

Oil Pump

Oil Pump Removal

- Remove the one way clutch.
- Remove the clutch shoe.
- Remove the snap ring.
- Remove the washer.
- Remove the oil pump driver gear.

Caution

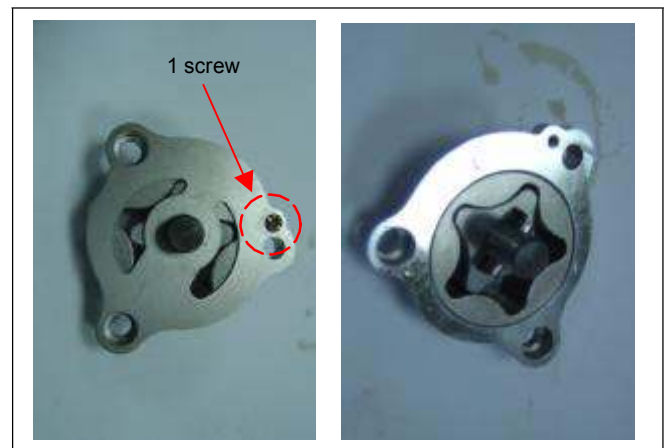
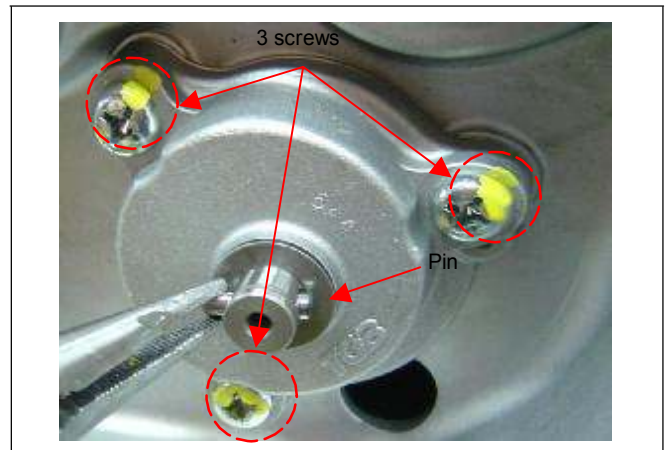
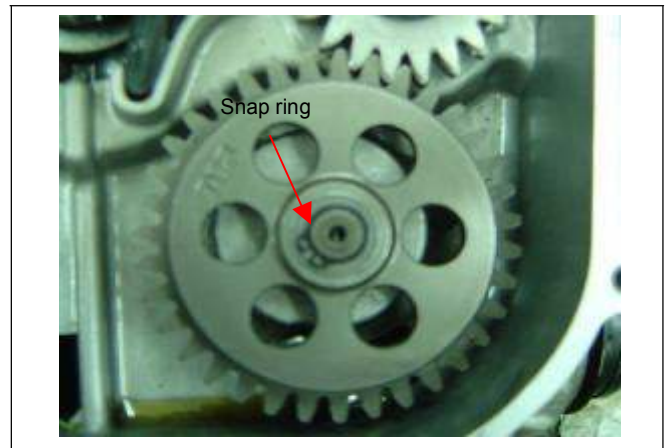
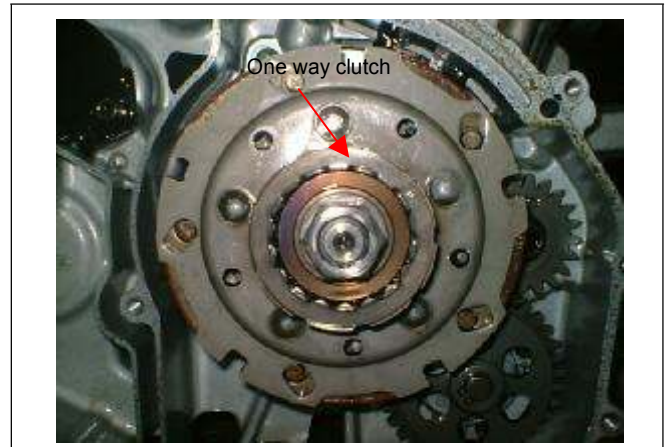
The clutch shoe nut has left-hand threads.

- Remove the snap ring.
- Remove the washer.
- Remove the oil pump driver gear.
- Remove the pin.
- Remove the washer.

- Make sure that pump shaft can be rotated freely.
- Remove 3 screws on the oil pump, and then remove oil pump.

Oil Pump Disassembly

- Remove the screws on oil pump cover and remove the cover.
- Remove oil pump shaft roller and shaft.



Oil Pump Inspection

Check the clearance between oil pump body and outer rotor.

Limit: 0.25 mm



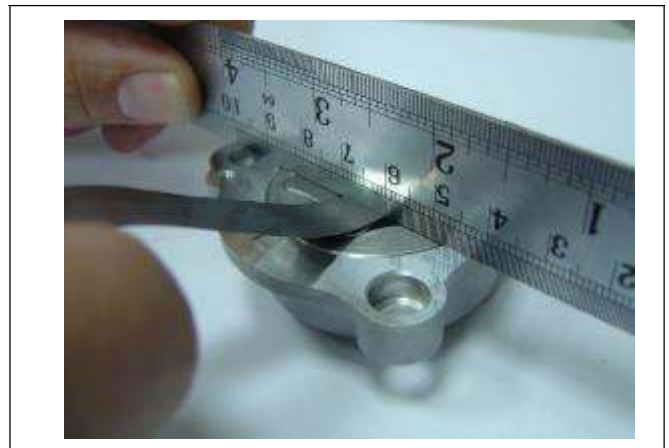
Check clearance between inner and outer rotors.

Limit: 0.20 mm



Check clearance between rotor side face and pump body

Limit: 0.12 mm

**Oil Pump Re-assembly**

Install inner and outer rotors into the pump body.
Align the indent on driving shaft with that of inner rotor.

Install the oil pump shaft and roller.

Install the oil pump cover and fixing pins properly.



3. LUBRICATION SYSTEM

Tighten the oil pump screw.



Oil Pump Installation

Install the oil pump, and then tighten 3 screws.

Torque value : 1.0kgf-m

Make sure that oil pump shaft can be rotated freely.



- Install the washer.
- Install the pin.
- Install the oil driven gear.
- Install the washer.
- Install the snap ring.

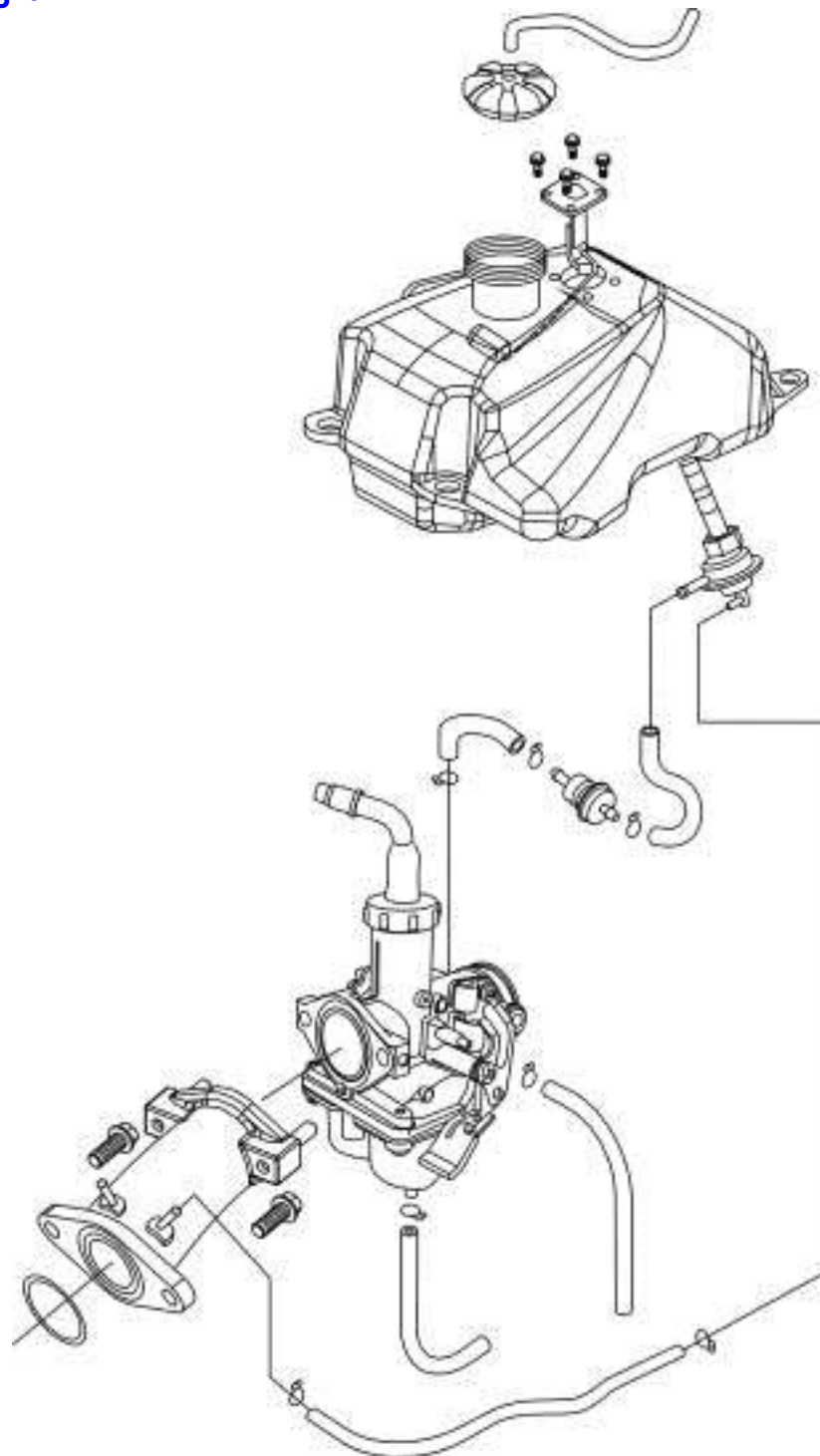


Notes:

Mechanism Diagram	4-1
Precautions in Operation.....	4-2
Trouble Diagnosis.....	4-3
Carburetor Remove / Install	4-4
Air Cut-Off Valve	4-5

Throttle Valve	4-6
Float Chamber.....	4-7
Adjustment of Idle Speed.....	4-9
Fuel Tank	4-10
Air Cleaner.....	4-11

Mechanism Diagram



Precautions in Operation

General Information

 **Warning**

Gasoline is a low ignition point and explosive materials, so always work in a well-ventilated place and strictly prohibit flame when working with gasoline.

 **Cautions**

- Do not bend off throttle cable. Damaged throttle cable will make unstable drive-ability.
- When disassembling fuel system parts, pay attention to O-ring position, replace with new one as re-assembly
- There is a drain screw in the float chamber for draining residual gasoline.
- Do not disassemble air cut valve arbitrarily.

Specification

ITEM	BSR33
Carburetor diameter	Ø33mm
I.D. number	33_77
Fuel level	31.5±0.5mm
Main injector	# 122.5
Idle injector	# 35
Idle speed	1500 ± 100rpm
Throttle handle clearance	1~3 mm
Pilot screw	2-1/2turns

Tool

Special service tools

Vacuum/air pressure pump

Fuel level gauge

Trouble Diagnosis

Poor engine start

No fuel in fuel tank

Clogged fuel tube

- Too much fuel in cylinder
- No spark from spark plug(malfunction of ignition system)
- Clogged air cleaner
- Malfunction of carburetor chock
- Malfunction of throttle operation

Stall after started

- Malfunction of carburetor chock
- Incorrect ignition timing
- Malfunction of carburetor
- Dirty engine oil
- Air existing in intake system
- Incorrect idle speed

Rough idle

- Malfunction of ignition system
- Incorrect idle speed
- Malfunction of carburetor
- Dirty fuel

Intermittently misfire as acceleration

- Malfunction of ignition system

Late ignition timing

- Malfunction of ignition system
- Malfunction of carburetor

Power insufficiency and fuel consuming

- Fuel system clogged
- Malfunction of ignition system

Mixture too lean

- Clogged fuel injector
- Vacuum piston stick and closed
- Malfunction of float valve
- Fuel level too low in float chamber
- Clogged fuel tank cap vent
- Clogged fuel filter
- Obstructed fuel pipe
- Clogged air vent hose
- Air existing in intake system

Mixture too rich

- Clogged air injector
- Malfunction of float valve
- Fuel level too high in float chamber
- Malfunction of carburetor chock
- Dirty air cleaner

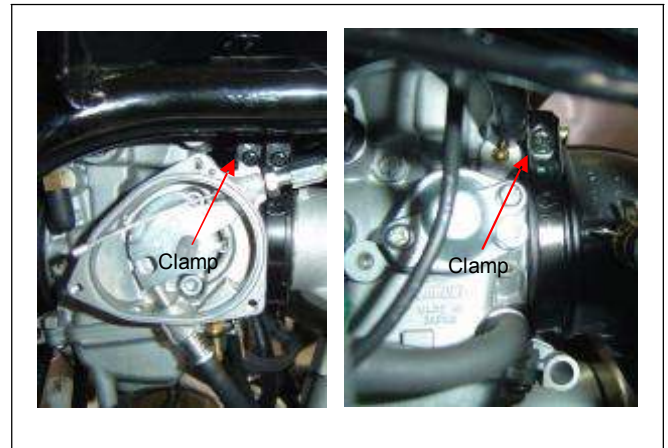
4. FUEL SYSTEM

Carburetor Remove / Install

Removal

Remove the fuel tank.

Loose the carburetor clamp screws.

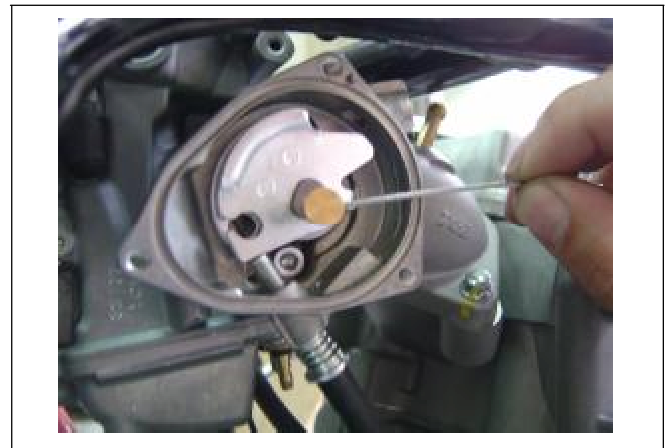


Loosen the carburetor side cap 3 screws.

Remove cap.



Disconnect the throttle cable.

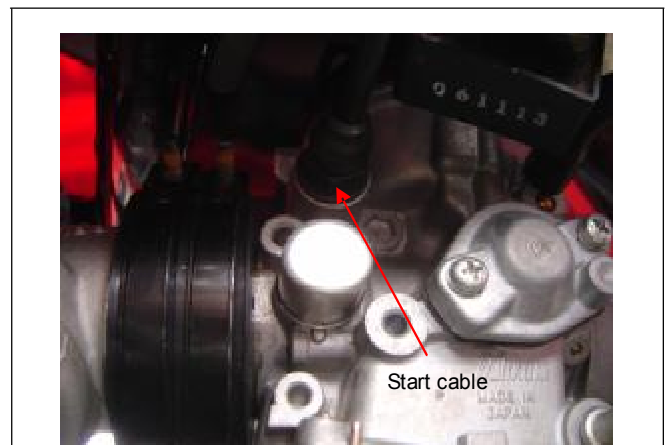


Disconnect the starter cable.

Remove the carburetor.

Installation

Install in reverse order of removal procedures.



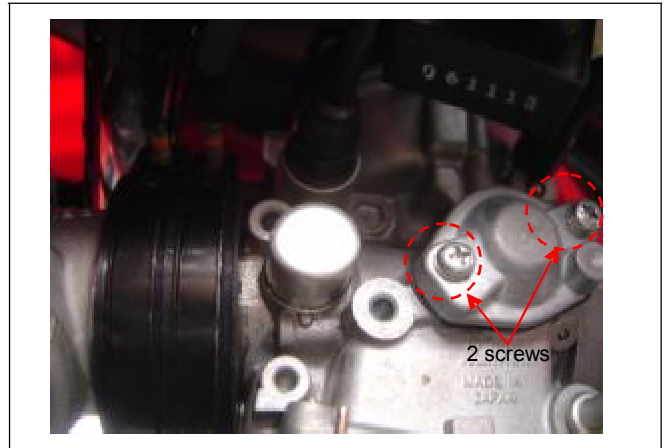
Air Cut-Off Valve

Disassembly

Remove air vent hoses.
Remove fuel hose.
Remove vacuum hose.



Remove air cut-off valve cover 2 screws, spring and valve.



Inspection

Check the valve is in normal.
If the valve is in normal, it will restrict air-flow
If air-flow is no restricting, replace carburetor assembly.
Check the vacuum pipe o-ring is in normal.



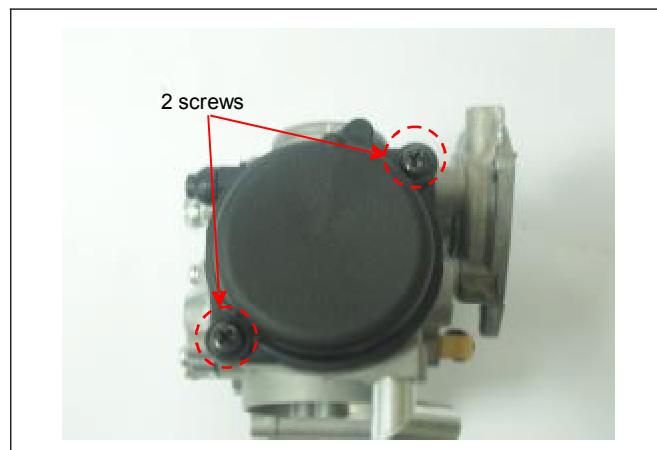
Assembly

Install in reverse order of removal procedures.

Throttle Valve

Disassembly

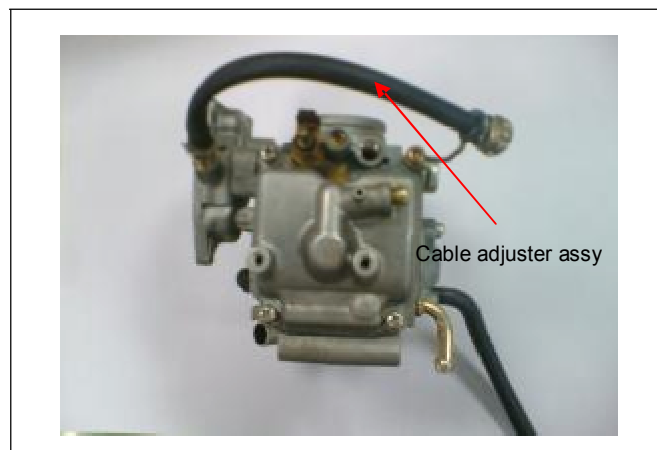
Remove carburetor top comp.



Remove the spring, holder, needle set, jet and piston valve.



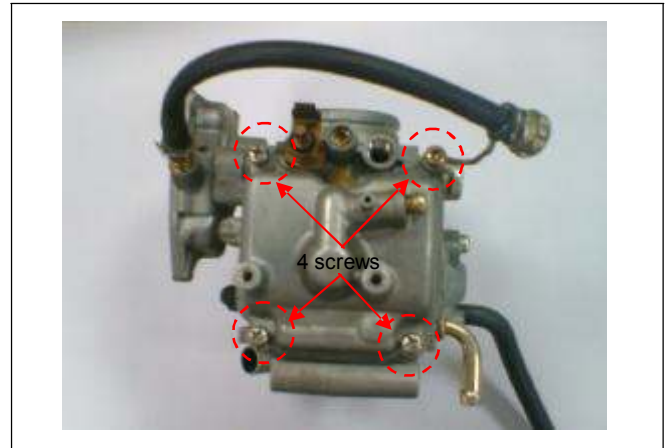
Remove the cable adjuster assy.



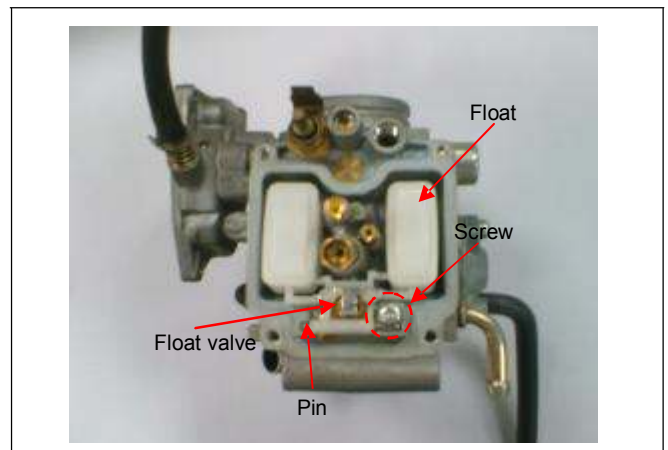
Float Chamber

Disassembly

Remove 4 mounting screws and remove float chamber cover.

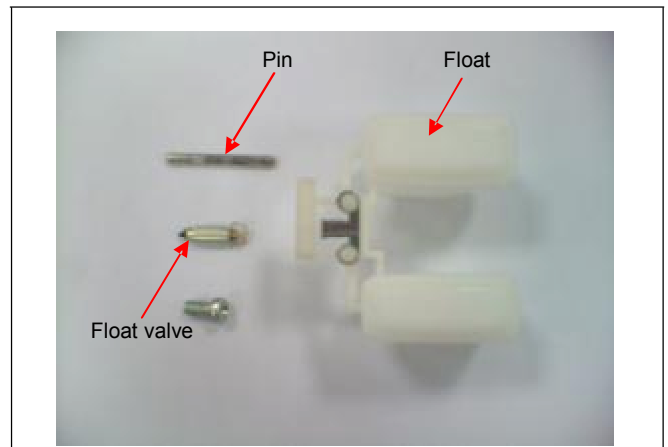


Remove the screw, float pin, float and float valve.



Inspection

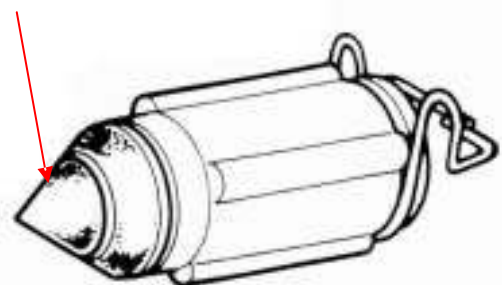
Check float valve and valve seat for damage, blocking.
 Check float valve for wearing, and check valve seat face for wear, dirt.



Cautions

In case of worn out or dirt, the float valve and valve seat will not tightly close causing fuel level to increase and as a result, fuel flooding. A worn out or dirty float valve must be replaced with a new a new one.

Check for wear or damage



4. FUEL SYSTEM

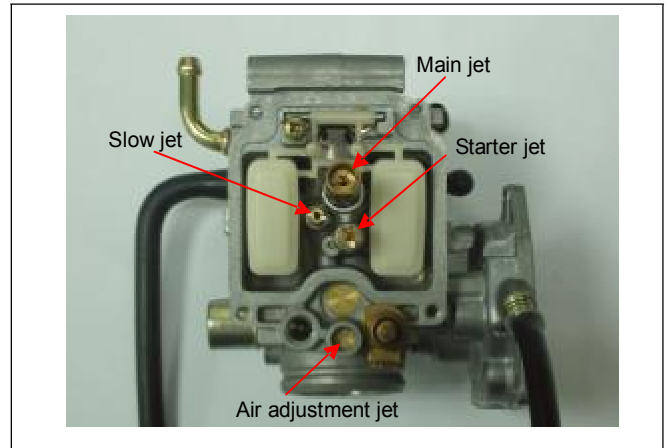
Remove main jet, needle jet holder, needle jet, slow jet and air adjustment screw.



Cautions

Take care not to damage jets and adjust screw.
Before removing adjustment screw, turn it all the way down and note the number of turns.

- Does not turn adjust screw forcefully to avoid damaging valve seat face.



Assembly

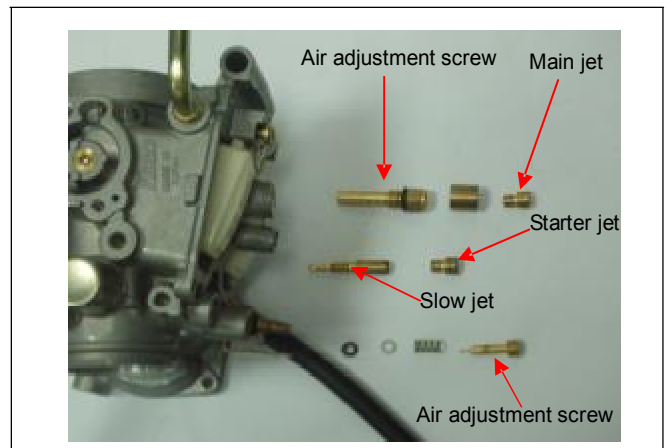
Install main jet, needle jet holder, needle jet, slow jet and air adjustment screw.



Cautions

Set the air adjustment screw in according to number of turns noted before it was removed.

Install the float valve, float, and float pin.



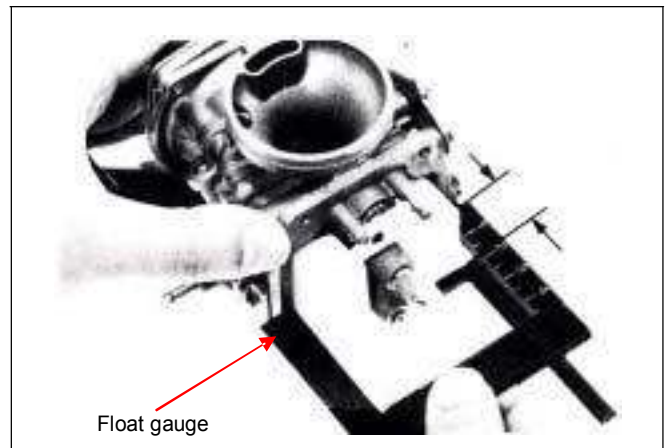
Checking fuel level



Caution

- Check again to ensure float valve, float for proper installation.
- To ensure correct measurement, position the float meter in such a way so that float chamber face is vertical to the main jet.

Fuel level: 31.5 ± 0.5 mm

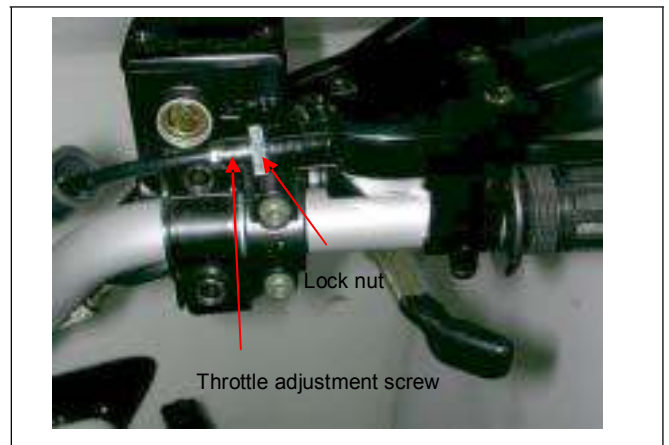


Installation of carburetor

Install carburetor in the reverse order of removal.

Following adjustments must be made after installation.

- Throttle cable adjustment.
- Idle adjustment



Adjustment of Idle Speed



Caution

- Air screw was set at factory, so no adjustment is needed. Note the number of turns it takes to screw it all the way in for ease of installation.
- The parking brake must be used to stop the ATV to perform the adjustments.

Use a tachometer when adjusting engine RPM. Screw in air adjustment screw gently, then back up to standard turns.

Standard turns: 2-1/2 turns

Warm up engine; adjust the throttle stopper screw of throttle valve to standard RPM.

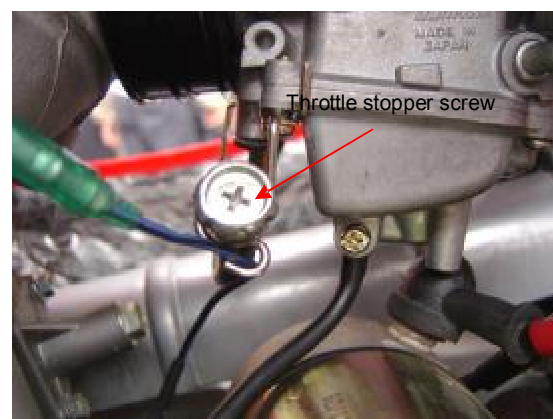
Idle speed rpm: 1500 ± 100 rpm

Connect the hose of exhaust analyzer to exhaust front end. Press test key on the analyzer.

Adjust the pilot screw and read CO reading on the analyzer

CO standard value: 1.0~1.5 %

Accelerate in gradual increments; make sure rpm and CO value are in standard value after engine running in stable. If rpm and CO value fluctuated, repeat the procedures described above for adjusting to standard value.



Fuel Tank

Fuel unit removal

- Open the seat.
- Remove the front cover and fuel tank.
- Remove the side covers and lower side covers.
- Remove the front fender.
- (Covers remove please refer chapter 13) Disconnect fuel unit coupler.
- Remove fuel unit (4 bolts).



Caution

- Do not bend the float arm of fuel unit.
- Do not fill out too much fuel to fuel tank.

Fuel unit inspection (Refer to electrical equipment chapter 17).

Fuel unit installation

Install the gauge in the reverse order of removal.



Caution

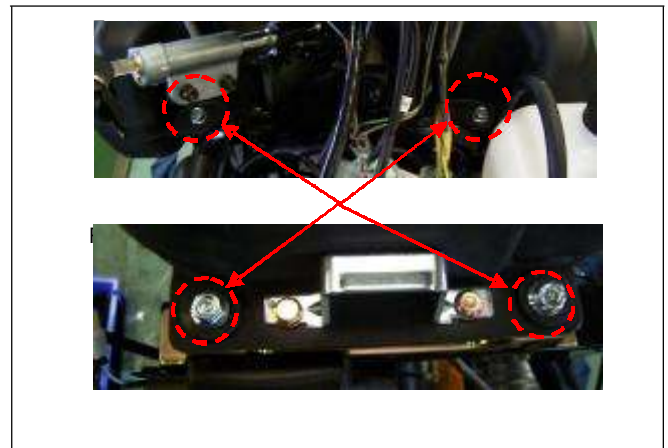
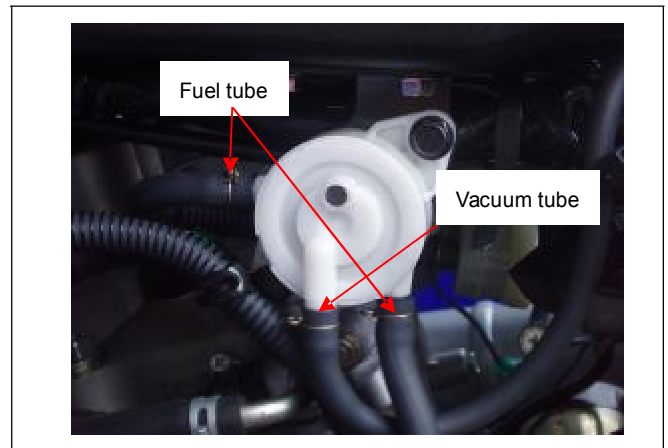
Do not forget to install the gasket of fuel unit or damage it.

Fuel tank removal

- Open the seat.
- Remove the front cover and fuel tank.
- Remove the side covers and lower side covers.
- Remove the front fender.
- (Covers remove please refer chapter 13) Disconnect fuel unit coupler.
- Remove fuel unit (4 bolts).
- Remove the fuel tube.
- Remove fuel tank front and rear side 4 bolts, and then remove fuel tank.

Installation

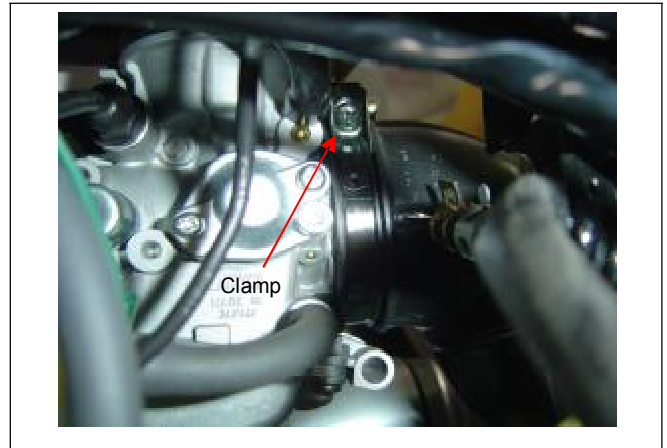
Install the tank in the reverse order of removal.



Air Cleaner

Removal

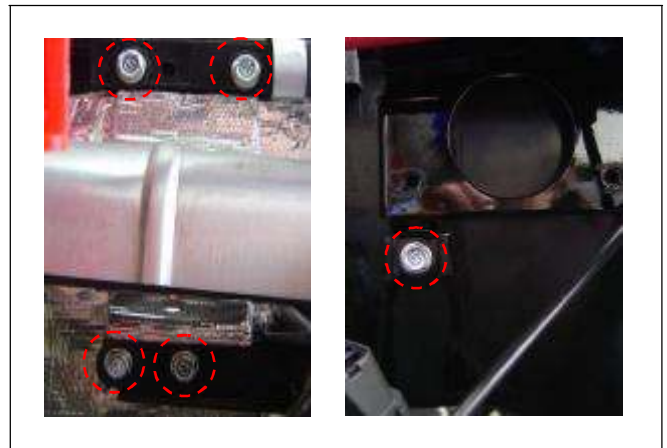
Loosen the clamp strip of air cleaner and carburetor, and then remove the vapor hose.



Loosen the clamp strip of air cleaner, and then remove the air cleaner vapor hose.

Remove the regulator.

Remove the air cleaner (5 bolts).



Installation

Install the tank in the reverse order of removal.

Cleaning air cleaner element

Remove the air cleaner cover (4 catch hooks).



Remove element mounting screw.

Loosen the clamp strip of air cleaner element, and then remove the air cleaner element.

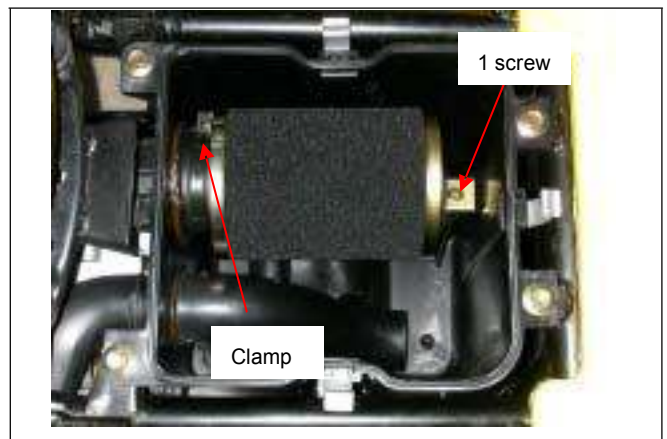
Clean the element with non-flammable or high-flash point solvent and then squeeze it for dry.



Caution

Never use gasoline or acid organized solvent to clean the element.

Soap the element into cleaning engine oil and then squeeze it out. Install the element onto the element seat and then install the air cleaner cover.



Notes:

Precautions in Operation	5-1	Engine Disassembly.....	5-10
Removal of Engine	5-2	Front differential set oil.....	5-12
Engine Installation.....	5-7	Final gear set oil.....	5-13

Precautions in Operation

General Information

- The engine has to be supported with special service tools that can be lifted or adjustable.
- Engine shall be removal in the conditions of necessary repair or adjustment to the only.
- The following parts can be serviced as engine mounted on frame: Carburetor.
Drive pulley, drive belt, clutch, and movable drive face assembly. Start motor.
AC. Generator, oil pump and start one way clutch.
Crankcase RH cover.
Clutch housing assy.
Unidirectional clutch.
Clutch assy.

5

Specification

Item		Capacity
Engine oil capacity	Replacement	3100 c.c.
	Oil and oil filter change	3300 c.c.
	Disassembly	3500 c.c.
Coolant capacity	Engine& radiator	2200 c.c.
	Reservoir	1200 c.c.
	Total	3400 c.c.

Torque Value

Engine hanger bolt	55N-m(5.5kgf-m or 40lb-ft)
Exhaust muffler mounting bolt	2.8~3.2kgf-m
Exhaust muffler connection nut	1.0~1.4kgf-m

5. ENGINE REMOVAL

Engine Removal

Before taking the engine out of the frame.
Clean and wash the engine using A steam cleaner.
Engine removal is explained in the following.

Steps.

Reinstall the engine by reversing the removal procedure.

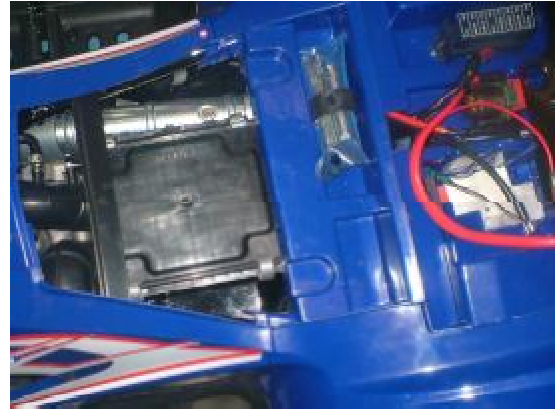
- Before removal the engine. Drain engine oil
- Remove the seat.
- Remove the seat lock plate.
- Remove battery negative post (-).
- Remove battery positive post (+).



Caution

Before remove battery positive post, Be sure remove negative post (-) first.

Remove the starter motor wire.



Remove the front fender side cover. (L and R)



Remove the footrest nut guard. (L and R)

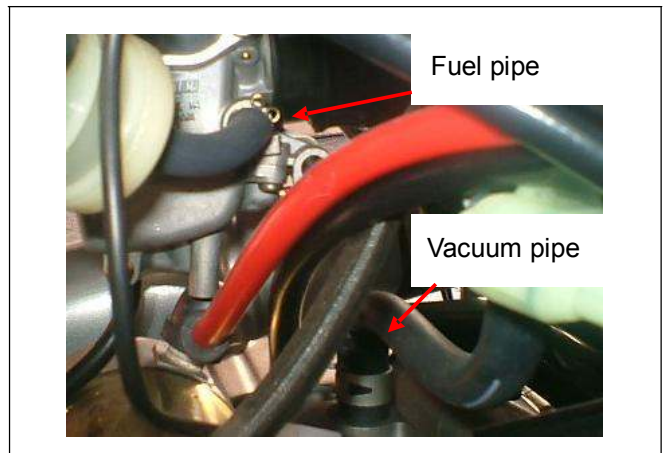
Remove the Fuel tank cover



Remove the gearshift lever.



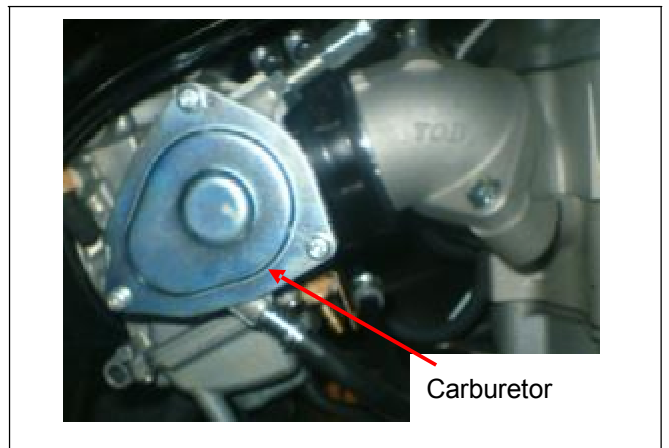
Remove the fuel hose and vacuum hose.



Remove the air cleaner



Remove the carburetor.



5. ENGINE REMOVAL

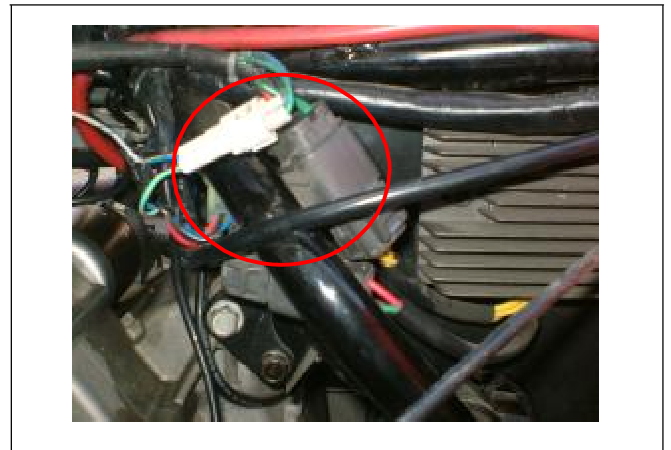
Remove the speedometer cable.



Remove the gearshift mud.



Remove the connector of lead wire.
Remove the signal generator lead wire connector and
generator lead wire connector.



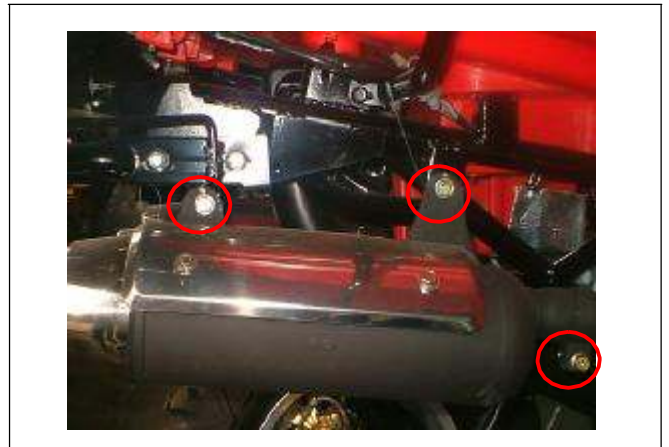
Remove the spark plug cap.



Remove the right footrest.
Remove the brake pedal.



Remove the L and R muffler.



Remove the exhaust pipe.

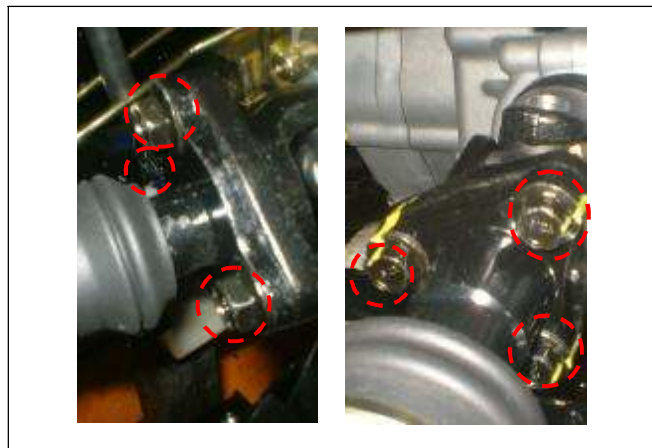


Remove the front and rear tube.

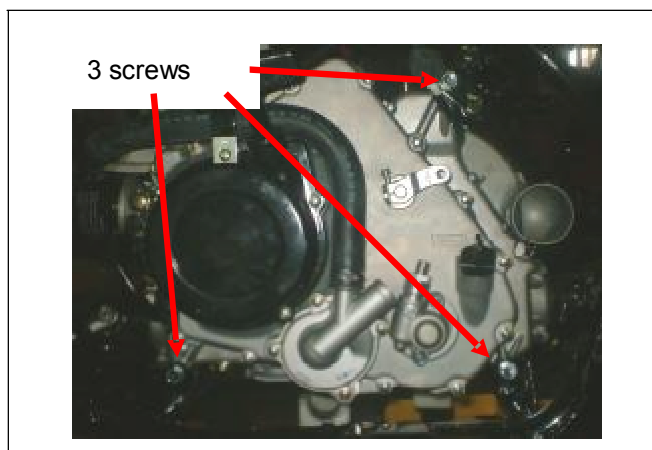


5. ENGINE REMOVAL

Remove the front shaft bolts.



Remove the engine mounting bolts and nuts.
Remove the engine mounting bracket.
Remove the engine from the right side.



Engine installation

Remove the engine in the reverse order of engine removal.

Caution

The engine mounting nuts are self-locking once the nut was been removed it is no longer of any use.
Be sure to use new nuts. For every time engine installation and tighten them



Torque value : 55 N-m (5.5kgf-m or 40lb-ft)

5. ENGINE REMOVAL

Torque valve:

Engine mounting bracket bolt 26 N-m
(2.6kgf-m, or 19lb-ft)

Apply sealant to the screw.

Apply sealant to the propeller shaft flange coupling bolts.

Tighten them to the standard torque.

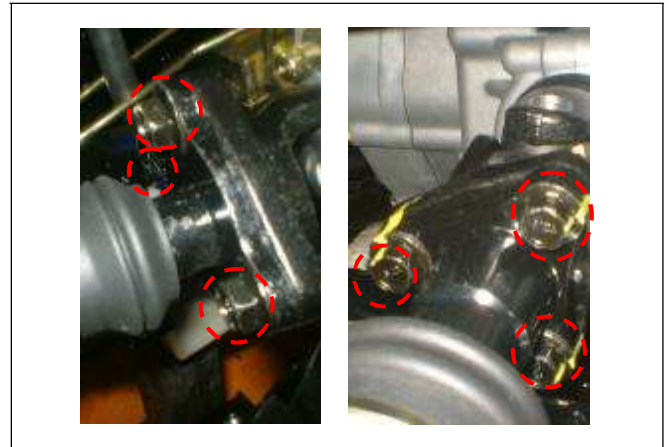
Apply sealant to the front propeller shaft flange coupling bolts.

Tighten them to the standard torque.



Torque value:

Front and rear propeller shaft flange coupling bolt:
45N-m(4.5kgf-m, 32.5lb-ft)



Install the new gasket.



Apply sealant to the muffler mounting bolt
Install muffler. Pay attention don't damage the
connector.

Tighten the exhaust pipe nuts and muffler bolts with
specified torque.



Exhaust pipe nut:
Connector bolt:
Muffler mounting bolt: 25N-m (2.5kgf-m, 16.5lb-ft)



Apply sealant to the muffler mounting bolt to the muffler fixed bolts and tighten them.



5. ENGINE REMOVAL

Engine Disassembly

Remove starter motor wire.



Remove the spark plug cap.



Remove the thermostat.



Remove the spring bolt and remove the cam chain tensioner adjuster assembly.



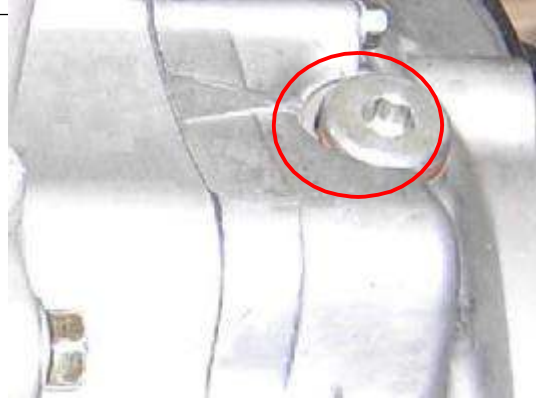
Remove the engine oil pipe bolts.



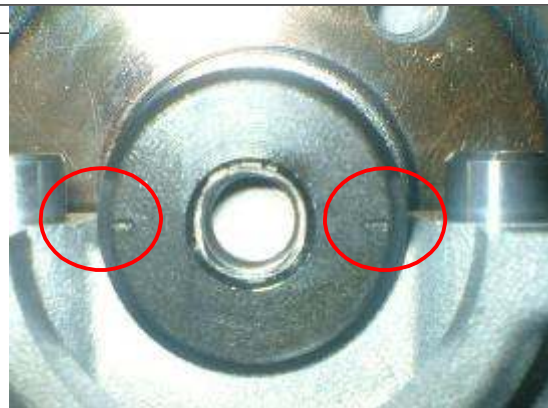
Remove the recoil starter.



Remove the valve timing check plug.



Turn the crankshaft and let the "T.D.C line" on the rotor with index mark.



5. ENGINE REMOVAL

Front differential set oil

Caution

Be sure the differential set temperature below 35

SAE#90 hypoid gear oil
Oil standard:
Oil capacity: 300c.c.



Remove the under cover.



Place an oil pan below the differential set case.



Remove drain bolt, filler nut and drain oil out.
Tighten the drain bolt to specified torque.
Pour the oil through the filler hole.
Tighten the filler cap to the specified torque,

Drain bolt: 33N-m
Oil filler nut: 36N-m

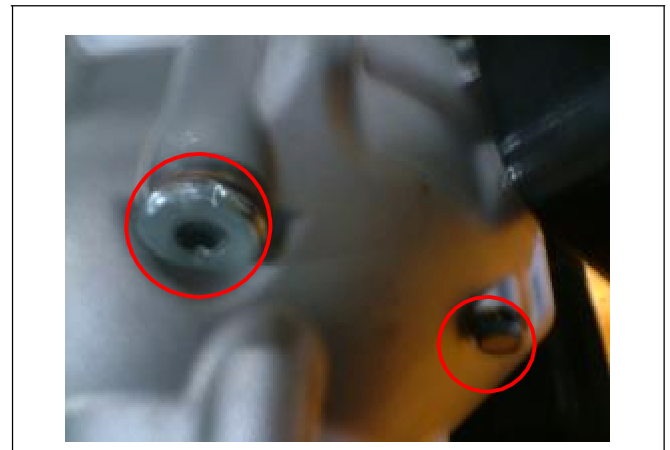


Final gear set oil

Remove the final gear set under cover.



Place an oil pan below the case of final gear set.
Remove the drain blot.
Remove the filler cap
Drain oil nut.



Tighten the drain blot.
Remove the oil check bolt.
Pour the specified oil through the filler hole. until the oil
lever reach the hole lower lever.
Tighten the oil level bolt.
Tighten the filler cap.

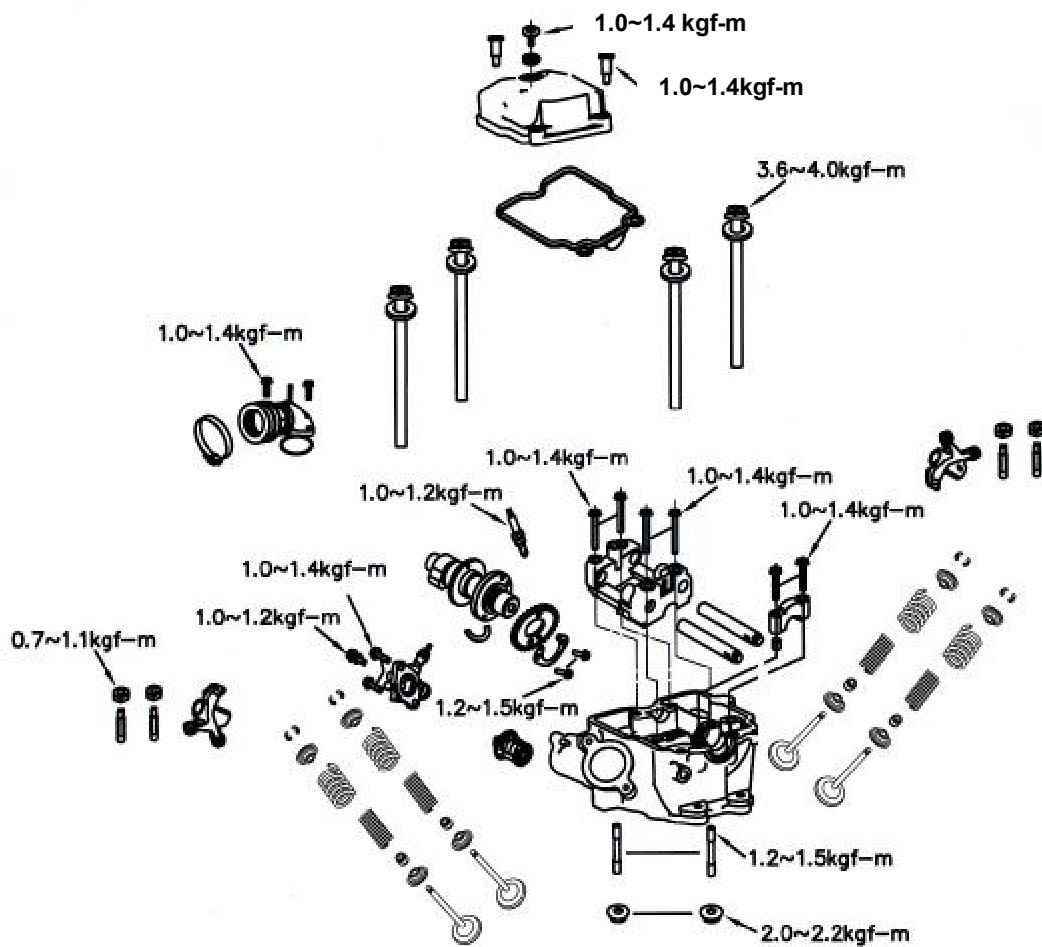


Final gear oil drain blot: 34 N-m (3.4 kgf-m, 24 lb-ft)
Final gear oil filler cap: 34 N-m (3.4 kgf-m, 24 lb-ft)

Note :

Mechanism Diagram.....	6-1	Valve Stem Replacement.....	6-10
Precautions in Operation	6-2	Valve Seat Inspection and Service ...	6-11
Troubleshooting.....	6-3	Cylinder Head Reassembly.....	6-13
Cylinder Head Removal.....	6-4	Cylinder Head Installation.....	6-14
Cylinder Head Inspection.....	6-7	Valve Clearance Adjustment.....	6-16

Mechanism Diagram



6. CYLINDER HEAD/VALVE

Precautions in Operation

General Information

- This chapter is contained maintenance and service for cylinder head, valve, and camshaft as well as rocker arm.
- Cylinder head service can be carried out when engine is in frame.

Specification

Item		Standard	Limit
Compression pressure		12±2 kg/cm ²	---
Camshaft	Height of cam lobe	Intake	33.442
		Exhaust	33.327
Rocker arm	ID of valve rocker arm		12~12.018
	OD of valve rocker arm shaft		11.966~11.984
Valve	OD of valve stem	Intake	4.975~4.990
		Exhaust	4.950~4.975
	ID of valve guide		5.000~5.012
	Clearance between valve stem and guide	Intake	0.010~0.037
		Exhaust	0.025~0.062
	Free length of valve spring	Inner	36
		outer	39.5
	Valve seat width		1.600
	Valve clearance	Intake	0.10 ± 0.02mm
		Exhaust	0.15 ± 0.02mm
Tilt angle of cylinder head		---	0.050

Torque Value

Cylinder head cover bolt	1.0~1.4kgf-m
Exhaust pipe stud bolt	2.4~3.0kgf-m
Cylinder head bolt	1.0~1.4kgf-m
Cylinder head Nut	2.0~2.2kgf-m
Sealing bolt of cam chain auto-tensioner	0.8~1.2kgf-m
Bolt of cam chain auto-tensioner	1.2~1.6kgf-m
Cylinder side cover bolt	1.0~1.4kgf-m
Cam sprocket bolt	1.0~1.4kgf-m
Tappet adjustment screw nut	0.7~1.1kgf-m
Spark plug	1.0~1.2kgf-m

Tools

Special service tools

- Valve reamer: 5.0mm
- Valve guide driver: 5.0mm
- Valve spring compressor

Troubleshooting

Engine performance will be affected by troubles on engine top parts. The trouble usually can be determined or by performing cylinder compression test and judging the abnormal noise generated.

Low compression pressure

1. Valve

- Improper valve adjustment
- Burnt or bent valve
- Improper valve timing
- Valve spring damage
- Valve carbon deposit.

2. Cylinder head

- Cylinder head gasket leaking or damage
- Tilt or crack cylinder

3. Piston

- Piston ring worn out.

High compression pressure

- Too much carbon deposit on combustion chamber or piston head

Noise

- Improper valve clearance adjustment
- Burnt valve or damaged valve spring
- Camshaft wear out or damage
- Chain wear out or looseness
- Auto-tensioner wear out or damage
- Camshaft sprocket
- Rocker arm or rocker arm shaft wear out

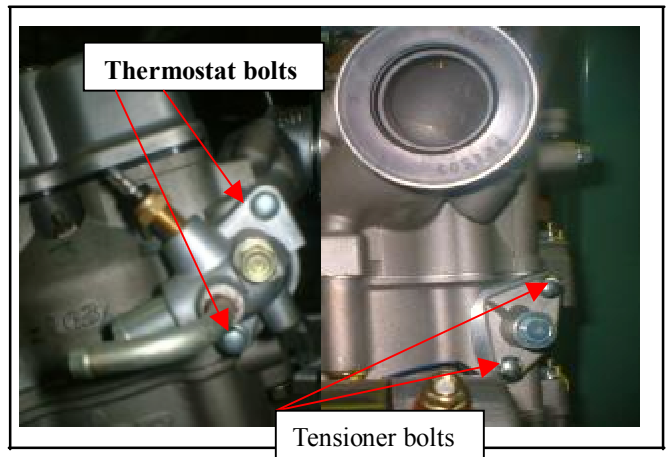
6. CYLINDER HEAD/VALVE

Cylinder Head Removal

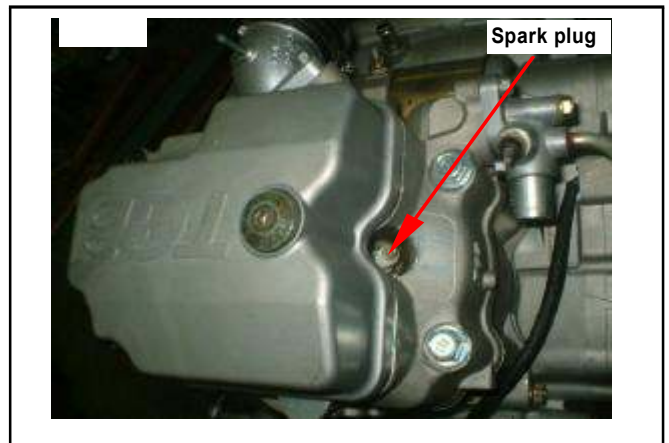
Remove engine. (Refer to chapter 5)
Remove the inlet pipe (2 nuts).



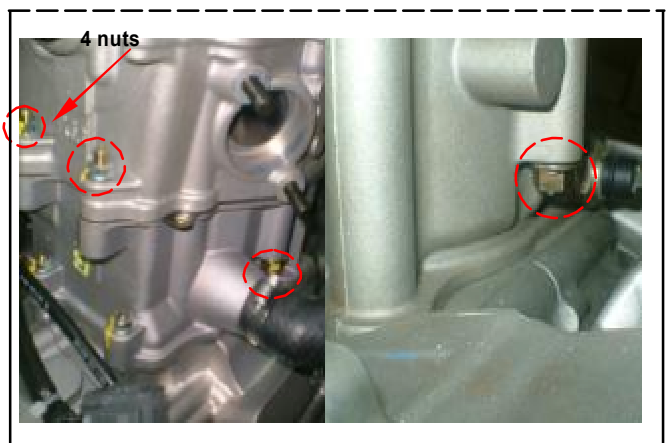
Remove 1 bolt of thermostat and then remove the thermostat.
Remove hole bolt and spring for the cam chain tensioner.
Loosen 2 bolts, and then remove tensioner.
Remove thermostat (2 bolts).



Remove spark plug.

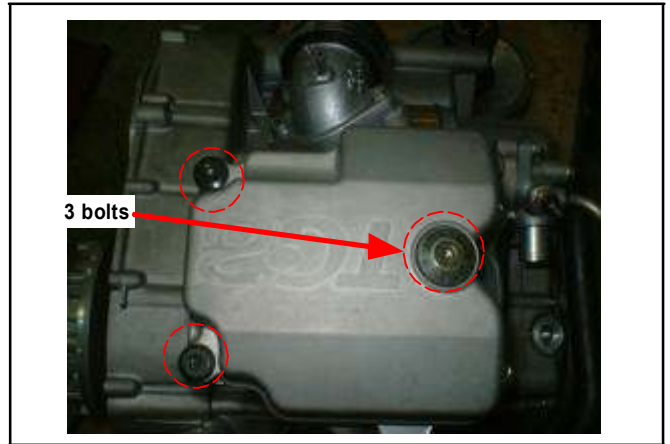


Remove the nuts of cylinder head(4 nuts)

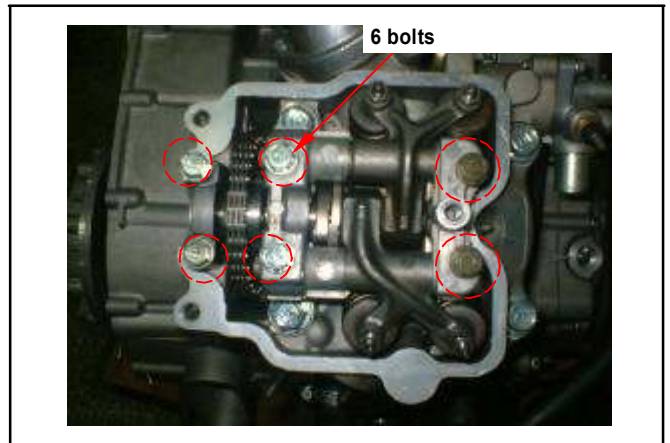


6. CYLINDER HEAD/VAL

Remove cylinder head cover, and hole bolts(3 bolts)

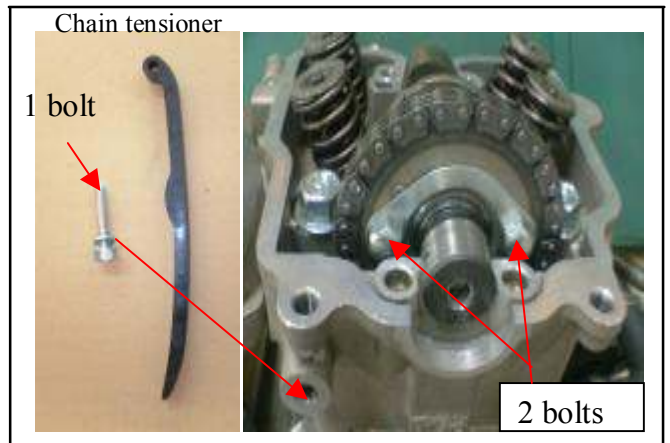


Remove fix stand for spindle .cam (6 bolts).

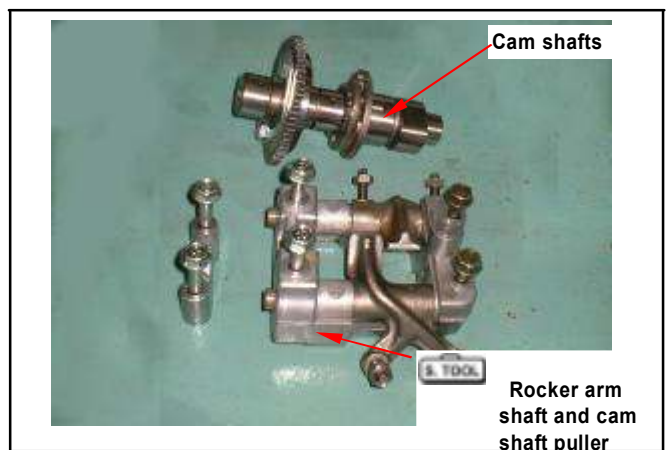


Remove cam sprocket bolts and then remove the sprocket by prying chain out.

Remove cam chain tensioner and hole bolt.

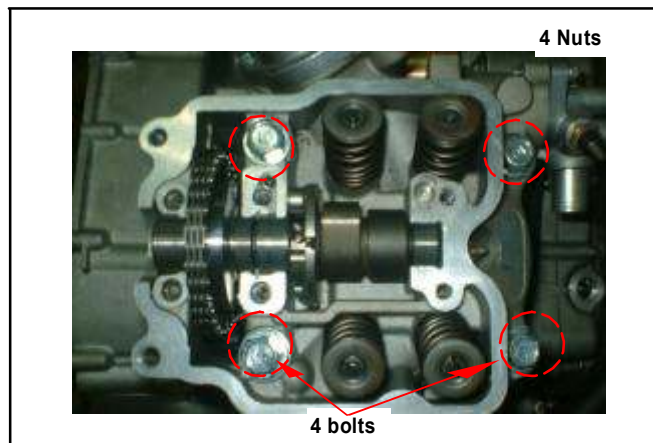


Remove cam shafts.
Remove Rocker arm and cam shaft puller



6. CYLINDER HEAD/VALVE

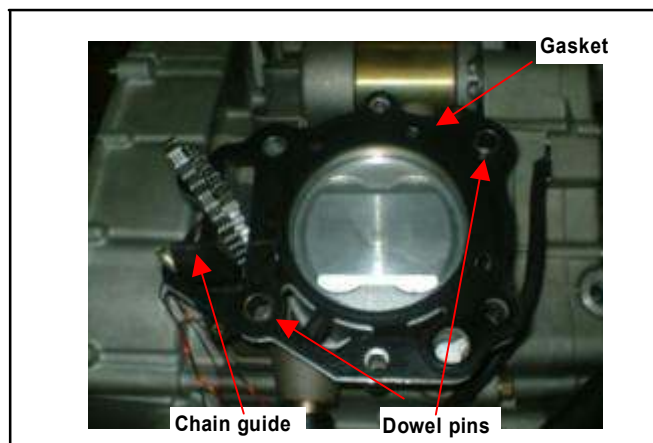
Remove the 4 cylinder head mounting bolts from cylinder head right side, and then remove 4 bolts and washers from cylinder head upper side. Remove the cylinder head.



Remove cylinder head gasket and 2 dowel pins. Remove chain guide. Clean up residues from the matching surfaces of cylinder and cylinder head.

Caution

- Do not damage the matching surfaces of cylinder and cylinder head.
- Avoid residues of gasket or foreign materials falling into crankcase as cleaning.



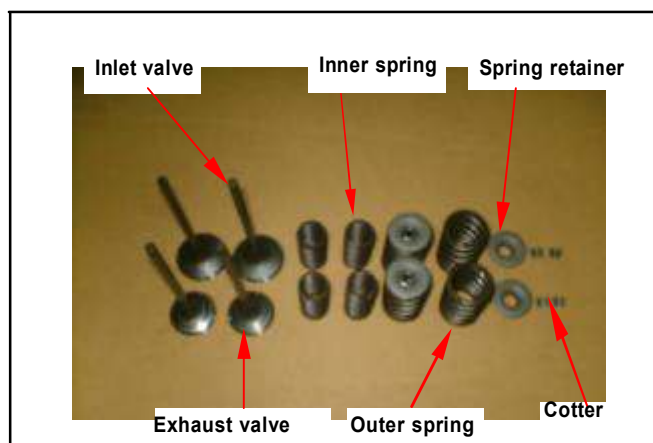
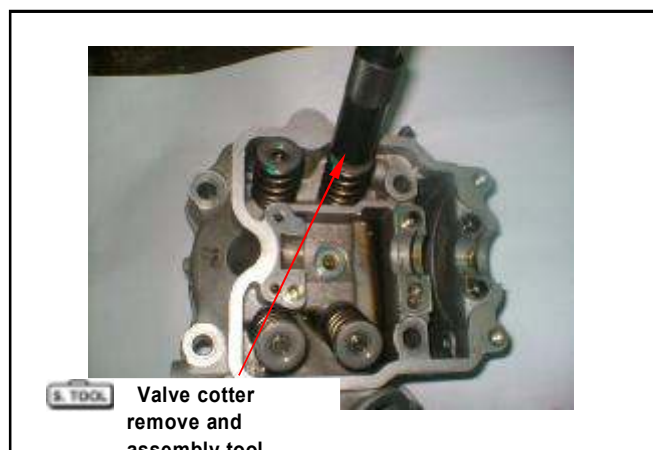
Use a valve cotter remove & assembly tool to press the valve spring, and then remove valves.

Caution

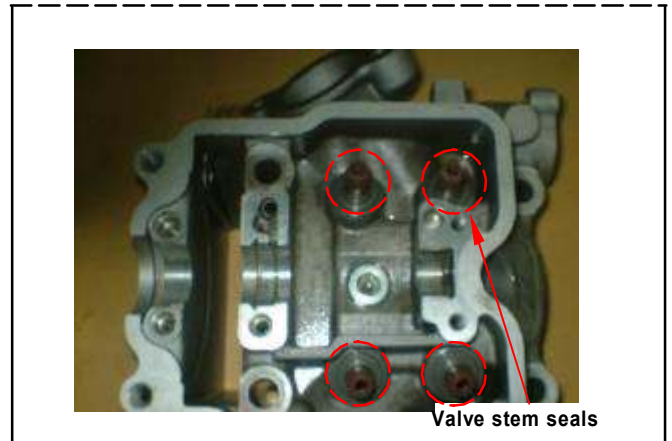
- In order to avoid losing spring elasticity, do not press the spring too much. Thus, press length is based on the valve cotter in which can be removed.

Special Service Tool:

Valve cotter remove & assembly tool



Remove valve stem seals.



Clean carbon deposits in combustion chamber.
Clean residues and foreign materials on cylinder head matching surface.



Caution

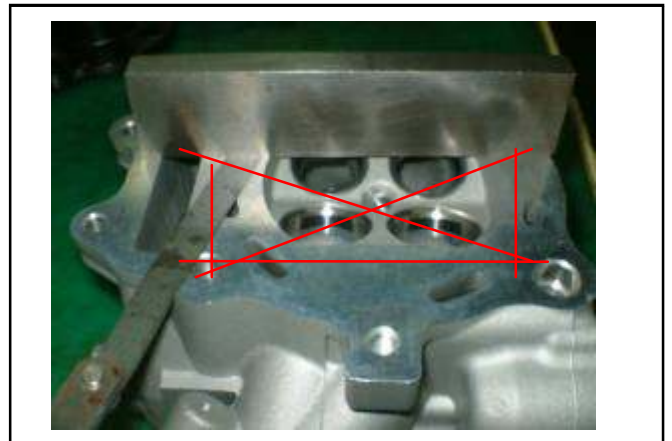
Do not damage the matching surface of cylinder head.



Cylinder Head Inspection

Check if spark plug and valve holes are cracked.
Measure cylinder head warp with a straightedge and thickness gauge.

Service limit: 0.05 mm



Camshaft

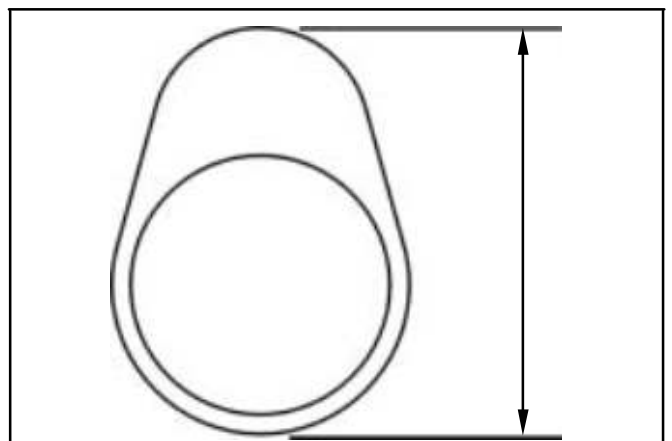
Inspect cam lobe height for damaged.

Service Limit:

IN: Replacement when less than 33.392mm

EX: Replacement when less than 33.277mm

Inspect the camshaft bearing for looseness or wear out. If any damage, replace whole set of camshaft and bearing.

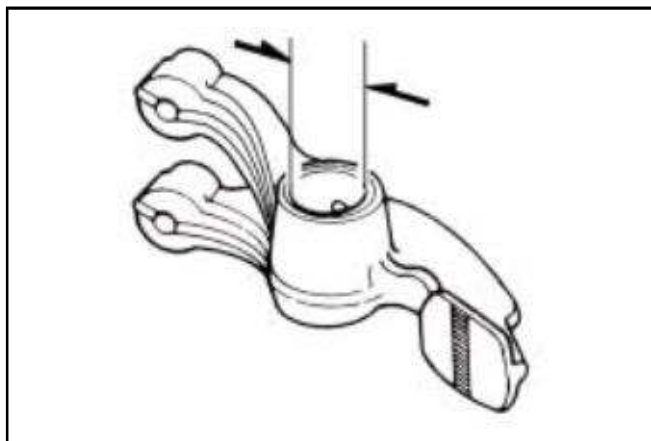


6. CYLINDER HEAD/VALVE

Rocker Arm

Measure the cam rocker arm I.D., and wear or damage, oil hole clogged?

Service Limit: Replace when it is less than 12.080 mm.



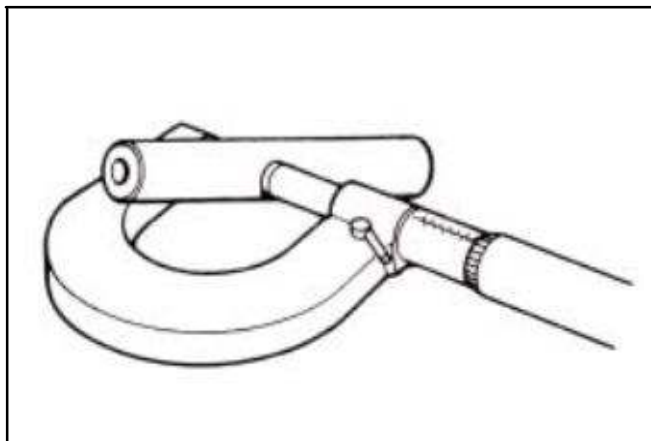
Rocker Arm Shaft

Measure the active O.D. of the cam rocker arm shaft and cam rocker arm.

Service Limit: Replace when it is less than 11.936 mm.

Calculate the clearance between the rocker arm shaft and the rocker arm.

Service Limit: Replace when it is less than 0.10 mm.



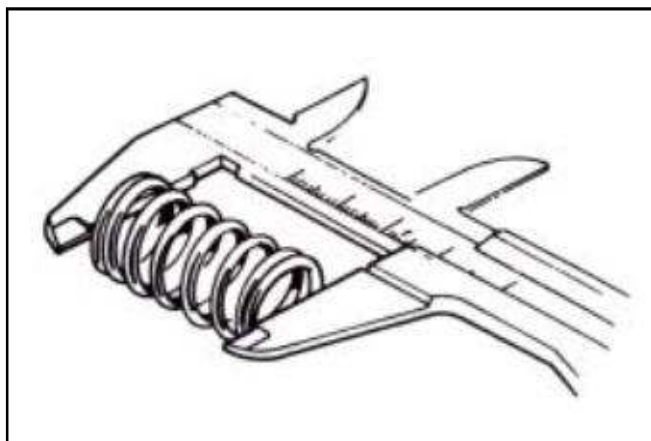
Valve spring free length

Measure the free length of intake and exhaust valve springs.

Service limit:

Inner spring 32.5 mm

Outer spring 36.0 mm



Valve stem

Check if valve stems are bend, crack or burn. Check the operation condition of valve stem in valve guide, and measure & record the valve stem outer diameter.

Service Limit: IN: 4.90 mm

EX: 4.90 mm

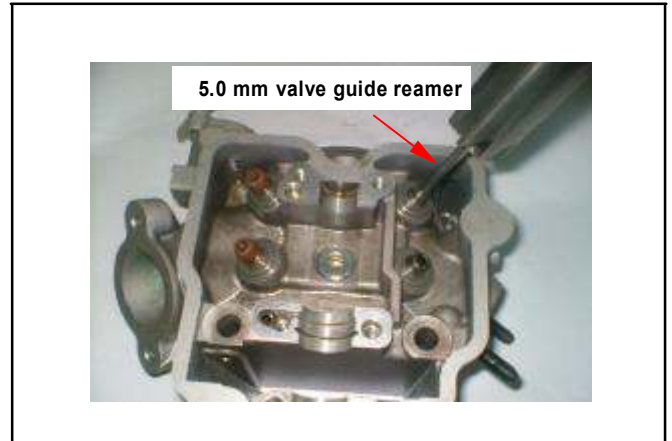


Valve guide

Caution

Before measuring the valve guide, clean carbon deposits with reamer.

Tool: 5.0 mm valve guide reamer



Measure and record each valve guide inner diameters.

Service limit: 5.03 mm

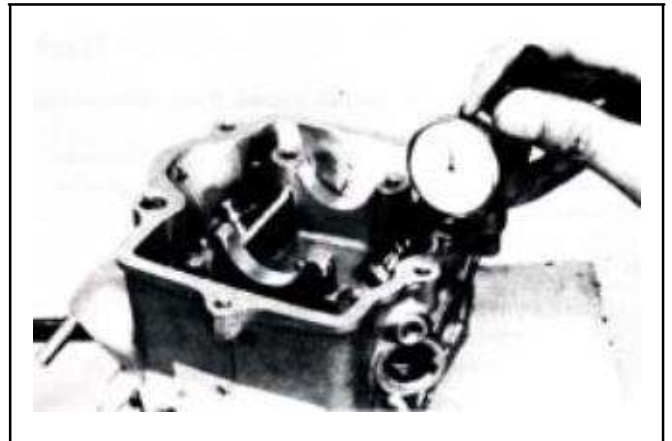
The difference that the inner diameter of valve guide deducts the outer diameter of valve stem is the clearance between the valve stem and valve guide.

Service Limit: IN→0.10 mm

EX→0.15 mm

Caution

If clearance between valve stem and valve guide exceeded service limit, check whether the new clearance that only replaces new valve guide is within service limit or not. If so, replace valve guide.



Correct it with reamer after replacement.
If clearance still exceeds service limit after replaced valve guide, replace valve stem too.

Caution

It has to correct valve seat when replacing valve guide.

6. CYLINDER HEAD/VALVE

Valve Stem Replacement

Heat up cylinder head to 100~150 °C with heated plate or toaster.

Caution

- Do not let torch heat cylinder head directly. Otherwise, the cylinder head may be deformed as heating it.
- Wear on a pair of glove to protect your hands when operating.

Hold the cylinder head, and then press out old valve guide from combustion chamber side.

Tool: Valve guide driver: 5.0 mm

Caution

- Check if new valve guide is deformation after pressed it in.
- When pressing in the new valve guide, cylinder head still have to be kept in 100~150°C.

Adjust the valve guide driver and let valve guide height is in 13 mm.

Press in new valve guide from rocker arm side.

Tool: Valve guide driver: 5.0 mm

Wait for the cylinder head cooling down to room temperature, and then correct the new valve guide with reamer.

Caution

- Using cutting oil when correcting valve guide with a reamer.
- Turn the reamer in same direction when it be inserted or rotated.

Correct valve seat, and clean up all metal residues from cylinder head.

Tool: Valve guide reamer: 5.0 mm

