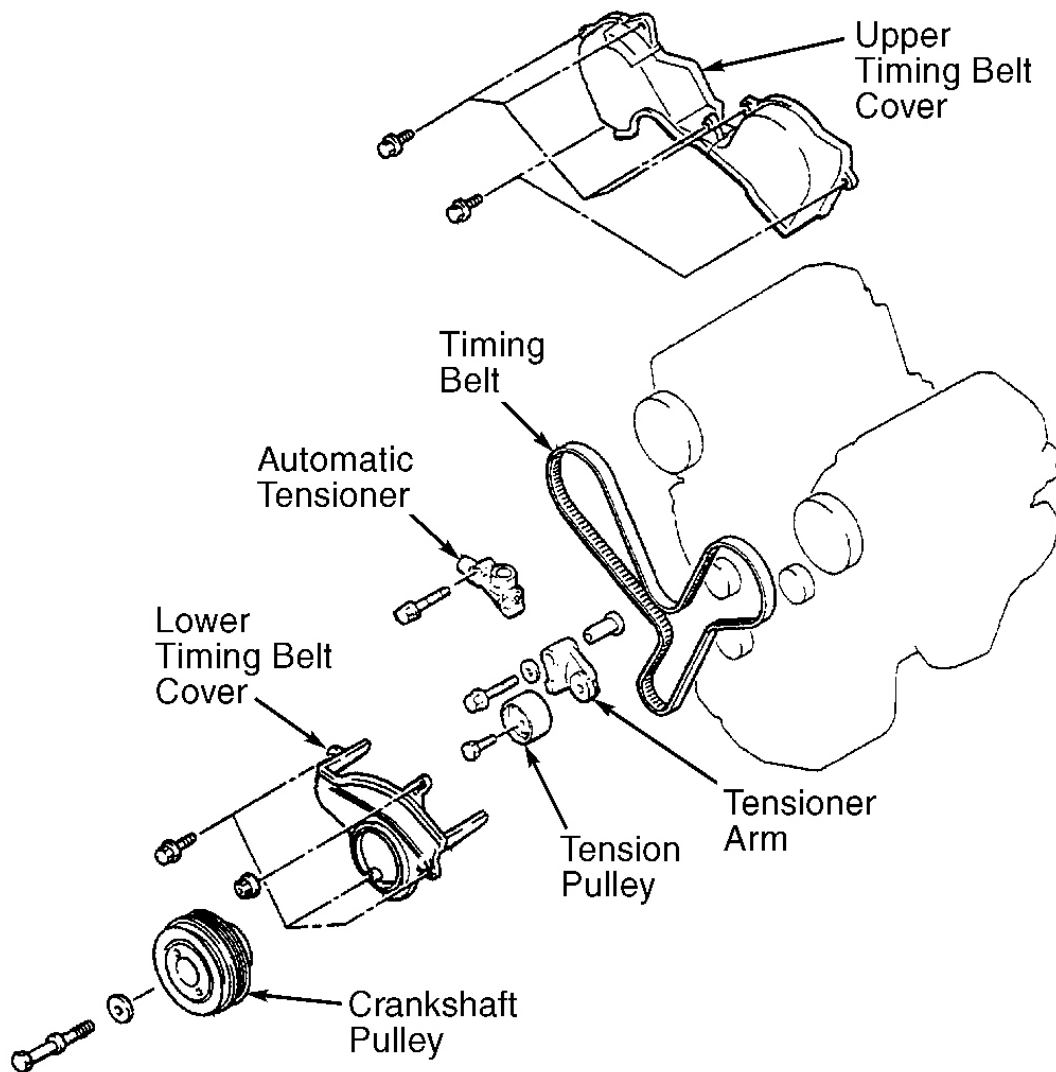
Fig. 14: Right Engine Support Bracket Removal Sequence (Montero Sport & 3000GT)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Installation (Montero Sport)

1. Install camshaft sprockets (if removed). Using holder, hold camshaft and tighten retaining bolt to specification. See **TORQUE SPECIFICATIONS**.
2. Install belt tensioner arm. Ensure auto-tensioner rod is not fully extended. If tensioner rod is fully extended, position auto-tensioner in vise and slowly close vise to align rod hole and set hole. Insert a .055" (1.4 mm) wire into set holes. Install auto-tensioner.
3. Rotate belt tensioner counterclockwise as far as possible, and temporarily tighten bolt. Align all timing marks with No. 1 cylinder at TDC of compression stroke. See **Fig. 16**.
4. Install timing belt onto crankshaft sprocket first, then onto left camshaft sprocket with all slack removed

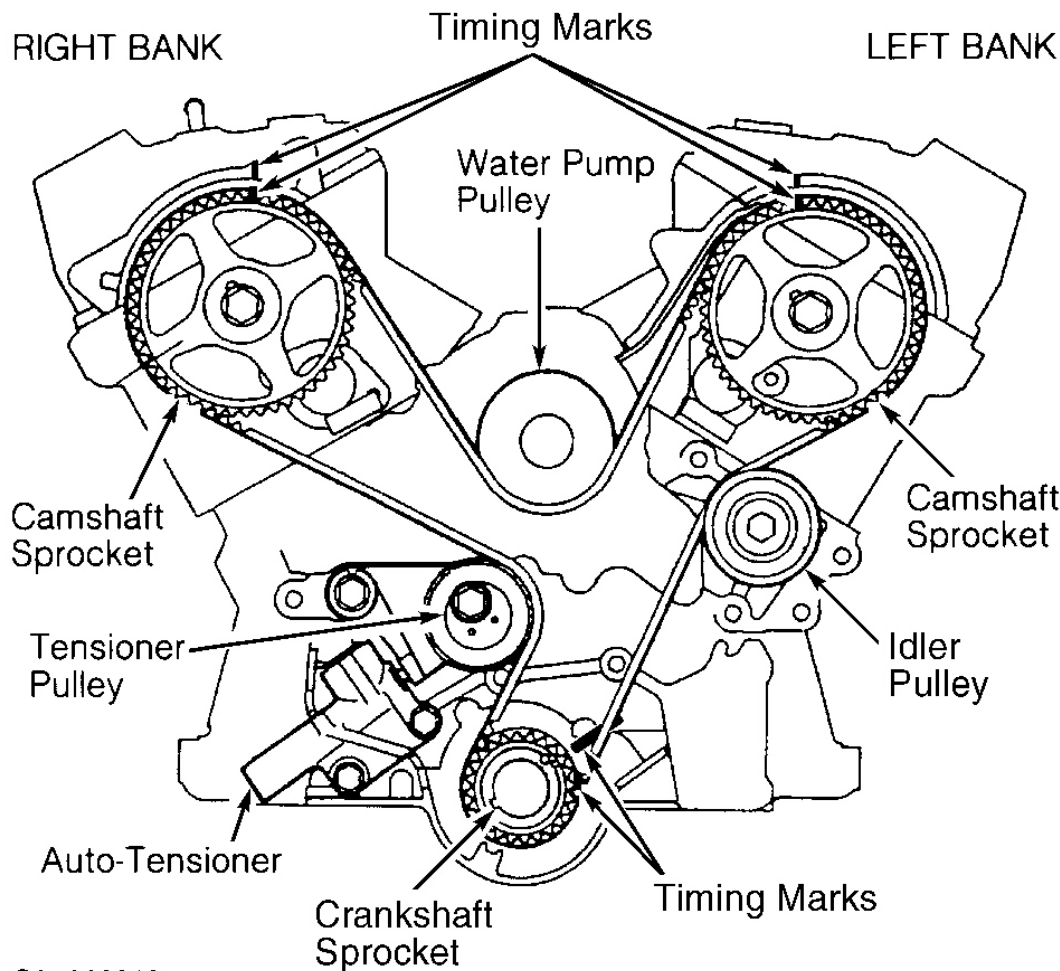
from tension side of belt. Route timing belt onto water pump pulley, right camshaft sprocket and tensioner. Remove any slack from belt by rotating left and then right camshaft sprockets counterclockwise.

5. Ensure belt is installed in original direction of rotation, and all timing marks are aligned. Loosen belt tensioner bolts slightly, and allow tensioner to apply belt tension.
6. Using Crankshaft Socket (MD998769) wrench, rotate crankshaft 1/4 turn counterclockwise, and then 2 revolutions clockwise. Ensure all timing marks are aligned. Use Tension Pulley Wrench (MD998767) to push tensioner pulley into timing belt, and then temporarily tighten center bolt.
7. Rotate crankshaft 1/4 turn counterclockwise, and then clockwise until all timing marks are aligned. Loosen tensioner center bolt, and then tighten to 35 ft. lbs. (48 N.m). Using Tension Pulley Wrench (MD998767) and torque wrench, check timing belt tension. Timing belt tension should be 39 INCH lbs. (4.4 N.m).
8. Tighten center bolt to 35 ft. lbs. (48 N.m). Remove setting pin from auto-tensioner. Turn crankshaft 2 revolutions and align timing marks. Wait about 5 minutes, and then check if auto-tensioner push rod extends .15-.20" (4-5 mm). If pushrod extension is not as specified, repeat step 6. To install remaining components, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.



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Fig. 15: Exploded View Of Timing Belt Components (Montero Sport)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.



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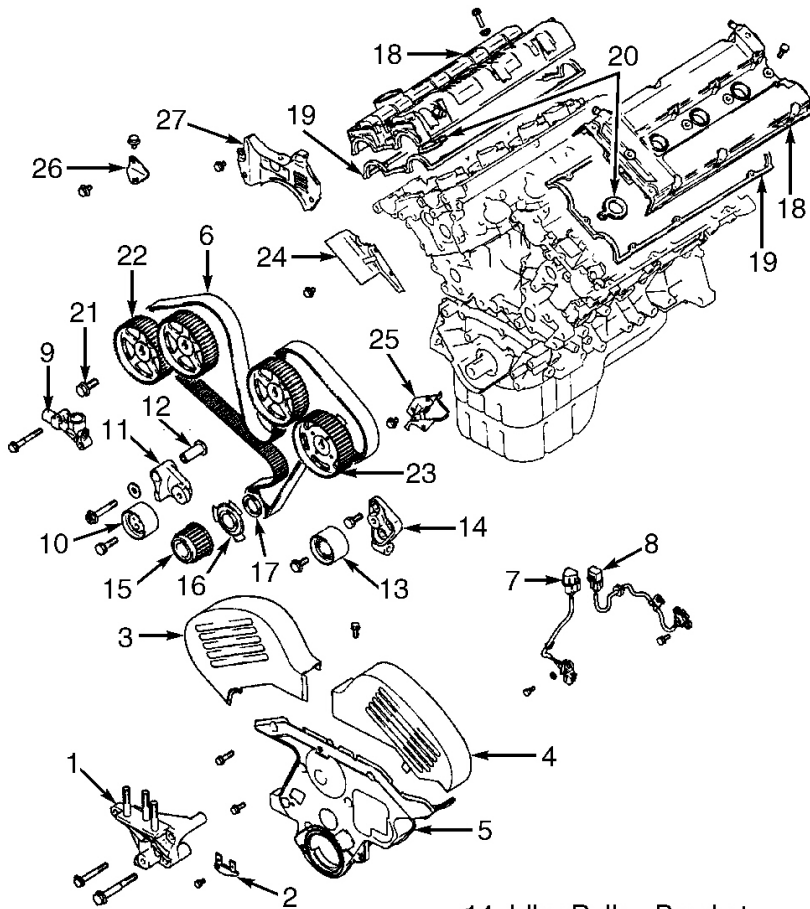
Fig. 16: Aligning Timing Marks (Montero Sport Show; Eclipse & Galant Are Similar)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Removal (3000GT - DOHC)

1. Remove lower splash shields. Remove cruise control actuator, if equipped. Remove drive belts. Remove generator. Remove drive belt tensioner assembly.
2. Remove lower front engine support bracket. Remove crankshaft position sensor bracket. Remove 2 front upper timing belt covers, noting length and location of cover bolts. See **Fig. 17**. Remove lower timing belt cover. If reusing timing belt, place arrow on belt to indicate direction of belt rotation.
3. Rotate crankshaft to align all timing marks. See **Fig. 18**. Remove timing belt. Remove crankshaft and camshaft position sensors. Remove belt tensioner. Remove belt tensioner pulley, tensioner arm assembly and shaft. See **Fig. 17**.
4. Remove drive belt idler pulley and pulley bracket. Using Holder (MB990767) and Adapter Bolts (MD998754), remove crankshaft pulley. Remove sensing plate and washer. Remove valve covers and

gaskets.

5. If camshaft sprocket requires removal, hold camshaft with wrench on hexagonal portion of camshaft. Remove camshaft sprocket bolt and camshaft sprocket. Remove 3 rear timing belt covers, if required.

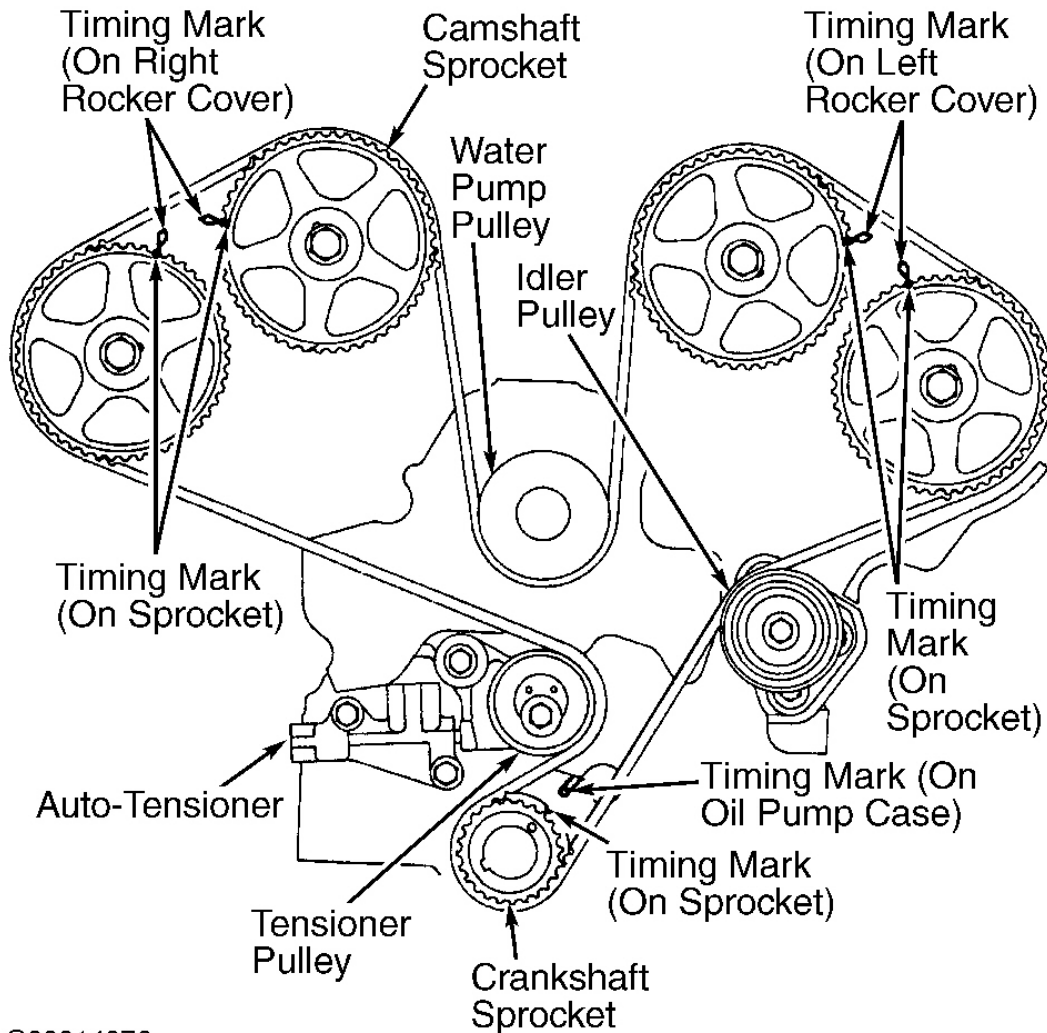


- | | |
|--|-----------------------------------|
| 1. Engine Support Bracket | 14. Idler Pulley Bracket |
| 2. CKP Sensor Bracket | 15. Crankshaft Sprocket |
| 3. Right Front Upper Timing Belt Cover | 16. Sensing Plate |
| 4. Left Front Upper Timing Belt Cover | 17. Washer |
| 5. Lower Front Timing Belt Cover | 18. Valve Cover |
| 6. Timing Belt | 19. Gasket |
| 7. CKP Sensor | 20. Gasket |
| 8. Camshaft Position Sensor | 21. Camshaft Sprocket Bolt |
| 9. Auto-Tensioner | 22. Camshaft Sprocket |
| 10. Tensioner Pulley | 23. Camshaft Sprocket |
| 11. Tensioner Arm | 24. Right Rear Timing Belt Cover |
| 12. Shaft | 25. Left Rear Timing Belt Cover |
| 13. Idler Pulley | 26. Bracket |
| | 27. Center Rear Timing Belt Cover |

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Fig. 17: Exploded View Of Timing Belt Components (3000GT - DOHC)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.



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Fig. 18: Aligning Timing Marks (3000GT - DOHC)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Inspection (3000GT - DOHC)

1. Inspect timing belt for wear, cracks, missing teeth or exposed fibers. Replace as necessary. Inspect tensioner pulley for smooth rotation. Check tensioner for oil leaks. Check tensioner rod for wear or damage. Measure rod projection from tensioner housing. Replace tensioner if rod projection is more than .461-.484" (11.7-12.3 mm).
2. Press tensioner rod with 22-44 lbs. (98-196 N) of force and measure rod movement. Replace tensioner if rod movement is more than .039" (1.0 mm).

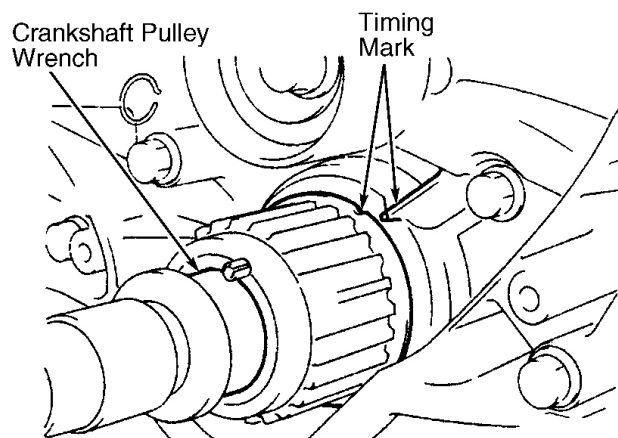
Installation (3000GT - DOHC)

1. Install camshaft sprockets (if removed) and tighten camshaft sprocket bolts to specification. See **TORQUE SPECIFICATIONS**.
2. Place automatic tensioner assembly in a soft-jaw vise. Slowly close vise to press rod back into tensioner until both rod and housing holes are aligned. Install a .055" (1.4 mm) diameter wire through both holes. Remove tensioner from vise, and install assembly with wire in place.

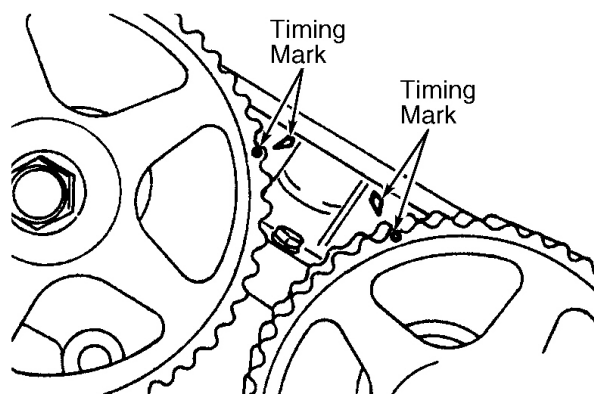
WARNING: Use care when aligning timing marks. When camshaft sprocket timing marks are in indicated area, camshaft is under valve spring pressure and may rotate suddenly, pinching hand between sprockets.

CAUTION: Turning camshaft sprockets while No. 1 cylinder is at TDC may damage valve and piston. Use care when aligning timing marks.

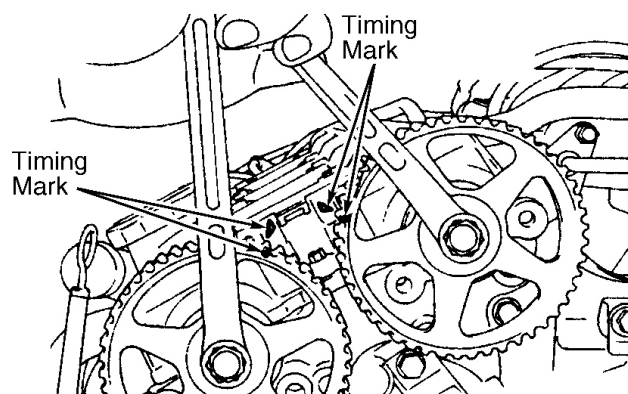
3. Install sensing plate and crankshaft sprocket flange. Install crankshaft sprocket. Rotate crankshaft sprocket one tooth counterclockwise. Align timing marks on left camshaft sprockets. Align timing marks on right camshaft sprockets. See **Fig. 19**.
4. Install timing belt on right side exhaust camshaft sprocket. Use a clip to hold belt in place. Place belt on right intake sprocket. Use a clip to hold belt in place. Ensure left camshaft sprocket timing marks are still aligned, and then install timing belt on left camshaft sprockets. Use clips to hold belt in place.
5. Install timing belt on idler pulley, crankshaft sprocket and belt tensioner pulley. Press belt against tensioner pulley and temporarily tighten tensioner bolt. Remove clips holding timing belt.
6. Rotate crankshaft sprocket 1/4 turn counterclockwise, and then rotate clockwise until timing marks are aligned. Ensure all sprocket timing marks are aligned. See **Fig. 18**.
7. Loosen tensioner pulley center bolt. Using Tensioner Pulley Socket (MD998767), apply about 89 INCH lbs. (10 N.m) torque to tensioner pulley to prevent it from turning. See **Fig. 20**. Retighten center bolt to specification. See **TORQUE SPECIFICATIONS**. Ensure tensioner pulley does not rotate while tightening center bolt.
8. Rotate crankshaft 2 revolutions clockwise. Wait 5 minutes. Verify wire can still be moved easily, or automatic tensioner rod projects from tensioner body .15-.18" (3.8-4.5 mm). If wire does not move easily, or rod projection is not to specification, repeat procedure.
9. To complete installation, reverse removal procedure. Install bolts into correct timing belt cover holes. Install bolts into engine support bracket in reverse order of removal sequence. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.



CRANKSHAFT PULLEY



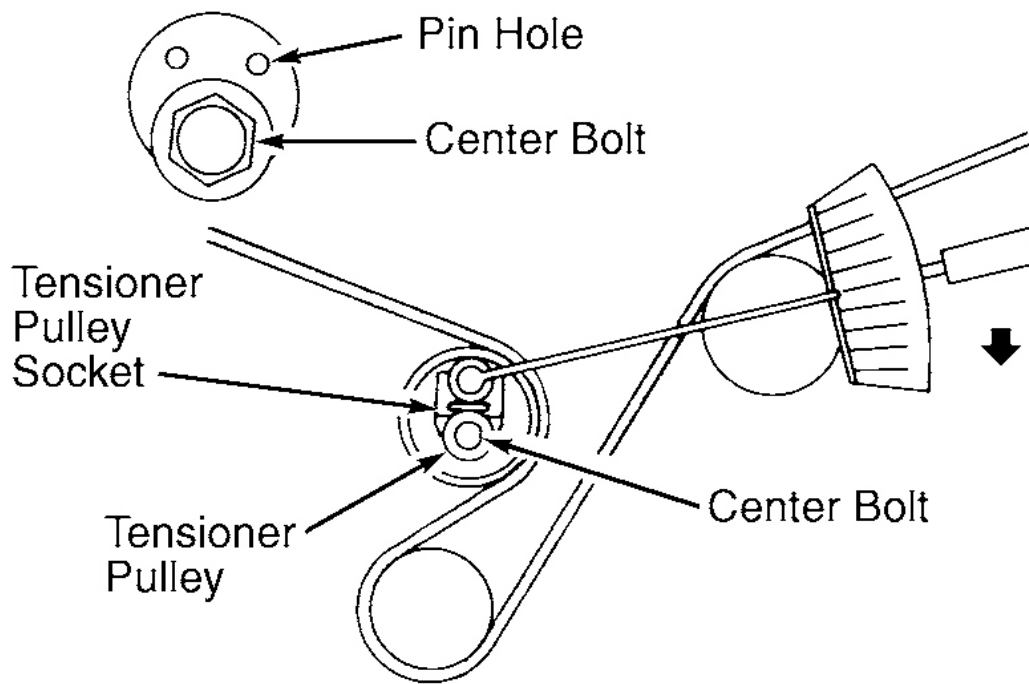
LEFT CAMSHAFT PULLEYS



RIGHT CAMSHAFT PULLEYS

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Fig. 19: Aligning Crankshaft & Camshaft Sprocket Timing Marks (3000GT - DOHC)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.



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Fig. 20: Adjusting Timing Belt Tensioner (3000GT - DOHC)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Removal (3000GT - SOHC)

1. Remove lower splash shields. Remove cruise control actuator, if equipped. Remove all drive belts. Unplug electrical connector at power steering pump. Remove A/C tensioner pulley and mounting bracket.
2. Remove power steering pump, leaving hoses connected and wire aside. Support engine. Remove front engine support bracket bolts and remove support bracket. Remove right front timing belt upper cover and gaskets. See **Fig. 21**.

NOTE: Engine support bracket reamer bolt may be seized. Apply penetrating lubricant to bolt during removal.

3. Remove timing cover cap, left front timing belt upper cover and gasket. Remove timing belt front lower cover. Using Holder (MB990767) and Adapter Bolts (MD998754), remove crankshaft pulley.
4. Remove crankshaft flange. See **Fig. 21**. Rotate crankshaft to align all timing marks. See **Fig. 22**. Loosen belt tensioner bolt. Rotate belt tensioner counterclockwise to relieve belt tension, and then tighten tensioner bolt.
5. If reusing timing belt, place arrow on belt to indicate direction of belt rotation. Remove timing belt and belt tensioner.

6. If camshaft sprocket requires removal, install Holder (MB990767) with Adapter Bolts (MD998754) onto camshaft sprocket. Remove camshaft sprocket bolt and camshaft sprocket. Remove rear timing belt cover if necessary.

Inspection (3000GT - SOHC)

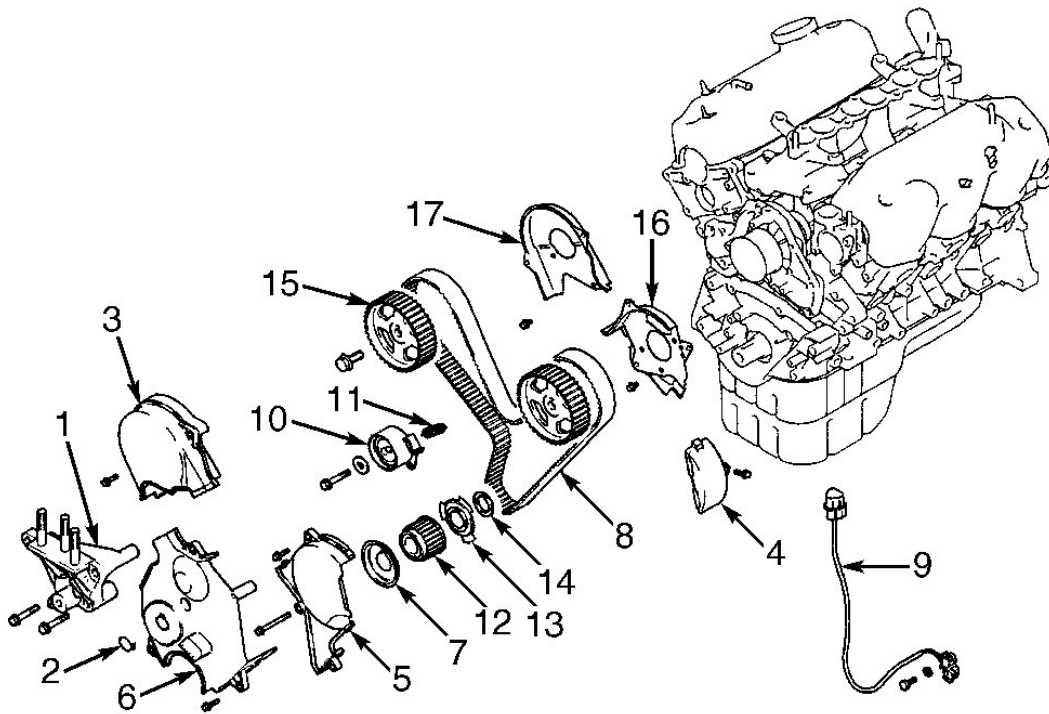
Inspect timing belt for wear, cracks, missing teeth or exposed fibers. Inspect tensioner pulley for smooth rotation. Replace components as necessary.

Installation (3000GT - SOHC)

1. Install rear timing belt cover. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Install camshaft sprockets, if removed. Using holder, hold camshaft and tighten camshaft sprocket bolt to specification.
2. Align camshaft sprockets and crankshaft sprocket timing marks. Install timing belt onto crankshaft sprocket. Keep belt tight and install on left camshaft sprocket, then water pump pulley, right camshaft sprocket, and timing belt tensioner. See **Fig. 22**.
3. Ensure belt is installed in original direction of rotation, and all timing marks are aligned. Install flange onto crankshaft. Loosen belt tensioner bolts slightly, and allow tensioner to apply belt tension.
4. Using Crankshaft Socket (MD990998), rotate crankshaft 2 revolutions clockwise. DO NOT rotate counterclockwise. Realign all timing marks. Tighten belt tensioner bolts to specification. See **TORQUE SPECIFICATIONS**.

NOTE: **Engine support bracket reamer bolt must be tightened slowly. Apply lubricant onto bolt during installation.**

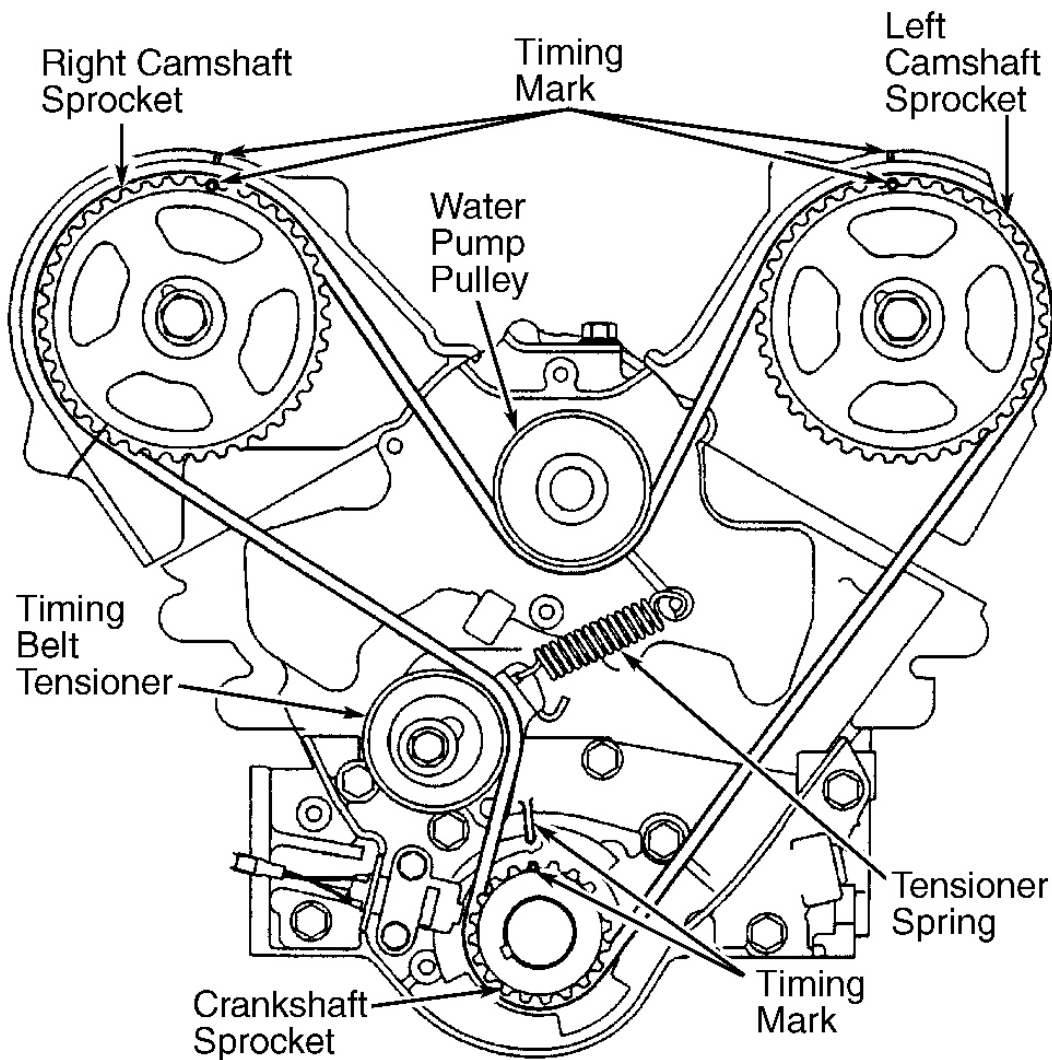
5. Install engine support bracket. To install remaining components, reverse removal procedure. See **Fig. 23**. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.



- | | |
|--|----------------------------------|
| 1. Engine Support Bracket | 8. Timing Belt |
| 2. Access Cover | 9. Crankshaft Position Sensor |
| 3. Right Front Timing Belt Upper Cover | 10. Tensioner |
| 4. Timing Belt Cover Cap | 11. Tensioner Spring |
| 5. Left Front Timing Belt Upper Cover | 12. Crankshaft Sprocket |
| 6. Timing Belt Front Lower Cover | 13. Crankshaft Sensing Blade |
| 7. Flange | 14. Crankshaft Spacer |
| | 15. Camshaft Sprocket |
| | 16. Left Timing Belt Rear Cover |
| | 17. Right Timing Belt Rear Cover |

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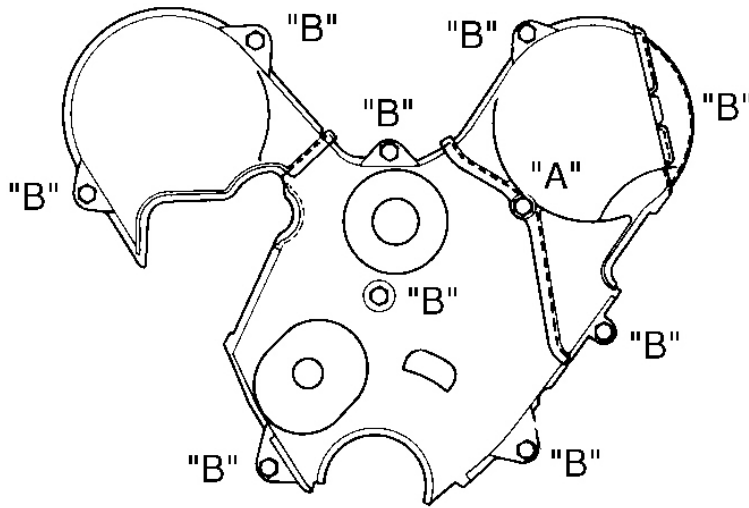
Fig. 21: Exploded View Of Timing Belt Components (3000GT - SOHC)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.



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Fig. 22: Aligning Timing Marks (3000GT - SOHC)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.



Note: Bolt measurements indicated in millimeters.

THREAD DIAMETER & LENGTH

"A" - 6 x 55 mm

"B" - 6 x 20 mm

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Fig. 23: Identifying Timing Belt Cover Bolts (3000GT - SOHC)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

CAMSHAFT & ROCKER ARMS

Removal (DOHC)

Remove front and rear camshaft bearing caps together with seals and packing. Remove remaining camshaft bearing caps in sequence: No. 2, 4 and 3. Remove camshaft, rocker arms and lash adjusters. Mark component location for reassembly reference.

Inspection (DOHC)

Inspect rocker arms for damage. Inspect camshaft for damage. Measure camshaft end play, journal diameter and lobe height. Replace camshaft if it is not within specification. See **CAMSHAFT (3000GT - DOHC)** table under ENGINE SPECIFICATIONS.

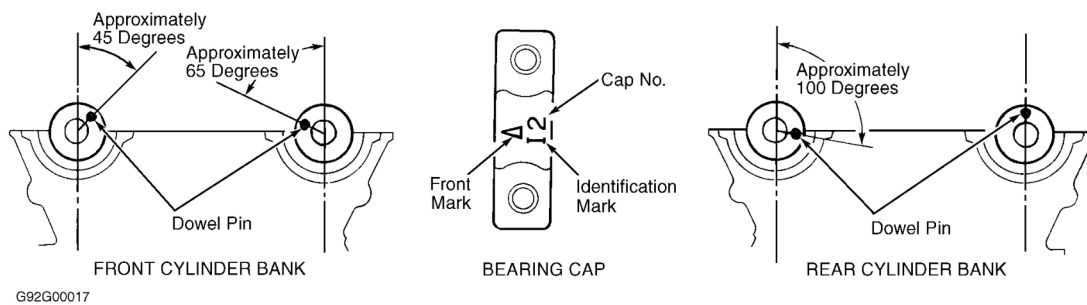
Installation (DOHC)

1. Lubricate components with engine oil. Install lash adjusters and rocker arms. Bring No. 1 cylinder to TDC. Install intake and exhaust camshafts into correct locations.

NOTE: If cylinder head is removed from vehicle, support cylinder head at least .40" (10 mm) above work surface to prevent valve damage while

installing camshaft bearing caps.

2. Install camshaft bearing caps in sequence: No. 3, 4 and 2. Install bearing caps with front mark arrow facing the same direction as similar mark on cylinder head beside bearing journal. Note bearing cap number and identification mark ("I") for intake camshaft and ("E") for exhaust. See **Fig. 24**.
3. Install front and rear bearing caps. Tighten bearing cap bolts to specification. See **TORQUE SPECIFICATIONS**. Lubricate camshaft oil seal area with engine oil. Using Seal Driver (MD998761), install camshaft oil seal. Using Circular Packing Installer (MD998761), install packing.
4. Install crankshaft angle sensor adapter. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

**Fig. 24: Installing Camshafts & Bearing Caps (DOHC)**

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Removal (SOHC)

1. Remove rocker covers and gaskets. Remove circular packing from rear of camshafts. Remove intake manifold plenum stay bracket.
2. Remove camshaft oil seal from front of cylinder head or distributor adapter. Remove distributor adapter and "O" ring. Install Valve Lash Adjuster Holder (MD998443) onto rocker arm. See **Fig. 25**.
3. Bearing cap location number is stamped on front side of bearing cap. Remove bearing cap bolts. Keep components in order for reassembly reference. Remove rocker arm assembly. Remove camshaft from cylinder head.

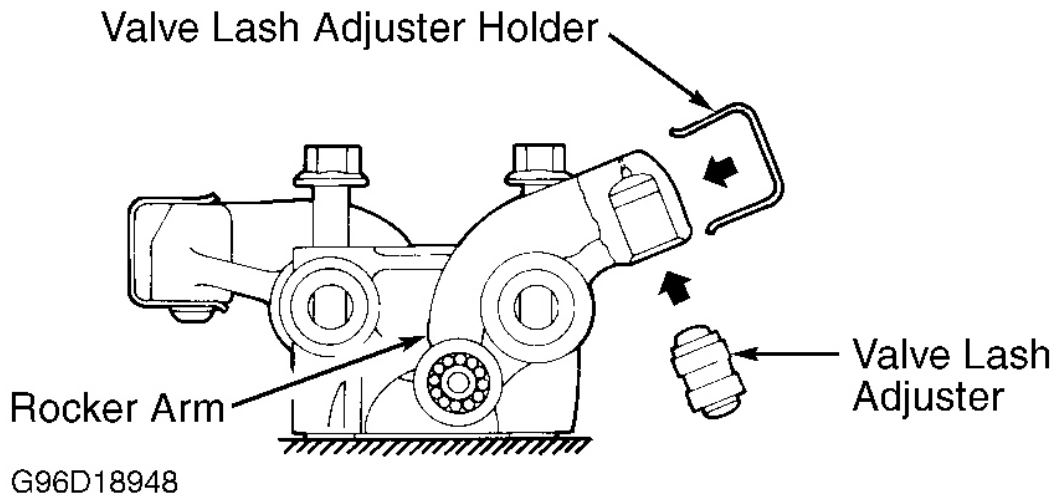
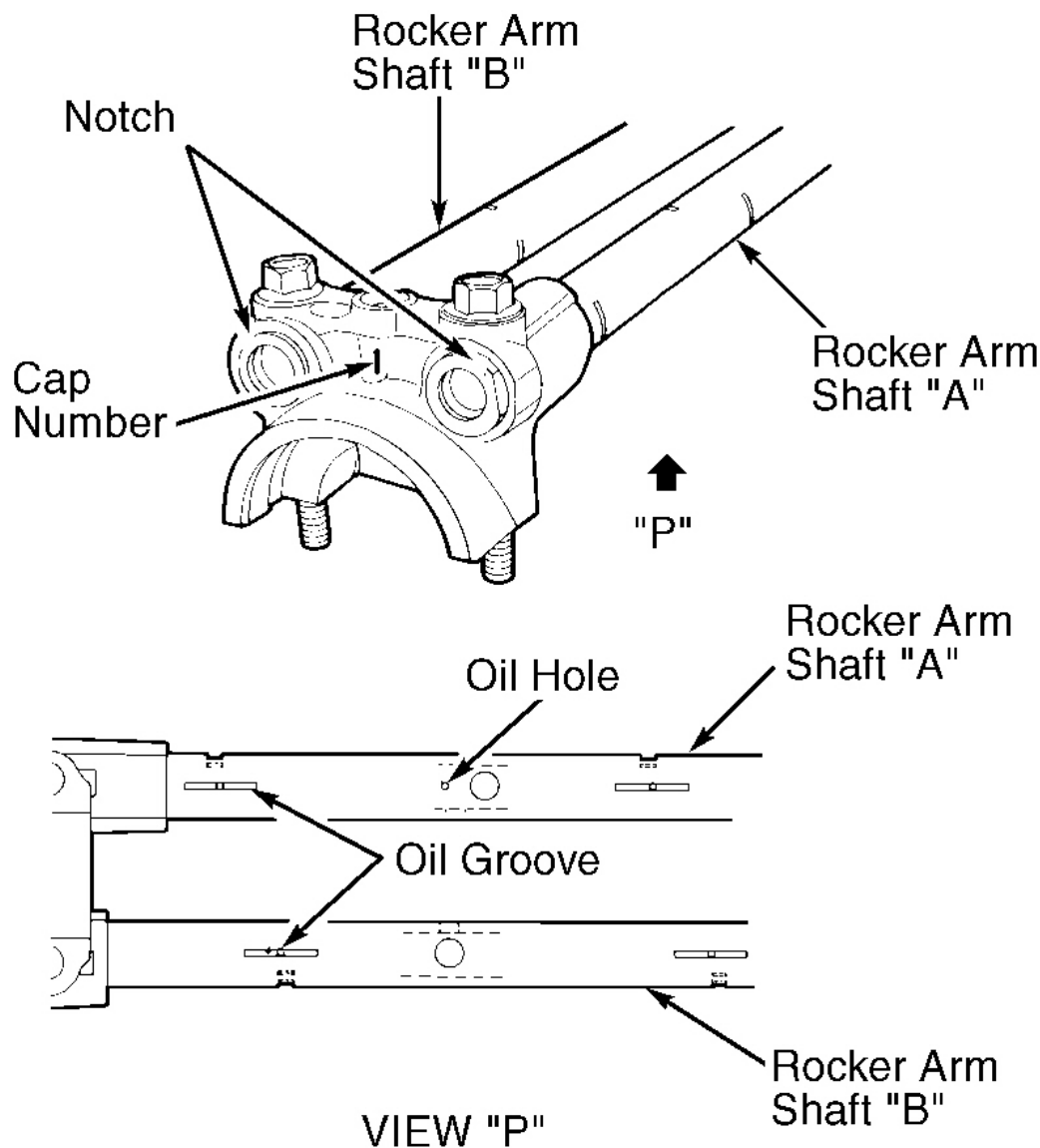


Fig. 25: Installing Valve Lash Adjuster Holder

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Inspection (SOHC)

1. Remove bearing caps, rocker arms and springs from shafts. Mark component location for reassembly reference. Inspect rocker arm and shaft for wear or damage. See **CAMSHAFT (SOHC)** table under ENGINE SPECIFICATIONS. Replace as necessary.
2. Lubricate components with engine oil. Reassemble rocker arms, springs and lash adjuster. Ensure oil holes and notch of shafts are properly positioned. See **Fig. 26**.



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Fig. 26: Installing Rocker Arm Shafts (SOHC)

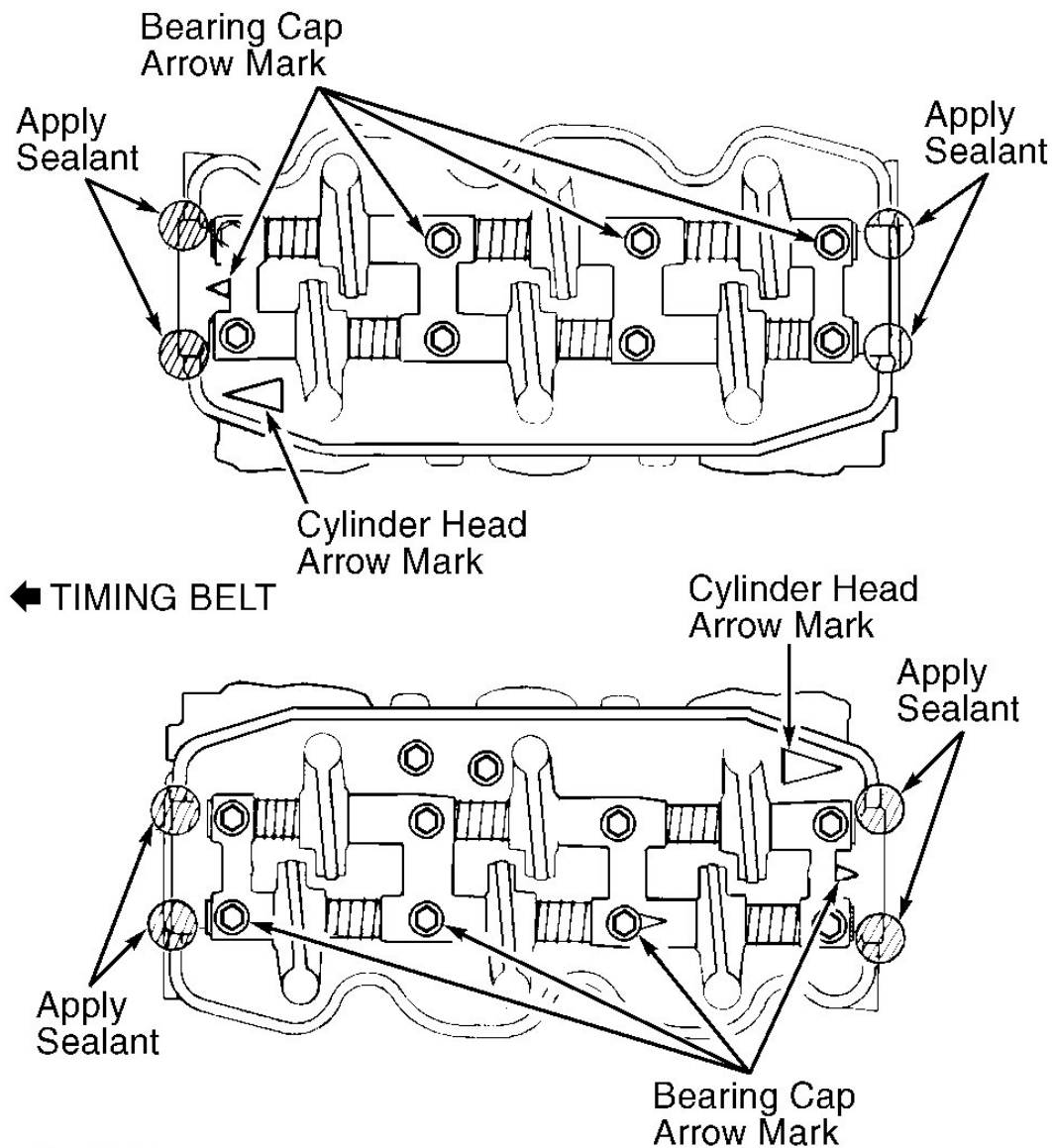
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Installation (SOHC)

1. Lubricate camshaft with engine oil, and install into cylinder head. Install valve lash adjusters and valve lash adjuster holders, if removed. See **Fig. 25**.
2. Apply 3M Sealant (4171) to designated areas of cylinder head. See **Fig. 27**. Ensure sealant does not contact camshaft or camshaft bearings. Install rocker arm assembly. Ensure arrow on bearing cap faces

same direction as arrow on cylinder head. See **Fig. 27**. Tighten bearing cap bolts to specification. See **TORQUE SPECIFICATIONS**. Remove valve lash adjuster holders.

3. Lubricate camshaft oil seal area with engine oil. Using Seal Driver (MD998713), install camshaft oil seal. Using Circular Packing Installer (MD998306), install circular packing to press-in depth of .02" (.5 mm).
4. Apply Three Bond (1212D) sealant to rocker cover sealing surfaces before installation. See **Fig. 9**. Lubricate NEW "O" ring with oil, and install onto distributor adapter, if removed.
5. Lubricate camshaft area with oil before installing distributor adapter. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.



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Fig. 27: Identifying Bearing Cap & Sealant Locations

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

REAR CRANKSHAFT OIL SEAL**Removal**

Remove transaxle/transmission. For A/T vehicles, see TRANSMISSION REMOVAL & INSTALLATION in TRANSMISSION SERVICING. For M/T vehicles, see appropriate article in CLUTCHES. Remove flywheel or drive plate. Remove rear oil seal housing. Pry seal from seal housing.

Installation

Lubricate seal lip with engine oil. Using Seal Driver (MD998718), install seal into seal housing. Apply sealant to sealing surface of seal case. Install seal case. Install flywheel or drive plate. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

WATER PUMP**Removal**

Drain cooling system. Remove timing belt and crankshaft sprocket. See **TIMING BELT**. Remove coolant ducts to water pump if necessary. Remove water pump bolts, noting length and location for reassembly reference. Remove water pump.

Installation

To install, reverse removal procedure, using NEW gasket and "O" rings. Coat "O" rings with water before installation. Install water pump and gasket. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

OIL PAN**Removal (Eclipse, Galant & Montero Sport)**

1. Raise and support vehicle. Remove skid plate and lower covers. Drain engine oil. Remove oil pressure switch. Remove oil filter, bracket and gasket. Remove drain plug and drain plug gasket.
2. Remove oil pan bolts. Using Seal Cutter (MD998727), separate lower oil pan from upper oil pan. Remove lower oil pan. Remove oil pump pick-up screen. Remove baffle plate. Remove upper oil pan.

Removal (3000GT)

1. Raise and support vehicle. Remove engine undercovers. Drain engine oil. Disconnect front exhaust pipe from manifolds. Remove left member. Remove starter.
2. Remove front transaxle stay. On AWD models, remove rear transaxle stay. On all models, remove bellhousing cover. On turbocharged models, remove oil return pipes connection. On all models, remove oil pan bolts. Using Seal Cutter (MD998727), separate oil pan from cylinder block. Remove oil pan.

Inspection (All Models)

Clean sealant from mating surfaces on engine block and oil pan. Inspect oil pan for cracks and damage. Inspect sealing surface for damage and deformation. Inspect oil pick-up screen for damage.

Installation (All Models)

1. To install, reverse removal procedure. Apply sealant to oil pan flange in a continuous .16" (4 mm) diameter bead. See **Fig. 28**. Install oil pan within 15 minutes of applying sealant.
2. Tighten bolts to specification in proper sequence. See **TORQUE SPECIFICATIONS**. Wait at least 30 minutes before adding oil and starting engine. On AWD models, refill transfer assembly with GL-4 hypoid gear oil. On all models, complete installation by reversing removal procedure.

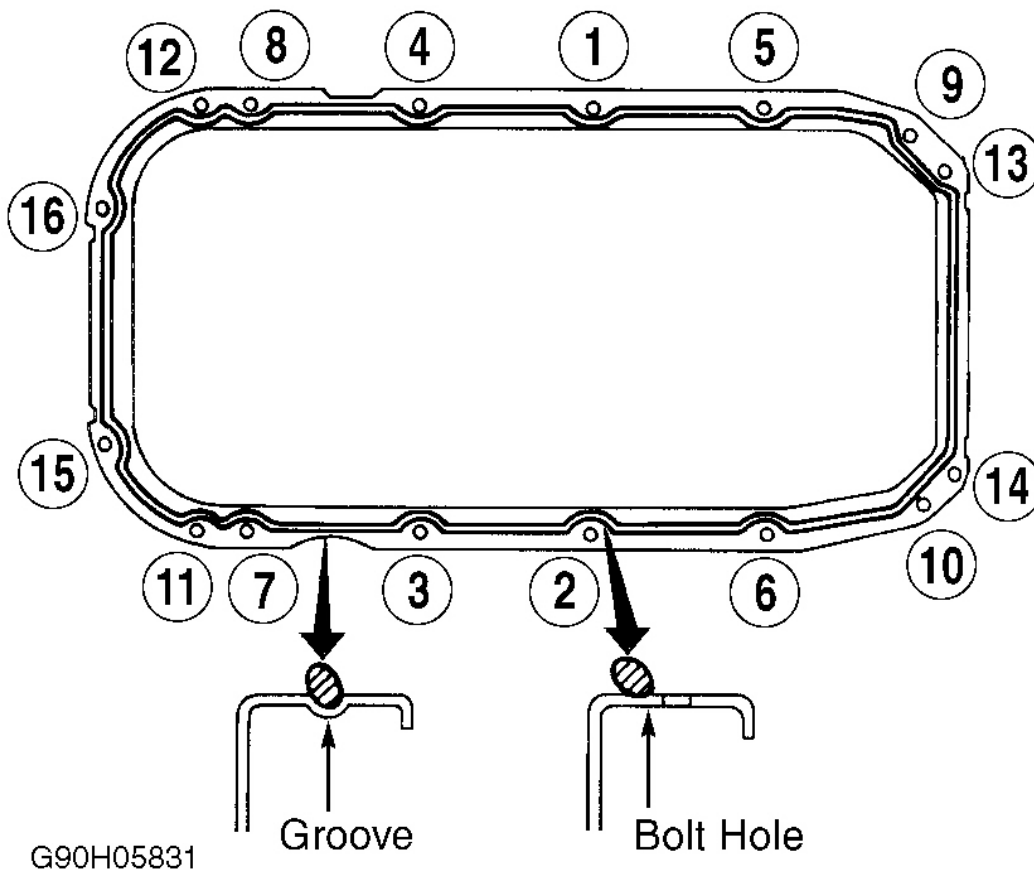


Fig. 28: Applying Sealant & Tightening Oil Pan Bolts

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

OVERHAUL

CYLINDER HEAD

Cylinder Head

Measure cylinder head height. Measure warpage at gasket and manifold surfaces. Resurface head if warpage exceeds specification. See appropriate CYLINDER HEAD table under **ENGINE SPECIFICATIONS**. Replace cylinder head if not within specification after resurfacing.

NOTE: Install valve springs with enamel-coated side toward valve spring retainer.

Valve Springs

Measure free length of valve springs. Measure spring pressure at specified height. Replace springs if not within specification. See appropriate VALVES & VALVE SPRINGS table under **ENGINE SPECIFICATIONS**. Inspect valve spring for squareness. Replace spring if out-of-square specification exceeds 4 degrees.

Valve Stem Oil Seals

With valves removed, remove oil seals from cylinder head. Lubricate new seals with engine oil. Using Valve Stem Oil Seal Installer (MD998774 for Montero Sport; MD998729 for 3000GT - SOHC, or MD998763 3000GT - DOHC), install valve stem oil seal.

Valve Guides

1. Measure valve stem oil clearance. Replace valve guide if not within specification. See appropriate VALVES & VALVE SPRINGS table under **ENGINE SPECIFICATIONS**.
2. Note length of valve guides. Use press and appropriate driver to press valve guide out toward combustion chamber side of head. Cylinder head must be bored to install oversized valve guide once guide is removed. DO NOT install valve guide with same O.D. as old guide. Bore cylinder head to specification for oversize valve guide.
3. Using valve guide remover/installer, install valve guide. See appropriate CYLINDER HEAD table under **ENGINE SPECIFICATIONS**. Ensure valve slides smoothly in valve guide. Recondition valve seat.

Valve Seat (DOHC)

Grind seat wall until seat can be removed. Machine cylinder head to accommodate an oversize valve seat. See **OVERSIZE VALVE SEAT SPECIFICATIONS (DOHC)** table. Heat cylinder head to about 482°F (250°C), or chill valve seat with liquid nitrogen, and install valve seat. Grind valve seat using 45-degree stone. Use 30-degree and 65-degree stones to adjust seat height.

OVERSIZE VALVE SEAT SPECIFICATIONS (DOHC)

Application	In. (mm)
Intake	
Seat Ring Bore Diameter	
.012" (.3 mm) Oversize	1.429-1.430 (36.30-36.32)
.024" (.6 mm) Oversize	1.441-1.442 (36.60-36.63)
Exhaust	
Seat Ring Bore Diameter	

1999 Mitsubishi 3000GT

1999-2000 ENGINES 3.0L V6

.012" (.3 mm) Oversize	1.311-1.312 (33.30-33.32)
.024" (.6 mm) Oversize	1.323-1.324 (33.60-33.63)

Valve Seat (SOHC)

1. Measure valve spring installed height after valve and valve seat have been reconditioned and lightly lapped. With valve assembly installed, measure installed height of valve spring between spring seat and retainer. Valve seat must be replaced if measurement exceeds specification. See **CYLINDER HEAD (SOHC)** table under ENGINE SPECIFICATIONS.
2. To replace seat, grind seat wall until seat can be removed. Machine cylinder head to accommodate an oversize valve seat. See **OVERSIZE VALVE SEAT SPECIFICATIONS (SOHC)** table. Heat cylinder head to about 482°F (250°C), and install valve seat. Grind valve seat using 45-degree stone. Use 30-degree and 65-degree stones to set seat height.

OVERSIZE VALVE SEAT SPECIFICATIONS (SOHC)

Application	In. (mm)
Intake	
Seat Ring Bore Diameter	
12-Valve	
.012" (.3 mm) Oversize	1.744-1.745 (44.30-44.32)
.024" (.6 mm) Oversize	1.756-1.757 (44.60-44.63)
24-Valve	
.012" (.3 mm) Oversize	1.350-1.352 (34.29-34.34)
.024" (.6 mm) Oversize	1.362-1.363 (34.59-34.62)
Exhaust	
Seat Ring Bore Diameter	
12-Valve	
.012" (.3 mm) Oversize	1.508-1.509 (38.30-38.33)
.024" (.6 mm) Oversize	1.520-1.521 (38.61-38.63)
24-Valve	
.012" (.3 mm) Oversize	1.252-1.253 (31.80-31.83)
.024" (.6 mm) Oversize	1.264-1.265 (32.11-32.13)

Valves

Disassemble cylinder head. Measure valve stem diameter, valve margin and overall length. See appropriate VALVES & VALVE SPRINGS table under **ENGINE SPECIFICATIONS**. Inspect valve for worn stem tip. Measure valve margin after grinding valves. Replace valves if not within specification.

Lash Adjusters

Before installation, submerge lash adjuster in diesel fuel. Using a small wire, hold down internal check valve. Pump plunger up and down 4-5 times to bleed air from lash adjuster.

CYLINDER BLOCK ASSEMBLY

Cylinder Block

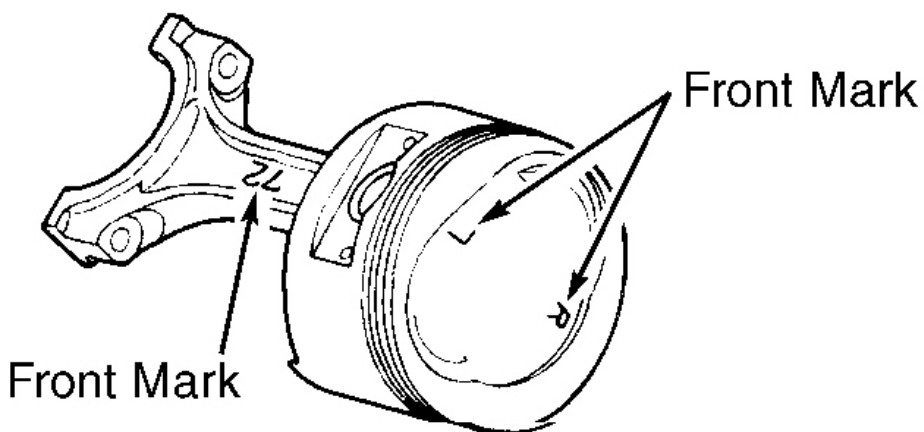
1. Inspect cylinder block for cracks, warpage, cylinder bore taper and out-of-round. Replace or repair cylinder block if not within specification. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS.
2. Measure cylinder bore and piston skirt diameter. Piston skirt diameter should be measured at 90-degrees to piston pin. Clearance between piston and cylinder bore must be within specification. See appropriate PISTONS, PINS & RINGS table under **ENGINE SPECIFICATIONS**.

Piston & Rod Assembly

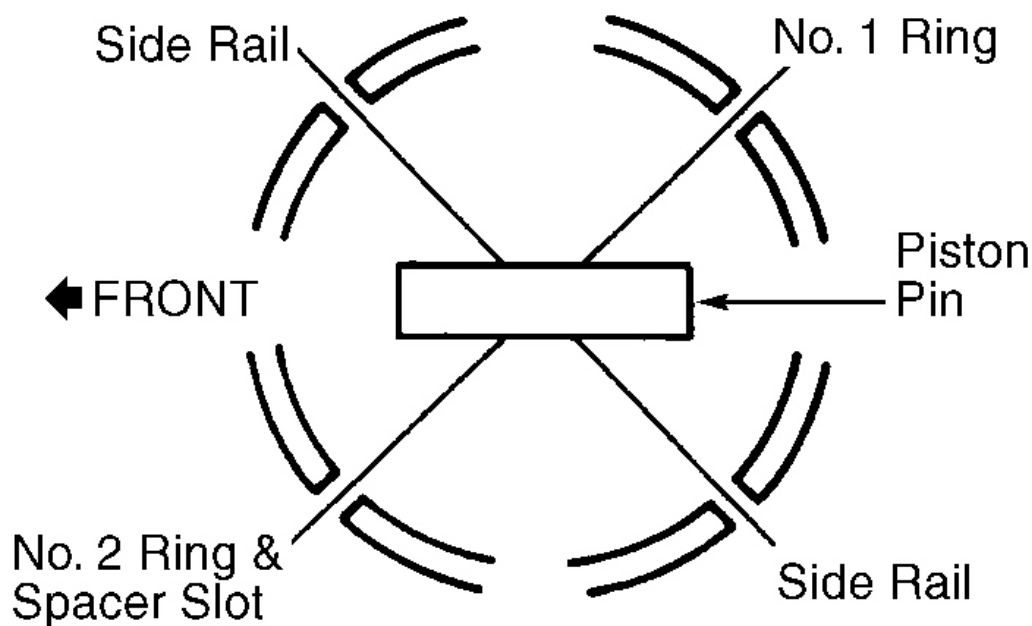
1. Remove cylinder heads and oil pan. See **CYLINDER HEAD** and **OIL PAN** under REMOVAL & INSTALLATION. Remove cylinder ridge. Mark connecting rod and cap for cylinder identification and remove rod cap.
2. Note front mark on piston and connecting rod. See **Fig. 29**. Mark is positioned toward timing belt side of engine. Remove rod and piston assembly.
3. Piston ring end gap and side clearance must be within specification. See appropriate PISTONS, PINS & RINGS table under **ENGINE SPECIFICATIONS**. Install rings onto piston with ring code identification marks toward top of piston. On DOHC models, top ring is marked "T", and No. 2 ring is marked T2. On SOHC models, top ring is marked 1R, and No. 2 ring is marked 2R. Lubricate piston, rings, and cylinder bore with engine oil.

NOTE: Front mark "R" on piston indicates installation in cylinders No. 1, 3, and 5; front mark "L" indicates installation in cylinders No. 2, 4, and 6. Ensure front mark on piston and connecting rod are toward timing belt side of engine. See **Fig. 29**.

4. Distribute ring end gaps properly around piston. See **Fig. 29**. Install piston and rod into cylinder bore, with front mark toward timing belt side of engine.
5. Measure bearing clearance using Plastigage. Tighten rod cap nuts to specification. See **TORQUE SPECIFICATIONS**. Connecting rod must move freely on crankshaft. Measure connecting rod side play. Repair or replace connecting rod if not within specification. See **CONNECTING RODS** table under ENGINE SPECIFICATIONS.



PISTON ALIGNMENT MARKS



PISTON RING ALIGNMENT

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Fig. 29: Aligning Piston & Rings

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Fitting Pistons

Measure cylinder bore and piston skirt diameter. Piston skirt diameter should be measured at 90-degree angle to piston pin. Clearance between piston and cylinder bore must be within specification. See appropriate PISTONS, PINS & RINGS table under **ENGINE SPECIFICATIONS**.

Piston Pin Replacement

1. Note reference mark on top of piston and connecting rod. See **Fig. 29**. Using Piston Pin Setting Tool (MIT216941), remove pin. See **PISTON PIN SETTING TOOL IDENTIFICATION** table.
2. Inspect piston for cracks and damage. Measure ring side clearance. Replace piston if not within specification. See appropriate PISTONS, PINS & RINGS table under **ENGINE SPECIFICATIONS**.
3. Measure connecting rod for bend and twist. Replace connecting rod if twist exceeds specifications. See **CONNECTING RODS** table under ENGINE SPECIFICATIONS.

NOTE: Install piston with reference mark aligned with connecting rod reference mark. See **Fig. 29**.

4. Position piston onto connecting rod. Align reference marks on top of piston and connecting rod. See **Fig. 29**. Lubricate all components with oil. Press piston pin into piston and connecting rod. To install, reverse removal procedure. Ensure piston pin is centered in piston.

PISTON PIN SETTING TOOL IDENTIFICATION

Application	Tool No.
Base	MIT310134
Connecting Rod Guide Pin	MIT310137
Connecting Rod Guide Pin	MIT310138
Connecting Rod Guide Pin	MIT310139
Connecting Rod Guide Pin	MIT310141
Nut	10396
Piston Support	MIT310136
Piston Support	MIT310140
Piston Support	MIT310142
Press Pin	MIT48143
Stop Screw	216943

Crankshaft & Main Bearings

1. Remove flywheel or drive plate. Remove transaxle/transmission mounting plate and rear seal case. Remove oil pump, oil pan, and oil pick-up tube. Mark connecting rod and main bearing caps for location.
2. Remove connecting rod caps and bearings. Note direction of arrow on main bearing cap. Remove main bearing cap. See **Fig. 32**. Remove crankshaft. Remove main bearings from cylinder block. Mark bearings for location.
3. Inspect crankshaft for cracks and damaged gear or threads. Measure crankshaft for taper and out-of-round. Replace or repair crankshaft if not within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.

4. Install appropriate sized upper main bearings into cylinder block. See **Fig. 30** and **Fig. 31** . Ensure oil holes are aligned, and bearings are properly seated. Lubricate bearings with engine oil. Install thrust bearing with oil grooves toward crankshaft thrust surface.
5. Install crankshaft into block. Install thrust bearing with oil grooves toward crankshaft thrust surface. Install main bearing caps with arrow toward front of engine.
6. Measure oil clearance using Plastigage. Tighten bolts to specification in proper sequence. See **Fig. 32**. See **TORQUE SPECIFICATIONS**. Clearance must be within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS. If oil clearance is not within specification, replace bearings or crankshaft.
7. Ensure crankshaft rotates freely with main bearing cap installed. Measure crankshaft end play. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.
8. Install connecting rod caps and bearings. Install components in original locations. Tighten rod nuts to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure. Tighten bolts to specification.

CRANKSHAFT JOURNAL OUTSIDE DIAMETER		CYLINDER BLOCK BEARING BORE	CRANK- SHAFT BEARING
ID COLOR	SIZE inch (mm)	ID MARK	ID COLOR
Yellow	2.3618 - 2.3620 (59.990 - 59.996)	I	Pink
		II	Red
		III	Green
None	2.3616 - 2.3618 (59.984 - 59.990)	I	Red
		II	Green
		III	Black
White	2.3613 - 2.3616 (59.978 - 59.984)	I	Green
		II	Black
		III	Brown

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Fig. 30: Identifying Main Bearing Sizes (Eclipse, Galant & Montero Sport)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

1999 Mitsubishi 3000GT

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SOHC

Crankshaft journal				Cylinder block bearing bore diameter	Crankshaft bearing
Classification	Identification mark (production part)	Identification mark (service part)	Outer diameter in. (mm)	Identification mark	Identification color or Identification mark (service part)
1	None	0	2.3620-2.3622 (59.994-60.000)	I	1
				II	2
				III	3
2	None	1	2.3617-2.3620 (59.988-59.994)	I	2
				II	3
				III	4
3	None	2	2.3614-2.3617 (59.982-59.988)	I	3
				II	4
				III	5

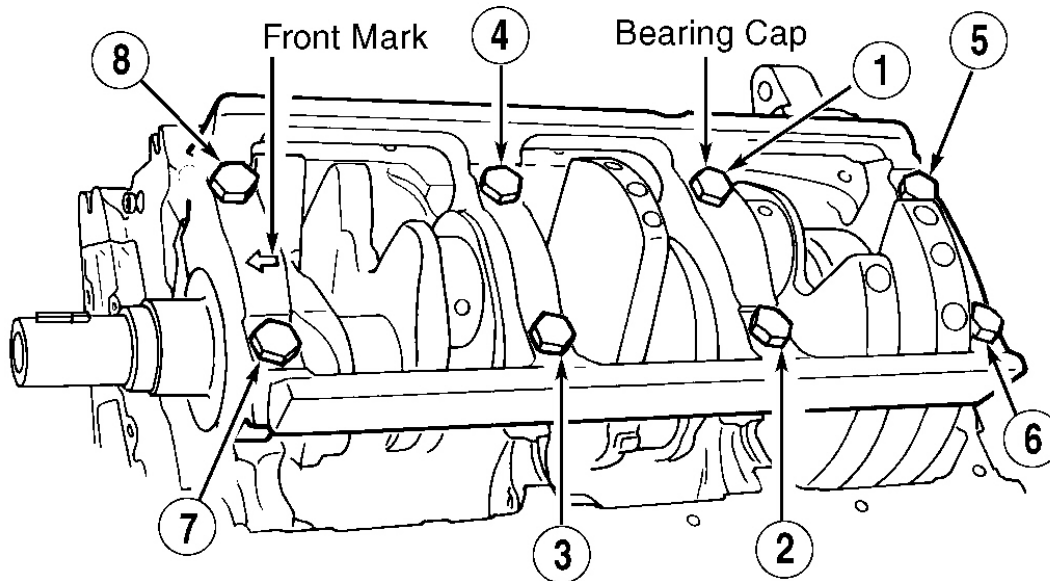
DOHC

Crankshaft journal				Cylinder block bearing bore diameter	Crankshaft bearing
Classification	Identification mark (production part)	Identification color (service part)	Outer diameter in. (mm)	Identification mark	Identification color (service part)
1	None	Yellow	2.3618-2.3620 (59.990-59.996)	I	Pink
				II	Red
				III	Green
2	None	None	2.3616-2.3618 (59.984-59.990)	I	Red
				II	Green
				III	Black
3	None	White	2.3613-2.3616 (59.978-59.984)	I	Green
				II	Black
				III	Brown

G00014612

Fig. 31: Identifying Main Bearing Sizes (3000GT)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 32: Main Bearing Cap Bolt Tightening Sequence

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA, INC.

Connecting Rod Bearings

1. Mark bearing cap and connecting rod for location. Remove connecting rod cap and bearing. Install appropriate sized replacement bearing. See **Fig. 33** and **Fig. 34**.

NOTE: Connecting rod bearing sizes and identification codes for 3000GT are not available from manufacturer.

2. Align reference marks on rod cap and connecting rod. Measure bearing clearance with Plastigage. Connecting rods must move freely on crankshaft. Measure connecting rod thrust clearance. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.

CRANKSHAFT PIN OUTSIDE DIAMETER		CONNECT- ING ROD	BEARING
ID COLOR	SIZE inch (mm)	ID COLOR	ID COLOR
Yellow	1.9683 - 1.9685 (49.995 - 50.000)	White	Yellow
		None	Yellow
		Yellow	None
None	1.9679 - 1.9683 (49.985 - 49.995)	White	Yellow
		None	None
		Yellow	Blue
White	1.9678 - 1.9679 (49.980 - 49.985)	White	None
		None	Blue
		Yellow	Blue
Blue	1.9676 - 1.9678 (49.976 - 49.980)	White	Blue
		None	Blue
		Yellow	Red

G00014607

Fig. 33: Identifying Connecting Rod Bearing Sizes (Eclipse & Galant)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CRANKSHAFT PIN OUTSIDE DIAMETER		CONNECTING ROD	BEARING
ID COLOR	SIZE inch (mm)	ID COLOR	ID COLOR
Yellow	1.9681 - 1.9683 (49.991 - 49.996)	White	Pink
		None	Pink
		Yellow	Black
None	1.9679 - 1.9681 (49.986 - 49.991)	White	Pink
		None	Yellow green
		Yellow	Black
White	1.9678 - 1.9679 (49.981 - 49.986)	White	Yellow green
		None	Black
		Yellow	Red
Blue	1.9676 - 1.9678 (49.976 - 49.981)	White	Yellow green
		None	Red
		Yellow	Red

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Fig. 34: Identifying Connecting Rod Bearing Sizes (Montero Sport)

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Crankshaft End Play

If end play is not within specification, inspect thrust bearings and crankshaft. Replace thrust bearing or crankshaft to obtain correct end play. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.

ENGINE OILING**ENGINE LUBRICATION SYSTEM**

Oil pressure is provided by a rotor-type pump driven by crankshaft. Pressure relief valve is located in oil pump body.

CRANKCASE CAPACITY SPECIFICATIONS

Application	⁽¹⁾ Qts. (L)
Eclipse & Galant	4.5 (4.3)
Montero Sport	4.8 (4.5)
3000GT	
Non-Turbo	4.5 (4.3)
Turbo	4.9 (4.6)
(1) Includes oil filter.	

Oil Pressure

Oil pressure should be at least 11 psi (.8 kg/cm²) at idle with engine oil temperature at 167-194°F (75-90°C).

OIL PUMP

Removal

Remove oil pan. See **OIL PAN** under REMOVAL & INSTALLATION. Remove relief spring and relief plunger. Remove crankshaft oil seal. Remove oil pump case. Remove "O" ring. Remove oil pump cover. Place match marks on outer and inner rotors for reassembly. Remove outer and inner rotors. Remove oil pump and gasket from cylinder block. Note bolt length and location for installation reference.

Disassembly & Inspection

1. Disassemble pump. Inspect for scoring and cracks. Install rotors into pump body. Measure clearance between driven rotor and pump body. Measure rotor tip clearance. Using a straightedge and feeler gauge, measure rotor side clearance (end play). See **OIL PUMP SPECIFICATIONS** table.
2. Replace rotor set or pump assembly if measurements are not within specification. Ensure relief valve slides freely in pump body bore. Inspect relief valve spring for damage.

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Rotor Tip Clearance	.0024-.0071 (.061-.180)
Housing Clearance	⁽¹⁾ .0039-.0071 (.099-.180)
Side Clearance	.0016-.0039 (.041-.099)
(1) Maximum clearance is 0.0138" (.35 mm).	

Reassembly & Installation

1. Reassemble pump. Tighten pump rear cover bolts to specification. See **TORQUE SPECIFICATIONS**. Install oil pump and gasket. Align splined teeth of oil pump with crankshaft. Install bolts and tighten to

specification.

- If oil seal was removed, coat new seal with grease. Using Seal Driver (MD998717), install seal in oil pump until flush with case. Install remaining components.

TORQUE SPECIFICATIONS

ECLIPSE, GALANT & MONTERO SPORT

TORQUE SPECIFICATIONS (ECLIPSE, GALANT & MONTERO SPORT)

Application	Ft. Lbs. (N.m)
Camshaft Position Sensor Bolt	17 (23)
Camshaft Sprocket Bolt	65 (88)
Connecting Rod Nut	38 (52)
Cooling Fan Bracket Bolt	30 (41)
Crankshaft Bearing Cap Bolt	69 (93)
Crankshaft Pulley Bolt	134 (182)
Cylinder Head Bolt	80 (108)
Drive Plate Bolt	55 (75)
Engine Support Bracket Bolt	
M8	18 (24)
M10	30 (41)
M12	54 (73)
Exhaust Manifold Stay Bolt	
M10	32 (44)
M12	55 (75)
Flywheel Bolt	55 (75)
Idle Pulley Bolt	32 (44)
Intake Manifold Bolt	16 (21)
Intake Manifold Plenum Bolt/Nut	13 (18)
Oil Filter Bracket Bolt	
M8	17 (23)
M10	30 (41)
Oil Pan Baffle Bolt	13 (18)
Relief Valve Plug	35 (47)
Rocker Arm & Shaft Assembly Bolt	23 (32)
Timing Belt	
Auto-Tensioner Bolt	17 (23)
Tensioner Arm Bolt	33 (44)
Tensioner Pulley Bolt	36 (49)
Water Pump Bolt	17 (23)
	INCH Lbs. (N.m)
Cooling Fan Bolt	97 (11)

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Delivery Pipe Bolt	80-106 (9-12)
Oil Pan Bolt	53 (6)
Eclipse & Galant	
Lower	97 (11)
Upper	59 (52)
Oil Pump Case Bolt	115 (13)
Oil Pump Cover Bolt	87 (9.8)
Rear Plate Bolt	97 (11)
Rear Seal Case Bolt	97 (11)
Rocker Cover Bolt	30 (3.4)
Throttle Body Bolt	97 (11)
Timing Belt Cover	
M6 Bolt	97 (11)
M8 Bolt	115 (13)
Nut	43 (4.9)
Transmission Mounting Plate Bolt	97 (11)

3000GT**TORQUE SPECIFICATIONS (3000GT)**

Application	Ft. Lbs. (N.m)
Air Intake Plenum Brace Bolts	13 (18)
Auto-Tensioner Bolt	17 (23)
Camshaft Bearing Cap Bolt	
Front & Rear	15 (20)
No. 2, 3 & 4	(1)
Camshaft Sprocket Bolt	66 (90)
Connecting Rod Nut	38 (52)
Crankshaft Pulley Bolt	
DOHC	130-137 (176-186)
SOHC	108-116 (146-157)
Cylinder Head Bolt ⁽²⁾	
DOHC Turbo	91 (123)
Except DOHC Turbo	80 (108)
Distributor Adapter Bolt	(3)
Drive Plate Bolt	55 (75)
Engine Support Bracket Bolt	
Except 10 x 40 mm	30 (41)
10 x 40 mm	54 (73)
Exhaust Manifold Nut	
DOHC Non-Turbo	33 (45)

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DOHC Turbo	
Front	(4)
Rear	(5)
SOHC	13 (18)
Flywheel Bolt	55 (75)
Intake Manifold Bolt	
DOHC	16 (22)
SOHC	13 (18)
Main Bearing Cap Bolt	
DOHC Non-Turbo	67 (91)
DOHC Turbo	54 (73)
SOHC	57 (77)
Oil Filter Bracket Bolt	
M8 Bolt	(3)
M10 Bolt	17 (23)
Oil Pick-Up Tube Bolt	14 (19)
Oil Pump Mounting Bolt	11 (15)
Rear Engine Support Bracket-To-Engine Bolt	13-18 (18-25)
Relief Valve Plug	33 (45)
Rocker Shaft	15 (20)
Roll Stopper Bracket Through-Bolts	36-43 (49-58)
Turbocharger-To-Exhaust Fitting	40-47 (54-64)
Timing Belt Tensioner Arm Bolt	31 (42)
Timing Belt Tensioner Pulley Bolt	36 (49)
Water Pump Bolt	17 (23)
INCH Lbs. (N.m)	
Delivery Pipe Bolt	108 (12)
Oil Pan Bolt	48-60 (5-7)
Oil Pump Cover Bolt	97 (11)
Rear Seal Case Bolt	117 (13)
Rocker Cover Bolt	
DOHC	26 (3)
SOHC	72-84 (8-9)
Throttle Body Bolt	84-108 (9-12)
Timing Belt Cover Bolt	84-108 (9-12)
Transmission Mounting Plate Bolt	84-108 (9-12)
(1) Tighten to 97 INCH lbs. (11 N.m).	
(2) Tighten in 2 stages in sequence. See Fig. 8 .	
(3) Tighten to 117 INCH lbs. (13 N.m).	

- (4) Tighten nuts "C" to 22 ft. lbs. (30 N.m). Temporarily tighten turbocharger to exhaust manifold. Tighten nuts "D" to 22 ft. lbs. (30 N.m). Tighten nuts "E" and "F" to 34-38 ft. lbs. (47-53 N.m). Back off nuts "E" and "F". Retighten nuts "E" and "F" to 21-22 ft. lbs. (29-31 N.m). See **Fig. 7**.
- (5) Tighten nuts "A" to 22 ft. lbs. (30 N.m). Tighten nuts "B" to 34-38 ft. lbs. (47-53 N.m). Back off nuts "B". Retighten nuts "B" to 21-22 ft. lbs. (29-31 N.m). See **Fig. 6**.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Specification
Displacement	181.4 Cu. In.
Bore	3.587" (91.2 mm)
Stroke	2.992" (76.0 mm)
Compression Ratio	
DOHC Non-Turbo	10.0:1
DOHC Turbo	8.0:1
SOHC	
12-Valve	8.9:1
24-Valve	9.0:1
Fuel System	MFI

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (ECLIPSE, GALANT & MONTERO SPORT)

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (ECLIPSE, GALANT & MONTERO SPORT)

Application	In. (mm)
Crankshaft	
End Play	
Standard	.002-.009 (.05-.23)
Limit	.012 (.3)
Main Bearings	
Journal Diameter	2.4 (61.0)
Oil Clearance	
Standard	.0008-.0015 (.020-.038)
Limit	.004 (.10)
Connecting Rod Bearings	
Thrust Clearance	.020 (.5)

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (3000GT)

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CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (3000GT)

Application	In. (mm)
Crankshaft	
End Play	
Standard	.0020-.0098 (.051-.250)
Limit	.012 (.30)
Main Bearings	
Journal Diameter	2.36 (59.9)
Journal Out-Of-Round	
DOHC	.0001 (.003)
SOHC	.0002 (.005)
Journal Taper	
DOHC	.0003 (.008)
SOHC	.0002 (.005)
Oil Clearance	.0008-.0020 (.020-.051)
Connecting Rod Bearings	
Thrust Clearance	.0039-.0098 (.099-.249)

CONNECTING RODS**CONNECTING RODS**

Application	In. (mm)
Maximum Bend	.0020 (.051)
Maximum Twist (Total Rod Length)	.004 (.10)
Side Play	
Standard	.0039-.0099 (.099-.251)
Limit	.016 (.41)

ENGINE PISTONS, PINS & PISTON RINGS (ECLIPSE, GALANT & MONTERO SPORT)**PISTONS, PINS & RINGS (ECLIPSE, GALANT & MONTERO SPORT)**

Application	In. (mm)
Pistons	
Clearance	.0008-.0016 (.020-.041)
Diameter	3.661 (92.99)
Pins	
Piston Fit	(1)
Rod Fit	(2)
Rings	
No. 1	
End Gap	
Standard	.0120-.0170 (.305-.432)

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Limit	.031 (.76)
Side Clearance	
Standard	.0012-.0027 (.030-.069)
Limit	.003 (.076)
No. 2	
End Gap	
Standard	.0180-.0230 (.457-.584)
Limit	.003 (.076)
Side Clearance	
Standard	.0008-.0023 (.020-.058)
Limit	.003 (.076)
No. 3 (Oil)	
End Gap	
Standard	.008-.023 (.20-.58)
Limit	.04 (1.00)
(1) Slip fit.	
(2) At press load of 1653-3866 lbs. (750-1754 kg).	

ENGINE PISTONS, PINS & PISTON RINGS (3000GT)**PISTONS, PINS & RINGS (3000GT)**

Application	In. (mm)
Pistons	
Clearance	.0008-.0016 (.020-.041)
Diameter	3.58 (90.9)
Pins	
Piston Fit	(1)
Rod Fit	(2)
Rings	
No. 1	
End Gap	
Standard	.0118-.0177 (.300-.450)
Limit	.031 (.79)
Side Clearance	
Standard	.0012-.0028 (.030-.071)
Limit	.004 (.10)
No. 2	
End Gap	
Standard	.0177-.0230 (.450-.584)
Limit	.031 (.79)

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Side Clearance	
Standard	.0008-.0024 (.020-.061)
Limit	.004 (.10)
No. 3 (Oil)	
End Gap	
Standard	.0079-.0236 (.201-.599)
Limit	.040 (1.00)
(1) Slip fit.	
(2) At press load of 1653-3867 lbs. (750-1754 kg).	

CYLINDER BLOCK**CYLINDER BLOCK**

Application	In. (mm)
Cylinder Bore	
Standard Diameter	3.590 (91.19)
Maximum Taper & Out-Of-Round	.0004 (.010)
Maximum Deck Warpage	
Standard	.002 (.05)
Limit	.008 (.20)

ENGINE VALVES & VALVE SPRINGS (DOHC)**VALVES & VALVE SPRINGS (DOHC)**

Application	Specification
Intake Valves	
Face Angle	45-45.5°
Minimum Margin	.019" (.48 mm)
Standard Length	4.184" (106.27 mm)
Stem Diameter	.260" (6.60 mm)
Exhaust Valves	
Face Angle	45-45.5°
Minimum Margin	.040" (1.00 mm)
Standard Length	4.150" (105.41 mm)
Stem Diameter	.256" (6.50 mm)
Valve Springs	
Free Length	
Standard	1.830" (46.48 mm)
Limit	1.790" (45.47 mm)
Installed Height	1.492" (37.90 mm)
Out-Of-Square	

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1999-2000 ENGINES 3.0L V6

Standard	2°
Limit	4°
Lbs. @ In. (kg @ mm)	
Pressure (Valves Closed)	62 @ 1.492 (28.1 @ 37.90)

ENGINE VALVES & VALVE SPRINGS (SOHC)**VALVES & VALVE SPRINGS (SOHC)**

Application	Specification
Intake Valves	
Face Angle	45-45.5°
Minimum Margin	
12-Valve	.028" (.71 mm)
24-Valve	.020" (.51 mm)
Stem Diameter	
12-Valve	.315" (8.00 mm)
24-Valve	.236" (5.99 mm)
Exhaust Valves	
Face Angle	45-45.5°
Minimum Margin	
12-Valve	.059" (1.50 mm)
24-Valve	.028" (0.71 mm)
Stem Diameter	
12-Valve	.311" (7.90 mm)
24-Valve	.236" (5.99 mm)
Valve Springs	
Free Length	
Standard	
12-Valve	1.960" (49.78 mm)
24-Valve	2.010" (51.05 mm)
Limit	
12-Valve	1.920" (48.77 mm)
24-Valve	1.970" (50.00 mm)
Installed Height	
12-Valve	1.591" (40.41 mm)
24-Valve	1.740" (44.20 mm)
Out-Of-Square	
Standard	2°
Limit	4°
Lbs. @ In. (kg @ mm)	
Pressure (Valves Closed)	74 @ 1.591 (33.6 @ 40.41)

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1999-2000 ENGINES 3.0L V6

CYLINDER HEAD (DOHC)**CYLINDER HEAD (DOHC)**

Application	Specification
Cylinder Head Height	5.20" (132.1 mm)
Maximum Warp	.008" (.20 mm)
Valve Seats (Intake & Exhaust)	
Seat Angle	45-45.5°
Seat Width	.035-.051" (.89-1.30 mm)
Valve Guides	
Intake Valve	
Valve Guide Cyl. Head Bore I.D.	.5118-.5189" (13.00-13.18 mm)
Valve Guide Installed Height	.689" (17.50 mm)
Stem-To-Guide Clearance	
Standard	.0008-.0020" (.020-.051 mm)
Limit	.0040" (.102 mm)
Exhaust Valve	
Valve Guide Cyl. Head Bore I.D.	.5118-.5189" (13.00-13.18 mm)
Valve Guide Installed Height	.689" (17.50 mm)
Valve Stem-To-Guide Clearance	
Standard	.0020-.0035" (.051-.089 mm)
Limit	.0060" (.152 mm)

CYLINDER HEAD (SOHC)**CYLINDER HEAD (SOHC)**

Application	Specification
Cylinder Head Height	
12-Valve	3.310" (84.07 mm)
24-Valve	4.720" (119.89 mm)
Maximum Warp	.008" (.20 mm)
Valve Seats (Intake & Exhaust)	
Seat Angle	45-45.5°
Seat Width	.04-.05" (1.0-1.3 mm)
Valve Guides	
Intake Valve	
Stem-To-Guide Clearance	
Standard	

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1999-2000 ENGINES 3.0L V6

12-Valve	.0012-.0024" (.030-.061 mm)
24-Valve	.0008-.0019" (.020-.048 mm)
Limit	.004" (.10 mm)
Exhaust Valve	
Stem-To-Guide Clearance	
Standard	
12-Valve	.0020-.0035" (.051-.089 mm)
24-Valve	.0016-.0027" (.041-.069 mm)
Limit	.006" (.15 mm)

CAMSHAFT (ECLIPSE, GALANT & 3000GT - SOHC)**CAMSHAFT (ECLIPSE, GALANT & 3000GT - SOHC)**

Application	In. (mm)
End Play	(1)
Journal Diameter	
12-Valve	1.34 (34.0)
24-Valve	1.8 (45.7)
Lobe Height	
12-Valve	
Standard	1.620 (41.15)
Limit	1.600 (40.64)
24-Valve	
Intake	
Standard	1.480 (37.59)
Limit	1.46 (37.08)
Exhaust	
Standard	1.455 (36.96)
Limit	1.435 (36.45)
Oil Clearance	(1)
(1) Information is not available from manufacturer.	

CAMSHAFT (MONTERO SPORT)**CAMSHAFT (MONTERO SPORT)**

Application	In. (mm)
End Play	(1)
Journal Diameter	1.77 (45.0)
Lobe Height	
Intake	
Standard	1.485 (37.72)

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Limit	1.465 (37.21)
Exhaust	
Standard	1.462 (37.13)
Limit	1.443 (36.65)
Oil Clearance	(1)
(1) Information is not available from manufacturer.	

CAMSHAFT (3000GT - DOHC)**CAMSHAFT (3000GT - DOHC)**

Application	In. (mm)
End Play	(1)
Journal Diameter	1.02 (25.9)
Lobe Height	
Intake	
Standard	1.37 (34.80)
Limit	1.35 (34.29)
Exhaust	
Standard	1.37 (34.80)
Limit	1.35 (34.29)
Oil Clearance	(1)
(1) Information is not available from manufacturer.	