Four Stroke 50 cc
SERVICE MANUAL

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SPECIFICATIONS

MAKER			TGB	MODEL		50c.c. engine
DIMENSION	Overall Length		1800mm	Deceleration equipment	Primary Reduction	BELT
	Overall Width		695mm		Secondary Reduction	GEAR
	Overall Height		1125mm		Clutch	One-way
	Wheel Base		1285mm		Transmission	C.V.T.
WEIGHT	Curb Weight	Front	39mm	Exhaust Pipe Position and Direction		Right side, and Backward
		Rear	57mm	Lubrication System		Separated-lubrication
		Total	96mm	Exhaust Concentration	Solid Particulate	15 % ↓
ENGINE	Type		4-STROKE ENGINE		CO	2.5±0.5 % ↓
	Installation and arrangement		Vertical, below center, incline 80°		HC	Below 800 PPM
	Fuel Used		Unleaded (92/95)			
	Cycle/Cooling		4-stroke/forced air cooled			
	Cylinder	Bore	Φ39.0 mm			
		Stroke	41.5 mm			
		Number/Arrangement	Single Cylinder/ horizontal			
	Displacement		49.6 cc			
	Compression Ratio		11.8±0.1			
	Max. HP		2.35KW/ 7500 rpm			
	Max. Torque		2.96N.m /6500 rpm			
	Ignition		C.D.I.			
	Starting System		Electrical & foot type			

TORQUE VALUES (ENGINE)

ITEM	Q'TY	THREAD DIA (mm)	TORQUE VALUE(Kg-m)	REMARKS
Cylinder head cover bolts	4	6	0.8~1.2	
Cylinder head nuts	4	7	1.0~1.4	Apply oil thread
Cylinder/cylinder head two-ends bolts	4	7	0.7~1.1	Tighten to crankcase
Cylinder head left bolts	2	6	0.8~1.2	
Valve adjustment fixing nuts	2	5	0.7~1.1	Apply oil to thread
Spark plug	1	10	1.0~1.4	
Carburetor heat protector connecting nuts	2	6	0.7~1.1	
Engine oil draining plug	1	12	3.5~4.5	
Engine oil strainer cap	1	30	1.3~1.7	
Gear oil draining plug	1	8	1.0~1.5	
Gear oil filling bolt	1	8	1.0~1.5	
Oil pump screws	3	3	0.1~0.3	
Engine left side cover bolts	9	6	0.8~1.2	Rubber washer attached
Camshaft chain tensioner bolt	1	8	0.45~0.6	Hex socket bolt
Camshaft chain adjuster bolts	2	6	0.8~1.2	
Clutch driving plate nut	1	28	5.0~6.0	
Clutch outer bracket nut	1	12	3.5~4.5	
Driving disk nut	1	10	3.5~4.5	
Flywheel nut	1	10	3.5~4.5	
Crankcase bolts	9	6	0.8~1.2	
Gear box cap bolts	7	8	2.6~3.0	
Exhaust pipe bolts	2	6	0.7~1.1	

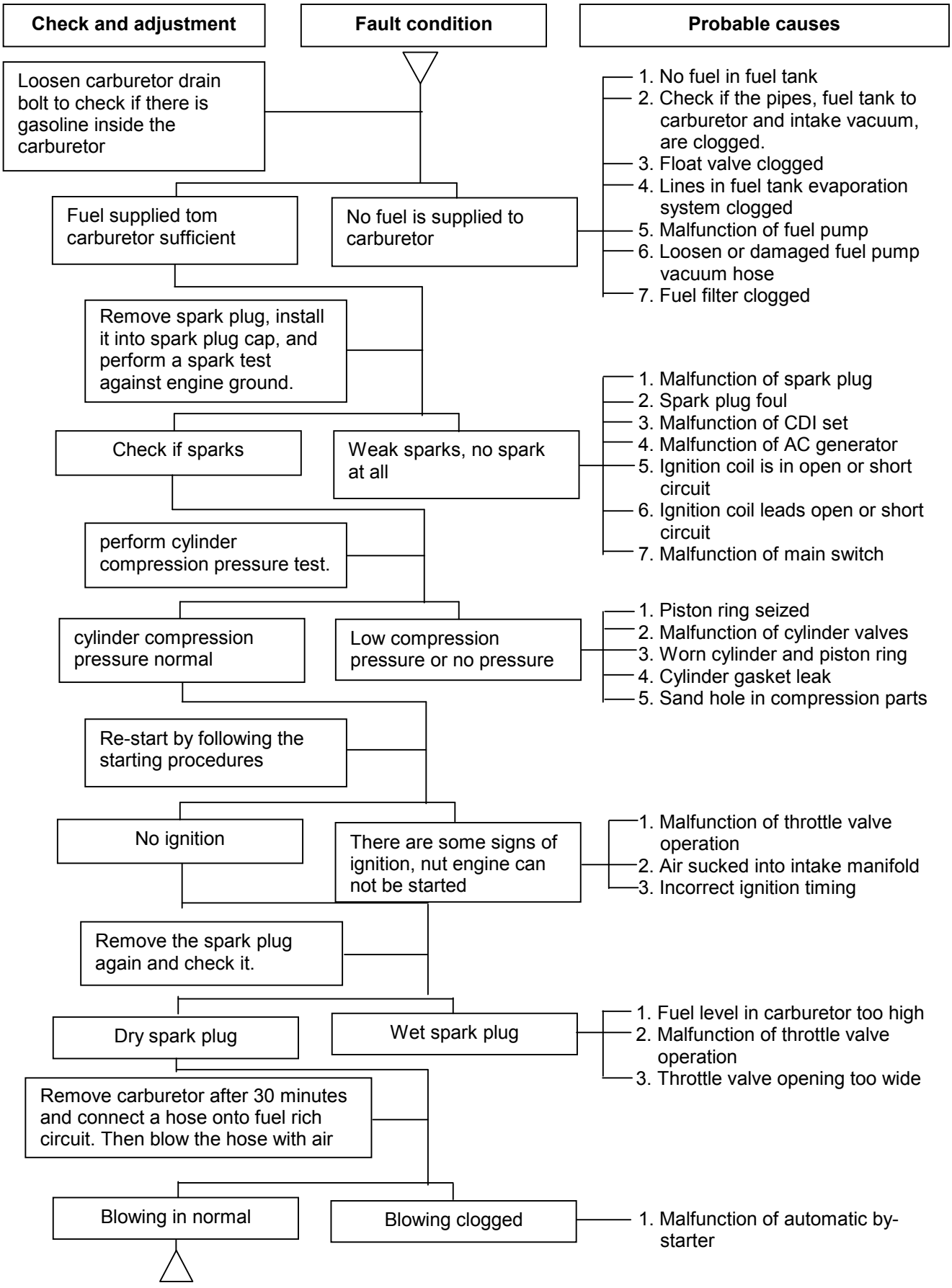
The torque values listed in above table are for more important tighten torque values. Please see standard values for not listed in the table.

Standard Torque Values for Reference

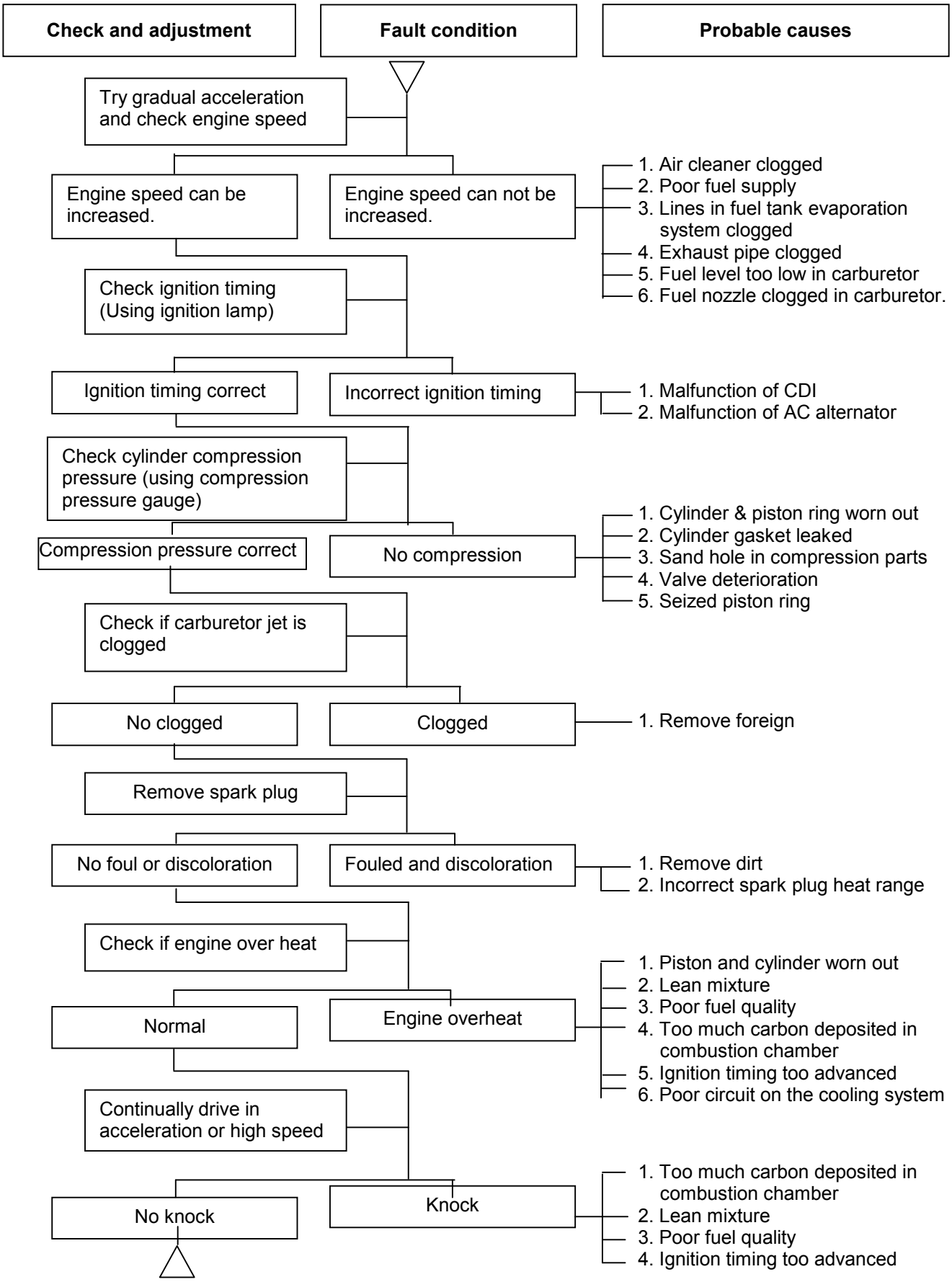
TYPE	TIGHTEN TORQUE	TYPE	TIGHTEN TORQUE
5mm bolt、nut	0.45~0.60kgf-m	3mm screw	0.05~0.08kgf-m
6mm bolt、nut	0.80~1.20kgf-m	4mm screw	0.10~0.15kgf-m
8mm bolt、nut	1.80~2.50kgf-m	5mm screw	0.35~0.50kgf-m
10mm bolt、nut	3.00~4.00kgf-m	6mm screw、SH nut	0.70~1.10kgf-m
12mm bolt、nut	5.00~6.00kgf-m	6mm bolt、nut	1.00~1.40kgf-m
		8mm bolt、nut	2.40~3.00kgf-m
		10mm bolt、nut	3.50~4.50kgf-m

TROUBLES DIAGNOSIS

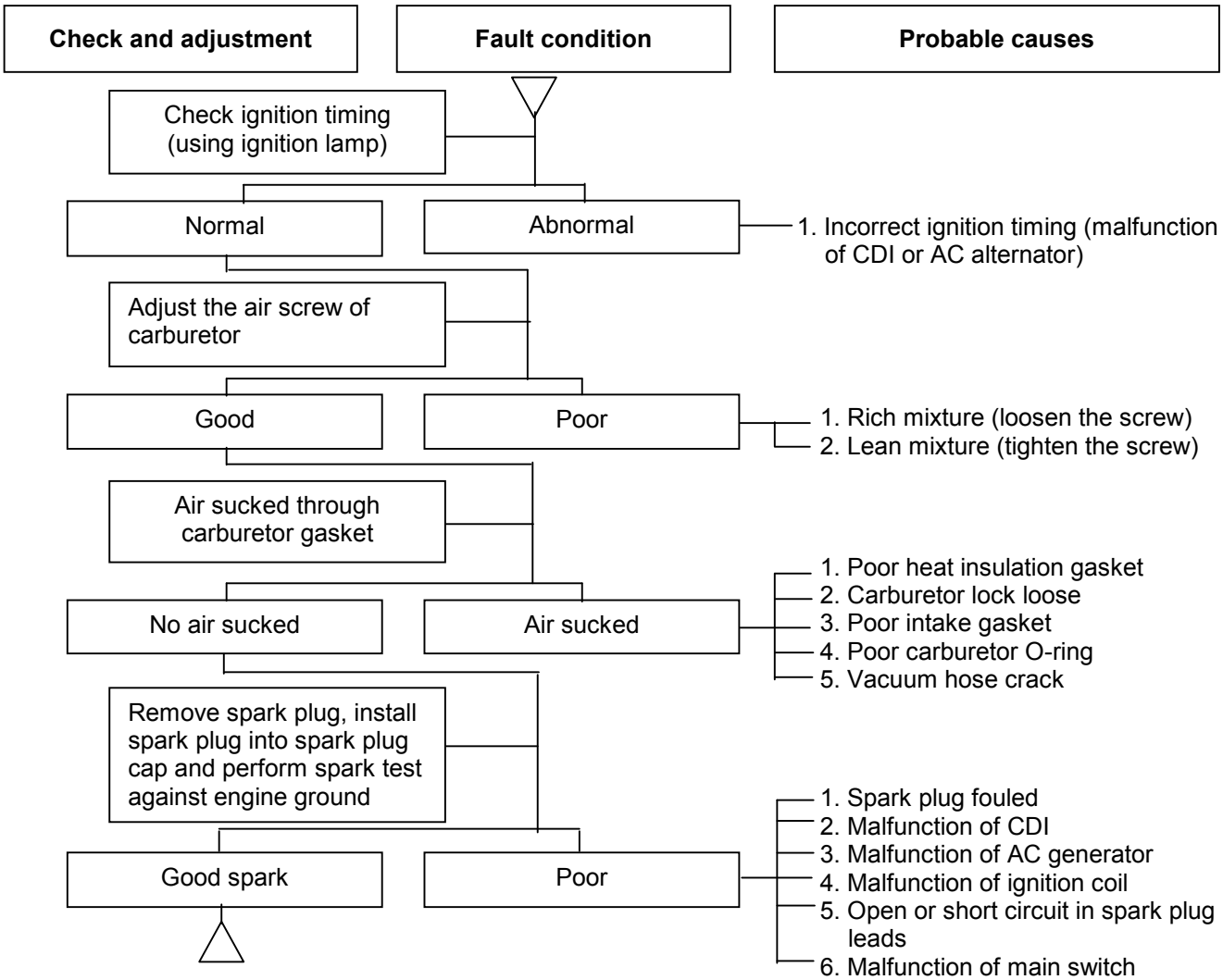
A. Engine hard to start or can not be started



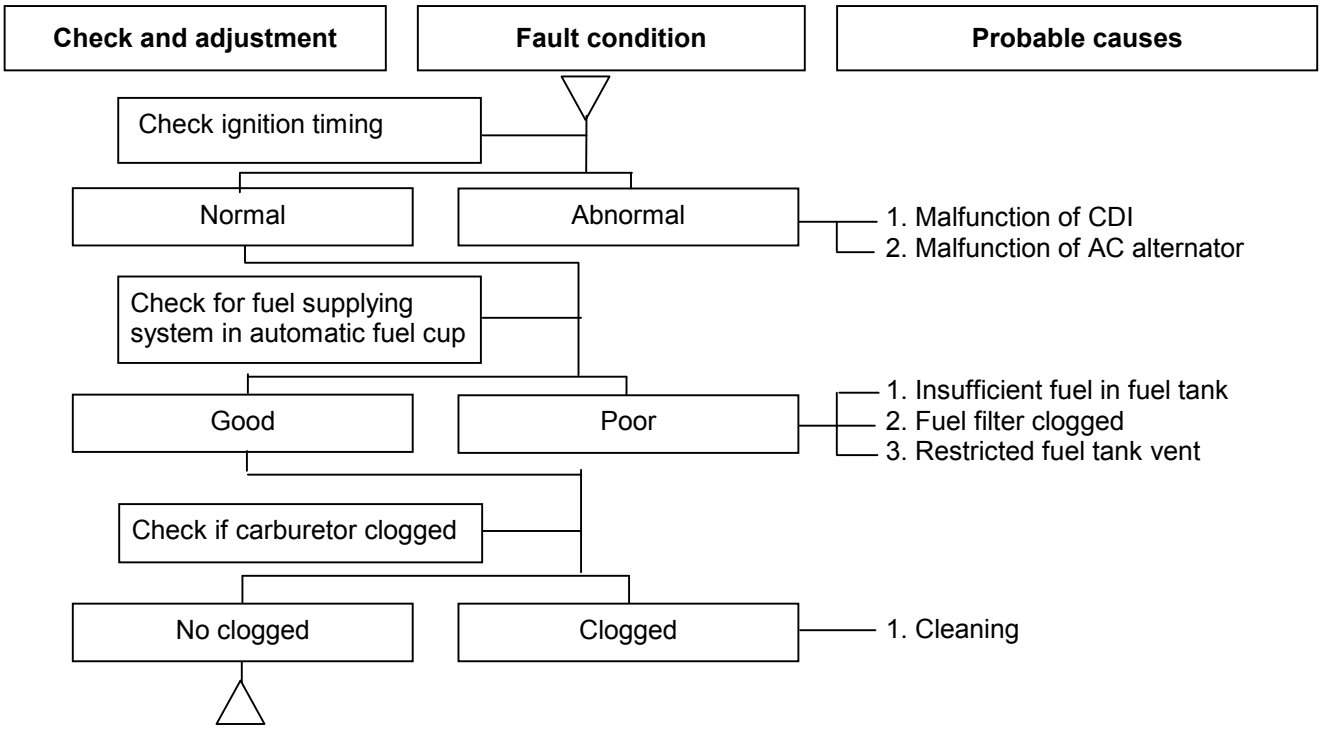
B. Engine run sluggish (Speed does not pick up, lack of power)



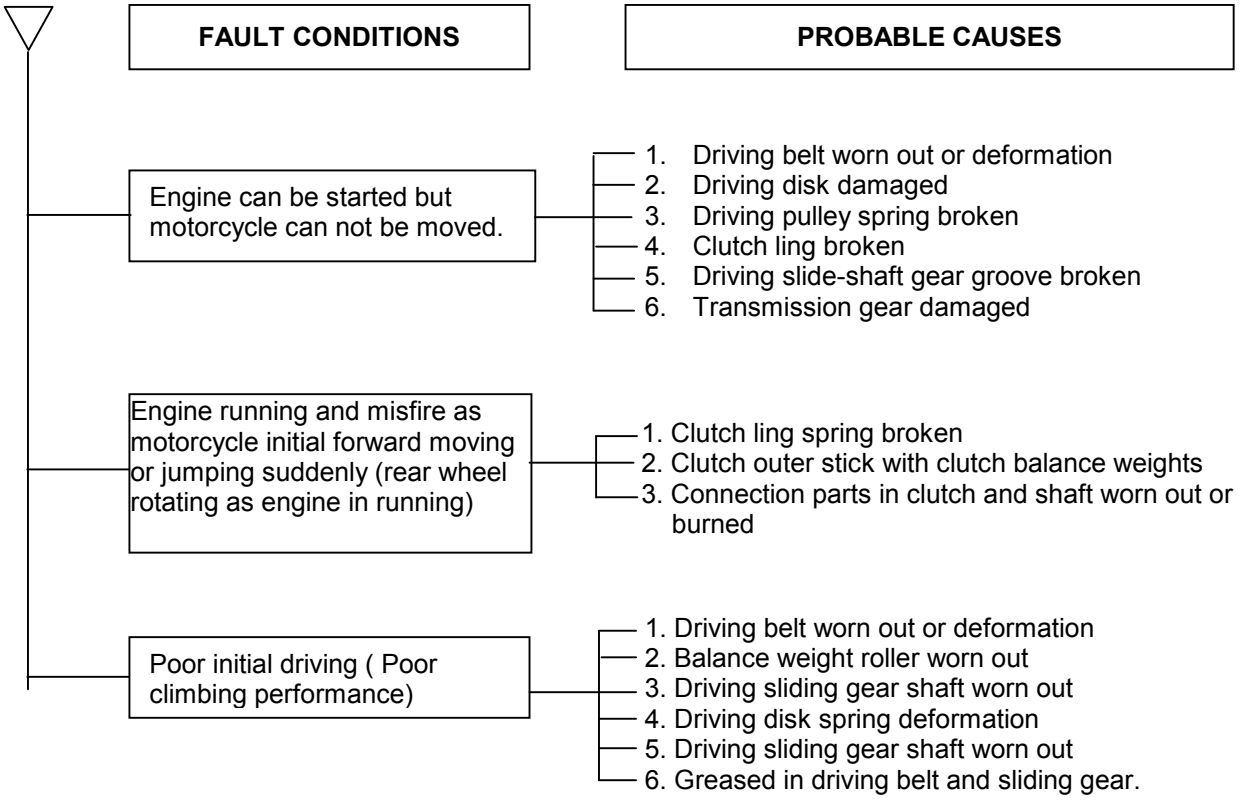
C. Engine runs sluggish (especially in low speed and idling)



D. Engine runs sluggish (High speed)



E. CLUTCH, DRIVING AND DRIVING PULLEY



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PRECAUTIONS IN OPERATION

Specification

Engine Oil	capacity	850 c.c.
	change	750 c.c.
Transmission Gear oil	capacity	120 c.c.
	change	110 c.c.
Clearance of throttle valve		2~6 mm
Spark plug		TORCH A7RC Gap: 0.6~0.7 mm
“F” Mark in idling speed		Before TDC 13º / 2200 rpm
Full timing advanced		Before TDC 26º / 8000 rpm
Idling speed		2200±100 rpm
Cylinder compression pressure		12±2 kg/cm²
Valve clearance: IN/EX		0.06±0.02 mm

PERIODICAL MAINTENANCE SCHEDULE

Maintenance Code	Item	Initial 300KM	1 Month Every1000KM	3 month Every3000KM	6 month Every6000KM	1 year Every12000KM
1	☆Air cleaner	**I**		**C**	**C**	**R**
2	☆Fuel filter	**I**			**I**	**R**
3	☆Oil filter	**C**			**C**	**C**
4	☆Engine oil change	**R**	Replacement for every 1000km			
5	Gear oil check for leaking	**I**	**I**			
6	☆Spark plug check or change	**I**		**I**	**R**	
7	☆Gear oil change	**R**	Replacement for every 5000km			
8	☆Ignition timing	**I**	**I**			
9	☆Emission check in Idling	**A**	**I**			
10	☆Engine bolt tightening	**I**		**I**		
11	☆CVT driving device (belt 〕				**I**	**R**
12	☆CVT driving device (roller)				**C**	
13	Cam chain	**I**		**I**		
14	☆Valve clearance	**I**		**A**		
15	☆Crankcase blow-by over-flow pipe	**I**	Replacement for every 2000km			

Code: I ~ Inspection, cleaning, and adjustment R ~ Replacement C ~ Cleaning (replaced if necessary) L ~ Lubrication

Have your motorcycle checked, adjusted, and recorded maintenance data periodically by your TGB Authorized Dealer to maintain the motorcycle at the optimum condition

The above maintenance schedule is established by taking the monthly 1000 kilometers as a reference which ever comes first.

Remarks:

1. **These marks "☆" in the schedule are emission control items. According to EPA regulations, these items must be perform normally periodical maintenance following the use r manual instructions. They are prohibited to be adjusted or repaired by unauthorized people. Otherwise, TGB is no responsible for the charge.**
2. Clean or replace the air cleaner element more often when the motorcycle is operated on dusty roads or in the Heavily- polluted environment.
3. Maintenance should be performed more often if the motorcycle is frequently operated in high speed and after the motorcycle has accumulated a higher mileage.
4. Preventive maintenance
   a. Ignition system - Perform maintenance and check when continuous abnormal ignition, misfire, after-burn, overheating occur.
   b. Carbon deposit removal - Remove carbon deposits in cylinder head, piston heads, exhaust system when power is obvious lower than ever.
   c. Replace worn out pistons, cylinder head.

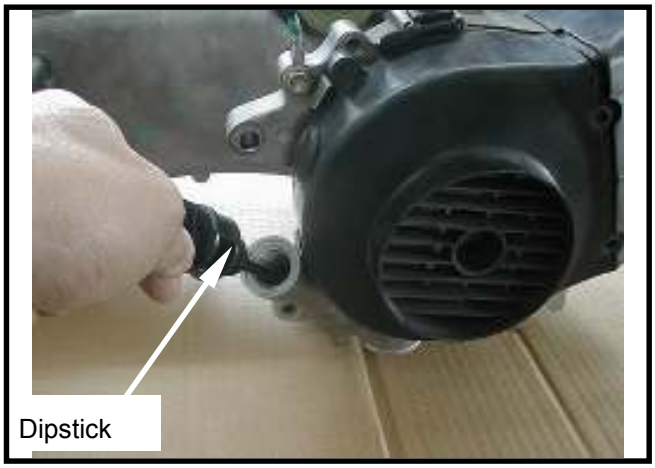
LUBRICATION SYSTEM

Engine Oil Capacity

⚠ Caution

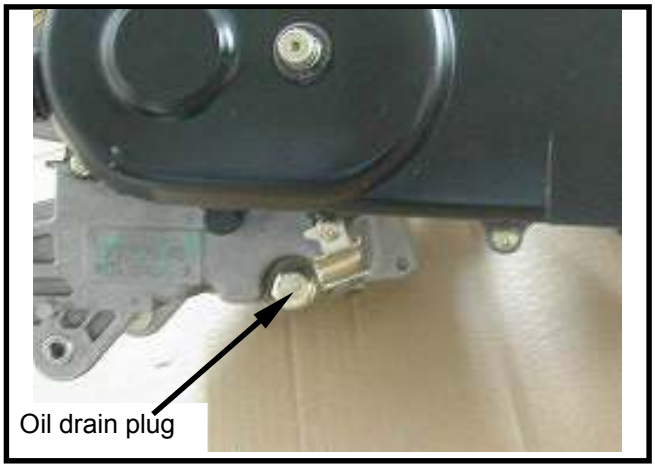
- The vehicle must be parked on a level ground when checking oil capacity.
- Run the engine for 2-3 minutes then stop, wait about 2-3 more minutes allowing engine oil to settle before checking the oil level.

Remove dipstick to check the oil level. If oil level is below the lower limit mark, add oil to the specified upper limit mark.



Oil change

Shut off the engine and remove dipstick.
Remove the oil drain plug on the bottom-left of crankcase to drain oil.
After draining out oil, clean oil plug and its gasket and reinstall. Replace the gasket if it is damaged.
Torque value: 3.5~4.5 kgf-m



⚠ Caution

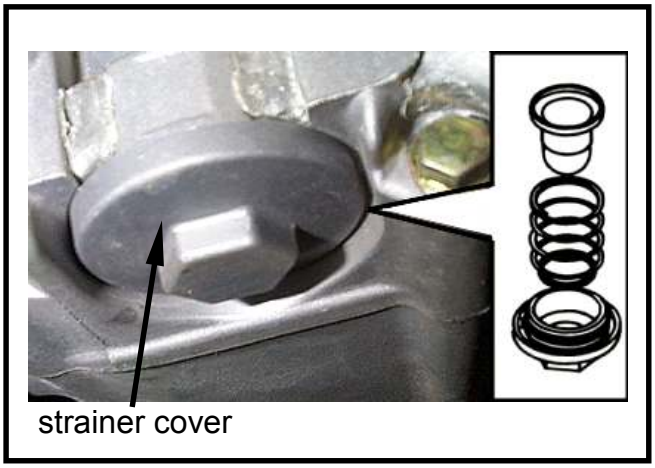
Warm up the engine. This will make the oil flow out easily.

Add oil to the specified capacity.

Oil Viscosity: SAE 10W-30, recommended using King-Mate serial oil.

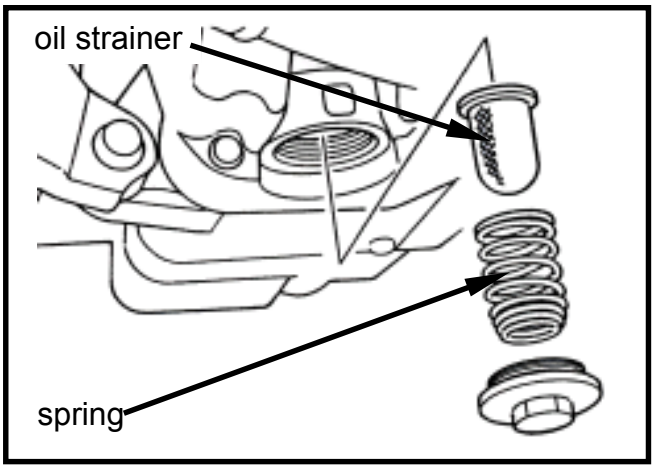
Engine oil capacity:
Disassembly: 850cc
Change: 750cc

When checking for oil leak, run the engine at idle speed for a few minutes, then check oil capacity with dipstick.



Cleaning the oil strainer

Drain oil from engine, remove the strainer cover, spring and strainer.
If there is an accumulation on the screen, wash it off with suitable solvent (recommended using compressed air).
Check O-ring for damage, replace if necessary.
Reinstall strainer, spring, O-ring and strainer cover.
Torque value: 1.3~1.7 kgf-m



Gear Oil

Inspection

Check gear oil if leaking.
Park the motorcycle with main stand on flat level place.
Turn off engine and remove the gear oil draining plug.
Place a measurement cup under the draining hole.
Remove the oil drain plug and drain gear oil into a measurement cup.
Check gear oil if enough.

Replacement

At first, remove the gear oil refilling bolt, and then remove the draining plug.
Install the draining plug after drained oil out.
Torque value: 0.8~1.2 kgf-m

⚠ Caution

Inspect if washer is in good condition. Replace it with new one if it was deformed or damaged.

Fill out gear oil to specified quantity from the engine oil filling hole.
Install the oil filling bolt.
Torque value: 0.8~1.2 kgf-m
Transmission oil capacity: 120 c.c.(110 c.c. for change)
Recommended: King-Mate HYPOID GEAR OIL (#140).

VALVE CLEARANCE ADJUSTMENT

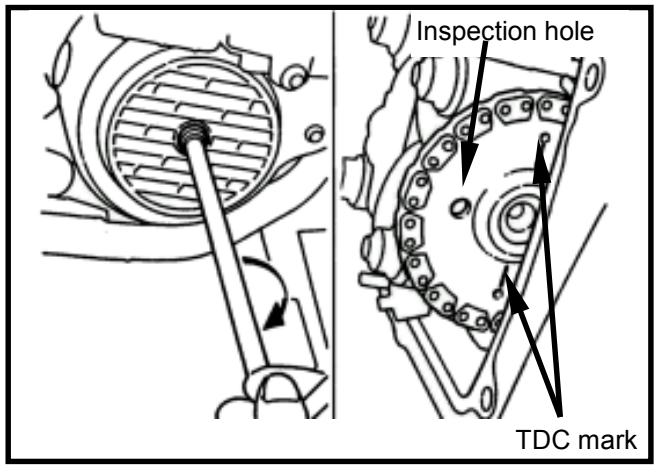
⚠ Caution

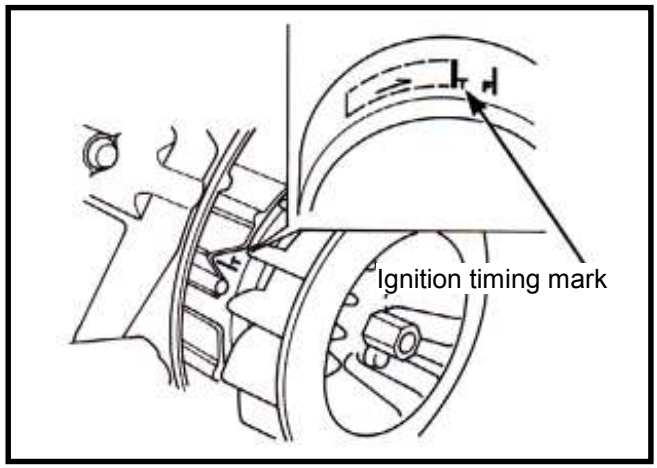
Checks and adjustment must be performed when engine is cold (below 35℃).

Remove luggage box and front center cover.
Remove the left body cover & left side cover.
Remove cylinder head cap.
Remove the ignition timing check hole on the cooling fan cover.
With “T” type wrench, turn crankshaft in clockwise motion so that mark (“T”) on the generator flywheel aligns with the mark on the crankshaft, and camshaft is at TDC position also as same as level of cylinder head top-end. A single hole on camshaft sprocket is forward to up. (Piston is at TDC position in the compression stroke.)

⚠ Caution

The crankshaft can not be rotated in counter-clockwise to prevent from damage so that valve clearance can not be measured.

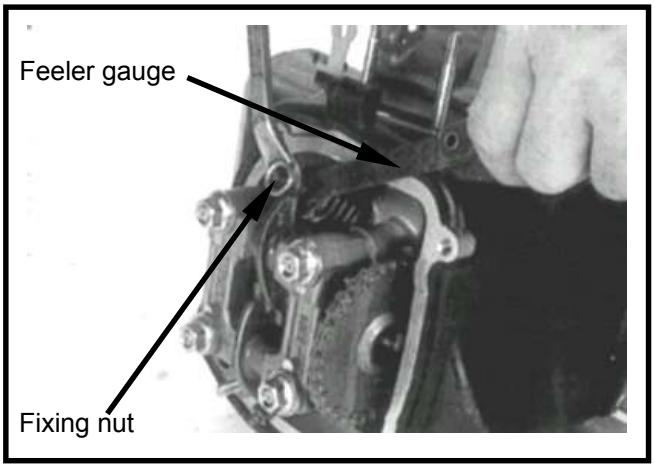




Check & adjust valve clearance with feeler gauge.
Valve clearance (IN/EX): 0.06±0.02 mm
Loosen fixing nut and turn the adjustment nut for adjustment.

⚠ Caution

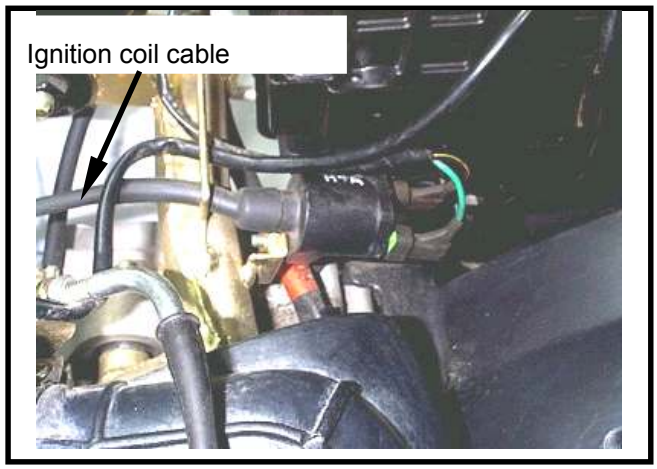
It has to make sure that valve-rocker arm is be adjusted to standard level when adjusting it, and re-check the valve clearance after tightened the fixing nut.



CARBURETOR IDLE SPEED ADJUSTMENT

⚠ Caution

- Inspection & adjustment for idle speed have to be performed after all other parts in engine that needed adjustment have been adjusted.
- Idle speed check and adjustment have to be done after engine is being warm up (around 10 minutes).



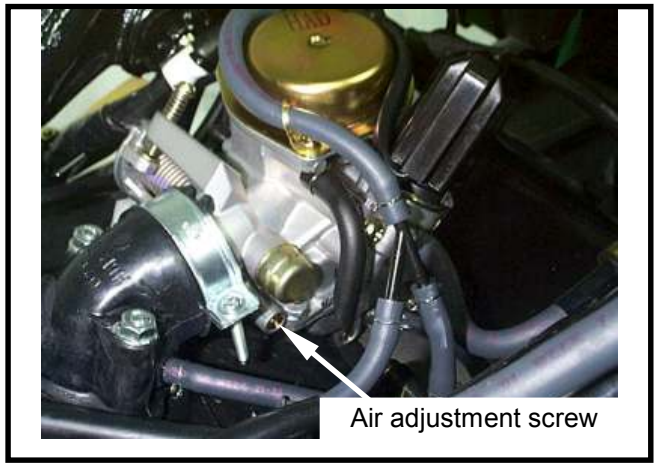
Park the motorcycle with main stand and warn up engine.
Open the carburetor cover from the luggage box.
Turn the throttle valve stopper screw to specified idle speed.

Specified idle speed: 2200±100 rpm

Emission adjustment in Idle speed
Warm up the engine for around 10 minutes and then conduct this adjustment.

1. Connect the tachometer onto engine.
2. Adjust the idle speed adjustment screw and let engine runs in 2200±100 rpm.
3. Insert the exhaust sampling muffler of exhaust analyzer into the front section of exhaust pipe. Adjust the air adjustment screw so that emission value in idle speed is within standard.
4. Slightly accelerate the throttle valve and release it immediately. Repeat this for 2~3 times.
5. Read engine RPM and value on the exhaust analyzer. Repeat step 2 to step 4 procedures until measured value within standard.

Emission standard: CO: below2.5±0.5 %
HC: below 800 ppm

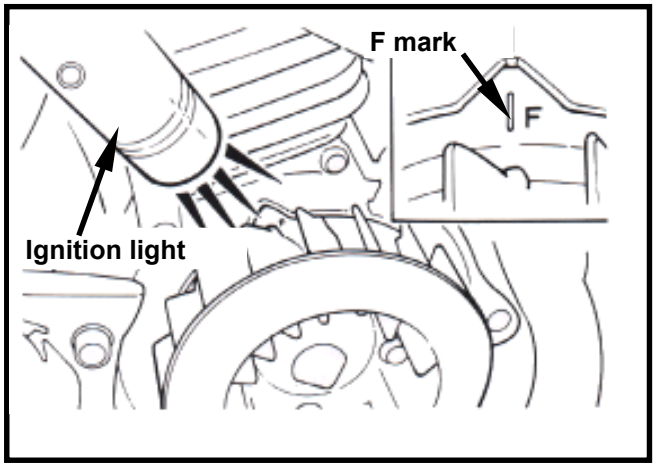


IGNITION SYSTEM

Ignition timing

Caution

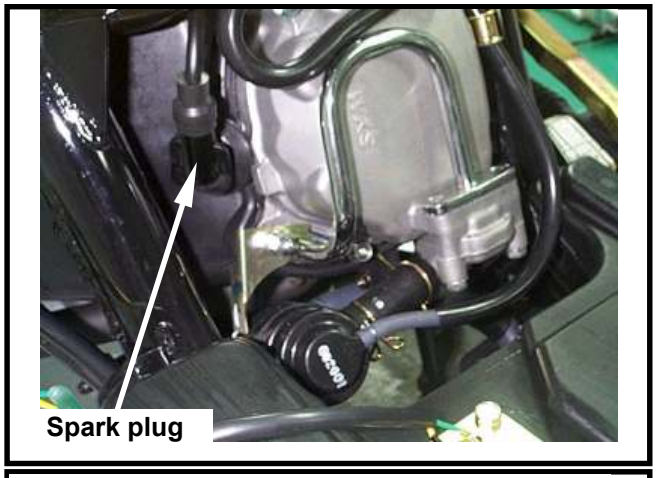
C.D.I ignition system is set by manufacturer so it can not be adjusted. Ignition timing check procedure is for checking whether C.D.I. function is in normal or not.

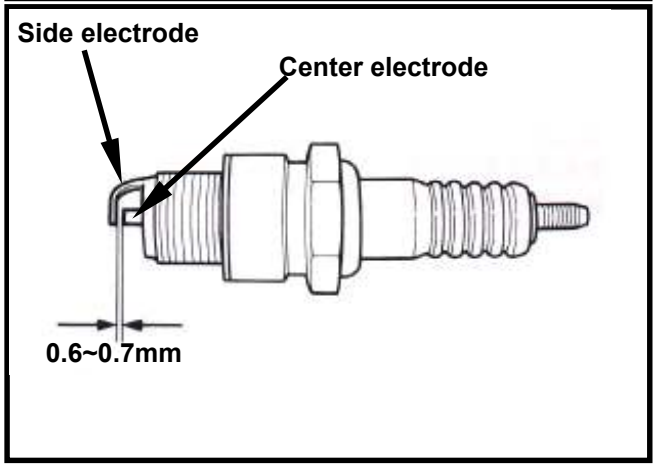


Remove right side cover.
Remove ignition timing hole cap located on the cooling fan cap, or remove the cooling fan cap.
Check ignition timing with ignition light.
Start engine and set engine idle speed in 1700 rpm, and if the mark aligns with the “F”, then it means that ignition timing is correct.
Increase engine speed to 8000 rpm to check ignition timing advance. If the detent aligns with advance mark “II”, then it means ignition timing advance is in functional. If not, check CDI set, pulse flywheel, and pulse generator. Replace these components if malfunction of these parts are found.

SPARK PLUG

Appointed spark plug: TORCH A7RC
Remove luggage box.
Remove body side cover.
Remove spark plug cap.
Clean dirt around the spark plug hole.
Remove spark plug.
Measure spark plug gap.
Spark plug gap: 0.6~0.7 mm
Carefully bend ground electrode of the plug to adjust the gap if necessary.
Screw the park plug into the plug hole with hands, then tighten the plug with a wrench to prevent from damaging the spark plug's thread.
Torque value: 1.0~1.2 kgf-m
Connect spark plug cap.





CYLINDER COPMRESSION PRESSURE

Warn up engine and then turnoff the engine.
Open the seat. Remove the luggage box.
Remove spark plug cap and spark plug.
Install compression gauge.
Full open the throttle valve, and rotate the engine by means of stepping the kick-starting lever.

⚠ Caution

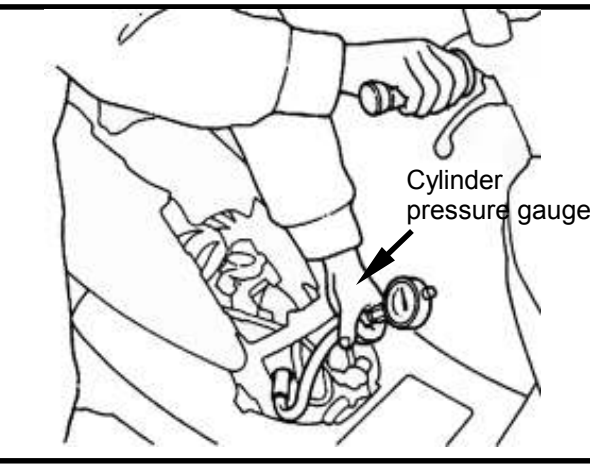
Rotate the engine until the reading in the gauge no more increasing.
Usually, the highest pressure reading will be obtained in 4~7 seconds.

Compression pressure: 12±2 Kg/cm²

Check following items if the pressure is too low:

- Incorrect valve clearance
- Valve leaking
- Cylinder head leaking, piston, piston ring and cylinder worn out

If the pressure is too high, it means carbon deposits in combustion chamber or piston head.

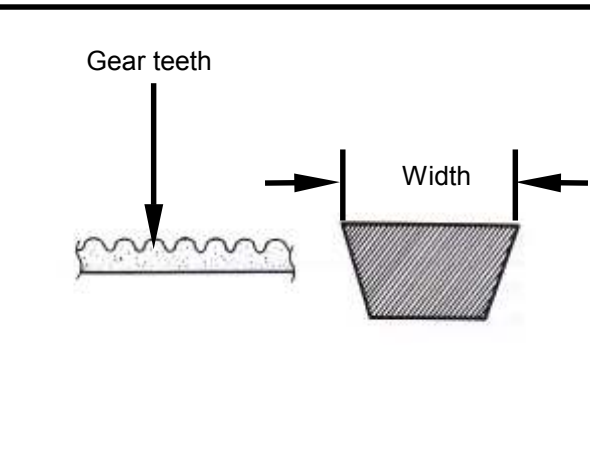


DRIVING SYSTEM

DRIVING BELT

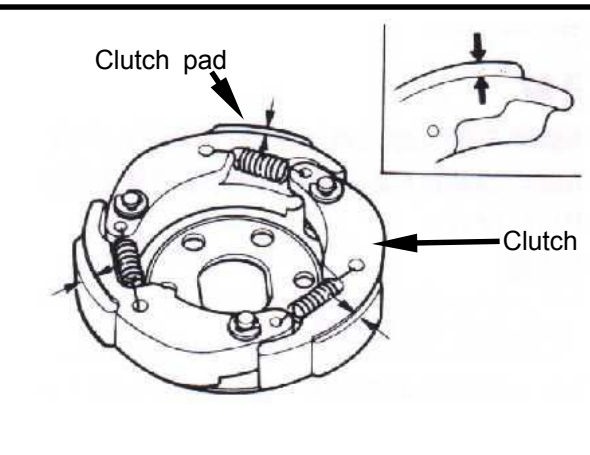
Remove left side cover.
Remove mounting bolt located under air cleaner.
Remove 9 bolts of the engine left crankcase.
Remove the left crankcase cover.
Check if the belt is crack or worn out.
Replace the belt if necessary or in accord with the periodical maintenance schedule to replace it.

Width limit: above 17.5 mm



Clutch pad

Start the motorcycle and gradually increase throttle valve openness to check clutch pad operation.
If the motorcycle moves with shaking, then check its clutch pad for wearing. Replace it if necessary.



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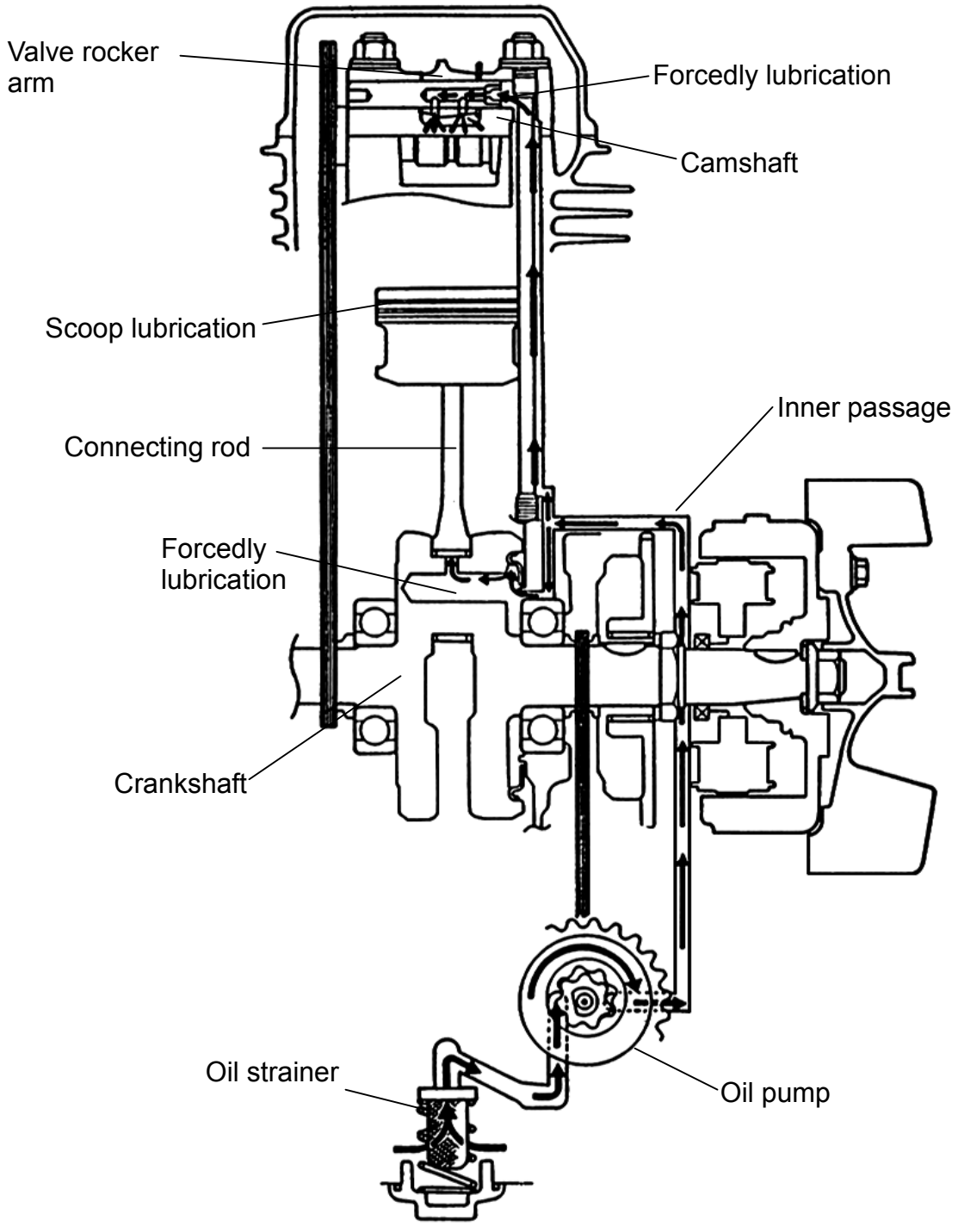
MECHANISM DIAGRAM



OPERATIONAL PRECAUTIONS

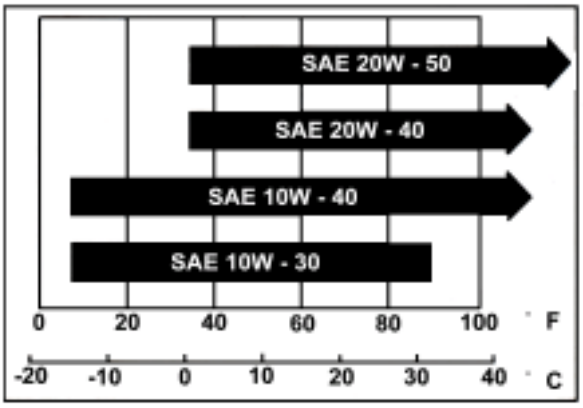
General Information

- This chapter contains maintenance operations for the engine oil pump, engine oil and gear oil.

Specifications

Engine oil quantity	Disassembly 850 c.c. Replacement 750 c.c.
Oil viscosity	SAE 10W-30 or equivalent (Recommended King-Mate serial oils)
Gear Oil	Disassembly 120 c.c. Replacement 110 c.c.
Oil viscosity of gear oil	SAE 85W-140 (Recommended King-Mate gear oil series SYM HYPOID GEAR OIL)

Oil viscosity



unit : mm

Items		Standard	Limit
Oil pump	Inner rotor clearance	-	0.12
	Clearance between outer rotor and body	-	0.12
	Clearance between rotor side and body	0.05~0.10	0.20

Torque value

Engine oil drain plug	3.5~4.5kgf-m
Engine oil screen cover	1.3~1.7kgf-m
Gear oil drain bolt	0.8~1.2kgf-m
Gear oil filling bolt	1.0~1.4kgf-m
Oil pump connection screw	0.1~0.3kgf-m

TROUBLE DIAGNOSIS

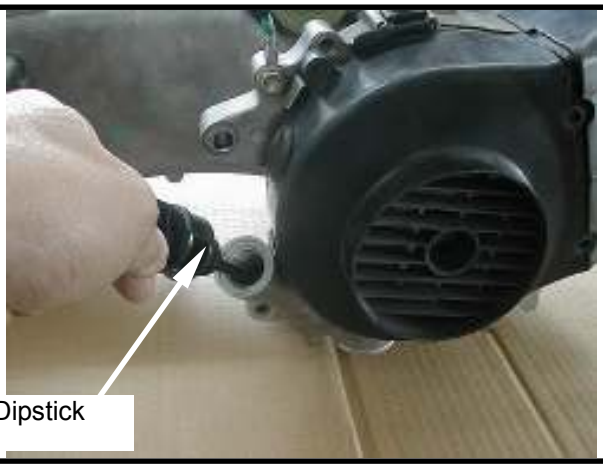
Low engine oil level
Oil leaking
Valve guide or seat worn out
Piston ring worn out

Low Oil Pressure
Low engine oil level
Clogged in oil strainer, circuits or pipes
Oil pump damage

Dirty oil
No oil change in periodical
Cylinder head gasket damage
Piston ring worn out

ENGINE OIL

Turn off engine, and park the motorcycle in flat ground with main stand.
Check oil level with oil dipstick after 3-5 minutes.
Do not rotate the dipstick into engine as checking.
If oil level is nearly low level, fill out recommended oil to upper level.

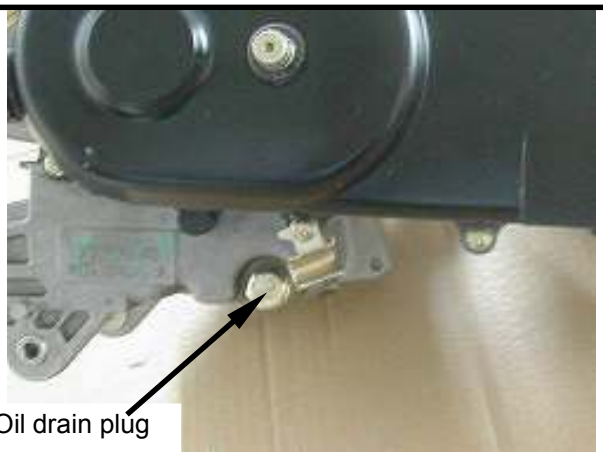


Oil Replacement

⚠ Caution

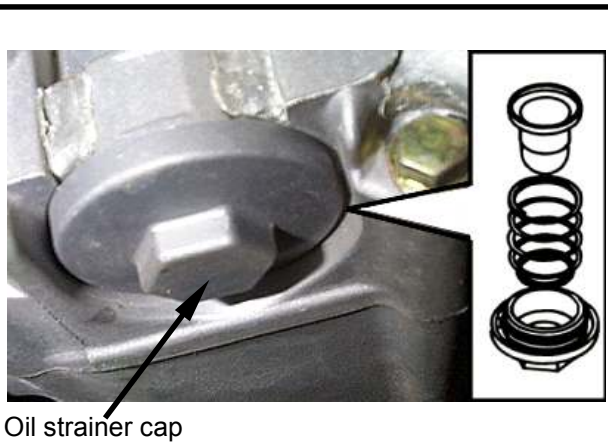
Drain oil as engine warmed up so that make sure oil can be drained smoothly and completely.

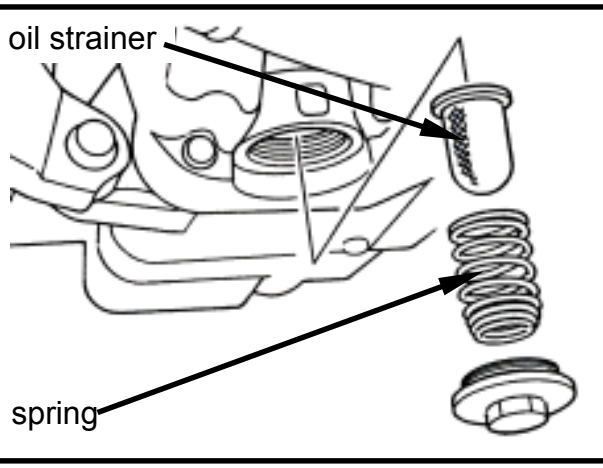
Place an oil pan under the motorcycle, and remove oil strainer cap.
Make sure if the aluminum washer of the draining bolt is damaged. If so, replace it with new one.
Install the drain bolt and tighten it.
Torque value: 3.5~4.5 kgf-m



CLEANING ENGINE OIL STRAINER

Remove the oil strainer cap.
Remove oil strainer and spring.
Clean oil strainer (recommended using compressed air to clean dirty foreign).
Check if the strainer and O-ring of the oil strainer are broken. Replace with new one if found.
Install the oil strainer and spring.
Install the oil strainer cap and tighten it.
Torque value: 1.3~1.7 kgf-m
Fill out oil to the oil filler (Oil viscosity SAE 10W-30) (Recommended King-Mate serial oils).
Engine oil quantity: Replacement 850 c.c.



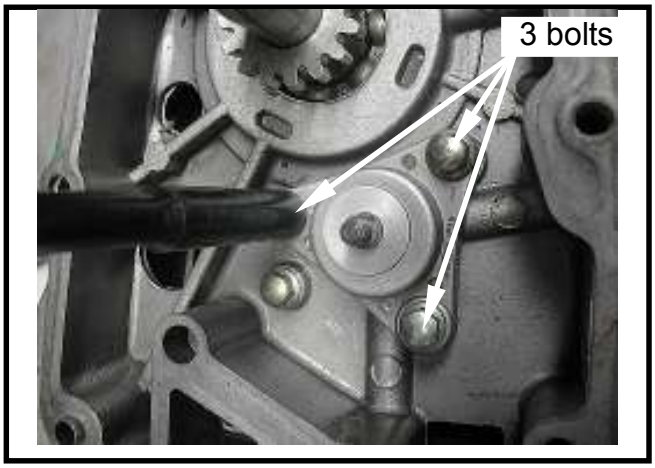


OIL PUMP

Oil Pump Removal

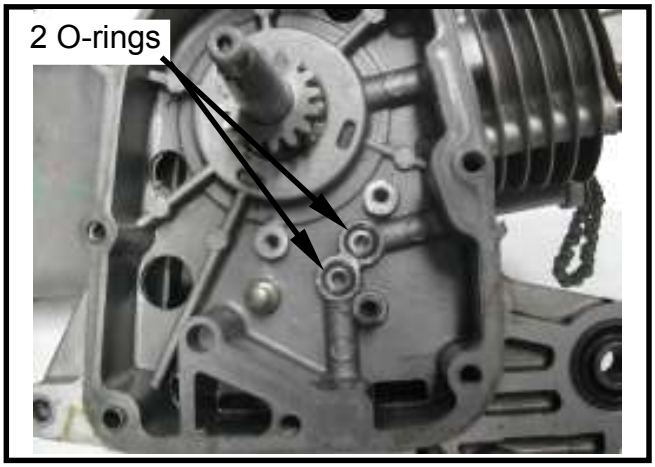
Remove the alternator (refer to chapter10).
Remove the engine right crankcase cover.
Make sure that the pump axle can be rotated freely.
Remove the oil pump driving gear nut.

Remove oil pump body bolts (3 bolts).



Remove the oil pump pin.
Remove the oil pump.

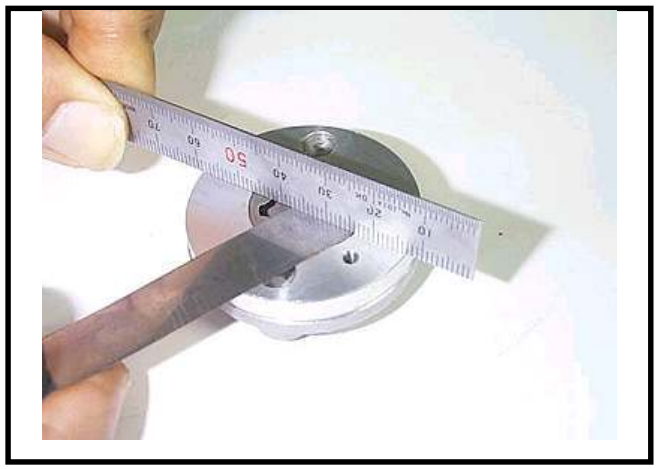
Remove the 2 O-rings.



Oil Pump Inspection
Check the clearance between oil pump body and outer rotor.
Limit: below 0.12 mm

Check clearance between inner and outer rotors.
Limit: below 0.12 mm

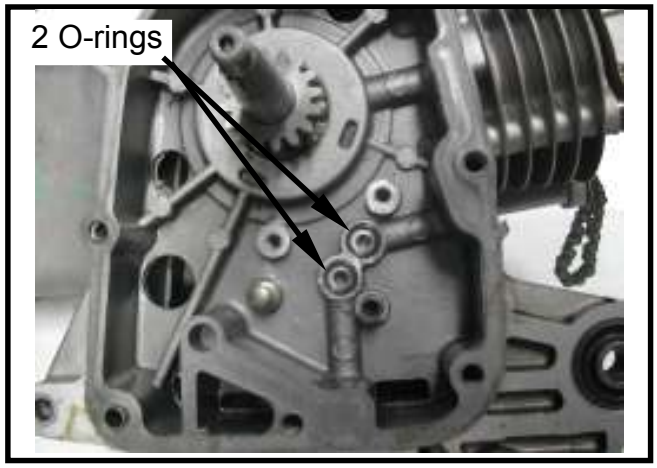
Check clearance between rotor side face and pump body.
Limit: below 2.0 mm



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 driving shaft.
Install the oil pump cover and fixing pin properly and then tighten screw. (1 screw)

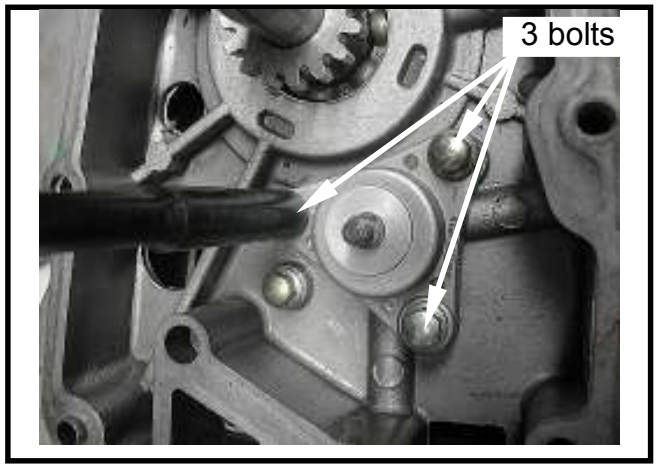
Oil Pump Installation

Install the 2 O-rings.



Install the oil pump pin.

Install the oil pump.
Install the oil pump body bolts (3 bolts).



Install the oil pump driving gear nut.
Install the alternator (refer to chapter10).
Install the engine right crankcase cover.

GEAR OIL

Oil Level Inspection

Park the motorcycle on flat ground with main stand.

Turn off engine and remove both engine oil filling bolt and oil draining bolt.

Remove gear oil filling hole bolt and place a measurement cup under the draining plug.

Remove the oil draining plug and the pour gear oil into the measurement cup.

Measure the gear oil quantity if within standard value.

Add specified gear oil if the oil level too low.

Standard quantity: 100cc.

Replacement: 90 cc.

Gear Oil Replacement

Remove the gear oil filling hole bolt and its draining plug and then drain oil completely.

Install the draining plug and tighten it. (Make sure if the plug washer is damaged. If so, replace it with new one.)

Torque Value：0.8~1.2 kgf-m

Add new gear oil (100 c.c.) from the gear oil filling hole and then install the gear oil filling hole bolt after added oil. And then, tighten the bolt.

Torque Value: 1.0~1.4 kgf-m

※Recommended to apply with SYM HYPOID GEAR OIL (SAE 85W-140)

Start engine and run it for 2~3 minutes.

Turn off engine and check if oil leaking.

PRECAUTIONS IN OPERATION 4-1	AUTO BY-STARTER 4-6
TROUBLE DIAGNOSIS 4-2	FLOAT CHAMBER 4-7
CARBURETOR REMOVAL 4-3	INSTALLATION OF CARBURETOR ..4-8
VACUUM CHAMBER 4-3	IDLE SPEED ADJUSTMENT 4-8
AIR CUT-OFF VALVE 4-5	AIR CLEANER.....4-9

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 or twist throttle valve cable. Damaged cable will make unstable drivability.
- 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 automatic by-starter and air cut-off valve arbitrarily.

Specification

Item	Specification
Venturi diameter	Φ6.7 mm / Φ15.3mm
I.D. number	063c
Fuel level	17.5 mm
Main injector	85#
Idle injector	# 32
Idle speed	2200±100 rpm
Fuel quantity adjustment screw	1 3/4±3/4 turns

Torque value

Fuel valve tightening nut: 1.5~2.0 Kgf-m

Tool

Special service tools

Vacuum/air pressure pump

General service tools

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 automatic by-starter
- Malfunction of throttle valve operation

Stall after started
- Malfunction of automatic by-starter
- 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

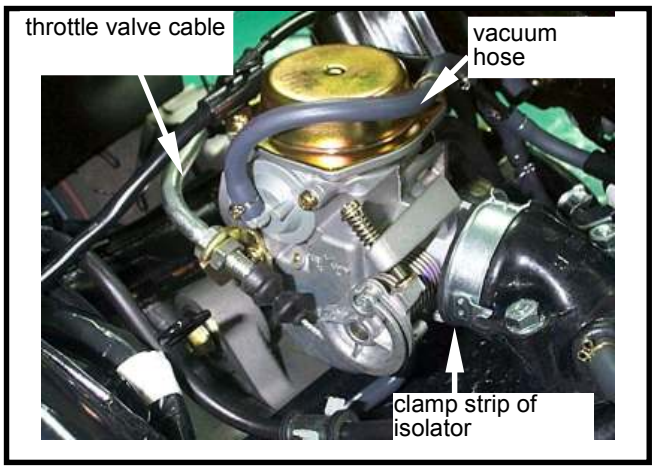
Power insufficiency and fuel consuming
- Fuel system clogged
- Malfunction of ignition system

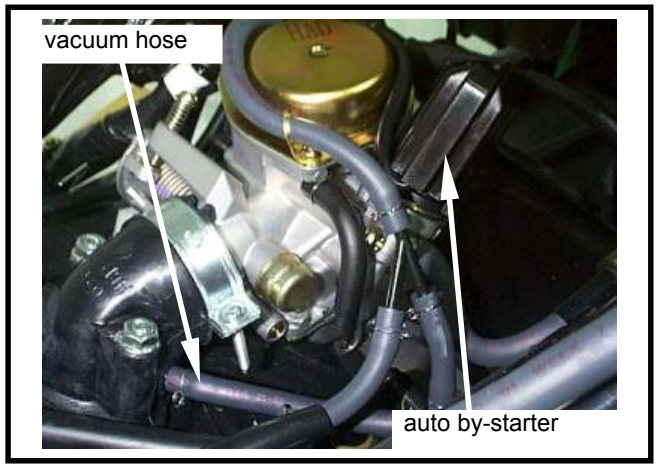
Mixture too lean
- Clogged fuel injector
- Vacuum piston stick and closed
- Malfunction of float valve
- Fuel level too low in float chamber
- Clogged fuel tank cap vent
- Clogged fuel filter
- Obstructed fuel pipe
- Clogged air vent hose
- Air existing in intake system

Mixture too rich
- Clogged air injector
- Malfunction of float valve
- Fuel level too high in float chamber
- Malfunction of automatic by-starter
- Dirty air cleaner

Carburetor Removal

Open the seat.
Remove the luggage box.
Loosen the adjustment nut and fixing nut of throttle valve cable, and release the cable from carburetor.
Remove fuel pipe, vacuum hose.
Disconnect auto by-starter connectors.
Release the clamp strip of air cleaner.
Release the clamp strip of carburetor isolator.
Take the carburetor out.

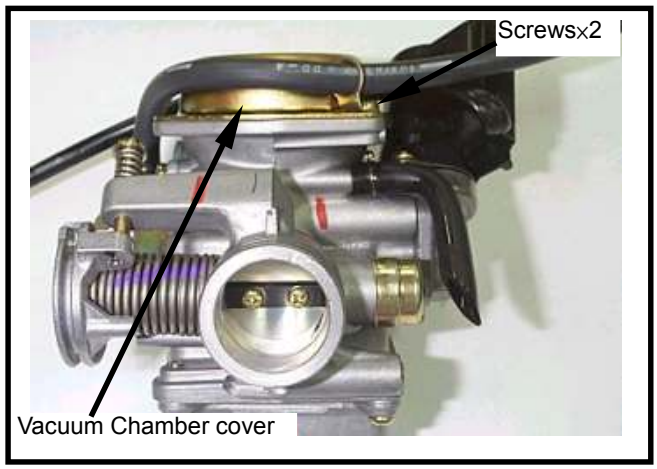




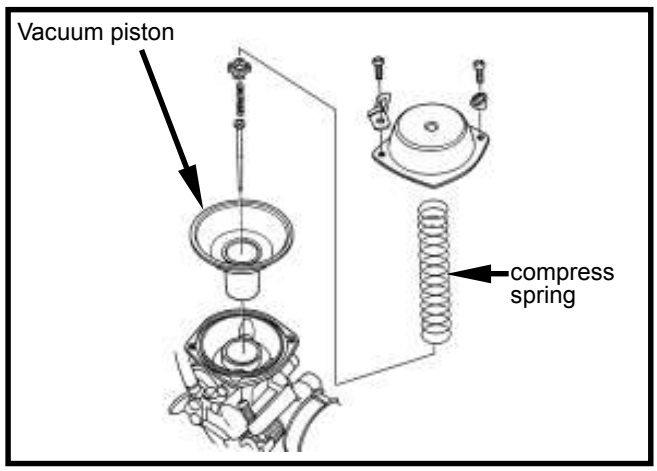
VACUUM CHAMBER

Removal

Loosen drain screw, and drain out residual fuel in float chamber.
Remove screws (2 screws) of vacuum chamber cover and the cover.



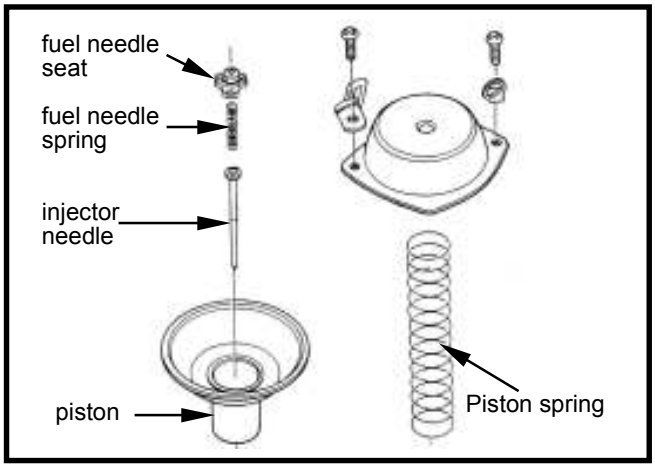
Remove compress spring and vacuum piston.



Remove fuel needle seat, spring, and injector needle.
Check if the vacuum piston for wear out, crack or other damage.
Check if the diaphragm for damage or crack.

⚠ Cautions

Do not damage vacuum diaphragm.



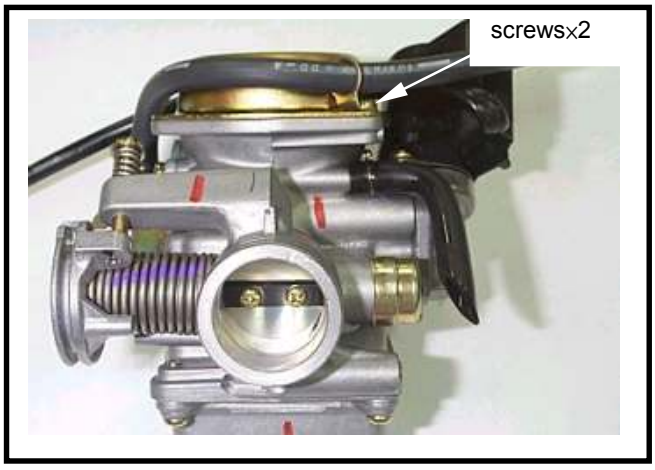
Installation
Install injector needle, spring and fuel needle seat to vacuum piston.

⚠ Cautions

- Note direction as installing the piston set because wrong direction of the piston cab not be installed.
- Align the indent of vacuum diaphragm with the carburetor body.

Install vacuum piston to carburetor body.
Install compress spring.

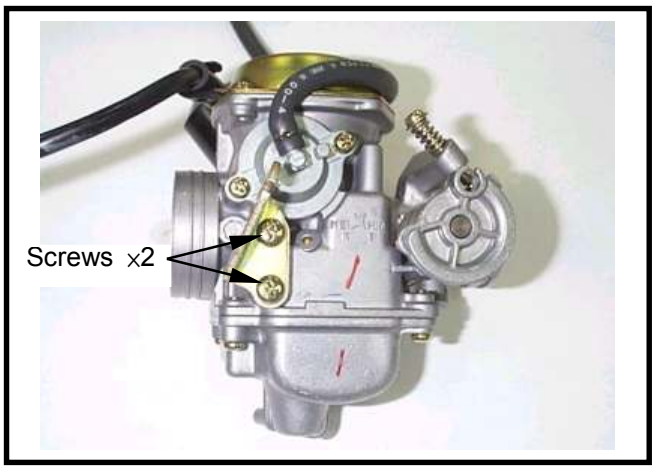
Install vacuum chamber cover and tighten 2 screws.



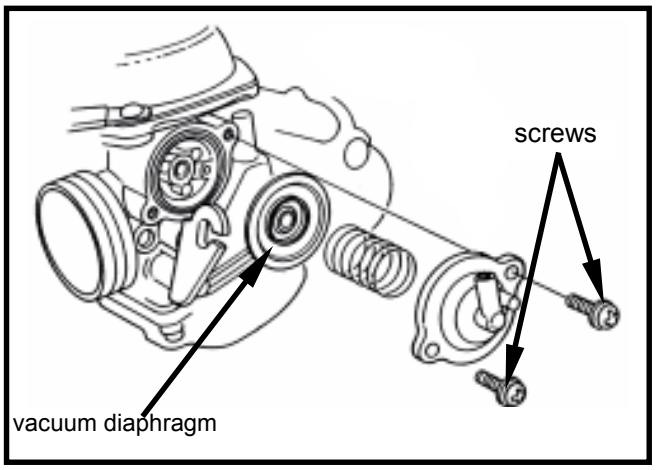
AIR CUT-OFF VALVE

Removal

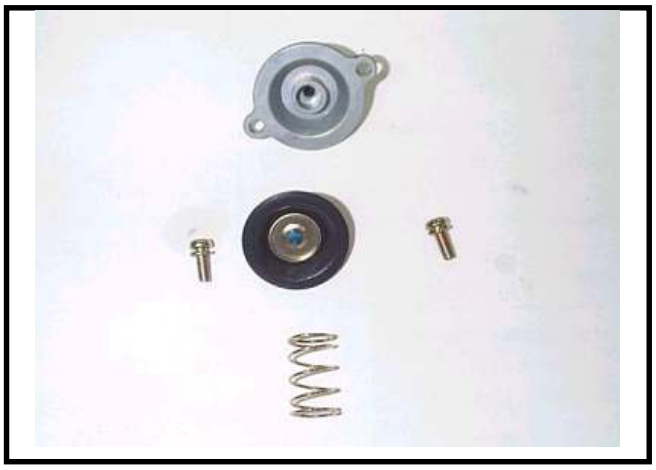
Remove the vacuum hose clamp and then the vacuum hose.



Remove the screws (screw x 2) of the air cut-off valve and its cover.



Remove the spring and vacuum diaphragm. Check if the vacuum diaphragm for deterioration or crack.



Installation

Install the valve as reverse order of removal.

⚠ Cautions

Do not damage the vacuum diaphragm or in opposite installation direction.

AUTO BY-STARTER

Inspection

Turn off engine and waiting for over 10 minutes for cooling.

Check resistance across the two terminals of the auto by-starter

Resistance value: Max. 10Ω (Measured after engine stopped for more than 10 minutes)

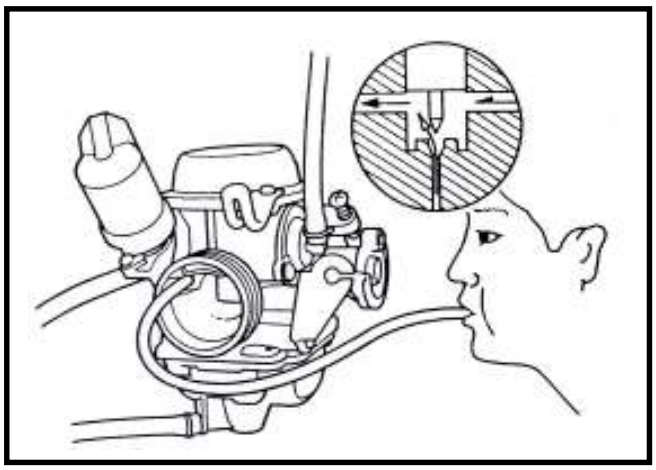
Replace the auto by-starter with a new one if resistance value exceeds standard.

Remove the carburetor, allow it to cool off for 30 minutes.

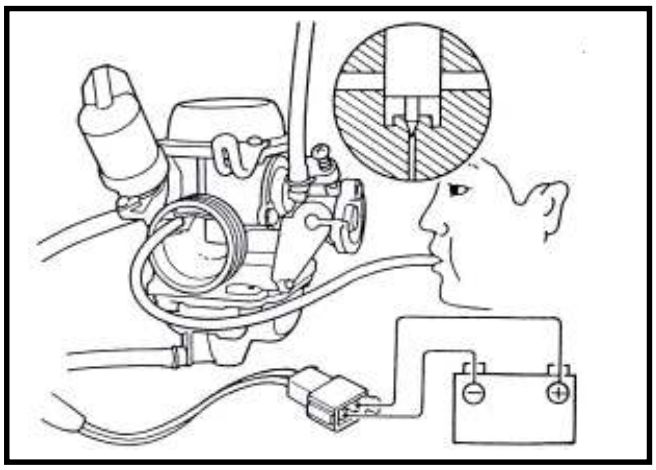
Connect a hose to fuel richment circuit.

Pump compressed air to the circuit.

Replace the auto by-starter if the circuit clogged.

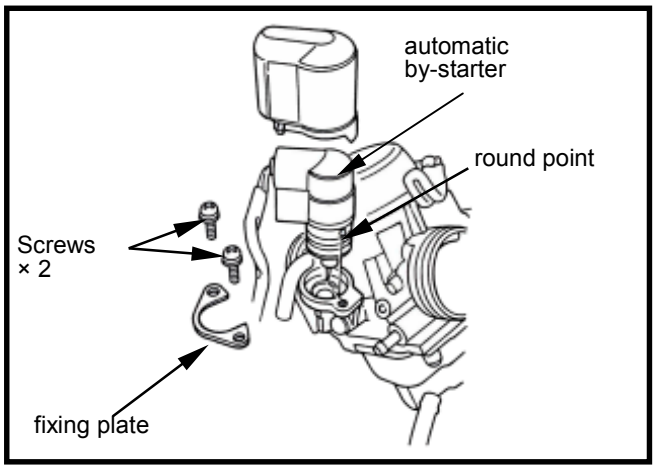


Connect battery posts (12V) to starter's connectors. After 5 minutes, test the rich circuit with compressed air. If air flow through the circuit, then replace the starter.



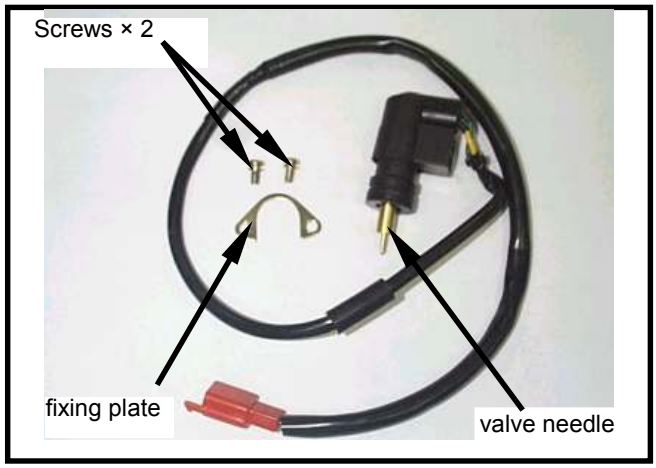
Removal

Remove fixing plate screw, and then remove the plate and auto by-starter from carburetor.



Valve inspection

Check if auto by-starter and valve needle for damage or wear out.



Installation

Install auto by-starter to the carburetor body.

Install fixing plate to the upper groove of auto by-starter, and install its flat surface to carburetor. Install screw and tighten it.

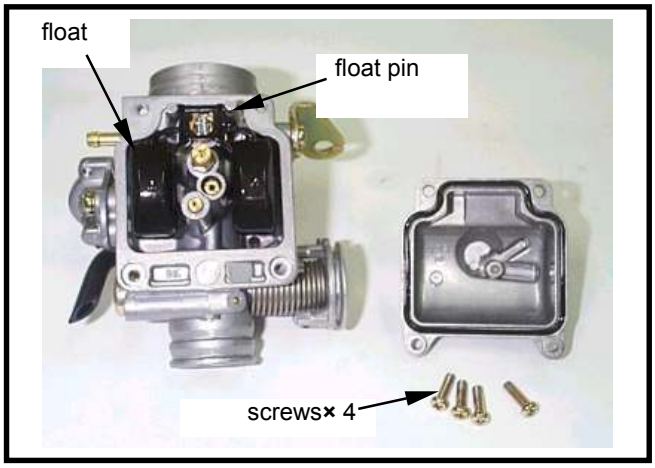
⚠ Cautions

Align the round point of the starter with the screw hole of air intake side.

FLOAT CHAMBER

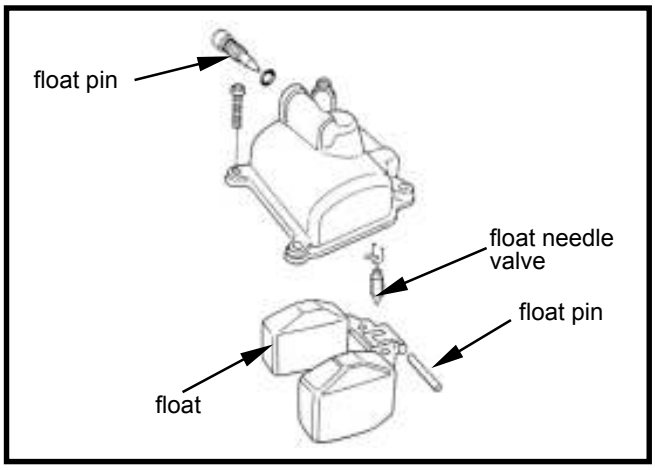
Disassembly

Remove 4 mounting screws and then the float chamber cover.
Remove the float pin and float valve.



Checking

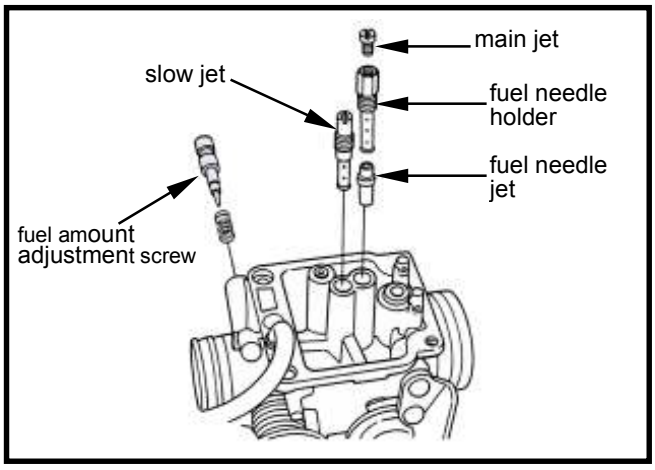
Check float needle valve and valve seat for drop difference damage, wear out, dirty or clogged.



⚠ 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.

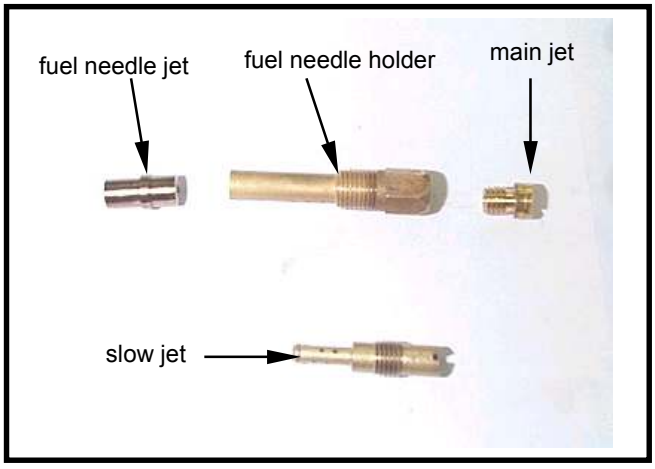
Remove main jet, fuel needle jet holder, fuel needle jet, slow jet, fuel amount adjustment screw.



⚠ 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.
- Do not turn adjustment screw forcefully to avoid damaging valve seat face.

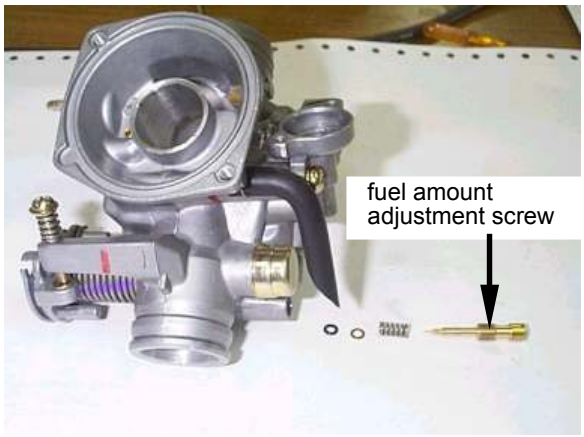
Clean jets with cleaning fluid.
Then use compressed air to blow dirt off.
Blow carburetor body passages with compressed air.



Installation
Install main jet, fuel needle jet seat, fuel needle jet, slow speed jet and fuel amount adjustment screw.

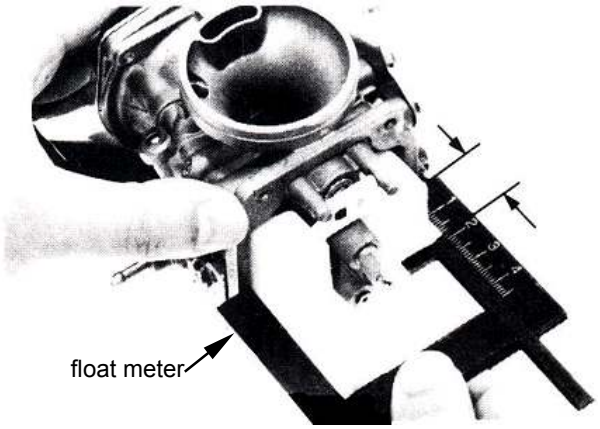
⚠ Cautions
Set the adjustment screw in according to number of turns noted before it was removed.

Install the float valve, float, and float pin.



Checking Fuel Level

⚠ Cautions
- 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.

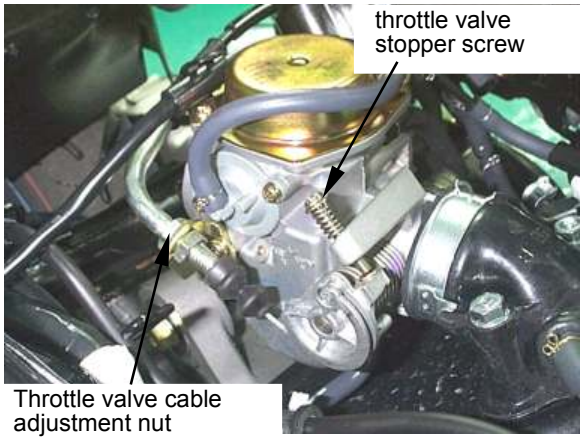


Fuel level: 17.5 mm

INSTALLATION OF CARBURETOR
Install carburetor in the reverse order of removal. Following adjustments must be made after installation.
- Throttle valve cable clearance adjustment
- Idle speed adjustment

IDLE SPEED ADJUSTMENT

⚠ Caution
- Fuel amount adjust 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.
- Never screw in forcedly to avoid damaging the screw seat.
- The main stand must be used to support the motorcycle to perform the adjustments.



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

Standard turns: 1 3/4±3/4 turns

Warm up engine, adjust throttle valve stopper screw to standard RPM.

Idle speed rpm: 1700±100 rpm

Connect the sampling hose of exhaust analyzer to exhaust front end. Press test key on the analyzer. Adjust the air volume adjustment screw and read CO reading on the analyzer.

CO standard value: 1.0~1.5 %

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

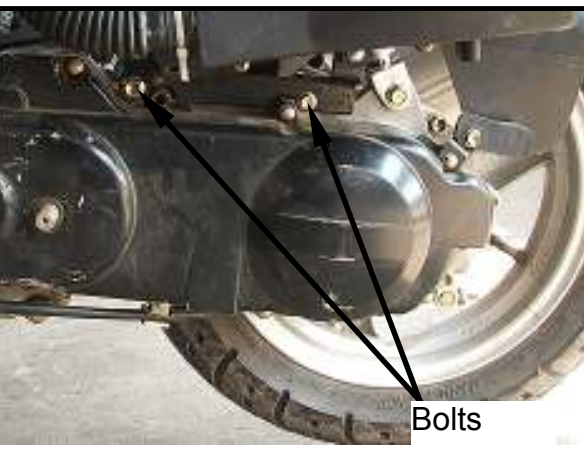
AIR CLEANER

Removal

Open the seat and remove the luggage box .
Loosen the clamp strip of air cleaner.
Remove evaporative return hose.
Remove body side cover.
Remove the air cleaner body bolts (2 bolts).
Remove the air cleaner.

Installation

Install the air cleaner in the reverse order of removal.

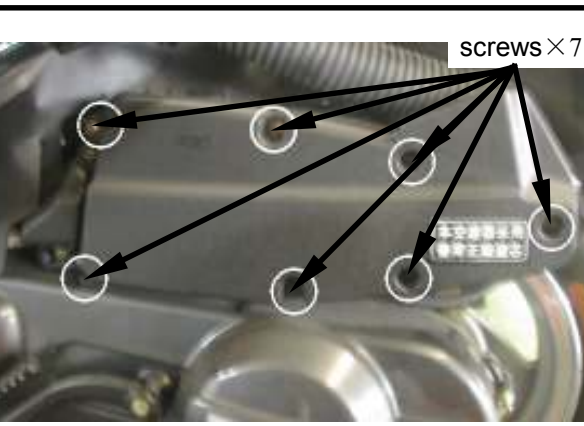


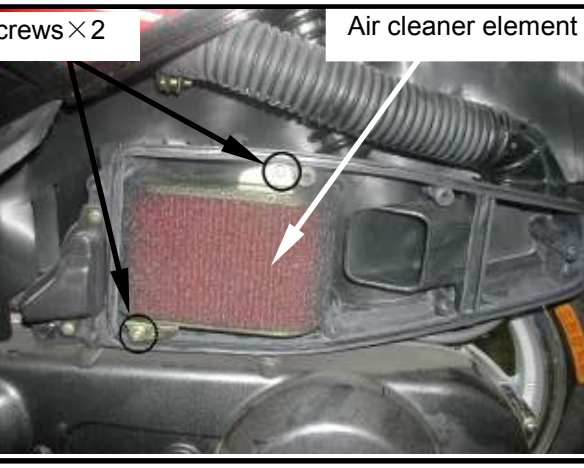
Air Cleaner Element Cleaning

Remove left body side little cover (2 screws).
Remove the air cleaner cover (7 screws).
Remove the air cleaner element (2 screws).
With compressed air to clean dirty around the element. Replace it if it is too dirty to clean.

Cautions

The air cleaner element is made of paper so do not soap it into water or wash it with water.





OPERATIONAL PRECAUTIONS 5-1
ENGINE REMOVAL 5-2
INSTALLATION OF ENGINE 5-4

OPERATIONAL PRECAUTIONS

General Information

- Engine must be supported by a bracket or adjustable tool in height.
- The following parts can be serviced with the engine installed on the frame.
  1. Carburetor
  2. Driving disk, driving belt, clutch, and transporting disk
  3. Final reduction gear mechanism

Specification

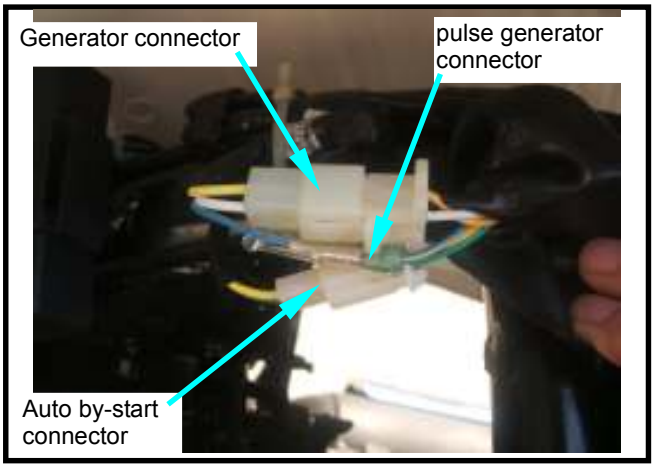
Item		Specification
Engine Oil Capacity	Replacement	750 c.c.
	Disassemble	850 c.c.
Gear Oil Capacity	Replacement	110 c.c.
	Disassemble	120 c.c.

Torque Values

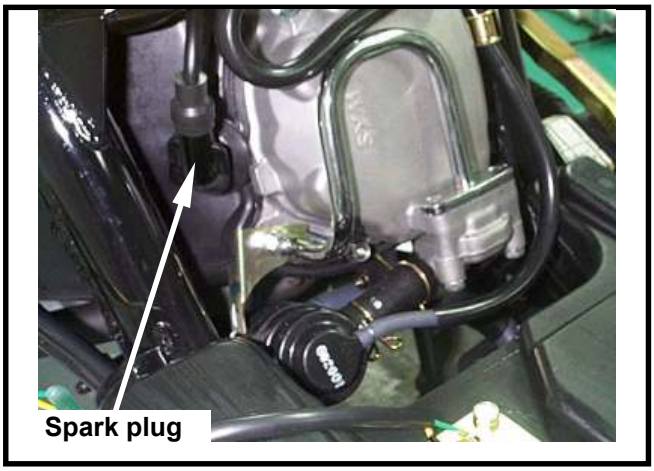
Engine suspension bolt	4.5~5.5kgf-m
Engine suspension nut	4.5~5.5kgf-m
Bolt of rear shock absorber upper connection	3.5~4.5kgf-m
Bolt of rear shock absorber lower connection	2.4~3.0kgf-m

ENGINE REMOVAL

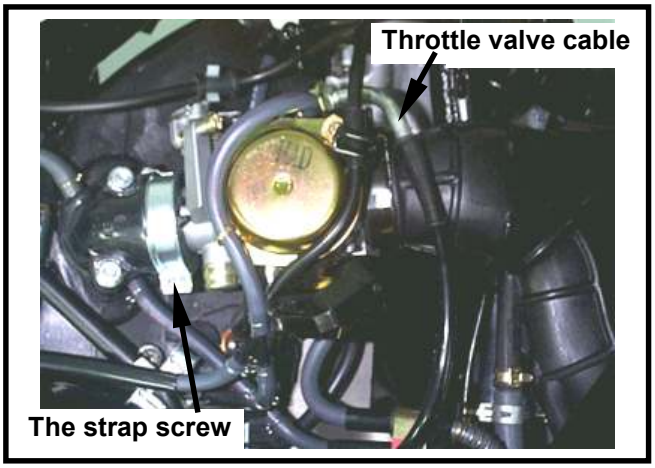
Remove the power connector of auto by-start.
Remove the generator wire and pulse generator connector.



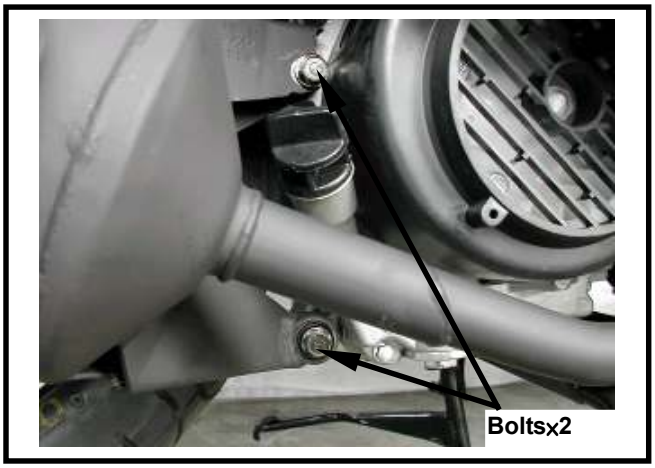
Remove the spark plug.



Remove the fuel pipe, vacuum hose, and throttle valve cable from the carburetor.
Loose the strap screw of the air cleaner guide, and then the air cleaner guide.

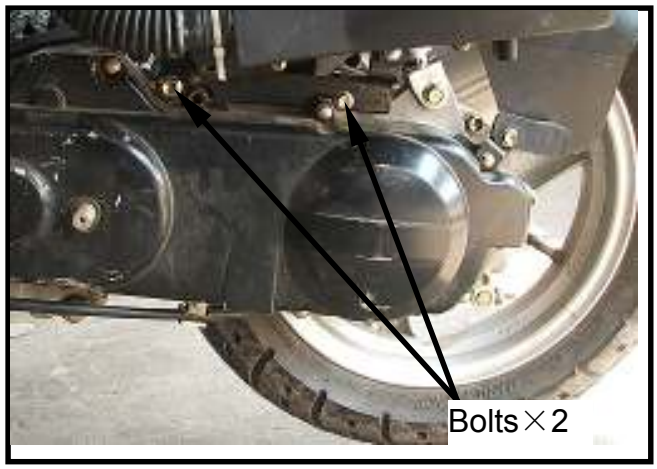


Remove the exhaust muffler (Bolts × 2, Nuts × 2).

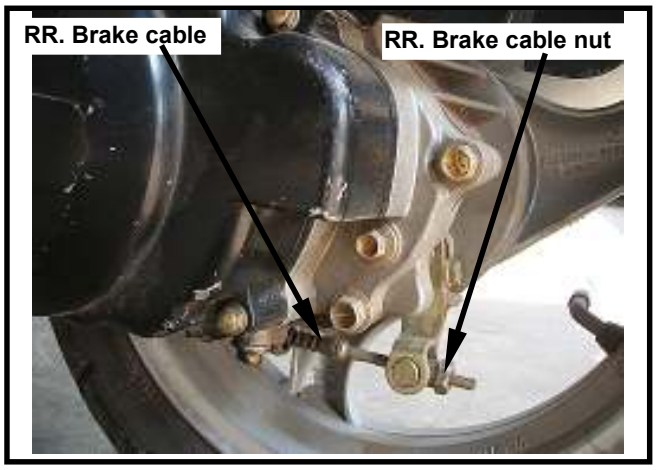


Remove the rear wheel (Nut × 1).

Remove the air cleaner connection bolts (2 bolts).



Remove the rear brake cable nut.
Remove the rear brake cable.



Remove the rear shock absorber lower bolt.

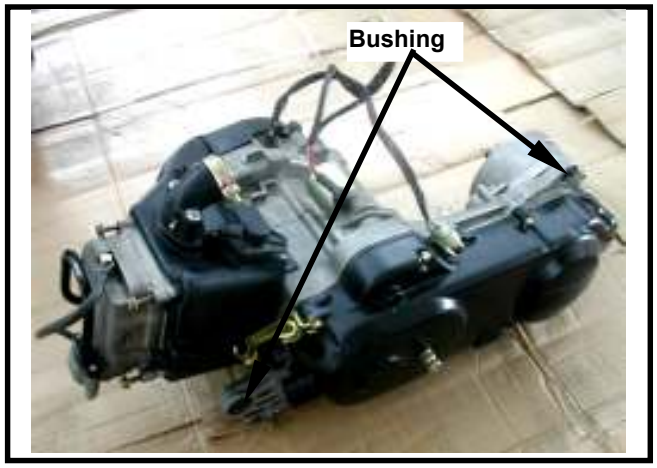
Loose the strap screw of engine left guide.

Remove the engine suspension nut and bolt , and then remove the engine.

⚠ Caution

- With a bracket to support the engine to prevent from it damage by falling down as removing the engine.

Check if the engine suspension, rear shock absorber bushing, and cushion rubber for damage. Replace them with new ones if so.

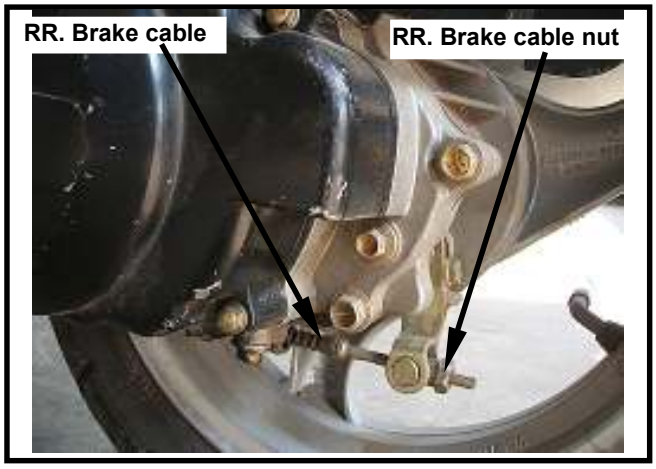


INSTALLATION OF ENGINE

Check if the bushings of engine suspension frame and shock absorber for damaged. If so, replace with new ones.
Install the engine according to the reversing order of removal.

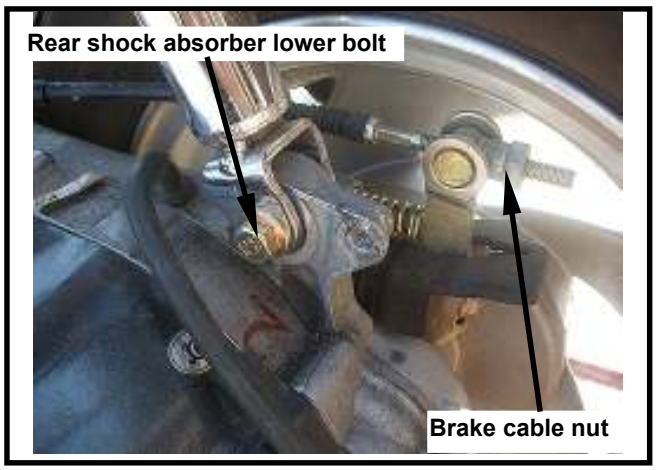
⚠ Caution

- Notice both feet and hands safety for squeezing as engine installation.
- Do not bent or squeeze each wires or hose.
- Route all cables and wires in accordance with the routine layout.



Engine suspension nut:
Torque Value: 4.5~5.5kgf-m

Rear shock absorber bolt:
Torque Value: Top: 3.5~4.5kgf-m
lower: 2.4~3.0kgf-m



Rear wheel axle nut:
Torque Value: 11.0~13.0kgf-m

MECHANISM DIAGRAM 6-1	CYLINDER HEAD INSPECTION 6-8
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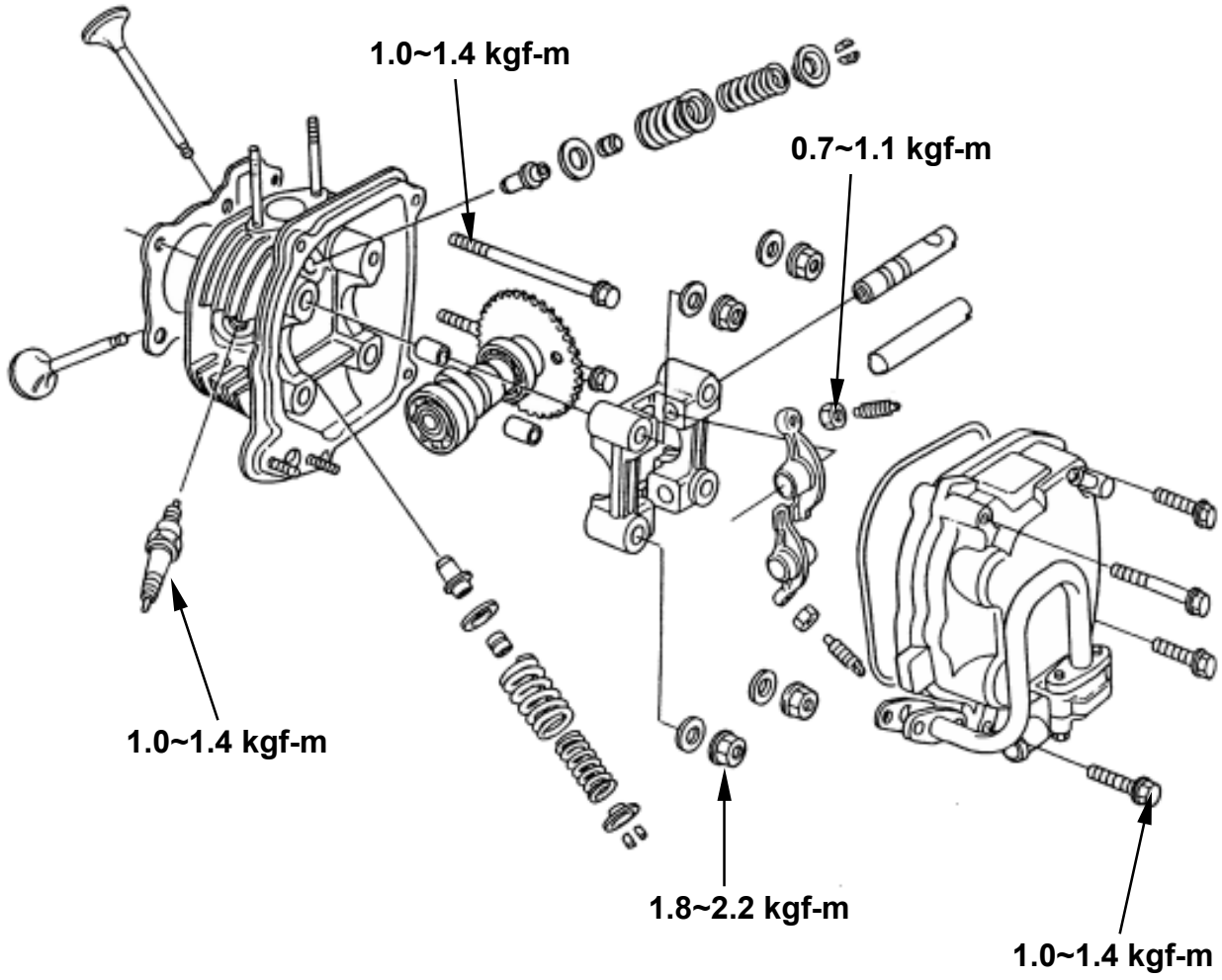
MECHANISM DIAGRAM



PRECAUTIONS IN OPERATION

General Information

- This chapter is contained maintenance and service for cylinder head, valve, and camshaft as well as valve rocker arm.
- Cylinder head service cannot be carried out when engine is in frame.

Specification **unit: mm**

Item			Standard	Limit
Compression pressure			12 ± 2 kg/cm²	-
Camshaft	Height of cam lobe	Intake	25.736	-
		Exhaust	25.55	-
Rocker arm	ID of valve rocker arm		10.00	10.000~10.015
	OD of valve rocker arm shaft		10.00	9.985~10.00
Valve	OD of valve stem	Intake	5.00	4.975~4.99
		Exhaust	5.00	4.97~4.98
	OD of Guide		5.00	5.030
	Clearance between valve stem and guide	Intake	0.010~0.037	0.080
		Exhaust	0.030~0.057	0.100
	Free length of valve spring		32.410	-
	Valve seat width		1.000	1.600
Connection Flatness of cylinder head			-	0.050

Torque Value

Cylinder head cover bolt	0.8~1.2kgf-m
Cylinder head bolt (LH)	0.8~1.2kgf-m
Cylinder head Nut	1.0~1.4kgf-m (apply with oil on bolt thread & seat)
Sealing bolt of timing chain auto-adjuster	0.8~1.2kgf-m
Bolt of timing chain auto-adjuster	0.8~1.2kgf-m
Timing gear cover bolts	0.7~1.1kgf-m (apply with oil on bolt thread & seat)
Spark plug	1.0~1.4kgf-m

TOOLS

Special service tools

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

TROUBLE SHOOTING

Engine performance will be effected by troubles on engine top end. The troubles usually can be determinate or by performing cylinder compression test and judging the abnormal noise generated.

Rough Idle

Low compression pressure.

Low compression pressure

1. Valve

- Improper valve adjustment.
- Burnt or bended valve.
- Improper valve timing.
- Valve spring damaged.
- Valve carbon.
- Poor sealing on valve seat.
- Improper spark plug installation.

2. Cylinder head

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

3. Piston

- Piston ring worn out.

High compression pressure

- Too much carbon deposit on combustion chamber or piston head.

Noise

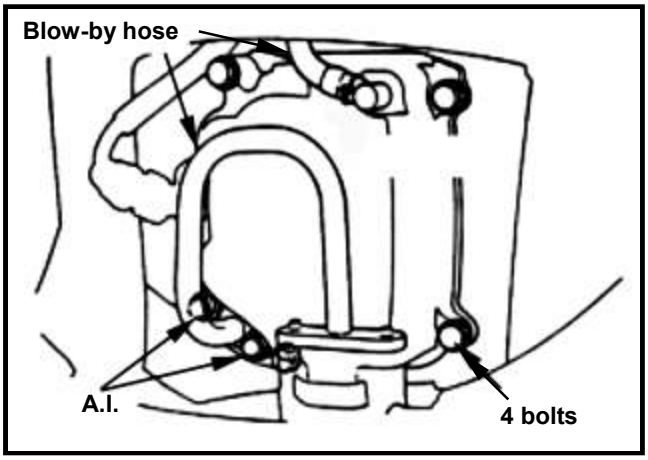
- Improper valve clearance adjustment
- Burnt valve or damaged valve spring
- Camshaft wear out or damage
- Cam chain wear out or looseness
- Auto-adjuster wear out or damage of cam chain
- Camshaft sprocket wear out
- Rocker arm or rocker arm shaft wear out

White smoke

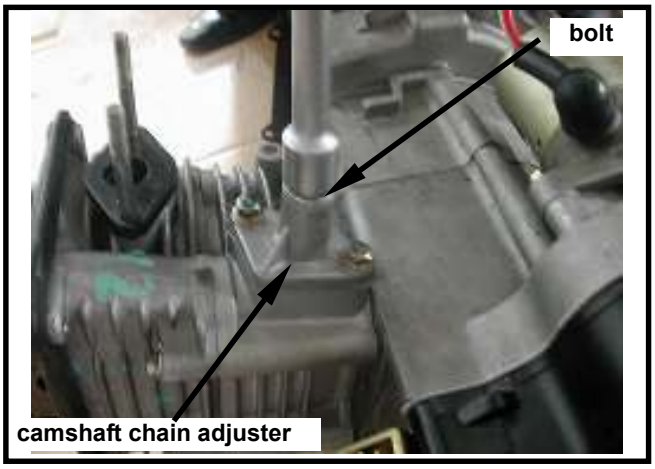
- Valve guide or valve stem wear out
- Valve stem seal wear out

CAMSHAFT REMOVAL

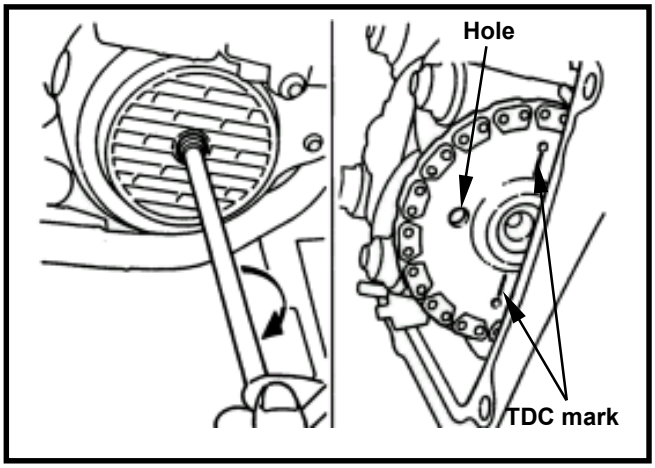
Remove the shroud of the engine.
Remove the crankcase blow-by system hose from the cylinder head.
Remove the cylinder head bolts and then the cylinder head (4 bolts).



Loosen the bolt of camshaft chain adjuster and remove O-ring.
With a flat screwdriver to tighten the screw of camshaft chain adjuster in a clockwise motion for release adjuster.



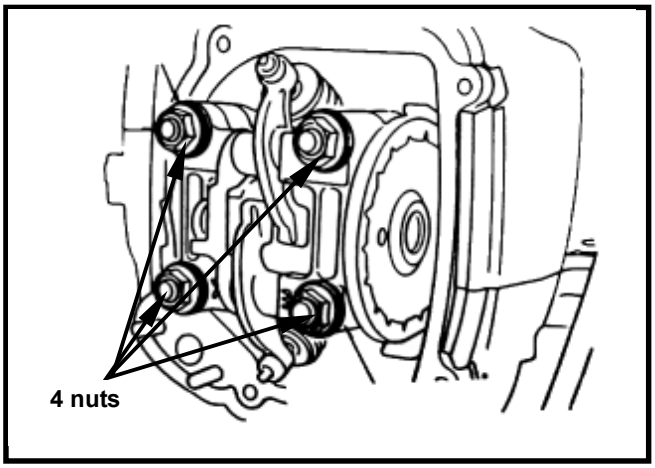
Turn the flywheel in counter clockwise motion with T type wrench until the “T” mark on flywheel aligned with the mark on the crankcase so that the hole on the camshaft sprocket is forward up and piston is at TDC position.



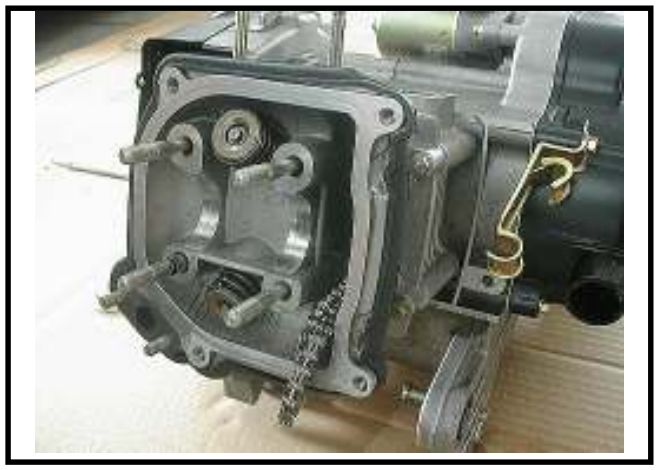
Remove camshaft holder nuts and washers.

⚠ Caution

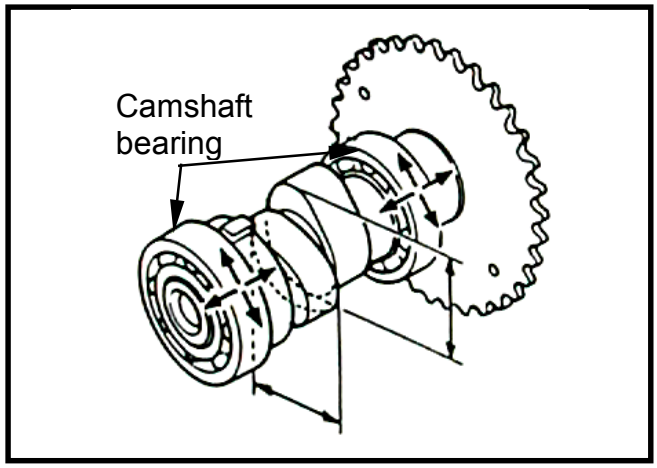
Loosen the nuts diagonally by 2-3 sequences.



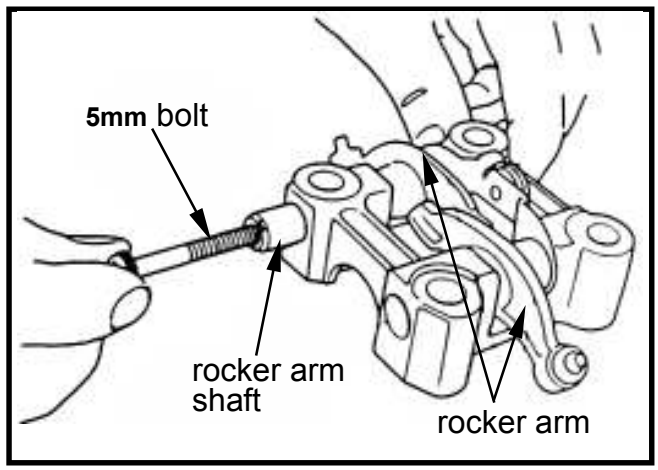
Remove the camshaft holder and rocker arm set.
Remove the camshaft chain from the camshaft sprocket.
Remove the camshaft.



Camshaft Inspection
Inspect cam lobe height for damaged.
Service Limit
IN: Replacement when less than 25.29 mm
EX: Replacement when less than 25.12 mm
Inspect the camshaft bearing for looseness or wear out. If any, replace whole set of camshaft and bearing.



Disassembly Of Camshaft Holder
With a 5 mm bolt to screw in the cam rocker arm shaft so that take it out.
Remove cam rocker arm.

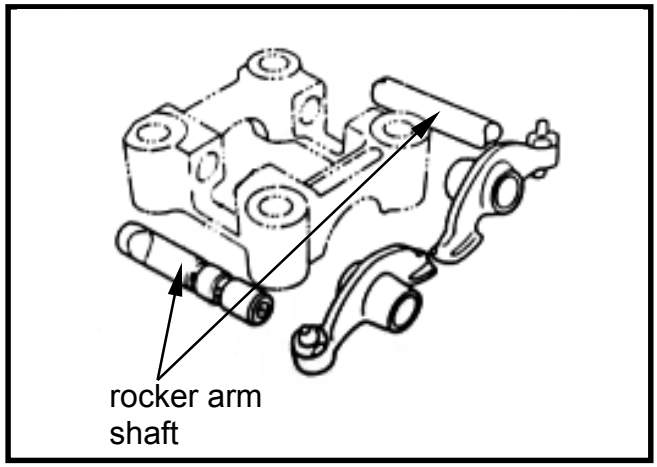


Inspection Of Camshaft Holder
Check if the camshaft holder, cam rocker arm and rock arm shaft for wearing out or damage.

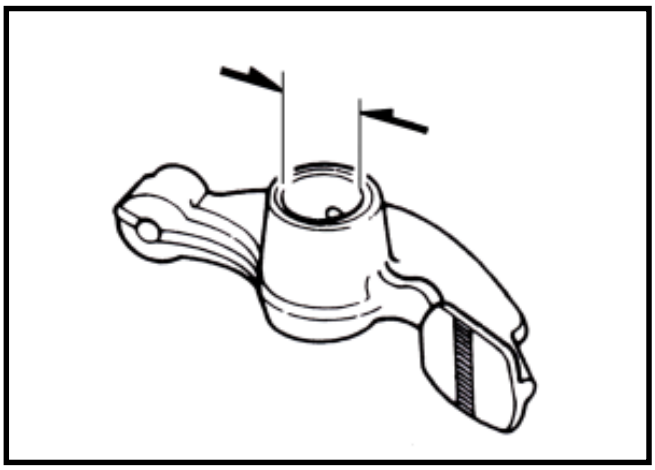
⚠ Caution

- Further check is necessary if any wear is found on the moveable surface of cam rocker arm.
- Check if the camshaft bearing mounting surface for wear or damage.

Measure the cam rocker arm I.D. of the camshaft holder.
Service Limit: Replace when it is above 10.10 mm

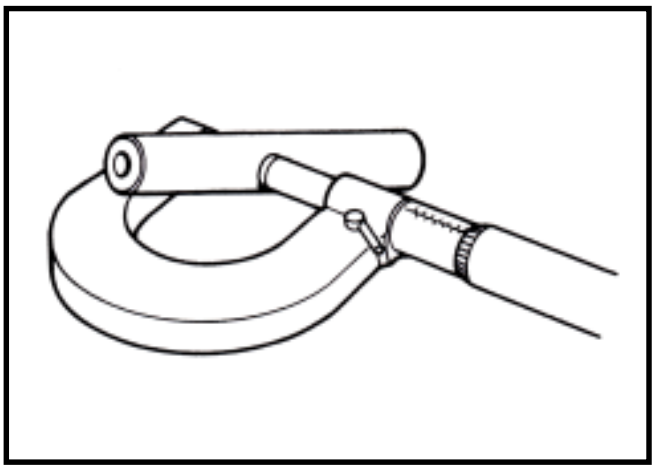


Measure the valve rocker arm I.D.
Service Limit: Replace when it is above 10.100 mm



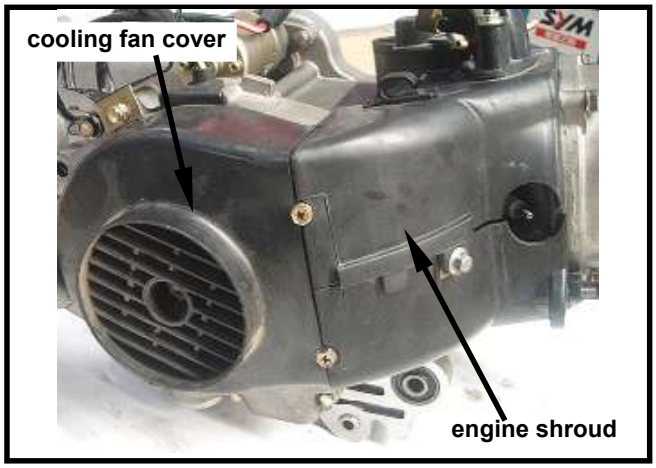
Measure the active O.D. of the valve rocker arm shaft and valve rocker arm.
Service Limit: Replace when it is above 9.910 mm

Calculate the clearance between the rocker arm shaft and the rocker arm.
Service Limit: Replace when it is above 0.10 mm

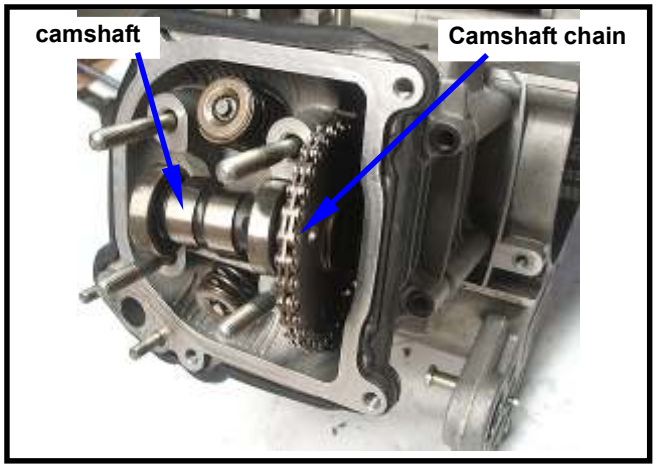


CYLINDER HEAD REMOVAL

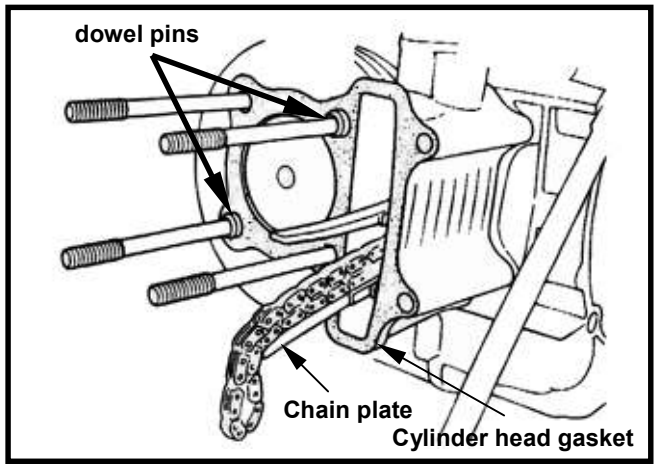
Remove double seat, luggage box and front center cover.
Remove the engine (refer to Chapter 5).
Remove the cooling fan cover.
Remove the engine shroud .



Remove the camshaft chain and camshaft.



Remove the 2 cylinder head mounting bolts from cylinder head left side cover.
Remove cylinder head gasket and 2 dowel pins.
Remove chain plate.
Clean up residues from the matching surfaces of cylinder and cylinder head.

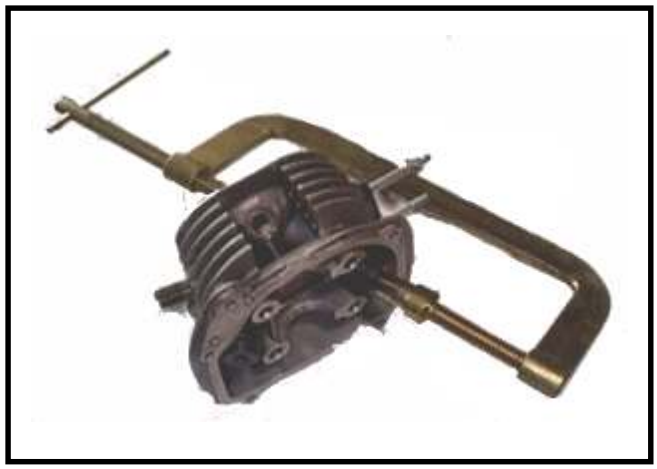


⚠ Caution

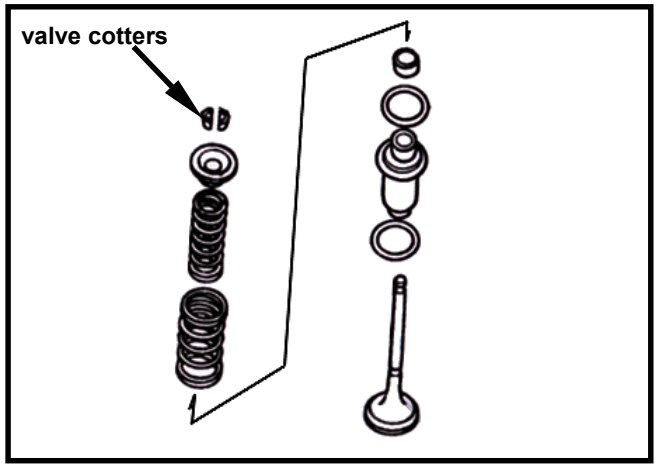
- Do not damage the matching surfaces of cylinder and cylinder head.
- Avoid residues of gasket or foreign materials falling into crankcase as cleaning.

CYLINDER HEAD DISASSEMBLY

Use a valve compressor to press the valve spring.



After removed valve cotters, release the compressor and then take out spring retainer, valve spring and valves.



⚠ Caution

In order to avoid to loosing spring tension, do not compress the spring too much. Its length is based on the installation of latch.

Special Service Tool: Valve spring compressor.

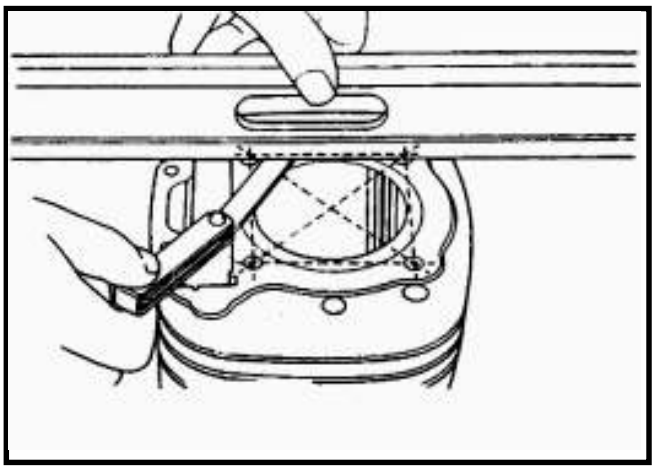
Remove valve stem guide seal.
Clean carbon deposits in combustion chamber.
Clean residues and foreign materials on cylinder head matching surface.

⚠ Caution

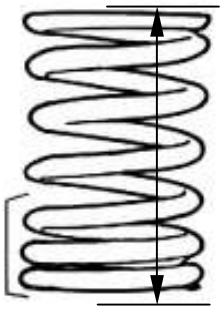
Do not damage the matching surface of cylinder head.

CYLINDER HEAD INSPECTION

Check if spark plug and valve holes are crack.
Measure cylinder head flat with a straightedge and flat feeler gauge.
Service limit: 0.5mm

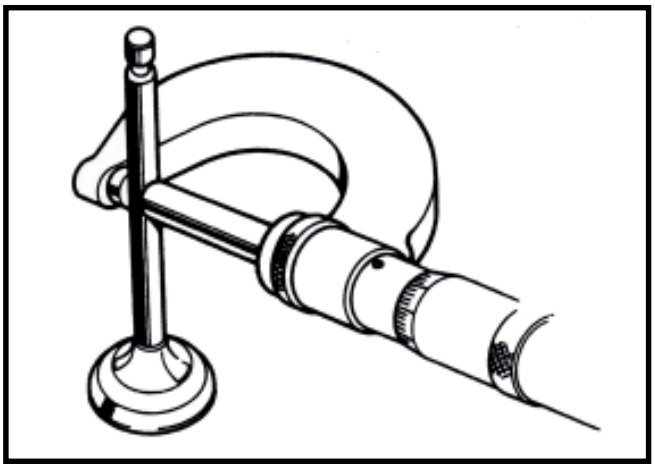


Valve spring free length
Measure the free length of intake and exhaust valve springs.
Standard:32.410 mm



The narrow pitch of the spring shall face to the combustion chamber.

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→ 4.900mm
EX→ 4.900mm

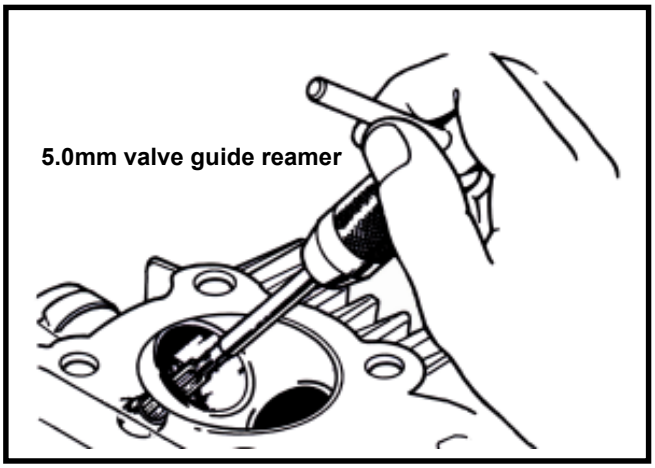


Valve guide

⚠ Caution

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

Special Service Tool: 5.0mm valve guide reamer
Measure and record each valve guide inner diameters.
Service limit: 5.030mm
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→ 0.08mm
EX→ 0.10mm

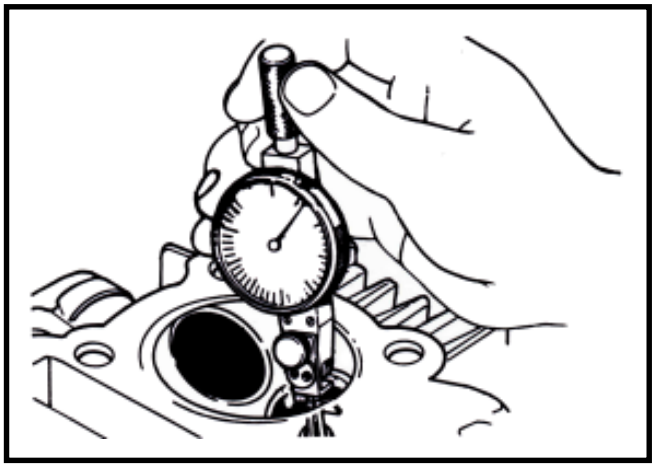


5.0mm valve guide reamer

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

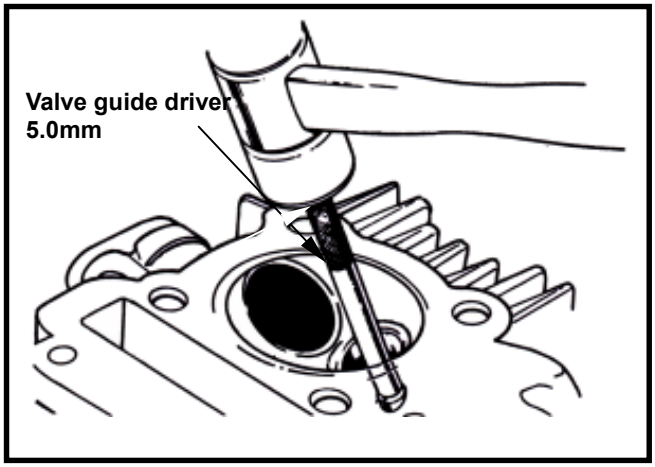
It must correct valve seat when replacing valve guide.

Valve guide replacement

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

Caution

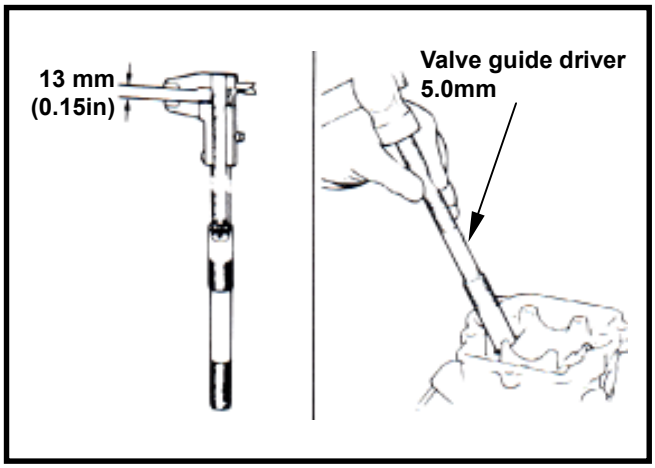
- Do not let torch heat cylinder head directly. Otherwise, the cylinder head may be deformed as heating it.
- Wear on a pair of glove to protect your hands when operating.



Hold the cylinder head, and then press out old valve guide from combustion chamber side.
Tool: Valve guide driver 5 mm

Caution

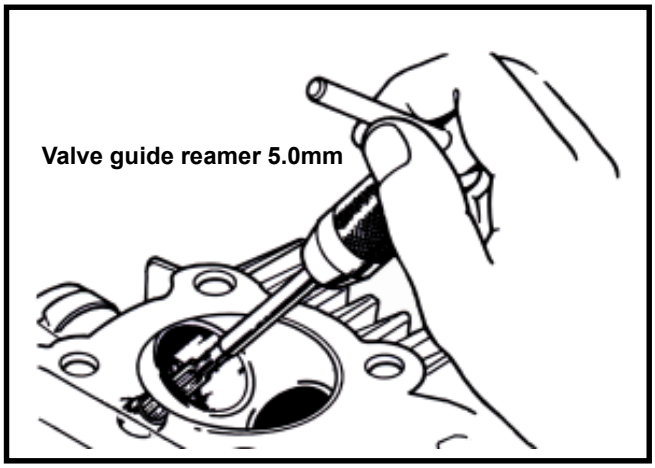
- Check if new valve guide is deformation after pressed it in.
- When pressing in the new valve guide, cylinder head still must be kept in 100~150 ℃.



Adjust the valve guide driver and let valve guide height is in 13mm.
Press in new valve guide from rocker arm side.
Tool: Valve guide driver 5 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.



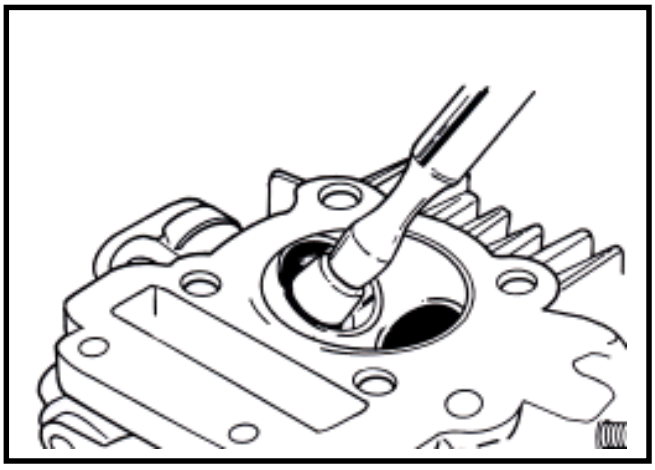
Correct valve seat, and clean up all metal residues from cylinder head.
Special tool: Valve guide reamer 5 mm

VALVE SEAT INSPECTION AND SERVICE

Clean up all carbon deposits onto intake and exhaust valves.
Apply with emery slightly onto valve contact face. Grind valve seat with a rubber hose or other manual grinding tool.

⚠ Caution

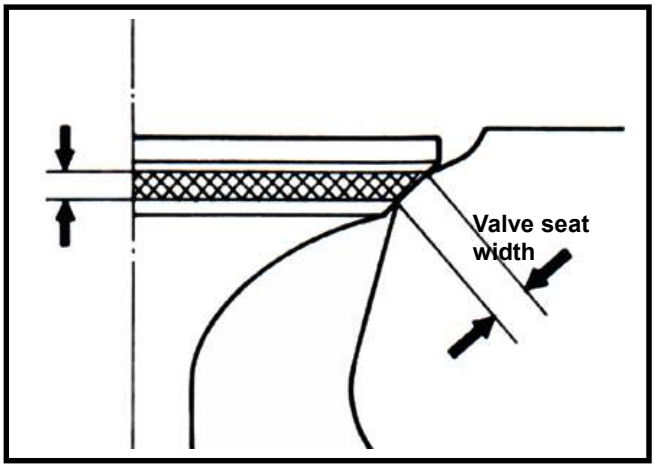
- Do not let emery enter into between valve stem and valve guide.
- Clean up the emery after corrected, and apply with red paint onto contact faces of valve and valve seat.



Remove the valve and check its contact face.

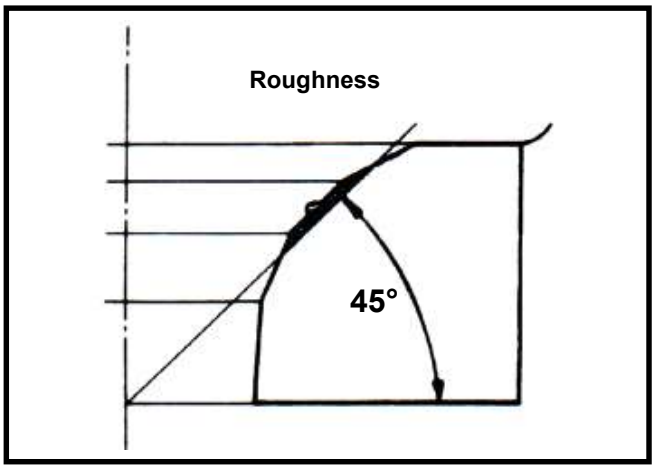
⚠ Caution

Replace the valve with new one if valve seat is roughness, wear out, or incomplete contacted with valve seat.
If the valve and the valve seat still can not be matched sealing after grinded, replace it with new one.



Valve seat inspection
If the valve seat is too width, narrow or rough, correct it.

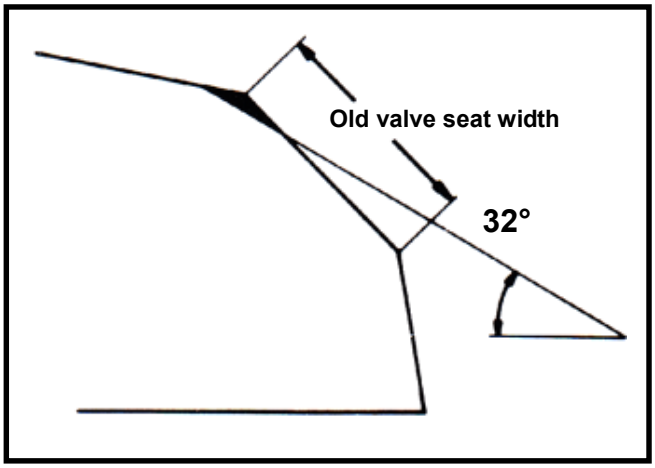
Valve seat width
Service limit: 1.6mm
Check the contact condition of valve seat.



Valve seat grinding
The worn valve seat has to be grinded with valve seat chamfer cutter.
Use 45° valve seat chamfer cutter to cut any rough or uneven surface from valve seat.

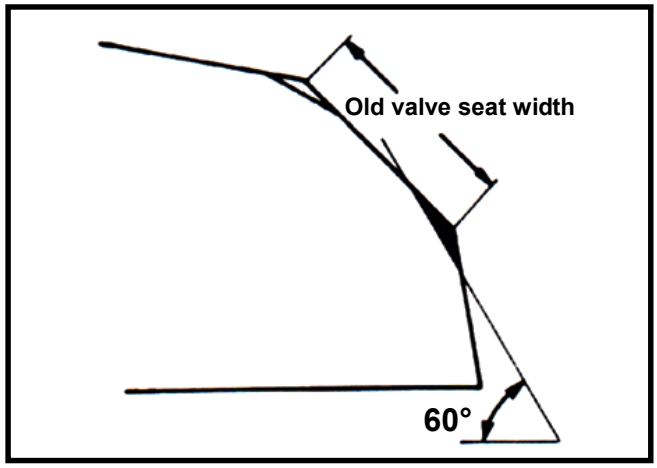
⚠ Caution

After valve guide had been replaced, it has to be grinded with 45° valve seal chamfer cutter to correct its seat face.



Use 32° cutter to cut a quarter upper part out.

Use 60° cutter to cut a quarter lower part out. Remove the cutter and check new valve seat.

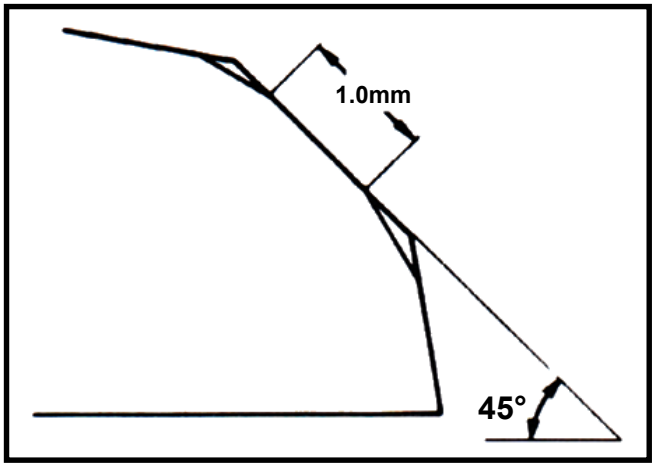


Use 45° cutter to grind the valve seat to specified width.

⚠ Caution

Make sure that all roughness and uneven faces had been grinded.

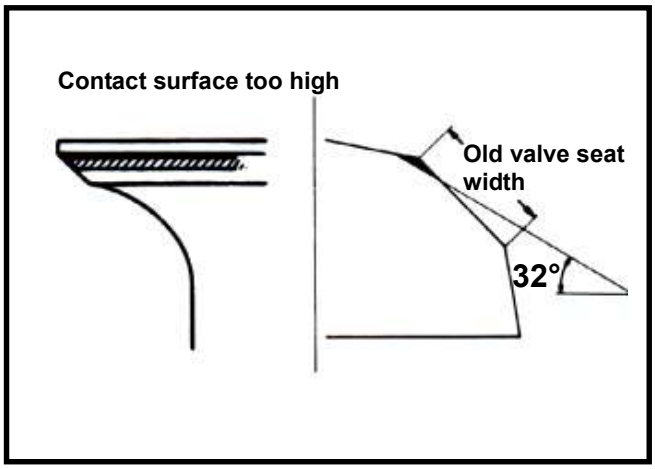
Grind valve seat again if necessary.



Coat the valve seat surface with red paint. Install the valve through valve guide until the valve contacting with valve seat, slightly press down the valve but do not rotate it so that a seal track will be created on contact surface.

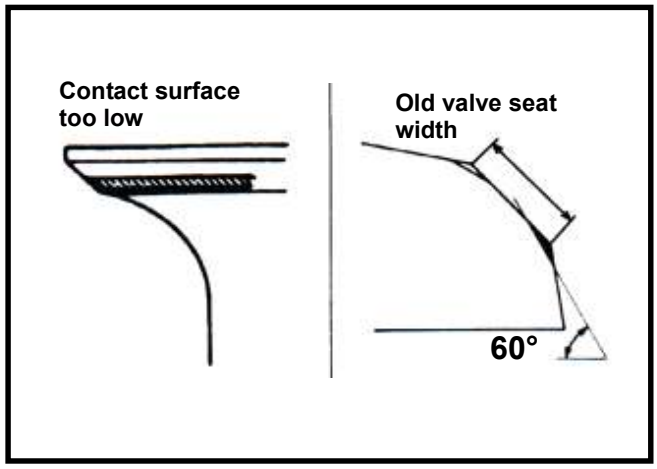
⚠ Caution

The contact surfaces of valve and valve seat are very important to the valve sealing capacity.

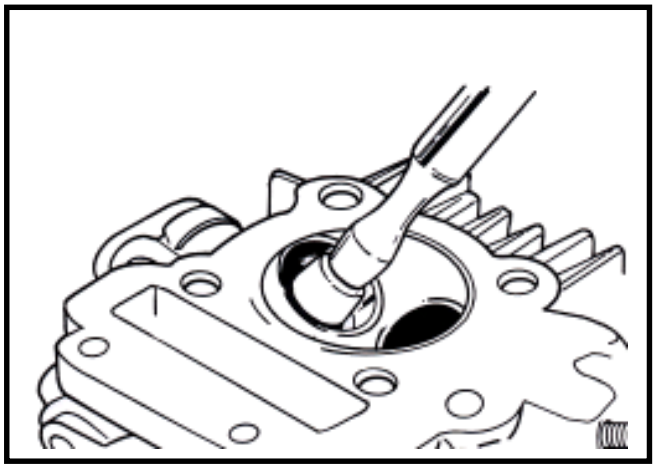


If the contact surface too high, grind the valve seat with 32° cutter.
Then, grind the valve seat with 45° cutter to specified width.

If the contact surface too low, grind the valve seat with 60° cutter.
Then, grind the valve seat with 45° cutter to specified width.



After the valve seat grinded, coat valve seat surface with emery and then slightly press the grinded surface.
Clean up all emery coated onto cylinder and valve after grinded.

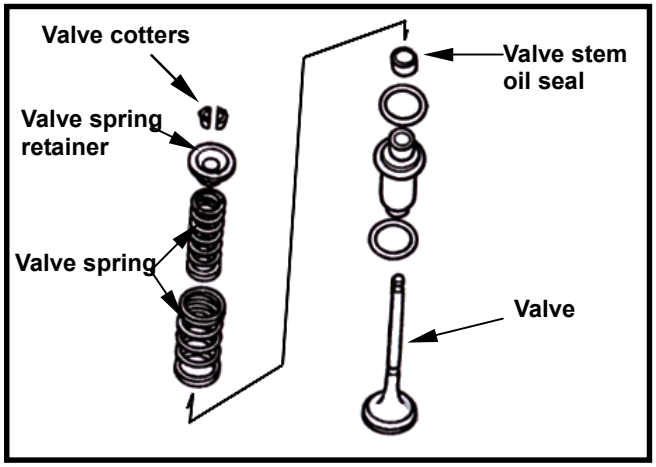


CYLINDER HEAD REASSEMBLY

Lubricate valve stem with engine oil, and then insert the valve into valve guide.
Install new valve stem oil seal.
Install valve springs and retainers.

⚠ Caution

The closed coils of valve spring should face down to combustion chamber.

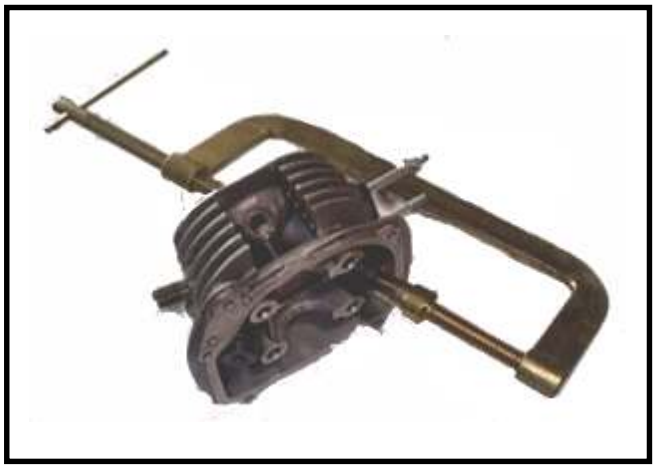


Use valve spring compressor to press valve spring.
Install valve split locks and release the valve compressor.

⚠ Caution

In order to avoid to loosing spring tension, do not compress the spring too much. Its length is based on the installation of latch.

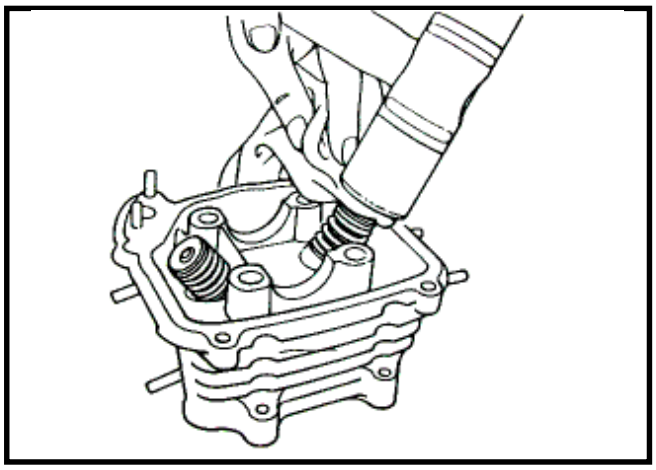
Special tool: valve spring compressor



Tap valve stem to make valve retainer and valve stem sealing properly.

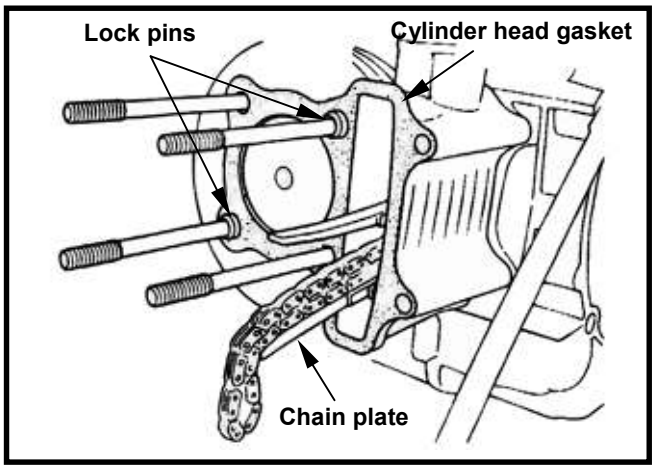
⚠ Caution

Place and hold cylinder head on to working table so that can prevent from valve damaged.

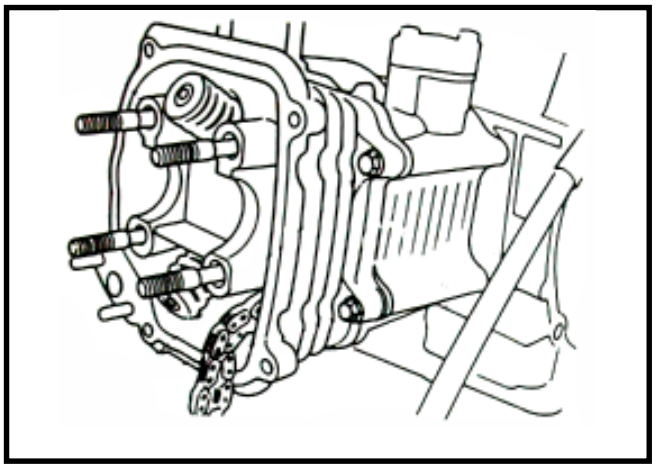


CYLINDER HEAD INSTALLATION

Install the lock pins and new cylinder head gasket onto the cylinder head.
Install the camshaft chain plate.



Install the cylinder head.

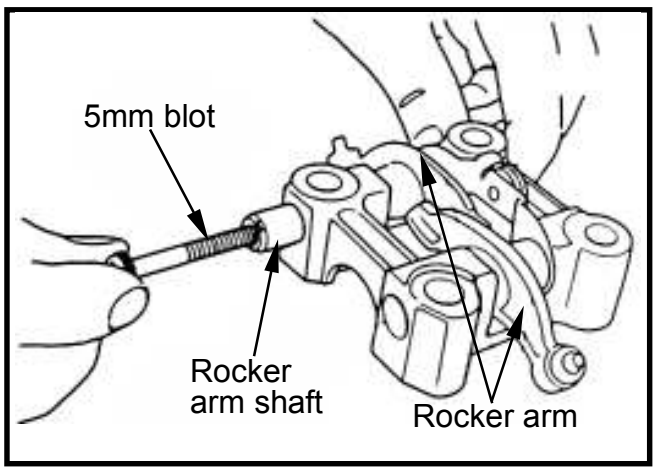


CAMSHAFT INSTALLATION

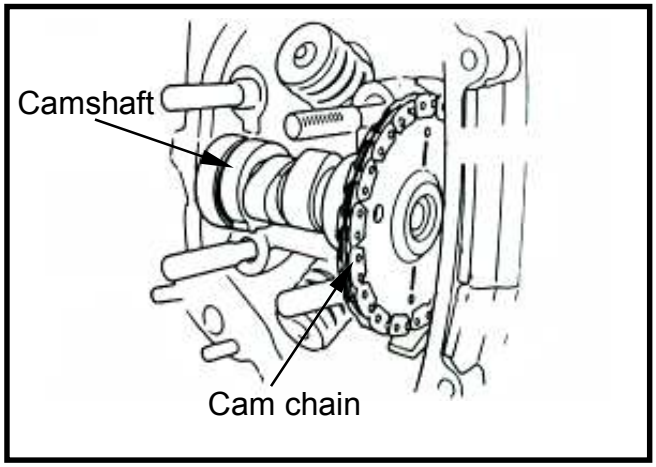
Assemble the camshaft holder.
Install the exhaust valve rocker arm set onto the camshaft holder showing “EX” mark.
Install intake valve rocker arm and rocker arm shaft.

⚠ Caution

The tangent of rocker shaft of intake valve should match with the bolt hole of camshaft mounting seat.



With T type wrench to turn crankshaft in a clockwise motion so that the “T” mark on the flywheel aligns with the mark on crankcase. (piston is at TDC position)
Place the TDC marks of the cam sprocket at same level of the top-end of cylinder head. The other single hole of the cam sprocket is in upward. Then, install the cam chain onto the cam sprocket.



Install the lock pins.
Install the camshaft holder, gasket and nut onto the cylinder head.
Tighten the cylinder head nuts. (4 nuts)
At first, tighten the 4 nuts on the cylinder top and then tighten the 2 bolts on the left side of cylinder head.
Torque value: 1.8~2.2 kgf-m
Install the spark plug and tighten it.
Torque value: 1.0~1.2 kgf-m

⚠ Caution

- Apply with oil onto the thread of cylinder head bolts and tighten the bolts in diagonally for 2-3 sequences.
- Do not over tightening the bolts to avoid the cylinder head deformation, noise created or leaking so that effects motorcycle's performance.

VALVE CLEARANCE ADJUSTMENT

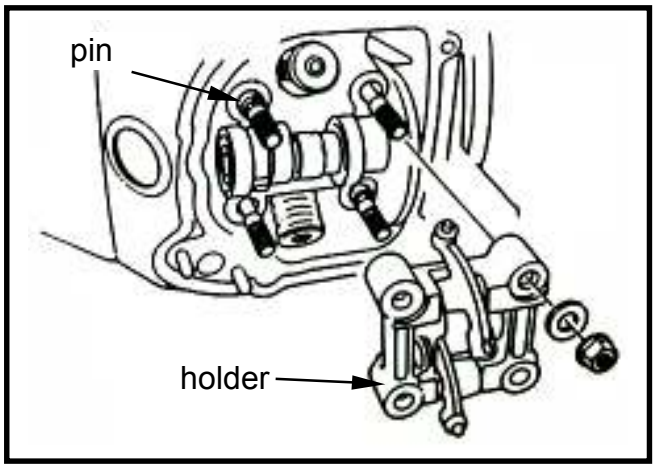
Loosen valve clearance adjustment nuts and bolts located on valve rocker arm.
Measure and adjust valve clearance with feeler gauge.
After valve clearance had been adjusted to standard value, hold adjustment bolt and then tighten the adjustment nut.
Standard Value: 0.06± 0.02mm
With flat screwdriver, turn the cam sprocket adjuster in counter-clockwise motion so that the adjuster is pushed out to contact the cam chain plate tightly. Apply with oil onto a new O-ring and then install it onto the adjuster hole. Tighten the bolt cap of the adjuster adjustment hole.

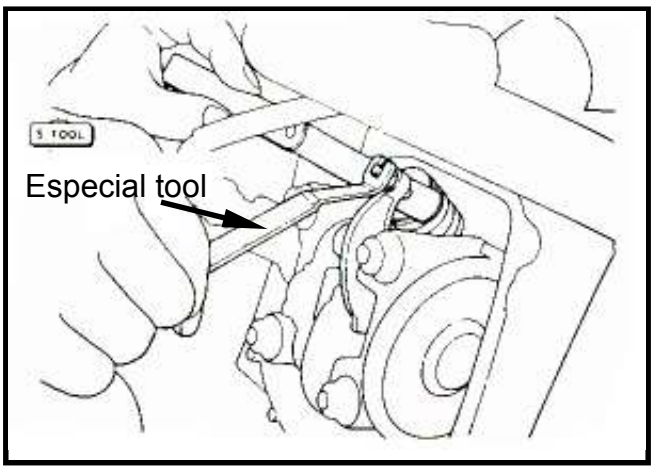
⚠ Caution

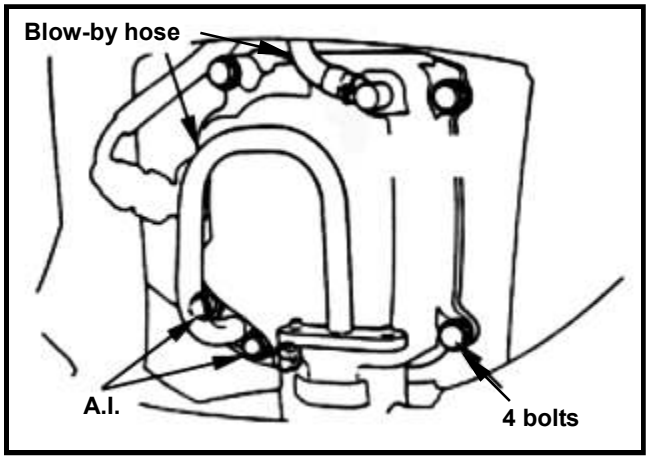
The O-ring must be installed into glove.

Replace the O-ring of the cylinder head with new one. Install the cylinder head.

Tighten the cylinder head lock bolts.
Connect the blow-by hose onto the cylinder head.
Install the engine onto the engine frame. (Refer to Chapter 5)







MECHANISM DIAGRAM 7-1	PISTON REMOVAL.....7-5
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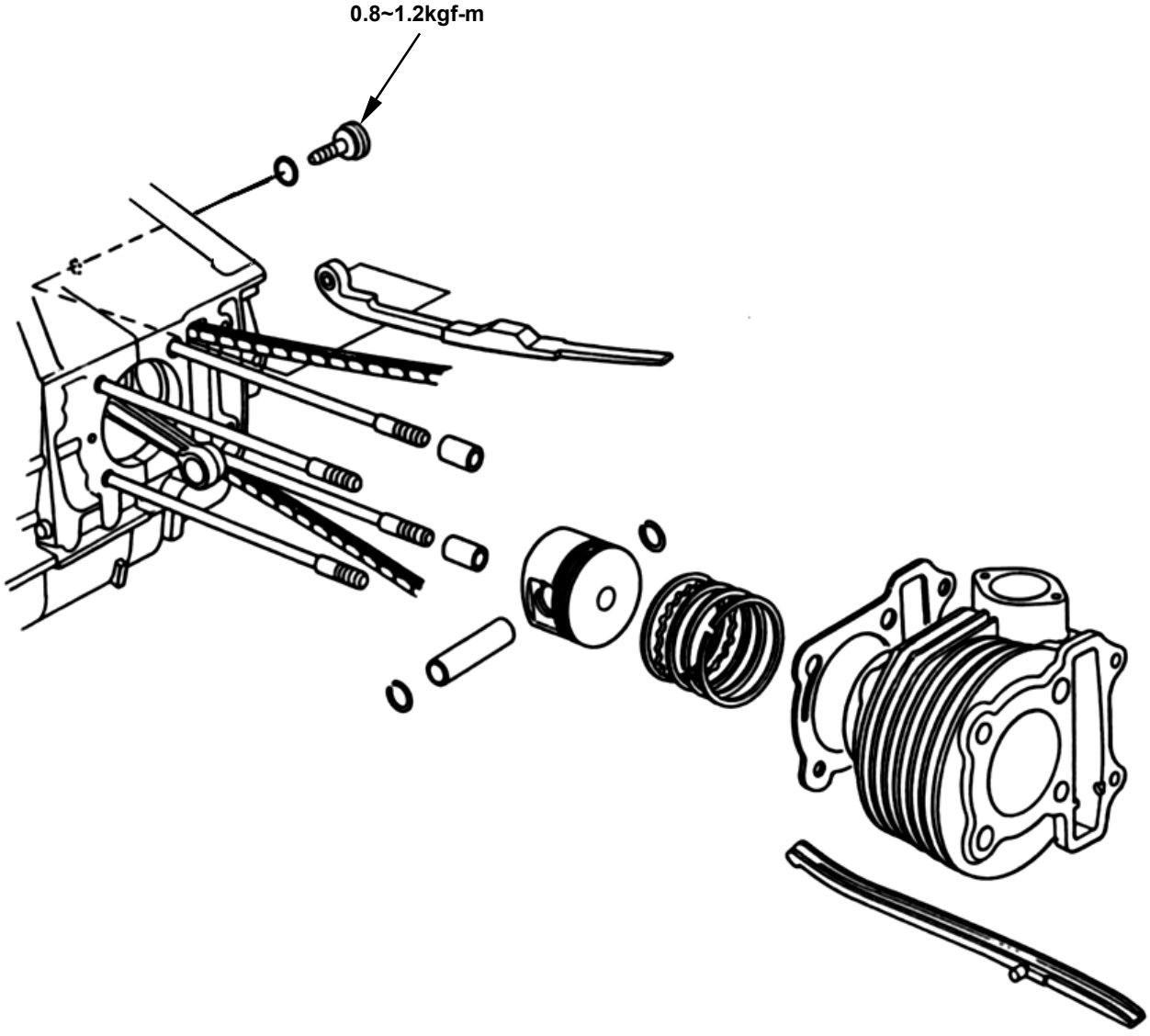
CYLINDER REMOVAL 7-3	CYLINDER INSTALLATION..... 7-8

MECHANISM DIAGRAM



PRECAUTIONS IN OPERATION

General Information

- Both cylinder and piston service cannot be carried out when engine mounted on frame.

Specification **unit: mm**

Item			Standard	Limit
Cylinder	ID		39.00	-
	Bend/wrap age		—	0.050
	Roundness		0.005	0.050
	Cylindrical		0.005	0.030
Piston/ Piston ring	Clearance between piston rings	Top ring	0.025~0.060	0.090
		2nd ring	0.015~0.050	0.090
	Ring-end gap	Top ring	0.200~0.400	0.500
		2nd ring	0.250~0.400	0.650
		Oil ring	0.200~0.700	-
	OD of piston		38.970~38.990	-
	Piston OD measurement position		Lower-end up 5mm of piston skirt	-
	Clearance between piston and cylinder		0.025~0.040	0.100
	ID of piston pin hole		13.002~13.008	13.040
OD of piston pin			13.000	12.994~13.000
Clearance between piston and piston pin			0.002~0.014	0.020
ID of connecting rod small-end			13	13.005~13.020

TROUBLE DIAGNOSIS

Low Or Unstable Compression Pressure
Cylinder or piston ring worn out.
Compress pressure to high.
Too much carbon deposited in combustion chamber and piston.

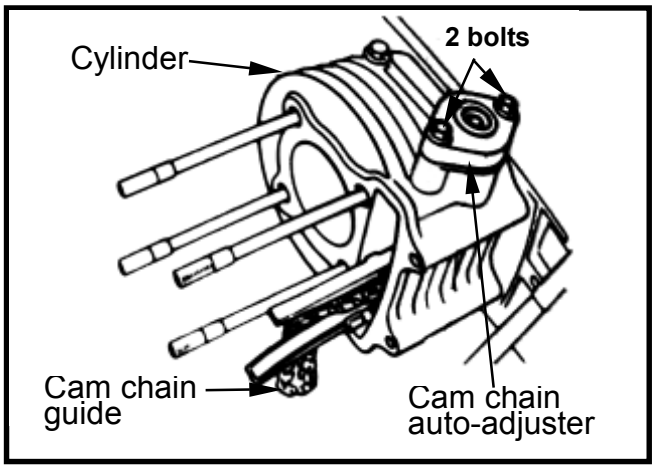
Knock or Noise
Cylinder or piston ring worn out.
Carbon deposits on cylinder head top-side.
Piston pin hole and piston pin wear out.

Smoking in Exhaust Pipe
Piston or piston ring worn out.
Piston ring installation improperly.
Cylinder or piston damage.

Engine Overheat
Carbon deposits on cylinder head top side.

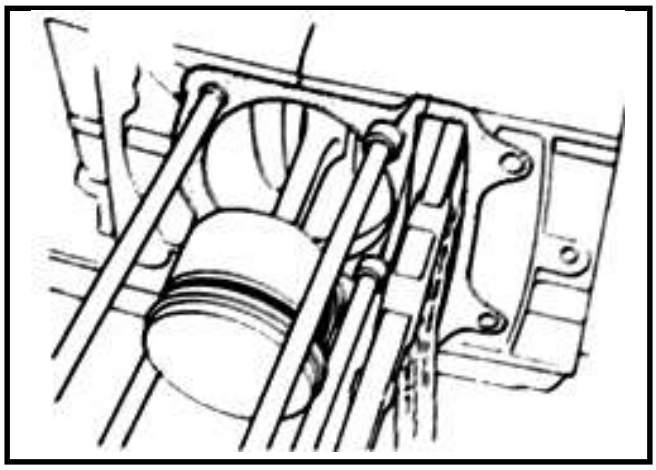
CYLINDER REMOVAL

Remove cylinder head. (refer to chapter 6)
Remove 2 bolts and then take out the cam chain auto-adjuster.

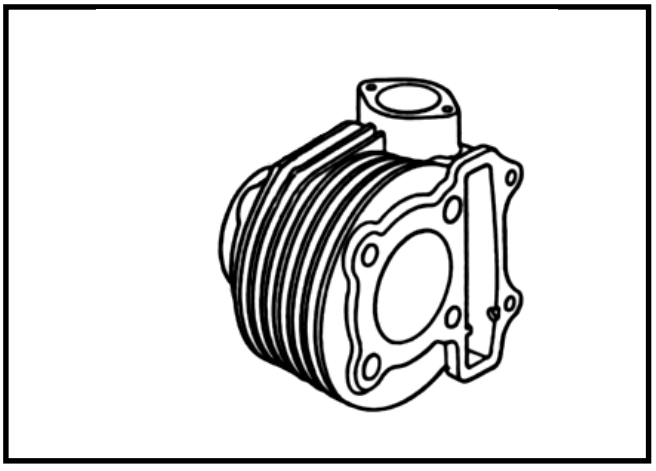


Remove cam chain plate.
Remove cylinder.

Remove cylinder gasket and lock pins



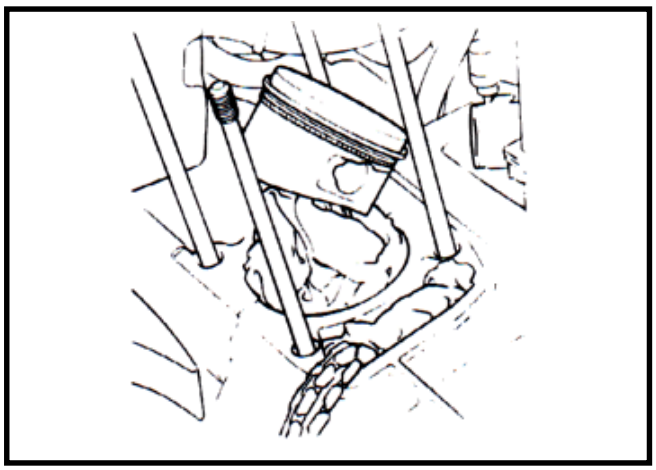
Clean the residues attached onto the matching surfaces of cylinder and crankcase.



Cover the holes of crankcase and cam chain with a piece of cleaning cloth.
Clean up all residues or foreign materials from the two matching surfaces of cylinder and crankcase.

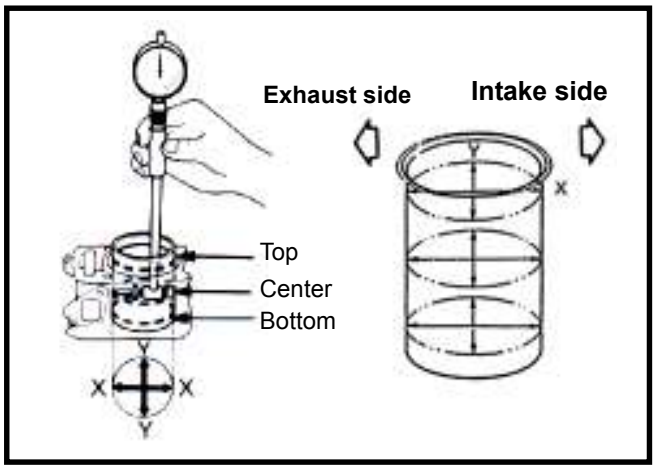
⚠ Caution

To soap the residues into solvent so that the residues can be removed more easily.

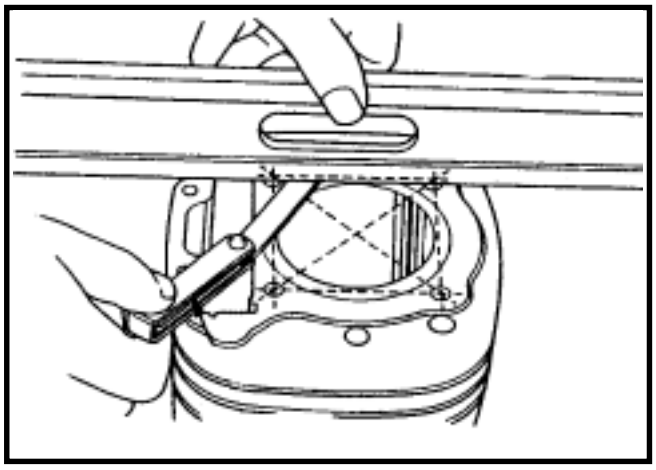


INSPECTION

Check if the inner diameter of cylinder is worn out or damaged.
In the 3 positions (top, center and bottom) of cylinder, measure the X and Y direction values respective in the cylinder.
Service limit: 38.090mm
Calculate both the real roundness (the difference between X and Y motion values) and the cylindrical roundness (the difference in the top, center or bottom positions of X or Y motion values.). Then, determinate by the max. value.
Service limit
Real roundness: correct or replace as over 0.05 mm
Cylindrical roundness: correct or replace as over 0.05 mm

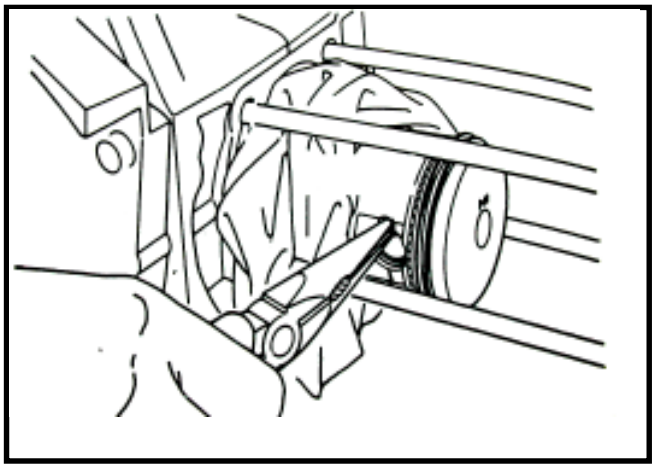


Check Cylinder flat.
Service limit: correct or replace as over 0.05 mm



PISTON REMOVAL

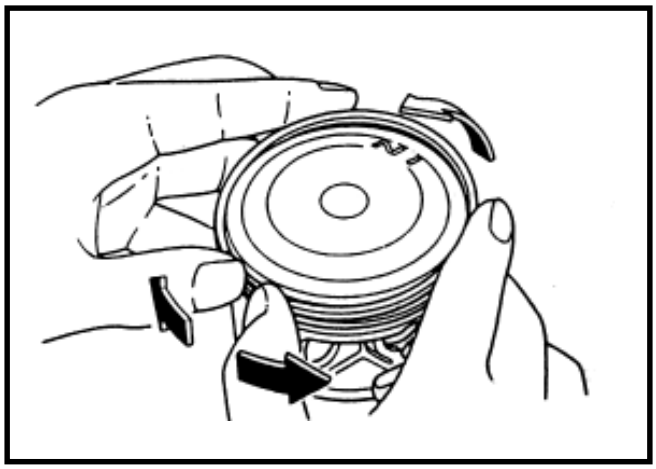
Plug crankcase opening with a cleaning cloth to prevent from piston pin snap ring or other parts falling into crankcase when disassembling.
Hold another snap ring with pliers.
Push out the piston pin from the side that not removed the snap ring.



Remove piston rings.

⚠ Caution

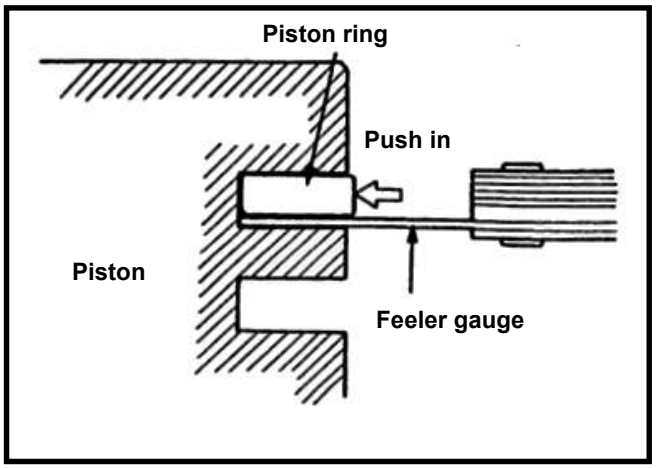
Pay attention to remove piston rings because they are fragile.



Disassemble the piston rings.
Check if the piston rings are damaged or its grooves are worn.
Cleaning the carbon in piston ring grooves.

Install the piston rings and then measure clearance between piston ring and its grooves.

Service Limit: Top ring: replace if over 0.09mm
2nd ring: replace if over 0.09mm

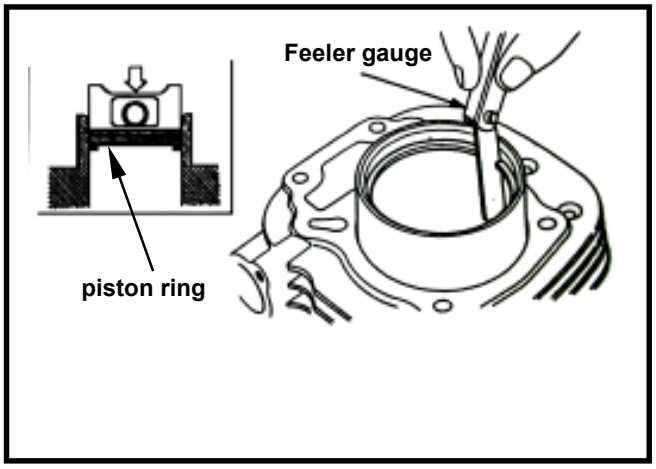


Take out the piston rings and place them respective into cylinder below 20mm of cylinder top. Measure each piston ring gaps.

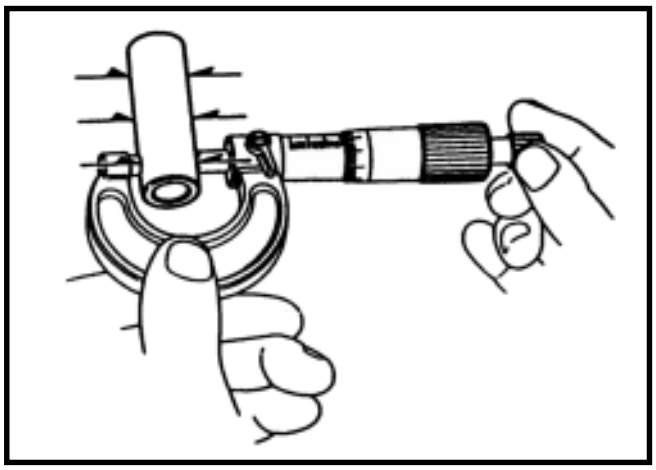
⚠ Caution

Push the piston rings into cylinder with piston top-end in parallel motion.

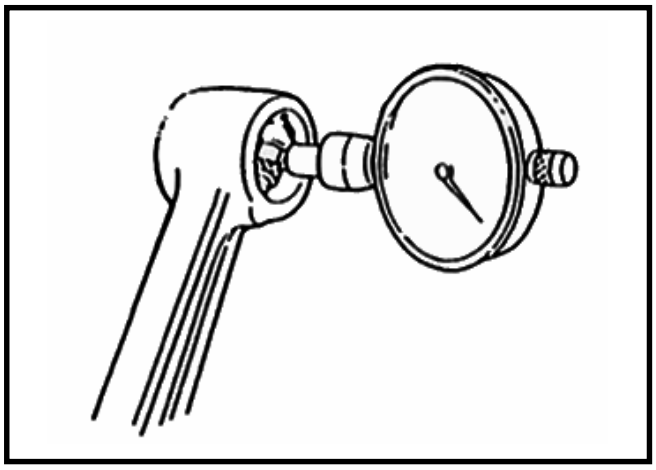
Service Limit: Top ring: replace if over 0.50mm
2nd ring: replace if over 0.650mm



Measure the outer diameter of piston pin.
Service Limit: 12.994mm

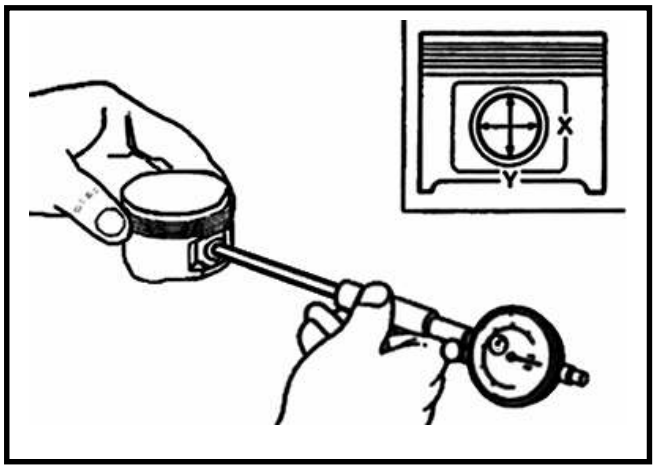


Measure the inner diameter of connecting rod small end.
Service Limit: 13.020mm



Measure the inner diameter of piston pin hole.
Service Limit: 13.040mm

Calculate clearance between piston pin and its hole.
Service Limit: 0.02mm

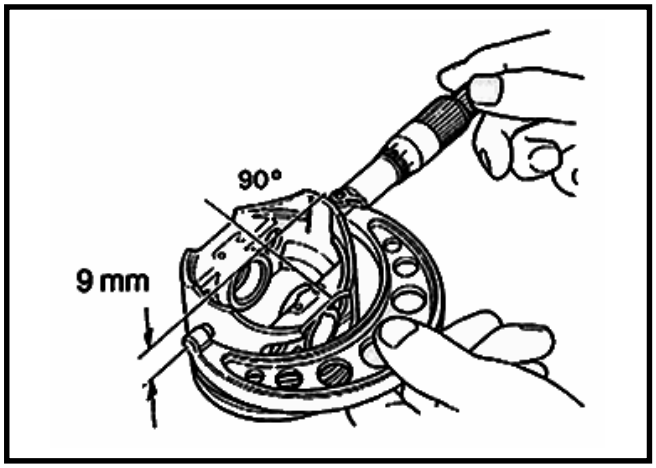


Measure piston outer diameter.

⚠ Caution

The measurement position is 10 mm distance from piston bottom side, and 90° to piston pin.

Service limit: 38.970mm
Compare measured value with service limit to calculate the clearance between piston and cylinder.

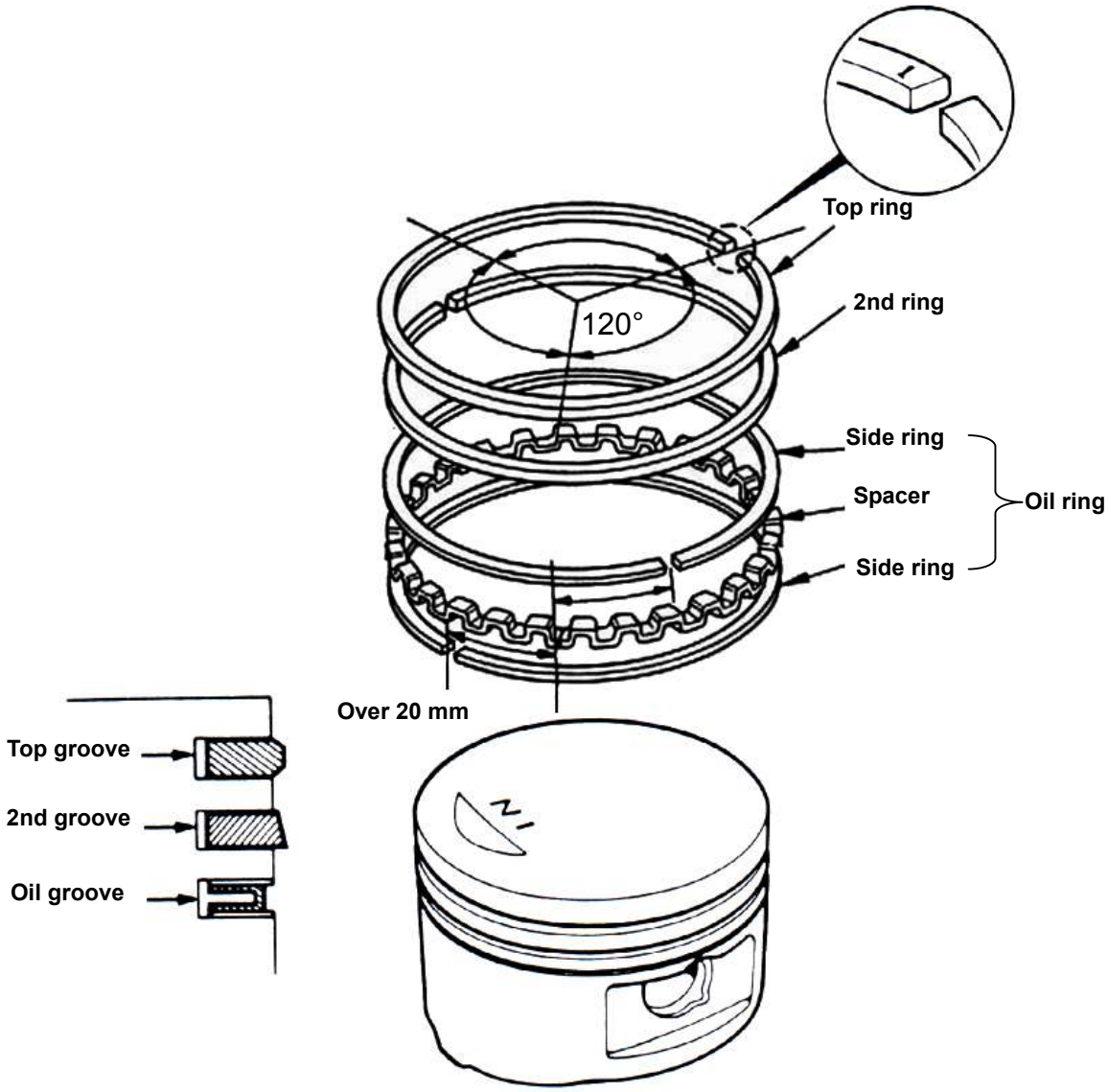


PISTON RING INSTALLATION

Clean up piston top, ring groove, and piston shirt.
Install the piston ring onto piston carefully.
Place the openings of piston ring as diagram shown.

Caution

- Do not damage piston and piston rings as installation.
- All marks on the piston rings must be forwarded to up side.
- Make sure that all piston rings can be rotated freely after installed.

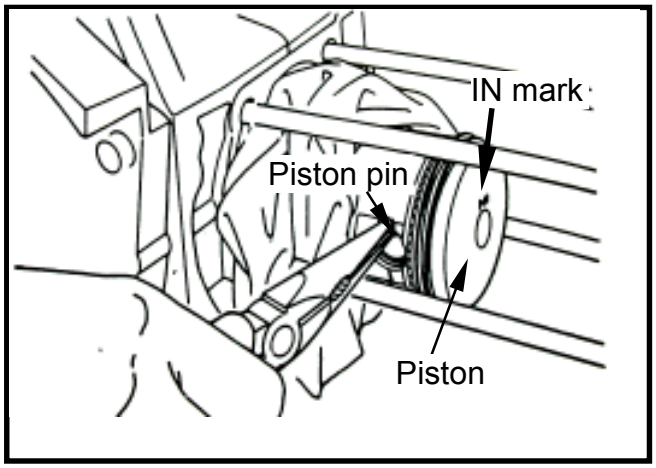


PISTON INSTALLATION

Install piston and piston pin, and place the IN mark on the piston top side forward to intake valve.
Install new piston pin snap ring.

⚠ Caution

- Do not let the opening of piston pin snap ring align with the opening piston ring.
- Place a piece of cleaning cloth between piston skirt section and crankcase in order to prevent snap ring from falling into crankcase as operation.

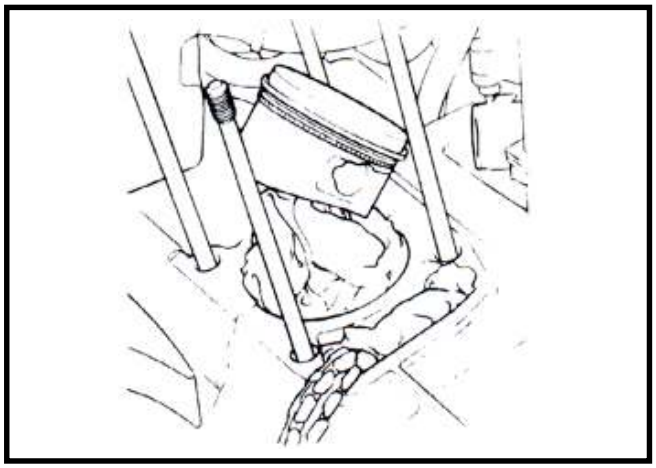


CYLINDER INSTALLATION

Clean up all residues and foreign materials on the matching surface of crankcase.
Pay attention to not let these residues and foreign materials fall into crankcase.

⚠ Caution

To soap the residues into solvent so that the residues can be removed more easily.

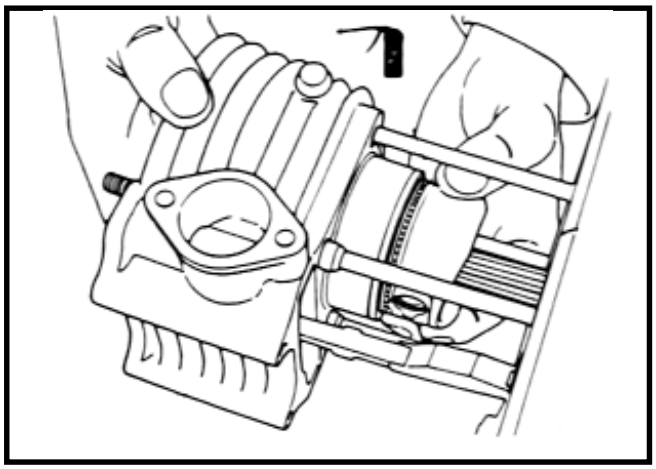


Install 2 lock pins and new gasket.

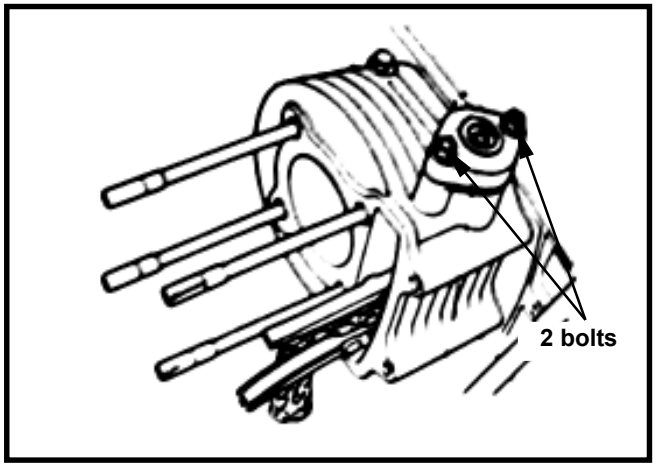
Coat engine oil to inside of cylinder, piston and piston rings.
Care to be taken when installing piston into cylinder. Press piston rings in one by one as installation.

⚠ Caution

Do not push piston into cylinder forcefully because this will cause the piston and the piston rings to be damaged.



Install the cam chain plate, the cylinder gasket and lock pins.
Install cylinder head. (refer to Chapter 6)
Install the cam chain auto-adjuster. (2 bolts)



MAINTENANCE DESCRIPTION 8-1	DRIVING BELT 8-3
TROUBLE DIAGNOSIS.....8-1	SLIDING PULLEY 8-5
LEFT CRANKCASE COVER.....8-2	CLUTCH/DRIVEN PULLEY..... 8-8
KICK STARTER ARM 8-2	

MAINTENANCE DESCRIPTION

PRECAUTIONS IN OPERATION

GENERAL INFORMATION

- Driving pulley, clutch, and driven pulley can be serviced on the motorcycle.
- Driving belt and driving pulley surface must be free of grease.

Specification

Unit: mm

Item	Standard value	Limit
Driving belt width	**17.50**	**-**
ID of sliding pulley bushing	**20.035~20.085**	**-**
OD of sliding pulley hub	**20.01~20.025**	**-**
OD of roller	**15.920~16.080**	**-**
ID of clutch outer	**107.00~107.20**	**-**
Thickness of clutch lining	**4.000**	**-**
Free length of driving pulley spring	**97.20**	**-**
OD of driving pulley	**33.965~33.985**	**33.940**
ID of sliding pulley	**34.000~34.025**	**34.060**

ID: Inner Diameter
OD: Outer diameter

Torque value

Sliding pulley nut: 5.0~6.0kgf-m
Clutch outer nut: 5.0~6.0kgf-m
driving pulley nut: 5.0~6.0kgf-m

Special Service Tools

Clutch spring compressor
Bearing puller (inner type)
Clutch mounting nut wrench
Universal fixture

TROUBLE DIAGNOSIS

Engine can be started but motorcycle can not be moved

1. Worn driving Belt
2. Worn tilt plate
3. Worn or damaged clutch lining
4. Broken driven pulley

Shudder or misfire when driving

1. Broken clutch lining
2. Worn clutch lining

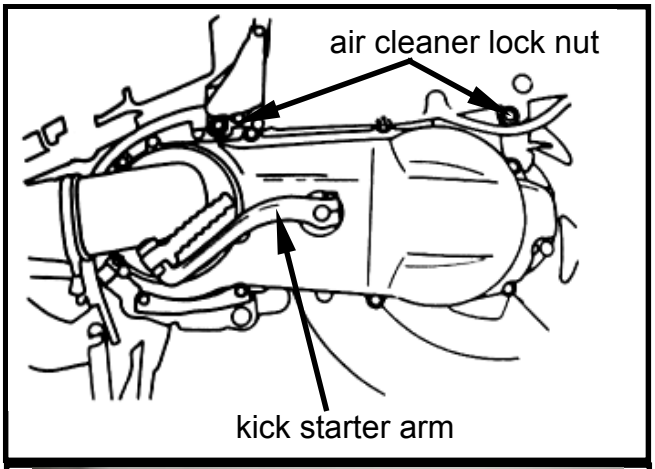
Insufficient horsepower or poor high speed performance

1. Worn driving belt
2. Insufficient spring capacity of driven pulley
3. Worn roller
4. Driven pulley operation un-smoothly

LEFT CRANKCASE COVER

Left crankcase cover removal

Remove air cleaner. (2 bolts)
Remove kick starter arm. (1 bolt)
Loosen vent strap on the front-left side of cover, and then remove the vent.
Remove engine left-side cover (8 bolts).



KICK STARTER ARM

Disassembly

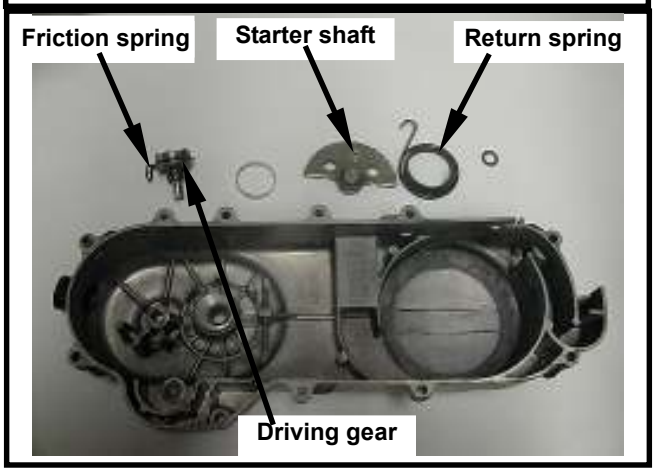
Remove the return spring, starter shaft.
Remove driving gear, friction spring and washer.

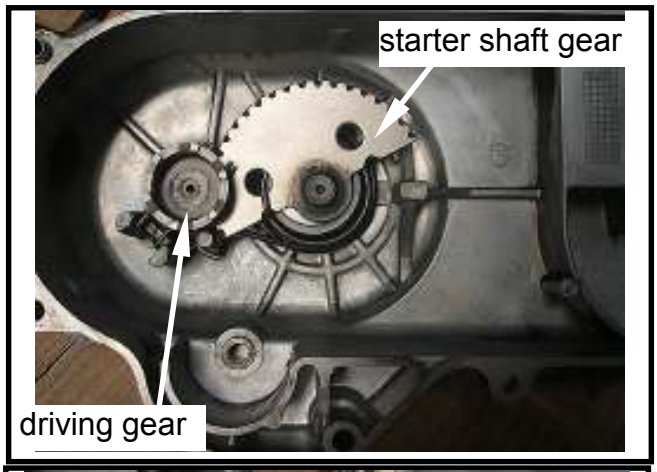
Inspection

Check if starter shaft, driving gear, for wear or damage. Replace it with new one if necessary.
Check the return spring for spring force or damaged. Replace it with one if poor parts found.

Reassembly

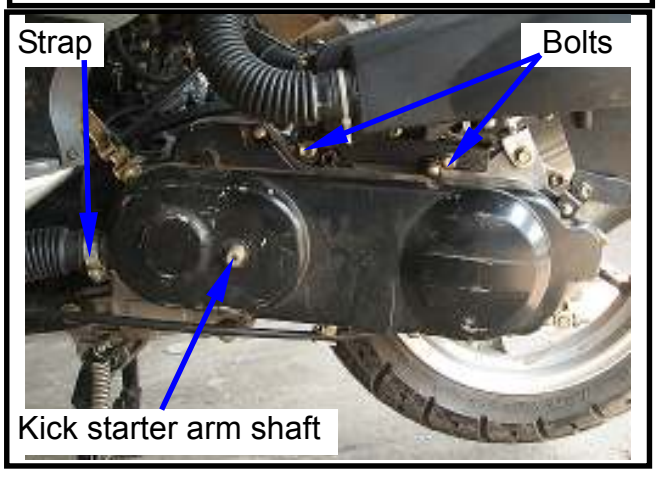
Apply with some specified grease on the gear, shaft.
Install the friction spring of driving gear onto convex part of the case cover.
Install, return spring and starter shaft as diagram shown.
Install kick starter arm temporary.
Rotate the lever and then align driving gear with width-tooth on the starter shaft.
Install thrust washer and socket onto starter shaft.





Installation of the left crankcase cover

Install the left crankcase cover. (8 bolts)
Install front vent tube of left cover and tighten the strap.
Install kick starter arm. (1 bolt)
Tighten the air cleaner. (2 bolts)

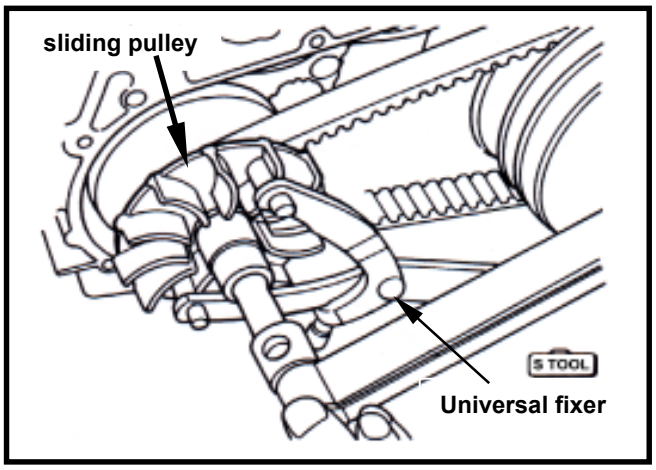


DRIVING BELT

Removal

Remove left crankcase cover.

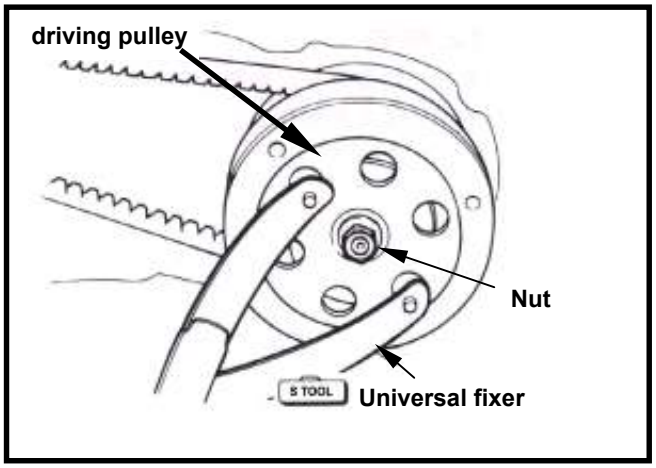
Hold the sliding pulley with a universal fixture, and then remove the nut and sliding pulley.



Hold driving pulley with universal fixture, and remove nut and clutch outer.

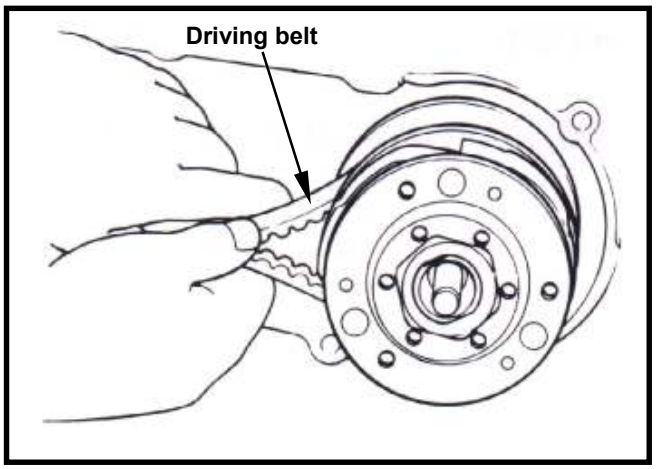
⚠ Caution

Using special service tools for tightening or loosening the nut. Fixed rear wheel or rear brake only will damage reduction gear system.



Push the driving belt into belt groove as diagram shown so that the belt can be loosened, and then remove.

Driving belt and clutch at same time.



Inspection

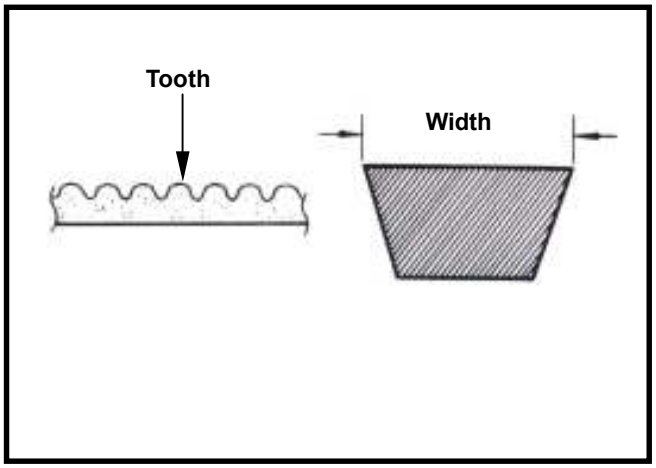
Check the driving belt for crack or wear. Replace it if necessary.

Measure the width of driving belt as diagram shown. Replace the driving belt if it exceed maintenance limited specification.

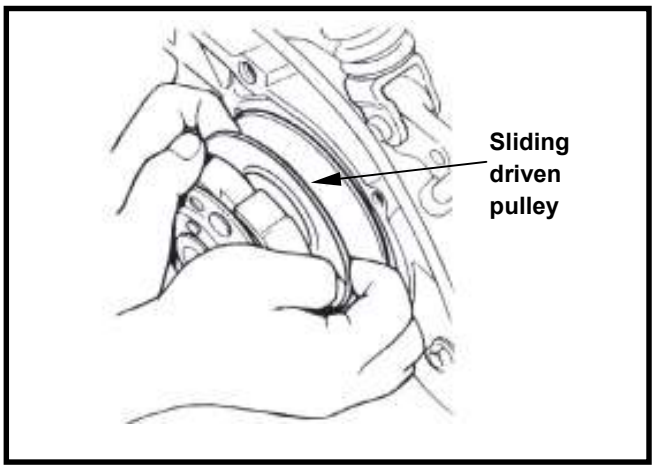
Service Limit: 17.50mm

⚠ Caution

- Using the genuine parts for replacement.
- The surfaces of driving belt or pulley must be free of grease.
- Clean up all grease or dirt before installation.



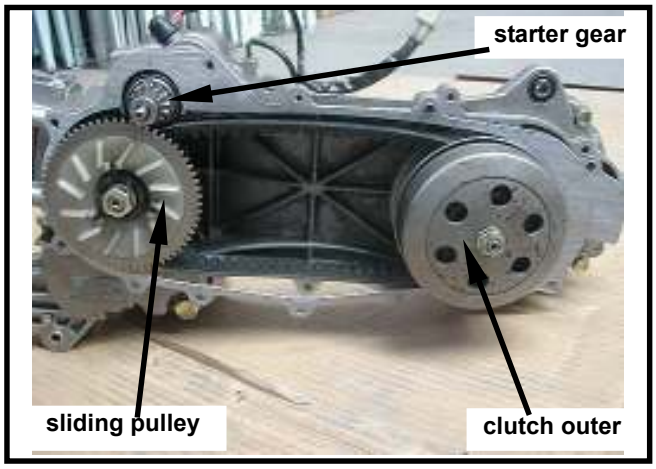
Installation
Pull out the driving pulley and then insert the driving pulley.



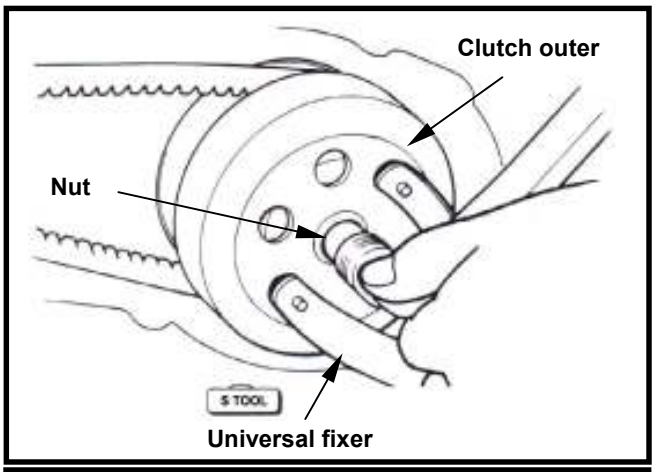
Caution

Pull out driving pulley and then insert the driving belt into the driving pulley so that the driving belt set can be installed onto sliding pulley more easily.

Install the starter gear.
Install the clutch set with driving belt onto the driving shaft.
Install the sliding pulley on the other end of belt.
Install clutch outer.

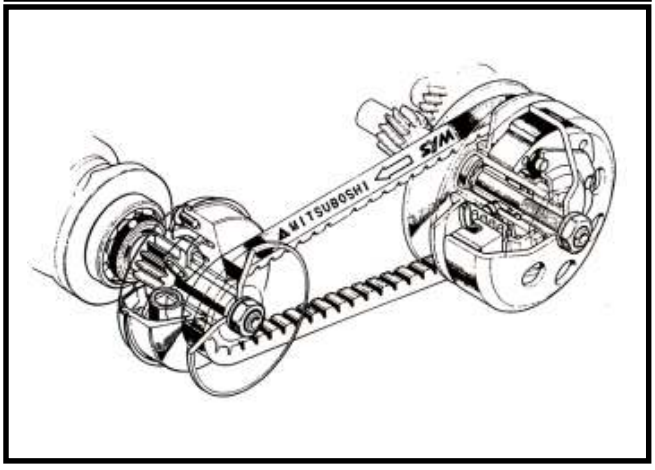


Install the clutch with universal fixture, and then tighten nut to specified torque value.
Torque value: 5.0~6.0 kgf-m



Caution

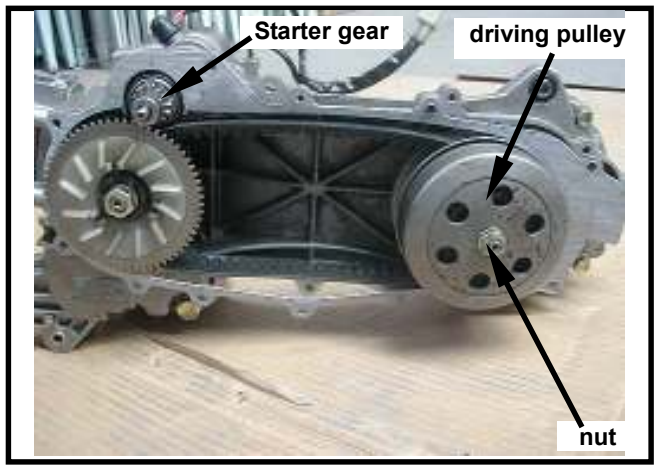
When install the driving belt, if there is a arrow mark, then the arrow mark must point to rotation motion. If not, the letters on the belt must be forwarded to assembly direction.



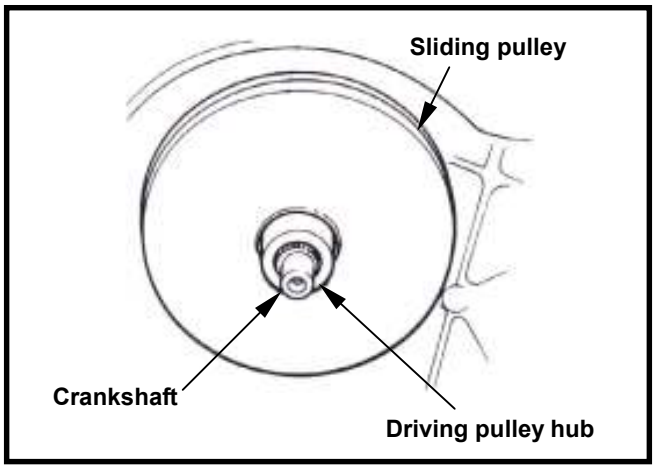
SLIDING PULLEY

REMOVAL

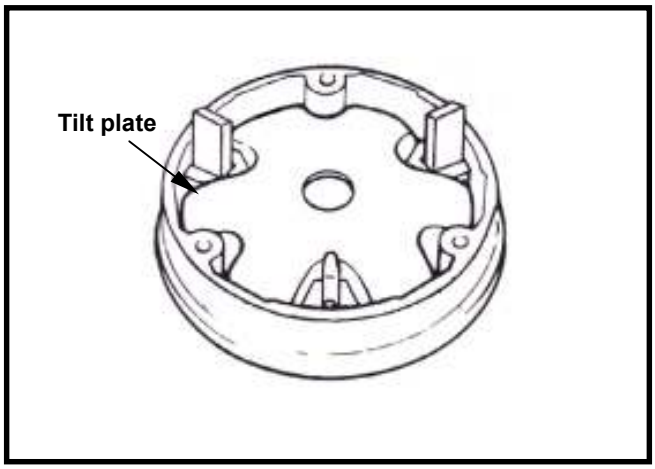
Remove left crankcase cover.
Hold driving pulley with universal fixture, and then remove driving pulley nut.
Remove driving pulley.



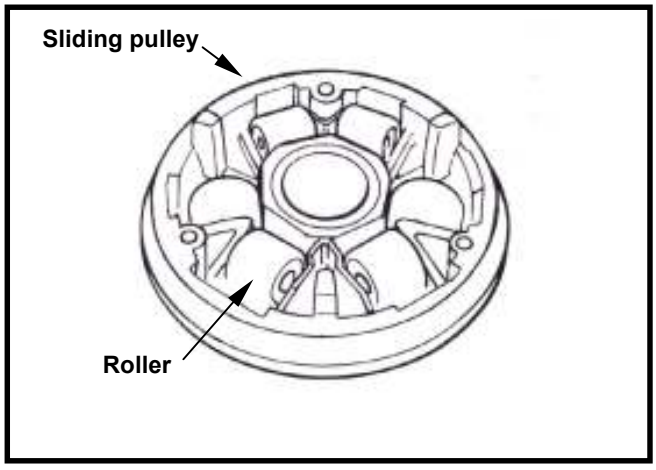
Remove the driving belt from the pulley.
Remove sliding pulley set and driving pulley hub from crankshaft.
Remove the belt and the starter gear.



Remove tilt plate.

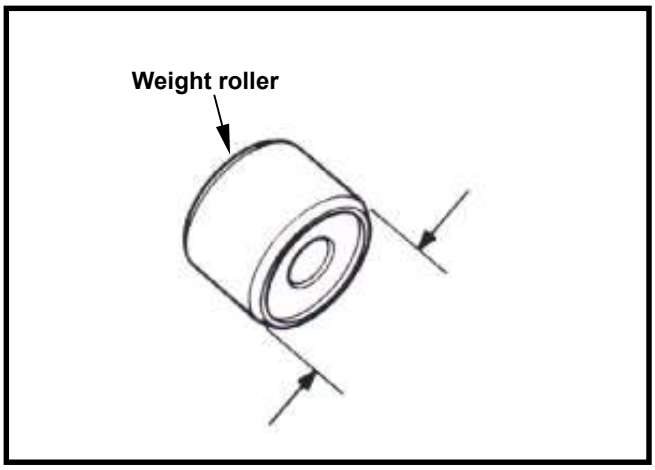


Remove weight rollers from sliding pulley.

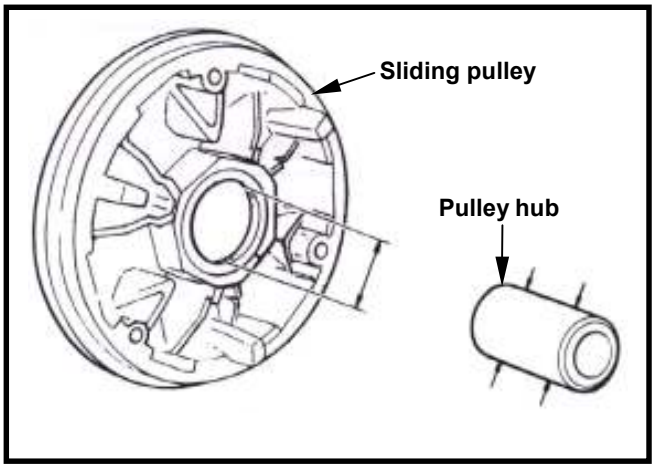


Inspection

The operation of sliding pulley is means of the weight roller to pressing on it with centrifuge force. And then the speed is changed by the title plate rotation. Thus, if weight rollers are wear out or damage, the centrifuge force will be effected.
Check if rollers are wear out or damage.
Replace it if necessary.
Measure each rollers' outer diameter.
Replace it if exceed the service limit.
Service limit: 15.92 mm

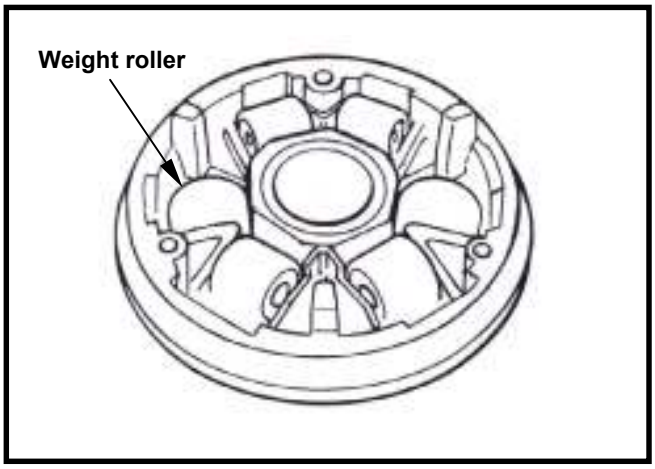


Check the pulley hub if damaged or wear out.
Replace it if necessary.
Measure the pulley hub's outer diameter.
Replace it if exceed the service limit.
Service limit: 20.025 mm
Measure the pulley hub's inner diameter.
Replace it if exceed the service limit.
Service limit: 20.028 mm

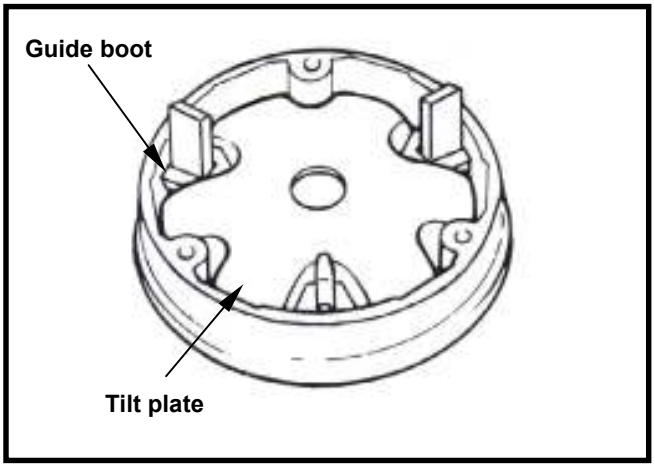


Assembly/Installation

Install the weight rollers.



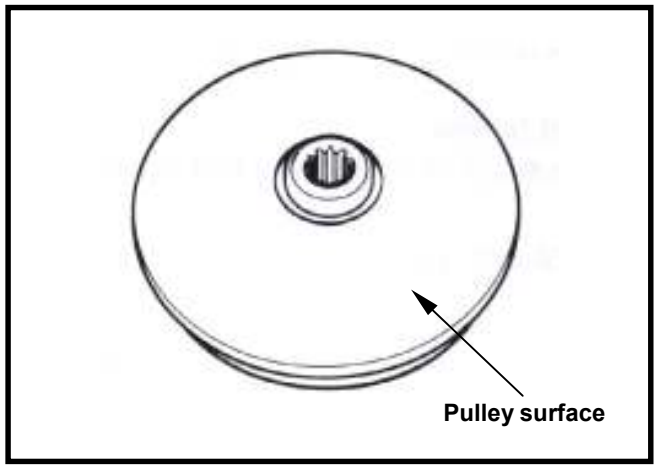
Install the title plate guide boot onto the title plate.
Install the title plate.



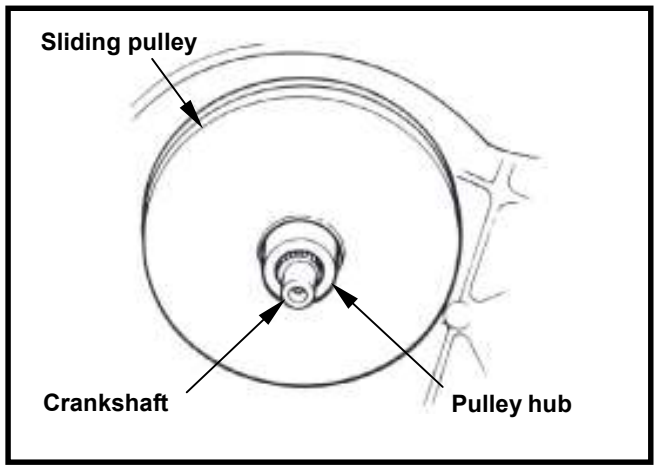
Apply with grease 4~5 g to inside of driving shaft hole, and install driving pulley hub.

Caution

The pulley surface has to be free of grease. Clean it with cleaning solvent.



Install siding pulley assembly onto crankshaft.

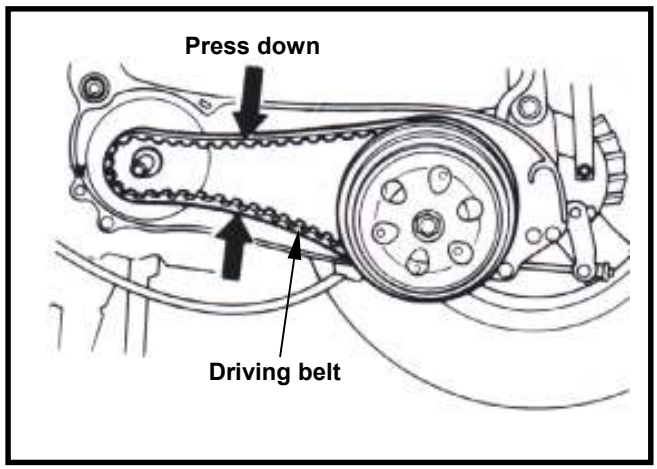


DRIVING PULLEY INSTALLATION

Press driving belt into pulley groove, and then press down the up & down sides of the driving belt to separate it away from the driving pulley hub.

Caution

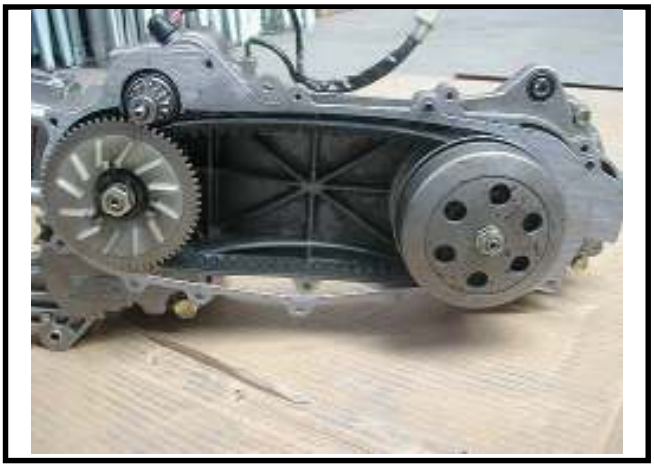
To press down the up & down sides of the driving belt can avoid to pressing and damaging the belt when installing the driving pulley, and also can make sure that the driving pulley can be tighten.



Install driving pulley, washer and nut.

Caution

Make sure that two sides of pulley surfaces have to be free of grease. Clean it with cleaning solvent.



Hold driving pulley with universal fixture.
Tighten nut to specified torque.
Torque value: 5.0~6.0 kgf-m
Install left crankcase cover.

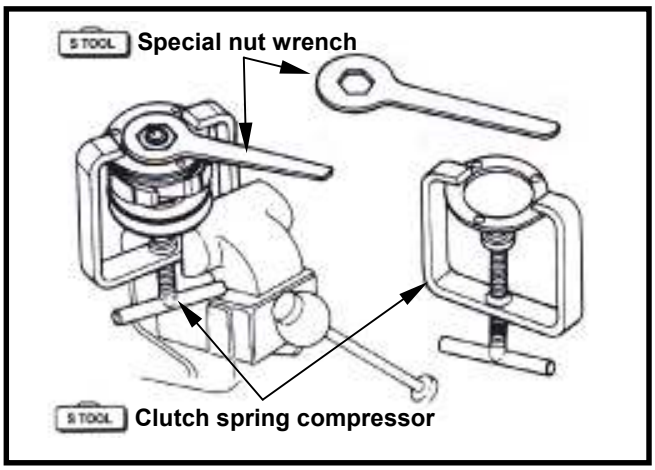
CLUTCH/DRIVEN PULLEY

DISASSEMBLY

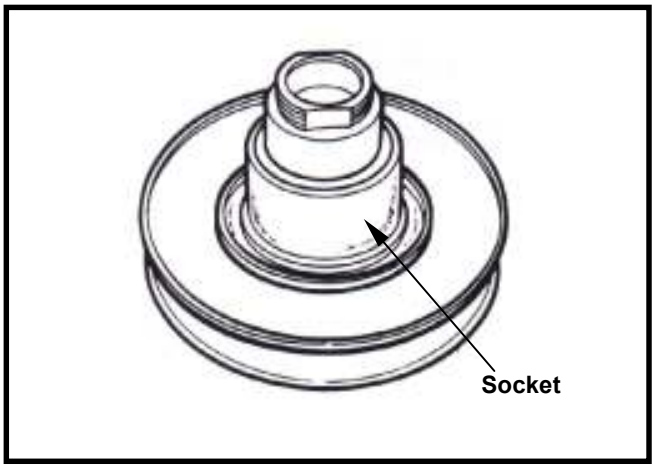
Remove driving belt and clutch/driven pulley.
Install clutch spring compressor onto the pulley assembly, and operate the compressor to let nut be installed more easily.

⚠ Caution

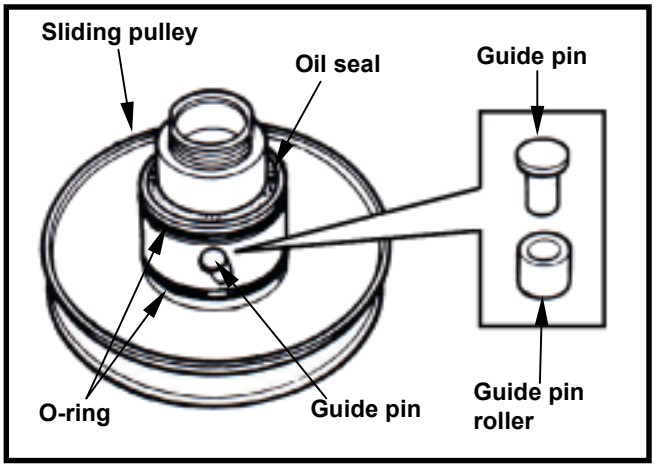
Do not press the compressor too much.



Hold the clutch spring compressor onto bench vise, and then remove mounting nut with special nut wrench.
Release the clutch spring compressor and remove clutch and spring from driven pulley.
Remove socket from driven pulley.



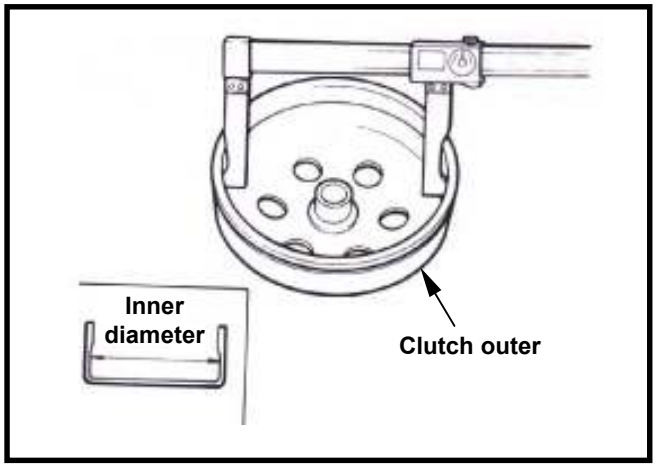
Remove oil seal from driven pulley.
Remove guide pin, guide pin roller, and sliding pulley, and then remove O-ring & oil seal seat from sliding pulley.



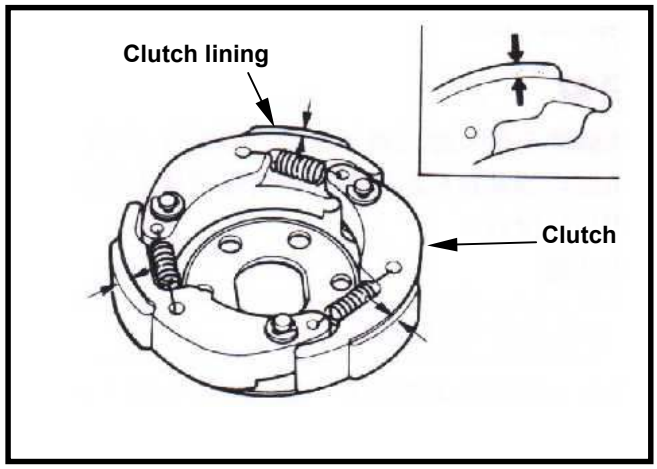
INSPECTION

Clutch outer

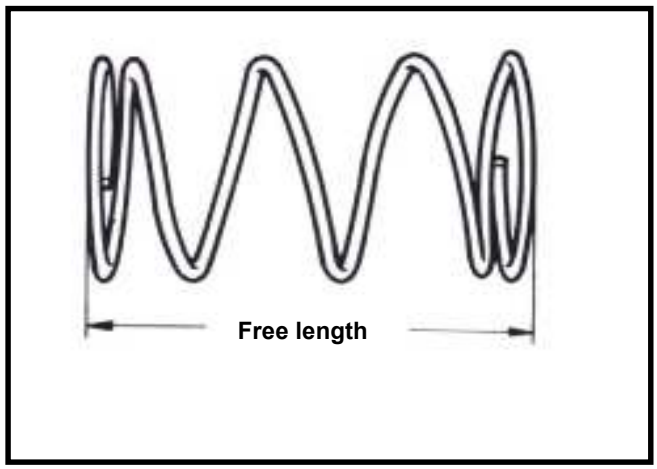
Measure the inner diameter of clutch outer friction face. Replace the clutch outer if exceed service limit.
Service limit: 107.2 mm



Clutch lining
Measure each clutch lining thickness.
Replace it if exceeds service limit.
Service limit: 2.0mm

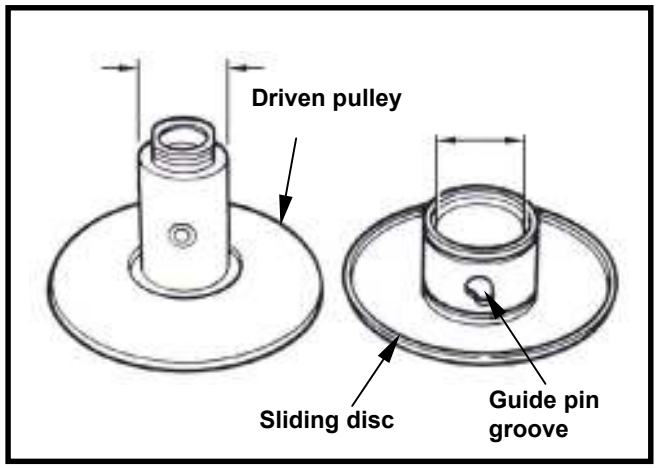


Driven pulley spring
Measure the length of driven pulley spring.
Replace it if exceeds service limit.
Service limit: 93.2mm

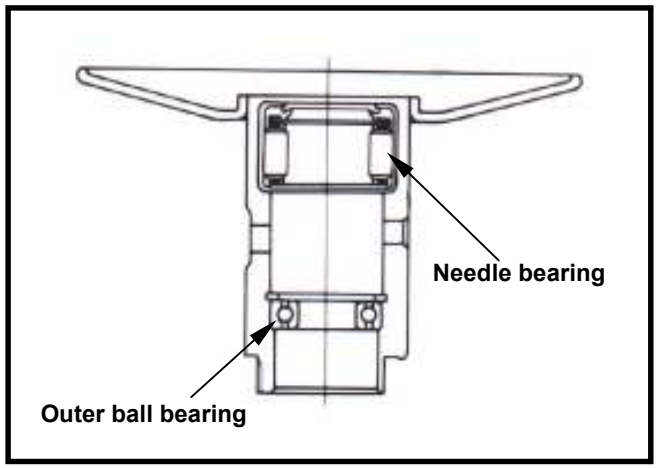


Driven pulley
Check following items;
- If both surfaces are damage or wear.
- If guide pin groove is damage or wear.

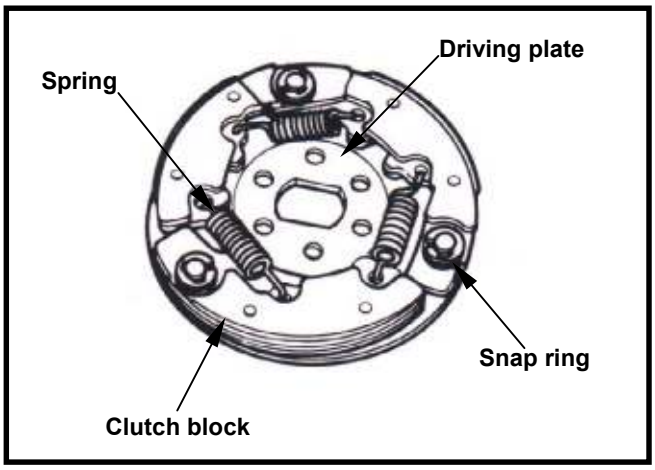
Replace damaged or worn components.
Measure the outer diameter of driven surface and the inner diameter of driven pulley.
Replace it if exceeds service limit.
Service limit: Outer diameter 33.94mm
Inner diameter 34.06mm



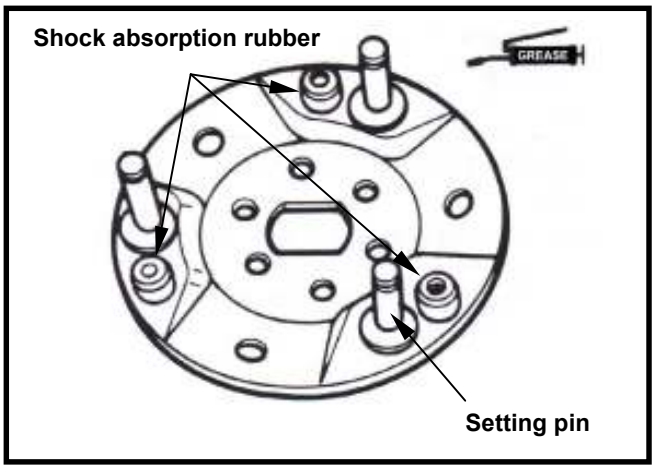
Driven Pulley Bearing Inspection
Check if the inner bearing oil seal is damage. Replace it if necessary.
Check if needle bearing is damage or too big clearance. Replace it if necessary.
Rotate the inside of inner bearing with fingers to check if the bearing rotation is in smooth and silent.



Clutch Block Replacement
Remove snap and washer, and the remove clutch block and spring from driving plate. Check if spring is damage or insufficient elasticity.



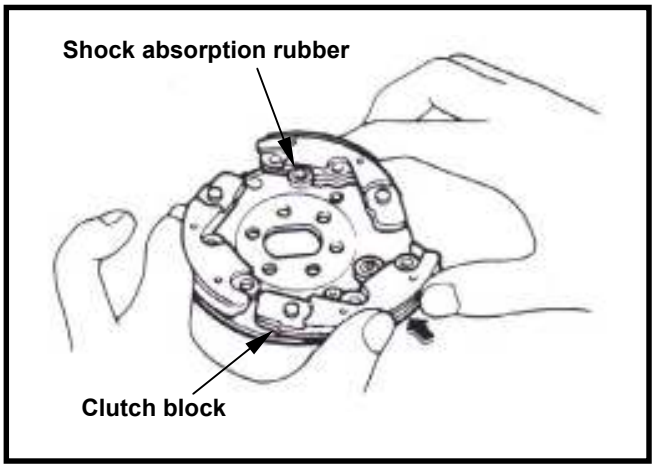
Check if shock absorption rubber is damage or deformation. Replace it if necessary. Apply with grease onto setting pins.



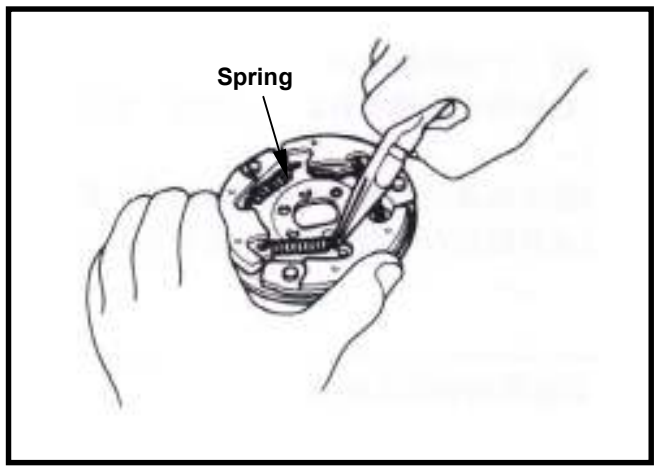
Apply with grease onto setting pins. But, the clutch block should not be greased. If so, replace it.
Install new clutch block onto setting pin and then push to specified location.

⚠ Caution

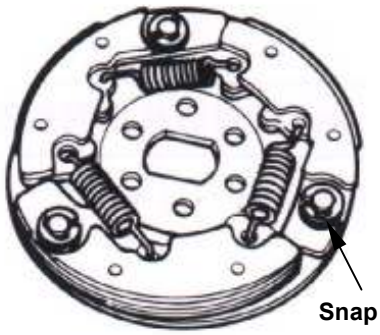
- Grease or lubricant will damage the clutch block and effect the block's connection capacity.



Install the spring snap into groove with pliers.



Install snap ring and mounting plate onto setting pin.

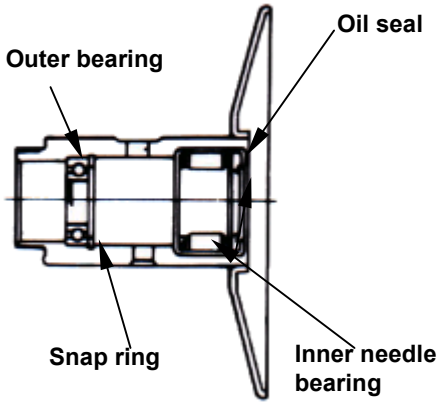


REPLACEMENT OF DRIVEN PULLEY BEARING

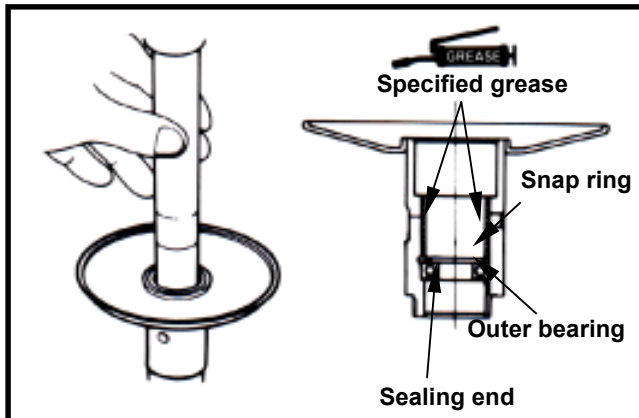
Remove inner bearing.

Caution

- If the inner bearing equipped with oil seal on one side in the driven pulley, then remove the oil seal firstly.
- If the pulley equipped with ball bearing, it has to remove snap ring and then the bearing.



Remove snap ring and then push bearing forward to other side of inner bearing.
Place new bearing onto proper position and its sealing end should be forwarded to outside.
Apply with specified grease.
Recommended to use the KING MATE G-3.
Install the snap ring and hold the bearing.

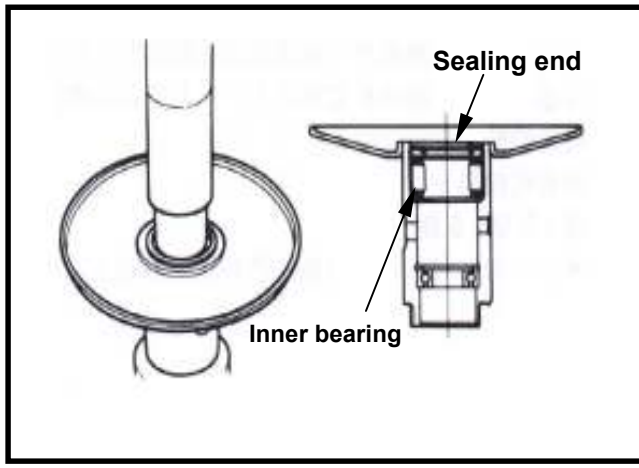


Install a new inner bearing.

Caution

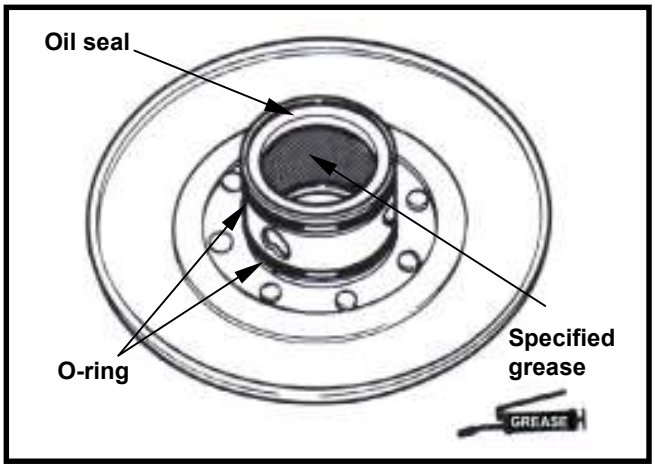
- Its sealing end should be forwarded to outside as bearing installation.
- Install needle bearing with hydraulic presser. Install ball bearing by means of hydraulic presser.

Align oil seal lip with bearing, and then install the new oil seal (if necessary).

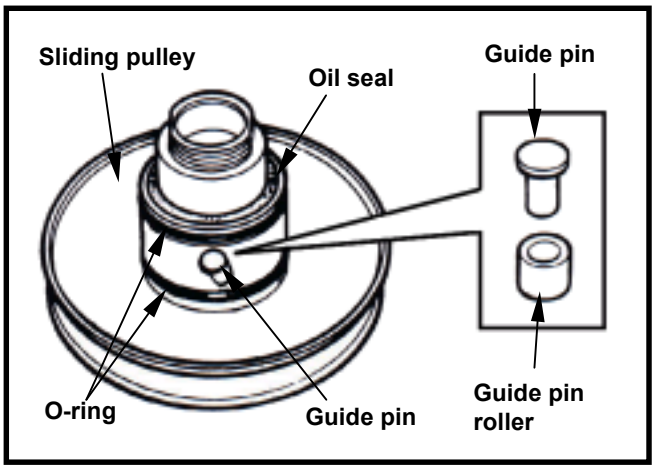


INSTALLATION OF CLUTCH/DRIVEN PULLEY ASSEMBLY

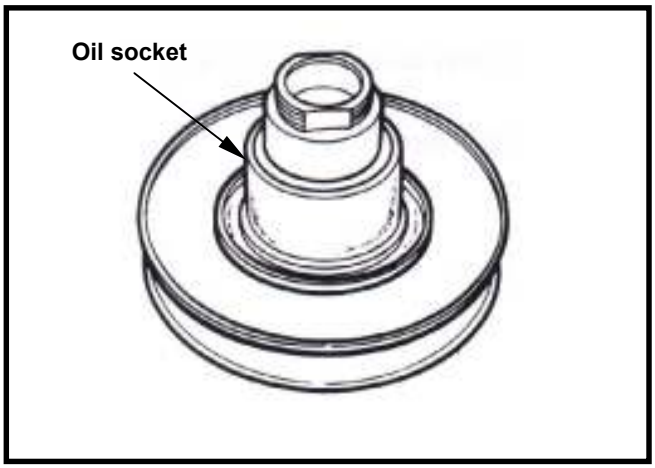
Install new oil seal and O-ring onto sliding pulley. Apply with specified grease to lubricate the inside of sliding pulley.



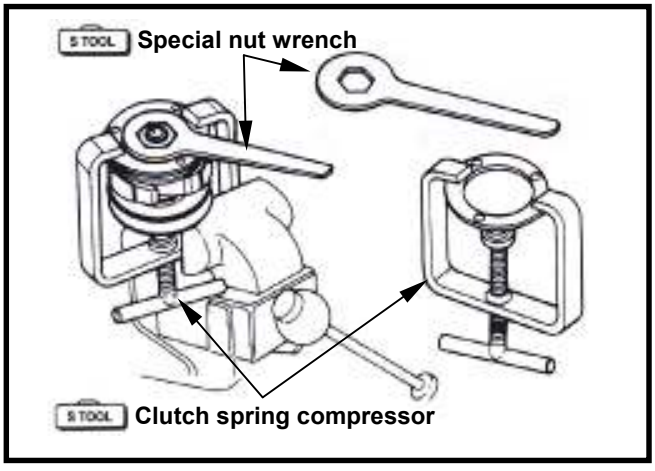
Install sliding pulley onto driven pulley.
Install guide pin and guide pin roller.



Install oil socket.



Install driving belt, spring and clutch into clutch spring compressor, and press down the assembly by turning manual lever until mounting nut that can be installed.
Hold the compressor by bench vise and tighten the mounting nut to specified torque with special nut wrench.
Remove the clutch spring compressor.
Torque value: 5.0~6.0 kg-m
Install clutch/driven pulley and driving belt onto driving shaft.



OPERATIONAL PRECAUTIONS 9-1	INSPECTION OF FINAL DRIVING MECHANISM . 9-2
TROUBLE DIAGNOSIS.....9-1	BEARING REPLACEMENT 9-3
DISASSEMBLY OF FINAL DRIVING MECHANISM 9-2	RE-ASSEMBLY OF FINAL DRIVING MECHANISM.....9-5

OPERATIONAL PRECAUTIONS

Specification

Application gear oil: 4-stroke lubricant
Recommended oil: KING MATE serial gear oils
Oil quantity: 120 c.c. (110 c.c. when replacing)

Torque value

Gear box cover	2.0~2.4 kgf-m
Gear oil drain plug	1.0~1.4 kgf-m
Gear oil filling bolt	0.8~1.2 kgf-m

Tools

Special service tools

Inner type bearing puller
Outer type bearing puller
Gear box oil seal installer
Gear box bearing installer

TROUBLE DIAGNOSIS

Engine can be started but motorcycle can not be moved

- Damaged driving gear
- Burnt out driving gear
- Broken driving belt

Noise

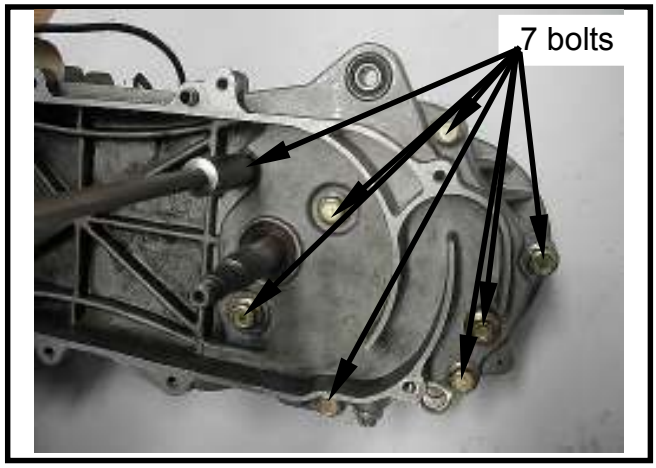
- Worn or burnt gear
- Worn gear

Gear oil leaks

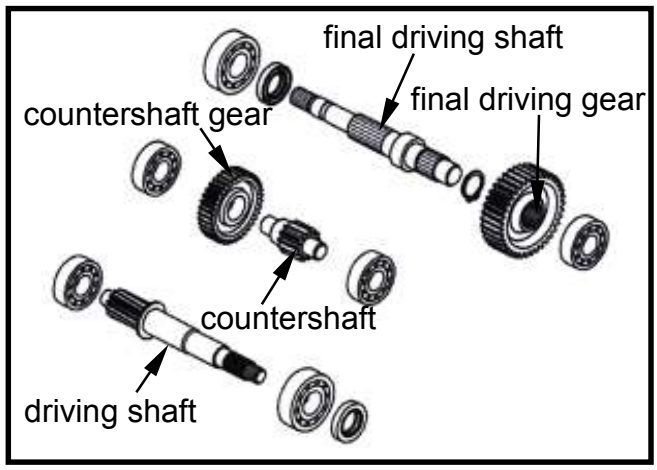
- Excessive gear oil
- Worn or damage oil seal

DISASSEMBLY OF FINAL DRIVING MECHANISM

Remove the rear wheel. (refer to chapter 15)
Remove the clutch.
Drain gear oil out from gear box.
Remove gear box cover bolts (7bolts) and then remove the gear box cover and the final driving shaft.
Remove gasket and setting pin.

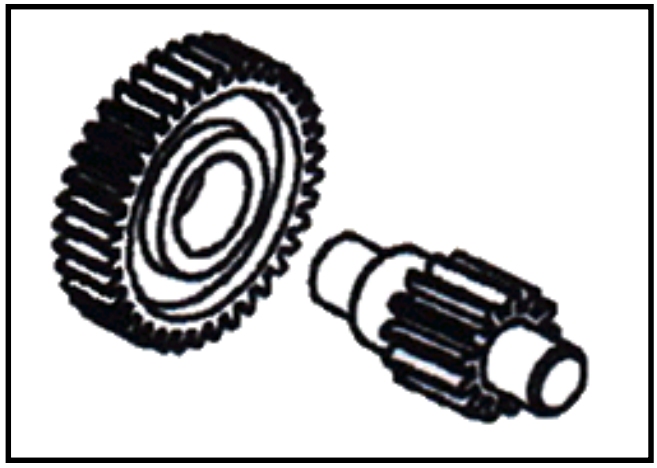


Remove countershaft and gear.
Remove final driving gear and shaft.

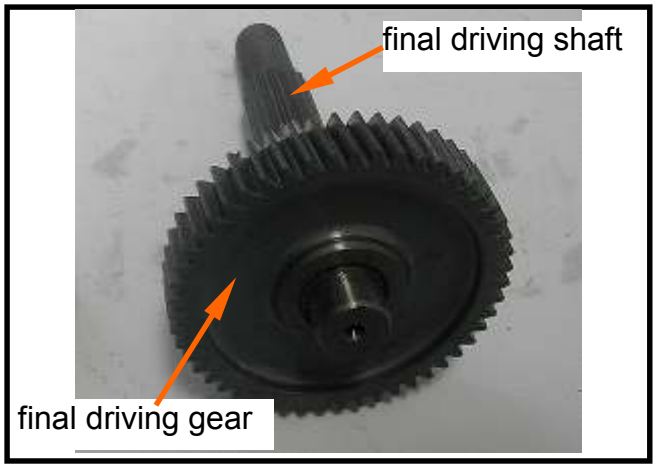


INSPECTION OF FINAL DRIVING MECHANISM

Check if the countershaft and the gear are wear or damage.

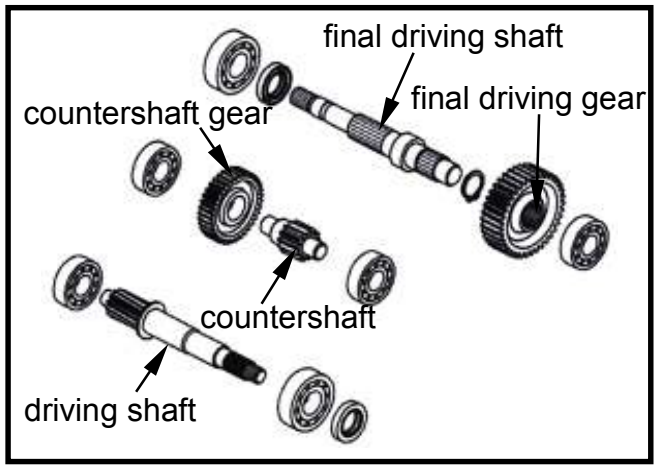


Check if the final driving shaft and gear are burn, wear or damage.



Check bearings on the gear box cover. Rotate each bearing's inner ring with fingers. Check if bearings can be turned in smooth and silent, and also check if bearing outer ring is mounted on gear box & cover tightly. If bearing rotation is uneven, noising, or loose bearing mounted, then replace it. Check oil seal for wear or damage, and replace it if necessary.

Check driving shaft and gear for wear or damage.

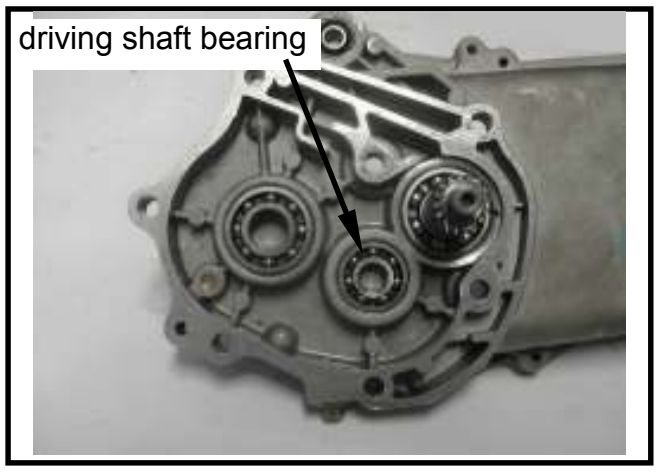


BEARING REPLACEMENT

⚠ Caution

Never install used bearings. Once bearing removed, it has to be replaced with new one.

Remove driving shaft bearing from left crankcase using following tools;
Inner type bearing puller



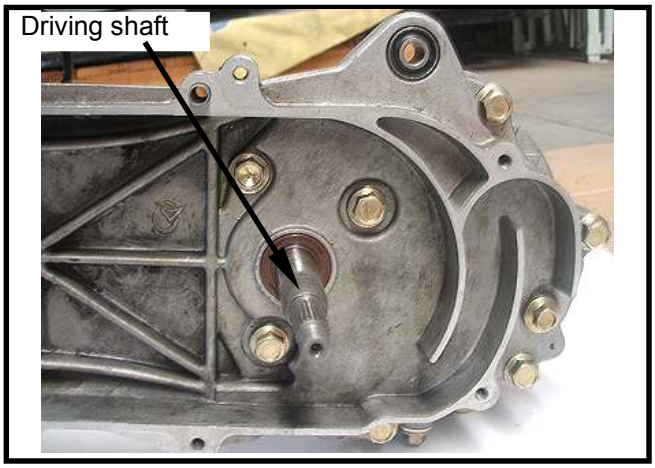
Install new driving shaft bearing into left crankcase.
Tool:
Press the bearing into cover with C type hydraulic presser or bearing installer.

Press out the driving shaft from the crankcase.
Remove oil seal from the crankcase.
Remove the driving shaft bearing from the gear box cover with the inner type bearing puller.

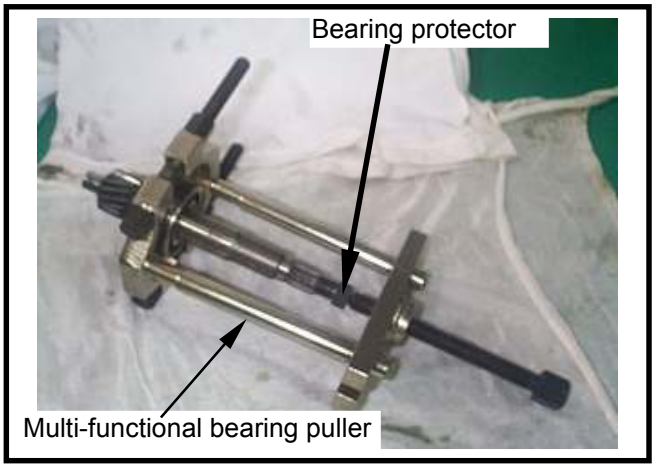
⚠ Caution

Using the bearing protector as pressing out the driving shaft from the gear box cover.

Specified tool:
Inner type bearing puller.

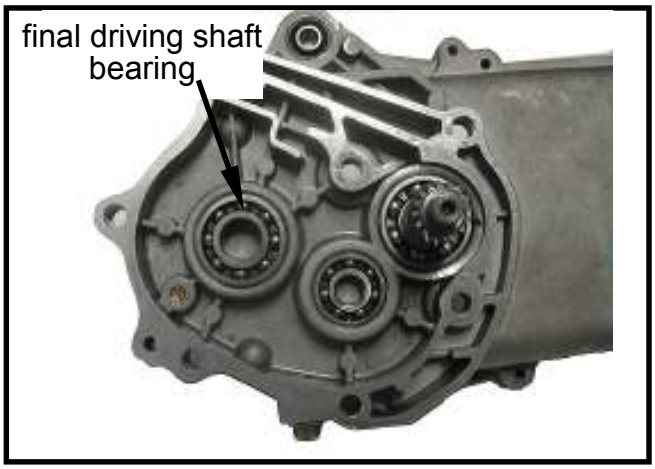


If the driving shaft is pulled out with its bearing, then remove the bearing with bearing puller and bearing protector.
Tool:
Multi-functional bearing puller
Bearing protector



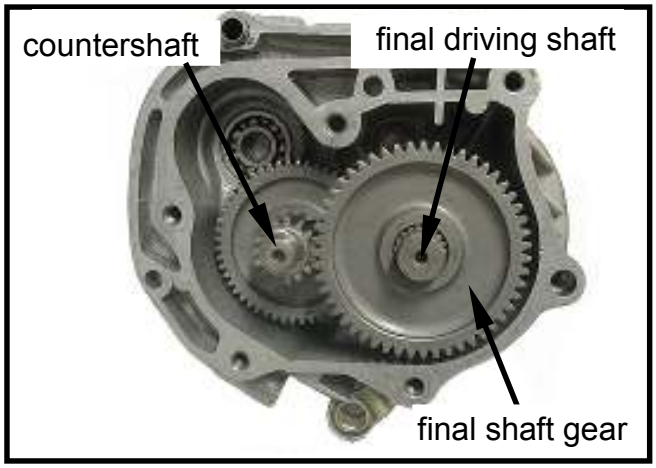
Install a new driving shaft bearing onto crankcase.
Then, install the driving shaft.
Specified tool:
Press the bearing in with C type hydraulic presser or bearing installer.

Install a new final driving shaft bearing onto crankcase.
Specified tool:
Press the bearing in with C type hydraulic presser or the bearing installer.
Apply with some grease onto the lip section of oil seal and then install the seal.

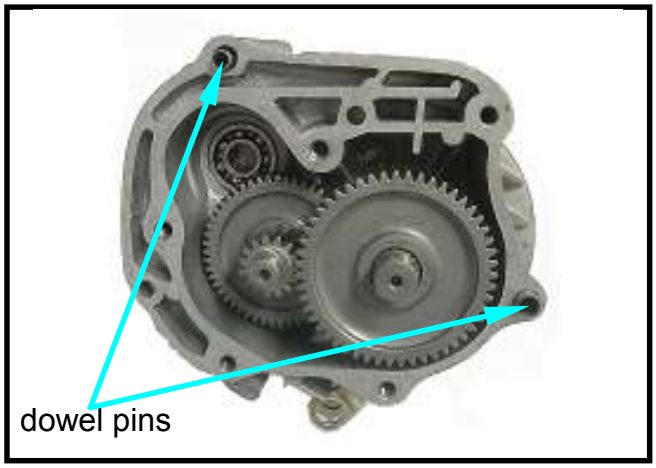


RE-ASSEMBLY OF FINAL DRIVING MECHANISM

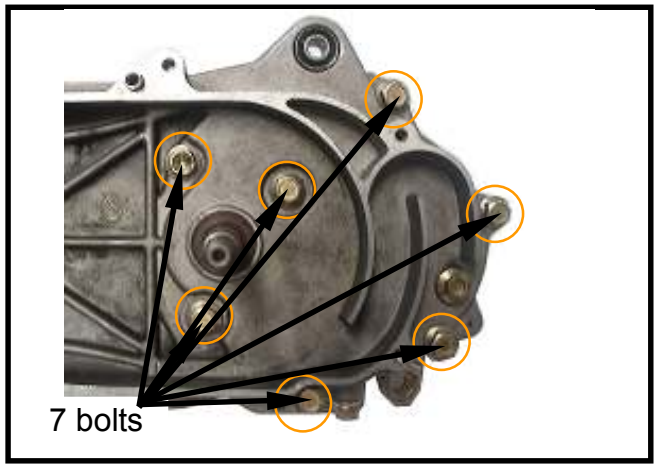
Install final driving shaft and final driving gear, countershaft, and countershaft gear.



Install the setting pins(2 pins) and new gasket.



Apply with grease onto the oil seal lip of final driving shaft.
Install the gear box cover and 7 bolts. (tighten the bolts)
Torque: 2.0~2.4 kgf-m
Install the clutch/sliding driving pulley.
Install the driving pulley, belt and left crankshaft cover.
Install the rear wheel.



Add gear oil.
Recommended usage: SYM HYPOID GEAR OIL (SAE 85W-140)
(110 cc: standard capacity)
(100 cc: when replacement)

PRECAUTIONS IN OPERATION 10-1	RIGHT CRANKCASE COVER INSTALLATION ... 10-4
A.C.GENERATOR REMOVAL 10-2	MOUNTED COIL SET INSTALLATION..... 10-4
RIGHT CRANKCASE COVER REMOVAL . 10-3	FLY WHEEL INSTALLATION..... 10-4

PRECAUTIONS IN OPERATION

General information

- Refer to chapter 5: Engine removal and installation
- Refer to chapter 1: The troubleshooting and inspection of A.C. generator

Specification Unit: mm

Item	Service Limit
ID of starting driven gear	32.060
OD of starting clutch cover	27.940

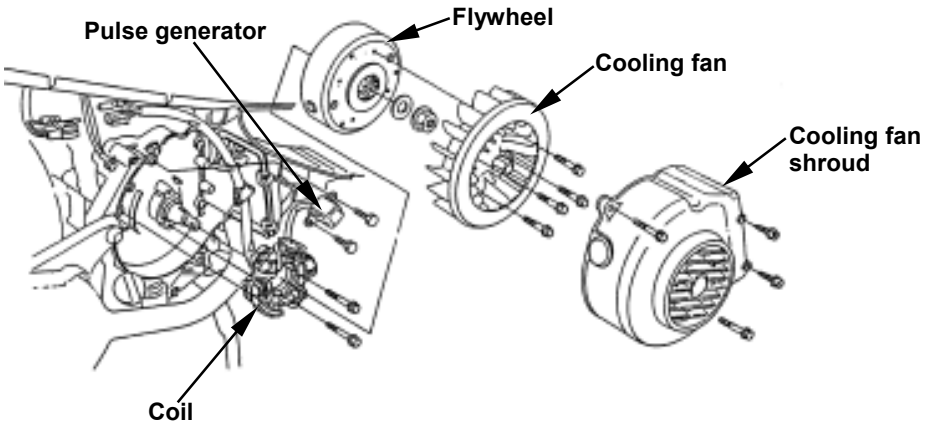
Torque value:

Flywheel nut	3.5~4.5kgf-m
Exhaust muffler bolt 6 mm	0.7~1.1kgf-m
Oil screen cover	1.3~1.7kgf-m

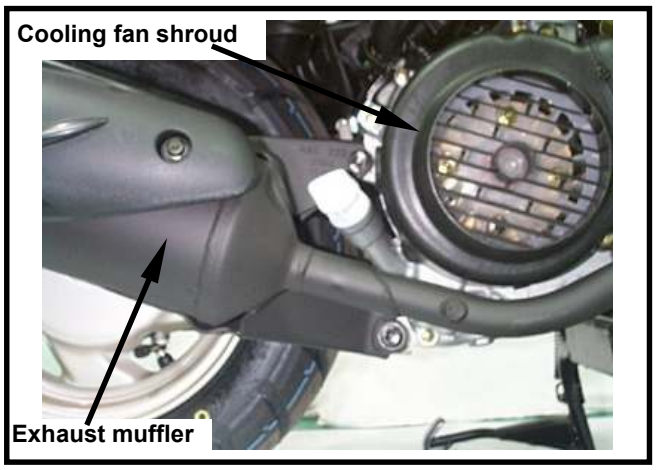
Special service tools

Flywheel puller
Universal fixture

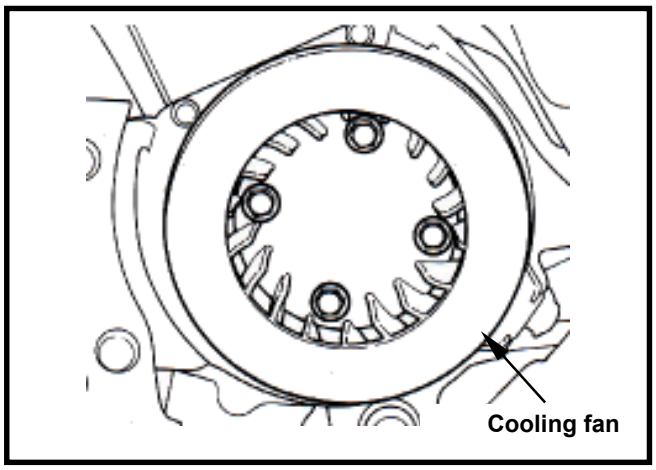
A.C. GENERATOR REMOVAL



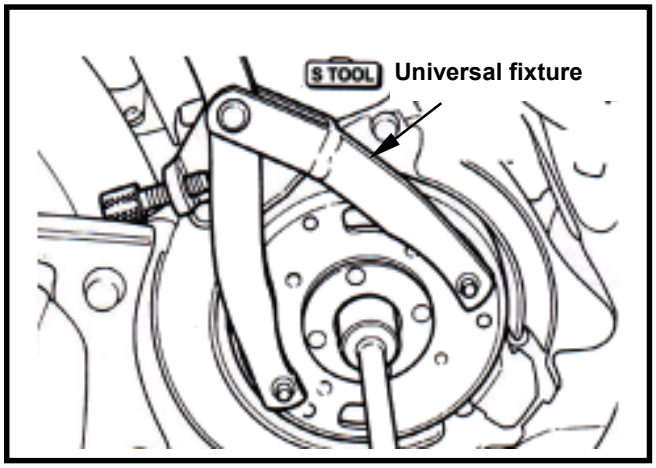
Drain out the engine oil.
Remove the exhaust muffler. (2 bolts, 2 nuts)
Remove the fan shroud.



Remove the fan. (4 bolts)



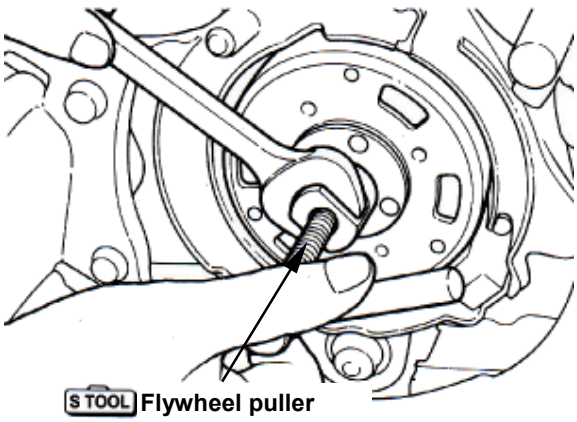
Hold the flywheel with the universal fixture.
Remove the nut on the flywheel.
Special Service Tools:
Universal Fixture



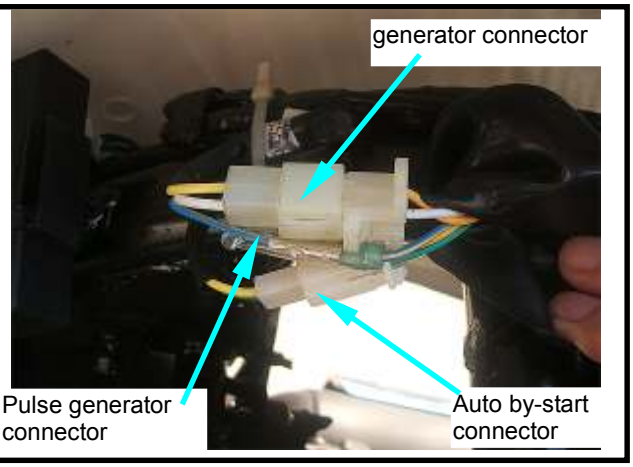
Remove the flywheel with the flywheel puller.
Special service tools:
Flywheel puller
Shaft protector

Caution

Install a shaft protector on the right end of crankshaft to avoid damaging the crankshaft before installing the flywheel puller.



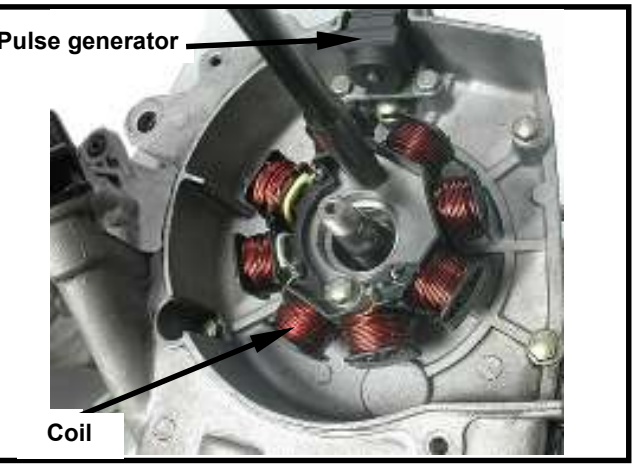
Remove the connectors of the A.C. generator and pulse generator.



Remove the bolts for the pulse generator, the A.C. generator coil. Then, remove the A.C. generator assembly.

Caution

Do not damage the alternator coil.

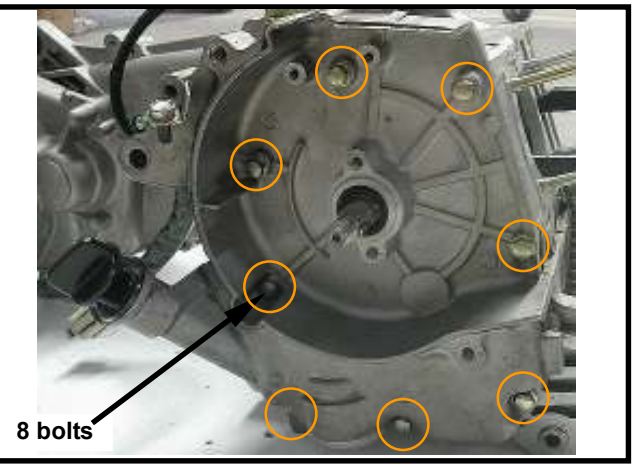


RIGHT CRANKCASE COVER REMOVAL

Remove the right crankcase cover. (8 bolts)
Remove setting pin and gasket.
Remove the gasket or foreign materials on the connection surfaces of both the cover and crankcase.

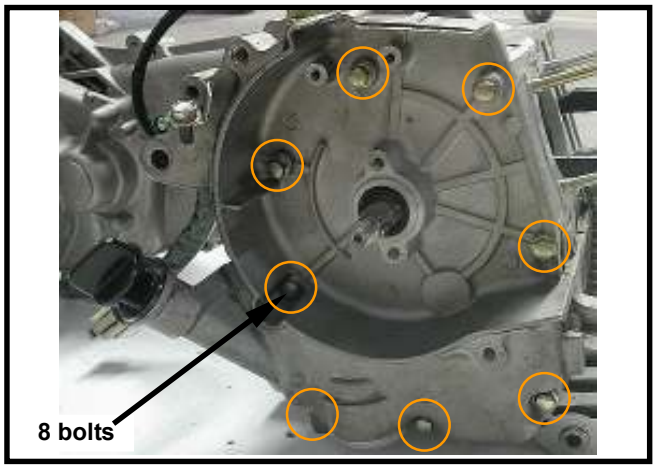
Caution

Do not damage the connection surfaces.



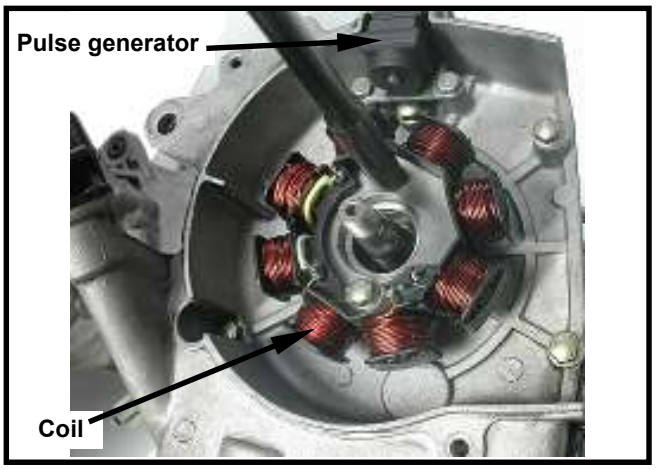
RIGHT CRANKCASE COVER INSTALLATION

Install setting pin and new gasket on the crankcase.
Replace the right crankshaft oil seal of the crankcase and apply some oil onto the oil seal lip.
Install right crankcase cover onto the right crankcase. (8 bolts)
Torque value: 1.5~2.0kgf-m



MOUNTED COIL SET INSTALLATION

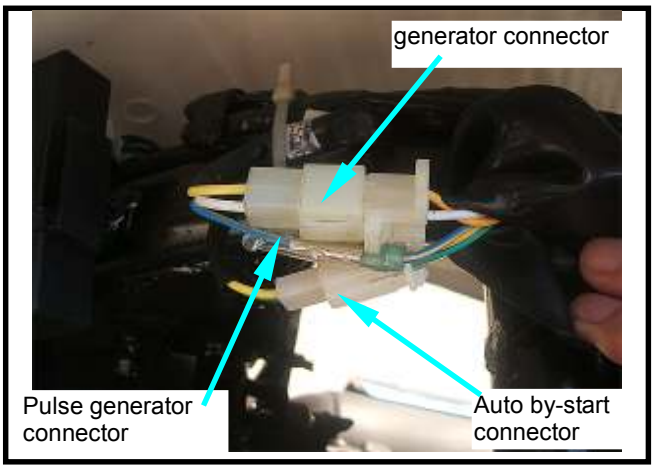
Install the coil set onto right crankcase cover. (2 bolts)
Install pulse generator. (2 bolts)
Torque: 1.5~2.0kgf-m
Tie the wire harness hose onto the indent of crankcase.



Caution

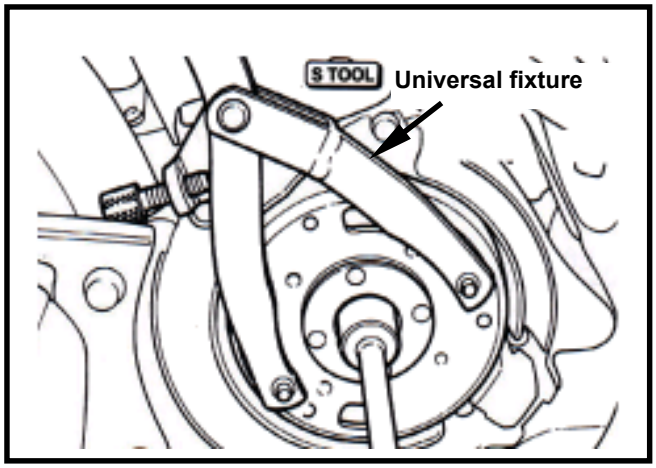
Make sure that the wire harness is placed under the pulse generator.

Install A.C. generator connector and pulse generator connector.

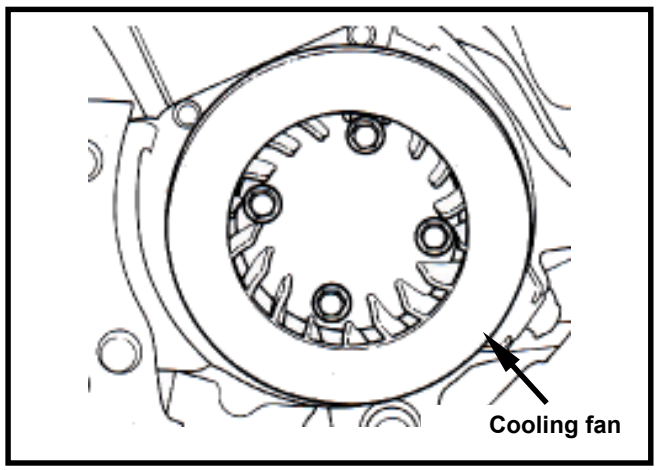


FLYWHEEL INSTALLATION

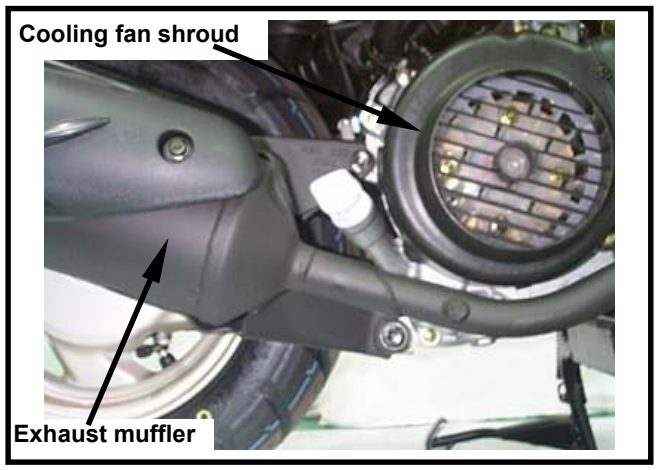
Make sure that there is no magnetic powder. If so, clean up it.
Align insert on crankshaft with the flywheel groove, and then install the flywheel.
Hold the flywheel with flywheel holder, and tighten its nut.
Torque value: 5.0~6.0kgf-m
Special service tool:
Universal fixture



Install the cooling fan. (4 bolts)



Install the cooling fan shroud. (4 bolts)
Install the exhaust muffler. (2 bolts, 2 nuts)
Add some engine oil according the specified quantity.



OPERATIONAL PRECAUTIONS ... 11-1	CRANKSHAFT INSPECTION 11-4
TROUBLE DIAGNOSIS 11-1	ASSEMBLY OF CRANKCASE 11-5
DISASSEMBLY OF CRANKCASE. 11-2	

OPERATIONAL PRECAUTIONS

General Information

- This Section contains descriptions concerning disassembly of the crankcase so that the crankshaft can be serviced.
- Complete following operations before disassembling crankcase.

Engine	Chapter 5
Cylinder head	Chapter 6
Cylinder and piston	Chapter 7
V-belt Drive pulley	Chapter 8
AC generator/ Starting Clutch	Chapter 10

If the crankshaft bearing or timing sprocket need be replaced, then the crankshaft set have to replaced.

Specification Unit: mm

Item	Standard	Limit
Left, right clearance of the big end of the connecting rod	0.100~0.350	0.550
Radial clearance of the big end of the connecting rod	0.000~0.008	0.050
Run-out	—	Below 0.030

Torque value

Bolts for crankcase	0.8~1.2 kgf-m
Bolts for cylinder/cylinder head	0.7~1.0 kgf-m
Engine oil draining plug	3.5~4.5 kgf-m
Bolts for cam chain tensioner	0.8~1.2 kgf-m

Special Service Tools

Crankcase remover/set
Crankshaft installation puller
Inner type bearing puller
Outer type bearing puller
Bearing pressing tools
Oil seal pressing tools

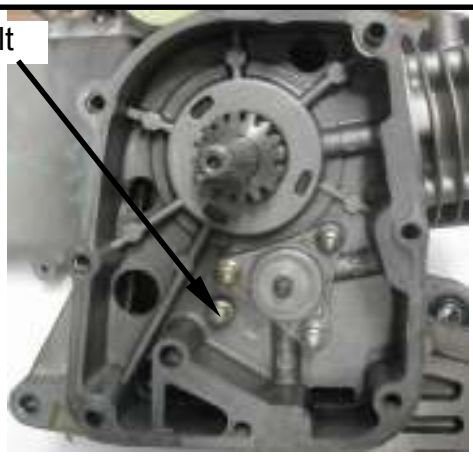
TROUBLE DIAGNOSIS

Engine noise

- Loose crankshaft bearing
- Loose crankshaft pin bearing
- Wear piston pin or piston pin hole

DISASSEMBLY OF CRANKCASE

Remove the 1 bolt from the right crankcase.



Remove the cam chain tensioner (hex socket bolt) from the left side of crankcase.

Place the left side of crankcase upward, and then install the crankcase remover/set onto the crankcase.
Drive the screw of the crankcase remover/set into the crankcase, and then separate the left and the right crankcases.
Remove the cam chain.

⚠ Caution

- Never pry out the connection surfaces of crankcases as separating. Otherwise, the connection surfaces could be damaged and cause oil leaking.
- It have to separate the cam chain and the drive gear before pressing out the both left and right crankcases.

Special Service Tools:
Crankcase remover/set

Remove the crankshaft from the right crankcase.

⚠ Caution

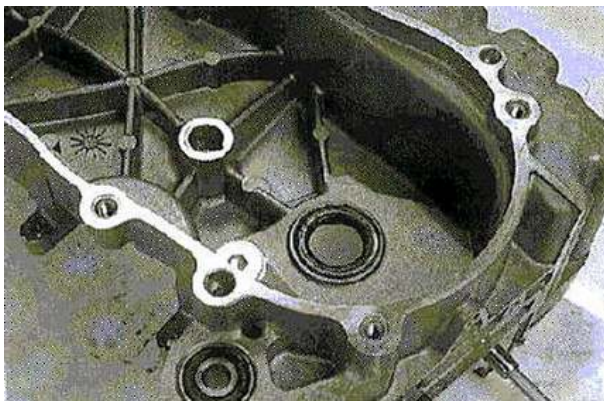
- The left and right bearings of crankshaft is to press-fit onto the crankshaft.

Remove gasket and dowel pins (2).
Scrape gasket residues off the crankcase contact surface.

⚠ Caution

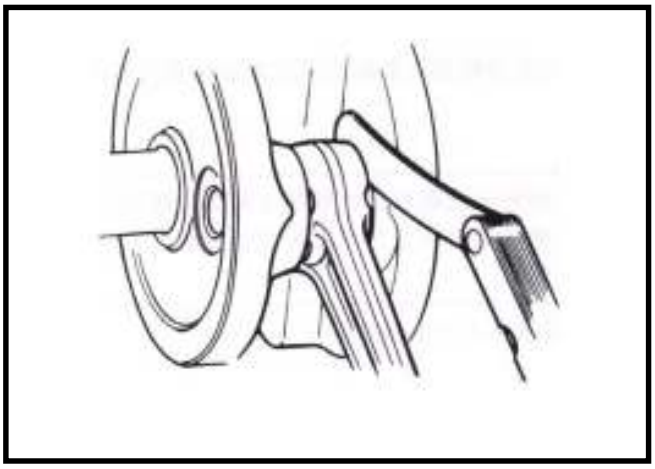
- Do not damage contact surface of the crankcase.
- Soap the gasket residues into solvent and the residues will be removed easily.

Remove oil seal from the left crankcase.

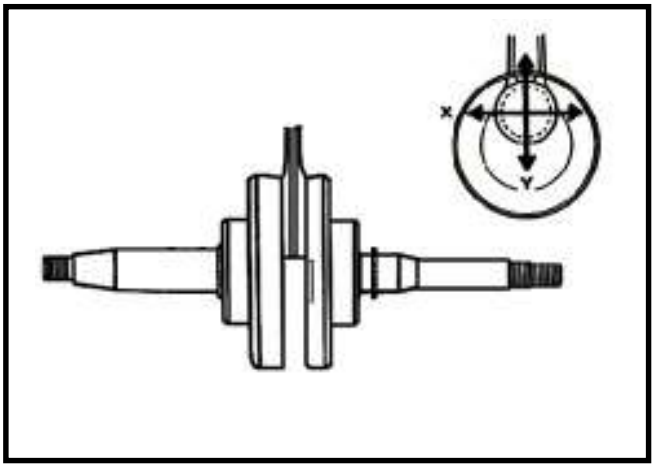


CRANKSHAFT INSPECTION

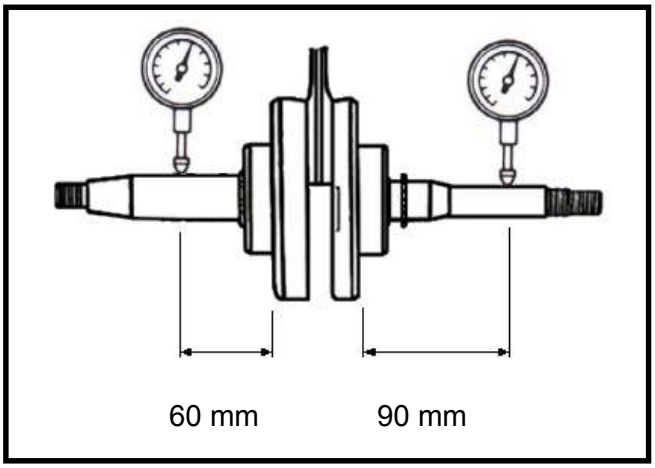
Measure left and right clearance of connecting rod big end.
Service limit: Replace when it is more than 0.55 mm



Measure the radical clearance of the big end at the vertical directions.
Service limit : 0.05 mm

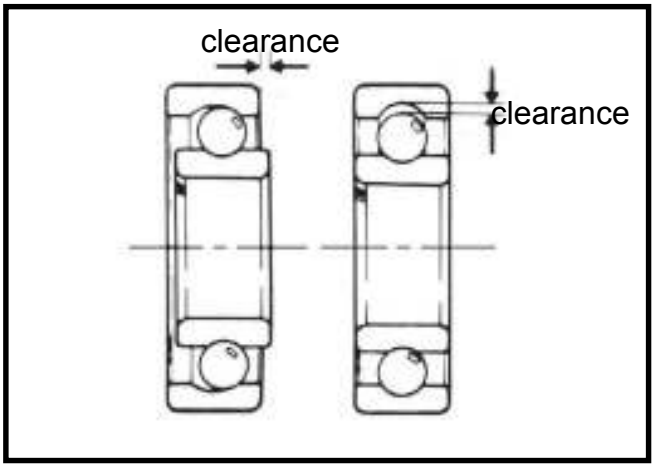


Place the crankshaft onto a V-block and measure run-out of the crankshaft with dial gauge.
Service limit: 0.10 mm



Bearing Inspection

Rotate the bearing with fingers and make sure the bearing can be rotated smoothly and quietly.
Check if the inner ring is connected onto the crankshaft tightly.
Replace crankshaft as a set when noise or looseness is detected.

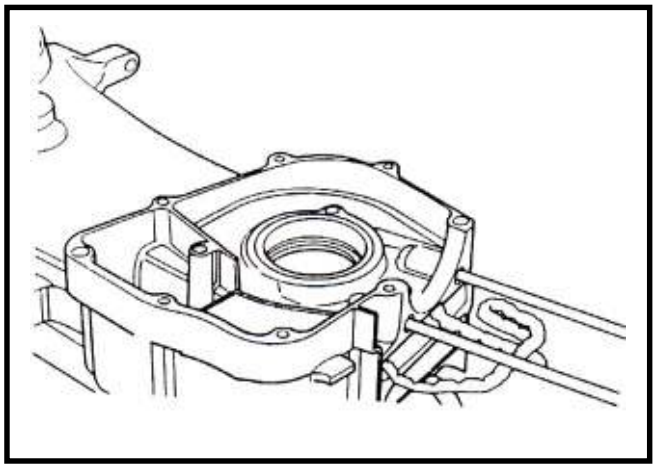


ASSEMBLY OF CRANKCASE

Install cam chain into the chain hole of the left crankcase, and then split out the cam chain.

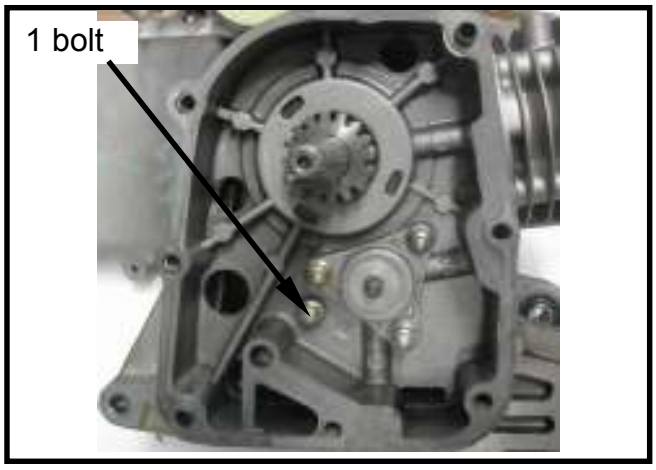
Caution

- Do not damage the cam chain as installing the crankshaft.



Install crankshaft into the left crankcase and then install two dowel pins and new crankcase gasket.

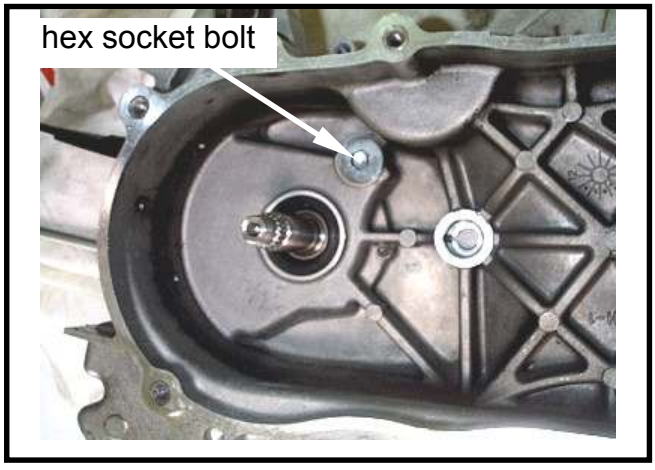
Install the right crankcase and tighten the crankcase bolts (1 bolts).
Torque value: 1.5~2.0 kgf-m



Install the cam chain tensioner.
Install a new O-ring onto the mounting bolt of the chain tensioner.
Apply some oil on the O-ring and tighten the bolt.
Torque value: 0.8~1.2 kgf-m

Caution

- The O-ring must be installed into the bolt's groove.



Apply with some grease onto the oil seal lip and then install it onto the left crankcase.

Press-fit the oil seal to specified position with the oil seal installer.
Special service tools: the oil seal installer

	
ITEM:L/R CRANK DISASSEMBLE TOOL	ITEM:CLUTCH NUT WEENCH
PURPOSE:CRANKSHAFT DISASSEMBLE	PURPOSE:LOOSE THE CLUTCH NUT
	
ITEM:UNIVERSAL HOLDER	ITEM:CLUTCH SPRING COMPRESSOR
PURPOSE:HOLDER THE MDF/CLUTCH OUTER	PURPOSE:DISASSEMBLE THE CLUTCH
	
ITEM:TAPPET ADJUSTING WRENCH	ITEM:ACG FLYWHEEL PULLER
PURPOSE:ADJUST VALVE CLEARANCE	PURPOSE:REMOVE ACG FLYWHEEL
	
ITEM:OIL SEAL DRIVER	ITEM:OIL SEAL DRIVER
PURPOSE:OIL SEAL INSTALLATION	PURPOSE:OIL SEAL INSTALLATION