

2.0L 4-CYL - VIN [G]

1993 Nissan Sentra

1993 NISSAN ENGINES
2.0L 4-Cylinder

NX, Sentra

* 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

Engine can be identified by fourth character of Vehicle Identification Number (VIN). See ENGINE IDENTIFICATION CODE table. VIN is located on top left end of instrument panel, near windshield. Engine serial number is stamped on rear of cylinder block, left of flywheel.

ENGINE IDENTIFICATION CODES TABLE

Application	Engine Code	VIN Code
NX & Sentra 2.0L 4-Cylinder	SR20DE	G

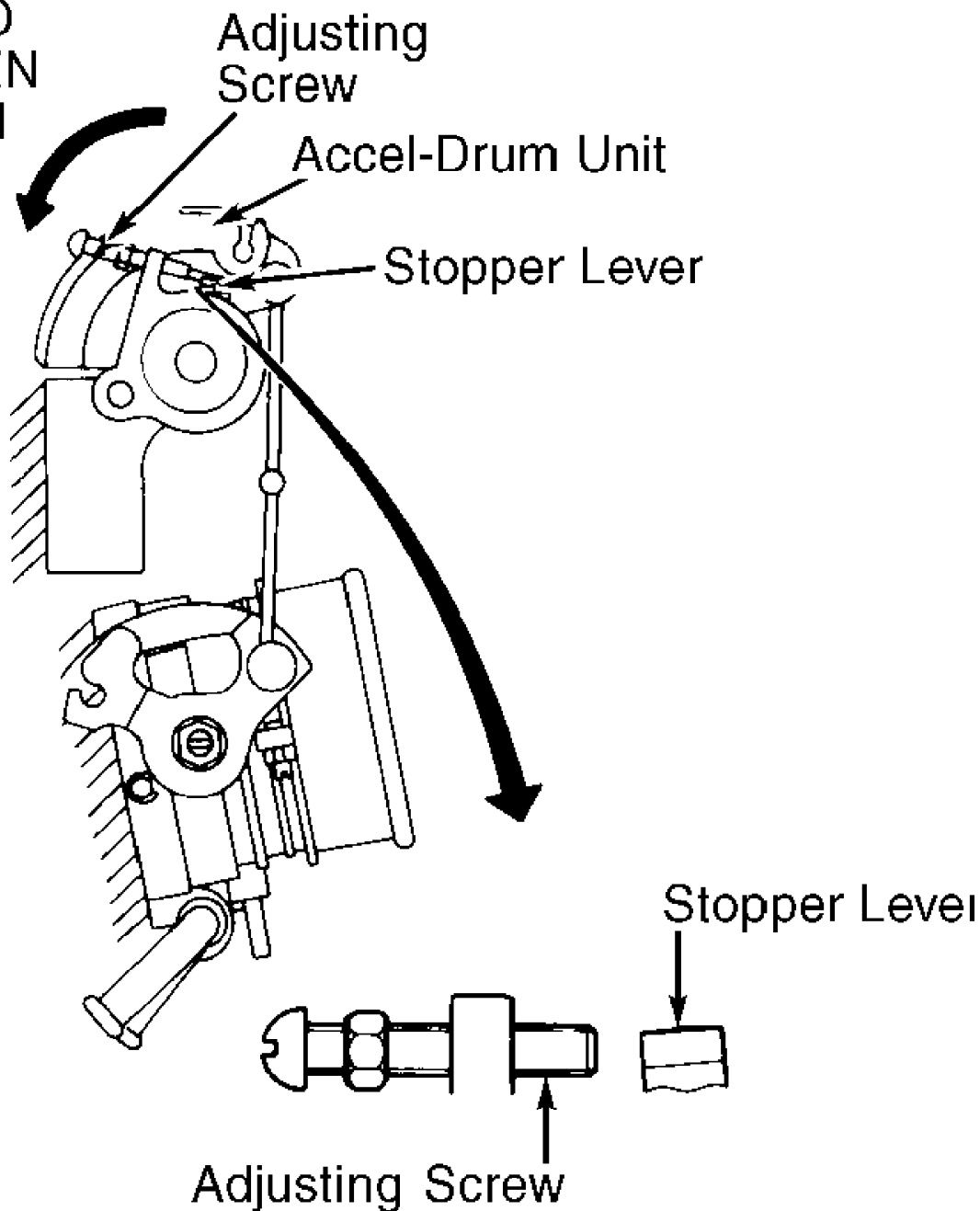
ADJUSTMENTS

ACCEL-DRUM UNIT

NOTE: Accel-drum unit must be adjusted whenever accel-drum unit, throttle chamber or rod is removed or replaced. Rod must be replaced whenever removed. Ensure rod couplings are coated with grease before installing rod.

- 1) With rod installed, loosen lock nut and adjusting screw. See Fig. 1. Manually rotate accel-drum unit until throttle valve in throttle chamber is fully open, and hold unit in this position.
- 2) Note if stopper lever contacts adjusting screw. If stopper lever contacts adjusting screw, rotate adjusting screw until stopper lever does not contact adjusting screw.
- 3) Rotate adjusting screw until it contacts stopper lever. Rotate accel-drum unit so throttle valve is closed. Rotate adjusting screw 3 full revolutions clockwise. Tighten lock nut to 48 INCH lbs. (5 N.m.).

ROTATE TO
FULLY OPEN
POSITION



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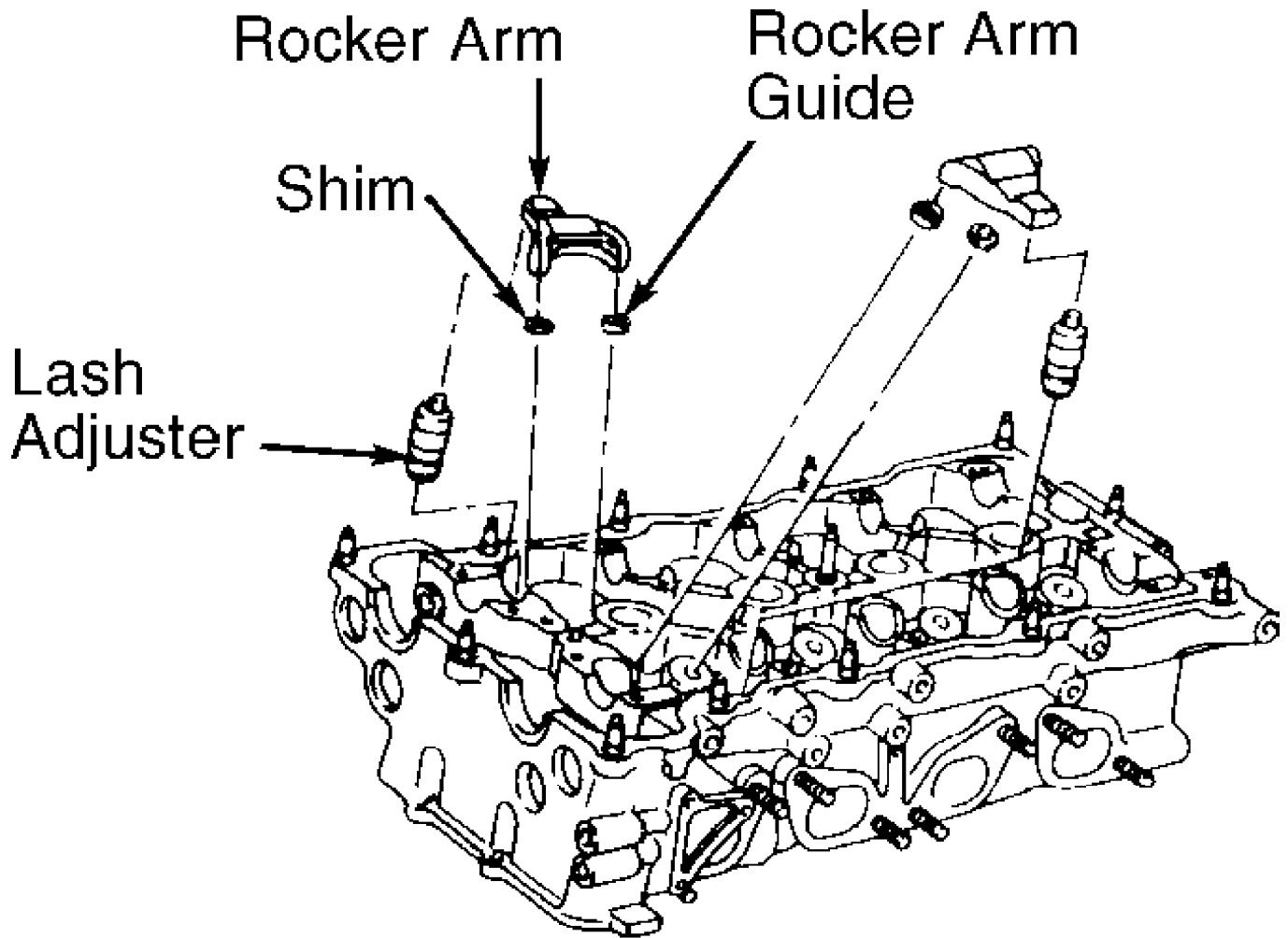
Fig. 1: Adjusting Accel-Drum Unit
Courtesy of Nissan Motor Co., U.S.A.

VALVE CLEARANCE ADJUSTMENT

CAUTION: Although engine uses hydraulic valve lash adjusters, valve clearance must be adjusted if cylinder head, rocker arm guide, shim, valve or valve seats are replaced.

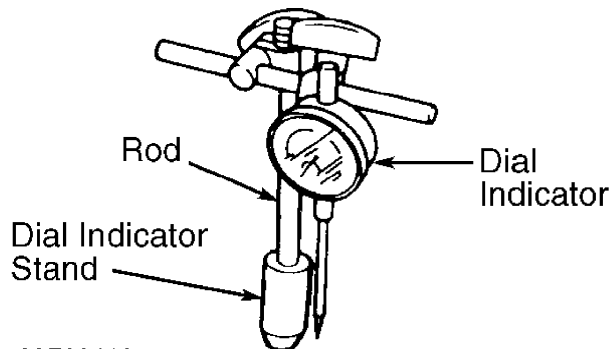
1) With camshafts and rocker arms removed, remove lash adjuster and shim. See Fig. 2. Install dial indicator on Dial

Indicator Stand(J-38957). See Fig. 3.



92D00417

Fig. 2: Exploded View Of Rocker Arm & Components
Courtesy of Nissan Motor Co., U.S.A.



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Fig. 3: Installing Dial Indicator Stand
Courtesy of Nissan Motor Co., U.S.A.

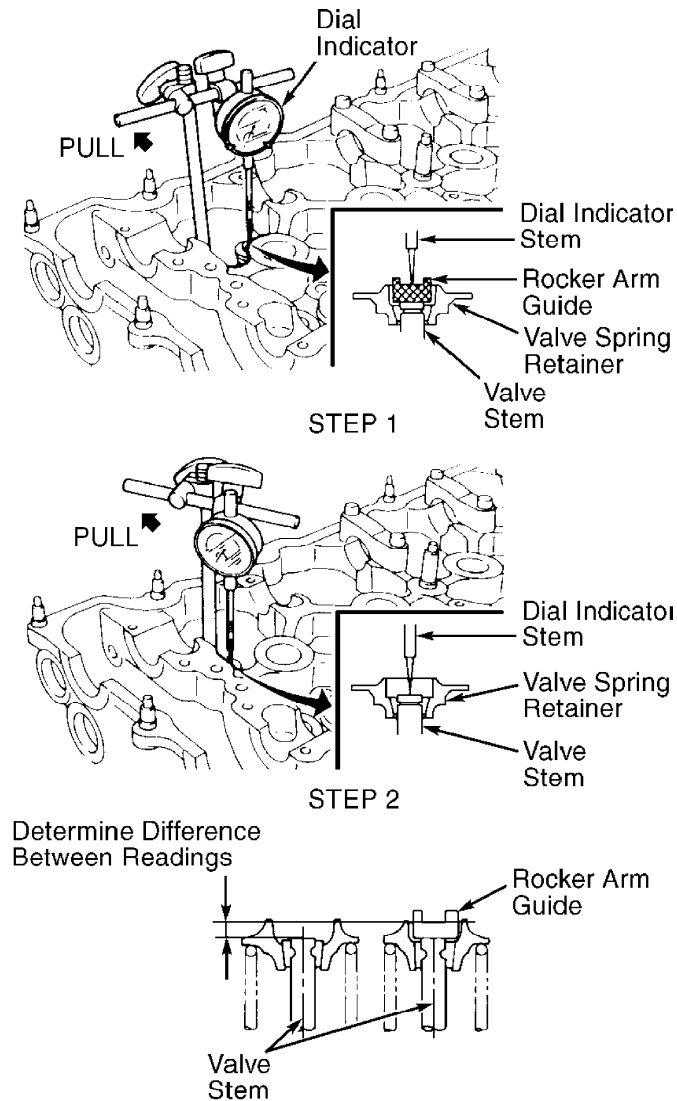
2) Install dial indicator assembly in lash adjuster hole in cylinder head. Position dial indicator stem on sliding surface of

rocker arm guide. See Fig. 4 (STEP 1). Lightly pull dial indicator rod toward outside of cylinder head to eliminate excessive movement in dial indicator stand, and note dial indicator reading.

3) Move dial indicator stem to other valve. Position dial indicator stem on valve stem. See Fig. 4 (STEP 2). Lightly pull dial indicator rod toward outside of cylinder head, and note dial indicator reading.

4) Determine difference between height of sliding surface on rocker arm guide and other valve stem. See Fig. 4. Select a replacement shim with thickness within .001" (.30 mm) of difference.

5) For example, if difference was .120" (3.05 mm), select a shim with .119-.121" (3.02-3.07 mm) thickness. Replacement shims are available in thicknesses ranging from .1102 (2.799 mm) to .1260" (3.200 mm) in increments of .001" (.25 mm). Install shim and remaining components in original locations.



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Fig. 4: Measuring Valve Clearance
Courtesy of Nissan Motor Co., U.S.A.

REMOVAL & INSTALLATION

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) With ignition off, remove fuel pump fuse from fuse block, located below left side of instrument panel. See Fig. 5. Start engine, and allow it to idle until it stalls.

2) Crank engine an additional 2-3 times to release residual fuel pressure. Turn ignition off. Reinstall fuel pump fuse.

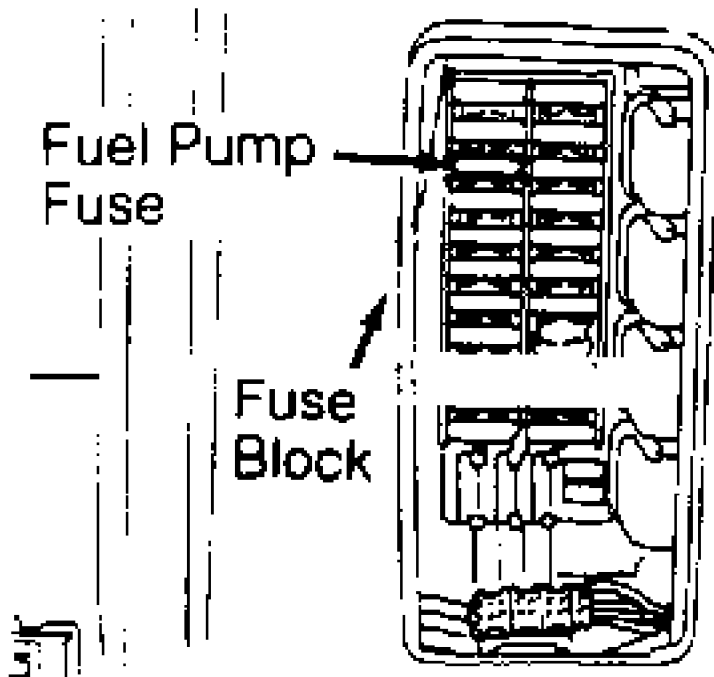
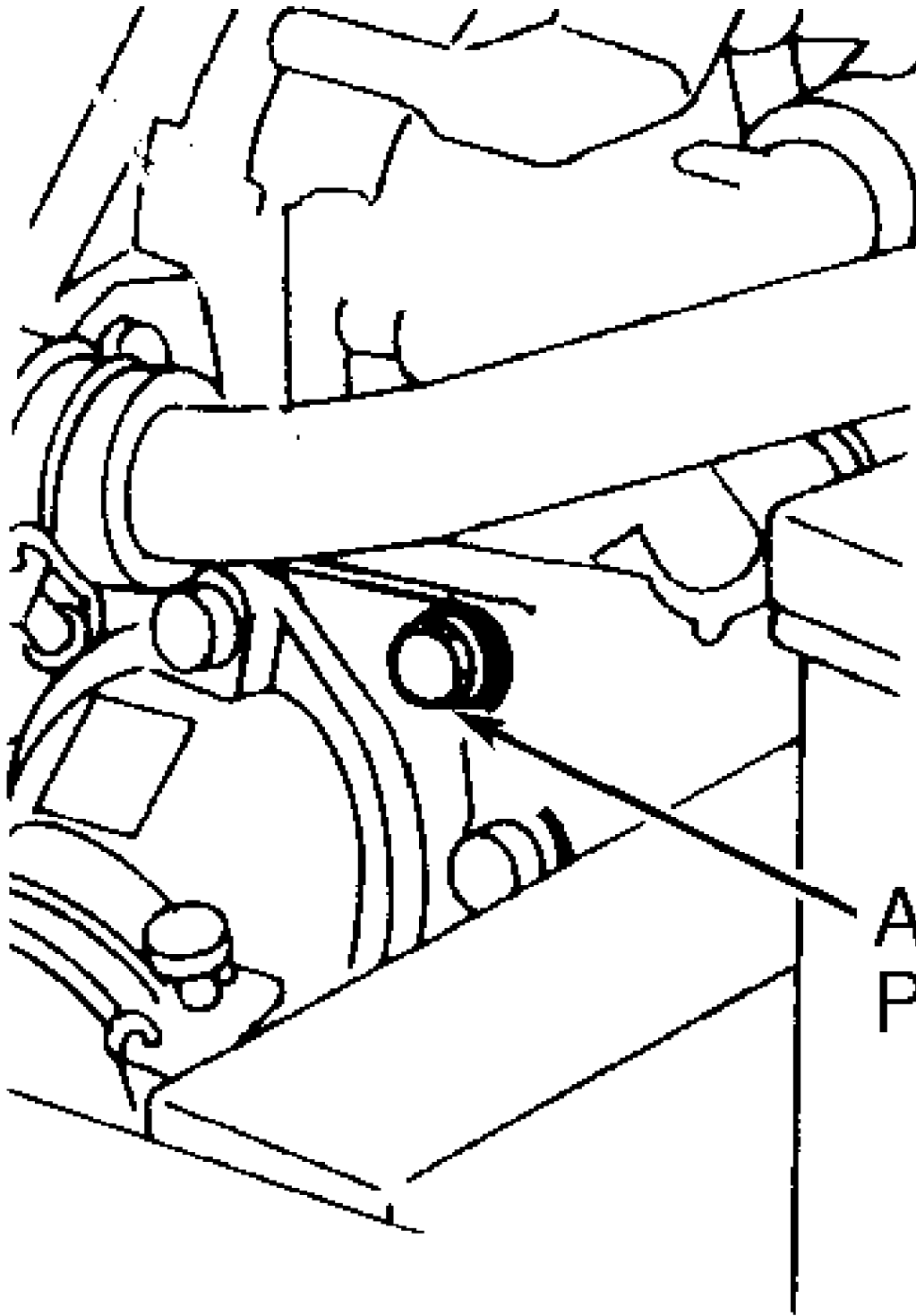


Fig. 5: Identifying Fuel Pump Fuse
Courtesy of Nissan Motor Co., U.S.A.

COOLING SYSTEM BLEEDING

1) Place heater temperature control cable in warmest heat position. Remove radiator cap. Remove air relief plug from thermostat housing and air bleeder cap from heater inlet hose. See Figs. 6 and 7.

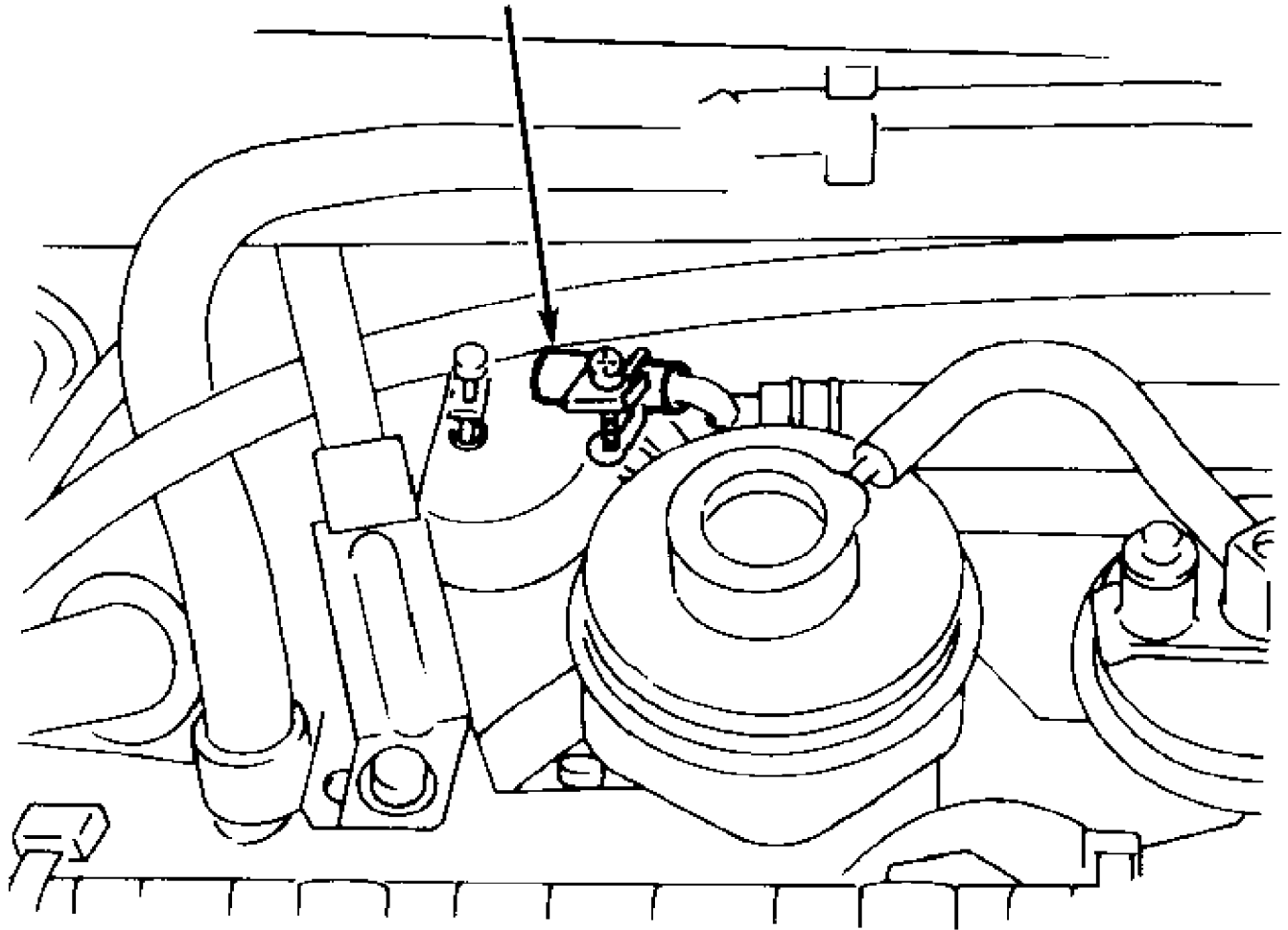


Air Relief
Plug

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Fig. 6: Identifying Air Relief Plug
Courtesy of Nissan Motor Co., U.S.A.

Air Bleeder Cap



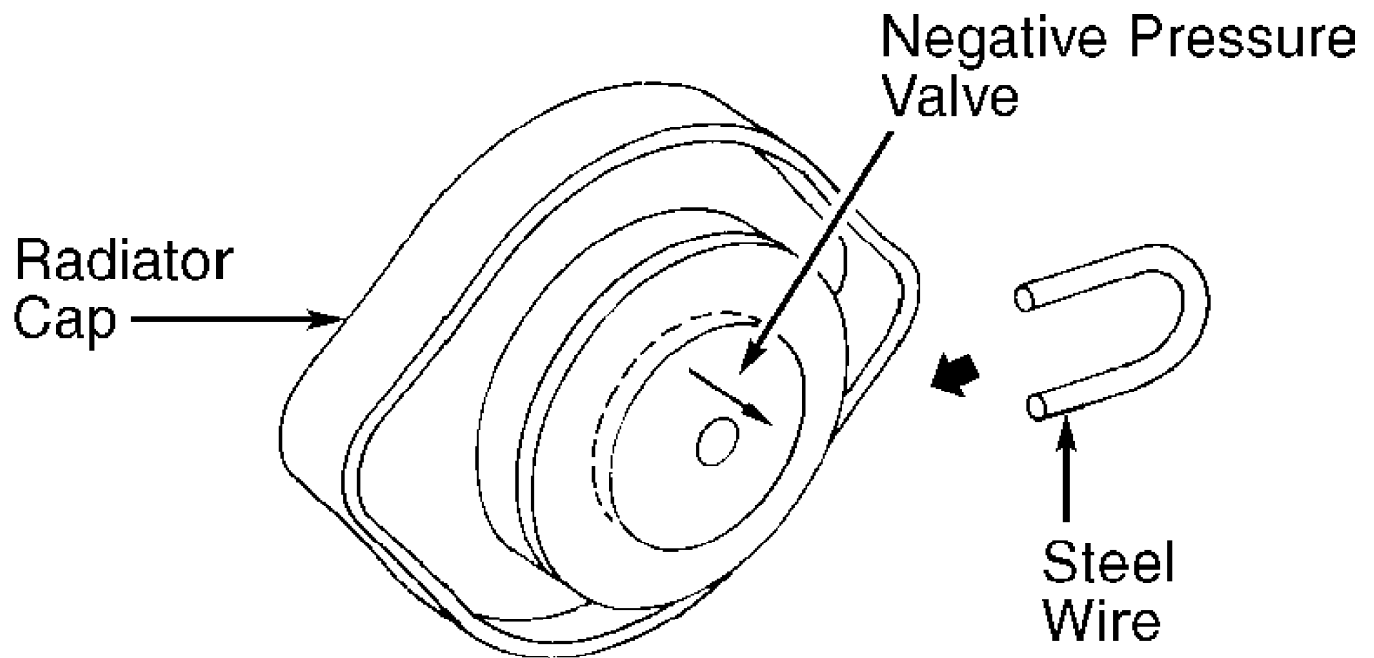
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Fig. 7: Identifying Air Bleeder Cap
Courtesy of Nissan Motor Co., U.S.A.

2) Fill radiator with coolant. Install air relief plug once coolant flows from air relief plug opening. Tighten air relief plug to specification. See TORQUE SPECIFICATIONS table at end of article.

3) Fill radiator and reservoir tank. Reinstall air bleeder cap. Install a temporary radiator cap with a steel wire installed between negative pressure valve and seat. See Fig. 8. This will allow air and coolant to be directed into coolant reservoir tank regardless of cooling system pressure.

4) Warm engine to normal operating temperature. Operate it at 2500 RPM for 10 seconds, and then allow it to idle. Repeat procedure 3 times. Ensure engine does not overheat.



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Fig. 8: Installing Steel Wire In Radiator Cap
 Courtesy of Nissan Motor Co., U.S.A.

5) Shut engine off, and allow it to cool. Remove temporary radiator cap, and check coolant level. Adjust radiator and coolant reservoir tank coolant level.

6) Repeat steps 4) and 5) at least twice more. Install original radiator cap. Warm engine to normal operating temperature. Check for sound of coolant flowing through heater water valve with engine at 4000 RPM and heater temperature control cable in several different positions.

7) If sound is heard, indicating air exists in cooling system, shut engine off. Allow engine to cool. Remove air bleeder cap on heater inlet hose. See Fig. 7.

8) Attach transparent hose on air bleeder pipe on heater inlet hose with opposite end of hose in coolant reservoir tank. Install a temporary radiator cap with a steel wire installed between negative pressure valve and seat. See Fig. 8. Start engine and check for bubbles in coolant reservoir tank.

CAUTION: DO NOT exceed 2300 RPM or engine may be damaged due to reduced coolant flow.

9) Place heater temperature control cable in coldest position. This will bypass coolant through transparent hose. Operate engine at 2300 RPM until bubbles in transparent hose disappear.

10) After bubbles disappear, place heater temperature control cable in warmest heat position. Check for sound of coolant flowing through heater water valve. If sound is heard, repeat step 9).

11) If sound is not heard, stop engine and allow it to cool. Install original radiator cap. Remove transparent hose. Install air bleeder cap.

ENGINE

NOTE: Engine and transaxle are removed through bottom of engine compartment.

Removal

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Mark and remove hood. Disconnect battery cables.

2) Drain cooling system. Drain engine oil. Disconnect necessary vacuum hoses, fuel hoses, coolant hoses, control cables and electrical connections. Remove cooling fans and radiator.

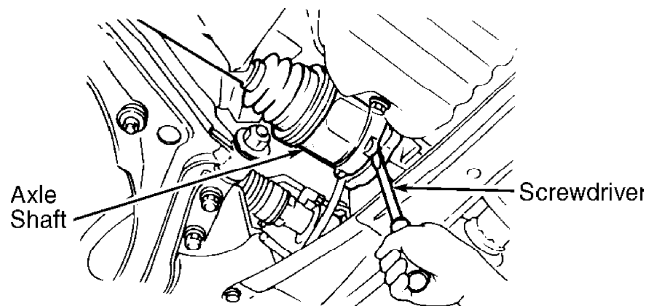
3) Remove all drive belts. Remove alternator. Remove A/C compressor with hoses attached if possible. If necessary, discharge A/C system using approved refrigerant recovery/recycling equipment and disconnect A/C hoses from compressor. Remove power steering pump. Raise and support vehicle so engine can be removed from bottom of engine compartment.

4) Remove lower engine cover. Disconnect control cables, shift linkage, electrical connections and oil cooler hoses (A/T) at transaxle. Remove exhaust pipes. Remove front wheels. Remove nut from end of axle shaft at hub. Remove brake caliper, and secure it aside.

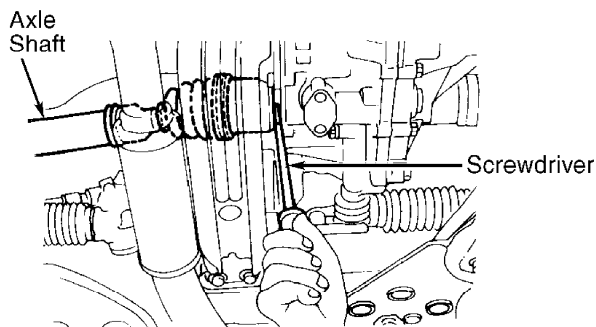
5) Remove nut, and separate tie rod from steering knuckle. Remove steering knuckle-to-strut bolts. Separate steering knuckle from strut, and lower steering knuckle.

NOTE: On models with support bearing, support bearing retaining bolts must be removed before removing right axle shaft.

6) Cover axle shaft boots using shop towel to prevent damage. Using soft-faced hammer, tap axle shaft from hub assembly. If axle shaft cannot be tapped from hub assembly, use puller to separate axle shaft from hub assembly. Using screwdriver, pry right axle shaft from transaxle. See Fig. 9.



WITH SUPPORT BEARING



WITHOUT SUPPORT BEARING

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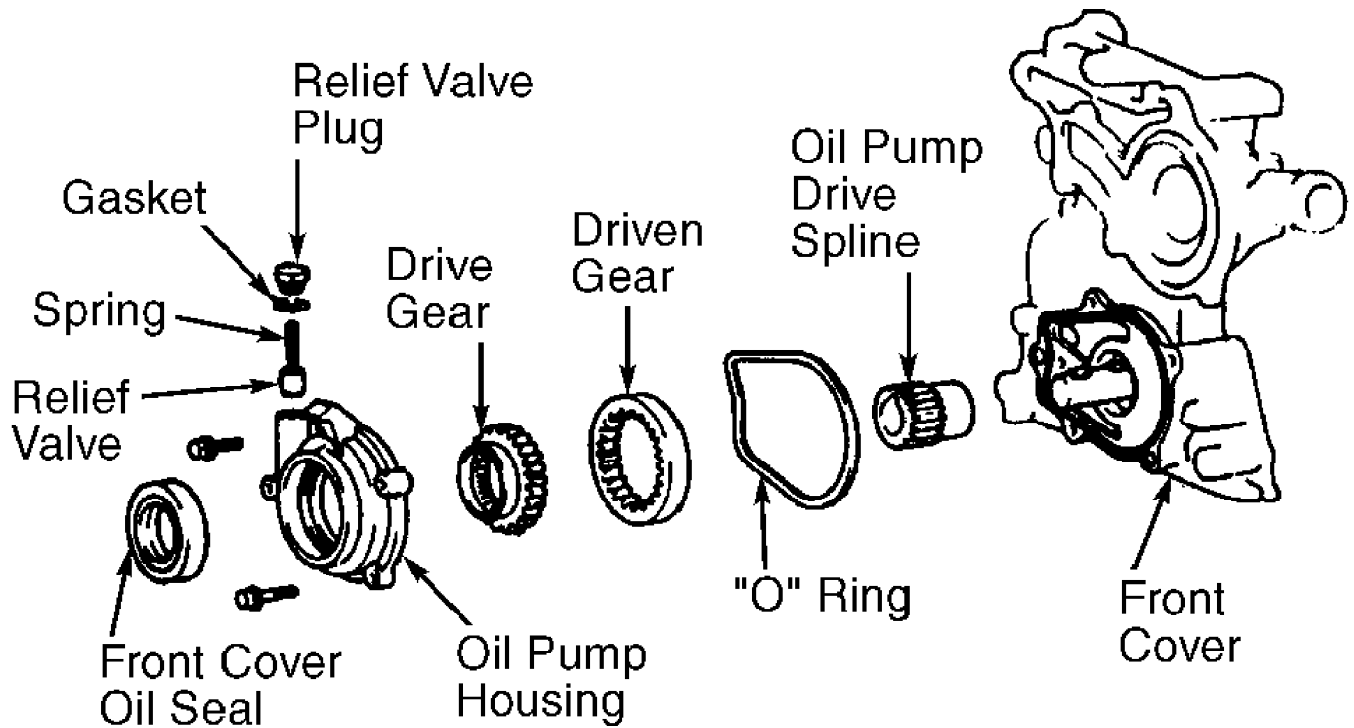
Fig. 9: Removing Right Axle Shaft From Transaxle
Courtesy of Nissan Motor Co., U.S.A.

CAUTION: Use care not to damage pinion shaft when removing left axle shaft from transaxle.

7) On M/T models, pry left axle shaft from transaxle. See Fig. 10. On A/T models, use screwdriver and hammer to remove left axle shaft from transaxle. See Fig. 11.

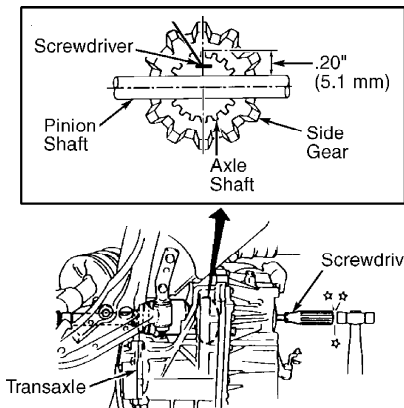
8) On all models, support transaxle using transmission jack. Support engine using engine hoist. Remove crossmember located below engine. Remove engine and transaxle mount bolts.

9) Lower engine hoist and transmission jack to lower engine and transaxle from bottom of engine compartment.



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Fig. 10: Removing Left Axle Shaft From Transaxle (M/T Models)
 Courtesy of Nissan Motor Co., U.S.A.



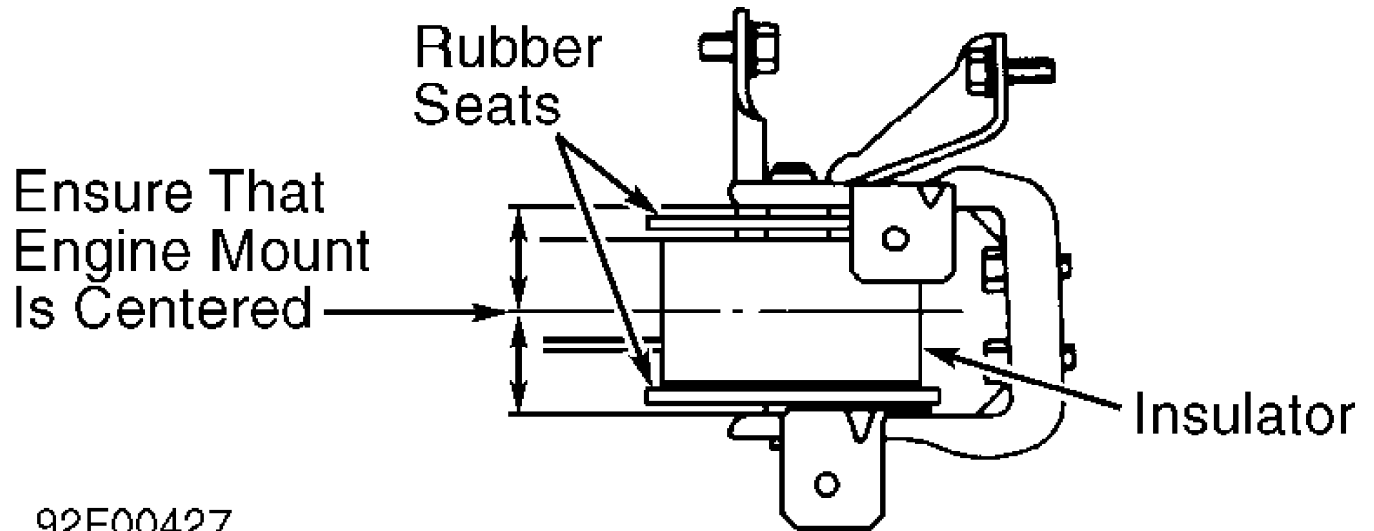
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Fig. 11: Removing Left Axle Shaft From Transaxle (A/T Models)
 Courtesy of Nissan Motor Co., U.S.A.

Installation

1) To install, reverse removal procedure. Ensure engine

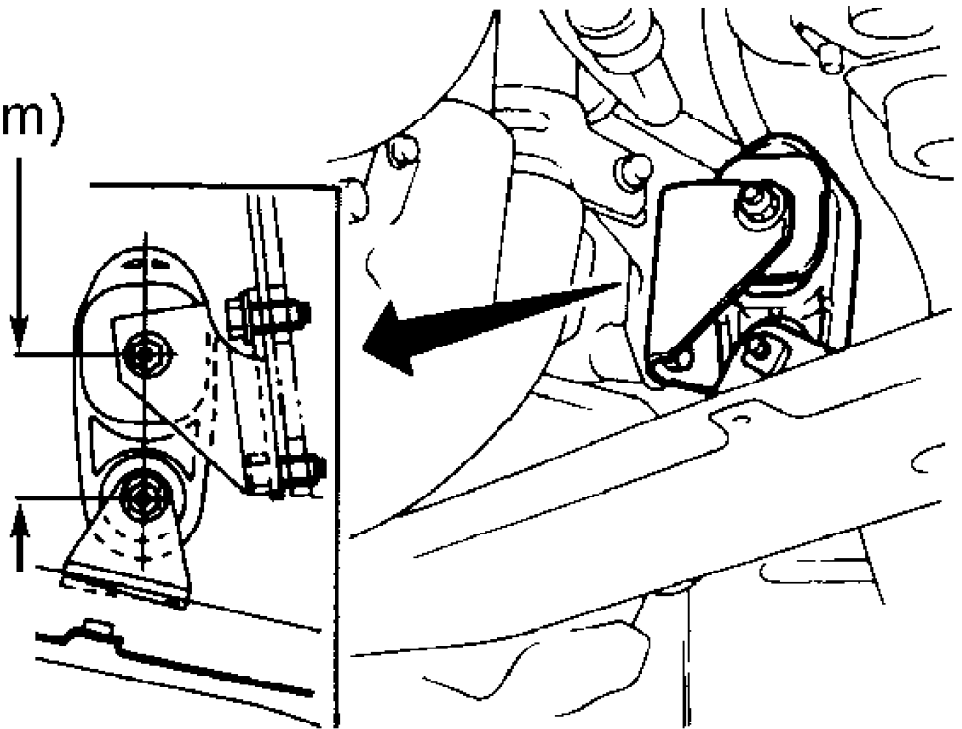
mounts are installed so rubber seats are properly positioned and engine mount is centered in mounting bracket. See Fig. 12. On M/T models, position engine at specified height on engine mount. See Fig. 13.



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Fig. 12: Positioning Engine Mounts
 Courtesy of Nissan Motor Co., U.S.A.

2.126-2.205"
 (54.00-56.01 mm)



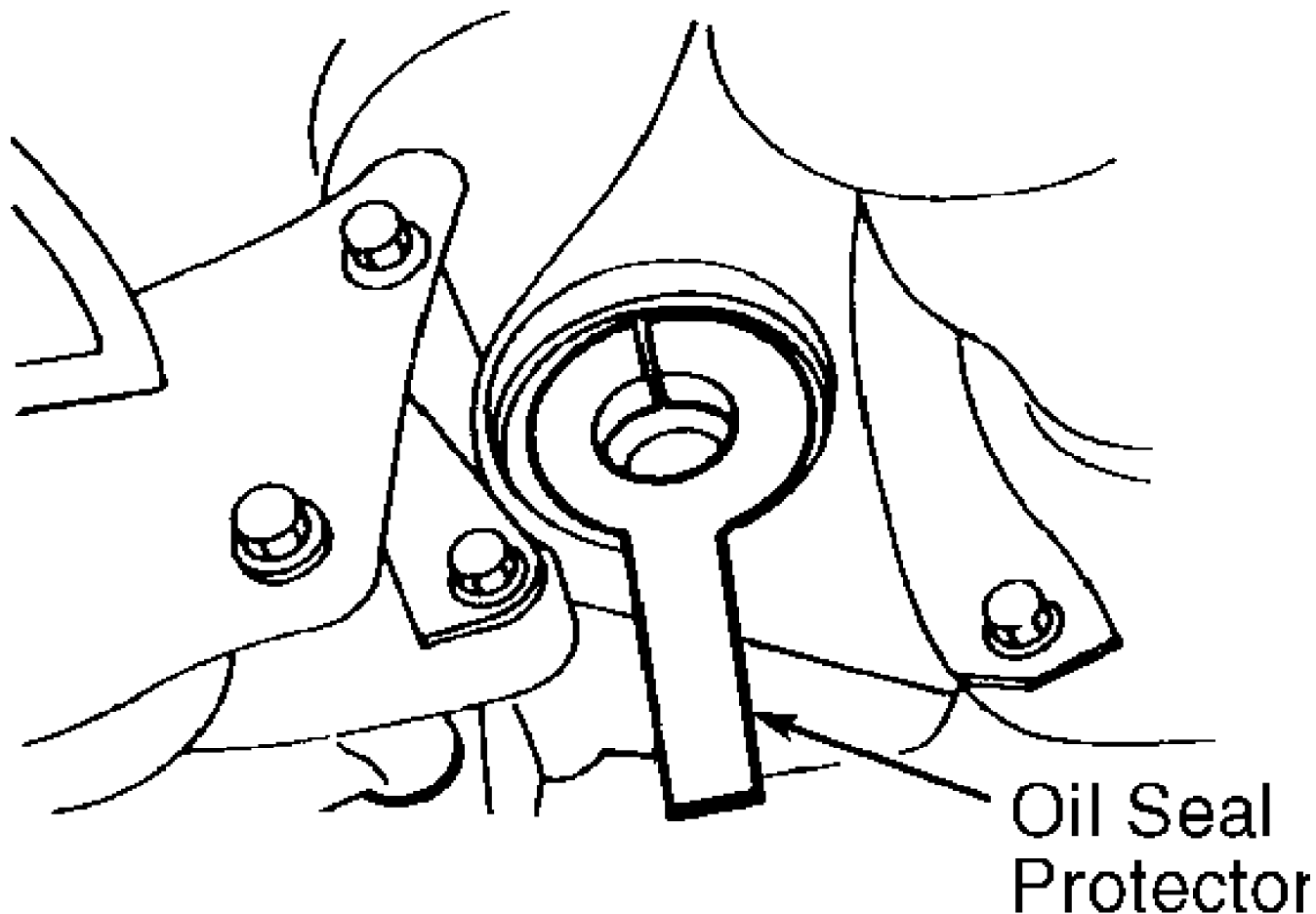
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Fig. 13: Adjusting Engine Height On Engine Mount (M/T Models)
 Courtesy of Nissan Motor Co., U.S.A.

2) On all models, install Oil Seal Protector (J-34296 for left side and J-34284 for right side) in oil seal on transaxle before installing axle shaft in transaxle. See Fig. 14.

3) Install axle shaft, and then remove oil seal protector. Ensure axle shaft circular clip locks in groove of differential side gear and axle shaft cannot be pulled out of transaxle.

4) Tighten all fasteners to specification. See TORQUE SPECIFICATIONS table at end of article. Evacuate and recharge A/C system (if necessary). Coat fuel hoses-to-fitting surface with small amount of silicone oil before installing. Adjust all control cables and fluid levels. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.



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Fig. 14: Installing Oil Seal Protector
Courtesy of Nissan Motor Co., U.S.A.

INTAKE MANIFOLD

NOTE: If necessary, drain cooling system and remove fuel rail for intake manifold removal.

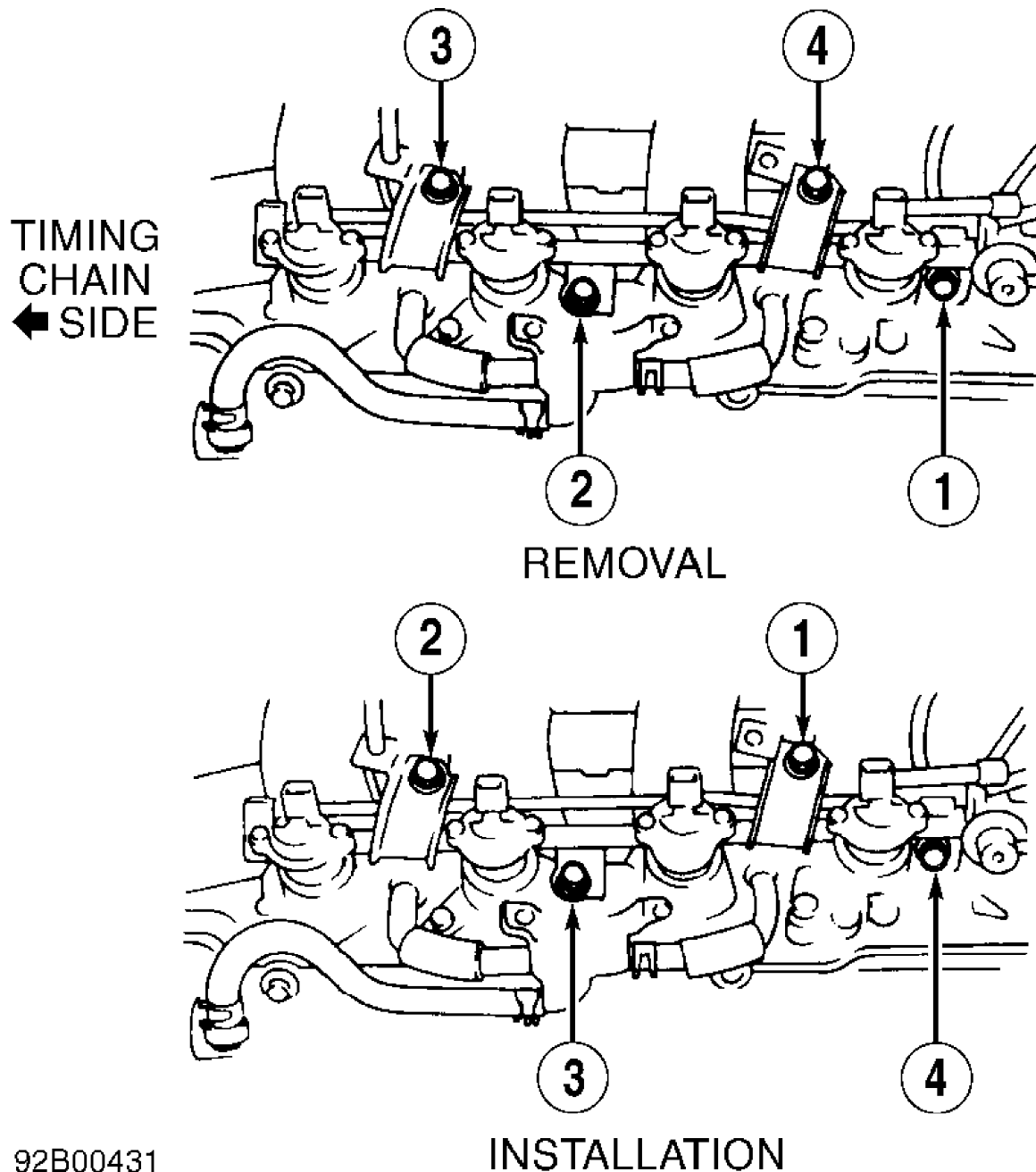
Removal

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Disconnect electrical connectors at fuel injectors and vacuum hose at pressure regulator. Disconnect necessary fuel hoses.

2) Remove fuel rail retaining bolts in proper sequence. See Fig. 15. Remove fuel rail with fuel injectors and insulators. See Fig. 16.

3) Disconnect necessary electrical connections, hoses and control cables. Remove support braces from intake manifold. Remove intake manifold retaining bolts in proper sequence. See Fig. 17. Remove intake manifold and gasket.

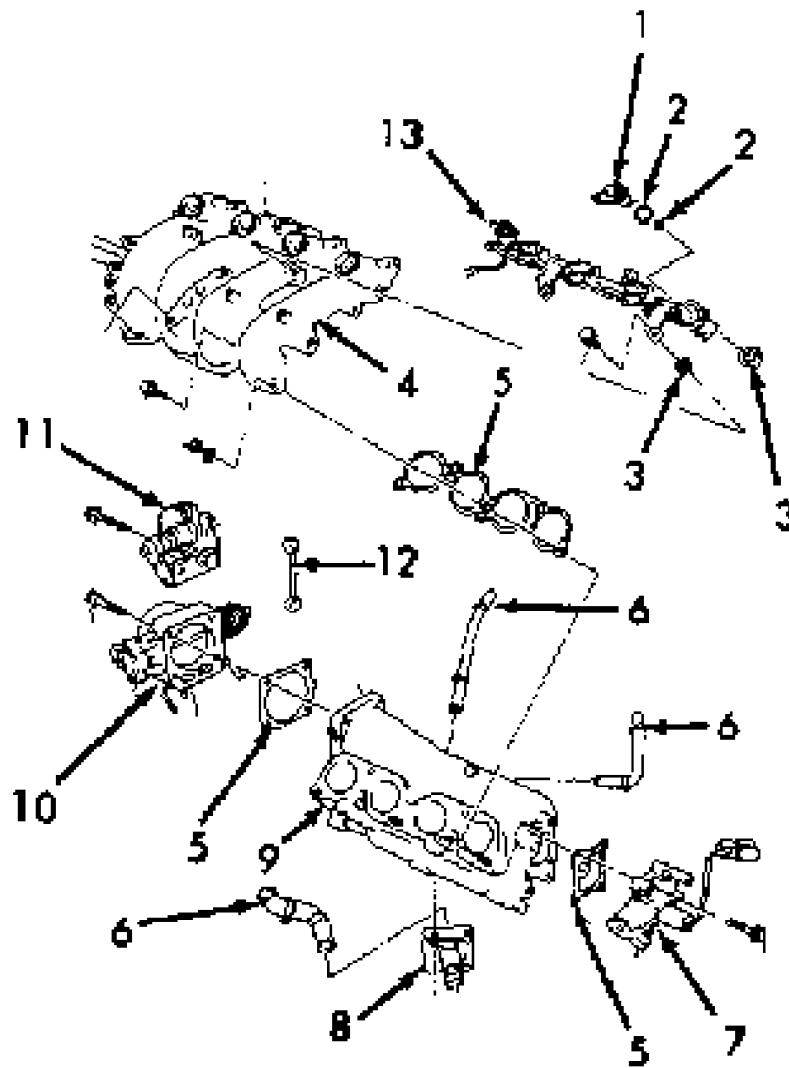
4) Remove intake manifold collector-to-intake manifold bolts/nuts in proper sequence if intake manifold collector is to be separated from intake manifold. See Fig. 17. Separate intake manifold collector and gasket from intake manifold.



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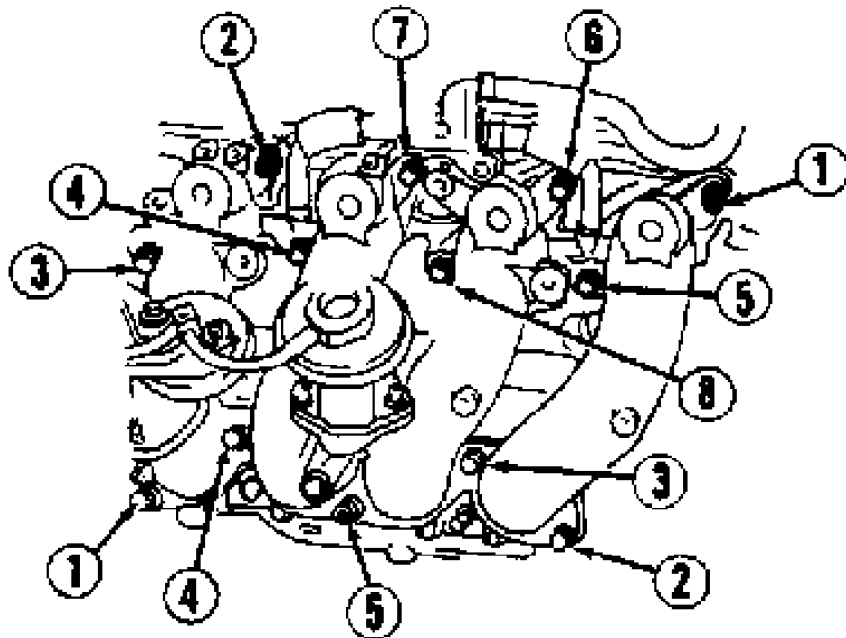
INSTALLATION

Fig. 15: Fuel Rail Bolt Removal & Installation Sequence
Courtesy of Nissan Motor Co., U.S.A.

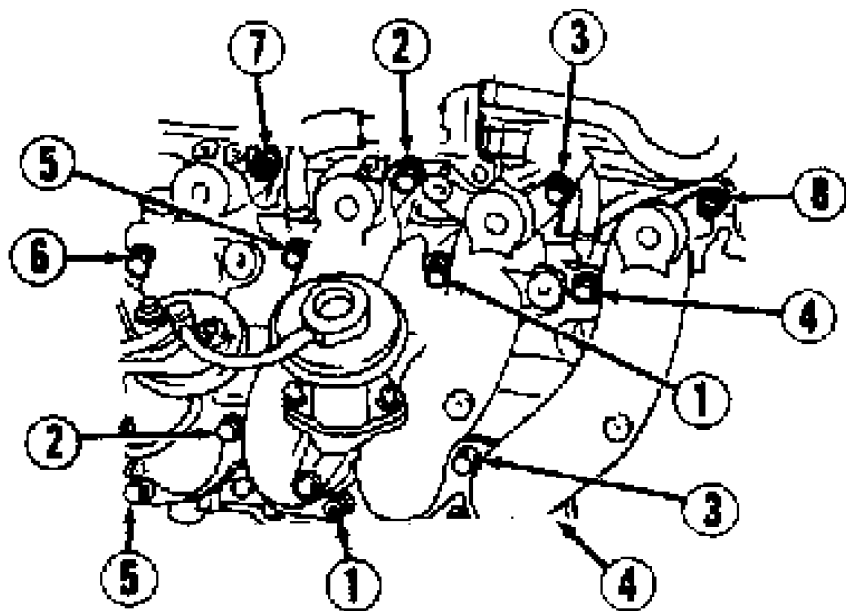


- | | |
|--------------------------------|------------------------------|
| 1. Fuel Injector | 8. Air Regulator |
| 2. "O" Ring | 9. Intake Manifold Collector |
| 3. Insulator | 10. Throttle Chamber |
| 4. Intake Manifold | 11. Accel-Drum Unit |
| 5. Gasket | 12. Rod |
| 6. Hose | 13. Fuel Rail |
| 7. Auxiliary Air Control Valve | |

Fig. 16: Exploded View Of Intake Manifold & Components
 Courtesy of Nissan Motor Co., U.S.A.



REMOVAL



INSTALLATION

Fig. 17: Intake Manifold & Intake Manifold Collector Bolt/Nut
Removal & Installation Sequence
Courtesy of Nissan Motor Co., U.S.A.

Installation

1) To install intake manifold collector and intake manifold, reverse removal procedure using new gaskets. Tighten all bolts to specification in sequence. See Fig. 17. See TORQUE SPECIFICATIONS table at end of article.

2) When installing fuel rail and fuel injectors, use new insulators and "O" rings. Lubricate "O" rings with silicone oil before installing. Tighten fuel rail retaining bolts to specification in sequence. See Fig. 15. See TORQUE SPECIFICATIONS table.

NOTE: If accel-drum unit was removed or throttle chamber or rod was changed, install new rod and adjust accel-drum unit. See ACCEL-DRUM UNIT under ADJUSTMENTS.

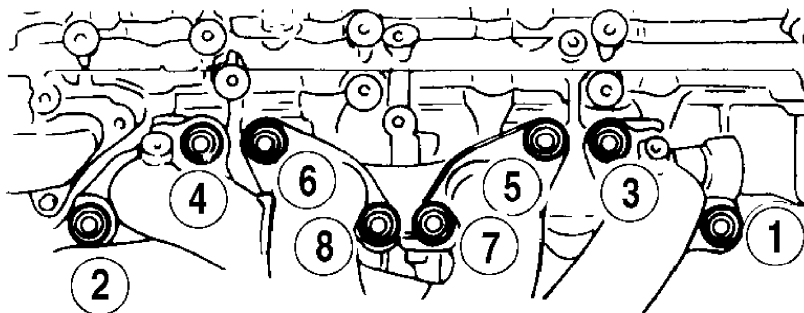
3) Coat fuel hoses-to-fitting surface with small amount of silicone oil before installing. To install remaining components, reverse removal procedure. If cooling system was drained, fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

EXHAUST MANIFOLD

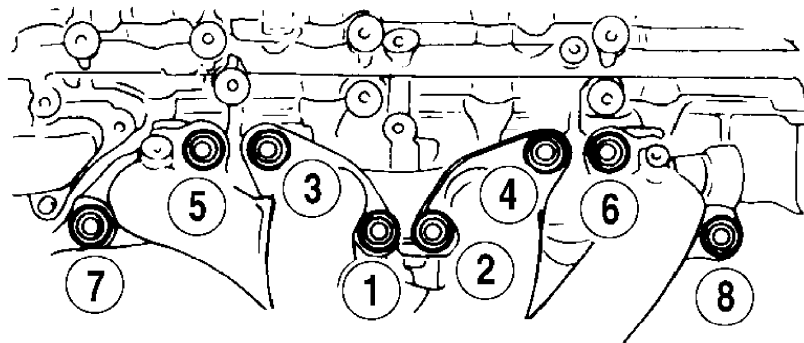
Removal & Installation

1) Remove heat shield and oxygen sensor (if necessary) from exhaust manifold. Disconnect exhaust pipe from exhaust manifold. Remove exhaust manifold nuts in sequence. See Fig. 18.

2) To install, reverse removal procedure. Tighten exhaust manifold nuts to specification in sequence. See Fig. 18. See TORQUE SPECIFICATIONS table at end of article.



REMOVAL



INSTALLATION

92D00433

Fig. 18: Exhaust Manifold Nut Removal & Installation Sequence
Courtesy of Nissan Motor Co., U.S.A.

CYLINDER HEAD

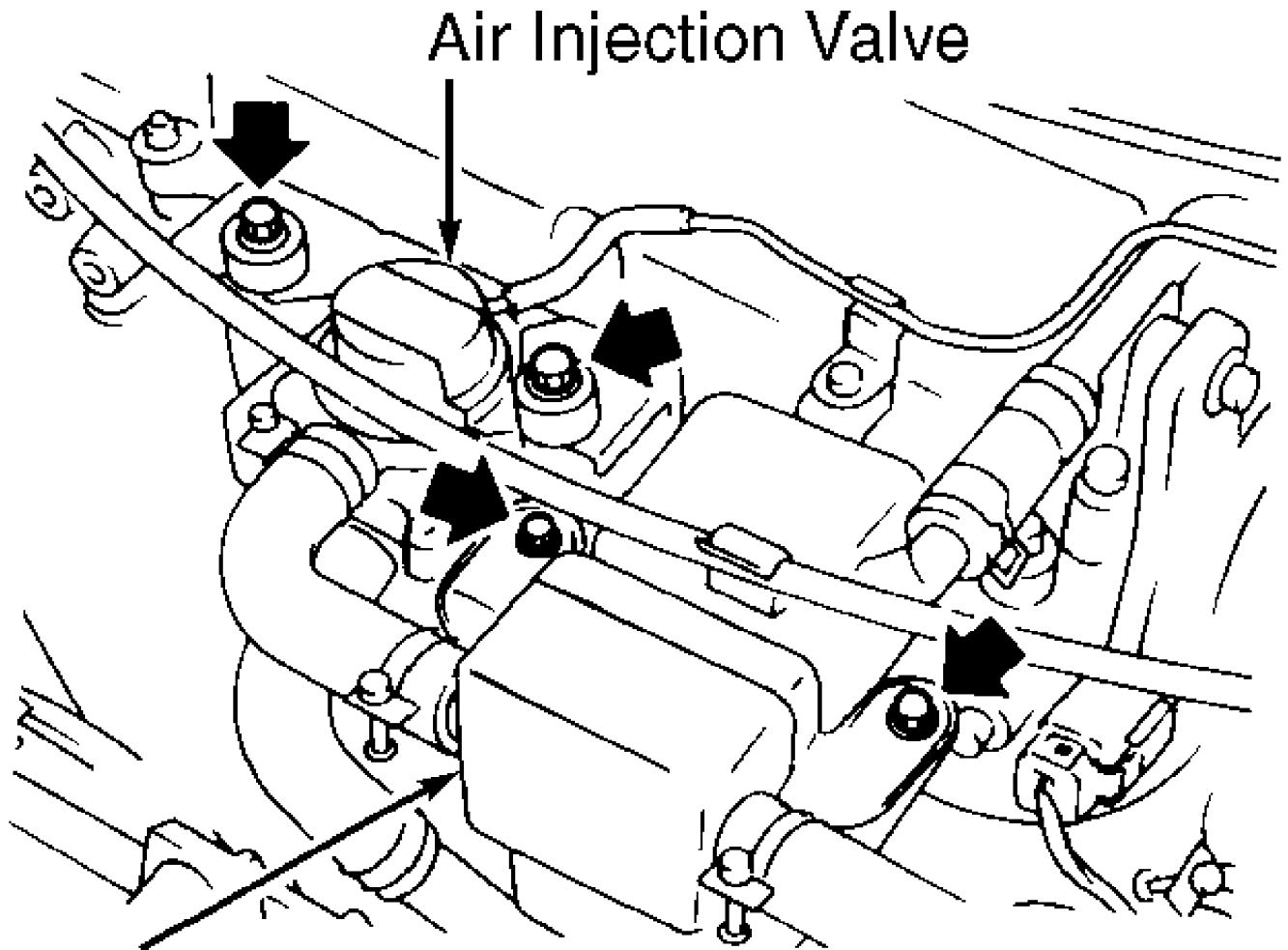
NOTE: Cylinder head can be removed with intake and exhaust manifolds installed.

Removal

1) Release fuel pressure. See FUEL PRESSURE RELEASE. Remove lower engine cover. Remove right front wheel and engine side cover. Drain cooling system and cylinder block. Remove radiator.

2) Remove intake air duct. Remove drive belts and water pump pulley. Remove alternator and power steering pump. Disconnect necessary coolant hoses, fuel hoses, vacuum hoses, control cables and electrical connectors. Remove spark plugs.

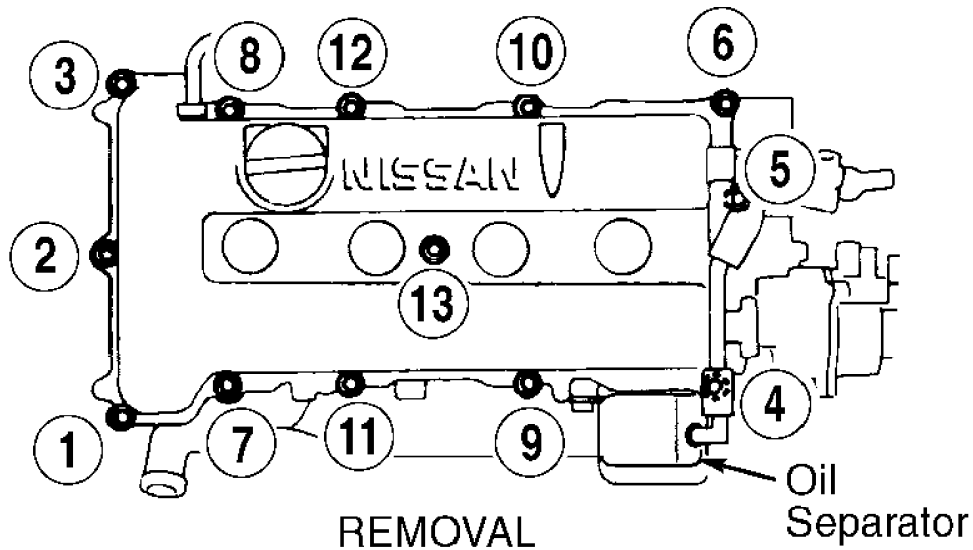
3) Remove air injection valve and resonator. See Fig. 19. Remove valve cover nuts in proper sequence. See Fig. 20. Remove valve cover, gasket and oil separator.



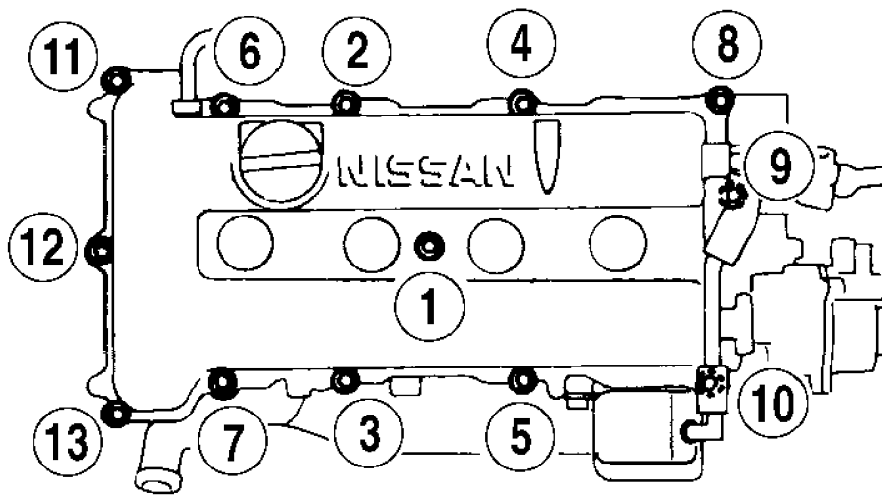
Resonator

92E00434

Fig. 19: Identifying Air Injection Valve & Resonator
Courtesy of Nissan Motor Co., U.S.A.



← TIMING CHAIN SIDE



STEP 1 - Tighten No. 1, 10, 11, 13 & 8 to 35 INCH Lbs. (4 N.m).

STEP 2 - Tighten all nuts in sequence to 72-86 INCH Lbs. (8-10 N.m).

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Fig. 20: Valve Cover Nut Removal & Installation Sequence
 Courtesy of Nissan Motor Co., U.S.A.

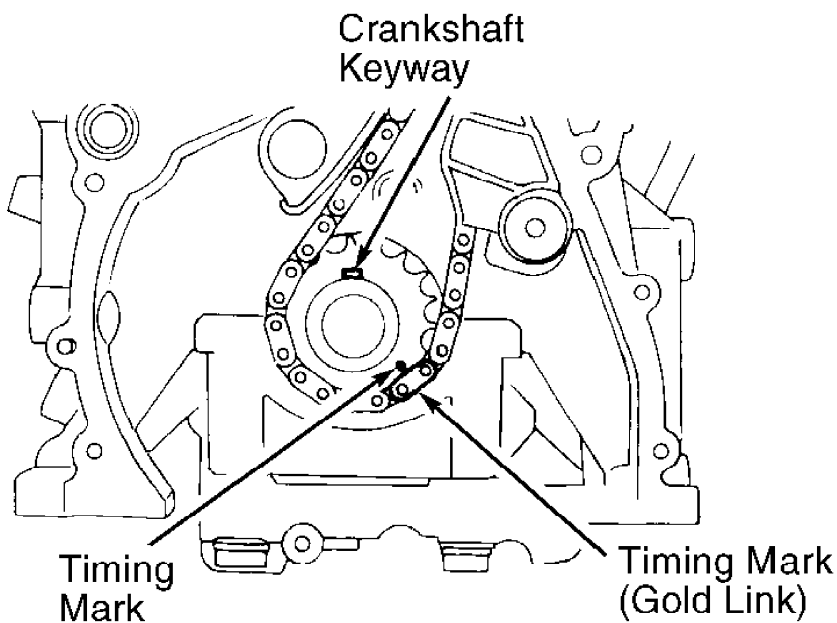
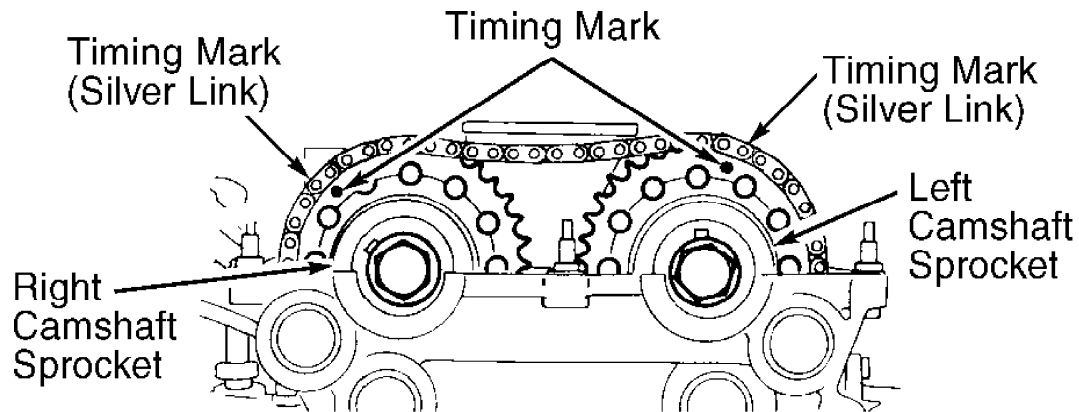
4) Remove intake manifold support braces. Remove oil filter bracket and power steering pump bracket. Set cylinder No. 1 at TDC of

compression stroke by rotating crankshaft until timing mark pointer on front cover aligns with "0" mark on crankshaft pulley and timing marks on camshaft sprockets are properly positioned. See Fig. 21.

5) Note orientation of arrow on timing chain tensioner, located on right side of cylinder head. See Figs. 22 and 29. Remove timing chain tensioner, "0" ring and gasket from cylinder head. Remove distributor cap. Mark and remove distributor. Remove upper timing chain guide.

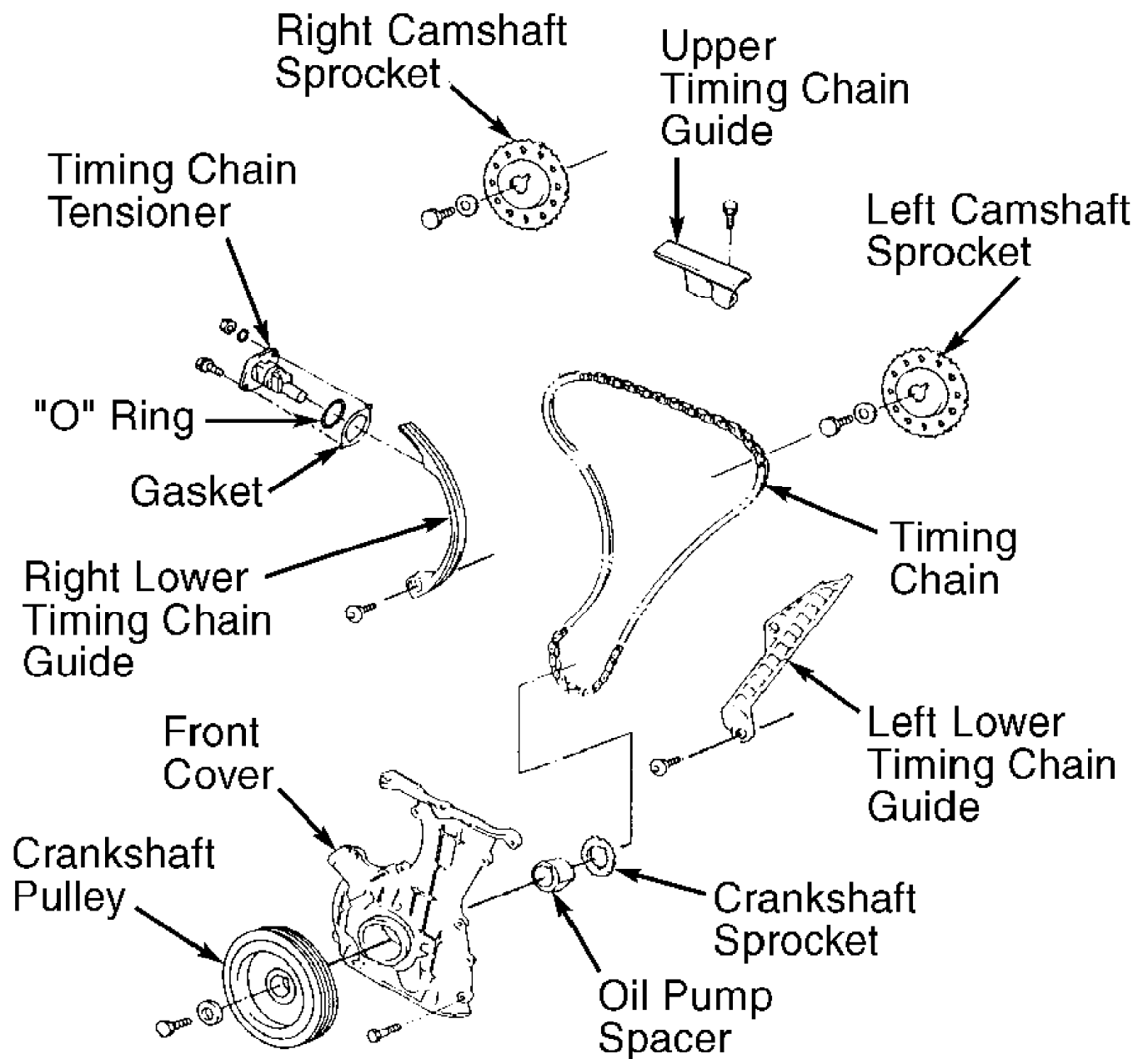
CAUTION: DO NOT rotate crankshaft or camshafts with timing chain removed or engine damage may result.

6) Hold camshaft using a wrench on area behind camshaft sprocket and remove camshaft sprocket bolts. Remove camshaft sprockets.



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Fig. 21: Aligning Timing Marks
Courtesy of Nissan Motor Co., U.S.A.



92H00437

Fig. 22: Exploded View Of Timing Chain & Components
 Courtesy of Nissan Motor Co., U.S.A.

CAUTION: Note direction and location of camshaft bearing cap installation. Arrow on cap points toward timing chain end of engine. Caps No. 1-4 are numbered for location with No. 1 at timing chain side. Caps at flywheel end of cylinder head are not numbered.

7) Remove camshaft bearing cap bolts in sequence. See Fig. 23. Note bolt location for reassembly reference.

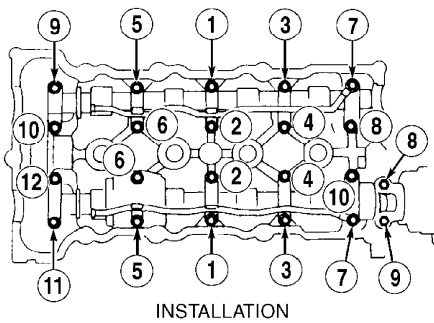
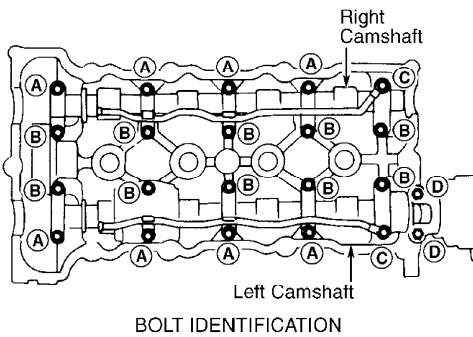
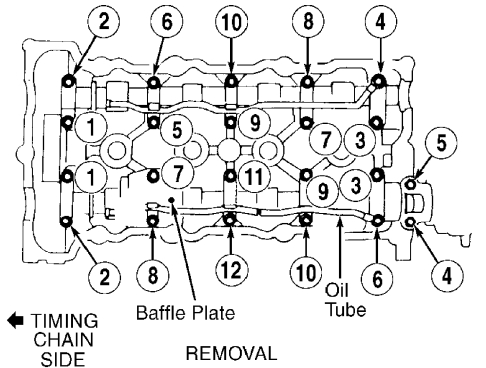
8) Remove camshafts, camshaft brackets, oil tubes and baffle plate. Disconnect coolant hoses as necessary. Remove water pipe bolt. Remove starter. Remove outside (small) cylinder head bolts.

CAUTION: Outside cylinder head bolts are located at front cover and near distributor.

9) Using Cylinder Head Bolt Wrench (J-24239-01), loosen cylinder head (large) bolts in 3 steps and in sequence. See Fig. 24. Remove cylinder head with intake and exhaust manifolds attached.

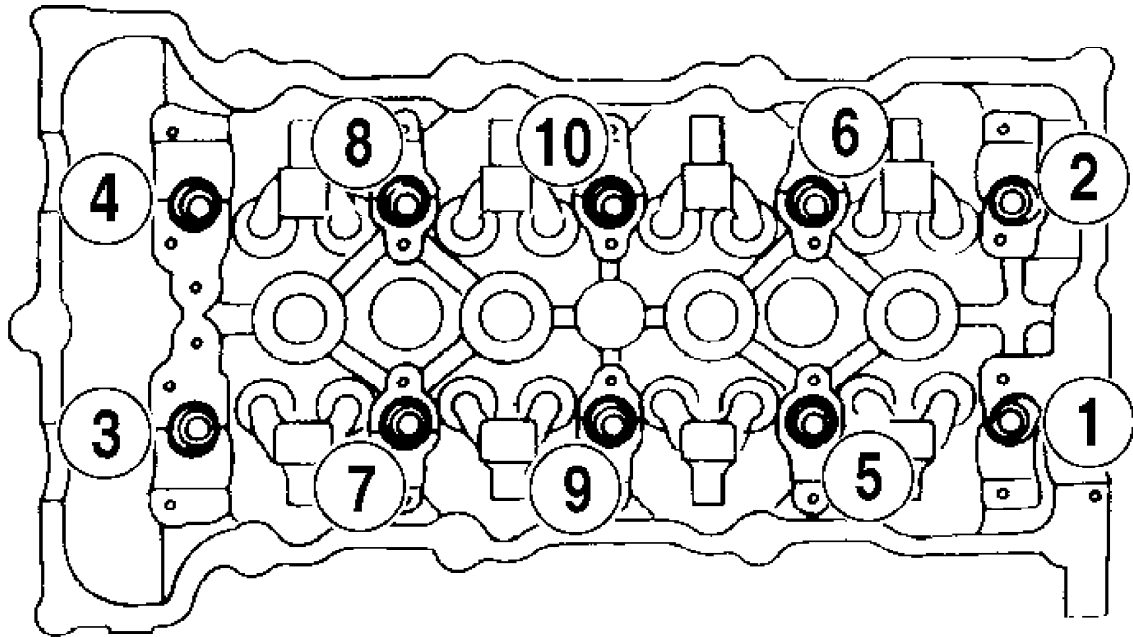
10) Remove oil pan. See OIL PAN. Remove oil pump pick-up tube and baffle plate. Remove crankshaft pulley bolt. Using puller, remove crankshaft pulley.

11) Support engine using floor jack positioned under main bearing caps. Remove engine mount located on front cover. Remove front cover bolts and front cover. Remove lower timing chain guides and timing chain. Remove oil pump spacer and crankshaft sprocket (if necessary). See Fig. 22.



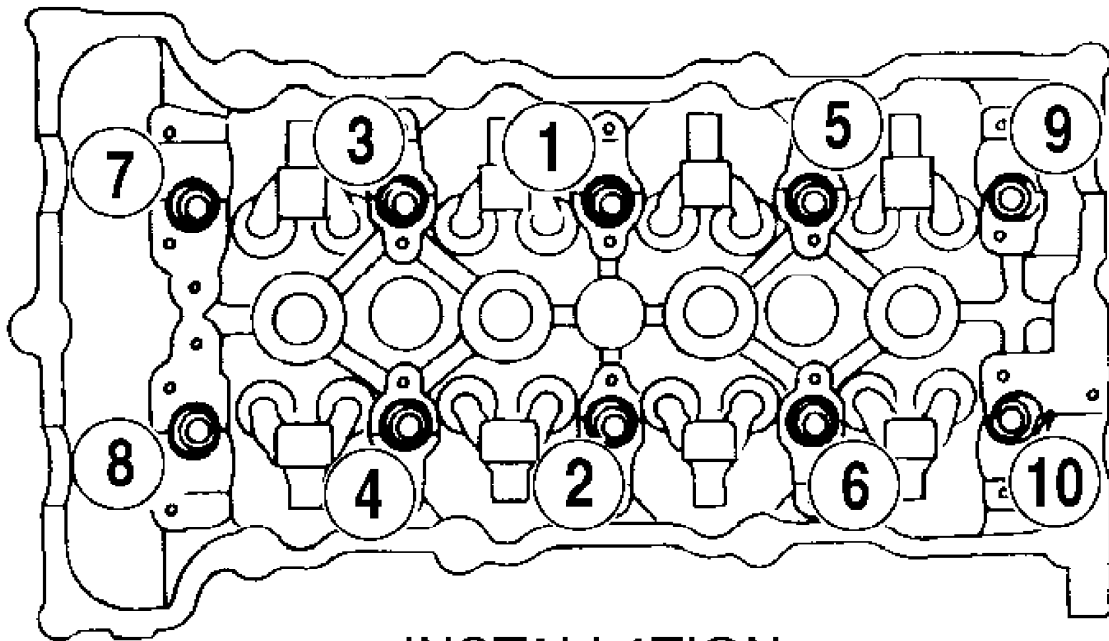
NOTE: Bolt identification must be used when tightening bolts to specification.

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 Fig. 23: Camshaft Bearing Cap Bolt Identification & Removal & Installation Sequence
 Courtesy of Nissan Motor Co., U.S.A.



REMOVAL

← TIMING CHAIN
SIDE



INSTALLATION

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Fig. 24: Cylinder Head Bolt Removal & Installation Sequence
Courtesy of Nissan Motor Co., U.S.A.

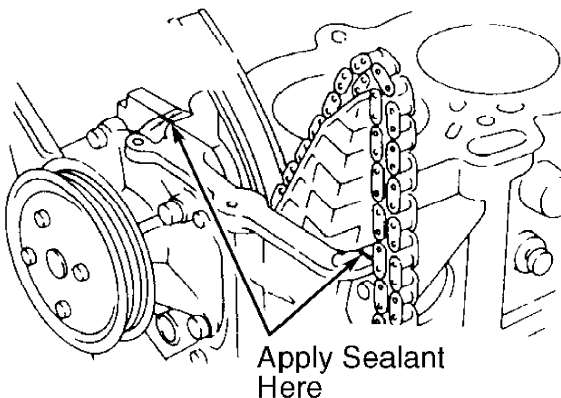
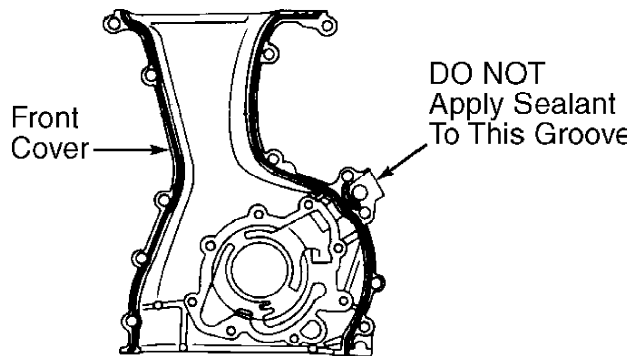
CAUTION: DO NOT machine more than .008" (.20 mm) total from cylinder head and cylinder block deck surface.

Inspection

- 1) Inspect cylinder head warpage at cylinder block area. Replace or resurface cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article. Ensure cylinder head height is within specification after machining.
- 2) Measure length of cylinder head bolts from bottom of bolt head to end of bolt. Cylinder head bolt must be replaced if distance exceeds 6.228" (158.19 mm).

Installation

- 1) If crankshaft sprocket was removed, install crankshaft sprocket with teeth away from cylinder block. This will position shoulder on rear of crankshaft sprocket toward cylinder block.
- 2) Set cylinder No. 1 at TDC by rotating crankshaft until crankshaft keyway is at 12 o'clock position and timing mark is at 4 o'clock position. See Fig. 21. Install timing chain so timing mark (Gold link) is aligned with timing mark on crankshaft sprocket. See Fig. 21.
- 3) Install lower timing chain guides, and tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article. Install oil pump spacer (if removed).
- 4) Clean old sealant from front cover and cylinder block. Apply .08-.12" (2.0-3.0 mm) diameter bead of sealant to front cover. DO NOT apply sealant to outer groove on front cover. See Fig. 25. Install front cover. Tighten bolts to specification. Wipe excess sealant from top and bottom of front cover.



92C00440

Fig. 25: Applying Sealant To Front Cover
Courtesy of Nissan Motor Co., U.S.A.

- 5) Install front engine mount. Tighten bolts to specification. Install crankshaft pulley. Coat crankshaft pulley bolt

threads and bolt seat area with oil. Install bolt, and tighten it to specification.

6) Set cylinder No. 1 at TDC by rotating crankshaft until timing mark pointer on front cover aligns with "0" mark on crankshaft pulley. Install new "O" ring, oil pump pick-up tube and baffle plate. Tighten bolts to specification. Install oil pan. See OIL PAN.

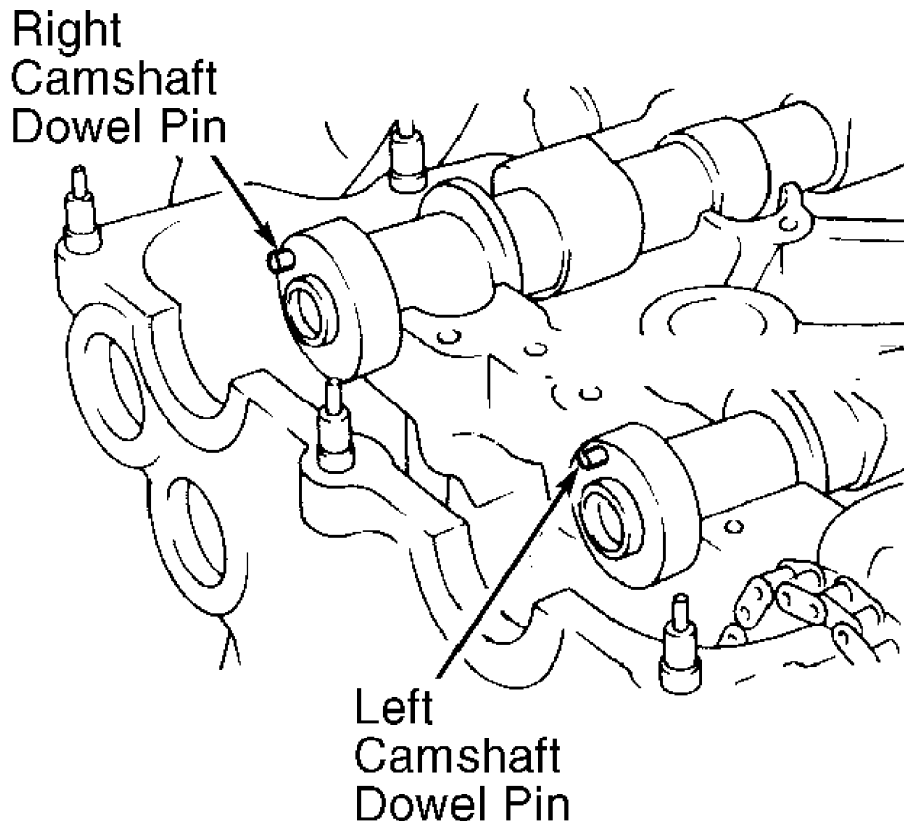
7) Apply a .08-.12" (2.0-3.0 mm) diameter bead of sealant to top of front cover, at front cover-to-cylinder block mating. See Fig. 25. Install cylinder head gasket and cylinder head.

CAUTION: Measure distance from bottom of head to end of bolt on all cylinder head-to-cylinder block bolts before installing. Cylinder head bolt must be replaced if distance exceeds 6.228" (158.19 mm).

8) Apply a light coat of oil to cylinder head-to-cylinder block bolt threads and bolt head seat area. Install and tighten bolts to specification in sequence using cylinder head bolt wrench. See Fig. 24.

9) Install outside cylinder head bolts, located at front cover and near distributor. Tighten bolts to specification. Install water pipe bolt. Install starter. Reconnect coolant hoses.

10) Coat camshaft and rocker arm components with engine oil. Install left camshaft with dowel pin at 12 o'clock position and right camshaft with dowel pin at 10 o'clock position. See Fig. 26.



92D00441

Fig. 26: Installing Camshafts
Courtesy of Nissan Motor Co., U.S.A.

11) Apply sealant to designated area on rear camshaft bearing cap of left camshaft. See Fig. 27. Install all camshaft bearing caps

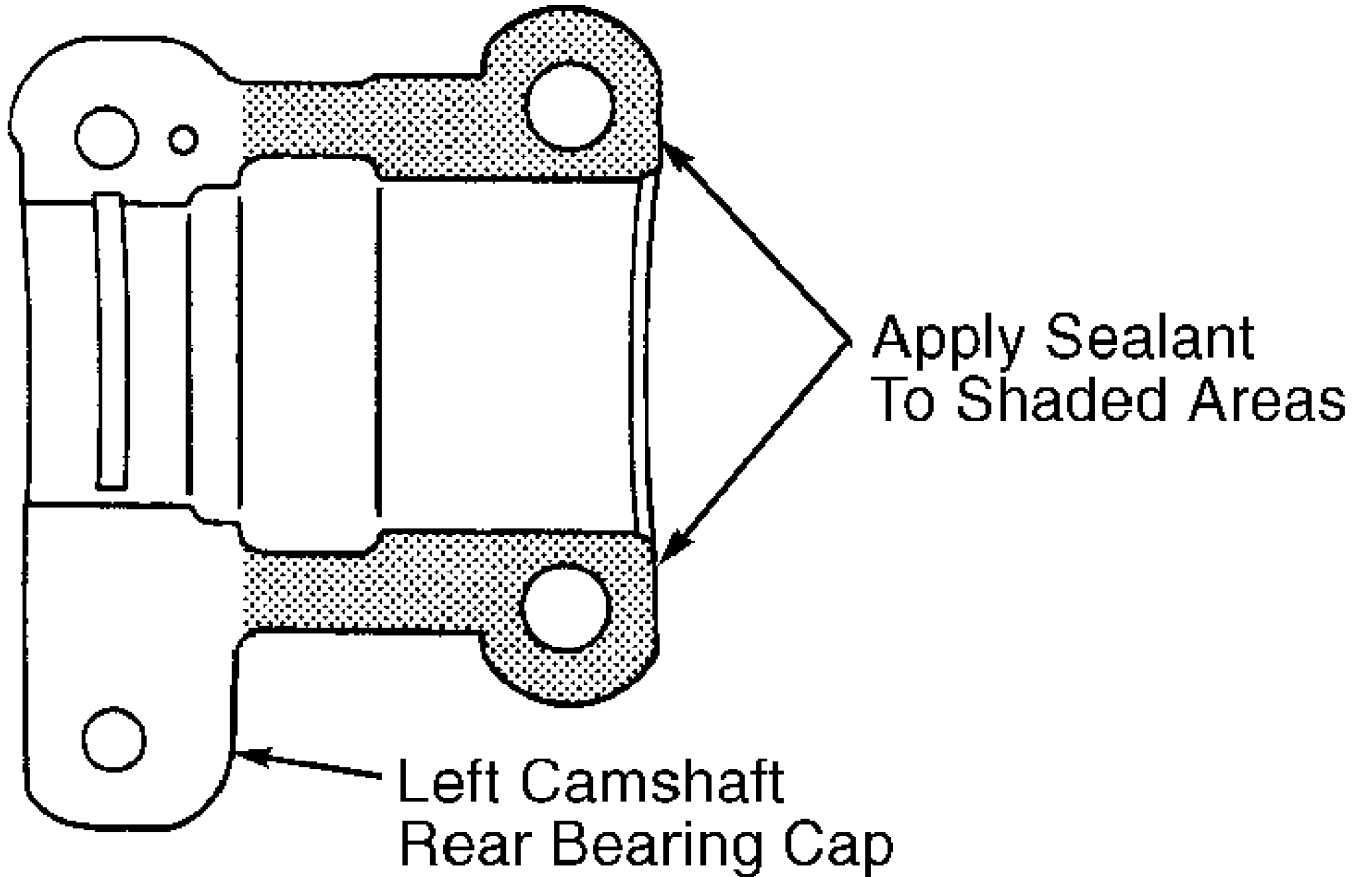
in original locations.

CAUTION: Install camshaft bearing caps with arrow pointing toward timing chain end of engine. Caps No. 1-4 are numbered for location, with No. 1 installed at timing chain end. Caps at rear end of cylinder head are not numbered.

CAUTION: DO NOT rotate crankshaft or camshafts with timing chain removed or engine damage may result.

12) Apply a coat of oil to camshaft bearing cap bolt threads and bolt seat area. Install and tighten camshaft bearing cap bolts to specification in sequence. See Fig. 23.

13) Ensure camshaft end play is within specification. See CAMSHAFT table under ENGINE SPECIFICATIONS at end of article.



92E00442

Fig. 27: Applying Sealant To Rear Camshaft Bearing Cap Of Left Camshaft
Courtesy of Nissan Motor Co., U.S.A.

14) Install timing chain onto camshaft sprockets and camshaft sprockets onto camshafts, ensuring timing marks on camshaft sprockets are aligned with timing marks (Silver links) on timing chain. See Fig. 21.

15) Apply a coat of oil to camshaft sprocket bolt threads and bolt head seat area. While holding camshaft, install and tighten camshaft sprocket bolts to specification.

16) Install upper timing chain guide. Tighten bolt to

specification. Ensure slot in camshaft is properly positioned, and install distributor. See Fig. 28.

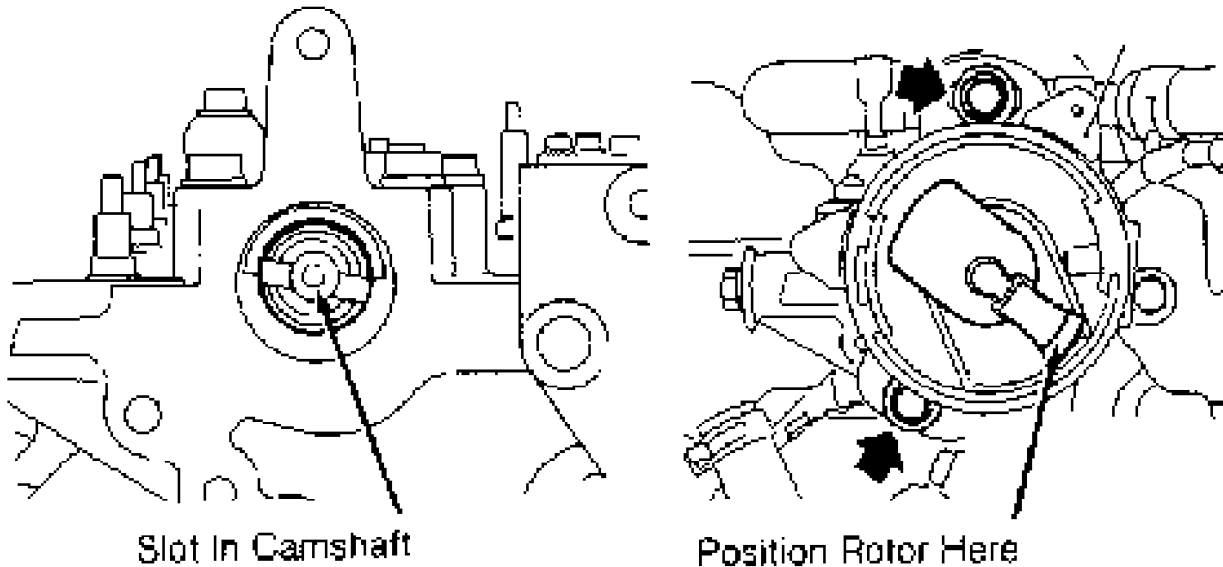


Fig. 28: Positioning Camshaft & Installing Distributor
Courtesy of Nissan Motor Co., U.S.A.

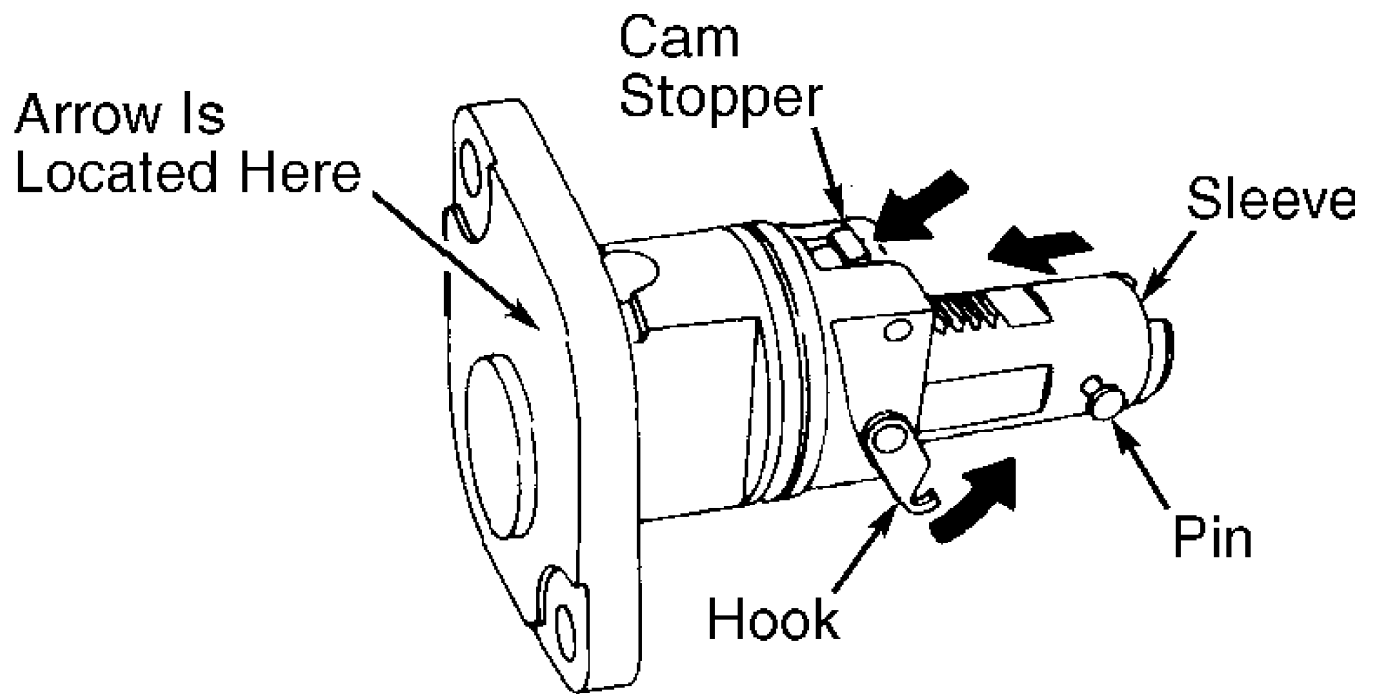
17) While pressing cam stopper downward, press sleeve into timing chain tensioner until hook can be engaged on pin. See Fig. 29. This will hold timing chain tensioner in retracted position for installation.

CAUTION: Timing chain tensioner must be installed with arrow pointing toward timing chain side of engine. Arrow is located between bolt holes on outside of timing chain tensioner. See Fig. 29. Timing chain tensioner will release automatically when installed on cylinder head.

18) Coat timing chain tensioner with engine oil. Install timing chain tensioner with new "O" ring and gasket. Tighten bolt/nut to specification.

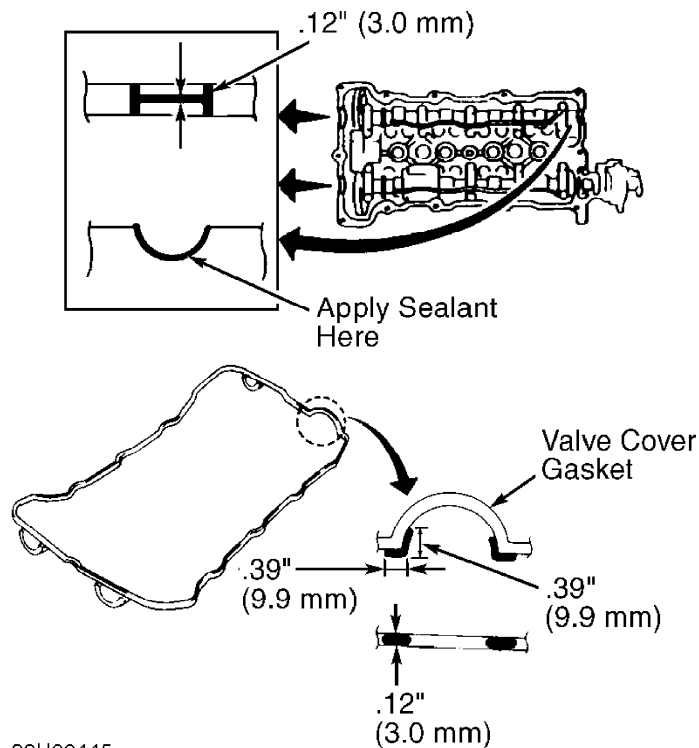
19) Install oil filter bracket and power steering pump bracket. Tighten bolts to specification. Install intake manifold supports. Apply sealant to designated area on valve cover gasket and cylinder head. See Fig. 30. Install gasket, valve cover and oil separator. Tighten valve cover nuts to specification in sequence. See Fig. 20.

20) To install remaining components, reverse removal procedure. Tighten fasteners to specification. Check fluid levels. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.



92G00444

Fig. 29: Retracting Timing Chain Tensioner
 Courtesy of Nissan Motor Co., U.S.A.



92H00445

Fig. 30: Applying Valve Cover Gasket Sealant
 Courtesy of Nissan Motor Co., U.S.A.

FRONT COVER OIL SEAL

Removal

1) Raise and support vehicle. Remove lower engine cover. Remove right front wheel and engine side cover. Remove accessory drive belts. Remove crankshaft pulley retaining bolt.

2) Using puller, remove crankshaft pulley. Pry front cover oil seal from front cover. Use care not to scratch front cover or crankshaft sealing surfaces. Note direction of oil seal installation.

Installation

1) Coat seal lip of new front cover oil seal with engine oil. Install oil seal.

2) Install crankshaft pulley. Apply a light coat of oil to crankshaft pulley bolt threads and bolt seat area. Install and tighten retaining bolt to specification. See TORQUE SPECIFICATIONS table at end of article. To install remaining components, reverse removal procedure.

TIMING CHAIN

Removal

To remove timing chain, manufacturer's procedure requires cylinder head removal. See CYLINDER HEAD under REMOVAL & INSTALLATION.

Inspection

Inspect timing chain, timing chain guides and all sprockets for damage. Replace components if damaged. Check for warped cylinder head and stretched cylinder head bolts. See CYLINDER HEAD under REMOVAL & INSTALLATION. Inspect camshaft and components. See CAMSHAFT under REMOVAL & INSTALLATION.

Installation

Install timing chain and cylinder head. See CYLINDER HEAD. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING under REMOVAL & INSTALLATION.

ROCKER ARM & LASH ADJUSTER

NOTE: Valve clearance must be adjusted if cylinder head, rocker arm guide, shim, valve or valve seats are replaced. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

CAUTION: Mark component location for reassembly reference. Components must be installed in original locations. Store lash adjusters in vertical position. If lash adjusters are not stored in vertical position, they must be stored in new engine oil to prevent air from entering lash adjuster.

Removal

Manufacturer's procedure assumes camshaft, timing chain and cylinder head are removed. See CYLINDER HEAD. Remove rocker arm, rocker arm guide, shim and lash adjuster. See Fig. 2.

Inspection

Inspect components for damage. Ensure lash adjuster diameter, bore diameter and oil clearance are within specification. See LASH ADJUSTER table under ENGINE SPECIFICATIONS at end of article.

NOTE: Always install a new rocker arm guide.

Installation

1) Coat components with engine oil. Install all components in original locations in reverse order of removal.

CAUTION: Air cannot be bled from lash adjuster by engine operation.

2) With lash adjuster and rocker arm components installed, push rocker arm downward at lash adjuster. Note amount of rocker arm movement. If rocker moves .04" (1.0 mm) or more, lash adjuster must be manually bled. See VALVE TRAIN under OVERHAUL. If rocker arm moves less than .04" (1.0 mm), install remaining components.

CAMSHAFT

Removal

Manufacturer's procedure assumes cylinder head is removed. See CYLINDER HEAD under REMOVAL & INSTALLATION.

Inspection

1) Inspect components for damage. Measure camshaft lobe height, journal diameter, bore diameter and oil clearance. Replace camshaft or cylinder head if measurements are not within specification. See CAMSHAFT table under ENGINE SPECIFICATIONS at end of article.

2) Install camshaft in cylinder head. Ensure end play is within specification. Replace camshaft/cylinder head if end play is not within specification. See CAMSHAFT table.

3) Install camshaft sprockets. Using dial indicator, check camshaft sprocket runout near timing chain area on face of camshaft sprocket. Replace camshaft sprocket if runout exceeds .010" (.25 mm).

Installation

Coat camshaft with engine oil before installing. Install camshaft using installation procedure listed in CYLINDER HEAD under REMOVAL & INSTALLATION.

REAR CRANKSHAFT OIL SEAL

Removal

Remove transaxle, clutch assembly (if equipped) and flywheel/drive plate. Pry rear crankshaft oil seal from oil seal retainer. Use care not to scratch oil seal retainer or crankshaft sealing surfaces. Note direction of oil seal installation.

Installation

Coat seal lip of new oil seal with engine oil. Install oil seal. To install remaining components, reverse removal procedure. Tighten fasteners to specification. See TORQUE SPECIFICATIONS table at end of article.

WATER PUMP

Removal & Installation

1) Drain cooling system. Remove accessory drive belts. Remove retaining bolts and water pump. To install, ensure all sealing surfaces are clean.

2) Apply bead of sealant to water pump. Install water pump. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article.

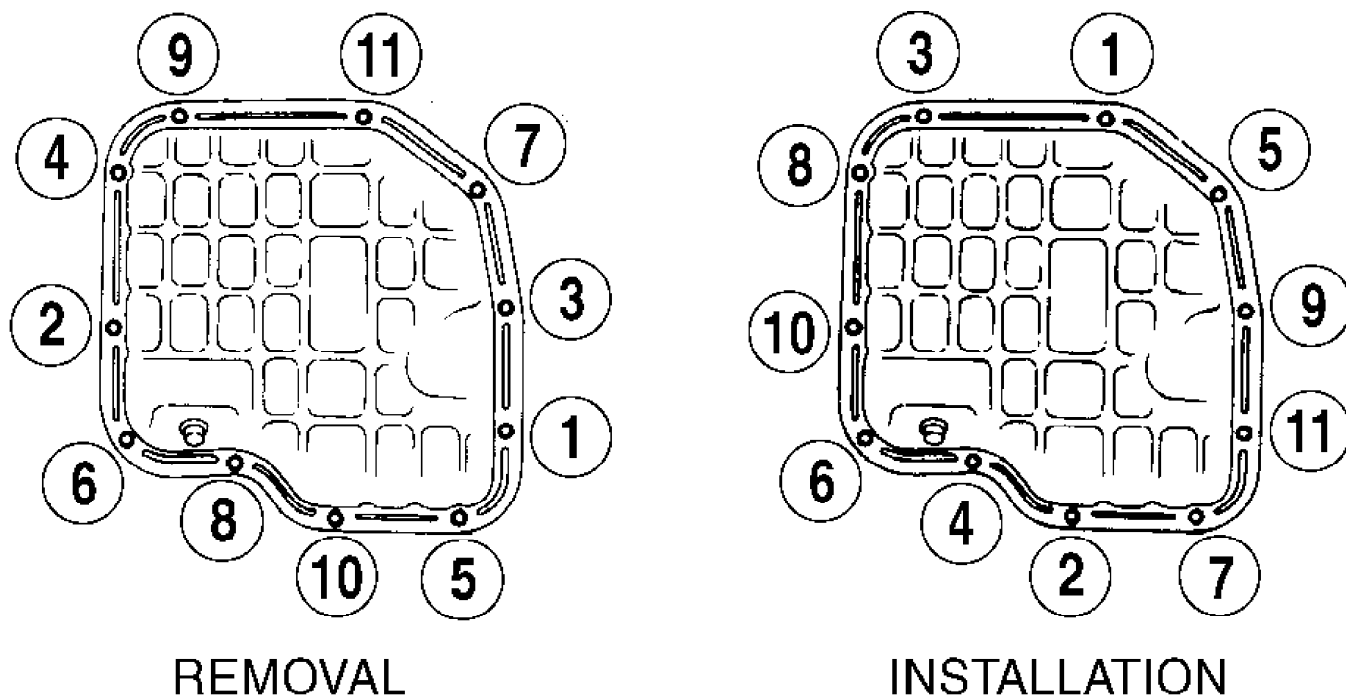
3) To install remaining components, reverse removal procedure. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

OIL PAN

Removal

1) Raise and support vehicle. Remove lower engine cover.

Drain engine oil. Remove lower oil pan retaining bolts in proper sequence. See Fig. 31.



92J00447

Fig. 31: Lower Oil Pan Bolt Removal & Installation Sequence
 Courtesy of Nissan Motor Co., U.S.A.

CAUTION: DO NOT insert screwdriver between upper and lower oil pans or oil pan flange may be distorted.

2) Install Seal Cutter (KV10111100) between lower oil pan and upper oil pan. Using hammer, tap seal cutter around oil pan surface to loosen seal between both oil pans. Remove lower oil pan.

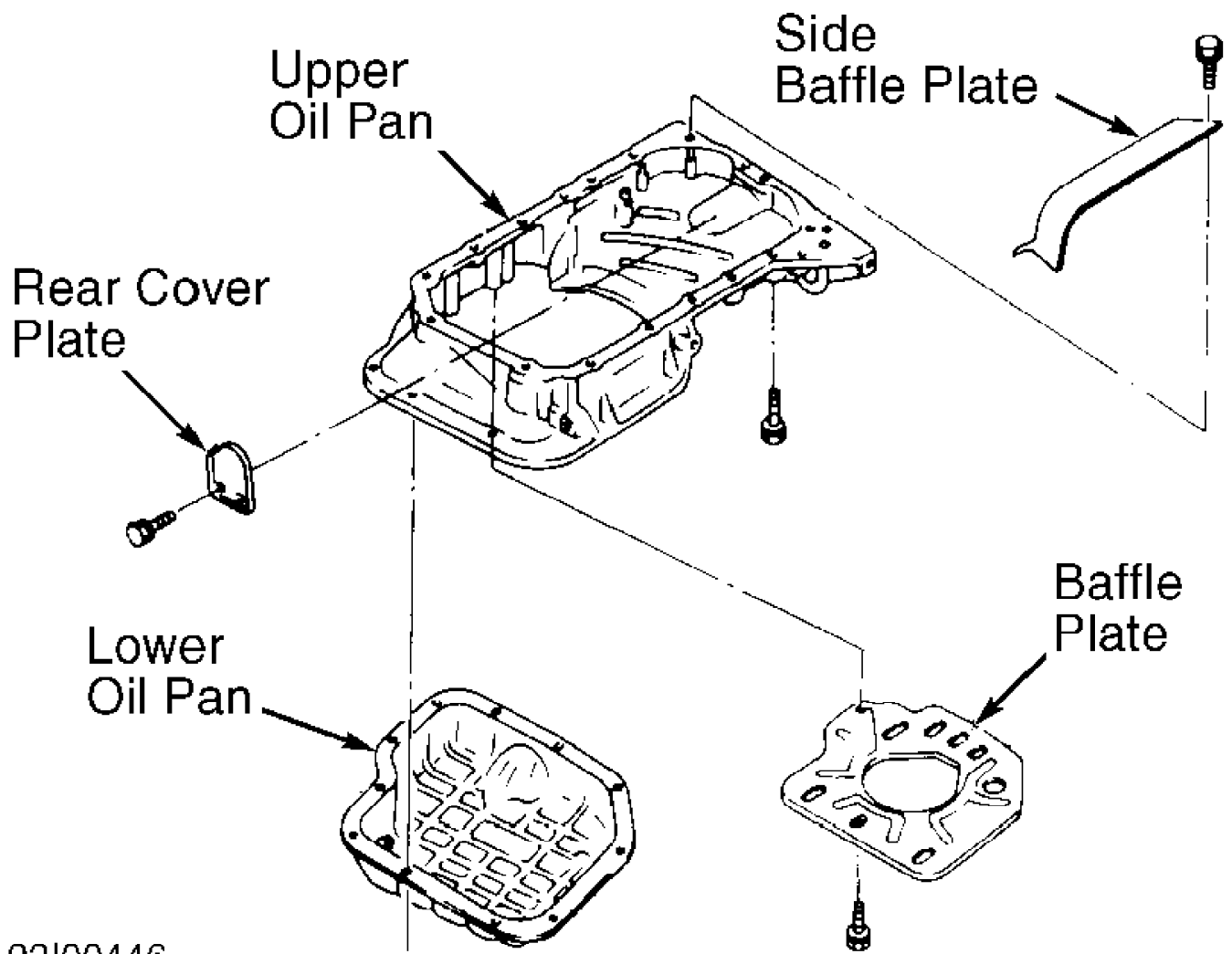
3) Remove baffle plate bolts and baffle plate. See Fig. 32. Remove exhaust pipe located below oil pan. Support transaxle using transmission jack. Support engine using engine hoist. Remove crossmember.

4) Disconnect shift control cable (A/T). Remove A/C compressor bolts at upper oil pan. Remove rear cover plate. See Fig. 32.

5) Remove upper oil pan retaining bolts in sequence. See Fig. 33. Remove 2 engine-to-transaxle bolts, and reinstall bolts in proper holes of upper oil pan. See Fig. 34. Tighten bolts to release upper oil pan from cylinder block.

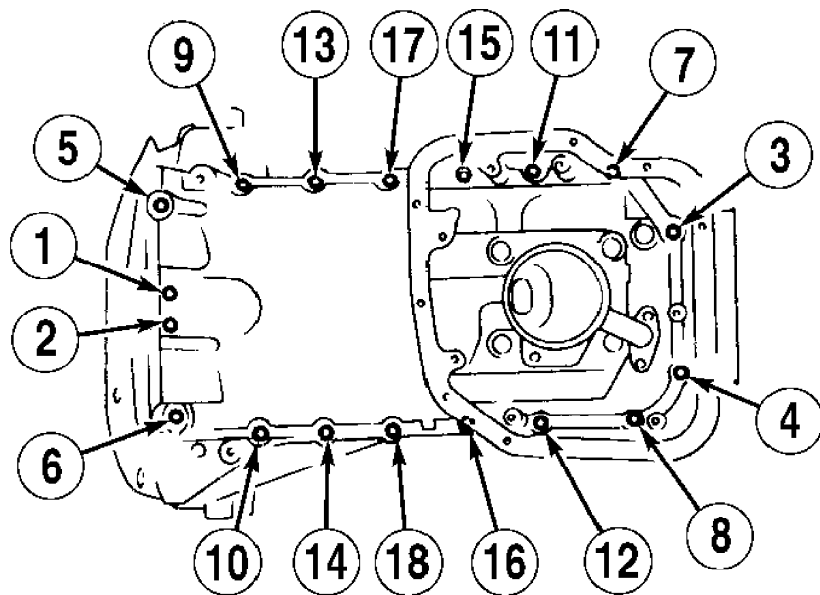
CAUTION: DO NOT insert screwdriver between upper oil pan and cylinder block or oil pan flange may be distorted.

6) Install Seal Cutter (KV10111100) between upper oil pan and cylinder block. Using hammer, tap seal cutter around oil pan surface to loosen seal between upper oil pan and cylinder block. Remove upper oil pan. Remove bolts which were installed to release upper oil pan.

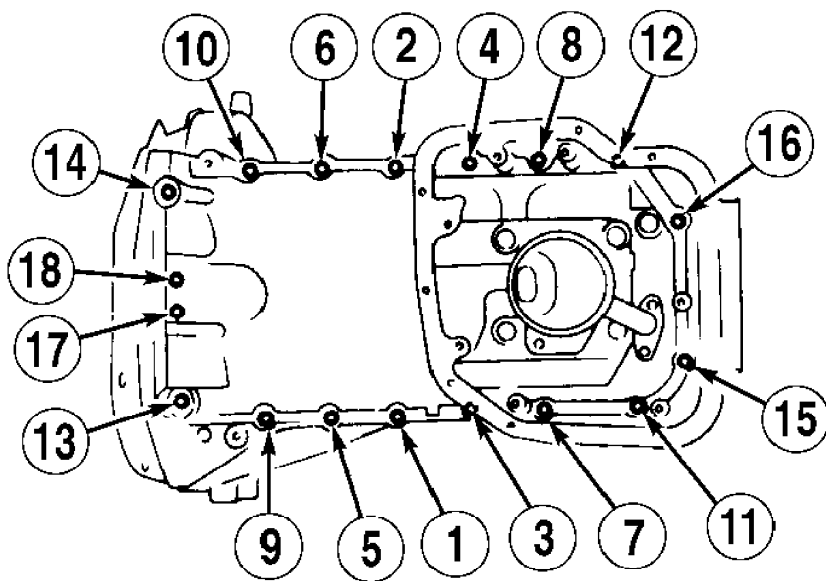


92100446

Fig. 32: Exploded View Of Oil Pan Assembly
Courtesy of Nissan Motor Co., U.S.A.



REMOVAL



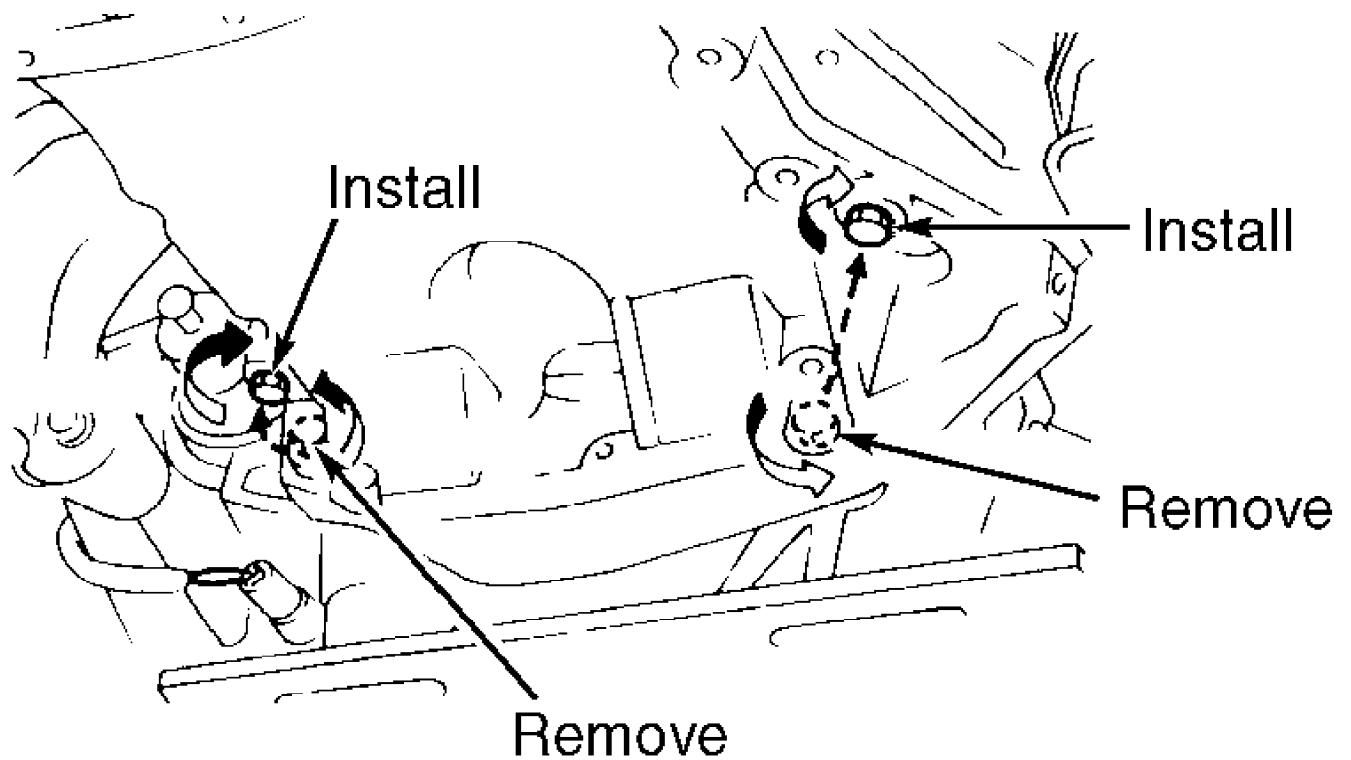
INSTALLATION

Tighten Bolts No. 1-16 To 12-14 Ft. Lbs. (16-19 N.m)

Tighten Bolts No. 17 & 18 To 56-66 INCH Lbs. (6-7 N.m)

92A00448

Fig. 33: Upper Oil Pan Bolt Removal & Installation Sequence
 Courtesy of Nissan Motor Co., U.S.A.



92B00449

Fig. 34: Releasing Upper Oil Pan From Cylinder Block
 Courtesy of Nissan Motor Co., U.S.A.

Installation

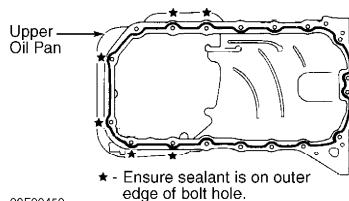
1) Apply a continuous .157-.197" (3.99-5.00 mm) diameter bead of sealant to groove on upper oil pan sealing surface. Ensure sealant is positioned on outside surface of proper bolt holes. See Fig. 35.

2) Install upper oil pan. Tighten bolts to specification in sequence. See Fig. 33. Install 2 engine-to-transaxle bolts. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article. Install rear cover plate. Tighten bolts to specification.

3) Install A/C compressor bolts at upper oil pan. Reconnect shift control cable (A/T). Install crossmember and baffle plate. Tighten bolts to specification.

4) Install exhaust pipe located below oil pan. Apply a continuous .157-.197" (3.99-5.00 mm) diameter bead of sealant to groove on lower oil pan sealing surface. Ensure sealant bead is inward of bolt holes.

5) Install lower oil pan. Tighten bolts to specification in sequence. See Fig. 31. Wait at least 30 minutes, and then refill with engine oil.



92F00450
 Fig. 35: Applying Sealant To Upper Oil Pan
 Courtesy of Nissan Motor Co., U.S.A.

OVERHAUL

CYLINDER HEAD

CAUTION: If replacing cylinder head, valve or valve seats, adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

CAUTION: DO NOT machine more than .008" (.20 mm) total from cylinder head and cylinder block deck surface.

Cylinder Head

1) Check cylinder head warpage. Replace or resurface cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article. Ensure cylinder head height is within specification after machining.

2) Ensure lash adjuster bore diameter in cylinder head and lash adjuster oil clearance are within specification. See LASH ADJUSTER table under ENGINE SPECIFICATIONS.

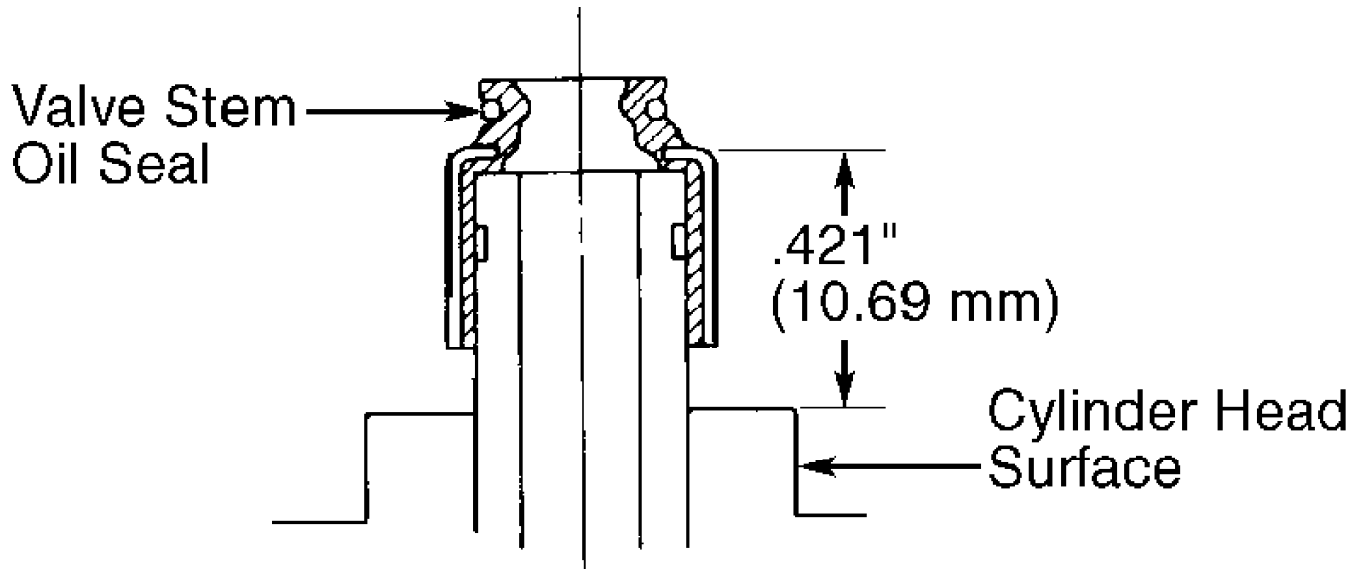
CAUTION: Install valve springs with tightest coil area or paint mark toward cylinder head.

Valve Springs

Ensure valve spring free length, pressure and out-of-square are within specification. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS at end of article.

Valve Stem Oil Seals

Lubricate valve stem oil seal with engine oil. Install oil seal using Oil Seal Installer (J-38958). Ensure valve stem oil seal is positioned so distance from top of valve stem oil seal to cylinder head surface is .421" (10.69 mm). See Fig. 36.



92G00451

Fig. 36: Installing Valve Stem Oil Seal
Courtesy of Nissan Motor Co., U.S.A.

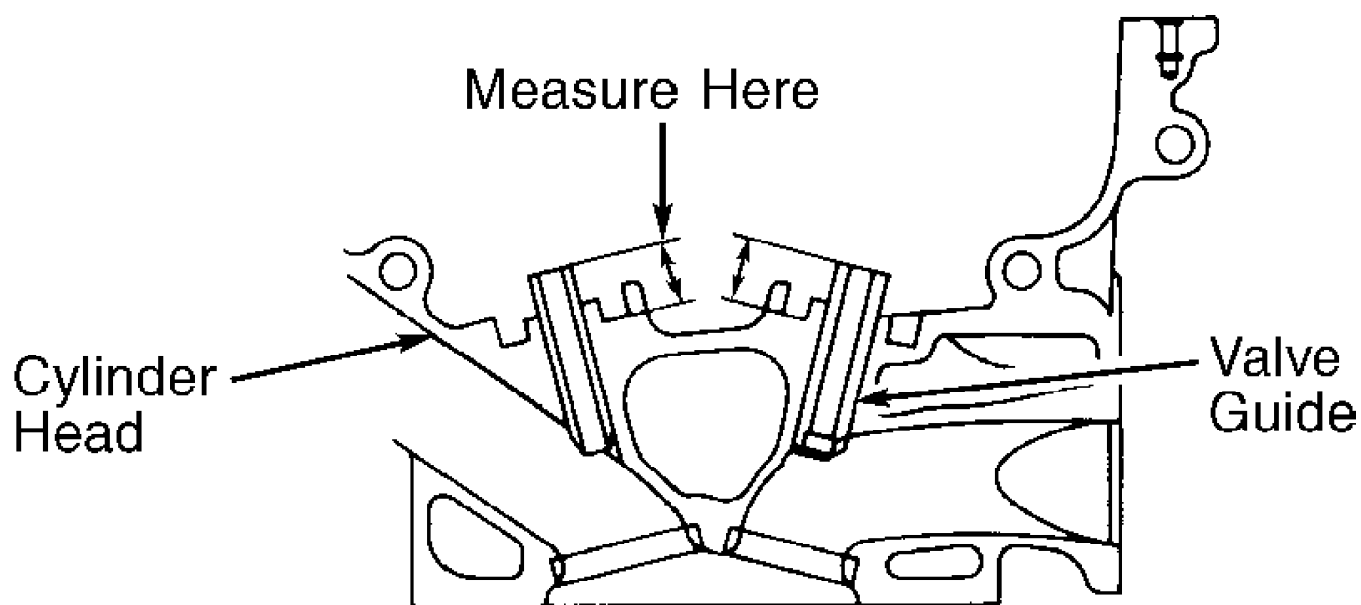
Valve Guides

1) Check valve stem-to-valve guide clearance. See CYLINDER

HEAD table under ENGINE SPECIFICATIONS at end of article. Ensure valve stem diameter is within specification. Valve guide can be replaced if clearance exceeds specification.

2) To replace valve guide, heat cylinder head to 230-266°F (110-130°C). Using hammer and drift, drive valve guide out through top of cylinder head (from combustion chamber). Using reamer, ream cylinder head valve guide bore to .4006-.4014" (10.175-10.196 mm).

3) Heat cylinder head to 230-266°F (110-130°C). Press valve guide into cylinder head from top until valve guide installed height is as specified. See Fig. 37. Ream valve guide bore to .2362-.2369" (5.999-6.018 mm) using reamer.



92H00452

Fig. 37: Installing Valve Guide
Courtesy of Nissan Motor Co., U.S.A.

Valve Seat

1) Ensure valve seat angle and seat width are within specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS at end of article. Valve seat can be replaced if damaged.

2) To replace valve seat, ream valve seat until it collapses. Cylinder head must be reamed for replacement valve seat. Adjust reaming machine depth stop so cylinder head will not be reamed beyond bottom face of valve seat recess in cylinder head.

3) Ream cylinder head valve seat bore diameter to 1.3976-1.3983" (35.499-35.517 mm) for intake or 1.2402-1.2408" (31.501-31.516 mm) for exhaust valve.

4) Heat cylinder head to 230-266°F (110-130°C). Press replacement valve seat in cylinder head until it bottoms in cylinder head. Cut replacement valve seat to proper angle and seat width.

CAUTION: Because intake and exhaust valve heads are almost same diameter, distinguishing between valves may be difficult. Valves can be identified by identification mark in center of valve head. Intake valve is marked "53J"; exhaust valve is marked "64Y". Ensure proper valve is installed in correct location.

Valves

Ensure valve head diameter, stem diameter and margin are within specification. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS at end of article.

VALVE TRAIN

Lash Adjuster

1) Ensure lash adjuster bore diameter, lash adjuster diameter and lash adjuster oil clearance are within specification. See LASH ADJUSTER table under ENGINE SPECIFICATIONS at end of article.

2) With lash adjuster and rocker arm components installed, push downward on end of rocker arm at lash adjuster. If rocker arm moves .04" (1.0 mm) or more, manually bleed lash adjuster. See BLEEDING LASH ADJUSTER.

CAUTION: Air cannot be bled from lash adjuster by engine operation.

Bleeding Lash Adjuster 1) Remove lash adjuster. Fully submerge lash adjuster in clean engine oil with rocker arm end of lash adjuster pointing up. Install small diameter rod in hole at rocker arm end of lash adjuster.

2) Lightly push check ball downward while pushing lash adjuster up and down to bleed air from lash adjuster. Air is bled when plunger in lash adjuster will no longer move. Reinstall lash adjuster in original location.

CYLINDER BLOCK ASSEMBLY

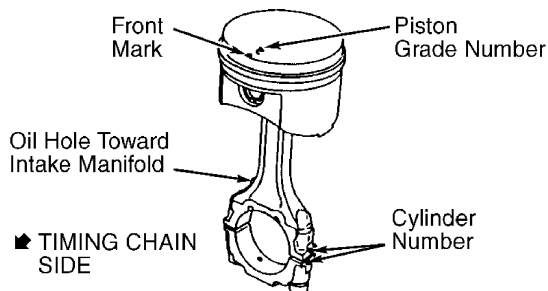
Piston & Rod Assembly

1) If piston is to be removed from connecting rod, remove snap ring from piston. Heat piston in oil to 140-158°F (60-70°C). Remove piston pin.

2) Ensure pin diameter is within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS at end of article.

3) Ensure piston pin bushing bore diameter of connecting rod is within specification. See CONNECTING RODS table under ENGINE SPECIFICATIONS. Bushing can be replaced if bore diameter is not within specification. Bushing must be reamed to obtain correct piston pin clearance.

4) To reassemble, install piston with front mark on top of piston toward timing chain side of engine and oil hole toward intake manifold side. See Fig. 38. Install new snap ring in piston. Heat piston in oil to 140-158°F (60-70°C). Install piston pin and remaining snap ring.



92100453
Fig. 38: Aligning Piston & Connecting Rod
Courtesy of Nissan Motor Co., U.S.A.

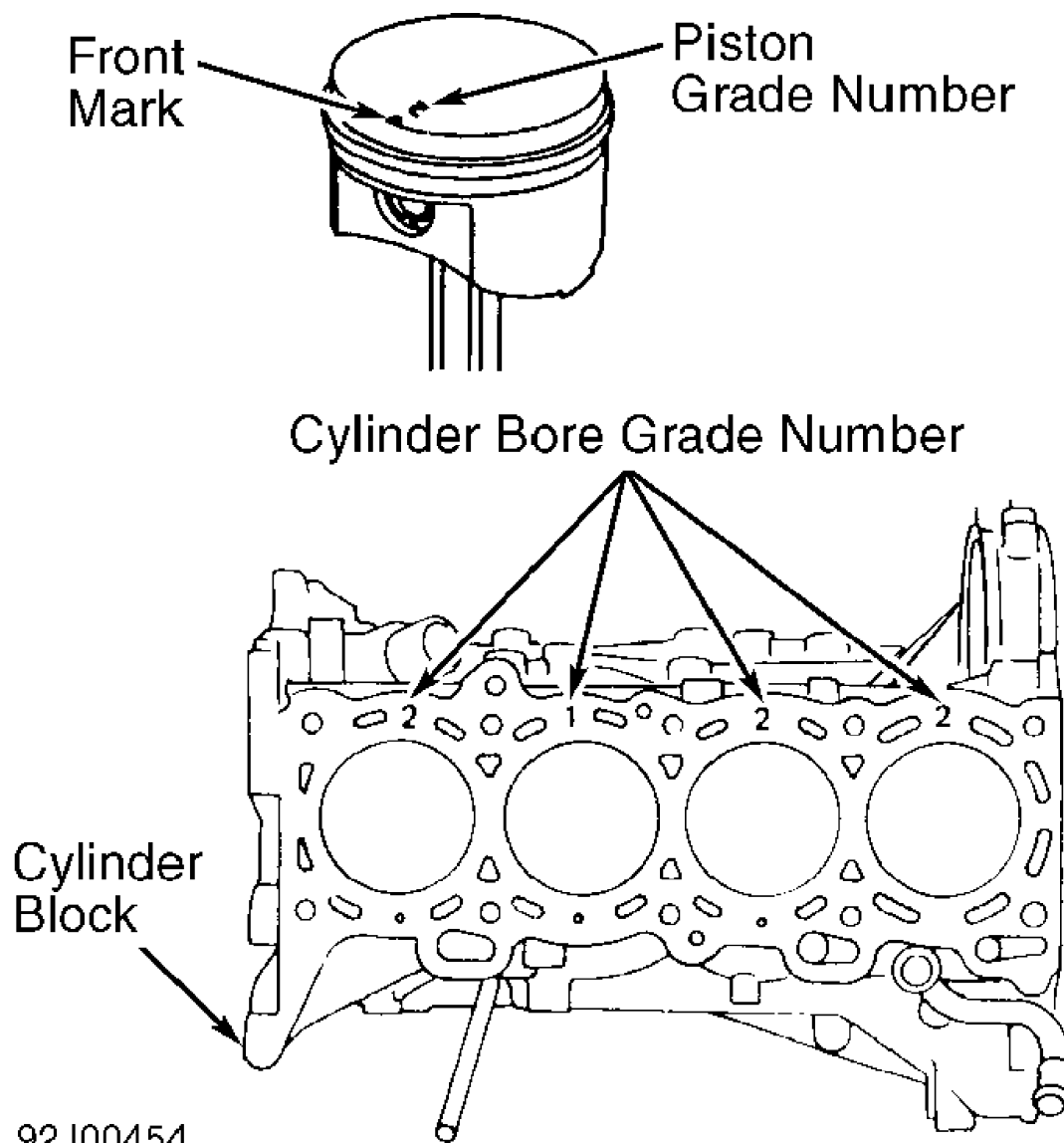
Fitting Pistons

1) To determine if piston-to-cylinder clearance is within

specification, measure piston skirt diameter at 90-degree angle to piston pin.

NOTE: Different standard piston sizes and cylinder bore diameters are used. Piston and cylinder bore sizes are marked using a No. 1, 2 or 3 grade number. Grade number represents diameter. Cylinder bore grade number is on cylinder block deck surface and piston grade number is on top of piston. See Fig. 39.

2) Measure piston diameter at .43" (11.0 mm) from bottom of piston skirt. Different sized standard pistons are used. Piston size can be identified by No. 1, 2 or 3 grade number stamped on top of piston. See Fig. 39.



92J00454

Fig. 39: Identifying Piston & Cylinder Block Grade Number
Courtesy of Nissan Motor Co., U.S.A.

3) Piston diameter must be within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS at end of article.

4) Measure cylinder bore diameter at .39" (10.0 mm), 2.36" (60.0 mm) and 3.94" (100.0 mm) from top of cylinder bore. Different cylinder bores are used and can be identified by No. 1, 2 or 3 grade number stamped on deck surface in accordance with cylinder location. See Fig. 39.

CAUTION: Before boring cylinder, install main bearing caps and tighten them to specification. This prevents cylinder distortion.

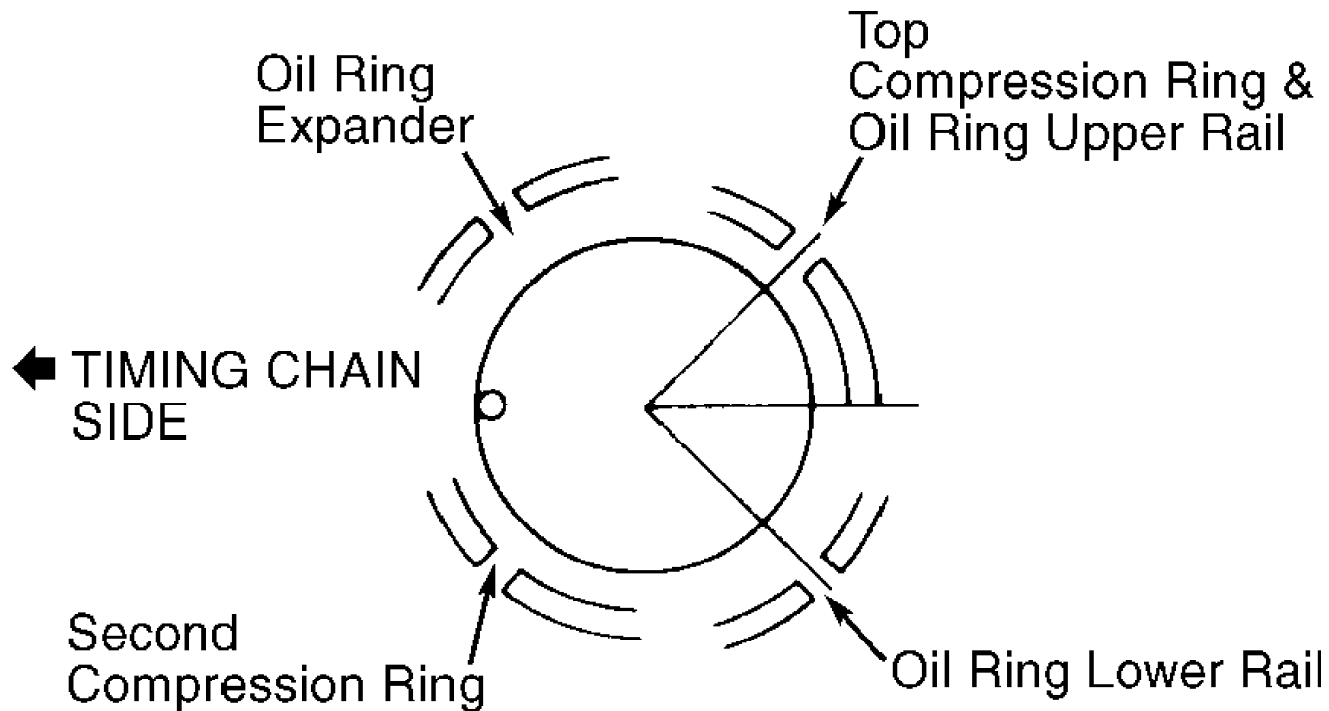
5) Cylinder bore diameter must be within specification. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS. Determine piston clearance. Replace piston or bore cylinder block if clearance is not within specification. See PISTONS, PINS & RINGS table. Pistons are available in .0079" (.200 mm) oversize.

Piston Rings

1) Ensure ring end gap and side clearance are within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS at end of article.

CAUTION: Top compression ring must be installed so chamfered edge on inside of ring is toward top of piston.

2) Ensure identification punch marks on piston rings are toward top of piston. If no identification punch marks are used, piston rings can be installed with either side toward top of piston. Position piston ring end gaps at designated areas. See Fig. 40.



92A00455

Fig. 40: Positioning Piston Rings
Courtesy of Nissan Motor Co., U.S.A.

Rod Bearings

1) Note orientation of connecting rod and cap before

disassembly. Connecting rod must be installed with oil hole toward intake manifold side of engine. See Fig. 38. Coat connecting rod bolt threads and seat area of nut with oil before tightening to specification.

2) Ensure bearing oil clearance and connecting rod side play are within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS and CONNECTING RODS tables under ENGINE SPECIFICATIONS at end of article.

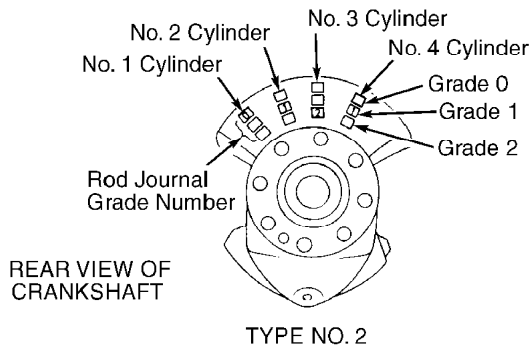
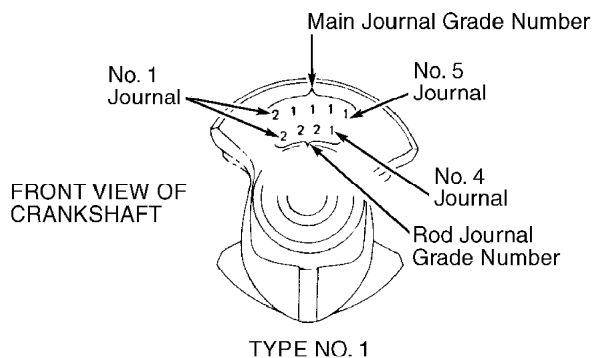
NOTE: Rod journal grade number is stamped on front of crankshaft on Type No. 1 crankshaft and on rear of crankshaft on Type No. 2 crankshaft. See Fig. 41.

3) If crankshaft is reused, select proper rod bearing to obtain correct bearing clearance. If crankshaft is replaced, note rod journal grade number stamped on crankshaft. See Fig. 41.

4) Using rod journal grade number stamped on crankshaft, determine rod bearing grade number to be used. See ROD BEARING APPLICATION table.

ROD BEARING APPLICATION TABLE

Rod Journal/Bearing Grade Number	Rod Bearing Color Code	Rod Bearing Thickness In. (mm)
0	None	.0591-.0592 (1.501-1.504)
1	Black	.0592-.0593 (1.504-1.506)
2	Brown	.0593-.0594 (1.506-1.509)



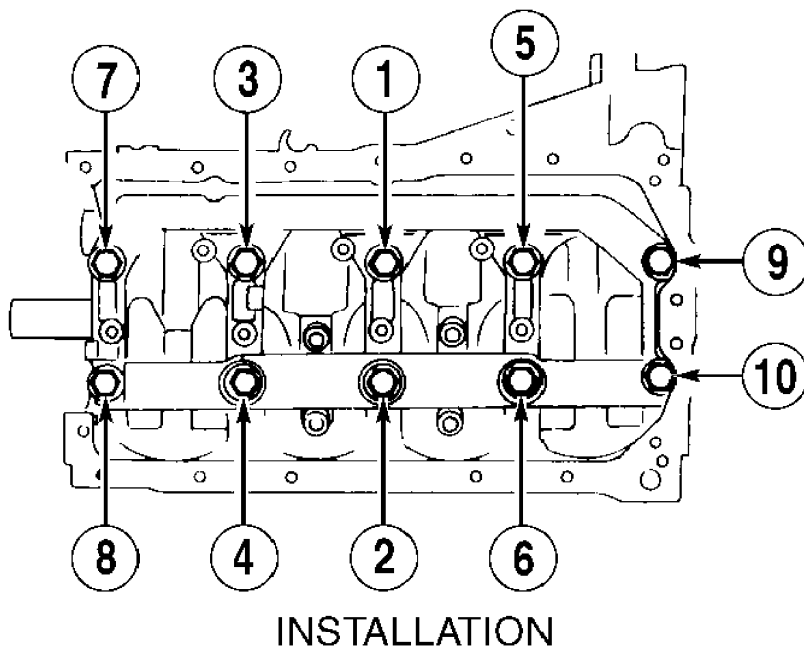
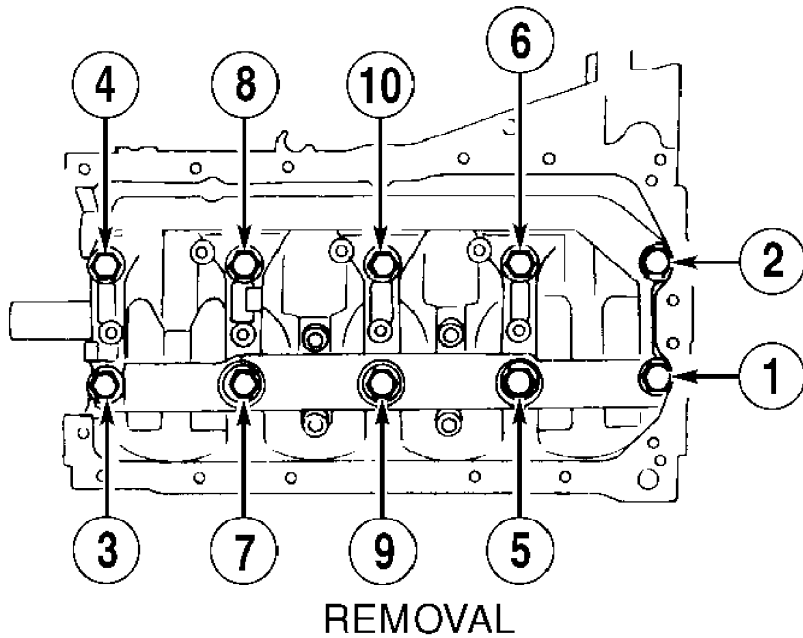
92B00456
Fig. 41: Identifying Rod Journal Grade Number
Courtesy of Nissan Motor Co., U.S.A.

CAUTION: Ensure main bearing caps are marked for location and direction of installation for reassembly reference before

removing. Main bearing caps must be installed in original locations.

Crankshaft & Main Bearings

1) Main bearing cap bolts must be loosened evenly in 3 steps and in proper sequence. See Fig. 42. Remove main bearing cap beam, located below main bearing caps.



92C00457

Fig. 42: Main Bearing Bolt Removal & Installation Sequence
Courtesy of Nissan Motor Co., U.S.A.

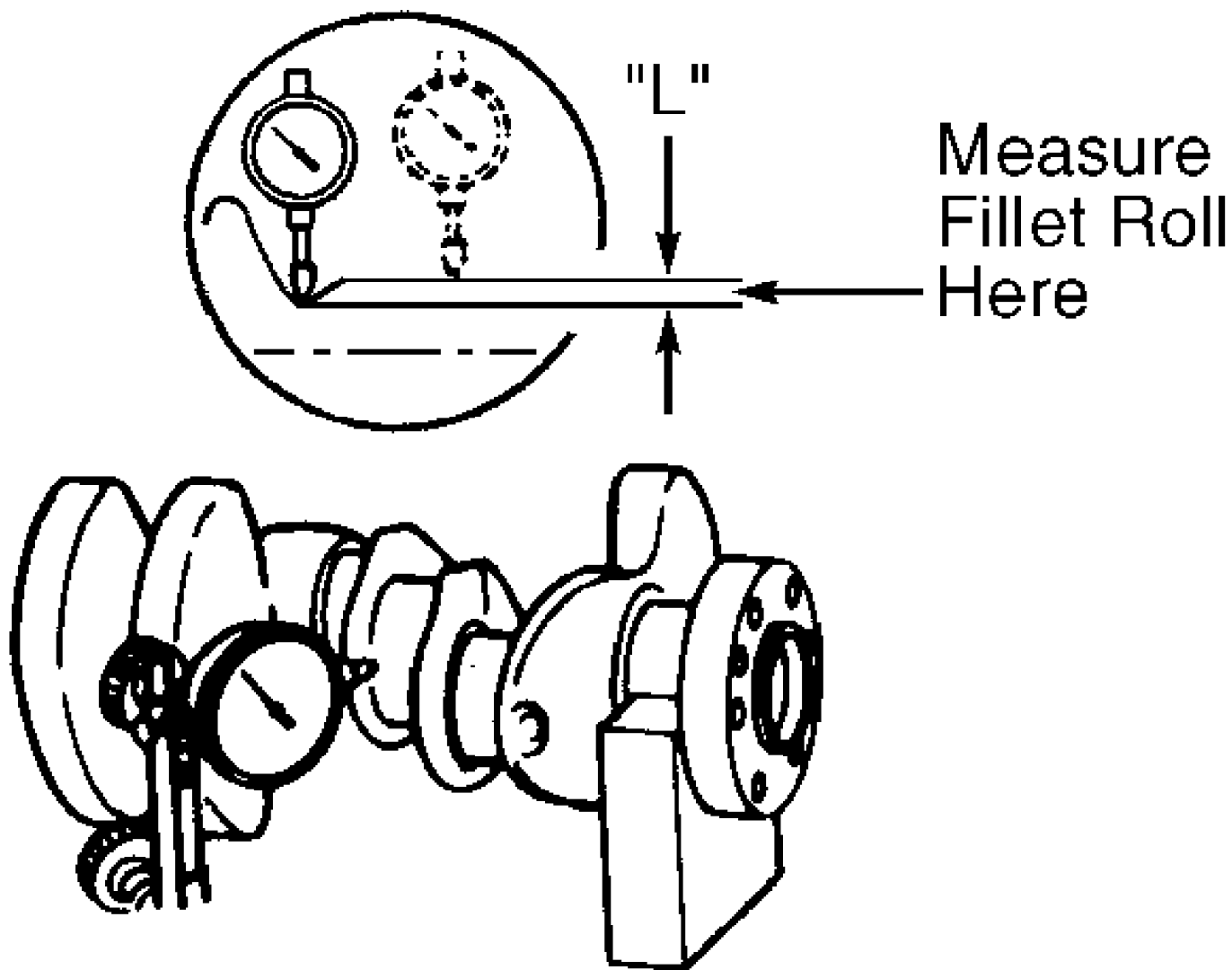
2) Ensure main bearing journal diameter, taper, runout and out-of-round are within specification. See CRANKSHAFT, MAIN &

CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS at end of article.

3) If crankshaft main bearing journals must be ground for undersize main bearings, ensure main bearing journal fillet roll exceeds .004" (.10 mm). See Fig. 43.

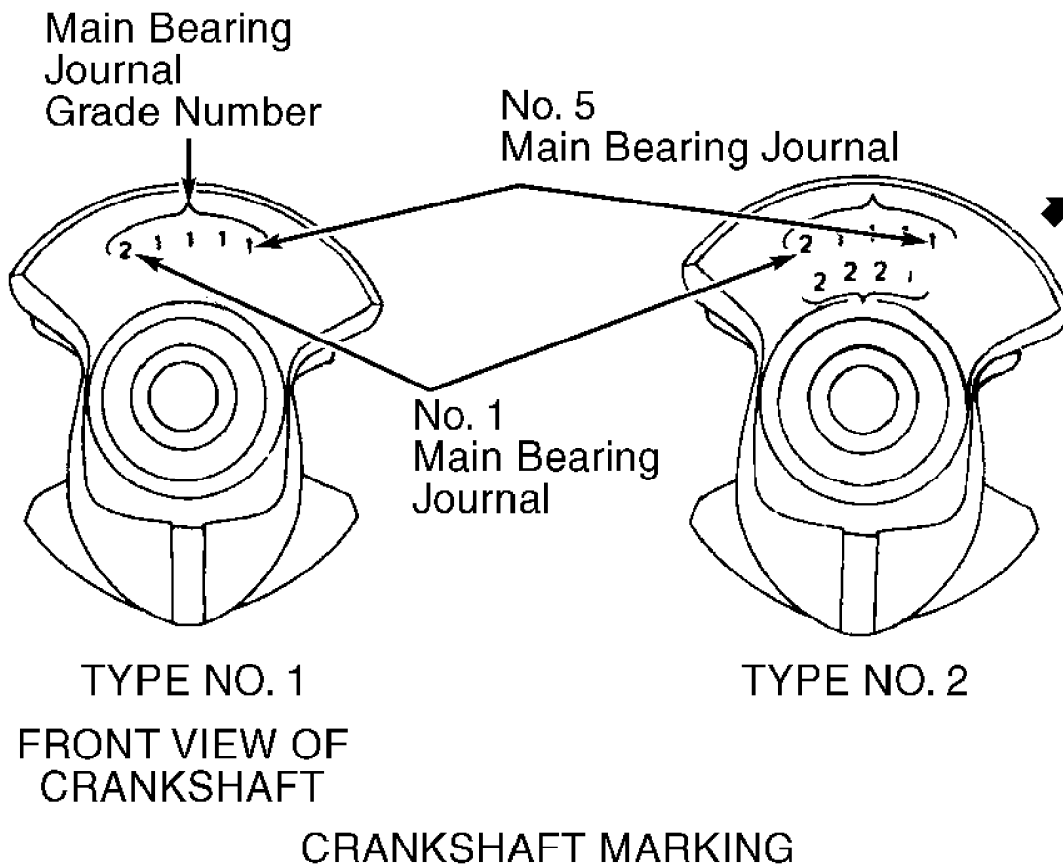
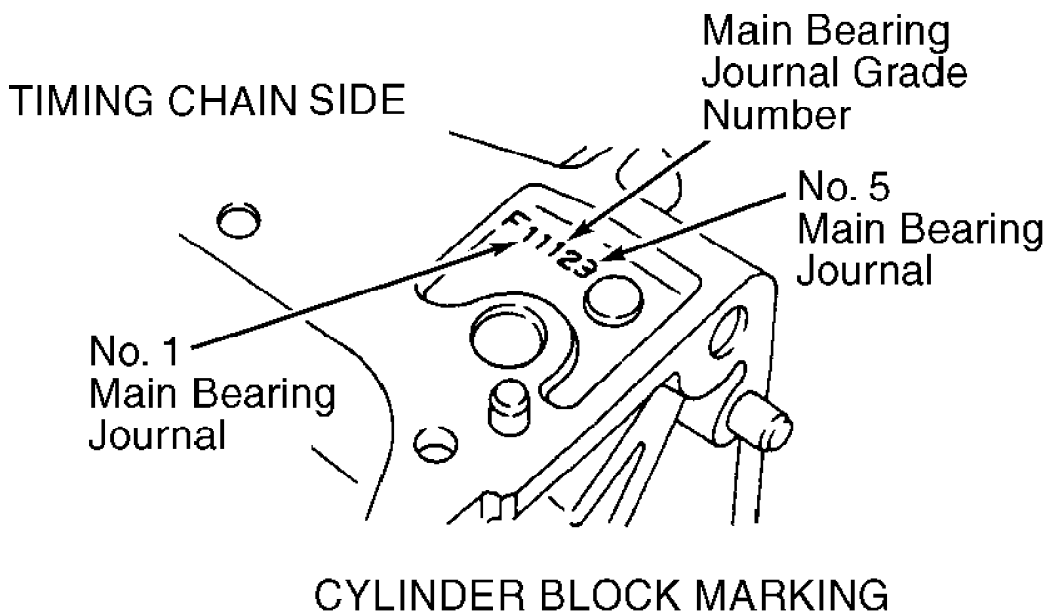
4) If crankshaft is reused, select main bearing to obtain correct bearing clearance. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table.

5) If replacing crankshaft, note main bearing journal grade number on rear corner of cylinder block and on crankshaft. See Fig. 44.



92D00458

Fig. 43: Measuring Main Bearing Journal Fillet Roll
Courtesy of Nissan Motor Co., U.S.A.



92E00459

Fig. 44: Identifying Main Bearing Journal Grade Number
 Courtesy of Nissan Motor Co., U.S.A.

6) Using main bearing grade numbers, determine main bearing grade number to be used. See MAIN BEARING APPLICATION table. For

example, if crankshaft grade number is 0 and cylinder block grade number is 0, use a grade number 0 main bearing with color code (A-Black).

7) Main bearing grade number can be identified by bearing color code. See MAIN BEARING SPECIFICATIONS table.

MAIN BEARING APPLICATION TABLE

Crankshaft Grade Number	Cylinder Block Grade Number	Bearing Number & Color Code
0	1	1 (B-Brown)
0	2	2 (C-Green)
0	3	3 (D-Yellow)
1	0	1 (B-Brown)
1	1	2 (C-Green)
1	2	3 (D-Yellow)
1	3	4 (E-Blue)
2	0	2 (C-Green)
2	1	3 (D-Yellow)
2	2	4 (E-Blue)
2	3	5 (F-Pink)
3	0	3 (D-Yellow)
3	1	4 (E-Blue)
3	2	5 (F-Pink)
3	3	6 (G-None)

MAIN BEARING SPECIFICATIONS TABLE

Grade Number	ID Mark & Color Code	Bearing Thickness In. (mm)
0	A-Black	.0778-.0780 (1.976-1.981)
1	B-Brown	.0780-.0781 (1.981-1.983)
2	C-Green	.0781-.0782 (1.983-1.986)
3	D-Yellow	.0782-.0783 (1.986-1.989)
4	E-Blue	.0783-.0784 (1.989-1.992)
5	F-Pink	.0784-.0785 (1.992-1.995)
6	G-None	.0785-.0787 (1.995-1.999)

8) Ensure main bearing caps are installed in original locations. Coat main bearing cap bolt threads and seat area of bolt with engine oil.

9) With all main bearing caps and main bearing cap beam installed, move crankshaft forward and backward to align all main bearings. Tighten main bearing cap bolts to specification in sequence. See Fig. 42. See TORQUE SPECIFICATIONS table at end of article.

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

Thrust Bearing

Thrust bearing is installed on No. 3 main bearing. Thrust bearing must be replaced if crankshaft end play is not within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS at end of article.

CAUTION: DO NOT machine more than .008" (.20 mm) total from cylinder head and cylinder block deck surface.

Cylinder Block

1) Inspect cylinder block deck surface warpage. Cylinder block must be resurfaced if warpage exceeds specification. Ensure cylinder block deck height is within specification after machining. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS at end of article.

2) Check cylinder bore wear, taper and out-of-round. Cylinder bore diameter is measured at .39" (10.0 mm), 2.36" (60.0 mm) and 3.94" (100.0 mm) from top of cylinder bore. Standard diameters of cylinder bores may differ from cylinder to cylinder. Standard diameter of each cylinder is identified by grade No. 1, 2 or 3 stamped on deck surface in accordance with cylinder location. See Fig. 39.

CAUTION: Before boring cylinder block, install main bearing caps and tighten bolts to specification. This prevents cylinder distortion.

3) Cylinder block can be bored if cylinder bore, taper or out-of-round are not within specification. See CYLINDER BLOCK table. Pistons are available in .0079" (.200 mm) oversize.

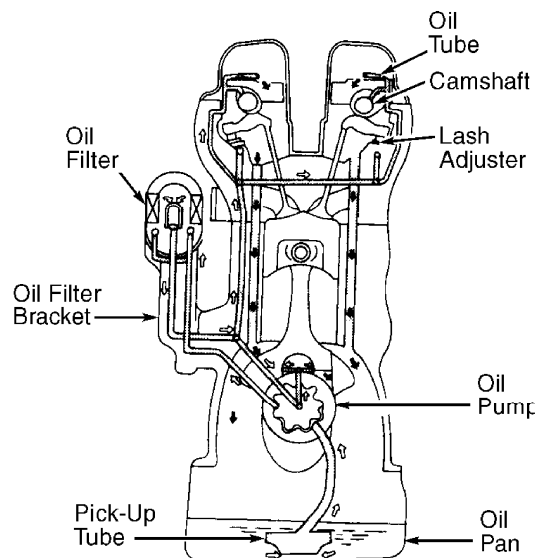
NOTE: Main bearing bore I.D. will depend on main bearing journal grade number stamped on top of cylinder block. See Fig. 44. Main bearing journal grade number may be 0, 1, 2 or 3.

4) With main bearing caps installed and bolts tightened to specification, ensure main bearing bore I.D. is within specification. See CYLINDER BLOCK table.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

Crankshaft-driven oil pump provides pressurized lubrication for engine oiling. See Fig. 45.



92H00460
Fig. 45: Engine Oil Circuit
Courtesy of Nissan Motor Co., U.S.A.

Crankcase Capacity
Crankcase capacity is 3.6 qts. (3.4L) with oil filter change

and 3.4 qts. (3.2L) without oil filter change.

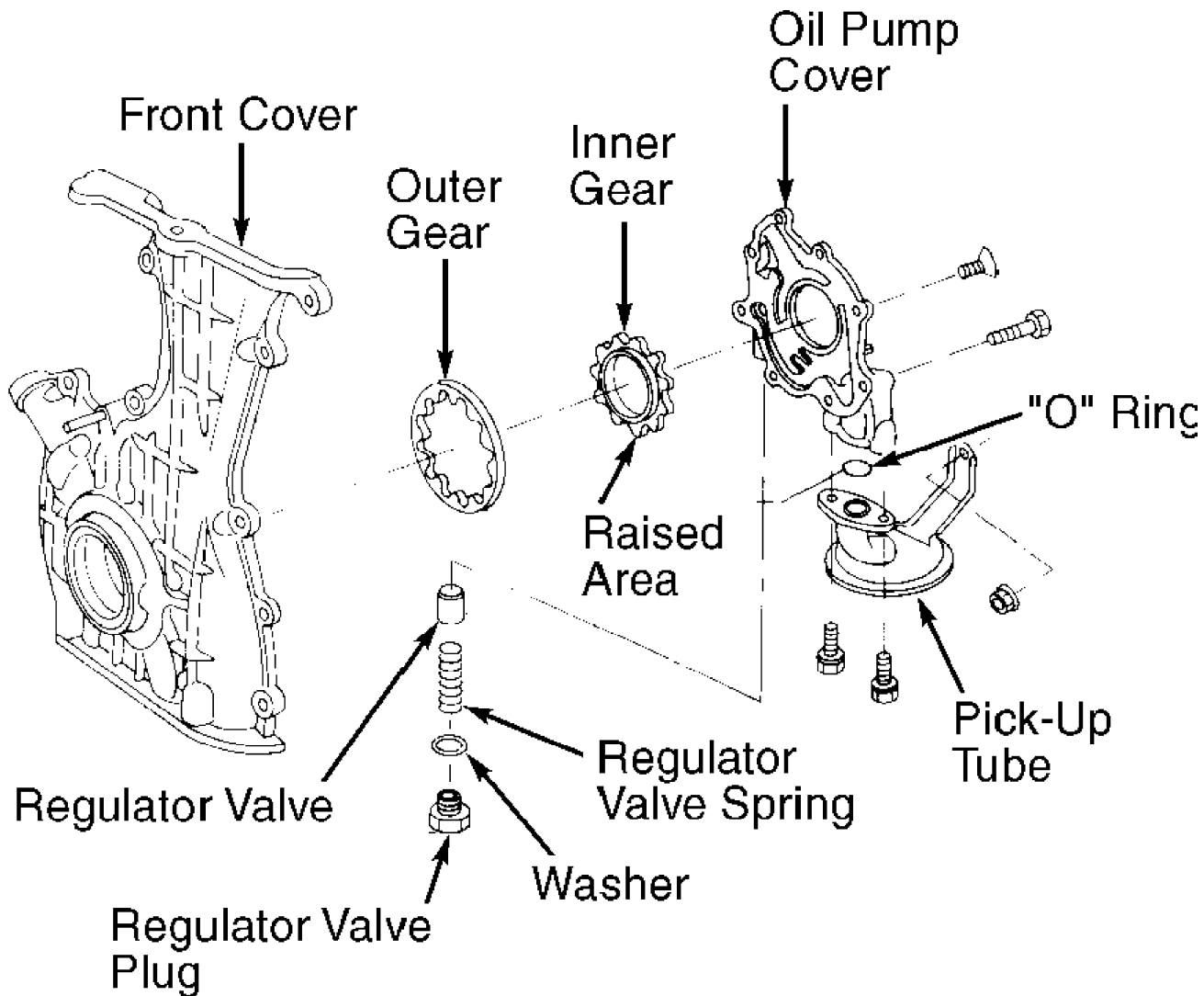
Oil Pressure

With engine at normal operating temperature, oil pressure should be at least 11 psi (.8 kg/cm²) at idle and 46-57 psi (3.2-4.0 kg/cm²) at 3200 RPM.

OIL PUMP

Removal & Disassembly

Oil pump is mounted in rear of front cover. Cylinder head must be removed for front cover removal. For front cover removal, see CYLINDER HEAD under REMOVAL & INSTALLATION. Disassemble oil pump. See Fig. 46. Mark components for reassembly reference.



92100461

Fig. 46: Exploded View Of Oil Pump Components
Courtesy of Nissan Motor Co., U.S.A.

Inspection

- 1) Inspect components for damage. Install inner and outer

gears in front cover. Using feeler gauge, measure outer gear-to-front cover clearance. Replace front cover if clearance exceeds specification. See OIL PUMP SPECIFICATIONS table.

2) Measure gear tip clearance between tip of inner gear and outer gear. Replace gear set if clearance exceeds specification.

3) Place straightedge across front cover above both gears. Measure inner and outer gear end clearance between straightedge and surface of both gears. Replace front cover if clearance exceeds specification.

4) Measure outside diameter of raised area on inner gear. See Fig. 46. Measure inside diameter of front cover where raised area on inner gear fits. Subtract raised area diameter from front cover diameter to determine inner gear-to-front cover clearance. Replace front cover if clearance exceeds specification.

5) Ensure regulator valve slides freely in oil pump cover bore. Measure regulator valve O.D. and oil pump cover bore I.D. Replace oil pump cover if regulator valve-to-oil pump cover clearance exceeds specification. See OIL PUMP SPECIFICATIONS table.

OIL PUMP SPECIFICATIONS TABLE

Application	In. (mm)
Gear Tip Clearance (Maximum) .....	.0071 (.180)
Inner Gear End Clearance .....	.0020-.0035 (.051-.089)
Inner Gear-To-Front Cover Clearance ...	.0018-.0036 (.046-.091)
Outer Gear End Clearance .....	.0020-.0043 (.051-.109)
Outer Gear-To-Front Cover Clearance ...	.0045-.0079 (.114-.201)
Regulator Valve-To-Oil Pump Cover Clearance .....	.0016-.0038 (.041-.097)

Reassembly & Installation

Coat all components with engine oil. To reassemble, reverse disassembly. Ensure components are installed in original locations. Tighten all bolts to specification. See TORQUE SPECIFICATIONS table. To install, see CYLINDER HEAD under REMOVAL & INSTALLATION.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Accel-Drum Unit Bolt	13-16 (18-22)
Axle Shaft Nut	145-203 (197-275)
Camshaft Bearing Cap Bolt	(1)
Camshaft Sprocket Bolt	101-116 (137-157)
Connecting Rod Nut	
Step 1	10-12 (14-16)
Step 2	28-33 (38-45)
Crankshaft Pulley Bolt	105-112 (142-152)
Crossmember Bolt	33-40 (45-54)
Cylinder Head Outside Bolt	(2)
Cylinder Head-To-Cylinder Block Bolt (3)	
Step 1	29 (39)
Step 2	58 (79)
Step 3	Loosen All Bolts
Step 4	25-33 (34-45)
Step 5	Tighten Additional 90 Degrees
Step 6	Tighten Additional 90 Degrees
Exhaust Manifold Nut (4)	27-35 (37-47)

Flywheel/Drive Plate Bolt	61-69	(83-94)
Front Engine Mount Through Bolt	33-40	(45-54)
Front Engine Mount-To-Front Cover Bolt	33-40	(45-54)
Fuel Rail Bolt		(5)
Intake Manifold Bolt (6)	13-15	(18-20)
Intake Manifold Collector Bolt/Nut (6)	13-15	(18-20)
Intake Manifold Support Brace Bolt	12-15	(16-20)
Knock Sensor Bolt	15-20	(20-27)
Main Bearing Cap Bolt (7)		
Step 1	24-28	(33-38)
Step 2	54-61	(73-83)
Oil Filter Bracket Bolt	12-14	(16-19)
Oil Pressure Regulator Valve Plug	29-51	(39-69)
Oil Pump Pick-Up Tube Bolt	12-14	(16-19)
Oxygen Sensor	13-17	(18-23)
Power Steering Pump Bracket Bolt	33-44	(45-60)
Right (Timing Chain Side) Engine		
Mount Through Bolt	33-40	(45-54)
Spark Plug	14-22	(19-30)
Steering Knuckle-To-Strut Bolt	84-98	(114-133)
Throttle Body Bolt		
Step 1		(8)
Step 2	13-16	(18-22)
Tie Rod-To-Steering Knuckle Nut	22-29	(30-39)
Timing Chain Guide Bolt		
Lower Guide	10-14	(14-19)
Upper Guide	12-14	(16-19)
Torque Converter-To-Drive Plate Bolt		
Bolt With Flange	33-43	(45-58)
Bolt Without Flange	29-36	(39-49)
Transaxle Mount Through Bolt	33-40	(45-54)
Upper Oil Pan Bolt		(9)
Upper Transaxle-To-Eng. Bolts	51-59	(70-79)
Valve Cover Nut		(10)
Water Pump Bolt	12-15	(16-20)
Wheel Lug Nut	72-87	(98-118)

INCH Lbs. (N.m)

Air Relief Plug	72	(8)
Baffle Plate Bolt	56-66	(6-7)
Crankshaft Rear Seal Housing Bolt	56-72	(6-8)
Front Cover Bolt	56-66	(6-7)
Fuel Injector Clamp Bolt	26-34	(3-4)
Lower Oil Pan Bolt (11)	56-66	(6-7)
Oil Pump Cover Bolt	56-66	(6-7)
Oil Pump Cover Screw	34-44	(4-5)
Rear Cover Plate Bolt	56-66	(6-7)
Timing Chain Tensioner Bolt/Nut	56-72	(6-8)
Water Pump Pulley Bolt	56-72	(6-8)

(1) - Tighten bolts using following procedure.
See Fig. 23.

- * Bolts No. 9 and 10 and then 1 and 8 on right camshaft to 17 INCH lbs. (2 N.m).
- * Bolts No. 11 and 12 and then 1 and 10 on left camshaft to 17 INCH lbs. (2 N.m)
- * All bolts in sequence to 52 INCH lbs. (5 N.m).
- * Type "A", "B" and "C" bolts to 80-104 INCH lbs. (9-12 N.m).
- * Type "D" bolts to 13-19 ft. lbs. (18-26 N.m).

- (2) - Information is not available.
- (3) - Tighten bolts to specification in sequence.
See Fig. 24.
- (4) - Tighten nuts to specification in sequence.
See Fig. 18.
- (5) - Tighten bolts to 83-96 INCH lbs. (8-11 N.m) and
then to 15-20ft. lbs. (20-27 N.m) in sequence.
See Fig. 15.
- (6) - Tighten bolts/nuts to specification in sequence.
See Fig. 17.
- (7) - Tighten bolts to specification in sequence.
See Fig. 42.
- (8) - Tighten bolts to 78-96 INCH lbs. (7-11 N.m).
- (9) - Tighten bolts to specification in sequence.
See Fig. 33.
- (10) - Tighten nuts to specification in sequence.
See Fig. 20.
- (11) - Tighten bolts to specification in sequence.
See Fig. 31.

ENGINE SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS TABLE

Application	Specification
Displacement	122 Cu. In. (2.0L)
Bore	3.39" (86.1 mm)
Stroke	3.39" (86.1 mm)
Compression Ratio	9.5:1
Fuel System	PFI
Horsepower @ RPM	140 @ 6400
Torque Ft. Lbs. @ RPM	132 @ 4800

CONNECTING RODS SPECIFICATIONS

CONNECTING RODS TABLE

Application	In. (mm)
Bore Diameter	
Pin Bushing Bore	0.9835-0.9843 (24.981-25.001)
Crankpin Bore	2.0079-2.0084 (51.001-51.013)
Maximum Bend	.0059 Per 3.94 (.150 Per 100.1)
Maximum Twist	.0012 Per 3.94 (.030 Per 100.1)
Side Play	
Standard	.0079-.0138 (.201-.351)
Wear Limit	.0200 (.510)

PISTONS, PINS & RINGS SPECIFICATIONS

PISTONS, PINS & RINGS TABLE

Application	In. (mm)
Pistons	
Clearance	.0004-.0012 (.010-.030)

Diameter (1)		
Grade No. 1	.....	3.3850-3.3854 (85.979-85.989)
Grade No. 2	.....	3.3854-3.3858 (85.989-85.999)
Grade No. 3	.....	3.3858-3.3862 (85.999-86.009)
Pins		
Diameter	.....	.8657-.8662 (21.989-22.001)
Piston Fit	.....	(2)
Rod Fit		
Standard	.....	.0002-.0007 (.005-.018)
Wear Limit	.....	.0009 (.023)
Rings		
No. 1		
End Gap		
Standard	.....	.0079-.0118 (.201-.300)
Wear Limit	.....	.0390 (.990)
Side Clearance		
Standard	.....	.0018-.0031 (.046-.079)
Wear Limit	.....	.0080 (.200)
No. 2		
End Gap		
Standard	.....	.0138-.0197 (.351-.500)
Wear Limit	.....	.0390 (.990)
Side Clearance		
Standard	.....	.0012-.0026 (.030-.066)
Wear Limit	.....	.0080 (.200)
No. 3		
End Gap		
Standard	.....	.0079-.0236 (.201-.599)
Wear Limit	.....	.0390 (.990)

- (1) - Piston diameter is determined by grade number stamped on top of piston. See Fig. 39.
(2) - Interference fit.

CYLINDER SPECIFICATIONS

CYLINDER BLOCK TABLE

Application	In. (mm)
Cylinder Bore	
Standard Diameter (1)	
Grade No. 1	..... 3.3858-3.3862 (85.999-86.009)
Grade No. 2	..... 3.3862-3.3866 (86.009-86.020)
Grade No. 3	..... 3.3866-3.3870 (86.020-86.030)
Maximum Taper	..... .0004 (.010)
Maximum Out-Of-Round	..... .0006 (.015)
Main Bearing Bore I.D (2)	
Grade No. 0	..... 2.3206-2.3209 (58.943-58.951)
Grade No. 1	..... 2.3209-2.3211 (58.951-58.956)
Grade No. 2	..... 2.3211-2.3213 (58.956-58.961)
Grade No. 3	..... 2.3213-2.3216 (58.961-58.969)
Deck Height	..... 8.3169-8.3209 (211.249-211.351)
Maximum Deck Warp	..... .0039 (.099)

- (1) - Cylinder bore diameter is determined by grade number on deck surface of cylinder block. See Fig. 39.
(2) - Main bearing bore I.D. is determined by grade number on rear corner of cylinder block. See Fig. 44.

CRANKSHAFT, MAIN & CONNECTING

ROD BEARINGS SPECIFICATIONS

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS SPECIFICATIONS TABLE

Application	In. (mm)
Crankshaft	
End Play	
Standard	.0039-.0102 (.099-.026)
Wear Limit	.0118 (.300)
Maximum Runout	.002 (.05)
Main Bearings	
Journal Diameter (1)	
Grade No. 0	2.1643-2.1646 (54.973-54.981)
Grade No. 1	2.1641-2.1643 (54.968-54.973)
Grade No. 2	2.1639-2.1641 (54.963-54.968)
Grade No. 3	2.1636-2.1639 (54.955-54.963)
Journal Out-Of-Round	.0002 (.005)
Journal Runout	.002 (.05)
Journal Taper	.0002 (.005)
Oil Clearance	
Standard	.0002-.0009 (.005-.023)
Wear Limit	.0020 (.050)
Connecting Rod Bearings	
Journal Diameter (2)	
Grade No. 0	1.8885-1.8887 (47.968-47.973)
Grade No. 1	1.8883-1.8885 (47.963-47.968)
Grade No. 2	1.8880-1.8883 (47.955-47.963)
Journal Out-Of-Round	.0002 (.005)
Journal Runout	.002 (.05)
Journal Taper	.0002 (.005)
Oil Clearance	
Standard	.0008-.0018 (.020-.046)
Wear Limit	.0035 (.089)

- (1) - Use main journal grade number stamped on crankshaft counterweight to determine journal diameter.
See Fig. 44.
- (2) - Use rod journal grade number stamped on crankshaft counterweight to determine journal diameter.
See Fig. 41.

VALVES & VALVE SPRINGS SPECIFICATIONS

VALVES & VALVE SPRINGS TABLE

Application	Specification
Intake Valves	
Face Angle	45°
Head Diameter	1.339-1.346" (34.01-34.19 mm)
Minimum Margin	.020" (.51 mm)
Stem Diameter	.2348-.2354" (5.964-5.979 mm)
Valve Tip Maximum Refinish	.008" (.20 mm)
Exhaust Valves	
Face Angle	45°
Head Diameter	1.181-1.189" (30.00-30.20 mm)
Minimum Margin	.020" (.51 mm)
Stem Diameter	.2341-.2346" (5.946-5.959 mm)
Valve Tip Maximum Refinish	.008" (.20 mm)
Valve Springs	

Free Length	1.9433" (49.360 mm)
Out-Of-Square .....	.087" (2.21 mm)
	Lbs. @ In. (kg @ mm)
Pressure	
Valve Open	127-144 @ 1.181 (58-65 @ 29.99)

CYLINDER HEAD SPECIFICATIONS

CYLINDER HEAD TABLE

Application	Specification
Cylinder Head Height	5.390-5.398" (136.91-137.11 mm)
Maximum Warpage .....	.004" (.10 mm)
Valve Seats	
Intake Valve	
Seat Angle	45°
Seat Width .....	.055-.067" (1.40-1.70 mm)
Seat Bore Diameter (1)	
Standard	1.3780-1.3786" (35.001-35.016 mm)
Service	1.3976-1.3983" (35.499-35.517 mm)
Exhaust Valve	
Seat Angle	45°
Seat Width .....	.067-.079" (1.70-2.01 mm)
Seat Bore Diameter (1)	
Standard	1.2205-1.2211" (31.000-31.016 mm)
Service	1.2402-1.2408" (31.501-31.516 mm)
Valve Guides	
Valve Guide Cylinder Head Bore I.D.	
Standard .....	.3927-.3935" (9.975-9.995 mm)
Service .....	.4006-.4014" (10.175-10.196 mm)
Valve Guide I.D. ....	.2362-.2369" (5.999-6.017 mm)
Valve Guide Installed Height .	.551-.559" (14.00-14.20 mm)
Valve Stem-To-Guide Oil Clearance	
Standard	
Intake .....	.0008-.0021" (.020-.053 mm)
Exhaust .....	.0016-.0029" (.041-.074 mm)
Wear Limit .....	.0040" (.100 mm)

(1) - Specification is for valve seat replacement.

CAMSHAFT SPECIFICATIONS

CAMSHAFT TABLE

Application	In. (mm)
Bore Diameter	1.1024-1.1032 (28.000-28.021)
End Play	
Standard .....	.0022-.0055 (.056-.140)
Wear Limit .....	.0079 (.201)
Journal Diameter	1.0998-1.1006 (27.935-27.955)
Journal Runout .....	.004 (.10)
Lobe Height	
Intake	1.5121-1.5196 (38.407-38.598)
Exhaust	1.4929-1.5004 (37.920-38.110)
Oil Clearance	
Standard .....	.0018-.0034 (.046-.086)
Wear Limit .....	.0047 (.119)

LASH ADJUSTER SPECIFICATIONS

LASH ADJUSTER TABLE

Application	In. (mm)
Bore Diameter .....	.6693-.6701 (17.000-17.021)
Lash Adjuster Diameter .....	.6685-.6690 (16.980-16.993)
Oil Clearance .....	.0003-.0016 (.008-.041)
