

# SECTION **EM**

## ENGINE MECHANICAL

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## PRECAUTION

### PRECAUTIONS

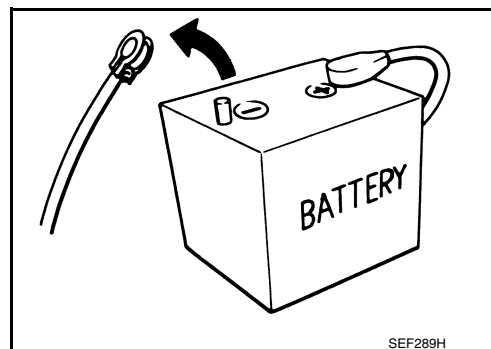
#### Precautions for Removing Battery Terminal

INFOID:0000000012958640

When disconnecting the battery terminal, pay attention to the following.

- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.
- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:

D4D engine	: 20 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		
V9X engine	: 4 minutes		
YD25DDTi	: 2 minutes		



#### NOTE:

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

#### 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.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

#### NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

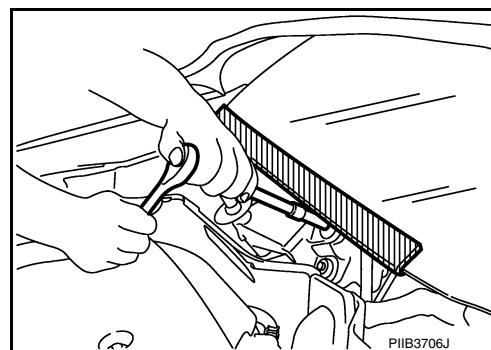
#### NOTE:

The removal of 12V battery may cause a DTC detection error.

#### Precaution for Procedure without Cowl Top Cover

INFOID:0000000012197228

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



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

INFOID:0000000012197229

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

## PRECAUTIONS

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[MR FOR NISMO RS MODELS]

types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

### **WARNING:**

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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 "SRS AIR BAG".
- Never 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:**

Always observe the following items for preventing accidental activation.

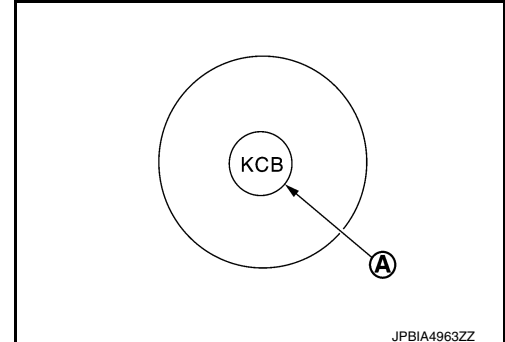
- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery or batteries, and wait at least 3 minutes before performing any service.

### Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves

INFOID:0000000012197230

Handling and disposal of sodium-filled exhaust valves requires special care and consideration. Under conditions such as breakage with subsequent contact with water, metal sodium which lines the inner portion of exhaust valve will react violently, forming sodium hydroxide and hydrogen which may result in an explosion. Sodium-filled exhaust valve is identified on the top of its stem as shown in illustration.

A : Identification mark of sodium-filled exhaust valve



### DEALER DISPOSAL INSTRUCTIONS

### **CAUTION:**

- Use approved shatter-resistant eye protection when performing this procedure.
- Perform this and all subsequent disposal work procedures in an open room, away from flammable liquids. Keep a fire extinguisher, rated at least 10 ABC, in close proximity to the work area.
- Be sure to wear rubber gloves when performing the following operations.
- Make sure the resultant (high alkalinity) waste water does not contact your skin. If the waste water does contact you, wash the contacted area immediately with large quantities of water.
- Dealers should check their respective state and local regulations concerning any chemical treatment or waste water discharge permits which may be required to dispose of the resultant (high alkalinity) waste water.

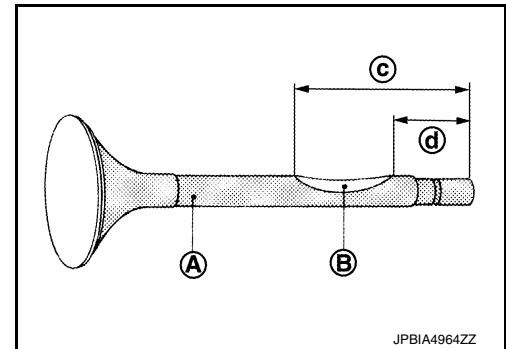
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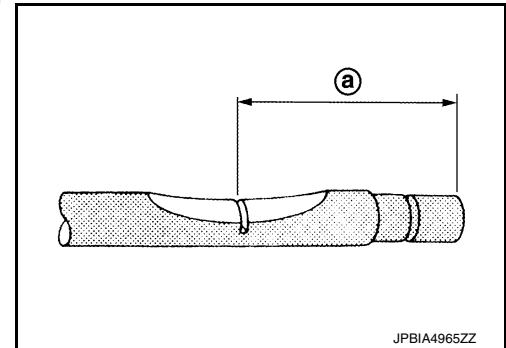
1. Clamp valve stem in a vice.
2. The valve has a specially-hardened surface. To cut through it, first remove a half-round section, approximately 30 mm (1.18 in) long using air-powered grinder until black color is removed and silver color appears.

- A : Black color  
B : Silver color  
c : 47 mm (1.85 in)  
d : 17 mm (0.67 in)

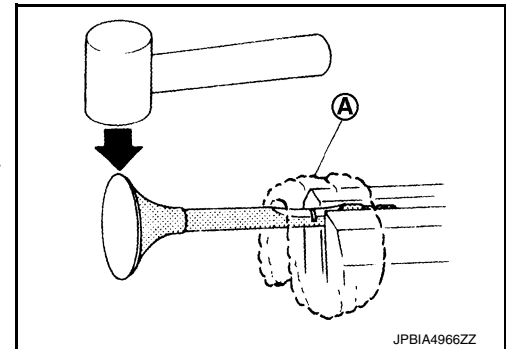


3. Use hacksaw to cut through approximately half the diameter of valve stem. Make the serration at a point 40 mm (1.57 in) from the end of valve stem.

- a : 32 mm (1.26 in)

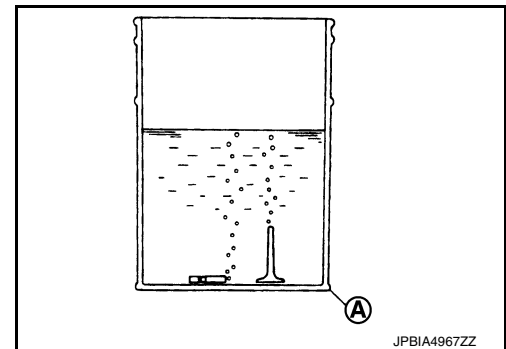


4. Cover the serrated end of the valve with a large shop towel (A). Strike the valve face end with a hammer, separating it into two pieces.
5. Fill a bucket (such as a 20 ℓ oil can) with at least 10 ℓ (2-5/8 US gal, 2-1/4 Imp gal) of water. Carefully place the already cut (serrated) valves into the water one-at-a-time using a set of large tweezers and quickly move away at least 2.7 m (9 ft).



6. The valves should be placed in a standing position as shown in the illustration to allow complete reaction. After the bubbling action has subsided, additional valves can be placed into the bucket allowing each subsequent chemical reaction to subside. However, no more than 8 valves should be placed in the same 10 ℓ (2-5/8 US gal, 2-1/4 Imp gal) amount of water. The complete chemical reaction may take as long as 4 to 5 hours. Remove the valves using a set of large tweezers after the chemical reaction has stopped. Afterwards, valves can be disposed as ordinary scrap.

- A : Bucket (Such as 20 ℓ oil can)



## Precautions For Engine Service

INFOID:0000000012197231

### 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.

# PRECAUTIONS

< PRECAUTION >

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## INSPECTION, REPAIR AND REPLACEMENT

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

## REMOVAL AND DISASSEMBLY

- When instructed to use SST, use specified tools. Always be careful to work safely, avoid forceful or uninstructed operations.
- Exercise maximum care to avoid damage to mating or sliding surfaces.
- Dowel pins are used for several parts alignment. When replacing and reassembling parts with dowel pins, check that dowel pins are installed in the original position.
- Must cover openings of engine system with a tape or equivalent, to seal out foreign materials.
- Mark and arrange disassembly parts in an organized way for easy troubleshooting and reassembly.
- When loosening nuts and bolts, as a basic rule, start with the one furthest outside, then the one diagonally opposite, and so on. If the order of loosening is specified, do exactly as specified. Power tools may be used in the step.

## ASSEMBLY AND INSTALLATION

- Use torque wrench to tighten bolts or nuts to specification.
- When tightening nuts and bolts, as a basic rule, equally tighten in several different steps starting with the ones in center, then ones on inside and outside diagonally in this order. If the order of tightening is specified, do exactly as specified.
- Replace with new gasket, packing, oil seal or O-ring.
- Thoroughly wash, clean, and air-blow each part. Carefully check engine oil or engine coolant passages for any restriction and blockage.
- Avoid damaging sliding or mating surfaces. Completely remove foreign materials such as cloth lint or dust. Before assembly, oil sliding surfaces well.
- After disassembling, or exposing any internal engine parts, change engine oil and replace oil filter with a new one.
- Release air within route when refilling after draining engine coolant.
- After repairing, start the engine and increase engine speed to check engine coolant, fuel, engine oil, and exhaust gases for leakage.

## Precaution for Handling High Pressure Fuel System

INFOID:0000000012197232

- High pressure fuel system components are between high pressure fuel pump and fuel injector.
- Always release fuel pressure and never start the engine when performing removal and installation.
- When removing or installing parts without releasing fuel pressure, fuel may be splashed and, if fuel contacts skin or eyes, it may cause inflammation.

## Parts Requiring Angle Tightening

INFOID:0000000012197233

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

## Liquid Gasket

INFOID:0000000012197234

## REMOVAL OF LIQUID GASKET SEALING

## PRECAUTIONS

### < PRECAUTION >

[MR FOR NISMO RS MODELS]

- After removing mounting nuts and bolts, separate the mating surface using the seal cutter [SST: KV10111100 (J-37228)] (A) and remove old liquid gasket sealing.

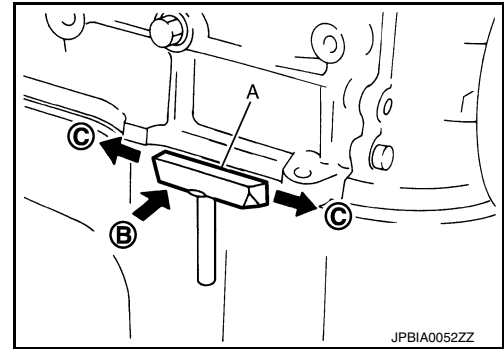
#### CAUTION:

**Be careful not to damage the mating surfaces.**

- Tap the seal cutter [SST: KV10111100 (J-37228)] to insert it (B), and then slide it (C) by tapping on the side as shown in the figure.
- In areas where the seal cutter [SST: KV10111100 (J-37228)] is difficult to use, lightly tap the parts using a plastic hammer to remove it.

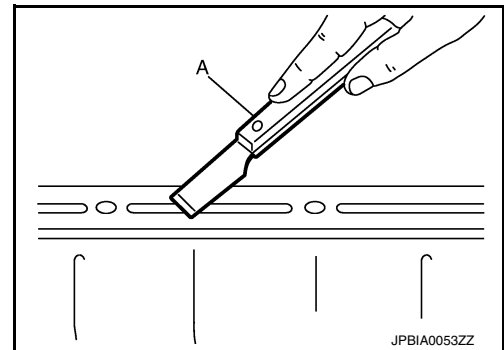
#### CAUTION:

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

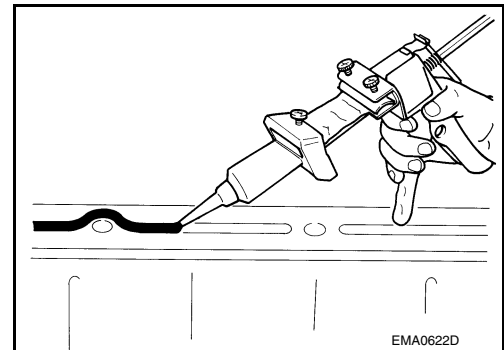


### LIQUID GASKET APPLICATION PROCEDURE

- Using a scraper (A), 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.
- 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.



- Attach liquid gasket tube to the tube presser (commercial service tool).  
**Use Genuine RTV Silicon Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**
- Apply liquid gasket without gaps to the specified location according to the specified dimensions.
  - If there is a groove for liquid gasket application, apply liquid gasket to the groove.



- As for bolt holes (B), normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Check to read the text of this manual.

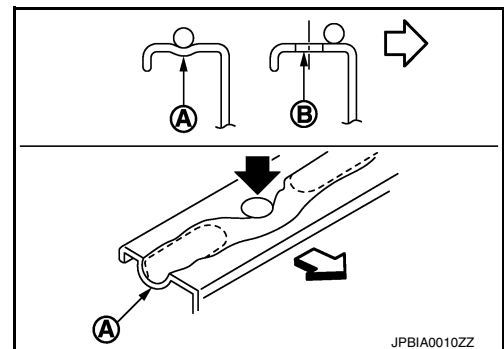
A : Groove

⇐ : Inside

- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten mounting bolts or nuts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.

#### CAUTION:

**If there are specific instructions in this manual, observe them.**



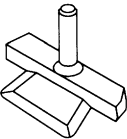
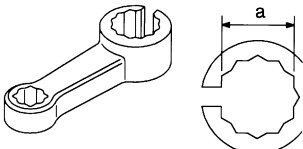
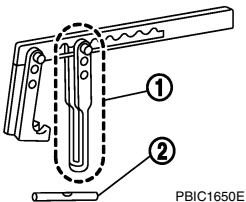
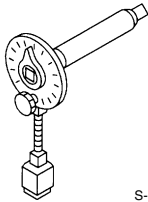
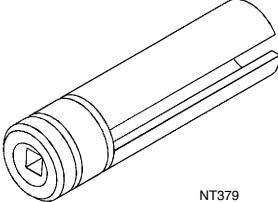
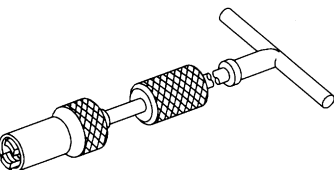
## PREPARATION

### PREPARATION

#### Special Service Tools

INFOID:0000000012197235

The actual shapes oh TechMate tools may differ from those of special service tools illustrated here.

Tool number (TechMate No.) Tool name	Description
KV10111100 (J-37228) Seal cutter	Removing oil pan (upper and lower) etc.  S-NT046
KV10114400 (J-38365) Heated oxygen sensor wrench	Loosening or tightening heated oxygen sensor 2 (AWD models) <b>a: For 22 mm (0.87 in) width hexagon nut</b>  S-NT636
KV10116200 (J-26336-A) Valve spring compressor 1. KV10115900 (J-26336-20) Attachment 2. KV10109220 ( — ) Adapter	Disassembling and assembling valve mechanism Part (1) is a component of KV10116200 (J-26336-A), but Part (2) is not so.  PBIC1650E
KV10112100 (BT8653-A) Angle wrench	Tightening bolts for main bearing cap, cylinder head, etc.  S-NT014
KV10117100 (J-3647-A) Heated oxygen sensor wrench	Loosening or tightening air fuel ratio sensor 1 <b>For 22 mm (0.87 in) width hexagon nut</b>  NT379
KV10107902 (J-38959) Valve oil seal puller	Removing valve oil seal  NT011

# PREPARATION

< PREPARATION >

[MR FOR NISMO RS MODELS]

Tool number (TechMate No.) Tool name	Description	
KV10115600 (J-38958) Valve oil seal drift	Installing valve oil seal <b>Use side A (G).</b> a: 20 (0.79) dia. d: 8 (0.31) dia. b: 13 (0.51) dia. e: 10.7 (0.421) c: 10.3 (0.406) dia. f: 5 (0.20) H: Side B Unit: mm (in)	A EM C
EM03470000 (J-8037) Piston ring compressor	Installing piston assembly into cylinder bore	D E F
ST16610001 (J-23907) Pilot bushing puller	Removing pilot converter	G H
KV11103000 ( — ) Pulley puller	Removing crankshaft pulley	I J K
KV11105210 (J-44716) Stopper plate	Fixing drive plate	L M
KV10119600 ( — ) Injector remover	Removing fuel injector	N O
KV101197S0 ( — ) Injector seal drift set	Installing fuel injector seal ring	P

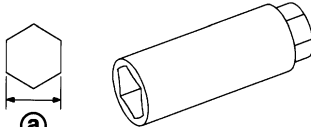


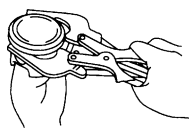

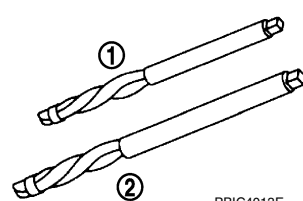
# PREPARATION

< PREPARATION >

[MR FOR NISMO RS MODELS]

## Commercial Service Tools

INFOID:000000012197236

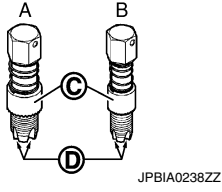
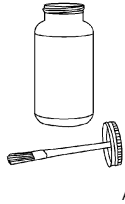
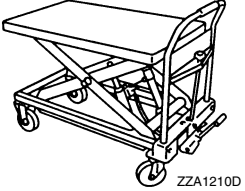
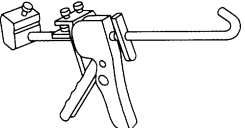
(TechMate No.) Tool name	Description
( — ) Spark plug wrench  JPBIA0399ZZ	Removing and installing spark plug a: 14 mm (0.55 in)
( — ) Pulley holder  ZZA1010D	Crankshaft pulley removing and installing
( — ) Valve seat cutter set  S-NT048	Finishing valve seat dimensions
( — ) Piston ring expander  S-NT030	Removing and installing piston ring
( — ) Valve guide drift  PBIC4012E	Removing and installing valve guide
( — ) Valve guide reamer  PBIC4013E	1: Reaming valve guide inner hole 2: Reaming hole for oversize valve guide



# PREPARATION

< PREPARATION >

[MR FOR NISMO RS MODELS]

(TechMate No.) Tool name		Description	
(J-43897-18) (J-43897-12) Oxygen sensor thread cleaner		Reconditioning the exhaust system threads before installing a new air fuel ratio sensor (Use with anti-seize lubricant shown below.) <b>A: J-43897-18 [18 mm (0.71 in) dia.] for zirconia heated oxygen sensor</b> <b>B: J-43897-12 [12 mm (0.47 in) dia.] for titania heated oxygen sensor</b> C: Mating surface shave cylinder D: Flutes	A EM
( — ) Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads	D E F
( — ) Manual lift table caddy		Removing and installing engine	G H
( — ) Tube presser		Pressing the tube of liquid gasket	I J K

## BASIC INSPECTION

## CAMSHAFT VALVE CLEARANCE

## Inspection and Adjustment

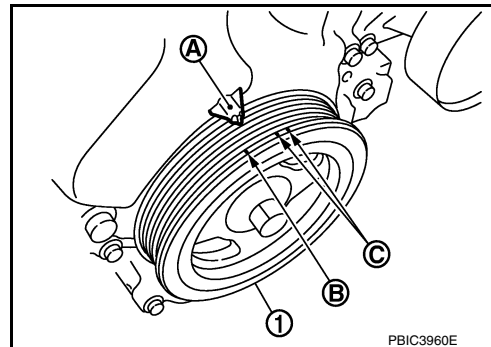
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## INSPECTION

Perform inspection as follows after removal, installation or replacement of camshaft or valve-related parts, or if there is unusual engine conditions regarding valve clearance.

1. Remove rocker cover. Refer to [EM-60, "Exploded View"](#).
2. Measure the valve clearance with the following procedure:
  - a. Set No. 1 cylinder at TDC of its compression stroke.
    - Rotate crankshaft pulley (1) clockwise and align TDC mark (no paint) (B) to timing indicator (A) on front cover.

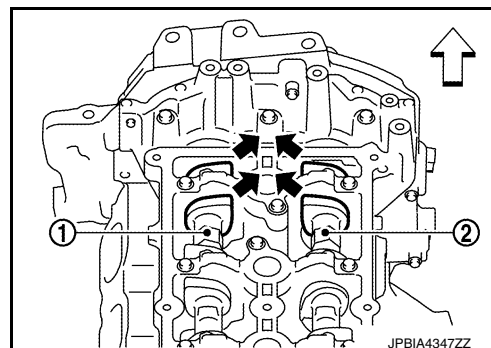
C : White paint mark (Not use for service)



- At the same time, check that both intake and exhaust cam noses of No. 1 cylinder face inside (←) as shown in the figure.

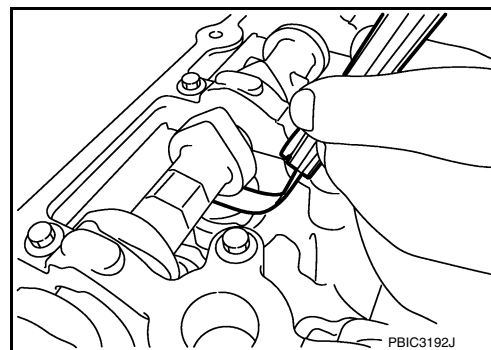
- 1 : Camshaft (INT)  
 2 : Camshaft (EXH)  
 ← : Engine front

- If they do not face inside, rotate crankshaft pulley once more (360 degrees) and align as shown in the figure.



- b. Use a feeler gauge, measure the clearance between valve lifter and camshaft.

**Valve clearance** : Refer to [EM-140, "Camshaft"](#).



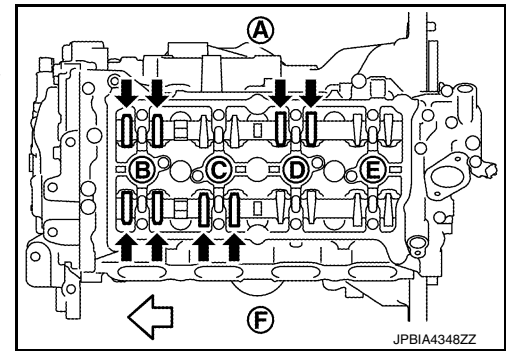
# CAMSHAFT VALVE CLEARANCE

## < BASIC INSPECTION >

[MR FOR NISMO RS MODELS]

- By referring to the figure, measure the valve clearances at locations marked "x" as shown in the table below [locations indicated with black arrow (↖) in the figure] with a feeler gauge.

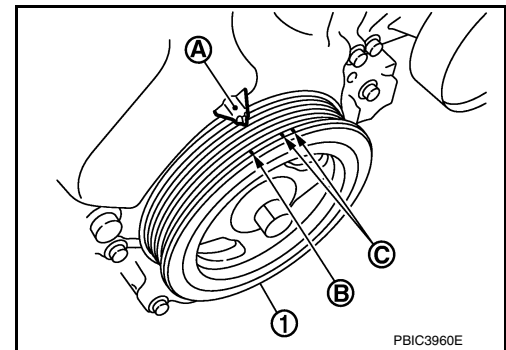
- A : Exhaust side  
 B : No. 1 cylinder  
 C : No. 2 cylinder  
 D : No. 3 cylinder  
 E : No. 4 cylinder  
 F : Intake side  
 ↖ : Engine front



Measuring position		No. 1 CYL.	No. 2 CYL.	No. 3 CYL.	No. 4 CYL.
No. 1 cylinder at compression TDC	EXH	x		x	
	INT	x	x		

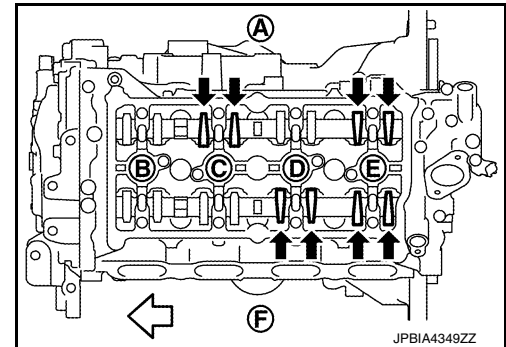
- c. Set No. 4 cylinder at TDC of its compression stroke.
- Rotate crankshaft pulley (1) one revolution (360 degrees) and align TDC mark (no paint) (B) to timing indicator (A) on front cover.

- C : White paint mark (Not use for service)



- By referring to the figure, measure the valve clearance at locations marked "x" as shown in the table below [locations indicated with black arrow (↖) in the figure] with a feeler gauge.

- A : Exhaust side  
 B : No. 1 cylinder  
 C : No. 2 cylinder  
 D : No. 3 cylinder  
 E : No. 4 cylinder  
 F : Intake side  
 ↖ : Engine front



Measuring position		No. 1 CYL.	No. 2 CYL.	No. 3 CYL.	No. 4 CYL.
No. 4 cylinder at compression TDC	EXH		x		x
	INT			x	x

3. If out of standard, perform adjustment. Refer to "ADJUSTMENT".

## ADJUSTMENT

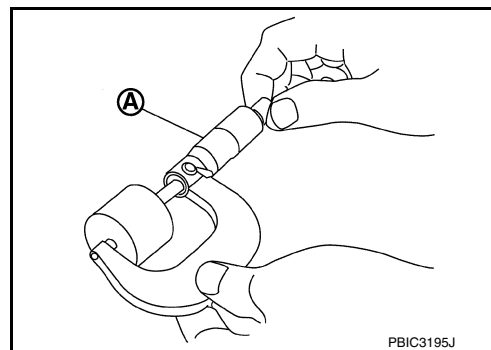
- Perform adjustment depending on selected head thickness of valve lifter.
- Remove camshaft. Refer to [EM-88. "Exploded View"](#).
  - Remove valve lifters at the locations that are out of the standard.

## CAMSHAFT VALVE CLEARANCE

< BASIC INSPECTION >

[MR FOR NISMO RS MODELS]

3. Measure the center thickness of the removed valve lifters with a micrometer (A).



4. Use the equation below to calculate valve lifter thickness for replacement.

**Valve lifter thickness calculation:**  $t = t_1 + (C_1 - C_2)$

**t** = Valve lifter thickness to be replaced

**t<sub>1</sub>** = Removed valve lifter thickness

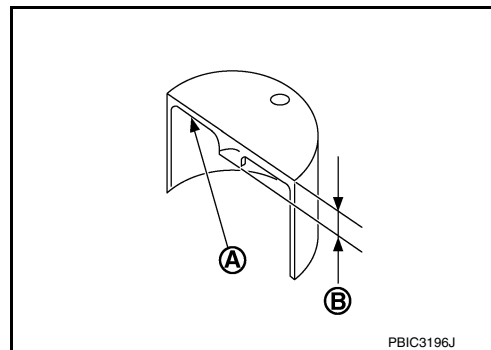
**C<sub>1</sub>** = Measured valve clearance

**C<sub>2</sub>** = Standard valve clearance:

Intake : 0.28 mm (0.011 in)

Exhaust : 0.29 mm (0.011 in)

- Thickness of new valve lifter (B) can be identified by stamp mark (A) on the reverse side (inside the cylinder).
- Stamp mark "302" indicates 3.02 mm (0.1189 in) in thickness.



### NOTE:

Available thickness of valve lifter: 26 sizes range 3.00 to 3.50 mm (0.1181 to 0.1378 in) in steps of 0.02 mm (0.0008 in) (when manufactured at factory). Refer to [EM-140, "Camshaft"](#).

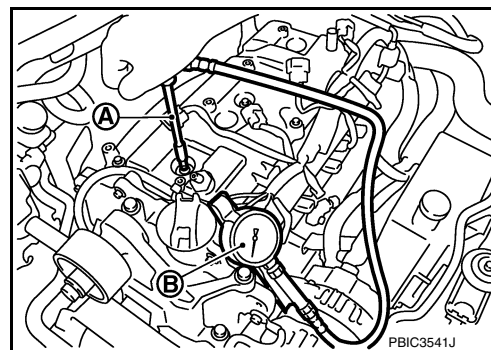
5. Install the selected valve lifter.
6. Install camshaft. Refer to [EM-88, "Exploded View"](#).
7. Install timing chain and related parts. Refer to [EM-76, "Exploded View"](#).
8. Manually rotate crankshaft pulley a few rotations.
9. Check that the valve clearances is within the standard. Refer to "INSPECTION".
10. Install remaining parts in the reverse order of removal.
11. Warm up the engine, and check for unusual noise and vibration.

## COMPRESSION PRESSURE

### Inspection

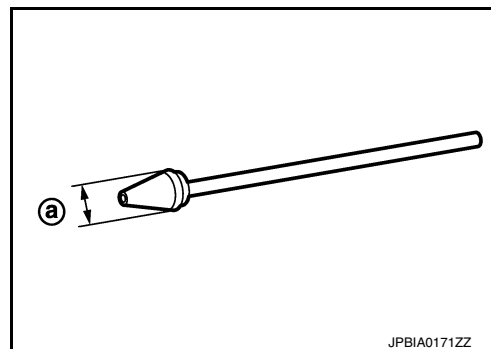
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1. Warm up engine thoroughly. Then, stop it.
2. Release fuel pressure. Refer to [EC-166, "Work Procedure"](#).
3. Remove ignition coil and spark plug from each cylinder. Refer to [EM-60, "Exploded View"](#).
4. Connect engine tachometer (not required in use of CONSULT).
5. Install compression gauge (B) with an adapter (A) (commercial service tool) onto spark plug hole.



- Use the adapter whose picking up end inserted to spark plug hole is smaller than 20 mm (0.79 in) in diameter. Otherwise, it may be caught by cylinder head during removal.

a : 20 mm (0.79 in)



6. With accelerator pedal fully depressed, turn ignition switch to "START" for cranking. When the gauge pointer stabilizes, read the compression pressure and the engine rpm. Perform these steps to check each cylinder.

**Compression pressure** : Refer to [EM-139, "General Specification"](#).

#### CAUTION:

**Always use a fully charged battery to obtain the specified engine speed.**

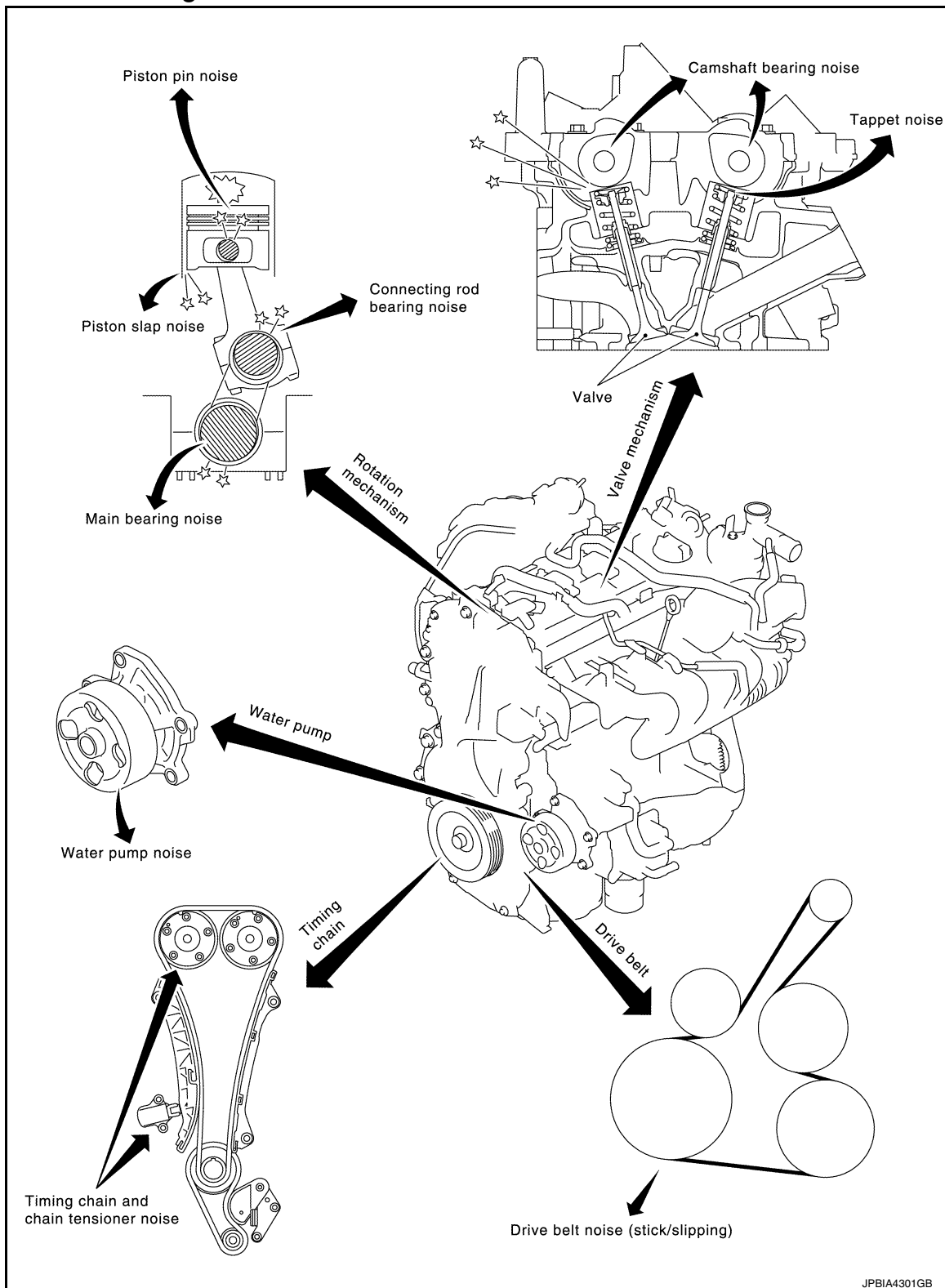
- If the engine speed is out of the specified range, check battery liquid for proper gravity. Check the engine speed again with normal battery gravity.
  - If compression pressure is below minimum value, check valve clearances, and parts associated with combustion chamber (valve, valve seat, piston, piston ring, cylinder bore, cylinder head, and cylinder head gasket). After the checking, measure compression pressure again.
  - If some cylinder has low compression pressure, pour small amount of engine oil into the spark plug hole of the cylinder to recheck it for compression.
  - If the added engine oil improves the compression, piston rings may be worn out or damaged. Check piston rings and replace if necessary.
  - If the compression pressure remains at low level despite the addition of engine oil, valves may be malfunctioning. Check valves for damage. Replace valve or valve seat accordingly.
  - If two adjacent cylinders have respectively low compression pressure and their compression remains low even after the addition of engine oil, cylinder head gaskets are leaking. In such a case, replace cylinder head gaskets.
7. After inspection is completed, install removed parts.
  8. Start the engine, and check that the engine runs smoothly.
  9. Perform trouble diagnosis. If DTC appears, erase it. Refer to [EC-180, "Description"](#).

## SYMPTOM DIAGNOSIS

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

#### NVH troubleshooting Chart

INFOID:000000012197239



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

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[MR FOR NISMO RS MODELS]

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	Reference page
		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	<a href="#">EM-14</a>
	Rattle	C	A	—	A	B	C	Camshaft bearing noise	Camshaft journal oil clearance Camshaft runout	<a href="#">EM-140</a>
Crank-shaft pulley Cylinder block (Side of engine) Oil pan	Slap or knock	—	A	—	B	B	—	Piston pin noise	Piston to piston pin oil clearance Connecting rod bushing oil clearance	<a href="#">EM-144</a>
	Slap or rap	A	—	—	B	B	A	Piston slap noise	Piston to cylinder bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion	<a href="#">EM-144</a>
	Knock	A	B	C	B	B	B	Connecting rod bearing noise	Connecting rod bushing oil clearance Connecting rod bearing oil clearance	<a href="#">EM-144</a> <a href="#">EM-148</a>
	Knock	A	B	—	A	B	C	Main bearing noise	Main bearing oil clearance Crankshaft runout	<a href="#">EM-148</a> <a href="#">EM-144</a>
Front of engine Front cover	Tapping or ticking	A	A	—	B	B	B	Timing chain and chain tensioner noise	Timing chain cracks and wear Timing chain tensioner operation	<a href="#">EM-86</a> <a href="#">EM-76</a>
Front of engine	Squeaking or fizzing	A	B	—	B	—	C	Drive belt (Sticking or slipping)	Drive belt deflection	<a href="#">EM-20</a>
	Creaking	A	B	A	B	A	B	Drive belt (Slipping)	Idler pulley bearing operation	
	Squall Creak	A	B	—	B	A	B	Water pump noise	Water pump operation	<a href="#">CO-21</a>

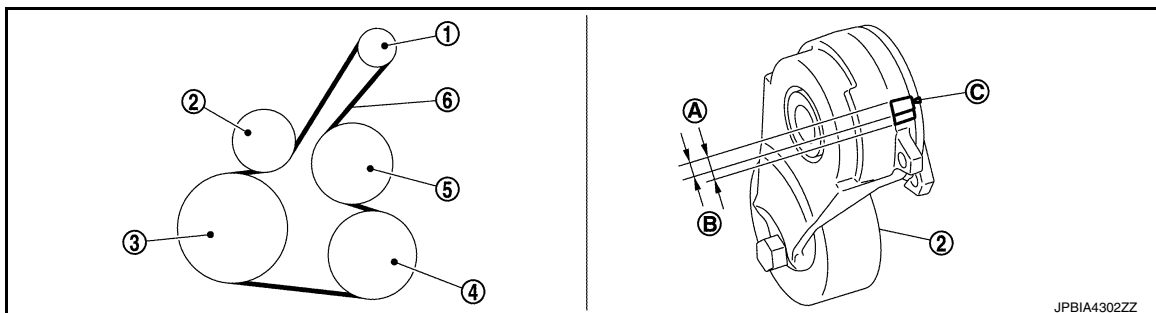
A: Closely related B: Related C: Sometimes related —: Not related

## PERIODIC MAINTENANCE

### DRIVE BELT

#### Exploded View

INFOID:0000000012197240



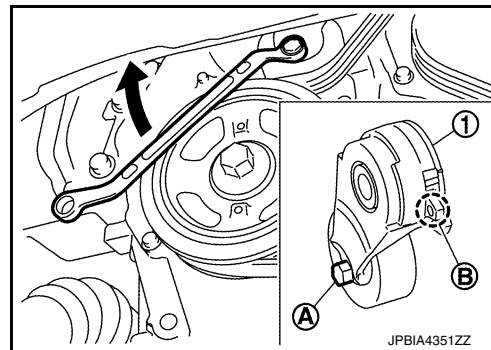
- |                       |   |                      |
|-----------------------|---|----------------------|
| 1. Alternator         | 2. Drive belt auto-tensioner              | 3. Crankshaft pulley |
| 4. A/C compressor     | 5. Water pump                             | 6. Drive belt        |
| A. Possible use range | B. Range when new drive belt is installed | C. Indicator         |

### Removal and Installation

INFOID:0000000012197241

#### REMOVAL

- Turn the steering wheel to the right.
- Remove the front fender protector (RH) front side bolts and clips. And keep a service area. Refer to [EXT-31, "Exploded View"](#).
- Hold the hexagonal part (A) of drive belt auto-tensioner (1) with a wrench securely. Then move the wrench handle in the direction of arrow (loosening direction of tensioner).  
**CAUTION:**  
**Avoid placing hand in a location where pinching may occur if the holding tool accidentally comes off.**
- Insert a rod approximately 6 mm (0.24 in) in diameter such as short-length screwdriver into the hole (B) of the retaining boss to fix drive belt auto-tensioner.  
• Keep drive belt auto-tensioner pulley arm locked after drive belt is removed.
- Remove drive belt.



#### INSTALLATION

- Install drive belt.  
**CAUTION:**  
• **Confirm drive belt is completely set to pulleys.**  
• **Check for engine oil, working fluid and engine coolant are not adhered to drive belt and each pulley groove.**
- Release drive belt auto-tensioner, and apply tension to drive belt.
- Turn crankshaft pulley clockwise several times to equalize tension between each pulley.
- Confirm tension of drive belt at indicator (notch on fixed side) is within the possible use range. Refer to [EM-20, "Exploded View"](#).



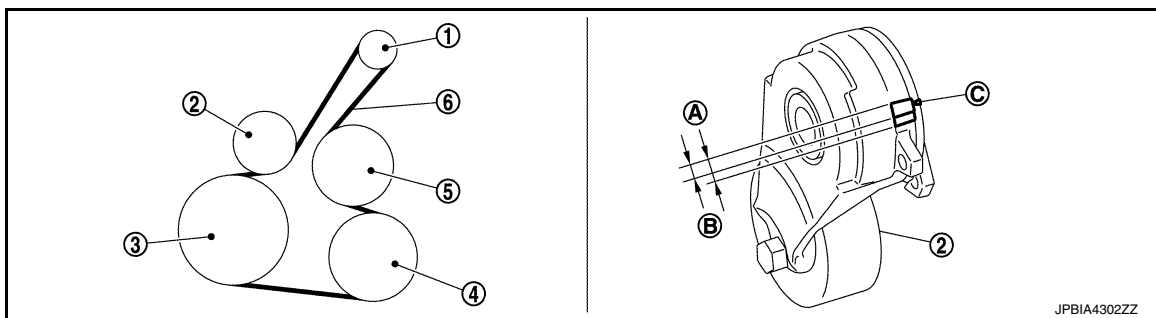
# DRIVE BELT

< PERIODIC MAINTENANCE >

[MR FOR NISMO RS MODELS]

## Inspection

INFOID:0000000012197242



- |                       |   |                      |
|-----------------------|---|----------------------|
| 1. Alternator         | 2. Drive belt auto-tensioner              | 3. Crankshaft pulley |
| 4. A/C compressor     | 5. Water pump                             | 6. Drive belt        |
| A. Possible use range | B. Range when new drive belt is installed | C. Indicator         |

### WARNING:

**Perform this step when engine is stopped.**

- Check that the indicator (C) (notch on fixed side) of drive belt auto-tensioner is within the possible use range (A) in the figure.

### NOTE:

- Check the drive belt auto-tensioner indication when the engine is cold.
- When new drive belt is installed, the indicator (notch on fixed side) should be within the range (B) in the figure.
- Visually check entire drive belt for wear, damage or cracks.
- If the indicator (notch on fixed side) is out of the possible use range or belt is damaged, replace drive belt.

## Adjustment

INFOID:0000000012197243

Refer to : [EM-139, "Drive Belt"](#).

# AIR CLEANER FILTER

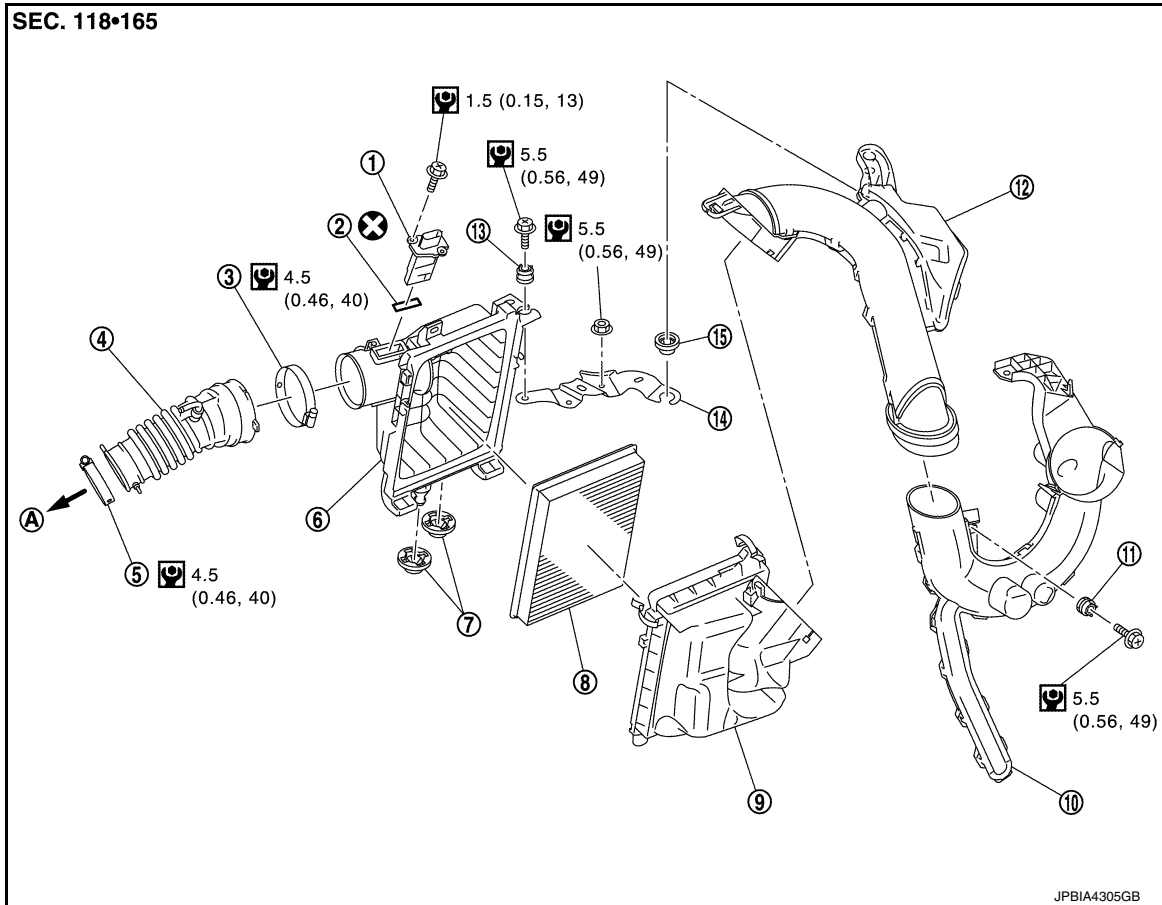
< PERIODIC MAINTENANCE >

[MR FOR NISMO RS MODELS]

## AIR CLEANER FILTER

### Exploded View

INFOID:0000000012197244



- |                            |                       |                               |
|----------------------------|-----------------------|-------------------------------|
| 1. Mass air flow sensor    | 2. Gasket             | 3. Clamp                      |
| 4. Air duct (suction side) | 5. Clamp              | 6. Air cleaner cover assembly |
| 7. Mounting rubber         | 8. Air cleaner filter | 9. Air cleaner body assembly  |
| 10. Air duct inlet (lower) | 11. Grommet           | 12. Air duct inlet (upper)    |
| 13. Grommet                | 14. Bracket           | 15. Mounting rubber           |
| A. To turbocharger         |                       |                               |

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

## Removal and Installation

INFOID:0000000012197245

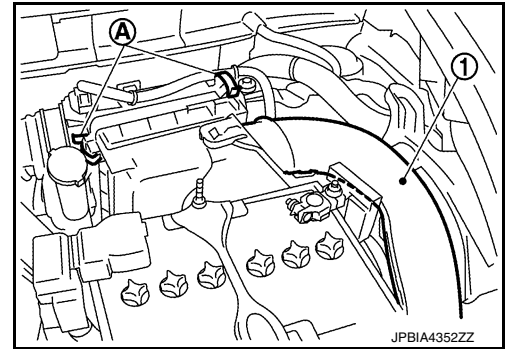
### REMOVAL

# AIR CLEANER FILTER

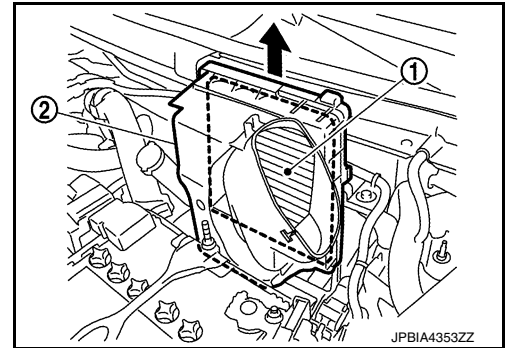
## < PERIODIC MAINTENANCE >

[MR FOR NISMO RS MODELS]

1. Remove air duct inlet (upper) (1).
2. Unhook the tabs (A) of both ends of the air cleaner cover.



3. Remove the air cleaner filter (1) and air cleaner body (2) from the air cleaner case.
4. Remove the air cleaner filter from the air cleaner body.



## INSTALLATION

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

- Fixing clips shall be fixed after inserting air cleaner body protrusion to air cleaner case notch hole.
- Make sure that whether air cleaner body has been firmly installed by shaking it.

## Inspection (Viscous Paper Type)

INFOID:0000000012197246

## INSPECTION AFTER REMOVAL

Examine with eyes that there is no stain, clogging, or damage on air cleaner element.

- Remove dusts (such as dead leaves) on air cleaner element surface and inside cleaner case.
- If clogging or damage is observed, replace the air cleaner element.

### **CAUTION:**

**Never clean the viscous paper type air cleaner element by blowing as there is a risk of deterioration of its performance**

## MAINTENANCE INTERVAL

Refer to [MA-7, "Introduction of Periodic Maintenance"](#).

# SPARK PLUG

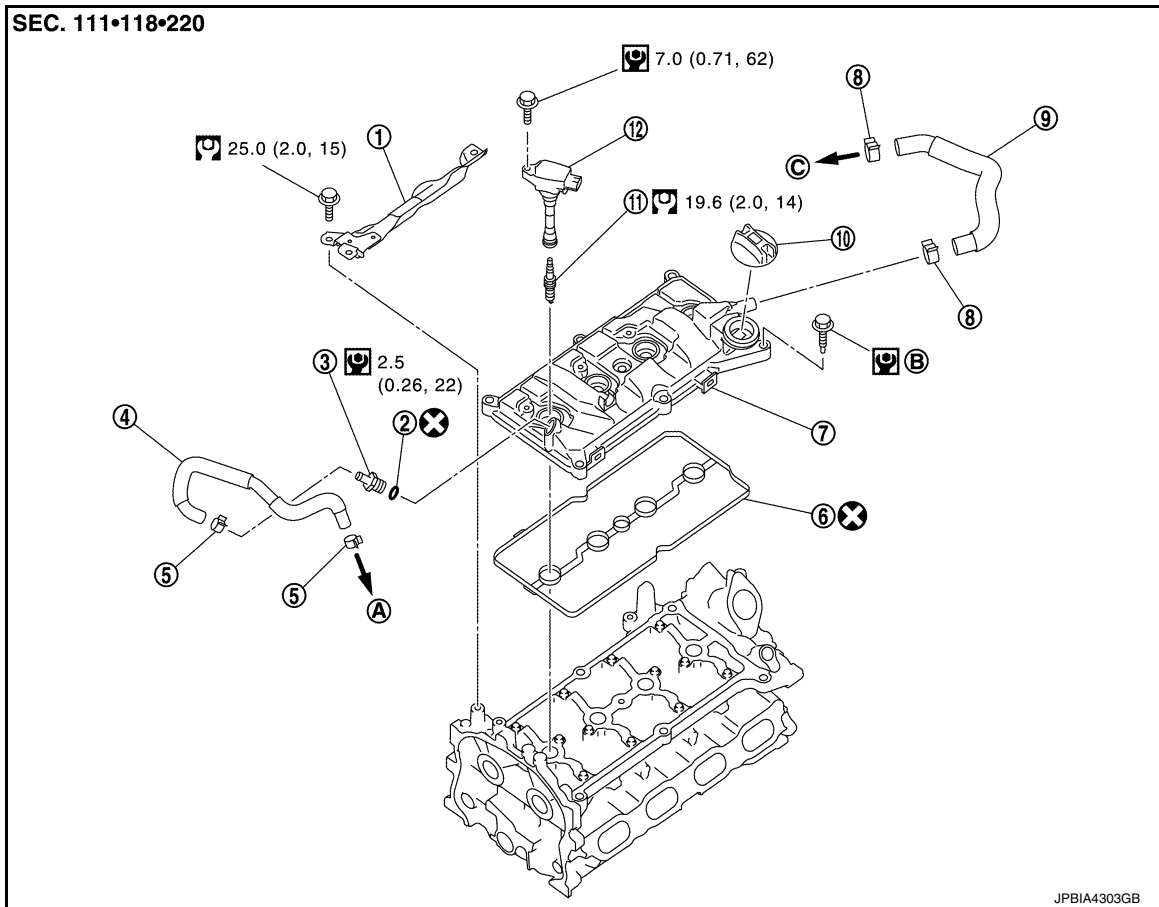
< PERIODIC MAINTENANCE >

[MR FOR NISMO RS MODELS]

## SPARK PLUG

### Exploded View

INFOID:000000012197247



- |                           |   |                        |
|---------------------------|---|------------------------|
| 1. Rocker cover protector | 2. O-ring   | 3. PCV valve           |
| 4. PCV hose               | 5. Clamp  | 6. Rocker cover gasket |
| 7. Rocker cover           | 8. Clamp  | 9. PCV hose            |
| 10. Oil filler cap        | 11. Spark plug  | 12. Ignition coil      |
| A. To intake manifold     | B. Comply with the assembly procedure when tightening. Refer to <a href="#">EM-60</a> | C. To air duct         |

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

## Removal and Installation

INFOID:000000012197248

### REMOVAL

1. Remove engine cover. Refer to [EM-26, "Exploded View"](#).
2. Remove air inlet tube assembly. Refer to [EM-32, "Exploded View"](#).
3. Remove ignition coil.

# SPARK PLUG

## < PERIODIC MAINTENANCE >

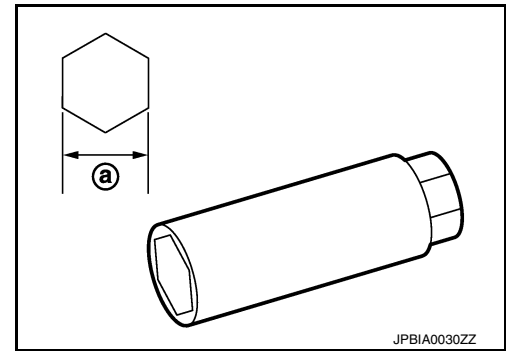
[MR FOR NISMO RS MODELS]

4. Remove spark plug with a spark plug wrench (commercial service tool).

a : 14 mm (0.55 in)

### CAUTION:

Never drop or shock spark plug.



## INSTALLATION

Install in the reverse order of removal.

## Inspection

INFOID:000000012197249

## INSPECTION AFTER REMOVAL

Use the standard type spark plug for normal condition.

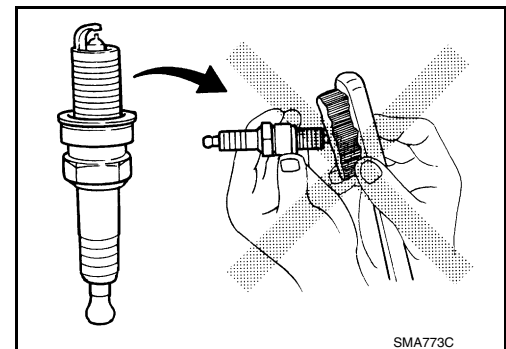
Spark plug (Standard type) : Refer to [EM-139, "Spark Plug"](#).

### CAUTION:

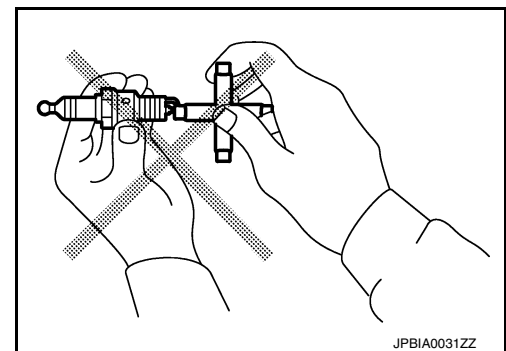
- Never drop or shock spark plug.
- Never use a wire brush for cleaning.
- If plug tip is covered with carbon, spark plug cleaner may be used.

Cleaner air pressure : Less than 588 kPa (6 kg/cm<sup>2</sup>, 85 psi)

Cleaning time : Less than 20 seconds



- Spark plug gap adjustment is not required between replacement intervals.
- Measure spark plug gap. when it exceeds the limit, replace spark plug even if it is with in the specified replacement mileage. Refer to [EM-139, "Spark Plug"](#).

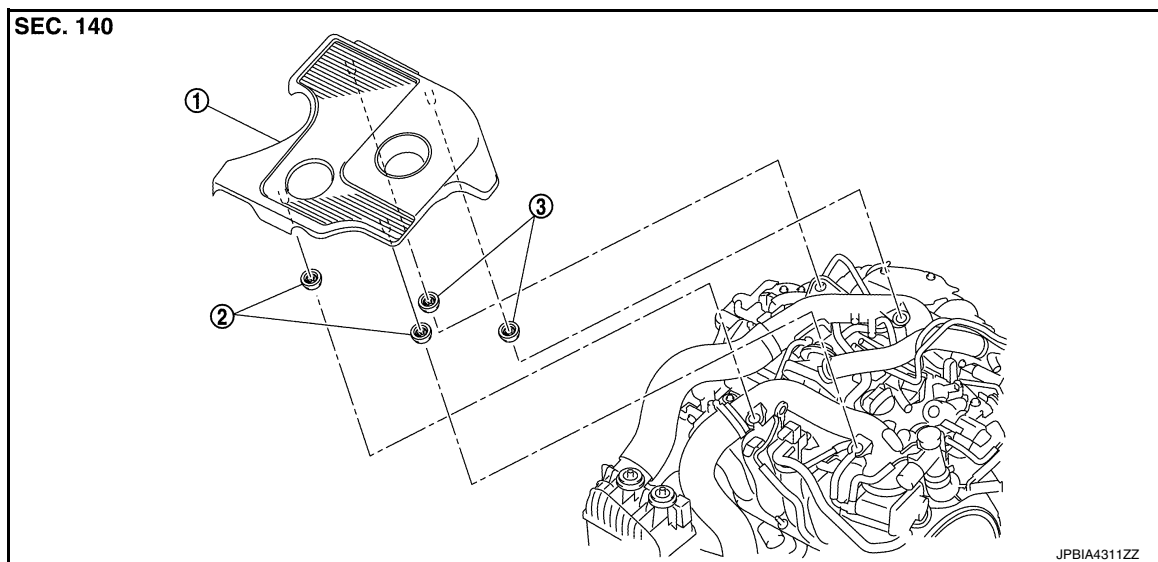


## REMOVAL AND INSTALLATION

### ENGINE COVER

#### Exploded View

INFOID:000000012197250



1. Engine cover

2. Mounting rubber (Black)

3. Mounting rubber (Gray)

### Removal and Installation

INFOID:000000012197251

#### REMOVAL

Remove engine cover.

#### **CAUTION:**

**Never damage or scratch engine cover when installing or removing.**

#### INSTALLATION

Install in the reverse order of removal.

# AIR CLEANER AND AIR DUCT

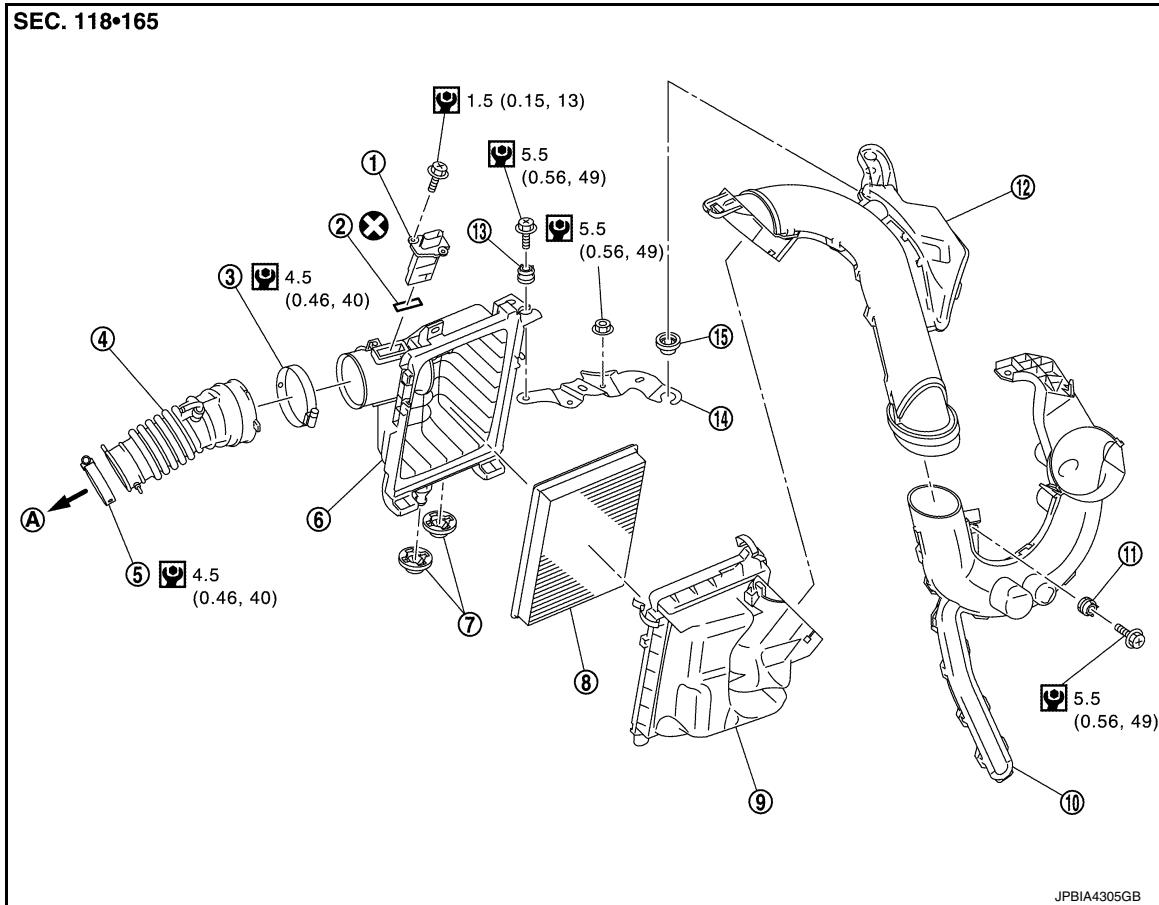
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## AIR CLEANER AND AIR DUCT

### Exploded View

INFOID:0000000012197252



- |                            |                       |                               |
|----------------------------|-----------------------|-------------------------------|
| 1. Mass air flow sensor    | 2. Gasket             | 3. Clamp                      |
| 4. Air duct (suction side) | 5. Clamp              | 6. Air cleaner cover assembly |
| 7. Mounting rubber         | 8. Air cleaner filter | 9. Air cleaner body assembly  |
| 10. Air duct inlet (lower) | 11. Grommet           | 12. Air duct inlet (upper)    |
| 13. Grommet                | 14. Bracket           | 15. Mounting rubber           |

A. To turbocharger

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

### Removal and Installation

INFOID:0000000012197253

#### REMOVAL

##### NOTE:

Mass air flow sensor is removable under the car-mounted condition.

1. Remove engine cover. Refer to [EM-26, "Exploded View"](#).
2. Remove air duct inlet (upper).
3. Remove the air cleaner filter from the air cleaner case.
4. Disconnect mass air flow sensor harness connector, and remove harness clamp from air cleaner body.
5. Remove air cleaner body assembly.
6. Remove the air duct (suction side).
  - Add matching marks if necessary for easier installation.

## AIR CLEANER AND AIR DUCT

### < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

7. Remove air cleaner cover assembly.
8. Remove mass air flow sensor from air cleaner cover, if necessary.

**CAUTION:**

Handle the mass air flow sensor with following cares.

- Never shock the mass air flow sensor.
- Never disassemble the mass air flow sensor.
- Never touch the sensor of the mass air flow sensor.

9. Remove air duct inlet (lower) with the following procedure.
  - a. Remove fender protector (LH). Refer to [EXT-31, "Exploded View"](#).
  - b. Remove air duct inlet (lower).

### INSTALLATION

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

- Align marks. Attach each joint. Screw clamps firmly.
- Fixing clips shall be fixed after inserting air cleaner body assembly protrusion to air cleaner case botch hole.
- Make sure whether air cleaner body has been firmly installed by shaking it.

### Inspection

INFOID:0000000012197254

### INSPECTION AFTER REMOVAL

Inspect air duct and resonator assembly for crack or tear.

- If anything found, replace air duct and resonator assembly.



# INTAKE MANIFOLD

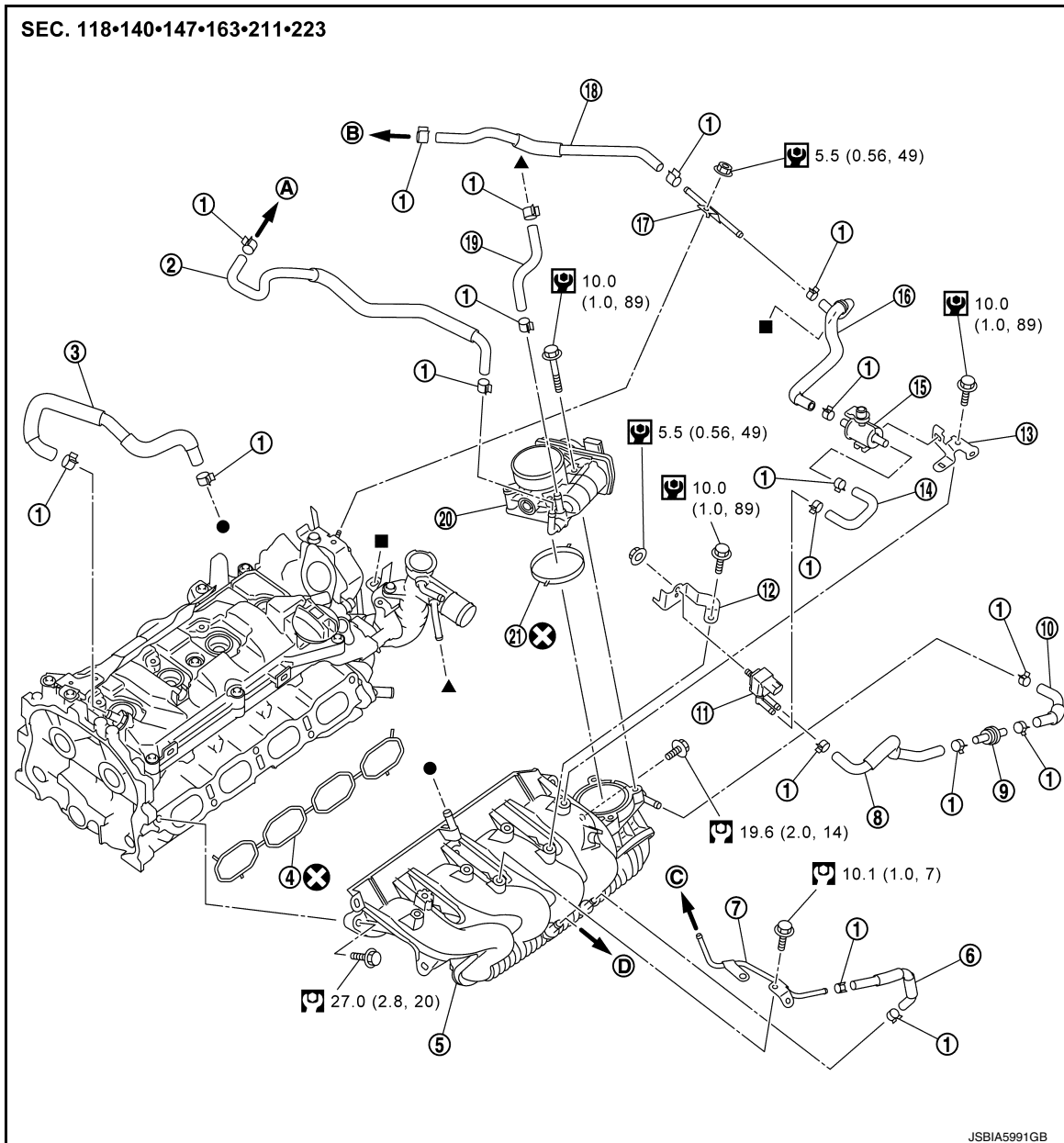
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## INTAKE MANIFOLD


### Exploded View

INFOID:000000012197255



- |   |                                      |                                |
|---|--------------------------------------|--------------------------------|
| 1. Clamp  | 2. Water hose                        | 3. PCV hose                    |
| 4. Gasket   | 5. Intake manifold                   | 6. Vacuum tube                 |
| 7. Vacuum hose (with check valve)                     | 8. Vacuum hose                       | 9. Vacuum gallery assembly     |
| 10. EVAP hose   | 11. EVAP check valve                 | 12. EVAP hose                  |
| 13. EVAP canister purge volume control solenoid valve | 14. Bracket                          | 15. Bracket                    |
| 16. EVAP hose   | 17. EVAP service port                | 18. EVAP hose                  |
| 19. EVAP tube   | 20. EVAP hose                        | 21. Water hose                 |
| 22. Electric throttle control actuator                | 23. Gasket                           |                                |
| A. To turbocharger                                    | B. To centralized under-floor piping | C. To recirculation valve hose |
| D. To break booster hose                              |                                      |                                |

□ : N·m (kg-m, ft-lb)

 : N·m (kg-m, in-lb)

 : Always replace after every disassembly.

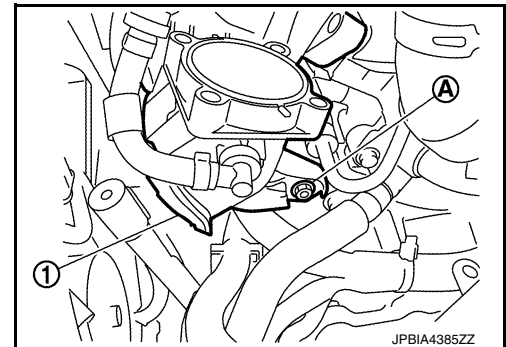
●, ▲, ■ : Indicates that the part is connected at points with same symbols in actual vehicle.

## Removal and Installation


INFOID:0000000012197256

### REMOVAL

1. Remove engine cover. Refer to [EM-26, "Exploded View"](#).
2. Pull out oil level gauge.  
**CAUTION:**  
**Cover the oil level gauge guide openings to avoid entry of foreign materials.**
3. Disconnect turbocharger boost sensor (with intake air temperature sensor 2) harness connector. Refer to [EM-32, "Exploded View"](#).
4. Remove air inlet tube assembly. Refer to [EM-32, "Exploded View"](#).
5. Disconnect water hoses from electric throttle control actuator as follows:
  - Attach plug to prevent engine coolant leakage when engine coolant is not drained. Refer to [CO-10, "Draining"](#).**CAUTION:**  
**Perform this step when the engine is cold.**  
**NOTE:**  
This step is not required when removing only intake manifold.
6. Disconnect electric throttle control actuator harness connector.
7. Remove electric throttle control actuator.  
**CAUTION:**
  - Handle carefully to avoid any shock to electric throttle control actuator.
  - Never disassemble electric throttle control actuator.
8. Remove EVAP vacuum tank.
9. Disconnect EVAP canister purge volume control solenoid valve harness connector, and then remove bracket with EVAP canister purge volume control solenoid valve.
10. Remove vacuum gallery.
11. Disconnect PCV hose (intake manifold side).
12. Remove intake manifold (1) with the following procedure.
  - Loosen and remove intake manifold mounting bolt (A).



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

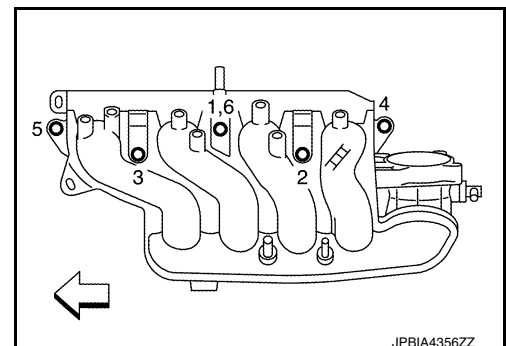
 : Engine front

**NOTE:**

Disregard the numerical order No.6 in removal.

**CAUTION:**

**Cover engine openings to avoid entry of foreign materials.**



# INTAKE MANIFOLD

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## INSTALLATION

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

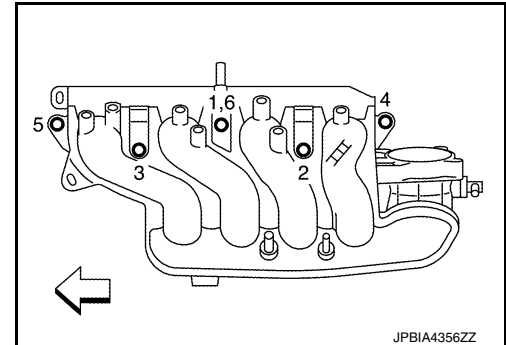
### Intake Manifold

1. Check if gasket is not dropped from the installation groove of intake manifold.
2. Install intake manifold with the following procedure:
  - a. Tighten in numerical order as shown in the figure.

⇐ : Engine front

#### NOTE:

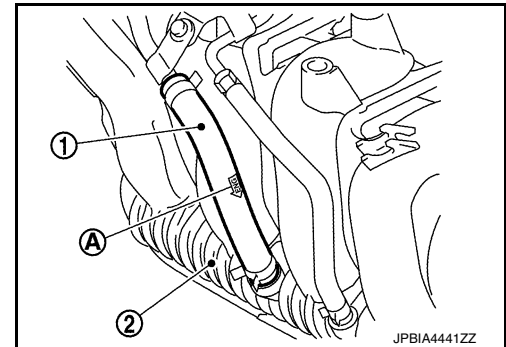
- Tighten bolt the No.1 in two steps.
- The numerical order No.6 shows the second step.



3. Install in the reverse order of removal after this step.

#### CAUTION:

Since check valve is built-in inside vacuum hose (1), install the vacuum hose fitting the arrow (A) to intake manifold side (2).



### Electric Throttle Control Actuator

- Tighten bolts of electric throttle control actuator equally and diagonally in several steps.
- Perform "Throttle Valve Closed Position Learning" after repair when removing harness connector of the electric throttle control actuator. Refer to [EC-161. "Work Procedure"](#).
- Perform "Throttle Valve Closed Position Learning" and "Idle Air Volume Learning" after repair when replacing electric throttle control actuator. Refer to [EC-161. "Work Procedure"](#) and [EC-162. "Work Procedure"](#).

## Inspection

INFOID:000000012197257

## INSPECTION AFTER REMOVAL

### Vacuum hose (with check valve)

Check that the check valve. Refer to [BR-47. "Inspection"](#).

# CHARGE AIR COOLER

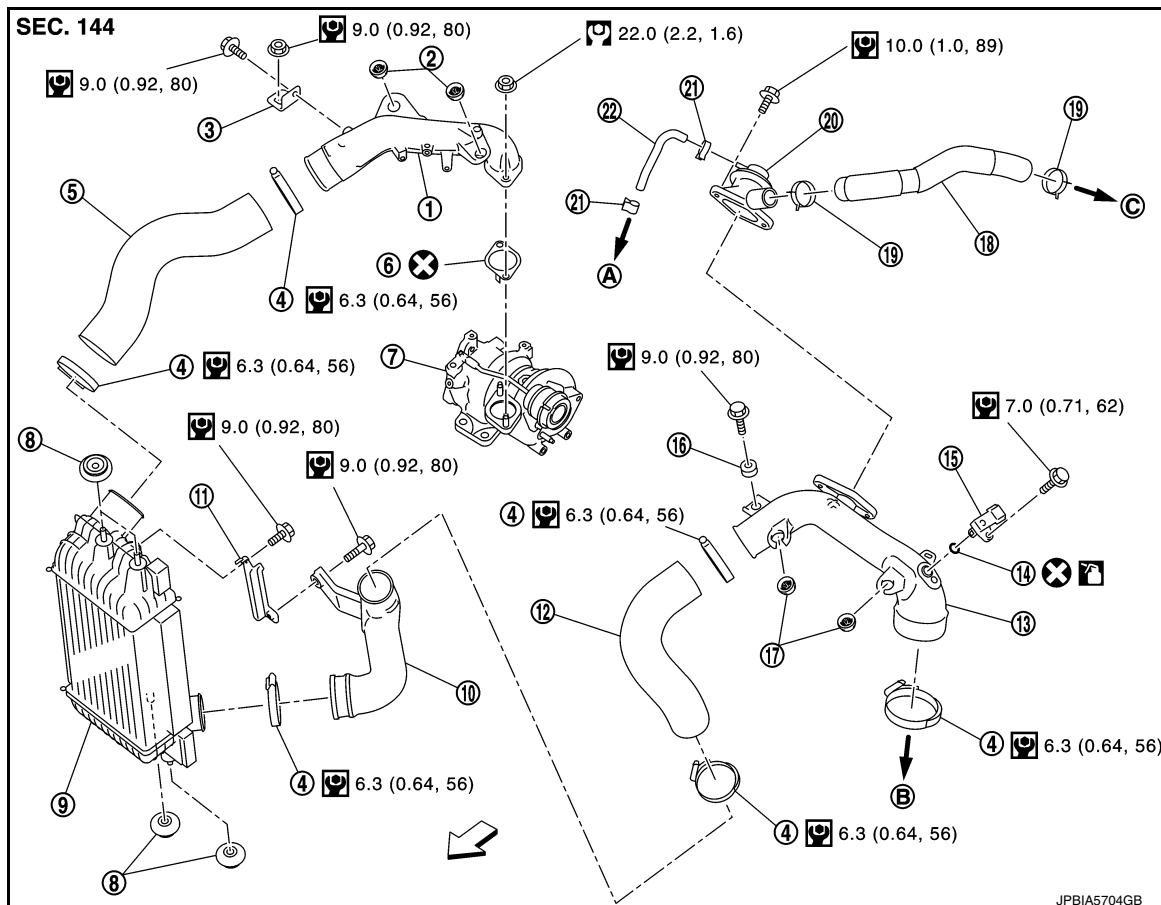
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## CHARGE AIR COOLER

### Exploded View

INFOID:000000012197258



- |                               |  |                               |
|-------------------------------|--|-------------------------------|
| 1. Air inlet tube 3           | 2. Mounting rubber (gray)                | 3. Air inlet tube bracket     |
| 4. Clamp                      | 5. Air inlet hose 2                      | 6. Gasket                     |
| 7. Turbocharger               | 8. Mounting rubber                       | 9. Charge air cooler          |
| 10. Air inlet tube 2          | 11. Air inlet tube bracket               | 12. Air inlet hose 1          |
| 13. Air inlet tube 1          | 14. O-ring                               | 15. Turbocharger boost sensor |
| 16. Grommet                   | 17. Mounting rubber (black)              | 18. Air inlet hose            |
| 19. Clamp                     | 20. Recirculation valve                  | 21. Clamp                     |
| 22. Vacuum hose               |  |                               |
| A. To vacuum gallery assembly | B. To electric throttle control actuator | C. To turbocharger            |

⇐ : Vehicle front

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

## Removal and Installation

INFOID:000000012197259

### REMOVAL

Air inlet hose 1, Air inlet tube 1 and Recirculation valve

1. Remove engine cover. Refer to [EM-26. "Exploded View"](#).

# CHARGE AIR COOLER

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

2. Make matching marks on each connecting part for reference at installation.
3. Remove recirculation hose and vacuum hose to recirculation valve.
4. Loosen clamp, and then remove air inlet hose 1.
5. Remove recirculation valve and turbocharger boost sensor from air inlet tube 1, if necessary.
6. loosen clamp, and then remove air inlet hose 1.

Air inlet tube 3

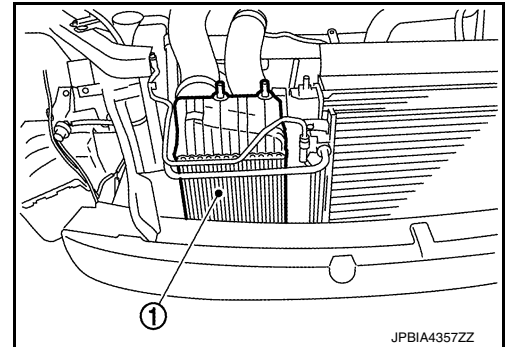
1. Remove engine cover. Refer to [EM-26, "Exploded View"](#).
2. Make matching marks on each connecting part for reference at installation.
3. Loosen clamp, and then remove air inlet tube 3.

Charge air cooler, Air inlet hose 2 and Air inlet tube 2

1. Remove front bumper. Refer to [EXT-12, "Exploded View"](#).
2. Remove radiator core support upper. Refer to [DLK-130, "MR16DDT : Exploded View"](#).
3. Make matching marks on each connecting part for reference at installation.
4. Remove air inlet hose 2.
5. Loosen air inlet tube 2 clamp, and then remove charge air cooler (1).

### CAUTION:

- Avoid interference between the charge air cooler and radiator.
- When removing charge air cooler, close opening on turbo charger and intake manifold with shop cloth or other suitable material.



6. Remove air inlet tube 2, if necessary.

## INSTALLATION

Install in the reverse order of removal paying attention to the following points:

### CAUTION:

**Do not reuse O-rings.**

- Apply a neutral detergent (fluid) to the joint between hoses and pipes (oil is not permissible).
- Pay attention to identification mark and direction.

## Inspection

INFOID:000000012197260

## INSPECTION AFTER REMOVAL

1. Check that the charge air cooler is not full of oil. In that case, clean it with cleaning agent and then let it dry.
2. Check air passages of charge air cooler core and fins for clogging, leaks or deformation. Clean or replace charge air cooler in necessary.
  - Be careful not to deform core fins.
  - For cleaning procedure of charge air cooler core, refer to [CO-18, "Inspection"](#).

# CATALYST

< REMOVAL AND INSTALLATION >

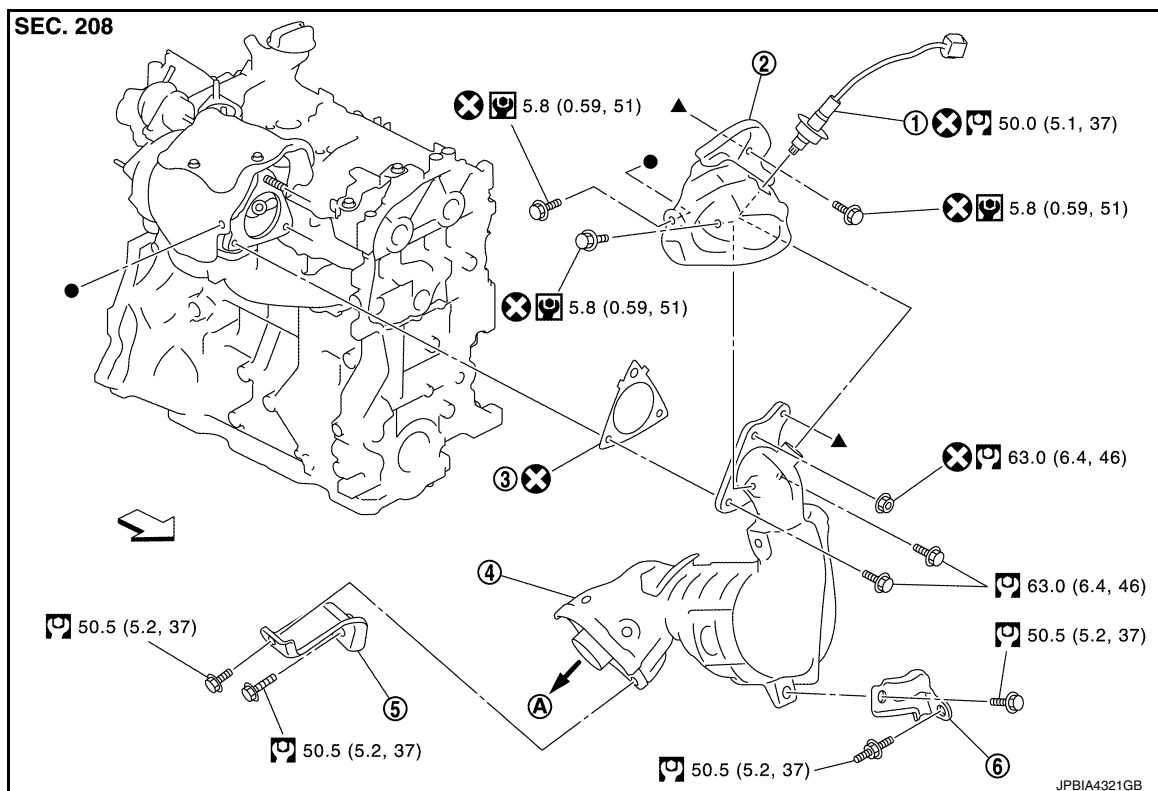
[MR FOR NISMO RS MODELS]

## CATALYST

2WD

2WD : Exploded View

INFOID:000000012197261



- |                       |   |   |
|-----------------------|---|---|
| 1. A/F sensor 1       | 2. Catalyst converter shroud upper            | 3. Gasket                                     |
| 4. Catalyst converter | 5. Catalyst converter support bracket (lower) | 6. Catalyst converter support bracket (upper) |

A. To exhaust system

Engine front

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

●, ▲ : Indicates that the parts is connected at points with same symbols in actual vehicle.

## 2WD : Removal and Installation

INFOID:000000012197262

### REMOVAL

- Remove engine cover. Refer to [EM-26, "Exploded View"](#).
- Remove cowl top extension. Refer to [EXT-29, "Exploded View"](#).
- Remove air duct (suction side). Refer to [EM-27, "Exploded View"](#).
- Remove air inlet tube 3. Refer to [EM-32, "Exploded View"](#).
- Remove front tube. Refer to [EX-5, "Exploded View"](#).
- Remove heat insulator. Refer to [FAX-27, "2WD : Exploded View"](#).
- Remove catalyst converter support bracket (upper and lower).
- Remove A/F sensor 1.
  - Using heated oxygen sensor wrench [SST: KV10117100 (J-3647-A)], remove A/F sensor 1.

**CAUTION:**

# CATALYST

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- **Never damage air fuel ratio sensor 1.**
- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

9. Remove catalyst converter shroud upper.
10. Remove bolts and nut of catalyst converter turbocharger side.
11. Remove catalyst converter. And keep a service area.

### NOTE:

Slide the catalyst converter in a lateral direction to obtain work space for removing exhaust manifold mounting nuts.

12. Remove heat insulator. Refer to [EM-40, "Exploded View"](#).
13. Disconnect water hoses from turbocharger as follows:
  - Attach plug to prevent engine coolant leakage when engine coolant is not drained.

### CAUTION:

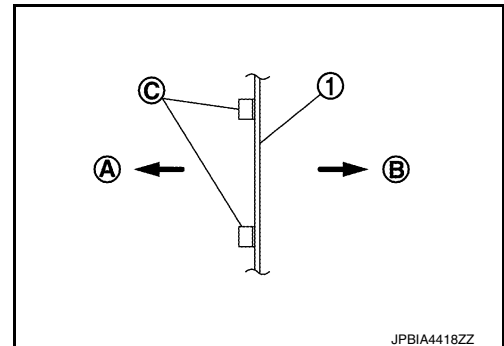
**Perform this step when the engine is cold.**

14. Remove oil supply tube and oil return pipe. Refer to [EM-40, "Exploded View"](#).
15. Remove exhaust manifold cover. Refer to [EM-44, "Exploded View"](#).
16. Remove exhaust manifold mounting nuts.
17. Remove exhaust manifold with turbocharger.
18. Remove gasket of exhaust manifold.
19. Remove catalyst converter.
20. Remove gasket.

## INSTALLATION

1. Install gasket between turbocharger and catalyst as shown in the figure.

- 1 : Gasket
- A : Turbocharger side
- B : Catalyst converter side
- C : Claw



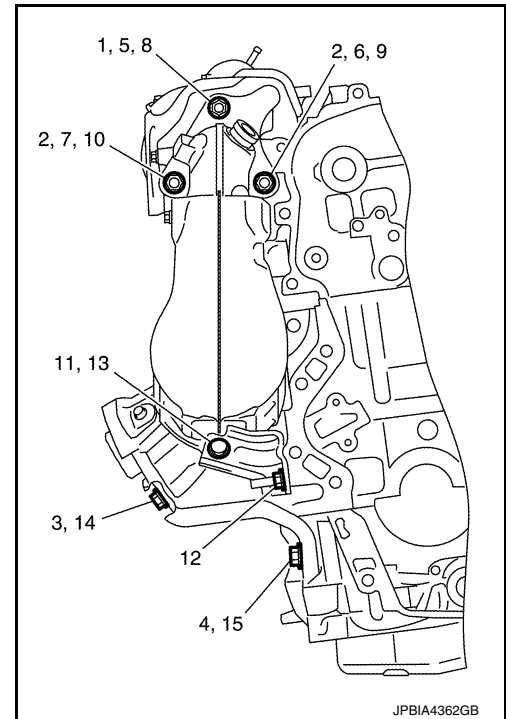
2. Install catalyst converter with the following procedure.

## CATALYST

### < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- Tighten in numerical order as shown in the figure.
- Install catalyst converter (base on stud position 1).
- Temporary assemble 2 (no priority).
- Temporary assemble 3, 4.
- Tightening 5, 6 and 7.
- Tightening again 8, 9 and 10.
- Temporary assemble 11.
- Tightening 12,13,14,and 15.



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

#### **A/F sensor 1**

- Using heated oxygen sensor wrench [SST: KV10117100 (J-3647-A)], install A/F sensor 1.

#### **CAUTION:**

- **Before installing a new sensors, clean exhaust system threads using heated oxygen sensor thread cleaner tool (Commercial Service Tool: J-43897-18 or J-43897-12) and apply anti-seize lubricant.**
- **Never apply excessive torque to sensor 2. Doing so may cause damage to sensor 2, resulting in the "MIL" illuminating.**
- **Prevent rust preventives from adhering to the sensor body.**

AWD



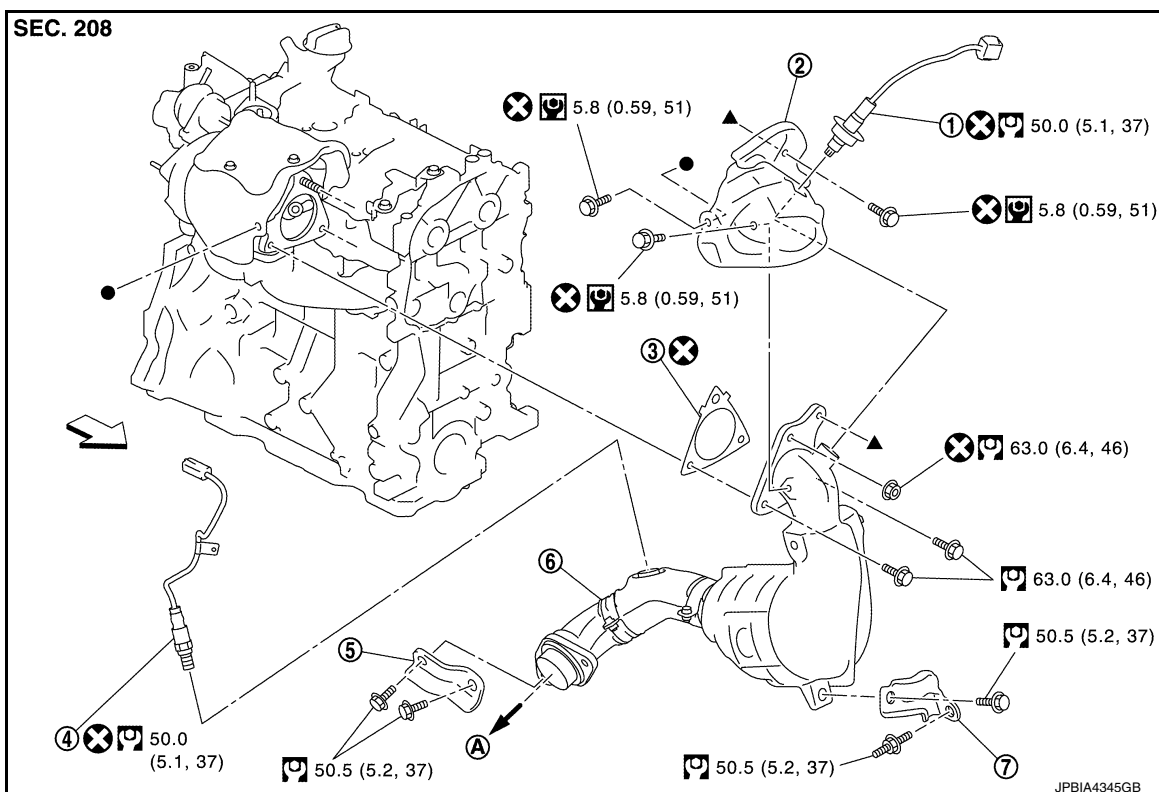
# CATALYST

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

INFOID:000000012197263

AWD : Exploded View



- |                           |   |                       |
|---------------------------|---|-----------------------|
| 1. A/F sensor 1           | 2. Catalyst converter shroud upper            | 3. Gasket             |
| 4. Heated oxygen sensor 2 | 5. Catalyst converter support bracket (lower) | 6. Catalyst converter |

7. Catalyst converter support bracket (upper)

A. To exhaust system

⇐ Engine front

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

●, ▲ : Indicates that the parts is connected at points with same symbols in actual vehicle.

AWD : Removal and Installation

INFOID:000000012197264

## REMOVAL

- Remove engine cover. Refer to [EM-26, "Exploded View"](#).
- Remove cowl top extension. Refer to [EXT-29, "Exploded View"](#).
- Remove air duct (suction side). Refer to [EM-27, "Exploded View"](#).
- Remove air inlet tube 3. Refer to [EM-32, "Exploded View"](#).
- Remove front tube. Refer to [EX-5, "Exploded View"](#).
- Remove heat insulator. Refer to [FAX-43, "AWD : Exploded View"](#).
- Remove catalyst converter support bracket (upper and lower).
- Remove A/F sensor 1 and heated oxygen sensor 2.
  - Use heated oxygen sensor wrench [SST: KV10117100 (J-3647-A)], remove A/F sensor 1 and heated oxygen sensor 2.

**CAUTION:**

# CATALYST

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- Never damage air fuel ratio sensor 1 and heated oxygen sensor 2.
- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

9. Remove catalyst converter shroud upper.
10. Remove bolts and nut of catalyst converter turbocharger side.
11. Remove catalyst converter. And keep a service area.

### NOTE:

Slide the catalyst converter in a lateral direction to obtain work space for removing exhaust manifold mounting nuts.

12. Remove heat insulator. Refer to [EM-40, "Exploded View"](#).
13. Disconnect water hoses from turbocharger as follows:
  - Attach plug to prevent engine coolant leakage when engine coolant is not drained.

### CAUTION:

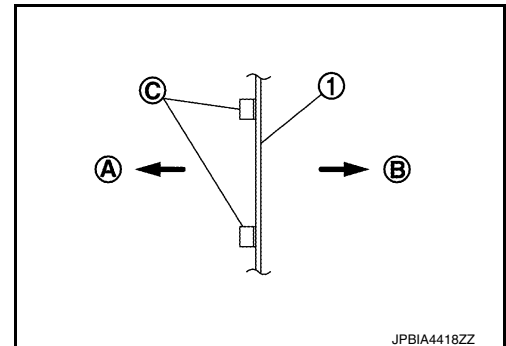
**Perform this step when the engine is cold.**

14. Remove oil supply tube and oil return pipe. Refer to [EM-40, "Exploded View"](#).
15. Remove exhaust manifold cover. Refer to [EM-44, "Exploded View"](#).
16. Remove exhaust manifold mounting nuts.
17. Remove exhaust manifold with turbocharger.
18. Remove gasket of exhaust manifold.
19. Remove catalyst converter.
20. Remove gasket.

## INSTALLATION

1. Install gasket between turbocharger and catalyst as shown in the figure.

- 1 : Gasket
- A : Turbocharger side
- B : Catalyst converter side
- C : Claw



JPBIA4418ZZ

2. Install catalyst converter with the following procedure.

## CATALYST

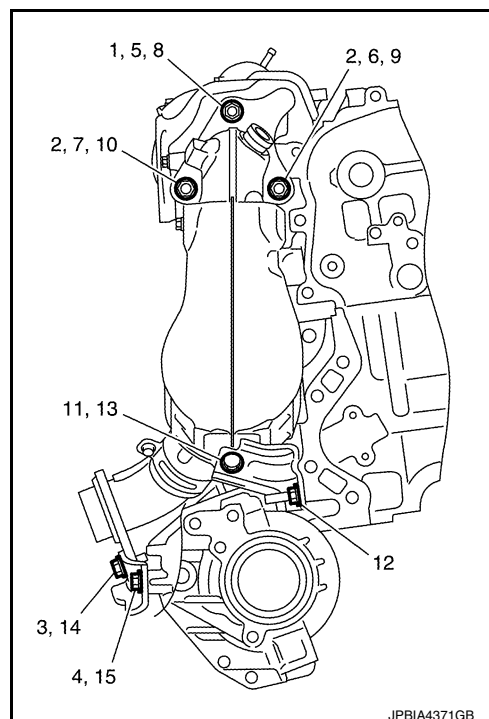
### < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- Tighten in numerical order as shown in the figure.
  - Install catalyst converter (base on stud position 1).
  - Temporary assemble 2 (no priority).
  - Temporary assemble 3, 4.
  - Tightening 5, 6 and 7.
  - Tightening again 8, 9 and 10.
  - Temporary assemble 11.
  - Tightening 12,13,14,and 15.
3. Note the following, and install in the reverse order of removal.
- A/F sensor 1 and Heated oxygen sensor 2**
- Using heated oxygen sensor wrench [SST: KV10117100 (J-3647-A)], install A/F sensor 1 and heated oxygen sensor 2.

**CAUTION:**

- Before installing a new sensors, clean exhaust system threads using heated oxygen sensor thread cleaner tool (Commercial Service Tool: J-43897-18 or J-43897-12) and apply anti-seize lubricant.
- Never apply excessive torque to sensors. Doing so may cause damage to sensors, resulting in the "MIL" illuminating.
- Prevent rust preventives from adhering to the sensor body.



# TURBOCHARGER

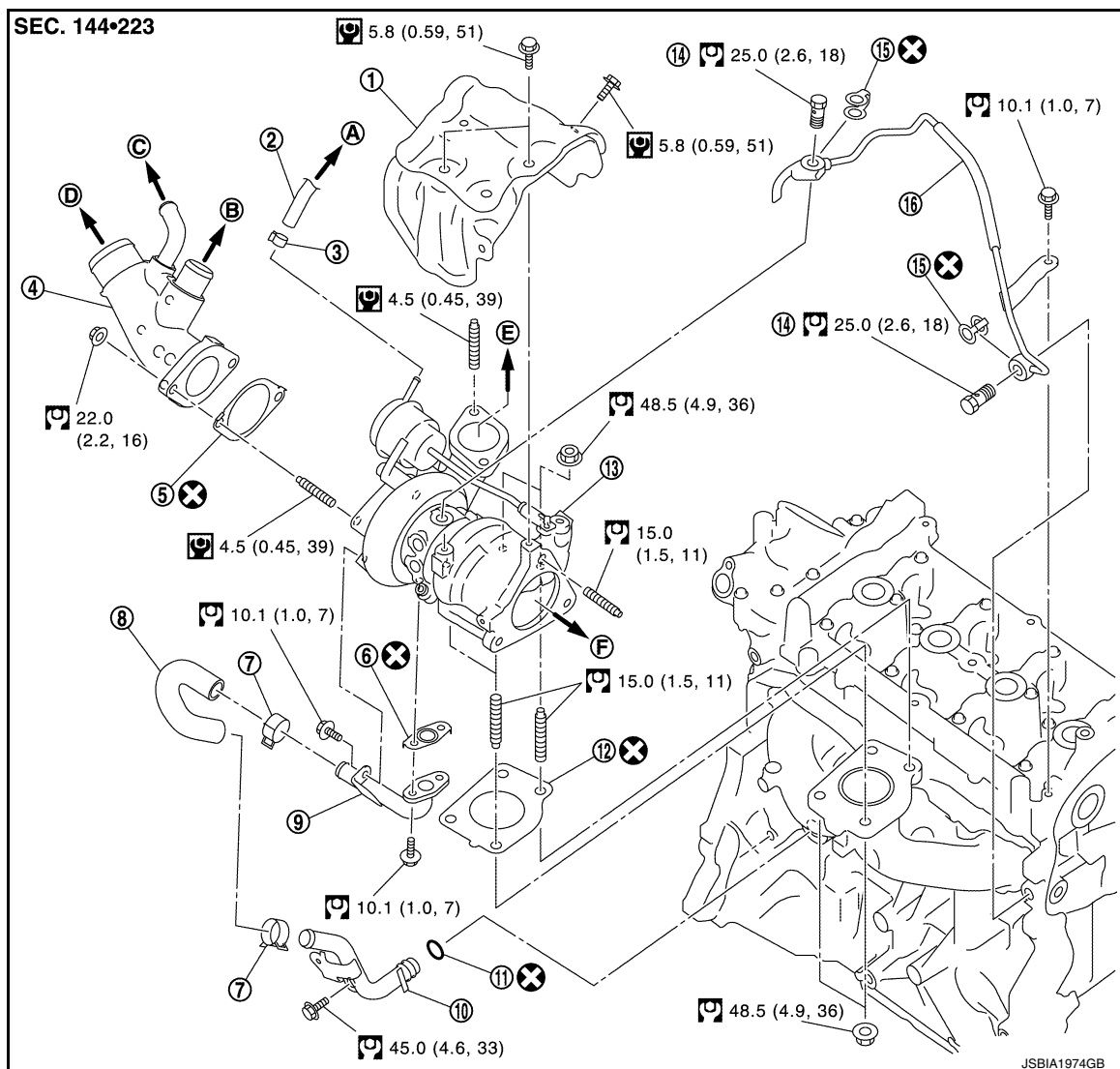
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## TURBOCHARGER

### Exploded View

INFOID:000000012197265



- |                                    |                               |                          |
|------------------------------------|-------------------------------|--------------------------|
| 1. Heat insulator                  | 2. Actuator hose              | 3. Clamp                 |
| 4. Turbocharger inlet tube         | 5. Gasket                     | 6. Gasket                |
| 7. Clamp                           | 8. Oil outlet hose            | 9. Oil return pipe       |
| 10. Oil supply tube                | 11. O-ring                    | 12. Gasket               |
| 13. Turbocharger                   | 14. Eye bolt                  | 15. Gasket               |
| 16. Oil supply tube                |                               |                          |
| A. To boost control solenoid valve | B. To air inlet hose          | C. To PCV hose           |
| D. To air duct                     | E. To air inlet tube assembly | F. To catalyst converter |

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

### Removal and Installation

INFOID:000000012197266

#### REMOVAL

# TURBOCHARGER

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

1. Remove engine cover. Refer to [EM-26, "Exploded View"](#).
  2. Remove cowl top extension. Refer to [EXT-29, "Exploded View"](#).
  3. Remove air duct (suction side). Refer to [EM-27, "Exploded View"](#).
  4. Remove air inlet tube 3. Refer to [EM-32, "Exploded View"](#).
  5. Remove front tube. Refer to [EX-5, "Exploded View"](#).
  6. Remove heat insulator. Refer to [FAX-27, "2WD : Exploded View"](#) (2WD models) or [FAX-43, "AWD : Exploded View"](#) (AWD models).
  7. Remove catalyst converter support bracket (upper and lower).
  8. Remove A/F sensor 1.
    - Using heated oxygen sensor wrench [SST: KV10117100 (J-3647-A)], remove A/F sensor 1.
- CAUTION:**
- **Discard any A/F sensor 1 which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
  - **Before installing new A/F sensor 1, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).**
9. Remove catalyst converter shroud upper.
  10. Disconnect heated oxygen sensor 2 harness connector. (AWD models)
  11. Remove bolts and nut of catalyst converter turbocharger side.
  12. Remove catalyst converter. And keep a service area.
- NOTE:**
- Slide the catalyst converter in a lateral direction to obtain work space for removing turbocharger.
13. Remove gasket of catalyst converter.
  14. Remove exhaust manifold cover. Refer to [EM-44, "Exploded View"](#).
  15. Remove turbocharger assembly as follows:
    - a. Remove heat insulator.
    - b. Disconnect water hose from turbocharger. Refer to [EM-29, "Exploded View"](#).
      - Attach plug to prevent engine coolant leakage when engine coolant is not drained.
    - c. Remove oil supply tube and oil return pipe.
    - d. Remove mounting nuts of turbocharger.
- CAUTION:**
- Never deform each turbocharger piping when pulling out the assembly.**

## INSTALLATION

### **CAUTION:**

**Do not reuse O-rings.**

Install in the reverse order of removal.

## Inspection

INFOID:0000000012197267

## INSPECTION PROCEDURE

Trouble Diagnosis of Turbocharger

Check items before trouble diagnosis

1. Check that the engine oil level is between L (Low level) and H (High level) of the oil level gauge. [When the engine oil amount is more than H (High level), the engine oil flows into the inlet duct through the blow-by gas passage, and the turbocharger is misjudged failure.]
2. Ask the customer if he/she always runs the vehicle in idle engine speed to cool the engine oil down after driving.
  - Replace the exhaust manifold and turbocharger assembly when any malfunction is found after unit inspections specified in the table below.
  - If no malfunction is found after the unit inspections, judge that the turbocharger body has no non-standard conditions. Check the other parts again.

# TURBOCHARGER

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

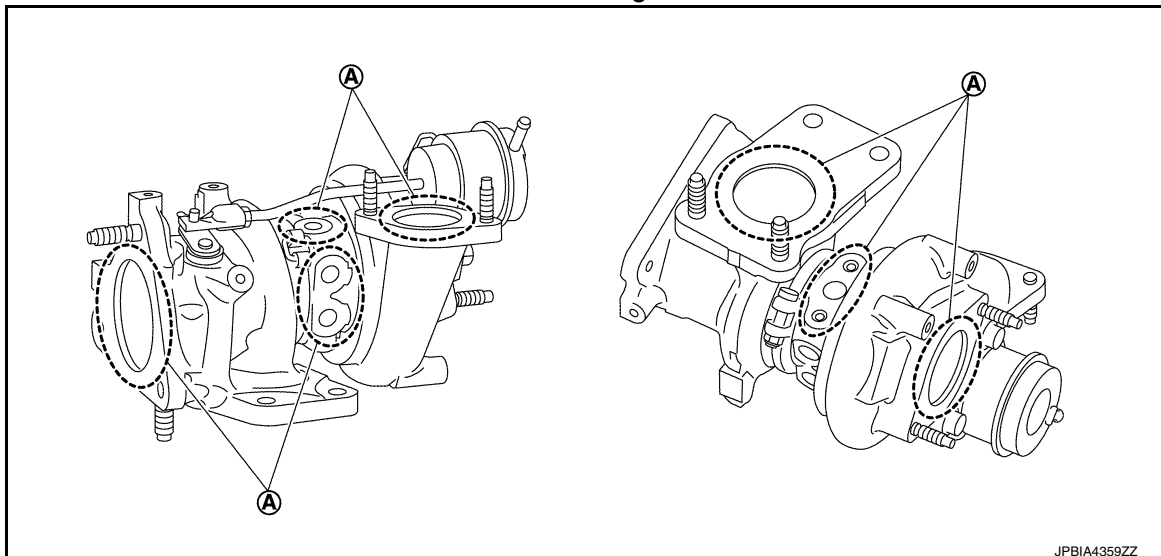
Inspection Location	Result	Symptoms likely to occur when the results shown on the left exist.			
		Oil leakage	Smoke	Noise	Poor power Poor acceleration
Turbine wheel	Wet with oil.	C	A	C	C
	Carbon deposits observed.	C	A	B	B
	"Rubs against" housing.	C	B	A	B
	Vane is bent or broken.			A	A
Compressor wheel	Inside of intake port is badly stained with oil.	B	B		
	"Rubs against" housing.	C	B	A	B
	Vane is bent or broken.			A	A
Check both turbine and compressor rotor shaft end play.	Heavy feel or catching when turned by hand.		C	C	B
	Cannot be turned by hand.				A
	Excessively loose bearing.	C	C	B	C
Rotor shaft, oil return port (Check inside using penlight.)	Carbon or sludge deposits in oil drain port.	C	A	C	C
Boost control valve actuator operation (using a handy pump)	<ul style="list-style-type: none"> <li>Does not operate smoothly when air pressure is gradually applied.</li> <li>Stroke amount is not compliance with the air pressure.</li> </ul>				A

**A:** Highly possible. **B:** Possible. **C:** May exist.

## INSPECTION AFTER REMOVAL

Turbocharger

Turbocharger



A. Check for leakage

### 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 failure:

# TURBOCHARGER

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

**Suction side** : Between turbocharger and charge air cooler

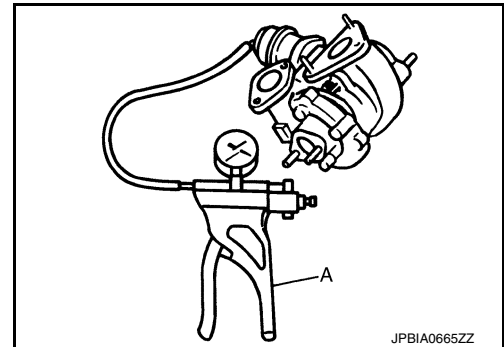
**Exhaust side** : Between turbocharger and outlet duct

Turbocharger Boost Control

- Connect the a pressurized handy pump (A) to the actuator, and check that the rod strokes smoothly in compliance with the following pressure.

**Standard (value of pressure/Value of rod moving):**

Refer to [EM-140, "Turbocharger"](#).



## INSPECTION AFTER INSTALLATION

Start engine and raise engine speed to check no exhaust emission leaks.

# EXHAUST MANIFOLD

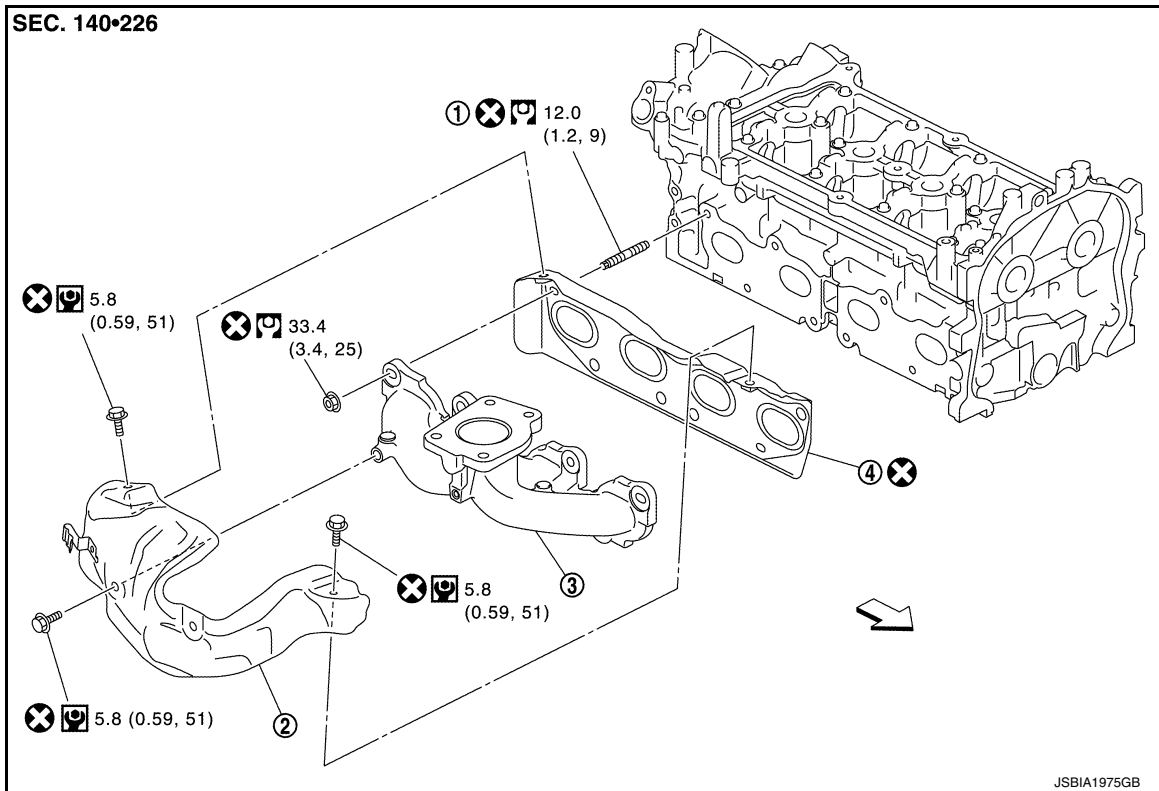
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## EXHAUST MANIFOLD

### Exploded View

INFOID:000000012197268



1. Stud bolt
  2. Exhaust manifold cover
  3. Exhaust manifold
  4. Gasket
- ⇐ Engine front

⊗ : N·m (kg-m, ft-lb)

⊗ : N·m (kg-m, in-lb)

⊗ : Always replace after every disassembly.

## Removal and Installation

INFOID:000000012197269

### REMOVAL

1. Remove turbocharger. Refer to [EM-40, "Exploded View"](#).
2. Remove exhaust manifold.
  - Loosen nuts in reverse order as shown in the figure.

⇐ : Engine front

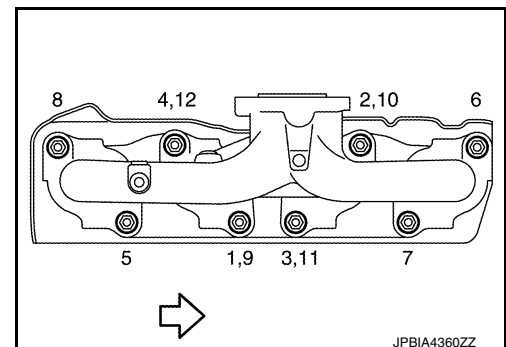
#### NOTE:

Disregard the numerical order No. 9 to 12 in removal.

3. Remove gasket.

#### CAUTION:

Cover engine openings to avoid entry of foreign materials.



### INSTALLATION



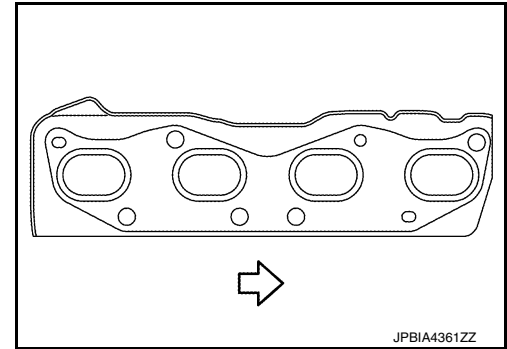
# EXHAUST MANIFOLD

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

1. Install gasket to cylinder head as shown in the figure.

⇐ : Engine front



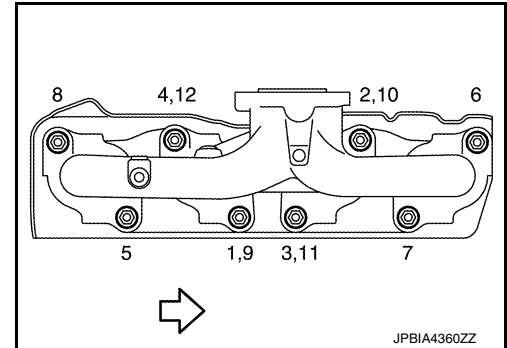
2. Install exhaust manifold with the following procedure:
  - a. Tighten nuts in numerical order as shown in the figure.

⇐ : Engine front

### NOTE:

- Tighten nuts the No.1 to No.4 in two steps.
- The numerical order No.9 to No.12 shows the second step.

3. Install remaining parts in the reverse order of removal.



INFOID:0000000012197270

## Inspection

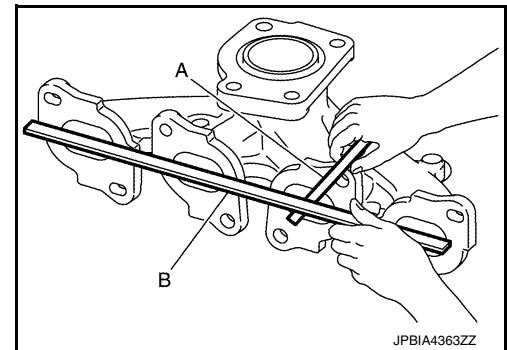
### INSPECTION AFTER REMOVAL

#### Surface Distortion

- Using feeler gauge (A) and straightedge (B), check the surface distortion of exhaust manifold mating surface in each exhaust port and entire part.

**Limit** : Refer to [EM-140, "Exhaust Manifold"](#).

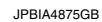
- If it exceeds the limit, replace exhaust manifold.



**[MR FOR NISMO RS MODELS]**

## OIL PAN (LOWER)

INFOID:0000000012197271



- 
- : Sealing point

# OIL PAN (LOWER)

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]



: Should be lubricated with oil.



: Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:0000000012197272

EM

### REMOVAL

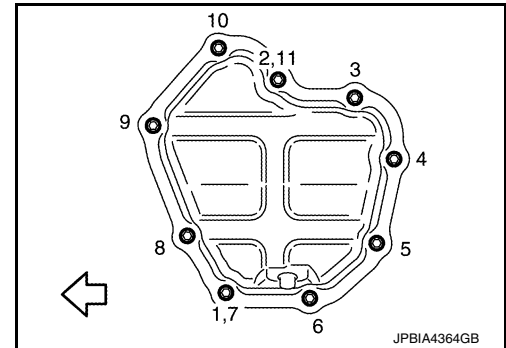
1. Drain engine oil. Refer to [LU-10, "Draining"](#).
2. Remove oil pan (lower) with the following procedure:
  - a. Loosen mounting bolts in reverse order as shown in the figure.



: Engine front

#### NOTE:

Disregard the numerical order No.7 and No.11 in removal.

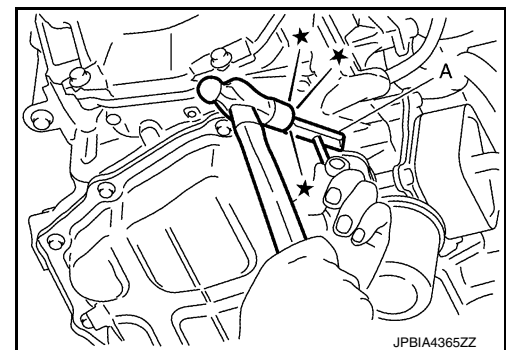


- b. Insert seal cutter [SST: KV10111100 (J-37228)] (A) between oil pan (upper) and oil pan (lower).

#### CAUTION:

- **Never damage the mating surface.**
- **Never insert a screwdriver. This damages the mating surfaces.**

- c. Slide the seal cutter [SST: KV10111100 (J-37228)] by tapping on the side of tool with a hammer.
    - d. Remove oil pan (lower).



### INSTALLATION

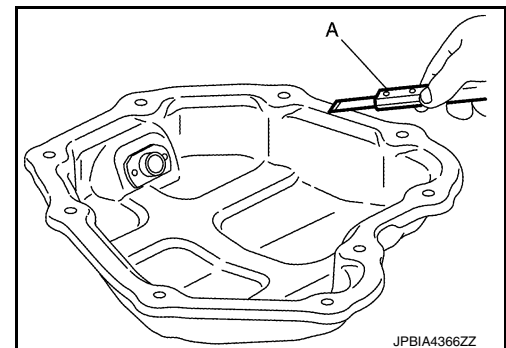
#### CAUTION:

**Do not reuse drain plug washer.**

1. Install oil pan (lower) as follows:
  - a. Use a scraper (A) to remove old liquid gasket from mating surfaces.
    - Also remove old liquid gasket from mating surface of oil pan (upper).
    - Remove old liquid gasket from the bolt holes and threads.

#### CAUTION:

**Never scratch or damage the mating surface when cleaning off old liquid gasket.**





## OIL PAN (LOWER)

[MR FOR NISMO RS MODELS]

### < REMOVAL AND INSTALLATION >

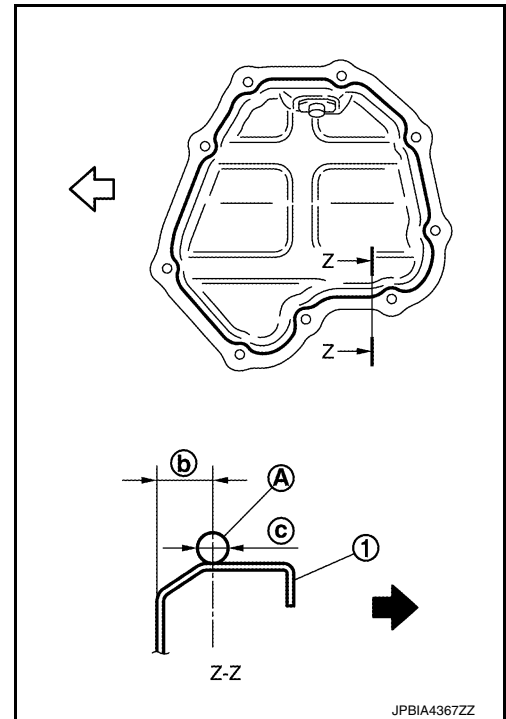
- b. Apply a continuous bead of liquid gasket (A) with a tube presser (commercial service tool) as shown in the figure.

- 1 : Oil pan (lower)  
 b : 7.5 - 9.5 mm (0.295 - 0.374 in)  
 c :  $\phi$  4.0 - 5.0 mm (0.157 - 0.197 in)  
 : Engine outside  
 : Engine front


Use Genuine RTV Silicon Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).

#### CAUTION:

Attaching should be done within 5 minutes after liquid gasket application.

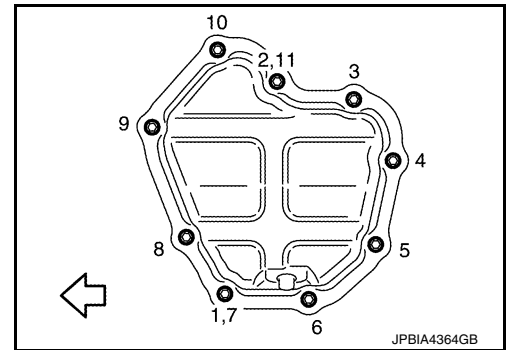


- c. Tighten bolts in numerical order as shown in the figure.

-  : Engine front

#### NOTE:

- Tighten bolts the No.1 and No.2 in two steps.
- The numerical order No.7 and No.11 shows the second steps.



2. Install oil pan drain plug.

#### CAUTION:

Do not reuse drain plug washer.

- Refer to the figure of components of former page for installation direction of drain plug washer. Refer to [EM-46, "Exploded View"](#).

3. Install in the reverse order of removal after this step.

### Inspection

INFOID:0000000012197273

#### INSPECTION AFTER REMOVAL

Clean oil strainer if any object attached.

#### INSPECTION AFTER INSTALLATION

1. Check the engine oil level and adjust engine oil. Refer to [LU-9, "Inspection"](#).
2. Start engine, and check there is no leakage of engine oil.
3. Stop engine and wait for 10 minutes.
4. Check the engine oil level again. Refer to [LU-9, "Inspection"](#).

# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

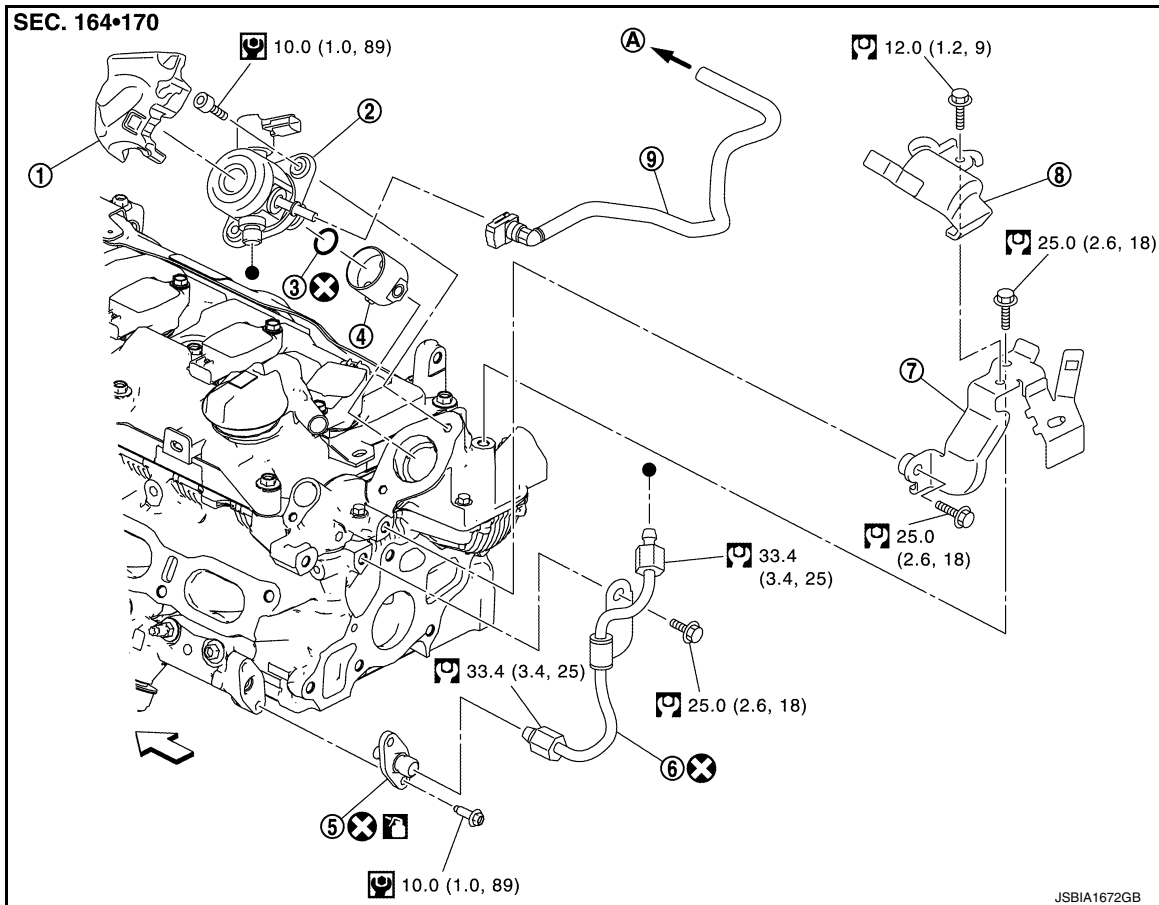
## HIGH PRESSURE FUEL PUMP AND FUEL HOSE

### Exploded View

INFOID:000000012197274

#### CAUTION:

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



- |                                      |                                  |                   |
|--------------------------------------|----------------------------------|-------------------|
| 1. High pressure fuel pump insulator | 2. High pressure fuel pump       | 3. O-ring         |
| 4. High pressure fuel pump lifter    | 5. Fuel rail connector           | 6. Fuel tube      |
| 7. Bracket                           | 8. Fuel pump connector protector | 9. Fuel feed hose |

A. To centralized under-floor piping

↔ : Engine front

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

● : Indicates that the parts is connected at points with same symbols in actual vehicle.

### Removal and Installation

INFOID:000000012197275

#### REMOVAL

#### WARNING:

- Be sure to read [EM-8, "Precaution for Handling High Pressure Fuel System"](#) when working on the high pressure fuel system.
- 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.

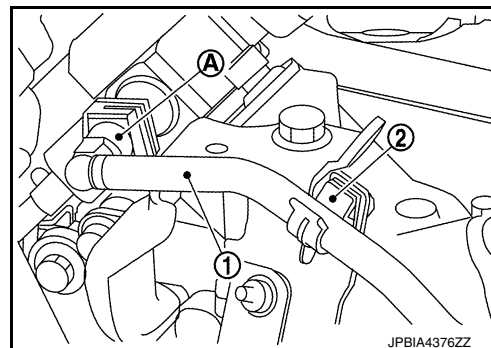
# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- **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. Release fuel pressure. Refer to [EC-166. "Work Procedure"](#).
2. Remove engine cover. Refer to [EM-26. "Exploded View"](#).
3. Remove fuel pump connector protector, and remove high pressure fuel pump insulator.
4. Disconnect quick connector (A) with the following procedure.
  - a. Disconnect fuel feed hose (1) from bracket hose clamp (2).



- b. Disengage (A) and pull up (B) the pawl of the fuel feed hose connector retainer (C) to disconnect the fuel feed hose from high pressure fuel pump.

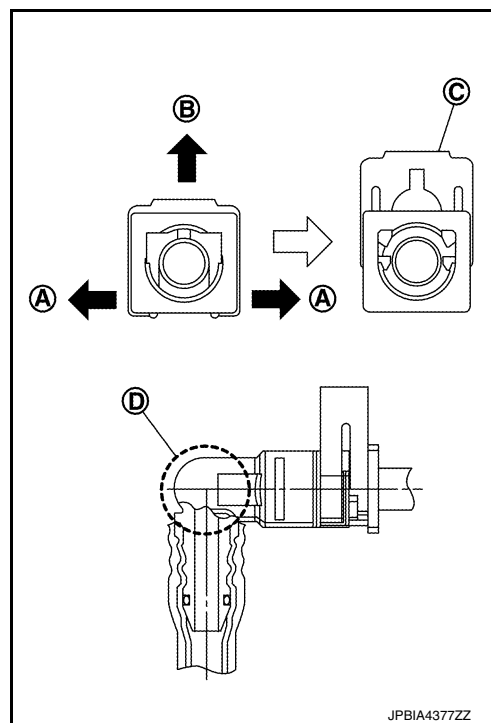
**NOTE:**

If the fuel feed hose is stuck, hold the fuel pipe by hand and disconnect it by pushing and pulling.

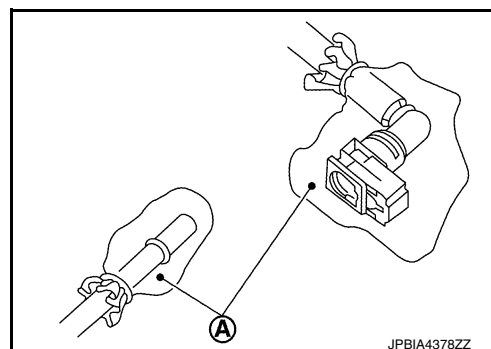
**CAUTION:**

- **Keep parts away from heat source. Especially, be careful when welding is performed around them.**
- **Never expose parts to battery electrolyte or other acids.**
- **Never bent or twist connection between quick connector and fuel feed hose (with damper) during installation/removal.**
- **Pull quick connector holding (D).**
- **Never remove the retainer.**
- **Prepare a tray and waste beforehand as fuel leaks out.**
- **Never pull with lateral force applied. O-ring inside quick connector may be damaged.**

Retainer color : Red



- **To prevent damage to each joint and protect it from the entry of foreign matter, cover the joint with plastic bag (A) or an equivalent.**



5. Remove intake manifold. Refer to [EM-30. "Removal and Installation"](#).
6. Remove fuel tube.
7. Remove fuel rail connector.

# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

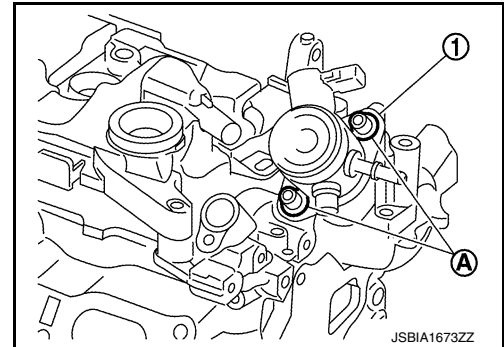
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

8. Remove high pressure fuel pump (1) and lifter.

**CAUTION:**

To prevent damage to high pressure fuel pump and camshaft bracket, loosen bolt (A) alternately by one turn at a time until the reaction force applied on the high pressure fuel pump disappears.



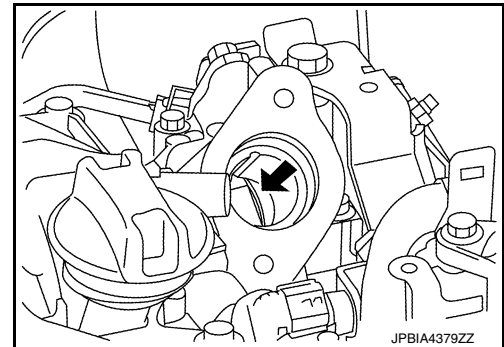
## INSTALLATION

**CAUTION:**

- Do not reuse O-rings.
- To prevent damage to parts due to generated abnormal stress and eccentric load, always observe the installation procedure.

1. Install high pressure fuel pump according to the following procedure.

- a. Check the orientation of pump cam from the mounting area (view arrow) of high pressure fuel pump.

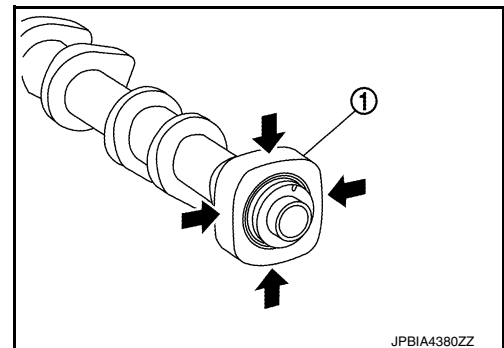


- b. Aim pump cam at the BDC area (arrow position).

1 : Camshaft (EXH)

**NOTE:**

For BDC area, anywhere within the area indicated by arrow can be accepted.



- c. Install O-ring to high pressure fuel pump. When handling new O-ring, paying attention to the following caution items:

**CAUTION:**

- Do not reuse O-ring.
- Handle O-ring with bare hands. Never wear gloves.
- Lubricate O-ring with new engine oil.
- Never clean O-ring with solvent.
- Check that O-ring and its mating part are free of foreign material.
- Never damage O-ring with tools and fingernails during the installation. In addition, twisting or stretching O-ring is not allowed. If O-ring is stretched during the installation to high pressure fuel pump, never install high pressure fuel pump immediately.

- d. Install high pressure fuel pump lifter.
- e. Apply oil to the fitting area of high pressure fuel pump O-ring and camshaft bracket side to install high pressure fuel pump.
- f. Install high pressure fuel pump. To prevent damage to high pressure fuel pump and camshaft bracket, the following instructions must be observed.



# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

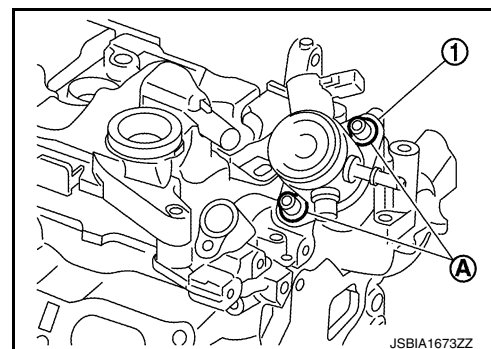
[MR FOR NISMO RS MODELS]

## CAUTION:

- Temporarily tighten bolt (A) by hand. Alternately tighten bolt by one turn at a time until high pressure fuel pump reaches camshaft bracket.

1 : High pressure fuel pump

- After a pump flange sitting, tighten the bolts to the specified torque.



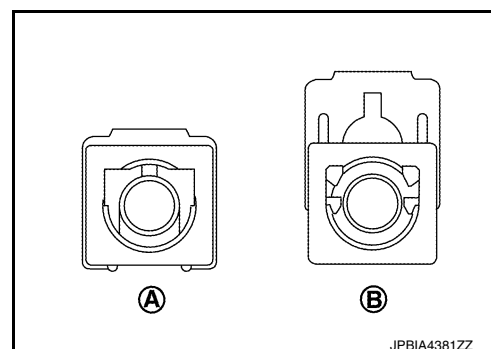
2. Connect fuel feed hose with the following procedure, and then install the fuel feed hose.
  - a. Check no foreign substances are deposited in and around matching pipe and quick connector, and no damage on them.
  - b. Quick connector shall be inserted gradually, aligning with the axis of the matching pipe.
  - c. Insert the retainer until it clicks and check the retainer is locked. After insertion, pull the connector and check that the connector is locked.

A : Lock position

B : Unlock position

## CAUTION:

If retainer cannot be installed smoothly, quick connector may be have not been installed correctly. Check connection again.

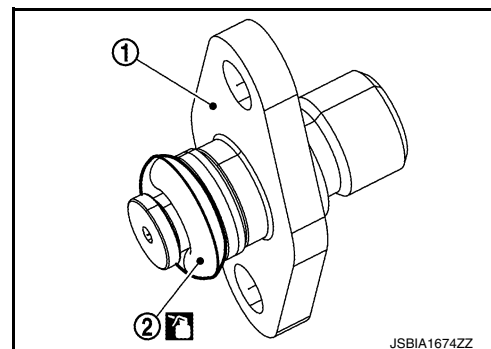


- d. After attaching the quick connector and fix the hose to the clamp.
3. Install new fuel rail connector (1).

2 : O-ring

## CAUTION:

- Never reuse fuel rail connector.
- Handle O-ring with bare hands. Never wear gloves.
- Lubricate O-ring with new engine oil.
- Never clean O-ring with solvent.
- Check that O-ring and its mating part are free of foreign material.
- Never scratch O-ring with tools or fingernails when installing fuel rail connector.
- Insert new fuel rail connector straight into fuel rail. Never decenter or twist the fuel rail connector during insertion.



4. Install the fuel tube with the following procedure.

## CAUTION:

- When removing fuel tube, always replace fuel rail connector together with fuel tube.
- Never reuse fuel tube.
- Never use fuel tube if its terminal tip is damaged.
- Observe the tightening order and the tightening torque.



# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- a. Temporarily tighten flare nut (A) and (B) of fuel tube (3) until seated.

- 1 : High pressure fuel pump  
2 : Fuel rail connector

### CAUTION:

**When temporarily tightening flare nut, place pipe in the center of the nut inner diameter.**

- b. Temporarily tighten bolt (4) until the seat of bracket is seated.  
c. Tighten flare nut (A) and (B) in alphabetical order.

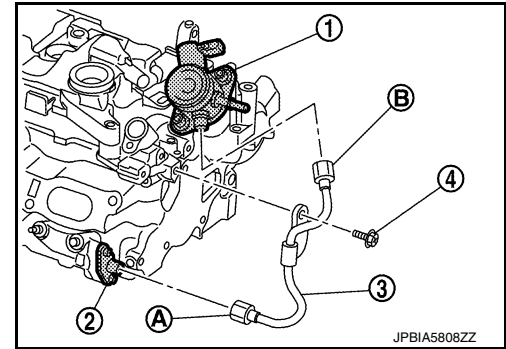
### CAUTION:

**Always fit the tool completely with the nut.**

- d. Tighten bolt (4).  
5. Install in the reverse order of removal after this step.

### CAUTION:

**After checking fuel leakage, maintain ten minutes of idling to bleed the fuel line.**



## Inspection

INFOID:0000000012197276

## INSPECTION AFTER INSTALLATION

### Check for Fuel Leakage

1. Turn ignition switch "ON" (with the engine stopped). With fuel pressure applied to fuel piping, check that there is no fuel leakage at connection points.

### NOTE:

Use mirrors for checking at points out of clear sight.

2. Start the engine. With engine speed increased, check again that there is no fuel leakage at connection points.

### CAUTION:

**Never touch the engine immediately after it is stopped because the engine is extremely hot.**

# FUEL INJECTOR AND FUEL TUBE

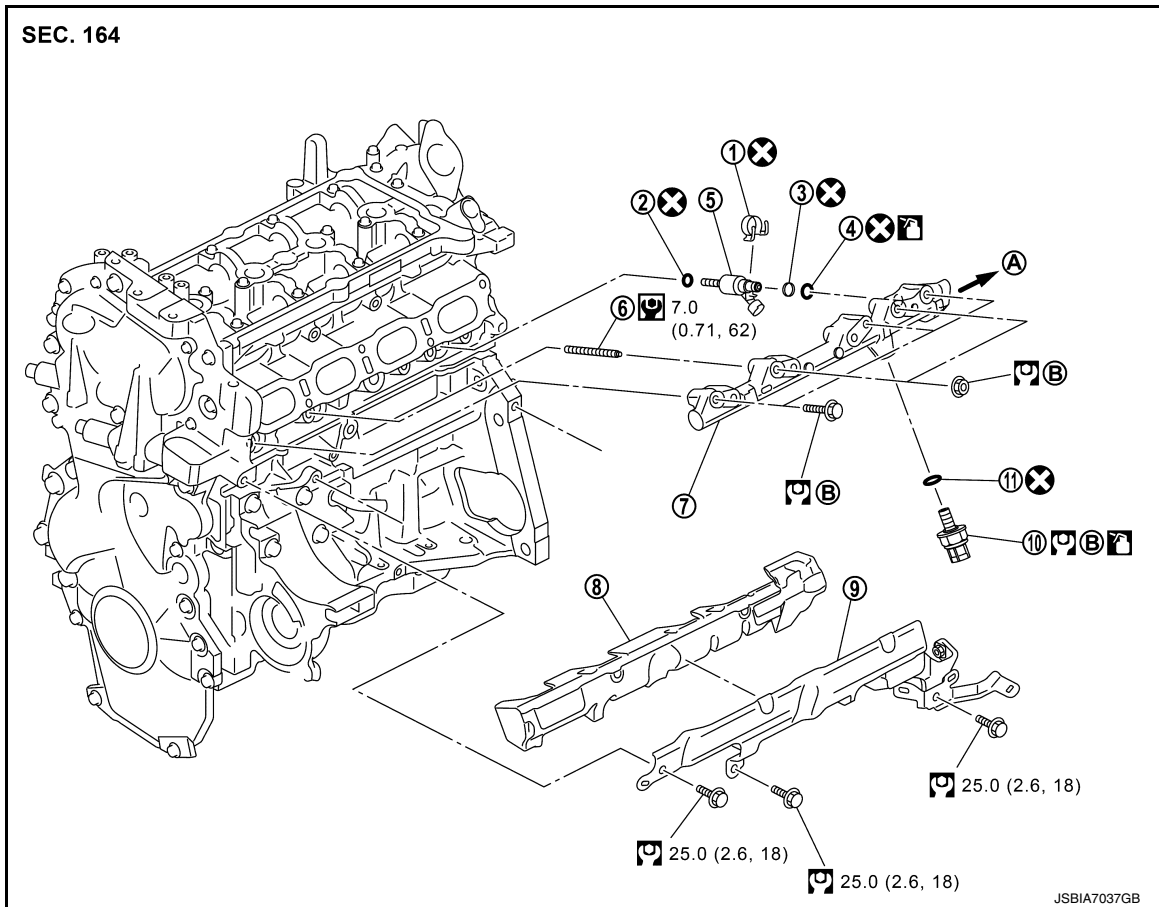
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## FUEL INJECTOR AND FUEL TUBE

Exploded View

INFOID:000000012197277



- |                          |                        |                    |
|--------------------------|------------------------|--------------------|
| 1. Holder                | 2. Seal ring (white)   | 3. Backup ring     |
| 4. O-ring (blue)         | 5. Fuel injector       | 6. Stud bolt       |
| 7. Fuel rail             | 8. Fuel rail insulator | 9. Fuel rail cover |
| 10. Fuel pressure sensor | 11. Gasket             |                    |

A. To fuel rail connector and fuel tube.  
Refer to [EM-49](#).

B. Comply with the assembly procedure  
when tightening. Refer to [EM-54](#).

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

### CAUTION:

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

### Removal and Installation

INFOID:000000012197278

### WARNING:

- Be sure to read [EM-8, "Precaution for Handling High Pressure Fuel System"](#) when working on the high pressure fuel system.
- 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 engine is hot.

# FUEL INJECTOR AND FUEL TUBE

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## REMOVAL

1. Release the fuel pressure. Refer to [EC-166, "Work Procedure"](#).
2. Remove front bumper. Refer to [EXT-12, "Exploded View"](#).
3. Remove charge air cooler. Refer to [EM-32, "Exploded View"](#).
4. Remove oil level gauge. Refer to [EM-46, "Exploded View"](#).
5. Remove intake manifold. Refer to [EM-29, "Exploded View"](#).
6. Remove alternator. Refer to [CHG-31, "MR16DDT : Exploded View"](#).
7. Remove oil level gauge guide. Refer to [EM-46, "Exploded View"](#).
8. Remove fuel rail cover, and then remove fuel rail insulator.
9. Remove fuel tube and fuel rail connector. Refer to [EM-49, "Exploded View"](#).
10. Disconnect fuel pressure sensor harness connector.
11. Disconnect fuel injector harness connector.
12. Remove fuel pressure sensor, if necessary.
13. Remove fuel rail.
  - Loosen mounting bolts in reverse order as shown in the figure.

↶ : Engine front

### CAUTION:

- When removing, be careful to avoid any interference with fuel injector.
- Use a shop cloth to absorb any fuel leakage from fuel rail.

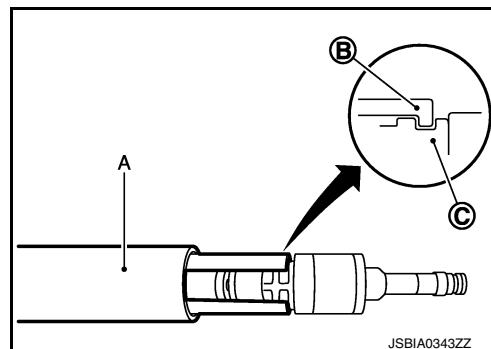
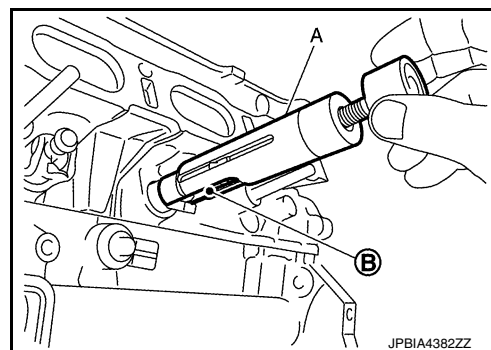
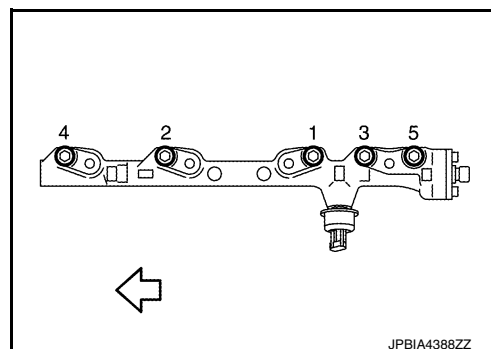
14. Remove fuel injector from cylinder head as per the following.

### CAUTION:

- Be careful with remaining fuel that may go out from fuel rail.
- Be careful not to damage injector nozzles during removal.
- Never bump or drop fuel injector.
- Never disassemble fuel injector.

- a. Remove injector holder.
- b. Install an remover [SST: KV10119600 (—)] (A) to the injector connector side so that cutout (B) of injector remover faces the injector connector side.

- Hook pawl portion (B) of injector remover [SST: KV10119600 (—)] (A) to groove portion (C) of injector

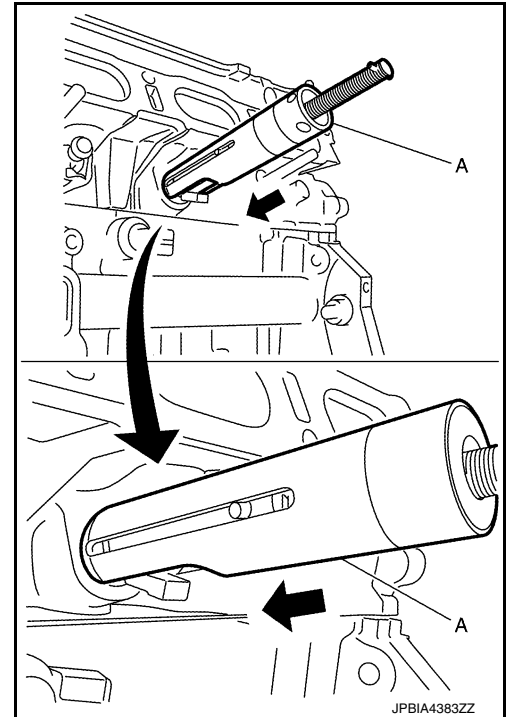


## FUEL INJECTOR AND FUEL TUBE

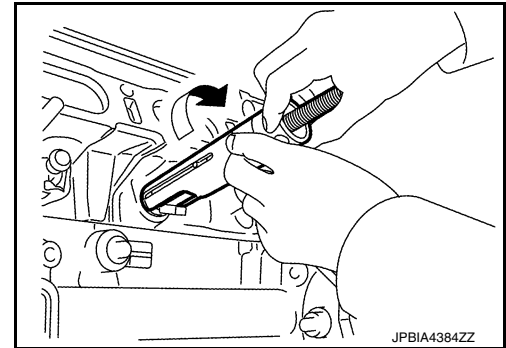
### < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

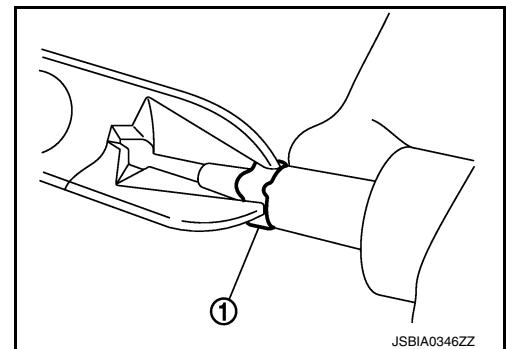
- c. Press down body portion of injector remover [SST: KV10119600 (—)] (A) until it contacts cylinder head.



- d. Tighten injector remover [SST: KV10119600 (—)] clockwise and remove injector from cylinder head.



- e. Cut seal ring (1) while pinching it. Be careful not to damage injector.



### INSTALLATION

#### CAUTION:

**Do not reuse O-rings.**

1. After removing fuel pressure sensor, install fuel pressure sensor according to the instructions below:

- a. Fix fuel rail in a vice.

#### CAUTION:

**Never scratch or crack fuel rail during work procedure.**

- b. Apply engine oil to the entire perimeter of the fuel pressure sensor screw.

#### CAUTION:

**Check that fuel rail and fuel pressure sensor screw have no damage, foreign matter, or stains.**

- c. Install gasket to fuel pressure sensor.

## FUEL INJECTOR AND FUEL TUBE

< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- d. Tighten fuel pressure sensor.

 : 10.0 N·m (1.0 kg-m, 89 in-lb)

**CAUTION:**

- Before tightening fuel pressure sensor, securely install a hexagon tool.
- Never use impact applied fuel pressure sensor or gasket, such as dropped.

- e. Tighten fuel rail pressure sensor again by using angle wrench [SST: KV10112100] and torque wrench. (Angle tightening)

 : 80° [(-0°) - (+5°)]

**CAUTION:**

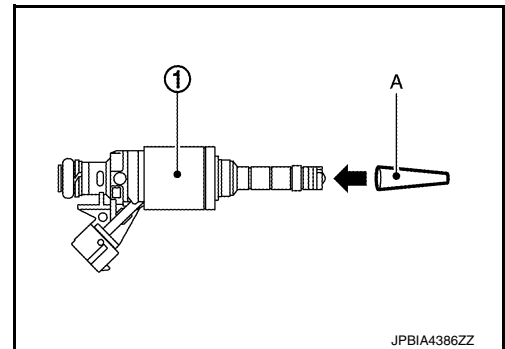
- To check tightening angle, use angle wrench [SST: KV10112100]. Never judge the angle by visual inspection.
- The torque value for the angle tightening must be 90 N·m (9.2 kg-m, 66 ft-lb) or less.
- If torque value reaches 90 N·m (9.2 kg-m, 66 ft-lb), then replace fuel rail pressure sensor with a new one.

2. Install seal ring to fuel injector as per the following:

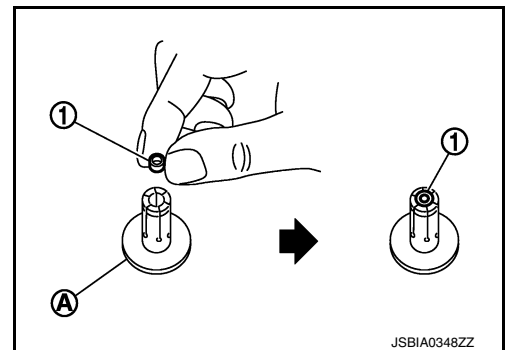
**CAUTION:**

- Handle seal ring with bare hands. Never wear gloves.
- Never apply engine oil to seal ring.
- Never clean seal ring with solvent.

- a. Install an injector seal drift set [SST: KV101197S0 (—)] (A) to fuel injector (1).



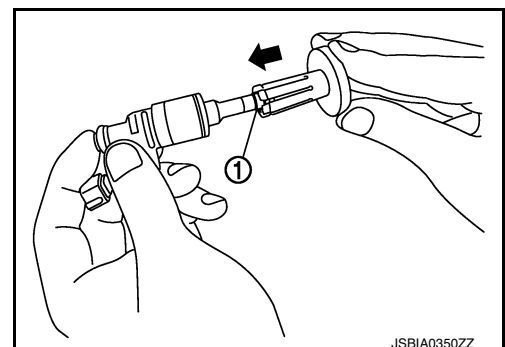
- b. Set seal ring (1) to injector seal drift set [SST: KV101197S0 (—)] (A).



- c. Straightly insert seal ring (1), which is set in step 2, to fuel injector as shown in the figure and install.

**CAUTION:**

Be careful that seal ring does not exceed the groove portion of fuel injector.



# FUEL INJECTOR AND FUEL TUBE

## < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- d. Insert injector seal drift set [SST: KV101197S0 (—)] (A) to injector and rotate clockwise and counterclockwise by 90° while pressing seal ring to fit it.

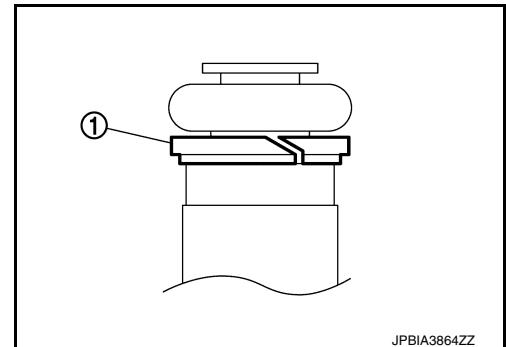
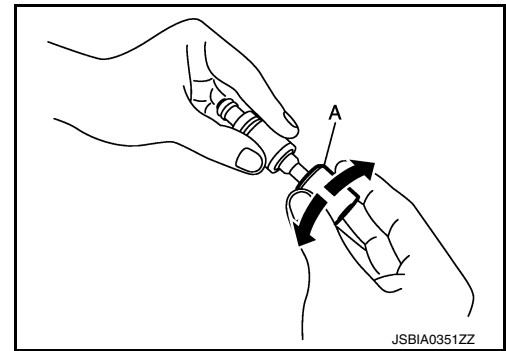
### NOTE:

Compress seal ring, because this operation is for rectifying stretch of seal ring caused by installation and for preventing sticking when inserting injector into cylinder head.

3. Install O-ring and backup ring to fuel injector. When handling new O-ring and backup ring, paying attention to the following caution items:

### CAUTION:

- Do not reuse O-ring.
- Handle O-ring with bare hands. Never wear gloves.
- Lubricate O-ring with new engine oil.
- Never clean O-ring with solvent.
- Check that O-ring and its mating part are free of foreign material.
- When installing O-ring, be careful not to scratch it with tool or fingernails. Also be careful not to twist or stretch O-ring. If O-ring was stretched while it was being attached, never insert it quickly into fuel tube.
- Insert new O-ring straight into fuel rail. Never decenter or twist it.
- Always install the back up ring (1) in the right direction as instructed.



4. Install fuel injector (1) to fuel rail (2) as per the following:

3 : O-ring (blue)

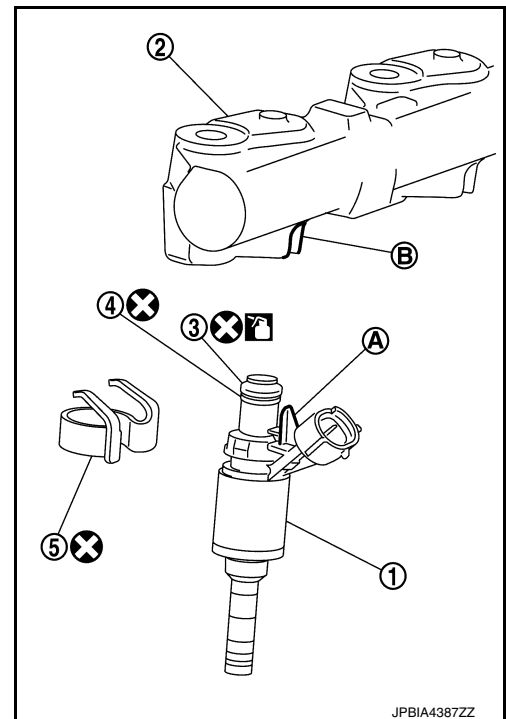
4 : Backup ring

- a. Install fuel injector holder (5) to fuel injector.

### CAUTION:

- Never reuse fuel injector holder. Replace it with a new one.
- Be careful to keep fuel injector holder from interfering with O-ring. If interference occurs, replace O-ring.

- b. Insert fuel injector into fuel rail with fuel injector holder attached.
- Insert it while matching it to the axial center.
  - Insert so that protrusion (A) of fuel injector is aligned to cutout (B).
- c. Check that installation is complete by checking that fuel injector does not rotate or come off.
- Check that protrusions of fuel injectors and fuel rail are aligned with cutouts of clips after installation.



5. Install fuel rail and fuel injector assembly to cylinder head.

## FUEL INJECTOR AND FUEL TUBE

### < REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- Tighten mounting bolts and nuts in two steps in numerical order as shown in the figure.

← : Engine front

**1st step** : 10.0 N·m (1.0 kg-m, 89 in-lb)

**2nd step** : 20.5 N·m (2.1 kg-m, 15 ft-lb)

6. Connect injector harness connector.
7. Install fuel rail insulator.

#### CAUTION:

- As covering part of fuel tube connector at the back end of common rail can easily move because of its shape, do not remove it before installation.
- Install the insulator so that it is placed under lower side of intake manifold flange.

8. Install in the reverse order of removal after this step.

### Inspection

INFOID:0000000012197279

### INSPECTION AFTER INSTALLATION

#### Check on Fuel Leakage

1. Turn ignition switch "ON" (with the engine stopped). With fuel pressure applied to fuel piping, check there are no fuel leakage at connection points.

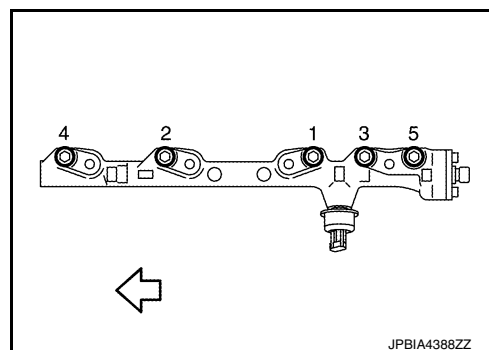
#### NOTE:

Use mirrors for checking at points out of clear sight.

2. Start the engine. With engine speed increased, check again that there are no fuel leakage at connection points.

#### CAUTION:

Never touch the engine immediately after stopped, as the engine becomes extremely hot.



# IGNITION COIL, SPARK PLUG AND ROCKER COVER

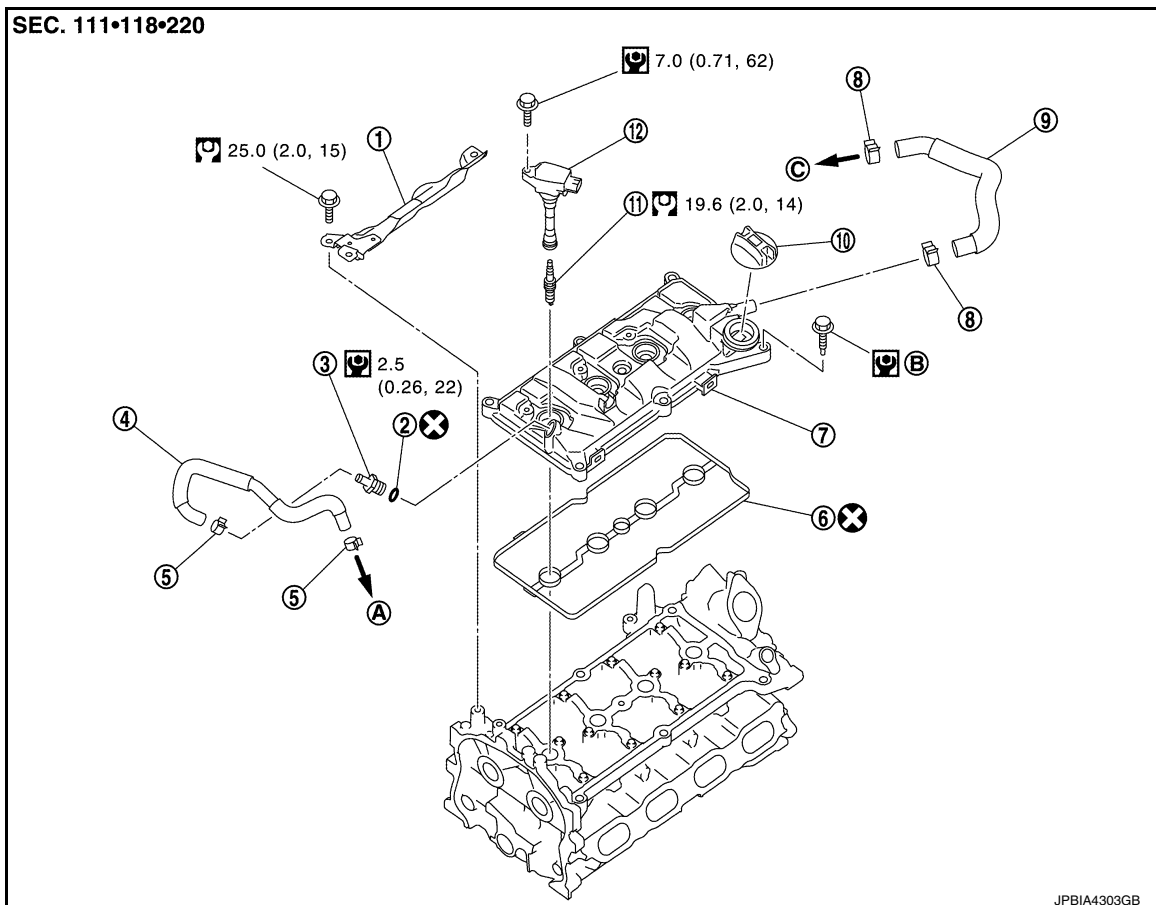
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

## IGNITION COIL, SPARK PLUG AND ROCKER COVER

### Exploded View

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- |                           |   |                        |
|---------------------------|---|------------------------|
| 1. Rocker cover protector | 2. O-ring   | 3. PCV control valve   |
| 4. PCV hose               | 5. Clamp  | 6. Rocker cover gasket |
| 7. Rocker cover           | 8. Clamp  | 9. PCV hose            |
| 10. Oil filler cap        | 11. Spark plug  | 12. Ignition coil      |
| A. To intake manifold     | B. Comply with the assembly procedure when tightening. Refer to <a href="#">EM-60</a> . | C. To air duct         |

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

### Removal and Installation

INFOID:000000012197281

#### REMOVAL

1. Drain engine coolant. Refer to [CO-10, "Draining"](#).
2. Remove engine cover. Refer to [EM-26, "Exploded View"](#).
3. Remove air inlet tube assembly. Refer to [EM-32, "Exploded View"](#).
4. Remove PCV hose.
5. Remove rocker cover protector.
6. Disconnect ignition coil harness connector, and then remove ignition coil.

#### CAUTION:

- Never drop or shock ignition coil.



# IGNITION COIL, SPARK PLUG AND ROCKER COVER

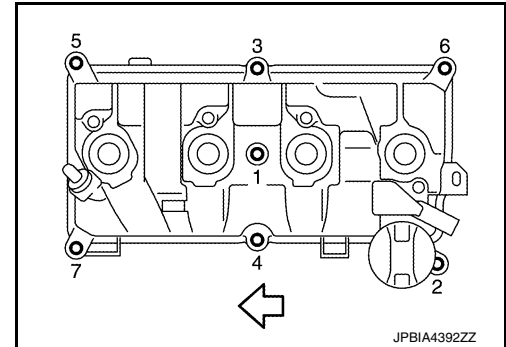
< REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- **Never disassemble ignition coil.**

7. Move ignition harness.
8. Remove rocker cover.
  - Loosen bolts in reverse order shown in the figure.

⇐ : Engine front



9. Remove PCV valve and PCV hose, if necessary.
10. Remove rocker cover gasket from rocker cover.

## INSTALLATION

### CAUTION:

**Do not reuse O-rings.**

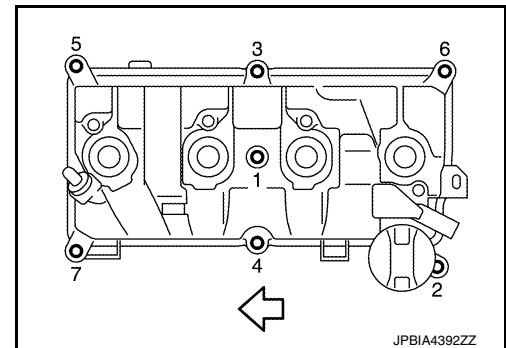
1. Install the rocker cover gasket to rocker cover.  
**CAUTION:**  
**Check the gasket is not dropped.**
2. Install rocker cover.
  - Tighten bolts in two steps separately in numerical order as shown in the figure.

⇐ : Engine front

 **1st step** : 1.96 N·m (0.20 kg-m, 17 in-lb)

 **2nd step** : 8.33 N·m (0.85 kg-m, 74 in-lb)

3. Install in the reverse order of removal, for the rest of parts.



## UNIT REMOVAL AND INSTALLATION

### ENGINE ASSEMBLY

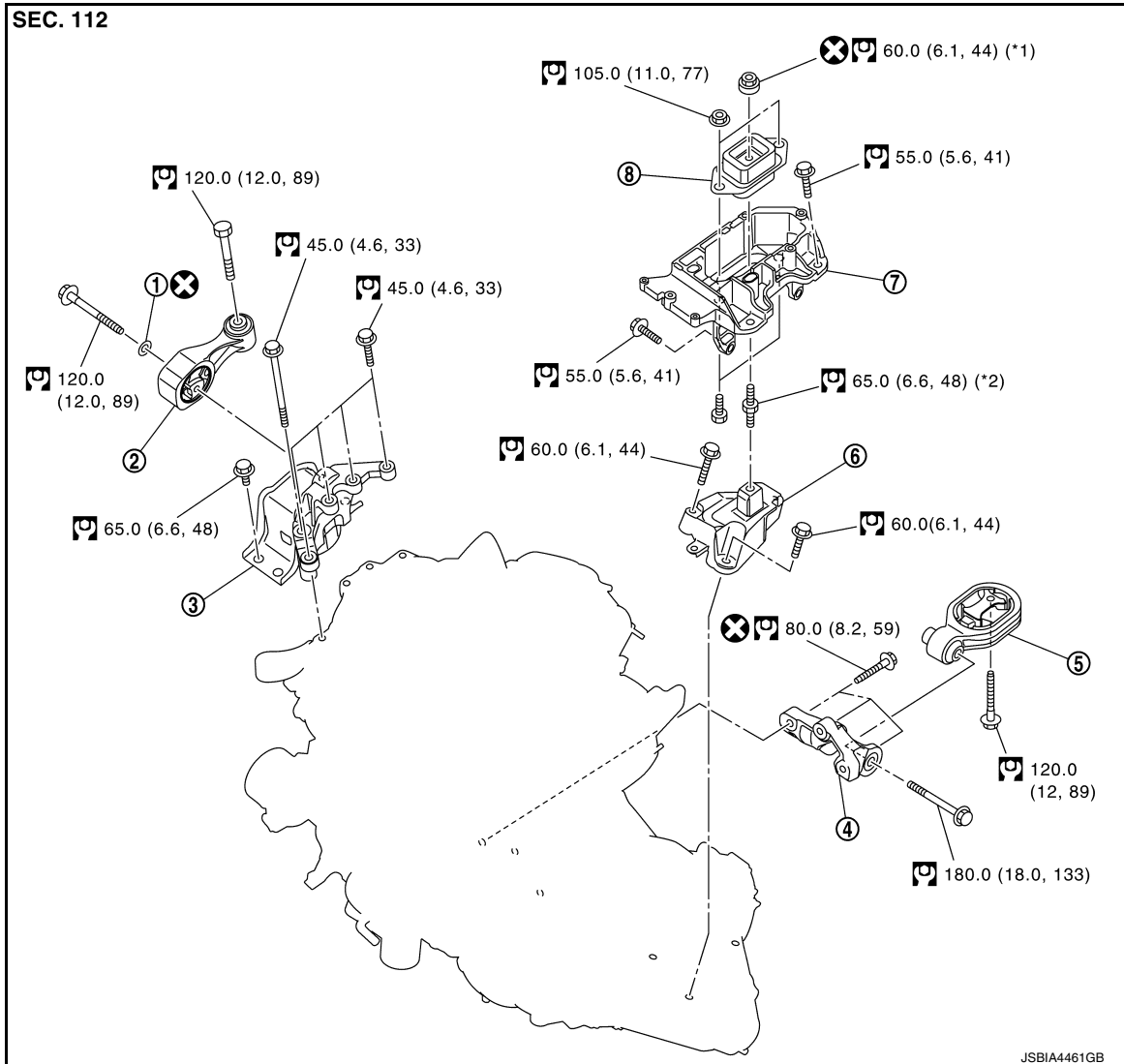
#### 2WD

#### 2WD : Exploded View

INFOID:0000000012197282

M/T

#### Standard Models



- |                                       |                                   |                                   |
|---------------------------------------|-----------------------------------|-----------------------------------|
| 1. Washer                             | 2. Upper torque rod (RH)          | 3. Engine mounting insulator (RH) |
| 4. Rear torque rod bracket            | 5. Rear torque rod                | 6. Engine mounting bracket (LH)   |
| 7. Engine mounting frame support (LH) | 8. Engine mounting insulator (LH) |                                   |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

#### CAUTION:

Check that the stud bolt (\*2) is tight at the specified torque before tightening the mounting nut (\*1) shown in the figure. [Stud bolt (\*2) may be loosened after loosening the mounting nut (\*1)]

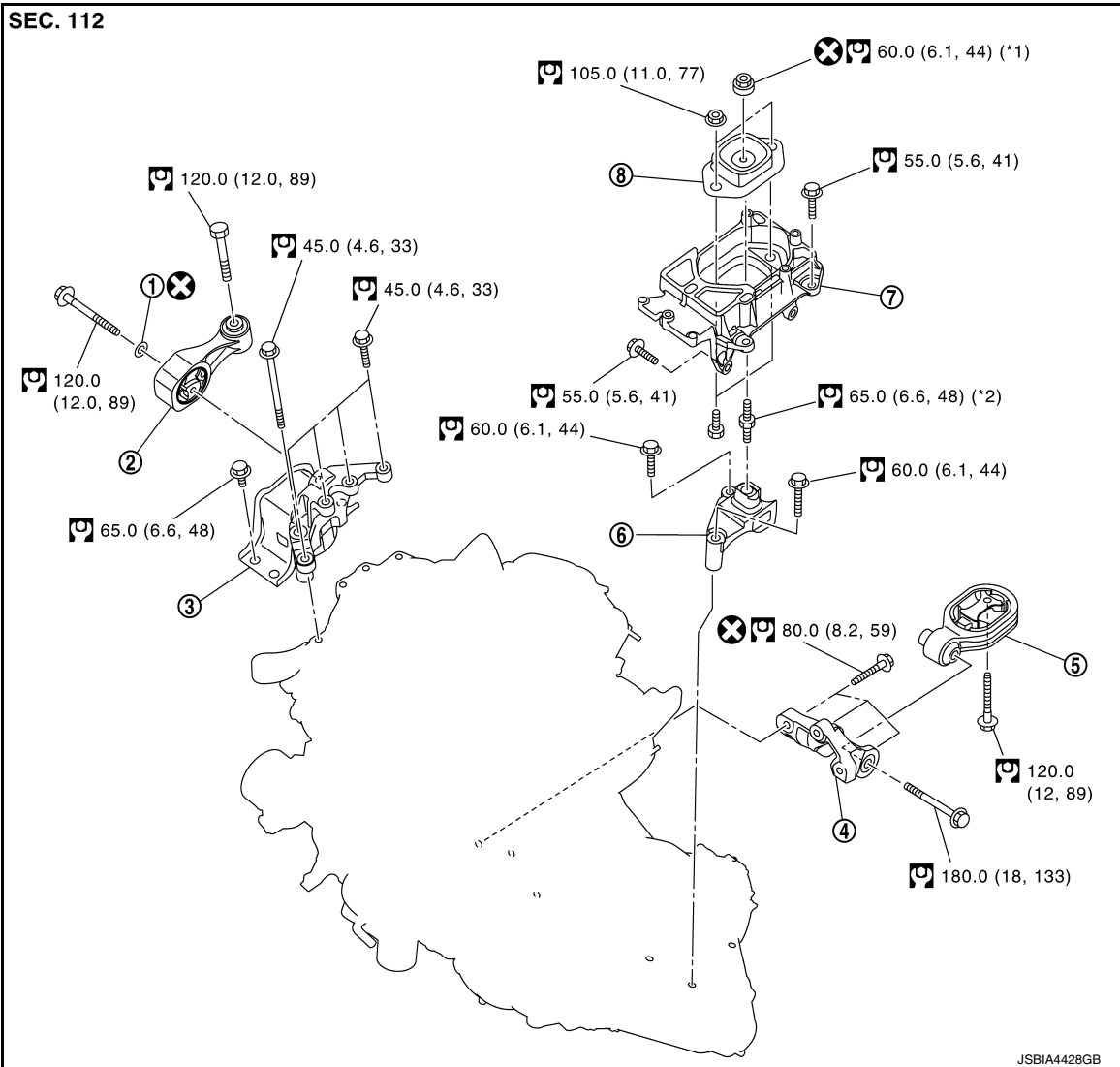
# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

NISMO RS Models

SEC. 112



- |                                       |                                   |                                   |
|---------------------------------------|-----------------------------------|-----------------------------------|
| 1. Washer                             | 2. Upper torque rod (RH)          | 3. Engine mounting insulator (RH) |
| 4. Rear torque rod bracket            | 5. Rear torque rod                | 6. Engine mounting bracket (LH)   |
| 7. Engine mounting frame support (LH) | 8. Engine mounting insulator (LH) |                                   |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

## CAUTION:

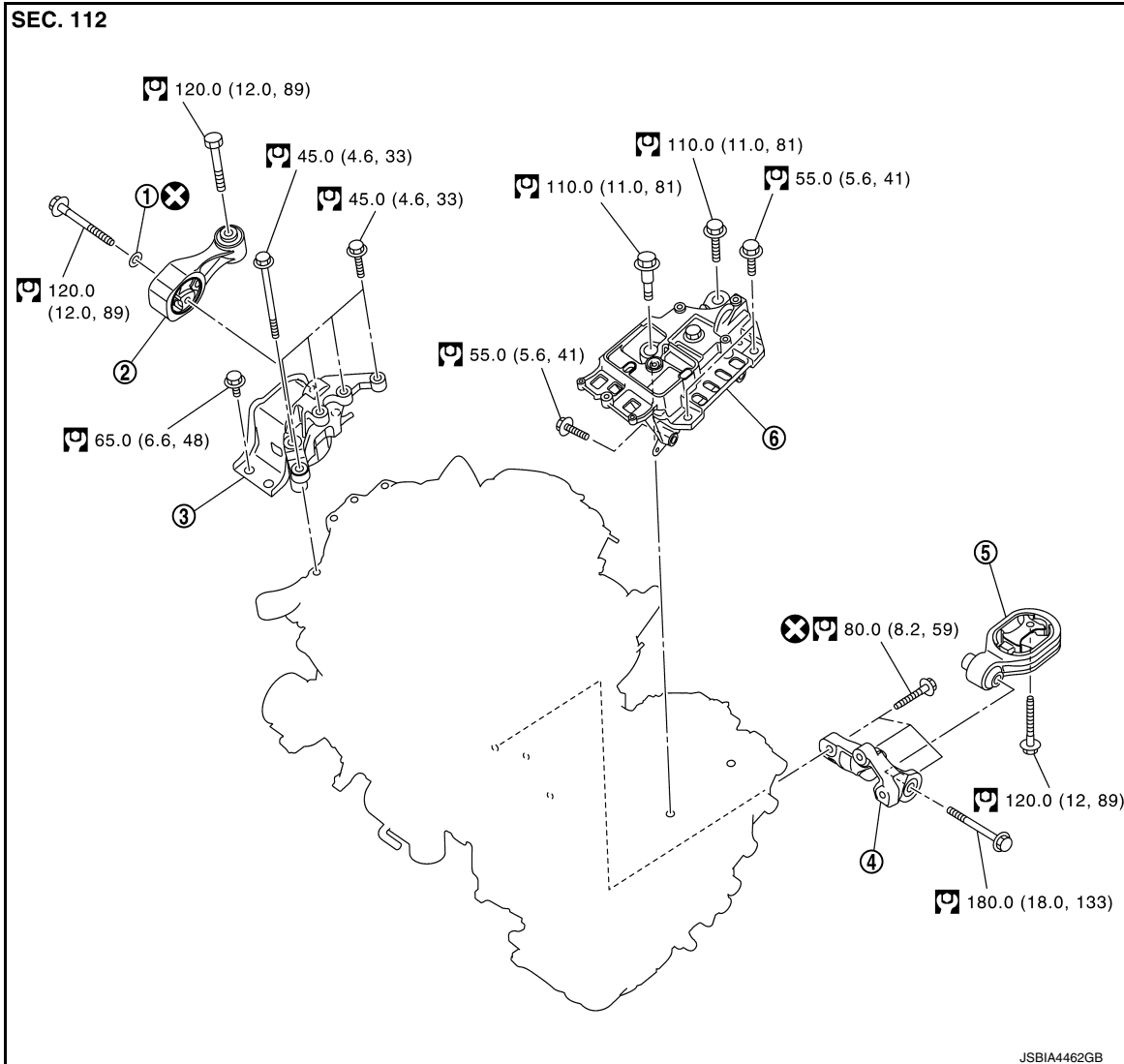
Check that the stud bolt (\*2) is tight at the specified torque before tightening the mounting nut (\*1) shown in the figure. [Stud bolt (\*2) may be loosened after loosening the mounting nut (\*1)]

CVT

# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]



- |                                 |                          |                                   |
|---------------------------------|--------------------------|-----------------------------------|
| 1. Washer                       | 2. Upper torque rod (RH) | 3. Engine mounting insulator (RH) |
| 4. Rear engine mounting bracket | 5. Rear torque rod       | 6. Engine mounting insulator (LH) |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

## 2WD : Removal and Installation

INFOID:0000000012197283

### WARNING:

- Situate the vehicle on a flat and solid surface.
- Place chocks at front and back of rear wheels.
- Attach proper slingers and bolts described in PARTS CATALOG if engine slingers are not equipped.

### CAUTION:

- Always be careful to work safely, avoid forceful or uninstructed operations.
- Never start working until exhaust system and 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.
- Use either 2-pole lift type or separate type lift as best you can. If board-on type is used for unavoidable reasons, support at the rear axle jacking point with a transmission jack or similar tool before starting work, in preparation for the backward shift of center of gravity.
- For supporting points for lifting and jacking point at rear axle, refer to [GI-30, "Garage Jack and Safety Stand and 2-Pole Lift"](#).

### NOTE:

# ENGINE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

### REMOVAL

#### Outline

Remove the engine and the transaxle assembly from the vehicle downward. Separate the engine and the transaxle.

#### Preparation

1. Release fuel pressure. Refer to [EC-166, "Work Procedure"](#).
2. Drain engine coolant from radiator. Refer to [CO-10, "Draining"](#).  
**CAUTION:**
  - **Perform this step when the engine is cold.**
  - **Never spill engine coolant on drive belts.**
3. Remove the following parts.
  - Engine undercover
  - Front road wheels and tires
  - Front fender protector (RH and LH): Refer to [EXT-31, "Exploded View"](#).
  - Drive belt: Refer to [EM-20, "Removal and Installation"](#).
  - Engine cover: Refer to [EM-26, "Exploded View"](#).
  - Battery and battery tray: Refer to [PG-105, "Exploded View"](#).
  - Air duct, and air cleaner case assembly and air cleaner body assembly: Refer to [EM-27, "Exploded View"](#).
  - Radiator hose (upper and lower): Refer to [CO-16, "Exploded View"](#).
  - Exhaust front tube: Refer to [EX-5, "Exploded View"](#).
  - Radiator cooling fan assembly: Refer to [CO-19, "Exploded View"](#).
  - Charger air cooler: Refer to [EM-32, "Exploded View"](#).
  - Alternator: Refer to [STR-28, "MR16DDT : Removal and Installation"](#).

#### Engine Room LH

1. Disconnect all connections of engine harness around the battery, and then temporarily secure the engine harness into the engine side.  
**CAUTION:**  
**Protect connectors using a resin bag against foreign materials during the operation.**
2. Disconnect fuel feed hose quick connector. Refer to [EM-49, "Exploded View"](#).
3. Disconnect heater hoses. Refer to [CO-25, "Exploded View"](#).
4. Remove EVAP hoses. Refer to [EM-29, "Exploded View"](#).
5. Disconnect control cable from transaxle. (CVT models) Refer to [TM-319, "Exploded View"](#).
6. Disconnect control linkage from transaxle. (M/T models) Refer to [TM-25, "Exploded View"](#).
7. Disconnect clutch tube on transaxle side from clutch damper. (M/T models) Refer to [CL-15, "Exploded View"](#).

#### Engine Room RH

1. Disconnect vacuum hose from intake manifold. Refer to [EM-29, "Exploded View"](#).
2. Remove A/C compressor. Refer to [HA-28, "Exploded View"](#).
3. Remove ground cable at engine side.

#### Vehicle Underbody

1. Remove ground cable at transaxle side.
2. Remove drive shafts (RH and LH). Refer to [FAX-28, "2WD : Removal and Installation"](#).
3. Remove rear torque rod.
4. Remove stabilizer connecting rod. Refer to [FSU-15, "Exploded View"](#).
5. Remove front suspension member. Refer to [FSU-17, "Exploded View"](#).
6. Preparation for the separation work of transaxle is as follows:
  - Remove transaxle joint bolts which pierce at oil pan (upper) lower rear side. Refer to [EM-110, "Exploded View"](#).

#### Removal

# ENGINE ASSEMBLY

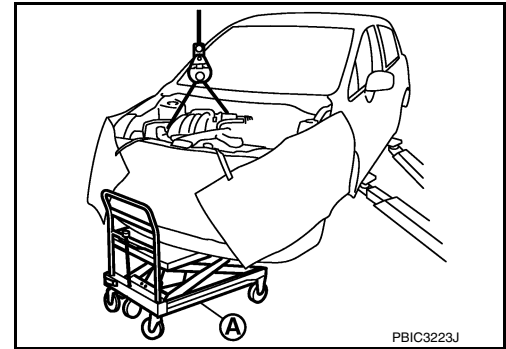
## < UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

1. Use a manual lift table caddy (commercial service tool) (A) or equivalently rigid tool such as a transmission jack. Securely support bottom of the engine and the transaxle assembly.

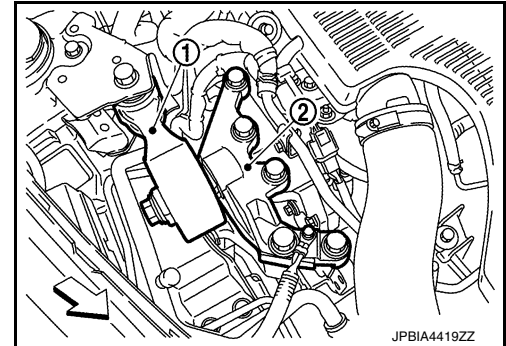
**CAUTION:**

**Put a piece of wood or an equivalent as the supporting surface, secure a completely stable condition.**



2. Remove upper torque rod (RH) (1), and engine mounting insulator (RH) (2).

⇐ : Vehicle front



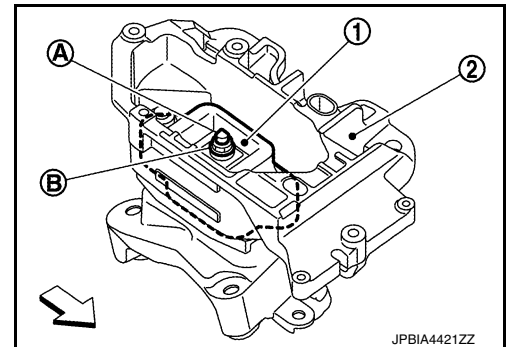
3. Remove engine mounting insulator (LH). (CVT models)
4. Remove the through bolt-securing nut (B) of engine mounting bracket (LH). (M/T models)

1 : Engine mounting insulator (LH)

2 : Engine mounting frame support (LH)

A : Through bolt

⇐ : Vehicle front



5. Carefully lower jack, or raise lift to remove the engine and the transaxle assembly. When performing work, observe the following caution.

**CAUTION:**

- Check that no part interferes with the vehicle side.
- Before and during this lifting, always check if any harnesses are left connected.
- During the removal, always be careful to prevent the vehicle from falling off the lift due to changes in the center of gravity.
- If necessary, support the vehicle by setting jack or suitable tool at the rear.

### Separation

1. Remove catalyst convertor. Refer to [EM-34, "2WD : Exploded View"](#).
2. Remove turbocharger. Refer to [EM-40, "Exploded View"](#).
3. Remove exhaust manifold. Refer to [EM-44, "Exploded View"](#).

# ENGINE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

4. Install engine slinger to front cover front left side (A) and cylinder head rear right side (B).

↔ : Engine front

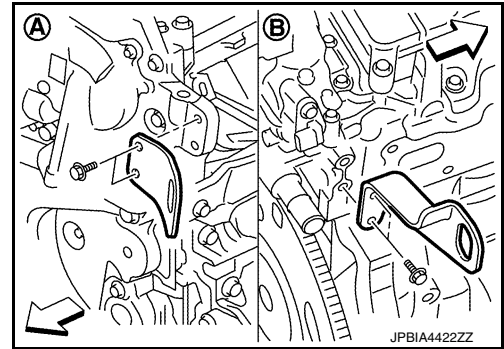
### Slinger bolts

Front cover front left side:

: 32.9 N·m (3.4 kg-m, 24 ft-lb)

Cylinder head rear right side:

: 25.0 N·m (2.6 kg-m, 18 ft-lb)



5. Remove starter motor. Refer to [STR-28, "MR16DDT : Removal and Installation"](#).
6. Lift with a hoist and separate the engine from the transaxle assembly. Refer to [TM-86, "Removal and Installation"](#).

## INSTALLATION

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

### CAUTION:

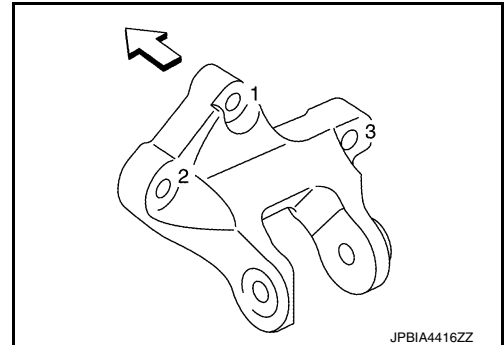
- Never allow engine oil to get on engine mounting insulator. Be careful not to damage engine mounting insulator.
- Check that each mounting insulator is seated properly, and tighten mounting nuts and bolts.
- When installation directions are specified, install parts according to the direction marks on them referring to the figure of components. Refer to [EM-62, "2WD : Exploded View"](#).

Rear torque rod bracket

1. Temporarily tighten mounting bolts in the numerical order as shown in the figure.

↔ : Vehicle front

2. Tighten mounting bolts to the specified torque in the numerical order as shown in the figure.



## 2WD : Inspection

INFOID:000000012197284

## INSPECTION AFTER INSTALLATION

### Inspection for Leakage

The following are procedures for checking fluids leakage, lubricates leakage, and exhaust gases leakage.

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-11, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
  - Turn ignition switch "ON" (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
  - Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to check there is no leakage of fuel, exhaust gases, or any oil/fluids including engine oil and engine coolant.
- Bleed air from lines and hoses of applicable lines, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to the specified level, if necessary.

Summary of the inspection items:

Items	Before starting engine	Engine running	After engine stopped
Engine coolant	Level	Leakage	Level

# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

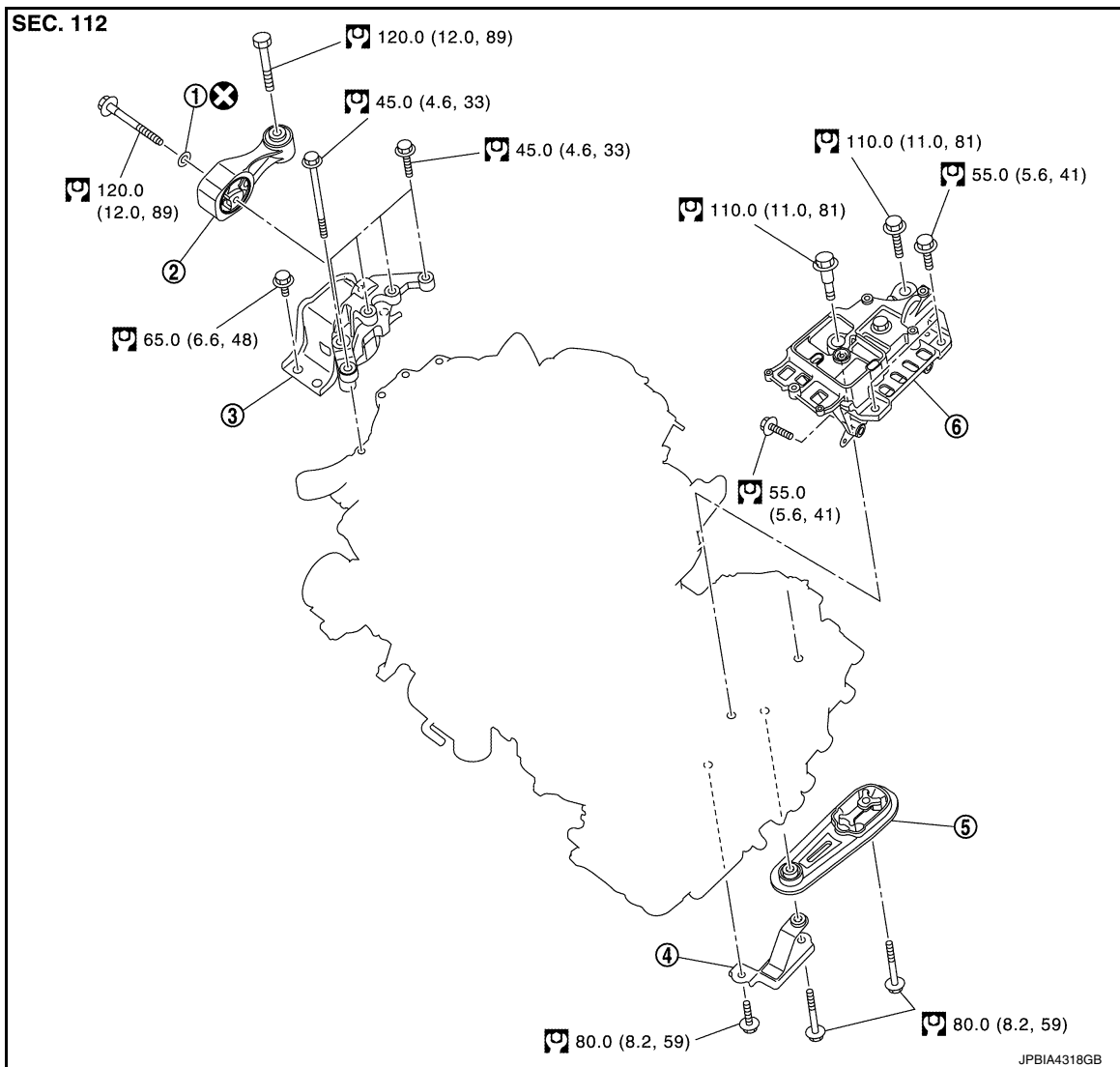
Engine oil		Level	Leakage	Level
Transmission / transaxle fluid	AT & CVT Models	Leakage	Level / Leakage	Leakage
	MT Models	Level / Leakage	Leakage	Level / Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gases		—	Leakage	—

\*: Power steering fluid, brake fluid, etc.

AWD

AWD : Exploded View

INFOID:000000012197285



- |                                 |                          |                                   |
|---------------------------------|--------------------------|-----------------------------------|
| 1. Washer                       | 2. Upper torque rod (RH) | 3. Engine mounting insulator (RH) |
| 4. Rear engine mounting bracket | 5. Rear torque rod       | 6. Engine mounting insulator (LH) |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

AWD : Removal and Installation

INFOID:000000012197286

**WARNING:**



# ENGINE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

- Situate the vehicle on a flat and solid surface.
- Place chocks at front and back of rear wheels.
- Attach proper slingers and bolts described in PARTS CATALOG if engine slingers are not equipped.

### CAUTION:

- Always be careful to work safely, avoid forceful or uninstructed operations.
- Never start working until exhaust system and 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.
- Use either 2-pole lift type or separate type lift as best you can. If board-on type is used for unavoidable reasons, support at the rear axle jacking point with a transmission jack or similar tool before starting work, in preparation for the backward shift of center of gravity.
- For supporting points for lifting and jacking point at rear axle, refer to [GI-30, "Garage Jack and Safety Stand and 2-Pole Lift"](#).

### NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

## REMOVAL

### Outline

Remove the engine and the transaxle assembly from the vehicle downward. Separate the engine and the transaxle.

### Preparation

1. Release fuel pressure. Refer to [EC-166, "Work Procedure"](#).
2. Drain engine coolant from radiator. Refer to [CO-10, "Draining"](#).  
**CAUTION:**
  - Perform this step when the engine is cold.
  - Never spill engine coolant on drive belts.
3. Remove the following parts.
  - Engine undercover
  - Front road wheels and tires
  - Front fender protector (RH and LH): Refer to [EXT-31, "Exploded View"](#).
  - Drive belt: Refer to [EM-20, "Removal and Installation"](#).
  - Engine cover: Refer to [EM-26, "Exploded View"](#).
  - Battery and battery tray: Refer to [PG-105, "Exploded View"](#).
  - Air duct, air cleaner case assembly and air cleaner body assembly: Refer to [EM-27, "Exploded View"](#).
  - Radiator hose (upper and lower): Refer to [CO-16, "Exploded View"](#).
  - Radiator cooling fan assembly: Refer to [CO-19, "Exploded View"](#).
  - Exhaust front tube: Refer to [EX-5, "Exploded View"](#).
  - Alternator: Refer to [CHG-33, "MR16DDT : Removal and Installation"](#).

### Engine Room LH

1. Disconnect all connections of engine harness around the battery, and then temporarily secure the engine harness into the engine side.  
**CAUTION:**  
**Protect connectors using a resin bag against foreign materials during the operation.**
2. Disconnect fuel feed hose quick connector. Refer to [EM-49, "Exploded View"](#).
3. Disconnect heater hoses. Refer to [CO-25, "Exploded View"](#).
4. Disconnect control cable from transaxle. Refer to [TM-319, "Exploded View"](#).
5. Remove EVAP hoses. Refer to [EM-29, "Exploded View"](#).

### Engine Room RH

1. Disconnect vacuum hose from intake manifold. Refer to [EM-29, "Exploded View"](#).
2. Remove A/C compressor. Refer to [HA-28, "Exploded View"](#).
3. Remove ground cable at engine side.

### Vehicle Underbody

1. Remove ground cable at transaxle side.
2. Remove rear propeller shaft. Refer to [DLN-124, "Exploded View"](#).

# ENGINE ASSEMBLY

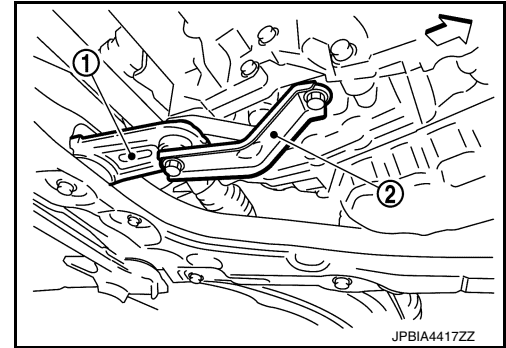
## < UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

3. Remove drive shafts (RH and LH). Refer to [FAX-28, "2WD : Removal and Installation"](#).
4. Remove rear torque rod (1). Refer to [EM-68, "AWD : Exploded View"](#).

2 : Rear torque rod bracket

⇐ : Vehicle front



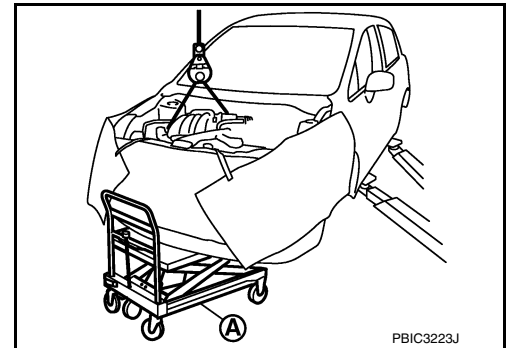
5. Remove stabilizer connecting rod. Refer to [FSU-15, "Exploded View"](#).
6. Rear front suspension member. Refer to [FSU-17, "Exploded View"](#).
7. Preparation for the separation work of transaxle is as follows:
  - Remove transaxle joint bolts which pierce at oil pan (upper) lower rear side. Refer to [EM-46, "Exploded View"](#).

### Removal

1. Use a manual lift table caddy (commercial service tool) (A) or equivalently rigid tool such as a transmission jack. Securely support bottom of the engine and the transaxle assembly.

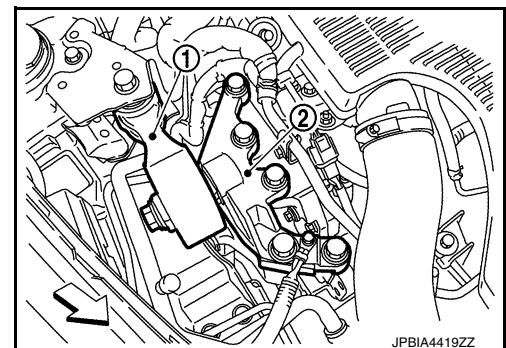
#### **CAUTION:**

**Put a piece of wood or an equivalent as the supporting surface, secure a completely stable condition.**



2. Remove upper torque rod (RH) (1) and engine mounting insulator (RH) (2).

⇐ : Vehicle front



3. Remove engine mounting insulator (LH).
4. Carefully lower jack, or raise lift to remove the engine and the transaxle assembly. When performing work, observe the following caution.

#### **CAUTION:**

- Check that no part interferes with the vehicle side.
- Before and during this lifting, always check if any harnesses are left connected.
- During the removal, always be careful to prevent the vehicle from falling off the lift due to changes in the center of gravity.
- If necessary, support the vehicle by setting jack or suitable tool at the rear.

### Separation

1. Remove catalyst convertor. Refer to [EM-37, "AWD : Exploded View"](#).
2. Remove turbocharger. Refer to [EM-40, "Exploded View"](#).
3. Remove exhaust manifold. Refer to [EM-44, "Exploded View"](#).

# ENGINE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

[MR FOR NISMO RS MODELS]

4. Install engine slinger to front cover front left side (A) and cylinder head rear right side (B).

↔ : Engine front

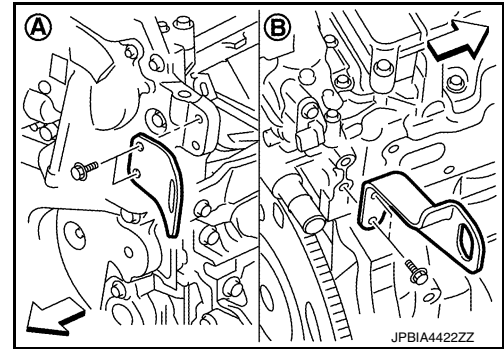
### Slinger bolts

Front cover front left side:

: 32.9 N·m (3.4 kg-m, 24 ft-lb)

Cylinder head rear right side:

: 25.0 N·m (2.6 kg-m, 18 ft-lb)



5. Remove starter motor. Refer to [STR-27, "MR16DDT : Exploded View"](#).  
6. Lift with a hoist and separate the engine from the transaxle assembly. Refer to [TM-347, "Removal and Installation"](#).

## INSTALLATION

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

### CAUTION:

- Never allow engine oil to get on engine mounting insulator. Be careful not to damage engine mounting insulator.
- Check that each mounting insulator is seated properly, and tighten mounting nuts and bolts.
- When installation directions are specified, install parts according to the direction marks on them referring to the figure of components. Refer to [EM-68, "AWD : Exploded View"](#).

## AWD : Inspection

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## INSPECTION AFTER INSTALLATION

### Inspection for Leakage

The following are procedures for checking fluids leakage, lubricates leakage, and exhaust gases leakage.

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-11, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
  - Turn ignition switch "ON" (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
  - Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to check there is no leakage of fuel, exhaust gases, or any oil/fluids including engine oil and engine coolant.
- Bleed air from lines and hoses of applicable lines, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to the specified level, if necessary.

Summary of the inspection items:

Items		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission / transaxle fluid	AT & CVT Models	Leakage	Level / Leakage	Leakage
	MT Models	Level / Leakage	Leakage	Level / Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gases		—	Leakage	—

\*: Power steering fluid, brake fluid, etc.

## UNIT DISASSEMBLY AND ASSEMBLY

## ENGINE STAND SETTING

## Setting

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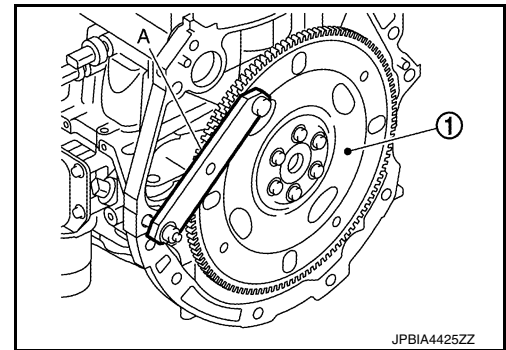
**NOTE:**

Explained here is how to disassemble with engine stand supporting transaxle surface. When using different type of engine stand, note with difference in steps and etc.

1. Remove the engine and the transaxle assembly from the vehicle, and separate the transaxle from the engine. Refer to [EM-64, "2WD : Removal and Installation"](#) (2WD models) or [EM-68, "AWD : Removal and Installation"](#) (AWD models).
2. Install engine to engine stand with the following procedure:
  - a. Remove flywheel (M/T models) or drive plate (CVT models).
    - Secure flywheel (M/T models) or drive plate (CVT models) (1) with a stopper plate [SST: KV11105210 (J-44716)] (A), and remove mounting bolts.

**NOTE:**

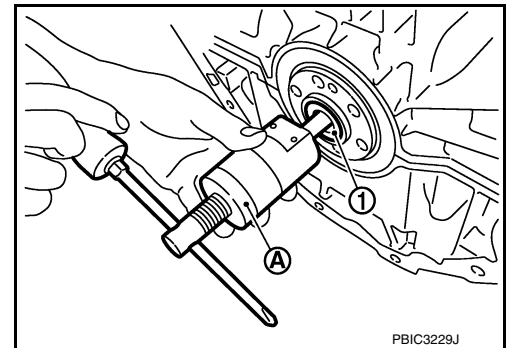
This figure shows CVT models as an example.



- b. Remove pilot converter (1) (CVT models) or pilot bush (M/T models) using pilot bushing puller [SST: ST16610001 (J-23907)] (A) or suitable tool.

**NOTE:**

This figure shows CVT models as an example.



- c. Lift the engine with a hoist to install it onto widely use engine stand.

**CAUTION:**

- Use the engine stand that has a load capacity [approximately 135 kg (298 lb) or more] large enough for supporting the engine weight.
- If the load capacity of stand is not adequate, remove the following parts beforehand to reduce the potential risk of overturning stand.
  - Intake manifold: Refer to [EM-29, "Exploded View"](#).
  - Catalyst converter: Refer to [EM-34, "2WD : Exploded View"](#) (2WD models) or [EM-37, "AWD : Exploded View"](#) (AWD models).
  - Rocker cover: Refer to [EM-60, "Exploded View"](#).

**NOTE:**

# ENGINE STAND SETTING

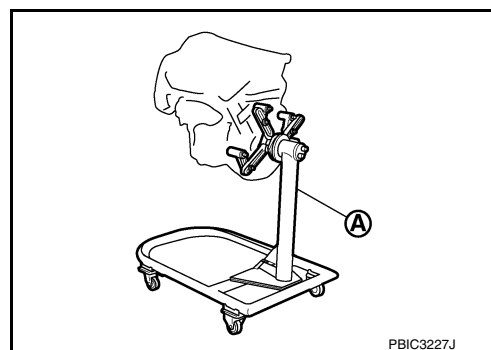
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

The figure shows an example of widely used engine stand (A) that can support mating surface of transaxle with flywheel (M/T models) or drive plate (CVT models) removed.

**CAUTION:**

**Before removing the hanging chains, check the engine stand is stable and there is no risk of overturning.**



3. Drain engine oil. Refer to [LU-10, "Draining"](#).

**CAUTION:**

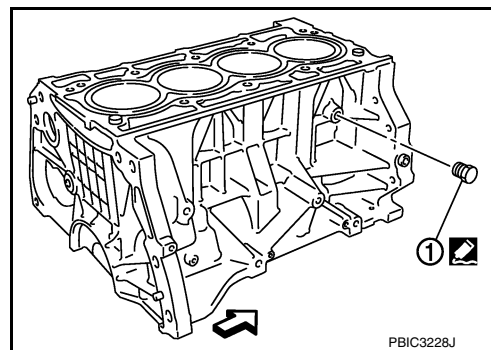
**Be sure to clean drain plug and install with new drain plug washer.**

4. Drain engine coolant by removing water drain plug (1) from inside of the engine.

⇐ : Engine front

**Tightening torque** : Refer to [EM-115, "Disassembly and Assembly"](#).

**Use Genuine RTV Silicon Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**



## ENGINE UNIT

### Disassembly

INFOID:0000000012197289

1. Remove intake manifold. Refer to [EM-29, "Exploded View"](#).
2. Remove oil pan (lower). Refer to [EM-110, "Exploded View"](#).
3. Remove ignition coil, spark plug, and rocker cover. Refer to [EM-24, "Exploded View"](#).
4. Remove fuel injector and fuel tube. Refer to [EM-54, "Exploded View"](#).
5. Remove timing chain. Refer to [EM-76, "Exploded View"](#).
6. Remove camshaft. Refer to [EM-88, "Exploded View"](#).
7. Remove water inlet. Refer to [CO-23, "Exploded View"](#).
8. Remove water outlet. Refer to [CO-25, "Exploded View"](#).
9. Remove cylinder head. Refer to [EM-100, "Exploded View"](#).

### Assembly

INFOID:0000000012197290

Assemble in the reverse order of disassembly.

# DRIVE BELT AUTO TENSIONER AND IDLER PULLEY

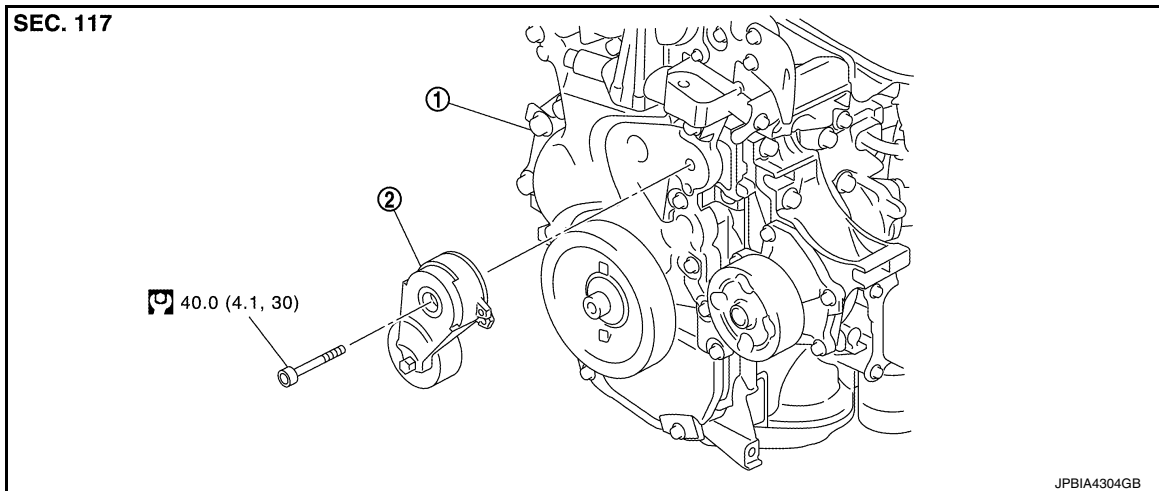
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## DRIVE BELT AUTO TENSIONER AND IDLER PULLEY

Exploded View

INFOID:0000000012197291



1. Front cover

2. Drive belt auto-tensioner

: N·m (kg-m, ft-lb)

### Removal and Installation

INFOID:0000000012197292

#### Removal

1. Loosen mounting bolt and remove drive belt auto-tensioner.

#### Installation

Install in the reverse order of removal.

#### **CAUTION:**

**When installing drive belt auto-tensioner, be careful not to interfere with water pump pulley.**

# TIMING CHAIN

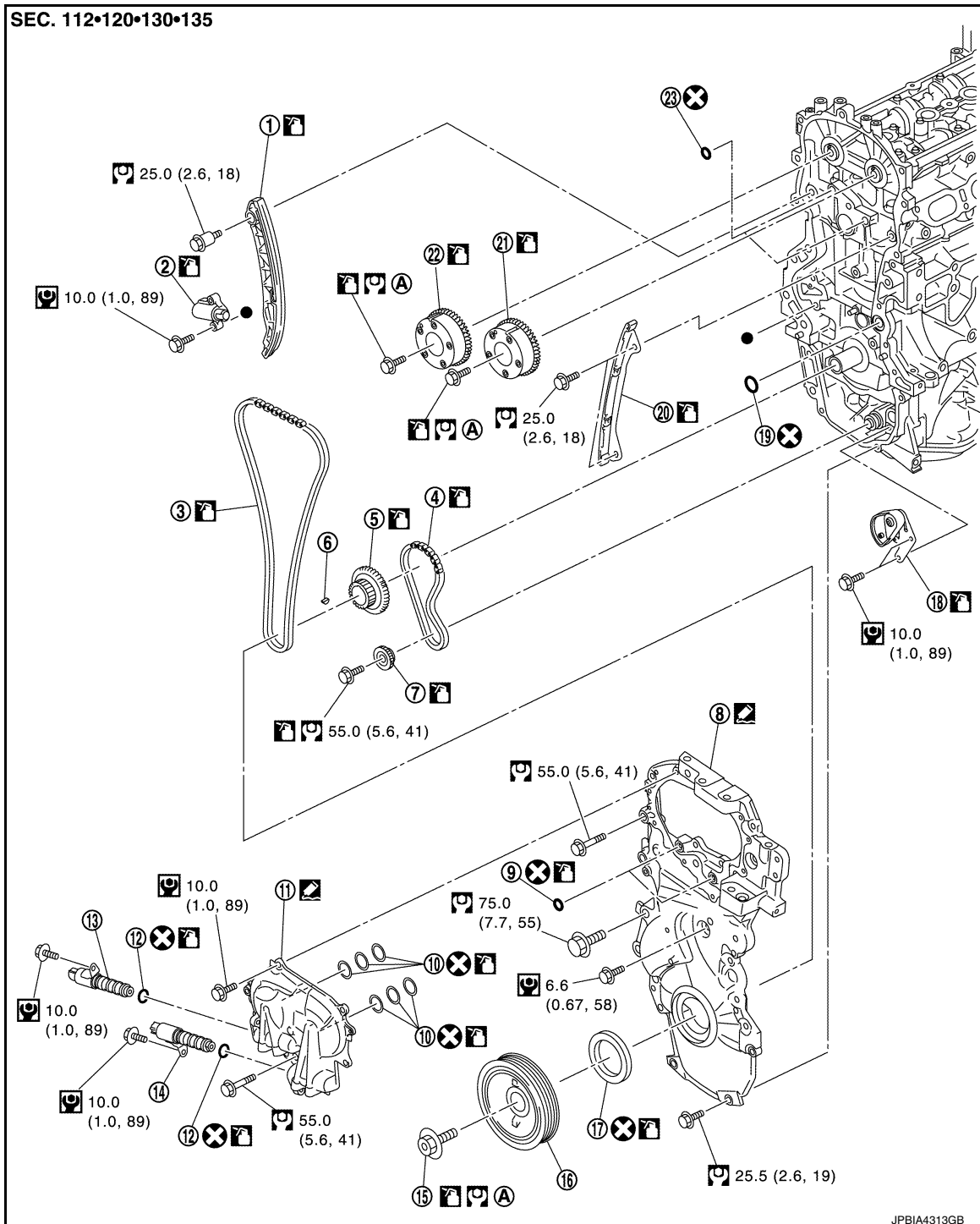
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## TIMING CHAIN

### Exploded View

INFOID:0000000012197293



- |   |  |                                    |
|---|--|------------------------------------|
| 1. Timing chain slack guide                     | 2. Timing chain tensioner                      | 3. Timing chain                    |
| 4. Oil pump drive chain                         | 5. Crankshaft sprocket                         | 6. Crankshaft key                  |
| 7. Oil pump sprocket                            | 8. Front cover                                 | 9. O-ring                          |
| 10. O-ring                                      | 11. Valve timing control cover                 | 12. O-ring                         |
| 13. Exhaust valve timing control solenoid valve | 14. Intake valve timing control solenoid valve | 15. Crankshaft pulley bolt         |
| 16. Crankshaft pulley                           | 17. Front oil seal                             | 18. Oil pump drive chain tensioner |
| 19. O-ring                                      | 20. Timing chain tension guide                 | 21. Camshaft sprocket (INT)        |





## < UNIT DISASSEMBLY AND ASSEMBLY >


22. Camshaft sprocket (EXH) 23. O-ring


Comply with the assembly procedure when tightening.


- A.
- Crankshaft pulley bolt. Refer to [EM-77](#)
  - Camshaft sprocket bolt. Refer to [EM-89](#)

 : N·m (kg-m, ft-lb)

 : N·m (kg-m, in-lb)

 : Always replace after every disassembly.

 : Should be lubricated with oil.

 : Sealing point

● : Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:0000000012197294

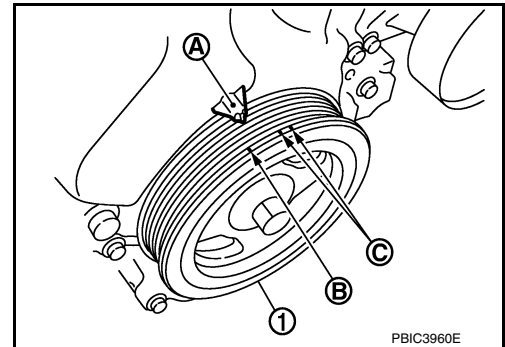
### REMOVAL

#### CAUTION:

The rotating direction in the text indicates all directions seen from the engine front.

1. Drain engine oil. Refer to [LU-10, "Draining"](#).  
**CAUTION:**  
Perform this step when engine is cold.
2. Remove the following parts:
  - Intake manifold: Refer to [EM-29, "Exploded View"](#).
  - Rocker cover: Refer to [EM-24, "Exploded View"](#).
3. Set No. 1 cylinder at TDC on its compression stroke with the following procedure:
  - a. Rotate crankshaft pulley (1) clockwise and align TDC mark (no paint) (B) to timing indicator (A) on front cover.

C : White paint mark (Not use for service)



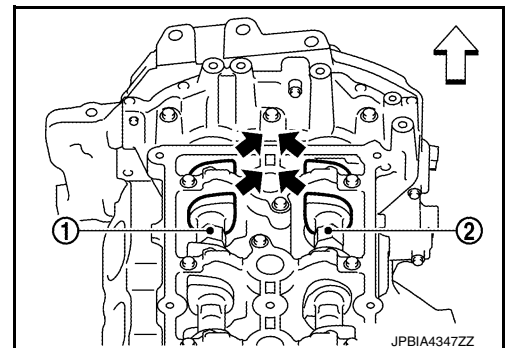
- b. At the same time, check that the cam noses of the No. 1 cylinder are located (←) as shown in the figure.

1 : Camshaft (INT)

2 : Camshaft (EXH)

← : Engine front

- If not, rotate crankshaft pulley one revolution (360 degrees) and align as shown in the figure.



4. Remove crankshaft pulley with the following procedure:

## TIMING CHAIN

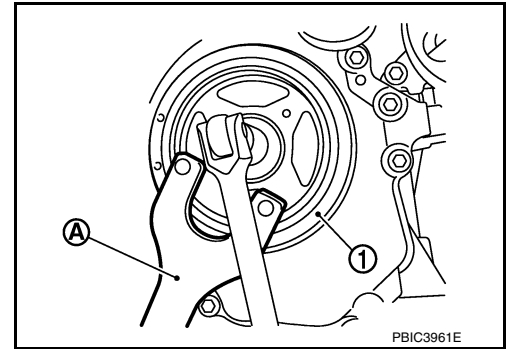
### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

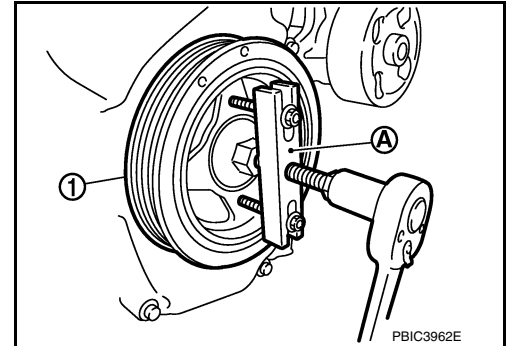
- a. Fix crankshaft pulley (1) with a pulley holder (commercial service tool) (A), loosen crankshaft pulley bolt, and locate bolt seating surface at 10 mm (0.39 in) from its original position.

**CAUTION:**

Never remove the crankshaft pulley bolt as they will be used as a supporting point for the pulley puller [SST: KV11103000 ( — )].



- b. Attach a pulley puller [SST: KV11103000 ( — )] (A) in the M6 thread hole on crankshaft pulley (1), and remove crankshaft pulley.

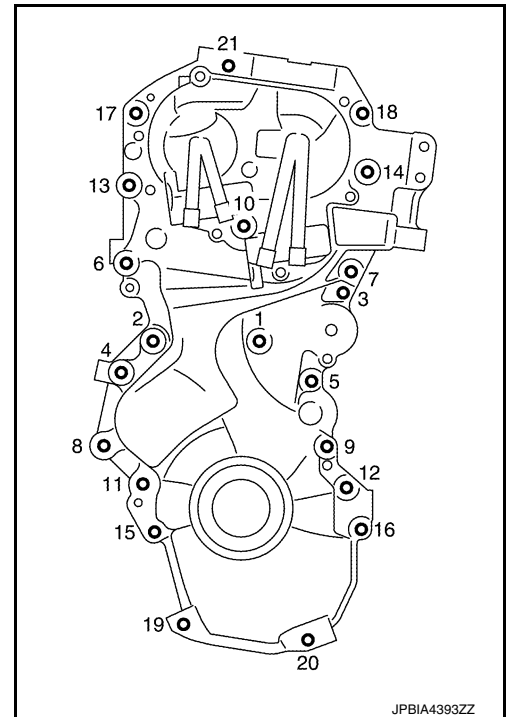


5. Remove oil pan (lower). Refer to [EM-110, "Exploded View"](#).

**NOTE:**

If crankshaft sprocket and oil pump drive component are not removed, this step is unnecessary.

6. Remove intake valve timing control solenoid valve and exhaust valve timing control valve.
7. Remove drive belt auto-tensioner. Refer to [EM-75, "Exploded View"](#).
8. Remove front cover with the following procedure:
  - a. Loosen mounting bolts in reverse order as shown in the figure.



## TIMING CHAIN

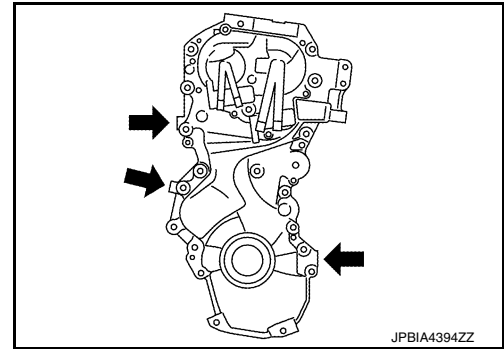
### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- b. Cut liquid gasket by prying the position (←) shown in the figure, and then remove the front cover.

**CAUTION:**

- Be careful not to damage the mating surface.
- A more adhesive liquid gasket is applied compared to previous types when shipped, so it should not be forced off the position not specified.



9. Remove front oil seal from front cover.

**CAUTION:**

**Be careful not to damage front cover.**

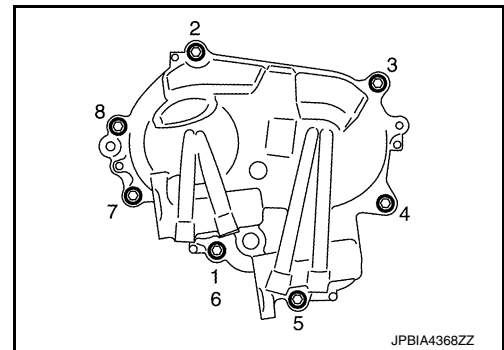
- Lift up front oil seal using a screwdriver.

10. Remove valve timing control cover, if necessary.

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

**NOTE:**

Disregard the numerical order No.1 in removal.



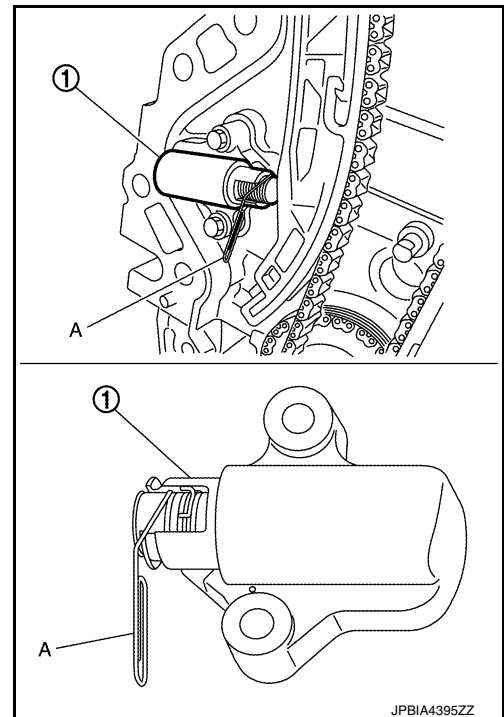
11. Remove timing chain tensioner with the following procedure:

- a. Insert a wire (A) (e.g. clip) into the top groove with the timing chain tensioner plunger pressed.

**NOTE:**

Timing chain tensioner plunger is securely fixed by inserting a wire (e.g. clip).

- b. Remove timing chain tensioner (1).



## TIMING CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

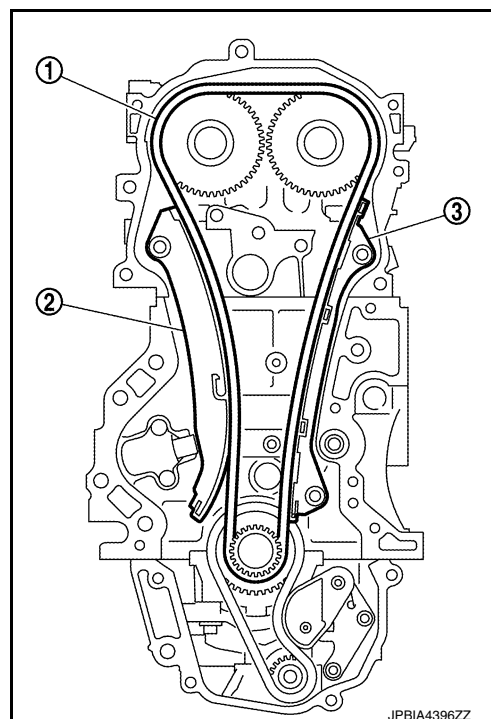
12. Remove slack guide (2), tension guide (3) and timing chain (1).

**CAUTION:**

Never rotate each crankshaft and camshaft individually while timing chain is removed. It causes interference between valve and piston.

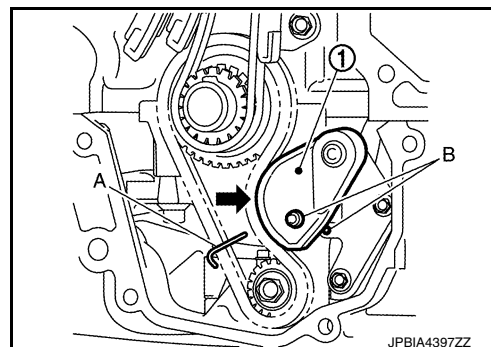
**NOTE:**

If timing chain is difficult to remove, remove camshaft sprocket (EXH) first to remove timing chain.



13. Remove crankshaft sprocket and oil pump drive component with the following procedure:

- Push oil pump drive chain tensioner (1) in the direction show in the figure.
- Insert a stopper pin (A) into the body hole (B).
- Remove oil pump chain tensioner.
  - When the holes on lever and tensioner body cannot be aligned, align these holes by slightly moving the oil pump chain tensioner slack guide.



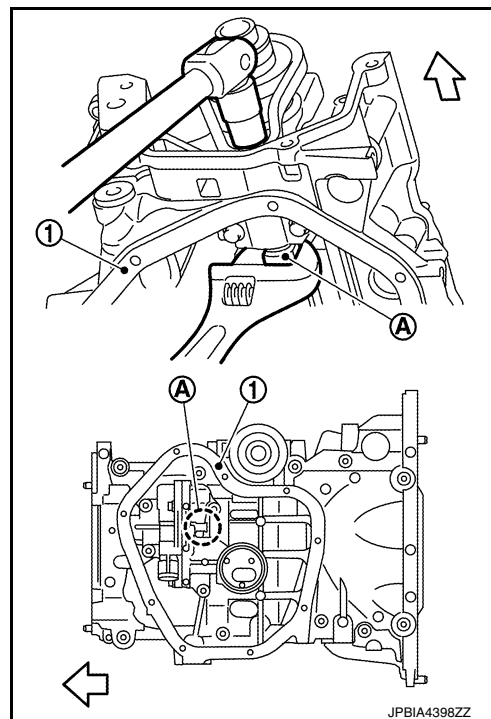
- Hold the WAF part of oil pump shaft [WAF: 10 mm (0.39 in)] (A), and then loosen the oil pump sprocket bolt and remove it.

1 : Oil pan (upper)

⇐ : Engine front

**CAUTION:**

- Secure the oil pump shaft with the WAF part.
- Never loosen the oil pump sprocket bolt by tightening the oil pump drive chain.



# TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## INSTALLATION

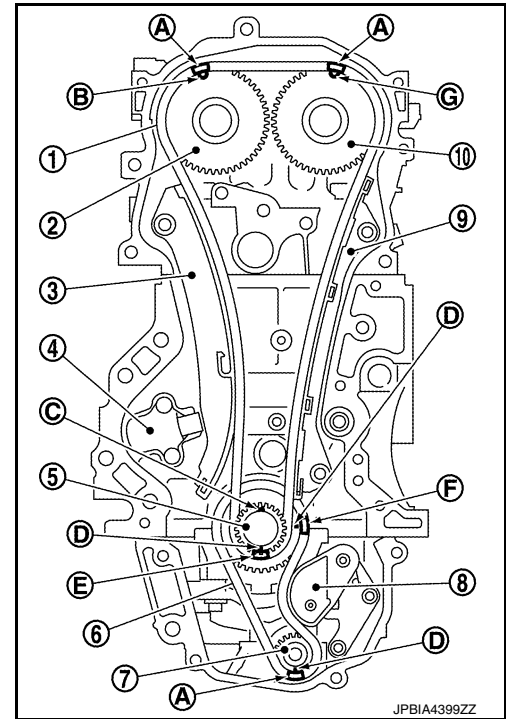
### CAUTION:

**Do not reuse O-rings.**

### NOTE:

The figure shows the relationship between the matching mark on each timing chain and that on the corresponding sprocket, with the components installed.

- 1 : Timing chain
- 2 : Camshaft sprocket (EXH)
- 3 : Slack guide
- 4 : Timing chain tensioner
- 5 : Crankshaft sprocket
- 6 : Oil pump drive chain
- 7 : Oil pump sprocket
- 8 : Oil pump drive chain tensioner
- 9 : Tension guide
- 10 : Camshaft sprocket (INT)
- A : Matching mark (dark blue link)
- B : Matching mark (outer groove)
- C : Crankshaft key position (straight up)
- D : Matching mark (stamping)
- E : Matching mark (white link)
- F : Matching mark (yellow link)
- G : Matching mark (outer groove)



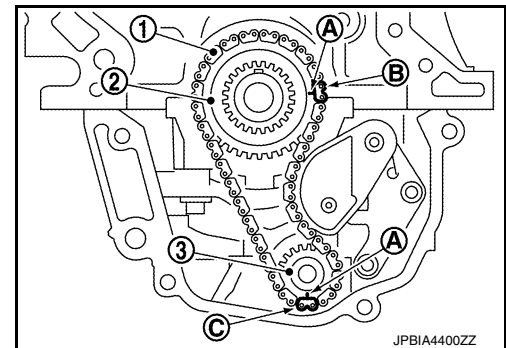
1. Check that crankshaft key points straight up.
2. Install crankshaft sprocket (2), oil pump sprocket (3), and oil pump drive chain (1).

- A : Matching mark (stamping)
- B : Matching mark (yellow link)
- C : Matching mark (dark blue link)

- Install it by aligning matching marks on each sprockets and oil pump drive chain.
- If these matching marks are not aligned, rotate the oil pump shaft slightly to correct the position.

### CAUTION:

**Check matching mark position of each sprockets after installing the oil pump drive chain.**



## TIMING CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

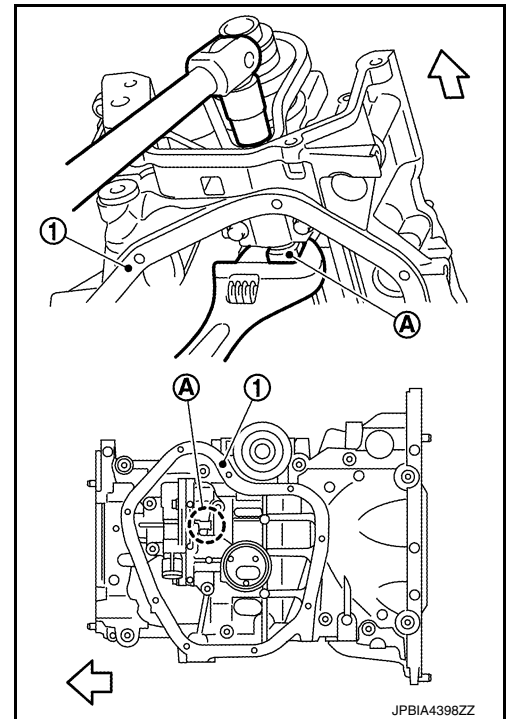
3. Hold the WAF part of oil pump shaft [WAF: 10 mm (0.39 in)] (A), and then tighten the oil pump shaft sprocket bolt.

1 : Oil pan (upper)

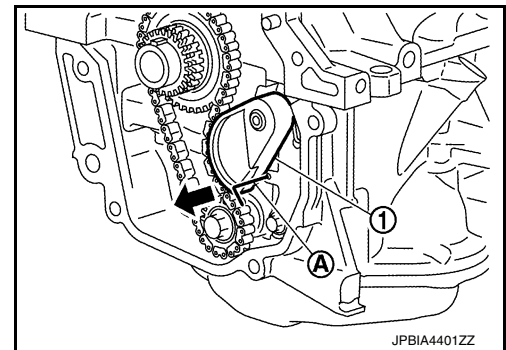
⇐ : Engine front

**CAUTION:**

- Secure the oil pump shaft with the WAF part.
- Never loosen the oil pump shaft sprocket bolt by tightening the oil pump drive chain.



4. Install oil pump chain tensioner (1).
- Fix the face oil pump tensioner at the most compressed position using a stopper pin (A), and then install it.
  - Securely pull out (⇐) the stopper pin after installing the oil pump chain tensioner.
  - Check matching mark position of oil pump drive chain and each sprockets again.



# TIMING CHAIN

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

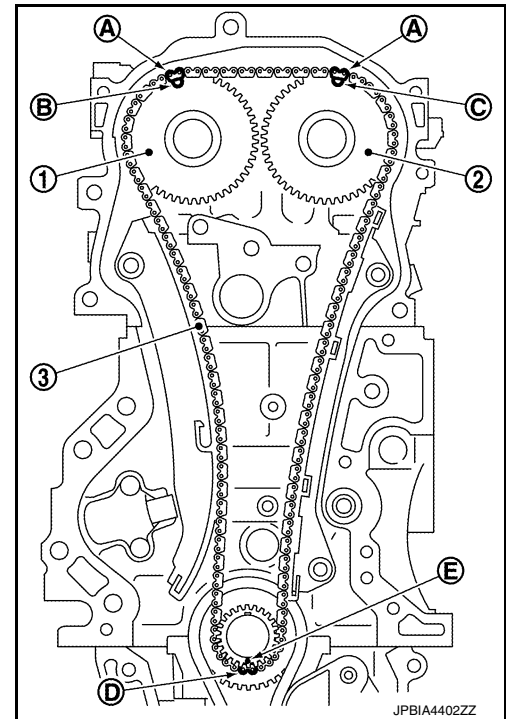
5. Align the matching marks of each sprockets with the matching marks of timing chain.

- 1 : Camshaft sprocket (EXH)
- 2 : Camshaft sprocket (INT)
- 3 : Timing chain
- A : Matching mark (dark blue link)
- B : Matching mark (outer groove)
- C : Matching mark (outer groove)
- D : Matching mark (white link)
- E : Matching mark (stamping)

- If these matching marks are not aligned, rotate the camshaft slightly by holding the hexagonal portion to correct the position.

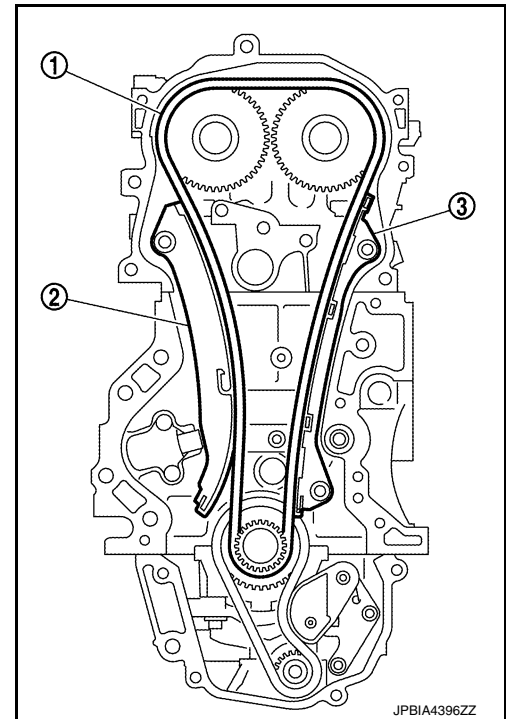
### CAUTION:

**Check matching mark position of each sprocket and timing chain again after installing the timing chain.**



6. Install the slack guide (2) and the tension guide (3).

- 1 : Timing chain



7. Install timing chain tensioner.

- Fix the plunger at the most compressed position using a stopper pin, and then install it.
- Securely pull out the stopper pin after installing the timing chain tensioner.

### CAUTION:

- After installing tensioner on the cam side, pull out lock pin.
- If plunger pops out after pulling out lock pin without installing the tensioner to the engine, never use the tensioner. (If used, the plunger does not slide smoothly.)
- To reuse tensioner on the cam side:  
After installation, pick up and move ratchet clip toward the tip of the plunger and position the tensioner parallel to the groove of the plunger.

8. Check matching mark position of timing chain and each sprockets again.

9. Install front oil seal. Refer to [EM-98. "FRONT OIL SEAL : Removal and Installation"](#).



## TIMING CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

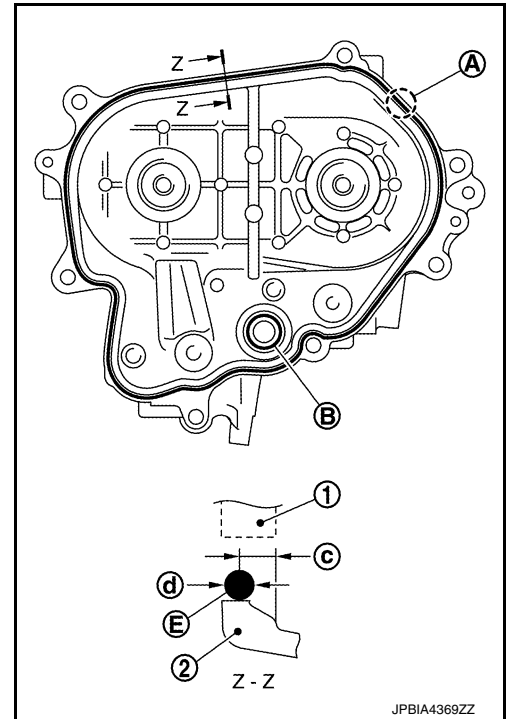
10. Install front cover with the following procedure:

- a. Install valve timing control cover, if removed.
- Apply a continuous bead of liquid gasket (E) with a tube presser (commercial service tool) to valve timing control cover as shown in the figure.

- 1 : Front cover  
2 : Valve timing control cover  
A : Start and end of gasket application  
B : Liquid gasket application area  
E : Gasket  
c : 4.0 - 5.6 mm (0.157 - 0.220 in)  
d :  $\phi$ 3.4 - 4.4 mm (0.134 - 0.173 in)

**NOTE:**

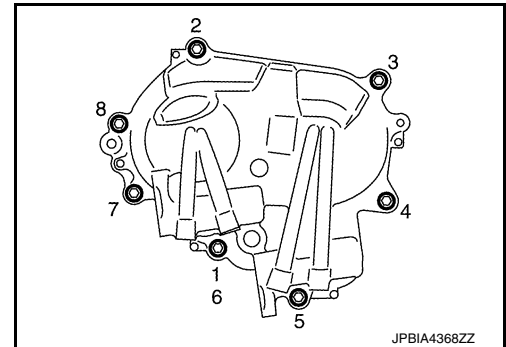
The start and end of gasket application must overlap 5mm or more one another.



- Tighten mounting bolts in numerical order as shown in the figure.

**NOTE:**

Tighten bolt the No.1 in two step. The numerical order No.6 shows the second step.



- b. Install new O-ring to cylinder block.

**CAUTION:**

**Do not reuse O-rings.**



# TIMING CHAIN

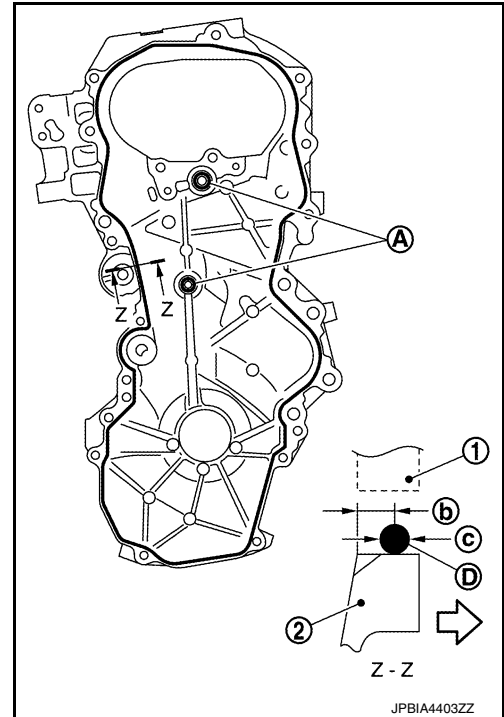
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

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

- 1 : Cylinder head
- 2 : Front cover
- A : Liquid gasket application area
- b : 4.0 - 5.6 mm (0.157 - 0.220 in)
- c :  $\phi 3.4 - 4.4$  mm (0.134 - 0.173 in)
- ↶ : Engine outside

Use Genuine RTV Silicon Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).



- d. Check that matching marks of timing chain and each sprockets are still aligned. Then install front cover.

**CAUTION:**

- Check O-ring on cylinder block is correctly installed.
- Be careful not to damage front oil seal by interference with front end of crankshaft.

- e. Install front cover, and tighten mounting bolts in numerical order as shown in the figure.
- Refer to the following for the installation position of bolts.

- M6 bolt : No. 1
- M10 bolts : No. 6, 7, 10, 13, 21
- M12 bolts : No. 2, 4, 8, 11
- M8 bolts : Except the above

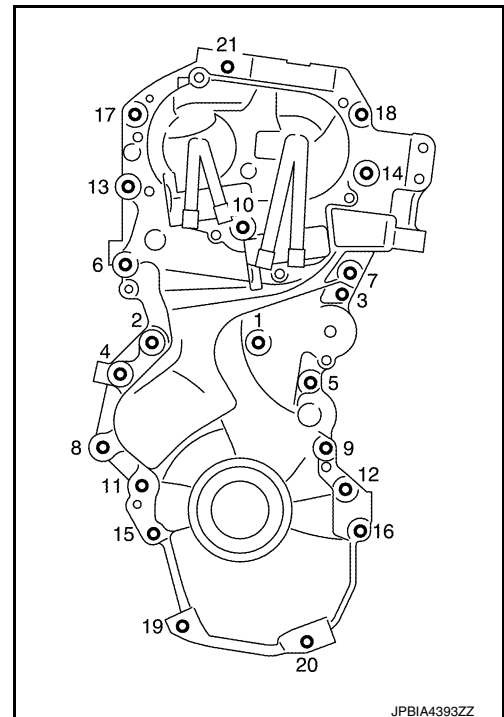
**CAUTION:**

Attaching should be done within 5 minutes after liquid gasket application.

- f. After all bolts are tightened, retighten them to specified torque in numerical order as shown in the figure.

**CAUTION:**

Be sure to wipe off any excessive liquid gasket leaking.



11. Install crankshaft pulley with the following procedure:

- a. When inserting crankshaft pulley with a plastic hammer, tap on its center portion (not circumference).

**CAUTION:**

Never damage front oil seal lip section.

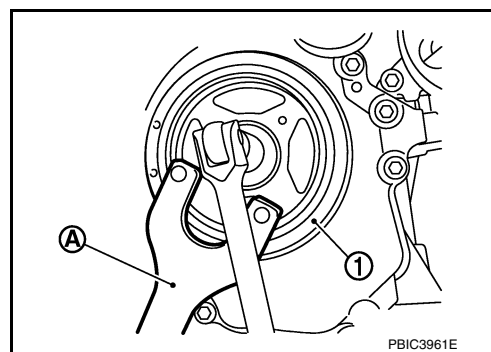
## TIMING CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

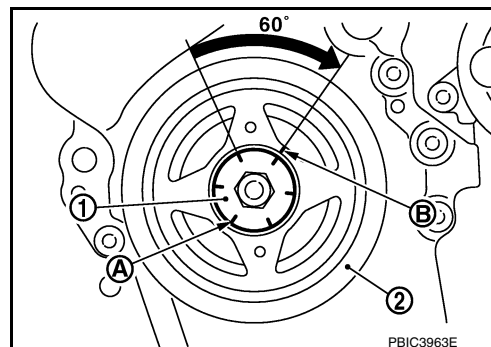
[MR FOR NISMO RS MODELS]

- b. Secure crankshaft pulley (1) with a pulley holder (commercial service tool) (A).
- c. Apply new engine oil to thread and seat surfaces of crankshaft pulley bolt.
- d. Tighten crankshaft pulley bolt.

 : 29.4 N·m (3.0 kg-m, 22 ft-lb)



- e. Put a paint mark (B) on crankshaft pulley (2), matching with any one of six easy to recognize angle marks (A) on crankshaft pulley bolt (1) flange.
- f. Turn another 60 degrees clockwise (angle tightening).
  - Check the tightening angle with movement of one angle mark.
- g. Check that crankshaft rotates clockwise smoothly.



12. Install remaining parts in the reverse order of removal.

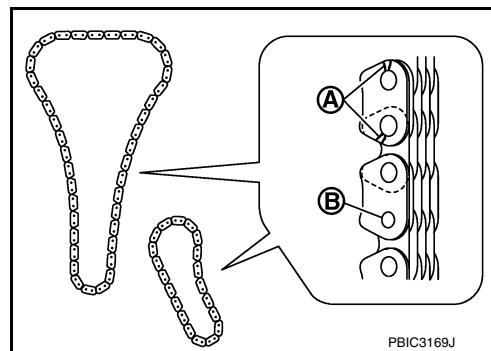
### Inspection

INFOID:0000000012197295

### INSPECTION AFTER REMOVAL

#### Timing Chain

Check for cracks (A) and any excessive wear (B) at link plates and roller links of timing chain. Replace timing chain if necessary.



### INSPECTION AFTER INSTALLATION

#### Inspection for Leakage

The following are procedures for checking fluids leakage, lubricates leakage, and exhaust gases leakage.

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-11, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
  - Turn ignition switch "ON" (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
  - Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

#### NOTE:

If hydraulic pressure inside chain tensioner drops after removal/installation, slack in guide may generate a pounding noise during and just after the engine start. However, this does not indicate an unusualness. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to check there is no leakage of fuel, or any oil/fluids including engine oil and engine coolant.
- Bleed air from lines and hoses of applicable lines, such as in cooling system.

# TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to the specified level, if necessary.

A

Summary of the inspection items:

Items		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission / transaxle fluid	AT & CVT Models	Leakage	Level / Leakage	Leakage
	MT Models	Level / Leakage	Leakage	Level / Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gases		—	Leakage	—

EM

C

D

E

F

G

H

I

J

K

L

M

N

O

P

\*: Power steering fluid, brake fluid, etc.

# CAMSHAFT

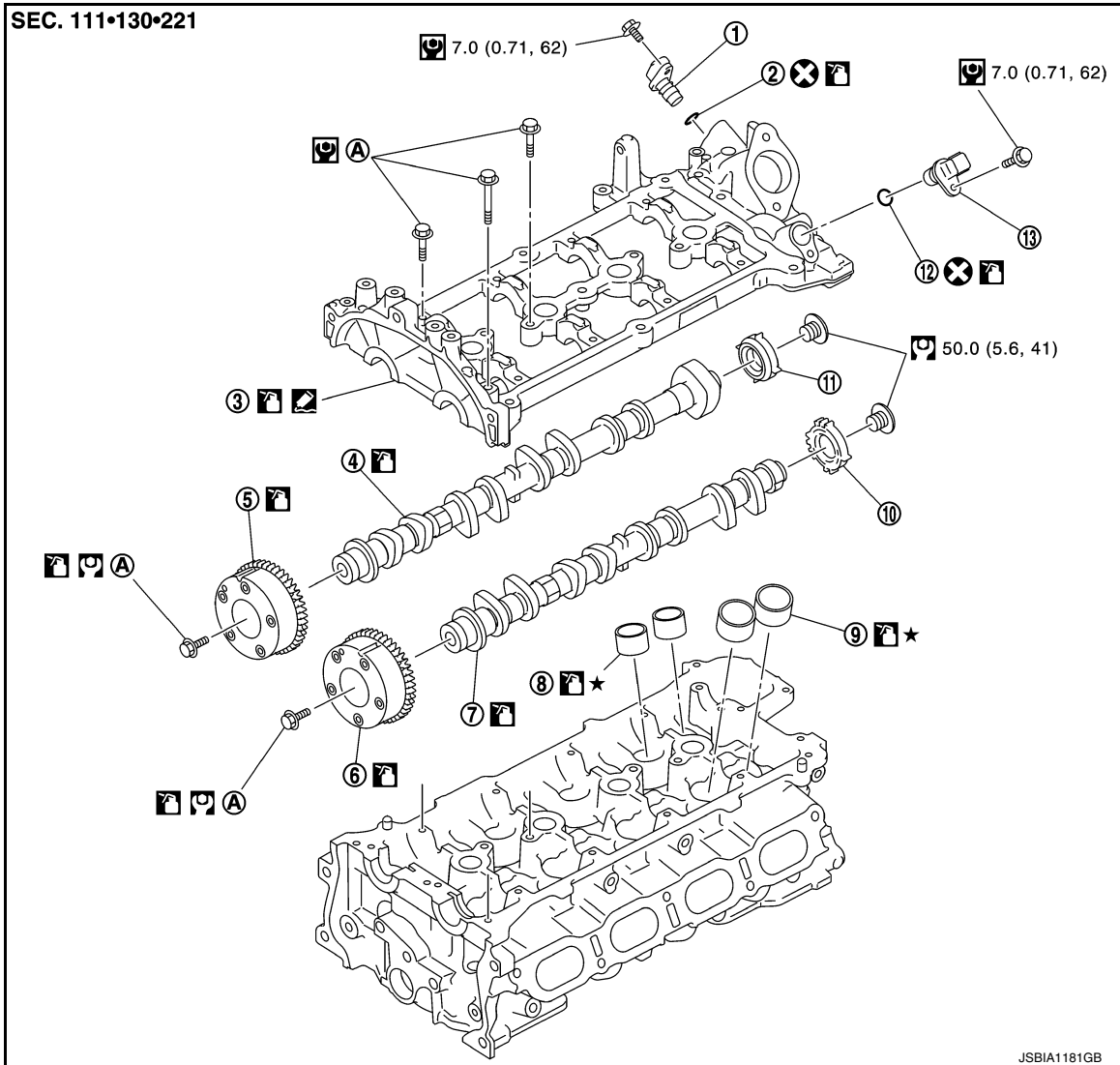
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## CAMSHAFT

### Exploded View

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- |   |                            |                            |
|---|----------------------------|----------------------------|
| 1. Exhaust valve timing control position sensor | 2. O-ring                  | 3. Camshaft bracket        |
| 4. Camshaft (EXH)                               | 5. Camshaft sprocket (EXH) | 6. Camshaft sprocket (INT) |
| 7. Camshaft (INT)                               | 8. Valve lifter (EXH)      | 9. Valve lifter (INT)      |
| 10. Signal plate (INT)                          | 11. Signal plate (EXH)     | 12. O-ring                 |
| 13. Camshaft position sensor (PHASE)            |                            |                            |

A. Comply with the assembly procedure when tightening. Refer to [EM-89](#)

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

: Sealing point

★ : Select with proper thickness.

## Removal and Installation

**CAUTION:**

The rotating direction in the text indicates all directions seen from the engine front.

## REMOVAL

1. Remove the following parts.

- Intake manifold: Refer to [EM-29, "Exploded View"](#).
- Rocker cover: Refer to [EM-24, "Exploded View"](#).
- Front cover and timing chain related parts: Refer to [EM-76, "Exploded View"](#).

**NOTE:**

Removal of oil pump drive related part is not necessary.

2. Remove camshaft position sensor (PHASE) and exhaust valve timing control position sensor from camshaft bracket.

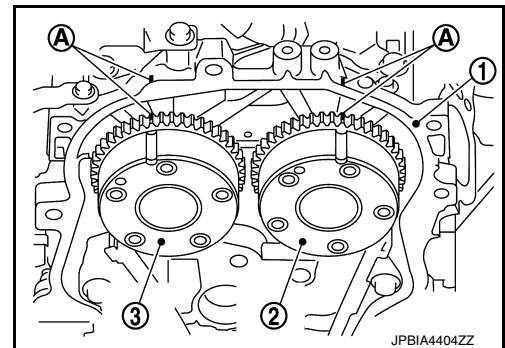
**CAUTION:**

- Handle camshaft position sensor (PHASE) and exhaust valve timing control position sensor carefully and avoid impacts.
- Never disassemble camshaft position sensor (PHASE) and exhaust valve timing control position sensor.
- Never place sensor where it is exposed to magnetism.

3. Put the matching mark (A) on the camshaft sprocket (INT) (2), camshaft sprocket (EXH) (3) and the camshaft bracket (1) as shown in the figure.

**NOTE:**

It prevents the knock pin of the camshaft (INT) from engaging with the incorrect pin hole when installing the camshaft sprocket (INT).



4. Remove camshaft sprockets (INT and EXH).

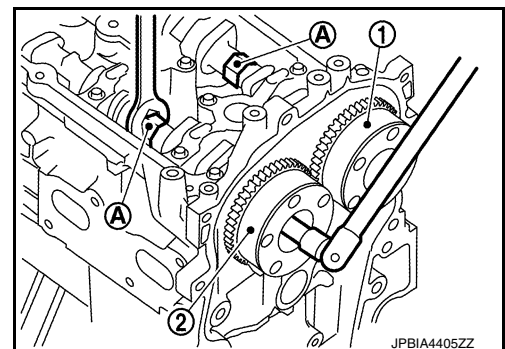
- Secure hexagonal part (A) of camshaft with a wrench. Loosen camshaft sprocket mounting bolts and remove camshaft sprocket.

1 : Camshaft sprocket (INT)

2 : Camshaft sprocket (EXH)

**CAUTION:**

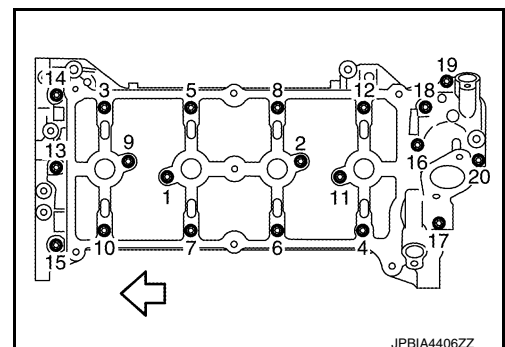
- Never rotate crankshaft or camshaft while timing chain is removed. It causes interference between valve and piston.
- Never loosen the mounting bolts with securing anything other than the camshaft hexagonal part or with tensioning the timing chain.



5. Remove camshaft bracket with the following procedure:

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

← : Engine front



# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

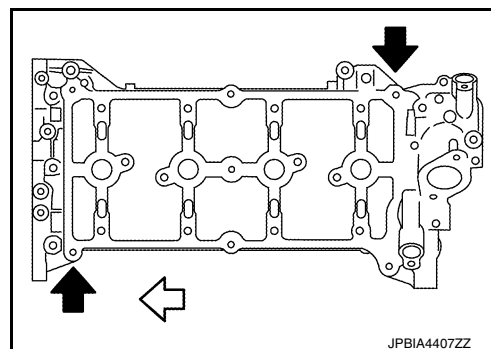
[MR FOR NISMO RS MODELS]

- b. Cut liquid gasket by prying the position (↖) shown in the figure, and then remove the camshaft bracket.

↖ : Engine front

### CAUTION:

- Never damage the mating surface.
- A more adhesive liquid gasket is applied compared to previous types when shipped, so it should not be forced off the position not specified.



- Remove camshafts.
- Remove valve lifters.
  - Identify installation positions, and store them without mixing them up.
- Remove signal plate from camshaft, if necessary.

## INSTALLATION

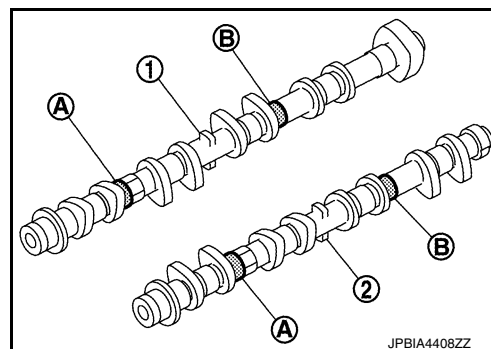
### CAUTION:

**Do not reuse O-rings.**

- Install valve lifters.
  - Install them in the original positions.
- Install camshafts.
  - Clean camshaft journal to remove any foreign material.
  - Distinguish between the intake and the exhaust by looking at the different shapes of the front and rear ends of the camshaft or using the identification colors (A) and (B).

- 1 : Camshaft (EXH)  
2 : Camshaft (INT)

Identification color	A	B
Camshaft (EXH)	—	Light blue
Camshaft (INT)	Light blue	—

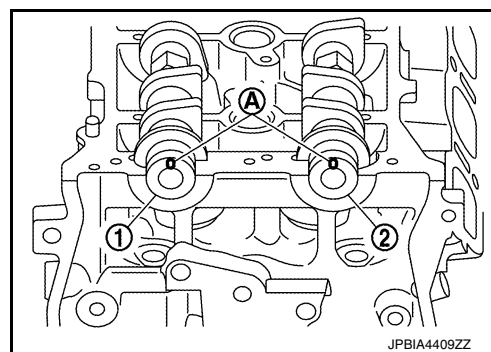


- Install camshafts so that camshaft dowel pins (A) on the front side are positioned as shown in the figure.

- 1 : Camshaft (EXH)  
2 : Camshaft (INT)

### NOTE:

Though camshaft does not stop at the positions as shown in the figure, for the placement of cam nose, it is generally accepted camshaft is placed for the same direction of the figure.





- Install camshaft bracket with the following procedure:
  - Remove foreign material completely from camshaft bracket backside and from cylinder head installation face.

# CAMSHAFT

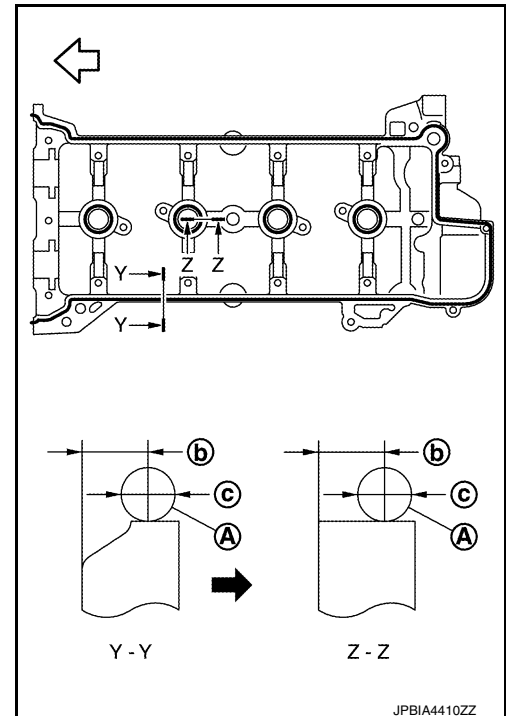
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]


- b. Apply liquid gasket (A) to camshaft bracket as shown in the figure.

- b : 4.0 - 5.6 mm (0.157 - 0.220 in)  
 c :  $\phi$  3.4 - 4.4mm (0.134 - 0.173 in)  
 : Engine front  
 : Engine outside

Use Genuine RTV silicon sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).



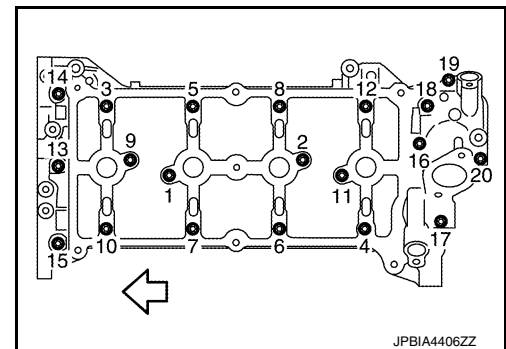
- c. Tighten mounting bolts of camshaft brackets in the following steps, in numerical order as shown in the figure.

 : Engine front

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

**M6 bolts [thread length: 57.5 mm (2.264 in)]**  
 : 13, 14, and 15 in the figure

**M6 bolts [thread length: 35.0 mm (1.378 in)]**  
 : Except the above



- i. Tighten mounting bolts in numerical order.

: **1.96 N·m (0.20 kg-m, 17 in-lb)**

- ii. Tighten mounting bolts in numerical order.

: **5.88 N·m (0.60 kg-m, 52 in-lb)**

- iii. Tighten mounting bolts in numerical order.

: **9.5 N·m (0.97 kg-m, 84 in-lb)**

### CAUTION:

After tightening mounting bolts of camshaft brackets, be sure to wipe off excessive liquid gasket from the mating surface of cylinder head.

4. Install the camshaft sprocket to the camshaft with the following procedure.



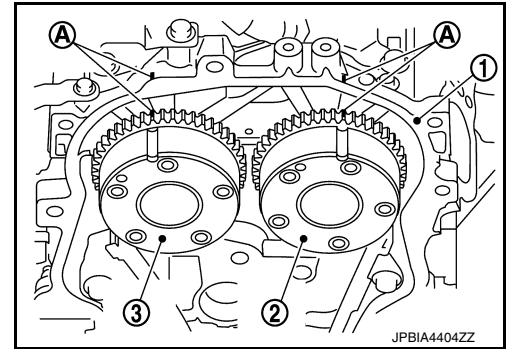
# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- a. When the camshaft sprocket (INT) (2) and camshaft sprocket (EXH) (3) is removed, refer to the paint mark (A) put according to step "3". Securely align the knock pin and the pin hole, and then install them.

1 : Camshaft bracket



- b. Tighten bolts in the following steps.
- Secure the hexagonal part of camshaft using wrench to tighten mounting bolt.
- i. Tighten camshaft mounting bolt.

: **35.0 N·m (3.6 kg-m, 26 ft-lb)**

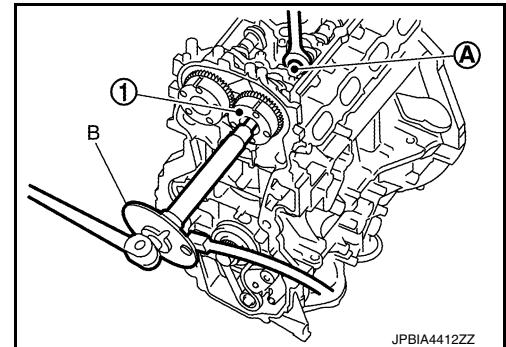
- ii. Turn 30 degrees clockwise (angle tightening).

**CAUTION:**

**Check the tightening angle by using an angle wrench [SST: KV10112100 (BT8653-A)] (B) or protractor. Never judge by visual inspection without an angle wrench.**

1 : Camshaft sprocket

A : Camshaft hexagonal part



5. Install timing chain and related parts. Refer to [EM-76, "Exploded View"](#).
6. Inspect and adjust valve clearance. Refer to [EM-14, "Inspection and Adjustment"](#).
7. Install remaining parts in the reverse order of removal.

## Inspection

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### INSPECTION AFTER REMOVAL

#### Camshaft Runout

1. Put V-block on a precise flat table, and support No. 2 and 5 journal of camshaft.

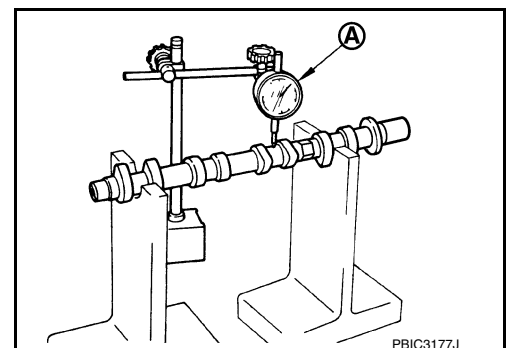
**CAUTION:**

**Never support No. 1 journal (on the side of camshaft sprocket) because it has a different diameter from the other four locations.**

2. Set dial indicator (A) vertically to No. 3 journal.
3. Turn camshaft to one direction with hands, and measure the camshaft runout on dial indicator. (Total indicator reading)

**Standard and Limit : Refer to [EM-140, "Camshaft"](#).**

4. If it exceeds the limit, replace camshaft.



#### Camshaft Cam Height



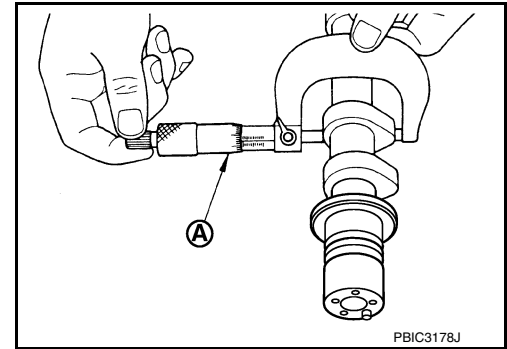
# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

1. Measure the camshaft cam height with a micrometer (A).

**Standard and Limit** : Refer to [EM-140, "Camshaft"](#).



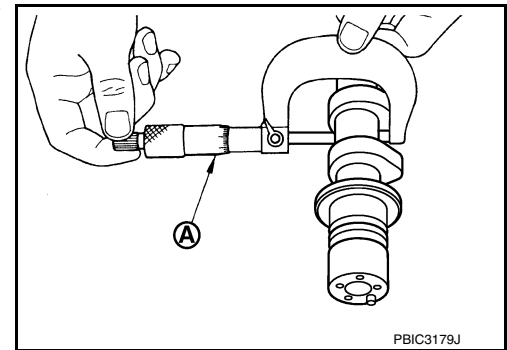
2. If it exceeds the limit, replace camshaft.

Camshaft Journal Oil Clearance

### CAMSHAFT JOURNAL OUTER DIAMETER

Measure the outer diameter of camshaft journal with a micrometer (A).

**Standard** : Refer to [EM-140, "Camshaft"](#).

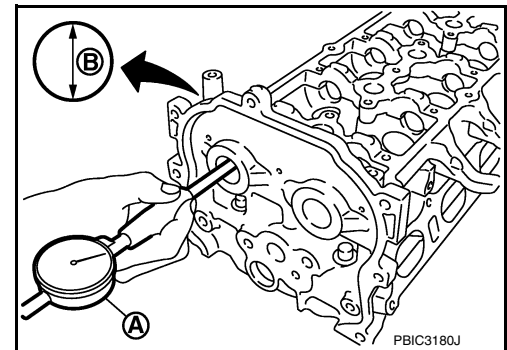


### CAMSHAFT BRACKET INNER DIAMETER

- Tighten camshaft bracket bolts with specified torque. Refer to [EM-89, "Removal and Installation"](#).
- Measure the inner diameter of camshaft bracket with a bore gauge (A).

B : Measuring direction of inner diameter

**Standard** : Refer to [EM-140, "Camshaft"](#).



### CAMSHAFT JOURNAL OIL CLEARANCE

- (Oil clearance) = (Camshaft bracket inner diameter) – (Camshaft journal diameter)

**Standard and Limit** : Refer to [EM-140, "Camshaft"](#).

- If it exceeds the limit, replace camshaft or cylinder head, or both.

#### NOTE:

Camshaft bracket cannot be replaced as a single part, because it is machined together with cylinder head. Replace whole cylinder head assembly.

Camshaft End Play

1. Install camshaft in cylinder head. Refer to [EM-89, "Removal and Installation"](#).

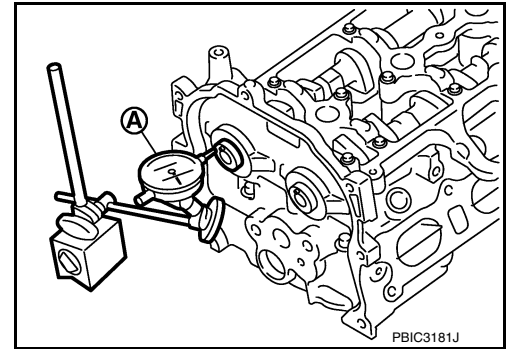
# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

2. Install dial indicator in thrust direction on front end of camshaft. Read the end play of dial indicator (A) when camshaft is moved forward/backward (in direction to axis).

**Standard and Limit** : Refer to [EM-140, "Camshaft"](#).



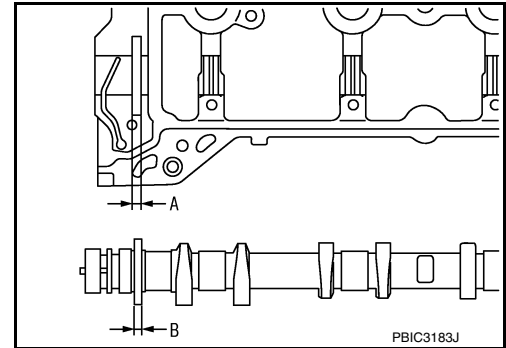
- Measure the following parts if out of the standard.
- Dimension (A) for groove of cylinder head No. 1 journal

**Standard** : 4.000 - 4.030 mm (0.1575 - 0.1587 in)

- Dimension (B) for camshaft flange

**Standard** : 3.877 - 3.925 mm (0.1526 - 0.1545 in)

- Refer to the standards above, and then replace camshaft and/or cylinder head.



### Camshaft Sprocket Runout

1. Put V-block on precise flat table, and support No. 2 and 5 journals of camshaft.

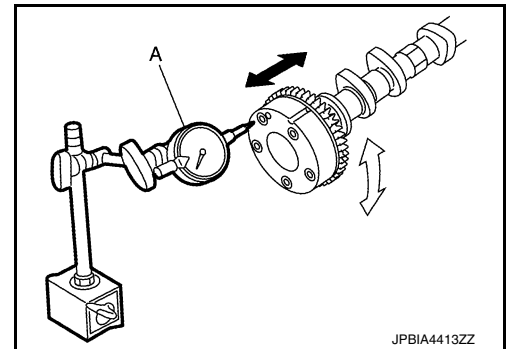
#### **CAUTION:**

**Never support No. 1 journal (on the side of camshaft sprocket) because it has a different diameter from the other four locations.**

2. Measure the camshaft sprocket runout with a dial indicator (A). (Total indicator reading)

**Limit** : Refer to [EM-140, "Camshaft"](#).

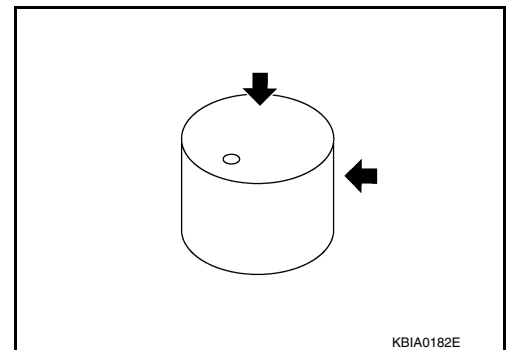
- If it exceeds the limit, replace camshaft sprocket.



### Valve Lifter

Check if surface of valve lifter has any wear or cracks.

- If anything above is found, replace valve lifter. Refer to [EM-140, "Camshaft"](#).



### Valve Lifter Clearance

#### VALVE LIFTER OUTER DIAMETER

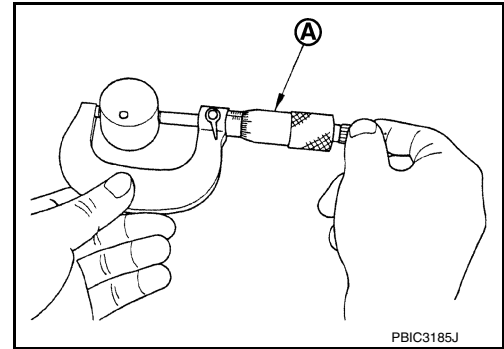
# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Measure the outer diameter of valve lifter with a micrometer (A).

**Standard** : Refer to [EM-140, "Camshaft"](#).



### VALVE LIFTER HOLE DIAMETER

Measure the inner diameter of valve lifter hole of cylinder head with an inside micrometer (A).

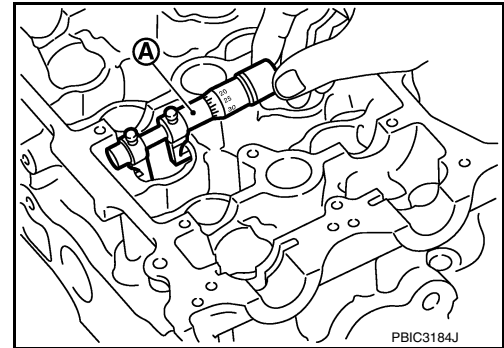
**Standard** : Refer to [EM-140, "Camshaft"](#).

### VALVE LIFTER CLEARANCE

- (Valve lifter clearance) = (Valve lifter hole diameter) – (Valve lifter outer diameter)

**Standard** : Refer to [EM-140, "Camshaft"](#).

- If out of the standard, referring to the each standard of valve lifter outer diameter and valve lifter hole diameter, replace either or both valve lifter and cylinder head.



## INSPECTION AFTER INSTALLATION

Inspection of Camshaft Sprocket (INT), (EXH) Oil Groove

### CAUTION:

- **Perform this inspection only when DTC P0011 or P0014 is detected in self-diagnostic results of CONSULT and it is directed according to inspection procedure of EC section. Refer to [EC-197, "Diagnosis Procedure"](#) (P0011) or [EC-200, "Diagnosis Procedure"](#) (P0014).**

- **Check when engine is cold so as to prevent burns by the splashing engine oil.**

1. Check engine oil level. Refer to [LU-9, "Inspection"](#).
2. Perform the following procedure so as to prevent the engine from being unintentionally started while checking.
  - a. Release the fuel pressure. Refer to [EC-166, "Work Procedure"](#).
  - b. Remove intake manifold. Refer to [EM-29, "Exploded View"](#).
  - c. Disconnect ignition coil and injector harness connectors.
  - d. Support the bottom surface of engine using a transmission jack, and then remove the engine mounting bracket (RH) and engine mounting insulator (RH). Refer to [EM-62, "2WD : Exploded View"](#) (M/T models) or [EM-68, "AWD : Exploded View"](#) (CVT models).
3. Remove intake or exhaust valve timing control solenoid valve. Refer to [EM-76, "Exploded View"](#).
  - Lift the front side of the engine with a jack base to remove intake or exhaust valve timing control solenoid valve.
4. Clean the mounting area of intake or exhaust valve timing control solenoid valve, and then insert a clean waste with no oil adhesion into the oil hole of the cylinder head.
5. Install engine mounting insulator (RH) and engine mounting bracket (RH). (After the removal of intake or exhaust valve timing control solenoid valve and insertion of a waste into the oil hole.)
6. Perform cranking to check that engine oil comes out from the oil hole (mounting hole of intake or exhaust valve timing control solenoid valve) of cylinder head.
  - Regarding the engine oil check, judge it by the amount of oil adhered to the wasted inserted into the oil hole.

### WARNING:

- **Never insert fingers into the oil hole.**
- **Be careful not to touch rotating parts (drive belt, idler pulleys and crankshaft pulley, etc.).**

**CAUTION:**

- Never perform cranking without installing the engine mounting insulator (RH) and engine mounting bracket (RH).
  - Prevent splashing by using a shop cloth so as to prevent the worker from injury from engine oil and so as to prevent engine oil contamination.
  - Prevent splashing by using a shop cloth so as to prevent engine oil from being splashed to engine and vehicle. Especially, be careful not to apply engine oil to rubber parts of drive belt, engine mounting insulator, etc. Wipe engine oil off immediately if it is splashed.
7. Perform the following inspection if engine oil does not come out from intake or exhaust valve timing control solenoid valve oil hole of the cylinder head.
    - Clean oil groove between oil strainer and intake or exhaust valve timing control solenoid valve. Refer to [LU-8, "Engine Lubrication System"](#) and [LU-8, "Engine Lubrication System Schematic"](#).
  8. Remove components between intake valve timing control solenoid valve and camshaft sprocket (INT) or exhaust valve control solenoid valve and camshaft sprocket (EXH), and then check each oil groove for clogging.
    - Clean oil groove if necessary. Refer to [LU-8, "Engine Lubrication System"](#) and [LU-8, "Engine Lubrication System Schematic"](#).
  9. After inspection, install removed parts in the reverse order.

## OIL SEAL

## VALVE OIL SEAL

## VALVE OIL SEAL : Removal and Installation

INFOID:0000000012197299

EM

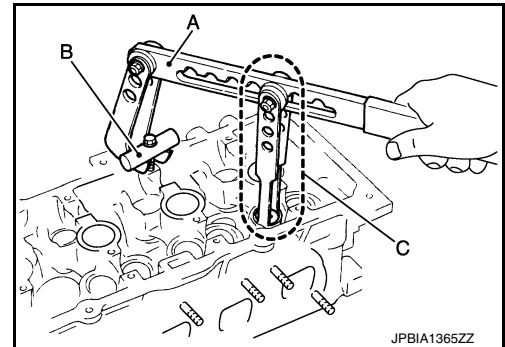
## REMOVAL

1. Remove camshafts. Refer to [EM-88, "Exploded View"](#).
2. Remove valve lifters. Refer to [EM-88, "Exploded View"](#).
3. Rotate crankshaft, and set piston whose valve oil seal is to be removed to TDC. This will prevent valve from dropping into cylinder.

**CAUTION:**

**When rotating crankshaft, be careful to avoid scarring front cover with timing chain.**

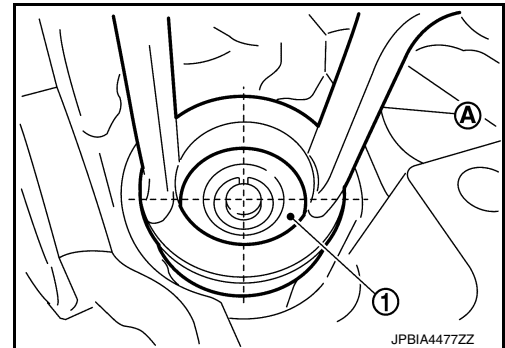
4. Remove valve collet.
  - Compress valve spring with the valve spring compressor [SST: KV10116200 (J-26336-A)] (A), the attachment [SST: KV10115900 (J-26336-20)] (C), and the adapter [SST: KV10109220 ( — )] (B). Remove valve collet with magnet hand.

**CAUTION:**

- Be careful not to damage valve lifter holes.
- Fit the attachment [SST: KV10115900 (J-26336-20)] in the center of valve spring retainer to press it.

1 : Valve spring retainer

A : Attachment

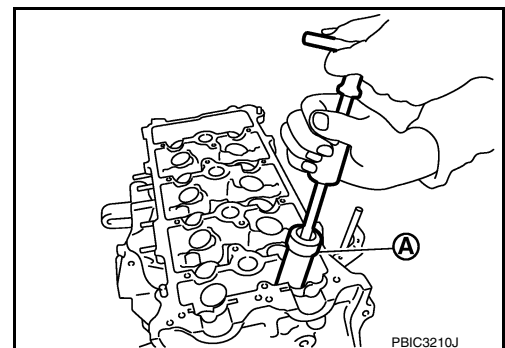


5. Remove valve spring retainer and valve spring (with valve spring seat).

**CAUTION:**

**Never remove valve spring seat from valve spring.**

6. Remove valve oil seal with the valve oil seal puller [SST: KV10107902 (J-38959)] (A).



## INSTALLATION

1. Apply new engine oil to valve oil seal joint surface and seal lip.

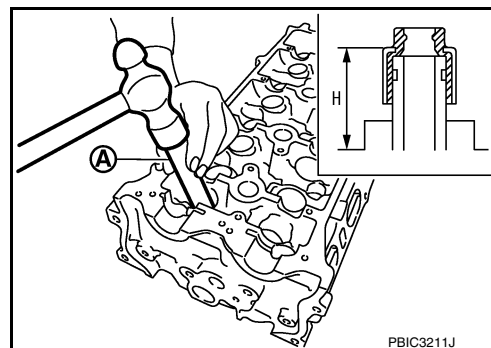
## OIL SEAL

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Press in valve oil seal to the height (H) shown in the figure with the valve oil seal drift [SST: KV10115600 (J-38958)] (A).

**Height (H) : 15.1 - 15.7 mm (0.594 - 0.618 in)**



- Install in the reverse order of removal, for the rest of parts.

## FRONT OIL SEAL

### FRONT OIL SEAL : Removal and Installation

INFOID:0000000012197300

#### REMOVAL

- Remove the following parts.
  - Front fender protector (RH): Refer to [EXT-31, "Exploded View"](#).
  - Drive belt: Refer to [EM-20, "Exploded View"](#).
  - Crankshaft pulley: Refer to [EM-76, "Exploded View"](#).
- Remove front oil seal with a suitable tool.

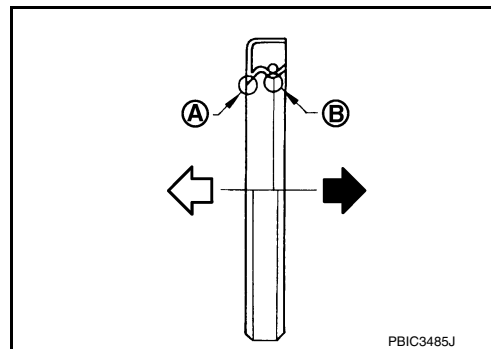
#### **CAUTION:**

**Be careful not to damage front cover and crankshaft.**

#### INSTALLATION

- Apply new engine oil to new front oil seal joint surface and seal lip.
- Install front oil seal so that each seal lip is oriented as shown in the figure.

- A : Dust seal lip  
B : Oil seal lip  
⇐ : Engine outside  
➡ : Engine inside



- Press-fit front oil seal using a suitable drift with outer diameter 57 mm (2.24 in) and inner diameter 45 mm (1.77 in).

**Within 0.3 mm (0.012 in) toward engine front (crankshaft pulley side)**

**Within 0.5 mm (0.020 in) toward engine rear (crankshaft sprocket side)**

#### **CAUTION:**

- Be careful not to damage front cover and crankshaft.**
- Press-fit oil seal straight to avoid causing burrs or tilting.**

- Install in the reverse order of removal, for the rest of parts.

## REAR OIL SEAL

### REAR OIL SEAL : Removal and Installation

INFOID:0000000012197301

#### REMOVAL

# OIL SEAL

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

1. Remove transaxle assembly. Refer to [TM-347, "Exploded View"](#) (CVT models) or [TM-30, "Exploded View"](#) (M/T models).
2. Remove clutch cover and clutch disk (M/T models). Refer to [EM-114, "Exploded View"](#).
3. Remove drive plate (CVT models) or flywheel (M/T models). Refer to [EM-114, "Exploded View"](#).
4. Remove rear oil seal with a suitable tool.

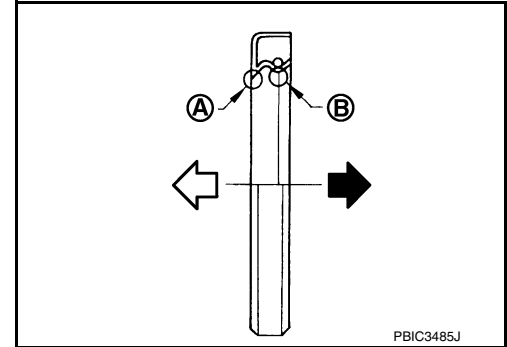
**CAUTION:**

**Be careful not to damage crankshaft and cylinder block.**

## INSTALLATION

1. Apply the liquid gasket lightly to entire outside area of new rear oil seal.  
**Use Genuine RTV silicon sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**
2. Install rear oil seal so that each seal lip is oriented as shown in the figure.

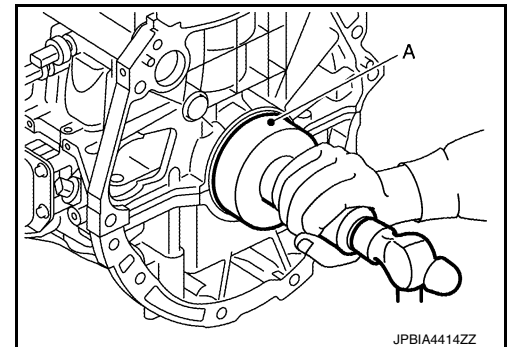
- A : Dust seal lip  
B : Oil seal lip  
⇐ : Engine outside  
➡ : Engine inside



- Press-fit rear oil seal with a suitable drift (A) outer diameter 115 mm (4.53 in) and inner diameter 90 mm (3.54 in).

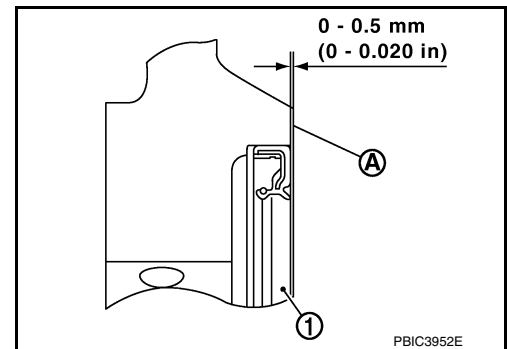
**CAUTION:**

- **Be careful not to damage crankshaft and cylinder block.**
- **Press-fit oil seal straight to avoid causing burrs or tilting.**
- **Never touch grease applied onto oil seal lip.**



- Press in rear oil seal (1) to the position as shown in the figure.

- A : Rear end surface of cylinder block



3. Install in the reverse order of removal, for the rest of parts.

# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## CYLINDER HEAD

### Exploded View

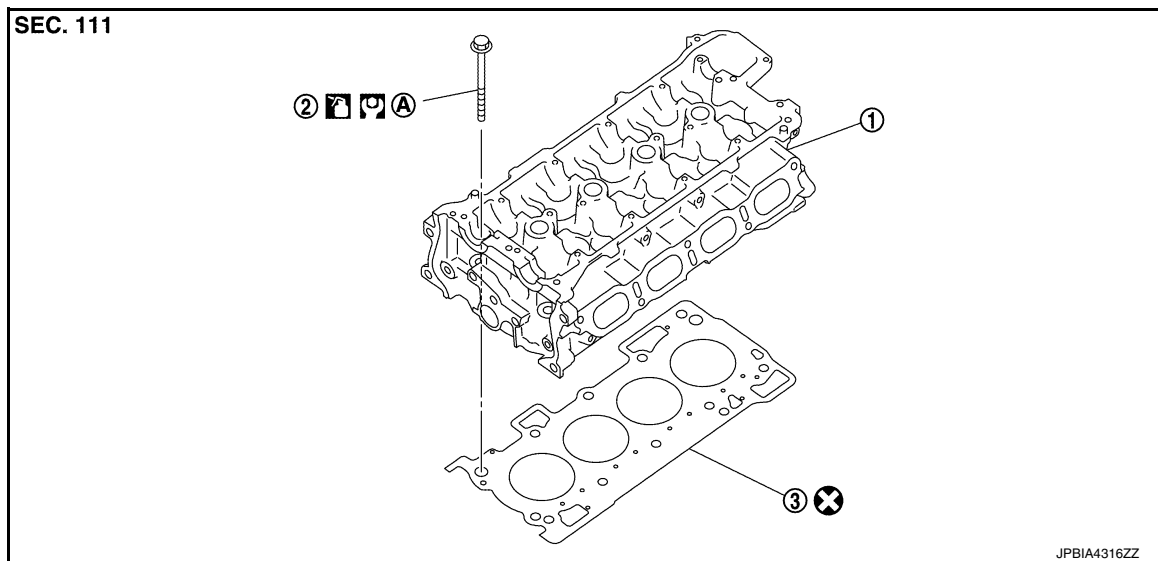
INFOID:0000000012197302

#### CAUTION:

Read PRECAUTION carefully.

The exhaust valve contains metallic sodium. Therefore, extreme caution must be taken when handling and disposing of the exhaust valve. Refer to [EM-6, "Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves"](#).

### REMOVAL



1. Cylinder head assembly
2. Cylinder head bolt
3. Cylinder head gasket

A. Comply with the assembly procedure when tightening. Refer to [EM-101](#).

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

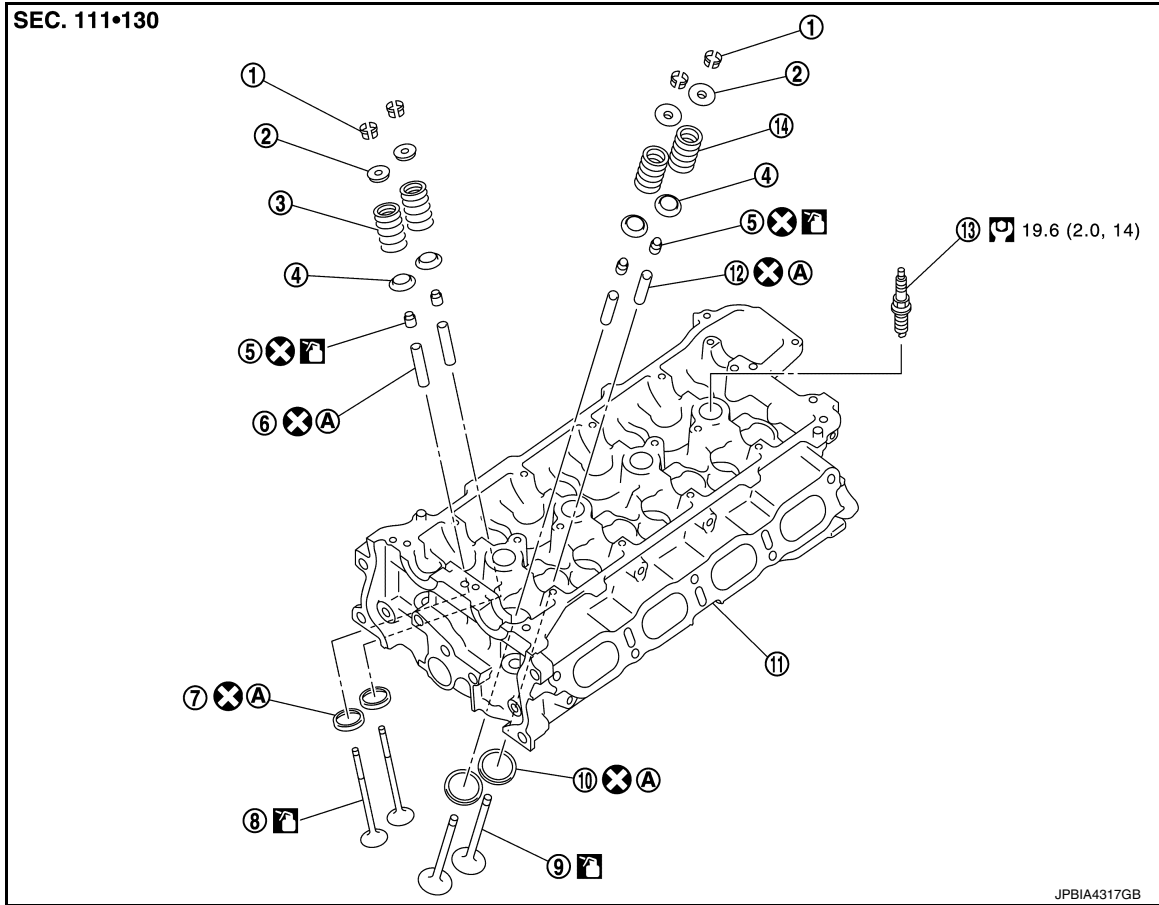
### DISASSEMBLY



# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]



- |                      |                          |                       |
|----------------------|--------------------------|-----------------------|
| 1. Valve collet      | 2. Valve spring retainer | 3. Valve spring (EXH) |
| 4. Valve spring seat | 5. Valve oil seal        | 6. Valve guide (EXH)  |
| 7. Valve seat (EXH)  | 8. Valve (EXH)           | 9. Valve (INT)        |
| 10. Valve seat (INT) | 11. Cylinder head        | 12. Valve guide (INT) |
| 13. Spark plug       | 14. Valve spring (INT)   |                       |

Replacement must be following the

- A. disassembly and assembly procedure. Refer to [EM-102](#)

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

## Removal and Installation

INFOID:0000000012197303

### REMOVAL

#### CAUTION:

Read PRECAUTION carefully.

The exhaust valve contains metallic sodium. Therefore, extreme caution must be taken when handling and disposing of the exhaust valve. Refer to [EM-6, "Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves"](#).

- Remove the following components and related parts.
  - Exhaust manifold: Refer to [EM-44, "Exploded View"](#).
  - Intake manifold: Refer to [EM-29, "Exploded View"](#).
  - Fuel injector and fuel tube assembly: Refer to [EM-54, "Exploded View"](#).
  - Water outlet: Refer to [CO-25, "Exploded View"](#).
  - Rocker cover: Refer to [EM-24, "Exploded View"](#).
  - Front cover, timing chain: Refer to [EM-76, "Exploded View"](#).

# CYLINDER HEAD

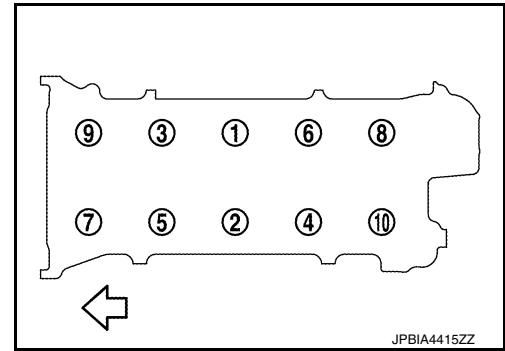
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Camshaft: Refer to [EM-88, "Exploded View"](#).
2. Remove cylinder head.
    - Loosen cylinder head bolts in reverse order as shown in the figure.

⇐ : Engine front

- Using TORX socket, loosen cylinder head bolts.



3. Remove cylinder head gasket.

## INSTALLATION

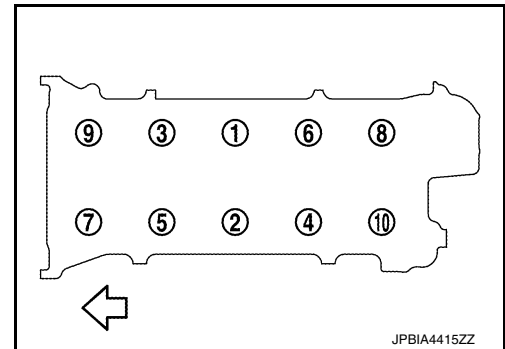
1. Install cylinder head gasket.
2. Install cylinder head, and tighten cylinder head bolts in numerical order as shown in the figure with the following procedure.

⇐ : Engine front

### CAUTION:

If cylinder head bolts are reused, check their outer diameters before installation. Refer to [EM-107, "Inspection"](#).

- a. Apply new engine oil to threads and seating surface of mounting bolts.
- b. Tighten all cylinder head bolts.



: 40.0 N·m (4.1 kg-m, 30 ft-lb)

- c. Turn all cylinder head bolts 100 degrees clockwise (angle tightening).

### CAUTION:

Check and confirm the tightening angle by using an angle wrench [SST: KV10112100 (BT8653-A)] (A) or protractor. Never judge by visual inspection without the tool.

- d. Completely loosen.

: 0 N·m (0 kg-m, 0 ft-lb)

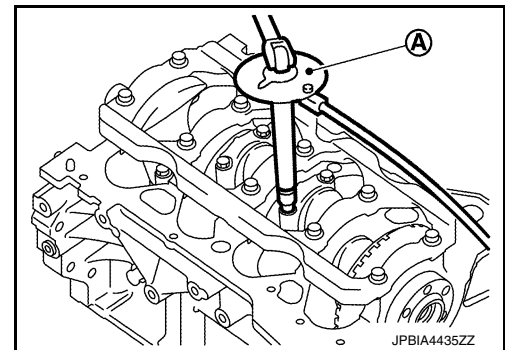
### CAUTION:

In this step, loosen cylinder head bolts in reverse order that indicated in the figure.

- e. Tighten all cylinder head bolts.

: 40.0 N·m (4.1 kg-m, 30 ft-lb)

- f. Turn all cylinder head bolts 95 degrees clockwise (angle tightening).
  - g. Turn all cylinder head bolts 95 degrees clockwise again (angle tightening).
3. Install in the reverse order of removal, for the rest of parts.



## Disassembly and Assembly

INFOID:0000000012197304

## DISASSEMBLY

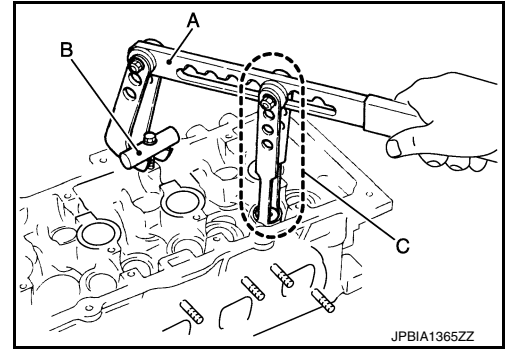
1. Remove spark plug with spark plug wrench (commercial service tool).
2. Remove valve lifter.
  - Identify installation positions, and store them without mixing them up.

# CYLINDER HEAD

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

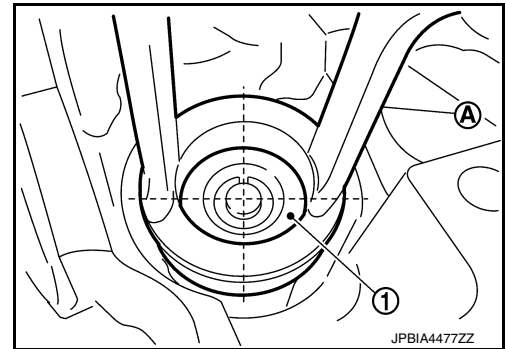
3. Remove valve collet.
  - Compress valve spring with the valve spring compressor [SST: KV10116200 (J-26336-A)] (A), the attachment [SST: KV10115900 (J-26336-20)] (C), and the adapter [SST: KV10109220 ( — )] (B). Remove valve collet with a magnet hand.



### CAUTION:

- Be careful not to damage valve lifter holes.
- Fit the attachment [SST: KV10115900 (J-26336-20)] in the center of valve spring retainer to press it.

- 1 : Valve spring retainer  
A : Attachment

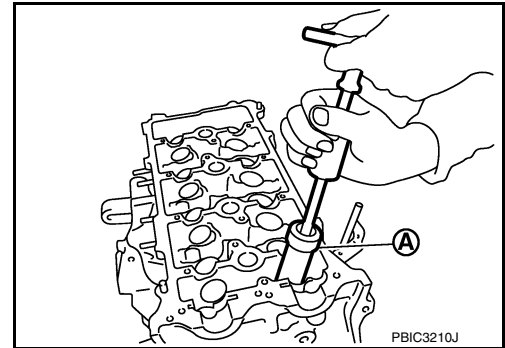


4. Remove valve spring retainer and valve spring (with valve spring seat).

### CAUTION:

**Never remove valve spring seat from valve spring.**

5. Push valve stem to combustion chamber side, and remove valve.
  - Identify installation positions, and store them without mixing them up.
6. Remove valve oil seal with a valve oil seal puller [SST: KV10107902 (J-38959)] (A).



7. When valve seat must be replaced.
  - 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-142, "Cylinder Head"](#).
8. When valve guide must be replaced.

### CAUTION:

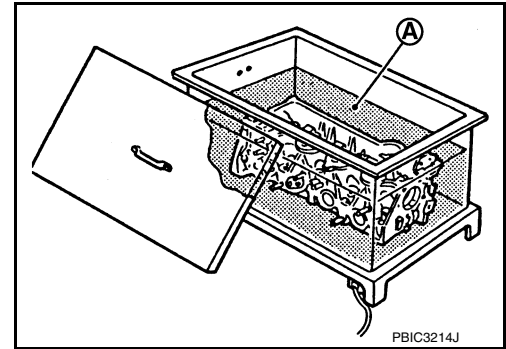
**Never bore excessively to prevent cylinder head from scratching.**

## CYLINDER HEAD

### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

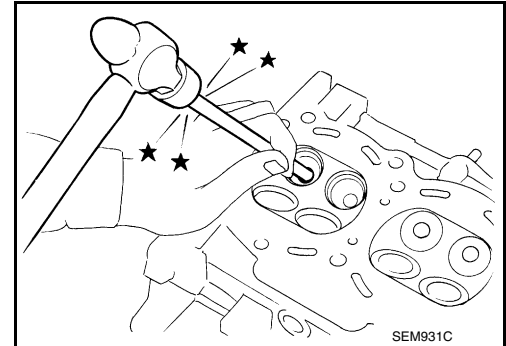
- a. To remove valve guide, heat cylinder head to 110 to 130°C (230 to 266°F) by soaking in heated oil (A).



- b. Drive out valve guide with a hammer and valve guide drift (commercial service tool).

**CAUTION:**

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



### ASSEMBLY

1. When valve guide is removed, install it.

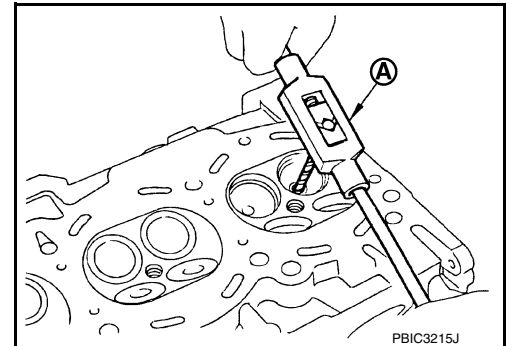
**CAUTION:**

**Replace with oversize [0.2 mm (0.008 in)] valve guide.**

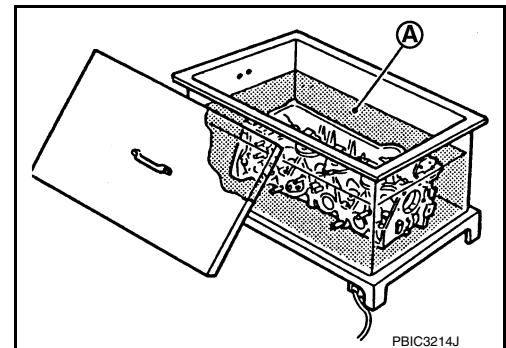
- a. Ream cylinder head valve guide hole with a valve guide reamer (commercial service tool) (A).

**For service parts: Oversize [0.2 mm (0.008 in)]**

**Refer to [EM-142, "Cylinder Head"](#).**



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



# CYLINDER HEAD

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

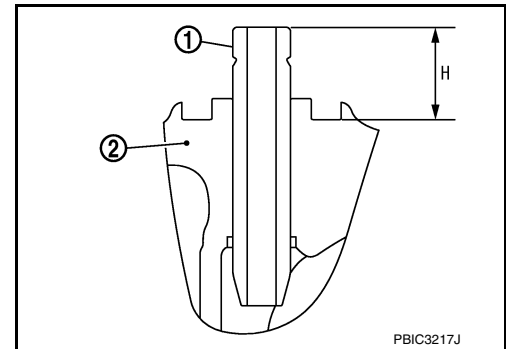
- c. Press valve guide (1) from camshaft side to dimensions as shown in the figure.

2 : Cylinder head

**Projection (H)** : Refer to [EM-142, "Cylinder Head"](#).

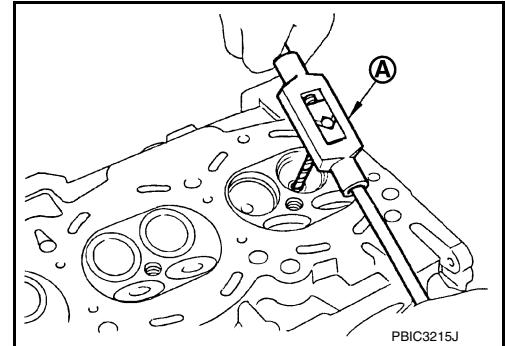
**CAUTION:**

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



- d. Apply reamer finish to valve guide with a valve guide reamer (commercial service tool) (A).

**Standard** : Refer to [EM-142, "Cylinder Head"](#).



2. When valve seat is removed, install it.

**CAUTION:**

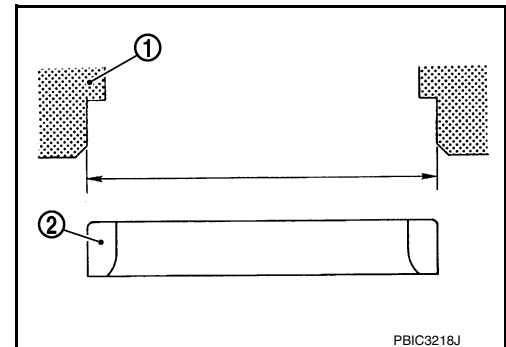
**Replace with oversize [0.5 mm (0.020 in)] valve seat.**

- a. Ream cylinder head (1) recess diameter for service valve seat (2).

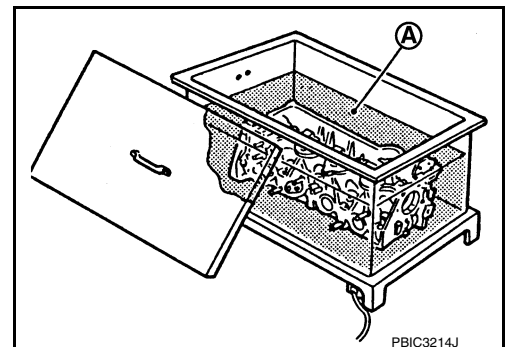
**For service parts: Oversize [0.5 mm (0.020 in)]**

**Refer to [EM-142, "Cylinder Head"](#).**

- Be sure to ream in circles concentric to the valve guide center. This will enable valve seat to fit correctly.



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



- c. Provide valve seats cooled well with dry ice. Press-fit valve seat into cylinder head.

**CAUTION:**

- **Never touch cold valve seats directly.**
- **Cylinder head contains heat, wear protective equipment to avoid getting burned.**

# CYLINDER HEAD

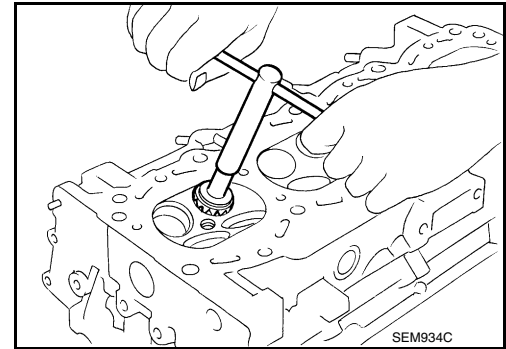
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- d. Using valve seat cutter set (commercial service tool) or valve seat grinder, finish valve seat to the specified dimensions. For dimensions, refer to [EM-142, "Cylinder Head"](#).

### CAUTION:

**When using valve seat cutter, firmly grip the cutter handle with both hands. Then, press on the contacting surface all around the circumference to cut in a single drive. Improper pressure on with the cutter or cutting many different times may result in stage valve seat.**

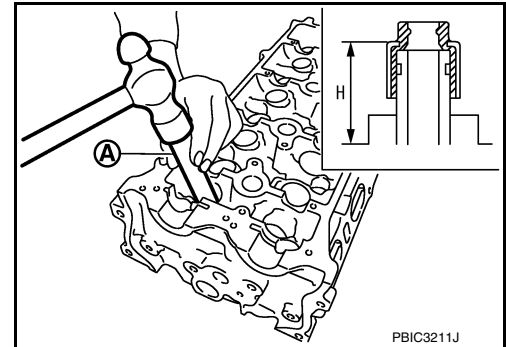


- e. Using compound, grind to adjust valve fitting.
- f. Check again for normal contact. Refer to [EM-107, "Inspection"](#).
3. Install valve oil seal.
  - Install with a valve oil seal drift [SST: KV10115600 (J-38958)] (A) to match dimension in the figure.

### NOTE:

Dimension is height that measured before installing valve spring (with valve spring seat).

**Height (H) : 15.1 - 15.7 mm (0.594 - 0.618 in)**



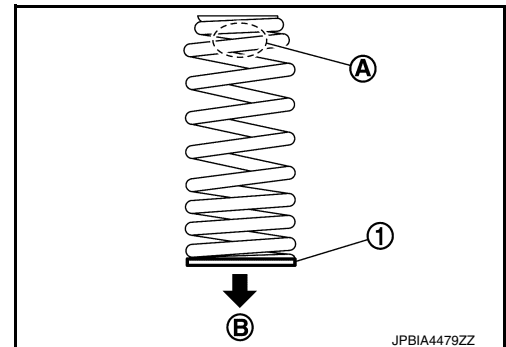
4. Install valve.
  - Install larger diameter to intake side.
5. Install valve spring (with valve spring seat).
  - Install smaller pitch (valve spring seat side) to cylinder head side (B).

1 : Valve spring seat (Do not remove from valve spring.)

- Confirm identification color (A) of valve spring.

**Intake : White**

**Exhaust : Yellow green**



6. Install valve spring retainer.

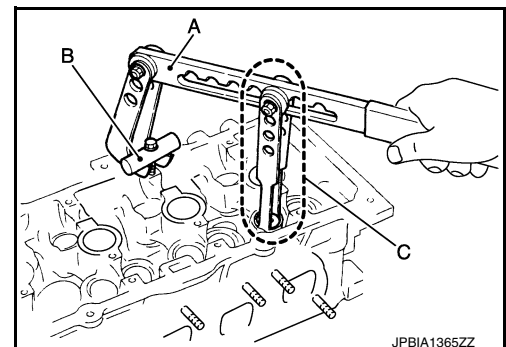
7. Install valve collet.

- Compress valve spring with the valve spring compressor [SST: KV10116200 (J-26336-A)] (A), the attachment [SST: KV10115900 (J-26336-20)] (C), and the adapter [SST: KV10109220 ( — )] (B). Install valve collet with a magnet hand.

### CAUTION:

**When working care not to damage valve lifter holes.**

- Tap valve stem edge lightly with a plastic hammer after installation to check its installed condition.



8. Install valve lifter.

- Install it in the original position.

9. Install spark plug with spark plug wrench (commercial service tool).

# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## Inspection

INFOID:000000012197305

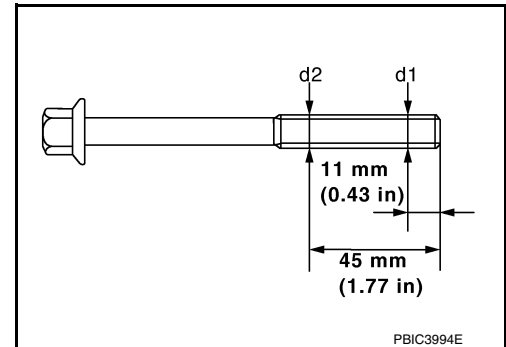
### INSPECTION AFTER REMOVAL

#### Cylinder Head Bolts Outer Diameter

- Cylinder head bolts are tightened by plastic zone tightening method. Whenever the size difference between (d1) and (d2) exceeds the limit, replace them with a new one.

**Limit [(d1) – (d2)]: 0.15 mm (0.0059 in)**

- If reduction of outer diameter appears in a position other than (d2), use it as (d2) point.



#### Cylinder Head Distortion

##### NOTE:

When performing this inspection, cylinder block distortion should be also checked. Refer to [EM-123. "Inspection"](#).

1. Wipe off engine oil and remove water scale (like deposit), gasket, sealant, carbon, etc. with a scraper.

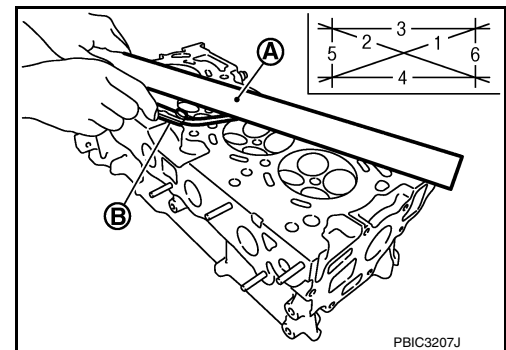
##### CAUTION:

**Never allow gasket debris to enter passages for engine oil or water.**

2. At each of several locations on bottom surface of cylinder head, measure the distortion in six directions using straightedge (A) and feeler gauge (B).

**Limit: Refer to [EM-142. "Cylinder Head"](#).**

- If it exceeds the limit, replace cylinder head.



### INSPECTION AFTER DISASSEMBLY

#### VALVE DIMENSIONS

- Check the dimensions of each valve. For the dimensions, refer to [EM-142. "Cylinder Head"](#).
- If dimensions are out of the standard, replace valve and check valve seat contact. Refer to "VALVE SEAT CONTACT".

#### VALVE GUIDE CLEARANCE

##### Valve Stem Diameter

- Measure the diameter of valve stem with micrometer (A).

**Standard: Refer to [EM-142. "Cylinder Head"](#).**

##### Valve Guide Inner Diameter

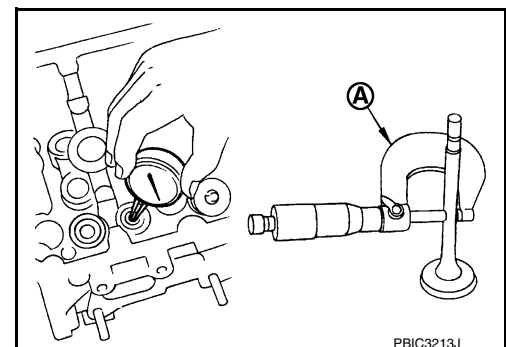
- Measure the inner diameter of valve guide with bore gauge.

**Standard: Refer to [EM-142. "Cylinder Head"](#).**

##### Valve Guide Clearance

- (Valve guide clearance) = (Valve guide inner diameter) – (Valve stem diameter)

**Standard and Limit: Refer to [EM-142. "Cylinder Head"](#).**





# CYLINDER HEAD

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

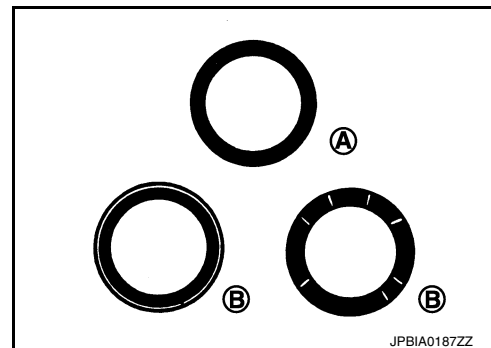
- If the calculated value exceeds the limit, replace valve and/or valve guide. When valve guide must be replaced. Refer to [EM-102, "Disassembly and Assembly"](#).

### 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.

A : OK

- If not, grind to adjust valve fitting and check again. If the contacting surface still has "NG" conditions (B) even after the recheck, replace valve seat. Refer to [EM-102, "Disassembly and Assembly"](#).



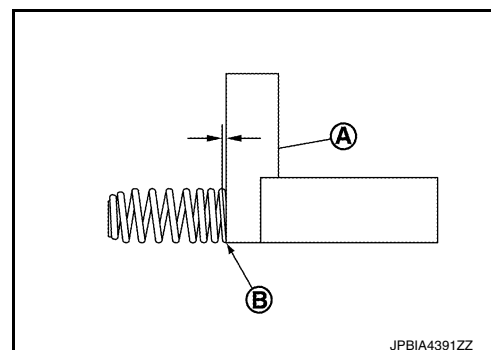
### VALVE SPRING SQUARENESS

- Set a try square (A) along the side of valve spring and rotate spring. Measure the maximum clearance between the top of spring and try square.

B : Contact

**Limit** : Refer to [EM-142, "Cylinder Head"](#).

- If it exceeds the limit, replace valve spring.



### VALVE SPRING DIMENSIONS AND VALVE SPRING PRESSURE LOAD

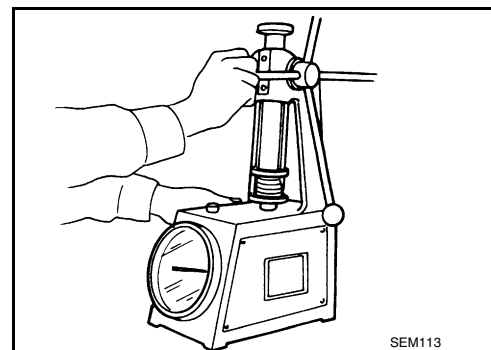
- Check valve spring pressure with valve spring seat installed at the specified spring height.

#### CAUTION:

**Never remove valve spring seat from valve spring.**

**Standard** : Refer to [EM-142, "Cylinder Head"](#).

- If the installation load or load with valve open is out of the standard, replace valve spring (with valve spring seat).



## INSPECTION AFTER INSTALLATION

### Inspection for Leakage

The following are procedures for checking fluids leakage, lubricates leakage, and exhaust gases leakage.

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-11, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
  - Turn ignition switch "ON" (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
  - Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to check there is no leakage of fuel, exhaust gases, or any oil/fluids including engine oil and engine coolant.
- Bleed air from lines and hoses of applicable lines, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to the specified level, if necessary.



# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

Summary of the inspection items:				
Items		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission / transaxle fluid	AT & CVT Models	Leakage	Level / Leakage	Leakage
	MT Models	Level / Leakage	Leakage	Level / Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gases		—	Leakage	—

\*: Power steering fluid, brake fluid, etc.

A  
EM  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P

# OIL PAN (UPPER)

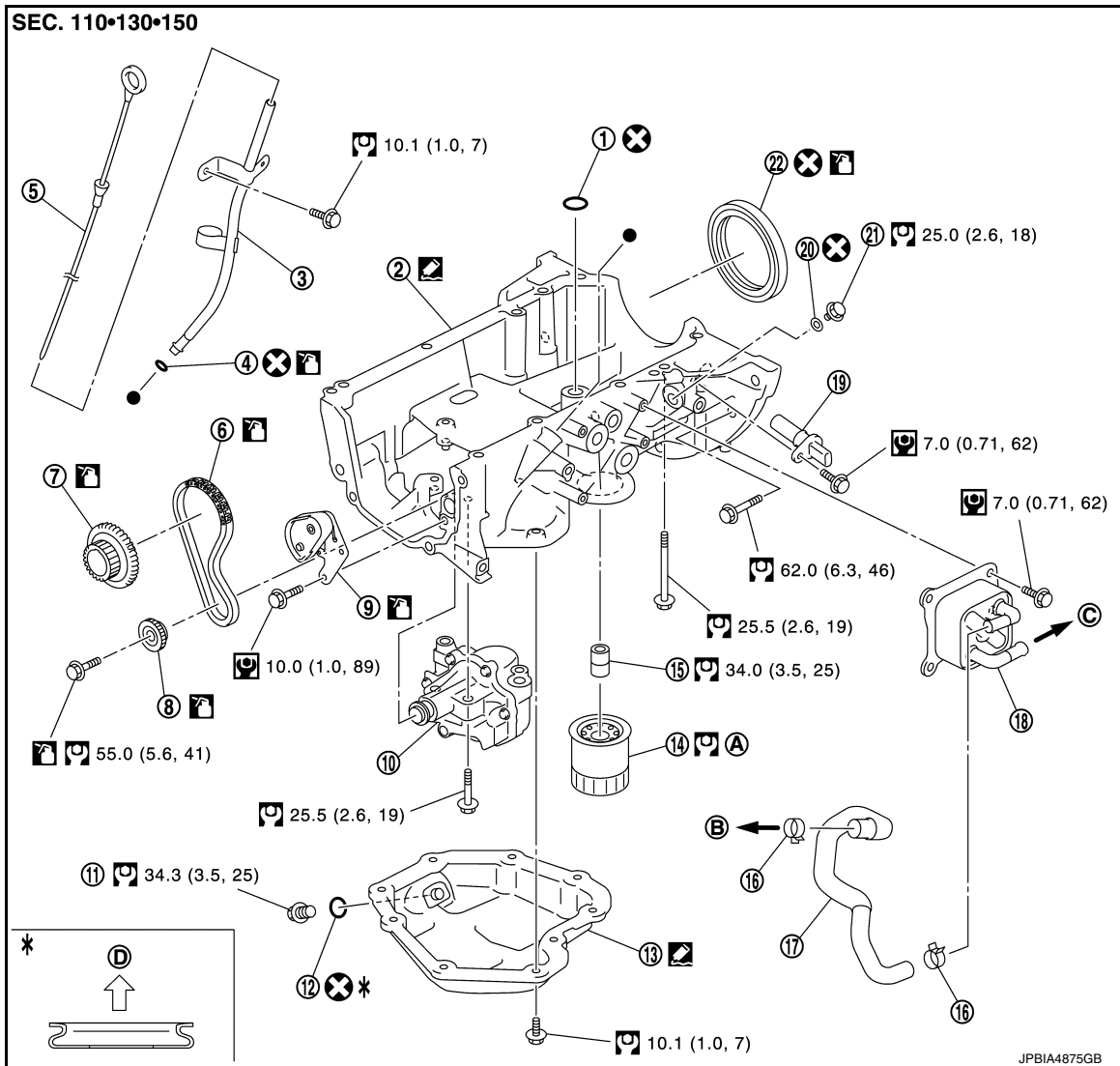
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## OIL PAN (UPPER)

Exploded View

INFOID:000000012197306



- |                                |                      |                             |
|--------------------------------|----------------------|-----------------------------|
| 1. O-ring                      | 2. Oil pan (upper)   | 3. Oil level gauge guide    |
| 4. O-ring                      | 5. Oil level gauge   | 6. Oil pump drive chain     |
| 7. Crankshaft sprocket         | 8. Oil pump sprocket | 9. Oil pump chain tensioner |
| 10. Oil pump                   | 11. Drain plug       | 12. Drain plug washer       |
| 13. Oil pan (lower)            | 14. Oil filter       | 15. Connector bolt          |
| 16. Clamp                      | 17. Water hose       | 18. Oil cooler              |
| 19. Crankshaft position sensor | 20. Gasket           | 21. Oil pan bolt            |
| 22. Rear oil seal              |                      |                             |
- A. Comply with the assembly procedure when tightening. Refer to [LU-12](#)
- B. To thermostat housing
- C. To thermostat housing (M/T models)  
To CVT fluid cooler (CVT models)
- D. Oil pan side

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly.

: Should be lubricated with oil.

# OIL PAN (UPPER)

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

 : Sealing point

● : Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:0000000012197307

EM

### REMOVAL

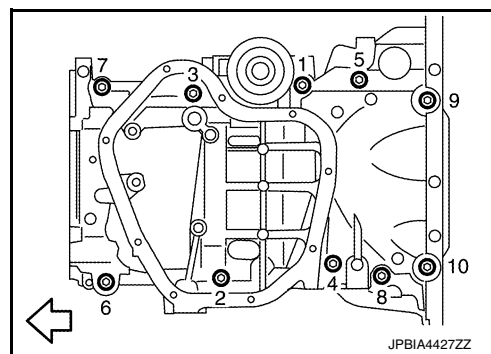
1. Remove oil pan (lower). Refer to [EM-110, "Exploded View"](#).
2. Remove oil filter. Refer to [LU-12, "Removal and Installation"](#).
3. Remove front cover, timing chain, oil pump drive chain, and other related parts. Refer to [EM-76, "Exploded View"](#).
4. Remove oil level gauge and oil level gauge guide.
5. Remove oil pump. Refer to [LU-16, "Exploded View"](#).

#### NOTE:


The oil pan (upper) can be removed and installed without removing the oil pump.

6. Remove oil pan (upper) with the following procedure:
  - a. Loosen bolts in reverse order as shown in the figure.

 : Engine front

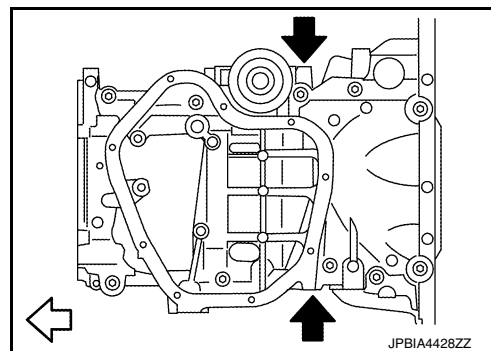


- b. Insert a screwdriver shown by the arrow (↔) in the figure and open up a crack between oil pan (upper) and cylinder block.

 : Engine front

#### CAUTION:

A more adhesive liquid gasket is applied compared to previous types when shipped, so it should not be forced off the position not specified.



- c. Insert seal cutter [SST: KV10111100 (J-37228)] between oil pan (upper) and cylinder block, and slide it by tapping on the side of the tool with a hammer.

#### CAUTION:

Never damage the mating surface.

7. Remove O-ring between cylinder block and oil pan (upper).

### INSTALLATION

#### CAUTION:

Do not reuse O-rings.

1. Install oil pan (upper) with the following procedure:

## OIL PAN (UPPER)

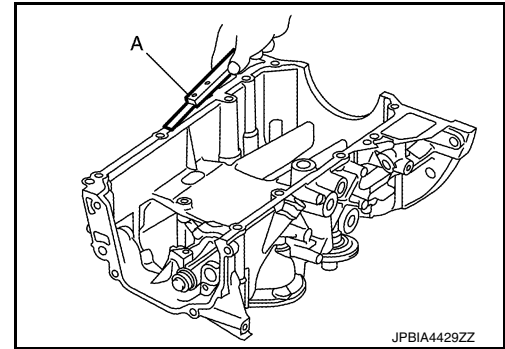
### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- a. Use a scraper (A) to remove old liquid gasket from mating surfaces.
  - Remove the old liquid gasket from mating surface of cylinder block.
  - Remove old liquid gasket from the bolt holes and threads.

**CAUTION:**

**Never scratch or damage the mating surfaces when cleaning off old liquid gasket.**



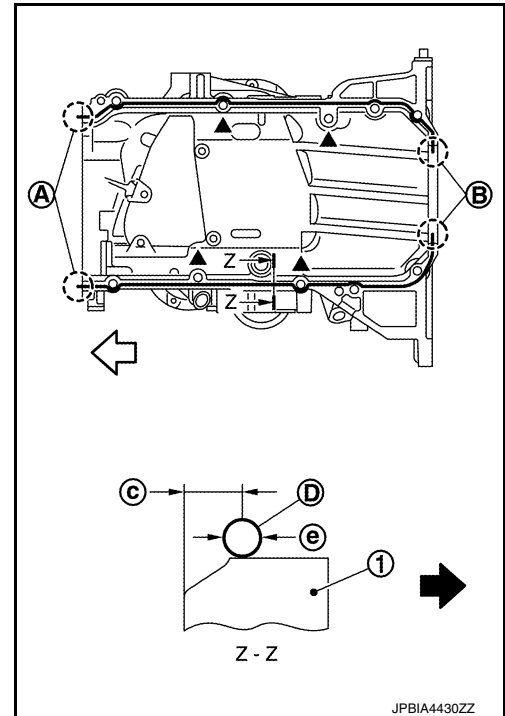
- b. Apply a continuous bead of liquid gasket (D) with a tube presser (commercial service tool) as shown in the figure.

- 1 : Oil pan (upper)
- A : 2 mm (0.08 in) protruded to outside
- B : 2 mm (0.08 in) protruded to rear oil seal mounting side
- c : 5.5 - 7.5 mm (0.217 - 0.295 in)
- e :  $\phi$  4.0 - 5.0 mm (0.157 - 0.197 in)
- ⇐ : Engine front
- ➡ : Engine outside

**Use Genuine RTV silicon sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**

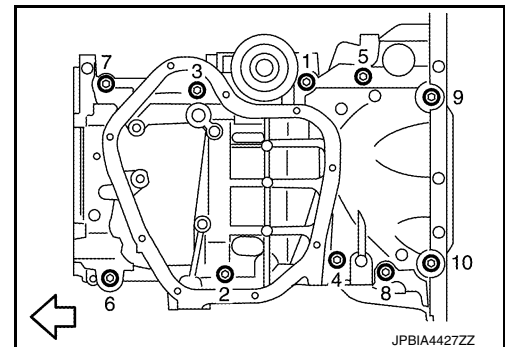
**CAUTION:**

- Apply liquid gasket to outside of bolt hole for the positions shown by ▲ marks.
- Attaching should be done within 5 minutes after liquid gasket application.



- c. Install new O-ring at cylinder block side.
- d. Tighten bolts in numerical order as shown in the figure.

- ⇐ : Engine front



2. Install rear oil seal with the following procedure.

**CAUTION:**

- The installation of rear oil seal should be completed within 5 minutes after installing oil pan (upper).
- Always replace rear oil seal with new one.
- Never touch oil seal lip.

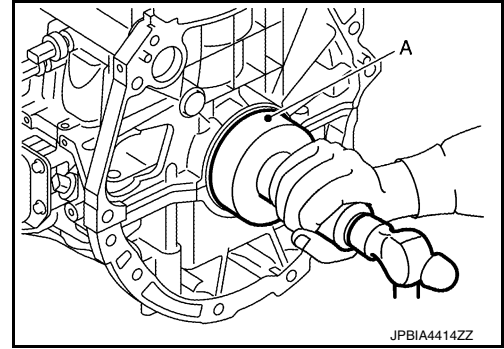
- a. Wipe off liquid gasket protruding to the rear oil seal mounting part of oil pan (upper) and cylinder block using a scraper.

## OIL PAN (UPPER)

### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- b. Apply engine oil to entire outside area of rear oil seal.
- c. Press-fit the rear oil seal using a suitable drift (A) with outer diameter 115 mm (4.53 in) and inner diameter 90 mm (3.54 in).



- Press-fit to the specified dimensions as shown in the figure.

1 : Rear oil seal

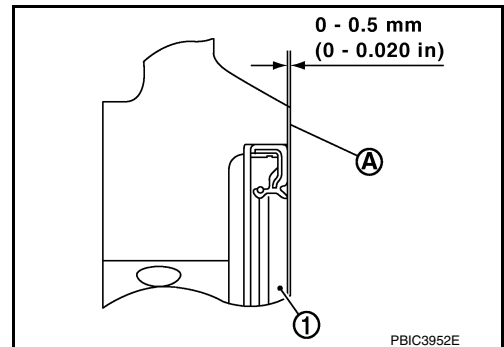
A : Cylinder block rear end surface

#### CAUTION:

- Never touch the grease applied to the oil seal lip.
- Be careful not to damage the rear oil seal mounting part of oil pan (upper) and cylinder block or the crankshaft.
- Press-fit straight, checking that rear oil seal does not curl or tilt.

#### NOTE:

The standard surface of the dimension is the rear end surface of cylinder block.



3. Install in the reverse order of removal, for the rest of parts.

### Inspection

INFOID:0000000012197308

### INSPECTION AFTER REMOVAL

Clean oil strainer portion (part of the oil pump) if any object attached.

# CYLINDER BLOCK

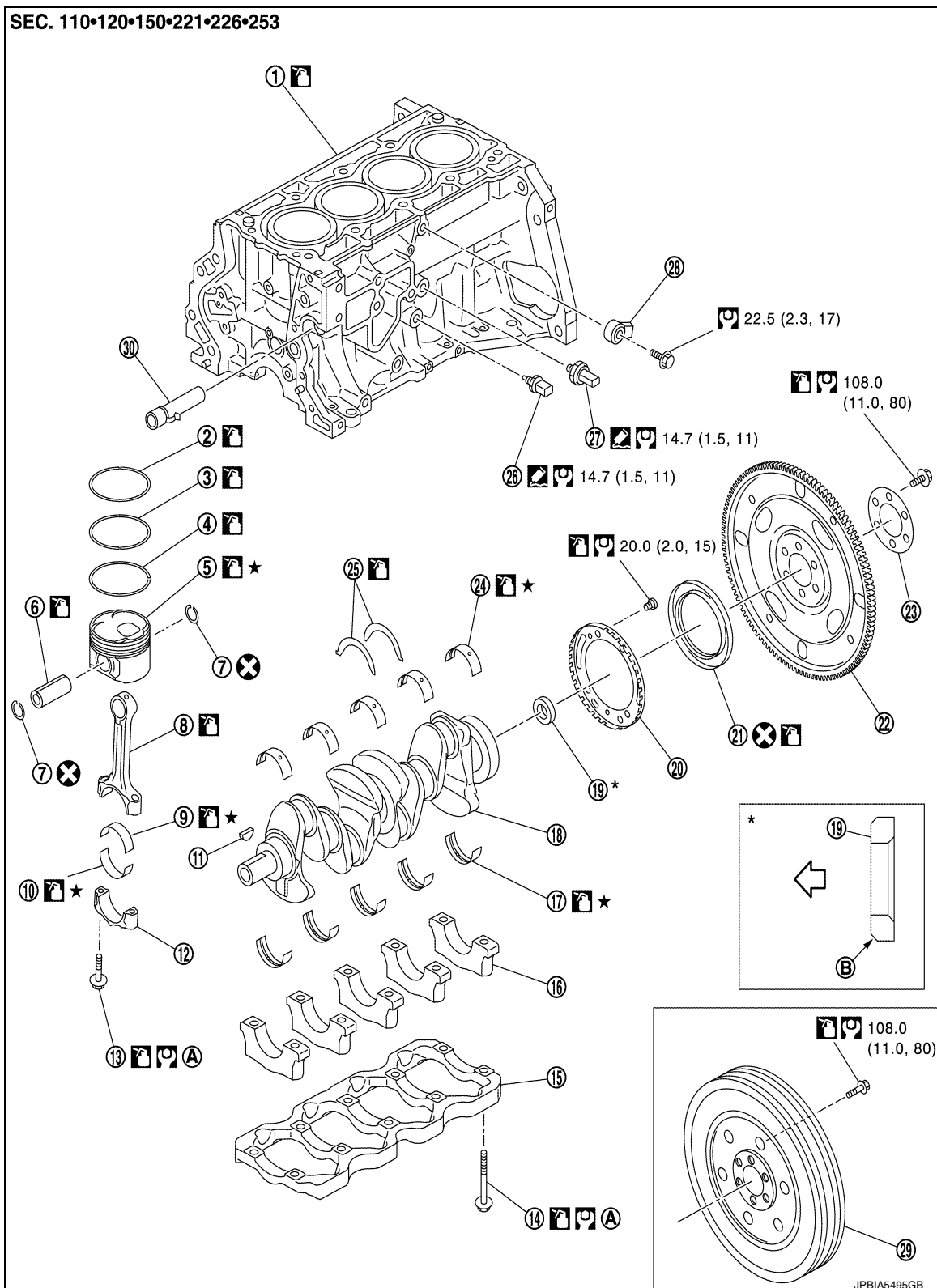
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## CYLINDER BLOCK

Exploded View

INFOID:000000012197309



1. Cylinder block

4. Oil ring

7. Snap ring

2. Top ring

5. Piston

8. Connecting rod

3. Second ring

6. Piston pin

9. Connecting rod bearing (upper)

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- |  |                                      |  |
|--|--------------------------------------|--|
| 10. Connecting rod bearing (lower)   | 11. Crankshaft key                   | 12. Connecting rod cap                 |
| 13. Connecting rod cap bolt  | 14. Main bearing cap bolt            | 15. Main bearing beam                  |
| 16. Main bearing cap   | 17. Main bearing (lower)             | 18. Crankshaft                         |
| 19. Pilot converter (CVT models)   | 20. Signal plate                     | 21. Rear oil seal                      |
| 22. Drive plate (CVT models)   | 23. Reinforcement plate (CVT models) | 24. Main bearing (upper)               |
| 25. Thrust bearing   | 26. Oil temperature sensor           | 27. Oil pressure sensor                |
| 28. Knock sensor   | 29. Flywheel (M/T models)            | 30. Cylinder block heater (For Canada) |
| A. Comply with assembly procedure when tightening. Refer to <a href="#">EM-115</a> | B. Chamfered                         |  |

↩ : Crankshaft side

⚙ : N·m (kg-m, ft-lb)

✖ : Always replace after every disassembly.

🛢 : Should be lubricated with oil.

🔧 : Sealing point

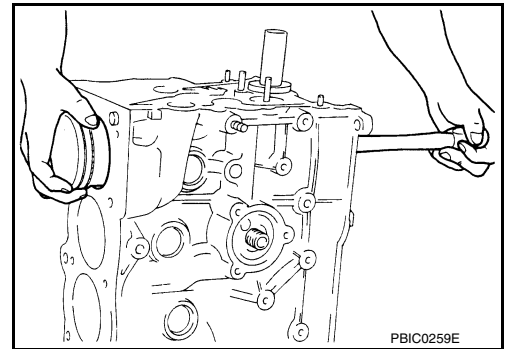
★ : Select with proper thickness.

## Disassembly and Assembly

INFOID:0000000012197310

### DISASSEMBLY

- Remove oil pan (upper). Refer to [EM-110, "Exploded View"](#).
- Remove thermostat housing. Refer to [CO-23, "Exploded View"](#).
- Remove knock sensor.  
**CAUTION:**  
**Carefully handle sensor avoiding shocks.**
- Remove piston and connecting rod assembly with the following procedure:
  - Before removing piston and connecting rod assembly, check the connecting rod side clearance. Refer to [EM-123, "Inspection"](#).
- Position crankshaft pin corresponding to connecting rod to be removed onto the bottom dead center.
- Remove connecting rod cap.
- Using a hammer handle or similar tool, push piston and connecting rod assembly out to the cylinder head side.  
**CAUTION:**
  - Never damage matching surface with connecting rod cap.
  - Never damage the cylinder wall and crankshaft pin, resulting from an interference of the connecting rod big end.



- Remove connecting rod bearings.

**CAUTION:**

**When removing them, note the installation position. Keep them in the correct.**

- Remove piston rings from piston.
  - Before removing piston rings, check the piston ring side clearance. Refer to [EM-123, "Inspection"](#).

## CYLINDER BLOCK

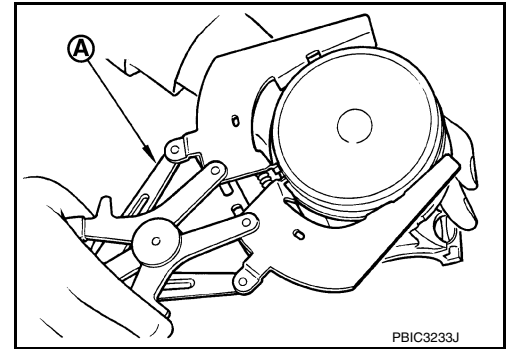
### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Use a piston ring expander (commercial service tool) (A).

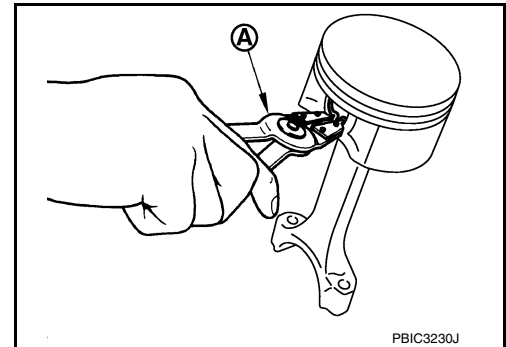
**CAUTION:**

- When removing piston rings, be careful not to damage the piston.
- Never damage piston rings by expanding them excessively.

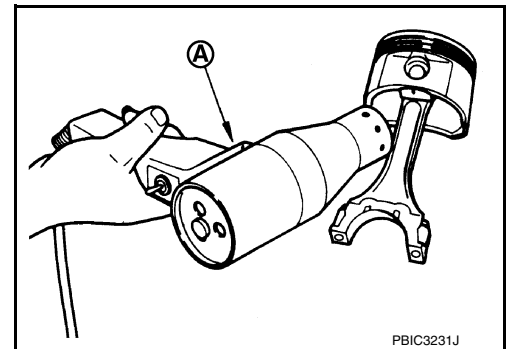


7. Remove piston from connecting rod with the following procedure:

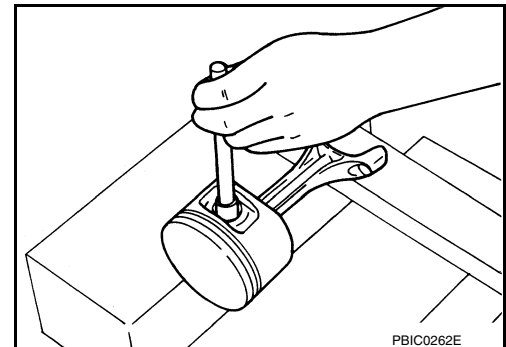
- a. Using snap ring pliers (A), remove snap rings.



- b. Heat piston to 60 to 70°C (140 to 158°F) with an industrial use drier (A) or equivalent.



- c. Push out piston pin with stick of outer diameter approximately 18 mm (0.71 in).



8. Remove main bearing cap bolts.

- Measure crankshaft end play before loosening main bearing cap bolts. Refer to [EM-123. "Inspection"](#).



# CYLINDER BLOCK

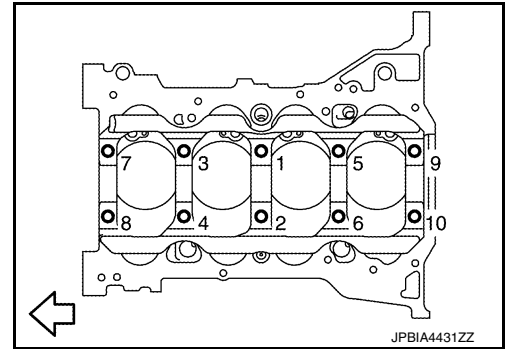
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Loosen and remove main bearing cap bolts in reverse order as shown in the figure.

↩ : Engine front

- Use TORX socket.



- Remove main bearing caps.
  - Tap main bearing caps lightly with a plastic hammer for removal.

### CAUTION:

Be careful not to damage the mounting surface.

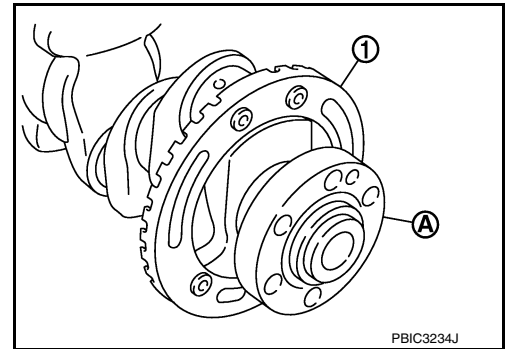
- Remove crankshaft.

### CAUTION:

- Be careful not to damage or deform signal plate (1) mounted on rear end of crankshaft (A).
- When setting crankshaft on a flat floor surface, use a block of wood to avoid interference between signal plate and the floor surface.
- Never remove signal plate unless it is necessary to do so.

### NOTE:

When removing or installing signal plate, use TORX socket.



- Pull rear oil seal out from rear end of crankshaft.
- Remove main bearings and thrust bearings from cylinder block and main bearing caps.

### CAUTION:

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

## ASSEMBLY

### CAUTION:

Do not reuse washers.

- Fully air-blow engine coolant and engine oil passages in cylinder block, cylinder bore and crankcase to remove any foreign material.

### CAUTION:

Use a goggles to protect your eye.

- Install each plug to cylinder block as shown in the figure.

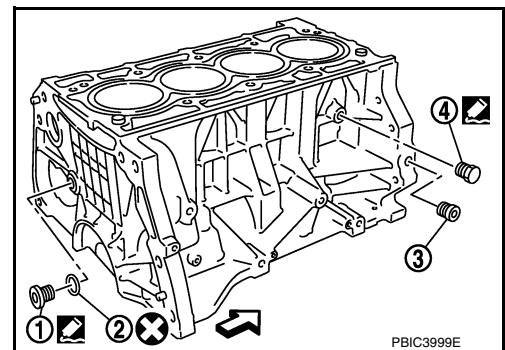
2 : Washer

↩ : Engine front

- Apply liquid gasket to the thread of water drain plug (4).  
Use **Genuine RTV silicon sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**
- Apply sealant to the thread of plug (1).  
Use **genuine high strength thread locking sealant or equivalent.**

### NOTE:

Do not apply liquid gasket or high strength thread locking sealant to the plug (3).



- Tighten each plug as specified below.

# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

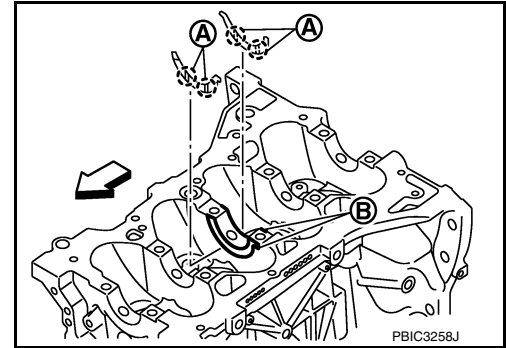
Part	Washer	Tightening torque
1	Yes	54.0 N·m (5.5 kg-m, 40 ft-lb)
3	No	19.6 N·m (2.0 kg-m, 14 ft-lb)
4	No	9.8 N·m (1.0 kg-m, 87 in-lb)

3. Install main bearings and thrust bearings with the following procedure:

- Remove dust, dirt, and engine oil on the bearing mating surfaces of cylinder block and main bearing cap.
- Install thrust bearings to the both sides of the No. 3 journal housing (B) on cylinder block.

⇐ : Engine front

- Install thrust bearings with the oil groove (A) facing crankshaft arm (outside).

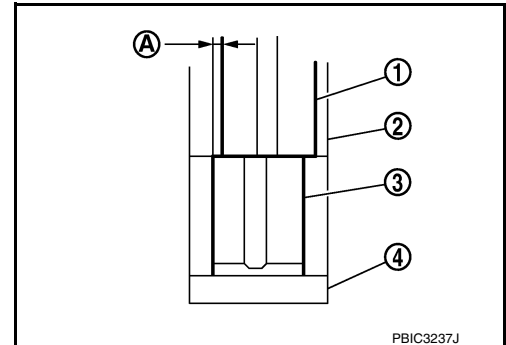


c. Install the main bearings paying attention to the direction.

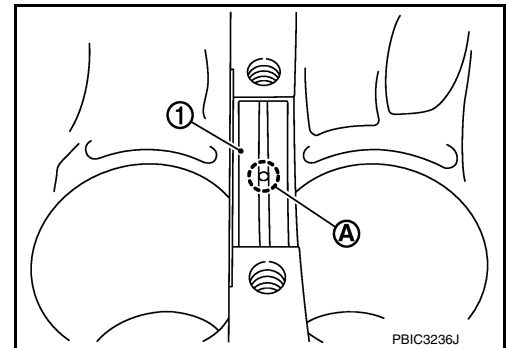
- Before installing main bearings, apply new engine oil to the bearing surface (inside). Do not apply new engine oil to the back surface, but thoroughly clean it.
- When installing, align main bearing to the center position of cylinder block and main bearing cap.
- The difference (A) between main bearing (upper) (1) and main bearing (lower) (3) should be 0.85 mm (0.0335 in) or less when installing.

2 : Cylinder block

4 : Main bearing cap



- Ensure the oil holes on cylinder block and oil holes (A) on the main bearings (1) are aligned.



4. Install signal plate to crankshaft if removed.

- Set the signal plate with the flange facing toward the counter weight side (engine front side) to the crankshaft rear surface.
- Apply new engine oil to threads and seat surfaces of mounting bolts.

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- c. Position crankshaft (2) and signal plate (1) using a dowel pin (service part), and tighten mounting bolts in numerical order as shown in the figure using TORX socket.

A : Dowel pin hole

### NOTE:

Dowel pin of crankshaft and signal plate is provided as a set for each.

- d. Tighten mounting bolts in numerical order as shown in the figure again.
- e. Remove dowel pin. (service parts)

### CAUTION:

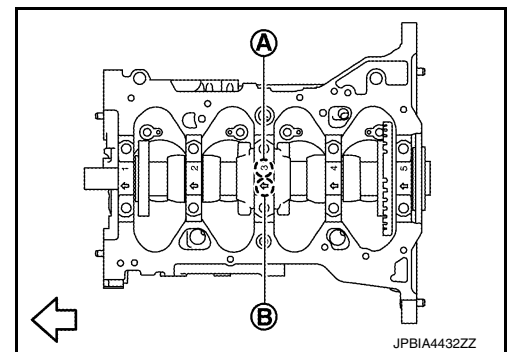
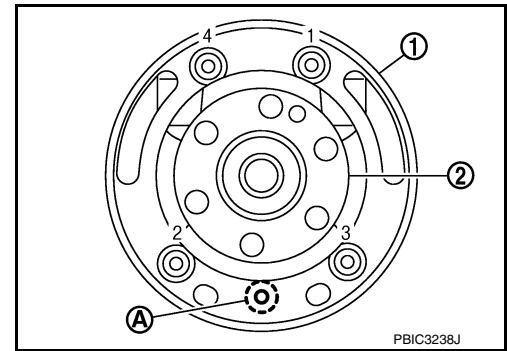
**Be sure to remove dowel pin.**

5. Install crankshaft to cylinder block.
  - While turning crankshaft by hand, check that it turns smoothly.
6. Install main bearing caps with the following procedure:
  - a. Install main bearing caps referring to the journal No. stamp (A) and front mark (B) as shown in the figure.

← : Engine front

### NOTE:

Main bearing cap cannot be replaced as a single part, because it is machined together with cylinder block.

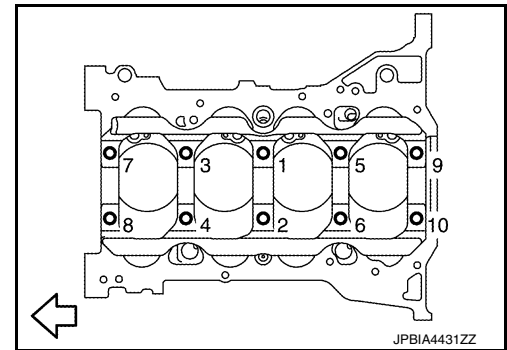


- b. Tighten main bearing cap bolts in numerical order as shown in the figure with the following procedure:

← : Engine front

- i. Apply new engine oil to threads and seat surfaces of mounting bolts.
- ii. Tighten main bearing cap bolts.

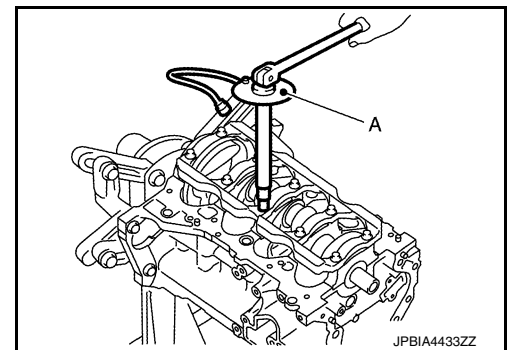
 **34.3 N·m (3.5 kg-m, 25 ft-lb)**



- iii. Turn main bearing cap bolts 70 degrees clockwise (angle tightening) in order from No. 1 to 10 in the figure.

### CAUTION:

**Confirm the tightening angle by using an angle wrench [SST: KV10112100 (BT8653-A)] (A) or protractor. Never judge by visual inspection without the tool.**



- After installing mounting bolts, check that crankshaft can be rotated smoothly by hand.
  - Check crankshaft end play. Refer to [EM-123. "Inspection"](#).
7. Install piston to connecting rod with the following procedure:

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- a. Using snap ring pliers, install new snap ring to the groove of the piston rear side.
  - Insert it fully into groove to install.
- b. Assemble piston to connecting rod.
  - Using an industrial use drier or similar tool, heat the piston until the piston pin can be pushed in by hand without excess force [approximately 60 to 70°C (140 to 158°F)]. From the front to the rear, insert piston pin into piston and connecting rod.
  - Assemble so that the front mark (A) on the piston head and the oil hole (B) and the cylinder number (D) on connecting rod are positioned as shown in the figure.

C : Engine type  
 E : Large end hole diameter grade  
 F : Front mark (connecting rod)

- c. Install new snap ring to the groove of the piston front side.
  - Insert it fully into groove to install.
  - After installing, check that connecting rod moves smoothly.
8. Using a piston ring expander (commercial service tool), install piston rings.

### CAUTION:

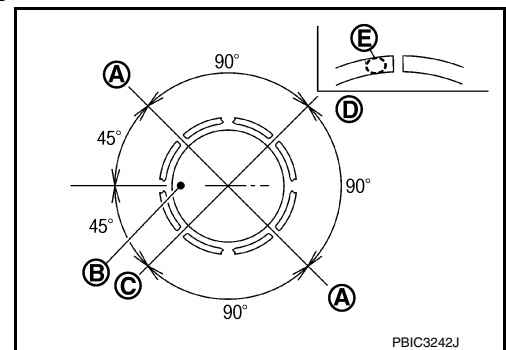
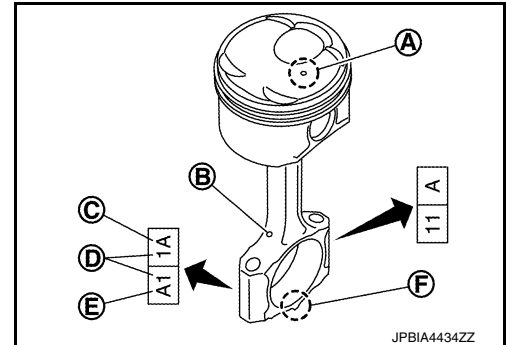
- **Never damage piston.**
- **Never damage piston rings by expanding them excessively.**
- Position each ring with the gap as shown in the figure referring to the piston front mark.

A : Oil ring upper or lower rail gap  
 B : Front mark  
 C : Second ring and oil ring spacer gap  
 D : Top ring gap  
 E : Stamped mark

### CAUTION:

**Never contact the rail end gap under the oil ring with the oil drain cast groove of piston.**

- Install second ring with the stamped surface facing upward.



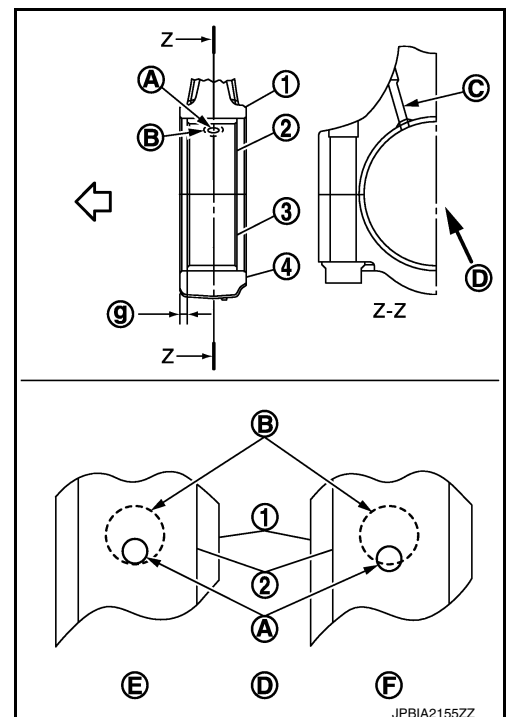
9. Install connecting rod bearing upper (2) and lower (3) to connecting rod (1) and connecting rod cap (4).

C : Oil hole (connecting rod)  
 D : View D  
 E : OK  
 F : NG  
 g : 2.55 - 2.95 mm (0.1004 - 0.1161 in)  
 ⇐ : Engine front

- Install the connecting rod in the dimension shown in the figure.
- Check that connecting rod bearing oil hole (A) is completely in the inside of connecting rod oil hole chamfered area (B).
- When installing connecting rod bearings, apply new engine oil to the bearing surface (inside). Do not apply new engine oil to the back surface, but thoroughly clean it.

### NOTE:

- There is no positioning tab.
- Install the connecting rod bearings in the center of connecting rod and connecting rod cap as shown in the figure. For service operation, the center position can be checked, visually.



# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

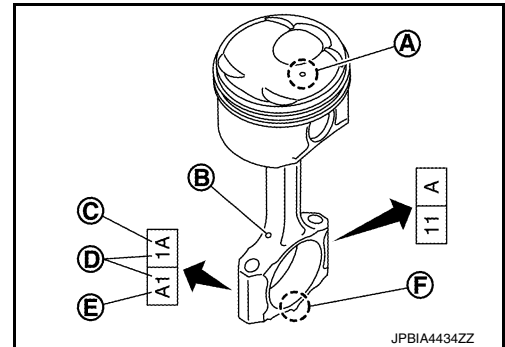
[MR FOR NISMO RS MODELS]

## 10. Install piston and connecting rod assembly to crankshaft.

- Position crankshaft pin corresponding to connecting rod to be installed onto the bottom dead center.
- Apply new engine oil sufficiently to the cylinder bore, piston and crankshaft pin.
- Match the cylinder position with the cylinder number (D) on connecting rod to install.

- A : Front mark (piston)
- B : Oil hole
- C : Engine type
- E : Large end hole diameter grade
- F : Front mark (connecting rod)

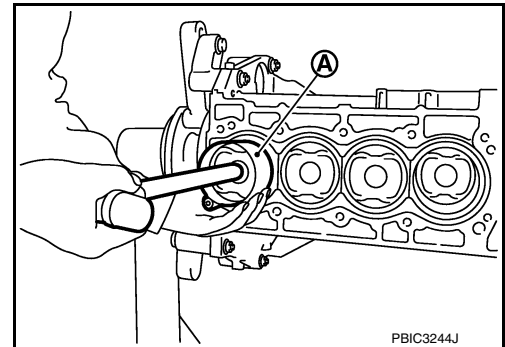
- Install so that front mark (A) on the piston head faces the front of engine.



- Using a piston ring compressor [SST: EM03470000 (J-8037)] (A) or suitable tool, install piston with the front mark on the piston head facing the front of the engine.

### CAUTION:

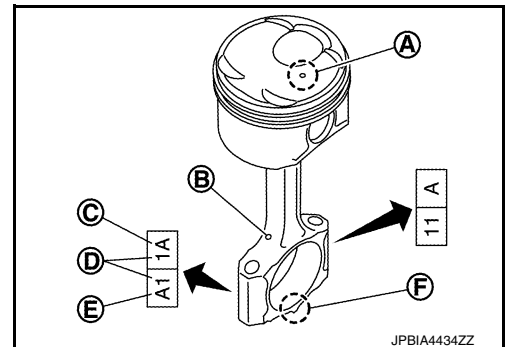
**Be careful not to damage the cylinder wall and crankshaft pin, resulting from an interference of the connecting rod big end.**



## 11. Install connecting rod cap.

- Match the stamped cylinder number marks (D) on connecting rod with those on connecting rod cap to install.

- A : Front mark (piston)
- B : Oil hole
- C : Engine type
- E : Large end hole diameter grade
- F : Front mark (connecting rod)



## 12. Tighten connecting rod cap bolt with the following procedure:

### CAUTION:

- Check that there is no gap in the thrust surface (A) of the joint between connecting rod (1) and connecting rod cap (2) and that these parts are in the correct position. And then, tighten the connecting rod cap bolts.
- If the connecting rod cap bolts are reused, measure the outer diameter. Refer to [EM-123, "Inspection"](#).

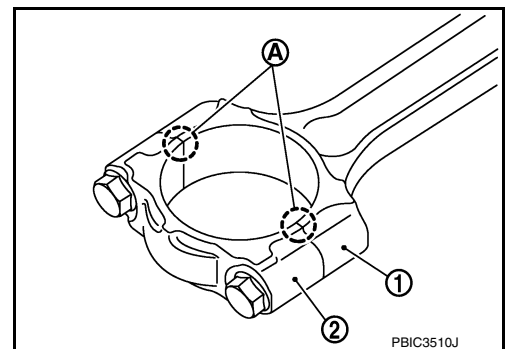
- Apply new engine oil to the threads and seats of connecting rod cap bolts.
- Tighten connecting rod cap bolts.

: 27.4 N·m (2.8 kg-m, 20 ft-lb)

- Completely loosen connecting rod cap bolts.

: 0 N·m (0 kg-m, 0 ft-lb)

- Tighten connecting rod cap bolts.



## CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

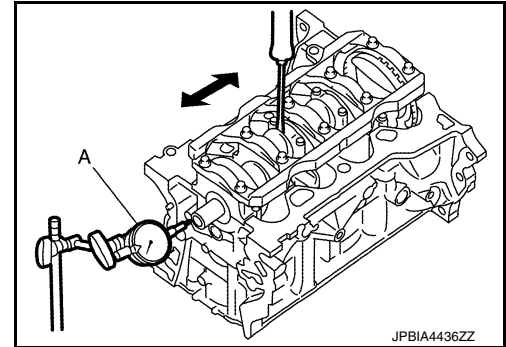
[MR FOR NISMO RS MODELS]

: 19.6 N·m (2.0 kg-m, 14 ft-lb)

- e. Then turn all connecting rod cap bolts 60 degrees clockwise (angle tightening).

**CAUTION:**

Check and confirm the tightening angle by using an angle wrench [SST: KV10112100 (BT8653-A)] (A) or protractor. Never judge by visual inspection without the tool.



- After tightening connecting rod cap bolt, check that crankshaft rotates smoothly.
- Check the connecting rod side clearance. Refer to [EM-123, "Inspection"](#).

13. Install oil pan (upper). Refer to [EM-110, "Exploded View"](#).

**NOTE:**

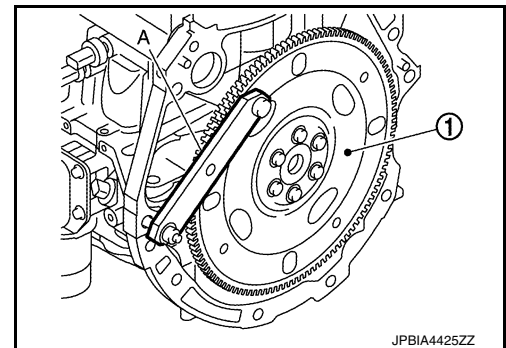
Install the rear oil seal after installing the oil pan (upper).

14. Install rear oil seal. Refer to [EM-98, "REAR OIL SEAL : Removal and Installation"](#).
15. Install flywheel (M/T models) or drive plate (CVT models).

Drive plate (CVT models)

- Secure crankshaft with a stopper plate [SST: KV11105210 (J-44716)], (A) and tighten mounting bolts crosswise over several times.

1 : Drive plate

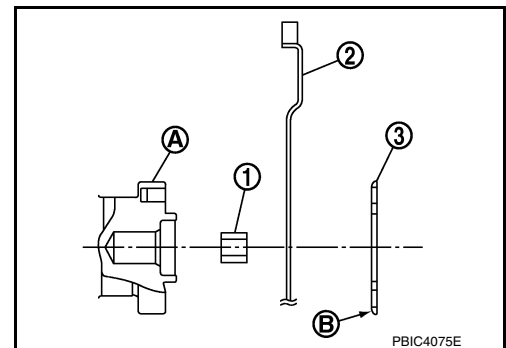


- Install pilot converter (1), drive plate (2), and reinforcement plate (3) as shown in the figure.

A : Crankshaft rear end

B : R

- Using a drift of 33 mm (1.30 in) in dia meter, press-fit pilot converter into the end of crankshaft until it stops.



Fly wheel (M/T models)

- Secure crankshaft with a stopper plate [SST: KV11105210 (J-44716)] and tighten mounting bolts crosswise over several times.

**NOTE:**

M/T models have no pilot bushing and reinforcement plate.

16. Install knock sensor.

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Install knock sensor (1) with harness connector facing toward the rear of engine.

A : Cylinder block left side

⇐ : Engine front

### CAUTION:

- **Never tighten mounting bolts while holding the harness connector.**
- **If any impact by dropping is applied to knock sensor, replace it with a new one.**

### NOTE:

- Check that there is no foreign material on the cylinder block mating surface and the back surface of knock sensor.
- Check that knock sensor does not interfere with other parts.

17. Assemble in the reverse order of disassembly.

## Inspection

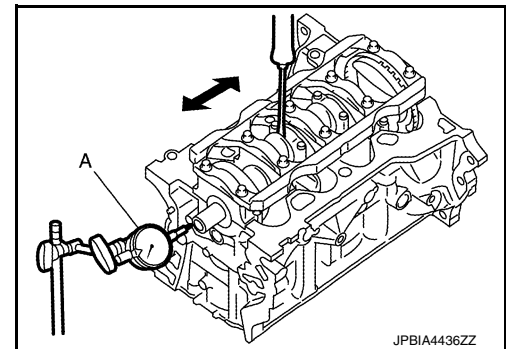
INFOID:0000000012197311

### CRANKSHAFT END PLAY

- Measure the clearance between thrust bearings and crankshaft arm when crankshaft is moved fully forward or backward with a dial indicator (A).

**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If the measured value exceeds the limit, replace thrust bearings, and measure again. If it still exceeds the limit, replace crankshaft also.

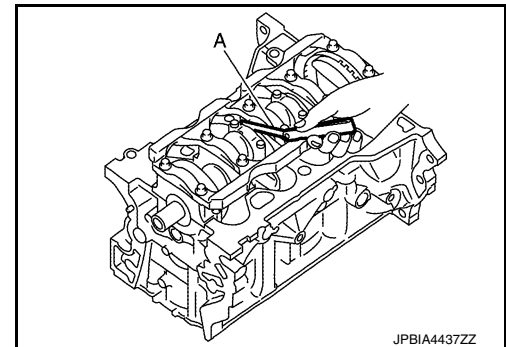


### CONNECTING ROD SIDE CLEARANCE

- Measure the side clearance between connecting rod and crankshaft arm with a feeler gauge (A).

**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If the measured value exceeds the limit, replace connecting rod, and measure again. If it still exceeds the limit, replace crankshaft also.

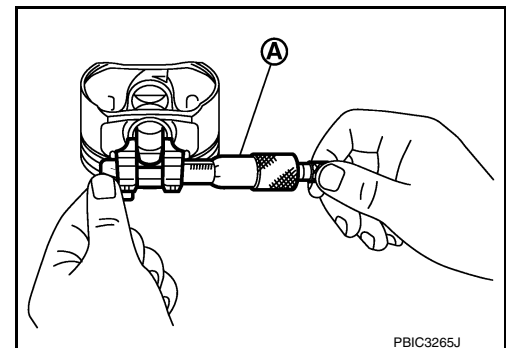


### PISTON TO PISTON PIN OIL CLEARANCE

Piston Pin Hole Diameter

Measure the inner diameter of piston pin hole with an inside micrometer (A).

**Standard** : Refer to [EM-144, "Cylinder Block"](#).



Piston Pin Outer Diameter



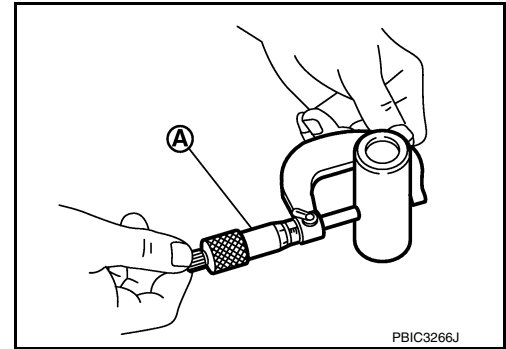
# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

Measure the outer diameter of piston pin with a micrometer (A).

**Standard** : Refer to [EM-144, "Cylinder Block"](#).



Piston to Piston Pin Oil Clearance

(Piston to piston pin oil clearance) = (Piston pin hole diameter) – (Piston pin outer diameter)

**Standard** : Refer to [EM-144, "Cylinder Block"](#).

- If oil clearance is out of the standard, replace piston and piston pin assembly.
- When replacing piston and piston pin assembly. Refer to [EM-133, "Description"](#).

**NOTE:**

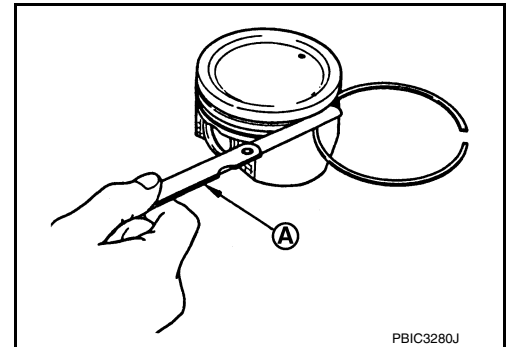
- Piston is available together with piston pin as assembly.
- Piston pin (piston pin hole) grade is provided only for the parts installed at the plant. For service parts, no grades can be selected. (Only grade "0" is available.)

## PISTON RING SIDE CLEARANCE

- Measure the side clearance of piston ring and piston ring groove with a feeler gauge (A).

**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If the measured value exceeds the limit, replace piston ring, and measure again. If it still exceeds the limit, replace piston also.

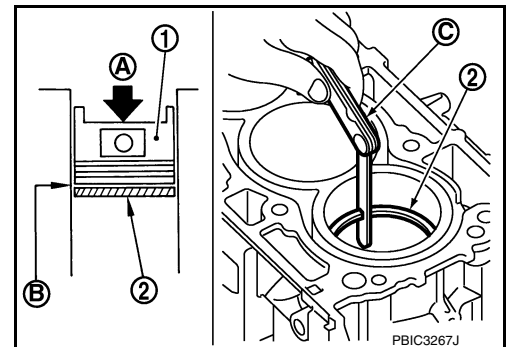


## PISTON RING END GAP

- Check that cylinder bore inner diameter is within specification. Refer to "PISTON TO CYLINDER BORE CLEARANCE".
- Lubricate with new engine oil to piston (1) and piston ring (2), and then insert (A) piston ring until middle of cylinder (B) with piston, and measure piston ring end gap with a feeler gauge (C).

**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If the measured value exceeds the limit, replace piston ring, and measure again. If it still exceeds the limit, rebore cylinder and use oversized piston and piston rings.



## CONNECTING ROD BEND AND TORSION



# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

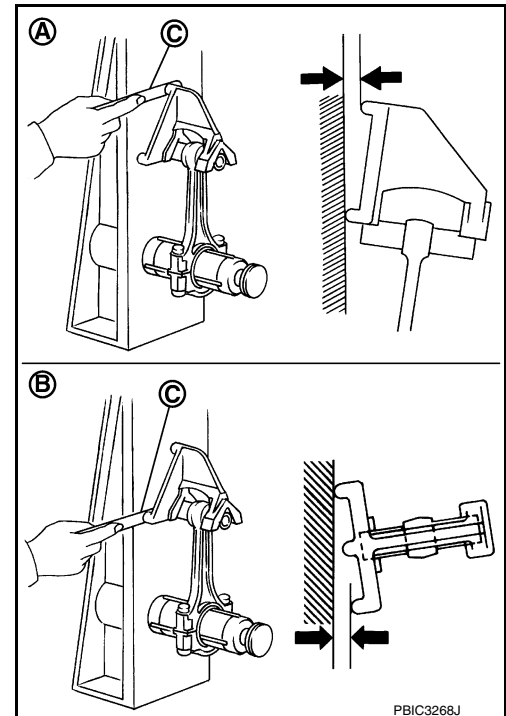
[MR FOR NISMO RS MODELS]

- Check with a connecting rod aligner.

- A : Bend  
B : Torsion  
C : Feeler gauge

**Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If it exceeds the limit, replace connecting rod assembly.



## CONNECTING ROD BIG END DIAMETER

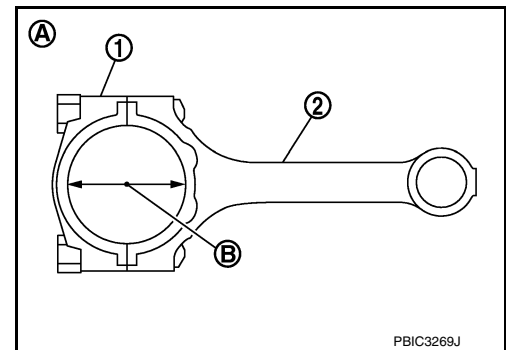
- Install connecting rod cap (1) without connecting rod bearing installed, and tightening connecting rod cap bolts to the specified torque. Refer to [EM-115, "Disassembly and Assembly"](#).

- 2 : Connecting rod  
A : Example  
B : Measuring direction of inner diameter

- Measure the inner diameter of connecting rod big end with an inside micrometer.

**Standard** : Refer to [EM-144, "Cylinder Block"](#).

- If out of the standard, replace connecting rod assembly.

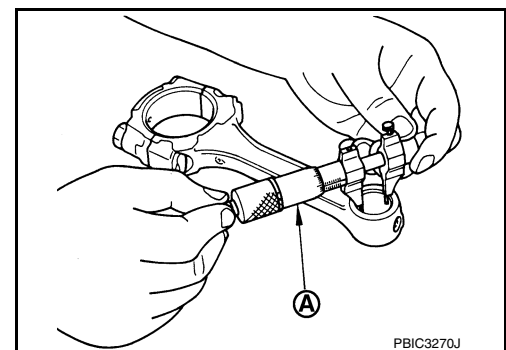


## CONNECTING ROD BUSHING OIL CLEARANCE

### Connecting Rod Bushing Inner Diameter

Measure the inner diameter of connecting rod bushing with an inside micrometer (A).

**Standard** : Refer to [EM-144, "Cylinder Block"](#).



### Piston Pin Outer Diameter

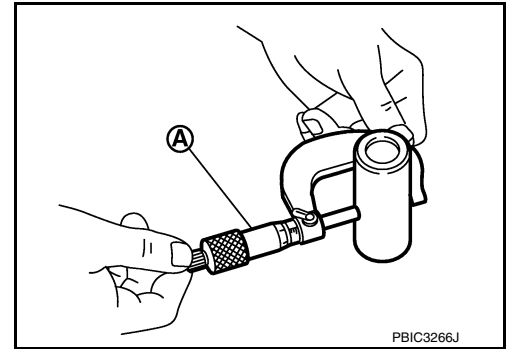
# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

Measure the outer diameter of piston pin with a micrometer (A).

**Standard** : Refer to [EM-144, "Cylinder Block"](#).



Connecting Rod Bushing Oil Clearance

(Connecting rod bushing oil clearance) = (Connecting rod bushing inner diameter) – (Piston pin outer diameter)

**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If the measured value is out of the standard, replace connecting rod assembly and/or piston and piston pin assembly.
- If replacing piston and piston pin assembly. Refer to [EM-133, "Piston"](#).
- If replacing connecting rod assembly. Refer to [EM-134, "Connecting Rod Bearing"](#).

## CYLINDER BLOCK TOP SURFACE DISTORTION

- Using a scraper, remove gasket on the cylinder block surface, and also remove engine oil, scale, carbon, or other contamination.

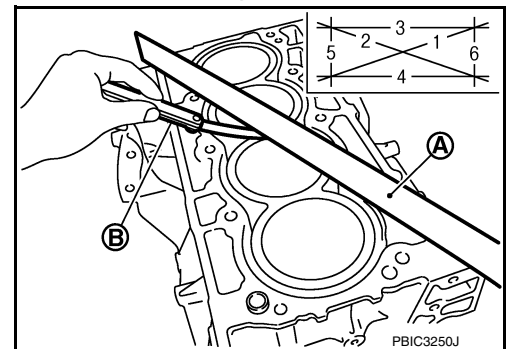
### CAUTION:

**Be careful not to allow gasket flakes to enter engine oil or engine coolant passages.**

- Measure the distortion on the cylinder block upper face at some different points in six directions with a straight edge (A) and feeler gauge (B).

**Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If it exceeds the limit, replace cylinder block.



## MAIN BEARING HOUSING INNER DIAMETER

- Install main bearing cap without main bearings installed, and tighten main bearing cap mounting bolts to the specified torque. Refer to [EM-115, "Disassembly and Assembly"](#).
- Measure the inner diameter of main bearing housing with a bore gauge.
- Measure the position shown in the figure [5 mm (0.20 in)] backward from main bearing housing front side in the 2 directions as shown in the figure. The smaller one is the measured value.

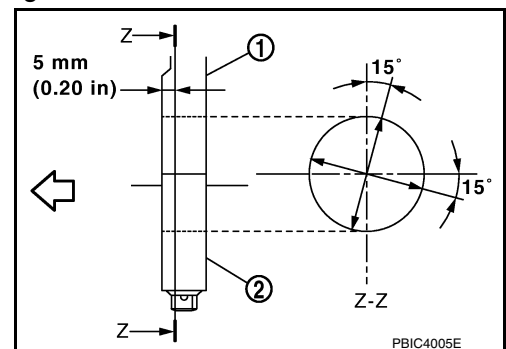
- 1 : Cylinder block
- 2 : Main bearing cap
- ⇐ : Engine front

**Standard** : Refer to [EM-144, "Cylinder Block"](#).

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

### NOTE:

Main bearing caps cannot be replaced as a single, because it is machined together with cylinder block.



## PISTON TO CYLINDER BORE CLEARANCE

# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

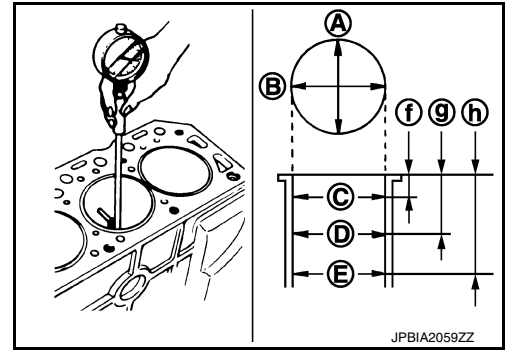
## Cylinder Bore Inner Diameter

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

f : 10 mm (0.39 in)  
g : 60 mm (2.36 in)  
h : 130 mm (5.12 in)

### NOTE:

When determining cylinder bore grade, measure the cylinder bore (B) direction at (D) position.



### Standard:

#### Cylinder bore inner diameter

: Refer to [EM-144, "Cylinder Block"](#).

### Limit:

#### Out-of-round [Difference between (A) and (B)]

#### Taper [Difference between (C) and (D)]

: Refer to [EM-144, "Cylinder Block"](#).

- If the measured value exceeds the limit, or if there are scratches and/or seizure on the cylinder inner wall, replace cylinder block.

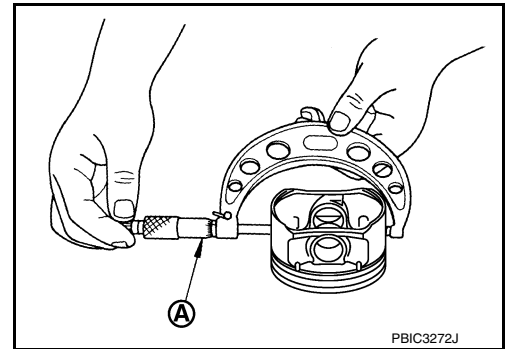
### NOTE:

Oversize piston is not provided.

## Piston Skirt Diameter

Measure the outer diameter of piston skirt with a micrometer (A).

**Standard** : Refer to [EM-144, "Cylinder Block"](#).

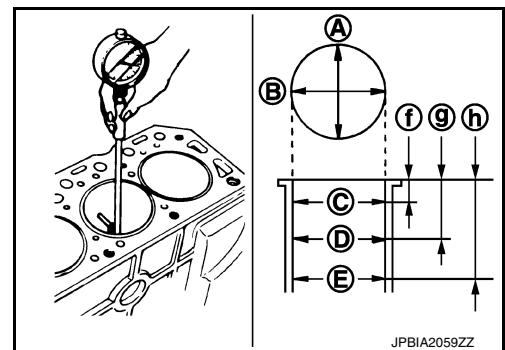


## Piston to Cylinder Bore Clearance

Calculate by piston skirt diameter and cylinder bore inner diameter [direction (B), position (D)].

A : Direction A  
C : Position C  
E : Position E  
f : 10 mm (0.39 in)  
g : 60 mm (2.36 in)  
h : 130 mm (5.12 in)

(Clearance) = (Cylinder bore inner diameter) – (Piston skirt diameter)



**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If it exceeds the limit, replace piston and piston pin assembly and/or cylinder block. Refer to [EM-133, "Piston"](#).

# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

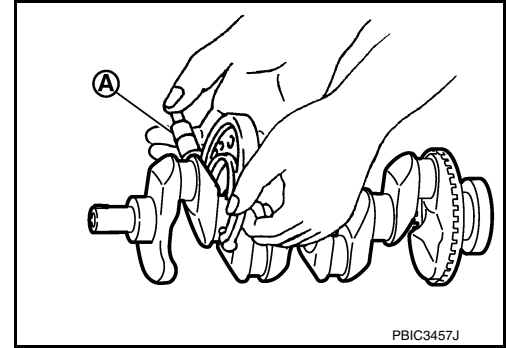
[MR FOR NISMO RS MODELS]

## CRANKSHAFT MAIN JOURNAL DIAMETER

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

**Standard** : Refer to [EM-144, "Cylinder Block"](#).

- If out of the standard, measure the main bearing oil clearance. Then use undersize bearing. Refer to [EM-148, "Main Bearing"](#).



## CRANKSHAFT PIN JOURNAL DIAMETER

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

**Standard** : Refer to [EM-144, "Cylinder Block"](#).

- If out of the standard, measure the connecting rod bearing oil clearance. Then use undersize bearing. Refer to [EM-148, "Connecting Rod Bearing"](#).

## OUT-OF-ROUND AND TAPER OF CRANKSHAFT

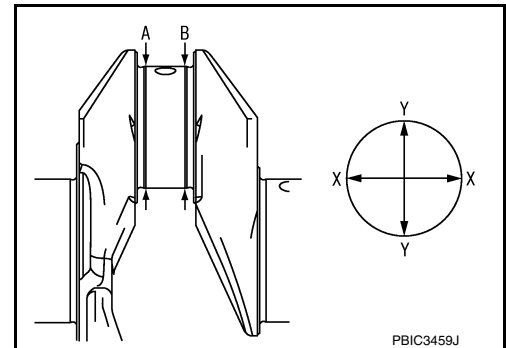
- Measure the dimensions at four different points as shown in the figure on each main journal and pin journal with a micrometer.
- Out-of-round is indicated by the difference in dimensions between (X) and (Y) at (A) and (B).
- Taper is indicated by the difference in dimension between (A) and (B) at (X)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

**Limit:**

**Out-of-round [Difference between (X) and (Y)]**

**Taper [Difference between (A) and (B)]**

**: Refer to [EM-144, "Cylinder Block"](#).**



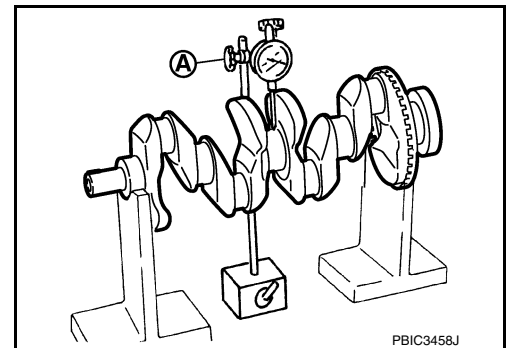
- If the measured value exceeds the limit, correct or replace crankshaft.
- If corrected, measure the bearing oil clearance of the corrected main journal and/or pin journal. Then select main bearing and/or connecting rod bearing. Refer to [EM-134, "Connecting Rod Bearing"](#) and/or [EM-136, "Main Bearing"](#).

## CRANKSHAFT RUNOUT

- Place a V-block on a precise flat table to support the journals on the both end of the crankshaft.
- Place a dial indicator (A) straight up on the No. 3 journal.
- While rotating crankshaft, read the movement of the pointer on the dial indicator. (Total indicator reading)

**Standard and Limit** : Refer to [EM-144, "Cylinder Block"](#).

- If it exceeds the limit, replace crankshaft.



## CONNECTING ROD BEARING OIL CLEARANCE

Method by Calculation

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

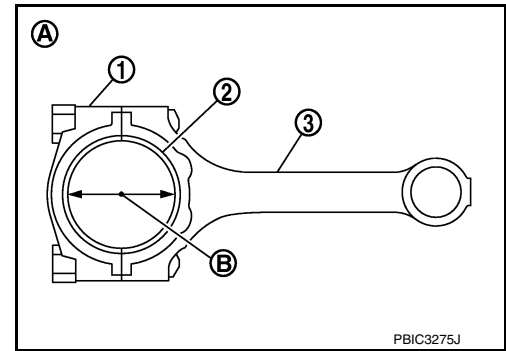
[MR FOR NISMO RS MODELS]

- Install connecting rod bearings (2) to connecting rod (3) and connecting rod bearing cap (1), and tighten connecting rod cap bolts to the specified torque. Refer to [EM-115, "Disassembly and Assembly"](#).

A : Example

B : Inner diameter measuring direction

- Measure the inner diameter of connecting rod bearing with an inside micrometer.  
(Bearing oil clearance) = (Connecting rod bearing inner diameter) – (Crankshaft pin journal diameter)



**Standard and Limit** : Refer to [EM-148, "Connecting Rod Bearing"](#).

- If clearance exceeds the limit, select proper connecting rod bearing according to connecting rod big end diameter and crankshaft pin journal diameter to obtain specified bearing oil clearance. Refer to [EM-134, "Connecting Rod Bearing"](#).

### Method of Using Plastigage

- Remove engine oil and dust on crankshaft pin and the surfaces of each bearing completely.
- Cut a plastigage slightly shorter than the bearing width, and place it in crankshaft axial direction, avoiding oil holes.
- Install connecting rod bearings to connecting rod and cap, and tighten connecting rod cap bolts to the specified torque. Refer to [EM-115, "Disassembly and Assembly"](#).

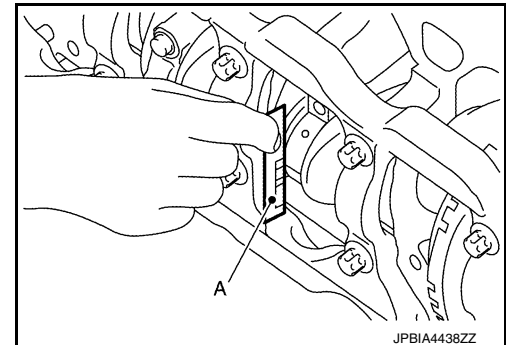
### CAUTION:

**Never rotate crankshaft.**

- Remove connecting rod cap and bearing, and using the scale (A) on the plastigage bag, measure the plastigage width.

### NOTE:

The procedure when the measured value exceeds the limit is same as that described in the "Method by Calculation".



## MAIN BEARING OIL CLEARANCE

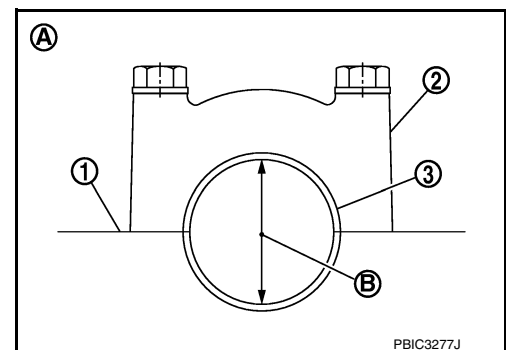
### Method by Calculation

- Install main bearings (3) to cylinder block (1) and main bearing cap (2), and tighten main bearing cap mounting bolts to the specified torque. Refer to [EM-115, "Disassembly and Assembly"](#).

A : Example

B : Inner diameter measuring direction

- Measure the inner diameter of main bearing with a bore gauge.  
(Bearing oil clearance) = (Main bearing inner diameter) – (Crankshaft main journal diameter)



**Standard and Limit** : Refer to [EM-148, "Main Bearing"](#).

- If clearance exceeds the limit, select proper main bearing according to main bearing inner diameter and crankshaft main journal diameter to obtain specified bearing oil clearance. Refer to [EM-136, "Main Bearing"](#).

### Method of Using Plastigage

- Remove engine oil and dust on crankshaft main journal and the surfaces of each bearing completely.
- Cut a plastigage slightly shorter than the bearing width, and place it in crankshaft axial direction, avoiding oil holes.
- Install main bearings to cylinder block and main bearing cap, and tighten main bearing cap mounting bolts to the specified torque. Refer to [EM-115, "Disassembly and Assembly"](#).

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

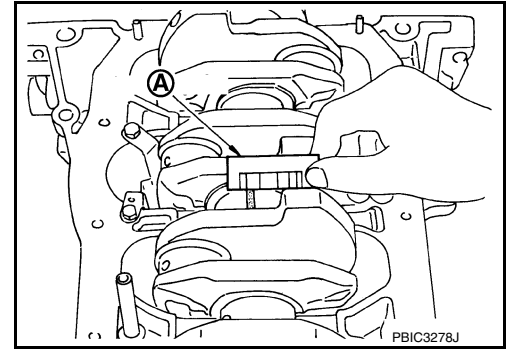
### CAUTION:

**Never rotate crankshaft.**

- Remove main bearing cap and bearings, and using the scale (A) on the plastigage bag, measure the plastigage width.

### NOTE:

The procedure when the measured value exceeds the limit is same as that described in the "Method by Calculation".



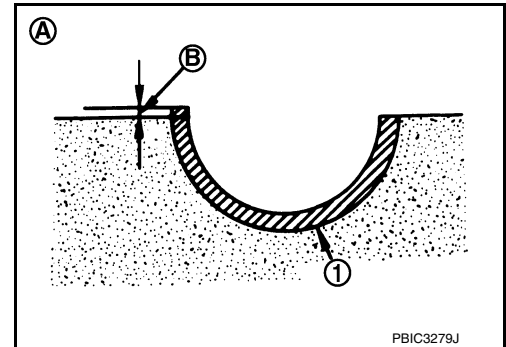
## MAIN BEARING CRUSH HEIGHT

- When main bearing cap is removed after being tightened to the specified torque with main bearings (1) installed, the tip end of bearing must protrude (B). Refer to [EM-115, "Disassembly and Assembly"](#).

A : Example

**Standard : There must be crush height.**

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



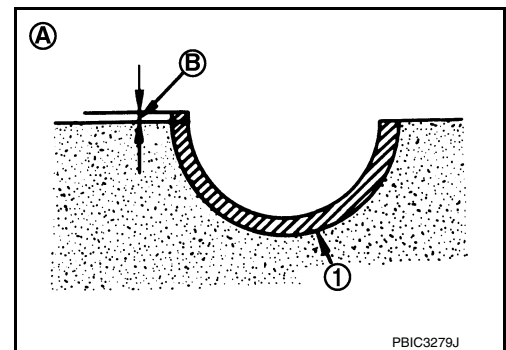
## CONNECTING ROD BEARING CRUSH HEIGHT

- When connecting rod cap is removed after being tightened to the specified torque with connecting rod bearings (1) installed, the tip end of bearing must protrude (B). Refer to [EM-115, "Disassembly and Assembly"](#).

A : Example

**Standard : There must be crush height.**

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



## MAIN BEARING CAP BOLT OUTER DIAMETER

- Measure the outer diameters (d1) and (d2) at two positions as shown in the figure.

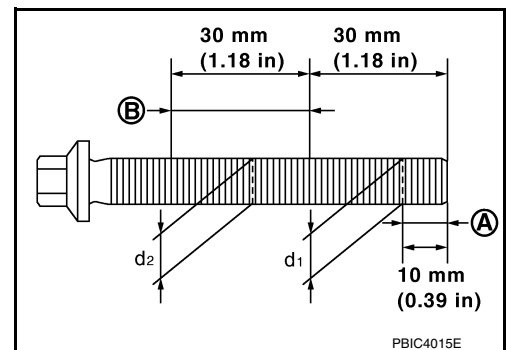
A : (d1) measuring position

B : (d2) measuring position

- If reduction appears in places other than (B) range, regard it as (d2).

**Limit [(d1) – (d2)]: 0.15 mm (0.0059 in)**

- If it exceeds the limit (a large difference in dimensions), replace main bearing cap mounting bolt with a new one.



## CONNECTING ROD CAP BOLT OUTER DIAMETER

# CYLINDER BLOCK

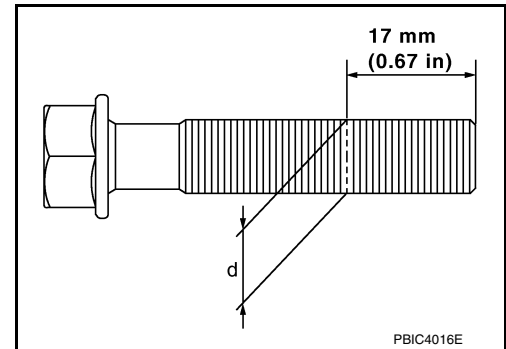
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Measure the outer diameter (d) at position as shown in the figure.
- If 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 cap bolt with a new one.



## FLYWHEEL DEFLECTION (M/T MODELS)

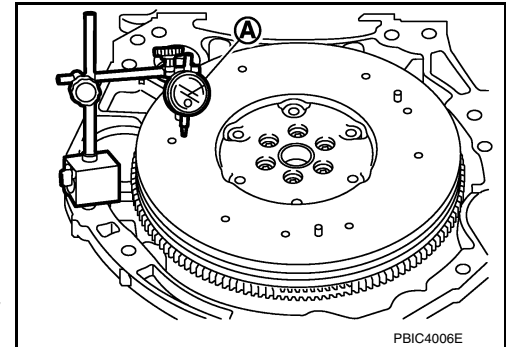
- Measure the deflection of flywheel contact surface to torque with a dial indicator (A).
- Measure the deflection at 210 mm (8.27 in) diameter.

**Limit : 0.45 mm (0.0177 in) or less.**

- If measured value is out of the standard, replace flywheel.
- If a trace of burn or discoloration is found on the surface, repair it with sandpaper.

### CAUTION:

**When measuring, keep magnetic fields (such as dial indicator stand) away from signal plate of the rear end of crankshaft.**



## MOVEMENT AMOUNT OF FLYWHEEL (M/T MODELS)

### CAUTION:

**Never disassemble double mass flywheel.**

### Movement Amount of Thrust (Fore-and-Aft) Direction

- Measure the movement amount of thrust (fore-and-aft) direction when 100 N (10.2 kg, 22 lb) force is added at the portion of 125 mm (4.92 in) radius from the center of flywheel.

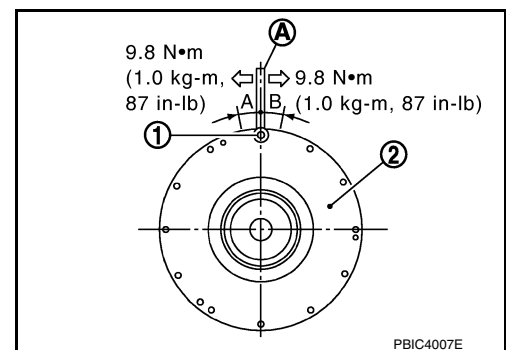
**Standard : 1.8 mm (0.071 in) or less**

- If measured value is out of the standard, replace flywheel.

### Movement Amount in Radial (Rotation) Direction

Check the movement amount of radial (rotation) direction with the following procedure:

1. Install clutch cover mounting bolt (1) to clutch cover mounting hole, and place a torque wrench (A) on the extended line of the flywheel (2) center line.
  - Tighten bolt at a force of 9.8 N·m (1.0 kg-m, 87 in-lb) to keep it from loosening.
2. Put a mating mark on circumferences of the two flywheel masses without applying any load (Measurement standard points).
3. Apply a force of 9.8 N·m (1.0 kg-m, 87 in-lb) in each direction, and mark the movement amount on the mass on the transaxle side.
4. Measure the dimensions of movement amounts "A" and "B" on circumference of the flywheel on the transaxle side.



**Limit : 33.2 mm (1.307 in) or less.**

- If measured value is out of the standard, replace flywheel.

## DRIVE PLATE DEFLECTION (CVT MODELS)



## CYLINDER BLOCK

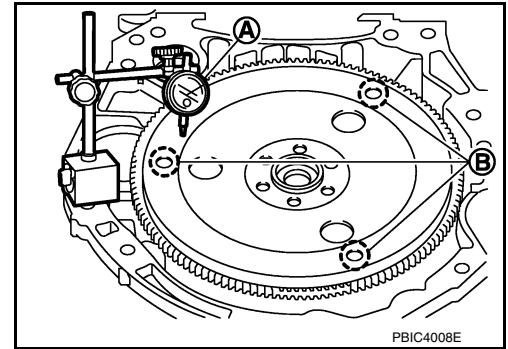
### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Measure the deflection of drive plate contact surface to torque converter with a dial indicator (A).
- Measure the deflection at the area limited between 12.4 mm (0.488 in) dia and 20.0 mm (0.787 in) dia around hole (B).

**Limit : 0.35 mm (0.0138 in) or less.**

- If measured value is out of the standard, replace drive plate.





# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## HOW TO SELECT PISTON AND BEARING

### Description

INFOID:0000000012197312

Selection points	Selection parts	Selection items	Selection methods
Between cylinder block and crankshaft	Main bearing	Main bearing grade (bearing thickness)	Determined by match of cylinder block bearing housing grade (inner diameter of housing) and crankshaft journal grade (outer diameter of journal)
Between crankshaft and connecting rod	Connecting rod bearing	Connecting rod bearing grade (bearing thickness)	Combining service grades for connecting rod big end diameter and crankshaft pin outer diameter determine connecting rod bearing selection.
Between cylinder block and piston	Piston and piston pin assembly (piston is available together with piston pin as an assembly.)	Piston grade (piston outer diameter)	Piston grade = cylinder bore grade (inner diameter of bore)

- The identification grade stamped on each part is the grade for the dimension measured in new condition. This grade cannot apply to reused parts.
- For reused or repaired parts, measure the dimension accurately. Determine the grade by comparing the measurement with the values of each selection table.
- For details of the measurement method of each part, the reuse standards and the selection method of the selective fitting parts, refer to the text.

### Piston

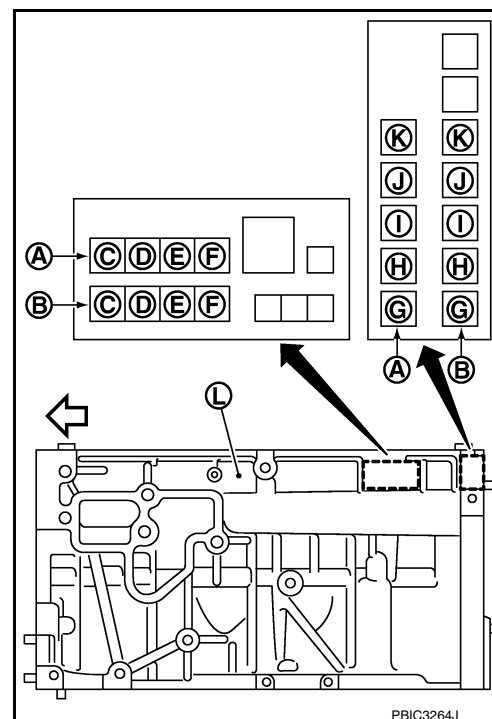
INFOID:0000000012197313

#### WHEN NEW CYLINDER BLOCK IS USED

- Check the cylinder bore grade on rear left side of cylinder block (L), and select piston of the same grade.

- A : Correction stamp  
 B : Standard stamp  
 C : Cylinder No. 1 bore grade  
 D : Cylinder No. 2 bore grade  
 E : Cylinder No. 3 bore grade  
 F : Cylinder No. 4 bore grade  
 G : No. 1 main bearing housing grade  
 H : No. 2 main bearing housing grade  
 I : No. 3 main bearing housing grade  
 J : No. 4 main bearing housing grade  
 K : No. 5 main bearing housing grade  
 ⇐ : Engine front

- If there is a correction stamp mark on the cylinder block, use it as a correct reference.



#### WHEN CYLINDER BLOCK IS REUSED

1. Measure the cylinder bore inner diameter. Refer to [EM-144, "Cylinder Block"](#).
2. Determine the bore grade by comparing the measurement with the values under the cylinder bore inner diameter of the "Piston Selection Table".

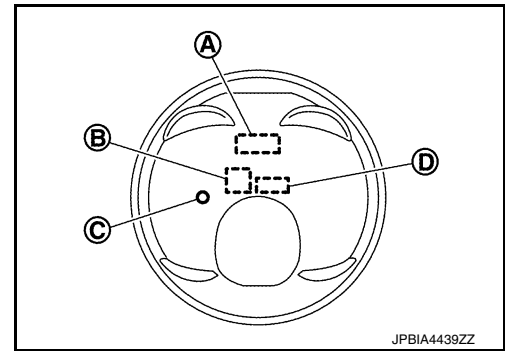
# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

## 3. Select piston of the same grade.

- A : Identification code
- B : Piston grade number
- C : Front mark
- D : Sub grade number



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## PISTON SELECTION TABLE

Unit: mm (in)

Grade number (Mark)	1	2 [or no mark (piston only)]
Cylinder bore Inner diameter	79.700 - 79.710 (3.1378 - 3.1382)	79.710 - 79.720 (3.1382 - 3.1386)
Piston skirt diameter	79.670 - 79.680 (3.1366 - 3.1370)	79.680 - 79.690 (3.1370 - 3.1374)

### NOTE:

Piston is available together with piston pin as an assembly.

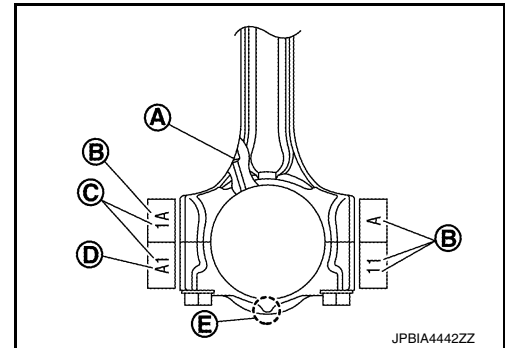
## Connecting Rod Bearing

INFOID:0000000012197314

### WHEN NEW CONNECTING ROD AND CRANKSHAFT ARE USED

1. Apply connecting rod big end diameter grade stamped on connecting rod side face to the row in the "Connecting Rod Bearing Selection Table".

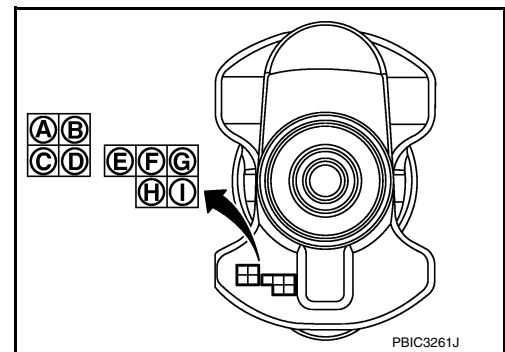
- A : Oil hole
- B : Management code
- C : Cylinder number
- D : Big end diameter grade
- E : Front mark



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2. Apply crankshaft pin journal diameter grade stamped on crankshaft front side to the column in the "Connecting Rod Bearing Selection Table".

- A : No. 1 pin journal diameter grade
- B : No. 2 pin journal diameter grade
- C : No. 3 pin journal diameter grade
- D : No. 4 pin journal diameter grade
- E : No. 1 main journal diameter grade
- F : No. 2 main journal diameter grade
- G : No. 3 main journal diameter grade
- H : No. 4 main journal diameter grade
- I : No. 5 main journal diameter grade



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3. Read the symbol at the cross point of selected row and column in the "Connecting Rod Bearing Selection Table".
4. Apply the symbol obtained to the "Connecting Rod Bearing Grade Table" to select connecting rod bearing.

### WHEN CONNECTING ROD AND CRANKSHAFT ARE REUSED

1. Measure the dimensions of the connecting rod big end diameter and crankshaft pin journal diameter individually. Refer to [EM-123. "Inspection"](#).

# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

- Apply the measured dimension to the "Connecting Rod Bearing Selection Table".
- Read the symbol at the cross point of selected row and column in the "Connecting Rod Bearing Selection Table".
- Apply the symbol obtained to the "Connecting Rod Bearing Grade Table" to select connecting rod bearing.

## CONNECTING ROD BEARING SELECTION TABLE

Connecting rod big end diameter Unit: mm (in)  Crankshaft pin journal diameter Unit: mm (in)		Mark																	
		Hole diameter		A	B	C	D	E	F	G	H	J	K	L	M	N			
Mark	Axle diameter			47.000 - 47.001 (1.8504 - 1.8504)	47.001 - 47.002 (1.8504 - 1.8505)	47.002 - 47.003 (1.8505 - 1.8505)	47.003 - 47.004 (1.8505 - 1.8505)	47.004 - 47.005 (1.8505 - 1.8506)	47.005 - 47.006 (1.8506 - 1.8506)	47.006 - 47.007 (1.8506 - 1.8507)	47.007 - 47.008 (1.8507 - 1.8507)	47.008 - 47.009 (1.8507 - 1.8507)	47.009 - 47.010 (1.8507 - 1.8508)	47.010 - 47.011 (1.8508 - 1.8508)	47.011 - 47.012 (1.8508 - 1.8509)	47.012 - 47.013 (1.8509 - 1.8509)			
A	43.970 - 43.971 (1.7311 - 1.7311)	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12			
B	43.969 - 43.970 (1.7311 - 1.7311)	0	0	0	0	0	01	01	01	01	1	1	1	1	12	12			
C	43.968 - 43.969 (1.7310 - 1.7311)	0	0	0	01	01	01	01	01	1	1	1	1	12	12	12			
D	43.967 - 43.968 (1.7310 - 1.7310)	0	0	01	01	01	01	1	1	1	1	12	12	12	2	2			
E	43.966 - 43.967 (1.7309 - 1.7310)	0	01	01	01	01	1	1	1	1	12	12	12	2	2	2			
F	43.965 - 43.966 (1.7309 - 1.7309)	01	01	01	1	1	1	1	12	12	12	2	2	2	2	23			
G	43.964 - 43.965 (1.7309 - 1.7309)	01	01	1	1	1	1	12	12	12	2	2	2	2	23	23			
H	43.963 - 43.964 (1.7308 - 1.7309)	01	1	1	1	1	12	12	12	2	2	2	2	2	23	23			
J	43.962 - 43.963 (1.7308 - 1.7308)	1	1	1	12	12	12	2	2	2	2	2	23	23	23	3			
K	43.961 - 43.962 (1.7307 - 1.7308)	1	1	12	12	12	2	2	2	2	2	23	23	23	3	3			
L	43.960 - 43.961 (1.7307 - 1.7307)	1	12	12	12	2	2	2	2	2	23	23	23	3	3	3			
M	43.959 - 43.960 (1.7307 - 1.7307)	12	12	12	2	2	2	2	2	23	23	23	3	3	3	34			
N	43.958 - 43.959 (1.7306 - 1.7307)	12	12	2	2	2	2	2	23	23	23	3	3	3	3	34			
P	43.957 - 43.958 (1.7306 - 1.7306)	12	2	2	2	2	23	23	23	23	3	3	3	3	34	34			
R	43.956 - 43.957 (1.7305 - 1.7306)	2	2	2	23	23	23	23	3	3	3	3	34	34	34	4			
S	43.955 - 43.956 (1.7305 - 1.7305)	2	2	23	23	23	23	3	3	3	3	34	34	34	4	4			
T	43.954 - 43.955 (1.7305 - 1.7305)	2	23	23	23	3	3	3	3	34	34	34	4	4	4	4			
U	43.953 - 43.954 (1.7304 - 1.7305)	23	23	23	3	3	3	3	34	34	34	4	4	4	4	4			

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## CONNECTING ROD BEARING GRADE TABLE

Connecting rod bearing grade table : Refer to [EM-148, "Connecting Rod Bearing"](#).

## UNDERSIZE BEARINGS USAGE GUIDE

- When the specified connecting rod bearing oil clearance is not obtained with standard size connecting rod bearings, use undersize (US) bearings.
- When using undersize (US) bearing, measure the connecting rod bearing inner diameter with bearing installed, and grind the crankshaft pin so that the connecting rod bearing oil clearance satisfies the standard.

**CAUTION:**

# HOW TO SELECT PISTON AND BEARING

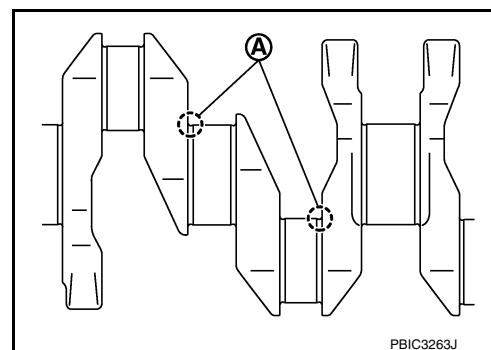
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

In grinding crankshaft pin to use undersize bearings, keep the fillet R [1.5 - 1.7 mm (0.059 - 0.067 in)] (A).

## Bearing undersize table

: Refer to [EM-148, "Connecting Rod Bearing"](#).



## Main Bearing

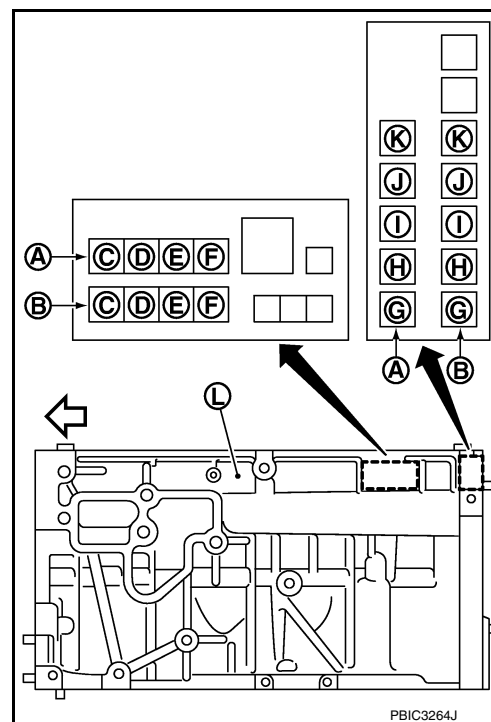
INFOID:000000012197315

### WHEN NEW CYLINDER BLOCK AND CRANKSHAFT ARE USED

1. "Main Bearing Selection Table" rows correspond to main bearing housing grade on rear left side of cylinder block (L).

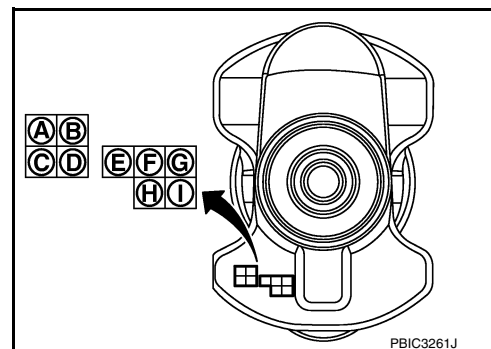
- A : Correction stamp
- B : Standard stamp
- C : Cylinder No. 1 bore grade
- D : Cylinder No. 2 bore grade
- E : Cylinder No. 3 bore grade
- F : Cylinder No. 4 bore grade
- G : No. 1 main bearing housing grade
- H : No. 2 main bearing housing grade
- I : No. 3 main bearing housing grade
- J : No. 4 main bearing housing grade
- K : No. 5 main bearing housing grade
- ↔ : Engine front

- If there is a correction stamp mark on cylinder block, use it as a correct reference.



2. Apply main journal diameter grade stamped on crankshaft front side to column in the "Main Bearing Selection Table".

- A : No. 1 pin journal diameter grade
- B : No. 2 pin journal diameter grade
- C : No. 3 pin journal diameter grade
- D : No. 4 pin journal diameter grade
- E : No. 1 main journal diameter grade
- F : No. 2 main journal diameter grade
- G : No. 3 main journal diameter grade
- H : No. 4 main journal diameter grade
- I : No. 5 main journal diameter grade



3. Read the symbol at the cross point of selected row and column in the "Main Bearing Selection Table".

### CAUTION:

There are two main bearing selection tables. One is for No. 1, 4, and 5 journals and the other is for No. 2 and 3 journals. Make certain to use the appropriate table. This is due to differences in the specified clearances.

# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

4. Apply the symbol obtained to the "Main Bearing Grade Table" to select main bearing.

## NOTE:

Service part is available as a set of both upper and lower.

## WHEN CYLINDER BLOCK AND CRANKSHAFT ARE REUSED

1. Measure the dimensions of the cylinder block main bearing housing inner diameter and crankshaft main journal diameter individually. Refer to [EM-123, "Inspection"](#).
2. Apply the measured dimension to the "Main Bearing Selection Table".
3. Read the symbol at the cross point of selected row and column in the "Main Bearing Selection Table".

## CAUTION:

There are two main bearing selection tables. One is for No. 1, 4, and 5 journals and the other is for No. 2 and 3 journals. Make certain to use the appropriate table. This is due to differences in the specified clearances.

4. Apply the symbol obtained to the "Main Bearing Grade Table" to select main bearing.

## NOTE:

Service part is available as a set of both upper and lower.

## MAIN BEARING SELECTION TABLE (No. 1, 4, AND 5 JOURNAL)

<div> <div>Cylinder block main bearing housing inner diameter Unit: mm (in)</div> <div>Crankshaft main journal diameter Unit: mm (in)</div> </div>		Mark		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
		Hole diameter		55.997 - 55.998 (2.2046 - 2.2046)	55.998 - 55.999 (2.2046 - 2.2047)	55.999 - 56.000 (2.2047 - 2.2047)	56.000 - 56.001 (2.2047 - 2.2048)	56.001 - 56.002 (2.2048 - 2.2048)	56.002 - 56.003 (2.2048 - 2.2048)	56.003 - 56.004 (2.2048 - 2.2049)	56.004 - 56.005 (2.2049 - 2.2049)	56.005 - 56.006 (2.2049 - 2.2050)	56.006 - 56.007 (2.2050 - 2.2050)	56.007 - 56.008 (2.2050 - 2.2050)	56.008 - 56.009 (2.2050 - 2.2051)	56.009 - 56.010 (2.2051 - 2.2051)	56.010 - 56.011 (2.2051 - 2.2052)	56.011 - 56.012 (2.2052 - 2.2052)	56.012 - 56.013 (2.2052 - 2.2052)	56.013 - 56.014 (2.2052 - 2.2053)	56.014 - 56.015 (2.2053 - 2.2053)	56.015 - 56.016 (2.2053 - 2.2053)	56.016 - 56.017 (2.2053 - 2.2054)
Mark	Axle diameter																						
A	51.978 - 51.979 (2.0464 - 2.0464)	0	0	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23
B	51.977 - 51.978 (2.0463 - 2.0464)	0	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23
C	51.976 - 51.977 (2.0463 - 2.0463)	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23
D	51.975 - 51.976 (2.0463 - 2.0463)	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3
E	51.974 - 51.975 (2.0462 - 2.0463)	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	3
F	51.973 - 51.974 (2.0462 - 2.0462)	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	3	3
G	51.972 - 51.973 (2.0461 - 2.0462)	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	3	3	34
H	51.971 - 51.972 (2.0461 - 2.0461)	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	34
J	51.970 - 51.971 (2.0461 - 2.0461)	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	34	34
K	51.969 - 51.970 (2.0460 - 2.0461)	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4
L	51.968 - 51.969 (2.0460 - 2.0460)	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4
M	51.967 - 51.968 (2.0459 - 2.0460)	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4
N	51.966 - 51.967 (2.0459 - 2.0459)	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	45
P	51.965 - 51.966 (2.0459 - 2.0459)	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	45
R	51.964 - 51.965 (2.0458 - 2.0459)	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	4	45
S	51.963 - 51.964 (2.0458 - 2.0458)	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	4	4	45
T	51.962 - 51.963 (2.0457 - 2.0458)	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	4	4	4	45
U	51.961 - 51.962 (2.0457 - 2.0457)	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	4	4	4	4	45
V	51.960 - 51.961 (2.0457 - 2.0457)	2	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	4	4	4	4	4	45
W	51.959 - 51.960 (2.0456 - 2.0457)	23	23	23	3	3	3	34	34	34	4	4	4	4	4	4	4	4	4	4	4	4	45

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# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR FOR NISMO RS MODELS]

MAIN BEARING SELECTION TABLE (No. 2 AND 3 JOURNAL)

<div>Cylinder block main bearing housing inner diameter Unit: mm (in)</div> <div>Crankshaft main journal diameter Unit: mm (in)</div>		Mark	Hole diameter																						
		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W				
Mark	Axle diameter	55.997 - 55.998 (2.2046 - 2.2046)	55.998 - 55.999 (2.2046 - 2.2047)	55.999 - 56.000 (2.2047 - 2.2047)	56.000 - 56.001 (2.2047 - 2.2048)	56.001 - 56.002 (2.2048 - 2.2048)	56.002 - 56.003 (2.2048 - 2.2048)	56.003 - 56.004 (2.2048 - 2.2049)	56.004 - 56.005 (2.2049 - 2.2049)	56.005 - 56.006 (2.2049 - 2.2050)	56.006 - 56.007 (2.2050 - 2.2050)	56.007 - 56.008 (2.2050 - 2.2050)	56.008 - 56.009 (2.2050 - 2.2051)	56.009 - 56.010 (2.2051 - 2.2051)	56.010 - 56.011 (2.2051 - 2.2052)	56.011 - 56.012 (2.2052 - 2.2052)	56.012 - 56.013 (2.2052 - 2.2052)	56.013 - 56.014 (2.2052 - 2.2053)	56.014 - 56.015 (2.2053 - 2.2053)	56.015 - 56.016 (2.2053 - 2.2053)	56.016 - 56.017 (2.2053 - 2.2054)				
A	51.978 - 51.979 (2.0464 - 2.0464)	2	2	2	2	2	2	23	23	23	3	3	3	3	34	34	34	4	4	4	45				
B	51.977 - 51.978 (2.0463 - 2.0464)	2	2	2	2	2	2	23	23	23	3	3	3	3	34	34	34	4	4	4	45				
C	51.976 - 51.977 (2.0463 - 2.0463)	2	2	2	2	2	23	23	23	3	3	3	3	34	34	34	4	4	4	45	45				
D	51.975 - 51.976 (2.0463 - 2.0463)	2	2	2	2	23	23	23	3	3	3	3	34	34	34	4	4	4	45	45	5				
E	51.974 - 51.975 (2.0462 - 2.0463)	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5				
F	51.973 - 51.974 (2.0462 - 2.0462)	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5				
G	51.972 - 51.973 (2.0461 - 2.0462)	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56				
H	51.971 - 51.972 (2.0461 - 2.0461)	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56				
J	51.970 - 51.971 (2.0461 - 2.0461)	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56				
K	51.969 - 51.970 (2.0460 - 2.0461)	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6				
L	51.968 - 51.969 (2.0460 - 2.0460)	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6				
M	51.967 - 51.968 (2.0459 - 2.0460)	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6				
N	51.966 - 51.967 (2.0459 - 2.0459)	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67				
P	51.965 - 51.966 (2.0459 - 2.0459)	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67				
R	51.964 - 51.965 (2.0458 - 2.0459)	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67				
S	51.963 - 51.964 (2.0458 - 2.0458)	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7				
T	51.962 - 51.963 (2.0457 - 2.0458)	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7				
U	51.961 - 51.962 (2.0457 - 2.0457)	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7				
V	51.960 - 51.961 (2.0457 - 2.0457)	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	7				
W	51.959 - 51.960 (2.0456 - 2.0457)	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	7	7				

JPBIA4443GB

MAIN BEARING GRADE TABLE (ALL JOURNALS)

Main bearing grade table (All journals) : Refer to [EM-148, "Main Bearing"](#).

## UNDERSIZE BEARING USAGE GUIDE

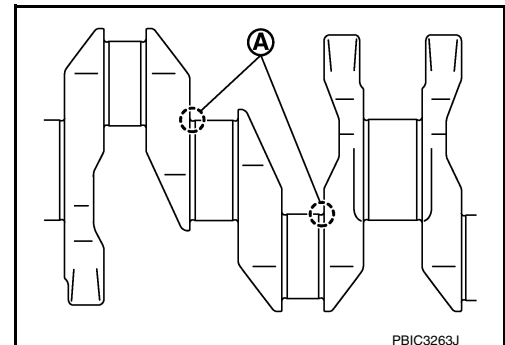
- When the specified main bearing oil clearance is not obtained with standard size main bearings, use undersize (US) bearing.
- When using undersize (US) bearing, measure the main bearing inner diameter with bearing installed, and grind main journal so that the main bearing oil clearance satisfies the standard.

### CAUTION:

In grinding crankshaft main journal to use undersize bearings, keep the fillet R [1.5 - 1.7 mm (0.059 - 0.067 in)] (A).

Bearing undersize table:

Refer to [EM-148, "Main Bearing"](#).



PBIC3263J

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

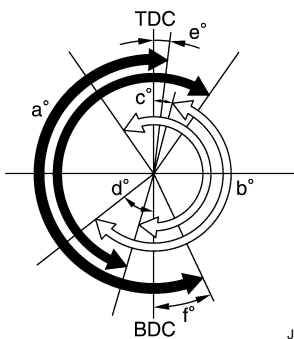
#### General Specification

INFOID:0000000012197316

#### GENERAL SPECIFICATIONS

Engine type	MR16DDT	
Cylinder arrangement	In-line 4	
Displacement cm <sup>3</sup> (cu in)	1,618 (98.78)	
Bore and stroke mm (in)	79.7×81.1 (3.138×3.193)	
Valve arrangement	DOHC	
Firing order	1-3-4-2	
Number of piston rings	Compression	2
	Oil	1
Compression ratio	9.5	
Compression pressure kPa (kg/cm <sup>2</sup> , psi)/250 rpm	Standard	1,560 (15.9, 226.2)
	Minimum	1,190 (12.1, 172.6)
	Differential limit between cylinders	100 (1.0, 14.5)

Unit: degree

Valve timing ↶ : Intake valve ↷ : Exhaust valve						
	a	b	c	d	e	f
	228	228	11 (-31) ATDC	59 (17) ABDC	4 (61) ATDC	44 (-13) BBDC

( ) : Valve timing control "ON"

#### Drive Belt

INFOID:0000000012197317

#### DRIVE BELT

Tension of drive belt	Belt tension is not necessary, as it is automatically adjusted by drive belt auto-tensioner.
-----------------------	--

#### Spark Plug

INFOID:0000000012197318

#### SPARK PLUG

Unit: mm (in)

Make	NGK	
Standard type	DILKAR7C9H	
Gap (Nominal)	Standard	0.9 (0.035)
	Limit	1.1 (0.043)



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

## Exhaust Manifold

INFOID:0000000012197319

### EXHAUST MANIFOLD

Unit: mm (in)

Items		Limit
Surface distortion	Each exhaust port	0.1 (0.004)
	Entire part	0.3 (0.012)

## Turbocharger

INFOID:0000000012197320

### TURBOCHARGER ACTUATOR

	Value of pressure	Value of rod moving
Standard	68.4 kPa (513 mmHg, 20.19 inHg)	1 mm (0.039 in)

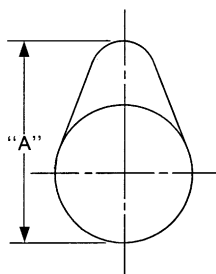
## Camshaft

INFOID:0000000012197321

### CAMSHAFT

Unit: mm (in)

Items		Standard	Limit
Camshaft journal oil clearance	No. 1	0.045 - 0.086 (0.0018 - 0.0034)	0.15 (0.0059)
	No. 2, 3, 4, 5	0.030 - 0.071 (0.0012 - 0.0028)	
Camshaft bracket inner diameter	No. 1	28.000 - 28.021 (1.1024 - 1.1032)	—
	No. 2, 3, 4, 5	25.000 - 25.021 (0.9843 - 0.9851)	—
Camshaft journal diameter	No. 1	27.935 - 27.955 (1.0998 - 1.1006)	—
	No. 2, 3, 4, 5	24.950 - 24.970 (0.9823 - 0.9831)	—
Camshaft end play		0.075 - 0.153 (0.0030 - 0.0060)	0.24 (0.0094)
Camshaft cam height "A"	Intake	44.605 - 44.795 (1.7561 - 1.7636)	44.66 (1.75827)
	Exhaust	43.175 - 43.365 (1.6998 - 1.7073)	44.20 (1.74016)
Camshaft runout [TIR*]		Less than 0.02 (0.0008)	0.05 (0.0020)
Camshaft sprocket runout [TIR*]		—	0.15 (0.0059)



SEM671

\*: Total indicator reading

### VALVE LIFTER

Unit: mm (in)

Items		Standard
Valve lifter outer diameter	Intake	33.977 - 33.987 (1.3377 - 1.3381)
	Exhaust	29.977 - 29.987 (1.1802 - 1.1806)



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Valve lifter hole diameter	Intake	34.000 - 34.021 (1.3386 - 1.3394)
	Exhaust	30.000 - 30.021 (1.1811 - 1.1819)
Valve lifter clearance		0.013 - 0.044 (0.0005 - 0.0017)

## VALVE CLEARANCE

Unit: mm (in)

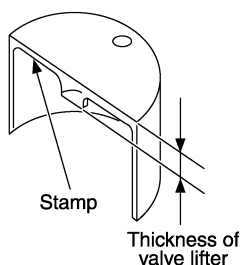
Items	Cold	Hot* (reference data)
Intake	0.24 - 0.32 (0.009 - 0.013)	0.304 - 0.416 (0.012 - 0.016)
Exhaust	0.25 - 0.33 (0.01 - 0.013)	0.308 - 0.432 (0.012 - 0.017)

\*: Approximately 80°C (176°F)

## AVAILABLE VALVE LIFTER

Unit: mm (in)

Identification mark	Thickness
---------------------	-----------



KBIA0119E

300	3.00 (0.1181)
302	3.02 (0.1189)
304	3.04 (0.1197)
306	3.06 (0.1205)
308	3.08 (0.1213)
310	3.10 (0.1220)
312	3.12 (0.1228)
314	3.14 (0.1236)
316	3.16 (0.1244)
318	3.18 (0.1252)
320	3.20 (0.1260)
322	3.22 (0.1268)
324	3.24 (0.1276)
326	3.26 (0.1283)
328	3.28 (0.1291)
330	3.30 (0.1299)
332	3.32 (0.1307)
334	3.34 (0.1315)
336	3.36 (0.1323)
338	3.38 (0.1331)
340	3.40 (0.1339)
342	3.42 (0.1346)
344	3.44 (0.1354)

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Identification mark	Thickness
346	3.46 (0.1362)
348	3.48 (0.1370)
350	3.50 (0.1378)

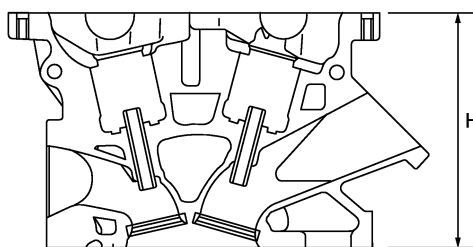
## Cylinder Head

INFOID:0000000012197322

### CYLINDER HEAD

Unit: mm (in)

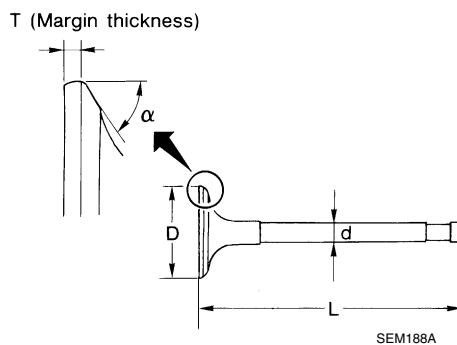
Items	Standard	Limit
Head surface distortion	—	0.1 (0.004)
Normal cylinder head height "H"	130.9 (5.15)	—



PBIC0924E

## VALVE DIMENSIONS

Unit: mm (in)



SEM188A

Valve head diameter "D"	Intake	31.2 - 31.5 (1.228 - 1.240)
	Exhaust	25.6 - 25.9 (1.008 - 1.020)
Valve length "L"	Intake	107.08 (4.22)
	Exhaust	106.06 (4.18)
Valve stem diameter "d"	Intake	5.465 - 5.480 (0.2152 - 0.2157)
	Exhaust	5.455 - 5.470 (0.2148 - 0.2154)
Valve seat angle "α"		45°15' - 45°45'
Valve margin "T"	Intake	1.4 (0.055)
	Exhaust	1.4 (0.055)

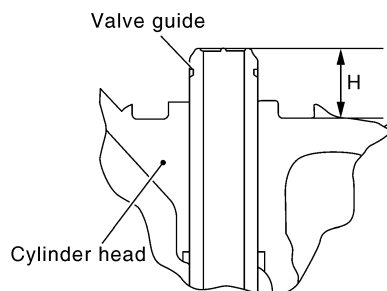
## VALVE GUIDE

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Unit: mm (in)

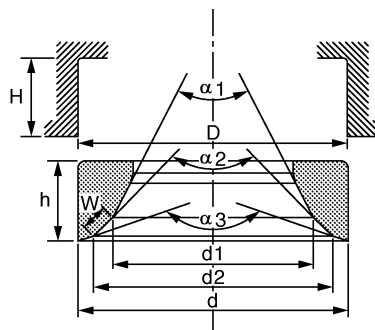


PBIC2187E

Items		Standard	Oversize (service) [0.2 (0.008)]
Valve guide	Outer diameter	9.523 - 9.534 (0.3749 - 0.3754)	9.723 - 9.734 (0.3828 - 0.3832)
	Inner diameter (Finished size)	5.500 - 5.518 (0.2165 - 0.2172)	
Cylinder head valve guide hole diameter		9.475 - 9.496 (0.3730 - 0.3739)	9.675 - 9.696 (0.3809 - 0.3817)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
Items		Standard	Limit
Valve guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.1 (0.004)
	Exhaust	0.030 - 0.063 (0.0012 - 0.0025)	
Projection length “H”		13.35 - 13.65 (0.5256 - 0.5374)	

## VALVE SEAT

Unit: mm (in)



PBIC2745E

Items		Standard	Oversize (service) [0.5 (0.020)]
Cylinder head seat recess diameter "D"	Intake	31.900 - 31.927 (1.2559 - 1.2570)	35.200 - 35.227 (1.3858 - 1.3869)
	Exhaust	26.300 - 26.327 (1.0354 - 1.0365)	29.200 - 29.227 (1.1496 - 1.1507)
Valve seat outer diameter "d"	Intake	31.997 - 32.013 (1.2597 - 1.2604)	32.497 - 32.513 (1.2794 - 1.2800)
	Exhaust	26.408 - 26.424 (1.0397 - 1.0403)	
Valve seat interference fit		0.07 - 0.113 (0.0028 - 0.0044)	
Diameter "d1"*1	Intake	29.2 (1.150)	
	Exhaust	23.3 (0.917)	
Diameter "d2"*2	Intake	30.5 - 31.0 (1.201 - 1.220)	
	Exhaust	24.9 - 25.4 (0.980 - 1.0)	
Angle " $\alpha_1$ "	Intake	70°	
	Exhaust	45°	
Angle " $\alpha_2$ "		88°45' - 90°15'	
Angle " $\alpha_3$ "		120°	

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Contacting width “W”*3	Intake	1.0 - 1.4 (0.039 - 0.055)	
	Exhaust	1.2 - 1.6 (0.047 - 0.063)	
Height “h”	Intake	5.9 - 6.0 (0.232 - 0.236)	5.09 - 5.10 (0.2004 - 0.2008)
	Exhaust		
Depth “H”	Intake	6.01 (0.2366)	
	Exhaust	6.07 (0.2390)	

\*1: Diameter made by intersection point of conic angles " $\alpha 1$ " and " $\alpha 2$ "

\*2: Diameter made by intersection point of conic angles " $\alpha 2$ " and " $\alpha 3$ "

\*3: Machining data

## VALVE SPRING

Items	Standard	
	Intake	Exhaust
Free height	49.4 - 49.6 mm (1.945 - 1.953 in)	54.5 - 54.7 mm (2.146 - 2.154 in)
Installation height	38.46 mm (1.514 in)	38.46 mm (1.514 in)
Installation load	151 - 175 N (15.4 - 17.9 kg, 34 - 39 lb)	257 - 289 N (26.2 - 29.5 kg, 57.8 - 65.0 lb)
Height during valve open	28.86 mm (1.1362 in)	30.03 mm (1.1823 in)
Load with valve open	344 - 392 N (35.0 - 40.0 kg, 77.3 - 88.1 lb)	450 - 502 N (45.9 - 51.2 kg, 101.2 - 112.9 lb)
Identification color	White	Yellow green

Unit: mm (in)

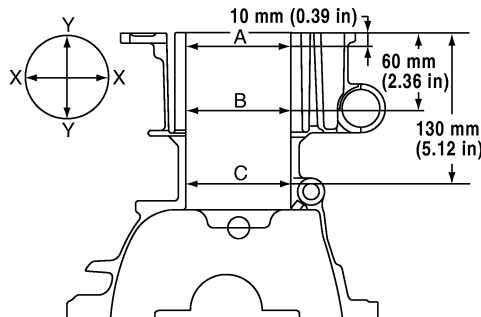
Items	Limit
Valve spring squareness	1.0 (0.039)

## Cylinder Block

INFOID:0000000012197323

## CYLINDER BLOCK

Unit: mm (in)



PBIC4017E

Cylinder block top surface distortion	Limit		0.1 (0.004)
Cylinder bore inner diameter	Standard	Grade No. 1	79.700 - 79.710 (3.1378 - 3.1382)
		Grade No. 2	79.710 - 79.720 (3.1382 - 3.1386)
Out-of-round	Limit		0.015 (0.0006)
Taper			0.010 (0.0004)

# SERVICE DATA AND SPECIFICATIONS (SDS)

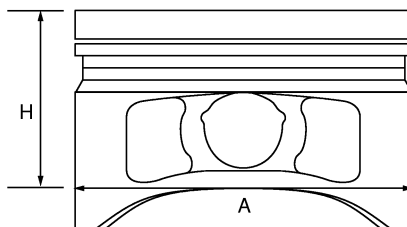
< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Main bearing housing inner diameter grade	Grade No. A	55.997 - 55.998 (2.2046 - 2.2046)	A
	Grade No. B	55.998 - 55.999 (2.2046 - 2.2047)	
	Grade No. C	55.999 - 56.000 (2.2047 - 2.2047)	
	Grade No. D	56.000 - 56.001 (2.2047 - 2.2048)	EM
	Grade No. E	56.001 - 56.002 (2.2048 - 2.2048)	
	Grade No. F	56.002 - 56.003 (2.2048 - 2.2048)	
	Grade No. G	56.003 - 56.004 (2.2048 - 2.2049)	C
	Grade No. H	56.004 - 56.005 (2.2049 - 2.2049)	
	Grade No. J	56.005 - 56.006 (2.2049 - 2.2050)	D
	Grade No. K	56.006 - 56.007 (2.2050 - 2.2050)	
	Grade No. L	56.007 - 56.008 (2.2050 - 2.2050)	
	Grade No. M	56.008 - 56.009 (2.2050 - 2.2051)	E
	Grade No. N	56.009 - 56.010 (2.2051 - 2.2051)	
	Grade No. P	56.010 - 56.011 (2.2051 - 2.2052)	F
	Grade No. R	56.011 - 56.012 (2.2052 - 2.2052)	
	Grade No. S	56.012 - 56.013 (2.2052 - 2.2052)	
	Grade No. T	56.013 - 56.014 (2.2052 - 2.2053)	G
	Grade No. U	56.014 - 56.015 (2.2053 - 2.2053)	
	Grade No. V	56.015 - 56.016 (2.2053 - 2.2053)	H
	Grade No. W	56.016 - 56.017 (2.2053 - 2.2054)	

## AVAILABLE PISTON

Unit: mm (in)



PBIC0188E

Piston skirt diameter “A”	Standard	Grade No. 1	79.670 - 79.680 (3.1366 - 3.1370)
		Grade No. 2	79.680 - 79.690 (3.1370 - 3.1374)
Measure point “H”			43.4 (1.7087)
Piston pin hole diameter			21.993 - 21.999 (0.8658 - 0.8661)
Piston to cylinder bore clearance	Standard		0.020 - 0.040 (0.0008 - 0.0016)
	Limit		0.08 (0.0031)

## PISTON RING

Unit: mm (in)

Items		Standard	Limit
Piston ring side clearance	Top	0.04 - 0.08 (0.0016 - 0.0031)	0.11 (0.0043)
	2nd	0.03 - 0.07 (0.0012 - 0.0028)	0.10 (0.0039)
	Oil ring	0.055 - 0.155 (0.0022 - 0.0061)	—

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Piston ring end gap	Top	0.19 - 0.29 (0.0075 - 0.0114)	0.48 (0.0189)
	2nd	0.29 - 0.44 (0.0114 - 0.0173)	0.60 (0.0236)
	Oil (rail ring)	0.15 - 0.45 (0.0059 - 0.0177)	0.76 (0.0299)

## PISTON PIN

Unit: mm (in)

Items	Standard	Limit
Piston pin outer diameter	21.989 - 21.995 (0.8657 - 0.8659)	—
Piston to piston pin oil clearance	0.002 - 0.006 (0.0001 - 0.0002)	—

## CONNECTING ROD

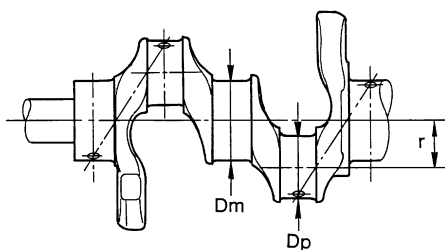
Unit: mm (in)

Center distance		138.97 - 139.07 (5.47 - 5.48)
Bend [per 100 (3.94)]	Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	Limit	0.30 (0.0118)
Connecting rod bushing inner diameter*	Standard	22.000 - 22.012 (0.8661 - 0.8666)
Connecting rod bushing oil clearance	Standard	0.005 - 0.023 (0.0002 - 0.0009)
	Limit	0.03 (0.0012)
Connecting rod side clearance	Standard	0.20 - 0.35 (0.0079 - 0.0138)
	Limit	0.4 (0.016)
Connecting rod big end diameter grade	Grade No. A	47.000 - 47.001 (1.8504 - 1.8504)
	Grade No. B	47.001 - 47.002 (1.8504 - 1.8505)
	Grade No. C	47.002 - 47.003 (1.8505 - 1.8505)
	Grade No. D	47.003 - 47.004 (1.8505 - 1.8505)
	Grade No. E	47.004 - 47.005 (1.8505 - 1.8506)
	Grade No. F	47.005 - 47.006 (1.8506 - 1.8506)
	Grade No. G	47.006 - 47.007 (1.8506 - 1.8507)
	Grade No. H	47.007 - 47.008 (1.8507 - 1.8507)
	Grade No. J	47.008 - 47.009 (1.8507 - 1.8507)
	Grade No. K	47.009 - 47.010 (1.8507 - 1.8508)
	Grade No. L	47.010 - 47.011 (1.8508 - 1.8508)
	Grade No. M	47.011 - 47.012 (1.8508 - 1.8509)
	Grade No. N	47.012 - 47.013 (1.8509 - 1.8509)

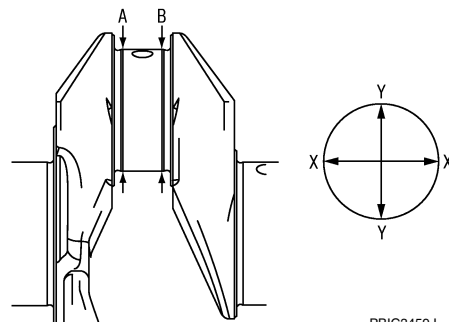
\*: After installing in connecting rod

## CRANKSHAFT

Unit: mm (in)



SEM645



PBIC3459J

Center distance "r"	40.41 - 40.49 (1.5909 - 1.5940)
---------------------	---------------------------------

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

Out-of-round	Limit	0.0035 (0.0001)	A
Taper	Limit		
Runout [TIR*]	Standard	0.05 (0.0020)	EM
	Limit	0.10 (0.0039)	
Crankshaft end play	Standard	0.10 - 0.26 (0.0039 - 0.0102)	
	Limit	0.30 (0.0118)	
Crankshaft pin journal diameter "Dp" grade.	Grade No. A	43.970 - 43.971 (1.7311 - 1.7311)	C
	Grade No. B	43.969 - 43.970 (1.7311 - 1.7311)	
	Grade No. C	43.968 - 43.969 (1.7310 - 1.7311)	D
	Grade No. D	43.967 - 43.968 (1.7310 - 1.7310)	
	Grade No. E	43.966 - 43.967 (1.7309 - 1.7310)	
	Grade No. F	43.965 - 43.966 (1.7309 - 1.7309)	E
	Grade No. G	43.964 - 43.965 (1.7309 - 1.7309)	
	Grade No. H	43.963 - 43.964 (1.7308 - 1.7309)	
	Grade No. J	43.962 - 43.963 (1.7308 - 1.7308)	F
	Grade No. K	43.961 - 43.962 (1.7307 - 1.7308)	
	Grade No. L	43.960 - 43.961 (1.7307 - 1.7307)	G
	Grade No. M	43.959 - 43.960 (1.7307 - 1.7307)	
	Grade No. N	43.958 - 43.959 (1.7306 - 1.7307)	
	Grade No. P	43.957 - 43.958 (1.7306 - 1.7306)	H
	Grade No. R	43.956 - 43.957 (1.7305 - 1.7306)	
	Grade No. S	43.955 - 43.956 (1.7305 - 1.7305)	I
	Grade No. T	43.954 - 43.955 (1.7305 - 1.7305)	
	Grade No. U	43.953 - 43.954 (1.7304 - 1.7305)	J
Crankshaft main journal diameter "Dm" grade.	Grade No. A	51.978 - 51.979 (2.0464 - 2.0464)	
	Grade No. B	51.977 - 51.978 (2.0463 - 2.0464)	
	Grade No. C	51.976 - 51.977 (2.0463 - 2.0463)	K
	Grade No. D	51.975 - 51.976 (2.0463 - 2.0463)	
	Grade No. E	51.974 - 51.975 (2.0462 - 2.0463)	
	Grade No. F	51.973 - 51.974 (2.0462 - 2.0462)	L
	Grade No. G	51.972 - 51.973 (2.0461 - 2.0462)	
	Grade No. H	51.971 - 51.972 (2.0461 - 2.0461)	
	Grade No. J	51.970 - 51.971 (2.0461 - 2.0461)	M
	Grade No. K	51.969 - 51.970 (2.0460 - 2.0461)	
	Grade No. L	51.968 - 51.969 (2.0460 - 2.0460)	N
	Grade No. M	51.967 - 51.968 (2.0459 - 2.0460)	
	Grade No. N	51.966 - 51.967 (2.0459 - 2.0459)	
	Grade No. P	51.965 - 51.966 (2.0459 - 2.0459)	O
	Grade No. R	51.964 - 51.965 (2.0458 - 2.0459)	
	Grade No. S	51.963 - 51.964 (2.0458 - 2.0458)	P
	Grade No. T	51.962 - 51.963 (2.0457 - 2.0458)	
	Grade No. U	51.961 - 51.962 (2.0457 - 2.0457)	
	Grade No. V	51.960 - 51.961 (2.0457 - 2.0457)	
	Grade No. W	51.959 - 51.960 (2.0456 - 2.0457)	

\*: Total indicator reading

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

## Connecting Rod Bearing

INFOID:000000012197324

### CONNECTING ROD BEARING GRADE TABLE

Unit: mm (in)

Grade number		Thickness	Identification color	Remarks
0		1.494 - 1.497 (0.0588 - 0.0589)	Black	Grade and color are the same for upper and lower bearings.
1		1.497 - 1.500 (0.0589 - 0.0591)	Brown	
2		1.500 - 1.503 (0.0591 - 0.0592)	Green	
3		1.503 - 1.506 (0.0592 - 0.0593)	Yellow	
4		1.506 - 1.509 (0.0593 - 0.0594)	Blue	
01	UPR	1.494 - 1.497 (0.0588 - 0.0589)	Black	Grade and color are different between upper and lower bearings.
	LWR	1.497 - 1.500 (0.0589 - 0.0591)	Brown	
12	UPR	1.497 - 1.500 (0.0589 - 0.0591)	Brown	
	LWR	1.500 - 1.503 (0.0591 - 0.0592)	Green	
23	UPR	1.500 - 1.503 (0.0591 - 0.0592)	Green	
	LWR	1.503 - 1.506 (0.0592 - 0.0593)	Yellow	
34	UPR	1.503 - 1.506 (0.0592 - 0.0593)	Yellow	
	LWR	1.506 - 1.509 (0.0593 - 0.0594)	Blue	

### UNDERSIZE TABLE

Unit: mm (in)

Items	Thickness	Crank pin journal diameter
US 0.25 (0.0098)	1.623 - 1.631 (0.0639 - 0.0642)	Grind so that bearing clearance is the specified value.

### CONNECTING ROD BEARING OIL CLEARANCE

Unit: mm (in)

Connecting rod bearing oil clearance	Standard	0.037 - 0.047 (0.0015 - 0.0019)
	Limit	0.07 (0.0028)

## Main Bearing

INFOID:000000012197325

### MAIN BEARING GRADE TABLE (ALL JOURNALS)

Unit: mm (in)

Grade number	Thickness	Identification color	Remarks
0	1.996 - 1.999 (0.0786 - 0.0787)	Black	Grade and color are the same for upper and lower bearings.
1	1.999 - 2.002 (0.0787 - 0.0788)	Brown	
2	2.002 - 2.005 (0.0788 - 0.0789)	Green	
3	2.005 - 2.008 (0.0789 - 0.0791)	Yellow	
4	2.008 - 2.011 (0.0791 - 0.0792)	Blue	
5	2.011 - 2.014 (0.0792 - 0.0793)	Pink	
6	2.014 - 2.017 (0.0793 - 0.0794)	Purple	
7	2.017 - 2.020 (0.0794 - 0.0795)	White	



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR FOR NISMO RS MODELS]

01	UPR	1.996 - 1.999 (0.0786 - 0.0787)	Black	Grade and color are different between upper and lower bearings.	A
	LWR	1.999 - 2.002 (0.0787 - 0.0788)	Brown		
12	UPR	1.999 - 2.002 (0.0787 - 0.0788)	Brown		EM
	LWR	2.002 - 2.005 (0.0788 - 0.0789)	Green		
23	UPR	2.002 - 2.005 (0.0788 - 0.0789)	Green		C
	LWR	2.005 - 2.008 (0.0789 - 0.0791)	Yellow		
34	UPR	2.005 - 2.008 (0.0789 - 0.0791)	Yellow		D
	LWR	2.008 - 2.011 (0.0791 - 0.0792)	Blue		
45	UPR	2.008 - 2.011 (0.0791 - 0.0792)	Blue		E
	LWR	2.011 - 2.014 (0.0792 - 0.0793)	Pink		
56	UPR	2.011 - 2.014 (0.0792 - 0.0793)	Pink		F
	LWR	2.014 - 2.017 (0.0793 - 0.0794)	Purple		
67	UPR	2.014 - 2.017 (0.0793 - 0.0794)	Purple		G
	LWR	2.017 - 2.020 (0.0794 - 0.0795)	White		

## UNDERSIZE TABLE

Unit: mm (in)

Items	Thickness	Main journal diameter
US 0.25 (0.0098)	2.126 - 2.134 (0.0837 - 0.0840)	Grind so that bearing clearance is the specified value.

## MAIN BEARING OIL CLEARANCE

Unit: mm (in)

Main bearing oil clearance	Standard	No. 1, 4 and 5	0.024 - 0.034 (0.0009 - 0.0013)
		No. 2 and 3	0.012 - 0.022 (0.0005 - 0.0009)
	Limit		0.065 (0.0026)

## PRECAUTION

### PRECAUTIONS

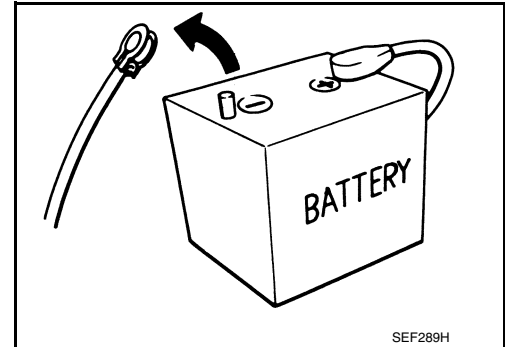
#### Precautions for Removing Battery Terminal

INFOID:0000000012958958

When disconnecting the battery terminal, pay attention to the following.

- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.
- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:

D4D engine	: 20 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		
V9X engine	: 4 minutes		
YD25DDTi	: 2 minutes		



#### NOTE:

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

#### 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.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

#### NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

#### NOTE:

The removal of 12V battery may cause a DTC detection error.

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

INFOID:0000000012197326

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted.

Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

#### WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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 "SRS AIR BAG".

## PRECAUTIONS

< PRECAUTION >

[MR EXCEPT FOR NISMO RS MODELS]

- **Never 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:**

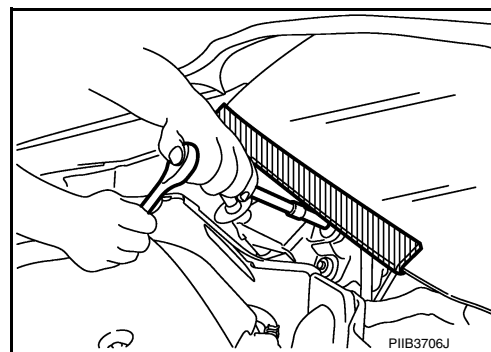
Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never 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 or batteries, and wait at least 3 minutes before performing any service.

### Precaution for Procedure without Cowl Top Cover

INFOID:0000000012197327

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



### Precaution Necessary for Steering Wheel Rotation after Battery Disconnect

INFOID:0000000012197329

#### **NOTE:**

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-II to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

This vehicle is equipped with a push-button ignition switch and a steering lock unit.

If the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the battery disconnected or discharged, 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. Carry the Intelligent Key or insert it to the key slot and turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT-II.

## PRECAUTIONS

< PRECAUTION >

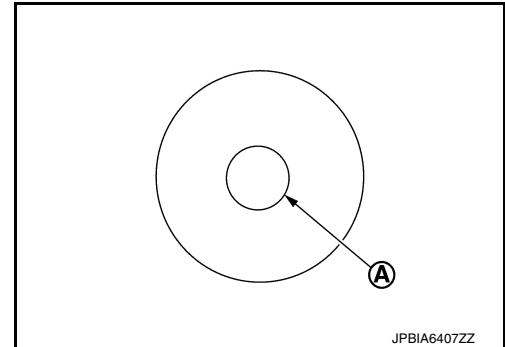
[MR EXCEPT FOR NISMO RS MODELS]

### Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves

INFOID:000000012197330

Handling and disposal of sodium-filled exhaust valves requires special care and consideration. Under conditions such as breakage with subsequent contact with water, metal sodium which lines the inner portion of exhaust valve will react violently, forming sodium hydroxide and hydrogen which may result in an explosion. Sodium-filled exhaust valve is identified on the top of its stem as shown in illustration.

Identification mark of sodium-filled exhaust valve A : B1A



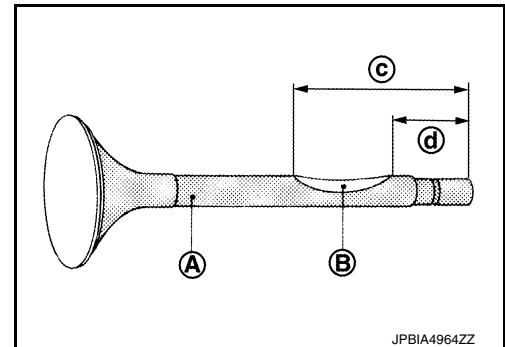
### DEALER DISPOSAL INSTRUCTIONS

#### CAUTION:

- Use approved shatter-resistant eye protection when performing this procedure.
- Perform this and all subsequent disposal work procedures in an open room, away from flammable liquids. Keep a fire extinguisher, rated at least 10 ABC, in close proximity to the work area.
- Be sure to wear rubber gloves when performing the following operations.
- Make sure the resultant (high alkalinity) waste water does not contact your skin. If the waste water does contact you, wash the contacted area immediately with large quantities of water.
- Dealers should check their respective state and local regulations concerning any chemical treatment or waste water discharge permits which may be required to dispose of the resultant (high alkalinity) waste water.

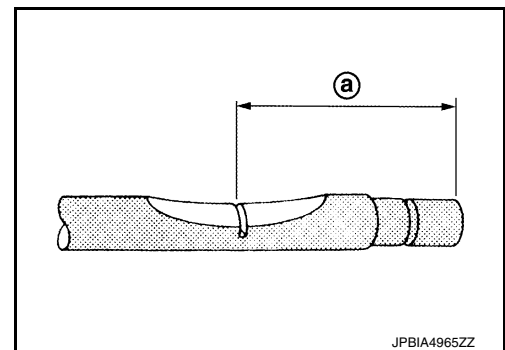
1. Clamp valve stem in a vice.
2. The valve has a specially-hardened surface. To cut through it, first remove a half-round section, approximately 30 mm (1.18 in) long using air-powered grinder until black color is removed and silver color appears.

- A : Black color  
B : Silver color  
c : 47 mm (1.85 in)  
d : 17 mm (0.67 in)



3. Use hacksaw to cut through approximately half the diameter of valve stem. Make the serration at a point 40 mm (1.57 in) from the end of valve stem.

- a : 32 mm (1.26 in)

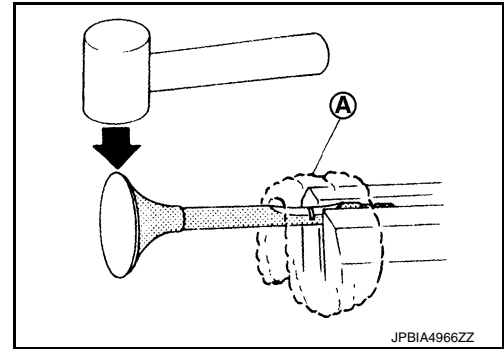


## PRECAUTIONS

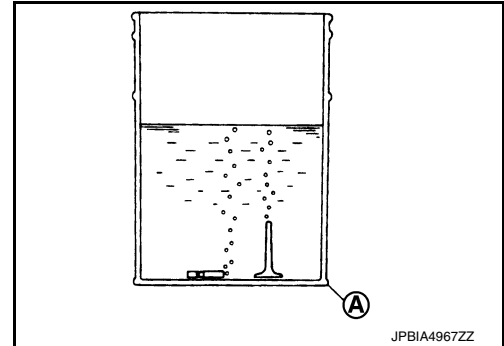
< PRECAUTION >

[MR EXCEPT FOR NISMO RS MODELS]

4. Cover the serrated end of the valve with a large shop towel (A). Strike the valve face end with a hammer, separating it into two pieces.
5. Fill a bucket (such as a 20 ℓ oil can) with at least 10 ℓ (2-1/4 Imp gal) of water. Carefully place the already cut (serrated) valves into the water one-at-a-time using a set of large tweezers and quickly move away at least 2.7 m (9 ft).



6. The valves should be placed in a standing position as shown in the illustration to allow complete reaction. After the bubbling action has subsided, additional valves can be placed into the bucket allowing each subsequent chemical reaction to subside. However, no more than 8 valves should be placed in the same 10 ℓ (2-1/4 Imp gal) amount of water. The complete chemical reaction may take as long as 4 to 5 hours. Remove the valves using a set of large tweezers after the chemical reaction has stopped. Afterwards, valves can be disposed as ordinary scrap.



A : Bucket (Such as 20 ℓ oil can)

### Precaution for Handling High Pressure Fuel System

INFOID:000000012197331

- High pressure fuel system components are between high pressure fuel pump and fuel injector.
- Always release fuel pressure and never start the engine when performing removal and installation.
- When removing or installing parts without releasing fuel pressure, fuel may be splashed and, if fuel contacts skin or eyes, it may cause inflammation.

### Precautions For Engine Service

INFOID:000000012197332

#### 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.

#### REMOVAL AND DISASSEMBLY

- When instructed to use SST, use specified tools. Always be careful to work safely, avoid forceful or uninstructed operations.
- Exercise maximum care to avoid damage to mating or sliding surfaces.
- Dowel pins are used for several parts alignment. When replacing and reassembling parts with dowel pins, check that dowel pins are installed in the original position.
- Must cover openings of engine system with a tape or equivalent, to seal out foreign materials.
- Mark and arrange disassembly parts in an organized way for easy troubleshooting and reassembly.
- When loosening nuts and bolts, as a basic rule, start with the one furthest outside, then the one diagonally opposite, and so on. If the order of loosening is specified, do exactly as specified. Power tools may be used in the step.

#### ASSEMBLY AND INSTALLATION

## PRECAUTIONS

< PRECAUTION >

[MR EXCEPT FOR NISMO RS MODELS]

- Use torque wrench to tighten bolts or nuts to specification.
- When tightening nuts and bolts, as a basic rule, equally tighten in several different steps starting with the ones in center, then ones on inside and outside diagonally in this order. If the order of tightening is specified, do exactly as specified.
- Replace with new gasket, packing, oil seal or O-ring.
- Thoroughly wash, clean, and air-blow each part. Carefully check engine oil or engine coolant passages for any restriction and blockage.
- Avoid damaging sliding or mating surfaces. Completely remove foreign materials such as cloth lint or dust. Before assembly, oil sliding surfaces well.
- After disassembling, or exposing any internal engine parts, change engine oil and replace oil filter with a new one.
- Release air within route when refilling after draining engine coolant.
- After repairing, start the engine and increase engine speed to check engine coolant, fuel, engine oil, and exhaust gases for leakage.

### Parts Requiring Angle Tightening

INFOID:0000000012197333

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

### Liquid Gasket

INFOID:0000000012197334

#### REMOVAL OF LIQUID GASKET SEALING

- After removing mounting nuts and bolts, separate the mating surface using the seal cutter [SST: KV10111100 (J-37228)] (A) and remove old liquid gasket sealing.

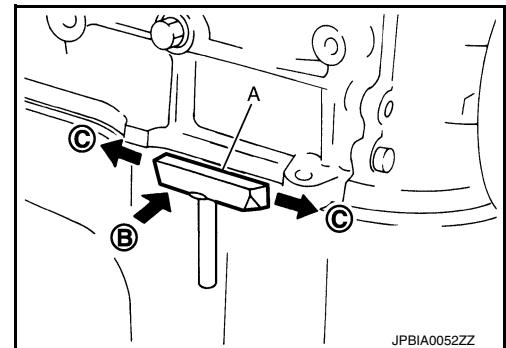
#### **CAUTION:**

**Never damage the mating surfaces.**

- Tap the seal cutter [SST: KV10111100 (J-37228)] to insert it (B), and then slide it (C) by tapping on the side as shown in the figure.
- In areas where the seal cutter [SST: KV10111100 (J-37228)] is difficult to use, lightly tap the parts using a plastic hammer to remove it.

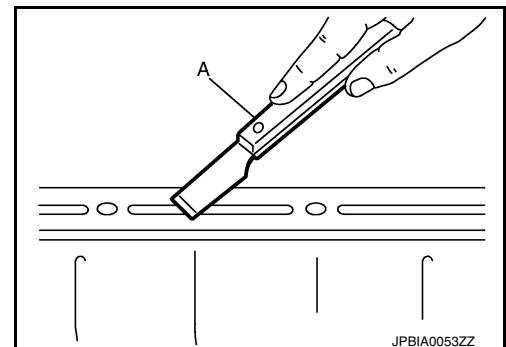
#### **CAUTION:**

**If for some unavoidable reason tool such as a screwdriver is used, never damage the mating surfaces.**



#### LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper (A), 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.

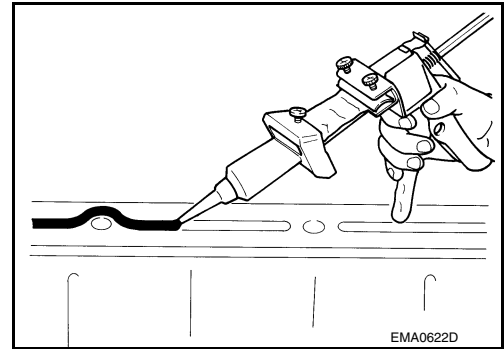


# PRECAUTIONS

< PRECAUTION >

[MR EXCEPT FOR NISMO RS MODELS]

3. Attach liquid gasket tube to the tube presser (commercial service tool).  
**Use Genuine Liquid Gasket or equivalent.**
4. Apply liquid gasket without gaps to the specified location according to the specified dimensions.
  - If there is a groove for liquid gasket application, apply liquid gasket to the groove.



- As for bolt holes ②, normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Check to read the text of this manual.

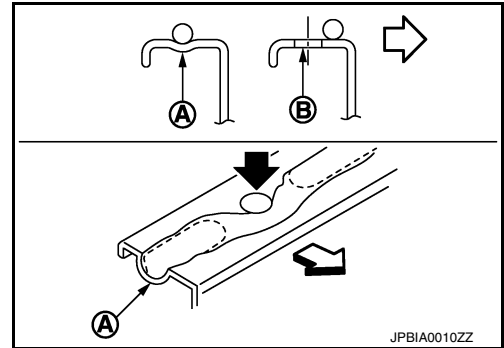
① : Groove

⇐ : Inside

- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten mounting bolts or nuts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.

## CAUTION:

If there are specific instructions in this manual, observe them.



# PREPARATION

< PREPARATION >

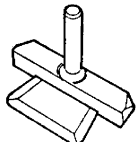
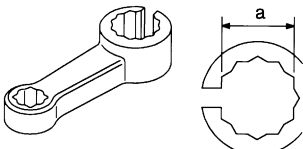
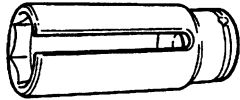
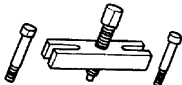
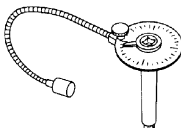
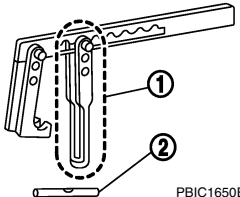
[MR EXCEPT FOR NISMO RS MODELS]

## PREPARATION

### PREPARATION

#### Special Service Tools

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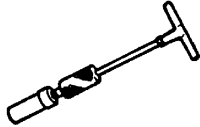
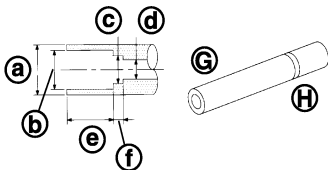
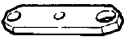
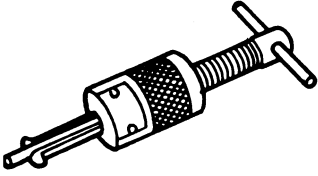
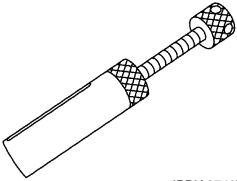
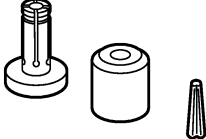
Tool number (TechMate No.) Tool name		Description
KV10111100 (J-37228) Seal cutter	 ZZA0013D	Removing parts with liquid gasket applied
KV10114400 (J-38365) Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensor 2 (AWD models) <b>a: For 22 mm (0.87 in) width hexagon nut</b>
KV10113700 or KV10117100 (J-3647-A) Heated oxygen sensor socket	 ZZA1007D	Loosening or tightening air fuel ratio sensor 1 <b>For 22 mm (0.87 in) width hexagon nut</b>
KV11103000 ( — ) Pulley puller	 ZZA0010D	Removing crankshaft pulley
KV10112100 (BT8653-A) Angle wrench	 ZZA0120D	Checking tightening angle
KV10116200 (J-26336-A) Valve spring compressor 1. KV10115900 (J-26336-20) Attachment 2. KV10109220 ( — ) Adapter	 PBIC1650E	Disassembling and assembling valve mechanism Part (1) is a component of KV10116200 (J-26336-A), but Part (2) is not so.



# PREPARATION

< PREPARATION >

[MR EXCEPT FOR NISMO RS MODELS]

Tool number (TechMate No.) Tool name		Description	
KV10107902 (J-38959) Valve oil seal puller	 ZZA0015D	Removing valve oil seal	EM
KV10115600 (J-38958) Valve oil seal drift	 JPBIA0396ZZ	Installing valve oil seal Use side A (G). a: 20 (0.79) dia. d: 8 (0.31) dia. b: 13 (0.51) dia. e: 10.7 (0.421) c: 10.3 (0.406) dia. f: 5 (0.20) H: Side B Unit: mm (in)	
KV11105210 (J-44716) Stopper plate	 ZZA0009D	Removing and installing crankshaft pulley	
ST16610001 (J-23907) Pilot bushing puller	 ZZA0046D	Removing pilot converter	
KV10119600 ( — ) Injector remover	 JPBIA3746ZZ	Removing and installing fuel injector	
KV101197S0 ( — ) Injector seal drift set	 JPBIA3281ZZ	Installing fuel injector seal	

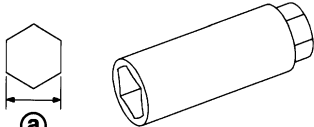
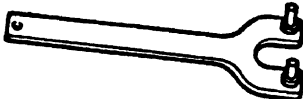
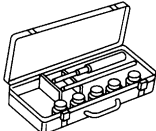
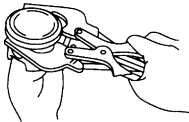
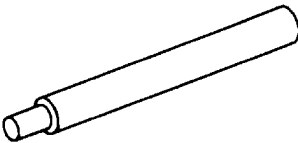
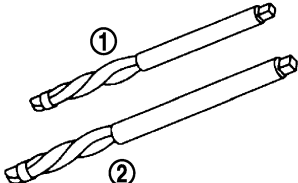
# PREPARATION

< PREPARATION >

[MR EXCEPT FOR NISMO RS MODELS]

## Commercial Service Tools

INFOID:000000012197336

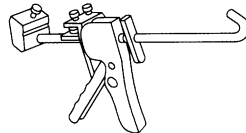
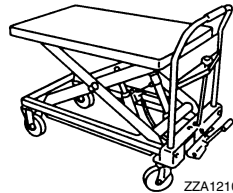
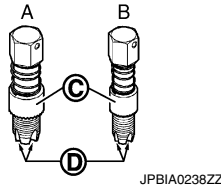
(TechMate No.) Tool name	Description
( — ) Spark plug wrench  JPBIA0399ZZ	Removing and installing spark plug a: 14 mm (0.55 in)
( — ) Pulley holder  ZZA1010D	Crankshaft pulley removing and installing
( — ) Valve seat cutter set  S-NT048	Finishing valve seat dimensions
( — ) Piston ring expander  S-NT030	Removing and installing piston ring
( — ) Valve guide drift  PBIC4012E	Removing and installing valve guide
( — ) Valve guide reamer  PBIC4013E	1: Reaming valve guide inner hole 2: Reaming hole for oversize valve guide

# PREPARATION

< PREPARATION >

[MR EXCEPT FOR NISMO RS MODELS]

(TechMate No.) Tool name	Description	A
(J-43897-18) (J-43897-12) Oxygen sensor thread cleaner	Reconditioning the exhaust system threads before installing a new air fuel ratio sensor (Use with anti-seize lubricant shown below.) <b>A: J-43897-18 [18 mm (0.71 in) dia.] for zirconia heated oxygen sensor</b> <b>B: J-43897-12 [12 mm (0.47 in) dia.] for titania heated oxygen sensor</b> C: Mating surface shave cylinder D: Flutes	EM
( — ) Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads	C
( — ) Manual lift table caddy	Removing and installing engine	D
( — ) Tube presser	Pressing the tube of liquid gasket	E



## Service Parts

INFOID:000000012197337

Name	Description	L
Engine slinger 10005 4BB0A: Front 10006 BV80A: Rear	Supporting and hoisting engine	M
Engine slinger mounting bolt : Front (two bolts), rear (two bolts)		N
Dowel pin 12313 ED000	Positioning crankshaft and signal plate	O

## SYSTEM DESCRIPTION

### COMPONENT PARTS

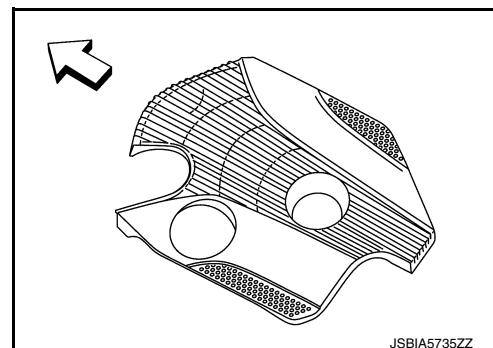
#### Engine Cover

INFOID:0000000012197338

- A plastic cover is used to improve the appearance of the engine compartment.

⇐ : Engine front

- Slits are formed at the location where the air inlet tube passes through for improving heat radiating performance.

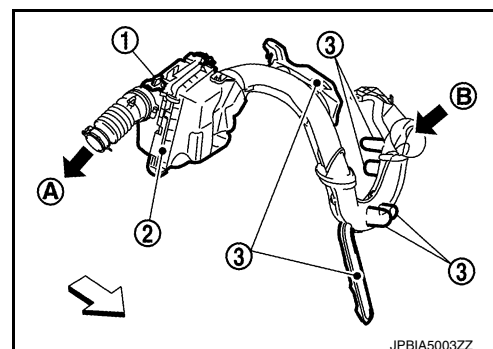


#### Air Cleaner and Air Duct

INFOID:0000000012197339

- A soft mounting with grommets is used to mount the air cleaner, air duct, and resonator onto the vehicle body.

- 1 : Mass air flow sensor
- 2 : Air cleaner case
- 3 : Resonator
- A : To exhaust manifold and turbocharger assembly
- B : Outside air
- ⇐ : Vehicle front



- For reducing intake noise, six resonators are installed to the air cleaner element, front side.

#### Electric Throttle Control Actuator

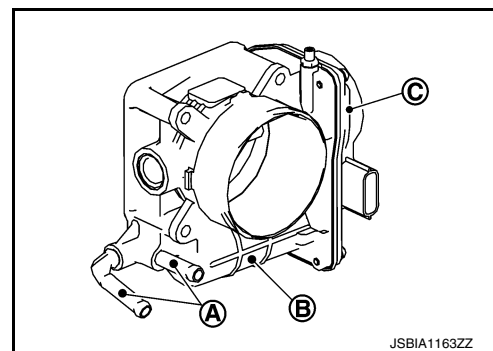
INFOID:0000000012197340

- An electric throttle control actuator is used which drives the throttle valves by using a throttle control motor according to control signals from the ECM (engine control module).

- A : Hot water piping
- B : Throttle control motor
- C : Throttle position sensor

- The electric throttle control actuator controls the position of the throttle valve for optimizing the amount of air intake according to driving conditions.
- Hot water piping is installed to prevent the throttle valve from freezing under extreme cold conditions.

For information about the electric throttle control actuator mechanisms and control, refer to [EC-606, "Electric Throttle Control Actuator"](#).



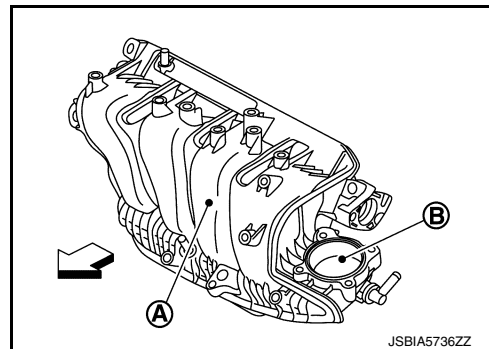
## Intake Manifold

INFOID:0000000012197341

- A plastic intake manifold is used to reduce weight, reduce the intake air temperature, and improve the roughness of the port inner surface and otherwise reduce air resistance.

- A : Intake manifold  
 B : Electric throttle control actuator mounting part  
 ⇐ : Vehicle front

- The electric throttle control actuator is mounted facing downward (down draft) to allow a more compact route for the intake piping.

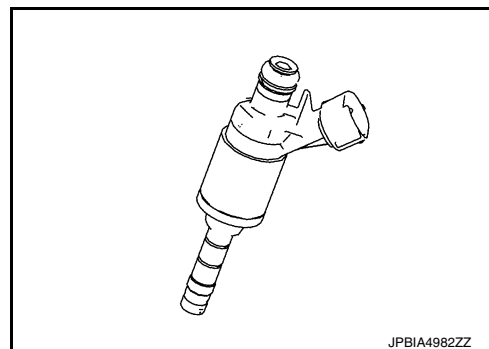


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## Fuel Injector

INFOID:0000000012197342

High-pressure fuel injectors that can inject highly pressurized fuel in an extremely short time are used. The injector driver is inside the ECM and drives the fuel injectors by means of high voltage (maximum approximately 65 V).



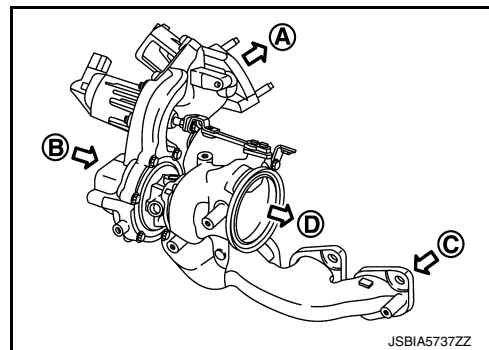
JPBIA4982ZZ

## Exhaust Manifold and Turbocharger Assembly

INFOID:0000000012197343

- A turbocharger assembly that is integrated with the exhaust manifold is used. This allows a larger exhaust manifold pipe diameter, shortens the pipe length, and improves exhaust efficiency and supercharging efficiency.
- A turbocharger boost control actuator and turbocharger bypass control valve are used for improving intake efficiency and output performance.

- A : To charge air cooler  
 B : From air cleaner  
 C : From cylinder head  
 D : To catalyst converter



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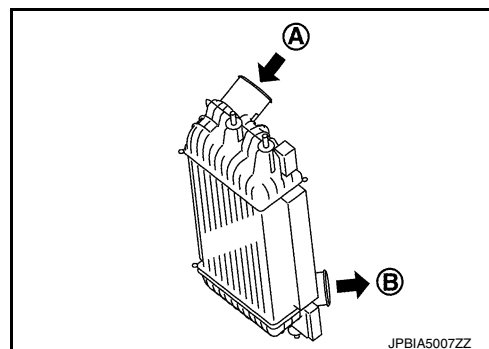
## Charge air cooler

INFOID:0000000012197344

- The air-cooled charge air cooler is an inner fin type with excellent heat radiating performance.

- A : From turbocharger  
 B : To electric throttle control actuator

- The structure mounts the charge air cooler on the vehicle front side.



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## Catalyst Converter

INFOID:0000000012197345

- Three-way catalysts are used in two locations: at the supercharger exit and under the floor.

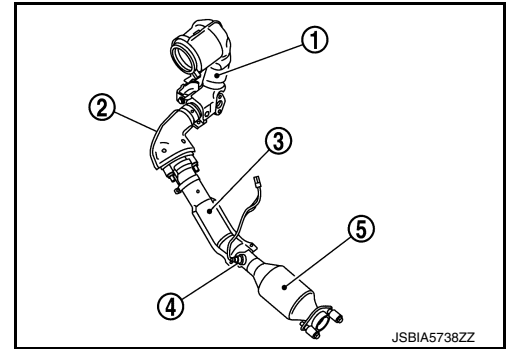
# COMPONENT PARTS

## < SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

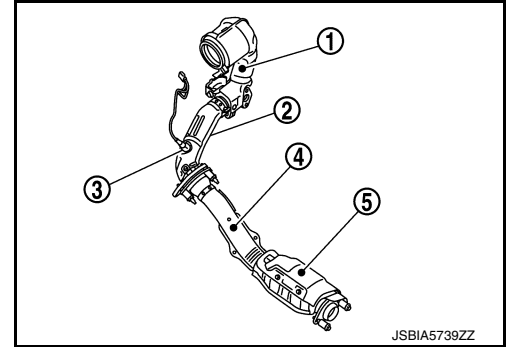
### - 2WD

- 1 : Catalyst converter (supercharger exit)
- 2 : Catalyst converter adapter
- 3 : Front tube
- 4 : Heated oxygen sensor 2
- 5 : Three-way catalyst converter (under floor)



### - AWD

- 1 : Catalyst converter (supercharger exit)
- 2 : Catalyst converter adapter
- 3 : Heated oxygen sensor 2
- 4 : Front tube
- 5 : Three-way catalyst converter (under floor)



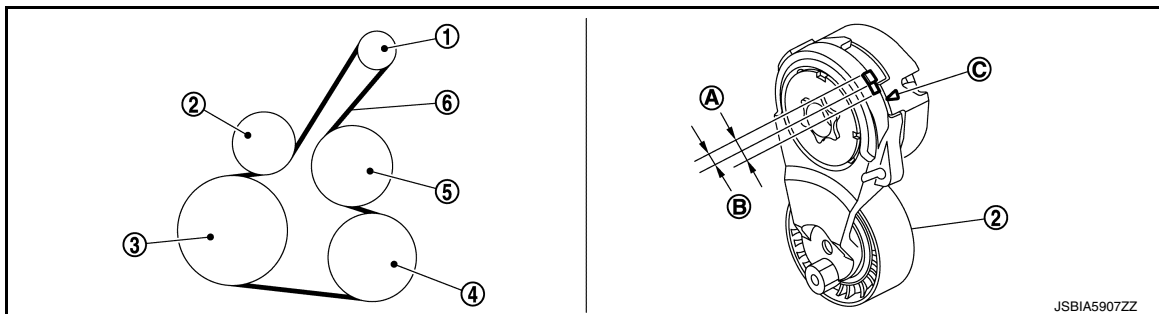
## SPECIFICATION

Installation position	Supercharger exit	Underfloor
Structure	Monolithic (ceramic)	Monolithic (ceramic)
Capacity liters (US qt, Imp qt)	0.92 (1, 6/8)	1.20 (1-2/8, 1)
Catalyst precious metal types	Palladium, rhodium	Palladium, rhodium

## Drive Belt

INFOID:0000000012197346

- A serpentine belt \* that drives all auxiliary devices with a single belt is used.
- \*Serpentine
- The drive belt auto tensioner is installed between the crank pulley and alternator.



- 1. Alternator
- 2. Drive belt auto tensioner
- 3. Crankshaft pulley
- 4. A/C compressor
- 5. Water pump
- 6. Drive belt
- A. Usable range
- B. Range for installation of new drive belt
- C. Indicator

## SPECIFICATION

- The belt used is a V-ribbed 6PK belt.
- The drive belt auto tensioner mechanism contains a coil spring and uses the idler pulley to maintain appropriate belt tension at all times, making regular belt tension adjustment unnecessary.

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

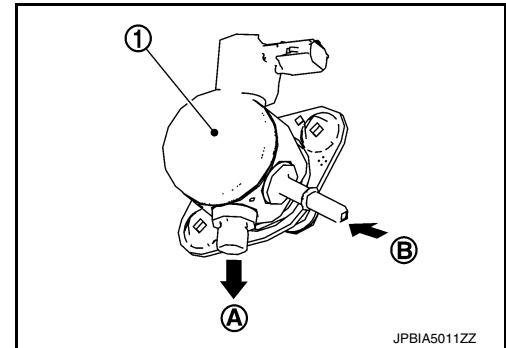
## High-pressure Fuel Pump

INFOID:000000012197347

- A single-plunger type compact high-pressure fuel pump is used.
- The high-pressure fuel pump (1) is installed to the camshaft bracket rear, and is driven by a special cam that is installed on the camshaft (EXH).

- A : To fuel rail  
B : From low-pressure fuel pump

For details of operation and control, refer to [EC-608. "High Pressure Fuel Pump"](#).



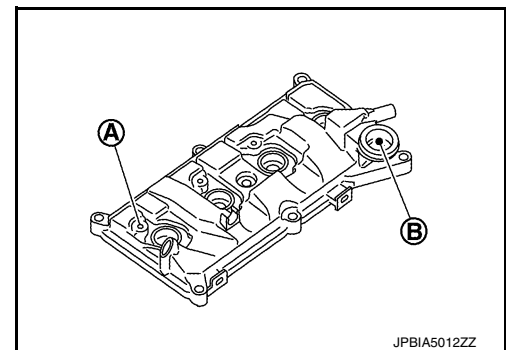
## Rocker Cover

INFOID:000000012197348

- A plastic rocker cover is used.

- A : Ignition coil mounting screw  
B : Oil filler cap installation part

- The rocker cover includes a part where the oil filler cap is installed and a screw for mounting the ignition coil.

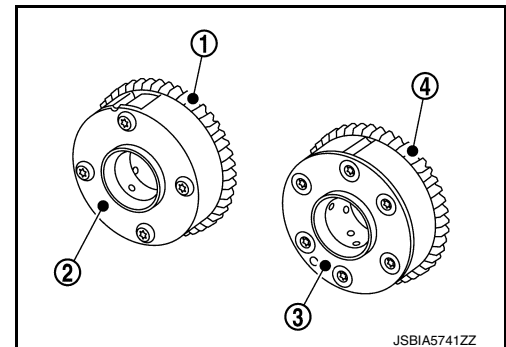


## Camshaft Sprocket

INFOID:000000012197349

- A sintered alloy sprocket is used for each sprocket. The sprocket teeth are induction-hardened for improved wear resistance.
- The camshaft sprockets used (both INT and EXH) are equipped with integrated vane-type valve timing controller.

- 1 : Camshaft sprocket (EXH)  
2 : Exhaust valve timing controller  
3 : Intake valve timing controller  
4 : Camshaft sprocket (INT)



## Camshaft

INFOID:000000012197350

### CAMSHAFT

Description

# COMPONENT PARTS

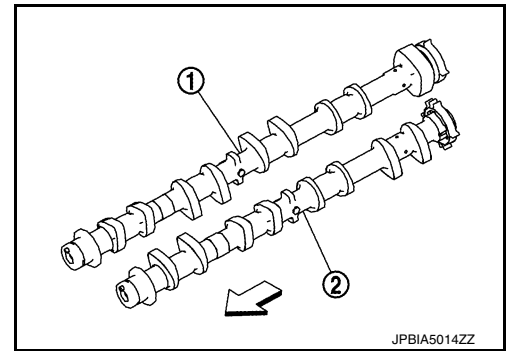
## < SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

- A special cast-iron camshaft is used.

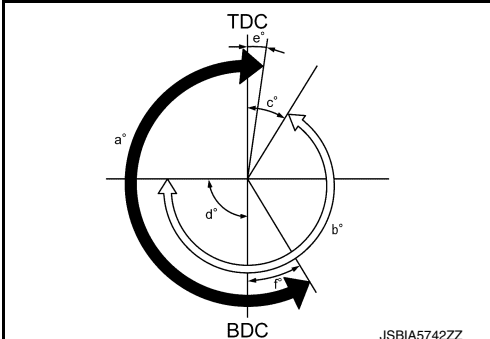
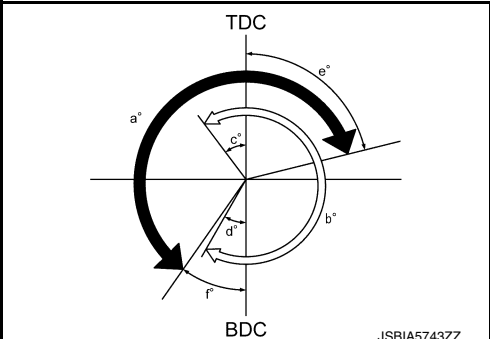
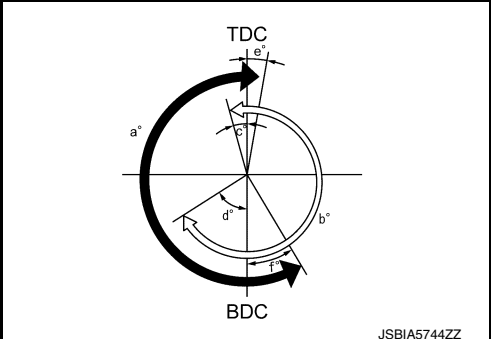
- 1 : Camshaft (EXH)
- 2 : Camshaft (INT)
- ⇐ : Engine front

- The cam lobe is processed with a nano-finish to reduce friction.
- A signal plate is installed at the rear end of each camshaft.



## SPECIFICATION

- The cam profile delivers the optimal characteristics with a good balance of engine output performance, drivability, fuel economy, and other performance.

Valve timing ⇐: Intake valve ⇐: Exhaust valve	VTC Minimum phasing (Mechanical)		VTC Maximum phasing (Mechanical)		Engine start (Mechanical)	
						
	a	b	c	d	e	f
	EXH valve opening angle	INT valve opening angle	INT open	INT closed	EXH closed	EXH open
	VTC Minimum phasing (Mechanical)* <sup>1</sup>		ATDC34	ABDC90	ATDC3	BBDC29
VTC Maximum phasing (Mechanical)* <sup>2</sup>	212	236	BTDC31	ABDC25	ATDC63	ABDC31
Engine start (Mechanical)* <sup>3</sup>			BTDC2	ABDC54	ATDC3	BBDC29

- \*1: Idling at coolant temperature of 60°C or more
- \*2: At maximum operation
- \*3: At coolant temperature of 60°C or less, or at engine start
- A valve timing control (VTC) system\* is used that can change the camshaft phase as needed according to the hydraulic pressure while maintaining a constant camshaft operating angle.  
For control, refer to [EC-639, "INTAKE VALVE TIMING CONTROL : System Description"](#) (exhaust valve timing control), [EC-642, "EXHAUST VALVE TIMING CONTROL : System Description"](#) (intake valve timing control).

\*: Valve timing control (VTC) system



## COMPONENT PARTS

### < SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

The valve timing can be controlled continually to the desired position within the movable range. This allows optimal valve timing control according to the engine speed and load, greatly improving low and medium-speed torque.

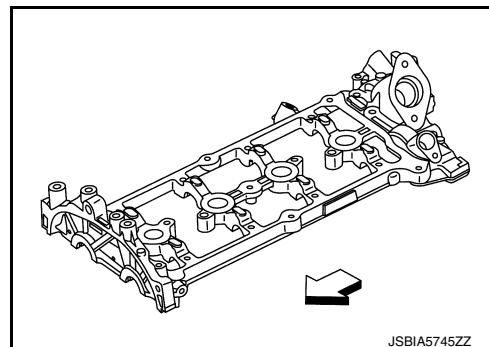
Location		Intake	Exhaust
Valve lift	[mm(in)]	8.90 (0.35)	7.20 (0.28)
Overlap	(deg)	(-31) – (+94)	

### CAMSHAFT BRACKET

- Made of die-cast aluminum, and includes five journal supports for each camshaft.

↶ : Engine front

- Integrates the camshaft bracket to reduce the number of parts.



INFOID:0000000012197351

### Valve

#### DESCRIPTION

A set of four valves is used for each cylinder: two intake valves and two exhaust valves.

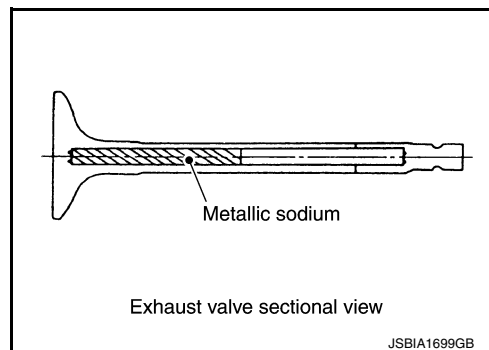
#### VALVE

##### Description

Valves containing metallic sodium are used for the exhaust valves. The valve stem is hollow and contains metallic sodium which has high specific heat (absorbs a large amount of heat) and liquifies at the temperatures at which the engine is running. This lowers the valve temperature and improves intake efficiency.

##### NOTE:

With a valve containing metallic sodium, the opening and closing motion of the valve agitates the liquefied metallic sodium. Heat from the combustion chamber and exhaust port is released to the valve guide, lowering the valve head temperature.



##### Specification

Location		Intake	Exhaust
Valve	Head diameter	[mm(in)]	$\phi 31.2$ (1.22)
	Stem diameter	[mm(in)]	$\phi 5.5$ (0.21)

### PRECAUTIONS FOR HANDLING VALVES CONTAINING METALLIC SODIUM

#### **WARNING:**

- Because metallic sodium is a strong alkali and there is the danger of violent chemical reactions, work carefully and use sufficient caution when handling or disposing of it. (Contact with the eye may cause blindness. Contact with the skin may cause burns. There is also the risk of fire caused by chemical reaction.)  
The metallic sodium contained in the valve is safe as long as it is not exposed to air.
- When scrapping a valve, or when a valve is damaged, remove the valve, process (neutralize) the metallic sodium, and process the wastewater.
- Never deliberately break a valve or remove the metallic sodium.

### VALVE LIFTER

# COMPONENT PARTS

## < SYSTEM DESCRIPTION >

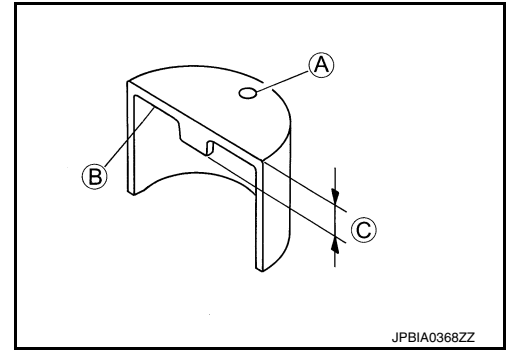
[MR EXCEPT FOR NISMO RS MODELS]

### Description

- A thin valve lifter is used.

- A : Oil supply hole
- B : Stamp mark
- C : Thickness of valve lifter top surface

- Because a material with high hardness and high wear resistance is used, regular maintenance of the valve clearance is not necessary.
- To adjust the valve clearance, change the valve lifter.
- The thickness of the valve lifter top surface is set in 0.02 mm increments. The thickness is identified by the 3-digit number (stamp) on the inside of the valve lifter.

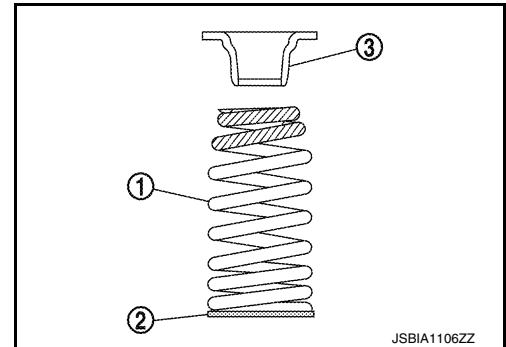


### Specification

Location		Intake	Exhaust
Valve lifter	Top surface thickness [mm(in)]	3.00 – 3.50 (0.11 - 0.138)	
	Number of settings	26 types	

### VALVE SPRING, VALVE SPRING SEAT, VALVE RETAINER

- A single beehive spring is used for the valve spring (1) For reducing friction and preventing surging.
- For improving assembly workability, the valve spring seat (2) is press-fit into the valve spring. (An assembly is set for the spring and seat.)
- The valve springs for the intake and exhaust valves are different. Identifier colors are used (hatched part). The intake valve springs are white, and the exhaust valve springs are yellow.
- Carbon steel is used for the valve spring retainer (3) to improve durability and heat resistance. The smaller size made possible by use of the beehive spring also reduces the weight.



### VALVE OIL SEAL

A type with a press-fit metal ring is used.

### Cylinder Head

INFOID:0000000012197352

### CYLINDER HEAD

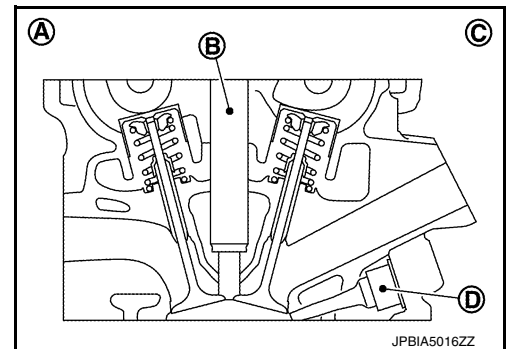
- The material is aluminum alloy, and a cross-flow V 4-valve DOHC is used for the intake valve layout.

- A : Exhaust side
- B : Spark plug mounting part
- C : Intake side
- D : Fuel injector mounting part

- The combustion chamber is a compact pent-roof type using a V arrangement with a smaller valve holding angle.
- Siamese ports are used for the intake port and exhaust port.
- The fuel injector installation part is placed on the bottom of the intake port, and injects fuel directly into the cylinder.
- The spark plugs are located at the centers of the combustion chambers to increase combustion efficiency.

#### NOTE:

- Cross-flow: Method of installing the intake and exhaust manifold so that it is split left/right with respect to the cylinder head.
- Pent-roof combustion chamber: Combustion chamber with an angled roof
- Siamese port: Two ports joined together



# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

## CYLINDER HEAD BOLT

- TORX-head (E18) M11×1.25 size flange bolts are used.
- The bolt tightening method is double tightening in six stages and angle tightening (plastic region tightening) to ensure even and stable tightening axial force.

## CYLINDER HEAD GASKET

- A three-layer metal structure on a stainless steel base is used.
- The gasket thickness is 0.72 mm (when tightened), and the bore is  $\phi 80.7$  mm.

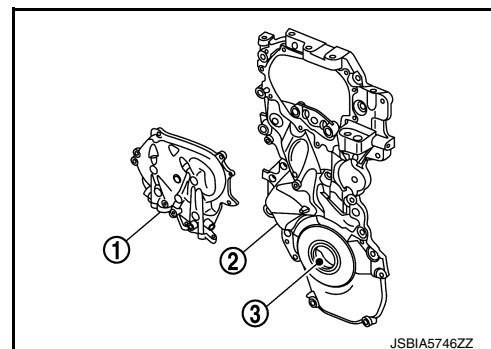
## Front Cover

INFOID:000000012197353

- An aluminum die-cast front cover is used.

- 1 : VTC cover
- 2 : Front cover
- 3 : Front oil seal

- The VTC cover uses a split structure. The VTC cover contains oil channels for the intake and exhaust valve timing controllers.
- It also contains a part for installation of the front oil seal.



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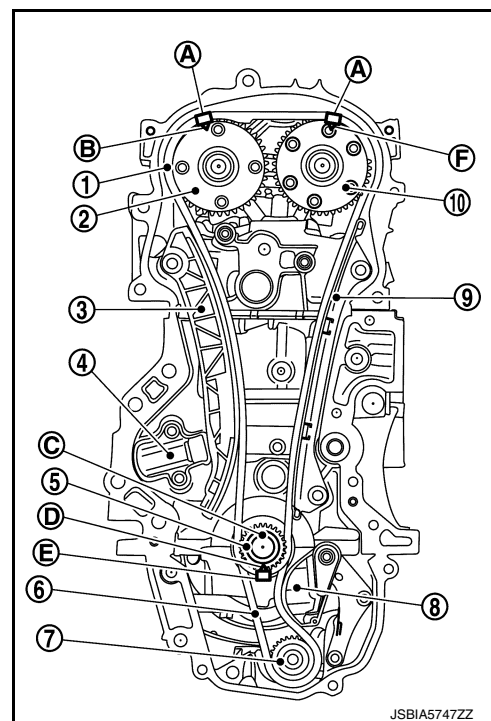
## Timing Chain

INFOID:000000012197354

### DESCRIPTION

- A timing chain which drives the camshaft and an oil pump drive chain are used.

- 1 : Timing chain
- 2 : Camshaft sprocket (EXH side)
- 3 : Timing chain slack guide
- 4 : Chain tensioner (for timing chain)
- 5 : Crankshaft sprocket
- 6 : Oil pump drive chain
- 7 : Oil pump sprocket
- 8 : Chain tensioner (for oil pump drive chain)
- 9 : Timing chain tension guide
- 10 : Camshaft sprocket (INT side)
- A : Matching mark (dark blue link)
- B : Matching mark (outer groove)
- C : Crankshaft key
- D : Matching mark (stamp)
- E : Matching mark (yellow link)
- F : Matching mark (outer groove)



JSBIA5747ZZ

- A small-pitch silent chain is used for both chains.
- Using a small-pitch silent chain allows a smaller sprocket and other changes for a more compact and light-weight camshaft drive system, and also reduces noise.

### Specification

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

For camshaft drive	Camshaft sprocket	No. of teeth	46
	Crankshaft sprocket	No. of teeth	23
	Timing chain	Total No. of links	162
	No. of links between timing marks	Between crankshaft sprocket and camshaft sprocket (INT)	72
Oil pump drive		Between camshaft sprocket (INT) and camshaft sprocket (EXH)	18
	Crankshaft sprocket	No. of teeth	23
	Oil pump sprocket	No. of teeth	23
	Oil pump drive chain	Total No. of links	58

## TIMING CHAIN

- A small-pitch [6.35 mm (0.25 in)] silent chain is used.
- The silent chain reduces the engagement contact angle with the sprocket, and the smaller chain pitch reduces the speed of engagement with the sprocket, reducing chain operating noise.

## CHAIN TENSIONER

- A hydraulic chain tensioner with ratchet mechanism is used.
- The chain tensioner (for timing chain) applies optimal tension to the timing chain via the timing chain slack guide by means of the engine oil pressure and spring force.

## TIMING CHAIN GUIDE

- The timing chain tension guide is installed between the crankshaft sprocket and camshaft sprocket (INT). The timing chain slack guide is installed between the camshaft sprocket (EXH) and crankshaft sprocket. These prevent chain link skipping and reduce noise.
- A plastic shoe is used for each chain guide for reducing friction.

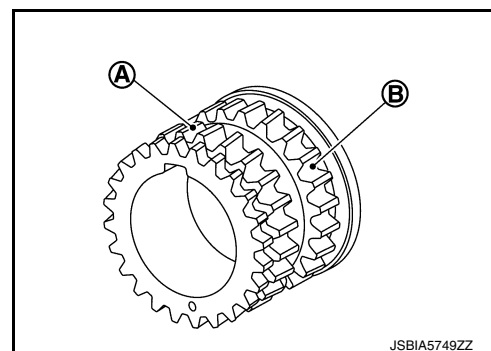
## CRANKSHAFT SPROCKET

- Integrated sintered alloy sprockets for the timing chain and oil pump drive chain are used.

A : Timing chain side

B : Oil pump drive chain side

- Carburizing is applied to all surfaces to improve rigidity and wear resistance.



## OIL PUMP DRIVE CHAIN

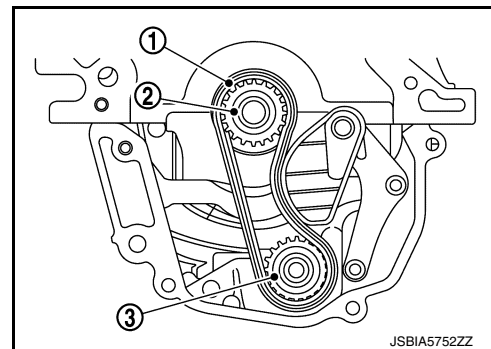
- An oil pump drive chain is used to drive the oil pump.

1 : Oil pump drive chain

2 : Crankshaft sprocket

3 : Oil pump sprocket

- In the same way as the timing chain, a silent chain is used for the oil pump drive chain.
- A chain tensioner which includes a chain guide and coil spring is used.
- The chain tensioner (for oil spring drive chain) is installed between the crankshaft sprocket and oil pump sprocket (slack side).



## Crankshaft Pulley

INFOID:0000000012197355

- A crankshaft pulley with cast-iron torsional damper is used.
- Angle tightening is used for tightening the crankshaft pulley bolts. The pulley has angle marks at 60° intervals for improved workability.

# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

## Crankshaft

INFOID:0000000012197356

### CRANKSHAFT

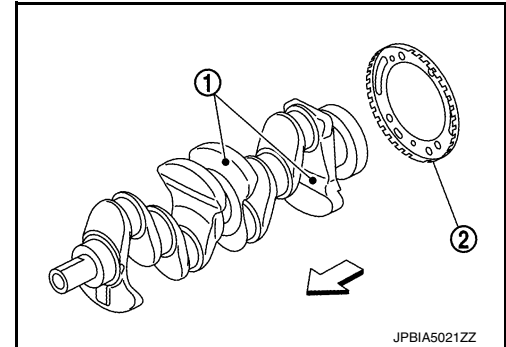
- A forged crankshaft with five journal supports is used.

1 : Counterweight

2 : Signal plate

⇐ : Engine front

- Four counterweights are installed to reduce vibration.
- Fillet rolling provided to the journals and both ends of the pins to reinforce each shaft part.
- A micro finish is applied to the journal and pin surfaces to reduce friction.
- A crankshaft position sensor signal plate is installed on the No. 4 counterweight.



### MAIN BEARING AND MAIN BEARING CAP BOLT

- Five bearing supports are used.
- A selective assembly method is used for the main bearing to ensure correct crank journal clearance.
- The bolts are external TORX (T-type) bolts. Angle tightening is used to tighten the bolts to ensure even and stable tightening axial force.

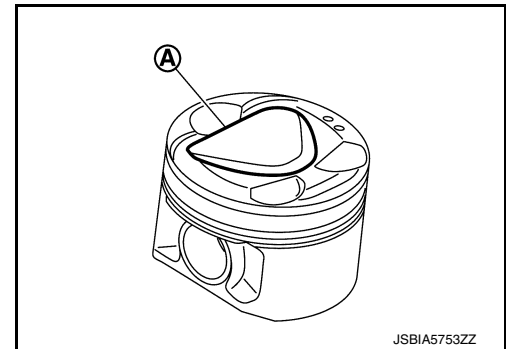
### Piston

INFOID:0000000012197357

- A shallow part (A) is created in the piston top surface. This generates a tumble flow at the layered combustion compression stroke and forms an ignitable mixed layer close to the spark plug.
- A thermal flow type is used to reduce the piston temperature.
- A plastic coating is applied to the piston skirt to reduce friction.
- A full-float method is used for the mating of the piston pin and connecting rod.
- Anodized aluminum treatment is performed for the piston top ring groove to improve durability.
- Three rings are used: a narrow top ring, a second ring, and an oil ring.

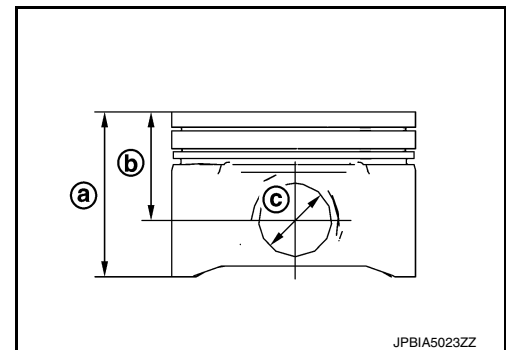
#### NOTE:

- Thermal flow type piston: A piston with only drill holes between the ring land and skirt to facilitate the flow of heat from the top surface of the piston to the skirt.
- Anodized aluminum treatment: Sealing which forms a film by anodic oxidation of aluminum and aluminum alloy to prevent corrosion.
- Tumble flow: Flow that swirls in the vertical direction inside the cylinder.



### SPECIFICATION

Piston	Standard diameter	[mm(in)]	φ79.67 (3.13)
	Total height	a [mm(in)]	53.83 (2.12)
	Compression height	b [mm(in)]	35.33 (1.39)
	Pin hole diameter	c [mm(in)]	φ22 (0.87)
	Material		Aluminum alloy
Piston pin	Outer diameter × Bore × Length	[mm(in)]	φ22 × φ12.5 × 54.5 (0.87, 0.49, 2.14)
	Material		Special carbon steel



### Connecting Rod

INFOID:0000000012197358

- The connecting rod is a high-rigidity fracture-split type.

**CAUTION:**

# COMPONENT PARTS

## < SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

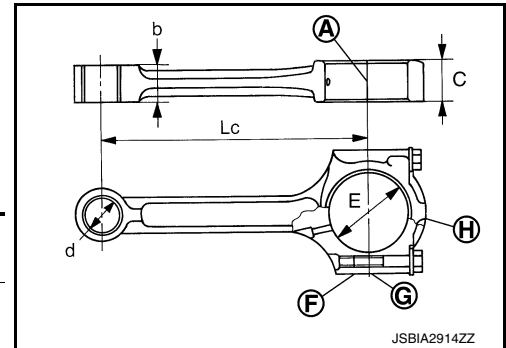
**Never set the connecting rod with its fracture-split surface (unmachined surface) facing downward. Also never allow it to contact with the split-fracture surface for preventing scratches.**

- Angle tightening is used for the connecting rod tightening method for ensuring even and stable tightening axial force.

## SPECIFICATION

- A : Fracture-split surface  
B : Cylinder No  
C : Connecting rod big end diameter grade No  
D : Front mark

Connecting rod	Center distance	Lc [mm(in)]	139.02 (5.47)
	Large end diameter × width	D × B [mm(in)]	φ47 × 20.5 (0.27 × 0.81)
	Small end diameter × width	d × b [mm(in)]	φ22 × 20.5 (0.87 × 0.81)
Connecting rod bearing	Inner diameter	[mm(in)]	φ44 (1.73)
	Bearing width	[mm(in)]	16 (0.63)
Connecting rod bolt	Thread size		M8 × 1.0
	Length under head	[mm(in)]	37.75 (1.49)



## Cylinder Block

INFOID:0000000012197359

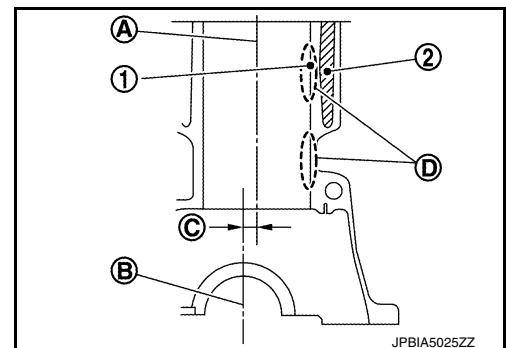
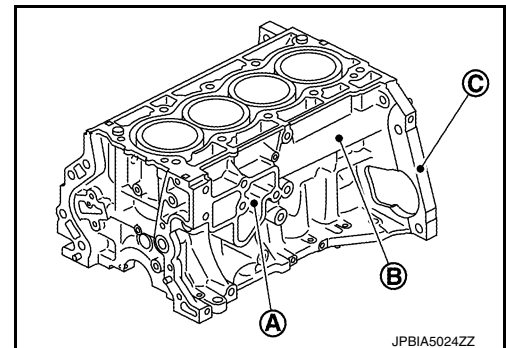
- An aluminum die-cast half-skirt block with mirror bore coating is used.

- A : Cylinder block  
B : Water piping  
C : Stamped location of engine model No.

- The water channel on the cylinder block left side is integrated with the block to allow a more compact engine.
- The insides of the cylinder bores are coated with a thin iron film and the cylinder liners are eliminated for reducing weight and improving cooling performance.
- The centers of the cylinder and crankshaft are offset for reducing friction.

- 1 : Mirror bore coating  
2 : Water jacket  
A : Cylinder center  
B : Crankshaft center  
C : Offset  
D : Approximately the same temperature

- A shallower water jacket (shallower base) is used around the cylinder bore to reduce heat loss to the coolant and maintain an even liner temperature.
- Projecting shapes are used on the cylinder liner periphery for improving aluminum adhesion for reducing bore deformation and improving cooling performance by increasing the surface area.



## COMPONENT PARTS

< SYSTEM DESCRIPTION >

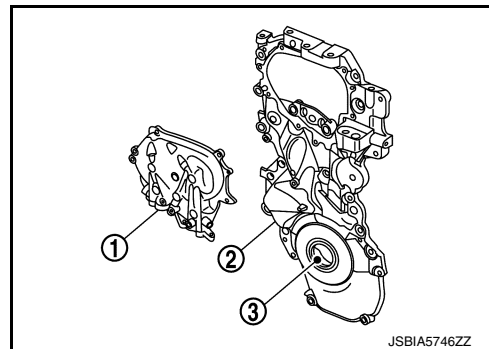
[MR EXCEPT FOR NISMO RS MODELS]

### Front Oil Seal

INFOID:0000000012197360

A structure is used in which the front oil seal is applied to the front cover.

- 1 : VTC cover
- 2 : Front cover
- 3 : Front oil seal



### Rear Oil Seal

INFOID:0000000012197361

A structure is used in which the rear oil seal is applied directly between the cylinder block and oil pan (upper).

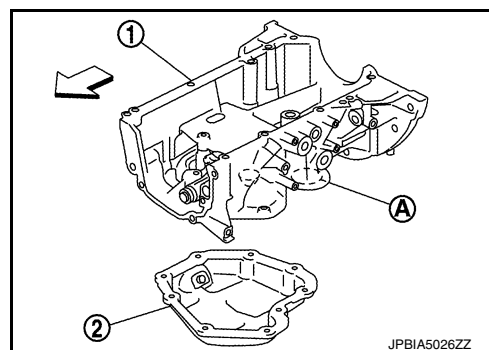
### Oil Pan

INFOID:0000000012197362

- A split oil pan combining a die-cast aluminum pan and sheet metal pan is used.

- 1 : Oil pan (upper)
- 2 : Oil pan (lower)
- A : Oil filter mounting part
- ↔ : Engine front

- An oil gallery is provided on the oil pan (upper), and the oil filter is mounted directly.



### Engine Mount

INFOID:0000000012197363

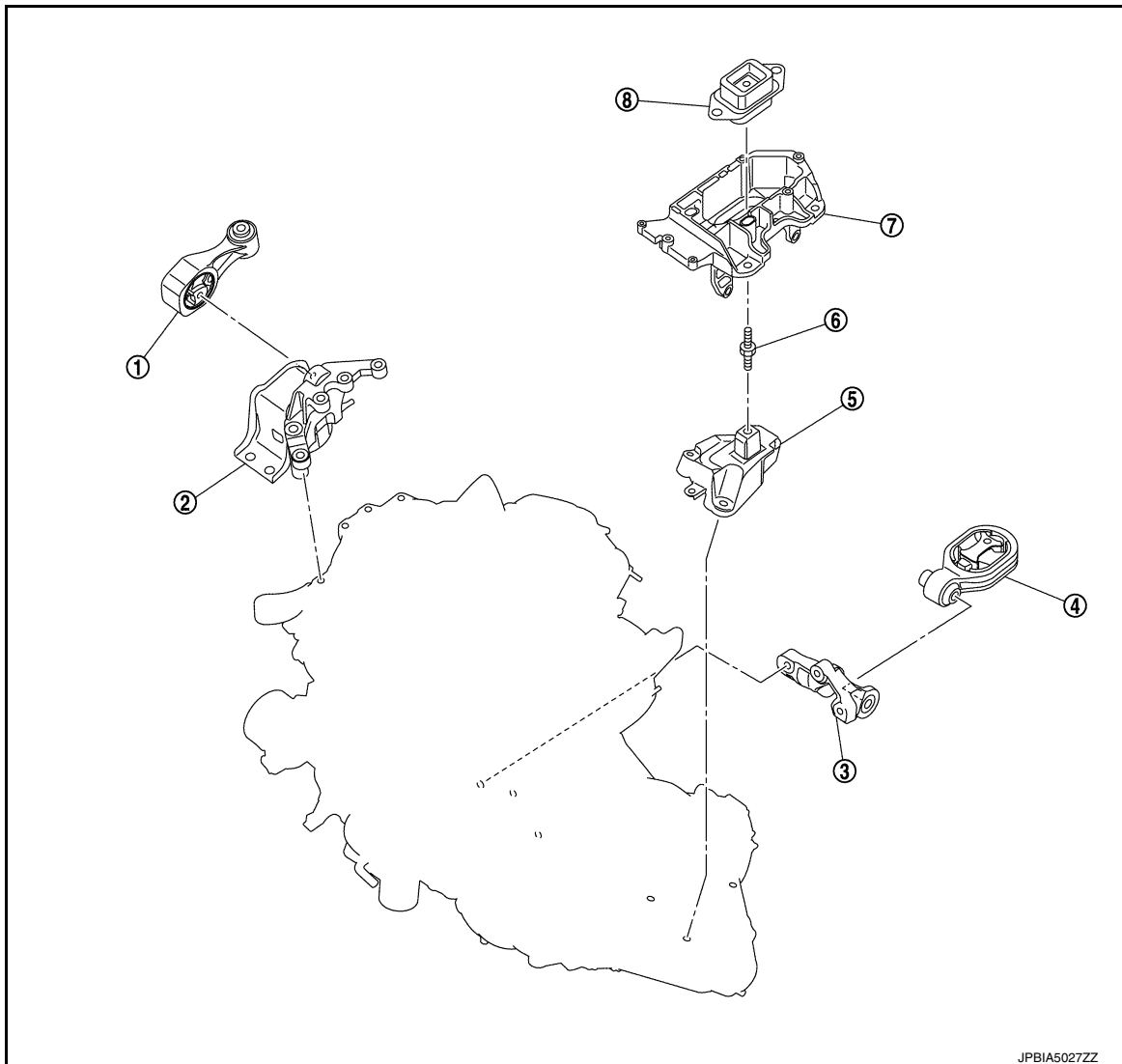
- A type with three supporting mounts (left, right, rear) is used.
- Aluminum brackets are used for the right and left engine mounts to reduce weight, improve rigidity, and improve quietness.
- A fluid mount insulator is used for the right engine mount, and a rubber mount insulator is used for the left engine mount.
- A torque rod type is used for the rear engine mount to restrict engine movement.

2WD

## COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]



- |  |  |                            |
|--|--|----------------------------|
| 1. Upper torque rod (RH)                     | 2. Engine mount insulator RH                   | 3. Rear torque rod bracket |
| 4. Rear torque rod                           | 5. Engine mounting bracket LH (transaxle side) | 6. Stud bolt               |
| 7. Engine mounting bracket LH (vehicle side) | 8. Engine mount insulator LH                   |                            |

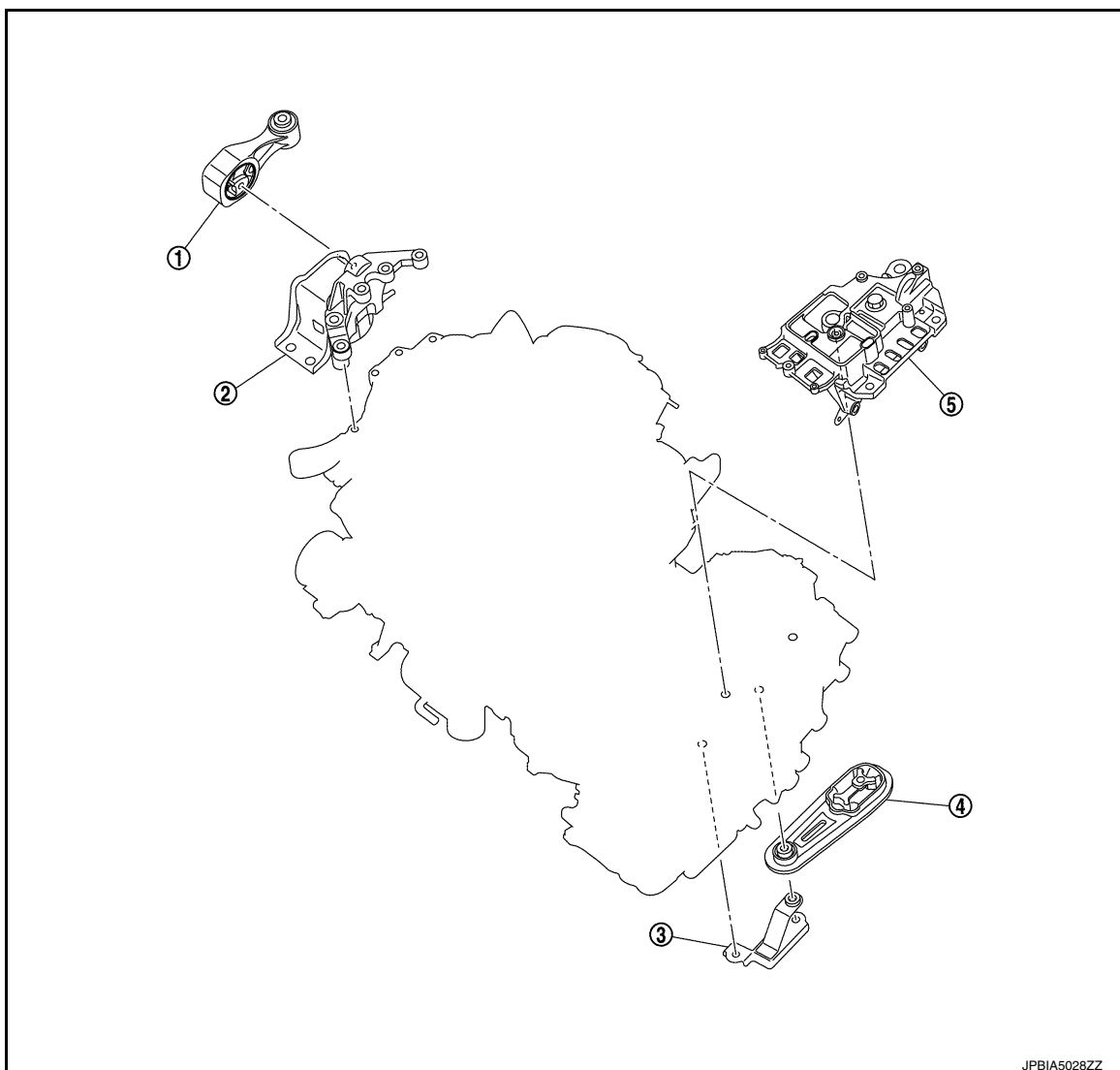
AWD



# COMPONENT PARTS

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]



- |                          |                              |                            |
|--------------------------|------------------------------|----------------------------|
| 1. Upper torque rod (RH) | 2. Engine mount insulator RH | 3. Rear torque rod bracket |
| 4. Rear torque rod       | 5. Engine mount insulator LH |                            |

A  
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## STRUCTURE AND OPERATION

### Main Motor System

INFOID:0000000012197364

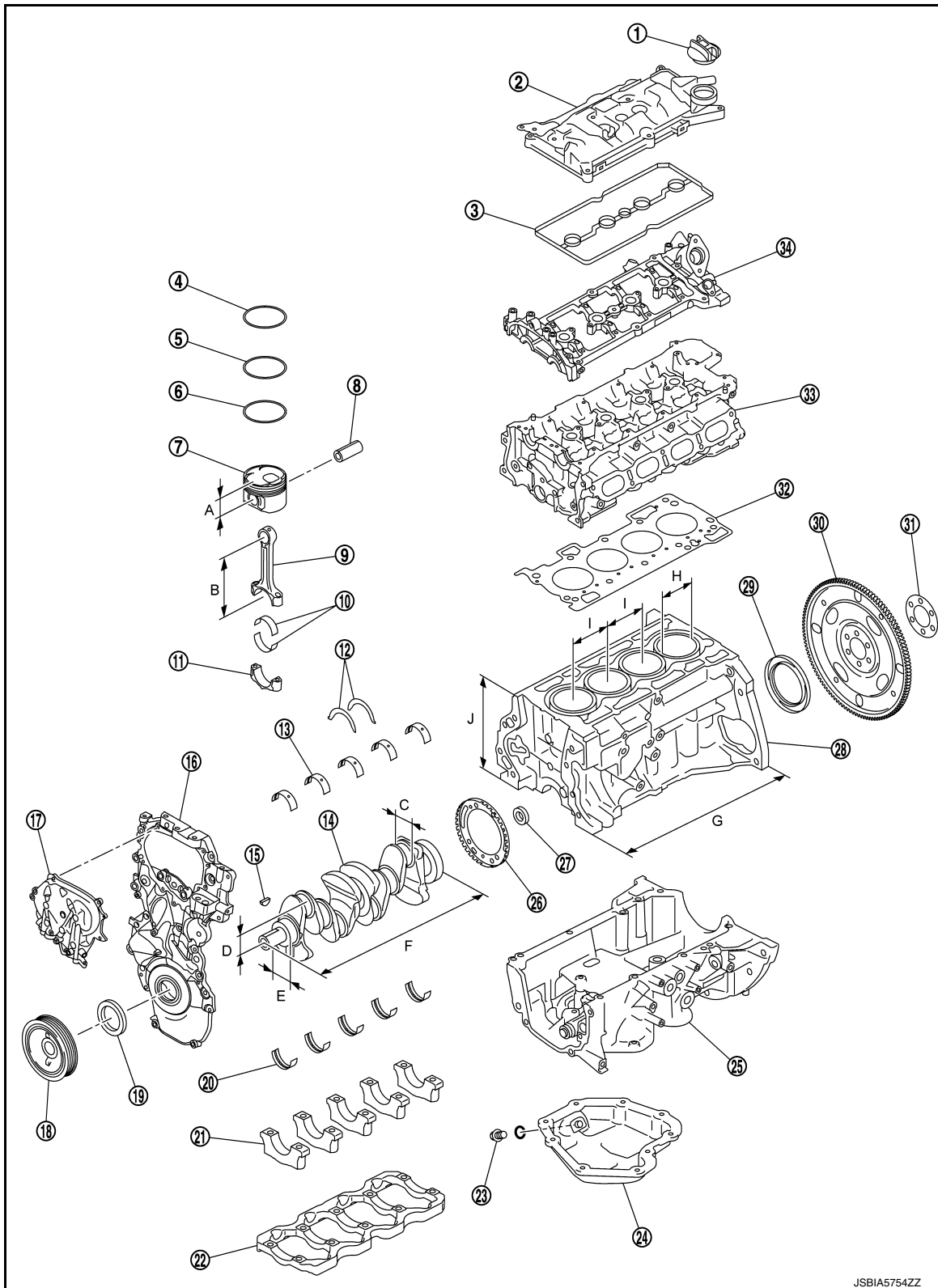
- Weight is reduced through the use of a die-case aluminum cylinder block, aluminum alloy cylinder heads, and other parts.
- Friction is reduced at the crankshaft, connecting rod bearings, piston rings, and other sliding parts for improving fuel economy and output.

### LOCATIONS OF MAIN COMPONENT PARTS

# STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]



- |                            |                        |                        |
|----------------------------|------------------------|------------------------|
| 1. Oil filler cap          | 2. Rocker cover        | 3. Rocker cover gasket |
| 4. Top ring                | 5. Second ring         | 6. Oil ring            |
| 7. Piston                  | 8. Piston pin          | 9. Connecting rod      |
| 10. Connecting rod bearing | 11. Connecting rod cap | 12. Thrust bearing     |
| 13. Main bearing (upper)   | 14. Crankshaft         | 15. Crankshaft key     |
| 16. Front cover            | 17. VTC cover          | 18. Crankshaft pulley  |

## STRUCTURE AND OPERATION

### < SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

19. Front oil seal	20. Main bearing (lower)	21. Main bearing cap
22. Main bearing beam	23. Drain plug	24. Oil pan (lower)
25. Oil pan (upper)	26. Signal plate	27. Pilot converter
28. Cylinder block	29. Rear oil seal	30. Drive plate
31. Reinforcement plate	32. Cylinder head gasket	33. Cylinder head
34. Camshaft bracket		
A. Piston compression height	B. Distance between connecting rod centers	C. Crankshaft pin diameter
D. Stroke (1/2)	E. Crankshaft journal diameter	F. Crankshaft total length
G. Cylinder block total length	H. Cylinder bore diameter	I. Pitch between bores
J. Cylinder block height (from crankshaft center)		

### LIST OF MAIN MOTOR SYSTEM DIMENSIONS

Unit: mm (in )

Cylinder block height (from crankshaft center)	215.0 (8.46)
Cylinder block total length	413.2 (16.27)
Pitch between bores	92.0 (3.62)
Cylinder bore inner diameter	φ79.7 (3.13)
Stroke (1/2)	40.55 (1.60)
Crankshaft journal diameter	φ52.0 (2.05)
Crankshaft pin diameter	φ44.0 (1.73)
Crankshaft total length	456.45 (17.97)
Piston compression height	35.33 (1.39)
Distance between connecting rod centers	139.02 (5.47)

### Valves

INFOID:0000000012197365

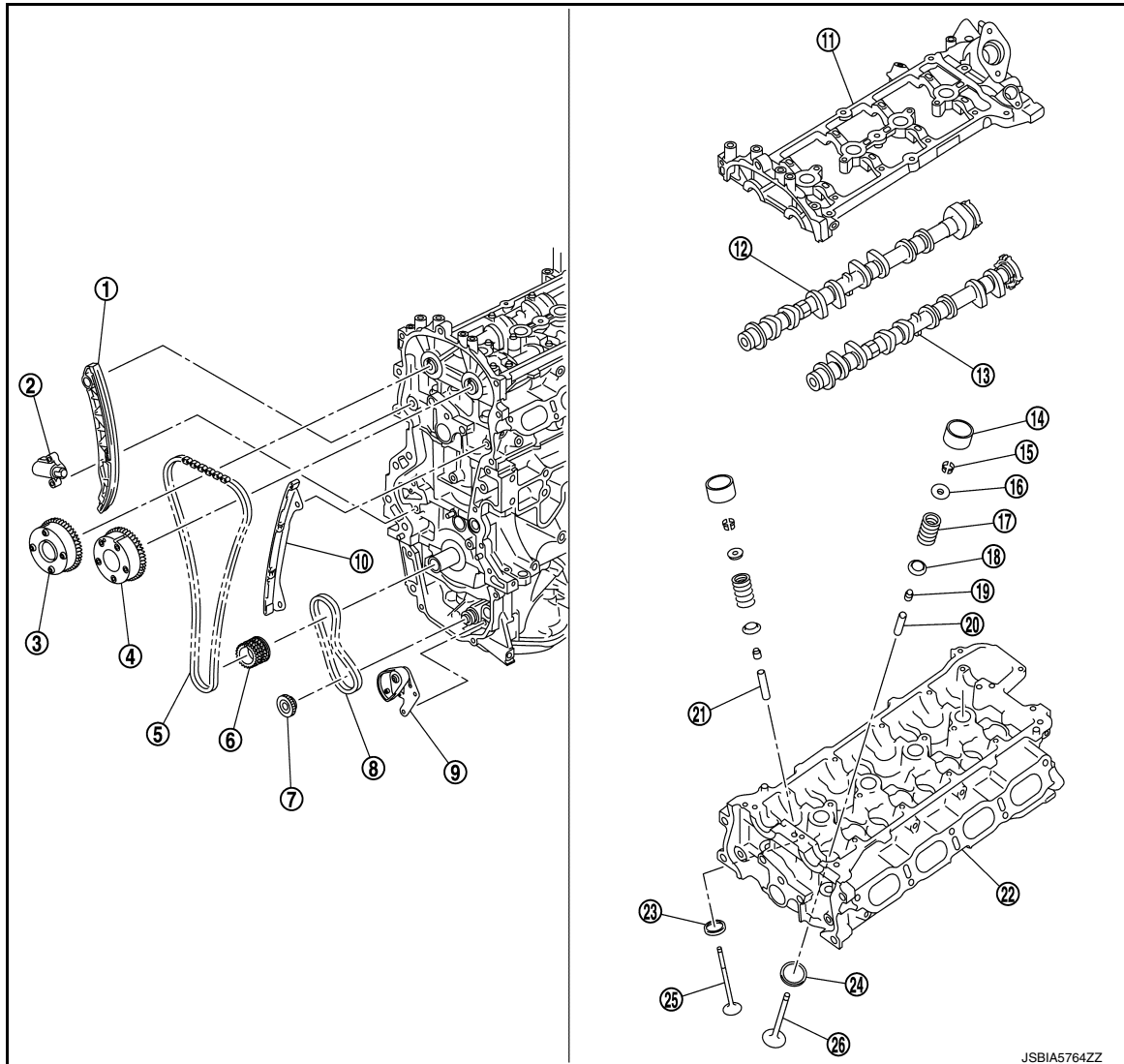
- A single-stage chain system is used for driving the DOHC mechanism with V valve layout and camshaft.
- A small-pitch silent chain is used for the timing chain. This allows a more compact and lightweight camshaft drive system and also reduces drive system noise.
- A valve control system that controls the valve timing to the optimal timing according to driving conditions is used.

# STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]

## LOCATIONS OF MAIN COMPONENT PARTS



- |                                |                                       |  |
|--------------------------------|---------------------------------------|--|
| 1. Timing chain slack guide    | 2. Chain tensioner (for timing chain) | 3. Camshaft sprocket (EXH)                           |
| 4. Camshaft sprocket (INT)     | 5. Timing chain                       | 6. Crankshaft sprocket                               |
| 7. Oil pump sprocket           | 8. Oil pump drive chain               | 9. Chain tensioner (for oil pump drive chain)        |
| 10. Timing chain tension guide | 11. Camshaft bracket                  | 12. Camshaft (EXH)                                   |
| 13. Camshaft (INT)             | 14. Valve lifter                      | 15. Valve collet                                     |
| 16. Valve spring retainer      | 17. Valve spring                      | 18. Valve spring seat (with integrated valve spring) |
| 19. Valve oil seal             | 20. Valve guide (INT)                 | 21. Valve guide (EXH)                                |
| 22. Cylinder head              | 23. Valve seat (EXH)                  | 24. Valve seat (INT)                                 |
| 25. Valve (EXH)                | 26. Valve (INT)                       |  |

## Intake/Exhaust System

INFOID:0000000012197366

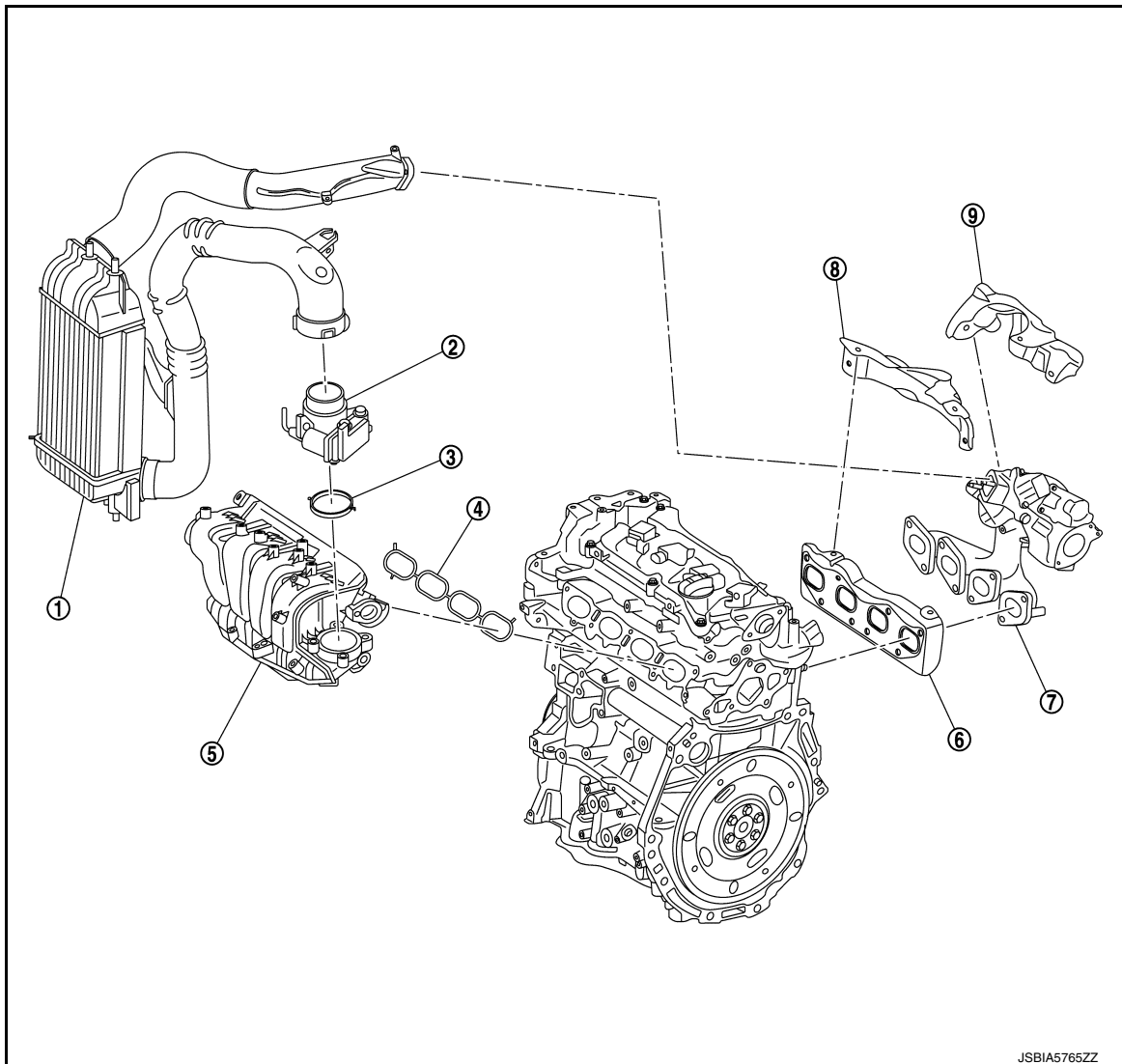
- A cross-flow layout is used for the intake manifold.
- An exhaust manifold which is integrated with the turbocharger, and an charge air cooler are used for improving intake efficiency and increasing output.
- The intake manifold is made of plastic, and the exhaust manifold is made of cast iron.
- An electric throttle control actuator is used to optimize the amount of air intake.

## MAIN COMPONENT PARTS

# STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

[MR EXCEPT FOR NISMO RS MODELS]



- |   |                                       |                             |
|---|---------------------------------------|-----------------------------|
| 1. Charge air cooler                          | 2. Electric throttle control actuator | 3. Gasket                   |
| 4. Gasket                                     | 5. Intake manifold                    | 6. Gasket                   |
| 7. Exhaust manifold and turbocharger assembly | 8. Exhaust manifold cover             | 9. Turbocharger cover upper |

## BASIC INSPECTION

## CAMSHAFT VALVE CLEARANCE

## Inspection and Adjustment

INFOID:0000000012197367

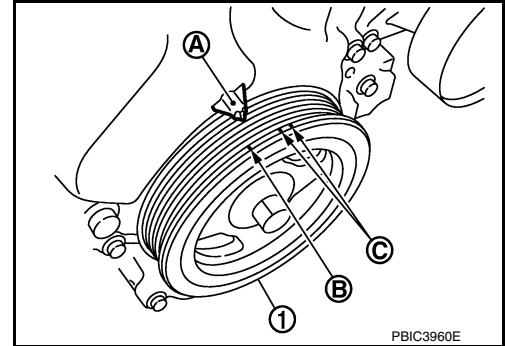
EM

## INSPECTION

Perform inspection as follows after removal, installation or replacement of camshaft or valve-related parts, or if there is unusual engine conditions regarding valve clearance.

1. Remove rocker cover. Refer to [EM-214, "Exploded View"](#).
2. Measure the valve clearance with the following procedure:
  - a. Set No. 1 cylinder at TDC of its compression stroke.
    - Rotate crankshaft pulley (1) clockwise and align TDC mark (no paint) (B) to timing indicator (A) on front cover.

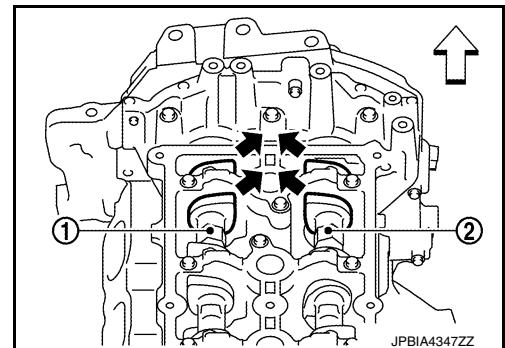
C : White paint mark (Not use for service)



- At the same time, check that both intake and exhaust cam noses of No. 1 cylinder face inside (↔) as shown in the figure.

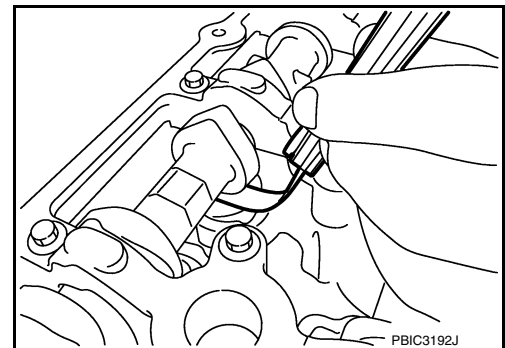
- 1 : Camshaft (INT)  
 2 : Camshaft (EXH)  
 ↔ : Engine front

- If they do not face inside, rotate crankshaft pulley once more (360 degrees) and align as shown in the figure.



- b. Use a feeler gauge, measure the clearance between valve lifter and camshaft.

**Valve clearance** : Refer to [EM-312, "Camshaft"](#).



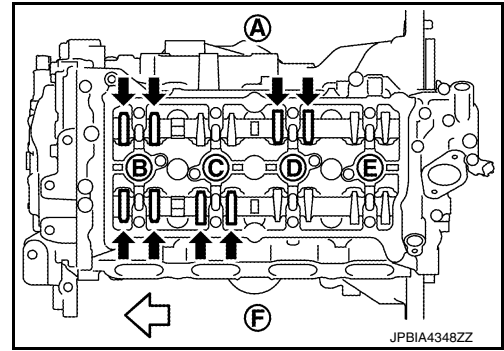
# CAMSHAFT VALVE CLEARANCE

## < BASIC INSPECTION >

[MR EXCEPT FOR NISMO RS MODELS]

- By referring to the figure, measure the valve clearances at locations marked "x" as shown in the table below [locations indicated with black arrow (↖) in the figure] with a feeler gauge.

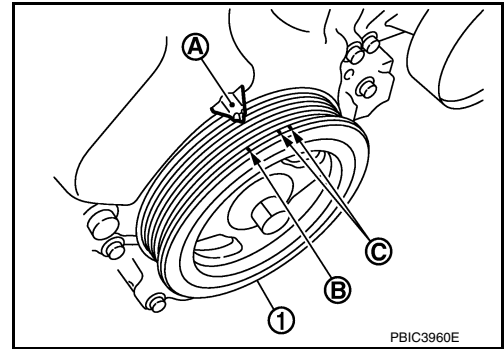
- A : Exhaust side  
 B : No. 1 cylinder  
 C : No. 2 cylinder  
 D : No. 3 cylinder  
 E : No. 4 cylinder  
 F : Intake side  
 ↖ : Engine front



Measuring position		No. 1 CYL.	No. 2 CYL.	No. 3 CYL.	No. 4 CYL.
No. 1 cylinder at compression TDC	EXH	x		x	
	INT	x	x		

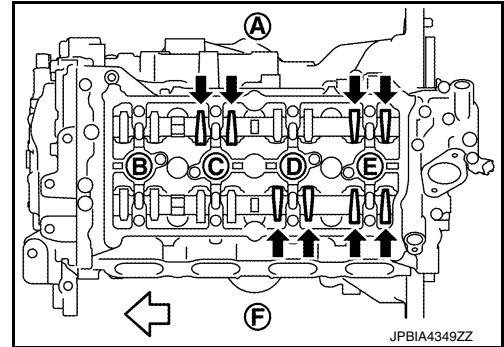
- c. Set No. 4 cylinder at TDC of its compression stroke.
- Rotate crankshaft pulley (1) one revolution (360 degrees) and align TDC mark (no paint) (B) to timing indicator (A) on front cover.

C : White paint mark (Not use for service)



- By referring to the figure, measure the valve clearance at locations marked "x" as shown in the table below [locations indicated with black arrow (↖) in the figure] with a feeler gauge.

- A : Exhaust side  
 B : No. 1 cylinder  
 C : No. 2 cylinder  
 D : No. 3 cylinder  
 E : No. 4 cylinder  
 F : Intake side  
 ↖ : Engine front



Measuring position		No. 1 CYL.	No. 2 CYL.	No. 3 CYL.	No. 4 CYL.
No. 4 cylinder at compression TDC	EXH		x		x
	INT			x	x

3. If out of standard, perform adjustment. Refer to "ADJUSTMENT".

## ADJUSTMENT

### NOTE:

Adjust by selecting the head thickness of the valve lifter. (Adjustment shims are not used.)

- Remove camshaft. Refer to [EM-260, "Exploded View"](#).
- Remove the valve lifters for parts that are outside the standard.

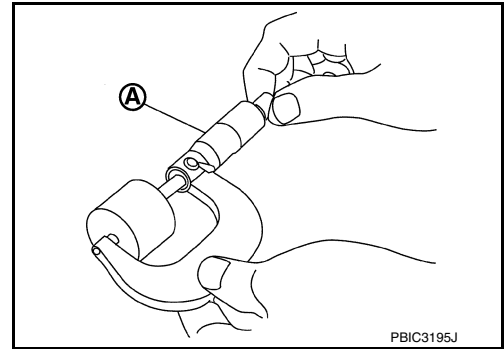


# CAMSHAFT VALVE CLEARANCE

< BASIC INSPECTION >

[MR EXCEPT FOR NISMO RS MODELS]

3. Measure thickness of the removed valve lifter center part using a micrometer (A).



4. Measure the thickness of the replacement valve lifter using the following formula. (Units: mm)

**Valve lifter thickness calculation:**  $t = t_1 + (C_1 - C_2)$

**t** = Valve lifter thickness to be replaced

**t<sub>1</sub>** = Removed valve lifter thickness

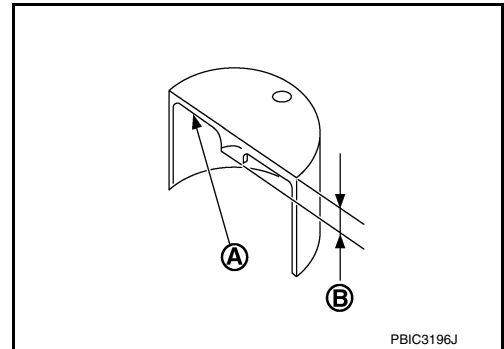
**C<sub>1</sub>** = Measured valve clearance

**C<sub>2</sub>** = Standard valve clearance:

Intake : 0.28 mm (0.011 in)

Exhaust : 0.29 mm (0.011 in)

- Thickness of new valve lifter (B) can be identified by stamp mark (A) on the reverse side (inside the cylinder).
- Stamp mark "302" indicates 3.02 mm (0.1189 in) in thickness.



## NOTE:

Available thickness of valve lifter: 26 sizes range 3.00 to 3.50 mm (0.1181 to 0.1378 in) in steps of 0.02 mm (0.0008 in) (when manufactured at factory). Refer to [EM-312. "Camshaft"](#).

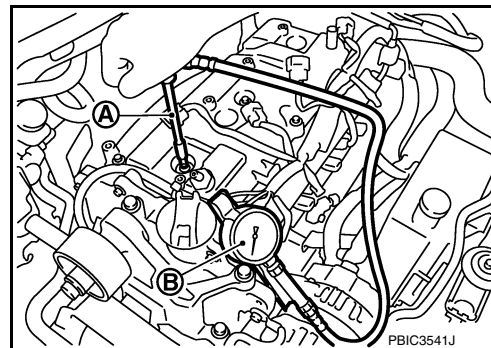
5. Install selected valve lifter.
6. Install camshaft. Refer to [EM-260. "Exploded View"](#).
7. Install parts related to the timing chain. Refer to [EM-249. "Removal and Installation"](#).
8. Rotate crankshaft at least two rotations using the manual tool.
9. Measure the valve clearance again, and check that it is within the valve clearance standard.
10. Install removed parts in the reverse order of removal.
11. Start engine and check for any unusual noise and vibration.

## COMPRESSION PRESSURE

### Inspection

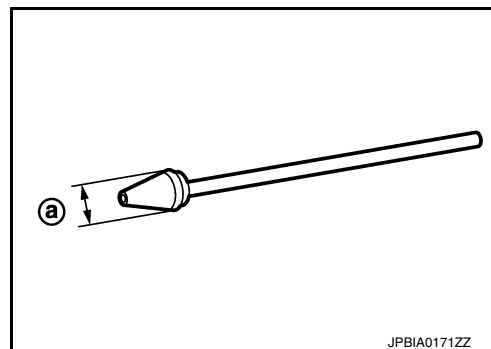
INFOID:0000000012197368

1. Warm up engine thoroughly. Then, stop it.
2. Release fuel pressure. Refer to [EC-771, "Work Procedure"](#).
3. Remove ignition coil and spark plug from each cylinder. Refer to [EM-214, "Exploded View"](#).
4. Connect engine tachometer (not required in use of CONSULT).
5. Install compression gauge (B) with an adapter (A) (commercial service tool) onto spark plug hole.



- Use the adapter whose picking up end inserted to spark plug hole is smaller than 20 mm (0.79 in) in diameter. Otherwise, it may be caught by cylinder head during removal.

a : 20 mm (0.79 in)



6. With accelerator pedal fully depressed, turn ignition switch to "START" for cranking. When the gauge pointer stabilizes, read the compression pressure and the engine rpm. Perform these steps to check each cylinder.

**Compression pressure** : Refer to [EM-311, "General Specification"](#).

### CAUTION:

**Always use a fully charged battery to obtain the specified engine speed.**

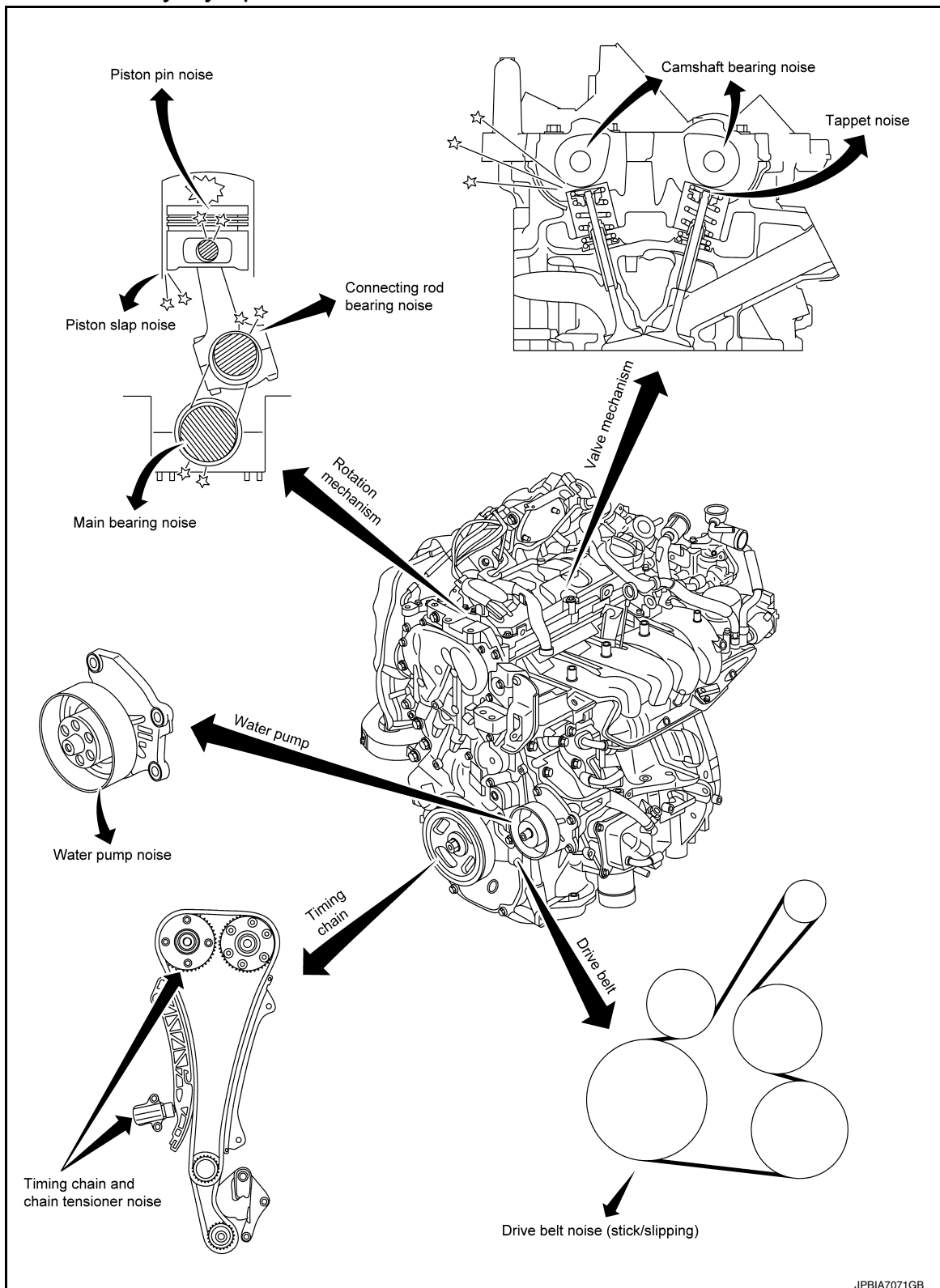
- If the engine speed is out of the specified range, check battery liquid for proper gravity. Check the engine speed again with normal battery gravity.
  - If compression pressure is below minimum value, check valve clearances, and parts associated with combustion chamber (valve, valve seat, piston, piston ring, cylinder bore, cylinder head, and cylinder head gasket). After the checking, measure compression pressure again.
  - If some cylinder has low compression pressure, pour small amount of engine oil into the spark plug hole of the cylinder to recheck it for compression.
  - If the added engine oil improves the compression, piston rings may be worn out or damaged. Check piston rings and replace if necessary.
  - If the compression pressure remains at low level despite the addition of engine oil, valves may be malfunctioning. Check valves for damage. Replace valve or valve seat accordingly.
  - If two adjacent cylinders have respectively low compression pressure and their compression remains low even after the addition of engine oil, cylinder head gaskets are leaking. In such a case, replace cylinder head gaskets.
7. After inspection is completed, install removed parts.
  8. Start the engine, and check that the engine runs smoothly.
  9. Perform trouble diagnosis. If DTC appears, erase it. Refer to [EC-785, "Description"](#).

## SYMPTOM DIAGNOSIS

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

#### Diagnosis Chart By Symptom

INFOID:000000012197369



1. Narrow down the locations where noise is occurring.
2. Narrow down the types of noise.

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[MR EXCEPT FOR NISMO RS MODELS]

3. Narrow down the presumed causes from the relationship between the engine operating conditions when the noise occurs and the symptoms.
4. Inspect the part that is presumed to be the source of the noise.  
If necessary, repair or replace the specific part.

Location of noise	Type of noise	Operating condition of engine						Source of noise	Check item	Reference page
		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	<a href="#">EM-179</a>
	Rattle	C	A	—	A	B	C	Camshaft bearing noise	Camshaft journal oil clearance Camshaft runout	<a href="#">EM-264</a>
Crank-shaft pulley Cylinder block (Side of engine) Oil pan	Slap or knock	—	A	—	B	B	—	Piston pin noise	Piston to piston pin oil clearance Connecting rod bushing oil clearance	<a href="#">EM-294</a>
	Slap or rap	A	—	—	B	B	A	Piston slap noise	Piston to cylinder bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion	<a href="#">EM-294</a>
	Knock	A	B	C	B	B	B	Connecting rod bearing noise	Connecting rod bushing oil clearance Connecting rod bearing oil clearance	<a href="#">EM-294</a>
	Knock	A	B	—	A	B	C	Main bearing noise	Main bearing oil clearance Crankshaft runout	<a href="#">EM-294</a>
Front of engine Front cover	Tapping or ticking	A	A	—	B	B	B	Timing chain and chain tensioner noise	Timing chain cracks and wear Timing chain tensioner operation	<a href="#">EM-259</a>
Front of engine	Squeaking or fizzing	A	B	—	B	—	C	Drive belt (Sticking or slipping)	Drive belt deflection	<a href="#">EM-186</a>
	Creaking	A	B	A	B	A	B	Drive belt (Slipping)	Idler pulley bearing operation	<a href="#">EM-186</a>
	Squall Creak	A	B	—	B	A	B	Water pump noise	Water pump operation	<a href="#">CO-53</a>

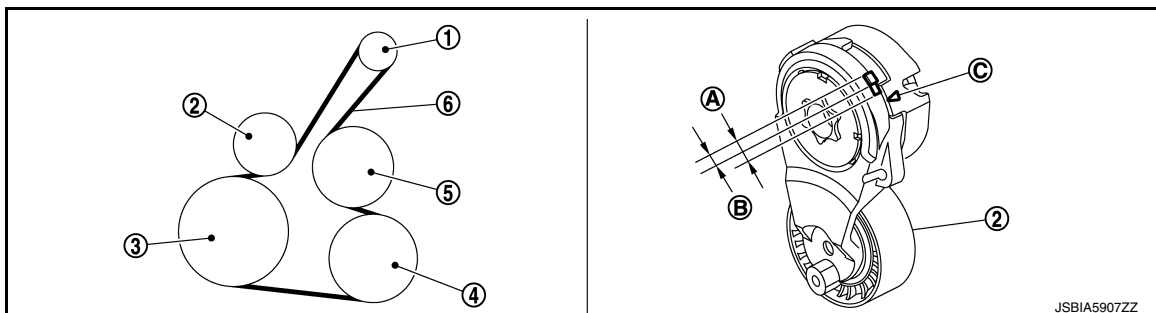
A: Closely related B: Related C: Sometimes related —: Not related

## PERIODIC MAINTENANCE

### DRIVE BELT

#### Exploded View

INFOID:0000000012197370



- |                       |   |                      |
|-----------------------|---|----------------------|
| 1. Alternator         | 2. Drive belt auto tensioner              | 3. Crankshaft pulley |
| 4. A/C compressor     | 5. Water pump                             | 6. Drive belt        |
| A. Possible use range | B. Range when new drive belt is installed | C. Indicator         |

### Removal and Installation

INFOID:0000000012197371

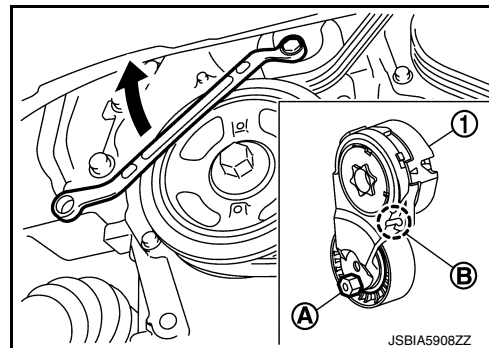
#### REMOVAL

1. Fully turn the steering wheel to the right.
2. Disconnect the front side of the front fender protector (RH), and peel back the protector to create work space. Refer to [EXT-31, "Exploded View"](#).
3. Securely hold the hexagonal part (A) of the drive belt auto tensioner (1) with a box wrench, and move it to the direction shown by the arrow (loosening direction of tensioner) in the figure.

#### CAUTION:

**Never put hand in a dangerous position where it could be pinched, taking into consideration the possibility that the fixing tool may become disconnected.**

4. Insert a rod approximately 6 mm (0.24 in) in diameter such as short-length screwdriver into the hole (B) of the retaining boss to fix drive belt auto-tensioner.
  - Keep drive belt auto-tensioner pulley arm locked after drive belt is removed.
5. Remove drive belt.



#### INSTALLATION

1. Set the drive belt onto all the pulleys.
 

#### CAUTION:

  - **Never put hand in a dangerous position where it could be pinched, taking into consideration the possibility that the fixing tool may become disconnected.**
  - Check that the drive belt path is normal. Refer to [EM-186, "Inspection"](#).
  - Check that the drive belt is securely inside the groove on each pulley.
  - Check for engine oil, engine coolant, or other oil or grease on the drive belt and surrounding locations.
2. Release drive belt auto-tensioner, and apply tension to drive belt.
3. Turn crankshaft pulley clockwise several times to equalize tension between each pulley.
4. Confirm tension of drive belt at indicator (notch on fixed side) is within the possible use range. Refer to [EM-186, "Inspection"](#).

# DRIVE BELT

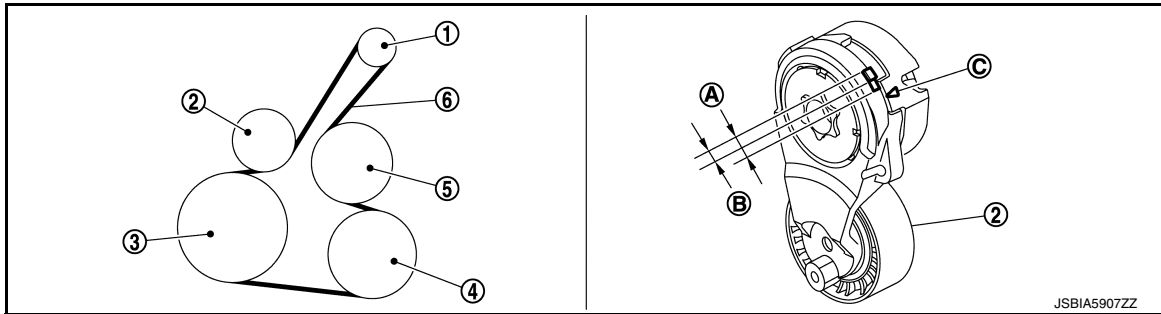
< PERIODIC MAINTENANCE >

[MR EXCEPT FOR NISMO RS MODELS]

## Inspection

INFOID:0000000012197372

### INSPECTION



- |                       |   |                      |
|-----------------------|---|----------------------|
| 1. Alternator         | 2. Drive belt auto tensioner              | 3. Crankshaft pulley |
| 4. A/C compressor     | 5. Water pump                             | 6. Drive belt        |
| A. Possible use range | B. Range when new drive belt is installed | C. Indicator         |

### **WARNING:**

**Perform this step when engine is stopped.**

- Check that the indicator (C) (notch on fixed side) of drive belt auto-tensioner is within the possible use range (A) in the figure.

### **NOTE:**

- Check the drive belt auto-tensioner indication when the engine is cold.
- When new drive belt is installed, the indicator (notch on fixed side) should be within the range (B) in the figure.
- Visually check entire drive belt for wear, damage or cracks.
- If the indicator (notch on fixed side) is out of the possible use range or belt is damaged, replace drive belt.

## Adjustment

INFOID:0000000012197373

Refer to : [EM-312, "Drive Belt"](#).

# AIR CLEANER FILTER

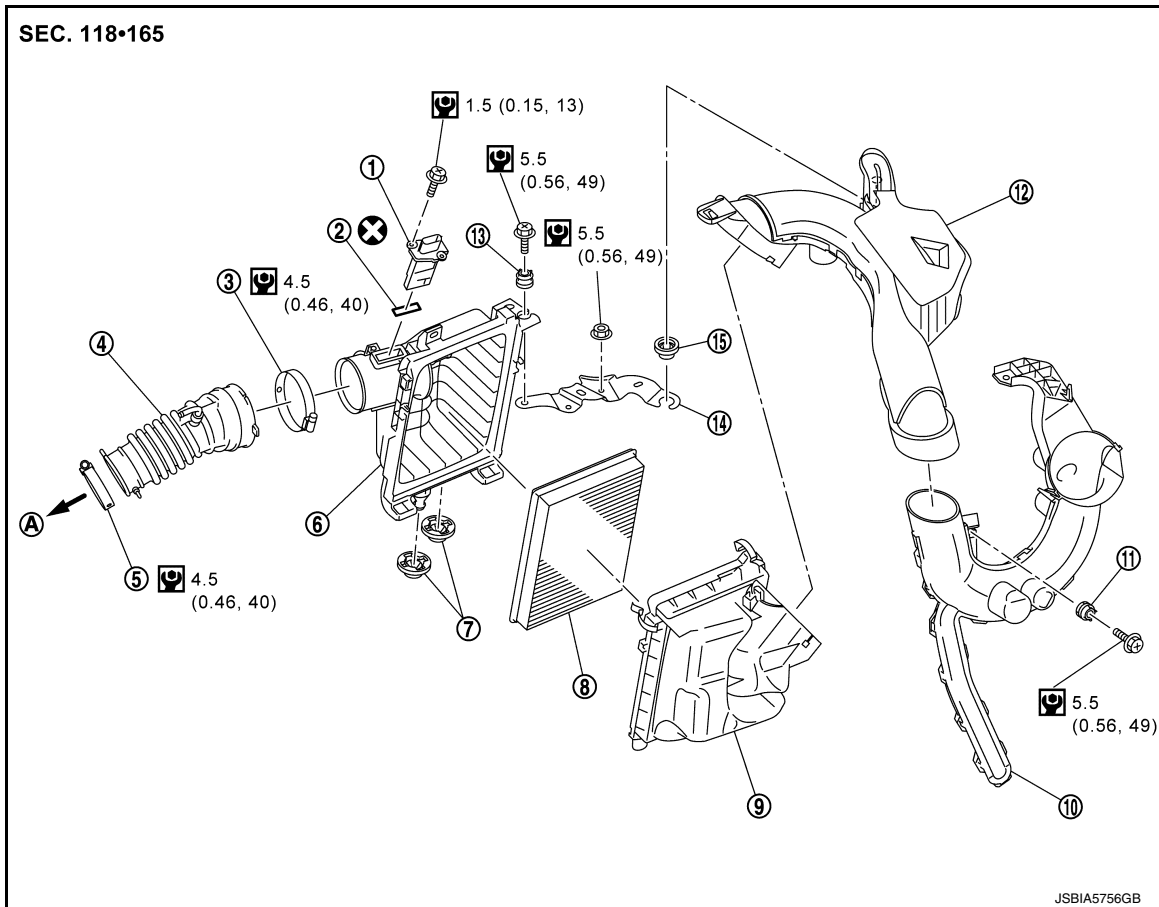
< PERIODIC MAINTENANCE >

[MR EXCEPT FOR NISMO RS MODELS]

## AIR CLEANER FILTER

### Exploded View

INFOID:000000012197374



- |                            |                       |                            |
|----------------------------|-----------------------|----------------------------|
| 1. Mass air flow sensor    | 2. Gasket             | 3. Clamp                   |
| 4. Air duct                | 5. Clamp              | 6. Air cleaner case        |
| 7. Mount rubber            | 8. Air cleaner filter | 9. Element case            |
| 10. Inlet air duct (lower) | 11. Grommet           | 12. Inlet air duct (upper) |
| 13. Grommet                | 14. Bracket           | 15. Mount rubber           |

A. To exhaust manifold and turbocharger assembly

⊗ : Always replace after every disassembly.

⊙ : N·m (kg-m, in-lb)

## Removal and Installation

INFOID:000000012197375

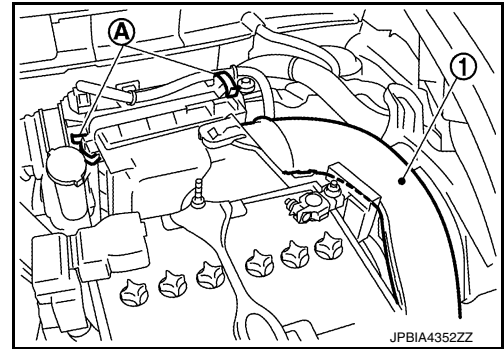
### REMOVAL

# AIR CLEANER FILTER

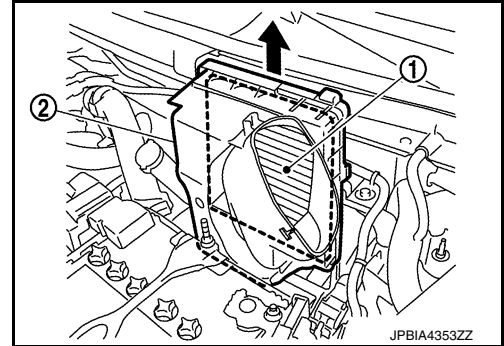
## < PERIODIC MAINTENANCE >

[MR EXCEPT FOR NISMO RS MODELS]

1. Remove the inlet air duct (upper) (1).
2. Unhook the tabs (A) of both ends of the air cleaner cover.



3. Remove the air cleaner filter (1) and air cleaner body (2) from the air cleaner case.
4. Remove the air cleaner filter from the air cleaner body.



## INSTALLATION

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

- Fixing clips shall be fixed after inserting air cleaner body protrusion to air cleaner case notch hole.
- Make sure that whether air cleaner body has been firmly installed by shaking it.

## Inspection (Viscous Paper Type)

INFOID:0000000012961777

## INSPECTION AFTER REMOVAL

Examine with eyes that there is no stain, clogging, or damage on air cleaner element.

- Remove dusts (such as dead leaves) on air cleaner element surface and inside cleaner case.
- If clogging or damage is observed, replace the air cleaner element.

### **CAUTION:**

**Never clean the viscous paper type air cleaner element by blowing as there is a risk of deterioration of its performance**

## MAINTENANCE INTERVAL

Refer to [MA-7. "Introduction of Periodic Maintenance"](#).



# SPARK PLUG

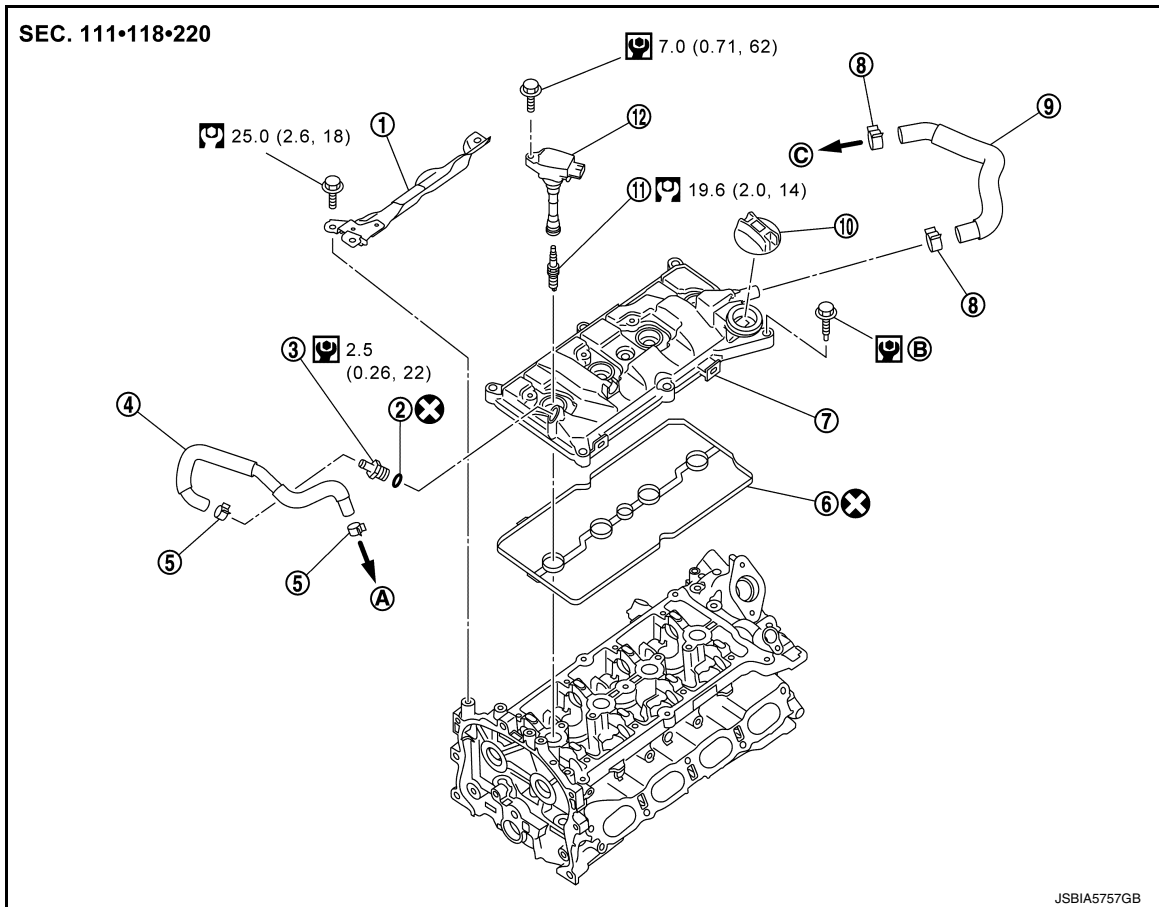
< PERIODIC MAINTENANCE >

[MR EXCEPT FOR NISMO RS MODELS]

## SPARK PLUG

### Exploded View

INFOID:000000012197376



- |                           |   |   |
|---------------------------|---|---|
| 1. Rocker cover protector | 2. O-ring   | 3. Positive Crank Ventilation (PCV) valve |
| 4. PCV hose               | 5. Clamp  | 6. Rocker cover gasket                    |
| 7. Rocker cover           | 8. Clamp  | 9. PCV hose                               |
| 10. Oil filler cap        | 11. Spark plug  | 12. Ignition coil                         |
| A. To intake manifold     | B. Comply with the assembly procedure when tightening. <a href="#">EM-214</a> . | C. To turbocharger inlet tube             |

⊗: Always replace after every disassembly.

⊞: N·m (kg-m, ft-lb)

⊞: N·m (kg-m, in-lb)

## Removal and Installation

INFOID:000000012197377

### REMOVAL

1. Remove the engine cover. Refer to [EM-191, "Exploded View"](#).
2. Remove air inlet tube 2. Refer to [EM-194, "Removal and Installation"](#).
3. Remove the ignition coil. Refer to [EM-214, "Exploded View"](#).

## SPARK PLUG

< PERIODIC MAINTENANCE >

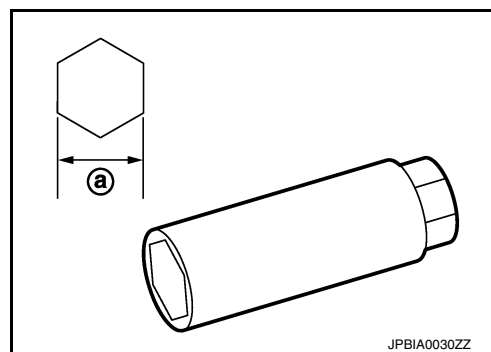
[MR EXCEPT FOR NISMO RS MODELS]

4. Remove spark plug with a spark plug wrench (commercial service tool).

a : 14 mm (0.55 in)

### CAUTION:

Never drop or shock spark plug.



## INSTALLATION

Install in the reverse order of removal.

## Inspection

INFOID:0000000012197378

## INSPECTION AFTER REMOVAL

Use the standard type spark plug for normal condition.

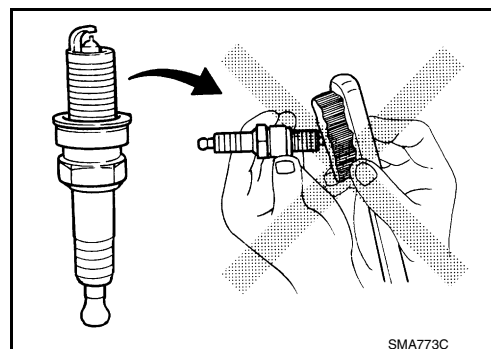
Spark plug (Standard type) : Refer to [EM-312, "Spark Plug"](#).

### CAUTION:

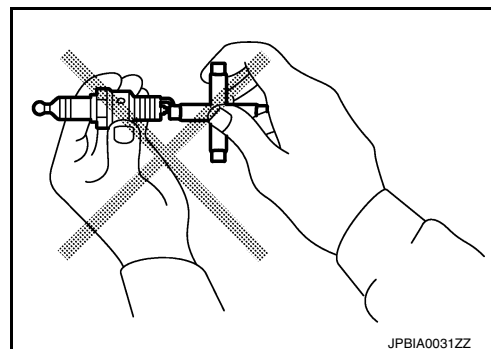
- Never drop or shock spark plug.
- Never use a wire brush for cleaning.
- If plug tip is covered with carbon, spark plug cleaner may be used.

Cleaner air pressure : Less than 588 kPa (6 kg/cm<sup>2</sup>, 85 psi)

Cleaning time : Less than 20 seconds



- Spark plug gap adjustment is not required between replacement intervals.
- Measure spark plug gap. when it exceeds the limit, replace spark plug even if it is within the specified replacement mileage. Refer to [EM-312, "Spark Plug"](#).



# ENGINE COVER

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

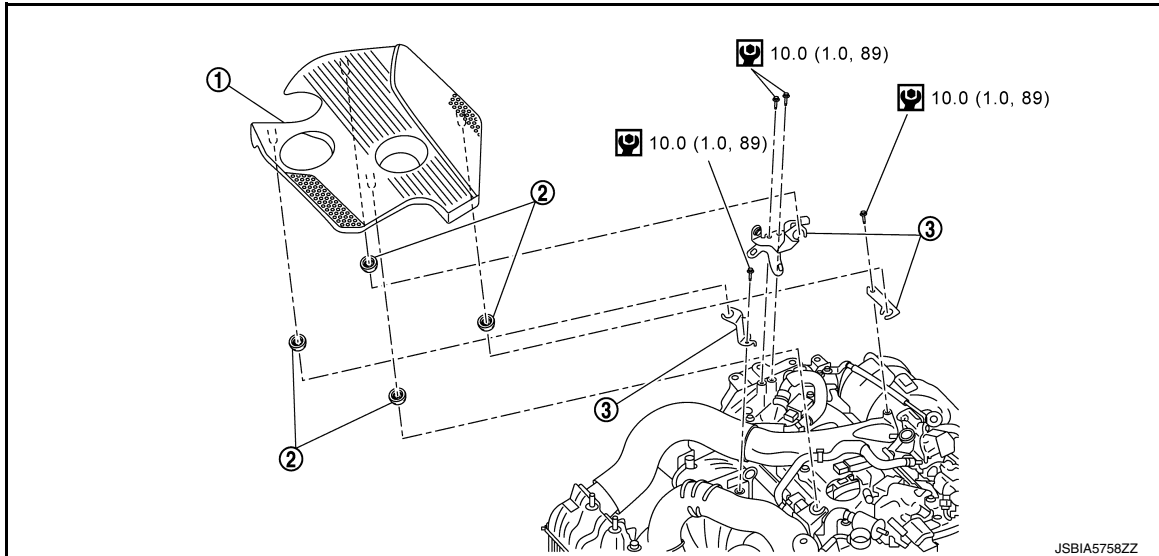
## REMOVAL AND INSTALLATION

### ENGINE COVER

#### Exploded View

INFOID:0000000012197379

EM



1. Engine cover

2. Mounting rubber

3. Mounting rubber bracket

: N·m (kg-m, in-lb)

### Removal and Installation

INFOID:0000000012197380

#### REMOVAL

1. Grasp the engine cover at a point close to the mounting rubber mating part, and pull upward to remove.
2. Remove the mounting rubber bracket if necessary.

#### **CAUTION:**

**Never damage or scratch engine cover when installing or removing.**

#### INSTALLATION

Install in the reverse order of removal.

# AIR CLEANER AND AIR DUCT

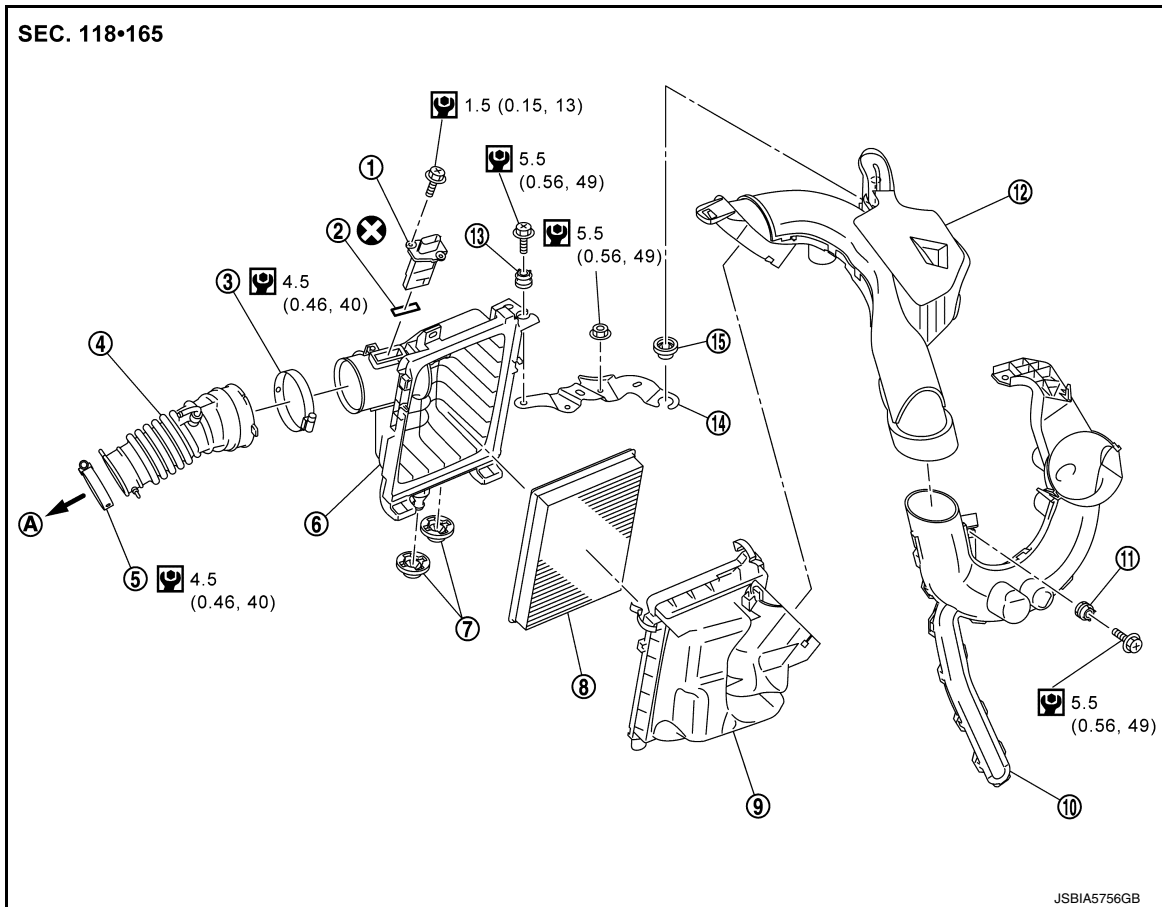
< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

## AIR CLEANER AND AIR DUCT

### Exploded View

INFOID:0000000012197381



- |                            |                       |                            |
|----------------------------|-----------------------|----------------------------|
| 1. Mass air flow sensor    | 2. Gasket             | 3. Clamp                   |
| 4. Air duct                | 5. Clamp              | 6. Air cleaner case        |
| 7. Mounting rubber         | 8. Air filter element | 9. Element case            |
| 10. Inlet air duct (lower) | 11. Grommet           | 12. Inlet air duct (upper) |
| 13. Grommet                | 14. Bracket           | 15. Mounting rubber        |

A. To exhaust manifold and turbocharger assembly

⊗ : Always replace after every disassembly.

🔧 : N·m (kg-m, in-lb)

## Removal and Installation

INFOID:0000000012197382

### REMOVAL

#### NOTE:

Mass air flow sensor is removable under the car-mounted condition.

1. Remove engine cover. Refer to [EM-191, "Exploded View"](#).
2. Remove air duct inlet (upper).
3. Remove the air cleaner filter from the air cleaner case.
4. Disconnect mass air flow sensor harness connector, and remove harness clamp from air cleaner body.
5. Remove air cleaner body assembly.
6. Remove the air duct (suction side).
  - Add matching marks if necessary for easier installation.

# AIR CLEANER AND AIR DUCT

## < REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

7. Remove air cleaner cover assembly.
8. Remove mass air flow sensor from air cleaner cover, if necessary.

### CAUTION:

Note the following, and be careful when handling mass air flow sensor.

- Never shock the mass air flow sensor.
- Never disassemble the mass air flow sensor.
- Never touch the sensor of the mass air flow sensor.

9. Remove air duct inlet (lower) with the following procedure.
  - a. Remove fender protector (LH). Refer to [EXT-31, "Exploded View"](#).
  - b. Remove air duct inlet (lower).

## INSTALLATION

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

- Install the air duct while aligning the matching marks on both sides with the matching marks of the mating part.
- Tighten the hose clamp to the specified torque.
- After installing, shake the element case and check that it is securely installed.

## Inspection

INFOID:0000000012197383

## INSPECTION AFTER REMOVAL

Air Duct (From Air Cleaner Case to Turbocharger)

- Visually check for damage or cracks of the air duct.
- Replace the air duct if an abnormal condition is found.

# CHARGE AIR COOLER

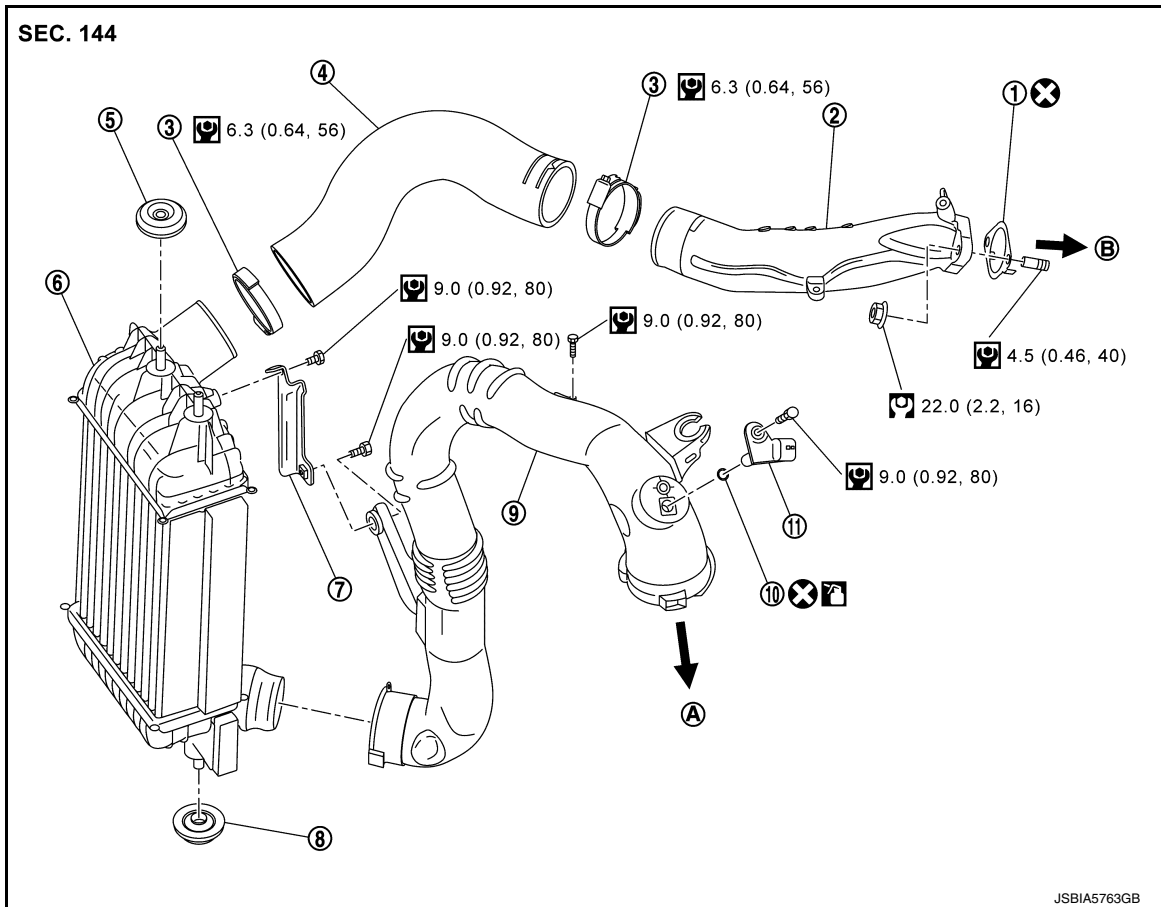
< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

## CHARGE AIR COOLER

### Exploded View

INFOID:000000012197384



- |  |                               |                               |
|--|-------------------------------|-------------------------------|
| 1. Gasket                                | 2. Air inlet tube 2           | 3. Clamp                      |
| 4. Air inlet hose                        | 5. Mounting rubber            | 6. Charge air cooler assembly |
| 7. Air inlet tube bracket                | 8. Mounting rubber            | 9. Air inlet tube 1           |
| 10. O-ring                               | 11. Turbocharger boost sensor |                               |
| A. To electric throttle control actuator | B. To turbocharger            |                               |

⊗ : Always replace after every disassembly.

🔧 : N·m (kg-m, in-lb)

🔧 : N·m (kg-m, ft-lb)

🔧 : Should be lubricated with oil.

## Removal and Installation

INFOID:000000012197385

### REMOVAL

#### Air Inlet Tube 1

1. Remove the engine cover. Refer to [EM-191, "Exploded View"](#).
2. Disconnect the turbocharger boost sensor harness connector.
3. Disengage the turbocharger boost sensor harness clip from air inlet tube 1.
4. Remove the air inlet tube 1 mounting bolt.

**NOTE:**

# CHARGE AIR COOLER

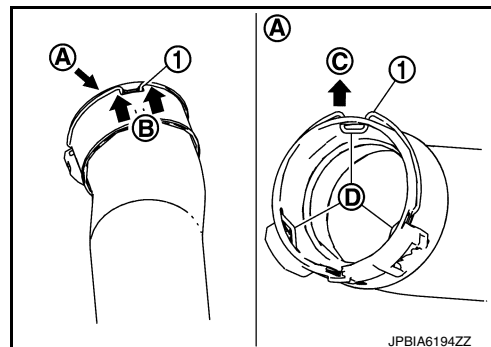
## < REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

On the charge air cooler side, remove the bolt from the top of the air inlet tube bracket, and remove both air inlet tube 1 and the air inlet tube bracket together.

5. Follow the procedure below and remove air inlet tube 1.
- a. Insert a flat-bladed screwdriver, or an equivalent, between air inlet tube 1 and the spring (1) into the space as shown by (B) in the figure.

- (A) : Arrow view  
(C) : Spring movement direction  
(D) : Tabs



- b. Move the spring upward and pull out the hose.

### CAUTION:

Use tape or other means to cover the openings so that foreign material does not enter the exhaust manifold and turbocharger assembly or the intake manifold.

### Air Inlet Tube 2, Air Inlet Hose

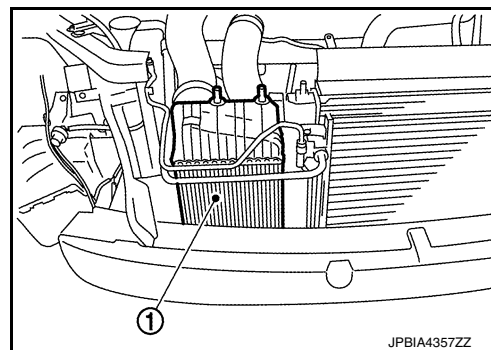
1. Remove the engine cover. Refer to [EM-191, "Exploded View"](#).
2. Put matching marks onto each connecting part for use as reference when installing.
3. Loosen the clamp on the air inlet hose side.
4. Remove the mounting nuts, and then remove air intake tube 2.
5. Loosen the clamp on the charge air cooler side.
6. Remove the air inlet hose.

### Charge air cooler Assembly

1. Remove the front bumper assembly. Refer to [EXT-17, "Removal and Installation"](#).
2. Remove the radiator core support (upper). Refer to [CO-46, "Removal and Installation"](#).
3. Put matching marks onto each connecting part for use as a reference when installing.
4. Disconnect air inlet tube 1 and the air inlet hose.
5. Remove the charge air cooler assembly (1).

### CAUTION:

- Remove the charge air cooler and radiator so that they do not interfere.
- Block the openings with tape or an equivalent so that no foreign material enters the charge air cooler.



## INSTALLATION

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

- Apply neutral detergent to the insertion part of the air inlet hose.

### CAUTION:

Never apply engine oil or other oil or grease.

- Install the connecting parts by lining up the matching marks put before parts are disconnected.
- Temporarily install all the removed parts before tightening the clamps to the specified torque.

### CAUTION:

Never allow installed sensor connector to interfere with other parts.

## Inspection

INFOID:0000000012197386

## INSPECTION AFTER REMOVAL

## CHARGE AIR COOLER

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- Check charge air cooler core and air tank visually, and by other means, for cracks and damage. Replace the charge air cooler if any abnormal condition is found.
- Inspect the charge air cooler for clogging by mud. Refer to "Cleaning" and remove any mud.

### CLEANING

#### CAUTION:

- **Never bend or scratch the charge air cooler fins.**
  - **When cleaning the charge air cooler on the vehicle, remove the surrounding parts. Cover the harnesses and connectors with tape or other means, so that those parts are not exposed to water.**
  - **Repeat cleaning. Never wash the same location with water continuously.**
1. Use the hose to wash the charge air cooler with water vertically from the charge air cooler core rear side.
  2. Clean until no more dirt comes out from the charge air cooler core front side.
  3. Blow-dry vertically from the charge air cooler rear side.

#### CAUTION:

- **Blow-dry from a location at least 30 cm away from the charge air cooler using pressure less than 0.49 MPa (5 kg/cm<sup>2</sup>).**
- **Never blow-dry continuously at the same location. Continue blow-drying until there is no water.**



# INTAKE MANIFOLD

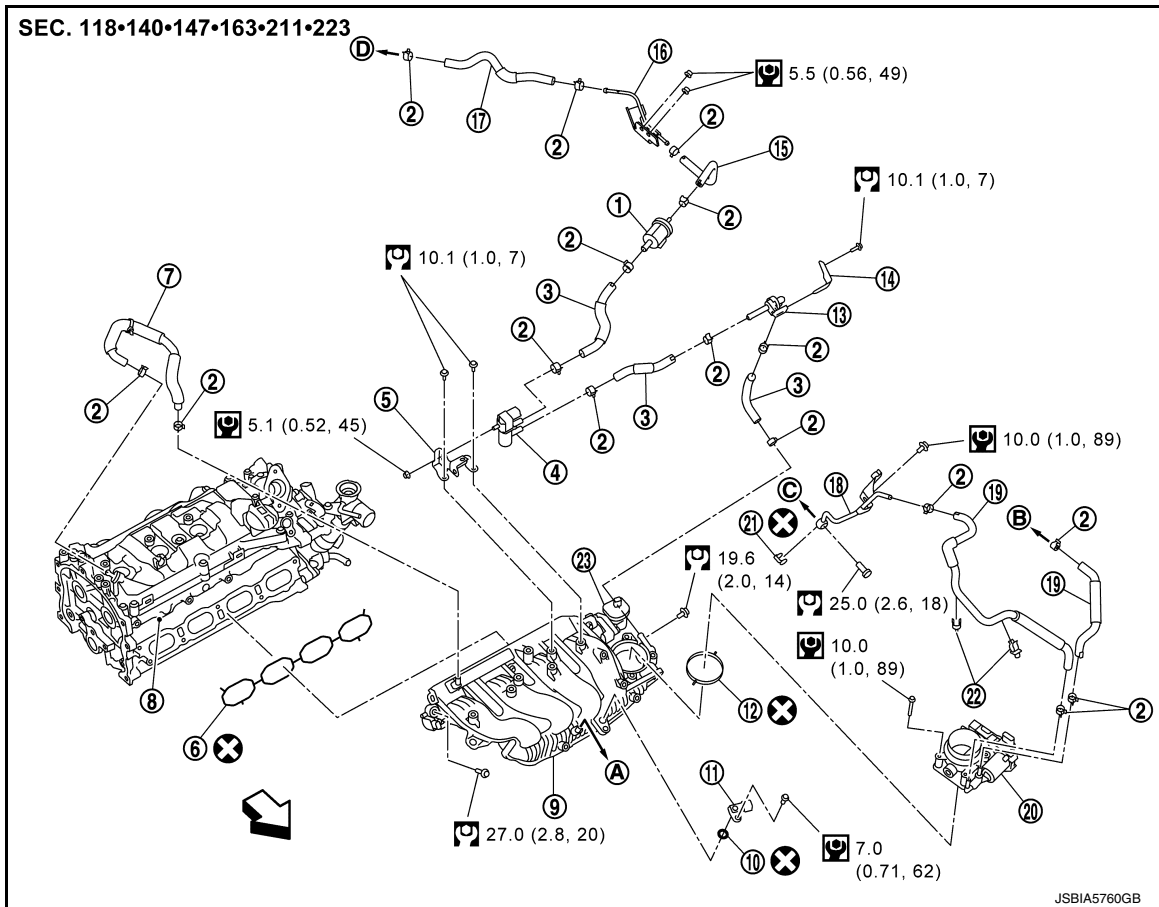
< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

## INTAKE MANIFOLD

### Exploded View

INFOID:0000000012197387



- |  |   |   |
|--|---|---|
| 1. Vacuum delay valve                                | 2. Hose clamp                                 | 3. EVAP hose                                      |
| 4. EVAP canister purge volume control solenoid valve | 5. Bracket                                    | 6. Gasket   |
| 7. PCV hose  | 8. Cylinder head                              | 9. Intake manifold                                |
| 10. O-ring   | 11. Throttle valve downstream pressure sensor | 12. Gasket  |
| 13. EVAP check valve                                 | 14. EVAP check valve bracket                  | 15. EVAP hose                                     |
| 16. EVAP tube  | 17. EVAP hose                                 | 18. Water hose tube                               |
| 19. Water hose                                       | 20. Electric throttle control actuator        | 21. Gasket  |
| 22. Clip   | 23. Intake manifold runner control valve      |   |
| A. To brake booster hose                             | B. To multi-way control valve                 | C. To exhaust manifold and turbo-charger assembly |

D. To underfloor central distribution pipe

⇐ : Vehicle front

⊗ : Always replace after every disassembly.

⊙ : N·m (kg-m, in-lb)

⊙ : N·m (kg-m, ft-lb)

## Removal and Installation

INFOID:0000000012197388

### REMOVAL

# INTAKE MANIFOLD

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

1. Remove the engine cover. Refer to [EM-191, "Removal and Installation"](#).
2. Pull out oil level gauge.  
**CAUTION:**  
**After removal, block the oil level gauge guide openings with tape so that no foreign material enters inside engine.**
3. Disconnect the turbocharger boost sensor harness connector. Refer to [EM-194, "Exploded View"](#).
4. Remove air inlet tube 1, air inlet tube 2, and the air inlet hose. Refer to [EM-194, "Exploded View"](#).
5. Disconnect the water hose from the electric throttle control actuator.
  - Install a clamp or plug onto the water hose for preventing coolant leakage.**CAUTION:**  
**Allow the engine to fully cool before starting operation.**  
**NOTE:**  
This work is not necessary when only the intake manifold is removed.
6. Disconnect the harness connector from the electric throttle control actuator.
7. Remove electric throttle control actuator.  
**CAUTION:**
  - **Never subject parts to impact.**
  - **Never disassemble or adjust. (Disassembly of this part is prohibited.)**
8. Disconnect the harness connector and EVAP hose from the EVAP purge volume control solenoid valve.  
**CAUTION:**  
**Never subject parts to impact.**
9. Disconnect the vacuum tube and vacuum hose.
10. Disconnect the PCV hose (intake manifold side).
11. Follow the procedure below and remove the intake manifold.
  - Loosen and remove bolts in the reverse order of the numerical order shown in the figure.

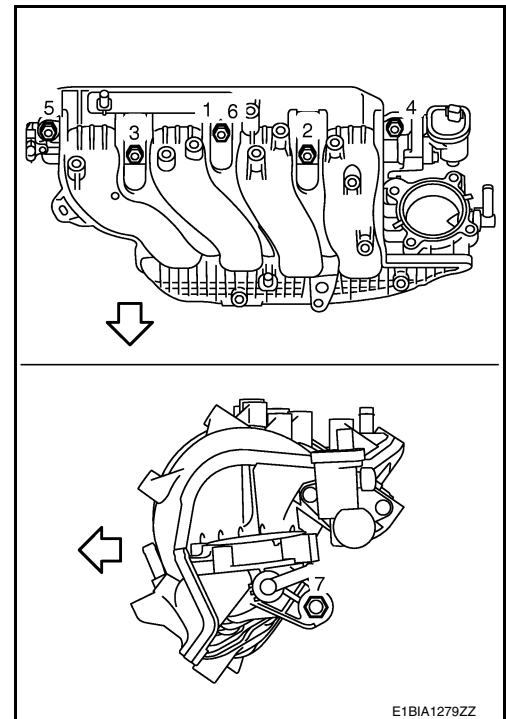
⇐ : Vehicle front

## NOTE:

Disregard the numerical order No.6 in removal.

## CAUTION:

**Block the openings with tape so that no foreign material enters the engine.**



12. If necessary, remove the EVAP purge control solenoid valve from the intake manifold.

## CAUTION:

**Never subject parts to impact.**

## INSTALLATION

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

### Intake Manifold

1. Install the gasket to the intake manifold mounting groove.
2. Follow the procedure below and install the intake manifold.

# INTAKE MANIFOLD

## < REMOVAL AND INSTALLATION >

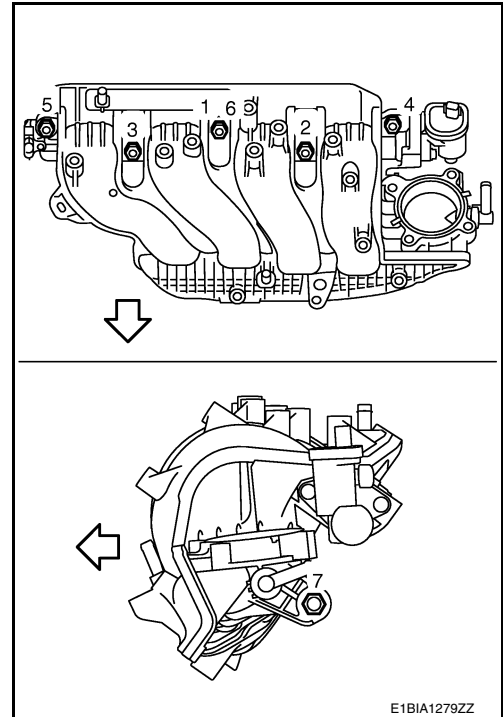
[MR EXCEPT FOR NISMO RS MODELS]

- Tighten the mounting bolts in the numerical order shown in the figure.

⇐ : Vehicle front

### NOTE:

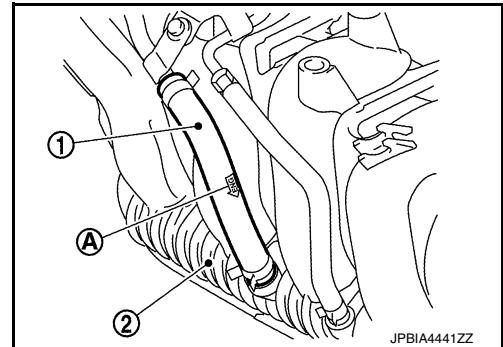
- Tighten bolt the No.1 in two steps.
- The numerical order No.6 shows the second step.



3. Install in the reverse order of removal after this step.

### CAUTION:

Since check valve is built-in inside vacuum hose (1), install the vacuum hose fitting the arrow (A) to intake manifold side (2).



### Electric Throttle Control Actuator

- Tighten bolts of electric throttle control actuator equally and diagonally in several steps.
- Perform "Throttle Valve Closed Position Learning" after repair when removing harness connector of the electric throttle control actuator. Refer to [EC-754, "Description"](#).
- Perform "Throttle Valve Closed Position Learning" and "Idle Air Volume Learning" after repair when replacing electric throttle control actuator. Refer to [EC-754, "Description"](#) and [EC-758, "Description"](#).

## Inspection

INFOID:0000000012197389

### INSPECTION AFTER REMOVAL

#### Vacuum Hose (With Check Valve)

Check the check valve. Refer to [BR-47, "Inspection"](#).

### INSPECTION AFTER INSTALLATION

Run the engine while checking the installation of parts. Check for exhaust gas leakage or noise.

# OIL PAN (LOWER)

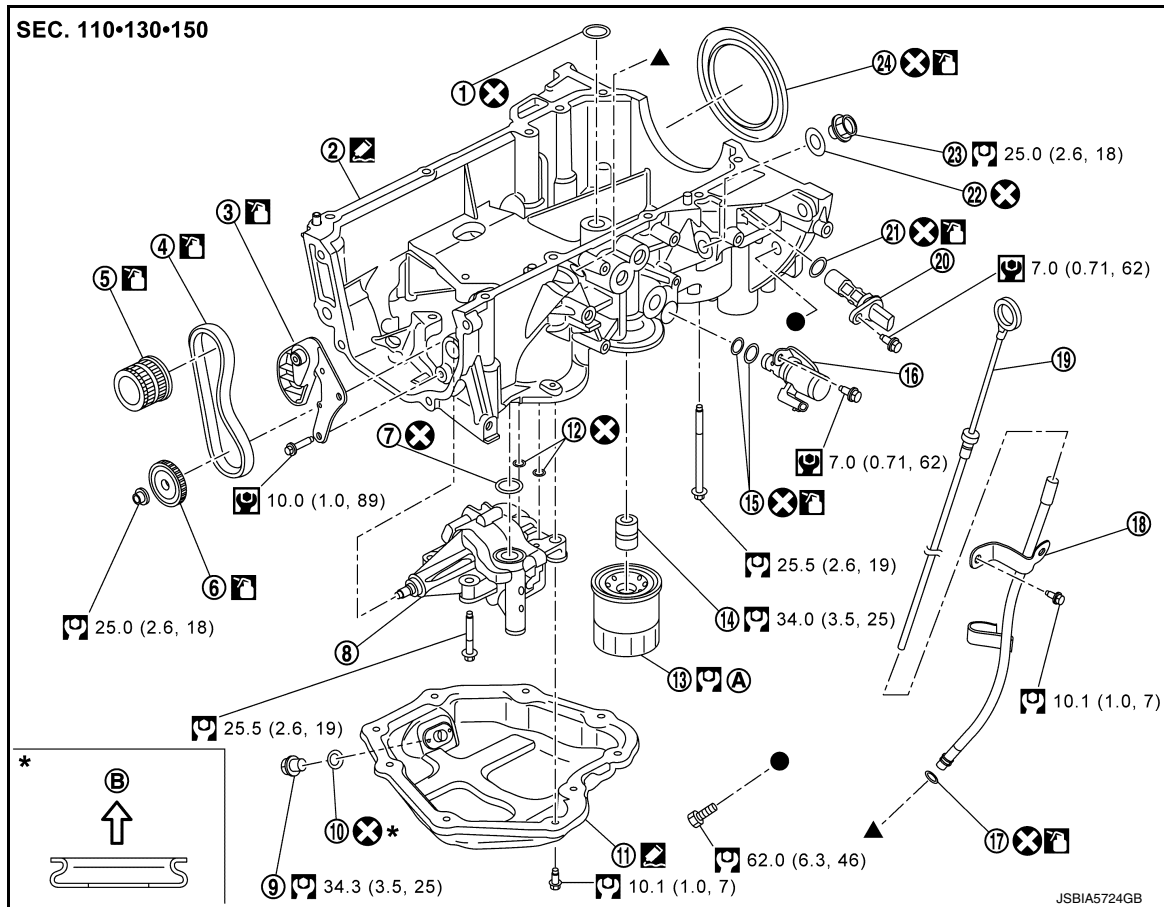
< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

## OIL PAN (LOWER)

Exploded View

INFOID:000000012197390



- |  |                                |                                   |
|--|--------------------------------|-----------------------------------|
| 1. O-ring                                      | 2. Oil pan (upper)             | 3. Oil pump drive chain tensioner |
| 4. Oil pump drive chain                        | 5. Crankshaft sprocket         | 6. Oil pump sprocket              |
| 7. O-ring                                      | 8. Oil pump                    | 9. Oil pan drain plug             |
| 10. Drain plug washer                          | 11. Oil pan (lower)            | 12. O-ring                        |
| 13. Oil filter                                 | 14. Oil filter stud            | 15. O-ring                        |
| 16. Engine oil pressure control solenoid valve | 17. O-ring                     | 18. Oil level gauge guide         |
| 19. Oil level gauge                            | 20. Crankshaft position sensor | 21. O-ring                        |
| 22. Gasket                                     | 23. Plug                       | 24. Rear oil seal                 |
| A. Refer to <a href="#">LU-27</a> .            | B. Oil pan side                |                                   |

: Always replace after every disassembly.

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Sealing point

: Should be lubricated with oil.

●, ▲: Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:000000012197391

### CAUTION:

Fill with engine oil 30 minutes or more after the oil pan is installed.

## OIL PAN (LOWER)

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

### NOTE:

For the check of each part after installation, refer to [EM-202, "Inspection"](#).

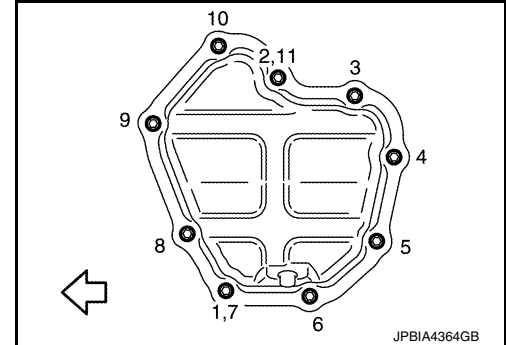
### REMOVAL

1. Drain engine oil. Refer to [LU-29, "Refilling"](#).
2. Remove the oil pan (lower) according to the following procedure.
  - a. Loosen and remove bolts in the reverse order of the numerical order shown in the figure.

⇐ : Engine front

### NOTE:

Disregard the numerical order No.7 and No.11 in removal.



- b. Cut off the liquid gasket using a seal cutter [SST: KV10111100 (J-37228)] and remove the oil pan (lower).

### CAUTION:

- Never damage the mating surface.
- Never insert a screwdriver. This damages the mating surfaces.

### INSTALLATION

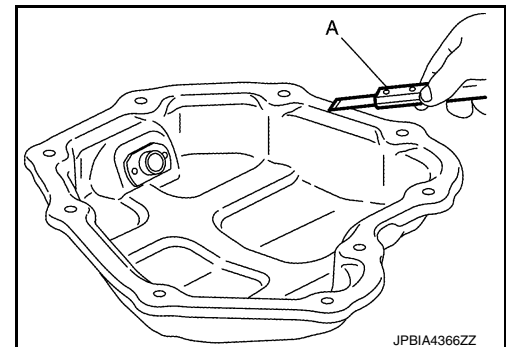
### CAUTION:

Never reuse drain plug washer.

1. Install oil pan (lower) as follows:
  - a. Use a scraper (A) to remove old liquid gasket from mating surfaces.
    - Also remove old liquid gasket from mating surface of oil pan (upper).
    - Remove old liquid gasket from the bolt holes and threads.

### CAUTION:

Never scratch or damage the mating surface when cleaning off old liquid gasket.





## OIL PAN (LOWER)

### < REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

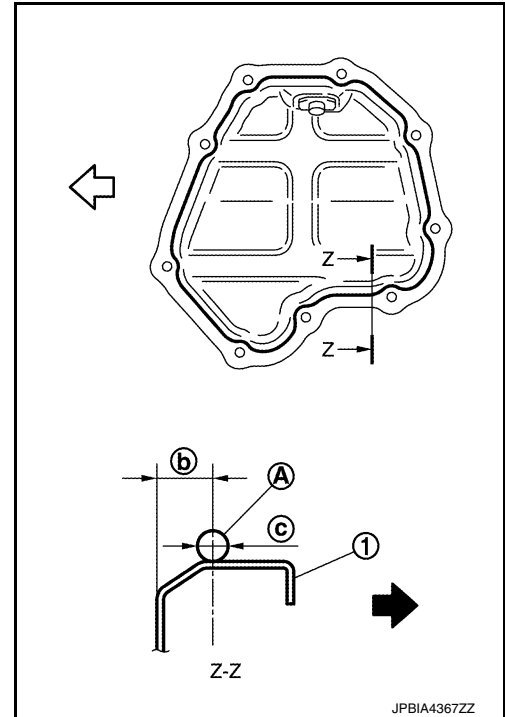
- b. Apply a continuous bead of liquid gasket (A) with a tube presser (commercial service tool) as shown in the figure.

- 1 : Oil pan (lower)  
 b : 7.5 - 9.5 mm (0.295 - 0.374 in)  
 c :  $\phi$  4.0 - 5.0 mm (0.157 - 0.197 in)  
 : Engine outside  
 : Engine front


Use Genuine RTV Silicon Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).

**CAUTION:**

Attaching should be done within 5 minutes after liquid gasket application.

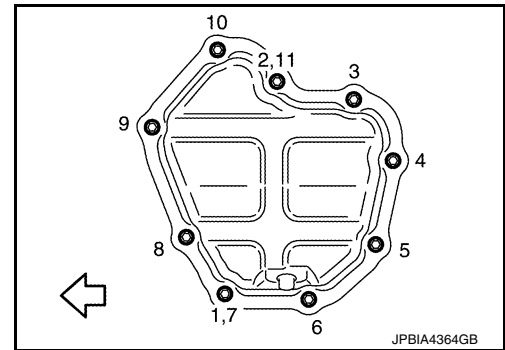


- c. Tighten bolts in numerical order as shown in the figure.

-  : Engine front

**NOTE:**

- Tighten bolts the No.1 and No.2 in two steps.
- The numerical order No.7 and No.11 shows the second steps.



2. Install oil pan drain plug.

**CAUTION:**

**Never reuse drain plug washer.**

- Refer to the figure of components of former page for installation direction of drain plug washer. Refer to [EM-200, "Exploded View"](#).

3. Install in the reverse order of removal after this step.

### Inspection

INFOID:0000000012197392

#### INSPECTION AFTER REMOVAL

Clean oil strainer if any object attached.

#### INSPECTION AFTER INSTALLATION

1. Check the engine oil level and adjust engine oil. Refer to [LU-28, "Inspection"](#).
2. Start engine, and check there is no leakage of engine oil.
3. Stop the engine and wait for approximately 10 minutes.
4. Check the engine oil level again. Refer to [LU-28, "Inspection"](#).

# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

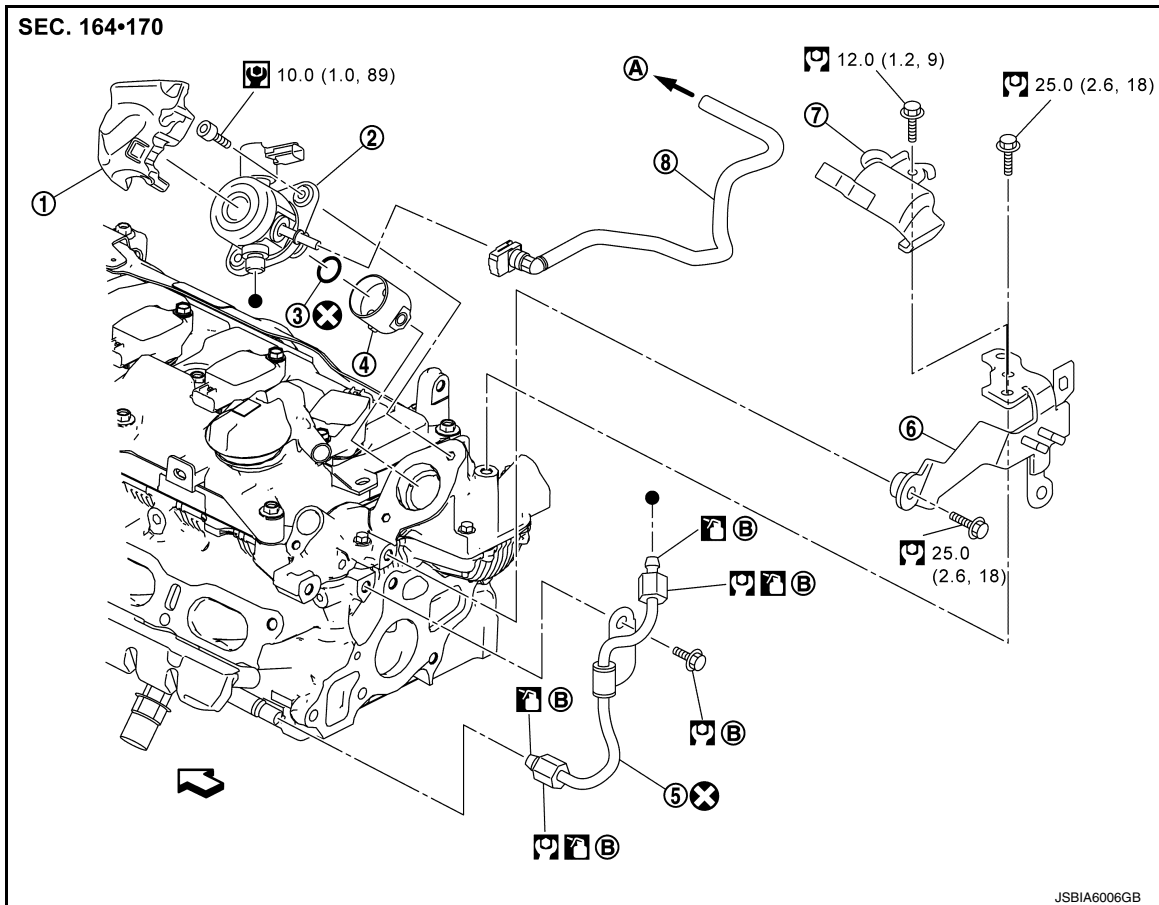
## HIGH PRESSURE FUEL PUMP AND FUEL HOSE

### Exploded View

INFOID:000000012197393

#### CAUTION:

Never disassemble or remove components beyond the configuration shown in the figure.



- |  |   |            |
|--|---|------------|
| 1. High-pressure fuel pump insulator           | 2. High-pressure fuel pump  | 3. O-ring  |
| 4. High-pressure fuel pump lifter              | 5. High-pressure fuel tube  | 6. Bracket |
| 7. High-pressure fuel pump connector protector | 8. Fuel feed hose   |            |
| A. To underfloor central distribution pipe     | B. Comply with the assembly procedure when tightening. <a href="#">EM-203</a> . |            |

↩ : Engine front

⊗ : Always replace after every disassembly.

⊙ : N·m (kg-m, ft-lb)

⊙ : N·m (kg-m, in-lb)

⊙ : Should be lubricated with oil.

● : Indicates that the parts is connected at points with same symbols in actual vehicle.

### Removal and Installation

INFOID:000000012197394

#### REMOVAL

#### WARNING:

- Be sure to read [EM-153, "Precaution for Handling High Pressure Fuel System"](#) when working on the high pressure fuel system.

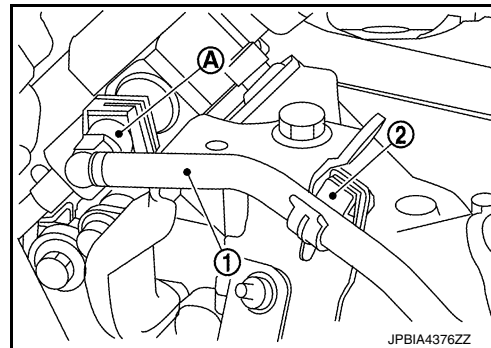
# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- 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 engine is hot.

1. Release fuel pressure. Refer to [EC-771, "Work Procedure"](#).
  2. Remove the engine cover. Refer to [EM-191, "Removal and Installation"](#).
  3. Remove the high-pressure fuel pump connector protector and the high-pressure fuel pump insulator.
  4. Follow the procedure below and disconnect the quick connector (A).
- a. Disconnect the hose clamp bracket (2) from the fuel feed hose (1).



- b. Follow the procedure below and disconnect the fuel feed connector from the high-pressure fuel pump.
  1. Expand the two engaged retainer tabs in direction (A) to disengage them.

**Retainer color** : Red

2. Press the retainer up in direction (B) to the point as shown by (C).

**CAUTION:**

**Never remove the retainer completely.**

3. Disconnect the fuel feed hose.

**CAUTION:**

**Grasp part (D) as shown in the figure, and pull it out.**

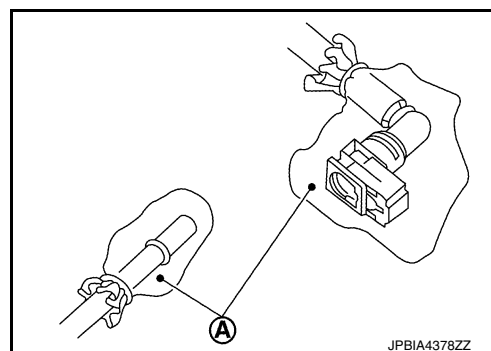
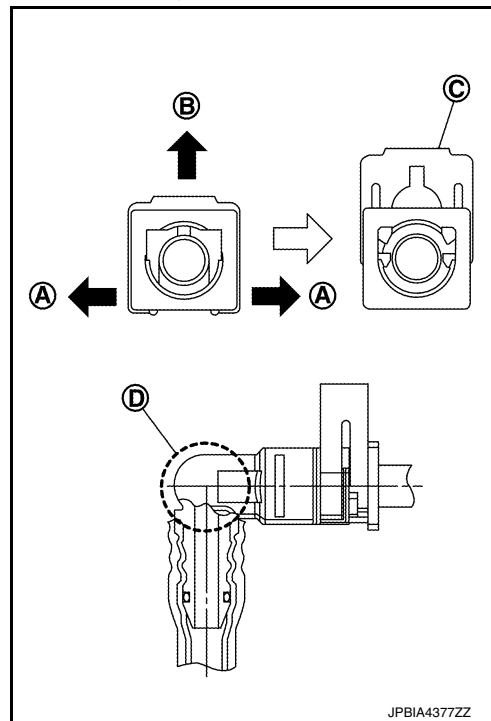
**NOTE:**

If the fuel feed hose connection is stuck, grasp the pipe, push/pull it back and forth so that the hose moves, and disconnect it.

**CAUTION:**

- Keep removed parts away from flame and high-temperature locations.
- Never allow removed parts to contact battery fluid or other acids.
- When removing and installing, be careful that the fuel feed hose and quick connector are not bent or twisted.
- Because fuel leakage occurs, prepare a tray, shop cloth, and other items in advance.
- Never pull in a lateral direction. The O-ring inside may be damaged.

- To prevent damage to each joint and protect it from the entry of foreign matter, cover the joint with plastic bag (A) or an equivalent.





# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

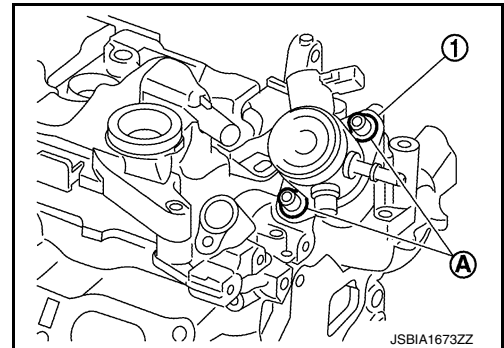
< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

5. Remove intake manifold. Refer to [EM-197, "Removal and Installation"](#).
6. Disconnect the high-pressure fuel tube.
7. Note the following and remove the high-pressure fuel pump (1) and high-pressure fuel pump lifter.

## CAUTION:

For preventing damage to the high-pressure fuel pump and camshaft bracket, loosen the bolts (A) alternately one turn at a time until the reaction force applied to the bolts (A) by the high-pressure fuel pump disappears.

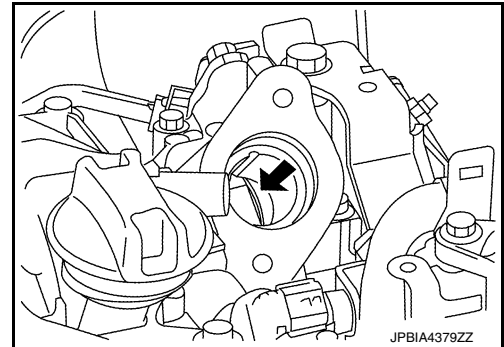


## INSTALLATION

### CAUTION:

Because there is a risk of part damage caused by abnormally generated pressure or uneven weight, be sure to observe the installation procedure.

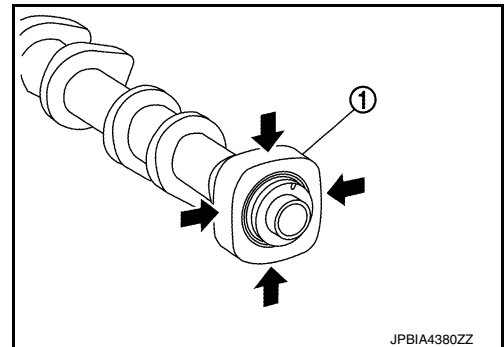
1. Follow the procedure below and install the high-pressure fuel pump.
  - a. Turn the crankshaft pulley to the TDC position.
  - b. Check that the flat surface from the high-pressure fuel pump mounting part (↔) to the high-pressure fuel pump drive cam is parallel to the high-pressure fuel pump mounting surface (when the cam is at the lowest position).



### NOTE:

- When the piston is at TDC, one of the flat surfaces of the high-pressure fuel pump drive cam (↔) is parallel to the high-pressure fuel pump installation surface (when the cam is at the lowest position).

1 : Camshaft (EXH)



- c. Note the following items, and install a new O-ring onto the high-pressure fuel pump.

### CAUTION:

- Handle O-ring with bare hands. (Never wear gloves.)
- Lubricate O-ring with engine oil (low viscosity oil such as 5W-30).
- Never clean O-ring using solvent.
- Check that the O-ring and its mating part are free of foreign material.
- When installing O-ring, never scratch it with tool or fingernails. Never twist or stretch the O-ring.
- Insert O-ring straight into the high-pressure fuel pump. Never decenter or twist it.

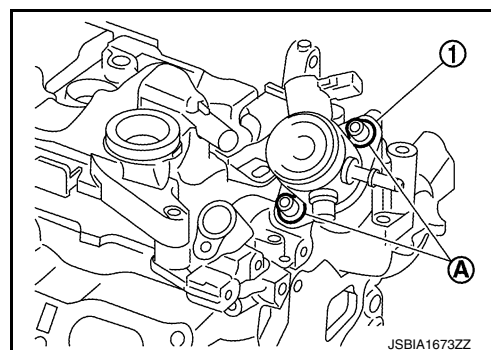
- d. Reinstall the high-pressure fuel pump lifter.
- e. Follow the procedure below and install the high-pressure fuel pump.
- i. Apply engine oil to the high-pressure fuel pump mounting surface on the camshaft bracket and to the O-ring.

# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- ii. Temporarily tighten the bolts (A) by hand, and then tighten the bolts (A) alternately one rotation at a time until the high-pressure fuel pump flange (1) contacts the camshaft bracket.
- iii. Tighten the bolts (A) to the specified torque.

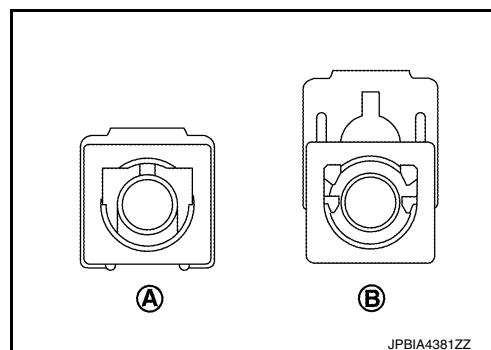


2. Follow the procedure below and install the fuel feed hose.
  - a. Check the fuel tube and quick connector for damage or foreign material.
  - b. Check that the axis is lined up when inserting the quick connector into the fuel tube.
  - c. Insert the retainer until a "click" sound is heard, and check that the retainer is securely installed. Pull the quick connector by hand and check that it is locked.

- A : Engaged condition  
B : Not engaged condition

## CAUTION:

If the retainer cannot be inserted smoothly, the quick connector may not be connected correctly. Remove the quick connector and then check the connection of quick connector again.



- d. Secure fuel feed hose to clamp.
3. Follow the procedure below and install the high-pressure fuel tube.

## CAUTION:

- Never reuse the high-pressure fuel hose. Always use a new one.
- If scratches or damage on the end of the high-pressure fuel tube are present, never use it.
- Always tighten in the correct order to the specified tightening torque.

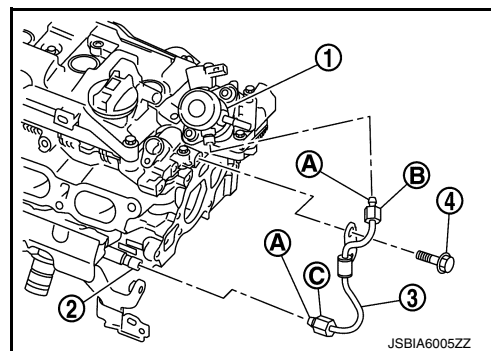
- a. Apply new engine oil to high-pressure fuel tube flare nipple (A) and flare nuts (B),(C).

## CAUTION:

Check that there is no foreign material on the high-pressure fuel tube flare nipple and flare nuts.

- b. Temporarily tighten until the high-pressure fuel tube (3) flare nuts (B) and (C) contact the seat.

- 1 : High-pressure fuel pump  
2 : Fuel rail



## CAUTION:

When temporarily tightening the flare nuts, insert them so that they are aligned with the center of the pipe.

- c. Tighten the high-pressure fuel tube bracket mounting bolt (4) to the specified torque.

 : 25.0 N·m (2.6 kg-m, 18 ft-lb)

- d. Tighten flare nuts to the specified torque in the order of (B) and (C).

 : 36.0 N·m (3.7 kg-m, 27 ft-lb)

## CAUTION:

Before tightening, check that the tool is attached at a 90° angle to the flare nut when working.

# HIGH PRESSURE FUEL PUMP AND FUEL HOSE

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- e. Again tighten flare nuts to the specified torque in the order of (B) and (C).

 : 36.0 N·m (3.7 kg-m, 27 ft-lb)

## CAUTION:

Before tightening, check that the tool is attached at a 90° angle to the flare nut when working.

4. Note the following and install the removed parts in the reverse order of removal.

## Inspection

INFOID:0000000012197395

## INSPECTION AFTER INSTALLATION

### Fuel Leakage Check

Check for fuel leakage according to the following procedure.

1. Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at the locations where parts are removed and reinstalled.

### NOTE:

Use a mirror or other means to check locations which cannot be seen directly.

2. Start the engine, increase the engine speed and again check for fuel leakage at the locations where parts are removed and reinstalled.

## CAUTION:

Be careful of burns when checking.

# FUEL INJECTOR

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

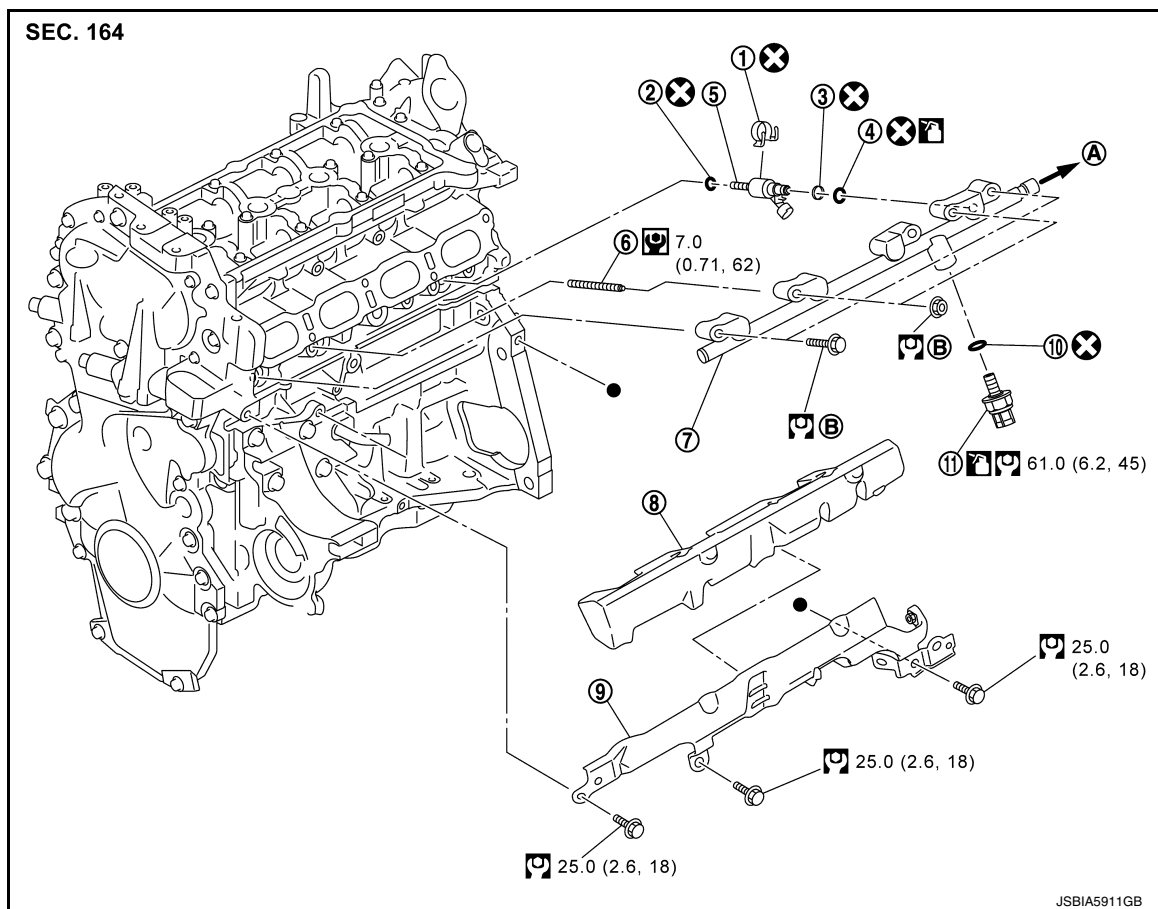
## FUEL INJECTOR

### Exploded View

INFOID:000000012197396

#### CAUTION:

Never disassemble or remove components beyond the configuration shown in the figure.



- |                    |   |                    |
|--------------------|---|--------------------|
| 1. Injector holder | 2. Seal ring (white)  | 3. Backup ring     |
| 4. O-ring (blue)   | 5. Fuel injector  | 6. Stud bolt       |
| 7. Fuel rail       | 8. Fuel rail insulator  | 9. Fuel rail cover |
| 10. Gasket         | 11. Fuel rail pressure sensor   |                    |
| A. To fuel tube    | B. Comply with the assembly procedure when tightening. <a href="#">EM-208</a> . |                    |

⊗: Always replace after every disassembly.

⊞: N·m (kg-m, ft-lb)

⊞: N·m (kg-m, in-lb)

⊞: Should be lubricated with oil.

●: Indicates that the parts is connected at points with same symbols in actual vehicle.

### Removal and Installation

INFOID:000000012197397

#### WARNING:

- Be sure to read [EM-153, "Precaution for Handling High Pressure Fuel System"](#) when working on the high pressure fuel system.
- 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.

# FUEL INJECTOR

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- To avoid the danger of being scalded, never drain engine coolant when engine is hot.

## REMOVAL

1. Release fuel pressure. Refer to [EC-771, "Work Procedure"](#).
2. Remove the front bumper. Refer to [EXT-17, "Removal and Installation"](#).
3. Remove the charge air cooler. Refer to [EM-194, "Removal and Installation"](#).
4. Remove the oil level gauge.
5. Remove the intake manifold. Refer to [EM-197, "Removal and Installation"](#).
6. Remove the alternator. Refer to [CHG-33, "MR16DDT : Removal and Installation"](#).
7. Remove the oil level gauge guide. Refer to [EM-282, "Exploded View"](#).
8. Remove the fuel rail cover and fuel rail insulator.
9. Remove the fuel tube. Refer to [EM-203, "Exploded View"](#).

### CAUTION:

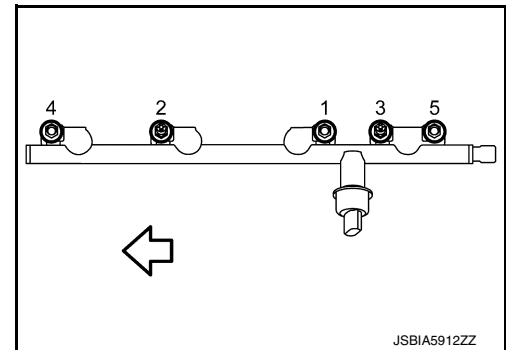
Because fuel leakage occurs, prepare a tray, shop cloth, and other items in advance.

10. Disconnect the fuel rail pressure sensor harness connector.
11. Disconnect the fuel injector harness connector.
12. Remove the fuel rail pressure sensor if necessary.
13. Remove the fuel rail.
  - Loosen mounting bolts in the reverse order of the numerical order shown in the figure, and remove the fuel rail.

⇐ : Engine front

### CAUTION:

- Be careful that no parts interfere with the fuel injectors.
- Because fuel leakage occurs, prepare a tray, shop cloth, and other items in advance.

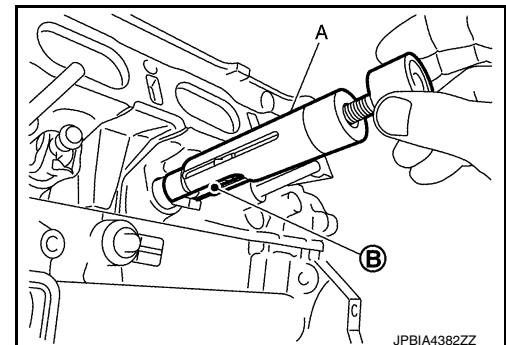


14. Follow the procedure below and remove the fuel injector from the fuel tube.

### CAUTION:

- Be careful of leakage of fuel remaining in fuel tube.
- Never damage the nozzle of fuel injector.
- Never subject parts to impact by dropping or hitting.
- Never disassemble or adjust. (Disassembly and adjustment of this part is prohibited.)

- a. Remove the injector holder.
- b. Install the injector remover [SST: KV10119600 ( — )] (A) with the slit (B) aligned with the fuel injector connector.

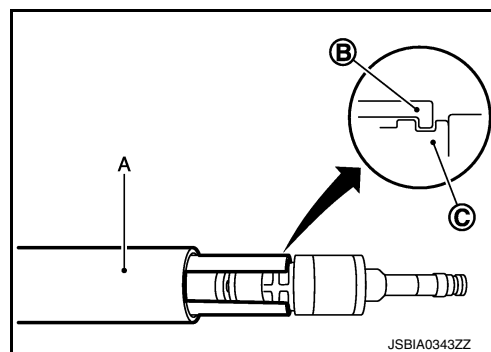


## FUEL INJECTOR

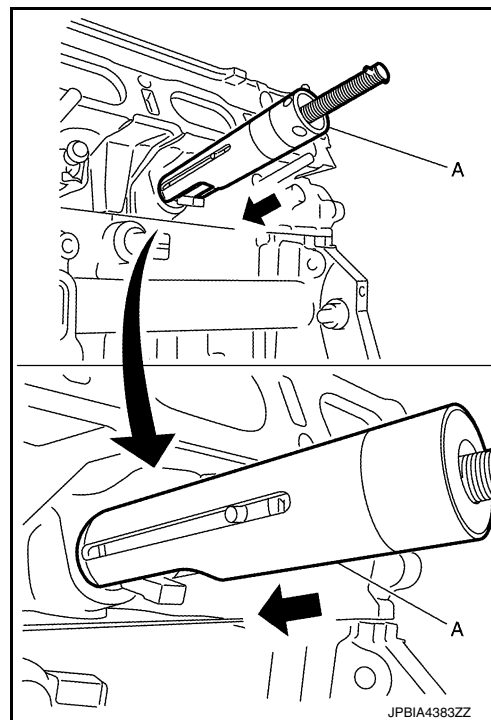
### < REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

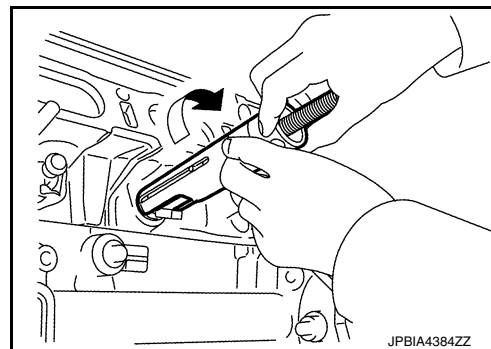
- Insert the tab (B) of the injector remover [SST: KV10119600 ( — )] (A) into the fuel injector groove (C).



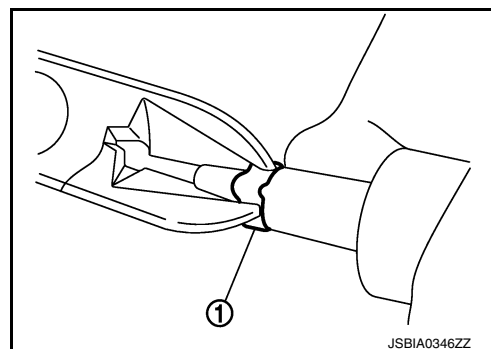
- c. Press the body of the injector remover [SST: KV10119600 ( — )] (A) until it contacts the cylinder head.



- d. Tighten the injector remover [SST: KV10119600 ( — )] clockwise, and remove injector from cylinder head.



- e. Pinch the seal ring (1) and cut it off. Never scratch the fuel injector.



# FUEL INJECTOR

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

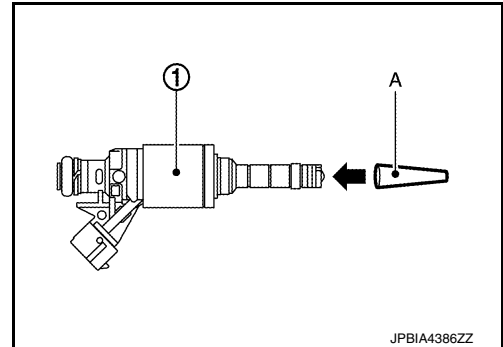
## INSTALLATION

1. Follow the procedure below and install the seal ring onto the fuel injector.

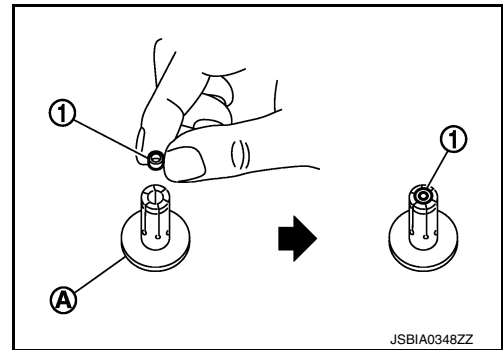
**CAUTION:**

- Handle the O-ring with bare hands. (Never wear gloves when handling O-ring.)
- Never apply engine oil to the seal ring.
- Never use solvents or similar substances to clean the seal ring.

- a. Install the injector seal drift [SST: KV101197S0 ( — )] (A) onto the fuel injector (1).



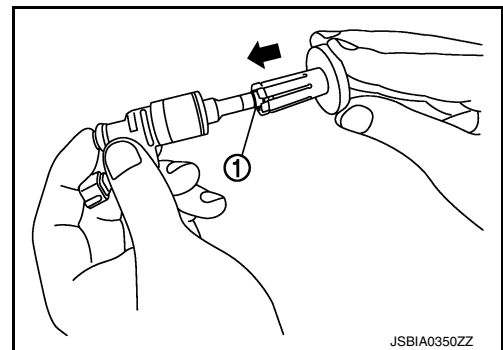
- b. Set the seal ring (1) onto the injector seal drift [SST: KV101197S0 ( — )] (A).



- c. Install the seal ring (1) set in step 2 by inserting it straight into the fuel injector as shown in the figure.

**CAUTION:**

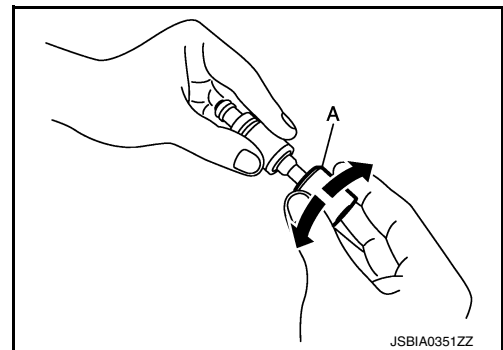
When inserting the seal ring, never insert it further than the groove portion of the fuel injector.



- d. After installing the seal ring onto the fuel injector, install the injector seal drift [SST: KV101197S0 ( — )] (A) onto the fuel injector as shown in the figure. Turn it left and right by 90° at a time until it contacts the seal ring to settle the seal ring in place.

**NOTE:**

For correcting any elongation of the seal ring that occurs when the injector seal drift is installed, use the drift so that the seal ring is pressed and contracted.



2. Note the following points and install the O-ring and backup ring to the fuel injector.

**CAUTION:**

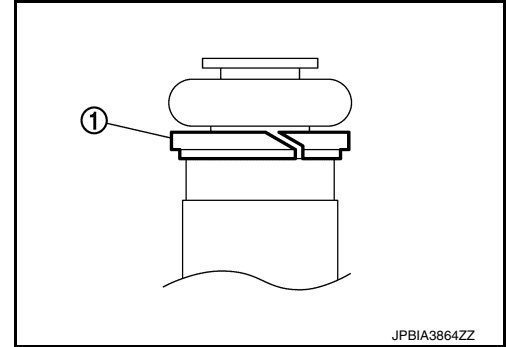
- Be sure to handle the O-ring with bare hands. (Never wear gloves.)
- Apply engine oil to the O-ring.
- Never use solvents or similar substances when cleaning the O-ring seal.

# FUEL INJECTOR

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- Check that the O-ring and its mating part are free of foreign material.
- When installing O-ring, never scratch it with tool or fingernail. Also never twist or stretch O-ring. If O-ring is stretched while being attached, never insert it immediately.
- Insert O-ring straight onto fuel tube. Never decenter or turn it.
- Both the fuel rail adapter and backup ring (1) have a tapered cross-section shape. Therefore, be careful of the orientation when installing them.



- Follow the procedure below and install the fuel rail (2) to the fuel injector (1).

3 : O-ring (blue)

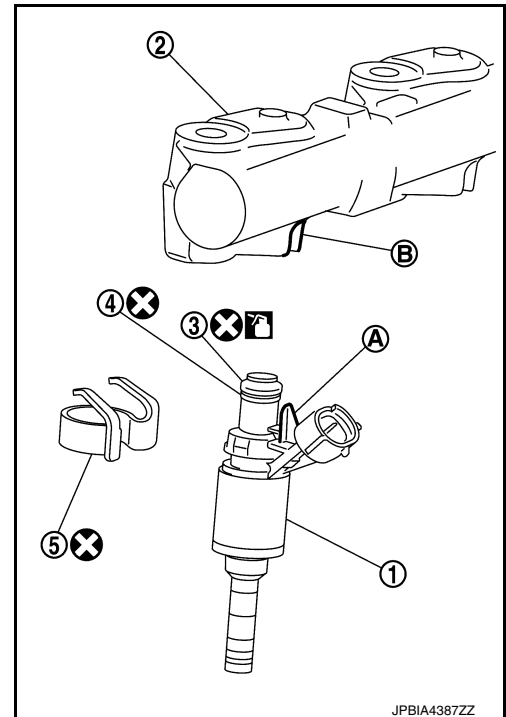
4 : Backup ring

- Install the injector holder (5) onto the fuel injector.

**CAUTION:**

- Never reuse the injector holder. Always use a new one.
- Check that the injector holder does not contact the O-ring. If the clip contacts the O-ring, replace the O-ring.

- With the injector holder installed, insert the fuel injector into the fuel rail.
  - Check that the axis is lined up when inserting.
  - Insert so that the fuel tube projection (A) is aligned with the notch (B).
- Check that the fuel injector is securely installed, and does not turn or come out.
  - Check that the projection on the fuel injector is fastened into the fastening groove on the fuel rail.



- Install the fuel injector assembly into the cylinder head installation hole.

**CAUTION:**

**Be careful to prevent contact with the end of the injector nozzle.**

- Tighten mounting bolts in two steps in the numerical order shown in the figure.

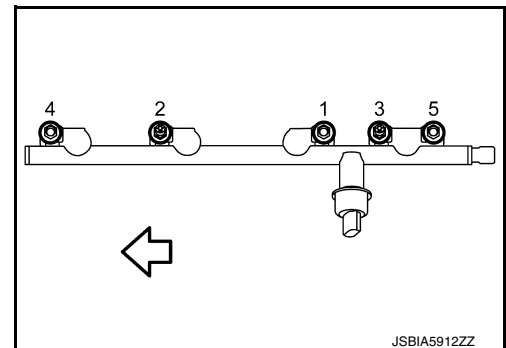
⇐ : Engine front

**First**

**tightening** : 10.0 N·m (1.0 kg-m, 89 in-lb)

**Second**

**tightening** : 25.0 N·m (2.6 kg-m, 18 ft-lb)



- If the fuel rail pressure sensor is removed, install it.

**CAUTION:**

**Apply oil to the threads of the fuel rail pressure sensor before installing.**

- Connect the fuel rail pressure sensor harness connector.
- Connect the fuel injector harness connector.



# FUEL INJECTOR

< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

8. Install the fuel rail insulator.

**CAUTION:**

- Because the part on the rear end of the fuel rail which covers the fuel rail adapter is a shape that can be moved easily, never remove it before assembling.
- Install the insulator so that it is underneath the intake manifold flange.

9. Install removed parts in the reverse order of removal.

## Inspection

INFOID:0000000012197398

## INSPECTION AFTER INSTALLATION

### Fuel Leakage Inspection

Check for fuel leakage according to the following procedure.

1. Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at the locations where parts are removed and reinstalled.

**NOTE:**

Use a mirror or other means to check locations that cannot be seen directly.

2. Start the engine, increase the engine speed, and check again for fuel leakage at the locations where parts are removed and reinstalled.

**CAUTION:**

**Be careful of burns when checking.**

# IGNITION COIL, SPARK PLUG AND ROCKER COVER

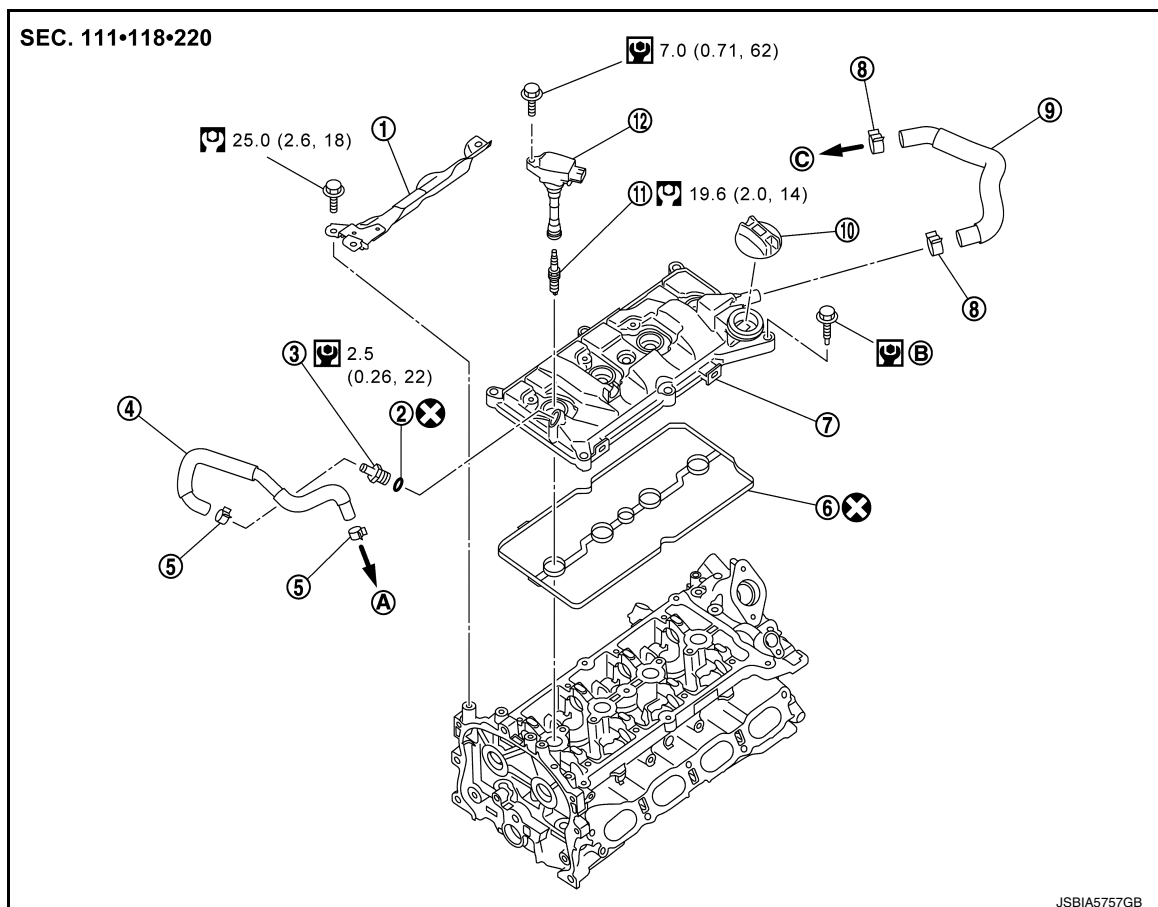
< REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

## IGNITION COIL, SPARK PLUG AND ROCKER COVER

Exploded View

INFOID:000000012197399



JSBIA5757GB

- |                           |   |   |
|---------------------------|---|---|
| 1. Rocker cover protector | 2. O-ring   | 3. Positive Crank Ventilation (PCV) valve |
| 4. PCV hose               | 5. Clamp  | 6. Rocker cover gasket                    |
| 7. Rocker cover           | 8. Clamp  | 9. PCV hose                               |
| 10. Oil filler cap        | 11. Spark plug  | 12. Ignition coil                         |
| A. To intake manifold     | B. Comply with the assembly procedure when tightening. <a href="#">EM-214</a> . | C. To turbocharger inlet tube             |

⊗: Always replace after every disassembly.

⊙: N·m (kg-m, ft-lb)

⊙: N·m (kg-m, in-lb)

## Removal and Installation

INFOID:000000012197400

### REMOVAL

1. Drain coolant. Refer to [CO-40, "Draining and Filling"](#).
2. Remove the engine cover. Refer to [EM-191, "Removal and Installation"](#).
3. Disconnect air inlet pipe 3, air inlet pipe 1, and the recirculation hose. Refer to [EM-194, "Exploded View"](#).
4. Disconnect the water hose (between the electric throttle control actuator and turbocharger). Refer to [EM-197, "Exploded View"](#).
5. Remove the PCV hose from rocker cover.
6. Remove the rocker cover protector.

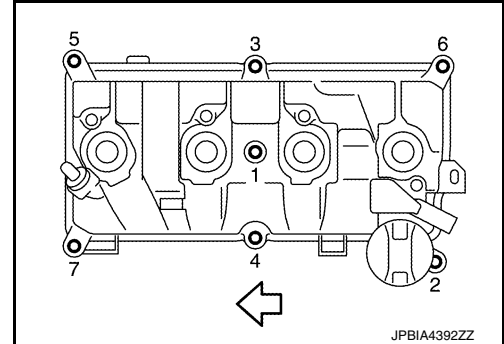
# IGNITION COIL, SPARK PLUG AND ROCKER COVER

## < REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

7. Remove the ignition coil.
  - CAUTION:**
  - **Never subject parts to impact.**
  - **Never disassemble the ignition coil.**
8. Remove PCV valve if necessary.
9. Move the ignition coil harness to secure space for work.
10. Loosen bolts in the reverse order of the numerical order shown in the figure to remove rocker cover.

⇐ : Engine front

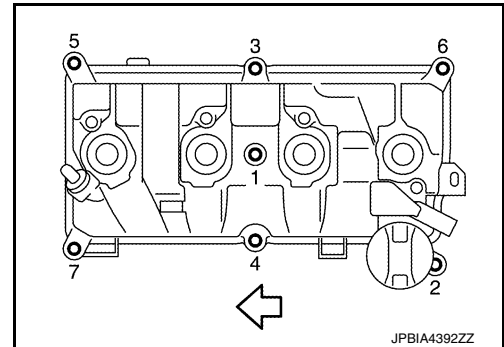


## INSTALLATION

1. Install the rocker cover according to the following procedure.
  - a. Install the rocker cover to the cylinder head.
    - CAUTION:**
    - Check that the gasket is not dropped.**
  - b. Tighten bolts evenly in two steps in the order as shown in the figure. Tighten the mounting bolts to the specified torque.

⇐ : Engine front

**First tightening torque : 1.96 N·m (0.20 kg-m, 17 in-lb)**  
**Second tightening : 8.33 N·m (0.85 kg-m, 74 in-lb)**  
**torque**



2. Install the PCV valve.
  - Insert flange of PCV valve until it closely contacts the grommet.
3. Install removed parts in the reverse order of removal.

# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

## UNIT REMOVAL AND INSTALLATION

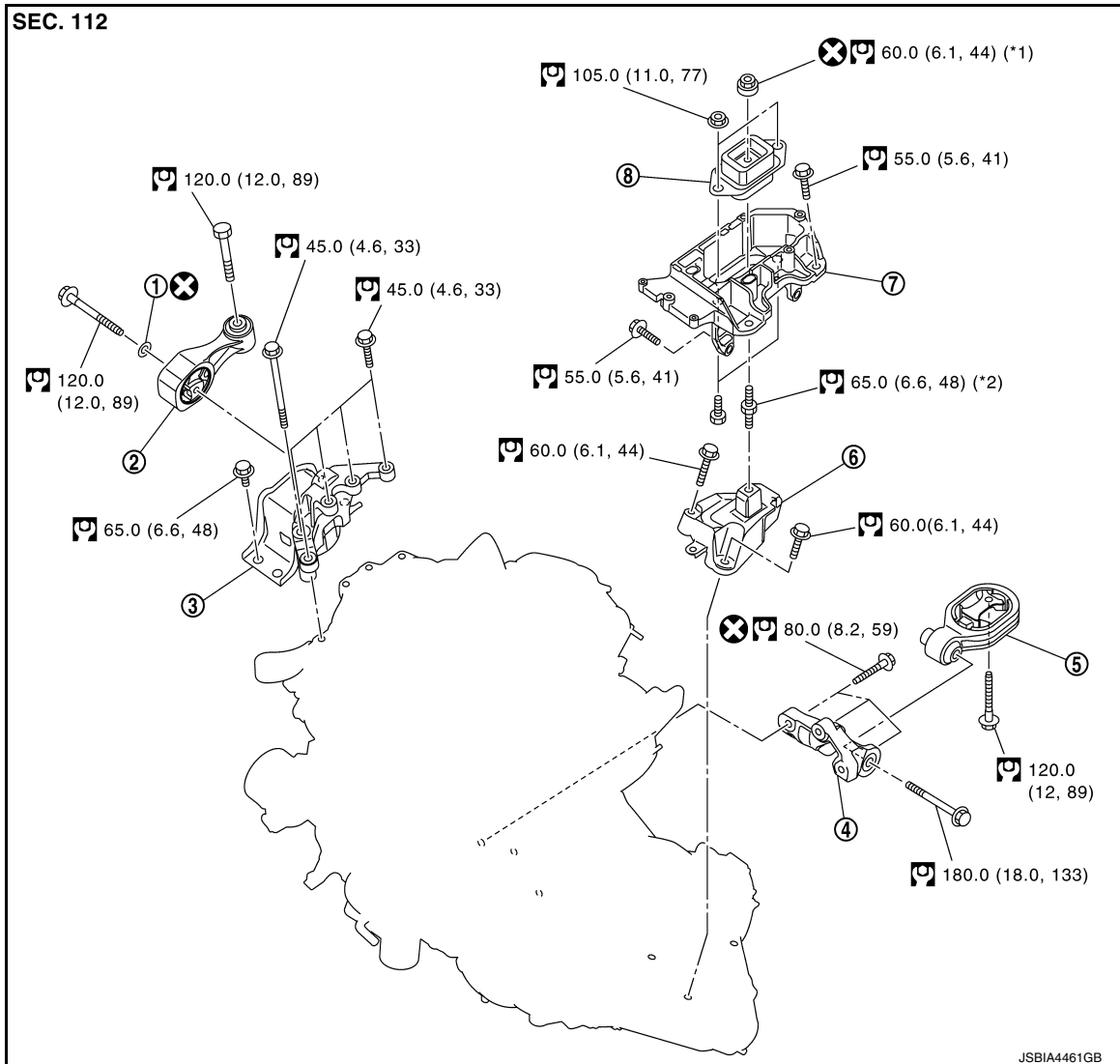
### ENGINE ASSEMBLY

2WD

2WD : Exploded View

INFOID:0000000012197401

M/T



- |                                       |                                   |                                   |
|---------------------------------------|-----------------------------------|-----------------------------------|
| 1. Washer                             | 2. Upper torque rod (RH)          | 3. Engine mounting insulator (RH) |
| 4. Rear torque rod bracket            | 5. Rear torque rod                | 6. Engine mounting bracket (LH)   |
| 7. Engine mounting frame support (LH) | 8. Engine mounting insulator (LH) |                                   |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

#### CAUTION:

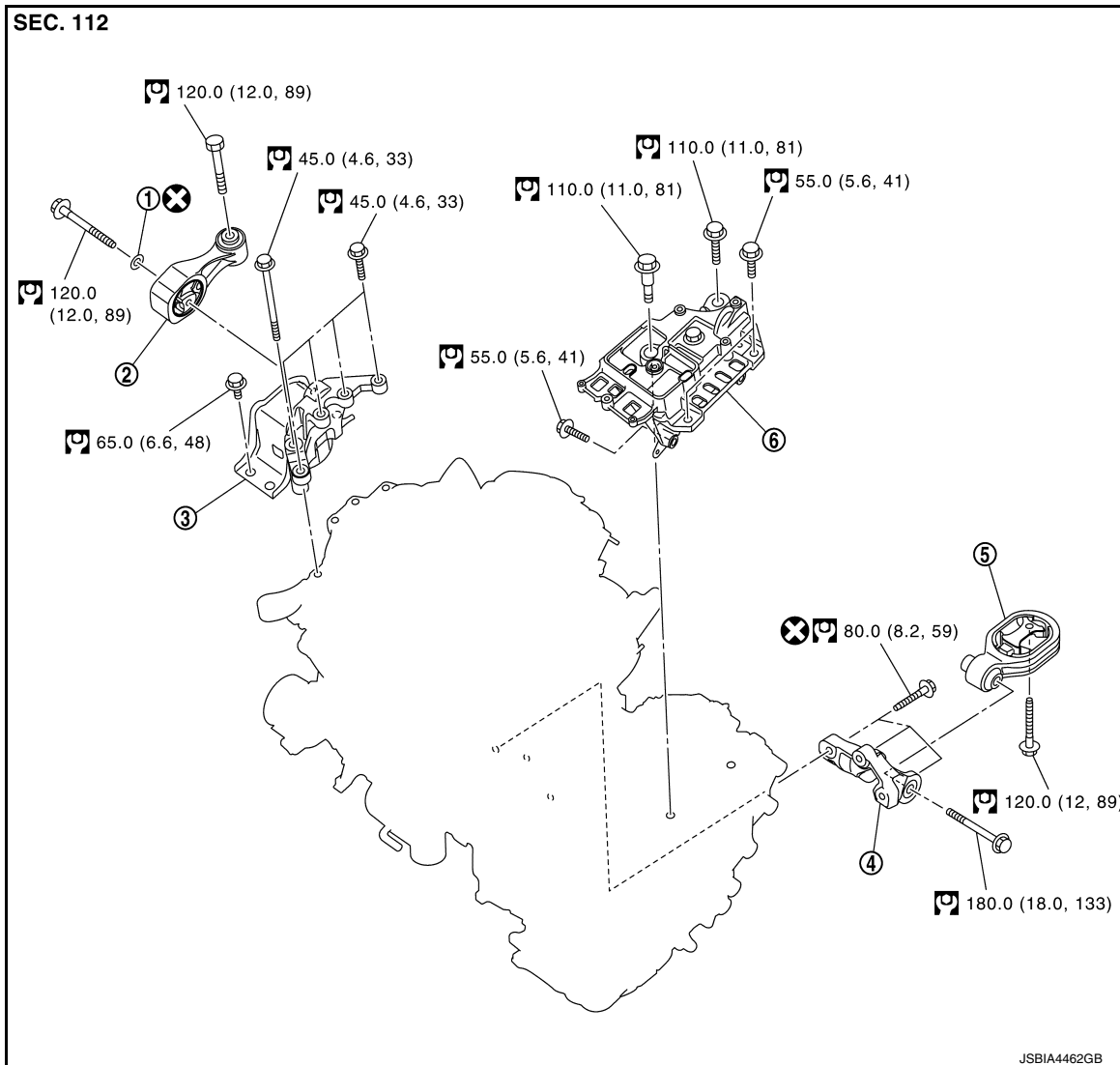
Check that the stud bolt (\*2) is tightened to the specified torque before tightening the mounting nut (\*1) shown in the figure. [Stud bolt (\*2) may be loosened after loosening the mounting nut (\*1)]

CVT

# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]



- |                                 |                          |                                   |
|---------------------------------|--------------------------|-----------------------------------|
| 1. Washer                       | 2. Upper torque rod (RH) | 3. Engine mounting insulator (RH) |
| 4. Rear engine mounting bracket | 5. Rear torque rod       | 6. Engine mounting insulator (LH) |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

## 2WD : Removal and Installation

INFOID:0000000012197402

### WARNING:

- Situate the vehicle on a flat and solid surface.
- Place chocks at front and back of rear wheels.
- Attach proper slingers and bolts described in PARTS CATALOG if engine slingers are not equipped.

### CAUTION:

- Always be careful to work safely, avoid forceful or uninstructed operations.
- Never start working until exhaust system and 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.
- Use either 2-pole lift type or separate type lift as best you can. If board-on type is used for unavoidable reasons, support at the rear axle jacking point with a transmission jack or an equivalent before starting work, in preparation for the backward shift of center of gravity.
- For supporting points for lifting and jacking point at rear axle, refer to [GI-30, "Garage Jack and Safety Stand and 2-Pole Lift"](#).

### NOTE:

# ENGINE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

### REMOVAL

#### Outline

Remove the engine and the transaxle assembly from the vehicle downward. Separate the engine and the transaxle.

#### Preparation

1. Release fuel pressure. Refer to [EC-771, "Work Procedure"](#).
2. Drain engine coolant from radiator. Refer to [CO-40, "Draining and Filling"](#).  
**CAUTION:**
  - Perform this step when the engine is cold.
  - Never spill engine coolant on drive belts.
3. Remove the following parts.
  - Engine undercover
  - Front road wheels and tires
  - Front fender protector (RH and LH): Refer to [EXT-31, "Exploded View"](#).
  - Drive belt: Refer to [EM-185, "Removal and Installation"](#).
  - Engine cover: Refer to [EM-191, "Exploded View"](#).
  - Battery and battery tray: Refer to [PG-105, "Exploded View"](#).
  - Air duct, and air cleaner case assembly and air cleaner body assembly: Refer to [EM-192, "Exploded View"](#).
  - Radiator hose (upper and lower): Refer to [CO-46, "Exploded View"](#).
  - Exhaust front tube: Refer to [EX-5, "Exploded View"](#).
  - Radiator cooling fan assembly: Refer to [CO-50, "Exploded View"](#).
  - Charger air cooler: Refer to [EM-194, "Exploded View"](#).
  - Alternator: Refer to [CHG-33, "MR16DDT : Removal and Installation"](#).

#### Engine Room LH

1. Disconnect all connections of engine harness around the battery, and then temporarily secure the engine harness into the engine side.  
**CAUTION:**  
**Protect connectors using a resin bag against foreign materials during the operation.**
2. Disconnect fuel feed hose quick connector. Refer to [EM-203, "Exploded View"](#).
3. Disconnect heater hoses. Refer to [CO-54, "Exploded View"](#).
4. Remove EVAP hoses. Refer to [EM-197, "Exploded View"](#).
5. Disconnect control cable from transaxle. (CVT models) Refer to [TM-319, "Exploded View"](#).
6. Disconnect control linkage from transaxle. (M/T models) Refer to [TM-25, "Exploded View"](#).
7. Disconnect clutch tube on transaxle side from clutch damper. (M/T models) Refer to [CL-15, "Exploded View"](#).

#### Engine Room RH

1. Disconnect vacuum hose from intake manifold. Refer to [EM-197, "Exploded View"](#).
2. Remove A/C compressor. Refer to [HA-28, "Exploded View"](#).
3. Remove ground cable at engine side.

#### Vehicle Underbody

1. Remove ground cable at transaxle side.
2. Remove drive shafts (RH and LH). Refer to [FAX-83, "2WD : Removal and Installation"](#).
3. Remove rear torque rod.
4. Remove stabilizer connecting rod. Refer to [FSU-15, "Exploded View"](#).
5. Remove front suspension member. Refer to [FSU-17, "Exploded View"](#).
6. Preparation for the separation work of transaxle is as follows:
  - Remove transaxle joint bolts which pierce at oil pan (upper) lower rear side. Refer to [EM-282, "Exploded View"](#).

#### Removal

# ENGINE ASSEMBLY

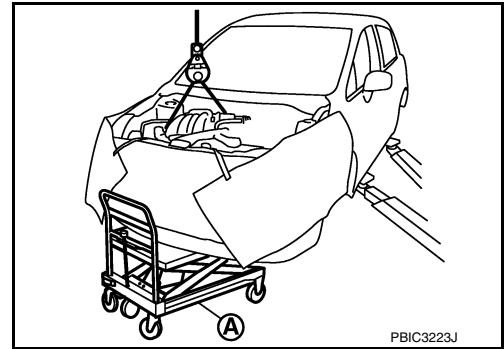
## < UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

1. Use a manual lift table caddy (commercial service tool) (A) or equivalently rigid tool such as a transmission jack. Securely support bottom of the engine and the transaxle assembly.

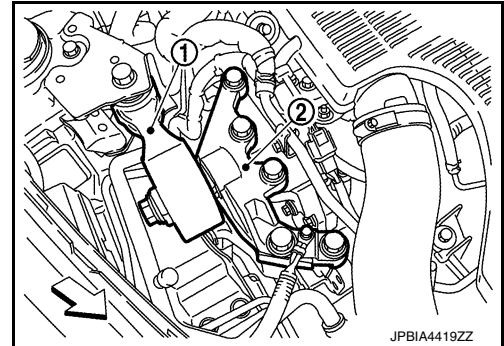
**CAUTION:**

**Put a piece of wood or an equivalent as the supporting surface, secure a completely stable condition.**



2. Remove upper torque rod (RH) (1), and engine mounting insulator (RH) (2).

↶ : Vehicle front



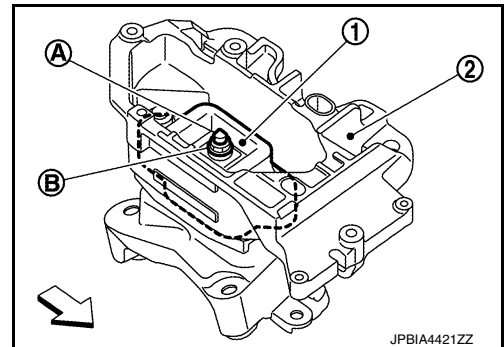
3. Remove engine mounting insulator (LH). (CVT models)
4. Remove the through bolt-securing nut (B) of engine mounting bracket (LH). (M/T models)

1 : Engine mounting insulator (LH)

2 : Engine mounting frame support (LH)

A : Through bolt

↶ : Vehicle front



5. Carefully lower jack, or raise lift to remove the engine and the transaxle assembly. When performing work, observe the following caution.

**CAUTION:**

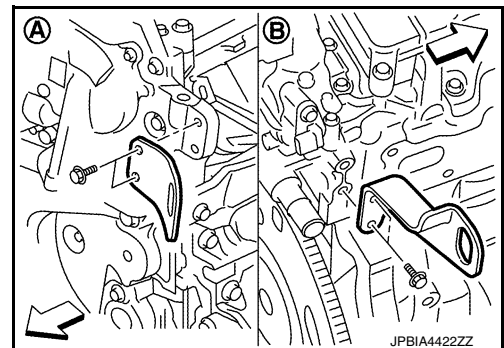
- Check that no part interferes with the vehicle side.
- Before and during this lifting, always check if any harnesses are left connected.
- During the removal, always be careful to prevent the vehicle from falling off the lift due to changes in the center of gravity.
- If necessary, support the vehicle by setting jack or suitable tool at the rear.

### Separation

1. Remove catalyst converter. Refer to [EM-232. "2WD : Exploded View"](#).
2. Remove exhaust manifold and turbocharger. Refer to [EM-243. "Removal and Installation"](#).
3. Install engine slinger to front cover front left side (A) and cylinder head rear right side (B).

↶ : Engine front

### Slinger bolts



# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

Front cover front left  
side:

: 32.9 N·m (3.4 kg-m, 24 ft-lb)

Cylinder head rear  
right side:

: 25.0 N·m (2.6 kg-m, 18 ft-lb)

4. Remove starter motor. Refer to [STR-28. "MR16DDT : Removal and Installation"](#).
5. Lift with a hoist and separate the engine from the transaxle assembly. Refer to [TM-30. "Exploded View"](#).

## INSTALLATION

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

### CAUTION:

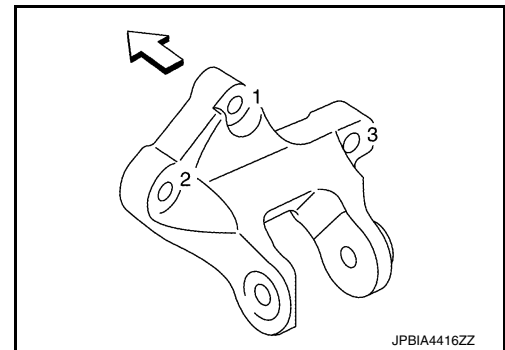
- **Never allow engine oil to get on engine mounting insulator. Never damage engine mounting insulator.**
- **Check that each mounting insulator is seated properly, and tighten mounting nuts and bolts.**
- **When installation directions are specified, install parts according to the direction marks on them referring to the figure of components. Refer to [EM-216. "2WD : Exploded View"](#).**

Rear Torque Rod Bracket

1. Temporarily tighten mounting bolts in the numerical order as shown in the figure.

 : Vehicle front

2. Tighten mounting bolts to the specified torque in the numerical order as shown in the figure.



## 2WD : Inspection

INFOID:0000000012197403

## INSPECTION AFTER INSTALLATION

### Inspection for Leakage

The following are procedures for checking fluids leakage, lubricates leakage, and exhaust gases leakage.

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-11. "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
  - Turn ignition switch "ON" (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
  - Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to check there is no leakage of fuel, exhaust gases, or any oil/fluids including engine oil and engine coolant.
- Bleed air from lines and hoses of applicable lines, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to the specified level, if necessary.

Summary of the inspection items:

Items		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission / transaxle fluid	AT & CVT Models	Leakage	Level / Leakage	Leakage
	MT Models	Level / Leakage	Leakage	Level / Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gases		—	Leakage	—



# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

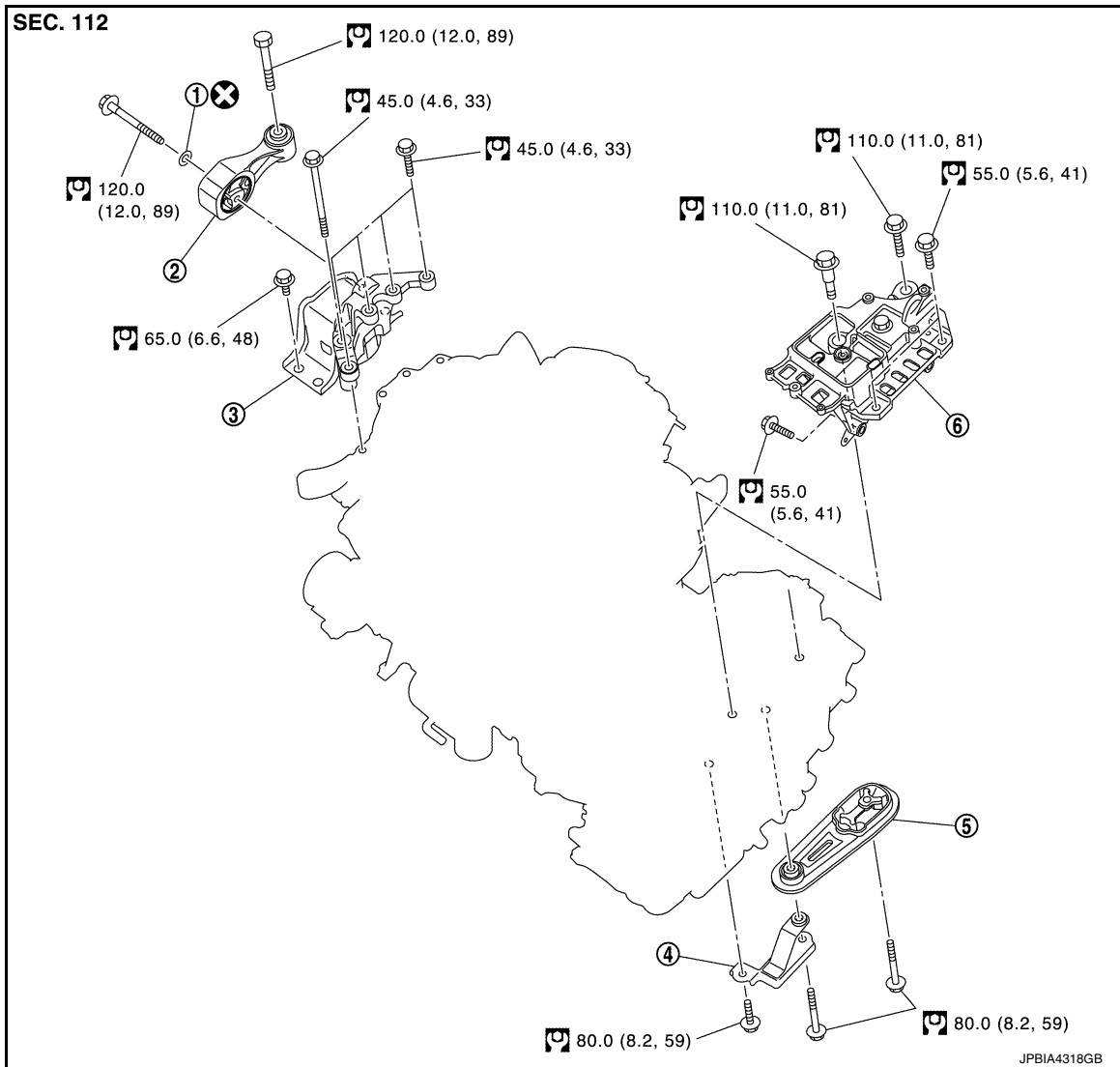
[MR EXCEPT FOR NISMO RS MODELS]

\*: Power steering fluid, brake fluid, etc.

AWD

AWD : Exploded View

INFOID:0000000012197404



- |                                 |                          |                                   |
|---------------------------------|--------------------------|-----------------------------------|
| 1. Washer                       | 2. Upper torque rod (RH) | 3. Engine mounting insulator (RH) |
| 4. Rear engine mounting bracket | 5. Rear torque rod       | 6. Engine mounting insulator (LH) |

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

AWD : Removal and Installation

INFOID:0000000012197405

## WARNING:

- Situate the vehicle on a flat and solid surface.
- Place chocks at front and back of rear wheels.
- Attach proper slingers and bolts described in PARTS CATALOG if engine slingers are not equipped.

## CAUTION:

- Always be careful to work safely, avoid forceful or uninstructed operations.
- Never start working until exhaust system and 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.

# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- Use either 2-pole lift type or separate type lift as best you can. If board-on type is used for unavoidable reasons, support at the rear axle jacking point with a transmission jack or an equivalent before starting work, in preparation for the backward shift of center of gravity.
- For supporting points for lifting and jacking point at rear axle, refer to [GI-30, "Garage Jack and Safety Stand and 2-Pole Lift"](#).

## NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

## REMOVAL

### Outline

Remove the engine and the transaxle assembly from the vehicle downward. Separate the engine and the transaxle.

### Preparation

1. Release fuel pressure. Refer to [EC-771, "Work Procedure"](#).
2. Drain engine coolant from radiator. Refer to [CO-40, "Draining and Filling"](#).  
**CAUTION:**
  - Perform this step when the engine is cold.
  - Never spill engine coolant on drive belts.
3. Remove the following parts.
  - Engine undercover
  - Front road wheels and tires
  - Front fender protector (RH and LH): Refer to [EXT-31, "Exploded View"](#).
  - Drive belt: Refer to [EM-185, "Removal and Installation"](#).
  - Engine cover: Refer to [EM-191, "Exploded View"](#).
  - Battery and battery tray: Refer to [PG-105, "Exploded View"](#).
  - Air duct, air cleaner case assembly and air cleaner body assembly: Refer to [EM-192, "Exploded View"](#).
  - Radiator hose (upper and lower): Refer to [CO-46, "Exploded View"](#).
  - Radiator cooling fan assembly: Refer to [CO-50, "Exploded View"](#).
  - Exhaust front tube: Refer to [EX-5, "Exploded View"](#).
  - Alternator: Refer to [CHG-33, "MR16DDT : Removal and Installation"](#).

### Engine Room LH

1. Disconnect all connections of engine harness around the battery, and then temporarily secure the engine harness into the engine side.  
**CAUTION:**  
**Protect connectors using a resin bag against foreign materials during the operation.**
2. Disconnect fuel feed hose quick connector. Refer to [EM-203, "Exploded View"](#).
3. Disconnect heater hoses. Refer to [CO-54, "Exploded View"](#).
4. Disconnect control cable from transaxle. Refer to [TM-319, "Exploded View"](#).
5. Remove EVAP hoses. Refer to [EM-197, "Exploded View"](#).

### Engine Room RH

1. Disconnect vacuum hose from intake manifold. Refer to [EM-197, "Exploded View"](#).
2. Remove A/C compressor. Refer to [HA-28, "Exploded View"](#).
3. Remove ground cable at engine side.

### Vehicle Underbody

1. Remove ground cable at transaxle side.
2. Remove rear propeller shaft. Refer to [DLN-124, "Exploded View"](#).
3. Remove drive shafts (RH and LH). Refer to [FAX-97, "AWD : Removal and Installation"](#).
4. Remove rear torque rod (1). Refer to [EM-221, "AWD : Exploded View"](#).

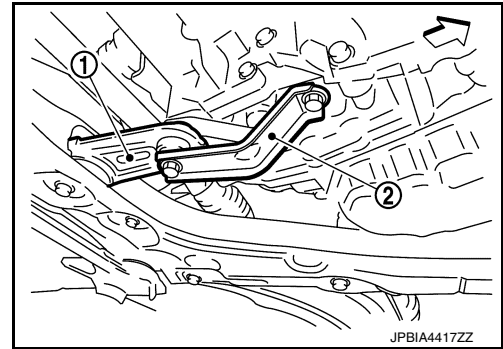
# ENGINE ASSEMBLY

< UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

2 : Rear torque rod bracket

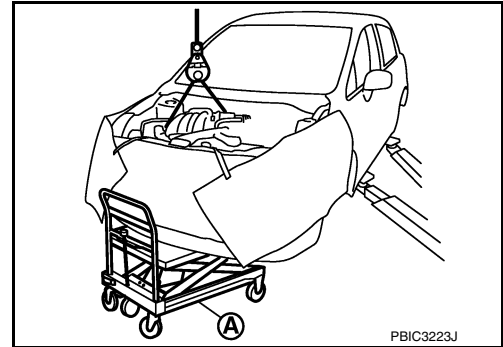
↔ : Vehicle front



5. Remove stabilizer connecting rod. Refer to [FSU-15, "Exploded View"](#).
6. Rear front suspension member. Refer to [FSU-17, "Exploded View"](#).
7. Preparation for the separation work of transaxle is as follows:
  - Remove transaxle joint bolts which pierce at oil pan (upper) lower rear side. Refer to [EM-200, "Exploded View"](#).

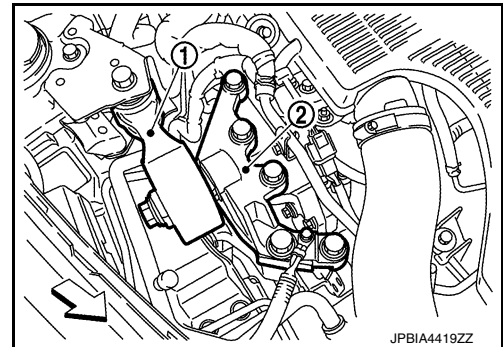
## Removal

1. Use a manual lift table caddy (commercial service tool) (A) or equivalently rigid tool such as a transmission jack. Securely support bottom of the engine and the transaxle assembly.  
**CAUTION:**  
Put a piece of wood or an equivalent as the supporting surface, secure a completely stable condition.



2. Remove upper torque rod (RH) (1) and engine mounting insulator (RH) (2).

↔ : Vehicle front



3. Remove engine mounting insulator (LH).
4. Carefully lower jack, or raise lift to remove the engine and the transaxle assembly. When performing work, observe the following caution.  
**CAUTION:**
  - Check that no part interferes with the vehicle side.
  - Before and during this lifting, always check if any harnesses are left connected.
  - During the removal, always be careful to prevent the vehicle from falling off the lift due to changes in the center of gravity.
  - If necessary, support the vehicle by setting jack or suitable tool at the rear.

## Separation

1. Remove catalyst convertor. Refer to [EM-235, "AWD : Exploded View"](#).
2. Remove exhaust manifold and turbocharger assembly. Refer to [EM-243, "Removal and Installation"](#).

# ENGINE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

[MR EXCEPT FOR NISMO RS MODELS]

- Install engine slinger to front cover front left side (A) and cylinder head rear right side (B).

↶ : Engine front

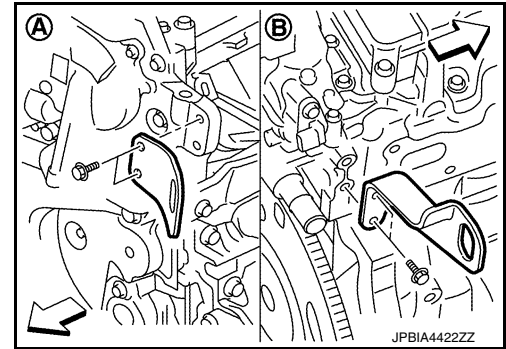
### Slinger bolts

Front cover front left side:

: 32.9 N·m (3.4 kg-m, 24 ft-lb)

Cylinder head rear right side:

: 25.0 N·m (2.6 kg-m, 18 ft-lb)



- Remove starter motor. Refer to [STR-28, "MR16DDT : Removal and Installation"](#).
- Lift with a hoist and separate the engine from the transaxle assembly. Refer to [TM-577, "Removal and Installation"](#).

## INSTALLATION

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

### CAUTION:

- Never allow engine oil to get on engine mounting insulator. Never damage engine mounting insulator.
- Check that each mounting insulator is seated properly, and tighten mounting nuts and bolts.
- When installation directions are specified, install parts according to the direction marks on them referring to the figure of components. Refer to [EM-221, "AWD : Exploded View"](#).

## AWD : Inspection

INFOID:0000000012197406

## INSPECTION AFTER INSTALLATION

### Inspection for Leakage

The following are procedures for checking fluids leakage, lubricates leakage, and exhaust gases leakage.

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-11, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
  - Turn ignition switch "ON" (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
  - Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to check there is no leakage of fuel, exhaust gases, or any oil/fluids including engine oil and engine coolant.
- Bleed air from lines and hoses of applicable lines, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to the specified level, if necessary.

Summary of the inspection items:

Items		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission / transaxle fluid	AT & CVT Models	Leakage	Level / Leakage	Leakage
	MT Models	Level / Leakage	Leakage	Level / Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gases		—	Leakage	—

\*: Power steering fluid, brake fluid, etc.

## UNIT DISASSEMBLY AND ASSEMBLY

## ENGINE STAND SETTING

## Installation

INFOID:0000000012197407

EM

## INSTALLATION

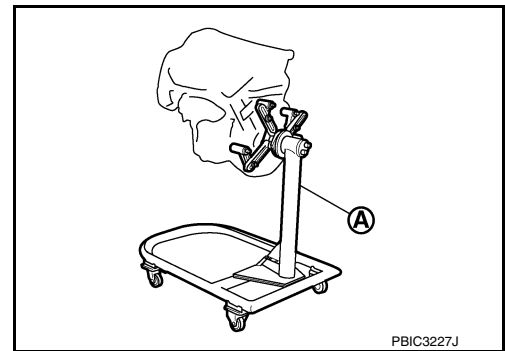
**NOTE:**

Explained here is how to disassemble with engine stand supporting transaxle surface. When using different type of engine stand, note with difference in steps and etc.

1. Remove the engine and the transaxle assembly from the vehicle, and separate the transaxle from the engine. Refer to [EM-217, "2WD : Removal and Installation"](#) (2WD models) or [EM-221, "AWD : Removal and Installation"](#) (AWD models).
2. Install engine to engine stand according to the following procedure:
  - a. Remove driveplate. Refer to [EM-229, "Removal and Installation"](#).
  - b. The figure shows an example of widely used engine stand (A) that can support mating surface of transaxle.

**CAUTION:**

**Before removing the hanging chains, check the engine stand is stable and there is no risk of overturning.**



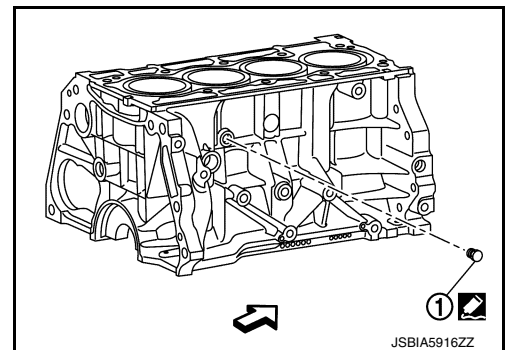
3. Drain engine oil. Refer to [LU-29, "Draining"](#).  
**CAUTION:**  
**Be sure to clean drain plug.**
4. Drain engine coolant by removing water drain plug (1) from inside of the engine.

↩ : Engine front

- **Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**

**Tightening torque**

: 9.8 N·m (1.0 kg-m, 87 in-lb)



**ENGINE UNIT****Disassembly and Assembly**

INFOID:0000000012197408

**DISASSEMBLY**

1. Remove intake manifold. Refer to [EM-197, "Exploded View"](#).
2. Remove oil pan (lower). Refer to [EM-282, "Exploded View"](#).
3. Remove ignition coil, spark plug, and rocker cover. Refer to [EM-189, "Exploded View"](#).
4. Remove fuel injector and fuel tube. Refer to [EM-208, "Exploded View"](#).
5. Remove timing chain. Refer to [EM-248, "Exploded View"](#).
6. Remove camshaft. Refer to [EM-260, "Exploded View"](#).
7. Remove water pump housing. Refer to [CO-52, "Exploded View"](#).
8. Remove Multi-way control valve. Refer to [CO-54, "Exploded View"](#).
9. Remove cylinder head. Refer to [EM-272, "Exploded View"](#).

**ASSEMBLY**

Assemble in the reverse order of disassembly.

# FLYWHEEL

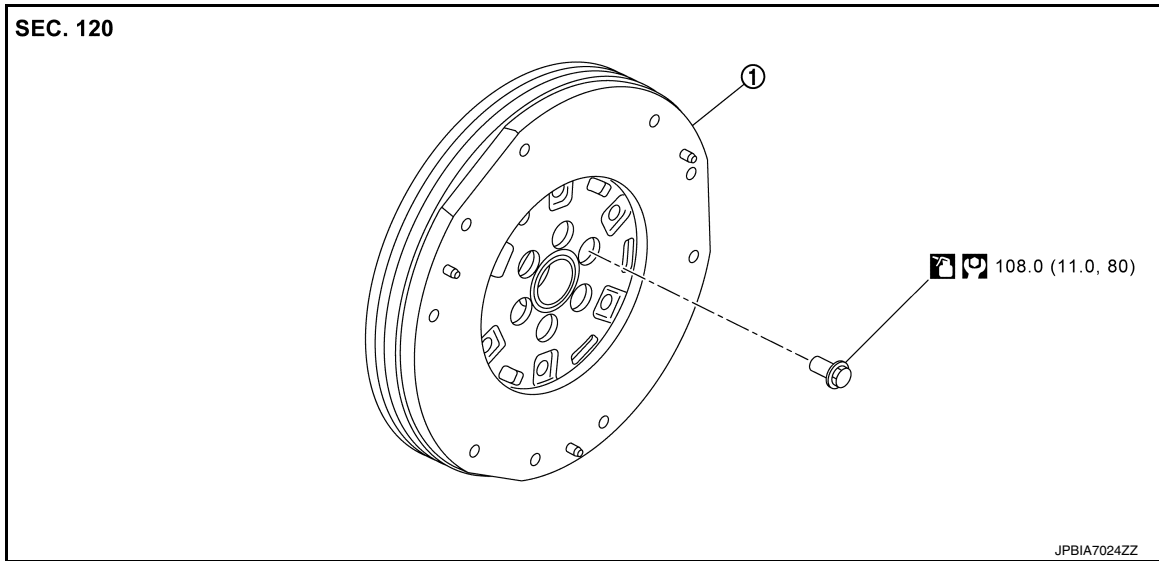
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## FLYWHEEL

### Exploded View

INFOID:0000000012197409



1. Flywheel

: N·m (kg-m, ft-lb)

: Should be lubricated with oil.

### Removal and Installation

INFOID:0000000012197410

#### REMOVAL

1. Remove the engine and the transaxle assembly from the vehicle, and separate the transaxle from the engine. Refer to [TM-30, "Removal and Installation"](#).
2. Remove flywheel with power tool. Fix crankshaft with a stopper plate [SST: KV11105210 (J-44716)], and remove mounting bolts.
  - Loosen mounting bolts in diagonal order.
  - Check for deformation or damage of flywheel.

**CAUTION:**

  - Any dropped flywheel shall not be used.
  - Never touch flywheel with bare hands. Always use urethane coating gloves or skin gloves when removing these parts.
  - Never use torn glove.
  - Never disassemble.

#### INSTALLATION

Install in the reverse order of removal.

**CAUTION:**

Never damage or scratch and contact surface for clutch disc of flywheel.

#### Inspection

INFOID:0000000012197411

#### FLYWHEEL DEFLECTION

# FLYWHEEL

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

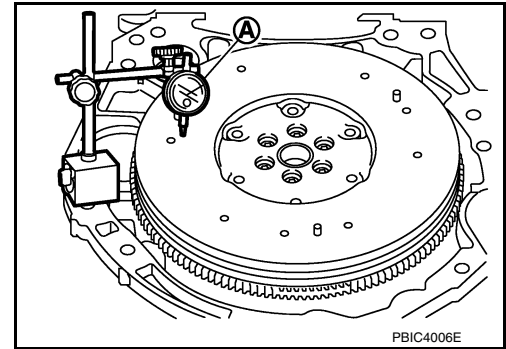
- Measure the deflection of flywheel contact surface to torque with a dial indicator (A).
- Measure the deflection at 210 mm (8.27 in) diameter.

**Limit : 0.45 mm (0.0177 in) or less.**

- If measured value is out of the standard, replace flywheel.
- If a trace of burn or discoloration is found on the surface, repair it with sandpaper.

### CAUTION:

**When measuring, keep magnetic fields (such as dial indicator stand) away from signal plate of the rear end of crankshaft.**



## MOVEMENT AMOUNT OF FLYWHEEL

### CAUTION:

**Never disassemble double mass flywheel.**

Movement Amount of Thrust (Fore-and-Aft) Direction

- Measure the movement amount of thrust (fore-and-aft) direction when 100 N (10.2 kg, 22 lb) force is added at the portion of 125 mm (4.92 in) radius from the center of flywheel.

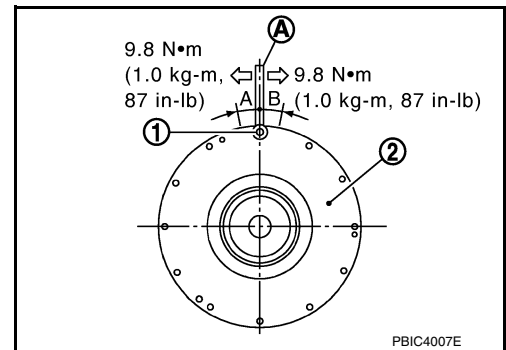
**Standard : 1.8 mm (0.071 in) or less**

- If measured value is out of the standard, replace flywheel.

Movement Amount in Radial (Rotation) Direction

Check the movement amount of radial (rotation) direction according to the following procedure:

1. Install clutch cover mounting bolt (1) to clutch cover mounting hole, and place a torque wrench (A) on the extended line of the flywheel (2) center line.
  - Tighten bolt at a force of 9.8 N·m (1.0 kg-m, 87 in-lb) to keep it from loosening.
2. Put a mating mark on circumferences of the two flywheel masses without applying any load (Measurement standard points).
3. Apply a force of 9.8 N·m (1.0 kg-m, 87 in-lb) in each direction, and mark the movement amount on the mass on the transaxle side.
4. Measure the dimensions of movement amounts "A" and "B" on circumference of the flywheel on the transaxle side.



**Limit : 66.7 mm (2.626 in) or less.**

- If measured value is out of the standard, replace flywheel.



# DRIVE PLATE

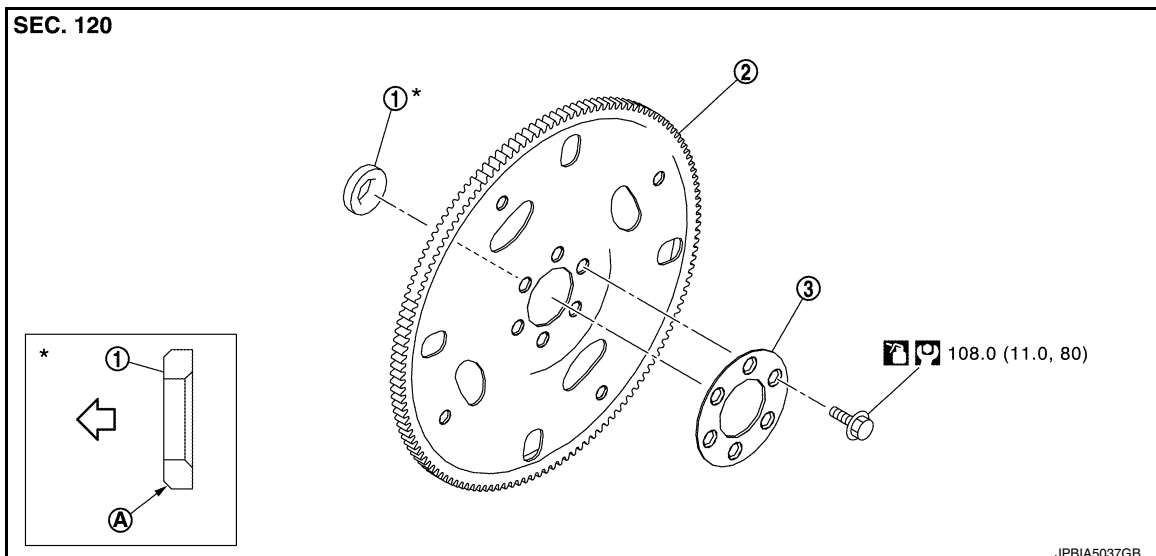
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## DRIVE PLATE

### Exploded View

INFOID:0000000012197412



1. Pilot converter

2. Drive plate

3. Reinforcement plate

A. Chamfered

← : Crankshaft side

: N·m (kg-m, ft-lb)

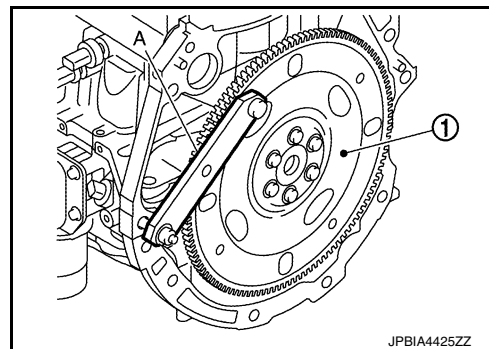
: Should be lubricated with oil.

## Removal and Installation

INFOID:0000000012197413

### REMOVAL

1. Remove the engine and the transaxle assembly from the vehicle, and separate the transaxle from the engine. Refer to [EM-217. "2WD : Removal and Installation"](#) (2WD models) or [EM-221. "AWD : Removal and Installation"](#) (AWD models).
2. Remove drive plate the following procedure:
  - a. Remove drive plate.
    - Secure drive plate(1) with a stopper plate [SST: KV11105210 (J-44716)] (A), and remove mounting bolts.

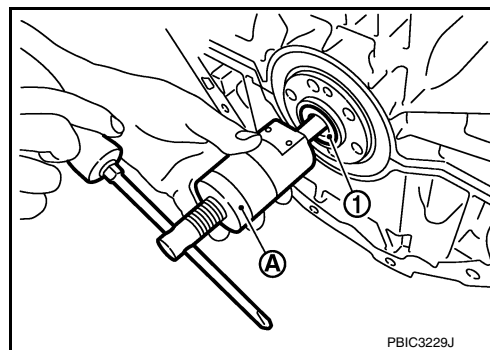


## DRIVE PLATE

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- b. Remove pilot converter (1) using pilot bushing puller [SST: ST16610001 (J-23907)] (A) or suitable tool.



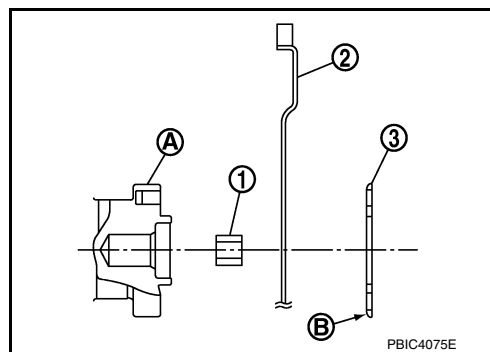
### INSTALLATION

1. Install drive plate the following procedure:
- Install pilot converter (1), drive plate (2), and reinforcement plate (3) as shown in the figure.

A : Crankshaft rear end

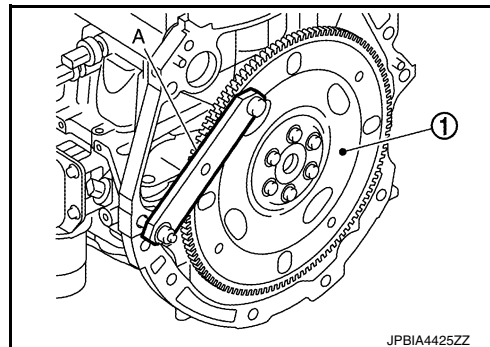
B : R

- Using a drift of 33 mm (1.30 in) in dia meter, press-fit pilot converter into the end of crankshaft until it stops.



- Secure crankshaft with a stopper plate [SST: KV11105210 (J-44716)], (A) and tighten mounting bolts crosswise over several times.

1 : Drive plate



### Inspection

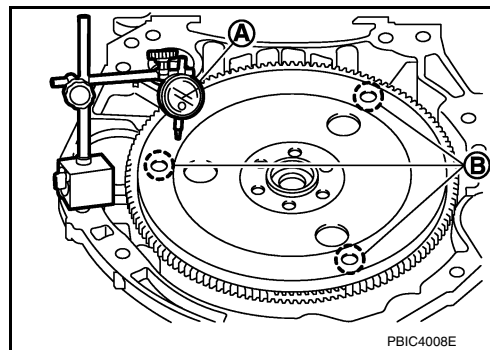
INFOID:0000000012197414

#### DRIVE PLATE DEFLECTION

- Measure the deflection of drive plate contact surface to torque converter with a dial indicator (A).
- Measure the deflection at the area limited between 12.4 mm (0.488 in) dia and 20.0 mm (0.787 in) dia around hole (B).

**Limit : 0.35 mm (0.0138 in) or less.**

- If measured value is out of the standard, replace drive plate.



# DRIVE BELT AUTO TENSIONER AND IDLER PULLEY

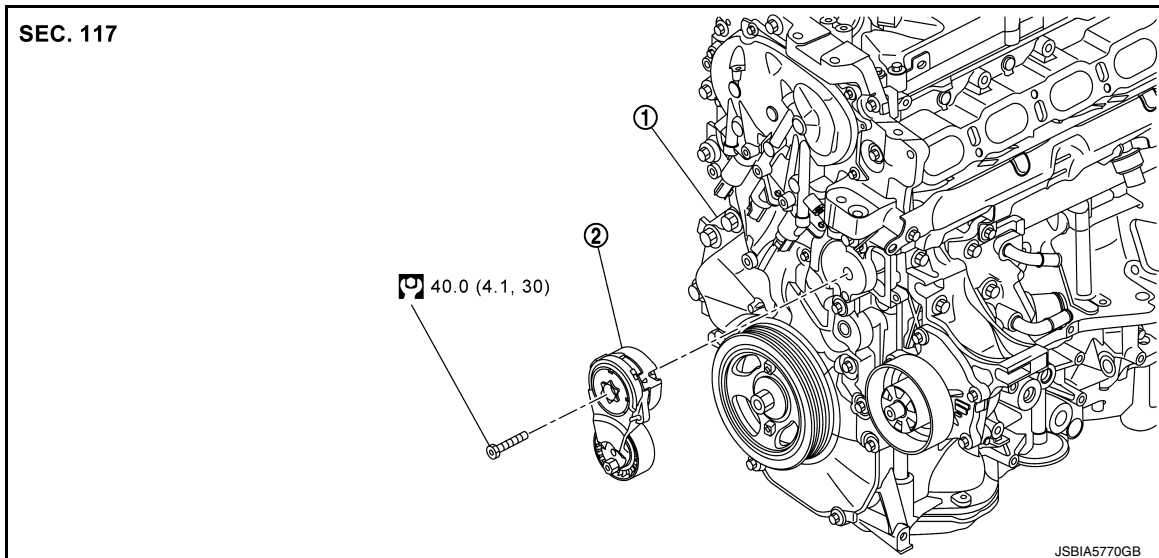
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## DRIVE BELT AUTO TENSIONER AND IDLER PULLEY

Exploded View

INFOID:0000000012197415



1. Front cover

2. Drive belt auto-tensioner

: N·m (kg-m, ft-lb)

### Removal and Installation

INFOID:0000000012197416

#### REMOVAL

1. Loosen mounting bolt and remove drive belt auto-tensioner.

#### INSTALLATION

Install in the reverse order of removal.

#### **CAUTION:**

**When installing drive belt auto-tensioner, never interfere with water pump pulley.**

# CATALYST

< UNIT DISASSEMBLY AND ASSEMBLY >

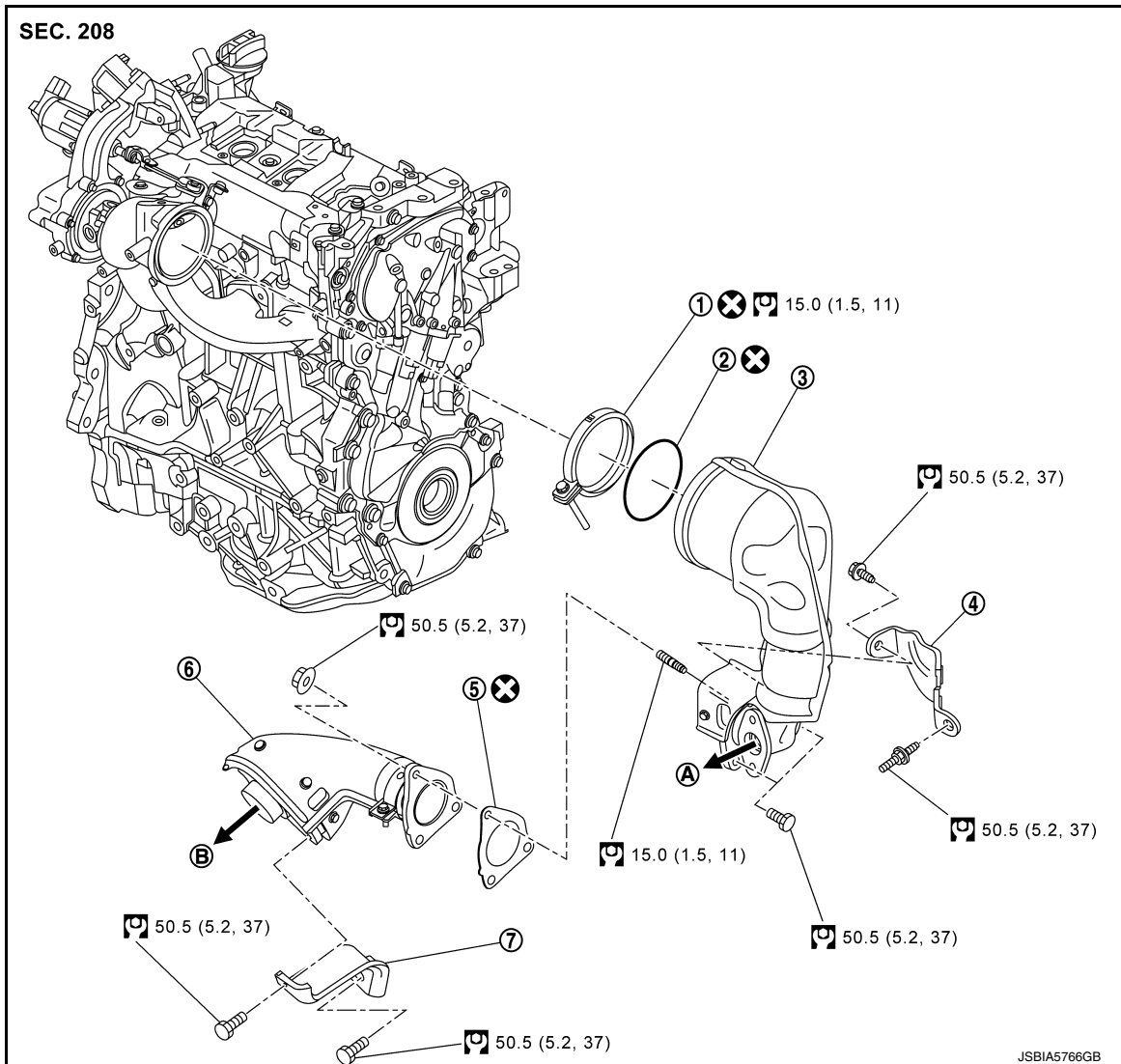
[MR EXCEPT FOR NISMO RS MODELS]

## CATALYST

2WD

2WD : Exploded View

INFOID:0000000012197417



- |                                       |                          |                               |
|---------------------------------------|--------------------------|-------------------------------|
| 1. Clamp                              | 2. Gasket                | 3. Catalyst converter         |
| 4. Catalyst converter bracket         | 5. Gasket                | 6. Catalyst converter adapter |
| 7. Catalyst converter adapter bracket |                          |                               |
| A. To EGR cooler                      | B. To exhaust front tube |                               |

⊗: Always replace after every disassembly.

⌘: N·m (kg-m, ft-lb)

## 2WD : Removal and Installation

INFOID:0000000012197418

### REMOVAL

1. Remove the EGR guide tube cover and EGR guide tube (catalyst converter). Refer to [EM-238. "Exploded View"](#).
2. Remove the exhaust manifold cover. Refer to [EM-243. "Removal and Installation"](#).
3. Remove the rocker cover protector. Refer to [EM-214. "Exploded View"](#).
4. Remove the mounting nuts and bolts.

# CATALYST

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

5. Remove the catalyst converter adapter bracket, and remove the catalyst converter adapter and gasket.
6. Remove the catalyst converter bracket.
7. Remove the clamp.
8. Remove the catalyst converter and gasket.

**CAUTION:**

**Never subject the catalyst converter to impact.**

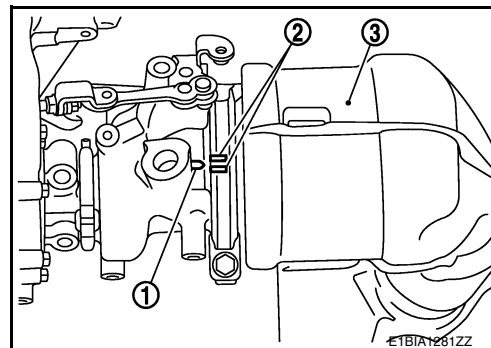
## INSTALLATION

1. Install the gasket between the exhaust manifold and turbocharger assembly and the catalyst converter.

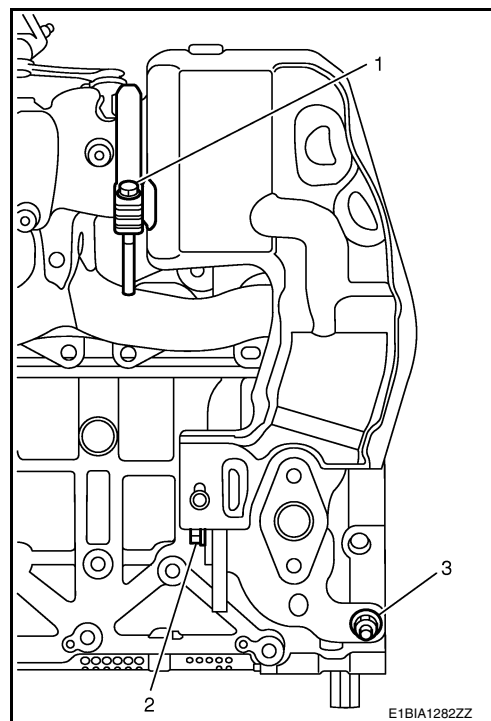
**CAUTION:**

**Check for foreign material on the tightening surface.**

2. Follow the procedure below and install the catalyst converter.
  - Temporarily tighten the clamp onto the exhaust manifold and turbocharger assembly. Use the bolts to temporarily tighten the catalyst converter bracket onto the cylinder head and catalyst converter (3).
  - The mark (1) on the exhaust manifold and turbocharger assembly should be between the marks (2) on the clamp.



- Tighten the clamp and mounting bolts in the numerical order shown in the figure.
- Temporarily tighten No. 1 - 3 until each is seated.
- Tighten No. 1 - 3.



3. Follow the procedure below and install the catalyst converter adapter.

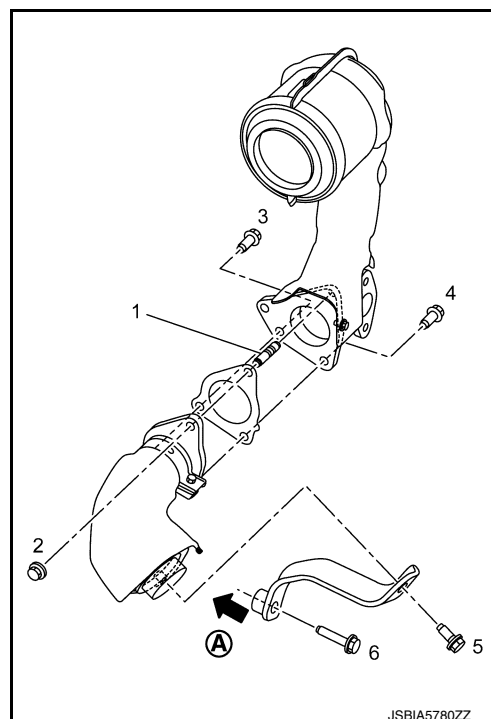
## CATALYST

### < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Tighten the mounting bolts and nuts in the numerical order shown in the figure.
- Tighten No. 1 to the specified torque.
- Temporarily tighten No. 2 - 6.
- Tighten No. 2 - 6.

A : To cylinder block



4. Install removed parts in the reverse order of removal.

AWD

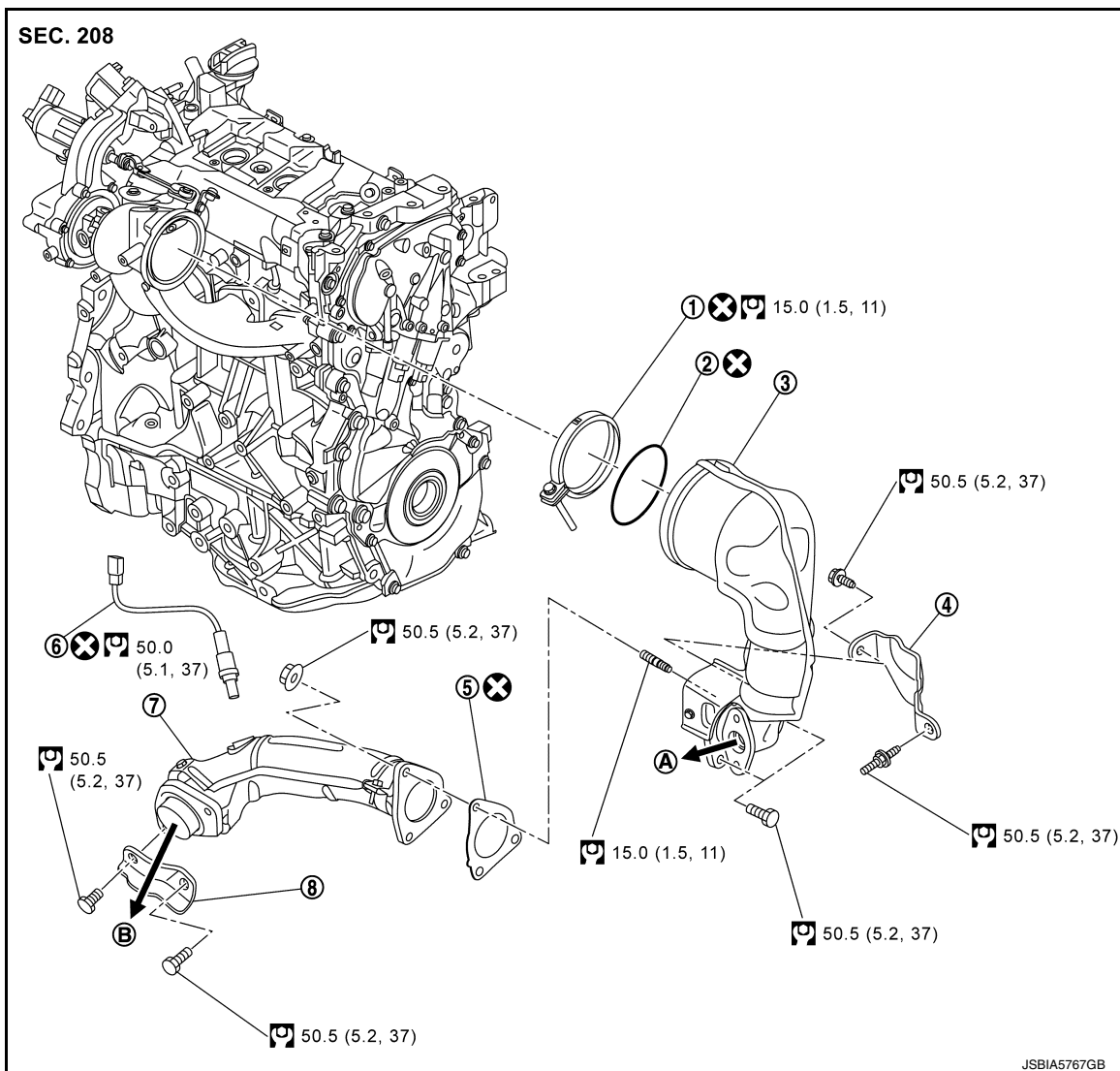
# CATALYST

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

AWD : Exploded View

INFOID:000000012197419



- |                               |                                       |                           |
|-------------------------------|---------------------------------------|---------------------------|
| 1. Clamp                      | 2. Gasket                             | 3. Catalyst converter     |
| 4. Catalyst converter bracket | 5. Gasket                             | 6. Heated oxygen sensor 2 |
| 7. Catalyst converter adapter | 8. Catalyst converter adapter bracket |                           |
| A. To EGR cooler              | B. To exhaust front tube              |                           |

⊗ : Always replace after every disassembly.

⌚ : N·m (kg-m, ft-lb)

AWD : Removal and Installation

INFOID:000000012197420

## REMOVAL

- Remove the EGR guide tube cover and EGR guide tube (catalyst converter). Refer to [EM-238, "Exploded View"](#).
- Remove the exhaust manifold cover. Refer to [EM-203, "Removal and Installation"](#).
- Remove the rocker cover protector. Refer to [EM-214, "Exploded View"](#).
- Remove heated oxygen sensor 2.
  - Remove A/F sensor 1 using a socket designed for heated oxygen sensor removal and installation [SST: KV10113700 or KV10117100 (J-3647-A)].

**CAUTION:**

## CATALYST

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- If the A/F sensor is dropped from a height of 0.5 m or more onto a concrete or other hard surface, scrap the dropped A/F sensor, and use a new one.
  - Before installing a new A/F sensor, clean the A/F sensor installation parts.
5. Remove the mounting nuts and bolts.
  6. Remove the catalyst converter adapter bracket, and remove the catalyst converter adapter and gasket.
  7. Remove the catalyst converter bracket.
  8. Remove the clamp.
  9. Remove the catalyst converter and gasket.
- CAUTION:**  
Never subject the catalyst converter to impact.

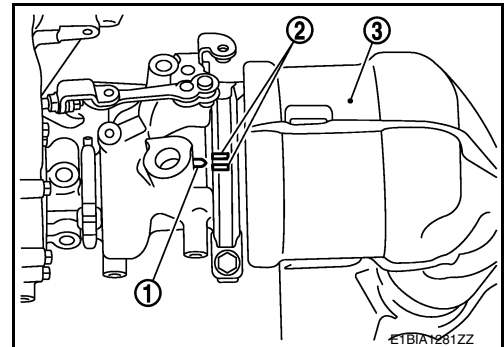
### INSTALLATION

1. Install the gasket between the exhaust manifold and turbocharger assembly and the catalyst converter.

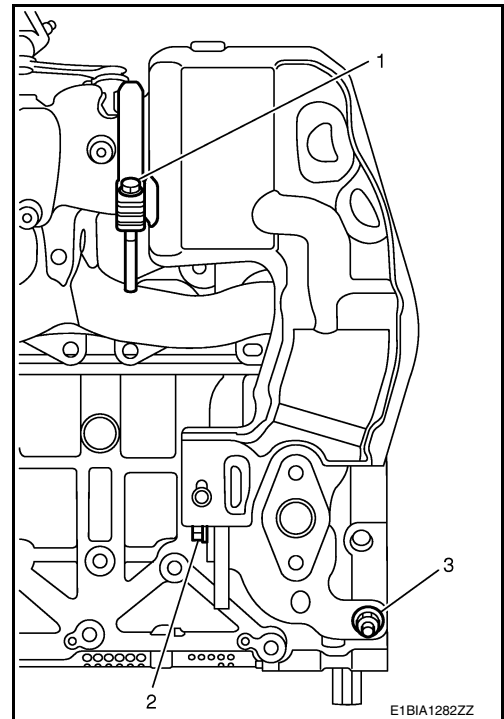
**CAUTION:**

**Check for foreign material on the tightening surface.**

2. Follow the procedure below and install the catalyst converter.
  - Temporarily fasten the clamp onto the exhaust manifold and turbocharger assembly, and use the bolts to temporarily fasten the catalyst converter bracket onto the cylinder head and catalyst converter (3).
  - The mark (1) on the exhaust manifold and turbocharger assembly should be between the marks (2) on the clamp.



- Tighten the clamp and mounting bolts in the numerical order shown in the figure.
  - Temporarily tighten No. 1 - 3 until each is seated.
  - Tighten No. 1 - 3.



3. Follow the procedure below and install the catalyst converter adapter.



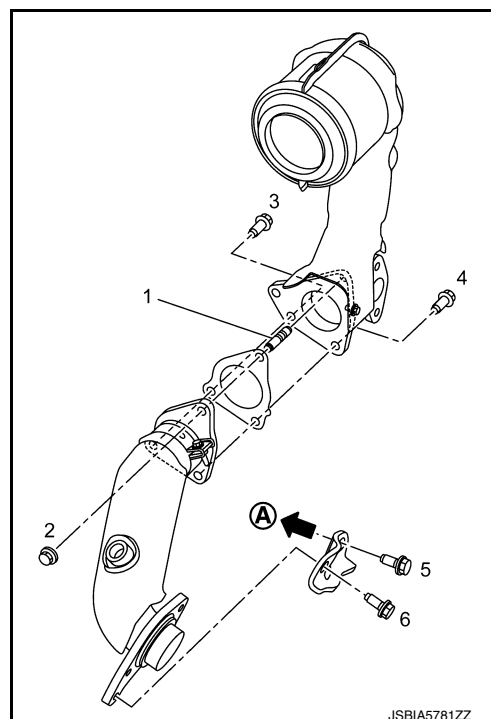
# CATALYST

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Tighten the mounting bolts and nuts in the numerical order shown in the figure.
- Tighten No. 1 to the specified torque.
- Temporarily tighten No. 2 - 6.
- Tighten No. 2 - 6.

A : To cylinder block



4. Install removed parts in the reverse order of removal.

# EGR SYSTEM

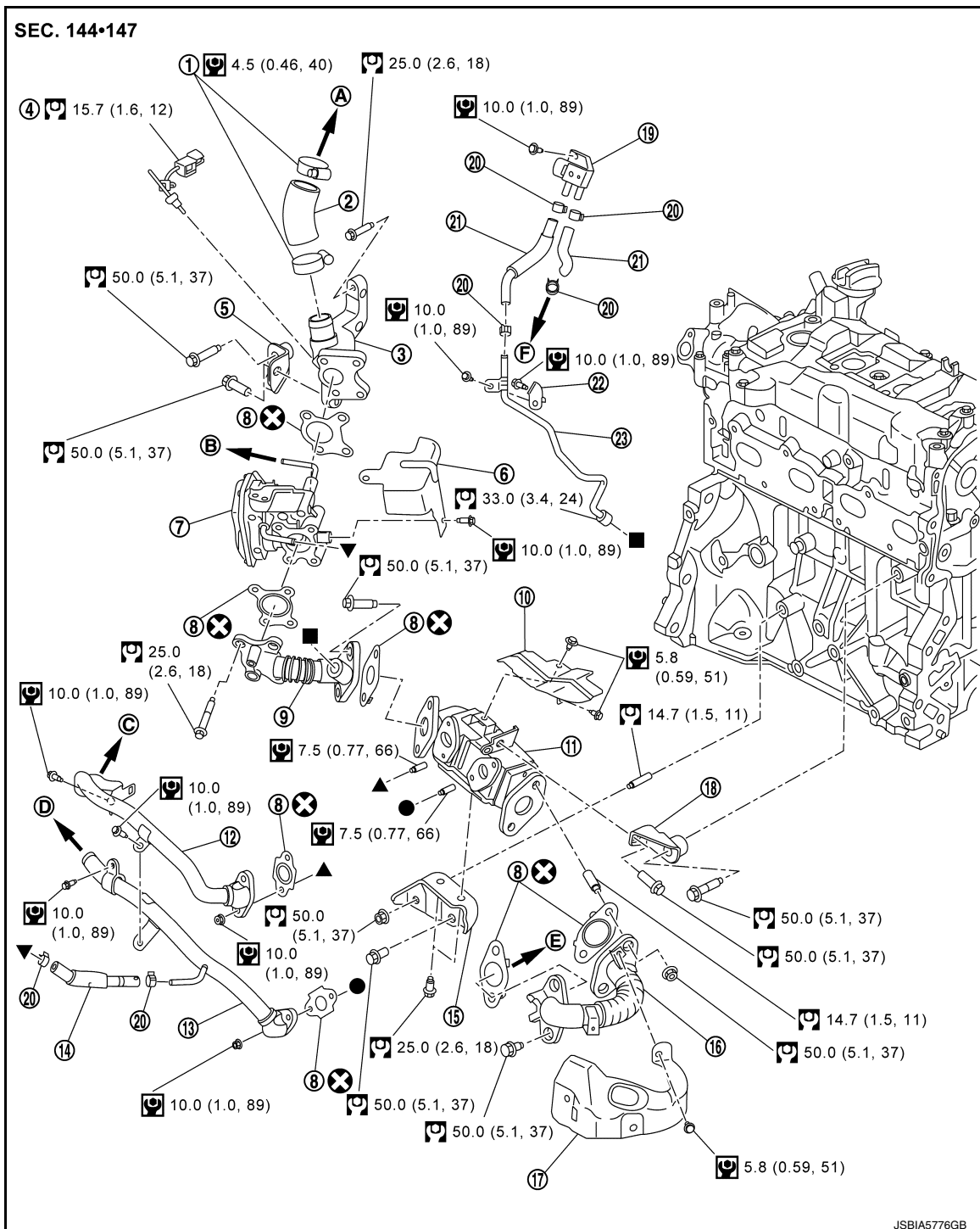
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## EGR SYSTEM

### Exploded View

INFOID:000000012197421



- |  |                          |                               |
|--|--------------------------|-------------------------------|
| 1. Clamp   | 2. Air hose inlet        | 3. EGR inlet tube             |
| 4. EGR temperature sensor (Up to 3/2015)<br>Not applicable (From 4/2015) | 5. Bracket               | 6. EGR cover                  |
| 7. EGR control valve   | 8. Gasket                | 9. EGR guide tube (EGR valve) |
| 10. EGR cooler cover   | 11. EGR cooler           | 12. Water outlet pipe         |
| 13. Water inlet pipe   | 14. Water hose           | 15. EGR bracket (lower)       |
| 16. EGR guide tube (catalyst converter)                                  | 17. EGR guide tube cover | 18. EGR bracket (upper)       |

# EGR SYSTEM

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- |                                      |  |   |
|--------------------------------------|--|---|
| 19. EGR differential pressure sensor | 20. Clamp  | 21. EGR differential pressure sensor hose |
| 22. Bracket                          | 23. EGR differential pressure sensor tube        |   |
| A. To turbocharger inlet tube        | B. To exhaust manifold and turbocharger assembly | C. To multi-way control valve             |
| D. To heater core                    | E. To catalyst converter                         | F. To turbocharger inlet tube             |

⊗: Always replace after every disassembly.

Ⓐ: N·m (kg-m, ft-lb)

Ⓑ: N·m (kg-m, in-lb)

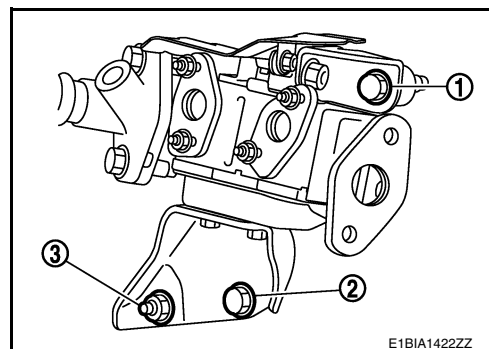
●, ▲, ■, ▼: Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:0000000012197422

### REMOVAL

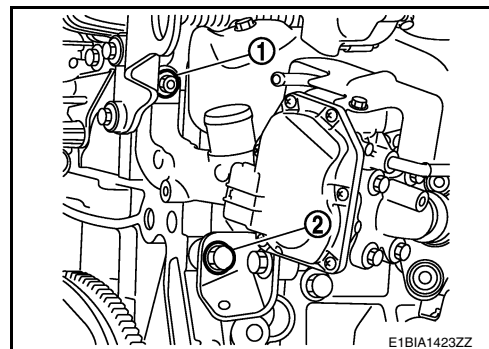
- Remove the catalyst converter.
  - 2WD : Refer to [EM-232, "2WD : Removal and Installation"](#).
  - AWD : Refer to [EM-235, "AWD : Removal and Installation"](#).
- Disconnect the turbocharger inlet tube and air hose inlet. Refer to [EM-242, "Exploded View"](#).
- Disconnect the water inlet pipe and water outlet pipe. Refer to [EM-242, "Exploded View"](#).
- Disconnect the oil outlet hose and oil outlet tube. Refer to [EM-242, "Exploded View"](#).
- Remove the gaskets.
- Remove the EGR differential pressure sensor tube.
- Follow the procedure below and remove the EGR system assembly.
  - Remove the EGR bracket (upper) mounting bolt (1).
  - Remove the EGR bracket (lower) mounting bolt (2) and nut (3).



- Remove the EGR inlet tube mounting bolt (1).
- Remove the EGR inlet tube lower bracket mounting bolt (2).
- Remove the EGR system assembly.

### CAUTION:

Never subject the EGR system assembly to impact.



### INSTALLATION

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

#### Installing the EGR System Assembly

- If the EGR system assembly is replaced or removed, perform an active test, and check that the EGR valve operates normally. Refer to [EC-961, "Component Inspection \(EGR Volume Control Valve\)"](#).

## EGR SYSTEM

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

### Disassembly and Assembly

INFOID:0000000012197423

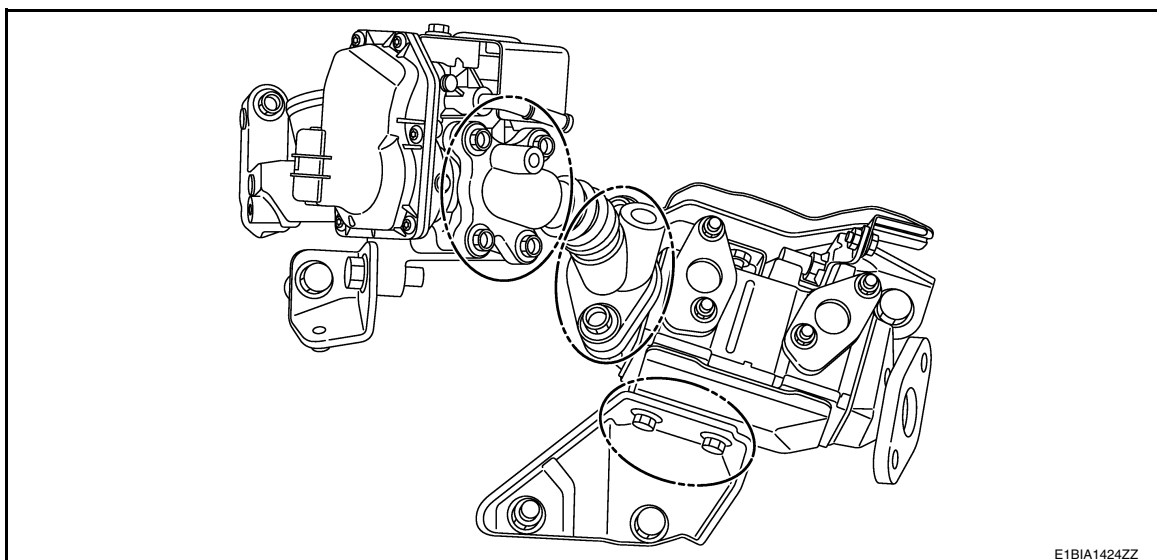
#### DISASSEMBLY

1. Remove the EGR cover from the EGR control valve.
2. Remove the EGR inlet tube and EGR control valve from the EGR guide tube (EGR valve).
3. Remove the bracket and EGR temperature sensor from the EGR inlet tube.
4. Remove the EGR guide tube (EGR valve) from the EGR cooler.
5. Remove the gaskets.
6. Remove the EGR cooler cover from the EGR cooler.
7. Remove the EGR bracket (upper) from the EGR cooler.
8. Remove the EGR bracket (lower) from the EGR cooler.

#### ASSEMBLY

##### CAUTION:

The EGR system assembly requires positioning at three locations as shown by the circles in the figure. Therefore, after the EGR system assembly is disassembled, follow the procedure below for installation. Never damage the parts when installing them.



○ : Locations of positioning

1. Temporarily tighten the bolts and nuts of removed parts until they are seated, and partially fasten the EGR system assembly onto the engine.

##### CAUTION:

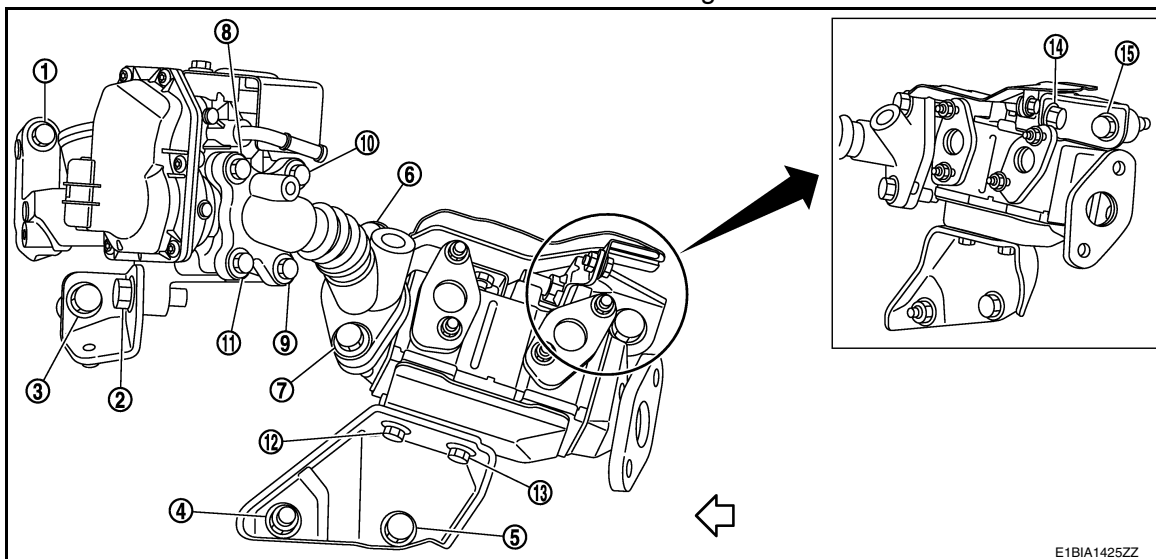
Be sure to only tighten temporarily, and not fully.

## EGR SYSTEM

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Tighten bolts and nuts in the numerical order shown in the figure.



### Inspection

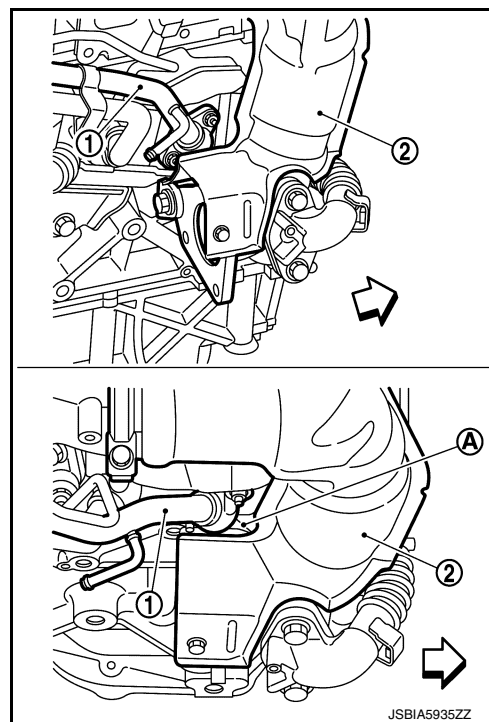
INFOID:000000012197424

#### INSPECTION AFTER INSTALLATION

- Ensure a minimum clearance of 2 mm of between the water inlet pipe (1) and catalyst converter(2), and check that for interference between them.

(A) : Locations to check for interference

↔ : Engine front



- Start the engine and increase the engine speed. Check for exhaust gas and coolant leakage.

# EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

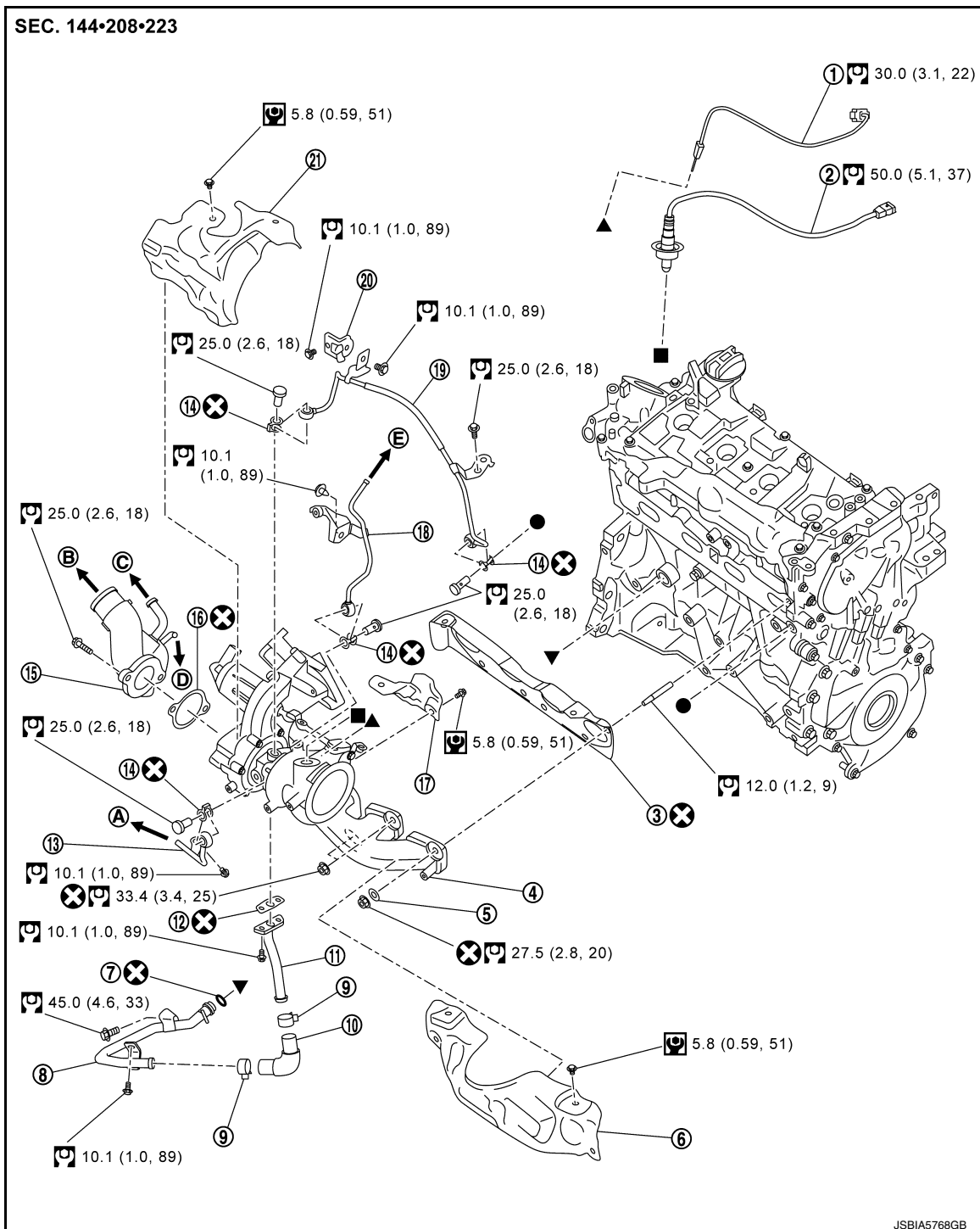
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

Exploded View

INFOID:000000012197425



1. Exhaust temperature sensor (Up to 3/2015)  
Not applicable (From 4/2015)
4. Exhaust manifold and turbocharger assembly
7. O-ring
10. Oil outlet hose
13. Water outlet tube
16. Gasket

2. Air fuel ratio sensor 1
5. Washer
8. Oil outlet tube
11. Oil outlet tube
14. Gasket
17. Turbocharger cover lower

3. Gasket
6. Exhaust manifold cover
9. Clamp
12. Gasket
15. Turbocharger inlet tube
18. Water inlet tube

# EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- |  |  |                              |
|--|--|------------------------------|
| 19. Oil inlet tube                     | 20. Bracket                              | 21. Turbocharger cover upper |
| A. To EGR valve                        | B. To air duct                           | C. To PCV hose               |
| D. To EGR differential pressure sensor | E. To electric throttle control actuator |                              |

⊗ : Always replace after every disassembly.

⊞ : N·m (kg-m, ft-lb)

⊞ : N·m (kg-m, in-lb)

●, ▲, ■, ▼: Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:0000000012197426

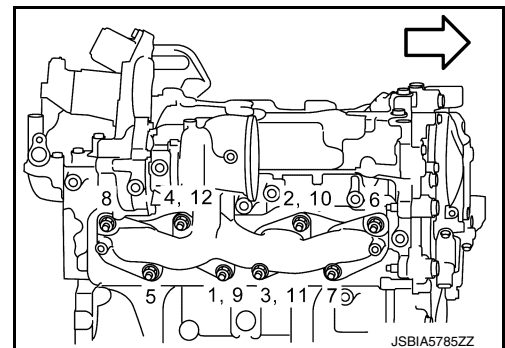
### REMOVAL

- Remove the catalyst converter.
  - 2WD : Refer to [EM-232, "2WD : Removal and Installation"](#).
  - AWD : Refer to [EM-235, "AWD : Removal and Installation"](#).
- Refer to the following to remove the exhaust manifold and turbocharger assembly.
  - Remove the exhaust temperature sensor.
  - Remove A/F sensor 1.
  - Remove the EGR system assembly. Refer to [EM-239, "Removal and Installation"](#).
  - Remove the turbocharger cover upper
  - Disconnect the water tubes.  
**CAUTION:**  
**Never bend the tubes.**
  - Disconnect the oil tubes.  
**CAUTION:**  
**Never bend the tubes.**
  - Remove the exhaust manifold cover.
  - Loosen the nuts in the reverse order of the numerical order shown in the figure. Remove the exhaust manifold and turbocharger assembly.

⇐ : Engine front

#### NOTE:

During removal, bolts 9 - 12 do not have any effect.



- Remove the gasket.
- If necessary, disconnect the turbocharger inlet tube.

#### CAUTION:

- Block the openings with tape or an equivalent so that no foreign material enters the cylinder head.
- Never disassemble or adjust the exhaust manifold and turbocharger assembly. (Disassembly and adjustment of this part is prohibited.)

### INSTALLATION

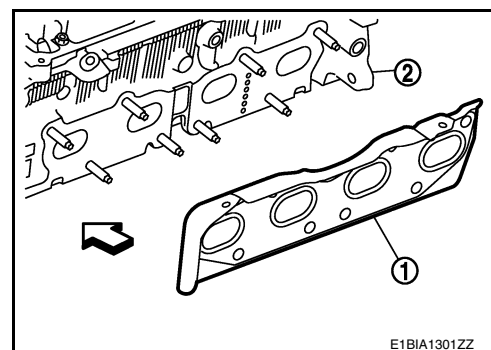
# EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

1. Refer to the figure and install the gasket (1) to the cylinder head (2).

↩ : Vehicle front



2. Tighten nuts in the numerical order shown in the figure.

↩ : Engine front

1, 4 - 12 : 27.5 N-m (2.8 kg-m, 20 ft-lb)

2, 3 : 33.4 N-m (3.4 kg-m, 25 ft-lb)

## CAUTION:

Nuts 1, 4 - 8 do not have washers. Because 2 and 3 are nuts with washers, be careful of the installation positions.

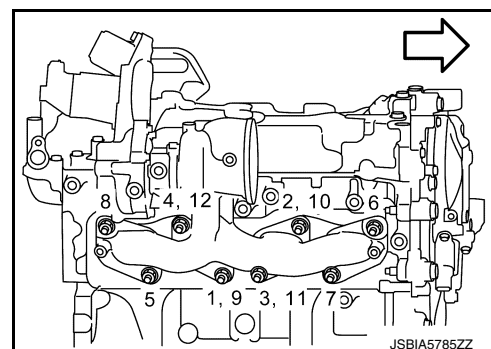
## NOTE:

Nuts 9 - 12 indicate the second tightening.

3. Install removed parts in the reverse order of removal.

## CAUTION:

After the exhaust manifold and turbocharger assembly is replaced, perform fully-closed position learning for the wastegate valve, and use CONSULT to individually check the functions of the turbocharger system. Refer to [EC-755, "Work Procedure"](#) (fully-closed position learning for waste gate valve) and [EC-932, "Component Function Check"](#) (individual function inspection).



## Inspection

INFOID:0000000012197427

## INSPECTION PROCEDURE

Turbocharger Trouble Diagnosis [Oil Leakage, Smoke (white/blue), Lack of Power, Poor Acceleration, Unusual Noise]

Check items before trouble diagnosis

1. Check that the engine oil amount is the specified level.
2. Interview the customer about whether the engine oil is cooled down by idling after driving.

Diagnosis

- Refer to the table below and check each of the parts.
- For the inspection methods, refer to "INSPECTION AFTER REMOVAL."

Inspection location	Check result	Symptoms likely to occur when the results shown on the left exist.			
		Oil leakage	Smoke	Noise	Low power Poor acceleration
Turbine wheel	Oil is leaking.	△	◎	△	△
	Carbon deposits are observed.	△	◎	○	○
	There are marks from rubbing against housing.	△	○	◎	○
	Vane is bent or broken.			◎	◎



# EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

Compressor wheel	Inside of intake port is badly stained with oil.	○	○		
	There are marks from rubbing against housing.	△	○	◎	○
	Vane is bent or broken.			◎	◎
Rotor shaft	Heavy feel or catching when turned by hand.		△	△	○
	Cannot be turned by hand.				◎
	Excessively loose bearing.	△	△	○	△
Oil return port	Carbon or sludge deposit in oil drain port.	△	◎	△	△

◎: **Highly possible.**    ○: **Possible.**    △: **May exist.**

## INSPECTION AFTER REMOVAL

Perform the following checks. If any adhering material is found, perform cleaning. If any irregularities are found, or if the value is outside the standard, replace the exhaust manifold and turbocharger assembly.

- Refer to the figure for the names of parts and the locations for visual inspection.
- If the compressor wheel, turbine wheel, rotor shaft, or other internal part is damaged, check the following paths and completely remove all fragments and other foreign material for preventing secondary malfunctions.

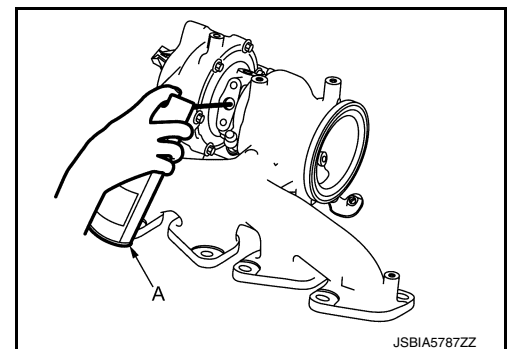
**Intake side:** From exhaust manifold and turbocharger assembly to charge air cooler  
**Exhaust side:** From exhaust manifold and turbocharger assembly to air cleaner  
**Exhaust side:** From exhaust manifold and turbocharger assembly to catalyst converter

## Cleaning Work

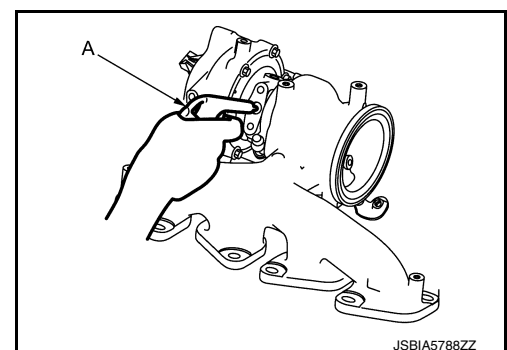
### NOTE:

The following explanatory figure shows an image of the inspection procedure. (The shapes in the figure do not match the actual vehicle parts.)

- Clean before checking.
- Use engine conditioner (A) to clean the oil feed and return ports.
- Use radiator cleaner to clean the water feed and return ports.



- After cleaning, air-blow using an air gun (A).
- Air-blow the compressor wheel, turbine wheel, compressor housing, and turbine housing.



# EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

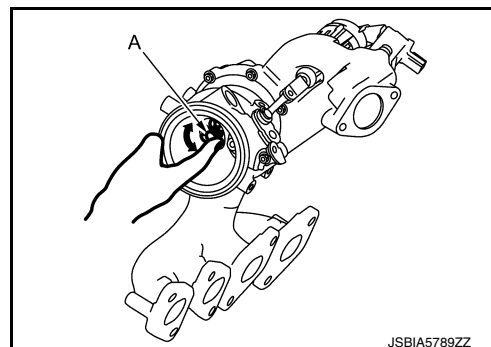
[MR EXCEPT FOR NISMO RS MODELS]

## Turbine Wheel and Compressor Wheel

- Check visually, and by other means, for adhering oil.
- Check visually, and by other means, for adhering carbon.
- Check for bent or broken vanes.
- Check for interference with the housing.

## Rotor Shaft

- Rotate rotor shaft (A) by hand and check that it turns smoothly without resistance or sticking.
- Shake rotor shaft (A) vertically and horizontally and check for looseness.



JSBIA5789ZZ

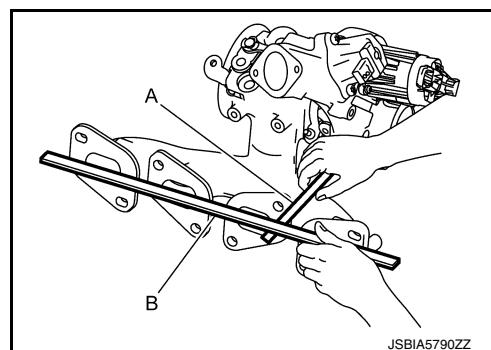
## Mounting Surface Distortion

- Using a thickness gauge (A) and straightedge (B), check for distortion of the exhaust manifold and turbocharger assembly mounting surface at each port, and for distortion of the overall assembly.

### Limit

: Refer to [EM-312, "Exhaust Manifold"](#).

- Replace exhaust manifold and turbocharger assembly if the limit is exceeded.



JSBIA5790ZZ

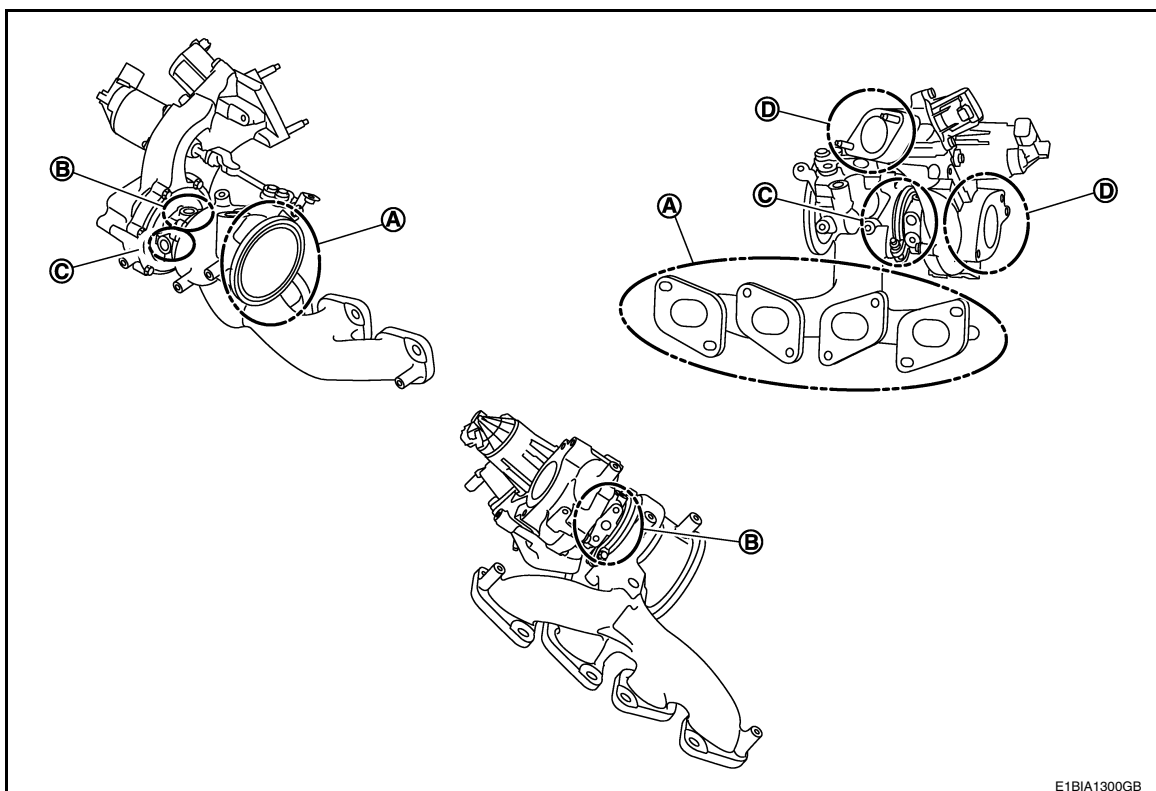
## INSPECTION AFTER INSTALLATION

Start the engine and increase the engine speed. Check for engine oil leakage, exhaust gas leakage, and coolant leakage.

# EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

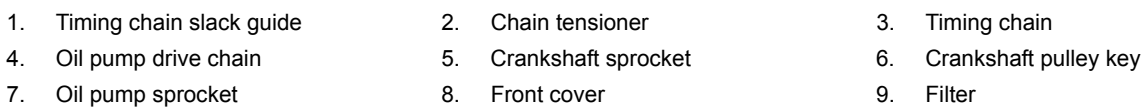
[MR EXCEPT FOR NISMO RS MODELS]



- A. Locations to check for exhaust gas leakage
- B. Locations to check for oil leakage
- C. Locations to check for coolant leakage
- D. Locations to check for air leakage

**[MR EXCEPT FOR NISMO RS MODELS]**

INFOID:0000000012197428



# TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- |  |  |   |
|--|--|---|
| 10. O-ring   | 11. VTC cover                                  | 12. Exhaust valve timing control solenoid valve |
| 13. Intake valve timing intermediate-lock control solenoid valve | 14. Intake valve timing control solenoid valve | 15. Crankshaft pulley bolt                      |
| 16. Crankshaft pulley  | 17. Front oil seal                             | 18. Oil pump drive chain tensioner              |
| 19. O-ring   | 20. Timing chain tension guide                 | 21. Camshaft sprocket (INT)                     |
| 22. Camshaft sprocket (EXH)                                      | 23. O-ring                                     |   |
- A. Comply with the assembly procedure when tightening. Refer to [EM-261](#).  
 B. Comply with the assembly procedure when tightening. Refer to [EM-261](#).

✕ : Always replace after every disassembly.

🔧 : N·m (kg-m, ft-lb)

🔧 : N·m (kg-m, in-lb)

🛢 : Should be lubricated with oil.

🔧 : Sealing point

● : Indicates that the parts is connected at points with same symbols in actual vehicle.

## Removal and Installation

INFOID:0000000012197429

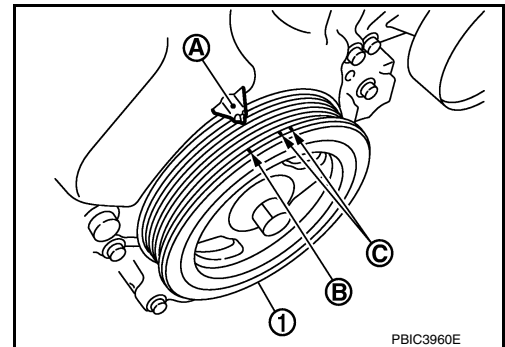
### CAUTION:

The rotation direction indicated in the text describes all directions as seen from engine front.

### REMOVAL

1. Drain engine oil. Refer to [LU-29, "Refilling"](#).
2. Remove the following parts.
  - Intake manifold: Refer to [EM-197, "Exploded View"](#).
  - Rocker cover: Refer to [EM-214, "Exploded View"](#).
3. Position cylinder No. 1 at compression-stroke TDC.
  - Rotate the crankshaft pulley (1) clockwise, and align the crankshaft pulley TDC stamp line (no color) (B) with the timing indicator (A).

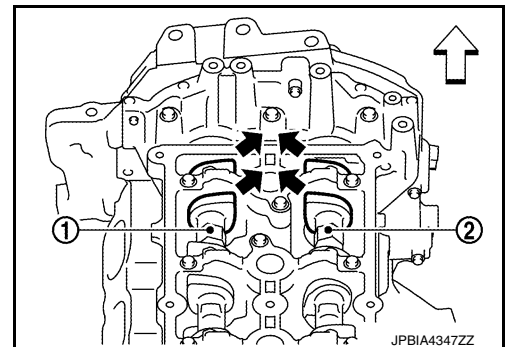
C : Engraved line (white)



- Check that the camshaft nose of cylinder No. 1 is positioned as shown in the figure.

- 1 : Camshaft (INT)  
 2 : Camshaft (EXH)  
 ⇐ : Engine front

- If camshaft nose is not at the specified position, rotate the crankshaft pulley one more turn.



4. Remove crankshaft pulley according to the following procedure.

## TIMING CHAIN

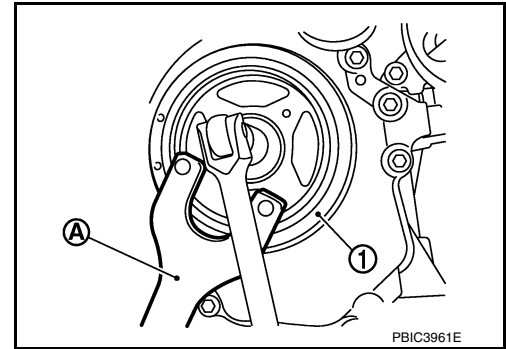
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- a. Secure crankshaft pulley (1) using a pulley holder (commercial service tool) (A).

**CAUTION:**

- When securing the pulley holder, use a piece of wood or an equivalent so that the pulley holder does not contact any surrounding parts.
- Secure the pulley holder so that it is located at a right angle to the crankshaft pulley.



- b. Loosen and pull out crankshaft pulley bolts.

**CAUTION:**

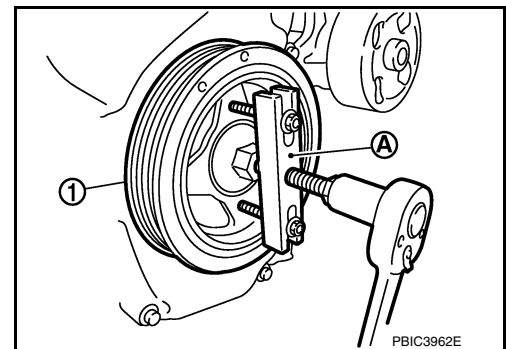
Never remove the crankshaft pulley bolts as they are used as a supporting point for the pulley puller.

- c. Install M6 bolt (pitch: 1.0) to the thread hole of crankshaft pulley.

**NOTE:**

M6 bolts with a length under head of approximately 60 – 80 mm (2.36 – 3.15 in) are recommended.

- d. Pull out crankshaft pulley (1) using a pulley puller [SST: KV11103000 (—)] (A).



5. Remove oil pan (lower). Refer to [EM-200, "Removal and Installation"](#).

**NOTE:**

When the crankshaft sprocket and the oil pump drive component are not removed, this procedure is not necessary.

6. Pull out the intake valve timing control solenoid valve and exhaust valve timing control solenoid valve.

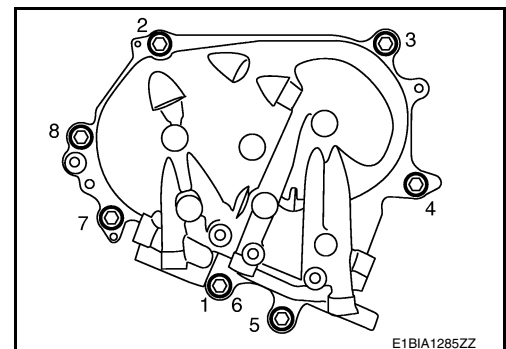
7. Remove drive belt auto tensioner. Refer to [EM-231, "Removal and Installation"](#).

8. Follow the procedure below to remove the front cover.

- Loosen and remove bolts in the reverse order of the numerical order shown in the figure.

**NOTE:**

Bolt 1 does not affect removal.



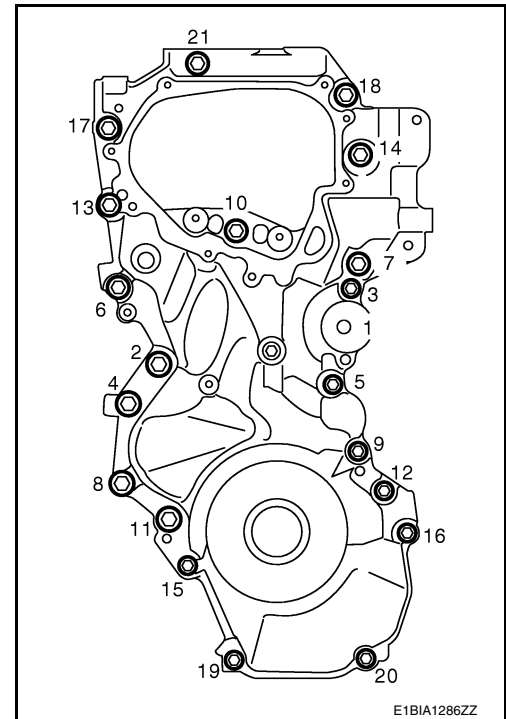
9. Follow the procedure below to remove front cover.

## TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

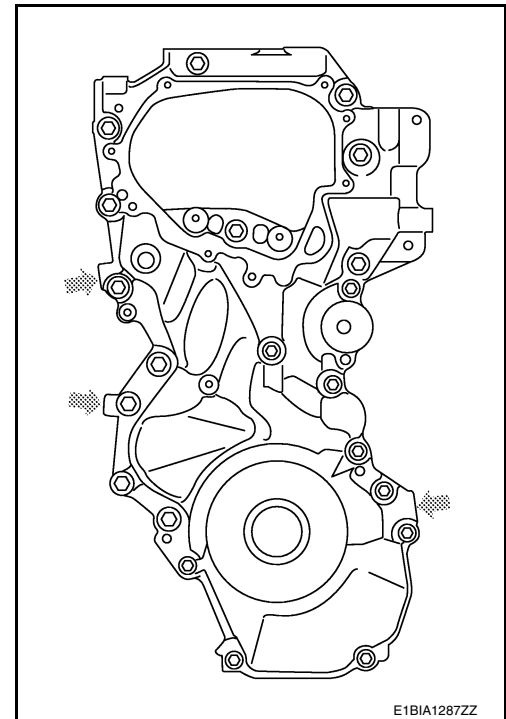
- a. Loosen and remove bolts in the reverse order of the numerical order shown in the figure.



- b. Pry at the positions as shown by (↖) in the figure to cut away the liquid gasket, and then remove the front cover.

**CAUTION:**

A liquid gasket more adhesive than previous types is applied when shipped, so never force it off of a position not specified.



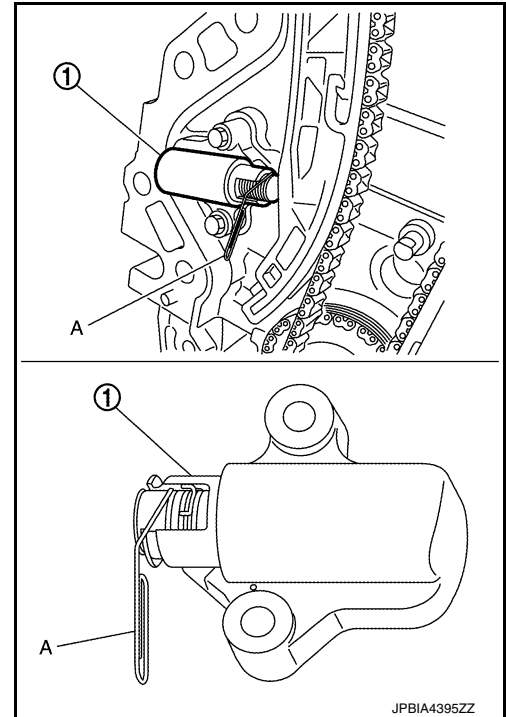
10. Remove front oil seal from front cover.  
• Remove by lifting it up using a flat-bladed screwdriver.  
**CAUTION:**  
Never damage the front cover.
11. Remove chain tensioner according to the following procedure.

## TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- a. Push the plunger into the inside of the chain tensioner (1).
- b. When the plunger is pushed in, insert the clip (A) and other wires into the groove closest to the front.
  - The figure shows an example using a  $\phi 1.5$  mm (0.06 in) clip.
- c. Remove chain tensioner.



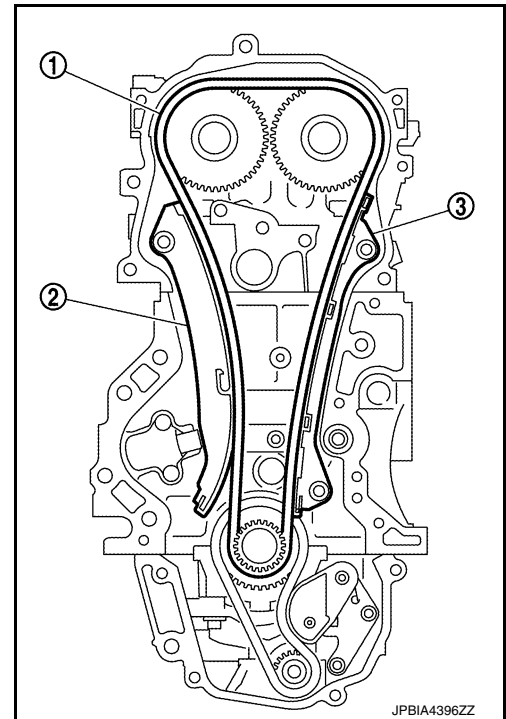
12. Remove the timing chain tension guide (3), the timing chain slack guide (2), and the timing chain (1).

**CAUTION:**

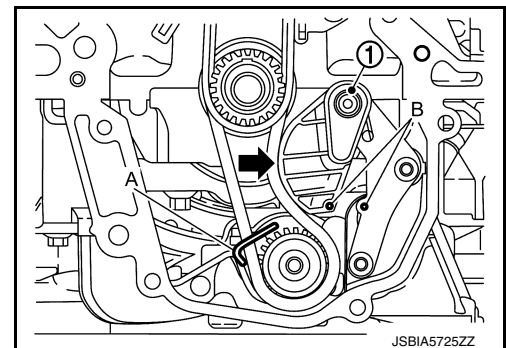
**After removing the timing chain, never rotate camshaft and crankshaft individually for preventing valve from interfering with piston.**

**NOTE:**

If the timing chain is difficult to remove, first remove the camshaft sprocket (EXH). Refer to [EM-261, "Removal and Installation"](#).



13. Remove the crankshaft sprocket and the oil pump drive related parts according to the following procedure.
- a. Push the oil pump drive chain tensioner cam (1) in the direction of the arrow (➡) as shown in the figure, and push the plunger into the inside of the tensioner.
- b. Insert the stopper pin (A) into the chain tensioner hole (B), and then fix it in place with the plunger pushed in.
- c. Remove the oil pump drive chain tensioner.





## TIMING CHAIN

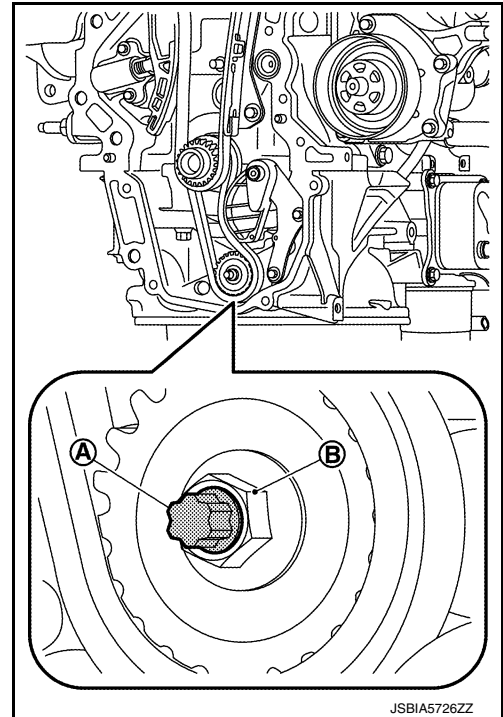
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

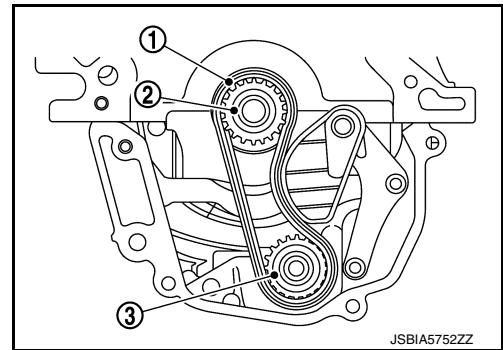
- d. Hold the oil pump shaft end (A), and then loosen and remove the oil pump sprocket mounting nut (B).

**CAUTION:**

- Be sure to hold the end of the shaft.
- Never allow the chain tension to loosen the oil pump sprocket mounting nut.



- e. Remove the oil pump drive chain (1), crankshaft sprocket (2), and oil pump sprocket (3) as a set.



14. Remove the timing chain tension guide (front cover side) from the front cover if necessary.

### INSTALLATION

**NOTE:**

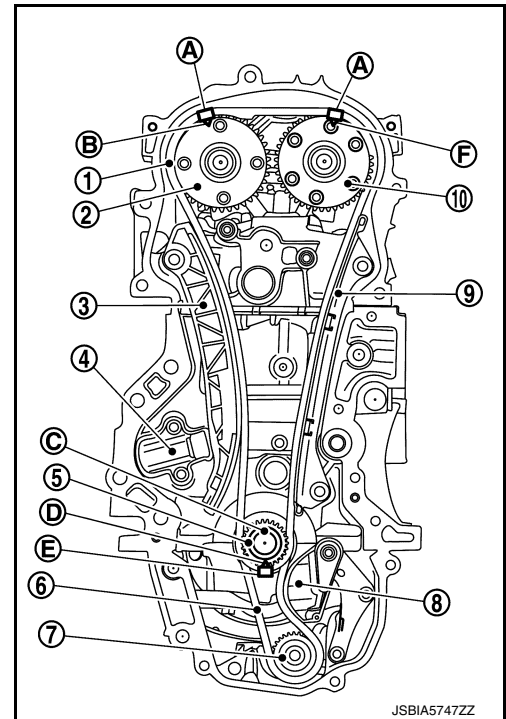
## TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

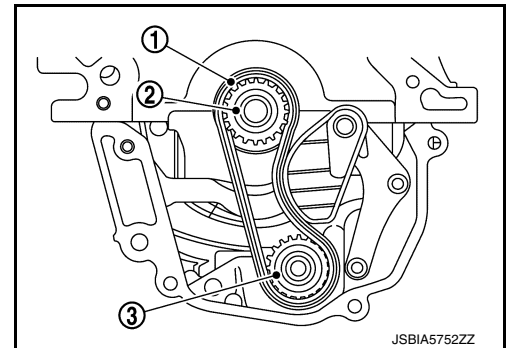
[MR EXCEPT FOR NISMO RS MODELS]

The figure shows component location, the matching mark location, and link color.

- 1 : Timing chain
- 2 : Camshaft sprocket (EXH)
- 3 : Timing chain slack guide
- 4 : Chain tensioner
- 5 : Crankshaft sprocket
- 6 : Oil pump drive chain
- 7 : Oil pump sprocket
- 8 : Oil pump drive chain tensioner.
- 9 : Timing chain tension guide
- 10 : Camshaft sprocket (INT)
- A : Matching mark (dark blue link)
- B : Matching mark (outer groove)
- C : Crankshaft key position (straight up)
- D : Matching mark (stamp)
- E : Matching mark (yellow link)
- F : Matching mark (outer groove)



1. Check that the crankshaft key position is straight up.
2. Install the oil pump drive chain (1), crankshaft sprocket (2), and oil pump sprocket (3) together.



# TIMING CHAIN

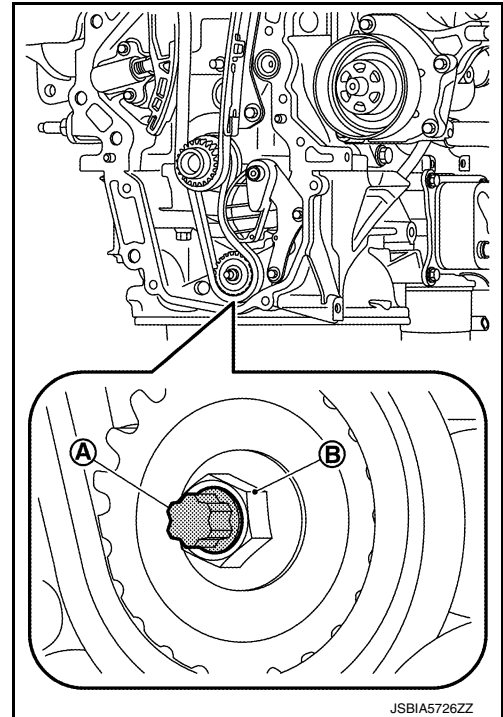
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

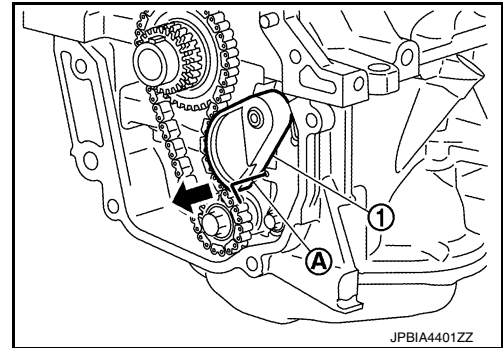
3. Hold the oil pump shaft end (A), and then tighten the oil pump sprocket mounting nut (B).

**CAUTION:**

- Be sure to hold the end of the shaft.
- Never allow chain tension to loosen the oil pump sprocket mounting nut.



4. Install the oil pump drive chain tensioner (1)
  - Fix the tensioner surface at the most compressed position using a stopper pin (A), and then install it.
  - Securely pull out the stopper pin after installing the chain tensioner (←).
  - Check matching mark position of oil pump drive chain and each sprocket again.



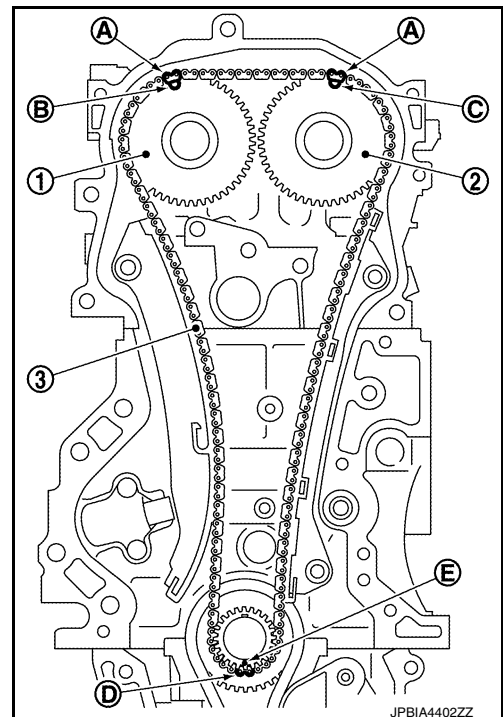
5. Align the matching marks of each sprocket with the matching marks of timing chain.

- 1 : Camshaft sprocket (EXH)
- 2 : Camshaft sprocket (INT)
- 3 : Timing chain
- A : Matching mark (dark blue link)
- B : Matching mark (outer groove)
- C : Matching mark (outer groove)
- D : Matching mark (yellow link)
- E : Matching mark (stamp)

- If these matching marks are not aligned, hold the hexagonal part and rotate the camshaft slightly to correct the position.

**CAUTION:**

Check matching mark position of each sprocket and timing chain again after installing the timing chain.



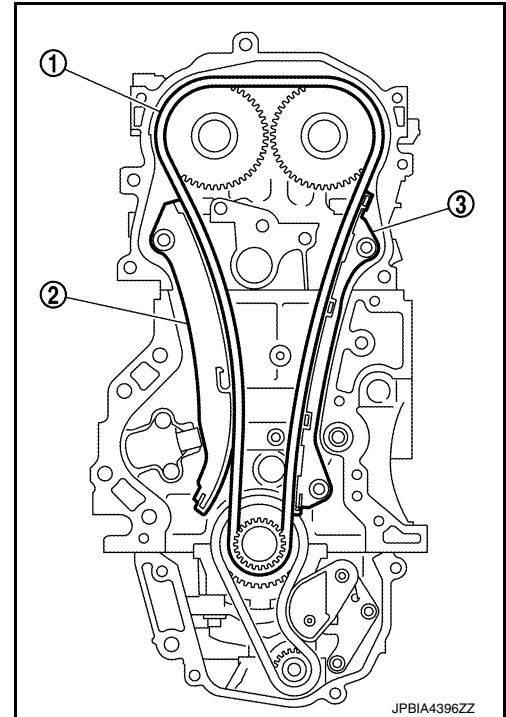
## TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

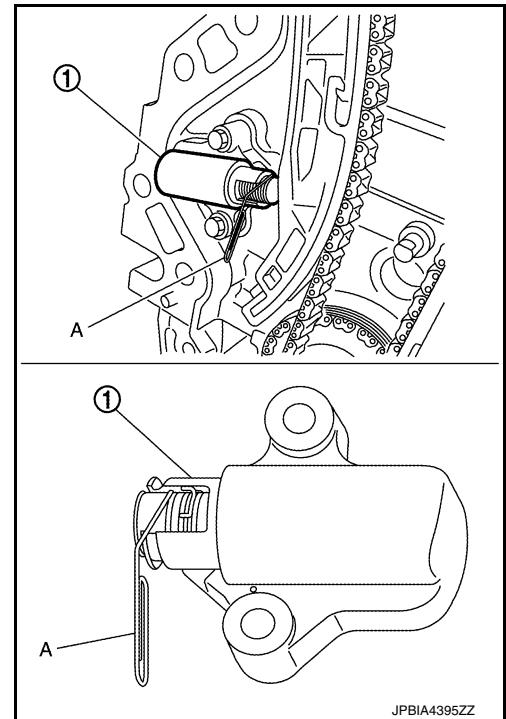
[MR EXCEPT FOR NISMO RS MODELS]

6. Install the timing chain slack guide (2) and the timing chain tension guide (3).

1 : Timing chain



7. Install chain tensioner (1).
- Fix the plunger at the most compressed position using a stopper pin (A), and then install it.
  - Securely pull out the stopper pin after installing the chain tensioner.



8. Check matching mark position of timing chain and each sprocket again.
9. Install the front oil seal to the front cover. Refer to [EM-270. "FRONT OIL SEAL : Removal and Installation"](#).
10. Follow the procedure below to install front cover.

# TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

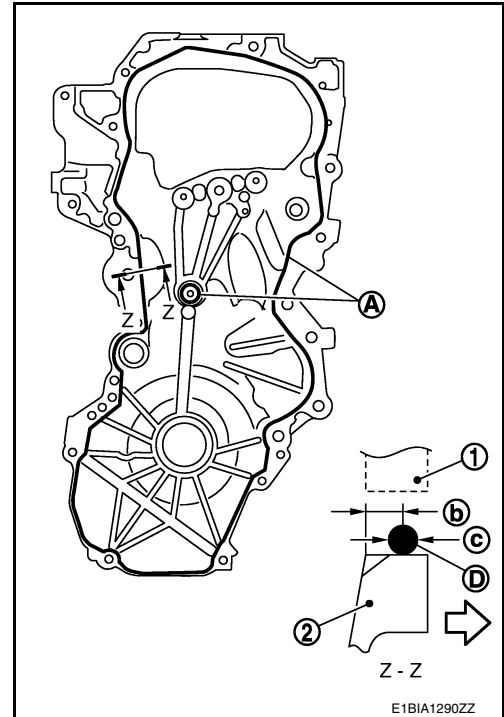
[MR EXCEPT FOR NISMO RS MODELS]

- a. Apply a continuous bead of liquid gasket (A) (ThreeBond 1217H or equivalent) to the position shown in the figure, while checking for overlaps. Refer to [EM-154. "Liquid Gasket"](#).

- 1 : Cylinder head  
 2 : Front cover  
 A : Liquid gasket application point  
 b : 4.0 – 5.6 mm (0.16 – 0.22 in)  
 c :  $\phi 3.4 - 4.4$  mm ( $\phi 0.13 - 0.17$  in)  
 ⇐ : Engine outside

## CAUTION:

Installation should be performed within 5 minutes after liquid gasket application.



- b. Install the O-ring into the cylinder block mounting groove.

## CAUTION:

Always replace O-ring with new a one.

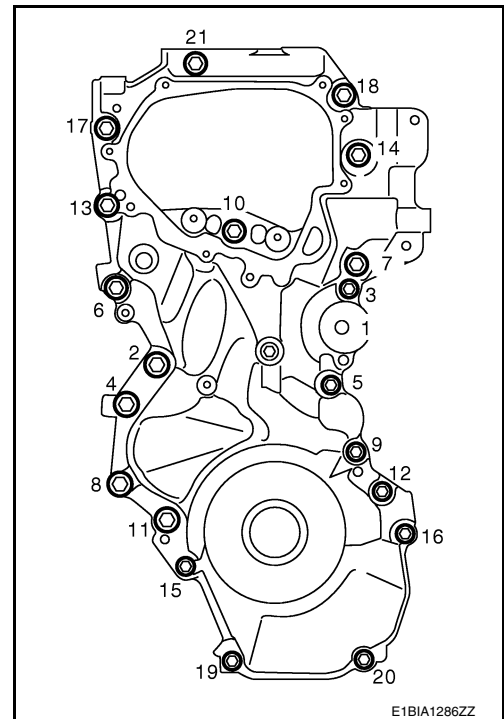
- c. Install front cover.

## CAUTION:

- Never allow the liquid gasket applied area to interfere with other parts.
- Install O-ring so that it does not move.

- d. Tighten bolts in the numerical order shown in the figure.
- Refer to the following for the installation positions of mounting bolts.

- M6 bolt** : 1 in the figure  
**M10 bolt** : 6, 7, 10, 13, 21 in the figure  
**M12 bolt** : 2, 4, 8, 11 in the figure  
**M8 bolt** : Other than the above



- e. Install front cover onto the VTC cover.

1. Install an O-ring.

## CAUTION:

Always replace O-ring with a new one.

# TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

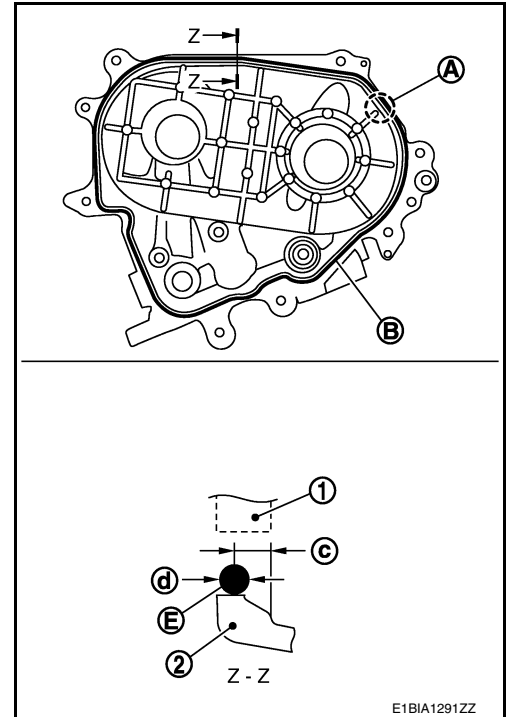
[MR EXCEPT FOR NISMO RS MODELS]

2. Apply a continuous bead of liquid gasket (E) (ThreeBond 1217H or equivalent) to the position shown in the figure, while checking for overlaps. Refer to [EM-154, "Liquid Gasket"](#).

- 1 : Front cover
- 2 : VTC cover
- A : Liquid gasket application start/end point
- B : Liquid gasket application point
- c : 4.0 – 5.6 mm (0.16 – 0.22 in)
- d :  $\phi 3.4$  – 4.4 mm ( $\phi 0.13$  – 0.17 in)

**NOTE:**

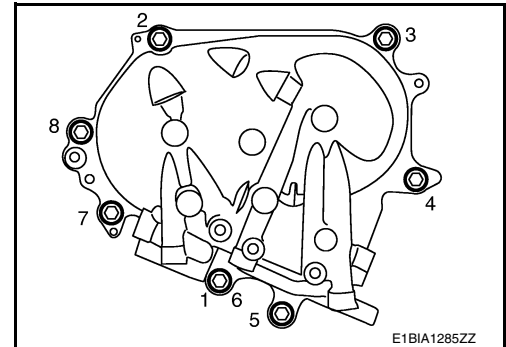
Start the application of liquid gasket. End application when it overlaps by 5 mm (0.20 in) or more.



3. Tighten bolts in the numerical order shown in the figure.

**NOTE:**

Bolt 6 in the figure shows the second tightening of bolt 1.



- f. Tighten bolts again in the numerical order shown in the figure.

**CAUTION:**

After tightening the mounting bolts, wipe away any liquid gasket that is squeezed out.

11. Install crankshaft pulley according to the following procedure.

- a. Install the crankshaft pulley without damaging the front oil seal.

**CAUTION:**

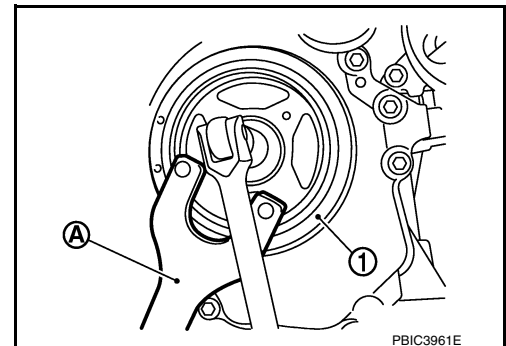
Never tap crankshaft pulley periphery when press-fitting using a plastic hammer. Lightly tap crankshaft pulley center.

- b. Apply engine oil to the crankshaft pulley bolt and seat surface.
- c. Fix crankshaft pulley in place (1) using a pulley holder (commercial service tool) (A).

**CAUTION:**

- When the pulley holder is secured, use a piece of wood or an equivalent so that the pulley holder does not contact any surrounding parts.
- Secure the pulley holder so as to locate it at a right angle to the crankshaft pulley.

- d. Tighten the crankshaft pulley bolt.



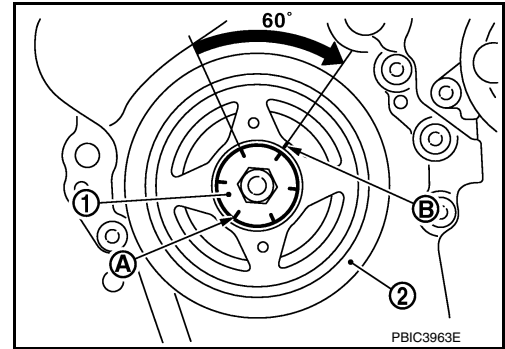
: 29.4 N·m (3.0 kg-m, 22 ft-lb)

## TIMING CHAIN

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- e. Use paint or other means to put matching marks (B) on the crankshaft pulley (2) aligned with the matching marks (6 stamp lines) (A) on the crankshaft pulley bolt (1).



- f. Tighten the crankshaft pulley bolt by 60° (1 stamp line) (angle tightening).  
g. Use a manual tool to rotate the crankshaft clockwise, as viewed from engine front side, and check that it turns smoothly.  
12. Install removed parts in the reverse order of removal.

**CAUTION:**

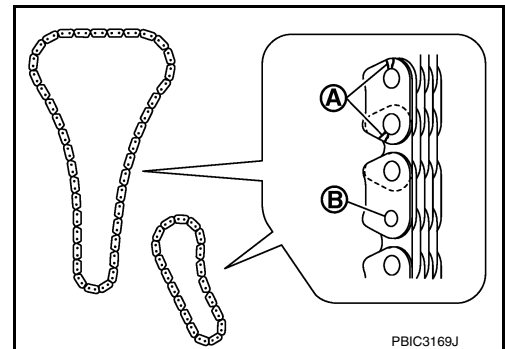
When replacing the timing chain, remove the 2D code label from the electric throttle control actuator, and clear the valve timing variation value. Refer to [EC-756, "Work Procedure"](#).

### Inspection

INFOID:0000000012197430

#### INSPECTION AFTER REMOVAL

- Check for cracks (A) or excessive wear (B) of the timing chain and oil pump drive chain.
- Replace the timing chain and the oil pump drive chain when an abnormal condition is found.



#### INSPECTION AFTER INSTALLATION

##### Engine Oil Leakage Inspection

With engine warmed up, check for engine oil leakage at locations where parts are removed and reinstalled.

**CAUTION:**

Start the check at least 30 minutes or more after installing liquid gasket applied parts (final step). This allows time for hardening of liquid gasket.

# CAMSHAFT

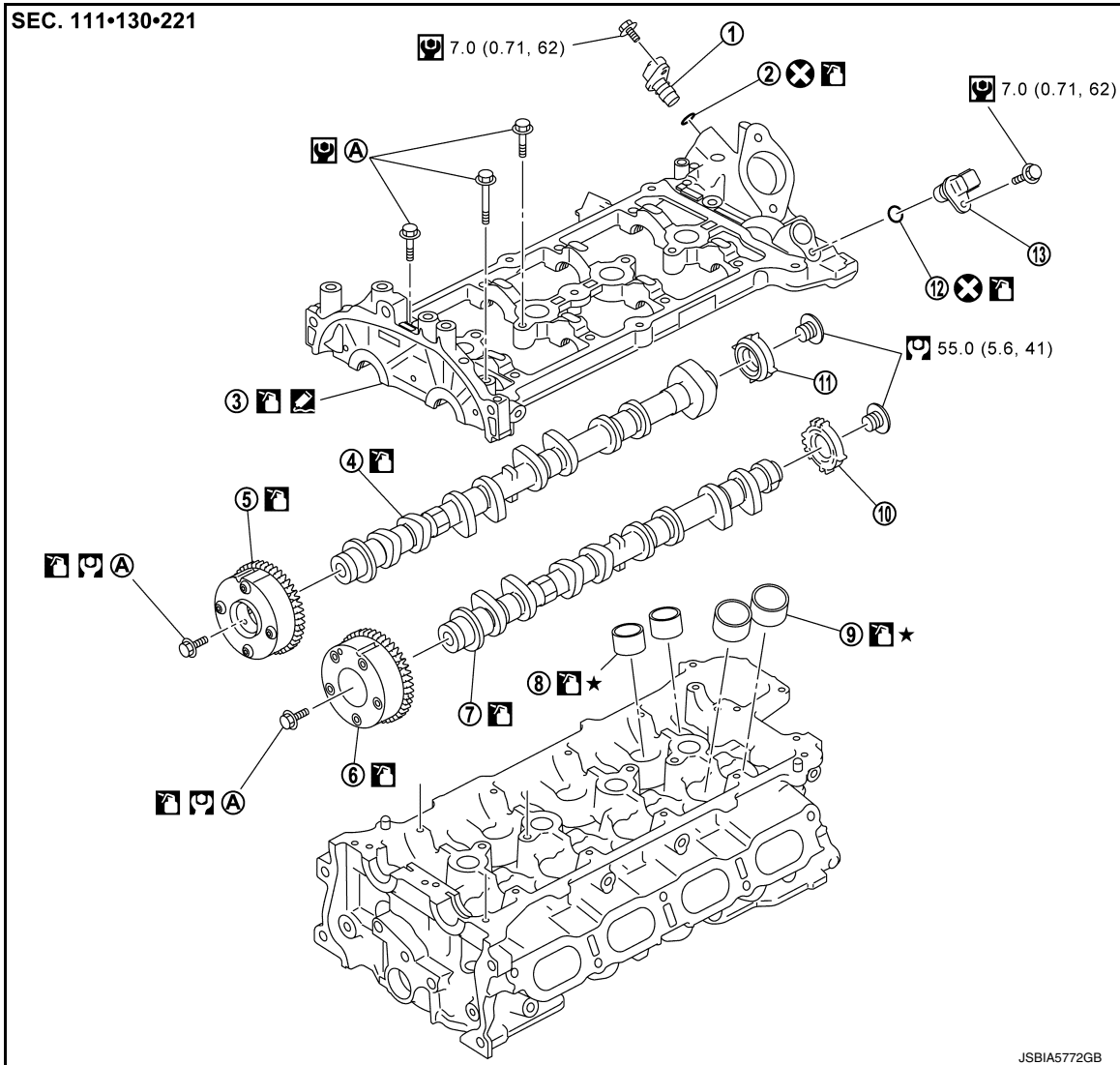
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## CAMSHAFT

### Exploded View

INFOID:000000012197431



- |   |                            |                            |
|---|----------------------------|----------------------------|
| 1. Exhaust valve timing control position sensor | 2. O-ring                  | 3. Camshaft bracket        |
| 4. Camshaft (EXH)                               | 5. Camshaft sprocket (EXH) | 6. Camshaft sprocket (INT) |
| 7. Camshaft (INT)                               | 8. Valve lifter (EXH)      | 9. Valve lifter (INT)      |
| 10. Signal plate (INT)                          | 11. Signal plate (EXH)     | 12. O-ring                 |
| 13. Camshaft position sensor                    |                            |                            |

A. Comply with the assembly procedure when tightening [EM-261](#).

⊗: Always replace after every disassembly.

🔧: N·m (kg-m, ft-lb)

🔧: N·m (kg-m, in-lb)

🛢️: Should be lubricated with oil.

🔧: Sealing point

★ Select correct part.



# CAMSHAFT

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## Removal and Installation

INFOID:000000012197432

### CAUTION:

All rotation directions indicated in the text are described as seen from engine front.

### REMOVAL

1. Remove the following parts.

- Intake manifold: Refer to [EM-197, "Removal and Installation"](#).
- Rocker cover: Refer to [EM-214, "Removal and Installation"](#).
- Front cover: Refer to [EM-249, "Removal and Installation"](#).
- Timing chain: Refer to [EM-249, "Removal and Installation"](#).

### CAUTION:

Never rotate crankshaft and camshaft separately, for preventing the valve from interfering with piston during the procedure.

### NOTE:

The removal of oil pump drive components is not necessary.

2. Remove the camshaft position sensor and exhaust valve timing position sensor from the camshaft bracket.

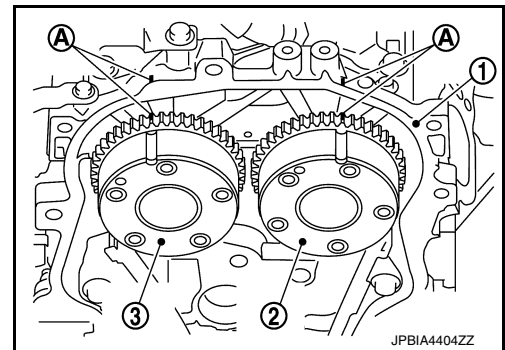
### CAUTION:

Never subject parts to impact.

3. Use paint or other means to put matching marks (A) on the camshaft sprocket (INT) (2), camshaft sprocket (EXH) (3), and camshaft bracket (1) as shown in the figure.

### NOTE:

This prevents the knock pin of the camshaft from engaging with the incorrect pin hole when installing the camshaft sprockets.



4. Remove the camshaft sprocket (INT) (1) and the camshaft sprocket (EXH) (2).

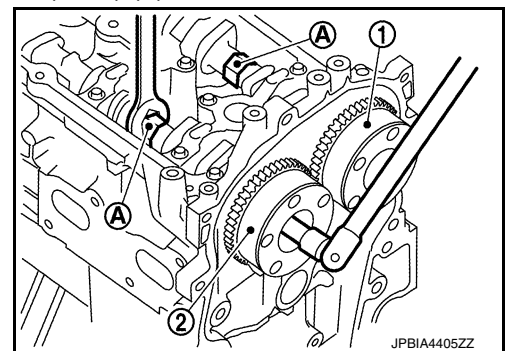
- Hold the hexagonal part of the camshaft (A) to fix the camshaft in place, and then loosen the camshaft sprocket mounting bolts.

1 : Camshaft sprocket (INT)

2 : Camshaft sprocket (EXH)

### CAUTION:

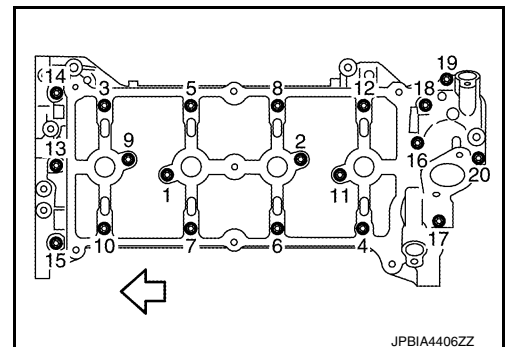
- After removing the timing chain, never rotate camshaft and crankshaft individually for prevent valve from interfering with piston.
- Be sure to hold the camshaft hexagonal part so that the chain tension does not loosen the sprocket mounting bolts.



5. Remove camshaft bracket according to the following procedure.

- a. Loosen bolts in the reverse order of the numerical order shown in the figure.

⇐ : Engine front



# CAMSHAFT

< UNIT DISASSEMBLY AND ASSEMBLY >

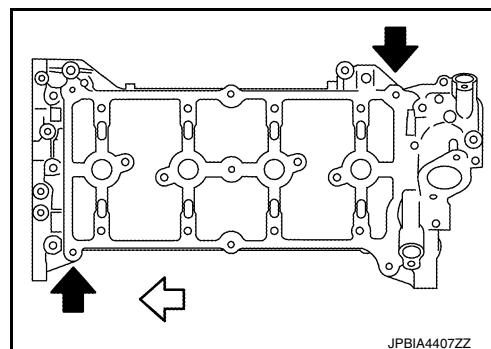
[MR EXCEPT FOR NISMO RS MODELS]

- b. Pry at the position of the (↖) in the figure to cut away the liquid gasket, and remove the camshaft bracket.

↖ : Engine front

## CAUTION:

A liquid gasket more adhesive than previous types is applied when shipped, so never force it off of a position not specified.

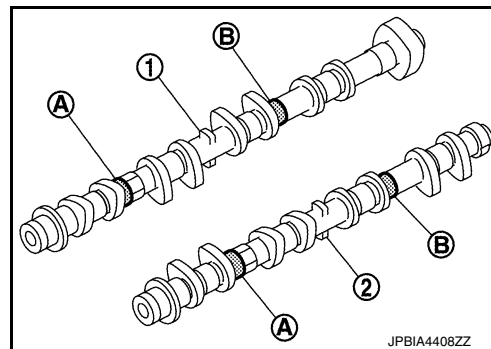


6. Remove camshaft.
7. Remove valve lifter.
  - Identify installation position of each valve. Arrange removed valves so that they cannot be mixed up.
8. If necessary, remove the camshaft signal plates from the camshaft.

## INSTALLATION

1. Install valve lifter.
  - If reused, install in the original position.
2. Install camshaft.
  - Clean the journal to remove any foreign material, dust, and oil.
  - Distinguish between the intake and the exhaust by looking at the different shapes of the front and rear ends of the camshaft or by using the identification colors (A) and (B).

Identification color	A	B
Camshaft (EXH) (1)	—	Orange
Camshaft (INT) (2)	Orange	—

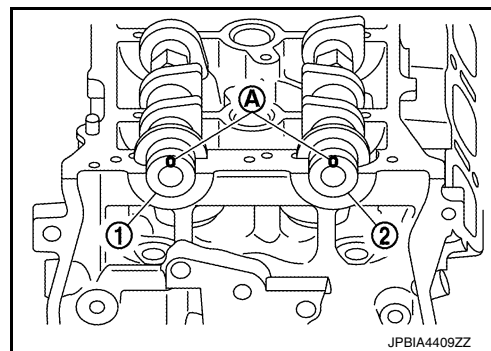


- Install camshafts to the cylinder head so that knock pin (A) on front end is positioned as shown in the figure.

- 1 : Camshaft (EXH)  
2 : Camshaft (INT)

## NOTE:

The knock pin does not stop at the position facing straight up due to the camshaft nose location. Therefore, it is generally acceptable for the position of the knock pin to be almost at the upper side.





3. Install camshaft bracket according to the following procedure.
  - a. Remove foreign material completely from the back of camshaft bracket and cylinder head mounting surface.

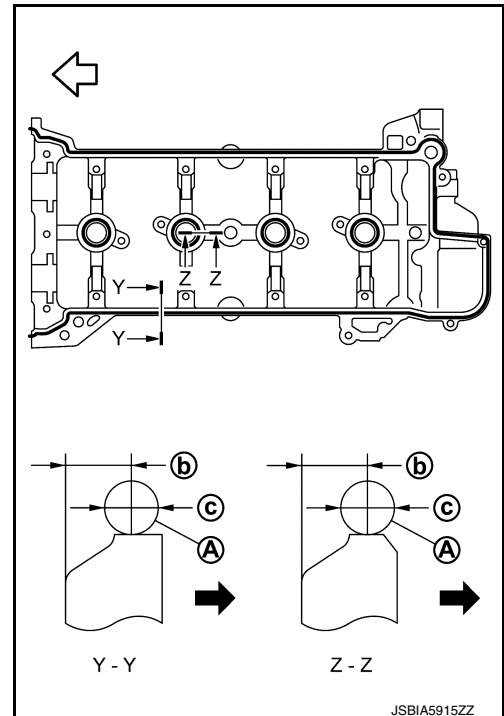
# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >


[MR EXCEPT FOR NISMO RS MODELS]

- b. Apply a continuous bead of liquid gasket (A) (ThreeBond 1217H or equivalent) to the position shown in the figure, while checking for overlaps.

- b : 4.0 – 5.6 mm (0.16 – 0.22 in)  
 c :  $\phi 3.4 - 4.4$  mm ( $\phi 0.13 - 0.17$  in)  
 : Engine front  
 : Engine outside



- c. Tighten camshaft bracket bolts evenly in three steps in the order as shown in the figure.

 : Engine front

### NOTE:

There are two types of bolts. Refer to the following when installing bolts.

- |                                    |                            |
|------------------------------------|----------------------------|
| <b>M6 bolt [length under head:</b> | <b>: 13, 14, 15 in the</b> |
| <b>57.5 mm ( 2.26 in)]</b>         | <b>figure</b>              |
| <b>M6 bolt [length under head:</b> | <b>: Other than the</b>    |
| <b>35.0 mm ( 1.38 in)]</b>         | <b>above</b>               |

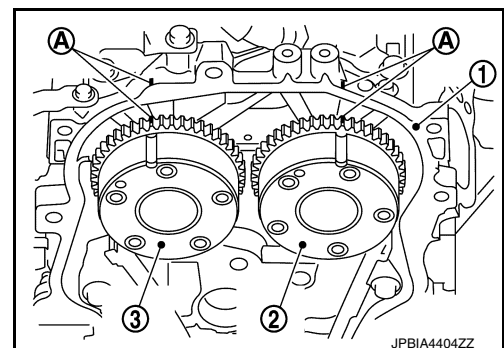
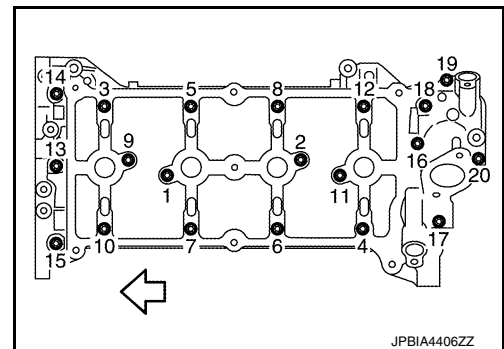
- |                                 |   |
|---------------------------------|---|
| <b>First tightening torque</b>  | <b>: 1.96 N·m (0.20 kg-m, 17 in-lb)</b> |
| <b>Second tightening torque</b> | <b>: 5.88 N·m (0.60 kg-m, 52 in-lb)</b> |
| <b>Third tightening torque</b>  | <b>: 9.5 N·m (0.97 kg-m, 84 in-lb)</b>  |

### CAUTION:

**After tightening the mounting bolts, wipe away any liquid gasket that is squeezed out.**

4. Install the camshaft sprocket onto the camshaft according to the following procedure.
- a. Refer to the marks (A) that are put when the sprockets are removed, and securely align the camshaft (INT) knock pins with the camshaft sprocket (INT) (2) pin holes, and the camshaft (EXH) knock pins with the camshaft sprocket (EXH) (3) pin holes, before installing.

- 1 : Camshaft bracket



- b. Tighten bolts in the following order.

### CAUTION:

# CAMSHAFT

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

**Hold the camshaft hexagonal part, and then secure the camshaft.**

- i. Tighten the camshaft sprocket mounting bolt.

 **35.0 N·m (3.6 kg-m, 26 ft-lb)**

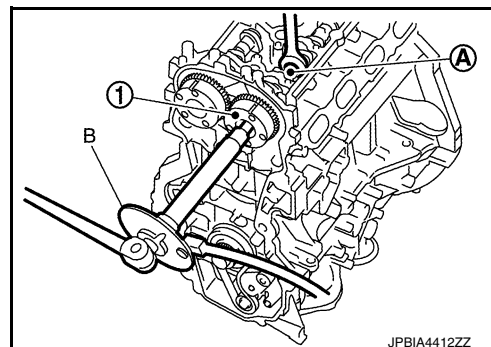
- ii. Tighten by a further 30° (angle tightening).

1 : Camshaft sprocket

A : Camshaft hexagonal part

**CAUTION:**

**Check tightening angle with an angle wrench [SST: KV10112100 (BT8653-A)] (B) or a protractor. Never estimate tightening angle visually.**



5. Install parts related to the timing chain. Refer to [EM-248, "Exploded View"](#).
6. Perform inspection and adjustment of valve clearance. Refer to [EM-179, "Inspection and Adjustment"](#).
7. Install removed parts in the reverse order of removal.

**CAUTION:**

**When replacing camshaft, remove the 2D code label from the electric throttle control actuator and clear the valve timing variation value. Refer to [EC-756, "Work Procedure"](#).**

## Inspection

INFOID:0000000012197433

### INSPECTION AFTER REMOVAL

#### Camshaft Runout

- Set a pair of V-blocks on a level surface and support journals No. 2 and 5 of camshaft.

**CAUTION:**

**Because journal No. 1 (camshaft sprocket side) has a different diameter from the other four locations, do not support it.**

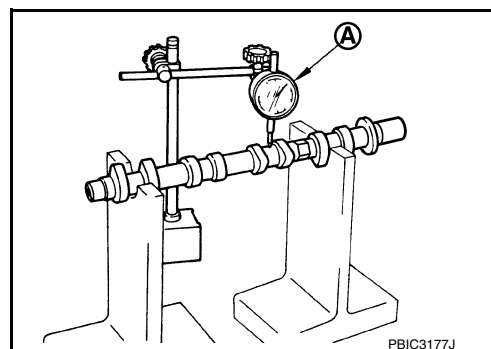
- Set a dial indicator (A) vertically onto journal No. 3.
- Rotate camshaft one rotation and read indication on the indicator.

**Standard**

**Limit**

: Refer to [EM-312, "Camshaft"](#).

- Replace camshaft if the limit is exceeded.



#### Camshaft Nose Height

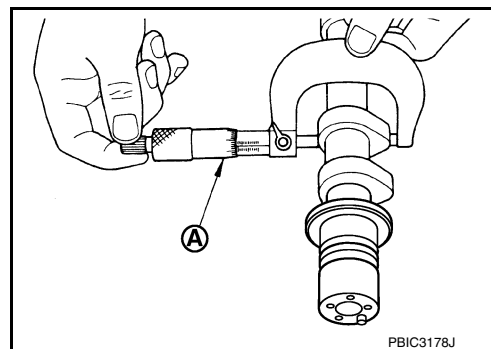
- Measure with a micrometer (A).

**Standard**

**Limit**

: Refer to [EM-312, "Camshaft"](#).

- Replace camshaft if the value is outside (less than) the limit.



#### Camshaft Oil Clearance

# CAMSHAFT

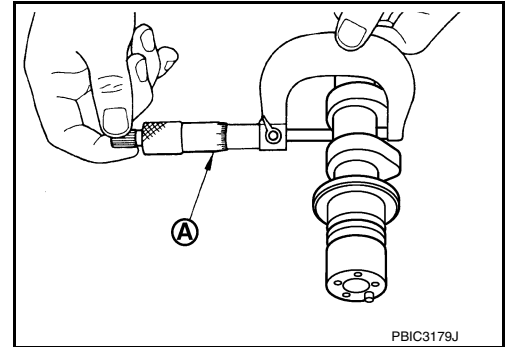
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

Camshaft journal outer diameter

- Measure with a micrometer (A).

**Standard** : Refer to [EM-312, "Camshaft"](#).

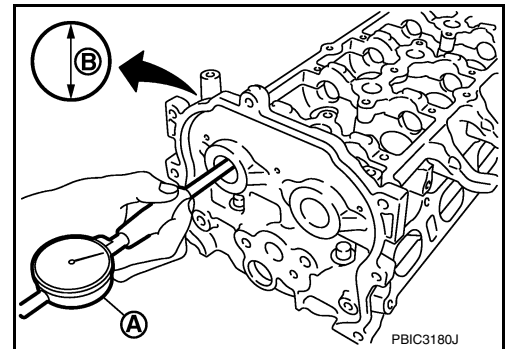


Camshaft bracket inner diameter

- Tighten camshaft bracket bolts to the specified torque.
- Measure inner diameter of the camshaft bracket using a bore gauge (A).

B : Inner diameter measurement direction

**Standard** : Refer to [EM-312, "Camshaft"](#).



How to calculate camshaft oil clearance

(Oil clearance) = (Camshaft bracket inner diameter) - (Camshaft journal outer diameter)

**Standard**  
**Limit** : Refer to [EM-312, "Camshaft"](#).

- If the limit is exceeded, replace camshaft and/or cylinder head. Refer to the standards for each unit.

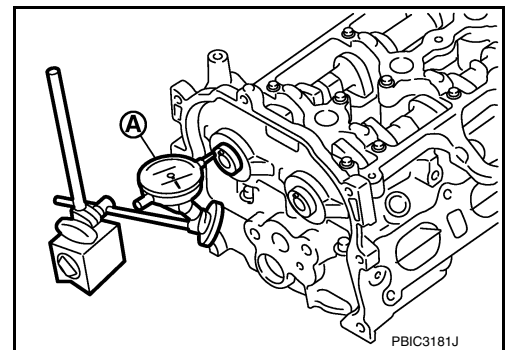
### NOTE:

Because camshaft bracket is machined together with cylinder head, replace it as a cylinder head assembly.

Camshaft End Play

- Set a dial indicator (A) to the camshaft front end in thrust direction. Move the camshaft back and forth (in axial direction) and read indication on the indicator.

**Standard**  
**Limit** : Refer to [EM-312, "Camshaft"](#).



# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Replace the following parts if the limit is exceeded.
- Dimension "A" of journal No. 1 thrust groove

**Standard** : 4.000 – 4.030 mm  
(0.157 – 0.159 in)

- Dimension "B" of camshaft thrust flange

**Standard** : 3.877 – 3.925 mm  
(0.153 – 0.155 in)

- Refer to the standards above, and then replace camshaft and/or cylinder head.

### Camshaft Sprocket Runout

- Set a pair of V-blocks on a level surface and support journals No. 2 and 5 of camshaft.

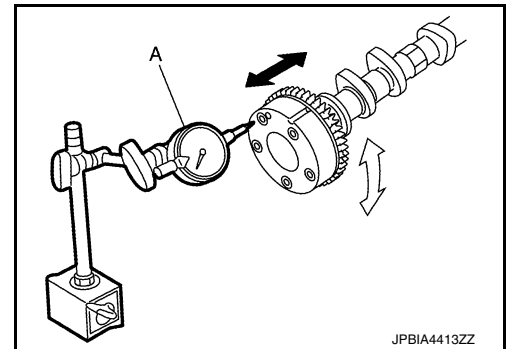
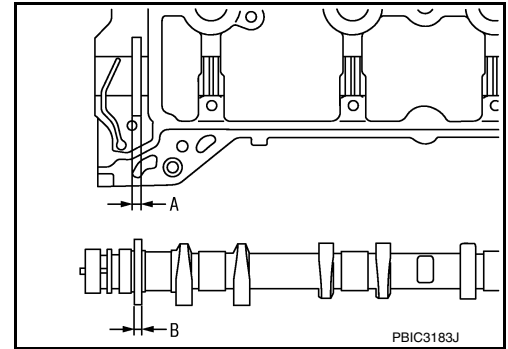
#### CAUTION:

**Because journal No. 1 (camshaft sprocket side) has a different diameter from the other four locations, do not support it.**

- Measure camshaft sprocket runout using a dial indicator (A).

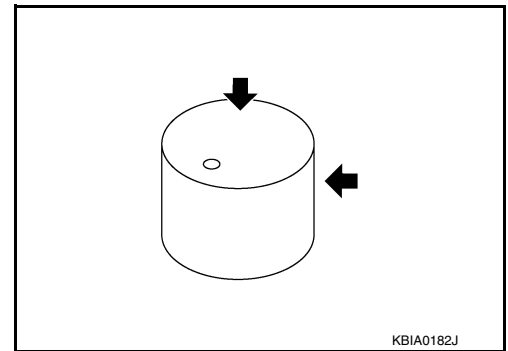
**Limit** : Refer to [EM-312, "Camshaft"](#).

- Replace camshaft sprocket if the limit is exceeded.



### Valve Lifter

- Check for cracks or wear on valve lifter surface.
- Replace valve lifter if any abnormal condition is found.

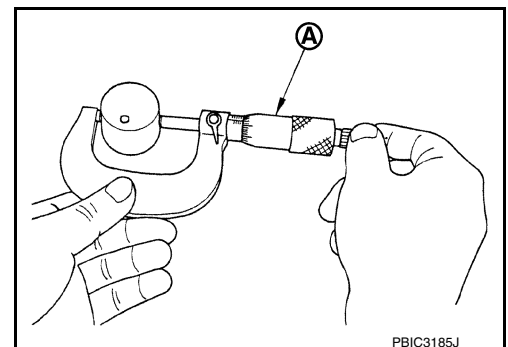


### Valve Lifter Clearance

#### Valve lifter outer diameter

- Measure with a micrometer (A).

**Standard** : Refer to [EM-312, "Camshaft"](#).



#### Valve lifter hole diameter

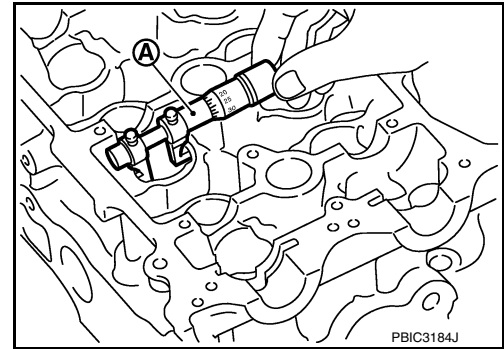
# CAMSHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Using an inside micrometer (A), measure the valve lifter hole diameter in cylinder head.

**Standard** : Refer to [EM-312, "Camshaft"](#).



How to calculate valve lifter clearance

- (Clearance) = (Valve lifter hole diameter) - (Valve lifter outer diameter)

**Standard** : Refer to [EM-312, "Camshaft"](#).

- If the value exceeds the standard, replace valve lifter and/or cylinder head. Refer to the standard values for valve lifter outer diameter and hole diameter.

## INSPECTION AFTER INSTALLATION

Inspection of Camshaft Sprocket (INT / EXH) Oil Groove

### CAUTION:

- This inspection is performed only when DTC P0011 or P0014 occurs in the CONSULT self-diagnosis results and when there is also an instruction to do so in the diagnosis procedures of the "Engine Control System" section. Never perform it at any other time. Refer to [EC-800, "Diagnosis Procedure"](#) (P0011) and [EC-803, "Diagnosis Procedure"](#) (P0014).**
- Check when engine is cold for preventing burns due to splashed engine oil.**

- Check the engine oil level. Refer to [LU-28, "Inspection"](#).
- Perform the following procedure for preventing the engine from unintentionally starting during check.
  - Release fuel pressure. Refer to [EC-771, "Work Procedure"](#).
  - Disconnect the ignition coil and injector harness connectors.
- Support the bottom of the engine with a transmission jack or an equivalent, and remove the right engine mount insulator. Refer to [EM-216, "2WD : Exploded View"](#) (2WD) or [EM-221, "AWD : Exploded View"](#) (AWD).
- Remove the intake and exhaust valve timing control solenoid valves. Refer to [EM-260, "Exploded View"](#).

### NOTE:

Use the supporting jack to slightly raise the front side of the engine.

- Clean the areas around the valve timing control solenoid valve mounting position, and then insert a clean shop cloth (without oil) into the oil hole of cylinder head.
- Under the conditions of step 5, install the engine mount insulator RH. Refer to [EM-216, "2WD : Exploded View"](#) (2WD) or [EM-221, "AWD : Exploded View"](#) (AWD).
- Crank engine, and then check that engine oil comes out from cylinder head oil hole (valve timing control solenoid valve mounting hole).
  - The engine oil leakage is judged by the oil amount of the shop cloth inserted into the oil hole.

### WARNING:

- Never insert a finger into the oil hole.**
- Never touch rotating parts (drive belts, idler pulley, and crankshaft pulley, etc.).**

### CAUTION:

- Never crank the engine when the engine mount insulator RH is not installed.**
  - Use shop cloth or other means to prevent engine oil from contacting the engine or vehicle. In particular, be careful that engine oil does not contact the drive belt, engine mounting insulator, and other rubber parts. If oil adheres to these parts, wipe it off immediately.**
- Perform the following inspection if engine oil does not come out from the valve timing control solenoid valve oil hole in the cylinder head.
    - Clean the oil passage between the oil strainer (integrated with oil strainer) and valve timing control solenoid valve. Refer to [LU-25, "Engine Lubrication System"](#).



## CAMSHAFT

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

9. Remove components between the valve timing control solenoid valve and the camshaft sprocket, and then check the oil passage of each part for clogging.
  - If clogging is found, clean the oil passage. Refer to [LU-25. "Engine Lubrication System"](#).
10. After inspection, install removed parts in the reverse order of removal.



## OIL SEAL

## VALVE OIL SEAL

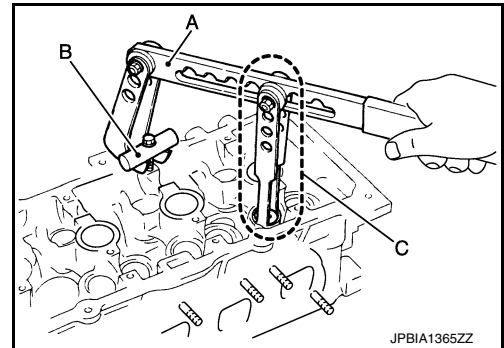
## VALVE OIL SEAL : Removal and Installation

INFOID:0000000012197434

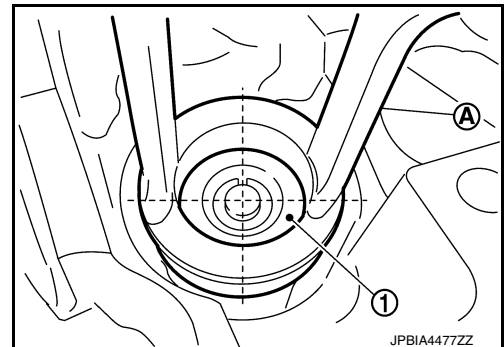
EM

## REMOVAL

1. Remove camshaft. Refer to [EM-260. "Exploded View"](#).
2. Remove valve lifter. Refer to [EM-260. "Exploded View"](#).
3. Turn the crankshaft, and put the cylinder with the oil seal removed in the TDC position for preventing the valve from falling into the cylinder.
4. Use valve spring compressor [SST: KV10116200 (J-26336-A)] (A), adapter [SST: KV10109220 ( — )] (B), and attachment [SST: KV10115900 (J-26336-20)] and remove the valve collet.

**CAUTION:**

- Never damage the valve lifter hole while working.
- Align the centers of the attachment [SST: KV10115900 (J-26336-20)] (A) and valve spring retainer (1).

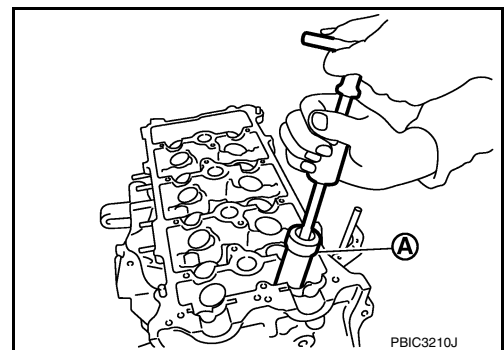


5. Remove valve spring retainer and valve spring.

**CAUTION:**

**Never remove valve spring seat from valve spring (assembly parts).**

6. Remove the valve oil seal using a valve oil seal puller [SST: KV10107902 (J-38959)] (A).



## INSTALLATION

1. Apply engine oil to the new valve oil seal joint and seal lip.

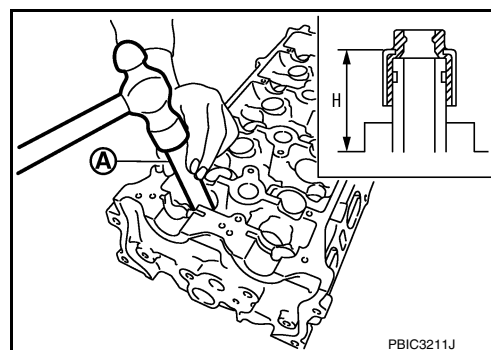
## OIL SEAL

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Using a valve oil seal drift [SST: KV10115600 (J-38958)] (A), press-fit the valve oil seal to the height shown in the diagram.

**Installation height H : 15.1 – 15.7 mm ( 0.59 – 0.62 in)**



- Install removed parts in the reverse order of removal.

### FRONT OIL SEAL

#### FRONT OIL SEAL : Removal and Installation

INFOID:000000012197435

##### REMOVAL

- Remove the following parts.
  - Right fender protector: [EXT-31, "Removal and Installation"](#).
  - Drive belt: [EM-185, "Removal and Installation"](#).
  - Crankshaft pulley: [EM-286, "Exploded View"](#).
- Remove the front oil seal using a flat-bladed screwdriver.

##### **CAUTION:**

**Never damage the front cover or the crankshaft.**

##### INSTALLATION

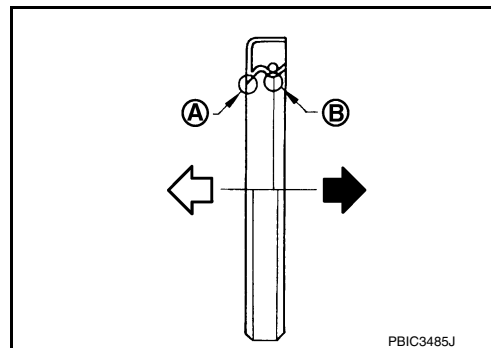
- Apply engine oil to the front oil seal lip.
- Refer to the figure and check the press-fitting direction.

A : Dust seal lip

B : Oil seal lip

⇐ : Engine front side

➡ : Crankshaft sprocket side



- Press-fit the oil seal using a drift with outer diameter approximately  $\phi 57$  mm (2.2 in) and inner diameter approximately  $\phi 45$  mm (1.8 in) (commercial service tool). The oil seal front end surface should be within the following dimensions, with the front cover front end surface as the standard surface.

**Within 0.3 mm (0.01 in) toward engine front (crankshaft pulley side)**

**Within 0.5 mm (0.02 in) toward engine rear (crankshaft sprocket side)**

##### **CAUTION:**

- Never damage the front cover or the crankshaft.**
  - Never touch the grease applied to the oil seal lip.**
  - Press-fit straight, while checking that the oil seal does not curl or tilt.**
- Install removed parts in the reverse order of removal.

### REAR OIL SEAL

# OIL SEAL

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

INFOID:000000012197436

## REAR OIL SEAL : Removal and Installation

### REMOVAL

1. Remove transaxle assembly. Refer to [TM-30. "Removal and Installation"](#) (M/T models), [TM-577. "Removal and Installation"](#) (CVT models).
2. Remove the drive plate. Refer to [EM-229. "Removal and Installation"](#) (CVT models).
3. Remove the flywheel. Refer to [EM-227. "Removal and Installation"](#) (M/T models).
4. Using a flat-bladed screwdriver, remove the rear oil seal.

#### CAUTION:

**Never damage the mounting surface or the crankshaft.**

### INSTALLATION

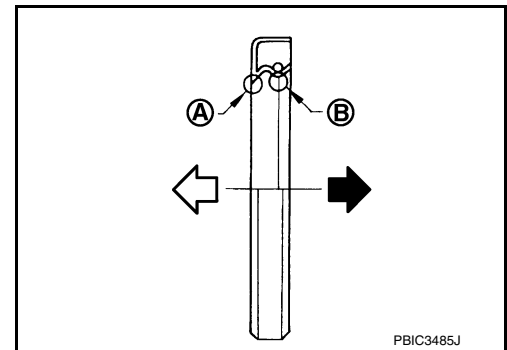
1. Apply engine oil to the rear oil seal joint.
2. Refer to the figure and check the press-fitting direction.

A : Dust seal lip

B : Oil seal lip

⇐ : Transaxle side

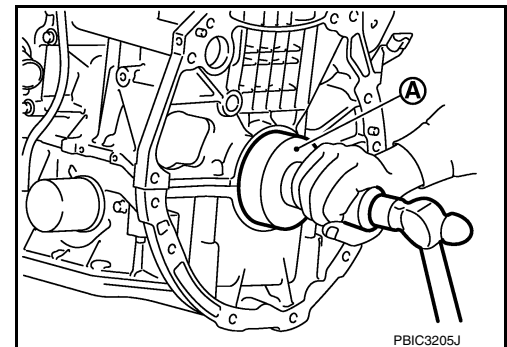
➡ : Cylinder block side



3. Press-fit the rear oil seal using a drift (commercial service tool) with outer diameter of approximately  $\phi 115$  mm (4.5 in) and inner diameter of approximately  $\phi 90$  mm (3.5 in), with the following precautions in mind.

#### CAUTION:

- Never touch the grease applied to the oil seal lip.
- Never damage the rear oil seal mounting parts on the oil pan (upper) and cylinder lock, or the crankshaft.
- Press-fit straight, while checking that the oil seal does not curl or tilt.



- Press-fit to the dimensions specified as shown in the figure.

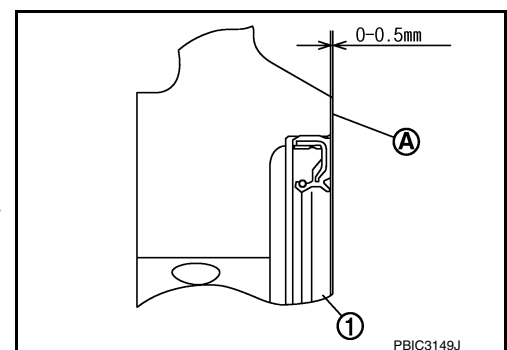
1 : Rear oil seal

A : Cylinder block rear end surface

#### NOTE:

The standard surface of the dimension is the rear end surface of cylinder block.

4. Install removed parts in the reverse order of removal.



# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## CYLINDER HEAD

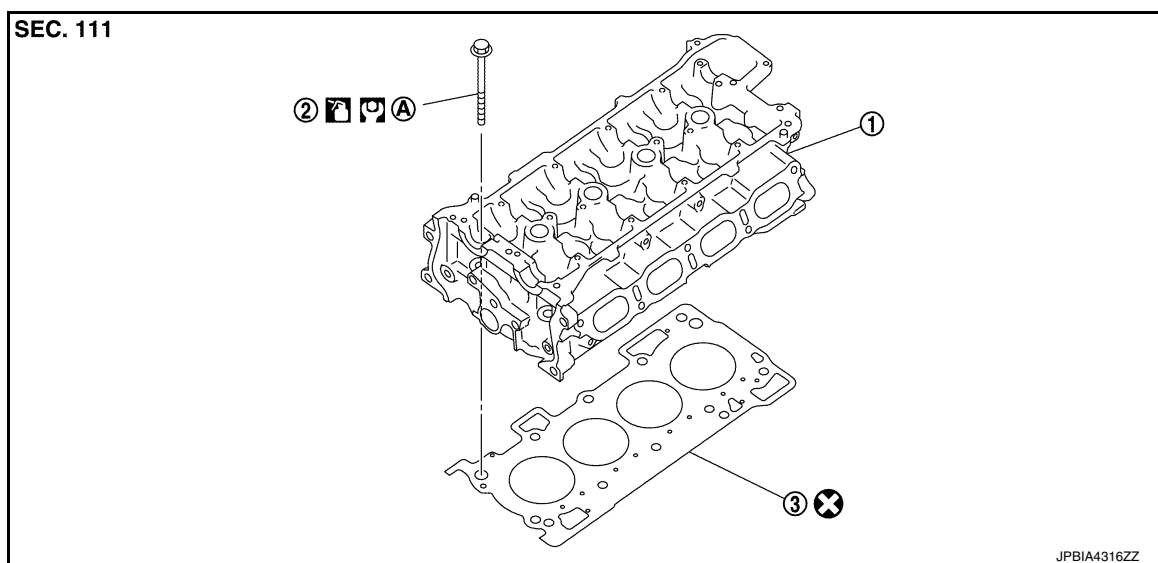
### Exploded View

INFOID:0000000012197437

#### **WARNING:**

Valves containing metallic sodium are used for the exhaust valves. Be careful to use sufficient caution when handling or disposing of them. Refer to [EM-152, "Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves"](#).

### REMOVAL



1. Cylinder head assembly

2. Cylinder head bolt

3. Cylinder head gasket

A. Comply with the assembly procedure when tightening. Refer to [EM-273](#).

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

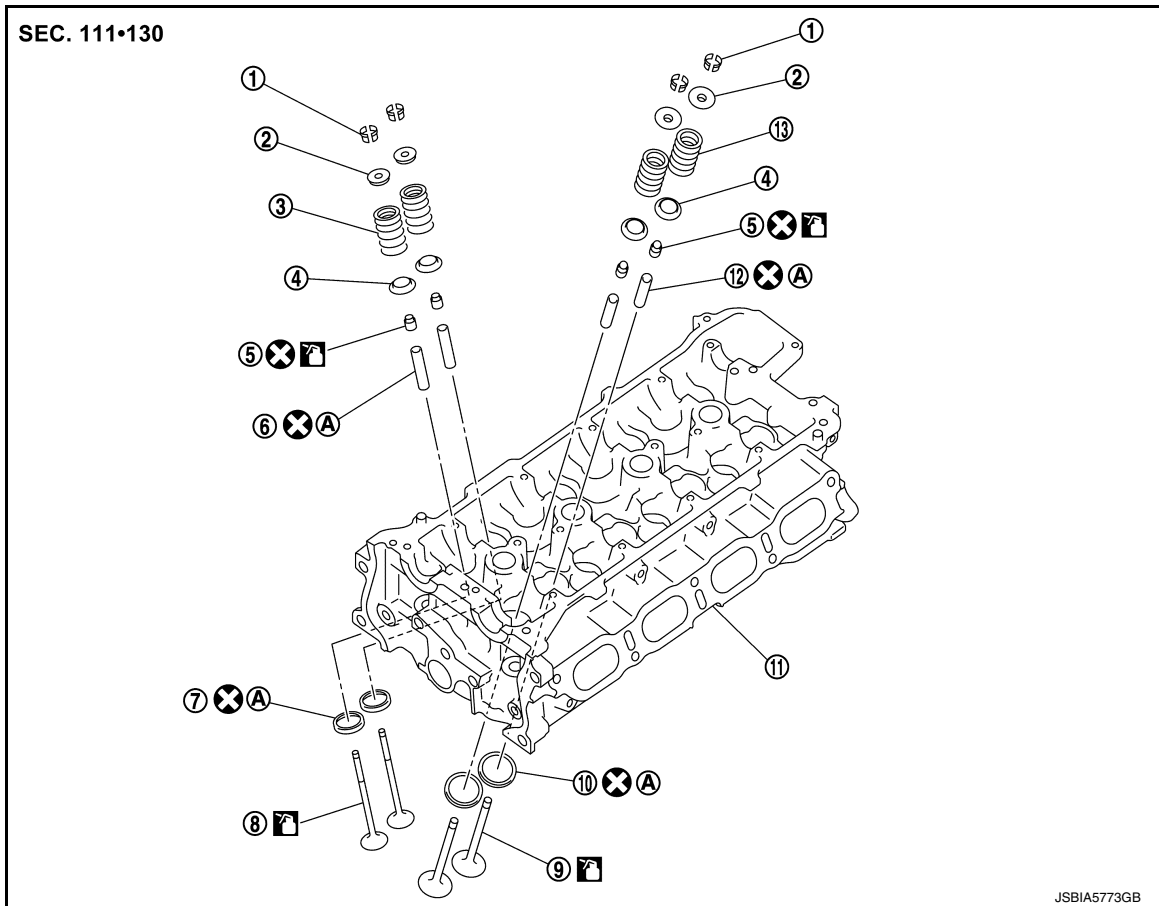
: Should be lubricated with oil.

### DISASSEMBLY

# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]



- |                        |                          |                       |
|------------------------|--------------------------|-----------------------|
| 1. Valve collet        | 2. Valve spring retainer | 3. Valve spring (EXH) |
| 4. Valve spring seat   | 5. Valve oil seal        | 6. Valve guide (EXH)  |
| 7. Valve seat (EXH)    | 8. Valve (EXH)           | 9. Valve (INT)        |
| 10. Valve seat (INT)   | 11. Cylinder head        | 12. Valve guide (INT) |
| 13. Valve spring (INT) |                          |                       |

A. Comply with the assembly procedure when tightening. [EM-275](#).

⊗: Always replace after every disassembly.

🛢: Should be lubricated with oil.

## Removal and Installation

INFOID:0000000012197438

### WARNING:

Valves containing metallic sodium are used for the exhaust valves. Be careful to use sufficient caution when handling or disposing of them. Refer to [EM-152, "Special Cautions to Ensure the Safe Disposal of Sodium-filled Exhaust Valves"](#).

### REMOVAL

- Remove the following parts.
  - Intake manifold: [EM-197, "Removal and Installation"](#).
  - Exhaust manifold and turbocharger assembly: [EM-243, "Removal and Installation"](#).
  - Fuel tube and fuel injector assembly: [EM-208, "Removal and Installation"](#).
  - Multi-way control valve: [CO-54, "Removal and Installation"](#).
  - Fuel hose bracket: [EM-208, "Exploded View"](#).
  - Ignition coil: [EM-214, "Exploded View"](#).
  - Rocker cover: [EM-214, "Exploded View"](#).
  - Front cover: [EM-248, "Exploded View"](#).
  - Parts related to the timing chain: [EM-249, "Removal and Installation"](#).

# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## NOTE:

It is not necessary to remove the oil pump drive components.

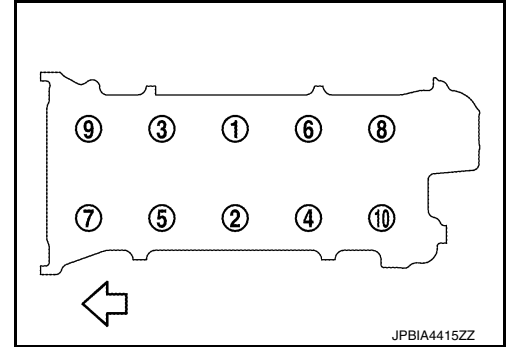
- Camshaft: [EM-261, "Removal and Installation"](#).
- Disconnect and move each wire and piping aside.

2. Loosen cylinder head bolts in the reverse order of the numerical order shown in the figure.

↩ : Engine front

- Use a TORX socket (size: E18).

3. Remove cylinder head gasket.



## INSTALLATION

1. Install cylinder head gasket.

### CAUTION:

**Always replace cylinder head gasket with a new one.**

2. Follow the procedure below and tighten cylinder head bolts in the numerical order shown in the figure.

↩ : Engine front

- Use a TORX socket (size: E18).

### CAUTION:

- If the cylinder head bolt is to be reused, check the outer diameter in advance. Refer to [EM-279, "Inspection"](#).
- In step (4), loosen all bolts in the reverse order of the numerical order shown in the figure.

- a. Apply new engine oil to the threads and seat surfaces of cylinder head bolts.
- b. Tighten the cylinder head bolts.

: 40.0 N·m (4.1 kg-m, 30 ft-lb)

- c. Tighten an additional 100° (angle tightening).
  - When using a protractor, mark the cylinder and bolt heads and check the tightening angle.

### CAUTION:

**Check tightening angle with an angle wrench [SST: KV10112100 (BT8653-A)] A or a protractor. Never estimate tightening angle visually.**

- d. Fully loosen the cylinder head bolts.

: 0 N·m (0 kg-m, 0 ft-lb)

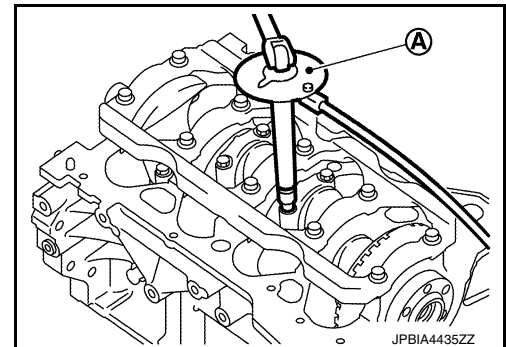
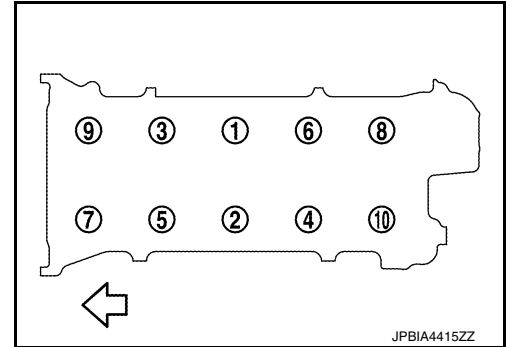
### CAUTION:

**Reverse order of tightening**

- e. Tighten the cylinder head bolts.

: 40.0 N·m (4.1 kg-m, 30 ft-lb)

- f. Tighten an additional 95° (angle tightening).
- g. Tighten an additional 95° (angle tightening).
3. Install removed parts in the reverse order of removal.



# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## Disassembly and Assembly

INFOID:000000012197439

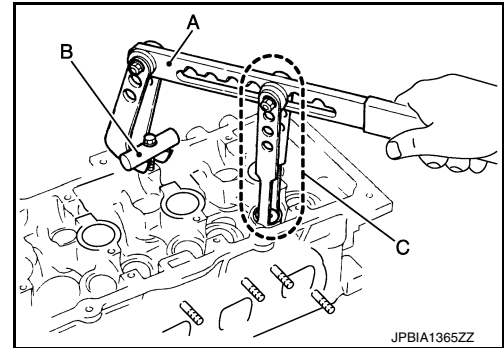
### DISASSEMBLY

1. Remove spark plugs with a spark plug wrench (commercial service tool).

#### CAUTION:

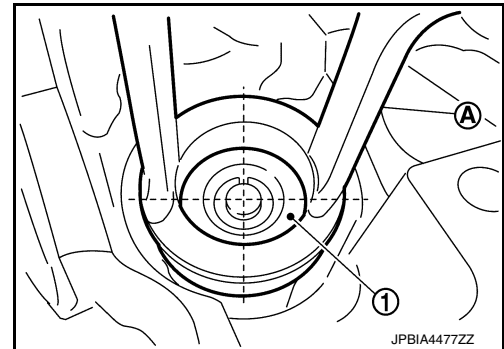
**Never subject parts to impact. (Use of pneumatic tools and power tools is prohibited.)**

2. Remove valve lifter.
  - Identify installation position of each valve. Arrange removed valves so that they cannot be mixed up.
3. Use a valve spring compressor [SST: KV10116200 (J-26336-A)] (A), adapter [SST: KV10109220 ( — )] (B), and attachment [SST: KV10115900 (J-26336-20)] and remove the valve collet.



#### CAUTION:

- Never damage the valve lifter hole while working.
- The centers of the attachment [SST: KV10115900 (J-26336-20)] (A) and valve spring retainer (1) must be aligned.

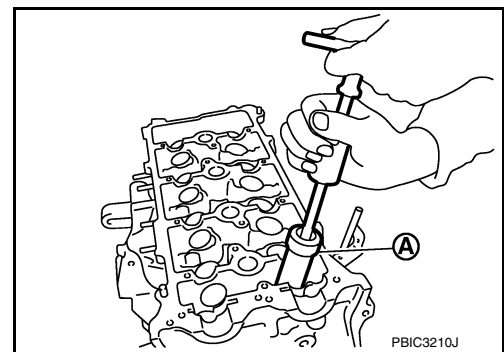


4. Remove valve spring retainer and valve spring.

#### CAUTION:

**Never remove valve spring seat from valve spring (assembly parts).**

5. Push the valve stem toward the combustion chamber side and remove valve.
  - After removal, check valve guide clearance. Refer to [EM-179, "Inspection and Adjustment"](#).
  - Identify installation position of each valve. Arrange removed valves so that they cannot be mixed up.
6. Remove valve oil seals.
  - Use valve oil seal puller [SST: KV10107902 (J-38959)] (A).



7. Remove valve seat if necessary.
  - Bore out old valve seat until it is thin enough to remove.

#### CAUTION:

**Never scratch the cylinder head.**

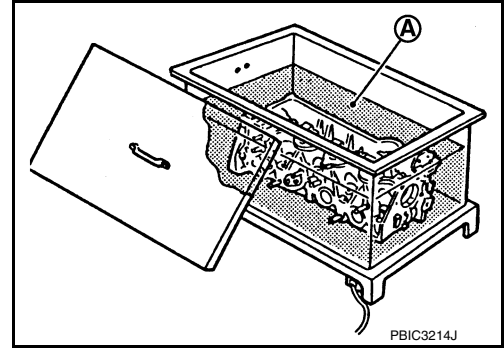
## CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

8. If necessary, follow the procedure below and remove the guide.
  - a. Heat cylinder head to 110 – 130 °C by soaking it in heated oil.

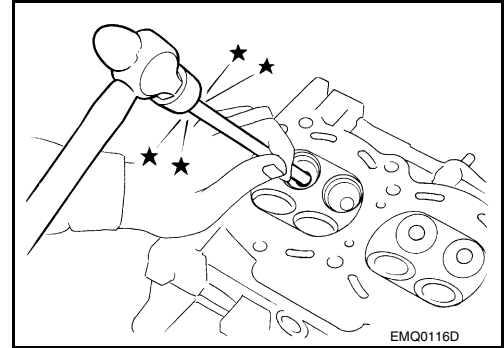
A : Oil



- b. Drive out the valve guide from combustion chamber side using a valve guide drift (commercial service tool: for inner diameter  $\phi 5.0$  mm).

**CAUTION:**

Use protective gloves so as to prevent burns because the cylinder head is hot.



### ASSEMBLY

1. If the valve guide is removed, follow the procedure below to install it.

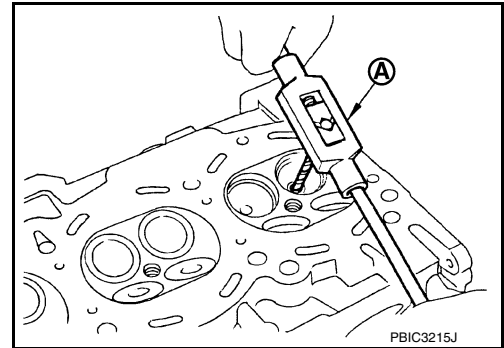
**CAUTION:**

Whenever the valve guide is removed, replace it with 0.2 mm (0.008 in) oversized valve guide.

- a. Ream cylinder head valve guide hole using a valve guide reamer (commercial service tool) (A).

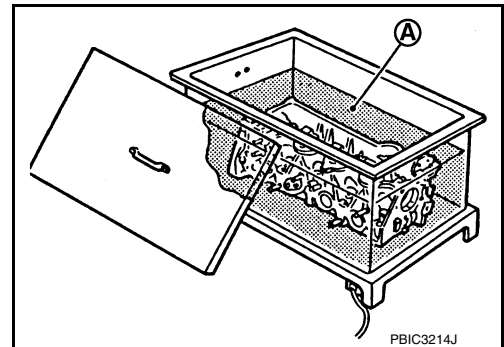
Ream finished in-  
ner diameter stan-  
dard [when 0.2 mm (0.008 in) oversized  
part is used]

Intake-exhaust : Refer to [EM-314, "Cylinder Head"](#).



- b. Heat cylinder head to approximately 110 – 130 °C by soaking it in heated oil.

A : Oil





# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

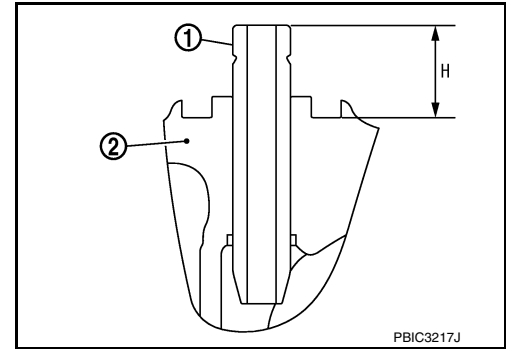
[MR EXCEPT FOR NISMO RS MODELS]

- c. Using a valve guide drift (commercial service tool: for inner diameter  $\phi 5.0$  mm), press-fit valve guide (1) from camshaft side so that the valve guide installation height is dimension H, as shown in the figure.

Dimension H : Refer to [EM-314, "Cylinder Head"](#).  
standard

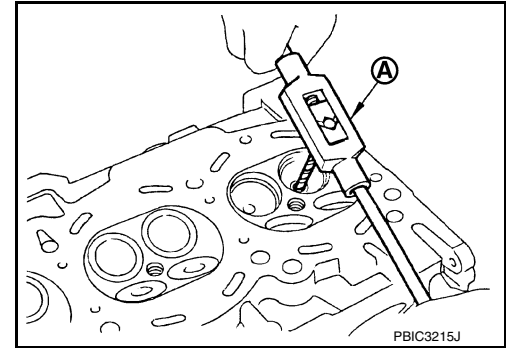
**CAUTION:**

Use protective gloves for preventing burns because the cylinder head (2) is hot.



- d. Ream press-fitted valve guide using a valve guide reamer (commercial service tool) (A).

Reamer finished standard  
Intake-exhaust : Refer to [EM-314, "Cylinder Head"](#).



2. If the valve seat is removed, follow the procedure below to install it.

**CAUTION:**

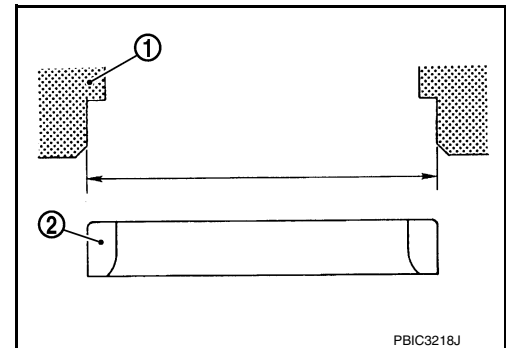
Whenever the valve seat is removed, replace it with 0.5 mm (0.020 in) oversized valve seat.

- a. Ream the cylinder head (1) valve seat mounting position so that it is the following dimension.

2 : Valve seat

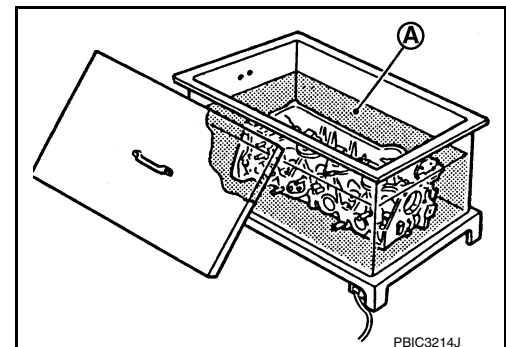
Standard machining dimensions [when 0.5 mm (0.020 in) oversized part is used]

: Refer to [EM-314, "Cylinder Head"](#).



- b. Heat cylinder head to 110 – 130 °C by soaking it in heated oil.

A : Oil



- c. Completely chill the service valve seat with dry ice, and press it into cylinder head.

**CAUTION:**

- Never touch chilled valve seat with bare hands.
- Use protective gloves for preventing burns because the cylinder head is hot.

# CYLINDER HEAD

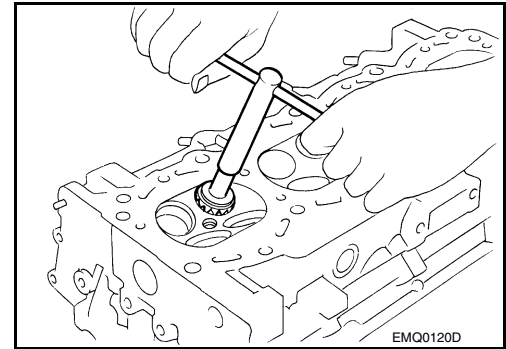
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- d. Cut the valve seat to the specified dimensions using a valve seat cutter set and valve seat grinder (commercial service tool).

**CAUTION:**

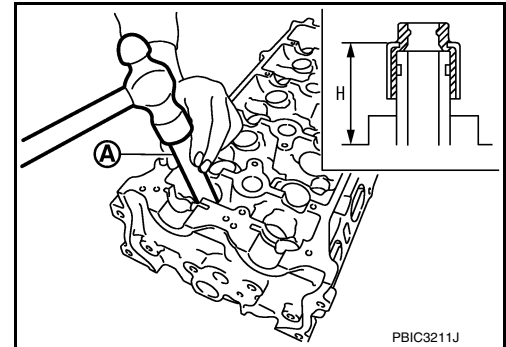
When using a valve seat cutter, hold the cutter handle firmly with both hands, and press the cutter to cut the entire periphery of the contacting face in one motion without stopping. If the cutter is not pressed correctly, or if the cutter is taken away and pressed again on the surface multiple times, a stage valve seat may result.



Ream- : Refer to [EM-314, "Cylinder Head"](#).  
ing di-  
mensio  
n

- e. Using an abrasive compound, grind to adjust valve seat.
- f. Check parts again. Check that the valve seat contact is normal. Refer to [EM-279, "Inspection"](#).
3. Install valve oil seals.
  - Using a valve oil seal drift [SST: KV10115600 (J-38958)] (A), press-fit to the dimensions specified in the figure.

Installation height H : 15.1 – 15.7 mm (0.59 – 0.62 in)

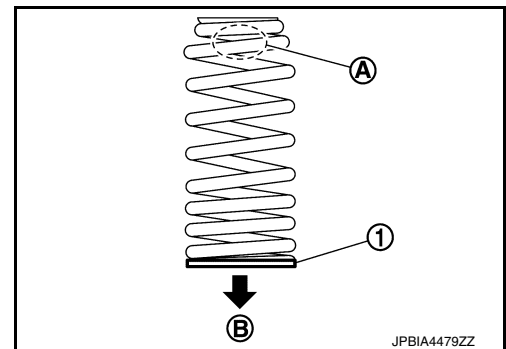


4. Install valves.
  - Valves of larger diameter is installed to the intake side.
5. Install valve springs.
  - Face the narrower pitch side [valve spring seat (1) press-fitted side] toward cylinder head (B).

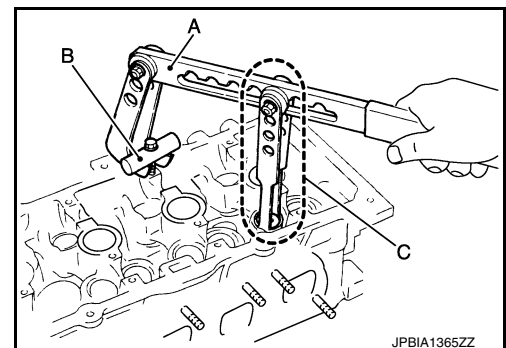
A : Identification color

- Parts for intake and exhaust are different. When installing them, check the identification colors.

Intake : White  
Exhaust : Yellow-  
ish green



6. Install valve spring retainers.
7. Install valve collets.
  - Use a valve spring compressor [SST: KV10116200 (J-26336-A)] (A), adapter [SST: KV10109220 ( — )] (B), and attachment [SST: KV10115900 (J-26336-20)] (C), and compress the valve spring. Then, use a magnetic screwdriver or an equivalent and install the valve collet.



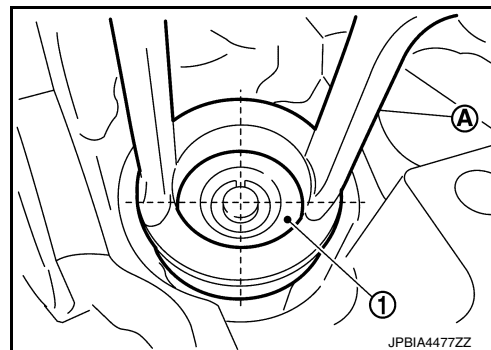
# CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## CAUTION:

- Never damage the valve lifter hole while working.
- Align the centers of the attachment [SST: KV10115900 (J-26336-20)] (A) and valve spring retainer (1).



- After installing, tap valve stem tip with a plastic hammer to ensure a proper fit.

8. Install valve lifter.
  - Install them in their original positions.
9. Install spark plugs.
  - Use a spark plug wrench (commercial service tool).

## Inspection

INFOID:000000012197440

### INSPECTION AFTER REMOVAL

#### Cylinder Head Bolt Outer Diameter

- Measure the outer diameter at two locations (d1 and d2) shown in the figure.

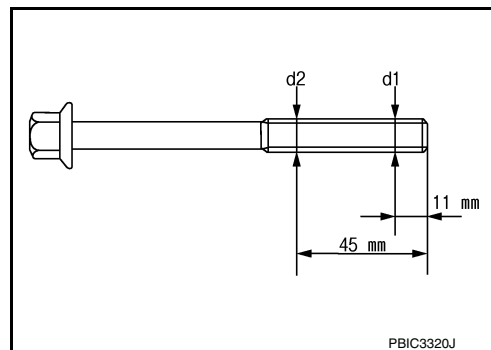
## CAUTION:

**When there is another narrowed point within the thread area, use this point as d2.**

- Calculate the difference between d1 and d2.

**Limit : 0.15 mm (0.0059 in)**

- Replace cylinder head bolt if limit is exceeded.



#### Cylinder Head Distortion

## NOTE:

Check the distortion of the cylinder block top surface at the same time as this inspection. Refer to [EM-294, "Inspection"](#).

1. Using a scraper, remove oil, scale, gasket, sealant, and carbon deposits from surface of cylinder head.

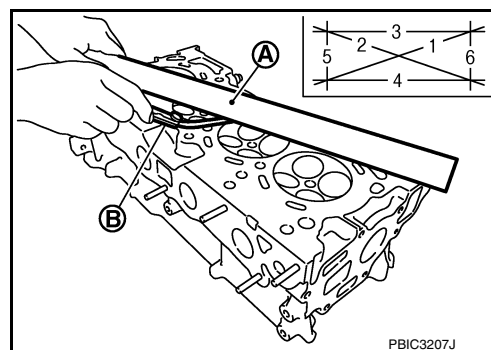
## CAUTION:

**Never allow gasket fragments to enter oil or engine coolant passages.**

2. Check flatness of cylinder head lower surface using a straight-edge (A) and a feeler gauge (B). Measure distortion, at several points each in six directions.

**Limit : Refer to [EM-314, "Cylinder Head"](#).**

- Replace cylinder head if the limit is exceeded.



### INSPECTION AFTER DISASSEMBLY

#### Valve Dimensions

# CYLINDER HEAD

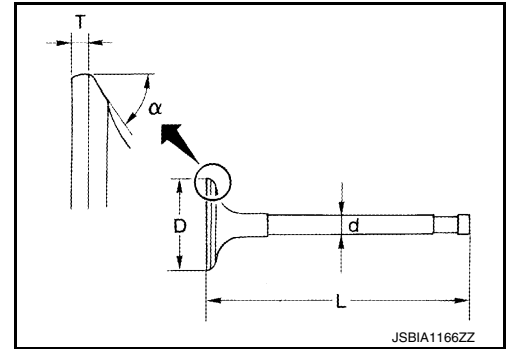
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Using a micrometer, measure dimensions at the points shown in the figure.

**Standard** : Refer to [EM-314, "Cylinder Head"](#).

- If it exceeds the standard, replace valve.

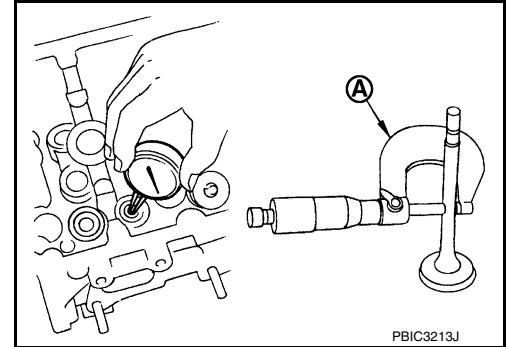


## Valve Guide Clearance

Calculate the clearance by measuring valve stem outer diameter and guide hole diameter using a micrometer (A) and a bore gauge.

**Standard** : Refer to [EM-314, "Cylinder Head"](#).  
**Limit**

- Replace the valve guide bolt if it exceeds the limit. Refer to [EM-275, "Disassembly and Assembly"](#).

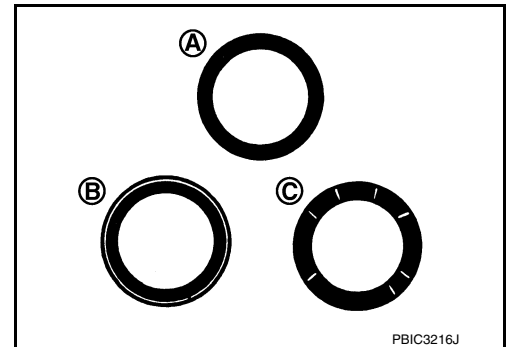


## Valve Seat Contact

- This inspection must be done after ensuring that the dimensions of the valve guide and the valve are within the standard.
- Apply DICATOL PL-1 to valve seat and valve face contact surfaces and check valve seating condition.
- Make sure that all connection surfaces are completely connected around.

A : OK  
B : Not OK  
C : Not OK

- Reseat the valve and check again for incorrect seating condition. Replace valve seat if seating condition cannot be corrected by reseating.



## Valve Spring Squareness

Set the valve spring against a square (A). Rotate the spring and record the maximum clearance (d) between spring upper end and the square.

B : Place in contact  
C : V-block

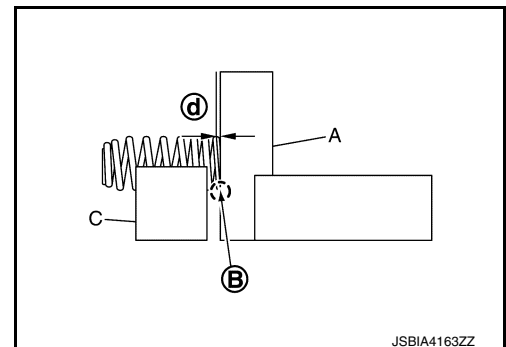
### CAUTION:

Never remove valve spring seat (assembly parts).

**Limit** : Refer to [EM-314, "Cylinder Head"](#).

- Replace valve spring if the limit is exceeded.

## Valve Spring Dimension and Inspection Load



## CYLINDER HEAD

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Check with a valve spring tester.

**CAUTION:**

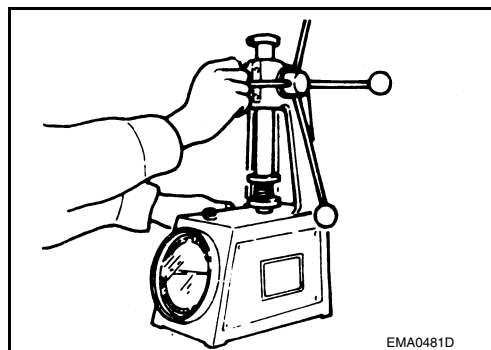
**Never remove valve spring seat (assembly parts).**

**NOTE:**

The following standard is for the valve spring seat assembly.

**Standard** : Refer to [EM-314, "Cylinder Head"](#).

- If valve-opening load exceeds the standard, replace valve spring.



A

EM

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# OIL PAN (UPPER)

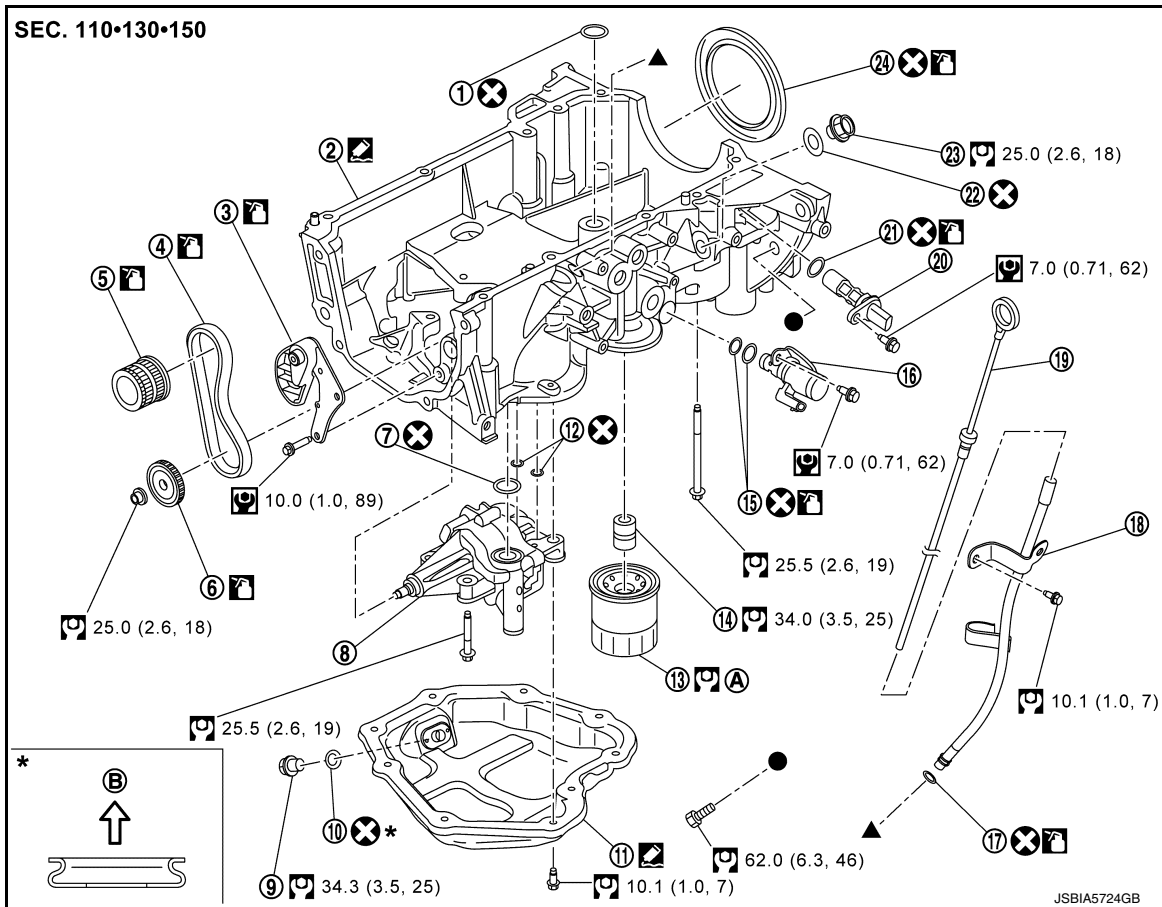
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## OIL PAN (UPPER)

### Exploded View

INFOID:000000012197441



## Removal and Installation

INFOID:000000012197442

### REMOVAL

## OIL PAN (UPPER)

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

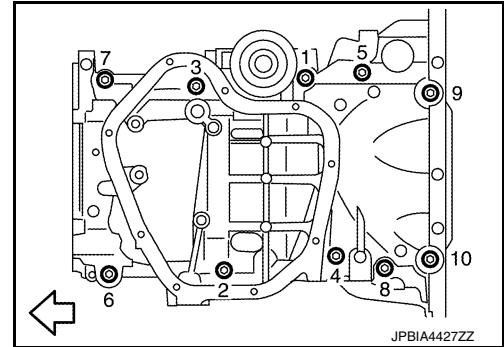
1. Remove oil pan (lower). Refer to [EM-200, "Exploded View"](#).
2. Remove oil filter. Refer to [LU-27, "Removal and Installation"](#).
3. Remove the front cover, timing chain, oil pump drive chain, and parts related to the drive chain. Refer to [EM-248, "Exploded View"](#).
4. Remove the oil level gauge and oil level gauge guide.
5. Remove the oil pump if necessary. Refer to [LU-35, "Removal and Installation"](#).

### NOTE:

This work is not necessary when only the oil pan (upper) is removed.

6. Remove oil pan (upper) according to the following procedure.
- a. Loosen oil pan (upper) mounting bolts in the reverse order of the numerical order shown in the figure.

← : Engine front



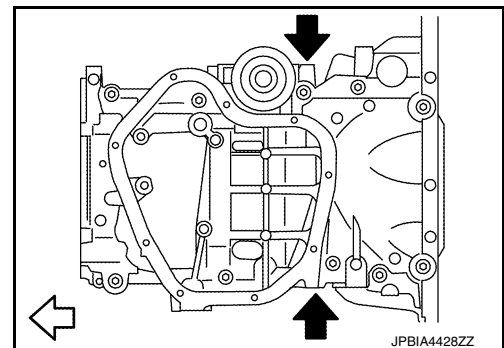
- b. Insert a flat-bladed offset screwdriver or an equivalent into the location shown by the arrow (↖) in the figure, and open up a clearance between the oil pan (upper) and cylinder block.

← : Engine front

### CAUTION:

- Never damage the mounting surface.
- A liquid gasket more adhesive than previous types is applied when shipped, so never force it off of a position not specified using a screwdriver or an equivalent.

- c. Cut off the liquid gasket using a seal cutter [SST: KV10111100 (J-37228)] and remove the oil pan (upper).
7. Remove rear oil seal from crankshaft.

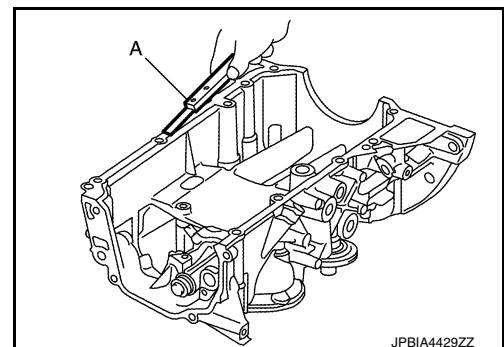


## INSTALLATION

1. Install oil pan (upper) according to the following procedure.
- a. Use a scraper or an equivalent (A) and remove the old liquid gasket that remains on the mounting surface of the oil pan (upper).  
In the same way, remove the old liquid gasket that remains on the mounting surface of the cylinder block.

### CAUTION:

Never damage the mounting surface.





## OIL PAN (UPPER)

< UNIT DISASSEMBLY AND ASSEMBLY >

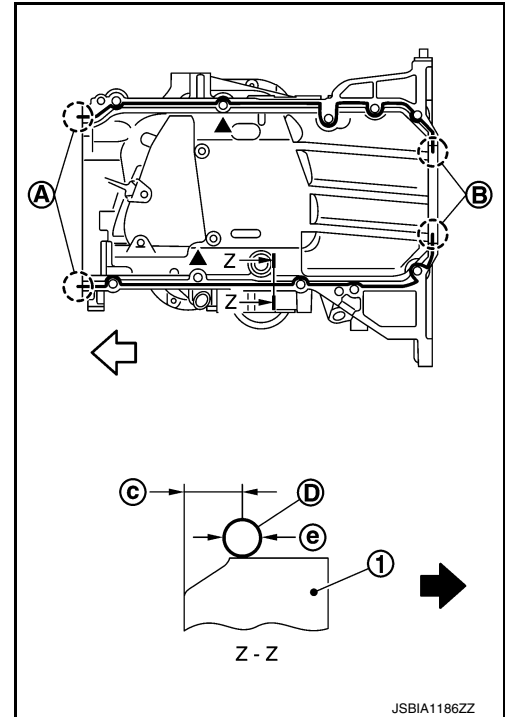
[MR EXCEPT FOR NISMO RS MODELS]

- b. Apply a continuous bead of liquid gasket (D) (ThreeBond 1217H or equivalent) to the position shown in the figure, while checking for overlaps. Refer to [EM-154. "Liquid Gasket"](#).

- 1 : Oil pan (upper)
- A : 2 mm (0.08 in) or more protruded to outside
- B : 2 mm (0.08 in) or more protruded to rear oil seal mounting side
- c : 5.5 – 7.5 mm (0.217 – 0.295 in)
- e :  $\phi 4.0 - 5.0$  mm (0.157 – 0.197 in)
- ⇐ : Engine front
- ➡ : Engine outside

### CAUTION:

- The ▲, as shown in the figure, indicates the locations where liquid gasket should be applied to the outside of the bolt holes.
- After applying liquid gasket, install quickly without waiting. (Install within 5 minutes.)



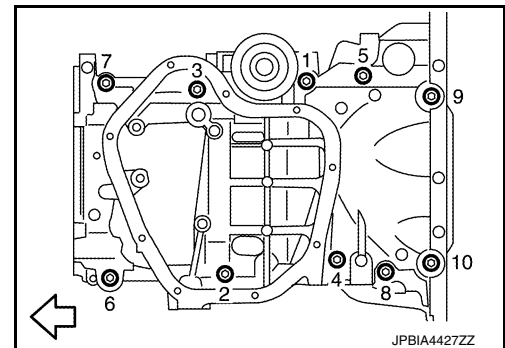
- c. Install the O-ring into the installation groove on the cylinder block, and install the oil pan (upper) onto the cylinder block. Do not allow the O-ring to become displaced.

### CAUTION:

**Always replace O-ring with a new one.**

- d. Tighten the mounting bolts in the numerical order shown in the figure.

- ⇐ : Engine front

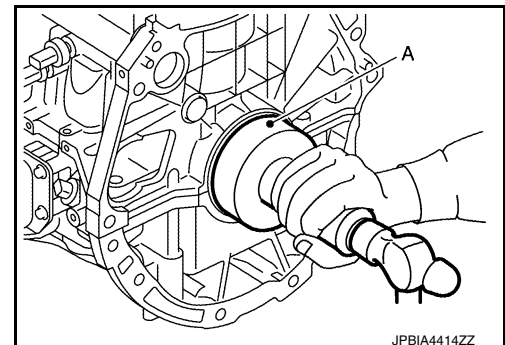


2. Install rear oil seal according to the following procedure:

### CAUTION:

- Complete installation of the rear oil seal within 5 minutes after installing the oil pan (upper).
- Always replace rear oil seal with a new one.
- Never touch oil seal lip.

- a. Wipe off any liquid gasket protruding to the rear oil seal mounting part of oil pan (upper) and cylinder block using a spatula.
- b. Apply engine oil to the rear oil seal joint.
- c. Press-fit the rear oil seal using a drift with an outer diameter of approximately  $\phi 115$  mm (4.5 in) and an inner diameter of approximately  $\phi 90$  mm (3.5 in) (commercial service tool).





## OIL PAN (UPPER)

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Press-fit to the dimensions specified in the figure.

1 : Rear oil seal

A : Cylinder block rear end surface

### CAUTION:

- Never touch the grease applied to the oil seal lip.
- Never damage the rear oil seal mounting parts on the oil pan (upper) and cylinder lock, or the crankshaft.
- Press-fit straight, while checking that the oil seal does not curl or tilt.

### NOTE:

The standard surface of the dimension is the rear end surface of cylinder block.

3. Install the oil pump sprocket, oil pump drive chain (for oil pump/balancer unit), and chain tensioner (for oil pump/balancer unit). Refer to [EM-248, "Exploded View"](#).
4. Install removed parts in the reverse order of removal.

### CAUTION:

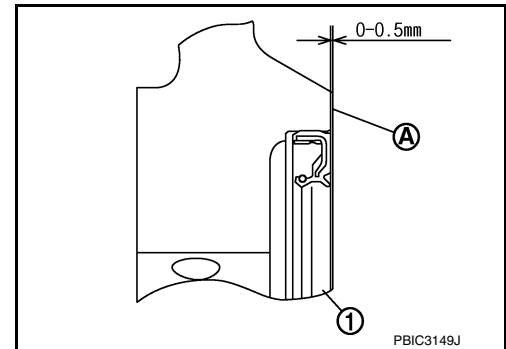
Fill with engine oil 30 minutes or more after the oil pan (lower) is installed.

## Inspection

INFOID:0000000012197443

### INSPECTION AFTER INSTALLATION

- Check the engine oil level. Refer to [LU-28, "Inspection"](#).
- With engine warmed up, check for engine oil leakage. Refer to [LU-28, "Inspection"](#).



# CYLINDER BLOCK

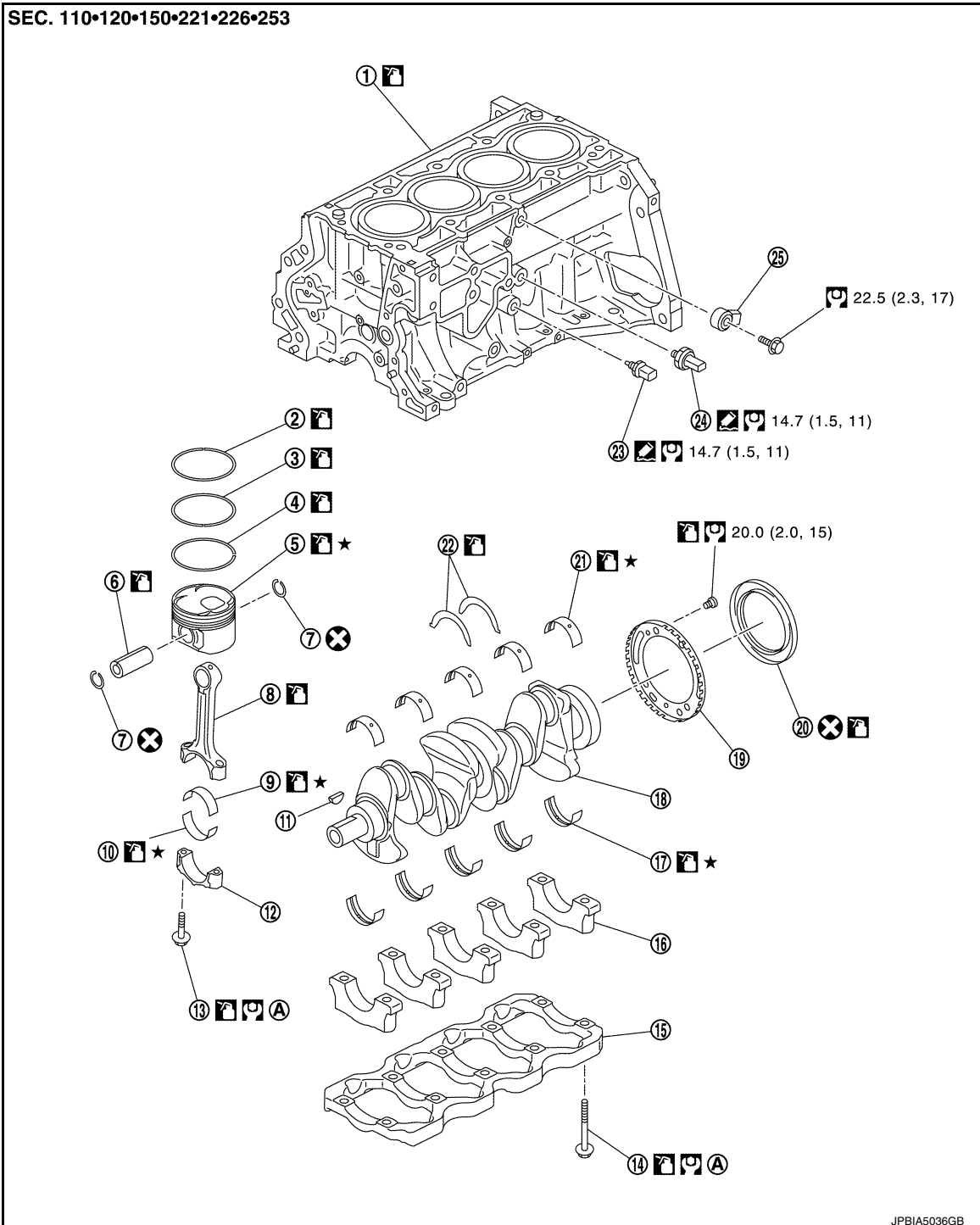
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## CYLINDER BLOCK

Exploded View

INFOID:000000012197444



- |                                    |                           |                                   |
|------------------------------------|---------------------------|-----------------------------------|
| 1. Cylinder block                  | 2. Top ring               | 3. Second ring                    |
| 4. Oil ring                        | 5. Piston                 | 6. Piston pin                     |
| 7. Snap ring                       | 8. Connecting rod         | 9. Connecting rod bearing (upper) |
| 10. Connecting rod bearing (lower) | 11. Crankshaft key        | 12. Connecting rod cap            |
| 13. Connecting rod cap bolt        | 14. Main bearing cap bolt | 15. Main bearing beam             |
| 16. Main bearing cap               | 17. Main bearing (lower)  | 18. Crankshaft                    |
| 19. Signal plate                   | 20. Rear oil seal         | 21. Main bearing (upper)          |

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

22. Thrust bearing  
25. Knock sensor  
A. Comply with the assembly procedure when tightening. Refer to [EM-287](#).



: N·m (kg-m, ft-lb)



: Always replace after every disassembly.



: Should be lubricated with oil.



: Sealing point



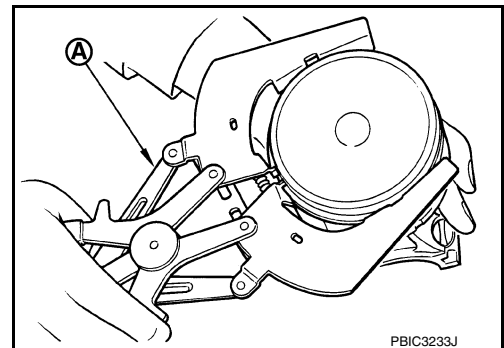
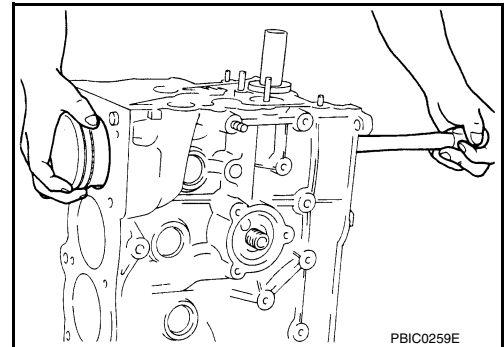
★ Select correct part.

## Disassembly and Assembly

INFOID:0000000012197445

### DISASSEMBLY

- Remove the crankshaft position sensor from the oil pan (upper). Refer to [EM-282, "Removal and Installation"](#).
- Remove the oil pan (upper). Refer to [EM-282, "Removal and Installation"](#).
- Remove the water pump housing. Refer to [CO-54, "Exploded View"](#).
- Remove the knock sensor.  
**CAUTION:**  
**Never subject parts to impact.**
- Remove the piston and connecting rod according to the following procedure.
  - Check the connecting rod side clearance before removing the piston and connecting rod assembly. Refer to [EM-294, "Inspection"](#).
- Set crankshaft pin at removal position to BDC on compression stroke.
- Remove connecting rod cap.  
**CAUTION:**
  - Never damage mating surface with connecting rod.**
  - Never place the drive plate with mating surface of connecting rod facing down.**
- Push the piston and connecting rod assembly to the cylinder head side with a hammer handle or an equivalent.  
**CAUTION:**
  - Never damage mating surface with connecting rod cap.**
  - Never place the mating surface of connecting rod cap facing down.**
  - Never damage cylinder inner wall and crankshaft pin by contact with the large end of the connecting rod.**
- Remove connecting rod bearing.  
**CAUTION:**  
**When removing, check location of each part, and store them in a manner that prevents them from being mixed up.**
- Remove the piston rings from the piston.
  - Remove using piston ring expander (commercial service tool) (A).**CAUTION:**
  - Never damage piston.**
  - Never expand piston rings excessively. It can damage piston rings.**
  - Check piston ring side clearance before removing piston ring. Refer to [EM-294, "Inspection"](#).



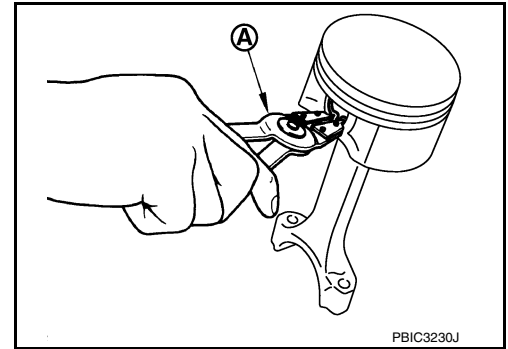
- Remove piston from connecting rod according to the following procedure.

## CYLINDER BLOCK

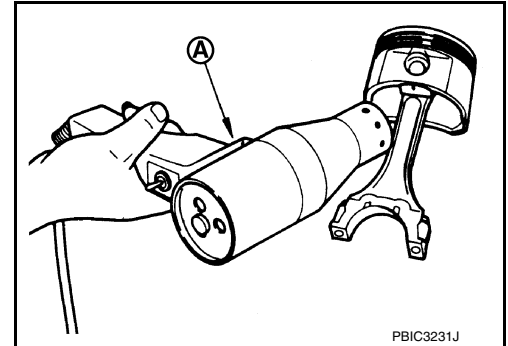
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

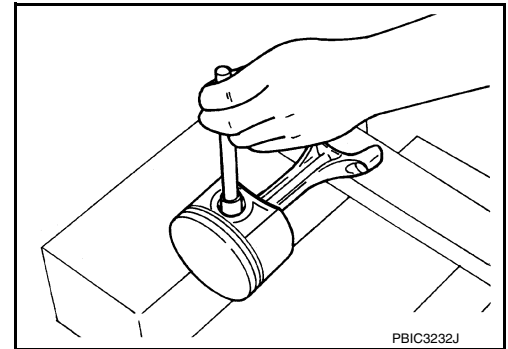
- a. Remove snap ring using snap ring pliers (commercial service tool) (A).



- b. Heat piston to 60 – 70°C using an industrial dryer (A).



- c. Using a round bar with outer diameter of approximately 18 mm (0.71 in), press out piston pin.



9. Follow the procedure below and remove the main bearing cap bolts.

- a. Loosen and remove bolts in several steps in the reverse order of the numerical order shown in the figure.

⇐ : Engine front

- Measure crankshaft side clearance before loosening main bearing cap bolts. Refer to [EM-294, "Inspection"](#).
- Use a TORX socket (size: E14).

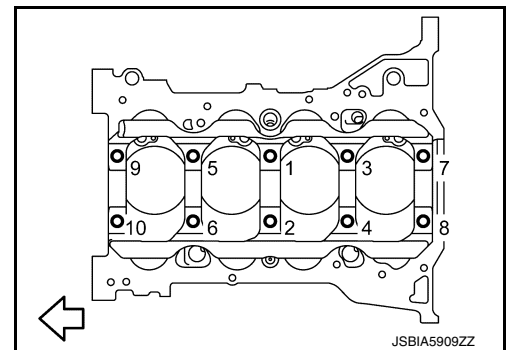
- b. Remove the main bearing cap from the cylinder block while tapping lightly with a plastic hammer.

**CAUTION:**

**Never damage the mounting surface when removing.**

10. Remove the crankshaft.

**CAUTION:**



# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Never deform or damage the signal plate (1) of crankshaft rear end (A).
- Never place crankshaft onto the floor or another flat surface. Use a block of wood for maintaining a clearance and preventing signal plate from interfering with the floor.
- Never remove the signal plate unless necessary.

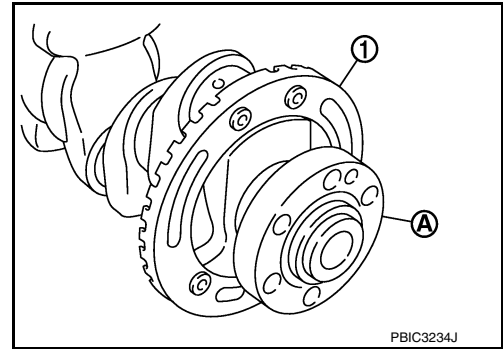
## NOTE:

Use a TORX bit (size: T30) for removal of the signal plate.

11. Pull the rear oil seal out from the rear end of crankshaft.
12. Remove the main bearings and the thrust bearings from the cylinder block and the main bearing caps.

## CAUTION:

Check the installation position of each part. Store the removed parts to prevent them from being mixed up.



## ASSEMBLY

1. Thoroughly clean engine coolant and oil passages in cylinder block, as well as inside of crankcase and cylinder bores, with compressed air.

## CAUTION:

Be sure to wear protective goggles for protection from flying substances.

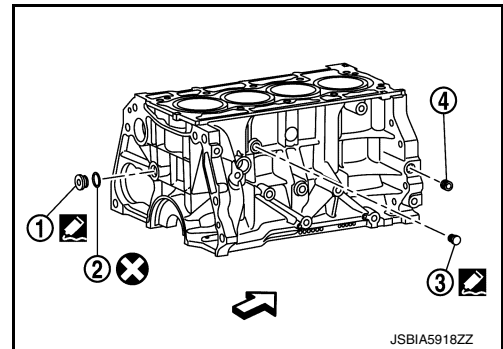
2. Refer to the figure and install each plug into the cylinder block.

- 1 : Plug
- 2 : Washer
- 3 : Engine coolant drain plug
- 4 : Plug

⇐ : Engine front

⊗ : Always replace after every disassembly.

▣ : Sealing point

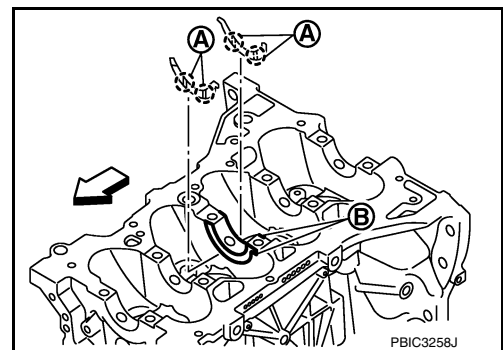


Plug	Liquid gasket	Washer	Tightening torque
1	Liquid gasket (TB1386B or an equivalent)	Yes	54.0 N·m (5.5 kg-m, 40 ft-lb)
3	Liquid gasket (TB1215 or an equivalent)	No	9.8 N·m (1.0 kg-m, 87 in-lb)
4	Not necessary	No	19.6 N·m (2.0 kg-m, 14 ft-lb)

3. Install main bearing and thrust bearing according to the following procedure.
  - a. Clean bearing mounting surfaces on cylinder block and main bearing cap to remove any foreign material, dust, and oil.
  - b. Install thrust bearings on both sides (B) of cylinder block No. 3 housing.

⇐ : Engine front

- Install thrust bearing with its oil groove (A) facing crankshaft arm side (outer side).



- c. Install the main bearing.
  - Before installing bearing, lubricate bearing surface (inside) with new engine oil.
  - Do not apply engine oil to reverse side of main bearing, but thoroughly clean it.
  - Install main bearing to the center position between cylinder block and main bearing cap.

# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

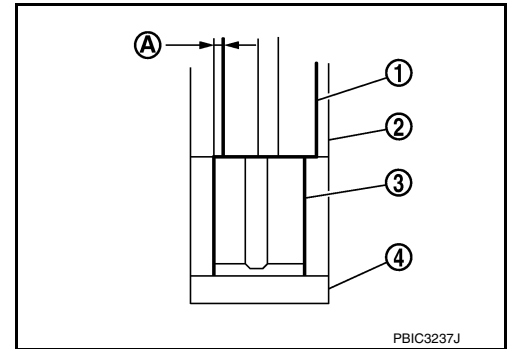
[MR EXCEPT FOR NISMO RS MODELS]

## NOTE:

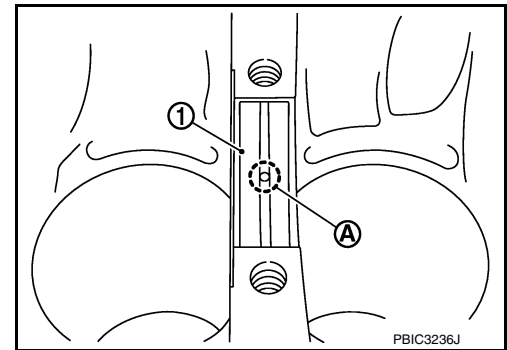
- There is no positioning pawl.
- For service operation, the center position can be checked visually.
- The difference (A) between main bearing (upper) (1) and main bearing (lower) (3) should be 0.85 mm or less when installing.

2 : Cylinder block

4 : Main bearing cap



- Check that the oil hole in cylinder block and the oil hole (A) in main bearing (1) are aligned.



4. Install the signal plate to the crankshaft according to the following procedure.
  - a. Set the signal plate with the flange facing toward the counterweight side (engine front side) to the crankshaft rear surface.
  - b. Lubricate threads and seat surface of each bolt with new engine oil.
  - c. After positioning crankshaft (2) and signal plate (1) with positioning dowel pin (service parts), tighten bolts in the numerical order shown in the figure.

A : Dowel pin hole

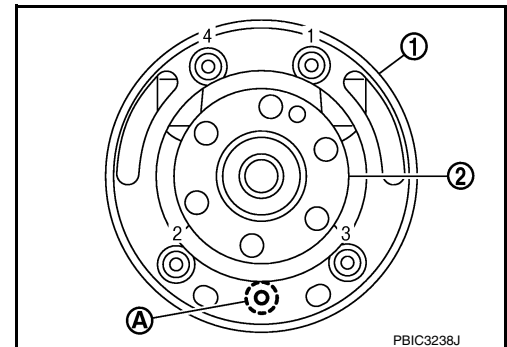
## NOTE:

- Dowel pin is included with crankshaft and signal plate respectively.
  - Use a TORX bit (size: T30) when installing the signal plate.
- d. Tighten bolts again in the numerical order shown in the figure.
  - e. Remove dowel pin.

## CAUTION:

**Be sure to remove dowel pin.**

5. Install the crankshaft to the cylinder block.
  - Clean the journal to remove any foreign material, dust, and oil.
  - Check that the crankshaft rotates smoothly by hand.
6. Install the main bearing cap.



# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

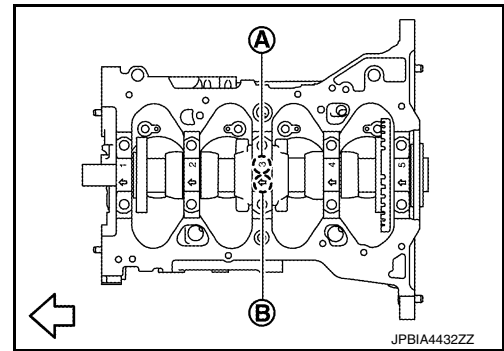
[MR EXCEPT FOR NISMO RS MODELS]

- Install the main bearing cap, while referring to the front mark (B) and the journal No. stamp (A).

⇐ : Engine front

## NOTE:

Main bearing cap is machined together with cylinder block and cannot be replaced by itself.



7. Tighten main bearing cap bolts in the numerical order shown in the figure with the following steps.

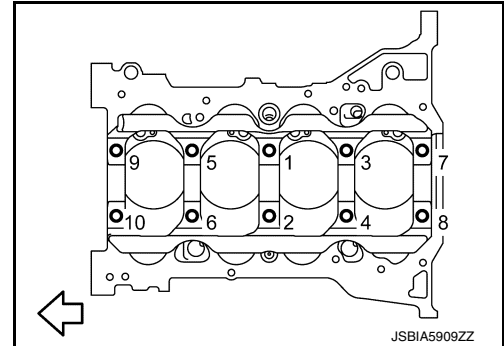
⇐ : Engine front

## CAUTION:

If the main bearing cap bolt is reused, check the outer diameter in advance. Refer to [EM-294, "Inspection"](#).

- Use a TORX socket (size: E14).

- a. Lubricate threads and seat surface of each bolt with new engine oil.
- b. Tighten the mounting bolts.



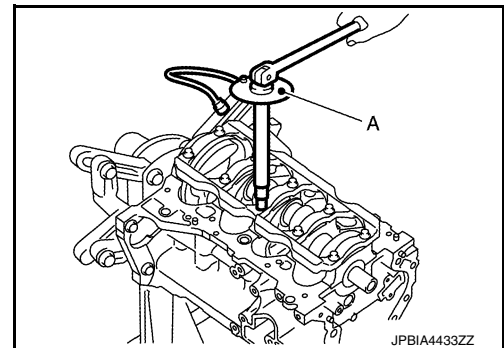
: 34.3 N·m (3.5 kg-m, 25 ft-lb)

- c. Tighten an additional 70° (angle tightening).
  - Use an angle wrench [SST: KV10112100 (BT8653-A)] (A) to check tightening angle.
  - If angle wrench is not available, put a matching mark on main bearing cap bolts before turning them, and check turning angle with a protractor.

## CAUTION:

Check tightening angle using an angle wrench or a protractor. Never estimate tightening angle visually.

- After tightening main bearing cap bolts, rotate crankshaft by hand and check that it turns smoothly.
- Check crankshaft side clearance. Refer to [EM-294, "Inspection"](#).



8. Install the piston to the connecting rod.
  - a. Use snap ring pliers (commercial service tool) to install snap ring in snap ring installation groove on rear side of piston.

## CAUTION:

Check that snap ring is securely seated in the groove.

- b. Install the piston to the connecting rod.
  - Using an industrial drier, heat piston to 60 – 70°C so that piston pin can be easily inserted by hand. Insert piston pin into piston and connecting rod from front side of piston.
  - Assemble so that piston head front mark (A), connecting rod oil hole (B), and connecting rod cylinder No. stamp (D) on are positioned as shown in the figure.

C : Engine type

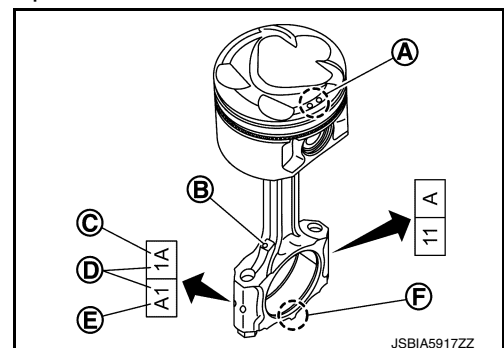
E : Large end grade

F : Connecting rod front mark

## NOTE:

- The symbol of connecting rod is one example.
- The symbols without notes are for management

- c. Install a new snap ring to the groove on the front side of piston.



# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## CAUTION:

**Check that snap ring is securely seated in the groove.**

- Check that the connecting rod moves smoothly.

9. Install piston rings using a piston ring expander (commercial service tool).

## CAUTION:

- **Never damage piston.**
- **Be careful that the piston ring does not spread out too much and break.**
- Position end gaps of each piston ring as shown in the figure.

- A : On oil ring or on lower rail end gap (either location)  
 B : Front mark  
 C : Second ring end gap, oil ring spacer end gap  
 D : Top ring end gap  
 E : Stamp (top ring: 1N, second ring: 2N)

## CAUTION:

**Never allow the rail end gap under the oil ring to contact the oil drain cast groove of piston.**

- Install top ring and second ring with stamp mark sides facing up.

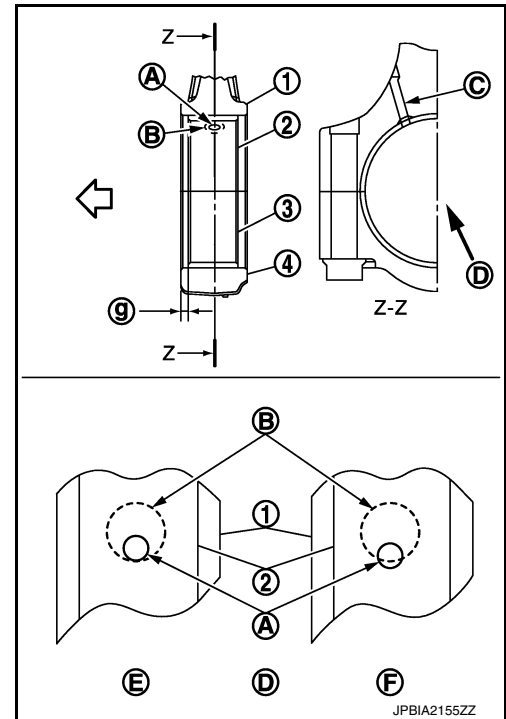
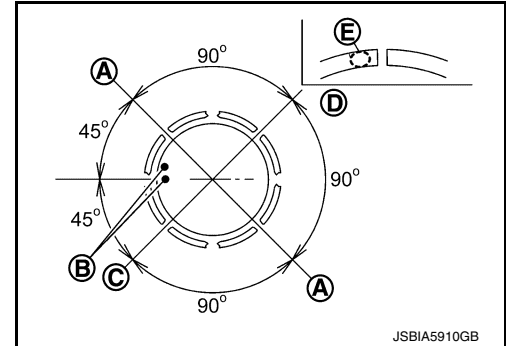
10. Install connecting rod bearing to connecting rod (1) and connecting rod cap (4).

- 2 : Connecting rod bearing (upper)  
 3 : Connecting rod bearing (lower)  
 A : Connecting rod bearing (upper) oil hole  
 B : Connecting rod oil hole chamfered area  
 C : Oil hole  
 D : Arrow view D  
 E : OK  
 F : Not OK  
 g : 2.05 – 2.45 mm (0.081 – 0.096 in)  
 ⇐ : Engine front

- Apply engine oil to the bearing surface (sliding surface). Do not apply engine oil to the reverse side of the bearing, but thoroughly clean it.
- Install the connecting rod in the dimension as shown in the figure.

## NOTE:

- There is no positioning pawl.
  - When it is installed at the position as shown in the figure, the connecting rod bearing is at the center. For service operation, the center position can be checked visually.
  - Check that the bearing oil hole is in the inside of the connecting rod oil hole chamfered area completely.
  - Temporarily install the connecting rod cap with the bearing to the connecting rod, and then check that the connecting rod bearings (upper) and (lower) are in the correct positions.
11. Install the piston and connecting rod assembly to the crankshaft.
- Set crankshaft pin at the installation position to BDC on compression stroke.
  - Apply engine oil to the cylinder bore, the piston, and the crankshaft pin journal.





# CYLINDER BLOCK

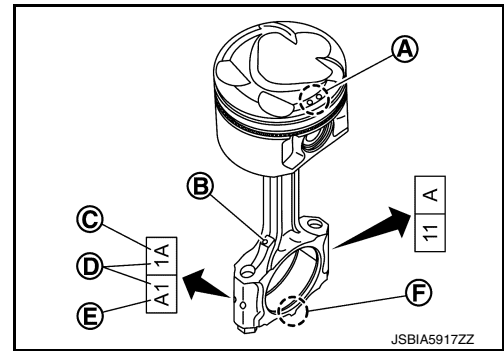
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Match the cylinder position and the connecting rod cylinder No. (D), and install.

- A : Piston front mark
- B : Oil hole
- C : Engine type
- E : Large end grade
- F : Connecting rod front mark

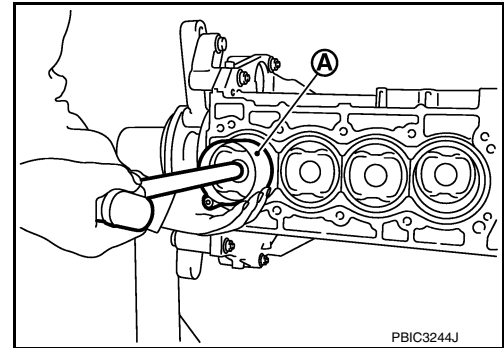
- Install so that the front mark on the piston head faces engine front.



- Install piston using a piston ring compressor (commercial service tool) (A) so that front mark on piston head faces toward engine front.

## CAUTION:

- Never damage mating surface with connecting rod cap.
- Never damage cylinder inner wall or crankshaft pin by interfering with connecting rod large end.



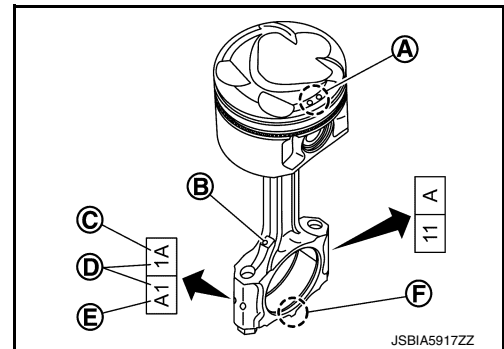
## 12. Install the connecting rod bearing cap.

- Match the cylinder No. stamp (D) on the connecting rod and the cylinder No. stamp on the cap and install.

- A : Piston front mark
- B : Oil hole
- C : Engine type
- E : Large end grade
- F : Connecting rod front mark

## NOTE:

- The symbol of connecting rod is one example.
- The symbols without notes are for management purposes.



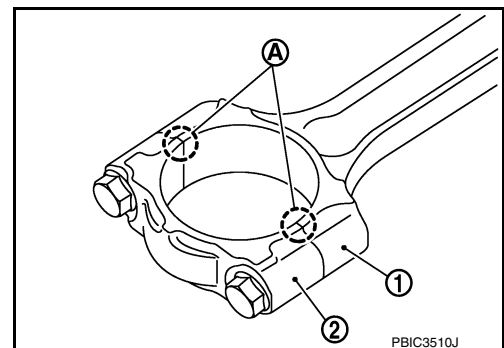
## 13. Tighten connecting rod bolts according to the following procedure.

## CAUTION:

- Check that there is no clearance in the thrust surface (A) of the joint between connecting rod (1) and connecting rod cap (2) and check that the parts are in the correct positions.
- Tighten the connecting rod bolts. Refer to [EM-294, "Inspection"](#).

- Apply new engine oil to the main bearing cap bolt threads and seat surfaces.
- Tighten to 27.4 N·m (2.8 kg-m, 20 ft-lb).
- Loosen all the way to 0 N·m (0 kg-m).
- Tighten at 19.6 N·m (2.0 kg-m, 14 ft-lb).
- Put a matching mark on each bolt and connecting rod cap in the same direction (when using a protractor).
- Tighten an additional 60° (angle tightening).

## CAUTION:



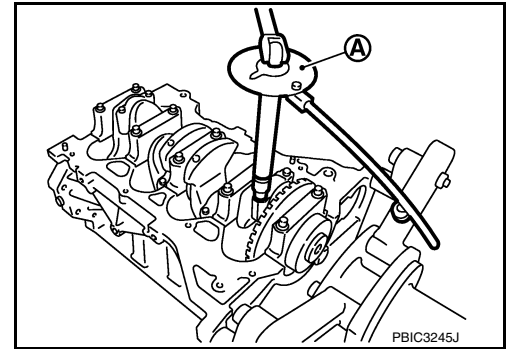
# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

Check tightening angle with an angle wrench [SST: KV10112100 (BT8653-A)] A or a protractor. Never estimate tightening angle visually.

- Check that the crankshaft rotates smoothly by hand after tightening the main bearing cap bolt.
- Check the connecting rod side clearance. Refer to [EM-294, "Inspection"](#).



14. Install the oil pan (upper). Refer to [EM-282, "Exploded View"](#).

**NOTE:**

Install the rear oil seal after installing the oil pan (upper).

15. Install rear oil seal. Refer to [EM-271, "REAR OIL SEAL : Removal and Installation"](#).

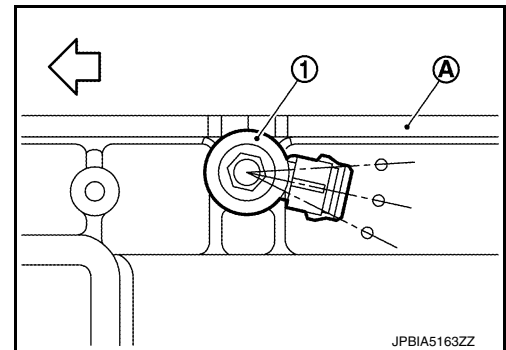
16. Install knock sensor (1) in the direction shown in the figure.

A : Left side of cylinder block

⇐ : Engine front

**CAUTION:**

- Never subject parts to impact. If any impact is applied, replace it.
- Check that no foreign material adheres to cylinder block and knock sensor mounting surfaces.
- Install connectors so that they are positioned toward engine rear.
- Be sure to use specified bolts.
- Never hold connector while tightening bolts.
- Never allow installed sensor connector to interfere with other parts.



17. Assemble in the reverse order of disassembly.

## Inspection

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## INSPECTION AFTER DISASSEMBLY

### Crankshaft Side Clearance

- Move crankshaft to front or rear, and measure thrust bearing-to-crank arm clearance using a dial indicator (A).

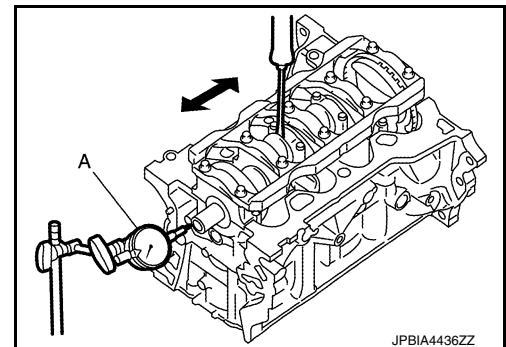
Stan

dard : Refer to [EM-317, "Cylinder Block"](#).

Limit

- If the limit is exceeded, replace the thrust bearing and then measure again. Replace the crankshaft if it still exceeds the limit.
- When replacing the crankshaft, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing and connecting rod bearing.

### Connecting Rod Side Clearance



# CYLINDER BLOCK

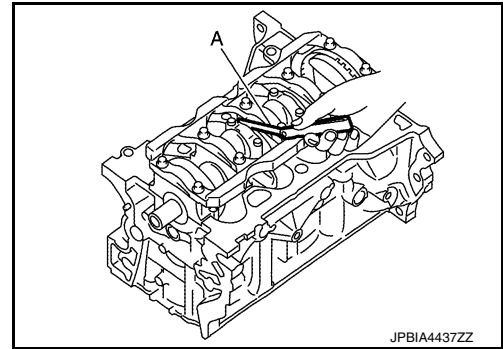
## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Measure connecting rod-to-crank arm side clearance using a feeler gauge (A).

**Standard** : Refer to [EM-317, "Cylinder Block"](#).  
**Limit**

- If the limit is exceeded, replace the connecting rod, and then measure again. Replace the crankshaft if it still exceeds the limit.
- When replacing the crankshaft, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing and connecting rod bearing.

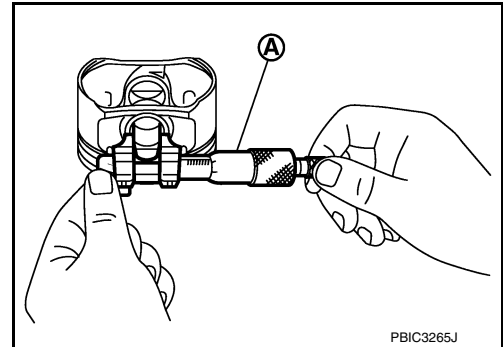


### Piston-to-piston Pin Clearance

Piston pin hole inner diameter

- Measure inner diameter of piston pin hole using an inside micrometer (A).

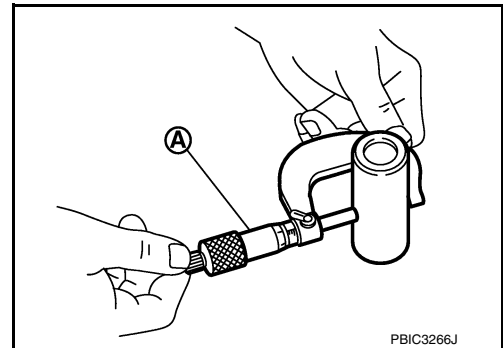
**Standard** : Refer to [EM-317, "Cylinder Block"](#).



Piston pin outer diameter

- Measure piston pin outer diameter using a micrometer (A).

**Standard** : Refer to [EM-317, "Cylinder Block"](#).



How to calculate piston-to-piston pin clearance

- Calculate the piston pin clearance using the following formula.  
(Piston pin clearance) = (Piston pin hole inner diameter) - (Piston pin outer diameter)

**Standard** : Refer to [EM-317, "Cylinder Block"](#).

- If clearance exceeds the standard, replace piston and piston pin assembly.
- When replacing piston and piston assembly, refer to [EM-304, "Selective-fit Service Parts"](#) and select the correct parts.

#### NOTE:

Piston and piston pin are service parts for assembly.

### Piston Ring Side Clearance

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

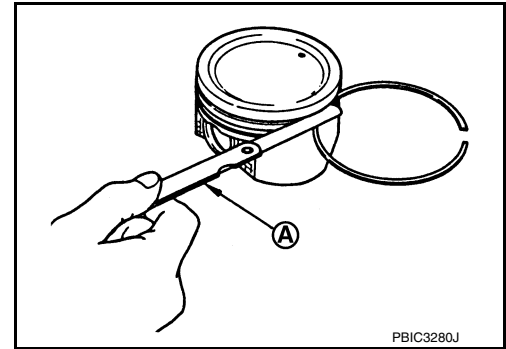
- Measure piston ring-to-piston ring groove clearance using a feeler gauge (A).

Standard

: Refer to [EM-317, "Cylinder Block"](#).

Limit

- Replace piston ring if the limit is exceeded (the standard for oil ring).
- Measure the clearance again. If it still exceeds the limit (the standard for oil ring), replace piston.
- When replacing the piston, refer to [EM-304, "Selective-fit Service Parts"](#) and select the correct part.



### Piston Ring End Gap

- Check that the cylinder bore inner diameter is within the standard. Refer to [EM-317, "Cylinder Block"](#).
- Apply oil to the piston (1) and the piston ring (2). Using the piston, press the piston ring into the cylinder center position (B), and then measure the end gap.

A : Press in.

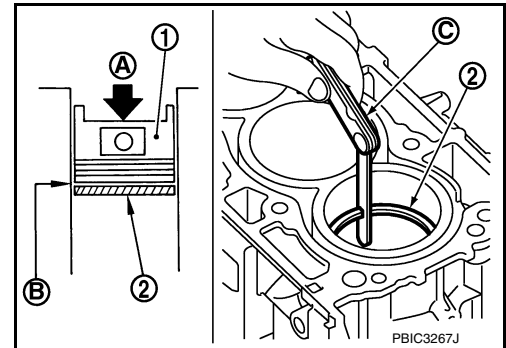
C : Feeler gauge

Standard

: Refer to [EM-317, "Cylinder Block"](#).

Limit

- If the limit is exceeded, replace piston rings.



### Connecting Rod Bend and Torsion

- Check connecting rod bend and torsion with a connecting rod alignment tool.

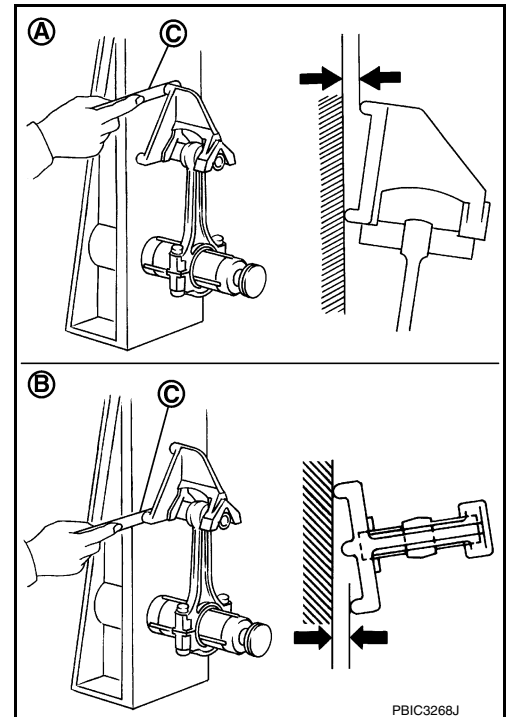
A : Bend

B : Twist

C : Feeler gauge

Limit : Refer to [EM-317, "Cylinder Block"](#).

- Replace the connecting rod assembly if it exceeds the limit.



### Connecting Rod Large End Diameter

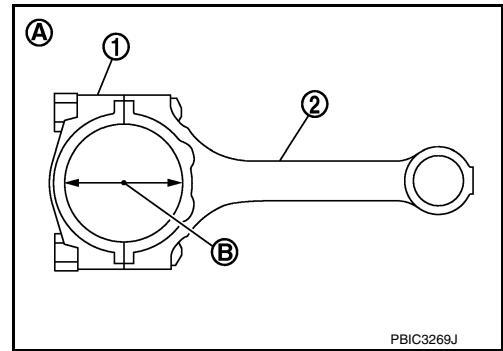
# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Without installing connecting rod bearing, install connecting rod cap (1) and tighten connecting rod bolt to the specified torque. Measure connecting rod large end diameter with an inside micrometer.

2 : Connecting rod  
A : Image  
: Inner diameter  
B : measurement direction



- For the connecting rod bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).

**Standard** : Refer to [EM-317, "Cylinder Block"](#).

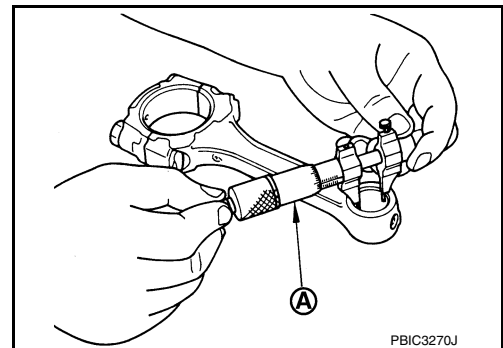
- Replace the connecting rod assembly if it is outside the standard.
- When replacing the connecting rod, refer to [EM-304, "Selective-fit Service Parts"](#), and select the connecting rod bearing.

### Connecting Rod Small End Clearance

Connecting rod small end inner diameter

- Measure inner diameter of connecting rod small end using an inside micrometer (A).

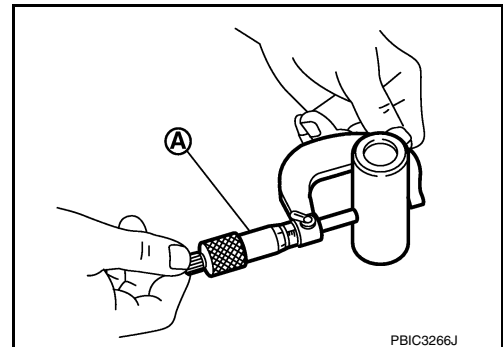
**Standard** : Refer to [EM-317, "Cylinder Block"](#).



Piston pin outer diameter

- Measure piston pin outer diameter using a micrometer (A).

**Standard** : Refer to [EM-317, "Cylinder Block"](#).



Calculating connecting rod small end clearance

- Calculate the connecting rod small end clearance using the following formula.  
(Connecting rod small end clearance) = (connecting rod small end inner diameter) - (piston pin outer diameter)

**Standard** : Refer to [EM-317, "Cylinder Block"](#).  
**Limit**

- Refer to each part standard and replace connecting rod and/or piston and piston pin assembly if the limit is exceeded.
- When replacing piston and piston assembly, refer to [EM-304, "Selective-fit Service Parts"](#) and select the correct parts.

# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## NOTE:

Piston and piston pin are service parts for assembly.

- When replacing the connecting rod, refer to [EM-304, "Selective-fit Service Parts"](#) and select the connecting rod bearing.

## Cylinder Block Upper Surface Distortion

- Remove old gasket on cylinder block upper surface using a scraper. Also remove oil, scale, and carbon deposits.

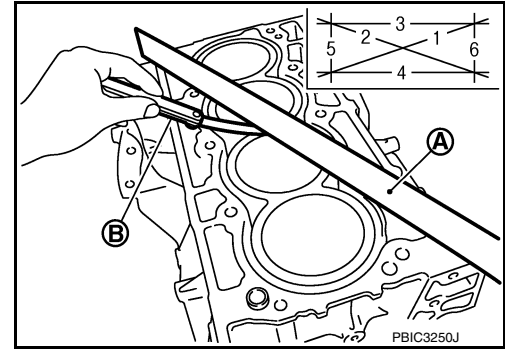
## CAUTION:

**Never allow gasket fragments to enter oil or engine coolant passages.**

- Check flatness of cylinder block upper surface using a straight-edge (A) and a feeler gauge (B). Measure distortion, at several points each in six directions.

**Limit** : Refer to [EM-317, "Cylinder Block"](#).

- If the limit is exceeded, replace the cylinder block.
- When replacing the cylinder block, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing.

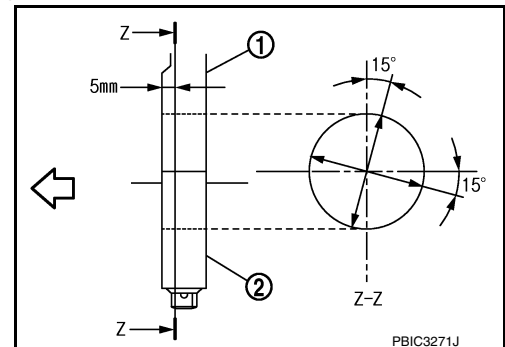


## Main Bearing Housing Inner Diameter

- Without installing main bearing, install main bearing cap, and tighten main bearing cap bolts to the specified torque.
- For main bearing cap bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).
- Measure the main bearing housing inside diameter with a bore gauge.
- Measure the position shown in the figure (5 mm rearward from main bearing housing front side end surface) in two directions, as shown in the figure. Use the smaller one as the measured value.

- 1 : Cylinder block
- 2 : Main bearing cap
- ⇐ : Engine front

**Standard** : Refer to [EM-317, "Cylinder Block"](#).



- If the result is outside the standard, replace the cylinder block.

## NOTE:

Main bearing cap is machined together with cylinder block, so they cannot be replaced separately.

- When replacing the cylinder block, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing.

## Piston-to-cylinder Bore Clearance

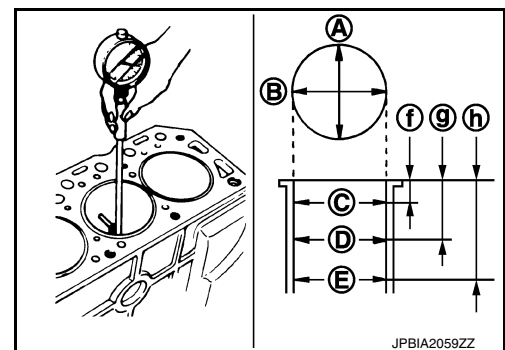
### Cylinder bore inner diameter

- Use a bore gauge and measure at three points from the top of the engine (upper, middle, lower: "C", "D", and "E" as shown in the figure) in two directions ("A", "B") for measurement at a total of six points.

- f : 10 mm (0.39 in)
- g : 60 mm (2.36 in)
- h : 130 mm (5.12 in)

## NOTE:

The measurement point for bore grade is 60 mm below the cylinder head mounting surface (position "D" in the figure). Measure the dimension in the engine LH/RH directions ("B" in the figure).



# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## Cylinder bore inner diameter standard

: Refer to [EM-317, "Cylinder Block"](#).

Out-of-round limit (difference between measurements X and Y)

Taper limit (difference between measurements A and C)

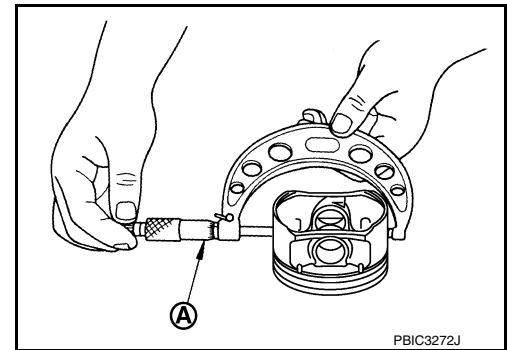
: Refer to [EM-317, "Cylinder Block"](#).

- Replace the cylinder block if the limit is exceeded, or if damage or seizure is found on cylinder inner wall.
- NOTE:**  
There is no service setting for oversized piston
- When replacing the cylinder block, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing.

Piston outer diameter

- Measure piston skirt outer diameter using a micrometer (A).

**Standard** : Refer to [EM-317, "Cylinder Block"](#).



How to calculate piston-to-cylinder bore clearance

- Calculate from the piston skirt outer diameter and the cylinder bore inner diameter (measured at position "D" in direction "B").

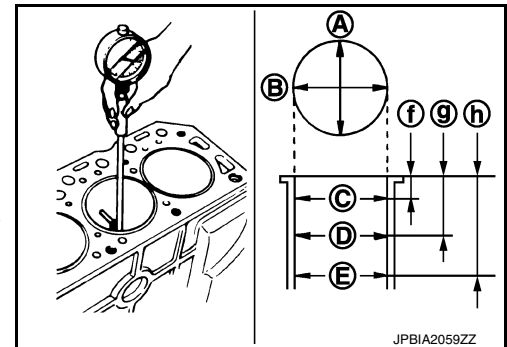
f : 10 mm (0.39 in)

g : 60 mm (2.36 in)

h : 130 mm (5.12 in)

(Clearance) = (Cylinder bore inner diameter) — (Piston skirt outer diameter)

**Standard** : Refer to [EM-317, "Cylinder Block"](#).  
**Limit**



- If the limit is exceeded, refer to the standard for each part standard, and replace the connecting rod and/or the piston and piston pin assembly.
- When replacing piston and piston assembly, refer to [EM-304, "Selective-fit Service Parts"](#) and select the correct parts.

**NOTE:**

Piston and piston pin are service parts for assembly.

- When replacing the cylinder block, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing.

Crankshaft Main Journal Diameter



# CYLINDER BLOCK

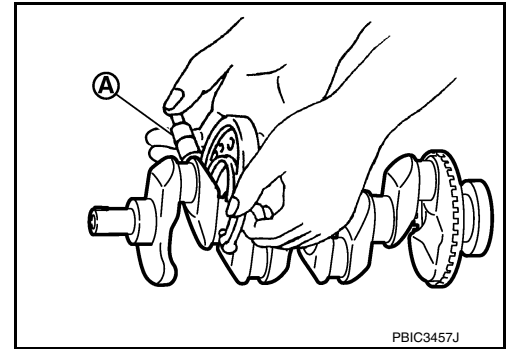
< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Measure the main journal outer diameter using a micrometer (A).

**Standard** : Refer to [EM-317, "Cylinder Block"](#).

- If it is outside the standard, check the main bearing oil clearance and use the undersize bearing. Refer to "Main bearing oil clearance."



PBIC3457J

Crankshaft Pin Journal Diameter

- Measure the main journal outer diameter using a micrometer.

**Standard** : Refer to [EM-317, "Cylinder Block"](#).

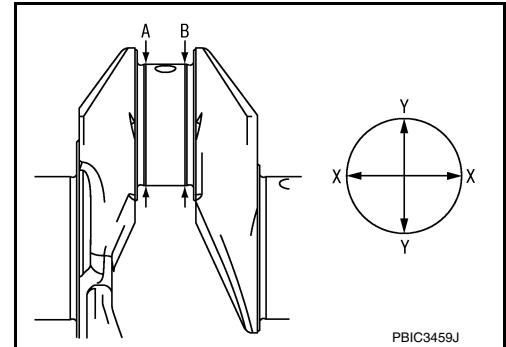
- If it is outside the standard, check the connecting rod bearing oil clearance and use the undersize bearing. Refer to "Connecting rod bearing oil clearance."

Out-of-round and Taper of Crankshaft

- Measure each main journal and pin journal at four locations shown in the figure using a micrometer.
- Out-of-round is indicated by the difference between the dimensions at positions "A" and "B" measured in directions "X" and "Y".
- Taper is indicated by the difference between the dimensions in directions "X" and "Y" measured at positions "A" and "B".

**Limit** : Refer to [EM-317, "Cylinder Block"](#).

- Correct or replace the crankshaft if it exceeds the limit.
- If repair is performed, check the oil clearance and select the main bearing and connecting rod bearing. Refer to "Main bearing oil clearance" or "Connecting rod bearing oil clearance."
- When replacing the crankshaft, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing and connecting rod bearing.



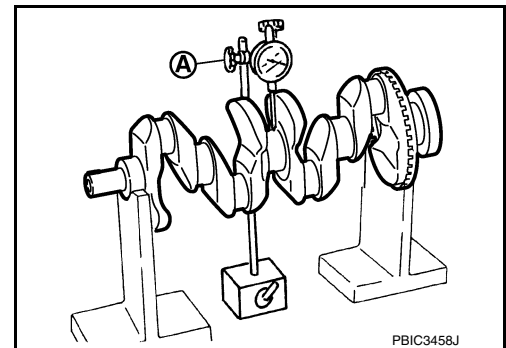
PBIC3459J

Crankshaft Runout

- Set a pair of V-blocks on a level block and support journals at both ends of crankshaft.
- Set a dial indicator (A) vertically onto journal No. 3.
- Rotate crankshaft one rotation and read indication on the indicator.

**Standard**  
**Limit** : Refer to [EM-317, "Cylinder Block"](#).

- Replace crankshaft if the limit is exceeded.
- When replacing the crankshaft, refer to [EM-304, "Selective-fit Service Parts"](#) and select the main bearing and connecting rod bearing.



PBIC3458J

Connecting Rod Bearing Oil Clearance

Using calculation



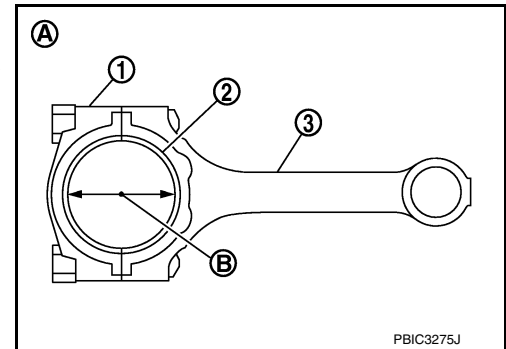
# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Install connecting rod bearing (2) onto connecting rod (3) and connecting rod cap (1). Tighten connecting rod bolts to the specified torque. Using an inside micrometer, measure connecting rod inner diameter.

A : Image  
 : Inner diameter  
 B measurement direction



- For the connecting rod bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).
- Measure crankshaft pin journal diameter. Refer to "Crankshaft pin journal diameter."
- (Oil clearance) = (Connecting rod bearing inner diameter) - (Camshaft pin journal outer diameter)

**Standard** : Refer to [EM-317, "Cylinder Block"](#).  
**Limit**

- If the limit is exceeded, select a connecting rod bearing according to the dimensions of the crankshaft pin journal outer diameter, so that engine oil clearance is within the standard. Refer to [EM-304, "Selective-fit Service Parts"](#).

Using plastigage

- Completely wipe away oil and dust on crankshaft pin journal and bearing surfaces.
- Cut a piece of plastigage slightly shorter than bearing width, and place it in axial direction. Be careful not to interfere with oil hole.
- Install connecting rod bearing to connecting rod and connecting rod cap. Tighten connecting rod bolts to the specified torque.
- For the connecting rod bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).

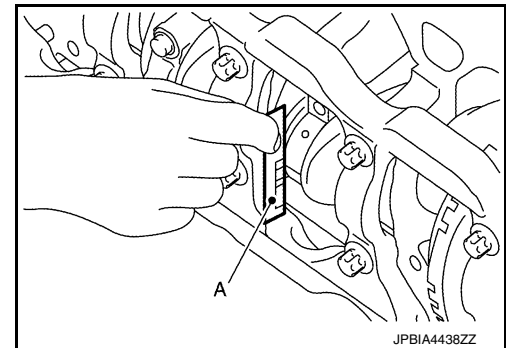
### CAUTION:

**Never rotate crankshaft while plastigage is in place.**

- Remove connecting rod cap and bearing. Measure width of the plastigage using scale (A) printed on its bag.

### NOTE:

If the limit is exceeded, follow the procedure in "Using calculation".

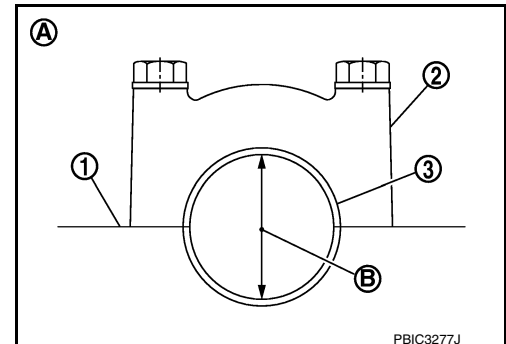


## Main Bearing Oil Clearance

Using calculation

- Install main bearing (3) onto cylinder block (1) and main bearing cap (2). Tighten main bearing cap bolts to the specified torque. Using a bore gauge, measure main bearing inner diameter.

A : Image  
 : Inner diameter measurement direction  
 B



- For main bearing cap bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).
- Measure crankshaft main journal diameter. Refer to "Crankshaft main journal diameter."
- (Oil clearance) = (Connecting rod bearing inner diameter) - (Crankshaft main journal outer diameter)

# CYLINDER BLOCK

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

Standard

: Refer to [EM-317, "Cylinder Block"](#).

Limit

- If the limit is exceeded, select a connecting rod bearing according to the dimensions of the crankshaft pin journal outer diameter, so that engine oil clearance is within the standard. Refer to [EM-304, "Selective-fit Service Parts"](#).

Using plastigage

- Completely wipe away oil and dust on crankshaft main journal and bearing surfaces.
- Cut a piece of plastigage slightly shorter than bearing width, and place it in axial direction. Be careful not to interfere with oil hole.
- Install the main bearing onto the cylinder block and main bearing cap, and then tighten the main bearing cap bolts to the specified torque.
- For main bearing cap bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).

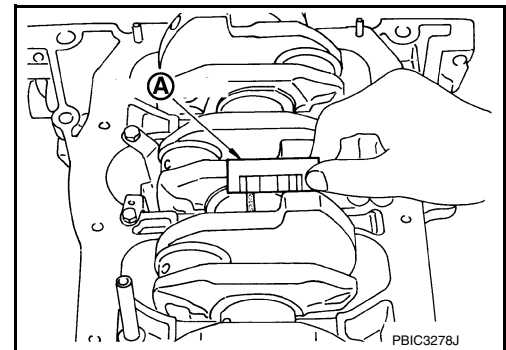
## CAUTION:

**Never rotate crankshaft while plastigage is in place.**

- Remove the main bearing cap and bearing. Measure width of the plastigage using scale (A) printed on its bag.

## NOTE:

If the limit is exceeded, follow the procedure in "Using calculation".

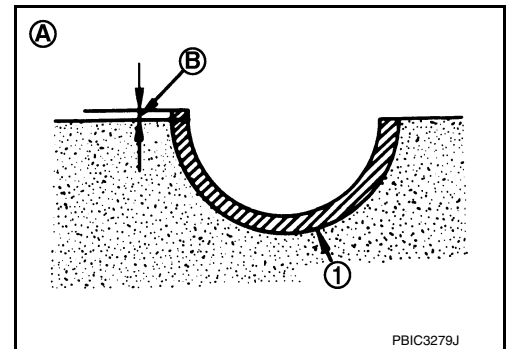


Main Bearing Crush Height

- With main bearing (1) installed, tighten main bearing cap bolt to the specified torque. Remove main bearing cap and check that the main bearing protrudes to [crush height (B)].

A : Image

- For main bearing cap bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).
- If crush height is not secured, replace the main bearing. Refer to [EM-304, "Selective-fit Service Parts"](#).

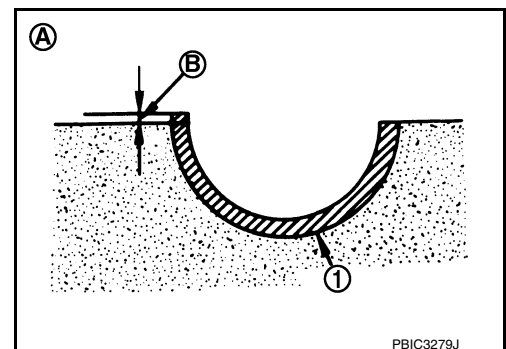


Connecting Rod Bearing Crush Height

- With connecting rod bearing (1) installed, tighten connecting rod bolt to the specified torque. Remove connecting rod cap and check that the front edge of the connecting rod bearing protrudes [to crush height (B)].

A : Image

- For the connecting rod bolt tightening procedure, refer to [EM-287, "Disassembly and Assembly"](#).
- If a crush height does not exist, replace the connecting rod bearing. Refer to [EM-304, "Selective-fit Service Parts"](#).



Main Bearing Cap Bolt Outer Diameter

# CYLINDER BLOCK

## < UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Measure diameter at two locations (d1 and d2) as shown in the figure.

A : d1 measurement range

B : d2 measurement range

- If another narrower part in the threads is identified, use the position as d2.
- Calculate the difference between d1 and d2.

**Limit : 0.15 mm (0.0059 in)**

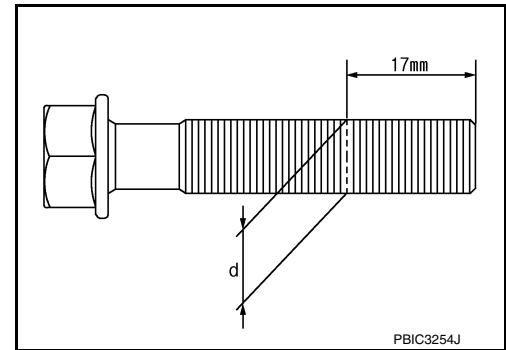
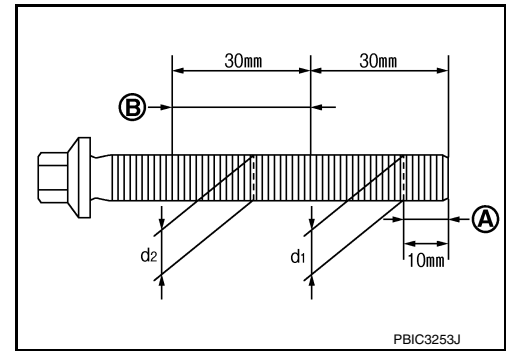
- Replace main bearing cap bolts if the limit is exceeded (the difference between the dimensions is large).

### Connecting Rod Bolt Outer Diameter

- Measure the outer diameter d at the position shown as in the figure.
- If another narrower part in the threads is identified, use the position as d.

**Limit :  $\phi 7.75$  mm (0.305 in)**

- Replace connecting rod bolts if the limit is exceeded (it is thinner).



# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

## HOW TO SELECT PISTON AND BEARING

### Selective-fit Service Parts

INFOID:000000012197447

### SELECTION METHOD

Position	Selective-fit service parts	Item to be selected	Selection method
Between cylinder block and crankshaft	Main bearing	Main bearing grade (Bearing thickness)	Select proper size according to cylinder block main bearing housing grade (housing inner diameter) and crankshaft main journal grade (journal outer diameter).
Between crankshaft and connecting rod	Connecting rod bearing	Connecting rod bearing grade (Bearing thickness)	Select proper size according to connecting rod large end grade (connecting rod large end inner diameter) and crankshaft pin journal grade (pin outer diameter).
Between cylinder block and piston	Piston and piston pin assembly Note: Piston and piston pin are service parts for assembly.	Piston grade (Piston outer diameter)	Piston grade = cylinder bore grade (bore inner diameter)

- The identification grade stamped on each part is the grade for the dimension measured in new condition. It is not applied to reused parts.
- For reused or repaired parts, measure the dimension accurately. Determine the grade by comparing the measurement with the values of each selection table in this section.
- For details of the measurement method of each part, the reuse standards and the selection method of the selective fitting parts, refer to the text.

### PISTON SELECTIVE-FIT SERVICE PARTS

#### When New Cylinder Block is Used

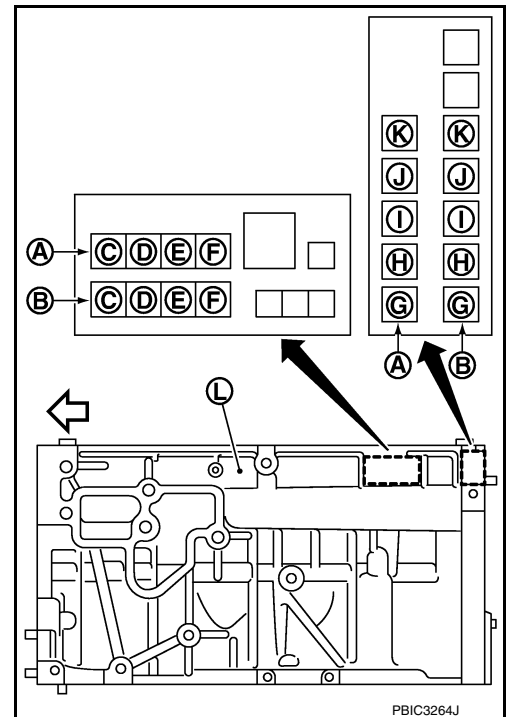
- Check cylinder bore grade number (either 1 or 2) stamped on cylinder block LH surface (L), and select piston of the same grade number.

- A : Correction stamp  
 B : Standard stamp  
 C : Cylinder No. 1 bore grade  
 D : Cylinder No. 2 bore grade  
 E : Cylinder No. 3 bore grade  
 F : Cylinder No. 4 bore grade  
 G : No. 1 main bearing housing grade  
 H : No. 2 main bearing housing grade  
 I : No. 3 main bearing housing grade  
 J : No. 4 main bearing housing grade  
 K : No. 5 main bearing housing grade  
 ⇐ : Engine front

- If there is a correction stamp, the symbol is the correct one.

#### NOTE:

Piston is a service part for piston pin and assembly.



#### When Reusing a Cylinder Block

1. Measure cylinder block bore inner diameter. Refer to [EM-294, "Inspection"](#).

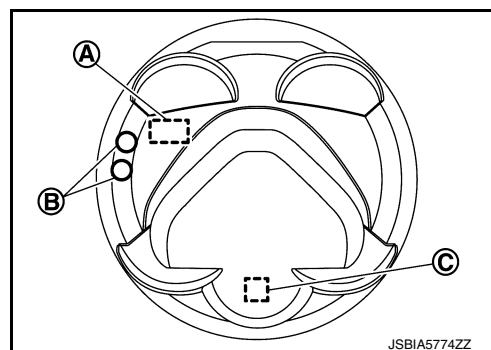
# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

- Determine the grade number of the measured cylinder bore at "Cylinder Bore Inner Diameter" in the Selective-fit Service Parts Table, and select the piston of the same grade number.

- A : Top surface identification mark  
B : Front mark  
C : Piston grade



Selective-fit Service Parts Table

Unit: mm (in)

Grade number (stamping)	1	2 (or no stamp*)
Cylinder bore inner diameter	79.700 – 79.710 (3.1378 – 3.1382)	79.710 – 79.720 (3.1382 – 3.1386)
Piston outer diameter	79.670 – 79.680 (3.1366 – 3.1370)	79.680 – 79.690 (3.1370 – 3.1374)

\*: No stamp is only for piston side.

## SELECTIVE-FIT CONNECTING ROD BEARING

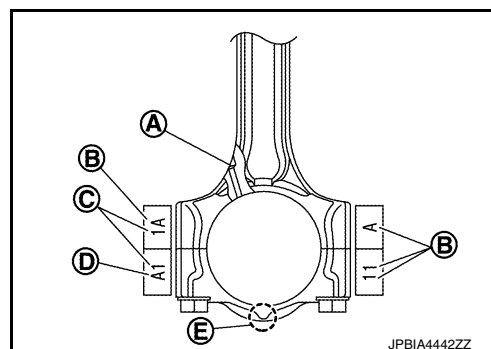
Using New Connecting Rod and Crankshaft

- Find the large end grade (D) of connecting rod side surface in the rows of the Selective-fit Service Parts Table.

- A : Oil hole  
B : Management code  
C : Cylinder No.  
D : Large end grade  
E : Front mark

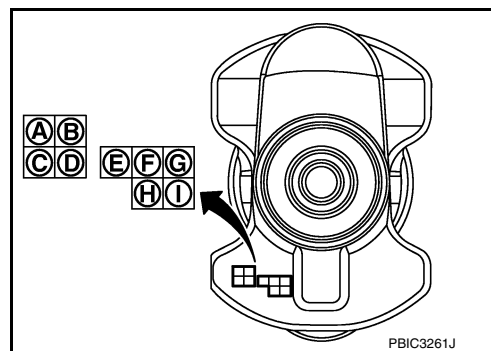
### NOTE:

The symbol of connecting rod is one example.



- Find the pin diameter grade of crankshaft front surface in the columns of the Selective-fit Service Parts Table.

- A : No. 1 pin journal grade  
B : No. 2 pin journal grade  
C : No. 3 pin journal grade  
D : No. 4 pin journal grade  
E : No. 1 main journal grade  
F : No. 2 main journal grade  
G : No. 3 main journal grade  
H : No. 4 main journal grade  
I : No. 5 main journal grade



- Find the symbol at the intersection of the selected row and column in the Selective-Fit service Parts Table.
- Find the symbol at the intersection in "Connecting rod bearing grade table", and select it.

When Reusing Crankshaft and Connecting Rod

- Measure each dimension of connecting rod large end inner diameter and crankshaft pin outer diameter.
- Find the measured dimension in the Selective-fit Service Parts Table.
- The procedure below is the same procedure as step 3 and later steps of "Using new connecting rod and crankshaft".

# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

Selective-fit Service Parts Table

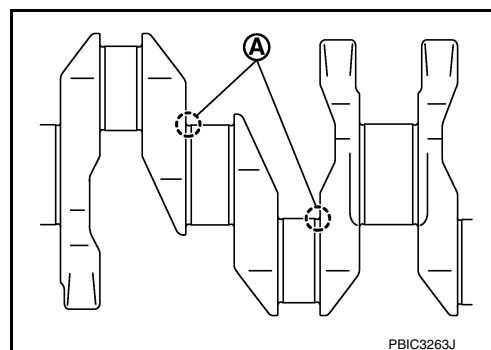
<div>Connecting rod big end diameter Unit: mm (in)</div> <div>Crankshaft pin journal diameter Unit: mm (in)</div>		Mark																
		Hole diameter																
Mark	Axle diameter	A	B	C	D	E	F	G	H	J	K	L	M	N				
		47.000 - 47.001 (1.8504 - 1.8504)	47.001 - 47.002 (1.8504 - 1.8505)	47.002 - 47.003 (1.8505 - 1.8505)	47.003 - 47.004 (1.8505 - 1.8505)	47.004 - 47.005 (1.8505 - 1.8506)	47.005 - 47.006 (1.8506 - 1.8506)	47.006 - 47.007 (1.8506 - 1.8507)	47.007 - 47.008 (1.8507 - 1.8507)	47.008 - 47.009 (1.8507 - 1.8507)	47.009 - 47.010 (1.8507 - 1.8508)	47.010 - 47.011 (1.8508 - 1.8508)	47.011 - 47.012 (1.8508 - 1.8509)	47.012 - 47.013 (1.8509 - 1.8509)				
A	43.970 - 43.971 (1.7311 - 1.7311)	0	0	0	0	0	01	01	01	1	1	1	12	12	12			
B	43.969 - 43.970 (1.7311 - 1.7311)	0	0	0	0	01	01	01	1	1	1	12	12	12	12			
C	43.968 - 43.969 (1.7310 - 1.7311)	0	0	0	01	01	01	1	1	1	12	12	12	12	23			
D	43.967 - 43.968 (1.7310 - 1.7310)	0	0	01	01	01	1	1	1	12	12	12	2	2	23			
E	43.966 - 43.967 (1.7309 - 1.7310)	0	01	01	01	1	1	1	12	12	12	2	2	2	23			
F	43.965 - 43.966 (1.7309 - 1.7309)	01	01	01	1	1	1	12	12	12	2	2	2	2	23			
G	43.964 - 43.965 (1.7309 - 1.7309)	01	01	1	1	1	12	12	12	2	2	2	23	23	23			
H	43.963 - 43.964 (1.7308 - 1.7309)	01	1	1	1	12	12	12	2	2	2	23	23	23	23			
J	43.962 - 43.963 (1.7308 - 1.7308)	1	1	1	12	12	12	2	2	2	23	23	23	3	3			
K	43.961 - 43.962 (1.7307 - 1.7308)	1	1	12	12	12	2	2	2	23	23	23	3	3	3			
L	43.960 - 43.961 (1.7307 - 1.7307)	1	12	12	12	2	2	2	23	23	23	3	3	3	3			
M	43.959 - 43.960 (1.7307 - 1.7307)	12	12	12	2	2	2	23	23	23	3	3	3	3	34			
N	43.958 - 43.959 (1.7306 - 1.7307)	12	12	2	2	2	23	23	23	3	3	3	3	34	34			
P	43.957 - 43.958 (1.7306 - 1.7306)	12	2	2	2	23	23	23	3	3	3	34	34	34	34			
R	43.956 - 43.957 (1.7305 - 1.7306)	2	2	2	23	23	23	3	3	3	34	34	34	4	4			
S	43.955 - 43.956 (1.7305 - 1.7305)	2	2	23	23	23	3	3	3	34	34	34	4	4	4			
T	43.954 - 43.955 (1.7305 - 1.7305)	2	23	23	23	3	3	3	34	34	34	4	4	4	4			
U	43.953 - 43.954 (1.7304 - 1.7305)	23	23	23	3	3	3	34	34	34	4	4	4	4	4			

# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

When grinding crankshaft pin to use undersize bearing, never damage fillet roll area [1.5 – 1.7 mm (0.059 – 0.067 in)] (A).



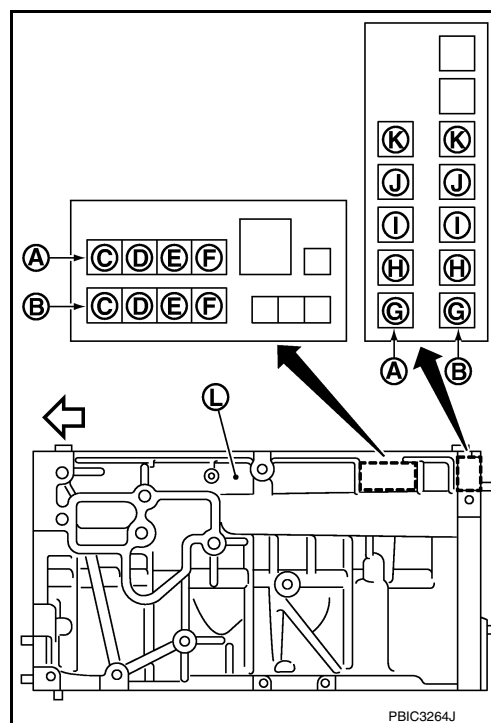
## SELECTIVE-FIT MAIN BEARING

Using New Cylinder Block and Crankshaft

- Find the bearing housing grade of cylinder block LH side (L) in the row of the Selective-fit Service Parts Table.

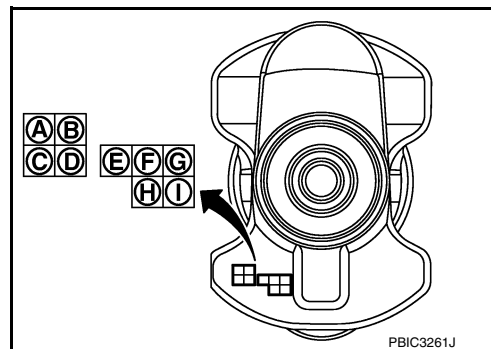
- A : Correction stamp position
- B : Standard stamp position
- C : Cylinder No. 1 bore grade
- D : Cylinder No. 2 bore grade
- E : Cylinder No. 3 bore grade
- F : Cylinder No. 4 bore grade
- G : No. 1 main bearing housing grade
- H : No. 2 main bearing housing grade
- I : No. 3 main bearing housing grade
- J : No. 4 main bearing housing grade
- K : No. 5 main bearing housing grade
- ↔ : Engine front

- If there is a correction stamp, the symbol is the correct one.



- Find the journal diameter grade of crankshaft front surface in the column of the Selective-fit Service Parts Table.

- A : No. 1 pin journal grade
- B : No. 2 pin journal grade
- C : No. 3 pin journal grade
- D : No. 4 pin journal grade
- E : No. 1 main journal grade
- F : No. 2 main journal grade
- G : No. 3 main journal grade
- H : No. 4 main journal grade
- I : No. 5 main journal grade



- Find the symbol at the intersection of the selected row and column in the Selective-fit Service Parts Table.

**CAUTION:**

The setting clearance is different between journal No. 1 and 4, and No. 2, 3, and 5. Use either 2 selective-fit service parts depending on the position.

- Find the symbol at the intersection in "MAIN BEARING GRADE TABLE" and select it.

**NOTE:**

Set the upper/lower values for service parts as a set.

# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

When Reusing Cylinder Block and Crankshaft

1. Measure each dimension of cylinder block main bearing housing inner diameter and crankshaft journal outer diameter.
2. Find the measured dimension in the Selective-fit Service Parts Table.
3. The procedure below is the same procedure as step 3 and later steps of "Using new cylinder block and crankshaft".

Selective-fit Service Parts Table

For No. 1 and 4 journal

<div> <div>Cylinder block main bearing housing inner diameter Unit: mm (in)</div> <div>Crankshaft main journal diameter Unit: mm (in)</div> </div>		Mark		Hole diameter		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
		Mark	Axle diameter			55.997 - 55.998 (2.2046 - 2.2046)	55.998 - 55.999 (2.2046 - 2.2047)	55.999 - 56.000 (2.2047 - 2.2047)	56.000 - 56.001 (2.2047 - 2.2048)	56.001 - 56.002 (2.2048 - 2.2048)	56.002 - 56.003 (2.2048 - 2.2048)	56.003 - 56.004 (2.2048 - 2.2049)	56.004 - 56.005 (2.2049 - 2.2049)	56.005 - 56.006 (2.2049 - 2.2050)	56.006 - 56.007 (2.2050 - 2.2050)	56.007 - 56.008 (2.2050 - 2.2050)	56.008 - 56.009 (2.2050 - 2.2051)	56.009 - 56.010 (2.2051 - 2.2051)	56.010 - 56.011 (2.2051 - 2.2052)	56.011 - 56.012 (2.2052 - 2.2052)	56.012 - 56.013 (2.2052 - 2.2052)	56.013 - 56.014 (2.2052 - 2.2053)	56.014 - 56.015 (2.2053 - 2.2053)	56.015 - 56.016 (2.2053 - 2.2053)	56.016 - 56.017 (2.2053 - 2.2054)
A	51.978 - 51.979 (2.0464 - 2.0464)			0	0	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23
B	51.977 - 51.978 (2.0463 - 2.0464)			0	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23
C	51.976 - 51.977 (2.0463 - 2.0463)			0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	2	23	23	23
D	51.975 - 51.976 (2.0463 - 2.0463)			0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3
E	51.974 - 51.975 (2.0462 - 2.0463)			0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3
F	51.973 - 51.974 (2.0462 - 2.0462)			0	0	01	01	01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	3
G	51.972 - 51.973 (2.0461 - 2.0462)			0	01	01	01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34
H	51.971 - 51.972 (2.0461 - 2.0461)			01	01	01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34
J	51.970 - 51.971 (2.0461 - 2.0461)			01	01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	34
K	51.969 - 51.970 (2.0460 - 2.0461)			01	1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	4	4
L	51.968 - 51.969 (2.0460 - 2.0460)			1	1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4
M	51.967 - 51.968 (2.0459 - 2.0460)			1	1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	4
N	51.966 - 51.967 (2.0459 - 2.0459)			1	12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45
P	51.965 - 51.966 (2.0459 - 2.0459)			12	12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45
R	51.964 - 51.965 (2.0458 - 2.0459)			12	12	2	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	45
S	51.963 - 51.964 (2.0458 - 2.0458)			12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5
T	51.962 - 51.963 (2.0457 - 2.0458)			2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	5
U	51.961 - 51.962 (2.0457 - 2.0457)			2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	5	5
V	51.960 - 51.961 (2.0457 - 2.0457)			2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	5	5	5
W	51.959 - 51.960 (2.0456 - 2.0457)			23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	5	5	5	5

PBIC4078E



# HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

For No. 2, 3, and 5 journal

<div> <div>Cylinder block main bearing housing inner diameter Unit: mm (in)</div> <div>Crankshaft main journal diameter Unit: mm (in)</div> </div>		Mark		Hole diameter		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W
		Mark	Axle diameter			55.997 - 55.998 (2.2046 - 2.2046)	55.998 - 55.999 (2.2046 - 2.2047)	55.999 - 56.000 (2.2047 - 2.2047)	56.000 - 56.001 (2.2047 - 2.2048)	56.001 - 56.002 (2.2048 - 2.2048)	56.002 - 56.003 (2.2048 - 2.2048)	56.003 - 56.004 (2.2048 - 2.2049)	56.004 - 56.005 (2.2049 - 2.2049)	56.005 - 56.006 (2.2049 - 2.2050)	56.006 - 56.007 (2.2050 - 2.2050)	56.007 - 56.008 (2.2050 - 2.2050)	56.008 - 56.009 (2.2050 - 2.2051)	56.009 - 56.010 (2.2051 - 2.2051)	56.010 - 56.011 (2.2051 - 2.2052)	56.011 - 56.012 (2.2052 - 2.2052)	56.012 - 56.013 (2.2052 - 2.2052)	56.013 - 56.014 (2.2052 - 2.2053)	56.014 - 56.015 (2.2053 - 2.2053)	56.015 - 56.016 (2.2053 - 2.2053)	56.016 - 56.017 (2.2053 - 2.2054)
A	51.978 - 51.979 (2.0464 - 2.0464)	1	12	12	12	2	2	2	23	23	23	3	3	3	3	3	3	34	34	34	4	4	4	4	45
B	51.977 - 51.978 (2.0463 - 2.0464)	12	12	12	2	2	2	23	23	23	3	3	3	3	3	3	34	34	34	4	4	4	4	4	45
C	51.976 - 51.977 (2.0463 - 2.0463)	12	12	2	2	2	23	23	23	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
D	51.975 - 51.976 (2.0463 - 2.0463)	12	2	2	2	23	23	23	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
E	51.974 - 51.975 (2.0462 - 2.0463)	2	2	2	23	23	23	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
F	51.973 - 51.974 (2.0462 - 2.0462)	2	2	23	23	23	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
G	51.972 - 51.973 (2.0461 - 2.0462)	2	23	23	23	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
H	51.971 - 51.972 (2.0461 - 2.0461)	23	23	23	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
J	51.970 - 51.971 (2.0461 - 2.0461)	23	23	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
K	51.969 - 51.970 (2.0460 - 2.0461)	23	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
L	51.968 - 51.969 (2.0460 - 2.0460)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
M	51.967 - 51.968 (2.0459 - 2.0460)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
N	51.966 - 51.967 (2.0459 - 2.0459)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
P	51.965 - 51.966 (2.0459 - 2.0459)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
R	51.964 - 51.965 (2.0458 - 2.0459)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
S	51.963 - 51.964 (2.0458 - 2.0458)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	34	34	34	4	4	4	4	4	4	45
T	51.962 - 51.963 (2.0457 - 2.0458)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
U	51.961 - 51.962 (2.0457 - 2.0457)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
V	51.960 - 51.961 (2.0457 - 2.0457)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
W	51.959 - 51.960 (2.0456 - 2.0457)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

PBIC4079E

Main Bearing Grade Table

Main bearing grade table : Refer to [EM-321, "Main Bearing"](#).

## Using Undersize Bearing

- If the standard oil clearance cannot be obtained by standard size main bearing, use undersize (US) bearing.
- When using undersize bearing, install it, measure bearing inner diameter, and then grind journal to obtain specified oil clearance.

Available undersize bearings : Refer to [EM-321, "Main Bearing"](#).

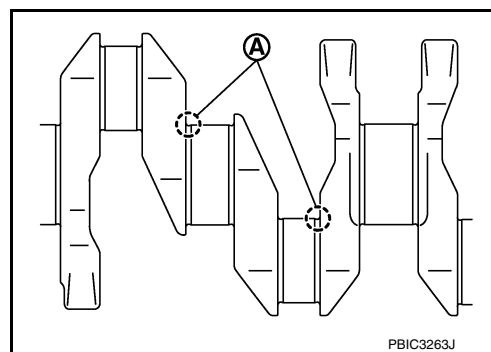
**CAUTION:**

## HOW TO SELECT PISTON AND BEARING

< UNIT DISASSEMBLY AND ASSEMBLY >

[MR EXCEPT FOR NISMO RS MODELS]

When grinding crankshaft journal to use undersize bearing, never damage fillet roll area [1.5 – 1.7 mm (0.059 – 0.067 in)] (A).



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### General Specification

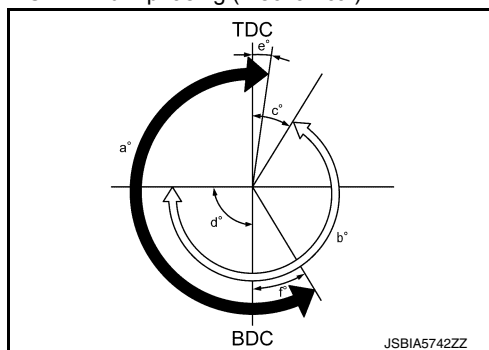
INFOID:0000000012197448

#### GENERAL SPECIFICATIONS

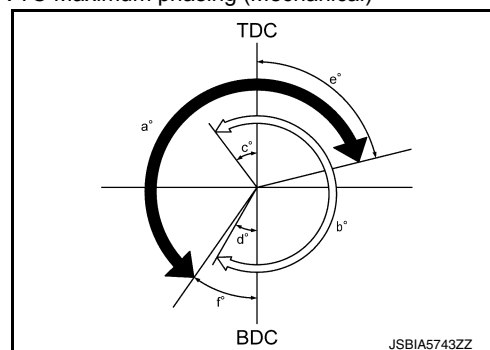
Engine type		MR16DDT
Cylinder arrangement		In-line 4
Displacement cm <sup>3</sup> (cu in)		1,618 (98.73)
Bore and stroke mm (in)		79.7×81.1 (3.138×3.193)
Valve arrangement		DOHC
Firing order		1-3-4-2
Number of piston rings	Compression	2
	Oil	1
Compression ratio		10.5
Compression pressure kPa (kg/cm <sup>2</sup> , psi)/200 rpm	Standard	1,550 (15.81, 224.7)
	Minimum	1,290 (13.15, 187.0)
	Differential limit between cylinders	100 (1.0, 14.5)

Unit: degree

VTC Minimum phasing (Mechanical)



VTC Maximum phasing (Mechanical)

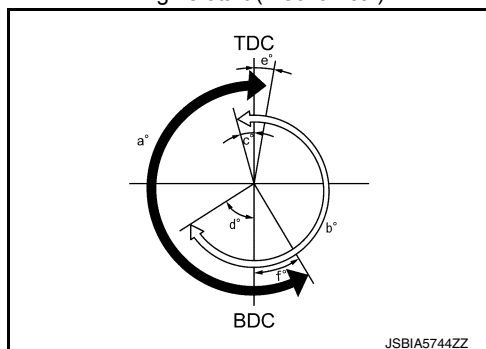


#### Valve timing

↶: Intake valve

↷: Exhaust valve

Engine start (Mechanical)



a  
EXH valve  
opening angle

b  
INT valve open-  
ing angle

c  
INT open

d  
INT closed

e  
EXH closed

f  
EXH open

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

VTC Minimum phasing (Mechanical)*1	212	236	ATDC34	ABDC90	ATDC3	BBDC29
VTC Maximum phasing (Mechanical)*2			BTDC31	ABDC25	ATDC63	ABDC31
Engine start (Mechanical)*3			BTDC2	ABDC54	ATDC3	BBDC29

- \*1: Idling at coolant temperature of 60°C or more
- \*2: At maximum operation
- \*3: At coolant temperature of 60°C or less, or at engine start

## Drive Belt

INFOID:0000000012197449

### DRIVE BELT

Tension of drive belt	Belt tension is not necessary, as it is automatically adjusted by drive belt auto-tensioner.
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## Air Cleaner

INFOID:0000000012197450

### AIR CLEANER ELEMENT

Replacement Interval	Every 60,000 km
----------------------	-----------------

## Spark Plug

INFOID:0000000012197451

### SPARK PLUG

Unit: mm (in)

Make	NGK	
Standard type	DILKAR7E9HS	
Gap (Nominal)	Standard	0.9 (0.035)
	Limit	1.1 (0.043)

## Exhaust Manifold

INFOID:0000000012197452

### EXHAUST MANIFOLD

Unit: mm (in)

Items		Limit
Surface distortion	Each exhaust port	0.1 (0.004)
	Entire part	0.3 (0.012)

## Camshaft

INFOID:0000000012197453

### CAMSHAFT

Unit: mm (in)

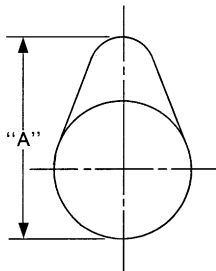
		Standard	Limit
Camshaft journal oil clearance	No. 1	0.038 - 0.086 (0.0015 - 0.0034)	0.15 (0.0059)
	No. 2, 3, 4, 5	0.030 - 0.071 (0.0012 - 0.0028)	
Camshaft bracket inner diameter	No. 1	28.000 - 28.021 (1.1024 - 1.1032)	—
	No. 2, 3, 4, 5	25.000 - 25.021 (0.9843 - 0.9851)	—
Camshaft journal diameter	No. 1	27.935 - 27.962 (1.0998 - 1.1009)	—
	No. 2, 3, 4, 5	24.950 - 24.970 (0.9823 - 0.9831)	—
Camshaft end play		0.075 - 0.153 (0.0030 - 0.0060)	0.24 (0.0095)

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

Camshaft nose height (A)	Intake	44.565 - 44.755 (1.7545 - 1.7620)	44.365 (1.7467)
	Exhaust	42.875 - 43.065 (1.6880 - 1.6955)	44.905 (1.7679)
Camshaft runout [TIR*]		Less than 0.02 (0.0008)	0.05 (0.0020)
Camshaft sprocket runout [TIR*]		—	0.15 (0.0059)



SEM671

\*: Total indicator reading

## VALVE LIFTER

Unit: mm (in)

Items		Standard
Valve lifter outer diameter	Intake	33.977 - 33.987 (1.3377 - 1.3381)
	Exhaust	29.977 - 29.987 (1.1802 - 1.1806)
Valve lifter hole diameter	Intake	34.000 - 34.021 (1.3386 - 1.3394)
	Exhaust	30.000 - 30.021 (1.1811 - 1.1819)
Valve lifter clearance		0.013 - 0.044 (0.0005 - 0.0017)

## VALVE CLEARANCE

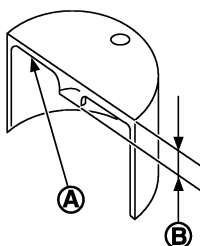
Unit: mm (in)

Items	Cold	Hot* (reference data)
Intake	0.24 - 0.32 (0.009 - 0.013)	0.304 - 0.416 (0.012 - 0.016)
Exhaust	0.25 - 0.33 (0.010 - 0.013)	0.308 - 0.432 (0.012 - 0.017)

\*: Approximately 80°C (176°F)

## AVAILABLE VALVE LIFTER

Unit: mm (in)



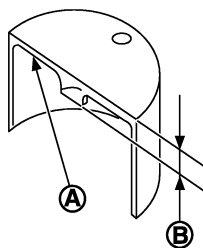
JPBIA0170ZZ

Stamp mark (A)		Valve lifter thickness (B)
Intake	Exhaust	
300 or 300H	300J or 300j or 300H	3.00 (0.1181)
302 or 302H	302J or 302j or 302H	3.02 (0.1189)
304 or 304H	304J or 304j or 304H	3.04 (0.1197)

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]



JPBIA0170ZZ

Stamp mark (A)		Valve lifter thickness (B)
Intake	Exhaust	
306 or 306H	306J or 306j or 306H	3.06 (0.1205)
308 or 308H	308J or 308j or 308H	3.08 (0.1213)
310 or 310H	310J or 310j or 310H	3.10 (0.1220)
312 or 312H	312J or 312j or 312H	3.12 (0.1228)
314 or 314H	314J or 314j or 314H	3.14 (0.1236)
316 or 316H	316J or 316j or 316H	3.16 (0.1244)
318 or 318H	318J or 318j or 318H	3.18 (0.1252)
320 or 320H	320J or 320j or 320H	3.20 (0.1260)
322 or 322H	322J or 322j or 322H	3.22 (0.1268)
324 or 324H	324J or 324j or 324H	3.24 (0.1276)
326 or 326H	326J or 326j or 326H	3.26 (0.1283)
328 or 328H	328J or 328j or 328H	3.28 (0.1291)
330 or 330H	330J or 330j or 330H	3.30 (0.1299)
332 or 332H	332J or 332j or 332H	3.32 (0.1307)
334 or 334H	334J or 334j or 334H	3.34 (0.1315)
336 or 336H	336J or 336j or 336H	3.36 (0.1323)
338 or 338H	338J or 338j or 338H	3.38 (0.1331)
340 or 340H	340J or 340j or 340H	3.40 (0.1339)
342 or 342H	342J or 342j or 342H	3.42 (0.1346)
344 or 344H	344J or 344j or 344H	3.44 (0.1354)
346 or 346H	346J or 346j or 346H	3.46 (0.1362)
348 or 348H	348J or 348j or 348H	3.48 (0.1370)
350 or 350H	350J or 350j or 350H	3.50 (0.1378)

## Cylinder Head

INFOID:0000000012197454

## CYLINDER HEAD

Unit: mm (in)

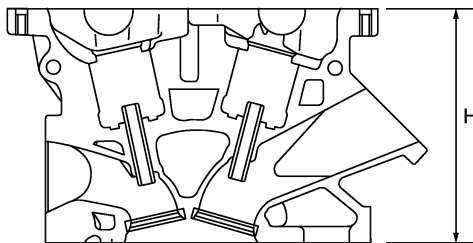
Items	Standard	Limit
Head surface distortion	—	0.1 (0.004)

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

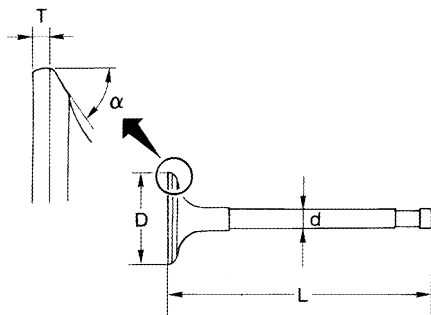
Items	Standard	Limit
Normal cylinder head height "H"	130.9 (5.15)	—



PBIC0924E

## VALVE DIMENSIONS

Unit: mm (in)

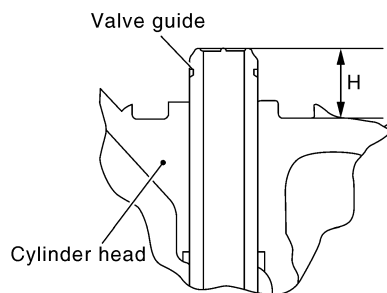


JSBIA1166ZZ

Measuring point		Standard
Valve head diameter "D"	Intake	31.2 - 31.5 (1.228 - 1.240)
	Exhaust	25.6 - 25.9 (1.008 - 1.020)
Valve total length "L"	Intake	105.48 (4.15)
	Exhaust	106.06 (4.18)
Stem diameter "d"	Intake	5.465 - 5.520 (0.2152 - 0.2173)
	Exhaust	5.455 - 5.530 (0.2148 - 0.2177)
Seat angle "α"		45°15' - 45°45'
Valve thickness "T"	Intake	1.4 (0.055)
	Exhaust	1.4 (0.055)

## VALVE GUIDE

Unit: mm (in)



PBIC2187E

Items	Standard	Oversize (service) [0.2 (0.008)]
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# SERVICE DATA AND SPECIFICATIONS (SDS)

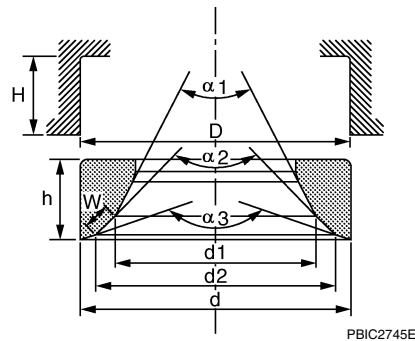
< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

Valve guide	Outer diameter	9.523 - 9.534 (0.3749 - 0.3754)	9.723 - 9.734 (0.3828 - 0.3832)
	Inner diameter (Finished size)	5.500 - 5.518 (0.2165 - 0.2172)	
Cylinder head valve guide hole diameter		9.475 - 9.496 (0.3730 - 0.3739)	9.675 - 9.696 (0.3809 - 0.3817)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
Items		Standard	Limit
Valve guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.1 (0.004)
	Exhaust	0.030 - 0.063 (0.0012 - 0.0025)	
Projection length “H”		13.35 - 13.65 (0.5256 - 0.5374)	

## VALVE SEAT

Unit: mm (in)



Items		Standard	Oversize (service) [0.5 (0.020)]
Cylinder head seat recess diameter “D”	Intake	31.900 - 31.927 (1.2559 - 1.2570)	35.200 - 35.227 (1.3858 - 1.3869)
	Exhaust	26.300 - 26.327 (1.0354 - 1.0365)	29.200 - 29.227 (1.1496 - 1.1507)
Valve seat outer diameter “d”	Intake	31.997 - 32.013 (1.2597 - 1.2604)	32.497 - 32.513 (1.2794 - 1.2800)
	Exhaust	26.408 - 26.424 (1.0397 - 1.0403)	
Valve seat interference fit		0.07 - 0.113 (0.0028 - 0.0044)	
Diameter “d1”*1	Intake	29.2 (1.150)	
	Exhaust	23.3 (0.917)	
Diameter “d2”*2	Intake	30.5 - 31.0 (1.201 - 1.220)	
	Exhaust	24.9 - 25.4 (0.980 - 1.0)	
Angle “α1”	Intake	70°	
	Exhaust	45°	
Angle “α2”		88°45′ - 90°15′	
Angle “α3”		120°	
Contacting width “W”*3	Intake	1.0 - 1.4 (0.039 - 0.055)	
	Exhaust	1.2 - 1.6 (0.047 - 0.063)	
Height “h”	Intake	5.9 - 6.0 (0.232 - 0.236)	5.09 - 5.10 (0.2004 - 0.2008)
	Exhaust		
Depth “H”	Intake	6.01 (0.2366)	
	Exhaust	6.07 (0.2390)	

\*1: Diameter made by intersection point of conic angles "alpha1" and "alpha2"

\*2: Diameter made by intersection point of conic angles "alpha2" and "alpha3"

\*3: Machining data

## VALVE SPRING



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

	Standard	
	Intake	Exhaust
Free height	49.4 - 49.6 mm (1.945 - 1.953 in)	54.5 - 54.7 mm (2.146 - 2.154 in)
Installation height	37.46 mm (1.4748 in)	37.46 mm (1.4748 in)
Installation load	153 - 173N (15.6 - 17.6 kg, 34.3 - 38.9 lb)	259 - 287N (26.4 - 29.3 kg, 58.2 - 64.5 lb)
Height during valve open	27.86 mm (1.0968 in)	29.03 mm (1.1429 in)
Load when valve open	346 - 390N (35.3 - 39.8 kg, 77.8 - 87.7 lb)	452 - 500N (46.1 - 51.0 kg, 101.6 - 112.4 lb)
Identification color	White	Yellowish green

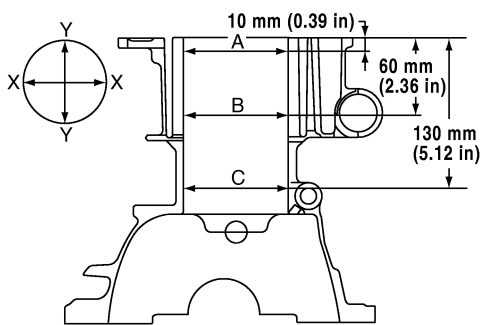
Valve spring squareness	Limit	1.0 (0.039)
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## Cylinder Block

INFOID:0000000012197455

## CYLINDER BLOCK

Unit: mm (in)



PBIC4017E

Cylinder block top surface distortion	Limit		0.1 (0.004)
Cylinder bore inner diameter	Standard	Grade No. 1	79.700 - 79.710 (3.1378 - 3.1382)
		Grade No. 2	79.710 - 79.720 (3.1382 - 3.1386)
Out-of-round	Limit		0.015 (0.0006)
Taper			0.010 (0.0004)

# SERVICE DATA AND SPECIFICATIONS (SDS)

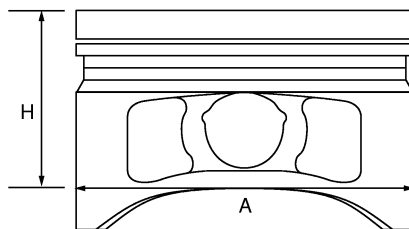
< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

Main bearing housing inner diameter grade	Grade No. A	55.997 - 55.998 (2.2046 - 2.2046)
	Grade No. B	55.998 - 55.999 (2.2046 - 2.2047)
	Grade No. C	55.999 - 56.000 (2.2047 - 2.2047)
	Grade No. D	56.000 - 56.001 (2.2047 - 2.2048)
	Grade No. E	56.001 - 56.002 (2.2048 - 2.2048)
	Grade No. F	56.002 - 56.003 (2.2048 - 2.2048)
	Grade No. G	56.003 - 56.004 (2.2048 - 2.2049)
	Grade No. H	56.004 - 56.005 (2.2049 - 2.2049)
	Grade No. J	56.005 - 56.006 (2.2049 - 2.2050)
	Grade No. K	56.006 - 56.007 (2.2050 - 2.2050)
	Grade No. L	56.007 - 56.008 (2.2050 - 2.2050)
	Grade No. M	56.008 - 56.009 (2.2050 - 2.2051)
	Grade No. N	56.009 - 56.010 (2.2051 - 2.2051)
	Grade No. P	56.010 - 56.011 (2.2051 - 2.2052)
	Grade No. R	56.011 - 56.012 (2.2052 - 2.2052)
	Grade No. S	56.012 - 56.013 (2.2052 - 2.2052)
	Grade No. T	56.013 - 56.014 (2.2052 - 2.2053)
	Grade No. U	56.014 - 56.015 (2.2053 - 2.2053)
	Grade No. V	56.015 - 56.016 (2.2053 - 2.2053)
	Grade No. W	56.016 - 56.017 (2.2053 - 2.2054)

## AVAILABLE PISTON

Unit: mm (in)



PBIC0188E

Piston skirt diameter “A”	Standard	Grade No. 1	79.670 - 79.680 (3.1366 - 3.1370)
		Grade No. 2	79.680 - 79.690 (3.1370 - 3.1374)
Measure point “H”			43.4 (1.7087)
Piston pin hole diameter			21.995 - 21.999 (0.8659 - 0.8661)
Piston to cylinder bore clearance	Standard		0.020 - 0.040 (0.0008 - 0.0016)
	Limit		0.08 (0.0032)

## PISTON RING

Unit: mm (in)

Items		Standard	Limit
Piston ring side clearance	Top	0.04 - 0.08 (0.0016 - 0.0031)	0.11 (0.0043)
	2nd	0.03 - 0.07 (0.0012 - 0.0028)	0.10 (0.0039)
	Oil ring	0.055 - 0.155 (0.0022 - 0.0061)	—

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

Piston ring end gap	Top	0.21 - 0.26 (0.0083 - 0.0102)	0.45 (0.0177)
	2nd	0.29 - 0.39 (0.0114 - 0.0154)	0.55 (0.0217)
	Oil (rail ring)	0.17 - 0.47(0.0067 - 0.0185)	0.78 (0.0307)

## PISTON PIN

Unit: mm (in)

Items	Standard	Limit
Piston pin outer diameter	21.989 - 21.993 (0.8657 - 0.8659)	—
Piston to piston pin oil clearance	0.002 - 0.010 (0.0001 - 0.0004)	—

## CONNECTING ROD

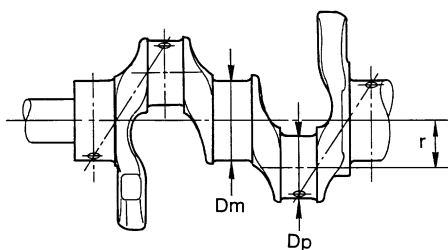
Unit: mm (in)

Center distance		138.97 - 139.07 (5.47 - 5.48)
Bend [per 100 (3.94)]	Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	Limit	0.30 (0.0118)
Connecting rod bushing inner diameter*	Standard	22.000 - 22.012 (0.8661 - 0.8666)
Connecting rod bushing oil clearance	Standard	0.005 - 0.023 (0.0002 - 0.0009)
	Limit	0.03 (0.0012)
Connecting rod side clearance	Standard	0.20 - 0.35 (0.0079 - 0.0138)
	Limit	0.4 (0.016)
Connecting rod big end diameter grade	Grade No. A	47.000 - 47.001 (1.8504 - 1.8504)
	Grade No. B	47.001 - 47.002 (1.8504 - 1.8505)
	Grade No. C	47.002 - 47.003 (1.8505 - 1.8505)
	Grade No. D	47.003 - 47.004 (1.8505 - 1.8505)
	Grade No. E	47.004 - 47.005 (1.8505 - 1.8506)
	Grade No. F	47.005 - 47.006 (1.8506 - 1.8506)
	Grade No. G	47.006 - 47.007 (1.8506 - 1.8507)
	Grade No. H	47.007 - 47.008 (1.8507 - 1.8507)
	Grade No. J	47.008 - 47.009 (1.8507 - 1.8507)
	Grade No. K	47.009 - 47.010 (1.8507 - 1.8508)
	Grade No. L	47.010 - 47.011 (1.8508 - 1.8508)
	Grade No. M	47.011 - 47.012 (1.8508 - 1.8509)
	Grade No. N	47.012 - 47.013 (1.8509 - 1.8509)

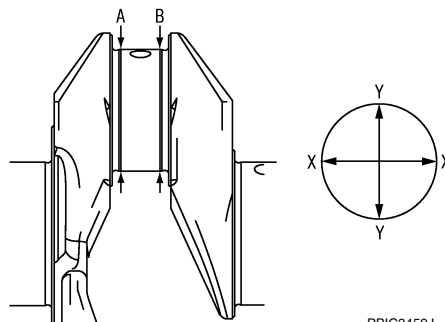
\*: After installing in connecting rod

## CRANKSHAFT

Unit: mm (in)



SEM645



PBIC3459J

Center distance "r"	40.41 - 40.49 (1.5909 - 1.5941)
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# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

Out-of-round	Limit	0.0035 (0.0001)
Taper	Limit	
Runout [TIR*]	Standard	0.05 (0.0020)
	Limit	0.10 (0.0039)
Crankshaft end play	Standard	0.10 - 0.26 (0.0039 - 0.0102)
	Limit	0.30 (0.0118)
Crankshaft pin journal diameter "Dp" grade.	Grade No. A	43.970 - 43.971 (1.7311 - 1.7311)
	Grade No. B	43.969 - 43.970 (1.7311 - 1.7311)
	Grade No. C	43.968 - 43.969 (1.7310 - 1.7311)
	Grade No. D	43.967 - 43.968 (1.7310 - 1.7310)
	Grade No. E	43.966 - 43.967 (1.7309 - 1.7310)
	Grade No. F	43.965 - 43.966 (1.7309 - 1.7309)
	Grade No. G	43.964 - 43.965 (1.7309 - 1.7309)
	Grade No. H	43.963 - 43.964 (1.7308 - 1.7309)
	Grade No. J	43.962 - 43.963 (1.7308 - 1.7308)
	Grade No. K	43.961 - 43.962 (1.7307 - 1.7308)
	Grade No. L	43.960 - 43.961 (1.7307 - 1.7307)
	Grade No. M	43.959 - 43.960 (1.7307 - 1.7307)
	Grade No. N	43.958 - 43.959 (1.7306 - 1.7307)
	Grade No. P	43.957 - 43.958 (1.7306 - 1.7306)
	Grade No. R	43.956 - 43.957 (1.7305 - 1.7306)
	Grade No. S	43.955 - 43.956 (1.7305 - 1.7305)
	Grade No. T	43.954 - 43.955 (1.7305 - 1.7305)
	Grade No. U	43.953 - 43.954 (1.7304 - 1.7305)
Crankshaft main journal diameter "Dm" grade.	Grade No. A	51.978 - 51.979 (2.0464 - 2.0464)
	Grade No. B	51.977 - 51.978 (2.0463 - 2.0464)
	Grade No. C	51.976 - 51.977 (2.0463 - 2.0463)
	Grade No. D	51.975 - 51.976 (2.0463 - 2.0463)
	Grade No. E	51.974 - 51.975 (2.0462 - 2.0463)
	Grade No. F	51.973 - 51.974 (2.0462 - 2.0462)
	Grade No. G	51.972 - 51.973 (2.0461 - 2.0462)
	Grade No. H	51.971 - 51.972 (2.0461 - 2.0461)
	Grade No. J	51.970 - 51.971 (2.0461 - 2.0461)
	Grade No. K	51.969 - 51.970 (2.0460 - 2.0461)
	Grade No. L	51.968 - 51.969 (2.0460 - 2.0460)
	Grade No. M	51.967 - 51.968 (2.0459 - 2.0460)
	Grade No. N	51.966 - 51.967 (2.0459 - 2.0459)
	Grade No. P	51.965 - 51.966 (2.0459 - 2.0459)
	Grade No. R	51.964 - 51.965 (2.0458 - 2.0459)
	Grade No. S	51.963 - 51.964 (2.0458 - 2.0458)
	Grade No. T	51.962 - 51.963 (2.0457 - 2.0458)
	Grade No. U	51.961 - 51.962 (2.0457 - 2.0457)
	Grade No. V	51.960 - 51.961 (2.0457 - 2.0457)
	Grade No. W	51.959 - 51.960 (2.0456 - 2.0457)

\*: Total indicator reading

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

## Connecting Rod Bearing

INFOID:0000000012197456

### CONNECTING ROD BEARING GRADE TABLE

Unit: mm (in)

Grade number		Thickness	Identification color	Remarks
0	UPR	1.494 - 1.497 (0.0588 - 0.0589)	Black-Black	Grade and color are the same for upper and lower bearings.
	LWR	1.494 - 1.497 (0.0588 - 0.0589)	Black-Black	
1	UPR	1.497 - 1.500 (0.0589 - 0.0591)	Brown-Brown	
	LWR	1.497 - 1.500 (0.0589 - 0.0591)	Brown-Brown	
2	UPR	1.500 - 1.503 (0.0591 - 0.0592)	Green-Green	
	LWR	1.500 - 1.503 (0.0591 - 0.0592)	Green-Green	
3	UPR	1.503 - 1.506 (0.0592 - 0.0593)	Yellow-Yellow	Grade and color are different between upper and lower bearings.
	LWR	1.503 - 1.506 (0.0592 - 0.0593)	Yellow-Yellow	
4	UPR	1.506 - 1.509 (0.0593 - 0.0594)	Blue-Blue	
	LWR	1.506 - 1.509 (0.0593 - 0.0594)	Blue-Blue	
01	UPR	1.494 - 1.497 (0.0588 - 0.0589)	Black-Black	
	LWR	1.497 - 1.500 (0.0589 - 0.0591)	Brown-Brown	
12	UPR	1.497 - 1.500 (0.0589 - 0.0591)	Brown-Brown	Grade and color are different between upper and lower bearings.
	LWR	1.500 - 1.503 (0.0591 - 0.0592)	Green-Green	
23	UPR	1.500 - 1.503 (0.0591 - 0.0592)	Green-Green	
	LWR	1.503 - 1.506 (0.0592 - 0.0593)	Yellow-Yellow	
34	UPR	1.503 - 1.506 (0.0592 - 0.0593)	Yellow-Yellow	
	LWR	1.506 - 1.509 (0.0593 - 0.0594)	Blue-Blue	

### UNDERSIZE TABLE

Unit: mm (in)

Items	Thickness	Crank pin journal diameter
US 0.25 (0.0098)	1.623 - 1.631 (0.0639 - 0.0642)	Grind so that bearing clearance is the specified value.

### CONNECTING ROD BEARING OIL CLEARANCE

Unit: mm (in)

Connecting rod bearing oil clearance	Standard	0.037 - 0.047 (0.0015 - 0.0019)
	Limit	0.07 (0.0028)

## Main Bearing

INFOID:0000000012197457

### MAIN BEARING GRADE TABLE (ALL JOURNALS)

Unit: mm (in)

Grade number	Thickness	Identification color	Remarks
0	1.996 - 1.999 (0.0786 - 0.0787)	Black - Black	Grade and color are the same for upper and lower bearings.
1	1.999 - 2.002 (0.0787 - 0.0788)	Brown - Brown	
2	2.002 - 2.005 (0.0788 - 0.0789)	Green - Green	
3	2.005 - 2.008 (0.0789 - 0.0791)	Yellow - Yellow	
4	2.008 - 2.011 (0.0791 - 0.0792)	Blue - Blue	
5	2.011 - 2.014 (0.0792 - 0.0793)	Pink - Pink	
6	2.014 - 2.017 (0.0793 - 0.0794)	Purple - Purple	
7	2.017 - 2.020 (0.0794 - 0.0795)	White - White	

## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR EXCEPT FOR NISMO RS MODELS]

01	UPR	1.996 - 1.999 (0.0786 - 0.0787)	Black - Black	Grade and color are different between upper and lower bearings.
	LWR	1.999 - 2.002 (0.0787 - 0.0788)	Brown - Brown	
12	UPR	1.999 - 2.002 (0.0787 - 0.0788)	Brown - Brown	
	LWR	2.002 - 2.005 (0.0788 - 0.0789)	Green - Green	
23	UPR	2.002 - 2.005 (0.0788 - 0.0789)	Green - Green	
	LWR	2.005 - 2.008 (0.0789 - 0.0791)	Yellow - Yellow	
34	UPR	2.005 - 2.008 (0.0789 - 0.0791)	Yellow - Yellow	
	LWR	2.008 - 2.011 (0.0791 - 0.0792)	Blue - Blue	
45	UPR	2.008 - 2.011 (0.0791 - 0.0792)	Blue - Blue	
	LWR	2.011 - 2.014 (0.0792 - 0.0793)	Pink - Pink	
56	UPR	2.011 - 2.014 (0.0792 - 0.0793)	Pink - Pink	
	LWR	2.014 - 2.017 (0.0793 - 0.0794)	Purple - Purple	
67	UPR	2.014 - 2.017 (0.0793 - 0.0794)	Purple - Purple	
	LWR	2.017 - 2.020 (0.0794 - 0.0795)	White - White	

### UNDERSIZE TABLE

Unit: mm (in)

Items	Thickness	Main journal diameter
US 0.25 (0.0098)	2.126 - 2.134 (0.0837 - 0.0840)	Grind so that bearing clearance is the specified value.

### MAIN BEARING OIL CLEARANCE

Unit: mm (in)

Main bearing oil clearance	Standard	No. 1 and 4	0.024 - 0.034 (0.0009 - 0.0013)
		No. 2, 3 and 5	0.012 - 0.022 (0.0005 - 0.0009)
	Limit		0.065 (0.0026)