

SECTION **EM**

**MODIFICATION NOTICE:**

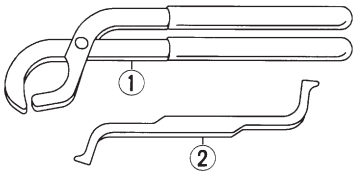
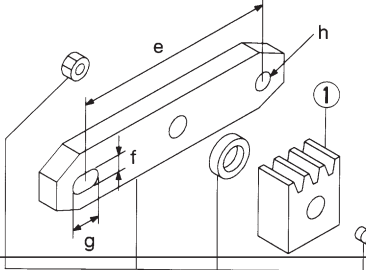
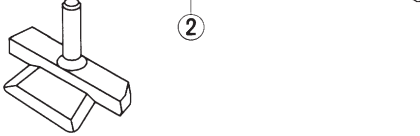
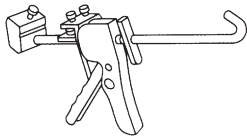
- Valve lifter of ZD30DDTi engine has been changed from a type without shim to a type with adjusting shim.

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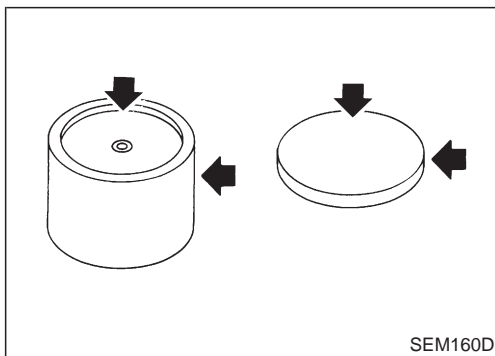
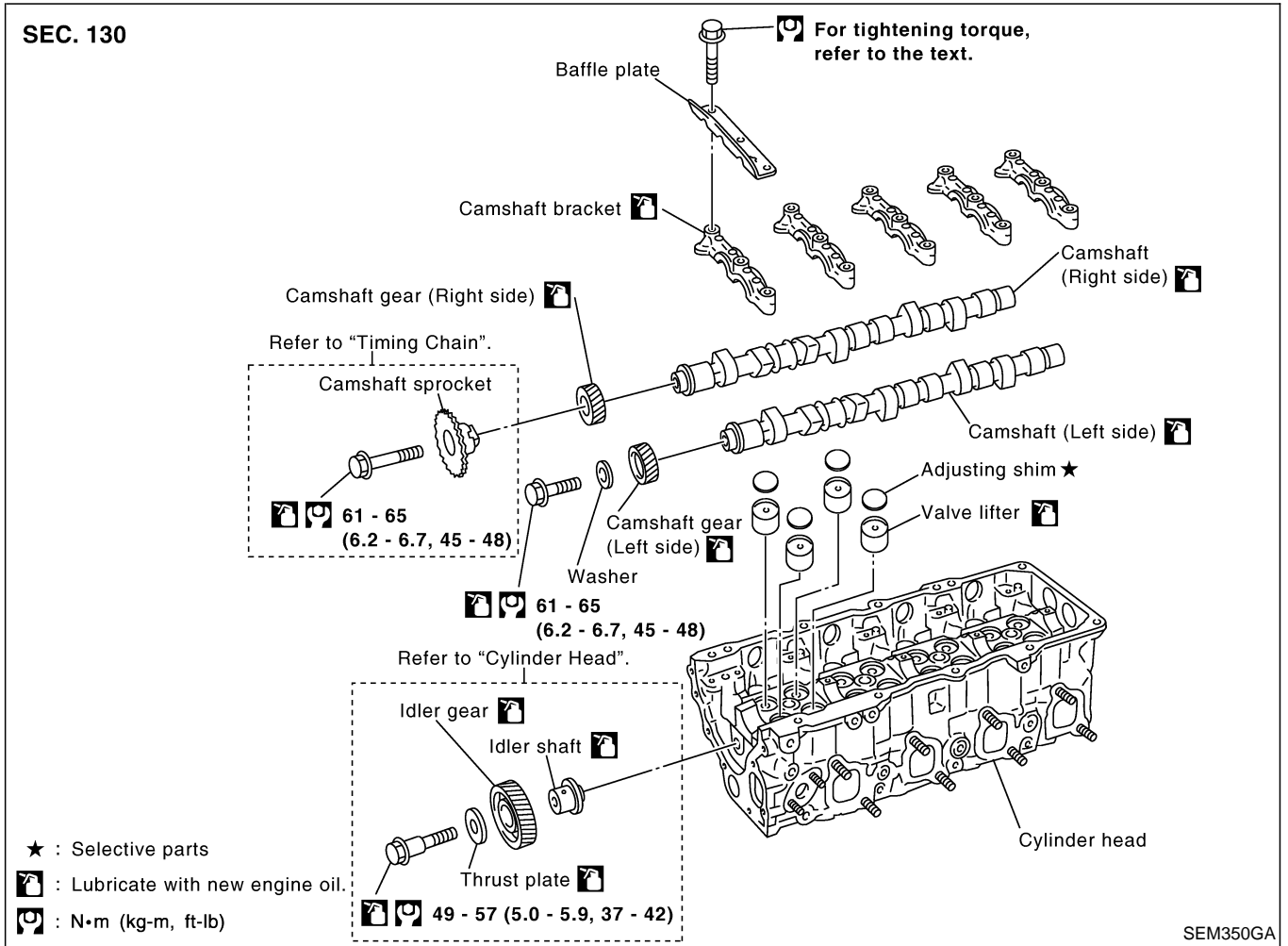
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# PREPARATION

## Special Service Tools

Tool number Tool name	Description
KV101151S0 Lifter stopper set ① KV10115110 Camshaft pliers ② KV10115120 Lifter stopper	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Changing adjusting shims</p> </div> </div> <p style="text-align: center;">NT041</p>
KV101056S0 Ring gear stopper ① KV10105630 Adapter ② KV10105610 Plate	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Preventing crankshaft from rotating</p> <p> <b>a: 3 (0.12)</b>  <b>b: 6.4 (0.252)</b>  <b>c: 2.8 (0.110)</b>  <b>d: 6.6 (0.260)</b>  <b>e: 107 (4.21)</b>  <b>f: 14 (0.55)</b>  <b>g: 20 (0.79)</b>  <b>h: 14 (0.55) dia.</b>            Unit: mm (in)         </p> </div> </div> <p style="text-align: center;">NT617</p>
KV10111100 Seal cutter	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Removing gear case</p> </div> </div> <p style="text-align: center;">NT046</p>
WS39930000 Tube presser	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Pressing the tube of liquid gasket</p> </div> </div> <p style="text-align: center;">NT052</p>

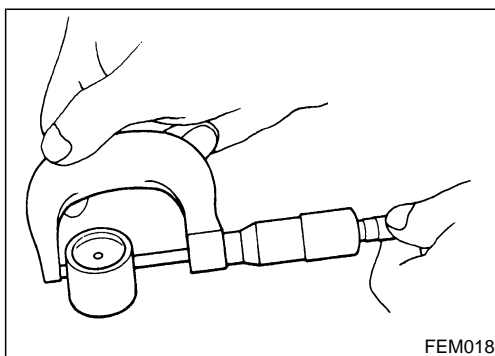
## Removal and Installation



### Inspection

#### VISUAL INSPECTION OF VALVE LIFTER AND ADJUSTING SHIM

- Check if surfaces of valve lifter and adjusting shim have any wear or cracks.
- Replace valve lifter or adjusting shim if necessary.
- Select the thickness of adjusting shim so that valve clearance is the standard when replacing. Refer to EM-4005, "Adjustments".



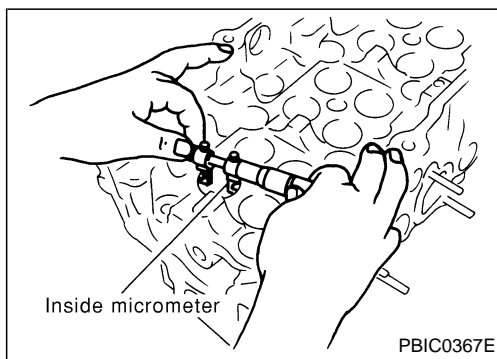
#### VALVE LIFTER OUTER DIAMETER

Measure the outer diameter of the valve lifter with a micrometer.  
**Standard: 34.450 - 34.465 mm (1.3563 - 1.3569 in)**

**Inspection (Cont'd)****LIFTER GUIDE INNER DIAMETER**

Measure the lifter guide inner diameter of the cylinder head with an inside micrometer.

**Standard: 34.495 - 34.515 mm (1.3581 - 1.3589 in)**

**VALVE LIFTER CLEARANCE CALCULATIONS**

Clearance = Lifter guide inner diameter – Valve lifter outer diameter

**Standard: 0.030 - 0.065 mm (0.0012 - 0.0026 in)**

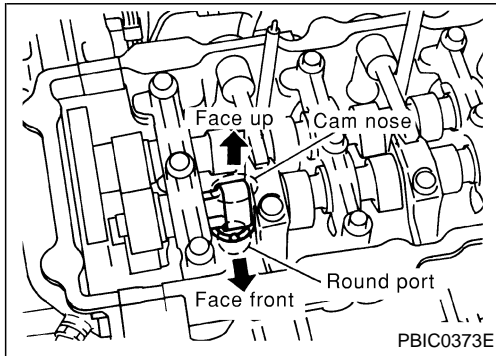
If it exceeds the standard value, refer to the outer diameter and inner diameter standard values and replace valve lifter and/or cylinder head.

## Adjustments

### NOTE:

**Adjust valve clearance while engine is cold.**

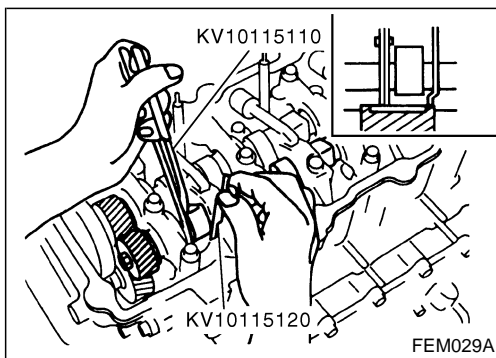
- Remove the adjusting shim for parts which are outside the specified valve clearance.
1. Remove the spill tube. Refer to "BASIC SERVICE PROCEDURE" in EC section.



2. Rotate the crankshaft to face the cam nose for adjusting shims that are to be removed upward.
3. Thoroughly wipe off engine oil on the upper side of the cylinder head (for the air gun used in step 7).
4. Move the round hole of the adjusting shim to the front with an extra-fine screwdriver or like that.

### CAUTION:

**Perform (the above procedure) while camshaft do not contact with adjusting shim.**



5. Grip the camshaft with camshaft pliers (SST), then using the camshaft as a support point, push the adjusting shim downward to compress the valve spring.

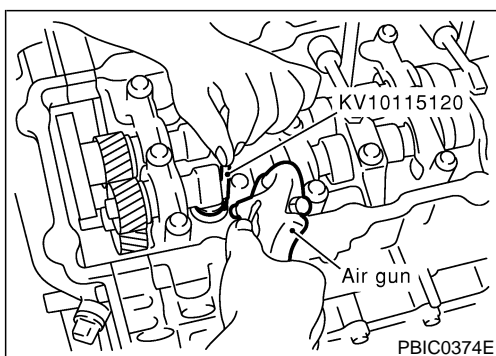
### CAUTION:

**Do not damage the camshaft, cylinder head, and the outer circumference of the valve lifter.**

6. With the valve spring in a compressed state, remove the camshaft pliers (SST) by securely setting the outer circumference of the valve lifter with the end of the lifter stopper (SST).
  - Hold the lifter stopper by hand until the shim is removed.

### CAUTION:

**Do not retrieve the camshaft pliers forcefully, as the camshaft will be damaged.**

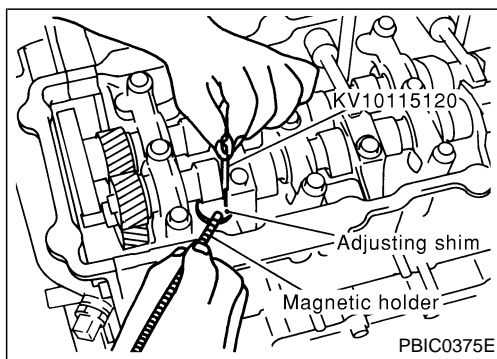


7. Remove the adjusting shim from the valve lifter by blowing air through the round hole of the adjusting shim with an air gun.

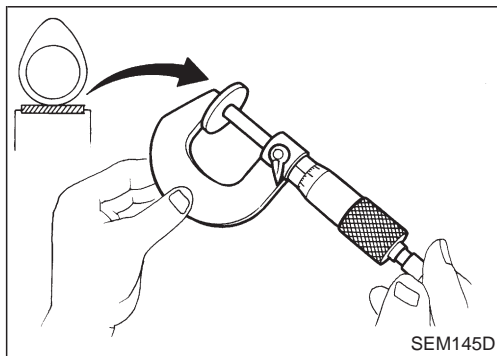
### CAUTION:

- **When blowing, use goggles to protect your eye.**
- **To prevent any remaining oil from being blown around, thoroughly wipe the area clean.**

## Adjustments (Cont'd)



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8. Remove the adjusting shim by using a magnetic holder.

9. Measure the thickness of the adjusting shim using a micrometer.

- Measure near the center of the shim (the part that touches the camshaft).

10. Select the new adjusting shim from the following methods.

**Calculation method of the adjusting shim thickness:**

$$t = t_1 + (C_1 - C_2)$$

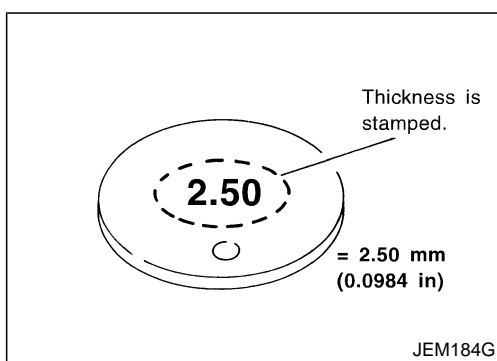
**t** = Thickness of replacement adjusting shim

**t<sub>1</sub>** = Thickness of removed adjusting shim

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

**C<sub>2</sub>** = Specified valve clearance

When engine is cold [Approximately 20°C (68°F)]  
0.35 mm (0.014 in)



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- New adjusting shims have the thickness stamped on the rear side.

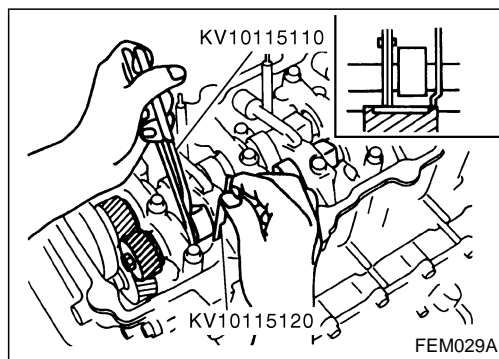
Stamped	Shim thickness	mm (in)
2.35	2.35	(0.0925)
2.40	2.40	(0.0945)
.	.	.
.	.	.
.	.	.
3.05	3.05	(0.1201)

- The thickness of the adjusting shim ranges from 2.35 to 3.05 mm (0.0925 to 0.1201 in), where in the space of 0.05 mm (0.0020 in). There are 15 types of shims available.

11. Fit the selected adjusting shim to the valve lifter.

**CAUTION:**

Place the stamped side of the adjusting shim to the valve lifter.

**Adjustments (Cont'd)**

12. Compress the valve spring using the camshaft pliers (SST) and remove the lifter stopper (SST).

13. Rotate the crankshaft 2 to 3 times by hand.

14. Confirm that the valve clearance is within the specification.

**Valve clearance:**

**When engine is cold [Approximately 20°C (68°F)]**

**Intake and exhaust**

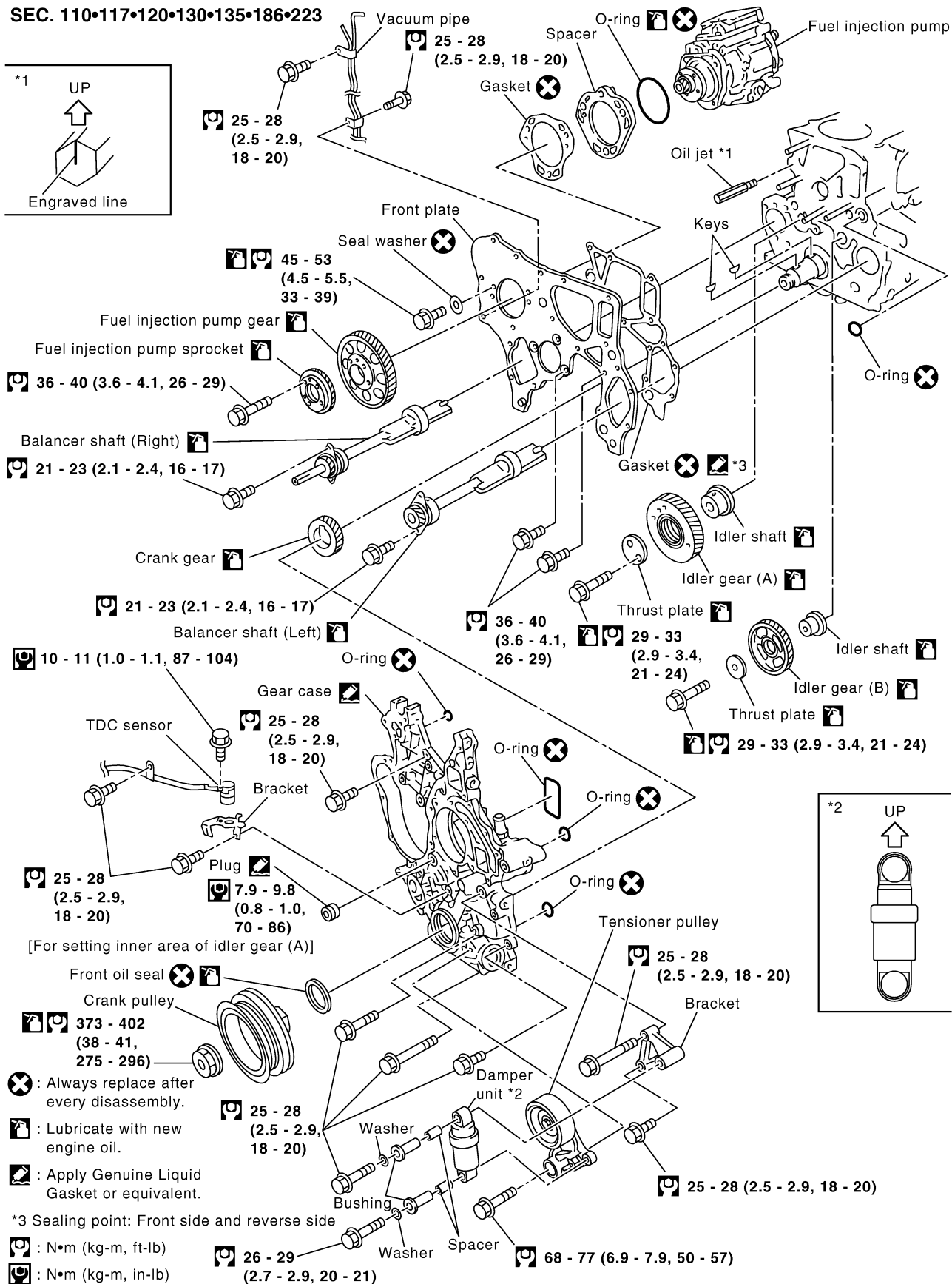
**0.30 - 0.40 mm (0.012 - 0.016 in)**

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

## Removal and Installation

2 idler gears are shown in this chapter. Idler gear (A) has scissor gear, and idler gear (B) does not.

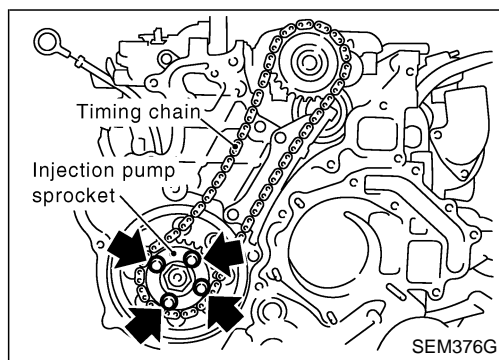
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## Removal

1. Remove the following parts.
  - Undercover
  - Engine oil (Drain)
  - Engine coolant (Drain)
  - Engine cover
  - Intercooler
  - Air inlet pipe
  - Air cleaner case
  - Throttle body
  - Swirl and intake air control valve control solenoid valve and bracket
  - Vacuum tank
  - Glow plate
  - Rocker cover
  - Spill tube
  - Radiator shrouds (Rear and Lower)
  - Cooling fan
  - Radiator hose (Upper and Lower)
  - Auxiliary belt and auto tensioner.
2. Remove the alternator.
3. Remove the A/C compressor and bracket with piping connected. Move and support it at the LH side of engine bay with a rope to avoid putting load on piping.  
Refer to HA section in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3).



4. Remove the chain cover, timing chain and other parts in connection.  
Before removing timing chain, remove injection pump sprocket with No. 1 cylinder being positioned at TDC. Refer to the figure. Refer to "TIMING CHAIN", EM-37 in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3).

### CAUTION:

**After removing timing chain, never rotate crankshaft, or the piston will push the valve up and damage the valve.**

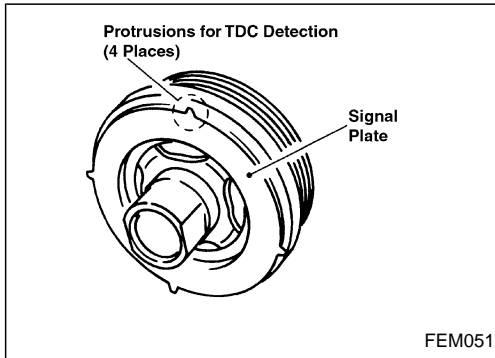
- Do not paint the match mark on the timing chain beforehand as the No. 1 cylinder is set at the TDC during assembly.
5. Remove the TDC sensor.
 

### CAUTION:

    - Do not drop or hit the sensor.
    - Store in a clean place free of iron filings, etc.
    - Do not place near any magnetic equipment.
  6. Remove the water pump and its stud bolts.  
Refer to "WATER PUMP" in LC section in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3).
  7. Remove the water inlet.

## TIMING GEAR

### Removal (Cont'd)

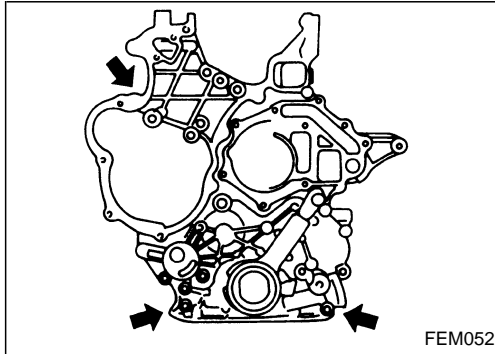


8. Remove the crankshaft pulley.

- To fix the crankshaft, remove the starter motor, and set ring gear stopper (SST).

#### CAUTION:

- Do not damage or magnetize the signal detection protrusions of the crankshaft pulley.
- After removing timing chain, never rotate crankshaft, or the piston will push the valve up and damage the valve.

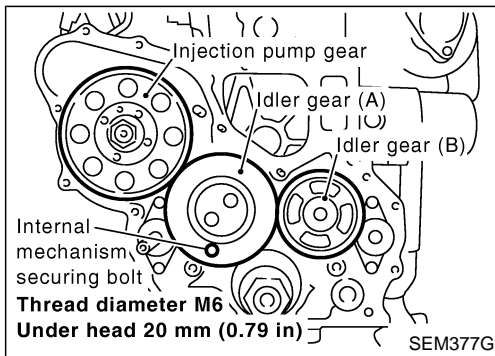


9. Remove the gear case.

- Using the grooved places shown in the figure, remove the gear case by using a screwdriver and a seal cutter (SST).
10. Remove the front oil seal from the gear case by using a screwdriver.

#### CAUTION:

Do not damage the gear case.

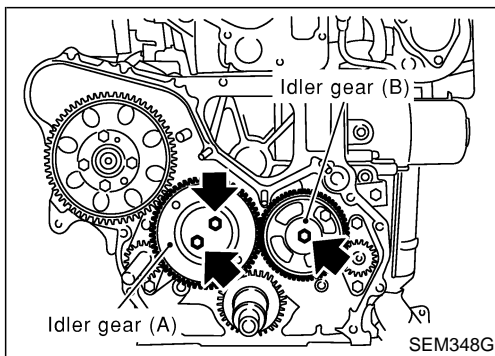


11. Fix the internal mechanism setting bolt [part No.: 81-20620-28, screw dia.: M6, dimension below neck: 20 mm (0.79 in)] to the bolt hole of the idler gear (A) and tighten to the specification.

: 2.5 - 3.4 N·m (0.25 - 0.35 kg·m, 22 - 30 in·lb)

#### CAUTION:

- Only use the genuine setting bolt, or the idler gear (A) will be damaged.
- Do not rotate the crankshaft as the head of the setting bolts interferes with the gear case.
- Do not remove the setting bolt from the idler gear (A) until the timing chain and all of the parts in connection have been installed.
- If these bolts are not installed, internal mechanism will disengage after the idler gear is removed. This will prohibit the idler gear from being reusable.

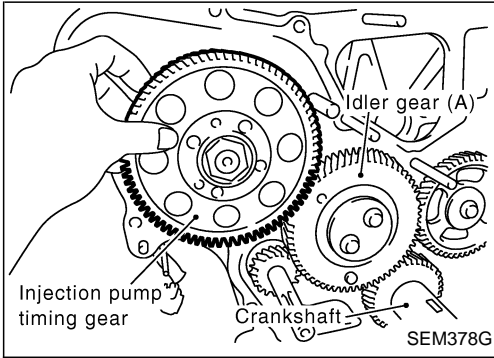


12. Remove the idler gears (A) and (B).

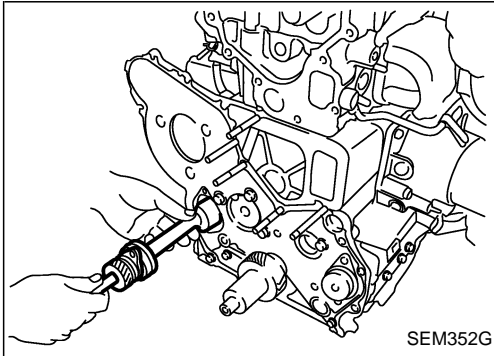
- Check the backlash of each gear before removing. Refer to EM-52, "BACKLASH OF EACH GEAR", "Inspection" in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3).

#### CAUTION:

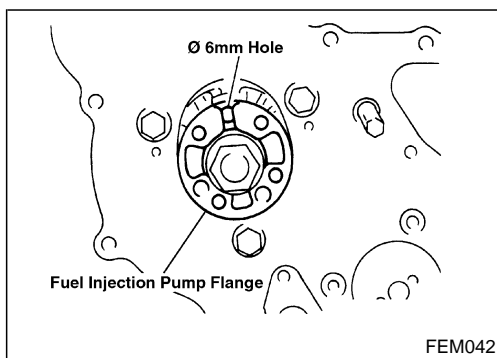
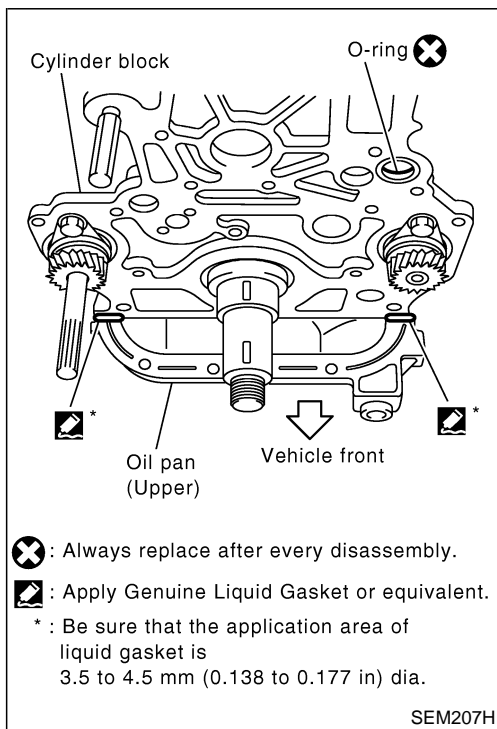
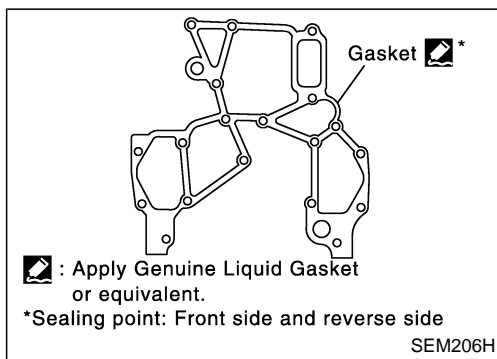
- Do not loosen the internal mechanism setting bolt of the idler gear (A). (The idler gear cannot be reused when the internal mechanism is released.)
- During removal of the idler gears (A) and (B), do not face the rear side downward as the idler shaft will drop.

**TIMING GEAR****Removal (Cont'd)**

13. Set the fuel injection timing gear with the pulley holder (SST).
14. Remove injection pump timing gear.



15. Extract the balancer shaft taking care not to damage the inner bushes of the cylinder block.
16. Remove the fuel injection pump.
17. Remove the front plate.



## Installation

1. Install the front plate.
  - 1) Install the O-ring and gasket to the cylinder block.
    - Apply liquid gasket uniformly and thinly to the front and reverse sides of gasket.

### Use Genuine Liquid Gasket or equivalent.

- 2) Install the front plate.
  - Before installing, apply liquid gasket to the mating surfaces of the cylinder block and the oil pan (upper).

### Use Genuine Liquid Gasket or equivalent.

- Lightly tap with a hammer if the dowel pin cannot be inserted easily.

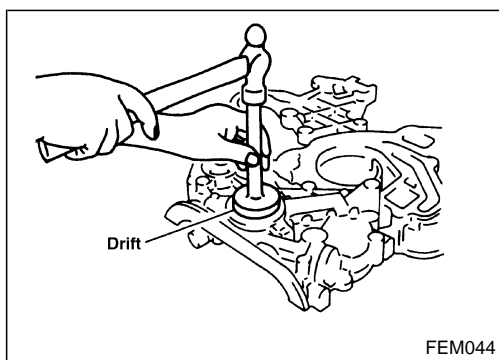
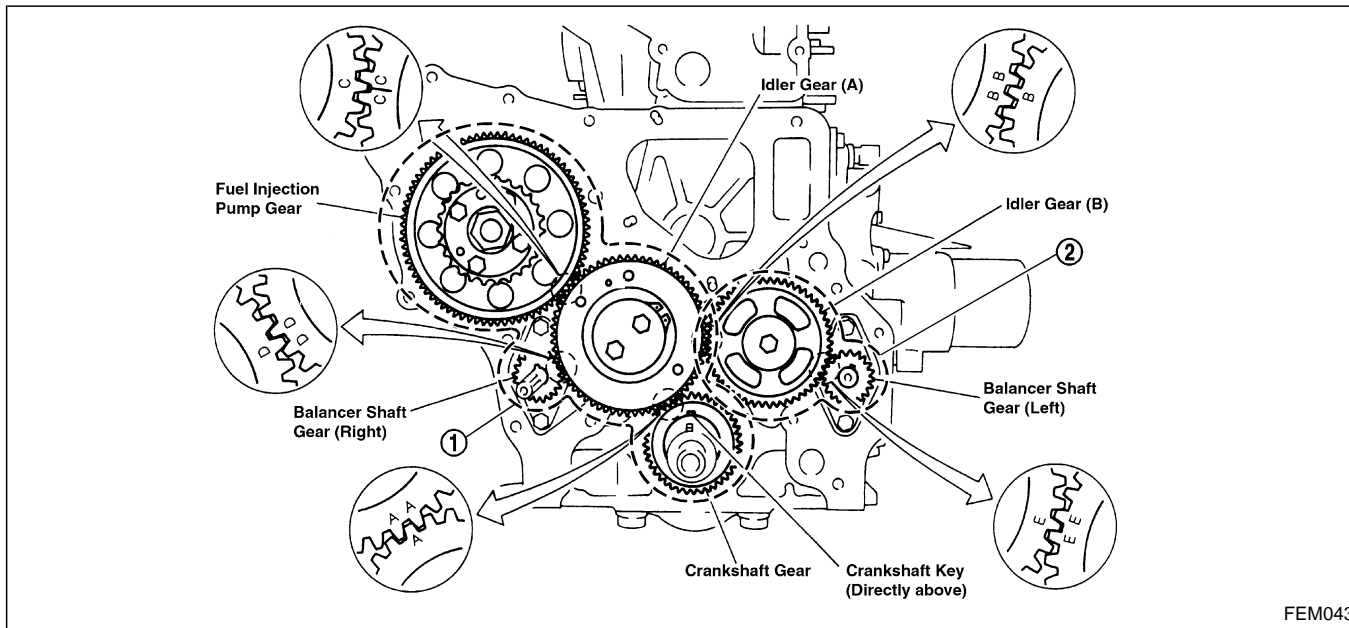
### CAUTION:

**Make sure that the O-ring does not pop out.**

2. Install the fuel injection pump.
  - After installing the front plate, align the 6 mm (0.24 in) dia. hole of the pump flange and the 6 mm (0.24 in) dia. hole position of the pump body.
3. Install each timing gear.
  - Align the match marks of the timing gears by referring to the figure below.
  - When installing timing gear, follow the order (① , ② ) shown in the dotted box in the figure below to facilitate installation.

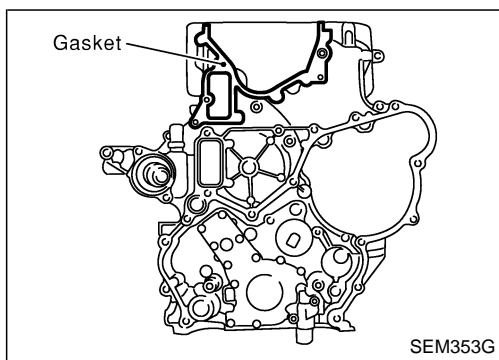
# TIMING GEAR Installation (Cont'd)

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4. Install the front oil seal to the gear case.
  - Apply engine oil to the fitting side.
  - Evenly insert the front oil seal using a drift [outer dia.: approx. 64 mm (2.52 in)] completely.

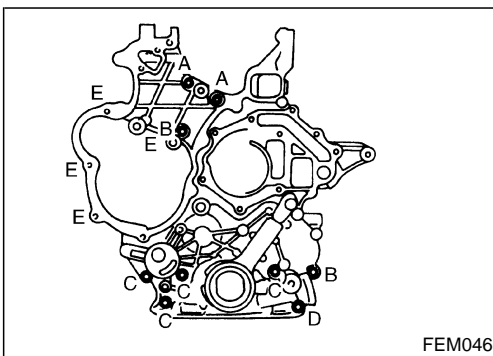
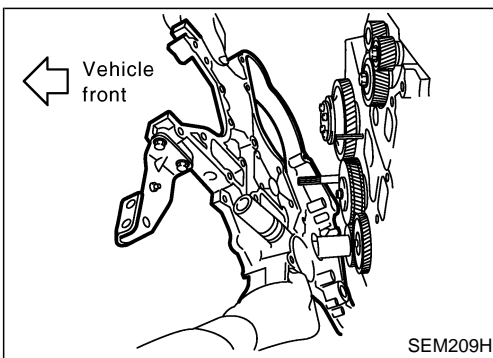
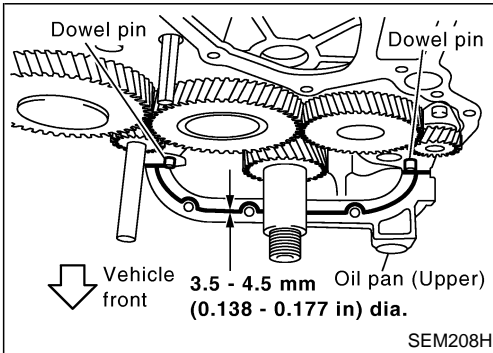
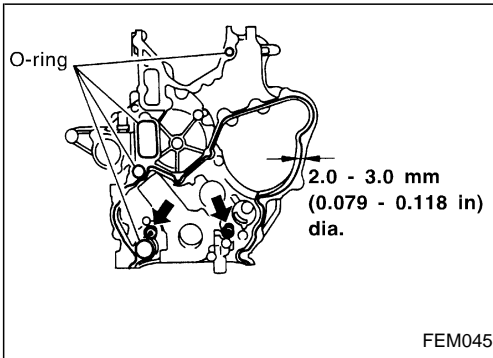
**CAUTION:**  
Make sure the oil seal does not spill off the end side of the gear case.



5. Install the gear case.
  - 1) Before installing gear case, remove all traces of liquid gasket from mating surface using a scraper.
  - 2) Align gasket with dowel and install.

## TIMING GEAR

### Installation (Cont'd)



- 3) Install the O-rings to the gear case.
  - The O-ring at the top position shown in the figure can be installed in during cylinder head installation.
- 4) Apply a continuous bead of liquid gasket to the gear case and the oil pan (upper).
  - **Use Genuine Liquid Gasket or equivalent.**

#### CAUTION:

Apply the liquid gasket around the bolt holes shown by the arrows in the figure.

- a. Coat of liquid gasket should be maintained within the specified range as shown in the figure.
- b. Attach gear case to cylinder block within 5 minutes after coating.
- c. Wait at least 30 minutes before refilling engine oil or starting engine.

- 5) Install the gear case.
  - Insert the gear case diagonally to prevent it from dragging over the liquid gasket applied on the timing gear case and the oil pan (upper).
  - Align the dowel pin at the lower position of cylinder block with the hole on the gear case side.
  - Tap the area around the dowel pin with a plastic hammer if it cannot be inserted easily.

#### CAUTION:

**Do not pop out the O-rings.**

- 6) Install the holding bolt referring to the figure.

#### Dimension below neck:

- A: 25 mm (0.98 in)
- B: 30 mm (1.18 in)
- C: 50 mm (1.97 in)
- D: 80 mm (3.15 in)
- E: 20 mm (0.79 in)

- 7) Install the holding bolts from the rear side of the front plate.

6. Install the crankshaft pulley.
  - Insert by aligning the 2 sides of the oil pump with the 2 sides of the shaft on the rear side of the crankshaft pulley.

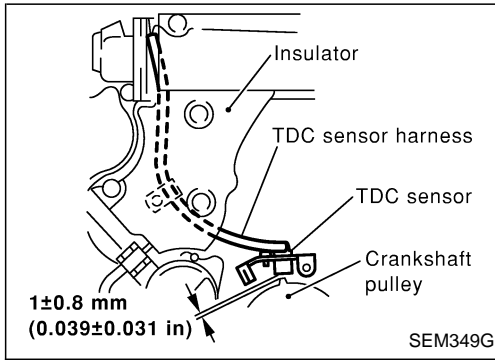
#### CAUTION:

**Do not damage the oil seal lip when inserting.**

- Refer to EM-51, "Removal" in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3) for the crankshaft setting procedures when tightening the holding nut.
7. Install the water pump.
    - Install it before installing the TDC sensor. Refer to "Water Pump" in LC section.

## TIMING GEAR

### Installation (Cont'd)



8. Install the TDC sensor.
  - Align the bracket knock pin with the hole on the gear case side and tighten the holding bolt.
  - Confirm that the clearance between the end of the sensor and the signal detection protrusion of the crankshaft pulley is within the specification.

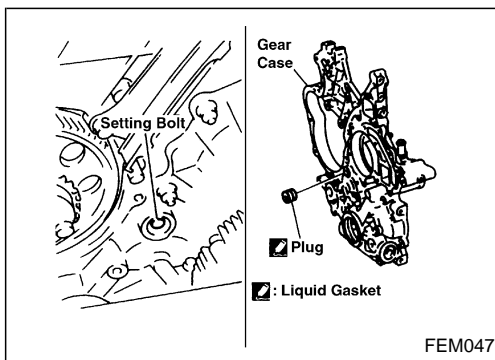
**Standard:  $1 \pm 0.8$  mm ( $0.039 \pm 0.031$  in)**

- Arrange the TDC sensor harness to the position shown in the figure.

#### CAUTION:

**Confirm that the harness has no deflection around the crankshaft pulley when installing the clamp.**

9. Install the timing chain, other parts in connection with the timing chain, and the chain cover. Refer to EM-37, "TIMING CHAIN" in NISSAN Service Manual (Publication No. SM9E-Y61CG2 or SM9E-Y61CG3).



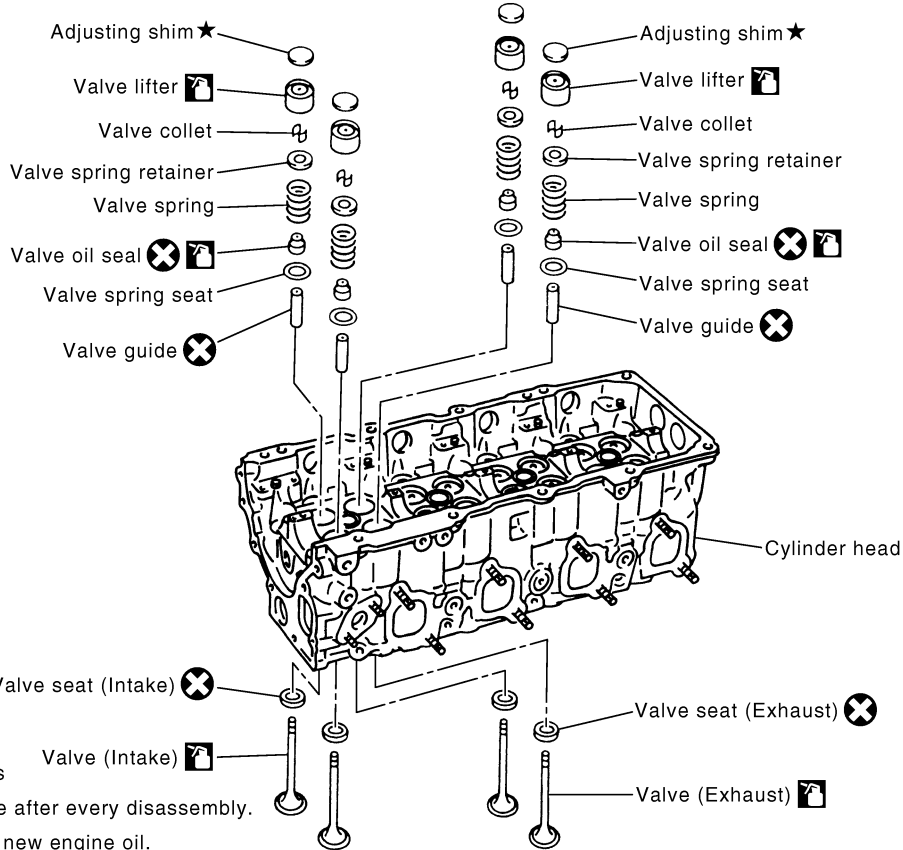
10. Remove the internal mechanism setting bolt of the idler gear (A).

11. Apply liquid gasket to the plug thread.

12. Install in the reverse order of removal.

Disassembly and Assembly

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**Valve**

**VALVE CLEARANCE**

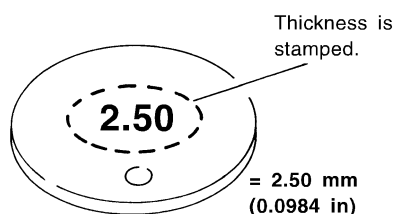
Unit: mm (in)

Items	Cold*
Intake and exhaust	0.30 - 0.40 (0.012 - 0.016)

\*: Approximately 20°C (68°F)

**AVAILABLE SHIMS**

Thickness mm (in)	Identification mark
2.35 (0.0925)	2.35
2.40 (0.0945)	2.40
2.45 (0.0965)	2.45
2.50 (0.0984)	2.50
2.55 (0.1004)	2.55
2.60 (0.1024)	2.60
2.65 (0.1043)	2.65
2.70 (0.1063)	2.70
2.75 (0.1083)	2.75
2.80 (0.1102)	2.80
2.85 (0.1122)	2.85
2.90 (0.1142)	2.90
2.95 (0.1161)	2.95
3.00 (0.1181)	3.00
3.05 (0.1201)	3.05



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**VALVE LIFTER**

Unit: mm (in)

Valve lifter outer diameter	34.450 - 34.465 (1.3563 - 1.3569)
Lifter guide inner diameter	34.495 - 34.515 (1.3581 - 1.3589)
Clearance between lifter and lifter guide	0.030 - 0.065 (0.0012 - 0.0026)