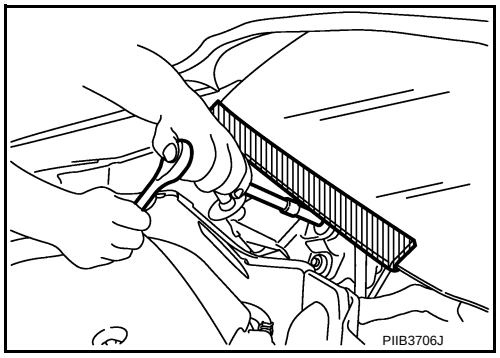
SERVICE INFORMATION

PRECAUTIONS

Precaution for Procedure without Cowl Top Cover

INFOID:0000000005447615

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000005447616

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SUPPLEMENTAL RESTRAINT SYSTEM” and “SEAT BELTS” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SUPPLEMENTAL RESTRAINT SYSTEM”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precautions For Engine Service

INFOID:0000000008180049

DISCONNECTING FUEL PIPING

- Before starting work, check no fire or spark producing items are in the work area.
- Release fuel pressure before disconnecting and disassembly.
- After disconnecting pipes, plug openings to stop fuel leakage.

DRAINING ENGINE COOLANT

Drain engine coolant and engine oil when the engine is cooled.

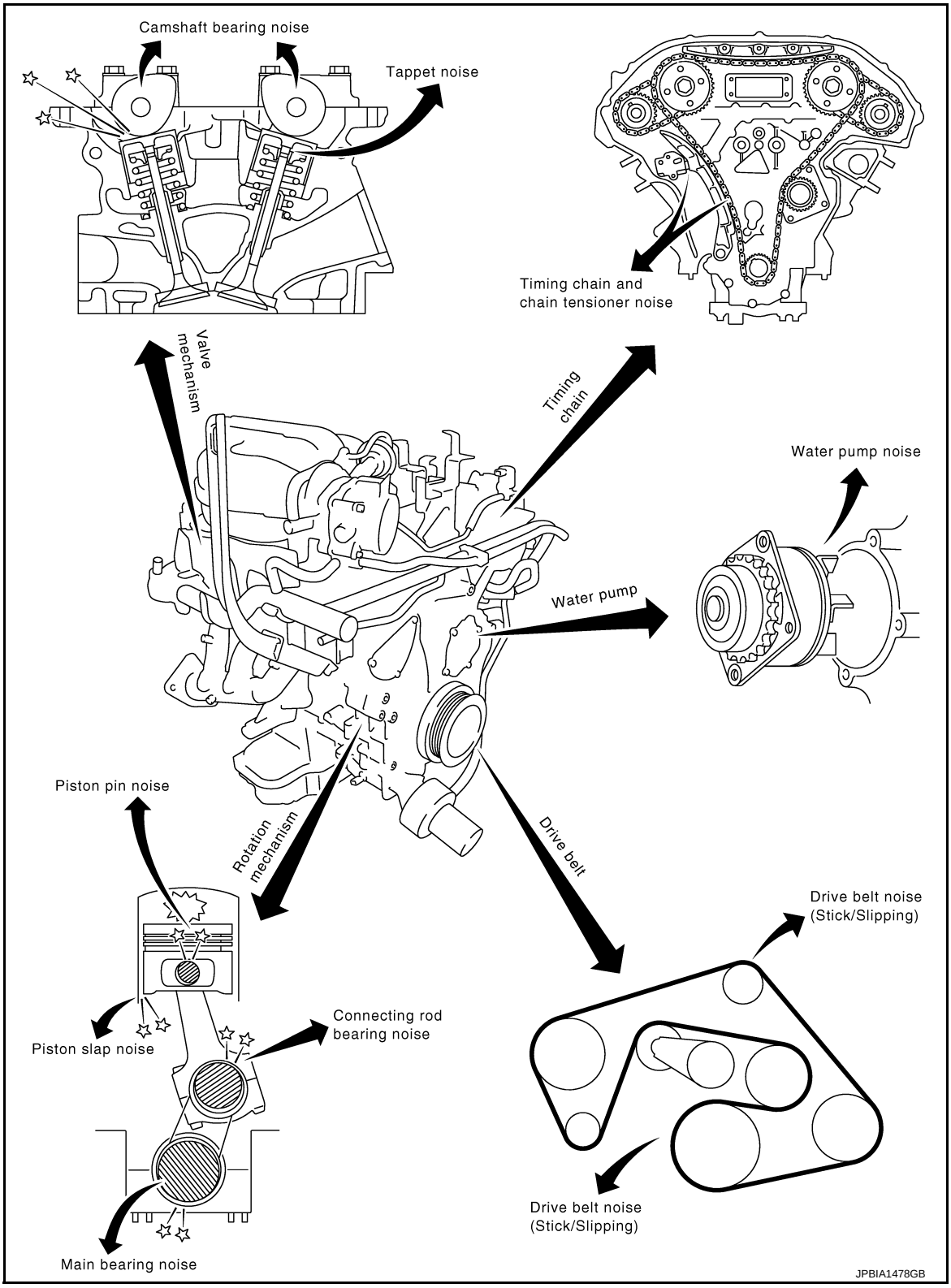
INSPECTION, REPAIR AND REPLACEMENT

Before repairing or replacing, thoroughly inspect parts. Inspect new replacement parts in the same way, and replace if necessary.

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting - Engine Noise

INFOID:0000000005447626



Use the Chart Below to Help You Find the Cause of the Symptom

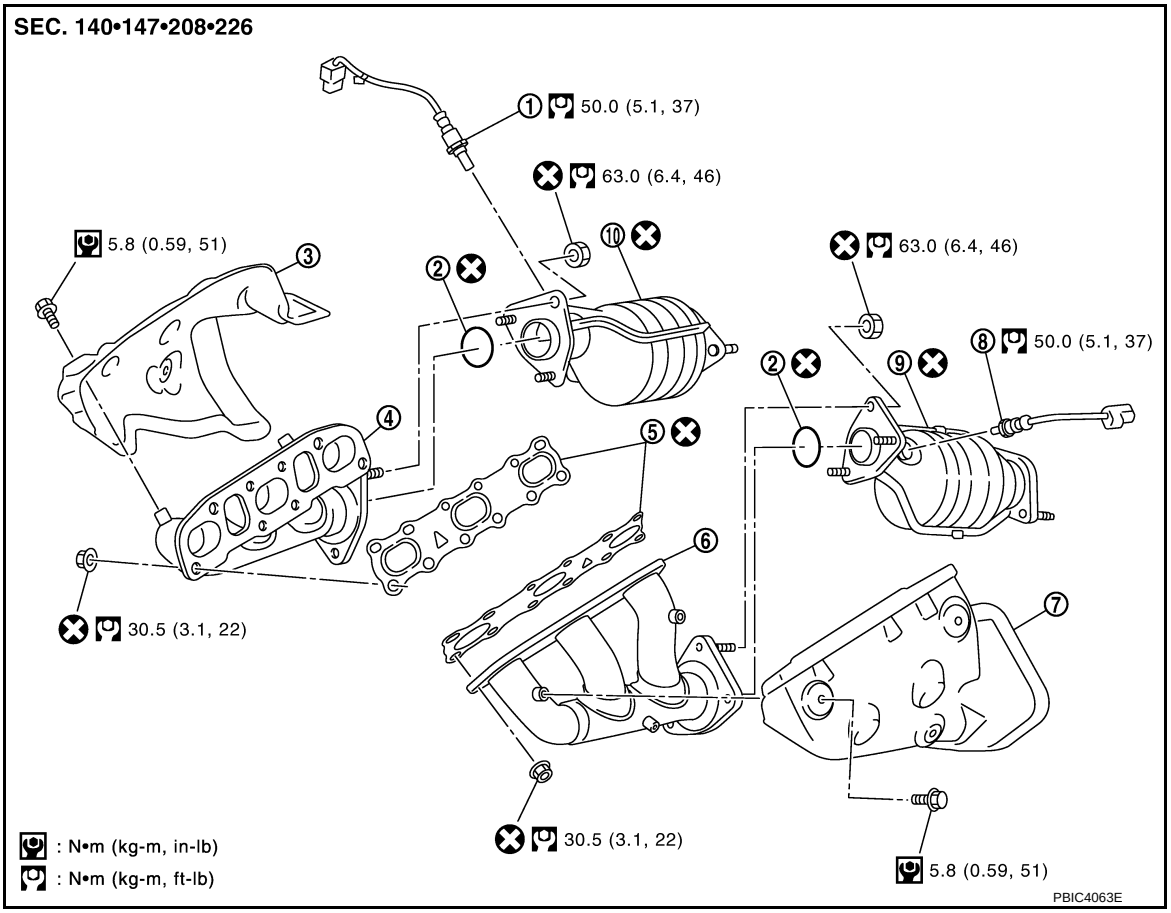
INFOID:0000000005447627

1. Locate the area where noise occurs.
2. Confirm the type of noise.

EXHAUST MANIFOLD AND THREE WAY CATALYST

Component

INFOID:0000000005447639



1. Air fuel ratio sensor 1 (bank 1)
2. Ring gasket
3. Exhaust manifold cover (right bank)
4. Exhaust manifold (right bank)
5. Gasket
6. Exhaust manifold (left bank)
7. Exhaust manifold cover (left bank)
8. Air fuel ratio sensor 1 (bank 2)
9. Three way catalyst (manifold) (left bank)
10. Three way catalyst (manifold) (right bank)

- Refer to GI-9, "Component" for symbol marks in the figure.

Removal and Installation

INFOID:0000000005447640

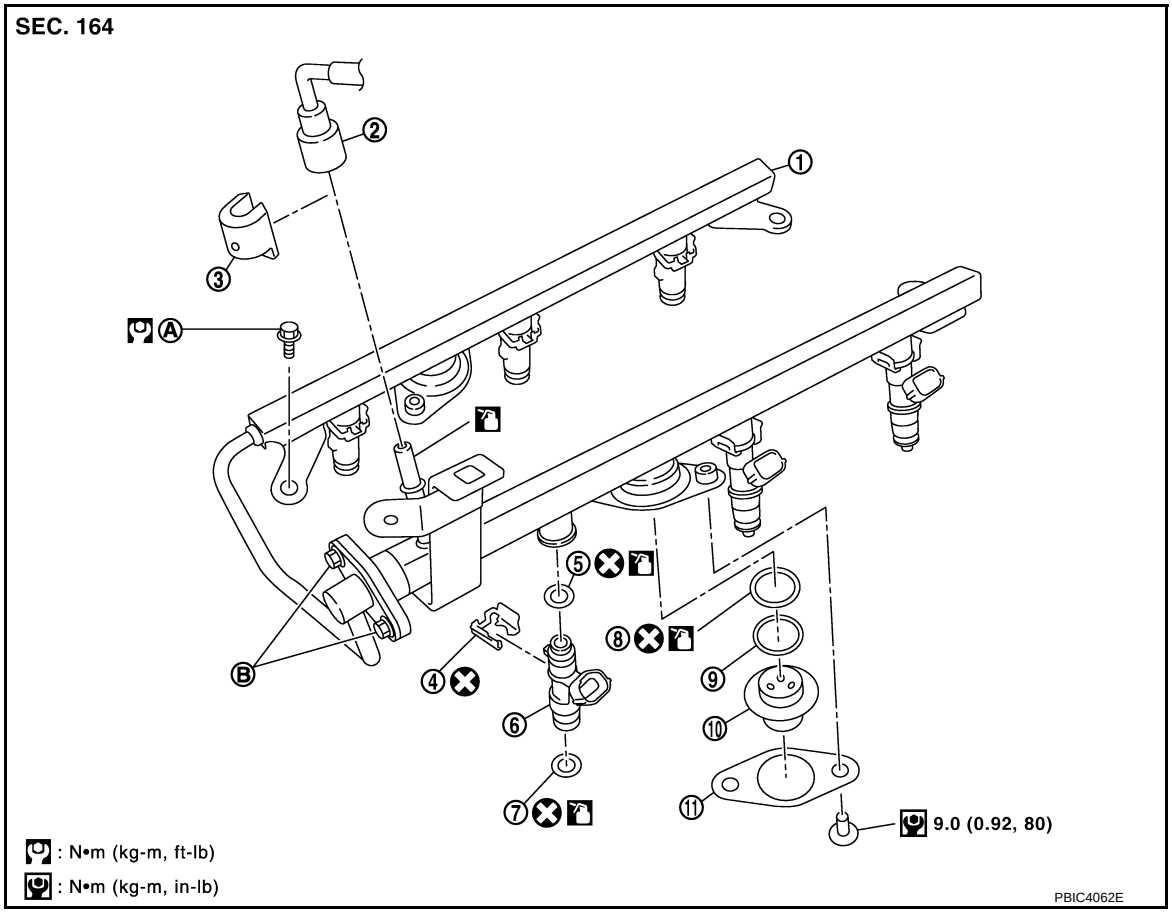
REMOVAL (LEFT BANK)

1. Remove air cleaner case and air duct. Refer to EM-16.
2. Remove engine undercover front and engine undercover middle. Refer to EI-12.

FUEL INJECTOR AND FUEL TUBE

Component

INFOID:0000000005447647



1. Fuel tube	2. Fuel feed hose	3. Quick connector cap
4. Clip	5. O-ring (blue)	6. Fuel injector
7. O-ring (brown)	8. O-ring	9. Spacer
10. Fuel damper	11. Fuel damper cap	
A. Refer to EM-36.	B. Do not loosen these bolts.	

- Refer to GI-9, "Component" for symbol marks in the figure.

Removal and Installation

INFOID:0000000005447648

REMOVAL

WARNING:

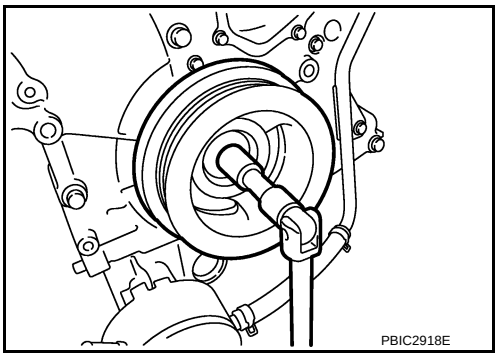
- **Put a “CAUTION: FLAMMABLE” sign in the workshop.**
- **Be sure to work in a well-ventilated area and furnish workshop with a CO_2 fire extinguisher.**
- **Never smoke while servicing fuel system. Keep open flames and sparks away from the work area.**
- **To avoid the danger of being scalded, never drain engine coolant when engine is hot.**

1. Remove intake manifold collector. Refer to EM-18.
2. Release fuel pressure. Refer to EC-84, "Fuel Pressure Check" (for Australia models) or EC-568, "Fuel Pressure Check" (except for Australia models).
3. Disconnect quick connector on the engine side as follows:

b. Loosen crankshaft pulley bolt and locate bolt seating surface as 10 mm (0.39 in) from its original position.

CAUTION:

Never remove crankshaft pulley bolt. Keep loosened crankshaft pulley bolt in place to protect removed crankshaft pulley from dropping.

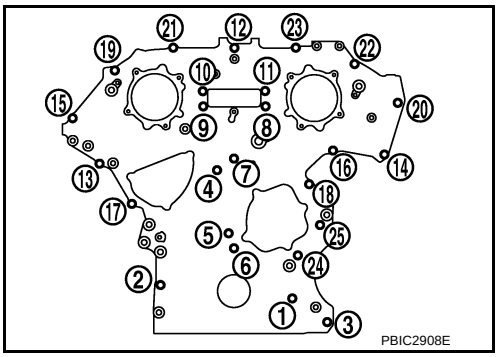


c. Pull crankshaft pulley with both hands to remove it.

20. Remove oil pans (upper and lower). Refer to EM-28.

21. Remove front timing chain case as follows:

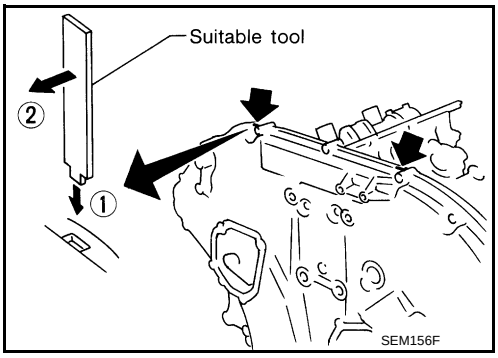
a. Loosen mounting bolts in reverse order as shown in the figure.



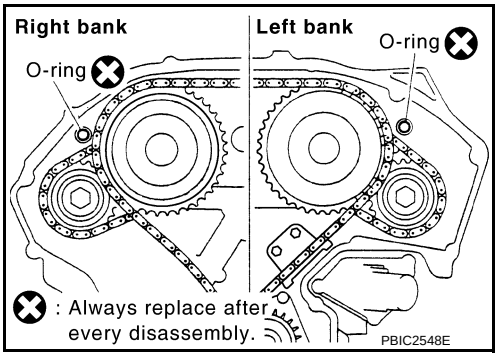
b. Insert suitable tool into the notch at the top of the front timing chain case as shown (1).

c. Pry off case by moving the tool as shown (2).
- Use seal cutter [SST: KV10111100] to cut liquid gasket for removal.

CAUTION:
- **Never use screwdriver or something similar.**
- **After removal, handle front timing chain case carefully so it does not tilt, cant, or warp under a load.**

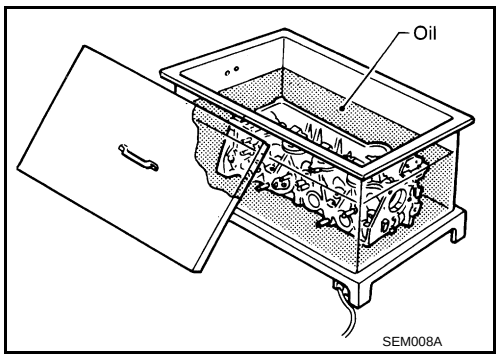


22. Remove O-rings from rear timing chain case.



23. Remove water pump cover and chain tensioner cover from front timing chain case.
- Use seal cutter [SST: KV10111100] to cut liquid gasket for removal.

4. Heat cylinder head to 110 to 130°C (230 to 266°F) by soaking in heated oil.



5. Using valve guide drift (commercial service tool), press valve guide from camshaft side to the dimensions as in the figure.

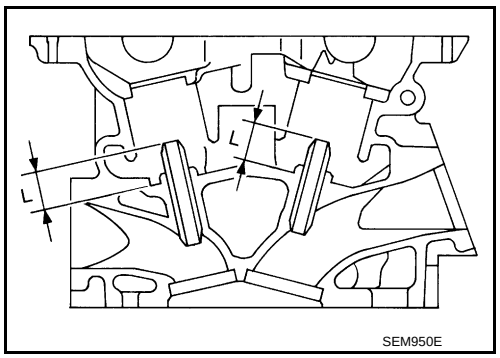
Projection "L"

Intake and exhaust

: 12.6 - 12.8 mm (0.496 - 0.504 in)

CAUTION:

Cylinder head contains heat. When working, wear protective equipment to avoid getting burned.

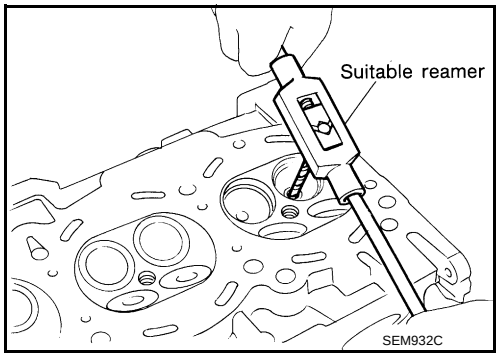


6. Using valve guide reamer (commercial service tool), apply reamer finish to valve guide.

Standard:

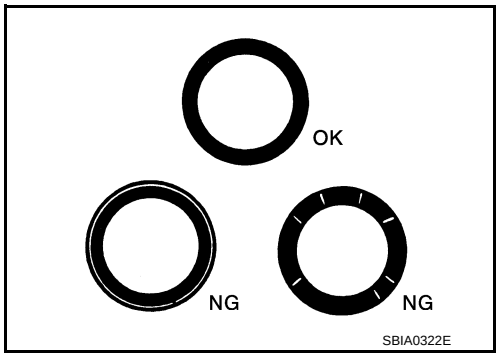
Intake and exhaust

: 6.000 - 6.018 mm (0.2362 - 0.2369 in)



VALVE SEAT CONTACT

- After confirming that the dimensions of valve guides and valves are within the specifications, perform this procedure.
- Apply prussian blue (or white lead) onto contacting surface of valve seat to check the condition of the valve contact on the surface.
- Check if the contact area band is continuous all around the circumference.
- If not, grind to adjust valve fitting and check again. If the contacting surface still has "NG" conditions even after the re-check, replace valve seat. Refer to "VALVE SEAT REPLACEMENT".



VALVE SEAT REPLACEMENT

When valve seat is removed, replace with oversized [0.5 mm (0.020 in)] valve seat.

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. Refer to EM-131, "Standard and Limit".

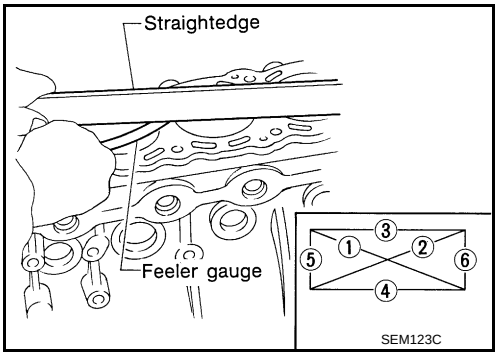
CAUTION:

Prevent to scratch cylinder head by excessive boring.

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

Limit : 0.1 mm (0.004 in)

- If it exceeds the limit, replace cylinder block.



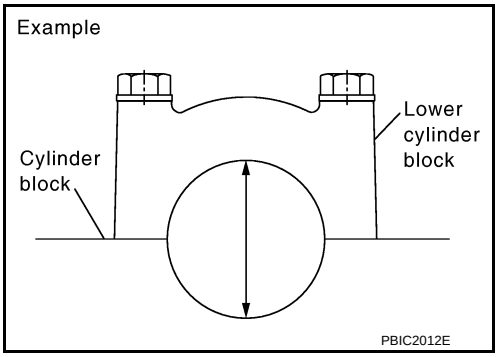
MAIN BEARING HOUSING INNER DIAMETER

- Install lower cylinder block without installing main bearings, and tighten lower cylinder block bolts to the specified torque. Refer to EM-105, "Disassembly and Assembly" for the tightening procedure.
- Measure the inner diameter of main bearing housing with bore gauge.

Standard : 74.993 - 75.017 mm (2.9525 - 2.9534 in)

- If out of the standard, replace cylinder block and lower cylinder block as assembly.

NOTE:
Cylinder block cannot be replaced as a single part, because it is machined together with lower cylinder block.

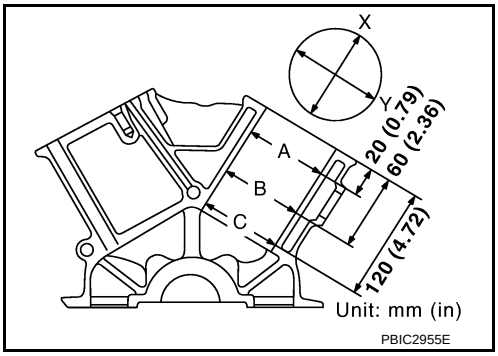


PISTON TO CYLINDER BORE CLEARANCE

Cylinder Bore Inner Diameter

- Using 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)

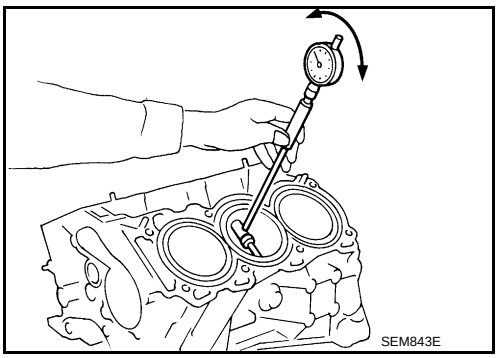
Standard inner diameter:
95.500 - 95.530 mm (3.7598 - 3.7610 in)
Out-of-round (Difference between “X” and “Y”):
0.015 mm (0.0006 in)
Taper limit (Difference between “A” and “C”):
0.01 mm (0.0004 in)



- 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)



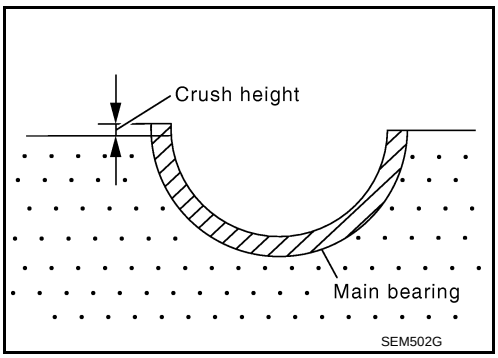
Piston Skirt Diameter

CRUSH HEIGHT OF MAIN BEARING

- When lower cylinder block is removed after being tightened to the specified torque with main bearings installed, the tip end of bearing must protrude. Refer to EM-105, "Disassembly and Assembly" for the tightening procedure.

Standard : There must be crush height.

- If the standard is not met, replace main bearings.

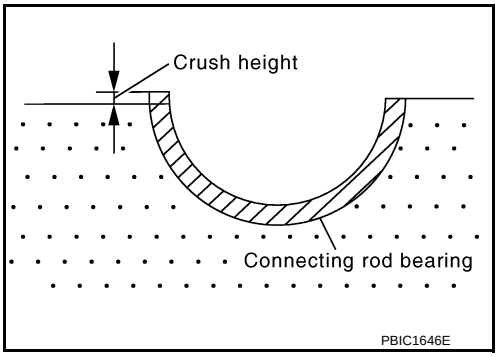


CRUSH HEIGHT OF CONNECTING ROD BEARING

- When connecting rod bearing cap is removed after being tightened to the specified torque with connecting rod bearings installed, the tip end of bearing must protrude. Refer to EM-105, "Disassembly and Assembly" for the tightening procedure.

Standard : There must be crush height.

- If the standard is not met, replace connecting rod bearings.

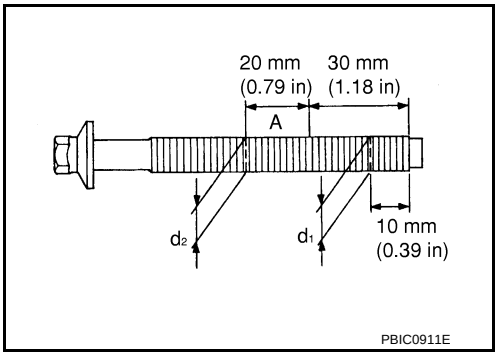


LOWER CYLINDER BLOCK BOLT OUTER DIAMETER

- Measure the outer diameters (“d_1”, “d_2”) at two positions as shown in the figure.
- If reduction appears in “A” range, regard it as “d_2”.

Limit (“d_1” – “d_2”) : 0.11 mm (0.0043 in)

- If it exceeds the limit (large difference in dimensions), replace lower cylinder block bolt with new one.

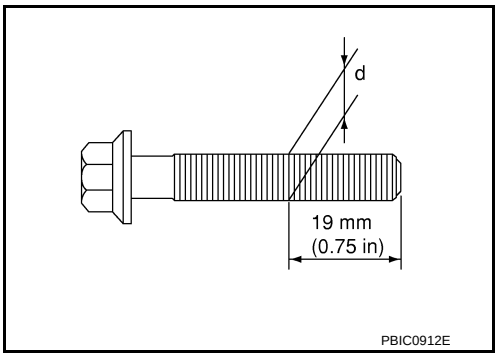


CONNECTING ROD BOLT OUTER DIAMETER

- Measure the outer diameter “d” at position shown in the figure.
- If the reduction appears in a position other than “d”, regard it as “d”.

Limit : 7.75 mm (0.3051 in)

- When “d” exceeds the limit (when it becomes thinner), replace connecting rod bolt with new one.



FLYWHEEL DEFLECTION (M/T MODELS)

Removal and Installation

INFOID:0000000007042379

REMOVAL

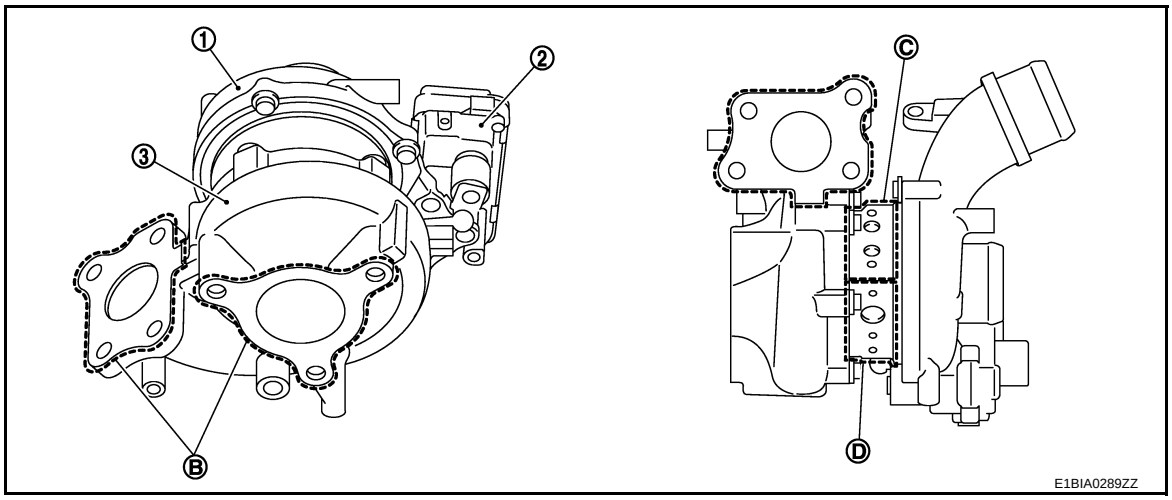
- After applying penetrative lubricant to the mounting nuts, check for the penetration of the lubricant, and then loosen the nuts to remove.

1. Drain engine coolant. Refer to CO-38, "Changing Engine Coolant"
2. Remove air inlet hose and air inlet pipe. Refer to EM-161.
3. Remove air duct and air inlet pipes. Refer to EM-157, "Removal and Installation".
4. Remove exhaust manifold cover. Refer to EM-171, "Removal and Installation".
5. Remove catalyst. Refer to EM-166, "Removal and Installation".
6. Remove eye bolts and water hose from water tube and oil feed tube and oil return tube.
7. Disconnect connector from turbocharger.
8. Remove turbocharger with water tube and oil feed tube and oil return tube.
   CAUTION:
   - **Be careful not to deform water tube and oil-feed-and-return tube.**
   - **Never disassemble or adjust the turbocharger.**
   - **Be careful not to contact with the vehicle.**
   - **Never hold turbocharger boost control actuator and actuator rod.**
9. Remove water tube and oil feed tube and oil return tube from turbocharger.
10. Remove turbocharger.
    CAUTION:
    - **Never disassemble or adjust the turbocharger.**
    - **Never hold turbocharger boost control actuator and actuator rod.**

Oil Tube and Water Tube

- Clean inside of oil feed tube and oil return tube and water tube, and check tubes for clogging.
- Replace oil feed tube and oil return tube and/or water tube if clogging still exists after cleaning.

INSPECTION AFTER REMOVAL



1. Compressor housing
2. Turbocharger boost control actuator
3. Turbine housing
A. Check for charge air pressure leaks
B. Check for exhaust gas leaks
C. Check for engine coolant leaks
D. Check for engine oil leaks

CAUTION:
When the compressor wheel turbine, wheel or rotor shaft is damaged, remove all the fragments and foreign matter left in the following passages in order to prevent a secondary malfunction:

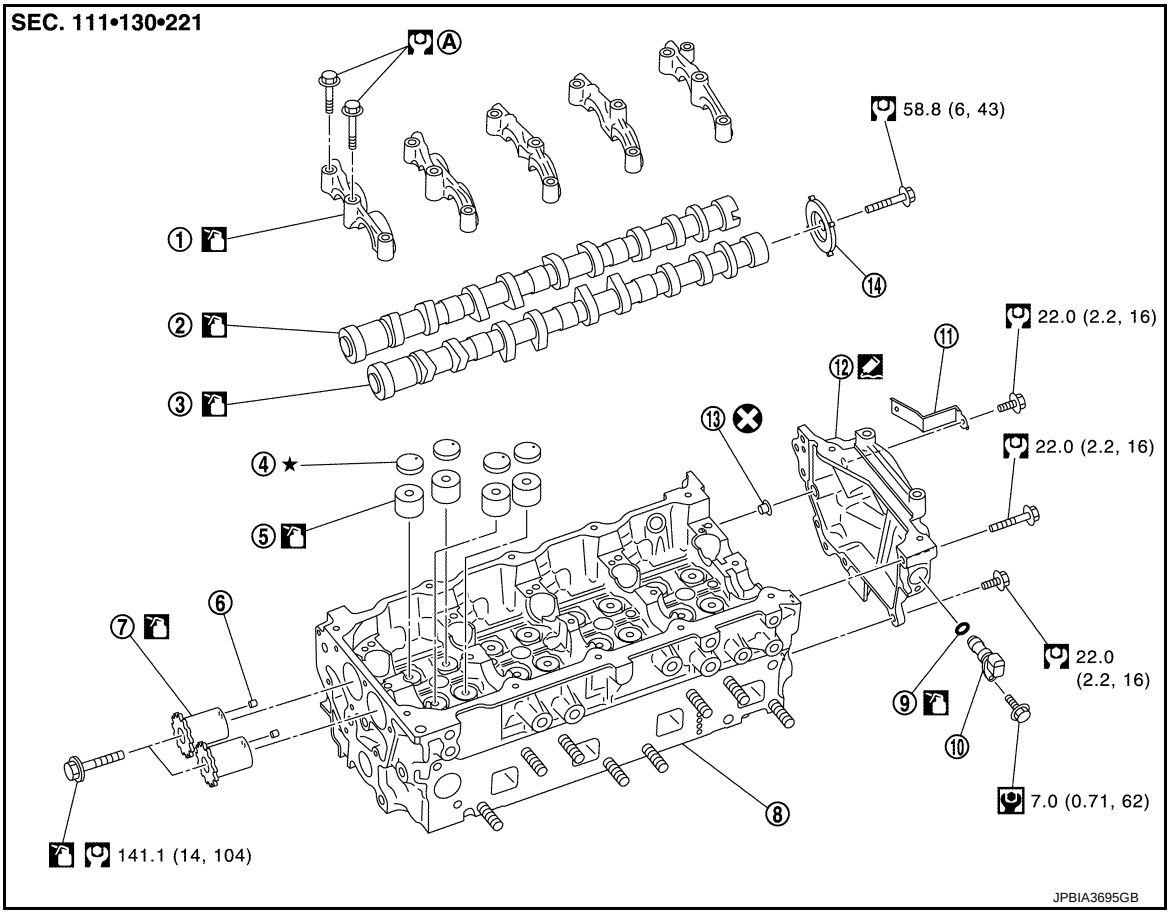
Suction side : Between turbocharger and charge air cooler
Exhaust side : Between turbocharger and catalyst

Rotor Shaft Clearance

CAMSHAFT

Component

INFOID:0000000007042399



1. Camshaft bracket	2. Intake camshaft	3. Exhaust camshaft
4. Adjusting shim	5. Valve lifter	6. Knock pin
7. Camshaft sprocket	8. Cylinder head	9. O-ring
10. Camshaft position sensor	11. Bracket	12. Cylinder head rear cover
13. Rubber washer	14. Signal plate	
A. Comply with the installation procedure when tightening. Refer to EM-199, "Removal and Installation"		

Refer to GI-9, "Component" for symbols in the figure.

Removal and Installation

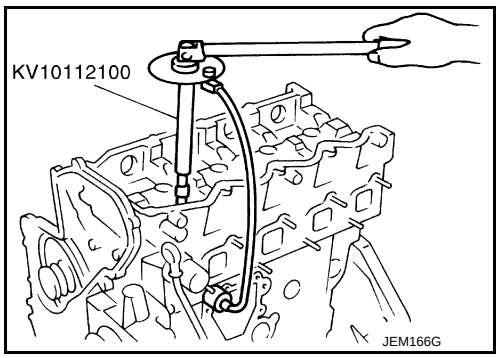
INFOID:0000000007042400

REMOVAL

1. Drain engine oil. Refer to LU-20, "Changing Engine Oil".
2. Remove the following parts:
   - Collector (upper and lower). Refer toEM-157, "Component".
   - Vacuum pump. Refer to EM-179, "Component".
   - Fuel injector. Refer to EM-181, "Exploded View".
   - Rocker cover. Refer to EM-196, "Component".
   - Secondary timing chain. Refer to EM-213, "Component".
3. Remove cylinder head rear cover, camshaft position sensor and rubber washer.

c. Tighten all cylinder head bolts (clockwise).

Angle tightening : 180 degrees



CAUTION:
- **When the angle wrench [SST: KV10112100] is not used, paint an alignment mark on the head of cylinder head bolt and cylinder head surface before tightening. Check the angle with a protractor.**

d. Loosen completely in the reverse order of that shown in the figure.

: 0 N·m (0 kg-m, 0 ft-lb)

e. Tighten all bolts.

: 39.2 N·m (4.0 kg-m, 29 ft-lb)

f. Tighten all cylinder head bolts (clockwise).

Angle tightening : 90 degrees

g. Tighten all cylinder head bolts (clockwise).

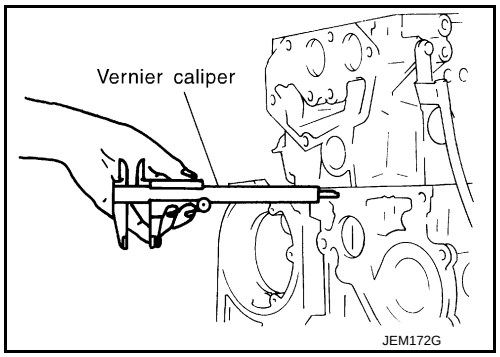
Angle tightening : 90 degrees

CAUTION:
- **When the angle wrench [SST: KV10112100] is not used, paint an alignment mark on the head of cylinder head bolt and cylinder head surface before tightening. Check the angle with a protractor.**

4. Tighten bolts between rear chain case and cylinder head. Refer to EM-233, "Exploded View".
5. After installing cylinder head, measure dimension from the front end surface of cylinder block to that of cylinder head (If rear chain case is removed).

Standard : 23.53 - 24.07 mm (0.9264 - 0.9476 in)

- If out of the standard, check fitting of dowel pins and cylinder head.



6. Install glow plug.

CAUTION:
- **To avoid damage, glow plugs should be removed only when required.**
- **Handle with care to avoid applying shock. When dropped from approx. 10 cm (3.94 in) or higher, always replace with a new one.**
- **Before installing, remove carbon depositing on mounting hole of glow plug with a reamer.**

7. Install engine coolant temperature sensor. Refer to EM-233, "Exploded View".
8. Install in the reverse order of removal.

Disassembly and Assembly

INFOID:0000000007042414

DISASSEMBLY

1. Remove adjusting shims and valve lifters.
   - Check the installation positions, and keep them to avoid being confused.

Re-bore size calculation:

D = A + B – C

Where,

D: Bored diameter

A: Piston outer diameter as measured

B: Piston-to-cylinder bore clearance

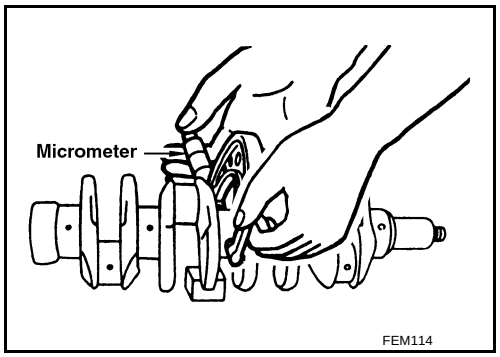
C: Honing allowance 0.02 mm (0.0008 in)

2. Install main bearing cap, and tighten to the specified torque. Otherwise, cylinder bores may be distorted in final assembly.
3. Cut cylinder bore.
   NOTE:
   - 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.
4. Hone cylinders to obtain the specified piston-to-cylinder bore clearance.
5. Measure finished cylinder bore for the out-of-round and taper.
   NOTE:
   - Perform measurement after cylinder bore cools down.

CRANKSHAFT MAIN JOURNAL DIAMETER

- Measure the outer diameter of crankshaft main journals with a micrometer.

Standard : Refer to EM-271, "Standard and Limit".

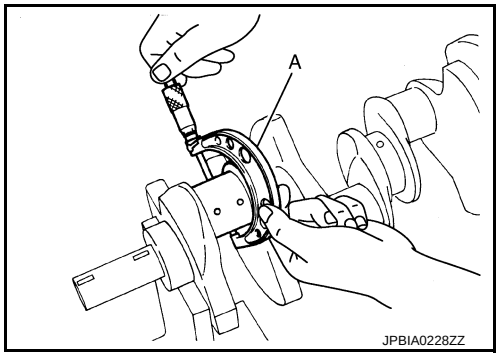


- If out of the standard, measure the main bearing oil clearance. Then use the under size bearing. Refer to EM-265, "How to Select Piston and Bearing".

CRANKSHAFT PIN JOURNAL DIAMETER

- Measure the outer diameter of crankshaft pin journal with a micrometer (A).

Standard : Refer to EM-271, "Standard and Limit".



- If out of the standard, measure the connecting rod bearing oil clearance. Then use under size bearing. Refer to EM-265, "How to Select Piston and Bearing".

CRANKSHAFT OUT-OF-ROUND AND TAPER

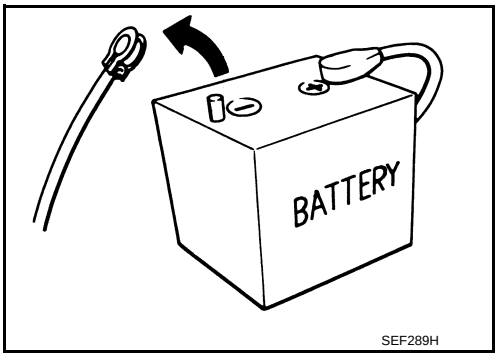
PRECAUTION

PRECAUTIONS

Precaution for Battery Service (for V9X Models)

INFOID:0000000006466962

When disconnect the battery cable, pay attention to the following.
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- **Before disconnecting battery cables, turn ignition switch OFF and wait at least 4 minutes.**
- **After high-load driving, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery cable.**
  NOTE:
  - Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
  - Example of high-load driving
  - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
  - Driving for 30 minutes or more on a steep slope.



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Precaution for Procedure without Cowl Top Cover

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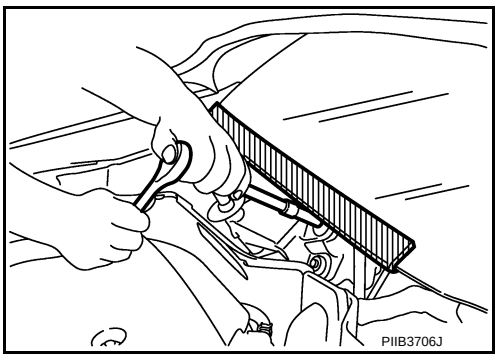
When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.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Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

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CAUTION:
Comply with the following cautions to prevent any error and malfunction.
- **This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).**
- **Remove and install all control units after disconnecting both battery cables with the ignition switch in the LOCK position.**
- **Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.**

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ACC position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.

VACUUM PUMP

Exploded View

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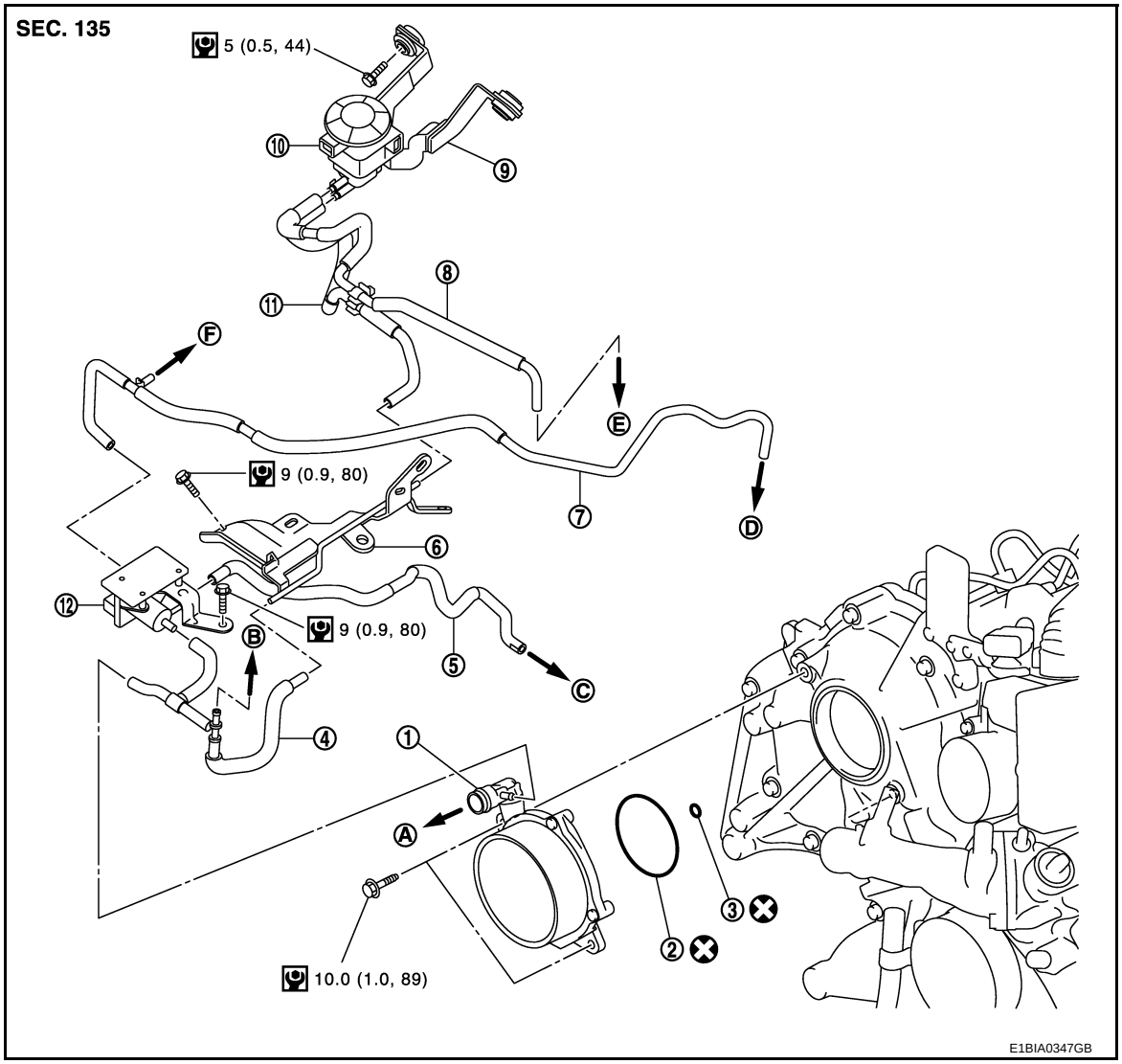


1.	Vacuum pump	2.	O-ring	3.	O-ring
4.	Vacuum hose	5.	Vacuum hose	6.	Vacuum tube and bracket
7.	Vacuum hose	8.	Vacuum hose	9.	Turbocharger boost control solenoid valve bracket
10.	Turbocharger boost control solenoid valve	11.	Vacuum hose	12.	EGR cooler bypass valve control solenoid valve
A.	To brake booster	B.	To engine mount solenoid valve	C.	To EGR
D.	To resonator	E.	To turbocharger	F.	To engine mount solenoid valve

Refer to GI-9, "Component" for symbols in the figure.

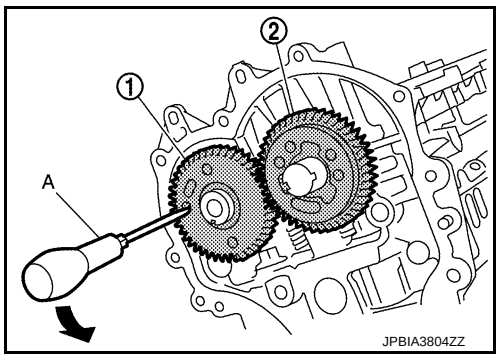
Removal and Installation

INFOID:0000000006466993

REMOVAL

1. Remove engine cover. Refer to EM-299, "Exploded View".
2. Remove air inlet hose 4, 5 and air inlet tube 6. Refer to EM-307, "Exploded View".
3. Disconnect vacuum hoses from vacuum pump.
4. Remove vacuum pump.

h. Insert a screwdriver (A) and lift it up to move the gear of wear compensation gear (1).
NOTE:
To align two gear teeth of wear compensation gear.



i. Remove timing gear (2) under the condition shown in Step “h”.

j. Remove wear compensation gear and spacer.

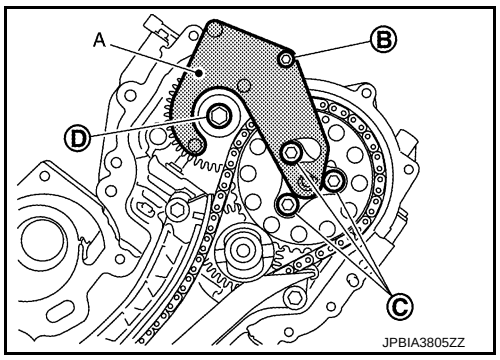
13. Remove the timing chain (bank 2) with the following procedure:

a. Set the camshaft timing tool [SST: — (Mot.1880)] (A), and tighten mounting bolt [M6 × 50 mm (1.97 in) (B).

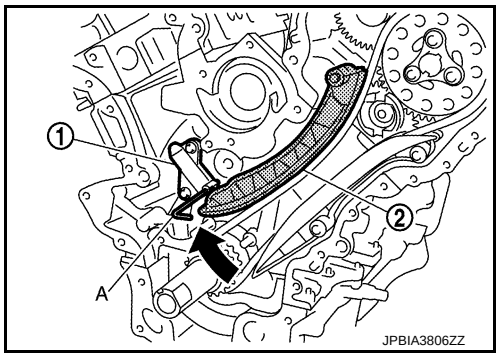
b. Loosen timing sprocket mounting bolts (C) and wear compensation gear mounting bolt (D).

c. Loosen fuel pump drive gear mounting bolts.

d. Remove the camshaft timing tool.



e. Remove the timing chain tensioner.
• Compress the timing chain tensioner (1) with timing chain slack guide (2), and then insert a stopper pin (A) into hole on timing chain tensioner.
NOTE:
Use approximately 3.0 mm (0.118 in) dia. hard metal pin as a stopper pin



f. Remove timing sproket spacer (1).