TOYOTA SERVICE BULLETIN
Group: 01 No.: 20 Date: Oct, 14

Rav 4

Corrections to Repair Manual RM01N3E

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

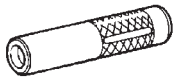
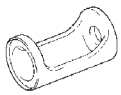
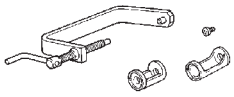
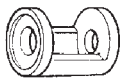
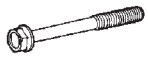
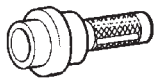
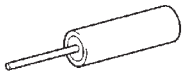
The revised pages listed above are attached.
(The corrected parts are indicated by arrows.)

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 Pulley Holding Tool	
	(09213-70020)	Bolt	
	09223-15030	Oil Seal & Bearing Replacer	
	09223-22010	Crankshaft Front Oil Seal Replacer	
	09276-75010	Valve Lifter Tool	

[Added]

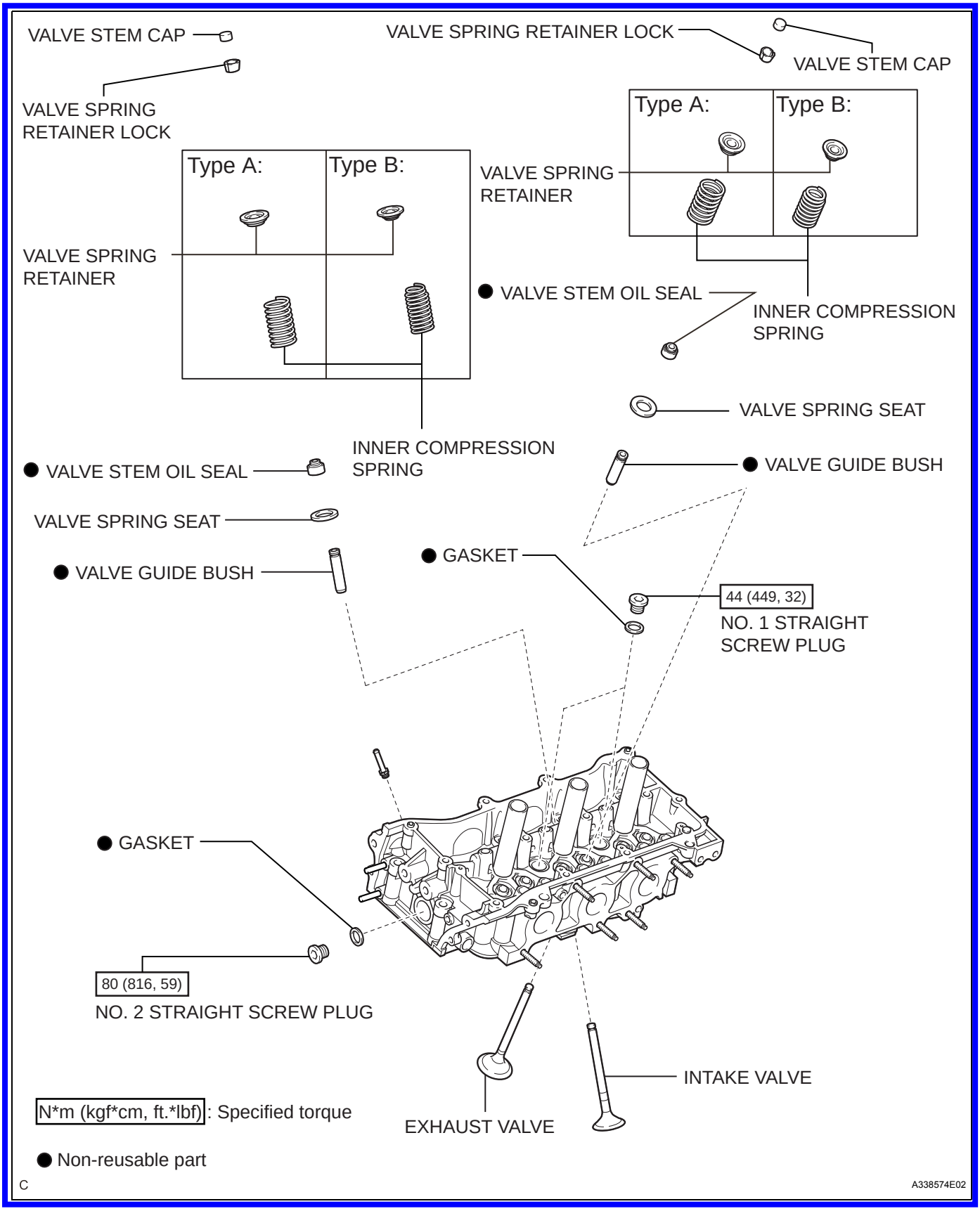
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Idle gear shaft	Idle gear shaft diameter	Standard		22.987 to 23.000 mm (0.9050 to 0.9055 in.)
	Idle gear inside diameter	Standard		23.02 to 23.03 mm (0.9062 to 0.9067 in.)
	Oil clearance	Standard		0.02 to 0.043 mm (0.0008 to 0.0017 in.)
		Maximum		0.043 mm (0.0017 in.)
No. 2 chain tensioner	Depth	Maximum		0.9 mm (0.035 in.)
No. 3 chain tensioner	Depth	Maximum		0.9 mm (0.035 in.)
Chain tensioner slipper	Depth	Maximum		1.0 mm (0.039 in.)
No. 1 chain vibration damper	Depth	Maximum		1.0 mm (0.039 in.)
No. 2 chain vibration damper	Depth	Maximum		1.0 mm (0.039 in.)
Cylinder head	Warpage	Standard	Cylinder head lower side	0.05 mm (0.0020 in.)
			Intake side	0.08 mm (0.0031 in.)
			Exhaust side	0.08 mm (0.0031 in.)
		Maximum		0.10 mm (0.0039 in.)
	Protrusion height	Standard		18.0 to 19.0 mm (0.71 to 0.75 in.)
Intake valve guide bush	Cylinder bore diameter	Standard		10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Bush bore diameter	Standard	Use STD	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
			Use O/S	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Protrusion height	Standard		9.1 to 9.9 mm (0.3582 to 0.3900 in.)
Exhaust valve guide bush	Cylinder bore diameter	Standard		10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Bush bore diameter	Standard	Use STD	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
			Use O/S 0.05	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Protrusion height	Standard		9.30 to 9.70 mm (0.3661 to 0.3819 in.)
Intake valve	Valve stem diameter	Standard		5.470 to 5.485 mm (0.2154 to 0.2159 in.)
	Margin thickness	Standard		1.0 mm (0.0394 in.)
		Minimum		0.50 mm (0.0197 in.)
	Overall length	Standard		105.85 mm (4.1673 in.)
		Minimum		105.35 mm (4.1476 in.)
Exhaust valve	Valve stem diameter	Standard		5.465 to 5.480 mm (0.2151 to 0.2157 in.)
	Margin thickness	Standard		1.0 mm (0.0394 in.)
		Minimum		0.50 mm (0.0197 in.)
	Overall length	Standard		110.40 mm (4.3464 in.)
		Minimum		109.90 mm (4.3268 in.)
Type A: Inner compression spring	Free length	Standard		45.91 mm (1.8075 in.)
	Deviation	Maximum		1.0 mm (0.0394 in.)
Type B: Inner compression spring	Free length	Standard		50.55 mm (1.9902 in.)
	Deviation	Maximum		1.4 mm (0.0551 in.)

[Corrected]

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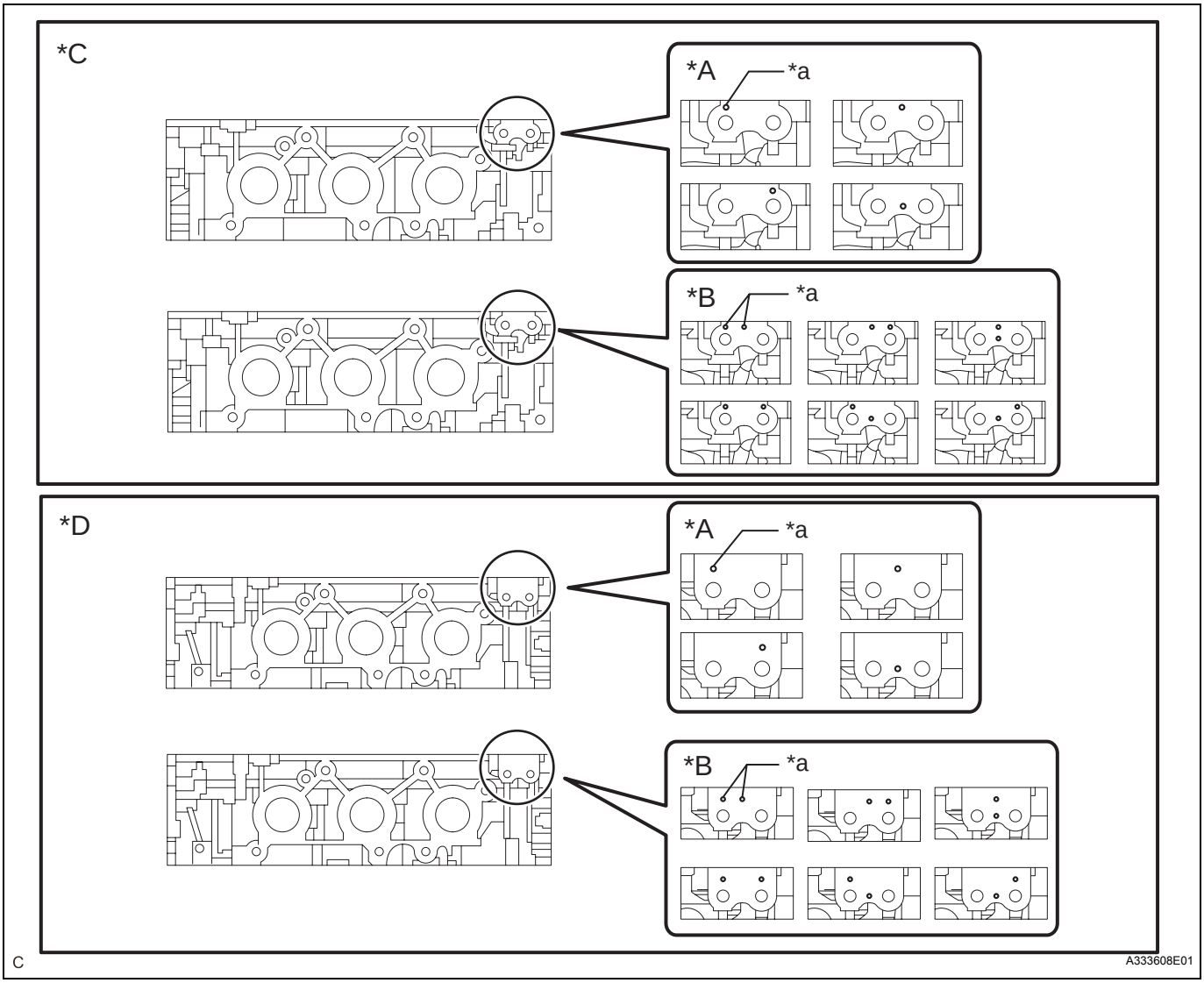
[Corrected]

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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.



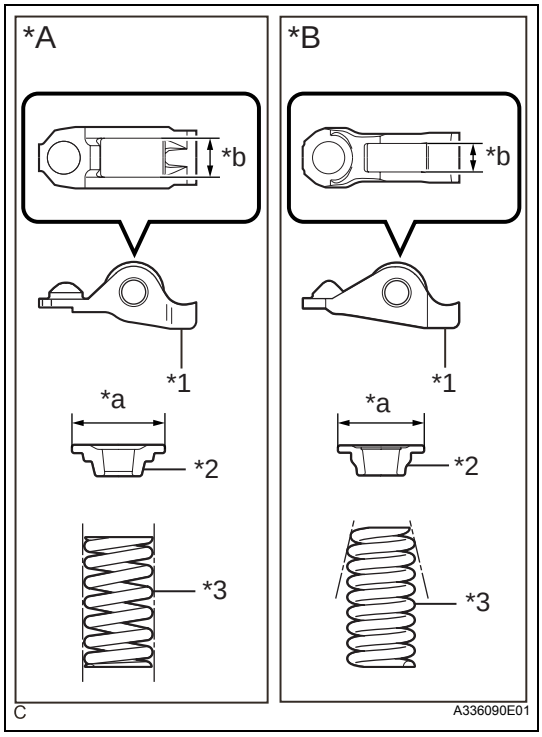
Text in Illustration

*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

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

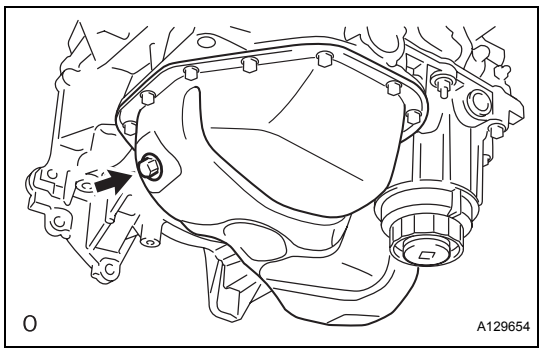
(a) Remove the oil filler cap sub-assembly.

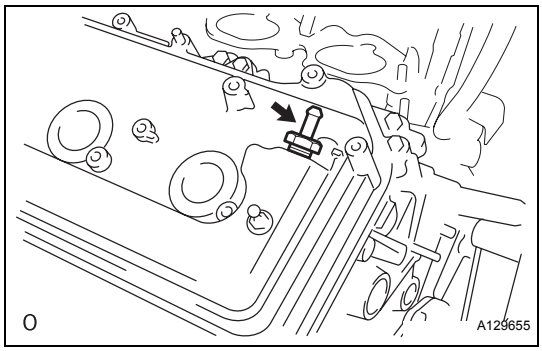
2. REMOVE SPARK PLUG

(a) Remove the 6 spark plugs.

3. REMOVE OIL PAN DRAIN PLUG

(a) Remove the drain plug and gasket.

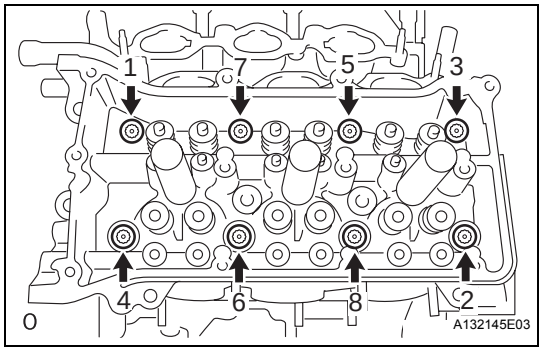




4. REMOVE VENTILATION VALVE SUB-ASSEMBLY

(a) Remove the ventilation valve sub-assembly.

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(b) Using a 10 mm bi-hexagon wrench, uniformly loosen the 8 bolts in the sequence shown in the illustration. Remove the 8 cylinder head bolts and plate washers.

NOTICE:

- **Be careful not to drop washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in an incorrect order.**

HINT:

Be sure to keep the removed parts separate for each installation position.

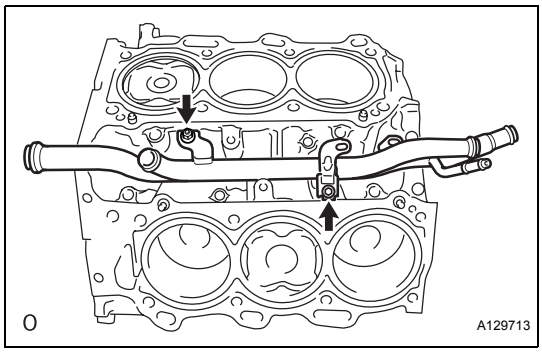
(c) Remove the cylinder head and gasket.

48. REMOVE WATER INLET PIPE

(a) Disconnect the knock sensor wire.

(b) Remove the 2 bolts and water outlet pipe.

(c) Disconnect the water by-pass hose.



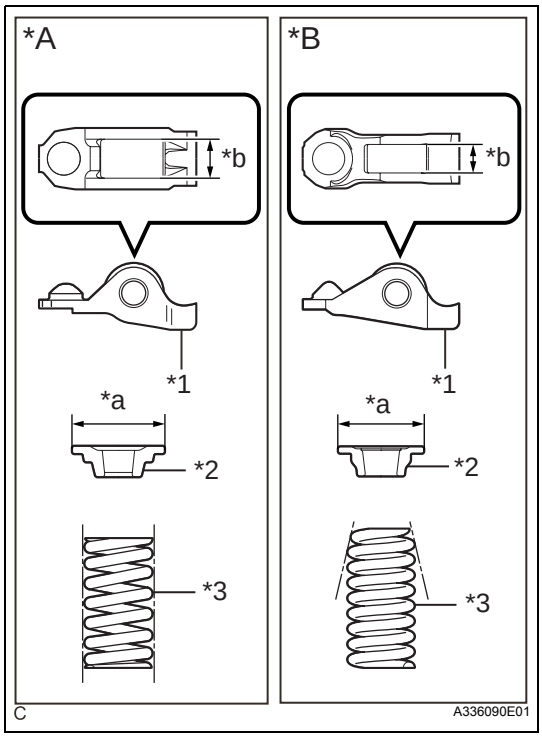
49. REMOVE VALVE STEM CAP

(a) Remove the valve stem caps from the cylinder head.

HINT:

Arrange the removed parts in the correct order.

EM



50. REMOVE INTAKE VALVE

HINT:

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

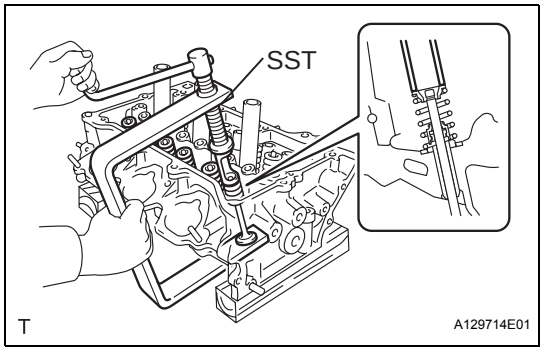
Text in Illustration

*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

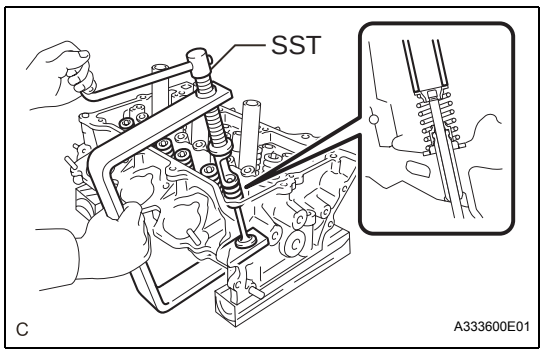
[Added]

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(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

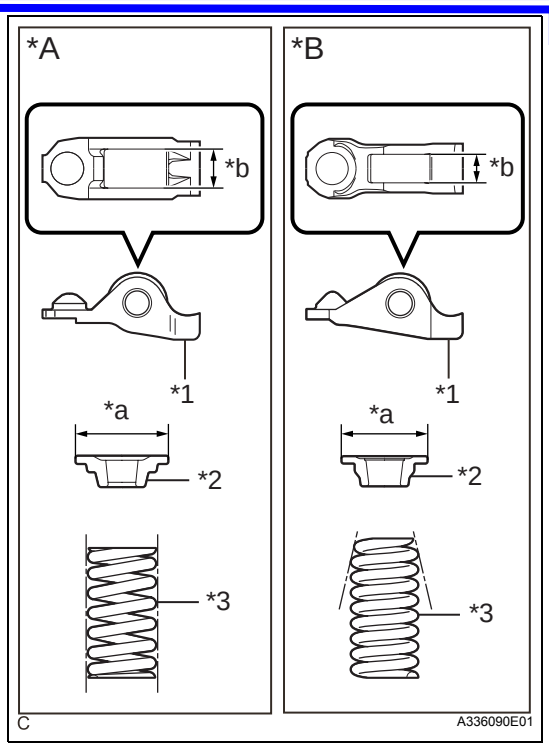
(c) Remove the retainer, compression spring and valve.
HINT:
Arrange the removed parts in the correct order.

[Added]

[Added]

51. REMOVE EXHAUST VALVE

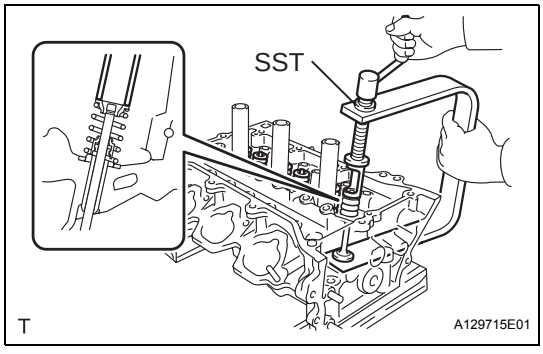
HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.



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

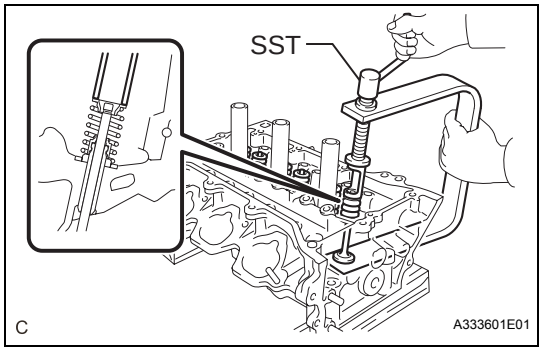


(a) Type A:
(1) Using SST, compress the inner compression spring and remove the valve spring retainer locks.
SST 09202-70020 (09202-00010)

[Corrected]

EM

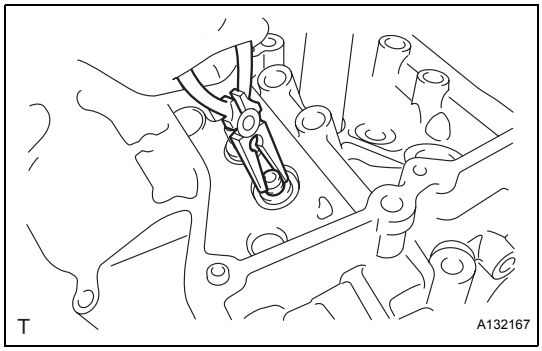
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(b) Type B:
(1) Using SST, compress the inner compression spring and remove the valve spring retainer locks.
SST 09202-70020, 09202-00020

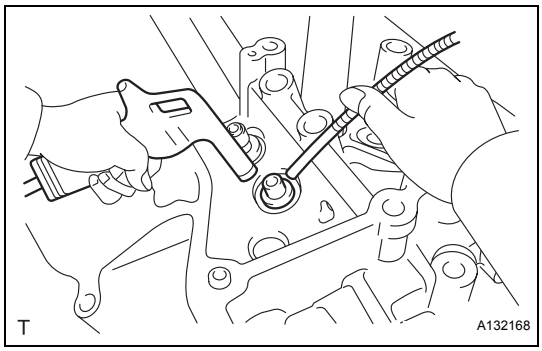
(c) Remove the retainer, compression spring and valve.
HINT:
Arrange the removed parts in the correct order.

[Added]



52. REMOVE VALVE STEM OIL SEAL

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

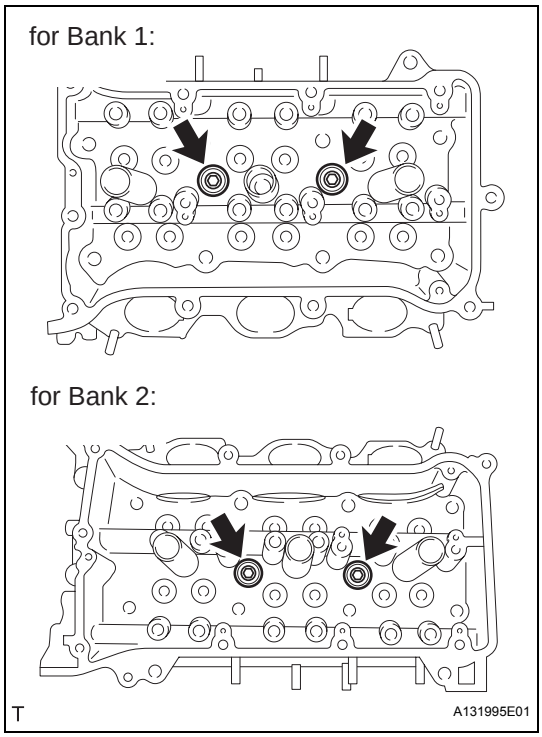


53. REMOVE VALVE SPRING SEAT

(a) Using compressed air and a magnetic finger, remove the valve spring seat by blowing air onto it.

54. REMOVE NO. 1 STRAIGHT SCREW PLUG

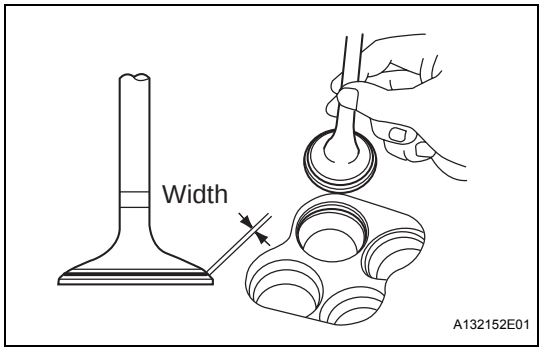
NOTICE:
If water leaks from the No. 1 screw plug or the plug is corroded, replace it.



(a) Using a 10 mm hexagon wrench, remove the 4 screw plugs and 4 gaskets.

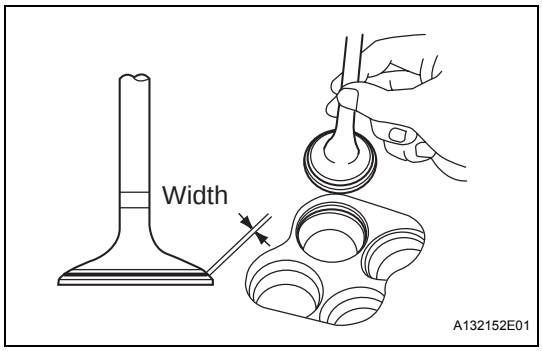
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20. INSPECT INTAKE VALVE SEAT

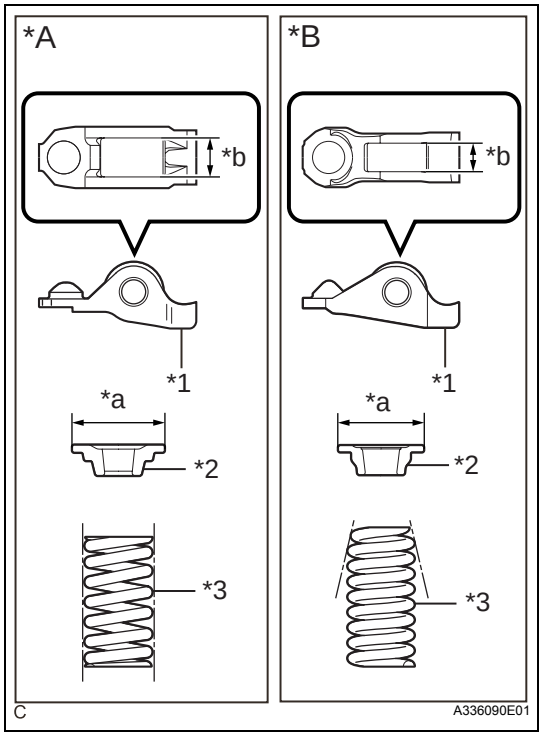
(a) Apply a light coat of Prussian blue to the valve face.
(b) Lightly press the valve face against the valve seat.
(c) Check the valve face and valve seat by using the following procedure.
  (1) If Prussian blue appears around the entire valve face, the valve face is concentric. If not, replace the valve.
  (2) If Prussian blue appears around the entire valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
  (3) Check that the valve seat contacts in the middle of the valve face with the width between 1.1 and 1.5 mm (0.043 and 0.059 in.).



21. INSPECT EXHAUST VALVE SEAT

(a) Apply a light coat of Prussian blue to the valve face.
(b) Lightly press the valve face against the valve seat.
(c) Check the valve face and valve seat by using the following procedure.
  (1) If Prussian blue appears around the entire valve face, the valve face is concentric. If not, replace the valve.
  (2) If Prussian blue appears around the entire valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
  (3) Check that the valve seat contacts in the middle of the valve face with the width between 1.2 and 1.6 mm (0.047 and 0.063 in.).

EM



22. INSPECT INNER COMPRESSION SPRING

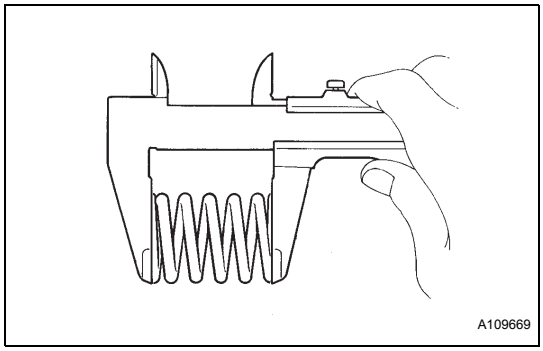
HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration

*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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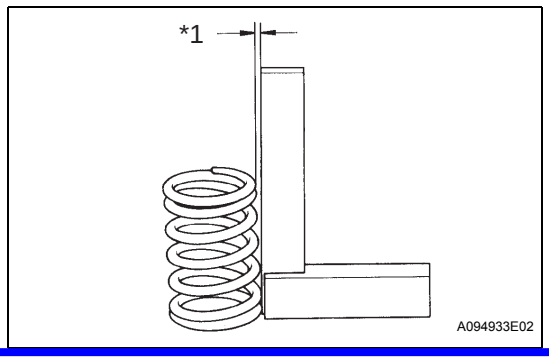
(a) Type A:

(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.

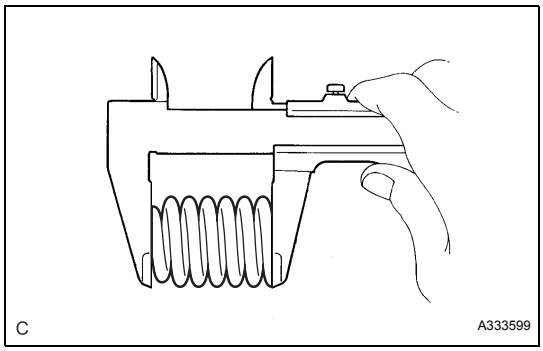
Text in Illustration

*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:

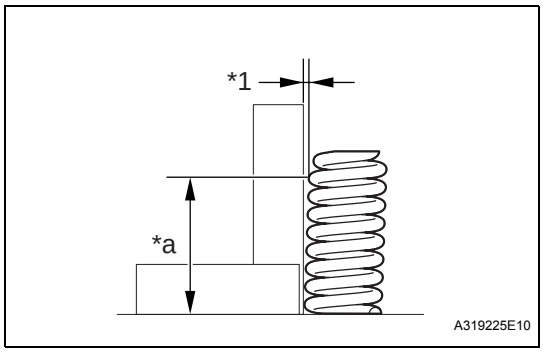
(1) Using vernier calipers, measure the free length of the inner compression spring.

Free length:

50.55 mm (1.9902 in.)

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

EM



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

Text in Illustration

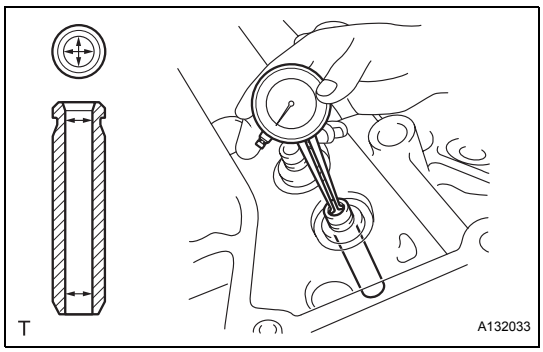
*1	Deviation
*a	40 mm (1.57 in.)

Maximum deviation:

1.4 mm (0.0551 in.)

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

[Added]



23. INSPECT VALVE GUIDE BUSH OIL CLEARANCE

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

Standard bush inside diameter:

5.51 to 5.53 mm (0.2169 to 0.2177 in.)

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

Standard clearance

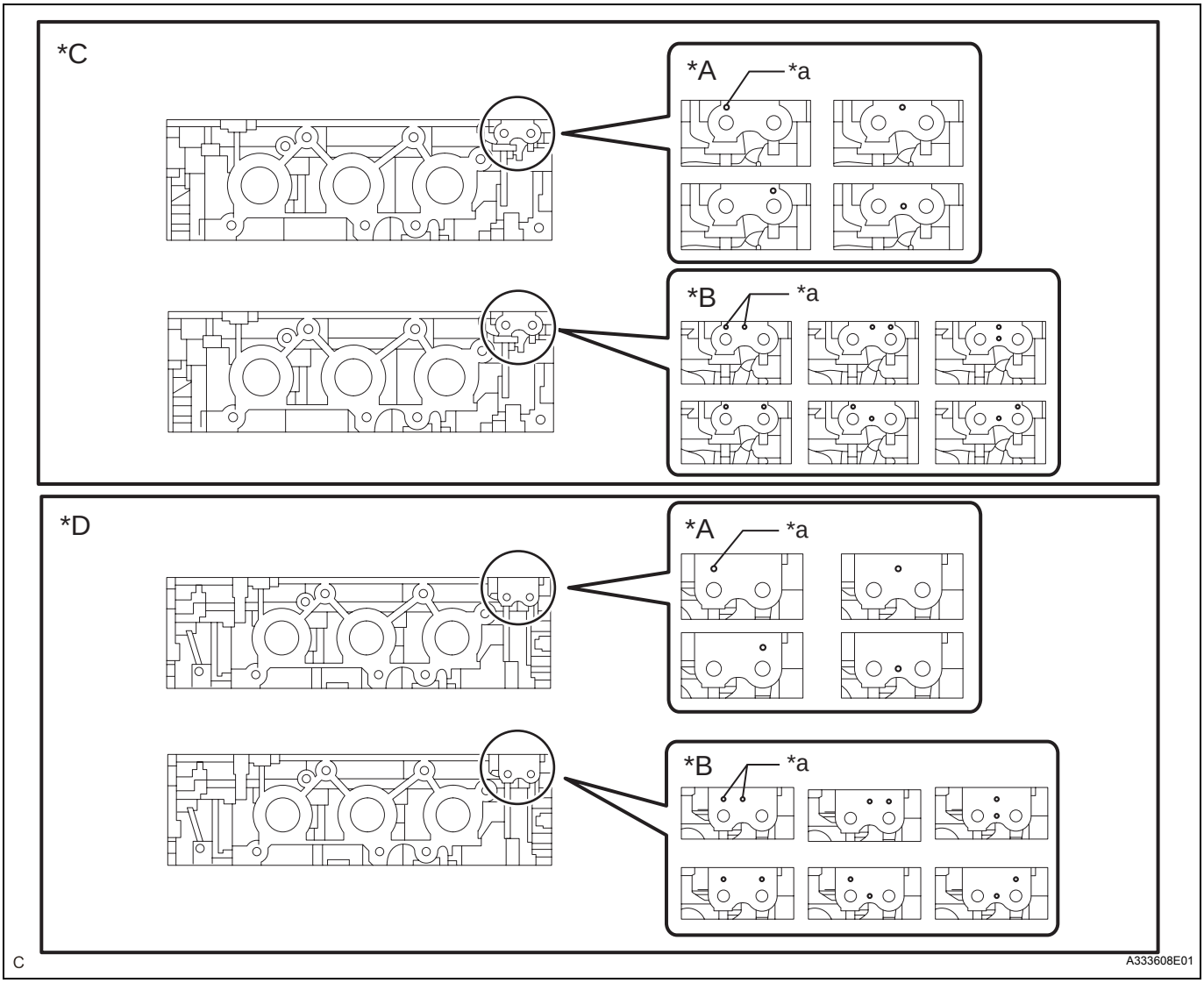
Item	Specified Condition
Intake	0.025 to 0.060 m (0.0010 to 0.0024 in.)

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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.



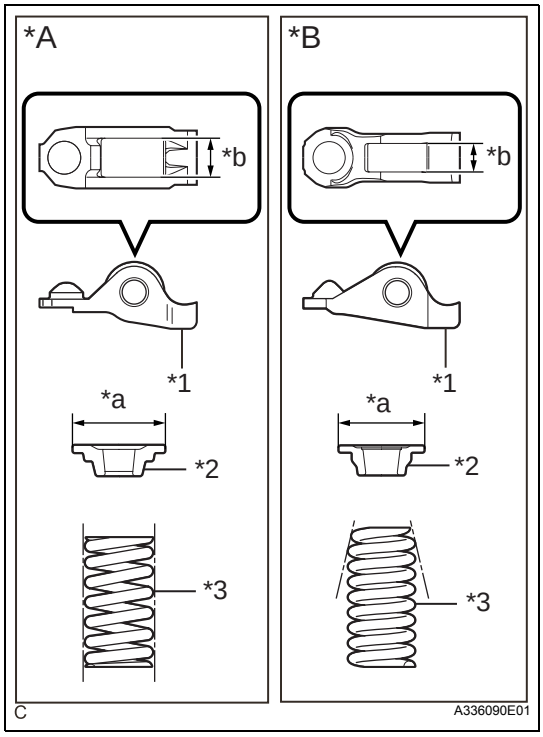
Text in Illustration

*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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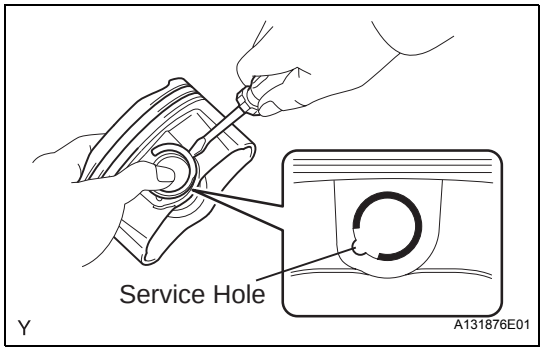


- There are 2 types of No. 1 valve rocker arm sub-assemblies, inner compression springs and valve spring retainers. The 2 types are not interchangeable.

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

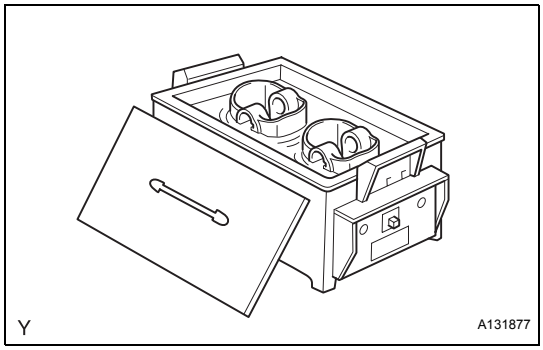
Type	No. 1 Valve Rocker Arm Sub-assembly Roller Width	Valve Spring Retainer Diameter	Inner Compression Spring Shape
A	10.7 mm (0.421 in.)	23.4 mm (0.921 in.)	Straight
B	8.0 mm (0.315 in.)	18.9 mm (0.744 in.)	Taper



1. INSTALL PISTON WITH PIN SUB-ASSEMBLY

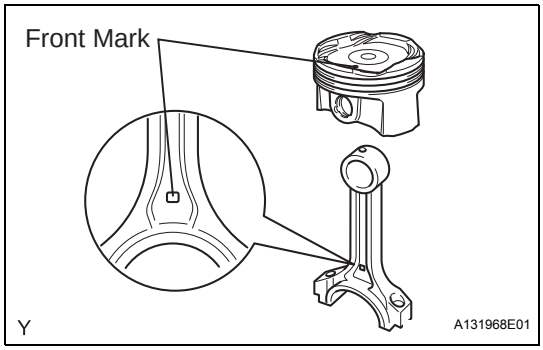
(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.
HINT:
Be sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

EM



(b) Gradually heat the piston to approximately 80°C (176°F).

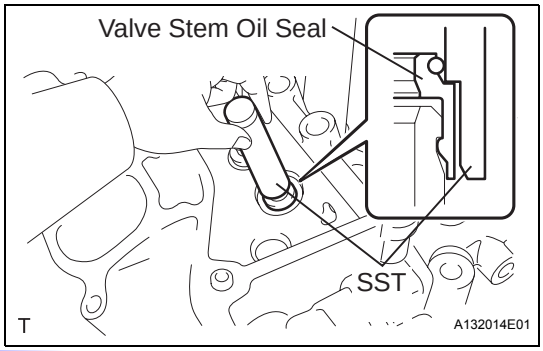
(c) Coat the piston pin with engine oil.



(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.
HINT:
The piston and pin are a matched set.

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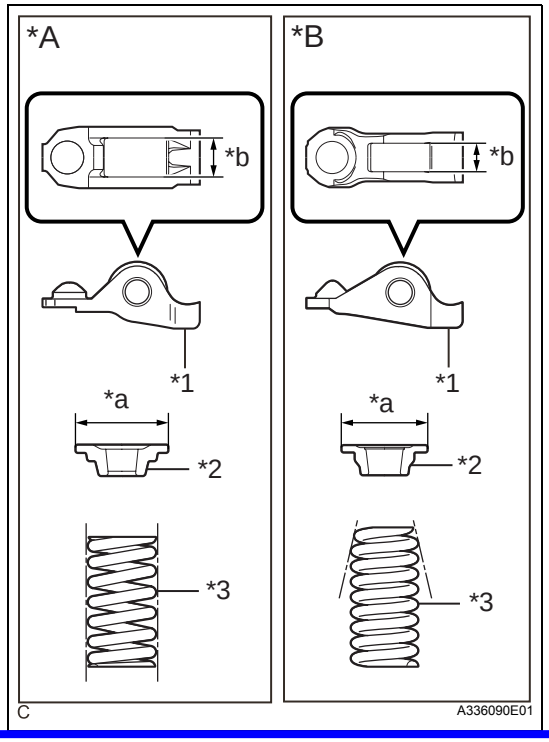
HINT:
The intake valve oil seals are white and the exhaust valve oil seals are black.



(b) Using SST, push in the oil seals.
SST 09201-41020
NOTICE:
Failure to use SST will cause the seal to be damaged or improperly seated.

[Added]

14. INSTALL INTAKE VALVE

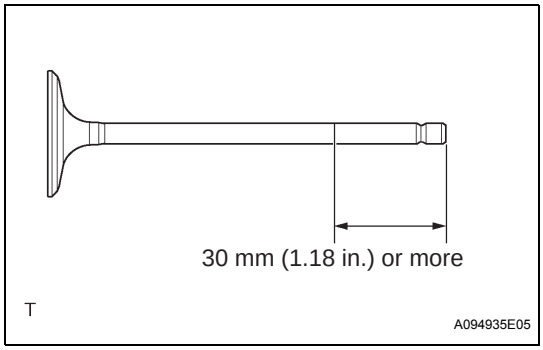


HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration

*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

EM

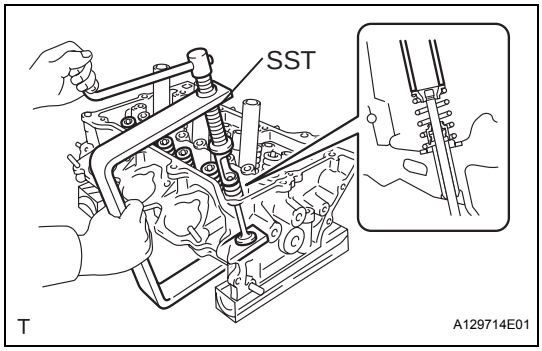


(a) Apply plenty of engine oil to the tip area of the intake valve shown in the illustration.

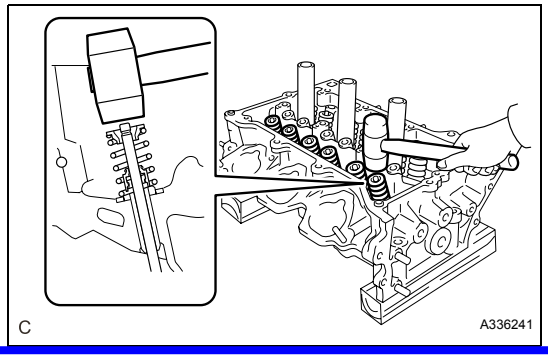
(b) Type A:
(1) Install the intake valve, inner compression spring and valve spring retainer to the cylinder head.
NOTICE:
Install the same parts in the same combination to the original locations.

[Corrected]

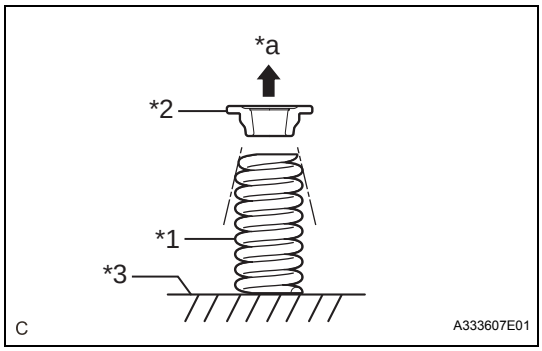
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(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.
SST 09202-70020 (09202-00010)



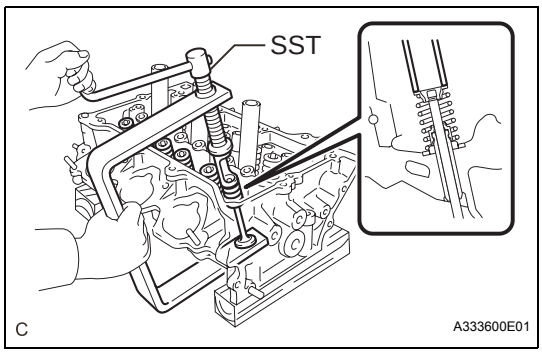
(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.



(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

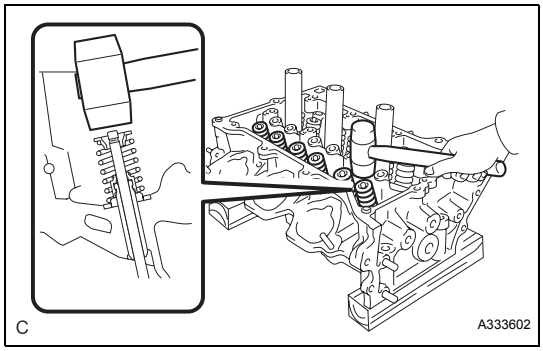
NOTICE:
- **Install the inner compression spring with its taper side facing upward (towards the valve spring retainer).**
- **Install the same parts in the same combination to the original locations.**



(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.
SST 09202-70020, 09202-00020

[Added]

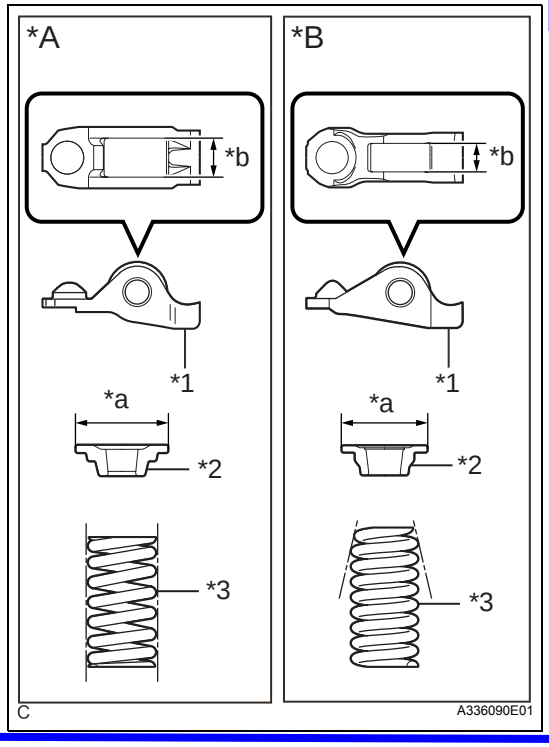
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(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.

15. INSTALL EXHAUST VALVE

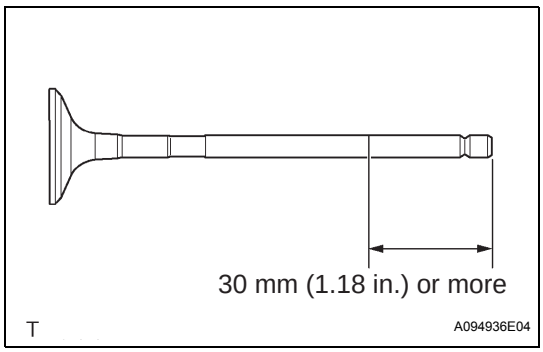
HINT:
Type A and Type B can be distinguished by the shape of the inner compression spring.
Text in Illustration



*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

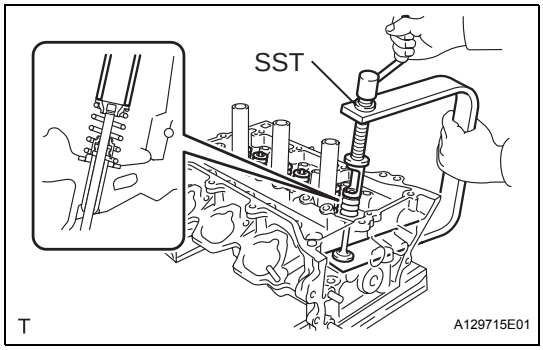
EM



(a) Apply plenty of engine oil to the tip area of the exhaust valve shown in the illustration.

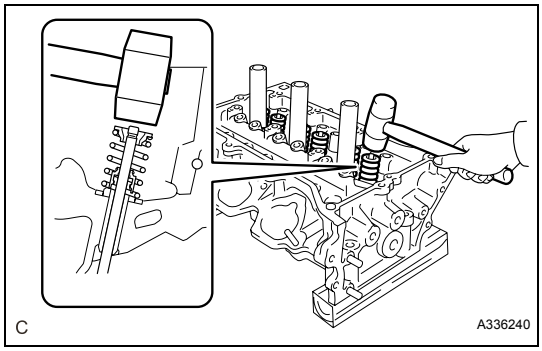
(b) Type A:

(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.

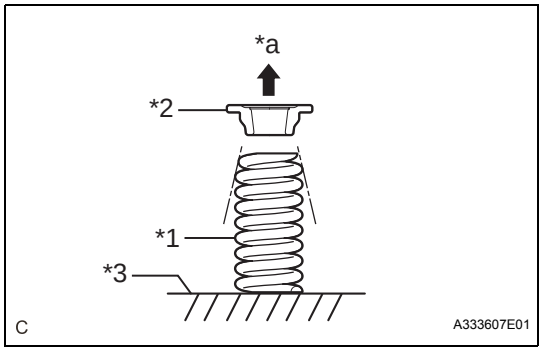


(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.
SST 09202-70020 (09202-00010)

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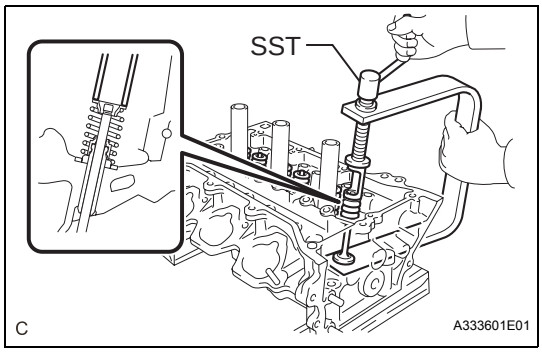
(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.



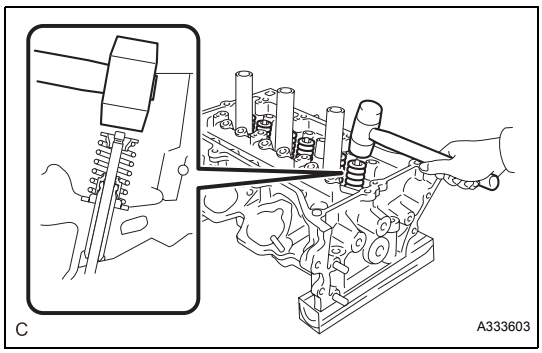
(c) Type B:
(1) Install the exhaust valve, inner compression spring and valve spring retainer to the cylinder head.
Text in Illustration

*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.**



(2) Using SST, compress the inner compression spring and install the 2 valve spring retainer locks.
SST 09202-70020, 09202-00020

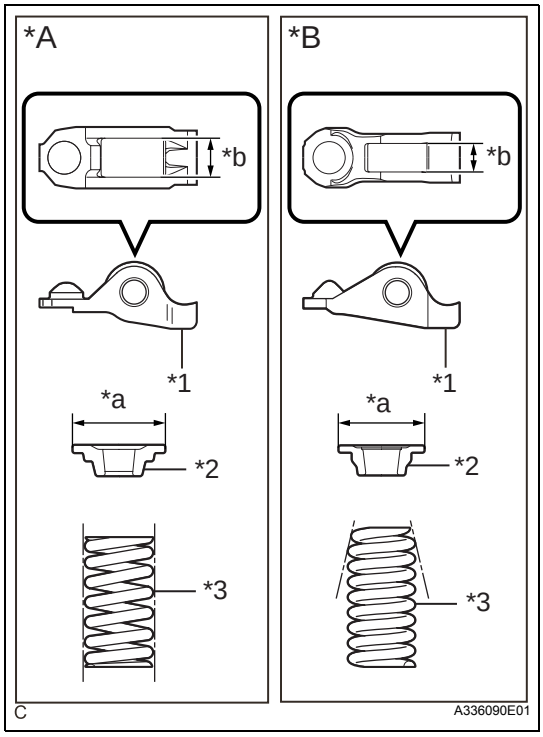


(3) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.

16. INSTALL VALVE STEM CAP
(a) Apply a light coat of engine oil to the valve stem caps.
(b) Install the valve stem caps to the cylinder head.

[Added]

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

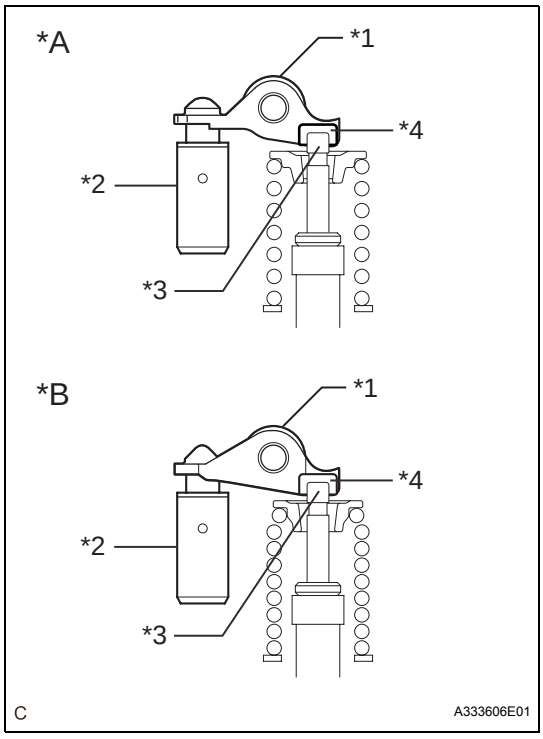
HINT:
Type A and Type B can be distinguished by the shape of the compression spring.
Text in Illustration

*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

(a) Apply engine oil to the lash adjuster tips and valve stem cap ends.

(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

[Corrected]

22. INSTALL NO. 1 CAMSHAFT (See page)

23. INSTALL NO. 2 CAMSHAFT (See page)

24. INSTALL CAMSHAFT BEARING CAP (for Bank 1) (See page)

25. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY (for Bank 1) (See page)

26. INSTALL NO. 3 CAMSHAFT (See page)

27. INSTALL NO. 4 CAMSHAFT (See page)

28. INSTALL CAMSHAFT BEARING CAP (for Bank 2) (See page)

29. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY (for Bank 2) (See page)

30. INSTALL NO. 2 CHAIN TENSIONER ASSEMBLY (See page)

31. INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 1) (See page)

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