

SECTION **EM**

ENGINE MECHANICAL

CONTENTS

VQ35DE	
SERVICE INFORMATION	4
PRECAUTIONS	4
Precaution for Procedure without Cowl Top Cover.....	4
Precaution Necessary for Steering Wheel Rotation after Battery Disconnect	4
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	4
Precaution for Disconnecting Fuel Piping	5
Precaution for Drain Engine Coolant and Engine Oil	5
Precaution for Removal and Disassembly	5
Precaution for Inspection, Repair and Replacement	5
Precaution for Assembly and Installation	5
Precaution for Angle Tightening	6
Precaution for Liquid Gasket	6
PREPARATION	8
Special Service Tool	8
Commercial Service Tool	9
NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING	12
NVH Troubleshooting - Engine Noise	12
Use the Chart Below to Help You Find the Cause of the Symptom	12
ENGINE ROOM COVER	14
Component	14
Removal and Installation	14
DRIVE BELTS	15
Checking Drive Belts	15
Tension Adjustment	15
Removal and Installation	17
AIR CLEANER AND AIR DUCT	18
Component	18
Removal and Installation	18
Changing Air Cleaner Filter	19
INTAKE MANIFOLD COLLECTOR	20
Component	20
Removal and Installation	20
INTAKE MANIFOLD	25
Component	25
Removal and Installation	25
EXHAUST MANIFOLD	27
Component	27
Removal and Installation	27
OIL PAN AND OIL STRAINER	30
2WD	30
2WD : Component	30
2WD : Removal and Installation	30
AWD	35
AWD : Component	36
AWD : Removal and Installation	37
IGNITION COIL	43
Component	43
Removal and Installation	43
SPARK PLUG (PLATINUM-TIPPED TYPE)	44
Component	44
Removal and Installation	44
FUEL INJECTOR AND FUEL TUBE	46
Component	46
Removal and Installation	46
ROCKER COVER	52
Component	52
Removal and Installation	52
FRONT TIMING CHAIN CASE	55
Removal and Installation	55

TIMING CHAIN	65	PREPARATION	165
Component	65	Special Service Tool	165
Removal and Installation	66	Commercial Service Tool	166
CAMSHAFT	84	NOISE, VIBRATION AND HARSHNESS	
Component	84	(NVH) TROUBLESHOOTING	169
Removal and Installation	84	NVH Troubleshooting - Engine Noise	169
Valve Clearance	92	Use the Chart Below to Help You Find the Cause	
OIL SEAL	98	of the Symptom	169
Removal and Installation of Valve Oil Seal	98	ENGINE ROOM COVER	171
Removal and Installation of Front Oil Seal	98	Component	171
Removal and Installation of Rear Oil Seal	99	Removal and Installation	171
CYLINDER HEAD	101	DRIVE BELTS	172
On-Vehicle Service	101	Component	172
Component	102	Checking Drive Belts	172
Removal and Installation	102	Tension Adjustment	172
Disassembly and Assembly	105	Removal and Installation	172
Inspection After Disassembly	108	Component	173
ENGINE ASSEMBLY	113	Drive Belt Auto Tensioner and Idler Pulley	174
2WD	113	AIR CLEANER AND AIR DUCT	175
2WD : Component	113	Component	175
2WD : Removal and Installation	113	Removal and Installation	175
AWD	117	Changing Air Cleaner Filter	176
AWD : Component	118	INTAKE MANIFOLD	177
AWD : Removal and Installation	118	Component	177
CYLINDER BLOCK	123	Removal and Installation	178
Component	123	EXHAUST MANIFOLD AND THREE WAY	
Disassembly and Assembly	124	CATALYST	181
How to Select Piston and Bearing	134	Component	181
Inspection After Disassembly	139	Removal and Installation	181
SERVICE DATA AND SPECIFICATIONS		OIL PAN AND OIL STRAINER	185
(SDS)	150	Component	185
Standard and Limit	150	Removal and Installation	186
		IGNITION COIL	189
		Component	189
		Removal and Installation	189
		SPARK PLUG (PLATINUM-TIPPED TYPE) ...	190
		Component	190
		Removal and Installation	190
SERVICE INFORMATION	161	FUEL INJECTOR AND FUEL TUBE	192
PRECAUTIONS	161	Component	192
Precaution for Procedure without Cowl Top Cover	161	Removal and Installation	192
Precaution Necessary for Steering Wheel Rotation after Battery Disconnect	161	ROCKER COVER	198
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	161	Component	198
Precaution for Drain Engine Coolant and Engine Oil	162	Removal and Installation	198
Precaution for Disconnecting Fuel Piping	162	TIMING CHAIN	202
Precaution for Removal and Disassembly	162	Component	202
Precaution for Inspection, Repair and Replacement	162	Removal and Installation	203
Precaution for Assembly and Installation	162	CAMSHAFT	214
Parts Requiring Angle Tightening	163	Component	214
Precaution for Liquid Gasket	163		

Removal and Installation	214	
Valve Clearance	222	
OIL SEAL	226	
Removal and Installation of Valve Oil Seal	226	
Removal and Installation of Front Oil Seal	227	
Removal and Installation of Rear Oil Seal	228	
CYLINDER HEAD	230	
On-Vehicle Service	230	
Component	231	
Removal and Installation	231	
Disassembly and Assembly	233	
Inspection After Disassembly	236	
ENGINE ASSEMBLY	241	
2WD	241	
2WD : Component	241	A
2WD : Removal and Installation	241	
AWD	244	
AWD : Component	245	EM
AWD : Removal and Installation	245	
CYLINDER BLOCK	249	
Component	249	C
Disassembly and Assembly	250	
How to Select Piston and Bearing	259	
Inspection After Disassembly	265	D
SERVICE DATA AND SPECIFICATIONS (SDS)	275	E
Standard and Limit	275	
		F
		G
		H
		I
		J
		K
		L
		M
		N
		O
		P

PRECAUTIONS

< SERVICE INFORMATION >

[VQ35DE]

Precaution for Angle Tightening

INFOID:000000002953885

- Use the angle wrench [SST: KV10112100 (BT8653-A)] for the final tightening of the following engine parts:
 - Cylinder head bolts
 - Main bearing cap bolts
 - Connecting rod cap bolts
 - Crankshaft pulley bolt (No angle wrench is required as the bolt flange is provided with notches for angle tightening)
- 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.

Precaution for Liquid Gasket

INFOID:000000002953886

REMOVAL OF LIQUID GASKET SEALING

- After removing mounting nuts and bolts, separate the mating surface using the seal cutter (SST) and remove old liquid gasket sealing.

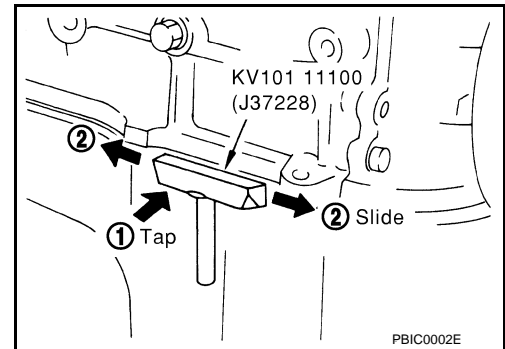
CAUTION:

Be careful not to damage the mating surfaces.

- Tap the seal cutter to insert it, and then slide it by tapping on the side as shown in the figure.
- In areas where the seal cutter (SST) is difficult to use, use a plastic hammer to lightly tap the parts, to remove it.

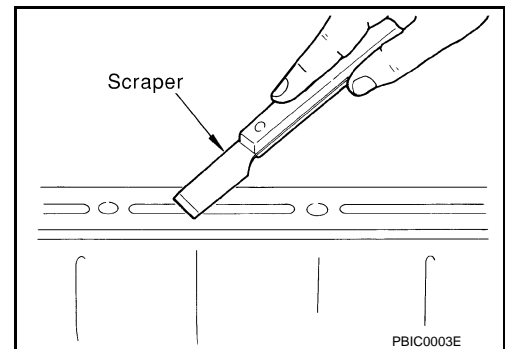
CAUTION:

If for some unavoidable reason tool such as a screwdriver is used, be careful not to damage the mating surfaces.

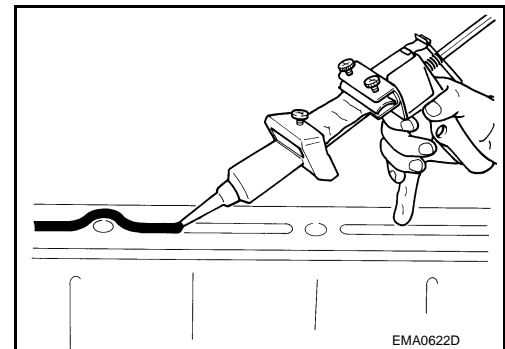


LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
 - Remove liquid gasket completely from the groove of the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.



3. Attach liquid gasket tube to the tube presser (commercial service tool).
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-44](#).
4. Apply liquid gasket without breaks to the specified location with the specified dimensions.
 - If there is a groove for liquid gasket application, apply liquid gasket to the groove.



INTAKE MANIFOLD

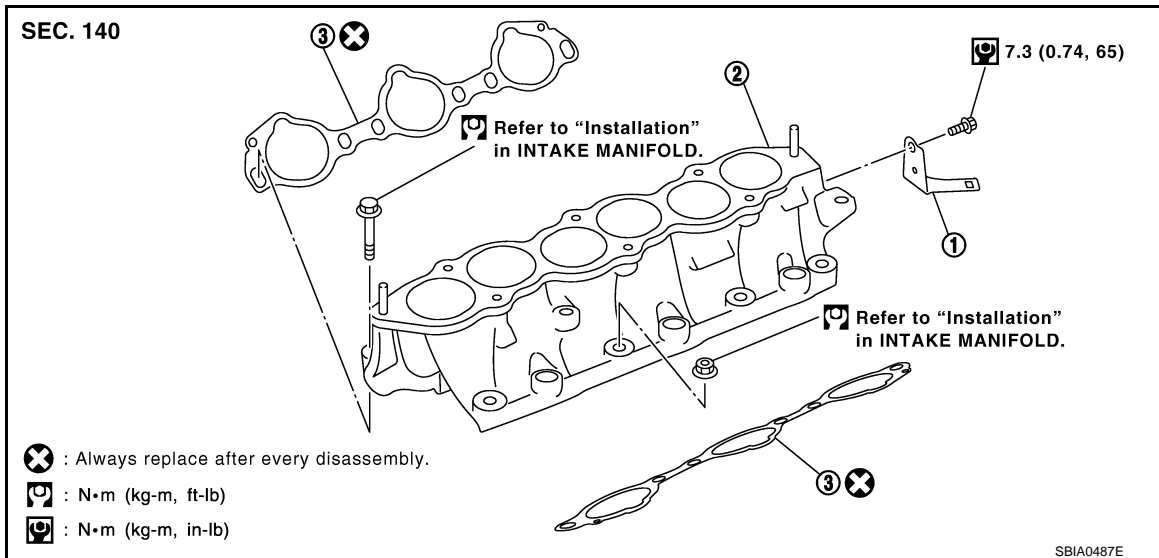
< SERVICE INFORMATION >

[VQ35DE]

INTAKE MANIFOLD

Component

INFOID:000000002953901



1. Harness bracket

2. Intake manifold

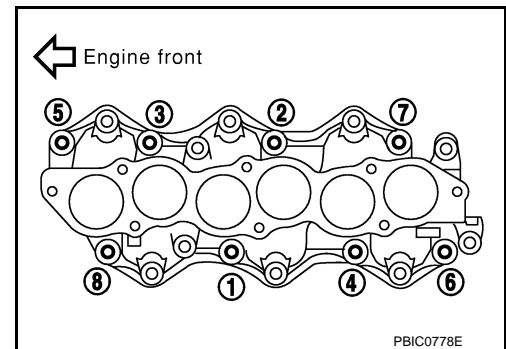
3. Gasket

Removal and Installation

INFOID:000000002953902

REMOVAL

1. Release fuel pressure. Refer to [EC-84. "Fuel Pressure Check"](#).
2. Remove intake manifold collectors (upper and lower). Refer to [EM-20](#).
3. Remove fuel tube and fuel injector assembly. Refer to [EM-46](#).
4. Loosen mounting bolts and nuts in reverse order as shown in the figure to remove intake manifold with power tool.



5. Remove gaskets.

CAUTION:

Cover engine openings to avoid entry of foreign materials.

INSPECTION AFTER REMOVAL

Surface Distortion

FUEL INJECTOR AND FUEL TUBE

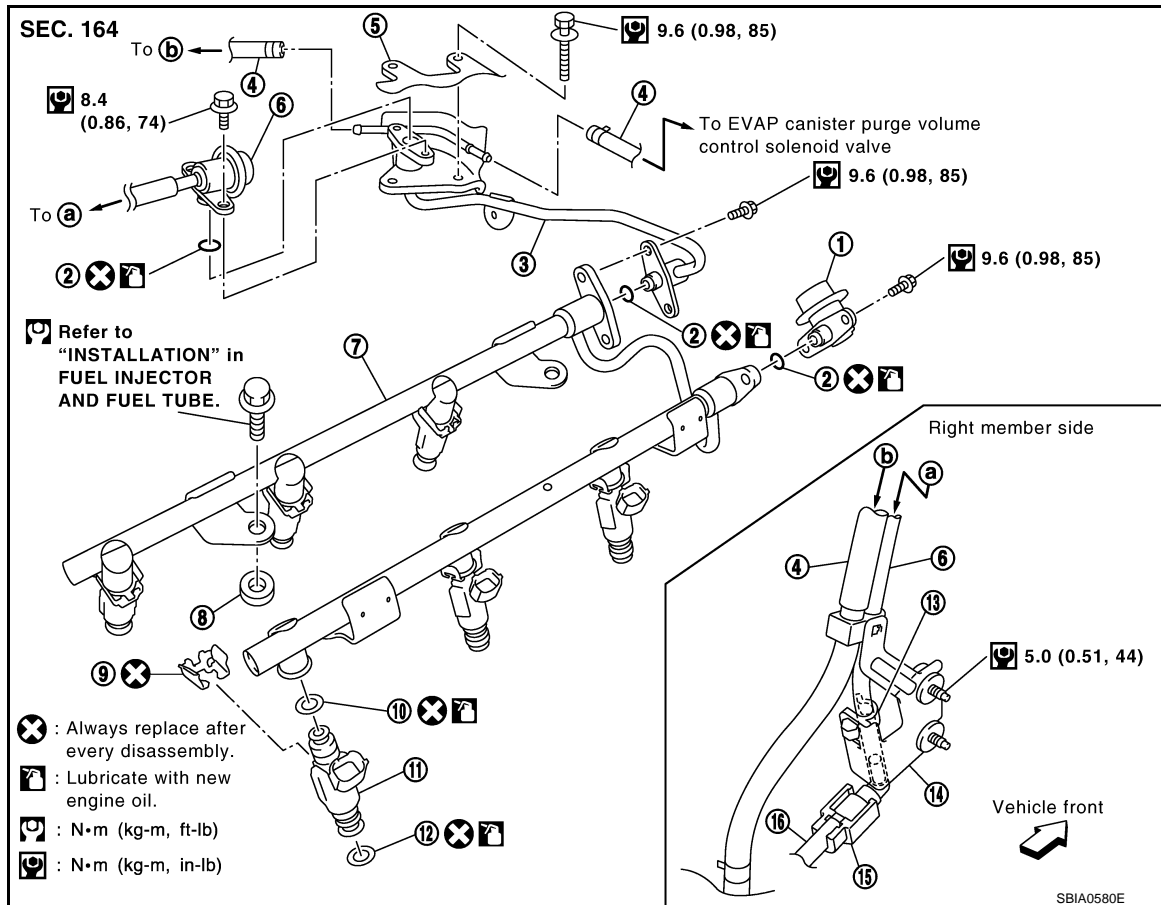
< SERVICE INFORMATION >

[VQ35DE]

FUEL INJECTOR AND FUEL TUBE

Component

INFOID:000000002953913



- | | | |
|------------------------------------|--------------------------------------|---------------------------------|
| 1. Fuel damper | 2. O-ring | 3. Fuel sub-tube |
| 4. EVAP hose | 5. Intake manifold collector (lower) | 6. Fuel feed hose (with damper) |
| 7. Fuel tube | 8. Spacer | 9. Clip |
| 10. O-ring (Blue) | 11. Fuel injector | 12. O-ring (Brown) |
| 13. Hose clamp | 14. Bracket | 15. Quick connector cap |
| 16. Centralized under-floor piping | | |

CAUTION:

Never remove or disassemble parts unless instructed as shown in the figure.

Removal and Installation

INFOID:000000002953914

REMOVAL

WARNING:

- Put a "CAUTION: FLAMMABLE" sign in the workshop.
- Be sure to work in a well ventilated area and furnish workshop with a CO2 fire extinguisher.
- Never smoke while servicing fuel system. Keep open flames and sparks away from the work area.
- To avoid the danger of being scalded, never drain engine coolant when the engine is hot.

1. Remove engine room cover (RH and LH). Refer to [EM-14](#).
2. Remove engine cover with power tool. Refer to [EM-20](#).
3. Release fuel pressure. Refer to [EC-84, "Fuel Pressure Check"](#).
4. Drain engine coolant, or when water hoses are disconnected, attach plug to prevent engine coolant leakage. Refer to [CO-10, "Changing Engine Coolant"](#) and [EM-20](#).

CAUTION:

TIMING CHAIN

< SERVICE INFORMATION >

[VQ35DE]

- | | | |
|---------------------------------------|---------------------------------------|-----------------------------|
| 10. Camshaft sprocket (EXH) | 11. Timing chain (secondary) | 12. Camshaft sprocket (INT) |
| 13. Slack guide | 14. Timing chain tensioner (primary) | 15. Crankshaft sprocket |
| 16. Intake valve timing control cover | 17. Collared O-ring | 18. Seal ring |
| 19. Chain tensioner cover | 20. Intake valve timing control cover | 21. Spacer |
| 22. Water hose clamp | 23. Idler pulley | 24. Front oil seal |
| 25. Crankshaft pulley | 26. Idler pulley | 27. A/C compressor bracket |
| 28. Water pump cover | 29. Front timing chain case | 30. Bracket |
| 31. Bracket | 32. Bracket | 33. Rear timing chain case |
| 34. Tension guide | 35. Water drain plug (front side) | 36. O-ring |
| 37. O-ring | 38. O-ring | |
| A. Refer to EM-66 | B. Refer to ATC-139 | |

- Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000002953919

NOTE:

- This section describes procedures for removing/installing front timing chain case and timing chain related parts, and rear timing chain case, when oil pan (upper) needs to be removed/installed for engine overhaul, etc.
- To remove/install front timing chain case, timing chain, and its related parts without removing oil pan (upper), refer to [EM-55](#).

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-14](#).
2. Remove front tire.
3. Disconnect the battery cable from the negative terminal.
4. Remove engine cover with power tool. Refer to [EM-20](#).
5. Remove air duct (inlet) and air cleaner case assembly. Refer to [EM-18](#).
6. Remove front and rear engine undercover with power tool.
7. Release the fuel pressure. Refer to [EC-84, "Fuel Pressure Check"](#).
8. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#).

CAUTION:

- Perform this step when the engine is cold.
- Never spill engine coolant on drive belts.

9. Remove radiator hose (upper and lower) and A/T fluid cooler hose. Refer to [CO-13](#).
10. Drain engine oil. Refer to [LU-7, "Changing Engine Oil"](#).

CAUTION:

- Perform this step when the engine is cold.
- Never spill engine oil on drive belts.

11. Separate engine harnesses removing their brackets from front timing chain case.
12. Remove intake manifold collectors (upper and lower). Refer to [EM-20](#).
13. Remove radiator cooling fan assembly. Refer to [CO-21](#).
14. Remove drive belts. Refer to [EM-15](#).
15. Remove A/C compressor from bracket with piping connected, and temporarily secure it aside. Refer to [ATC-139, "Removal and Installation of Compressor"](#).
16. Remove power steering oil pump from bracket with piping connected, and temporarily secure it aside. Refer to [PS-28](#).
17. Remove power steering oil pump bracket. Refer to [PS-28](#).
18. Remove alternator. Refer to [SC-19](#).
19. Remove water bypass hose, water hose clamp and idler pulley bracket from front timing chain case.
20. Remove intake valve timing control covers.

TIMING CHAIN

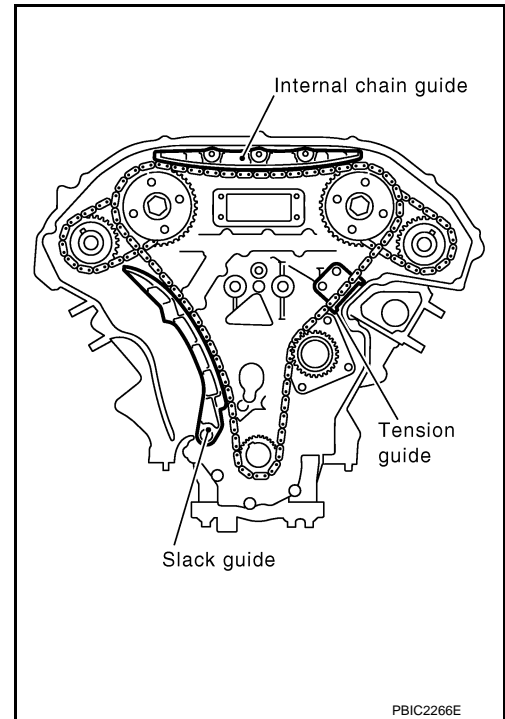
[VQ35DE]

< SERVICE INFORMATION >

31. Remove internal chain guide, tension guide and slack guide.

NOTE:

Tension guide can be removed after removing timing chain (primary).



32. Remove timing chain (primary) and crankshaft sprocket.

CAUTION:

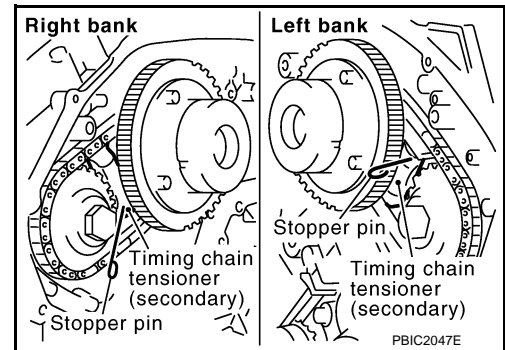
After removing timing chain (primary), never turn crankshaft and camshaft separately, or valves will strike the piston heads.

33. Remove timing chain (secondary) and camshaft sprockets as follows:

- a. Attach suitable stopper pin to the right and left timing chain tensioners (secondary).

NOTE:

- Use approximately 0.5 mm (0.020 in) dia. hard metal pin as a stopper pin.
- For removal of timing chain tensioner (secondary), refer to [EM-84](#). [Removing camshaft bracket (No. 1) is required.]

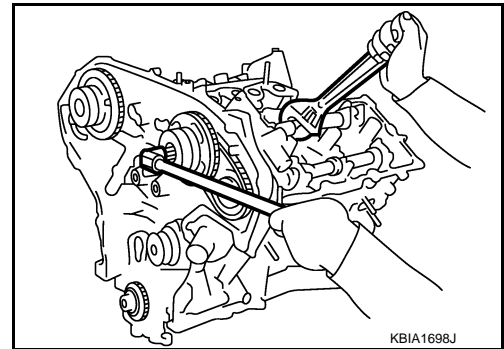


- b. Remove camshaft sprocket (INT and EXH) mounting bolts.

- Secure the hexagonal portion of camshaft using a wrench to loosen mounting bolts.

CAUTION:

Never loosen the mounting bolts with securing anything other than the camshaft hexagonal portion or with tensioning the timing chain.



- c. Remove timing chain (secondary) together with camshaft sprockets.

- Turn camshaft slightly to secure slackness of timing chain on timing chain tensioner (secondary) side.

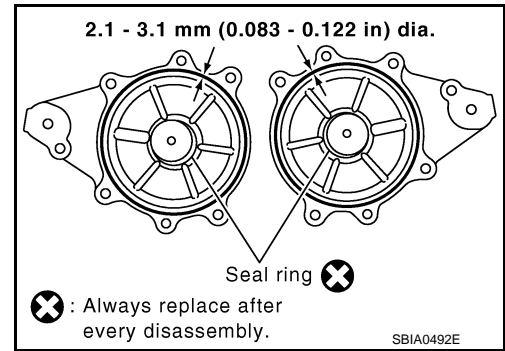
TIMING CHAIN

[VQ35DE]

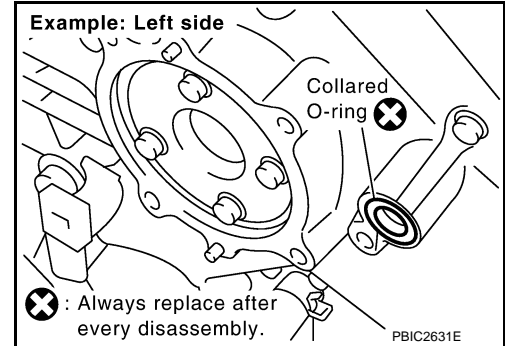
< SERVICE INFORMATION >

- b. Apply a continuous bead of liquid gasket with the tube presser (commercial service tool) to intake valve timing control covers as shown in the figure.

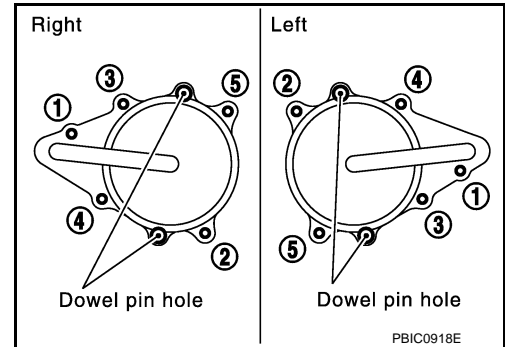
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-44](#).



- c. Install new collared O-rings in front timing chain case oil hole (left and right sides).



- d. Being careful not to move seal ring from the installation groove, align dowel pins on front timing chain case with holes to install intake valve timing control covers.
- e. Tighten mounting bolts in numerical order as shown in the figure.



16. Install oil pans (upper and lower). Refer to [EM-30](#).

17. Install rocker covers (right bank and left bank). Refer to [EM-52](#).

18. Install crankshaft pulley as follows:

- Fix crankshaft using the ring gear stopper [SST: KV10117700 (J44716)].
- Install crankshaft pulley, taking care not to damage front oil seal.
 - When press-fitting crankshaft pulley with plastic hammer, tap on its center portion (not circumference).
- Tighten crankshaft pulley bolt.

: **44.1 N·m (4.5 kg-m, 33 ft-lb)**

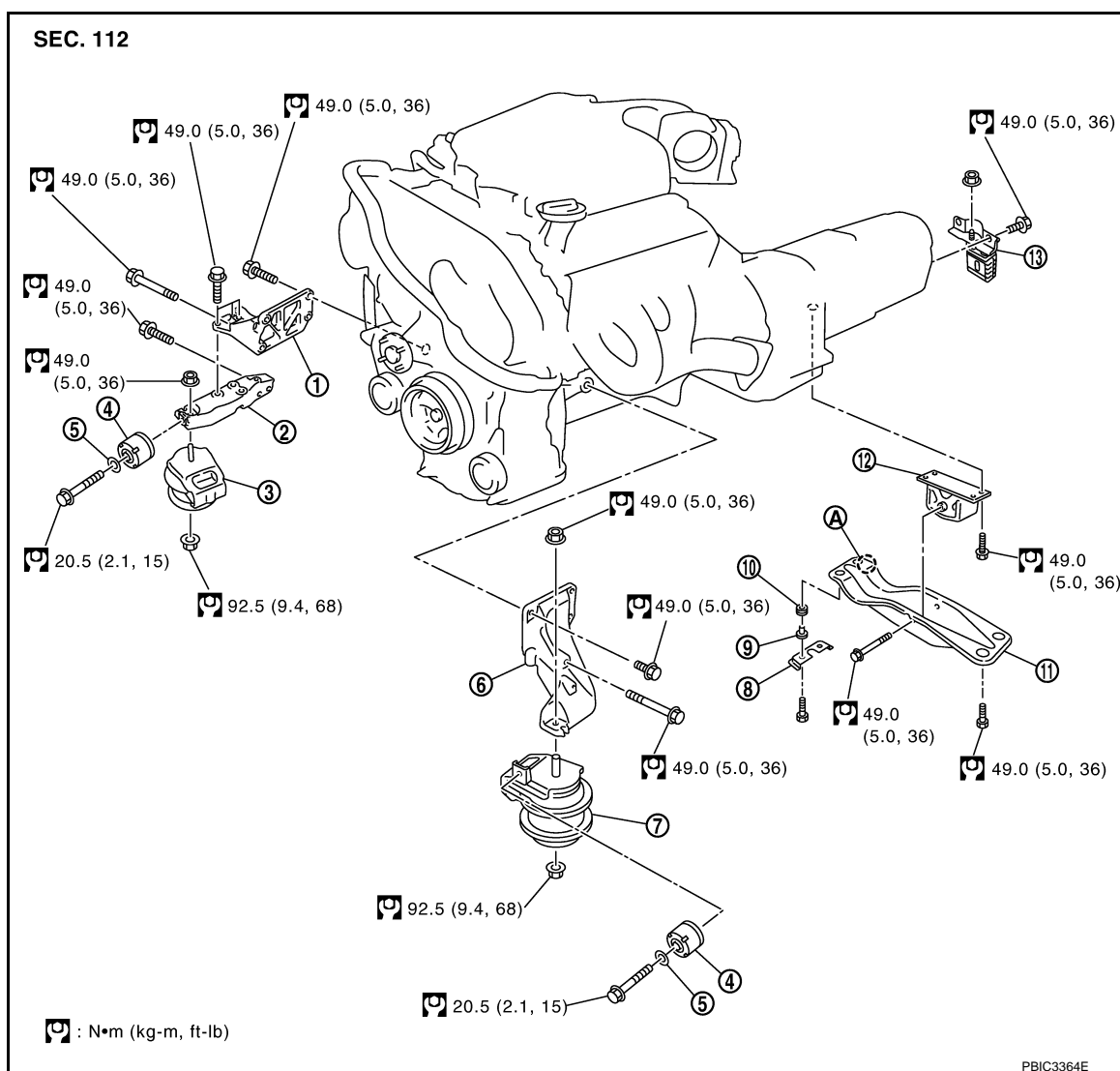
ENGINE ASSEMBLY

< SERVICE INFORMATION >

[VQ35DE]

AWD : Component

INFOID:0000000002953933



- | | | | | | |
|-----|--------------------------------|-----|--------------------------------------|-----|----------------------------------|
| 1. | Engine mounting bracket (RH) | 2. | Engine mounting bracket (RH) (lower) | 3. | Engine mounting insulator (RH) |
| 4. | Dynamic damper | 5. | Washer | 6. | Engine mounting bracket (LH) |
| 7. | Engine mounting insulator (LH) | 8. | Heat insulator | 9. | Collar |
| 10. | Rubber bushing | 11. | Rear engine mounting member | 12. | Engine mounting insulator (rear) |
| 13. | Dynamic damper | | | | |
| A. | Front mark | | | | |

AWD : Removal and Installation

INFOID:0000000002953934

WARNING:

- Situate the vehicle on a flat and solid surface.
- Place chocks at front and back of rear wheels.
- For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.

CAUTION:

- Always be careful to work safely, avoid forceful or uninstructed operations.
- Never start working until exhaust system and engine coolant are cool enough.
- If items or work required are not covered by the engine section, refer to the applicable sections.
- Always use the support point specified for lifting.

CYLINDER BLOCK

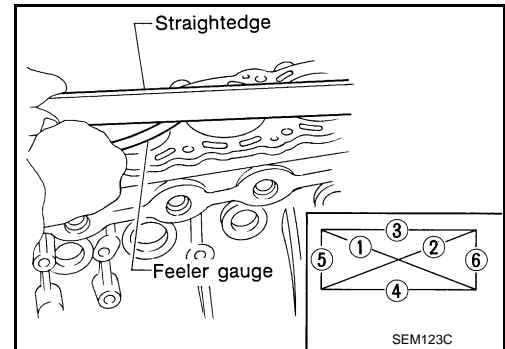
[VQ35DE]

< SERVICE INFORMATION >

- Measure the distortion on the cylinder block upper face at some different points in six directions with a straightedge and a feeler gauge.

Limit : 0.1 mm (0.004 in)

- If it exceeds the limit, replace cylinder block.



MAIN BEARING HOUSING INNER DIAMETER

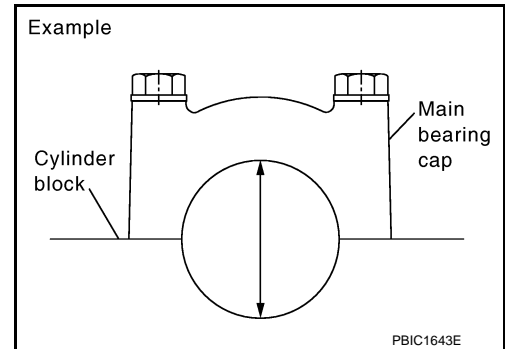
- Install main bearing caps and main bearing beam without installing main bearings, and tighten main bearing cap bolts to the specified torque. Refer to [EM-124, "Disassembly and Assembly"](#) for the tightening procedure.
- Measure the inner diameter of main bearing housing with a bore gauge.

Standard : 63.993 - 64.017 mm (2.5194 - 2.5203 in)

- If out of the standard, replace cylinder block and main bearing caps as assembly.

NOTE:

Cylinder block cannot be replaced as a single part, because it is machined together with main bearing caps.



PISTON TO CYLINDER BORE CLEARANCE

Cylinder Bore inner Diameter

- Using a bore gauge, measure cylinder bore for wear, out-of-round and taper at six different points on each cylinder. ("X" and "Y" directions at "A", "B" and "C") ("X" is in longitudinal direction of engine)

Standard inner diameter:

95.500 - 95.530 mm (3.7598 - 3.7610 in)

Wear limit:

0.20 mm (0.0079 in)

Out-of-round (Difference between "X" and "Y"):

Limit: 0.015 mm (0.0006 in)

Taper (Difference between "A" and "C"):

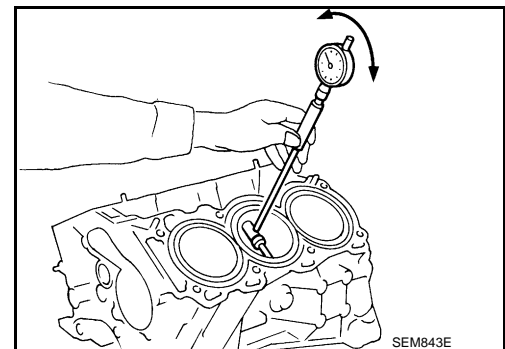
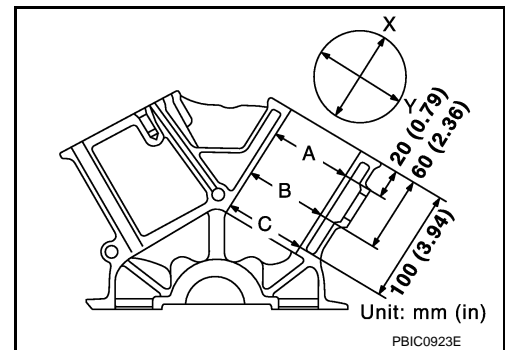
Limit: 0.010 mm (0.0004 in)

- If the measured value exceeds the limit, or if there are scratches and/or seizure on the cylinder inner wall, hone or re-bore the inner wall.
- Oversize piston is provided. When using oversize piston, re-bore cylinder so that the clearance of the piston-to-cylinder bore satisfies the standard.

CAUTION:

When using oversize piston, use oversize pistons for all cylinders with oversize piston rings.

Oversize (O/S) : 0.2 mm (0.008 in)



Piston Skirt Diameter

INTAKE MANIFOLD

[VK45DE]

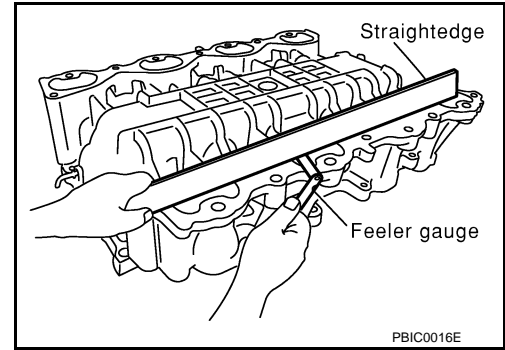
< SERVICE INFORMATION >

Surface Distortion

- Check the surface distortion of both the intake manifold (upper and lower) mating surfaces with straightedge and feeler gauge.

Limit : 0.1 mm (0.004 in)

- If it exceeds the limit, replace intake manifolds (lower and/or upper).



INSTALLATION

Note the following, and install in the reverse order of removal.

Intake Manifold (Lower)

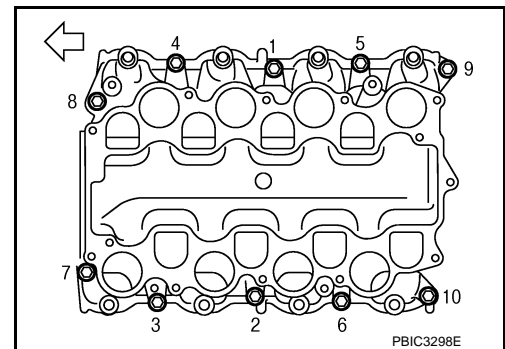
Tighten in numerical order as shown in the figure.

↩ : Engine front

- There are two types of mounting bolts. Refer to the following for locating bolts.

M8 × 90 mm (3.54 in) : 7, 8

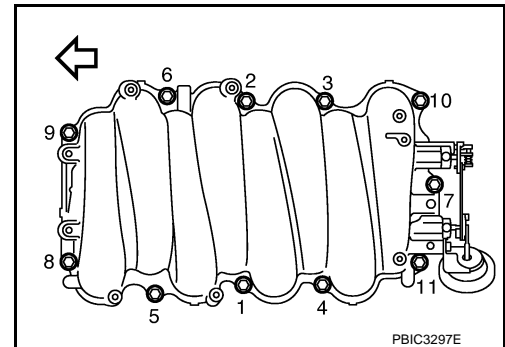
M8 × 35 mm (1.38 in) : Except the above



Intake Manifold (Upper)

Tighten in numerical order as shown in the figure.

↩ : Engine front



Electric Throttle Control Actuator

- Install gasket with its directional protrusion set up/downward.
- Tighten mounting bolts of electric throttle control actuator equally and diagonally in several steps.
- After installation perform procedure in "INSPECTION AFTER INSTALLATION".

Water Hose

Insert hose by 27 to 32 mm (1.06 to 1.26 in) from connector end.

Vacuum Hose

Refer to [EC-730, "Vacuum Hose Drawing"](#).

INSPECTION AFTER INSTALLATION

- Perform the "Throttle Valve Closed Position Learning" when harness connector of electric throttle control actuator is disconnected. Refer to [EC-706, "Throttle Valve Closed Position Learning"](#).
- Perform the "Idle Air Volume Learning" and "Throttle Valve Closed Position Learning" when electric throttle control actuator is replaced. Refer to [EC-707, "Idle Air Volume Learning"](#).

ROCKER COVER

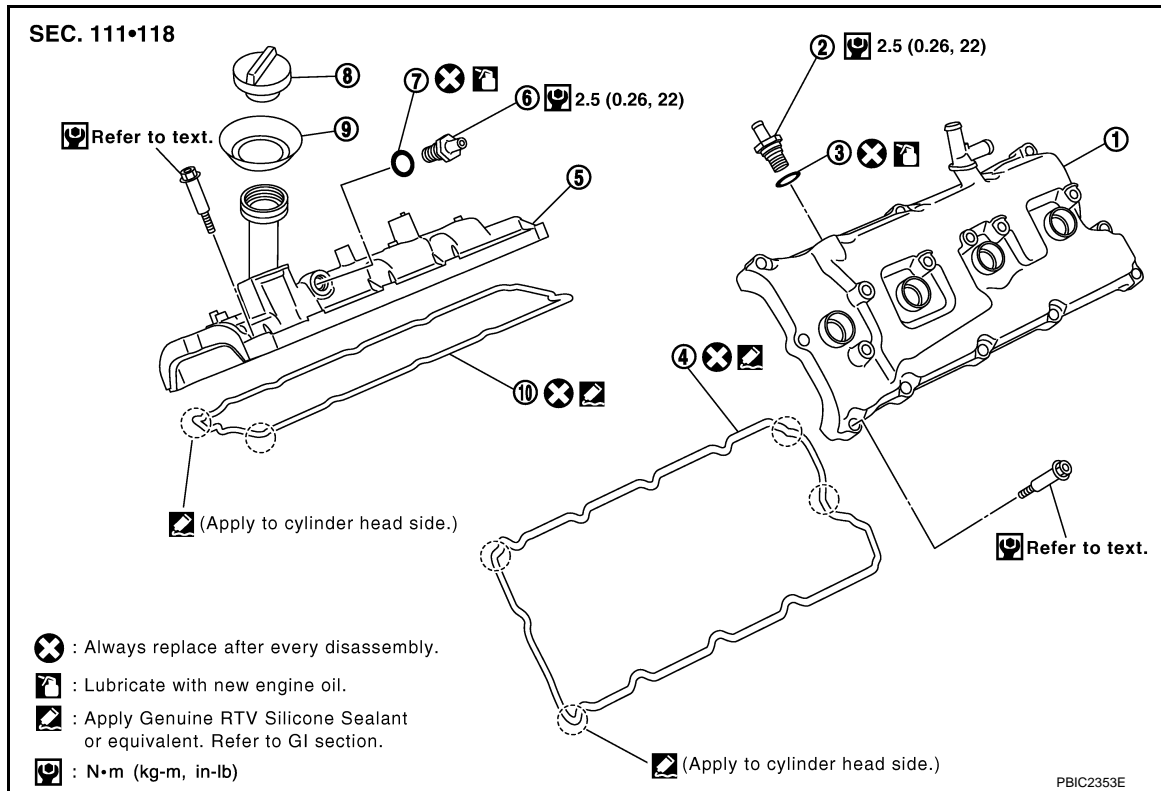
< SERVICE INFORMATION >

[VK45DE]

ROCKER COVER

Component

INFOID:000000002953977



- | | | |
|--------------------------------------|------------------------------|----------------|
| 1. Rocker cover (left bank) | 2. PCV valve | 3. O-ring |
| 4. Rocker cover gasket (left bank) | 5. Rocker cover (right bank) | 6. PCV valve |
| 7. O-ring | 8. Oil filler cap | 9. Oil catcher |
| 10. Rocker cover gasket (right bank) | | |

Removal and Installation

INFOID:000000002953978

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-171](#).
2. Remove engine cover with power tool. Refer to [EM-177](#).
3. Refer to the following for incidental works related to left bank.
 - a. Remove air duct (inlet), air cleaner case and air duct and resonator assembly. Refer to [EM-175](#).
 - b. Move harness on upper rocker cover and its peripheral aside.
 - c. Remove harness bracket from camshaft bracket (No. 6). Refer to [EM-214](#).
 - d. Remove ignition coil. Refer to [EM-189](#).
 - e. Remove PCV hose from PCV valve.
4. Refer to the following for incidental works related to right bank.
 - a. Move harness on upper rocker cover and its peripheral aside.
 - b. Remove ignition coil. Refer to [EM-189](#).
 - c. Remove PCV hose from PCV valve.
5. Remove PCV valves and O-rings from rocker covers (right bank and left bank), if necessary.
6. Remove oil filler cap and oil catcher from rocker cover (right bank), if necessary.
7. Remove rocker cover (right bank) as follows:
 - a. Remove battery cover. Refer to [EM-171](#).

TIMING CHAIN

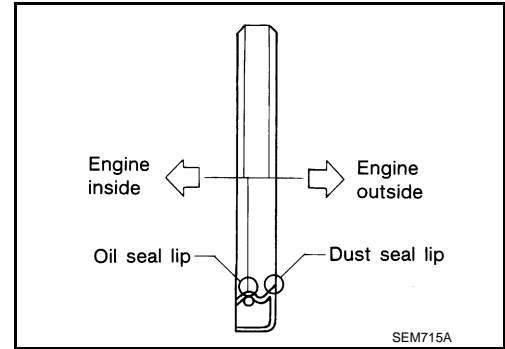
< SERVICE INFORMATION >

[VK45DE]

- Install it so that each seal lip is oriented as shown in the figure.

CAUTION:

Be careful not to scratch or make burrs on circumference of oil seal.



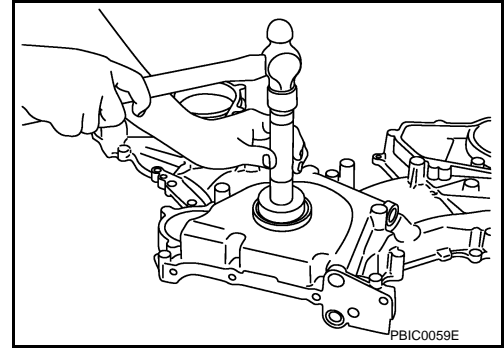
- Using front oil seal drift (commercial service tool), press fit until the height of front oil seal is level with the mounting surface.

Front oil seal drift

Outer diameter : 56 mm (2.20 in)

Inner diameter : 49 mm (1.93 in)

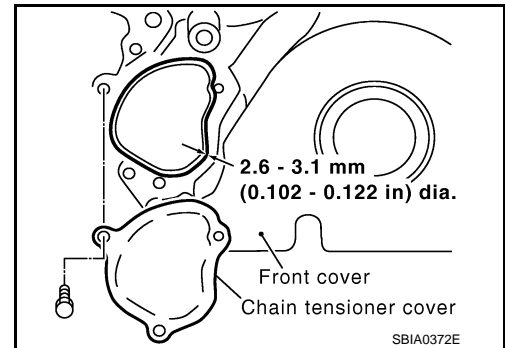
- Check the garter spring is in position and seal lips not inverted.



9. Install chain tensioner cover to front cover.

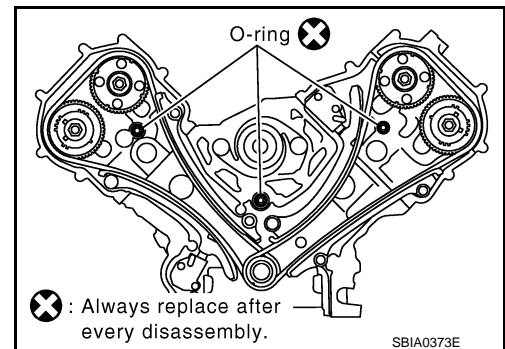
- Apply a continuous bead of liquid gasket with tube presser (commercial service tool) to front cover as shown in the figure.

Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-44](#).



10. Install front cover as follows:

- a. Install new O-rings onto cylinder heads (right bank and left bank) and cylinder block.

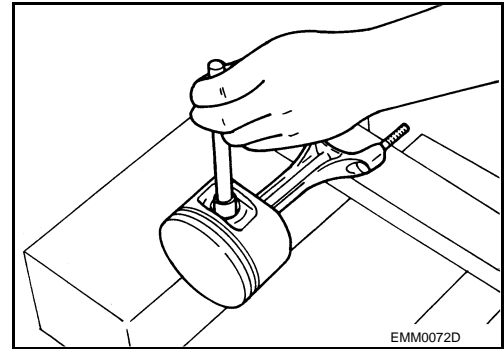


CYLINDER BLOCK

[VK45DE]

< SERVICE INFORMATION >

- c. Push out piston pin with stick of outer diameter approximately 20 mm (0.79 in).



14. Remove rear oil seal retainer from cylinder block.
 - Insert screwdriver or similar tool between rear end of crankshaft counter weight and rear oil seal retainer, and separate liquid gasket to remove.

CAUTION:

Be careful not to damage the mating surfaces.

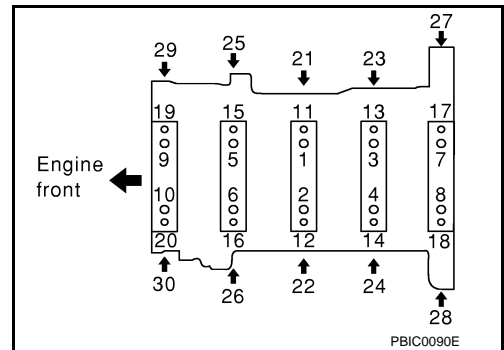
15. Using screwdriver or similar tool, and lever off rear oil seal from rear oil seal retainer.
16. Remove main bearing cap as follows:
 - Before loosening main bearing cap bolts, measure the crankshaft end play. Refer to [EM-265, "Inspection After Disassembly"](#).
 - Loosen main bearing cap bolts in several different steps.

- a. Remove cover attached to the rear left side of cylinder block (next to the starter motor housing).

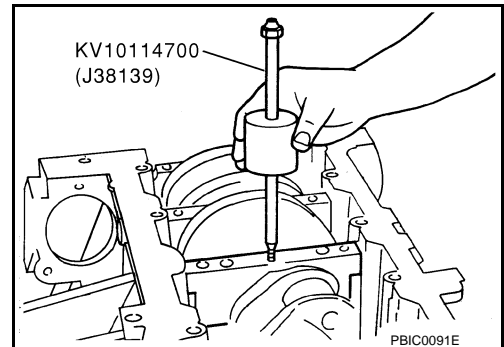
NOTE:

Bolts (No. 27 shown in the figure) are installed on the inside of cover.

- b. Loosen side bolts (M10) starting from 30 to 21 to remove.
- c. Loosen main bearing cap sub bolts (M9) starting from 20 to 11 to remove.
- d. Loosen main bearing cap bolts (M12) starting from 10 to 1 to remove.



- e. Using main bearing cap remover (SST), remove main bearing cap.



17. Remove crankshaft.
18. Remove main bearings and thrust bearings from cylinder block and main bearing caps.

CAUTION:

Identify installation positions, and store them without mixing them up.