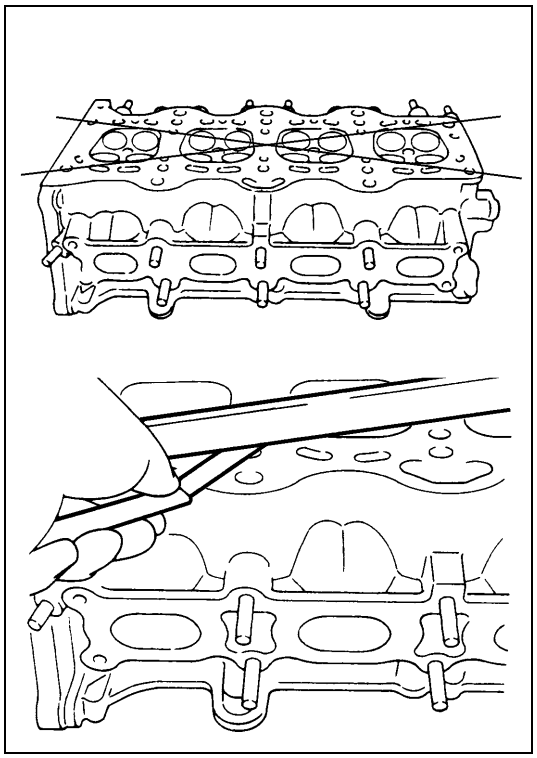
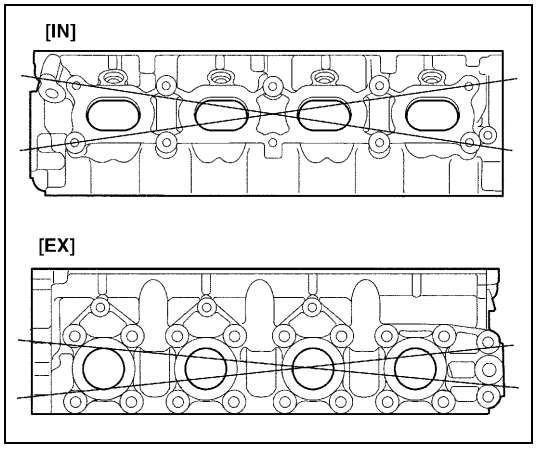


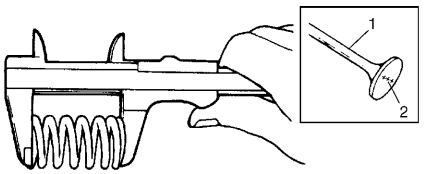
- Check cylinder head for cracks on intake and exhaust ports, combustion chambers, and head surface.
  Using a straightedge and thickness gauge, check flatness of gasketed surface at a total of 2 locations. If distortion limit, given below, is exceeded, correct gasketed surface with a surface plate and abrasive paper of about #400 (Waterproof silicon carbide abrasive paper): place abrasive paper on and over surface plate, and rub gasketed surface against paper to grind off high spots. Should this fail to reduce thickness gauge readings to within limit, replace cylinder head.
  Leakage of combustion gases from this gasketed joint is often due to warped gasketed surface: such leakage results in reduced power output.

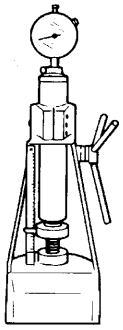
Limit of distortion for cylinder head surface on piston side
: 0.03 mm (0.001 in.)



- Distortion of manifold seating faces:
  Check seating faces of cylinder head for manifolds, using a straightedge and thickness gauge, in order to determine whether these faces should be corrected or cylinder head replaced.

Limit of distortion for cylinder head surface on intake and exhaust manifold
: 0.05 mm (0.002 in.)





Valve Springs

- Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

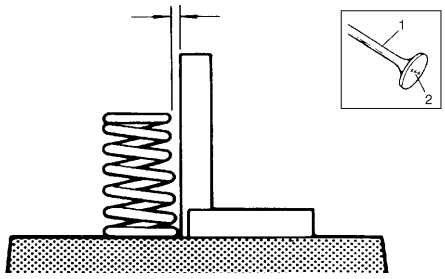
Valve spring free length for engine equipped with 69G type valve
Standard : 43.00 mm (1.693 in.)
Limit : 42.00 mm (1.652 in.)

Valve spring free length for engine equipped with 54G type valve
Standard : 36.83 mm (1.450 in.)
Limit : 35.83 mm (1.410 in.)

Valve spring preload for engine equipped with 69G type valve
Standard : 110 – 126 N (11.2 – 12.8 kg) for 39.50 mm (24.7 – 28.2 lb/1.555 in.)
Limit : 105 N (10.7 kg) for 39.5 mm (23.6 lb/1.555 in.)

Valve spring preload for engine equipped with 54G type valve
Standard : 107 – 125 N (10.7 – 12.5 kg) for 31.50 mm (23.6 – 27.6 lb/1.240 in.)
Limit : 102 N (10.4 kg) for 31.50 mm (22.9 lb/1.240 in.)

1. Valve
2. Emboss mark 54G or 69G

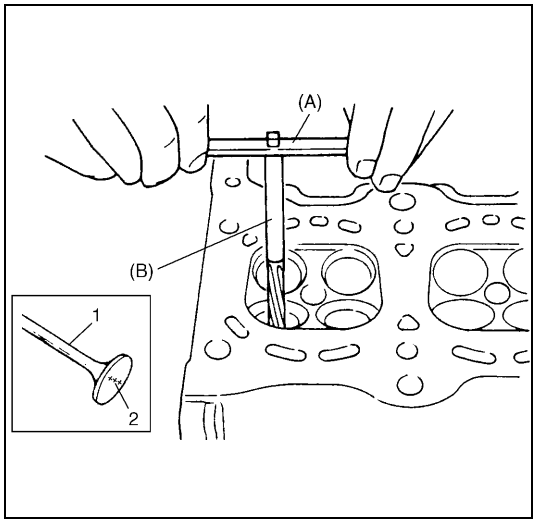


- Spring skewness:
  Use a square and surface plate to check each spring for skewness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

Valve spring skewness
Limit : 2.0 mm (0.079 in.) for engine equipped with 69G type valve
Limit : 1.6 mm (0.063 in.) for engine equipped with 54G type valve

1. Valve
2. Emboss mark 54G or 69G

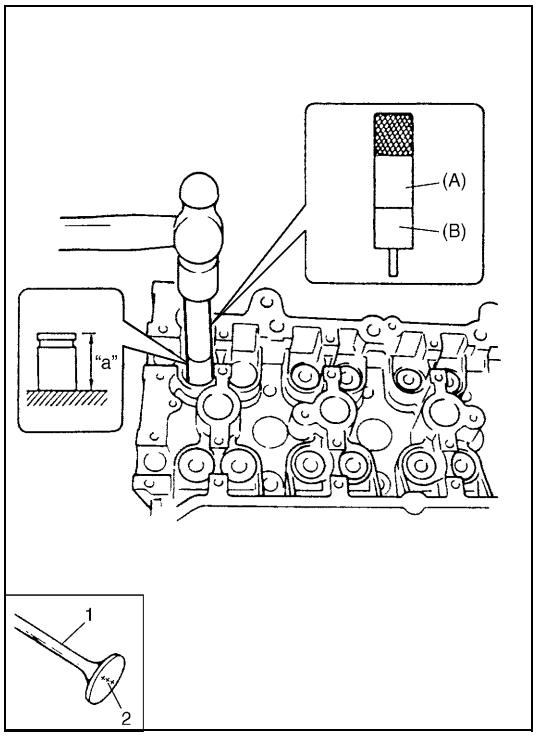
ASSEMBLY



1) Before installing valve guide into cylinder head, ream guide hole with special tool (11 mm reamer for engine equipped with 69G type valve or 10.5 mm reamer for engine equipped with 54G type valve) so as to remove burrs and make it truly round.

Special tool
(A) : 09916-34542
(B) : 09916-38210 (11 mm) for engine equipped with 69G type valve
(B) : 09916-37320 (10.5 mm) for engine equipped with 54G type valve

1. Valve
2. Emboss mark 54G or 69G



2) Install valve guide to cylinder head.
Heat cylinder head uniformly to a temperature of 80 to 100 °C (176 to 212 °F) so that head will not be distorted, and drive new valve guide into hole with special tools. Drive in new valve guide until special tool (Valve guide installer) contacts cylinder head.
After installing, make sure that valve guide protrudes by specified dimension "a" from cylinder head.

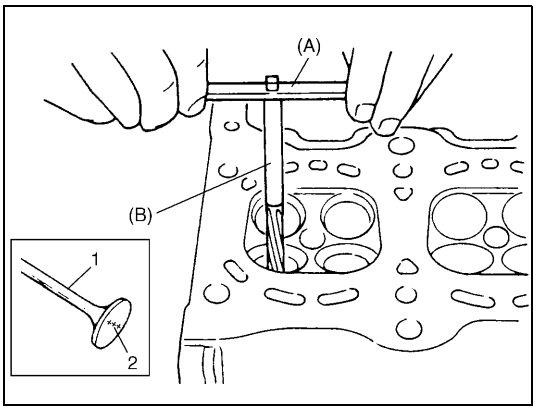
Special tool
(A) : 09916-57350 (For engine equipped with 69G type valve)
(A) : 09916-58210 (For engine equipped with 54G type valve)
(B) : 09917-88240 (For Intake side of engine equipped with 69G type valve)
(B) : 09917-88250 (For Exhaust side of engine equipped with 69G type valve)
(B) : 09916-56011 (For both sides of engine equipped with 54G type valve)

NOTE:

- **Never reuse once-disassembled valve guide. Make sure to install new valve guide.**
- **Intake and exhaust valve guides are identical.**

Specification for valve guide protrusion "a"
Intake side of engine equipped with 69G type valve : 17.5 mm (0.71 in.)
Exhaust side of engine equipped with 69G type valve : 14.5 mm (0.57 in.)
Both sides of engine equipped with 54G type valve : 11.1 – 11.5 mm (0.44 – 0.45 in.)

1. Valve
2. Emboss mark 54G or 69G

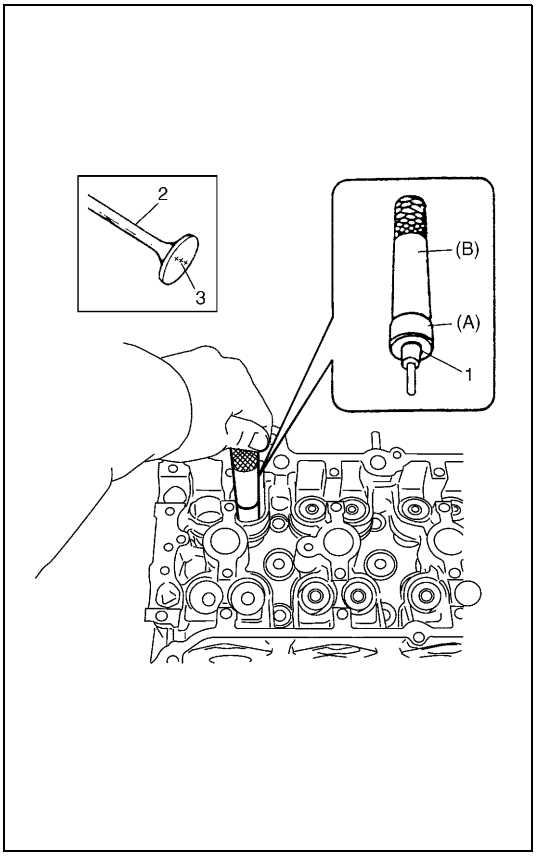


3) Ream valve guide bore with special tool (6.0 mm reamer for engine equipped with 69G type valve or 5.5 mm reamer for engine equipped with 54G type valve). After reaming, clean bore.

Special tool
(A) : 09916-34542
(B) : 09916-37810 (6 mm) for engine equipped with 69G type valve
(B) : 09916-34550 (5.5 mm) for engine equipped with 54G type valve

1. Valve
2. Emboss mark 54G or 69G

4) Install valve spring seat to cylinder head.



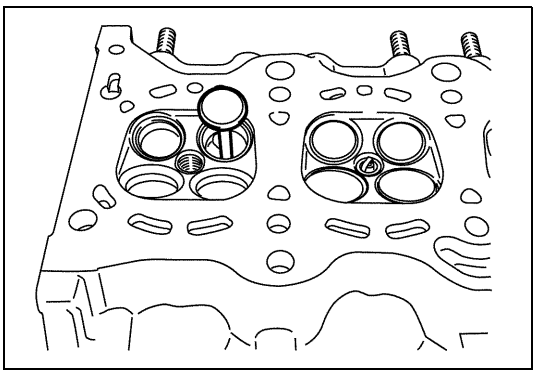
5) Install new valve stem seal (1) to valve guide.
After applying engine oil to seal and spindle of special tool (Valve guide installer handle), fit oil seal to spindle, and then install seal to valve guide by pushing special tool by hand.
After installing, check to be sure that seal is properly fixed to valve guide.

Special tool
(A) : 09917-98221
(B) : 09916-57350 (For engine equipped with 69G type valve)
(B) : 09916-58210 (For engine equipped with 54G type valve)

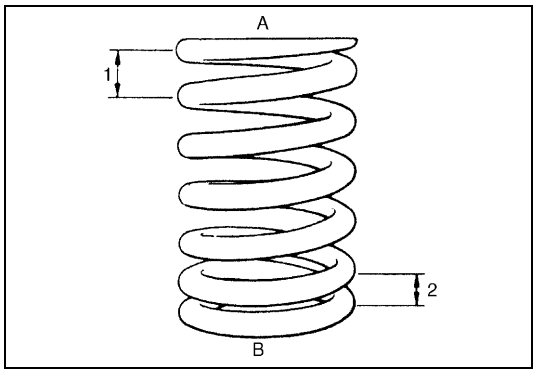
NOTE:

- **Do not reuse once-disassembled seal. Be sure to install new seal.**
- **When installing, never tap or hit special tool with a hammer or else. Install seal to guide only by pushing special tool by hand. Tapping or hitting special tool may cause damage to seal.**

2. Valve
3. Emboss mark 54G or 69G

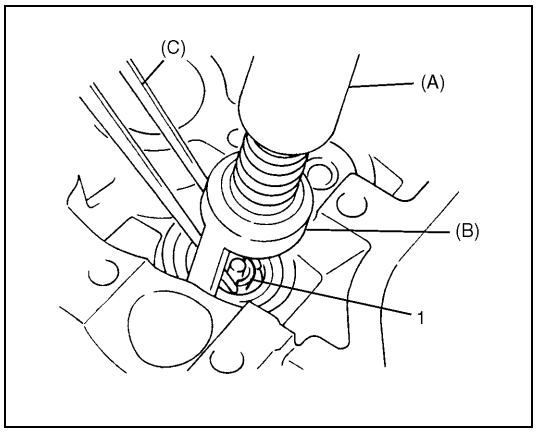


6) Install valve to valve guide.
Before installing valve to valve guide, apply engine oil to stem seal, valve guide bore and valve stem.



7) Install valve spring and spring retainer.
   Each valve spring has top end (large-pitch end (1)) and bottom end (small-pitch end (2)). Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).

A :	Valve spring retainer side
B :	Valve spring seat side



8) Using special tools (Valve lifter), compress valve spring and fit two valve cotters (1) into groove in valve stem.

Special tool
(A) : 09916-14510
(B) : 09916-14910
(C) : 09916-84511

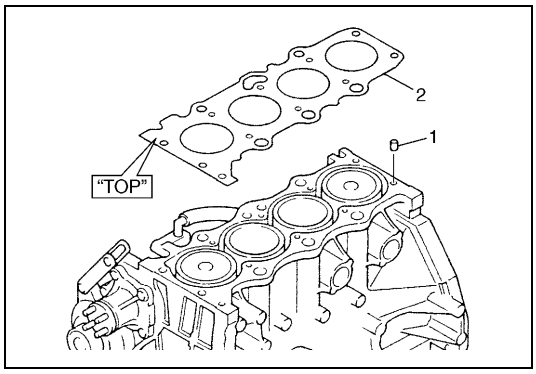
NOTE:

When compressing the valve spring, be carefully to free from damage in inside face of tappet installing hole.

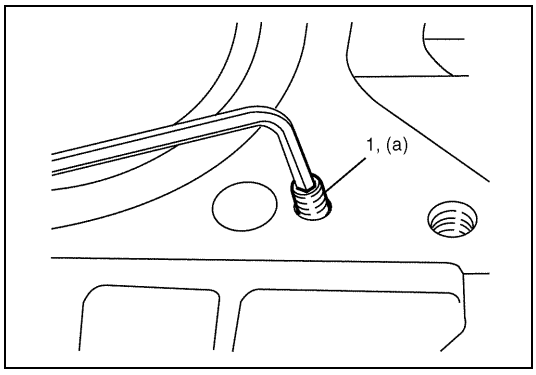
9) Install intake manifold, injectors and exhaust manifold to cylinder head.

INSTALLATION

1) Clean mating surface of cylinder head and cylinder block. Remove oil, old gasket and dust from mating surface.

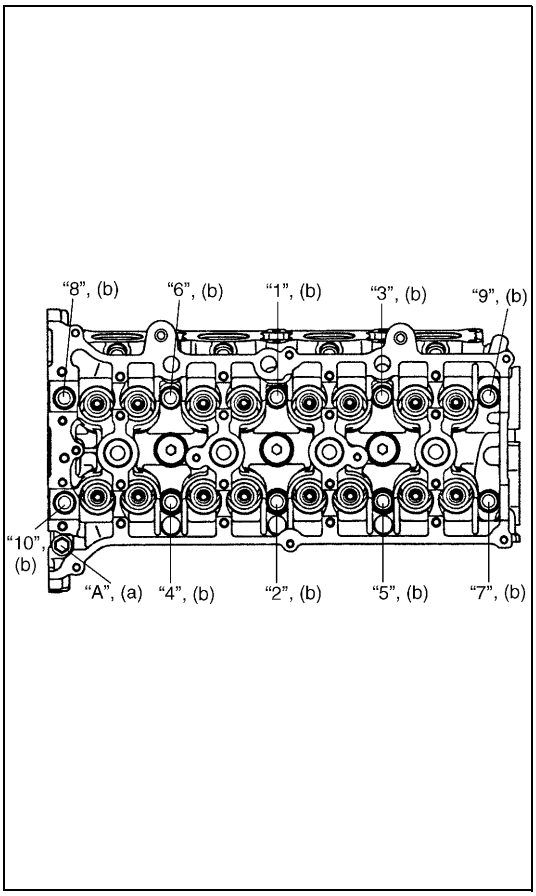


2) Install knock pins (1) to cylinder block.
3) Install new cylinder head gasket (2) to cylinder block.
   "TOP" mark provided on gasket comes to crankshaft pulley side, facing up (toward cylinder head side).



4) Make sure that oil jet (venturi plug) (1) is installed and if it is, that it is not clogged.
   When installing it, be sure to tighten to specified torque.

Tightening torque
Venturi plug (a) : 5 N·m (0.5 kg-m, 3.5 lb-ft)



5) Install cylinder head to cylinder block.
   Apply engine oil to new cylinder head bolts and tighten them gradually as follows.
   a) Tighten cylinder head bolts ("1" – "10") to 20 N·m (2.0 kg-m, 14.5 lb-ft) according to numerical order as shown by using a 12 corner socket wrenches.
   b) In the same manner as in Step a), tighten them to 40 N·m (4.0 kg-m, 29.0 lb-ft).
   c) Turn all bolts 60° according to numerical order in figure.
   d) Repeat Step c).
   e) Tighten bolt "A" to specified torque.

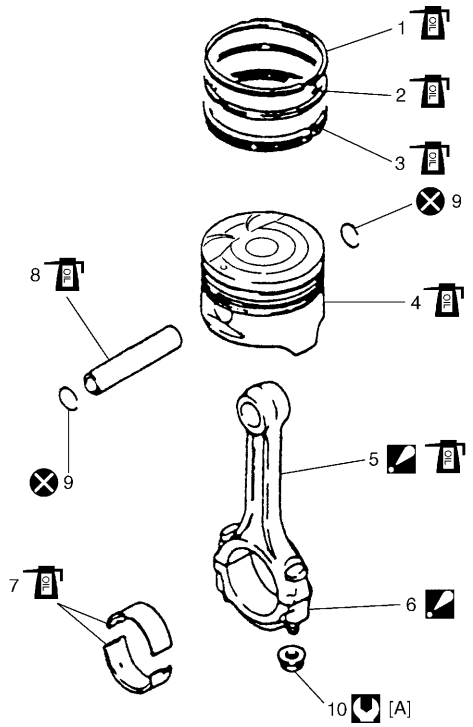
NOTE:

- **Never reuse cylinder head bolts ("1" – "10") once disassembled it due to plastic deformation tightening. Be sure to use new cylinder head bolts.**
- **Be sure to tighten M8 bolt ("A") after securing the other bolt.**

Tightening torque
Cylinder head bolt for M8 (a) : 22 N·m (2.2 kg-m, 16.0 lb-ft)
Cylinder head bolts for M10
(b) : 40 N·m (4.0 kg-m, 29.0 lb-ft) and then turn to 60° twice

6) Install exhaust manifold stiffener and exhaust No.1 pipe referring to "EXHAUST MANIFOLD".
7) Install camshafts, timing chain and chain cover as previously outlined.
8) Install cylinder head cover and oil pan as previously outlined.
9) Install intake manifold stiffener and connect each hoses and electric lead wires securely.
10) Install air cleaner assembly, resonator and hoses referring to "AIR CLEANER ASSEMBLY AND RESONATOR".
11) Adjust water pump belt tension referring to Section 6B.
12) Adjust A/C compressor belt tension (if equipped) referring to Section 1B.
13) Adjust accelerator cable play referring to Section 6E1.
14) Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
15) Refill cooling system with coolant, engine with engine oil.
16) Connect negative cable at battery.
17) Verify that there is no fuel leakage, coolant leakage, oil leakage and exhaust gas leakage at each connection.

PISTONS, PISTON RINGS, CONNECTING RODS AND CYLINDERS



	[A] : 1) Tighten all nuts to 15 N·m (1.5 kg-m) 2) Turn all nuts to 45° 3) Then, Turn all nuts to 45° one again	7.	Connecting rod bearing
	1. Top ring	8.	Piston pin
	2. 2nd ring	9.	Piston pin circlip
	3. Oil ring	10.	Bearing cap nut
	4. Piston		Tightening torque
	5. Connecting rod : Apply engine oil to sliding surface except inner surface of big end, and rod bolts. Make sure rod bolt diameter when reuse it due to plastic deformation tightening. Refer to “INSPECTION” of “CONNECTING ROD”.		Apply engine oil to sliding surface of each parts.
	6. Connecting rod bearing cap : Point arrow mark on cap to crankshaft pulley side.		Do not reuse.

REMOVAL

1) Relieve fuel pressure according to procedure described in Section 6.
2) Disconnect negative cable at battery.
3) Drain engine oil.
4) Drain coolant.
5) Remove cylinder head referring to “VALVES AND CYLINDER HEAD”.
6) Mark cylinder number on all pistons, connecting rods and connecting rod caps using silver pencil or quick drying paint.
7) Remove rod bearing caps.