

SECTION **EM**

ENGINE MECHANICAL

CONTENTS

QR25DE

PRECAUTIONS	5
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	5
Precautions for Draining Coolant	5
Precautions for Disconnecting Fuel Piping	5
Precautions for Removal and Disassembly	5
Precautions for Inspection, Repair and Replacement	5
Precautions for Assembly and Installation	5
Parts Requiring Angular Tightening	6
Precautions for Liquid Gasket	6
REMOVAL OF LIQUID GASKET SEALING	6
LIQUID GASKET APPLICATION PROCEDURE.....	6
PREPARATION	8
Special Service Tools	8
Commercial Service Tools	11
NOISE, VIBRATION, AND HARSHNESS (NVH)	
TROUBLESHOOTING	13
NVH Troubleshooting —Engine Noise	13
Use the Chart Below to Help You Find the Cause of the Symptom.	14
DRIVE BELTS	15
Checking Drive Belts	15
Tension Adjustment	15
Removal and Installation	15
REMOVAL	15
INSTALLATION	16
Removal and Installation of Drive Belt Auto-tensioner	16
REMOVAL	16
INSTALLATION	16
AIR CLEANER AND AIR DUCT	17
Removal and Installation	17
REMOVAL	17
INSTALLATION	17
CHANGING THE AIR CLEANER ELEMENT	18

INTAKE MANIFOLD	19
Removal and Installation	19
REMOVAL	19
INSPECTION AFTER REMOVAL	21
INSTALLATION	21
INSPECTION AFTER INSTALLATION	23
EXHAUST MANIFOLD AND THREE WAY CATALYST	24
Removal and Installation	24
REMOVAL	24
INSPECTION AFTER REMOVAL	25
INSTALLATION	25
OIL PAN AND OIL STRAINER	26
Removal and Installation	26
REMOVAL	26
INSPECTION AFTER REMOVAL	27
INSTALLATION	27
INSPECTION AFTER INSTALLATION	28
IGNITION COIL	29
Removal and Installation	29
REMOVAL	29
INSTALLATION	29
SPARK PLUG	30
Removal and Installation	30
REMOVAL	30
INSPECTION AFTER REMOVAL	30
INSTALLATION	31
FUEL INJECTOR AND FUEL TUBE	32
Removal and Installation	32
REMOVAL	32
INSTALLATION	33
INSPECTION AFTER INSTALLATION	34
ROCKER COVER	35
Removal and Installation	35
REMOVAL	35
INSTALLATION	35
CAMSHAFT	37
Removal and Installation	37
REMOVAL	37
INSPECTION AFTER REMOVAL	39

INSTALLATION	42	HOW TO SELECT A MAIN BEARING	86
INSPECTION AFTER INSTALLATION	44	Inspection After Disassembly	89
INSPECTION OF CAMSHAFT SPROCKET (INT) OIL GROOVE	44	CRANKSHAFT SIDE CLEARANCE	89
Valve Clearance	45	CONNECTING ROD SIDE CLEARANCE	90
INSPECTION	45	PISTON AND PISTON PIN CLEARANCE	90
ADJUSTMENT	46	PISTON RING SIDE CLEARANCE	91
TIMING CHAIN	48	PISTON RING END GAP	91
Removal and Installation	48	CONNECTING ROD BEND AND TORSION	91
REMOVAL	49	CONNECTING ROD BEARING (BIG END)	92
INSPECTION AFTER REMOVAL	52	CONNECTING ROD BUSHING OIL CLEAR- ANCE (SMALL END)	92
INSTALLATION	52	CYLINDER BLOCK DISTORTION	93
OIL SEAL	56	INNER DIAMETER OF MAIN BEARING HOUS- ING	93
Removal and installation of Valve Oil Seal	56	PISTON TO CYLINDER BORE CLEARANCE	94
REMOVAL	56	OUTER DIAMETER OF CRANKSHAFT JOUR- NAL	95
INSTALLATION	56	OUTER DIAMETER OF CRANKSHAFT PIN	95
Removal and Installation of Front Oil Seal	57	OUT-OF-ROUND AND TAPER OF CRANK- SHAFT	95
REMOVAL	57	CRANKSHAFT RUNOUT	95
INSTALLATION	57	OIL CLEARANCE OF CONNECTING ROD BEARING	96
Removal and Installation of Rear Oil Seal	58	OIL CLEARANCE OF MAIN BEARING	96
REMOVAL	58	CRUSH HEIGHT OF MAIN BEARING	97
INSTALLATION	58	OUTER DIAMETER OF LOWER CYLINDER BLOCK BOLT	97
CYLINDER HEAD	59	OUTER DIAMETER OF CONNECTING ROD BOLT	97
On-Vehicle Service	59	MOVEMENT AMOUNT OF FLYWHEEL (M/T MODEL)	97
CHECKING COMPRESSION PRESSURE	59	SERVICE DATA AND SPECIFICATIONS (SDS)	99
Removal and Installation	61	Standard and Limit	99
REMOVAL	62	GENERAL SPECIFICATIONS	99
INSPECTION AFTER REMOVAL	62	DRIVE BELTS	99
INSTALLATION	63	INTAKE MANIFOLD AND EXHAUST MANI- FOLD	99
Disassembly and Assembly	64	SPARK PLUG	99
DISASSEMBLY	64	CYLINDER HEAD	100
ASSEMBLY	65	VALVE	100
Inspection After Disassembly	66	CAMSHAFT AND CAMSHAFT BEARING	103
CYLINDER HEAD DISTORTION	66	CYLINDER BLOCK	104
VALVE DIMENSIONS	66	PISTON, PISTON RING, AND PISTON PIN	105
VALVE GUIDE CLEARANCE	66	CONNECTING ROD	105
VALVE GUIDE REPLACEMENT	66	CRANKSHAFT	106
VALVE SEAT CONTACT	68	MAIN BEARING	107
VALVE SEAT REPLACEMENT	68	CONNECTING ROD BEARING	108
VALVE SPRING SQUARENESS	69		
VALVE SPRING DIMENSIONS AND VALVE SPRING PRESSURE LOAD	69		
ENGINE ASSEMBLY	71		
Removal and Installation	71		
REMOVAL	72		
INSTALLATION	73		
INSPECTION AFTER INSTALLATION	73		
CYLINDER BLOCK	75		
Disassembly and Assembly	75		
DISASSEMBLY	76		
ASSEMBLY	78		
How to Select Piston and Bearing	83		
DESCRIPTION	83		
HOW TO SELECT A PISTON	83		
HOW TO SELECT A CONNECTING ROD BEAR- ING	84		

VQ35DE

PRECAUTIONS	109
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TEN- SIONER"	109
Precautions for Drain Coolant	109
Precautions for Disconnecting Fuel Piping	109
Precautions for Removal and Disassembly	109
Precautions for Inspection, Repair and Replace- ment	109

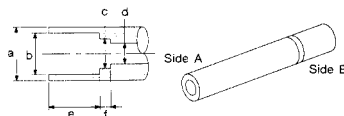
Precautions for Assembly and Installation	109	FUEL INJECTOR AND FUEL TUBE	147	
Parts Requiring Angular Tightening	110	Removal and Installation	147	A
Precautions for Liquid Gasket	110	REMOVAL	147	
REMOVAL OF LIQUID GASKET SEALING	110	INSTALLATION	148	
LIQUID GASKET APPLICATION PROCEDURE	110	INSPECTION AFTER INSTALLATION	149	EM
PREPARATION	112	ROCKER COVER	150	
Special Service Tools	112	Removal and Installation	150	
Commercial Service Tools	115	REMOVAL	150	C
NOISE, VIBRATION, AND HARSHNESS (NVH)		INSTALLATION	151	
TROUBLESHOOTING	117	FRONT TIMING CHAIN CASE	152	
NVH Troubleshooting — Engine Noise	117	Removal and Installation	152	
Use the Chart Below to Help You Find the Cause		REMOVAL	153	D
of the Symptom.	118	INSTALLATION	157	
DRIVE BELTS	119	TIMING CHAIN	161	
Checking Drive Belts	119	Components	161	E
AIR CLEANER AND AIR DUCT	120	POSITION FOR APPLYING LIQUID GASKET	163	
Removal and Installation	120	Removal	164	
REMOVAL	120	Inspection	171	F
INSTALLATION	120	Installation	172	
CHANGING AIR CLEANER ELEMENT	120	CAMSHAFT	182	
INTAKE MANIFOLD COLLECTOR	122	Removal and Installation	182	
Removal and Installation	122	REMOVAL	183	G
REMOVAL	123	INSTALLATION	184	
INSTALLATION	124	INSPECTION AFTER REMOVAL	187	
EGR VOLUME CONTROL VALVE	126	Inspection after Installation	190	H
Removal and Installation	126	INSPECTION OF CAMSHAFT SPROCKET		
REMOVAL	127	(INT) OIL GROOVE	190	
INSTALLATION	127	Valve Clearance	191	I
INTAKE MANIFOLD	129	CHECKING	191	
Removal and Installation	129	VALVE ADJUSTING	194	
REMOVAL	130	OIL SEAL	195	J
INSPECTION AFTER REMOVAL	131	Removal and Installation of Valve Oil Seal	195	
INSTALLATION	131	REMOVAL	195	
INSPECTION AFTER INSTALLATION	132	INSTALLATION	195	
EXHAUST MANIFOLD AND THREE WAY CATALYST	134	Removal and Installation of Front Oil Seal	195	K
Removal and Installation	134	REMOVAL	195	
REMOVAL	135	INSTALLATION	197	
INSPECTION AFTER REMOVAL	136	Removal and Installation of Rear Oil Seal	198	L
INSTALLATION	136	REMOVAL	198	
OIL PAN AND OIL STRAINER	138	INSTALLATION	198	
Removal and Installation	138	CYLINDER HEAD	200	M
REMOVAL	138	On-Vehicle Service	200	
INSPECTION AFTER REMOVAL	141	CHECKING COMPRESSION PRESSURE	200	
INSTALLATION	141	Removal and Installation	201	
INSPECTION AFTER INSTALLATION	143	REMOVAL	201	
IGNITION COIL	144	INSTALLATION	204	
Removal and Installation	144	Disassembly and Assembly	212	
REMOVAL	144	DISASSEMBLY	213	
INSTALLATION	144	ASSEMBLY	213	
SPARK PLUG (PLATINUM-TIPPED TYPE)	145	Inspection After Disassembly	215	
Removal and Installation	145	CYLINDER HEAD DISTORTION	215	
REMOVAL	145	VALVE GUIDE CLEARANCE	215	
INSPECTION AFTER REMOVAL	146	VALVE GUIDE REPLACEMENT	215	
INSTALLATION	146	VALVE SEAT CONTACT	217	
		VALVE SEAT REPLACEMENT	217	
		VALVE SPRING SQUARENESS	218	
		VALVE SPRING DIMENSIONS AND VALVE		
		SPRING PRESSURE LOAD	218	

ENGINE ASSEMBLY	219	ING	237
Removal and Installation	219	PISTON-TO-CYLINDER BORE CLEARANCE	237
REMOVAL	220	CRANKSHAFT	239
INSTALLATION	222	BEARING CLEARANCE	239
INSPECTION AFTER INSTALLATION	222	DRIVE PLATE RUNOUT (A/T)	243
CYLINDER BLOCK	224	FLYWHEEL RUNOUT (M/T)	243
Disassembly and Assembly	224	OIL JET	244
DISASSEMBLY	225	OIL JET RELIEF VALVE	244
ASSEMBLY	227	SERVICE DATA AND SPECIFICATIONS (SDS) ...	245
Inspection	234	Standard and Limit	245
PISTON AND PISTON PIN CLEARANCE	234	GENERAL SPECIFICATIONS	245
PISTON RING SIDE CLEARANCE	234	DRIVE BELT	246
PISTON RING END GAP	235	INTAKE MANIFOLD AND EXHAUST MANI- FOLD	246
CONNECTING ROD BEND AND TORSION	235	SPARK PLUG	246
CONNECTING ROD BEARING HOUSING DIAMETER (BIG END)	236	CYLINDER HEAD	247
CONNECTING ROD BUSHING OIL CLEAR- ANCE (SMALL END)	236	VALVE	247
CYLINDER BLOCK DISTORTION	237	CAMSHAFT AND CAMSHAFT BEARING	251
INNER DIAMETER OF MAIN BEARING HOUS- ING	237	CYLINDER BLOCK	251
		PISTON, PISTON RING AND PISTON PIN	252
		CONNECTING ROD	253
		CRANKSHAFT	254
		AVAILABLE MAIN BEARING	255
		CONNECTING ROD BEARING	255
		MISCELLANEOUS COMPONENTS	256
		BEARING CLEARANCE	256

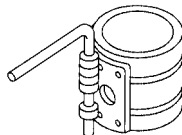
PREPARATION

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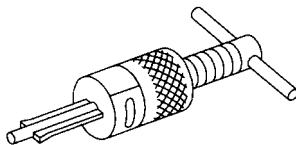
Tool number (Kent-Moore No.) Tool name	Description	
KV10115600 (J-38958) Valve oil seal drift	Installing valve oil seal Use side A. a: 20 (0.79) dia. d: 8 (0.31) dia. b: 13 (0.51) dia. e: 10.7 (0.421) dia. c: 10.3 (0.406) dia. f: 5 (0.20) dia. Unit: mm (in)	A EM C
EM03470000 (J-8037) Piston ring compressor	Installing piston assembly into cylinder bore	D E
ST16610001 (J-23907) Pilot bushing puller	Removing crankshaft pilot bushing	F G H
WS39930000 (—) Tube presser	Pressing the tube of liquid gasket	I J
16441 6N210 (J-45488) Quick connector release	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)	K L
KV10114400 (J-38365) Heated oxygen sensor wrench	Loosening or tightening rear heated oxygen sensor a: 22 mm (0.87 in)	M
KV10117100 (J-36471-A) Heated oxygen sensor wrench	Loosening or tightening heated oxygen sensor For 22 mm (0.87 in) hexagon nut	



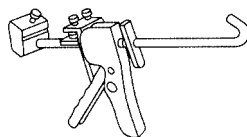
S-NT603



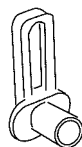
S-NT044



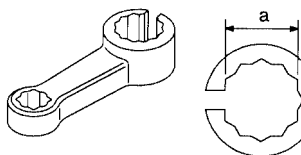
S-NT045



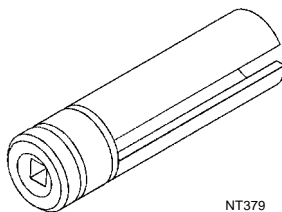
S-NT052



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NT636

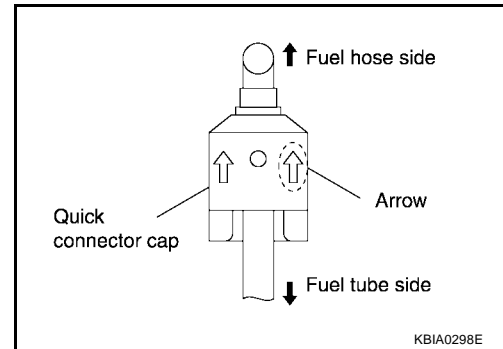


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INTAKE MANIFOLD

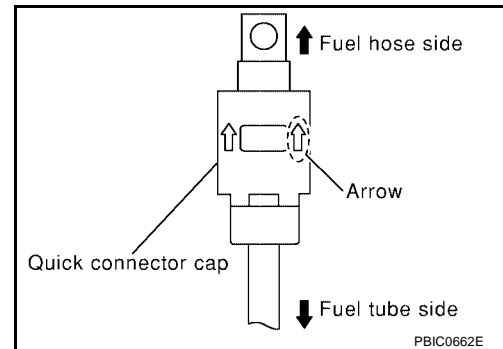
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5. Install quick connector cap on quick connector joint.
 - Direct arrow mark on quick connector cap to upper side (fuel hose side).
6. Install fuel hose to hose clamp.



CONNECTING QUICK CONNECTOR ON THE FUEL HOSE (VEHICLE PIPING SIDE)

1. Make sure no foreign substances are deposited in and around the fuel tube and quick connector, and there is no damage to them.
2. Align center to insert quick connector straight into fuel tube.
 - Insert fuel tube until a click is heard.
 - Install quick connector cap on quick connector joint. Direct arrow mark on quick connector cap upper side.
 - Install fuel hose to hose clamp.



INSPECTION AFTER INSTALLATION

Make sure there is no fuel leakage at connections as follows:

1. Apply fuel pressure to fuel lines by turning ignition switch ON (with engine stopped). Then check for fuel leaks at connections.
2. Start the engine and rev it up and check for fuel leaks at connections.

NOTE:

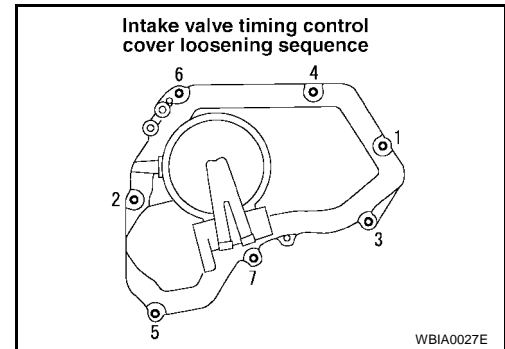
Use mirrors for checking on connections out of the direct line of sight.

CAUTION:

Do not touch engine immediately after stopping as engine is extremely hot.

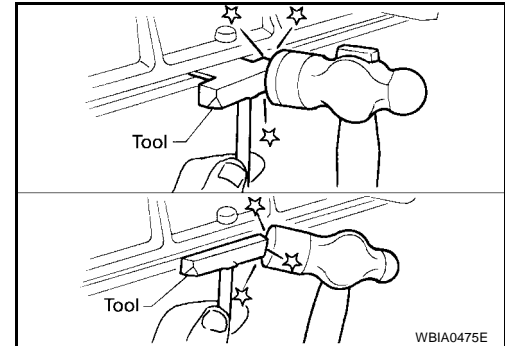
- Perform procedures for "Throttle Valve Closed Position Learning" after finishing repairs. Refer to [EC-93, "Throttle Valve Closed Position Learning"](#).
- If electric throttle control actuator is replaced, perform procedures for "Idle Air Volume Learning" after finishing repairs. Refer to [EC-93, "Idle Air Volume Learning"](#).

7. Loosen the bolts in the order as shown.

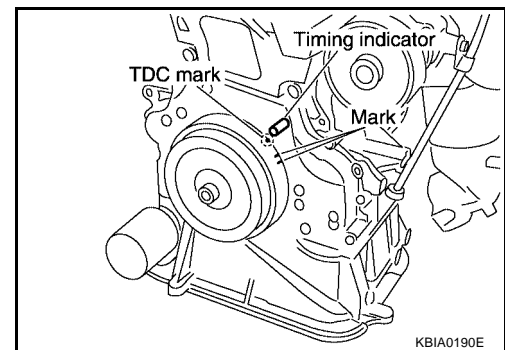


- Remove the IVT control cover by cutting the sealant using Tool.

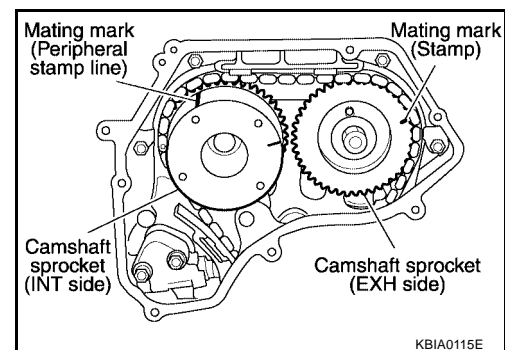
Tool number : KV10111100 (J-37228)



8. Set the No.1 cylinder at TDC on its compression stroke with the following procedure:
- Open the splash cover on RH under cover.
 - Rotate crankshaft pulley clockwise, and align mating marks for TDC with timing indicator on front cover, as shown.



- At the same time, make sure that the mating marks on camshaft sprockets are lined up with the yellow links in the timing chain, as shown.
 - If not, rotate crankshaft pulley one more turn to line up the mating marks to the yellow links, as shown.



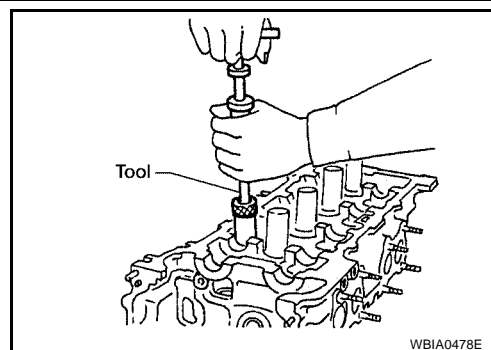
9. Pull the timing chain guide out between the camshaft sprockets through front cover.

Tool number : KV10107902 (J-38959)

5. When valve seat must be replaced, refer to [EM-68, "VALVE SEAT REPLACEMENT"](#).
6. When valve guide must be replaced, refer to [EM-66, "VALVE GUIDE REPLACEMENT"](#).
7. Remove spark plug using suitable tool.
8. Remove spark plug tubes, if necessary using suitable tool.

CAUTION:

- Be careful not to damage cylinder head.
- Do not remove spark plug tube if not necessary. Once removed, the spark plug tube cannot be reused because of deformation.

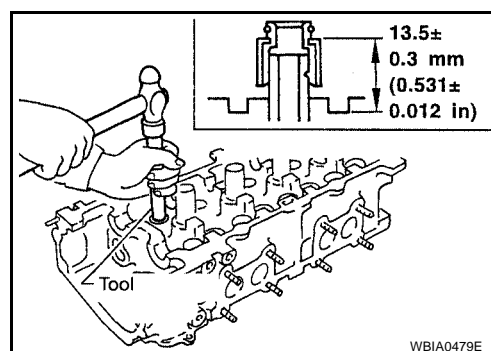


ASSEMBLY

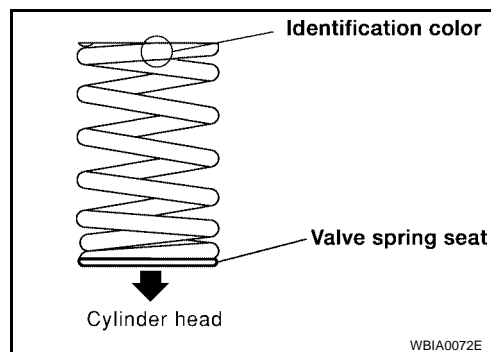
1. Install valve guide. Refer to [EM-66, "VALVE GUIDE REPLACEMENT"](#).
2. Install valve seat. Refer to [EM-68, "VALVE SEAT REPLACEMENT"](#).
3. Install new valve oil seal using Tool.

Tool number : KV10115600 (J-38958)

4. Install valve.
 - Install larger diameter to intake side.



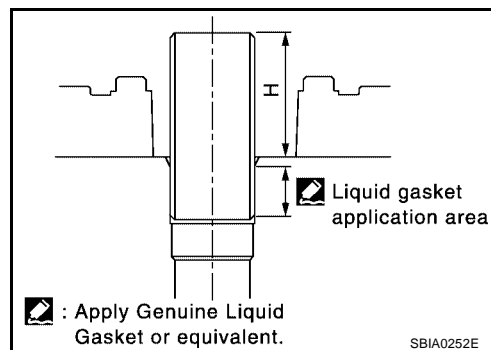
5. Install valve spring.
 - Install smaller pitch (valve spring seat side) to cylinder head side.
 - Confirm the identification color of the valve spring:
Intake: blue
Exhaust: yellow
6. Install valve spring retainer.
7. Install valve collet using Tool.
 - Compress valve spring with valve spring compressor. Install valve collet with magnet hand.
 - Tap stem edge lightly with plastic hammer after installation to check its installed condition.
8. Install valve lifter.
9. Install spark plug tube.
 - a. Remove old liquid gasket from cylinder head side mounting hole.
 - b. Apply liquid gasket all around on spark plug tube with a 12 mm (0.47 in) width from edge of spark plug tube on the press fit side.
 - Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to [MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).
 - c. Press fit spark plug tube so that height is to "H" as shown.



Press fit height "H" standard value : 38.55 - 38.65 mm (1.518 - 1.522 in)

CAUTION:

- When press fitting be careful not to deform spark plug tube.
- After press fitting, wipe off any protruding liquid gasket on top surface of cylinder head.



CAUTION:

Apply new engine oil to parts marked in illustration before installation.

DISASSEMBLY

1. Remove the engine and transaxle as an assembly from the vehicle, and separate the transaxle from the engine. Refer to [EM-71, "Removal and Installation"](#).
2. Mount the engine on a suitable engine stand.
3. Drain any remaining engine oil and coolant from the engine.
4. Remove the following components and associated parts.
 - Exhaust manifold and three way catalyst assembly. Refer to [EM-24, "Removal and Installation"](#).
 - Intake manifold collector. Refer to [EM-19, "Removal and Installation"](#).
 - Intake manifold and fuel tube assembly. Refer to [EM-19, "Removal and Installation"](#).
 - Ignition coils. Refer to [EM-29, "Removal and Installation"](#).
 - Rocker cover. Refer to [EM-35, "Removal and Installation"](#).
 - Front cover, timing chain, and balancer unit. Refer to [EM-48, "Removal and Installation"](#).
 - Cylinder head. Refer to [EM-61, "Removal and Installation"](#).
5. Remove the knock sensor.

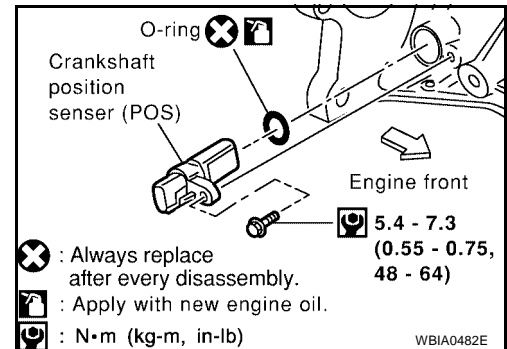
CAUTION:

Carefully handle the sensor and do not drop the sensor.

6. Remove crankshaft position sensor (POS).

CAUTION:

- Avoid impacts such as a dropping.
- Do not disassemble.
- Keep it away from metal particles.
- Do not place sensor close to magnetic materials.



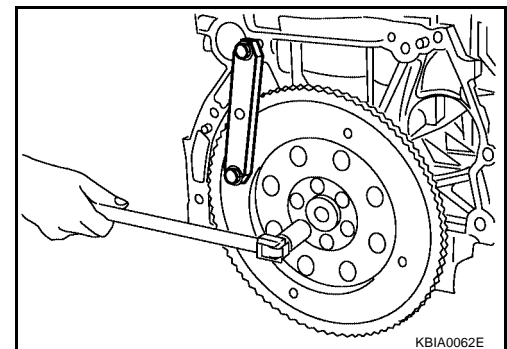
7. Remove the flywheel (M/T models) or drive plate (A/T models). Hold the crankshaft with a stopper plate and use a suitable tool to remove the bolts.

CAUTION:

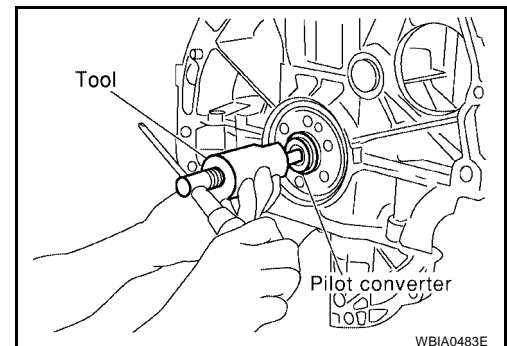
- Be careful not to damage the flywheel contact surface for the clutch disc.

NOTE:

- The flywheel two-block construction allows movement in response to transmission side pressure, or when twisted in its rotational direction, therefore, some amount of noise is normal.



8. Remove pilot converter using Tool (A/T models).



4. Hone cylinders to obtain specified piston-to-bore clearance.
5. Measure finished cylinder bore for out-of-round and taper.
- **Measurement should be done after cylinder bore cools down.**

OUTER DIAMETER OF CRANKSHAFT JOURNAL

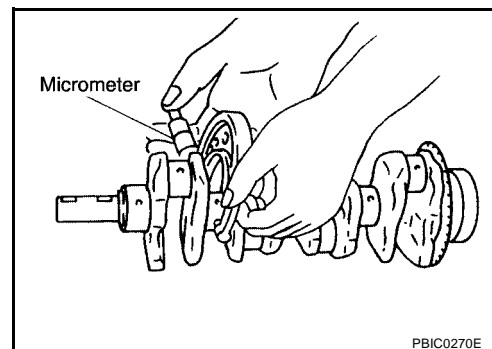
- Measure outer diameter of crankshaft journals.

Standard : 54.955 - 54.979 mm (2.1636 - 2.1645 in)

OUTER DIAMETER OF CRANKSHAFT PIN

- Measure outer diameter of crankshaft pin.

Standard : 44.956 - 44.974 mm (1.7699 - 1.7706 in)



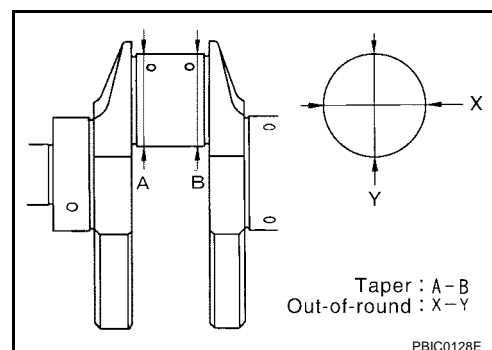
OUT-OF-ROUND AND TAPER OF CRANKSHAFT

- Measure the dimensions at four different points as shown on each journal and pin using a micrometer.
- Out-of-round is indicated by the difference in dimensions between "X" and "Y" at "A" and "B".
- Taper is indicated by the difference in dimension between "A" and "B" at "X" and "Y".

Limit

Out-of-round (X - Y) : 0.005 mm (0.0002 in)

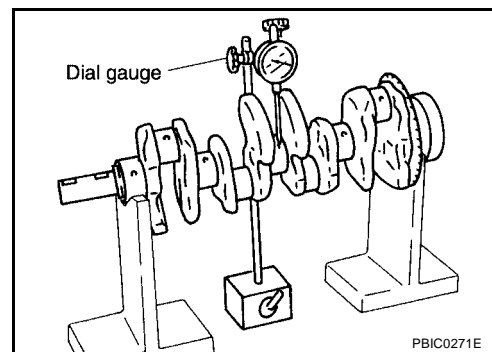
Taper (A - B) : 0.005 mm (0.0002 in)



CRANKSHAFT RUNOUT

- Place a V-block on a precise flat table to support the journals on both ends of the crankshaft.
- Place a dial gauge straight up on the No. 3 journal.
- While rotating the crankshaft, read the movement of the pointer on the dial gauge, the total indicator reading.

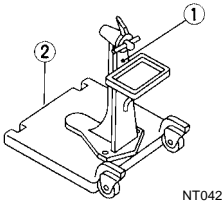
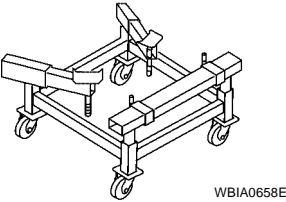
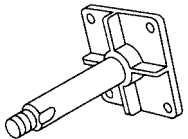
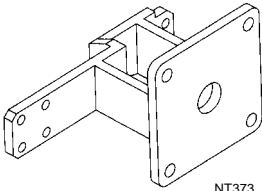
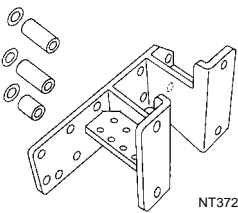
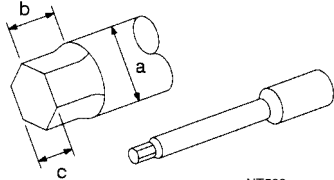
Limit : Less than 0.05 mm (0.002 in)



PREPARATION

Special Service Tools

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

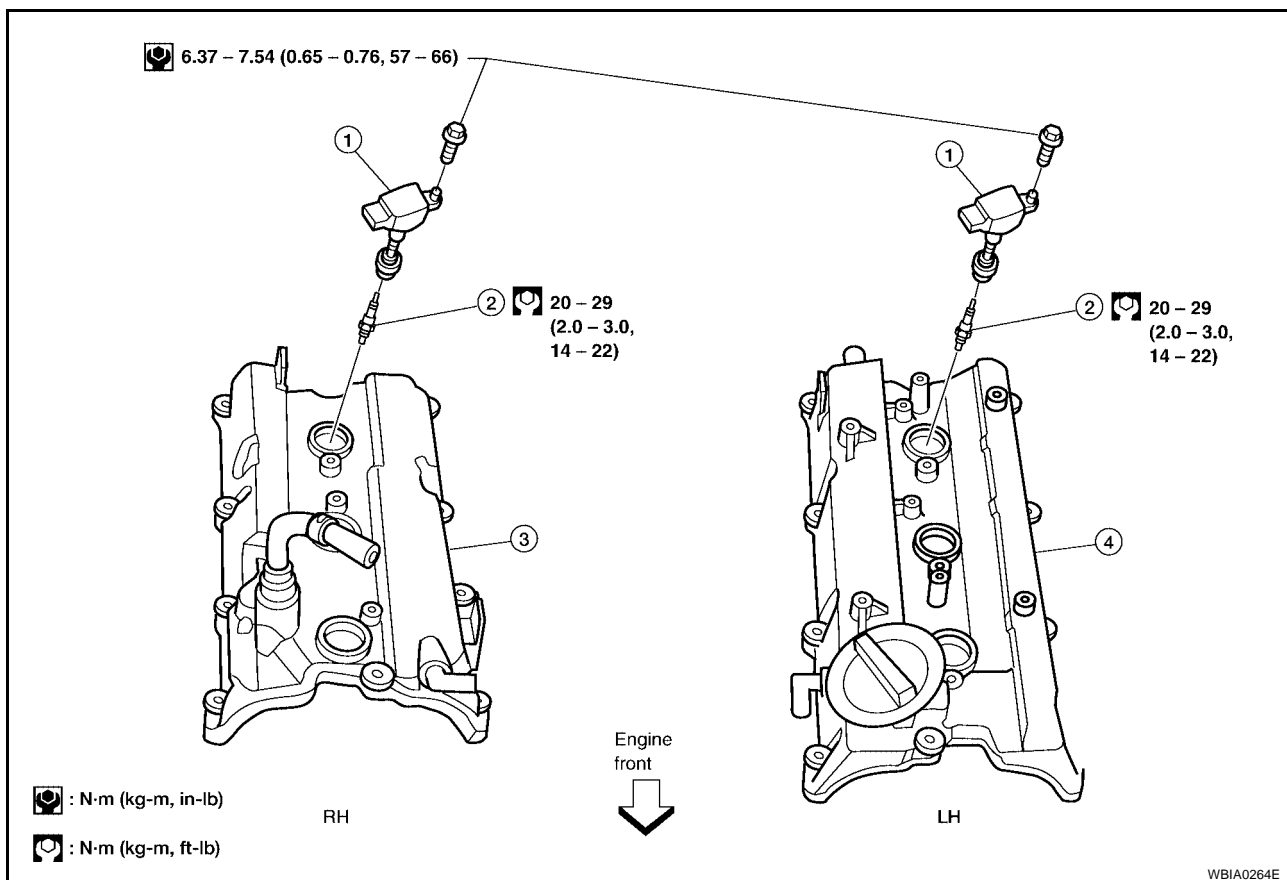
Tool number (Kent-Moore No.) Tool name	Description
ST0501S000 (—) Engine stand assembly 1 ST05011000 (—) Engine stand 2 ST05012000 (—) Base	 Disassembling and assembling
KV101J0010 (J-47242) Engine support table	 Engine and transmission assembly removal
KV10106500 (—) Engine stand shaft	
KV10117000 (J-41262) Engine sub-attachment	 <p>KV10117000 has been replaced with KV10117001 (KV10117000 is no longer in production, but it is usable).</p>
KV10117001 (—) Engine sub-attachment	 Installing on the cylinder block
ST10120000 (J-24239-01) Cylinder head bolt wrench	 <p>Loosening and tightening cylinder head bolt a: 13 (0.51) dia. b: 12 (0.47) c: 10 (0.39) Unit: mm (in)</p>

SPARK PLUG (PLATINUM-TIPPED TYPE)

PFP:22401

Removal and Installation

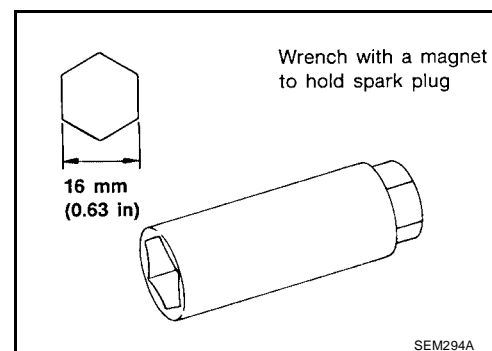
EBS00J5X



1. Ignition coil
2. Spark plug
3. Rocker cover (right bank)
4. Rocker cover (left bank)

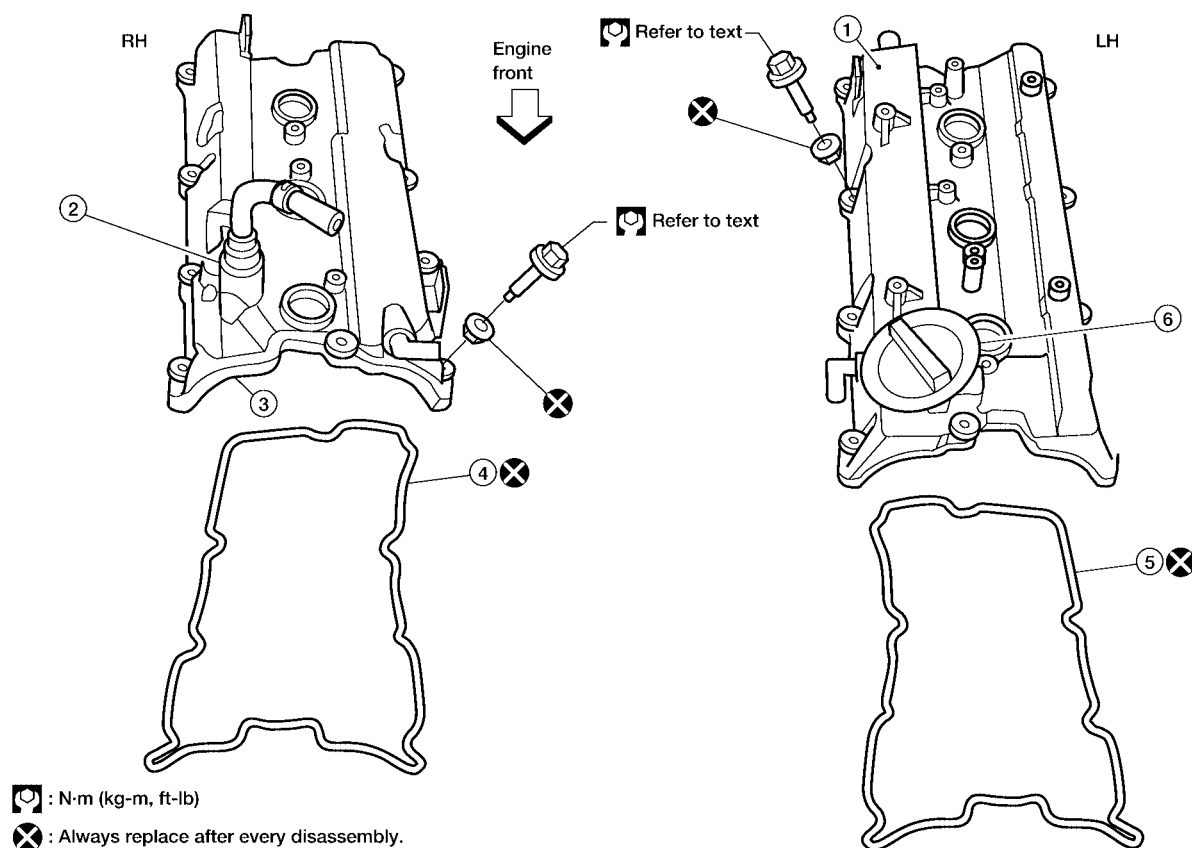
REMOVAL

1. Remove the engine cover, with power tool.
2. Drain engine coolant. Refer to [MA-22, "DRAINING ENGINE COOLANT"](#).
3. Disconnect the mass air flow sensor electrical connector and remove the air cleaner assembly and air intake tubes. Refer to [EM-120, "Removal and Installation"](#).
4. Remove the windshield wiper arms and motor assembly and the front cowl panel. Refer to [EI-19, "Removal and Installation"](#).
5. Remove the intake manifold collector, gasket, and throttle body. Refer to [EM-129, "Removal and Installation"](#).
6. Remove the six ignition coils.
7. Remove the six spark plugs with a suitable tool.
 - If replacing the spark plugs use the correct spark plug for maximum performance. Refer to [MA-26, "Changing Spark Plugs \(Platinum - Tipped Type\)"](#).



ROCKER COVER

Removal and Installation



WBIA0222E

- | | | |
|-------------------------------------|-----------------------------|------------------------------|
| 1. Rocker cover (left bank) | 2. PCV valve | 3. Rocker cover (right bank) |
| 4. Rocker cover gasket (right bank) | 5. Rocker cover (left bank) | 6. Oil filler cap |

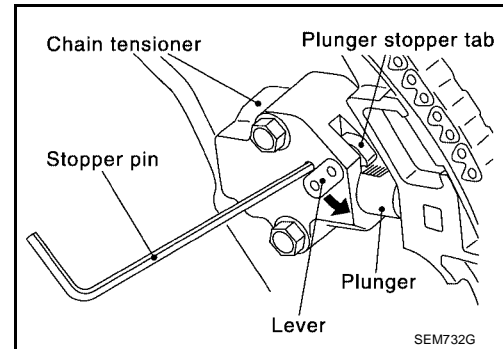
REMOVAL

1. Remove the engine cover, using power tool.
2. Disconnect the mass air flow sensor electrical connector and remove the air cleaner assembly and air intake tubes. Refer to [EM-120, "Removal and Installation"](#).
3. Remove the windshield wiper arms and motor assembly and the front cowl panel. Refer to [WW-27, "Removal and Installation of Wiper Motor and Linkage"](#).
4. Remove the intake manifold collector using power tool. Remove gasket and the electric throttle control actuator. Refer to [EM-129, "Removal and Installation"](#).
5. Remove the six ignition coils. Refer to [EM-144, "Removal and Installation"](#).
6. Remove the two intake valve timing control solenoid valves and gaskets. Refer to [EC-1065, "INTAKE VALVE TIMING CONTROL SOLENOID VALVE"](#).

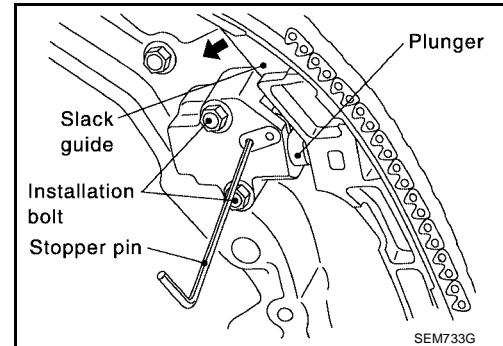
TIMING CHAIN

[VQ35DE]

- a. Pull lever down and release plunger stopper tab. Plunger stopper tab can be pushed up to release (coaxial structure with lever).



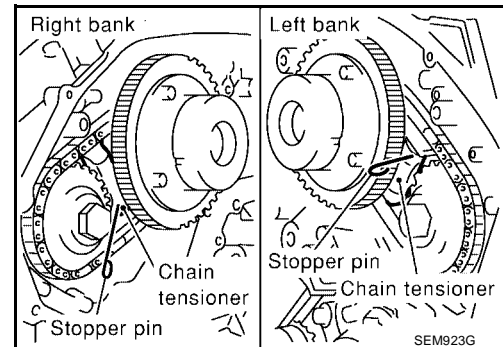
- b. Insert stopper pin into tensioner body hole to hold lever, and keep the tab released. An Allen wrench [2.5 mm (0.098 in)] is used for a stopper pin as an example.
- c. Insert plunger into tensioner body by pressing the slack side chain guide.
- d. Keep the slack side chain guide pressed and hold it by pushing the stopper pin through the lever hole and body hole.
- e. Remove the bolts and remove the timing chain tensioner.
41. Remove primary timing chain and crankshaft sprocket.



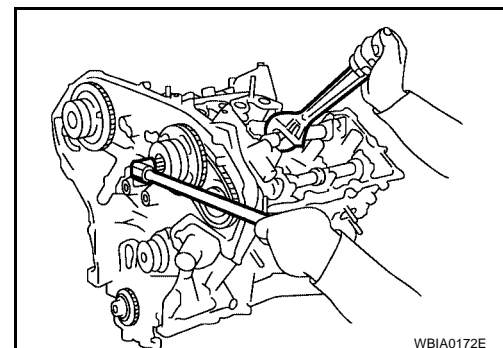
CAUTION:

After removing timing chain, do not turn the crankshaft and camshaft separately, or the valves will strike the pistons.

42. Attach a suitable stopper pin to the right and left camshaft chain tensioners (for secondary timing chains).



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

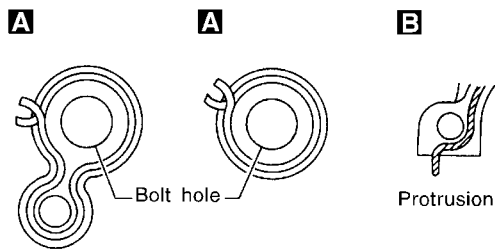
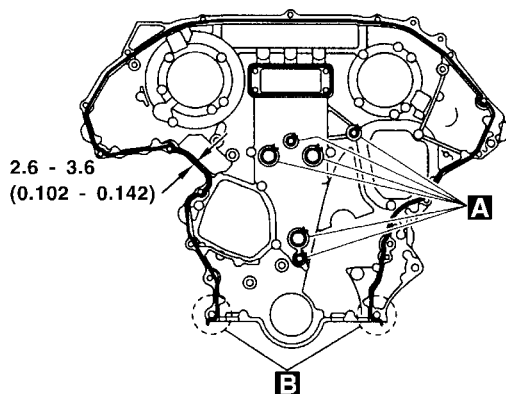


CYLINDER HEAD

[VQ35DE]

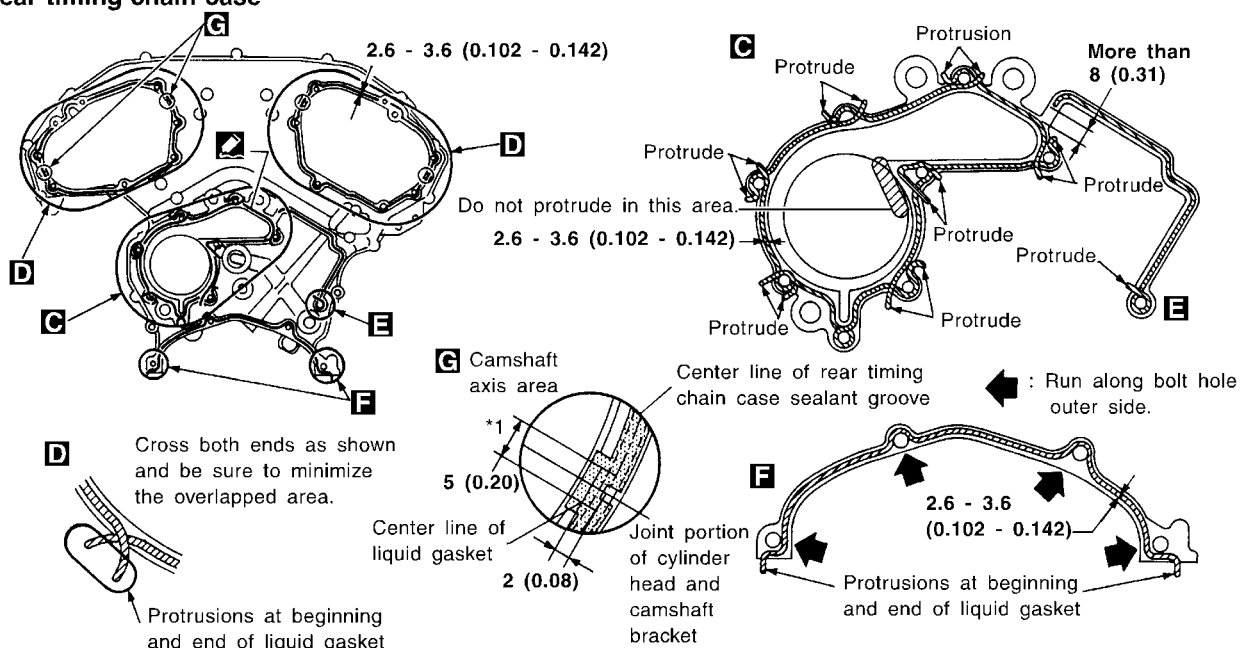
- Use Genuine Silicone RTV Sealant, or equivalent. Refer to [MA-12. "RECOMMENDED FLUIDS AND LUBRICANTS"](#).

Front timing chain case



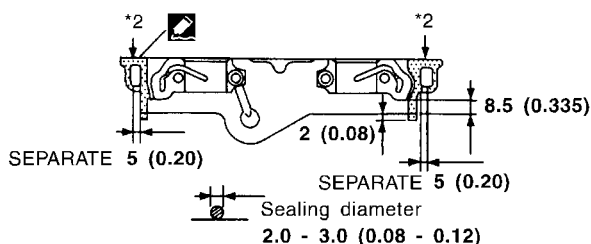
Sealant protrusion away from bolt hole

Rear timing chain case



*1: Apply liquid gasket to the chamfered surface between camshaft bracket and cylinder head.

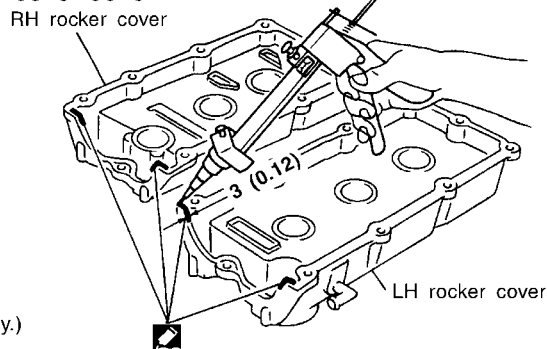
Camshaft bracket



*2: Remove the protruding sealant from front face.
(Remove the hardened sealant from surface only.)

Unit: mm (in)

Rocker cover



SEM411G

- Before installation, wipe off the protruding sealant.