TOYOTA SERVICE BULLETIN
Group: 01 No.: 15 Date: Sept, 14

Aurion

Corrections to Repair Manual RM02N2EQ

Please ensure these pages are distributed to all relevant staff for their information; and a copy made available for future reference, with the above repair manual.

Section	Title	Paragraph
PREPARATION	2GR-FE ENGINE MECHANICAL	SST
SERVICE SPECIFICATIONS	2GR-FE ENGINE MECHANICAL	SERVICE DATA
2GR-FE ENGINE MECHANICAL	ENGINE UNIT	COMPONENTS
		DISASSEMBLY
		INSPECTION
		REASSEMBLY

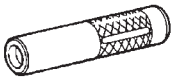
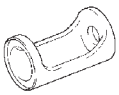
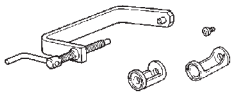
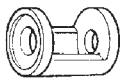
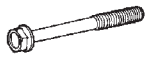
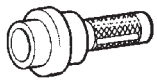
The revised pages listed above are attached.
(The corrected parts are indicated by arrows.)

This Bulletin does not cause the Flat Rate Manual to be changed.

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2GR-FE ENGINE MECHANICAL

SST

	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01050)	Valve Guide Bushing Remover & Replacer 5	
	09201-41020	Valve Stem Oil Seal Replacer	
	09202-00020	Attachment	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-70011	Crankshaft Pully Holding Tool	
	(09213-70020)	Bolt	
	09223-15030	Oil Seal & Bearing Replacer	
	09223-22010	Crankshaft Front Oil Seal Replacer	
	09228-06501	Oil Filter Wrench	

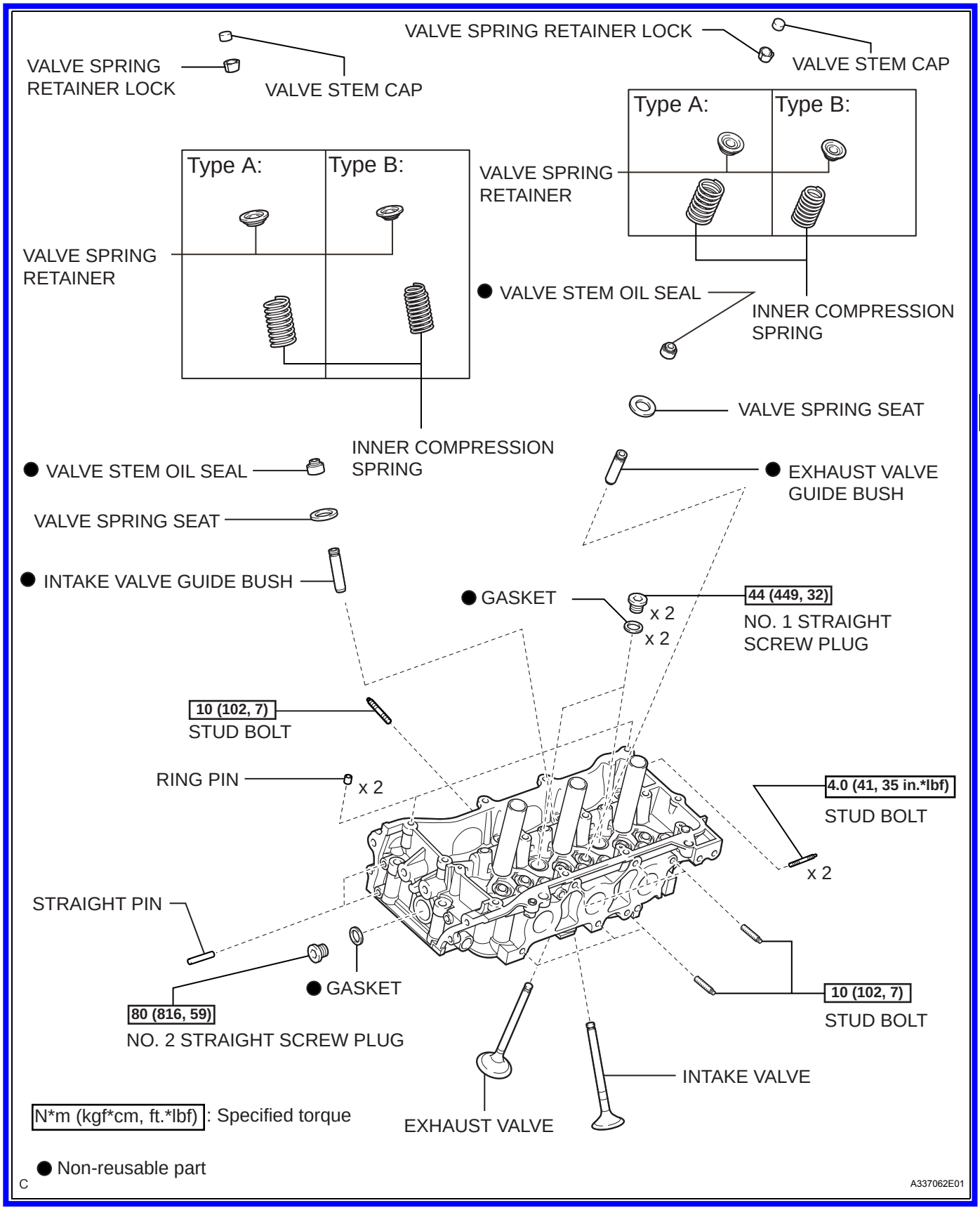
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PP

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Margin thickness	Standard	1.0 mm (0.0394 in.)
	Maximum	0.5 mm (0.0197 in.)
Overall length	Standard	111.40 mm (4.3858 in.)
	Maximum	109.90 mm (4.3268 in.)
Type A: Inner compression spring		
Free length		45.91 mm (1.8075 in.)
Deviation	Maximum	1.0 mm (0.0394 in.)
Type B: Inner compression spring		
Free length		50.55 mm (1.9902 in.)
Deviation	Maximum	1.4 mm (0.0551 in.)
Intake valve guide bush		
Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.) [Corrected]
Oil clearance	Standard	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
	Maximum	0.08 mm (0.0031 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.3 to 9.7 mm (0.3661 to 0.3819 in.)
Exhaust valve guide bush		
Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.)
Oil clearance	Standard	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
	Maximum	0.10 mm (0.0039 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.30 to 9.70 mm (0.3661 to 0.3819 in.)
No. 1 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
	Maximum	44.166 mm (1.7388 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm
No. 2 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.262 to 44.362 mm (1.7426 to 1.7465 in.)
	Maximum	44.112 mm (1.7367 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm
No. 3 camshaft		

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[Corrected]

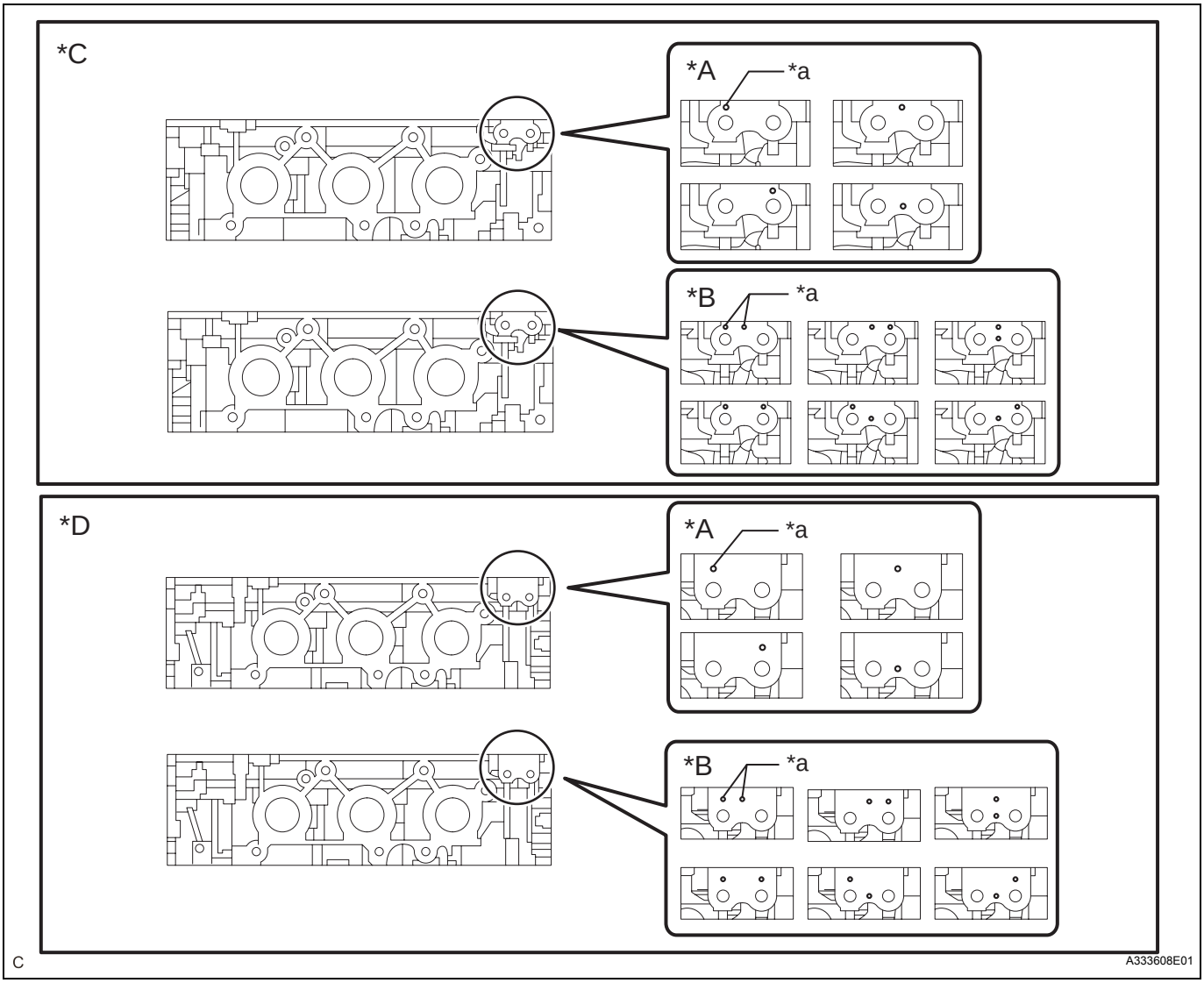
EM

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DISASSEMBLY

HINT:

- Select the No. 1 valve rocker arm sub-assemblies, inner compression springs and valve spring retainers based on the identification mark on the cylinder head.



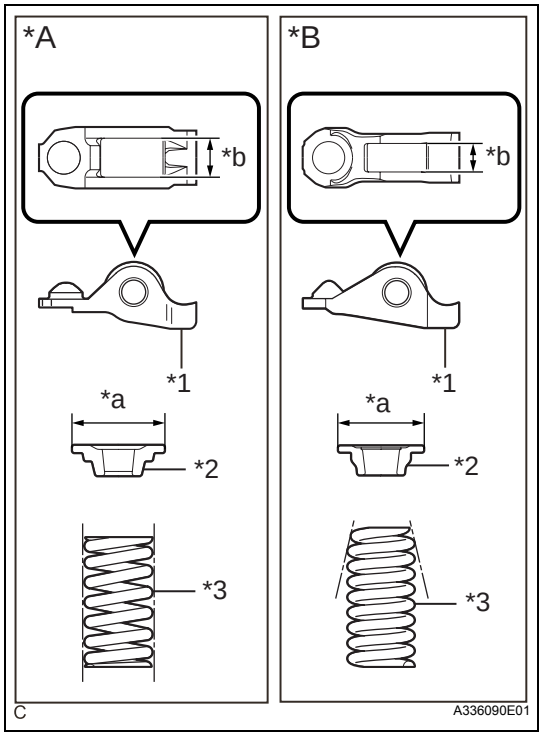
Text in Illustration

*A	Type A	*B	Type B
*C	Cylinder Head RH	*D	Cylinder Head LH
*a	Identification Mark	-	-

Type	Identification Mark	Inner Compression Spring Shape
A	1 Hole	Straight
B	2 Holes	Taper

[Added]

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- There are 2 types of No. 1 valve rocker arm sub-assemblies, inner compression springs and valve spring retainers. The 2 types are not interchangeable.

Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

EM

1. REMOVE OIL FILLER CAP SUB-ASSEMBLY [Added]

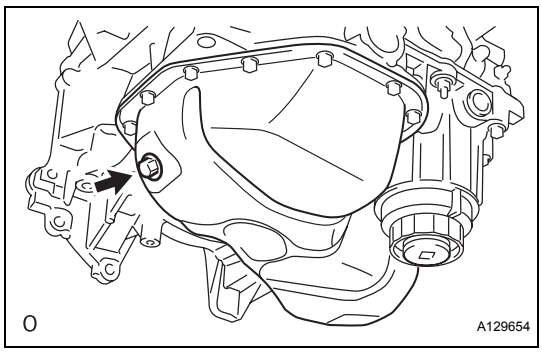
(a) Remove the oil filler cap and gasket.

2. REMOVE SPARK PLUG

(a) Remove the spark plugs.

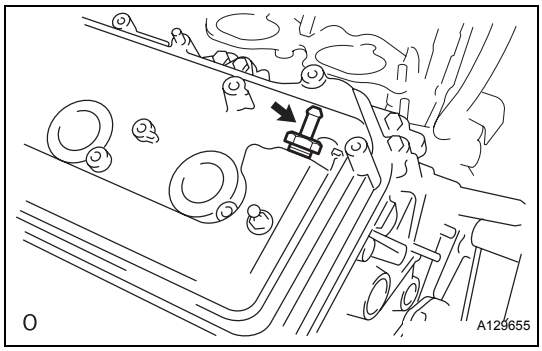
3. REMOVE OIL PAN DRAIN PLUG

(a) Remove the drain plug and gasket.

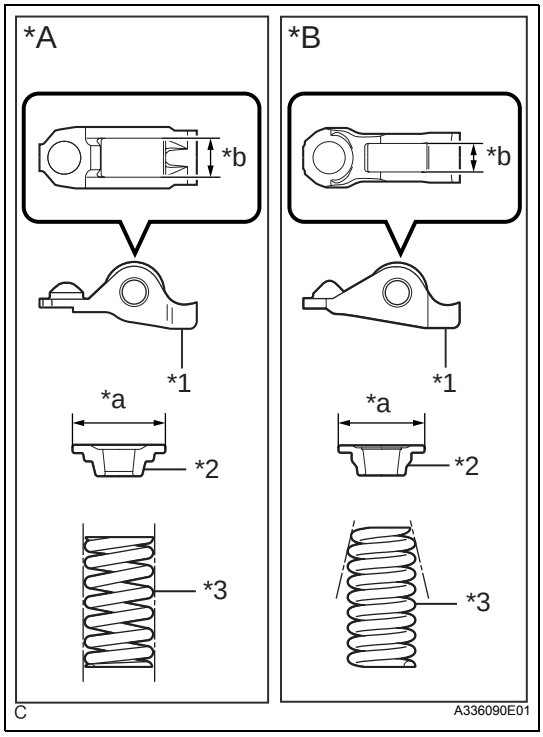


4. REMOVE VENTILATION VALVE SUB-ASSEMBLY

(a) Remove the ventilation valve.



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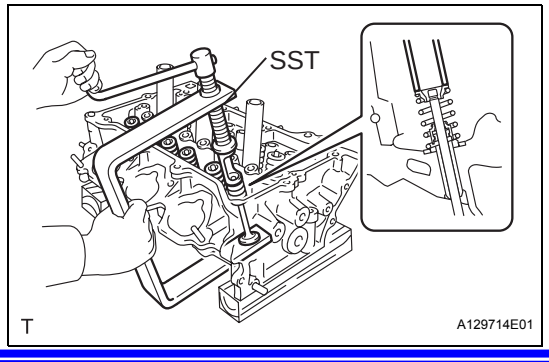
55. REMOVE INTAKE VALVE

HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

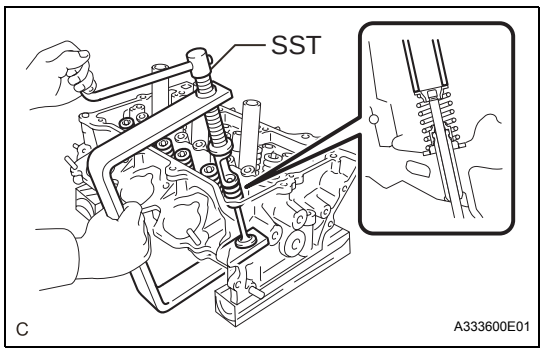
Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

EM



(a) Type A:
(1) Using SST, compress the inner compression spring and remove the valve spring retainer locks.
SST 09202-70020 (09202-00010)

[Corrected]

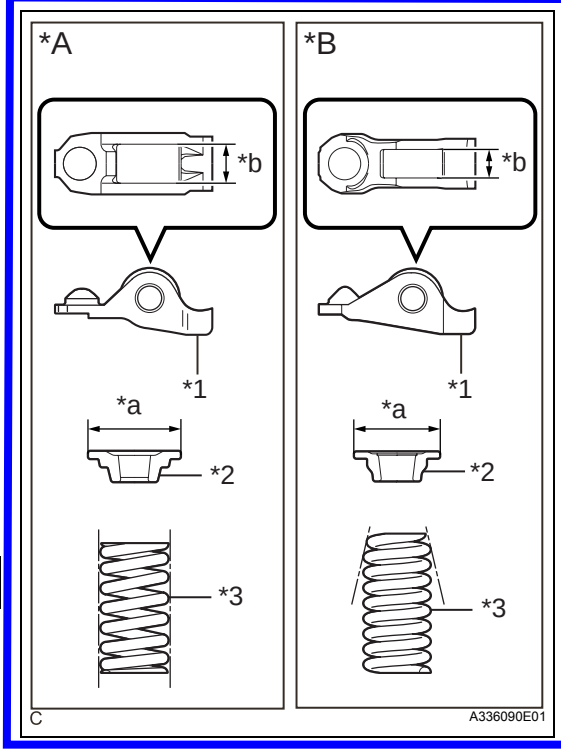


(b) Type B:
(1) Using SST, compress the inner compression spring and remove the valve spring retainer locks.
SST 09202-70020, 09202-00020

(c) Remove the retainer, compression spring, and valve.
HINT:
Arrange the removed parts in the correct order.

[Added]

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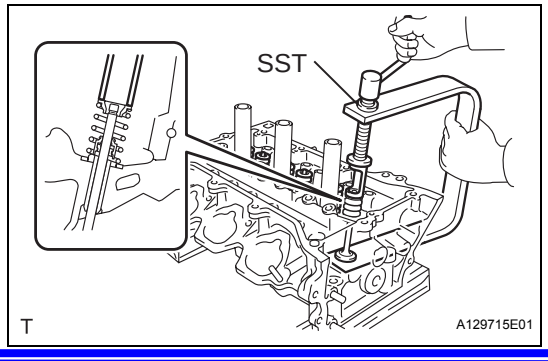
56. REMOVE EXHAUST VALVE

HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

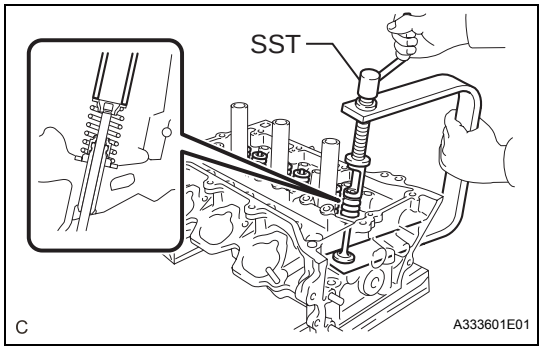
Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

EM



(a) Type A:
(1) Using SST, compress the inner compression spring and remove the valve spring retainer locks.
SST 09202-70020 (09202-00010)

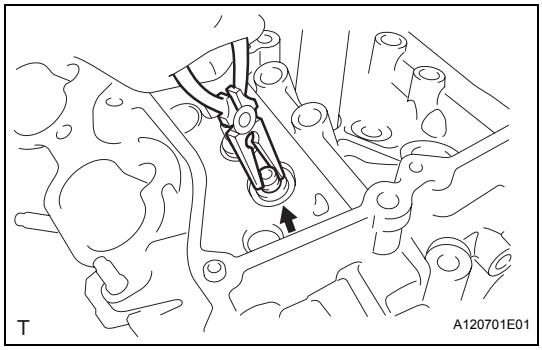
[Corrected]



(b) Type B:
(1) Using SST, compress the inner compression spring and remove the valve spring retainer locks.
SST 09202-70020, 09202-00020

(c) Remove the retainer, compression spring, and valve.
HINT:
Arrange the removed parts in the correct order.

[Added]



57. REMOVE VALVE STEM OIL SEAL

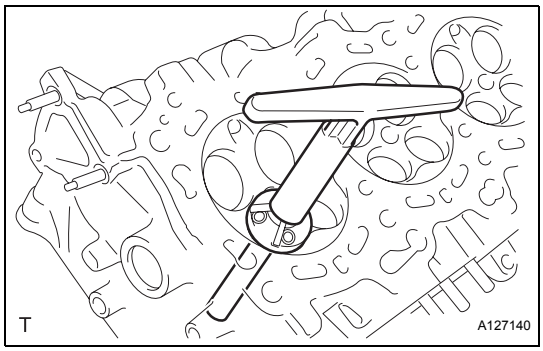
(a) Using needle-nose pliers, remove the oil seals.

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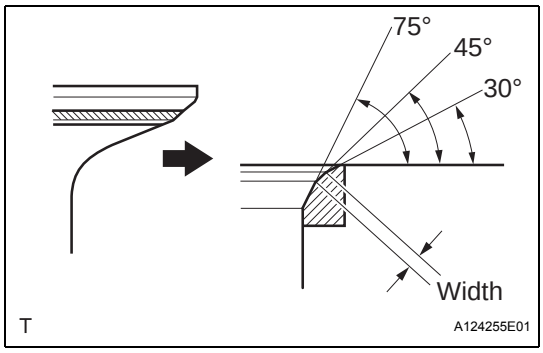
24. REPAIR EXHAUST VALVE SEAT

NOTICE:

- **Repair the seat while checking the seating position.**
- **Keep the lip free of foreign matter.**



(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.



(b) Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Width:

1.1 to 1.5 mm (0.043 to 0.059 in.)

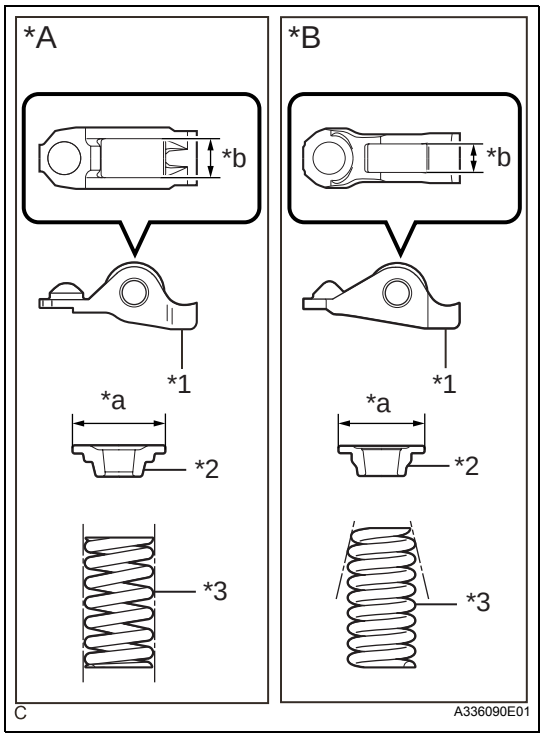
(c) Handrub the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.

25. INSPECT COMPRESSION SPRING

HINT:

Type A and Type B can be distinguished by the shape of the inner compression spring.



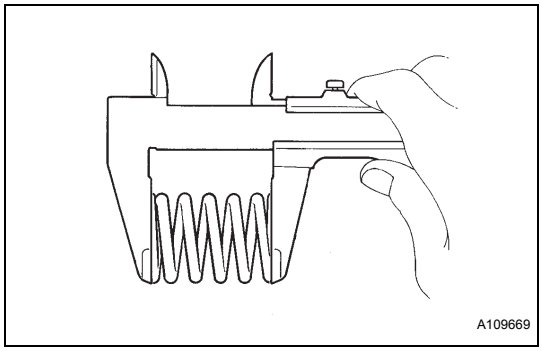
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

[Added]

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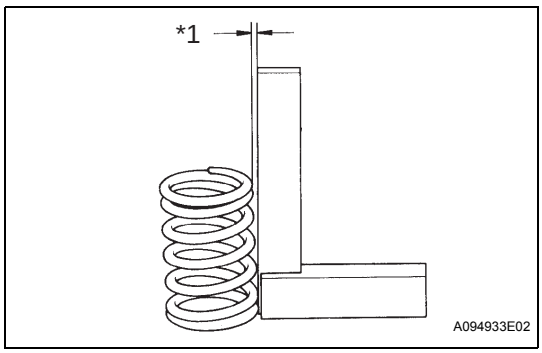
(a) Type A:

(1) Using vernier calipers, measure the free length of the inner compression spring.

Free length:

45.91 mm (1.8075 in.)

If the free length is not as specified, replace the inner compression spring.



(2) Using a steel square, measure the deviation of the inner compression spring.

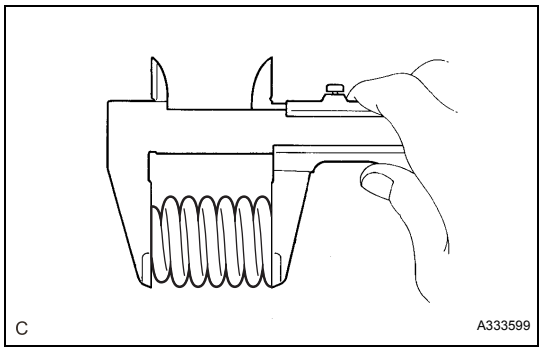
Text in Illustration

*1	Deviation

Maximum deviation:

1.0 mm (0.0394 in.)

If the deviation is greater than the maximum, replace the inner compression spring.



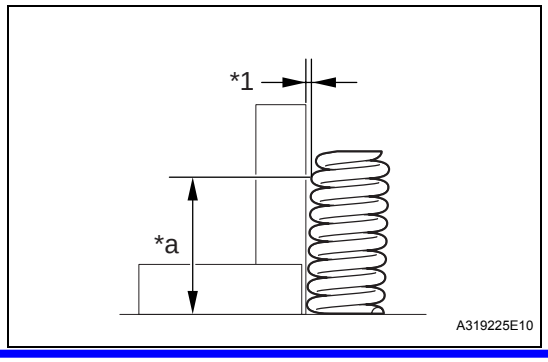
(b) Type B:

(1) Using vernier calipers, measure the free length of the inner compression spring.

Free length:

50.55 mm (1.9902 in.)

If the free length is not as specified, replace the inner compression spring.



(2) Using a steel square, measure the deviation of the inner compression spring.

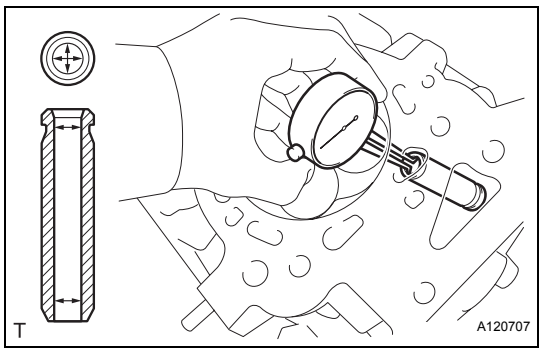
Text in Illustration

*1	Deviation
*a	40 mm (1.57 in.)

Maximum deviation:

1.4 mm (0.0551 in.)

If the deviation is greater than the maximum, replace the inner compression spring.



26. INSPECT VALVE GUIDE BUSH OIL CLEARANCE

[Added]

(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Bush inside diameter:

5.510 to 5.530 mm (0.2169 to 0.2177 in.)

(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard clearance

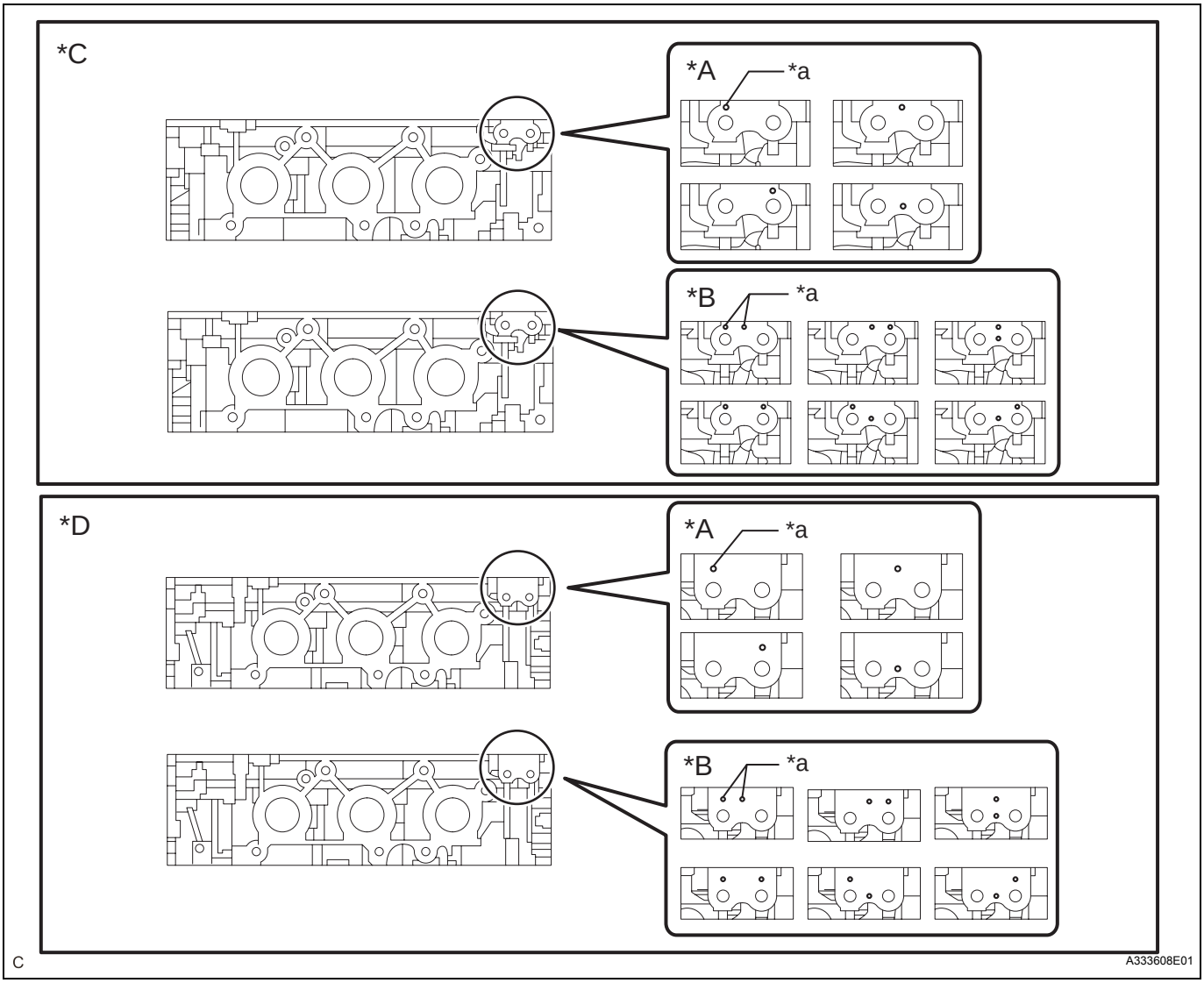
Item	Clearance
Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)

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REASSEMBLY

HINT:

- Select the No. 1 valve rocker arm sub-assemblies, inner compression springs and valve spring retainers based on the identification mark on the cylinder head.



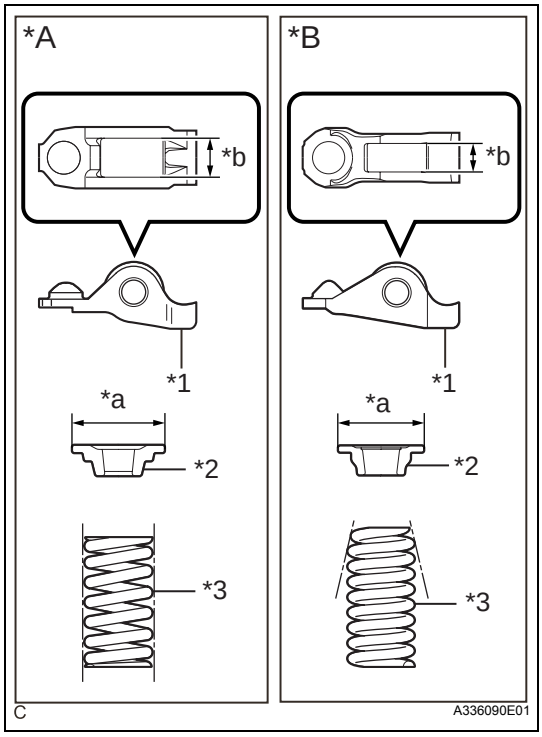
Text in Illustration

*A	Type A	*B	Type B
*C	Cylinder Head RH	*D	Cylinder Head LH
*a	Identification Mark	-	-

Type	Identification Mark	Inner Compression Spring Shape
A	1 Hole	Straight
B	2 Holes	Taper

[Added]

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- There are 2 types of No. 1 valve rocker arm sub-assemblies, inner compression springs and valve spring retainers. The 2 types are not interchangeable.

Text in Illustration

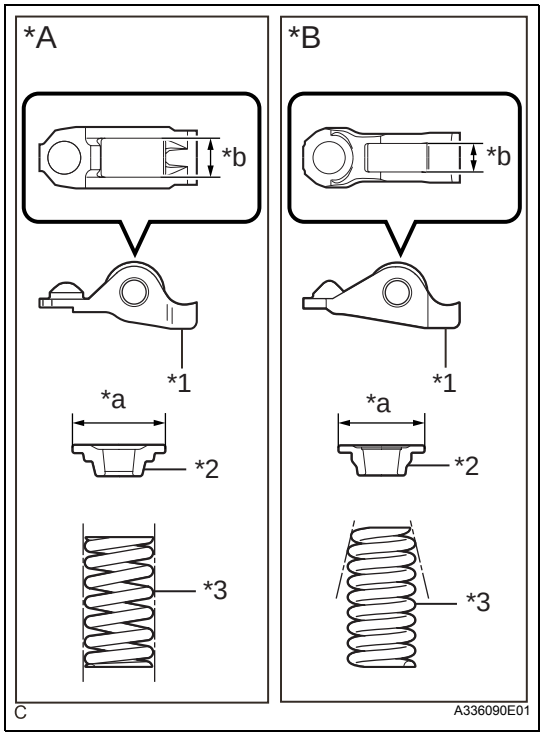
*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

[Added]

EM

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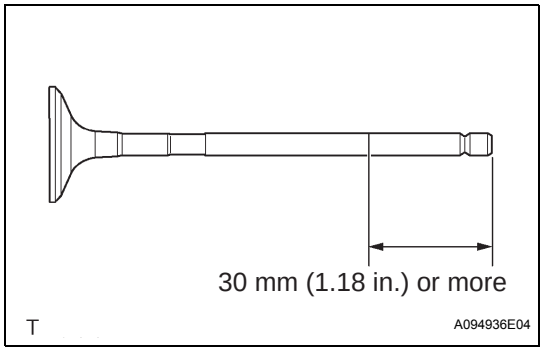
20. INSTALL EXHAUST VALVE

HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

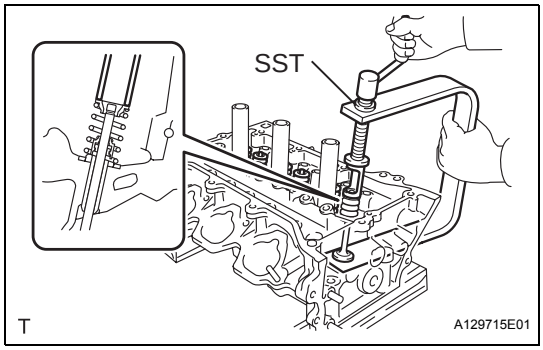
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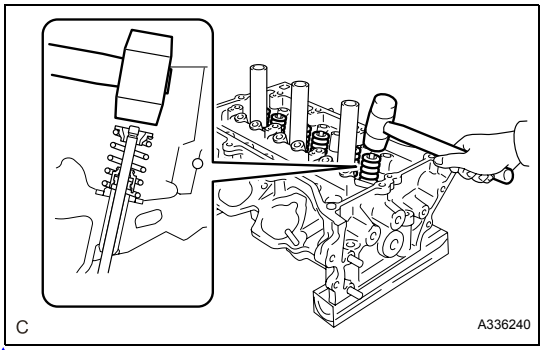
(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

(b) Type A:

(1) Install the exhaust valve, inner compression spring and valve spring retainer to the cylinder head.
NOTICE:
Install the same parts in the same combination to the original locations.



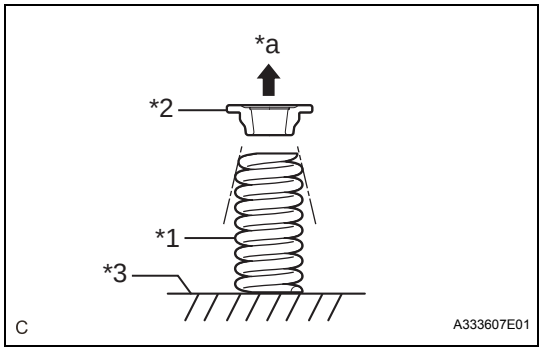
(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.
SST 09202-70020 (09202-00010)



(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.

[Corrected]

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(c) Type B:

(1) Install the exhaust valve, inner compression spring and valve spring retainer to the cylinder head.

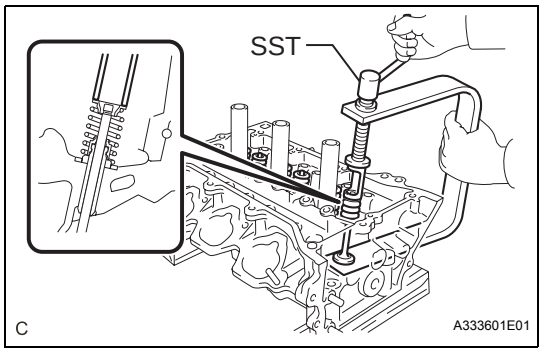
Text in Illustration

*1	Inner Compression Spring
*2	Valve Spring Retainer
*3	Cylinder Head
*a	Up

NOTICE:

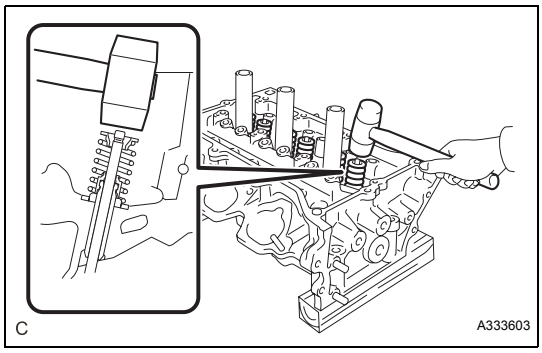
- **Install the inner compression spring with its taper side facing upward (towards the valve spring retainer).**
- **Install the same parts in the same combination to the original locations.**

EM



(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.

SST 09202-70020, 09202-00020



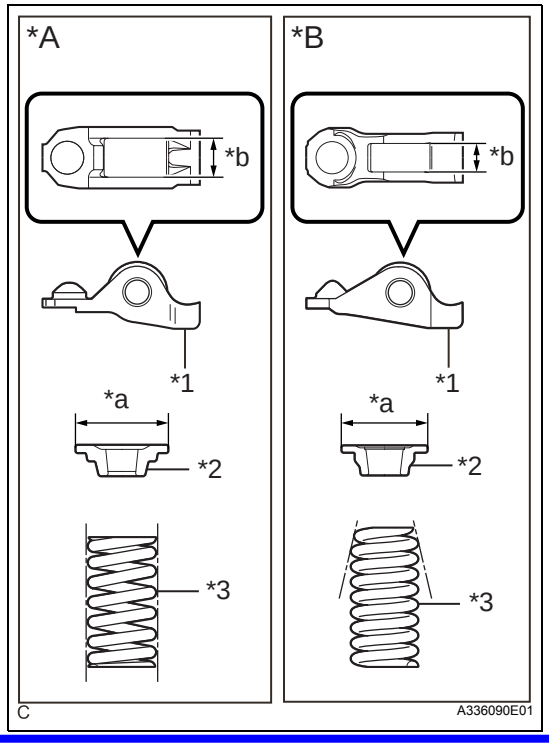
(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

Be careful not to damage the retainer.

[Added]

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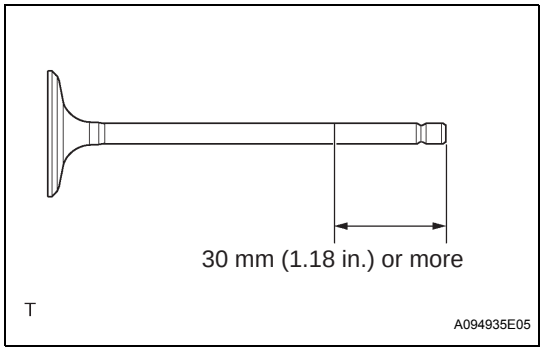
21. INSTALL INTAKE VALVE

HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

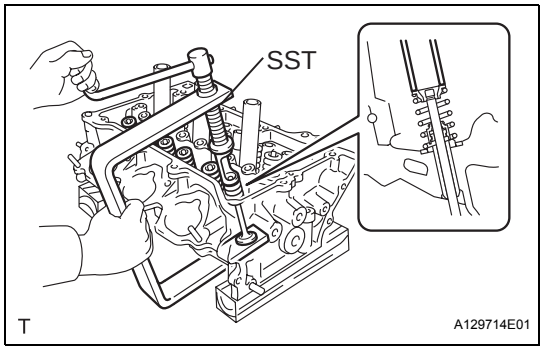
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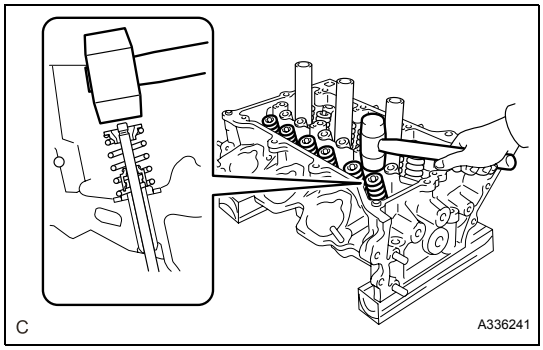
(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

(b) Type A:

(1) Install the intake valve, inner compression spring and valve spring retainer to the cylinder head.
NOTICE:
Install the same parts in the same combination to the original locations.



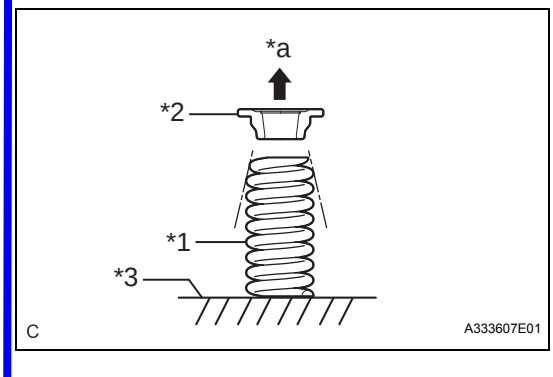
(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.
SST 09202-70020 (09202-00010)



(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.

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[Corrected]



(c) Type B:

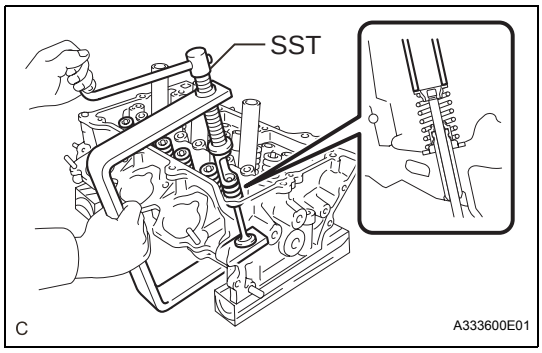
(1) Install the intake valve, inner compression spring and valve spring retainer to the cylinder head.

Text in Illustration

*1	Inner Compression Spring
*2	Valve Spring Retainer
*3	Cylinder Head
*a	Up

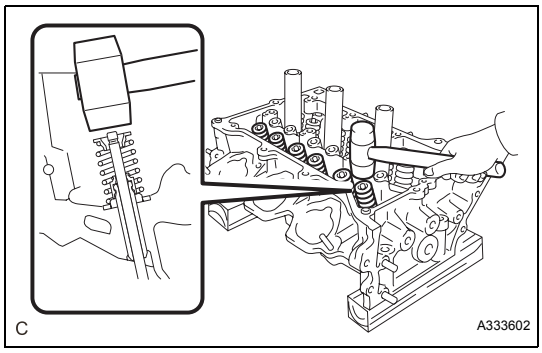
NOTICE:

- **Install the inner compression spring with its taper side facing upward (towards the valve spring retainer).**
- **Install the same parts in the same combination to the original locations.**



(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.

SST 09202-70020, 09202-00020



(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

Be careful not to damage the retainer.

22. INSTALL VALVE STEM CAP

(a) Apply a light coat of engine oil to the valve stem caps.

(b) Install the valve stem caps on the valves.

[Added]

23. INSTALL ENGINE REAR OIL SEAL

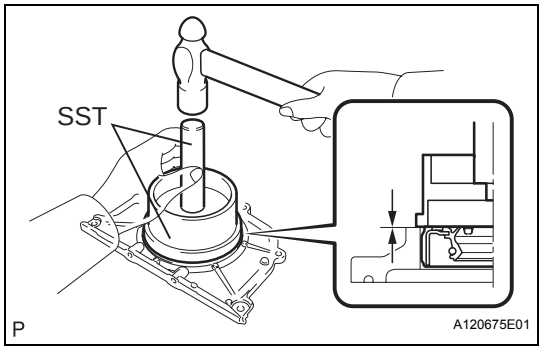
(a) Place the oil seal retainer on wooden blocks.

(b) Using SST, tap in a new oil seal until its surface is flush with the oil seal retainer edge.

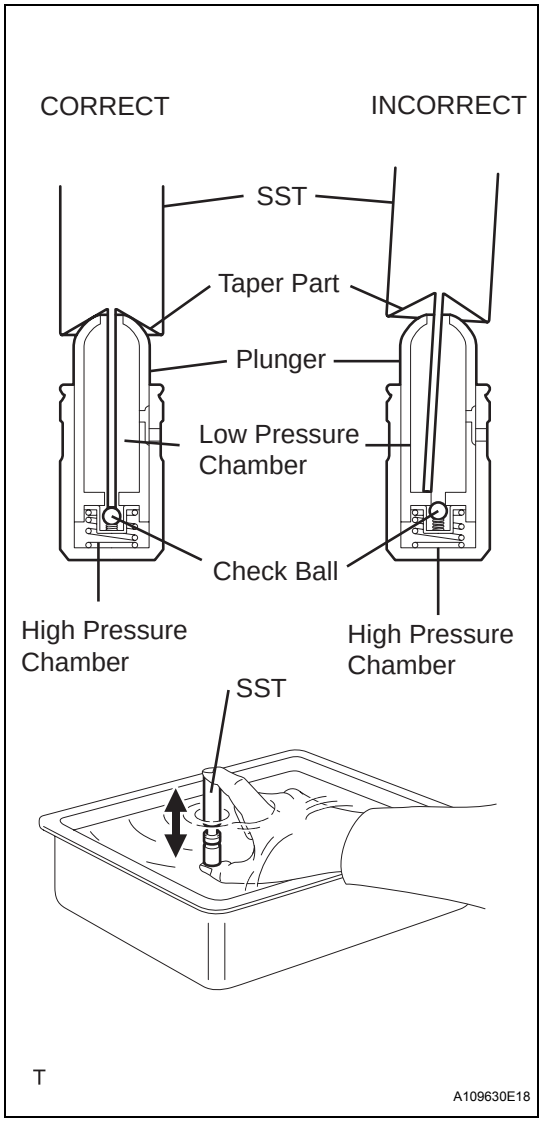
SST 09223-15030, 09950-70010 (09951-07100)

NOTICE:

- **Keep the lip free of foreign matter.**
- **Do not tap on the oil seal at an angle.**



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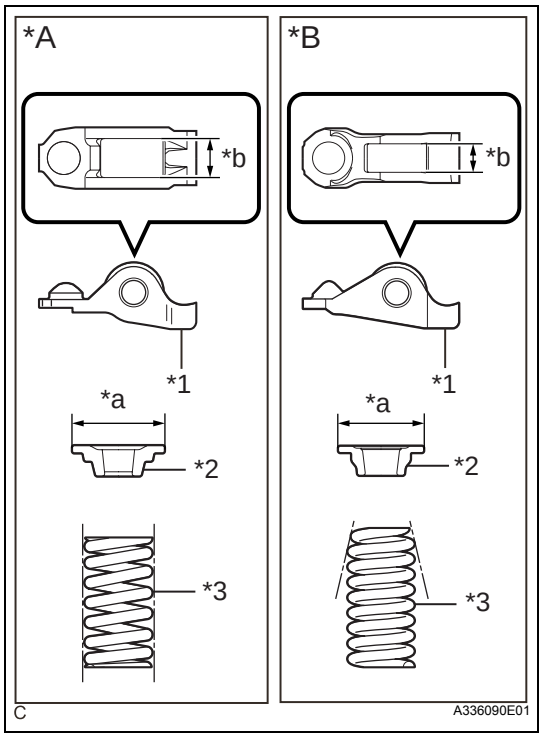
(b) Insert SST's tip into the lash adjuster's plunger and use the tip to press down on the check ball inside the plunger.
SST 09276-75010

(c) Squeeze SST and lash adjuster together to move the plunger up and down 5 to 6 times.

(d) Check the movement of the plunger and bleed the air.
OK:
The plunger moves up and down.
NOTICE:
When bleeding air from the high-pressure chamber, make sure that the tip of SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, air will not be bled.

(e) After bleeding the air, remove SST. Then, try to press the plunger quickly and firmly with a finger.
OK:
The plunger is very difficult to move.
If the result is not as specified, replace the lash adjuster.

(f) Install the lash adjusters.
NOTICE:
Install the lash adjuster to the same place where it was removed from.



29. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

HINT:
Type A and Type B can be distinguished by the shape of the compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

[Added]

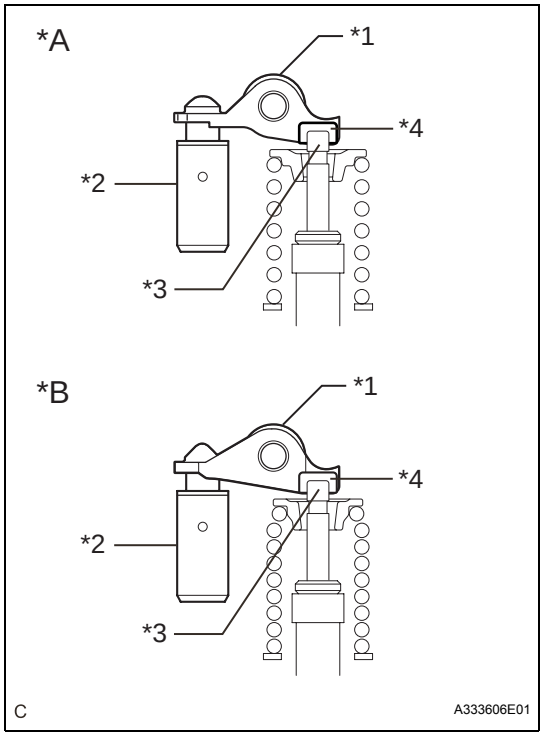
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(a) Apply engine oil to the lash adjuster tip and valve stem cap end.

(b) Install the 24 No. 1 valve rocker arm sub-assemblies as shown in the illustration.

Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Lash Adjuster Assembly
*3	Valve Stem
*4	Valve Stem Cap



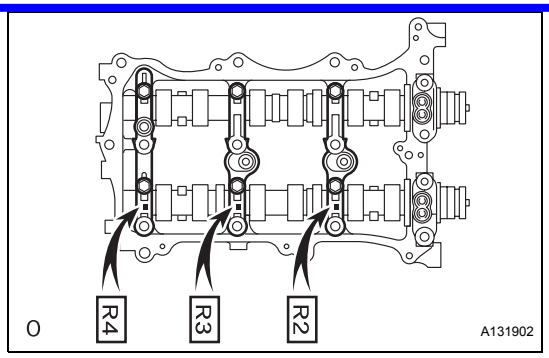
30. INSTALL CAMSHAFT BEARING CAP (for Bank 1)

(a) Apply engine oil to the camshaft journals, camshaft housing, and bearing caps.

(b) Install the camshaft and No. 2 camshaft to the camshaft housing RH.

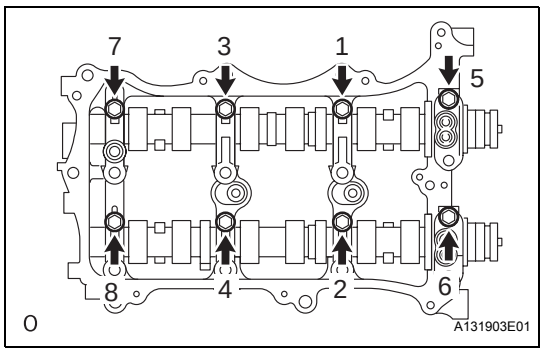
[Corrected]

(c) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

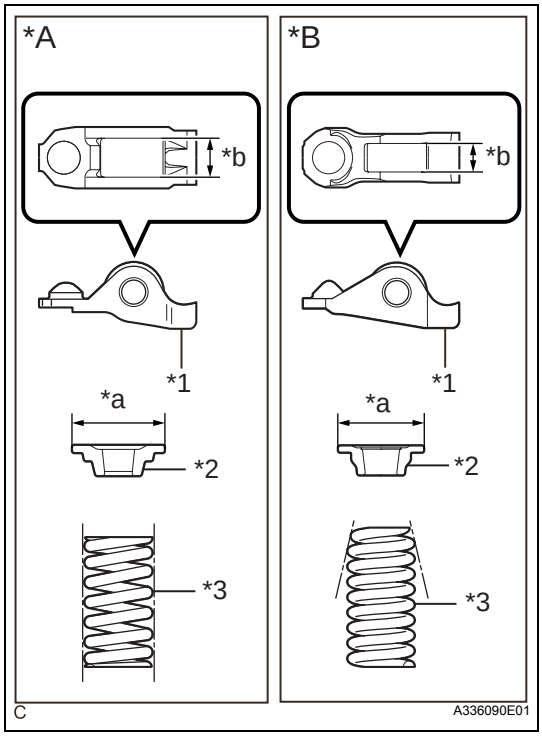


(d) Temporarily tighten the 8 bolts in the order shown in the illustration.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



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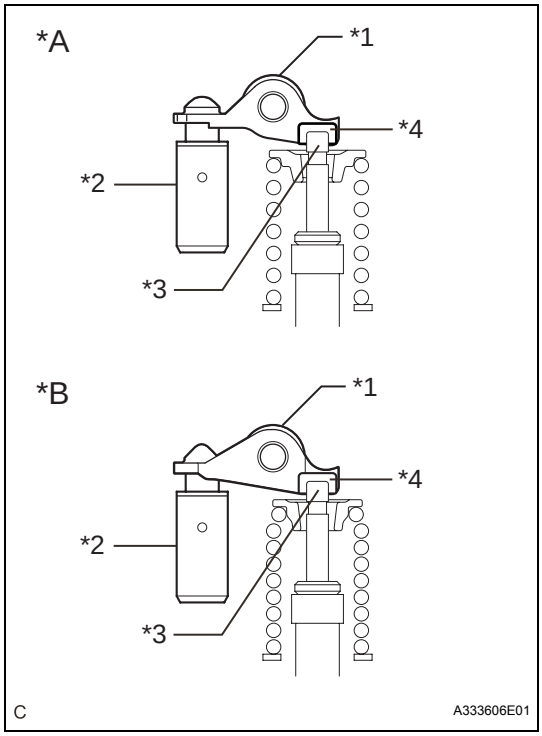
31. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY RH

HINT:
Type A and Type B can be distinguished by the shape of the compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

EM

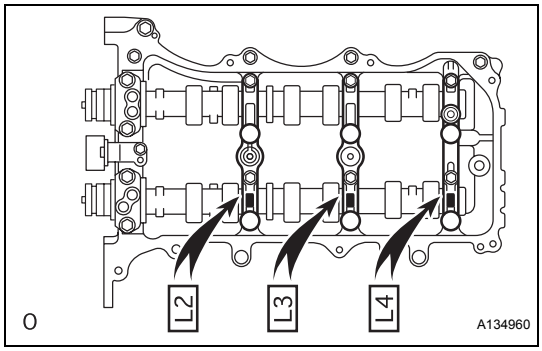


(a) Make sure that the No. 1 valve rocker arm sub-assembly is installed as shown in the illustration.
Text in Illustration

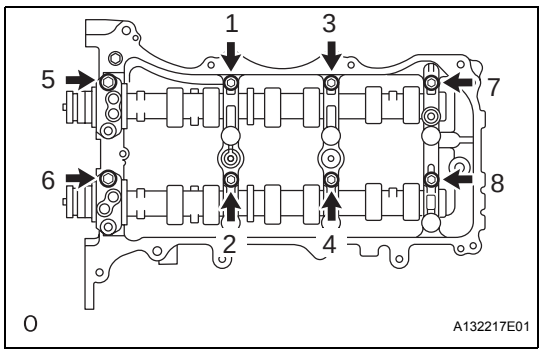
*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Lash Adjuster Assembly
*3	Valve Stem
*4	Valve Stem Cap

[Corrected]

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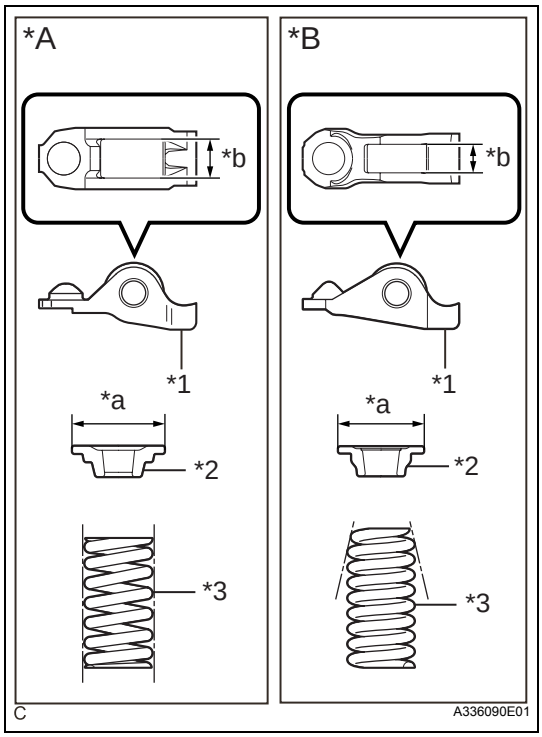


(c) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.



(d) Temporarily tighten the 8 bolts in the order shown in the illustration.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

EM



33. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY LH

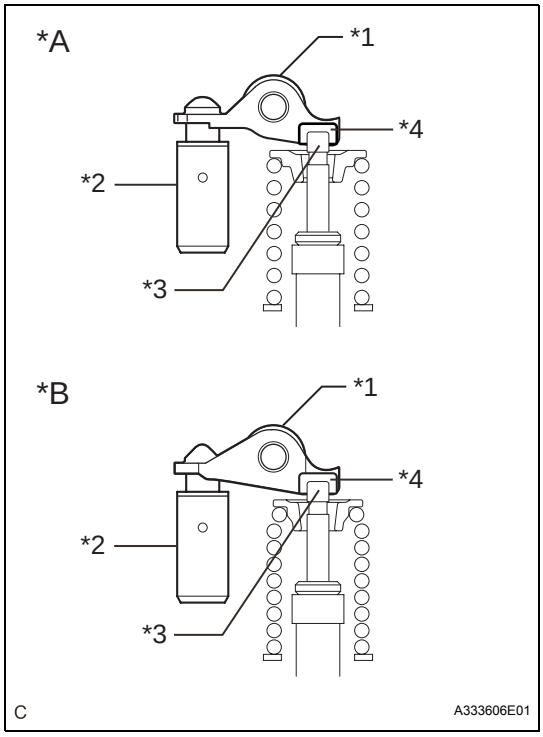
HINT:
Type A and Type B can be distinguished by the shape of the compression spring.
Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Spring Retainer
*3	Inner Compression Spring
*a	Valve Spring Retainer Diameter
*b	No. 1 Valve Rocker Arm Sub-assembly Roller Width

Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper

[Added]

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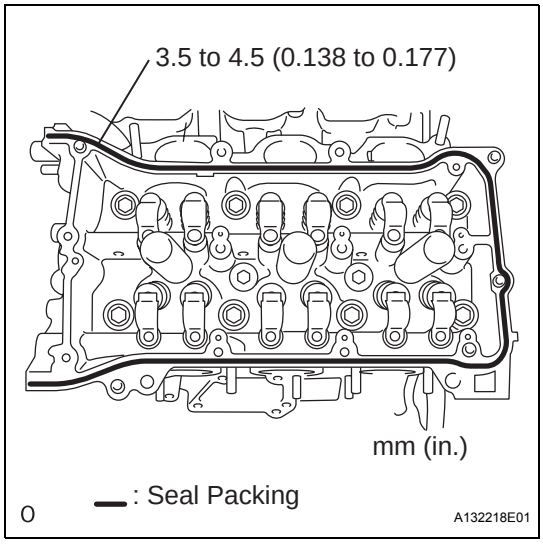
(a) Make sure that the No. 1 valve rocker arm sub-assembly is installed as shown in the illustration.

Text in Illustration

*A	Type A
*B	Type B
*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Lash Adjuster Assembly
*3	Valve Stem
*4	Valve Stem Cap

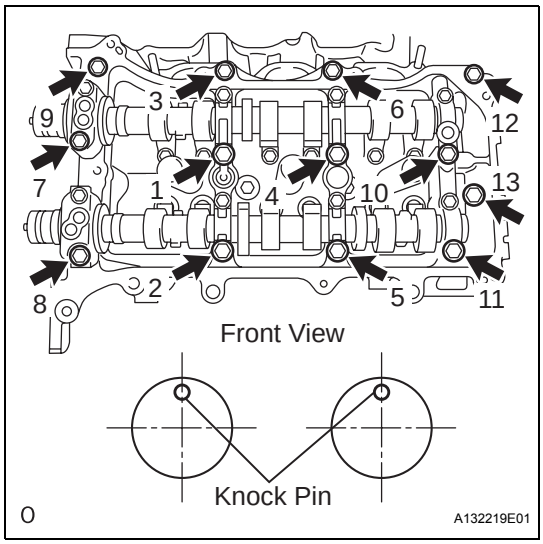
[Corrected]

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(b) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal diameter:
3.5 to 4.5 mm (0.138 to 0.177 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the camshaft housing sub-assembly LH within 3 minutes.**
- **Do not start the engine for at least 2 hours after installing.**



(c) Install the camshaft housing LH and tighten the 13 bolts in the order shown in the illustration.

Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)
NOTICE:
- **When installing the camshaft housing LH, it is necessary to correctly position the camshafts as shown in the illustration. Failure to correctly position these parts may result in damage due to contact between the pistons and valves. If a camshaft is rotated with a piston at TDC, valve contact will occur.**
- **If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.**

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