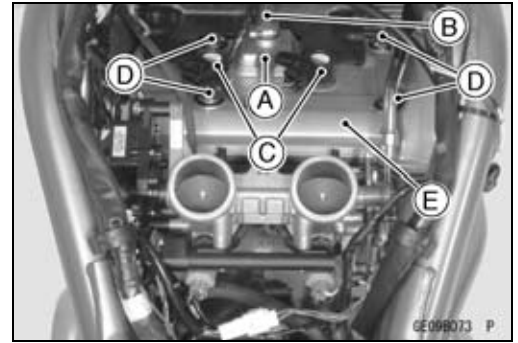


Cylinder Head Cover

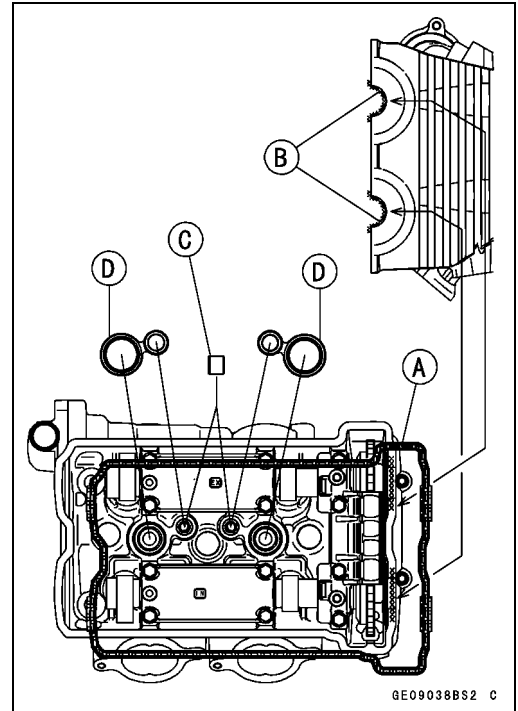
Cylinder Head Cover Removal

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
 - Air Suction Valve Cover [A] with Hose [B]
 - Stick Coils [C]
 - Baffle Plate
 - Cylinder Head Cover Bolts [D]
 - Cylinder Head Cover [E]

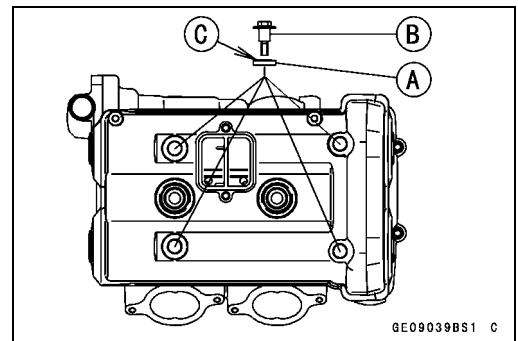


Cylinder Head Cover Installation

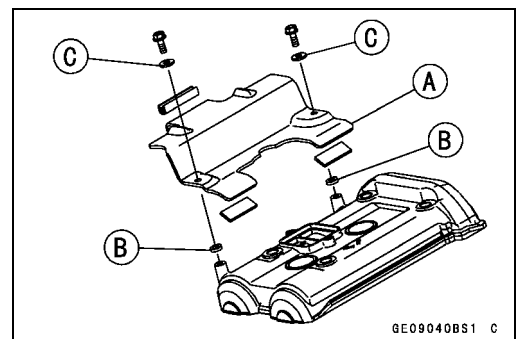
- Replace the head cover gasket [A] with a new one.
- Apply silicone sealant [B] to the cylinder head as shown.
 - Sealant - Kawasaki Bond (Silicone Sealant): 92104-0004**
- Install:
 - Dowel Pins [C]
 - Plug Hole Gaskets [D]



- Install:
 - Washers [A]
 - Cylinder Head Cover Bolts [B]
- Install the washers with metal side [C] faces upward.
- Tighten:
 - Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**



- Install the baffle plate [A].
- Put the insulators [B] under the baffle plate and the washers [C] on the baffle plate.
- Apply a non-permanent locking agent to the baffle plate bolts and torque them.
- Torque - Baffle Plate Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)**



5-14 ENGINE TOP END

Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

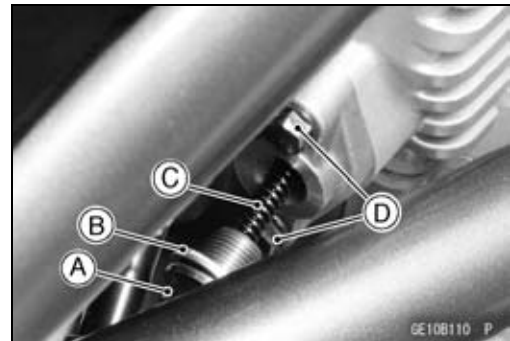
CAUTION

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below:

When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation."

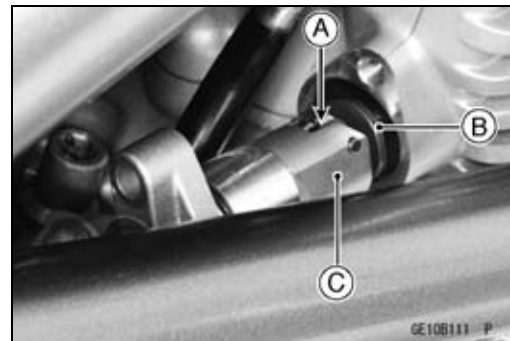
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove:
 - Cap Bolt [A]
 - Washer [B]
 - Spring [C]
- Remove the mounting bolts [D] and take off the camshaft chain tensioner.

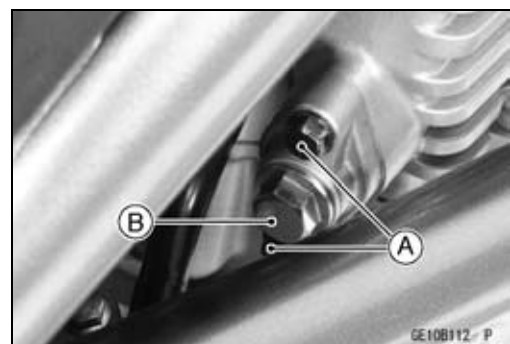


Camshaft Chain Tensioner Installation

- Release the stopper [A] and push the push rod [B] into the tensioner [C].
- Install the tensioner so that the stopper faces upward.



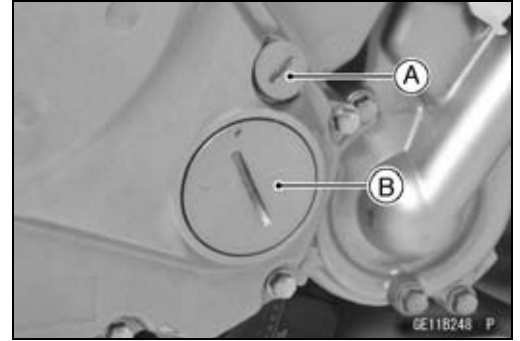
- Tighten the tensioner mounting bolts [A].
Torque - Camshaft Chain Tensioner Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install the spring and washer.
- Tighten the cap bolt [B].
Torque - Camshaft Chain Tensioner Cap Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.



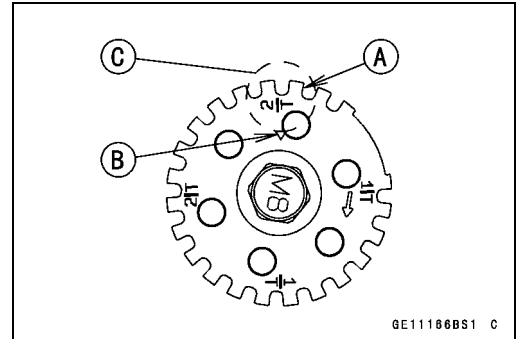
Camshaft, Camshaft Chain

Camshaft Removal

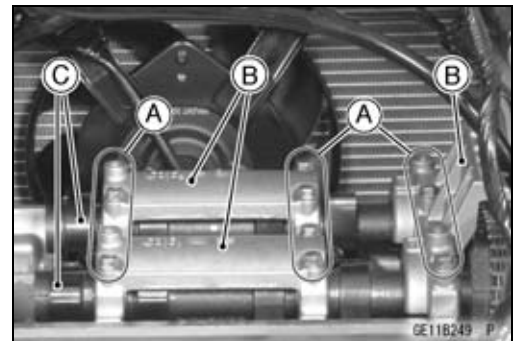
- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Position the crankshaft as follows.
 - Remove the upper [A] and lower [B] caps on the clutch cover.



- Using a wrench on the crankshaft rotation bolt, turn the crankshaft clockwise until the 2/T mark line [A] on the timing rotor is aligned with the notch [B] in the edge of the upper hole [C] in the clutch cover.



- Remove:
 - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
 - Camshaft Cap Bolts [A]
 - Camshaft Caps [B]
 - Camshafts [C]

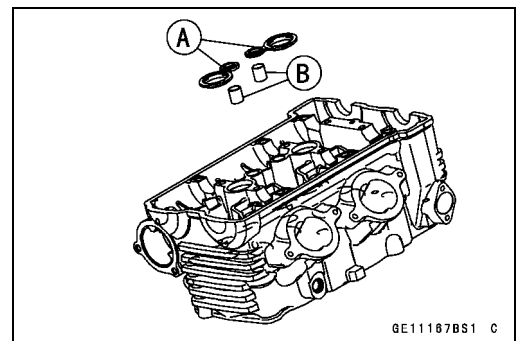


CAUTION

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft Installation

- Be sure to install the following parts.
 - Plug Hole Gaskets [A]
 - Dowel Pins [B]



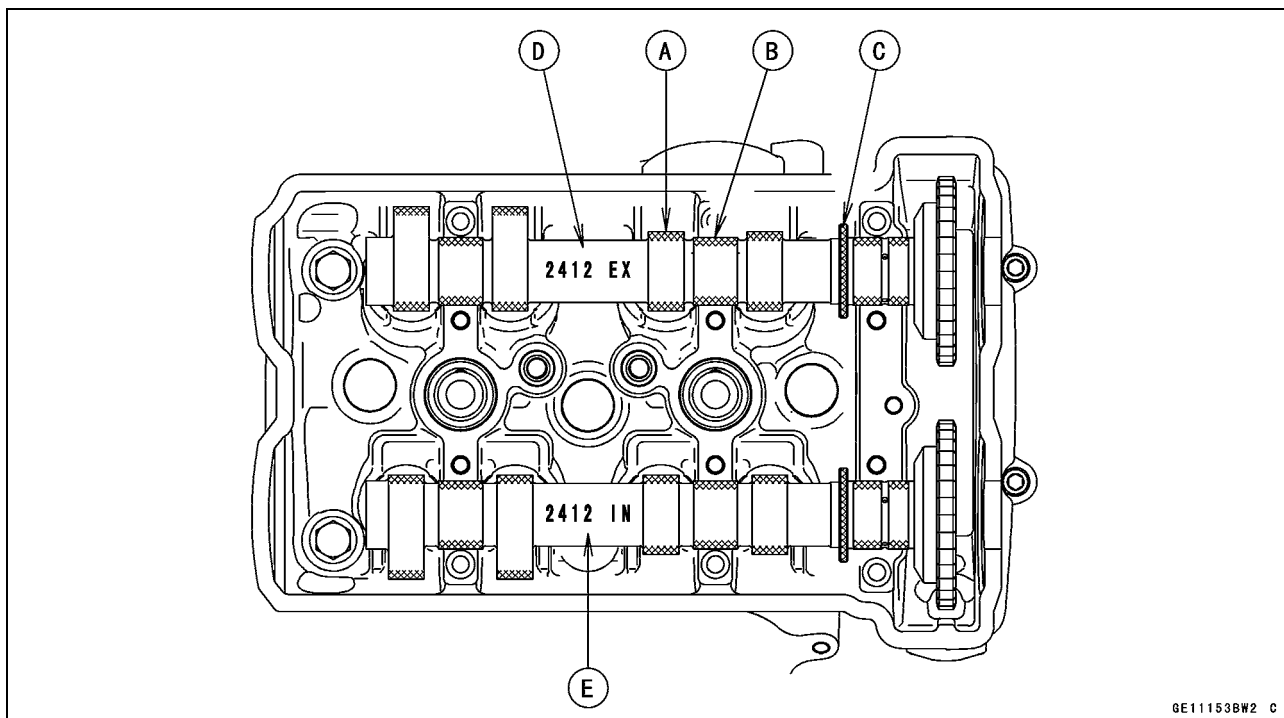
5-16 ENGINE TOP END

Camshaft, Camshaft Chain

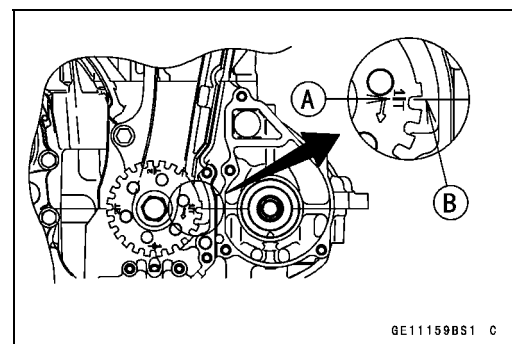
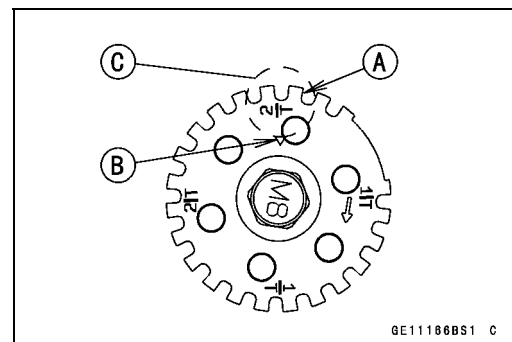
- Apply molybdenum disulfide oil solution to all cams [A] journals [B] and thrust blocks [C] with × marks.
- If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.

NOTE

○ The exhaust camshaft has a 2 412 EX mark [D] and the inlet camshaft has a 2 412 IN mark [E]. Be careful not to mix up these shafts.

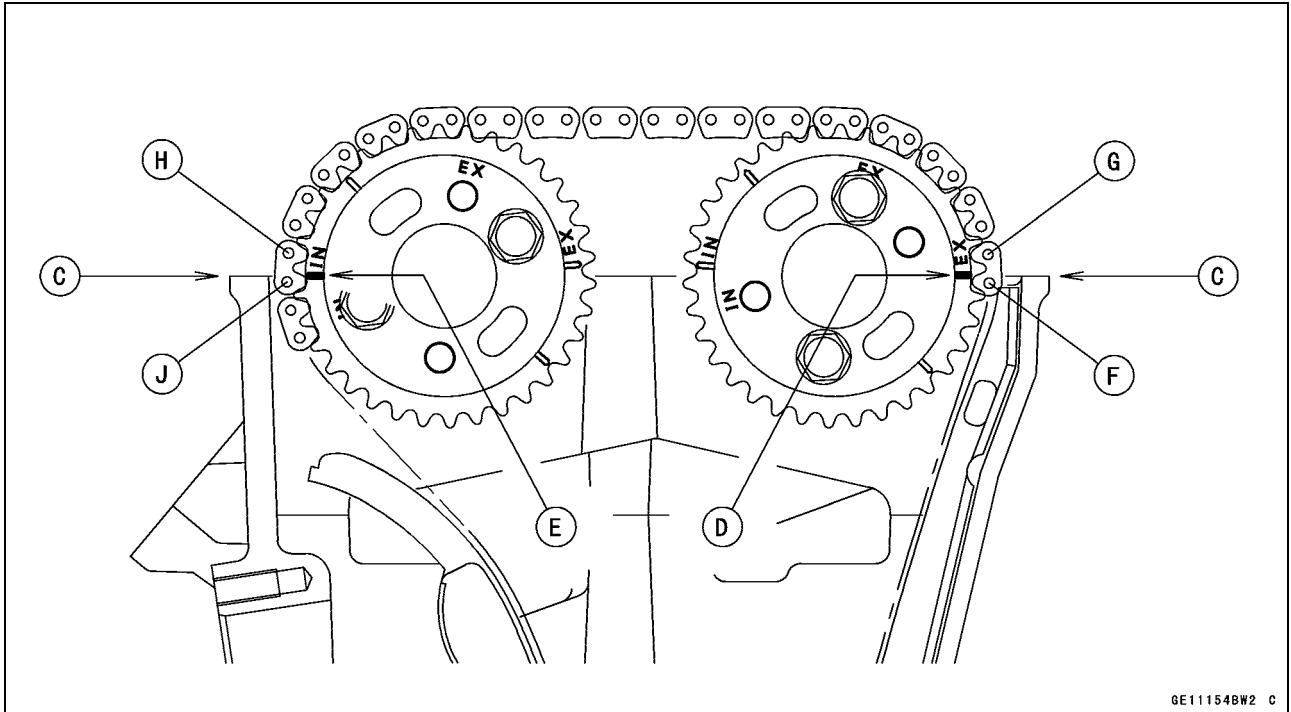


- Position the crankshaft as follows.
- Pull the tension side (exhaust side) of the chain taut to install the chain.
- Engage the camshaft chain with the camshaft sprockets so that the timing marks on the sprockets are positioned as shown.
- Using a wrench on the crankshaft rotation bolt, turn the crankshaft clockwise until the 2|T mark line [A] on the timing rotor is aligned with the notch [B] in the edge of the upper hole [C] in the clutch cover.
- If the clutch cover is removed, perform the next procedure.
- Using a wrench on the crankshaft rotation bolt, turn the crankshaft clockwise until the 1|T mark line [A] on the timing rotor is aligned with the wating surface [B] of the crankcase halves.



Camshaft, Camshaft Chain

- The timing marks must be aligned with the cylinder head upper surface [C].
 - EX mark [D] (Between #1 Pin and #2 Pin)
 - IN mark [E] (Between #31 Pin and #32 Pin)
 - #1 Pin [F]
 - #2 Pin [G]
 - #31 Pin [H]
 - #32 Pin [J]



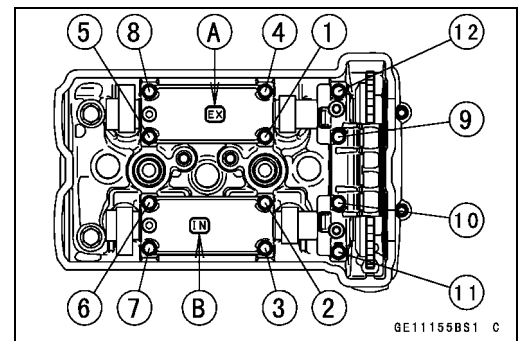
- Install the camshaft cap, while pushing the camshaft chain, tighten all camshaft bolts and chain guide bolts.

NOTE

- The exhaust cap has a "EX" mark [A] and the inlet cap has a "IN" mark [B]. Be careful not to mix up these caps.
- First tighten all the camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence.

Torque - Camshaft Cap Bolts (1 ~ 12): 12 N·m (1.2 kgf·m, 106 in·lb)

- Install:
 - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Installation)
 - Cylinder Head Cover (see Cylinder Head Cover Installation)



5-18 ENGINE TOP END

Camshaft, Camshaft Chain

Camshaft and Sprocket Assembly

- The inlet and exhaust sprockets are identical.
- Install the sprockets so that the marked ("IN" and "EX") side faces to the right side.

CAUTION

**Inlet sprocket must use "IN" marked bolts holes [A].
Exhaust sprocket must use "EX" marked bolts holes [B].**

- Apply a non-permanent locking agent to the camshaft sprockets bolts and tighten them.

Torque - Camshaft Sprockets Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

- ★ If a new camshaft is to be used, apply a thin coat of a molybdenum disulfide grease to the cam surfaces.

Camshaft, Camshaft Cap Wear

- Remove:
 - Camshaft Caps (see Camshaft Removal)
- Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Measure each clearance between the camshaft journal and the camshaft cap using plastigage (press gauge) [A].
- Tighten:

Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

NOTE

○ Do not turn the camshaft when the plastigage is between the journal and camshaft cap.

Camshaft Journal, Camshaft Cap Clearance

Standard: 0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)

Service Limit: 0.16 mm (0.0063 in.)

- ★ If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

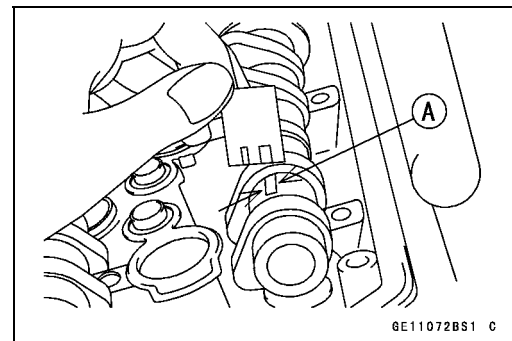
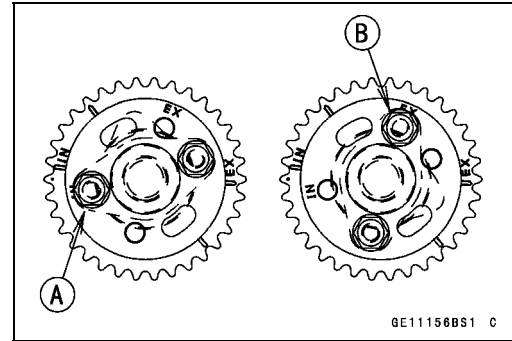
Camshaft Journal Diameter

Standard: 23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)

Service Limit: 23.92 mm (0.942 in.)

- ★ If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.

- ★ If the clearance still remains out of the limit, replace the cylinder head unit.



Camshaft, Camshaft Chain

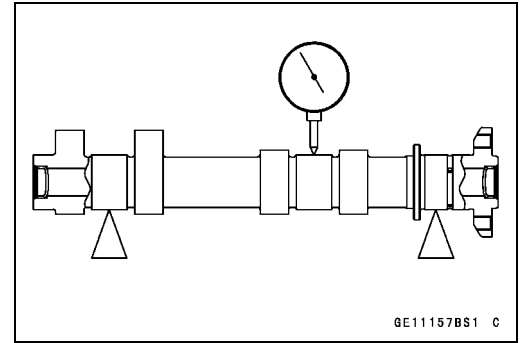
Camshaft Runout

- Remove the camshaft (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure runout with a dial gauge at the specified place as shown.
- ★ If the runout exceeds the service limit, replace the shaft.

Camshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)



Cam Wear

- Remove the camshaft (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.
- ★ If the cams are worn down past the service limit, replace the camshaft.

Cam Height

Standard:

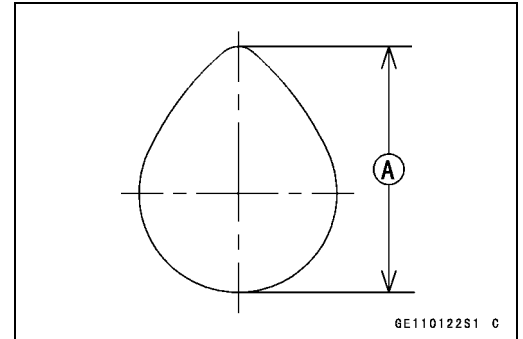
Exhaust 35.843 ~ 35.957 mm (1.4111 ~ 1.4156 in.)

Inlet 36.543 ~ 36.657 mm (1.4387 ~ 1.4432 in.)

Service Limit:

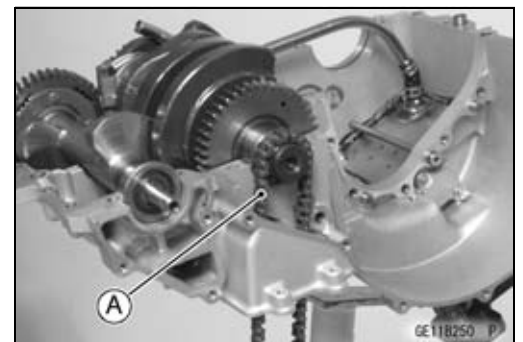
Exhaust 35.74 mm (1.4071 in.)

Inlet 36.44 mm (1.4346 in.)



Camshaft Chain Removal

- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.



5-20 ENGINE TOP END

Cylinder Head

Cylinder Compression Measurement

NOTE

○Use the battery which is fully charged.

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
 - Stick Coils (see Stick Coil (Ignition Coil together with Spark Plug Cap) Removal in the Electrical System chapter)
 - Spark Plugs (see Spark Plug Replacement in the Periodic Maintenance chapter)

Owner's Tool - Spark Plug Wrench, 16 mm: 92110-1132

NOTE

○Reconnect the connectors of the air switching valve lead and the inlet air temperature sensor lead. When the ignition switch is turned ON with the above connectors disconnected, the service codes (13, 64) are stores in the ECU.

- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

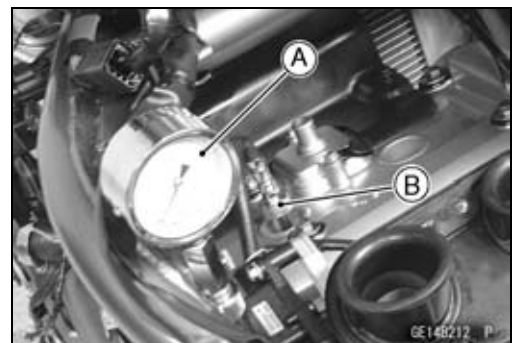
Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1317

Cylinder Compression

Usable Range: 961 ~ 1 471 kPa (9.8 ~ 15.0 kgf/cm², 139 ~ 213 psi) @400 r/min (rpm)

- Repeat the measurement for the other cylinders.
- Install the spark plugs.

Torque - Spark Plugs: 15 N·m (1.5 kgf·m, 11 ft·lb)



Cylinder Head

The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

Cylinder Head Removal

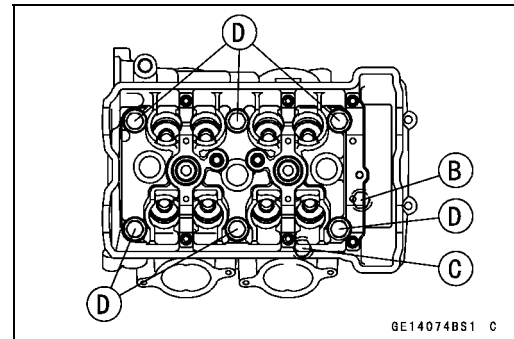
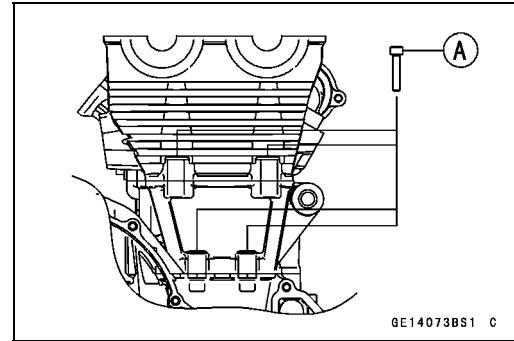
- Remove:
 - Exhaust Pipes (see Exhaust Pipe Removal)
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Camshafts (see Camshaft Removal)
 - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Throttle Body Holder
 - Water Hose
 - Water Temperature Sensor Connector [A]
 - Front Camshaft Chain Guide



5-22 ENGINE TOP END

Cylinder Head

- Firstly remove the M6 cylinder head bolts and M6 cylinder bolts [A].
- Secondly, remove the M8 bolts [B].
- Thirdly, remove the M10 nut [C].
- Fourthly, remove the M10 bolts [D].



Cylinder Head Installation

NOTE

- *The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*
- Install a new cylinder head gasket [A] and dowel pins [B].

