Symba 100

Service Manual

Foreword

This service manual contains the technical data of each component inspection and repair for the SANYANG MB10A7-A series motorcycle. The manual is shown with illustrations and focused on “Service Procedures”, “Operation Key Points”, and “Inspection Adjustment”, providing technician with service guidelines.

If the style and construction of the motorcycle, MB10A7-A series motorcycle, are different from that of the photos, pictures shown in this manual, the actual vehicle layout should be followed. Specifications may be changed without notice.

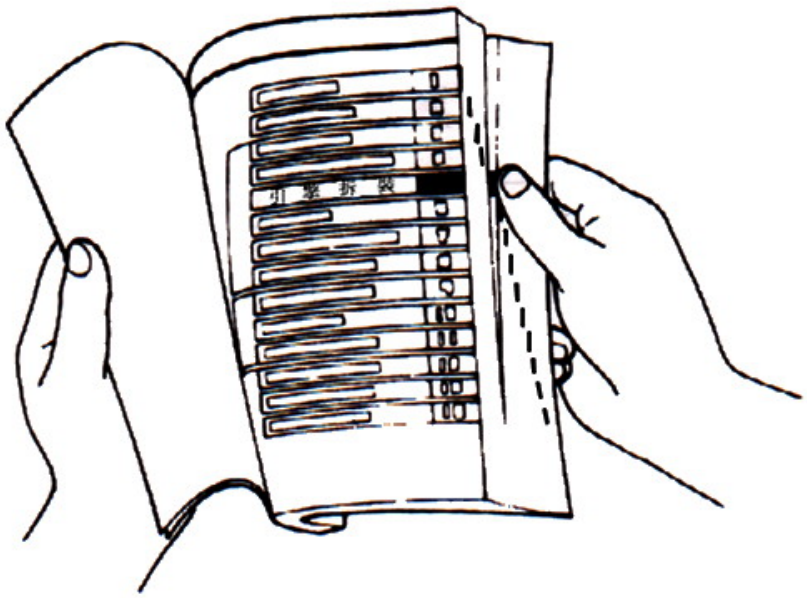
Service Department

SANYANG INDUSTRY CO., LTD.

How to Use This Manual

This service manual describes basic information of individual parts and system inspection & service for SANYANG MB10A7-A series motorcycle. In addition, please refer to the manual contents for detailed information for the model year.

The first chapter covers general information and troubleshooting.
The second chapter covers maintenance information and special tools catalog.
The third to the 9th chapters cover engine, fuel and driving systems.
The 10th and 11th chapters contain the parts of vehicle frame.
The 12th chapter is electrical appliances.
The 13th chapter is wiring diagram.
Please see index of content for brief information and quick guide.



There are 4 buttons, “Foreword”, “Contents”, “How to Use This Manual” and “Mechanical Layout” on the PDF version homepage, and can access these items by clicking of the mouse.

If technician wants to see the content of one specific chapter, click on the title of each chapter on the Index page. There are two buttons on the upper part of each page, “Homepage” and “contents”. The user can click on the “Homepage” button or the “Contents” button to go back to the homepage or contents index. Therefore, to check one paragraph inside the chapter, click on the paragraph index to go to the desired paragraph. In addition, there is a “To This Chapter Contents” button at the upper side of each page, by clicking the button; you can go back to the paragraph selection index of this specific chapter.

Homepage

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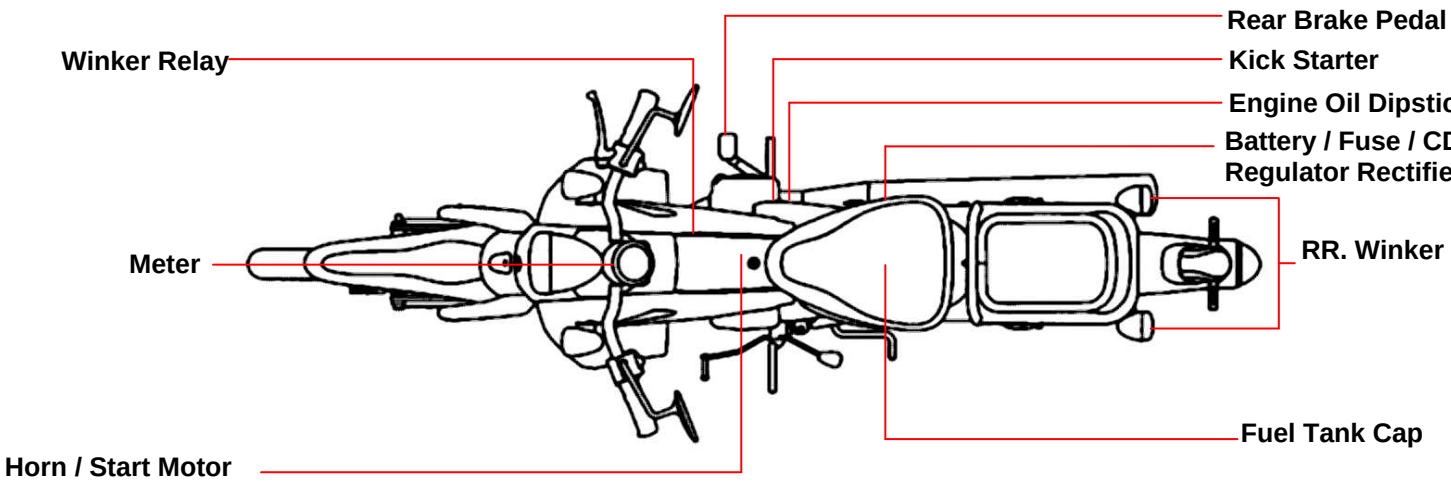
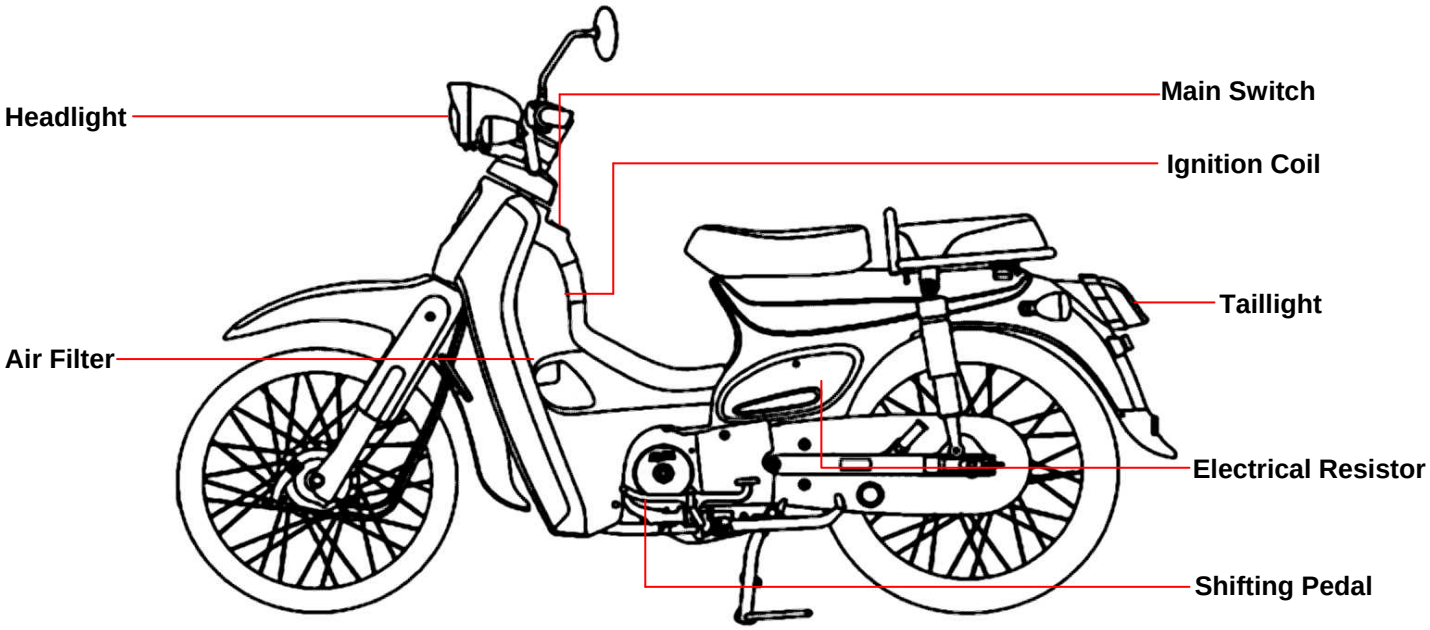
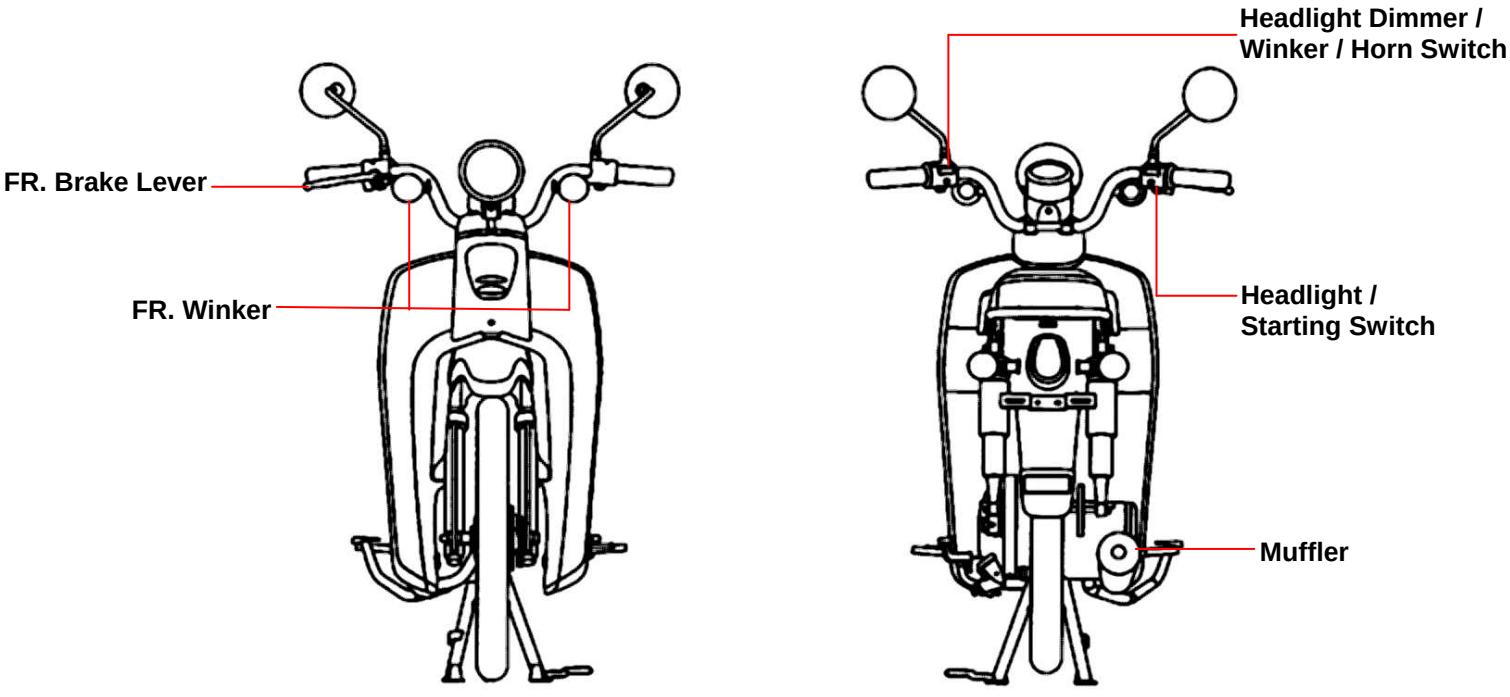
Mechanical Layout







Symbols and Marks

Symbols and marks are used in this manual to indicate what and where the special service are needed, in case supplemental information is procedures needed for these symbols and marks, explanations will be added to the text instead of using the symbols or marks.

Warning	Serious injury or even death may occur if procedures are not followed.
Caution	Equipment damages may occur if procedures are not followed.
Engine oil	Recommended oil: Bramax motor oil or equivalent motor oil, SAE 10W-30 API SH class oil. Warranty will not cover the damage which is caused by not applying with the recommended engine oil.
Grease	King Mate G-3 is recommended.
Locking sealant	Apply sealant; medium strength sealant should be used unless otherwise specified.
Oil seal	Apply with lubricant.
Renew	Replace with a new part before installation.
Brake fluid	Use recommended brake fluid DOT3 or WELLRUN brake fluid.
Special tools	Use special tools.
Correct	Correct installation.
Wrong	Wrong installation.
Indication	Indication of parts.
Directions	Position and operation directions
	Parts assembly directions.
	Bolt installation direction, --- means that bolt go through the component (invisible).

General Safety

Carbon monoxide

If you must run your engine, ensure the place is well ventilated. Never run your engine in a closed area. Run your engine in an open area, if you have to run your engine in a closed area, be sure to use a ventilator.

⚠ Caution

- Exhaust contains toxic gas, which may cause one to lose consciousness and even result in death.

Gasoline

Gasoline is a low ignition point and explosive material. Work in a well-ventilated place, no flame or spark allowed in the work place or where gasoline is being stored.

⚠ Caution

- Gasoline is highly flammable, and may explode under some conditions, keep it away from children.

Used engine oil

⚠ Caution

- Prolonged contact with used engine oil (or transmission oil) may cause skin cancer although it might not be verified.
- We recommend you to wash your hands with soap and water right after contacting. Keep the used oil beyond reach of children.

Hot components

⚠ Caution

- Components of the engine and exhaust system can become extremely hot after engine running. They remain very hot even after the engine has been stopped for some time. When performing service work on these parts, wear insulated gloves and wait until the vehicle is cooling down.

Battery

⚠ Caution

- Battery emits explosive gases; flame is strictly prohibited. Keeps the place well ventilated when charging the battery.
- Battery contains sulfuric acid (electrolyte), which can cause serious burns, so be careful not to get the sulfuric acid on your eyes or skin. If you get battery acid on your skin, flush it off immediately with water. If you get battery acid in your eyes, flush it off immediately with plenty of water and then go to hospital to consult an ophthalmologist.
- If you swallow it by mistake, drink a lot of water or milk, and take some laxative such as vegetable oil and then go to see a doctor.
- Keep electrolyte beyond reach of children.

Brake shoe

Do not use an air hose or a dry brush to clean components of the brake system; use a vacuum cleaner or the equivalent to avoid dust flying.

⚠ Caution

- Inhaling brake shoe or pad ash may cause disorders and cancer of the breathing system

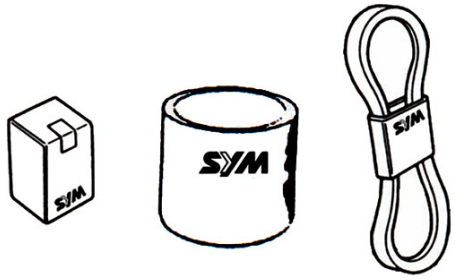
Brake fluid

⚠ Caution

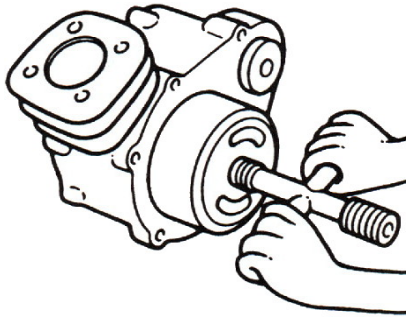
- Spilling brake fluid on painted, plastic, or rubber parts may cause damage to the parts. Place a piece of clean cloth on the above-mentioned parts for protection when servicing the brake system. Keep the brake fluid beyond reach of children.

Service Precautions

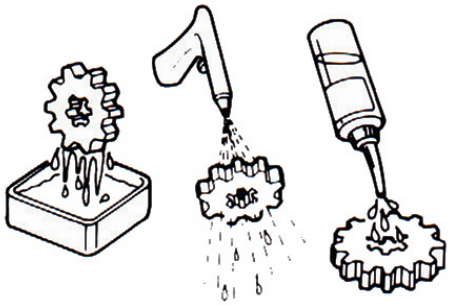
- Always use with SANYANG genuine parts and recommended oils. Using non-genuine parts for SANYANG vehicle may damage it.



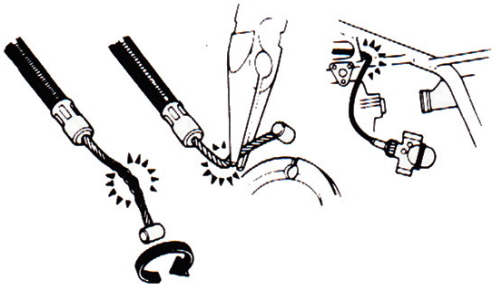
- Special tools are designed for remove and install of components without damaging the part. Using wrong tools may result in damage.



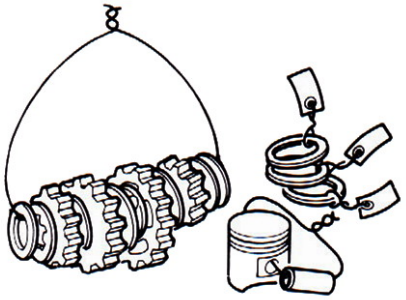
- When servicing this bike, use only metric tools. Metric bolts, nuts, using wrong tools and fasteners may damage this vehicle.
- Clean the outside of the parts or the cover before removing it from the bike. Otherwise, dirt and deposit accumulated on the part's surface may fall into the engine, chassis, or brake system, and cause damage.
- Wash and clean parts with high ignition point solvent, and blow-dry with compressed air. Pay special attention to O-rings or oil seals because most cleaning agents have an adverse effect on them.



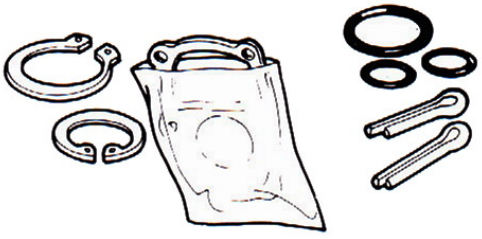
- Never bend or twist a control cable to prevent unsmooth control and premature worn out.



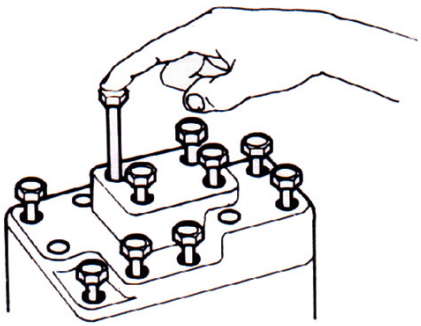
- Rubber parts may become deteriorated when old, and easy to be damaged by solvent and oil. Check these parts before installation to make sure that they are in good condition, replace if necessary.
- When loosening a component, which has different sized fasteners, operate with a diagonal pattern and work from inside out. Loosen the small fasteners first. If the bigger ones are loosen first, small fasteners may receive too much stress.
- Store complex components such as transmission parts in the proper assemble order and tie them together with a wire for ease of installation later.



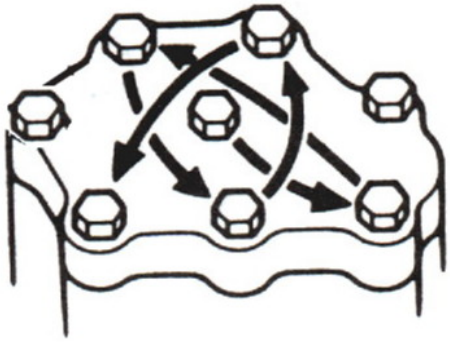
- Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).
- Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap rings, and split pins.



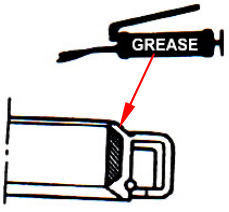
- The length of bolts and screws for assembly, cover plates or boxes is different from one another; make sure they are correctly installed. In case of confusion, Insert the bolt into the hole to compare its length with other bolts, if its length out side the hole is the same with other bolts, it is a correct bolt. Bolts for the same assembly should have the same length.



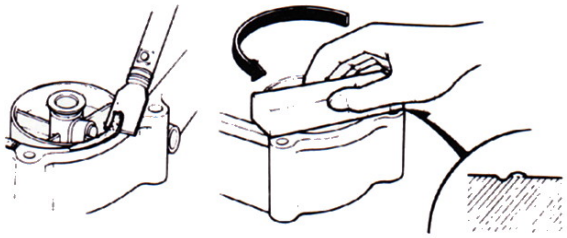
- Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unless otherwise indicated. Bolts and fasteners should be kept clean and dry. Do not apply oil to the threads.



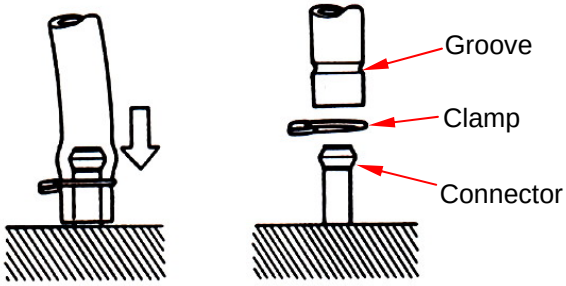
- When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, and check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.



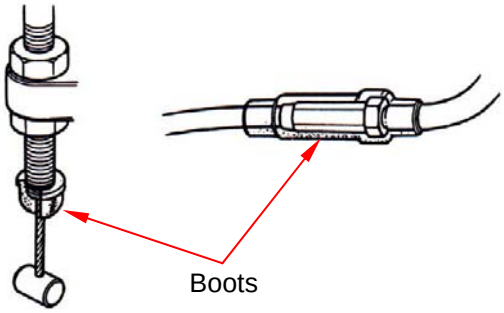
- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.



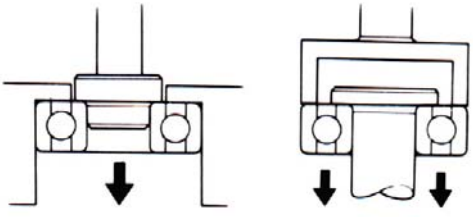
- The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections so that there is enough room below the enlarged ends for tightening the clamps.



- Rubber and plastic boots should be properly reinstalled to the original correct positions as designed.

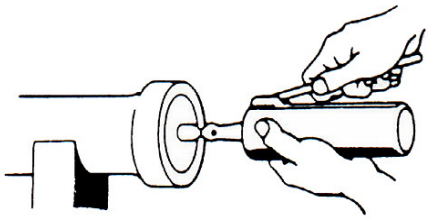


- The tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force on both races.

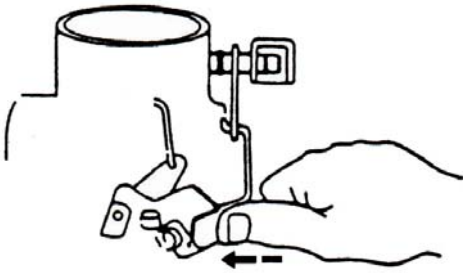


Both of these examples can result in bearing damage.

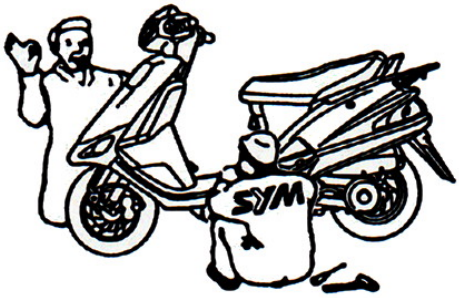
- Lubricate the rotation face with specified lubricant on the lubrication points before assembling.



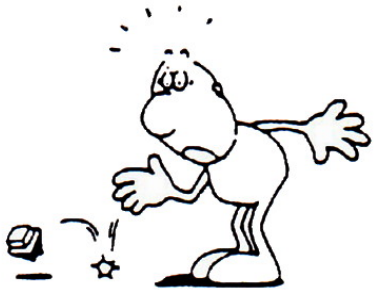
- Check if positions and operation for installed parts is in correct and properly.



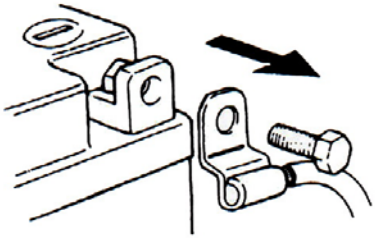
- Make sure service safety each other when conducting by two persons.



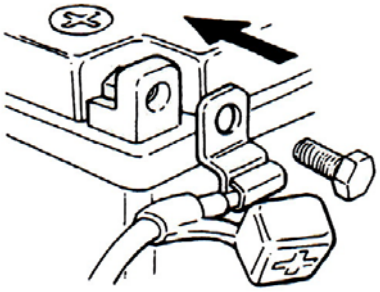
- Note that do not let parts fall down.



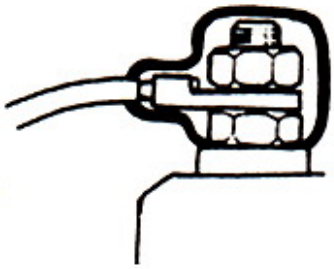
- Before battery removal operation, you have to remove the battery negative (-) cable first. Avoid using tools like open-end wrench, which may contact with body or create spark.



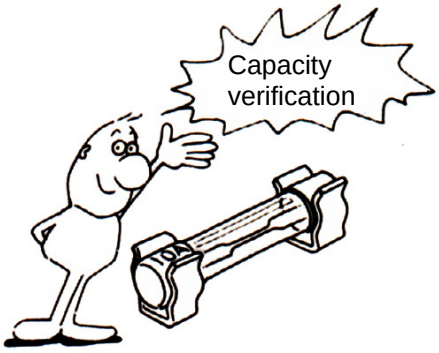
- After service completed, make sure all connection points is secured. Battery positive (+) cable should be connected firstly.
- And the two posts of battery have to be greased after connected the cables.



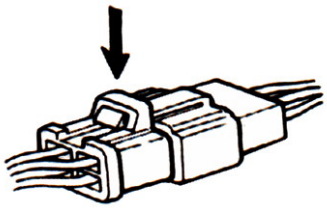
- Make sure that the battery post caps are located in properly after the battery posts had been serviced.



- If fuse burned, it has to find out the cause and solved it. And then replace with specified capacity fuse.

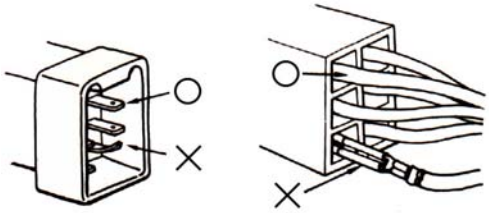


- When separating a connector, it locker has to be unlocked first. Then, conduct the service operation.

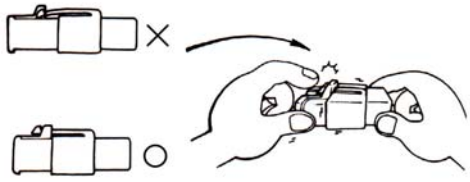


- Do not pull the wires as removing a connector or wires. Hold the connector body.

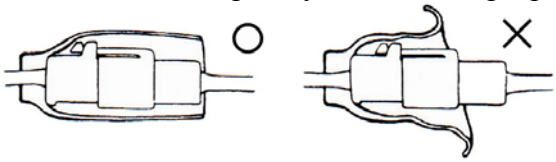
- Make sure if the connector pins are bent, extruded or loosen.



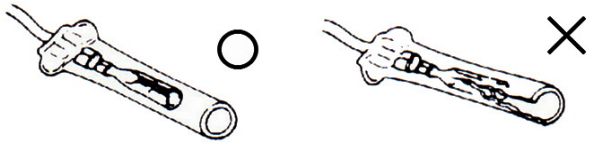
- Insert the connector completely.
  If there are two lockers on two connector sides, make sure the lockers are locked in properly.
  Check if any wire loose.



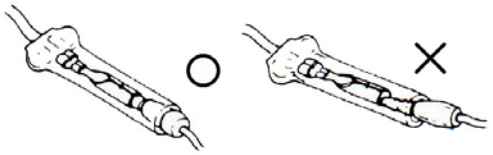
- Check if the connector is covered by the twin connector boot completely and secured properly.



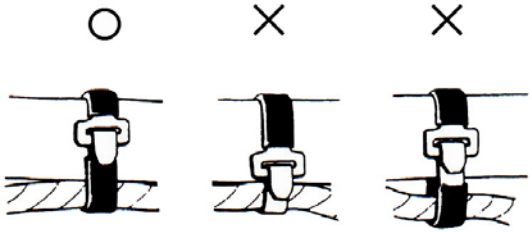
- Before terminal connection, check if the boot is crack or the terminal is loose.



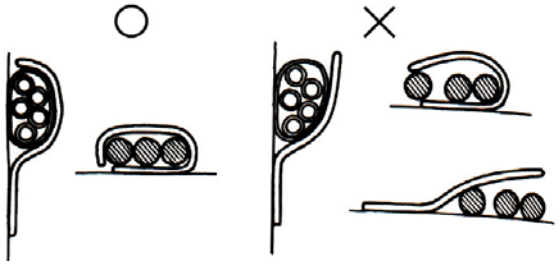
- Insert the terminal completely.
  Check if the boot covers the terminal.
  Do not let boot open facing up.



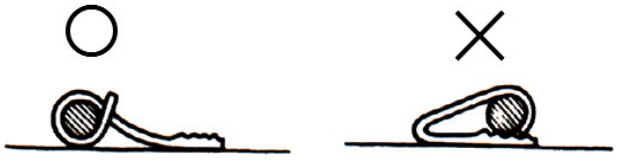
- Secure wires and wire harnesses to the frame with respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.



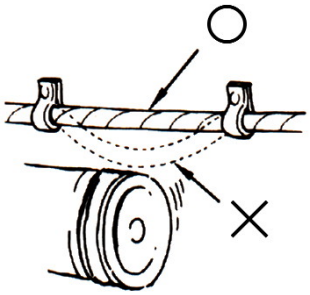
- Wire band and wire harness have to be clamped secured properly.



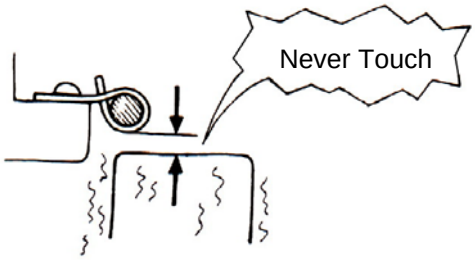
- Do not squeeze wires against the weld or its clamp.



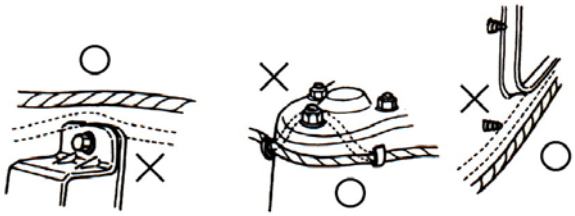
- Do not let the wire harness contact with rotating, moving or vibrating components when routing the harness.



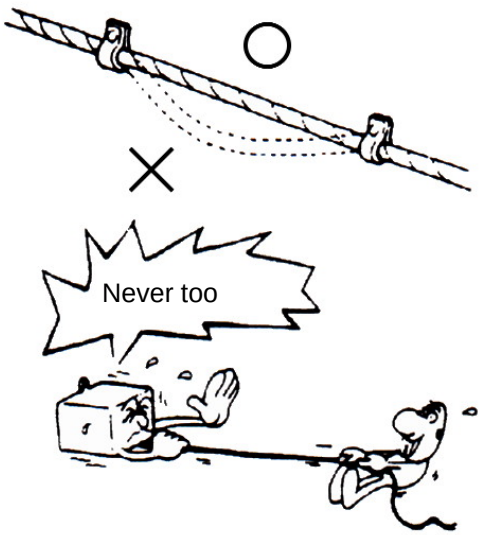
- Keep wire harnesses far away from the hot parts.



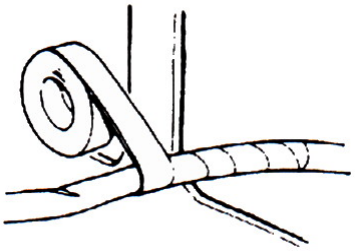
- Avoid wire harnesses from sharp edges or corners, and also avoid the jutted-out ends of bolts and screws.



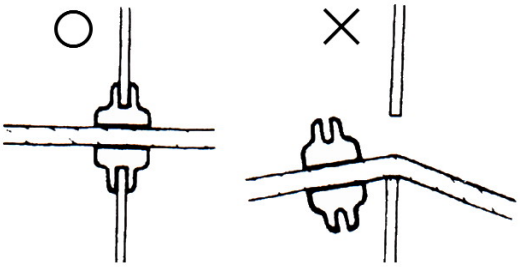
- Route harnesses so that they neither pull too tight nor have excessive slack.



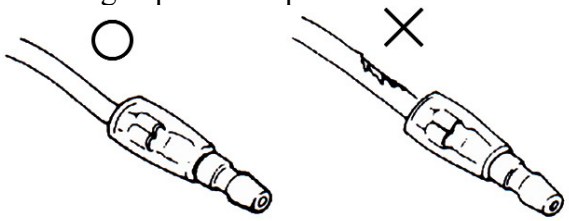
- Protect wires or wire harnesses with electrical tape or tube if they contact a sharp edge or corner. Thoroughly clean the surface where tape is to be applied.



- Secure the rubber boot firmly as applying it on wire harness.

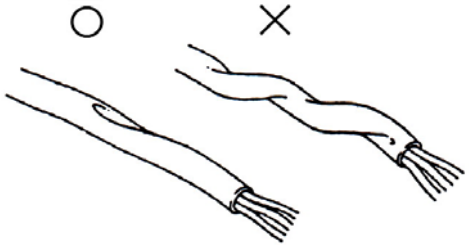


- Never use wires or harnesses which insulation has been broken. Wrap electrical tape around the damaged parts or replace them.

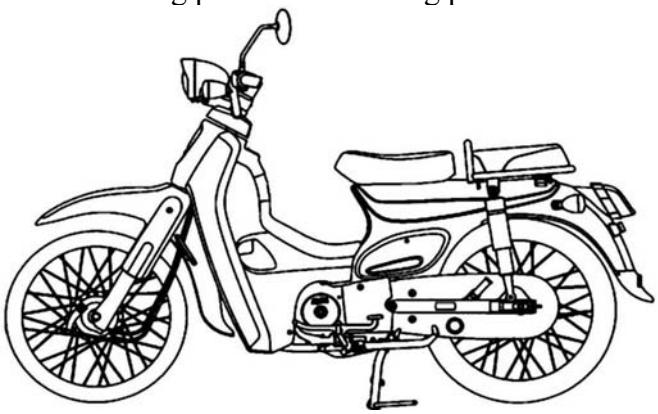


- Never clamp or squeeze the wire harness when installing other components.

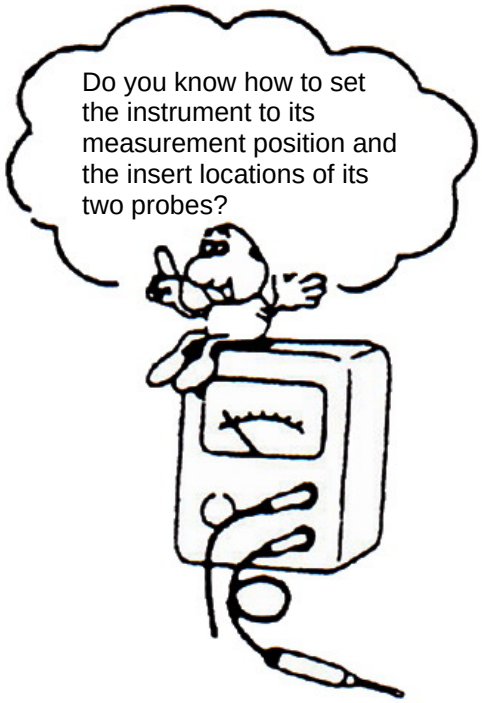
- Do not let the wire harness been twisted when installation.



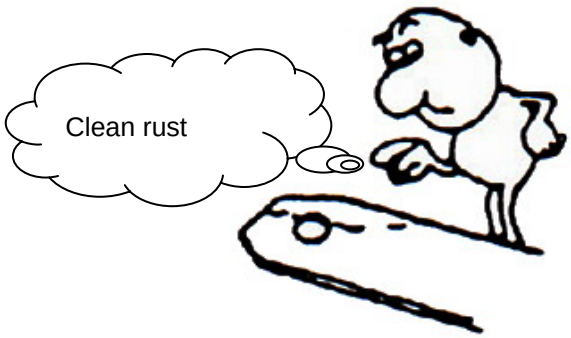
- Wire harnesses routed along the handlebar should not be pulled too tight or have excessive slack, use rubber covering against adjacent or surrounding parts in all steering perimeters.



- Before operating a test instrument, operator should read the operation manual of the instrument. And then, conduct test in accordance with the instruction.



- Use sand paper to clean connector pins/terminals if rust is found. And then continue the connection operation.



Specifications

Manufacturer			SANYANG	Model		MB10A7-A
Dimension	Overall Length		1910 mm	Suspension System	Front	TELESCOPIC
	Overall Width		690 mm		Rear	SWING ARM
	Overall Height		1055 mm	Tire Specifications	Front	2.50-17 38L
	Wheel Base		1225 mm		Rear	2.50-17 38L
Weight	Curb Weight	Front	38 kg	Brake System	Front	Drum (ø 110 mm)
		Rear	57 kg			
		Total	95 kg		Rear	Drum (ø 110 mm)
	Passengers/Weight		1 passenger /75 kg	Performance	Max. Speed	Over 80 km/hr
	Total Weight	Front	53 kg		Climb Ability	Below 20°
		Rear	117 kg	Reduction	Primary Reduction	4.059 (69/17T)
		Total	170 kg		Secondary Reduction	2.571 (36/14T)
Engine	Type		Air cooled 4-stroke gasoline engine		Clutch	Wet multi-plate, auto centrifugal clutch
	Installation and arrangement		Vertical, below center, incline 15°		Transmission	4 speed, circulated
	Fuel Used		Unleaded gasoline	Speedometer		0 ~ 120 km/hr
	Fuel system		Carburetor	Horn		80~110 dB
	Cylinder	Bore	Ø 52.4 mm	Muffler		Expansion & Pulse Type
		Stroke	47 mm	Exhaust Pipe Position and Direction		Right side, and Backward
		Arrangement	Single Cylinder	Lubrication System		Forced and wet sump
	Displacement		101.4 cc	Exhaust Concentration	Solid Particulate	-
	Compression Ratio		9.2 : 1		CO	Below 1.8 %
	Max HP		6.8 ps / 8500 rpm		HC	Below 2000 ppm
	Max Torque		0.69 kg-m / 6000 rpm	E.E.C.		√
	Ignition		C.D.I.	P.C.V.		√
	Starting System		Kick/ Electrical Starter	Catalytic Converter		√

Torque Reference Values

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

Standard Torque Values for Reference

Type	Tighten Torque		Type	Tighten Torque	
	kgf-m	N-m		kgf-m	N-m
5mm bolt、nut	0.45~0.6	4.4~6	4mm screw	0.1~0.15	1.0~1.5
6mm bolt、nut	0.8~1.2	8~12	5mm screw	0.35~0.5	3.4~5
8mm bolt、nut	1.8~2.5	18~25	6mm screw、SH nut	0.7~1.1	7~11
10mm bolt、nut	3.0~4.0	29~39	6mm bolt、nut	1.0~1.4	10~14
12mm bolt、nut	5.0~6.0	49~59	8mm bolt、nut	2.4~3.0	24~29
3mm screw	0.05~0.08	0.5~0.8	10mm bolt、nut	3.5~4.5	34~44

Engine Torque Values

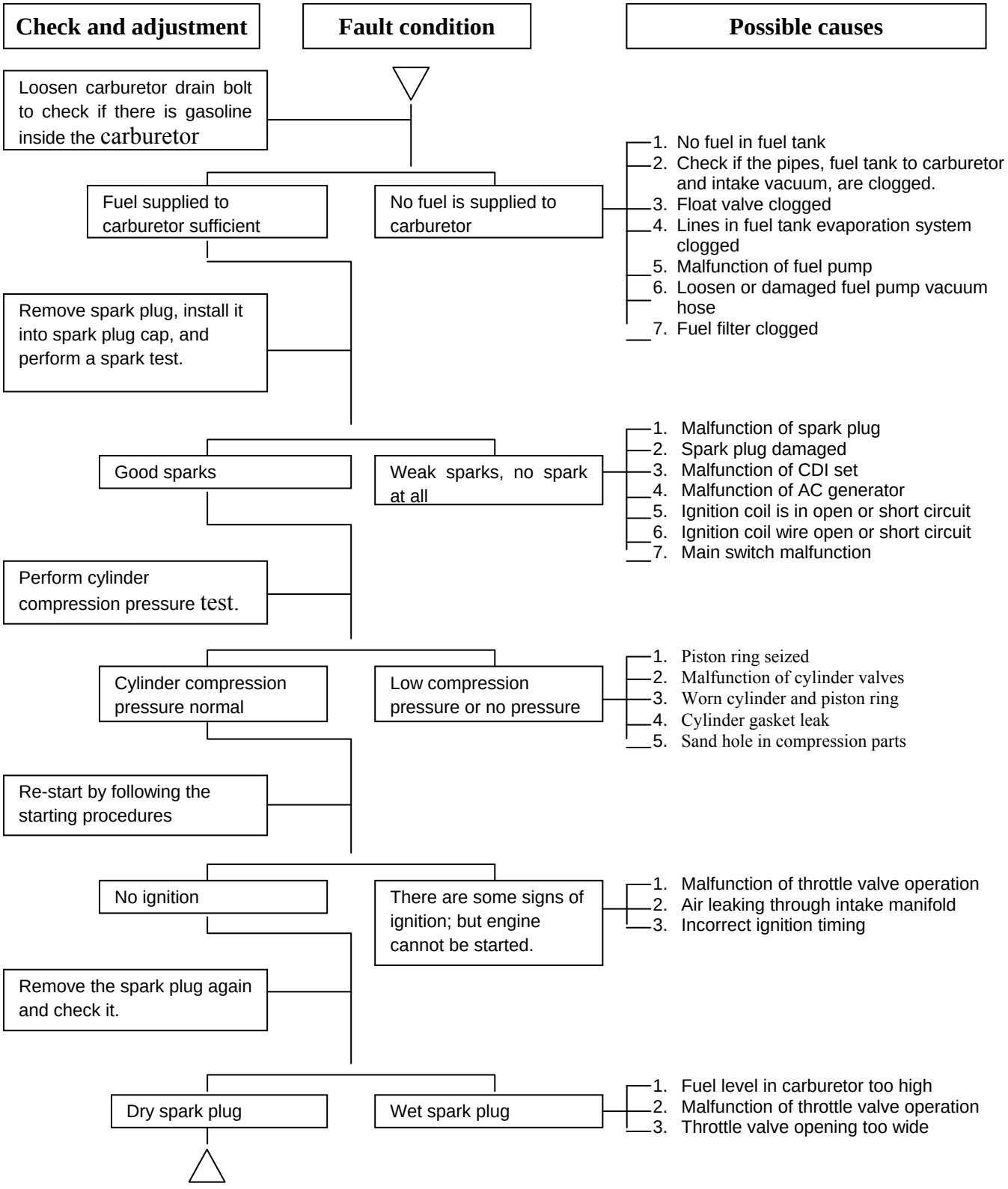
Item	Q'ty	Thread Dia. (mm)	Torque Value		Remarks
			kgf-m	N-m	
Cylinder head nut	4	8	1.0~1.2	10~12	
Cylinder head left bolt	1	6	0.8~1.2	7.8~12	
Cylinder stud bolt	4	8	0.7~1.0	7~10	
Cylinder head side cover bolt	3	6	0.8~1.2	7.8~12	
Tappet adjustment hole cap	2	6	0.8~1.2	7.8~12	
Tappet adjustment screw nut	4	5	0.7~1.1	7~11	Apply oil to thread
Cam gear bolt	2	6	1.0~1.2	10~12	
Spark plug	1	10	1.0~1.2	10~12	
Carburetor insulator bolt	2	6	0.7~1.1	7~11	
Engine oil draining bolt	1	12	1.5~2.0	15~20	
Clutch nut	1	14	3.8~4.5	38~45	
Engine oil strainer cap	2	6	0.8~1.2	7.8~12	
Engine oil pump cover screw	2	6	0.3~0.4	3~4	
Engine oil pump screw	3	6	0.4~0.6	4~6	
Right crankcase cover bolt	10	6	0.8~1.2	7.8~12	
Left crankcase cover bolt	8	6	0.8~1.2	7.8~12	
Left crankcase rear cover bolt	2	6	0.8~1.2	7.8~12	
Driving	2	6	0.8~1.2	7.8~12	
ACG. Flywheel nut	1	12	3.5~4.3	35~43	
Starting clutch bolt	3	6	1.0~1.4	10~14	Apply glue to thread
Crankcase bolt	7	6	0.8~1.2	7.8~12	

Frame Torque Values

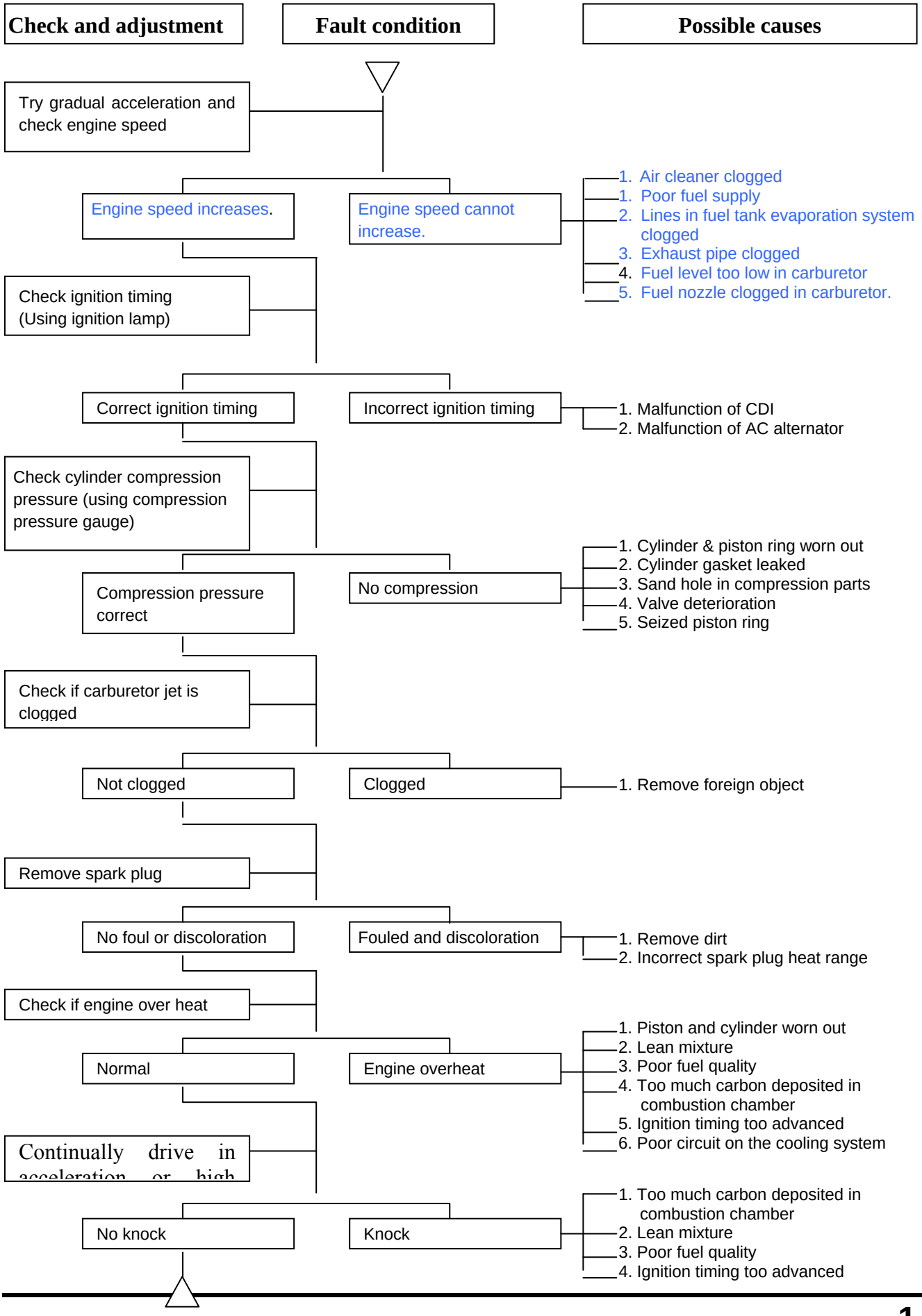
Item	Q'ty	Thread Dia. (mm)	Torque Value		Remarks
			(kgf-m)	(N-m)	
Handlebar luck bolt	4	8	3.0~3.5	29~35	
Handlebar post locknut	1	10	4.0~4.5	39~49	
Steering stem locknut	1	25.4	6.0~8.0	59~78	
Steering top cone race	1	25.4	0.15~0.25	1.5~2.5	
Front wheel axle nut	1	10	4.0~5.0	39~49	
Rear wheel axle nut	1	12	5.0~6.0	49~59	
Final driven sprocket nut	1	16	6.0~7.0	59~69	
Drive sprocket nut	4	8	2.7~3.3	26~32	
Front cushion mounting bolt	2	8	3.0~3.5	29~35	
Rear cushion upper connection bolt	2	10	3.0~4.0	29~39	
Rear cushion lower connection bolt	2	10	3.0~4.0	29~39	
Brake lever nut	2	6	0.8~1.2	7.8~12	
Rear brake drum mounting bolt	1	8	1.5~2.5	15~25	
Engine hanger link nut	2	8	3.0~3.5	44~54	
Foot stand bolt	4	8	2.4~3.0	24~29	
Kick starter bolt	1	6	1.6~1.8	15.7~17.6	
Gear change pedal bolt	1	6	1.4~1.5	13.7~14.7	
Rear fork mounting bolt	1	10	3.0~4.0	29~39	
Muffler mounting nut	2	6	1.0~1.4	10~13.7	

Troubleshooting

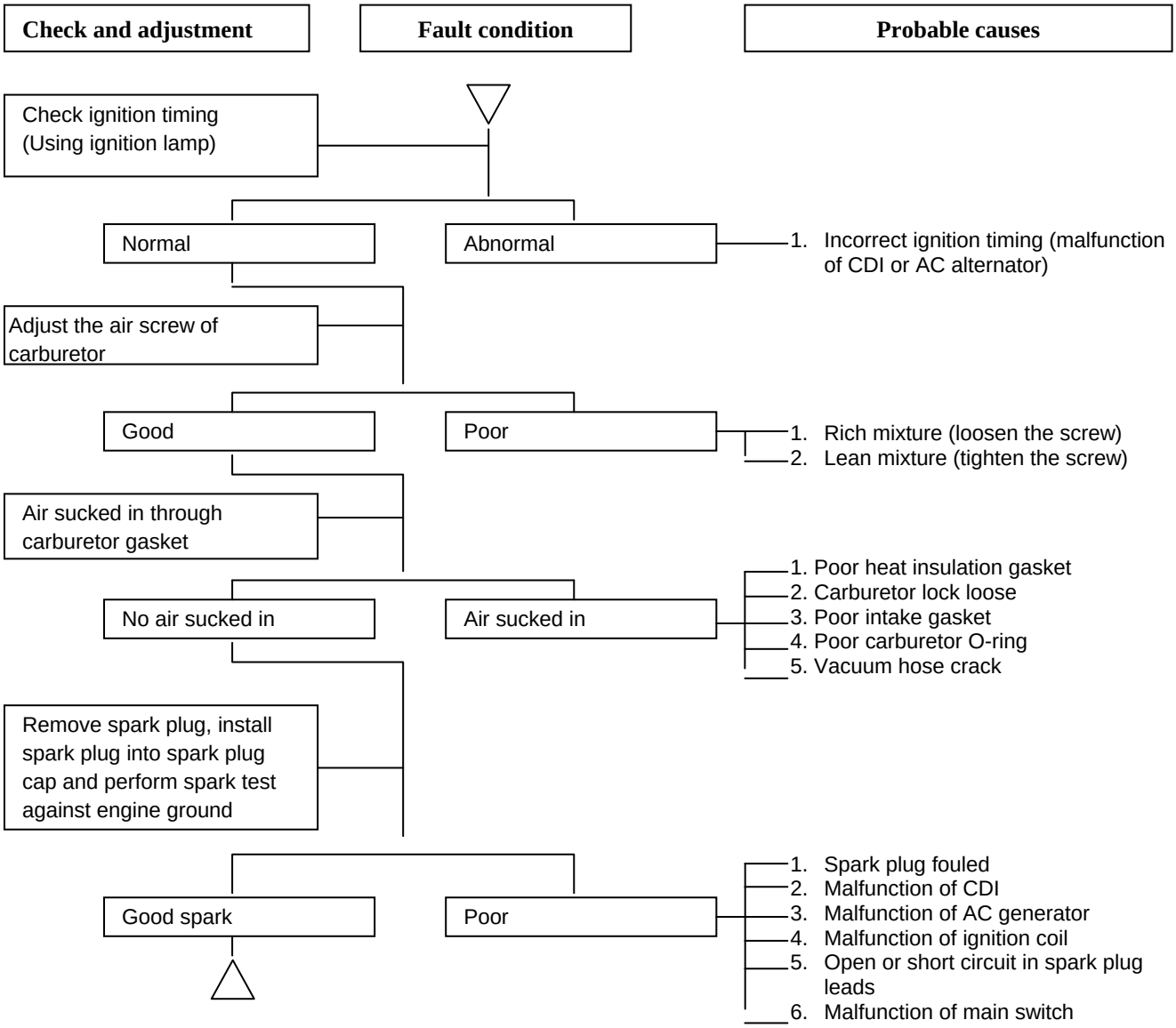
A. Engine hard to start or can not be started



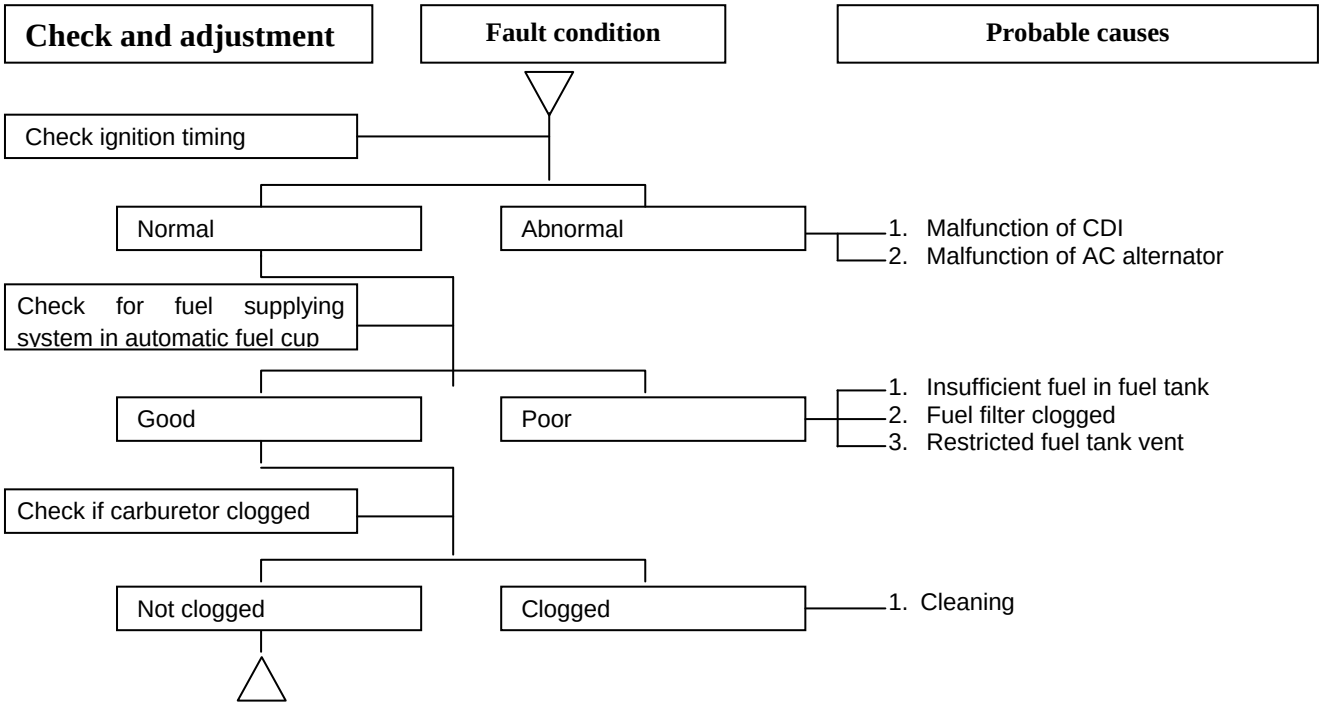
B. Engine run sluggish (Speed does not pick up, lack of power)



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

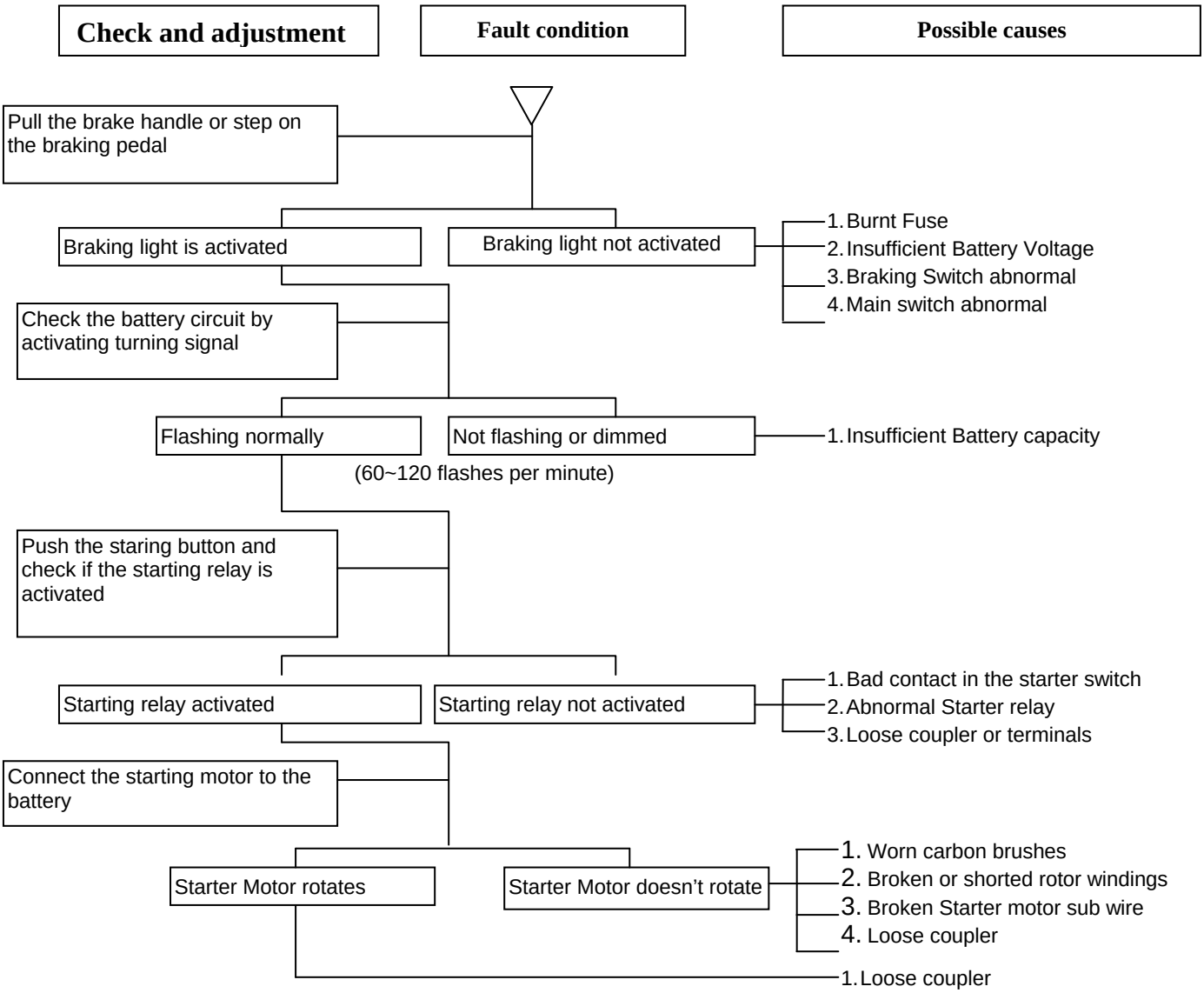


D. Engine runs sluggish (High speed)

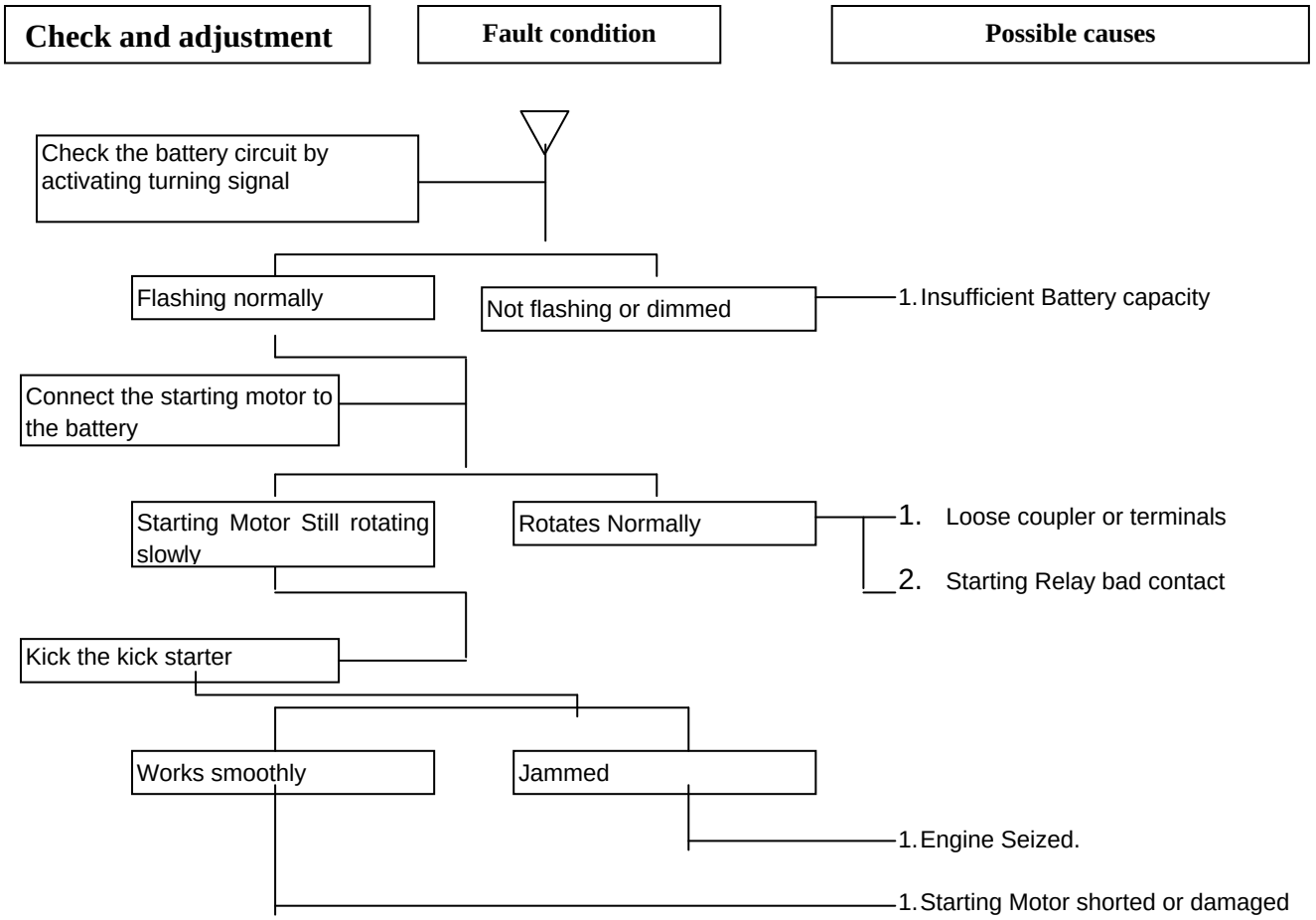


E. Starter Motor Malfunction

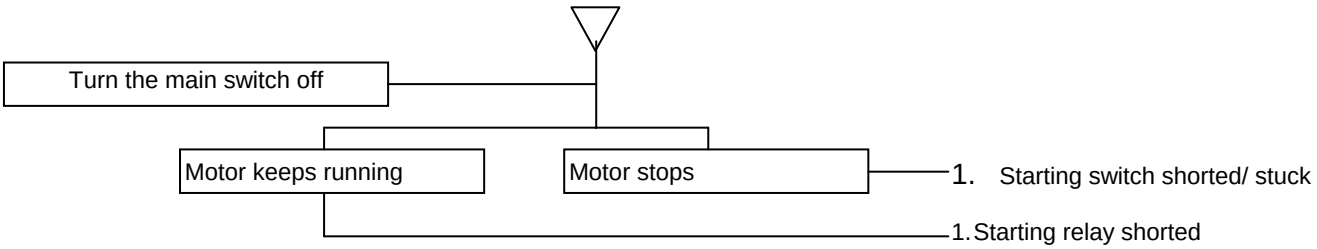
1. Starter Motor doesn't rotate



2. Starting Motor rotates slowly or spins without engagement with crankshaft



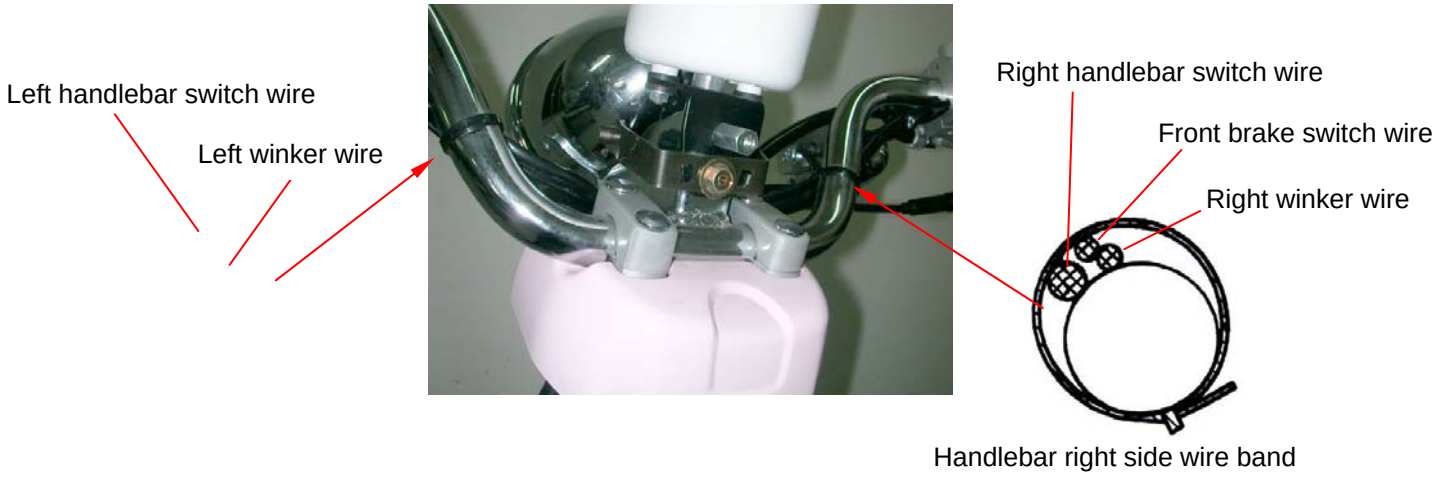
3. Starter motor won't stop rotating

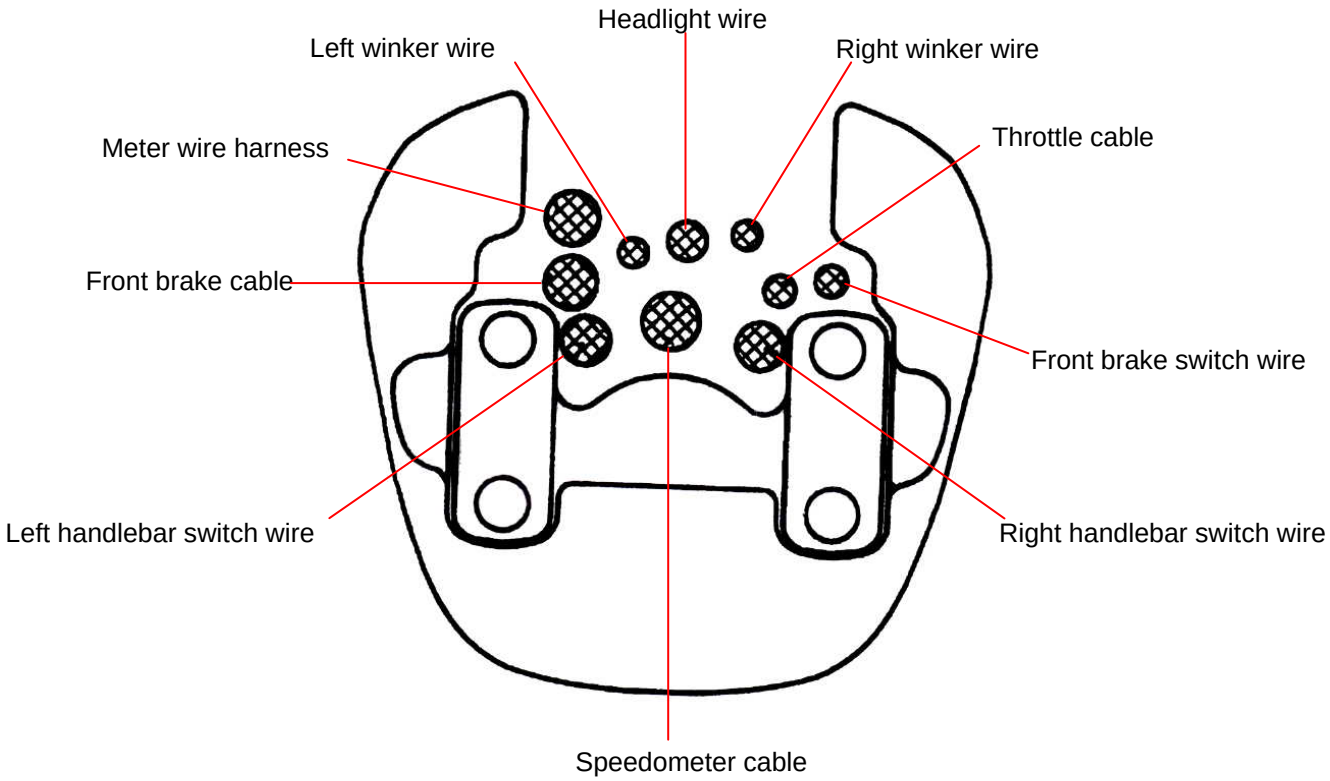


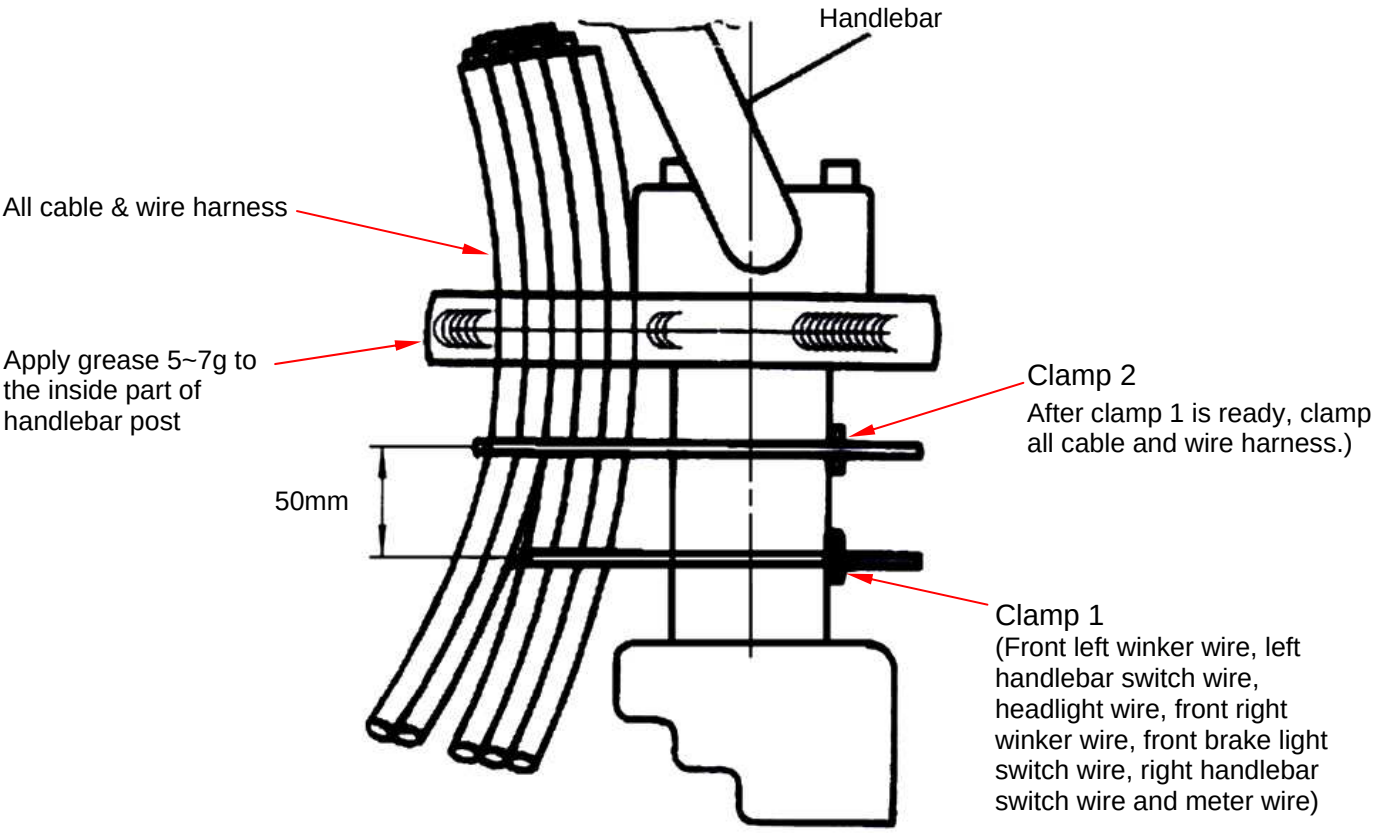
F. Abnormal Engine Noise

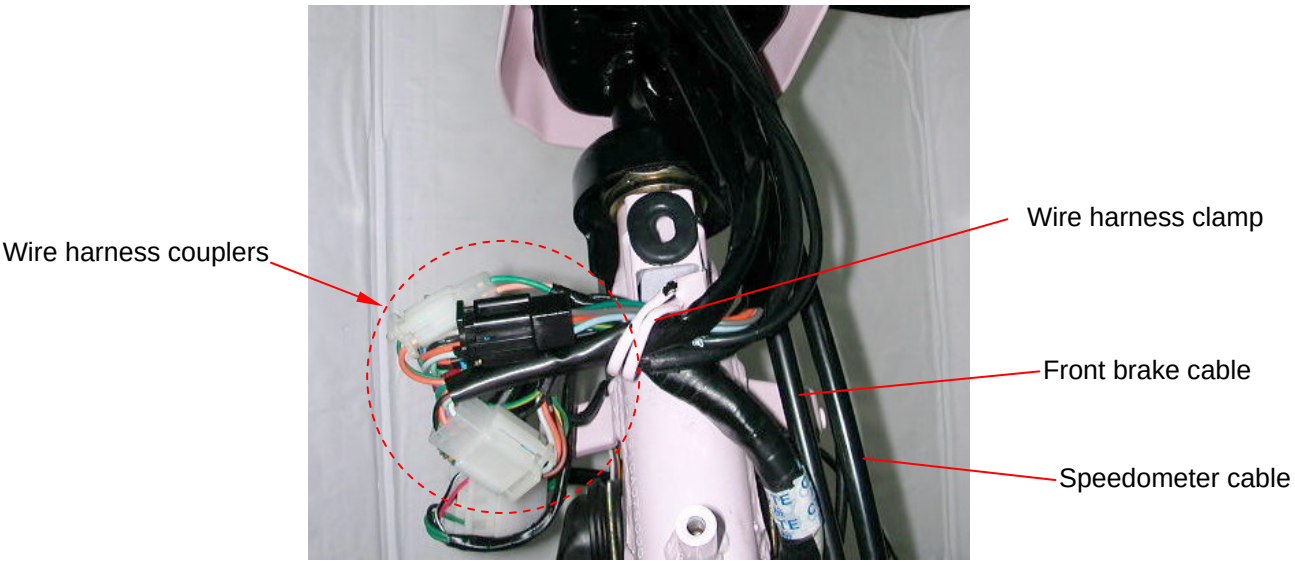
Fault condition	Possible causes
Rocker arm noise	1. Excessive valve clearance 2. Worn rocker arm 3. Worn camshaft
Piston slapping	1. Worn piston and cylinder 2. Carbon deposit in the combustion chamber 3. Worn piston pin or connecting rod lower end
Cam chain noise	1. Worn camshaft bearings. 2. Worn cam sprocket. 3. Loose or worn cam chain.
Clutch knocking	1. Excessive clutch plate clearance
Transmission gear noise	1. Worn or deteriorated rear wheel damping rubber. 2. Gear surface worn 3. Worn transmission gear set

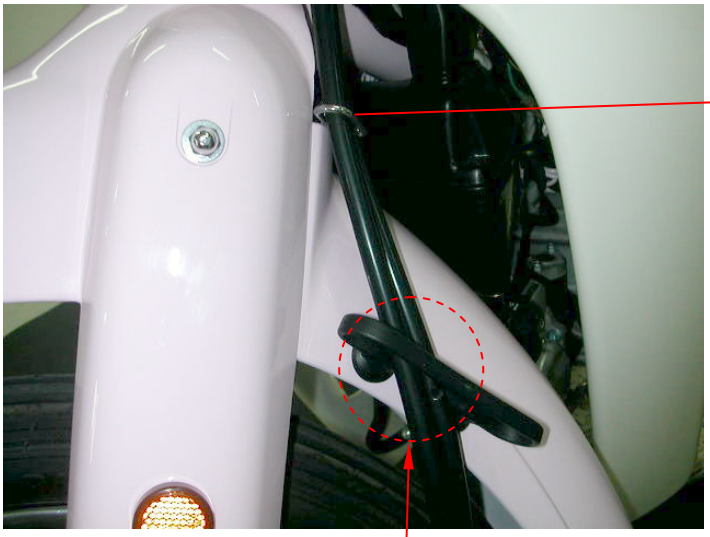
Cable & Wire Routing

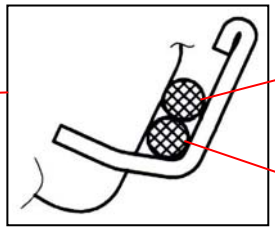





Handlebar
All cable & wire harness
Apply grease 5~7g to the inside part of handlebar post
50mm
Clamp 2
After clamp 1 is ready, clamp all cable and wire harness.)
Clamp 1
(Front left winker wire, left handlebar switch wire, headlight wire, front right winker wire, front brake light switch wire, right handlebar switch wire and meter wire)


Wire harness couplers
Wire harness clamp
Front brake cable
Speedometer cable

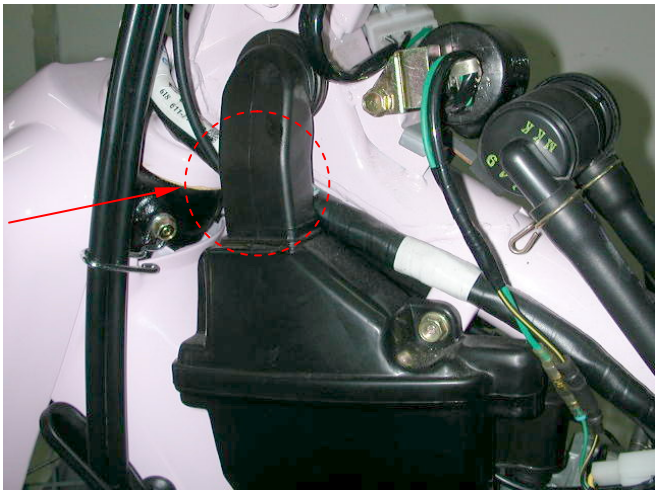


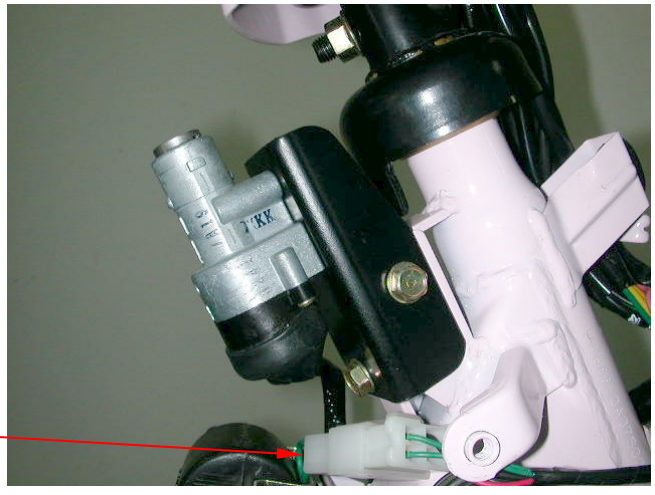


Push the wire clamp when the wires are at right place.

Make sure all cables and wires go through wire grommet

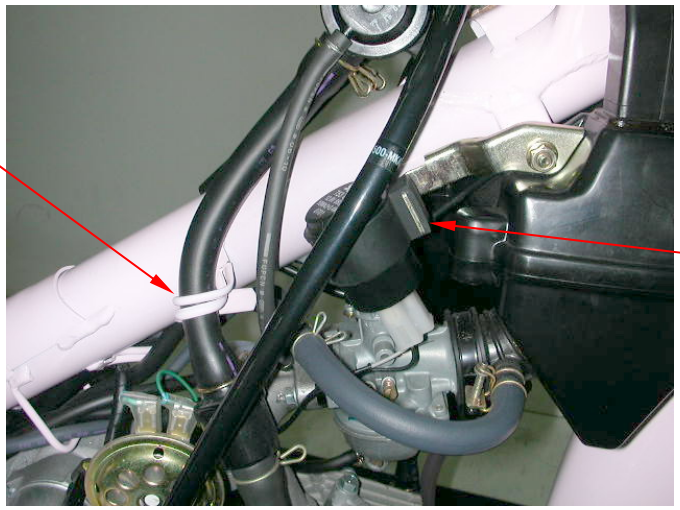
Throttle cable and main wire harness should be placed between the left air cleaner intake duct and the frame.



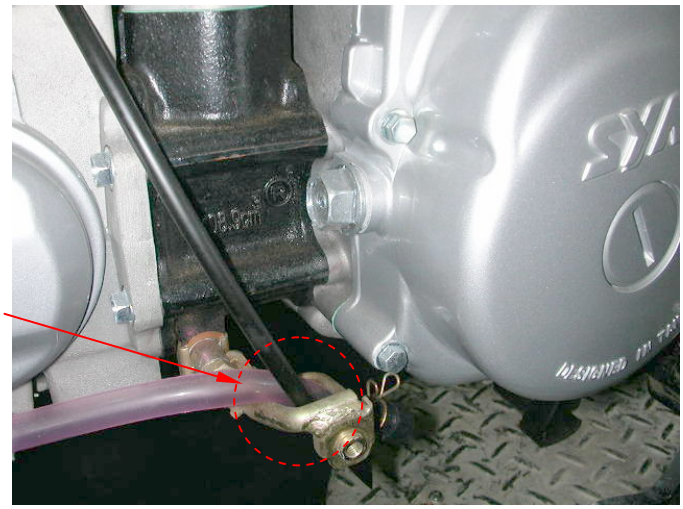


Main switch coupler location

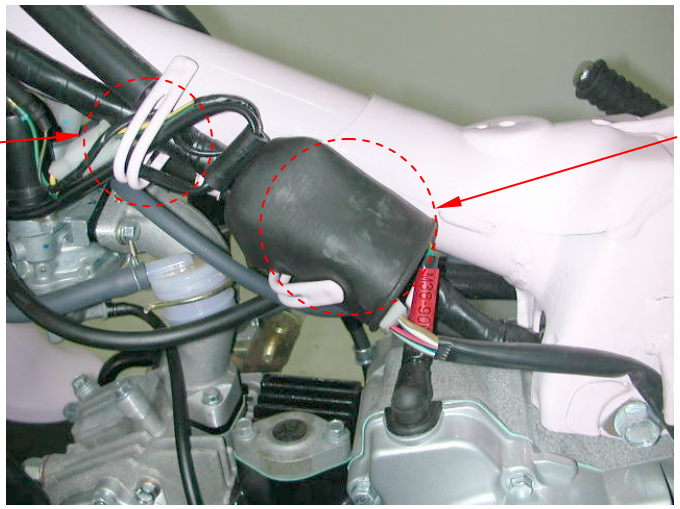
Secondary air pipe and winker relay wire should be clamped.



Located on the relay stay



PCV drain pipe and carburetor drain pipe should go through the hole of body cover stay.

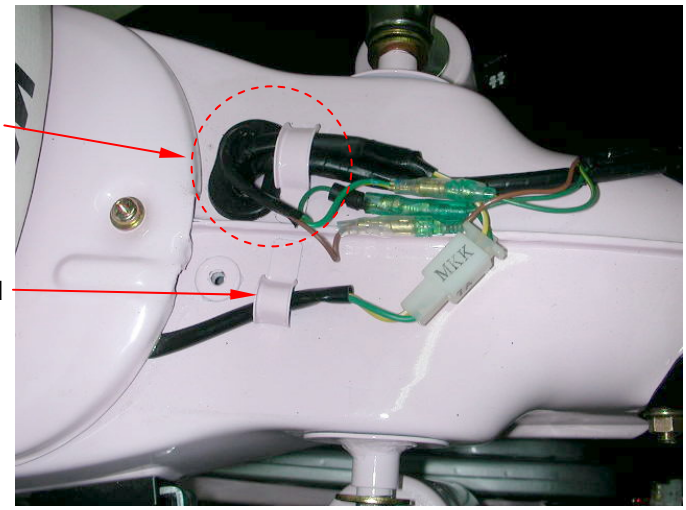


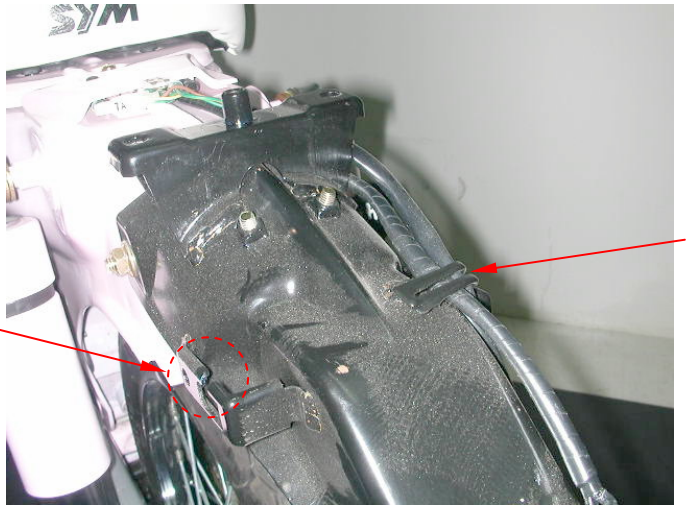
Auto by-starter wire and main wire harness should be clamped properly.

AC Generator wire gear switch couplers should be packed well and clamped.

Taillight wire, rear winker wire should be clamped.

Fuel level gauge wire should be clamped

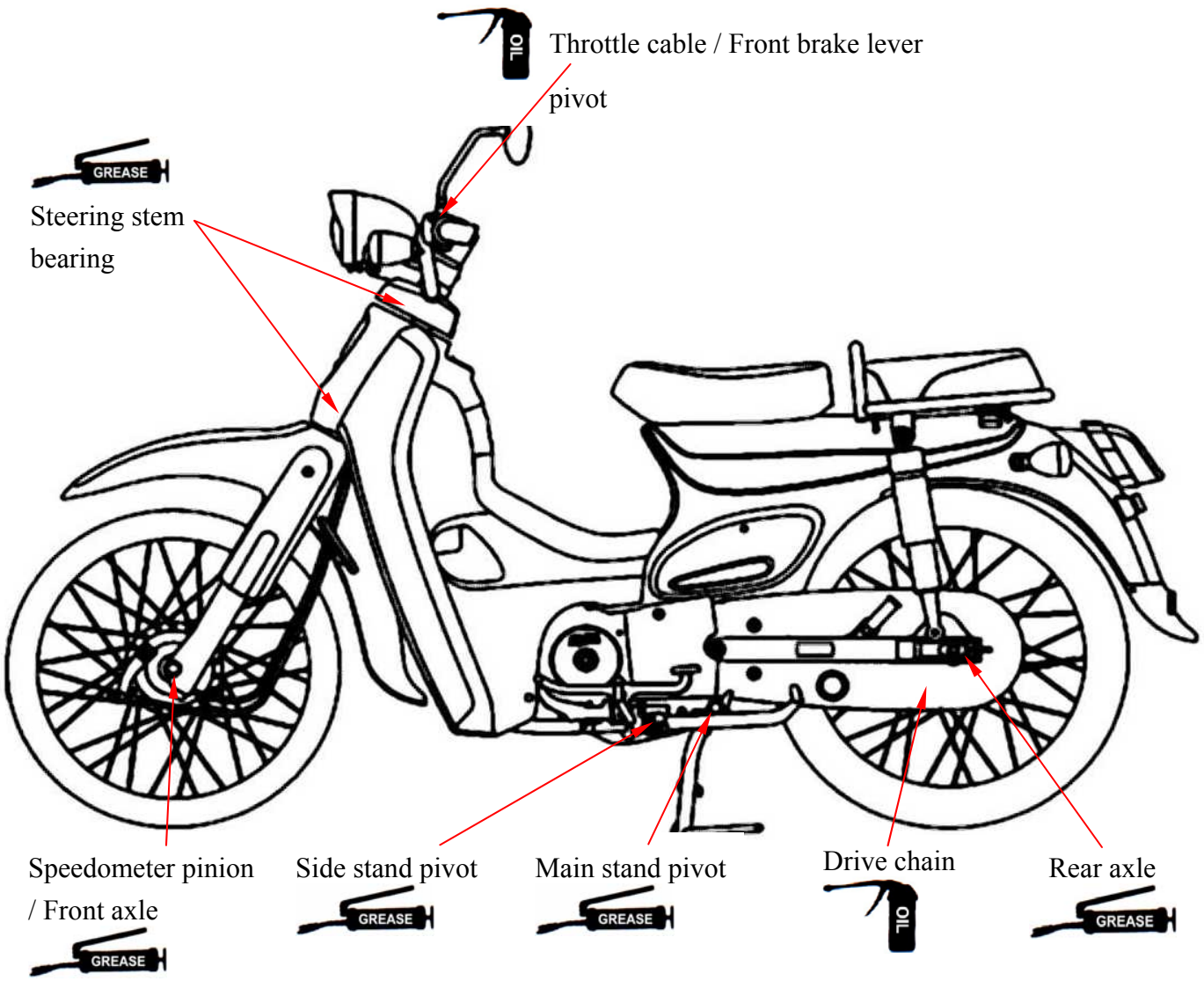




Rear winker wire should go through winker stay hole.

Rear winker wire should be clamped

Lubrication Points



Precautions in Operation

Specification

Fuel Tank Capacity		4100 c.c.
Engine Oil	Capacity	1000 c.c.
	Changed	800 c.c.
Throttle Cable Free Play		2~6 mm
Spark Plug		NGK C6HSA
Spark Plug gap		0.6~0.7 mm
Ignition Timing		BTDC 15°±1° / 1600 rpm
Ignition Advance		BTDC 32°±1° / 3300 rpm
Idle Speed		1600±100 rpm
Compression Pressure		11±1 kgf/cm² (600 rpm)
Valve Clearance	In./Ex.	0.12±0.02 mm
Tire Size	Front/Rear	2.50-17 38L
Tire Pressure(Cold)	Single Ride	Front：1.75 kg/cm² / Rear：2.25 kg/cm²
	Tandem Ride	Front：1.75 kg/cm² / Rear：2.75 kg/cm²
Battery	Type	12N5A (12V 5Ah)
Brake Lever Clearance		10~20 mm

2. Maintenance Information

Periodical Maintenance Schedule

NO	Items	Initial 300KM	1 month or every 1000KM	3 months or every 3000KM	6 months or every 6000KM	1 year or every 12000KM
1	☆Air filter element	I		C	C	R
2	☆AICV filter	I		C	C	R
3	☆Gasoline filter	I			I	R
4	☆Engine oil filter	C			C	C
5	☆Engine oil replacement	R	Exchange every 1000 km			
6	Tire pressure	I	I			
7	Battery Inspection	I	I			
8	Brake lever free play check	I	I			
9	Steering handle integrity check	I	I			
10	Shock absorber performance check	I		I		
11	Bolts tightening check	I	I			
12	Check the engine for oil leakage	I	I			
13	☆Spark plug inspection or replacement	I		I	R	
14	☆Change gear oil	R	Exchange every 5000 km			
15	Lubrication of the whole bike				L	
16	Exhaust pipe	I	I			
17	☆Ignition timing	I	I			
18	☆Idle emission check	A	I	A		
19	☆Throttle operation	I		I		
20	☆Engine bolts torque	I		I		
21	☆Transmission / Chain	I	I/L			R
22	☆Clutch free play inspection	I	I			
23	Light/ electrical system/ instrument readings.	I	I			
24	Main stand/ side stand springs.	I			I	
25	Fuel lines	I		I		
27	Cam chain	I		I		
28	☆Valve clearance	I		A		
29	☆PCV system integrity	I		C		
30	☆Crankcase blow-by over-flow pipe	I	Drain every 2000km			
31	☆Second air injection system (filter)	I		I	C	
32	☆E.E.C. Device check			I		

Note：I-Inspection A-Adjustment R-Replacement C-Clean L-Lubrication

Please have your periodical maintenance data recorded by your SYM Authorized Dealer to maintain the motorcycle in excellent condition. The above maintenance schedule is established by taking the monthly 1,000 kilometers as a reference. Whichever-time or mileage- comes first will be regarded as an index for maintenance.

Remark： **These marks "☆" in the schedule are emission control items. According to EPA regulations, these item checks must be performed periodically following the use r manual instructions. It's prohibited to adjust or repair these emission control items by unauthorized people. Otherwise, SYM is no responsible.**

1. Clean or replace the air cleaner element more often when the motorcycle is operated on dusty roads or in the Heavily- polluted environment.
2. Maintenance should be performed more often if the motorcycle is frequently operated in high speed and after the motorcycle has accumulated a higher mileage.
3. Preventive maintenance：
   a. Ignition system－Perform maintenance or 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 decreasing.
   c. Replace worn out pistons, cylinder head.

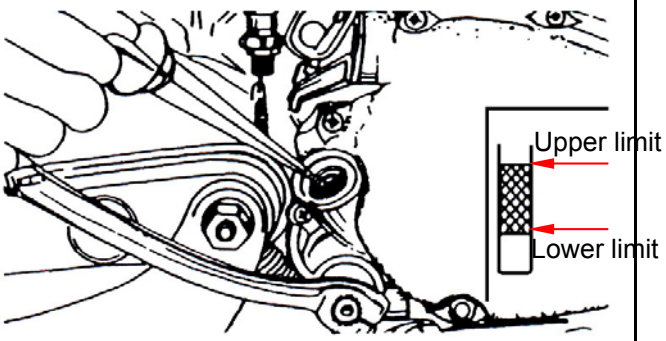
Lubrication System

Engine Oil Capacity

⚠ Caution

- Turn off engine, and park the motorcycle on flat surface with main stand.
- Check oil level with oil dipstick. (Do not screw the dipstick into engine when checking.)

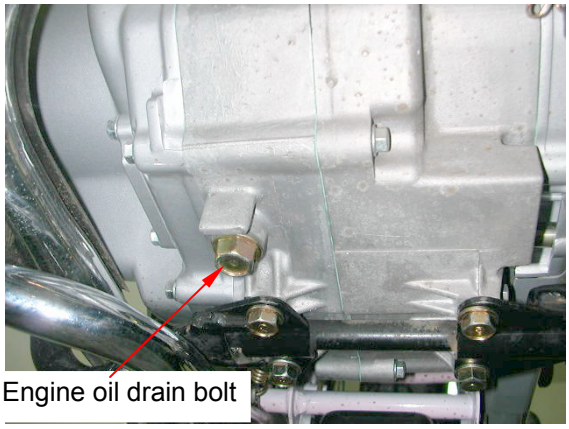
If oil level is near lower limit, fill in the recommended engine oil to upper limit.



Engine Oil Replacement

Engine off and replace the oil dipstick.

Remove the oil drain bolt under the crankcase to drain the engine oil.
After completely drain the engine oil, clean the drain bolt and the washer. If the washer is deformed or cracked, replace with a new one.
Torque value：**3.5~4.5kgf-m**



⚠ Caution

- Warm up the engine before drain oil, that will make engine oil easily drained thoroughly

Fill in the engine oil to the standard capacity.

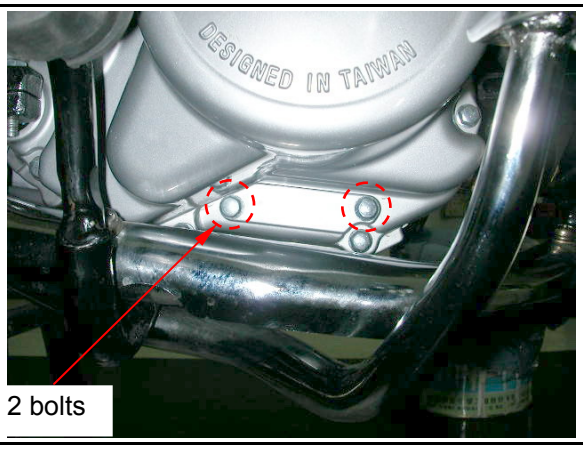
Oil viscosity SAE 10W-30 Recommended using Bramax series engine oil.

Engine Oil Capacity

Full disassembly：1000 c.c.

Regular replacement：800 c.c.

Install the dipstick, run the engine for several minutes. Turn off the engine, and check oil level again. Check if engine oil leaks.



Engine Oil Strainer Cleaning

Drain engine oil completely.
Remove oil strainer.
Using high pressure air to clean oil strainer is suggested.
Check if oil strainer is deformed or damaged. Replace it if necessary.
Reinstall oil strainer and oil strainer cap.
Torque value：0**.8~1.2kgf-m**

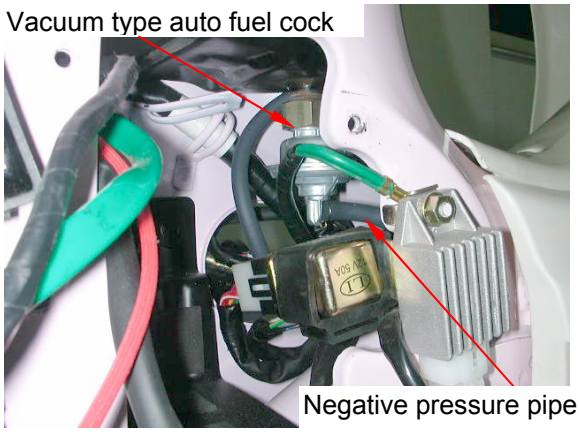
Fuel System

Fuel lines

Check all fuel lines, and replace when they are deteriorated, damaged or leaking.

⚠ Caution

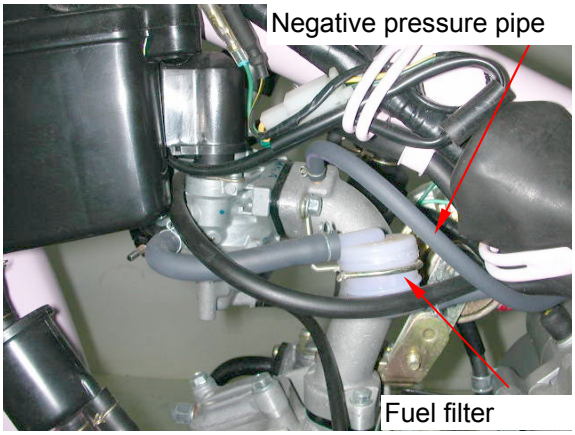
- Gasoline is a highly flammable substance, so any source of fire or spark is strictly prohibited during operation.



Fuel filter replacement

⚠ Warning

- Any source of fire or spark is strictly prohibited during operation.
- Fuel filter is sealed so cannot be cleaned. Replace it if it's clogged.



If fuel filter is clogged, please drain all the gasoline into a clean container, and wash the fuel tank.

After replacing the fuel filter and washing the fuel tank, refill the tank with clean gasoline. Check the fuel line for leakage.

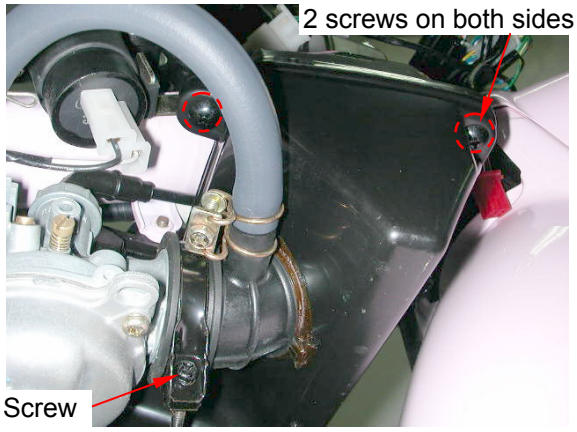
Air Filter

Air filter element

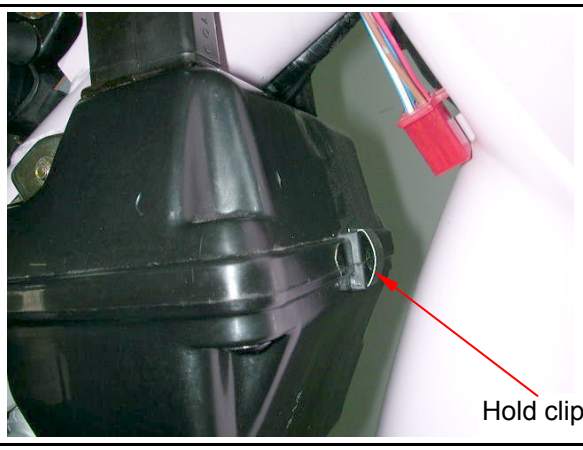
Remove the side cover.

Remove the air filter duct (1 screw).

Remove the air filter cover screw (4 screws).

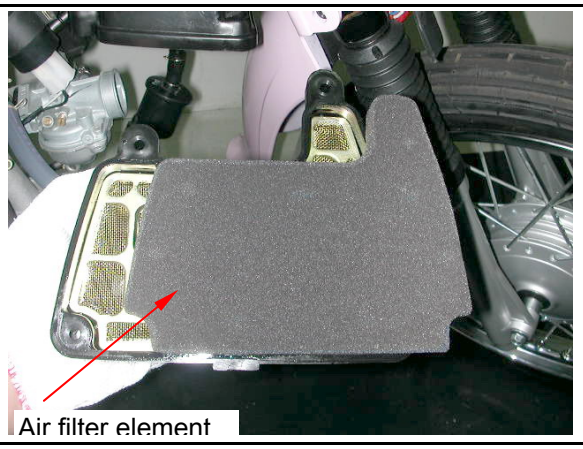


Open the hold clip and remove the air filter cover.



Remove the air filter element.

Check the filter element for dirty or damage.

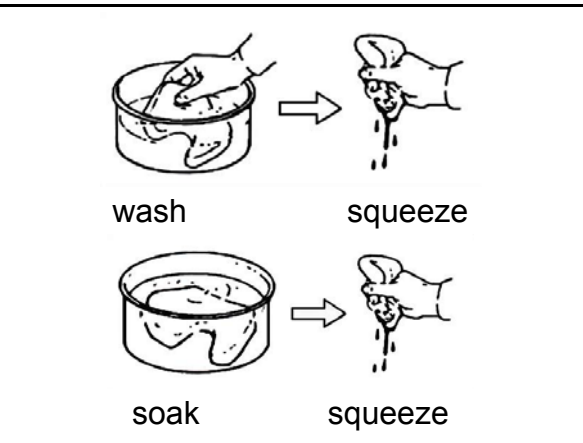


Wash the air filter element with high flash point solvent (for example, kerosene or diesel)

Squeeze out the cleaning solvent thoroughly, soak the element into engine oil, and squeeze out the excessive.

Re-install the filter and the cover.

If the air filter element is too dirty or damaged, replace it with new parts.



⚠ Caution

- Never use gasoline or other low-flash point solvent for cleaning the element.

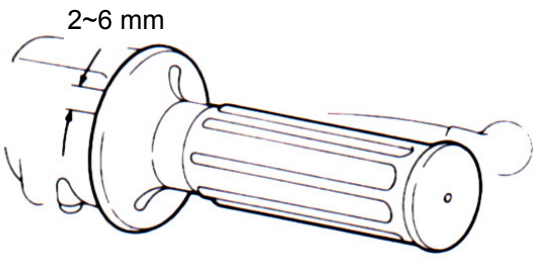
Throttle Operation

Operate the throttle grip to see if the throttle cable is going smoothly. If the throttle cable is deteriorated, twisted or damaged, replace it with new part.

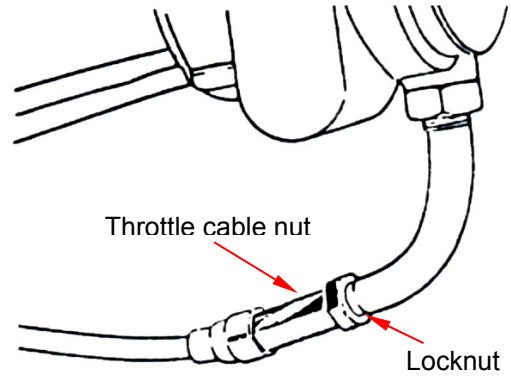
If the throttle cable doesn't operate smoothly, apply some lubrication oil onto it.

Measure the free play of the throttle grip, through the inner side flange of it.

Free play：2~6 mm



Please loosen the lock nut and adjust the throttle cable nut to reach the normal free play.

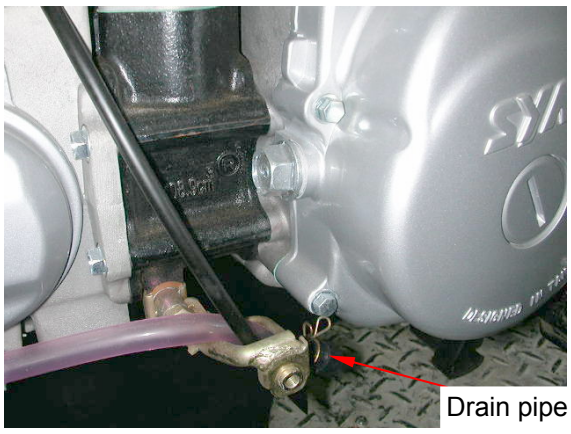


PCV System

Unplug the drain pipe, and leak the deposit off. Drain the pipe every 2,000 km.

⚠ Caution

- Under rainy or full- throttle situation, the maintenance period should be shortened. You can check the deposit amount through the transparent pipe.



Valve Clearance Adjustment

⚠ Caution

- The valve clearance should be adjusted when the engine is cold. (Under 35 degrees Celsius)

Remove the valve clearance-adjusting cap (2 bolts).Remove the cylinder head side cover (2 bolts).

Remove the timing inspection cap and the AC.G cap on the crankcase L cover.

Use a T socket wrench to rotate the crankshaft counterclockwise. Align the “T” mark on the AC.G flywheel with the crankcase sign, and simultaneously, the cam- chain sprocket TDC mark aligning with the cylinder head mark (That means the piston is in the upper end of compression stroke)

Valve clearance inspection and adjustment

Check the intake and exhaust valve clearance by inserting the feeler gauge between the adjusting screw and the lock nut.

Valve clearance：IN / EX 0.12±0.02 mm

Adjust by loosening the lock nut first, and turning the adjusting screw until you feel slight drag on the feeler gauge.

Hold the adjusting screw and tighten the lock nut.

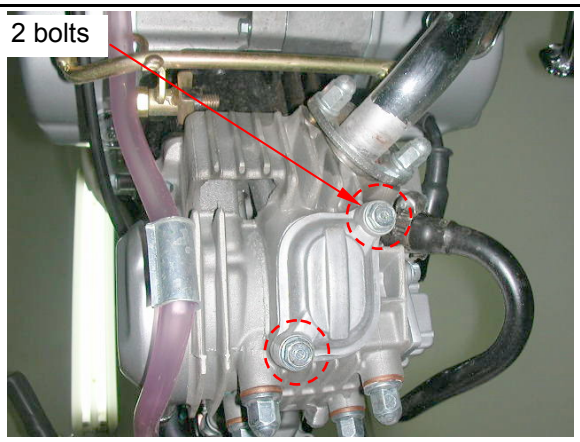
⚠ Caution

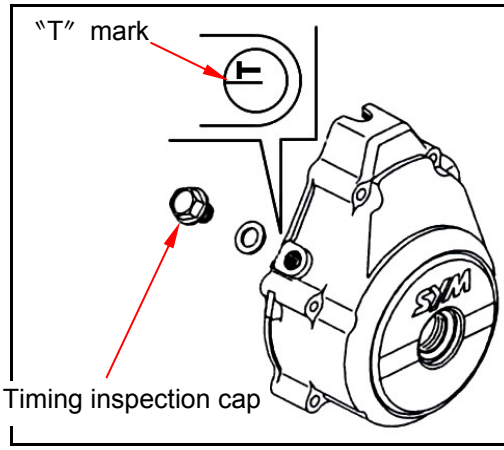
- Check the valve clearance after the adjustment.

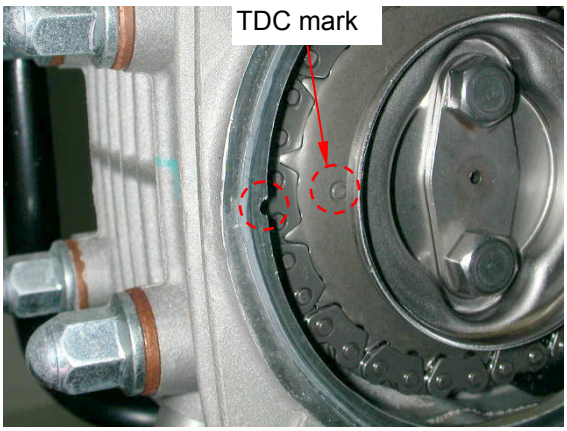
Install the valve clearance-adjusting cap, cylinder head side cover, and the timing inspection cap and the AC.G cap on the crankcase L cover.

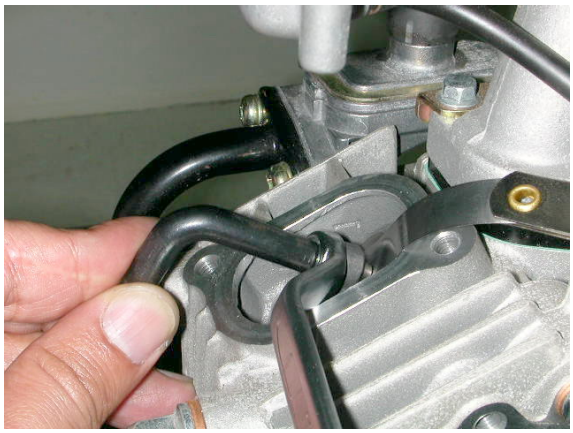
⚠ Caution

- Before installing the O-ring, check if the O-ring is damaged, and apply some oil on it to prevent damage during assembly.







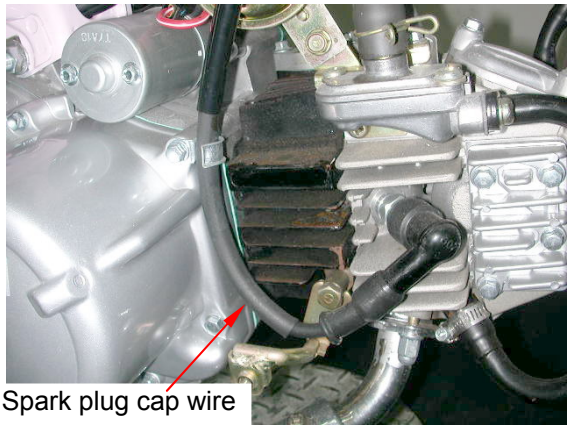


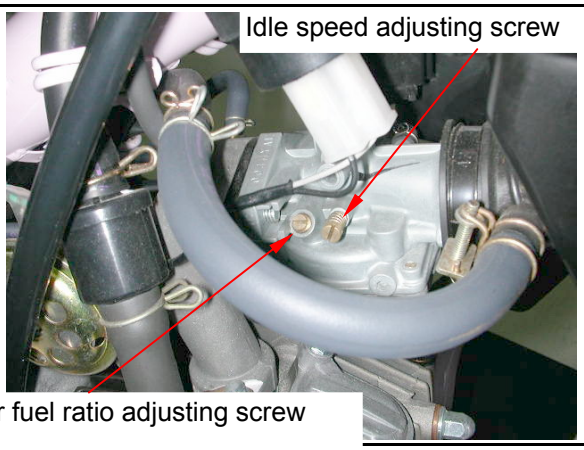
Idle Speed Adjustment

⚠ Caution

- All the other configurations should be completed before idle speed adjustment.
- The engine must be fully warmed before the idle speed adjustment.

Use the main stand of the bike, and warm up the engine. Clip on the RPM sensor (Clip the RPM sensor clamp on the spark plug cap wire)
Turn the idle speed adjusting screw to reach the recommended idle speed.
Recommended idle speed：1600±100rpm





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. Turn the idle speed adjusting screw and let the engine run at the recommended idle speed.
3. Insert the exhaust sampling pipe of exhaust analyzer into the front section of exhaust pipe. Turn the air fuel ratio adjusting screw to make the emission value in idle speed within standard.
4. Slightly accelerate the throttle valve and release it immediately. Repeat this for 2~3 times.
5. Read the engine RPM and emission value on the exhaust analyzer. Repeat step 2 to step 4 procedures until measured value within standard.

Emission standard：CO：3. 0 % ↓
HC：2000 P.P.M. ↓

Ignition System

Ignition timing

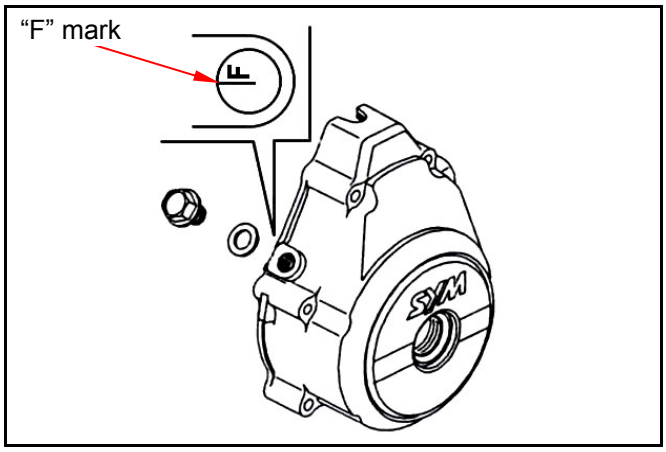
Caution

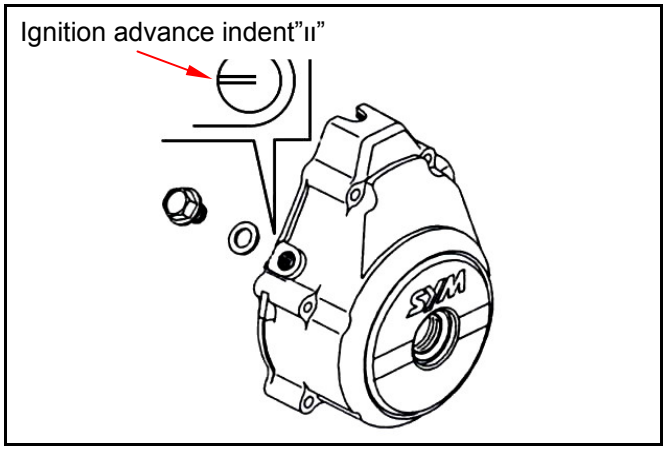
- C.D.I ignition system is set by manufacturer so it cannot be adjusted.
- Ignition timing check procedure is for checking whether CDI function is normal or not.

Remove the ignition timing inspection hole cap on the crankcase left cover.
Connect tachometer and ignition lamp and start the engine. Keep the engine run in the idle speed, if the “F” mark meets with the ignition lamp.

Increase engine RPM to check ignition advance degree. If the illustrated indent is within the ignition advance degrees, it means that the ignition advance degree is in normal. If ignition timing is incorrect, check CDI set, pulse rotor and pulse generator. Replace defective parts if malfunction is found.

Idle Speed：1600±100rpm
Ignition Advance：3300±100rpm





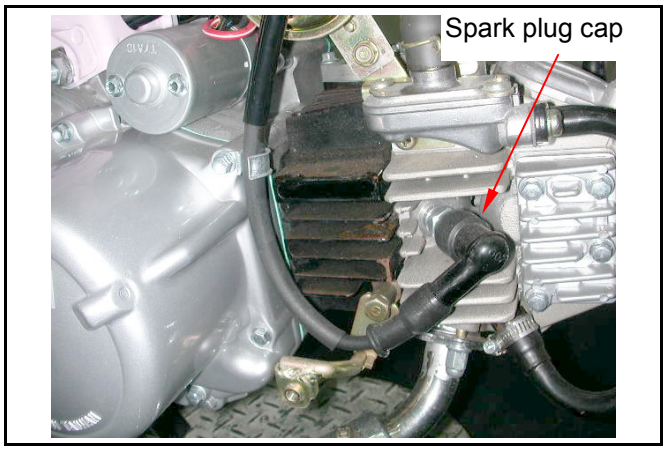
Spark Plug

Recommended spark plug：**C6HSA**

Remove the spark plug cap.

Clean dirt around the spark-plug hole.

Remove the spark plug.



Measure the spark plug ignition gap.

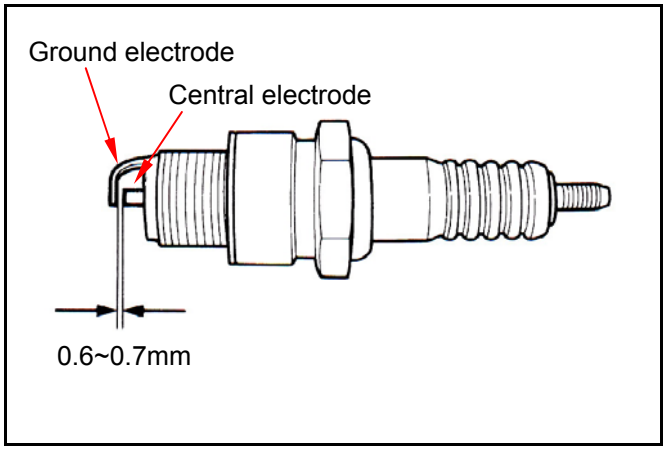
Spark plug gap：0.6~0.7 mm

Carefully bend ground electrode of the plug to adjust the gap if necessary.

Hold spark plug and install the spark plug by screwing it with hand, after tightening the plug by hands, use plug socket to tighten it to the standard torque value

Torque value：1.0~1.2kgf-m

Reinstall the spark plug cap.



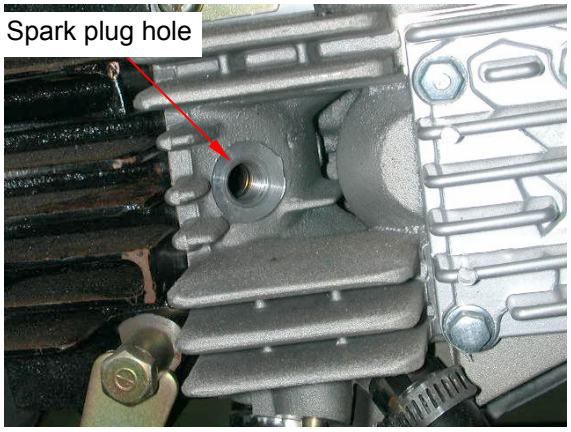
Cylinder Compression Pressure

Warm up the engine and turn it off.

Remove the side cover.

Remove the spark plug cap and the spark plug.

Install compression gauge into the spark plug hole, full open the throttle, and kick the kick starter for several times.



⚠ Caution

Rotate the engine until the reading in the gauge gains no more.

- Usually the highest-pressure reading will appear in 4~7 seconds.

Compression pressure : 11 ±1 Kg/cm²

Check the following items if the pressure reading is too low:

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

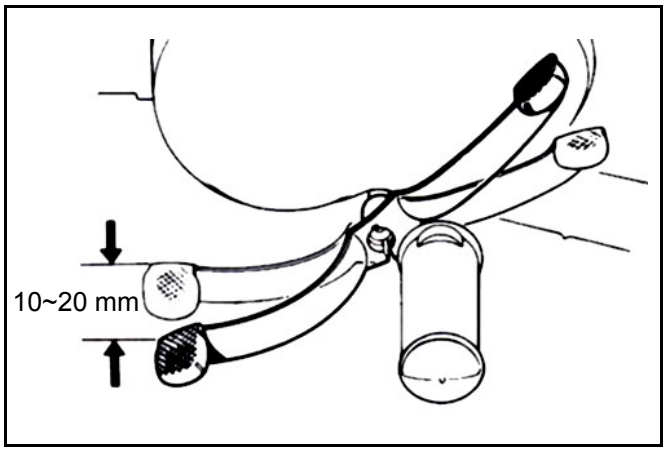
If the pressure is too high, it means carbon deposits in combustion chamber or piston head.

Clutch Adjustment

Gear change pedal free play inspection

Slightly step on the gear change pedal to check the free play before clutch disengagement.

Free play：10~20 mm



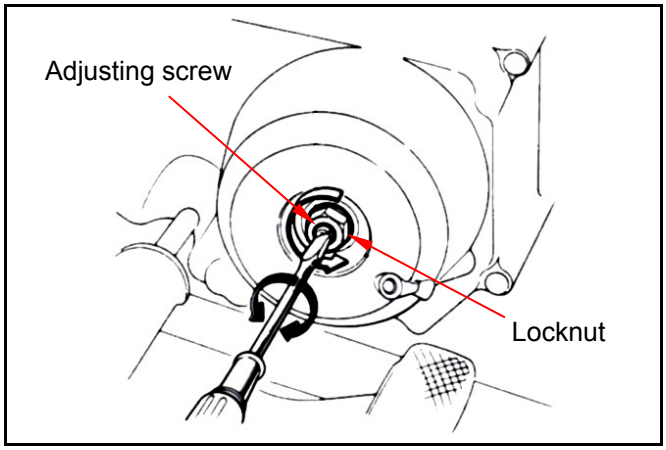
Gear change pedal free play adjustment

Before adjusting the gear change pedal, loosen the locknut first.

Then turn the adjusting screw to achieve the recommended gear change pedal free play.

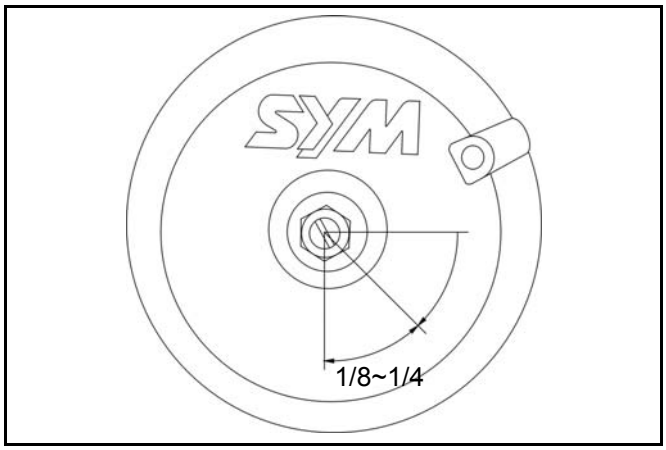
Turn the adjusting screw counterclockwise to decrease the free play of the gear change pedal. Turn the adjusting screw clockwise to increase the free play.

After adjustment, fix the adjusting screw and tighten the locknut.



⚠ Caution

- Turn the adjusting screw counterclockwise to the tightest position, and then turn the adjusting screw clockwise 1/8 circle to 1/4 circle.
- Increase or decrease the free play according to circumstances.



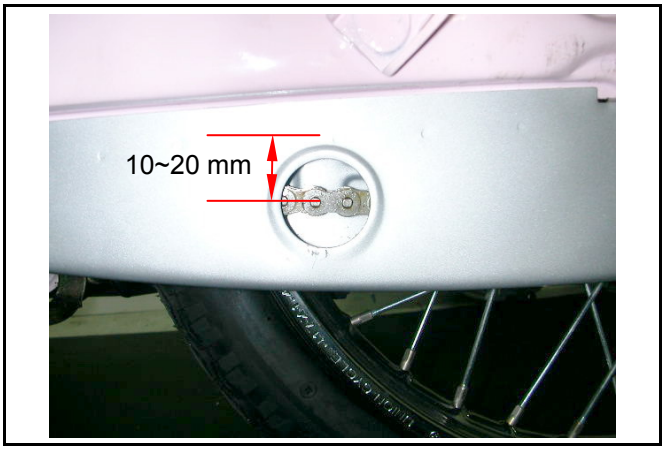
Drive Chain Adjustment

Drive chain inspection

Place the bike on its main-stand with its neutral gear.

Check the drive chain slack by moving the chain up and down by fingers, and measure the amount of chain slack.

Standard chain slack：10~20 mm



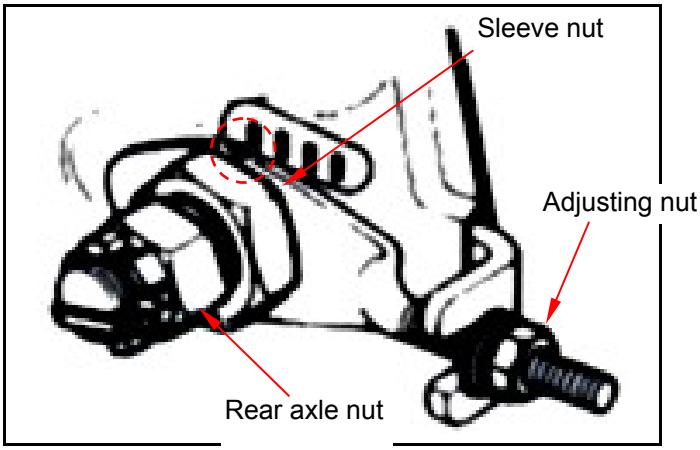
⚠ Caution

- Because the front and rear sprocket has different wearing situation, so please rotate the rear wheel to find the minimum chain slack for the measurement.

Drive chain adjustment

If you need to adjust the chain slack, please loosen the rear axle nut and sleeve nut first.

Turn the left side and the right side adjusting nut evenly to make the chain slack within the standard range.



⚠ Caution

- Turn the adjusting nuts of both sides evenly to make the drive chain and sprockets rotate smoothly.

Turn the nuts clockwise to tighten the chain, or counterclockwise to loosen the chain

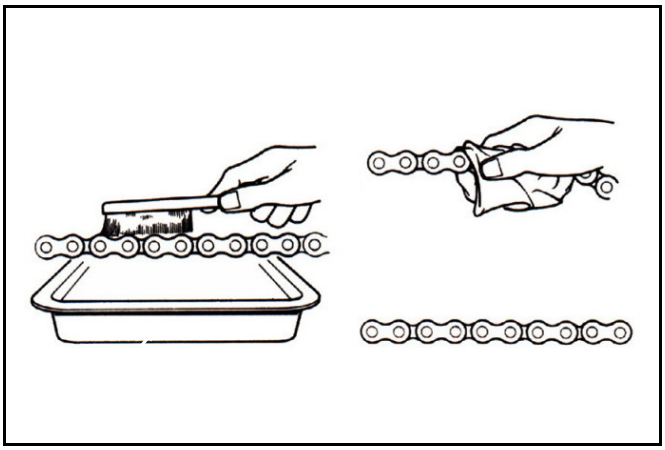
Tighten the sleeve nuts, then the rear axle nut.

Torque value：4.0~5.0kgf-m

After tightening the rear axle nut, please check the sleeve nuts to prevent them from loosening.

Check the chain slack again, and make sure the rear wheel rotates smoothly.

If the chain is too dirty, use high-flash point solvents (Kerosene or Diesel) to clean the chain.



⚠ Caution

- Do not use gasoline when cleaning a the chain. The gasoline will damage the O-ring in the chain.

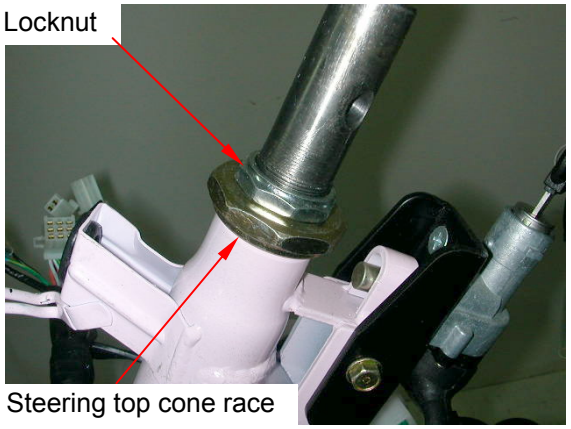
After cleaning, lubricate the chain with chain lubricant.

Steering Mechanism

Caution

- Check all wires and cables if they are interfered with the rotation of the steering handle bar.

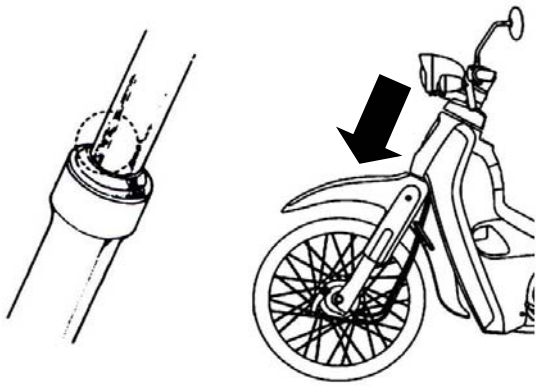
Lift the front wheel off the ground.
Turn the handle bar from right to left end and check if turning is smooth.
If handle bar is uneven or bending, or the handle bar can be lifted through vertical direction, adjust the steering top cone race.



Suspension System

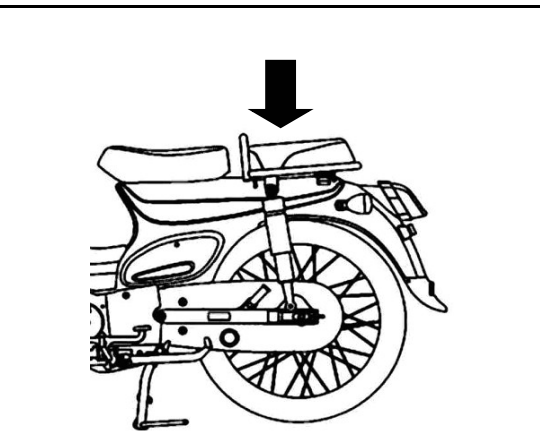
Caution

- Do not ride the motorcycle with poor suspension system.
- Loose, worn or damaged suspension system will result in poor stability and maneuverability.



Front cushion

Press down the front cushion for several times to check its integrity.
Check if any oil leaks or damage found.
Replace relative parts if damage found.
Tighten all nuts and bolts.



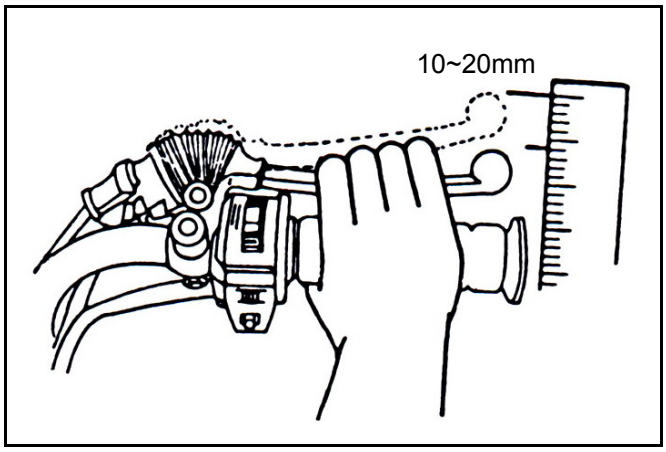
Rear cushion

Press down the rear cushion for several times to check its integrity.
Check if any oil leaks or damage found.
Replace rear cushion if any damage found.
Park the motorcycle with main stand.
Move the rear wheel sideways forcefully to see if the swing arm bushing and pivot nut are loosened.
Tighten all nuts and bolts.

Brake System

Front drum brake lever free play inspection

Pull the front brake lever slightly, and measure the free play before brake engagement.

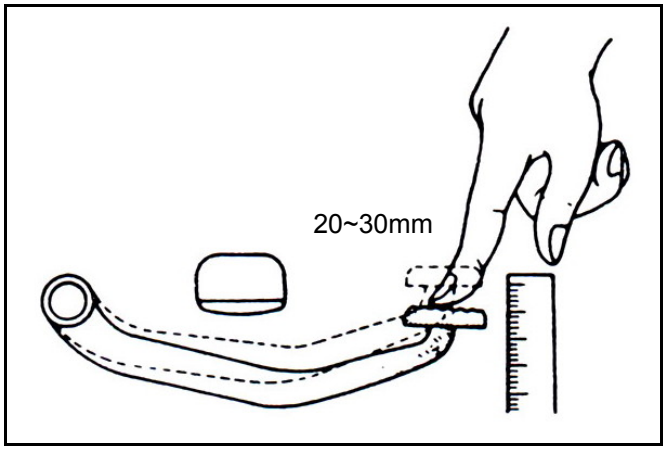


Free play：10~20 mm

Turn the brake adjusting nut to adjust the free play. Turn the brake adjusting nut clockwise to decrease the free play. Turn the nut counterclockwise to increase the free play.

Rear disk brake pedal free play inspection

Press down the brake pedal slightly, and measure the free play before brake engagement.

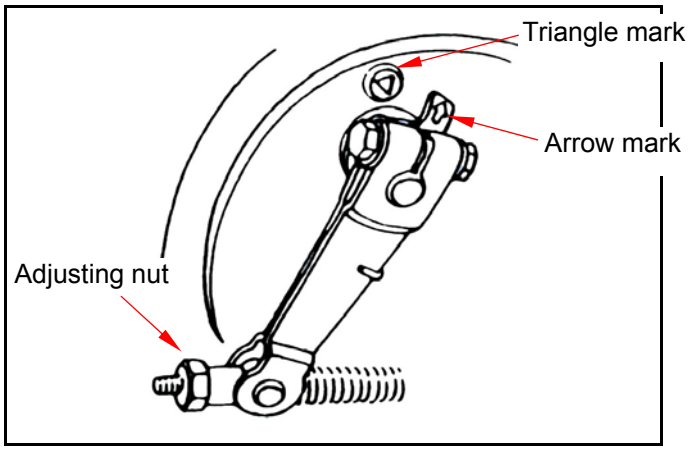


Free play：20~30 mm

Turn the brake adjusting nut to adjust the free play. Turn the brake adjusting nut clockwise to decrease the free play. Turn the nut counterclockwise to increase the free play.

Brake lining inspection

When pressing the brake pedal down, if the arrow mark on the braking arm reaches the triangle mark on the brake panel, it means that the brake lining needs to be changed. Please refer to Chapter 11 and 12 for brake lining exchange process.



Brake system integrity confirmation

⚠ Caution

- After changing the brake lining or the brake cable, you must check the brake system to see if it works well or not.

Tire

Check the tire pressure to see if it's in the specified pressure range.

⚠ Caution

- Check the tire pressure when the tire is cold.

Specified tire pressure range

Tire pressure		Front	Rear
Tire pressure when cold (Kg/cm²)	Single ride	1.75	2.25
	With passenger	1.75	2.75

Specified tire：

Front/Rear：2.50-17 38L

Check the tire surface for embedded nails, stones or other objects.

Check if front and rear tires pressure is normal.

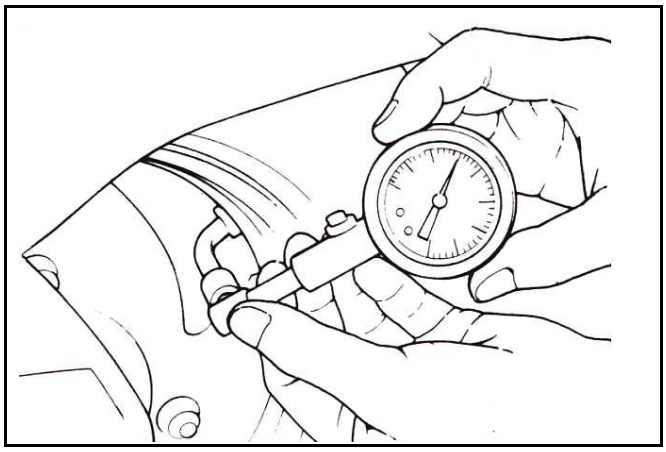
If the wearing of the tire thread reaches triangle △ mark index, the tire also have to be replaced.
Measure the tire thread depth at the center of the tire, and if the depth is not enough, please replace the tire.
Minimum tire tread depth：

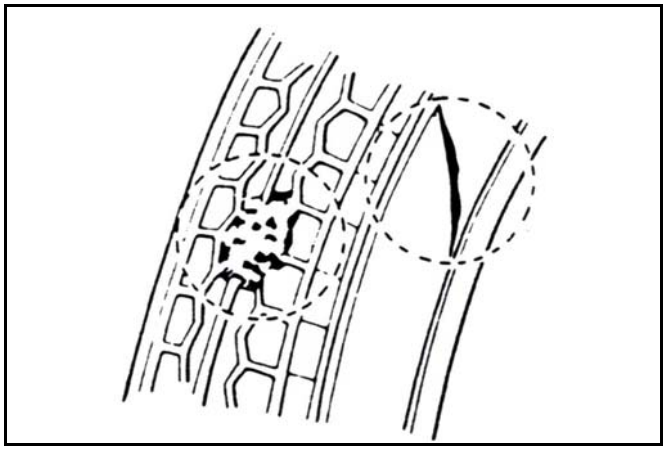
Front：1.5 mm

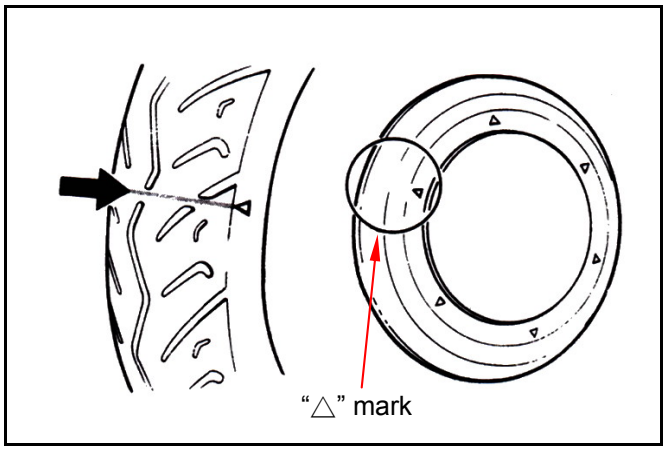
Rear：2.0 mm

⚠ Caution

- Wear mark index "△" is located along the tire wall.



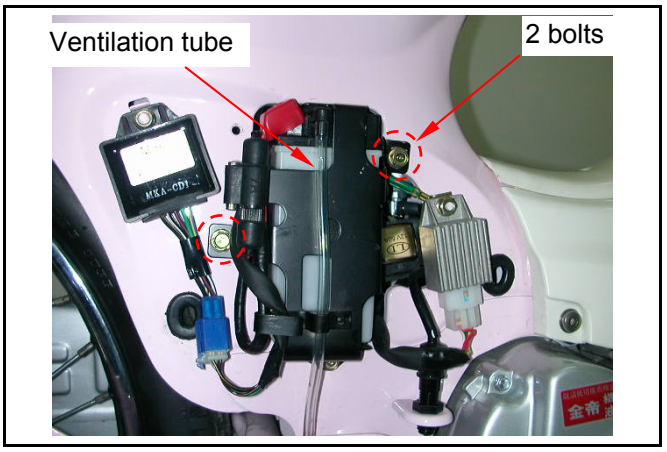




Battery

Battery removal

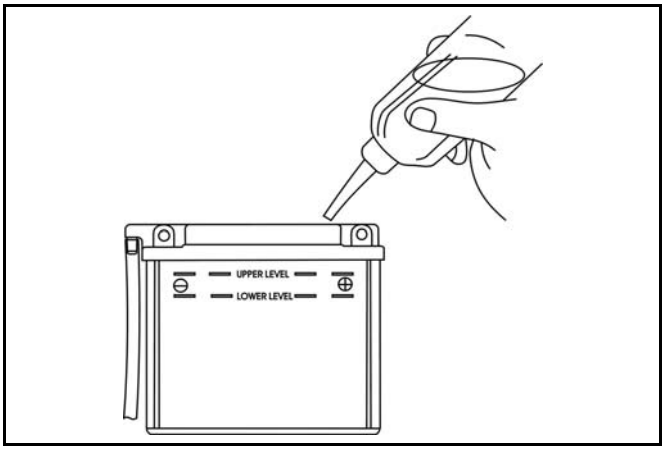
Remove the right side cover.
Unplug the ventilation tube.
Remove the battery holder (2 bolts).
Remove the 〝—〞 negative pole first, then remove the 〝＋〞 positive pole.
Remove the battery.



If the battery liquid level is too low, please remove the top plug, and fill in distilled water to the upper limit.

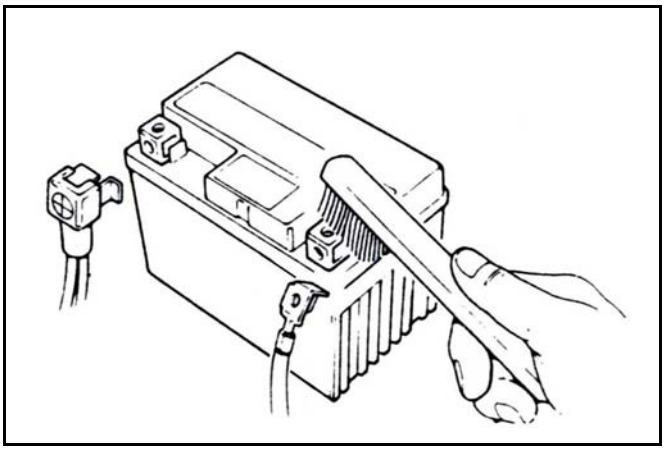
⚠ Caution

- Don't fill in too much distilled water, or the electrolyte may overflow and corrode the frame.
- Only distilled water is allowed. If any impure water is filled in, it will shorten the battery life.



⚠ Warning

- The electrolyte contained sulfuric acid. Please avoid touching the eyes, skin, or clothes. If any contact by accident, please flush with plenty of water.



If there is some rust on battery posts, clean it with steel brush.
Install the battery in the reverse procedures of removal.

⚠ Caution

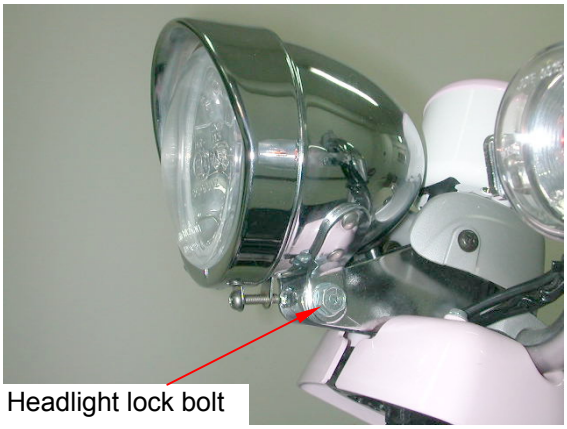
- If the rust on the posts is very serious, spray some hot water on them. Then, more easily you can remove the rust by steel brush.
- Apply some grease on the posts after cleaning rust to prevent from happening again.

Headlight Adjustment

Start the engine, turn on the headlight.
Loosen the headlight lock bolt, move the headlight upward or downward to adjust the headlight beam height.
When the proper headlight beam height is reached, tighten the lock bolt.

⚠ Caution

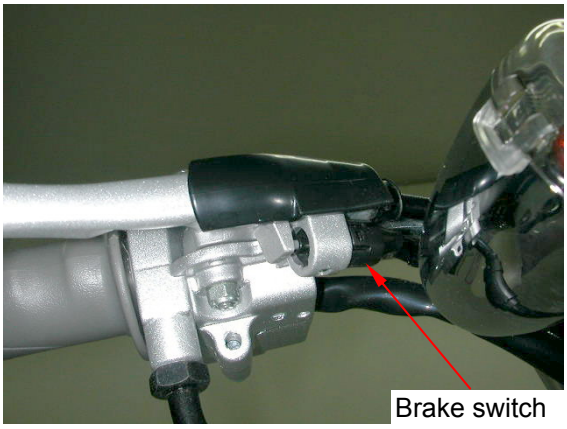
- The factory setting of the beam height is consistent with government orders.
- Improper headlight beam setting will make driver in the opposite lane dazzled and cause danger.



Brake Switch

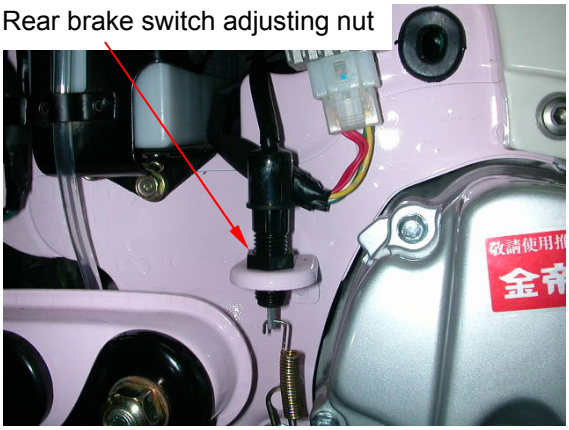
Brake switch inspection

When the brake lever is pulled, the brake switch will light up the brake lamp.
Make sure that electrical starter can be activated only under braking condition.



Rear brake switch adjustment

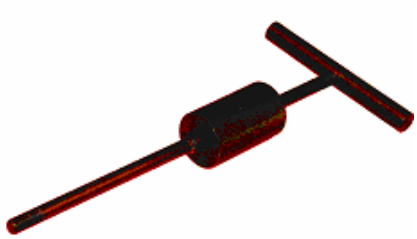
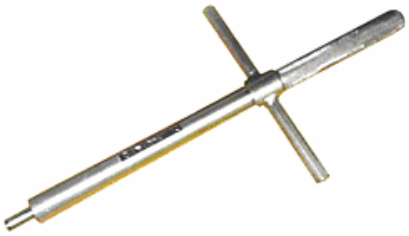
Turn on the main switch.
When the brake pedal is stepped down for 20mm，the brake lamp should be activated.
If the brake lamp is not activated or activated too early, adjust through the rear brake switch adjusting nut.
Turning clockwise will decrease the free play, and counterclockwise to increase the free play.



Nuts, Bolts Tightness

Apply periodical maintenance in according with the Periodical Maintenance Schedule.
Check if all the bolts and nuts on the frame are tightened well.
Check all fixing pins, snap rings, hose (pipe) clamps, and wire holders for security.

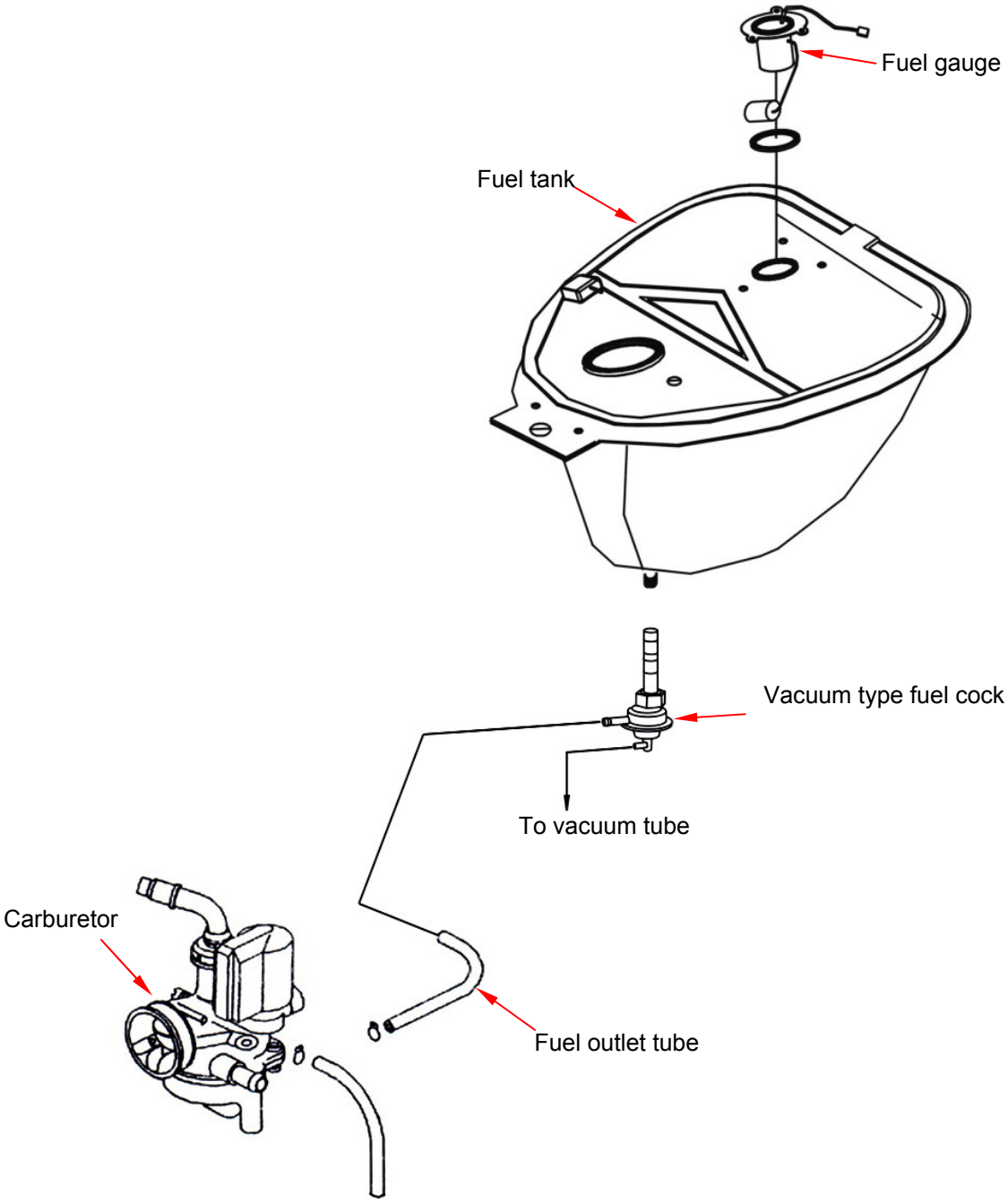
Special Tool Catalog

					
Name	Rocker arm shaft disassemble tool	Name	Valve spring compressor	Name	Valve remove/ assemble tool
SY No.	SYM-1445100	SY No.	SYM-1471100	SY No.	SYM-1471110/20
					
Name	Tappet adjusting wrench	Name	TAPPET ADJUSTING TOOLS	Name	ACG puller
SY No.	SYM-9001200	SY No.	SYM-9001210	SY No.	SYM-3110A00
		 (20*32*6)		 (6203/6004UZ)	
Name	Special nut socket	Name	Oil seal driver	Name	Bearing driver
SY No.	SYM-9023100-SY125	SY No.	SYM-9120200	SY No.	SYM-9620000
 (6204)		 (6301)			
Name	Bearing driver	Name	Bearing driver	Name	Bush puller
SY No.	SYM-9110400	SY No.	SYM-9610000	SY No.	SYM-1120310

					
Name	Steering stem locknut remove/ assemble tool	Name	Steering top cone race wrench	Name	Universal bearing driver
SY No.	SYM-5320000	SY No.	SYM-5320020	SY No.	SYM-6204024
					
Name	Inner bearing puller set	Name	Outer bearing puller	Name	Electrical gauge
SY No.	SYM-6204020	SY No.	SYM-6204001	SY No.	SYM-HE07007-01

Note:

Mechanism Diagram



Precautions in Operation

General information

Warning

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

Caution

- 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.
- 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 the auto by-starter and air cut valve arbitrarily.

Specification

Item	Specification
Carburetor diameter	Ø 16 mm
I.D. number	PTE004D
Fuel level	10.2 mm
Main injector	# 58
Idle injector	# 40
Idle speed	1600±100 rpm
Throttle free play	2~6 mm
Pilot screw	1 3/4 turns

Torque value

Carburetor locknut 0.7~1.1kgf-m

Special service tool

Vacuum/air pressure pump

General tool

Float Chamber fuel level gauge

Troubleshooting

Engine cannot be started
- No fuel in fuel tank
- Clogged fuel tube
- Excessive fuel in cylinder
- No spark from spark plug (malfunction of ignition system)
- Clogged air cleaner
- Malfunction of auto by-starter
- Throttle cable damaged

Engine stalled after being started
- Malfunction of auto by-starter
- Incorrect ignition timing
- Malfunction of carburetor
- Improper engine oil
- Air leakage into inlet manifold
- Incorrect idle speed settings.

Unstable idle speed
- Abnormal ignition system
- Incorrect idle settings.
- Abnormal carburetor
- Impure fuel

Misfire during acceleration
- Malfunction of ignition system

Late ignition timing
- Malfunction of ignition system
- Malfunction of carburetor

Weak engine power
- Fuel system clogged
- Malfunction of ignition system

Fuel / Air Mixture too lean
- Clogged carburetor jet
- Carburetor parts 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 leakage into inlet manifold

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

Carburetor Removal

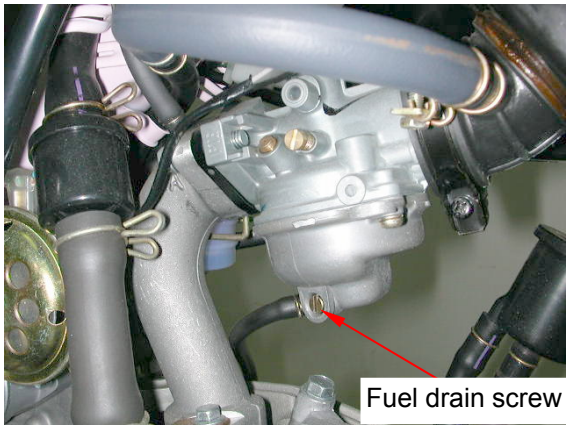
Removal

Remove the body side cover.

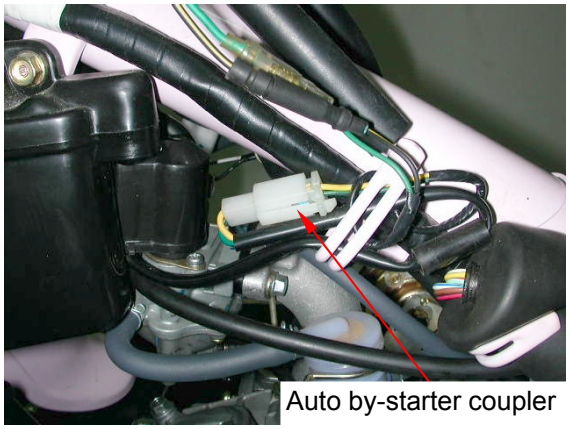
Put a container near the fuel drain screw, and loosen it. Drain all the fuel of the float chamber.

Warning

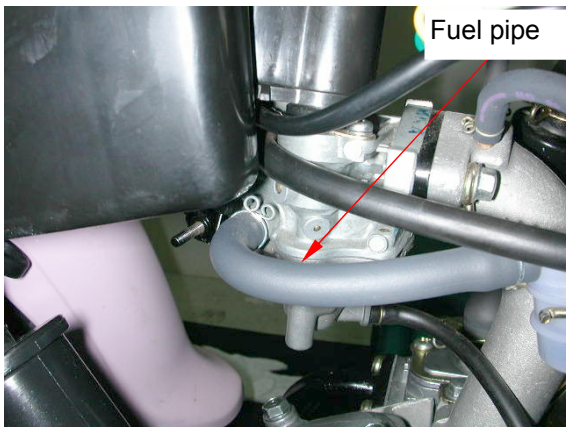
- Gasoline should stay away from fire, and avoid getting on the frame. If gasoline gets on the frame, please wash it off immediately.



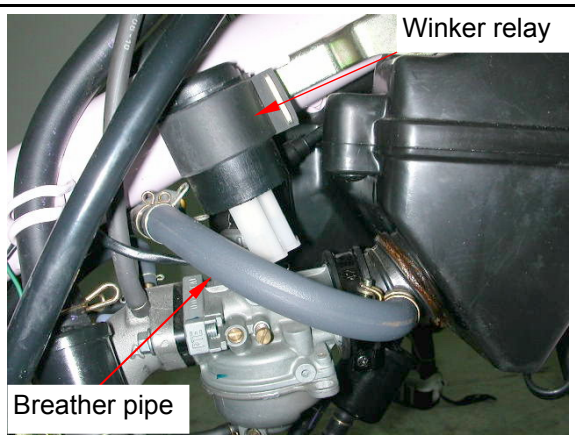
Disconnect the auto by-starter coupler.



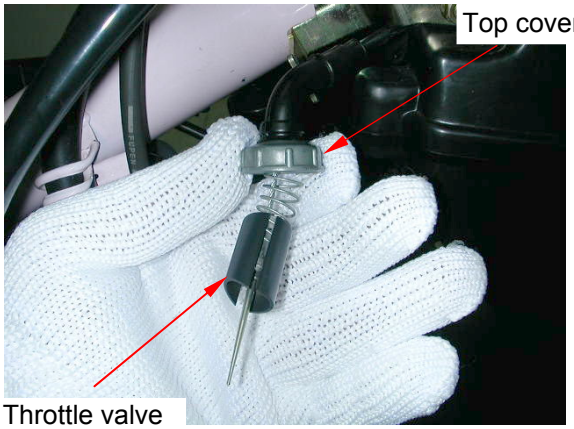
Disconnect the fuel pipe.



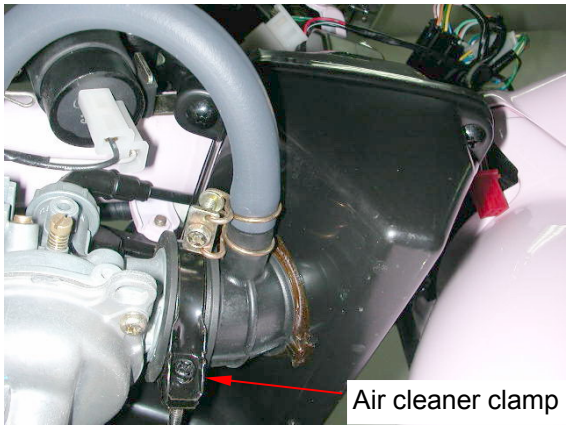
Disconnect the breather pipe and remove the winker relay.



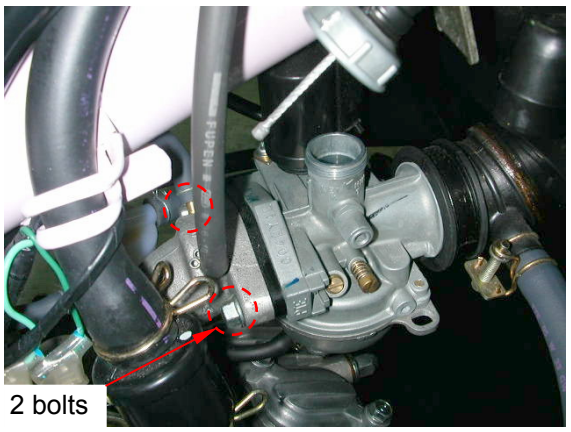
Remove the carburetor top cover by turning it counterclockwise. Remove the top cover, throttle cable, and throttle valve.



Loosen the clamp from the air cleaner side and remove the pipe.



Remove the carburetor lock bolts.
Remove the insulator and the carburetor.



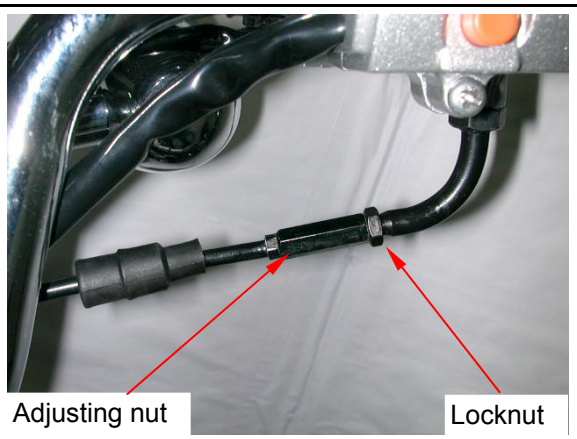
Installation

Install as the reversed order of removal procedures.

Torque value：
Carburetor holding nuts：0.7~1.1kgf-m

After installation, the following adjustment is required:

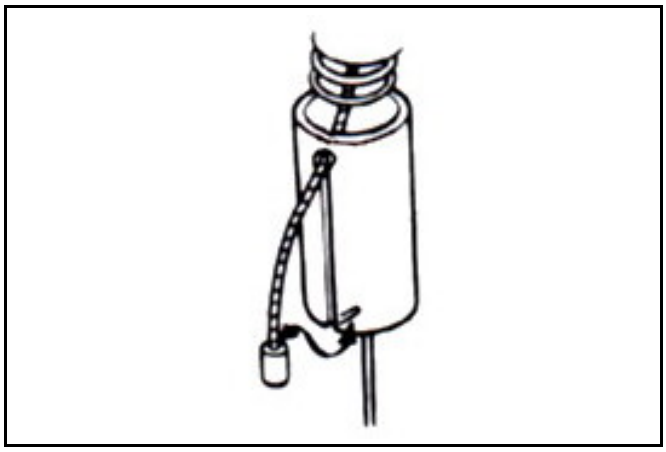
- Throttle cable free play.
- Idle speed adjustment.



Throttle Valve

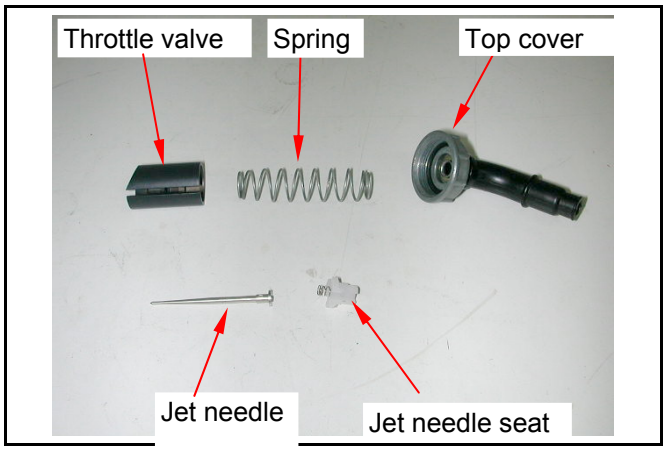
Disassembly

Compress the throttle spring and disassemble the throttle cable, and the spring.



Turn the jet needle seat counterclockwise to remove the jet needle and the seat from the throttle valve.

Check the throttle valve and the jet needle to see if they are damaged or not.

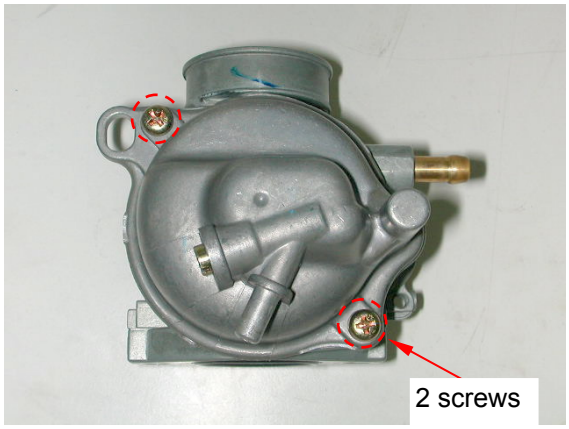


Assembly

Assemble as reversed order of removal procedures.

Float Chamber / Jet Set

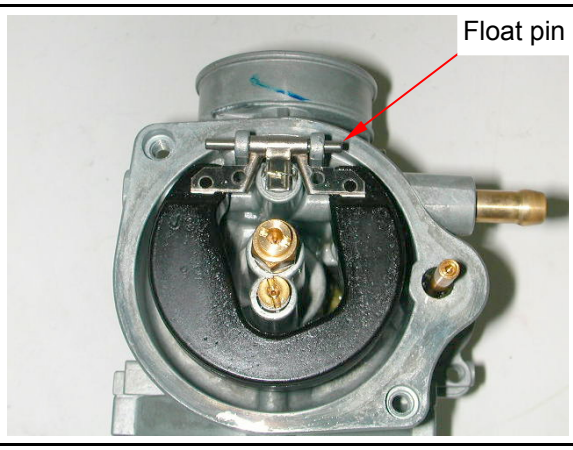
Remove 2 mounting screws and remove float chamber cover.

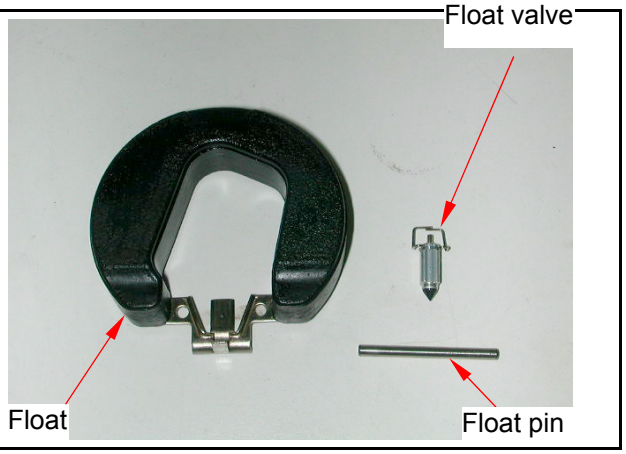


Warning

- Please fill the gasoline in float chamber into the fuel tank.

Remove the float pin.
Remove the float and float valve.



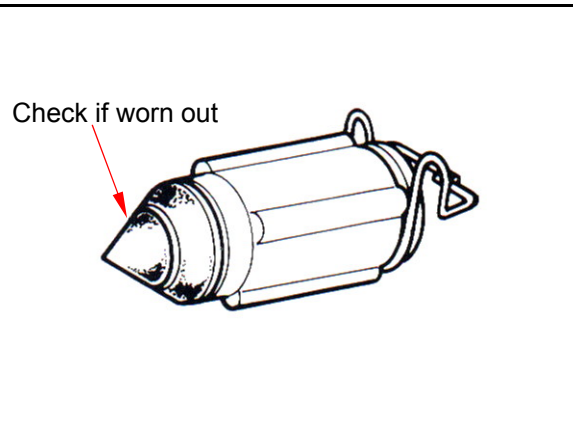


Inspection

Check the float valve and valve seat for any damage or blocking.

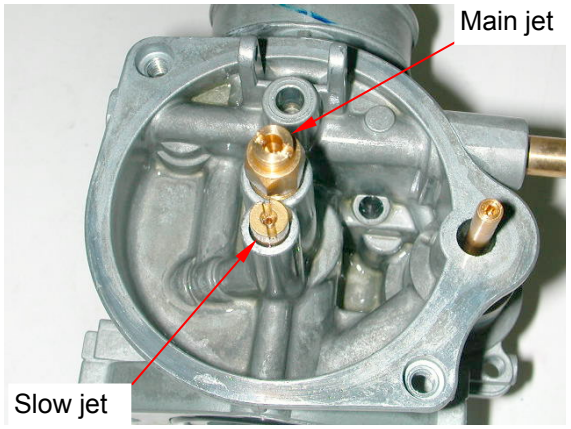
Caution

- In case of worn out or dirty, the float valve and valve seat will not close tightly. The fuel will overflow. A worn out or dirty float valve must be replaced with a new one to fix the problem.



Cleaning

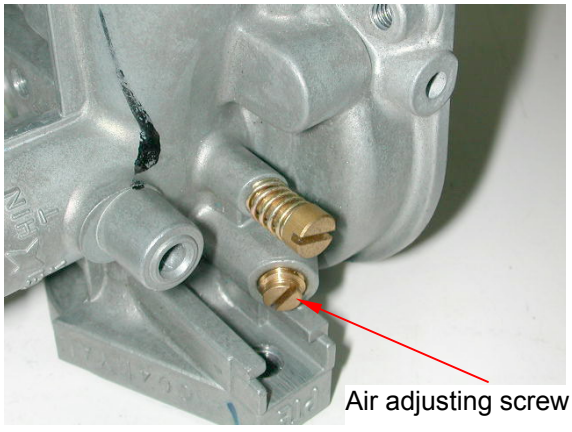
Remove the main jet, main jet seat and slow jet.



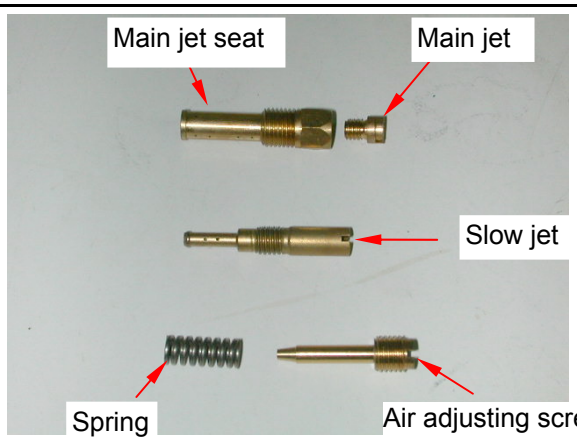
Remove the air adjusting screw.

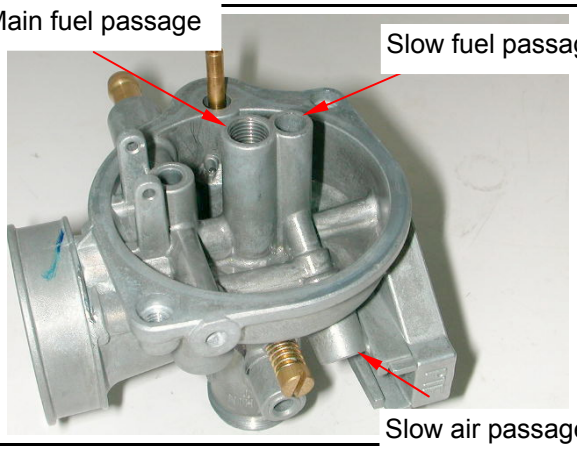
Caution

- Be careful not to damage jets and adjusting screw.
- Before removing the adjusting screw, turn it all the way in clockwise and record the number of circles.
- Do not turn the adjusting screw forcefully, or the valve seat may be damaged.
- When the air adjusting screw is removed, take out the inner washer with it.



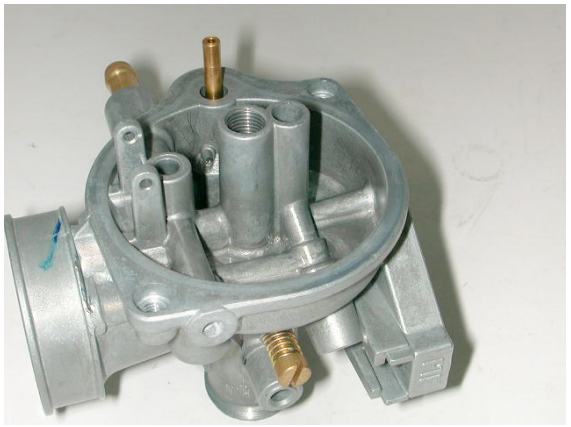
Clean the jets with Carburetor conditioner. Then use compressed air to blow the dirt off.





Assembly

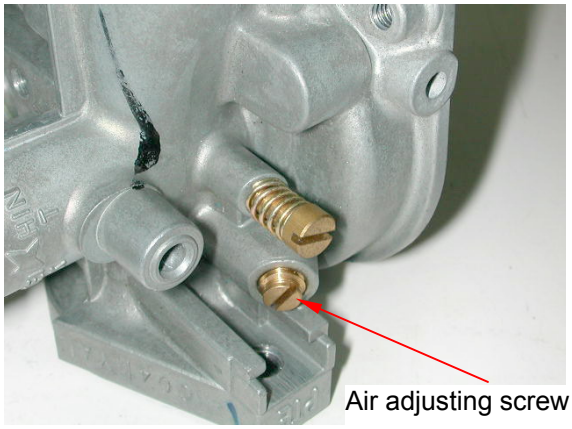
Before assembling, please blow the fuel passages with compressed air.



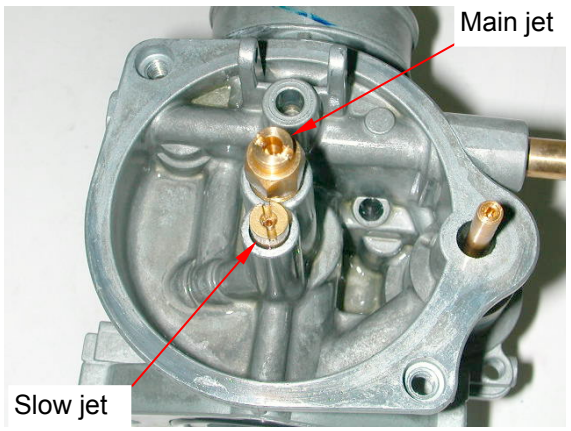
Assemble the air adjusting screw.

⚠ Caution

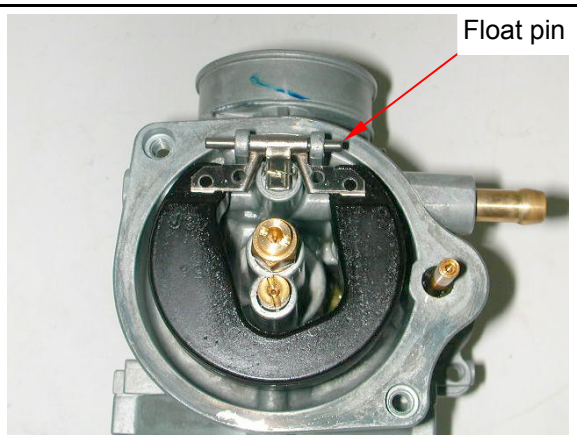
- Please assemble the air adjusting screw with the same setting circles as removal.



Assemble the main jet seat, main jet and slow jet.



Assemble the float valve, float and float pin.

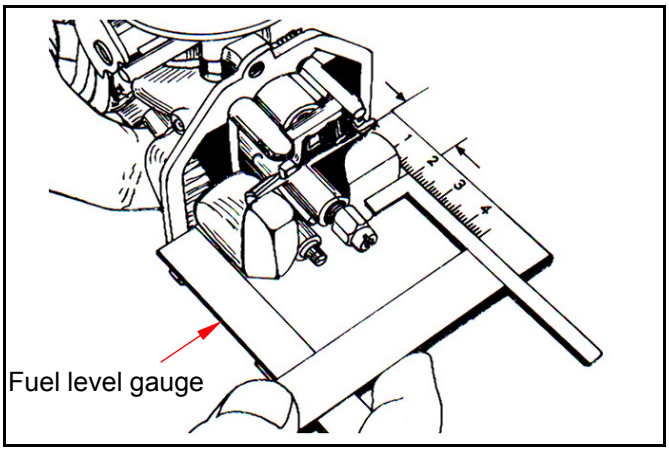


Fuel level inspection

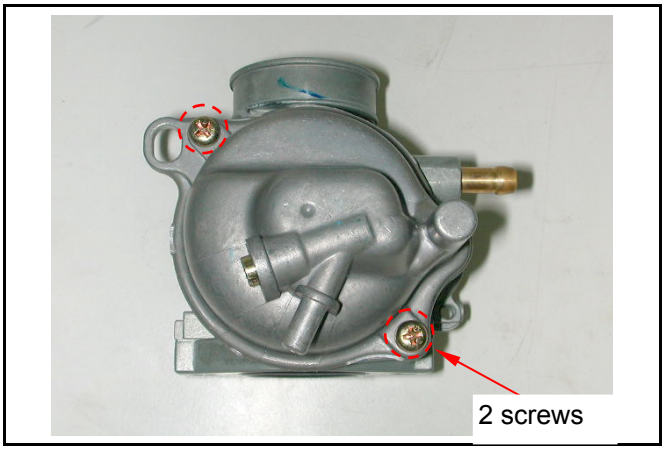
⚠ Caution

- Check the float valve and float for proper installation.
- To get the correct reading, position the fuel level gauge in the way that float chamber face is vertical to the main jet.

Fuel level：10.2mm



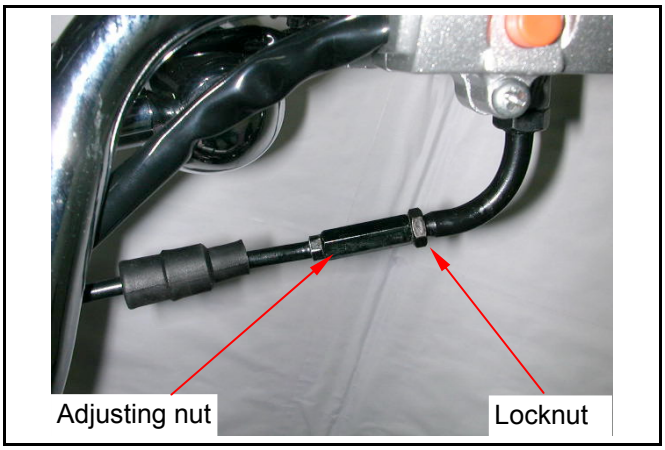
Assemble the fuel cup after confirming the fuel level.



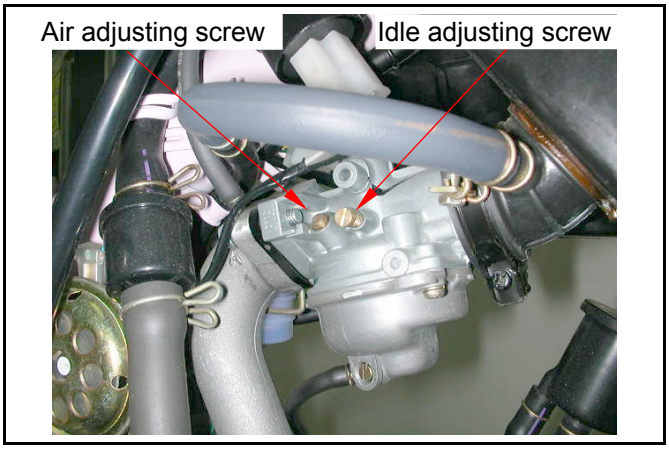
Carburetor Installation

Install the carburetor in the reverse order of removal.
Following adjustments must be made after installation.

- Throttle cable free play adjustment.
- Idle speed adjustment



Idle Speed Adjustment



⚠ Caution

- Air-screw was set at factory, so no adjustment is needed. For easy installation, count the number of circles it takes to screw the air-screw to the bottom.
- The idle adjustment process must be done while the bike is on its main stand.

Use a tachometer while adjusting engine RPM.
Screw in air adjusting screw gently, then back up to standard circles.

Standard setting：1 3/4 circles

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

Standard idle speed：1600rpm±100

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

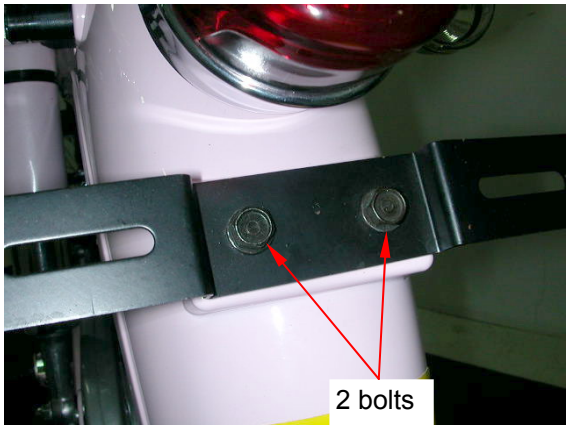
Standard value of CO emission：1.0~1.5 %

Gradually increase the throttle, make sure rpm and CO value are within the standard range after engine running stable. If rpm and CO value fluctuated, repeat the procedures above for achieving the standard value.

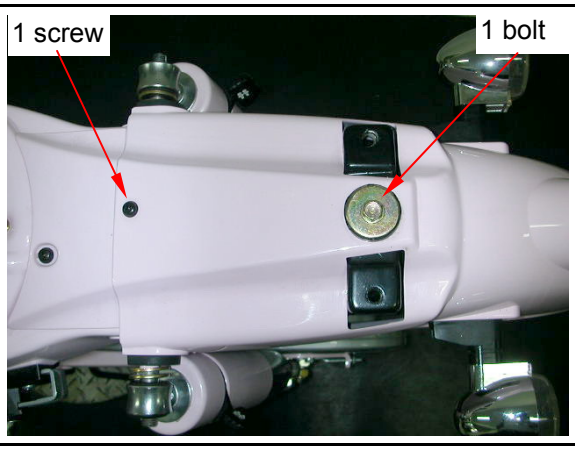
Fuel Tank

Fuel tank removal

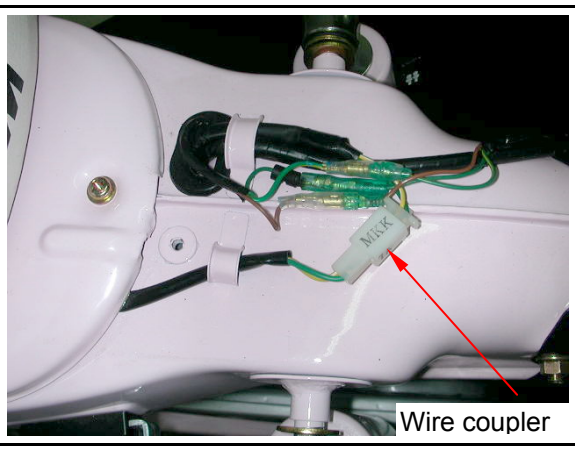
Remove the license plate bracket (2 bolts).



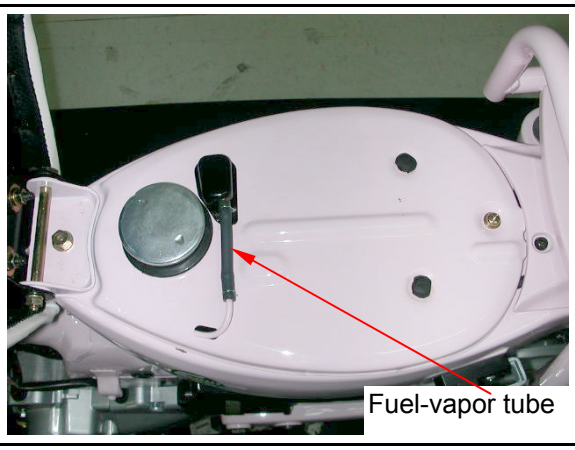
Remove the rear right / left winkers, and the rear fender (1 bolt, 1 screw).
Remove the rear top cover.



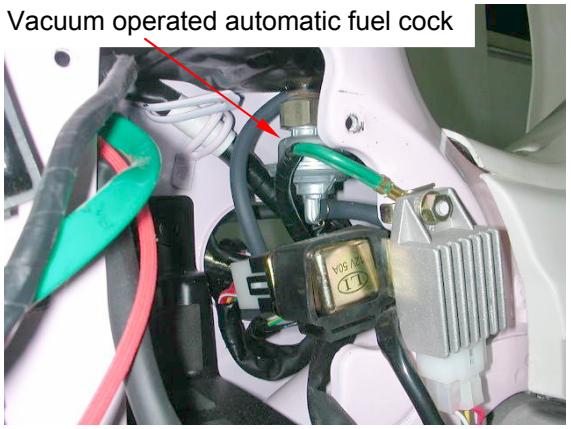
Disconnect the fuel unit wire coupler.



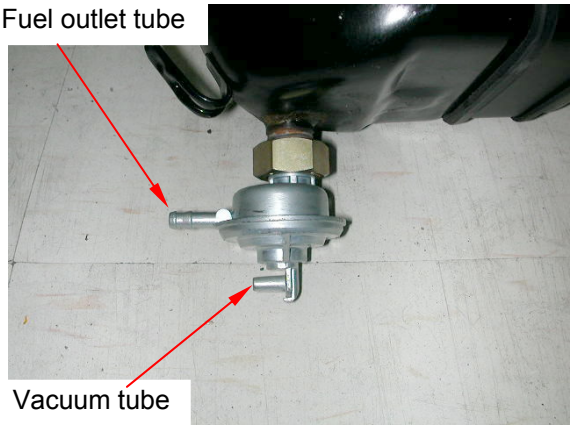
Open the seat.
Disassemble the fuel-vapor tube to the carbon canister.



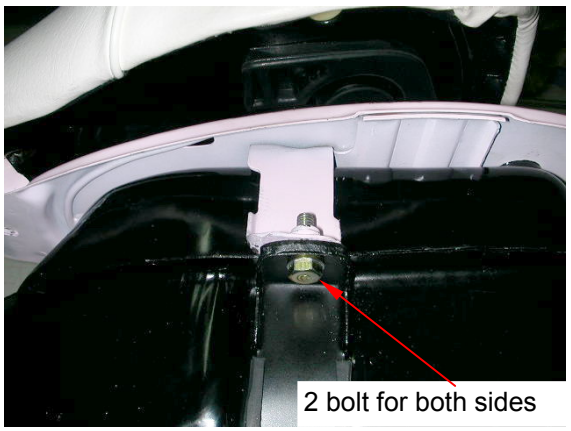
Remove the right body cover, and remove the battery.



Remove the fuel outlet pipe and the vacuum pipe from the Vacuum operated automatic fuel cock.

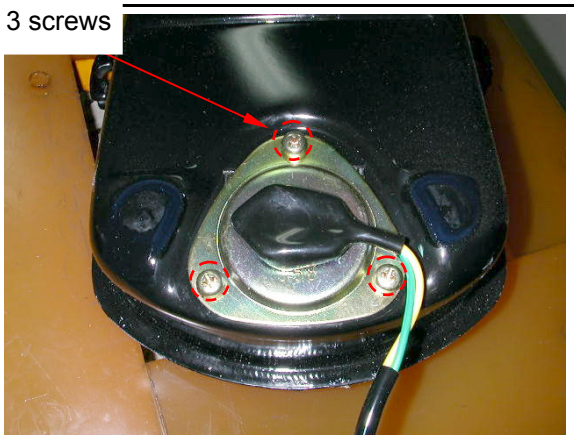


Lift the fuel tank with the fuel tank cover. Remove the lock bolts to separate the cover from the fuel tank.



Fuel unit removal

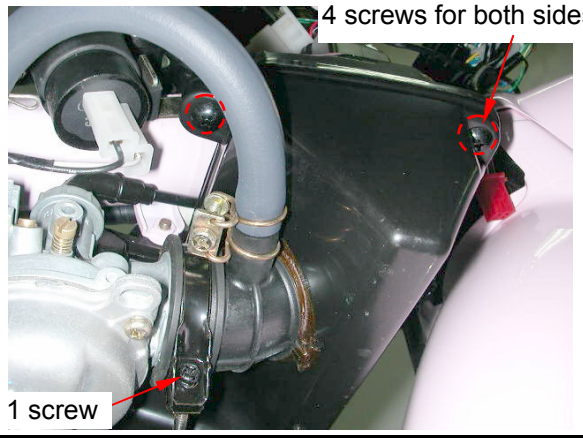
Remove the fuel unit (3 screws).
Refer to the chapter 12 for the detailed inspection for the fuel unit.



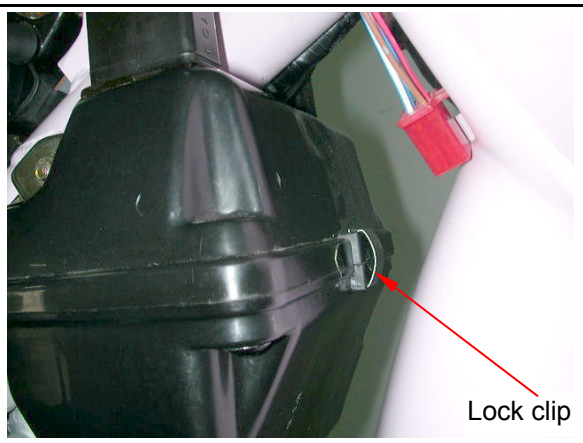
Air Cleaner

Air filter element

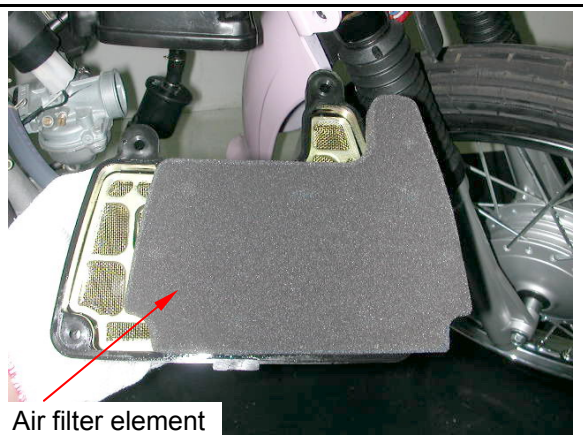
Remove the body cover.
Loosen the air duct clamp (1 screw).
Remove the air cleaner cover screws.



Open the air cleaner lock clip and remove the air cleaner cover.



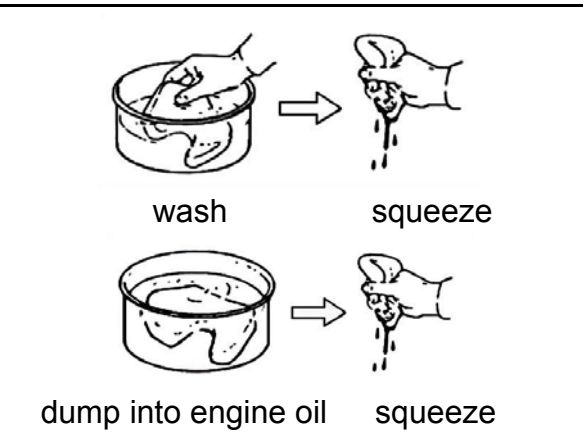
Remove the air filter element.
Check if the air filter element is dirty or damaged.



Wash the air filter element with non-flammable or high flash-point solvent (Like kerosene or diesel).
After washing, squeeze it and dump into motor oil, and squeeze again.
If the element is too dirty or damaged, please change a new one.

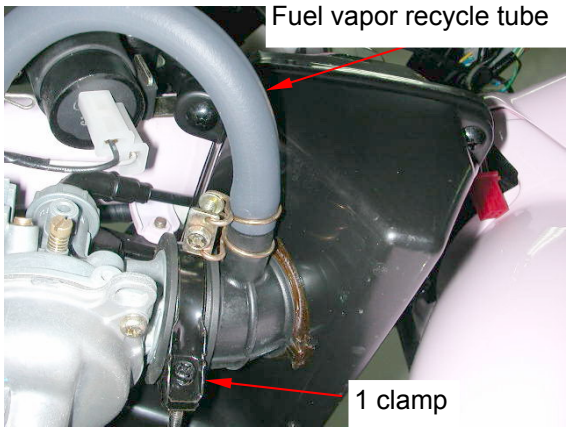
⚠ Caution

- Don't use gasoline or other flammable solvents to clean the element.

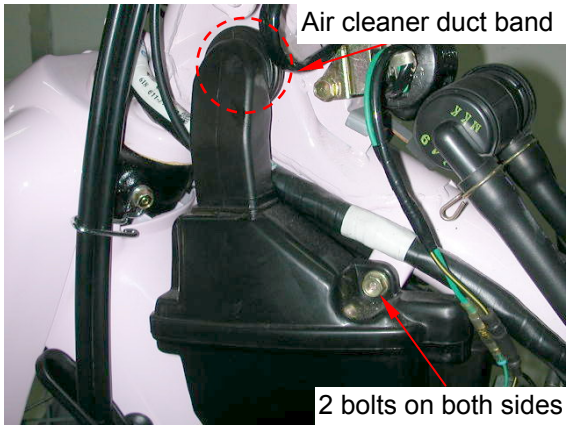


Air cleaner removal

Remove the body cover.
Remove the air cleaner connecting tube and the fuel vapor recycle tube.



Loosen the air cleaner duct band, and remove the air cleaner ducts (both sides).
Remove the air cleaner (2 bolts on both sides).

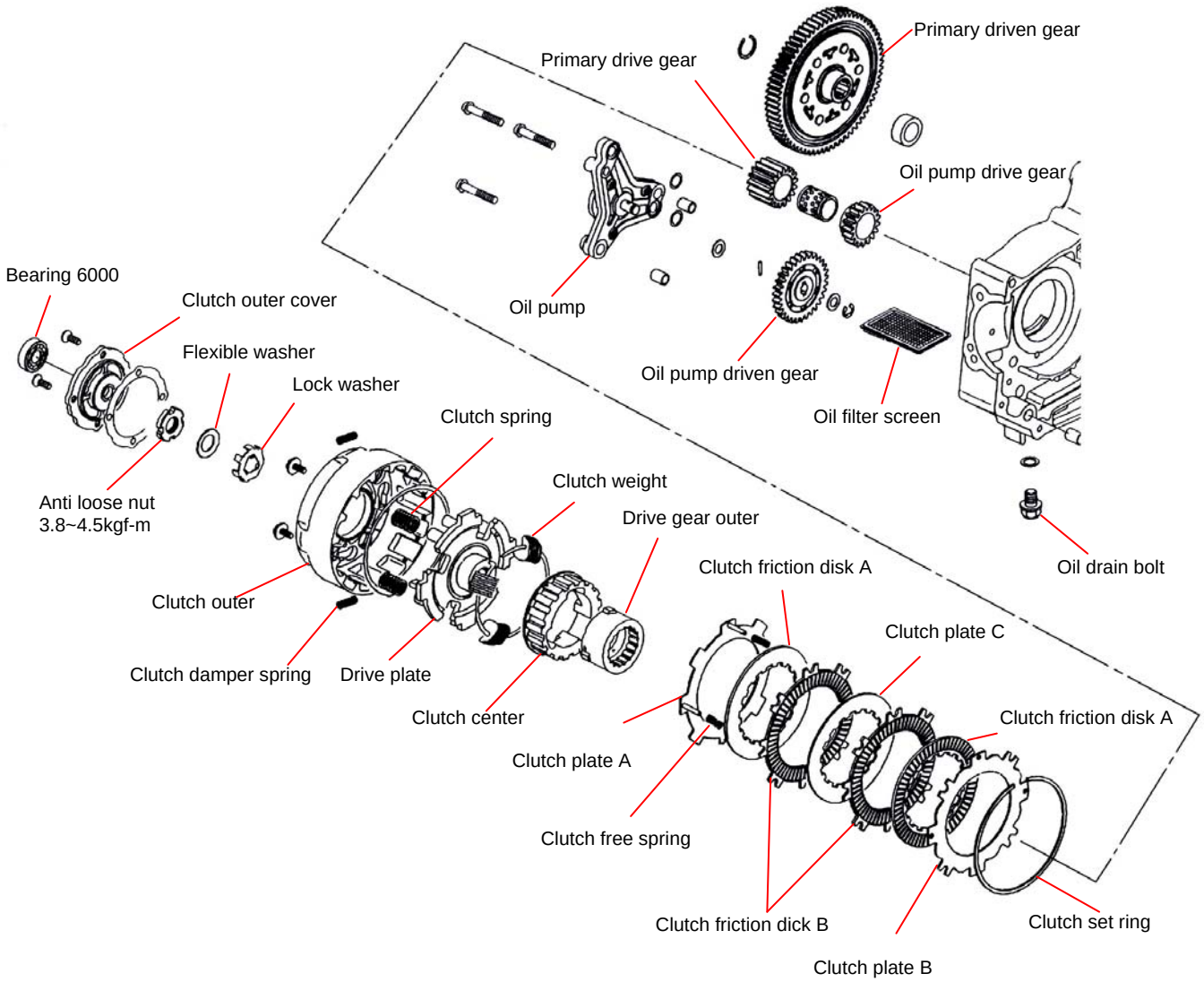


Installation

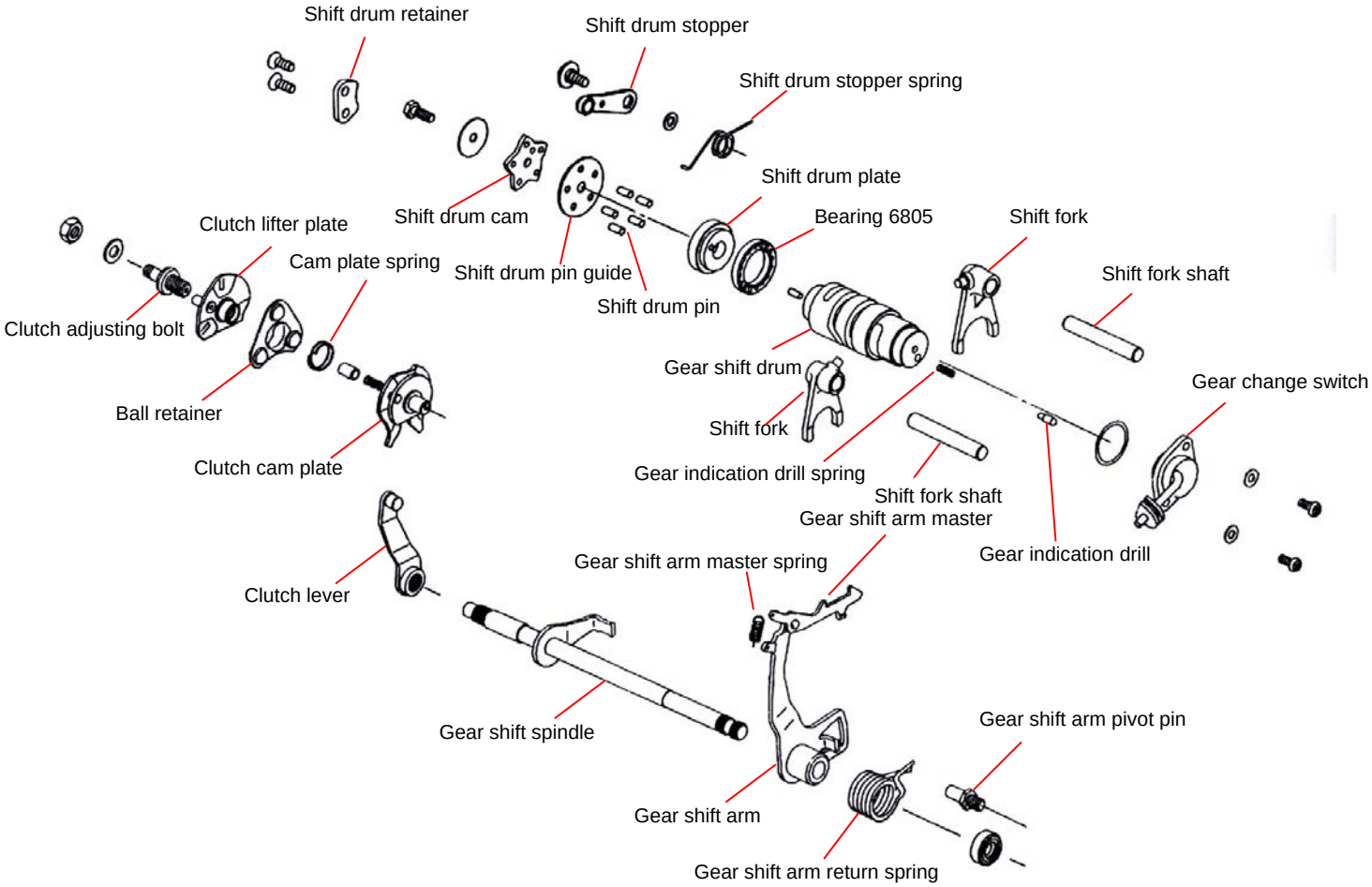
Install as the reversed order of removal.

Note:

Mechanism Diagram



Mechanism Diagram



Precautions in Operation：

General Information

- This chapter covers the engine oil pump and the oil replacement.
- The disassembly of the clutch and the shifting linkage is covered. All these operations can be done while the engine is still on the motorcycle.

Specification

Engine Oil Capacity：

After disassembly：1000 c.c.

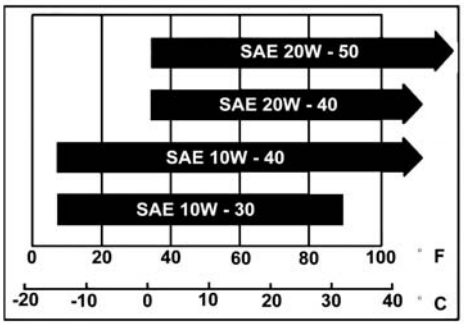
After draining：800 c.c.

Recommended engine oil viscosity:

SAE 10W-30

(The Bramax series oil is recommended)

Engine oil viscosity



Measurement: mm

Item		Standard	Service Limit
Oil pump	Clearance between inner rotor and outer rotor	0.30	0.35
	Clearance between outer rotor and the pump body	0.30~0.36	0.40
	Clearance between rotor and pump cover	0~0.06	0.11
Clutch	Clutch pedal free play	10~20	-
	Spring free length	16.35	15.50
	Clutch friction disk A thickness	2.55~2.68	2.20
	Clutch friction disk A thickness	3.35~3.45	3.00
	Clutch plate warp	-	0.20

Torque value

Oil drain bolt	1.5~2.0kgf-m	Oil pump screw	0.4~0.6kgf-m
Oil filter cover bolt	0.8~1.2kgf-m	Clutch anti-loosen nut	3.8~4.5kgf-m
Oil pump cover screw	0.3~0.4kgf-m	Right crankcase bolt	0.8~1.2kgf-m

Special tool

Clutch anti-loosen nut socket wrench SYM-9023100-SY125

Troubleshooting

Engine oil level too low
- Oil leakage
- Worn valve guide or stem seal
- Worn piston ring

Engine oil pressure too low
- Oil level low
- Clogged oil filter, passage
- Damaged oil pump

Engine contamination
- Oil or filter not changed regularly
- Damaged cylinder head gasket
- Worn piston ring

Clutch slips during acceleration
- Worn clutch plate
- Weak clutch spring

Bike trembles
- Bent clutch plate

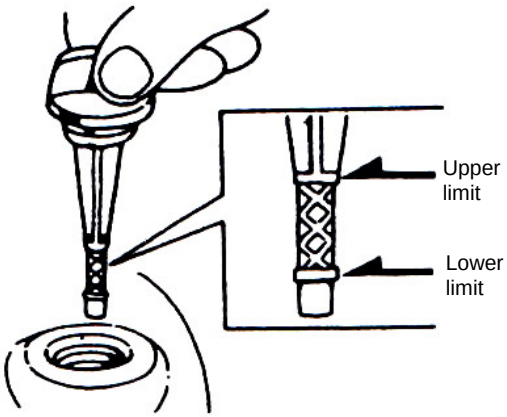
Hard to shift gear
- Improper
- bent shift fork shaft

Gear shift pedal won’t return
- Broken or weak gear shift arm return spring
- Bent shift fork shaft

Gear jumps out
- Bent shift fork
- Bent shift fork shaft
- Damaged shift drum stopper spring

Engine Oil

Turn off the engine, and park the motorcycle on flat surface with main stand.
Check the oil level with the oil dipstick.
Do not screw the dipstick in while checking.
If oil level is low, fill into recommended oil to reach the upper limit.

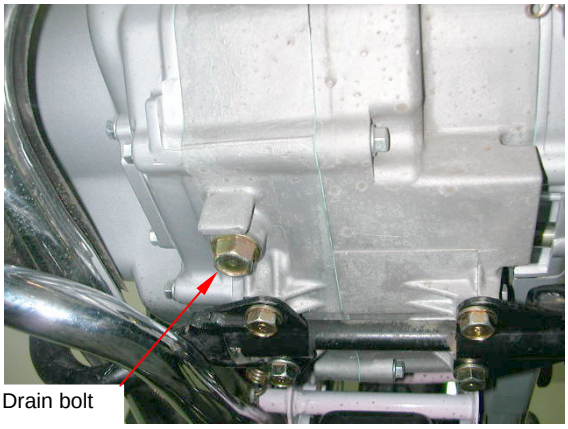


Engine oil replacement

⚠ Caution

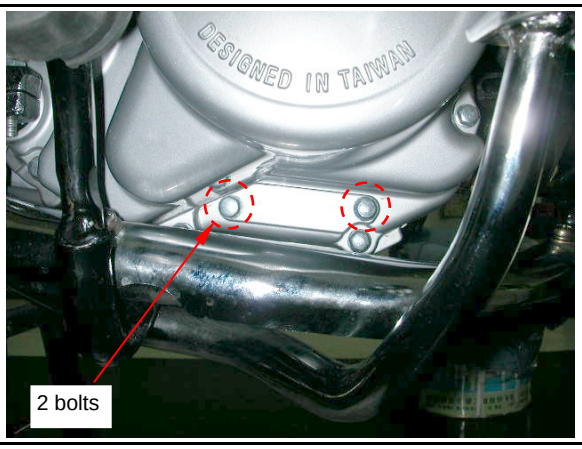
- Drain the engine oil when the engine is fully warmed up, so the oil can be drained out completely.

Place an oil basin under the bike, and remove oil drain bolt.
After all oil is drained, make sure washer can be re-used, and re-install oil drain bolt.
If the Oil drain bolt washer is damaged, it should be replaced.
Torque value：1.5~2.5kgf-m



Oil Filter Screen Cleaning

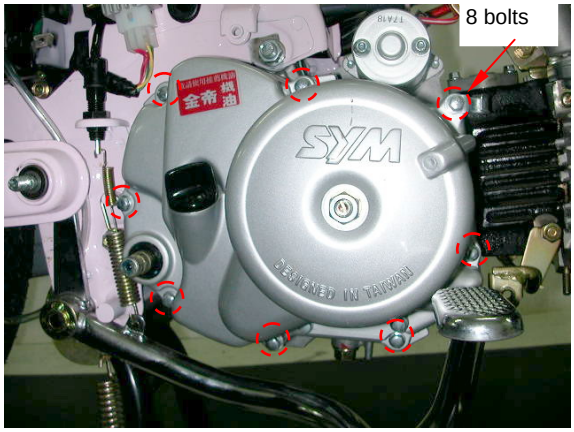
Remove the oil filter screen cover (2 bolts).
Remove the oil filter screen.
Clean the oil filter screen with compressed air.
Check the cover washer and the oil filter screen for any damage. Replace it with new one if necessary.
Install the oil filter screen and the cover.
Torque value：0.8~1.2kgf-m



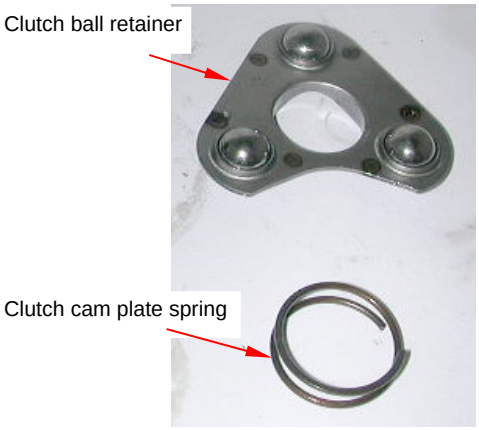
Fill in engine oil (oil viscosity SAE 10W-30)
Recommended using Bramax series oil.
Engine oil capacity: 800 c.c. Regular exchange.
Install dipstick, run the engine for several minutes. Then turn off the engine, and check the oil level again.
Check if engine oil leaks.

Clutch Removal

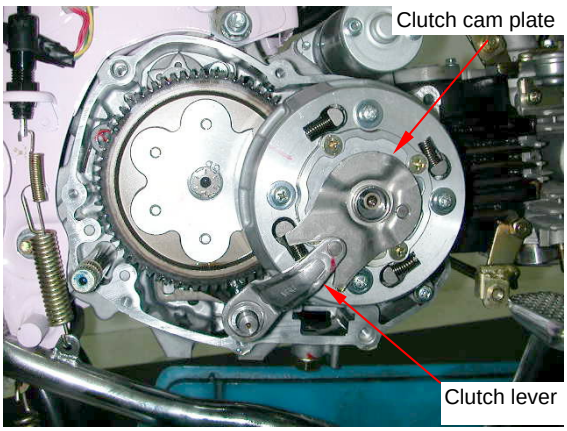
Drain the engine oil.
Remove the footrest, exhaust pipe and kick-starter.
Remove the right crankcase cover (8 bolts).



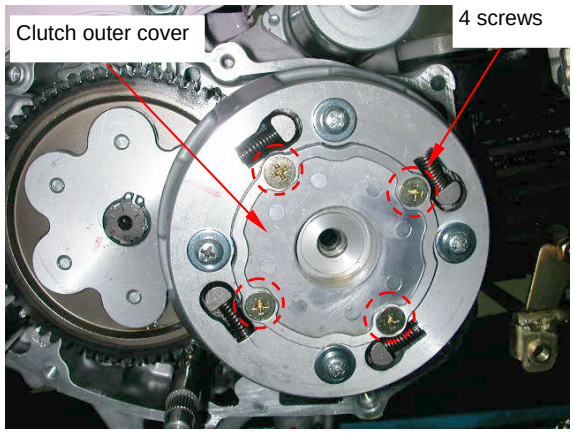
Remove the clutch lift plate, ball retainer and clutch cam plate spring.



Remove the clutch lever and clutch cam plate.



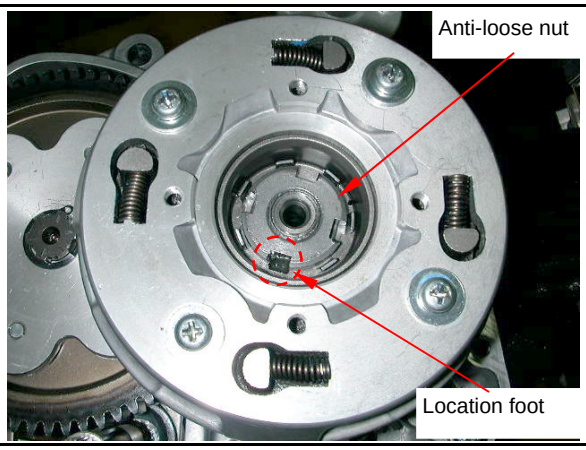
Remove the clutch outer cover (4 screws).



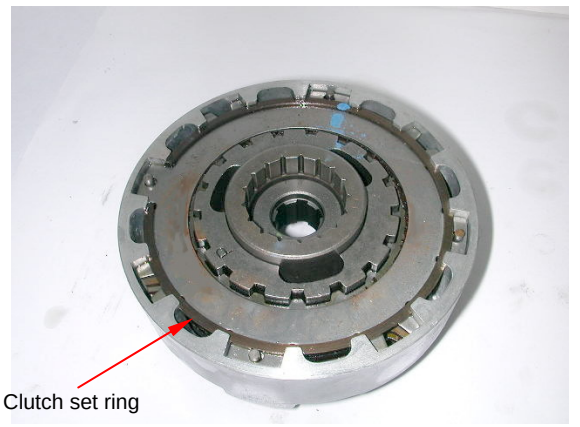
Open the location foot of the lock washer.
Remove the anti-loose locknut.
Remove the flexible washer, lock washer and the whole clutch assembly.

Special tool：

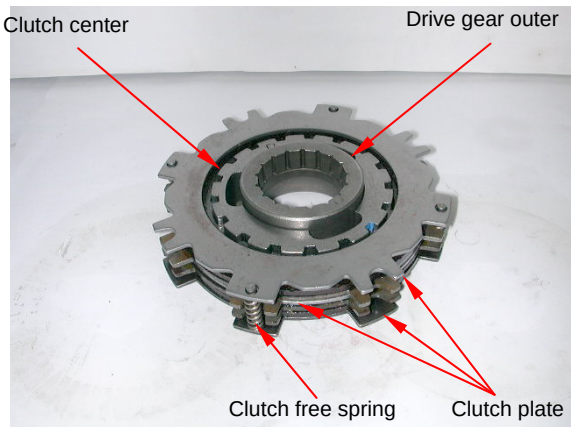
Anti-loosen locknut socket wrench
SYM-9023100-SY125



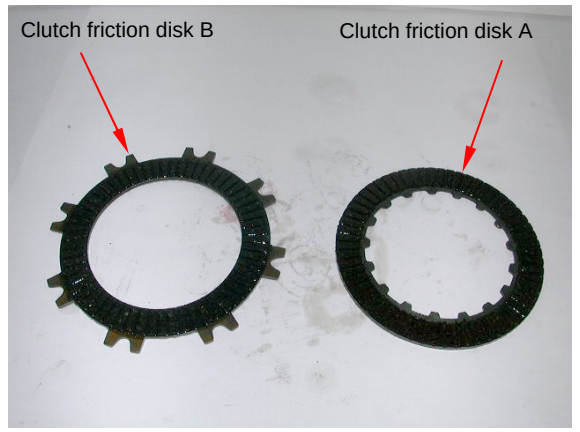
Remove the clutch set ring.



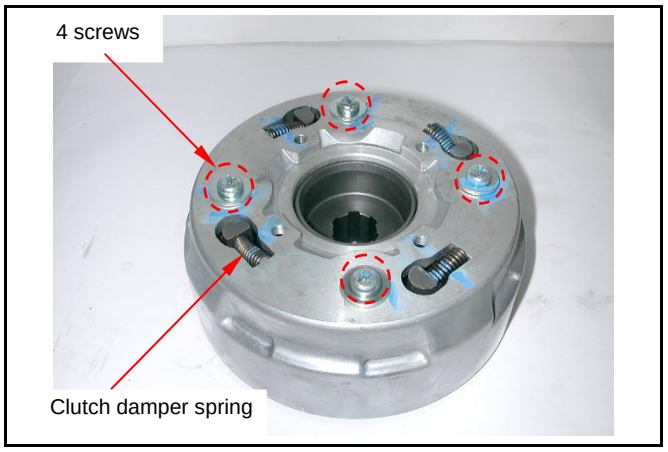
Remove the drive gear outer, clutch center, clutch plates and clutch friction disks from the clutch outer.



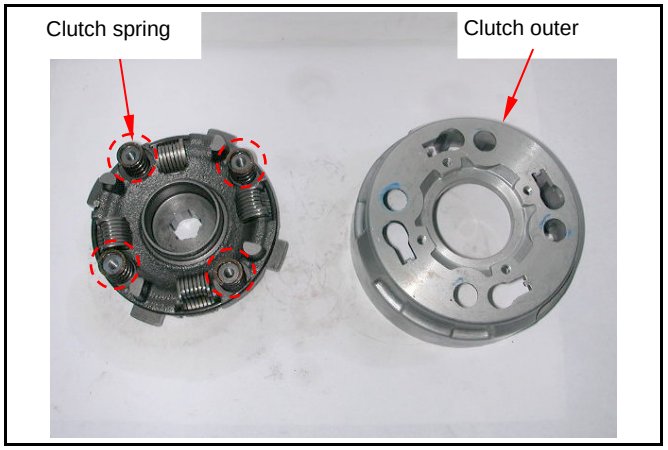
Disassemble the drive gear outer, clutch center, clutch plates and clutch friction disks.



Remove the clutch drive plate screws (4 screws) and disassemble the clutch drive plate from the clutch outer.



Remove the clutch spring.

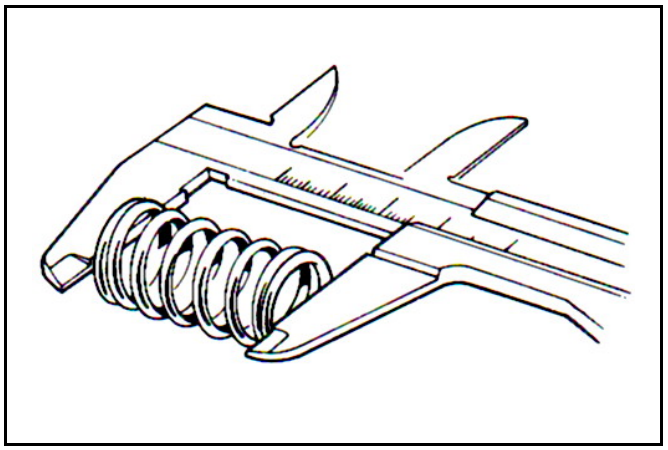


Clutch Inspection

Clutch spring inspection

Measure the free length of four clutch springs.

Service limit：15.5mm

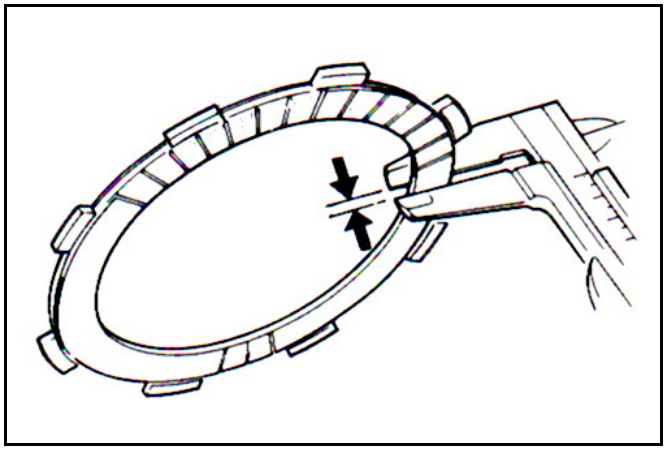


Clutch friction disk inspection

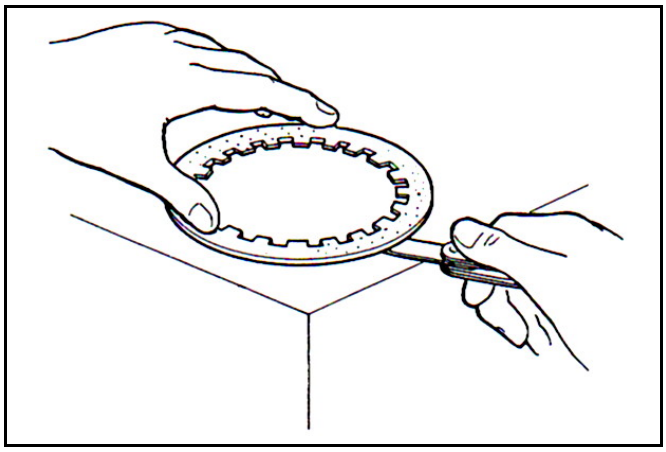
Measure the thickness of each clutch friction disk. If it's under service limit or it's damaged, replace it with a new one.

Service limit：Friction disk A 2.2mm

Friction disk B3.0mm



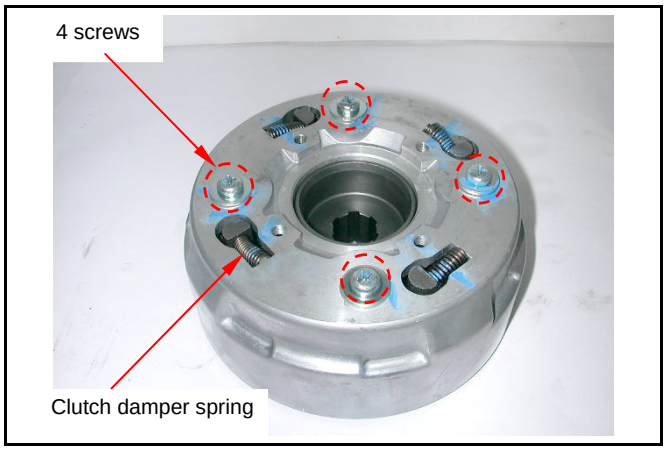
Clutch plate inspection
Use a feeler gauge to measure the warp of each clutch plate.
Service limit：0.2mm



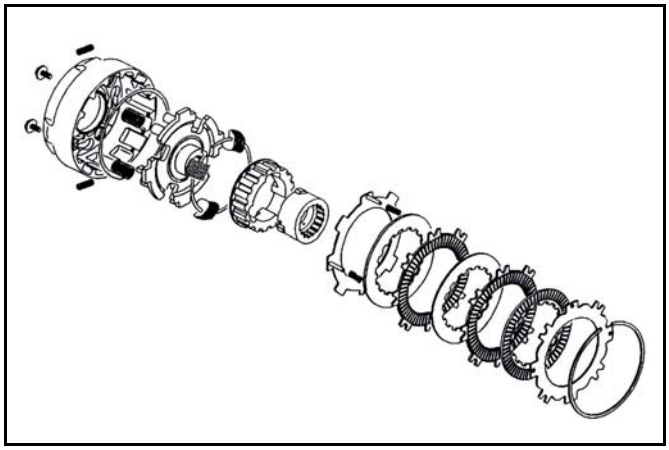
Clutch outer inspection
Check the clutch outer to see if any cracks or damage can be found.

Clutch Installation

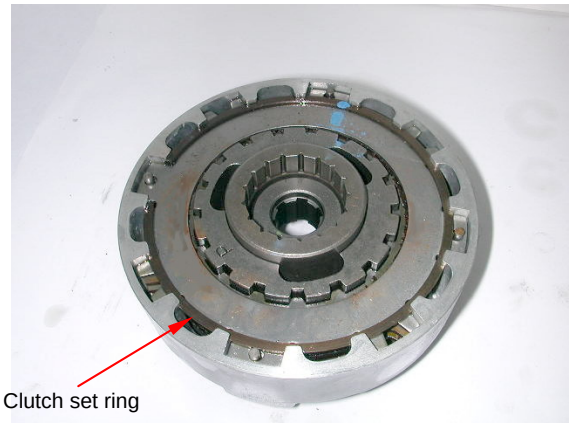
Assemble the clutch drive plate onto the clutch outer (4 screws) and install the clutch damper spring in the clutch outer.



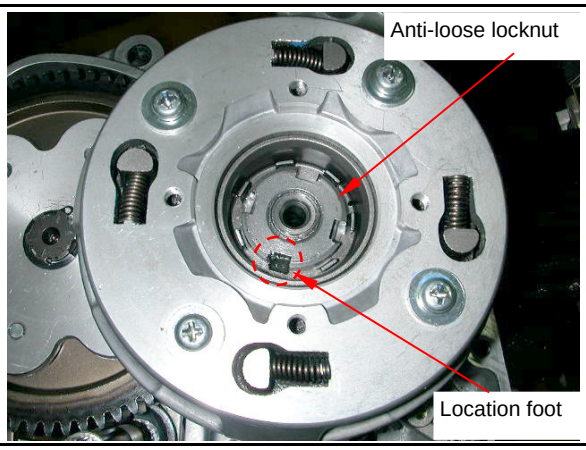
Reinstall the clutch plate, clutch friction disks, clutch center and drive gear outer.



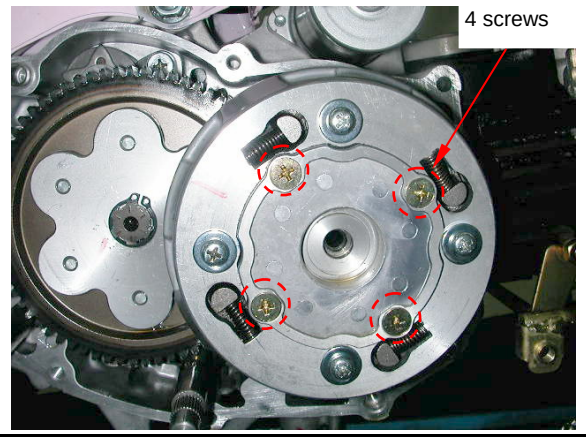
Reinstall the clutch set ring.



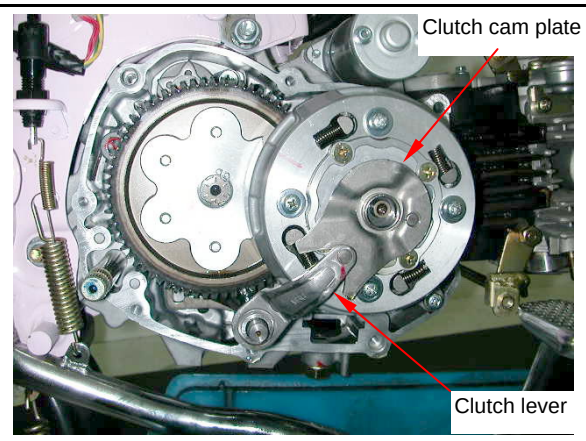
Assemble the clutch assembly to the crankshaft.
Put the anti-loose lock washer first and then the flexible washer.
After the anti-loose locknut is installed, bend any one location foot of the lock washer to fit in the locknut.



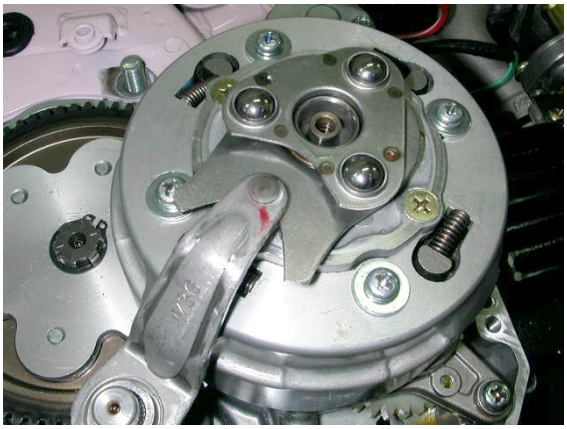
Install the clutch outer cover (4 screws).



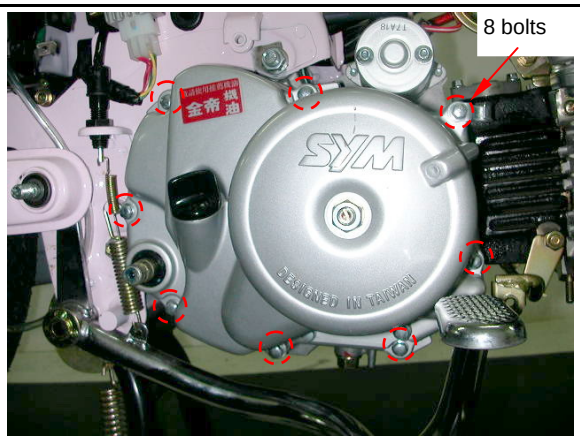
Install the clutch cam plate.
Make the clutch lever aim at the breach of the clutch cam plate and install the clutch lever onto the gear shift spindle.



Install the clutch cam plate side spring, ball retainer, and clutch lifter plate onto the clutch cam plate.



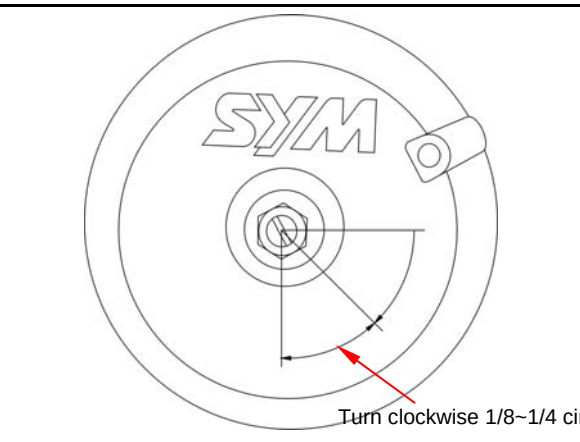
Install the right crankcase cover (8 bolts).
Reinstall the kick starter, gear shift pedal, footrest and exhaust pipe.
Refill the specified engine oil.



Loosen the locknut of the clutch adjusting bolt.
Turn the clutch adjusting bolt counterclockwise to the end and then turn it clockwise 1/8~1/4 circle to adjust the clutch free play.
After the clutch clearance adjustment, lock the adjusting bolt and then the locknut.

Caution

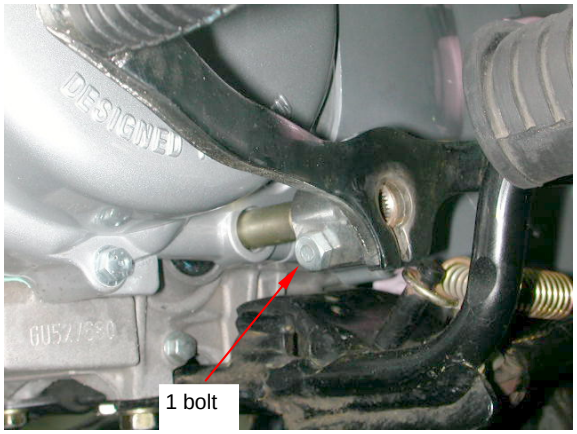
- Increase or decrease the clutch clearance according to the real circumstance.



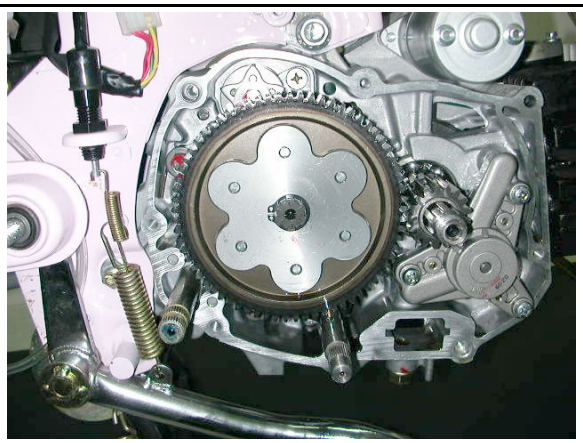
Gear Shift Linkage Mechanism

Gear shift linkage mechanism removal

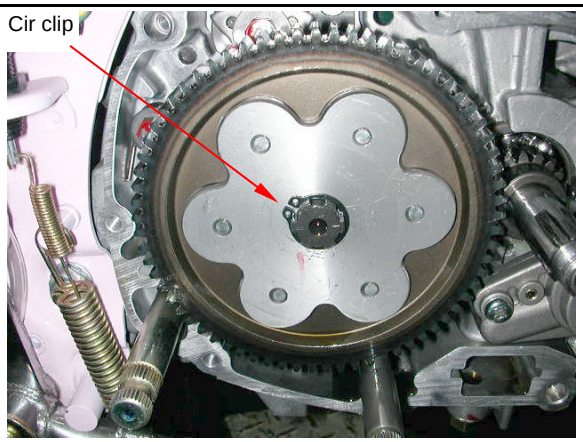
Remove the gear shift pedal (1 bolt).



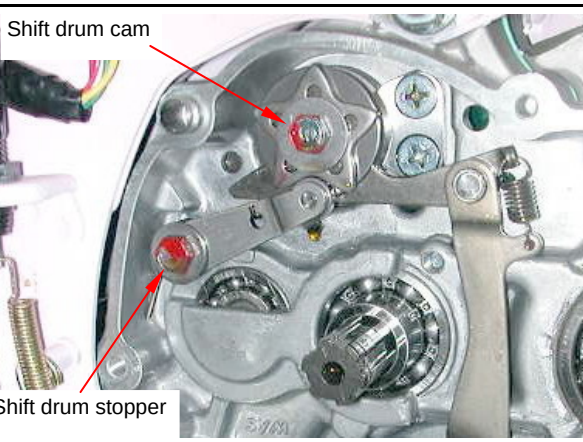
Drain out the engine oil.
Remove the footrest, kick starter and exhaust pipe.
Remove the right crankcase cover.
Remove the clutch lever and the clutch assembly.



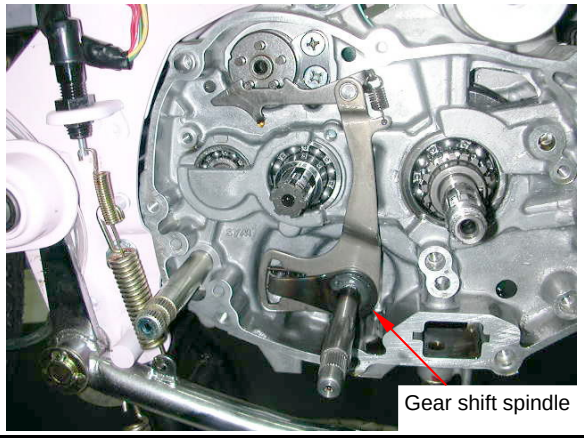
Remove the primary driven gear cir clip.
Remove the primary driven gear.



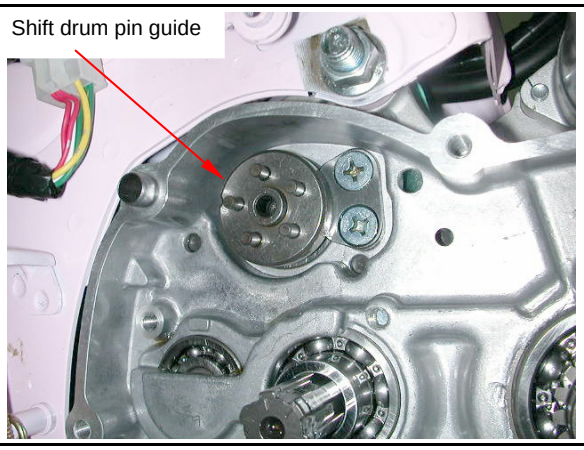
Remove the shift drum stopper and stopper spring (1 bolt).
Remove the shift drum cam and shift drum pin guide (1 bolt).



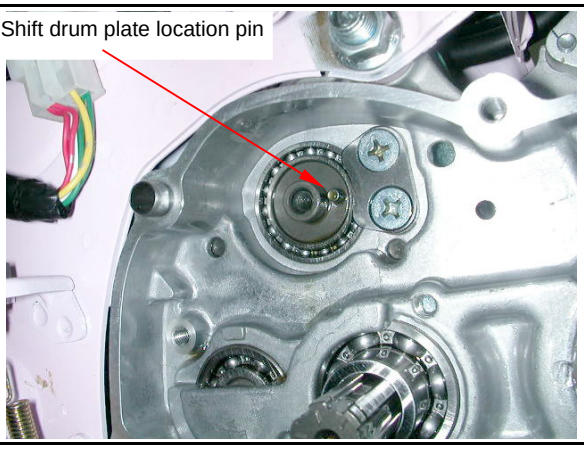
Pull out the gear shift spindle and gear shift arm.



Remove the shift drum pin guide and gear shift drum pins.



Remove the shift drum plate location pin and prevent it from being lost.



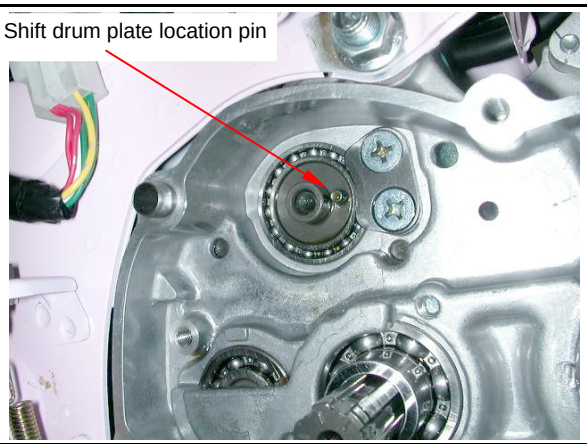
Inspection
Check the gear shift spindle and gear shift arm for wear or damage.

Check the shift drum stopper and stopper spring for wear or damage.

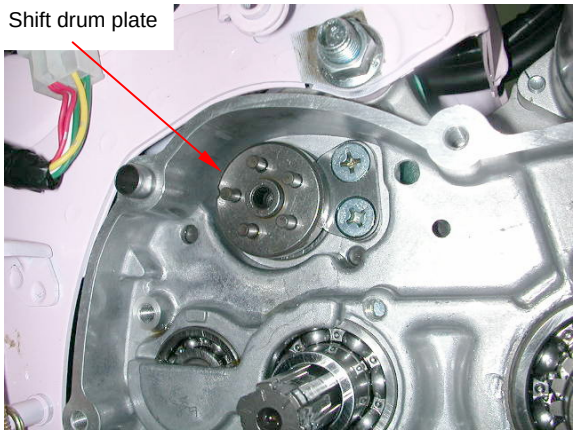
Check the shift drum cam for wear or damage.

Check the shift drum plate and shift drum pin for wear or damage.

Gear shift linkage mechanism assembly
Install the shift drum plate location pin onto the gear shift drum.



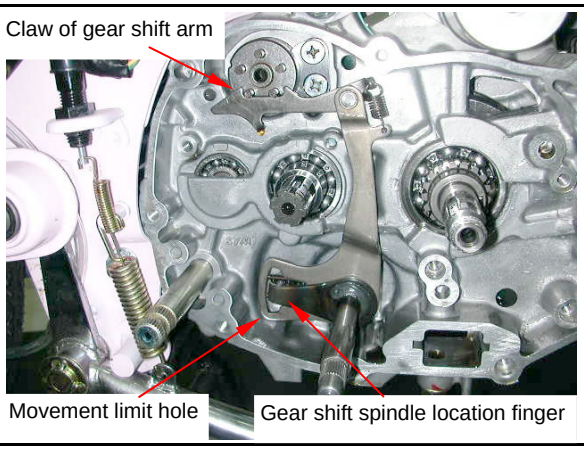
Install the shift drum plate and shift drum pin onto the gear shift drum.



Install the gear shift spindle and gear shift arm.

⚠ Caution

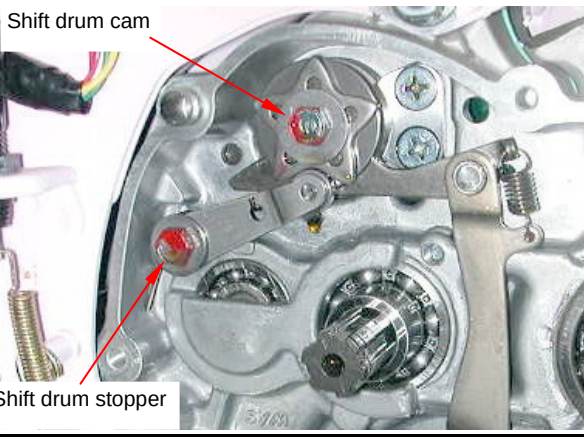
- The gear shift spindle location finger must pass through movement limit hole of the gear shift arm.
- The claw of gear shift arm must hook up with shift drum pins.



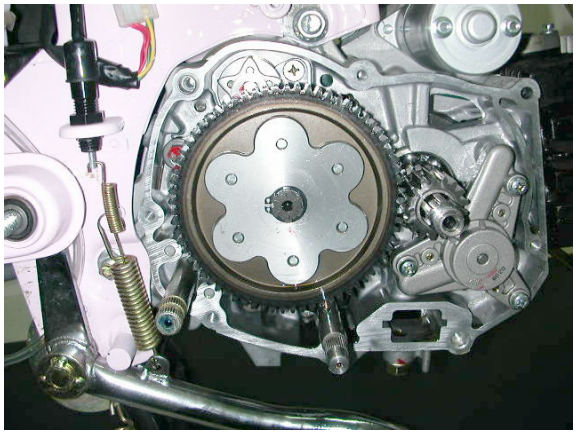
Install the shift drum pin guide and shift drum cam (1 bolt).
Install the shift drum stopper and stopper spring (1 bolt).
Torque value：0.8~1.2kgf-m

⚠ Caution

- After the shift drum stopper is reinstalled, make sure it operates well.



Install the primary driven gear and put on the cir clip.
Install the primary drive gear, clutch assembly, and linkage mechanism.
Install the crankcase location pin, new crankcase gasket and right crankcase cover.
Install the kick starter, gear shift pedal, footrest and exhaust pipe.
Fill in the specified engine oil.

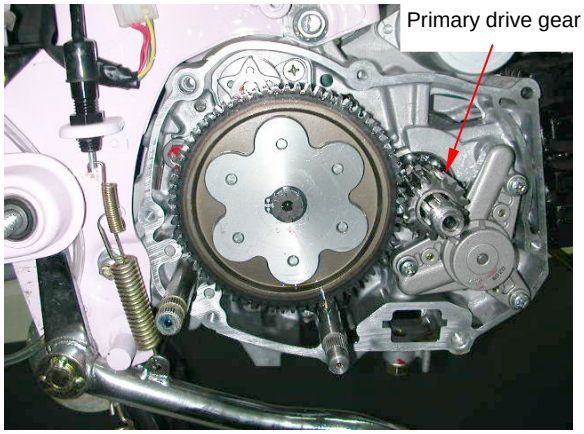


Oil Pump Removal / Inspection

Drain out the engine oil.
Remove the footrest and exhaust pipe.
Remove the kick starter (1 bolt).
Remove the right crankcase cover (8 bolts) and clutch assembly.
Remove the primary drive gear.

Special tool :

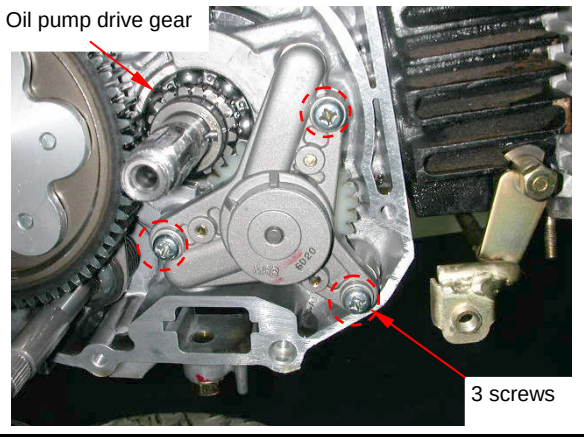
Special nut socket wrench
SYM-9023100-SY125



Remove the oil pump (3 screws).

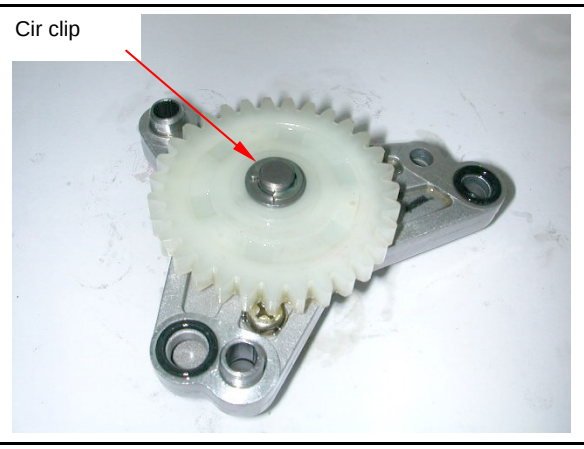
⚠ Caution

- Impact screwdriver is allowed to be used to remove the oil pump lock screws.

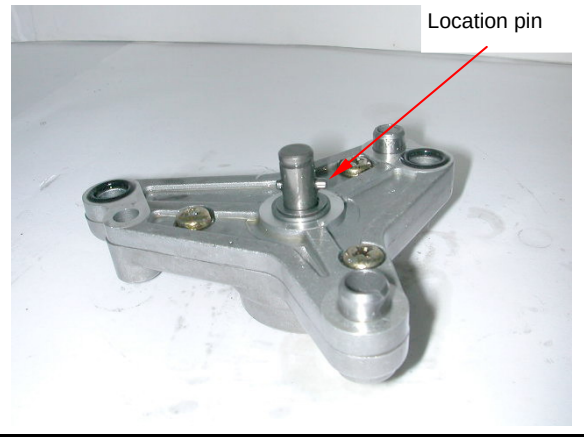


Oil pump disassembly

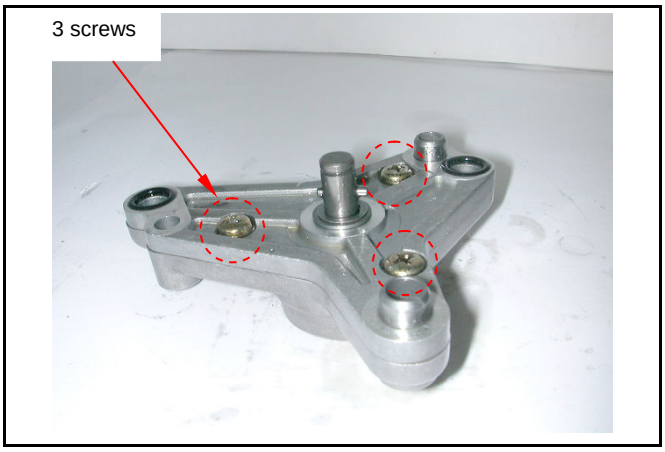
Remove the cir clip, washer and oil pump driven gear



Remove the oil pump driven gear location pin.



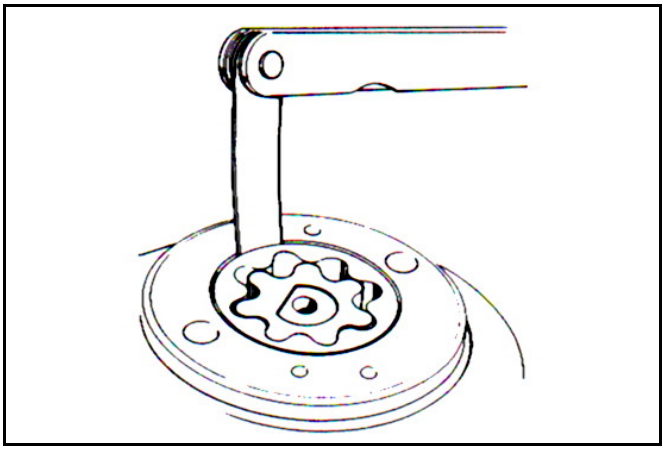
Remove the oil pump cover and washer (3 screws).



Oil pump inspection

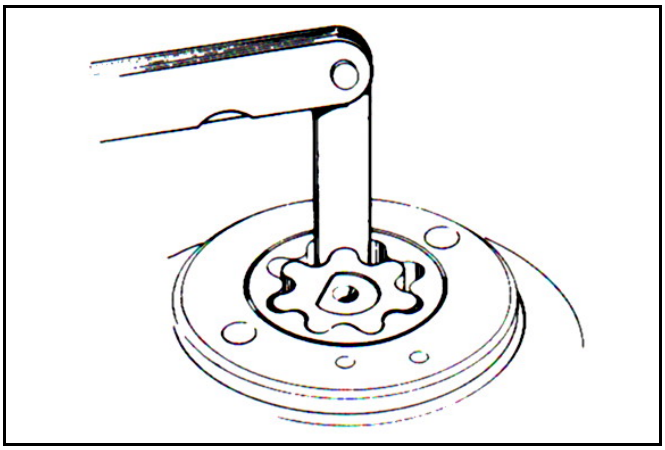
Check the clearance between the oil pump and outer rotor.

Service limit：Under 0.35 mm



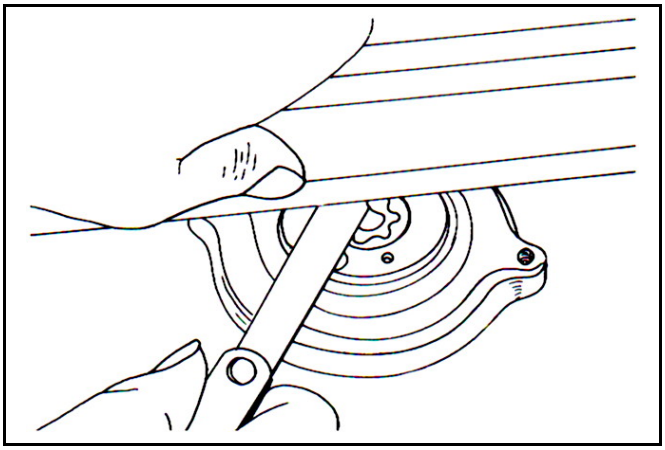
Check the clearance between the inner and outer rotor.

Service limit：Under 0.40mm



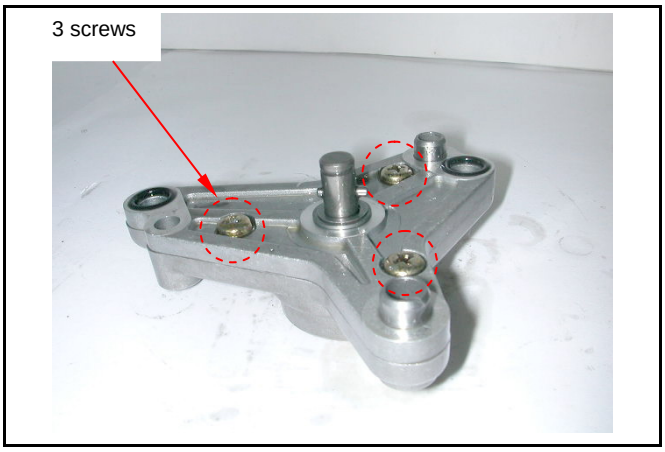
Check the clearance between the surface of oil pump and rotor.

Service limit：Under 0.11 mm



Oil Pump Assembly / Installation

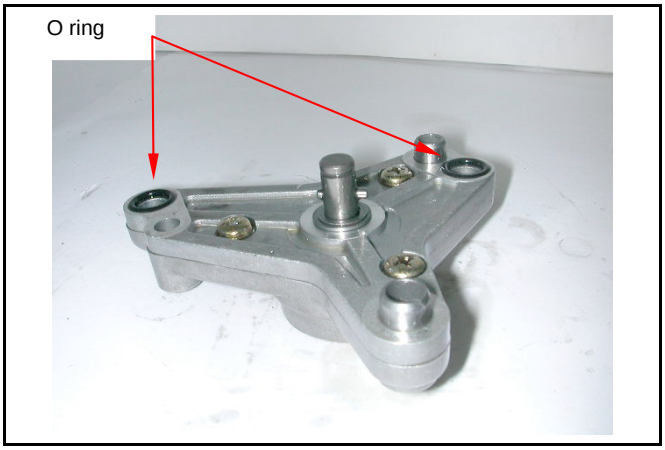
Assemble the inner and outer rotor into the oil pump body.
Install the oil pump drive shaft.
Install the oil pump cover and washer (3 screws).
Torque value：0.3~0.4kgf-m



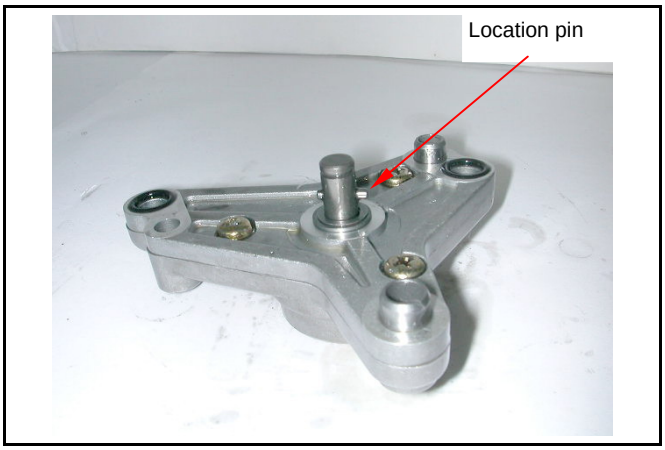
⚠ Caution

- Make sure the oil pump rotate smoothly.

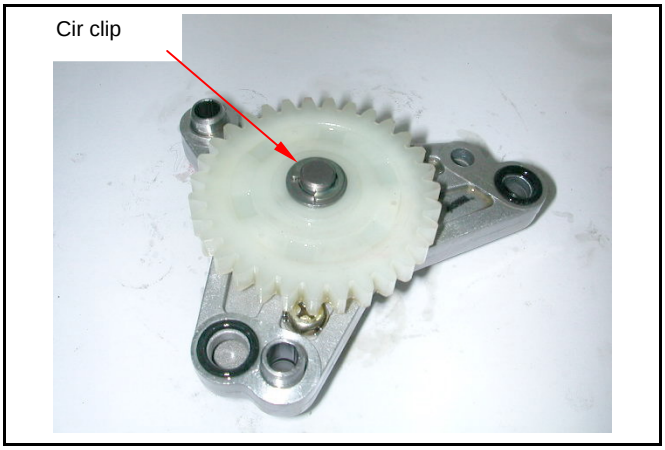
Install new o-rings.



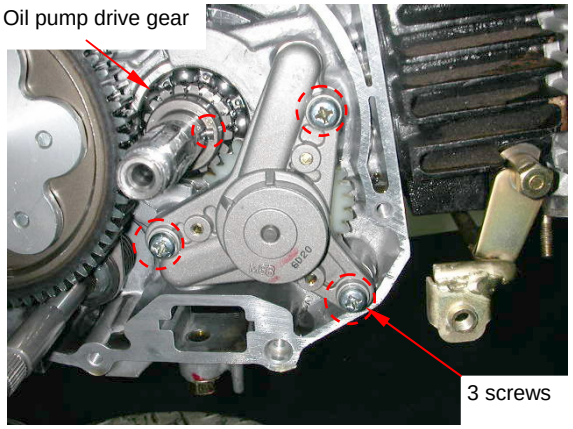
Install the oil pump driven gear location pin.



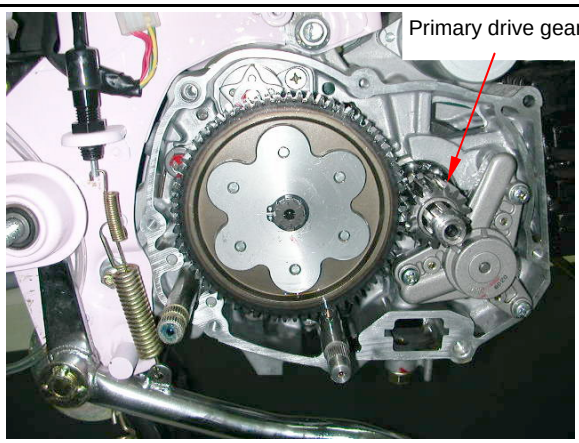
Install the oil pump driven gear and cir clip.



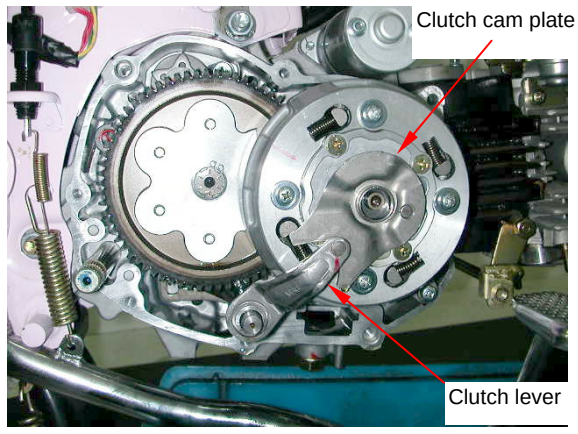
Install the oil pump (3 screws).
Torque value：0.4~0.6kgf-m
Install the oil pump drive gear onto the crankshaft and make the teeth of oil pump drive gear and driven gear coordinate.



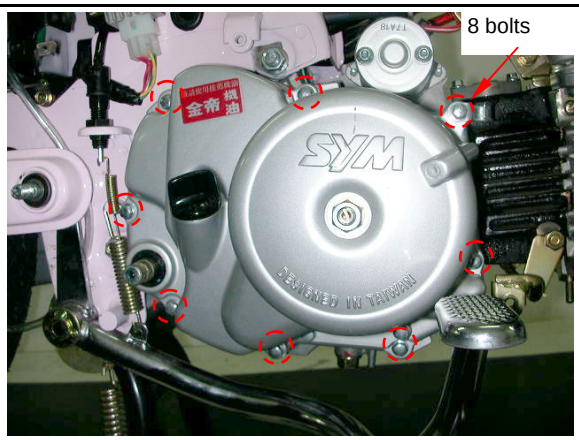
Install the primary drive gear.



Install the clutch assembly and clutch lever.

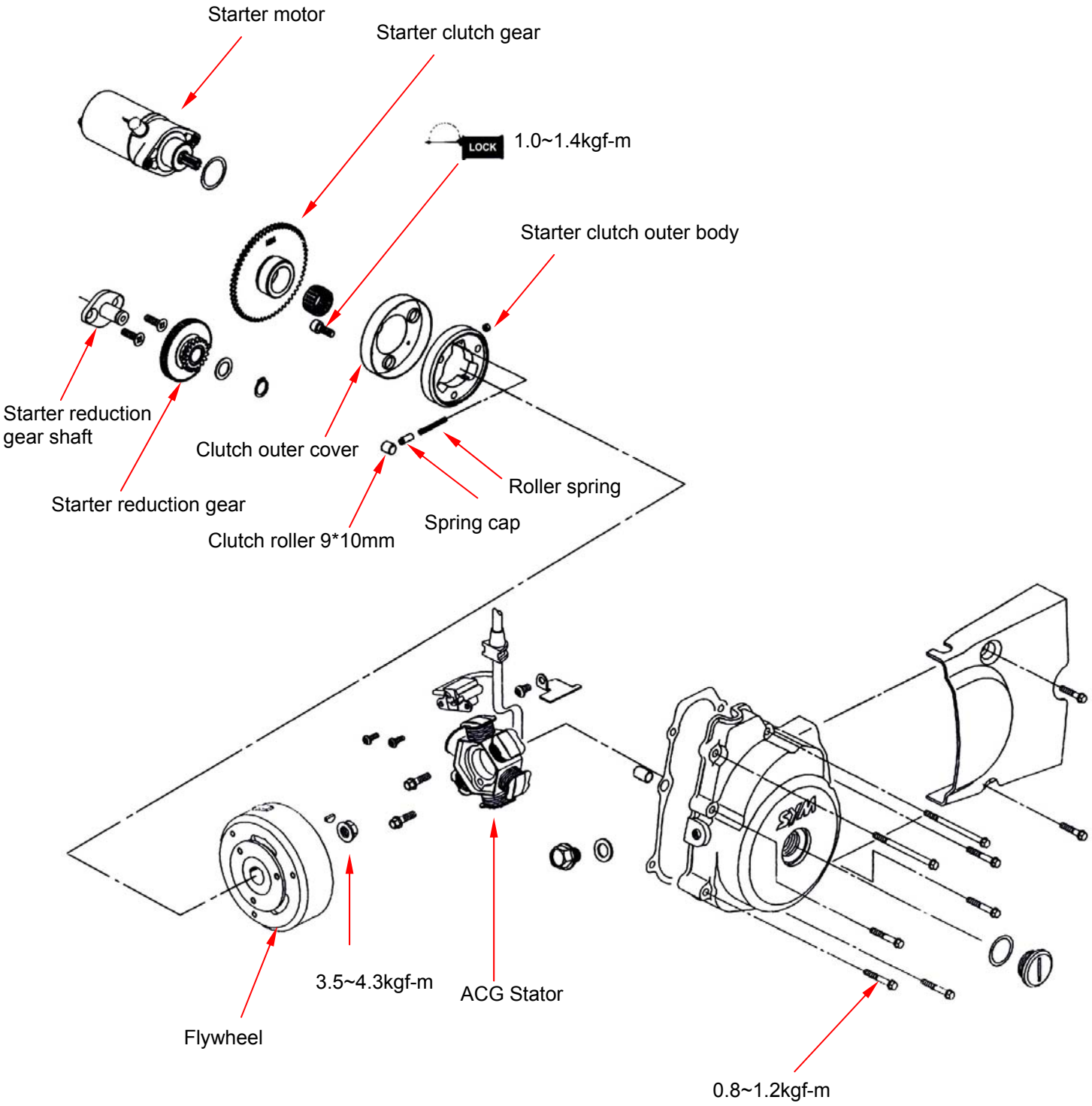


Install the location pin and new right crankcase cover gasket.
Install the right crankcase cover (8 bolts).
Torque value：0.8~1.2kgf-m



Note:

Mechanism Diagram



5. AC. Generator / Starting Clutch

Precautions in Operation

General information

- For engine troubleshooting and inspection, refer to the first chapter.
- For starting Motor repairing process and cautions, refer to Chapter 13.

Specification

Measurement unit：mm

Item	Service limit
Starter clutch gear exterior diameter	35.91
Starter clutch outer interior diameter	37.8

Torque value

Flywheel locknut	3.5~4.3kgf-m
Left crankcase cover bolt	0.8~1.2kgf-m
Starter clutch inner-hexagon bolts	1.0~1.4kgf-m with screw adhesive

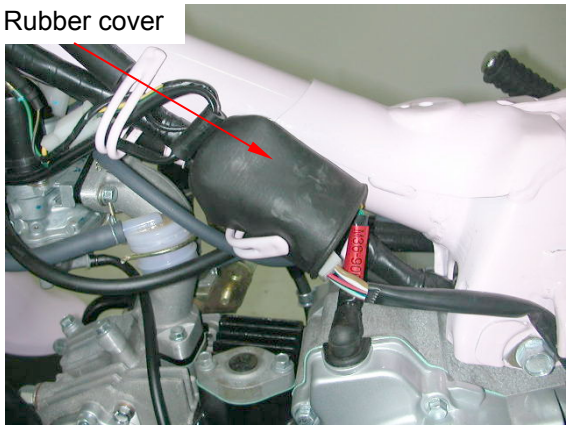
Special tool

Flywheel puller	SYM-3110A00

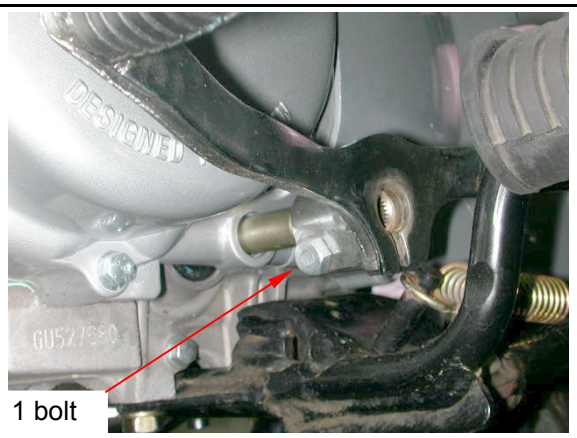
ACG Stator Replacement

Stator replacement

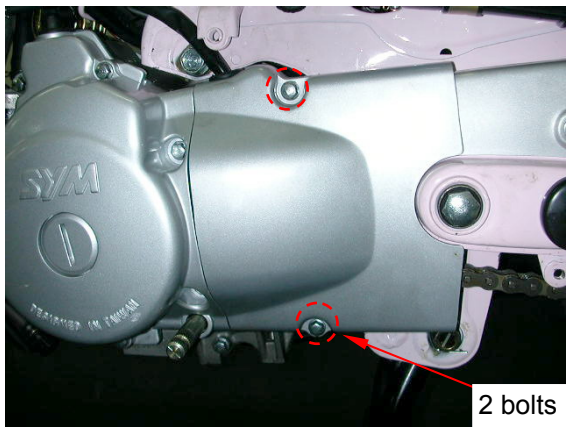
Remove the body cover.
Disconnect the ACG coupler.
Disconnect the gear change switch coupler.



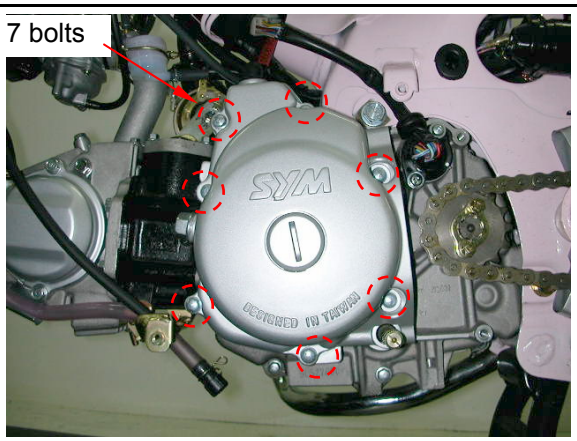
Remove the gear shift pedal (1 bolt).



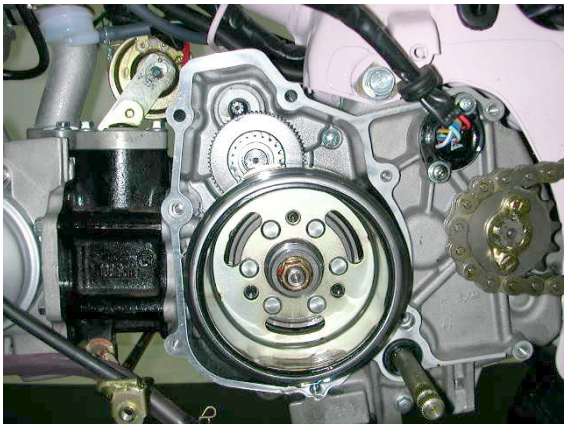
Remove the left crankcase rear cover (2 bolts).



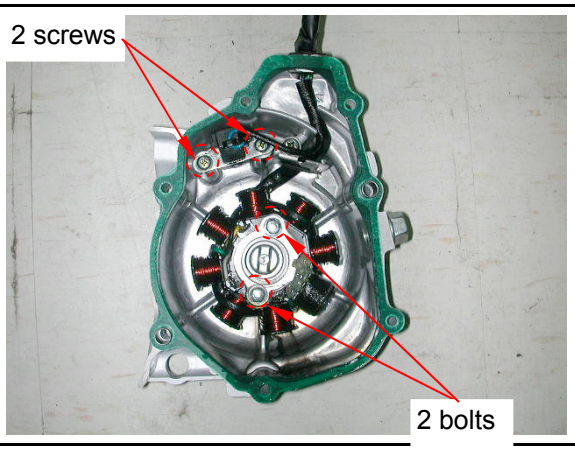
Remove the left crankcase cover (7 bolts).



Remove the foreign objects and gasket residue on the interface of crankcase and cover.



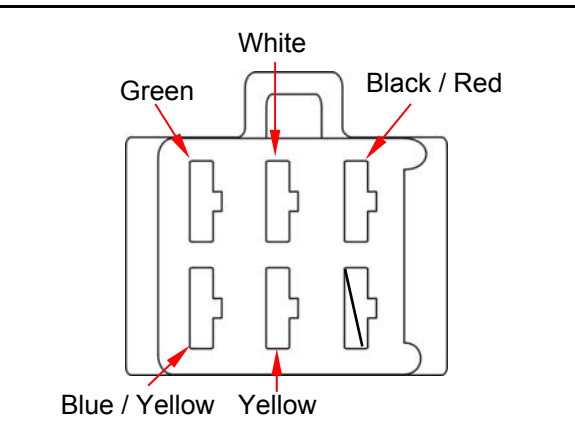
Remove the pulse coil (2 screws) and ACG stator (2 bolts).

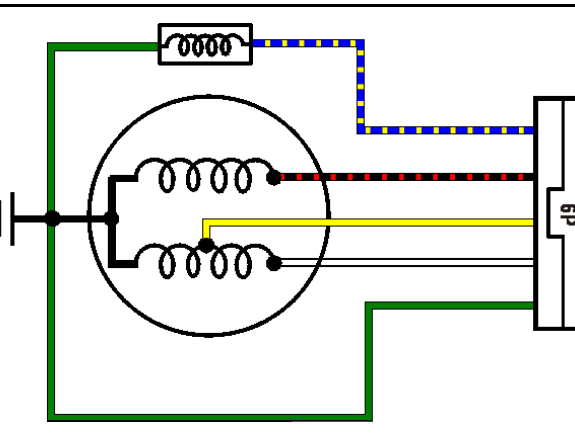


ACG stator inspection

Check the following circuit for electricity conductivity.

White ~ Green	0.7Ω±10%
Yellow ~ Green	0.5Ω±10%
Black / Red ~ Green	780Ω±10%
Blue / Yellow ~ Green	110Ω±10%

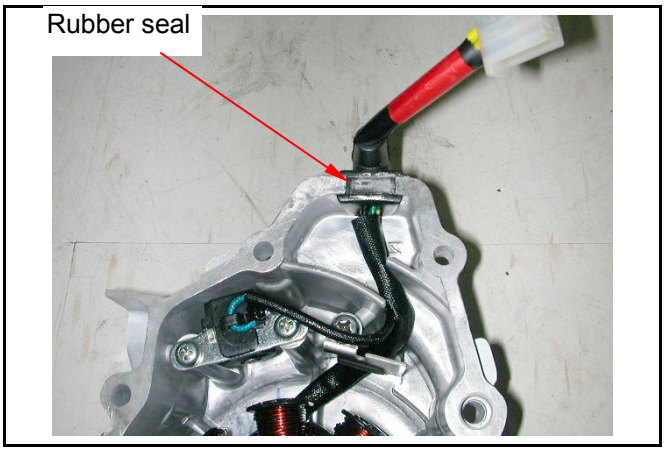




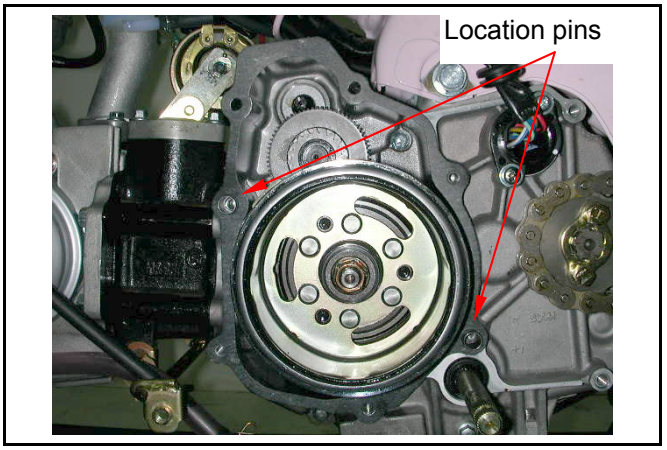
ACG stator assembly

Assemble the ACG stator (2 bolts) and pulse coil (2 screws).

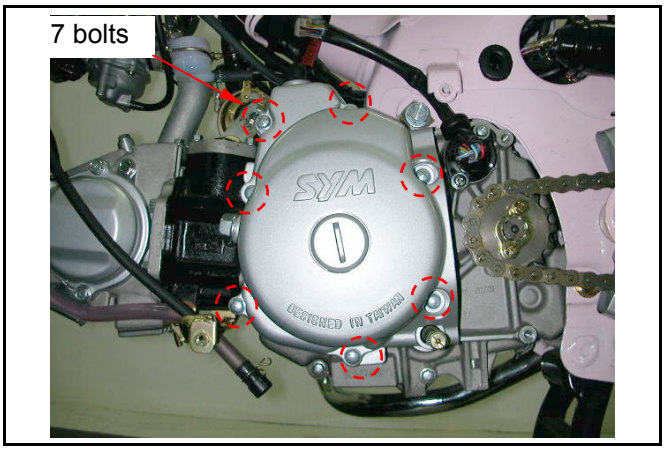
Assemble the stator wire correctly onto the left crankcase cover with the rubber seal.



Install the location pins and new left crankcase gasket.



Install the left crankcase cover (7 bolts).



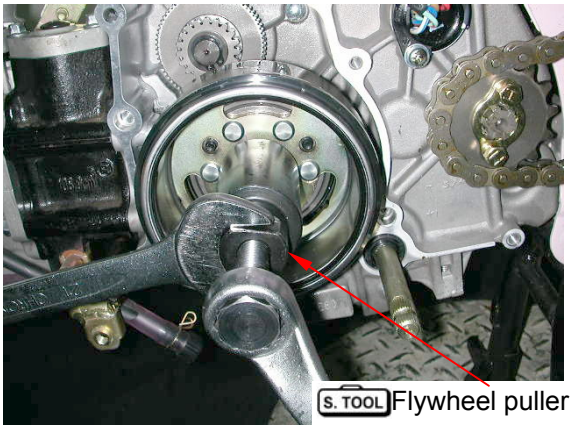
ACG Flywheel / Starting One-way Clutch

ACG flywheel / starting clutch removal

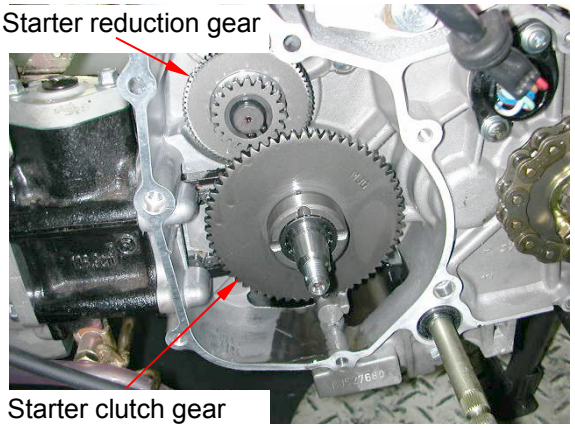
Remove the flywheel / starting one-way clutch with flywheel puller.

Special tool：

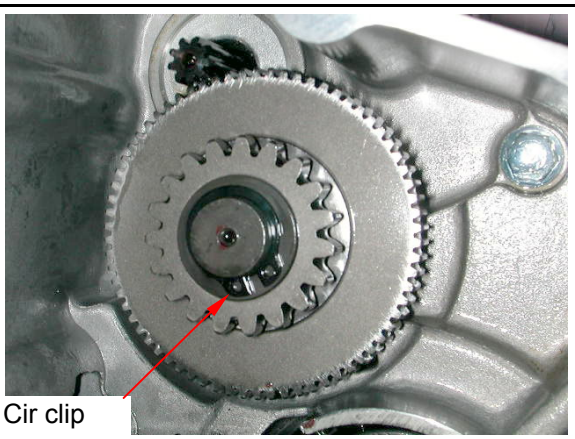
ACG flywheel puller SYM-3110A00



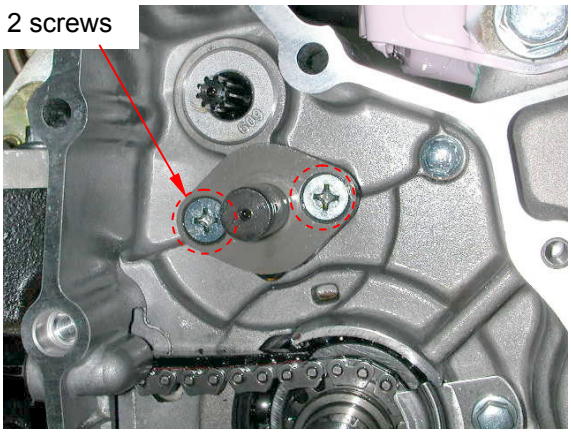
Remove the starter clutch gear and needle bearing



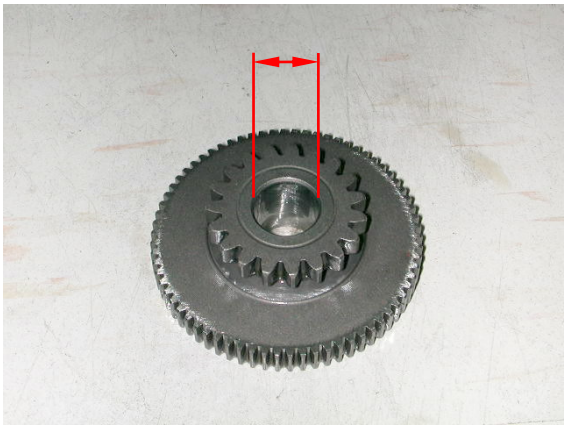
Remove the cir clip and starter reduction gear.



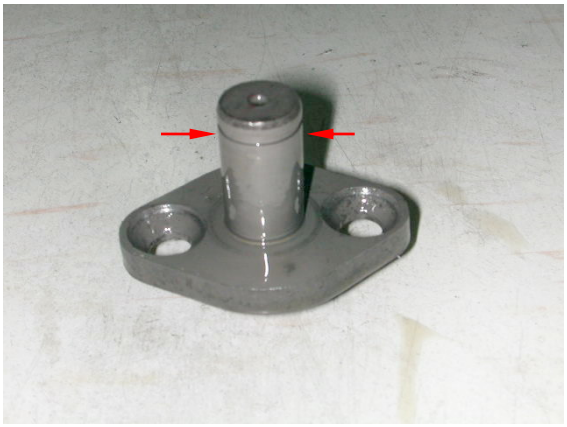
Remove the starter reduction gear shaft (2 screws).



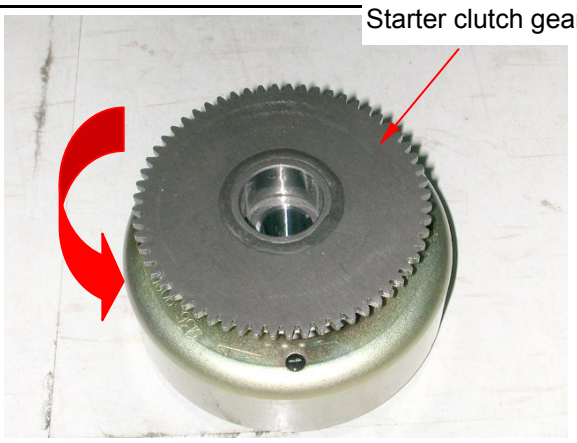
Check the starter reduction gear and shaft for any wear or damage.
Measure the inner diameter of starter reduction gear.
Service limit：
Inner diameter：Under 13.02 mm



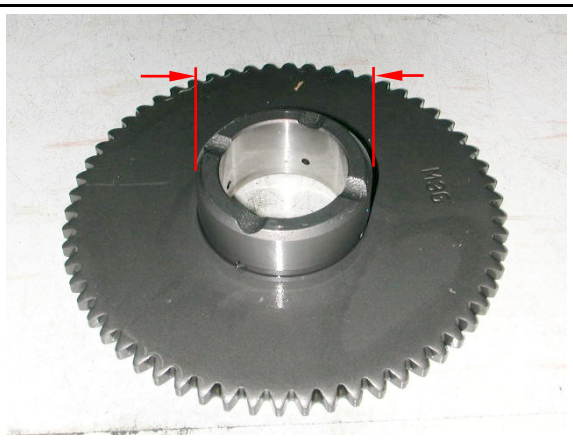
Measure the exterior diameter of starter reduction gear shaft.
Service limit：
Exterior diameter：Over 12.96 mm



Starter clutch inspection
Install the starter clutch gear onto the starter clutch outer.
Hold the starter clutch and turn the starter clutch gear.
Make sure the starter clutch gear can only be turned counterclockwise.

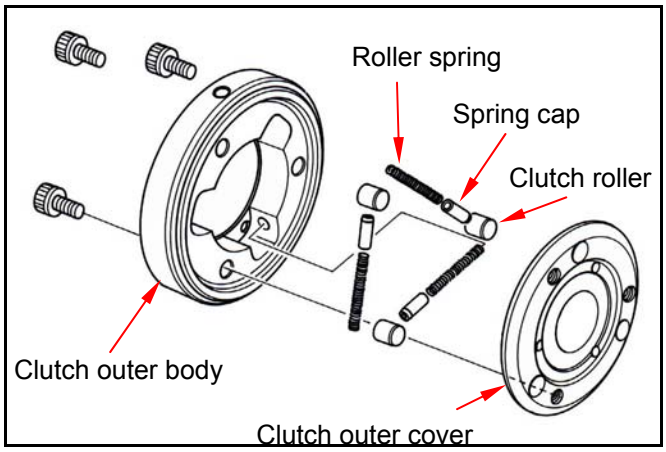


Check the starter clutch gear for any wear or damage.
Measure the exterior diameter of the starter clutch gear.
Service limit：
Exterior diameter：over 35.91 mm

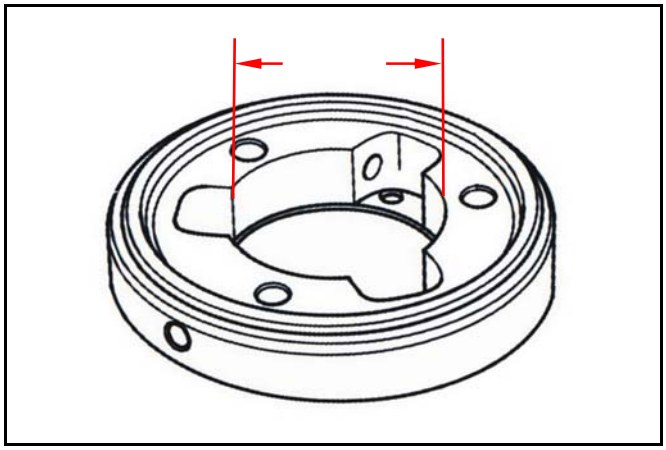


Starter clutch disassembly

Remove the starter clutch inner-hexagon bolts.
Separate the starter clutch outer body and the clutch outer cover.
Disassemble the clutch rollers, spring caps, and springs.
Check if the rollers and spring caps are worn or damaged.
Assemble the rollers, spring caps, and springs.



Measure the inner diameter of the starter clutch outer.
Service limit：
Inner diameter：under 37.8 mm



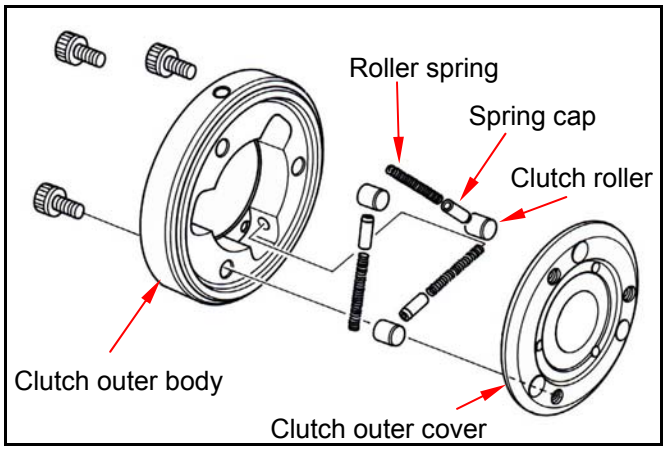
Assembly

Assemble in the reversed process of disassembly.

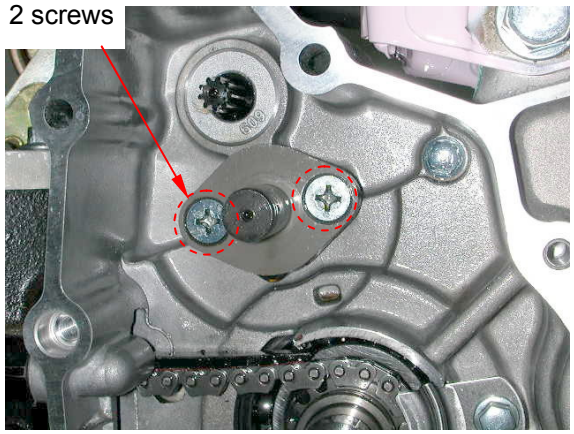
⚠ Caution

- Apply some screw- adhesive on the thread of inner-hexagon bolts.

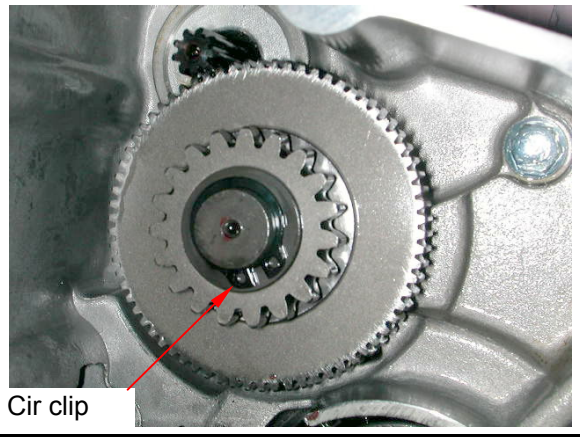
Torque value：1.0~1.4kgf-m



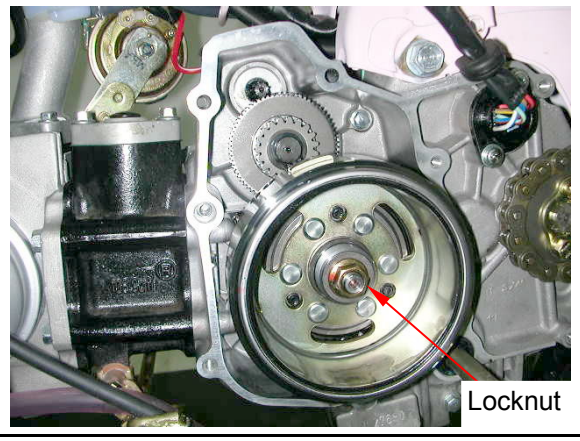
Flywheel / starter clutch installation
Install the starter reduction gear shaft (2 bolts).



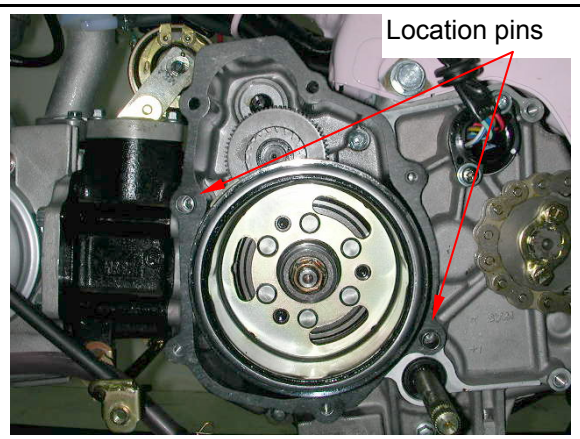
Install the starter reduction gear and cir clip.



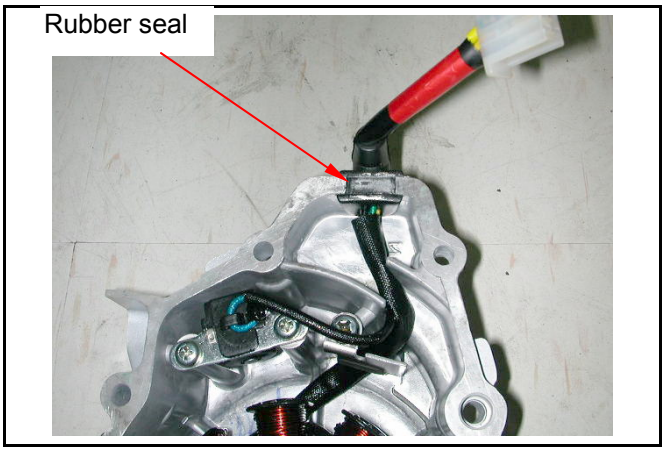
Install the ACG flywheel, starter clutch and starter clutch gear (1 locknut).
Torque value：5.0~6.0kgf-m



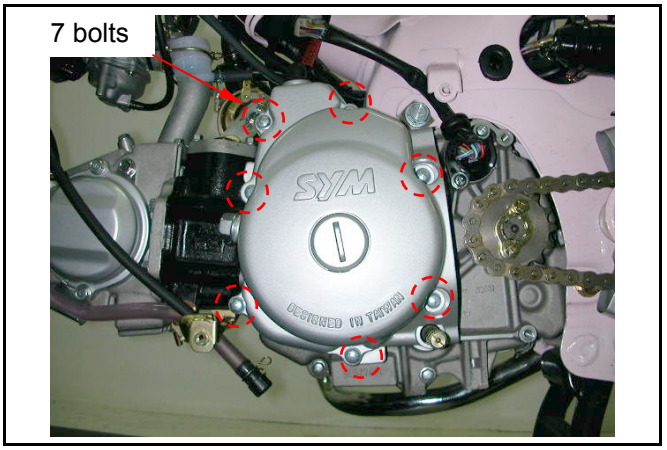
Install the location pins and new gasket onto the crankcase.



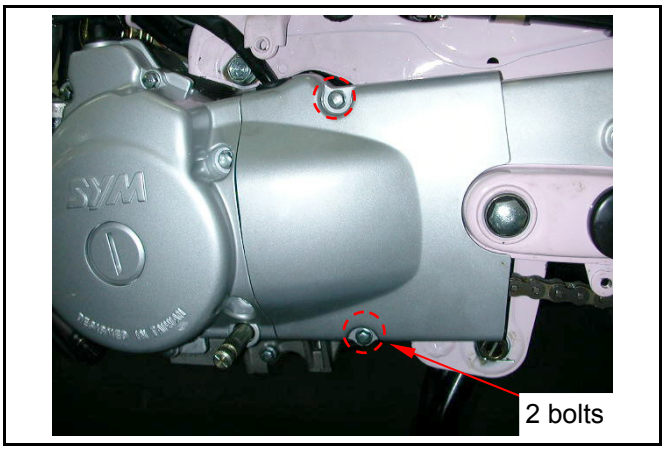
Assemble the stator wire correctly onto the left crankcase cover with the rubber seal.



Install the left crankcase cover (7 bolts).
Torque value：1.5~2.0kgf-m



Install the left crankcase rear cover (2 bolts).



Precautions in Operation

General information

- During maintenance of a removed engine, you need to use an adjustable rack or cart to support the engine.
- The following parts can be repaired with the engine staying on the frame:
  1. Carburetor
  2. AC. Generator
  3. Starting clutch
  4. Clutch
  5. Gear shift mechanism
  6. Cylinder / Piston
  7. Cam chain tensioner
  8. Cam shaft / Rocker arm
- You must remove the engine for repairing the following parts:
  1. Crankshaft
  2. Gear box
  3. Kick starter mechanism

Specification

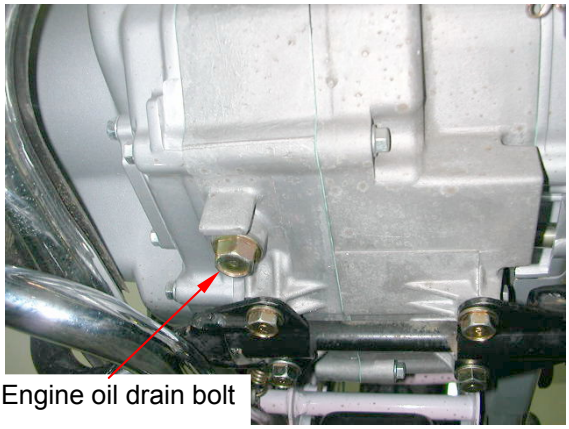
Item		Specification
Engine oil capacity	Regular replacement	800 c.c.
	Fully disassembly	1000 c.c.

Torque value

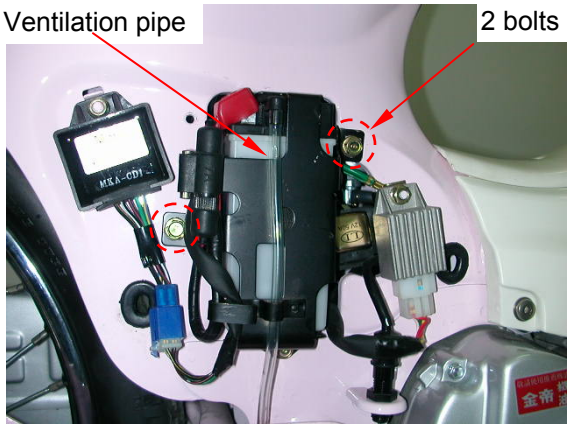
Engine suspension nut	3.0~3.5kgf-m
Left crankcase rear cover bolt	0.8~1.2kgf-m
Driven sprocket bolt	0.8~1.2kgf-m
Step bar lock bolt	2.4~3.0kgf-m

Engine Removal

Drain the engine oil.



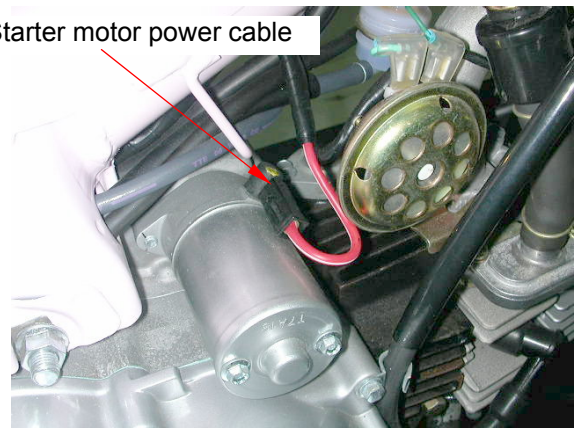
Remove the right body cover.
Remove the battery ventilation pipe.
Remove the battery cable, first negative then positive pole.
Remove the battery (2 bolts).



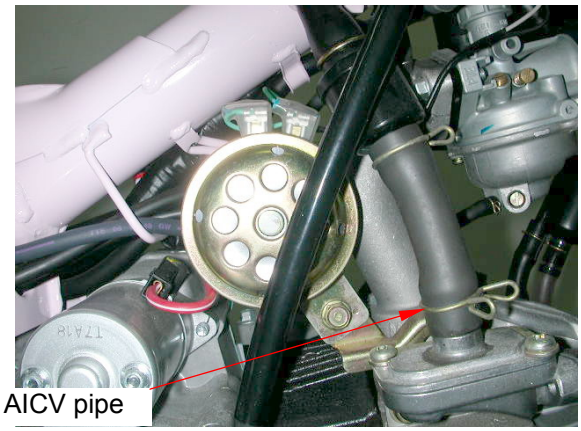
⚠ Caution

- To prevent short circuit, always connect the positive pole before the negative one.

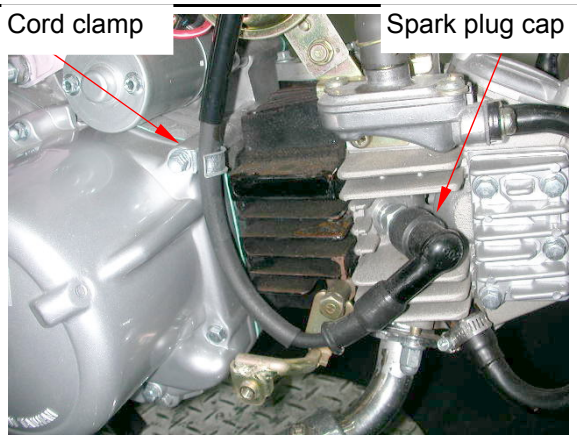
Remove the starter motor power cable.



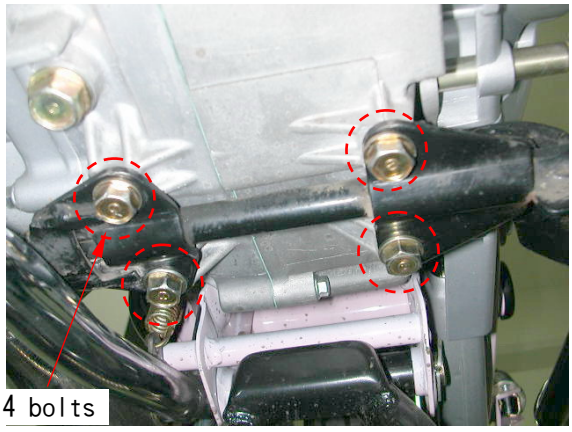
Remove the AICV pipe.



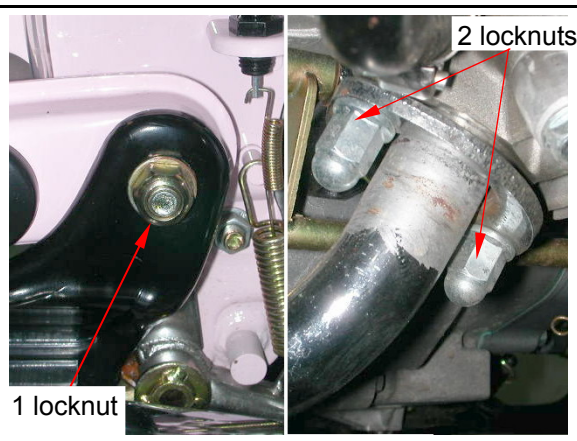
Remove the spark plug cap.
Remove the high tension cord from the cord clamp.



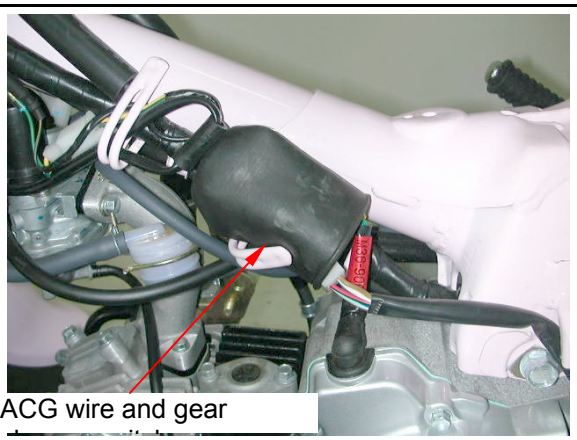
Remove the step bar (4 bolts).



Remove the exhaust pipe (3 locknuts)

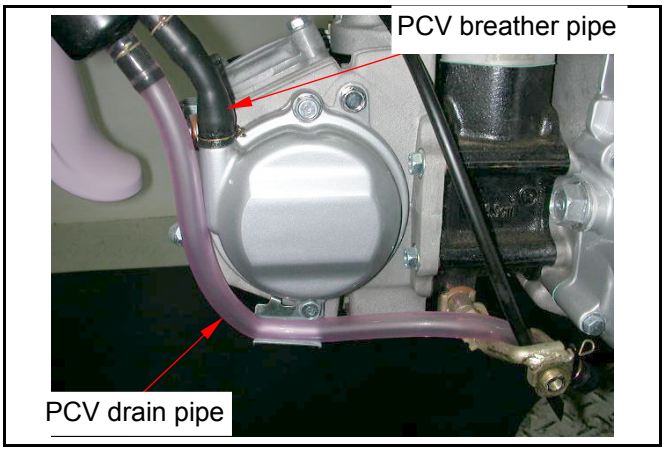


Disconnect the ACG wire and gear change switch.

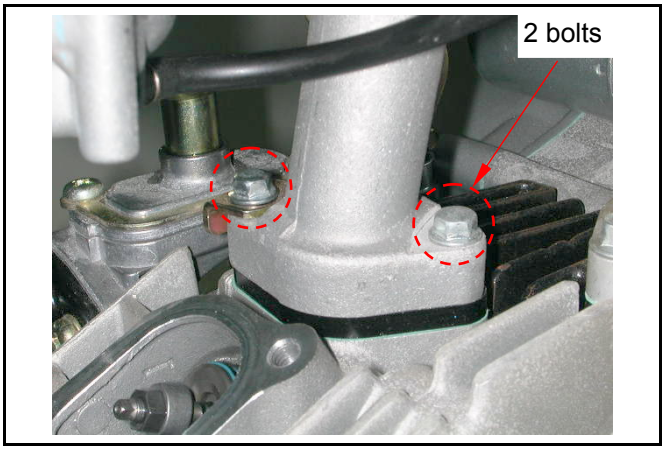


6. Engine Removal

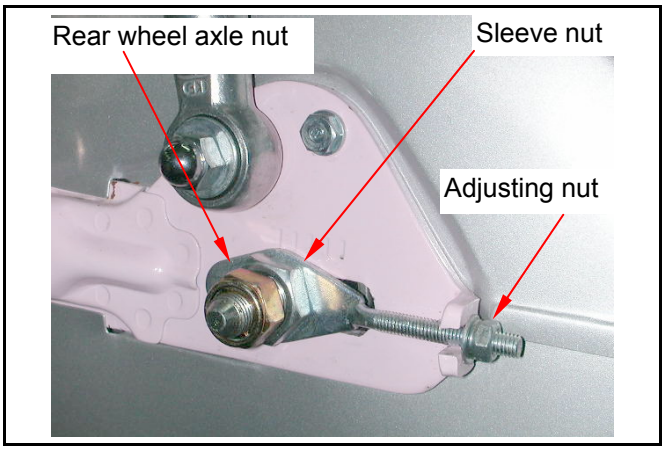
Remove the PCV breather tube.
Remove the PCV drain pipe from the drain pipe clamp.



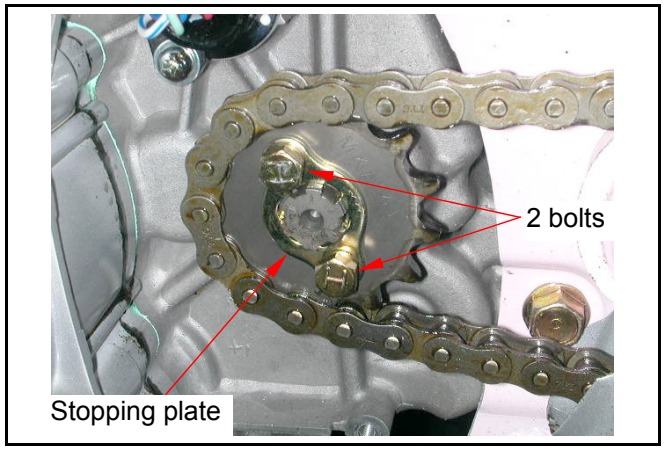
Remove the inlet pipe lock bolts.



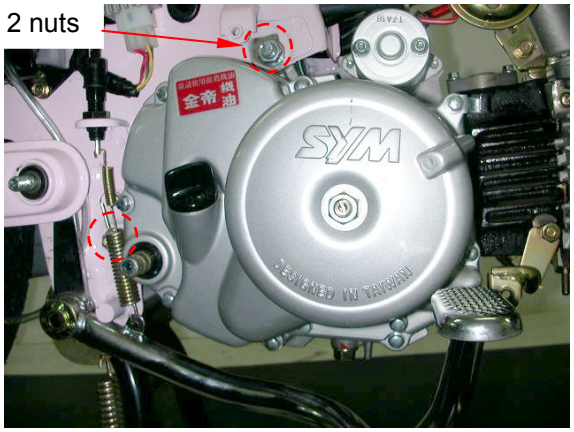
Loosen the rear wheel axle nut, and the sleeve nut.
Loosen the adjusting nut and push the rear wheel forward.



Remove the left crankcase rear cover.
Remove the driving sprocket holding bolts.
Turn slightly and take out the stopping plate, then remove the driving sprocket and chain.

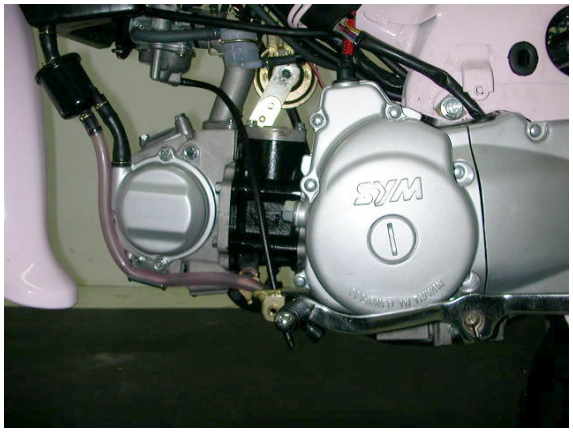


Use a rack to hold the engine.
Remove the engine locknuts.
Pull out the engine holding bolts and remove the engine.



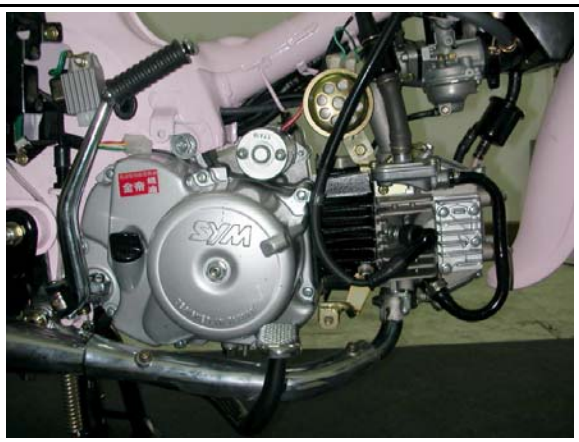
Engine Installation

Install the engine in the reversed procedure of removal



Caution

- During installation, always pay attention to the possible injuries.
- All the wires and cables can't be bent or pressed.
- Please align the wires and cables in accordance with the setting diagram.



Torque value：

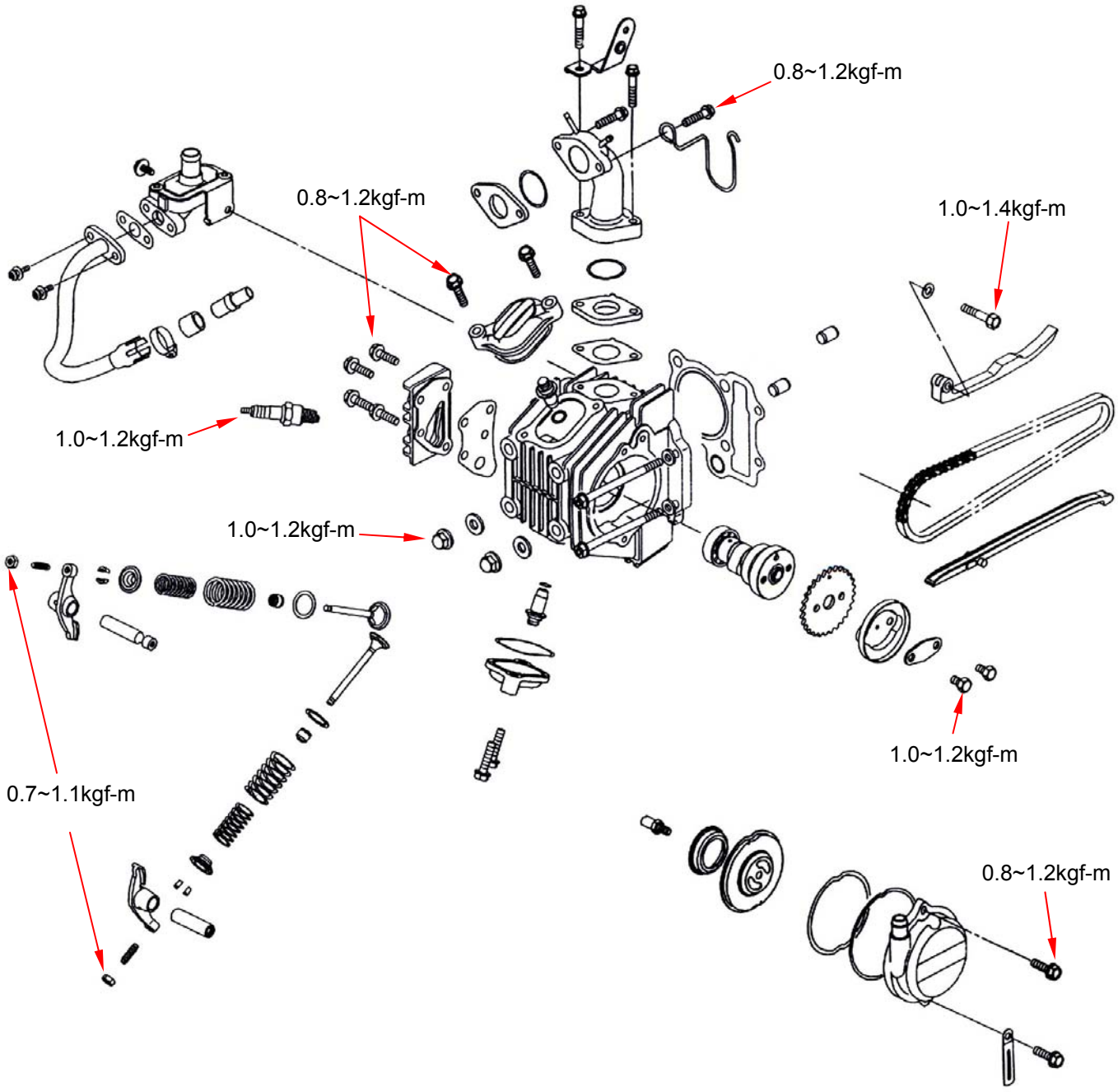
Engine locknut (rear part of engine and frame)	**3.0~3.5kgf-m**
Step bar lock bolt	**2.4~3.0kgf-m**
Left crankcase rear cover lock bolt	**0.8~1.2kgf-m**
Drive sprocket lock bolt	**0.8~1.2kgf-m**

After installation and filling in engine oil, adjust clutch free play, drive chain wave clearance and idle speed.

6. Engine Removal

Note:

Mechanism Diagram



Precautions in Operation

General information

- This chapter includes the repair information of the cylinder head, valve, camshaft, and valve rocker arm.
- The repairing of Cylinder head can be proceeded when the engine is still on the frame.

Specification

Measurement unit: mm

Item			Specification	
			Standard	Service limit
Valve clearance (when engine is cold)			0.12±0.02	—
Compression pressure			11 ± 1 kg/cm²	—
Cam	Cam lift	IN	26.100	26.000
		EX	26.050	25.050
Rocker arm	Inner diameter		10.000~10.018	10.100
	Exterior diameter		9.978~9.987	9.900
Valve	Valve stem exterior diameter	IN	4.985~4.995	4.900
		EX	4.970~4.980	4.900
	Valve guide	IN / EX	5.000~5.012	5.100
	Clearance between valve stem / guide	IN	0.010~0.035	0.080
		EX	0.030~0.055	0.100
	Valve seat width		1.200	1.600
	Valve spring free length	Inner spring	32.500	30.500
		Outer spring	34.750	34.000
Warp / clearance between cylinder head and cylinder			—	0.050

Torque valve

Cylinder head nut	1.0~1.2kgf-m	Tappet adjustment cap	0.8~1.2kgf-m
Cylinder head left bolt	0.8~1.2kgf-m	Valve adjustment locknut	0.7~1.1kgf-m
Cylinder head side cover bolt	0.8~1.2kgf-m		(Apply engine oil on threads and seats)
Cam chain sprocket bolt	1.0~1.2kgf-m		
Cam chain tensioner shaft bolt	1.0~1.4kgf-m	Spark plug	1.0~1.2kgf-m

Special tools

Valve guide reamer 5.0mm

Valve guide driver 5.0mm

Rocker arm shaft / camshaft puller	SYM-1445100
Valve spring compressor	SYM-1471100
Valve spring assemble / disassemble tool	SYM-1471110/20
Cylinder head / engine oil strainer cap wrench	SYM-ALL23461
Valve clearance adjusting Wrench	SYM-9001200

Troubleshooting

Engine performance will be affected by troubles on cylinder-head perimeter parts. The trouble usually can be determined or by performing cylinder compression test or judging the abnormal noise.

Poor idle speed

Compression pressure is too low.

Low compression pressure

1. Valve

Improper valve clearance adjustment
Burnt or bent valve
Improper valve timing
Valve spring damage
Valve carbon deposit
Valve seat warp
Spark plug not tightened of badly assembled.

2. Cylinder head

Cylinder head gasket leaking or damage
Tilt or crack cylinder

3. Piston

Worn piston rings

High compression pressure

Too much carbon deposit on combustion chamber or piston head

Abnormal noise

Improper valve clearance adjustment
Burnt valve or damaged valve spring
Camshaft worn out or damage
Cam chain worn out or looseness
Cam chain tensioner worn out or damage
Camshaft sprocket worn out
Rocker arm or rocker arm shaft worn out

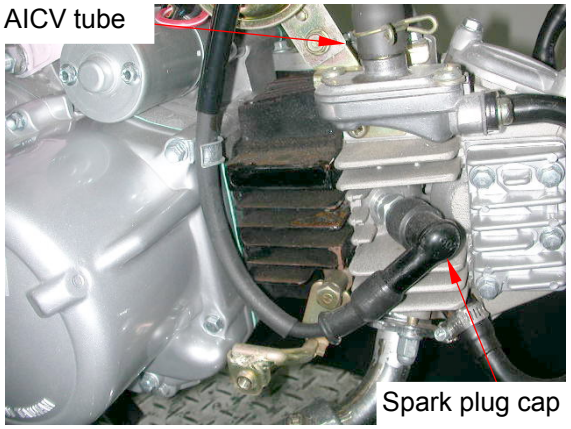
Smoke from exhaust pipe

Valve guide or stem worn out
Valve guide oil seal worn out

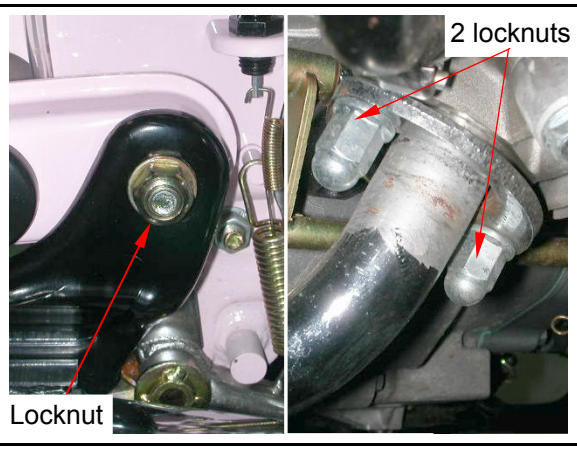
Cylinder Head

Cylinder head disassembly

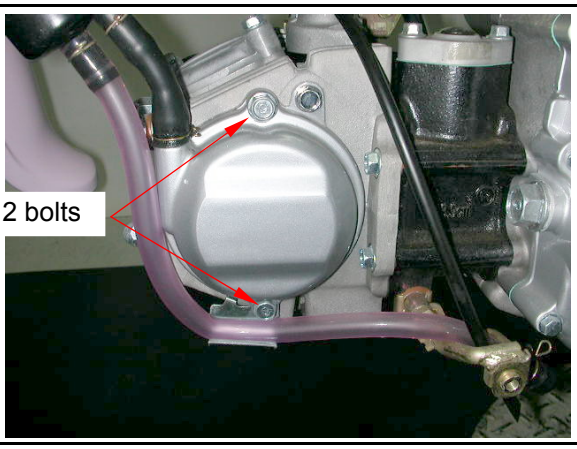
Remove the AICV pipe and spark plug cap on the right side of engine.



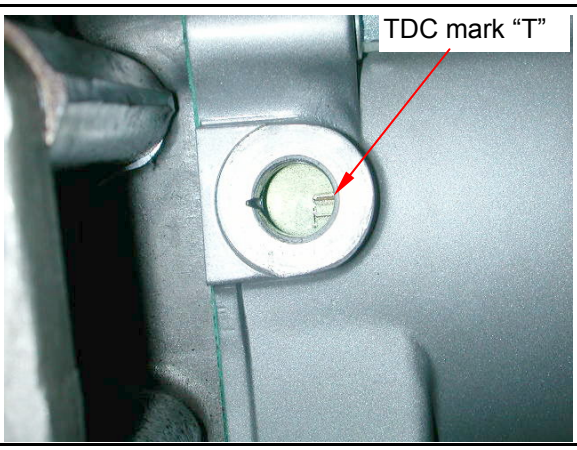
Remove the exhaust pipe (3 locknuts).



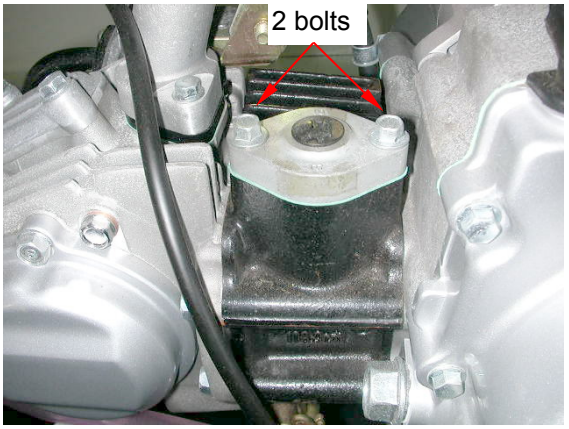
Remove the PCV breather pipe and the cylinder head left side cover (2 bolts).



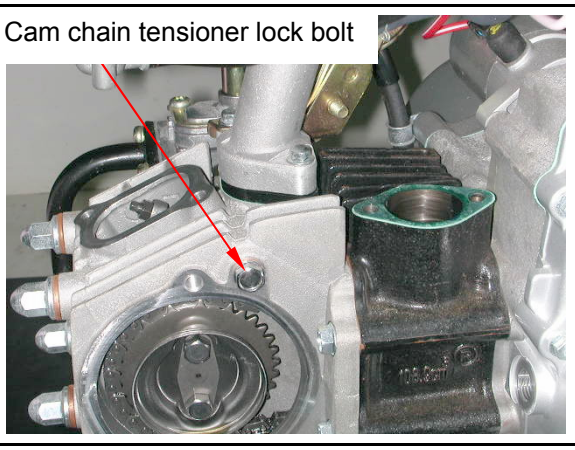
Remove the timing-inspecting hole cap and ACG cap. Rotate the crankshaft counterclockwise to match the TDC mark “T”.



Remove the cam chain tensioner lifter (2 bolts).



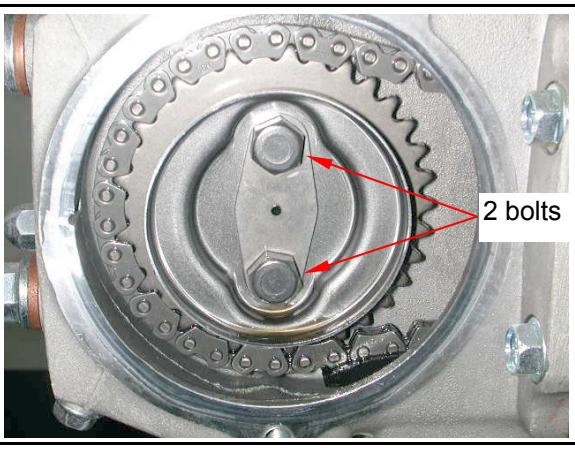
Remove the cam chain tensioner lock bolt.



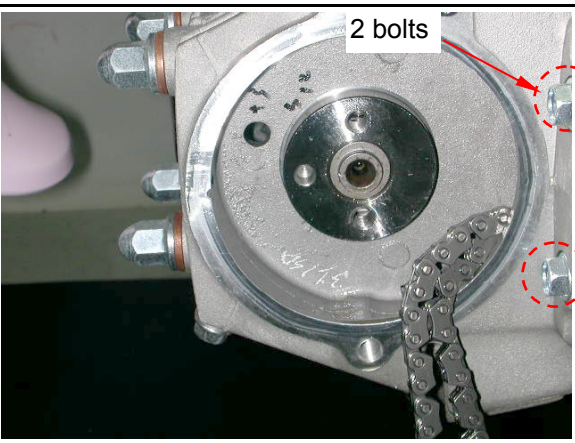
Remove the cam chain sprocket (2 bolts).

Caution

- After removing the cam chain sprocket, drag out the cam chain to prevent it from falling into the crankcase.

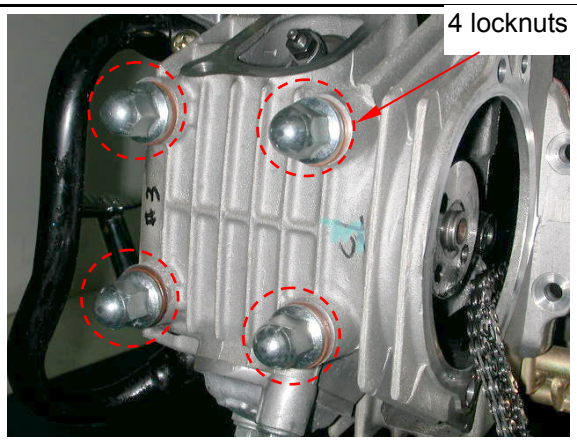


Remove the cylinder head left side lock bolt (6mm).



7. Cylinder Head / Valve

Remove the cylinder head (4 locknuts).



Clean up residues from the matching surfaces of cylinder and cylinder head

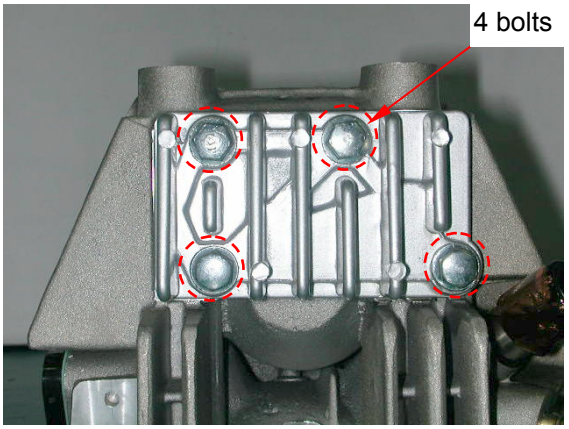
Caution

- Don't damage the matching surfaces of cylinder and cylinder head
- Avoid residues of gasket or foreign materials falling into crankcase when cleaning.

Valve Rocker Arm

Valve rocker arm removal

Remove the cylinder head right side cover (4 bolts).



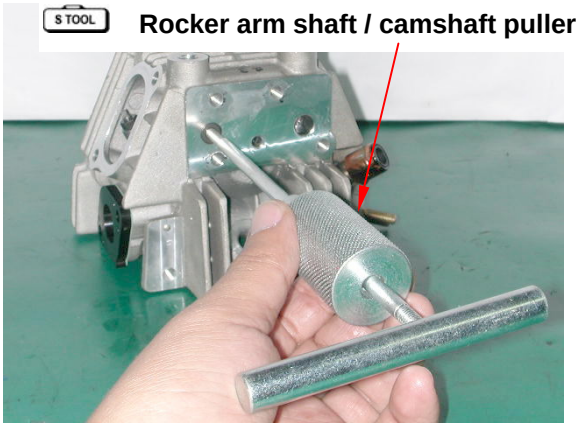
Use **rocker arm shaft / camshaft puller** to pull out the in. valve rocker arm shaft.
Use an 8mm bolt to pull out the ex. valve rocker arm shaft.

Special tool：

Rocker arm shaft / camshaft puller

SYM-1445100

Remove the valve rocker arm.



Camshaft

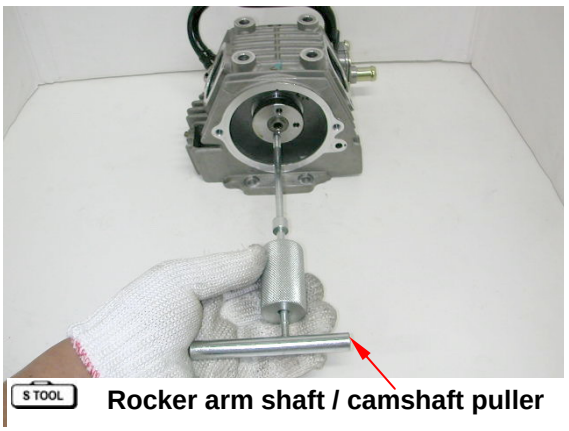
Camshaft removal

Use a 5mm bolt or the **rocker arm shaft / camshaft puller** to pull out the camshaft

Special tool：

Rocker arm shaft / camshaft puller

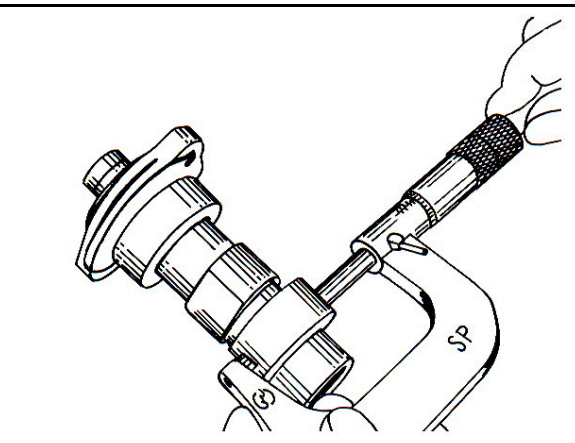
SYM-1445100



Camshaft inspection

Check the camshaft any wear or loose, also the bearing on the camshaft

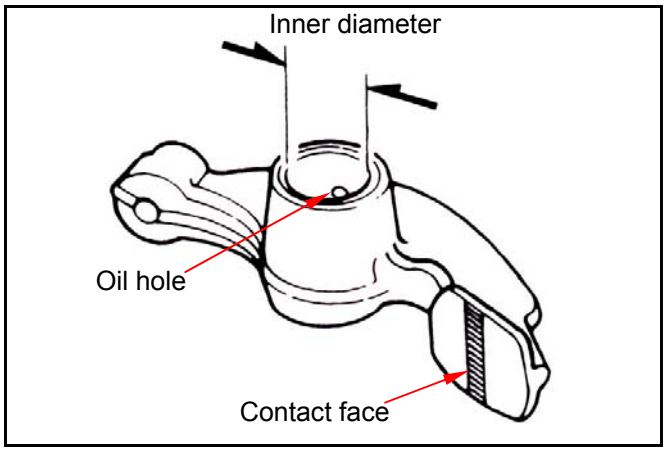
Service limit： In. 26.00mm
Ex. 25.05mm



Valve rocker arm inspection

Measure the valve rocker arm inner diameter and the contact face for wear or damage. Also check if the oil hole is clogged.

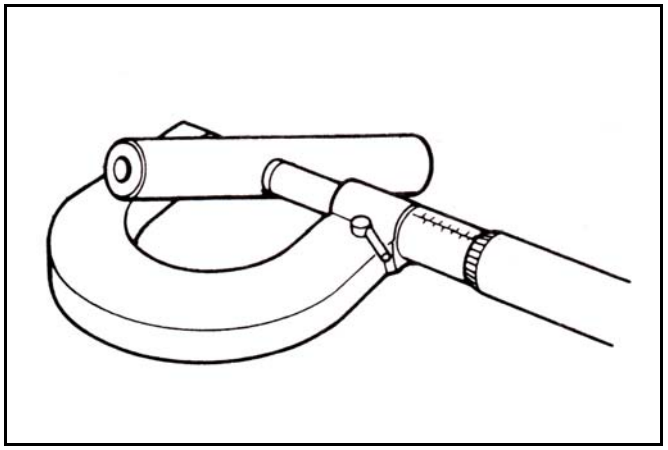
Rocker arm inner diameter service limit：10.1mm



Valve rocker arm shaft inspection

Check the valve rocker arm shaft outer diameter for wear.

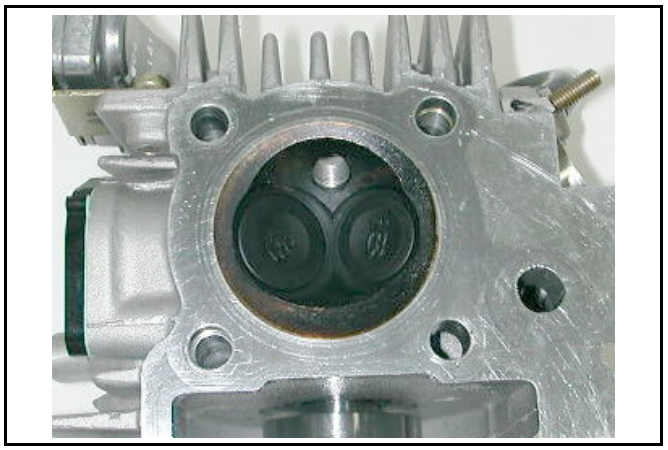
Valve rocker arm shaft outer diameter service limit：9.90mm



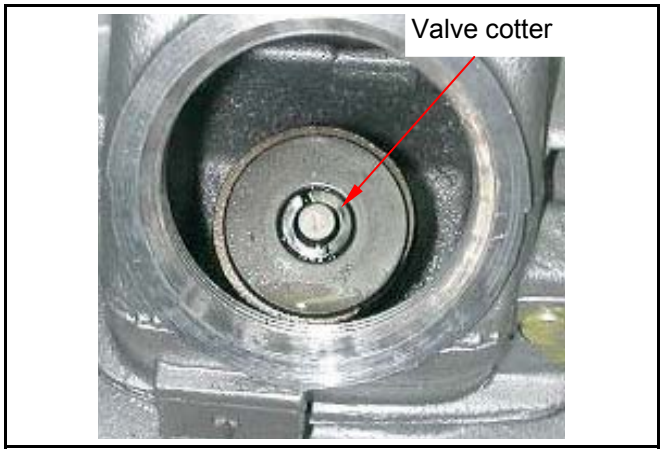
Valve

Valve removal

Clean the carbon deposit inside the combustion chamber.



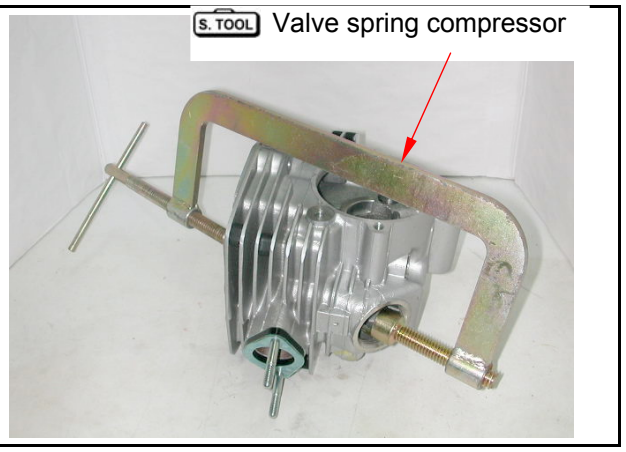
Remove the valve cotter.



Use the valve spring compressor to compress the spring, remove the valve cotter, and then take out the spring and spring retainers

Special tool：

Valve spring compressor SYM-1471100



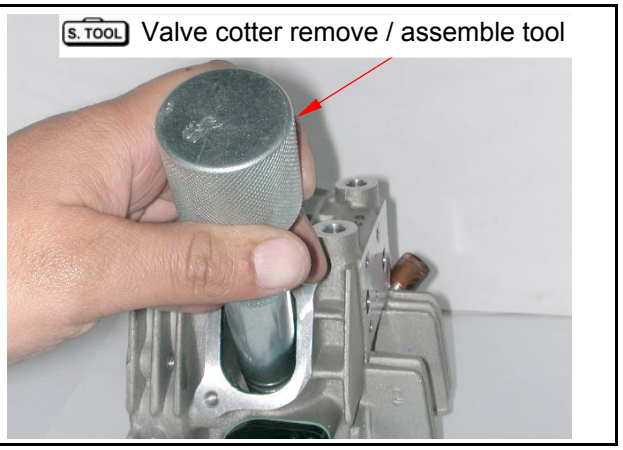
⚠ Caution

- Do not over compress the valve spring.
- When removing the carbon deposit, beware not to damage the components inside the combustion chamber

Valve cotter remove / assemble tool can be used to remove the valve cotter too.

Special tool：

Valve cotter remove / assemble tool SYM-1471110/20



⚠ Caution

- To avoid damaging the valve stem and the cylinder head, put a rag under the cylinder head when compressing the valve spring.

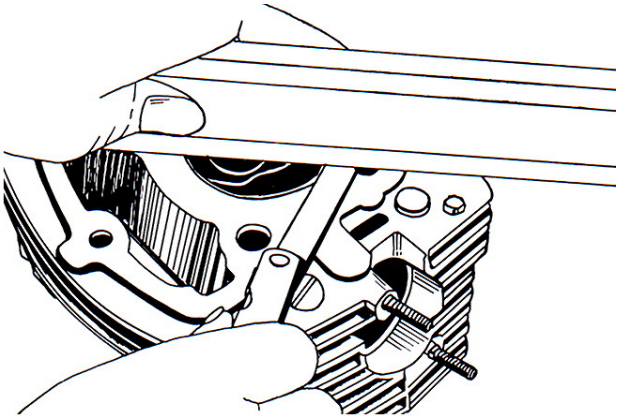
Cylinder head inspection

Clean the gasket residue on the matching surface.

Check if the cylinder head has any cracks.

Measure cylinder head warp with a straightedge and thickness gauge.

Service limit：0.05mm

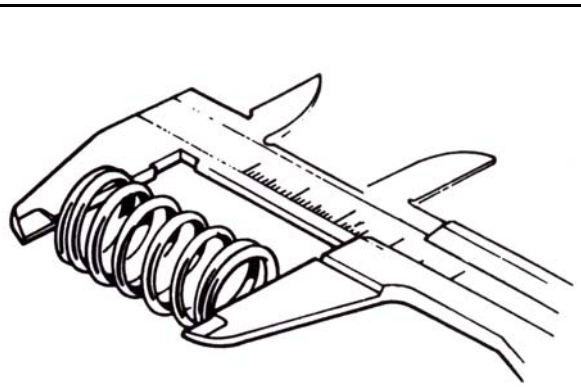


Valve spring free length inspection

Measure the free length of inner and outer valve spring

Service limit：Outer spring 34.00mm

Inner spring 30.50mm

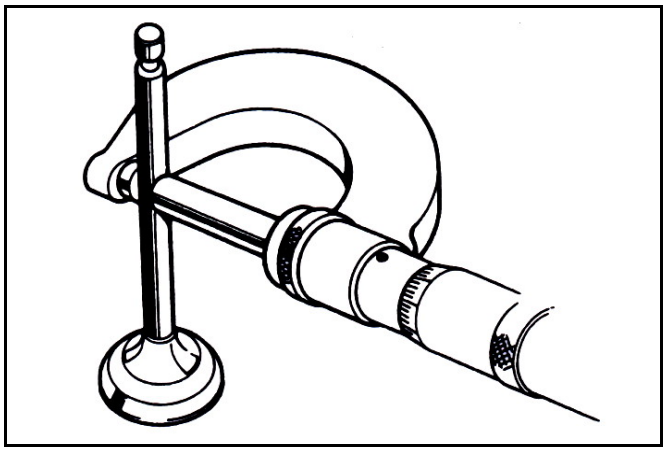


Valve stem inspection

Check if valve stems are bent, cracked or burnt.

Check the operation condition of valve stem in valve guide, and measure the valve stem outer diameter

Service limit：In. valve 4.90mm
Ex. valve 4.90mm

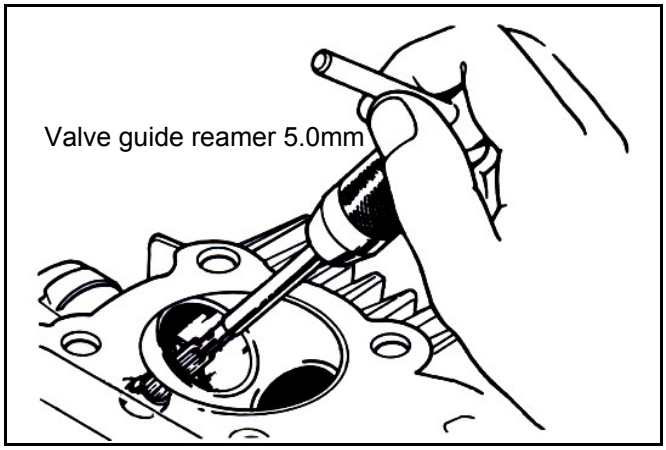


Valve guide inspection

Caution

- Clean all the carbon deposit with reamer before measuring the valve guides

Special tool: Valve guide reamer 5.0mm

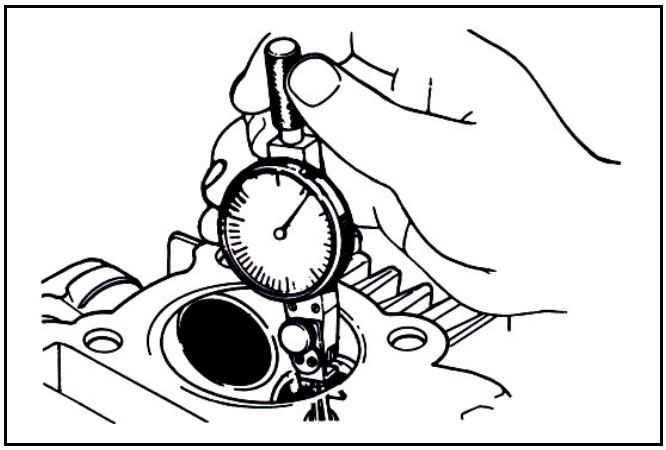


Measure and record each valve guide inner diameters.

Service Limit：5.10mm

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

Service Limit：
Intake: 0.08mm
Exhaust: 0.10mm

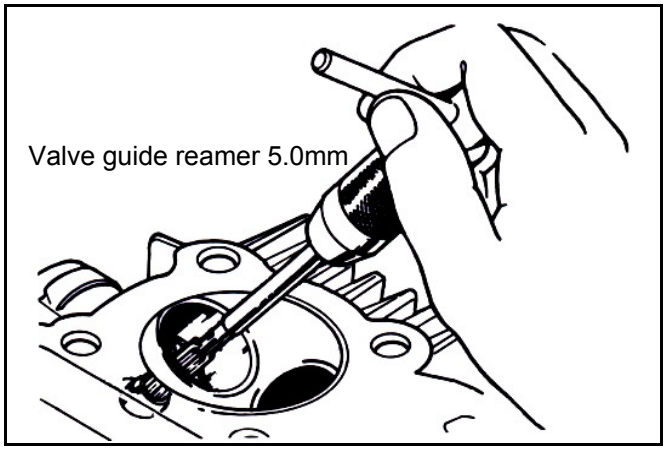


Caution

- If clearance is over service limit, check if only replaces new valve guide will fix the clearance into service limit or not. If yes, replace valve guide only.

Fix the guides with reamer after replacement.

If clearance still exceeds service limit after replacing valve guides, please also replace valve stem too.



Caution

- Fix the valve seat after replacing valve guides.

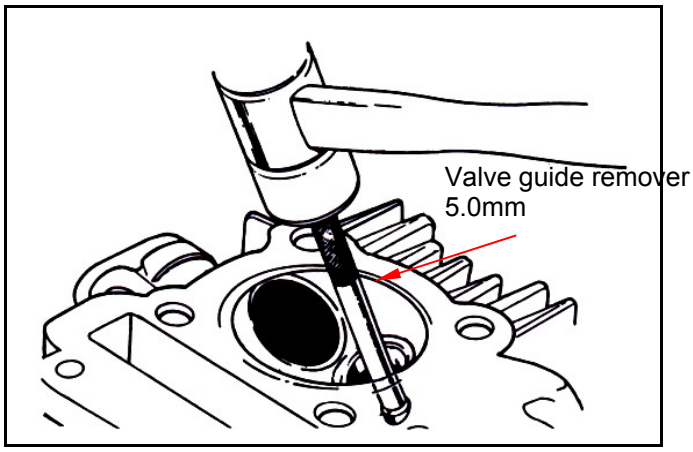
Valve guide replacement

Heat the cylinder head with heated plate or toaster till the temperature reaches 100~150 ℃.

⚠ Caution

- Do not use flame to heat the cylinder head directly. Otherwise, the cylinder head will be deformed.
- Wear a pair of heat-isolation glove to protect your hands when operating.

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



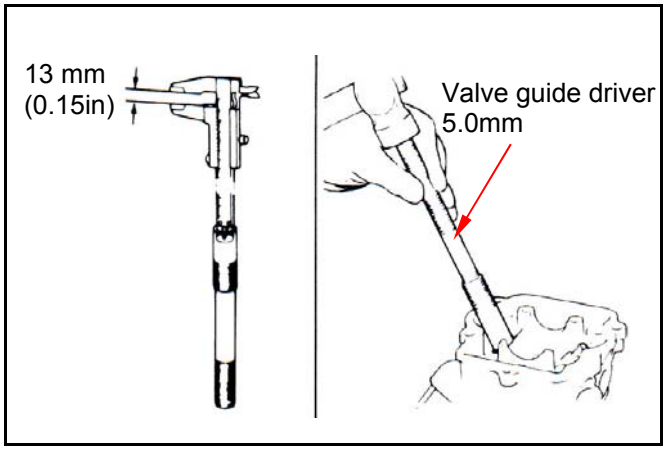
Tool：Valve guide remover 5mm

⚠ Caution

- Check if new valve guide is deformed when pressed it in.
- When pressing in the new valve guide, cylinder head still have to be maintained 100~150℃.

Adjust the valve guide driver and let valve guide height be 13 mm.

Press in new valve guide from rocker arm side.

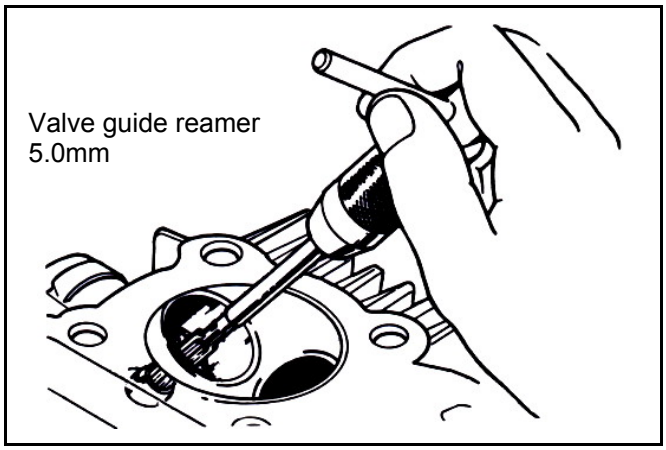


Tool：Valve guide driver 5mm

Wait until cylinder head is cooled down to room temperature, and then fix the new valve guide with reamer.

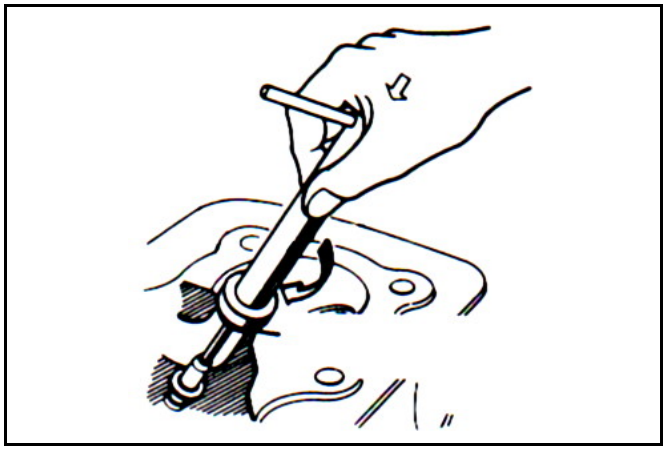
⚠ Caution

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



Fix the valve seat, and clean all metal residues from cylinder head

Special tool：Valve guide reamer 5mm



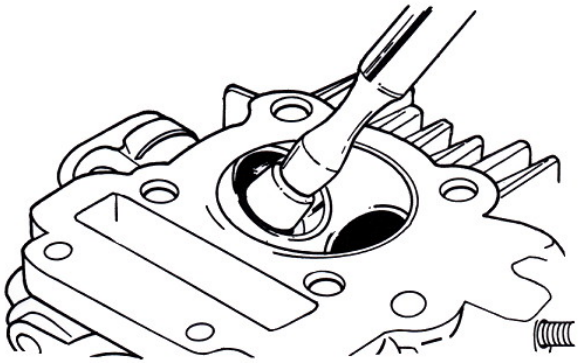
Valve Seat Inspection / Refacing

Inspection

Clean up all carbon deposits on the intake and exhaust valve seats.

Apply some red lead paint onto valve contact face.

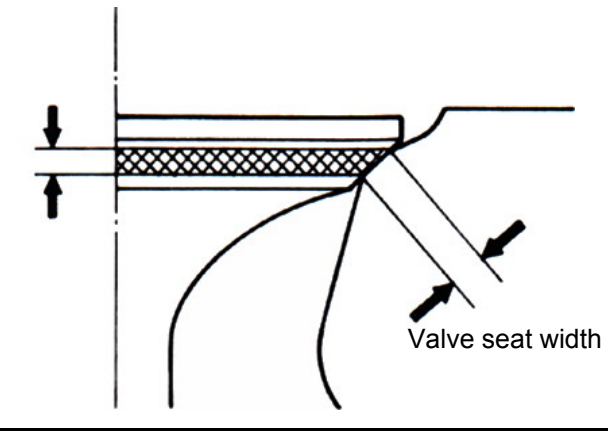
Grind valve seat with a rubber hose or other manual grinding tool.



Remove the valve and check if the contact face is even.

Caution

- The valve can not be ground. If the valve is burned, worn, or its contact face is uneven, replace it.
- If the valve contacts the seat unevenly after grinding, replace it.

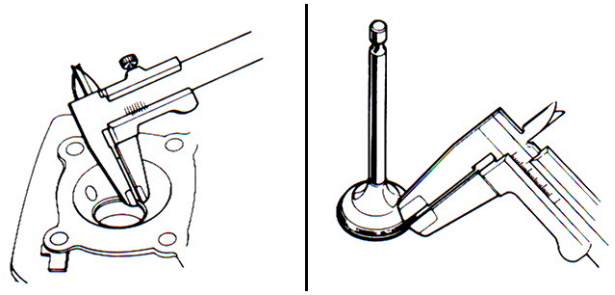


Check the valve seat contact condition.

If the valve seat is too wide, narrow or rough, corrects it.

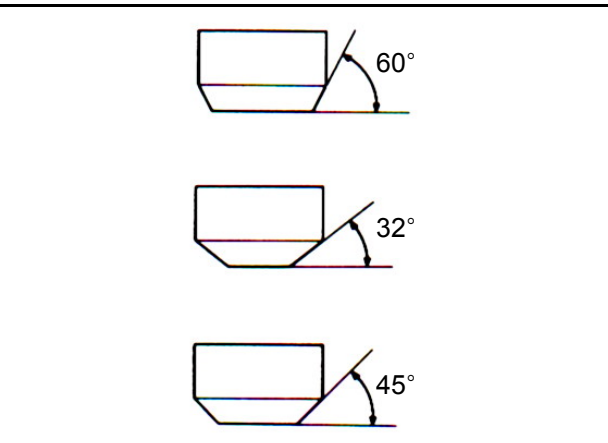
Service limit：Valve seat width 1.6 mm

Valve contact face 1.8 mm

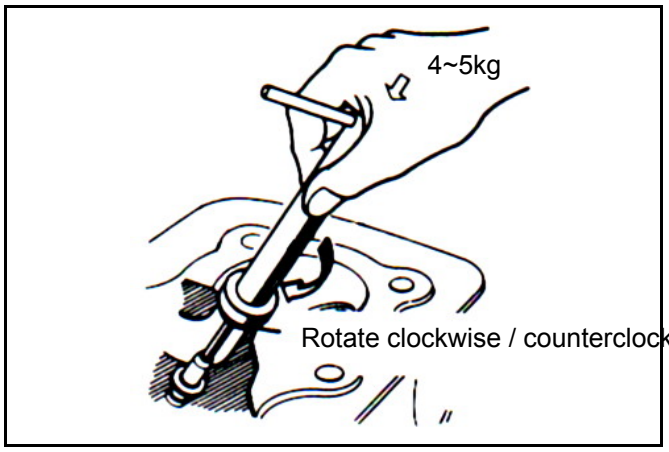


Valve seat refacing

The worn valve seat has to be ground with valve seat cutter/ grinder.



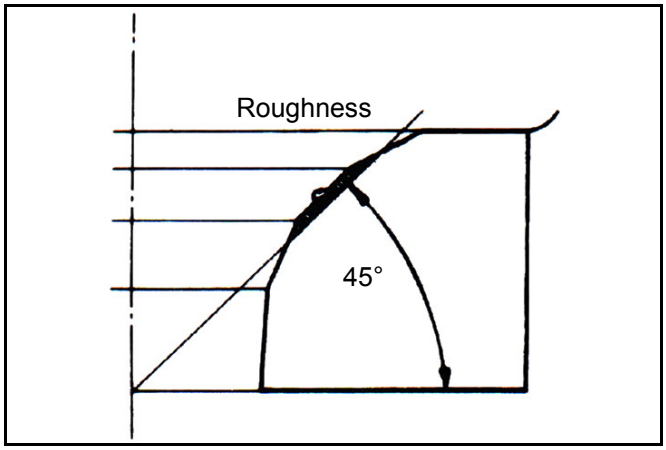
Rotate the valve seat cutter clockwise and counterclockwise with 4 to 5 kg pressure in order to fix the uneven part.



Caution

- Apply motor oil to the contact face while grinding it.

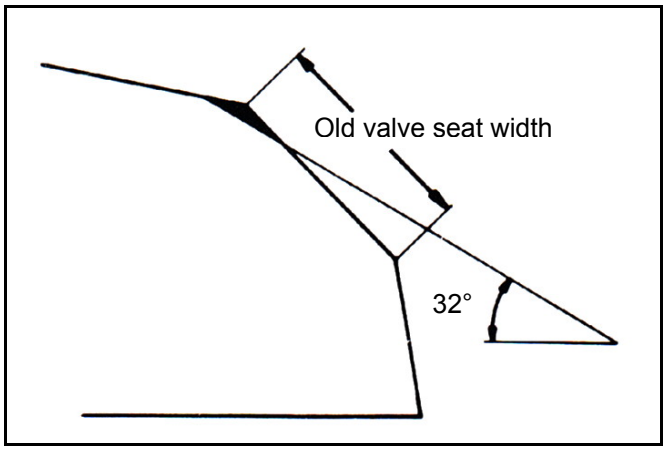
Use the 45 degree valve seat cutter to remove any roughness on the valve seat.



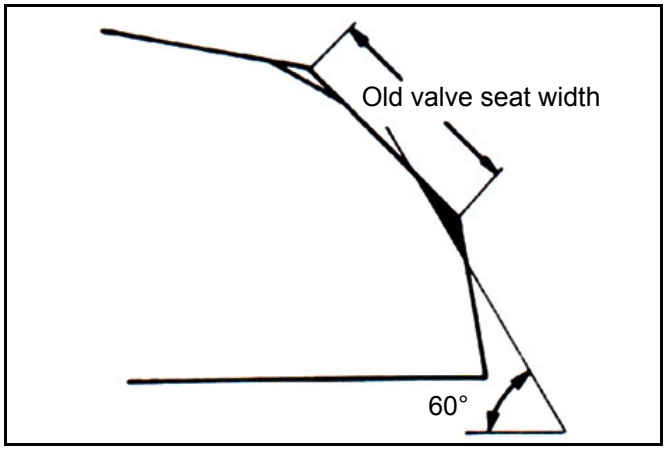
Caution

- Reface the valve seat with 45 degree valve seat cutter after removing the valve guide.

Use the 32 degree cutter to remove the upper 1/4 part of the valve seat.



Use the 60 degree cutter to remove the bottom 1/4 part of the seat and check the new valve seat.

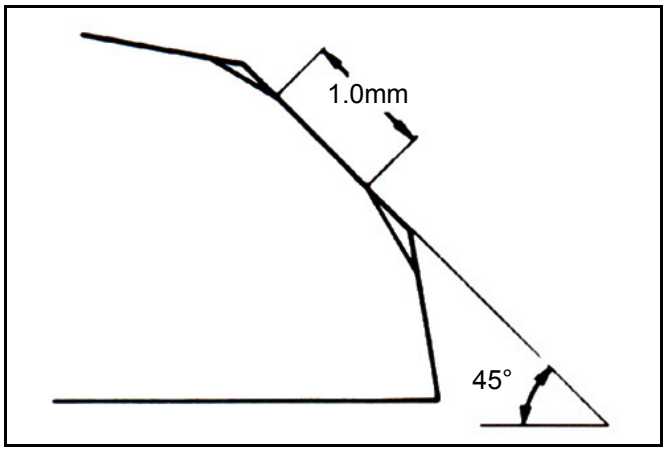


7. Cylinder Head / Valve

Use the 45 degree cutter and cut the seat to the proper width.

Caution

- Confirm that all roughness is removed.

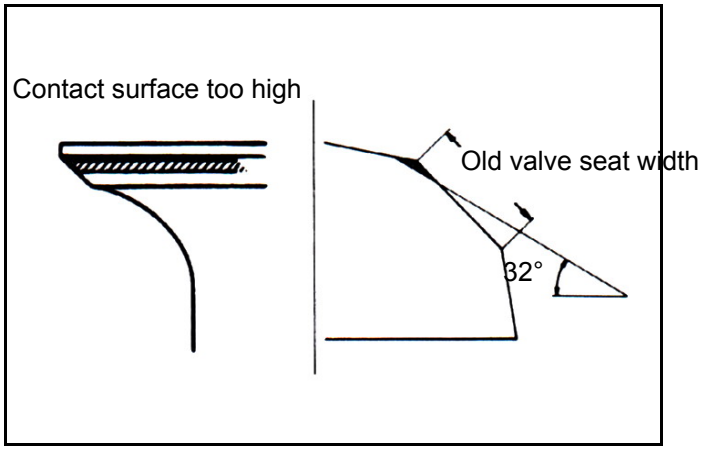


Grind valve seat again if necessary.

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.

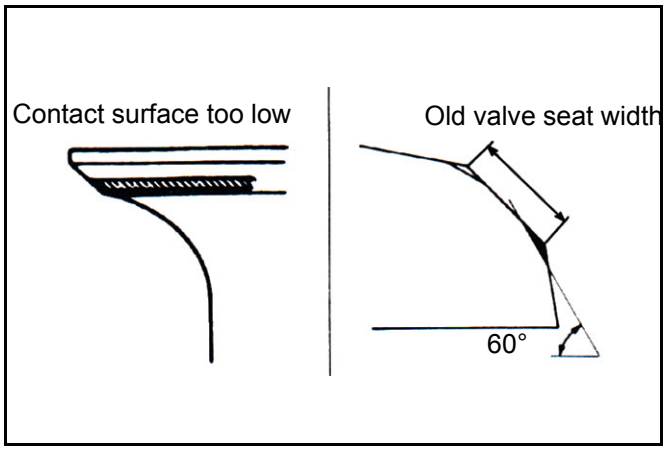
Caution

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



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

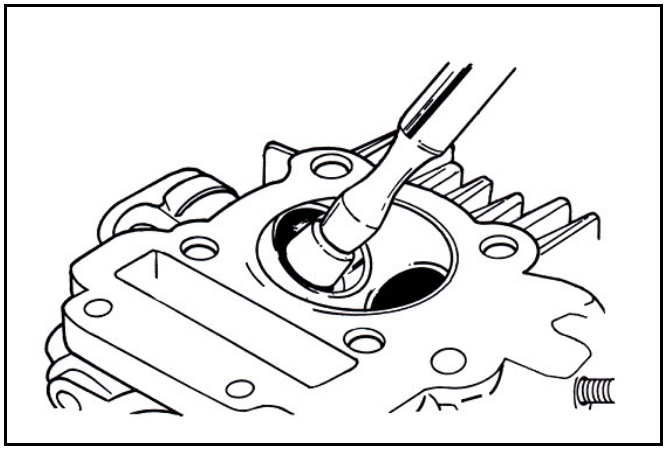
If the contact surface too low, grind the valve seat with 60° cutter.
Then, grind the valve seat to specified width.



After grinding the valve seat, coat the valve seat surface with emery and then slightly grind the valve seat with the valve by using specified grinding driver.
Clean up all emery coated on the valve seat and valve after grinding.

Caution

- Do not let the emery into the valve guide.
- Clean out all the emery, and apply some red lead paint onto the valve seat contact face.



Cylinder Head Assembly

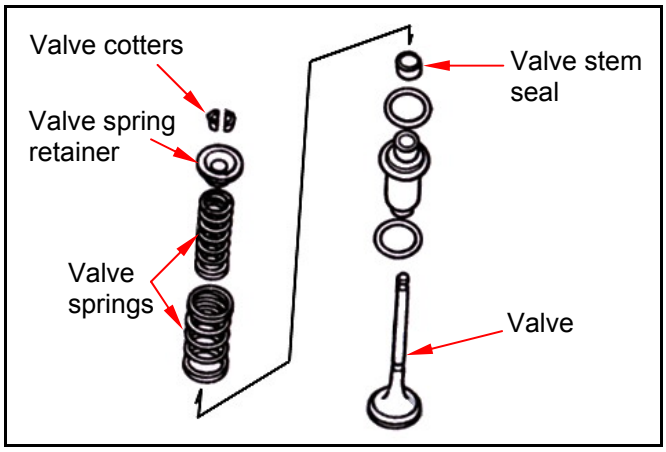
Lubricate the valve stem with engine oil, and then insert the valve into valve guide.
Install the new valve stem oil seal.
Install the valve springs, retainer and valve cotters.
Install the valve by using valve assemble tool.

Special tool：

Valve cotter remove / assemble tool
SYM-1471120

Valve spring compressor

SYM-1471100

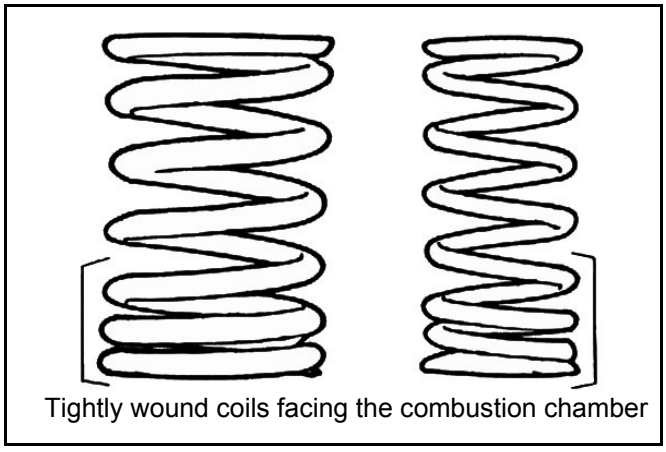


Caution

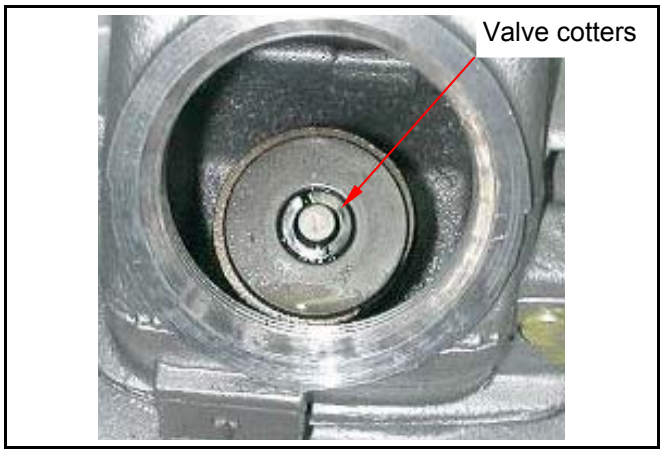
- To avoid damaging the valve stem and the cylinder head, put a rag under the cylinder head when compressing the valve spring.

Caution

- Tightly wound coils face the combustion chamber.


Tightly wound coils facing the combustion chamber

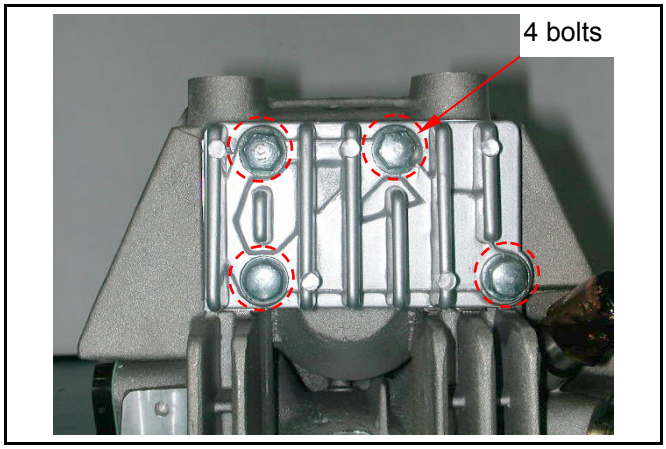
Tap the valve stem slightly with rubber hammer to make valve cotters and valve stem match perfectly.



Caution

- Place and hold cylinder head on to working table to prevent valve from being damaged.

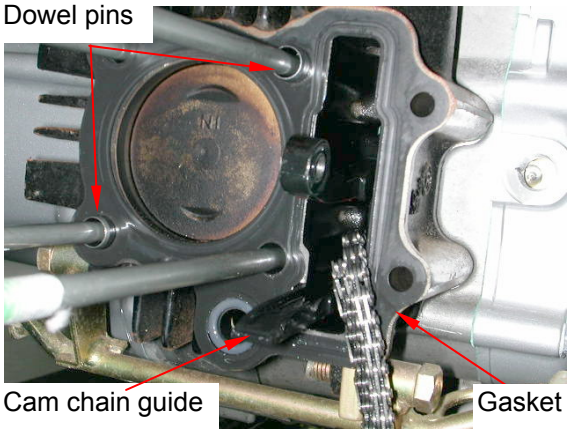
Lubricate the valve rocker arm, rocker arm shaft and cam shaft with engine oil.
Install the cam shaft, valve rocker arm and rocker arm shaft onto the cylinder head.
Install the cylinder head right side cover (4 bolts).



Torque value：0.8~1.2kgf-m

Cylinder Head Installation

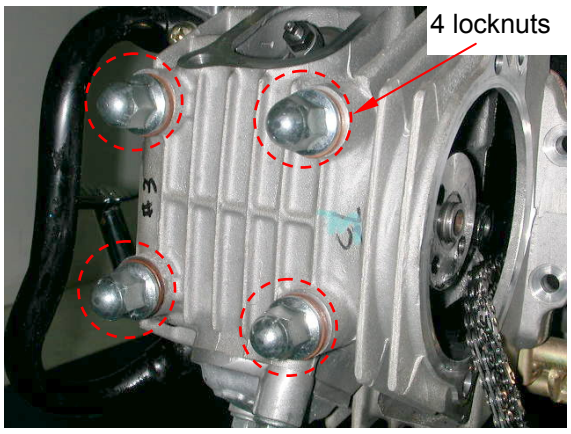
Install the cam chain guide, dowel pins and a new cylinder head gasket onto the cylinder.



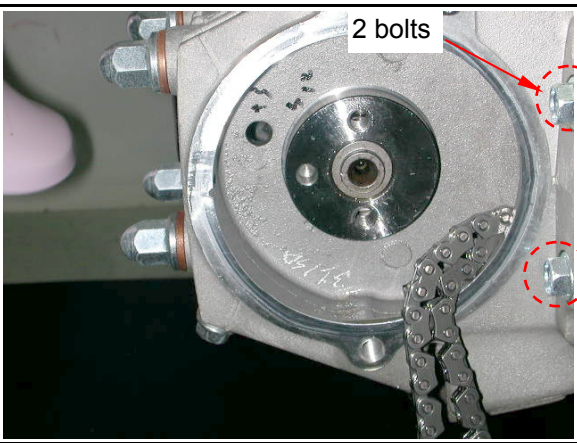
Install the cylinder head.
Lock the cylinder head locknuts.
Torque value：Cylinder head locknut
1.0~1.2kgf-m

Caution

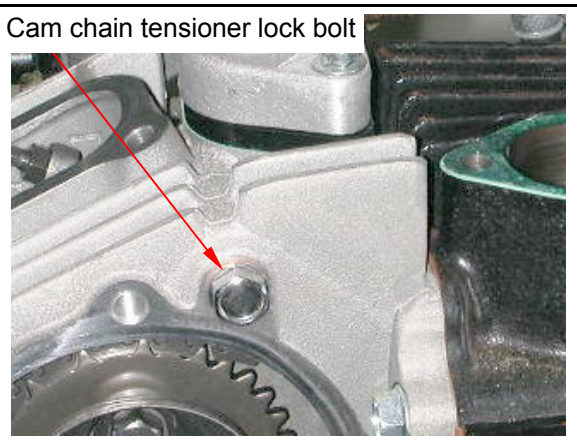
- Tighten the cylinder head locknuts evenly.
- Do not tighten the cylinder head locknuts more than standard torque value, or the cylinder head may be deformed, making abnormal noise, leakage and decreasing the performance.



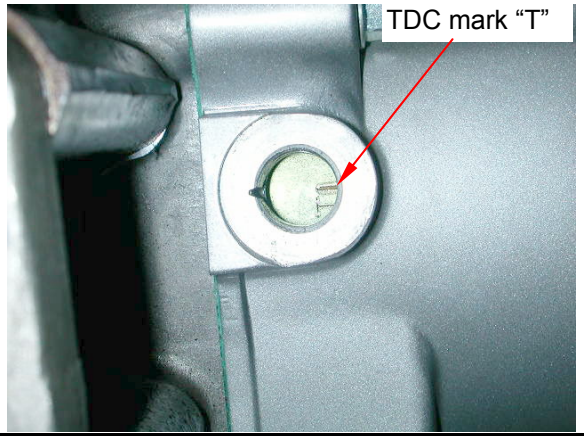
Tighten the cylinder head left side lock bolt (6mm).
Torque value：
Cylinder head left side lock bolt
0.8~1.2kgf-m



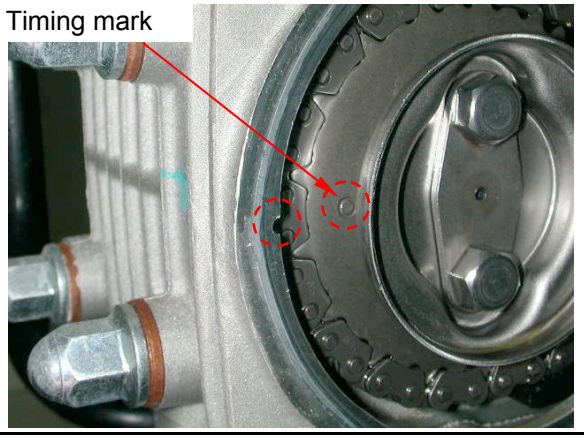
Install the cam chain tensioner.
Tighten the cam chain tensioner lock bolt.
Torque value：1.0~1.4kgf-m



Rotate the crankshaft counterclockwise to match the TDC mark “T”.

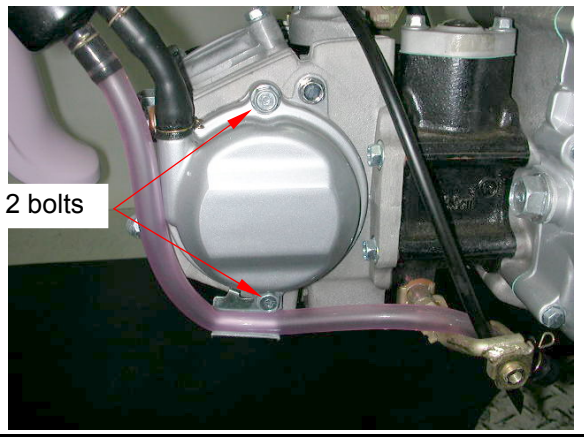


Install the cam chain sprocket.
Install the cam chain onto the sprocket and align the timing mark on the sprocket with that of cylinder head.
Tighten the sprocket mounting bolts.



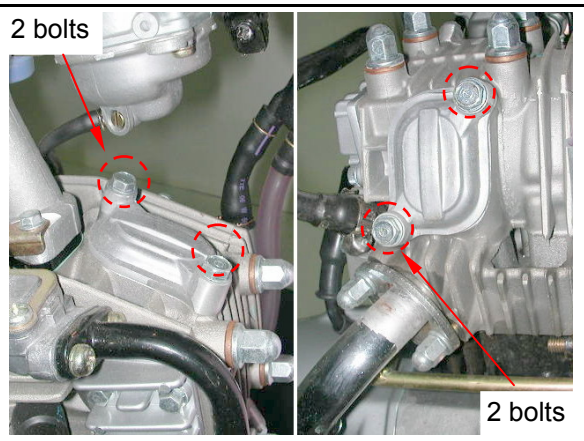
Torque value：1.0~1.2kgf-m

Install the cylinder head side cover (2 bolts).



Torque value：0.8~1.2kgf-m

Install the tappet adjusting hole caps (4 bolts for 2 caps).



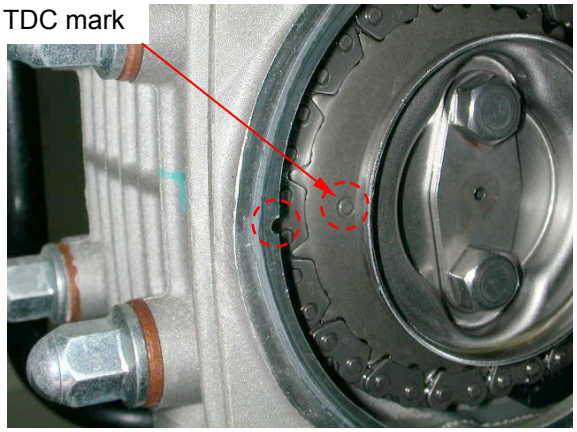
Torque value：0.8~1.2kgf-m

Valve Clearance Adjustment

⚠ Caution

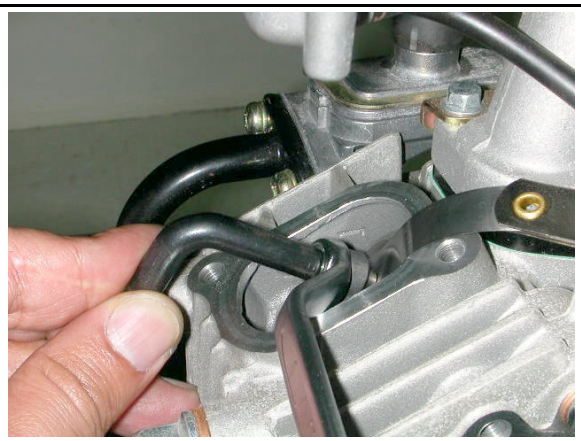
- Check and adjust the valve clearance when the engine is cold (below 35°C).

Remove the tappet adjusting hole cap, cylinder head side cover, timing-inspecting hole cap, and ACG cap.
Rotate the crankshaft counterclockwise to match the TDC mark “T” (piston is at TDC position).



Valve clearance inspection / adjustment

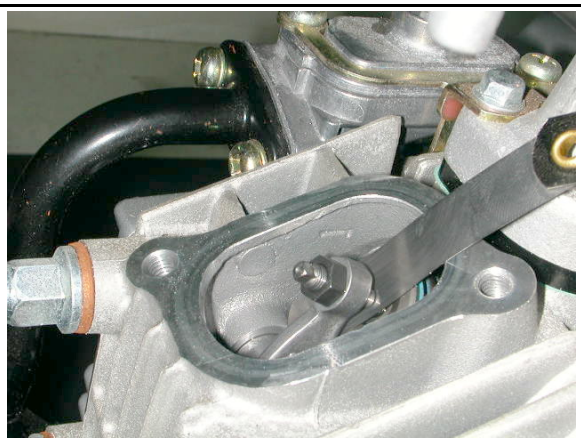
Loosen the valve clearance adjustment nuts and bolts located on valve rocker arm.
Measure and adjust the valve clearance with feeler gauge.
After the valve clearance being adjusted to standard value, hold adjustment bolt and then tighten the locknut.



Valve clearance：0.12±0.02 mm

⚠ Caution

- Make sure the valve clearance be adjusted to the standard value.
- Check the valve clearance after the locknut is tightened.



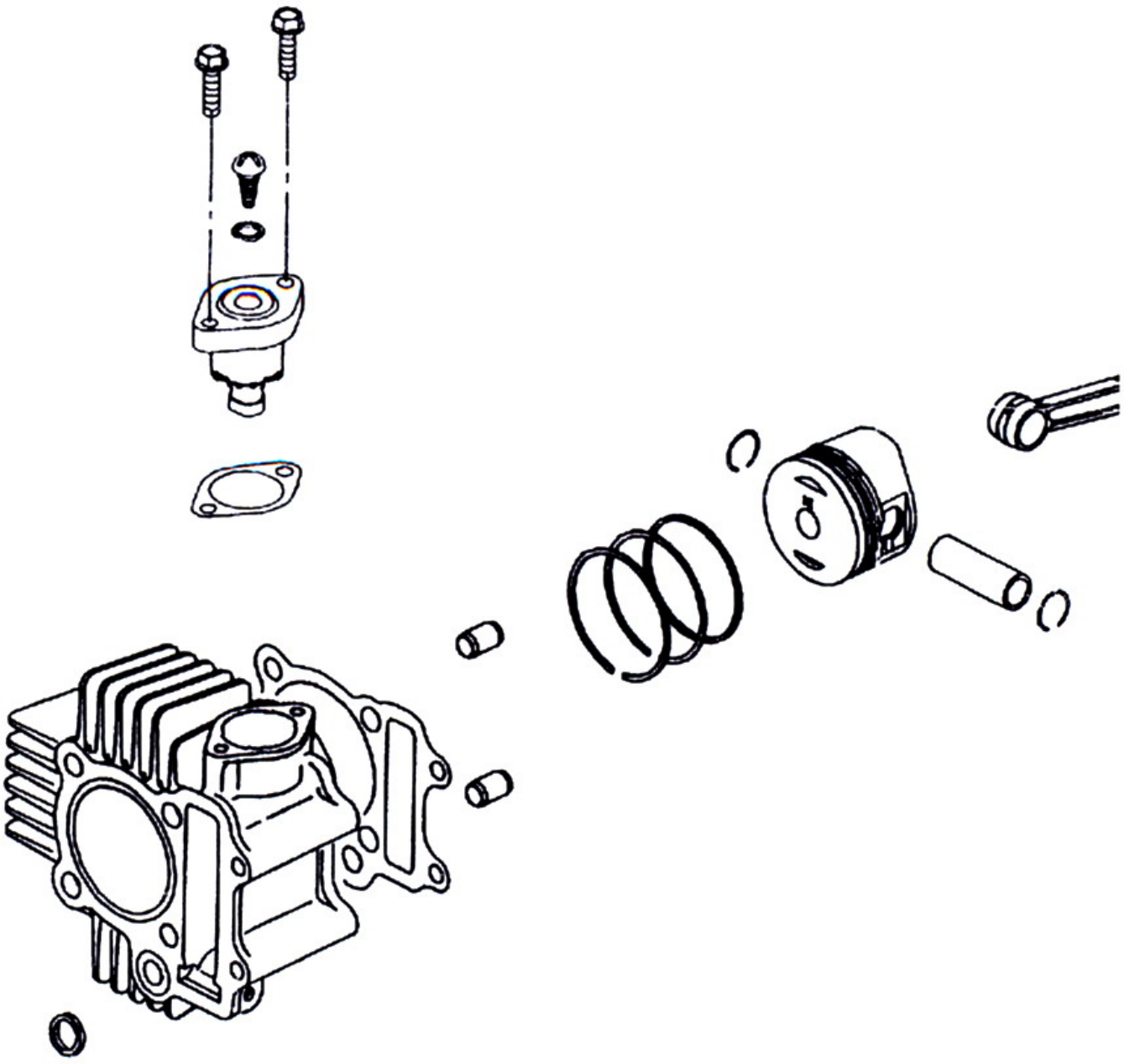
Reconfirm the valve clearance after locking the locknut.

Install the tappet adjusting hole cap, cylinder head side cover, timing-inspecting hole cap, and ACG cap.

⚠ Caution

- Check the o-ring/ oil seal on the tappet adjusting hole cap, cylinder head side cover, timing-inspecting hole cap, and ACG cap before installation and apply some engine oil.

Mechanism Diagram



8. Cylinder / Piston

Precautions in Operation

General information

- The engine must be removed from the frame before the repairing of the cylinder and piston.

Specification

Measurement unit：mm

Item			Specification	
			Standard	Service limit
Cylinder	Inner diameter		52.390~52.410	52.450
	Out of round		—	0.050
	Taper		—	0.050
	Warp		—	0.050
Piston / Piston rings	Piston ring / groove clearance	Top ring	0.025~0.055	0.130
		Second ring	0.015~0.045	0.120
	Piston ring end gap	Top ring	0.150~0.350	0.500
		Second ring	0.150~0.350	0.500
		Oil ring	0.200~0.500	—
	Piston ring Thickness	Top ring	0.95	0.90
		Second ring	0.95	0.90
	Piston outer diameter		52.370~52.390	52.250
	Piston outer diameter measure point		Second piston ring	
	Piston / cylinder clearance		0.020~0.050	0.110
	Piston pin hole inner diameter		15.002~15.008	15.050
Piston pin outer diameter			14.994~15.000	14.950
Piston / piston pin clearance			0.002~0.014	0.020
Connecting rod small end inner diameter			15.007~15.025	15.050

Troubleshooting

Compression too low or instability

Worn cylinder or piston rings

Compression too high

Excessive carbon built-up on the piston or combustion chamber

Knocking or Abnormal Noise

Worn cylinder or piston rings

Excessive carbon built-up on the top of the piston

Worn piston pin or piston pin hole

Excessive smoke

Worn cylinder, piston or piston rings

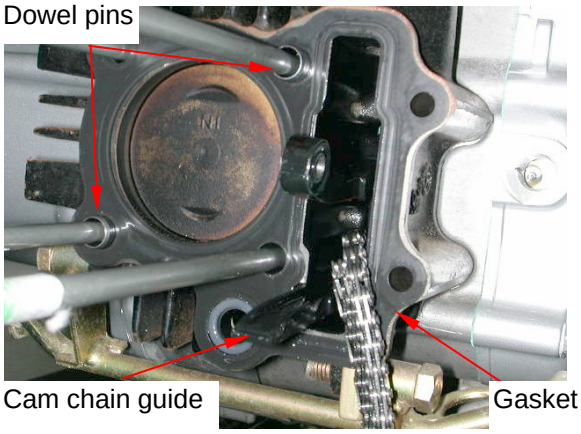
Improper piston rings installation

Over heating

Excessive carbon built-up on the piston or combustion chamber

Cylinder Removal / Inspection

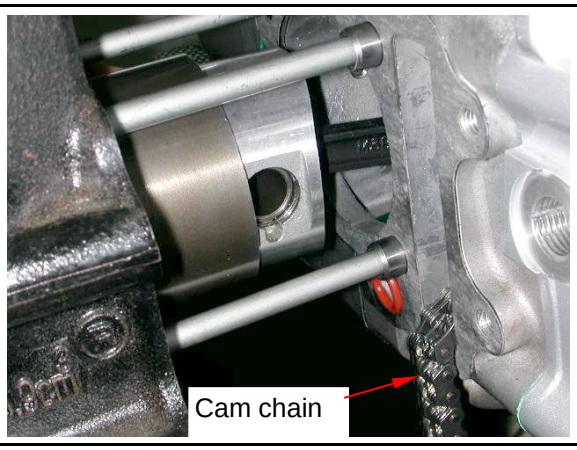
Remove the cylinder head (refer to Chapter 7).
Remove the cylinder head gasket and dowel pins.
Remove the cam chain guide.



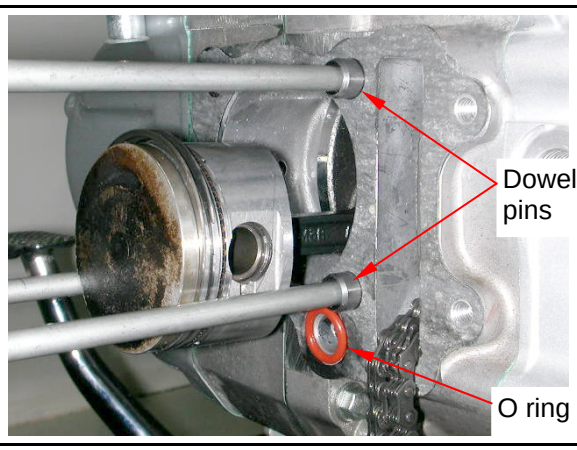
Remove the cylinder.

Caution

- Prevent the cam chain falling into the crankcase when removing the cylinder



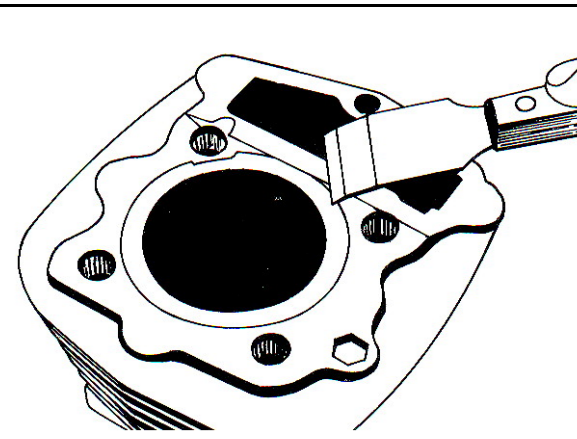
Remove the cylinder gasket, dowel pins and o-ring.



Clean all the gasket material from the sealing surface.

Caution

- Use solvent to wet the gasket material in order to remove it more easily.
- Do not damage the sealing surface during operation



Inspection

Check the inner diameter of cylinder for any wear or damage.

Service limit：52.45 mm

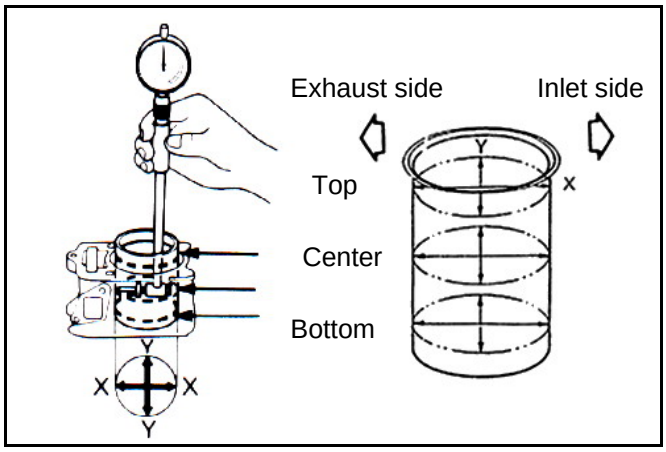
Calculate the taper and out of round at three levels in X and Y axis.

Take the maximum value to determine the cylinder wear.

Service limit：

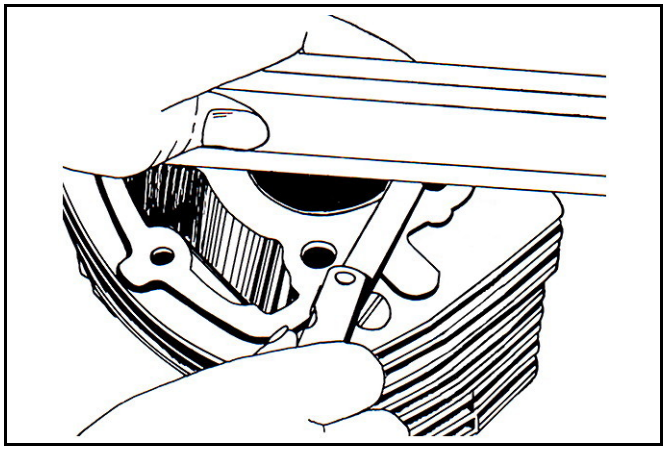
Out of round：0.05 mm

Taper：0.05 mm



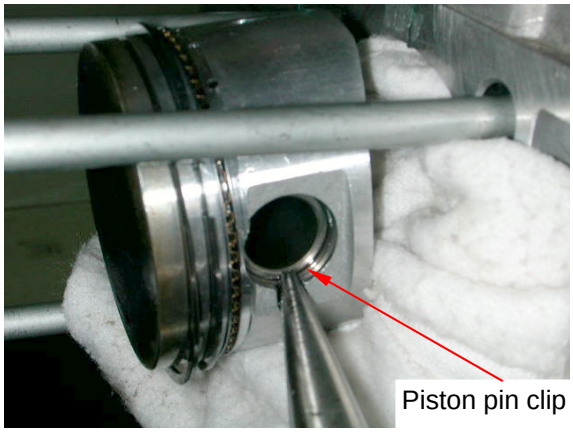
Check the top of the cylinder for warp.

Service limit：0.05 mm



Piston Removal / Inspection

Cover the holes of crankcase and cam chain with a piece of clean cloth to prevent piston pin clips from falling into the crankcase.
Remove piston pin clip with pliers.



Push the piston pin out of the piston and connecting rod small end.
Remove the piston.

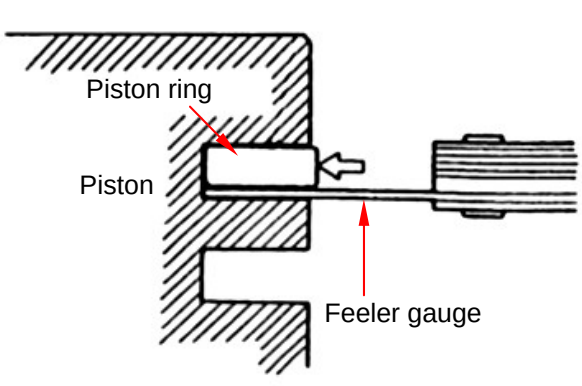
Remove the piston rings.

⚠ Caution

- Pay attention when removing the piston rings because they are fragile.

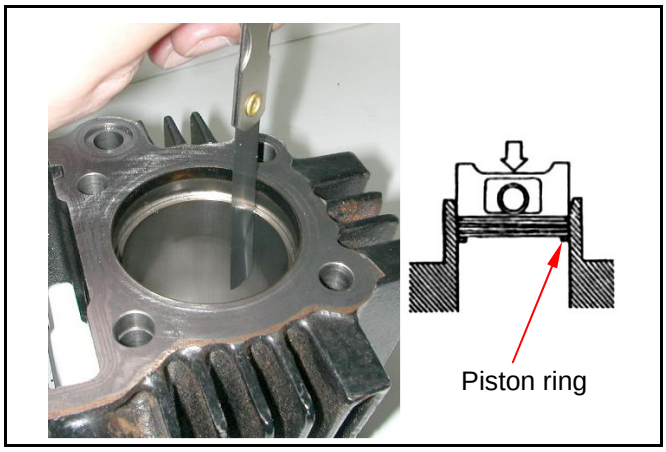
Check if the piston rings are damaged or its grooves are worn.
Clean out the carbon deposit from the piston ring grooves.

Assemble the piston rings and measure the clearance between the piston ring and groove.
Service limit：Top ring 0.13 mm
Second ring 0.12 mm



8. Cylinder / Piston

Insert the piston ring into the bottom of the cylinder and then push it to the position 20 mm from the cylinder surface.
Measure the piston ring end.

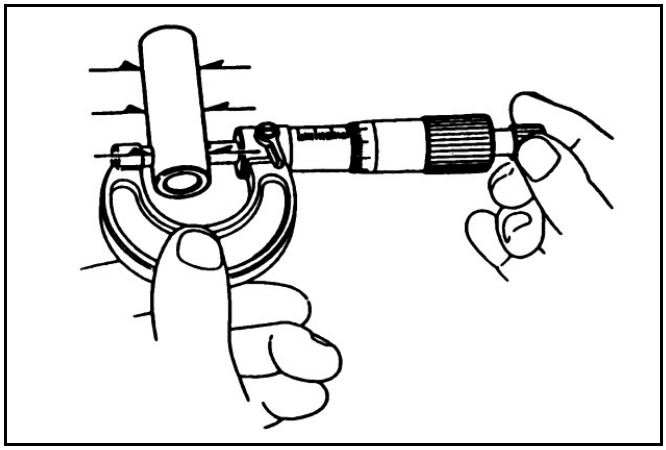


Caution

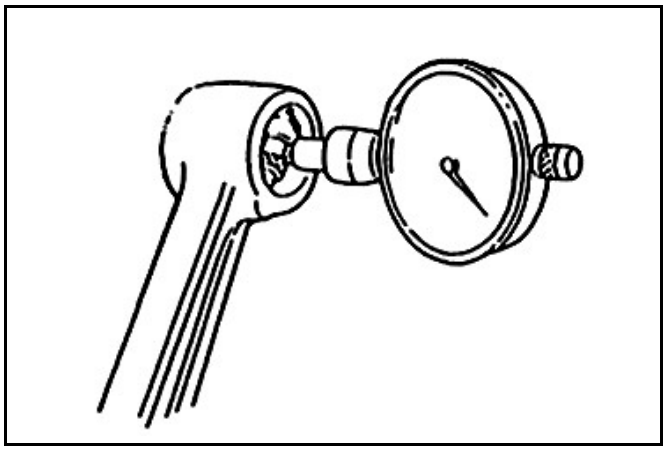
- Push the piston ring squarely by the piston.

Service limit：Top ring：0.5 mm
Second ring：0.5 mm

Measure the piston pin outer diameter.
Service limit：14.95 mm

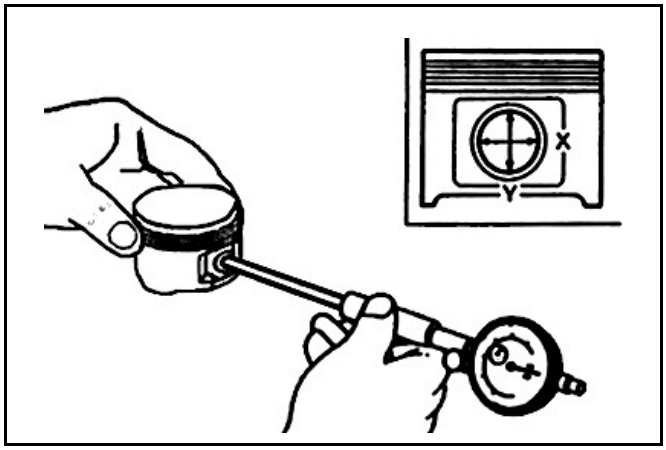


Measure the inner diameter of connecting rod small end.
Service limit：15.05 mm



Measure the inner diameter of piston pin hole.
Service limit：15.05 mm

Calculate the clearance between the piston and piston pin
Service limit：0.02 mm

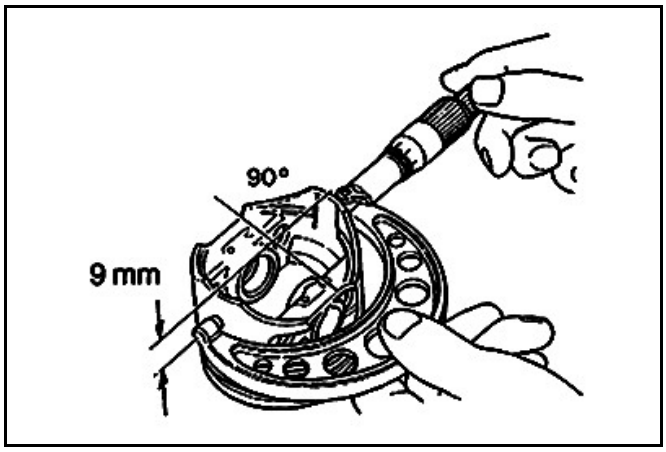


Measure the piston outer diameter.

⚠ Caution

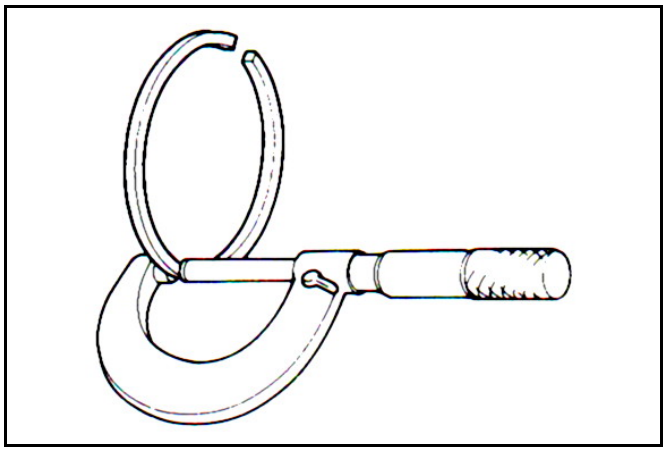
- Measure the piston outer diameter 90 degrees to the piston pin hole.

Service limit：52.25 mm



Calculate the clearance between the piston and cylinder.

Measure the piston ring thickness.
Service limit：0.90 mm

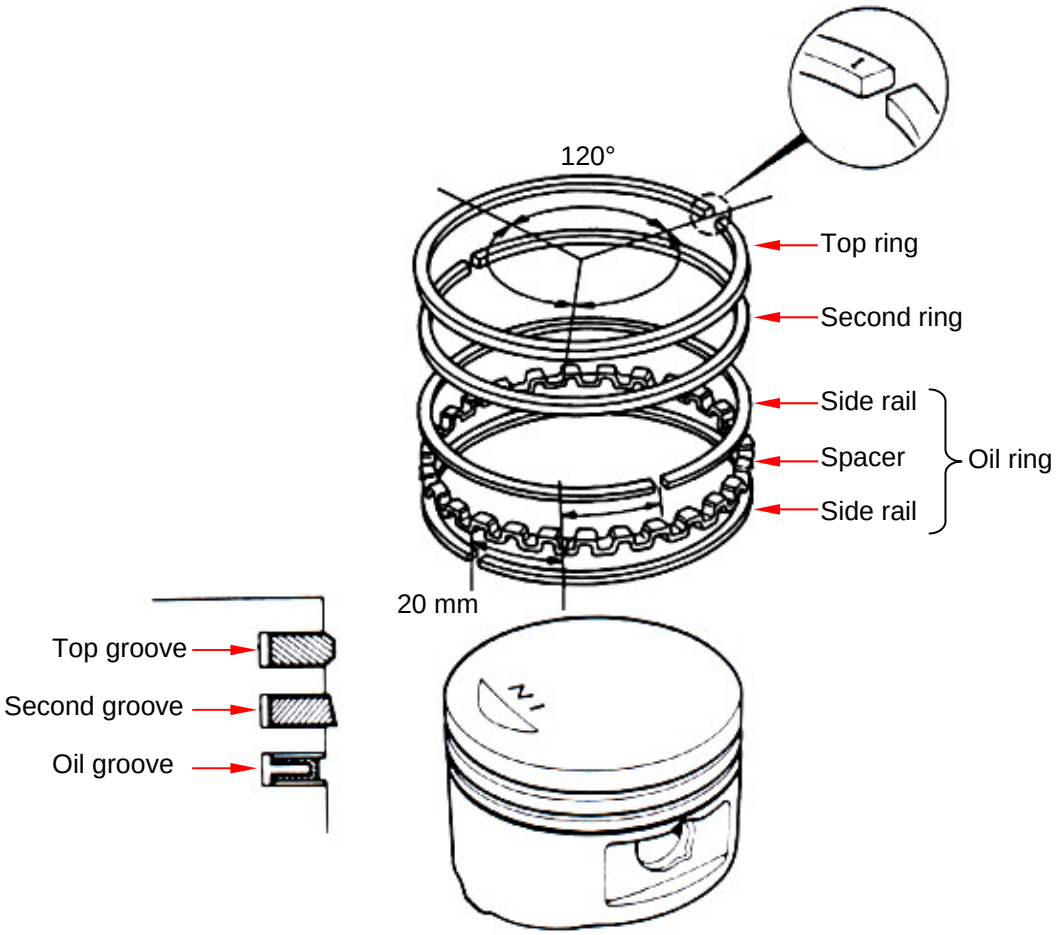


Piston Rings Assembly

Clean up the piston and ring grooves.
Install the piston rings onto piston carefully.
Place the opening of piston rings as diagram shown.

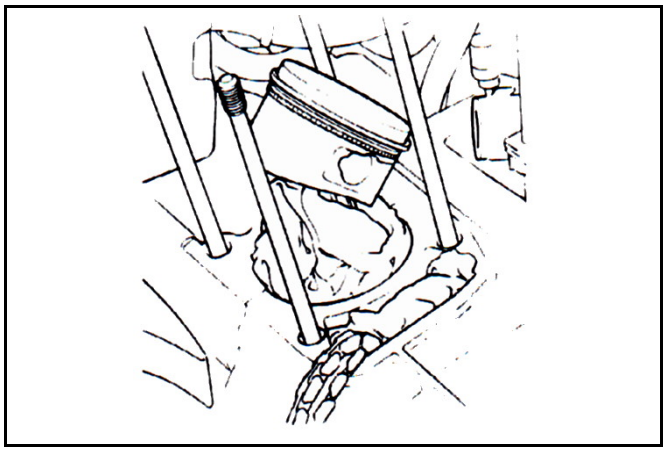
Caution

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



Piston Installation

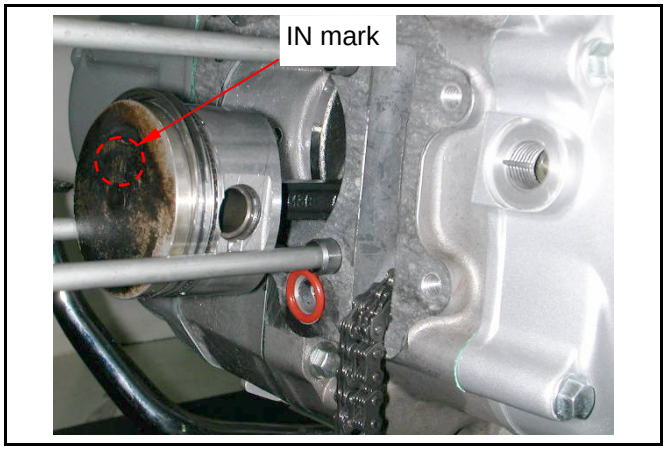
Cover the holes of crankcase and cam chain with a piece of clean cloth.
Clean out the gasket and residues on the cylinder and crankcase contact face.



Caution

- Soap the residues with solvent to make the residues be removed more easily.

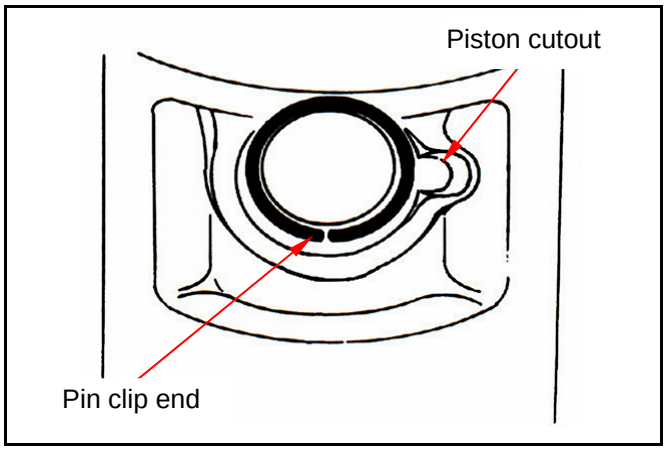
Assemble the piston and piston pin and place the IN mark on the piston top side forward to inlet valve.



Assemble the new piston pin clip.

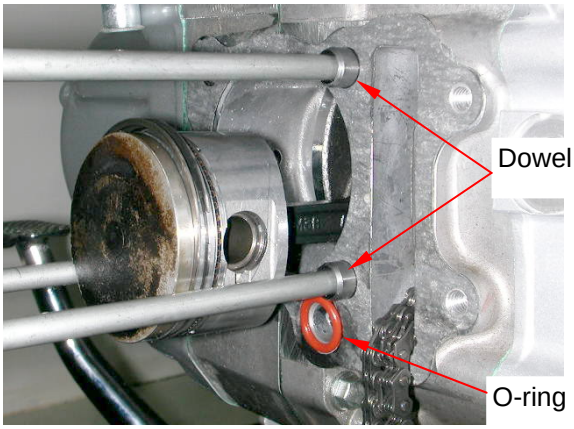
Caution

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



Cylinder Installation

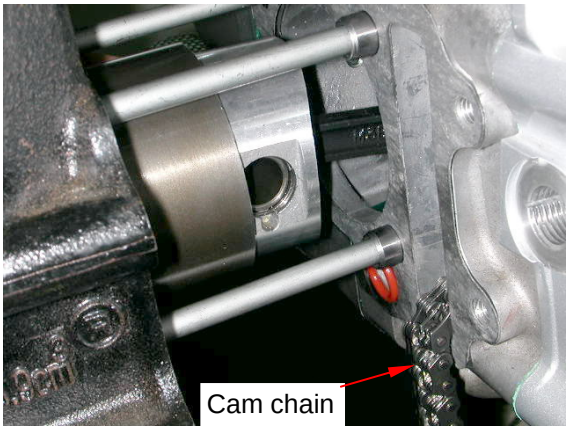
Install dowel pins, new cylinder gasket and o-ring.



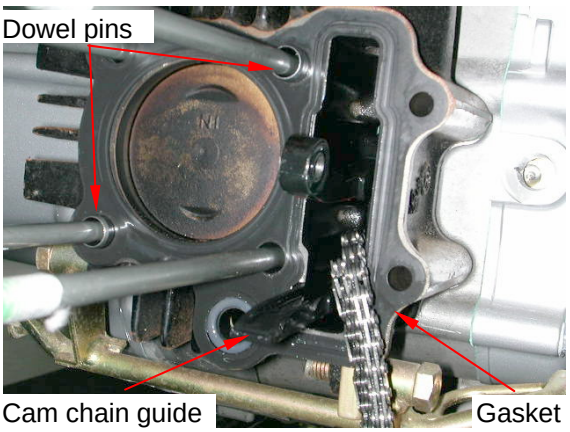
Apply some engine oil to the inside of cylinder, piston and piston rings.
Install the piston into cylinder carefully.
Press the piston rings in one by one as installation.

⚠ Caution

- Do not push the piston into cylinder forcefully or the piston and piston rings could be damaged.

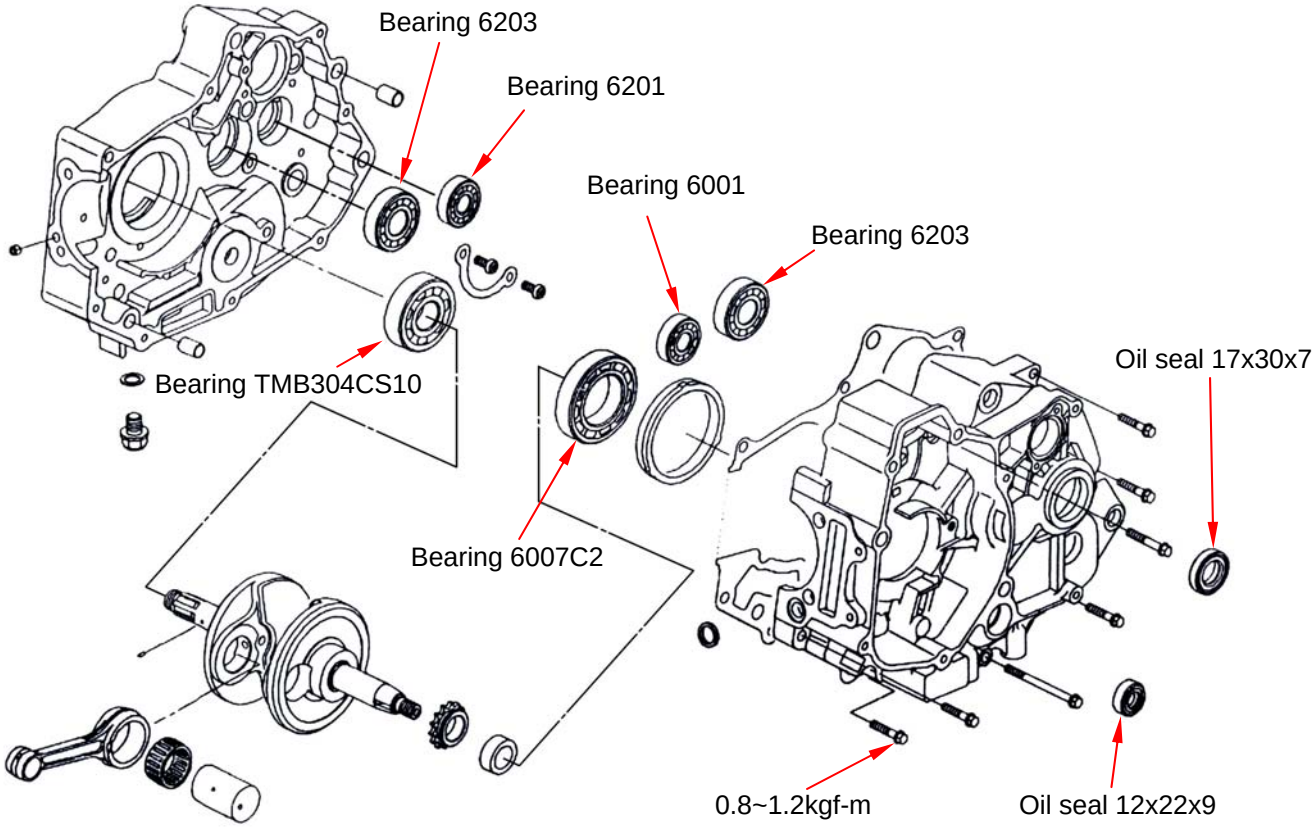


Install the cam chain guide, dowel pins and cylinder head gasket.
Install the cylinder head (refer to chapter 7).

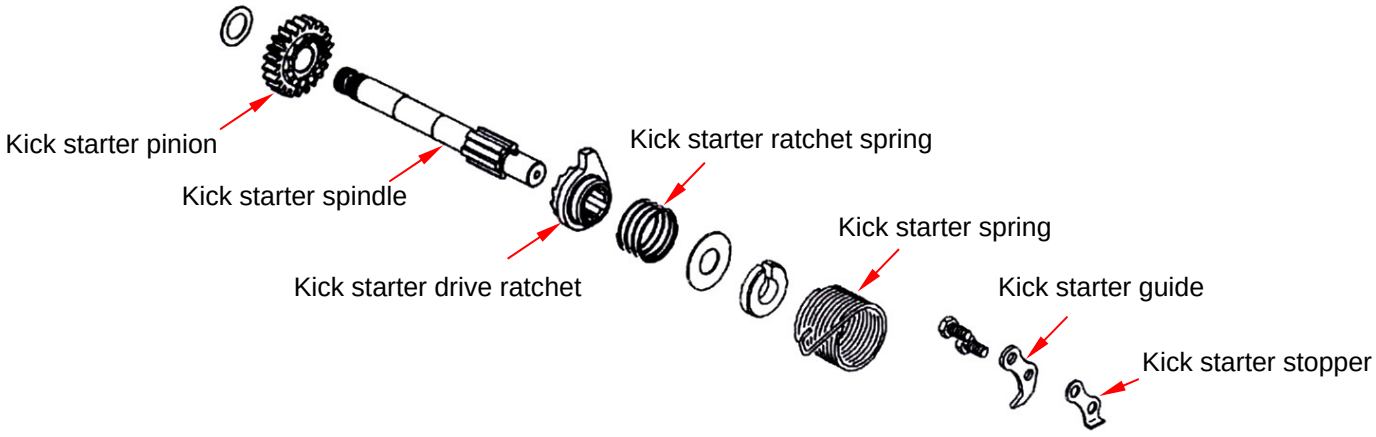


Mechanism Diagram

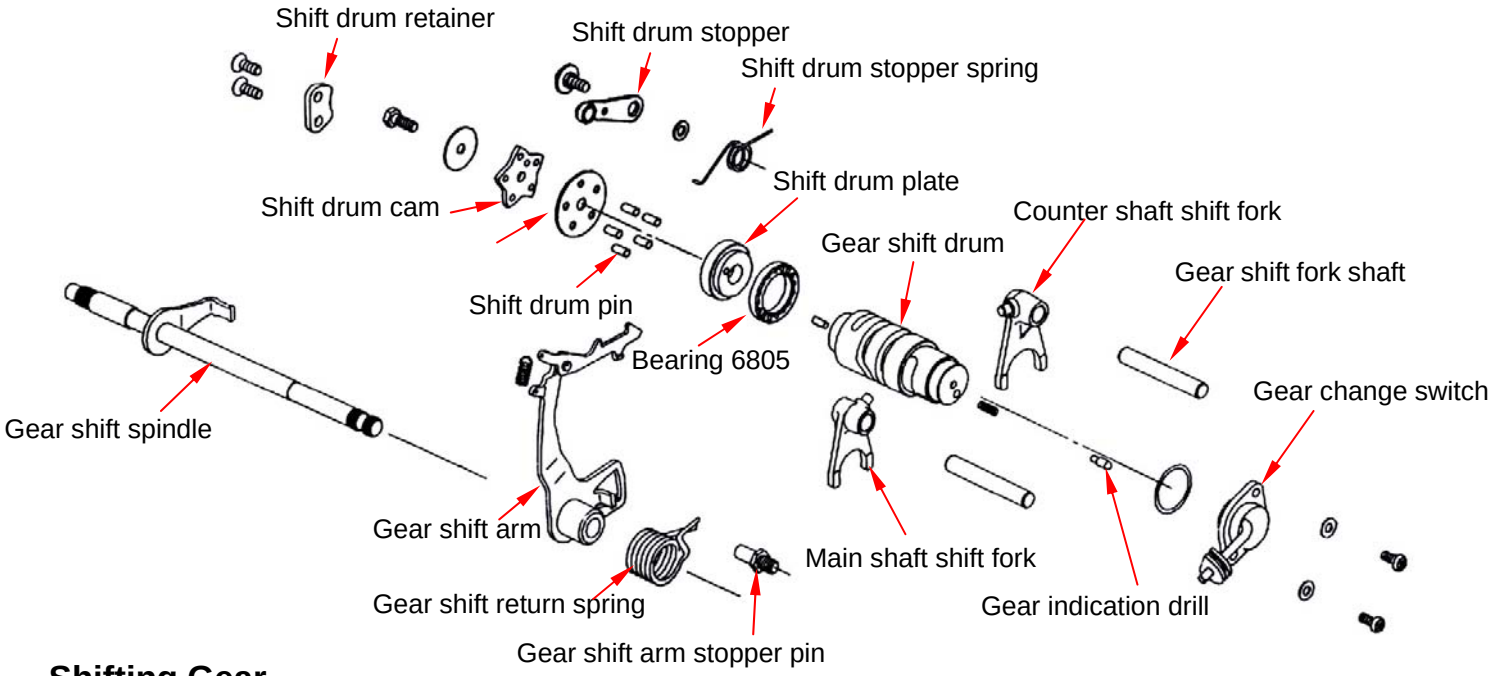
Crankcase / Crankshaft



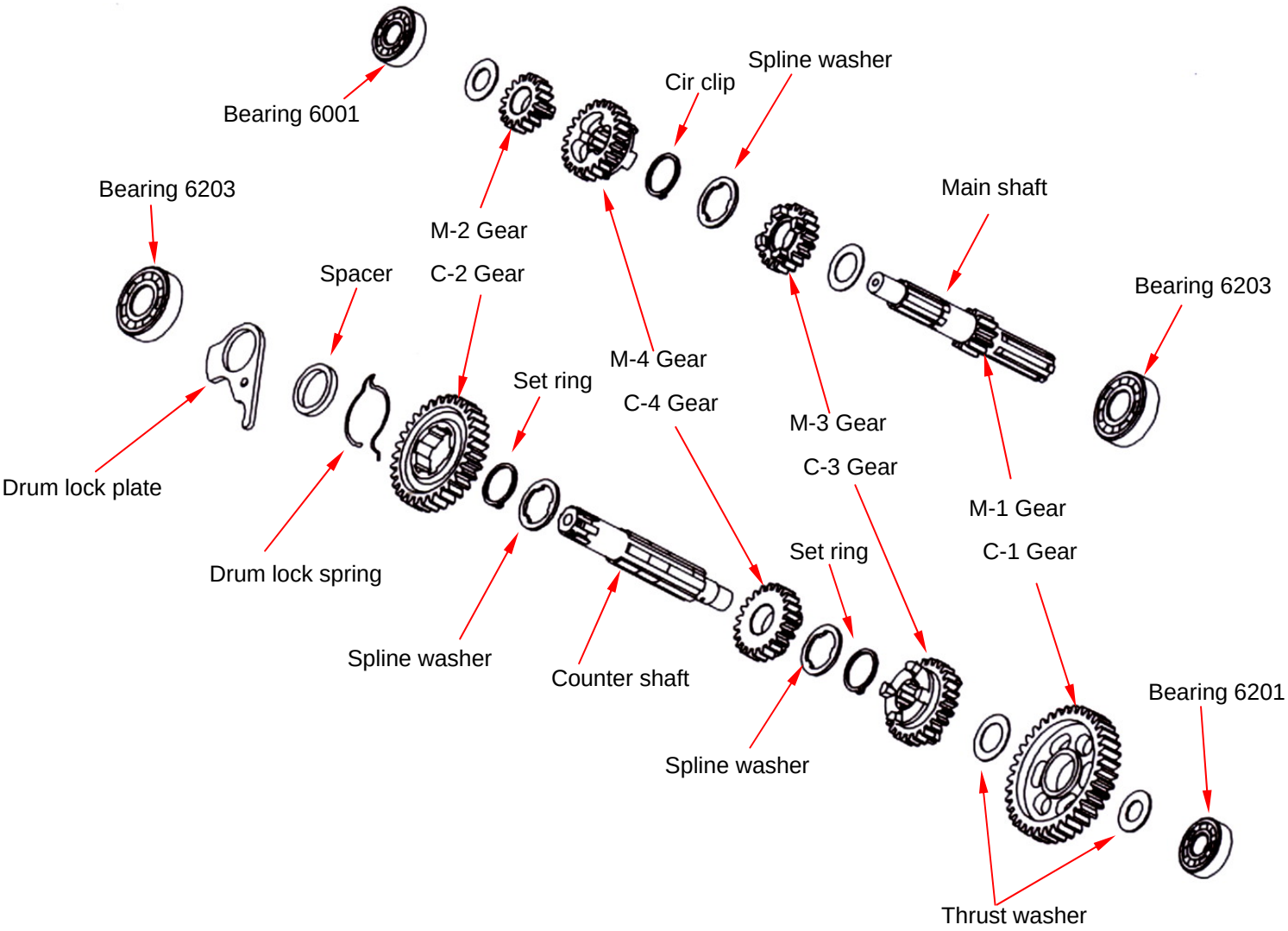
Kick starter



Gear shift mechanism



Shifting Gear



Precautions in Operation

General information

- This Section concerns disassembly of the crankcase and transmission system for repair purpose.
- The following components need to be removed before disassembling the crankcase.

Engine	chapter 6
Cylinder head	chapter 7
Cylinder / piston	chapter 8
Clutch / oil pump / transmission	chapter 4
AC Generator / starting clutch / starter motor	chapter 5

- The crankshaft should be replaced as a unit if the timing sprocket needs to be replaced.

Specification

Measurement unit：mm

Item		Standard	Service limit
Crankshaft	Connecting rod big end side clearance	0.050~0.300	0.600
	Connecting rod big end vertical clearance	0.004~0.012	0.050
	Run-out	—	0.100
	Connecting rod small end inner diameter	18.000~18.800	18.800
Shift fork	Inner diameter	10.000~10.018	10.050
	Claw thickness	4.700~4.707	4.500
Shift fork shaft	Outer diameter	9.976~9.994	9.960
Kick starter	Kick starter spindle outer diameter	19.059~19.080	19.000
	Kick starter pinion inner diameter	20.900~20.921	20.960

Torque value

Bolts for crankcase	0.8~1.2kgf-m
Cylinder stud bolts	0.7~1.0kgf-m
Engine oil drain bolt	1.5~2.0kgf-m

Special tool

Inner bearing puller	SYM-6204020
Universal bearing driver	SYM-6204024

Troubleshooting

Excessive engine noise

- Worn connecting rod big end
- Worn crankshaft bearing
- Worn piston pin or piston pin hole

Hard to shift gear

- Bent shift fork
- Bent shift fork shaft
- Bent shift fork claw

Transmission jumps out of gear

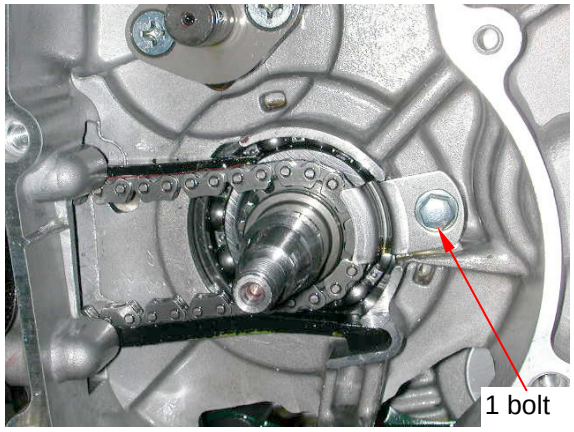
- Worn gear teeth
- Bent or damaged shift fork
- Bent shift fork shaft

Excessive gear noise

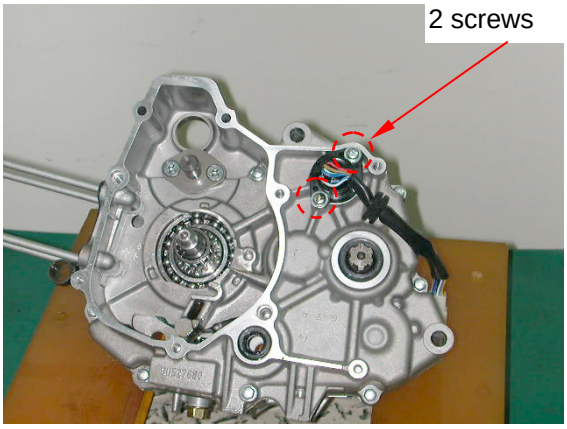
- Worn gear teeth
- Worn gear shaft

Crankcase Disassembly

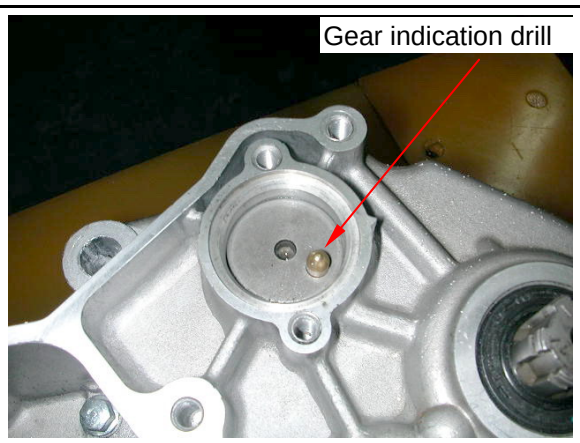
Remove the cam chain set plate from the left crankcase (1 bolt).
Remove the cam chain.



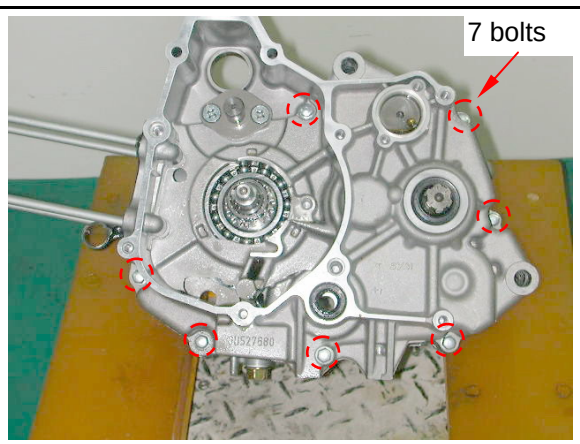
Remove the gear change switch (2 screws).



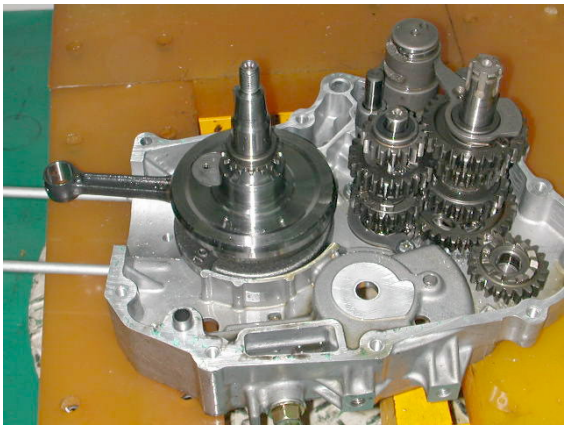
Remove the gear indication drill and spring in advance to avoid losing them.



Remove the lock bolts from the left crankcase.

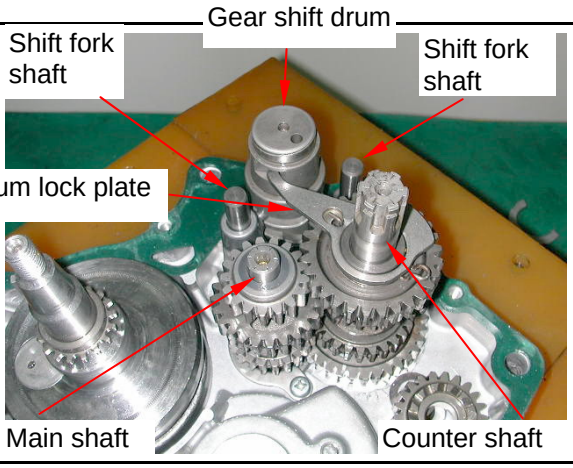


Separate the left crankcase from the right crankcase.
Shake the crankshaft gently and remove the crankshaft.

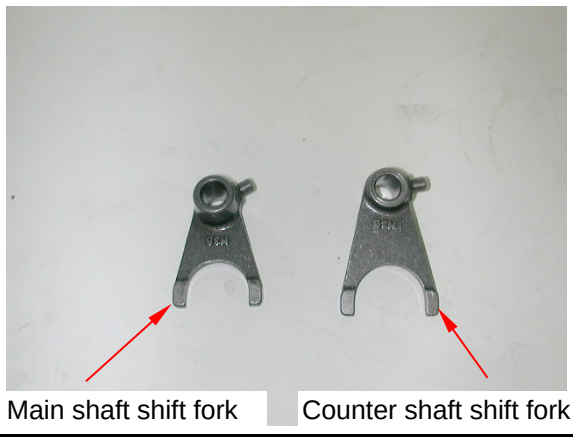


Shifting Gear Disassembly

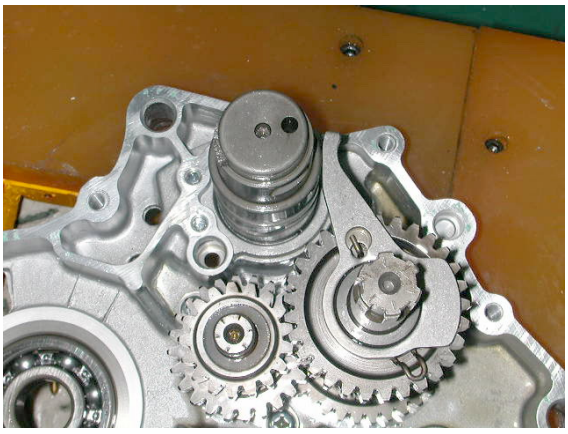
Remove the shift fork shafts.



Remove the main shaft and counter shaft shift forks.

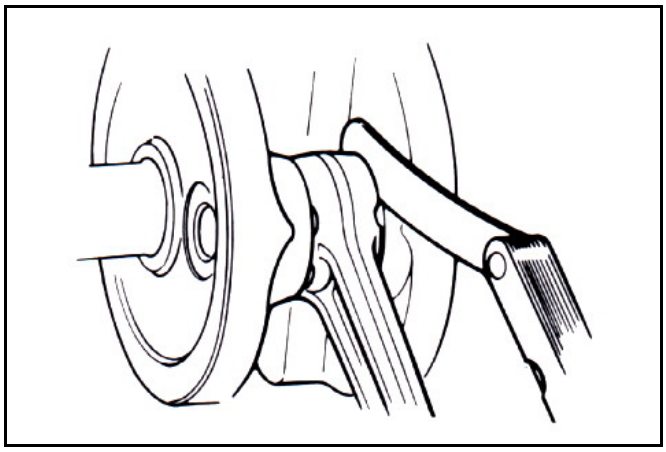


Remove the gear shift drum.
Remove the main gear shaft and counter gear shaft.

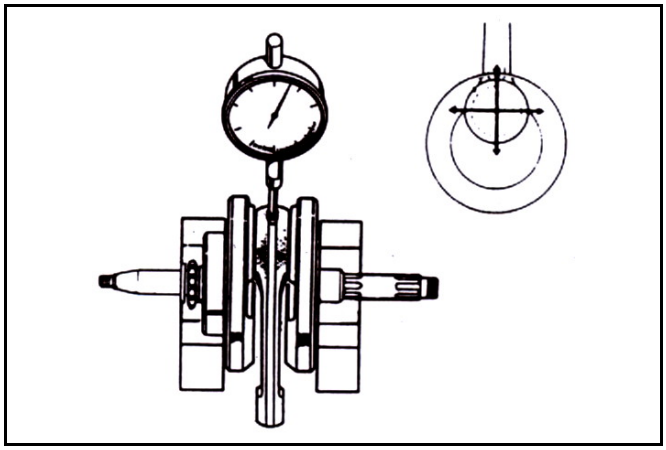


Crankshaft Inspection

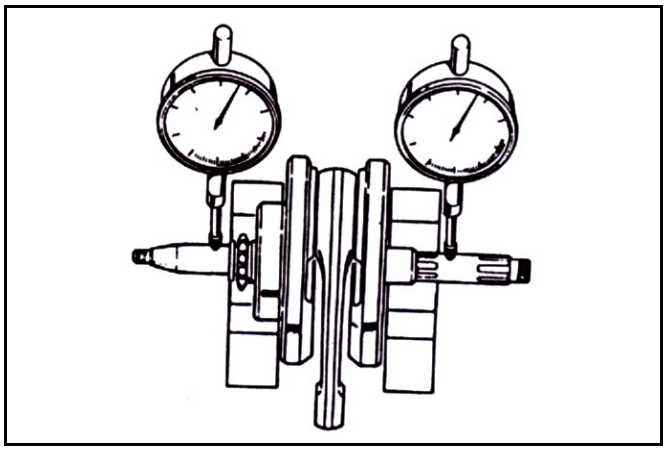
Use a feeler gauge to measure left and right clearance of connecting rod big end.
Service limit：0.6 mm



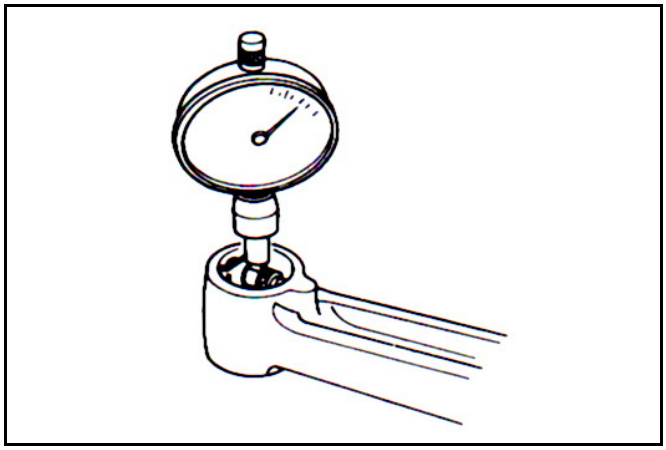
Measure the clearance of the big end at the vertical directions.
Service limit：0.05 mm



Place the crankshaft on a V-block, measure run-out of the crankshaft.
Service limit：0.10 mm



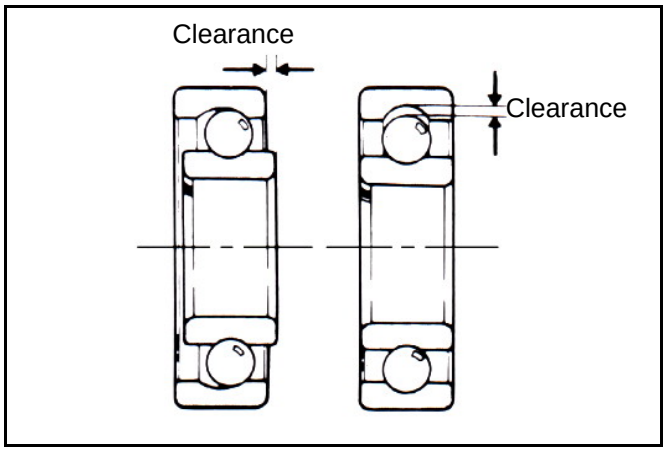
Measure the inner diameter of the crankshaft small end.
Service limit：18.80 mm



Crankcase bearing inspection

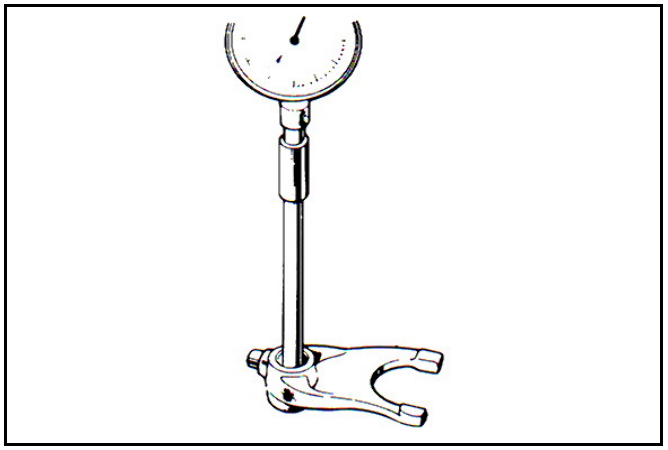
Rotate the bearings on the left and right crankcase to check if the bearings rotate smoothly and silently.
Check if the outer ring of the bearing fixes on the crankcase firmly or not.
The bearing must be replaced if there is excessive noise or roughness.

Left crankcase bearing 6007C2
Right crankcase bearing TMB304CS10

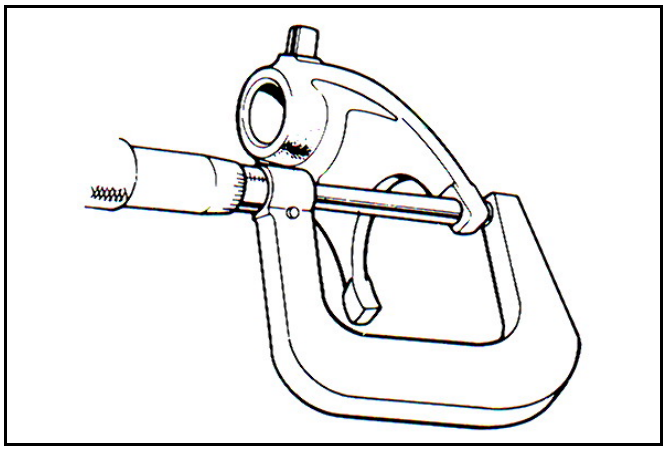


Shifting Gear Inspection

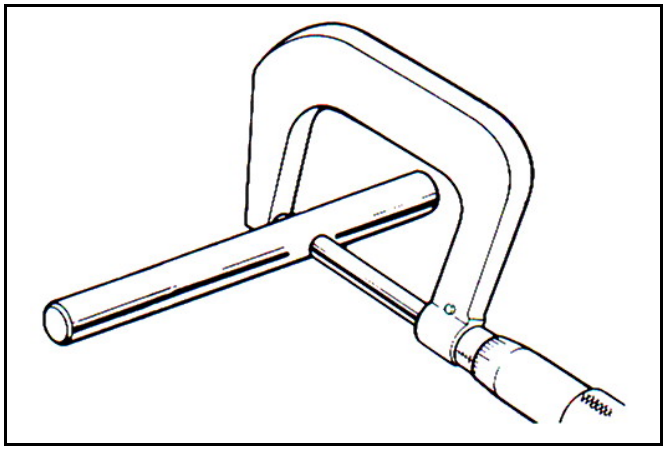
Check if the gear shift fork is worn, bent or damaged.
Measure the inner diameter of the gear shift fork.
Service limit：10.05 mm



Measure the thickness of the gear shift fork claws.
Service limit：4.5 mm

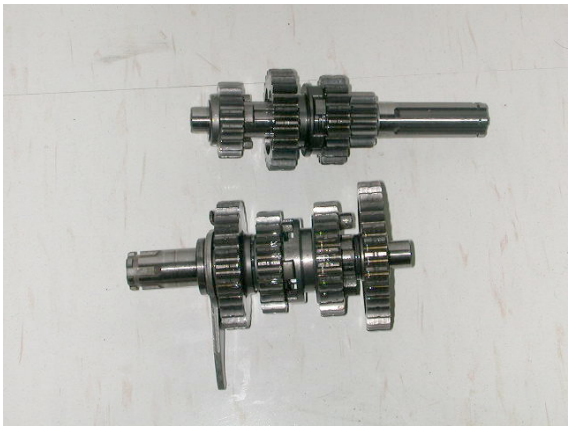


Measure the outer diameter of the gear shift fork shaft.
Service limit：9.96 mm



Check the gear shift drum for wear or damage.

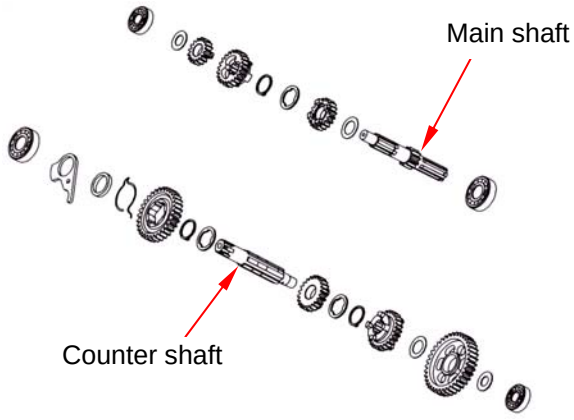
Disassemble the gears and washers on the main shaft and counter; arrange the gears and washers in order.
Check the teeth and grooves of the gear for wear and damage.



Assemble the gears and washers onto the main shaft and counter shaft by order after the inspection is finished without anything incorrect.

⚠ Caution

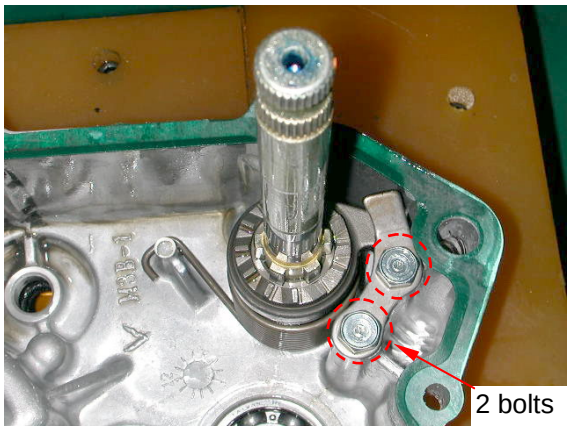
- Apply clean engine oil to the gears before assembly.
- Make sure the cir clip is fully seated in the shaft grooves after installation.



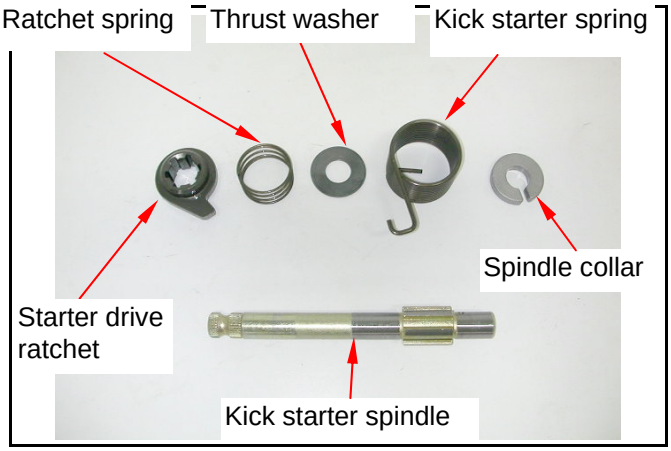
Kick Starter

Removal / inspection

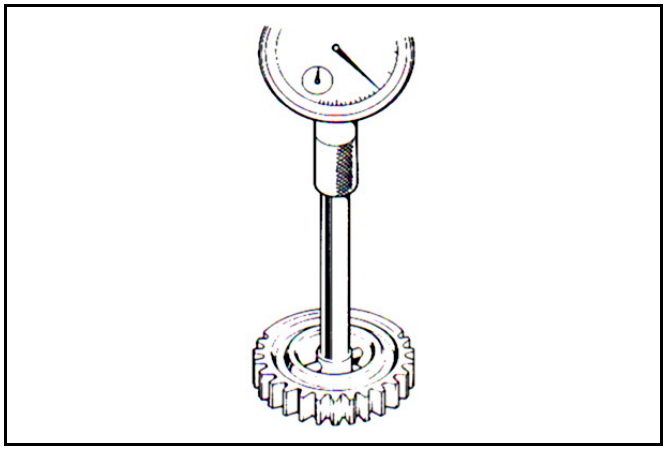
Remove the kick starter guide (2 bolts).
Loosen the kick starter spring by rotating the kick starter spindle.
Remove the kick starter spindle and starter drive ratchet.
Remove the kick starter stopper.



Remove the starter drive ratchet and spring.
Remove the spindle collar, kick starter spring and thrust washer.



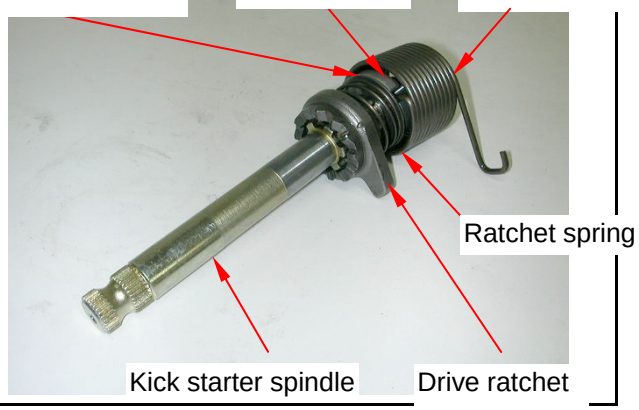
Remove the kick starter pinion.
Measure the inner diameter of the kick starter pinion.
Service limit：20.96mm



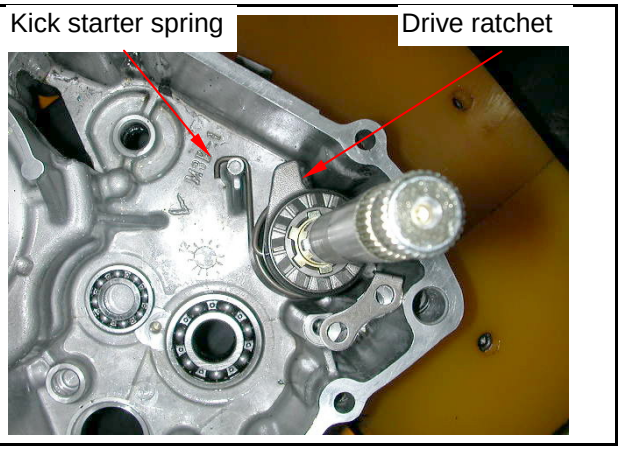
Measure the outer diameter of the kick starter spindle.
Service limit：19.00mm

Kick starter assembly

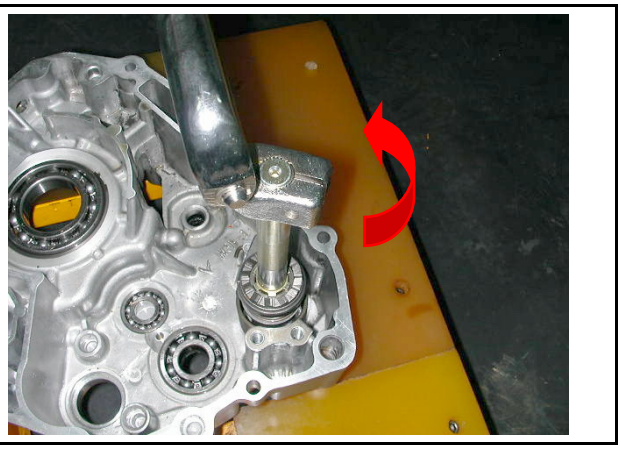
Assemble the kick starter spring, spindle collar and thrust washer to the kick starter spindle.
Assemble the drive ratchet and ratchet spring to the kick starter spindle.



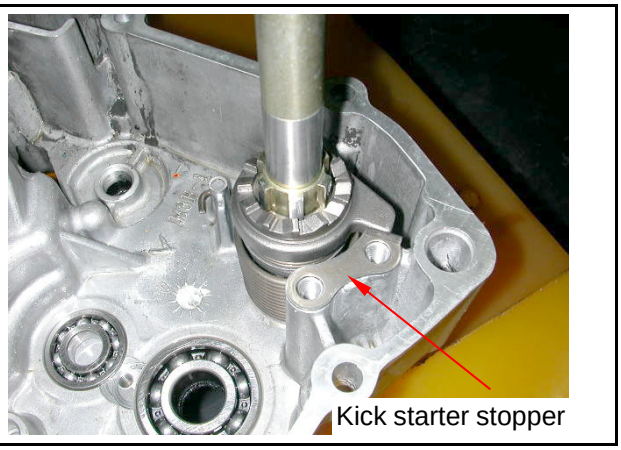
Assemble the kick starter spindle to the left crankcase.
Hook the kick starter spring to the crankcase stopper.



Put the kick starter stopper on the left crankcase.
Rotate the kick starter spindle counterclockwise by using kick starter arm to make the drive ratchet turn over the kick starter stopper.

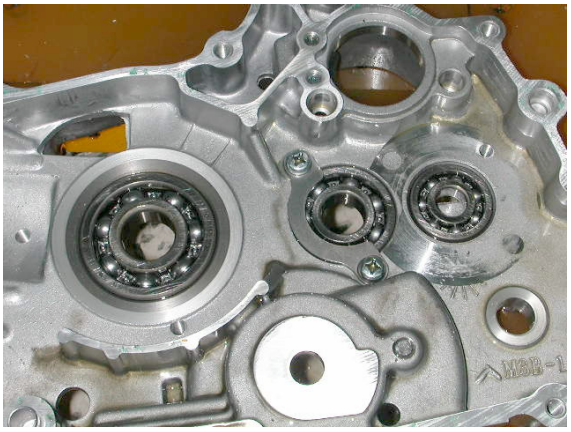


Push down the drive ratchet and make it locate on the kick starter stopper.
Install the kick starter guide (2 bolts).



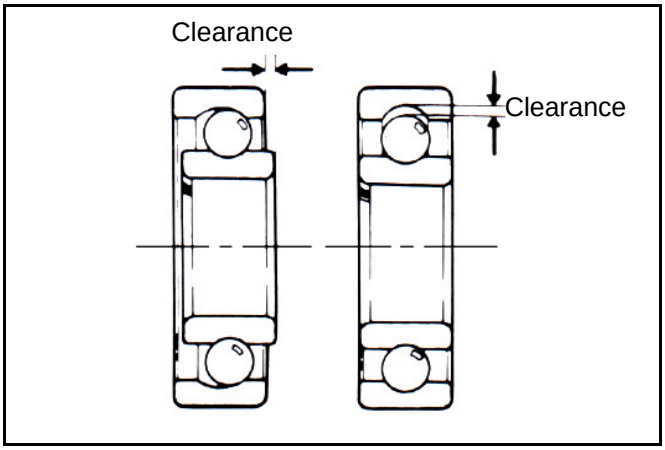
Crankcase Inspection

Check if the oil path on the crankcase is clogged or not.
Blow the oil path with compressed air if necessary.



Transmission bearing inspection

Rotate the bearings to check if the bearings rotate smoothly and silently.
Check if the outer ring of the bearing fixes on the crankcase firmly or not.
The bearing must be replaced if there is excessive noise or roughness.
Check the oil seal of the counter shaft for any damage; replace it with new one if necessary.



Transmission bearing removal

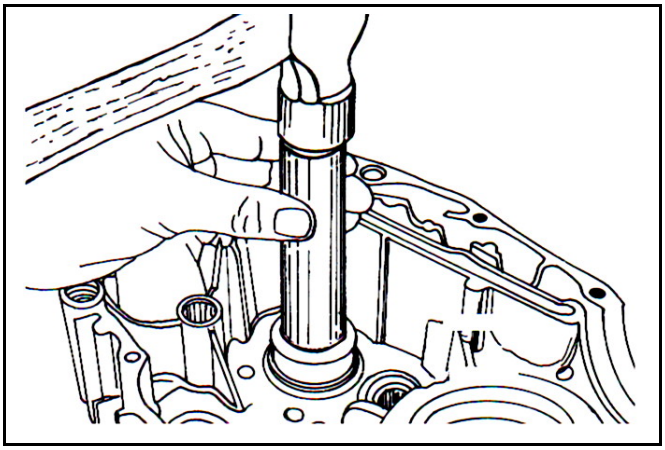
Remove the damaged bearing by using the inner bearing puller.
Special tool：
Inner bearing puller SYM-6204020

⚠ Caution

- The set plate of the main shaft bearing on the right crankcase needs to be removed first before removing the bearing.

Transmission bearing installation

Install the new bearings onto the crankcase by using bearing driver.
Special tool：
Universal bearing driver SYM-6204024

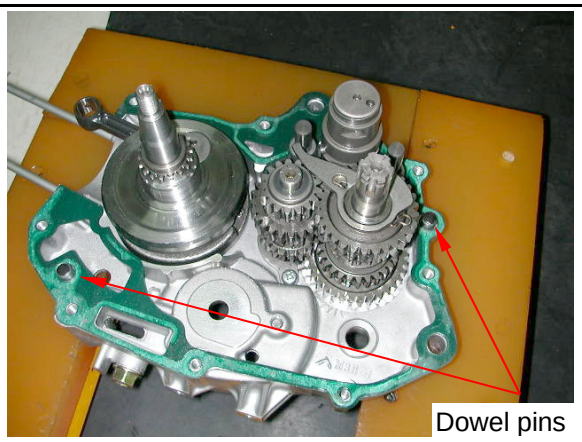


Crankcase Assembly

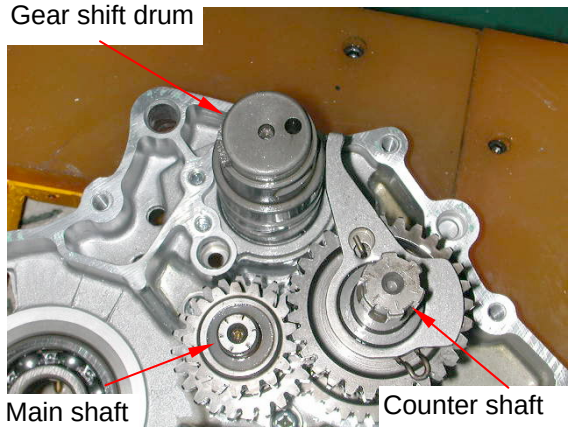
Remove the crankcase gasket and dowel pins.
Clean the gasket residues off the crankcase contact surface.

Caution

- Do not damage the contact surface of the crankcase.
- It is better to wet the gasket residue for easy scrapping.



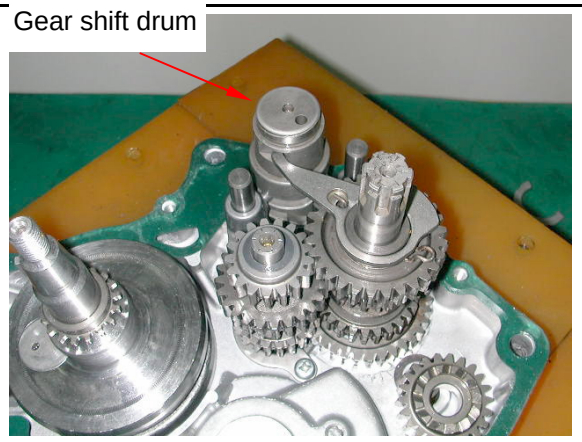
Install the main gear shaft and counter gear shaft onto the right crankcase.
Install the gear shift drum and make the drum lock plate to the inner side of the shift drum.



Caution

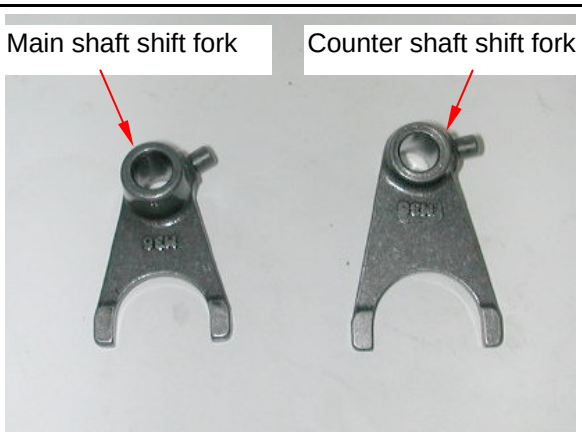
- Make sure the thrust washer in the position.

Install the main shaft shift fork, make the shift fork guide in the upper shift drum guide groove and install the shift fork shaft.
Install the counter shaft shift fork, make the shift fork guide in the lower shift drum guide groove and install the shift fork shaft.



Caution

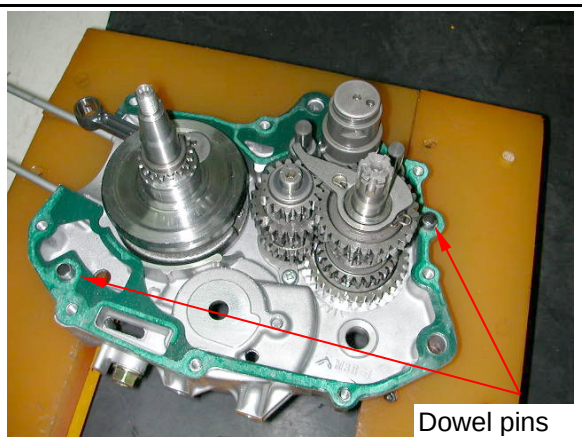
- The identification mark on the main shift fork needs to face upward and the mark on the counter shift fork faces downward during installation.



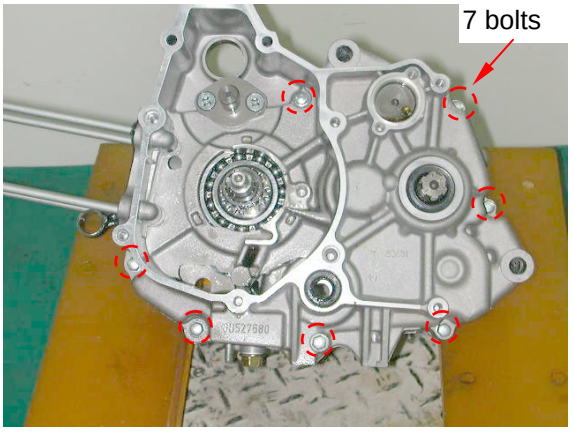
Caution

- Make sure all the parts move smoothly.
- Rotate the gear shift drum to the neutral gear.

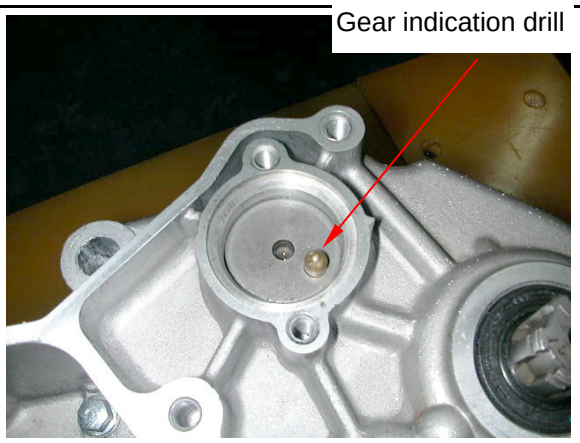
Install the crankshaft onto the right crankcase.
Install the crankcase gasket and dowel pins.



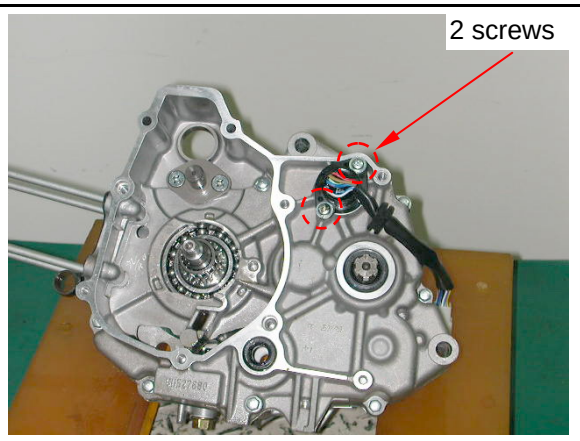
Assemble the left crankcase to the right crankcase.
Tighten the locknuts on the left crankcase.
Torque value：0.8~1.2kgf-m
Apply some grease to the oil seal of the counter shaft and then knock the oil seal in slightly.



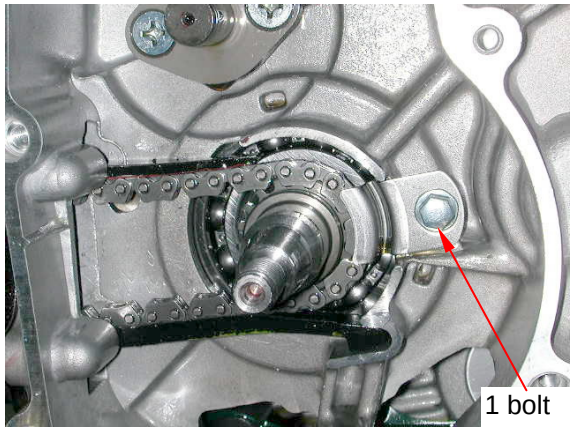
Install the gear indication drill and spring.



Install the gear change switch (2 screws).

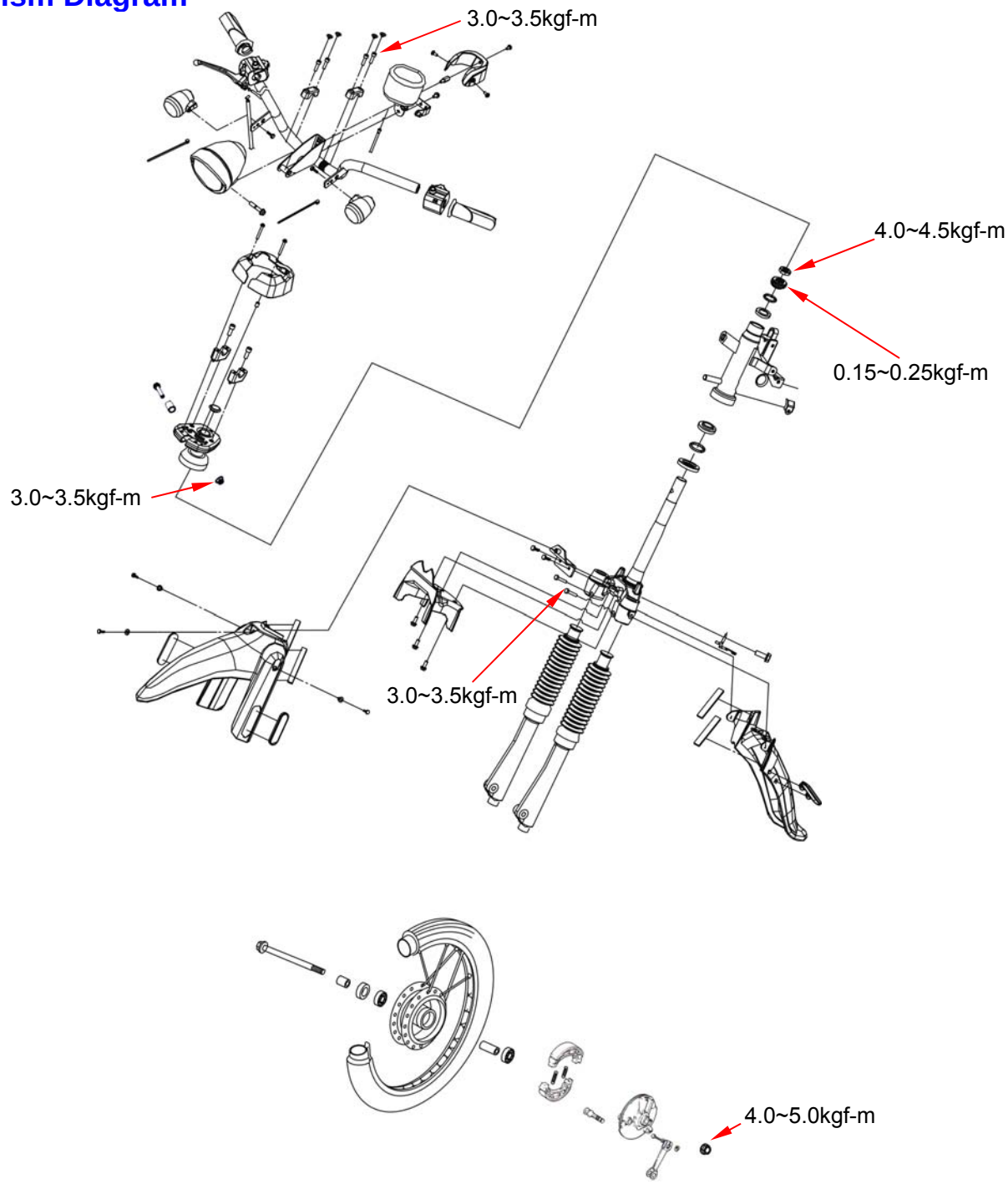


Install the cam chain and cam chain set plate (1 bolt).



Note:

Mechanism Diagram



Precautions in Operation

General information

- Before removing the front wheel, use a bracket to hold the bottom of engine. Let the front wheel away from the ground and do not let the vehicle topple over.
- Pay attention not to apply any oil or grease to the brake shoes and wheel hub, or the brake efficiency may decrease.
- Check the brake system before using the vehicle.

⚠ Caution

- Inhaling asbestos may cause disorders of respiration system or cancer, therefore, never use air hose or dry brush to clean brake parts. Use vacuum cleaner or other authorized tool instead.

Specification **measurement unit：mm**

Item		Standard	Service limit
Axle run out		—	0.2
Wheel rim run out	Axial	—	2.0
	Radial	—	2.0
Front brake drum inner diameter		110.00	111.00
Front brake lining thickness		4mm	2mm

Torque value

Front axle locknut	4.0~5.0kgf-m	Speedometer cable screw	0.15~0.3kgf-m
Steering handlebar locknut	3.0~3.5kgf-m	Front cushion locknut	3.0~3.5kgf-m
Steering handlebar holder nut	4.0~4.5kgf-m	Front brake lever nut	0.8~1.2kgf-m
Steering top cone race	0.15~0.25kgf-m	Front brake arm nut	0.8~1.2kgf-m
Steering stem locknut	6.0~8.0kgf-m		

Special tool

Steel ball race driver 32×35mm

Steel ball race driver 42×47mm

Steering stem locknut socket wrench	SYM-5320000
Steering upper cone race wrench	SYM-5320020
Inner bearing puller	SYM-6204020
Universal bearing driver	SYM-6204024

Troubleshooting

Steering / Front suspension

Hard steering
- Steering stem locknut too tight
- Worn or damaged steering bottom cone race/ steering ball.
- Insufficient tire pressure

Handle pipe steers to one side
- Improper adjustment of front cushions
- Bent front fork
- Bent front wheel axle
- Improper tire

Front wheel wobbling
- Distorted rim
- Bent or loose spoke
- Axle locknut not tightened properly
- Improper or partly worn tire
- Worn front wheel bearing

Soft front suspension
- Worn front cushion spring
- Oil seal leakage

Hard front suspension
- Bent cushion pipe
- Too much cushion fluid

Front suspension noise
- Bent cushion pipe
- Insufficient cushion fluid
- Loose cushion fastener

Drum brake

Weak brake
- Incorrect brake adjustment
- Worn brake shoe
- Worn wheel hub
- Worn brake cam
- Improper brake shoe assembly
- Jammed or interfered brake cable
- Contaminated brake shoe
- Contaminated wheel hub
- Brake shoe / brake cam contact face worn out
- Improper brake arm / brake cam contact face

Brake lever tight or slow to react
- Worn or damaged brake shoe spring
- Worn wheel hub
- Contaminated brake shoe
- Jammed or interfered brake cable
- Worn brake cam
- Incorrect brake shoe installation

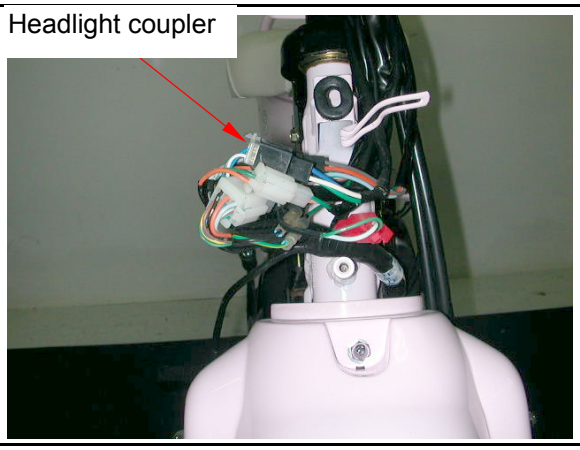
Brake noise
- Worn brake shoe
- Worn wheel hub
- Contaminated brake shoe
- Contaminated wheel hub

Headlight

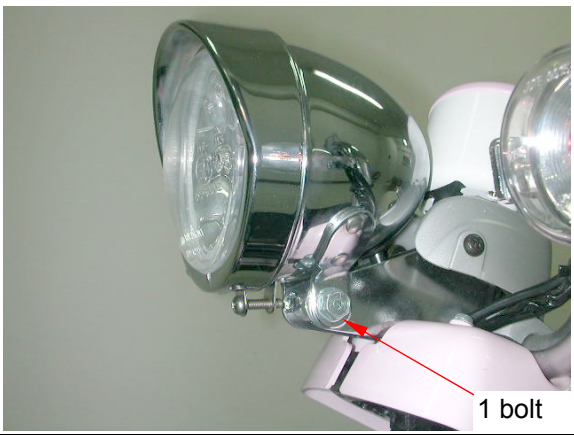
Removal

Remove the front cover (1 bolt).

Disconnect the headlight wire coupler.



Remove the headlight lock bolt and the headlight.

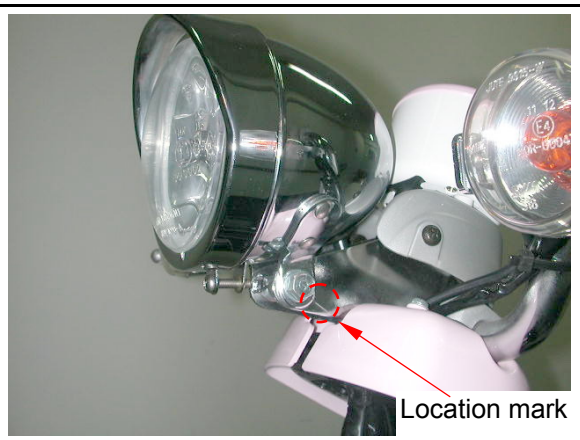


Installation

Align the headlight location mark and install the headlight.
Install other parts in reverse order.

Headlight angle adjustment

Loosen the headlight lock bolt and adjust the headlight angle.
Tighten the lock bolt after adjustment.

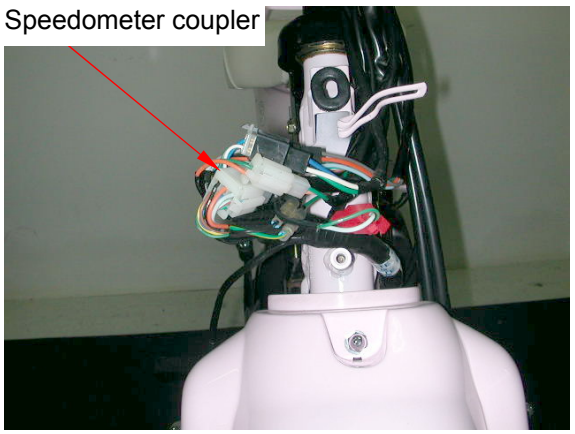


Speedometer

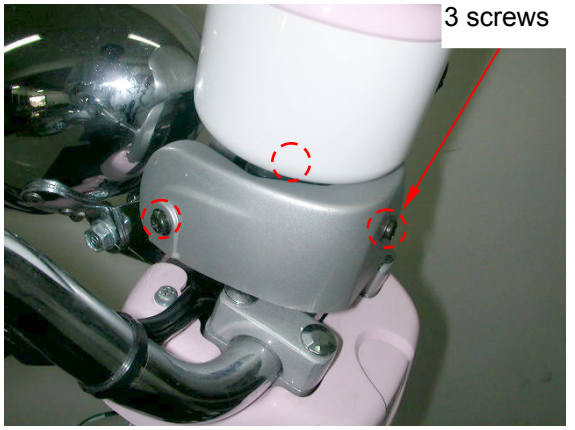
Removal

Remove the front cover (1 bolt).

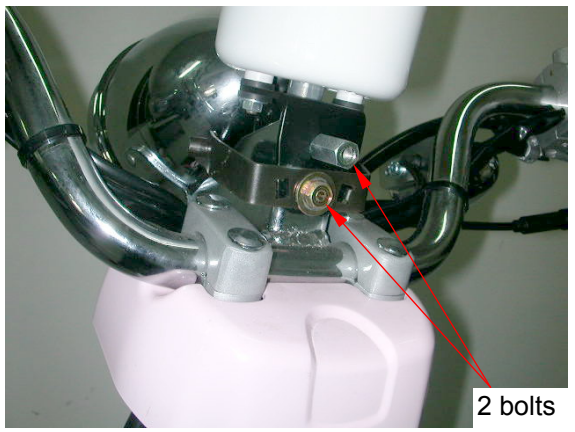
Disconnect the speedometer wire coupler.



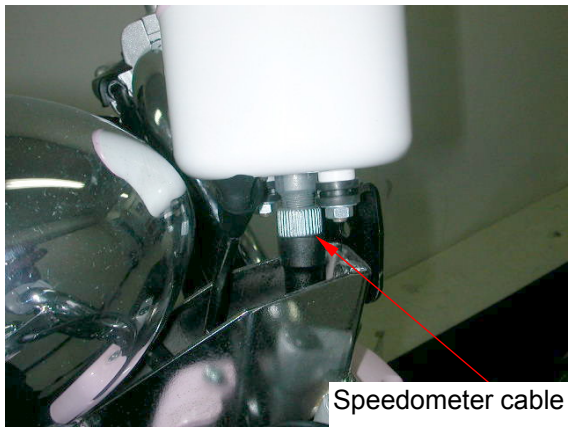
Remove the speedometer cover (3 screws).



Remove the speedometer cover stay (2 bolts)



Remove the speedometer cable and the speedometer.



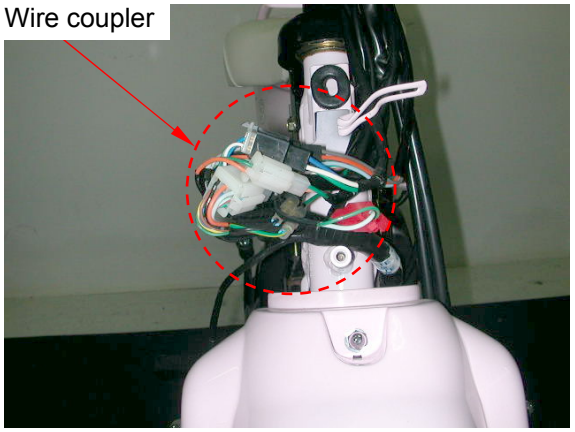
Installation

Install in the reverse order.

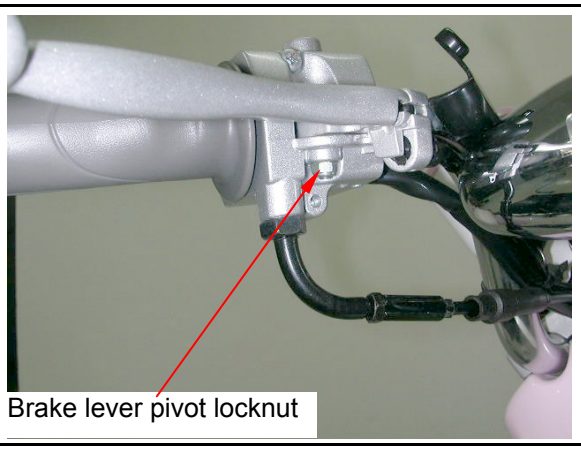
Handlebar

Removal

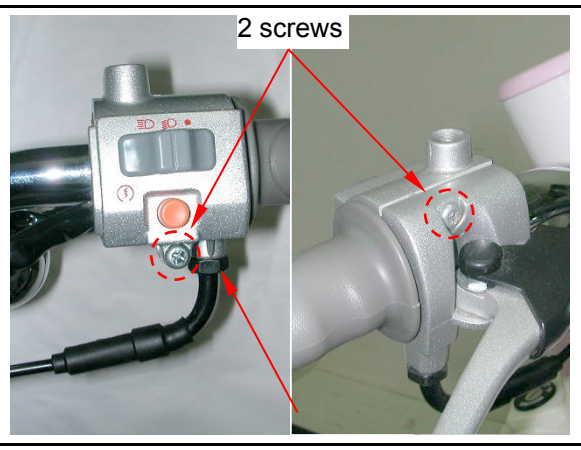
Remove the front cover (1 bolt).
Disconnect the speedometer cable, left / right handle switch, winker coupler, brake light switch and headlight coupler.
Remove the back mirror, headlight and speedometer.
Remove the handle wire band.



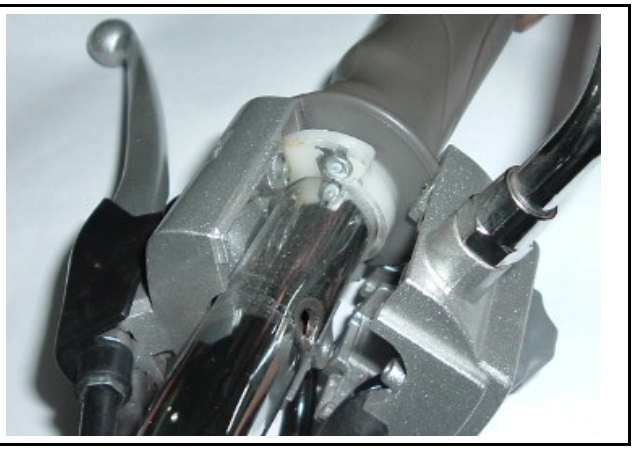
Remove the front brake lever pivot locknut.
Remove the front brake lever.



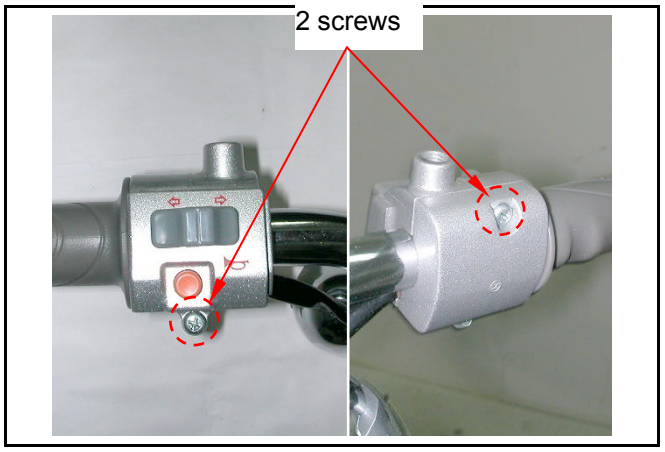
Loosen the throttle cable locknut.
Remove the right handle switch lock screws.



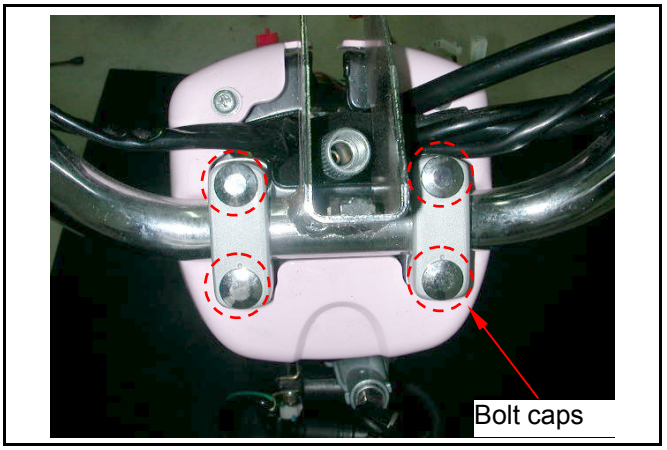
Remove the throttle grip and right handle switch.



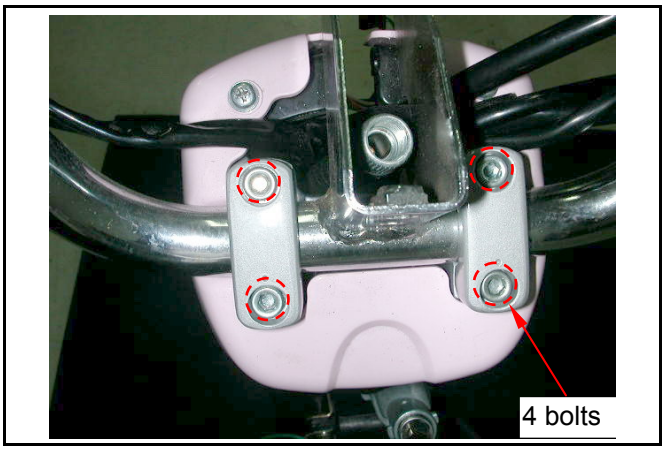
Remove the left handle switch (2 screws).



Remove the handle pipe up holder bolt caps.



Remove the handle pipe up holder (4 bolts).
Remove the handle pipe.

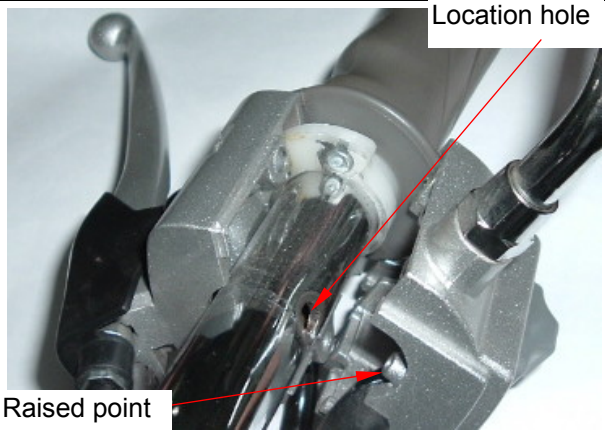


Installation
Install in the reverse order.

Torque value：
Handlebar locknut 3.0~3.5kgf-m

Before assembling the handle switch, throttle grip and throttle cable, apply grease to the sliding surface.
Align the raised point inside the handle switch with the location hole on the steering handle pipe.
After assembling the handle pipe set, confirm and adjust the following：

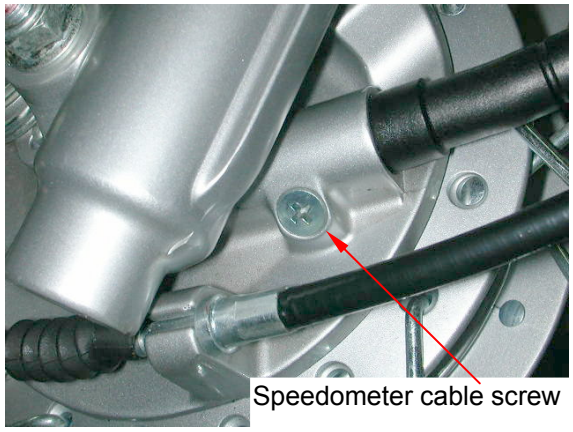
- the operation and clearance of throttle grip
- the operation of electrical system and speedometer



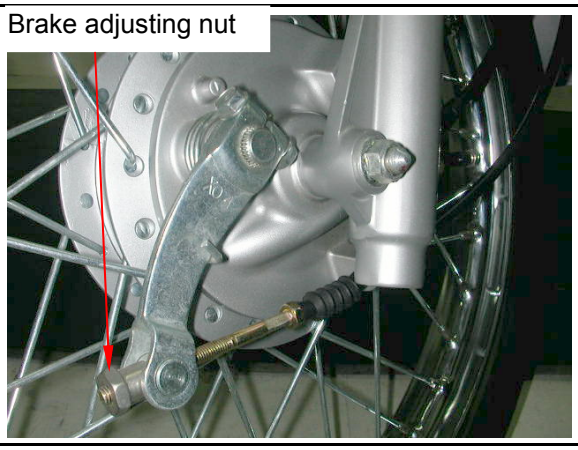
Front Wheel

Removal

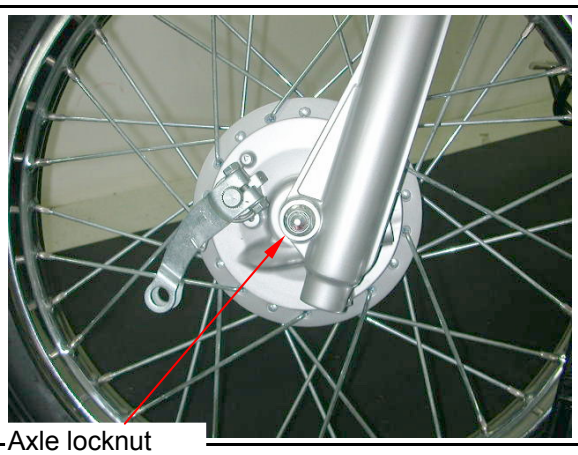
Use a bracket to hold the bottom of engine and let the front wheel away from the ground.
Remove the speedometer cable from the brake panel



Remove the brake cable.



Remove the front wheel axle locknut.
Pull out the front wheel axle.
Remove the front wheel, brake panel and side collar.

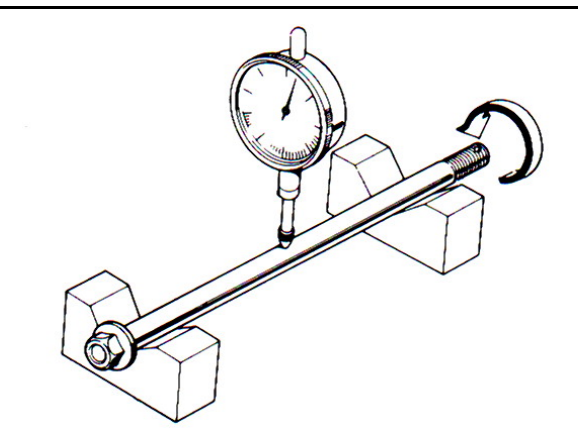


Inspection

Front wheel axle

Put the axle on a V-block and measure the run out.

Service limit：0.2 mm

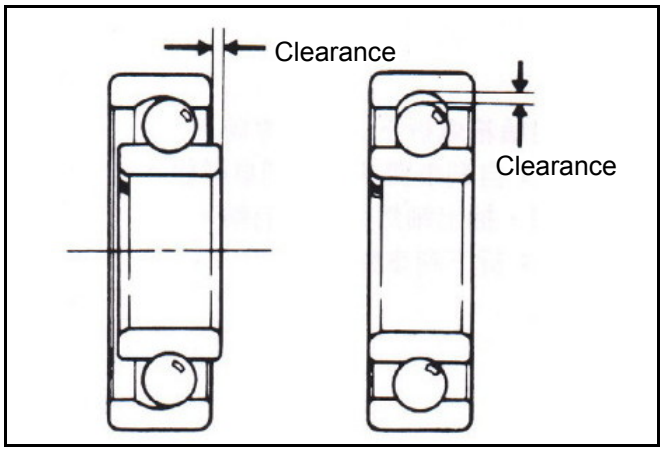


Bearing

Turn the inner ring of each bearing to check if it rotates smoothly and quietly.
Meanwhile, check if the outer ring fits the wheel hub closely.
If the bearing doesn't rotate smoothly or quietly, replace it with new one.

⚠ Caution

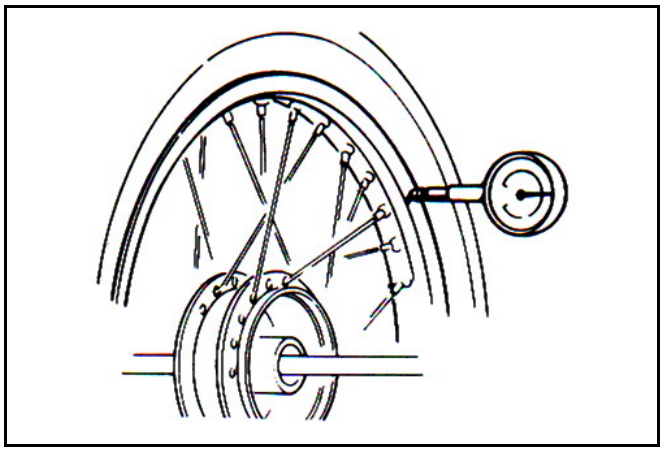
- The old bearing cannot be reused but be replaced with new one by pairs.



Rim

Place the rim in a rotating stand.
Spin the rim by hand and measure the run out by using a dial indicator.

Service limit : Radial 2.0mm
Axial 2.0mm

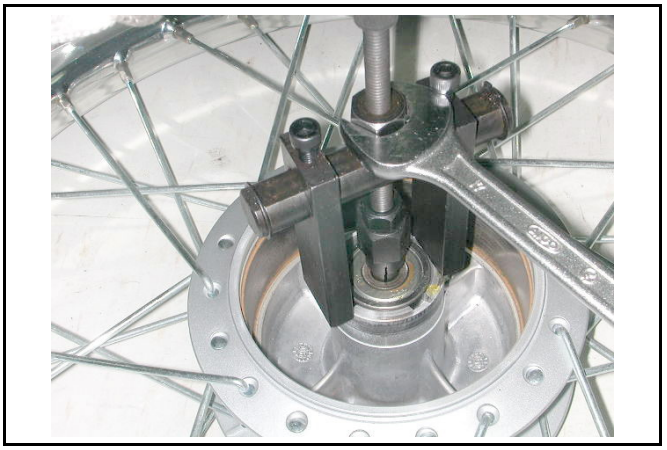


Disassembly

Pull out the left bearing by using inner bearing puller.
Remove the front axle distance collar.
Pull out the right bearing and oil seal by using inner bearing puller.

Special tool :

Inner bearing puller SYM-6204020



Reassembly

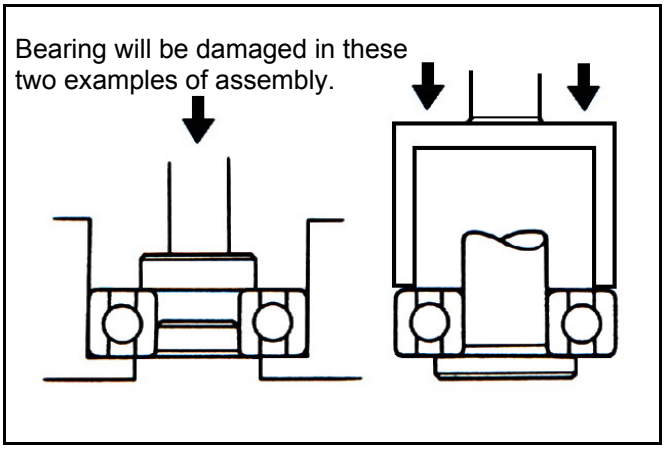
Apply grease to the wheel hub / bearing contact surface.
Install the left bearing.
Install the distance collar and then the right bearing.

⚠ Caution

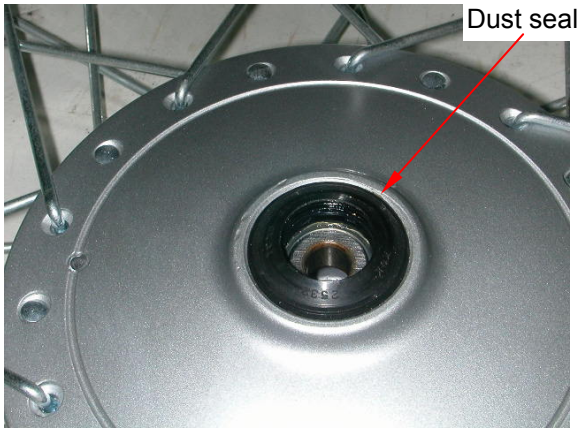
- The bearing cannot lean to one side during installation.

Tool :

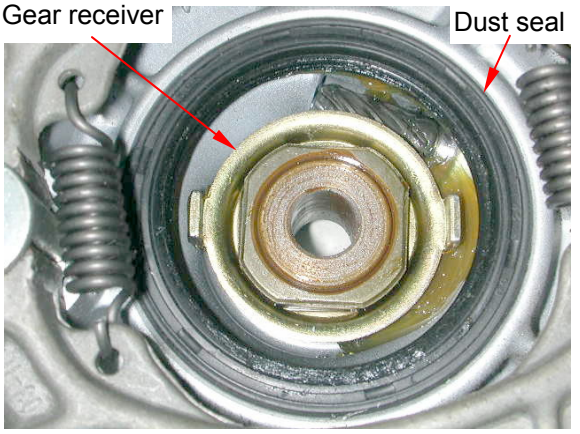
Bearing driver



Apply grease to the inner side of right dust seal and install the dust seal to the wheel hub.



Check the dust seal inside the brake panel for wear or damage. Replace it with new one if necessary.
Turn the speedometer gear receiver to check if the speedometer gear rotates fluently.

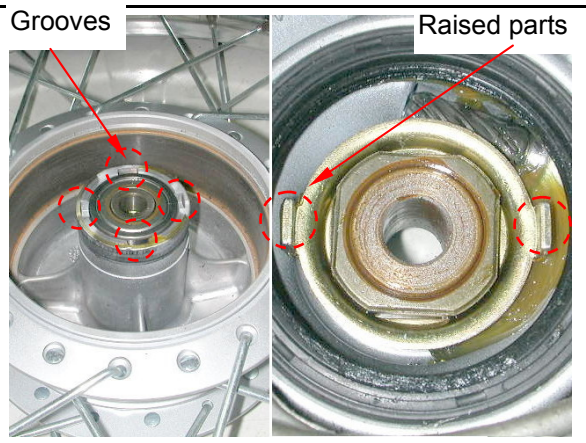


Front wheel installation

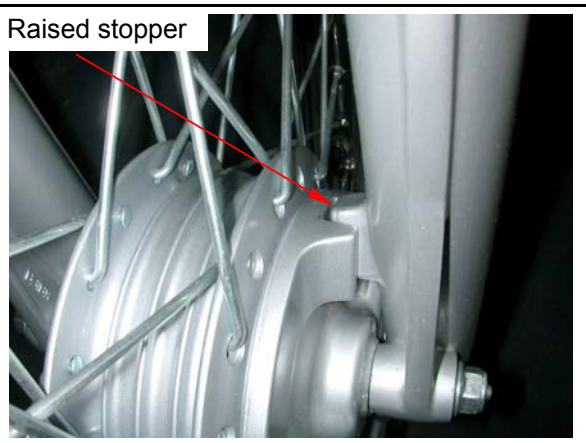
Align the raised parts of the speedometer gear receiver with the grooves of the front wheel hub.
Install the front brake panel.

Caution

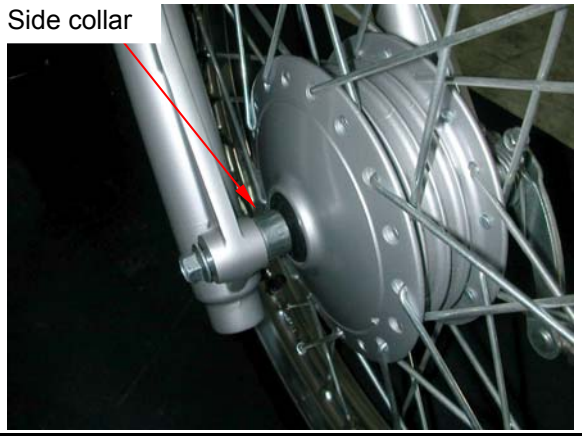
- Contaminated brake shoe will decrease braking efficiency; therefore grease cannot be applied to brake shoes and wheel hub.



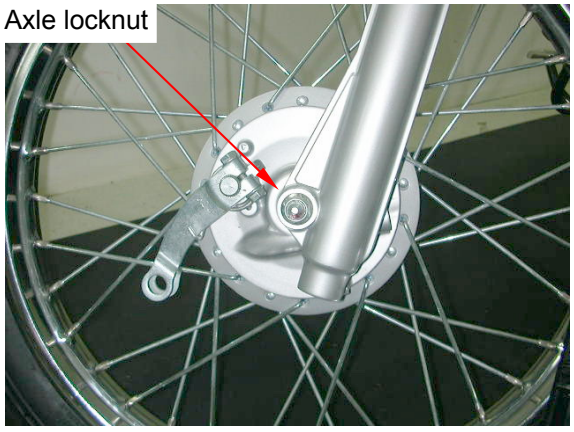
Place the front wheel between the front cushions.
Align the groove on the brake panel with the raised stopper on the left front cushion.



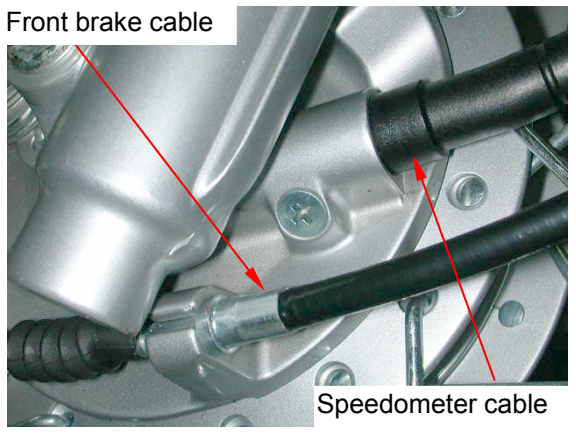
Install the right side collar and push in the front wheel axle from the right cushion.



Assemble the front wheel axle locknut and lock it to the specified torque value.
Torque value：4.0~5.0kgf-m



Assemble the speedometer cable to the brake panel.
Install the front brake cable.

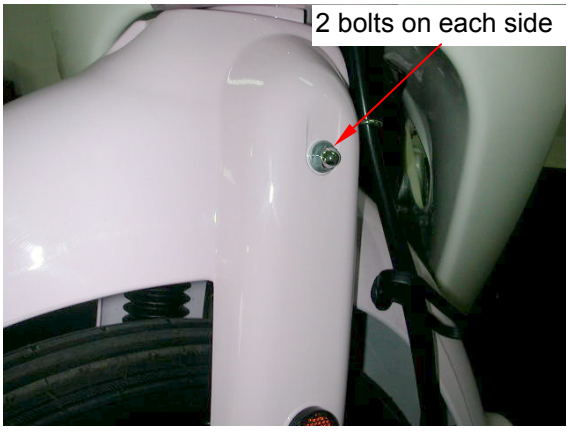


Front Suspension

Removal

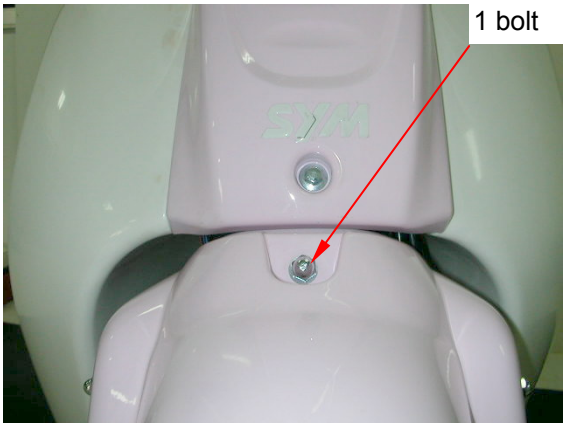
Remove the front wheel and front brake mechanism.

Remove 2 lock bolts from the right / left side of the front fender A.

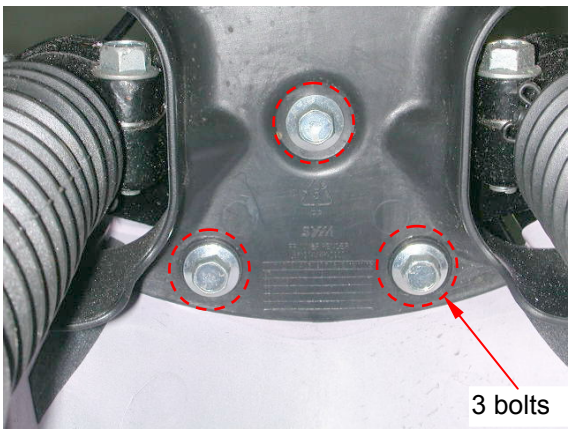


Remove the upper lock bolt on the front fender A.

Separate the front fender A and front fender B.

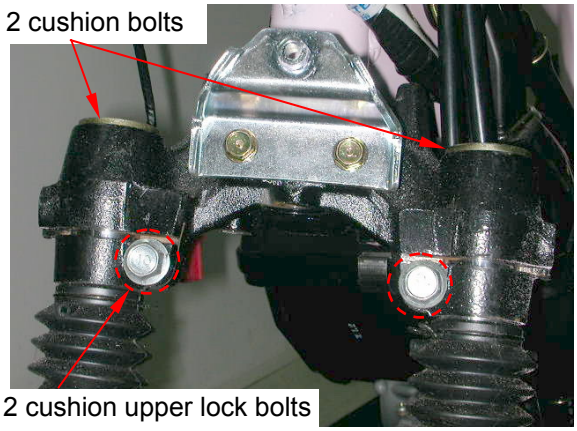


Remove the front inner fender and front fender B (3 bolts).



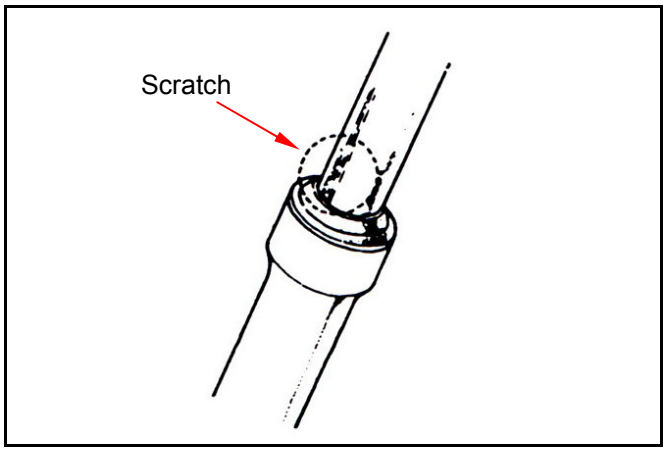
Release the front cushion bolts and front cushion upper lock bolts.

Remove the front cushions.



Front cushion inspection / bearing replacement

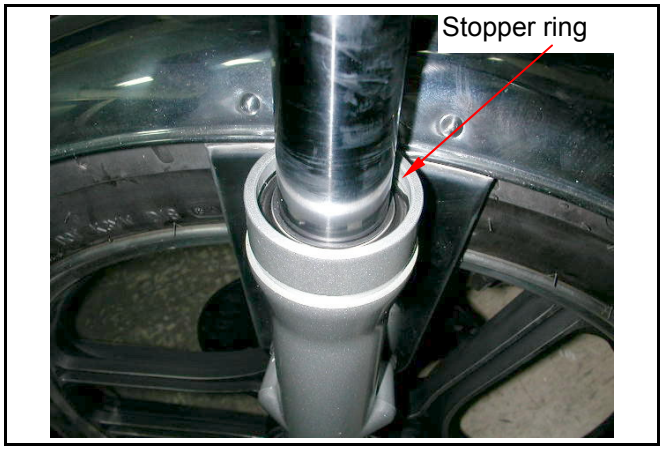
Push the fork pipe for several times to check if there is any oil leakage or excessive noise.
Check if there is any scratch on the fork pipe if oil leakage happens.
Replace the front cushion if there is scratch on the fork pipe.



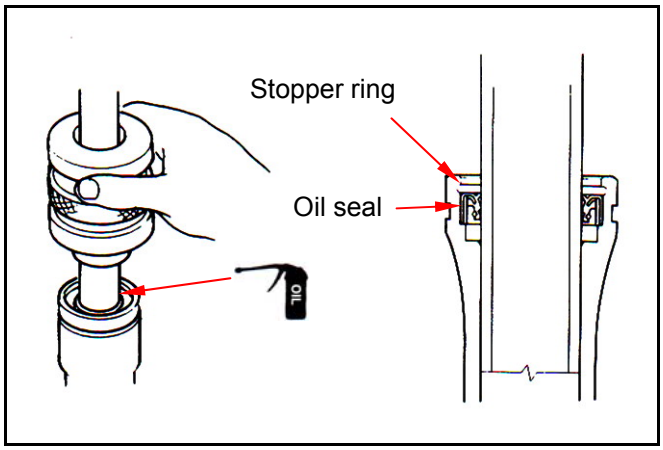
If there is oil leakage but without scratch on the fork pipe, replace the oil seal.
Pour out the cushion oil.
Remove the oil seal stopper ring and then remove the old oil seal.

⚠ Caution

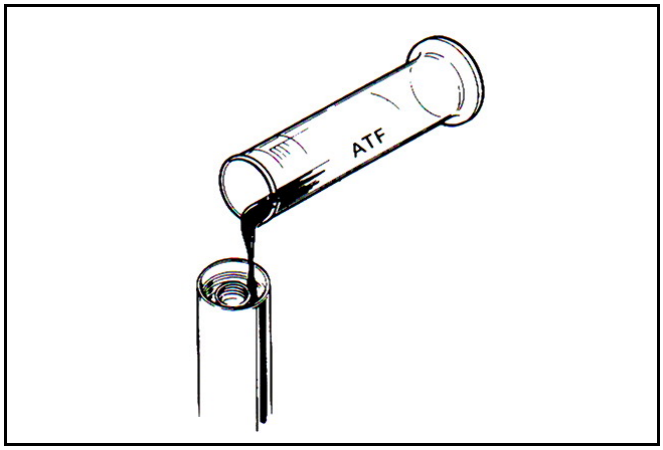
- Do not damage the fork pipe when removing the oil seal.



Coat the inner side of the new oil seal with cushion oil and then put in the fork pipe.
Install the oil seal to the right position by using an oil seal driver.
Clip the stopper ring.



Adjust the cushion oil capacity if the front cushion is too hard or too soft.
Cushion oil：BRAMAX CUSHION OIL
Capacity：50 c.c.

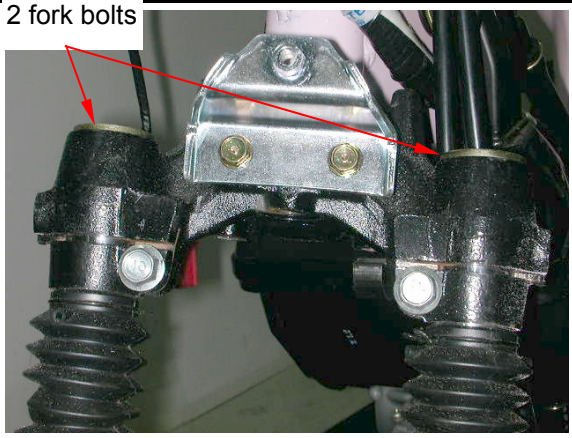


Front cushion installation

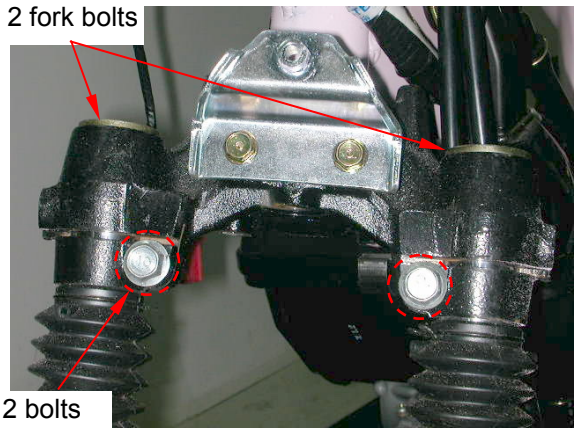
⚠ Caution

- Rotate the fork pipe during installation will make it easier to install the fork pipe.

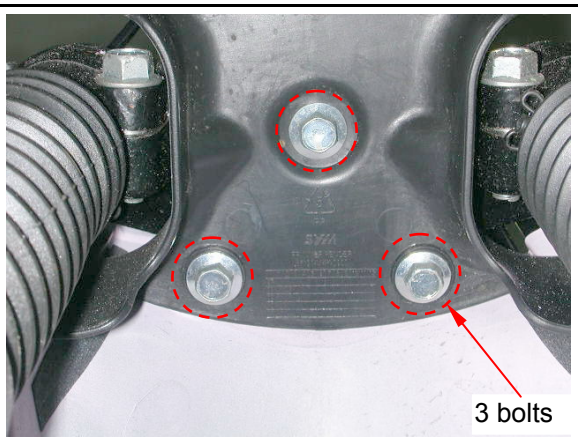
Install the fork pipe from the bottom of the front fork.
Hold the fork pipe by hand and lock the fork bolt as tight as possible.



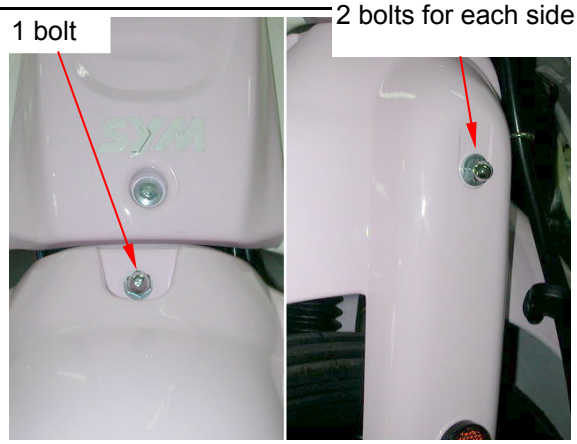
Lock the fork lock bolts.
Torque value：3.0~3.5kgf-m
Lock the fork bolt again.



Install the front inner fender and front fender B (3 bolts).



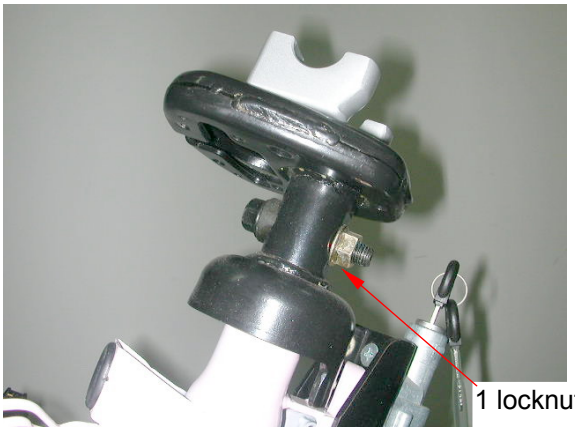
Assemble the front fender A and front fender B.
Lock the upper lock bolt on the front fender A.



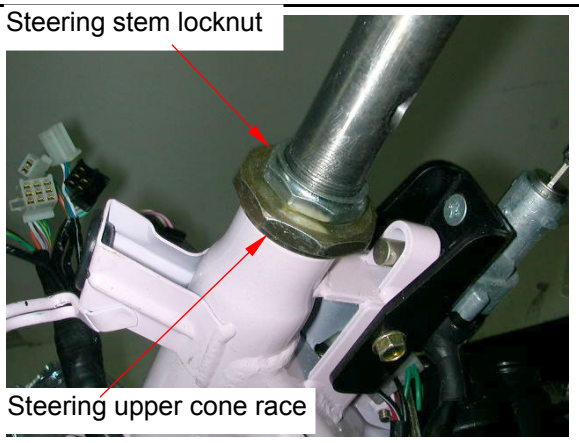
Steering Stem

Removal

Remove the speedometer, headlight, headlight bracket, steering hand pipe, front wheel, front brake set and front cushion.
Remove the steering handle pipe post 1 locknut.



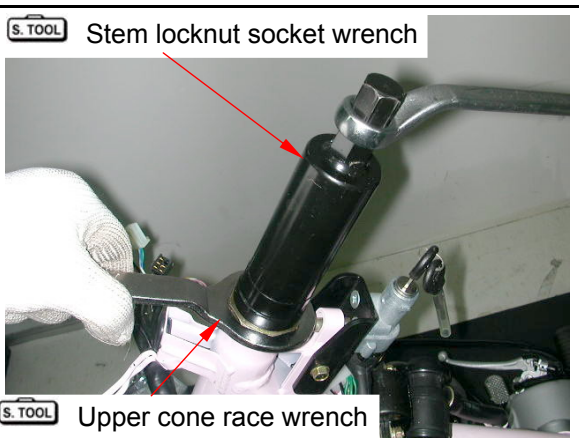
Remove the steering handle pipe.



Remove the steering stem locknut and steering upper cone race.
Special tool：

Stem locknut socket wrench	SYM-5320000
Upper cone race wrench	SYM-5320020

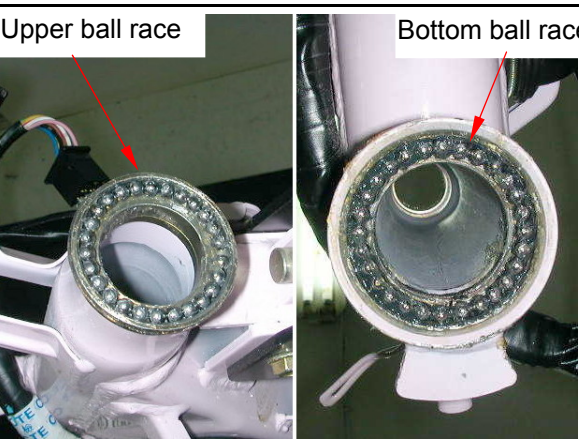
Remove the steering stem.



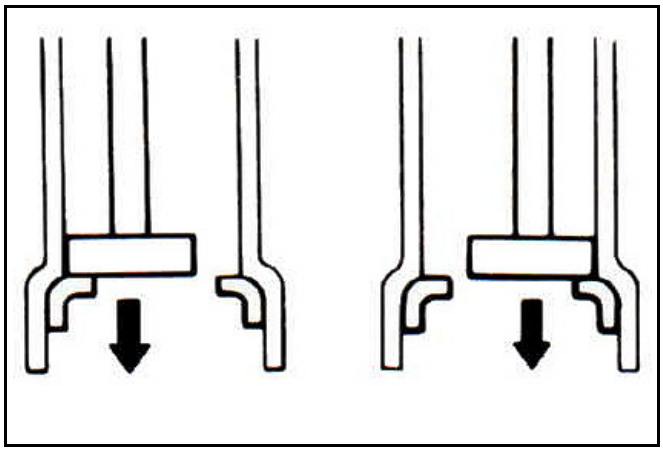
Remove the steering steel balls from the steering upper / bottom ball race.
Upper steering steel ball number：26
Bottom steering steel ball number：28

⚠ Caution

- Keep the steering steel balls in a container to avoid missing them.
- If the steering steel ball is worn or deformed.



Remove the steering upper / bottom ball race by driver and rubber hammer.



Remove the steering bottom cone race from the steering stem.

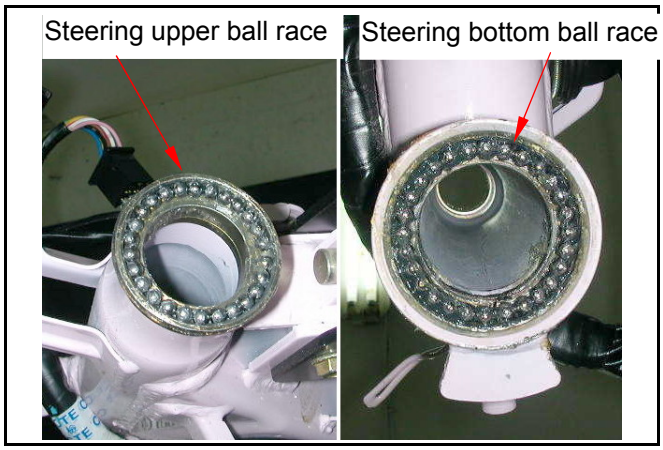
⚠ Caution

- Do not do harm to the frame and steering stem.

Installation

Install a new steering bottom cone race onto the steering stem and lubricate with grease.

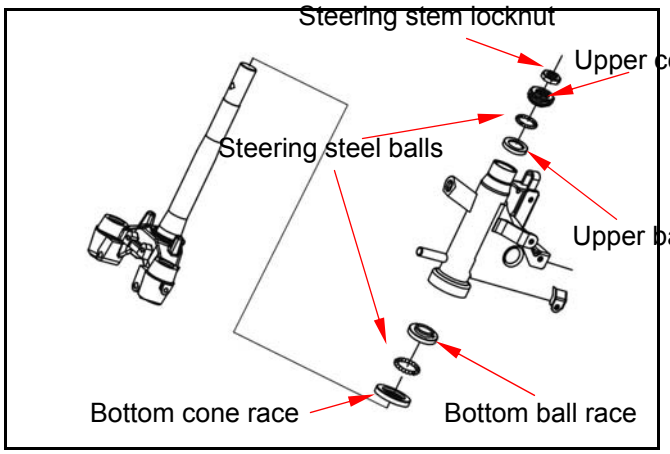
Install the steering upper / bottom ball race to the right position.



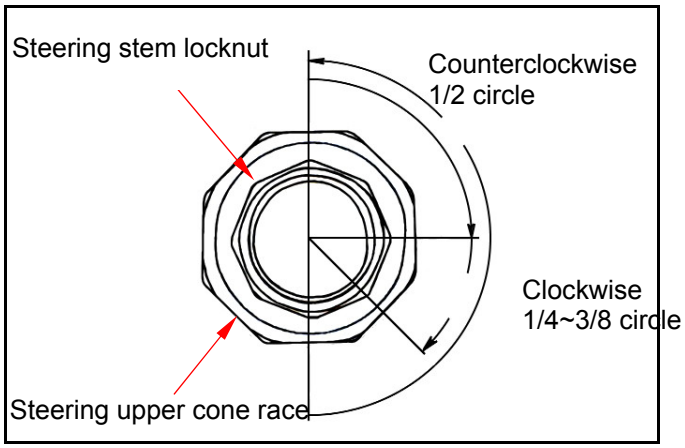
⚠ Caution

- Do not let the ball race lean on one side during installation.

Coat the upper / bottom ball race with grease and install the steering balls.



Install the steering stem into the frame.
Lubricate the steering upper cone race.
Screw the upper cone race and steering stem locknut to the steering stem till the steering balls touch the upper cone race closely.
Turn the upper cone race counterclockwise 1/2 circle and then tighten it with specific torque value (1/4~3/8 circle).

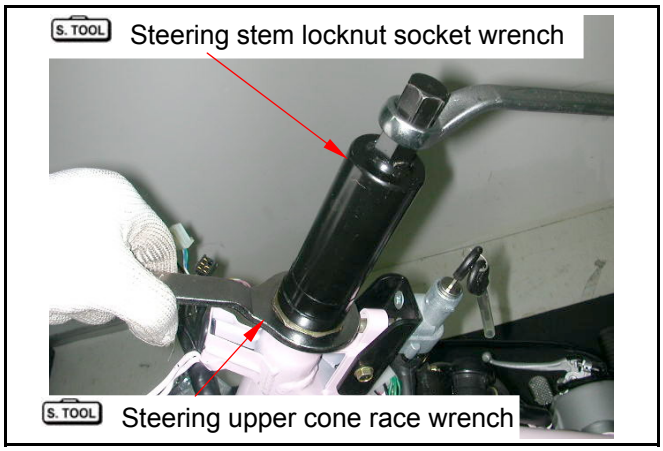


Special tool：
Upper cone race wrench SYM-5320020
Torque value：0.15~0.25kgf-m

⚠ Caution

- Do not over tighten upper cone race or the steering ball race may be damaged.

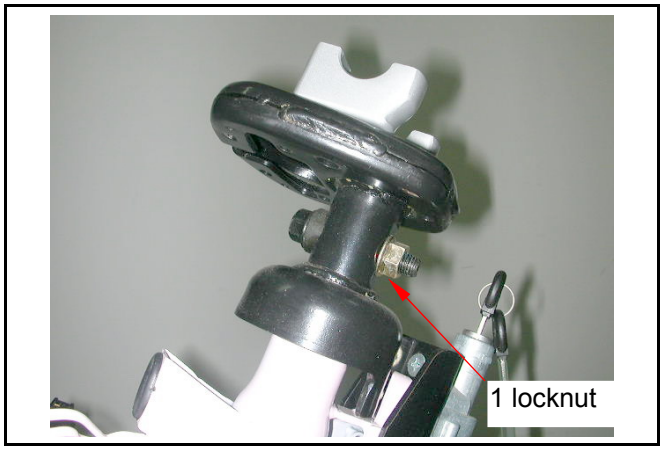
Fix the steering upper cone race and tighten the steering stem locknut.
Special tool：
Steering stem locknut socket wrench SYM-5320000
Steering upper cone race wrench SYM-5320020
Torque value：6.0~8.0kgf-m



⚠ Caution

- After installation, check if the steering stem can rotate freely with vertical clearance or not.

Install the steering pipe post (1 locknut).
Torque value：4.0~4.5kgf-m
Install other parts in the reverse order of removal.



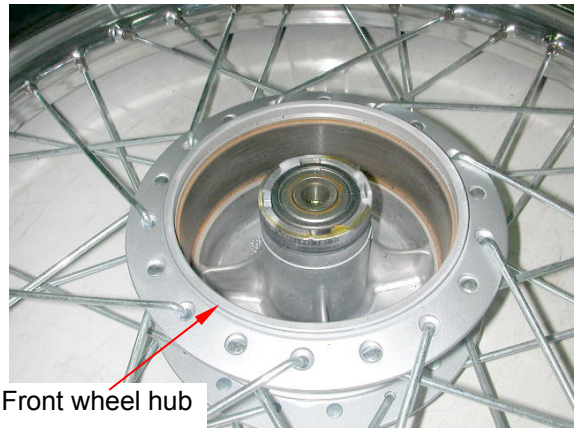
Front Brake Hub

Removal

Remove the front wheel.
Clean the wheel hub with vacuum cleaner.

⚠ Caution

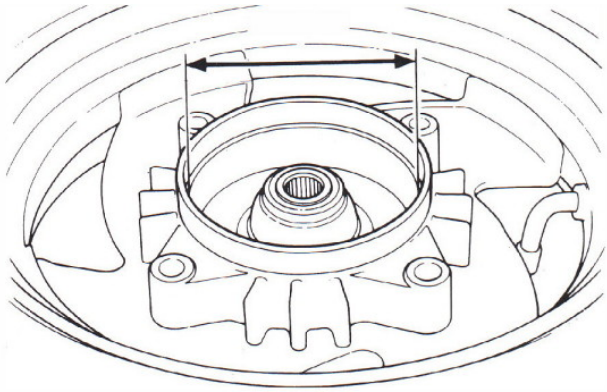
- Inhaling asbestos may cause disorders of respiration system or cancer, therefore, never use compressed air or dry brush to clean brake parts. Use vacuum cleaner or other authorized tool instead.
- Grease on the brake lining will decrease the braking efficiency.



Inspection

Check if the wheel hub is damaged or worn out.
Replace the wheel hub if necessary.
Measure the inner diameter of the wheel hub.

Service limit： 111.0mm



⚠ Caution

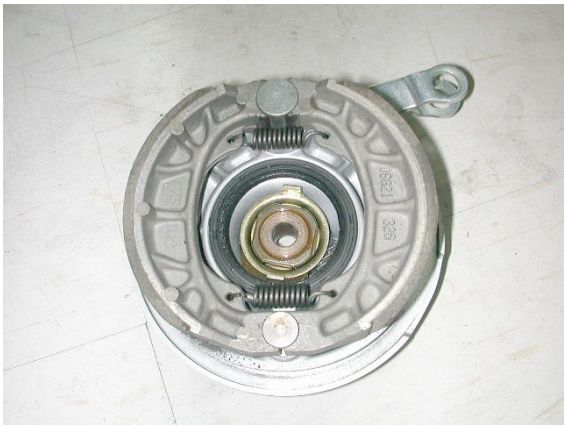
- Rub the wheel hub with #120 sandpaper if it is rusty.
- Measure the inner diameter of the wheel hub by a vernier caliper.

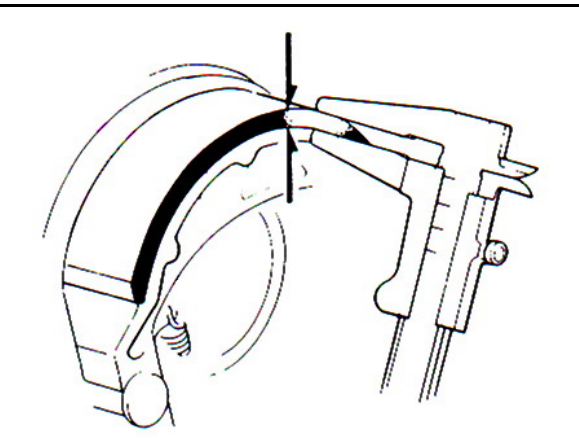
Front Brake Shoes

Inspection

Measure the brake lining thickness on three points (2 ends and the middle).
If the brake lining thickness is below service limit or contaminated by grease, replace it with new one.

Service limit： 2.0 mm



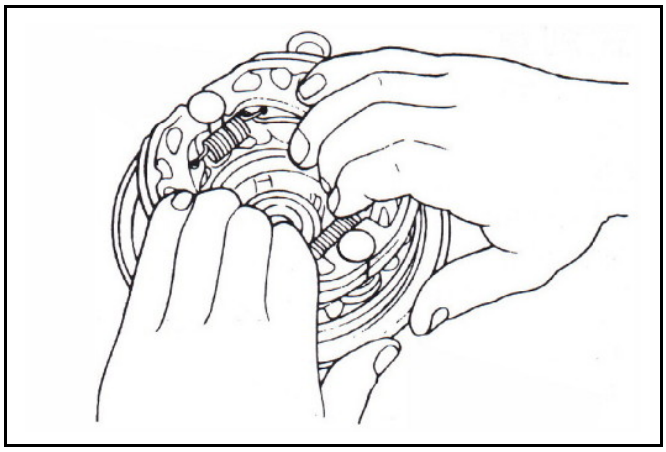


Removal

⚠ Caution

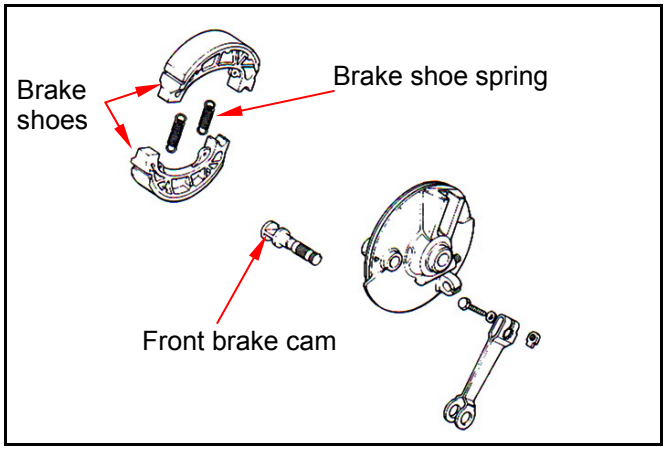
- Brake shoes must be replaced with a new pair.

Remove the brake shoes from the brake panel.



Installation

Coat some grease to the front brake cam.
Hook the brake shoe springs onto the brake shoes.
Pull out the brake shoes and install the brake shoes on the brake penal.
Clean out the excessive grease from the front brake cam.
Rub the brake lining slightly with sandpaper to clean the lining surface after assembly.



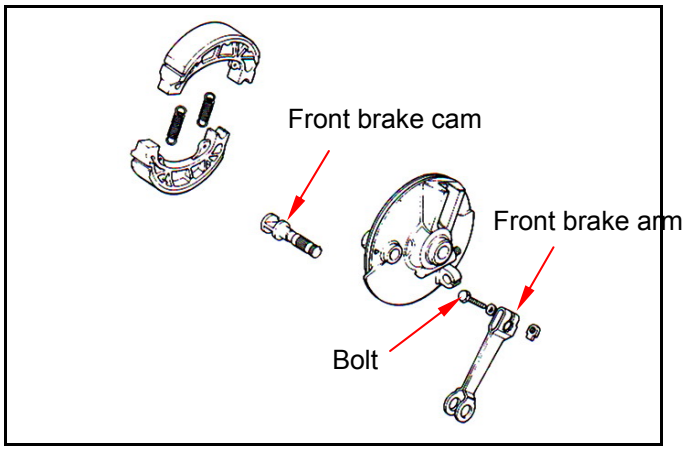
⚠ Caution

- If the brake shoe is contaminated by grease, braking efficiency will decrease or even totally lose.

Front Brake Panel

Brake panel removal

Remove the front brake arm lock bolt.
Remove the brake arm, brake cam and oil seal from the brake panel.



Brake panel installation

Coat some grease to the front brake cam.
Assemble the front brake cam to the brake panel.
Align the location mark on the brake arm with the brake cam groove and assemble and brake arm.
Tighten the lock bolt to the specific torque value.
Torque value：0.8~1.2kgf-m

11. Rear Wheel / Rear Suspension / Rear Brake

Precautions in Operation

General information

Refer to the service manual of tire for the information of tire removal, repair and installation.

Specification

measurement unit : mm

Item		Standard	Service limit
Axle run out		—	0.2
Rim run out	Radial	—	2.0
	Axial	—	2.0
Inner diameter of wheel hub		110.0	111.0
Drive chain slack		—	10~20
Brake lining thickness		4.0	2.0

Torque value

Rear axle locknut	5.0~6.0kgf-m
Final driven flange locknut	6.0~7.0kgf-m
Final driven sprocket lock bolt	2.7~3.3kgf-m
Drive sprocket fixing bolt	0.8~1.2kgf-m
Rear fork axle locknut	3.0~4.0kgf-m
Muffler mounting nut	1.0~1.4kgf-m
Rear cushion upper mounting nut	3.0~4.0kgf-m
Rear cushion lower mounting nut	3.0~4.0kgf-m
Rear brake arm bolt	0.8~1.2kgf-m
Rear brake torque link locknut	1.5~2.5kgf-m
Main stand locknut	3.5~4.5kgf-m

Special tool

Inner bearing puller	SYM-6204020
Rubber bush puller / driver	SYM-1120310

Troubleshooting

Rear wheel wobbling
- Distorted rim
- Faulty rear tire
- Rear axle not tightened correctly

Soft suspension
- Weak cushion spring
- Incorrect cushion adjustment

Hard suspension
- Bad rubber bush
- Bent cushion pivot

Suspension excessive noise
- Loose cushion mounting bolt
- Bad rubber bush
- Cushion oil leakage
- Bent cushion

Insufficient braking performance
- Incorrect brake adjustment
- Worn brake lining
- Worn wheel hub
- Worn brake cam
- Incorrect brake shoe installation
- Jammed or interfered brake pedal
- Contaminated brake lining
- Contaminated wheel hub
- Brake shoe / brake cam contact face worn out
- Improper brake arm / brake cam contact face

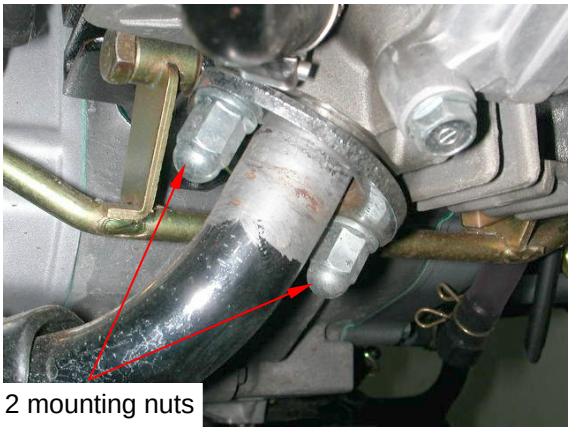
Brake pedal tight or slow react
- Worn or damaged brake arm return spring
- Worn wheel hub
- Contaminated brake lining
- Contaminated wheel hub
- Jammed or interfered brake pedal
- Worn brake cam
- Incorrect brake shoe installation

Excessive braking noise
- Worn brake lining
- Worn wheel hub
- Contaminated brake lining
- Contaminated wheel hub

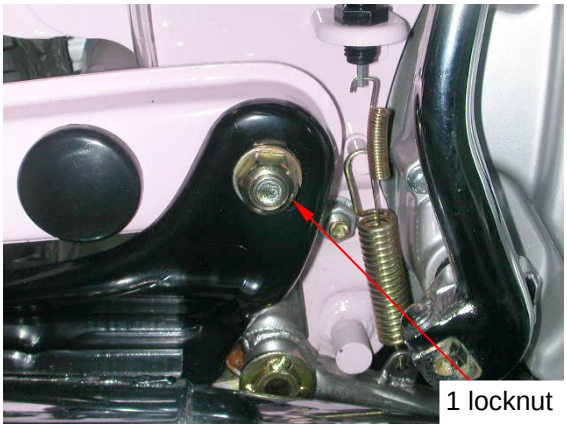
Rear Wheel

Rear wheel removal

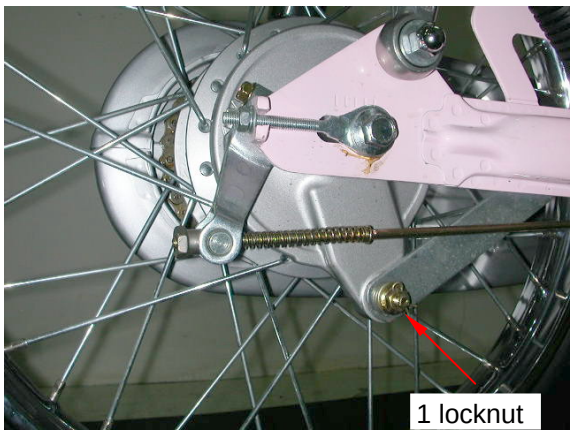
Remove the exhaust pipe mounting nuts.



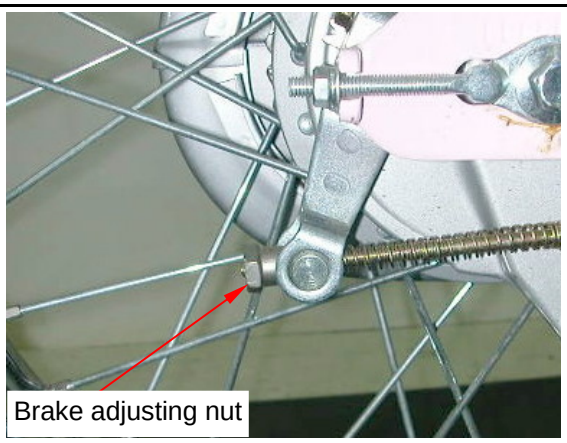
Remove the rear fork axle locknut.
Remove the exhaust pipe.



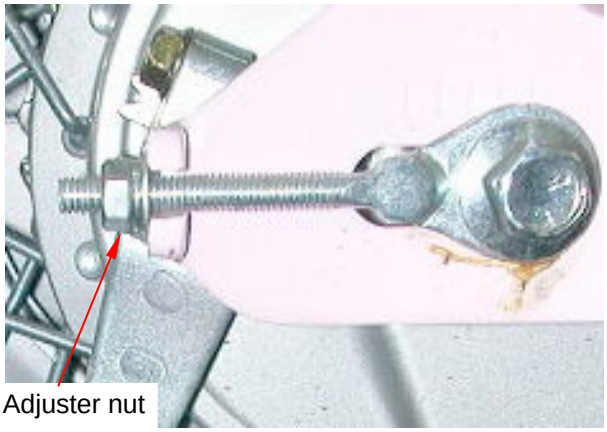
Remove the rear brake torque link (1 locknut).



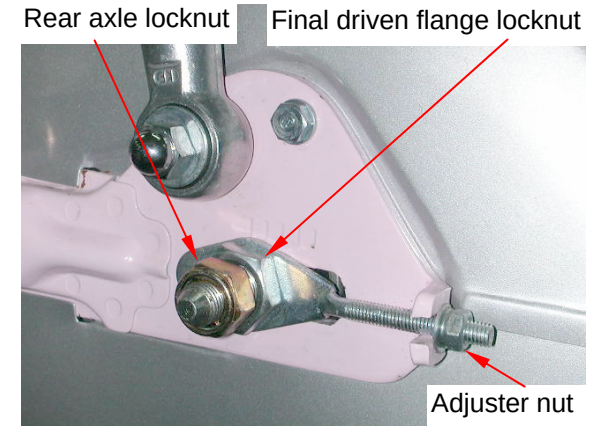
Remove the brake adjusting nut and rear brake rod.



Loosen the left and right drive chain adjuster nuts.



Loosen the final driven flange locknut.

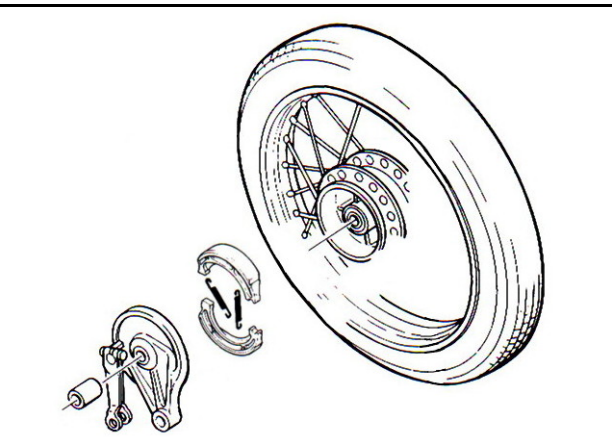


Fix the rear wheel axle and remove the rear axle locknut.

Pull out eh rear wheel axle and remove the rear wheel, rear wheel distance collar, drive chain adjusters and rear brake penal.

⚠ Caution

- Inhaling asbestos may cause disorders of respiration system or cancer, therefore, never use air hose or dry brush to clean brake parts. Use vacuum cleaner or other authorized tool instead.
- Grease on the brake lining will decrease the braking efficiency.

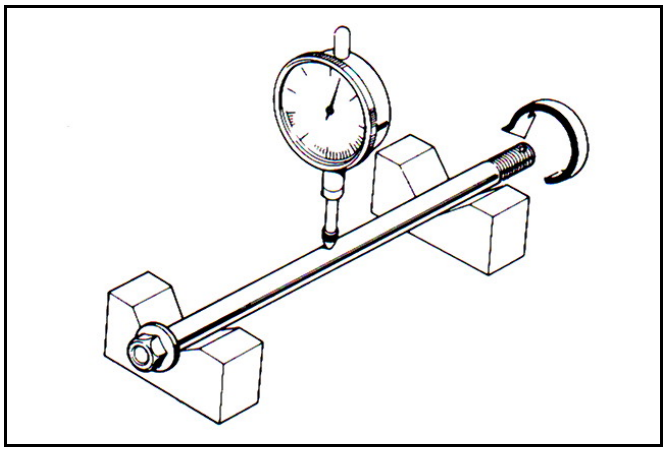


Inspection

Rear wheel axle

Put the rear axle on a V-block and measure the run out.

Service limit：0.2 mm

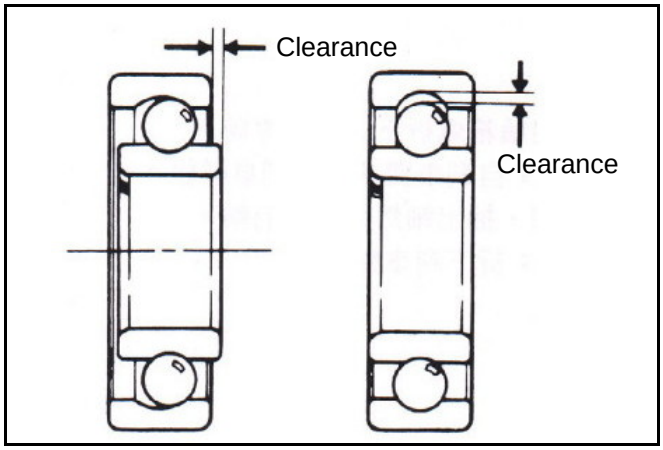


Bearing

Turn the inner ring of each bearing to check if it rotates smoothly and quietly.
Meanwhile, check if the outer ring fits the wheel hub closely.
If the bearing doesn't rotate smoothly or quietly, replace it with new one.

⚠ Caution

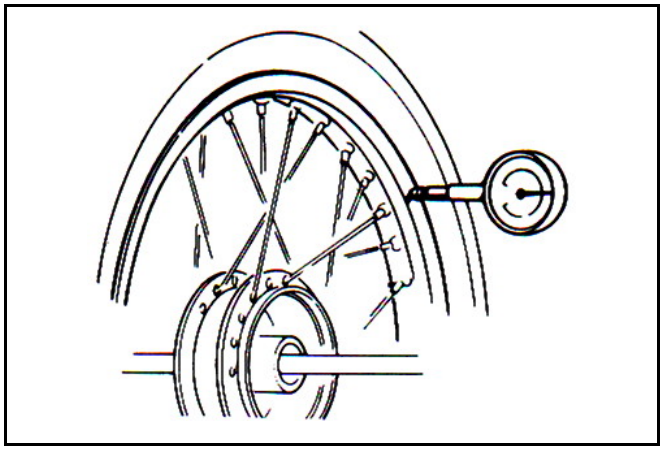
- The old bearing cannot be reused but be replaced with new one by pairs.



Rim

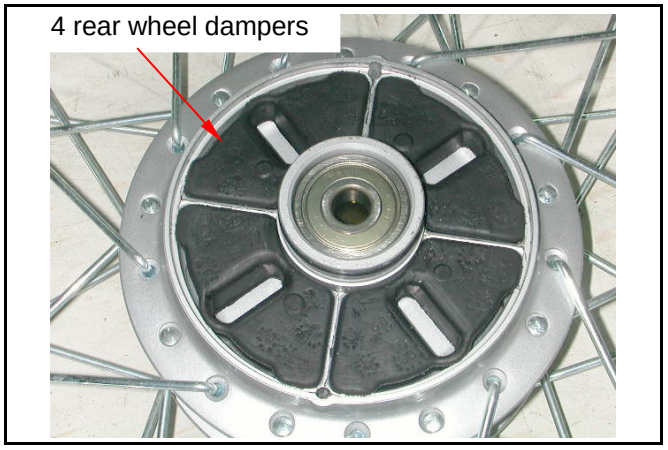
Place the rim in a rotating stand.
Spin the rim by hand and measure the run out by using a dial indicator.

Service limit：Radial 2.0mm
Axial 2.0mm



Rear wheel damper inspection

Check the four rear wheel dampers for wear or damage.
Replace it with new one if necessary.

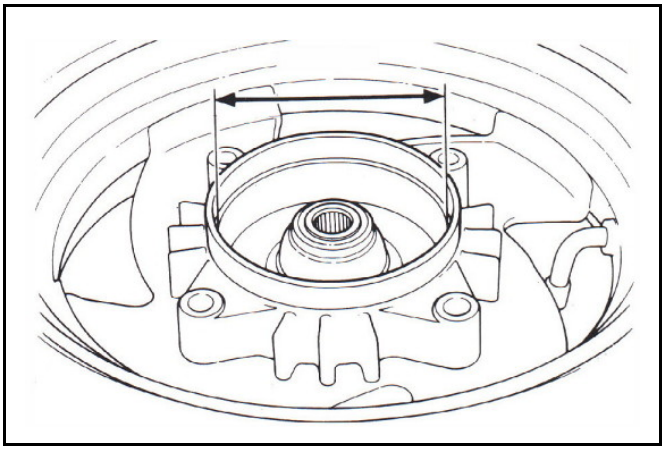


Rear wheel hub
Check the rear wheel hub for wear or damage.
Replace it if necessary.

Measure the inner diameter of the wheel hub.
Service limit：111.0mm

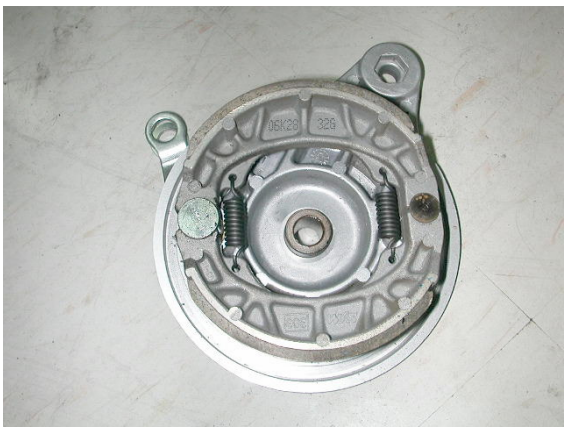
⚠ Caution

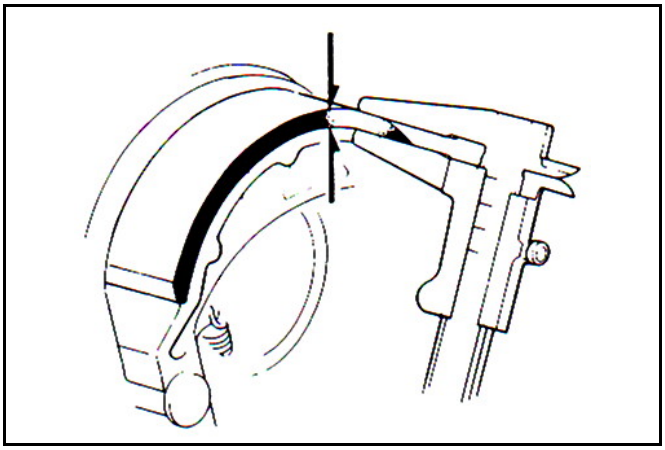
- Rub the wheel hub with #120 sandpaper if it is rusty.
- Measure the inner diameter of the wheel hub by a vernier caliper.



Brake shoes
Measure the brake lining thickness on three points (2 ends and the middle).
If the brake lining thickness is below service limit or contaminated by grease, replace it with new one.

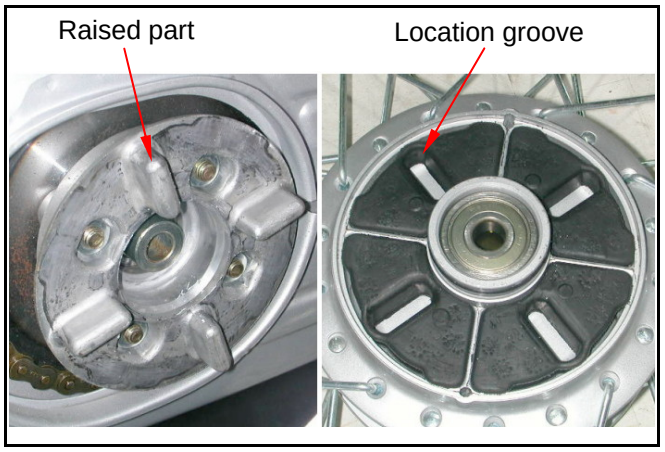
Service limit： **Front ：2.0 mm**
Rear ：2.0 mm



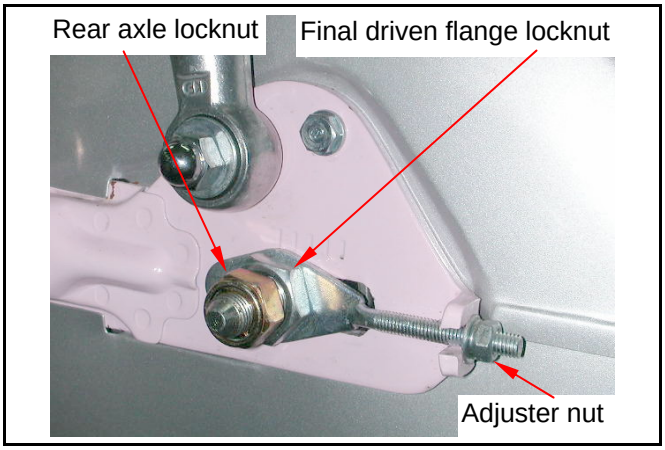


Rear wheel installation

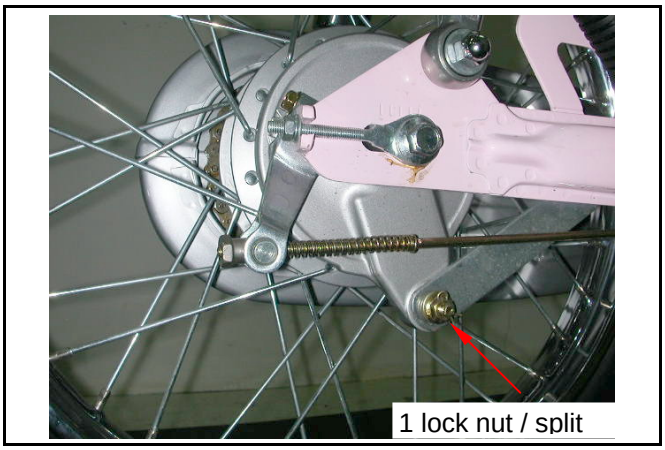
Install the rear brake penal into the wheel hub.
Align the location grooves on the rear wheel dampers with the raised parts on the final driven flange.
Install the rear wheel.



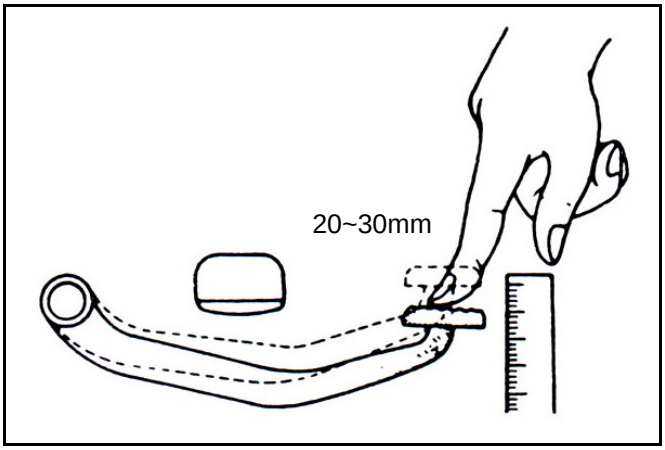
Install the rear axle distance collar and insert the rear wheel axle.
Adjust the drive chain slack.
Tighten the final driven flange locknut.
Torque value：5.0~6.0kgf-m
Fix the rear wheel axle and tighten the rear axle locknut.
Torque value：6.0~7.0kgf-m



Tighten the adjuster nut slightly to prevent it from loosening.
Install the rear brake torque link.
Install the split pin.
Torque value：1.5~2.5kgf-m



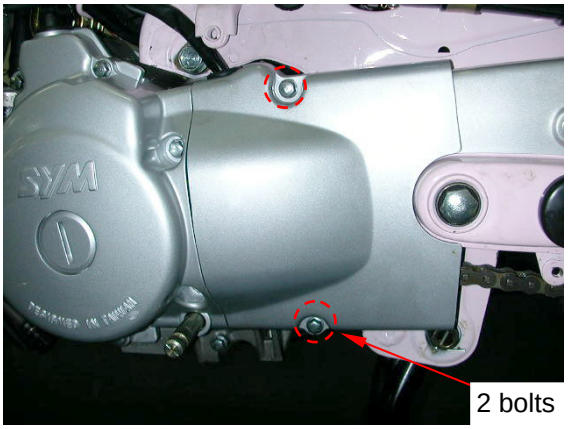
Install the rear brake rod, brake rod spring and adjusting nut.
Adjust the rear brake pedal clearance.
Rear brake pedal clearance：20~30mm



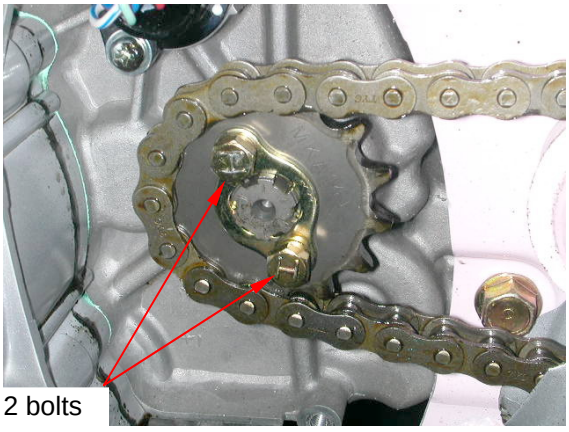
Drive Chain / Drive Sprocket / Final Driven Flange

Drive chain / drive sprocket removal

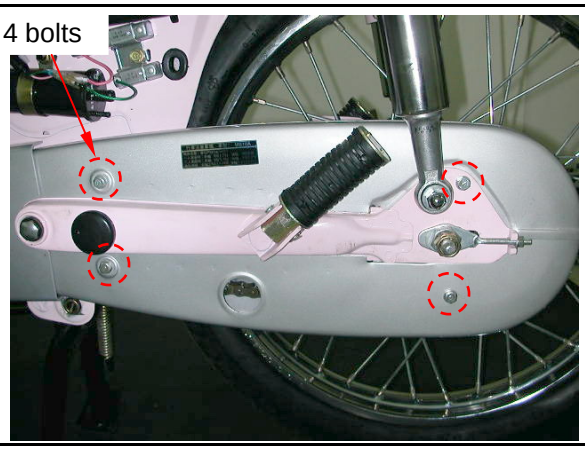
Remove the left crankcase rear cover (2 bolts).



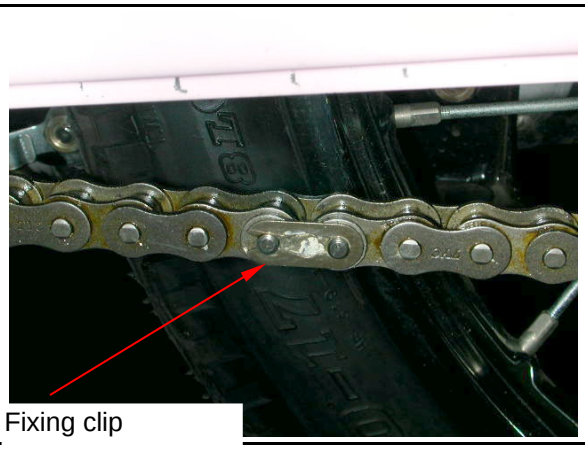
Remove the drive sprocket lock bolts.
Remove the drive sprocket fixing plate and drive sprocket.



Remove the drive chain upper / lower covers (4 bolts).



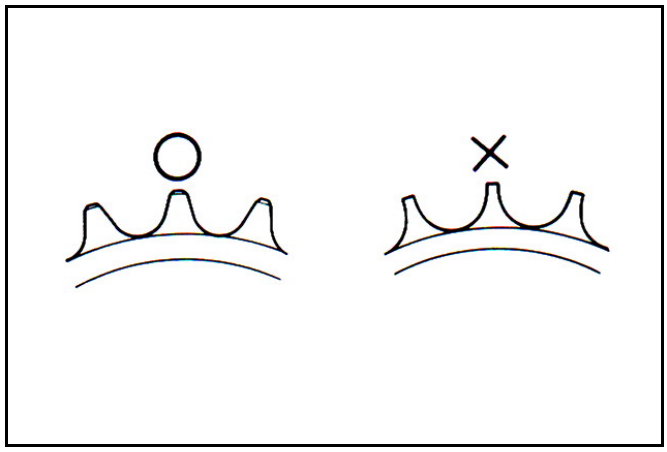
Remove the drive chain fixing clip.
Remove the drive chain.



Drive chain / drive sprocket inspection

Drive chain

Inspect the drive sprocket teeth for wear or damage.
Replace it if it is over worn out.

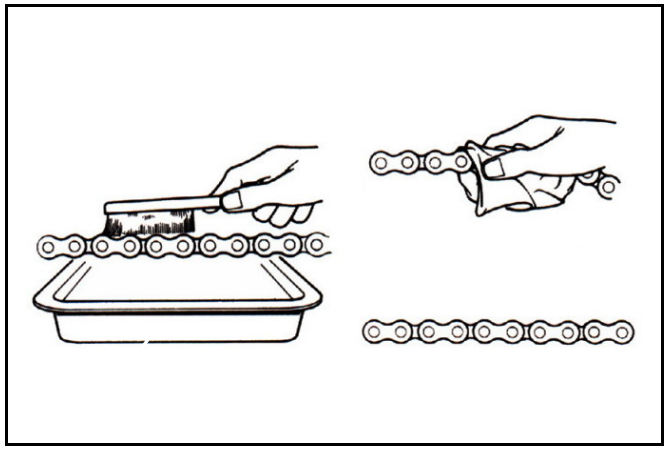


⚠ Caution

⚠ The drive sprocket teeth and drive chain should be checked at the same time.

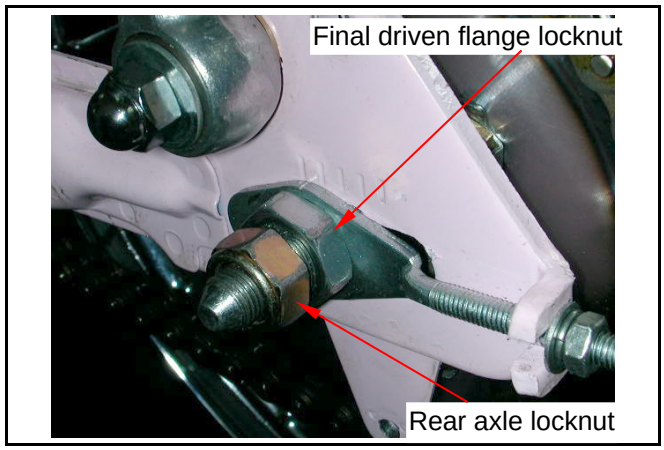
Drive chain cleaning

Check the drive chain for wear or damage.
Replace it if necessary.

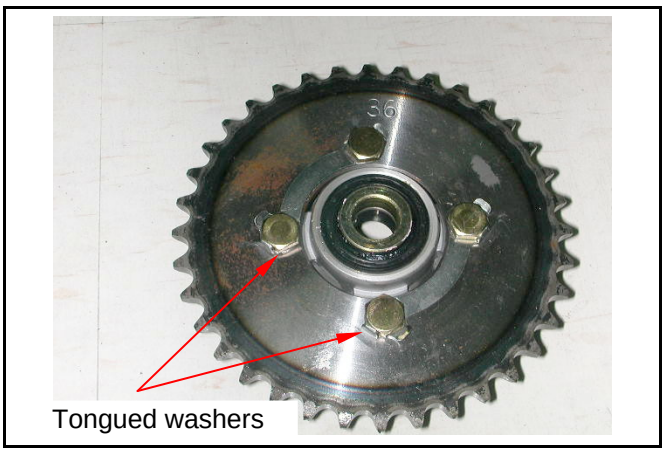


Driven flange / driven sprocket removal

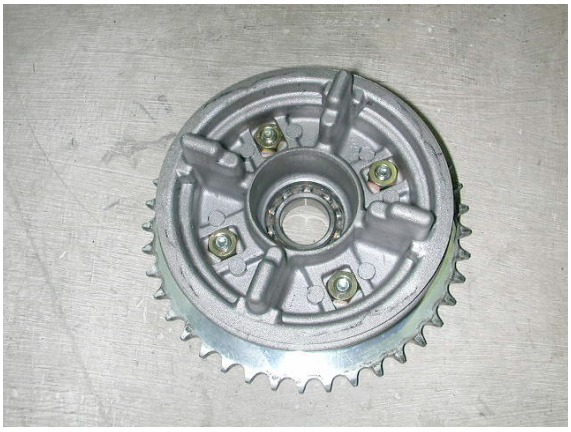
Remove the rear wheel and drive chain.
Remove the rear wheel axle locknut and final driven flange locknut.
Remove the final driven flange and driven sprocket.



Make the tongued washers on the final driven sprocket flat.

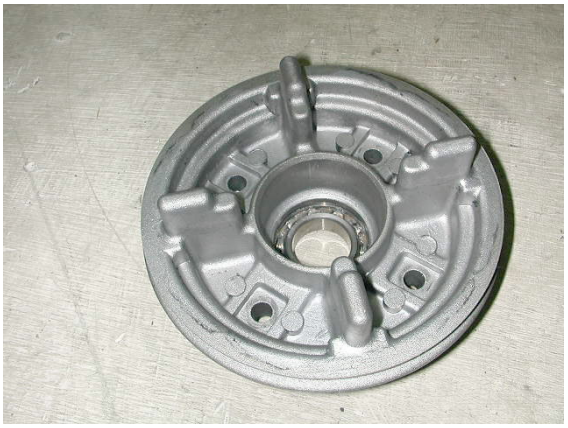


Remove the final driven sprocket from the final driven flange (4 bolts, 4 locknuts).



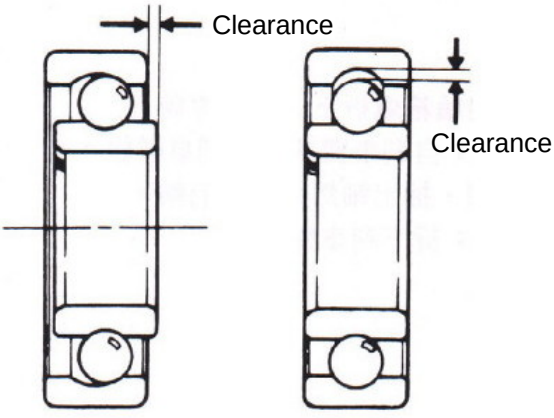
Final driven flange inspection

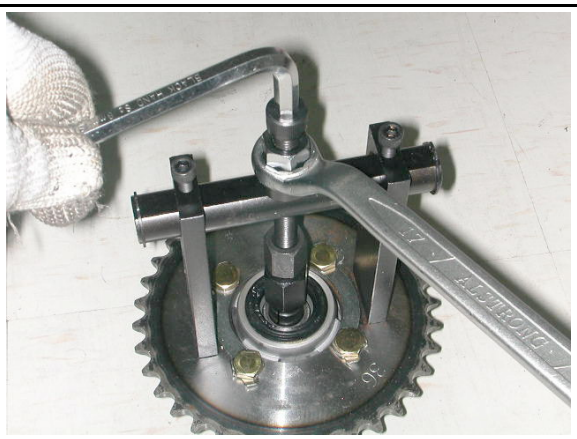
Check the final driven flange and the raised parts for crack or damage.



Bearing inspection

Turn the inner ring of each bearing to check if it rotates smoothly and quietly.
Meanwhile, check if the outer ring fits the wheel hub closely.
If the bearing doesn't rotate smoothly or quietly, replace it with new one.





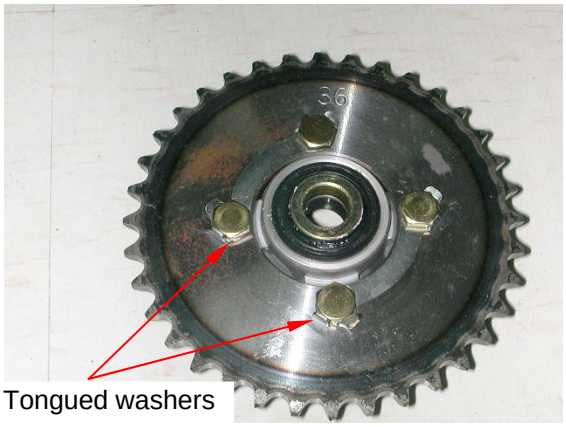
Final driven flange / final driven sprocket installation

Install the driven sprocket onto the driven flange.

Tighten the locknuts and bend the tongued washers.

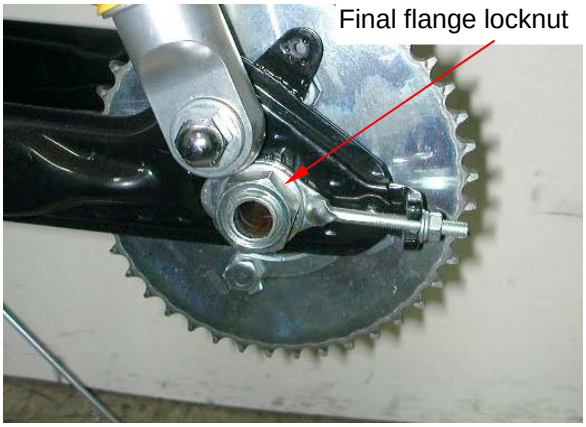
Torque value：

Final driven sprocket locknut 2.7~3.3kgf-m



Install the final driven flange, driven sprocket and rear axle sleeve to the rear fork.

Install the left side drive chain adjuster and lock the final driven flange by hand.

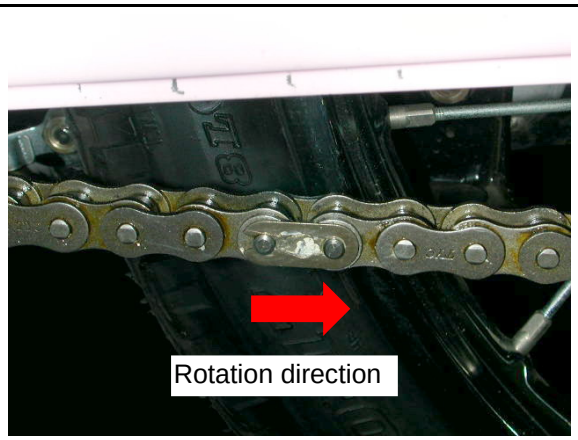


Install the rear wheel, rear axle distance collar and right side drive chain adjuster.

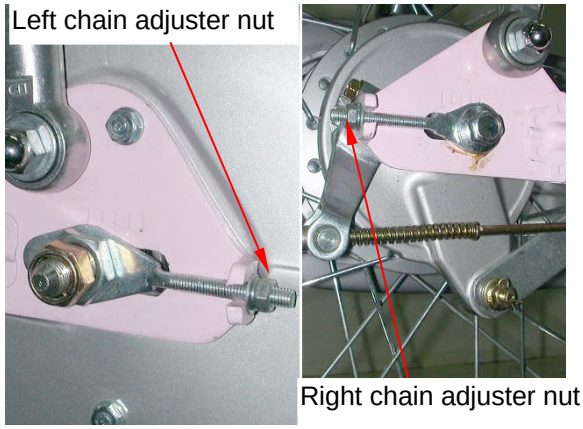
Install the drive chain.

⚠ Caution

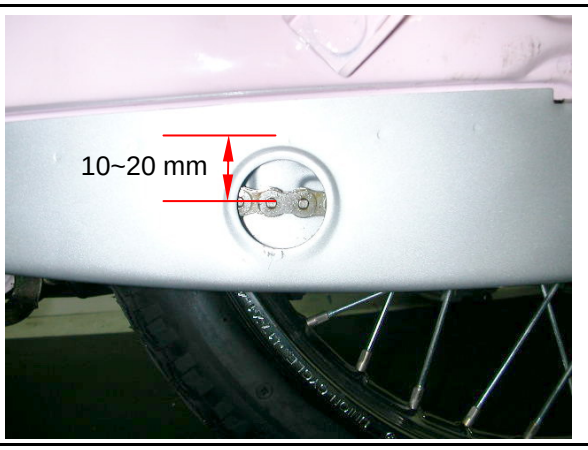
⚠The breach of the drive chain fixing clip cannot face the chain rotation direction.



Drive chain adjustment
Turn the right / left side drive chain adjuster nuts evenly to adjust the drive chain slack to the normal range.



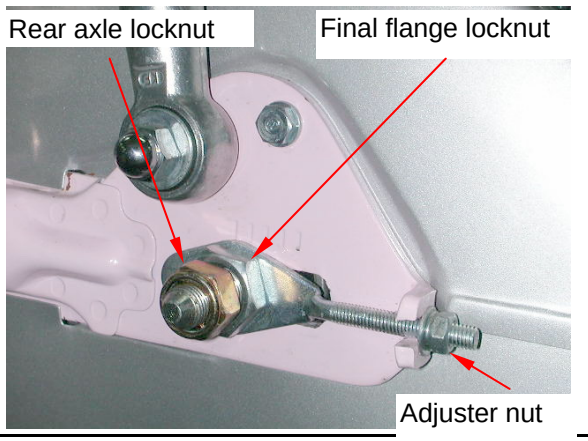
Tighten the drive chain slack by turning the adjuster nuts clockwise.
Loosen the driven chain slack by turning the adjuster nuts counterclockwise.
Drive chain slack：10~20mm



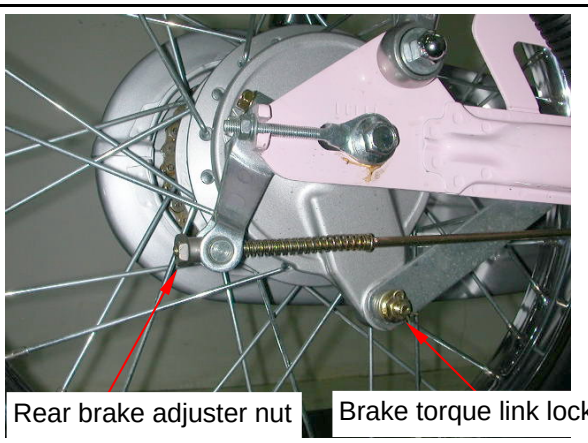
Tighten the final driven flange locknut first and then the rear wheel axle locknut.
Torque value：

Rear axle locknut	**5.0~6.0kgf-m**
Final flange locknut	**6.0~7.0kgf-m**

After locking the rear wheel axle locknut, tighten the drive chain adjuster nuts slightly to prevent the adjuster nuts from being loosened.
Check the drive chain slack again to make sure that the rear wheel can rotate smoothly.
Lubricate the drive chain.



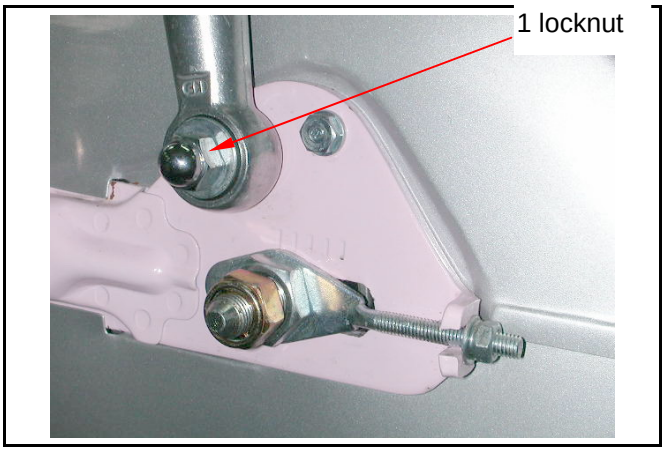
Install the rear brake torque link, tighten the locknut and insert the split pin.
Install the rear brake rod and adjust the rear brake pedal free play.



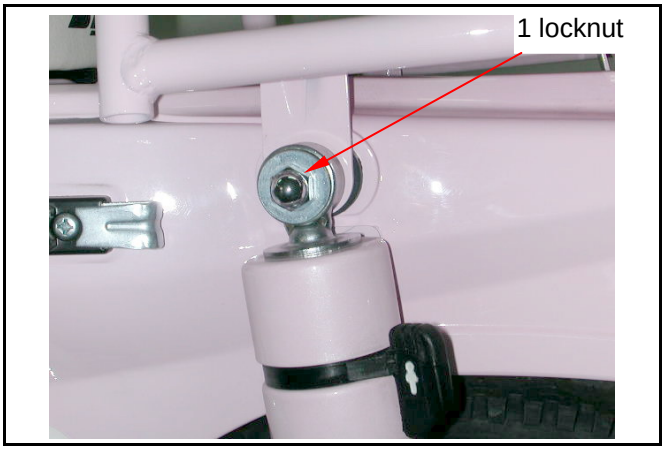
Rear Cushion

Removal

Remove the rear cushion lower locknut.



Remove the rear cushion upper locknut.
Remove the rear cushion.



Installation

Install in the reverse order of removal.

Torque value :

Rear cushion locknut 3.0~4.0kgf-m

⚠ Caution

- Rear cushion should be replaced as a complete set.
- Rubber bush and structure will be damaged during disassembly.

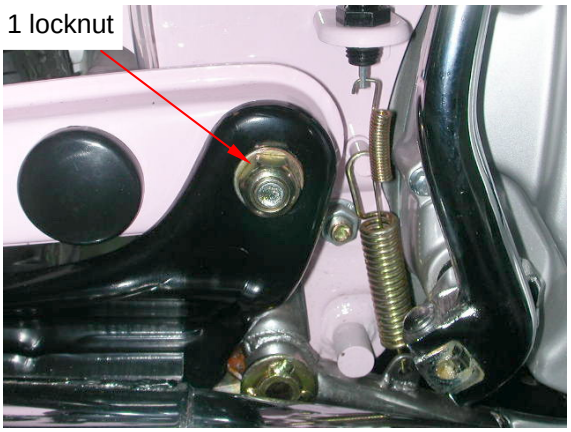
Press the rear cushion to check if the rear cushions move freely.

Check if both sides of rear cushion spring adjusters are adjusted to the same tightness.

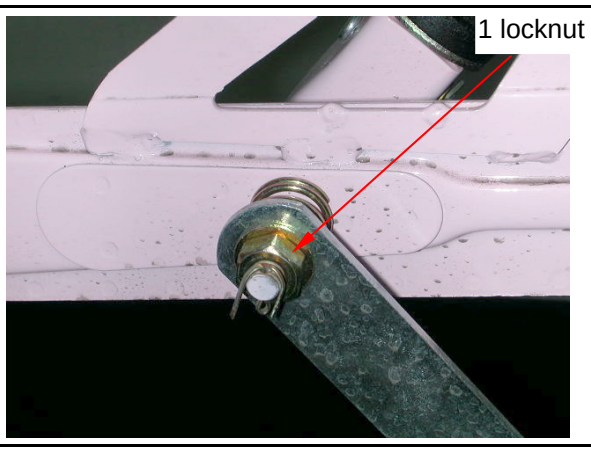
Rear Fork

Removal

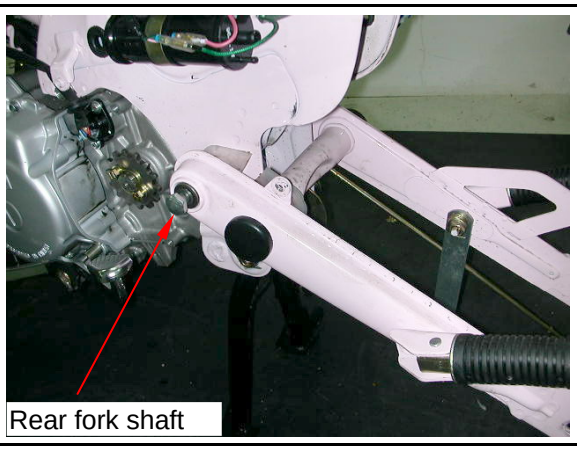
Remove the rear fork pivot locknut.
Remove the exhaust pipe, rear wheel, drive chain final driven sprocket, drive chain cases and rear cushions.



Remove the rear brake torque link.

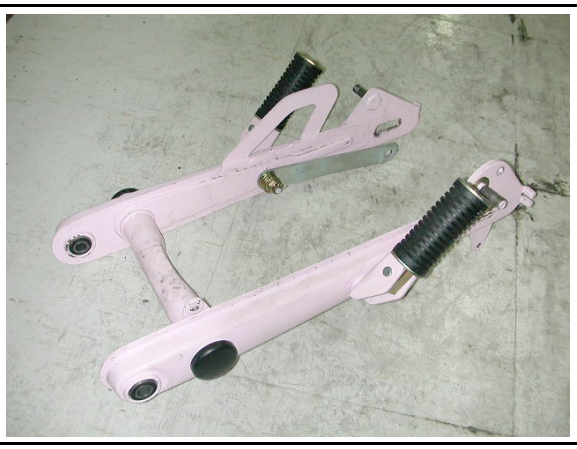


Pull out the rear fork pivot bolt.
Remove the rear fork.

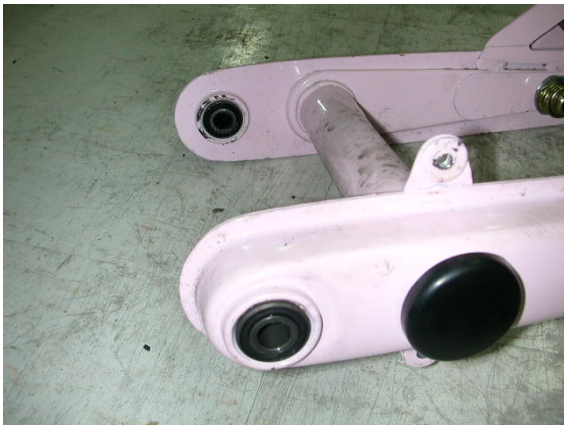


Inspection

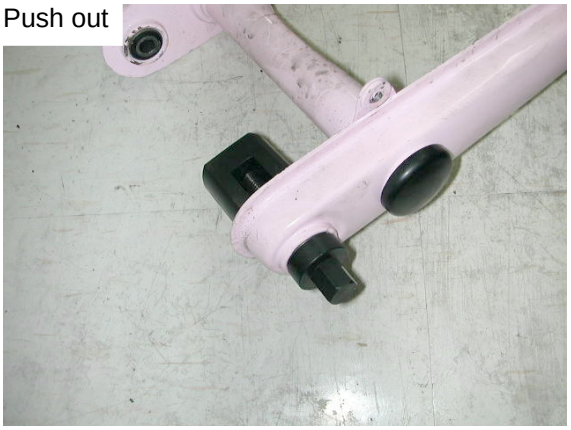
Check the rear fork for wear or damage.



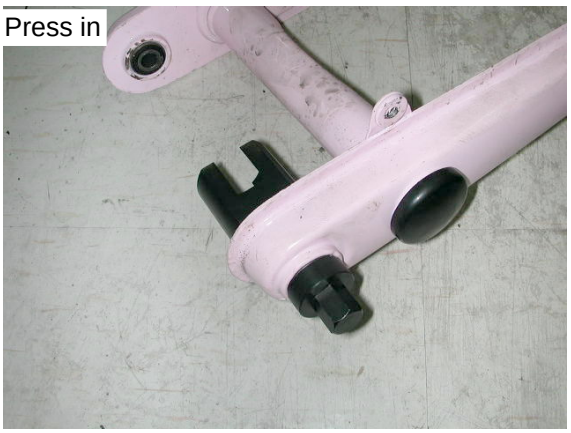
Check the rear fork rubber bush for crack or wear.



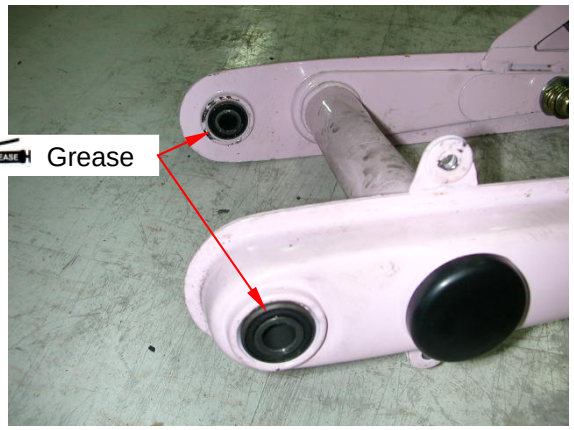
Rear fork rubber bush replacement
Push out the rear fork rubber bush.
Special tool：
Rubber bush puller / driver SYM-1120310



Press in the new rear fork rubber bush.
Special tool：
Rubber bush puller / driver SYM-1120310



Apply grease to the both sides of rear fork rubber bush.



Installation
Install in the reverse order of removal.

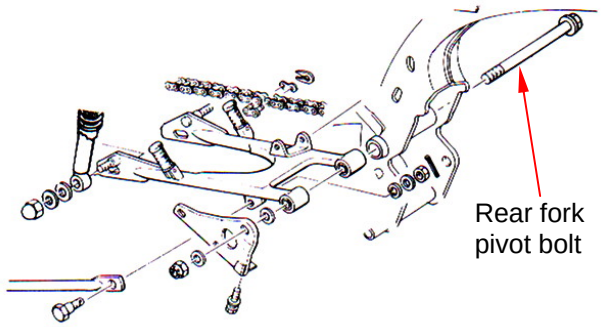
Torque value :

Rear fork pivot locknut

3.0~4.0kgf-m

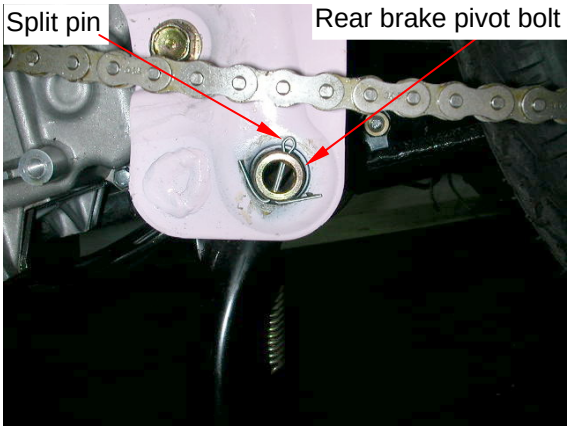
Rear brake torque link locknut

1.5~2.5kgf-m

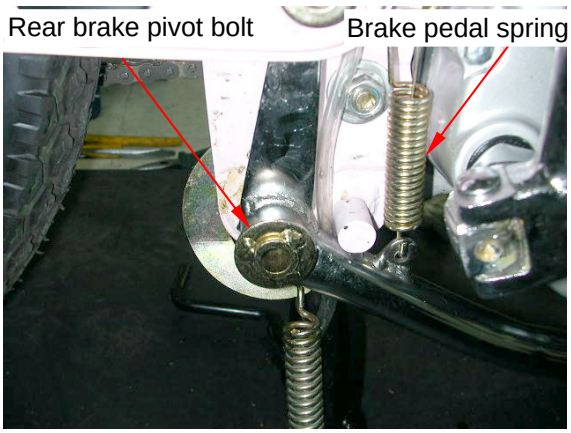


Rear Brake Pedal

Removal
Remove the rear fork pivot locknut.
Remove the step bar and exhaust pipe.
Remove the rear brake adjuster nut and rear brake rod.
Remove the rear stop switch spring.
Remove the rear brake pedal spring.
Hold the vehicle with a hanger.
Remove the split pin of the rear brake pivot bolt.

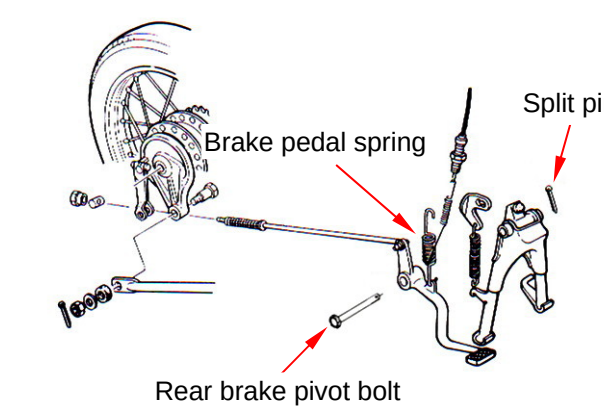


Pull out the rear brake pivot bolt.
Remove the rear brake pedal and main stand.

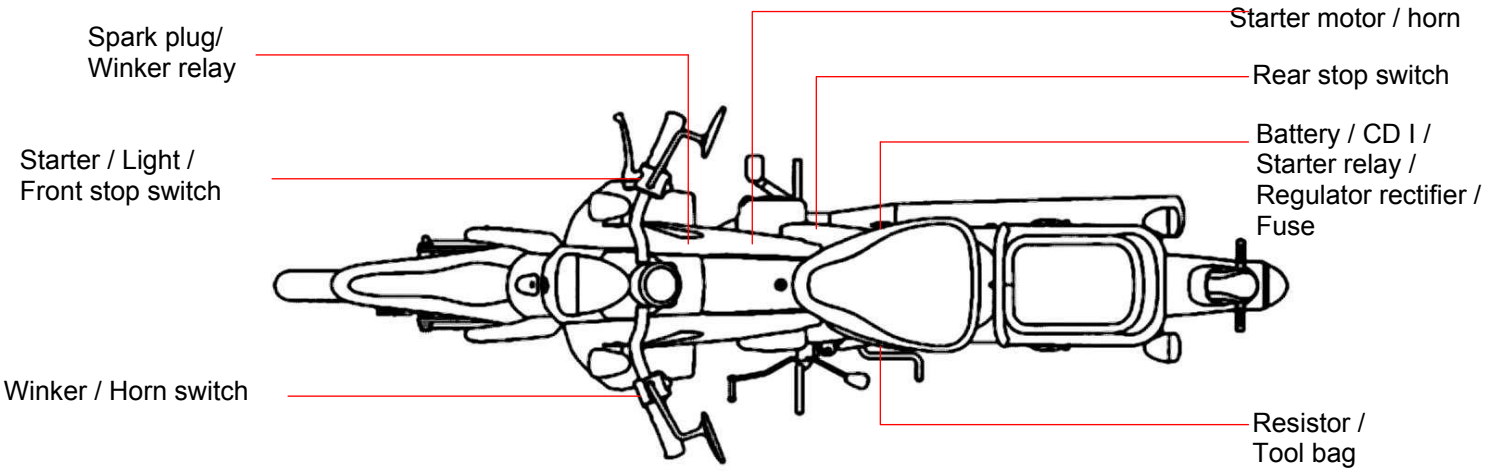


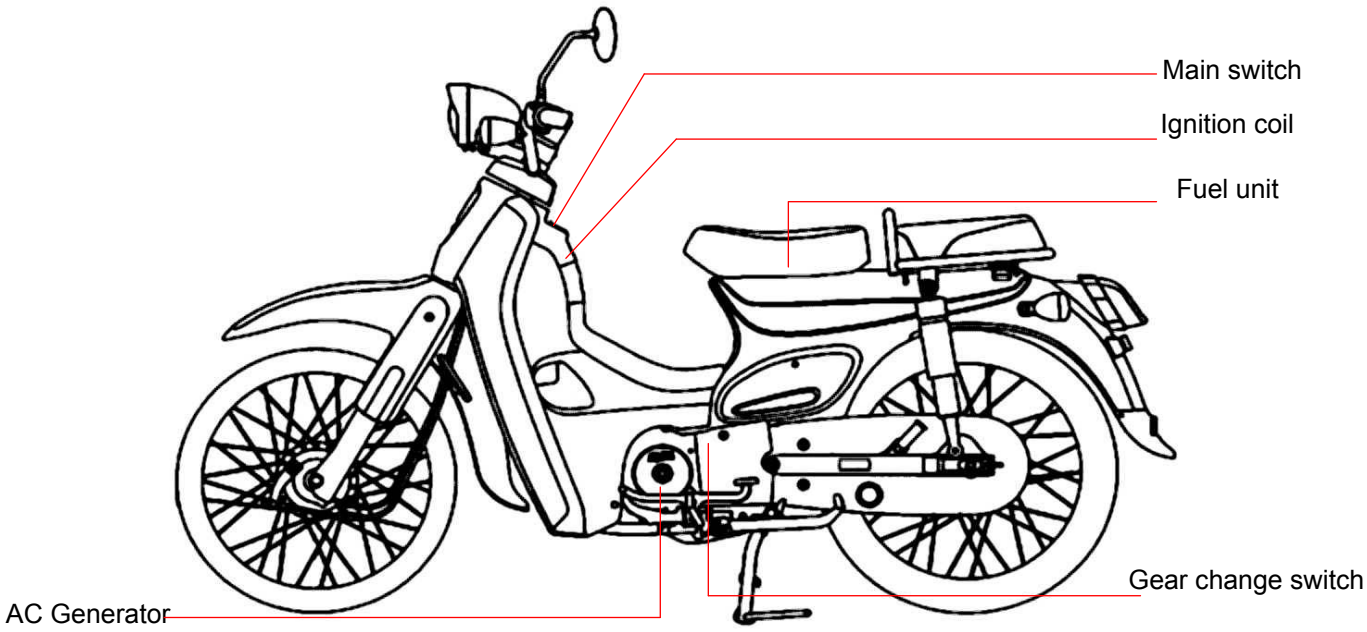
Installation
Install in the reverse order of removal.
Adjust the rear brake pedal free play after installation.

Rear brake pedal free play : 20~30mm



Mechanism Diagram





Precautions in Operation

Charging system

- When removing the battery, the disconnection sequence of cable terminals shall be strictly observed. (First disconnect the negative cable terminal then the positive cable terminal.)
- The electrolyte level should be checked carefully. Add distilled water if electrolyte is not enough.
- Remove the battery from the frame before charging and remove the electrolyte plug from the battery.
- Do not proceed with quick charging except in emergency.
- The voltage meter is required when checking the charging voltage.
- The battery can be recharged. If the battery is not in use after being discharged, it will lead to damage, short life span or lower performance. The performance of the battery may decline after 1-2 years of normal usage. The voltage of the battery with lower capacity will recover after recharging.
- If the battery cells are shorted, the terminal voltage cannot be measured. When the regulator rectifier doesn't function properly, the charging voltage will be too excessive and the battery life span will be shortened.
- The battery will self discharge if the battery is not in use for a long period of time. Recharge the battery two months later when the vehicle is not in use.
- Add electrolyte to the new battery and ten minutes later check if the terminal voltage is over 12.5V or not. Recharge the battery if the terminal voltage is too low. Charging the new battery before using it may lengthen the battery life span.
- Follow the troubleshooting procedure to check the charging system.
- Always turn off the main switch before disconnecting any electrical components or the regulator rectifier will be damaged due to excessively high voltage.
- Follow the removal procedure to remove the AC Generator and pulse coil.

Ignition system

- Follow the troubleshooting procedure to check the ignition system.
- The ignition timing does not need to be adjusted since the C.D.I. is factory present. Check the C.D.I and AC Generator if the ignition timing is not correct. Check the ignition timing with ignition timing light after replacement.
- The drooping or impact of C.D.I. set may lead to malfunction. Pay attention during removal.
- Most of the malfunctions result from poor contact of terminal, coupler and switch. Check for any poor contact before proceeding with repair or maintenance.
- Improper spark plug will cause abnormal operation or severe damage of engine. Besides, pay attention to the spark plug tightening torque.

Starting system

- Follow the troubleshooting procedure to check the starting system.
- The removal of the starter motor can be preceded when the engine is still on the vehicle.
- Refer to chapter 5 to remove the starter clutch.

Technical Specification

Charging system

Item			Specification
Battery	Capacity / Type		12V5Ah / 12N5A
	Charging rate		0.5A / 5~10hr (Standard) 3A / 1hr (Quick)
	Specific gravity of electrolyte (20ºC)		1.260~1.280
	Fully charged	Volt (20ºC)	13.0~13.2V
	Need to be charged		12.3V
AC Generator	Characteristic		14V / 3A
	Charge coil resistance (20ºC)		0.7 Ω±20% (White ~ Green)
	Lamp coil resistance (20ºC)		0.5 Ω±20%(Yellow ~ Green)
Leak current			Below 1mA
RPM to start charging			Below 1800 rpm
Control voltage in charging			14.3±0.5V
Fuse			7A

Ignition system

Item		Specification
Spark plug	Type	NGK C6HSA
	Clearance	0.6~0.7 mm
Ignition coil resistance	Primary winding	1.2 Ω±15%
	Secondary winding (with cap)	10.7 KΩ±15%
	Secondary winding (without cap)	6.6 KΩ±15%
Ignition timing	〝F〞 mark	BTDC 15º±1º / 2300 rpm
	Ignition advance	BTDC 32º±1º / 3300 rpm
Pulse coil resistance (20ºC)		110Ω±20% (Blue / Yellow ~Green)
Exciter coil resistance (20ºC)		780Ω±20% (Black / Red ~ Green)
Exciter coil voltage		50~100V
Pulse coil voltage		0.5V 以上

Starting system

Item		Specification
Starter motor	Model	DC
	Characteristic	0.25 KW

Troubleshooting

Charging system

No battery voltage
- Battery discharged
- The cable disconnected
- The fuse is blown
- Improper operation of the main switch

Low battery voltage
- The battery is not fully charged
- Poor contact
- Poor charging system
- Poor regulator rectifier

Intermittent power supply
- Loose charging system coupler
- Poor contact of the battery cable

Poor charging system
- Burned fuse
- Poor contact, open or short circuit
- Poor regulator rectifier
- Poor ACG

Ignition system

No spark
- Poor spark plug
- The cable is poorly connected, open or short-circuited
  ~between AC. Generator / C.D.I.
  ~between C.D.I. / ignition coil
  ~between C.D.I. / main switch
- Poor main switch
- Poor C.D.I.
- Poor AC. Generator

Engine does not crank smoothly
- Primary winding circuit
  ~Poor ignition coil
  ~Poor contact of cable
  ~Poor contact of main switch
- Secondary winding circuit
  ~Poor ignition coil
  ~Poor spark plug
  ~Poor ignition coil cable
  ~Current leakage from spark plug cap
- Incorrect ignition timing
  ~Poor AC. Generator
  ~Improper installation of pulse coil
  ~Poor C.D.I.

Starting system

Starter motor does not work
- The fuse is blown
- The battery is not fully charged
- Poor main switch
- Poor starter switch
- The front and rear brake switches do not operate correctly
- Poor starter relay
- The ignition coil is poorly connected, open or short-circuited
- Poor starter motor

Weak starter motor
- Poor charging system
- Insufficient battery voltage
- Poor contact of power cable
- The starter motor gear is stuck by foreign material

Starter motor works but engine does not crank
- Poor starter motor pinion
- The starter motor run in reverse direction
- Poor starter clutch
- Poor battery

Charging System

Battery

Removal

Remove the right side cover (1 bolt).
Remove the battery fix bracket (2 bolts).
Pull out the battery.
Disconnect the negative terminal wire first and then the positive terminal.
Remove the battery.
Install in the reverse order of removal.

⚠ Caution

- To prevent short circuit, the positive terminal wire should be connected before the negative terminal being connected.

Specific gravity of electrolyte inspection

Measure the specific gravity of electrolyte with the specific gravity gauge.

Specific gravity specification (20°C) :

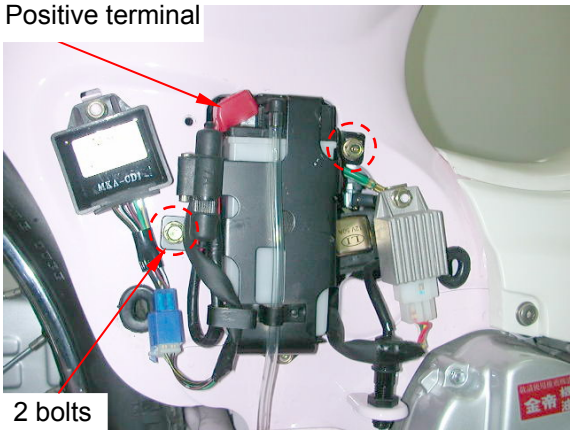
1.260~1.280	**Fully charged**
1.220 以下	**Insufficiently charged**

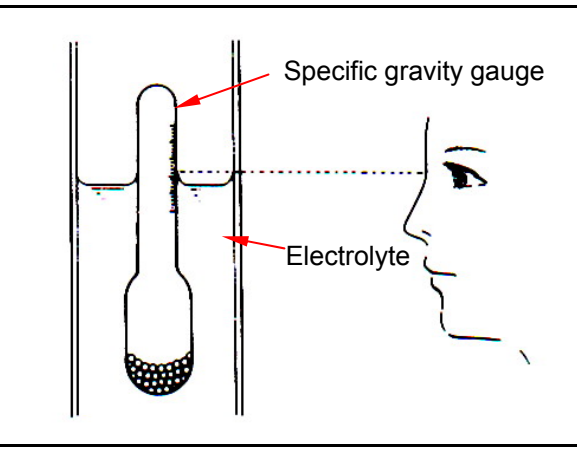
⚠ Caution

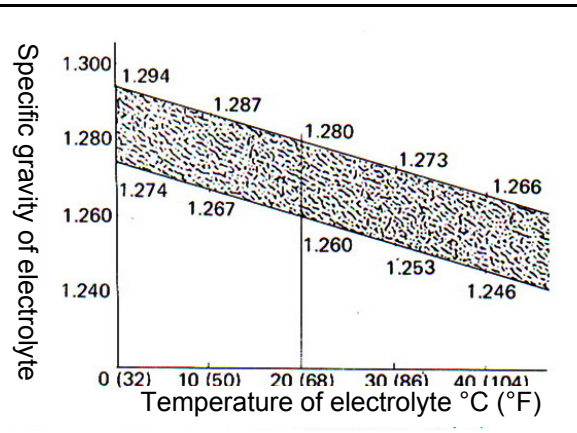
- Recharge the battery when the specific gravity of electrolyte is below 1.23.
- The specific gravity of electrolyte changes when the temperature changes, as shown on the right chart.
- Replace the battery with new one when the formation or deposit of lead sulfate happens.

⚠ Warning

- The battery contains sulfuric acid. Avoid contact with skin, eyes or clothing.
  Antidote :
  1. external: flush with water
  2. internal: drink large amount of water or milk, and call for medical care
- Stay away from fire and keep good ventilation.







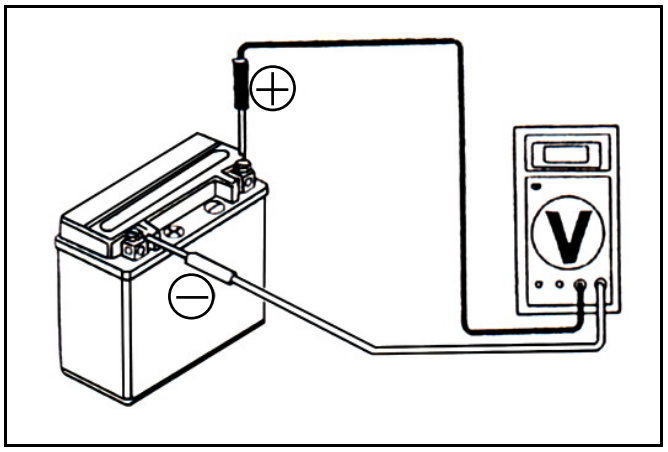
Battery voltage inspection

Use the digital voltmeter or multi meter to measure the battery voltage.

Voltage

Fully charged：13.0~13.2V (20°C)

Insufficiently charged：Below 12.3V (20°C)

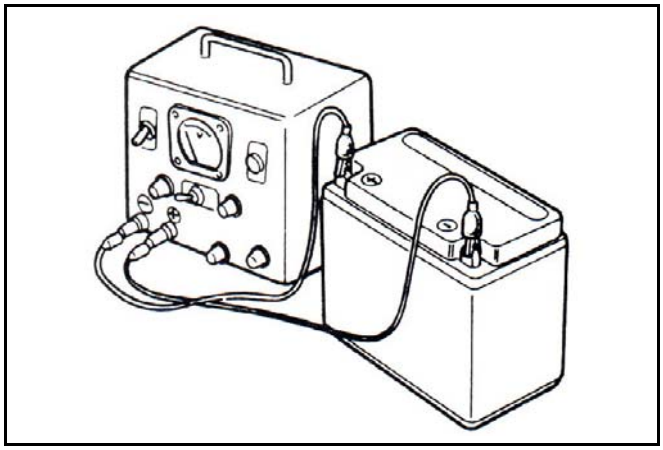


Charging

Remove the battery cell caps.

Connect the charger positive (+) cable to the battery positive (+) terminal.

Connect the charger negative (-) cable to the battery negative (-) terminal.



⚠ Warning

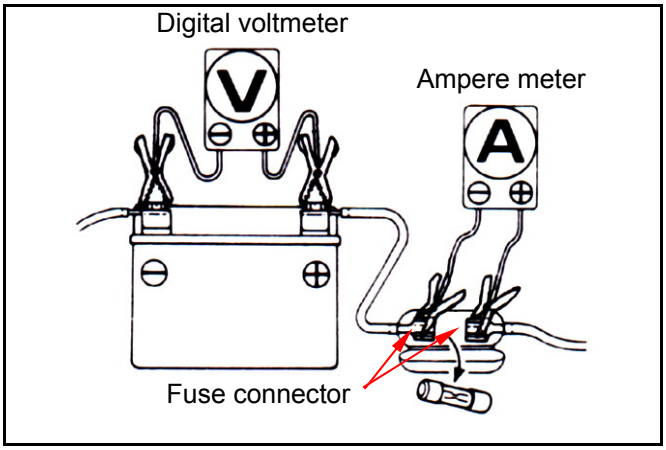
- Avoid any fire near the battery during charging.
- Before or after charging, always turn off the charging machine to avoid explosion caused by sparks.
- Follow the regulated charging current and time shown on the battery.

⚠ Caution

- Do not charge the battery quickly except for emergency situation.
- Confirm the charging current and time before charging the battery.
- Excessive charging current or time will damage the battery.
- After charging the battery, wait for 30 minutes and then measure the battery voltage.

After installing the battery, coat the terminal with grease to avoid oxidation.

Charging voltage / current inspection



Caution

- Make sure the battery being charged already before carry out inspection.
- While starting the engine, the starter motor draws large amount of current from the battery.
- Use a fully charged battery having a voltage larger than 13.0 V

After the engine is warmed up, replace the original battery with a fully charged battery.
Connect a digital voltmeter to the battery terminals.
Connect an ampere meter between both ends of the main fuse.

Caution

- Use a ampere meter having an indication that the current flows from the positive or the negative direction. The measurement should be at zero if the ampere meter is one direction only.

Caution

- Do not use a short-circuit cable.
- While the starter motor is activated, the surge current the motor may damage the ammeter. Use the kick starter to start the engine.
- The main switch shall be turned to OFF position during the process of inspection. Never tamper with the ampere meter and the cable while there is current flowing through. It may damage the ampere meter.

Connect a tachometer.
Turn on the headlight to high beam and start the engine.
Accelerate the engine to the specified revolution per minute and measure the charging voltage.

Charging current：Over 1.5A / 2500rpm
Over 1.8A / 5000rpm
Charging control voltage：
14.3±0.5V / 2100rpm

Caution

- Check if the charging current / voltage is normal or not after replacing new battery.

The following problems are related to the charging system; follow the instructions provided in the checking list to correct it if any one of the problems takes place.

1. The charging voltage can not exceed the voltage between two battery terminals and the charging current is in the discharging direction.
2. The charging voltage and current are too much higher than the standard values.

The following problems are not related to the charging system; correct it if any by following steps indicate in the checking list.

(1) The standard charging voltage and current can only reach when the revolution of the engine exceeds the specified rpm.
- Bulbs used exceed their rate and consume too much power.
- The replacement battery is aged and does not have enough capacity.

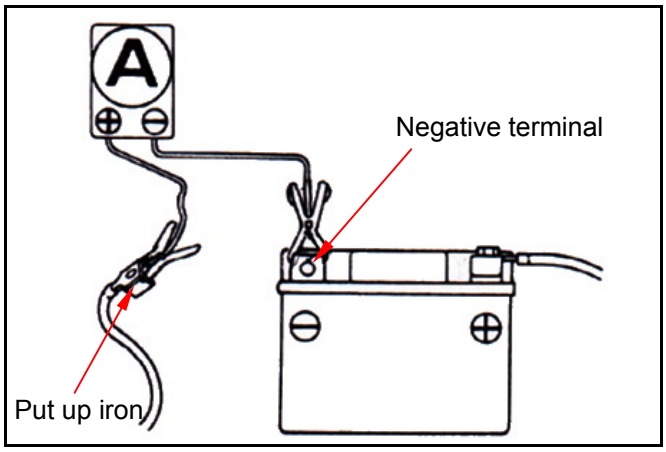
(2) The charging voltage is normal, but the current is not.
- The replacement battery is aged and does not have enough capacity.
- Battery used do not have enough electricity or is over charged.
- The fuse of the ammeter is blown.
- The ammeter is improperly connected.

(3) The charging current is normal, but the voltage is not.
-The fuse of the voltmeter is blown.

Current leakage test

Inspection

Turn off the main switch.
Disconnect the negative terminal wire from the battery.
Connect ammeter between battery negative terminal and negative terminal wire (as shown at left picture).



⚠ Caution

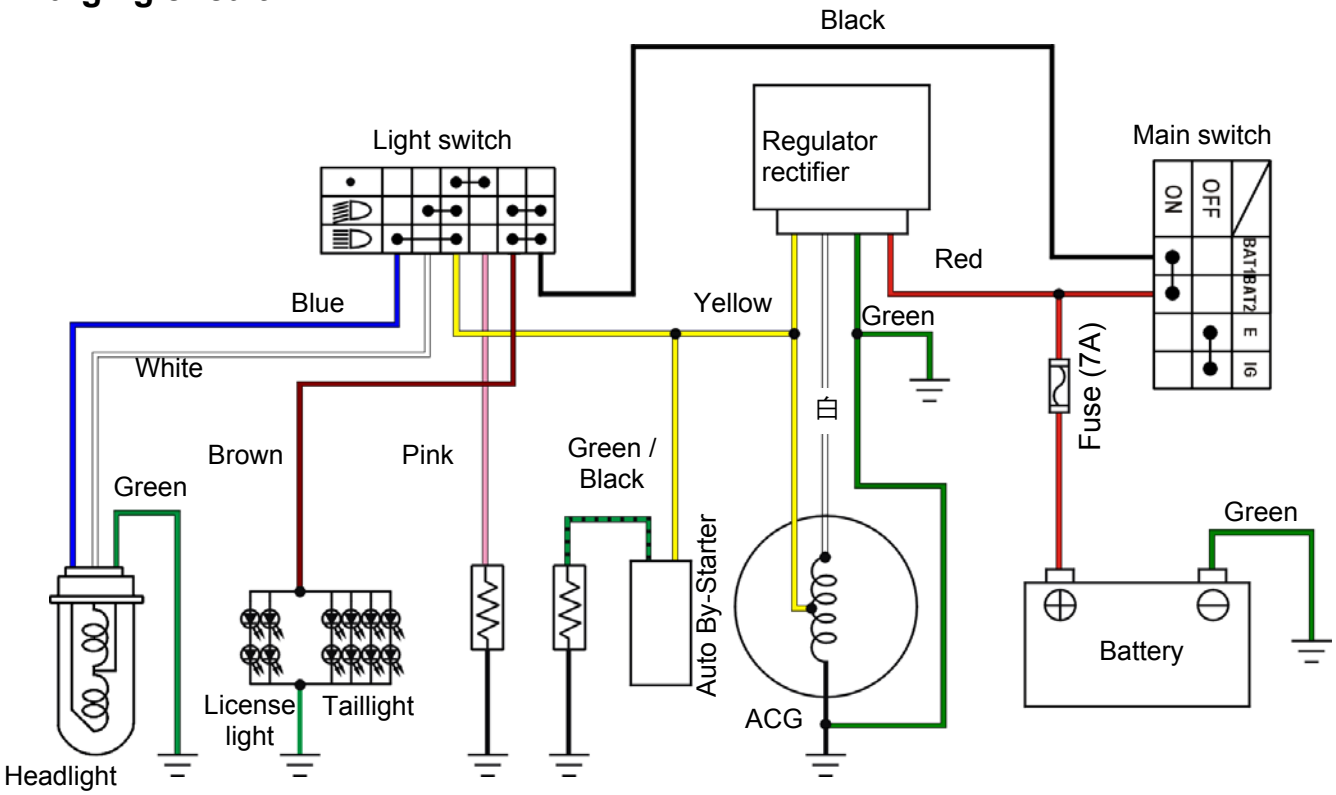
In the current leakage test, set the current range at the largest scale, then gradually decrease to the lower scale as the test process goes to avoid possible damage to the ammeter and the fuse.

- Do not turn on the main switch when testing the current leakage.

If the current leakage is over the standard value, it shows that short circuit happens.
Current leakage：below 1mA

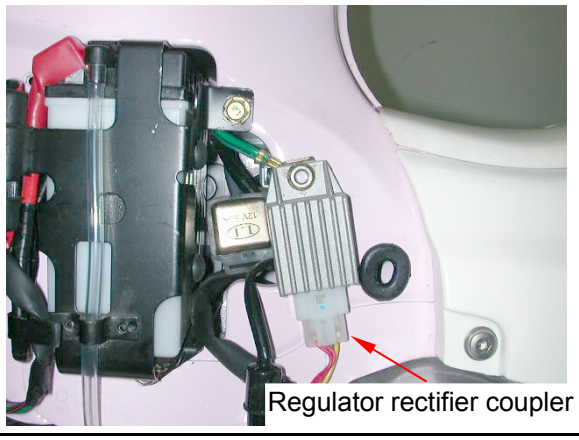
If the leaked current exceeds the specified value, it may indicate a short circuit.

Charging circuit



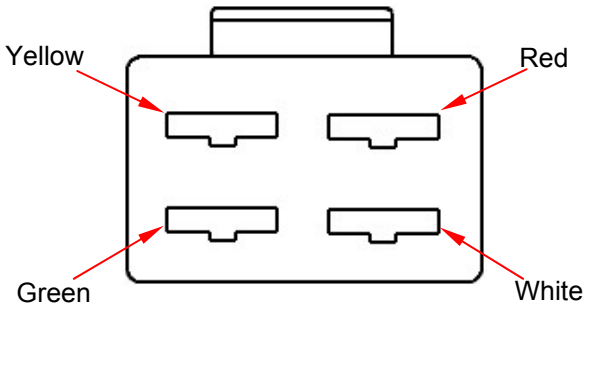
Regulator rectifier inspection

Remove the right side cover.
Disconnect the regulator rectifier 4 pin coupler and inspect the wire circuit.

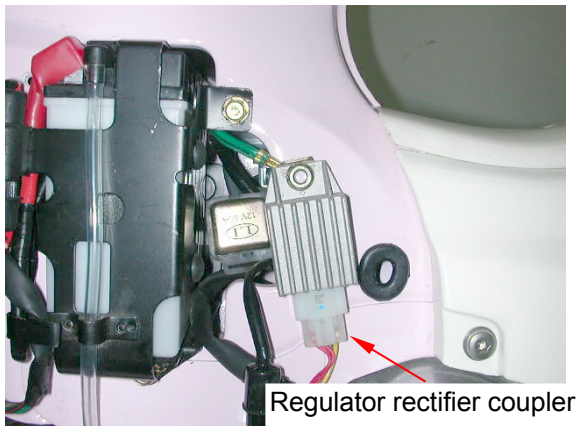

Regulator rectifier coupler

Wire harness circuit inspection

Item (wire color)	Judgment
Battery (red) / frame grounding	Battery voltage
Earth (green) / frame grounding	Close circuit
Charge coil (white) / earth (green)	Close circuit with resistance
Lamp coil (yellow) / earth (green)	Close circuit with resistance

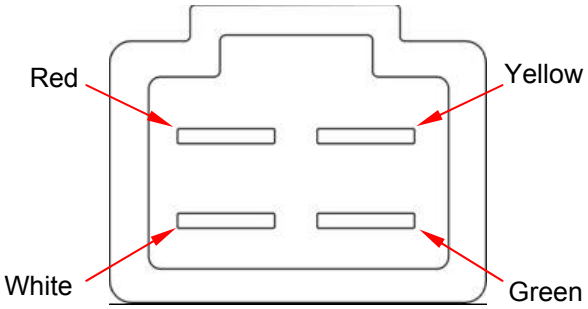


If the readings measured are not normal, check parts in the circuit.
If the parts are normal, then trouble is in the wiring.
If there is nothing wrong with parts and wiring, replace the regulator rectifier.



Regulator rectifier inspection
measurement unit: KΩ

(+) / (-)	White	Yellow	Red	Green
White		∞	4~7	∞
Yellow	∞			2.4~48
Red	∞	∞		∞
Green	∞	2.4~48	∞	



⚠ Caution

- Human body has resistor. Do not touch the multi meter probe metal or the measured value would be affected.

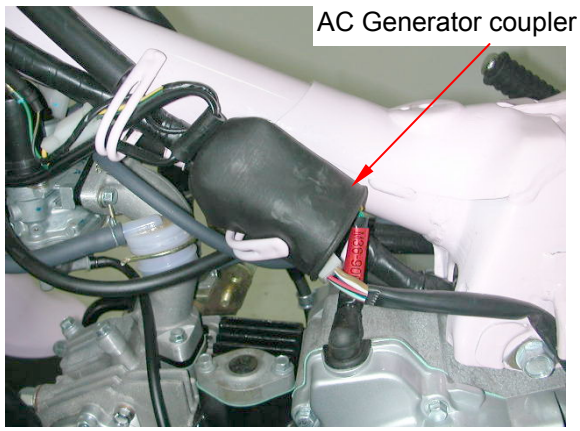
AC Generator coil inspection

⚠ Caution

- The inspection of AC Generator charge coil / lamp coil can be proceeded on the engine.

Measure the resistor value between AC. Generator wiring.
Disconnect AC Generator 6 pin coupler.

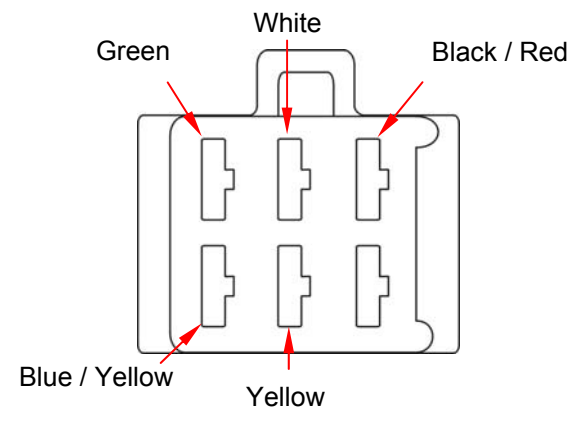
\



Standard value :

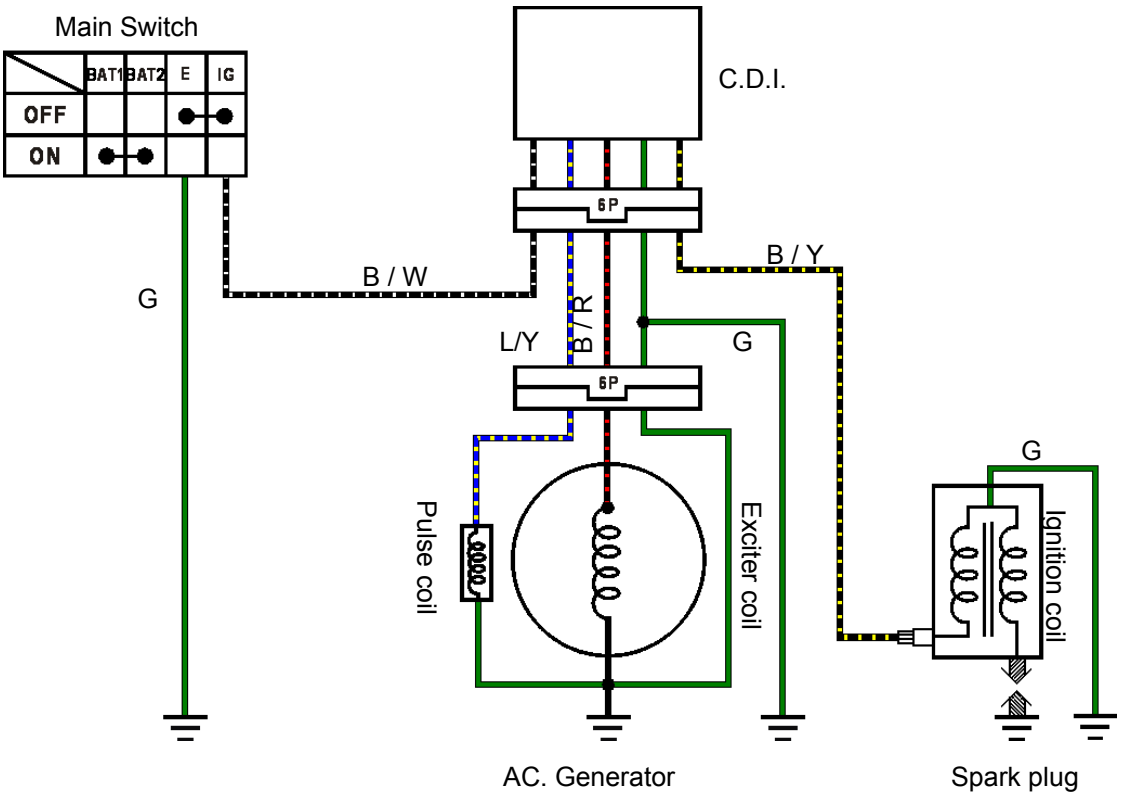
White ~ Green	**0.7Ω±10%**
Yellow ~ Green	**0.5Ω±10%**
Black / Red ~ Green	**780Ω±10%**
Blue / Yellow ~ Green	**110Ω±10%**

Replace the AC. Generator coil if the measured value is over the standard value.



Ignition System

Ignition circuit

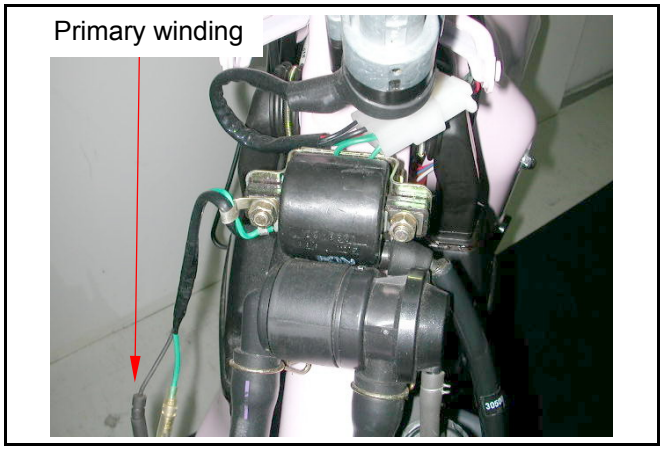


Ignition coil inspection

Remove the front seat and fuel tank.
Measure the resistance between the terminals of the primary winding.
Standard value : 1.2Ω±15% (20ºC)

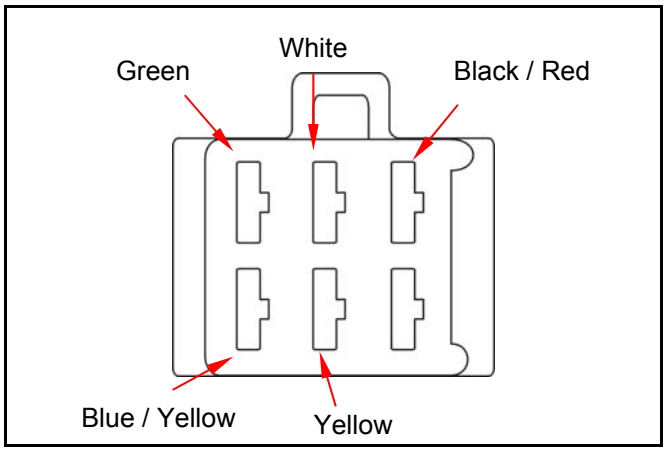
Remove the cap from the spark plug and measure the resistance between terminals of secondary winding.
Standard value :

6.6KΩ±15% (without cap 20ºC)
10.7KΩ±15% (with cap 20ºC)



Exciter coil inspection

Disconnect the AC. Generator 6 pin coupler.
Measure the resistance between the terminal Black / Red and terminal Green.
Standard value : 780Ω±10%

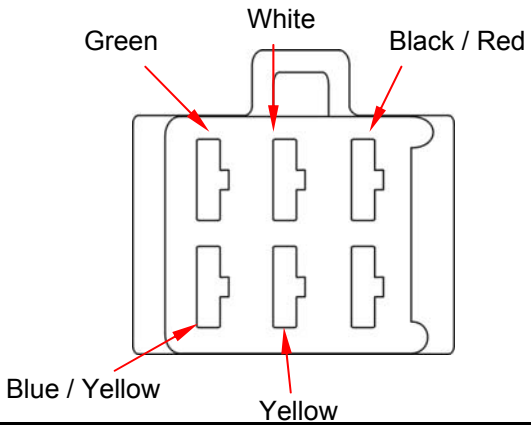


⚠ Caution

- Coil does not need to be removed from the engine before inspection.

Pulse coil inspection

Disconnect the AC. Generator 6 pin coupler.
Measure the resistance between the terminal Blue / Yellow and terminal Green.
Standard value : 110Ω±10%

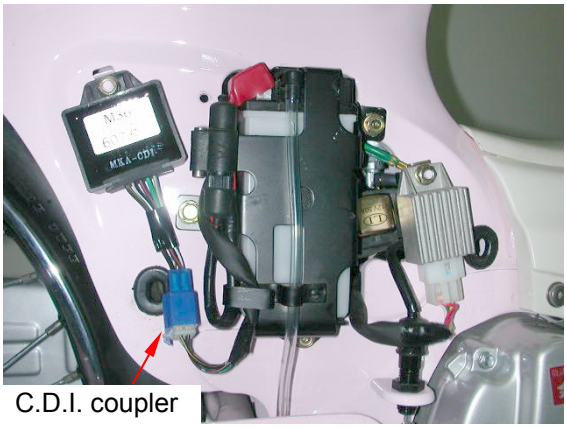


⚠ Caution

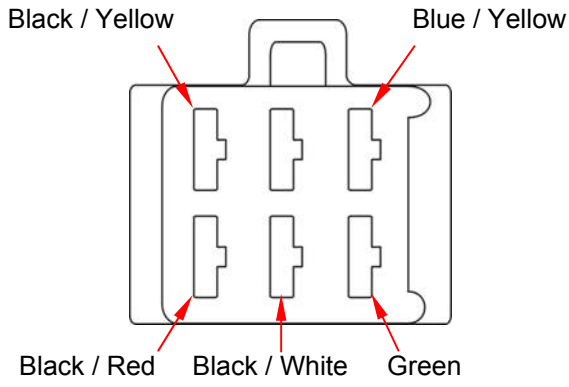
- Coil does not need to be removed from the engine before inspection.

C.D.I.

Removal
Remove the right side cover.



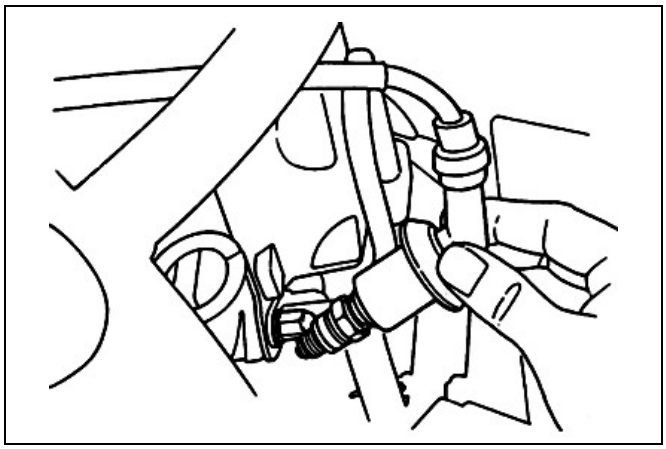
Inspection
Disconnect the C.D.I. 6 pin coupler.
Check the following terminals from the wire side.



Item		Check points	Standard value (20°C)
Main switch		Black / White ~ Green	Close circuit when OFF
Exciter coil		Black / Red ~ Green	780Ω±20%
Pulse coil		Blue / Yellow ~ Green	110Ω±20%
Ignition coil	Primary winding	Black / Yellow ~ Green	1.2Ω±15%
	Secondary winding	Green ~ High tension cable (without cap)	6.6 KΩ±15%
		Green ~ High tension cable (with cap)	10.7 KΩ±15%

Spark plug inspection

Check the sparking condition.
If the sparking condition is not proper or the spark plug electrode is contaminated, replace it with new one.

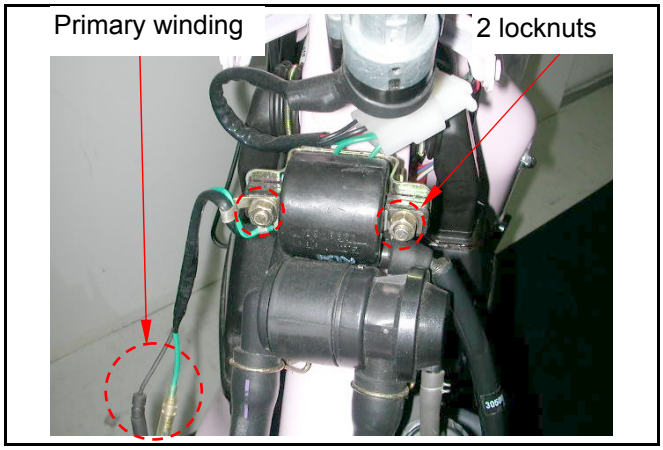


Caution

- Be extremely careful to carry out the sparking condition inspection.

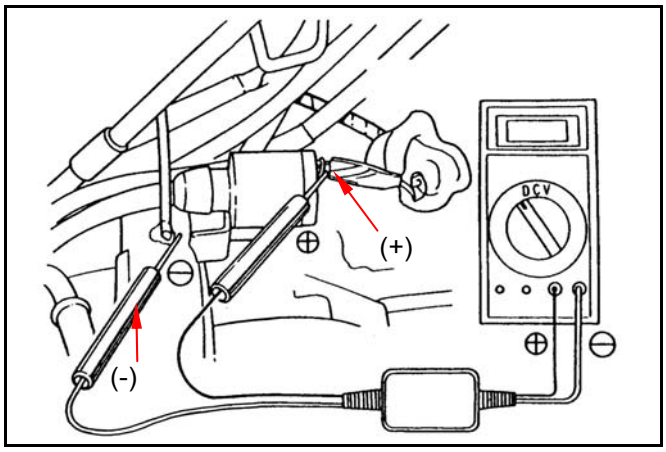
Ignition coil removal

Remove the front seat and fuel tank.
Remove the spark plug cap.
Disconnect the ignition coil primary winding wire (black / yellow and green).
Remove the ignition coil (2 locknuts).
Install in the reverse order of removal.



Use a multi meter with input resistor over 10MΩ 10CV.
Connect the terminals of primary winding, positive cable to Black / Yellow, negative cable to earth.

Minimum voltage：95~400V

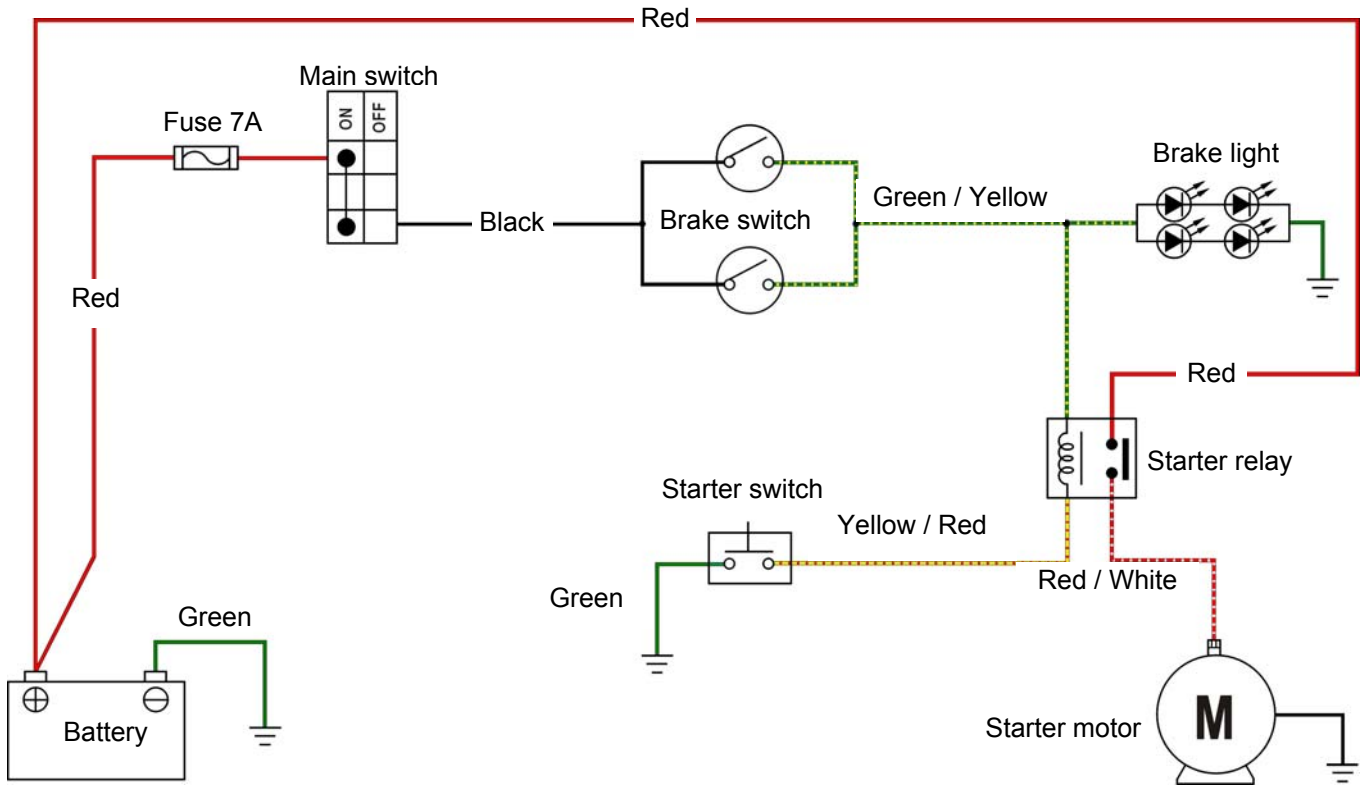


Caution

- Do not touch the probe metal during inspection, or electric shock may happen.

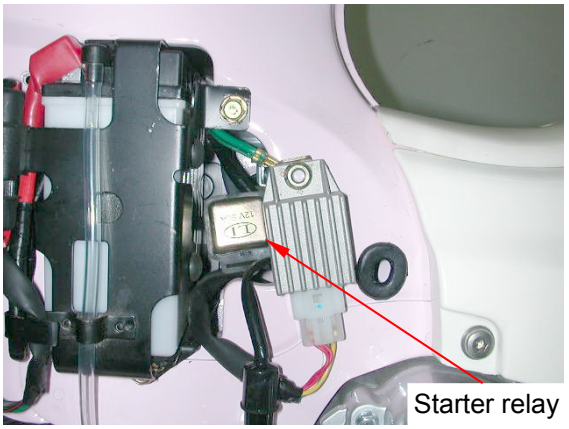
Starting System

Starting circuit diagram

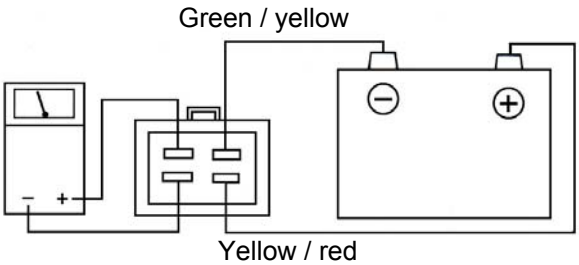


Starter relay inspection

Turn the main switch.
Pull the brake lever and press the starter switch.
If a sound of “Looh Looh” is heard, it indicates the relay function normally.

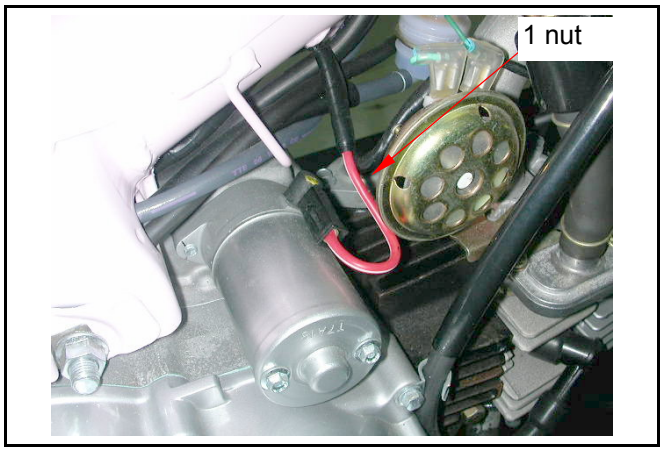


Remove the left side cover.
Disconnect the negative terminal wire.
Disconnect the starter relay coupler.
Connect an ohmmeter to the starter relay terminal.
Connect the yellow / red wire to the battery positive terminal and the green / yellow wire to the battery negative terminal.
Check the continuity of the starter relay terminal.
If there is no continuity, replace the relay.

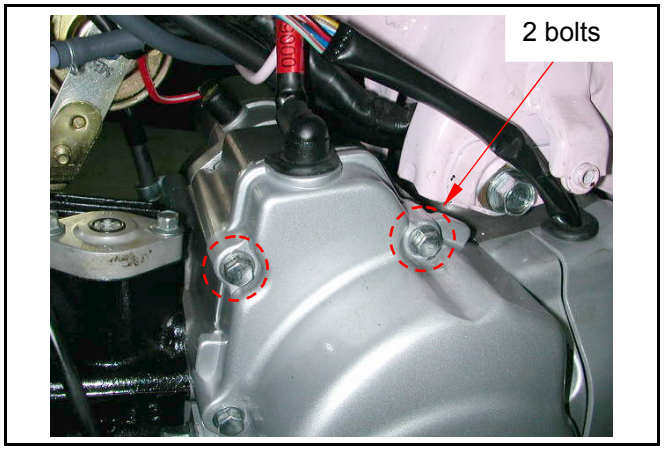


Starter motor removal

Disconnect the starter motor wire.

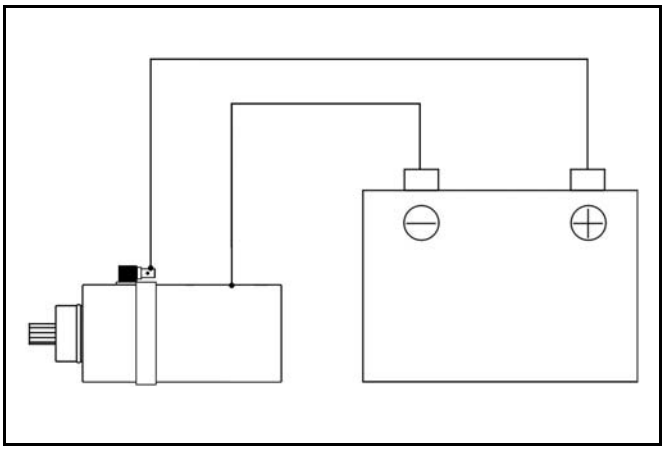


Remove the starter motor (2 lock bolts).



Starter motor inspection

Connect the battery positive terminal and starter motor power terminal.
Put up iron between the battery negative terminal and starter motor case.
Check the starter motor rotating condition.
Replace the starter motor if the rotating speed is too slow.

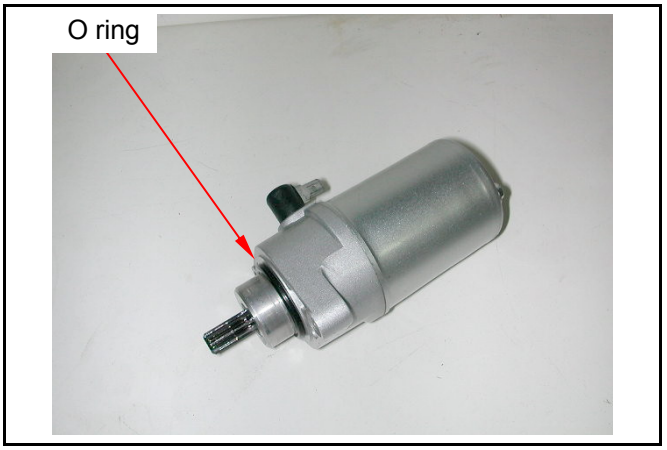


Starter motor installation

Install in the reverse order of removal.

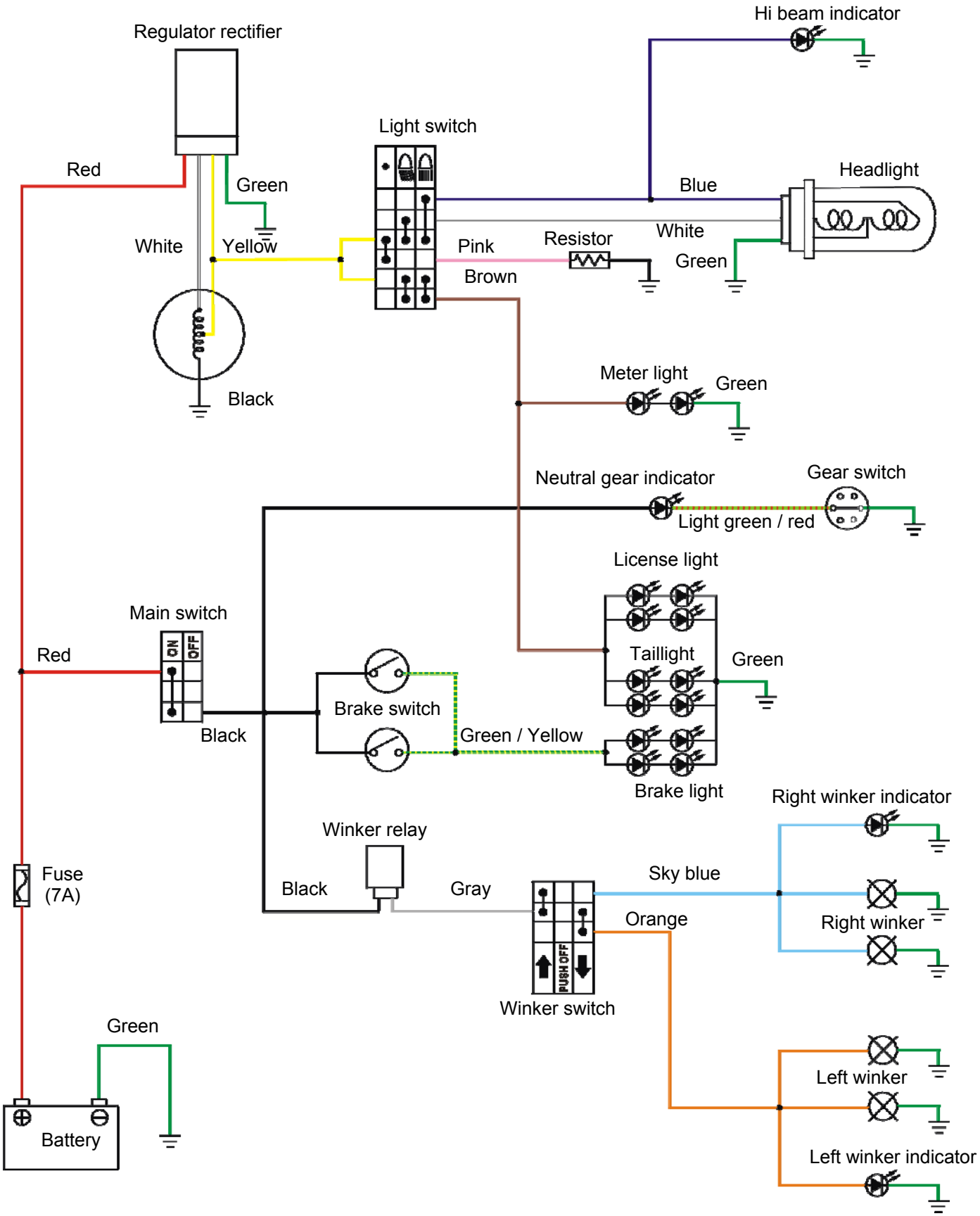
⚠ Caution

- Make sure the O ring is ok and coat it with motor oil before installation.



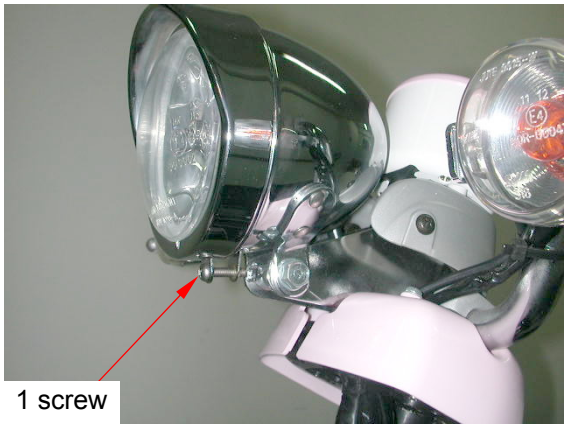
Light System

Light circuit diagram

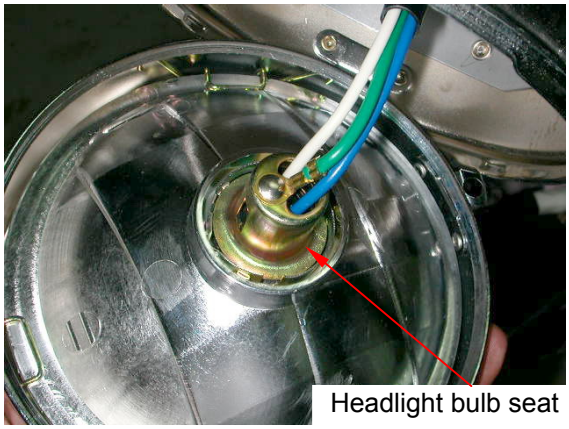


Headlight bulb replacement

Remove the headlight lock screw.



Pull out the headlight set.
Press the headlight bulb seat and rotate it counterclockwise to remove it.



Remove the headlight bulb and replace it if necessary.

Specification :

Headlight **12V 35W/35W**

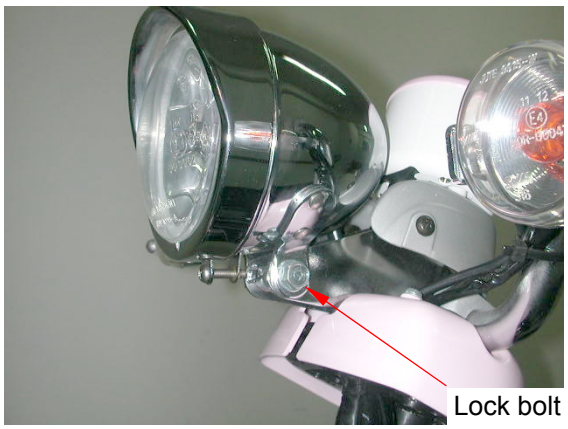
Headlight installation

Install in the reverse order of removal.

Alight the headlight set with the headlight lens.
Tighten the lock screw.
Make sure the headlight work properly.
Adjust the headlight beam.

Headlight beam adjustment

Loosen the headlight lock bolt and move the headlight up and down to adjust headlight beam.
Tighten the lock bolt after adjustment.

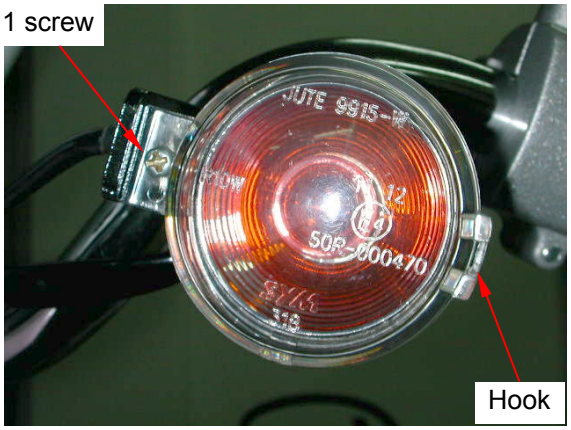


⚠ Caution

- Do not adjust the headlight beam except for necessity.
- Improper headlight beam adjustment dazzles the coming driver / rider or results in insufficient illumination.

Winker bulb replacement

Remove the winker lens lock screw.
Pull out the hook and remove the winker lens.



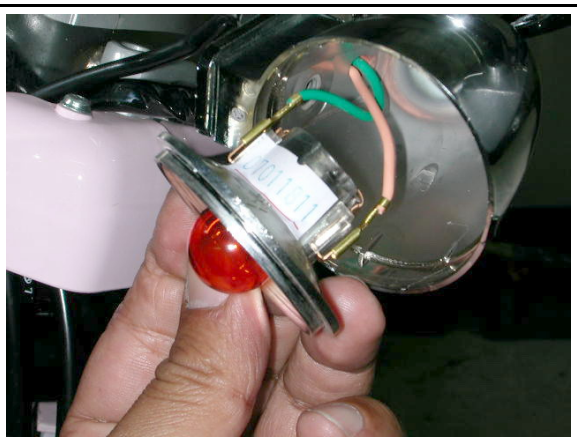
Press the winker bulb slightly and rotate it clockwise.

Pull out the bulb and replace it if necessary.
Specification :
Winker bulb 12V 10W

Installation

Install in the reverse order of removal.

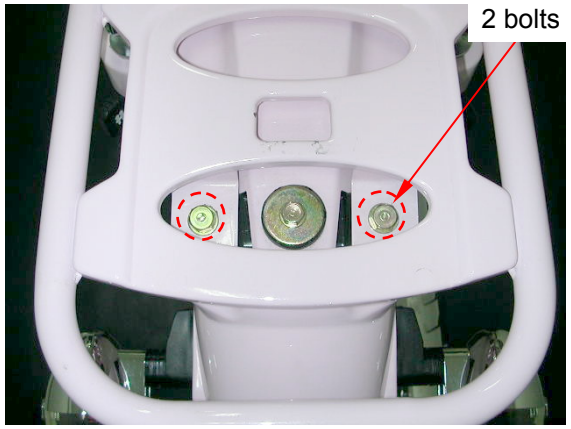
Winker bulb can also be replaced with the reflector be pulled out.



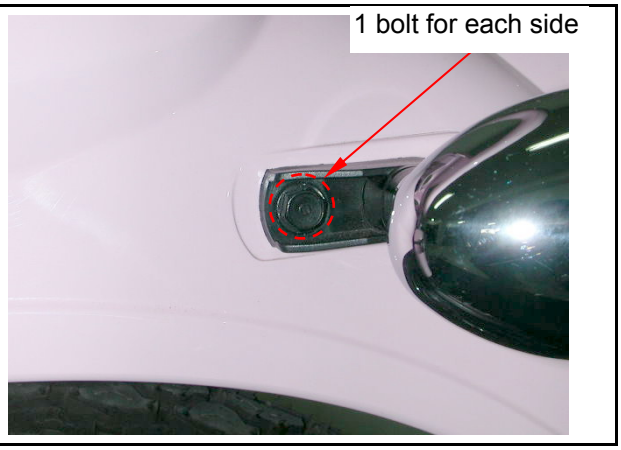
⚠ Caution

- Make sure winker lens and base properly sealed up during assembly.

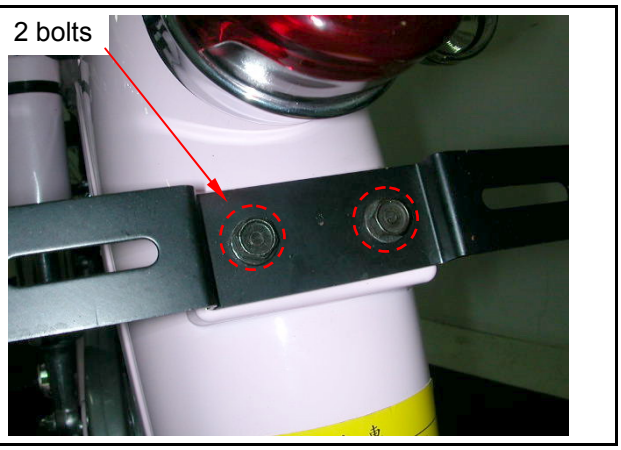
Taillight / brake light / license light removal
Remove the pillion seat and rear cushion upper locknuts.
Remove the luggage carrier (2 bolts).



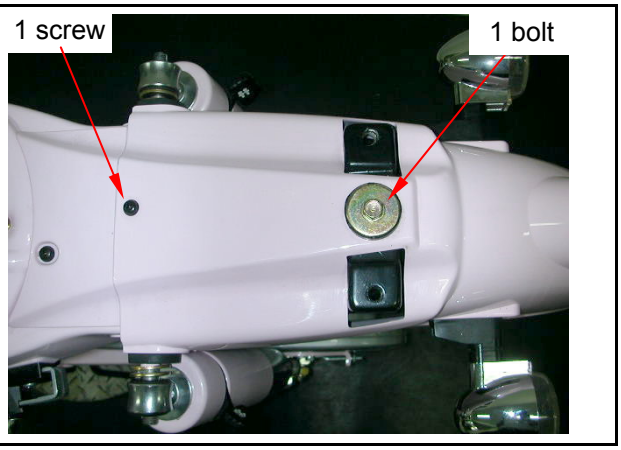
Remove the winker lock bolts and disconnect the wire coupler.
Remove the right / left winker.



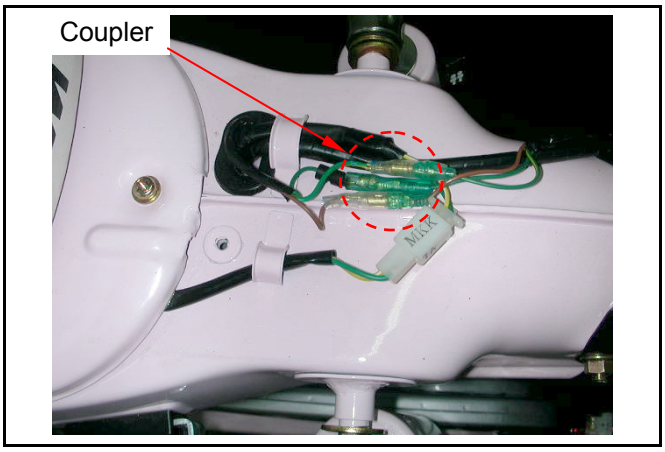
Remove the license plate bracket (2 bolts).



Remove the lock bolt and screw on the rear fender.



Disconnect the taillight wire coupler.



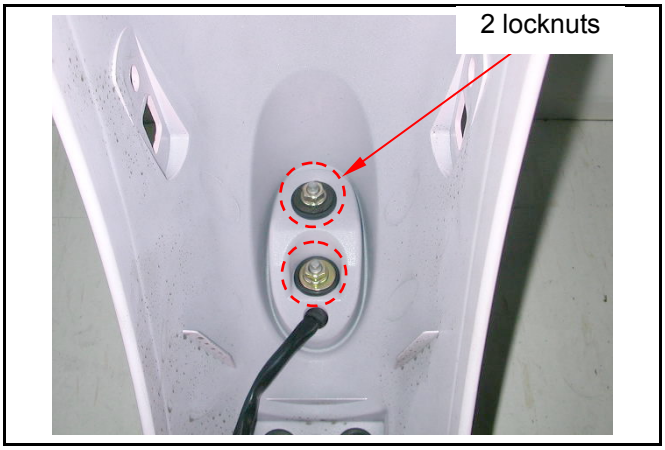
Remove the taillight (2 locknuts).

Specification :

Taillight / Brake light 12V LED

Caution

- Taillight / Brake light are LED type; it needs to be replaced as a set.



Installation

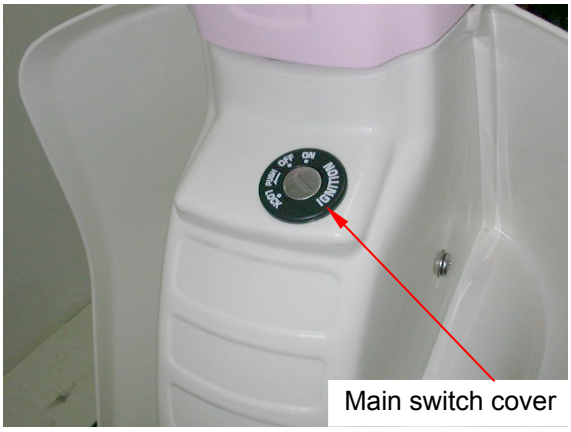
Install in the reverse order of removal.

Switch / Horn

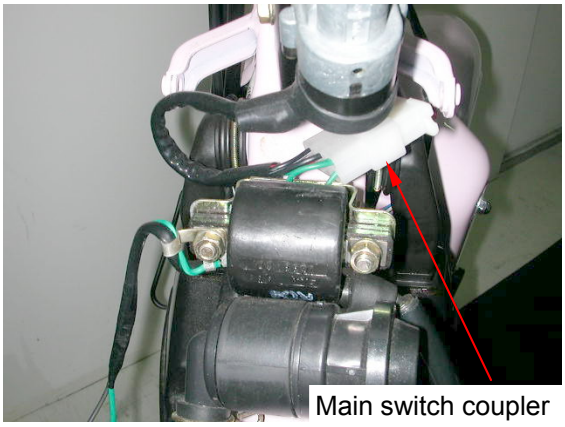
Main switch

Inspection

Turn the main switch cover counterclockwise and remove the cover.
Remove the body cover.

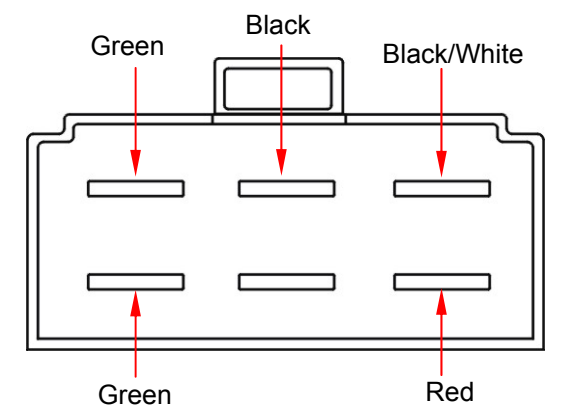


Disconnect the main switch coupler.



Check the circuit between two points as indicated in the table below.

	BAT1	BAT2	IG	E
OFF			●	●
ON	●	●		
Wire color	Red	Black	B/W	Green

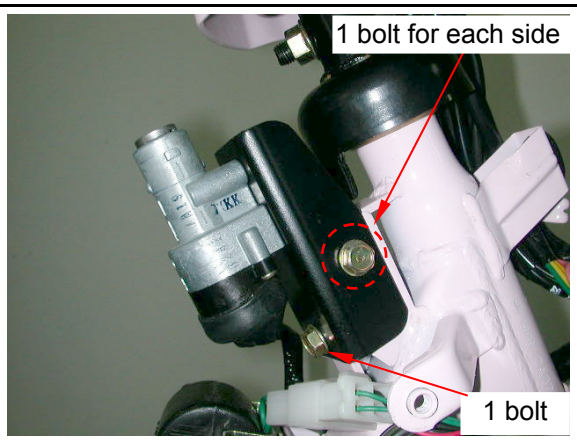


Replacement

Remove the main switch cover and front cover protector.
Remove the front cover (6 bolts).
Disconnect the main switch wire coupler.
Remove the main switch brocket (3 bolts).
Remove the main switch from the brocket.

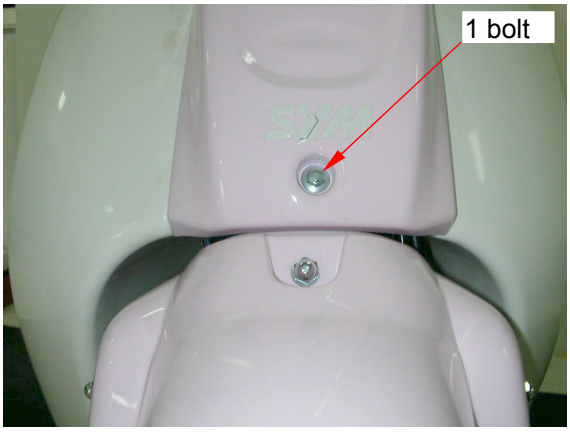
Installation

Install in the reverse order of removal.

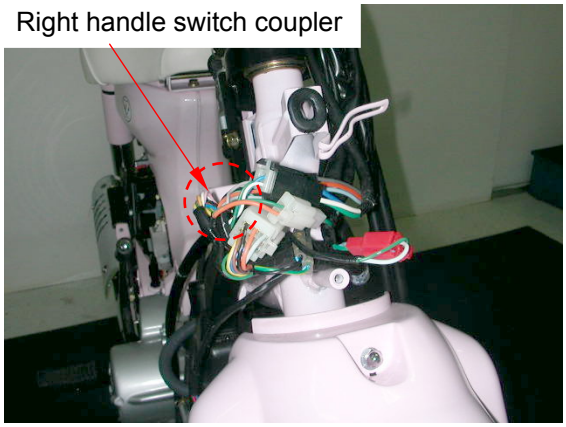


Right handle switch

Remove the front cover (1 bolt).



Disconnect the right handle switch coupler.



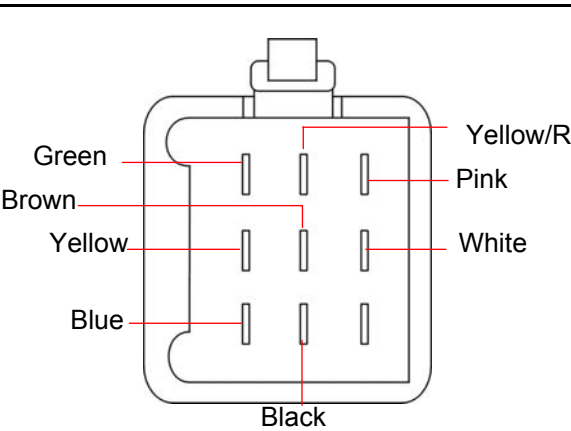
Check the circuit between two points as indicated in the table below.

Light switch

	Hi	Lo	C1	RE	BAT	TL
●			●	●		
≡D		●	●		●	●
≡D	●		●		●	●
Wire color	**Y**	**W**	**B**	**P**	**B**	**BR**

Start switch

	ST	E
FREE		
⚡	●	●
Wire color	**Yellow / Red**	**Green**

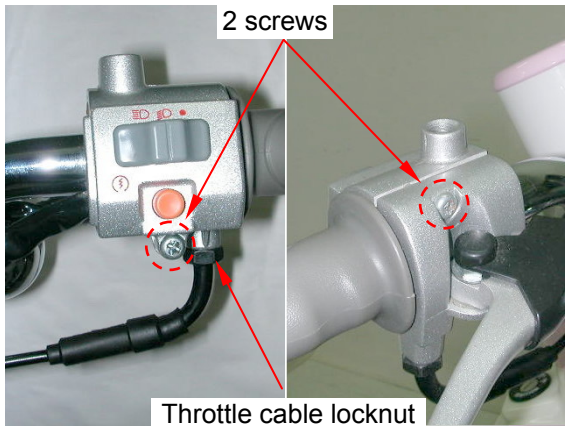


Removal

Loosen the throttle cable locknut, remove the lock screws.
Remove the throttle cable and disassemble the right handle switch.

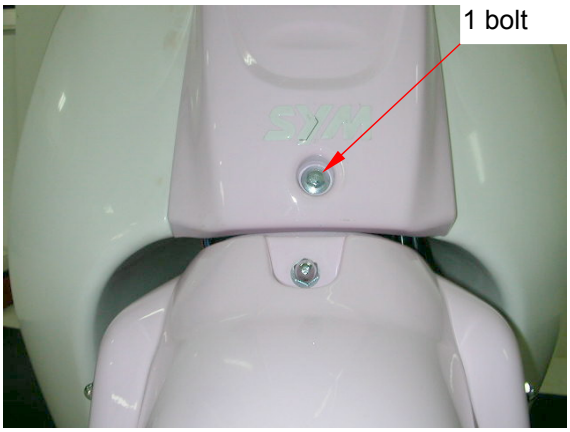
Installation

Assemble in the reverse order of disassembly. Make sure the switch can work properly after assembly.

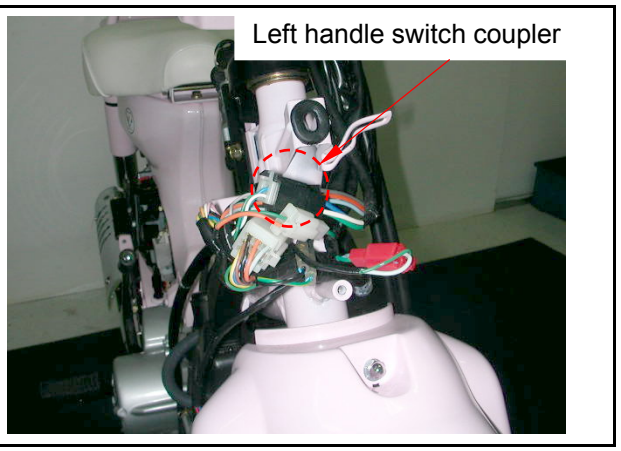


Left handle switch

Remove the front cover (1 bolt).



Disconnect the left handle switch couplers.



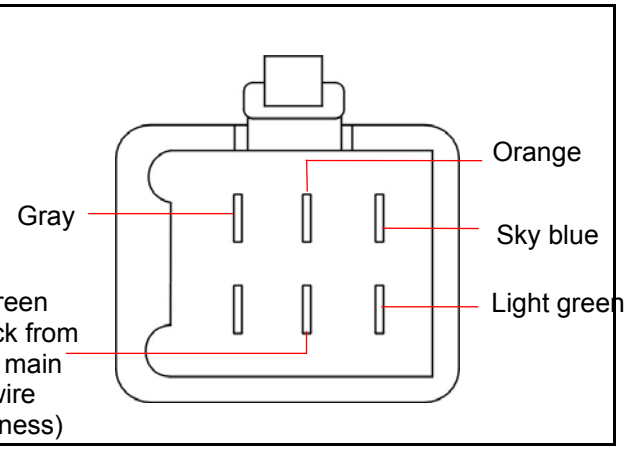
Check the circuit between two points as indicated in the table below.

Winker switch

	L	W	R
⇨		●	●
⇦	●	●	
Wire color	**Orange**	**Gray**	**Sky blue**

Horn switch

	HO	BAT
FREE		
📯	●	●
Wire color	**Light green**	**Green**

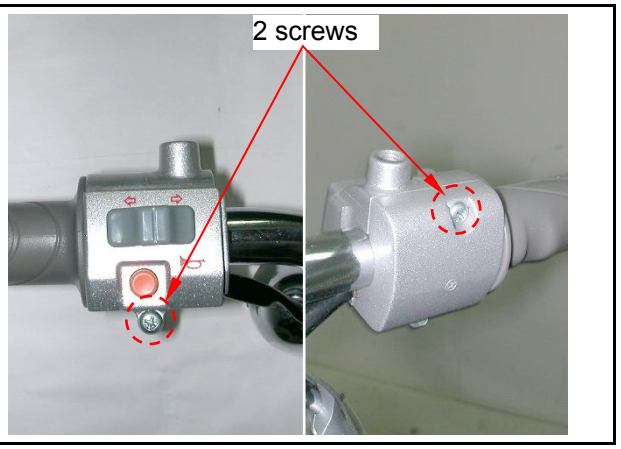


Removal

Remove the lock screws and disassemble the left handle switch.

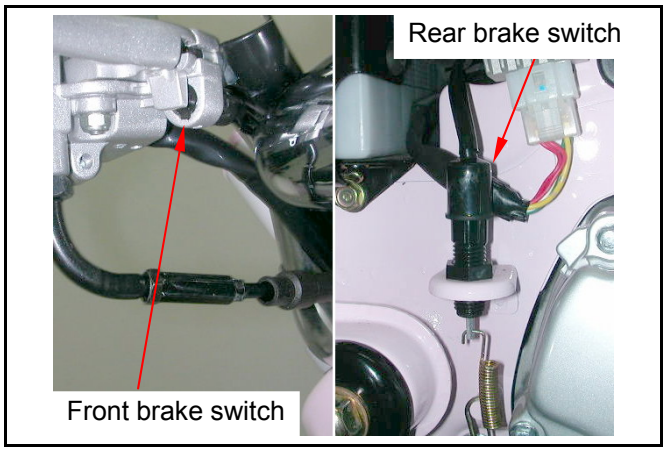
Installation

Assemble in the reverse order of disassembly. Make sure the switch can work properly after assembly.



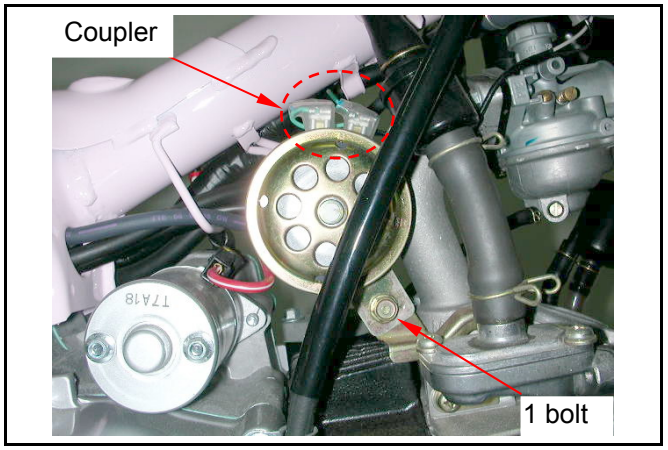
Brake switch

While grasp the brake lever firmly, the terminals of black and green/yellow of the brake should have continuity.
Replace the switch if damaged.

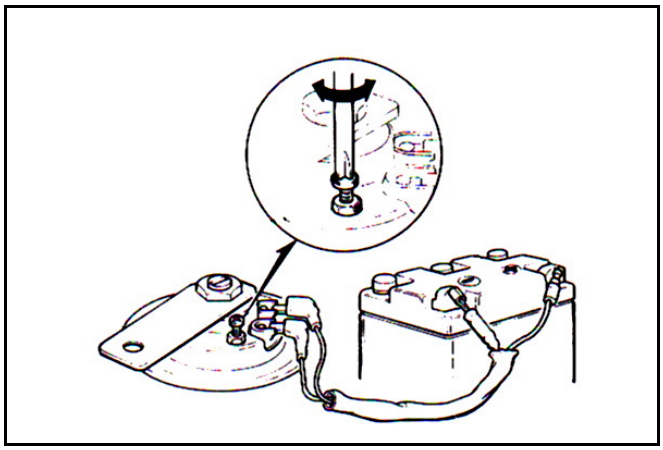


Horn

Disconnect the coupler and remove the horn (1 bolt).



Remove the front cover and front under spoiler.
Apply 12 V power source to two terminals of the horn, the horn should make sound.
Replace the horn if necessary.
Adjust the quality of sound by turning the adjusting screw.



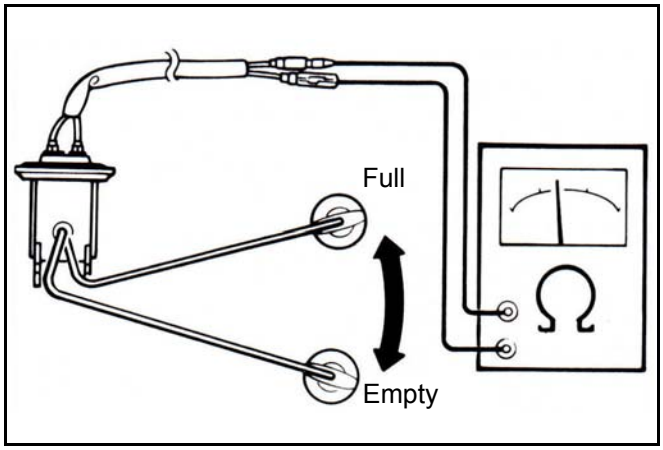
Fuel Unit

Fuel unit inspection

Remove the fuel unit (3 screws).
Check the washer for deformation or damage; replace it with new one if necessary.

Measure the fuel unit electrical resistance.

Float arm position	Resistance
Lower (empty)	745 Ω±10%
Upper (full)	80 Ω±10%



Connect the wiring to the fuel unit and the ohmmeter as shown.
Connect the fuel unit coupler to the wire harness.
Turn on the main switch.
Move the float arm to verify the proper position the fuel gauge needle indicates.

Float arm position	LED display
Upper (full)	F (full)
Lower (empty)	E (empty)

⚠ Caution

- Make sure the battery voltage is sufficient before proceeding inspection.

⚠ Caution

- Make sure there is not too much fuel in the fuel tank before proceeding operation.

Note:

Names of Mechanism in the Emission Control System

Four-Stroke Engine Model

1. Catalyst converter (CATA.)
2. Evaporative Emission Control System (E.E.C.)
3. Air Injection System (A.I.)
4. Positive Crankcase Ventilation System (P.C.V.)

Function of Mechanism in the Emission Control System

General

The emission control strategy of this model was formulated basing on a four-stroke SOHC carburetor single cylinder engine. It adopts secondary air introducing device to purify the exhaust, in addition, it also adopts a charcoal canister to absorb the fuel vapor generated through evaporation in the fuel system.

※ **Engine refinements—**
Two Valves designed combustion chamber, together with optimum compression ratio, ignition timing, intake and exhaust timing, have all contributed to maximize the intake/exhaust efficiency and combustion efficiency.

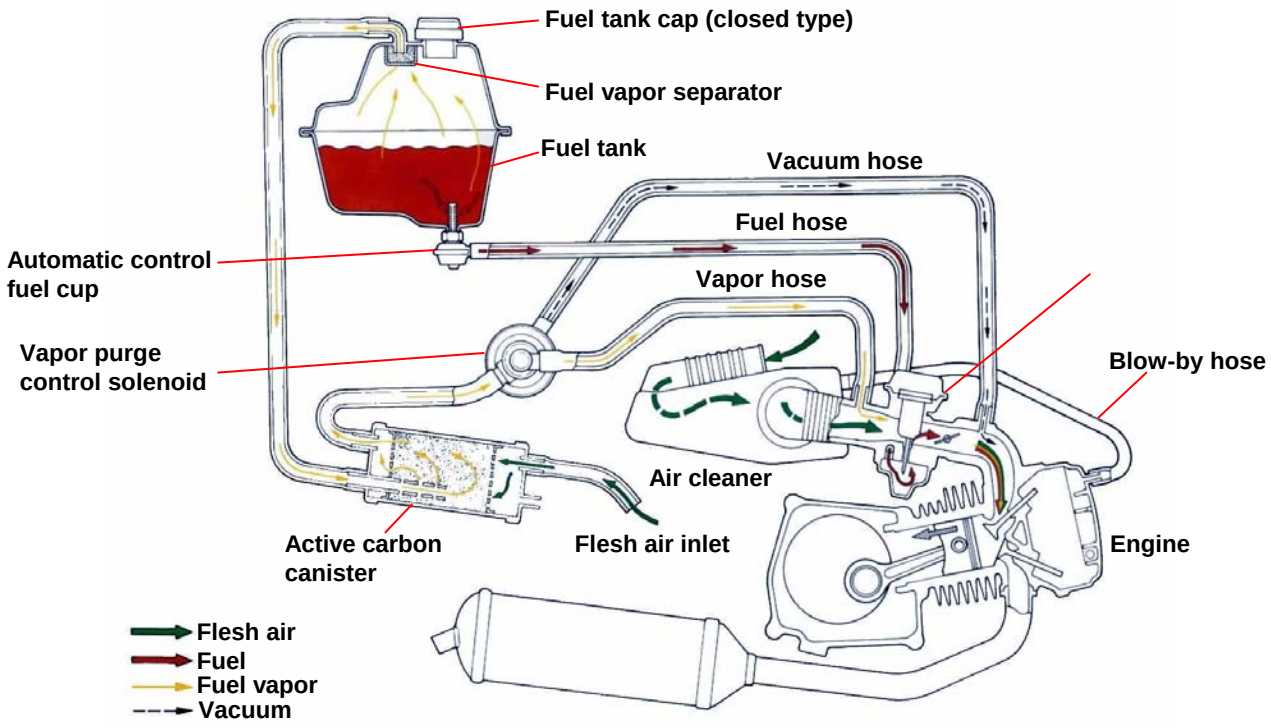
※ **Secondary air introducing system—**
It is used to introduce secondary air into exhaust manifold so that incomplete burned exhausts, CO & HC, may be burned again and to be harmless gases.

System	Device	Components	Purpose & function
Combustion chamber	Combustion chamber	2-valve combustion chamber	The semi-circular combustion chamber is designed to balancing the air stream to achieve the combustion stability.
Exhaust system	Post-treatment device	Catalytic converter	Installed a three-way catalytic converter in the middle of exhaust pipe to oxidize the CO, HC in the exhaust gas.
E.E.C. system	Evaporative emission control system	Charcoal canister Purge control valve	A canister is used to absorb vapor from fuel tank and to introduce it into carburetor at an opportune timing.
A.I. system	Secondary air-injection system	Air inject cut-valve Secondary air filter	To introduce flesh air into exhaust manifold controlled by an air cut-valve to burn the exhaust again.
P.C.V. system	Crankcase blow-by introducing device	Vapor separator	To introduce blow-by into combustion chamber via a vapor separator for burning then discharging.

Fuel Evaporative Emission Control System (E.E.C.)

1. Construction:

- Reduce HC to pollute air.
- To absorber fuel vapor and saving fuel consumption



2. Principle of operation

- Vapor generated in fuel tank and fuel system through evaporation is contained in the confined system to prevent it from escaping into the atmosphere, at the same time, the vapor will be introduced into a charcoal canister where the hydrocarbon in the vapor will be absorbed by active carbon.
- When engine is running, the negative pressure of intake opens the purge line, breaks HC off from active carbon and then sucks it into engine together with air from bottom of the canister.
- The canister can be used repeatedly without reducing its performance because of the system's purge function.

3. Trouble Diagnosis:

Fuel can not flow to carburetor

- No fuel in the fuel tank
- loosen vacuum hose of the fuel pump
- plugged hose in the system

4. Cautions:

- Do not exceed the reed valve of the fuel filler when filling out fuel.
- Do not have rush acceleration or running in high speed when applying the spare fuel.

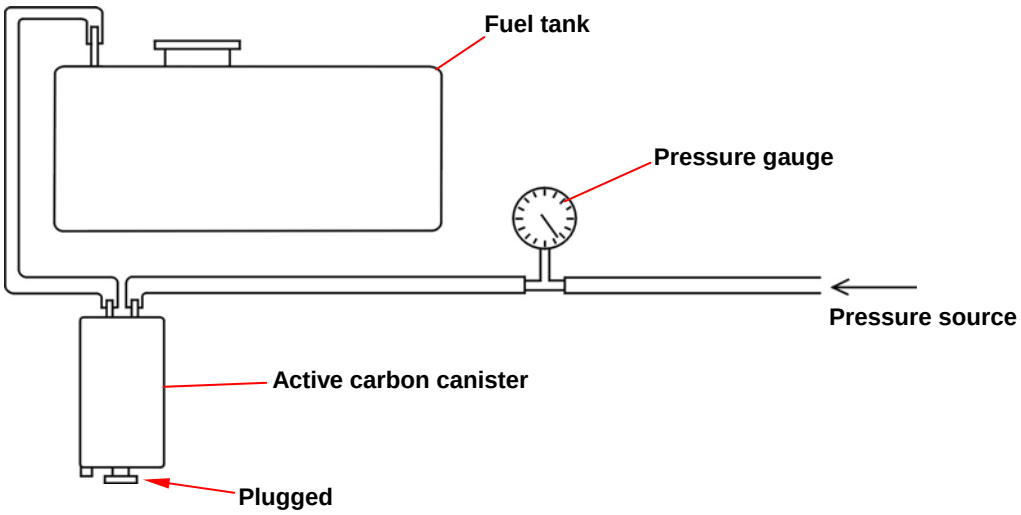
Evaporative Emission Control System (EEC)

1. Visual check:

1) Check the outside of canister for damage.
2) Check all hoses for breakage.

2. Leak test:

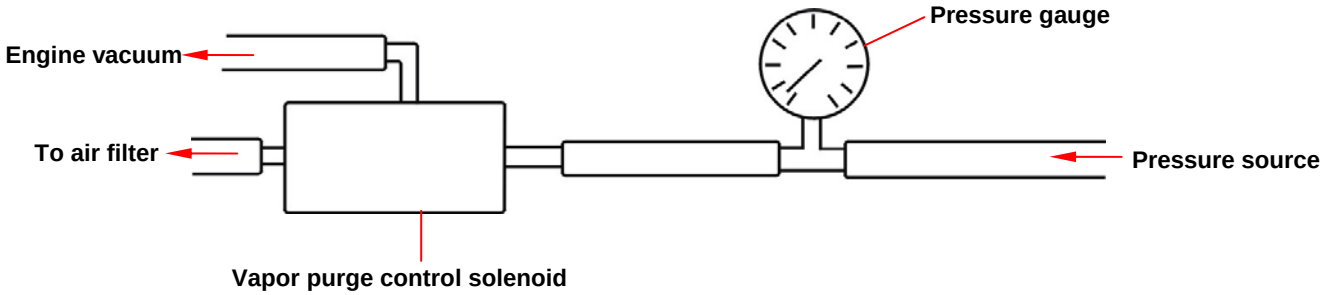
1) Disconnect the Vapor purge control solenoid hose, and connect a T-type hose connector to a pressure gauge and a pressure source as shown below:



2) Plug canister vent.
3) Apply 100mmAq into pressure source inlet then plug it. The pressure at the gauge should not drop to below 10mmAq within 10 seconds.

3. PCV Function Test

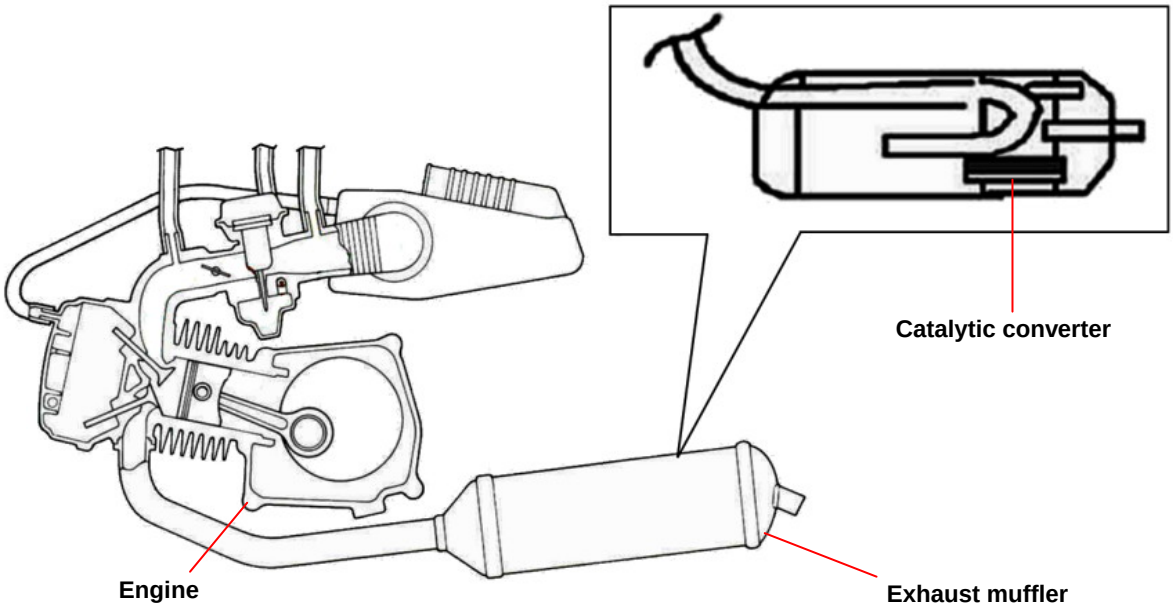
1) Disconnect the hose of connection to the active carbon canister, and then connect a T-type hose connector to pressure source as shown below:



2) Apply 100mmAq into pressure source inlet as engine stopped then plug it. The pressure at the gauge should not drop to below 10mmAq within 10 seconds.

Catalytic Converting System (CATA)

1. Construction:

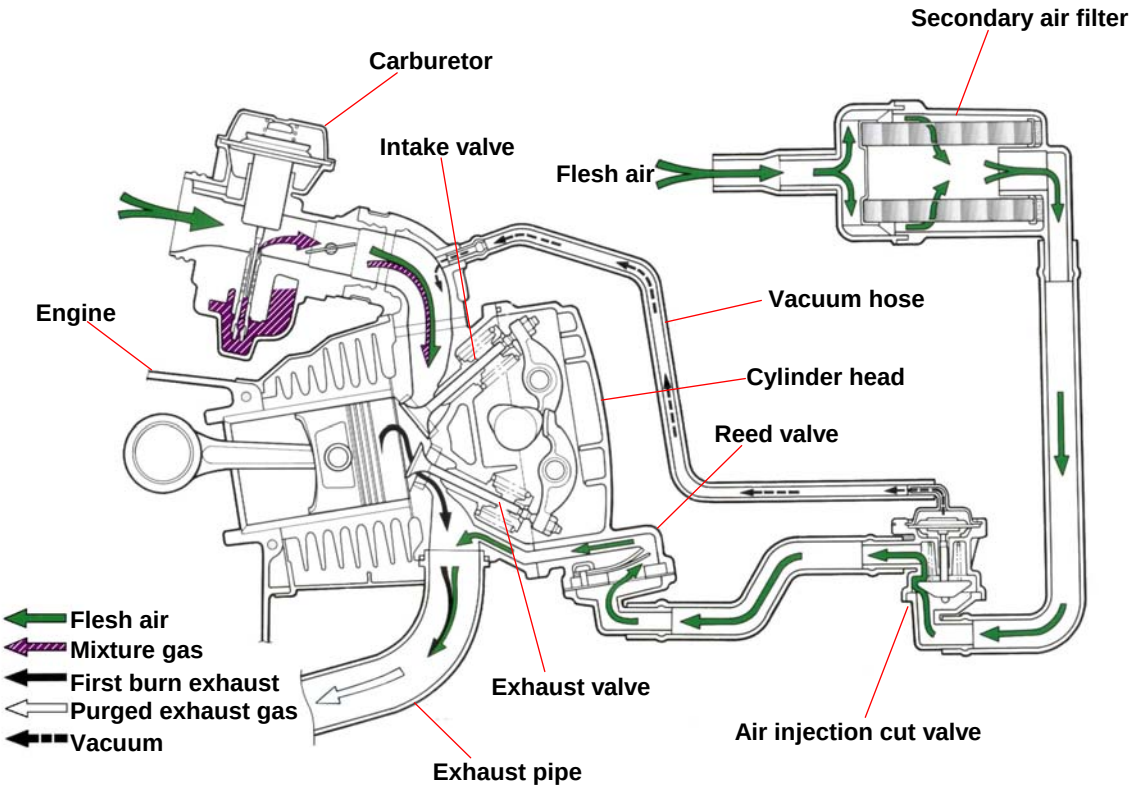


2. Description:

1) The function of the catalytic converter is to transfer unburned CO, HC, and NOx harmless CO_2, H_2O, N_2 gases.
2) Pt, Pd, Rh…etc. precious metals are used into the catalytic converter so use only unleaded gasoline to prevent from cause the catalytic converter to fail.

Secondary Air Introduction System

4. Construction



This system contained AICV (air Injection Cut Valve), R/V (Reed Valve) and other intake components.

2. Principle of operation:

- Secondary air is introduced into exhaust manifold so that CO and HC in the exhaust will be burned again under a state of rich oxygen and appropriate temperature and be turned into harmless CO_2, H_2O.
- The opening and closing of the exhaust valve can generate a positive or a negative pressure pulse inside a motorcycle's exhaust system. Exhaust gas is controlled by a reed valve. When pressure inside the exhaust manifold is negative, reed valve will be sucked open by the negative pressure and outside air will enter to mix with CO, HC, thus generating a secondary burn reaction and turning them into harmless gases. When pressure inside the exhaust manifold is positive, reed valve will close to prevent exhaust back up and enter into the secondary air cleaner.
- Air cut-off valve (AICV) will cut off the secondary air supply during engine fuel returning cycle to reduce after-burning noises.

3. Service Points/Trouble Diagnosis:

Diesel
a. Malfunction of air inject cut valve (AICV).
b. System hose leakage.
c. abnormal ignition timing.
d. lean mixture gas.
e. abnormal fuel supply.

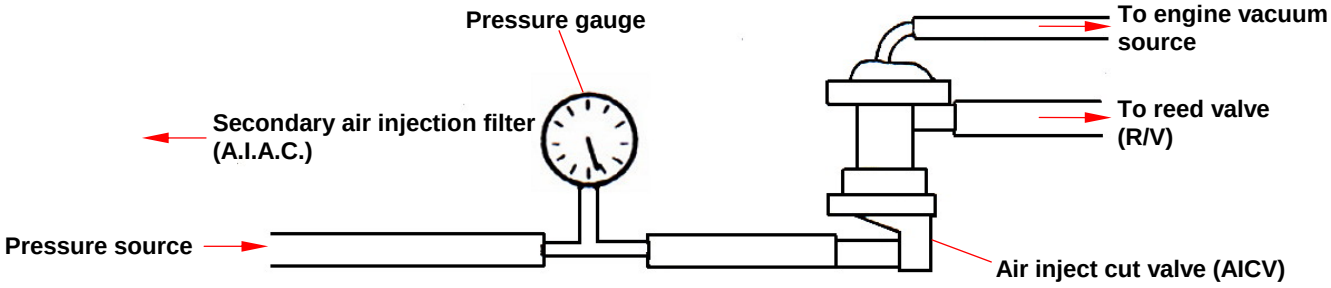
Rich Exhaust Gas:
a. plugged air-jet by dirty carburetor.
b. poor adjustment of air adjustment screw.
c. poor reed valve.
d. System hose leakage or plugged.

Noise:
a. System hose leakage.
b. Loosen secondary air injection filter.
c. Loosen secondary air injection filter hose.

4. AI System Service methods:

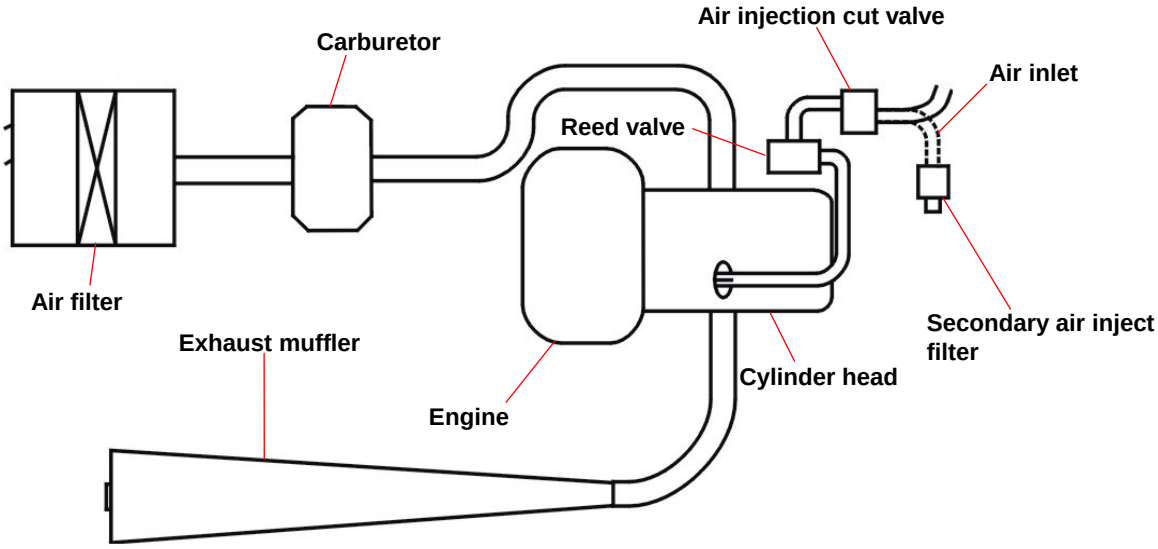
a. Visual check:
- Check reed valve, air cut-off valve, secondary air cleaner for outside damages.
- Check metal pipes and hoses for breakage and cracks.

b. Leak test:

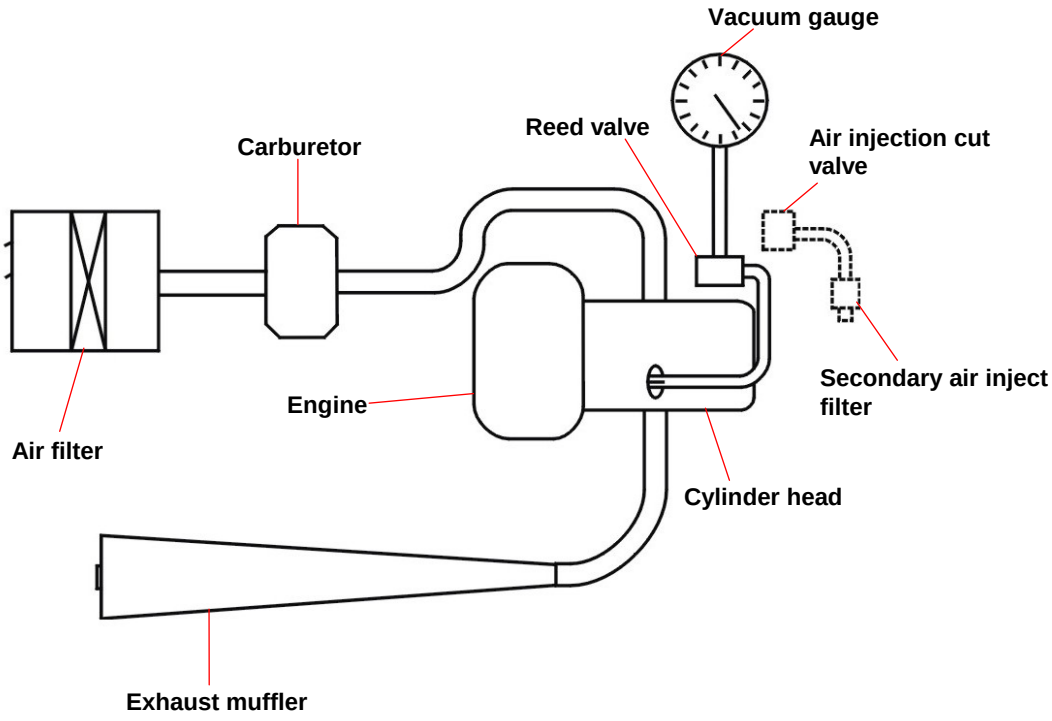


- Plug the hose leading to reed valve.
- Remove the hose of connection to air injection cut valve. Connect a T-type hose connector, pressure gauge and pressure source as shown above.
- With engine stopped, apply 1.0kg/cm2 pressure to inlet and then plug it. There should be no leakage.

1. **Warm-up test:**
   - Start engine.
   - Remove the air injection filter.
   - Check the air inlet if there is air-sucking sounds during idling (should hear Bo-Bo-Bo sound).



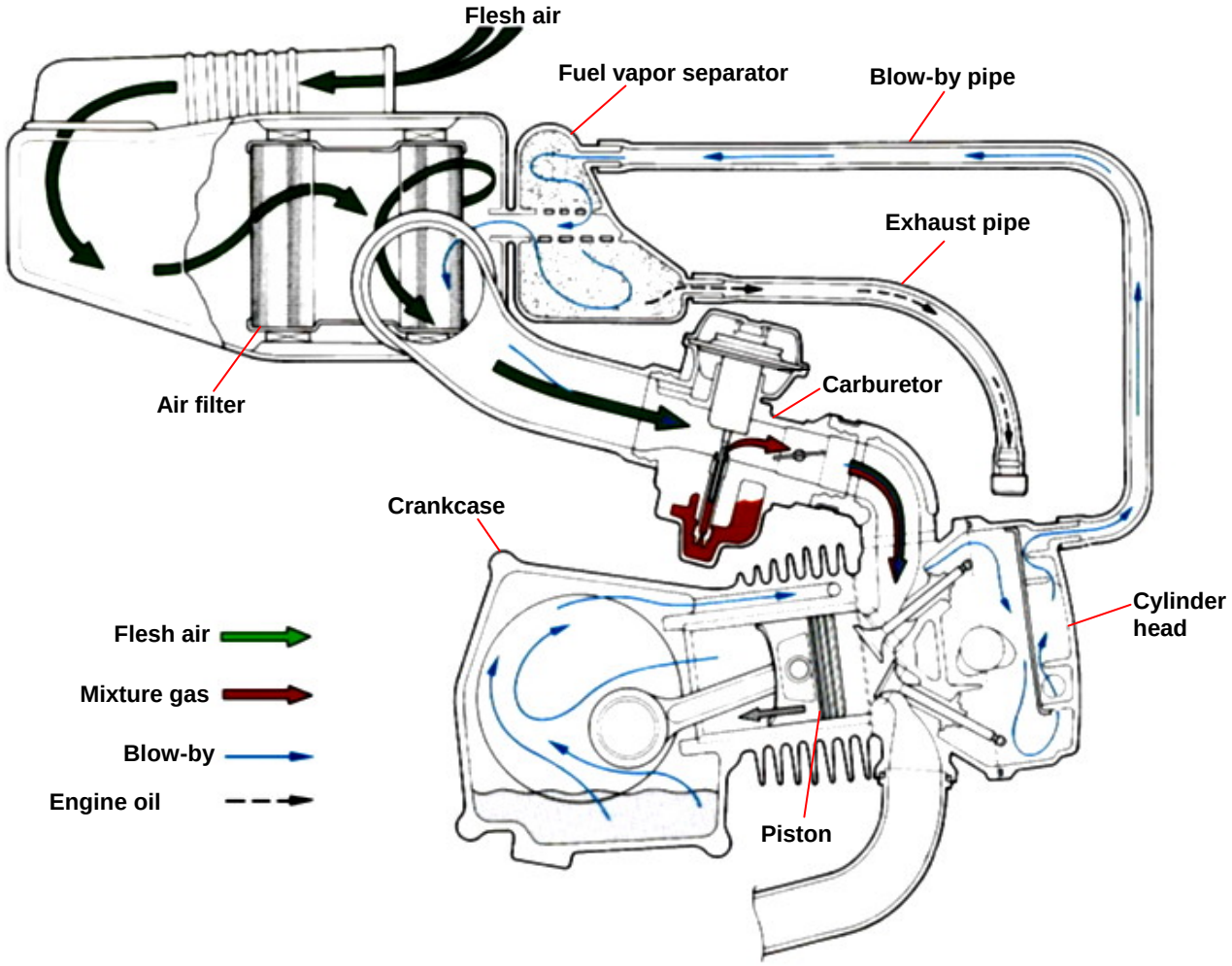
   - If no sound is heard, remove air cut-off valve, and connect a vacuum meter to air pipe to check for leakage.



   - If there is no vacuum, replace reed valve and test again.
   - If there is no vacuum, check the air pipe for leakage, plugged or loose.

Positive Crankcase Ventilation System (P.C.V.)

1. Construction



2. Principle of operation:

- Install a separated chamber on cylinder head, and suck the blow-by gas to the fuel vapor separator by engine vacuum.
- Drill a hole in the air cleaner and install a vapor separator, so that blow-by from crankcase will flow through a cylinder check valve and then separated by the separator.
- The separated vapor will be sucked into combustion chamber by engine negative pressure to be burned again instead of discharging into atmosphere. Drain liquidized fuel in the drain pipe periodically.

3. Service Methods

Visual check:

- Remove drain plug to drain the fuel when fuel level on the drain pipe reaches 80 % full.
- Check connecting hose for damage and looseness.

Inspection Items

Secondary air injection system

1. Visual inspect the reed valve, air injection cut valve, and secondary air filter as well as hoses for damage.
2. Leaking check.
3. Warm-up running check.

Fuel Evaporation Control System

1. Visual inspect the carbon canister and hoses for damage.
2. Leaking check.
3. Function test of the purge control solenoid.

Catalytic converter

1. Check if exhaust gas content is within standard.
2. Remove the exhaust pipe and shake it gently for noise.

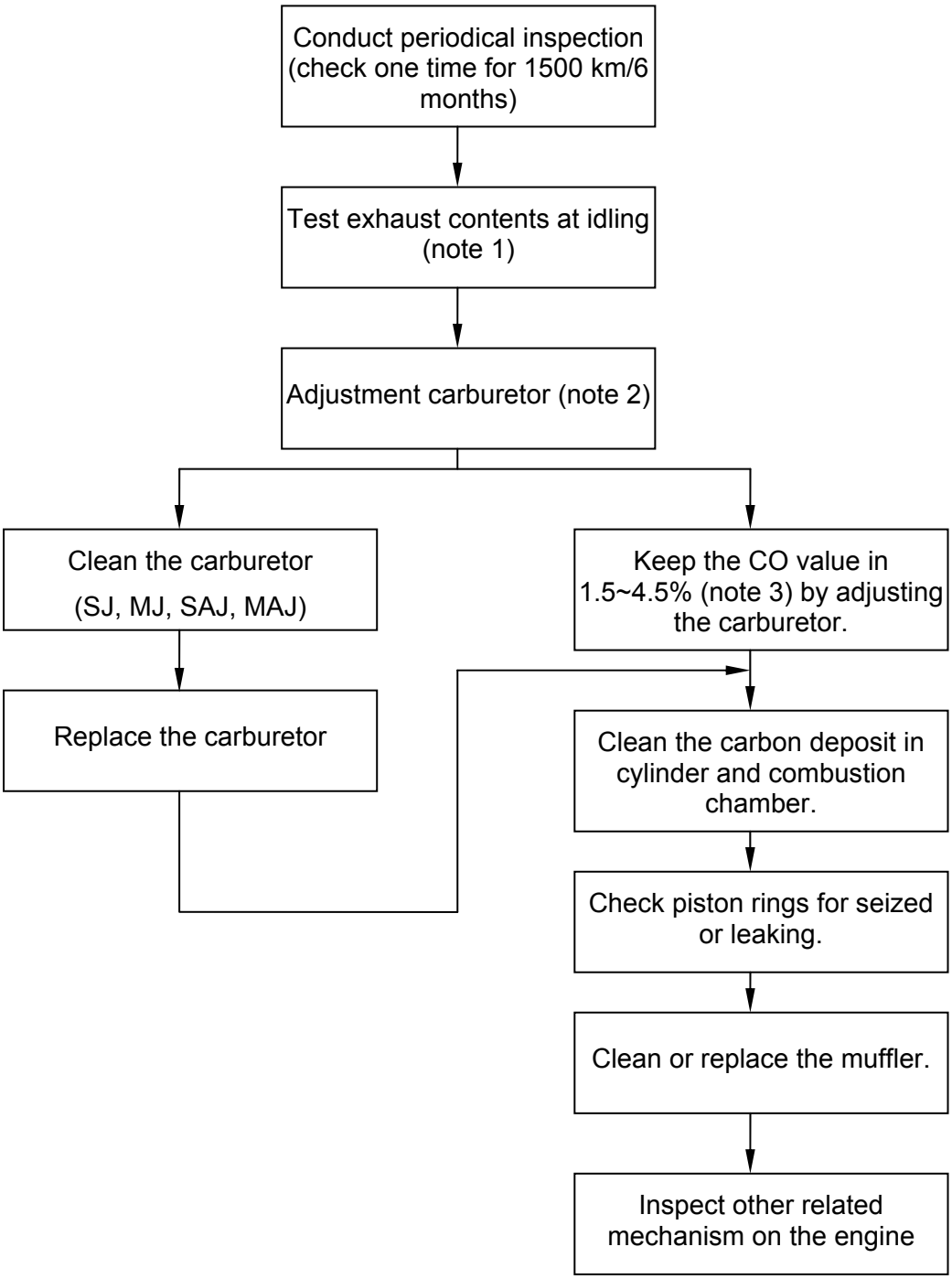
Fuel Supply System

1. Clean the air filter.
2. Check the air filter.
3. Clean the carburetor fuel jet, air jet and all circuit with air gun or specified solvent.
4. Check the float level of carburetor.
5. Adjust CO/HC values at idling. (engine rpm must be within specification)

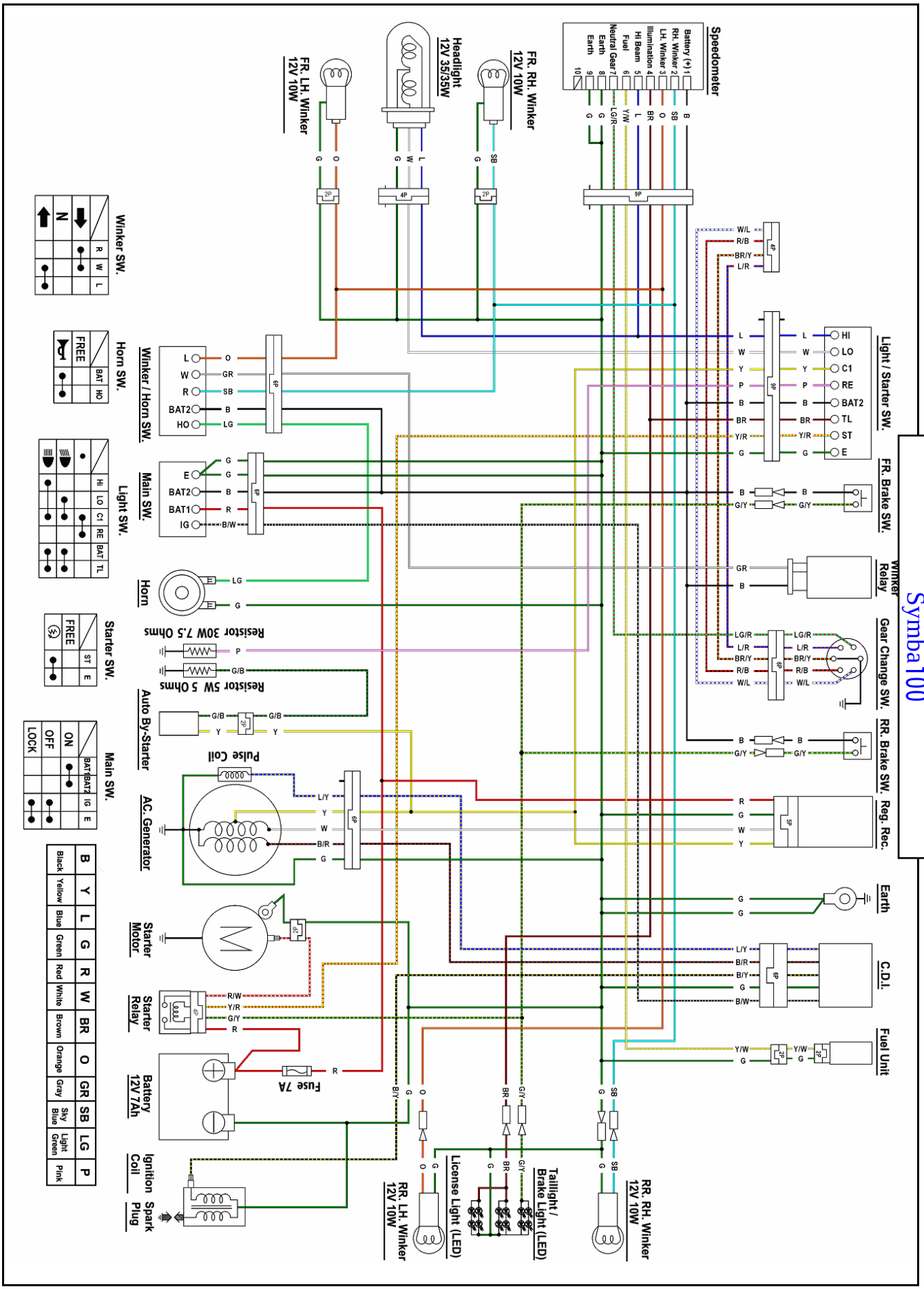
Ignition system

1. Spark plug check and replacement.
2. Ignition coil check and replacement.

Countermeasure for Emission Pollutants Not Within Standard as In Idle Speed (4-Stroke Engine)



Note 1: Test it according to the idling test procedure.
Note 2: Adjustment the idle adjustment screw. Set the engine rpm in specified speed, and test CO, HC at idling. And then adjust the air adjustment screw at the same time to let CO value to be 1.5~4.5%.
Note 3: If the values still can not be reached to specification after adjusted the carburetor, then clean or replace it with new one according to the procedures.


Speedometer
Battery (+) 1
RH. Winker 2
LH. Winker 3
Illumination 4
Hi Beam 5
Fuel 6
Neutral Gear 7
Earth 8
Earth 9
10
FR. LH. Winker 12V 10W
Headlight 12V 35/35W
FR. RH. Winker 12V 10W
Winker SW.
Horn SW.
Light SW.
Starter SW.
Main SW.
Winker / Horn SW.
Main SW.
Horn
Resistor 30W 7.5 Ohms
Resistor 5W 5 Ohms
Auto By-Starter
Pulse Coil
AC. Generator
Starter Motor
Starter Relay
Fuse 7A
Battery 12V 7Ah
Ignition Coil
Spark Plug
Light / Starter SW.
FR. Brake SW.
Winker Relay
Gear Change SW.
RR. Brake SW.
Reg. Rec.
Earth
C.D.I.
Fuel Unit
RR. RH. Winker 12V 10W
Taillight / Brake Light (LED)
License Light (LED)
RR. LH. Winker 12V 10W
Black
Yellow
Blue
Green
Red
White
Brown
Orange
Gray
Sky Blue
Light Green
Pink
Symba100
14

14. Electrical Diagram

Note: