

2002 ENGINE**Engine Mechanical - I35****PRECAUTIONS****PARTS REQUIRING ANGULAR TIGHTENING**

- Use an angle wrench for the final tightening of the following engine parts:
 - a. Cylinder head bolts
 - b. Main bearing cap bolts
 - c. Connecting rod cap nuts
 - d. Crankshaft pulley bolt
- Do not use a torque value for final tightening.
- The torque value for these parts are for a preliminary step.
- Ensure thread and seat surfaces are clean and coated with engine oil.

LIQUID GASKET APPLICATION PROCEDURE

1. **Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.**
2. **Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine RTV silicone sealant or equivalent. Refer to RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS .)**
 - Be sure liquid gasket diameter is as specified in this manual.

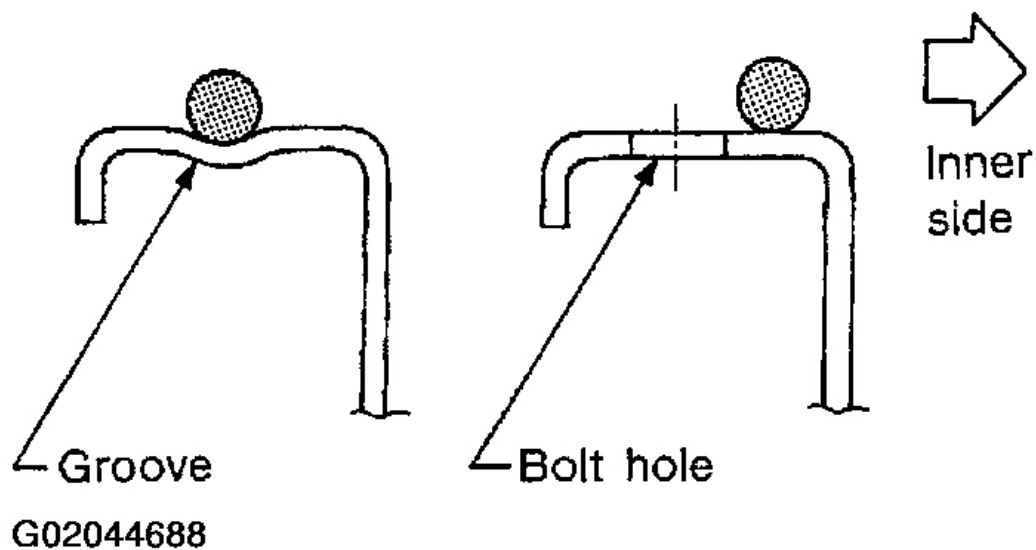
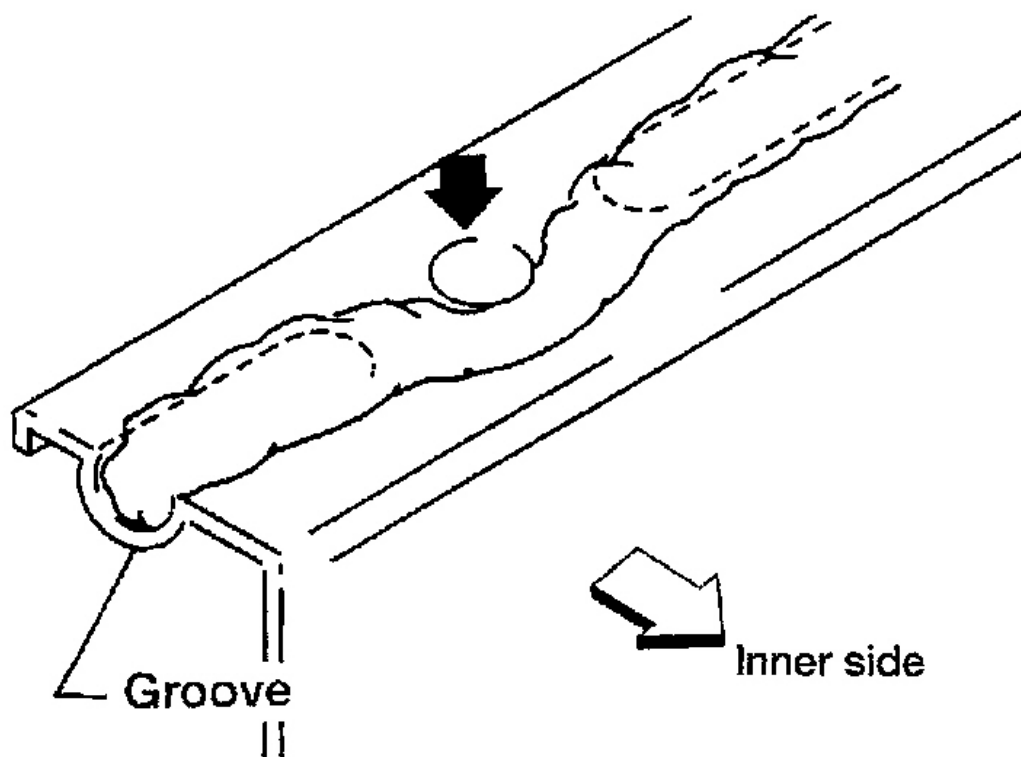


Fig. 1: Identifying Liquid Gasket Application
Courtesy of NISSAN MOTOR CO., U.S.A.

3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.



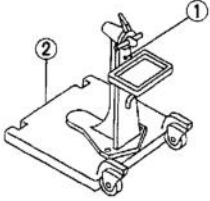
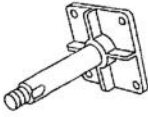
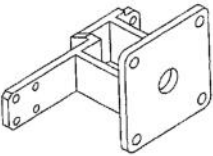
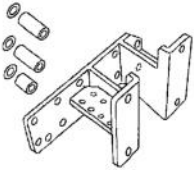
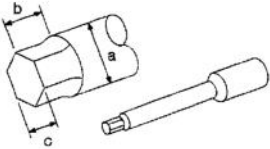
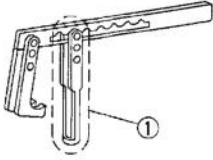
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Fig. 2: Applying Liquid Gasket Around Inner Side Of Bolt Holes
Courtesy of NISSAN MOTOR CO., U.S.A.

PREPARATION

SPECIAL SERVICE TOOLS

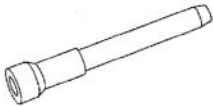
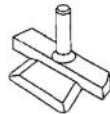
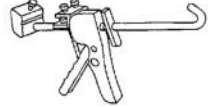
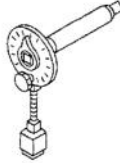
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST0501S000 (—) Engine stand assembly 1 ST05011000 (—) Engine stand 2 ST05012000 (—) Base	 Disassembling and assembling
KV10106500 (—) Engine stand shaft	
KV10117000 (J41262) Engine sub-attachment	 KV10117000 has been replaced with KV10117001 (KV10117000 is no longer in production, but it is usable).
KV10117001 (—) Engine sub-attachment	 Installing on the cylinder block
ST10120000 (J24239-01) Cylinder head bolt wrench	 Loosening and tightening cylinder head bolt a: 13 (0.51) dia. b: 12 (0.47) c: 10 (0.39) Unit: mm (in)
KV10116200 (J26336-A) Valve spring compressor 1 KV10115900 (J26336-20) Attachment	 Disassembling valve mechanism

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Fig. 3: Identifying Special Service Tools (1 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

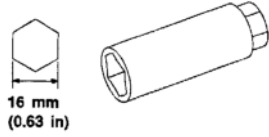
2002 Infiniti I35**2002 ENGINE Engine Mechanical - I35**

Tool number (Kent-Moore No.) Tool name	Description
(J39386) Valve oil seal drift	 Installing valve oil seal
EM03470000 (J8037) Piston ring compressor	 Installing piston assembly into cylinder bore
ST16610001 (J23907) Pilot bushing puller	 Removing crankshaft pilot bushing
KV10111100 (J37228) Seal cutter	 Removing steel oil pan and rear timing chain case
WS39930000 (—) Tube presser	 Pressing the tube of liquid gasket
KV10112100 (BT8653-A) Angle wrench	 Tightening bolts for bearing cap, cylinder head, etc.

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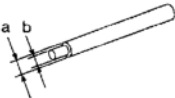
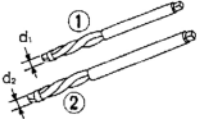
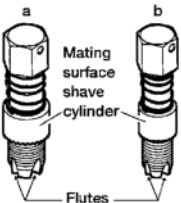
Fig. 4: Identifying Special Service Tools (2 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

COMMERCIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
Spark plug wrench	 Removing and installing spark plug

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Fig. 5: Identifying Commercial Service Tools (1 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

Tool number (Kent-Moore No.) Tool name	Description
Valve seat cutter set	 Finishing valve seat dimensions
Piston ring expander	 Removing and installing piston ring
Valve guide drift	 Removing and installing valve guide Intake & Exhaust: a = 9.5 mm (0.374 in) dia. b = 5.5 mm (0.217 in) dia.
Valve guide reamer	 Reaming valve guide 1 or hole for oversize valve guide 2 Intake & Exhaust: d₁ = 6.0 mm (0.236 in) dia. d₂ = 10.2 mm (0.402 in) dia.
(J-43897-18) (J-43897-12) Oxygen sensor thread cleaner	 Reconditioning the exhaust system threads before installing a new oxygen sensor (Use with anti-seize lubricant shown below.) a = J-43897-18 (18 mm dia.) for zirconia oxygen sensor b = J-43897-12 (12 mm dia.) for titania oxygen sensor
Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)	 Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads

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Fig. 6: Identifying Commercial Service Tools (2 Of 2)
 Courtesy of NISSAN MOTOR CO., U.S.A.

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

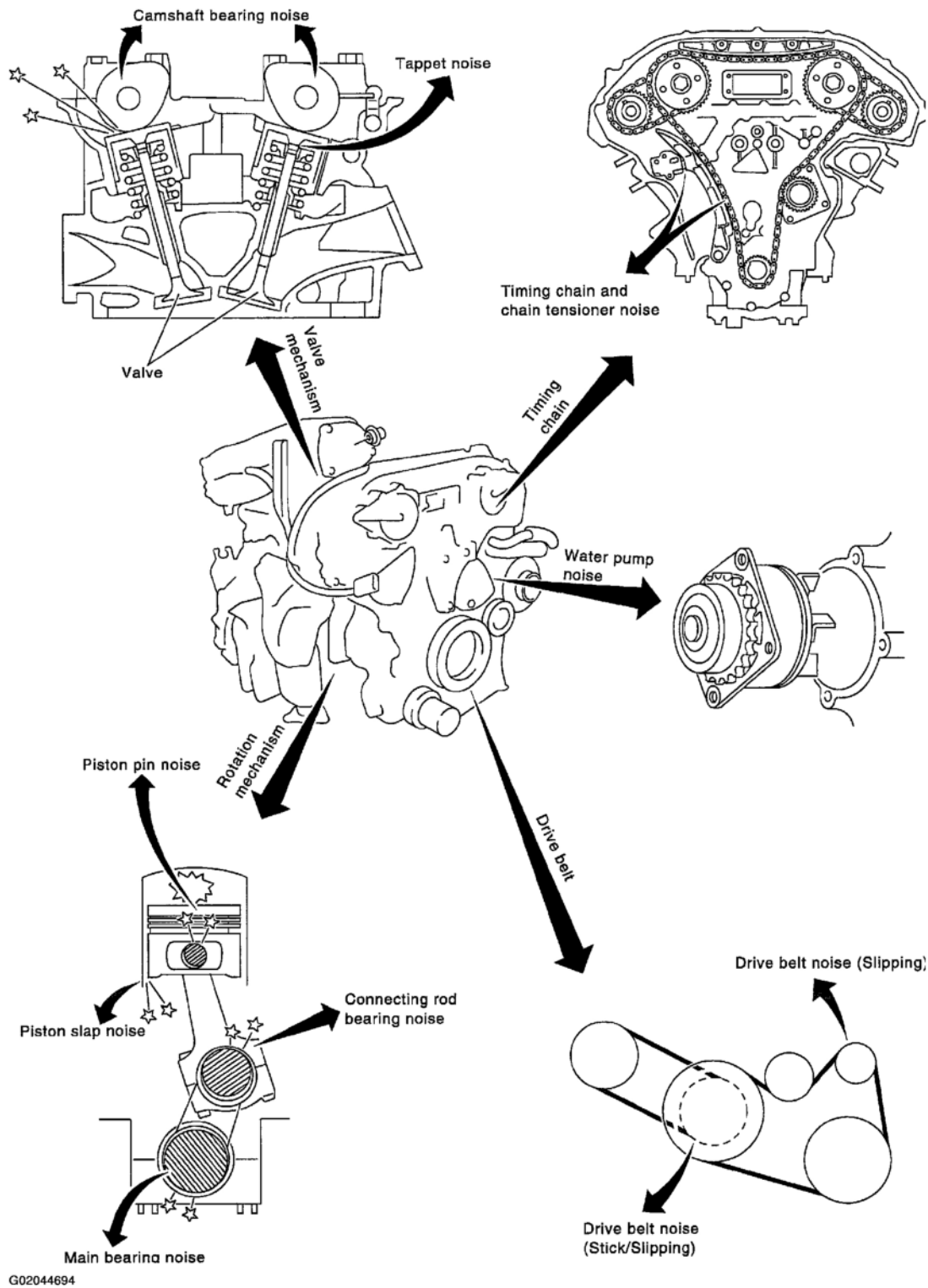


Fig. 7: Identifying Noise, Vibration And Harshness (NVH) Troubleshooting
 Courtesy of NISSAN MOTOR CO., U.S.A.

NVH TROUBLESHOOTING - ENGINE NOISE

Use the chart below to help you find the cause of the symptom.

1. Locate the area where noise occurs.
2. Confirm the type of noise.
3. Specify the operating condition of engine.
4. Check specified noise source.

If necessary, repair or replace these parts.

Location of noise	Type of noise	Operating condition of engine						Source of noise	Check item
		Before warm-up	After warm-up	When starting	When idling	When racing	While driving		
Top of engine Rocker cover Cylinder head	Ticking or clicking	C	A	—	A	B	—	Tappet noise	Valve clearance
	Rattle	C	A	—	A	B	C	Camshaft bearing noise	Camshaft journal clearance Camshaft runout
Crankshaft pulley Cylinder block (Side of engine) Oil pan	Slap or knock	—	A	—	B	B	—	Piston pin noise	Piston and piston pin clearance Connecting rod bushing clearance
	Slap or rap	A	—	—	B	B	A	Piston slap noise	Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion
	Knock	A	B	C	B	B	B	Connecting rod bearing noise	Connecting rod bushing clearance (Small end) Connecting rod bearing clearance (Big end)
	Knock	A	B	—	A	B	C	Main bearing noise	Main bearing oil clearance Crankshaft runout
Front of engine Timing chain cover	Tapping or ticking	A	A	—	B	B	B	Timing chain and chain tensioner noise	Timing chain cracks and wear Timing chain tensioner operation
Front of engine	Squeaking or fizzing	A	B	—	B	—	C	Drive belts (Sticking or slipping)	Drive belts deflection
	Creaking	A	B	A	B	A	B	Drive belts (Slipping)	Idler pulley bearing operation
	Squall Creak	A	B	—	B	A	B	Water pump noise	Water pump operation

A: Closely related B: Related C: Sometimes related —: Not related

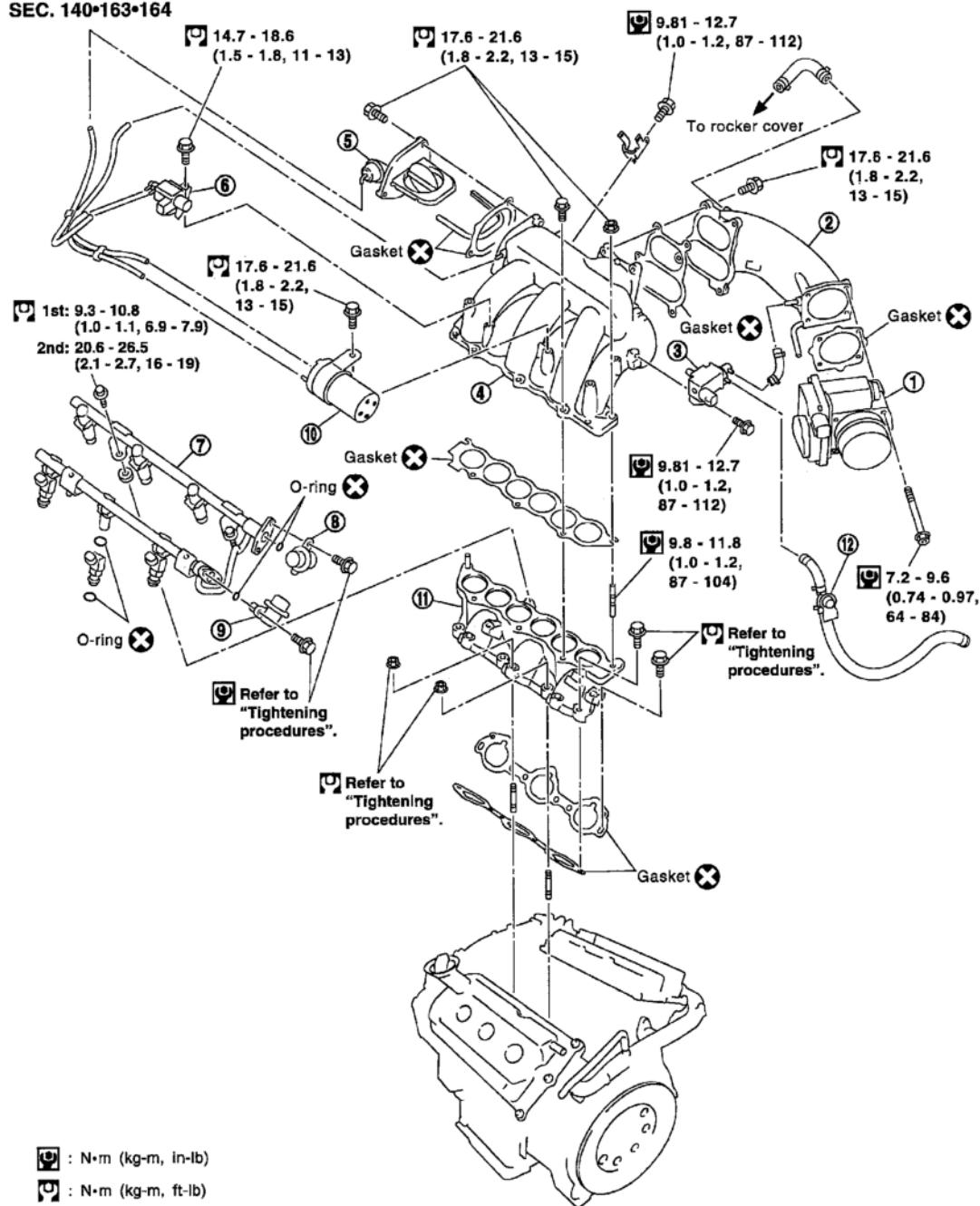
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Fig. 8: NVH Troubleshooting Chart - Engine Noise
 Courtesy of NISSAN MOTOR CO., U.S.A.

OUTER COMPONENT PARTS

REMOVAL AND INSTALLATION

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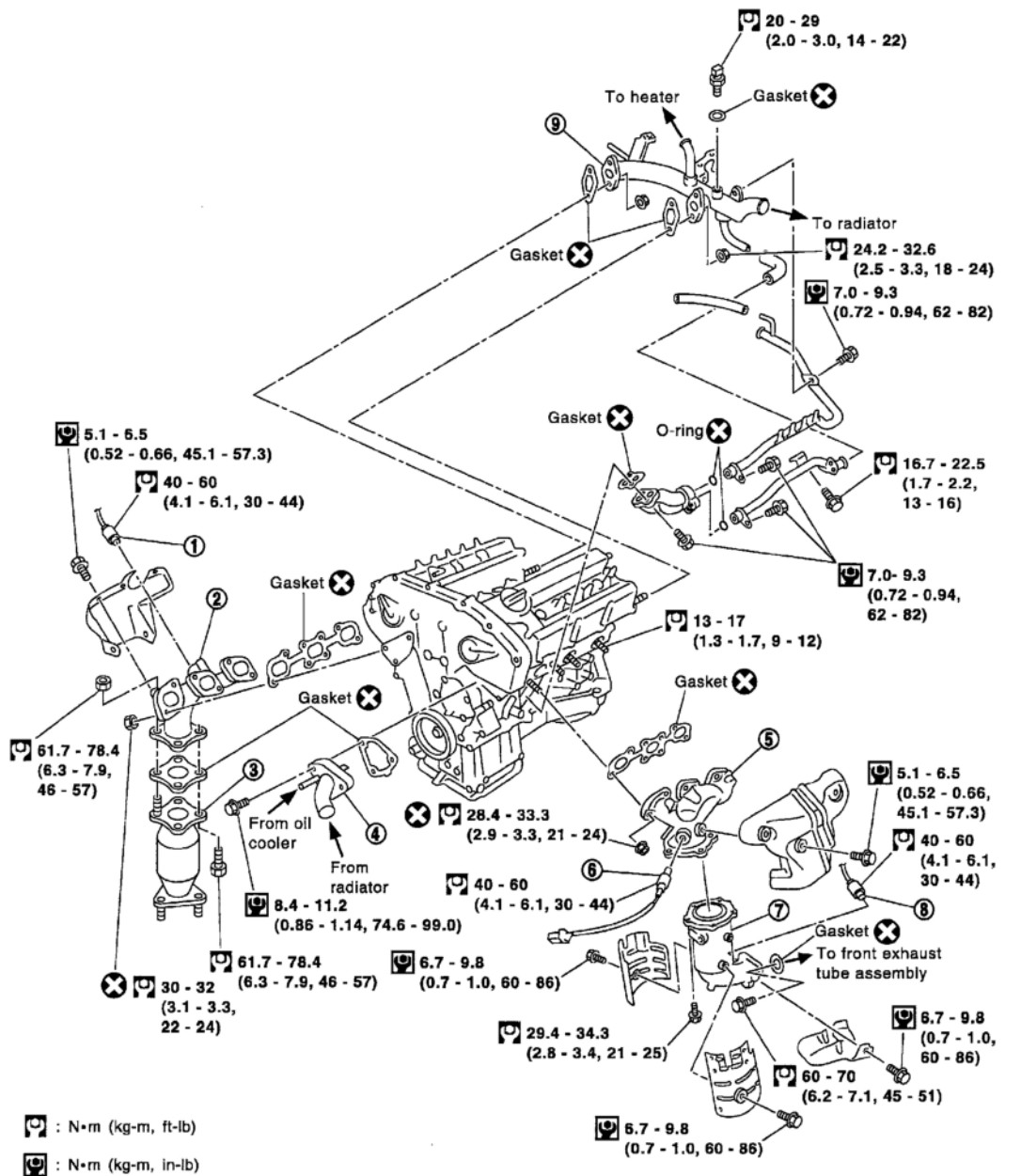
1. Electronic control throttle actuator
2. Intake manifold upper collector
3. EVAP canister purge volume control solenoid valve
4. Intake manifold lower collector

5. Power valve
6. VIAS control solenoid valve
7. Fuel tube
8. Fuel damper

9. Fuel damper
10. Vacuum tank
11. Intake manifold
12. Service port

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Fig. 9: View Of Outer Component Parts (1 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.



- | | | |
|---|---|--|
| 1. Heated oxygen sensor 1 (front)
(bank 1) | 4. Thermostat with water inlet | 7. TWC (manifold) |
| 2. Exhaust manifold | 5. Exhaust manifold | 8. Heated oxygen sensor 2 (rear)
(bank 2) |
| 3. TWC (manifold) | 6. Heated oxygen sensor 1 (front)
(bank 2) | 9. Water outlet |

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Fig. 10: View Of Outer Component Parts (2 Of 2)
 Courtesy of NISSAN MOTOR CO., U.S.A.

TIGHTENING PROCEDURES

Intake Manifold

- Tighten in numerical order shown in the figure.
1. Tighten all bolts and nuts to 4.9 to 9.8 N.m (0.50 to 0.99 kg.m, 44 to 86 in-lb).
 2. Finally tighten all bolts and nuts to 26.5 to 31.4 N.m (2.7 to 3.2 kg-m, 20 to 23 ft-lb).
 - Tighten all bolts and nuts to the final torque, evenly dividing the tightening into at least five steps.

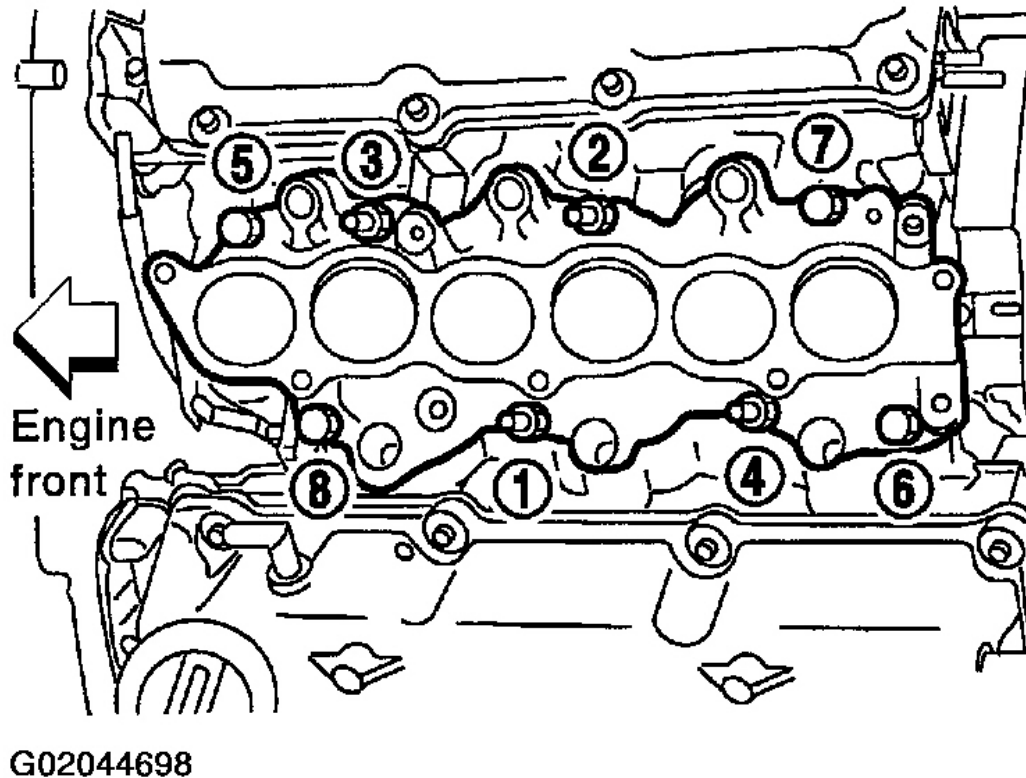
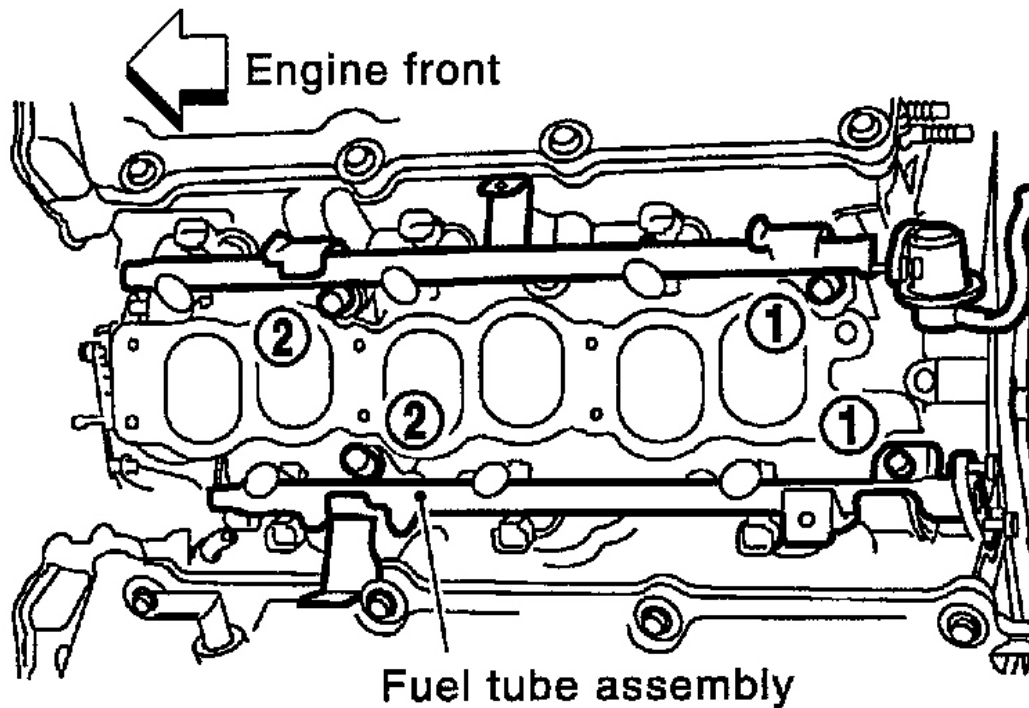


Fig. 11: Tightening Intake Manifold Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

Fuel Tube

- Tighten in numerical order shown in the figure.
1. Tighten all bolts to 9.3 to 10.8 N.m (0.95 to 1.1 kg-m, 83 to 95 in-lb).
 2. Then tighten all bolts to 20.6 to 26.5 N.m (2.1 to 2.7 kg-m, 16 to 19 ft-lb).



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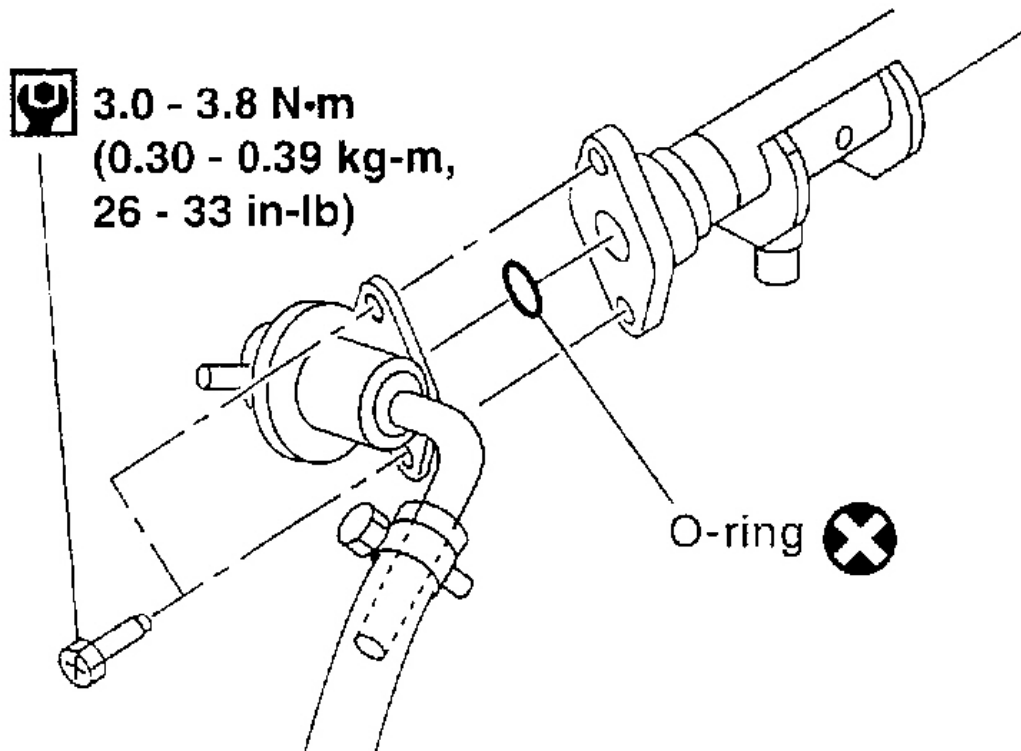
Fig. 12: Tightening Fuel Tube Bolts

Courtesy of NISSAN MOTOR CO., U.S.A.

Fuel Damper

Tighten fuel pressure regulator to 2.9 to 3.8 N.m (0.3 to 0.39 kg-m, 26.0 to 33.9 in-lb).

- Tighten screws evenly several times to have the fuel damper tightened at the specified torque.
- Always replace O-ring with new ones.
- Lubricate O-ring with new engine oil.



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Fig. 13: Tightening Fuel Damper Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

Electronic Control Throttle Actuator

- Tighten in numerical order shown in the figure.

Tighten all bolts to 7.2 to 9.6 N.m (0.74 to 0.97 kg-m, 64 to 84 in-lb).

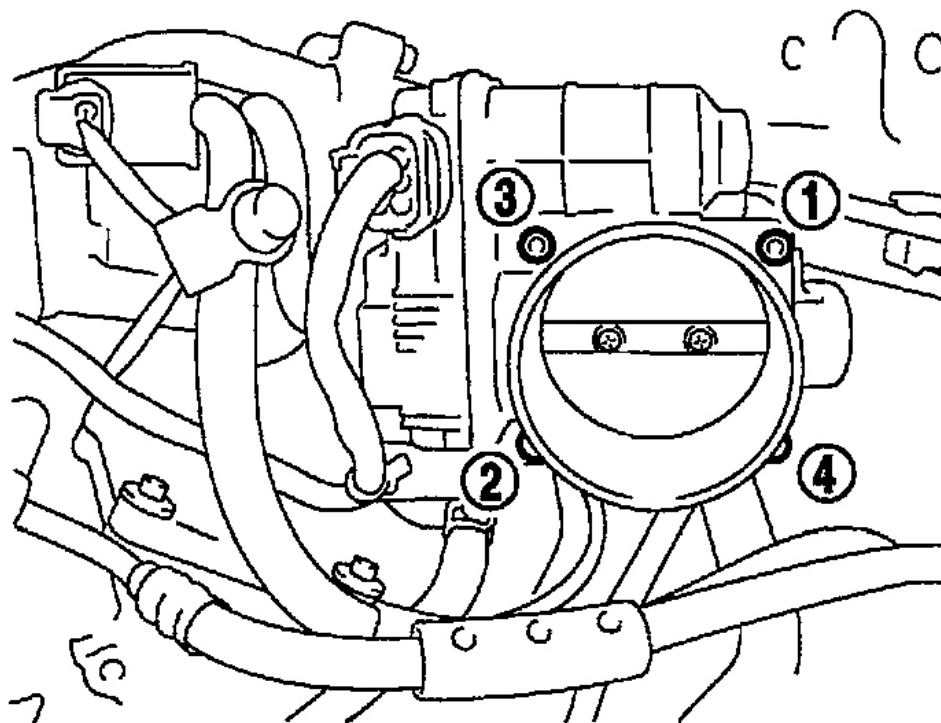
CAUTION:

- Perform "Throttle Valve Closed Position Learning" when harness connector of electronic throttle control actuator is disconnected.

Refer to THROTTLE POSITION SWITCH, IGNITION TIMING & IDLE

- Perform "Idle Air Volume Learning" when electronic throttle control actuator is replaced.

Refer to THROTTLE POSITION SWITCH, IGNITION TIMING & IDLE



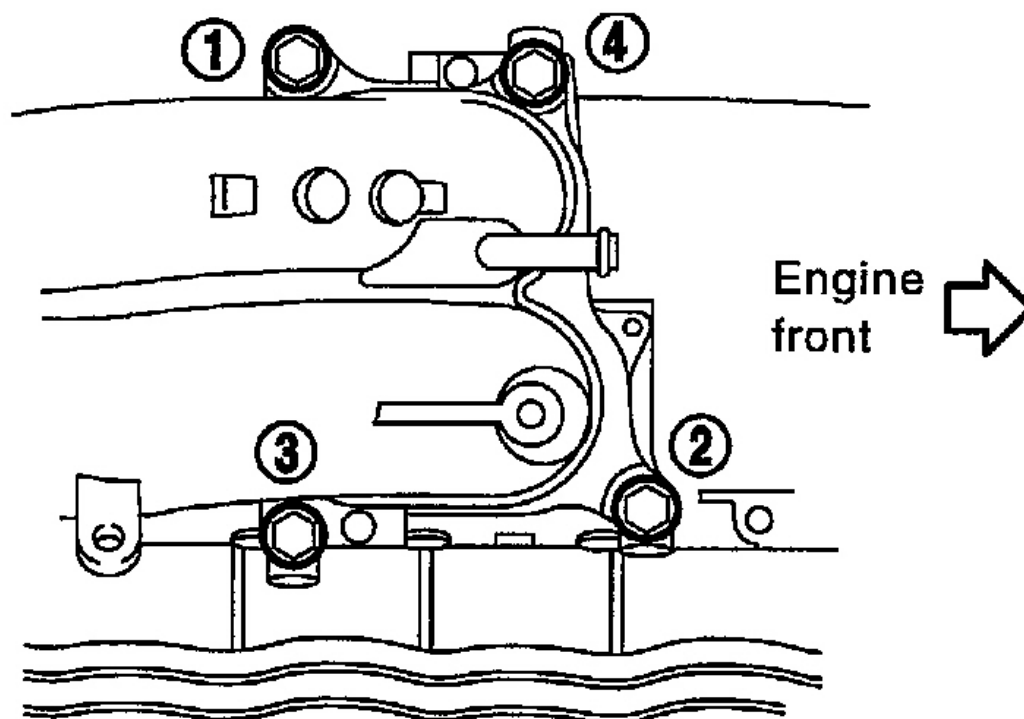
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Fig. 14: Tightening Electronic Control Throttle Actuator Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

Intake Manifold Upper Collector

- **Tighten in numerical order shown in the figure.**

Tighten all bolts to 17.6 to 21.6 N.m (1.8 to 2.2 kg-m, 13 to 15 ft-lb).

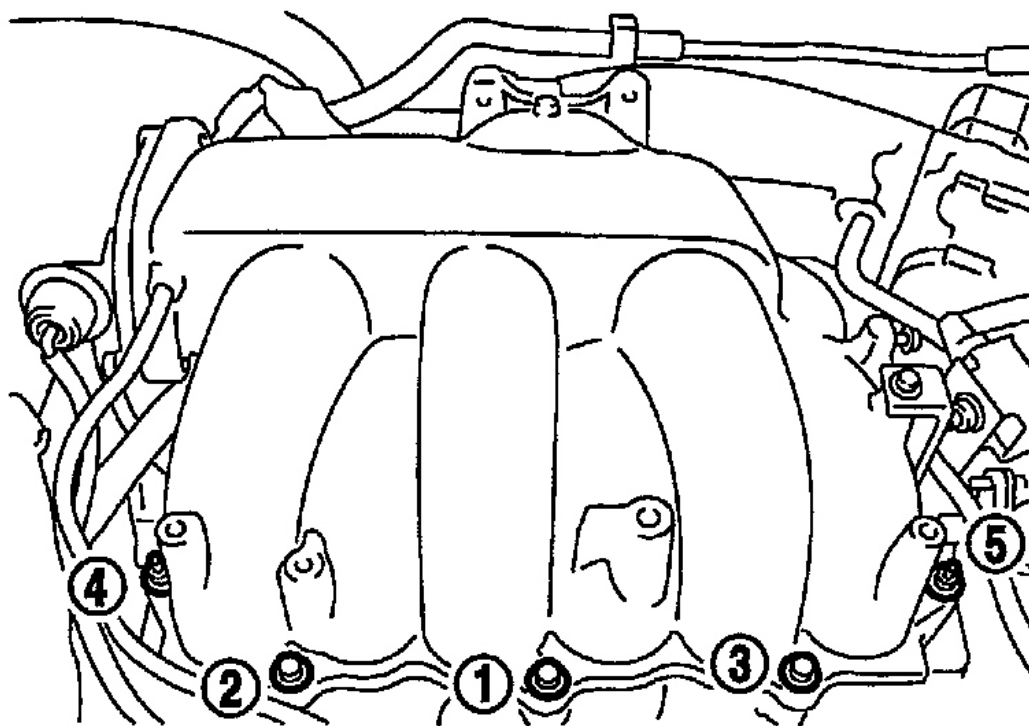


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Fig. 15: Tightening Intake Manifold Upper Collector Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

Intake Manifold Lower Collector

Tighten bolts and nuts to 17.6 to 21.6 N.m (1.8 to 2.2 kg-m, 13 to 15 ft-lb) in numerical order shown in the figure.



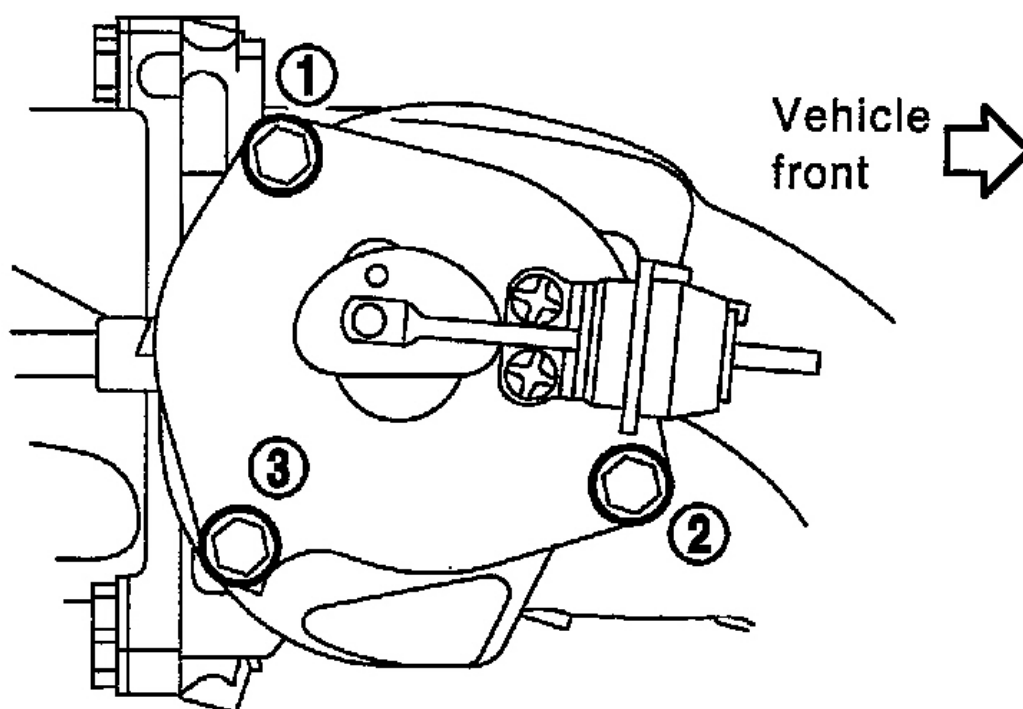
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Fig. 16: Tightening Intake Manifold Lower Collector Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

Power Valve

- Tighten in numerical order shown in the figure.

Tighten all bolts to 17.6 to 21.6 N.m (1.8 to 2.2 kg-m, 13 to 15 ft-lb).

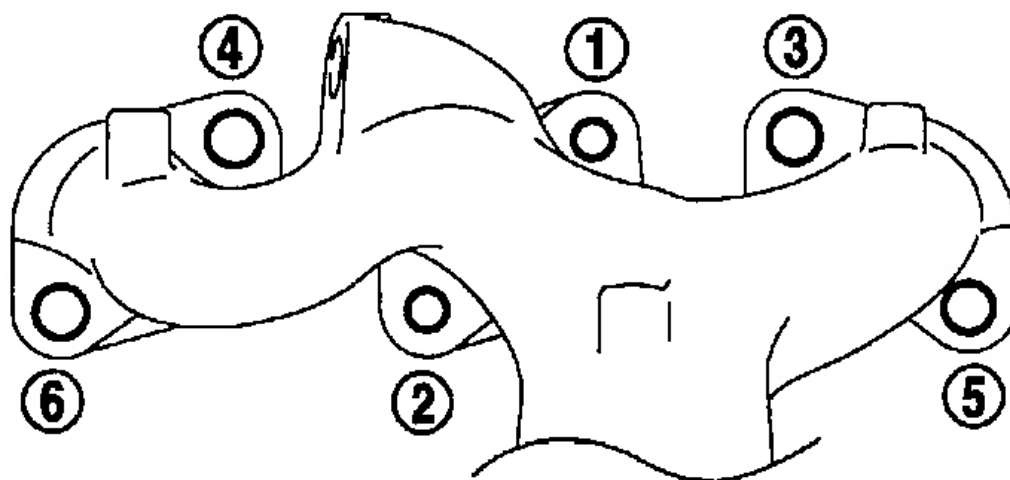


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Fig. 17: Identifying Power Valve Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

Exhaust Manifold

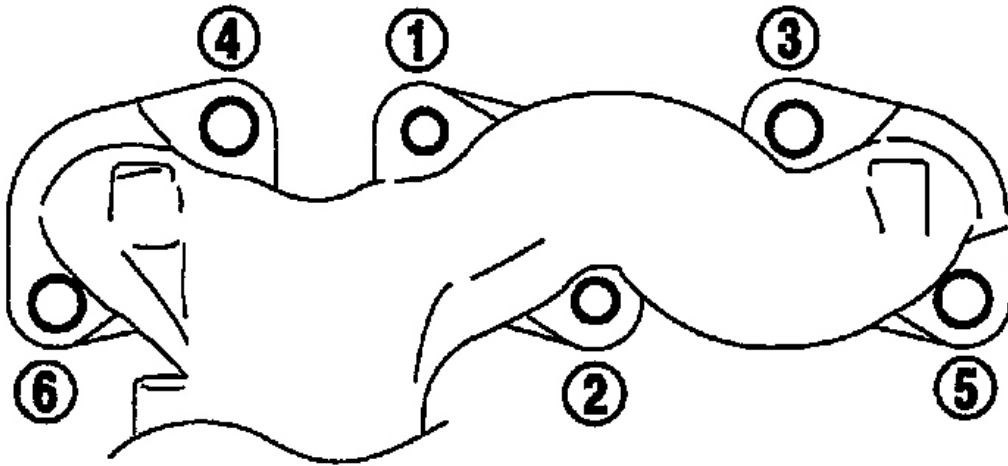
Tighten nuts to 30 to 32 N.m (3.1 to 3.2 kg-m, 22 to 24 ft-lb) in numerical order shown in the figure.

RH bank

➡ Engine front

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Fig. 18: Identifying Exhaust Manifold Bolts (RH)
Courtesy of NISSAN MOTOR CO., U.S.A.

LH bank

Engine front ←

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Fig. 19: Identifying Exhaust Manifold Bolts (LH)

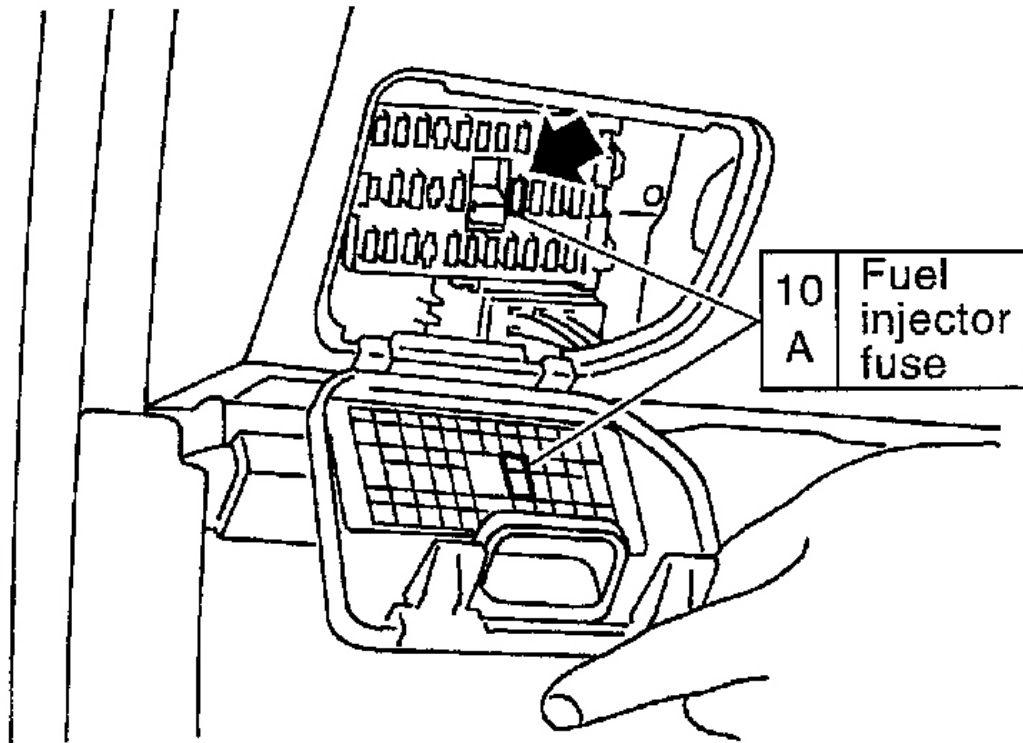
Courtesy of NISSAN MOTOR CO., U.S.A.

MEASUREMENT OF COMPRESSION PRESSURE

1. Warm up engine.
2. Turn ignition switch OFF.
3. Release fuel pressure.

Refer to **FUEL SYSTEM PRESSURE RELEASE** .

4. Disconnect ignition coil with power transistor harness connectors, then remove ignition coils.
5. Remove all spark plugs.
6. Remove fuse for fuel injector.



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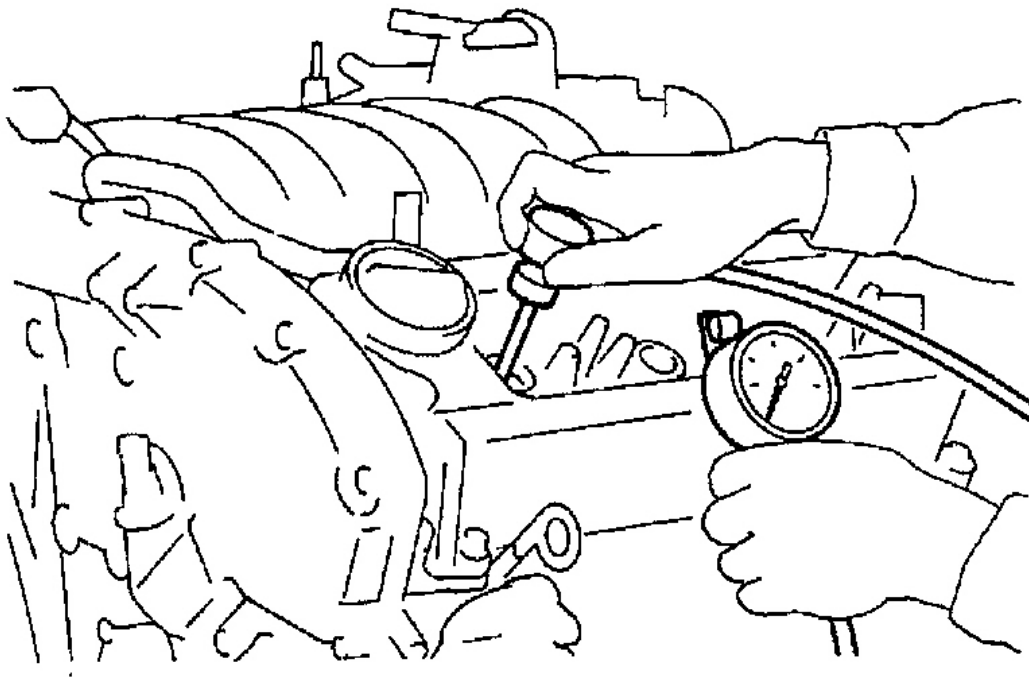
Fig. 20: Identifying Fuel Injector Fuse
Courtesy of NISSAN MOTOR CO., U.S.A.

7. Attach a compression tester to No. 1 cylinder.
8. Depress accelerator pedal fully to keep throttle valve wide open.
9. Crank engine and record highest gauge indication.
10. Repeat the measurement on each cylinder as shown above.
 - Always use a fully-charged battery to obtain specified engine speed.

Unit: kPa (kg/cm ² , psi)/rpm		
Standard	Minimum	Difference limit between cylinders
1,275 (13.0, 185)/300	981 (10.0, 142)/300	98 (1.0, 14)/300

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Fig. 21: Attaching A Compression Tester To Cylinder (1 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.



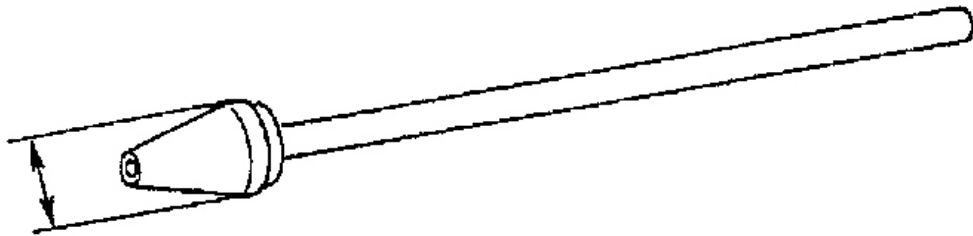
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Fig. 22: Attaching A Compression Tester To Cylinder (2 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

11. If compression in one or more cylinders is low:
 - a. Pour a small amount of engine oil into cylinders through spark plug holes.
 - b. Retest compression.
 - If adding oil helps compression, piston rings may be worn or damaged. If so, replace

piston rings after checking piston.

- If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to SDS, VALVE and VALVE SEAT.) If valve or valve seat is damaged excessively, replace them.



20 mm (0.79 in) dia.

Use compressor tester whose end (rubber portion) is less than 20 mm (0.79 in) dia. Otherwise, it may be caught by cylinder head during removal.

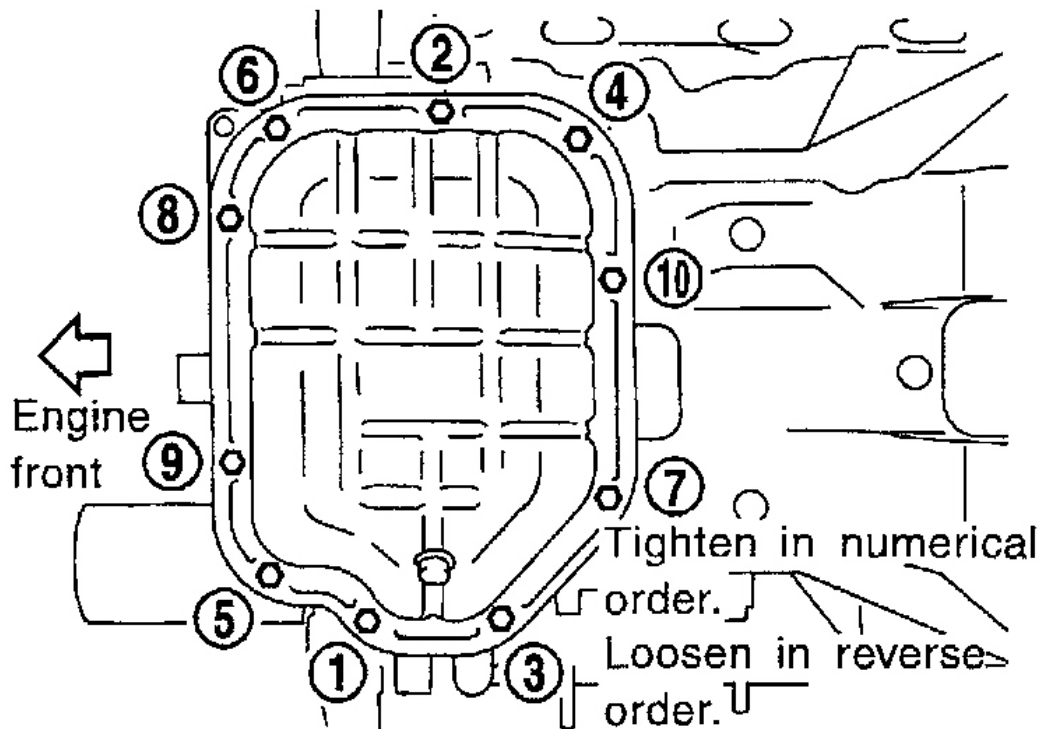
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Fig. 23: Identifying Compression Tester
Courtesy of NISSAN MOTOR CO., U.S.A.

- If compression stays low in two cylinders that are next to each other:
 - a. The cylinder head gasket may be leaking, or
 - b. Both cylinders may have valve component damage. Inspect and repair as necessary.

OIL PAN

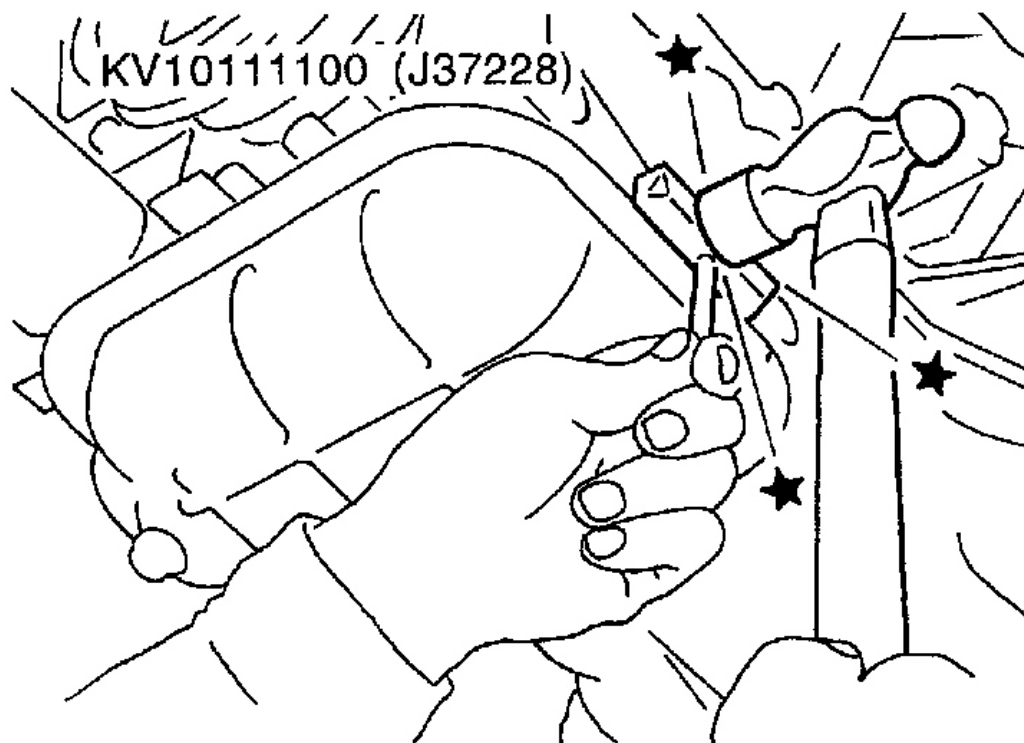
COMPONENTS



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Fig. 25: Removing Engine Side Cover
Courtesy of NISSAN MOTOR CO., U.S.A.

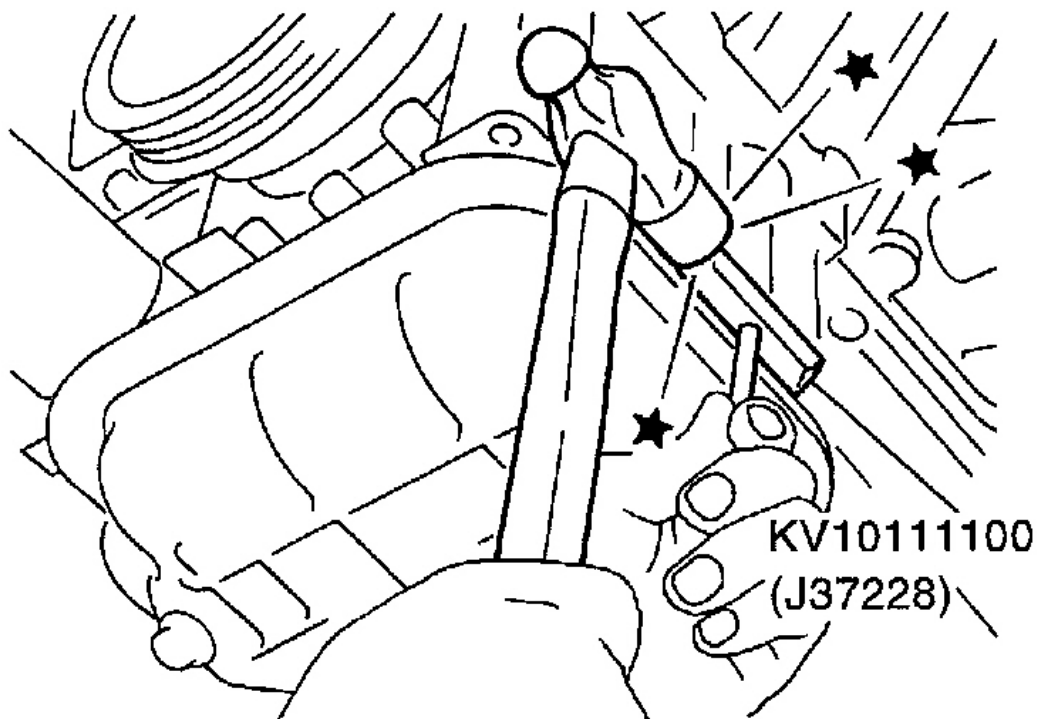
4. Remove steel oil pan.
 - a. Insert Tool between aluminum oil pan and steel oil pan.
 - Be careful not to damage aluminum mating surface.
 - Do not insert screwdriver, or oil pan flange will be deformed.



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Fig. 26: Removing Steel Oil Pan
Courtesy of NISSAN MOTOR CO., U.S.A.

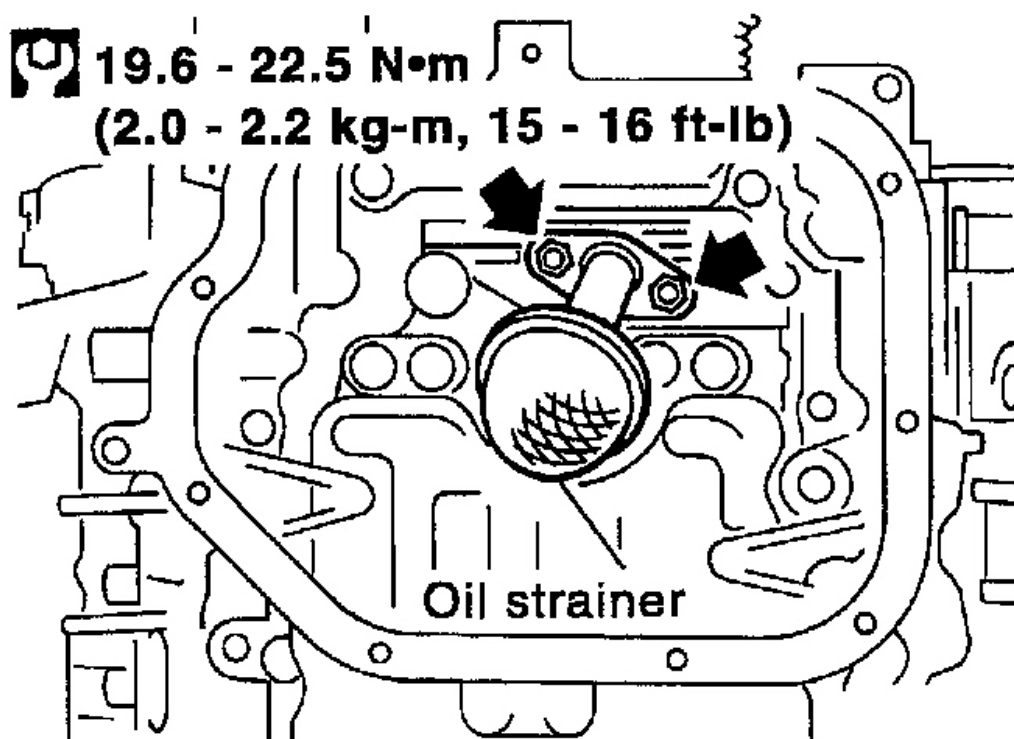
- b. Slide Tool by tapping on the side of the Tool with a hammer.
- c. Remove steel oil pan.



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Fig. 27: Removing Steel Oil Pan (Tapping On The Side Of The Tool With A Hammer)
Courtesy of NISSAN MOTOR CO., U.S.A.

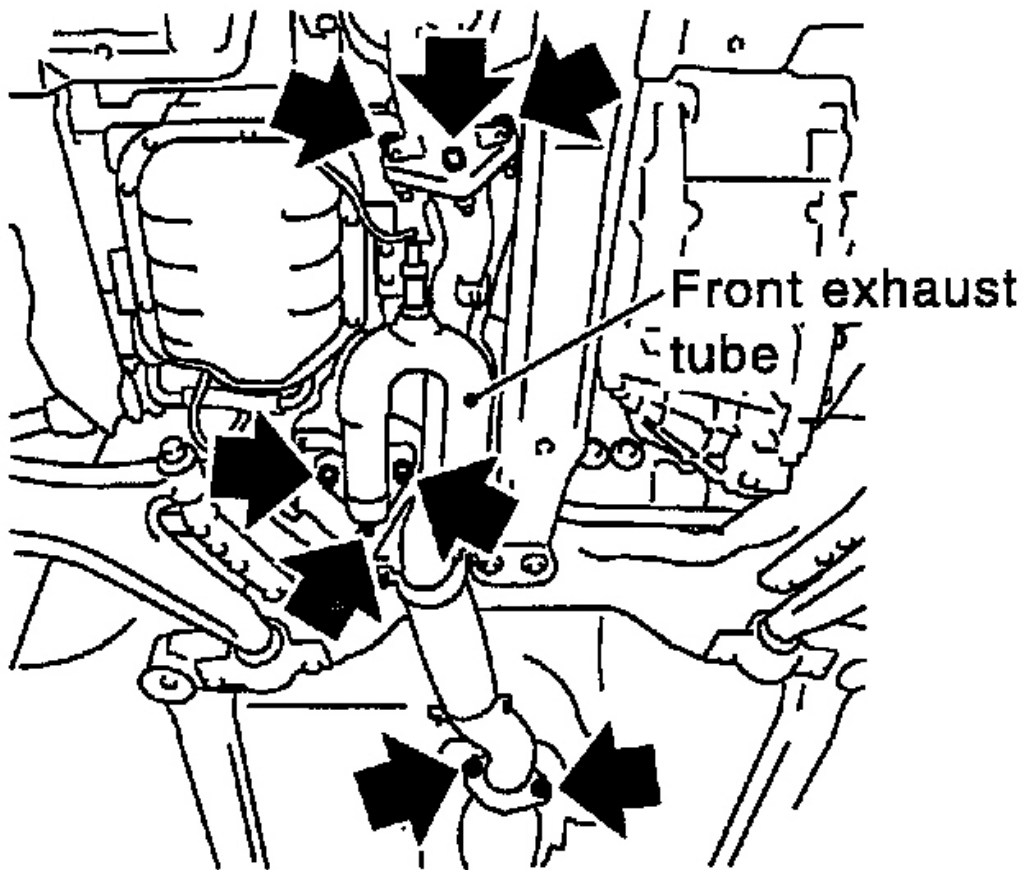
5. Remove oil strainer.



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Fig. 28: Removing A/C Compressor Gussets
Courtesy of NISSAN MOTOR CO., U.S.A.

6. Remove front exhaust tube and its support.

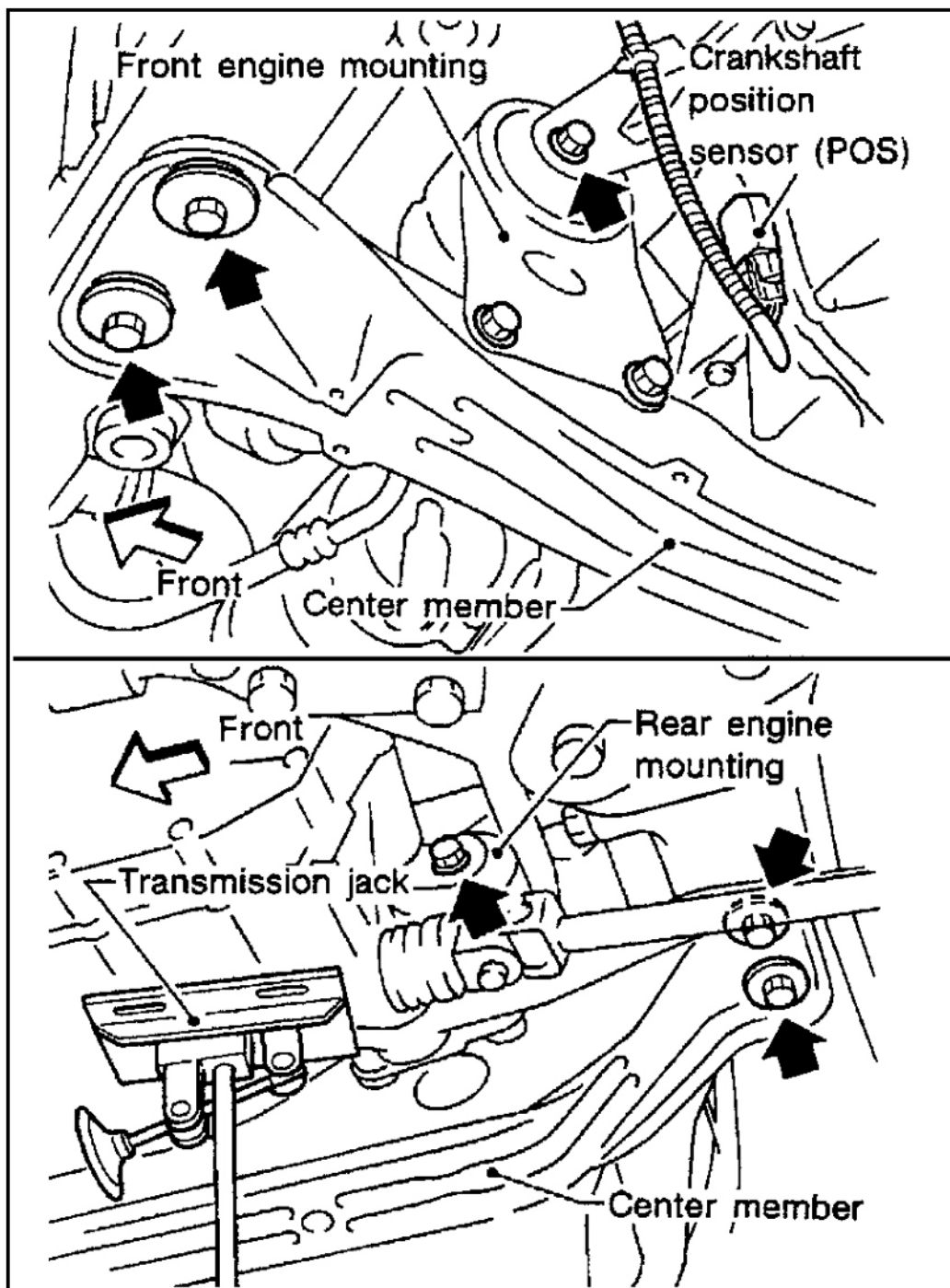


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Fig. 29: Removing Rear Cover Plate

Courtesy of NISSAN MOTOR CO., U.S.A.

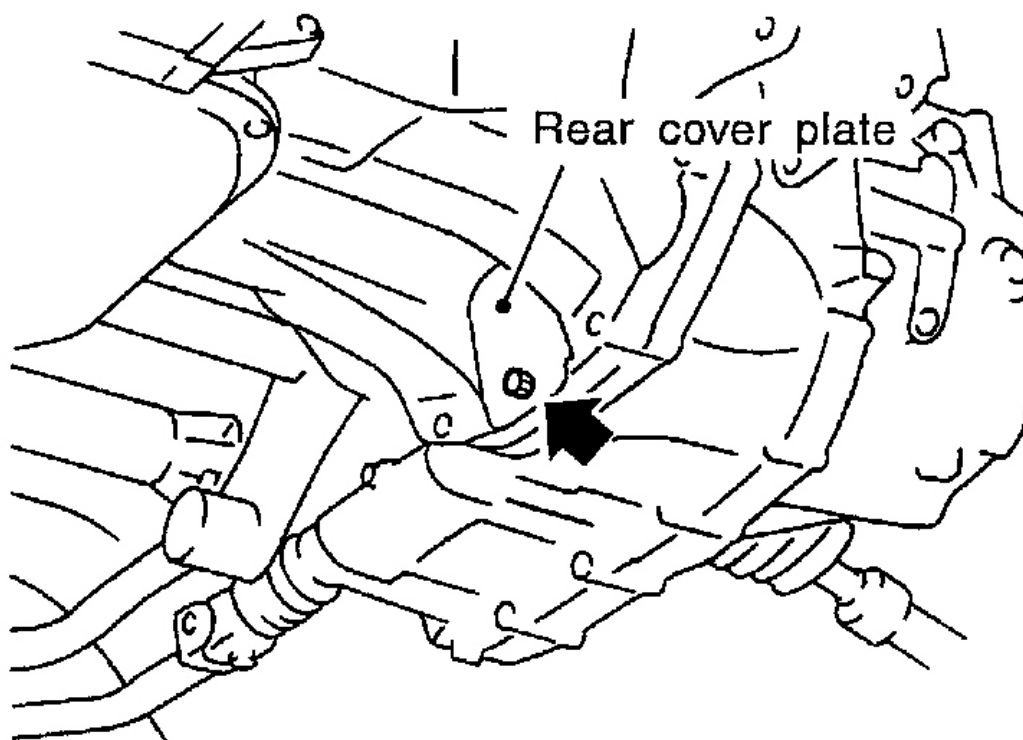
7. Set a suitable transmission jack under transaxle and hoist engine with engine slinger.
8. Remove crankshaft position sensor (POS) from oil pan.
9. Remove front and rear engine mounting nuts and bolts.
10. Remove center member.



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Fig. 30: Removing Aluminum Oil Pan Bolts In Numerical Order
Courtesy of NISSAN MOTOR CO., U.S.A.

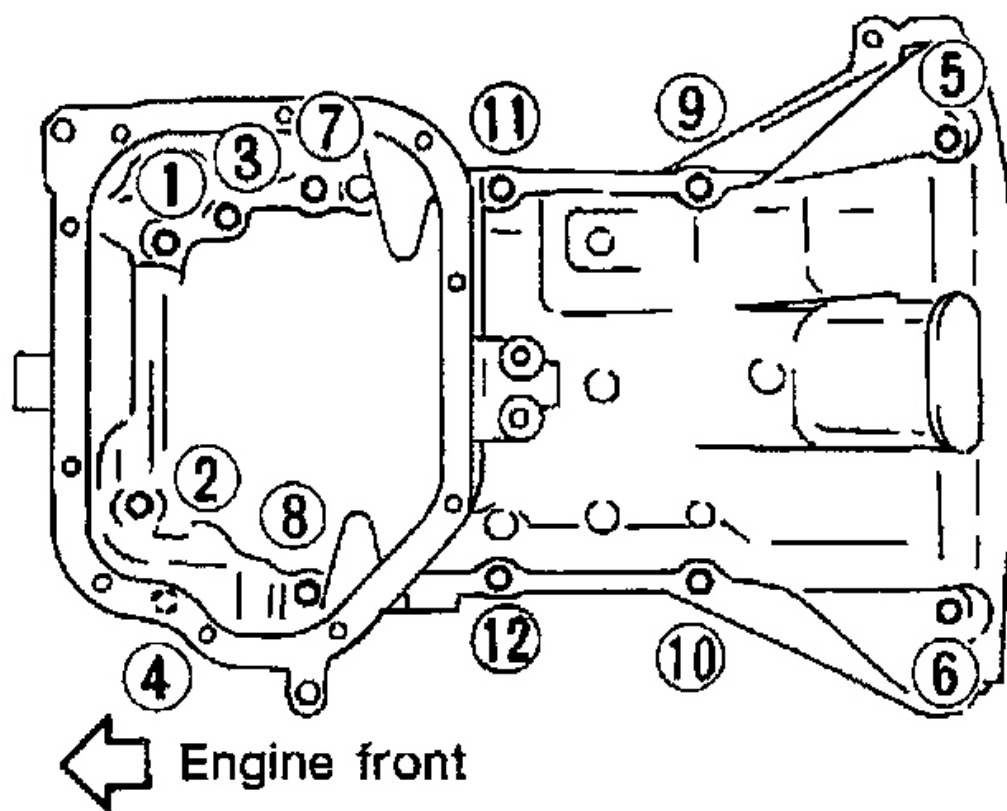
11. Remove drive belts.
12. Remove air conditioner compressor and bracket.
13. Remove rear cover plate.



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Fig. 31: Removing Rear Cover Plate
Courtesy of NISSAN MOTOR CO., U.S.A.

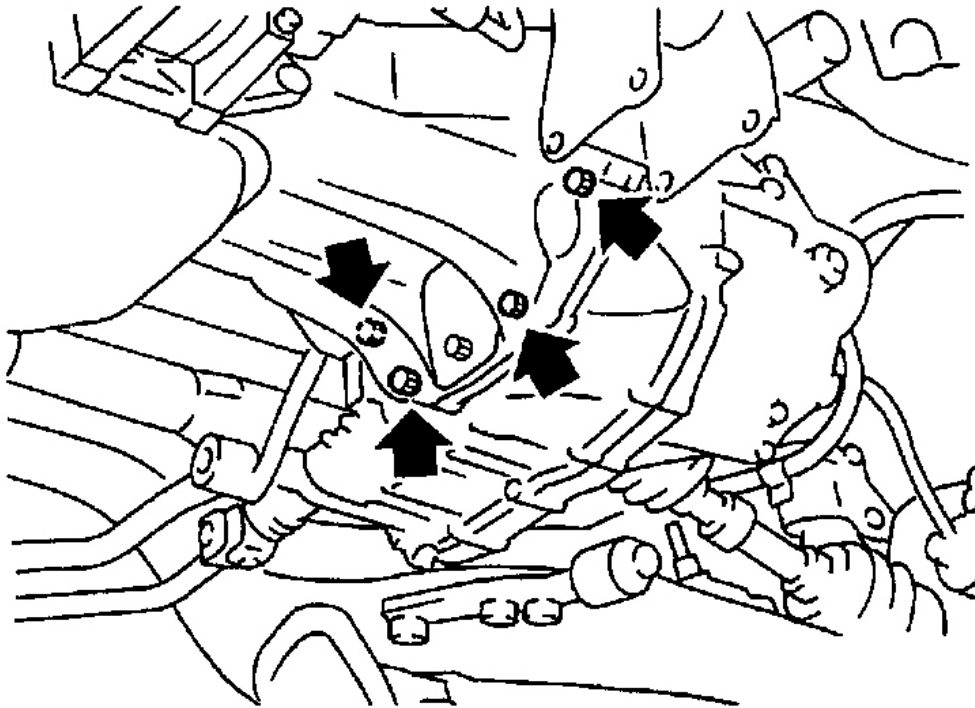
14. Remove aluminum oil pan bolts in numerical order.



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Fig. 32: Removing Aluminum Oil Pan Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

15. Remove four engine-to-transaxle bolts.

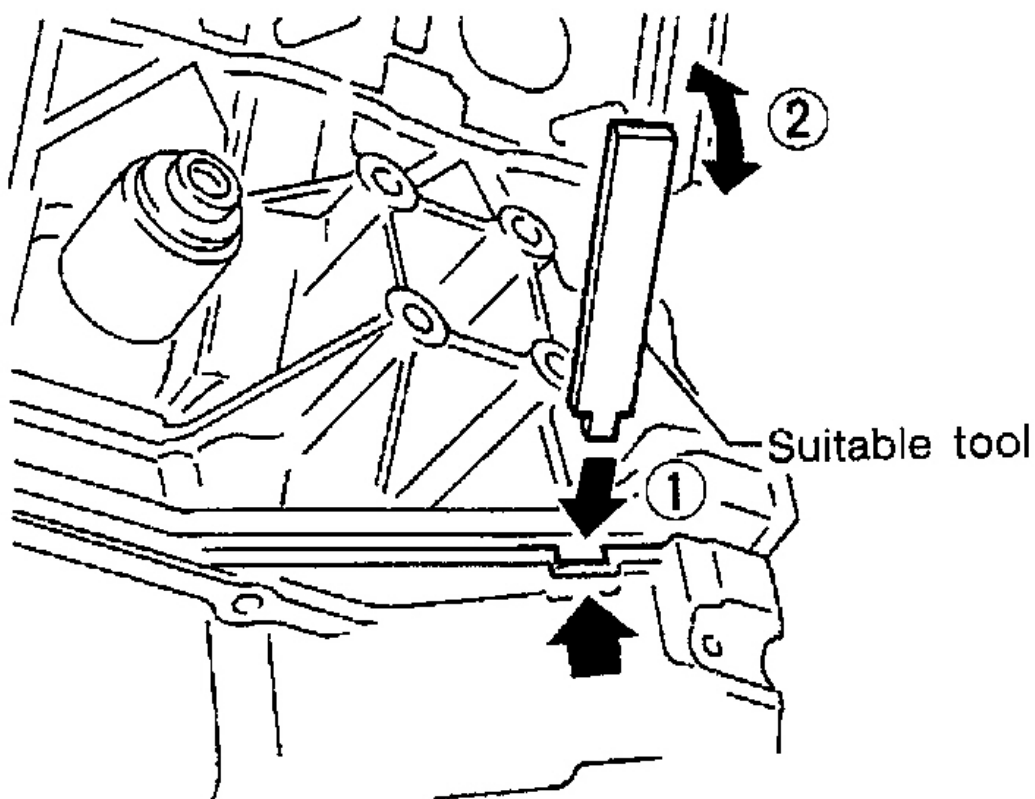


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Fig. 33: Removing Engine-To-Transaxle Bolts

Courtesy of NISSAN MOTOR CO., U.S.A.

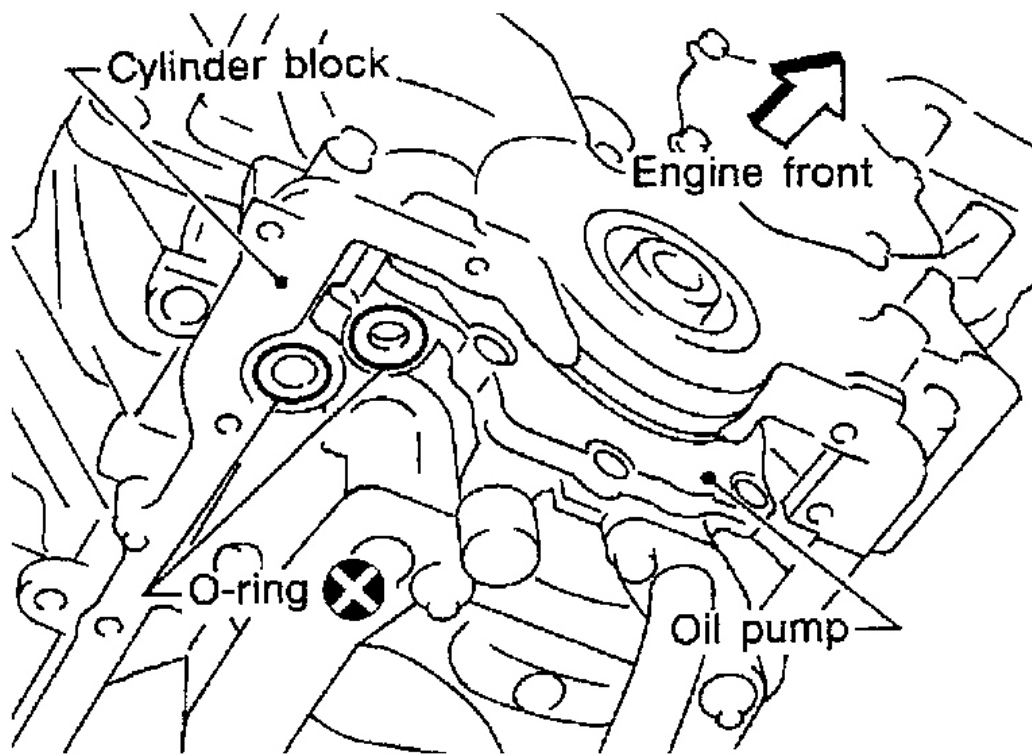
16. Remove aluminum oil pan.
 - a. Insert an appropriate size tool into the notch of aluminum oil pan as shown in the figure.
 - **Be careful not to damage aluminum mating surface.**
 - **Do not insert screwdriver, or oil pan flange will be deformed.**
 - b. Pry off aluminum oil pan by moving the tool up and down.
 - c. Remove aluminum oil pan.



G02044721

Fig. 34: Removing Aluminum Oil Pan
Courtesy of NISSAN MOTOR CO., U.S.A.

17. Remove O-rings from cylinder block and oil pump body.

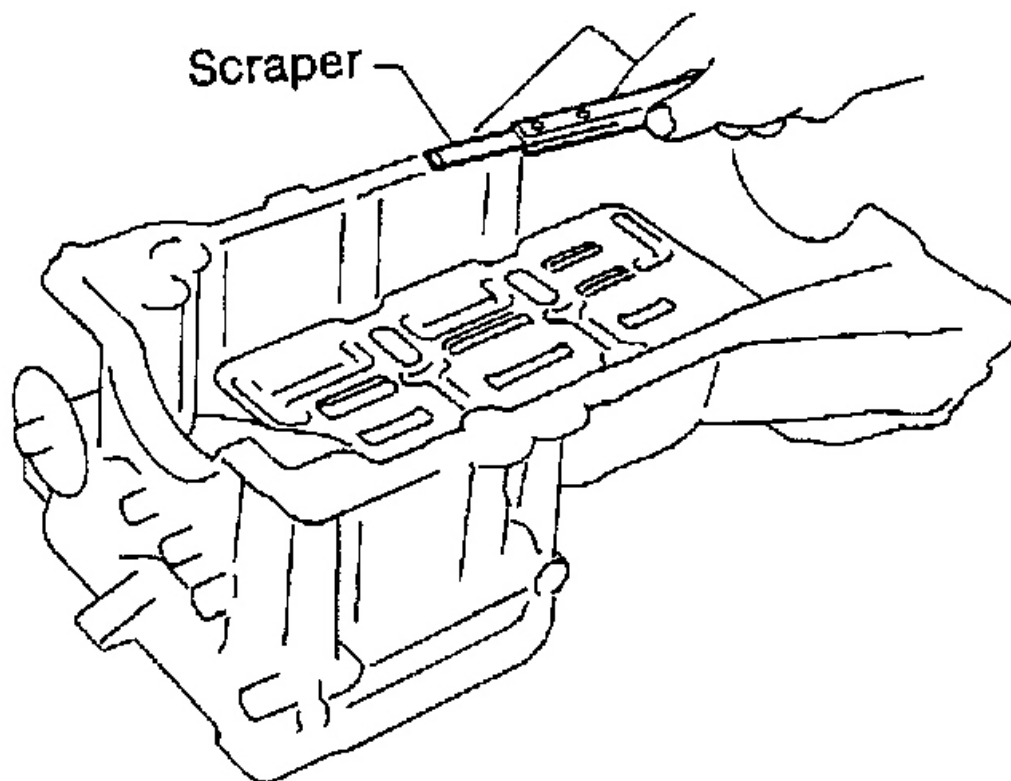


G02044722

Fig. 35: Removing O-Rings From Cylinder Block And Oil Pump Body
Courtesy of NISSAN MOTOR CO., U.S.A.

INSTALLATION

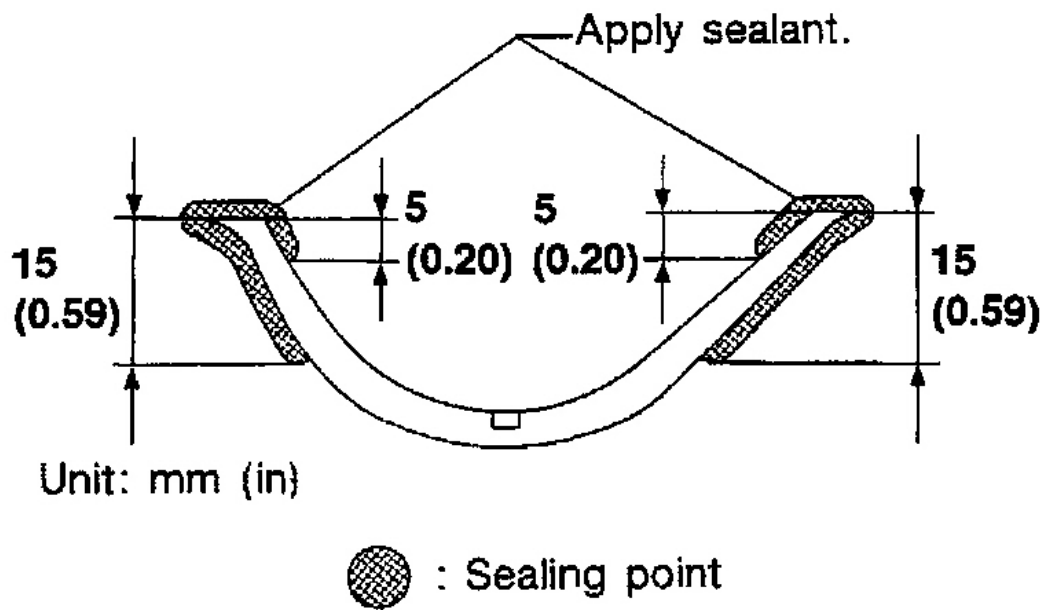
1. Install aluminum oil pan.
 - a. Use a scraper to remove old liquid gasket from mating surfaces.
 - Also remove old liquid gasket from mating surface of cylinder block, front cover and steel oil pan.
 - Remove old liquid gasket from the bolt hole and thread.



G02044723

Fig. 36: Removing Old Liquid Gasket From Mating Surfaces
Courtesy of NISSAN MOTOR CO., U.S.A.

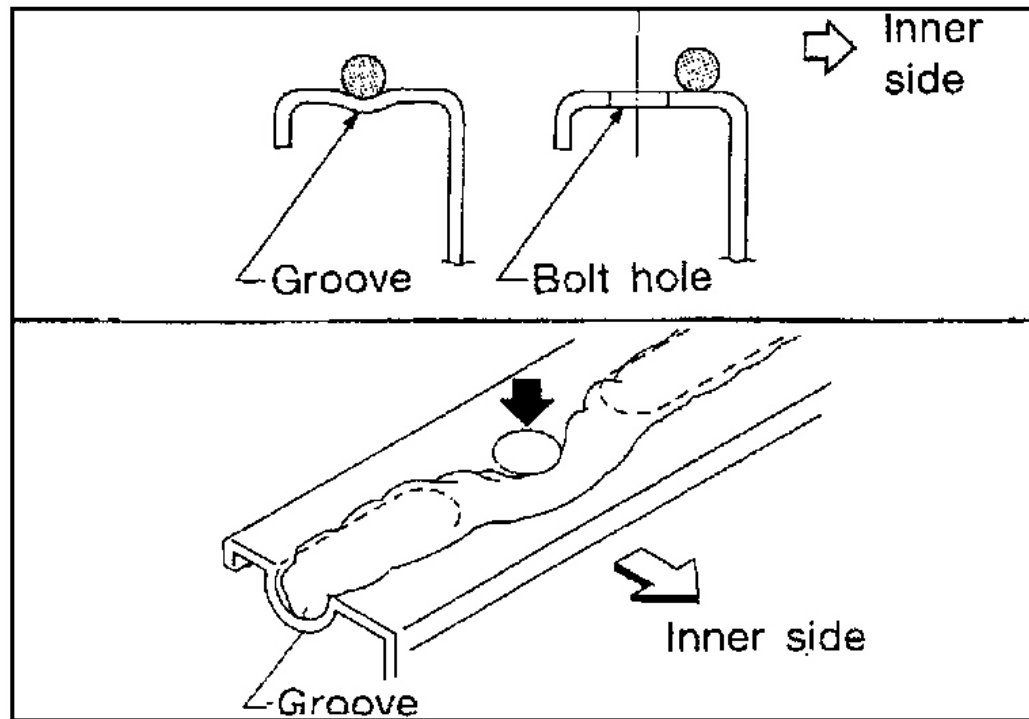
- b. Apply sealant to front cover gasket and rear oil seal retainer gasket.



G02044724

Fig. 37: Applying Sealant To Front Cover Gasket And Rear Oil Seal Retainer Gasket
Courtesy of NISSAN MOTOR CO., U.S.A.

- c. Apply a continuous bead of liquid gasket to mating surface of aluminum oil pan.
 - Use Genuine RTV silicone sealant or equivalent. Refer to **RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS**.

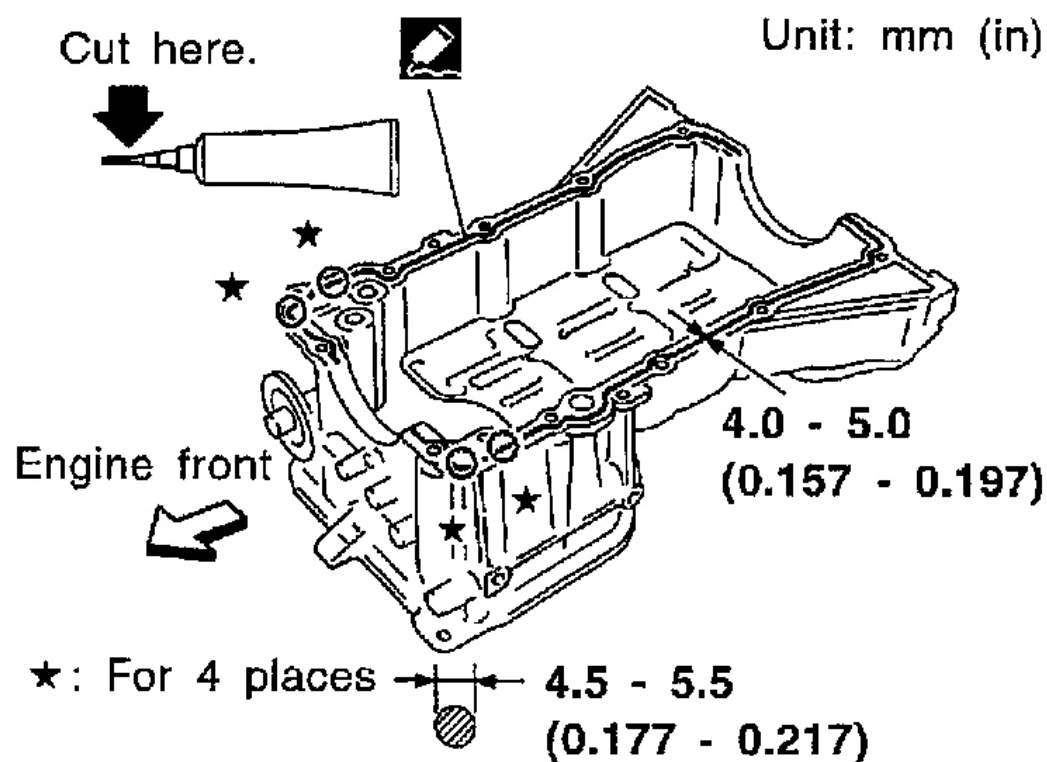


G02044725

Fig. 38: Applying A Continuous Bead Of Liquid Gasket To Mating Surface Of Aluminum Oil Pan

Courtesy of NISSAN MOTOR CO., U.S.A.

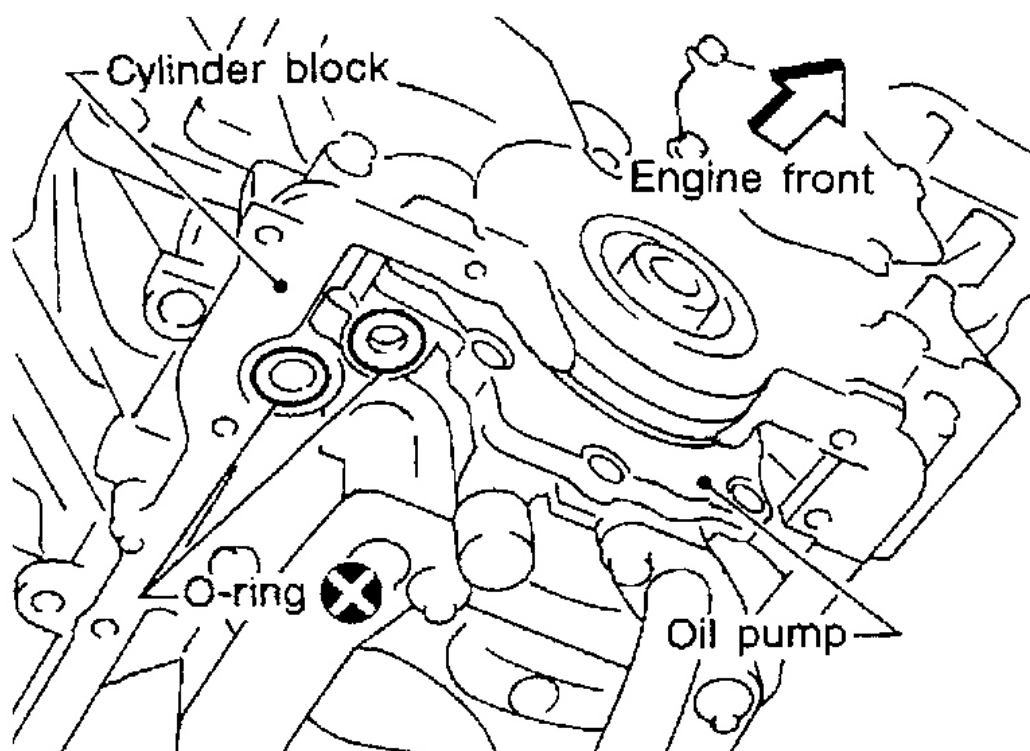
- d. Apply liquid gasket to inner sealing surface as shown in figure.
- Be sure liquid gasket is 4.0 to 5.0 mm (0.157 to 0.197 in) or 4.5 to 5.5 mm (0.177 to 0.217 in) wide as shown in the figure.
 - Attaching should be done within 5 minutes after coating.



G02044726

Fig. 39: Apply Liquid Gasket To Inner Sealing Surface
Courtesy of NISSAN MOTOR CO., U.S.A.

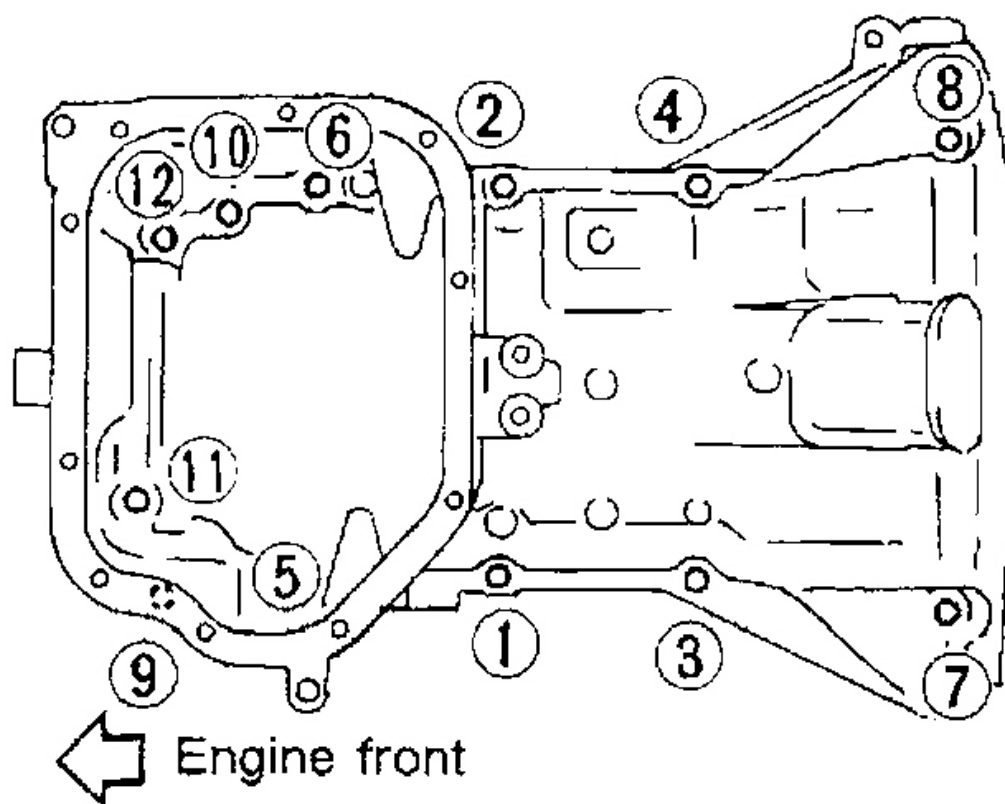
- e. Install O-rings, cylinder block and oil pump body.



G02044727

Fig. 40: Installing O-Rings, Cylinder Block And Oil Pump Body
Courtesy of NISSAN MOTOR CO., U.S.A.

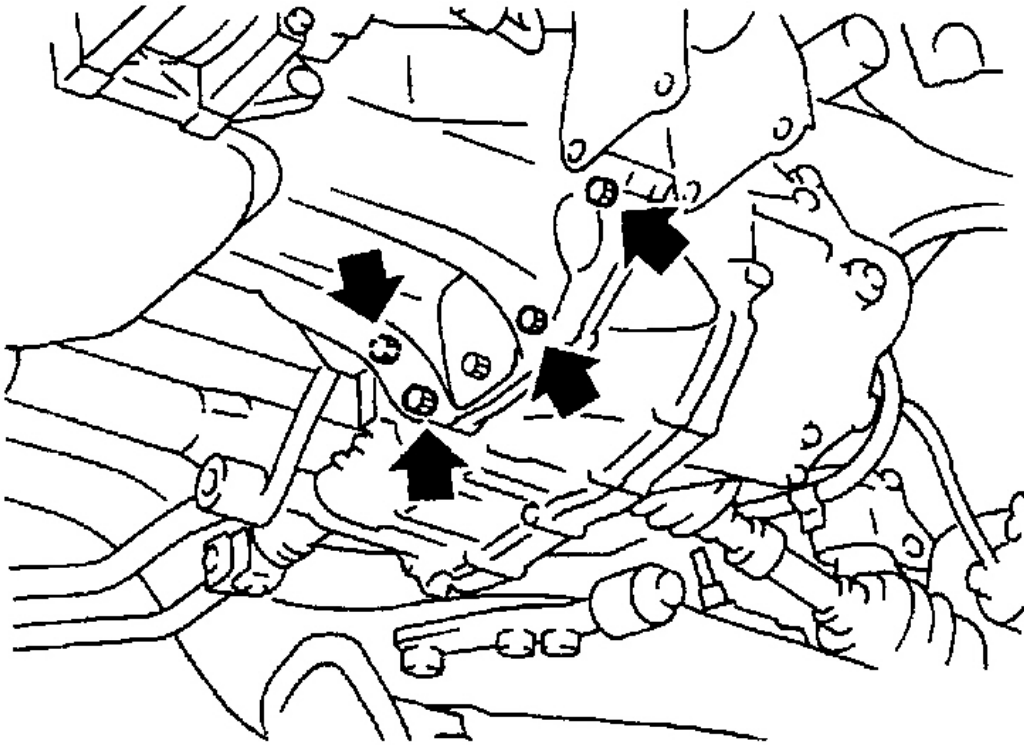
- f. Install aluminum oil pan.
- Tighten bolts in numerical order.
 - **Wait at least 30 minutes before refilling engine oil.**



G02044728

Fig. 41: Installing Aluminum Oil Pan
Courtesy of NISSAN MOTOR CO., U.S.A.

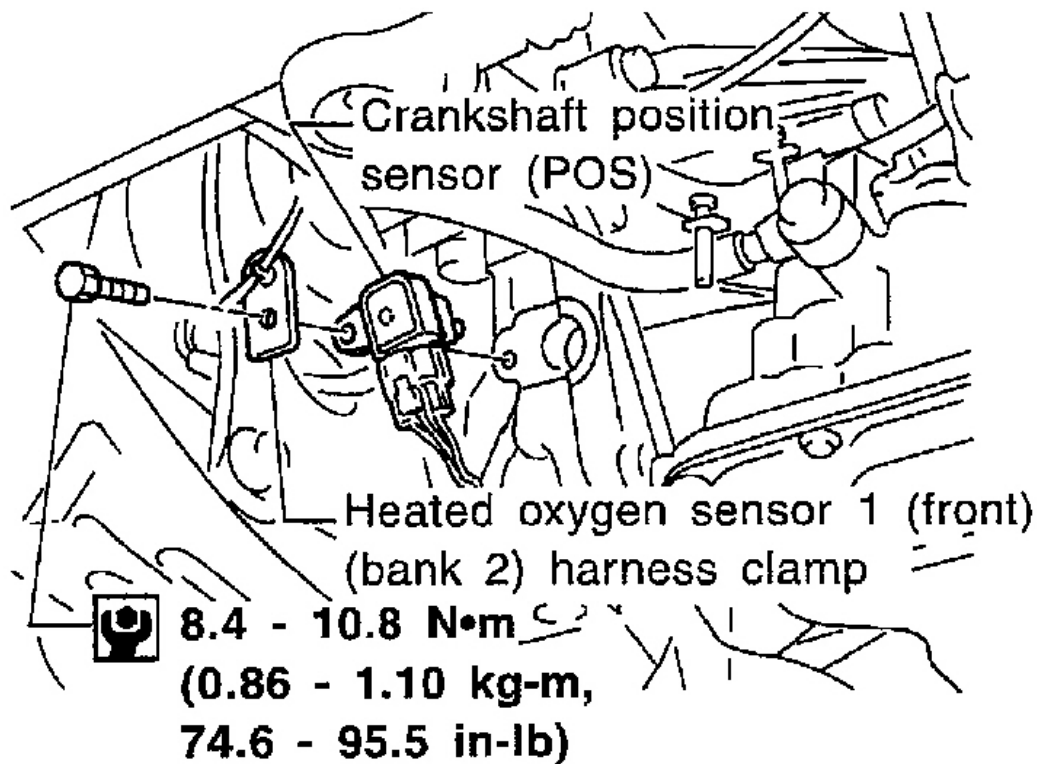
2. Install the four engine-to-transaxle bolts. For tightening torque, refer to **INSTALLATION**.
3. Install rear cover plate.



G02044729

Fig. 42: Installing Engine-To-Transaxle Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

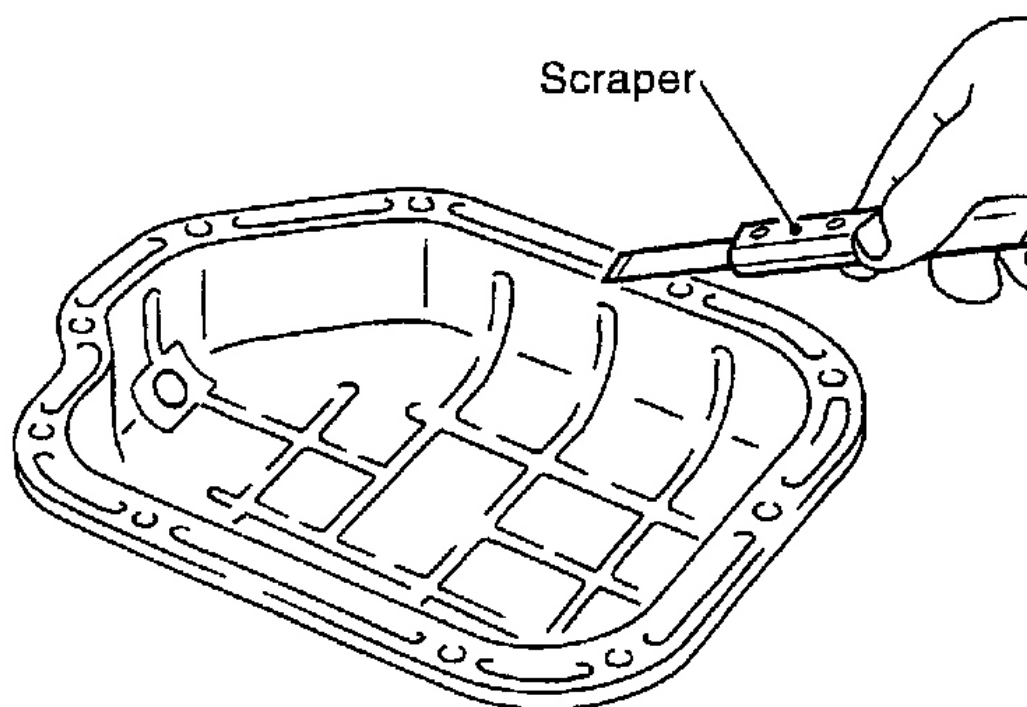
4. Install air conditioner compressor and bracket. Refer to **REMOVAL AND INSTALLATION** .
5. Install drive belts.
6. Install center member.
7. Install front and rear engine mounting insulator nuts and bolts.
8. Install crankshaft position sensor (POS) with rubber seal, and heated oxygen sensor 1 (front) (bank 2) harness clamp.
 - **Make sure that crankshaft position sensor (POS) and heated oxygen sensor 1 (front) (bank 2) harness clamp are installed correctly as shown in figure.**
9. Install front exhaust tube and its support.
10. Install oil strainer.



G02044730

Fig. 43: Installing Crankshaft Position Sensor
Courtesy of NISSAN MOTOR CO., U.S.A.

11. Install steel oil pan.
 - a. Use a scraper to remove old liquid gasket from mating surfaces.
 - **Also remove old liquid gasket from mating surface of aluminum oil pan.**

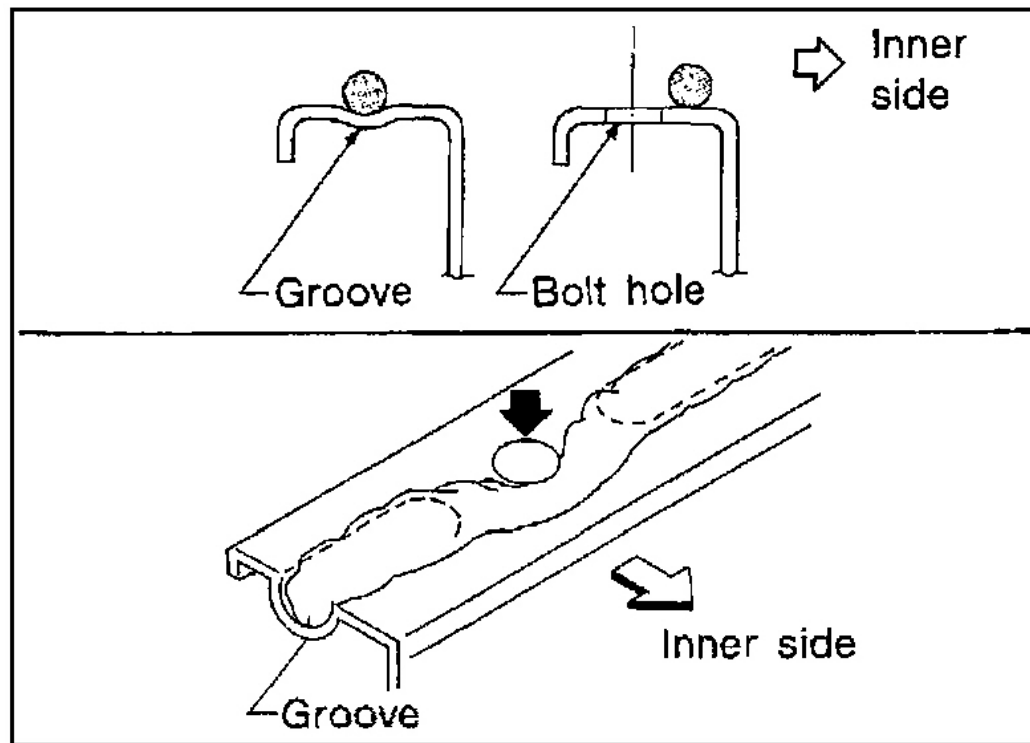


G02044731

Fig. 44: Removing Old Liquid Gasket From Mating Surfaces

Courtesy of NISSAN MOTOR CO., U.S.A.

- b. Apply a continuous bead of liquid gasket to mating surface of steel oil pan.
 - **Use Genuine RTV silicone sealant or equivalent. Refer to RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS .**

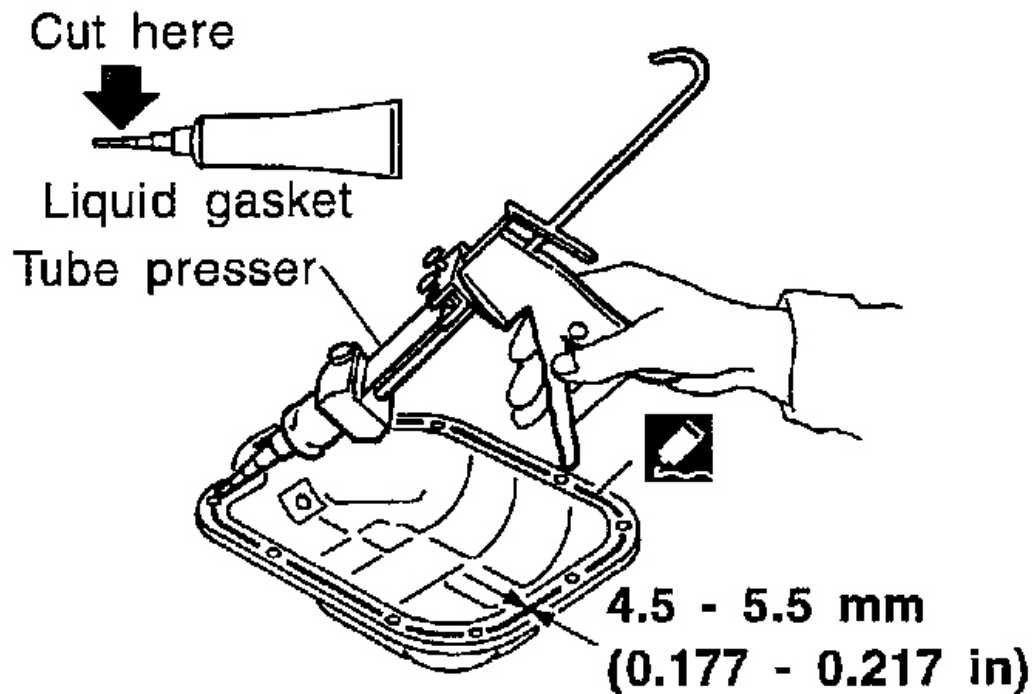


G02044732

Fig. 45: Applying A Continuous Bead Of Liquid Gasket To Mating Surface Of Steel Oil Pan (Around Bolt Holes)

Courtesy of NISSAN MOTOR CO., U.S.A.

- Be sure liquid gasket is 4.5 to 5.5 mm (0.177 to 0.217 in) wide.
- Attaching should be done within 5 minutes after coating.

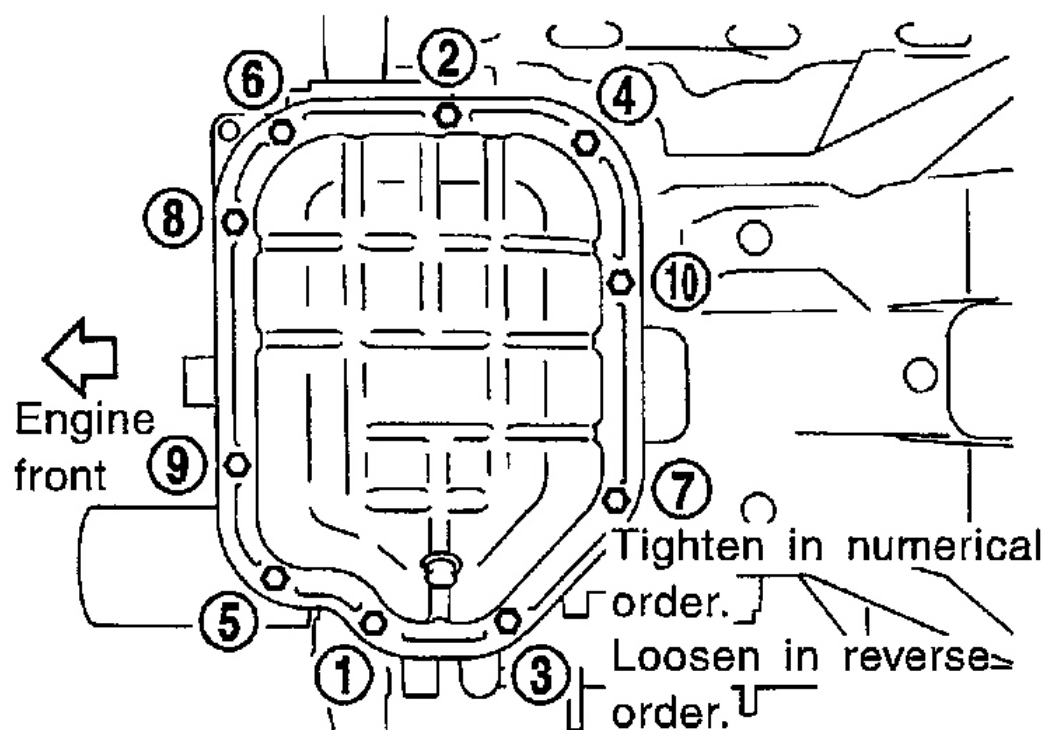


G02044733

Fig. 46: Applying A Continuous Bead Of Liquid Gasket To Mating Surface Of Steel Oil Pan

Courtesy of NISSAN MOTOR CO., U.S.A.

- c. Install steel oil pan.
- Tighten in numerical order shown in the figure.
 - Wait at least 30 minutes before refilling engine oil.



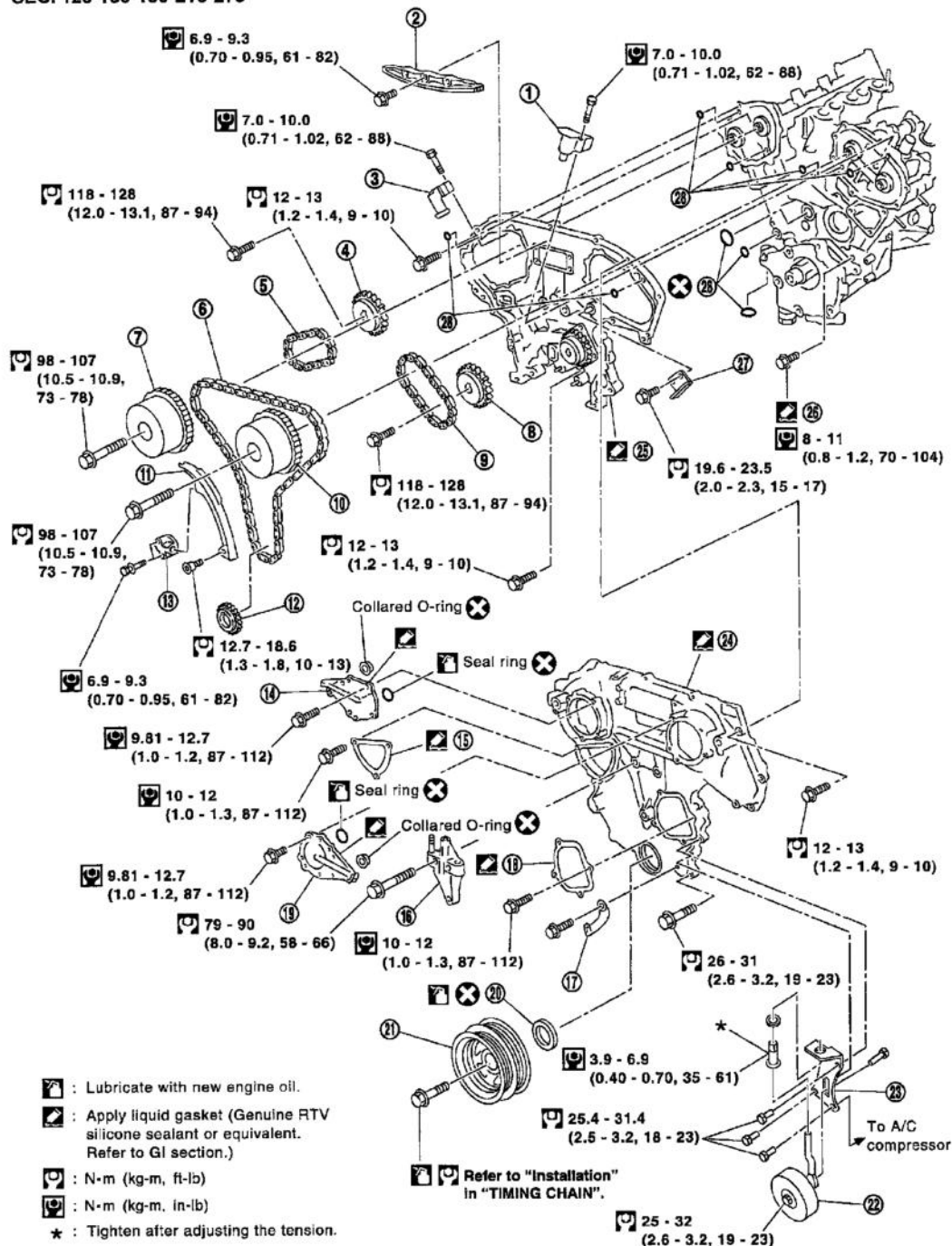
G02044734

Fig. 47: Installing Steel Oil Pan Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

TIMING CHAIN

COMPONENTS

SEC. 120•130•150•210•275



- | | | |
|-----------------------------|---|-----------------------------|
| 1. Timing chain tensioner | 11. Slack guide | 20. Front oil seal |
| 2. Internal chain guide | 12. Crankshaft sprocket | 21. Crankshaft pulley |
| 3. Timing chain tensioner | 13. Timing chain tensioner | 22. Idler pulley |
| 4. Camshaft sprocket (EXH) | 14. Intake valve timing control valve cover | 23. Idler pulley bracket |
| 5. Timing chain (Secondary) | 15. Chain tensioner cover | 24. Front timing chain case |
| 6. Timing chain (Primary) | 16. Mounting bracket | 25. Rear timing chain case |
| 7. Camshaft sprocket (INT) | 17. Water hose clamp | 26. Water drain plug |
| 8. Camshaft sprocket (EXH) | 18. Water pump cover | 27. Tension guide |
| 9. Timing chain (Secondary) | 19. Intake valve timing control valve cover | 28. O-ring |
| 10. Camshaft sprocket (INT) | | |

Courtesy of NISSAN MOTOR CO., U.S.A.

Refer to "**LIQUID GASKET APPLICATION PROCEDURE**" in "PRECAUTIONS", .

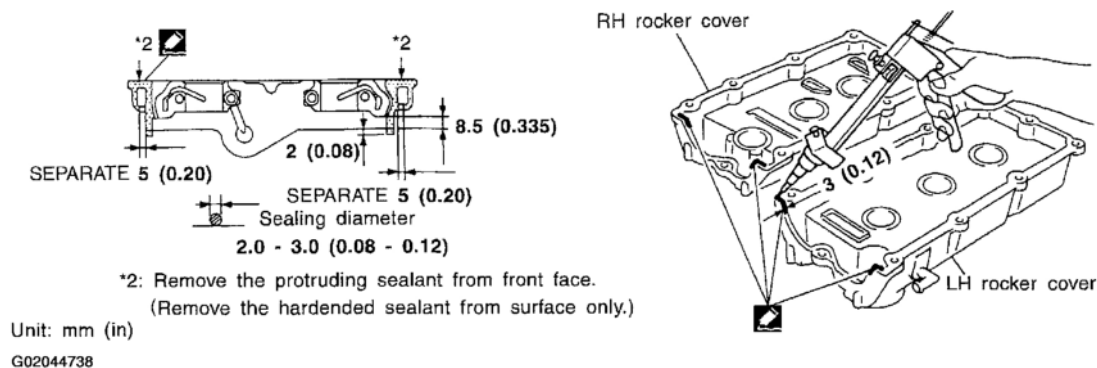
-
- 2.6 - 3.6
(0.102 - 0.142)
- A
- B
- A
- A
- B
- Bolt hole
- Protrusion
- G02044736

Courtesy of NISSAN MOTOR CO., U.S.A.



Fig. 50: Installing Liquid Gasket (Rear Timing Chain Case)

Courtesy of NISSAN MOTOR CO., U.S.A.

**Fig. 51: Installing Liquid Gasket (Camshaft Bracket & Rocker Cover)**

Courtesy of NISSAN MOTOR CO., U.S.A.

CAUTION:

- After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.
- When installing camshafts, chain tensioners, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.
- Apply new engine oil to bolt threads and seat surfaces when installing cylinder head, camshaft sprockets, crankshaft pulley, and camshaft brackets.
- Before disconnecting fuel hose, release fuel pressure.

Refer to **FUEL SYSTEM PRESSURE RELEASE** .

- When removing the oil pans, oil pump assembly and timing chain from engine, first remove the crankshaft position sensor (POS) from the assembly.

Be careful not to damage sensor edges.

- Do not spill engine coolant on drive belts.

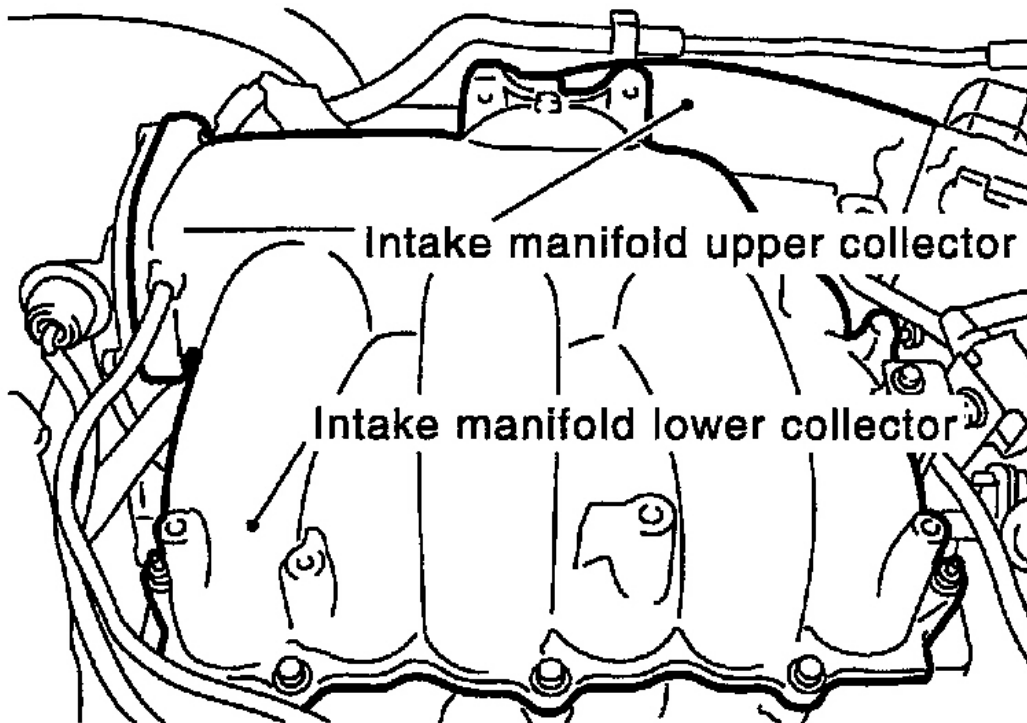
REMOVAL

1. Drain engine oil.
2. Release fuel pressure.

Refer to **FUEL SYSTEM PRESSURE RELEASE** .

3. Drain coolant by removing cylinder block drain plugs.

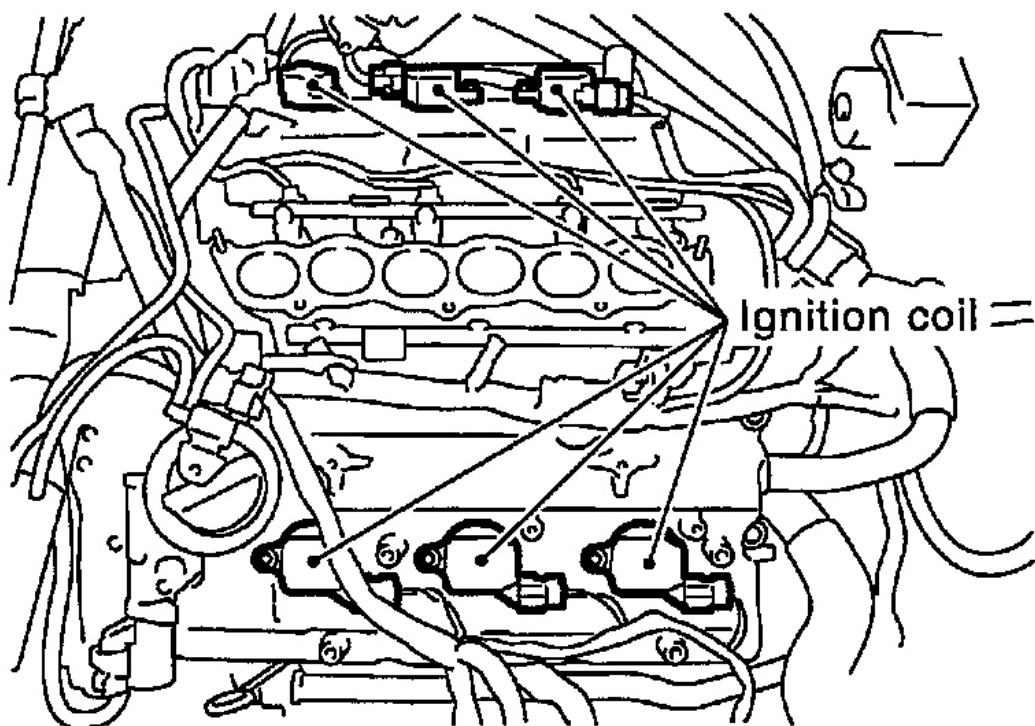
4. Remove ornament cover.
5. Remove air duct to intake manifold, collector, PCV hose, vacuum hoses, fuel hoses, wires, harness, connectors and so on.
6. Remove the following.
 - Water hoses
 - EVAP canister purge hose
 - PCV hose
 - PCV valve
 - Water outlet
7. Remove intake manifold upper and lower collectors loosening bolts and nuts in reverse order of tightening. Refer to "**TIGHTENING PROCEDURES**", .



G02044739

Fig. 52: Removing Rocker Cover
Courtesy of NISSAN MOTOR CO., U.S.A.

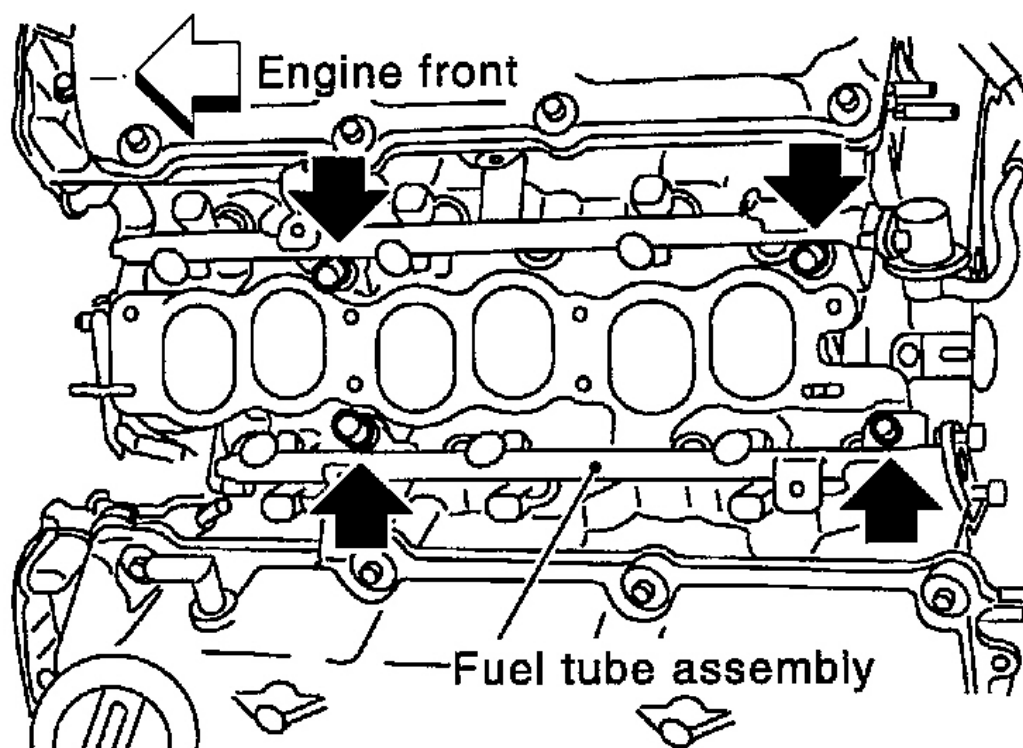
8. Remove RH and LH ignition coils.



G02044740

Fig. 53: Removing Cylinder Head Outside Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

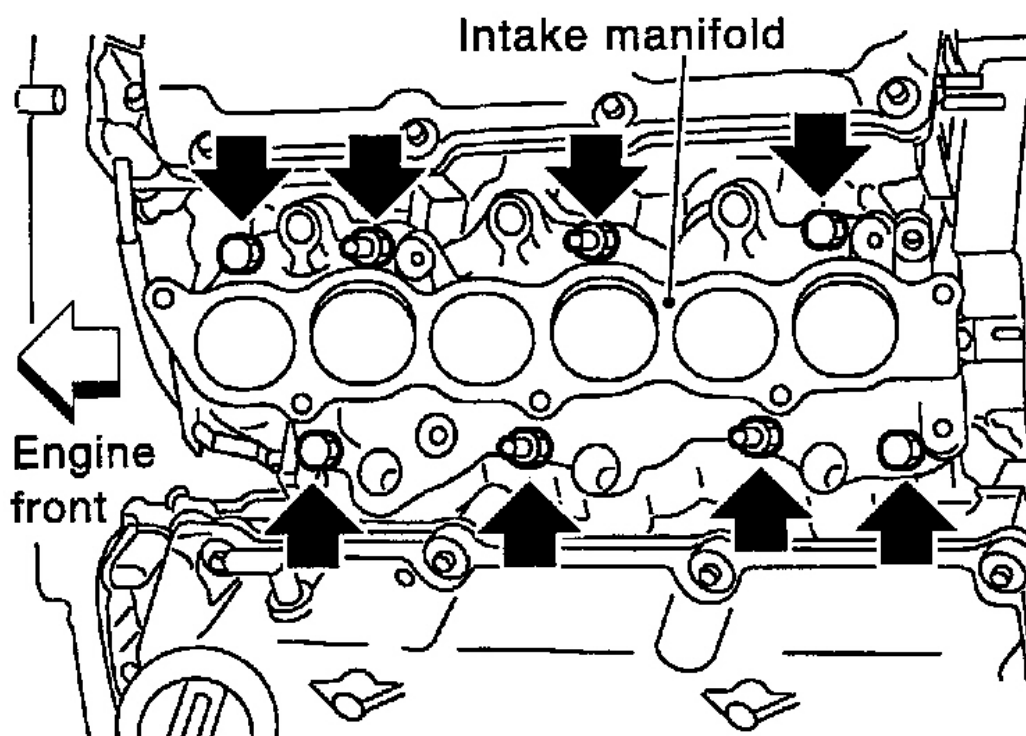
9. Remove fuel tube assembly. Refer to **FUEL RAILS & INJECTORS** .



G02044741

Fig. 54: Identifying Fuel Tube Assembly
Courtesy of NISSAN MOTOR CO., U.S.A.

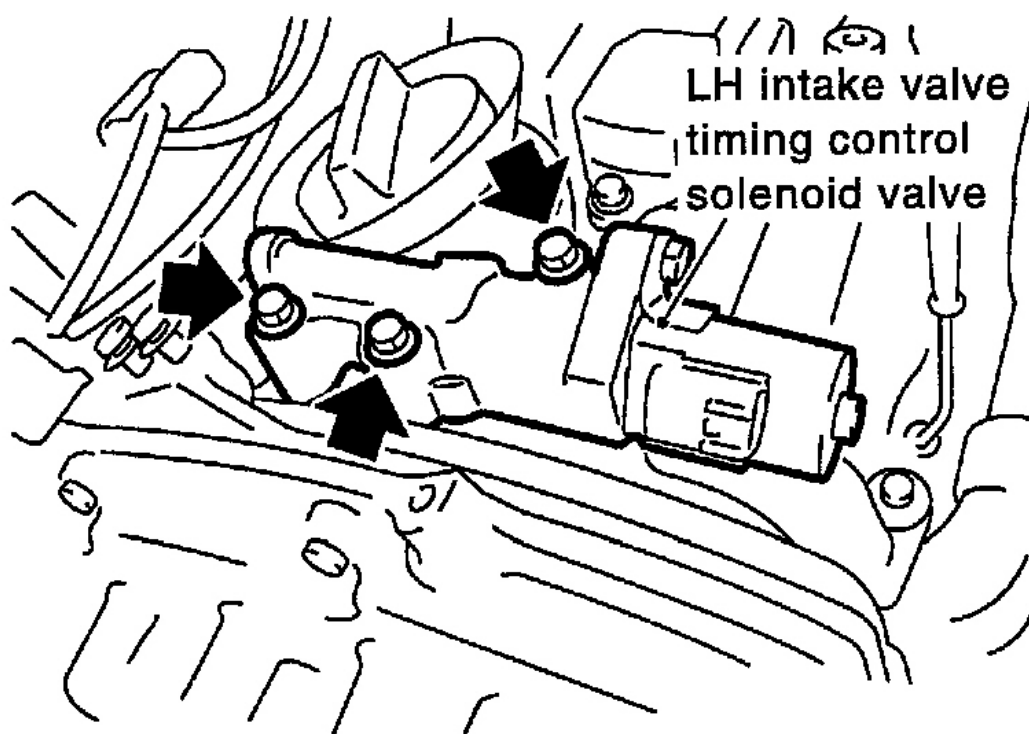
10. Remove intake manifold loosening bolts and nuts in reverse order of tightening. Refer to "**TIGHTENING PROCEDURES**", .



G02044742

Fig. 55: Rotating Intake Manifold Loosening Bolts And Nuts In Reverse Order Of Tightening
Courtesy of NISSAN MOTOR CO., U.S.A.

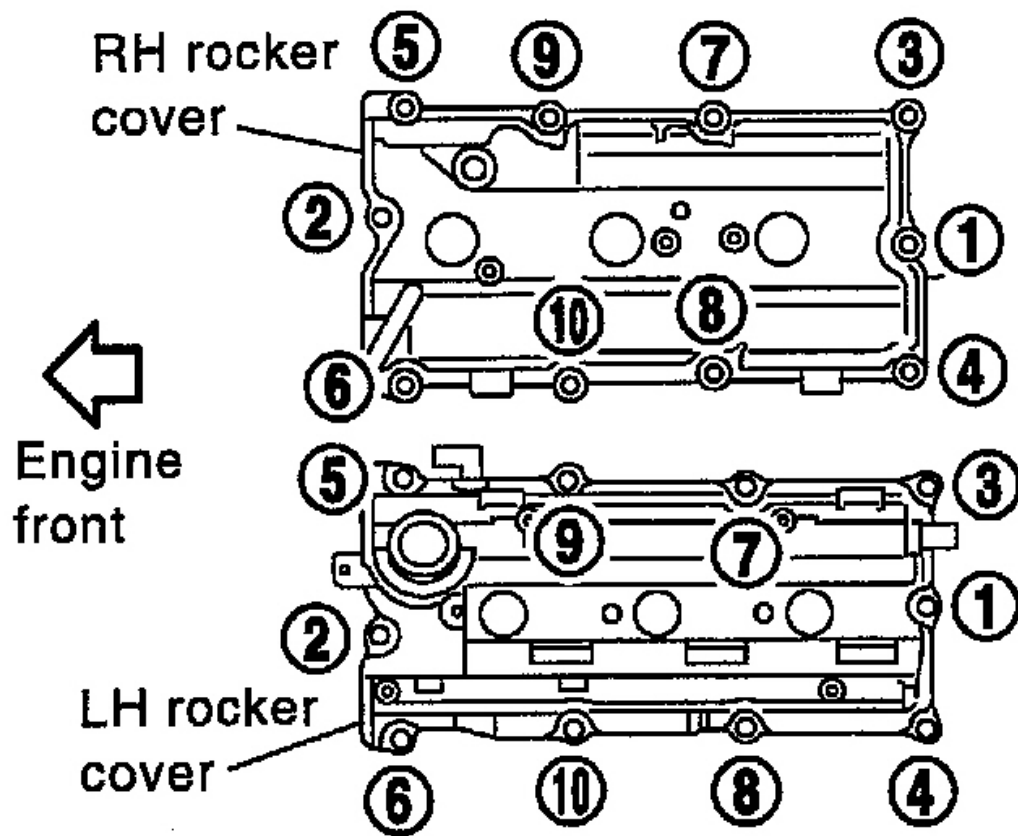
11. Remove RH and LH intake valve timing control solenoid valves.



G02044743

Fig. 56: Removing Intake Valve Timing Control Solenoid Valve
Courtesy of NISSAN MOTOR CO., U.S.A.

12. Remove RH and LH rocker covers from cylinder head.
 - Loosen bolts in numerical order shown in the figure.



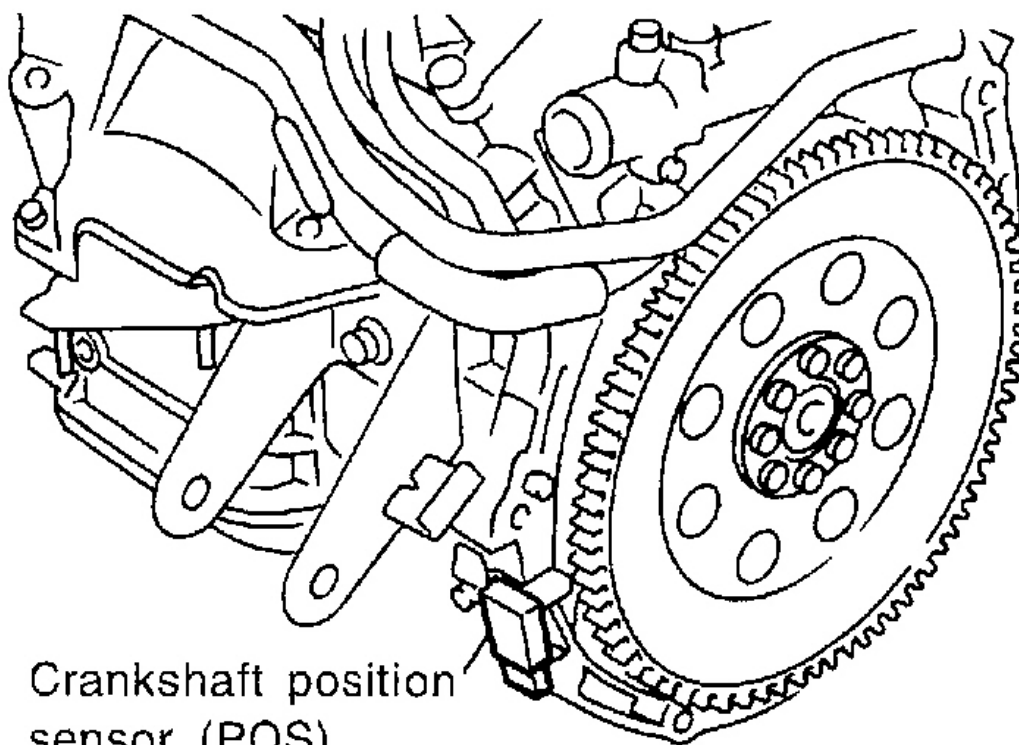
G02044744

Fig. 57: Removing RH And LH Rocker Covers
 Courtesy of NISSAN MOTOR CO., U.S.A.

13. Remove engine undercover.
14. Remove front RH wheel and engine side cover.
15. Remove drive belts and idler pulley bracket.
16. Remove power steering oil pump belt and power steering oil pump assembly.

Refer to **POWER STEERING OIL PUMP** .

17. Remove crankshaft position sensor (POS).

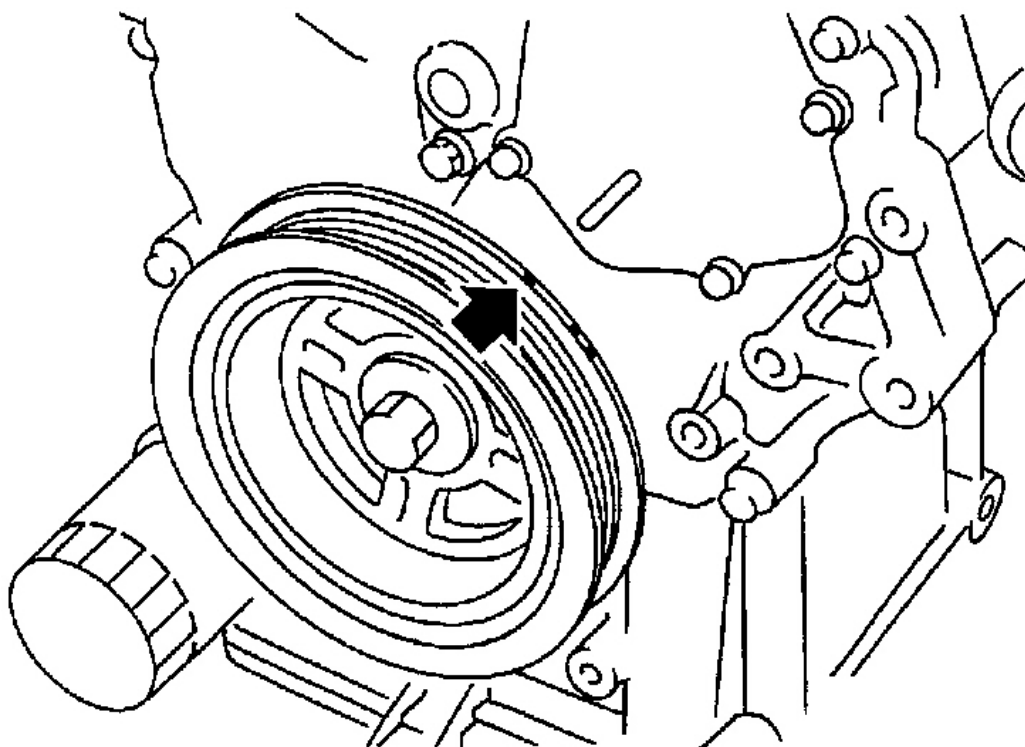


Crankshaft position
sensor (POS)

G02044745

Fig. 58: Identifying Crankshaft Position Sensor
Courtesy of NISSAN MOTOR CO., U.S.A.

18. Set No. 1 piston at TDC on the compression stroke by rotating crankshaft.

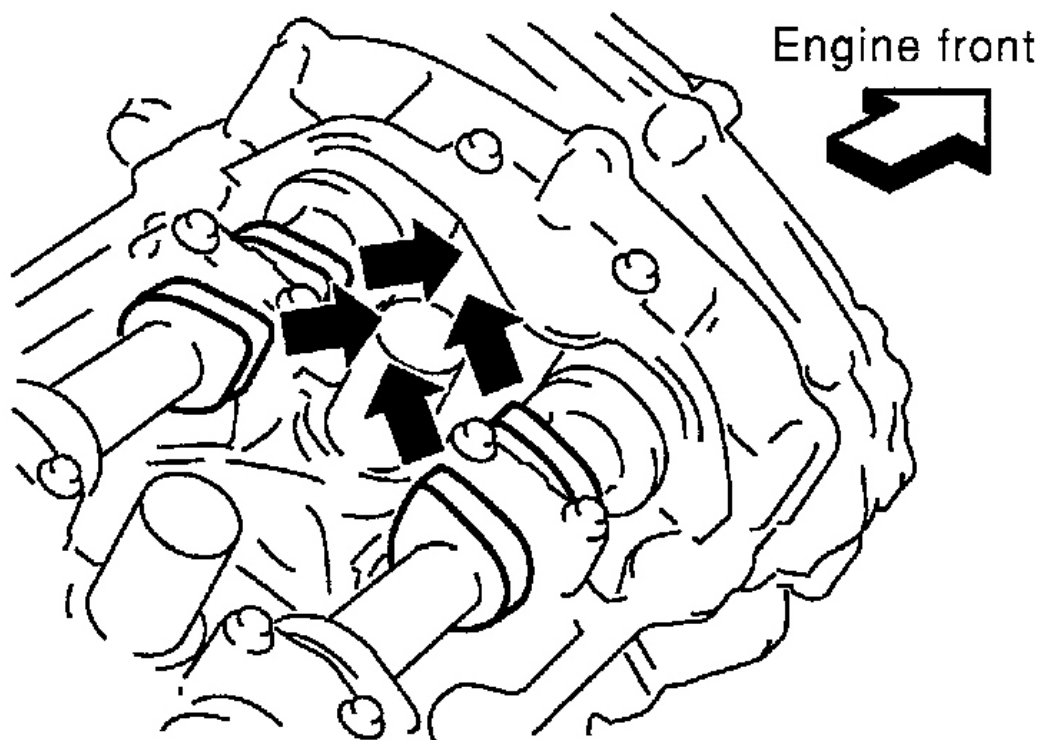


G02044746

Fig. 59: Setting No. 1 Piston At TDC On The Compression Stroke
Courtesy of NISSAN MOTOR CO., U.S.A.

- Check that intake and exhaust cam nose on No. 1 cylinder are installed as shown.

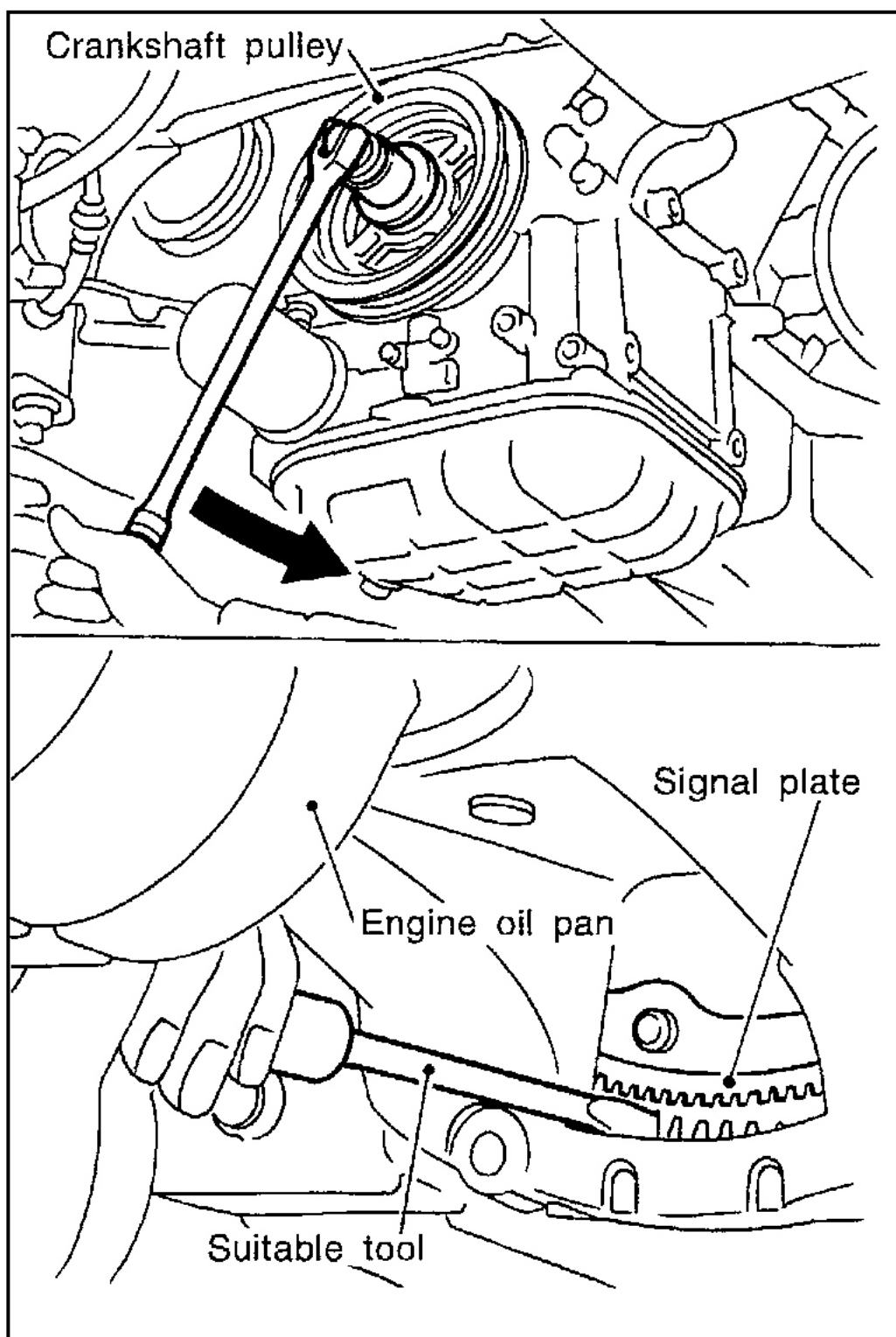
If not, turn the crankshaft one revolution (360°) and align as above.



G02044747

Fig. 60: Identifying Intake And Exhaust Cam Nose
Courtesy of NISSAN MOTOR CO., U.S.A.

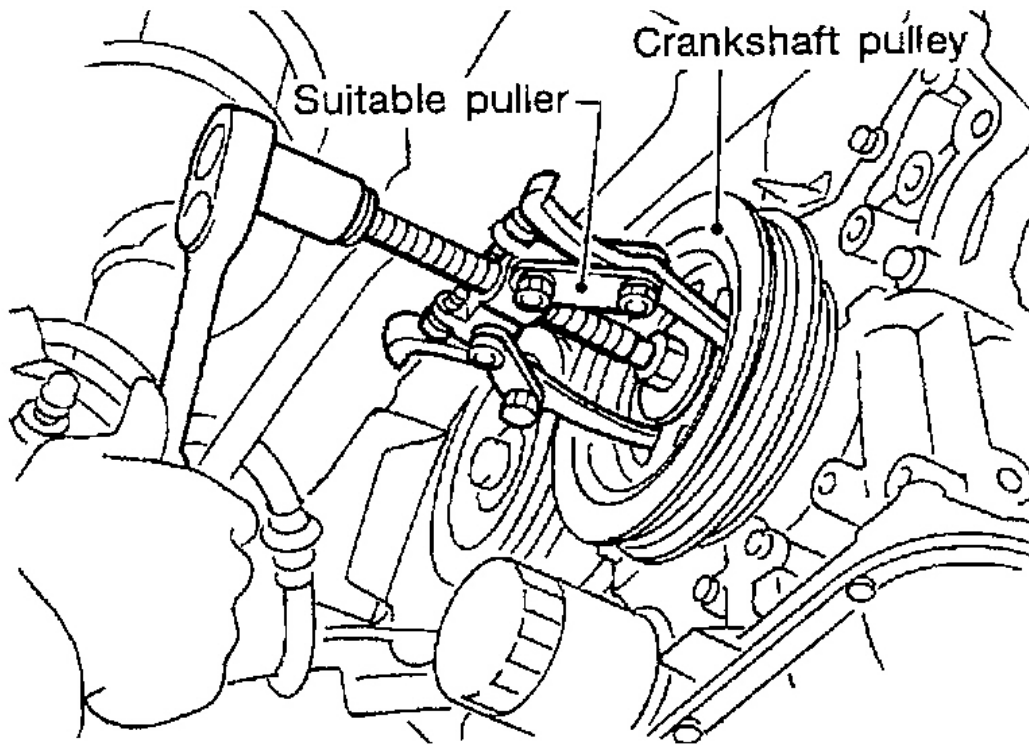
19. Loosen crankshaft pulley bolt. (At this time remove oil pan rear cover plate and set a suitable tool to ring gear so that crankshaft cannot rotate.)
 - Be careful not to damage the signal plate teeth.



G02044748

Fig. 61: Loosening Crankshaft Pulley Bolt
Courtesy of NISSAN MOTOR CO., U.S.A.

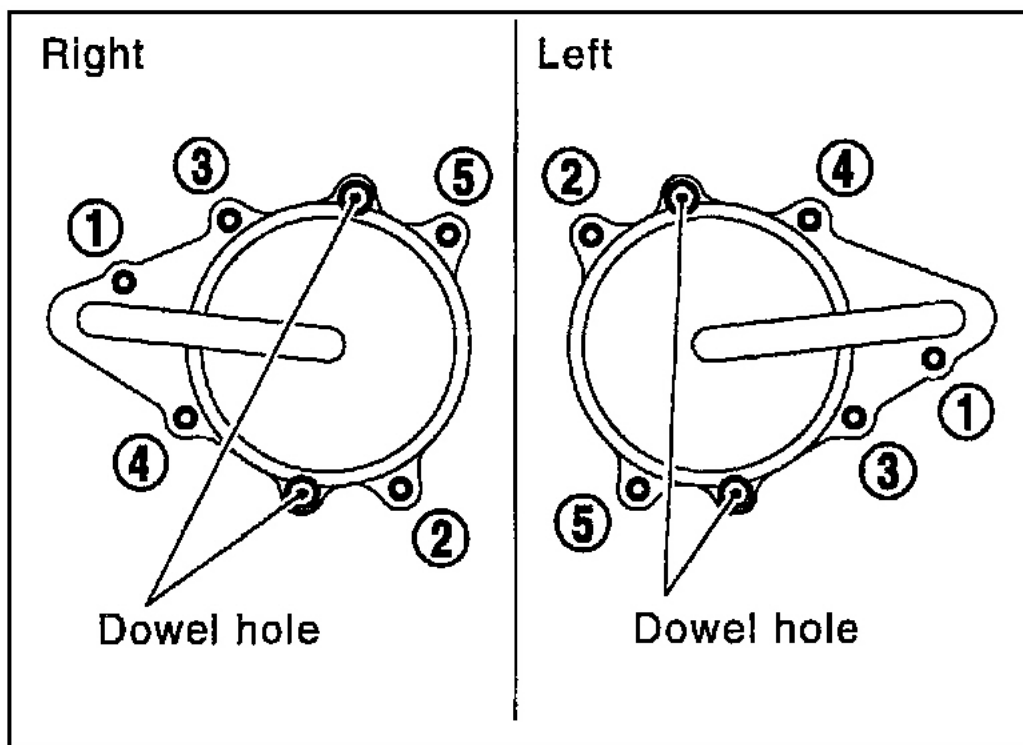
20. Remove crankshaft pulley with a suitable puller.



G02044749

Fig. 62: Removing Crankshaft Pulley With A Suitable Puller
Courtesy of NISSAN MOTOR CO., U.S.A.

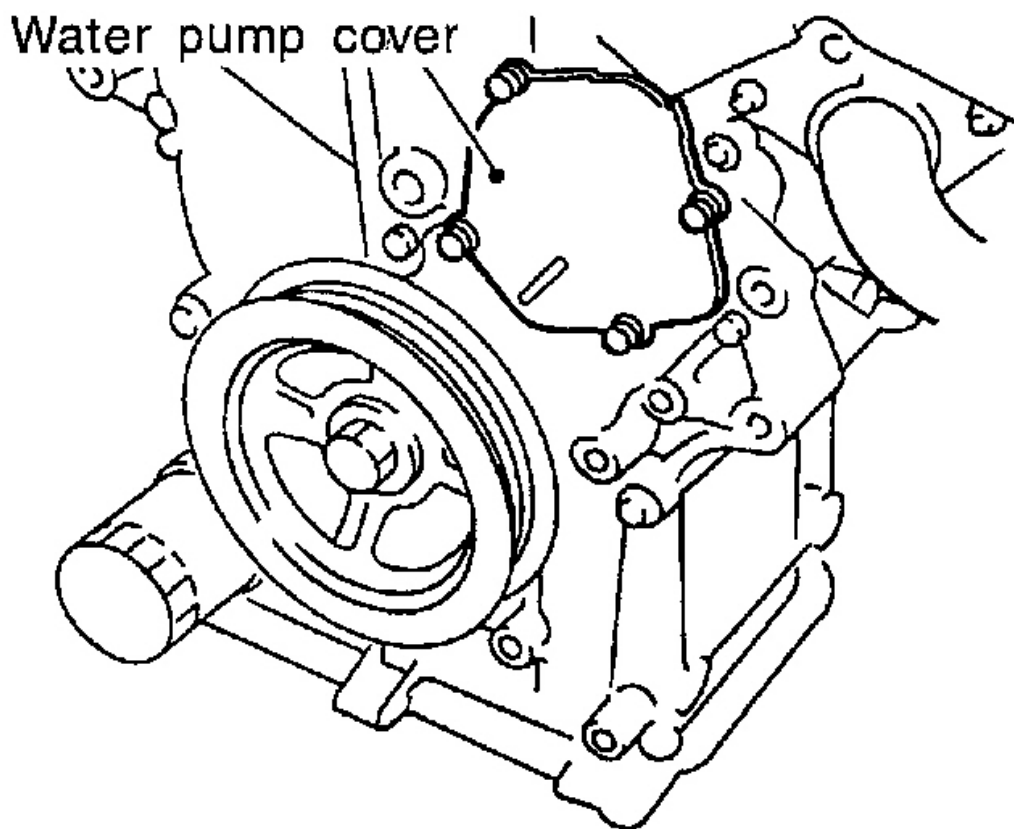
21. Remove intake valve timing control valve covers.
- Loosen bolts in reverse order shown in the figure.
 - In the cover, the shaft is engaged with the center hole of the intake camshaft sprocket. Remove it straight out until the engagement comes off.



G02044750

Fig. 63: Removing Intake Valve Timing Control Valve Controls
 Courtesy of NISSAN MOTOR CO., U.S.A.

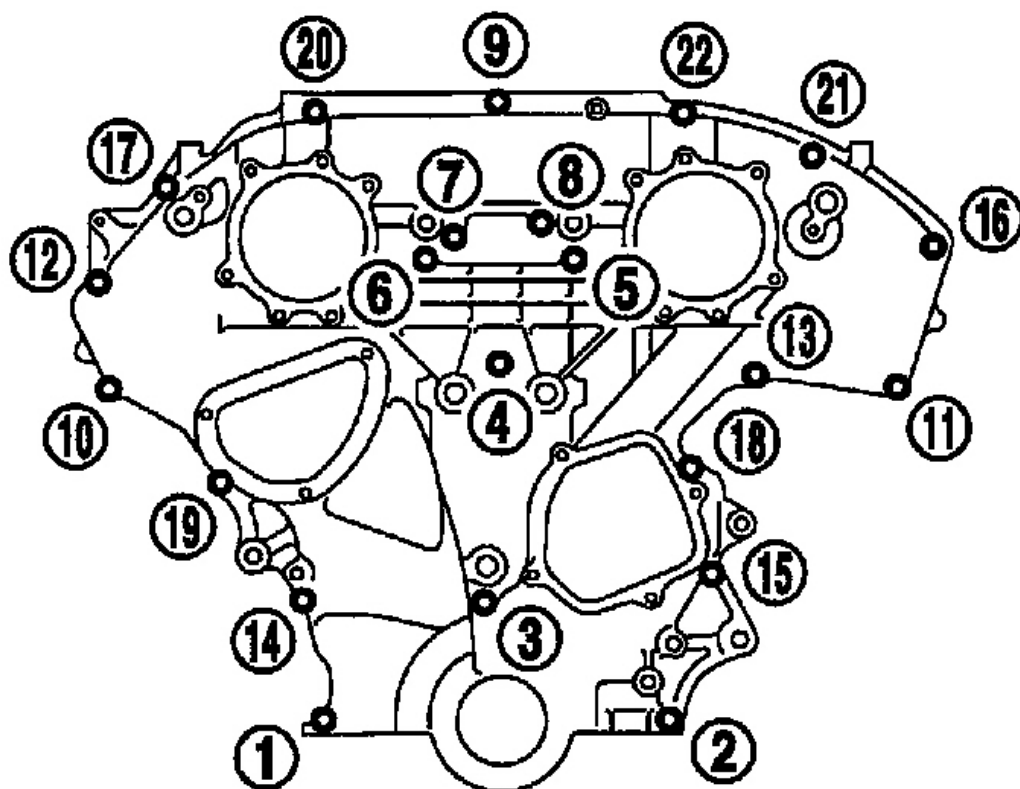
22. Remove air conditioner compressor and bracket. Refer to **REMOVAL AND INSTALLATION** .
23. Remove front exhaust tube and its support.
24. Hang engine at right and left side engine slingers with a suitable hoist. Refer to **ENGINE ASSEMBLY**, "Removal and Installation".
25. Remove right side engine mounting, mounting bracket and nuts. Refer to , "**REMOVAL AND INSTALLATION**".
26. Remove center member assembly.
27. Remove upper and lower oil pans. Refer to , "**REMOVAL**".
28. Remove water pump cover.



G02044751

Fig. 64: Removing Water Pump Cover
Courtesy of NISSAN MOTOR CO., U.S.A.

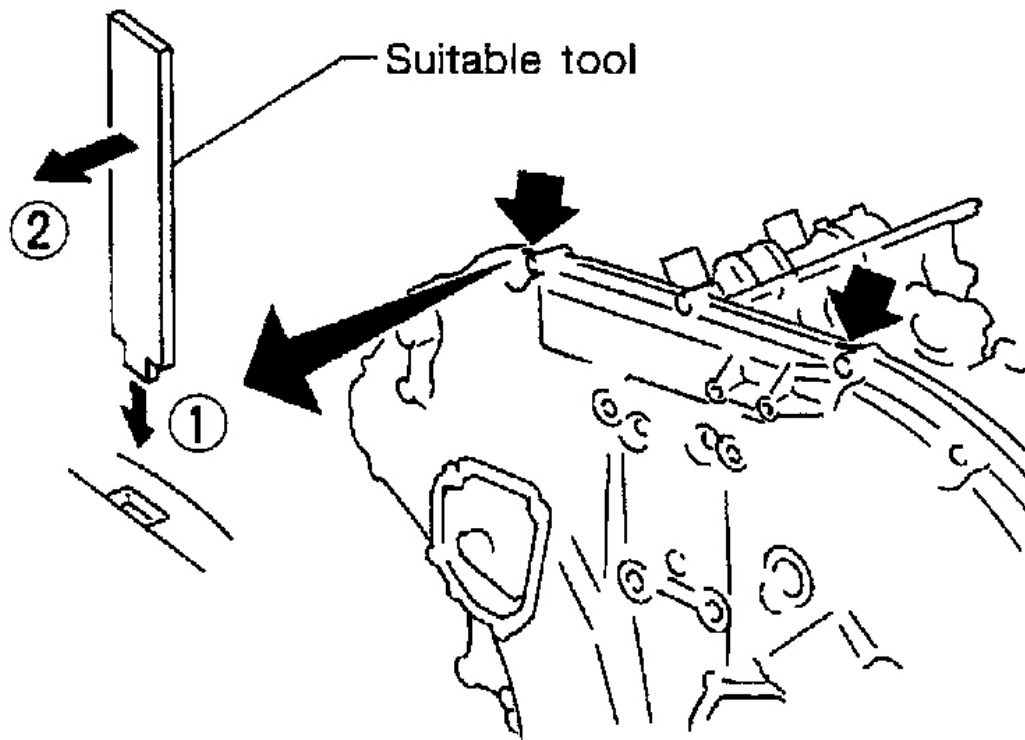
29. Remove front timing chain case bolts.
 - Loosen bolts in reverse order shown in the figure.



G02044752

Fig. 65: Removing Front Timing Chain Case Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

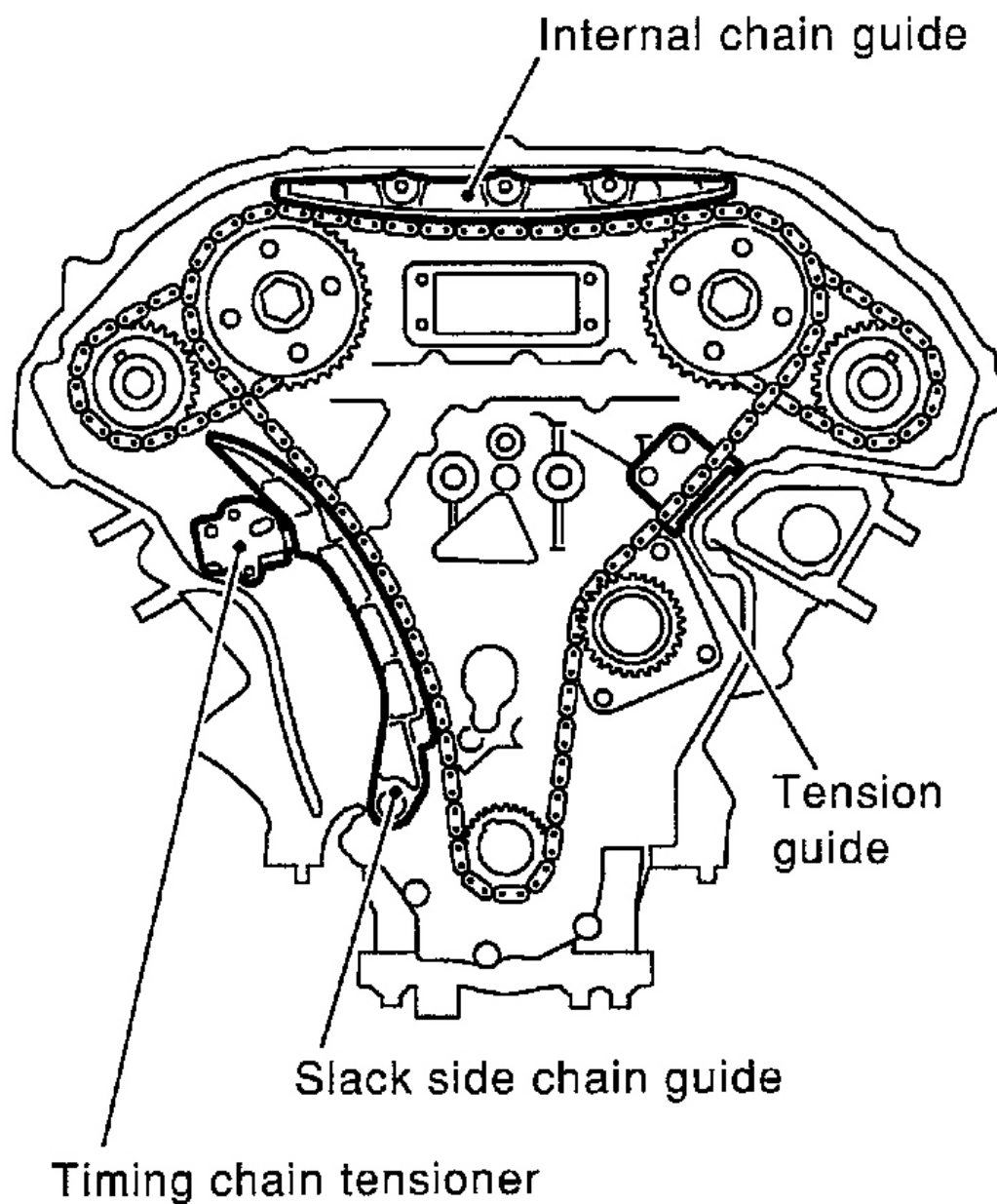
30. Remove front timing chain case.
 - **Do not scratch sealing surfaces.**



G02044753

Fig. 66: Removing Front Timing Chain Case
Courtesy of NISSAN MOTOR CO., U.S.A.

31. Remove timing chain tensioner cover from front timing chain case.
32. Remove front oil seal from front timing chain case. Refer to , "**FRONT OIL SEAL**".
33. Remove internal chain guide.
34. Remove timing chain tensioner and slack side chain guide.



G02044754

Fig. 67: Removing Timing Chain Tensioner And Slack Side Chain Guide
Courtesy of NISSAN MOTOR CO., U.S.A.

- Remove chain tensioner as follows.
 - a. Pull lever down, and release plunger stopper tab.

- Plunger stopper tab can be pushed up to release (coaxial structure with lever).
- b. Insert stopper pin into tensioner body hole to fix lever, and keep the tab released.
 - In figure, Allen wrench [2.5 mm (0.098 in)] is used for stopper pin as an example.
 - c. Insert plunger into tensioner body by pressing slack guide.
 - d. Keep slack guide pressed, and fix it by pushing stopper pin through lever hole and body hole.

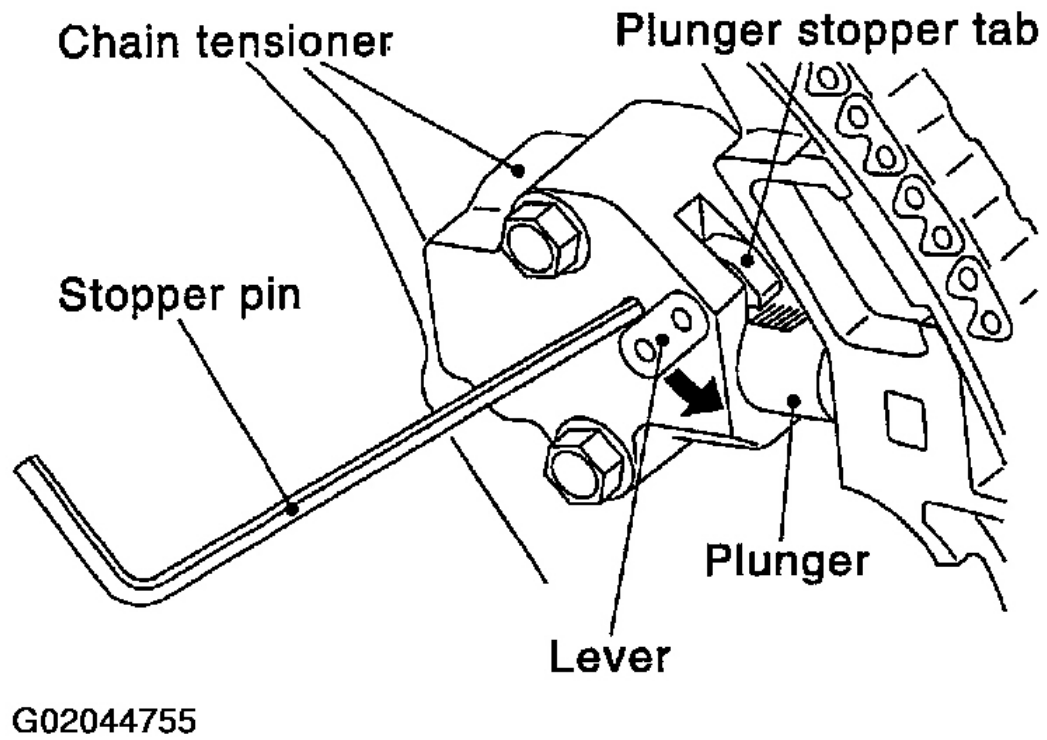
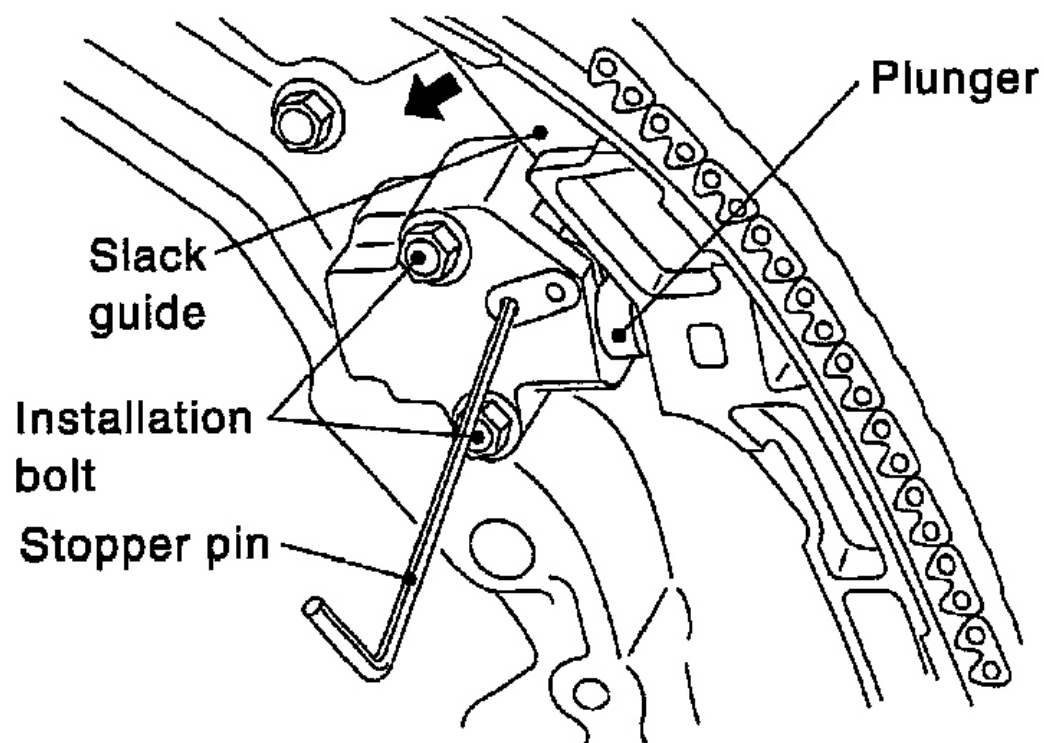


Fig. 68: Inserting Plunger Into Tensioner Body By Pressing Slack Guide
Courtesy of NISSAN MOTOR CO., U.S.A.

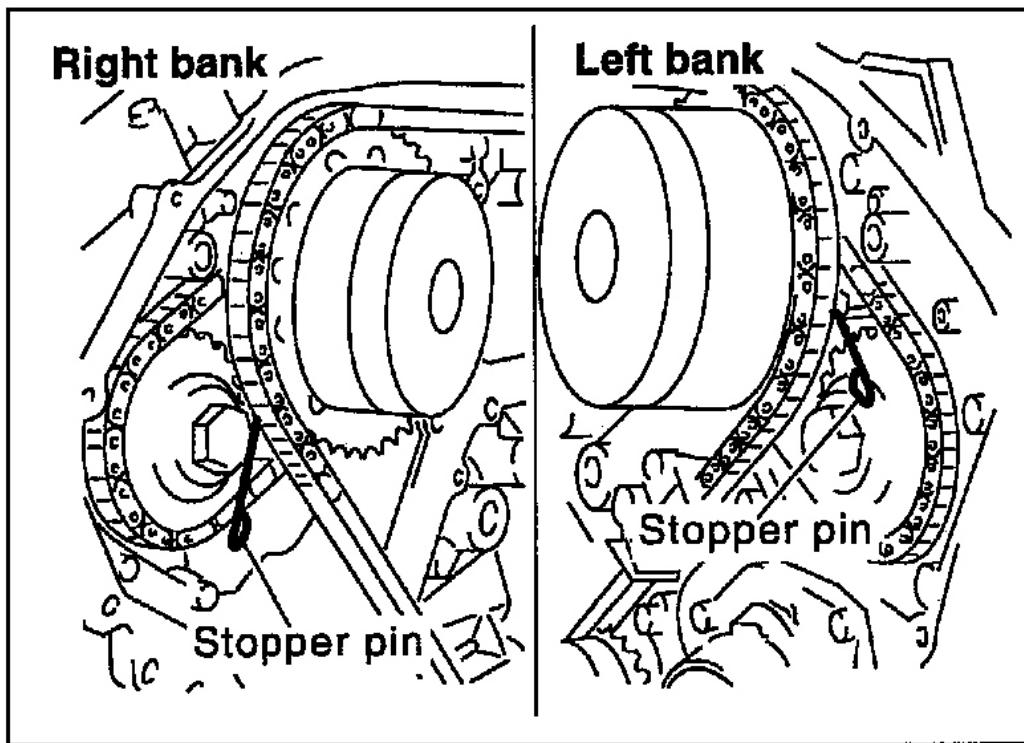
- e. Remove mounting bolts, and remove chain tensioner.



G02044756

Fig. 69: Removing Mounting Bolts And Remove Chain Tensioner
Courtesy of NISSAN MOTOR CO., U.S.A.

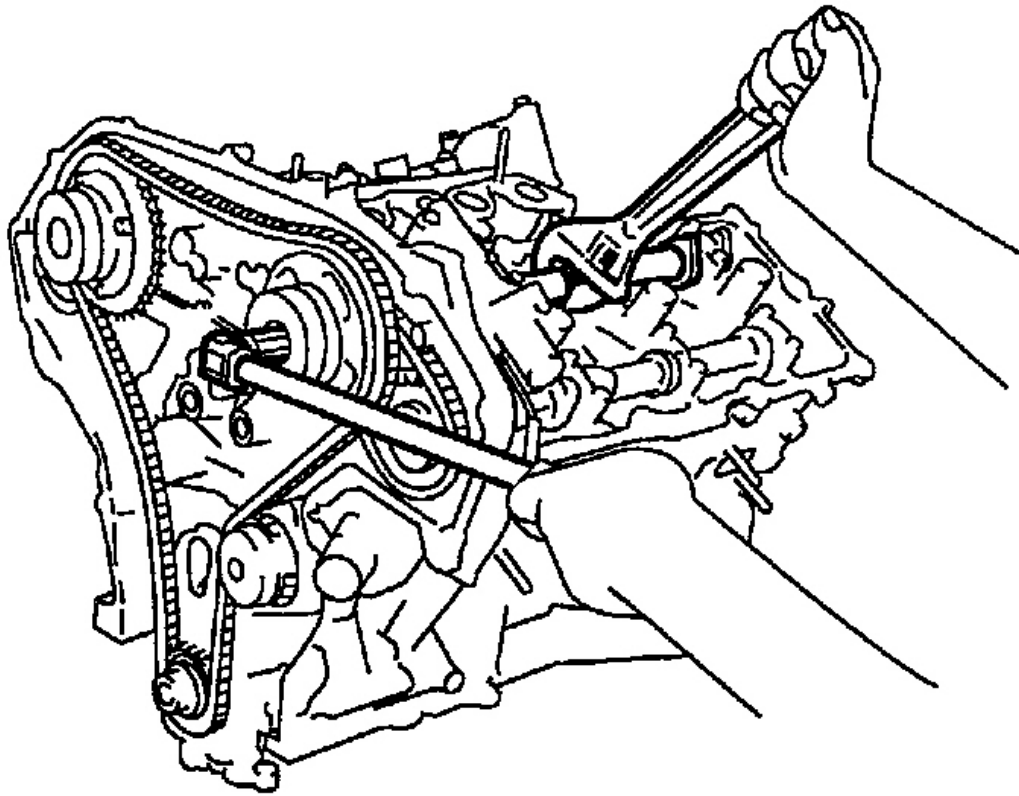
35. Attach a suitable stopper pin to RH and LH camshaft chain tensioners. (For secondary timing chains)



G02044757

Fig. 70: Attaching A Suitable Stopper Pin To RH And LH Camshaft Chain Tensioners
Courtesy of NISSAN MOTOR CO., U.S.A.

36. Remove intake and exhaust camshaft sprocket bolts.
- Apply paint to timing chain and camshaft sprockets for alignment during installation.
 - Secure the hexagonal portion of the camshaft using a spanner to loosen mounting bolts.



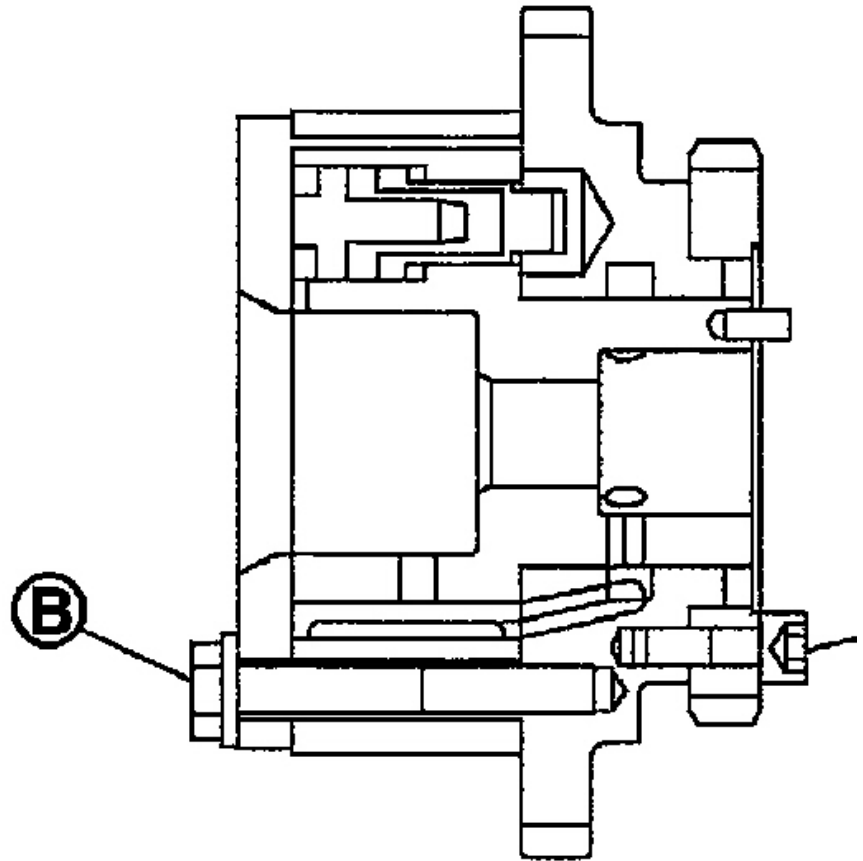
G02044758

Fig. 71: Removing Intake And Exhaust Camshaft Sprocket Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

37. Remove primary and secondary timing chains with camshaft sprockets.
- Intake camshaft sprocket is two-for-one structure of primary and secondary sprockets.
 - Handle intake camshaft sprocket, taking care of the following.

CAUTION:

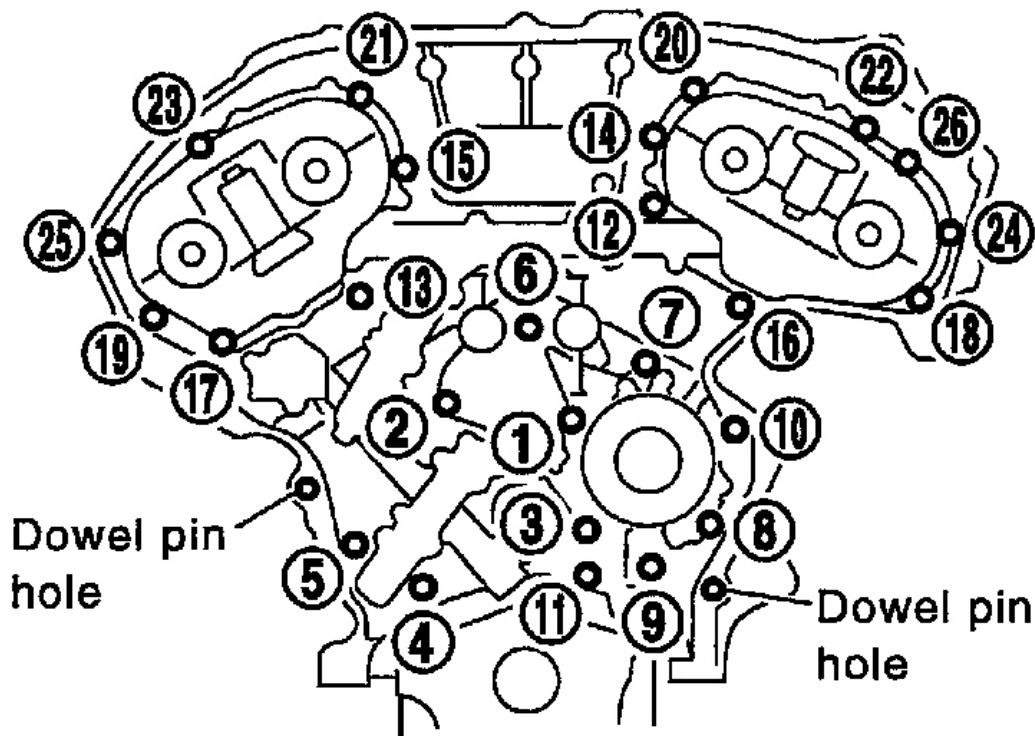
- **Avoid impact.**
- **Do not disassemble (Never loosen bolts A and B).**



G02044759

**Fig. 72: Removing Primary And Secondary Timing Chains W
Sprockets**
Courtesy of NISSAN MOTOR CO., U.S.A.

38. Remove chain tension guide and crankshaft sprocket.
39. Remove rear timing chain case as follows.
 - a. Loosen mounting bolts in reverse order shown in figure, and remove them.
 - b. Disconnect liquid gasket applied portion using seal cutter (special service tool: KV101 11100) or an equivalent tool. Then remove rear timing chain case.

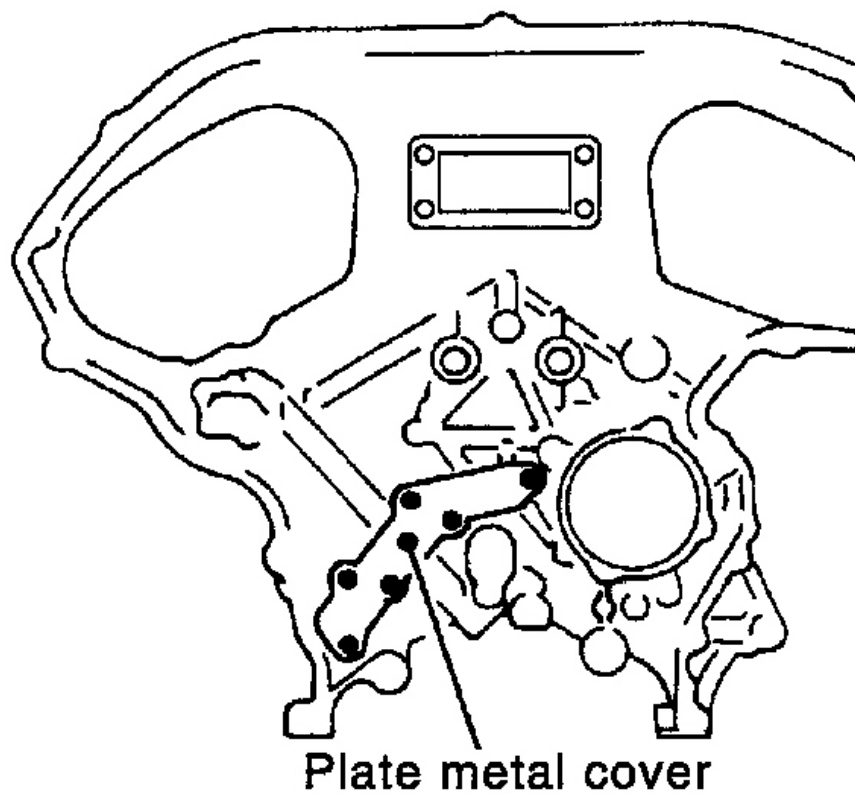


G02044760

Fig. 73: Removing Rear Timing Chain Case
Courtesy of NISSAN MOTOR CO., U.S.A.

CAUTION:

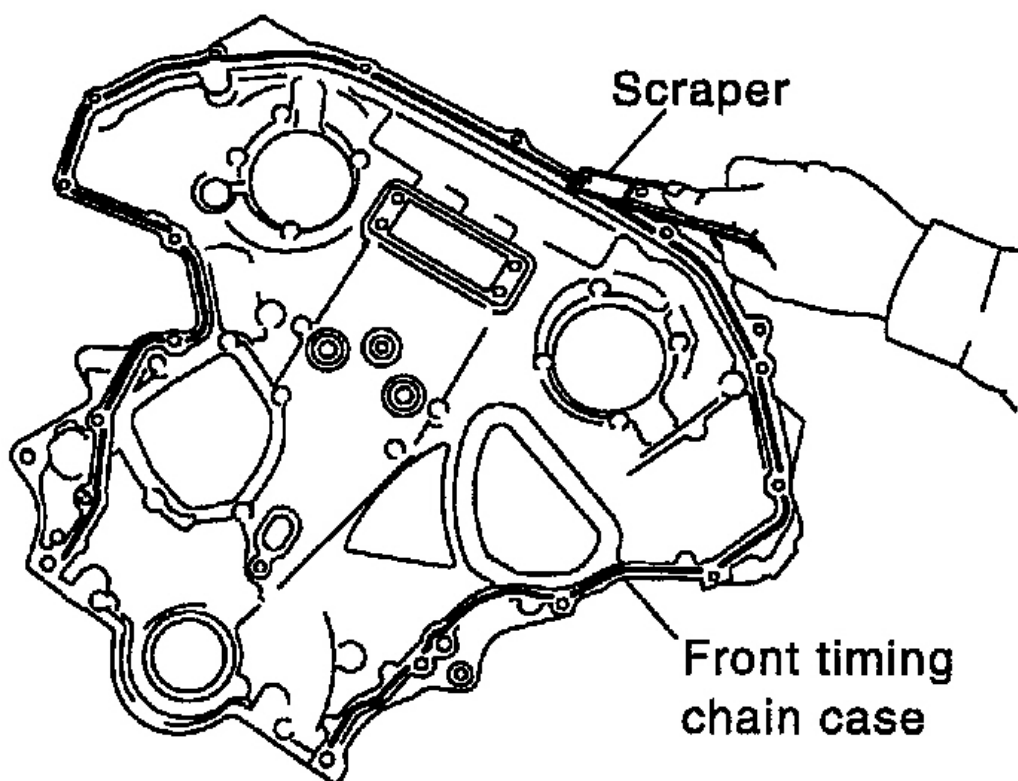
- Do not remove plate metal cover of oil passage.
- After removing chain case, do not apply any load which affects the timing chain.



G02044761

Fig. 74: Removing Plate Metal Cover Of Oil Passage
Courtesy of NISSAN MOTOR CO., U.S.A.

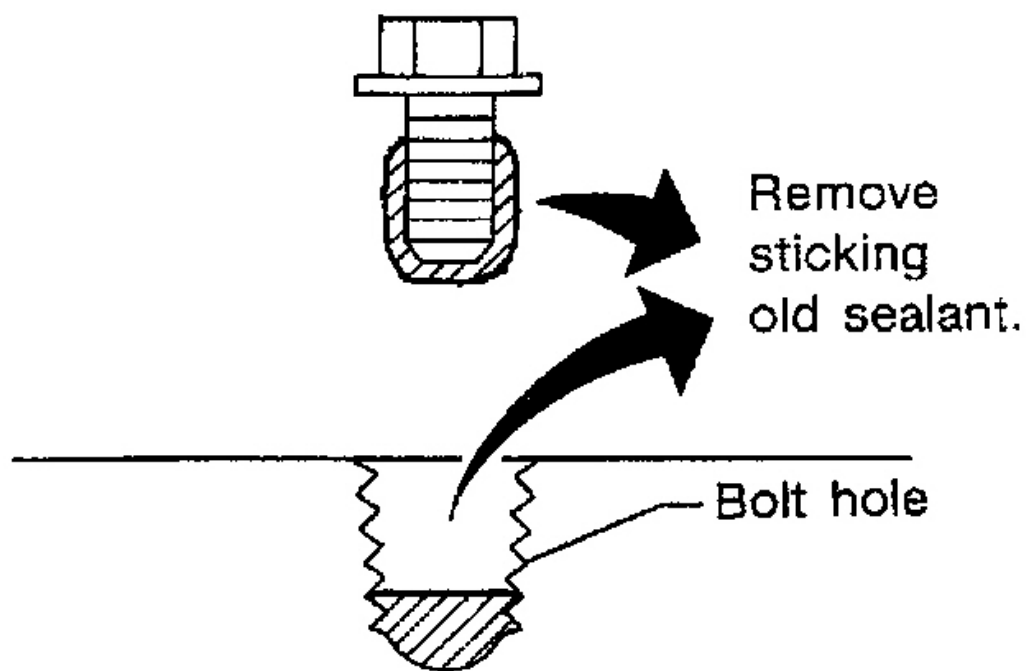
40. Use a scraper to remove all traces of liquid gasket from front timing chain case.



G02044762

Fig. 75: Removing All Traces Of Liquid Gasket From Front Timing Chain Case
Courtesy of NISSAN MOTOR CO., U.S.A.

- Remove old liquid gasket from the bolt hole and thread.



G02044763

Fig. 76: Removing Old Liquid Gasket From Bolt Hole And Thread
Courtesy of NISSAN MOTOR CO., U.S.A.

41. Use a scraper to remove all traces of liquid gasket from water pump cover and intake valve timing control solenoid valve covers.

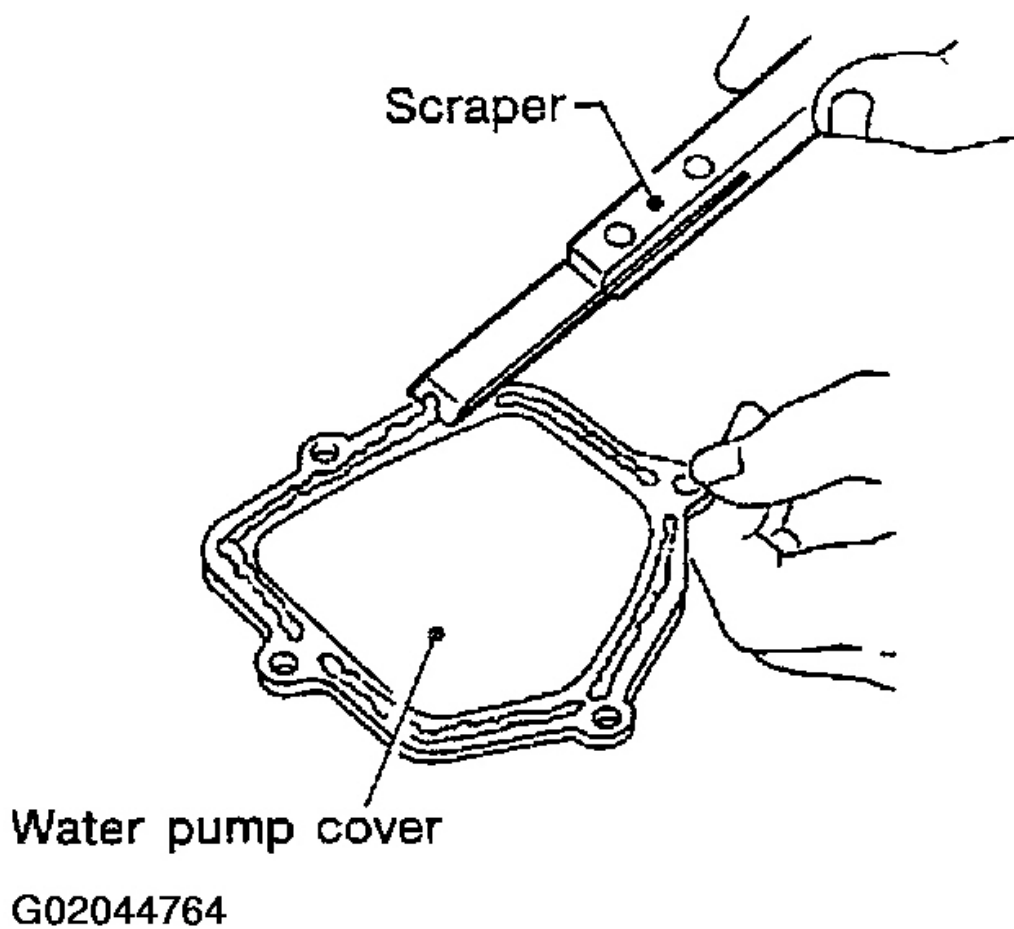
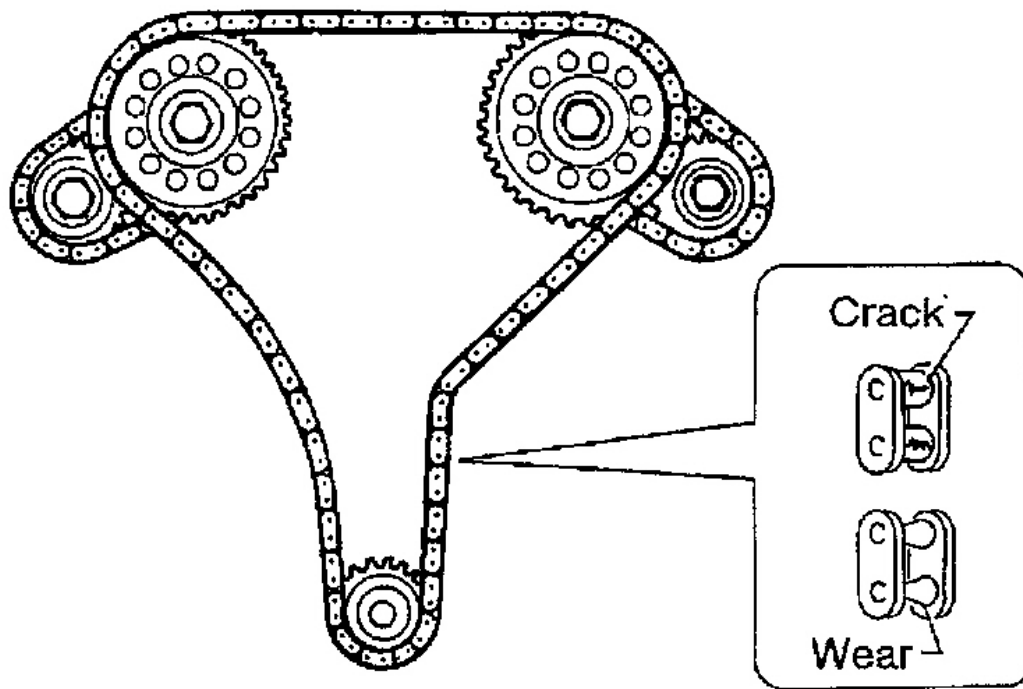


Fig. 77: Removing All Traces Of Liquid Gasket From Water Pump
Courtesy of NISSAN MOTOR CO., U.S.A.

INSPECTION

Check for cracks and excessive wear at roller links. Replace chain if necessary.



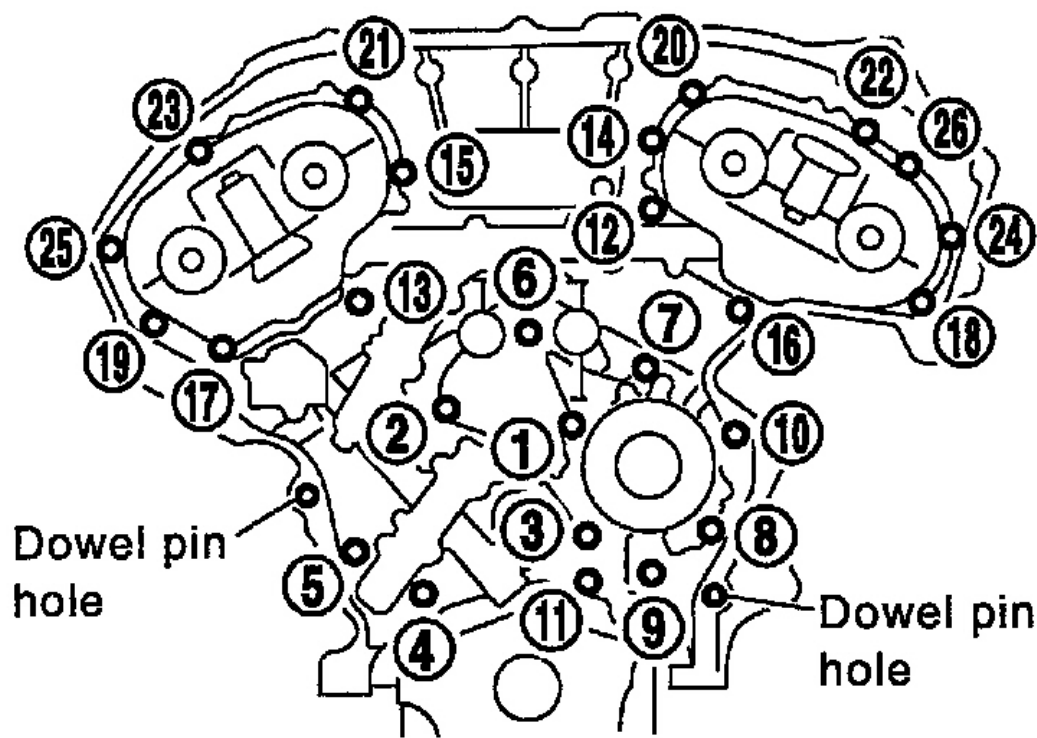
G02044765

Fig. 78: Checking For Cracks And Excessive Wear At Roller Links

Courtesy of NISSAN MOTOR CO., U.S.A.

INSTALLATION

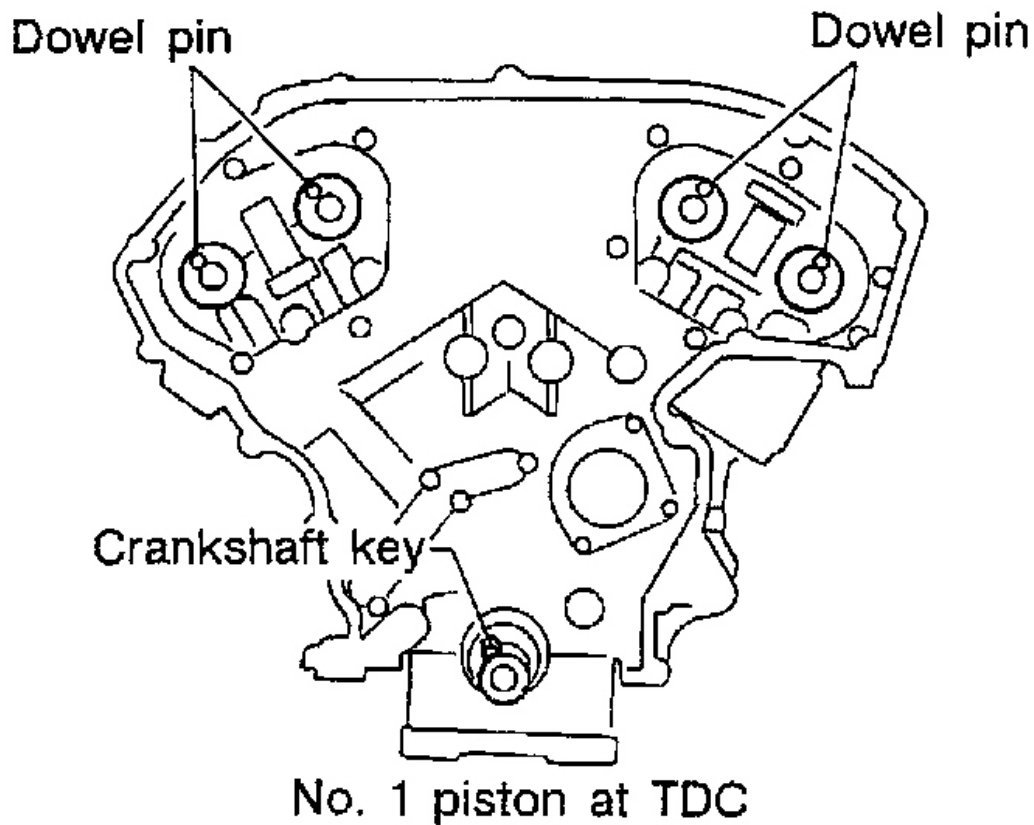
1. Apply liquid gasket to rear timing chain case. Refer to , "**POSITION FOR APPLYING LIQUID GASKET**".
 2. Align rear timing chain case and water pump assembly with dowel pins (RH and LH) on cylinder block. Then install it.
 - Do not allow O-ring to drop.
 - a. Tighten mounting bolts in order as shown in the figure.
 - Install two types of mounting bolts, referring to the following instructions and figure.
- Bolt length: 20 mm (0.79 in) (1, 2, 3, 6, 7, 8, 9, and 10 in the figure) 16 mm (0.63 in) (other than the above)**
- b. After all bolts are temporarily tightened, retight specified torque in order shown in the figure.



G02044766

Fig. 79: Installing Rear Timing Chain Case Bolts
 Courtesy of NISSAN MOTOR CO., U.S.A.

3. Install chain tension guide.
4. Make sure that camshaft and crankshaft are at TDC position of No.1 cylinder.
 - Make sure that knock pin hole, knock pin and crankshaft key are located as shown in the figure.
 Camshaft knock pin hole (intake-side): At cylinder head upper face side in each bank
 Camshaft knock pin (exhaust-side): At cylinder head upper face side in each bank
 Crankshaft key: At cylinder head side of RH bank



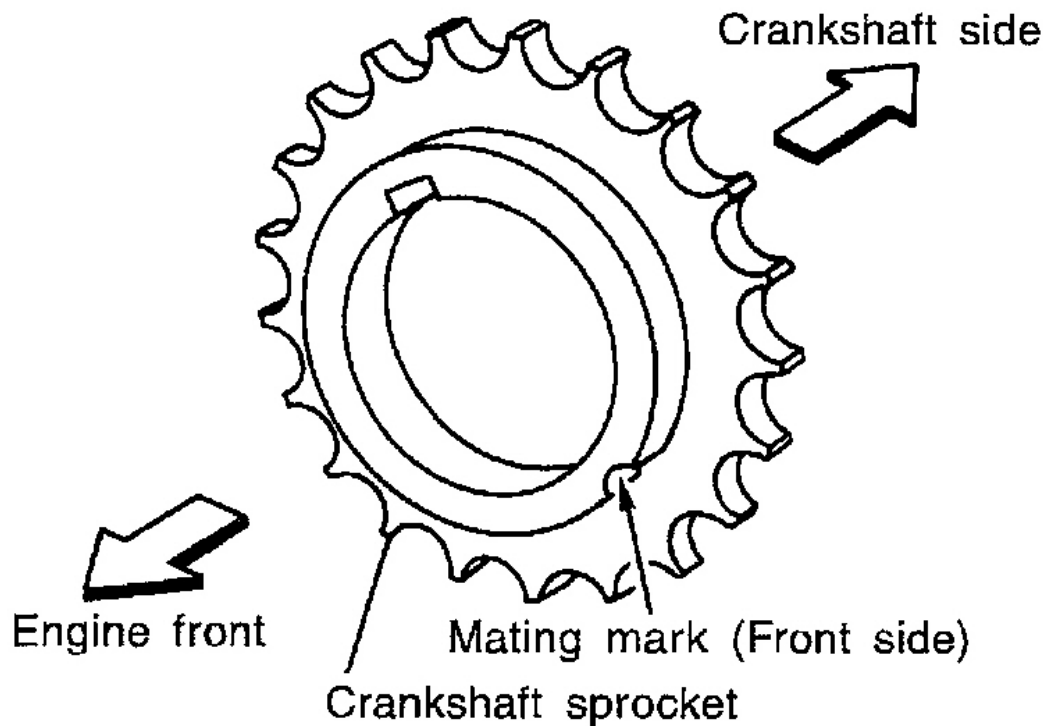
G02044767

Fig. 80: Identifying Camshaft And Dowel Pins

Courtesy of NISSAN MOTOR CO., U.S.A.

CAUTION: Hole on small diameter side must be used for intake knock pin.
Do not misidentify (Ignore big diameter side).

5. Install crankshaft sprocket.
 - Install it, with matching mark to timing chain facing front of engine.



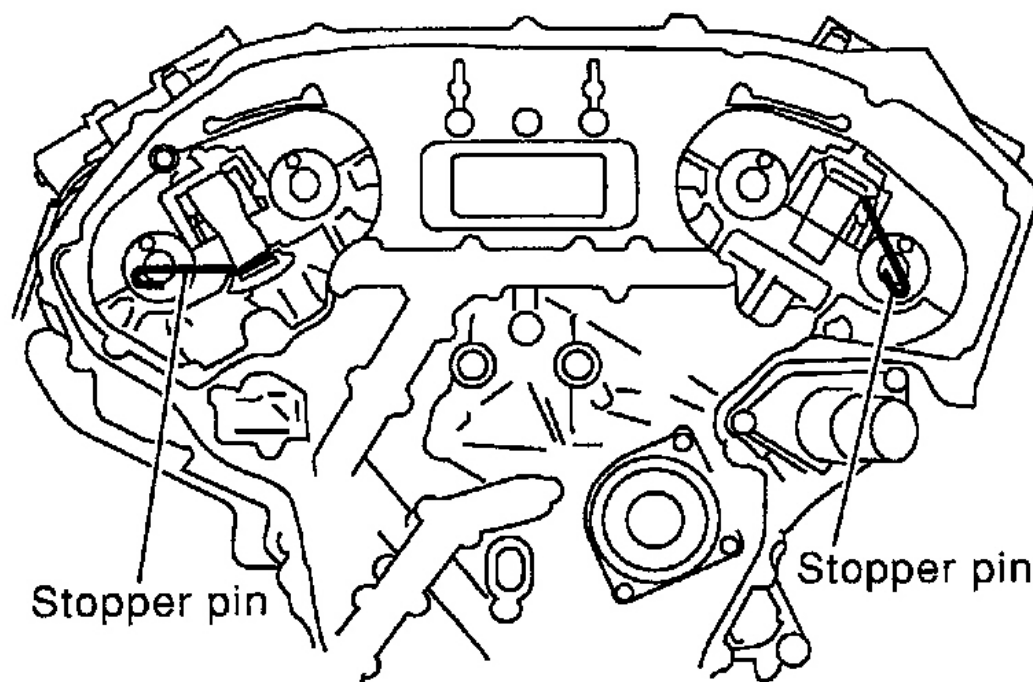
G02044768

Fig. 81: Installing Crankshaft Sprocket
Courtesy of NISSAN MOTOR CO., U.S.A.

6. Install secondary timing chain and camshaft sprocket.

CAUTION: Matching marks between timing chain and sprockets slip easily. Confirm all matching mark positions repeatedly during the installation process.

- Push sleeve of secondary chain tensioner, and keep it pressed with stopper pin.
 - a. Align matching marks on secondary timing chain (gold link) with the ones on intake and exhaust sprockets (stamped). Then install them.
 - Matching marks of intake sprocket are on back side secondary sprocket.

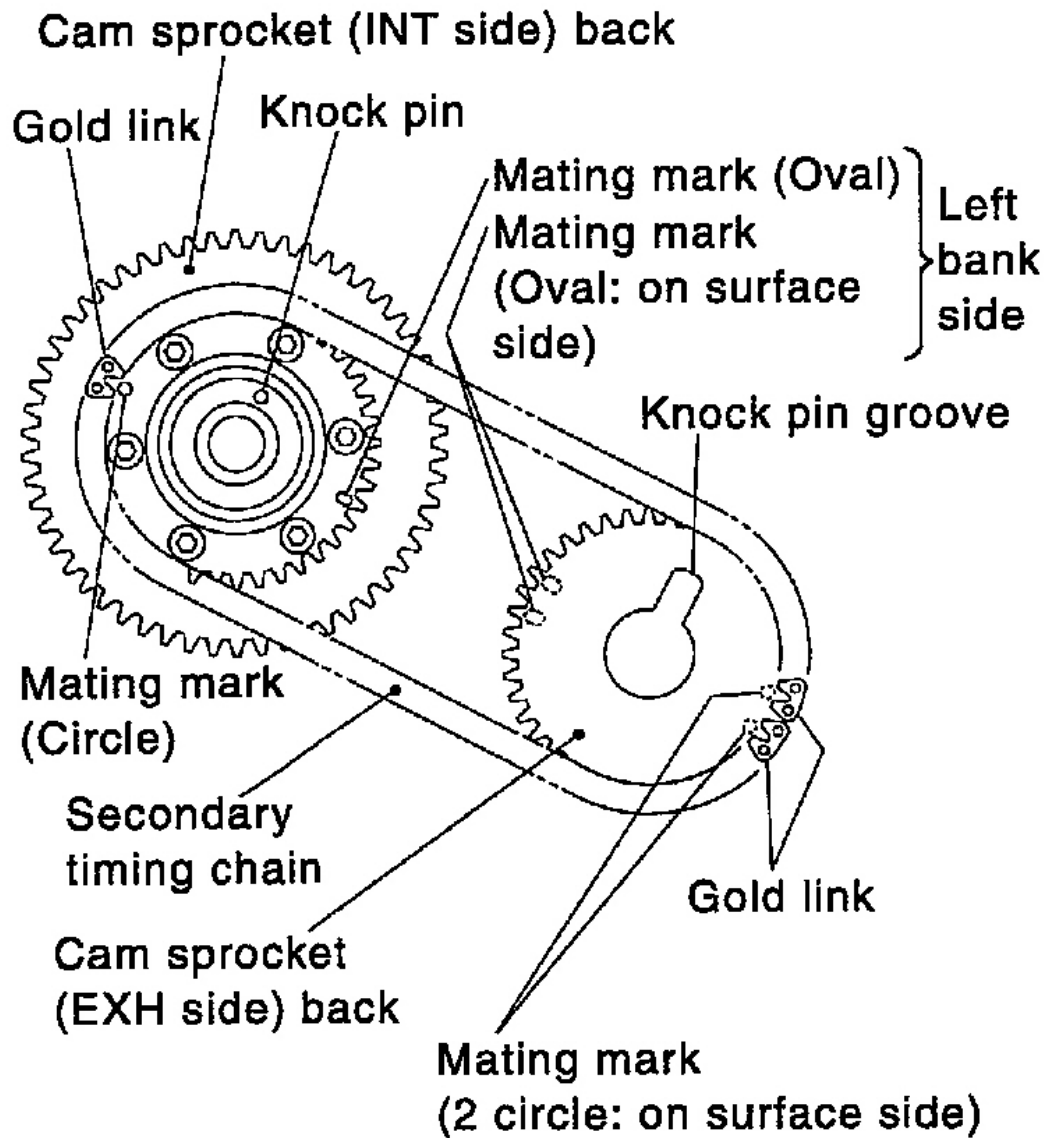


G02044769

Fig. 82: Installing Secondary Timing Chain And Camshaft Sprocket
Courtesy of NISSAN MOTOR CO., U.S.A.

- There are two types of matching marks: round and oval types. They should be used for RH/LH banks respectively. RH bank: Use round type. LH bank: Use oval type.
- b. Align knock pin and pin hole on camshaft with groove and knock pin on sprocket. Then install them.
 - On intake side, align pin hole on small diameter side of camshaft front end with knock pin on back side of camshaft sprocket. Then install them.
 - On exhaust side, align knock pin on camshaft front end with pin groove on camshaft sprocket. Then install them.
 - Mounting bolts for camshaft sprockets must be tightened in step 7. Tightening them by hand is enough to prevent dislocation of knock pins.

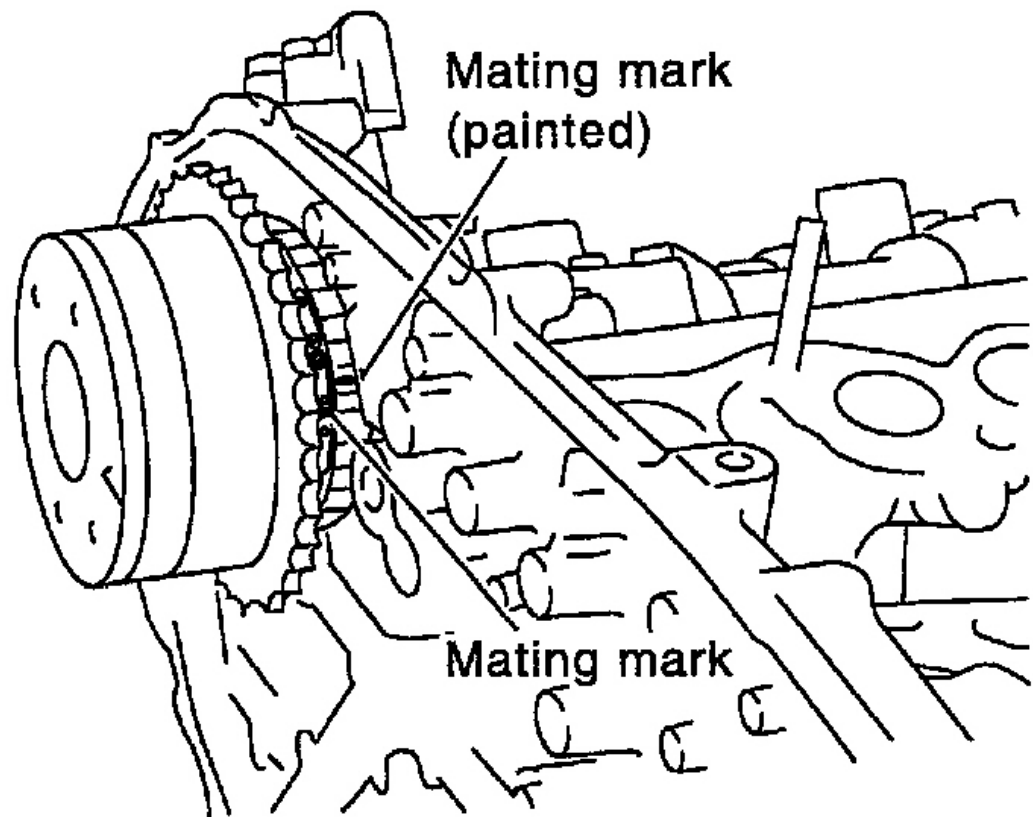
Right bank side



G02044770

Fig. 83: Aligning Knock Pin And Pin Hole On Camshaft With Groove And Knock Pin On Sprocket
 Courtesy of NISSAN MOTOR CO., U.S.A.

- It may be difficult to visually check the dislocation of mating marks during and after installation. To make the matching easier, make a mating mark on the sprocket teeth in advance using paint.



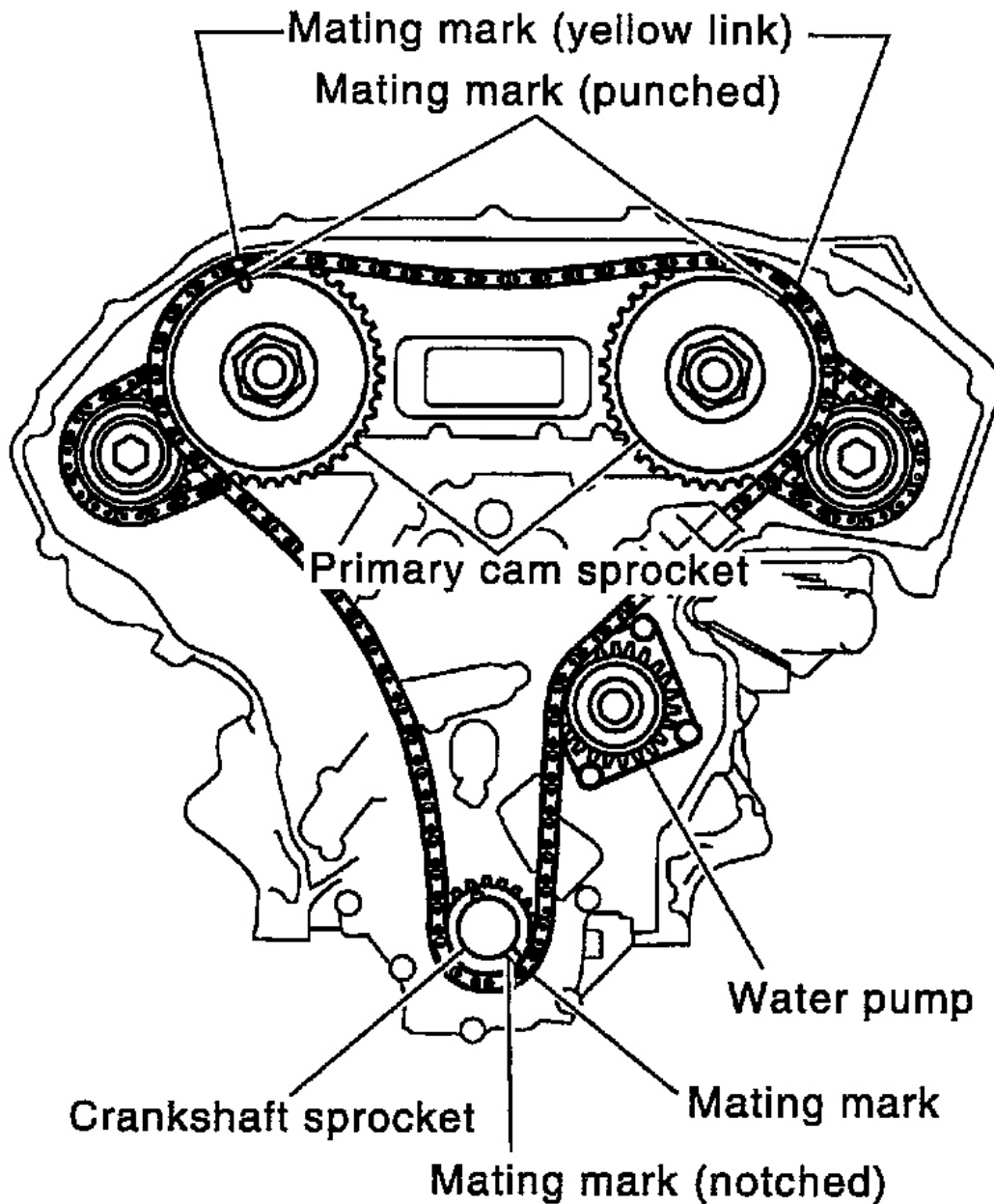
G02044771

Fig. 84: Applying New Engine Oil To Threads And Seating Surfaces Of Camshaft Sprocket Bolts

Courtesy of NISSAN MOTOR CO., U.S.A.

7. Install secondary timing chain and sprocket to the other bank. Install primary timing chain at the same time.
 - Installation of the secondary timing chain follows the procedure described in step 6.
 - Install primary timing chain so that mating mark (punched) on camshaft sprocket is aligned with that (yellow link) on the timing chain, and mating mark (notched) on crankshaft sprocket is aligned with that on the timing chain, respectively.
 - When it is difficult to align mating marks of the primary timing chain with each sprocket, gradually turn the camshaft hexagonal portion using a spanner so it is aligned with the mating mark.

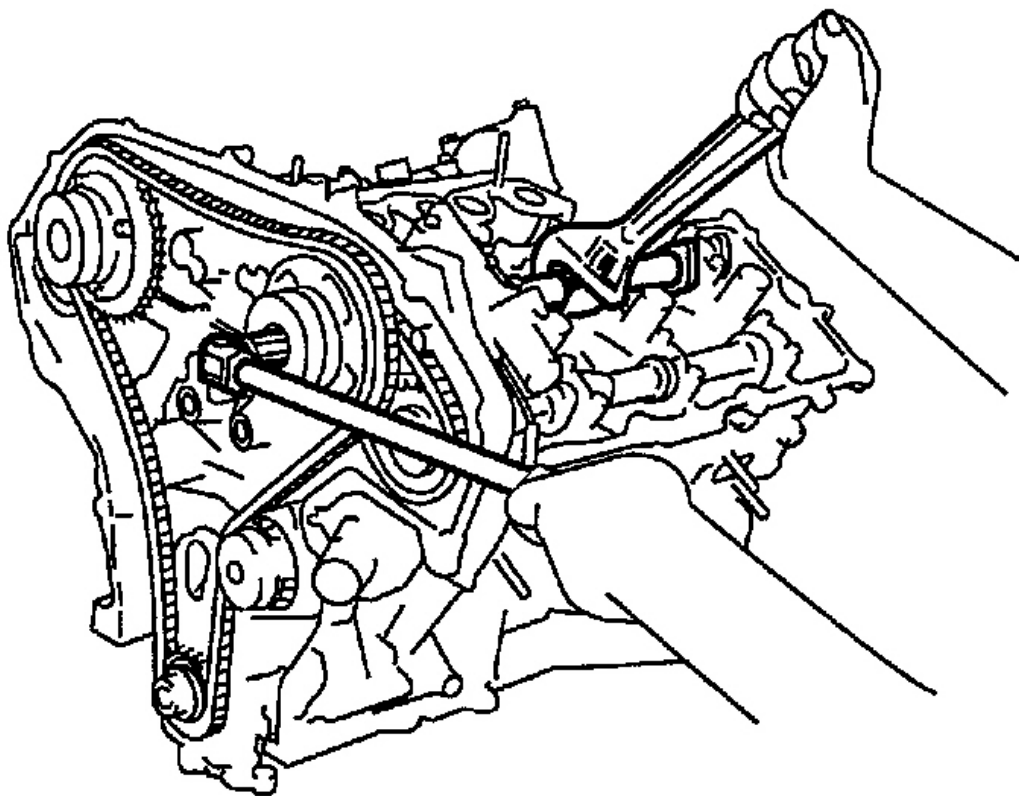
- During alignment, be careful to prevent dislocation of mating marks on the secondary timing chain.



G02044772

Fig. 85: Installing Chain Tensioner
Courtesy of NISSAN MOTOR CO., U.S.A.

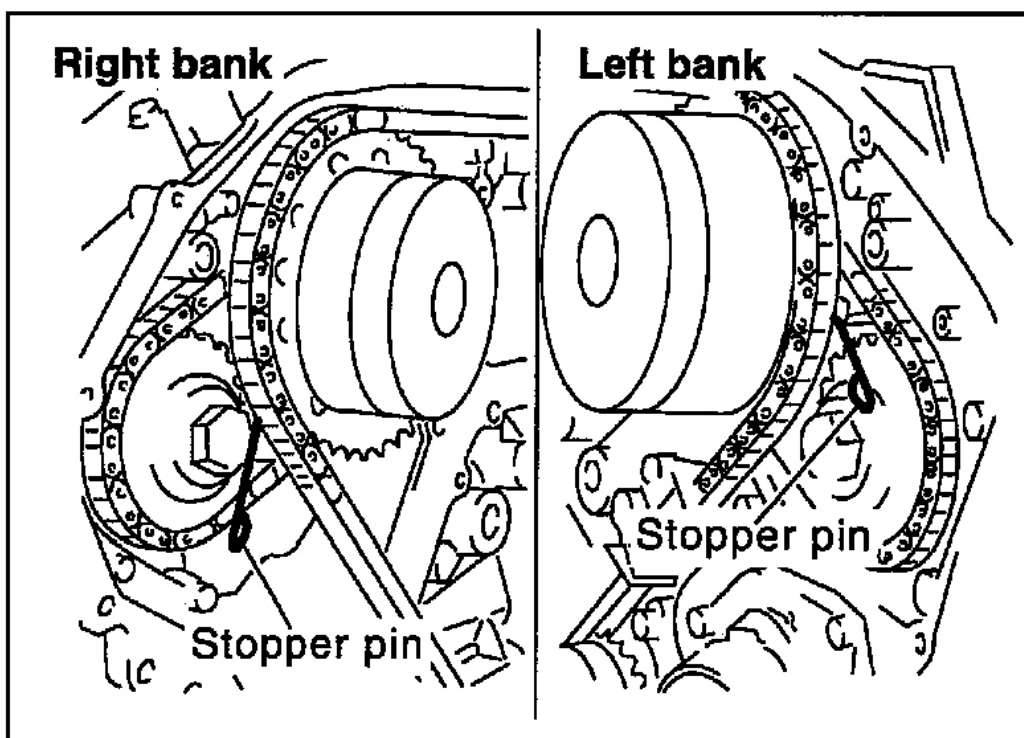
8. After confirming the mating marks are aligned, tighten the camshaft sprocket mounting bolts.
 - Secure the camshaft hexagonal portion using a spanner to tighten mounting bolts.



G02044773

Fig. 86: Tightening Camshaft Hexagonal Portion Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

9. Pull out the stopper pin from the secondary timing chain tensioner.



G02044774

Fig. 87: Pulling Out Stopper Pin From Secondary Timing Chain Tensioner
Courtesy of NISSAN MOTOR CO., U.S.A.

10. Install internal chain guide.
11. Install slack guide.

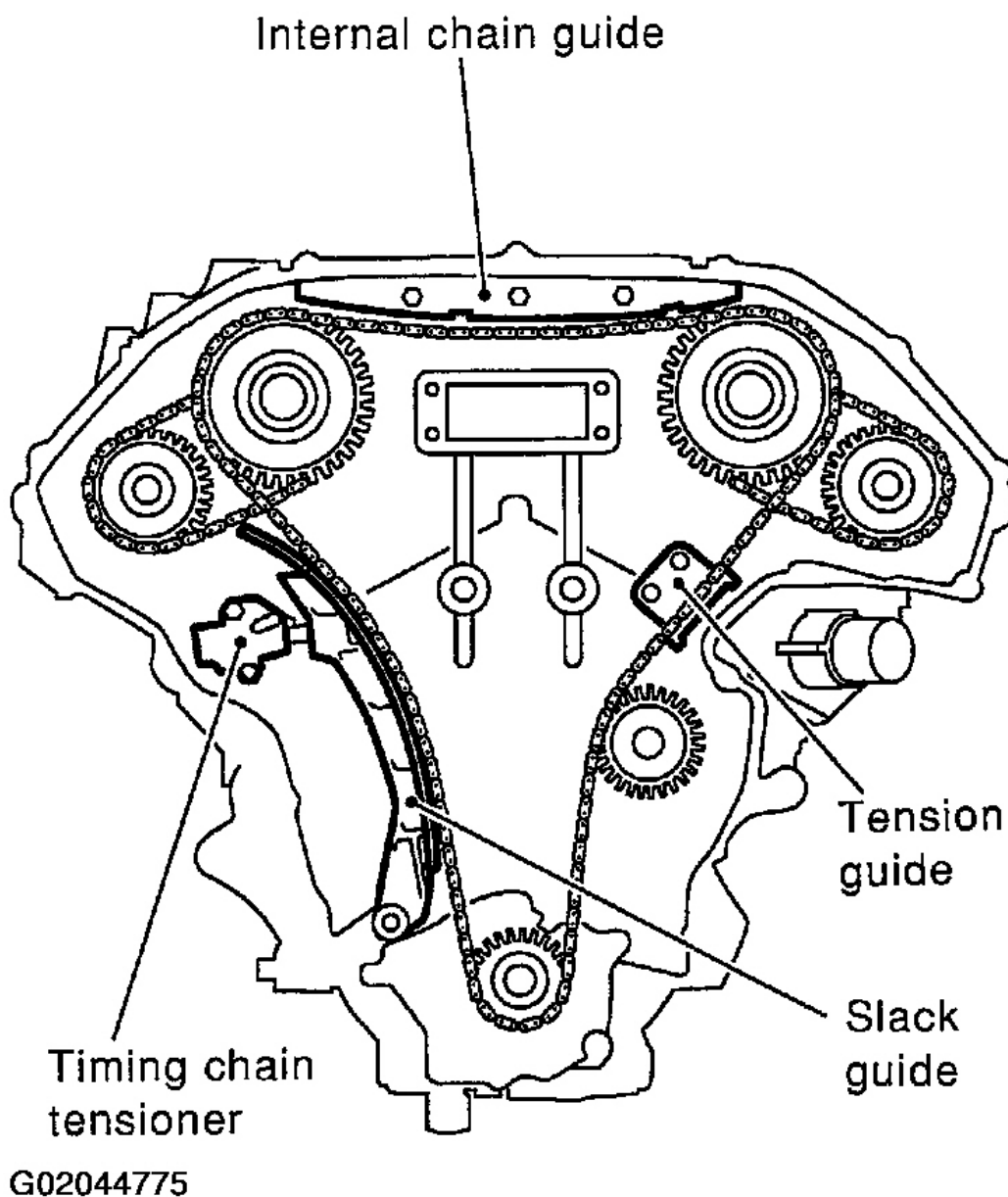
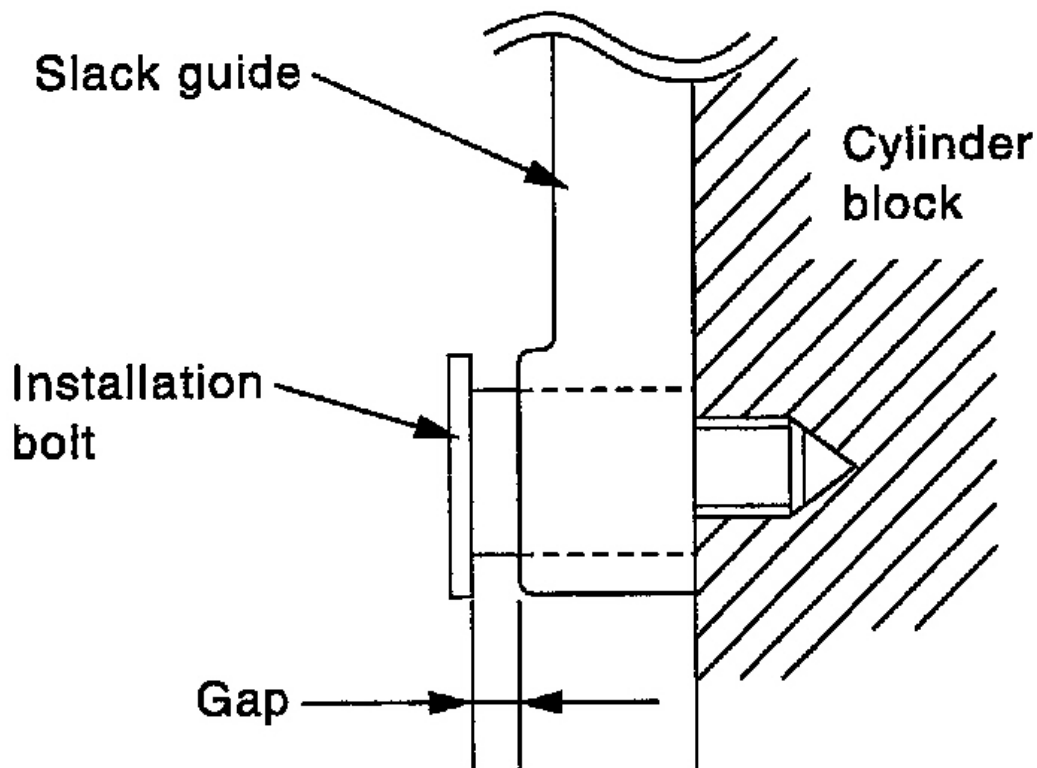


Fig. 88: Installing Internal Chain Guide
Courtesy of NISSAN MOTOR CO., U.S.A.

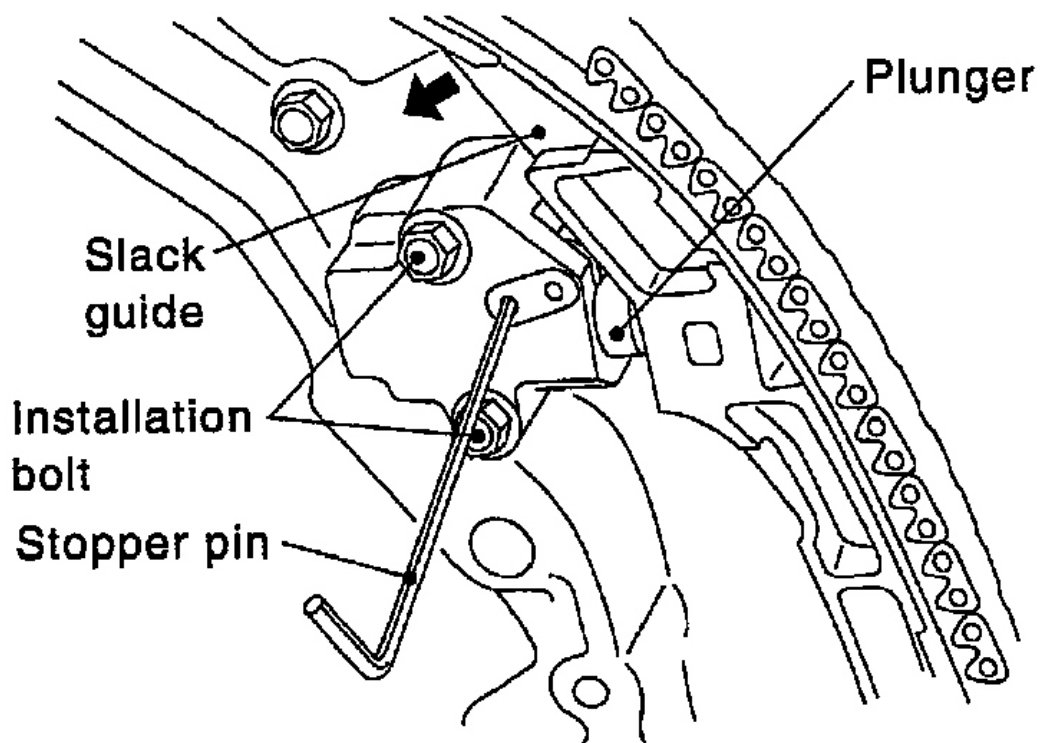
- Take care not to overtighten mounting bolts for slack guide. It is normal for a gap to exist under bolt seats when mounting bolts are tightened to specified torque.



G02044776

Fig. 89: Identifying Normal For A Gap To Exist Under Bolt Seats Mounting Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

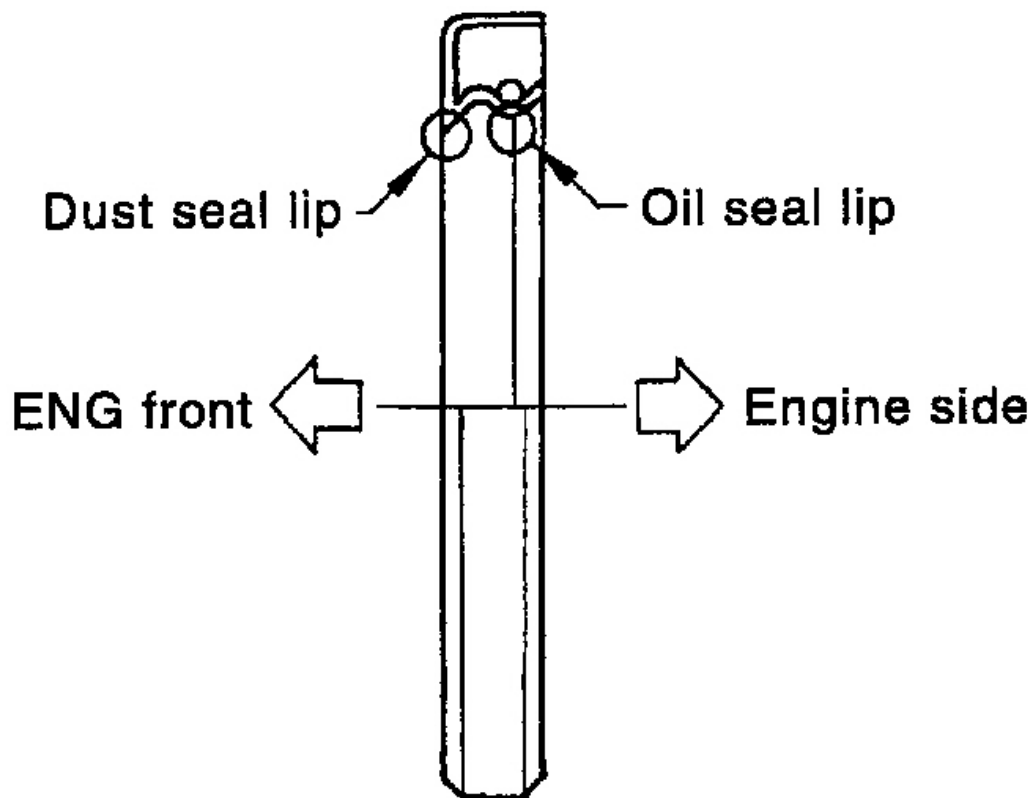
12. Install chain tensioner for slack guide.
 - When installing chain tensioner, push in sleeve and keep it pressed with stopper pin.
 - Remove dirt and foreign materials completely from back and mounting surfaces of chain tensioner.
 - After installing, pull out stopper pin by pressing slack guide.
13. Confirm again that matching marks on sprockets and timing chain have not slipped.



G02044777

Fig. 90: Installing Chain Tensioner For Slack Guide
Courtesy of NISSAN MOTOR CO., U.S.A.

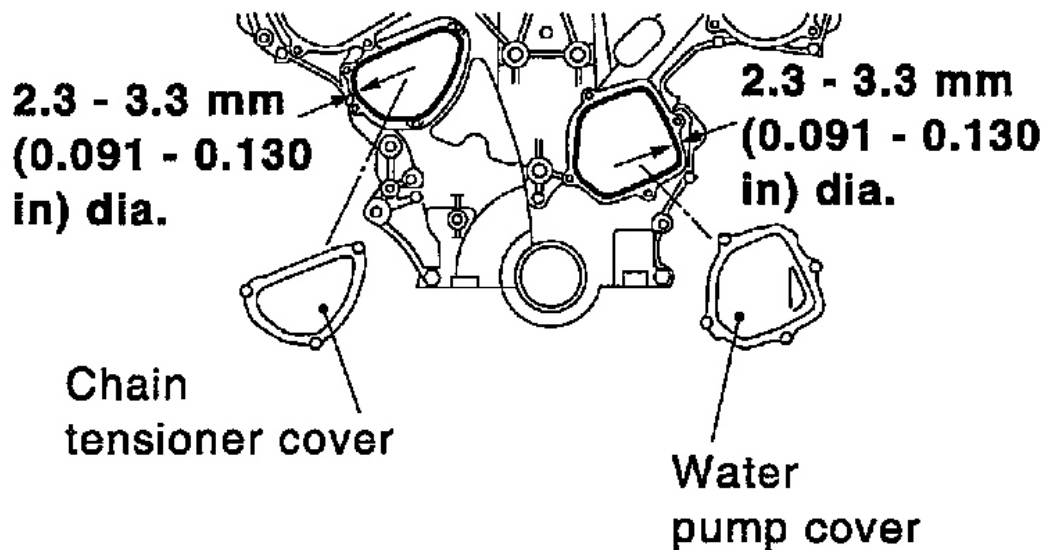
14. Install front oil seal to front timing chain case. Refer to , "**FRONT OIL SEAL**".



G02044778

Fig. 91: Installing Front Oil Seal To Front Timing Chain Case
Courtesy of NISSAN MOTOR CO., U.S.A.

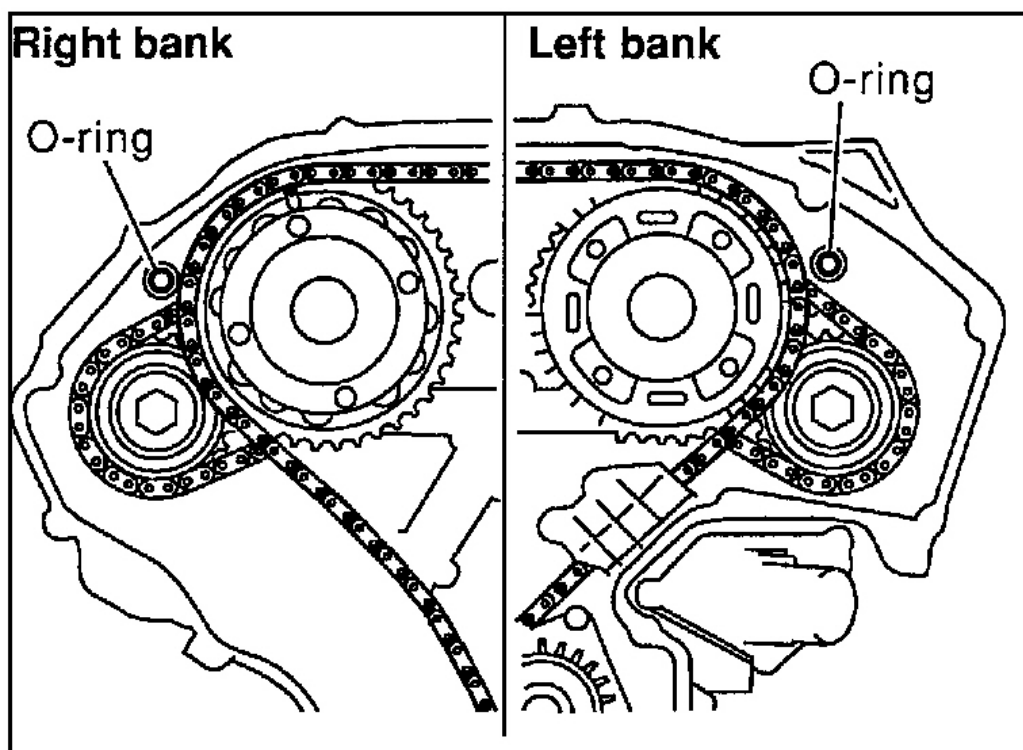
15. Apply liquid gasket to water pump cover and chain tensioner cover.
 - Refer to "**POSITION FOR APPLYING LIQUID GASKET**", .
 - **Before installation, wipe off the protruding sealant.**
16. Install water pump cover and chain tensioner cover.



G02044779

Fig. 92: Installing A/C Compressor Bracket And Compressor
Courtesy of NISSAN MOTOR CO., U.S.A.

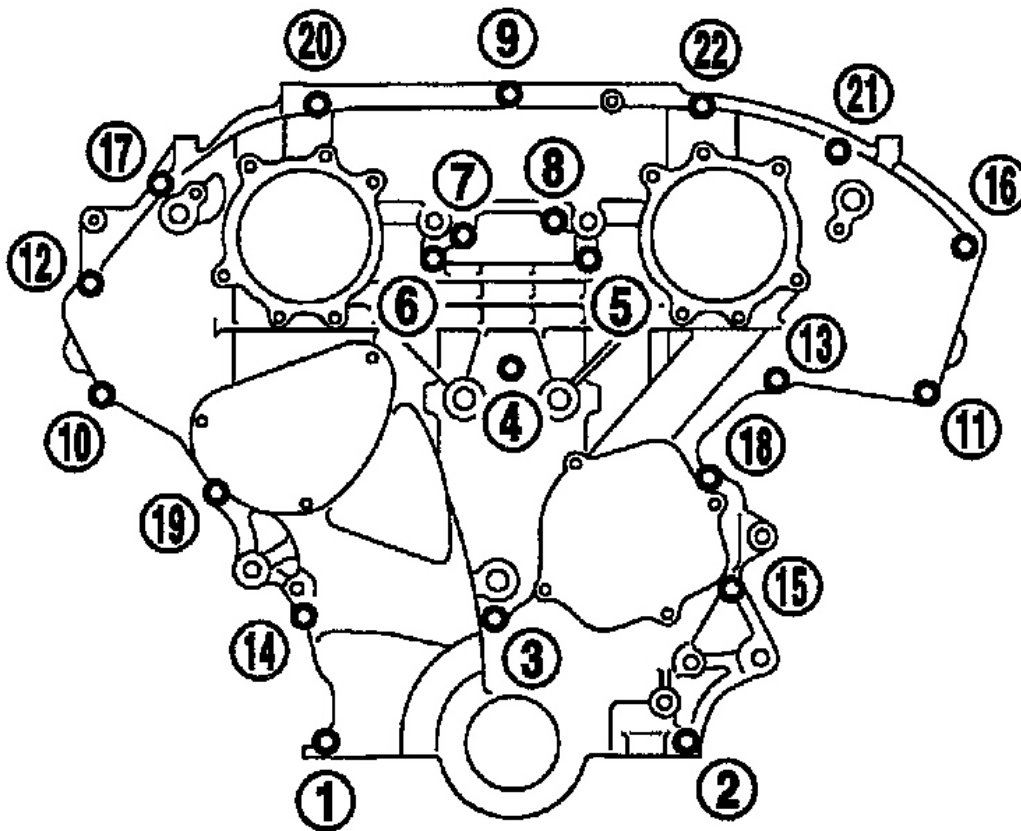
17. Install O-rings on rear timing chain case.
18. Apply liquid gasket to front timing chain case.
 - Refer to "**POSITION FOR APPLYING LIQUID GASKET**", .
 - **Before installation, wipe off the protruding sealant.**
19. Apply liquid gasket to front timing chain case.
 - Refer to "**POSITION FOR APPLYING LIQUID GASKET**", .



G02044780

Fig. 93: Installing O-Rings On Rear Timing Chain Case
Courtesy of NISSAN MOTOR CO., U.S.A.

20. Install front timing chain case.
 - Align dowel pin on rear timing chain case with hole on front timing chain case.
21. Tighten bolts to the specified torque in order shown in the figure.



-  **① - ②** 8 mm (0.31 in) dia. bolts
25.5 - 31.3 N·m
(2.6 - 3.1 kg-m, 19 - 23 ft-lb)
③ - ②② 6 mm (0.24 in) dia. bolts
11.7 - 13.7 N·m
(1.2 - 1.4 kg-m, 9 - 10 ft-lb)

G02044781

Fig. 94: Installing Front Timing Chain Case
 Courtesy of NISSAN MOTOR CO., U.S.A.

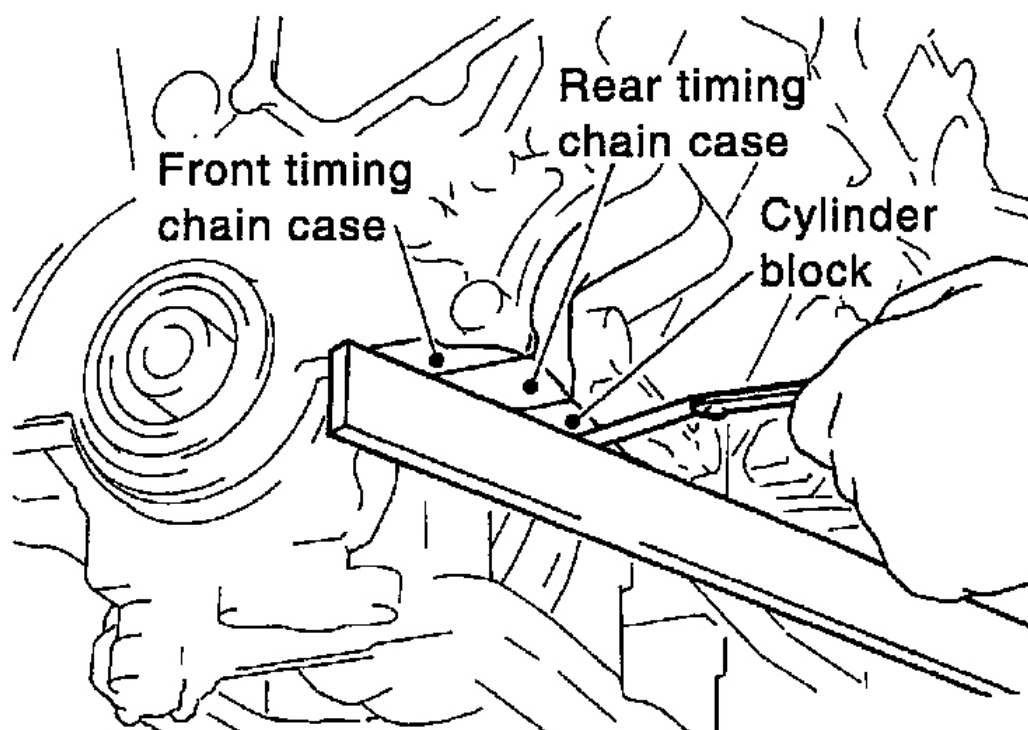
22. After installing front timing chain case, check surface height difference between following parts on oil

pan mounting surface.

Standard Front timing chain case to rear timing chain case: -0.14 to 0.14 mm (-0.0055 to 0.0055 in)

Oil pump to cylinder block: -0.36 to -0.10 mm (-0.0142 to -0.0039 in)

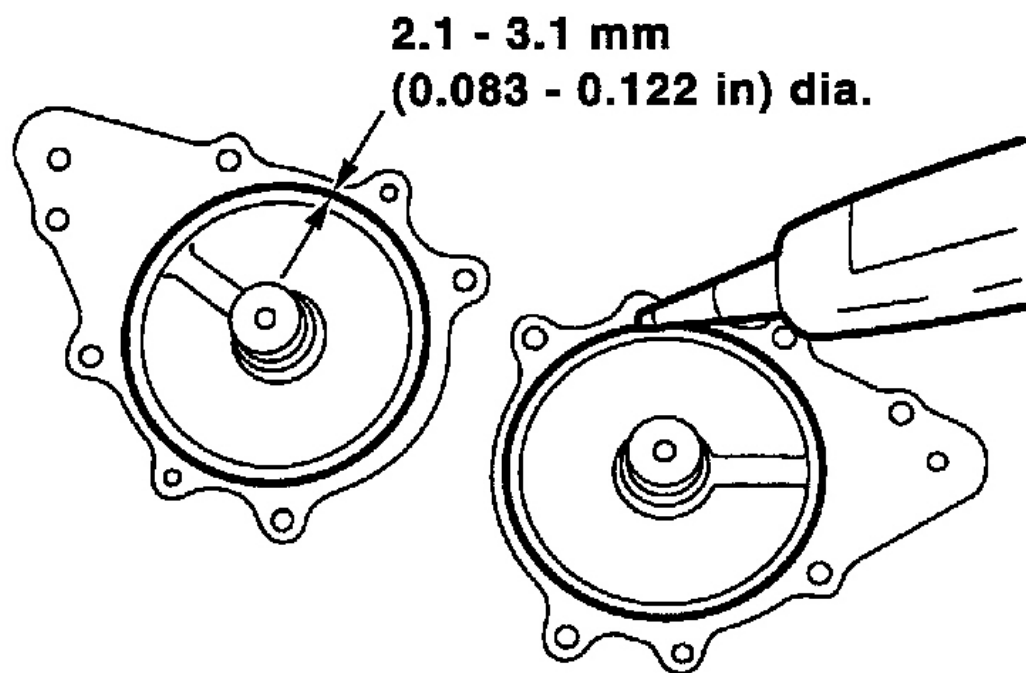
Rear timing chain case to cylinder block: -0.24 to 0.14 mm (-0.0094 to 0.0055 in)



G02044782

Fig. 95: Checking Surface Height Difference
Courtesy of NISSAN MOTOR CO., U.S.A.

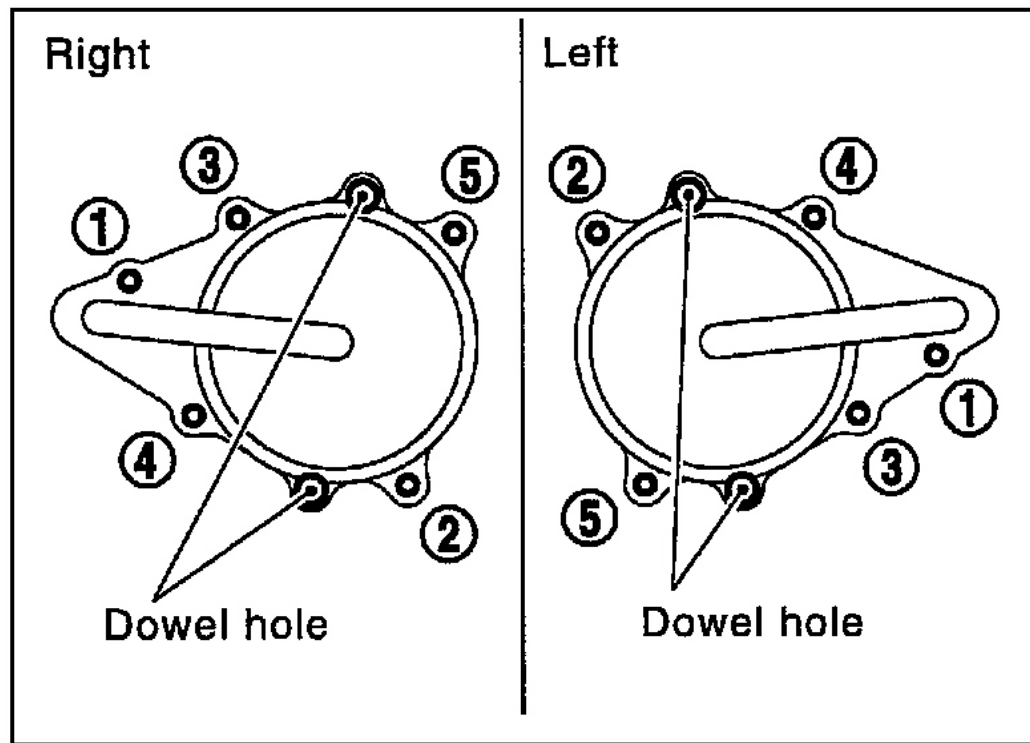
- If not within standard, repeat above installation procedure.
23. Install intake valve timing control valve cover.
- a. Install new O-rings at front timing chain case.
 - b. Install new seal ring at intake valve timing control valve cover with new engine oil applied on it.
 - c. Apply liquid gasket to intake valve timing control valve covers. Use genuine RTV silicone sealant or equivalent. Refer to **RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS**.
- Being careful not to move the seal ring from the installation groove, align the dowel pins on the chain case with the holes to install the intake valve timing control valve cover.



G02044783

Fig. 96: Applying Liquid Gasket To Intake Valve Timing Control Valve Covers
Courtesy of NISSAN MOTOR CO., U.S.A.

- Tighten in numerical order as shown in the figure.



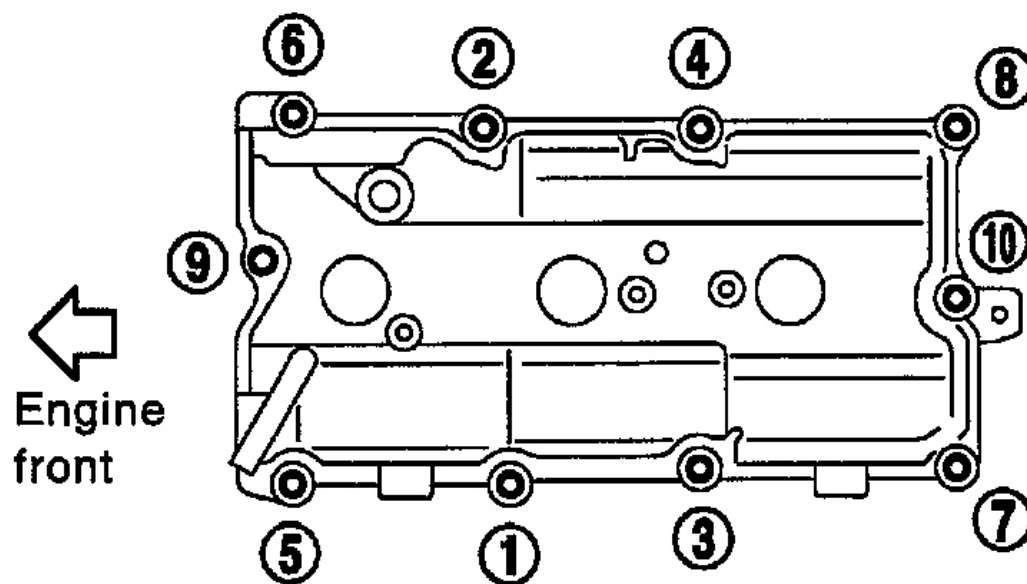
G02044784

Fig. 97: Intake Valve Timing Control Valve Bolts Tightening Sequence
 Courtesy of NISSAN MOTOR CO., U.S.A.

24. Install RH and LH rocker covers.

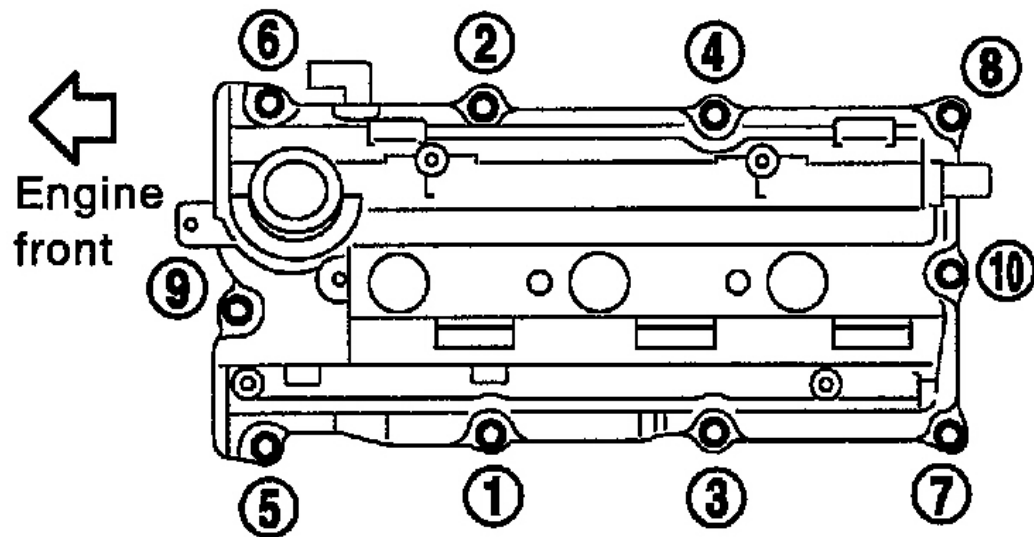
Rocker cover tightening procedure:

- **Tighten in numerical order as shown in the figure.**
 - a. Tighten bolts 1 to 10 in that order to 0.96 to 2.96 N.m (0.10 to 0.30 kg-m, 9 to 26 in-lb).
 - b. Then tighten bolts 1 to 10 as indicated in figure to 7.33 to 9.33 N.m (0.75 to 0.95 kg-m, 65 to 82 in-lb).



G02044785

Fig. 98: Installing RH And LH Rocker Covers (1 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.



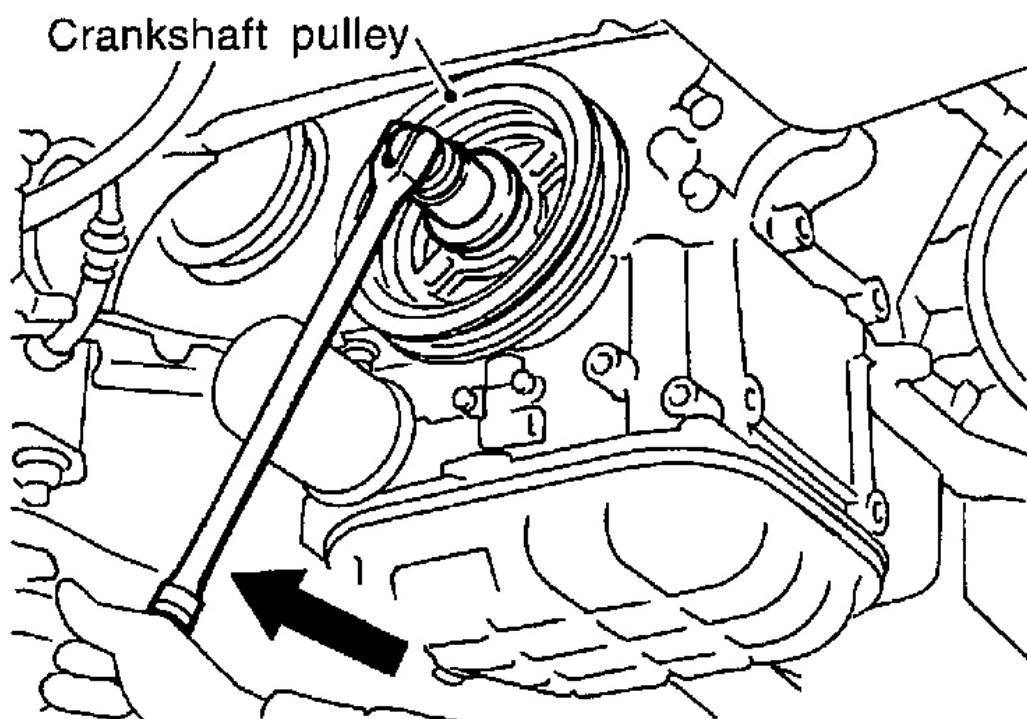
G02044786

Fig. 99: Installing RH And LH Rocker Covers (2 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

25. Install intake manifold. Tighten intake manifold nuts and bolts.

Refer to "**TIGHTENING PROCEDURES**", .

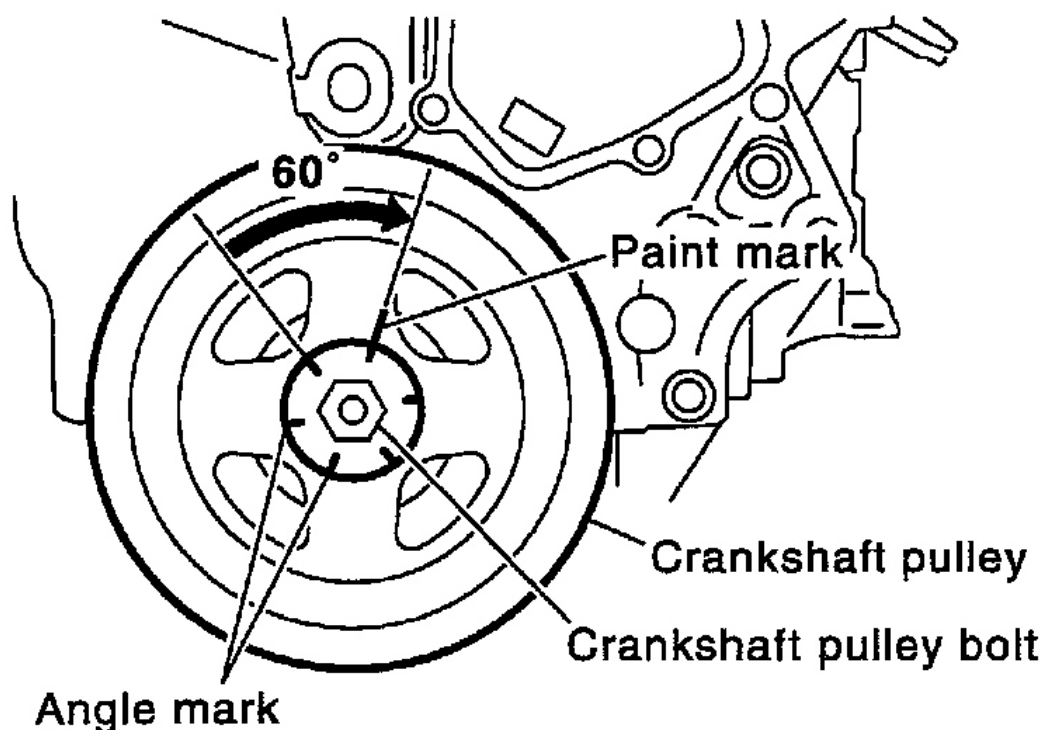
26. Install fuel tube assembly.
27. Install intake manifold collector gasket.
28. Install intake manifold upper and lower collectors.
29. Install RH and LH ignition coils.
30. Install crankshaft pulley to crankshaft.
 a. Tighten to 39 to 49 N.m (4.0 to 5.0 kg-m, 29 to 36 ft-lb).
 b. Put a paint mark on the crankshaft pulley.



G02044787

Fig. 100: Installing Crankshaft Pulley
Courtesy of NISSAN MOTOR CO., U.S.A.

- c. Again tighten by turning 60° to 66°, about the angle from one hexagon bolt head corner to another.

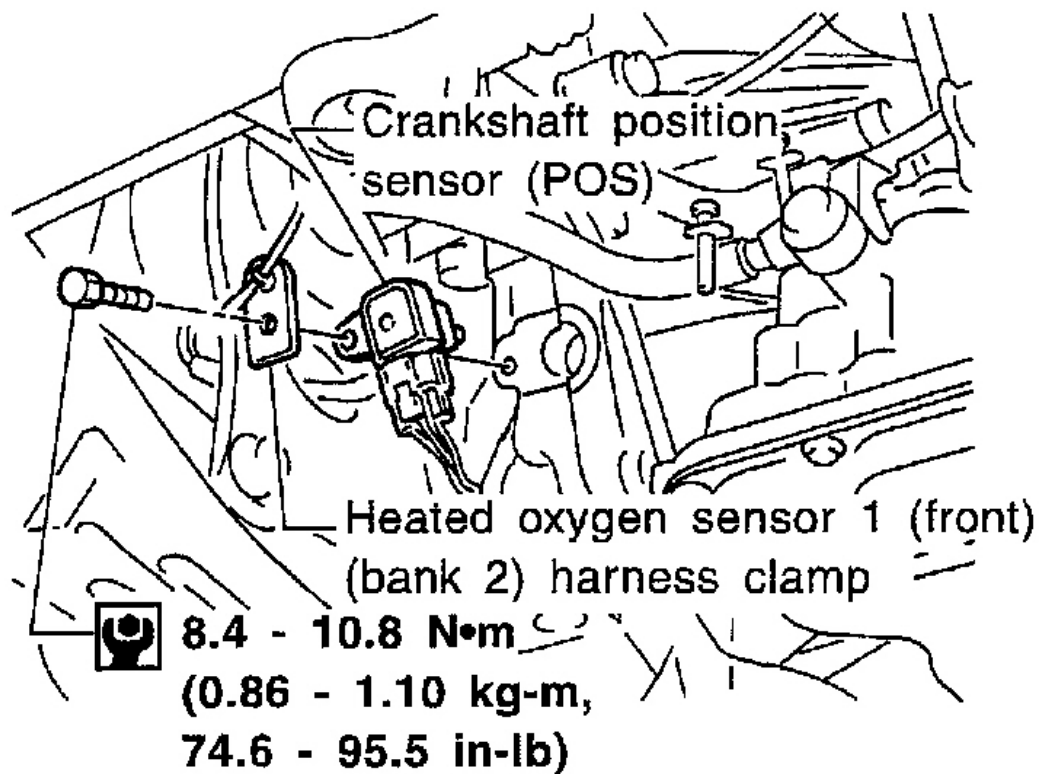


G02044788

Fig. 101: Identifying Angle From One Hexagon Bolt Head Corner To Another
Courtesy of NISSAN MOTOR CO., U.S.A.

31. Reinstall removed parts in reverse order of removal.

- Make sure that crankshaft position sensor (POS) and heated oxygen sensor 1 (front) (bank 2) harness clamp are installed correctly as shown in figure.
- When installing fuel tube assembly. Refer to **FUEL RAILS & INJECTORS** .
- After starting engine, keep idling for three minutes. Then rev engine up to 3,000 RPM under no load to purge air from the high-pressure chamber of the chain tensioners. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.



G02044789

Fig. 102: Identifying Crankshaft Position Sensor
Courtesy of NISSAN MOTOR CO., U.S.A.

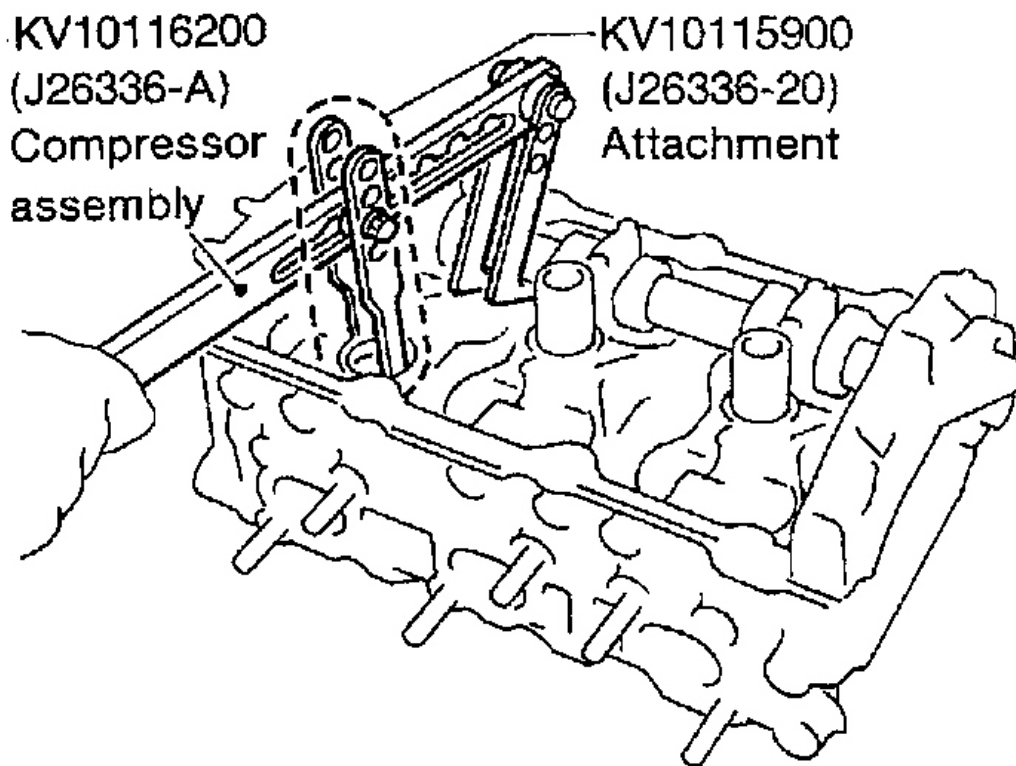
OIL SEAL

REPLACEMENT

CAUTION: When removing the oil pans, oil pump assembly and timing chain from engine, first remove the crankshaft position sensor (POS) from the assembly.
Be careful not to damage sensor edges.

VALVE OIL SEAL

1. Remove ornament cover.
2. Remove RH and LH ignition coils.
3. Remove intake manifold collector supports and intake manifold collector (RH cylinder head only).



G02044790

Fig. 103: View Of Valve Oil Seal

Courtesy of NISSAN MOTOR CO., U.S.A.

4. Remove RH and LH rocker covers from cylinder head.
5. Remove crankshaft position sensor (POS).
6. Remove oil pan. Refer to "**REMOVAL**", .
7. Remove timing chain. Refer to "**REMOVAL**", .
8. Remove camshaft brackets and camshaft. Refer to "**DISASSEMBLY**", .
9. Remove valve lifters.
10. Remove valve spring with Tool.
11. Reinstall any parts removed in reverse order of removal.

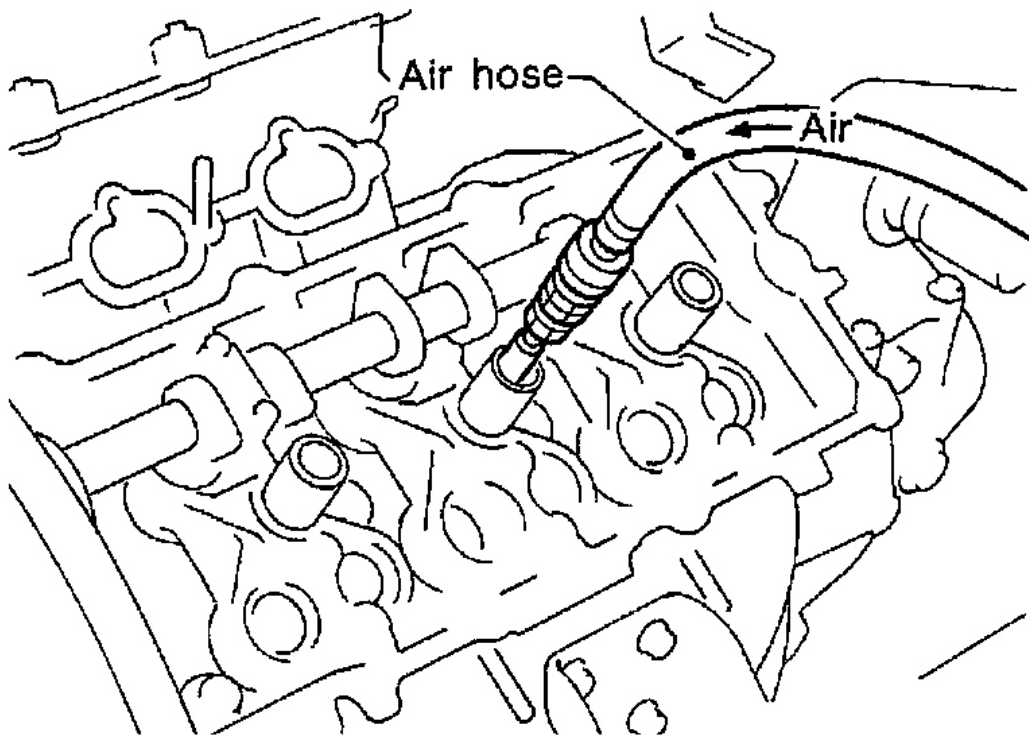
Before removing valve spring, fix valve as follows.

Method A:

Piston concerned should be set at TDC to prevent valve from falling.

Method B:

Remove spark plug, then install air hose adapter into spark plug hole and apply air pressure to hold valves in place. Apply a pressure of 490 kPa (5 kg/cm² , 71 psi).

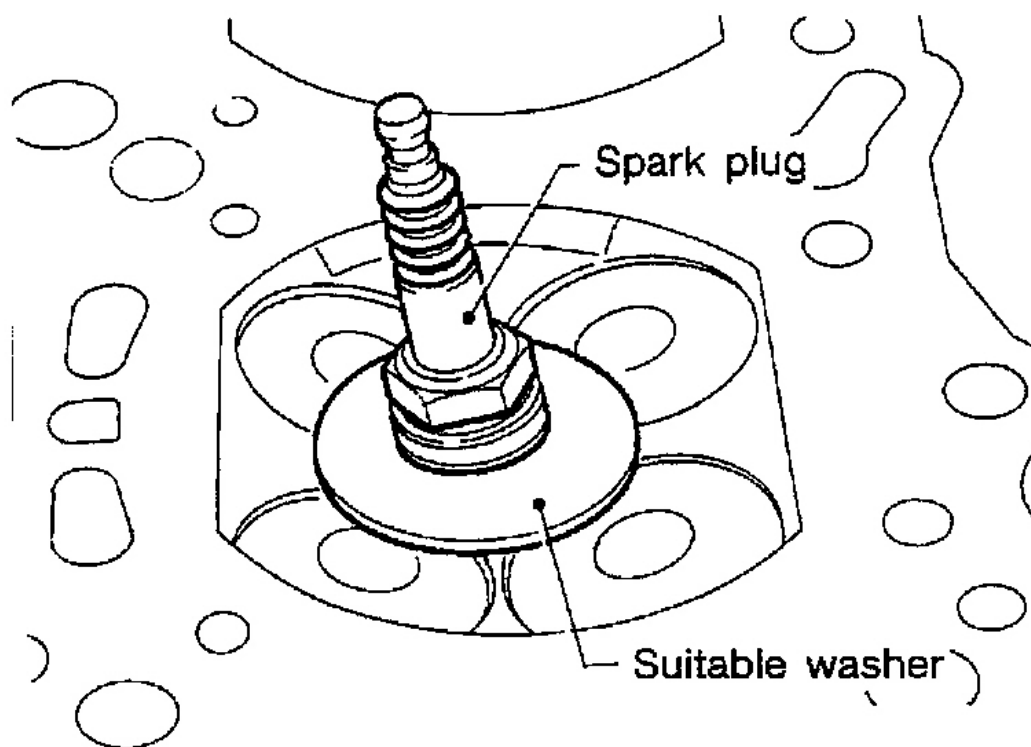


G02044791

Fig. 104: Applying Air Pressure To Hold Valves In Place
Courtesy of NISSAN MOTOR CO., U.S.A.

Method C:

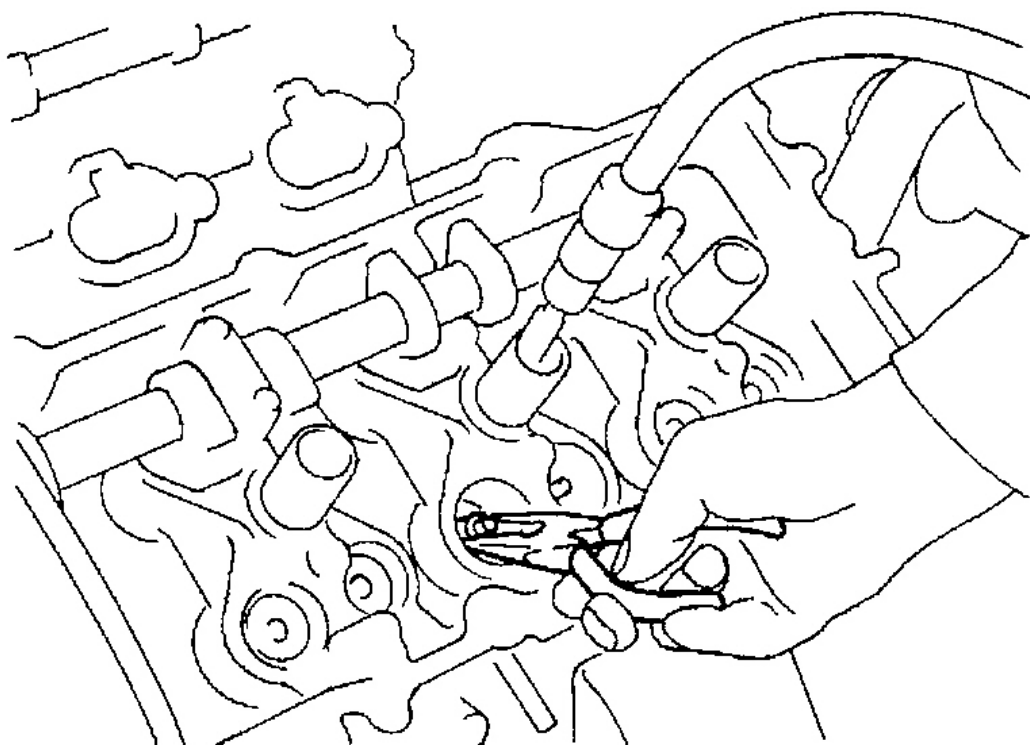
Install spark plug with suitable washer into spark plug hole from combustion chamber side.



G02044792

Fig. 105: Installing Spark Plug With Suitable Washer Into Spark Plug Hole
Courtesy of NISSAN MOTOR CO., U.S.A.

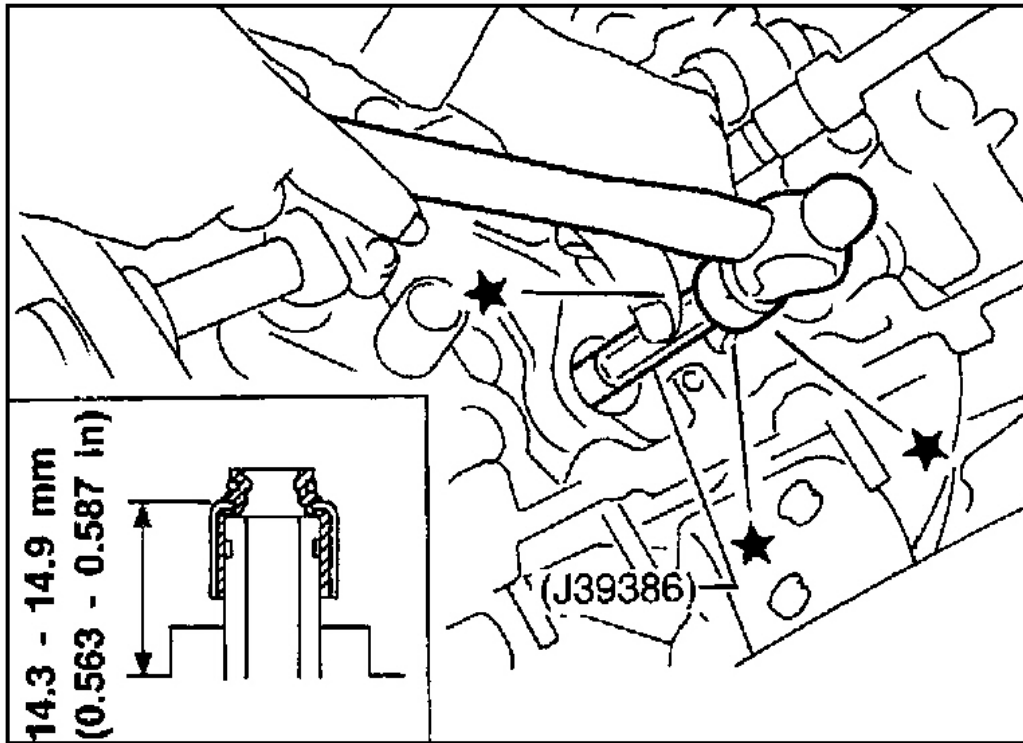
12. Remove valve oil seal.



G02044793

Fig. 106: Remove Valve Oil Seal
Courtesy of NISSAN MOTOR CO., U.S.A.

13. Apply engine oil to new valve oil seal and install it with Tool.



G02044794

Fig. 107: Installing Valve Oil Seal
Courtesy of NISSAN MOTOR CO., U.S.A.

FRONT OIL SEAL

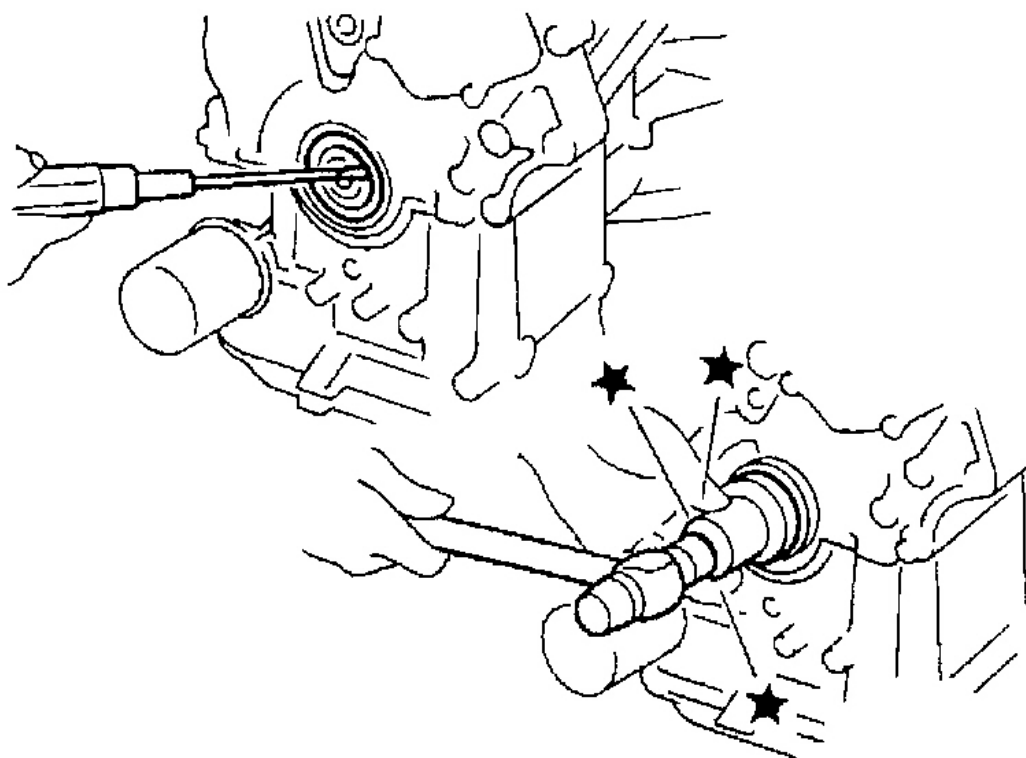
1. Remove the following parts:
 - Engine undercover
 - Front RH wheel and engine side cover
 - Drive belts
 - Crankshaft pulley

Be careful not to damage sensor edge.

2. Remove front oil seal using a suitable tool.

Be careful not to scratch front cover.

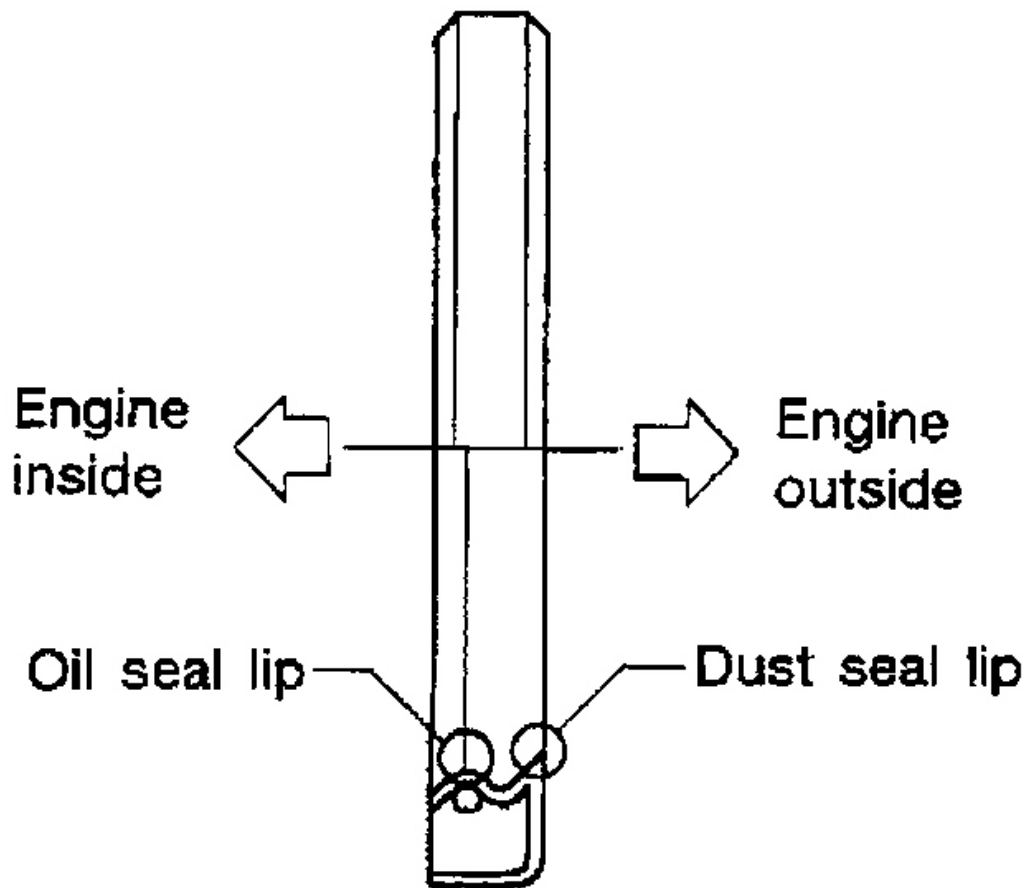
3. Apply engine oil to new oil seal and install it using a suitable tool.



G02044795

Fig. 108: Removing Front Oil Seal
Courtesy of NISSAN MOTOR CO., U.S.A.

- Install new oil seal in the direction shown in the figure.

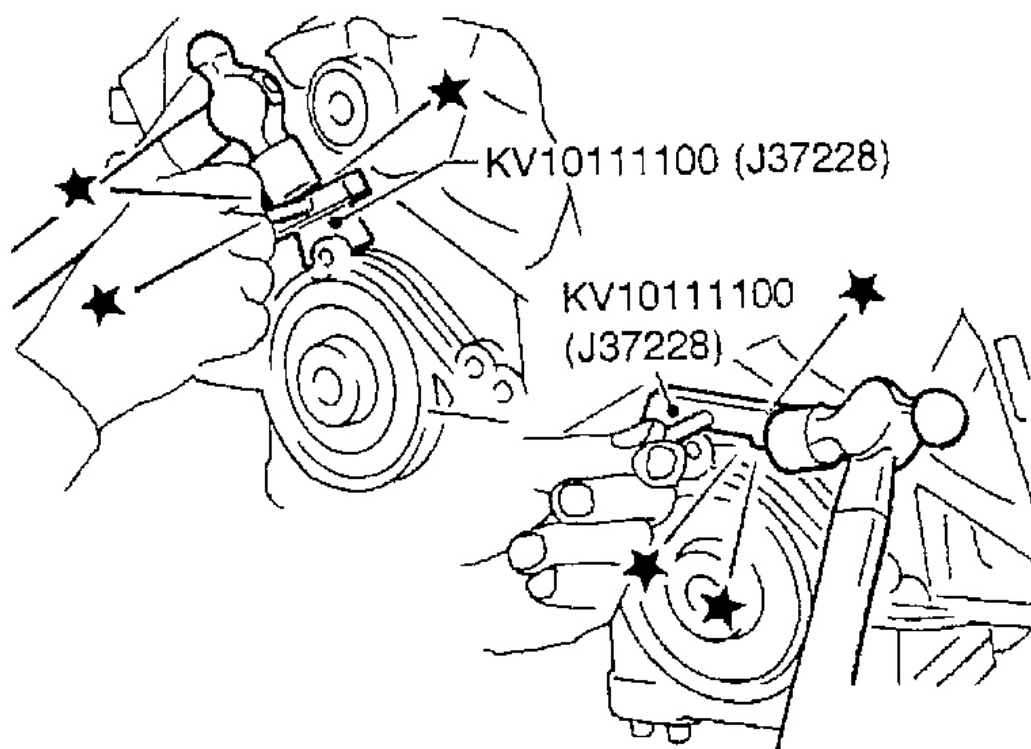


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Fig. 109: Applying New Engine Oil To New Oil Seal
Courtesy of NISSAN MOTOR CO., U.S.A.

REAR OIL SEAL

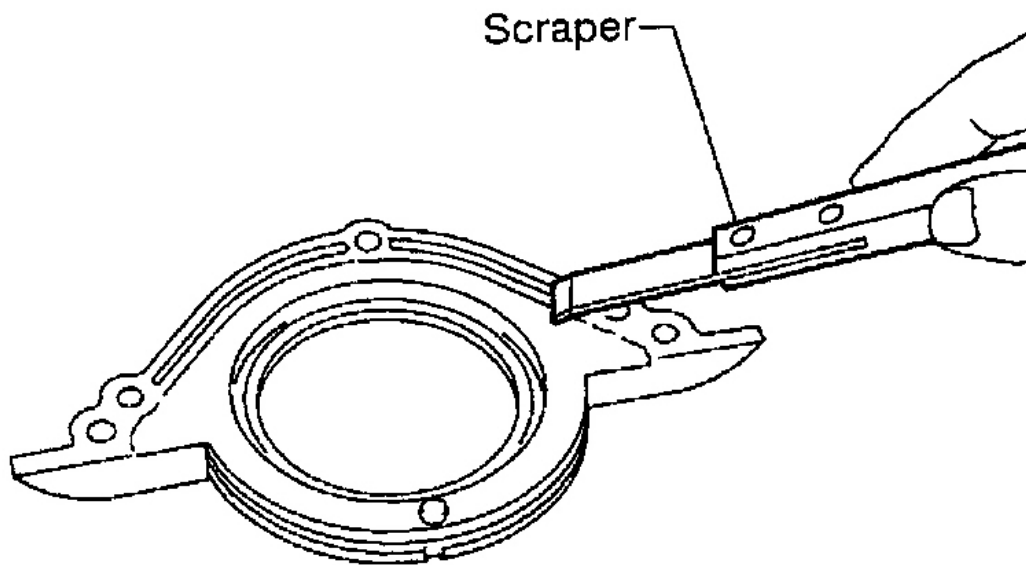
1. Remove transaxle. Refer to **REMOVAL & INSTALLATION** .
2. Remove flywheel or drive plate.
3. Remove oil pan. Refer to **OIL PAN**.
4. Remove rear oil seal retainer.



G02044797

Fig. 110: Removing Rear Oil Seal Retainer
Courtesy of NISSAN MOTOR CO., U.S.A.

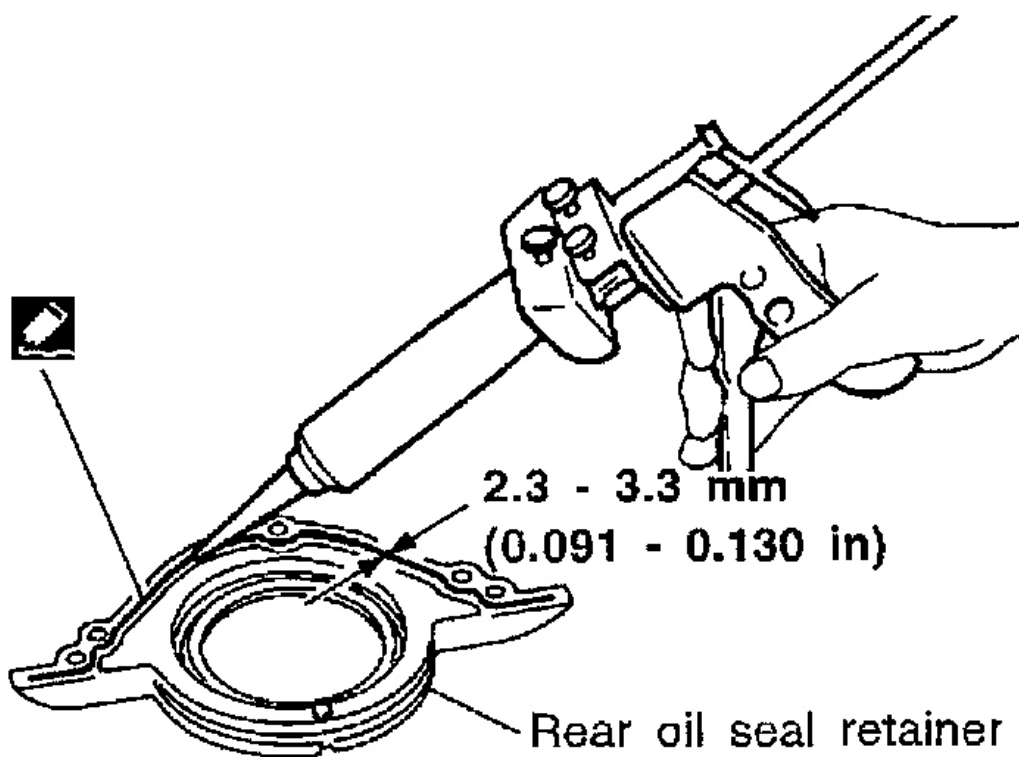
5. Remove old liquid gasket on mating surface of cylinder block and oil pan using scraper.
 - **Remove old liquid gasket from the bolt hole and thread.**



G02044798

Fig. 111: Removing Old Liquid Gasket On Mating Surface Of Cylinder Block And Oil Pan
Courtesy of NISSAN MOTOR CO., U.S.A.

6. Apply liquid gasket to rear oil seal retainer.
 - Use Genuine RTV Silicone Sealant or equivalent. Refer to **RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS** .
 - Assembly should be done within 5 minutes after coating.
 - Wait at least 30 minutes before refilling engine oil and engine coolant.



G02044799

Fig. 112: Applying Liquid Gasket To Rear Oil Seal Retainer
Courtesy of NISSAN MOTOR CO., U.S.A.

CYLINDER HEAD

COMPONENTS

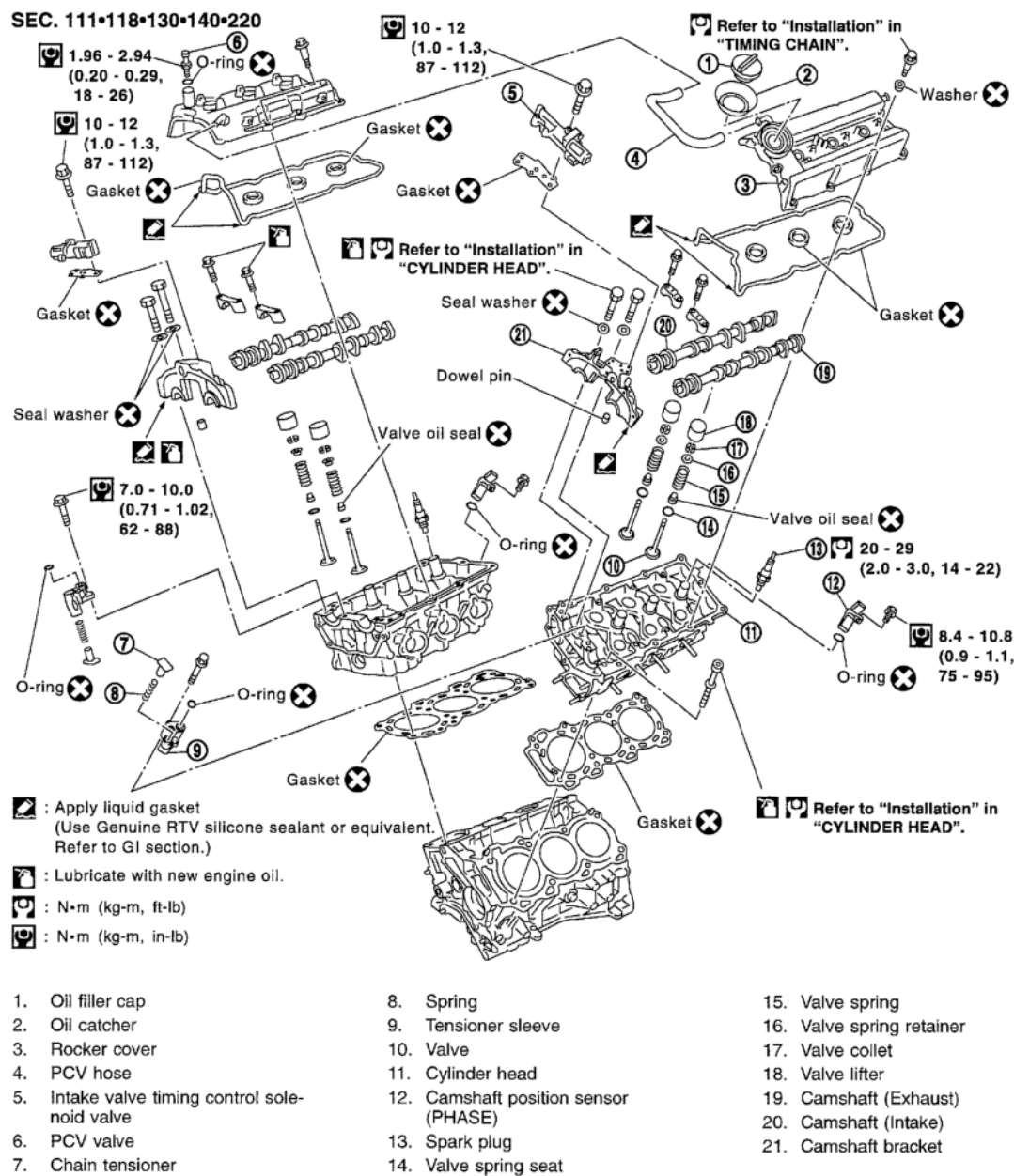


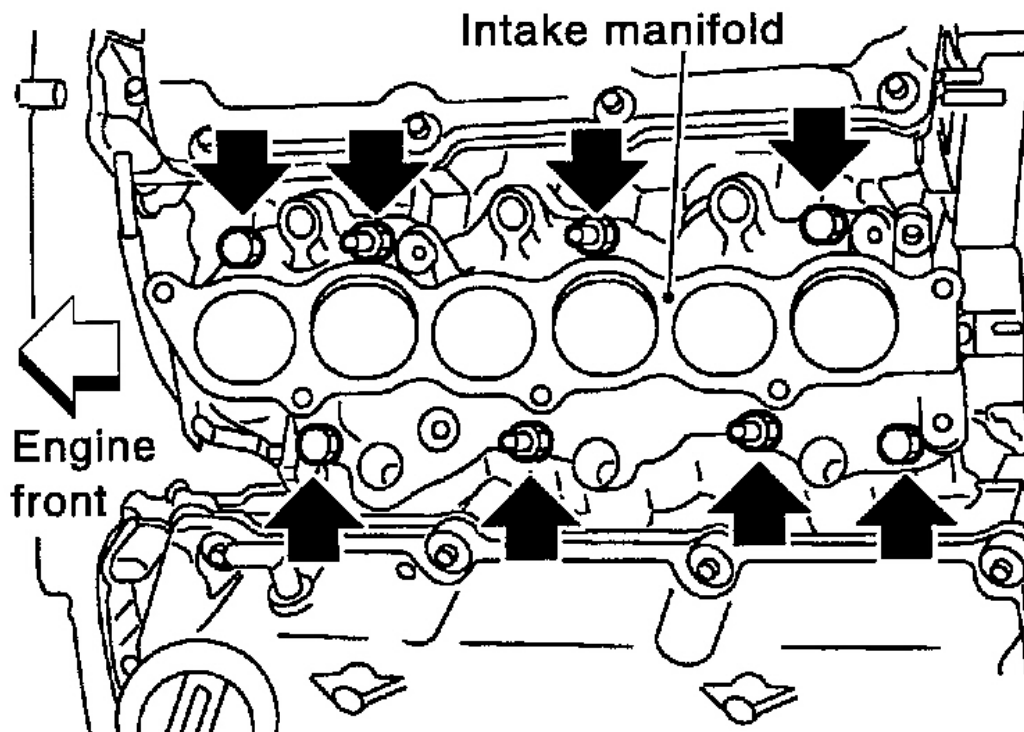
Fig. 113: Identifying Cylinder Head Components
Courtesy of NISSAN MOTOR CO., U.S.A.

CAUTION:

- When installing camshafts, chain tensioners, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.
- Apply new engine oil to threads and seat surfaces when installing cylinder head, camshaft sprocket, crankshaft pulley, and camshaft bracket.
- Attach tags to valve lifters so as not to mix them up.

REMOVAL

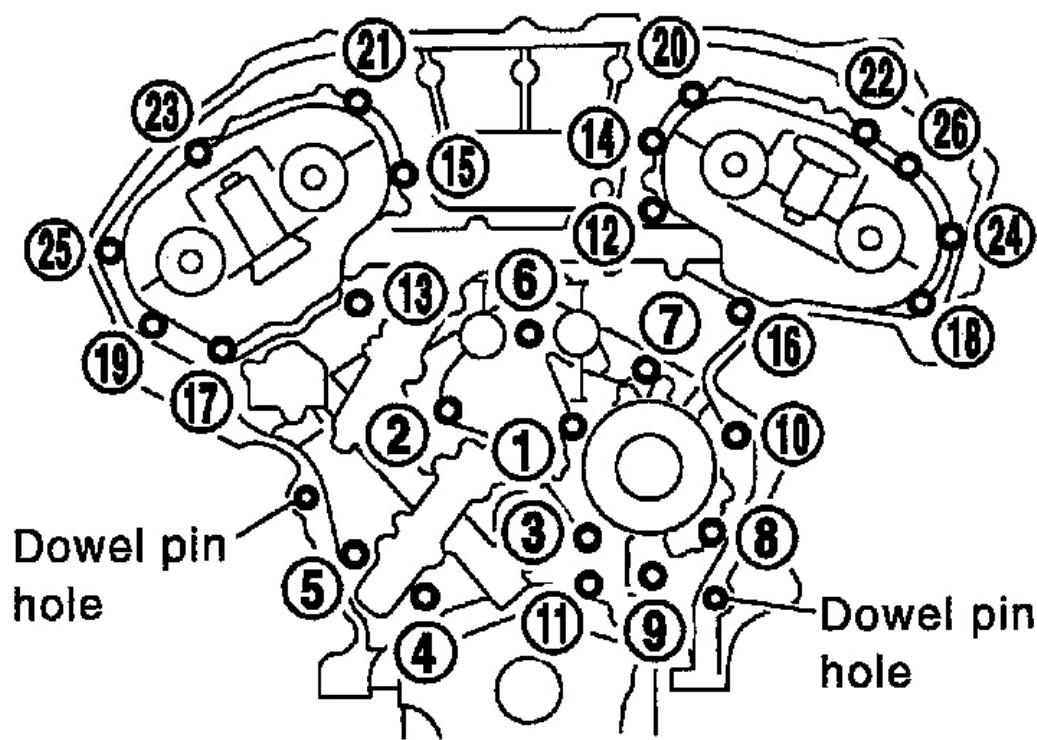
1. Remove engine from vehicle. Refer to , "**REMOVAL AND INSTALLATION**".
2. Remove exhaust manifolds.
3. Place engine on a work stand.
4. Remove aluminum oil pan. Refer to , "**REMOVAL**".
5. Remove timing chain. Refer to , "**REMOVAL**".
6. Remove intake manifold in reverse order of installation. Refer to "**TIGHTENING PROCEDURES**", .
7. Remove water outlet.



G02044801

Fig. 114: Removing Aluminum Oil Pan
Courtesy of NISSAN MOTOR CO., U.S.A.

8. Remove rear timing chain case bolts.
 - Loosen in reverse order as shown in the figure.



G02044802

Fig. 115: Removing Rear Timing Chain Case Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

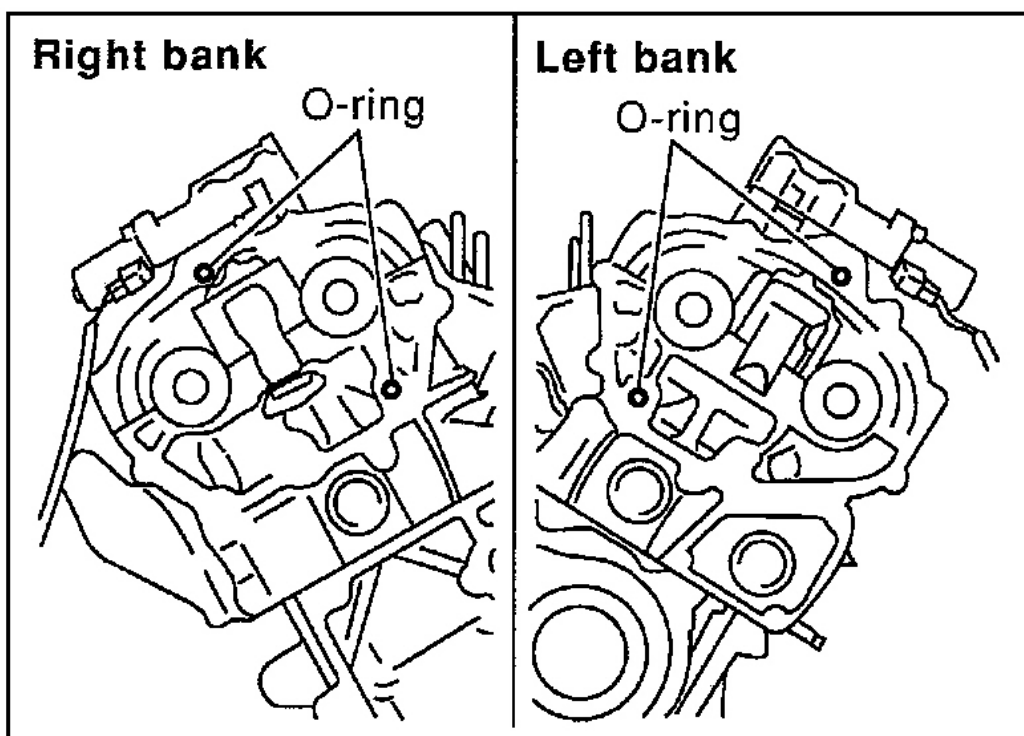
9. Remove rear timing chain case.



G02044803

Fig. 116: Removing Rear Timing Chain Case
Courtesy of NISSAN MOTOR CO., U.S.A.

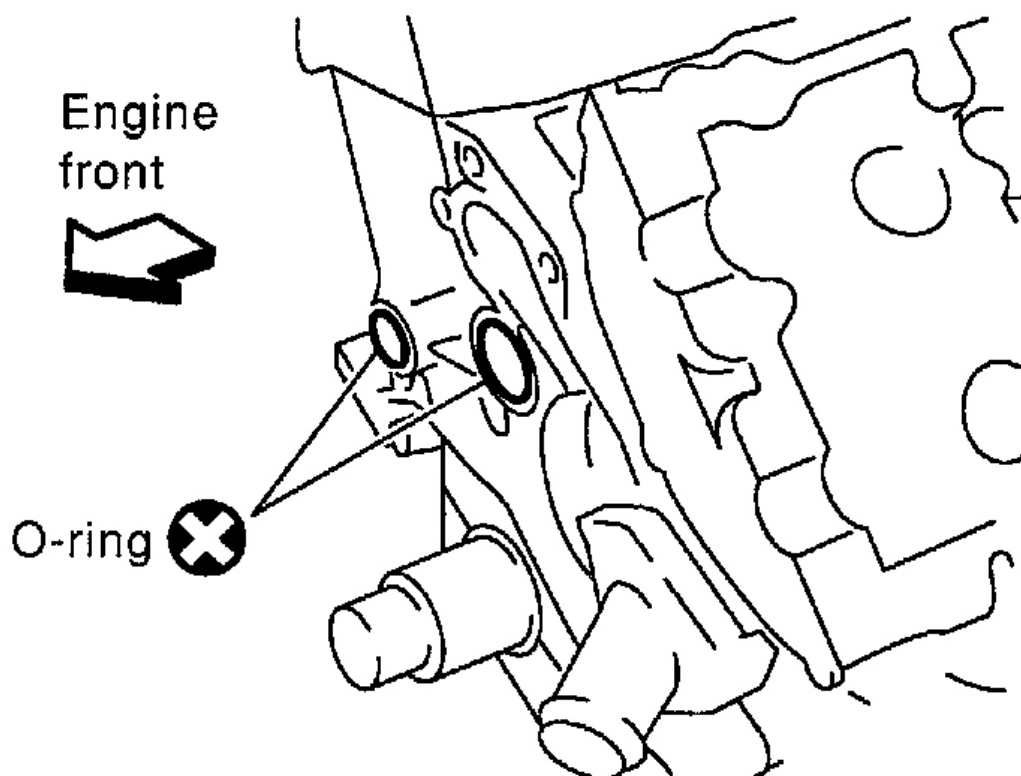
10. Remove O-rings from cylinder head.



G02044804

Fig. 117: Removing O-Rings From Cylinder Head
Courtesy of NISSAN MOTOR CO., U.S.A.

11. Remove O-rings from cylinder block.



G02044805

Fig. 118: Removing O-Rings From Cylinder Block
Courtesy of NISSAN MOTOR CO., U.S.A.

12. Remove intake valve timing control solenoid valves.

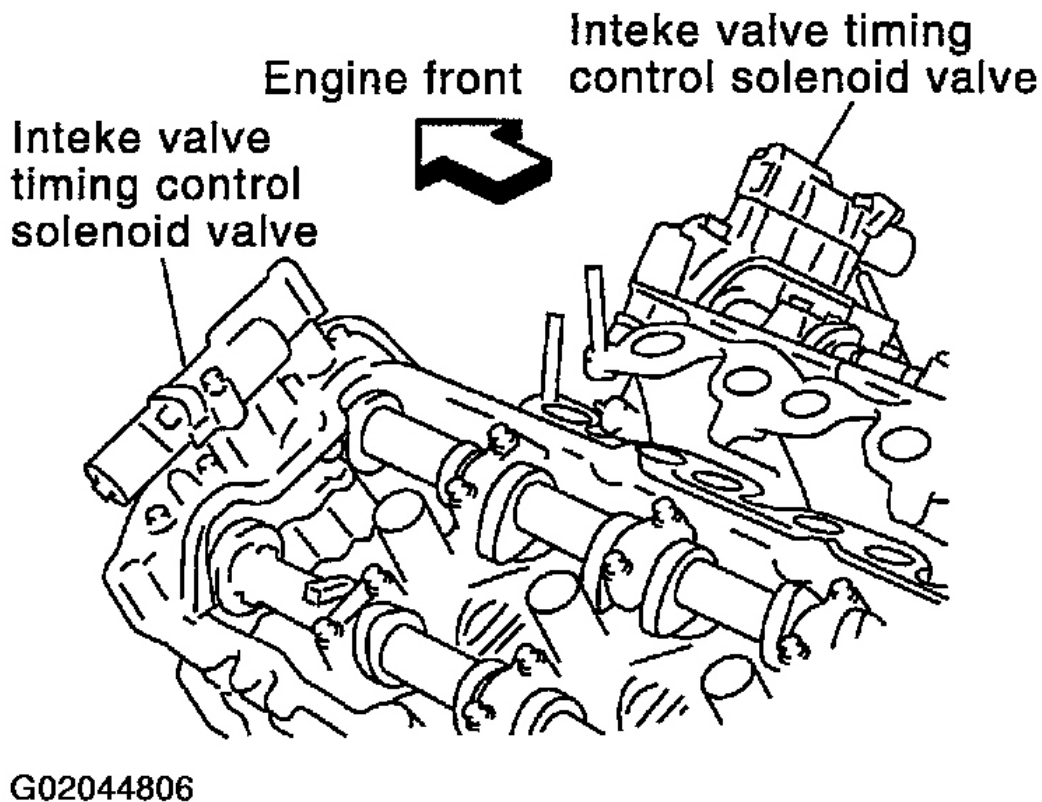
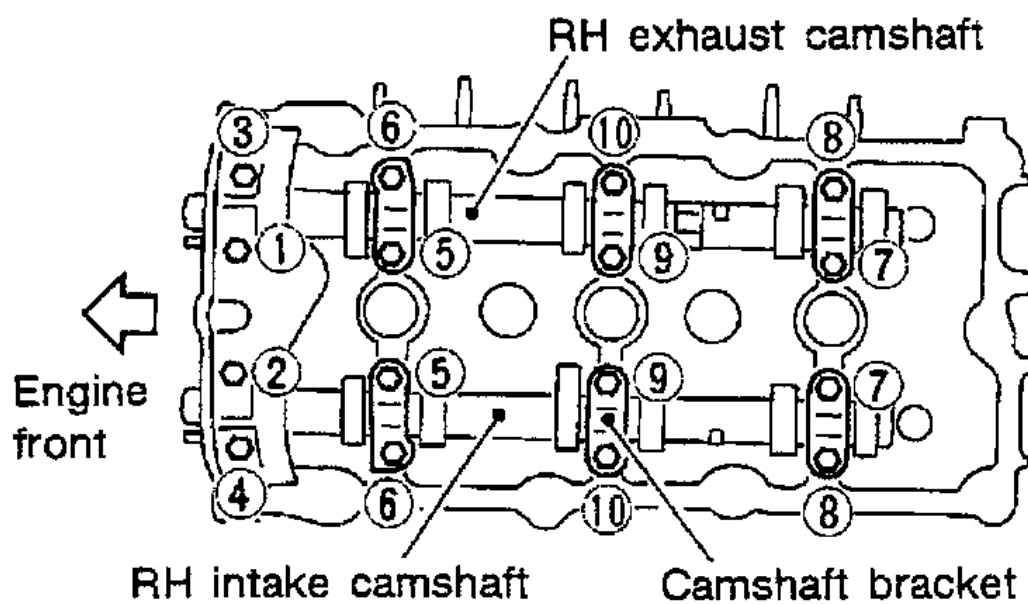


Fig. 119: Removing Intake Valve Timing Control Solenoid Valves
Courtesy of NISSAN MOTOR CO., U.S.A.

13. Remove intake and exhaust camshafts and camshaft brackets.
 - Equally loosen camshaft bracket bolts in several steps in the numerical order shown in the figure.

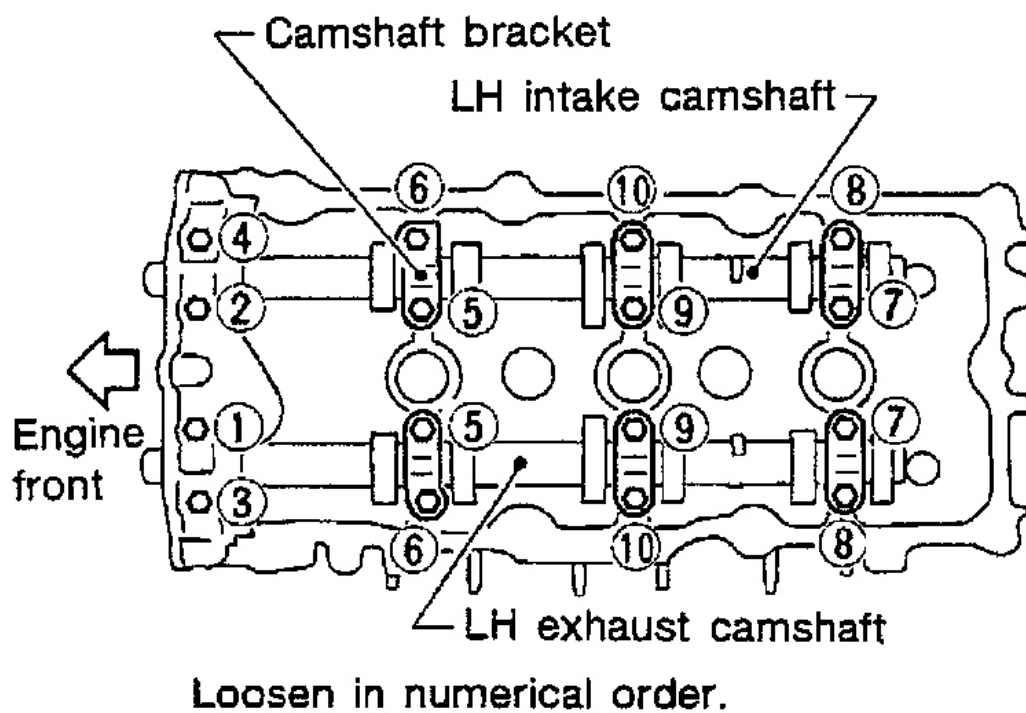
For reinstallation, be sure to put marks on camshaft bracket before removal.



Loosen in numerical order.

G02044807

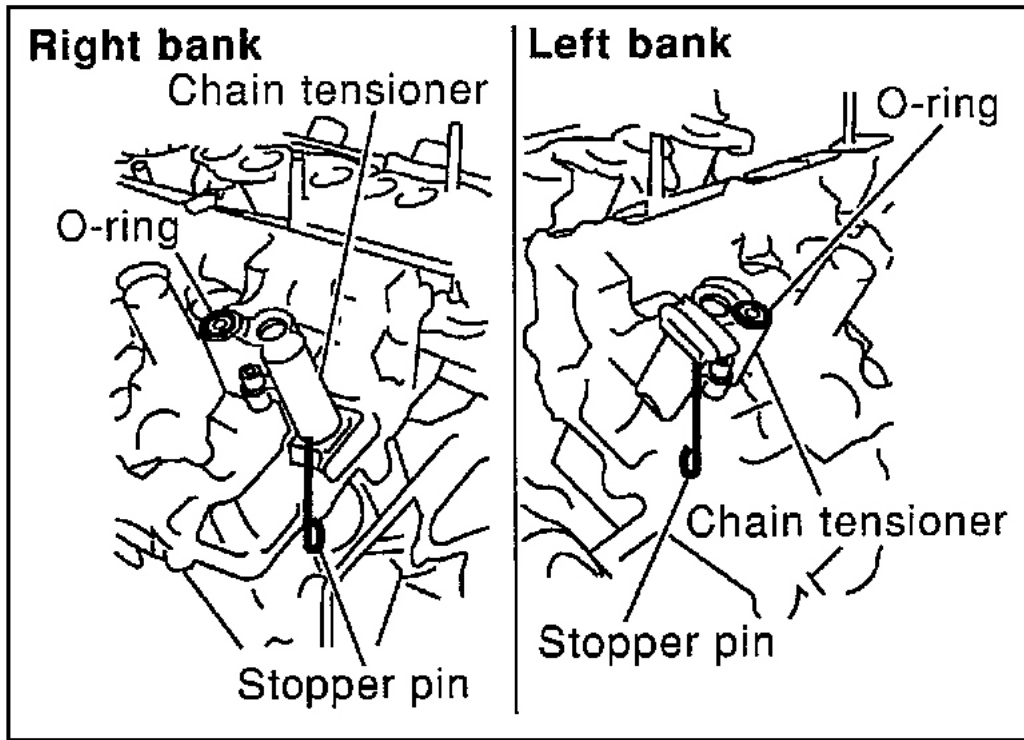
Fig. 120: Removing Intake And Exhaust Camshafts And Camshaft Brackets
Courtesy of NISSAN MOTOR CO., U.S.A.



G02044808

Fig. 121: Removing Camshaft Sprockets
Courtesy of NISSAN MOTOR CO., U.S.A.

14. Remove RH and LH camshaft chain tensioners from cylinder head.

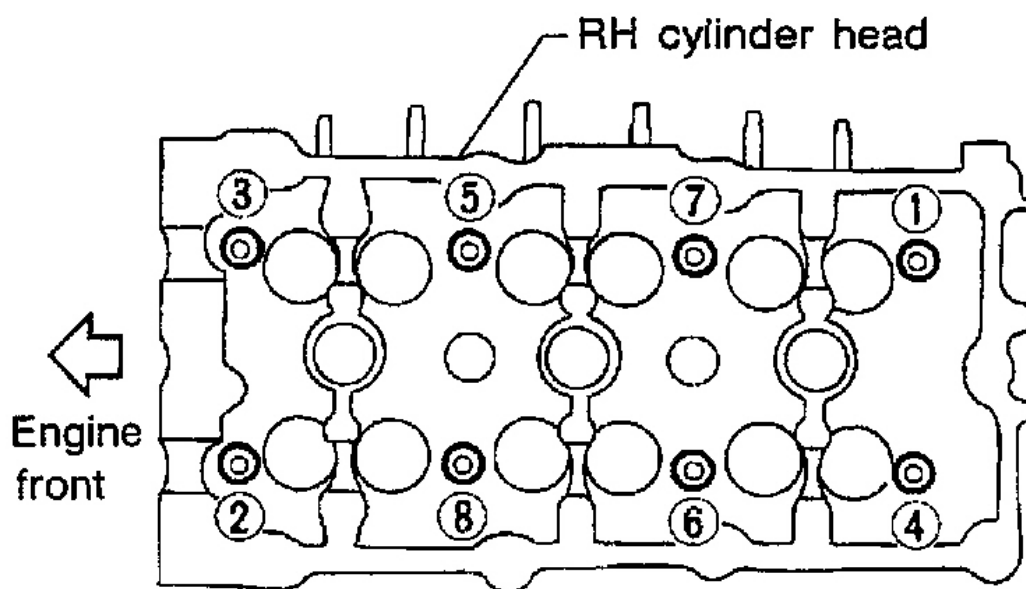


G02044809

Fig. 122: Removing Camshafts And Camshaft Brackets

Courtesy of NISSAN MOTOR CO., U.S.A.

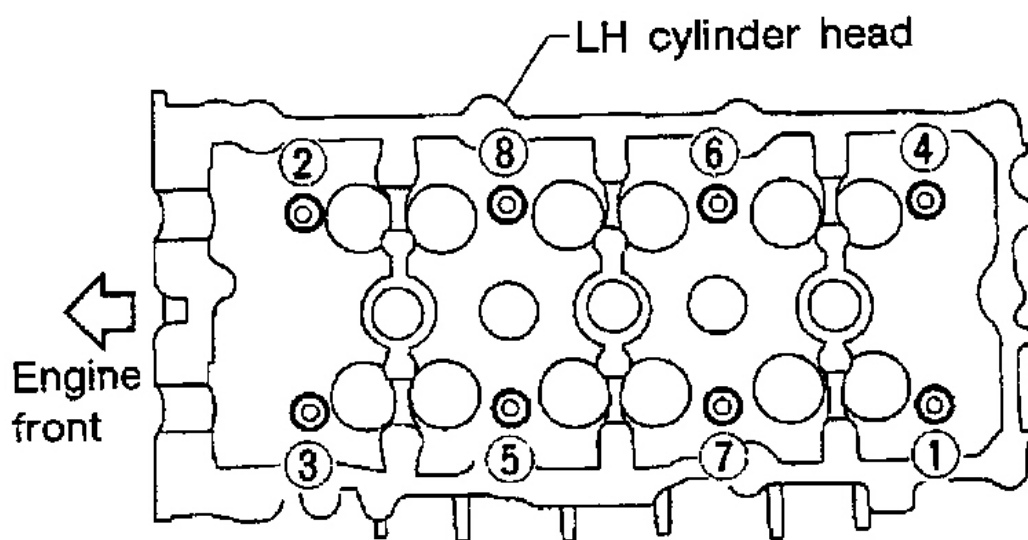
15. Remove cylinder head bolts.
 - Cylinder head bolts should be loosened in two or three steps.
 - A warped or cracked cylinder head could result from removing in incorrect order.



Loosen in numerical order.

G02044810

Fig. 123: Removing Cylinder Head Bolts (RH)
Courtesy of NISSAN MOTOR CO., U.S.A.

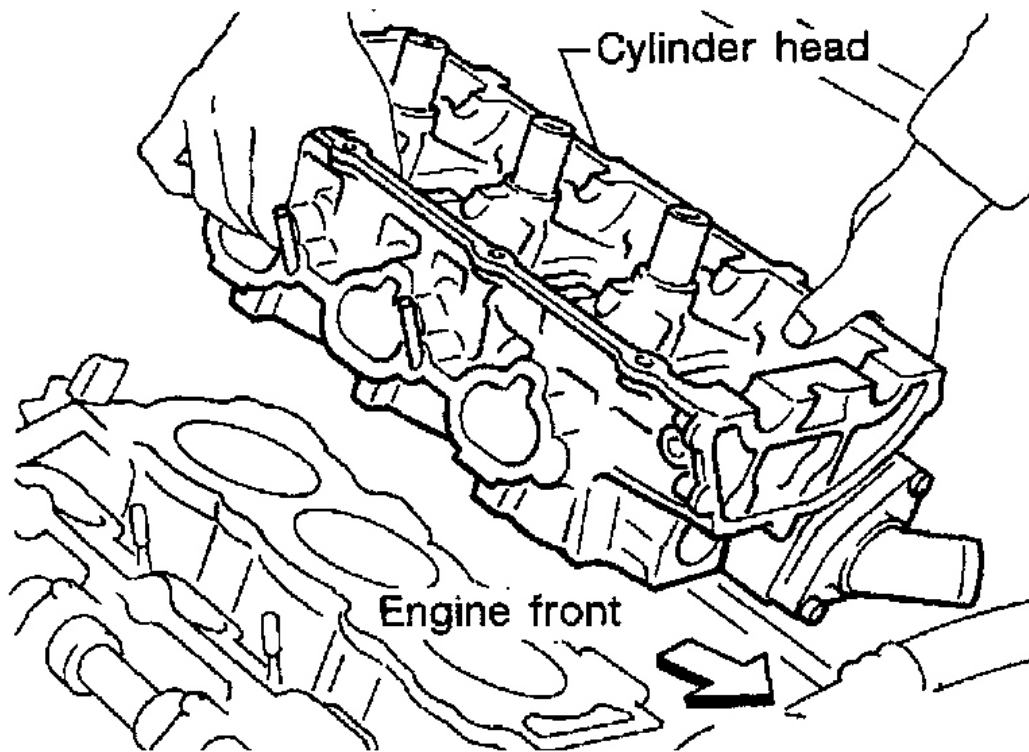


Loosen in numerical order.

G02044811

Fig. 124: Removing Cylinder Head Bolts (LH)
Courtesy of NISSAN MOTOR CO., U.S.A.

16. Remove cylinder head.



G02044812

Fig. 125: Removing Cylinder Head
Courtesy of NISSAN MOTOR CO., U.S.A.

DISASSEMBLY

Remove valve component parts.

Refer to , "VALVE OIL SEAL".

- Check the clearance before removing the valve guide. Refer to , "VALVE GUIDE CLEARANCE".

INSPECTION

CYLINDER HEAD DISTORTION

Clean surface of cylinder head.

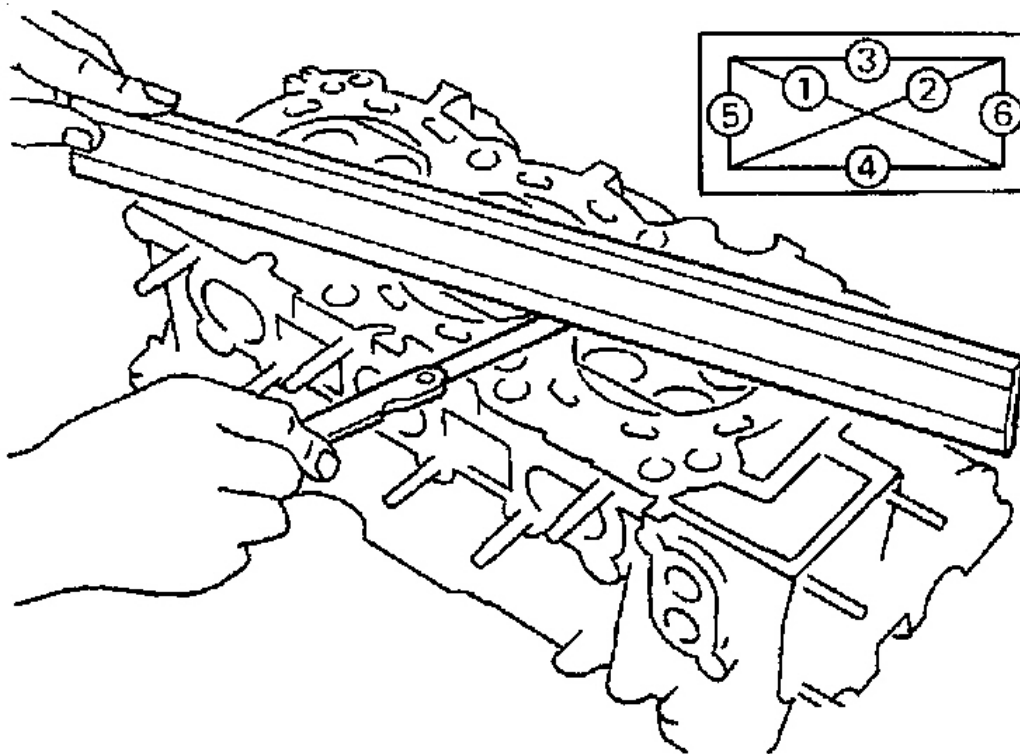
Use a reliable straightedge and feeler gauge to check the flatness of cylinder head surface.

Check along six positions shown in the figure.

Head surface flatness: Limit 0.1 mm (0.004 in)

If beyond the specified limit, resurface or replace it.

The limit for cylinder head resurfacing is determined by the cylinder block resurfacing.



G02044813

Fig. 126: Inspecting Cylinder Head Distortion
Courtesy of NISSAN MOTOR CO., U.S.A.

Resurfacing limit:

Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

The maximum limit: $A + B = 0.2 \text{ mm (0.008 in)}$

After resurfacing cylinder head, check that camshaft rotates freely by hand. If resistance is felt, cylinder head must be replaced.

Nominal cylinder head height:**126.3 - 126.5 mm (4.972 - 4.980 in)****CAMSHAFT VISUAL CHECK**

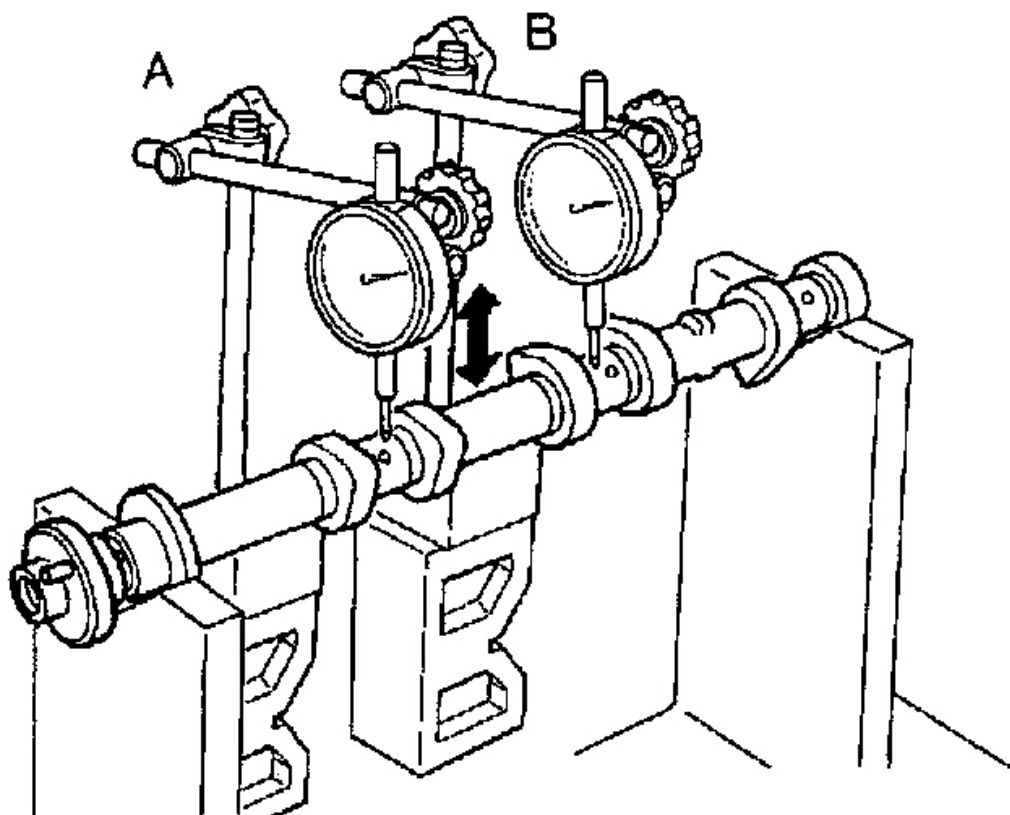
Check camshaft for scratches, seizure and wear.

CAMSHAFT RUNOUT

1. Measure camshaft runout at A and B as shown in the figure.

Runout (Total indicator reading):**Limit 0.05 mm (0.0020 in)**

2. If it exceeds the limit, replace camshaft.



G02044814

Fig. 127: Checking Camshaft For Scratches Seizure And Wear
Courtesy of NISSAN MOTOR CO., U.S.A.

CAMSHAFT CAM HEIGHT

1. Measure camshaft cam height.

Standard cam height:

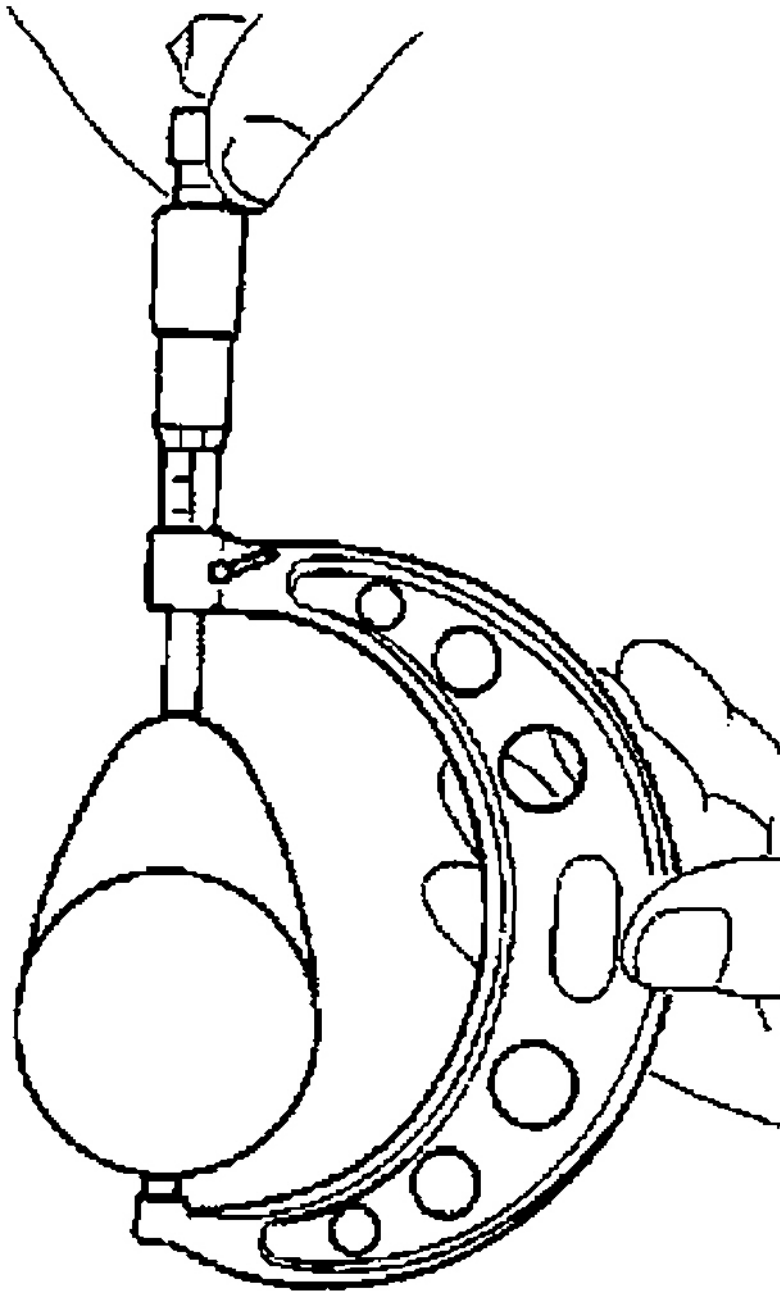
Intake and exhaust

44.865 - 45.055 mm (1.7763 - 1.7738 in)

Cam wear limit:

0.2 mm (0.008 in)

2. If wear is beyond the limit, replace camshaft.



G02044815

Fig. 128: Measuring Camshaft CAM Height
Courtesy of NISSAN MOTOR CO., U.S.A.

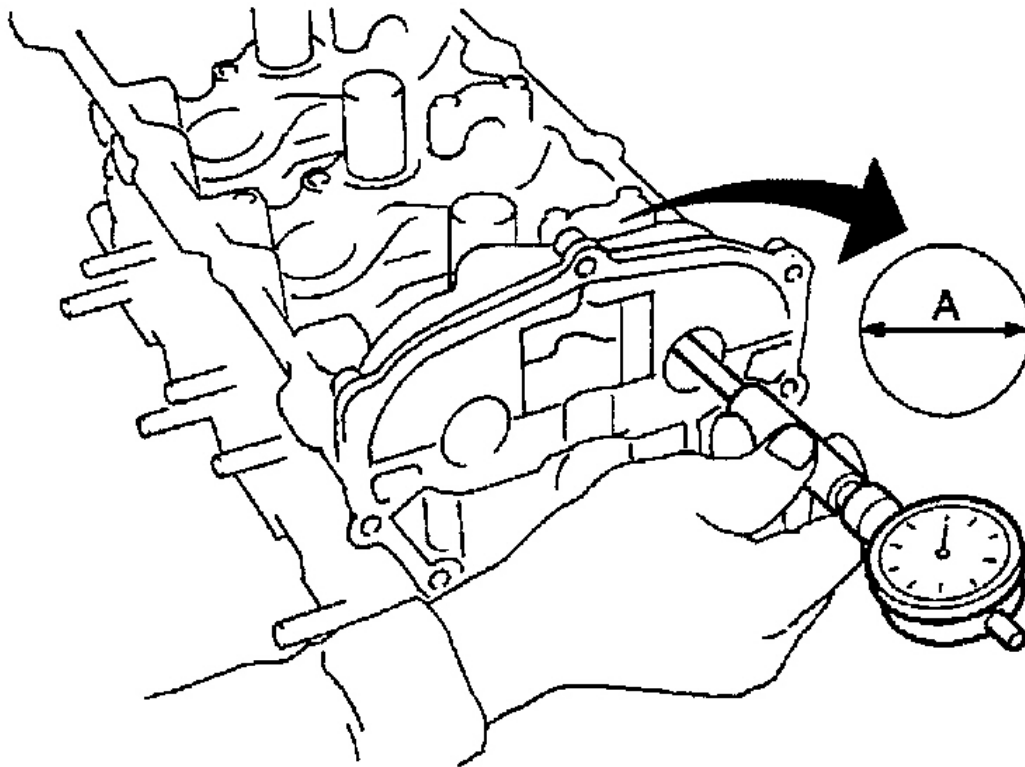
CAMSHAFT JOURNAL CLEARANCE

1. Install camshaft bracket and tighten bolts to the specified torque.
2. Measure inner diameter "A" of camshaft bearing.

Standard inner diameter:

No. 1: 26.000 - 26.021 mm (1.0236 - 1.0244 in)

No. 2, 3, 4: 23.500 - 23.521 mm (0.9252 - 0.9260 in)



G02044816

Fig. 129: Measuring Inner Diameter Of Camshaft Bearing
Courtesy of NISSAN MOTOR CO., U.S.A.

3. Measure outer diameter of camshaft journal.

Standard outer diameter:

No. 1: 25.935 - 25.955 mm (1.0211 - 1.0218 in)

No. 2, 3, 4: 23.445 - 23.465 mm (0.9230 - 0.9238 in)

4. If clearance exceeds the limit, replace camshaft and/or cylinder head.

Camshaft journal clearance:

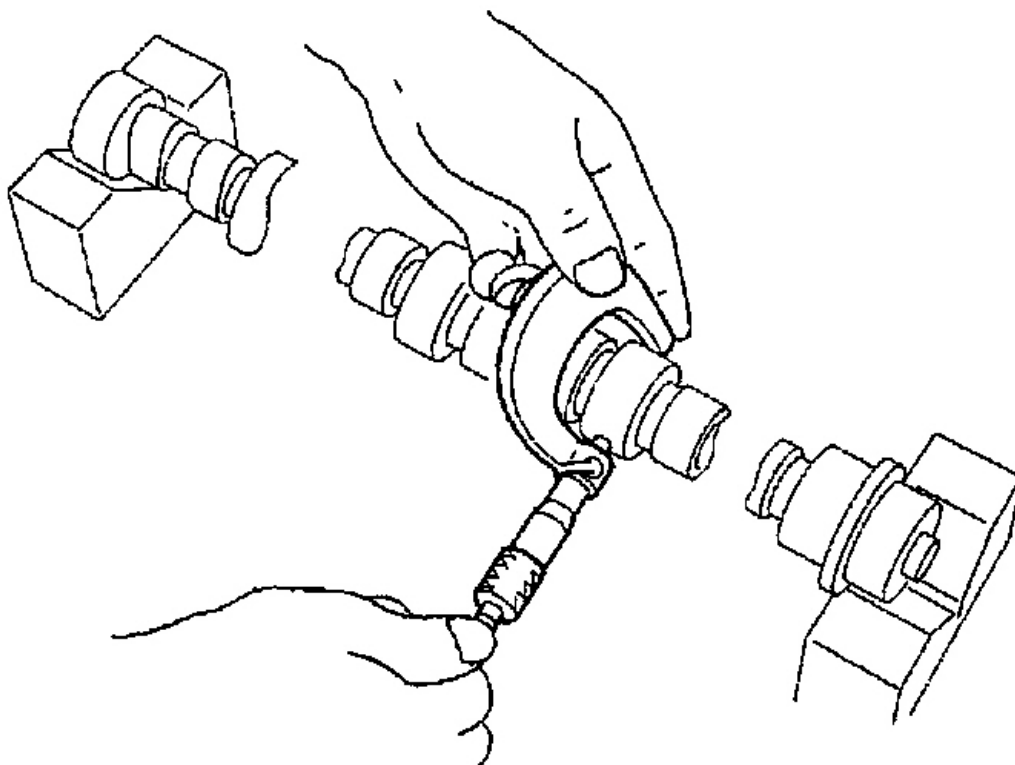
Standard

No. 1: 0.045 - 0.086 mm (0.0018 - 0.0034 in)

No. 2, 3, 4: 0.035 - 0.076 mm (0.0014 - 0.0030 in)

Limit

0.15 mm (0.0059 in)



G02044817

Fig. 130: Measuring Outer Diameter Of Camshaft
Courtesy of NISSAN MOTOR CO., U.S.A.

CAMSHAFT END PLAY

1. Install camshaft in cylinder head.
2. Measure camshaft end play.

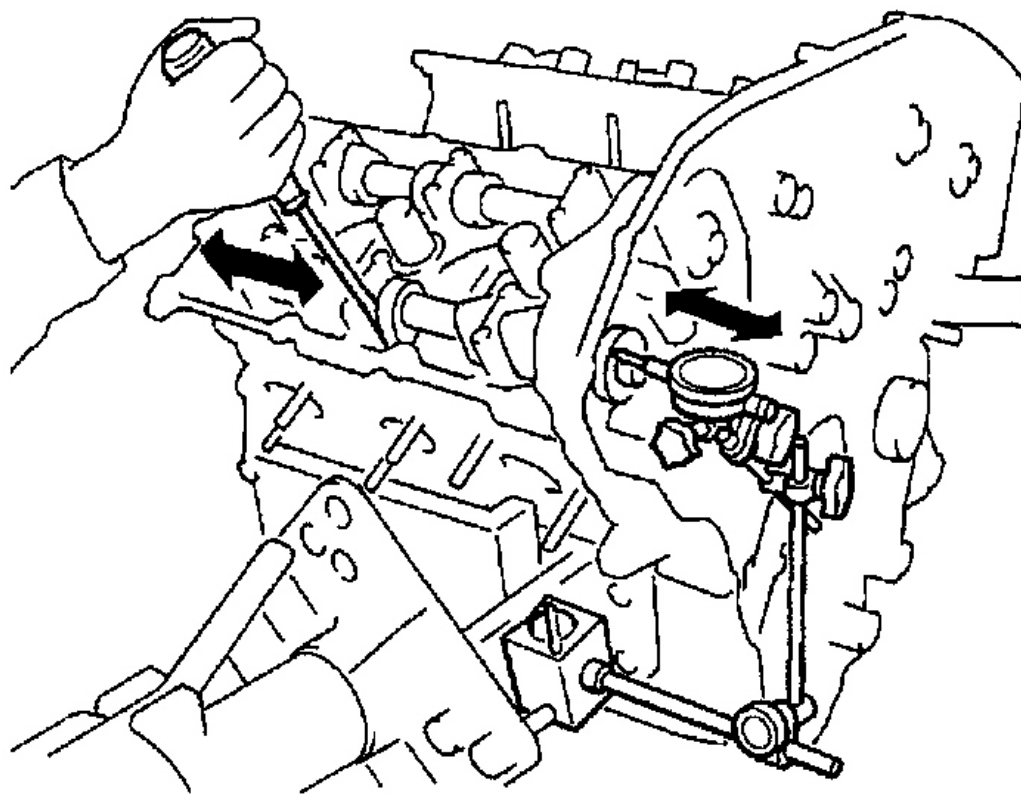
Camshaft end play:

Standard

0.115 - 0.188 mm (0.0045 - 0.0074 in)

Limit

0.24 mm (0.0094 in)



G02044818

Fig. 131: Measuring Camshaft End Play
Courtesy of NISSAN MOTOR CO., U.S.A.

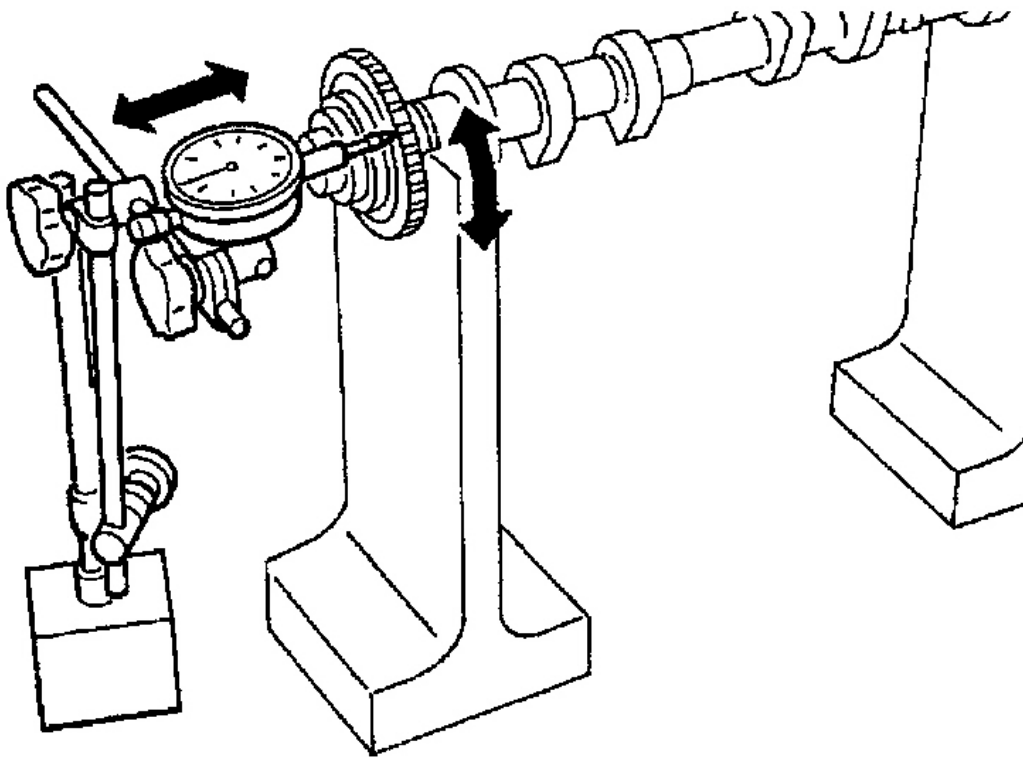
CAMSHAFT SPROCKET RUNOUT

1. Install sprocket on camshaft.
2. Measure camshaft sprocket runout.

Runout (Total indicator reading):

Less than 0.15 mm (0.0059 in)

3. If it exceeds the limit, replace camshaft sprocket.



G02044819

Fig. 132: Measuring Camshaft Sprocket Runout
Courtesy of NISSAN MOTOR CO., U.S.A.

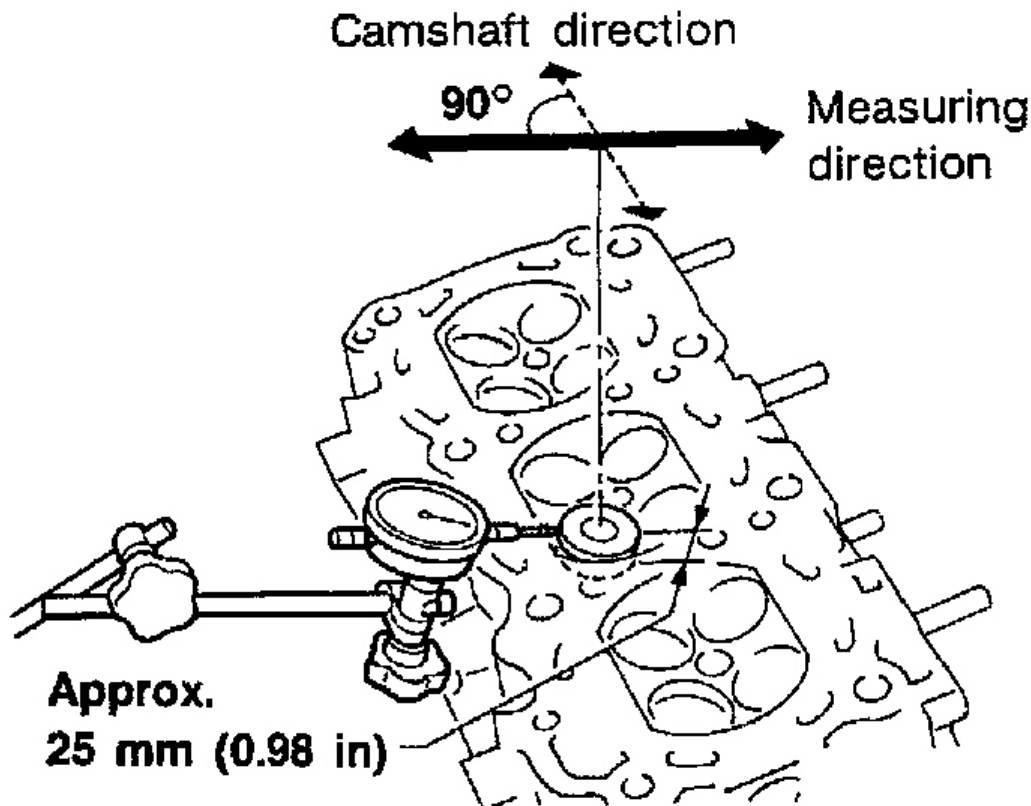
VALVE GUIDE CLEARANCE

1. Measure valve deflection as shown in the figure. (Valve and valve guide mostly wear in this direction.)

Valve deflection limit (Dial gauge reading):

Intake 0.24 mm (0.0094 in)

Exhaust 0.28 mm (0.0110 in)



G02044820

Fig. 133: Measuring Valve Guide Clearance
Courtesy of NISSAN MOTOR CO., U.S.A.

2. If it exceeds the limit, check valve to valve guide clearance.
 - a. Measure valve stem diameter and valve guide inner diameter.
 - b. Check that clearance is within specification.

Valve to valve guide clearance limit:

Intake 0.08 mm (0.0031 in)

Exhaust 0.1 mm (0.004 in)

- c. If it exceeds the limit, replace valve or valve guide.

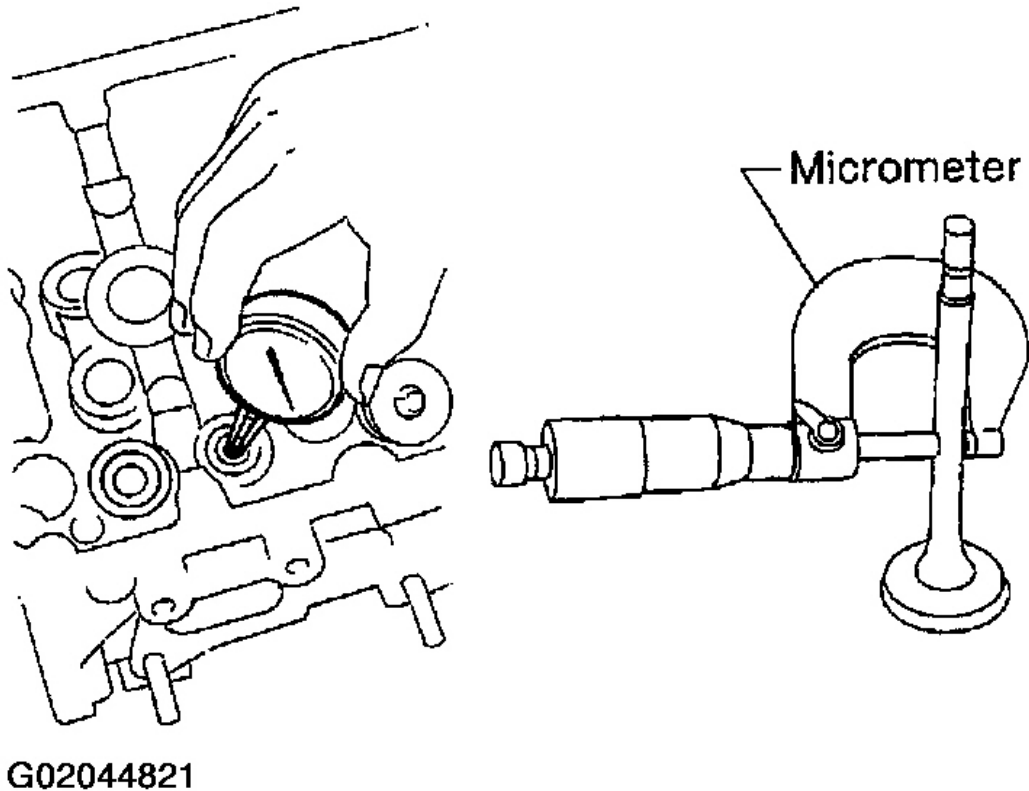
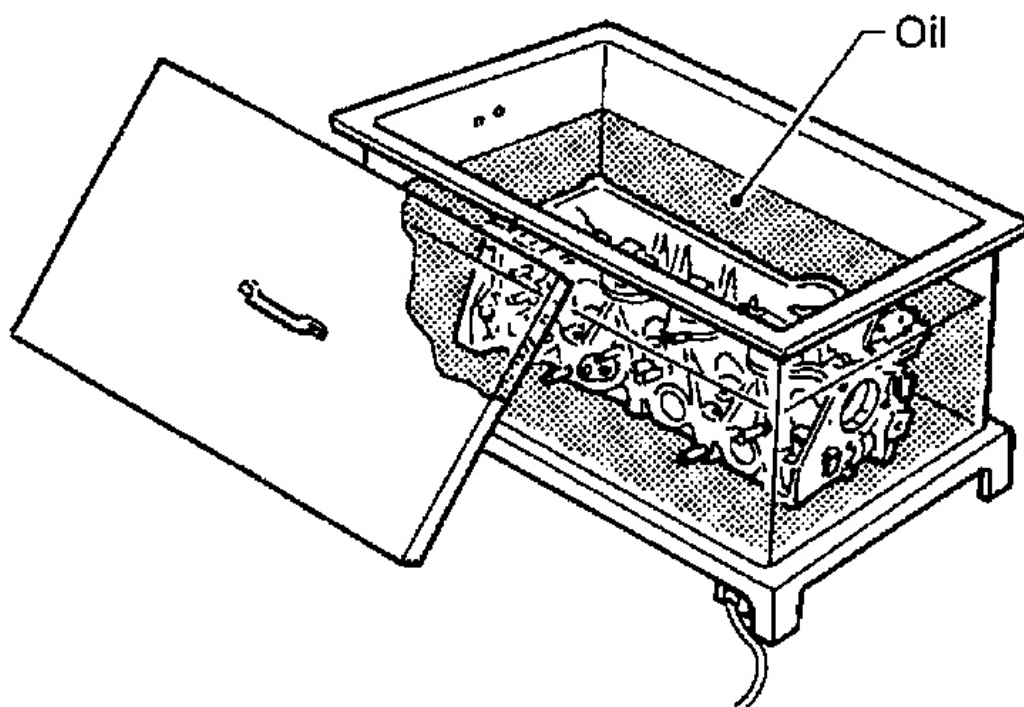


Fig. 134: Measuring Valve Stem
Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE GUIDE REPLACEMENT

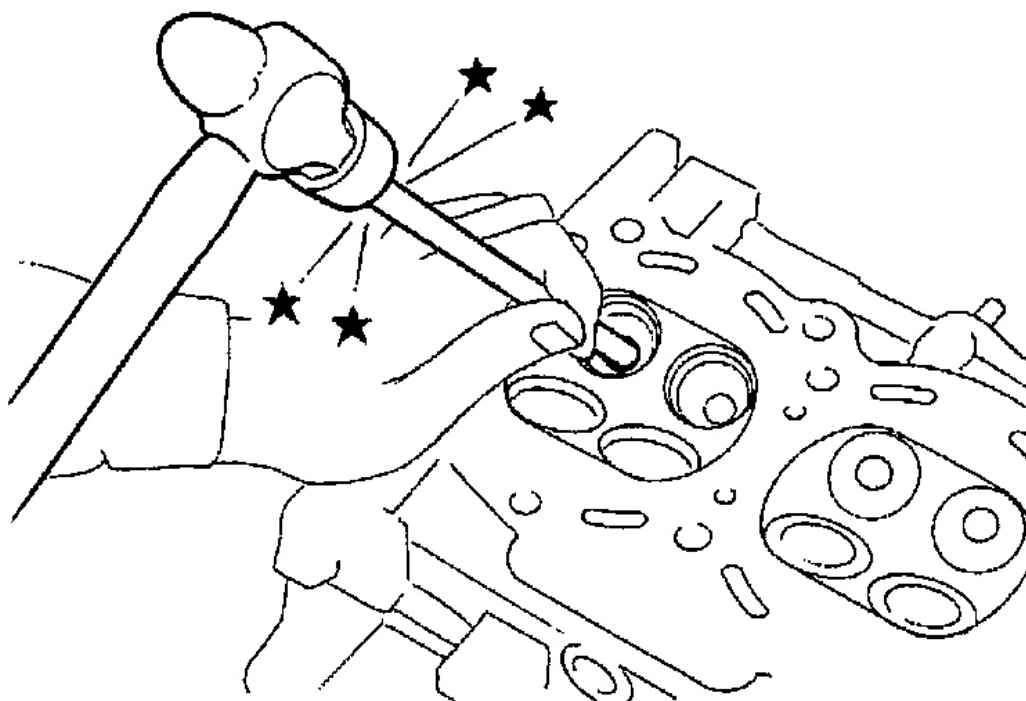
1. To remove valve guide, heat cylinder head to 110 to 130°C (230 to 266°F) by soaking in heated oil.



G02044822

Fig. 135: Soaking Cylinder Head In Heated Oil
Courtesy of NISSAN MOTOR CO., U.S.A.

2. Drive out valve guide with a press [under a 20 kN (2 ton, 2.2 US ton, 2.0 Imp ton) pressure] or hammer and suitable tool.



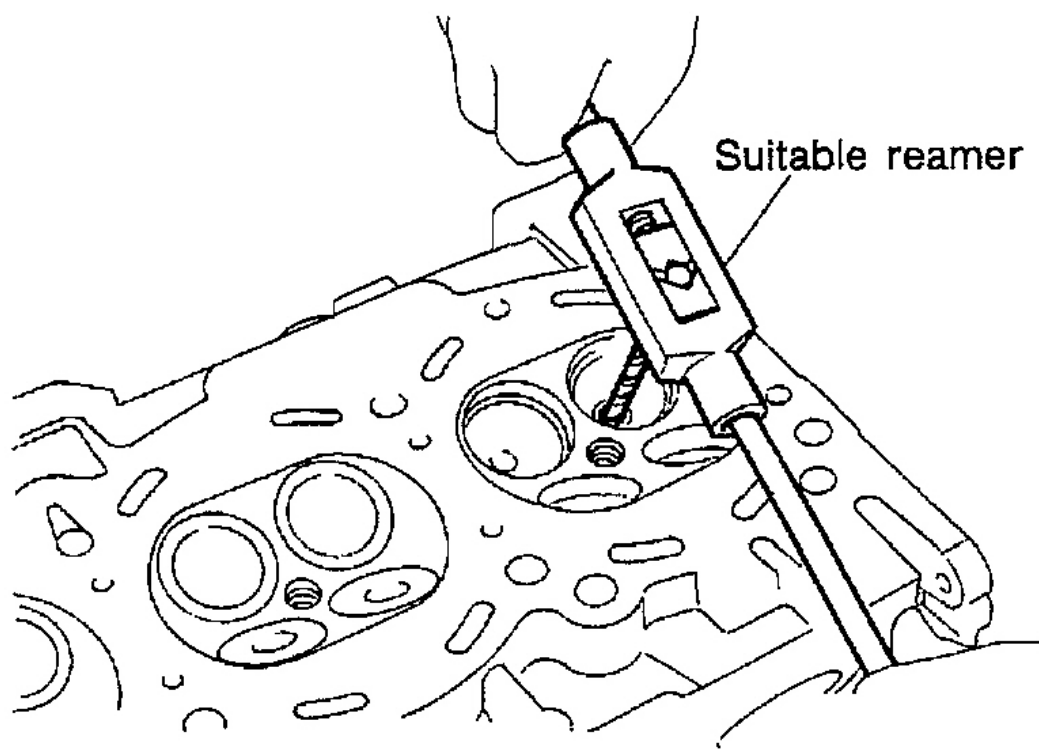
G02044823

Fig. 136: Driving Out Valve Guide
Courtesy of NISSAN MOTOR CO., U.S.A.

3. Ream cylinder head valve guide hole.

Valve guide hole diameter (for service parts):

10.175 - 10.196 mm (0.4006 - 0.4014 in)



G02044824

Fig. 137: Reaming Cylinder Head Valve Guide Hole

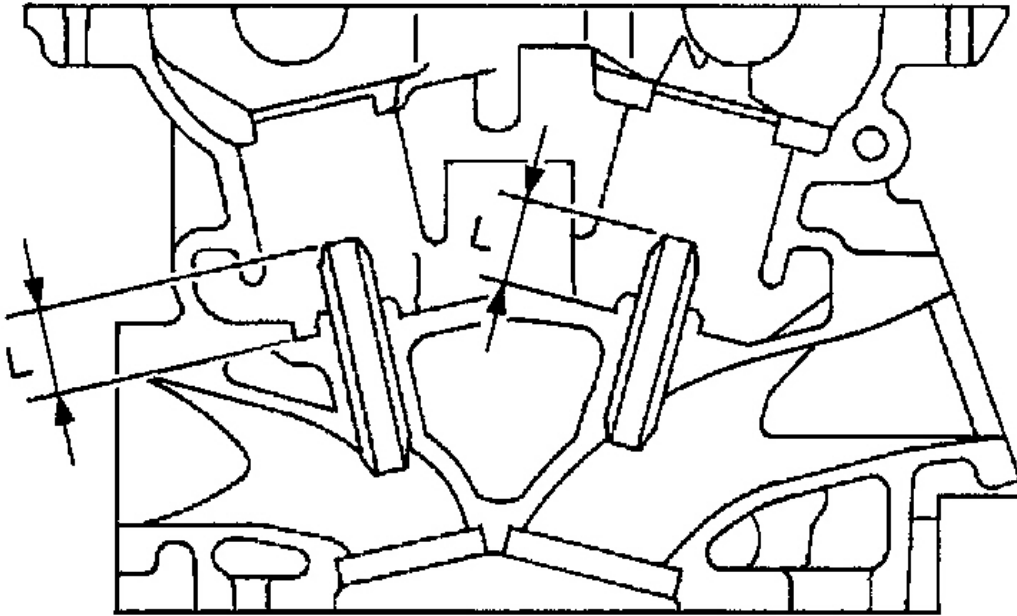
Courtesy of NISSAN MOTOR CO., U.S.A.

4. Heat cylinder head to 110 to 130°C (230 to 266°F) and press service valve guide onto cylinder head.

Projection "L":**12.6 - 12.8 mm (0.496 - 0.504 in)**

5. Ream valve guide.

Finished size:**6.000 - 6.018 mm (0.2362 - 0.2369 in)**



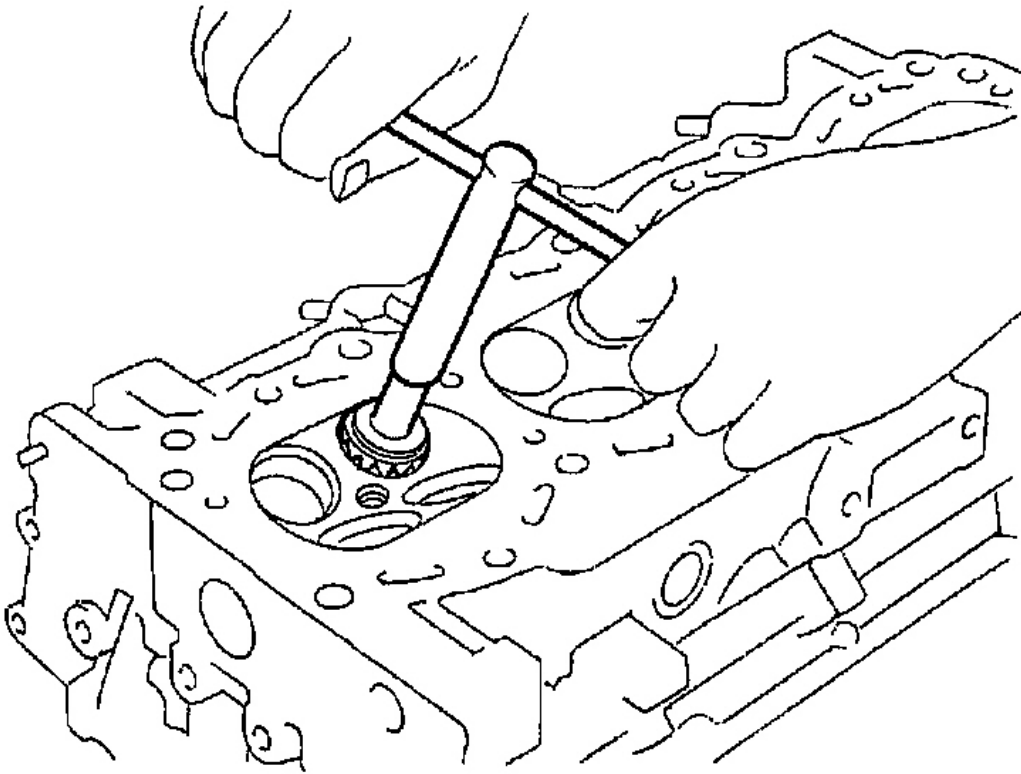
G02044825

Fig. 138: Pressing Service Valve Guide Onto Cylinder Head
Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE SEATS

Check valve seats for any evidence of pitting at valve contact surface, and reseal or replace if it has worn out excessively.

- **Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat.**
- **Use both hands to cut uniformly.**



G02044826

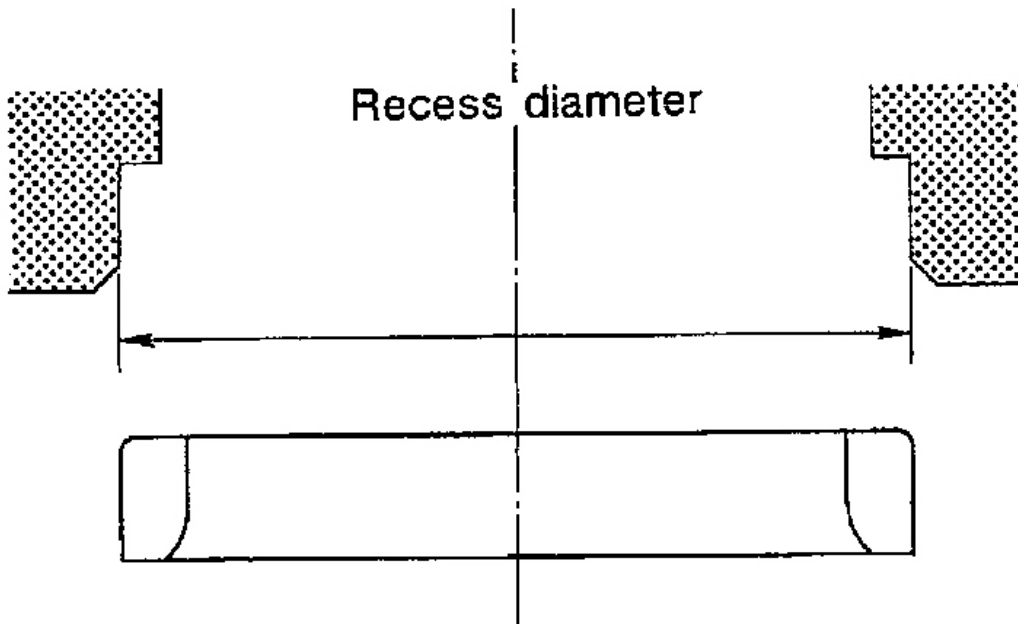
Fig. 139: Checking Valve Seats

Courtesy of NISSAN MOTOR CO., U.S.A.

REPLACING VALVE SEAT FOR SERVICE PARTS

1. Bore out old seat until it collapses. Boring should not continue beyond the bottom face of the seat recess in cylinder head. Set the machine depth stop to ensure this.
2. Ream cylinder head recess for service valve seat.

Oversize [0.5 mm (0.020 in)]:**Intake 38.500 - 38.516 mm (1.5157 - 1.5164 in)****Exhaust 32.700 - 32.716 mm (1.2874 - 1.2880 in)****Be sure to ream in circles concentric to the valve guide center.****This will enable valve seat to fit correctly.**



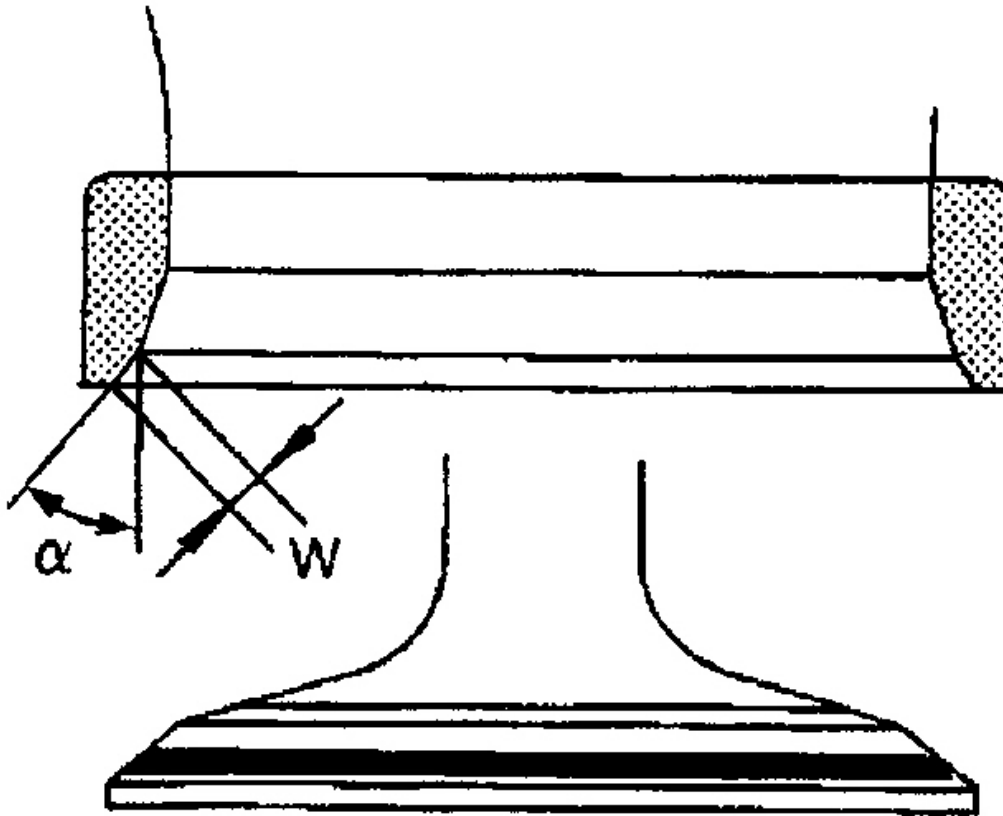
G02044827

Fig. 140: Identifying Cylinder Head Recess

Courtesy of NISSAN MOTOR CO., U.S.A.

3. Heat cylinder head to 110 to 130°C (230 to 266°F) by soaking in heated oil.
4. Press fit valve seat until it seats on the bottom.
5. Cut or grind valve seat using suitable tool to the specified dimensions as shown in SDS (**VALVE SEAT**).
6. After cutting, lap valve seat with abrasive compound.
7. Check valve seating condition.

Seat face angle "alpha": 45°15' - 45°45'**Contacting width "W":****Intake 1.09 - 1.31 mm (0.0429 - 0.0516 in)****Exhaust 1.29 - 1.51 mm (0.0508 - 0.0594 in)**



G02044828

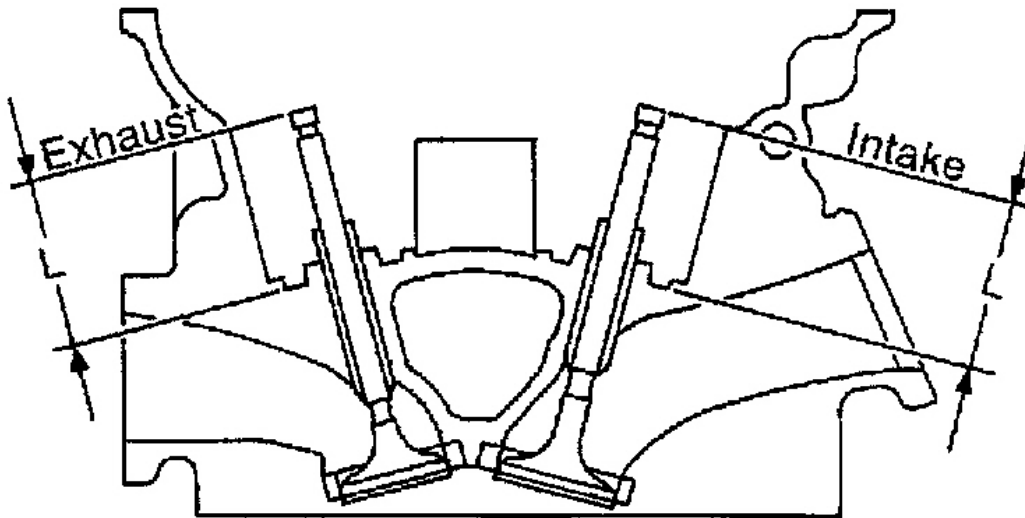
Fig. 141: Identifying Valve Seating Condition
Courtesy of NISSAN MOTOR CO., U.S.A.

8. Use a depth gauge to measure the distance between the mounting surface of the cylinder head spring seat and the valve stem end. If the distance is shorter than specified, repeat step 5 above to adjust it. If it is longer, replace the valve seat with a new one.

Valve seat resurface limit "L":

Intake 41.07 - 41.67 mm (1.6169 - 1.6405 in)

Exhaust 41.00 - 41.60 mm (1.6142 - 1.6378 in)



G02044829

Fig. 142: Measuring Between The Mounting Surface Of The Cylinder Head Spring Seat And The Valve Stem End

Courtesy of NISSAN MOTOR CO., U.S.A.

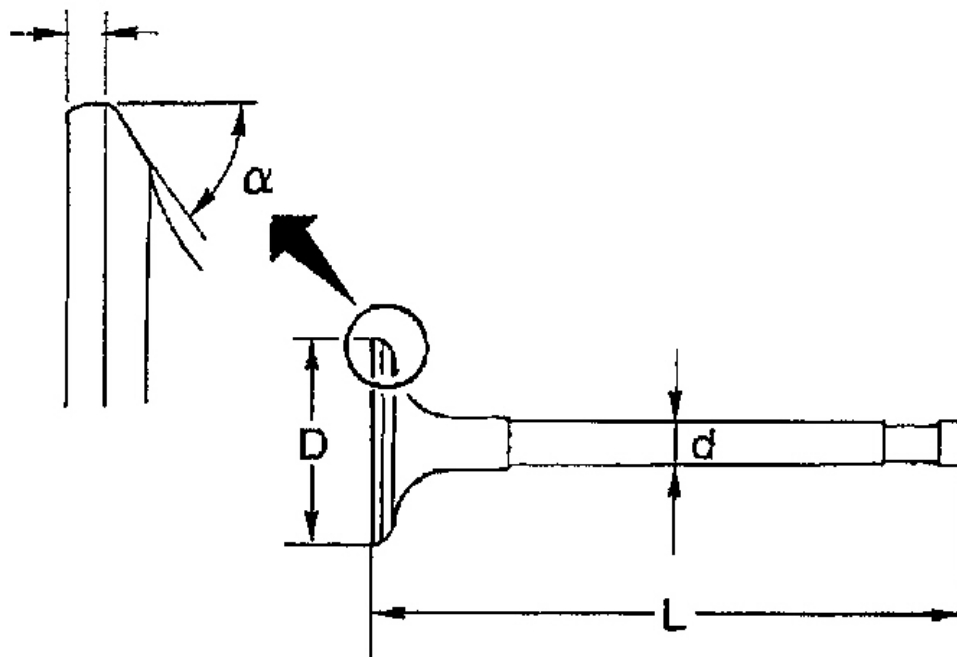
VALVE DIMENSIONS

Check dimensions of each valve. For dimensions, refer to SDS (**VALVE**).

When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace valve.

Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less.

T (Margin thickness)



G02044830

Fig. 143: Checking Valve Dimensions
 Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE SPRING

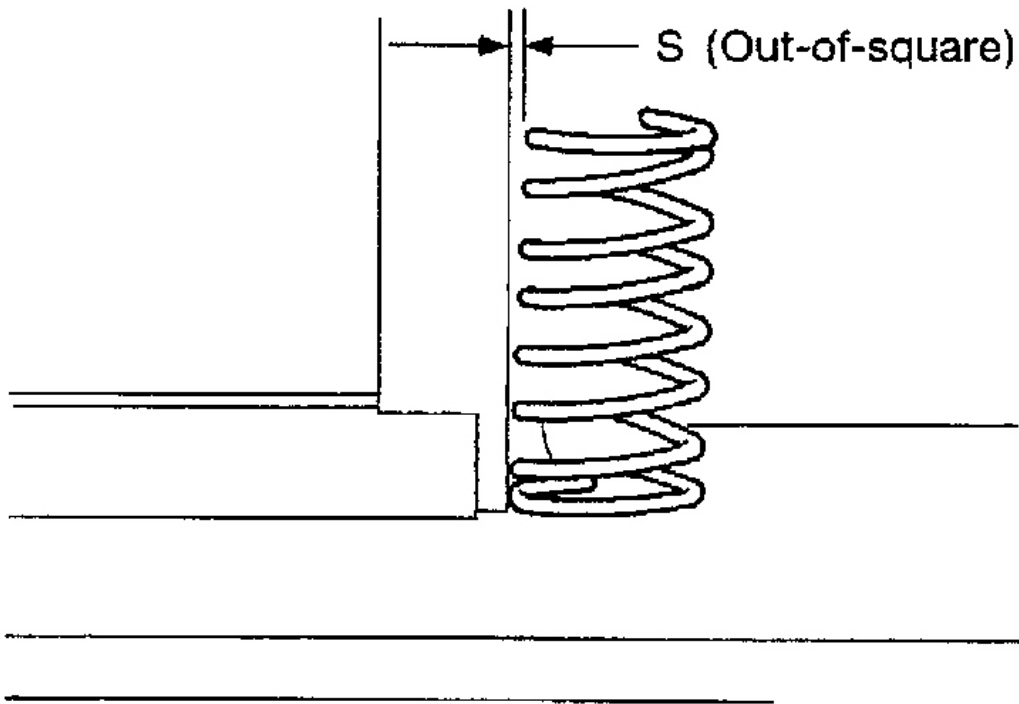
Squareness

1. Measure dimension "S".

Out-of-square "S":

Less than 2.0 mm (0.079 in)

2. If it exceeds the limit, replace spring.



G02044831

Fig. 144: Identifying Valve Spring Squareness
Courtesy of NISSAN MOTOR CO., U.S.A.

Pressure

Check valve spring pressure at specified spring height.

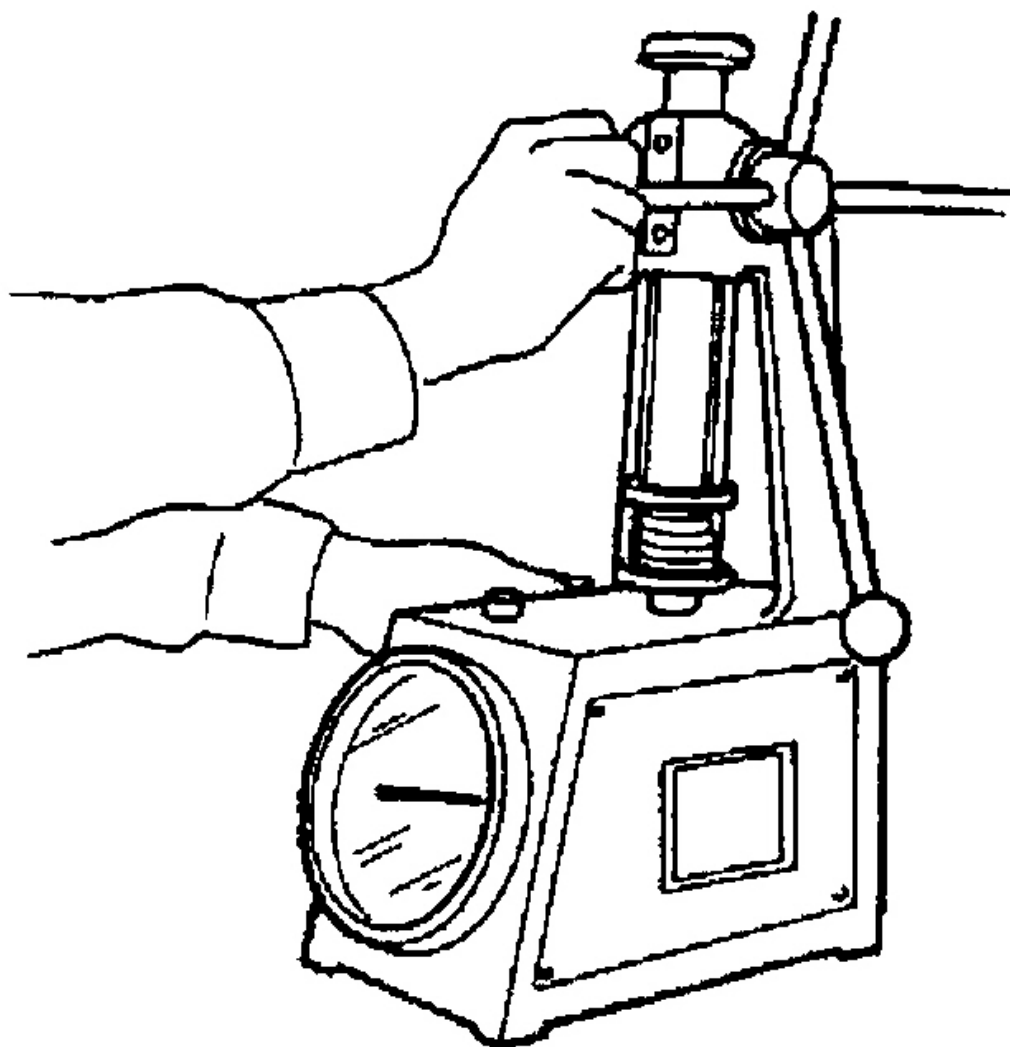
Pressure:**Standard**

196 N (20.0 kg, 44.1 lb) at height 37.0 mm (1.457 in)

Limit

More than 433 N (44.2 kg, 97.3 lb) at height 27.8 mm (1.094 in)

If it exceeds the limit, replace spring.

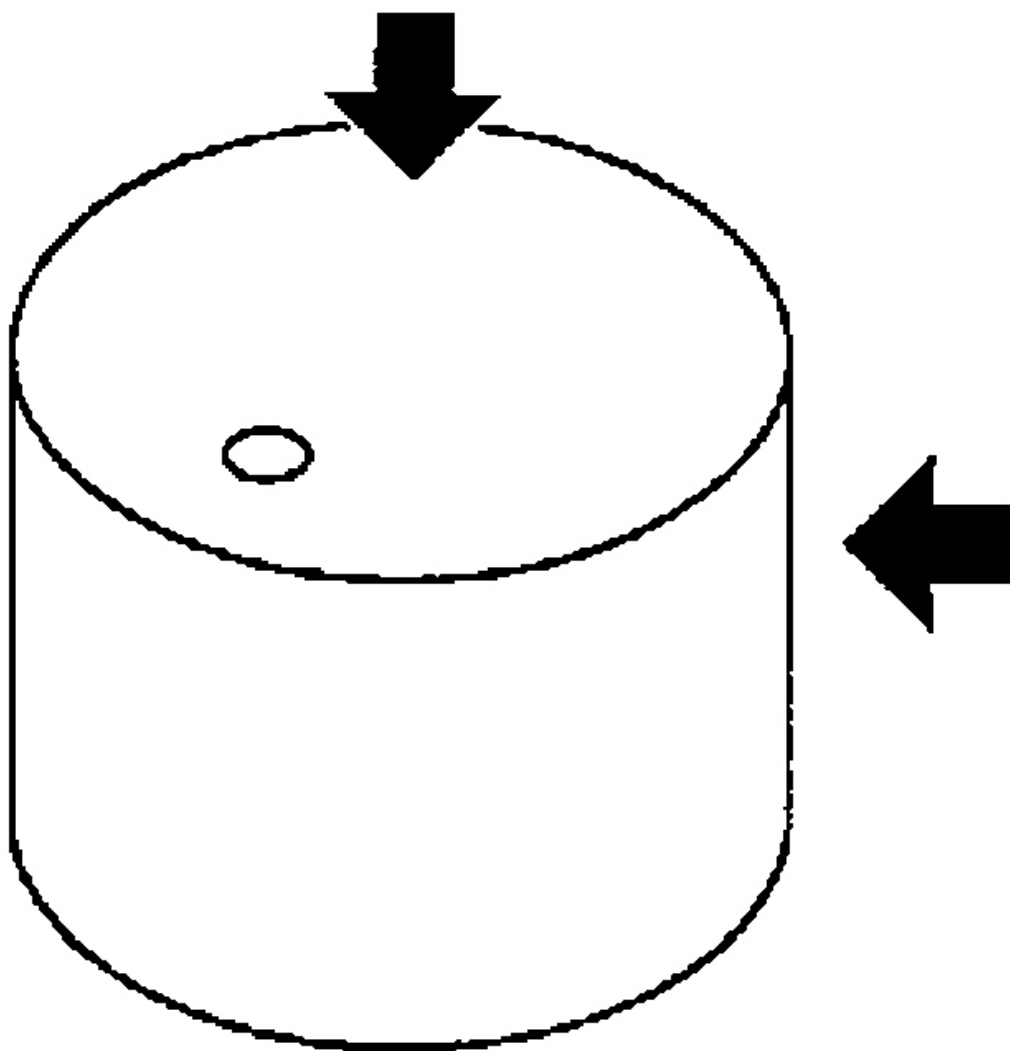


G02044832

Fig. 145: Checking Valve Spring Pressure Specified Spring Height
Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE LIFTER

1. Check contact and sliding surfaces for wear or scratches.



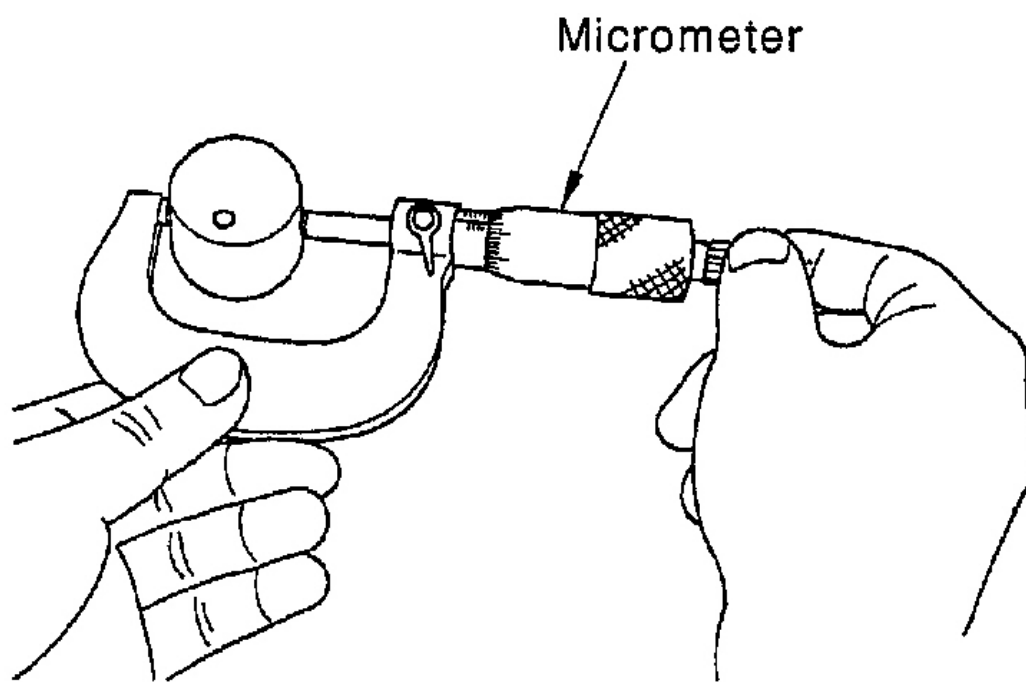
G02044833

Fig. 146: Checking Contact And Sliding Valve Lifter
Courtesy of NISSAN MOTOR CO., U.S.A.

2. Check diameter of valve lifter and valve lifter guide bore.

Valve lifter outer diameter:

33.977 - 33.987 mm (1.3377 - 1.3381 in)

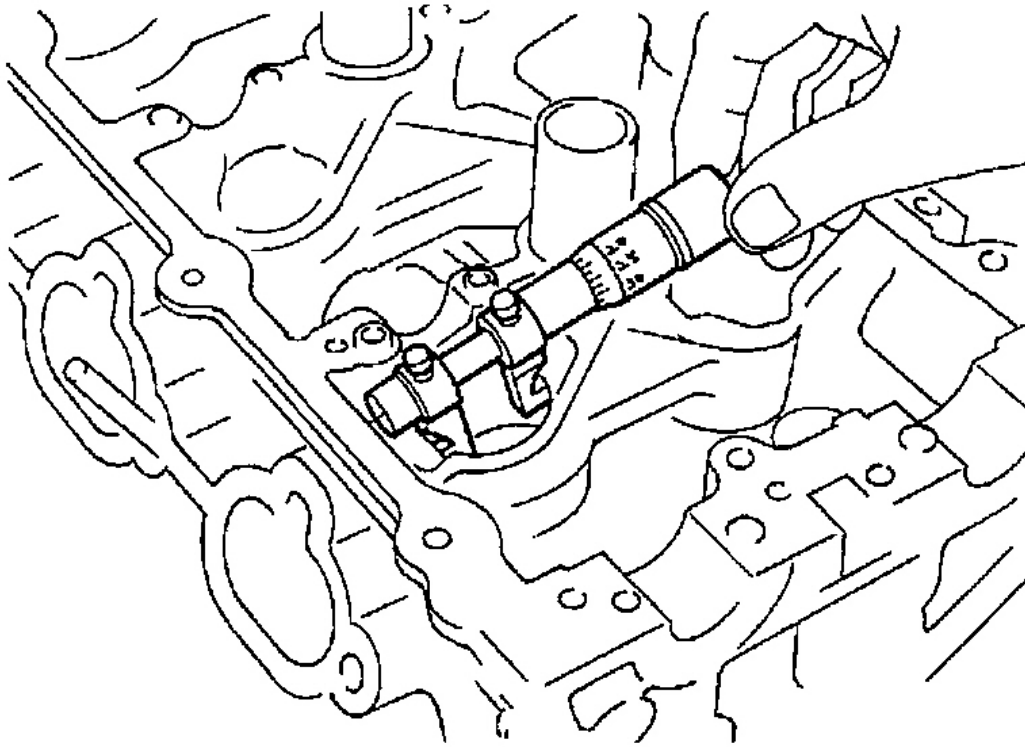


G02044834

Fig. 147: Checking Diameter Of Valve Lifter And Valve Lifter Guide Bore
Courtesy of NISSAN MOTOR CO., U.S.A.

Lifter guide bore diameter:

34.000 - 34.016 mm (1.3386 - 1.3392 in)

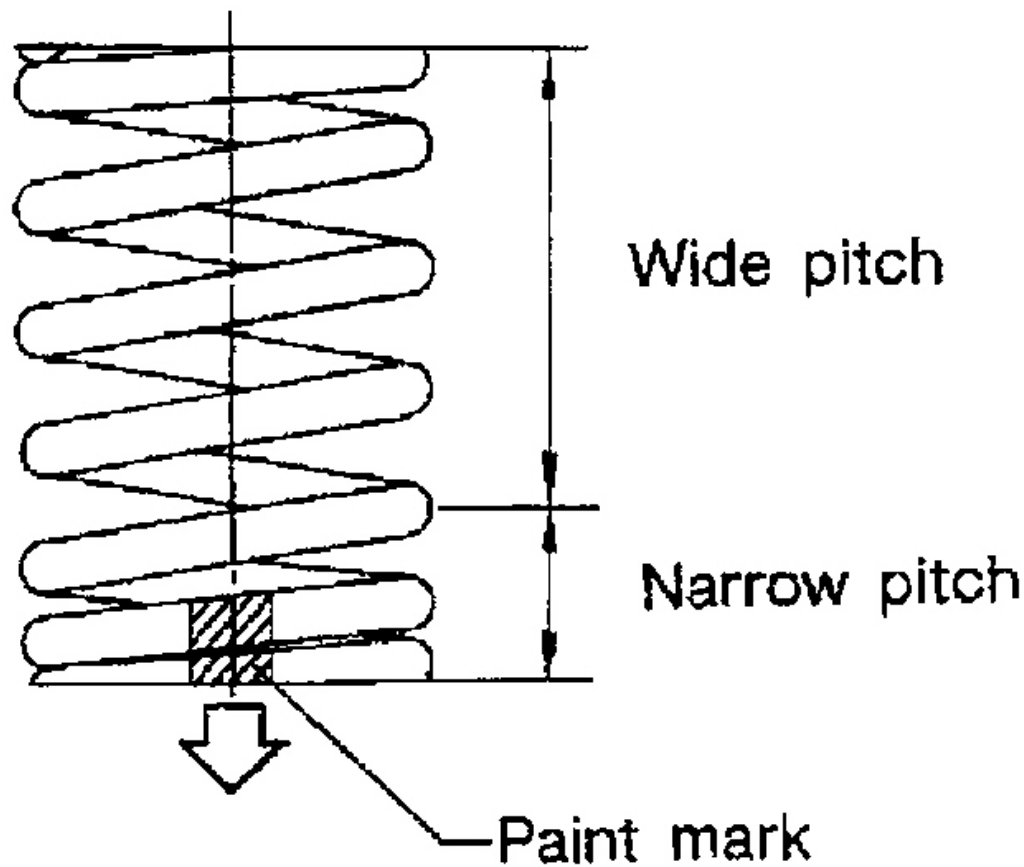


G02044835

Fig. 148: Measuring Lifter Guide Bore Diameter
Courtesy of NISSAN MOTOR CO., U.S.A.

ASSEMBLY

1. Install valve component parts.
 - Always use new valve oil seal. Refer to "VALVE OIL SEAL", .
 - Before installing valve oil seal, install valve spring seat.
 - Install valve spring (uneven pitch type) with its narrow pitch side toward cylinder head side (paint mark).
 - After installing valve component parts, tap valve stem tip with plastic hammer to assure a proper fit.



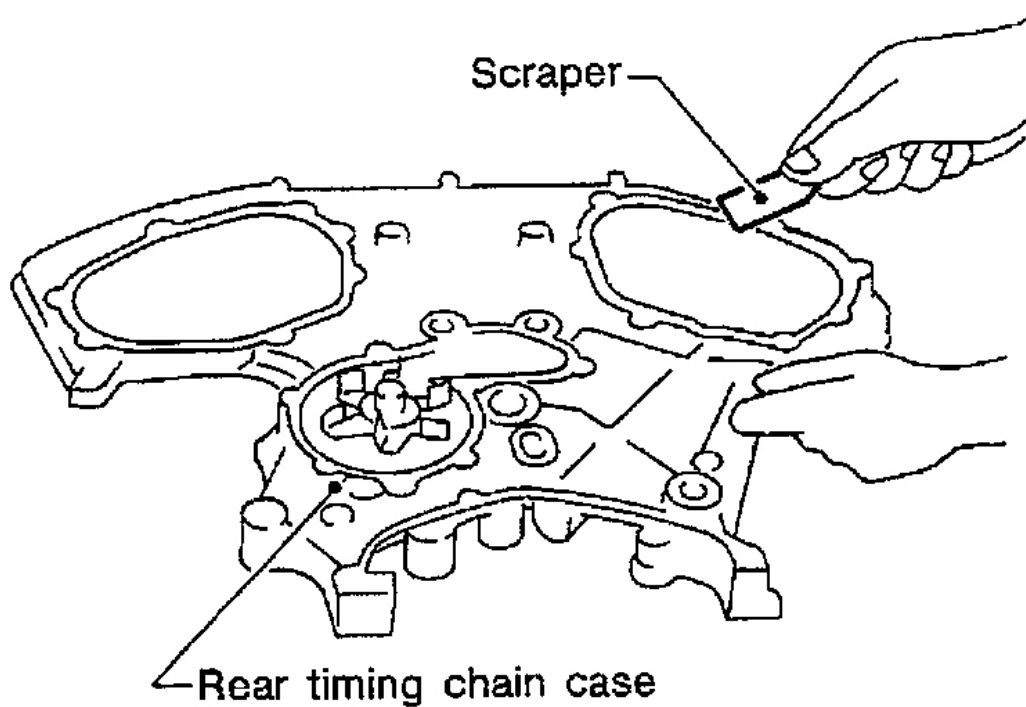
Cylinder head side

G02044836

Fig. 149: Installing Valve Spring
Courtesy of NISSAN MOTOR CO., U.S.A.

INSTALLATION

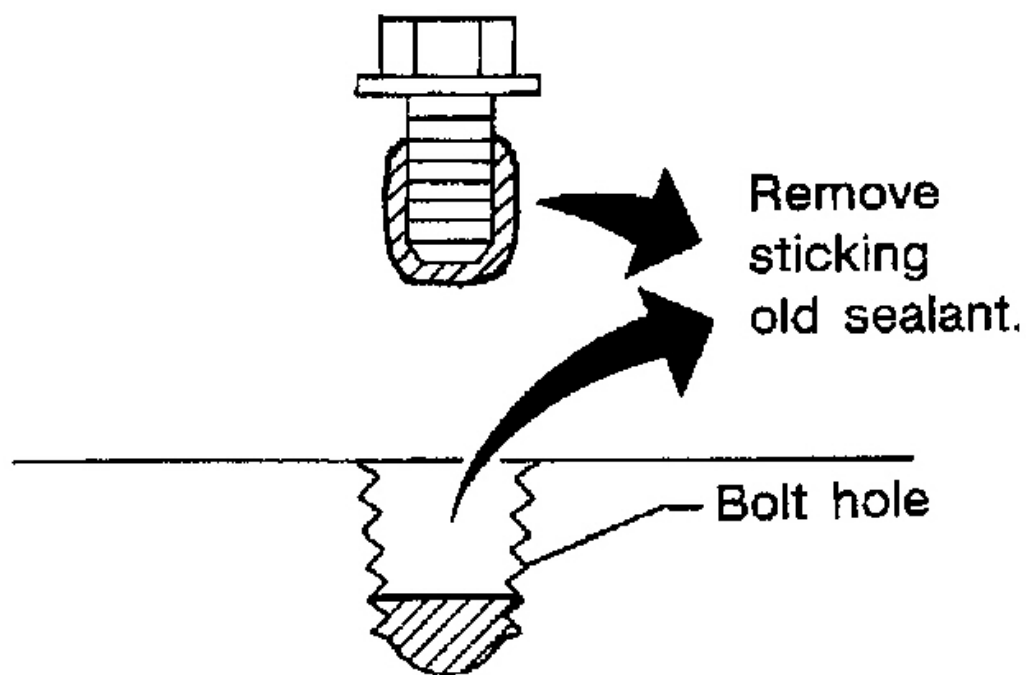
1. Before installing rear timing chain case, remove old liquid gasket from mating surface using a scraper.
 - Also remove old liquid gasket from mating surface of cylinder block.



G02044837

Fig. 150: Removing Old Liquid Gasket From Mating Surface Of Cylinder Block
Courtesy of NISSAN MOTOR CO., U.S.A.

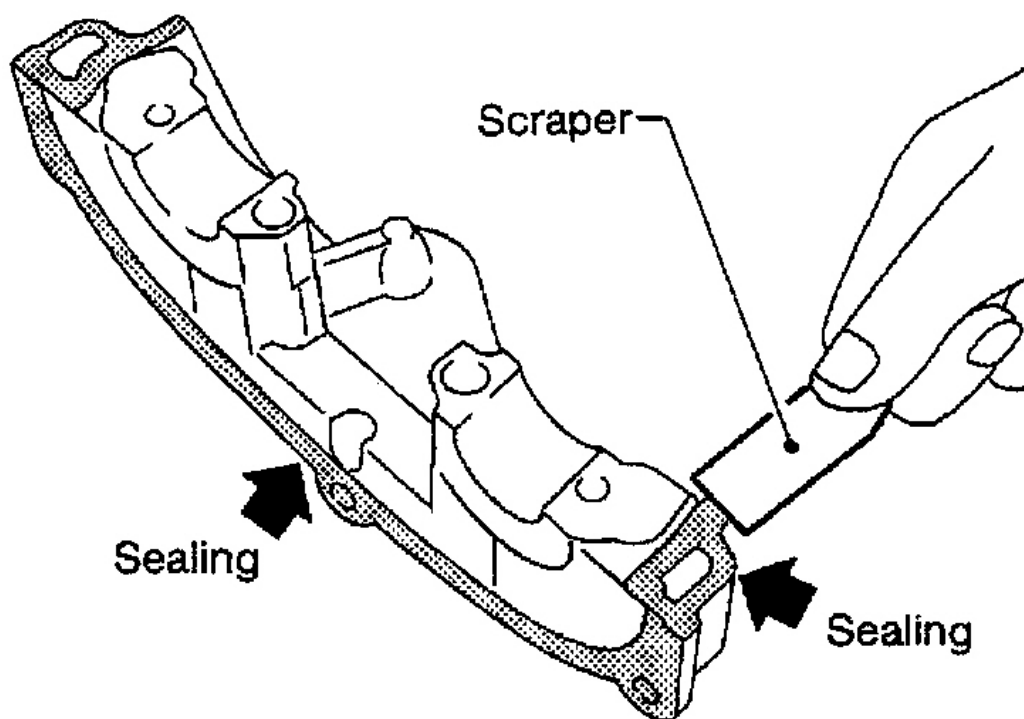
- Remove old liquid gasket from the bolt hole and thread.



G02044838

Fig. 151: Removing Old Liquid Gasket From The Bolt Hole And Thread
Courtesy of NISSAN MOTOR CO., U.S.A.

2. Before installing cam bracket, remove old liquid gasket from mating surface using a scraper.

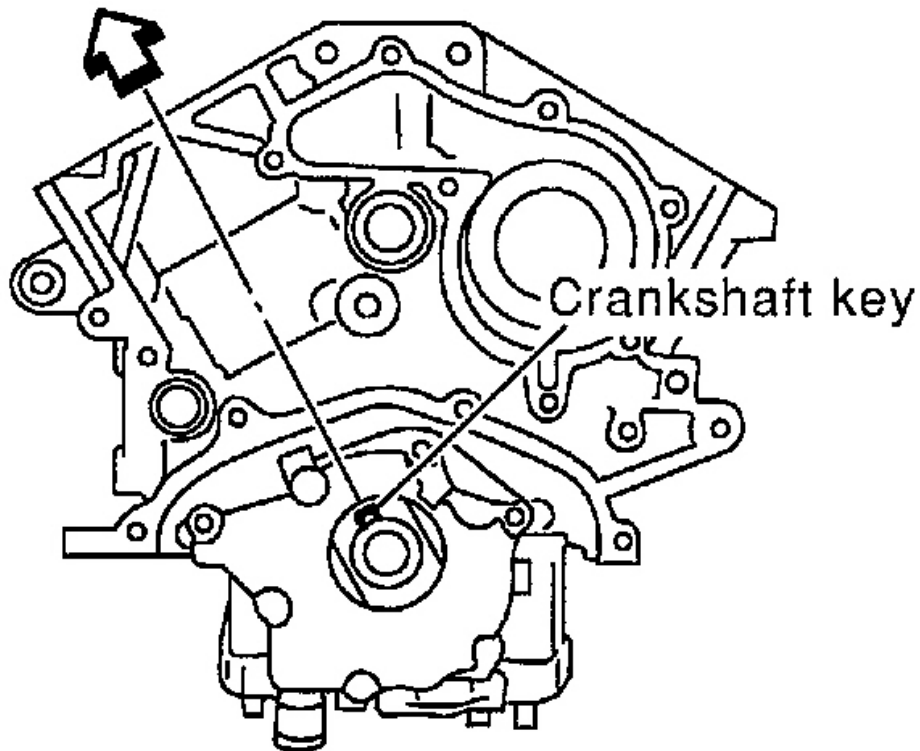


G02044839

Fig. 152: Removing Old Liquid Gasket From Mating Surface
Courtesy of NISSAN MOTOR CO., U.S.A.

3. Before installing the cylinder head gasket, be sure that No. 1 cylinder is at TDC.
 - At this time, the crankshaft key should face toward the right bank.

Right bank side

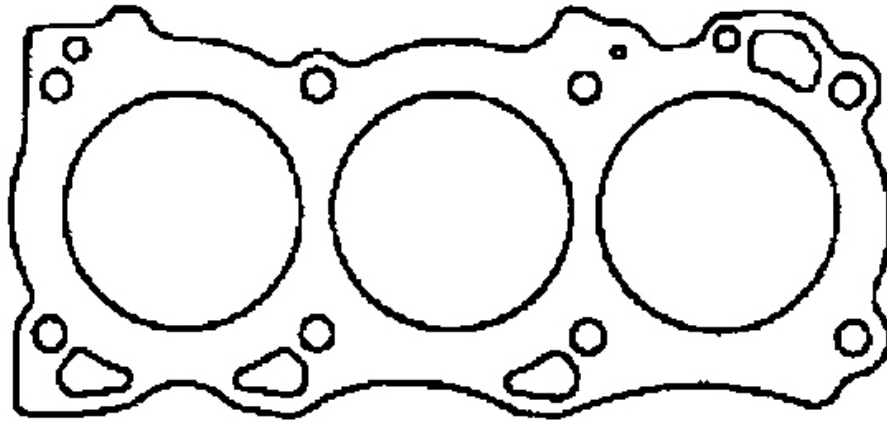


G02044840

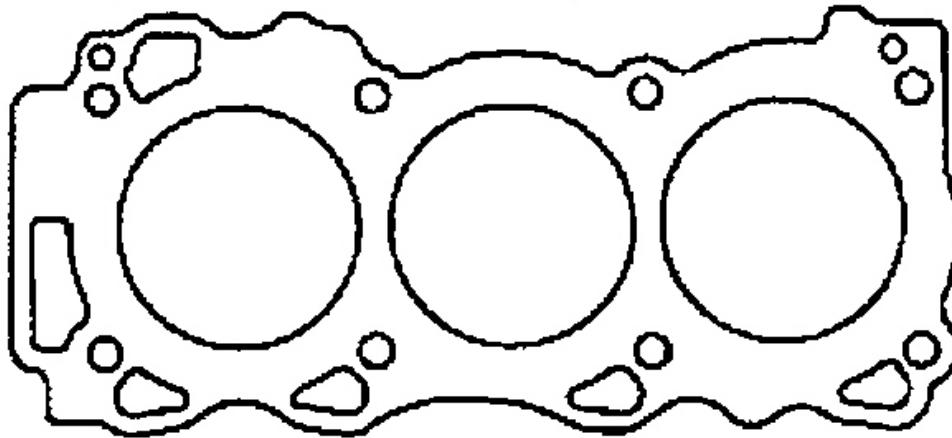
Fig. 153: Identifying Crankshaft Key
Courtesy of NISSAN MOTOR CO., U.S.A.

4. Install cylinder heads with new gaskets.
 - **Do not rotate crankshaft and camshaft separately, or valves will strike piston heads.**

RH cylinder head gasket



LH cylinder head gasket



G02044841

Fig. 154: Identifying Cylinder Head Gaskets
Courtesy of NISSAN MOTOR CO., U.S.A.

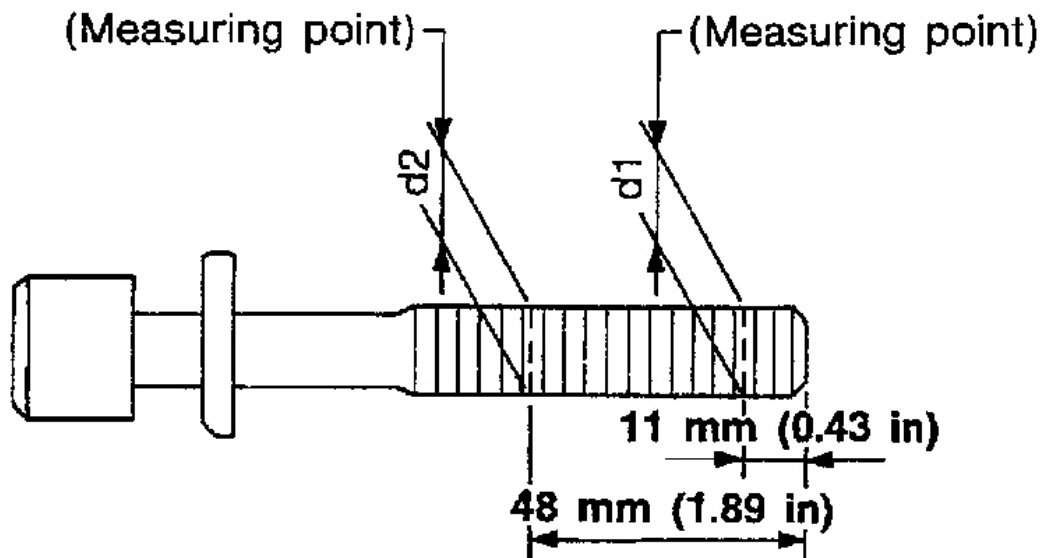
CAUTION: Cylinder head bolts are tightened by plastic zone tightening method. Whenever the size difference between d1 and d2 exceeds the limit, replace them with new ones.

Limit (d1 - d2):

0.11 mm (0.0043 in)

- Lubricate threads and seat surfaces of the bolts with new engine oil.

Cylinder head bolt

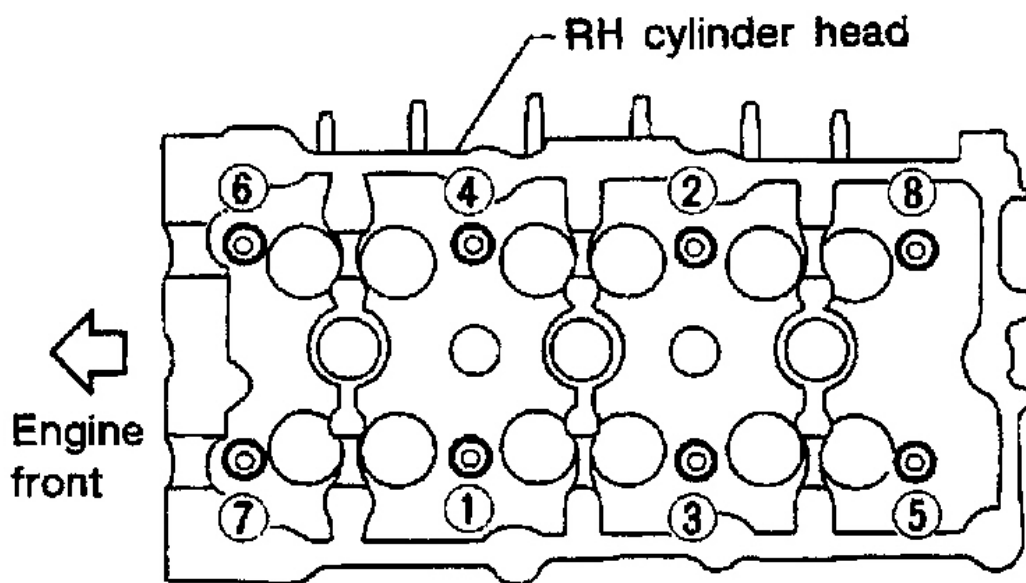


G02044842

Fig. 155: Identifying Cylinder Head Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

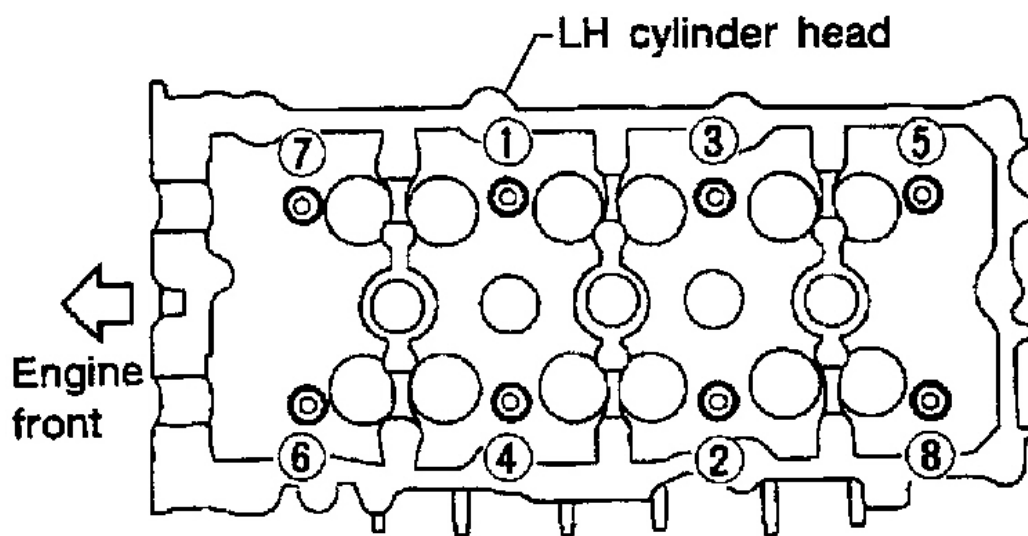
5. Install cylinder head outside bolts.

- **Tightening procedure:**
 - a. Tighten all bolts to 98 N.m (10 kg-m, 72 ft-lb).
 - b. Completely loosen all bolts.
 - c. Tighten all bolts to 34.3 to 44.1 N.m (3.5 to 4.4 kg-m, 26 to 32 ft-lb).
 - d. Turn all bolts 90 to 95 degrees clockwise.
 - e. Turn all bolts 90 to 95 degrees clockwise.
- Tighten in numerical order shown in the figure.



G02044843

Fig. 156: Identifying Cylinder Head Bolt Tightening Sequence (RH)
Courtesy of NISSAN MOTOR CO., U.S.A.



G02044844

Fig. 157: Identifying Cylinder Head Bolt Tightening Sequence (LH)
Courtesy of NISSAN MOTOR CO., U.S.A.

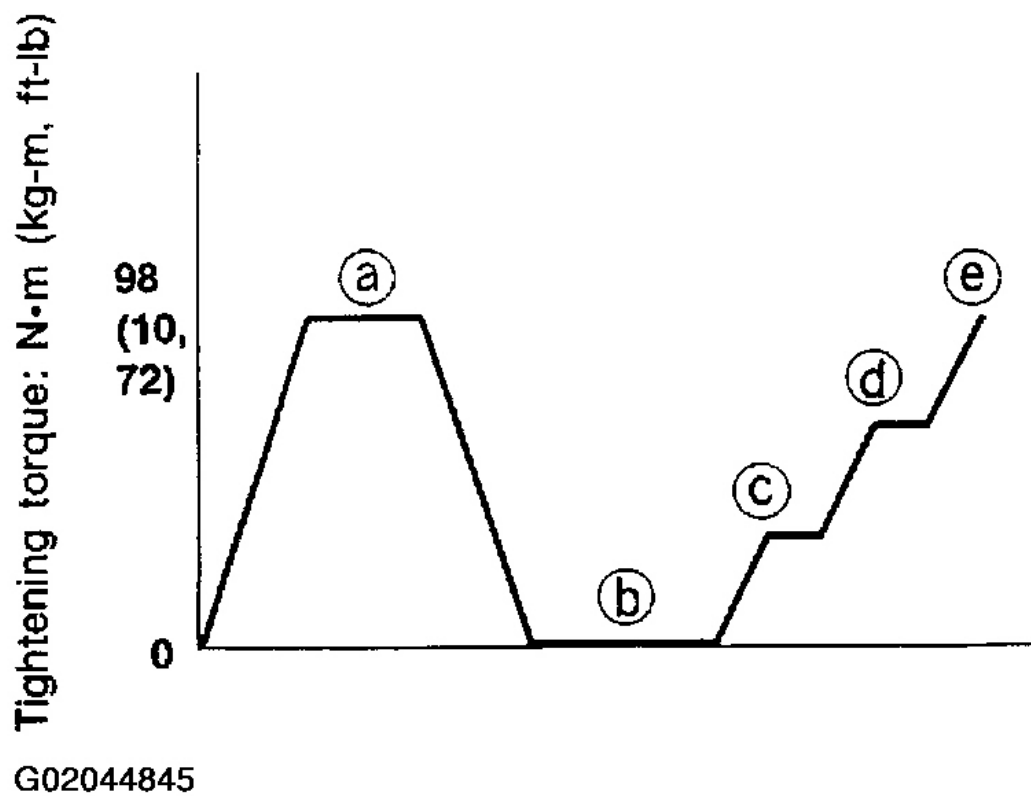
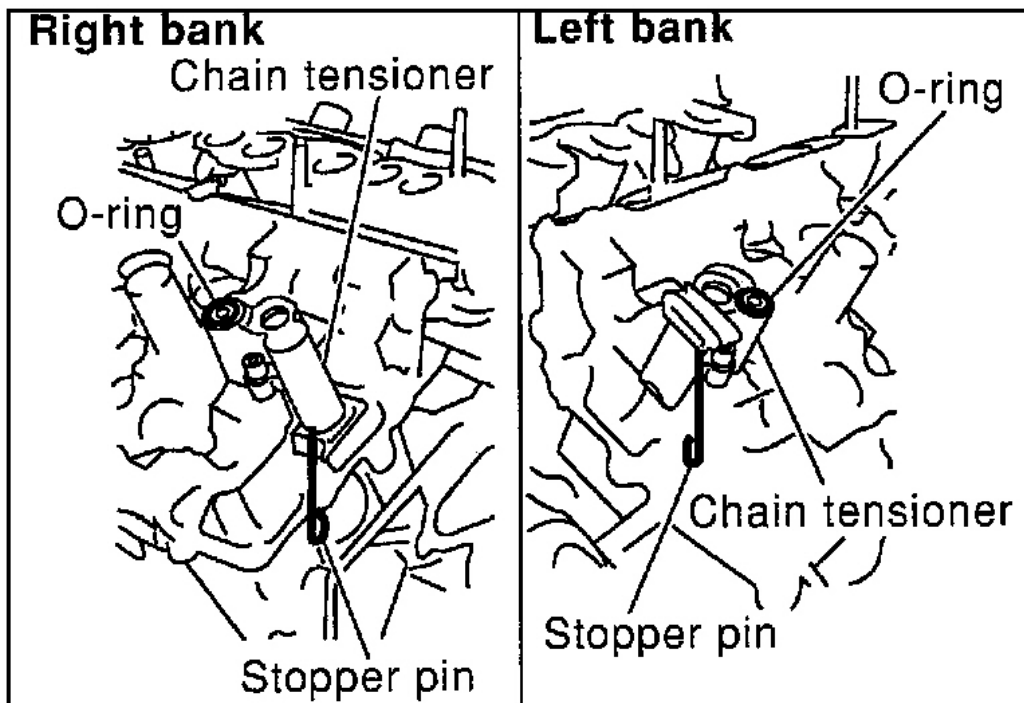


Fig. 158: Identifying Cylinder Head Bolt Tightening Torque Chart
Courtesy of NISSAN MOTOR CO., U.S.A.

6. Install camshaft chain tensioners on both sides of cylinder head.



G02044846

Fig. 159: Installing Camshaft Chain Tensioners On Both Sides Of Cylinder Head
Courtesy of NISSAN MOTOR CO., U.S.A.

7. Install exhaust and intake camshafts and camshaft brackets.
 - Intake camshaft has a drill mark on camshaft sprocket mounting flange. Install it on the intake side.

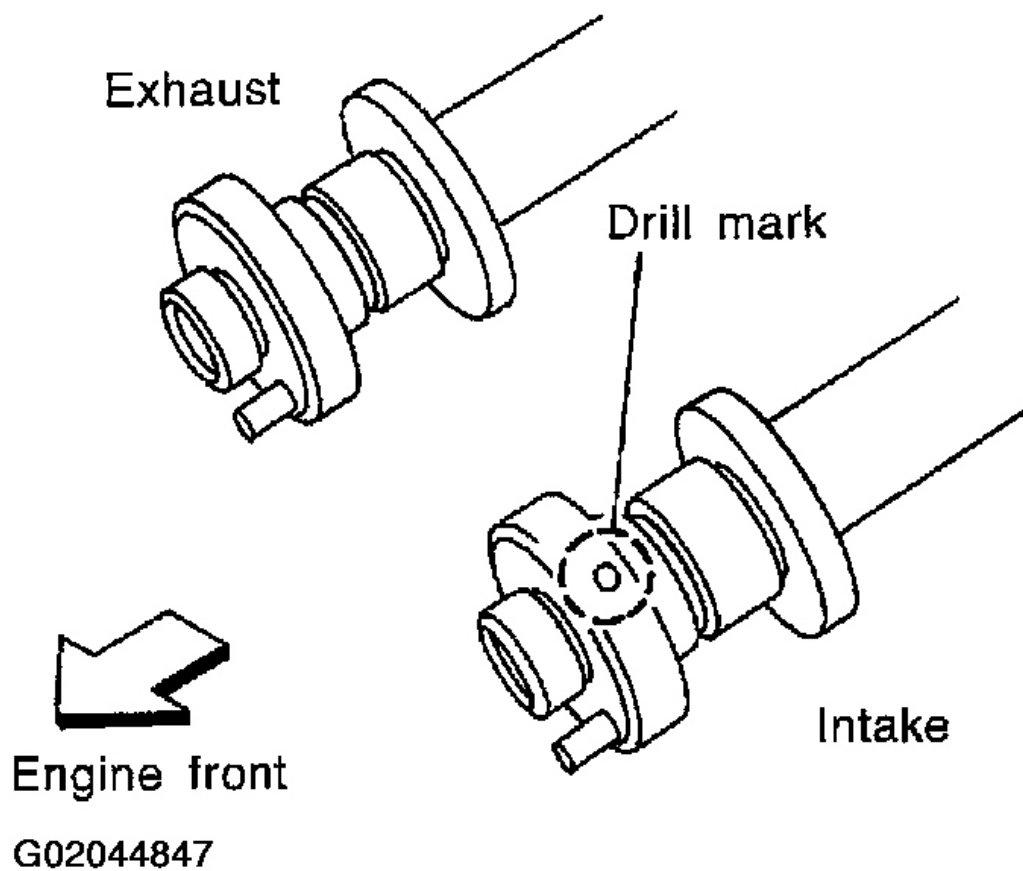


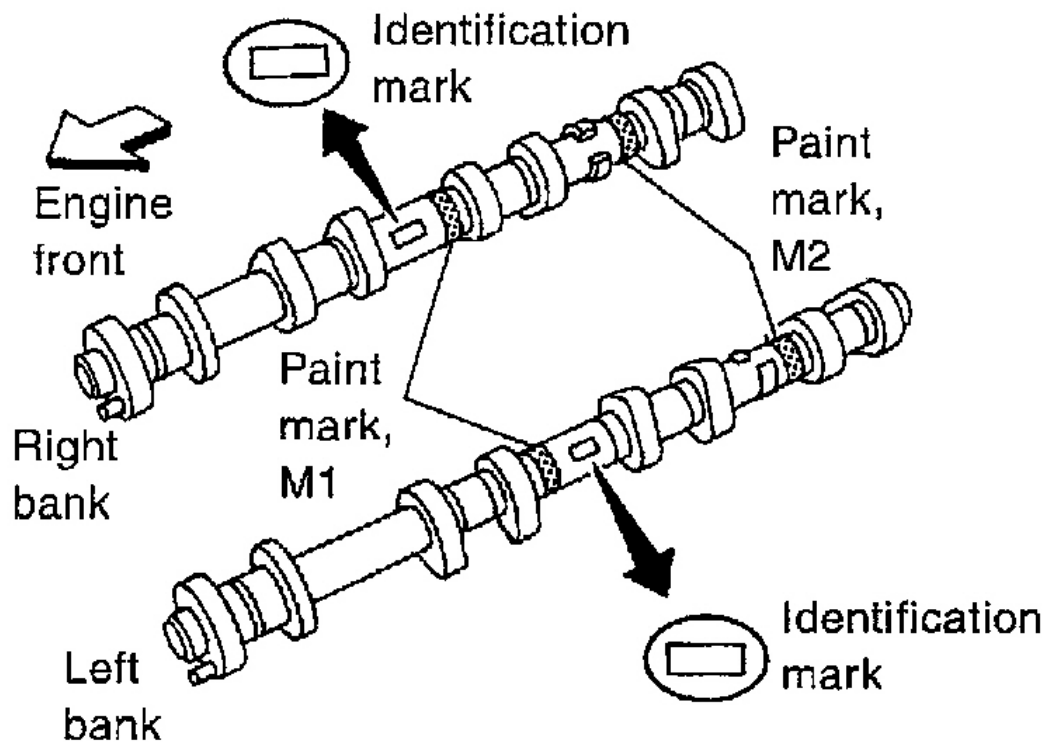
Fig. 160: Identifying Camshaft Drill Mark On Camshaft Sprocket Mounting Flange
Courtesy of NISSAN MOTOR CO., U.S.A.

- Identification marks are present on camshafts.

Bank	INT/EXH	ID mark	Drill mark	Paint mark	
				M1	M2
RH	INT	RE	Yes	Yes	No
	EXH	RE	No	No	Yes
LH	INT	LH	Yes	Yes	No
	EXH	LH	No	No	Yes

G02044848

Fig. 161: Identifying Marks On Camshafts Chart
 Courtesy of NISSAN MOTOR CO., U.S.A.



G02044849

Fig. 162: Identifying Marks On Camshafts
 Courtesy of NISSAN MOTOR CO., U.S.A.

- Position camshaft

RH exhaust camshaft dowel pin at about 10 o'clock

LH exhaust camshaft dowel pin at about 2 o'clock

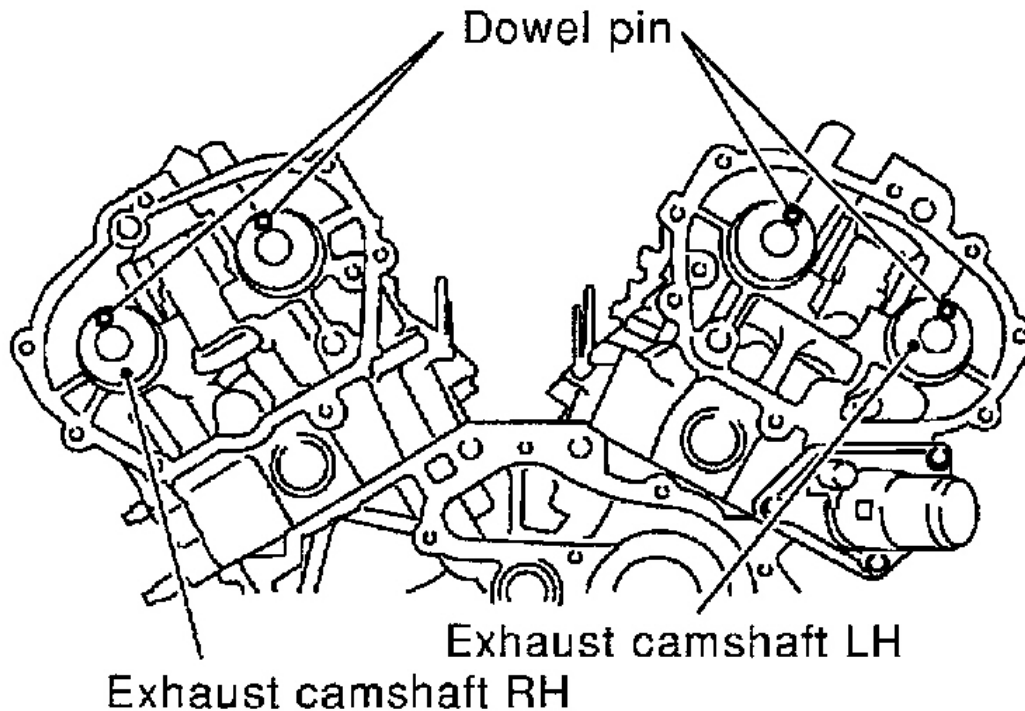
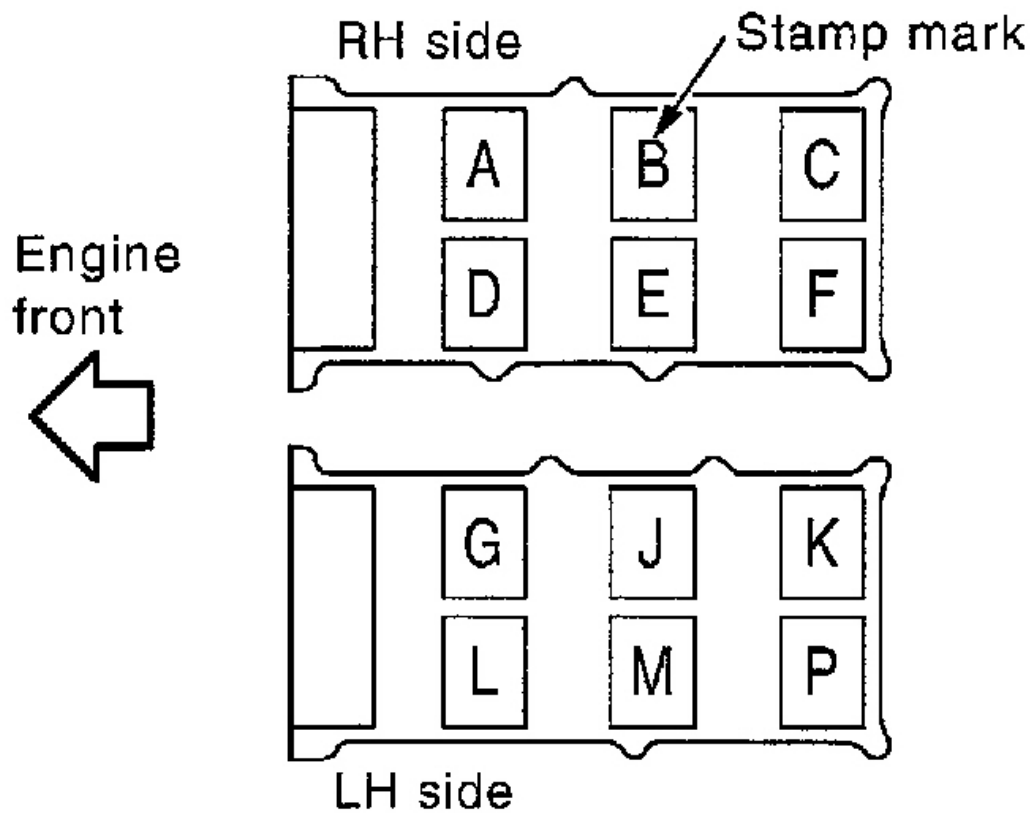


Fig. 163: Identifying Exhaust Camshaft Dowel Pin

Courtesy of NISSAN MOTOR CO., U.S.A.

8. Before installing camshaft brackets, apply sealant to mating surface of No. 1 camshaft bracket.
 - Refer to "**POSITION FOR APPLYING LIQUID GASKET**", .
 - Use Genuine RTV silicone sealant or equivalent. Refer to **RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS** .
 - Install camshaft brackets in their original positions. Align stamp mark as shown in the figure.
 - If any part of valve assembly or camshaft is replaced, check valve clearance according to reference data. After completing assembly check valve clearance. Refer to "**CHECKING**" and "**ADJUSTING**", and .



G02044851

Fig. 164: Identifying Stamp Marks On Camshaft Brackets
Courtesy of NISSAN MOTOR CO., U.S.A.

Reference data valve clearance (Cold):

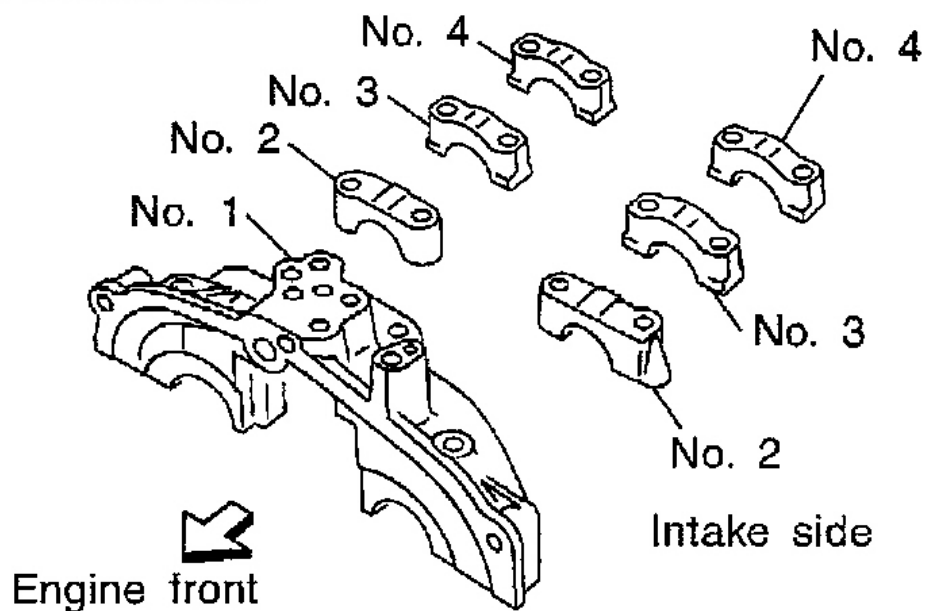
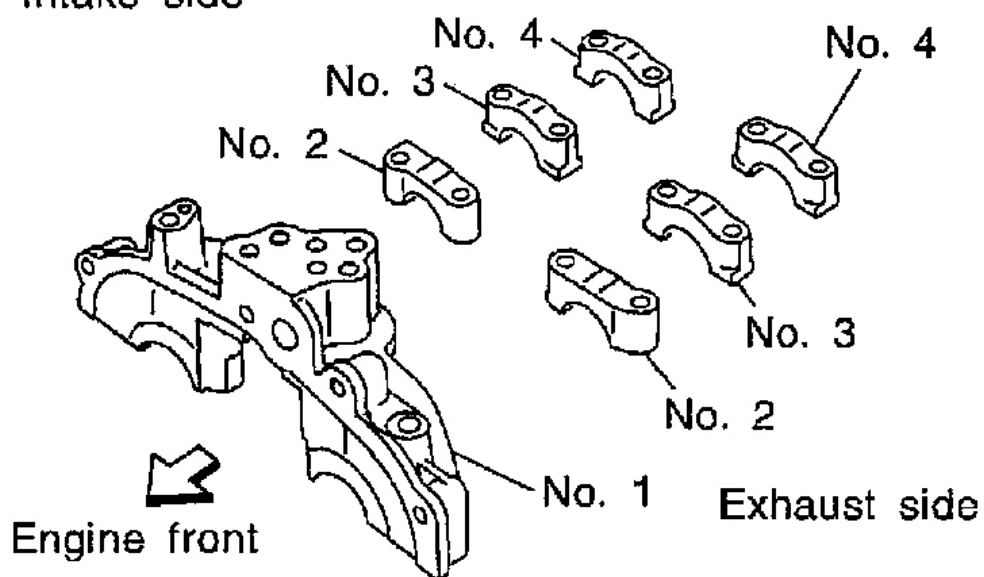
Intake

0.26 - 0.34 mm (0.010 - 0.013 in)

Exhaust

0.29 - 0.37 mm (0.011 - 0.015 in)

- Lubricate threads and seat surfaces of camshaft bracket bolts with new engine oil before installing them.

RH camshaft brackets**Exhaust side****LH camshaft brackets****Intake side**

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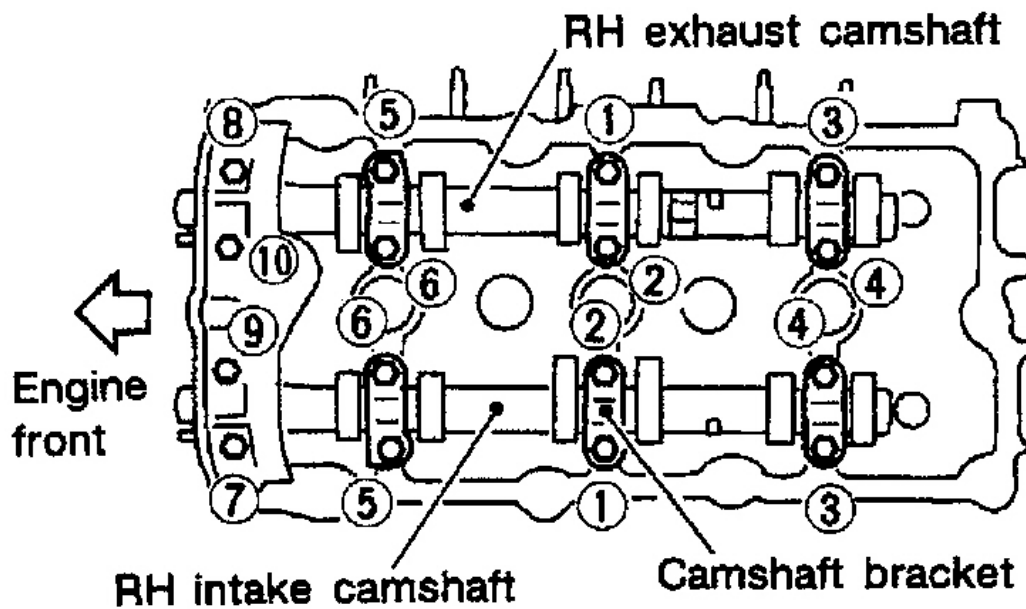
Fig. 165: Identifying Camshaft Brackets
 Courtesy of NISSAN MOTOR CO., U.S.A.

- Tighten the camshaft brackets in the following steps.

Step	Tightening torque	Tightening order
1	1.96 N·m (0.2 kg-m, 17 in-lb)	Tighten in the order of 7 to 10, then tighten 1 to 6.
2	5.88 N·m (0.6 kg-m, 52 in-lb)	Tighten in the numerical order.
3	9.02 - 11.8 N·m (0.92 - 1.20 kg-m, 79.9 - 104.2 in-lb)	Tighten in the order of 1 to 6.
	8.3 - 10.3 N·m (0.9 - 1.0 kg-m, 74 - 91 in-lb)	Tighten in the order of 7 to 10.

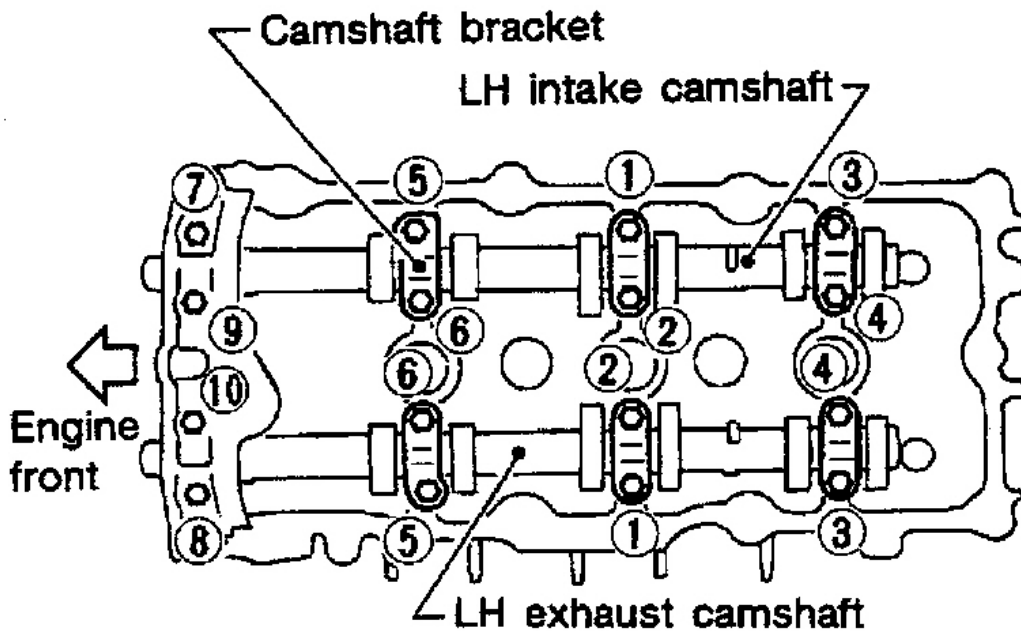
G02044853

Fig. 166: Camshaft Bolts Tightening Chart
 Courtesy of NISSAN MOTOR CO., U.S.A.



G02044854

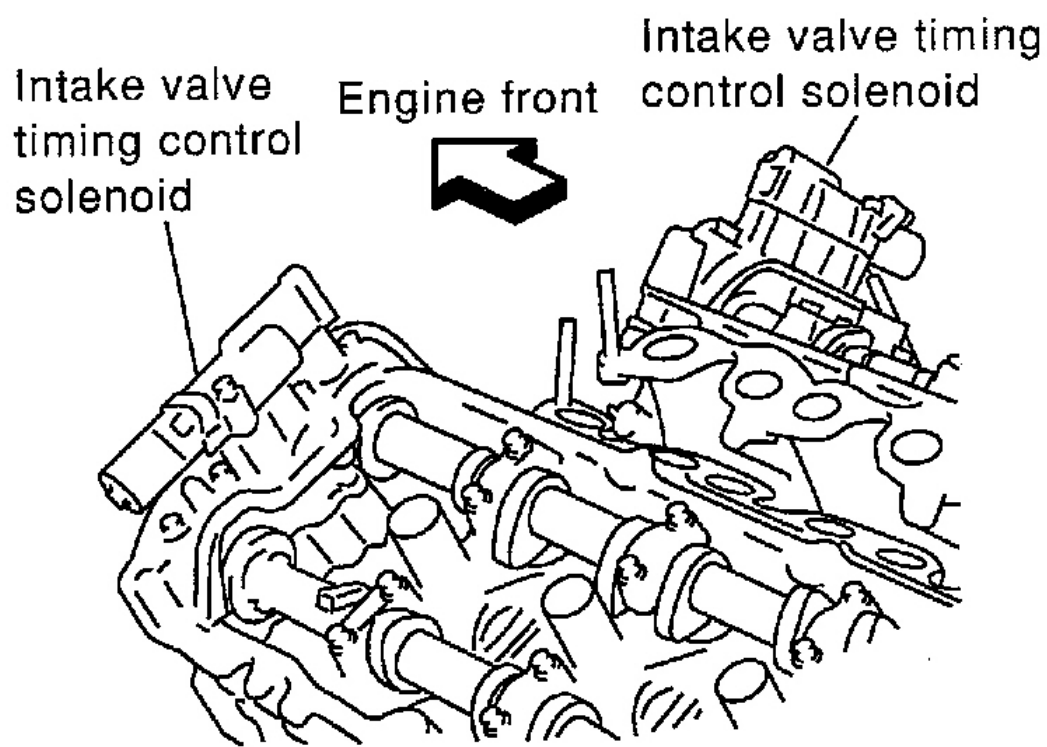
Fig. 167: Identifying Intake And Exhaust Camshafts (RH)
Courtesy of NISSAN MOTOR CO., U.S.A.



G02044855

Fig. 168: Identifying Intake And Exhaust Camshafts (LH)
Courtesy of NISSAN MOTOR CO., U.S.A.

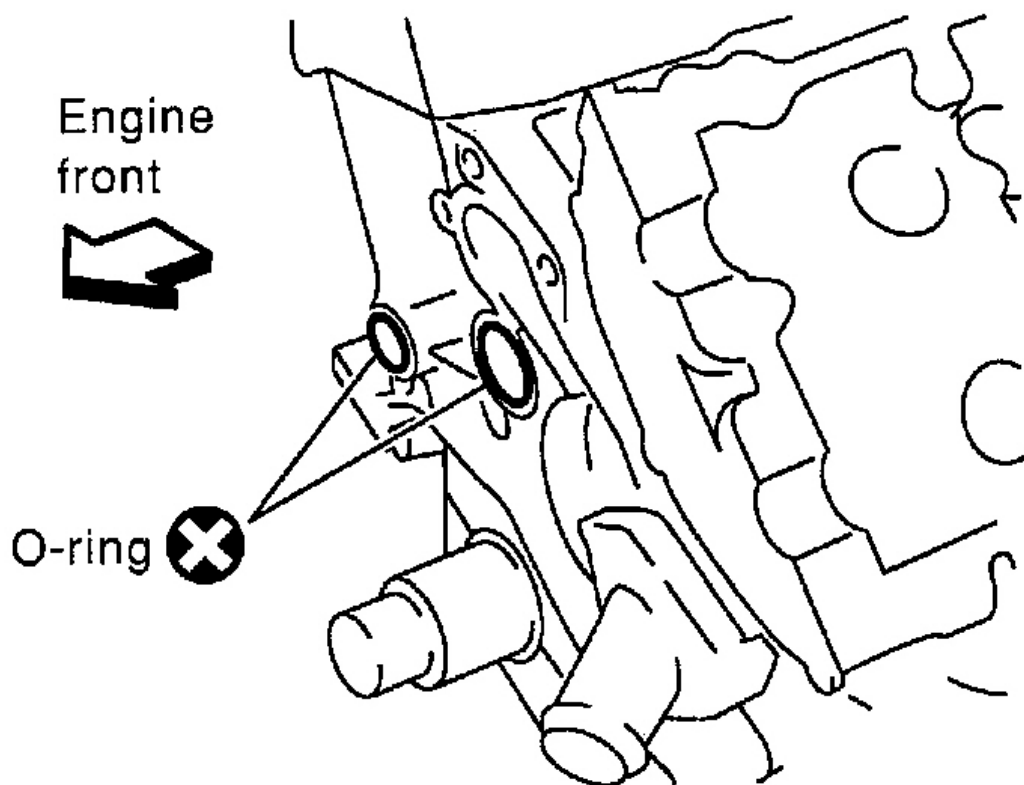
9. Install intake valve timing control solenoid valves.



G02044856

Fig. 169: Installing Intake Valve Timing Control Solenoid Valves
Courtesy of NISSAN MOTOR CO., U.S.A.

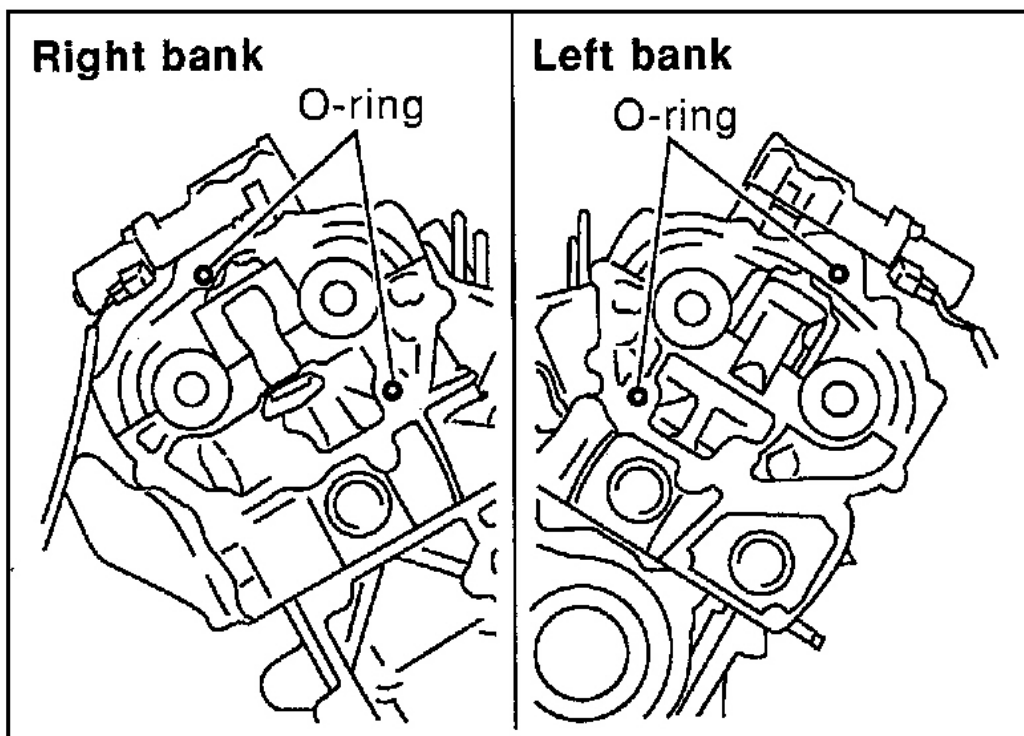
10. Install O-rings to cylinder block.



G02044857

Fig. 170: Installing O-Rings To Cylinder Block
Courtesy of NISSAN MOTOR CO., U.S.A.

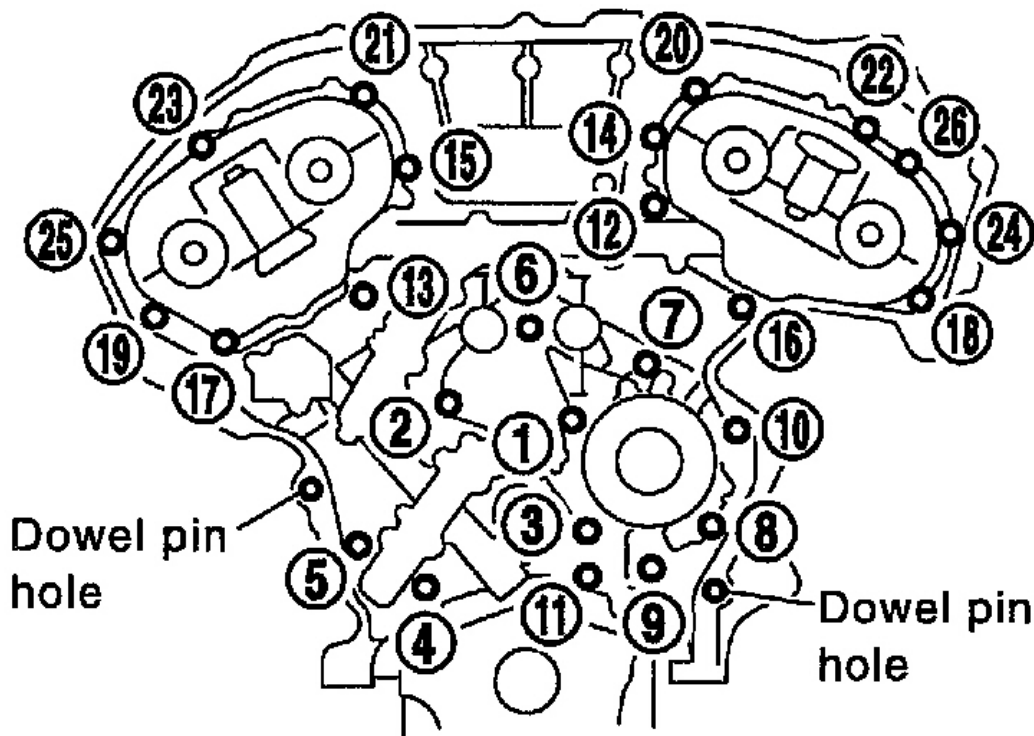
11. Install O-rings to cylinder head.



G02044858

Fig. 171: Installing O-Rings To Cylinder Head
Courtesy of NISSAN MOTOR CO., U.S.A.

12. Apply sealant to the hatched portion of rear timing chain case. Refer to "**POSITION FOR APPLYING LIQUID GASKET**", .
 - Apply continuous bead of liquid gasket to mating surface of rear timing chain case.
 - **Before installation, wipe off the protruding sealant.**
13. Align rear timing chain case with dowel pins, then install on cylinder head and block.
14. Tighten rear chain case bolts.
 - a. Tighten bolts in numerical order shown in the figure with smaller torque than specified.
 - b. Tighten bolts to the specified torque repeating step a above.
15. Reinstall all removed parts in reverse order of removal.



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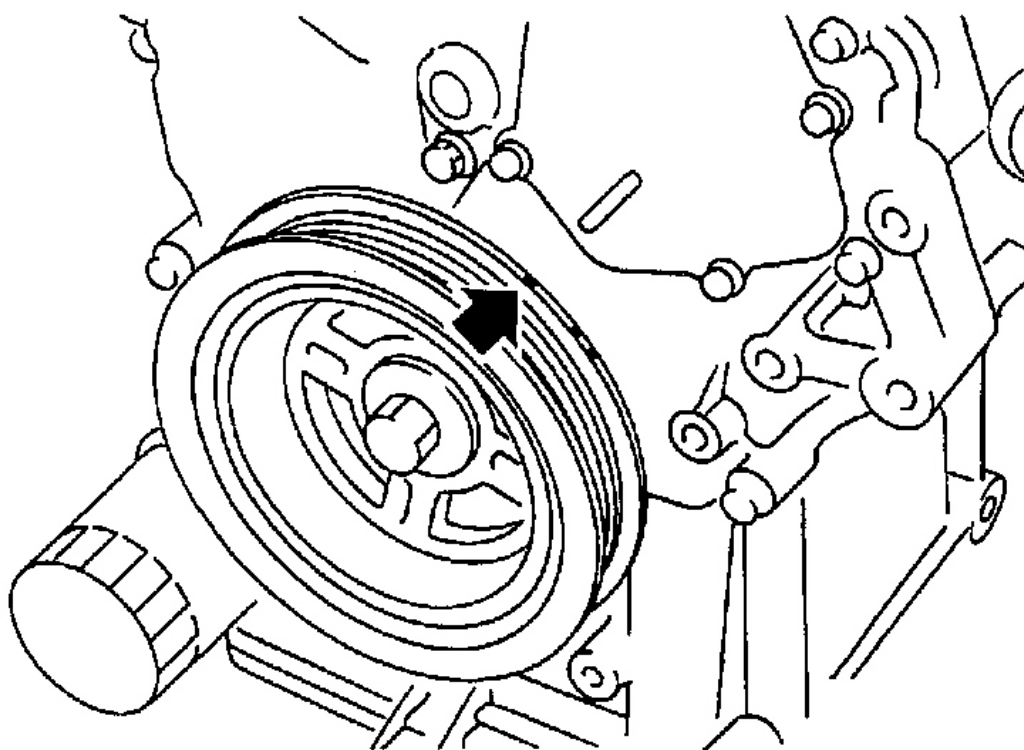
Fig. 172: Installing Timing Chain Case Bolts
 Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE CLEARANCE

CHECKING

Check valve clearance while engine is cold and not running.

1. Remove ornament cover.
2. Remove air duct with air cleaner case, collectors, hoses, wires, harnesses, connectors and so on.
3. Remove intake manifold collectors.
4. Remove ignition coils and spark plugs.
5. Remove RH and LH rocker covers.
6. Set No. 1 cylinder at TDC on its compression stroke.
 - Align pointer with TDC mark on crankshaft pulley.



G02044860

Fig. 173: Set No. 1 Cylinder At TDC On Its Compression Stroke
Courtesy of NISSAN MOTOR CO., U.S.A.

- Check that valve lifters on No. 1 cylinder are loose and valve lifters on No. 4 are tight.

If not, turn crankshaft one revolution (360°) and align as above.

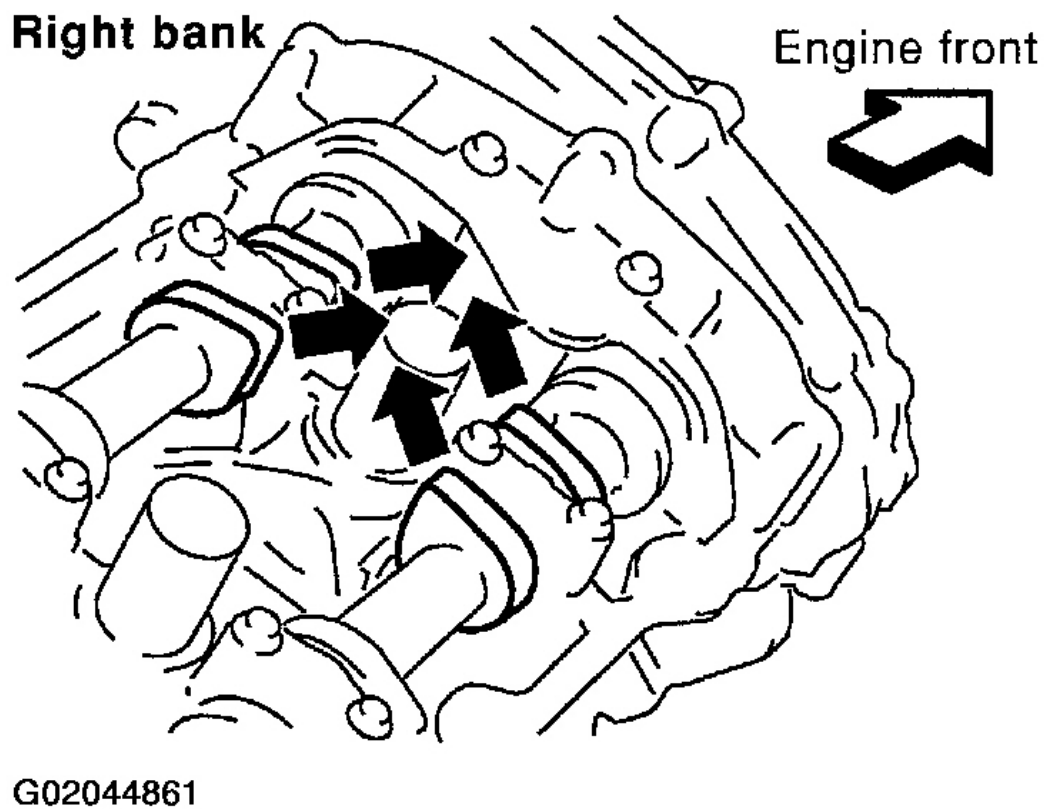


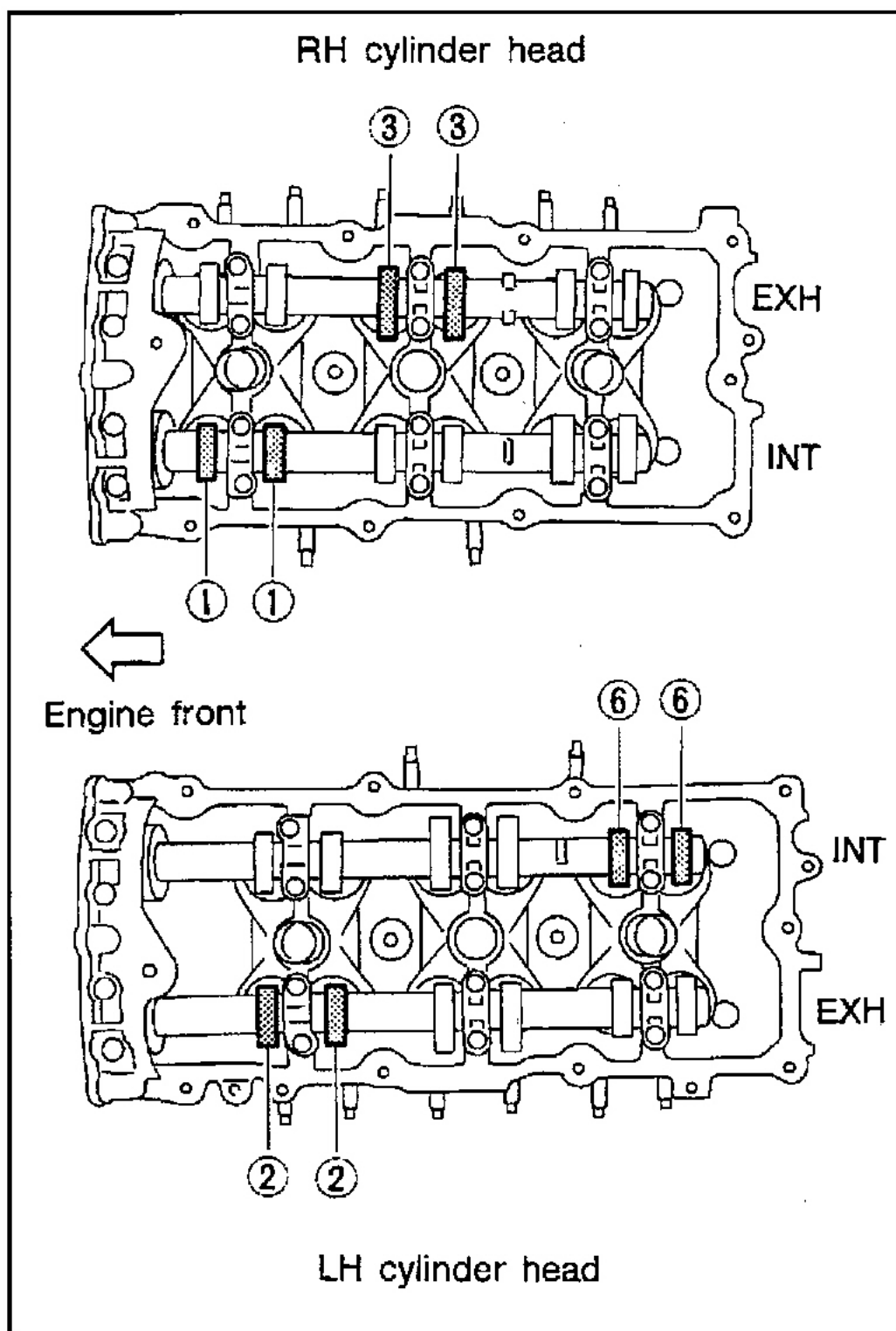
Fig. 174: Checking Valve Lifters On Cylinder
 Courtesy of NISSAN MOTOR CO., U.S.A.

7. Check only those valves shown in the figure.

Crank position	Valve											
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6	
	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 1 TDC	○			○		○					○	

G02044862

Fig. 175: Checking Valves Chart (1 Of 3)
 Courtesy of NISSAN MOTOR CO., U.S.A.



G02044863

Fig. 176: Checking Valves (1 Of 3)
Courtesy of NISSAN MOTOR CO., U.S.A.

- Using a feeler gauge, measure clearance between valve lifter and camshaft.
- Record any valve clearance measurements which are out of specification. They will be used later to determine the required replacement adjusting shim.

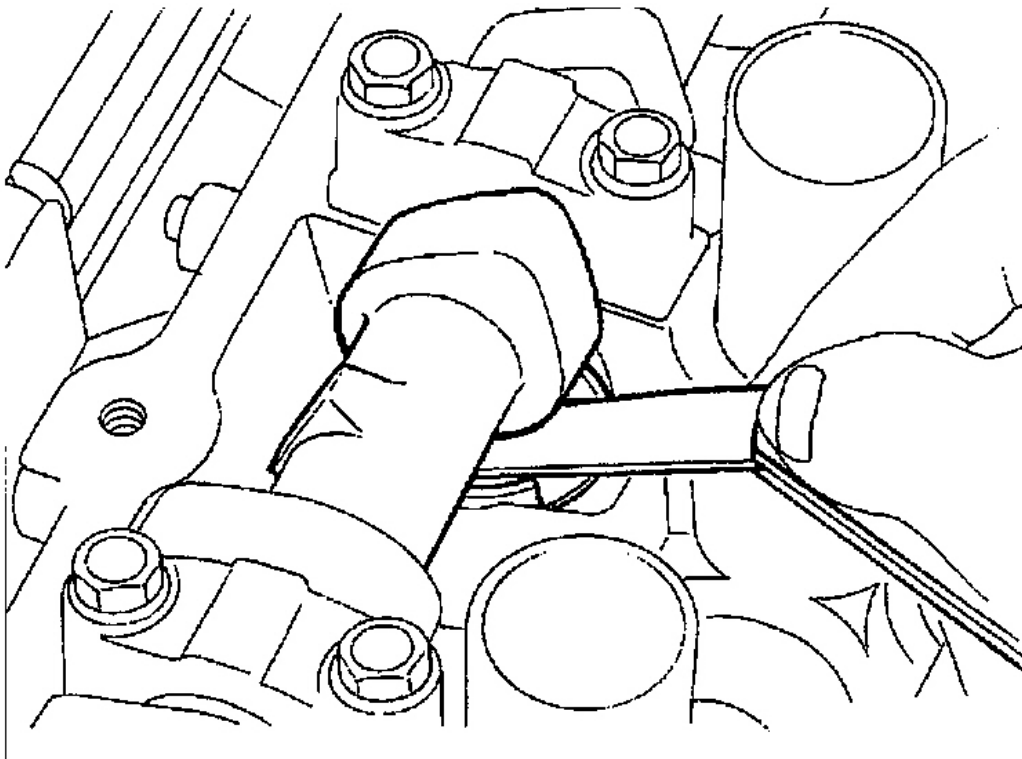
Valve clearance for checking (Cold):

Intake

0.26 - 0.34 mm (0.010 - 0.013 in)

Exhaust

0.29 - 0.37 mm (0.011 - 0.015 in)



G02044864

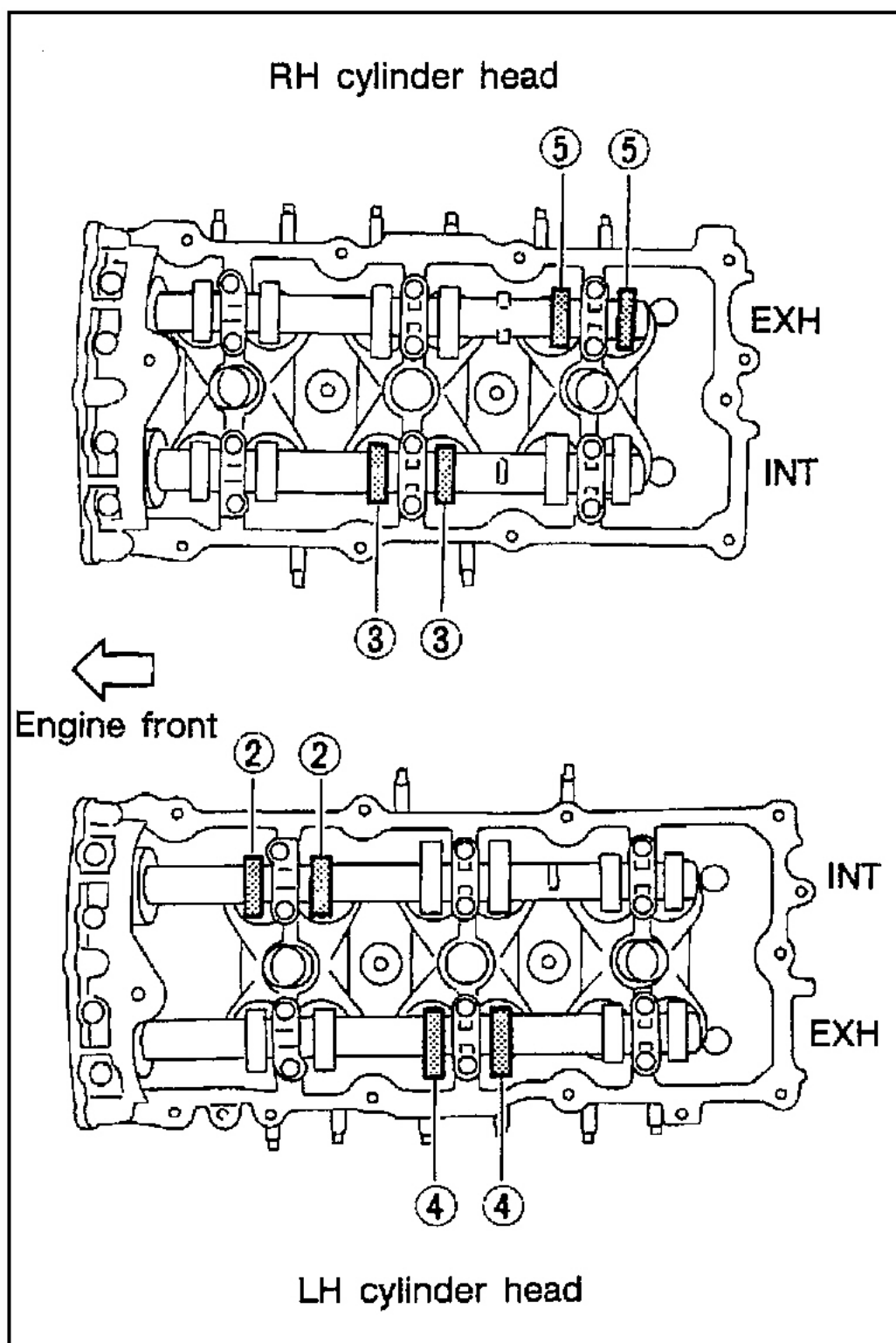
Fig. 177: Measuring Clearance Between Valve Lifter And Camshaft
Courtesy of NISSAN MOTOR CO., U.S.A.

8. Turn crankshaft 240° and align as above.
9. Set No. 3 cylinder at TDC on its compression stroke.
10. Check only those valves shown in the figure.

Crank position	Valve											
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6	
	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 3 TDC			○		○			○		○		

G02044865

Fig. 178: Checking Valves Chart (2 Of 3)
 Courtesy of NISSAN MOTOR CO., U.S.A.



G02044866

Fig. 179: Checking Valves (2 Of 3)
 Courtesy of NISSAN MOTOR CO., U.S.A.

11. Turn crankshaft 240° and align as above.
12. Set No. 5 cylinder at TDC on its compression stroke.
13. Check only those valves shown in the figure.

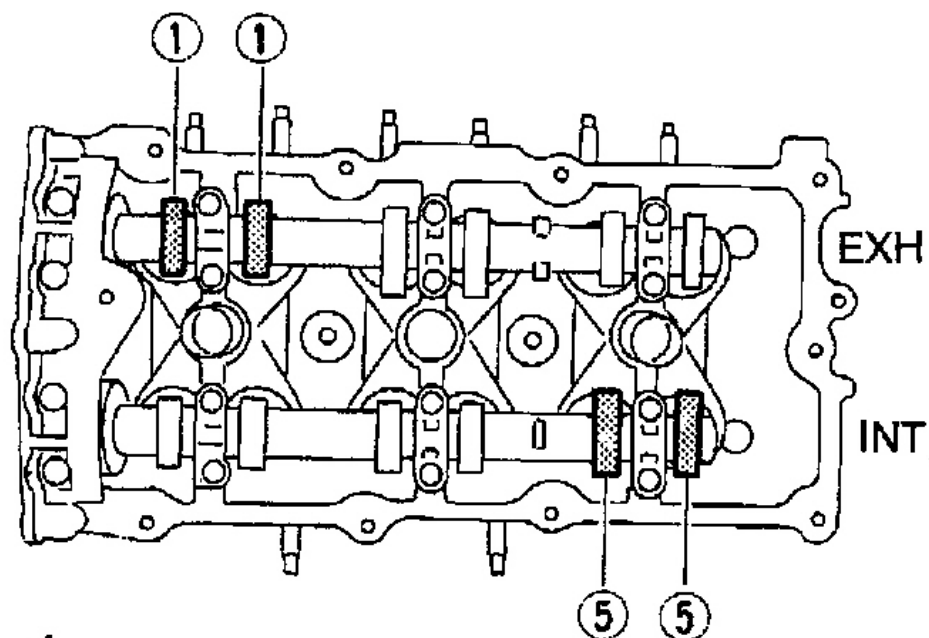
Crank position	Valve											
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6	
	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 5 TDC		○					○		○			○

G02044867

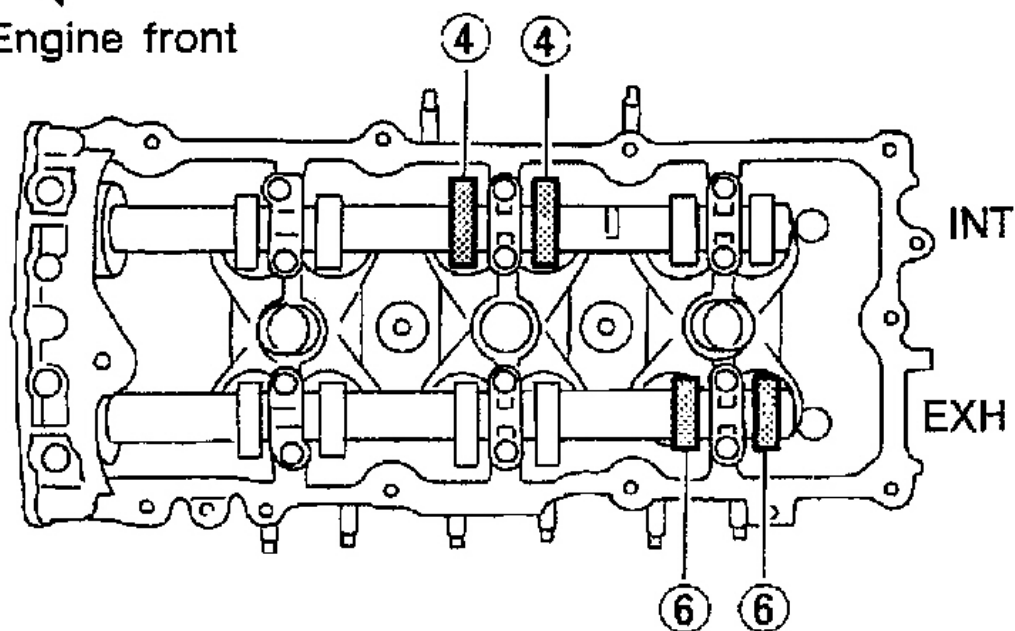
Fig. 180: Checking Valves Chart (3 Of 3)
 Courtesy of NISSAN MOTOR CO., U.S.A.

14. If all valve clearances are within specification, install the following parts. If they are out of specification, adjust the valve clearances.
 - Intake manifold collectors
 - RH and LH rocker covers
 - All spark plugs
 - All ignition coils

RH cylinder head



Engine front



LH cylinder head

G02044868

Fig. 181: Checking Valves (3 Of 3)
Courtesy of NISSAN MOTOR CO., U.S.A.

ADJUSTING

Adjust valve clearance while engine is cold.

Perform adjustment by selecting head thickness of valve lifter (Adjusting shims are not used).

1. Remove camshaft.
2. Remove valve lifter at location where measured value is outside standard.
3. Measure center thickness of removed valve lifter with micrometer.
4. Use equation below to calculate valve lifter thickness for replacement.

Valve lifter thickness calculation: $t = t1 + (C1 - C2)$

t = Thickness of replacement valve lifter

t1 = Thickness of removed valve lifter

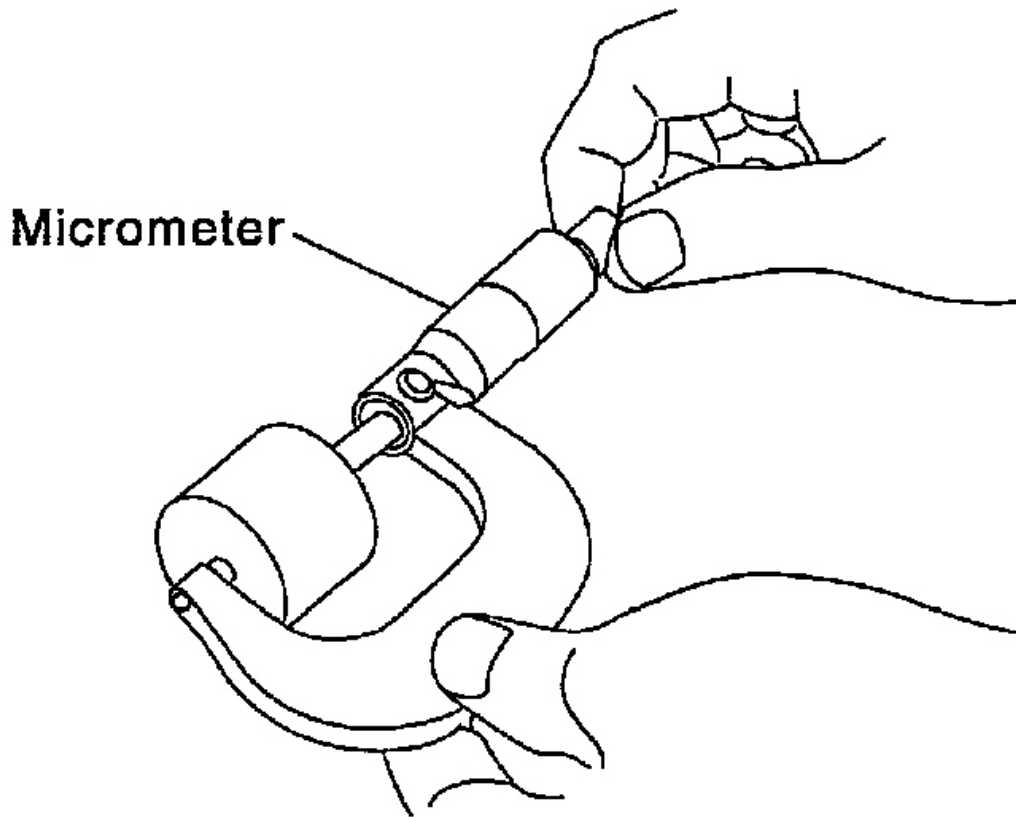
C1 = Measured valve clearance

C2 = Standard valve clearance

Valve lifter thickness:

Intake: 0.30 mm (0.012 in)

Exhaust: 0.33 mm (0.013 in)



G02044869

Fig. 182: Measuring Lifter Center Thickness With Micrometer

Courtesy of NISSAN MOTOR CO., U.S.A.

- Thickness of new valve lifter can be identified by stamp mark on reverse side (inside cylinder).

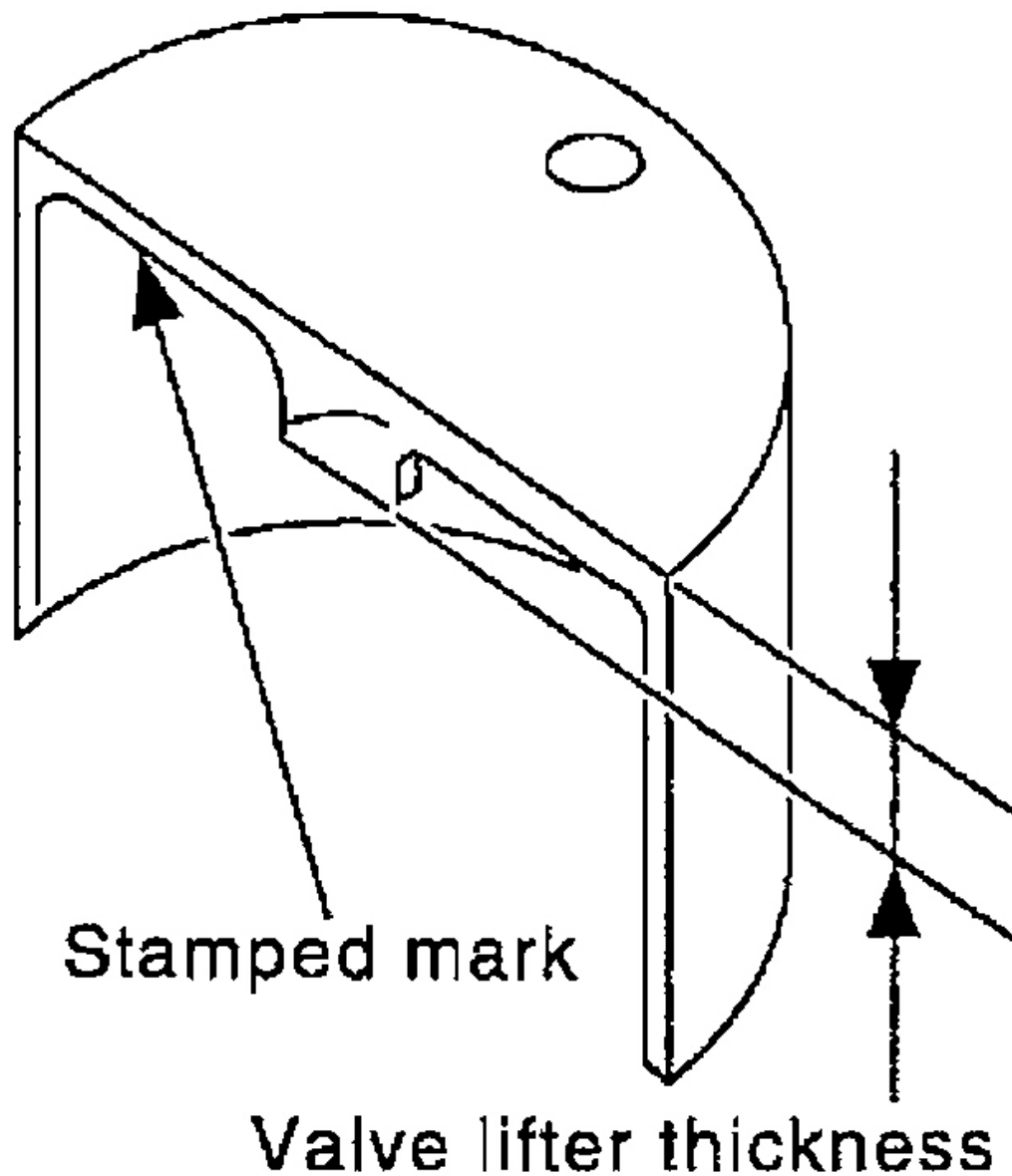
Unit: mm (in)	
Stamp mark	Thickness of valve lifter
Starting: 788C	7.88 (0.3102)
Ending: 836C	8.36 (0.3291)

G02044870

Fig. 183: Thickness Of New Valve Lifter Chart

Courtesy of NISSAN MOTOR CO., U.S.A.

- Available thickness of valve lifter (Factory setting): 7.88 - 8.36 mm (0.3102 - 0.3291 in) [in 0.02 mm (0.0008 in) step] in 25 sizes (Intake/Exhaust)



G02044871

Fig. 184: Identifying Thickness Of Valve Lifter

Courtesy of NISSAN MOTOR CO., U.S.A.

5. Install selected valve lifter.
6. Install camshaft.
7. Rotate crankshaft a few turns by hand.
8. Confirm that valve clearance is within standard.
9. After repair, confirm that valve clearance is within standard with engine warmed-up.

Valve clearance:

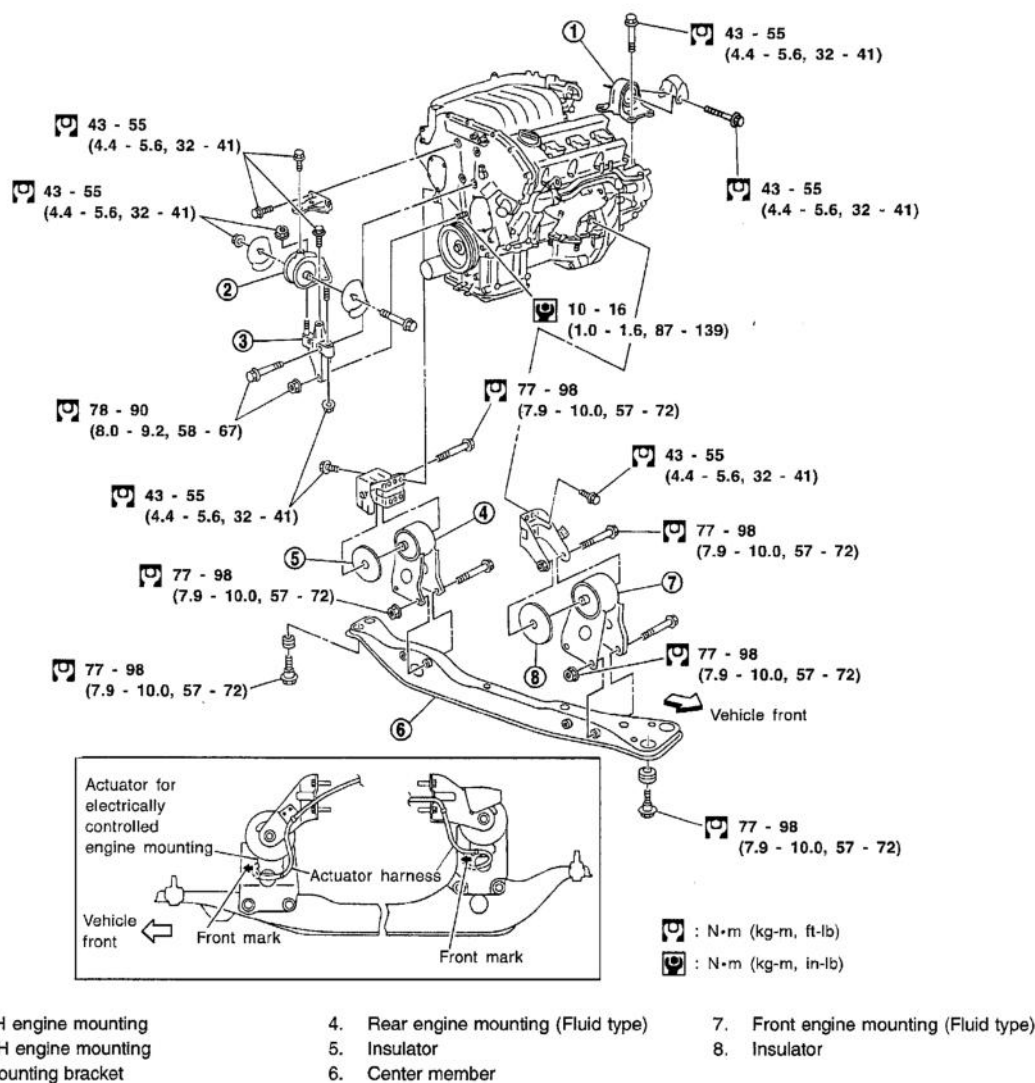
Unit: mm (in)

	Cold	Hot* (reference data)
Intake	0.26 - 0.34 (0.010 - 0.013)	0.32 - 0.40 (0.013 - 0.016)
Exhaust	0.29 - 0.37 (0.011 - 0.015)	0.33 - 0.41 (0.013 - 0.016)

*: Approximately 80°C (176°F)

G02044872

Fig. 185: Valve Clearance Chart**Courtesy of NISSAN MOTOR CO., U.S.A.****ENGINE ASSEMBLY****REMOVAL AND INSTALLATION**

**Fig. 186: View Of Engine Assembly**

Courtesy of NISSAN MOTOR CO., U.S.A.

WARNING:

- Situate vehicle on a flat and solid surface.
- Place chocks at front and back of rear wheels.
- Do not remove engine until exhaust system has completely cooled off. Otherwise, you may burn yourself and/or fire may break out in fuel line.
- For safety during subsequent steps, the tension of wires should be slackened against the engine.
- Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to **FUEL SYSTEM PRESSURE RELEASE**.
- Before removing front axle from transaxle, place safety stands under

designated front supporting points. Refer to

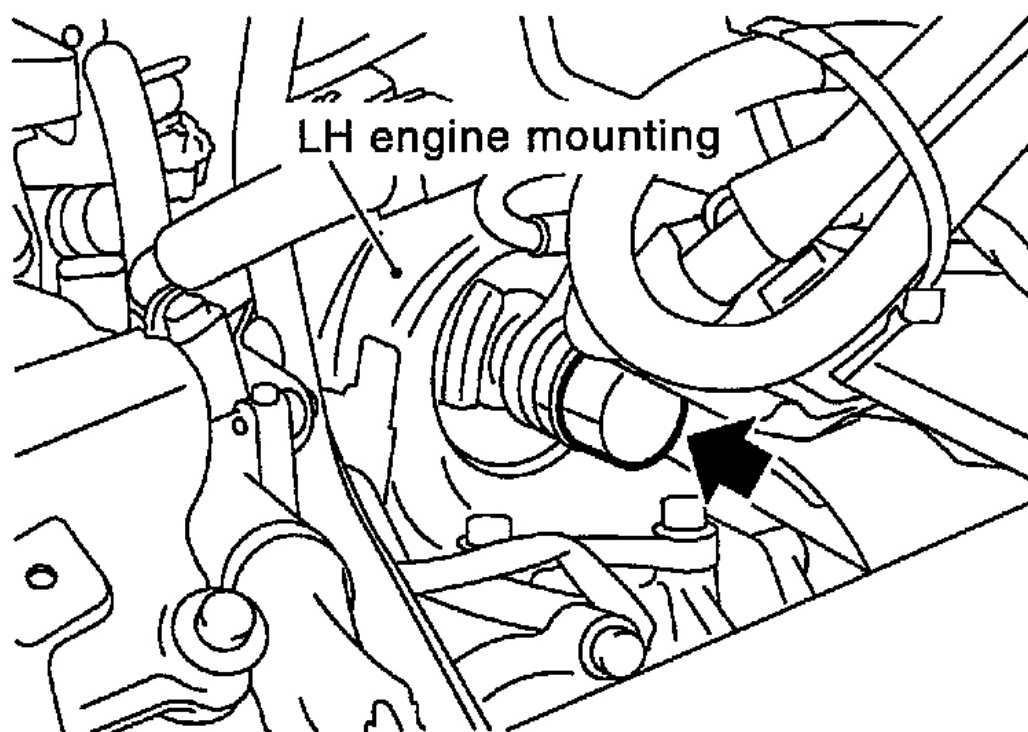
- **GARAGE JACK AND SAFETY STAND** .
- Be sure to hoist engine and transaxle in a safe manner.
- For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.

CAUTION:

- When lifting engine, be careful not to strike adjacent parts, especially the following: Accelerator wire casing, brake lines, and brake master cylinder.
- In hoisting the engine, always use engine slingers in a safe manner.
- In removing drive shaft, be careful not to damage grease seal of transaxle.
- Before separating engine and transaxle, remove the crankshaft position sensor (POS) from the assembly.
- Always pay extra attention not to damage edge of crankshaft position sensor (POS) or ring gear teeth.

REMOVAL

1. Remove engine undercover and hood.
2. Drain coolant from both cylinder block and radiator.
3. Remove vacuum hoses, fuel hoses, wires, harnesses, connectors and so on.
4. Remove front exhaust tubes, ball joints and drive shafts.
5. Remove radiator and fans.
6. Remove drive belts.
7. Remove alternator, compressor and power steering oil pump from engine.
8. Set a suitable transmission jack under transaxle. Hoist engine with engine slinger.



G02044874

Fig. 187: Locating LH Engine Mount
Courtesy of NISSAN MOTOR CO., U.S.A.

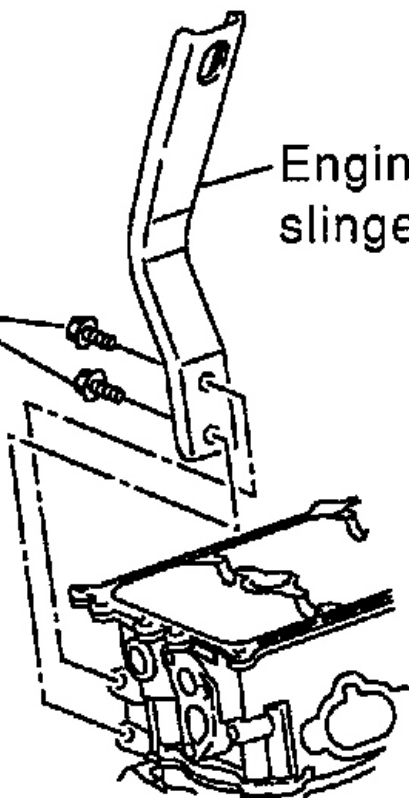
9. Remove LH engine mounting.

Vehicle front

**24.5 - 31.4 N•m
(2.5 - 3.2 kg-m,
18 - 23 ft-lb)**

Engine rear
slinger


Engine front



G02044875

Fig. 188: Removing LH Engine Mounting
Courtesy of NISSAN MOTOR CO., U.S.A.

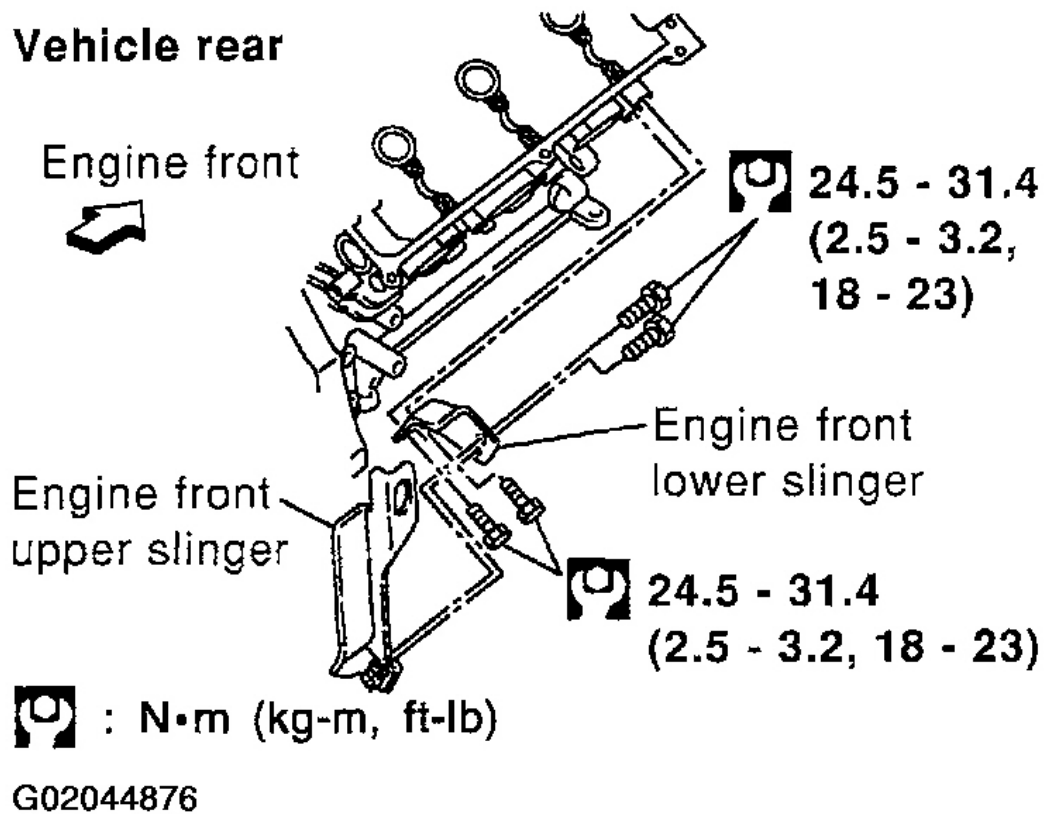
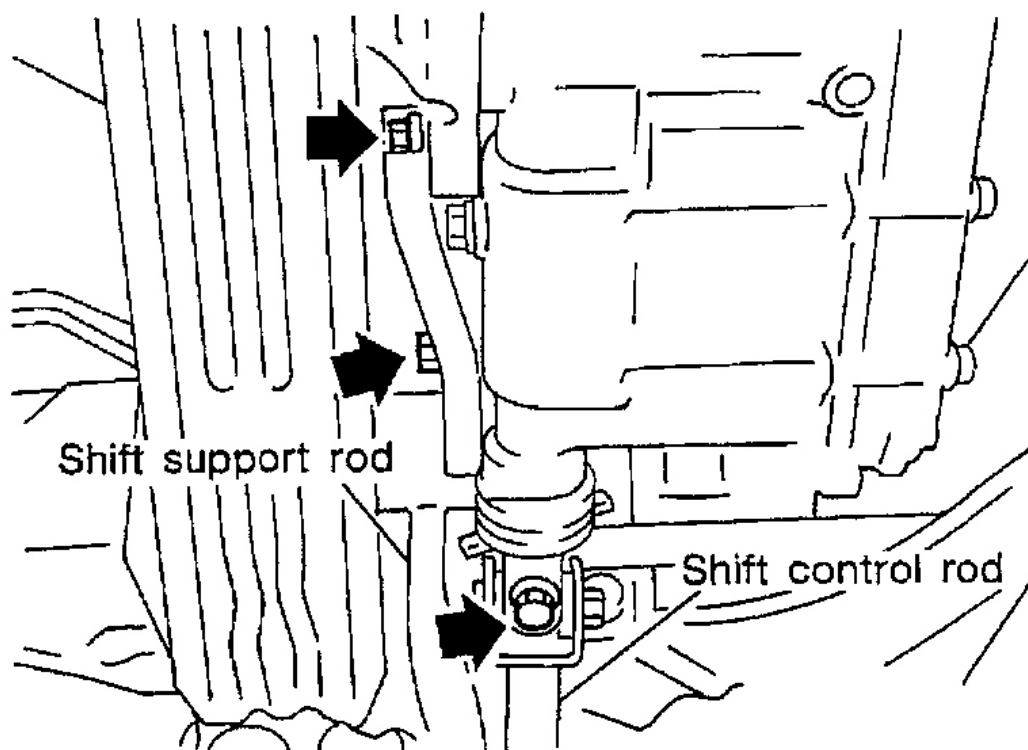


Fig. 189: Removing Engine Front Slingers
 Courtesy of NISSAN MOTOR CO., U.S.A.

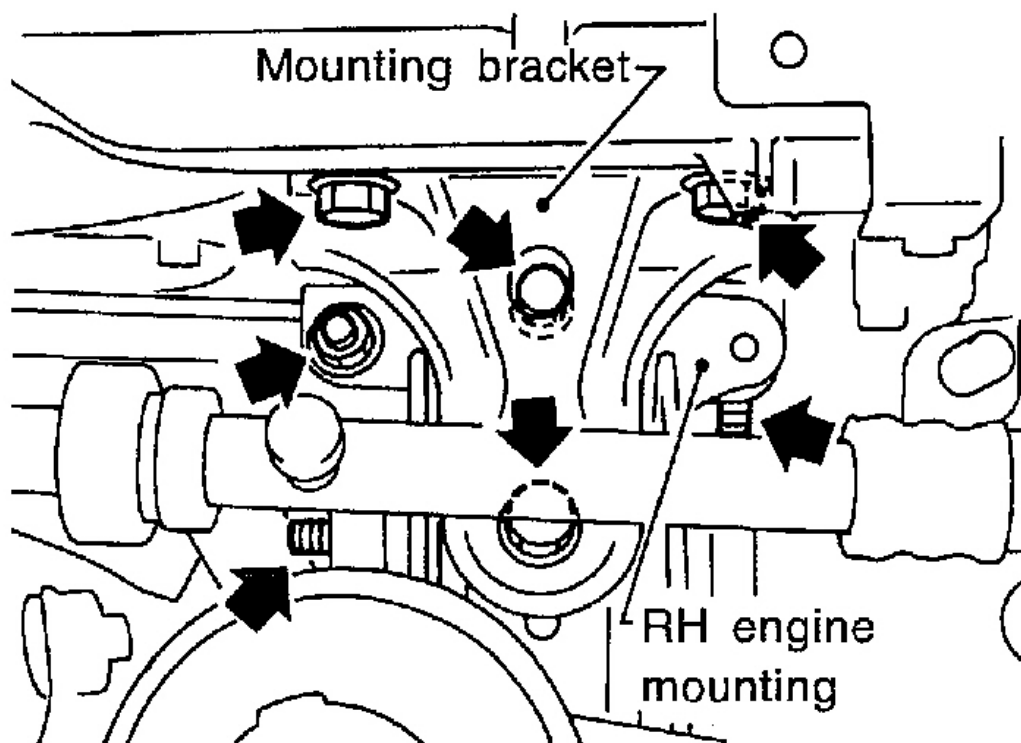
10. Disconnect control rod and support rod from transaxle (M/T model).
11. Disconnect control cable from transaxle (A/T model).



G02044877

Fig. 190: Identifying Control Rod And Support Rod From Transaxle (M/T Model)
Courtesy of NISSAN MOTOR CO., U.S.A.

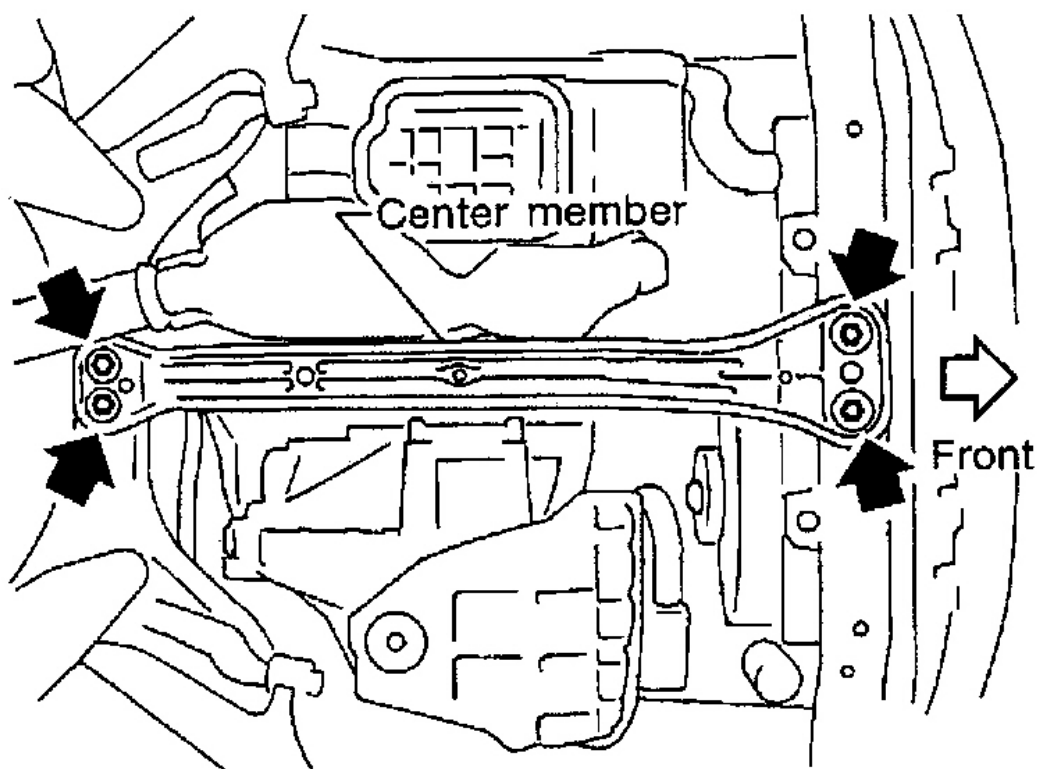
12. Remove RH engine mounting.



G02044878

Fig. 191: Removing RH Engine Mounting
Courtesy of NISSAN MOTOR CO., U.S.A.

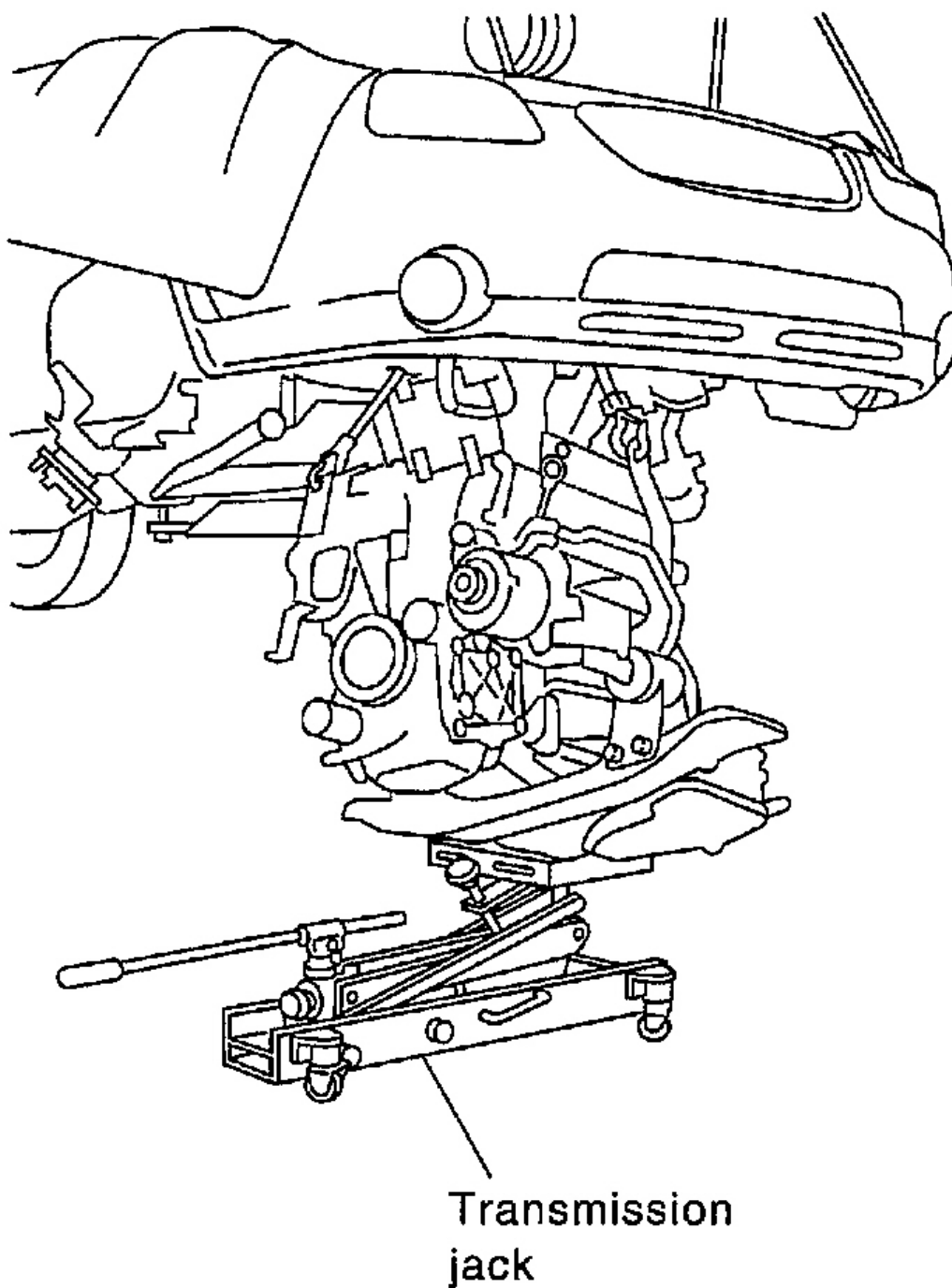
13. Remove center member and then slowly lower transmission jack.



G02044879

Fig. 192: Removing Center Lower Transmission Jack
Courtesy of NISSAN MOTOR CO., U.S.A.

14. Remove engine with transaxle as shown.



G02044880

Fig. 193: Removing Engine With Transaxle

Courtesy of NISSAN MOTOR CO., U.S.A.

INSTALLATION

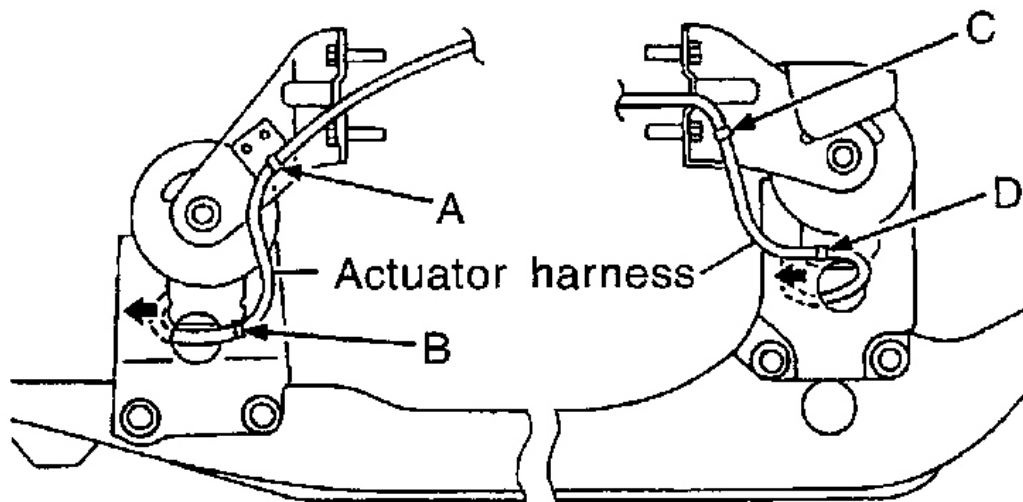
Installation is in the reverse order of removal. Install the electronically - controlled engine mount harness to match the following values. (Models with electronically-controlled engine mounts)

Length between A and B:

170 mm (6.69 in)

Length between C and D:

130 mm (5.12 in)

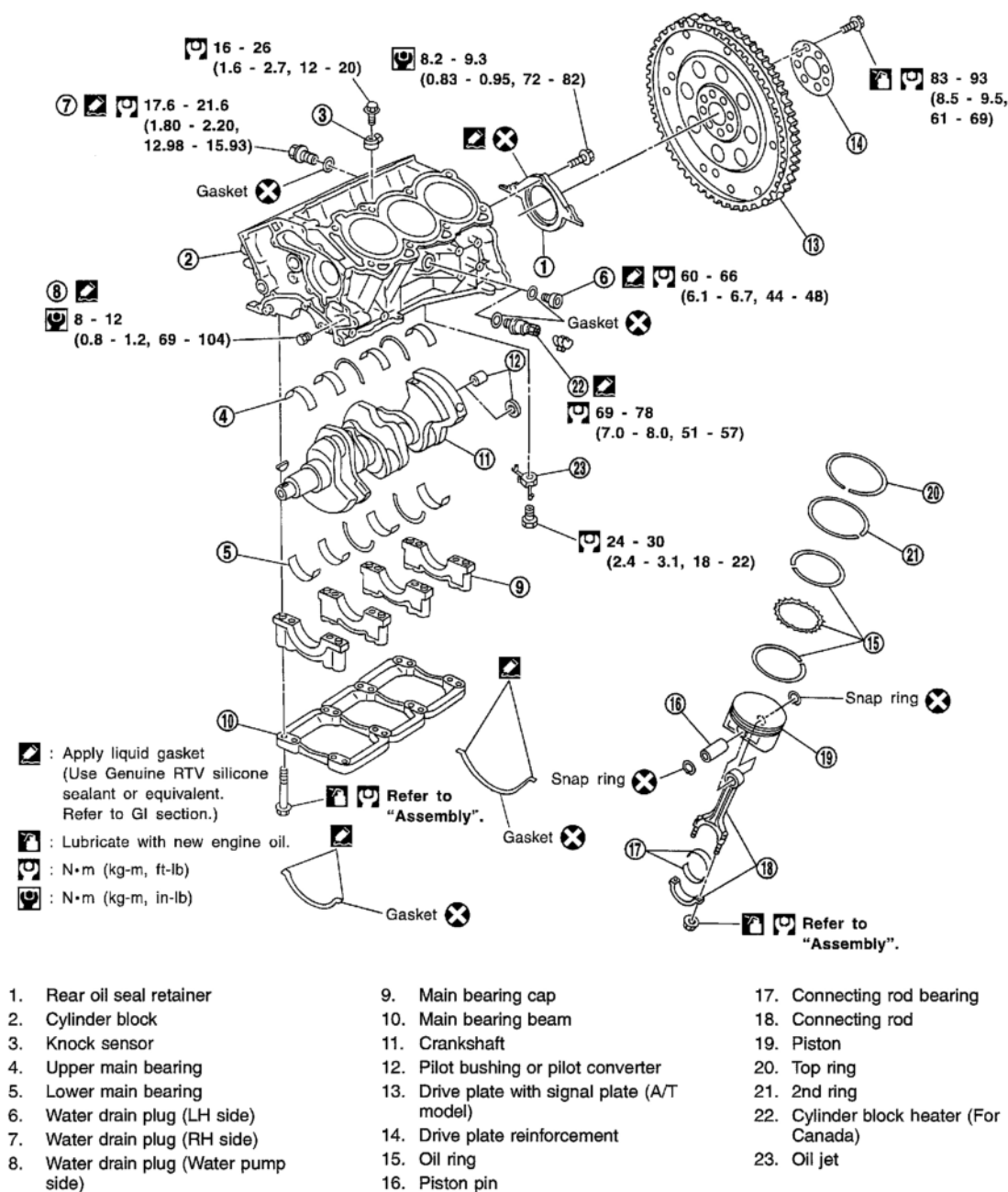


G02044881

Fig. 194: Installing Electronically-Controlled Engine Mounts
Courtesy of NISSAN MOTOR CO., U.S.A.

CYLINDER BLOCK

COMPONENTS



G02044882

Fig. 195: Identifying Cylinder Block Components

Courtesy of NISSAN MOTOR CO., U.S.A.

REMOVAL AND INSTALLATION**CAUTION:**

- When installing bearings, pistons, or other sliding parts, lubricate contacting surfaces with new engine oil.
- Place removed parts such as bearings and bearing caps in their proper

order and direction.

- When installing connecting rod nuts, and main bearing cap bolts, apply new engine oil to threads and seating surfaces.
- Do not allow any magnetic materials to contact the signal plate teeth or drive plate.

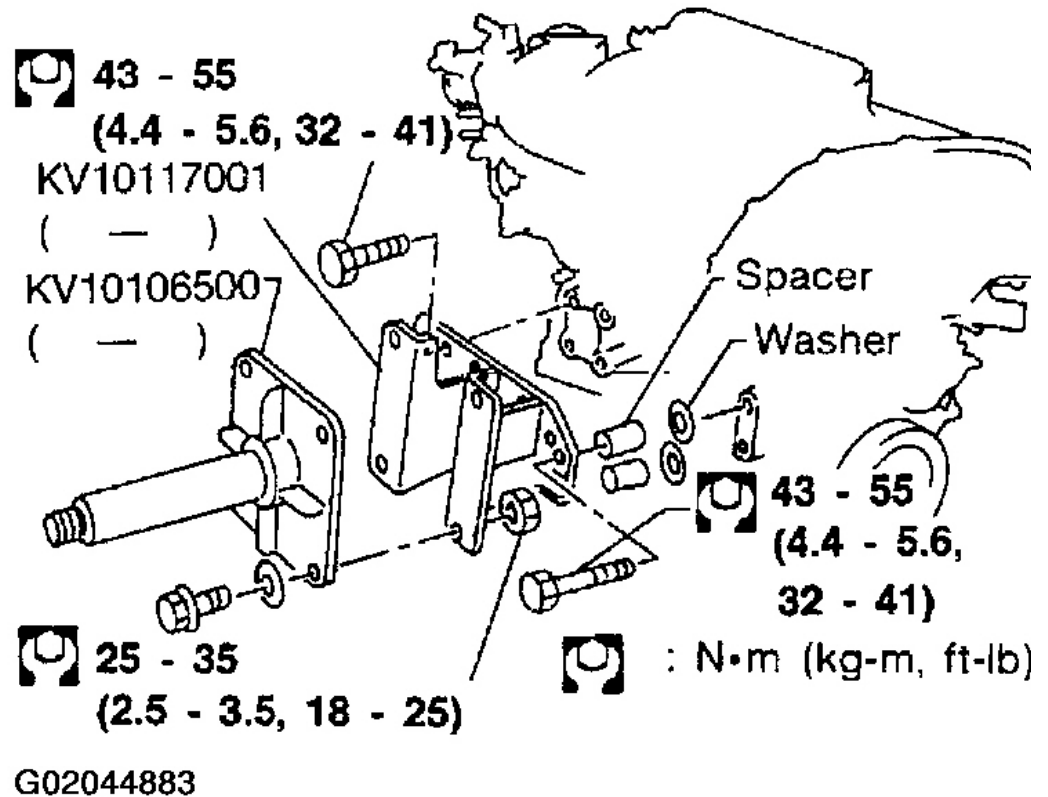


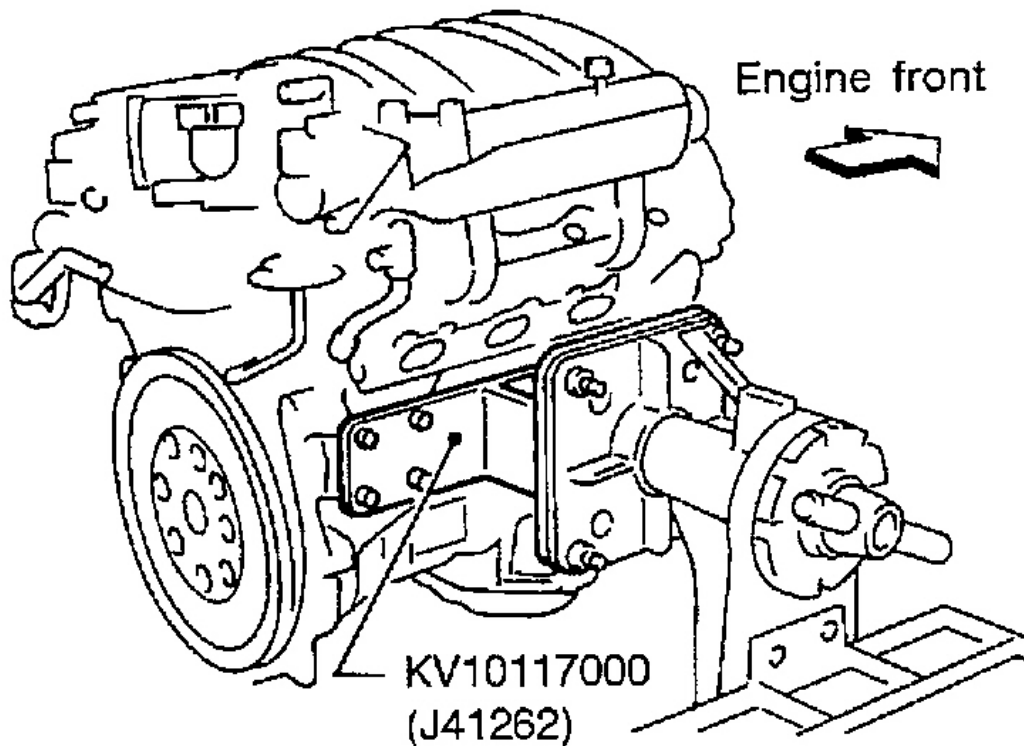
Fig. 196: Placing Removed Parts In Order Of Removal
Courtesy of NISSAN MOTOR CO., U.S.A.

DISASSEMBLY

PISTON, CRANKSHAFT AND OIL JET

1. Remove engine. Refer to "**REMOVAL AND INSTALLATION**", .
2. Place engine on a work stand.
3. Drain coolant and oil.
4. Remove oil pan. Refer to "**REMOVAL**", .
5. Remove timing chain. Refer to "**REMOVAL**", .

6. Remove cylinder head. Refer to "**REMOVAL**", .



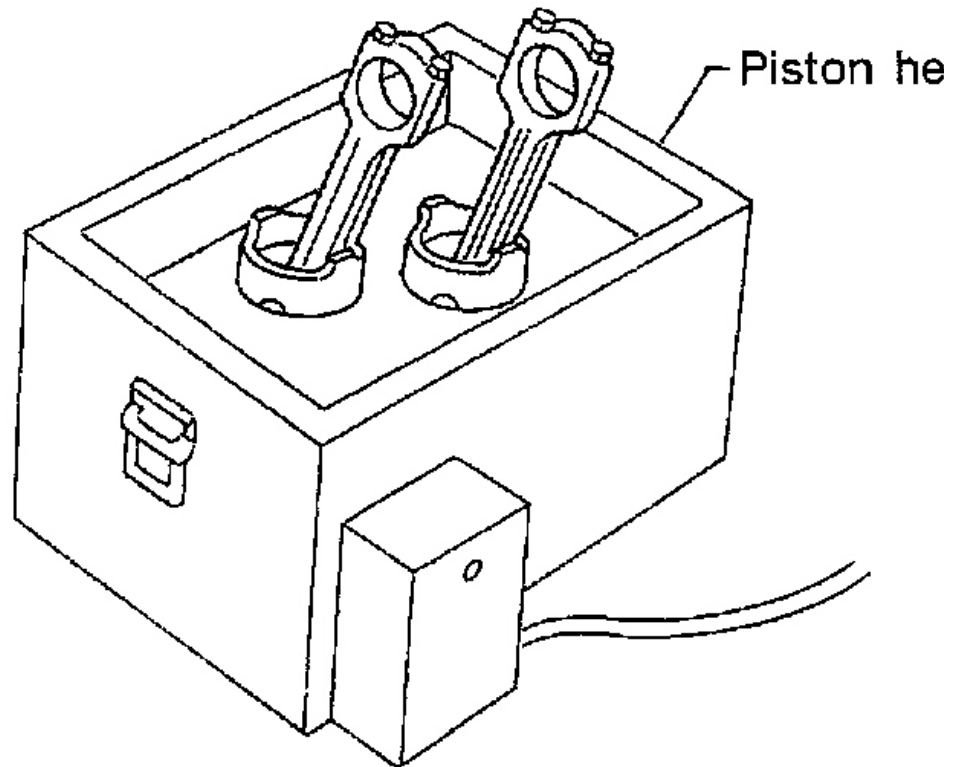
G02044884

Fig. 197: Identifying Engine On Work Stand
Courtesy of NISSAN MOTOR CO., U.S.A.

7. Remove pistons with connecting rods.
- When disassembling piston and connecting rod, remove snap ring first, then heat piston to 60 to 70° C (140 to 158°F).
8. Remove rear oil seal retainer.

CAUTION:

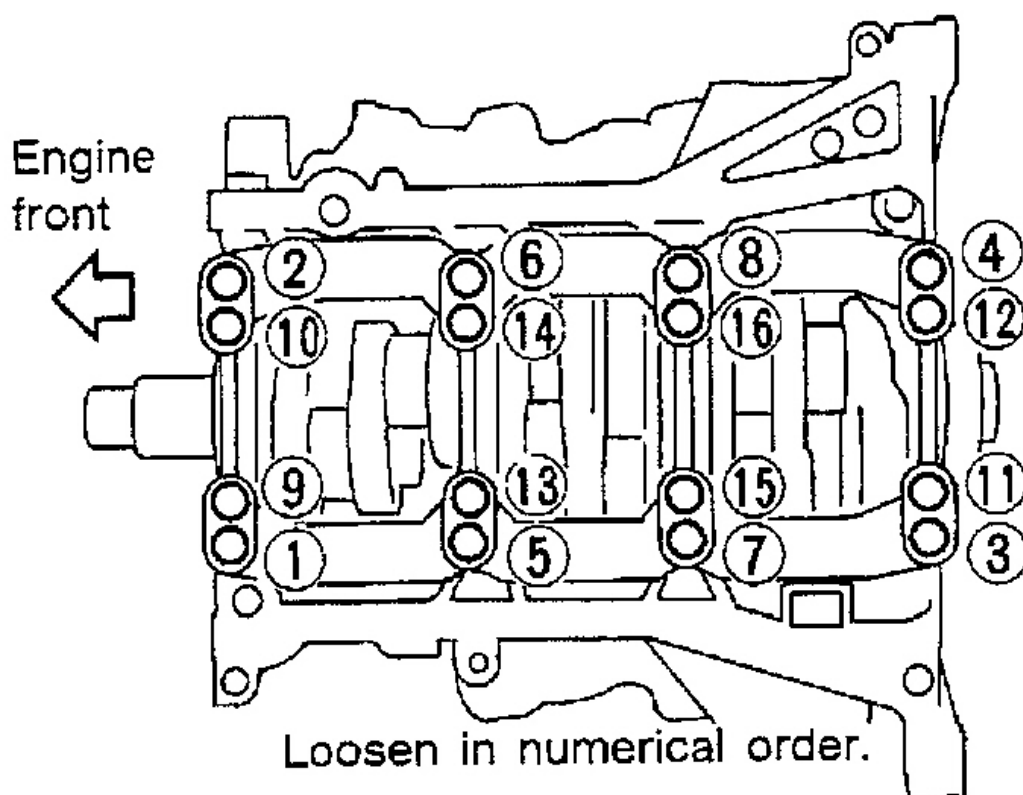
- When piston rings are not replaced, make sure that piston rings are mounted in their original positions.
- When replacing piston rings, if there is no punchmark, install with side up.



G02044885

Fig. 198: Identifying Piston Heater
Courtesy of NISSAN MOTOR CO., U.S.A.

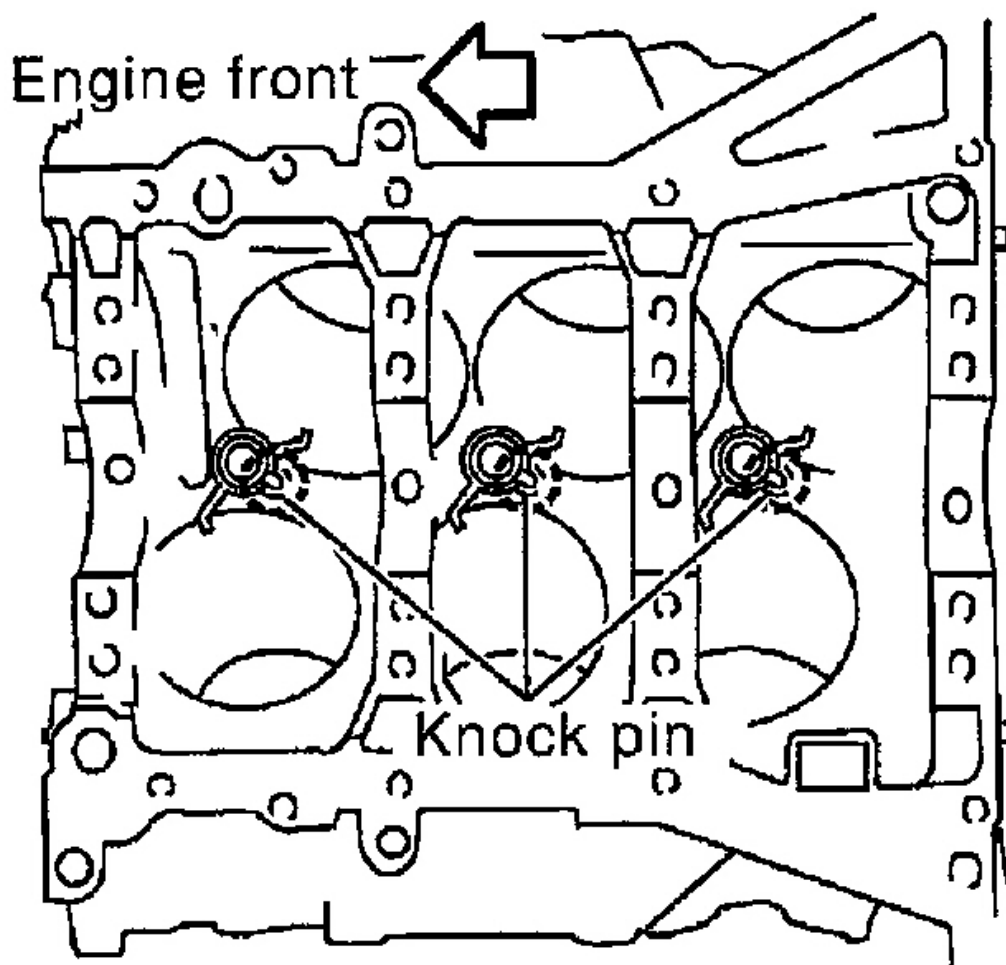
9. Loosen bolts in numerical order as shown and remove main bearing beam, bearing cap and crankshaft.
 - Before removing bearing beam and bearing cap, measure crankshaft end play. Refer to **OIL JET**.
 - Bolts should be loosened in two or three steps.



G02044886

Fig. 199: Removing Main Bearing Beam Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

10. Remove oil jets.



G02044887

Fig. 200: Removing Oil Jets

Courtesy of NISSAN MOTOR CO., U.S.A.

INSPECTION**PISTON AND PISTON PIN CLEARANCE**

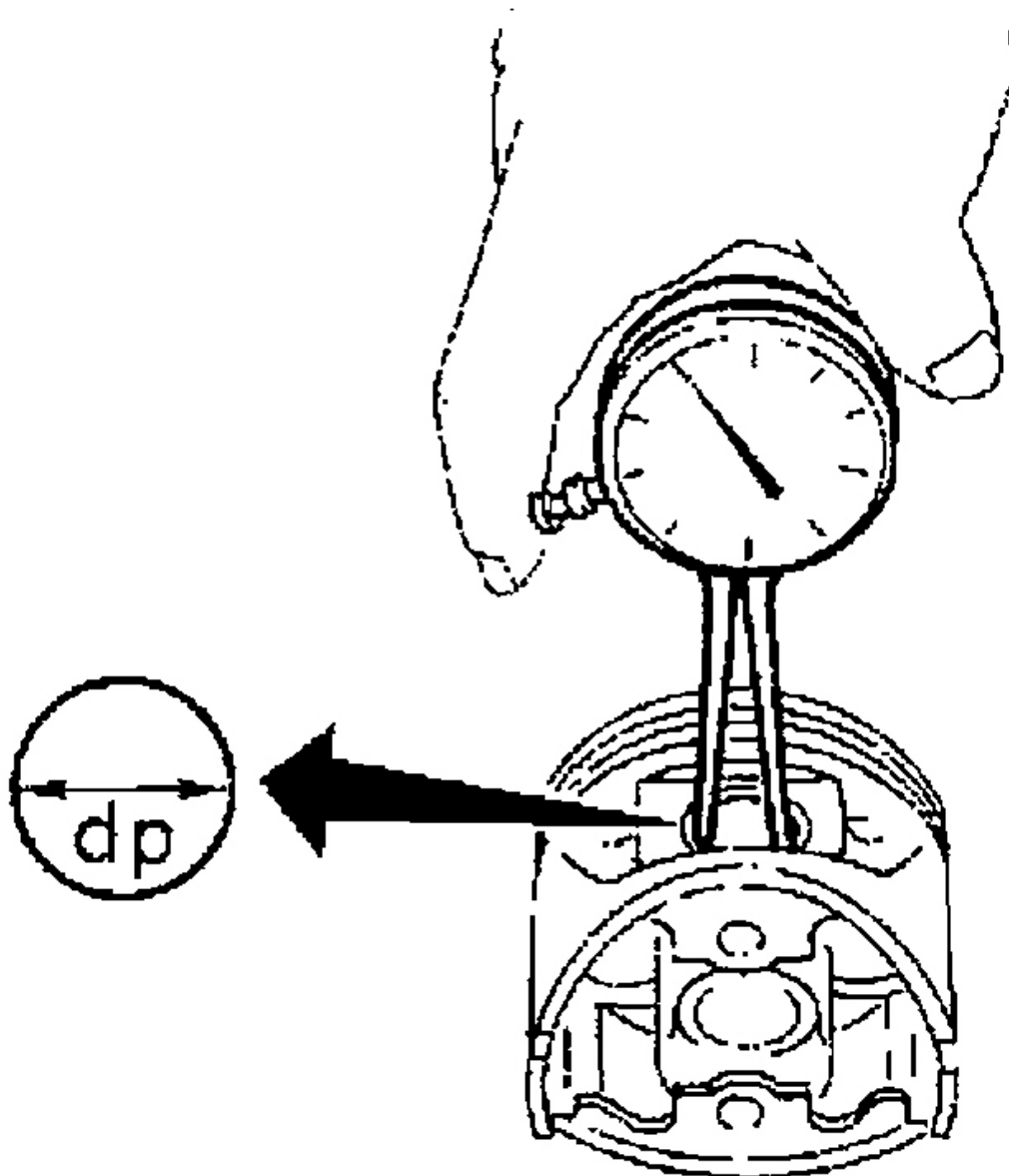
1. Measure inner diameter of piston pin hole "dp".

Standard diameter "dp":**Grade No. 0**

21.993 - 21.999 mm (0.8659 - 0.8661 in)

Grade No. 1

21.999 - 22.005 mm (0.8661 - 0.8663 in)



G02044888

Fig. 201: Inspecting Piston And Piston Pin Clearance

Courtesy of NISSAN MOTOR CO., U.S.A.

2. Measure outer diameter of piston pin "Dp".

Standard diameter "Dp":

Grade No. 0

21.989 - 21.995 mm (0.8657 - 0.8659 in)

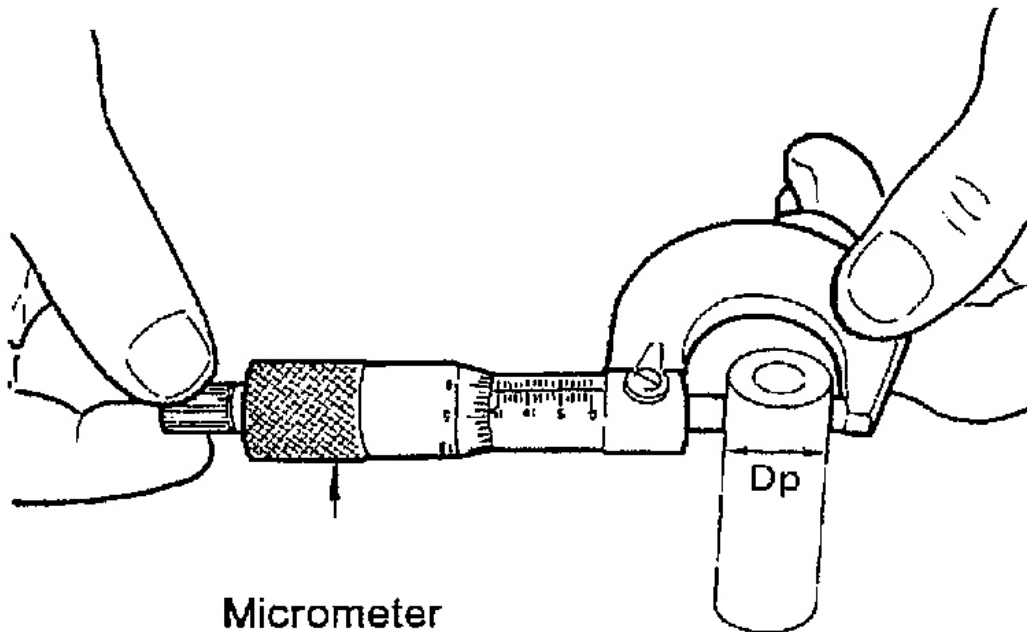
Grade No. 1

21.995 - 22.001 mm (0.8659 - 0.8662 in)

3. Calculate interference fit of piston pin to piston.

$D_p - d_p = 0.002 - 0.006 \text{ mm (0.0001 - 0.0002 in)}$

If it exceeds the above value, replace piston assembly with pin.



G02044889

Fig. 202: Measuring Outer Diameter Of Piston Pin

Courtesy of NISSAN MOTOR CO., U.S.A.

PISTON RING SIDE CLEARANCE**Side clearance:****Top ring**

0.045 - 0.080 mm (0.0018 - 0.0031 in)

2nd ring

0.030 - 0.070 mm (0.0012 - 0.0028 in)

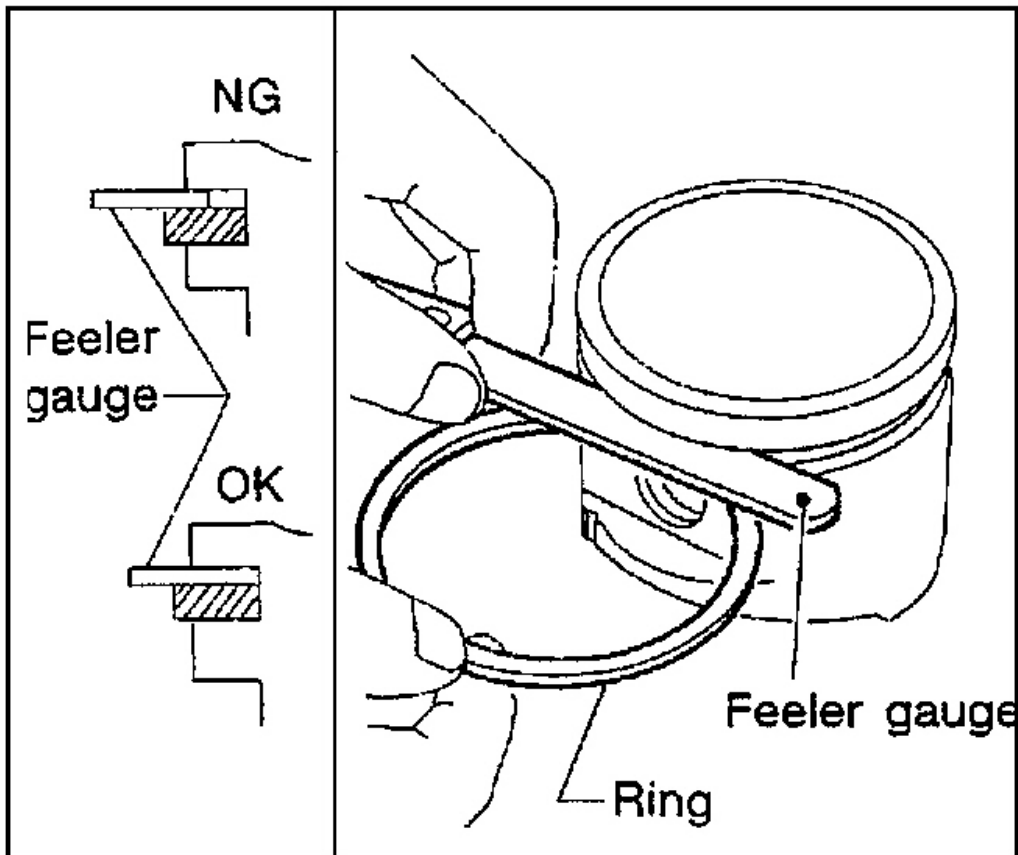
Oil ring

0.065 - 0.135 mm (0.0026 - 0.0053 in)

Max. limit of side clearance:

Top ring 0.11 mm (0.0043 in)

2nd ring 0.1 mm (0.004 in)



G02044890

Fig. 203: Measuring Piston Ring Side
Courtesy of NISSAN MOTOR CO., U.S.A.

If out of specification, replace piston ring. If clearance exceeds maximum limit with new ring, replace piston.

PISTON RING END GAP

End gap:

Top ring 0.23 - 0.33 mm (0.0091 - 0.0130 in)

2nd ring 0.33 - 0.48 mm (0.0130- 0.0189 in)

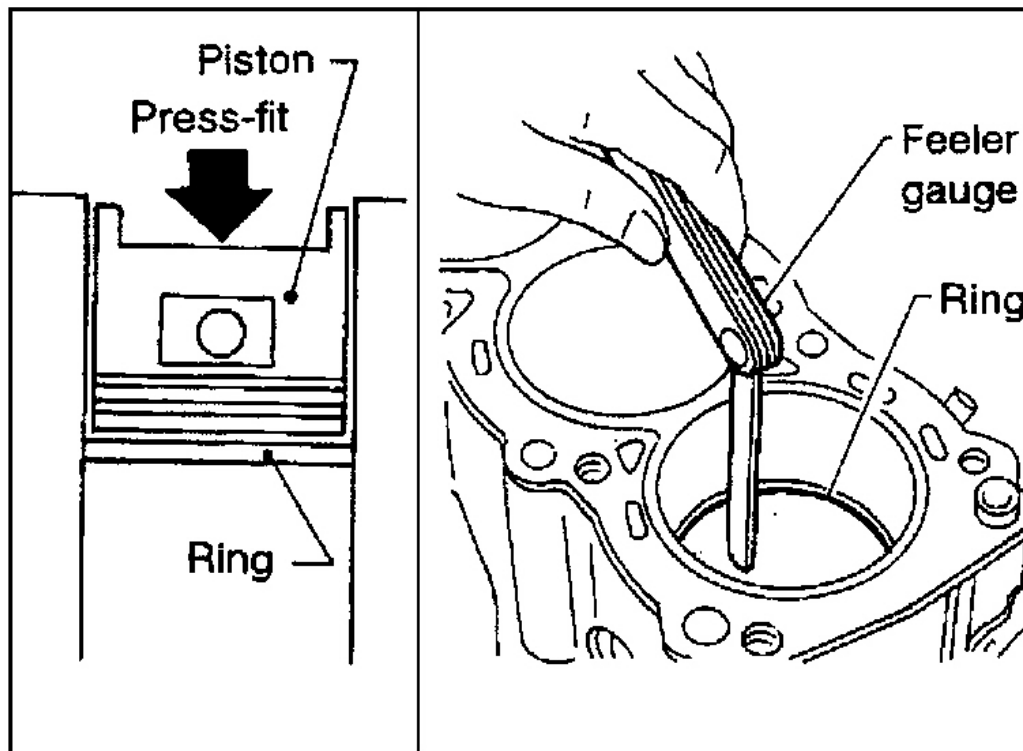
Oil ring 0.20 - 0.80 mm (0.0079 - 0.0315 in)

Max. limit of ring gap:

Top ring 0.54 mm (0.0213 in)

2nd ring 0.80 mm (0.0315 in)

Oil ring 0.50 mm (0.0197 in)



G02044891

Fig. 204: Measuring Piston Ring End Gap

Courtesy of NISSAN MOTOR CO., U.S.A.

If out of specification, replace piston ring. If gap still exceeds the limit even with a new ring, do the following. Rebore cylinder and use oversized piston and piston rings.

Refer to SDS (PISTON, PISTON RING AND PISTON PIN).

- When replacing the piston, check the cylinder block surface for scratches or seizure. If scratches or seizure is found, hone or replace the cylinder block.

CONNECTING ROD BEND AND TORSION**Bend:**

Limit 0.15 mm (0.0059 in)

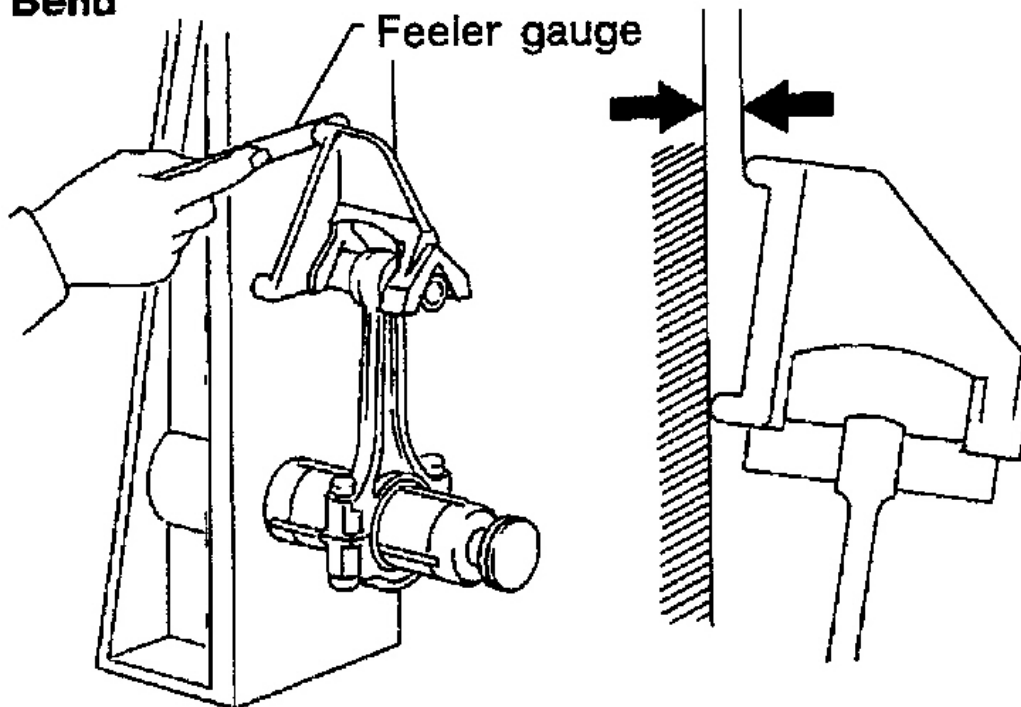
per 100 mm (3.94 in) length

Torsion:

Limit 0.30 mm (0.0118 in)

per 100 mm (3.94 in) length

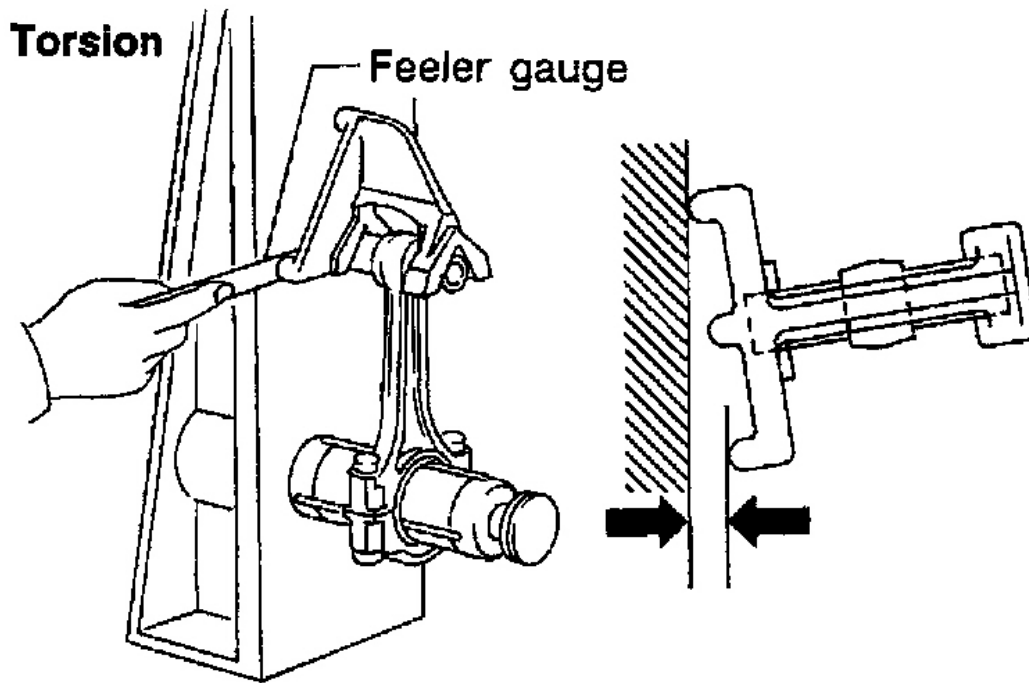
If it exceeds the limit, replace connecting rod assembly.

Bend

G02044892

Fig. 205: Measuring Connecting Rod Bend And Torsion (1 Of 2)

Courtesy of NISSAN MOTOR CO., U.S.A.



G02044893

Fig. 206: Measuring Connecting Rod Bend And Torsion (1 Of 2)

Courtesy of NISSAN MOTOR CO., U.S.A.

CYLINDER BLOCK DISTORTION AND WEAR

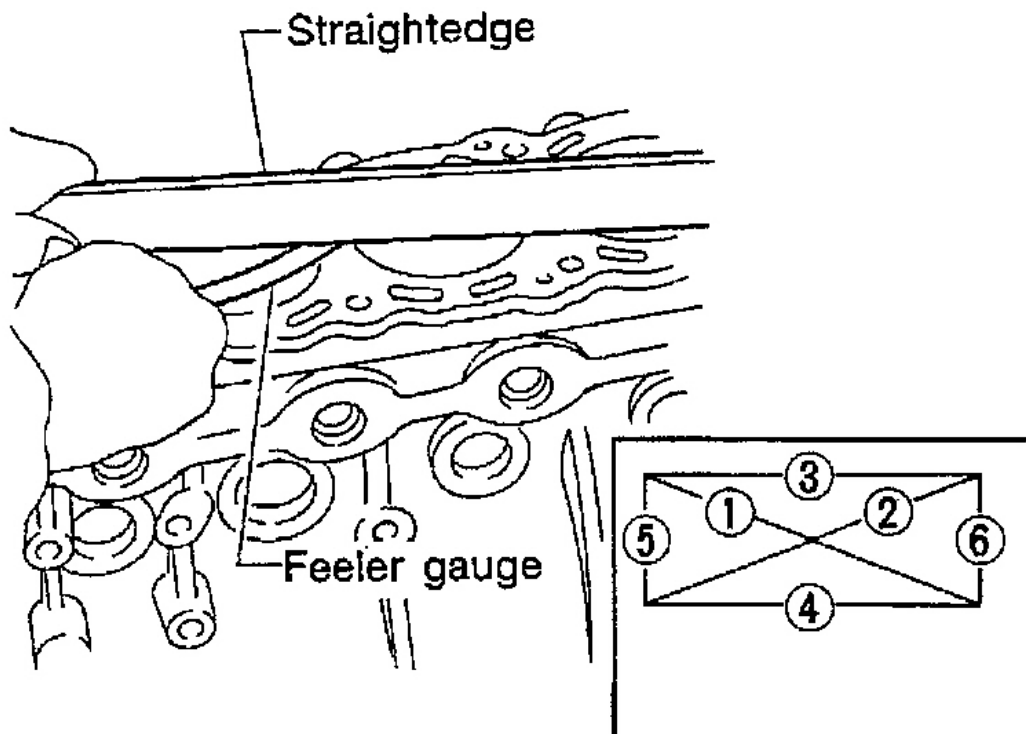
- Clean upper surface of cylinder block.

Use a reliable straightedge and feeler gauge to check the flatness of cylinder block surface.

Check along six positions shown in the figure.

Distortion limit: 0.10 mm (0.0039 in)

- If out of specification, resurface it. The limit for cylinder block resurfacing is determined by cylinder head resurfacing in engine.



G02044894

Fig. 207: Measuring Cylinder Block Distortion And Wear
 Courtesy of NISSAN MOTOR CO., U.S.A.

Resurfacing limit:

Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

The maximum limit is as follows:

$A+B=0.2$ mm (0.008 in)

Nominal cylinder block height from crankshaft center:

214.95 - 215.05 mm (8.4626 - 8.4665 in)

Refer to SDS (CYLINDER BLOCK).

- If necessary, replace cylinder block.

PISTON-TO-BORE CLEARANCE

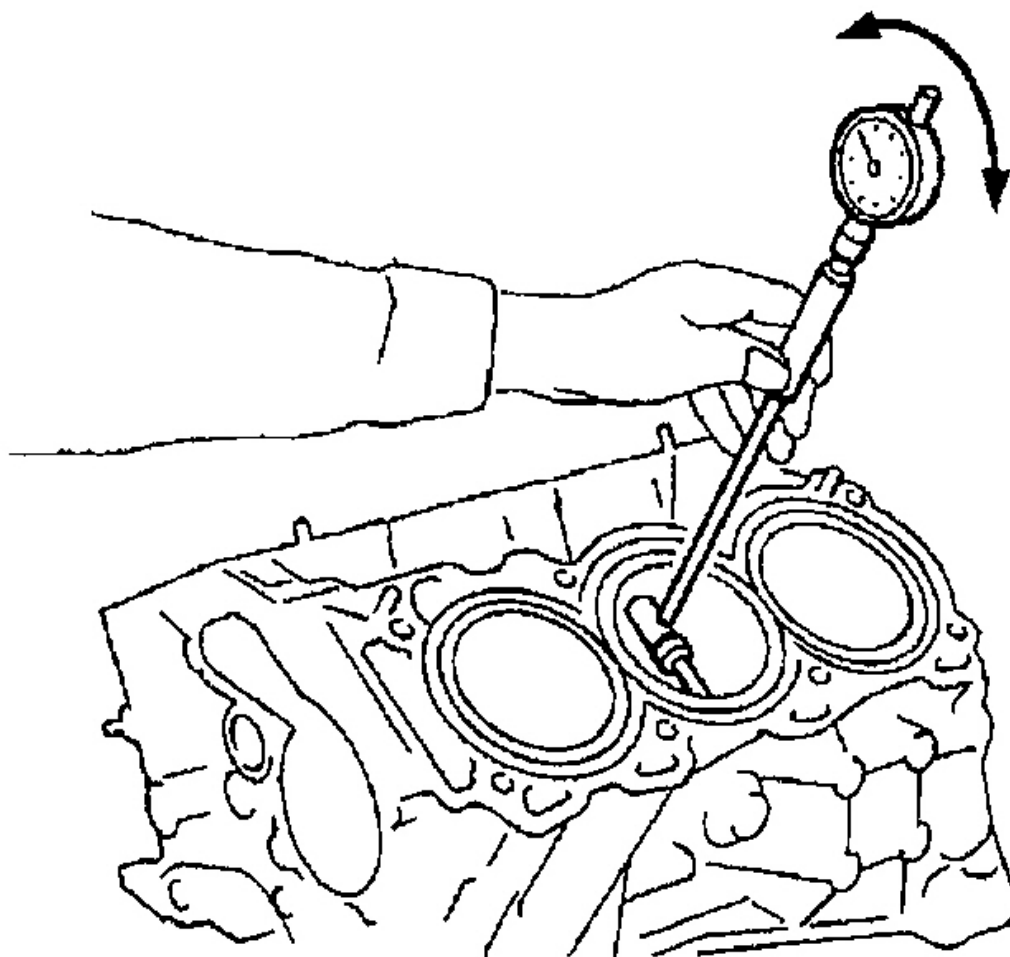
1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper.

Cylinder bore inner diameter

Grade No.	Standard inner diameter	Wear limit
No. 1	95.500 - 95.510 mm (3.7598 - 3.7602 in)	0.20 mm (0.0079 in)
No. 2	95.510 - 95.520 mm (3.7602 - 3.7606 in)	
No. 3	95.520 - 95.530 mm (3.7606 - 3.7610 in)	

G02044895

Fig. 208: Measuring Cylinder Bore For Wear Out-Of-Round And Taper
 Courtesy of NISSAN MOTOR CO., U.S.A.



G02044896

Fig. 209: Checking For Score And Seizure
Courtesy of NISSAN MOTOR CO., U.S.A.

If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.

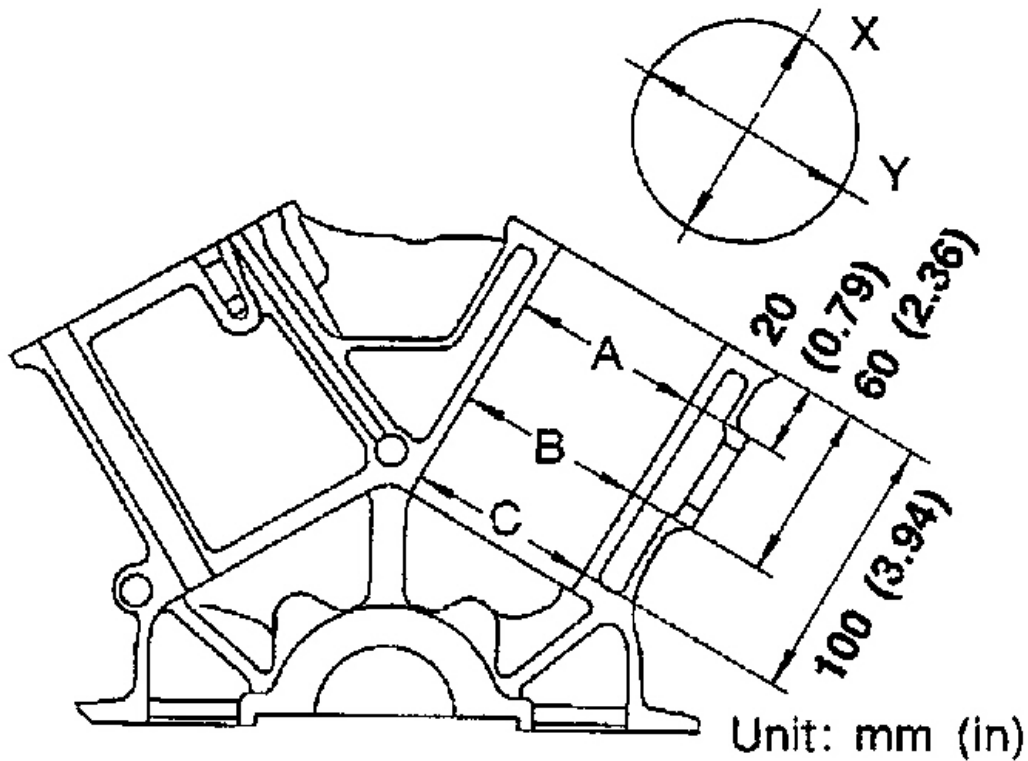
Out-of-round (X - Y):

Limit 0.015 mm (0.0006 in)

Taper (A - B - C):

Limit 0.015 mm (0.0006 in)

2. Check for scratches and seizure. If seizure is found, hone it.

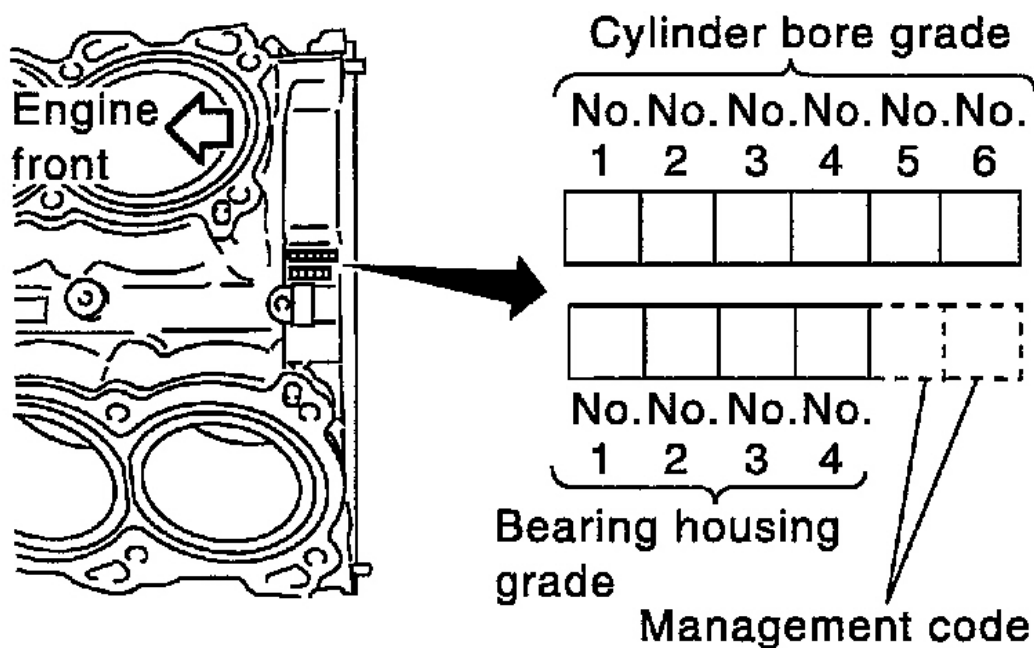


G02044897

Fig. 210: Identifying Out-Of-Round And Taper Measurements

Courtesy of NISSAN MOTOR CO., U.S.A.

- If both cylinder block and piston are replaced with new ones, select piston of the same grade number punched on cylinder block rear position. These numbers are punched in either Arabic or Roman numerals.



G02044898

Fig. 211: Identifying Piston Grade Number On Cylinder Block
 Courtesy of NISSAN MOTOR CO., U.S.A.

3. Measure piston skirt diameter.

Piston diameter "A": Refer to SDS (PISTON, PISTON RING AND PISTON PIN).

Measuring point "a" (Distance from the top):

41.0 mm (1.61 in)

4. Check that piston-to-bore clearance is within specification.

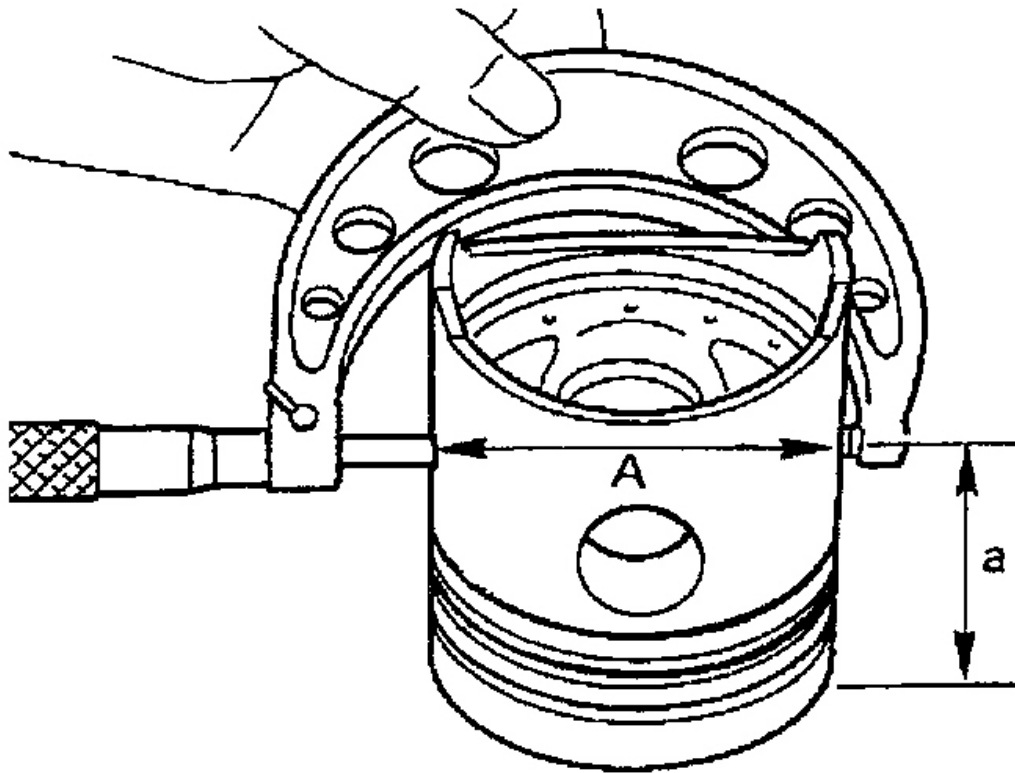
Piston-to-bore clearance "B":

0.010 - 0.030 mm (0.0004 - 0.0012 in)

5. Determine piston oversize according to amount of cylinder wear.

Oversize pistons are available for service.

Refer to SDS (PISTON, PISTON RING AND PISTON PIN).



G02044899

Fig. 212: Checking Piston-To-Bore Clearance
Courtesy of NISSAN MOTOR CO., U.S.A.

- If oversize piston is used, use oversize piston ring also.
6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".

Rebored size calculation: $D = A + B - C$

where,

D: Bored diameter

A: Piston diameter as measured

B: Piston-to-bore clearance

C: Honing allowance 0.02 mm (0.0008 in)

7. Install main bearing caps, and tighten to the specified torque. Otherwise, cylinder bores may be distorted in final assembly.
8. Cut cylinder bores.
 - **When any cylinder needs boring, all other cylinders must also be bored.**
 - **Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**
9. Hone cylinders to obtain specified piston-to-bore clearance.
10. Measure finished cylinder bore for out-of-round and taper.
 - **Measurement should be done after cylinder bore cools down.**

CRANKSHAFT

1. Check crankshaft main and pin journals for score, wear or cracks.
2. With a micrometer, measure journals for taper and out-of-round.

Out-of-round (X - Y):**Standard****0.002 mm (0.0001 in)****Taper (A - B):****Standard****0.002 mm (0.0001 in)**

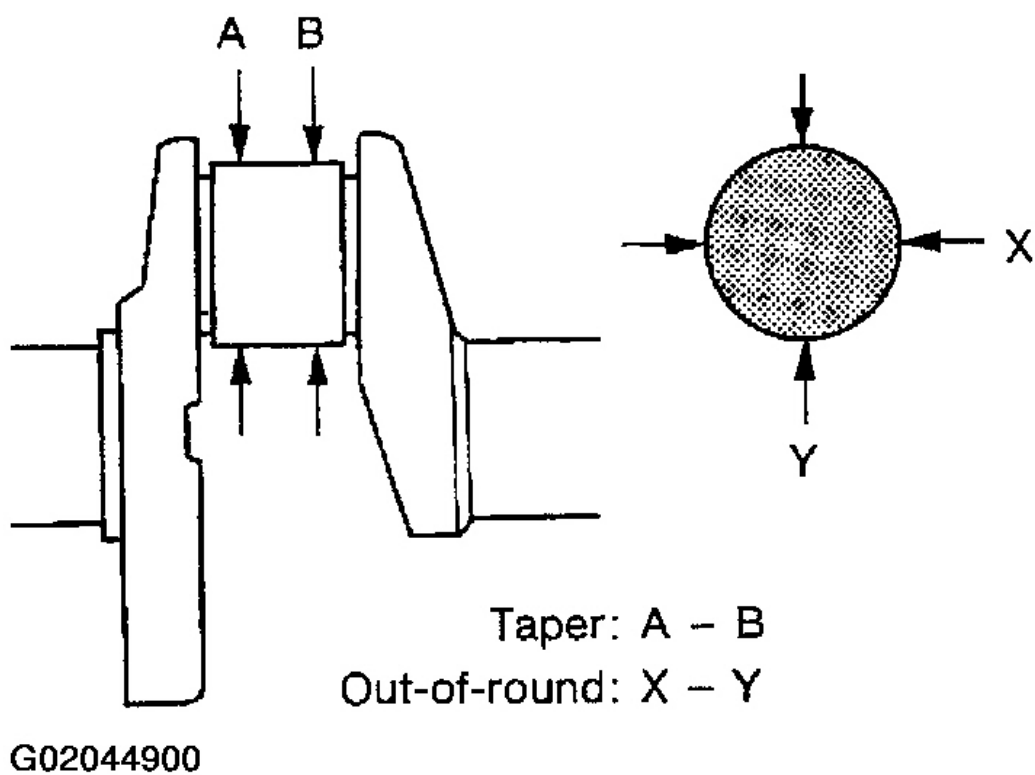
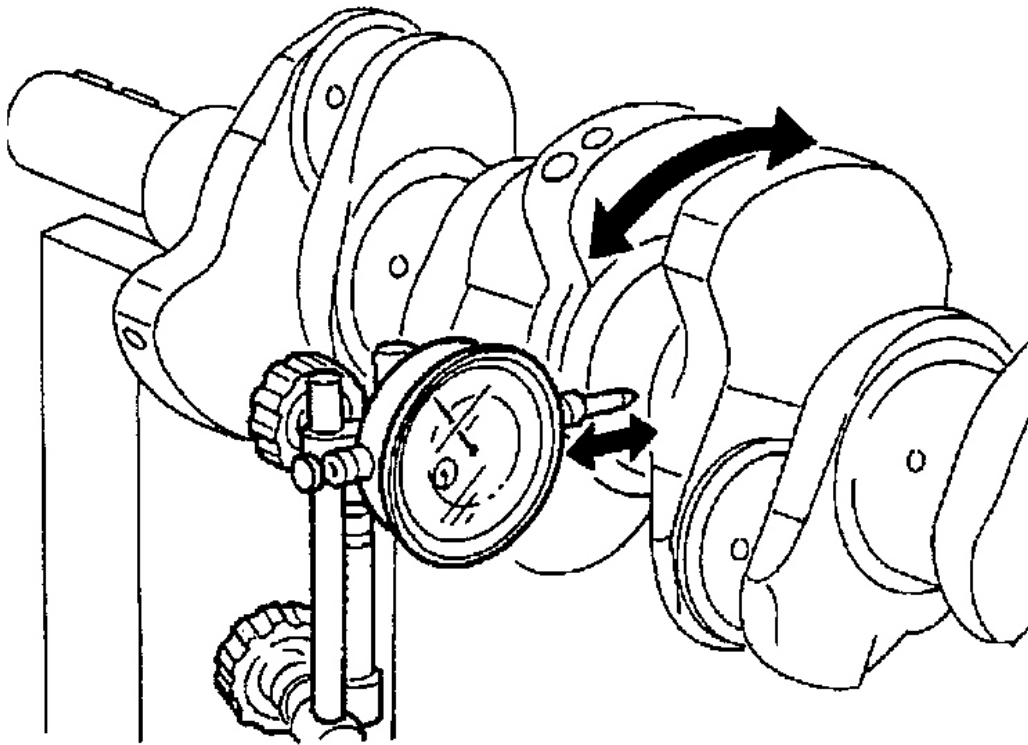


Fig. 213: Checking Crankshaft Main And Pin Journals For Score
Courtesy of NISSAN MOTOR CO., U.S.A.

3. Measure crankshaft runout.

Runout (Total indicator reading):

Limit 0.10 mm (0.0039 in)



G02044901

Fig. 214: Measuring Crankshaft Runout
Courtesy of NISSAN MOTOR CO., U.S.A.

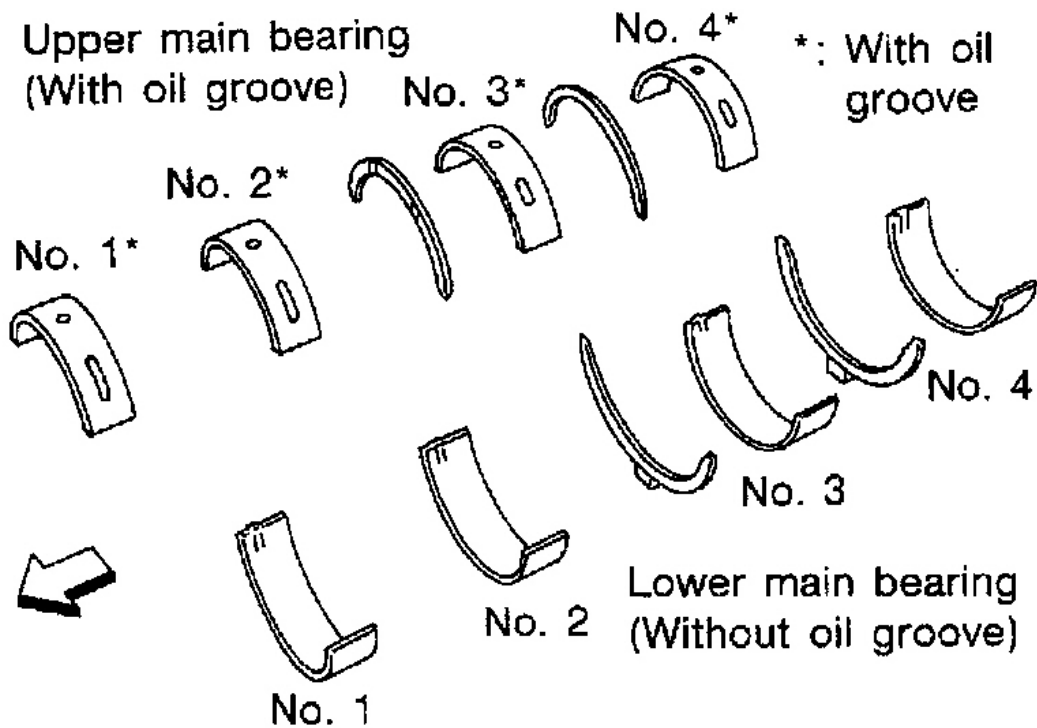
BEARING CLEARANCE

- Use either of the following two methods, however, method "A" gives more reliable results and is preferable.

Method A (Using bore gauge & micrometer)

Main bearing

1. Set main bearings in their proper positions on cylinder block and main bearing cap.



G02044902

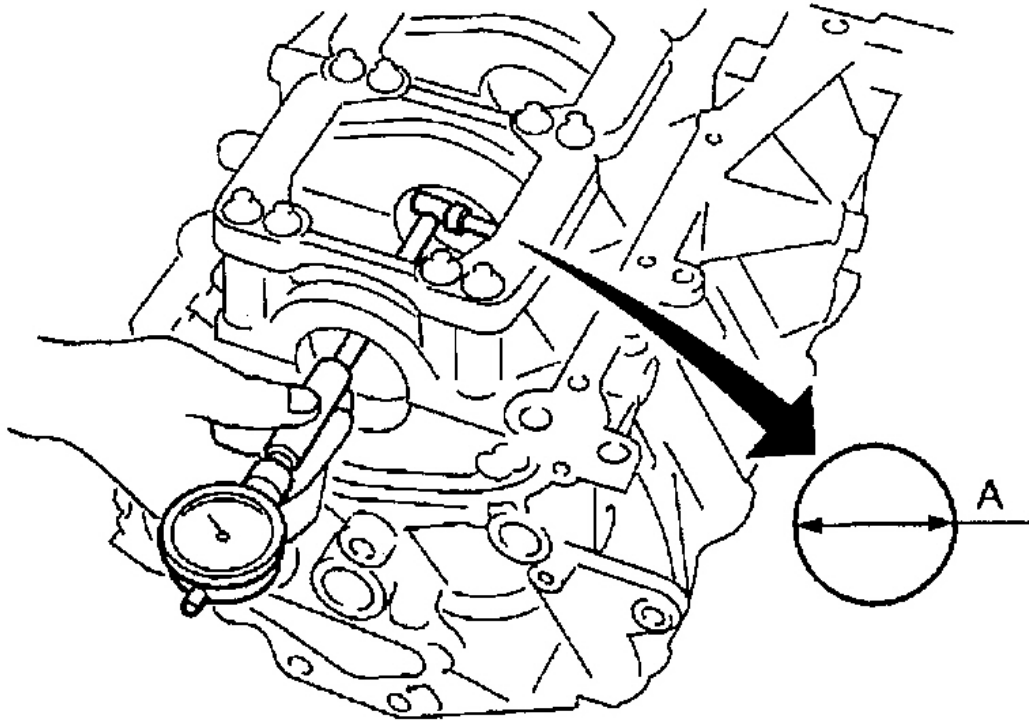
Fig. 215: Identifying Bearings

Courtesy of NISSAN MOTOR CO., U.S.A.

2. Install main bearing cap and bearing beam to cylinder block.

Tighten all bolts in correct order.

3. Measure inner diameters "A" of each main bearing.



G02044903

Fig. 216: Measuring Inner Diameters "A" Of Each Main Bearing
Courtesy of NISSAN MOTOR CO., U.S.A.

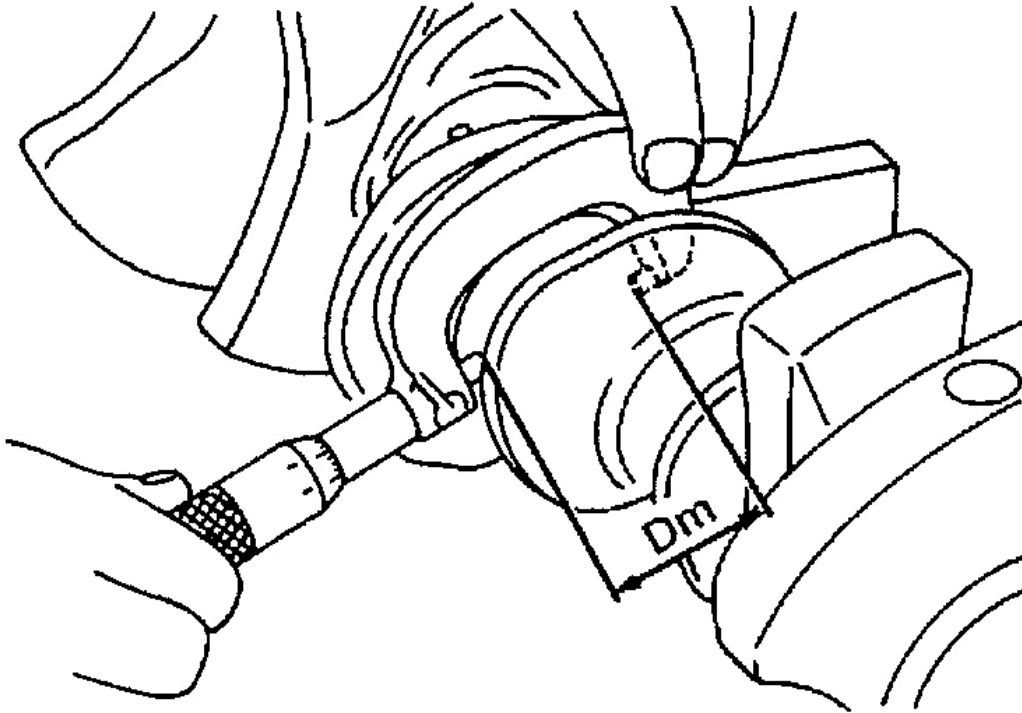
4. Measure outer diameters "Dm" of each crankshaft main journal.
5. Calculate main bearing clearance.

Main bearing clearance = A - Dm

Standard: 0.035 - 0.045 mm (0.0014 - 0.0018 in)

Limit: 0.065 mm (0.0026 in)

- If it exceeds the limit, replace bearing.
- If clearance cannot be adjusted using any standard bearing grade, grind crankshaft journal and use undersized bearing.



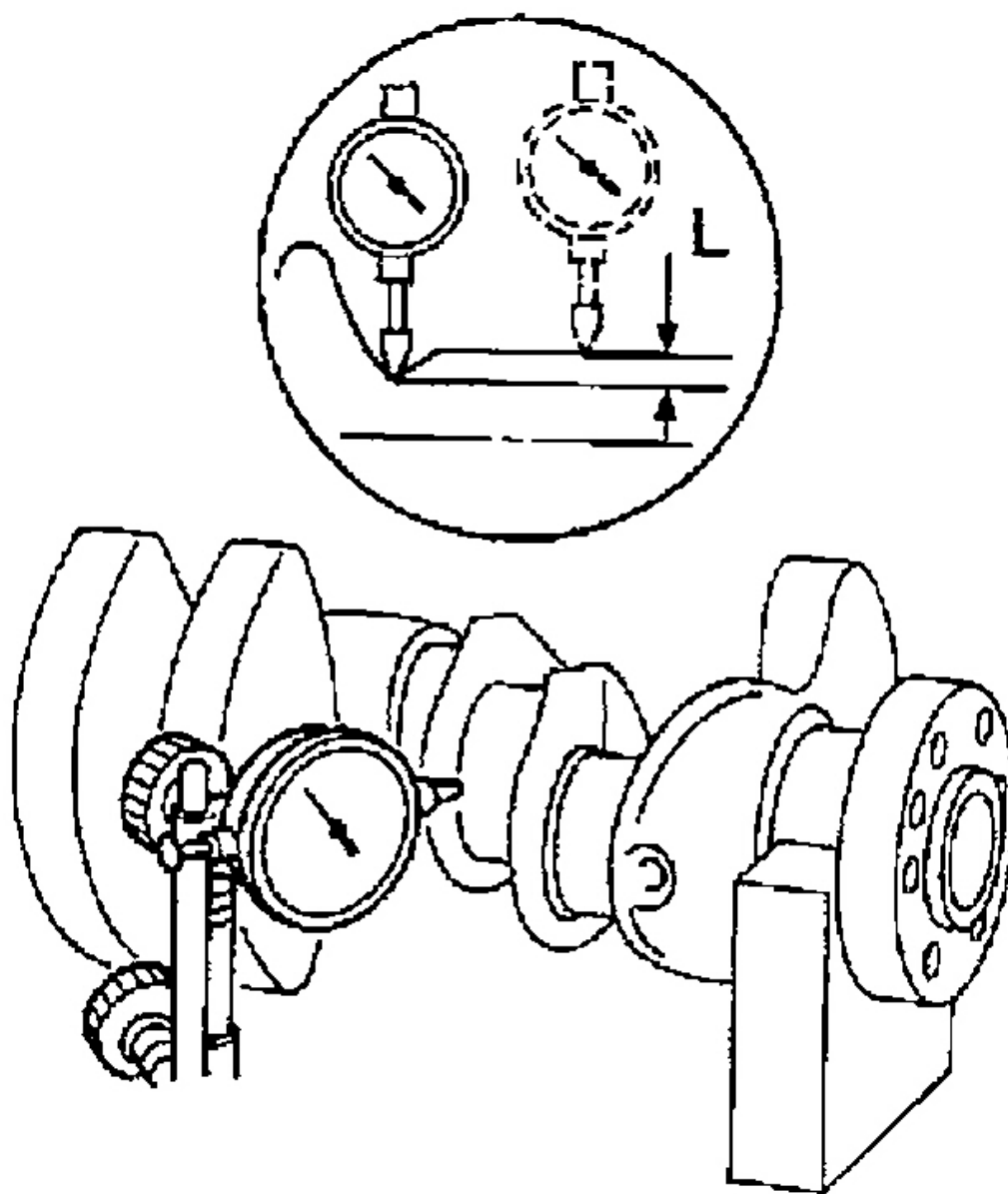
G02044904

Fig. 217: Measuring Outer Diameters Of Crankshaft Main Journal
Courtesy of NISSAN MOTOR CO., U.S.A.

- a. When grinding crankshaft journal, confirm that "L" dimension in fillet roll is more than the specified limit.

"L": 0.1 mm (0.004 in)

- b. Refer to SDS for grinding crankshaft and available service parts.



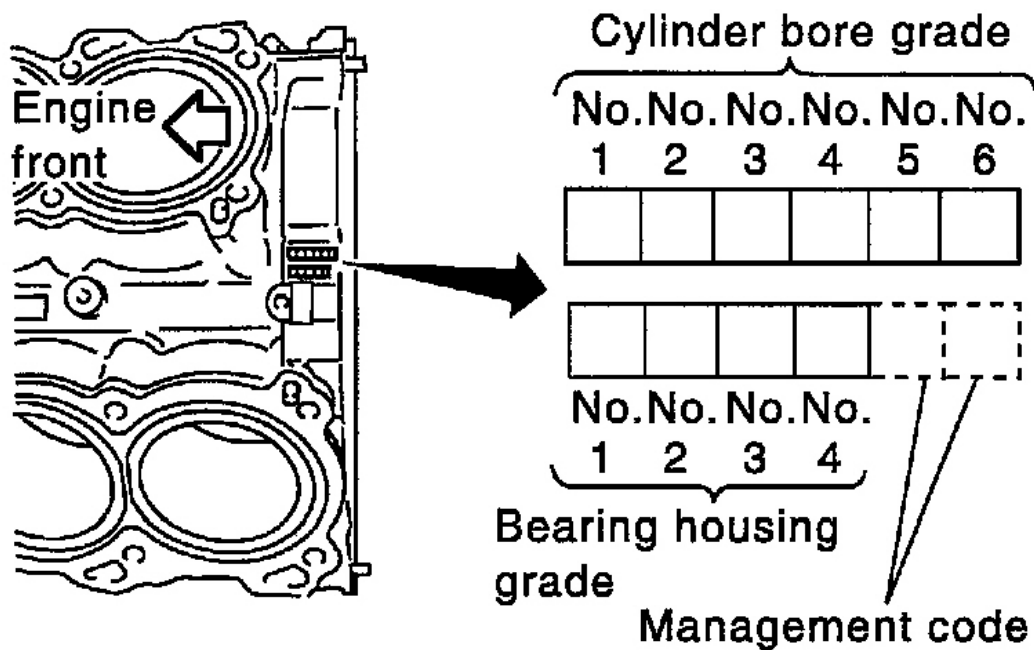
G02044905

Fig. 218: Identifying Crankshaft For Grinding Crankshaft
Courtesy of NISSAN MOTOR CO., U.S.A.

6. If crankshaft or cylinder block is replaced with a new one, select thickness of main bearings as follows:
 - a. Grade number of each cylinder block main journal is punched on the respective cylinder block.

These numbers are punched in either Arabic or Alphabet. Refer to SDS, **CYLINDER BLOCK**.

If measured diameter is out of grade punched, decide suitable grade using table in SDS.



G02044906

Fig. 219: Identifying Cylinder Block Grade Number
Courtesy of NISSAN MOTOR CO., U.S.A.

- b. Grade number of each crankshaft main journal is punched on the respective crankshaft. These numbers are punched in either Arabic or Alphabet. Refer to SDS, **CRANKSHAFT**.

If measured diameter is out of grade punched, decide suitable grade using table in SDS.

- c. Select main bearing with suitable thickness according to the following table.

Refer to "SDS", **AVAILABLE MAIN BEARING**, for available main bearings.

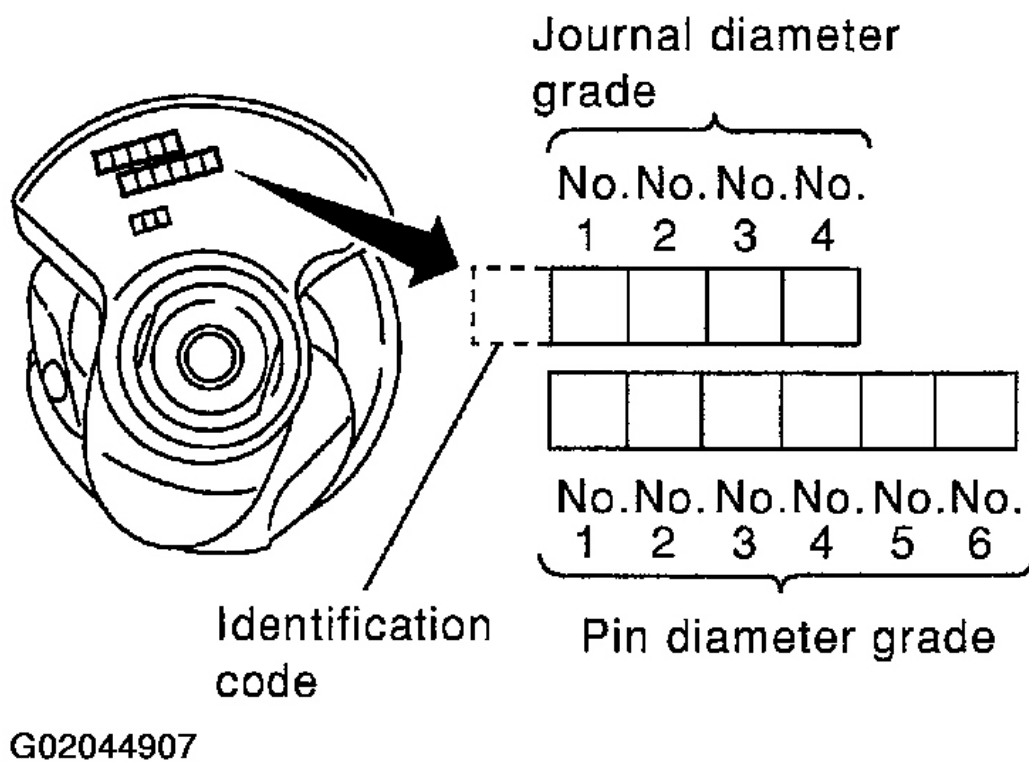
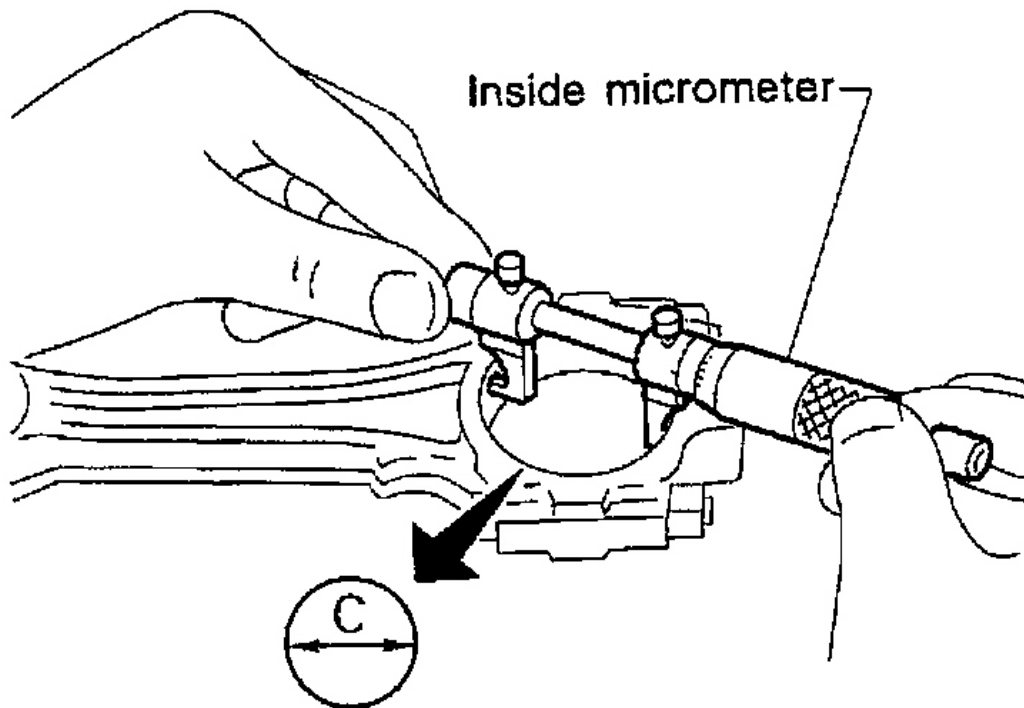


Fig. 220: Identifying Crankshaft Main Journal Grade
 Courtesy of NISSAN MOTOR CO., U.S.A.

Main bearing selection table



G02044909

Fig. 222: Measuring Inner Diameter Of Connecting Rod
Courtesy of NISSAN MOTOR CO., U.S.A.

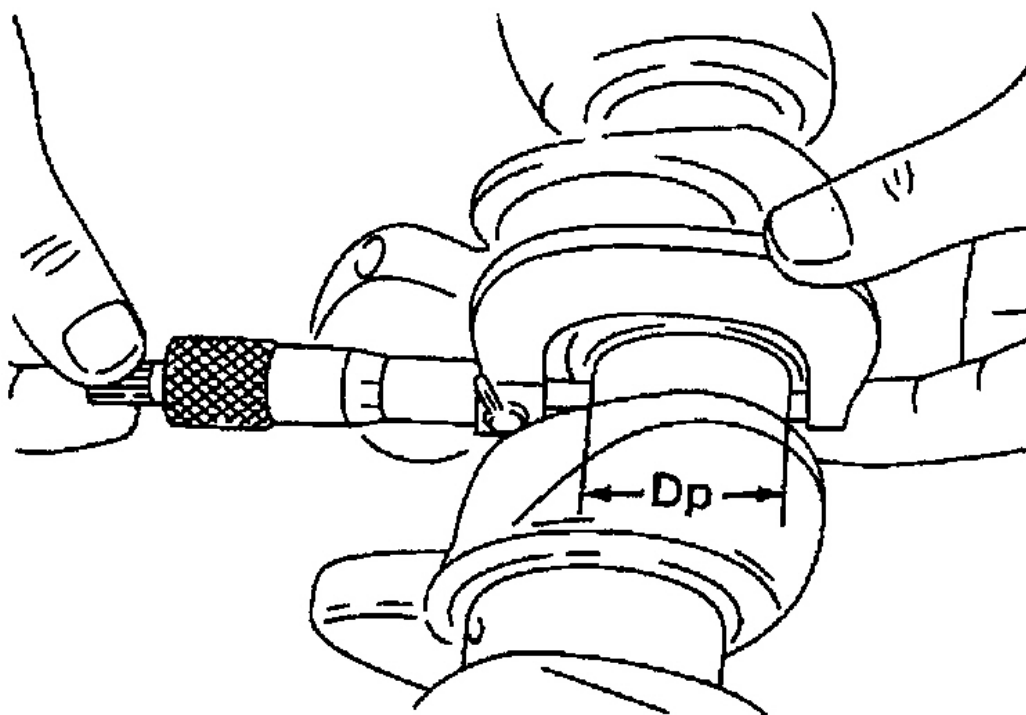
4. Measure outer diameter "Dp" of each crankshaft pin journal.
5. Calculate connecting rod bearing clearance.

Connecting rod bearing clearance = C - Dp

Standard: 0.034 - 0.059 mm (0.0013 - 0.0023 in)

Limit: 0.070 mm (0.0028 in)

6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing. Refer to "BEARING CLEARANCE - Main bearing", **BEARING CLEARANCE**.



G02044910

Fig. 223: Measuring Outer Diameter Of Crankshaft
Courtesy of NISSAN MOTOR CO., U.S.A.

8. If crankshaft is replaced with a new one, select connecting rod bearing according to the following table.

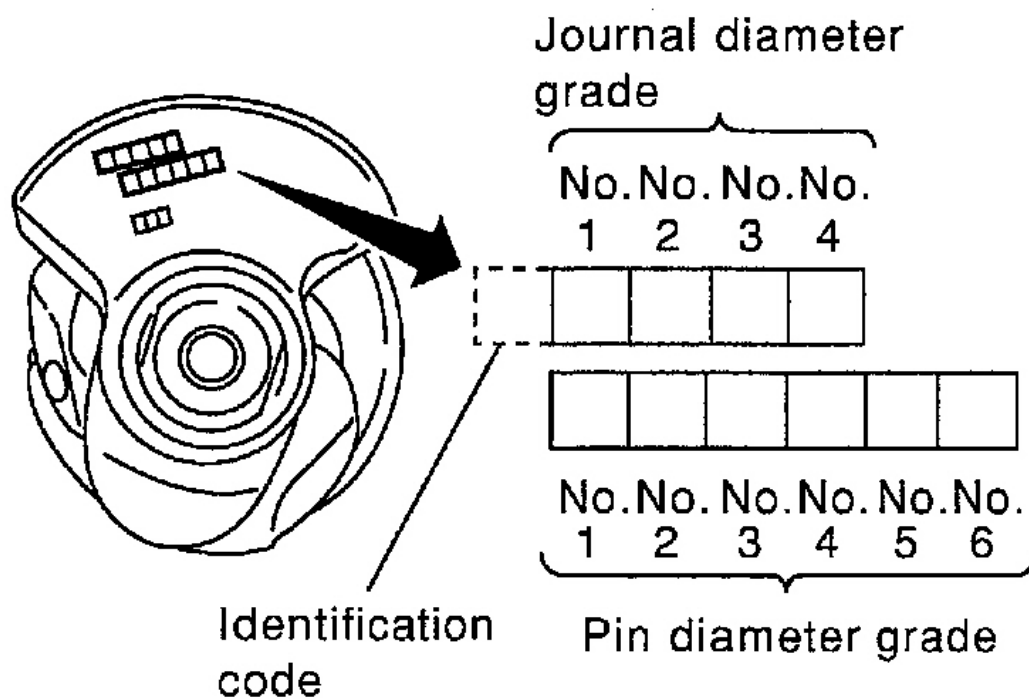
Connecting rod bearing grade number (Identification color):

These numbers are punched in either Arabic or Roman numerals.

Crankshaft pin journal grade number	Connecting rod bearing grade number
0	0 (Black)
1	1 (Brown)
2	2 (Green)

G02044911

Fig. 224: Connecting Rod Bearing Grade Number Chart
 Courtesy of NISSAN MOTOR CO., U.S.A.



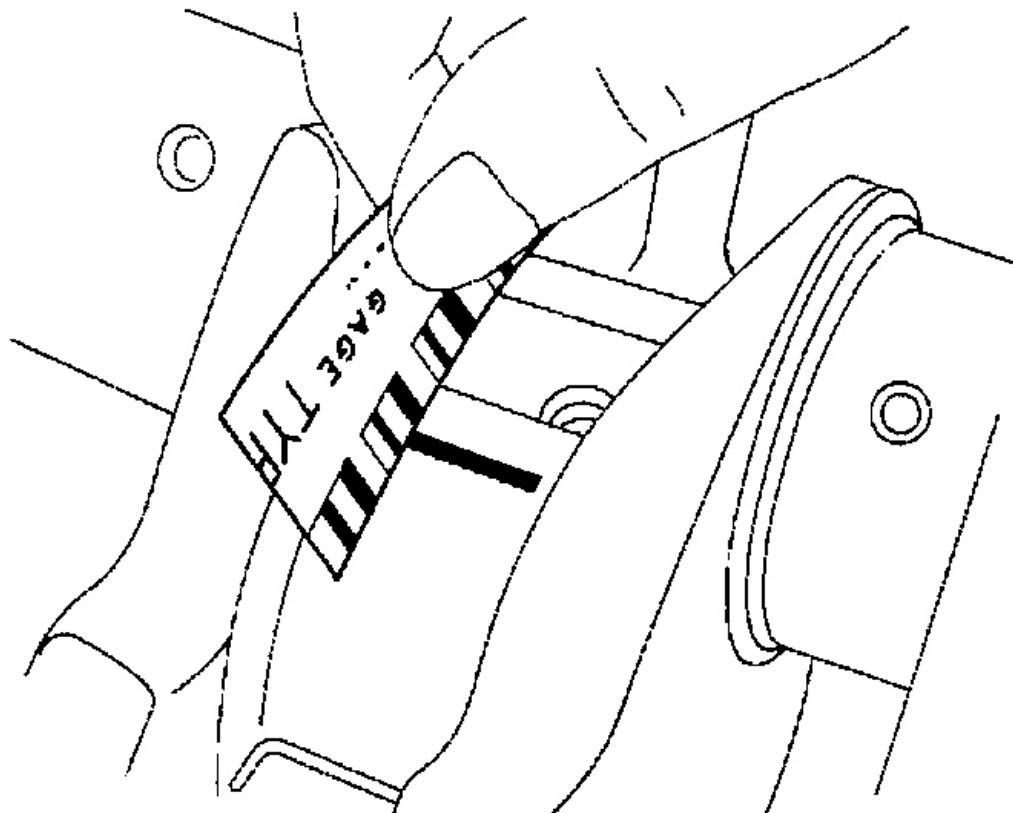
G02044912

Fig. 225: Connecting Rod Bearing Grade Number Location
 Courtesy of NISSAN MOTOR CO., U.S.A.

Method B (Using plastigage)

CAUTION:

- Do not turn crankshaft or connecting rod while plastigage is being inserted.
- When bearing clearance exceeds the specified limit, ensure that the proper bearing has been installed. If incorrect bearing clearance exists use a thicker or undersized main bearing to ensure specified clearance.



G02044913

Fig. 226: Measuring Bearing Clearance
Courtesy of NISSAN MOTOR CO., U.S.A.

CONNECTING ROD BUSHING CLEARANCE (SMALL END)

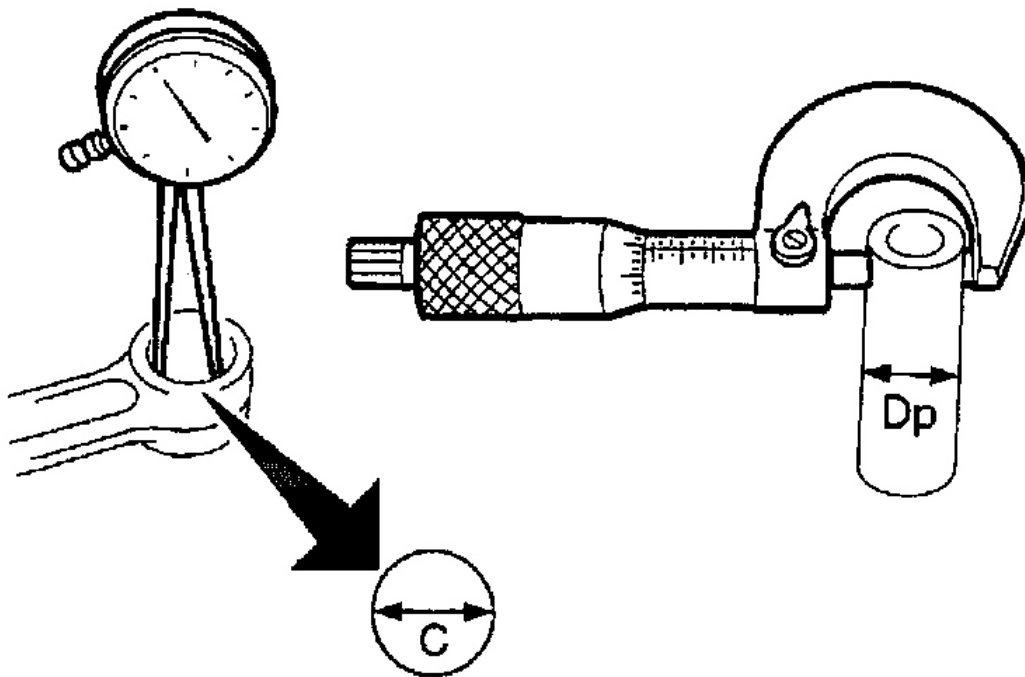
1. Measure inner diameter "C" of bushing.
2. Measure outer diameter "Dp" of piston pin.
3. Calculate connecting rod bushing clearance.

Connecting rod bushing clearance = $C - D_p$

Standard: 0.005 - 0.017 mm (0.0002 - 0.0007 in)

Limit: 0.030 mm (0.0012 in)

If it exceeds the limit, replace connecting rod assembly or connecting rod bushing and/or piston set with pin.



G02044914

Fig. 227: Measuring Connecting Rod Bushing Clearance
Courtesy of NISSAN MOTOR CO., U.S.A.

DRIVE PLATE RUNOUT

Runout (Total indicator reading):

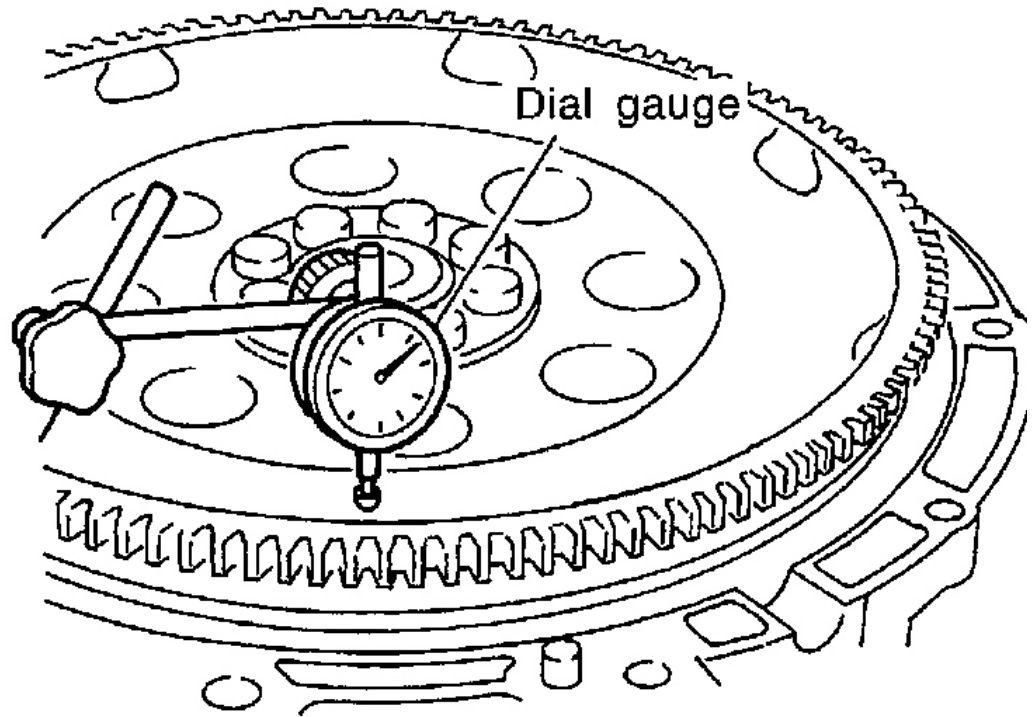
Drive plate

Less than 0.15 mm (0.0059 in)

CAUTION: • The signal plate is built into the drive plate assembly. Be careful not to

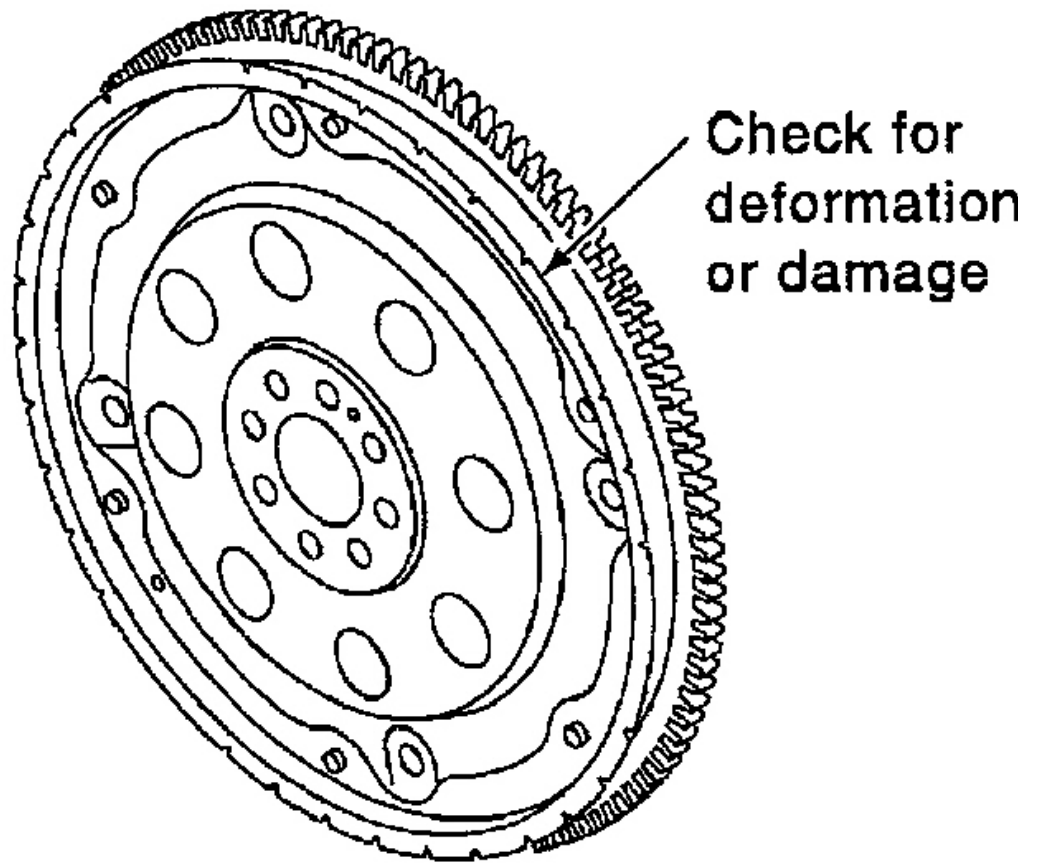
damage the signal plate, especially the teeth.

- Check the drive plate and signal plate for deformation or cracks.
- Keep any magnetized objects away from the signal plate.
- Do not allow any magnetic materials to contact the signal plate teeth.



G02044915

Fig. 228: Measuring Drive Plate Runout
Courtesy of NISSAN MOTOR CO., U.S.A.



G02044916

Fig. 229: Checking Flywheel Teeth
Courtesy of NISSAN MOTOR CO., U.S.A.

ASSEMBLY

PISTON

1. Install new snap ring on one side of piston pin hole.
2. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring.
 - **Align the direction of piston and connecting rod.**
 - **Numbers stamped on connecting rod and cap correspond to each cylinder.**
 - **After assembly, make sure connecting rod swings smoothly.**

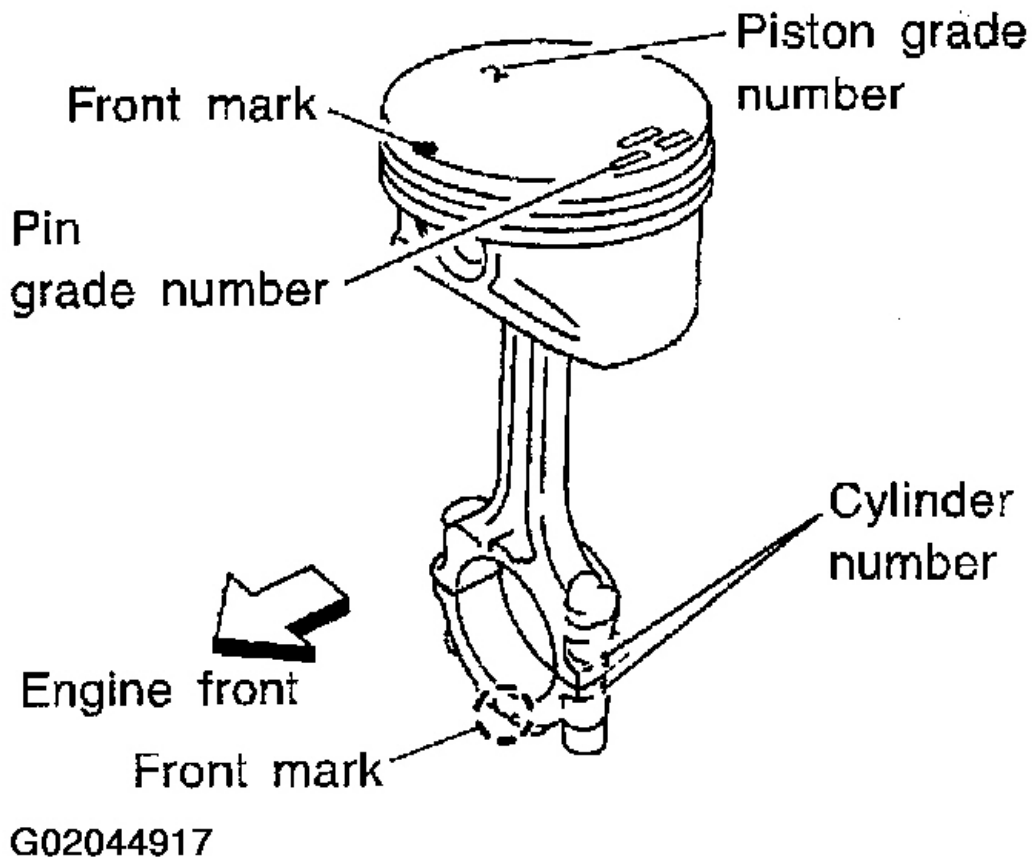
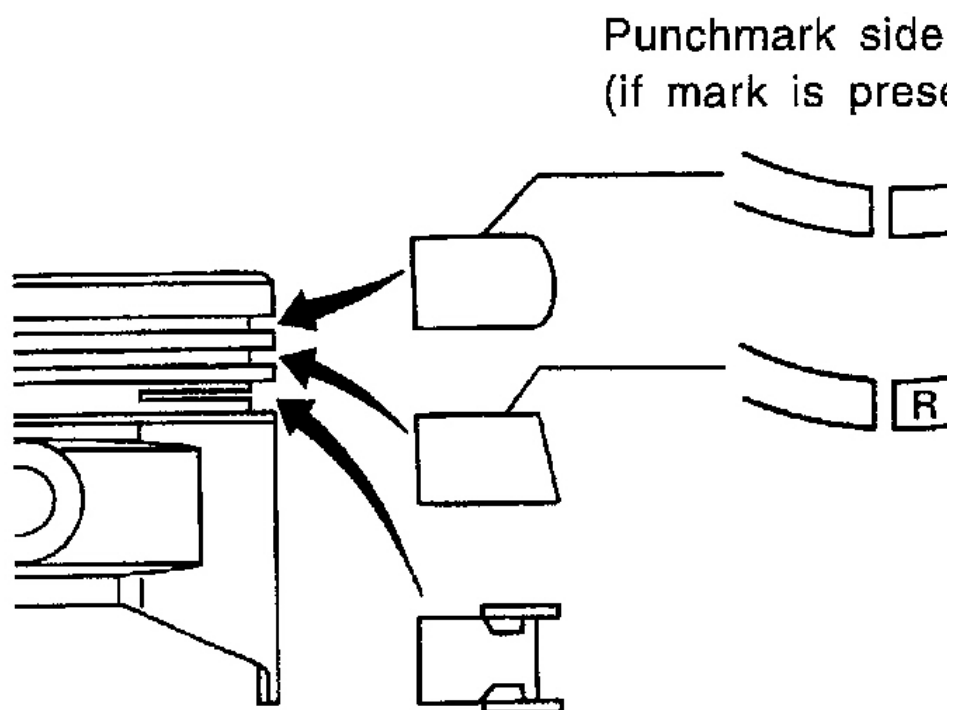


Fig. 230: Identifying Piston Markings
Courtesy of NISSAN MOTOR CO., U.S.A.

3. Set piston rings as shown.

CAUTION:

- When piston rings are not replaced, make sure that piston rings are mounted in their original positions.
- When replacing piston rings, those without punchmarks present mounted with either side up.



G02044918

Fig. 231: Setting Piston Rings

Courtesy of NISSAN MOTOR CO., U.S.A.

- Align piston rings so that end gaps are positioned as shown in the

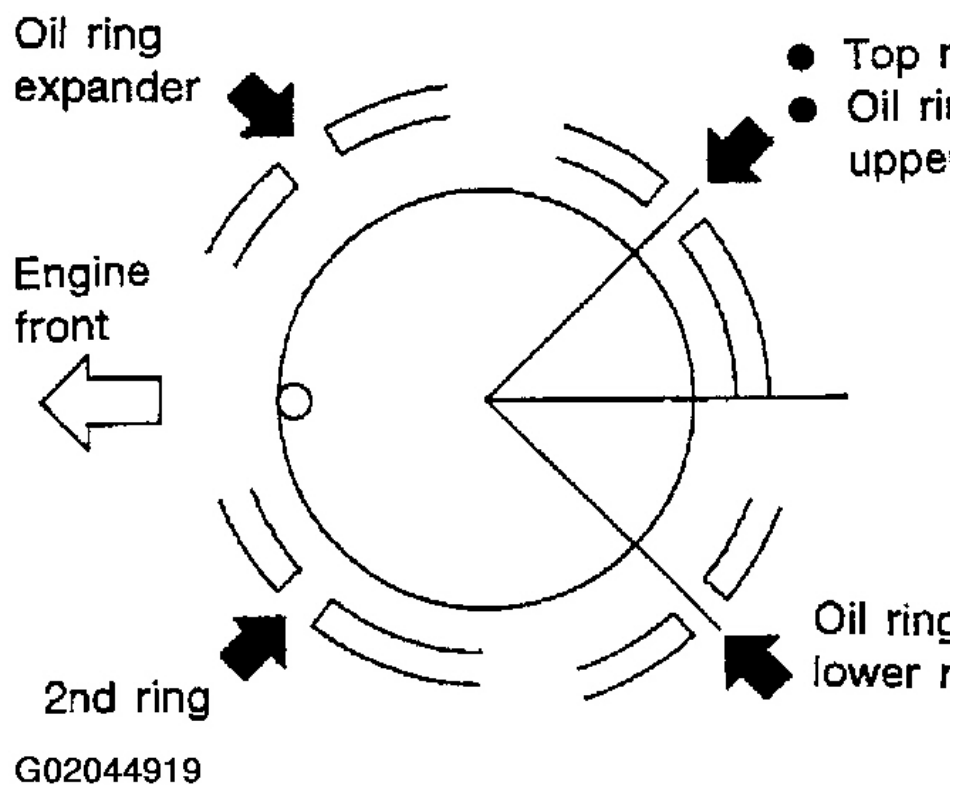
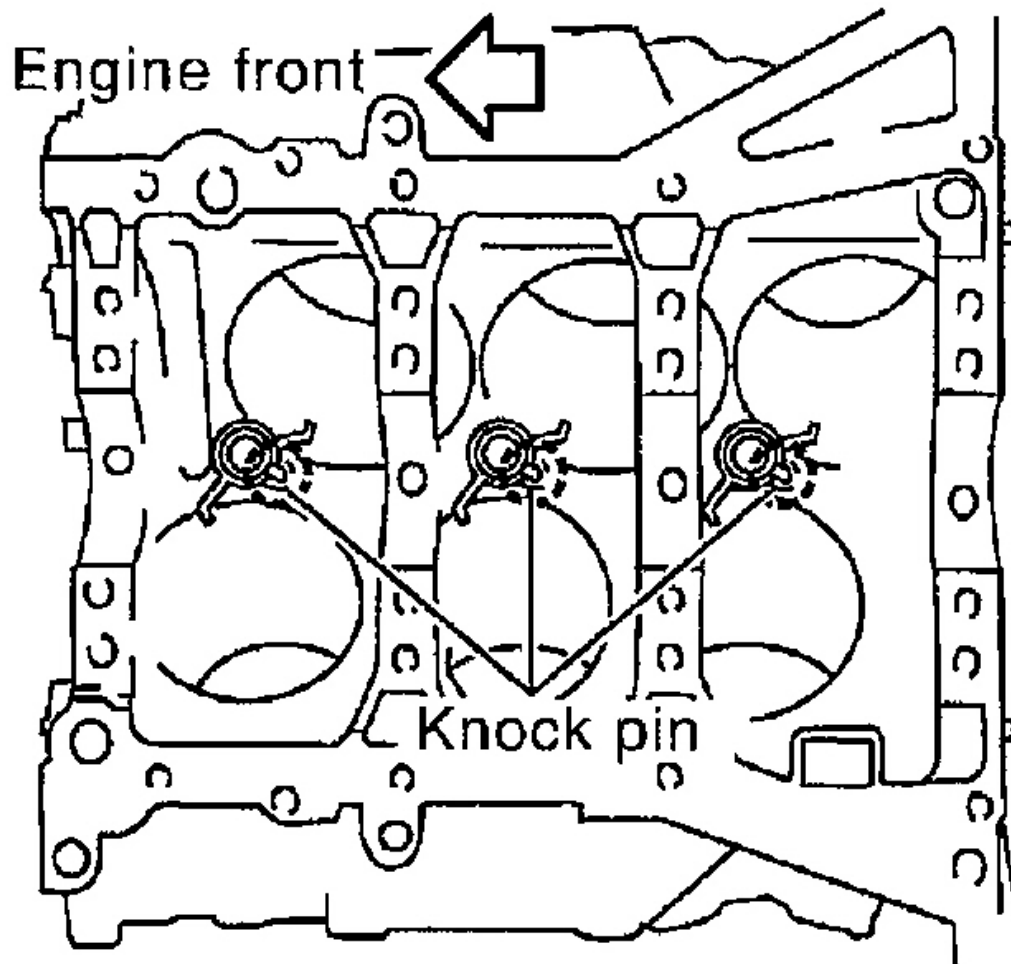


Fig. 232: Aligning Piston Rings So End Gaps
Courtesy of NISSAN MOTOR CO., U.S.A.

OIL JET

1. Install oil jets.
 - Insert oil jet knock pin into the cylinder block knock pin hole, and tighten the mounting bolts.

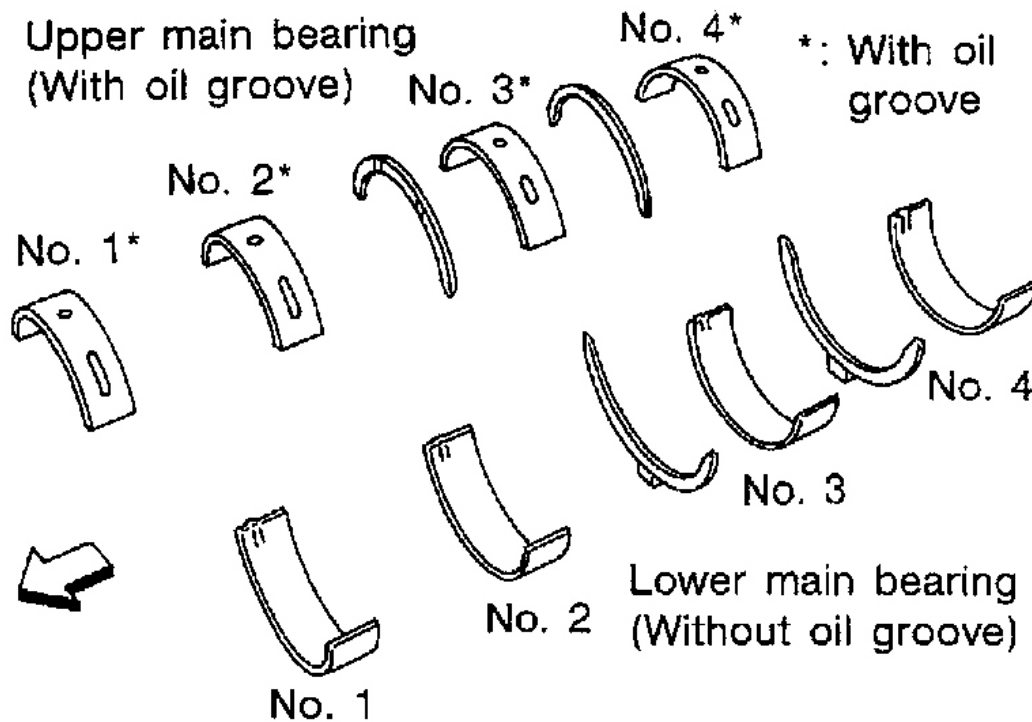


G02044920

Fig. 233: Inserting Oil Jet Knock Pin Into Cylinder Block Knock Pin Hole
Courtesy of NISSAN MOTOR CO., U.S.A.

CRANKSHAFT

1. Set main bearings in their proper positions on cylinder block and main bearing beam.
 - Confirm that correct main bearings are used. Refer to "INSPECTION" of this section.



G02044921

Fig. 234: Identifying Main Bearings

Courtesy of NISSAN MOTOR CO., U.S.A.

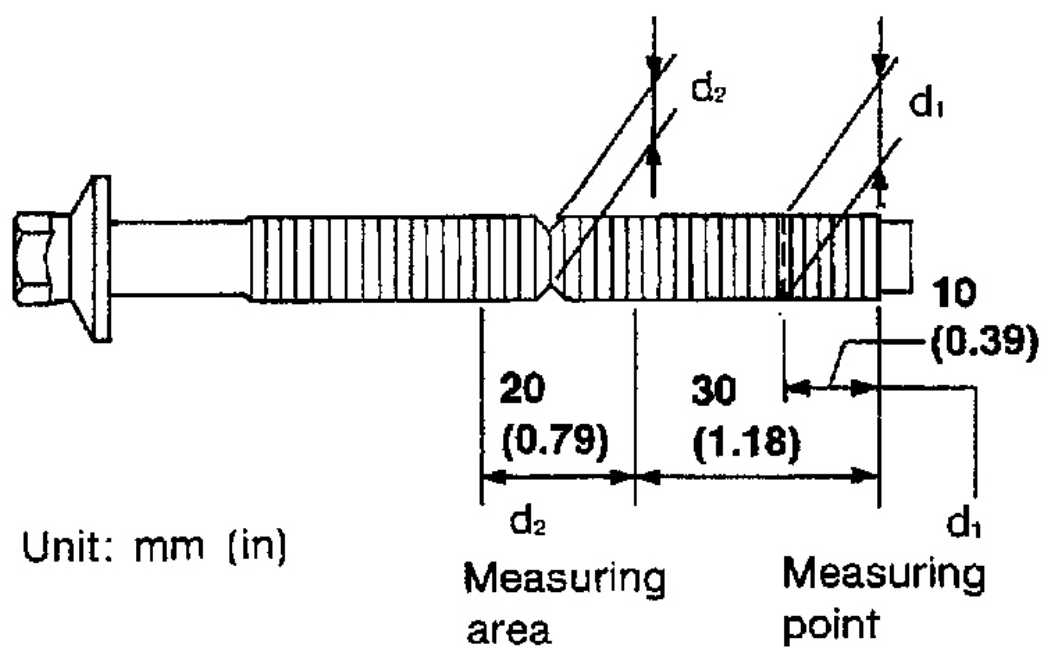
2. Instructions for re-use of main bearing cap bolts.

- A plastic zone tightening method is used for tightening main bearing cap bolts. Measure d1 and d2 as shown in the figure.

d2: Select minimum diameter in the measuring area.

If the difference between d1 and d2 exceeds the limit, replace the bolts with new ones.

Limit (d1 - d2): 0.11 mm (0.0043 in)



G02044922

Fig. 235: Identifying Main Bearing Cap Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

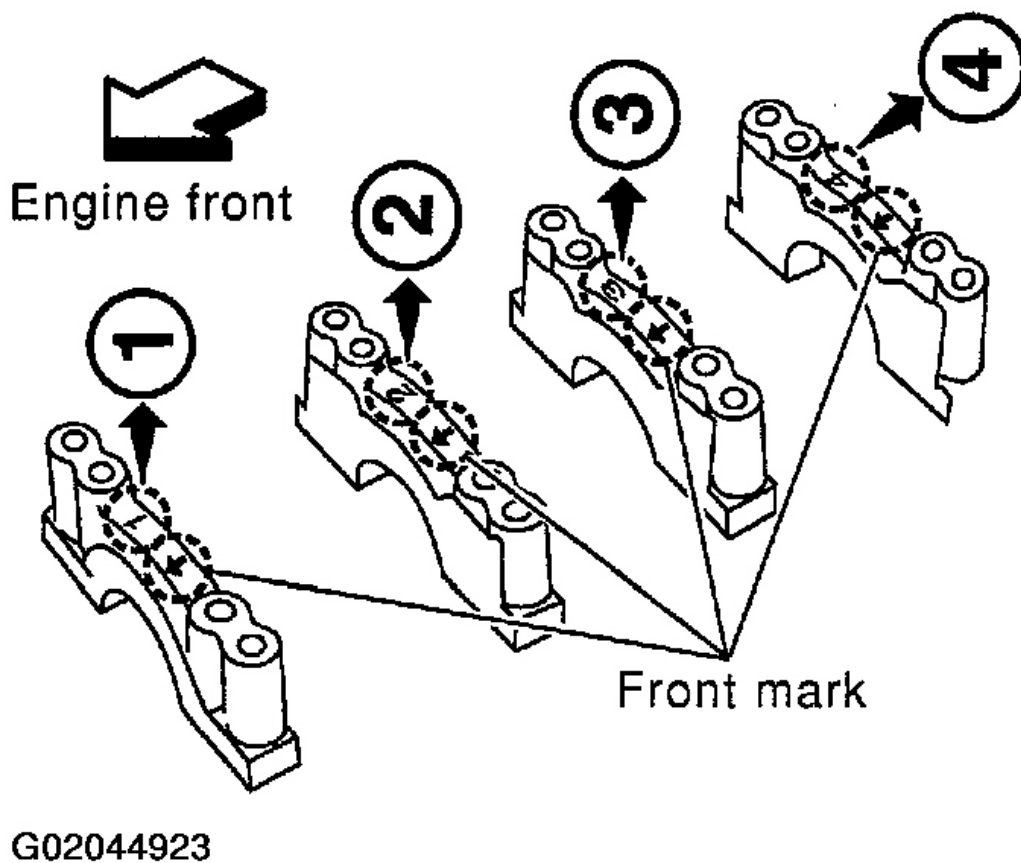
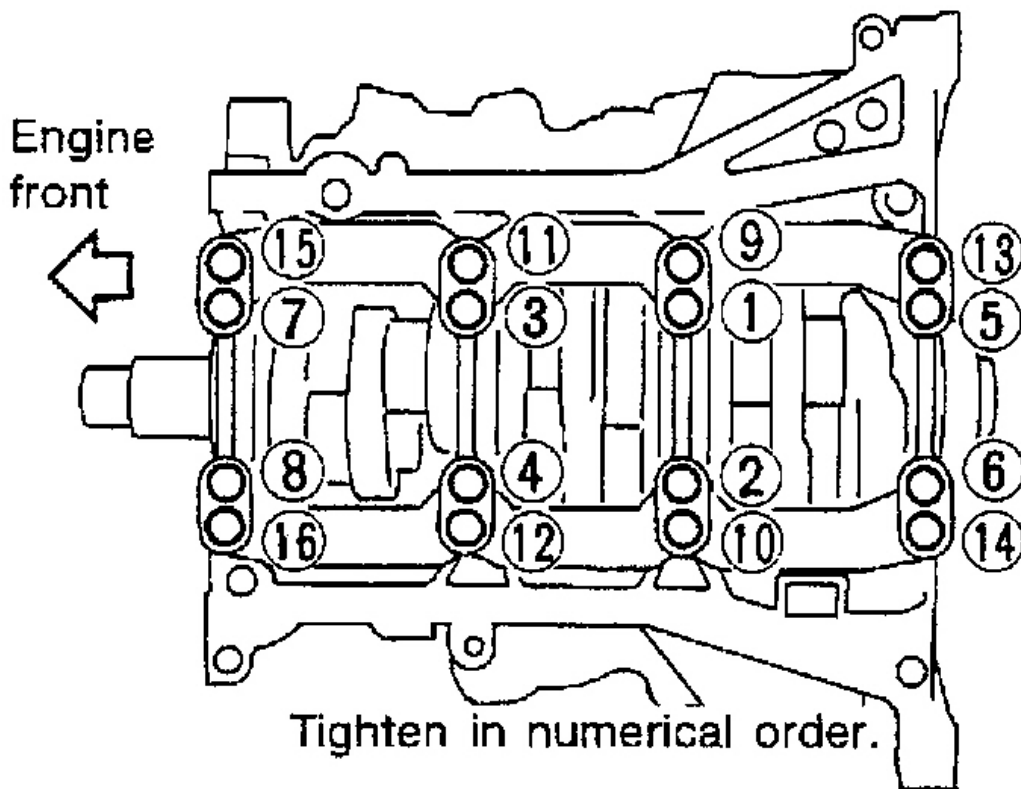


Fig. 236: Main Bearing Cap Bolts Mark
Courtesy of NISSAN MOTOR CO., U.S.A.

3. After installing crankshaft, main bearing cap, main bearing beam and bearing cap bolts, tighten bearing cap bolts in numerical order as shown.
 - **Make sure that the front mark on the main bearing beam faces the front of the engine.**
 - **Tightening procedure**
 - a. Tighten all bolts to 32 to 38 N.m (3.3 to 3.9 kg-m, 24 to 28 ft-lb).
 - b. Turn all bolts 90 to 95 degrees clockwise with angle wrench.
 - **Prior to tightening bearing cap bolts, place bearing beam in its proper position by shifting crankshaft in the axial direction.**



G02044924

Fig. 237: Installing Main Bearing Cap Bolts
Courtesy of NISSAN MOTOR CO., U.S.A.

- After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.
 - Lubricate threads and seat surfaces of the bolts with new engine oil.
4. Measure crankshaft end play.

Crankshaft end play:

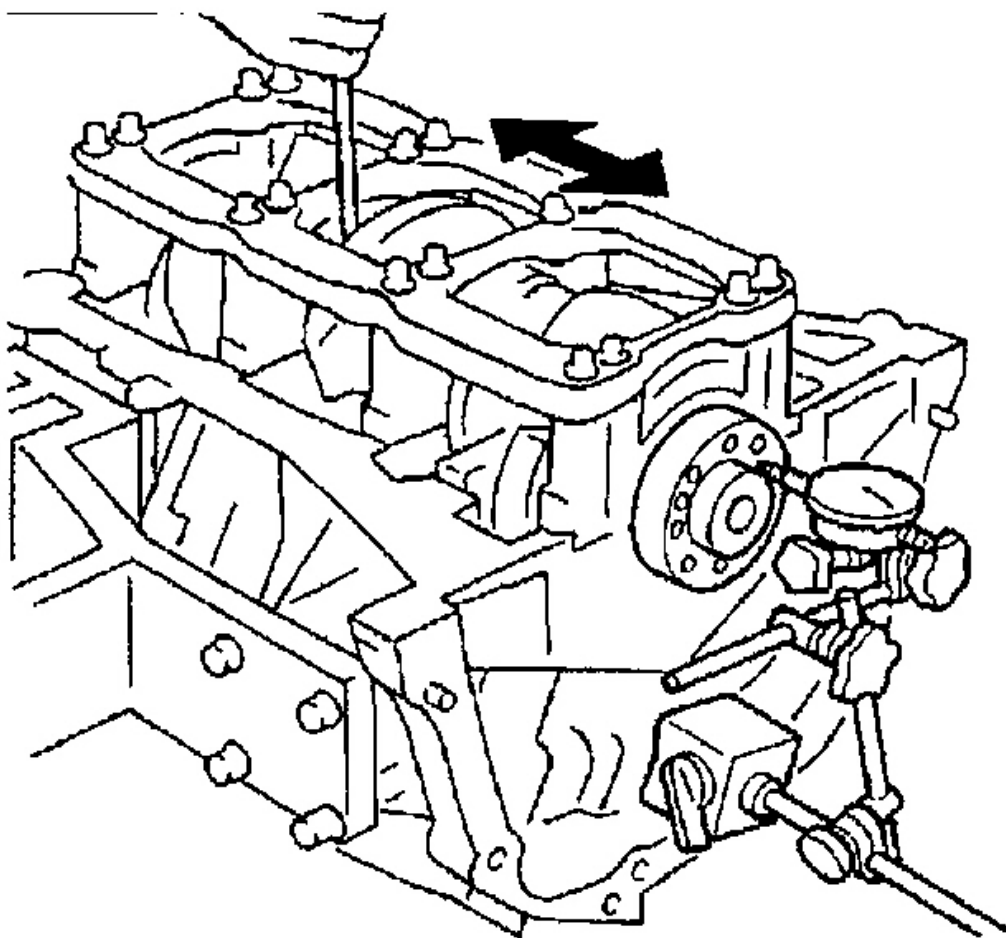
Standard

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Limit

0.30 mm (0.0118 in)

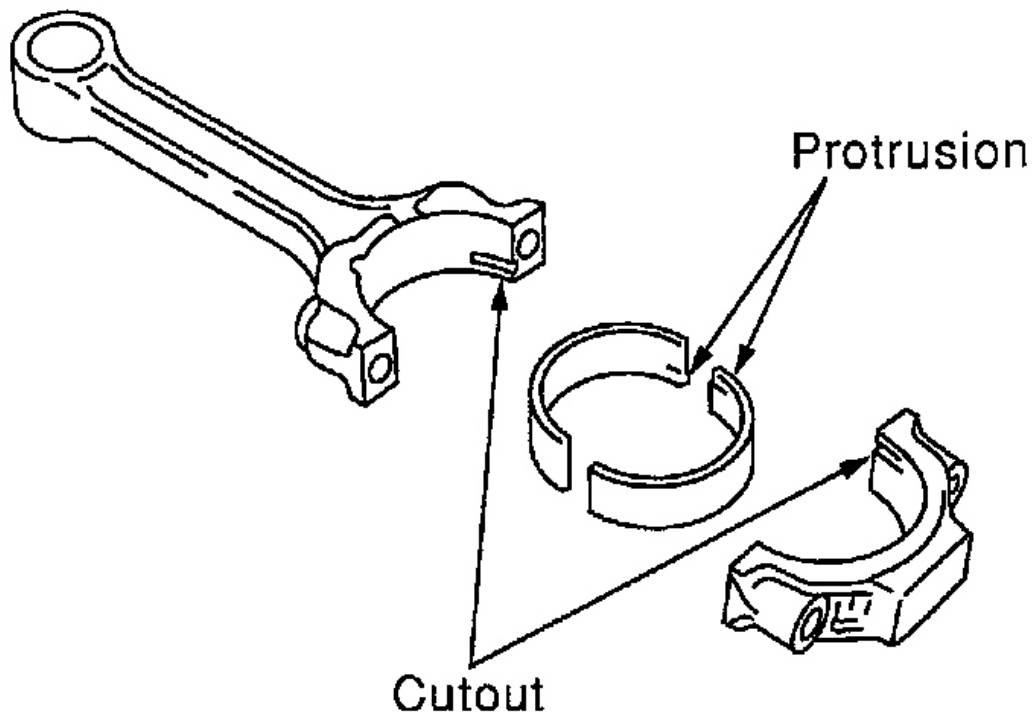
If beyond the limit, replace bearing with a new one.



G02044925

Fig. 238: Measuring Crankshaft End Play
Courtesy of NISSAN MOTOR CO., U.S.A.

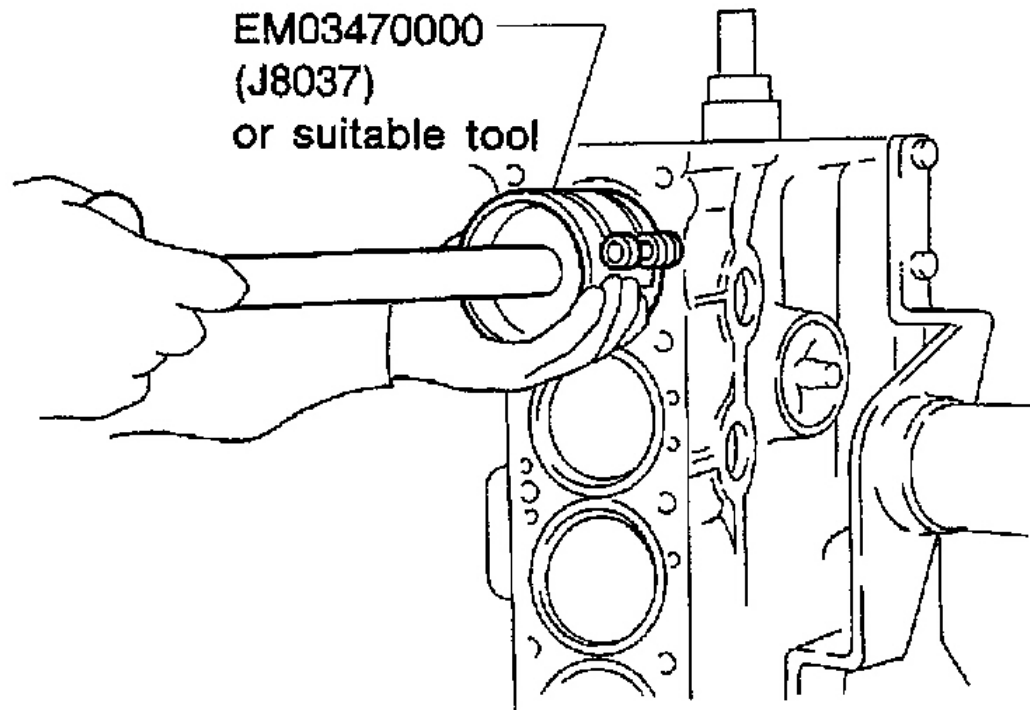
5. Install connecting rod bearings in connecting rods and connecting rod caps.
 - **Confirm that correct bearings are used.**



G02044926

Fig. 239: Installing Connecting Rod Bearings In Connecting Rods And Connecting Rod Caps
Courtesy of NISSAN MOTOR CO., U.S.A.

6. Install pistons with connecting rods.
 - a. Install them into corresponding cylinders with Tool.
 - Be careful not to scratch cylinder wall with the connecting rod.
 - Arrange so that front mark on piston head faces toward engine front.



G02044927

Fig. 240: Installing Pistons With Connecting Rods
Courtesy of NISSAN MOTOR CO., U.S.A.

- b. Install connecting rod caps.
- **Lubricate threads and seat surfaces with new engine oil.**
 - Install so that the cylinder number stamped on the connecting rod agrees with that stamped on cap side.
 - Make sure that front mark on the connecting rod cap faces the front of the engine.

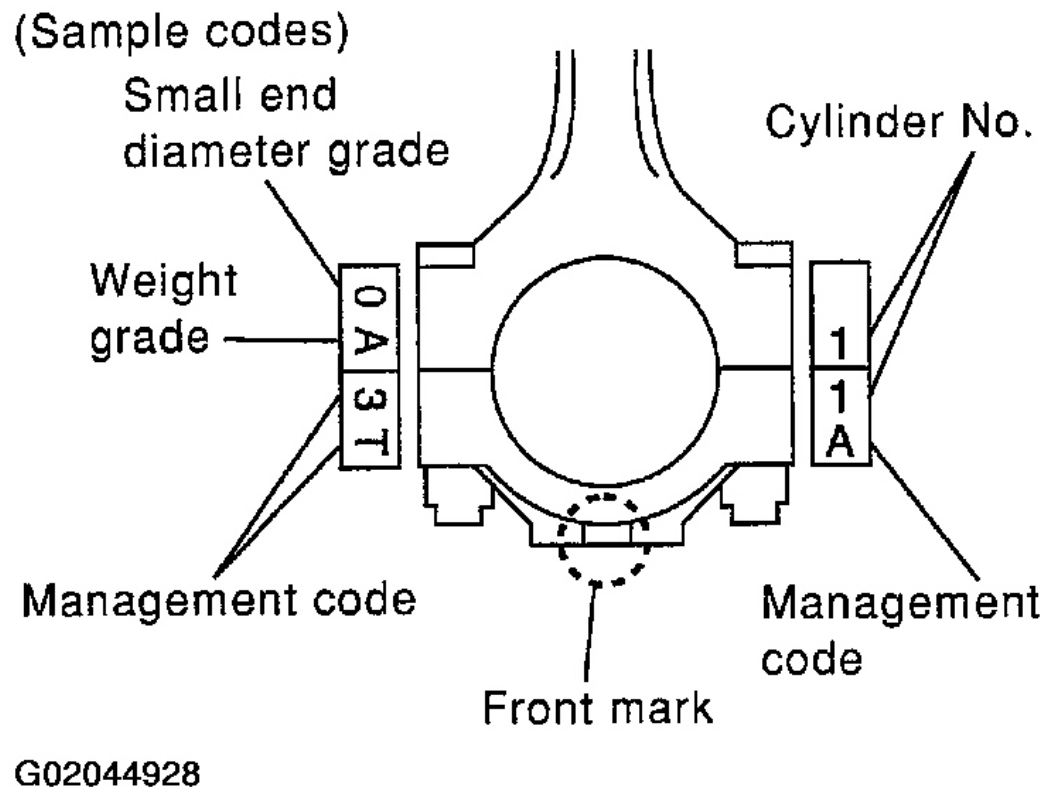


Fig. 241: Installing Connecting Rod Caps
 Courtesy of NISSAN MOTOR CO., U.S.A.

- c. Re-use connecting rod cap bolts as follows.
- Make sure that the bolts can be smoothly screwed-in to the end manually.
 - If not, measure the outer diameter "d" shown in the figure.

Outer diameter "d" of connecting rod cap bolt:

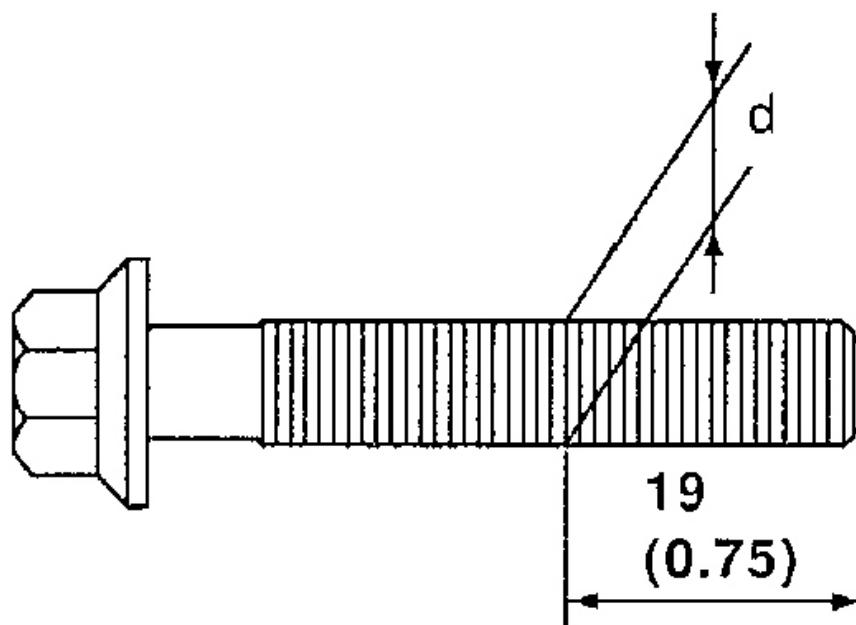
Standard

7.90 - 8.00 mm (0.3110 - 0.3150 in)

Limit

7.75 mm (0.3051 in)

- d. Tighten connecting rod cap bolts to the specified torque.



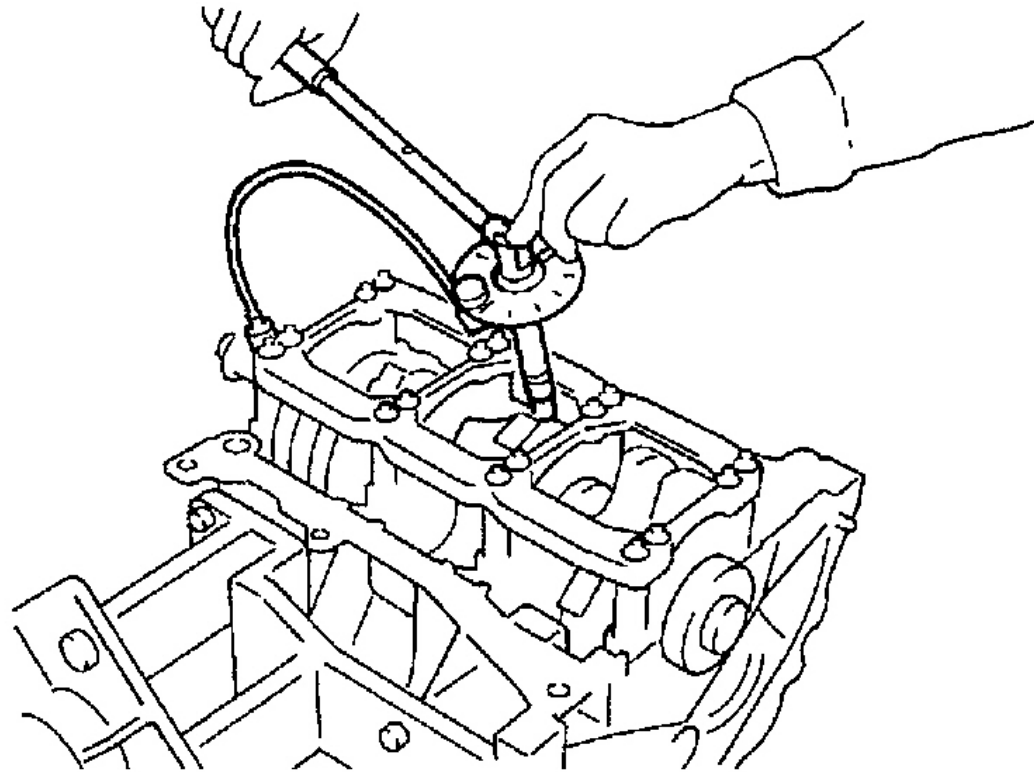
Unit: mm (in)

G02044929

Fig. 242: Measuring Outer Diameter Of Connecting Rod Cap Bolt
Courtesy of NISSAN MOTOR CO., U.S.A.

Connecting rod cap bolt:

1. Tighten nuts to 19 to 21 N.m (1.9 to 2.1 kg-m, 14 to 15 ft-lb).
2. Turn nuts 90 to 95 degrees clockwise with angle wrench.



G02044930

Fig. 243: Installing Connecting Rod Cap Bolt
Courtesy of NISSAN MOTOR CO., U.S.A.

7. Measure connecting rod side clearance.

Connecting rod side clearance:

Standard

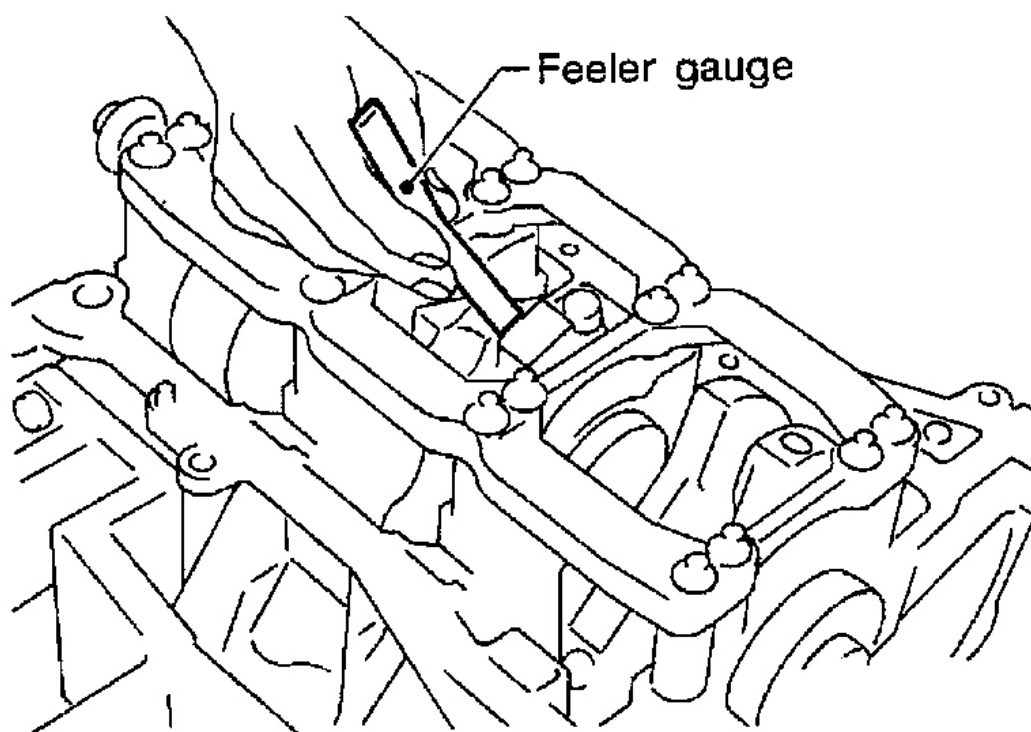
0.20 - 0.35 mm (0.0079 - 0.0138 in)

Limit

0.40 mm (0.0157 in)

If beyond the limit, replace connecting rod and/or crankshaft.

8. Install rear oil seal retainer.



G02044931

Fig. 244: Measure Connecting Rod Side Clearance
Courtesy of NISSAN MOTOR CO., U.S.A.

REPLACEMENT OF PILOT CONVERTER

1. Remove pilot converter using tool or suitable tool.

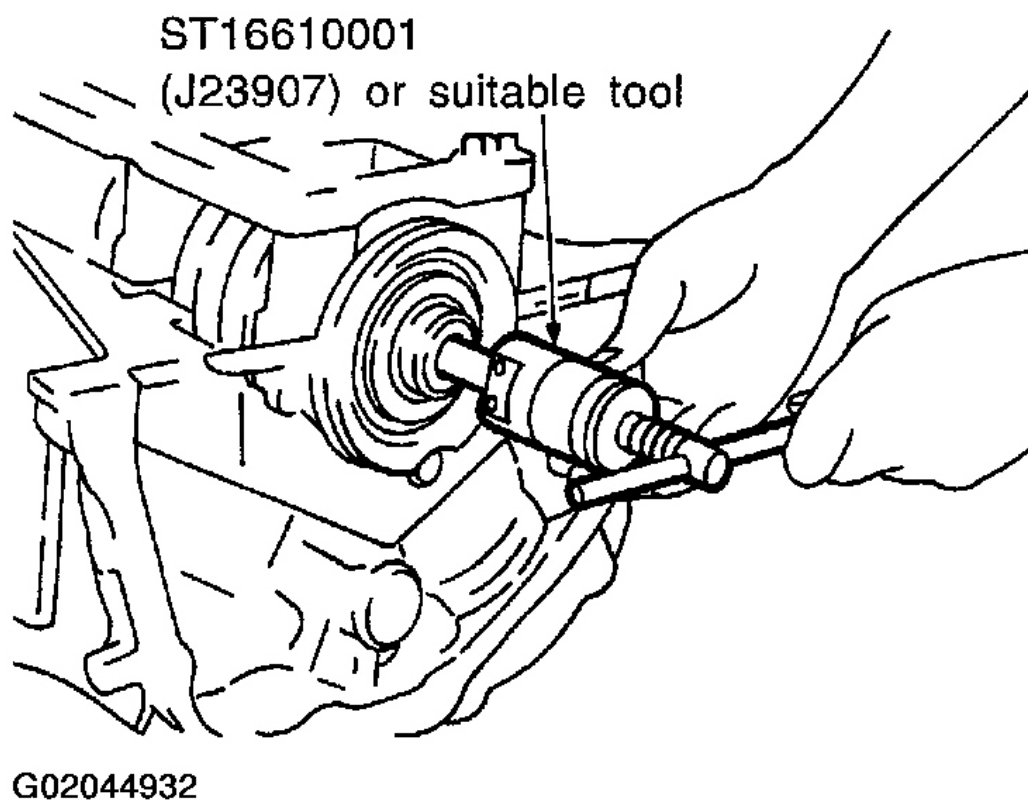
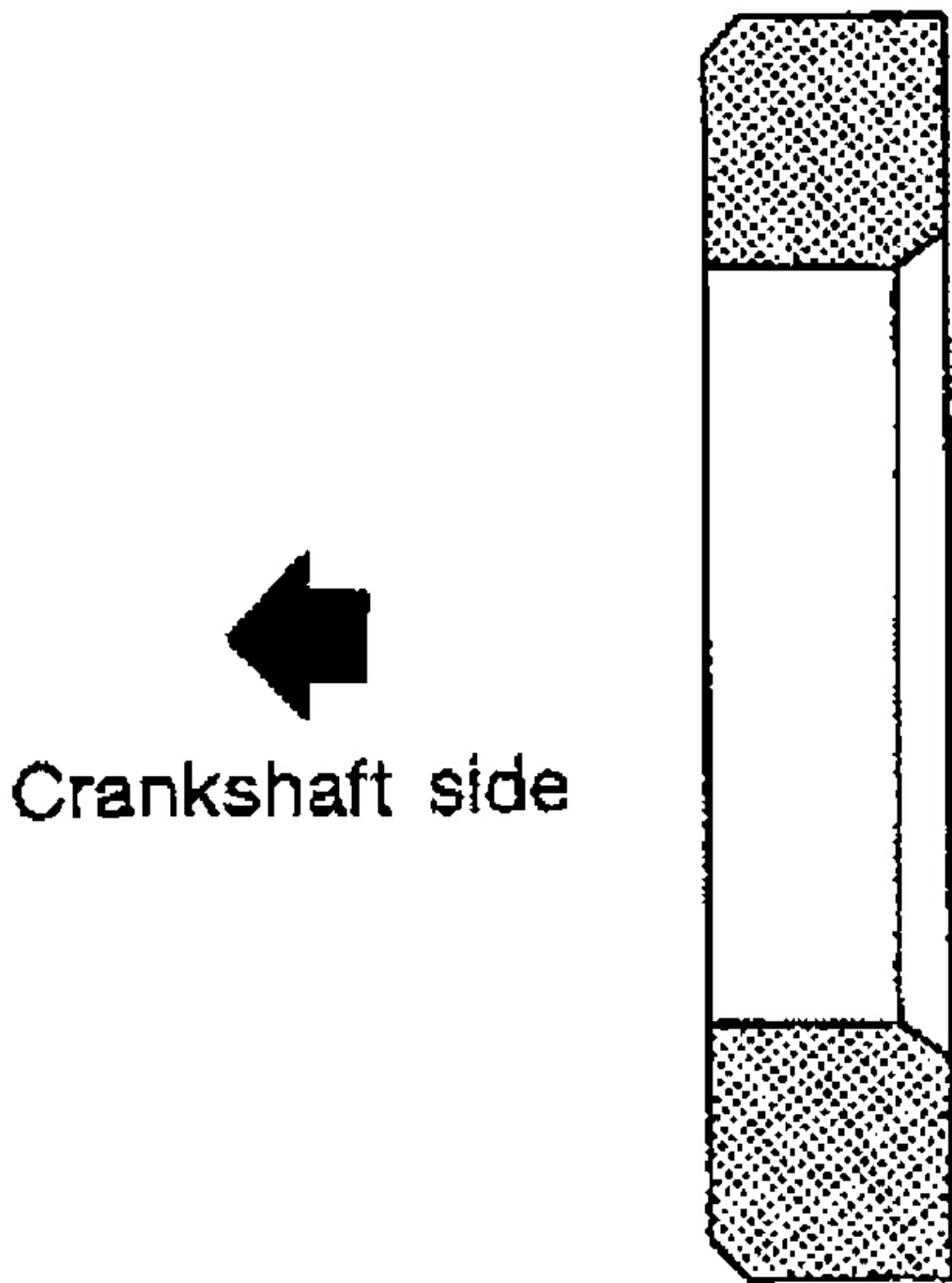


Fig. 245: Removing Pilot Converter
Courtesy of NISSAN MOTOR CO., U.S.A.

2. Install pilot converter as shown.



G02044933

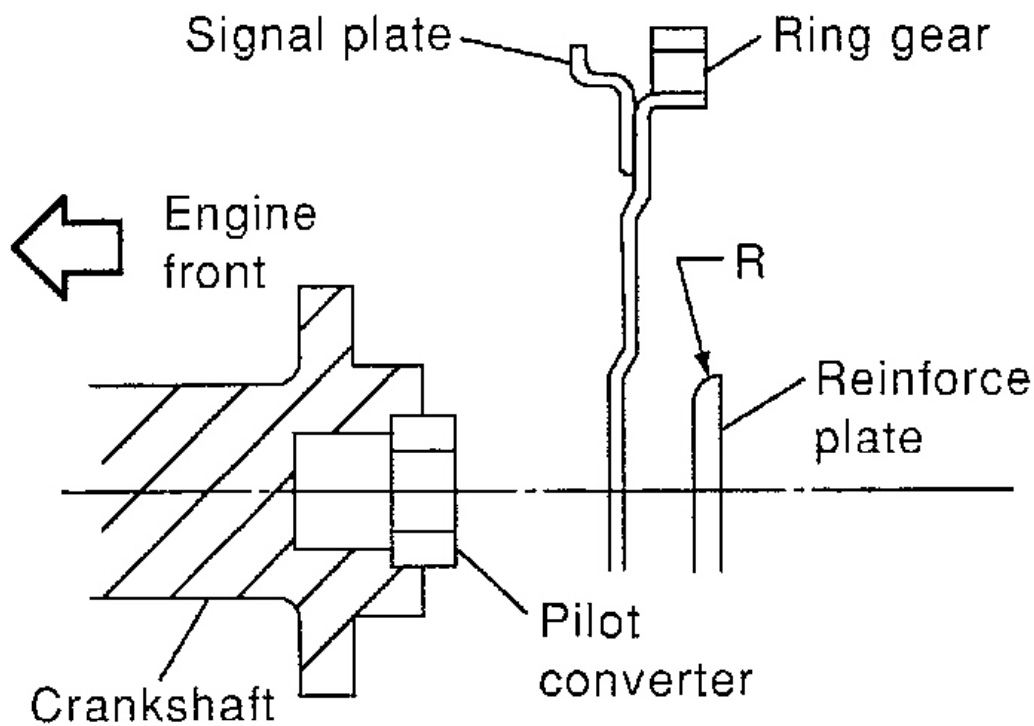
Fig. 246: Installing Pilot Converter

Courtesy of NISSAN MOTOR CO., U.S.A.

DRIVE PLATE

Install drive plate.

- Install the drive plate and reinforce plate in the direction shown in the figure.
- Secure the crankshaft using a ring gear stopper.
- Tighten the installation bolts crosswise over several times.



G02044934

Fig. 247: Installing The Drive Plate And Reinforce Plate
Courtesy of NISSAN MOTOR CO., U.S.A.

SERVICE DATA AND SPECIFICATIONS (SDS)

GENERAL SPECIFICATIONS

Identifying General Specifications

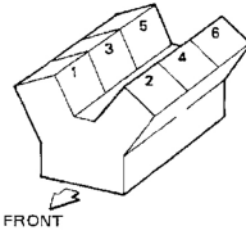
2002 Infiniti I35

2002 ENGINE Engine Mechanical - I35

Cylinder arrangement		V-6
Displacement cm ³ (cu in)		3,498 (213.45)
Bore and stroke mm (in)		95.5 x 81.4 (3.760 x 3.205)
Valve arrangement		DOHC
Firing order		1-2-3-4-5-6
Number of piston rings	Compression	2
	Oil	1
Number of main bearings		4
Compression ratio		10.3

COMPRESSION PRESSURE

Unit: kPa (kg/cm², psi)/300 rpm

Compression pressure	Standard	1,275 (13.0, 185)
	Minimum	981 (10.0, 142)
	Differential limit between cylinders	98 (1.0, 14)
Cylinder number		

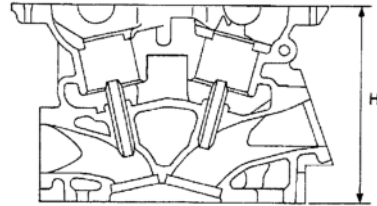
G02044936

Fig. 248: Identifying Compression Pressure
Courtesy of NISSAN MOTOR CO., U.S.A.

CYLINDER HEAD

Unit: mm (in)

	Standard	Limit
Head surface distortion	Less than 0.03 (0.0012)	0.1 (0.004)



Nominal cylinder head height:
H = 126.3 - 126.5 mm (4.972 - 4.980 in)

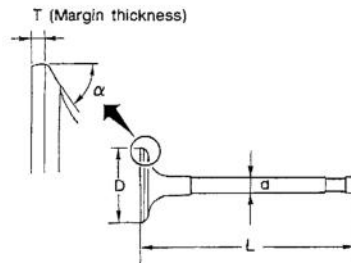
G02044937

Fig. 249: Identifying Cylinder Head Specification
Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE

VALVE

Unit: mm (in)



Valve head diameter "D"	Intake	37.0 - 37.3 (1.4567 - 1.4685)
	Exhaust	31.2 - 31.5 (1.228 - 1.240)
Valve length "L"	Intake	96.12 - 96.62 (3.7842 - 3.8039)
	Exhaust	93.65 - 94.15 (3.6870 - 3.7067)
Valve stem diameter "d"	Intake	5.965 - 5.980 (0.2348 - 0.2354)
	Exhaust	5.955 - 5.970 (0.2344 - 0.2350)
Valve seat angle "α"	Intake	45°15' - 45°45'
	Exhaust	
Valve margin "T"	Intake	1.15 - 1.45 (0.0453 - 0.0571)
	Exhaust	1.45 - 1.75 (0.0571 - 0.0689)
Valve margin "T" limit		More than 0.5 (0.020)
Valve stem end surface grinding limit		Less than 0.2 (0.008)

G02044938

Fig. 250: Identifying Valve Specification

Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE CLEARANCE

Unit: mm (in)

	Cold	Hot* (reference data)
Intake	*: Approximately 80°C (176°F)	0.32 - 0.40 (0.013 - 0.016)
Exhaust	0.29 - 0.37 (0.011 - 0.015)	0.33 - 0.41 (0.013 - 0.016)

*: Approximately 80°C (176°F)

G02044939

Fig. 251: Identifying Valve Clearance Specification

Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE SPRING

Free height	mm (in)	45.62 (1.7961)
Pressure	N (kg, lb) at height mm (in)	Standard
		Limit
		196 (20.0, 44.1) at 37.0 (1.457)
		433 (44.2, 97.3) at 27.8 (1.094)
Out-of-square	mm (in)	Less than 2.0 (0.079)

G02044940

Fig. 252: Identifying Valve Spring Specification

Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE LIFTER

Unit: mm (in)

Valve lifter outer diameter	33.977 - 33.987 (1.3377 - 1.3381)
Lifter guide inner diameter	34.000 - 34.016 (1.3386 - 1.3392)
Clearance between lifter and lifter guide	0.013 - 0.039 (0.0005 - 0.0015)

G02044941

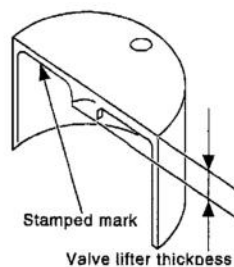
Fig. 253: Identifying Valve Lifter Specification (1 Of 2)

Courtesy of NISSAN MOTOR CO., U.S.A.

2002 Infiniti I35

2002 ENGINE Engine Mechanical - I35

Identification mark	Thickness mm (in)
788C	7.88 (0.3102)
790C	7.90 (0.3110)
792C	7.92 (0.3118)
794C	7.94 (0.3126)
796C	7.96 (0.3134)
798C	7.98 (0.3142)
800C	8.00 (0.3150)
802C	8.02 (0.3157)
804C	8.04 (0.3165)
806C	8.06 (0.3173)
808C	8.08 (0.3181)
810C	8.10 (0.3189)
812C	8.12 (0.3197)
814C	8.14 (0.3205)
816C	8.16 (0.3213)
818C	8.18 (0.3220)
820C	8.20 (0.3228)
822C	8.22 (0.3236)
824C	8.24 (0.3244)
826C	8.26 (0.3252)
828C	8.28 (0.3260)
830C	8.30 (0.3268)
832C	8.32 (0.3276)
834C	8.34 (0.3283)
836C	8.36 (0.3291)

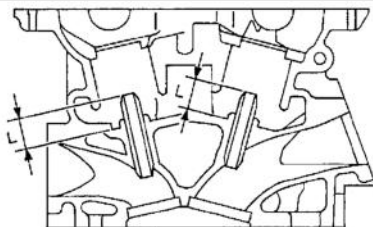


G02044942

Fig. 254: Identifying Valve Lifter Specification (2 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE GUIDE

Unit: mm (in)



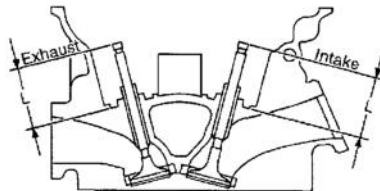
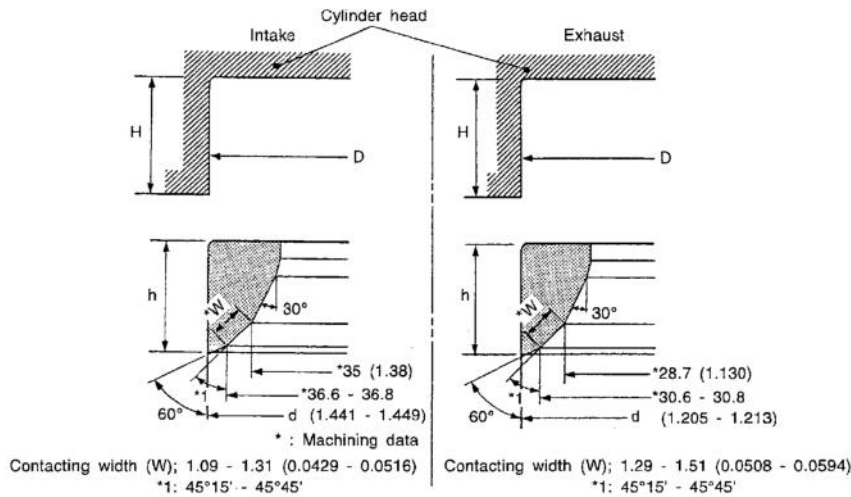
		Standard	Service
Valve guide	Outer diameter	10.023 - 10.034 (0.3946 - 0.3950)	10.223 - 10.234 (0.4025 - 0.4029)
Valve guide	Inner diameter (Finished size)	6.000 - 6.018 (0.2362 - 0.2369)	
Cylinder head valve guide hole diameter		9.975 - 9.996 (0.3927 - 0.3935)	10.175 - 10.196 (0.4006 - 0.4014)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
		Standard	Max. tolerance
Stem to guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.08 (0.0031)
	Exhaust	0.030 - 0.063 (0.0012 - 0.0025)	0.09 (0.0035)
Valve deflection limit	Intake	—	0.24 (0.0094)
	Exhaust	—	0.28 (0.0110)
Projection length "L"		12.6 - 12.8 (0.496 - 0.504)	

G02044943

Fig. 255: Identifying Valve Guide Specification
 Courtesy of NISSAN MOTOR CO., U.S.A.

VALVE SEAT

Unit: mm (in)



		Standard	Service
Cylinder head seat recess diameter (D)	Intake	38.000 - 38.016 (1.4961 - 1.4967)	38.500 - 38.516 (1.5157 - 1.5164)
	Exhaust	32.200 - 32.216 (1.2677 - 1.2683)	32.700 - 32.716 (1.2874 - 1.2880)
Valve seat interference fit	Intake	0.081 - 0.113 (0.0032 - 0.0044)	
	Exhaust	0.064 - 0.096 (0.0025 - 0.0038)	
Valve seat outer diameter (d)	Intake	38.097 - 38.113 (1.4999 - 1.5005)	38.597 - 38.613 (1.5196 - 1.5202)
	Exhaust	32.280 - 32.296 (1.2709 - 1.2715)	32.780 - 32.796 (1.2905 - 1.2912)
Height (h)	Intake	5.9 - 6.0 (0.232 - 0.236)	5.05 - 5.15 (0.1988 - 0.2028)
	Exhaust	5.9 - 6.0 (0.232 - 0.236)	4.95 - 5.05 (0.1949 - 0.1988)
Depth (H)		5.9 - 6.1 (0.232 - 0.240)	
Depth (L)	Intake	41.07 - 41.67 (1.6169 - 1.6405)	
	Exhaust	41.00 - 41.60 (1.6142 - 1.6378)	

G02044944

Fig. 256: Identifying Valve Seat Specification
Courtesy of NISSAN MOTOR CO., U.S.A.

CAMSHAFT AND CAMSHAFT BEARING

2002 Infiniti I35

2002 ENGINE Engine Mechanical - I35

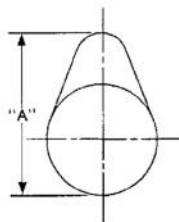
Unit: mm (in)

	Standard	Limit
Camshaft journal to bearing clearance	No. 1 0.045 - 0.086 (0.0018 - 0.0034) No. 2, 3, 4 0.035 - 0.076 (0.0014 - 0.0030)	0.15 (0.0059)
Inner diameter of camshaft bearing	No. 1 26.000 - 26.021 (1.0236 - 1.0244) No. 2, 3, 4 23.500 - 23.521 (0.9252 - 0.9260)	—
Outer diameter of camshaft journal	No. 1 25.935 - 25.955 (1.0211 - 1.0218) No. 2, 3, 4 23.445 - 23.465 (0.9230 - 0.9238)	—
Camshaft runout [TIR*]	Less than 0.02 (0.0008)	0.05 (0.0020)
Camshaft sprocket runout [TIR*]	Less than 0.15 (0.0059)	—
Camshaft end play	0.115 - 0.188 (0.0045 - 0.0074)	0.24 (0.0094)

*: Total indicator reading

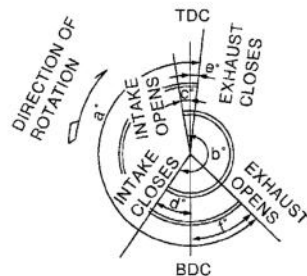
G02044945

Fig. 257: Identifying Camshaft And Camshaft Bearing (1 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.



Cam height "A"	Intake and exhaust	44.865 - 45.055 (1.7663 - 1.7738)
Wear limit of cam height		0.2 (0.008)

Valve timing



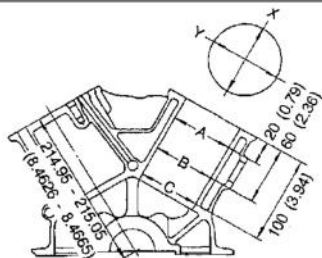
		Unit: degree					
		a	b	c	d	e	f
Intake valve timing control	OFF	240	238	-6	64	8	52

G02044946

Fig. 258: Identifying Camshaft And Camshaft Bearing (2 Of 2)
Courtesy of NISSAN MOTOR CO., U.S.A.

CYLINDER BLOCK

Unit: mm (in)



Surface flatness	Standard			Less than 0.03 (0.0012)
	Limit			0.10 (0.0039)
Cylinder bore	Inner diameter	Standard	Grade No. 1	95.500 - 95.510 (3.7598 - 3.7602)
			Grade No. 2	95.510 - 95.520 (3.7602 - 3.7606)
			Grade No. 3	95.520 - 95.530 (3.7606 - 3.7610)
		Wear limit		0.20 (0.0079)
Out-of-round (X – Y)				Less than 0.015 (0.0006)
Taper (A – B – C)				Less than 0.015 (0.0006)
Main journal inner diameter grade (Without bearing)	Grade No. A			63.993 - 63.994 (2.5194 - 2.5194)
	Grade No. B			63.994 - 63.995 (2.5194 - 2.5195)
	Grade No. C			63.995 - 63.996 (2.5195 - 2.5195)
	Grade No. D			63.996 - 63.997 (2.5195 - 2.5196)
	Grade No. E			63.997 - 63.998 (2.5196 - 2.5196)
	Grade No. F			63.998 - 63.999 (2.5196 - 2.5196)
	Grade No. G			63.999 - 64.000 (2.5196 - 2.5197)
	Grade No. H			64.000 - 64.001 (2.5197 - 2.5197)
	Grade No. J			64.001 - 64.002 (2.5197 - 2.5198)
	Grade No. K			64.002 - 64.003 (2.5198 - 2.5198)
	Grade No. L			64.003 - 64.004 (2.5198 - 2.5198)
	Grade No. M			64.004 - 64.005 (2.5198 - 2.5199)
	Grade No. N			64.005 - 64.006 (2.5199 - 2.5199)
	Grade No. P			64.006 - 64.007 (2.5199 - 2.5200)
	Grade No. R			64.007 - 64.008 (2.5200 - 2.5200)
	Grade No. S			64.008 - 64.009 (2.5200 - 2.5200)
	Grade No. T			64.009 - 64.010 (2.5200 - 2.5201)
	Grade No. U			64.010 - 64.011 (2.5201 - 2.5201)
	Grade No. V			64.011 - 64.012 (2.5201 - 2.5202)
	Grade No. W			64.012 - 64.013 (2.5202 - 2.5202)
Grade No. X			64.013 - 64.014 (2.5202 - 2.5202)	
Grade No. Y			64.014 - 64.015 (2.5202 - 2.5203)	
Grade No. 4			64.015 - 64.016 (2.5203 - 2.5203)	
Grade No. 7			64.016 - 64.017 (2.5203 - 2.5203)	
Difference in inner diameter between cylinders	Standard			Less than 0.03 (0.0012)

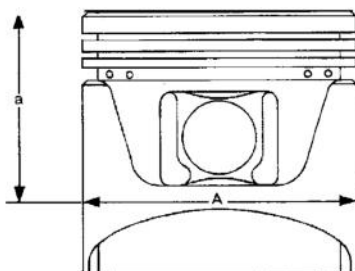
G02044947

Fig. 259: Identifying Cylinder Block
 Courtesy of NISSAN MOTOR CO., U.S.A.

PISTON, PISTON RING AND PISTON PIN

AVAILABLE PISTON

Unit: mm (in)



Piston skirt diameter "A"	Standard	Grade No. 1	95.480 - 95.490 (3.7590 - 3.7594)
		Grade No. 2	95.490 - 95.500 (3.7594 - 3.7598)
		Grade No. 3	95.500 - 95.510 (3.7598 - 3.7602)
		0.20 (0.0079) oversize (Service)	95.680 - 95.710 (3.7669 - 3.7681)
"a" dimension			41.0 (1.614)
Piston pin hole diameter		Grade No. 0	21.993 - 21.999 (0.8659 - 0.8661)
		Grade No. 1	21.999 - 22.005 (0.8661 - 0.8663)
Piston clearance to cylinder block			0.010 - 0.030 (0.0004 - 0.0012)

G02044948

Fig. 260: Identifying Available Piston Specification
 Courtesy of NISSAN MOTOR CO., U.S.A.

PISTON RING

Unit: mm (in)

		Standard	Limit
Side clearance	Top	0.045 - 0.060 (0.0018 - 0.0031)	0.11 (0.0043)
	2nd	0.030 - 0.070 (0.0012 - 0.0028)	0.1 (0.004)
	Oil ring	0.065 - 0.135 (0.0026 - 0.0053)	—
End gap	Top	0.23 - 0.33 (0.0091 - 0.0130)	0.54 (0.0213)
	2nd	0.33 - 0.48 (0.0130 - 0.0189)	0.80 (0.0315)
	Oil (rail ring)	0.20 - 0.50 (0.0079 - 0.0197)	0.95 (0.0374)

G02044949

Fig. 261: Identifying Piston Ring Specification
 Courtesy of NISSAN MOTOR CO., U.S.A.

PISTON PIN

2002 Infiniti I35

2002 ENGINE Engine Mechanical - I35

Unit: mm (in)

		Standard	Limit
Side clearance	Top	0.045 - 0.080 (0.0018 - 0.0031)	0.11 (0.0043)
	2nd	0.030 - 0.070 (0.0012 - 0.0028)	0.1 (0.004)
	Oil ring	0.065 - 0.135 (0.0026 - 0.0053)	—
End gap	Top	0.23 - 0.33 (0.0091 - 0.0130)	0.54 (0.0213)
	2nd	0.33 - 0.48 (0.0130 - 0.0189)	0.80 (0.0315)
	Oil (rail ring)	0.20 - 0.50 (0.0079 - 0.0197)	0.95 (0.0374)

G02044950

Fig. 262: Identifying Piston Pin Specification
Courtesy of NISSAN MOTOR CO., U.S.A.

CONNECTING ROD

Unit: mm (in)

Center distance		144.15 - 144.25 (5.6752 - 5.6791)
Bend [per 100 (3.94)]	Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	Limit	0.30 (0.0118)
Connecting rod small end inner diameter		23.980 - 24.000 (0.9441 - 0.9449)
Piston pin bushing inner diameter*	Grade No. 0	22.000 - 22.006 (0.8661 - 0.8664)
	Grade No. 1	22.006 - 22.012 (0.8664 - 0.8666)
Connecting rod big end inner diameter		55.000 - 55.013 (2.1654 - 2.1659)
Side clearance	Standard	0.20 - 0.35 (0.0079 - 0.0138)
	Limit	0.40 (0.0157)

*: After installing in connecting rod

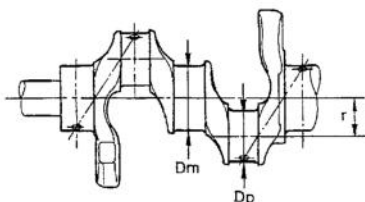
G02044951

Fig. 263: Connecting Rod Specification
Courtesy of NISSAN MOTOR CO., U.S.A.

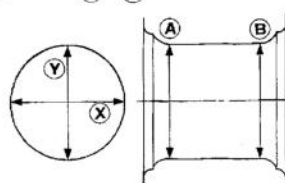
CRANKSHAFT

Unit: mm (in)

Main journal dia. "Dm" grade	Grade No. A	59.975 - 59.974 (2.3612 - 2.3612)
	Grade No. B	59.974 - 59.973 (2.3612 - 2.3611)
	Grade No. C	59.973 - 59.972 (2.3611 - 2.3611)
	Grade No. D	59.972 - 59.971 (2.3611 - 2.3611)
	Grade No. E	59.971 - 59.970 (2.3611 - 2.3610)
	Grade No. F	59.970 - 59.969 (2.3610 - 2.3610)
	Grade No. G	59.969 - 59.968 (2.3610 - 2.3609)
	Grade No. H	59.968 - 59.967 (2.3609 - 2.3609)
	Grade No. J	59.967 - 59.966 (2.3609 - 2.3609)
	Grade No. K	59.966 - 59.965 (2.3609 - 2.3608)
	Grade No. L	59.965 - 59.964 (2.3608 - 2.3608)
	Grade No. M	59.964 - 59.963 (2.3608 - 2.3607)
	Grade No. N	59.963 - 59.962 (2.3607 - 2.3607)
	Grade No. P	59.962 - 59.961 (2.3607 - 2.3607)
	Grade No. R	59.961 - 59.960 (2.3607 - 2.3606)
	Grade No. S	59.960 - 59.959 (2.3606 - 2.3606)
	Grade No. T	59.959 - 59.958 (2.3606 - 2.3605)
	Grade No. U	59.958 - 59.957 (2.3605 - 2.3605)
	Grade No. V	59.957 - 59.956 (2.3605 - 2.3605)
	Grade No. W	59.956 - 59.955 (2.3605 - 2.3604)
	Grade No. X	59.955 - 59.954 (2.3604 - 2.3604)
Pin journal dia. "Dp"	Grade No. 0	51.968 - 51.974 (2.0460 - 2.0462)
	Grade No. 1	51.962 - 51.968 (2.0457 - 2.0460)
	Grade No. 2	51.956 - 51.962 (2.0445 - 2.0457)
Center distance "r"		40.36 - 40.44 (1.5890 - 1.5921)
Out-of-round (X - Y)	Standard	Less than 0.002 (0.0001)
Taper (A - B)	Standard	Less than 0.002 (0.0001)
Runout [TIR*]	Limit	Less than 0.10 (0.0039)
Free end play	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Limit	0.30 (0.0118)



Out-of-round (X - Y)
Taper (A - B)

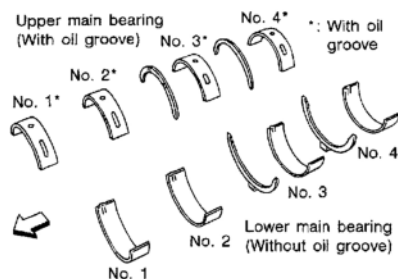


*: Total indicator reading

G02044952

Fig. 264: Crankshaft Specification
Courtesy of NISSAN MOTOR CO., U.S.A.

AVAILABLE MAIN BEARING



Grade number		Thickness "T" mm (in)	Width "W" mm (in)	Identification color (UPR/LWR)	Remarks
0		2.000 - 2.003 (0.0787 - 0.0789)	19.9 - 20.1 (0.783 - 0.791)	Black	Grade is the same for upper and lower bearings.
1		2.003 - 2.006 (0.0789 - 0.0790)		Brown	
2		2.006 - 2.009 (0.0790 - 0.0791)		Green	
3		2.009 - 2.012 (0.0791 - 0.0792)		Yellow	
4		2.012 - 2.015 (0.0792 - 0.0793)		Blue	
5		2.015 - 2.018 (0.0793 - 0.0794)		Pink	
6		2.018 - 2.021 (0.0794 - 0.0796)		Purple	
7		2.021 - 2.024 (0.0796 - 0.0797)		White	
01	UPP	2.003 - 2.006 (0.0789 - 0.0790)		Brown/Black	Grade is different for upper and lower bearings.
	LWR	2.000 - 2.003 (0.0787 - 0.0789)			
12	UPR	2.006 - 2.009 (0.0790 - 0.0791)		Green/Brown	
	LWR	2.003 - 2.006 (0.0789 - 0.0790)			
23	UPR	2.009 - 2.012 (0.0791 - 0.0792)		Yellow/Green	
	LWR	2.006 - 2.009 (0.0790 - 0.0791)			
34	UPR	2.012 - 2.015 (0.0792 - 0.0793)		Blue/Yellow	
	LWR	2.009 - 2.012 (0.0791 - 0.0792)			
45	UPR	2.015 - 2.018 (0.0793 - 0.0794)		Pink/Blue	
	LWR	2.012 - 2.015 (0.0792 - 0.0793)			
56	UPR	2.018 - 2.021 (0.0794 - 0.0796)		Purple/Pink	
	LWR	2.015 - 2.018 (0.0793 - 0.0794)			
67	UPR	2.021 - 2.024 (0.0796 - 0.0797)		White/Purple	
	LWR	2.018 - 2.021 (0.0794 - 0.0796)			

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Fig. 265: Main Bearing Specification
 Courtesy of NISSAN MOTOR CO., U.S.A.

UNDERSIZE

2002 Infiniti I35

2002 ENGINE Engine Mechanical - I35

Unit: mm (in)

	Thickness	Main journal diameter "Dm"
0.25 (0.0098)	2.132 - 2.140 (0.0839 - 0.0843)	Grind so that bearing clearance is the specified value.

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Fig. 266: Main Bearing Undersize Specification
Courtesy of NISSAN MOTOR CO., U.S.A.

AVAILABLE CONNECTING ROD BEARING

CONNECTING ROD BEARING

Grade number	Thickness "T" mm (in)	Identification color (mark)
0	1.500 - 1.503 (0.0591 - 0.0592)	Black
1	1.503 - 1.506 (0.0592 - 0.0593)	Brown
2	1.506 - 1.509 (0.0593 - 0.0594)	Green

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Fig. 267: Identifying Connecting Rod Bearing
Courtesy of NISSAN MOTOR CO., U.S.A.

UNDERSIZE

Unit: mm (in)

	Thickness	Crank pin journal diameter "Dp"
0.25 (0.0098)	1.626 - 1.634 (0.0640 - 0.0643)	Grind so that bearing clearance is the specified value.

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Fig. 268: Undersize Reference
Courtesy of NISSAN MOTOR CO., U.S.A.

MISCELLANEOUS COMPONENTS

Unit: mm (in)

Drive plate runout [TIR]*	Less than 0.15 (0.0059)
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*: Total indicator reading

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Fig. 269: Identifying Miscellaneous Components
Courtesy of NISSAN MOTOR CO., U.S.A.

BEARING CLEARANCE

2002 Infiniti I35

2002 ENGINE Engine Mechanical - I35

Unit: mm (in)

Main bearing clearance	Standard	0.035 - 0.045 (0.0014 - 0.0018)
	Limit	0.065 (0.0026)
Connecting rod bearing clearance	Standard	0.034 - 0.059 (0.0013 - 0.0023)
	Limit	0.070 (0.0028)

*: Total indicator reading

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Fig. 270: Identifying Bearing Clearance Specification
Courtesy of NISSAN MOTOR CO., U.S.A.