FORWARD

HOW TO USE THIS MANUAL

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SERVICE MANUAL

FORWARD

This service manual contains the technical data of each component inspection and repair for the SANGANG FT05 series motorcycle. The manual is shown with illustrations and focused on “Service Procedures”, “Operation Key Points”, and “Inspection Adjustment” so that provides technician with service guidelines.

If the style and construction of the motorcycle, FT05 series, are different from that of the photos, pictures shown in this manual, the actual vehicle shall prevail. Specifications are subject to change without notice.

Service Department

Sanyang Industry Co., LTD.

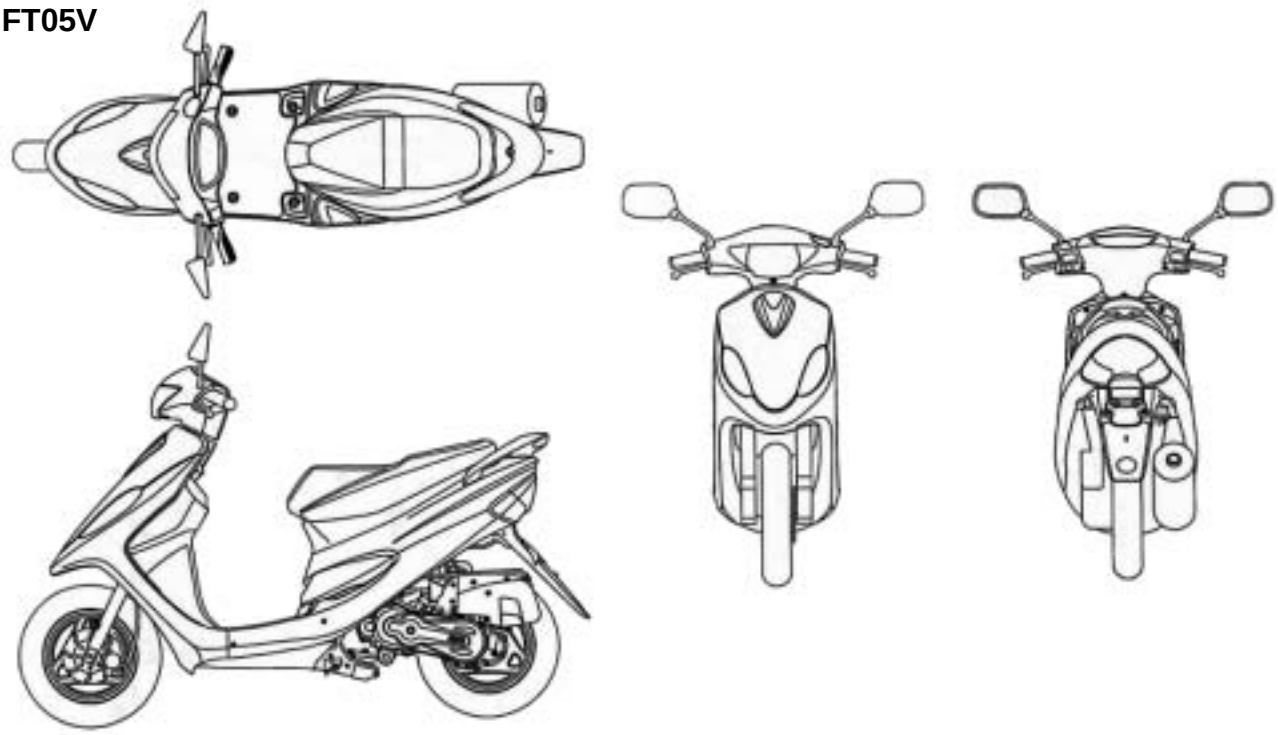
How to Use This Manual

This service manual describes basic information of different system parts and system inspection & service for Sanyang FT05 series motorcycles. In addition, please refer to the manual contents in detailed for the model you serviced in inspection and adjustment.

The first chapter covers general information and trouble diagnosis.
The second chapter covers service maintenance information.
Th third to the tenth chapters cover engine and driving systems.
The eleventh to the fourteenth is contained the parts set of assembly body.
The fifteenth chapter is electrical equipment.
The sixteenth chapter is emission control system.
The seventeenth chapter is wiring diagram
Please see index of content for quick having the special parts and system information.

MODEL ILLUSTRATION

FT05V



FT05T

FT05U

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	Means that serious injury or even death may result if procedures are not followed.
Caution	Means that equipment damages may result if procedures are not followed.
Engine oil	Limits to use SAE 20 JASO FC class oil. Warranty will not cover the damage that caused by not apply with the limited engine oil. (Recommended oil: MAX-2 serial oils)
Grease	King Mate G-3 is recommended.
Gear oil	King Mate gear oil serials are recommended. (Bramax HYPOID GEAR OIL # 140)
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	Special tools.
Correct	Meaning correct installation.
Wrong	Meaning wrong installation.
Indication	Indication of components.
Directions	Indicates position and operation directions.
	Components assembly directions each other.
	Indicates where the bolt installation direction, --- means that bolt cross through the component (invisibility).

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 an extractor.

⚠ 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 should be 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 that you 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 cooling off.

Battery

⚠ Caution

- Battery emits explosive gases; flame is strictly prohibited. Keep the place well ventilated when charging the battery.
- Battery contains sulfuric acid (electrolyte) which can cause serious burns so be careful do not be spray 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 water and then go to hospital to see an ophthalmologist.
- If you swallow it by mistake, drink a lot of water or milk, and take some laxative such as castor oil or 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 dust may cause disorders and cancer of the breathing system.

Brake fluid

⚠ Caution

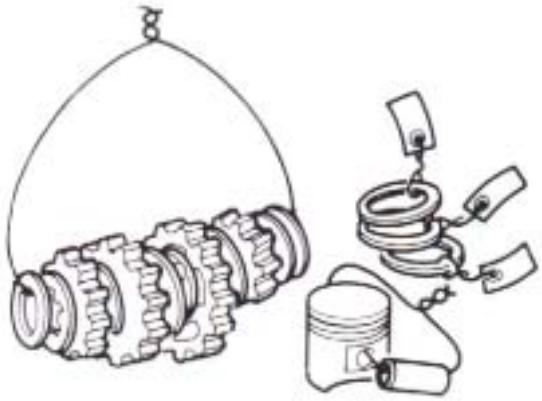
Spilling brake fluid on painted, plastic, or rubber parts may cause damage to the parts. Place a clean towel on the above-mentioned parts for protection when servicing the brake system. Keep the brake fluid beyond reach of children.

Service Precautions

- Always use with Sanyang genuine parts and recommended oils. Using non-designed parts for Sanyang motorcycle may damage the motorcycle.
- Special tools are designed for remove and install of components without damaging the parts being worked on. Using wrong tools may result in parts damaged.
- When servicing this motorcycle, use only metric tools. Metric bolts, nuts, and screws are not interchangeable with the English system, using wrong tools and fasteners may damage this vehicle.
- Clean the outside of the parts or the cover before removing it from the motorcycle. Otherwise, dirt and deposit accumulated on the part's surface may fall into the engine, chassis, or brake system to cause a 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 stiff control and premature worn out.

- Rubber parts may become deteriorated when old, and prone 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.

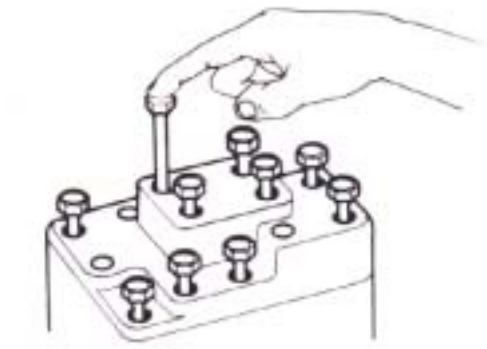


- Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).
- Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap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

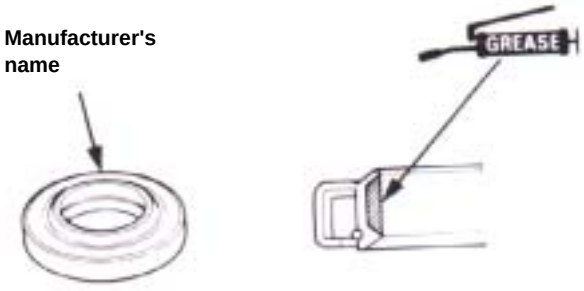
⚠ Caution

In addition to damaging paint finish, brake oil can also damage the structural integration of plastic or rubber parts.

- The length of bolts and screws for assemblies, cover plates or boxes is different from one another, be 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.

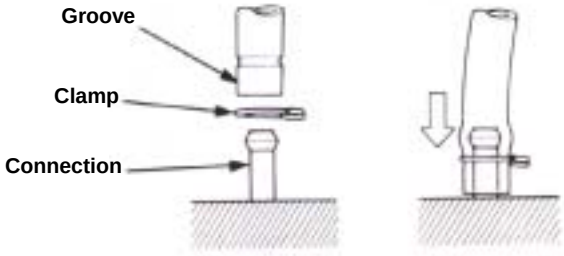


- Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unless otherwise 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, check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.

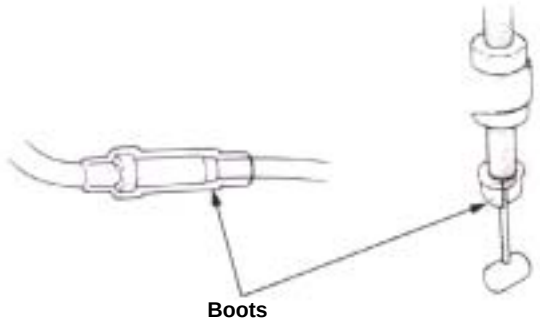


- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.

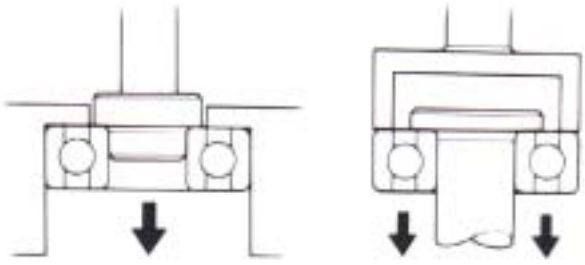
- The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections so that there is enough room below the enlarged ends for tightening the clamps.



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

Specifications

Make			SANYANG	MODEL		FT05W
DIMENSION	Overall Length		1660 mm	Suspension System	Front	TELESCOPIC
	Overall Width		630 mm		Rear	UNIT SWING
	Overall Height		1020 mm	Tire Specifications	Front	3.00 - 10 42J(T/L)
	Wheel Base		1155 mm		Rear	3.00 - 10 42J(T/L)
WEIGHT	Curb Weight	Front	32 kg	Brake System	Front	DISK (ψ160mm)
		Rear	48 kg			DRUM (ψ110mm)
		Total	80 kg		Rear	DRUM (ψ95mm)
	Passengers/ Weight		Two /110 kg	PERFORMANCE	Max. Speed	48 km/hr Below
	Total Weight	Front	54 kg		Climb Ability	20° Below
		Rear	136 kg		Primary Reduction	BELT
		Total	190 kg		Secondary Reduction	GEAR
ENGINE	Type		Gasoline		Clutch	Centrifugal, dry type
	Installation and arrangement		Vertical, below center, incline		Transmission	C.V.T.
	Fuel Used		Unleaded(92/95)	Speedometer		0 ~ 90 km/hr
	Cycle/Cooling		2-stroke/forced air cooled	Horn		80 – 112 dB/A
	Cylinder	Bore	39 mm	Muffler		Expansion & Pulse Type
		Stroke	41.4 mm	Exhaust Pipe Position and Direction		Right side, and Backward
		Number/Arrangement	Single Cylinder	Lubrication System		Separated-lubrication
	Displacement		49.4 cc	Exhaust Concentration	Solid Particulate	15 % ↓
	Compression Ratio		7.1 : 1		CO	3.5 % ↓
	Max. HP		2.7 kw / 6250 rpm		HC	Below 4000 ppm
	Max. Torque		4.41 Nm / 5000 rpm	E.E.C.		Below 2g / test
	Ignition		C.D.I.	P.C.V.		X
	Starting System		Electrical & kick	Catalytic reaction control system		○

Torque values

Standard Torque Values for Reference

Type	Torque value	Type	Torque value
5 mm Bolt, nut	0.45 - 0.6 kg-m	5 mm Bolt	0.35 - 0.5 kg-m
6 mm Bolt, nut	0.8 - 1.2 kg-m	6 mm Bolt, SH nut	0.7 - 1.1 kg-m
8 mm Bolt, nut	1.8 - 2.5 kg-m	6 mm Flange bolt, nut	1.0 - 1.4 kg-m
10 mm Bolt, nut	3.0 - 4.0 kg-m	8 mm Flange bolt, nut	2.4 - 3.0 kg-m
12 mm Bolt, nut	5.0 - 6.0 kg-m	10 mm Flange bolt, nut	3.5 - 4.5 kg-m

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

Engine

Item	Q'ty	Thread Dia. (mm)	Torque Value (Kg-m)	Remarks
Cylinder head bolt	**4**	**6**	**1.0**	When engine cooled
Spark plug	**1**	**14**	**1.4**	
Flywheel nut	**1**	**10**	**3.8**	
Sliding driving disc nut	**1**	**10**	**3.8**	
Sliding driving disc nut	**1**	**28**	**5.5**	
Clutch outer cover nut	**1**	**10**	**3.8**	
Drain bolts	**1**	**8**	**1.3**	
Crankcase bolts	**6**	**6**	**1.0**	

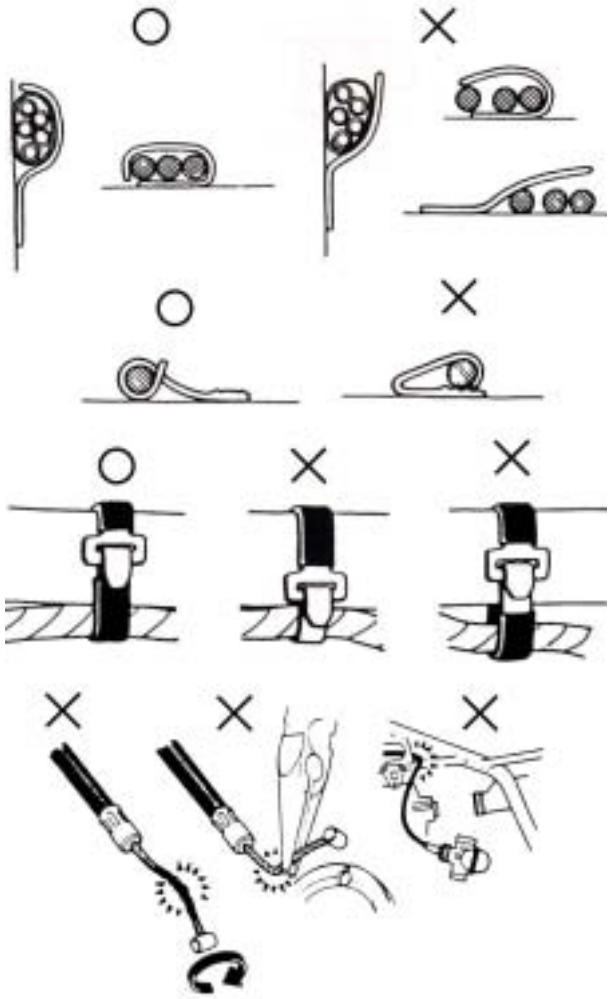
Frame

Item	Q'ty	Thread Dia. (mm)	Torque Value (Kg-m)	Remarks
Bolt for engine suspension	**1**	**10**	**5.0**	
Bolt for engine suspension bracket	**1**	**12**	**6.0**	
Upper bolt for rear shock absorber	**1**	**10**	**4.0**	
Lower bolt for rear shock absorber	**1**	**8**	**2.7**	
Mounting screws for exhaust pipe connection	**2**	**6**	**1.2**	
Nut for exhaust	**2**	**8**	**3.3**	
Brake hose bolts	**2**	**10**	**3.5**	
Brake caliper mounting bolts	**2**	**8**	**3.1**	
Brake cushion guide bolts	**2**	**6**	**1.8**	
Brake cushion guide bolts cap	**2**	**6**	**1.0**	
Brake drain valve	**1**	**6**	**0.6**	
Rear brake arm bolts	**1**	**5**	**0.55**	
Tightening nut for steering rod	**1**	**25.4**	**7.0**	
Front shaft nut	**1**	**12**	**6.0**	
Mounting bolt for handle	**1**	**10**	**5.0**	
Mounting nut for front hub	**4**	**8**	**2.5**	
Mounting bolt for front brake disc	**3**	8	4.5	
Rear shaft nut	**1**	14	11.0	
Nut for rear hub	**4**	8	2.5	

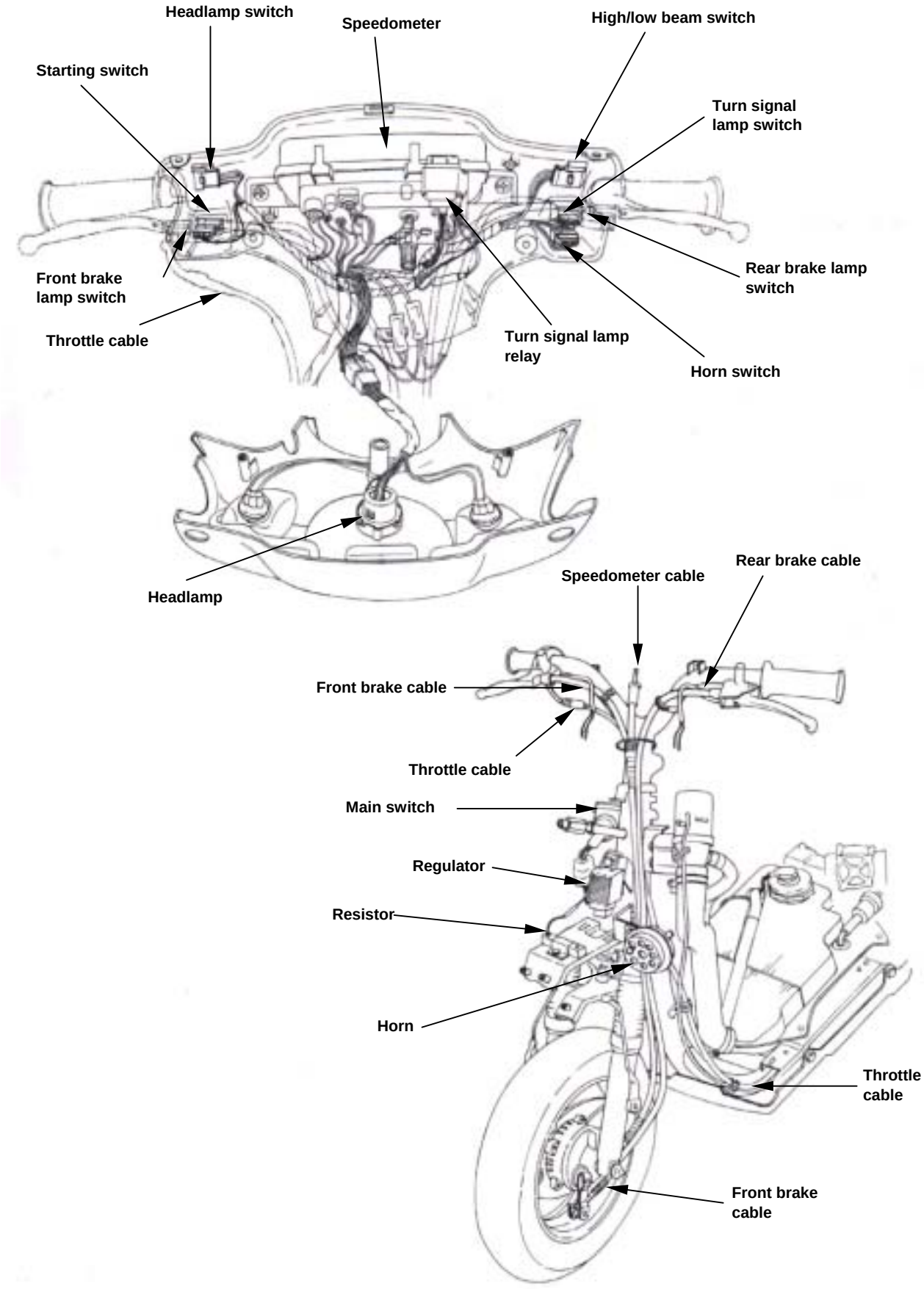
Cables and Harness Routing

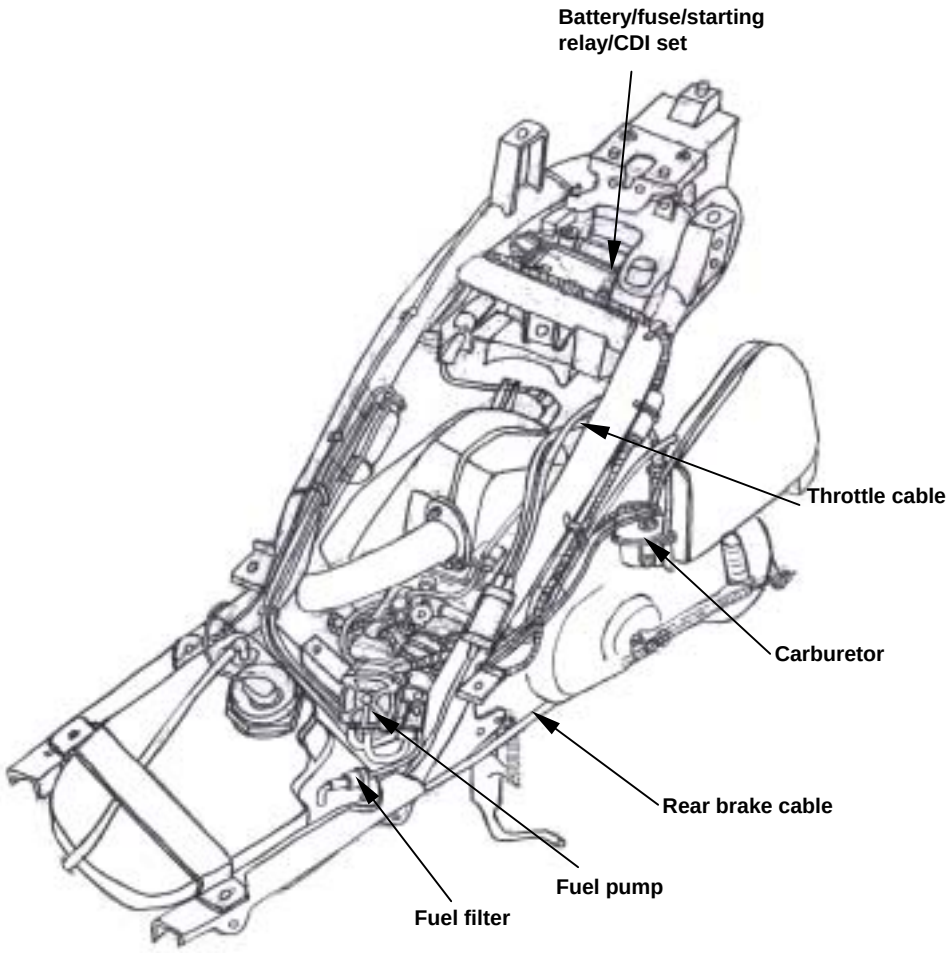
Note the following when routing cables and wire harnesses:

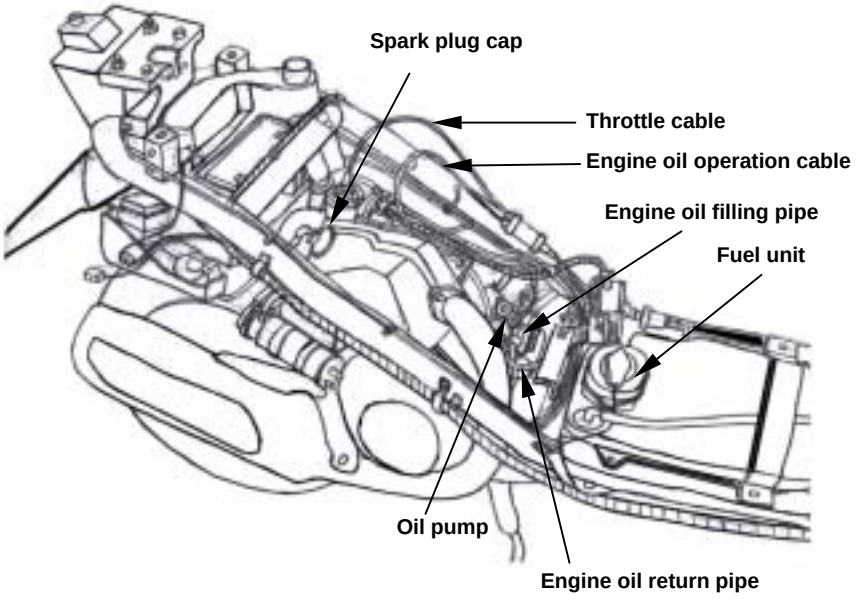
- A loose wire, cable or harness may cause safety hazard. After clamping, check each wire to make sure it is secured.
- Do not squeeze wires against the weld or its clamp.
- Secure wires and wire harnesses to the frame with respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.
- 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.
- Route wire harnesses to avoid sharp edges or corners.
- Avoid the projected ends of bolts and screws.
- Keep wire harnesses far away from the exhaust pipes and other hot parts.
- Be sure grommets are seated in their groves properly.
- After clamping, check each harness to be certain that it is not interfered with any moving or sliding parts.
- After routing, check that the wire harnesses are not twisted or kink.
- Wire harnesses routed along the handlebar should not be pulled too tight or have excessive slack, be rubbed against or interfere with adjacent or surrounding parts in all steering positions.
- Thoroughly clean the surface where tape is to be applied.
- Wrap electrical tape around the damaged parts or replace them.



O：Correct
X：Wrong

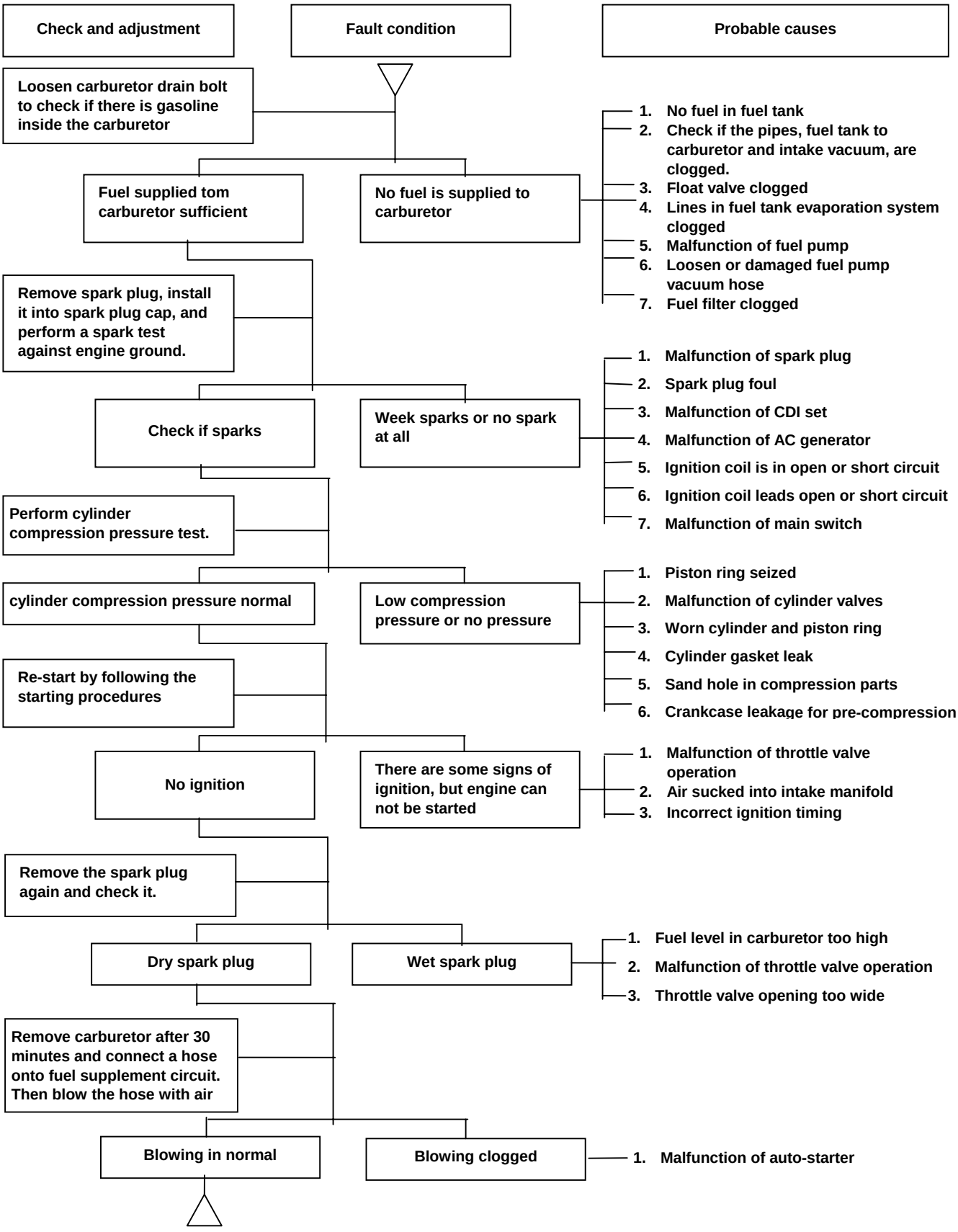

Headlamp switch
Speedometer
High/low beam switch
Starting switch
Turn signal lamp switch
Front brake lamp switch
Rear brake lamp switch
Throttle cable
Turn signal lamp relay
Horn switch
Headlamp
Speedometer cable
Rear brake cable
Front brake cable
Throttle cable
Main switch
Regulator
Resistor
Horn
Throttle cable
Front brake cable


Battery/fuse/starting relay/CDI set
Throttle cable
Carburetor
Rear brake cable
Fuel pump
Fuel filter

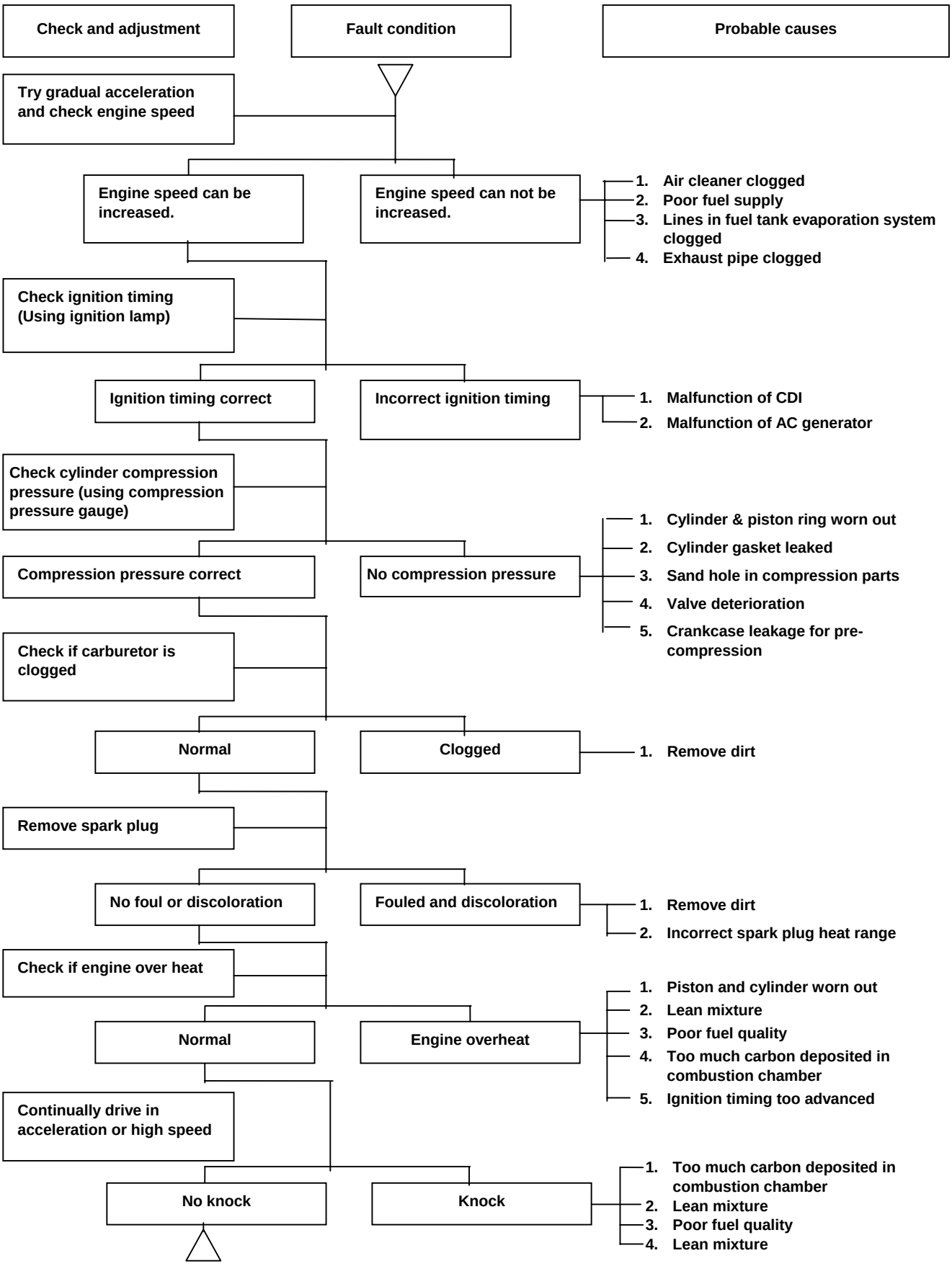

Spark plug cap
Throttle cable
Engine oil operation cable
Engine oil filling pipe
Fuel unit
Oil pump
Engine oil return pipe

Troubleshooting

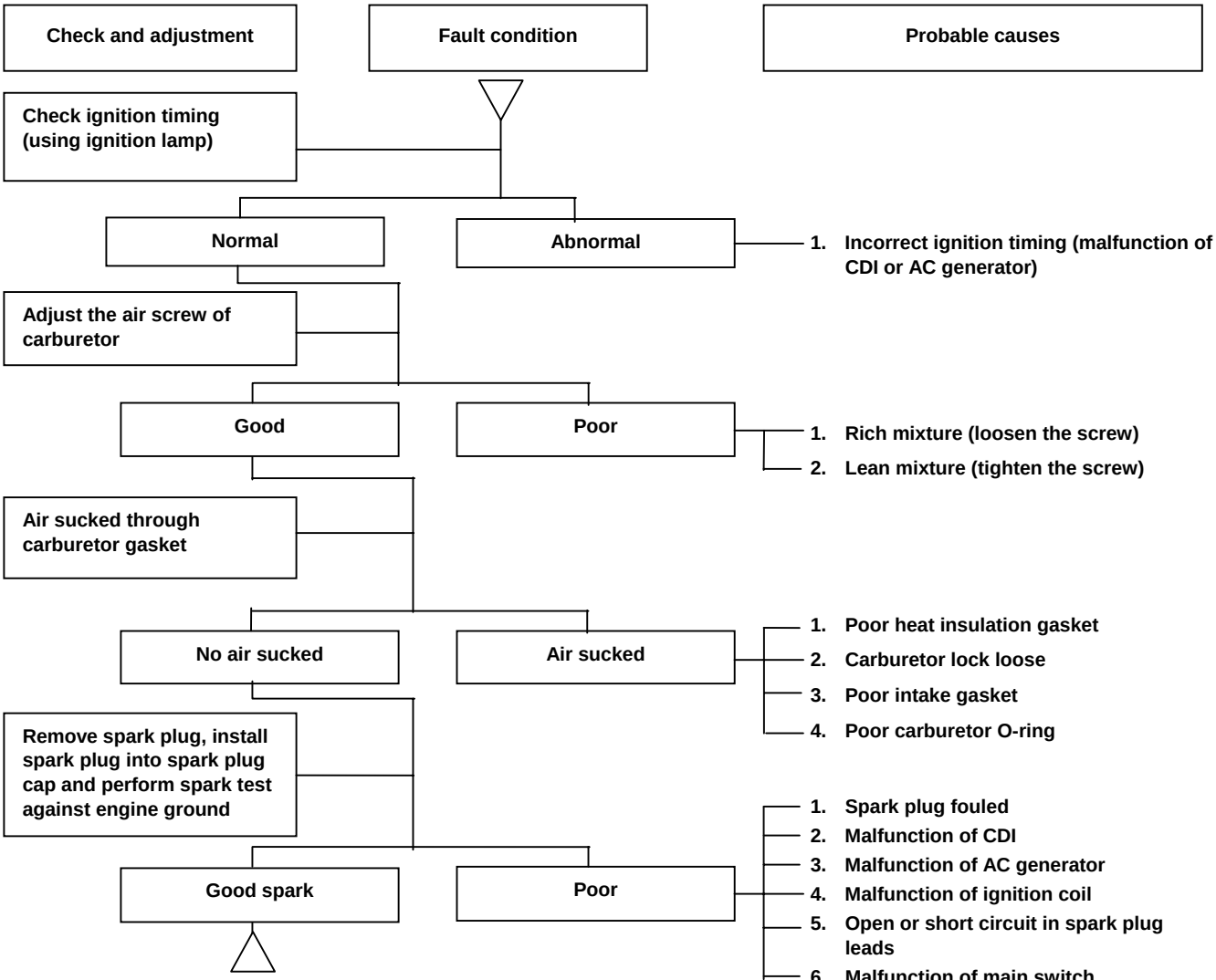
A. Engine hard to start or can not be started



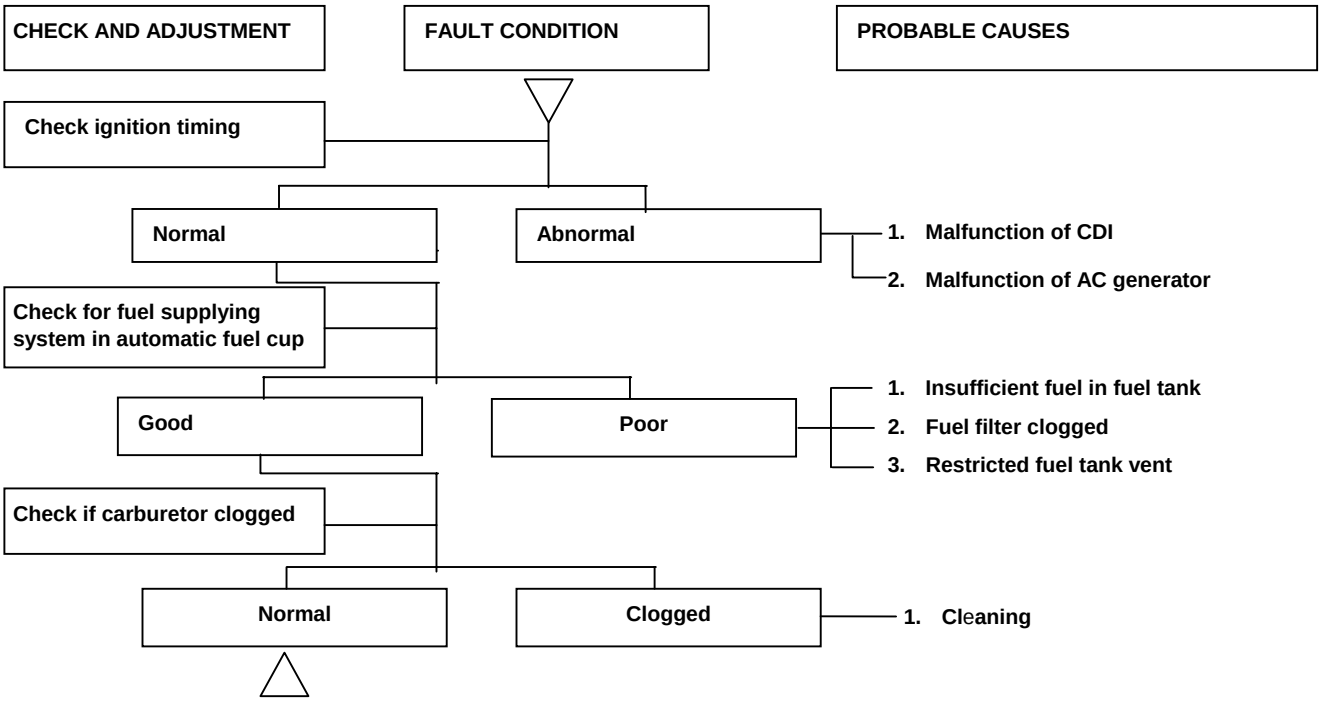
B. Engine run sluggish (Speed does not pick up, lack of power)



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



D. Engine runs sluggish (High speed)



E. CLUTCH, DRIVING AND DRIVING PULLEY

FAULT CONDITION	PROBABLE CAUSES
Engine can be started but motorcycle can not be driving	1. Driving belt worn out or deformation 2. Driving disk damaged 3. Driving pulley spring broken 4. Clutch ling broken 5. Driving slide-shaft gear groove broken 6. Transmission gear damage 7. Transmission gear worn out or burned
Engine running and misfire as motorcycle initial forward moving or jumping sudden (rear wheel rotating as engine in running)	1. Clutch ling spring broken 2. Clutch outer cover stuck with clutch balance weights 3. Connection parts in clutch and shaft worn out or burned
Poor initial driving (Poor climbing performance)	1. Driving belt worn out or deformation 2. Balance weight roller worn out 3. Driving sliding gear shaft worn out 4. Driving disk spring deformation 5. Driving sliding gear shaft worn out 6. Greased in driving belt and sliding gear.

General Information

Specification

Tire dimension		Front: 3.00-10 42J Rear: 3.00-10 42J	
Tire pressure at cold	Only rider	Front: 1.5kg/cm^2 Rear: 2.25 kg/cm^2	
Front brake lever free play		10~20 mm	
Rear brake lever free play		10~20 mm	
Transmission oil		Recommendation	Type: HYPOID GEAR OIL Oil: SAE #140 Quantity: 0.1 L
Spark plug		Recommendation	Type: NGK BR8HSA Plug gap: 0.6-0.7mm
Driving belt width		Standard 18.0mm Allowable limit: replace it if below 16.5mm	
Ignition timing F mark		17°, BTDC/1500 rpm	
Acceleration operation		2~6 mm	
Idle speed		2000±100 rpm	
Cylinder compression pressure		7±1 kgf/cm²	

Periodical Maintenance Schedule

	Maintenance kilometer / Check item / Maintenance interval	300KM	Every 1000KM	Every 3000KM	Every 6000KM	Every 12000KM	Reference
		New	1 month	3 month	6 month	1 year	
☆	1. Air cleaner	**I**		**C**	**C**	**R**	
☆	2. Fuel filter				**C**	**C**	
☆	3. Engine oil filter cleaning	**C**			**C**	**C**	
☆	4. Oil pump linkage operation check	**I**		**I**	**I**	**I**	
	5. Tire pressure	**I**	**I**	**I**	**I**	**I**	
	6. Battery inspection	**I**	**I**	**I**	**I**	**I**	
	7. Brake & free play check	**I**	**I**	**I**	**I**	**I**	
	8. Steering handle check	**I**			**I**	**I**	
	9. Cushion operation check	**I**			**I**	**I**	
	10. Every screw tightening check	**I**	**I**	**I**	**I**	**I**	
	11. Gear oil check for leaking	**I**	**I**	**I**	**I**	**I**	
☆	12. Spark plug check or change	**I**		**R**	**R**	**R**	
☆	13. Gear oil change	**R**	**Replacement for every 5000km**				
	14. Frame lubrication				**L**	**L**	
	15. Exhaust pipe	**I**	**I**	**I**	**I**	**I**	
☆	16. Carburetor	**I**	**I**	**I**	**I**	**I**	
	17. Driving belt check					**I**	
☆	18. Ignition timing	**I**	**I**	**I**	**I**	**I**	
☆	19. emission check in Idling	**I**	**I**	**I**	**I**	**I**	
☆	20. Idle speed check	**I**	**I**	**I**	**I**	**I**	
	21. fuel lines	**I**		**I**	**I**	**I**	
☆	22. Throttle operation	**I**		**I**	**I**	**I**	
☆	23. Engine bolt tightening	**I**		**I**	**I**	**I**	
☆	24. engine screw torque					**I**	
☆	25. Carbon cleaning for cylinder head, cylinder, piston head, and exhaust system.			**I**	**I**	**I**	

Have your motorcycle checked, adjusted periodically by your SYM Authorized Dealer to maintain the motorcycle at the optimum condition

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

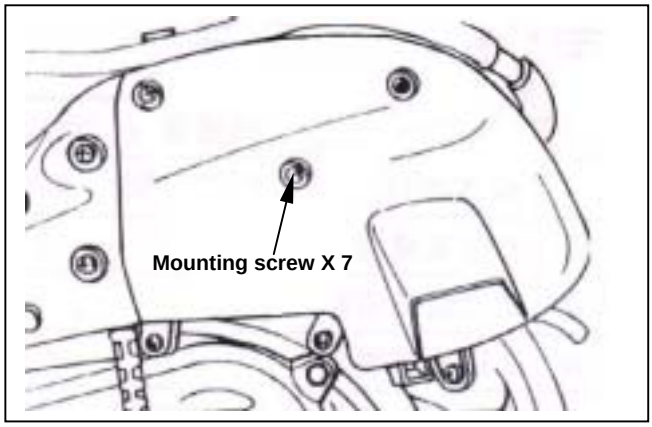
The above maintenance schedule is established by taking the monthly 1000 kilometers as a reference which ever comes first.

Remarks:

1. Clean or replace the air cleaner element more often for pro-long engine life-span 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.

AIR CLEANER - AIR CLEANER COVER

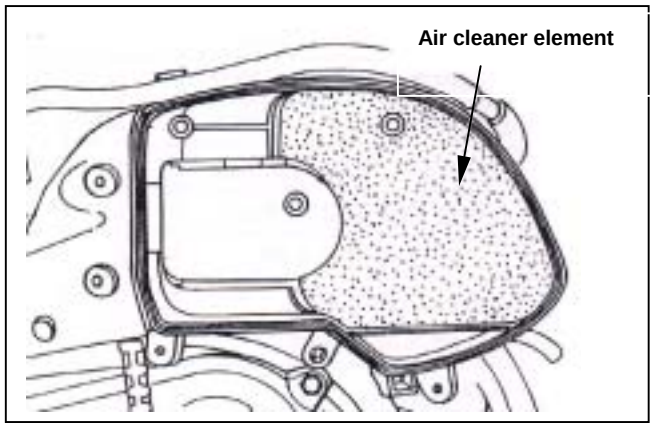
- Remove the mounting screw from the air cleaner cover
- Remove the air cleaner cover



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

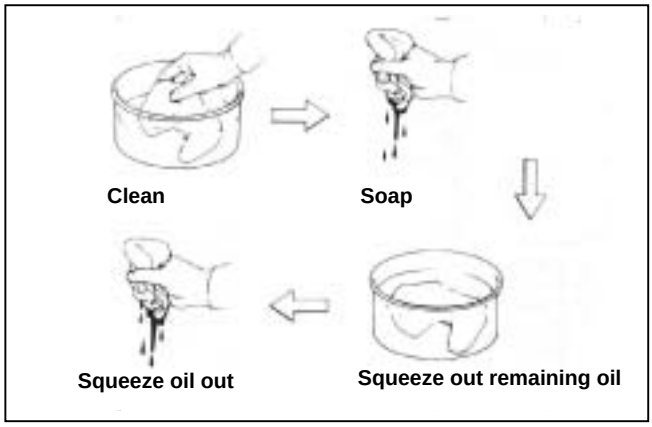
⚠ Caution

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



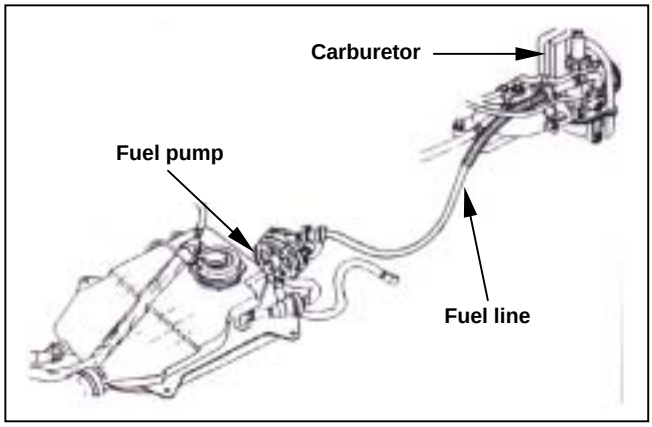
Soap the element into cleaning engine oil and then squeeze it out. Install the element onto the element seat and then install the air cleaner cover.

- Limit to use SAE 20 JASO FC class engine oil, otherwise, SYM is no responsible for the warranty.
- Recommended engine oil: MAX-2 serial oils.



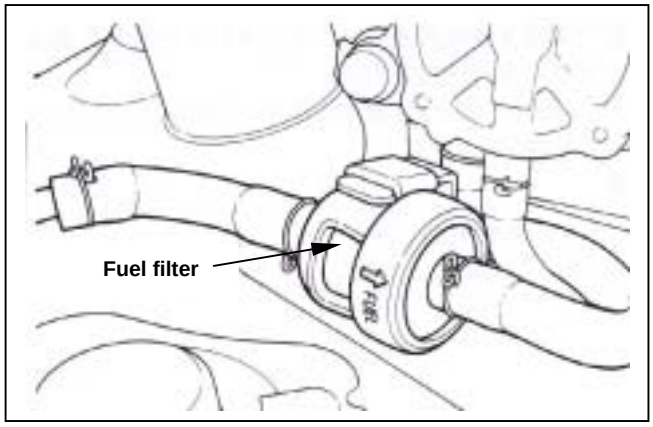
FUEL LINES

Remove the body cover
Check fuel lines and replace damaged lines if found.
Install the body cover.



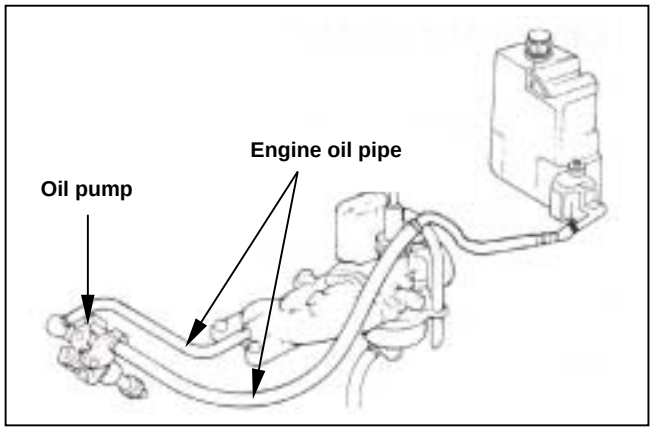
FUEL FILTER

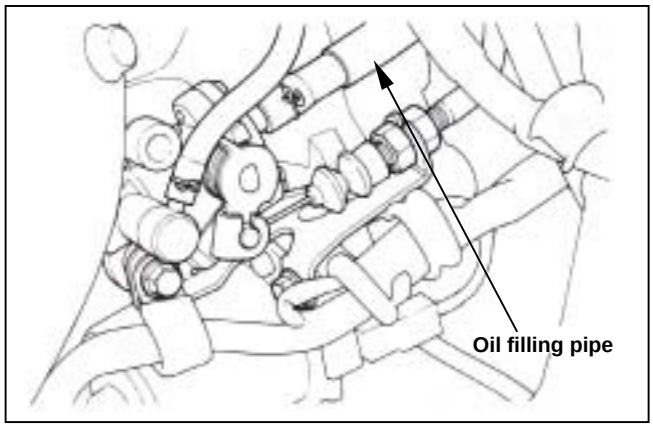
Remove the luggage box.
Remove the fuel line from the fuel filter.
Replace the fuel filter with new one.
Install the fuel filter. The arrow indicates the fuel flowing direction.
Check the fuel line for leaking.

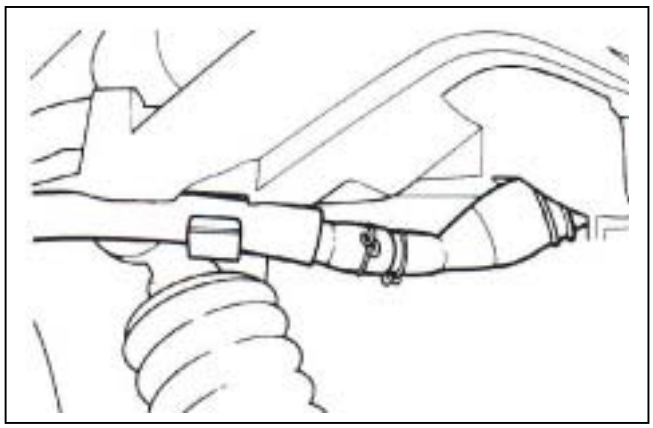


ENGINE OIL LINE

Remove the body cover.
Check the engine oil line and replace damaged parts.
Remove the filling pipe from the oil pump, and drain oil into a cleaning container.
Loosen the clamp under the engine oil tank, and then remove the oil pipe.
Bleed the air inside the oil pump and oil pipe if air found.
Install the body cover.





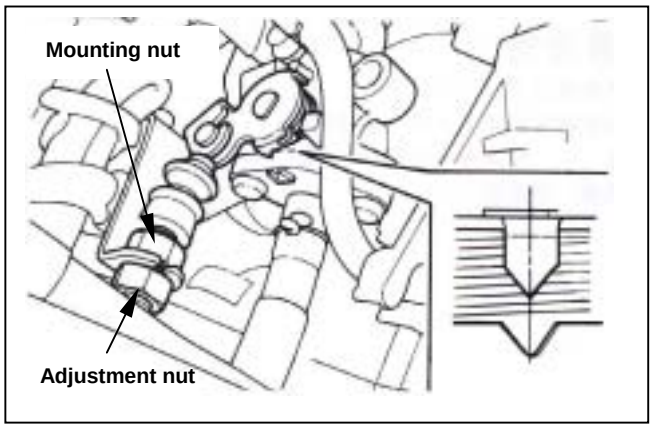


OIL PUMP CONTROL CABLE

⚠ Caution

To adjust the oil pump control cable after adjusted the throttle grip play.

Remove the body cover.
Wide open the throttle valve, and check if the calibration point aligns on the oil pump lever with the mark of pump body.
Loosen the adjustment nut of the oil pump control cable.
Turn the adjustment nut and align with the point, then tighten the nut.



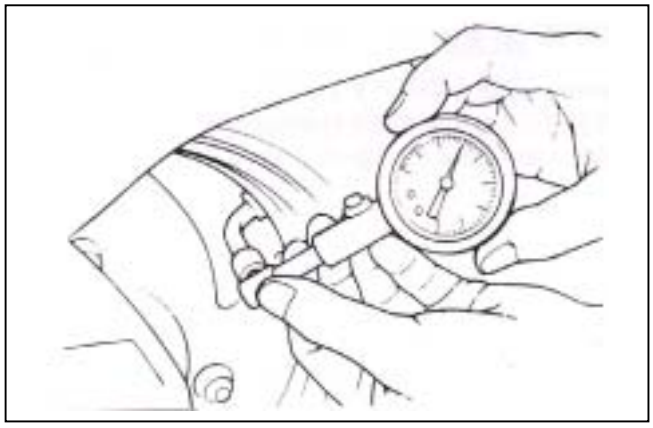
TIRE

⚠ Caution

Tire pressure should be checked when cold.

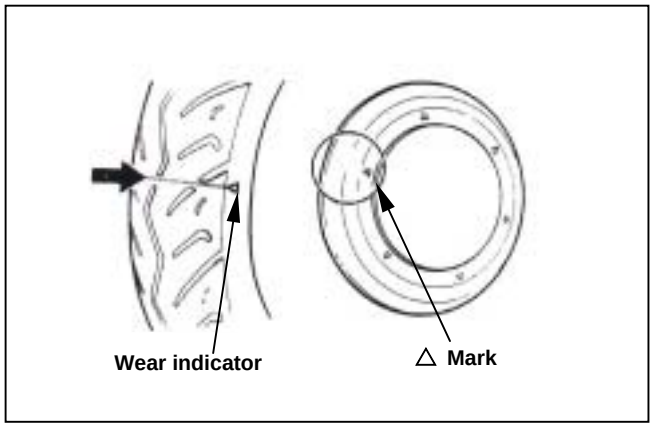
Check tire for cracks, damage, nail, or other object stuck in tread.
Recommended tire and tire pressure

Tire size	Front: 3.00-10 42J	Rear: 3.00-10 42J
Tire pressure (cold) kg/cm^2	1.50	2.25



Check if the tire tread and wall rubber for crack or damage, and replace if necessary.
Check if foreign materials such as nail, metal pieces, and stones stuck on tire.
The thread depth can be checked by visual inspection or by a depth gauge.

- If the tread bend too much, replace the tire.
- If tire wear exceeds limitation, replace the tire, and check it for un-even wear.

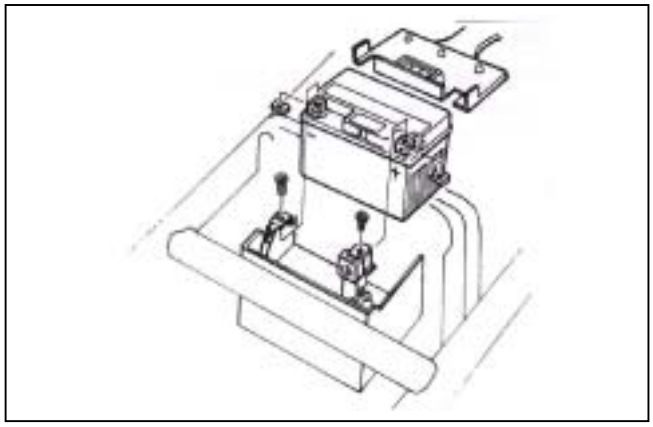


⚠ Caution

Wear indicator "△" is distributed on average along the wall rubber for check.

BATTERY

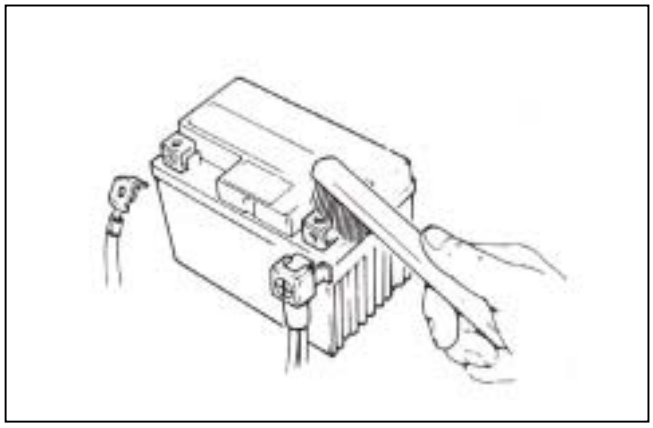
Open the seat.
Loosen two screws of battery cap and then remove the cap. Check if the battery terminals are loosen. Remove the battery if its terminals are corroded obviously.



BATTERY REMOVAL

1. Remove the Negative (-) battery cable at first.
2. Then, remove the Positive (+) battery cable.
3. Remove the battery.

Clean the rust with steel brush.
Install the battery in reverse order of removal, and apply with grease onto two terminals.

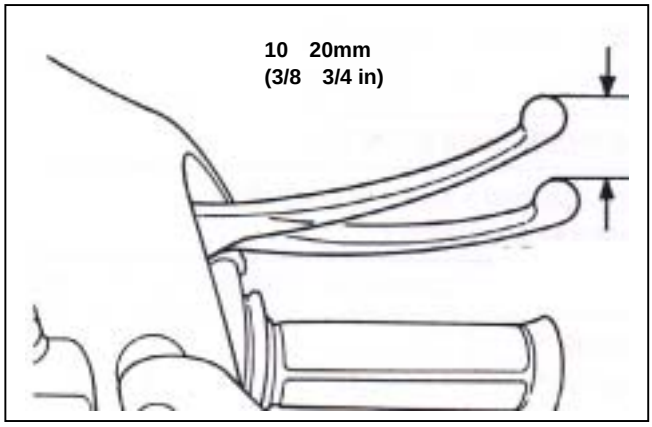


⚠ Caution

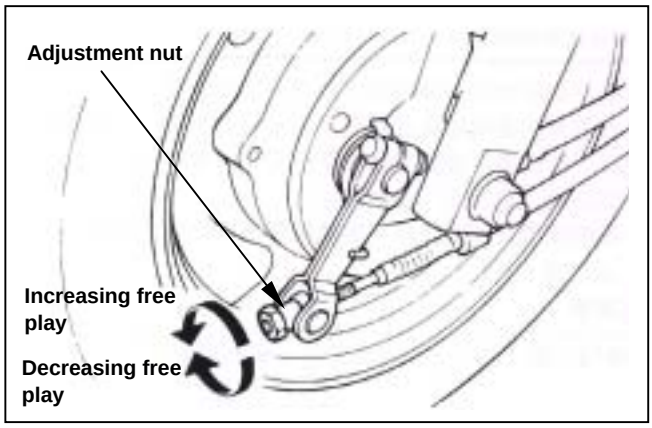
The electrolyte is contained sulfuric acid so be careful not to let it touch to eyes, skin, or clothes. If touched by accident, flush them with clean water immediately. However, if the electrolyte sprays to eyes, medical care should be done quickly.

BRAKE SYSTEM

FRONT BRAKE FREE PLAY: (DRUM BRAKE TYPE)
Measure the free play of the front brake lever at the end of the lever.
Free play: 10-20 mm (3/8-3/4 in)

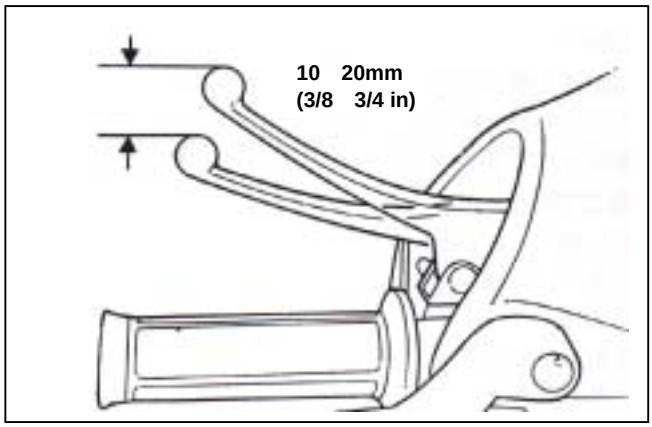


Adjust the free play by turning the front brake adjustment nut if necessary.



REAR BRAKE FREE PLAY: (DRUM BRAKE TYPE)

Measure the free play of the rear brake lever at the end of the lever.
Free play: 10-20 mm (3/8-3/4 in)

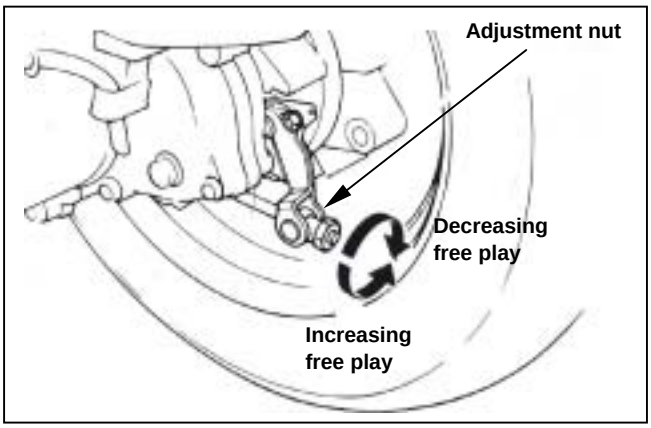


Adjust the free play by turning the front brake adjustment nut if necessary.

BRAKE CONFIRAMTION

⚠ Caution

After brake adjustment, it has to check the brake operation to make sure the front and rear wheel can be braked.



BRAKE SYSTEM HOSE: (FRONT DISC BRAKE TYPE)

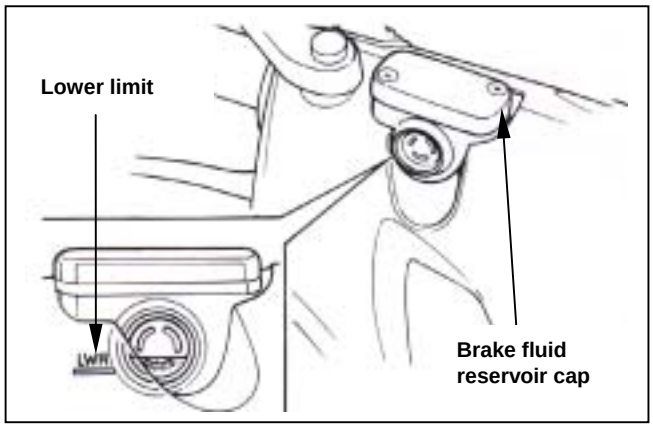
Make sure that the brake hose is corrosion or damage, and also check the system for leaking.

BRAKE FLUID:

Check brake fluid level in the brake fluid reservoir. If the level is lower than the LOWER limit, add brake fluid DOT-3 to UPPER limit. Also check brake system for leaking if low brake level found.

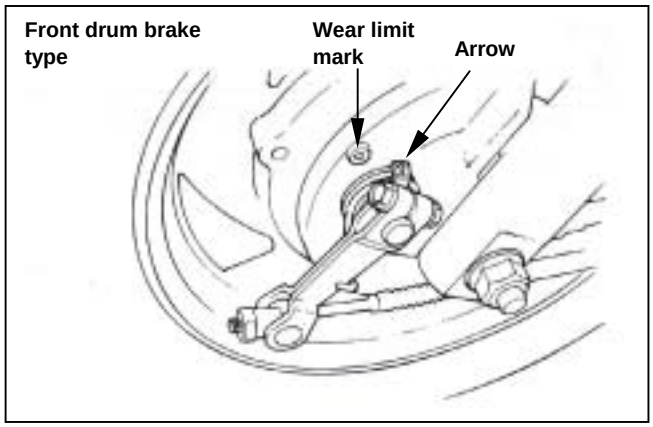
⚠ Caution

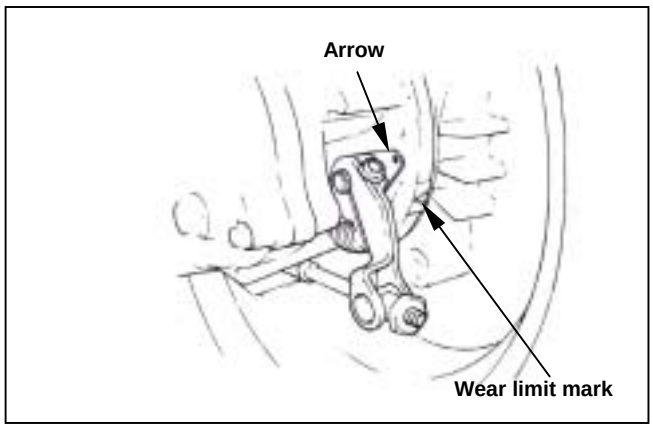
- In order to maintain brake fluid in the reservoir in horizontal position, do not remove the cap until handle bar stop.
- Do not operate the brake lever after the cap had been removed. Otherwise, the brake fluid will spread out if operated the lever.
- Do not mix non-compatible brake fluid together.



BRAKE LINING WEAR:

Replace the brake lining if the wear limit mark "△" on the brake arm aligning with the indicator of brake drum.





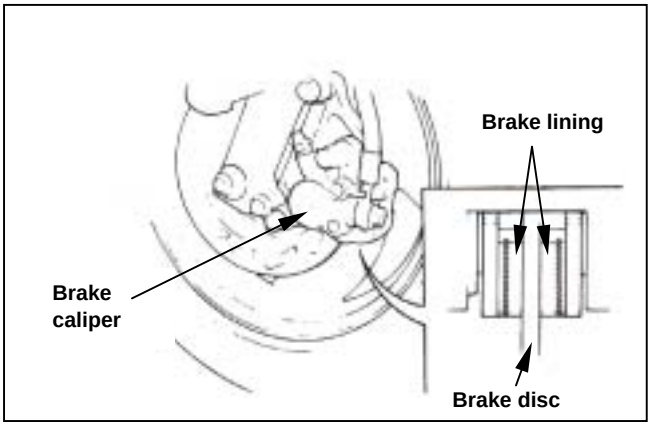
BRAKE LINING WEAR: (FRONT DISC BRAKE TYPE)

The arrow mark on brake lining is the wear limitation.

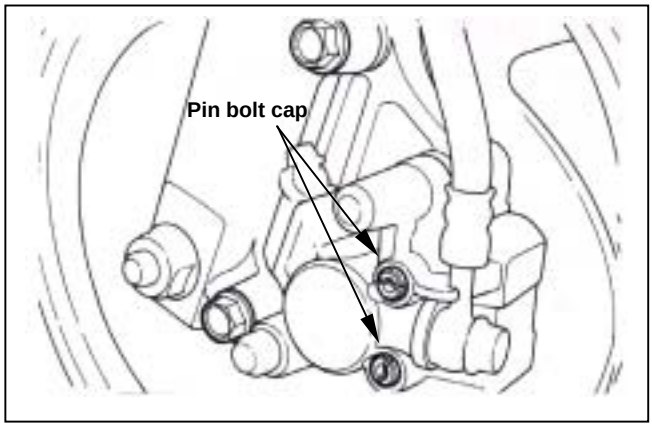
Replace the brake lining if the wear limit mark closed to the edge of brake disc.

⚠ Caution

In order to maintain brake power balance, the brake lining must be replaced with one set.



- Remove the pin bolt cap.
- Loosen the bolt.
- Remove the front wheel shaft bolt.
- Take out the front wheel.

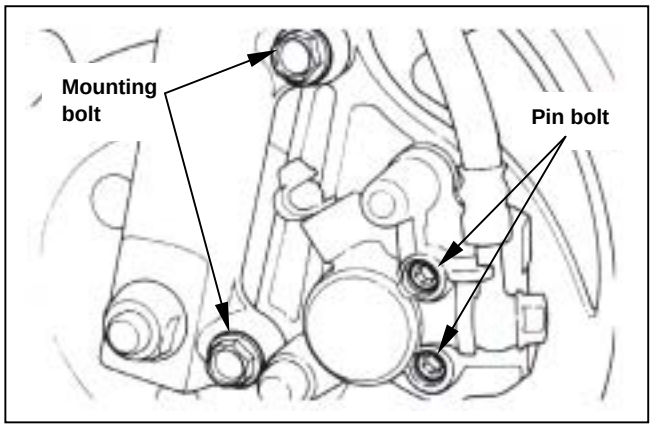


Remove brake caliper mounting bolt and then remove the brake caliper.

⚠ Caution

Do not operate the brake lever after the clipper removed to avoid clipping the brake lining.

Pry out the brake lining with a flat driver if lining is clipped.



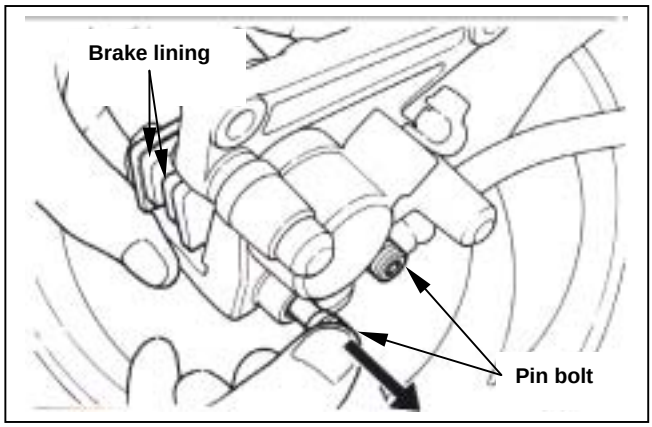
Remove brake lining bolt.
Take out the lining.

Tighten Torque:

Mounting bolt: 2.9-3.5 kg-m

Pin bolt: 1.5-2.0 kg-m

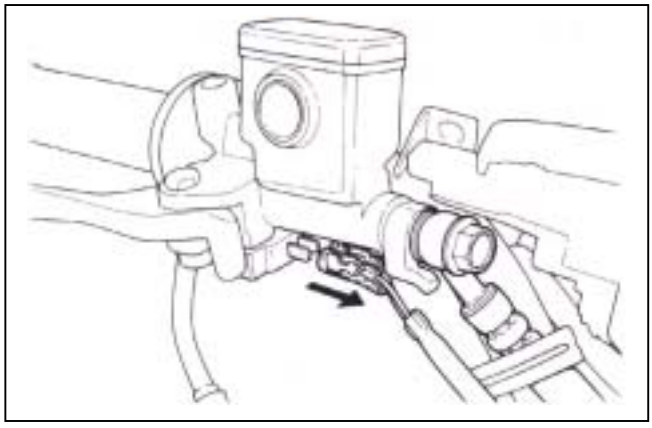
Pin bolt cap: 0.8-1.2 kg-m



The brake lamp switch is to light up brake lamp as brake applied. Replace the switch if the lamp does not light up in properly.

⚠ Caution

The brake lamp switch is un-adjustable.

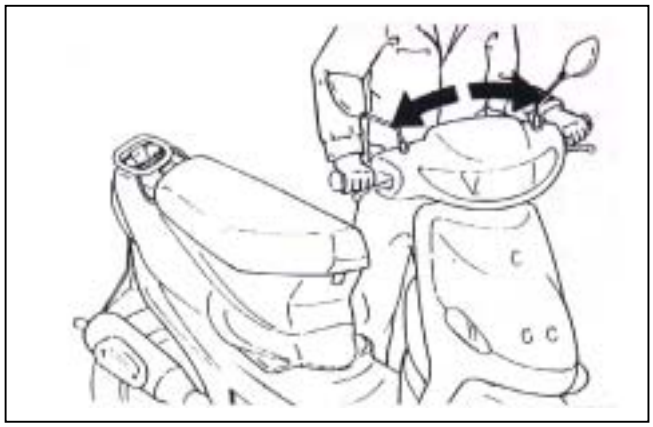


STEERING SYSTEM

⚠ Caution

The control cables can not interfere with the rotation of steering handle.

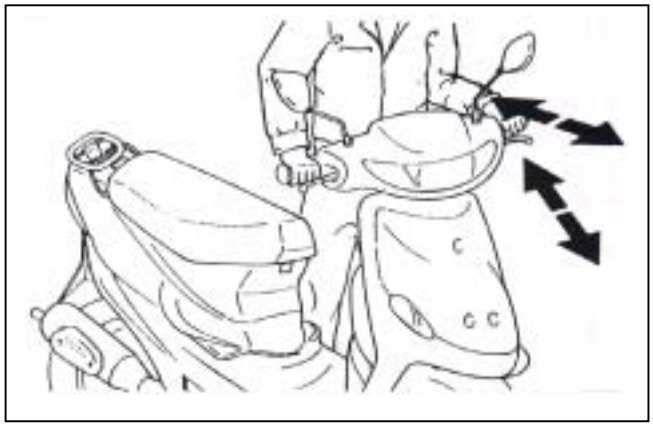
Lift the front wheel out of ground, and check if the steering handle turning is smoothly.
If handle turning is uneven and bending, stuck, or the handle can be operated in vertical direction, then adjust the handle top bearing by adjusting the steering nut.



SUSPENSION

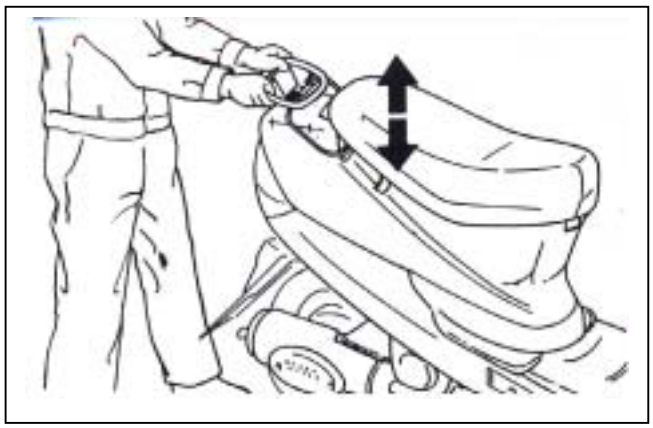
⚠ Warning

Do not ride the motorcycle with poor suspension. Looseness, wear or damage suspension system will make poor stability and drive-ability.



FRONT SHOCK ABSORBER

Press down the front shock absorber for several times to check it operation.
Check if the shock absorber assembly is damage. Replace it if damage found and can not be repaired.
Tighten all nuts and bolts.



REAR SHOCK ABSORBER

Park the motorcycle with its main stand.
Shake the rear wheel side to side to check engine suspension bushing for wear.
Replace the bushing if looseness found. Check the shock absorber for damage.
Tighten all nuts and bolts.

NUTS, BOLTS TIGHTNESS

Check if all bolts and nuts on the frame are tightened to specified torque in accord with the interval of Periodical Maintenance Schedule.
Check all split pins, snap rings, hose clamps, and wire holders for security.

TRANSMISSION OIL

LEAK

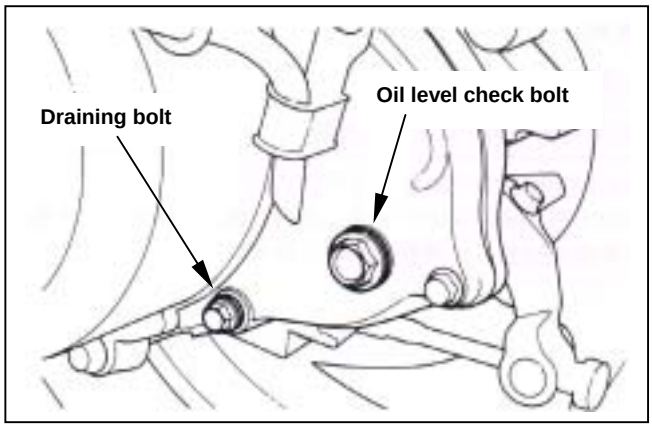
Check if the transmission is leak.

CHECK

⚠ Caution

Park the motorcycle on flat ground with its main stand.

Remove the oil level check bolt, and check if the oil level is placed on the hole of check bolt.

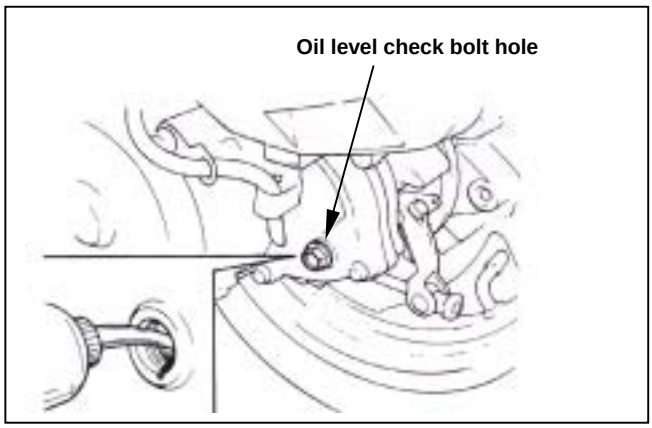


REPLACEMENT

Remove the oil level check bolt.
Remove the oil draining bolt, and then drain oil out.
Install the oil draining bolt.
Tighten torque: 1.3 kg-m

⚠ Caution

Check if oil seal and washer is in good condition.

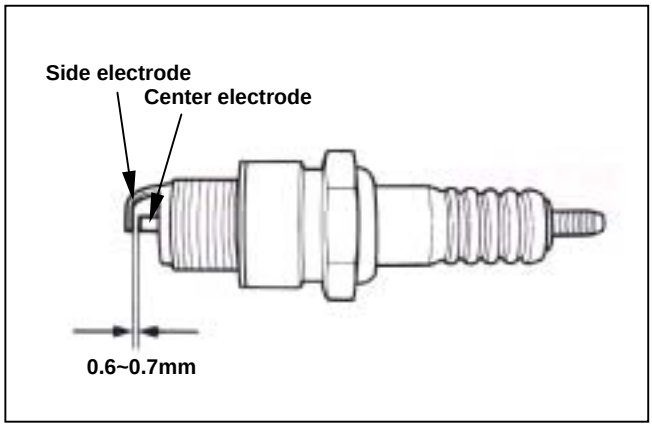


Replacement Quantity: 0.09 L (90 cc)
Recommended oil: King Bramax HYPOID GEAR OIL #140

SPARK PLUG

Recommended plug: NGK BR8HSA

- Remove the luggage box.
- Remove the spark plug cap.
- Clean any dirt on the spark plug seat.
- Remove the spark plug.
- Visually inspect the spark plug electrodes for wear.
- The center electrode should have square edges and side electrode should have a constant thickness. Replace the spark plug if there is apparent wear or if the insulator is cracked and/or chipped. If the spark plug deposits can be removed by sandpaper, the spark plug can be reused.
- Measure the spark plug gap with feeler gauge.
  Spark plug gap: 0.6-0.7mm (0.024-0.028in)
- Adjust the gap by careful bending the side electrode.
- Install the spark plug by screwing it with hands after installed the spark plug washer so that can prevent the plug from out of thread. Then, tighten the spark plug with a spark plug wrench.
- Install the spark plug cap.



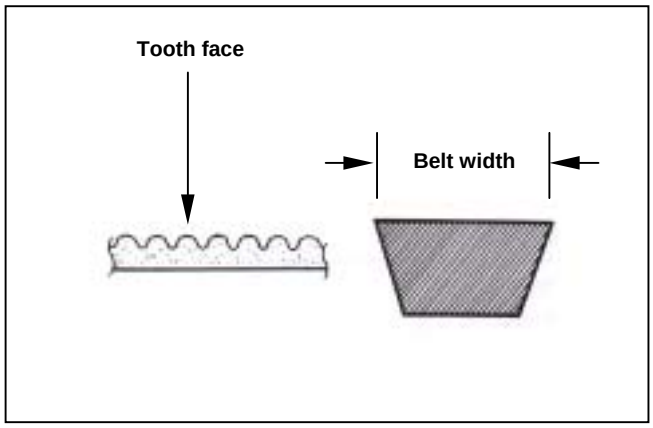
CONTROL CABLE LUBRICATION

Remove the throttle control and the brake cables periodically, and lubricate the moving parts of the cables thoroughly.

DRIVING BELT

- Remove left crankcase cover.
- Check if the belt is crack or worn out. Replace the belt if necessary.
- Measure the driving belt width

Allowable limit: 16.5mm

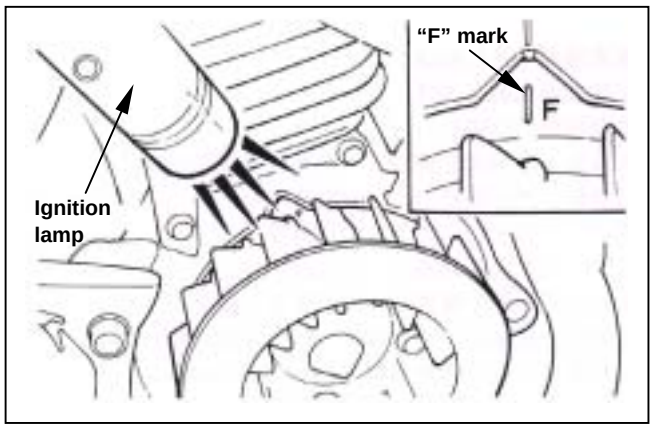


IGNITION TIMING

⚠ Caution

- C.D.I ignition timing can not be adjusted. If the ignition timing is incorrect, check the C.D.I. device and the alternator and replace damaged components.
- Check ignition timing with standard instrument.

Remove the right-side cooling fan cover.
Check ignition timing with the timing lamp.
When engine speed setting to 1800 rpm, and if the mark aligns with “F” mark, then it means that the ignition timing is correct.

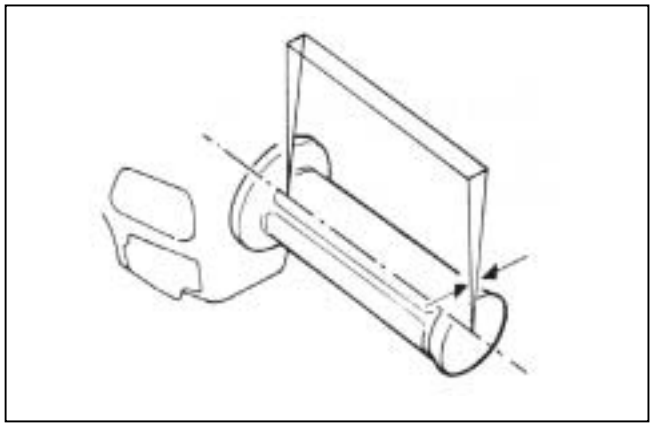


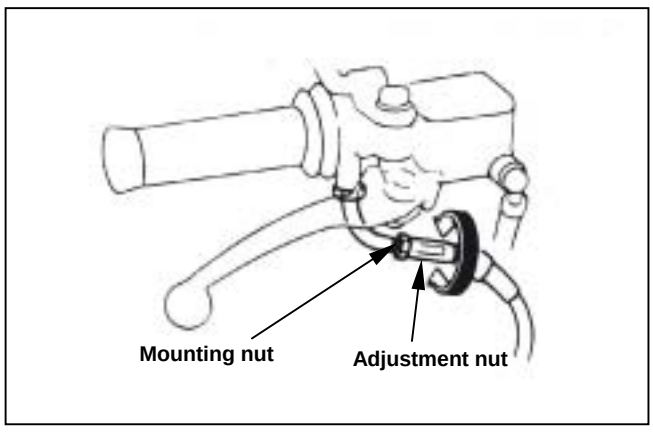
THROTTLE VALVE OPERATION

Check if each steering positions are operated in smooth, and handle bar if its operation is smooth as the throttle valve wide opening or fully closed.
Check throttle cable and replace it if deteriorated, twisted or damaged.
Lubricate the cable if operation is not smooth
Measure throttle valve handle free play.

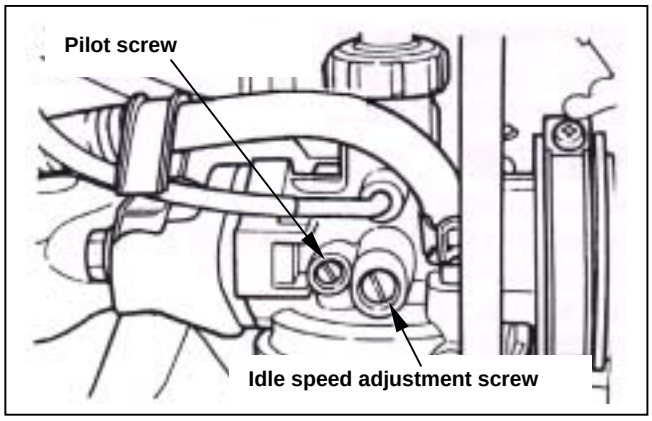
Free play：2~6 mm (1/8-1/4 in)

Loosen the mounting nut, and turn the free play adjustment nut of the throttle valve handle for adjustment.
Replace the cable if it can not be adjusted.





CARBUTRTOR IDLE SPEED ADJUSTMENT



⚠ Caution

- Inspection & adjustment for idle speed have to be performed after all parts in engine had been adjusted in specification.
- Idle speed check and adjustment have to be done after engine is being warn up. It around operates engine from stop to running for 10 minutes.

Remove the body cover.
Park the motorcycle with main stand after warned up engine. According to the required idling and air screw to adjust to specified idle speed.
Idle speed: 2000± 100 rpm (rotation per minute)

IDLE SPEED ADJUSTMENT

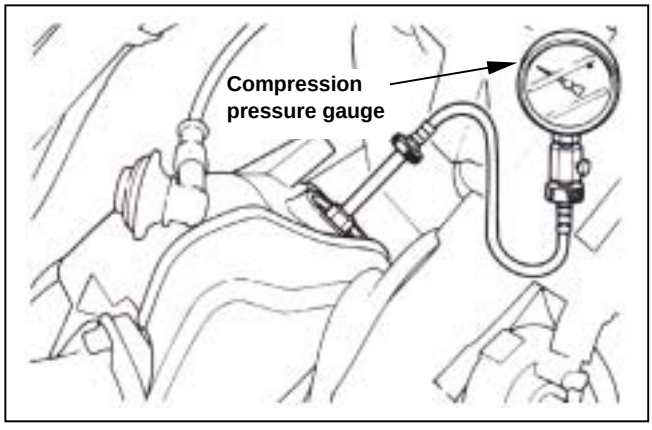
Adjust the idling after warn up engine for 10 minutes.

1. Connect tachometer.
2. Adjust the idle speed screw to let engine speed in 2000±100 rpm.
3. Insert the sampling pipe of the CO/HC meter to the test hole on the front end of exhaust pipe. Adjust the idling emission value to standard range. (CO: 1.8-2.6%)
4. Slightly accelerate the throttle valve and release it. Repeat this operation for 1-2 times.
5. Read the engine idle speed and the emission value after engine speed in stable. Repeat the operation on step No. 2 – No. 4. until these value within standard range.

CARBON REMOVING FOR EXHAUST PIPE & MUFFLE

Remove the body cover.
Remove the exhaust pipe & muffler.
Clean the carbon deposits on the muffler & cylinder exhaust edge.

CYLINDER COMPRESSION PRESSURE TEST



Remove the left body cover, and warn up engine.
Stop the engine and remove the spark plug.
Insert the compression gauge and wide open the throttle, and then rotate the engine by means of the starting motor.
Compression pressure: 13.0±2 kg/cm^2
Probable causes for low compression pressure.

- Damaged cylinder head gasket.
- Worn piston ring
- Worn cylinder

Probable causes for high compression pressure.

- Carbon on the combustion chamber or cylinder head

EVAPORATION EMISSION CONTROL SYSTEM

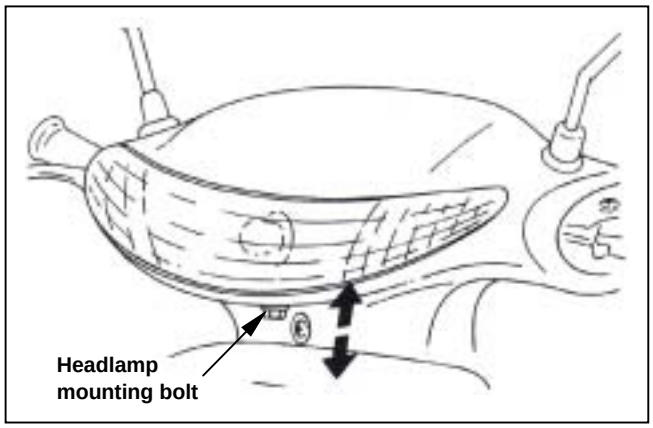
Remove the body cover.
Check if hoses are corroded, plugged, or damaged, and also check hose connection for loosen.
Replace the damaged hoses.
Check if the canister crack or damage.

HEADLAMP ADJUSTMENT

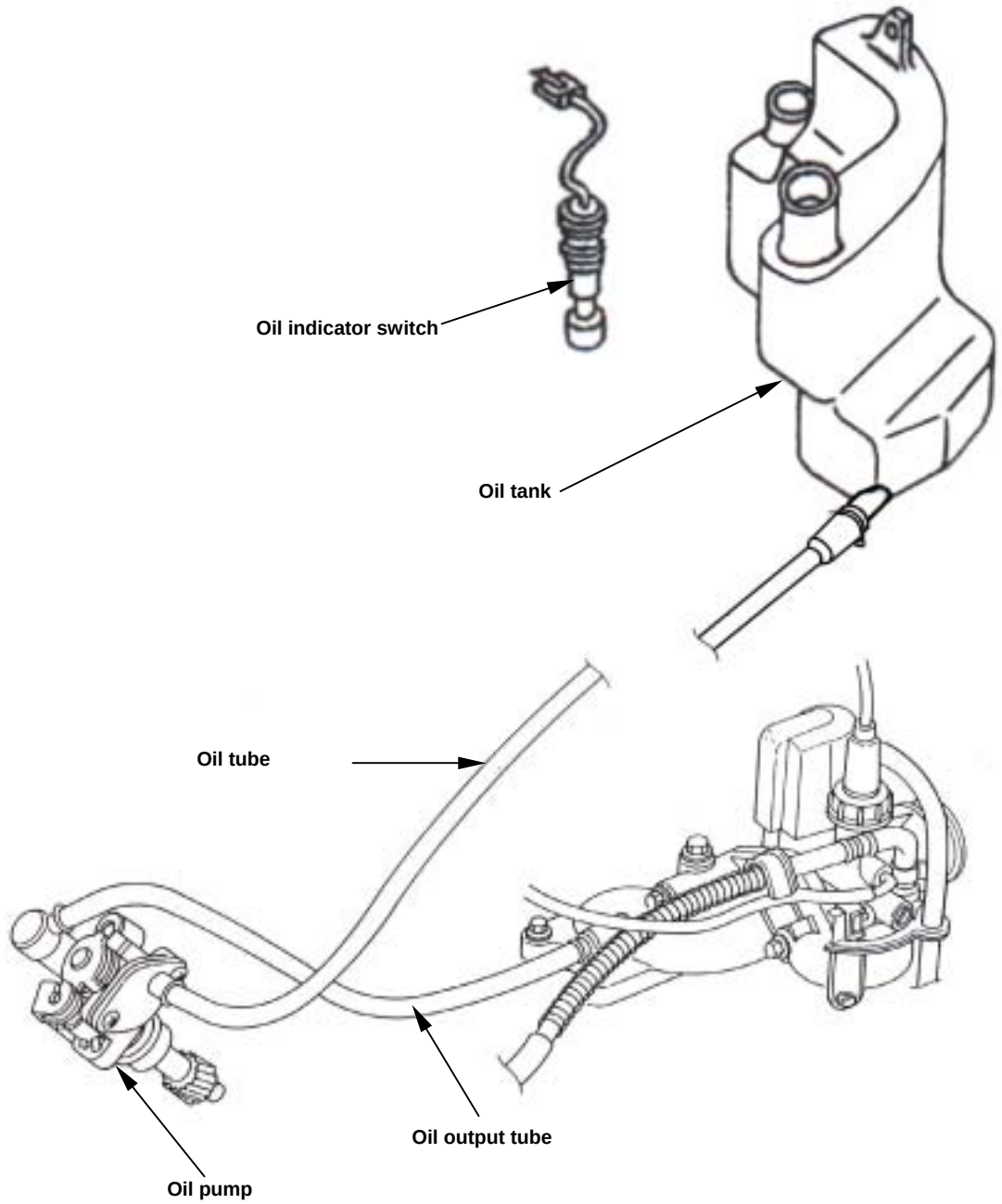
Loosen headlamp mounting bolt.
Move the headlamp for adjustment its light beam.
Tighten the headlamp mounting bolt after adjusted.

⚠ Caution

Improper headlamp beam adjustment will make in coming driver dazzled or insufficient lighting for safety distance.



LUBRICATION SYSTEM DIAGRAM



3. LUBRICATION SYSTEM

PRECAUTIONS IN OPERATION

- Be careful not let dirt enter into engine or oil hoses when removing or installing the oil pump.
- If air is found in the oil tube (from oil tank to oil pump) or oil tube is removed, the oil pump should be conducted air-bleeding operation.
- It should bleed the oil output tube (from oil pump to carburetor) as hose removed.
- The adjustment of oil pump control cable.

LUBRICANT

- Appointed to apply SAE 20 JASO FC class oil. Otherwise, warranty shall not cover the damage.
- Recommended Oil: MAX-2 oil

TROUBLESHOOTING

Too much smoke, carbon in spark plug

1. Improperly oil pump adjustment (too much oil)
2. Poor quality oil.
3. Applying with poor quality oil.

Over heat

1. Improperly oil pump adjustment (insufficient oil)
2. Poor quality oil.
3. Applying with poor quality oil.

Piston seized

1. No oil in oil tank or clogged hose.
2. Improperly oil pump adjustment (insufficient oil)
3. air in oil hose
4. malfunction of oil pump

Oil did not flow out the oil tank

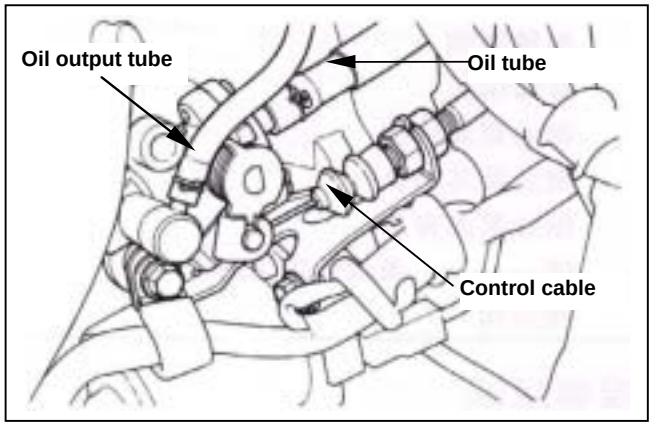
1. clogged breath hole on the oil tank cover.

OIL PUMP REMOVAL

⚠ Caution

Before removing the oil pump, clean the oil pump and crankcase.

Remove the body cover.
Remove the oil tube, and clip its end side to prevent oil from flowing out.
Remove the oil output tube form intake manifold.
Remove the oil pump mounting bolts, and then take out the oil pump.



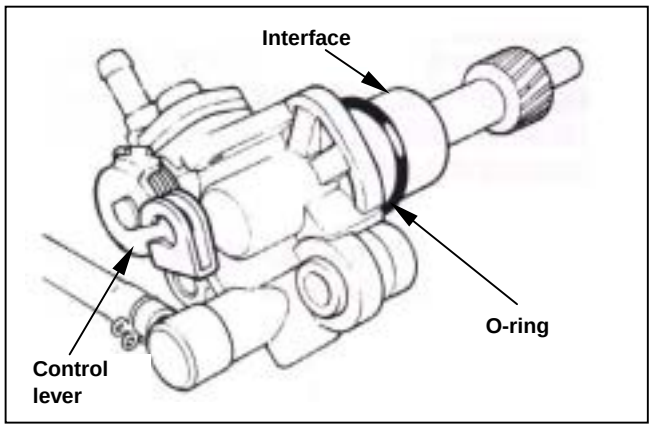
OIL PUMP INSPECTION

Inspect the following items on the removed oil pump.

- Check if O-ring is damaged or softening.
- Check if crankcase interface is damaged.
- Check if pump body is damaged.
- Check if pump gear is damaged.
- Check for oil leaking.

⚠ Caution

The oil pump can not be disassembled.



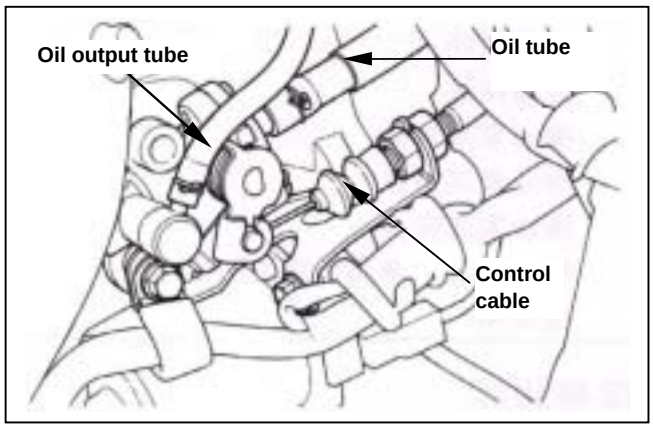
OIL PUMP INSTALLATION

Install the oil pump onto the crankcase.

⚠ Caution

- Apply with some grease onto oil pump oil ring.
- The connection between both oil pump and crankcase has to be installed in position security.

Tighten the oil pump mounting bolt security.
Install the oil tube.
Installation in the reverse order of removal.



⚠ Caution

Inspection and Adjustment following items as installed.

- The adjustment operation of control cable.
- Air bleeding operation of oil pump.
- Air bleeding operation of oil tube.
- Check each section for leaking.

OIL PUMP/OIL TUBE AIR BLEEDING

⚠ Caution

- The oil tube system has to be conducted air bleeding operation because air will clog or restraint oil flowing so that cause serious engine damage.

⚠ Caution

After disconnect the oil tube, air enters oil tube due to oil leak out without added oil. There is why the oil tube and oil pump have to conduct air bleeding operation.

OIL TUBE/OIL PUMP

- It has to add some oil into the oil tank.
- Place a piece of dry cloth around the oil pump.
- Disconnect the oil tube.
- Fill out oil to oil pump connection section by means of the oil pot so that the oil pump body is full with oil.
- Fill out oil to oil tube connection section so that the oil tube is full with oil. Then, install the tube onto oil pump.
- Make sure whether air is in the oil tube or not after installation.

⚠ Caution

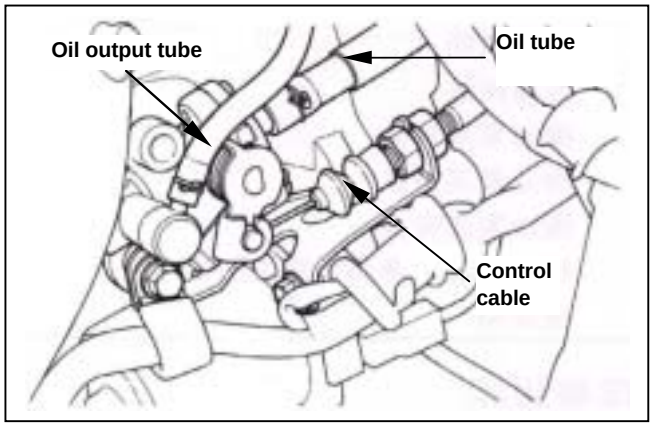
After bleeding the oil tube and oil pump, the oil tube has to be conducted air bleeding operation too.

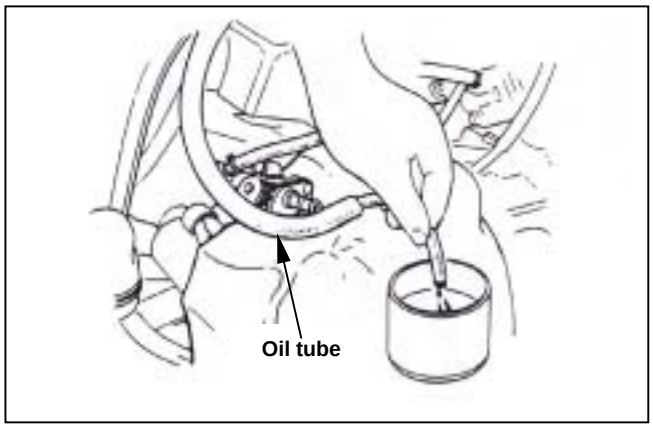
OIL TUBE AIR BLEEDING

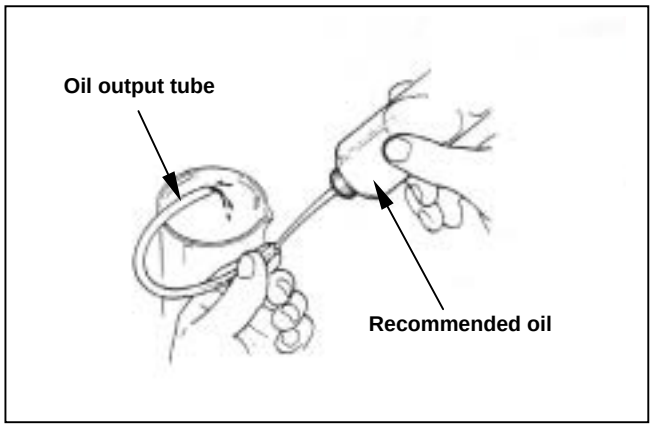
Remove the oil output tube and plug its input connector. Bend the oil tube into “U “shape, and fill out new oil into the output tube.
Connect the oil output tube to the oil pump connection part.
Start engine, and run it in idling as the oil control lever in wide open position. Make sure oil flows out from the oil output tube.

⚠ Caution

- Motorcycle’s exhaust gas includes with CO which causes human to coma or death so perform this operation in well-ventilation place.
- Run the engine in extreme low speed to avoid to damaging the engine caused from clogged oil tube



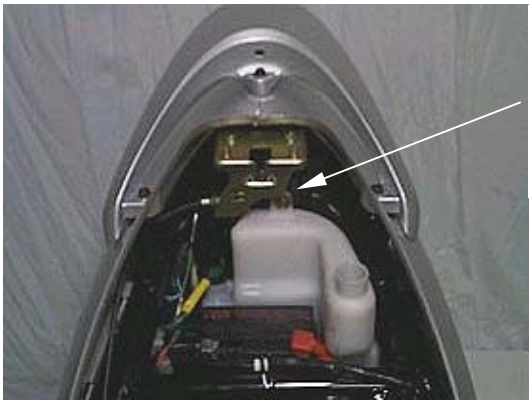




OIL TANK

REMOVAL/INSTALLATION

Remove the luggage box and seat.
Remove the oil input tube from oil pump, and then drain oil to a clean container.
Remove the oil switch wire of the oil indicator.
Remove the mounting bolt on the oil tank upper side, and then remove the oil tank.
Installation in the reverse order of removal.
Air bleeding the oil tubes after installation.



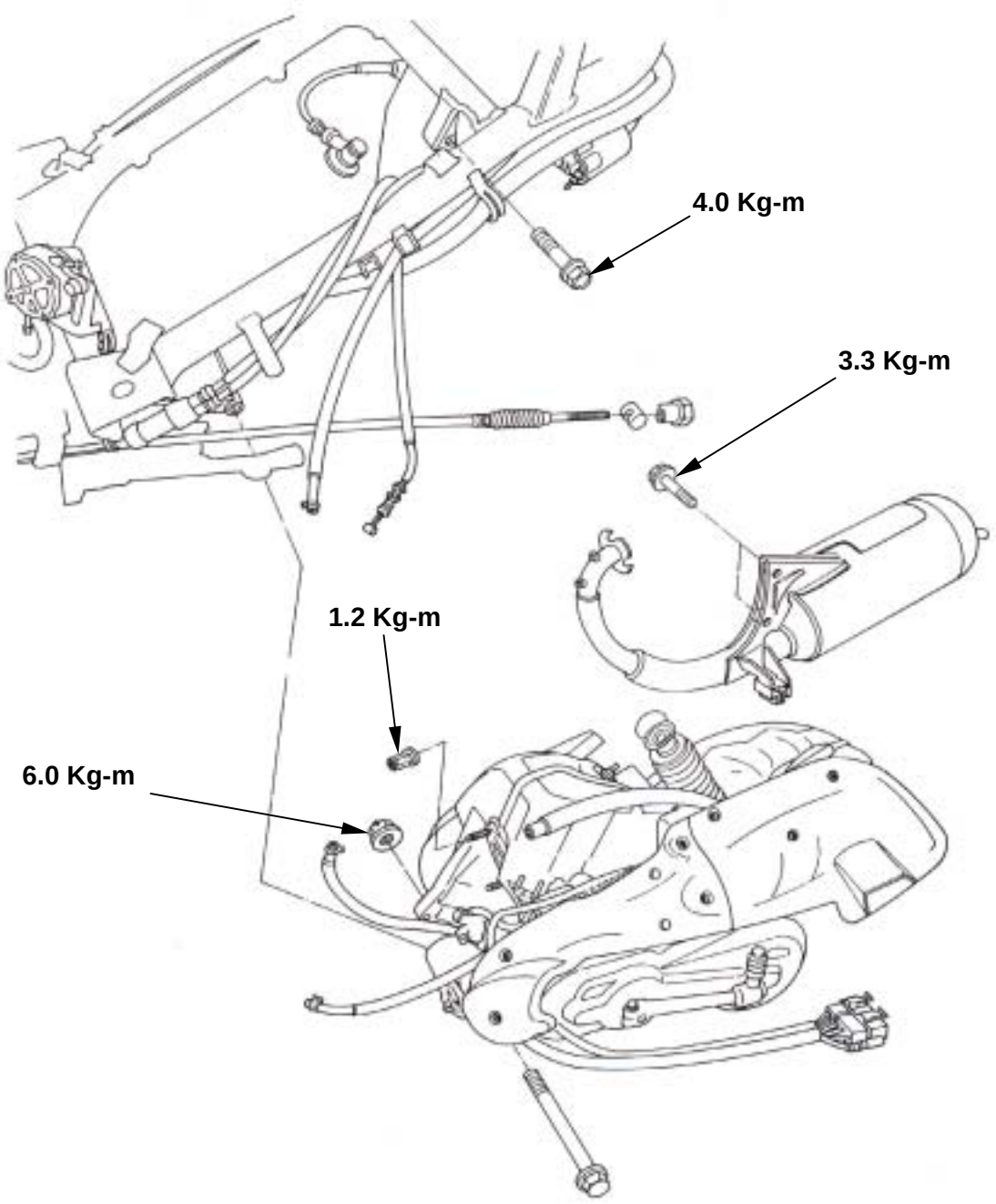
NOTES

There are parts that require removal of engine for maintenance.

- Crankcase
- Crankshaft

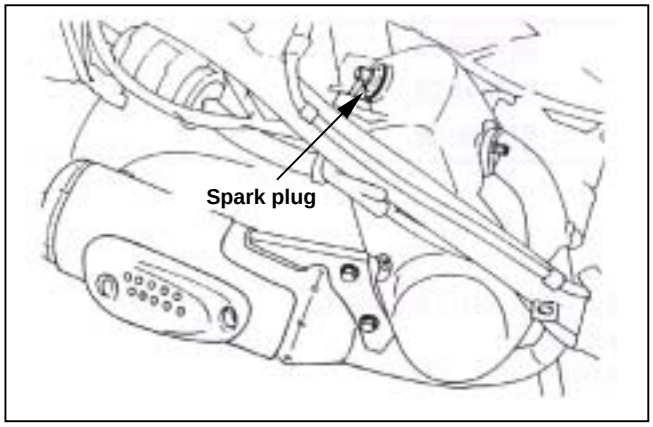
Related bolts tightening torque for removal of engine :

Engine hanger bolt	5.0 kg-m
Engine bracket bolt	6.0 kg-m
Rear shock absorber upper mounting bolts	4.0 kg-m
Rear shock absorber lower mounting bolts	2.7 kg-m
Exhaust pipe connection nut	1.2 kg-m
Muffle mounting bolt	3.3 kg-m

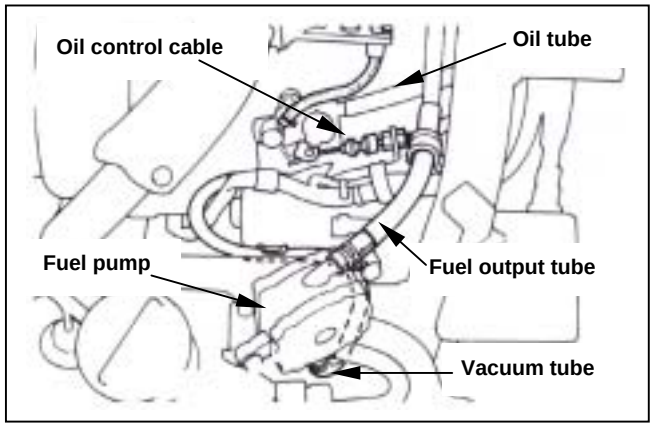


ENGINE REMOVAL

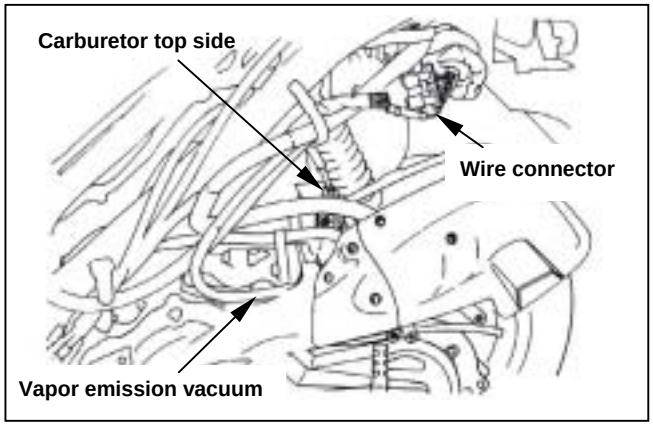
Remove body cover.
Remove the spark plug cap from the spark plug section.



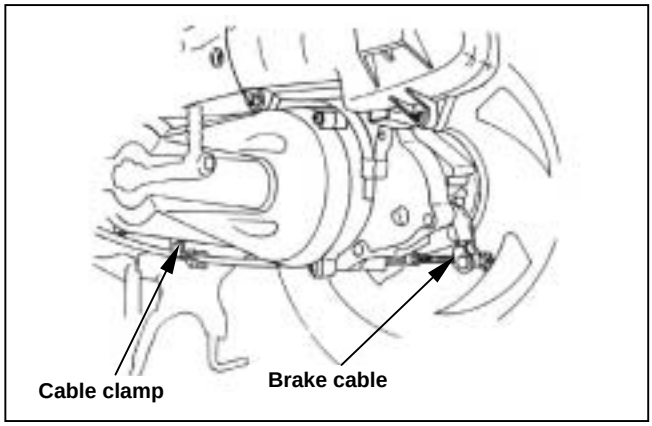
Remove the fuel output and the vacuum tubes from fuel pump.
Remove the oil control cable from oil pump.
Remove the oil tube from oil pump and then clip the tube.



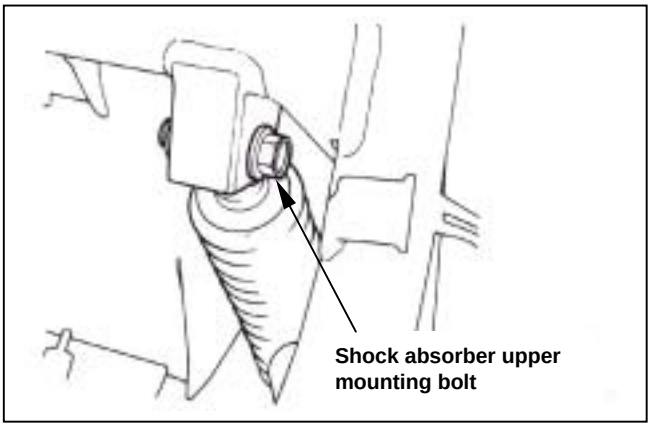
Remove the wire connectors of auto by starter and ACG.
Remove the upper part of the carburetor from its top side.
Remove the vapor emission vacuum tube from carburetor intake manifold.



Remove rear brake cable from engine rear-lower side.

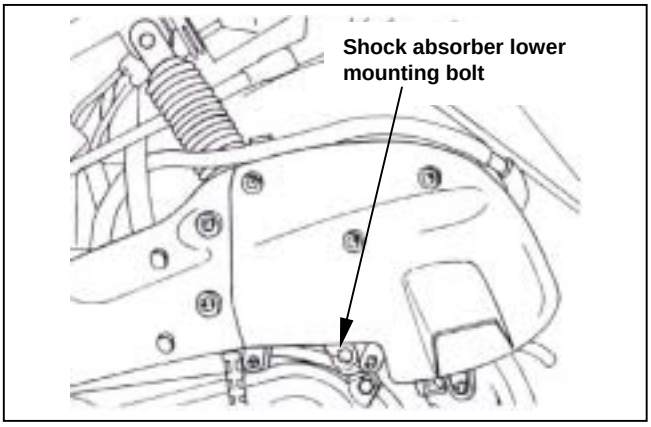


Support the engine and then remove shock absorber lower mounting bolt.



Remove two exhaust pipe connection nuts.
Remove two bolts beside fan cover and exhaust pipe.

Remove engine mounting nut and bolt.

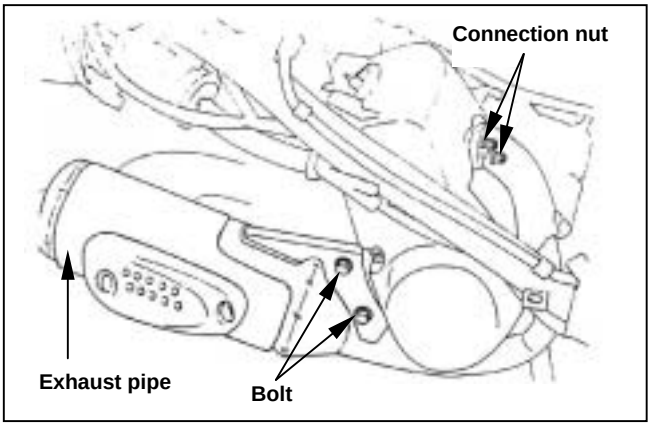


ENGINE INSTALLATION

Install in the reverse order of removal procedures.
Tighten the engine mounting and rear shock absorber upper/lower bolts.

Torque value:

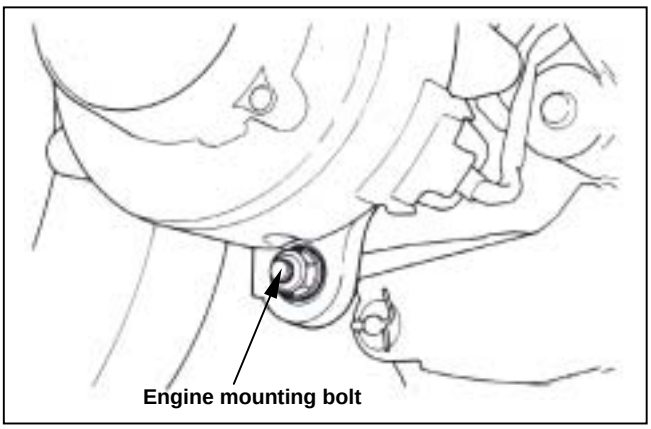
Engine hanger bolt:	5.0 kg-m
Rear shock absorber upper mounting bolts:	4.0 kg-m
Rear shock absorber lower mounting bolts:	2.7 kg-m
Exhaust pipe connection nut:	1.2 kg-m
Muffle mounting bolt:	3.3 kg-m



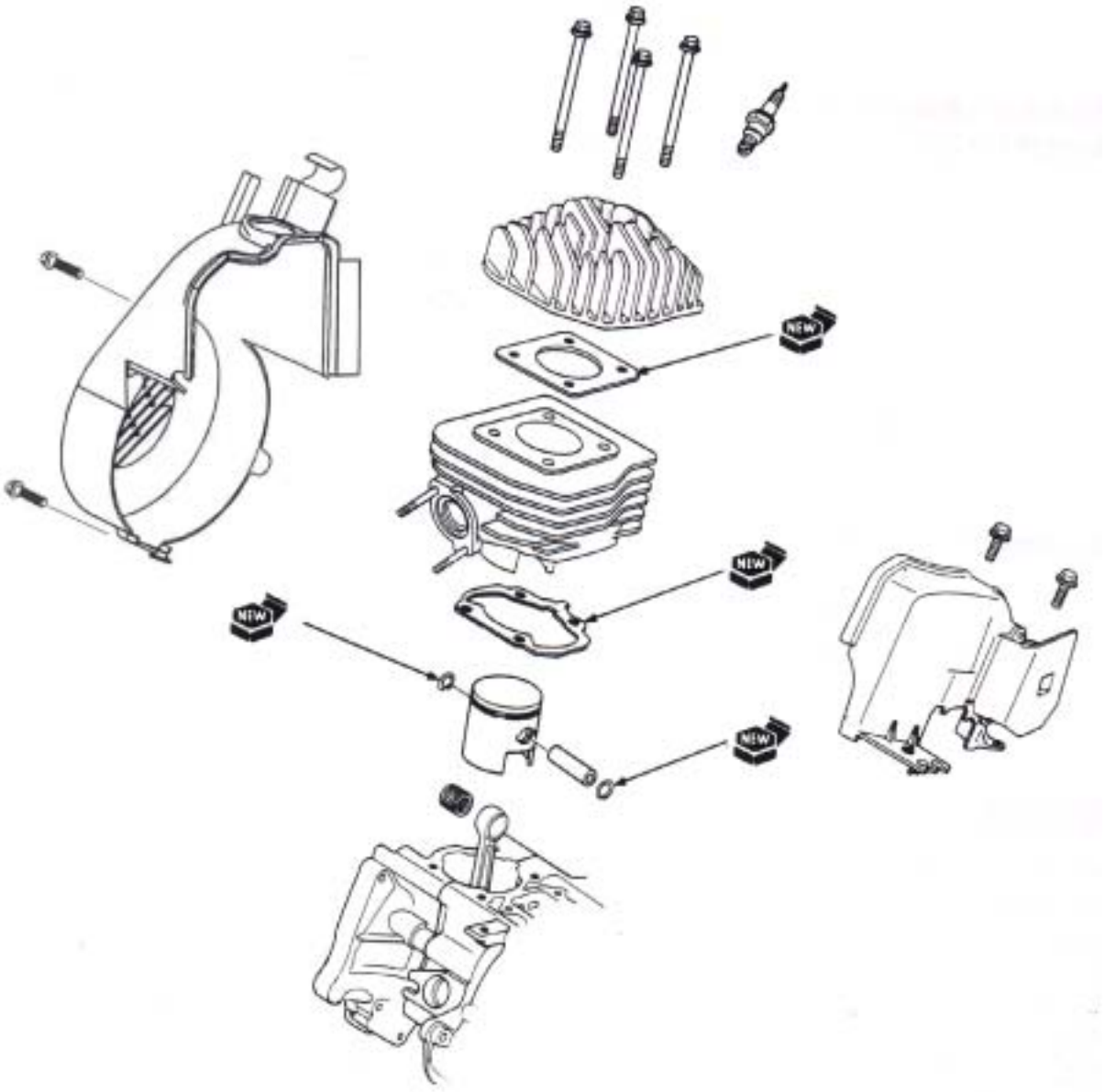
Perform the following inspection and adjustment after installation.

- Check if control cable is correct.
- Check if throttle valve cable is correct.
- Check if oil pump control cable is correct.
- Oil input and output of the oil pump.

Adjust rear brake.



NOTES



MAINTENANCE INFORMATION

PRECAUTIONS IN OPERATION

- The inspection and maintenance of the cylinder head, cylinder and piston can be carried as engine mounted on the body.
- It should clean the engine to prevent dirt from entering into cylinder and crankcase before removal.
- Remove all washes from the interfaces of cylinder head, cylinder and crankcase.
- Be careful do not damage cylinder head, cylinder and piston when removing.
- Inspect the removed & cleaned parts thoroughly, and apply with oil onto the rotation surfaces before installation.

SPECIFICATION

Item		Standard value (mm)	Limit (mm)
Cylinder head	**Deformation**		**0.10**
Piston	**Piston OD**	**39.030~39.045**	**38.935**
	Clearance between cylinder and piston	**0.040~0.050**	**0.100**
	Piston pin hole	**12.002~12.008**	**12.030**
	Piston pin OD	**11.994~12.000**	**11.970**
	Clearance between piston and piston pin	**0.002~0.014**	**0.03**
	Piston ring end gap	**0.10~0.25**	**0.40**
	ID of connecting rod small end	**17.005~17.015**	**17.025**
Cylinder	**ID**	**39.000~39.035**	**39.050**
	DEFORMATION		**0.10**

ID: inner diameter
OD: outer diameter

Tighten torque value

Cylinder head	**1.0 kg-m**	Exhaust pipe connection nut	**1.2 kg-m**
Spark plug	**1.4 kg-m**	Exhaust muffler mounting bolt	**3.3 kg-m**

TROUBLESHOOTING

Compression Pressure Too Low/Difficult To Start/Rough Idling

1. cylinder head gasket leaking
2. spark plug not tighten enough
3. worn, seized or crack piston ring
4. damaged, worn cylinder or piston
5. poor reed

Compression Pressure Too High/Overheat/Knock

1. too much carbon deposit built up in combustion chamber

Piston Noise

1. cylinder and piston worn out
2. piston pin or piston pin hole worn out
3. connecting rod small end bearing worn out

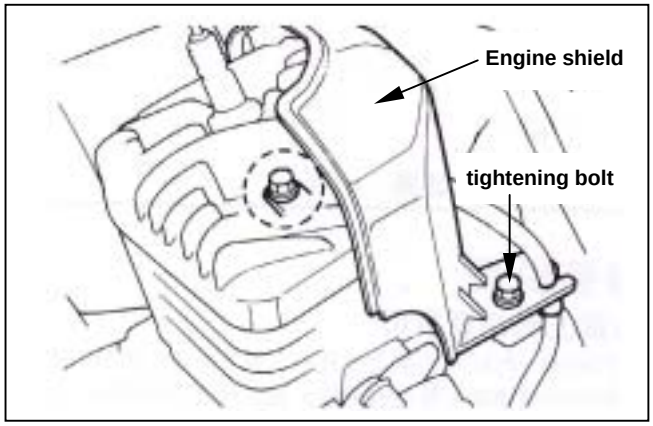
Piston Ring Noise

1. worn, seized or crack piston ring
2. cylinder worn out or damaged

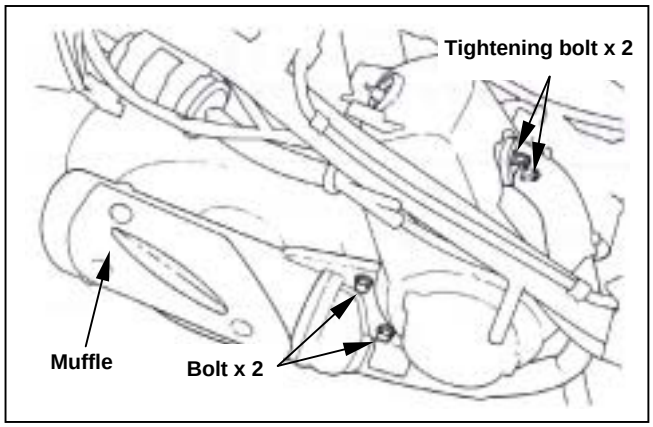
CYLINDER HEAD

CYLINDER REMOVAL

Removal body cover.
Remove spark plug cap.
Remove fan cover.
Remove engine shield.



Remove two connection nuts of the exhaust pipe.
Remove exhaust muffle mounting bolt, and then remove the exhaust pipe.

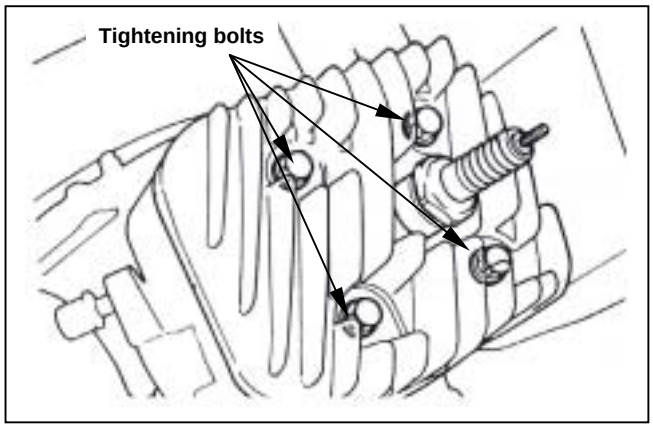


CYLINDER HEAD REMOVAL

Remove the 4 cylinder head bolts and then remove the cylinder head.

⚠ Caution

Loosen the cylinder head bolts with diagonal direction to avoid to damaging it.

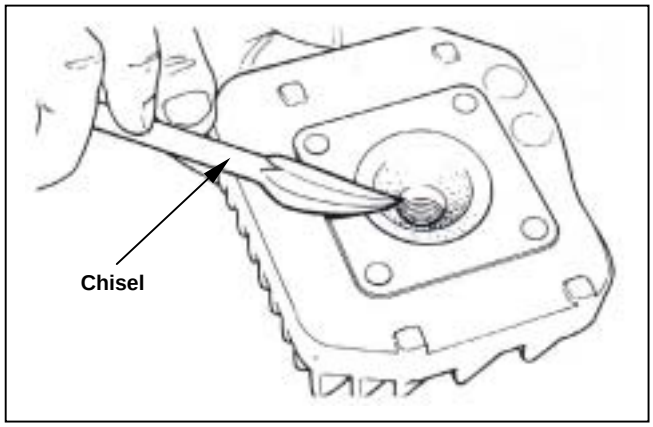


CLEANING CARBON IN COMBUSTION CHAMBER

Clean carbon deposit in which built up in combustion chamber with shown chisel.

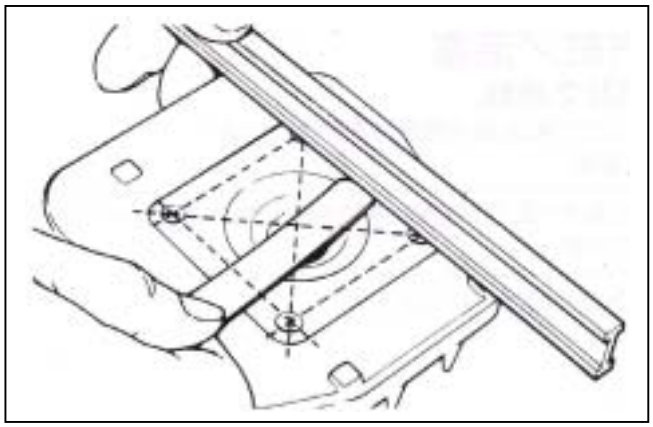
⚠ Caution

Do not scratch to the interfaces of combustion chamber and cylinder.



CYLINDER HEAD INSPECTION

Use a straight edge and a feeler gauge to measure the cylinder head for warp.
Service limit: 0.10 mm



CYLINDER HEAD INSTALLATION

Replace the cylinder head gasket with new one, and place the cylinder head onto cylinder.
Tighten the 4 bolts with diagonal direction and by 2-3 sequences.
Tighten torque: 1.0 kg-m

Install spark plug
Tighten torque: 1.4 kg-m

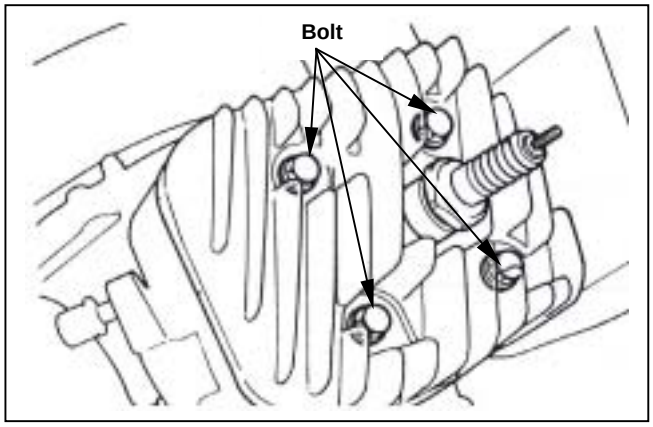
Replace the exhaust pipe washer with new one and then install exhaust pipe.
Tighten exhaust pipe connection nut.
Tighten torque: 1.2 kg-m

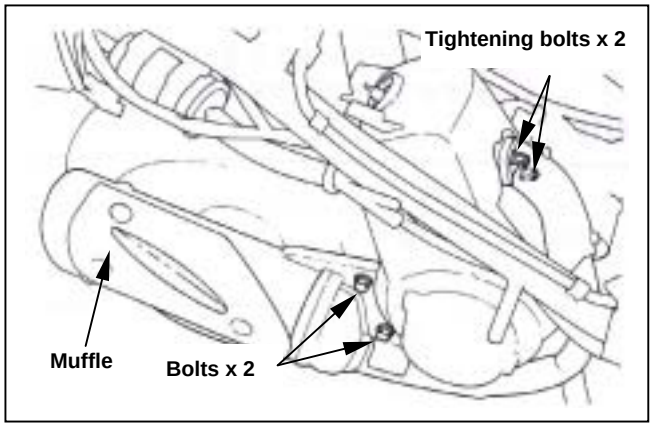
Tighten exhaust pipe mounting bolt.
Tighten torque: 3.3 kg-m

Install the removed parts in the reverse order of removal procedures.
Inspect following item after installation.

- compression pressure test

Check for engine noise.





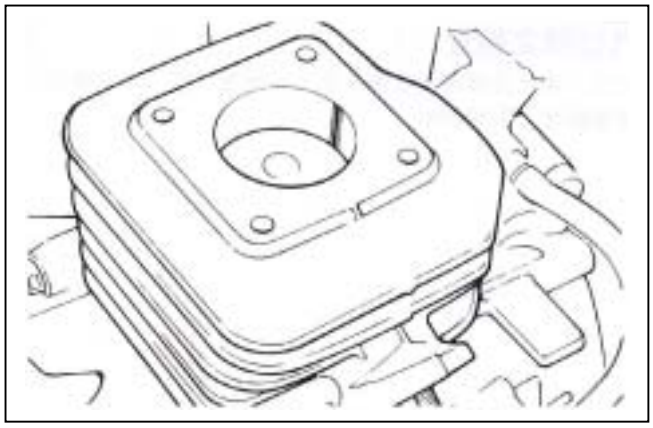
CYLINDER/PISTON

CYLINDER REMOVAL

Be careful to pull the cylinder up and prevent piston from damage.

⚠ Caution

Do not have pry out operation between cylinder and crankcase. Or let radiation fan be knocked seriously.

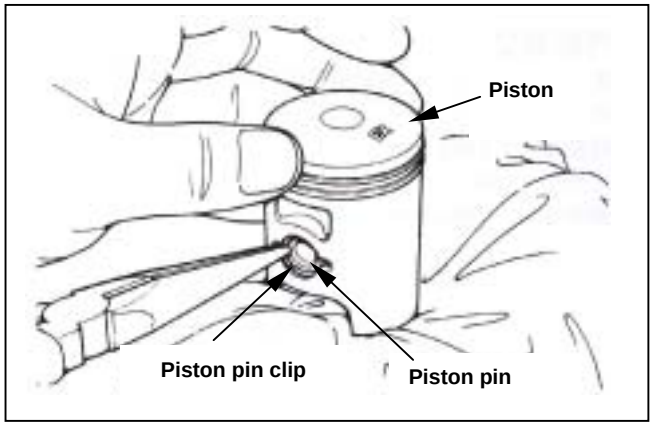


PISTON REMOVAL

Place a clean rag onto crankshaft to cover the piston.
Remove piston pin clip (one piece) and then push piston pin out the piston.

⚠ Caution

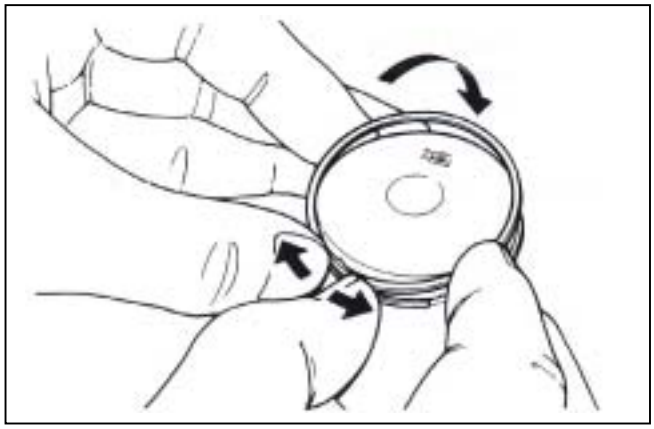
- Do not damage or scratch the piston.
- Do not apply with lateral force to connecting rod.
- Do not let piston pin snap ring falling into crankcase.



PISTON RING REMOVAL

⚠ Caution

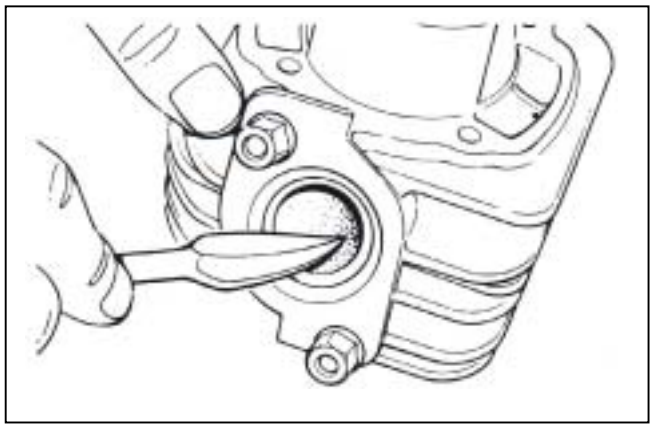
Pry out the opening end of each piston ring and then remove the ring from piston.



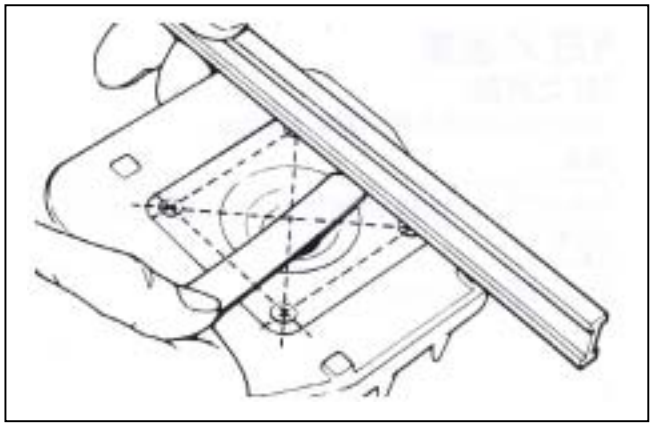
Check if cylinder and piston are worn or damaged, and then clean carbon deposit on exhaust opening area as the diagram shown.

⚠ Caution

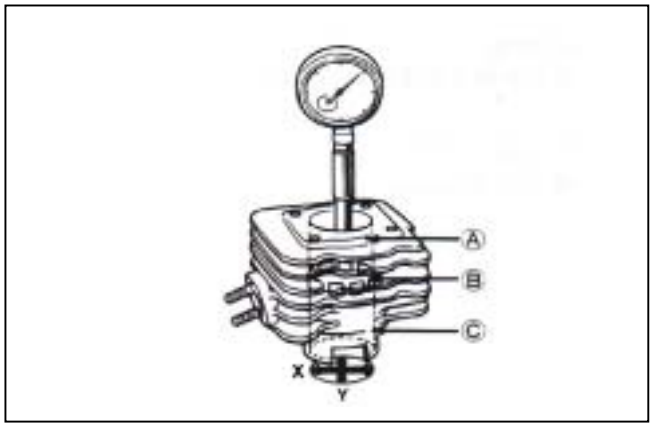
Do not scratch both the cylinder and the piston.



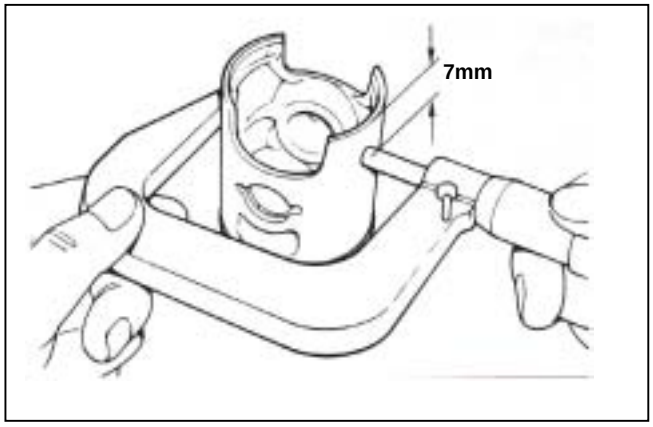
Use a straight edge and a feeler gauge to measure the cylinder head for warp.
Service limit: 0.10 mm



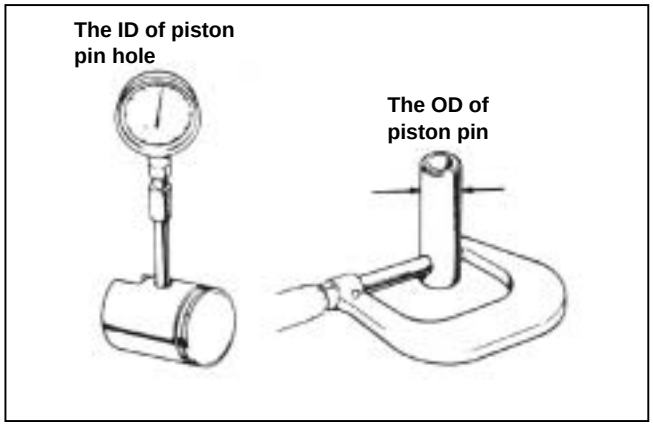
In X and Y direction, measure the cylinder for worn out as the three levels shown in the figure. With the max. value to decide cylinder wear out condition.
Service limit: 39.05mm



Measure the OD of piston at the 7 mm from the bottom of the piston.
Service limit: 38.935 mm
Calculate the clearance between piston and cylinder.
Service limit: 0.100 mm



Measure the ID of piston pin hole.
Service limit: 12.030 mm
Measure the OD of piston pin.
Service limit: 11.970 mm



PISTON RING INSPECTION

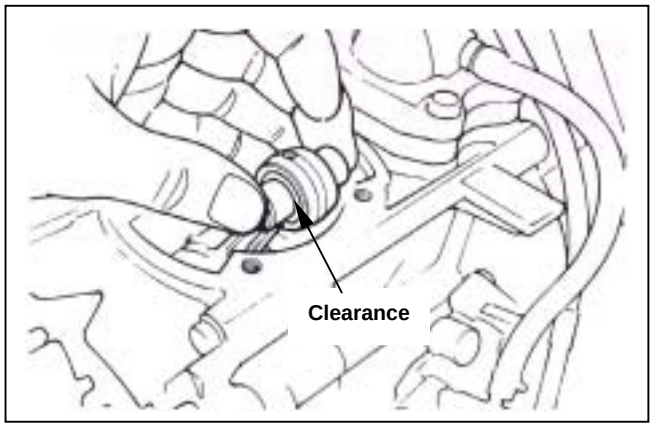
Measure the end gap of each piston ring.
Service limit: 0.40 mm

⚠ Caution

With the piston, push each piston ring into cylinder correctly.

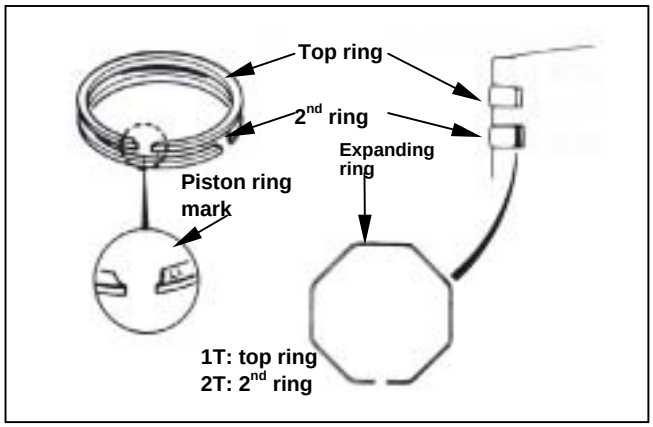
CONNECTING ROD INSPECTION

Install bearing and piston pin onto connecting rod small end, and then check its clearance.
Measure the ID of connecting rod small end.
Service limit: 17.025 mm



PISTON/CYLINDER INSTALLATION

Install the expanding ring into the groove of 2nd ring.
Align the ring end with the lock pin in the ring groove.
Install the top ring and the 2nd ring onto the ring groove respective.



⚠ Caution

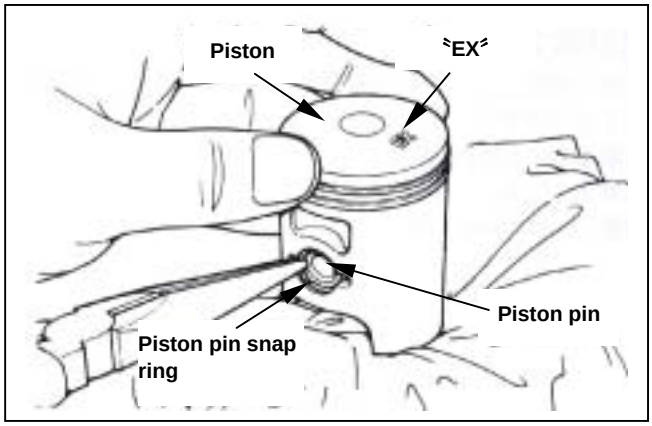
The top ring and the 2nd ring can not be changeable each other.

Push the rings into ring groove and then check rings' mating condition.
If ring could not be push in the ring groove, it means that ring groove is dirty or wrong ring groove installation.

⚠ Caution

- All rings should be installed with the marks facing up.
- All ring should be replaced at same time, and it can not be replaced one ring only.
- It should use same brand name piston ring in an engine and can not mix with other one.

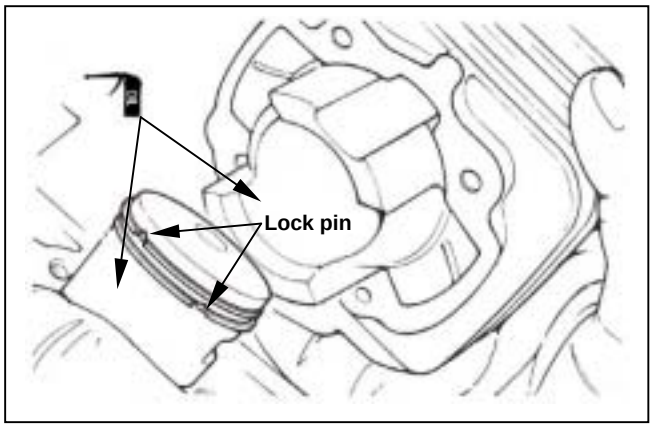
Place a cleaning cloth onto the crankcase opening to prevent the piston pin snap ring from falling into the crankcase.
Apply with two-stroke engine oil onto needle bearing and piston pin, and then install the piston pin onto connecting rod. Install piston, and place “EX” mark of the piston toward to exhaust side.
Install new piston pin snap ring.



Clean all gaskets onto the interfaces of cylinder and crankcase.
Place a new gasket onto the crankcase.
Make sure that the piston ring aligns with the lock pin in piston ring groove.

Caution

Make sure that all rings in the piston ring groove can not be rotated around the lock pin to avoid to damaging the rings, piston and cylinder.

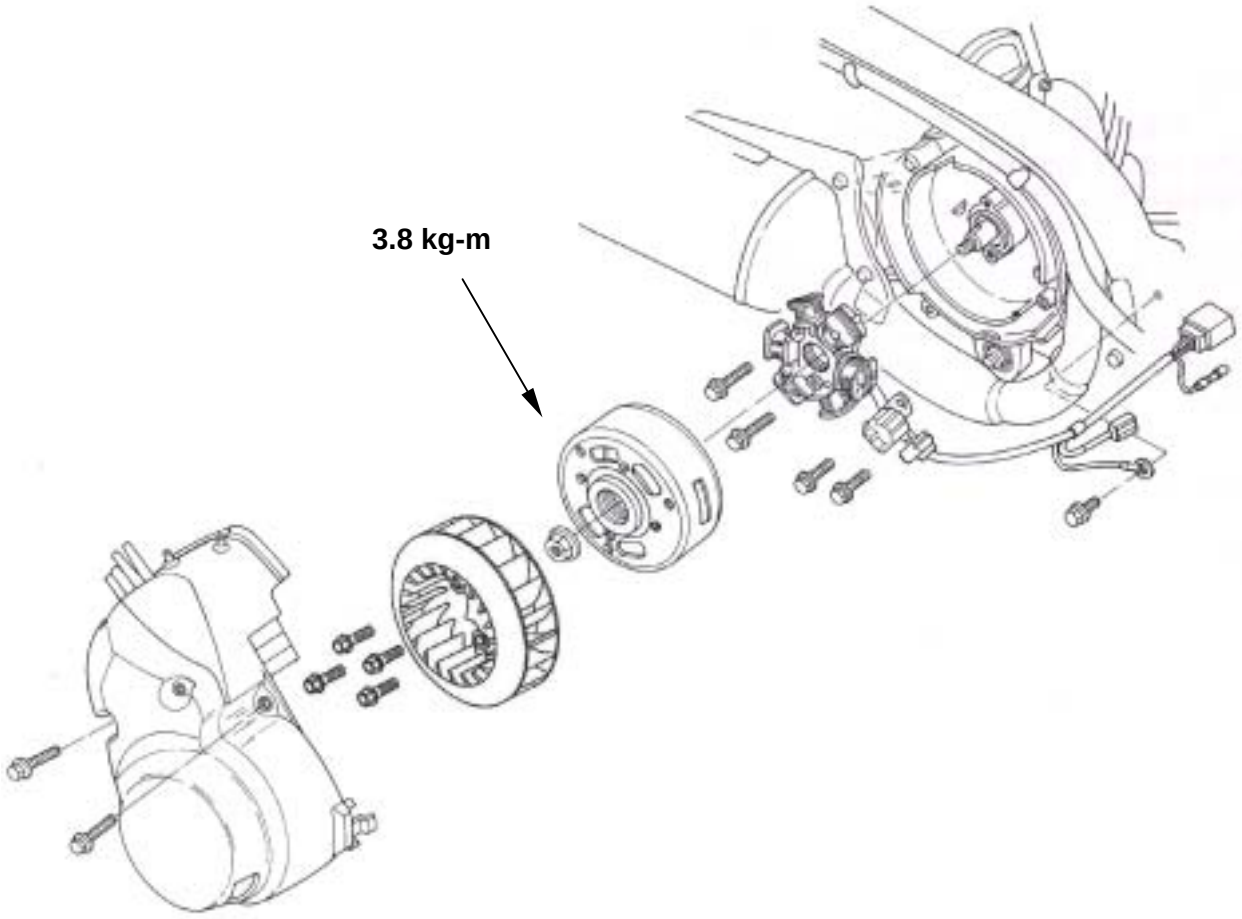


Lubricate cylinder and piston with two-stroke engine oil. Hold the piston and then install it into cylinder.

Caution

To avoid to damaging the piston and the cylinder sliding surface.

Install the cylinder head.



MAINTENANCE INFORMATION

Precautions in Operation

- The maintenance service of A.C. alternator can be carried out directly on the motorcycle.
- Please refer to Chapter 15 for the relative alternator inspection.

Torque value:

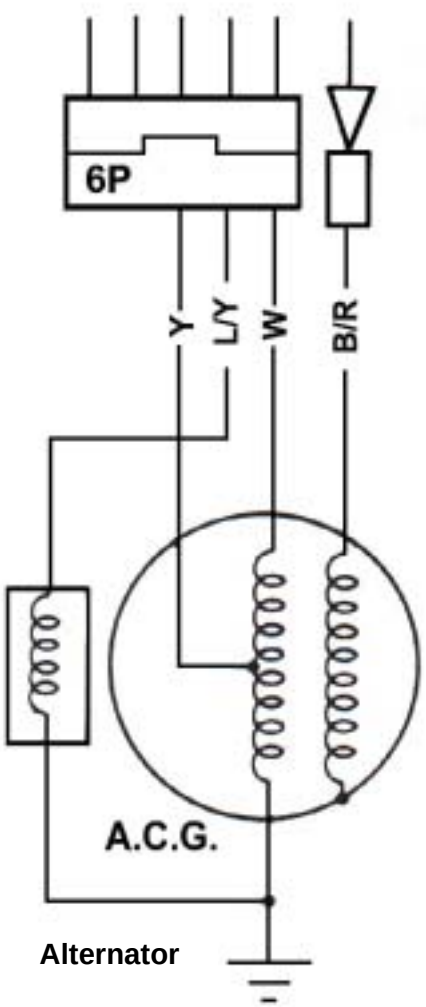
Flywheel **3.8 kg-m**

Tool

General tool
Rotor puller
Universal holder

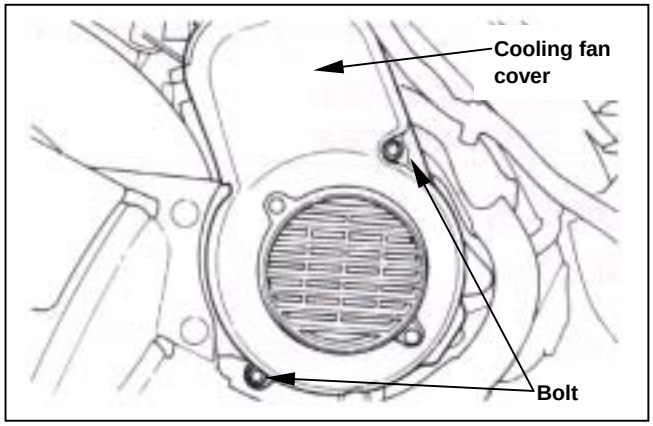
Coil resistance value for the A.C. alternator

	Y/L	Y	W	R/B	Earth
Earth	50 ∫ 200	0.2 ∫ 0.8	0.2 ∫ 1.0	400 ∫ 800	

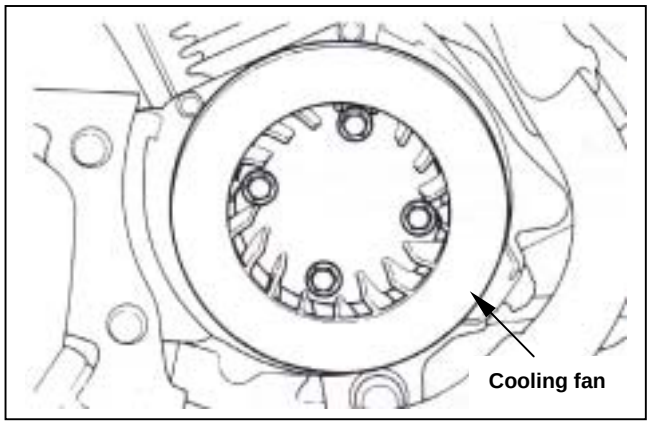


ALTERNATOR REMOVAL

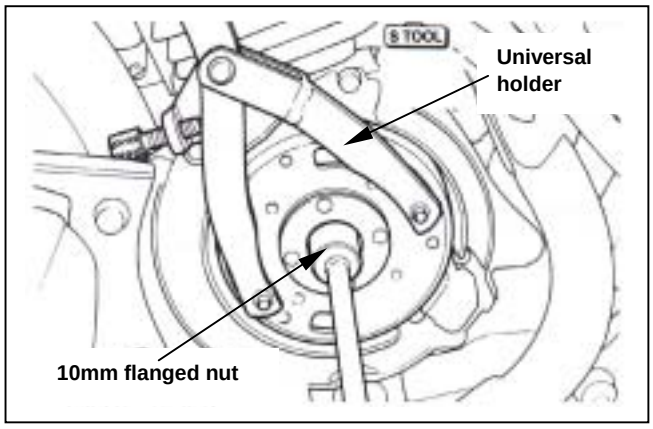
Remove the body cover.
Remove two bolts and then take out cooling fan cover.



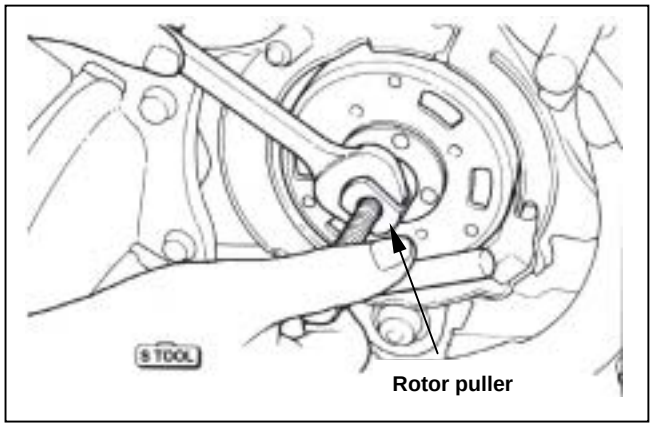
Remove four bolts, and then take out the cooling fan.



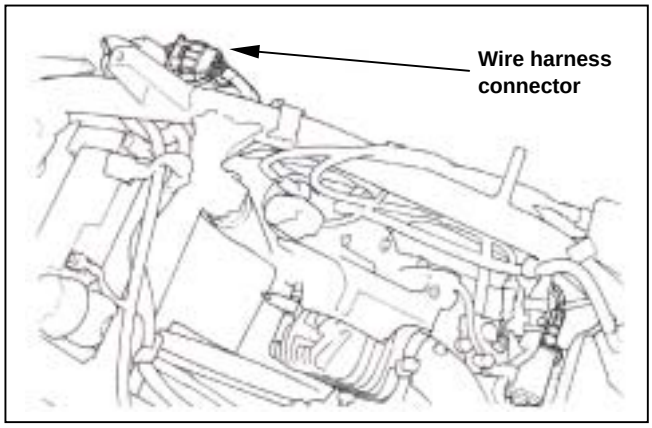
Hold flywheel with universal holder.
Support the flywheel and the remove the 10 mm nut on the flywheel.



Remove the flywheel with rotor puller.



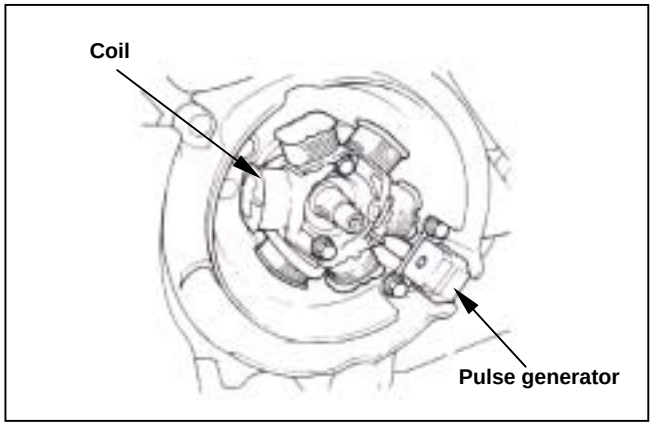
Disconnect alternator wire connector and pulse generator connector.



Remove the pulse generator and alternator four (4) bolts, and then take out the alternator assembly.

⚠ Caution

Care to be taken for not damaging the alternator coil.



ALTERNATOR INSTALLATION

Install the alternator assembly.
Connect the alternator connector.

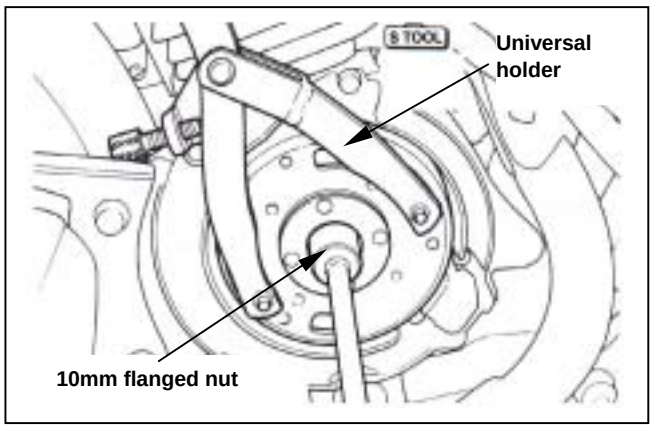
⚠ Caution

Connect the alternator wire harness properly and then clip the harness with clipper.

Install the woodruff key onto the crankshaft groove.

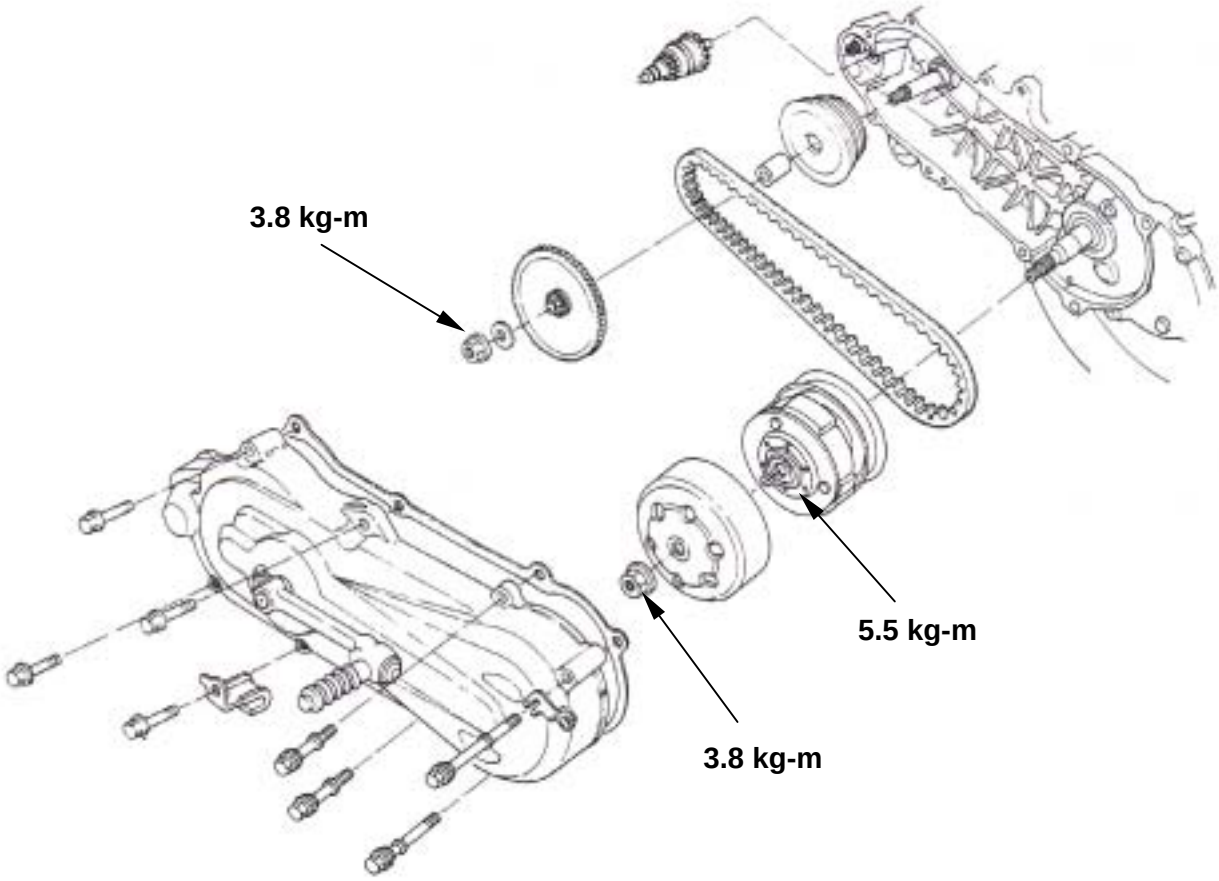
⚠ Caution

- Clean dirt and metal pieces inside the flywheel.
- Make sure that there is no foreign material inside the flywheel.



Install the flywheel.

Tighten the flywheel 10 mm nut.
Torque value:
Install the removed parts in reverse order of removal procedures.
Start engine and check its ignition timing.



MAINTENANCE INFORMATION

Precautions In Operation

The surfaces of driving belt and driving pulley must be free of grease.

SPECIFICATION

Item	Standard value(mm)	Limit(mm)
Driving belt width	**18.0**	**16.5**
ID of movable driving pulley	**20.035~20.085**	**20.120**
OD of movable driving pulley boss	**20.010~20.025**	**19.98**
OD of weight roller	**15.92~16.08**	**15.40**
ID of clutch outer	**107.0~107.2**	**107.5**
Thickness of clutch weight	**4.0~4.1**	**2.0**
Free length of driven pulley spring	**98.1**	**92.7**
OD of driven pulley	**33.965~33.985**	**33.94**
ID of movable driven pulley	**34.000~34.025**	**34.06**

ID: Inner Diameter
OD: Outer diameter

Torque Values:

Movable driving pulley: **3.8 kg-m**
Driven pulley: **5.5 kg-m**
Clutch outer: **3.8 kg-m**

Special Service Tools

Clutch spring compressor
Bearing driver
Clutch nut wrench 39x41 mm
Bearing driver accessory 39x41 mm
Universal holder
Driver

TROUBLESHOOTING

Engine can be started but motorcycle can not be moved

1. Worn driving Belt
2. Worn ramp plate
3. Worn or damaged clutch weight
4. Broken driven pulley spring

Shudder or misfire when driving

1. Broken clutch weight
2. Worn clutch weight

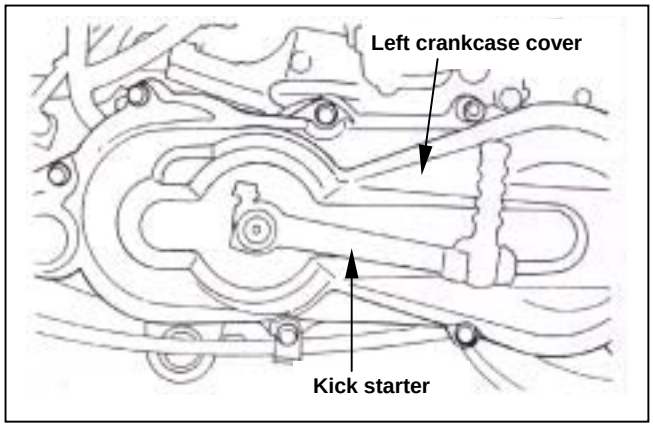
Insufficient horsepower or poor high speed performance

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

LEFT CRANKCASE COVER

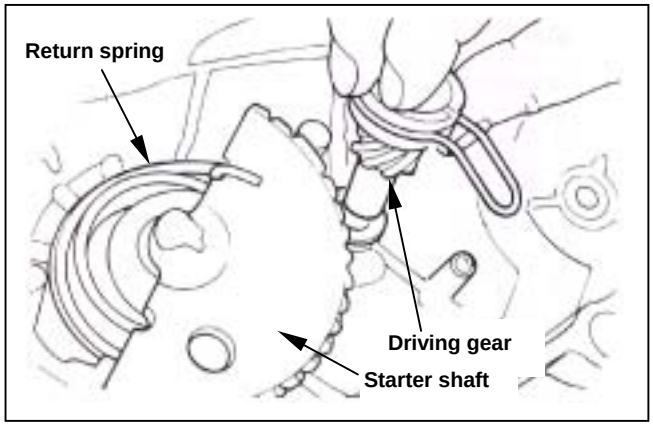
Left crankcase cover removal

Remove body cover.
Remove air cleaner.
Remove kick starter.
Remove left crankcasecover.



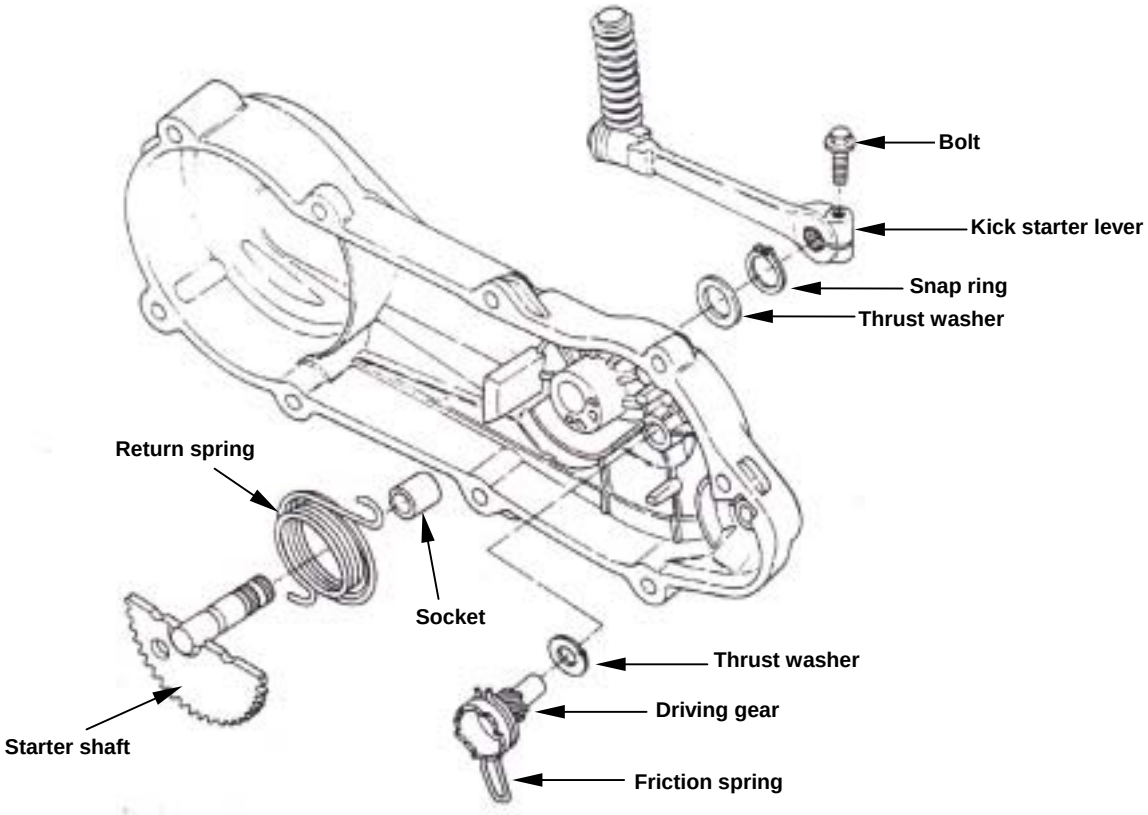
Disassembly of Kick Starter

Remove snap ring and thrust washer from left crankcase cover.
Install kick starter lever, rotate the lever slightly and then remove driving gear and washer.
Remove the lever, kick starter, starter shaft, and return spring as well as socket.



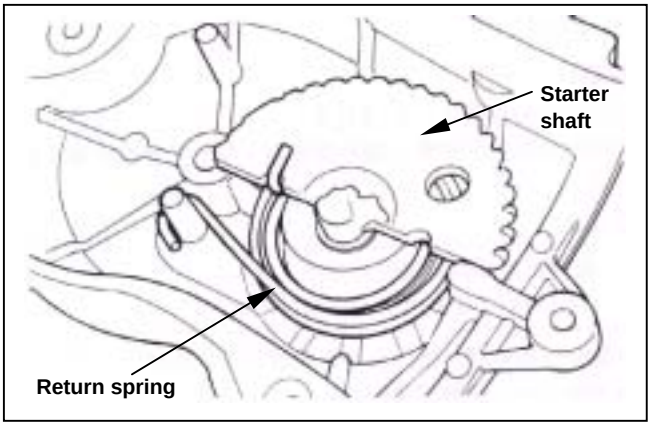
Inspection of kick Starter

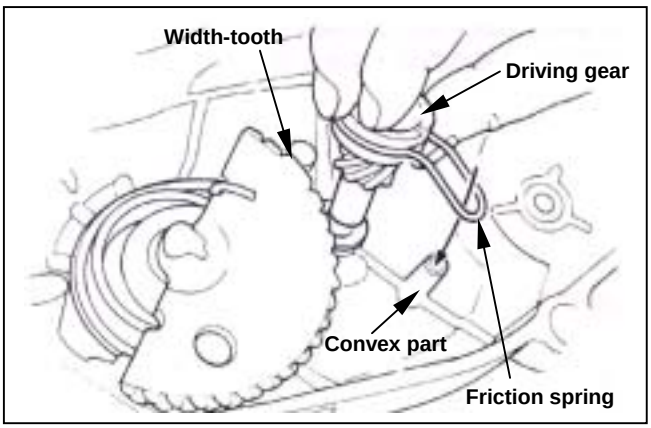
Check if starter shaft, driving gear, socket and bearing hole for wear or damage.



REASSEMBLY OF KICK STARTER

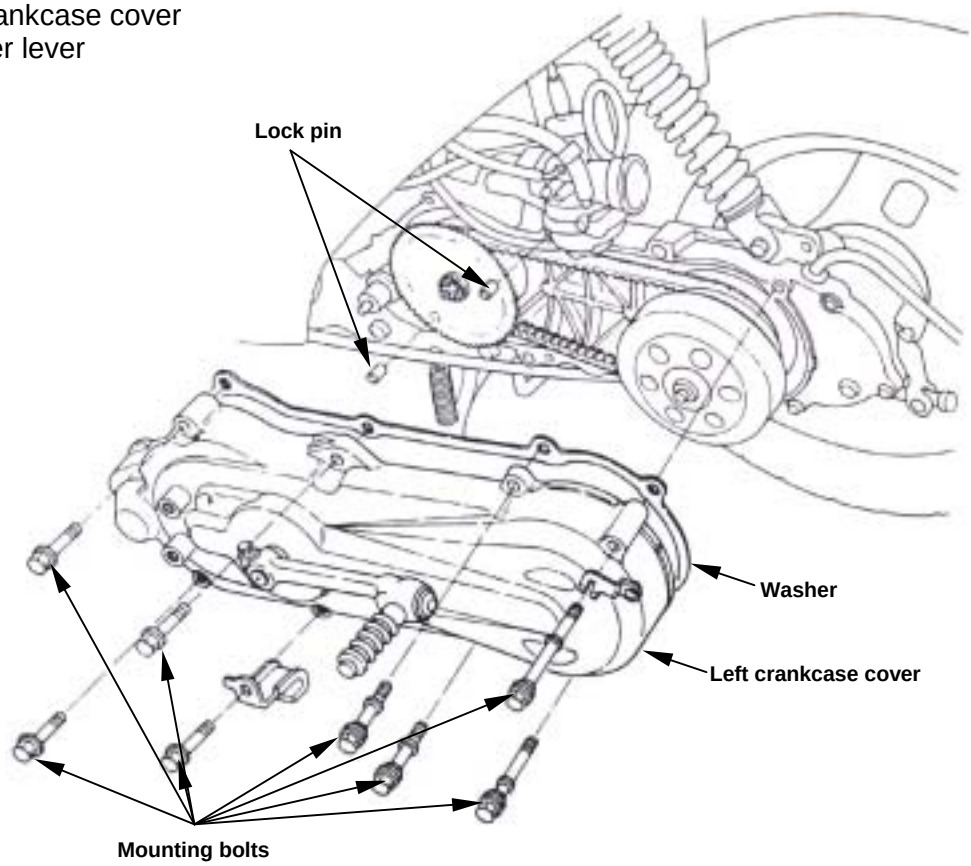
Install socket, return spring and starter shaft as diagram shown.
Install thrust washer and snap ring onto starter shaft.
Install Kick starter lever temporary.
Slightly rotate the lever and then align driving gear with width-tooth on the starter shaft.
Install the friction spring of driving gear onto convex part of the cover.





INSTALLATION OF THE LEFT CRANKCASE COVER

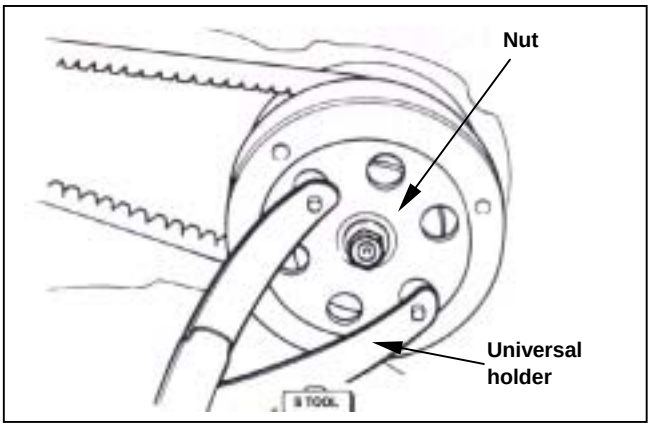
Install the left crankcase cover
Install kick starter lever



DRIVING BELT

Removal

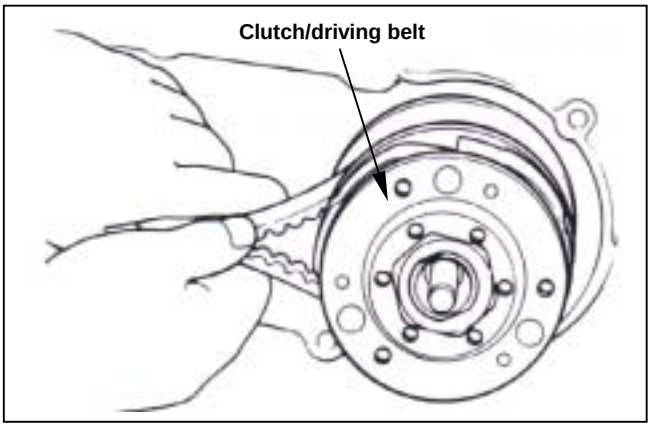
Remove left crankcase cover.
Hold clutch outer with universal holder, and remove nut and clutch jacket.



Caution

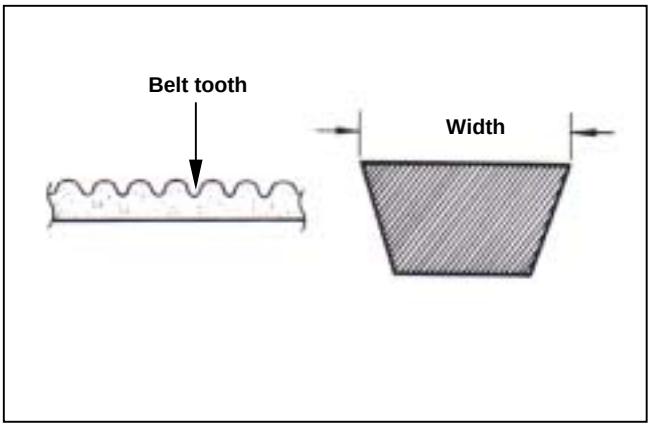
- Using special service tools for tightening or loosening the nut.
- Fixed rear wheel or rear brake will damage reduction gear system.

Push the driving belt into belt groove as diagram shown so that the belt can be loosened, and then remove the driven pulley.
Remove driven pulley/clutch. Do not remove driving belt.
Remove the driving belt from the groove of driven pulley.



INSPECTION

Check the driving belt for crack or wear.
Replace it if necessary.
Measure the width of driving belt as diagram shown.
Service Limit: 16.5 mm
Replace the belt if exceeds the service limit.



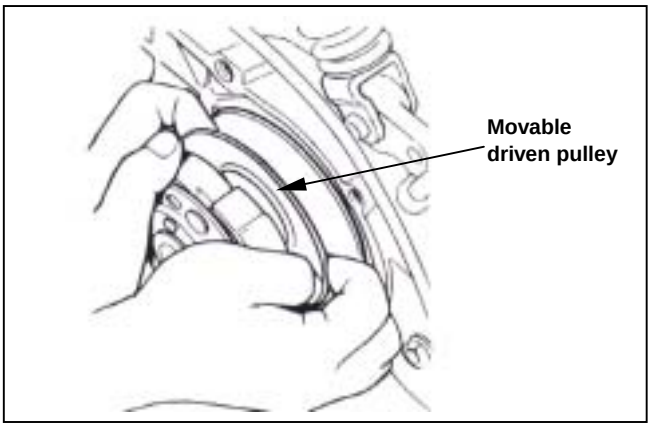
Caution

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

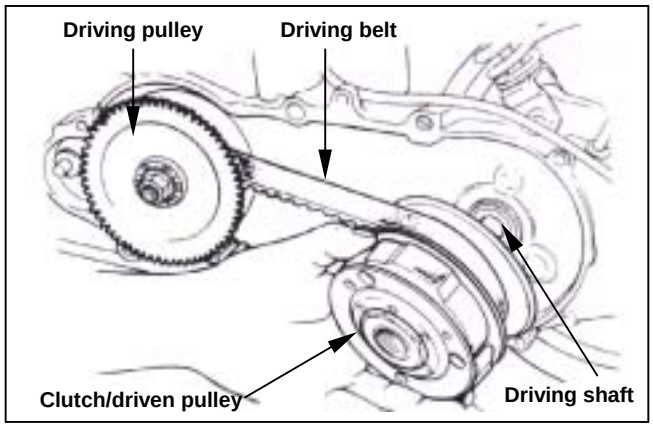
Installation

Caution

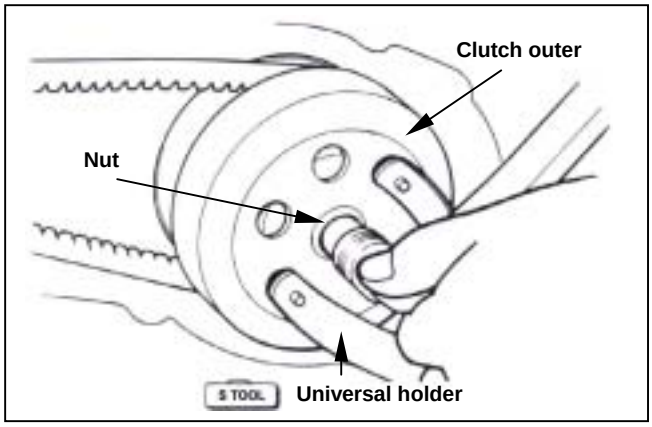
Pull out driving pulley to avoid it closing.



Install driving belt onto driven pulley.
Install the driven pulley that has installed the belt onto driving shaft.



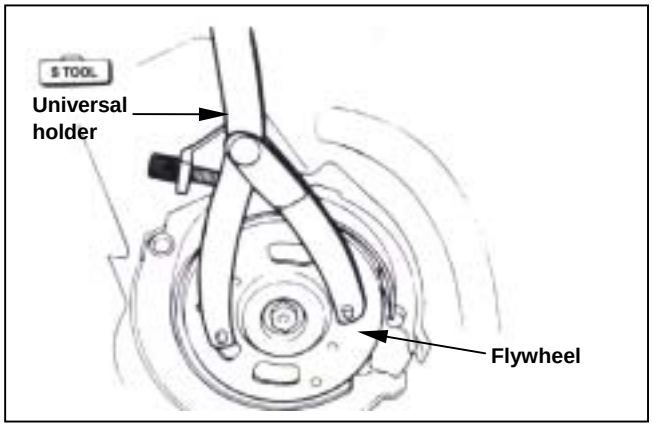
Install the clutch with universal holder, and then tighten nut to specified torque value.
Torque value: 3.8 kg-m



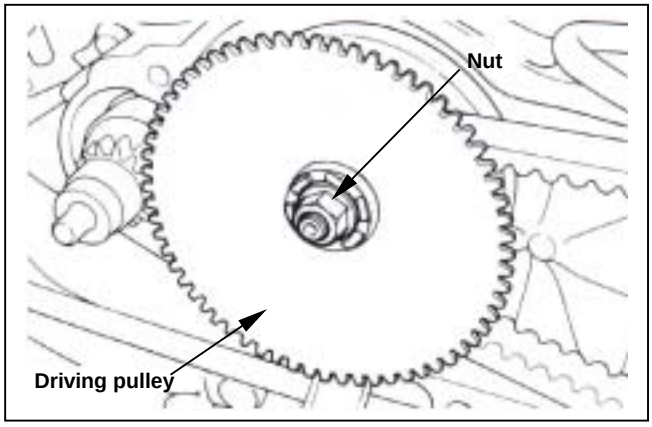
MOVABLE DRIVEN PULLEY

REMOVAL

Remove left crankcase cover.

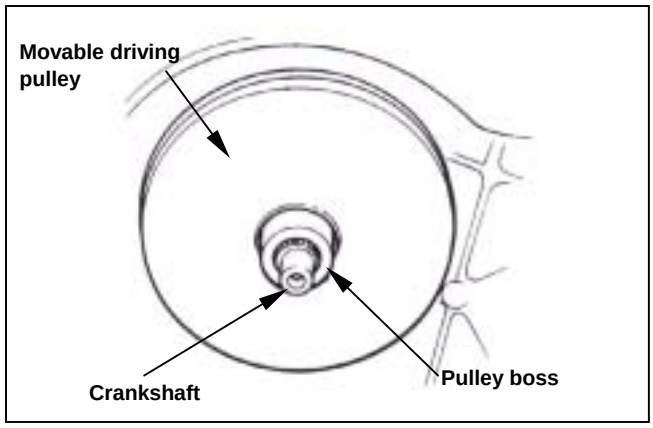


Hold generator flywheel with universal holder, and then remove driving pulley nut.
Remove driving pulley.

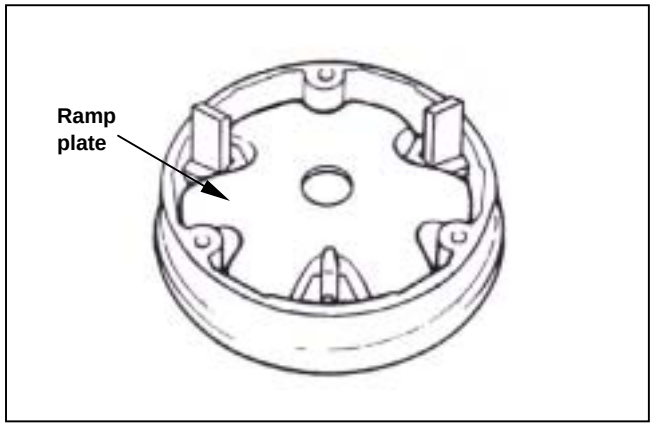


REMOVAL

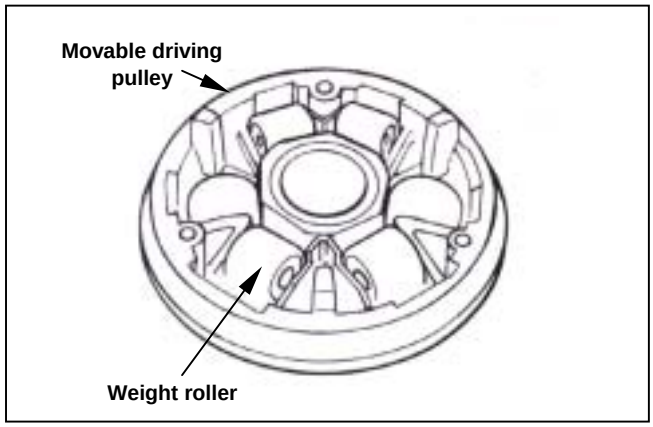
Remove movable driving pulley set and driving belt from crankshaft.



Remove ramp plate.

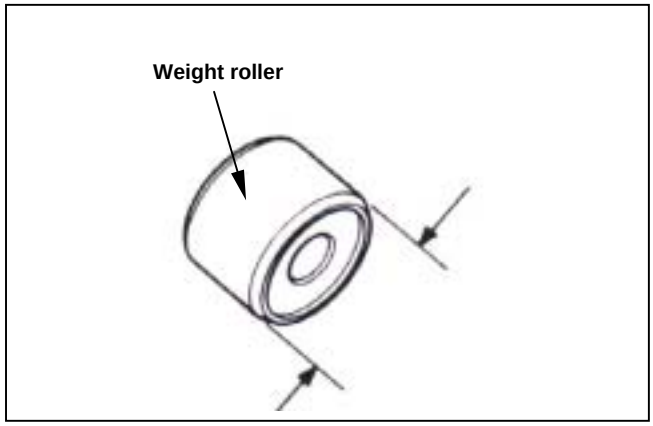


Remove weight rollers from sliding pulley.

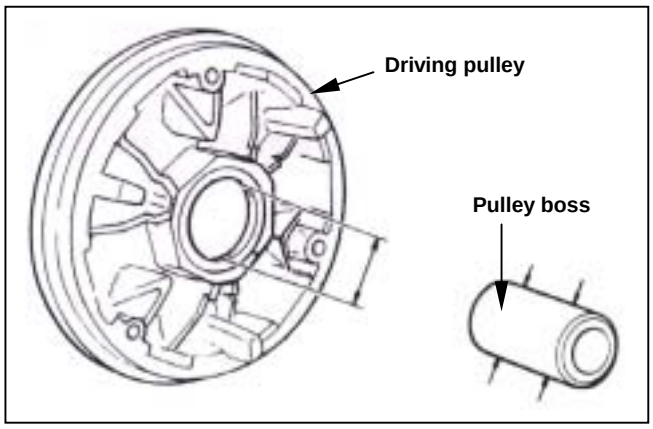


INSPECTION

The weight roller is to press sliding pulley by means of centrifuge force. Thus, if weight rollers are worn out or damage, the centrifuge force will be effected.
Check if rollers are wear out or damage. Replace it if necessary.
Measure each roller’s outer diameter. Replace it if exceed the service limit.
Service limit: 15.40 mm

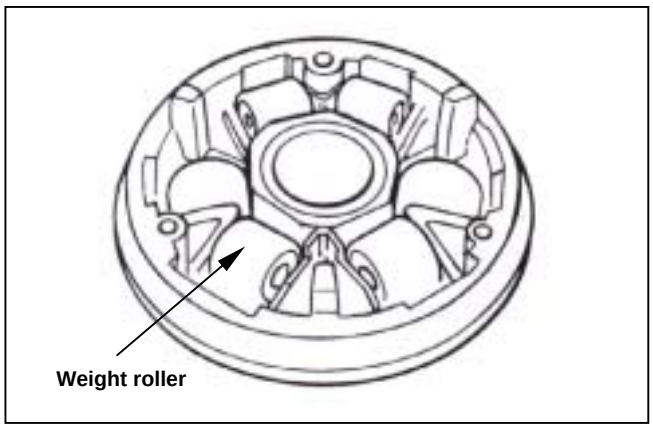


Check if driving pulley boss is worn or damage and replace it if necessary.
Measure the outer diameter of pulley boss, and replace it if it exceed service limit.
Service limit: 19.98 mm
Measure the inner diameter of driving pulley, and replace it if it exceed service limit.
Service limit: 20.120 mm

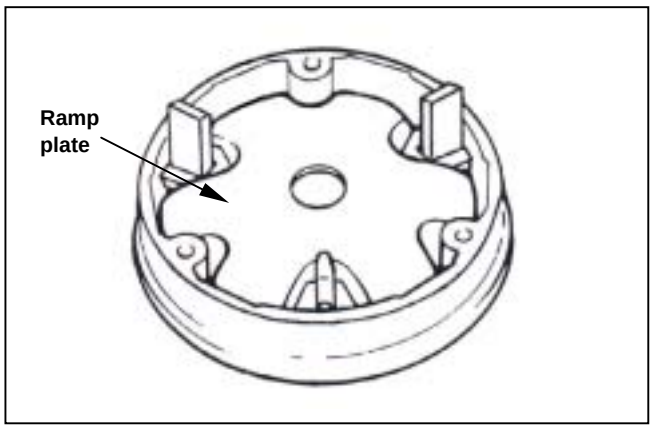


REASSEMBLY/INSTALLATION

Install weight rollers.



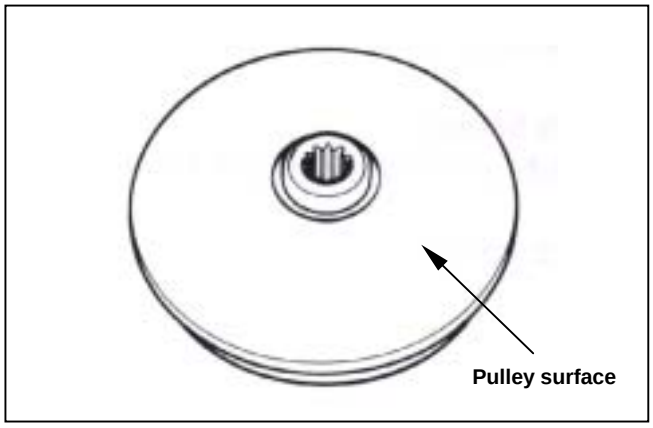
Install ramp plate.



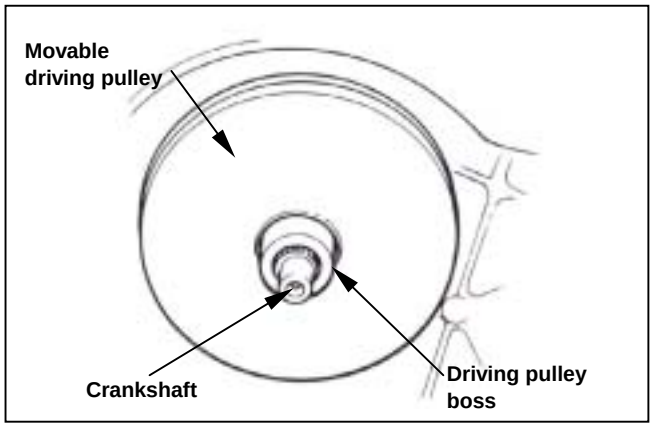
Apply with grease 4~5g to inside of driving pulley, and install driving pulley boss.

Caution

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

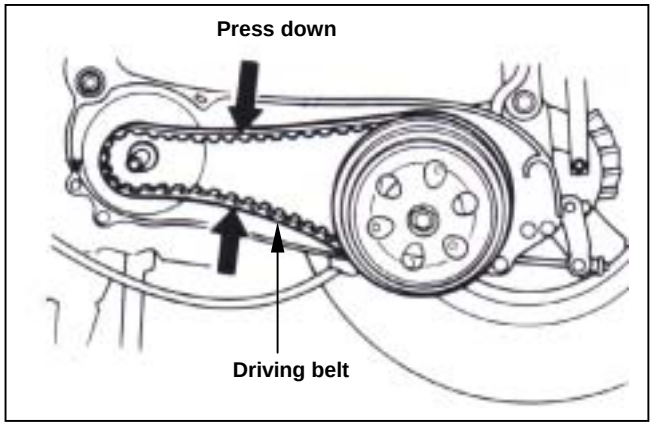


Install movable driving pulley assembly onto crankshaft.



DRIVING PULLEY INSTALLATION

Press driving belt into pulley groove, and then pull the belt on to driving pulley shaft.

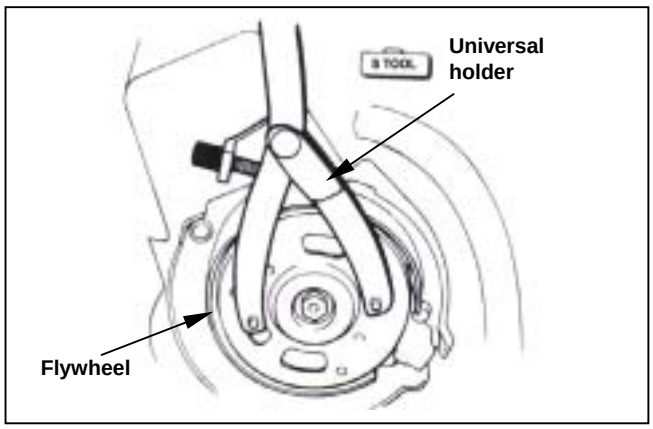


Install driving pulley, washer and nut.

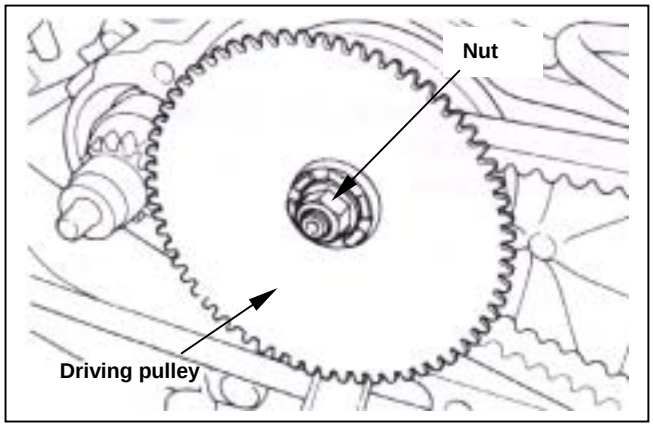
⚠ Caution

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

Hold flywheel with universal holder.



Tighten nut to specified torque.
Torque value: 3.5-4.0 kg-m
Install left crankcase cover.



CLUTCH/DRIVEN PULLEY

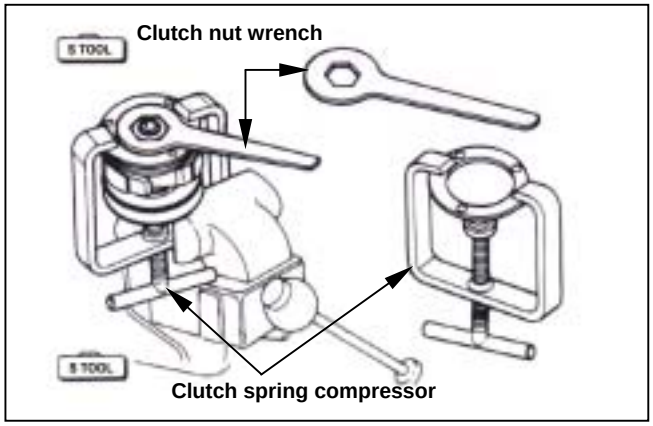
DISASSEMBLY

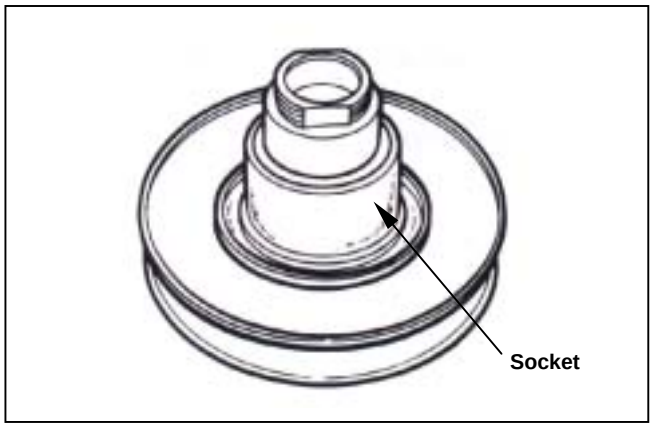
Remove driving belt and clutch/driven pulley.
Install clutch spring compressor onto the pulley assembly, and operate the compressor to let nut be installed more easily.

⚠ Caution

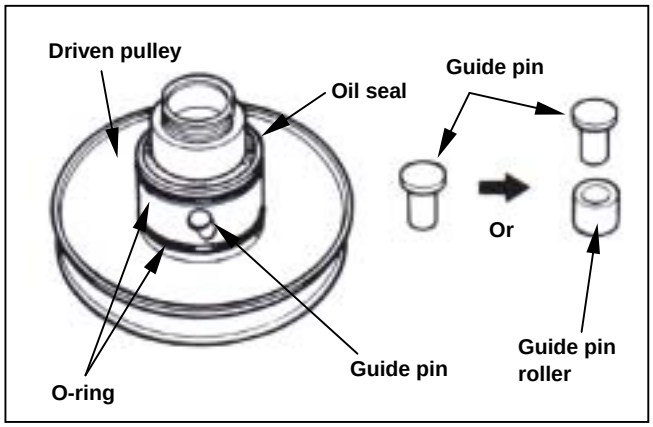
Do not press the compressor too much.

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





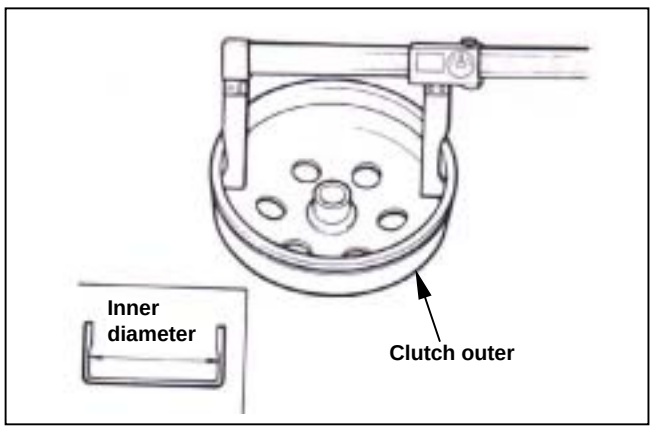
Remove guide pin, guide pin roller, and driven pulley, and then remove O-ring & oil seal seat from driven pulley.



INSPECTION

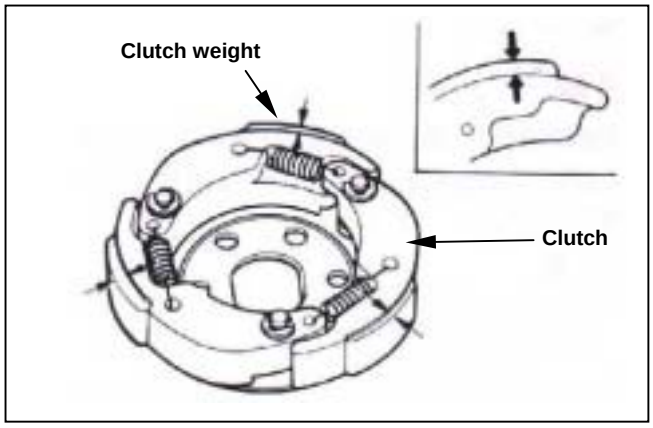
Clutch jacket

Measure the inner diameter of clutch outer friction face. Replace clutch outer if exceed service limit.
Service limit: 107.5 mm



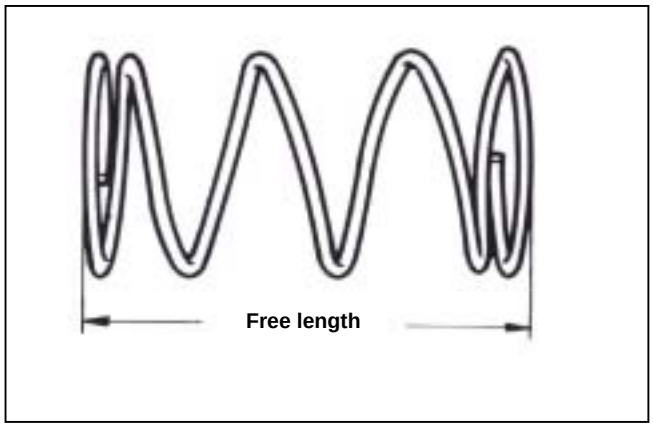
Clutch weight

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



Driven pulley spring

Measure the length of driven pulley spring. Replace it if exceeds service limit.
Service limit: 92.7 mm

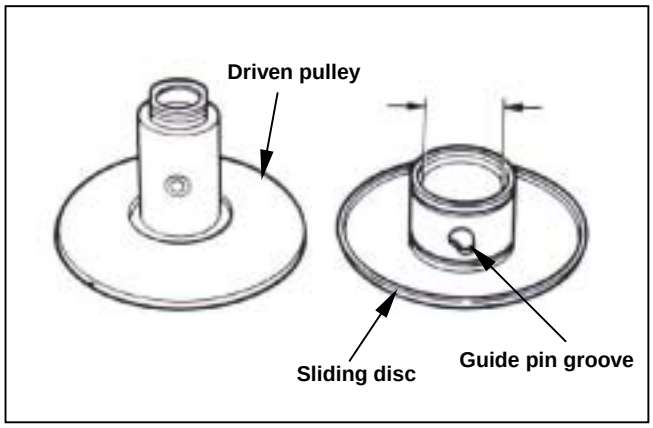


Driven pulley

Check following items:

- If both surfaces are damage or wear.
- If guide pin groove is damage or wear.

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

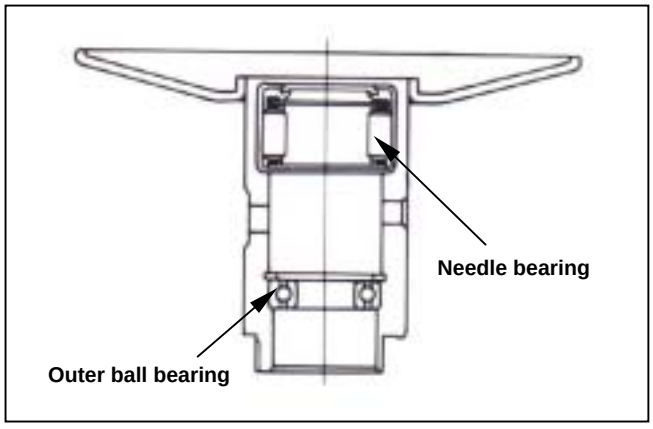


Driven Pulley Bearing Inspection

Check if the inner bearing oil seal is damage. Replace it if necessary.
Check if needle bearing is damage or too big clearance. Replace it if necessary.
Rotate the inside of inner bearing with fingers to check if the bearing rotation is in smooth and silent. Check if the bearing outer parts are closed and fixed. Replace it if necessary.

⚠ Caution

Some of models are equipped with two ball bearings.



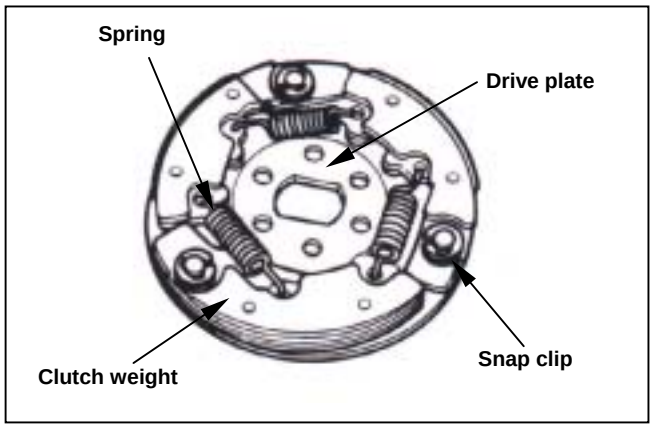
Clutch Block Replacement

Remove clip and washer, and then remove clutch weight and spring from drive plate.

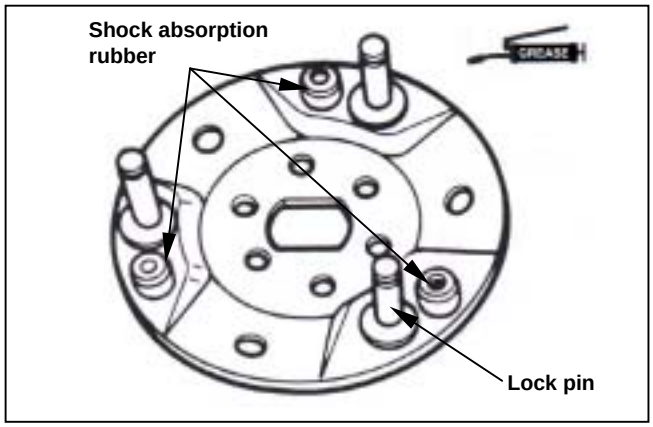
Caution

Some of models are equipped with one mounting plate instead of 3 snap clips.

Check if spring is damage or insufficient elasticity.



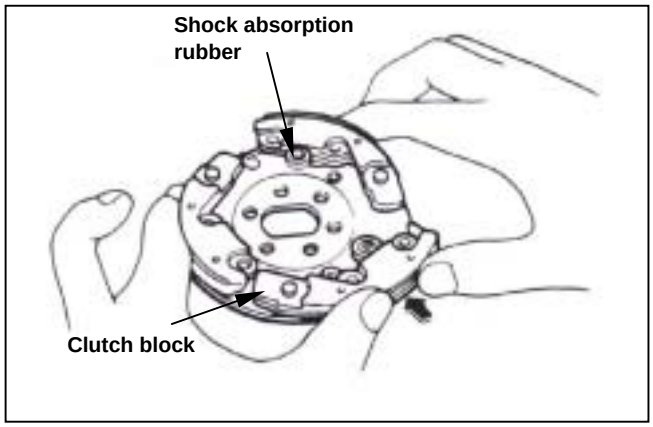
Check if shock absorption rubber is damage or deformation. Replace it if necessary.
Apply with grease onto lock pins.



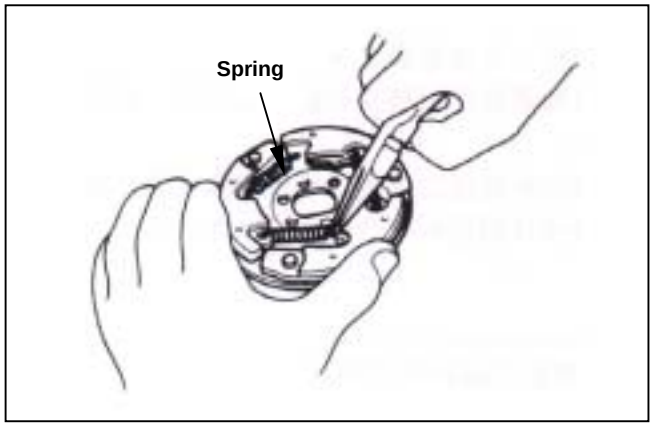
Install new clutch weight onto lock pin and then push to specific location.
Apply with grease onto lock pins. But, the clutch weight should not be greased. If so, replace it.

Caution

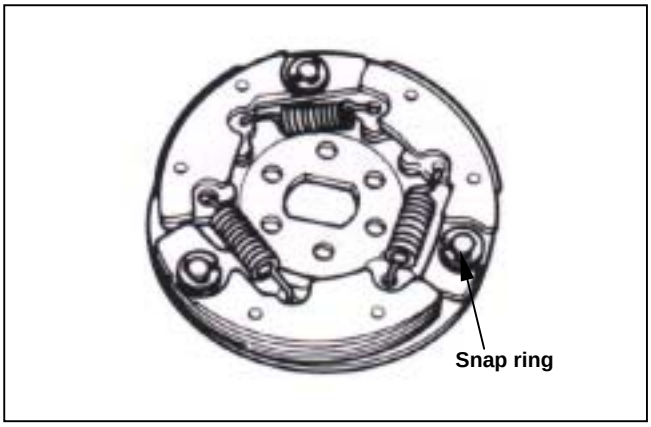
Grease or lubricant will damage the clutch weight and effect the weight’s connection capacity.



Install the spring into groove with pliers.



Install snap clip and mounting plate onto lock pin.

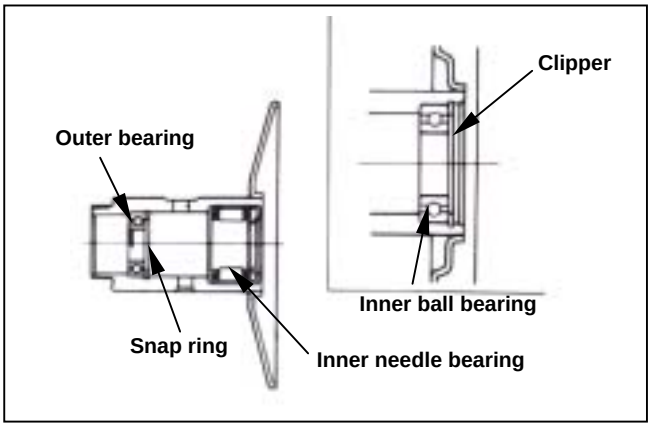


Replacement of Driven Pulley Bearing

Remove inner bearing.

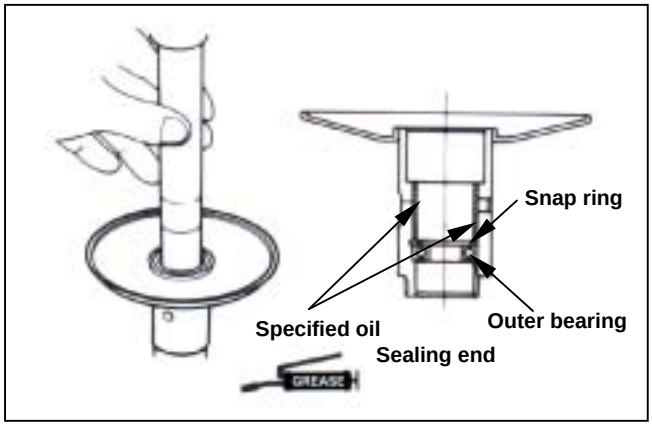
⚠ Caution

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



Remove snap ring and then push bearing forward to other side of inner bearing.

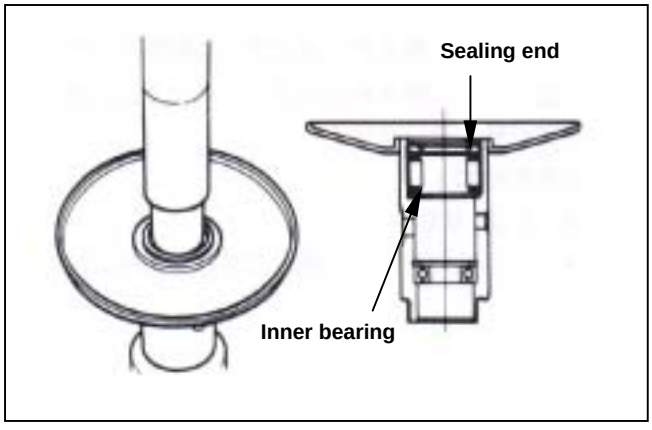
Place new bearing onto proper position and its sealing end should be forwarded to outside. Apply with specified oil.



Install new inner bearing.

⚠ Caution

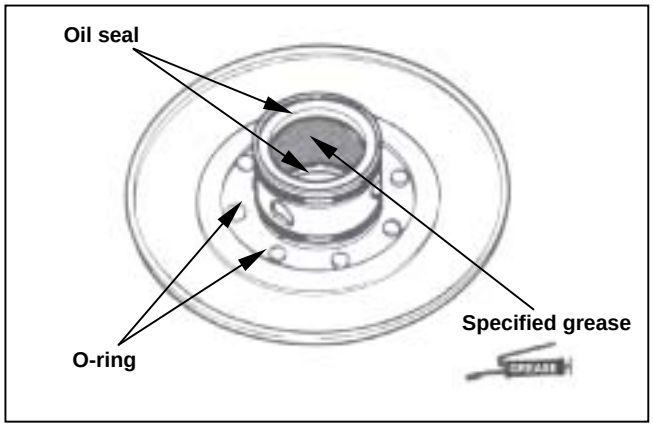
- Its sealing end should be forwarded to outside as bearing installation.
- Install needle bearing with hydraulic presser. Install ball bearing by means of hydraulic presser or driver.



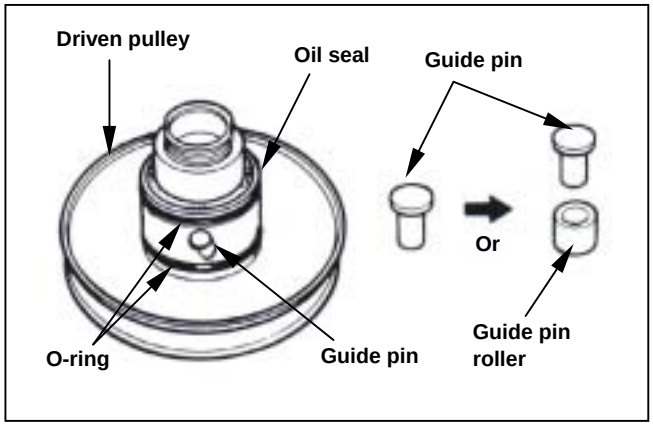
Install snap ring into the groove of driving face. Align oil seal lip with bearing, and then install the new oil seal (if necessary).

Installation of Clutch/Driven Pulley Assembly

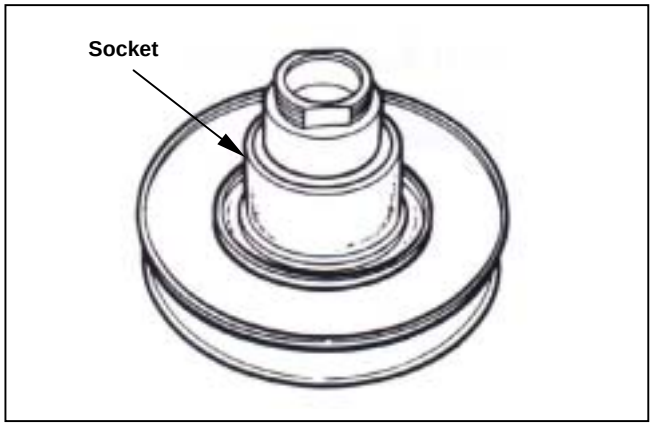
Install new oil seal and O-ring onto driven pulley. Apply with specified grease to lubricate the inside of sliding disc.



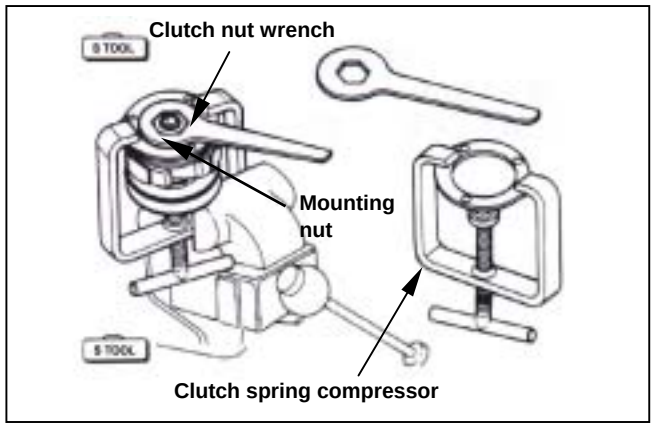
Install sliding pulley onto driven pulley.
Install guide pin and guide pin roller.

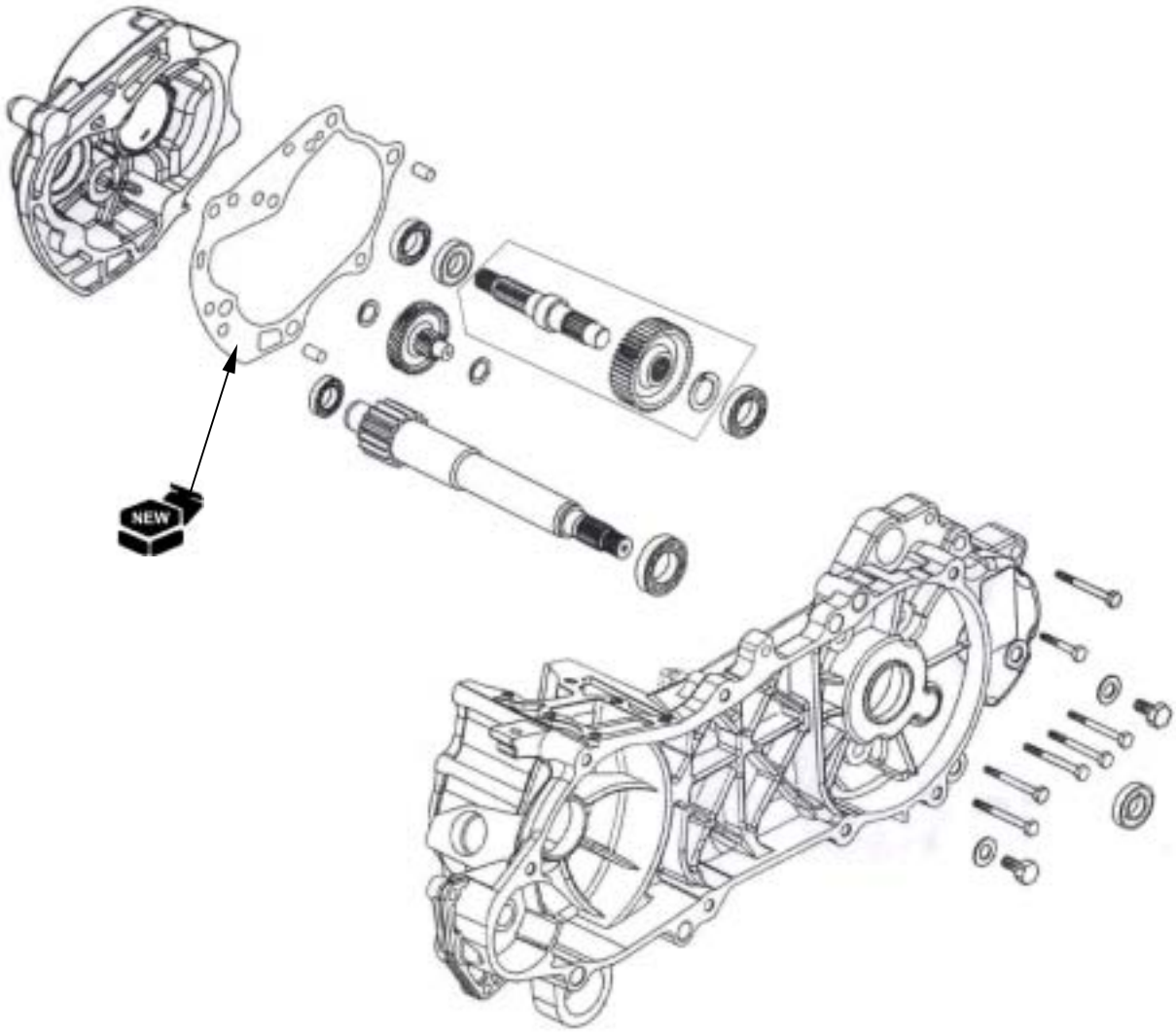


Install socket.



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





MAINTENANCE INFORMATION

Limited usage of engine oil: 4-stroke lubricant
Recommended oil: King serial oil.
Oil quantity: 100 c.c. (90 c.c. as replacement)

Bearing puller set 12 mm
Bearing puller 15 mm

General tools:

Adapter 32X35 mm	
Adapter 37X40 mm	
Punch guide 12mm	
Punch guide 15mm	
Punch guide 17mm	
Driver	

TROUBLESHOOTING

Trouble Diagnosis

Engine can be started but motorcycle can not be moved.

1. Damaged driving gear
2. Burnt out or seized driving gear

Noise

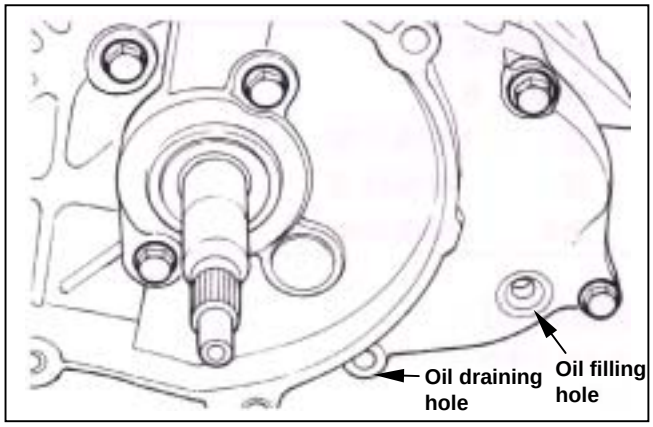
1. Seized, worn or damage gear
2. Worn or loose bearing

Gear oil leaks

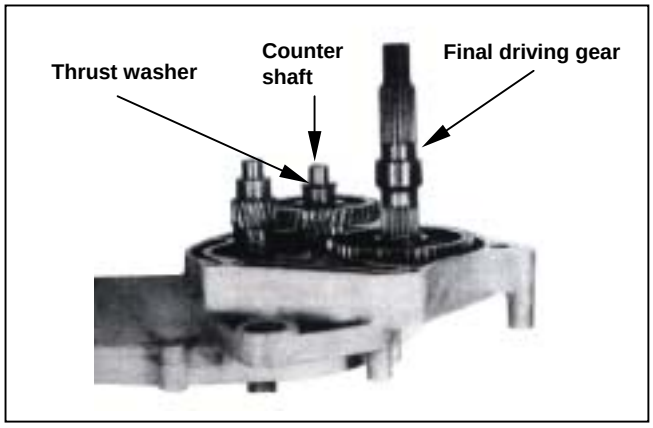
1. Excessive gear oil.
2. Worn or damage oil seal

DISASSEMBLY OF FINAL DRIVING MECHANISM

Remove driven pulley
Drain gear oil out from gearbox.
Remove rear wheel.
Remove gearbox cover mounting bolts from the clutch side and then remove the cover from the rear wheel side.



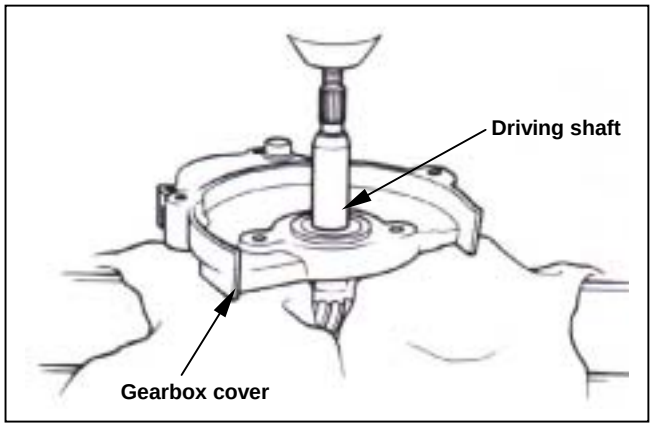
Remove final driving gear and countershaft.



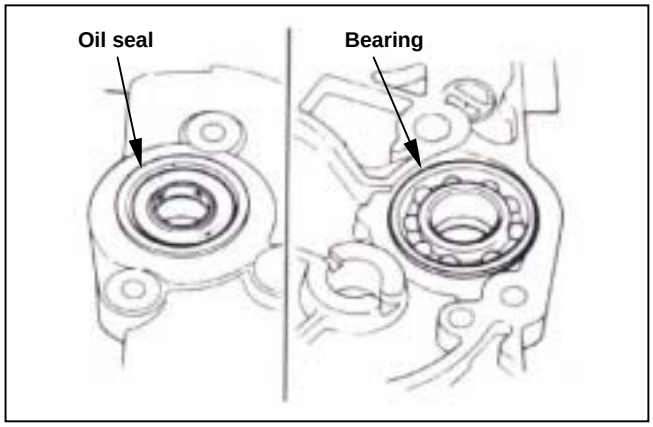
Remove the driving shaft from left crankcase cover.

⚠ Caution

The bearing must be replaced when removing the driving shaft.

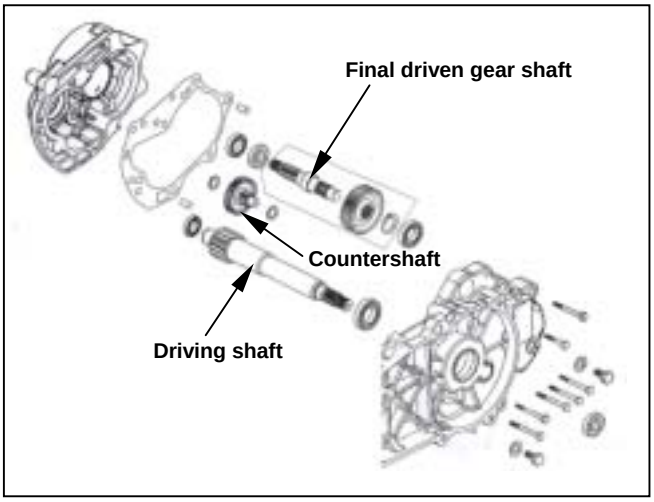


Remove driving shaft oil seal and bearing from left crankcase cover.



INSPECTION OF FINAL DRIVING MECHANISM

Check if the driving shaft, countershaft and final gear shaft are worn or damage.
Check if the gearbox cover bearing, oil seal and the inner diameter of countershaft are worn or damage.
Check if the left crankcase cover bearing, oil seal and the inner diameter of countershaft are worn or damage.

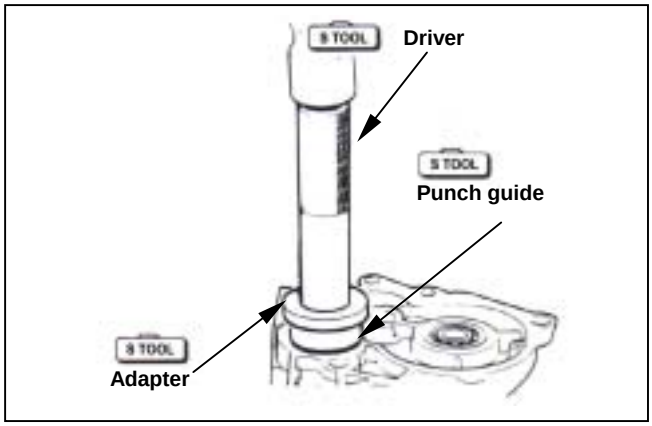


RE-ASSEMBLY OF FINAL DRIVING MECHANISM

Re-assemble the gearbox cover and left crankcase with following tools:

Gear Box Cover

Driving shaft bearing:
Driver
Adapter 37 x 40 mm
Punch guide, 17 mm

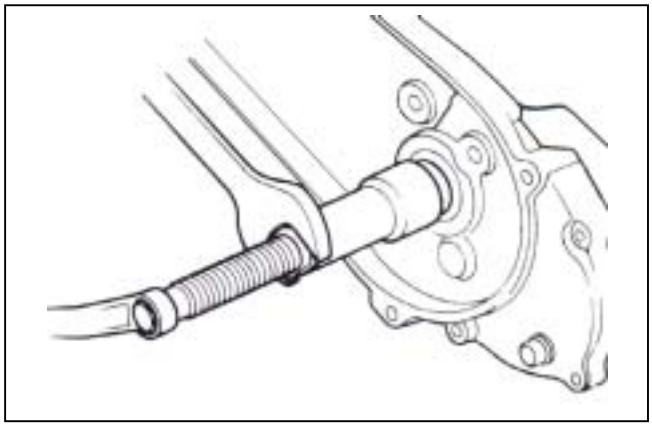


Final Driven Shaft Bearing:

Driver
Adapter 32 x 35 mm
Punch guide, 15 mm

Left Crankcase

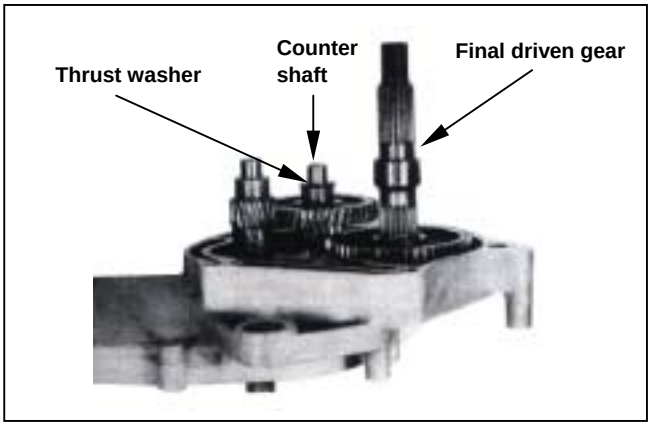
Driving shaft bearing:
Driver
Adapter 32 x 35 mm
Punch guide, 12 mm



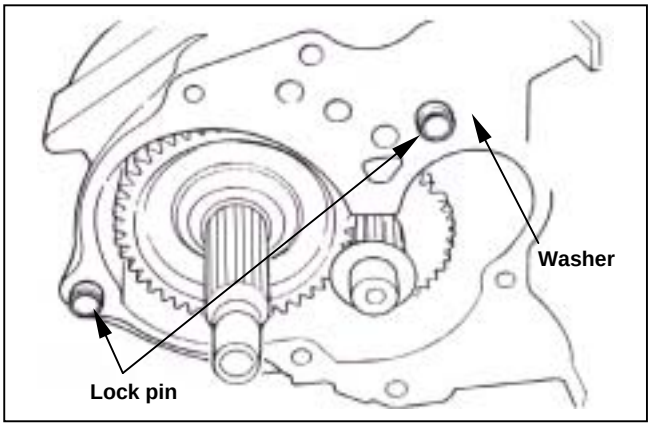
Final Driven Shaft Bearing:

Driver
Adapter 37 x 40 mm
Punch guide, 17 mm
With the special service tools to install driving shaft by through the bearing.
Install a new driving shaft oil seal.
Install a new driven shaft oil seal.

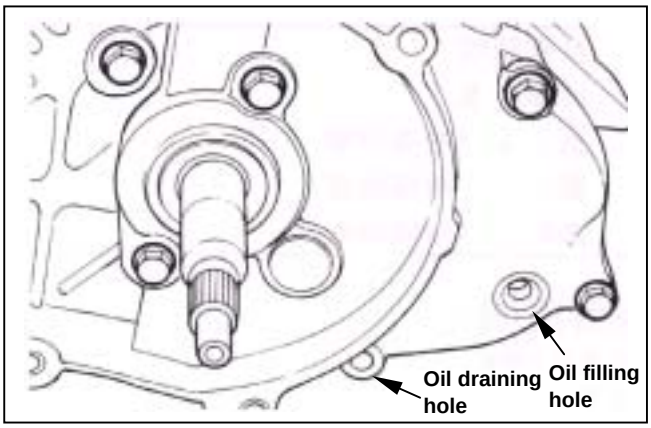
Install countershaft, final driven gear and thrust washer.



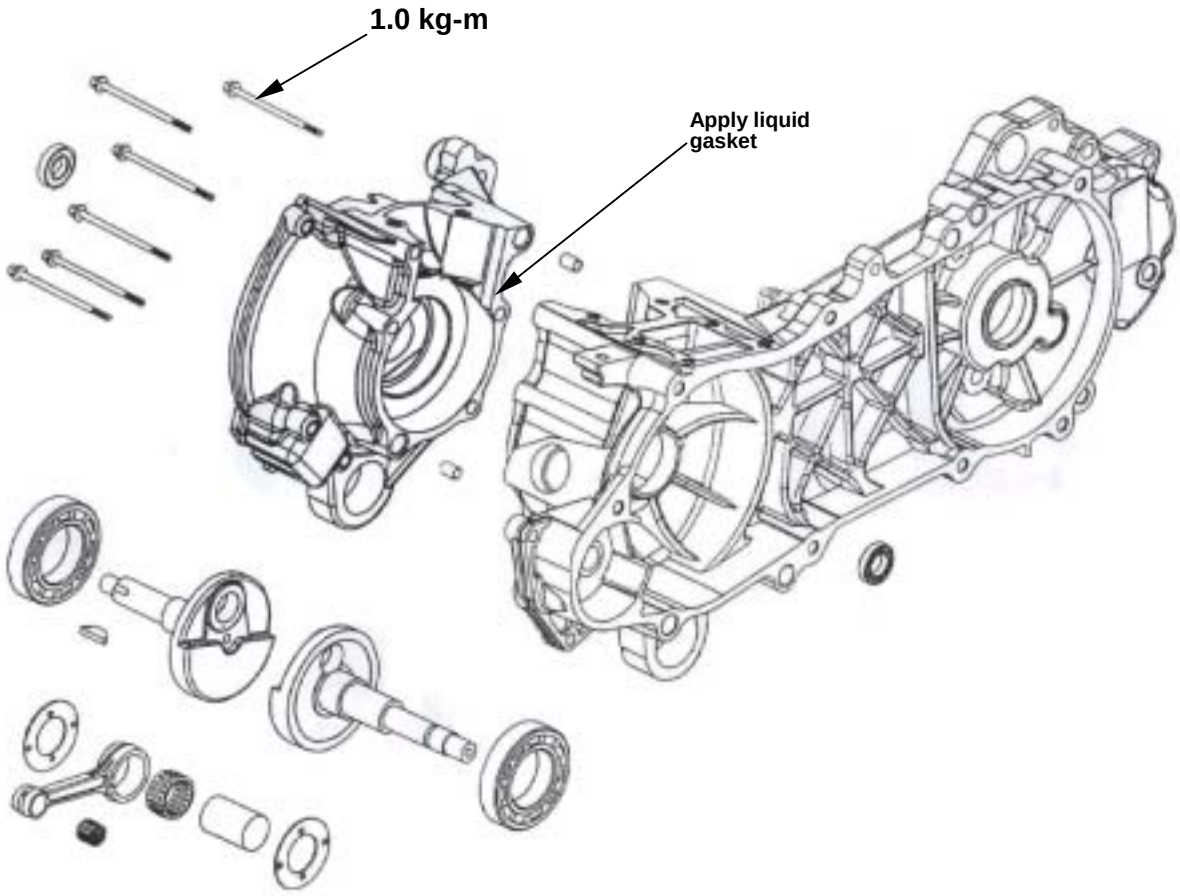
Install new washer and lock pin.



Install gearbox cover.
Install clutch/driven pulley assembly.
Install driven pulley, driving belt, and left crankcase side cover.
Install body cover.
Install rear wheel.
Fill out specified oil quantity into gearbox.



NOTES



9. CRANKCASE/CRANKSHAFT

- This chapter concerns disassembly of the crankcase for repair purpose.
- Before disassembling crankcase, except removing engine firstly, following components must be removed too.
  - Carburetor (page 10-3)
  - Oil pump (page 3-2)
  - Reed valve (page 10-6)
  - Driving belt (page 7-2, 7-4, & 7-5)
  - Alternator (page 6-2)
  - Cylinder head/cylinder/piston (page 5-2 & 5-4)
- Except above components are needed be removed , when disassembling L crankcase, following components must be removed too.
  - Final driving mechanism (page 9-2)
- When assembling both crankcase and crankshaft, it has press the inner ring edge of the crankshaft bearing to push the crankshaft into the crankcase hole by using the specified service tools. The old bearing onto the crankshaft has to be removed. Then install a new bearing onto the crankshaft on the crankcase side. Oil seal has to be replaced with new one after assembled the crankcase.

Item	Standard	Limit (mm)
Lateral cearance of the big end of the connecting rod	—	0.60
Radial clearance of the big end of the connecting rod	—	0.04
Crankshaft run-out point A	—	0.10
Crankshaft run-out point B	—	0.10

Service Tools

Special Service Tools

Assembly shaft tube	Driver
Assembly shaft	Adapter 52 X 55 mm
Multi-purpose bearing puller	Guide bar 17 mm
Crankcase puller	

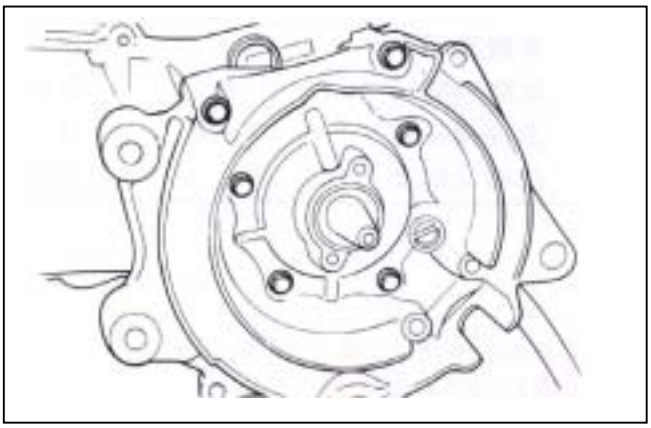
TROUBLESHOOTING

Engine noise

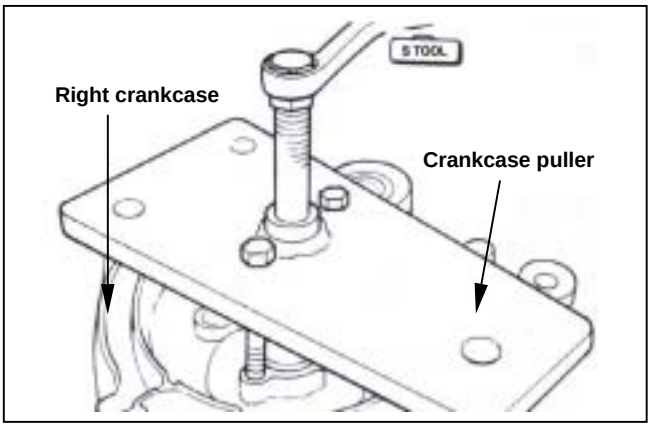
1. Worn bearing of connecting rod bog end
2. Bend connecting rod
3. Worn crankshaft bearing

CRANKCASE DISASSEMBLY

Remove the crankcase bolts.



Install the crankcase puller onto the right crankcase with two (2) bolts, 6mm, as the diagram shown.
Disassemble the right crankcase.

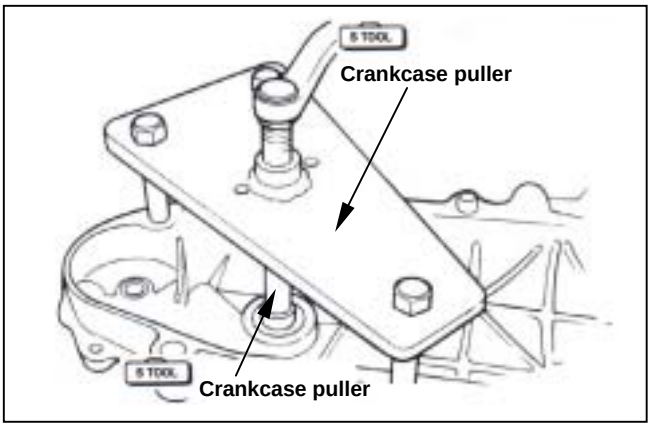


CRANKSHAFT REMOVAL

As the diagram show with 3 special bolts to install the specified service tool onto the left crankcase.
Remove the crankcase.

⚠ Caution

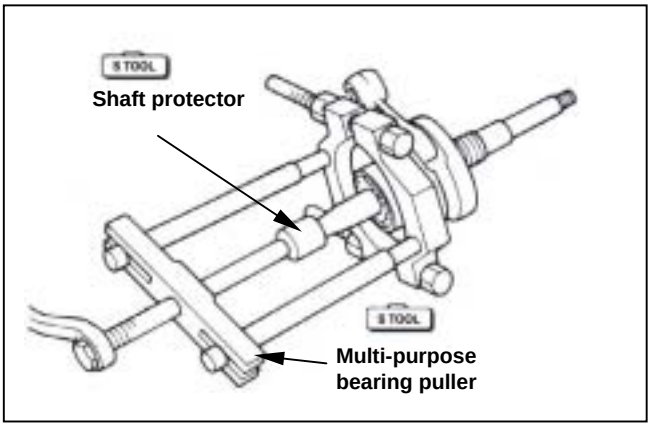
Do not use iron hammer to knock out the crankshaft.



Remove crankshaft bearing with bearing puller.
Remove the right and left side oil seals.

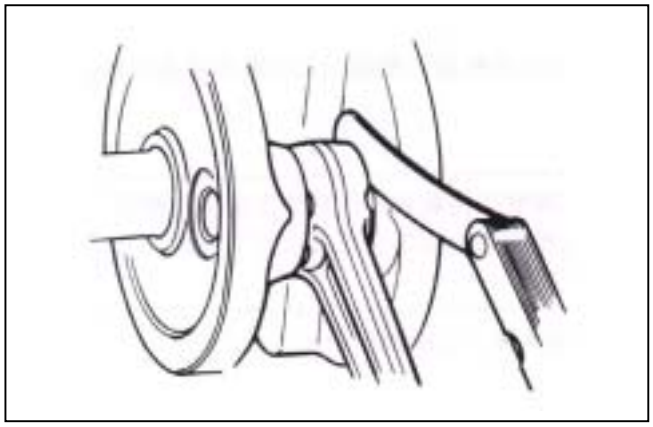
⚠ Caution

Replace the oil seal with new one as removing the crankshaft.

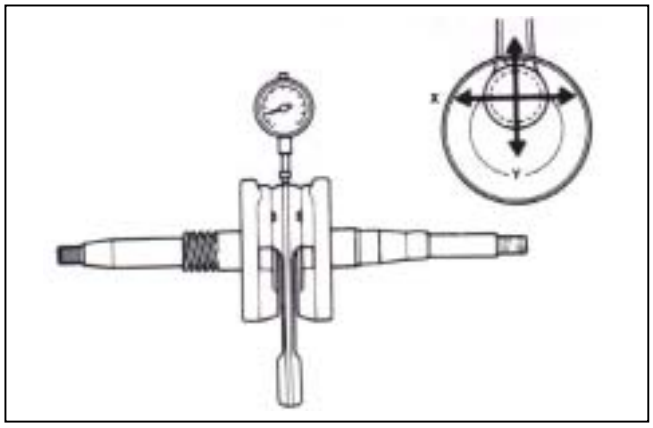


CRANKSHAFT INSPECTION

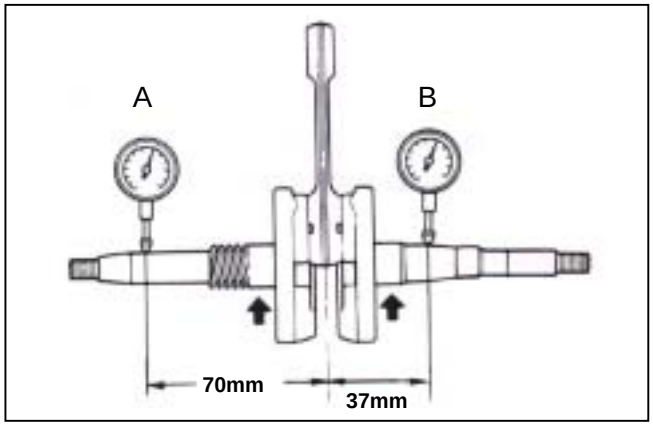
Measure the clearance of connecting rod big end.
Service limit: 0.60 mm



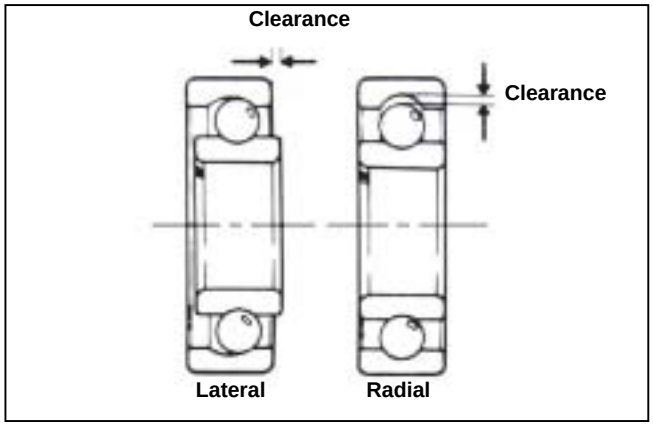
Measure the radial clearance of connecting rod big end at X-Y directions as diagram show.
Service limit: 0.04 mm



Place the crankshaft on a V-block, measure run-out points A and B of the crankshaft with dial gauge.
Service limit: A: 0.10 mm
B: 0.10 mm



Check the crankshaft bearing by means of turning it with hand. If any noise and bigger clearance are detected, replace the bearing with new one.

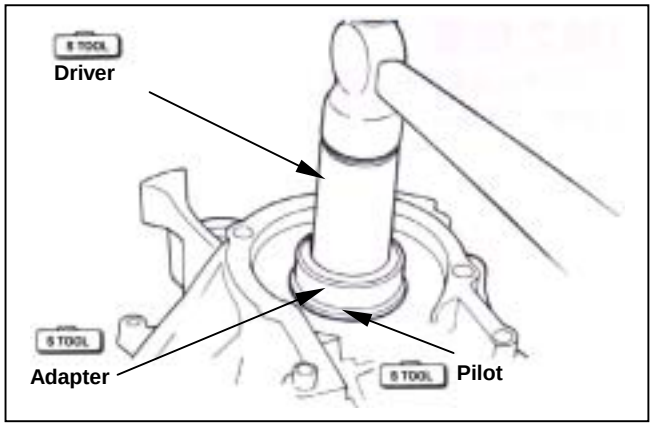


CRANKSHAFT INSTALLATION

Clean the crankshaft with solvent and blow it with compressed air. Then, check for damage or other foreign materials attached.

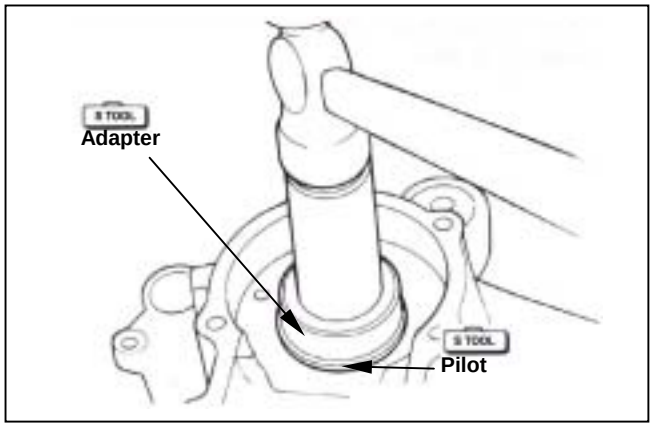
⚠ Caution

- All rotation and sliding surfaces have to be applied with clean engine oil.
- Remove all gaskets onto the crankcase interfaces and flat it with special tool.

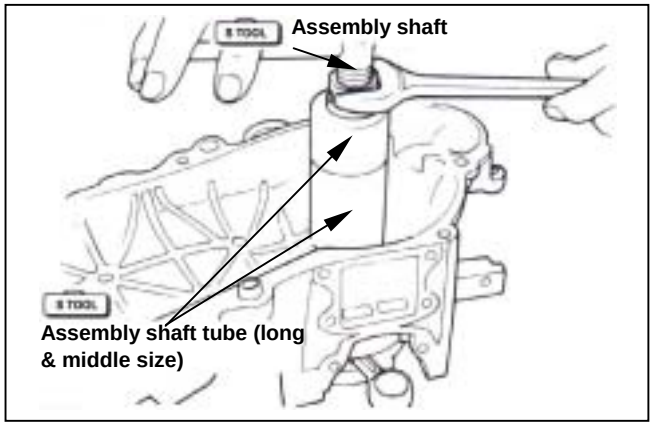


Install new bearing into right crankcase.

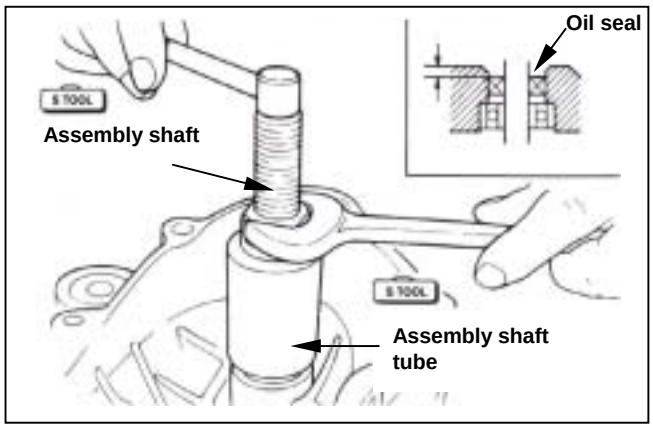
Install new bearing into left crankcase.



Install crankshaft onto the left crankcase.
Install crankshaft assembly tool onto crankshaft.
Screw the bolt into crankshaft.
Turn the bolt in C.W. direction and then completely screw the bolt to bottom.
Lubricate crankshaft bearing and bearing seat with 2-stroke engine oil.

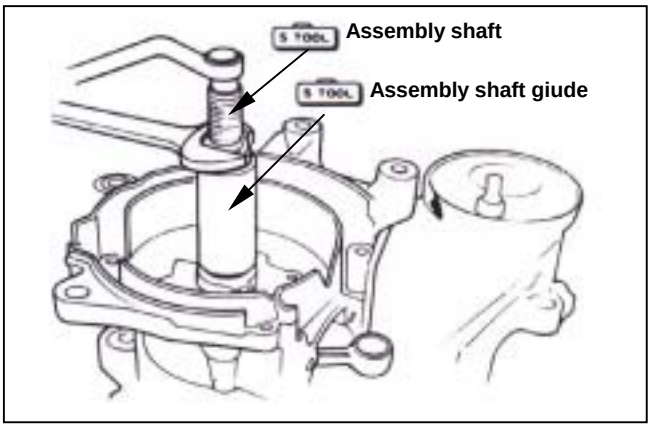


With the specified service tool to install a new oil seal onto the left crankcase to the depth of 1 mm as the diagram shown.

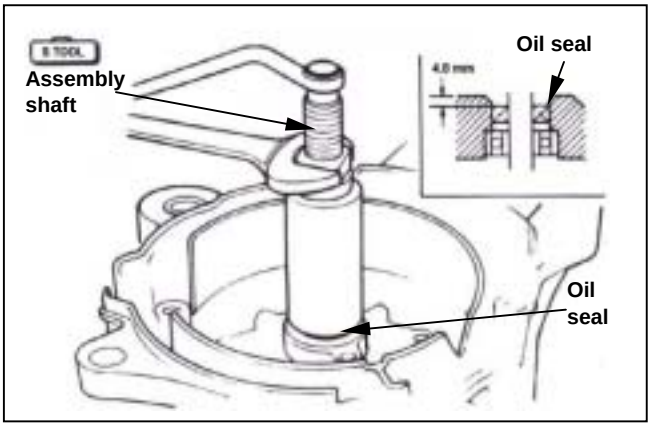


CRANKCASE ASSEMBLY

Install gasket and lock pin onto the interface of crankcase.
Assemble the crankcase with assembly tools.



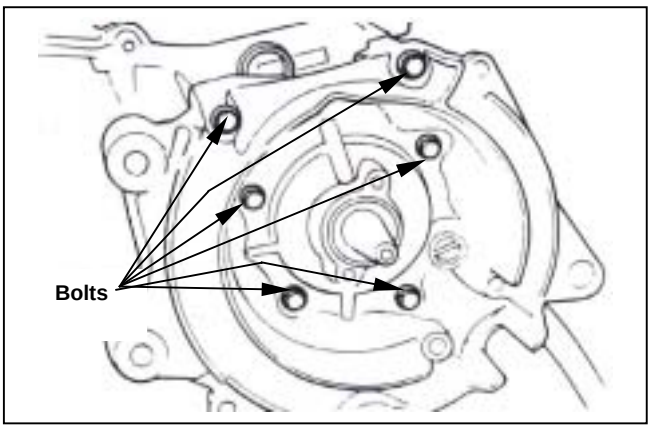
With same tools, install new oil seal into the right crankcase. Its installation depth is 4 mm as the diagram shown.



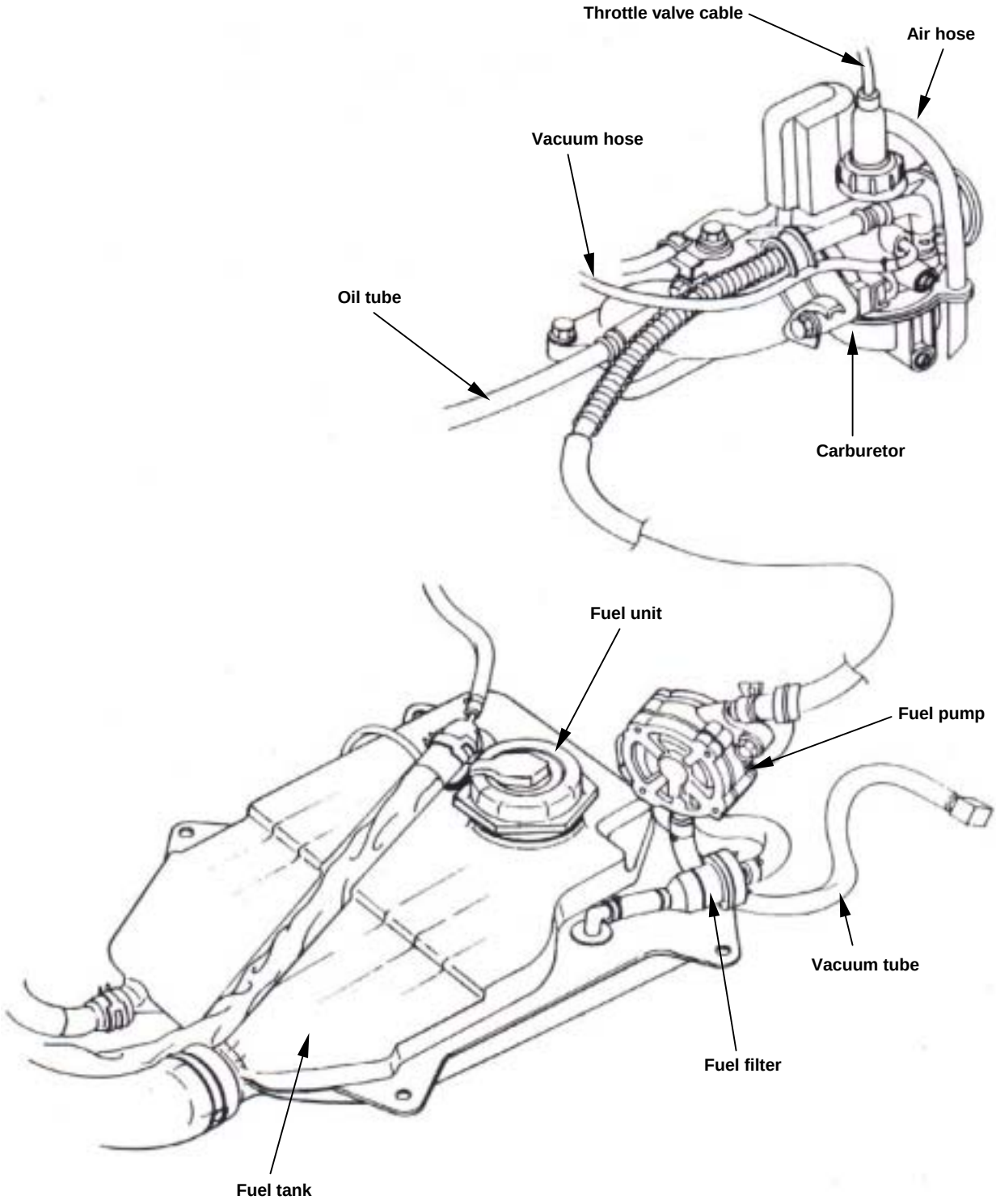
Install the bolts and tighten them.
Torque value: 1.0 kg-m

⚠ Caution

Make sure that the crankshaft can be rotated freely after tightening the bolts.



Install the following components:
~ Final driving mechanism (page 8-3)
~ Alternator (page 6-2)
~ Piston/cylinder/cylinder head (page 7-4, 7-8)
~ Oil pump (page 3-2)
~ Reed valve and carburetor (page 10-3, 10-6)
~ Engine (page 4-3)



MAINTENANCE INFORMATION

Precautions in Operations

⚠ Warning

Gasoline is a highly flammable material and may explosive under circumstance. Thus, always work in a well-ventilated place and strictly prohibit flame when working with gasoline.

- Care must be taken when dealing with gasoline, and always work in a well-ventilated place and strictly prohibit flame.
- When disassembling fuel system parts, pay attention to O-ring position, replace with new one as re-assembly
- It has to conduct air bleeding operation as removed the oil tube.
- Idle speed adjustment.

Specification

Venturi diameter	14 mm
I.D. number	PB2BE
Fuel level	8.6 mm (0.335 in)
Air screw opener	1 3/8
Idle speed	2000± 100 rpm
Throttle handle free play	2~6 mm
Main jet	#82
Fuel pump output	20 c.c. minimum.

TROUBLESHOOTING

Engine can not be started

1. No fuel in fuel tank
2. Fuel can not reach to carburetor
3. Too much fuel in cylinder
4. Clogged air cleaner

Stall after started

1. Incorrect idle speed adjustment
2. No spark on the spark plug
3. Low compression pressure
4. Rich mixture
5. Lean mixture
6. Clogged air cleaner
7. Intake pipe leaking
8. Polluted fuel

Lean Mixture

1. Clogged carburetor jet
2. Clogged hose from carburetor to canister
3. Bend, squeezed or clogged fuel lines
4. Clogged fuel filter
5. Malfunction of float valve
6. Low fuel level in float chamber
7. Clogged vent pipe
8. Malfunction of fuel pump

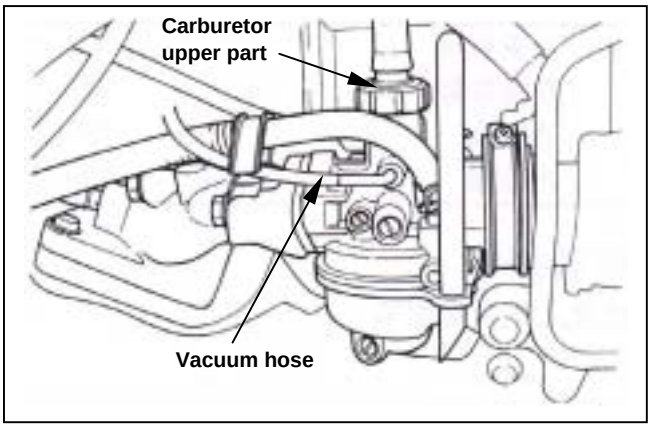
Rich Mixture

1. Malfunction of float valve
2. Low fuel level in float chamber
3. Clogged carburetor air injector

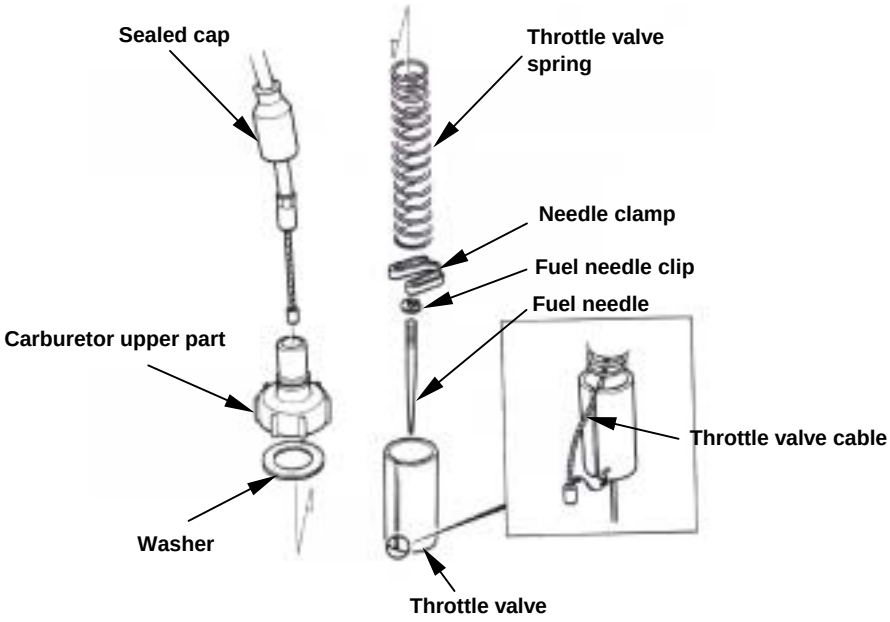
THROTTLE VALVE

Removal

Remove the body cover.
Remove the throttle valve cable from the throttle valve.
Remove the throttle valve spring, carburetor upper part and sealed cap.
Remove needle clamp and fuel needle.



Inspection



Installation

Place the fuel needle onto the throttle valve and clip it with needle clamp.
Install the sealed cap, carburetor upper part, and throttle valve spring.
Connect the throttle valve cable to the throttle valve.
Install the throttle valve into the carburetor body.

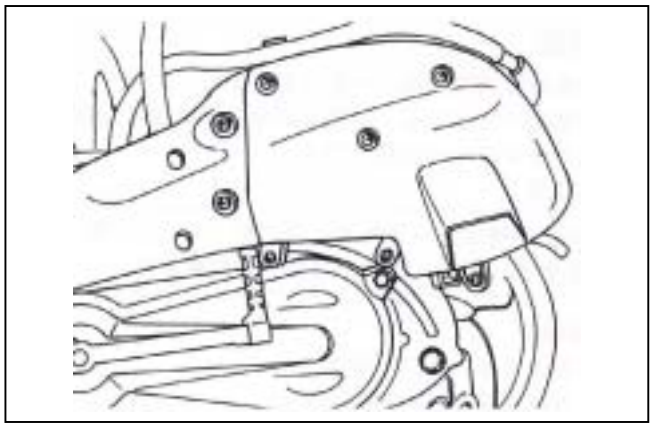
⚠ Caution

Align the groove inside the throttle valve with the throttle stopper screw of the carburetor body.

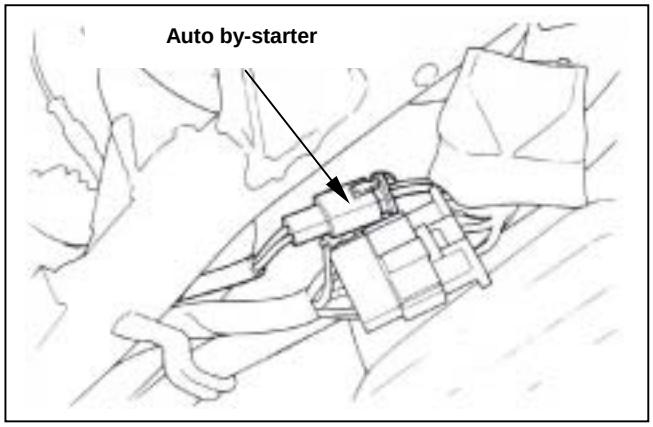
Tighten the carburetor upper part.
Install carburetor protector.
Adjust the free play of throttle valve cable.

CARBURETOR

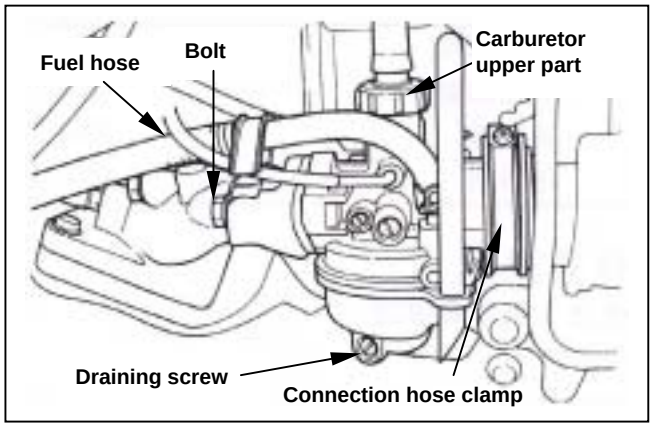
Remove the body cover.
Remove the mounting bolts of carburetor cap and cover.



Disconnect the auto by-starter connector.



Loosen draining screw and then drain out fuel inside the carburetor.
Loosen connection screw and remove carburetor upper part.
Remove fuel and vent hoses from carburetor.
Remove carburetor mounting bolt and carburetor.



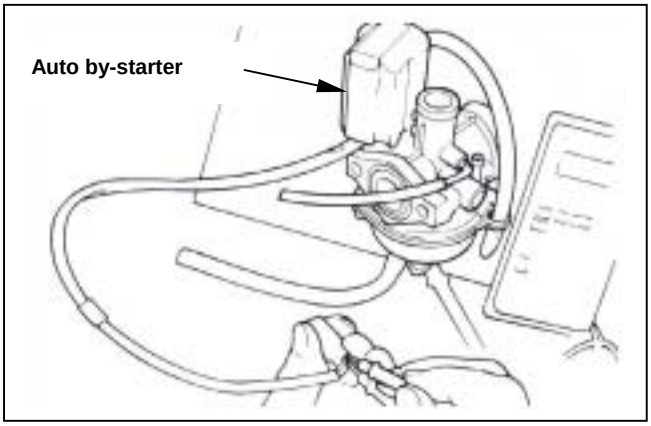
AUTO BY-STARTER INSPECTION

Connect resistor meter to the terminals of auto by-starter, and then measure its resistance.
If the resistance value exceeds specification too much, it means that the PTC in the auto by-starter is malfunction. Then, replace the auto by-starter.

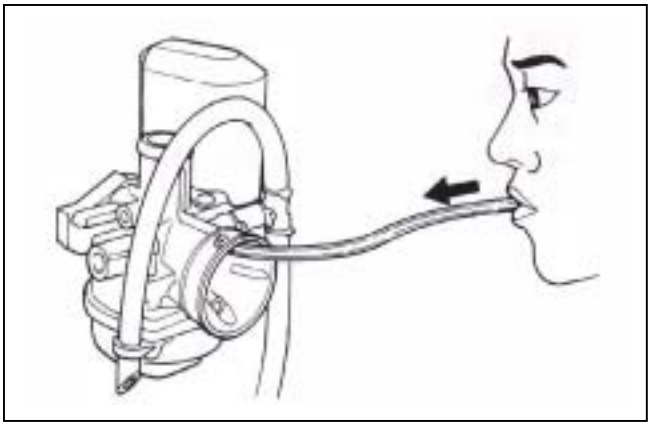
Resistance value: Max. 10Ω(at cold engine)

⚠ Caution

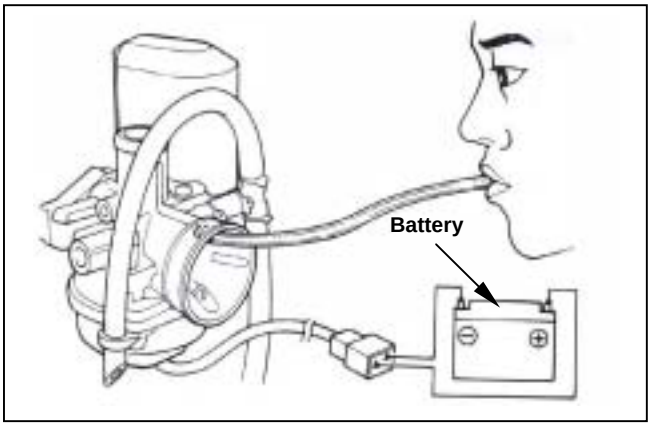
If the resistance value exceeds the standard a little bit, the auto by-starter may still in normal. However, it is necessary to check other relative components for damage.



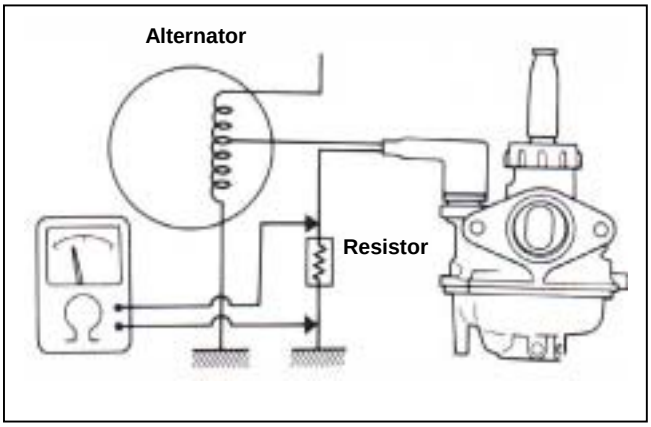
Remove carburetor, and allow it to cool off for 30 minutes.
Connect fuel rich circuit with a hose and pump compressed air to the hose.
Air should flow into fuel rich circuit.
Replace the auto by-starter if the circuit clogged.



Connect battery to starter's connectors and wait for several minutes.
Pump compressed air into the fuel rich circuit.
Air should not flow into the circuit.
If air flow through the circuit, then, replace the starter.

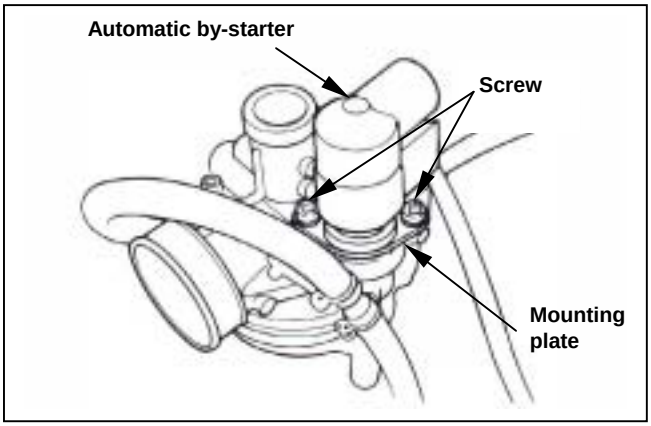


Check resistor to make sure that the auto by-starter is in normal. Engine is running.
If the resistor is in open-circuit, then current will not flow into the PTC. Thus, the auto by-starter is not operated.
However, if the resistor is in short-circuit, current higher than specification will flow into the PTC. Then, it will cause the fuel rich circuit close rapidly, and difficult to start the motorcycle.
Resistance value: 10.2Ω



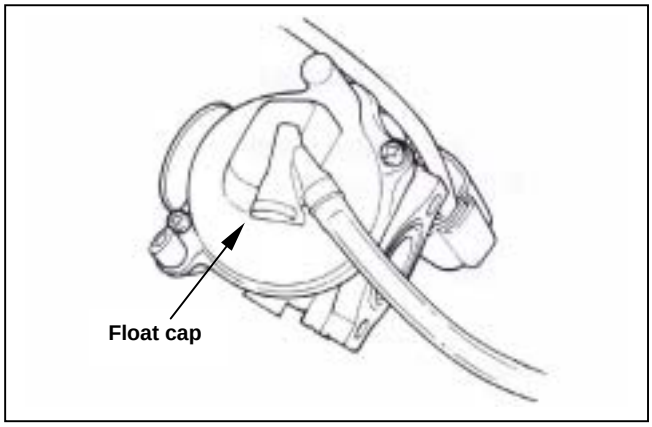
AUTOMATCI BY-STARTER REMOVAL/INSTALLATION

Remove the cover of the by-starter.
Remove screw and mounting plate.
Remove the auto by-starter from carburetor.
Install in the reverse order of removal procedures.



FLOAT/FLOAT VALVE/JET REMOVAL

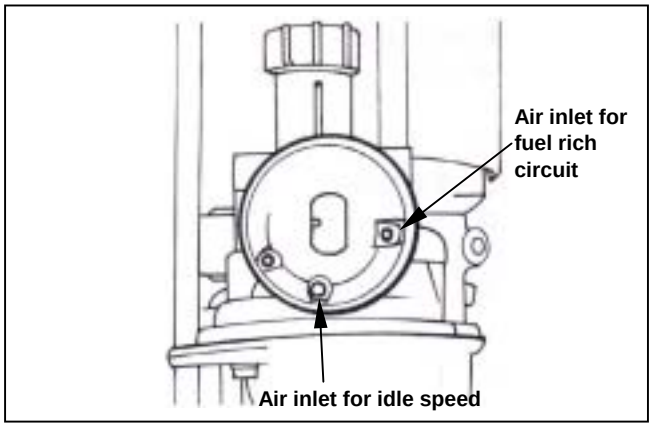
Remove the float from carburetor body.
Remove the float pin and then remove float and float valve.
Check the valve seat for worn out or damage.
Check float for bend and if fuel inside the float.
Before removing both the throttle valve stopper and air screws, record their original turns for close to their original set up position as installation.



⚠ Caution

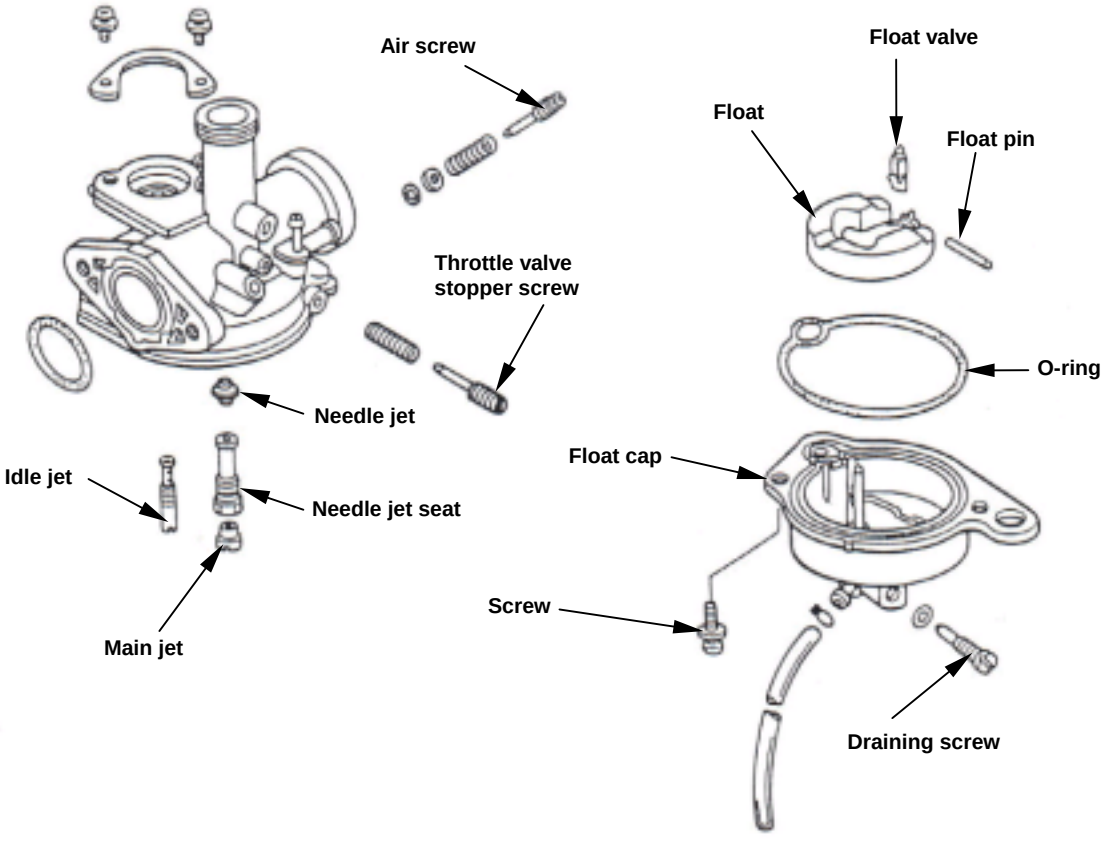
Do not tighten the screw forcedly to avoid to damaging the valve seat.

Remove main jet, needle jet seat and idle jet and clean them and each component with compressed air.



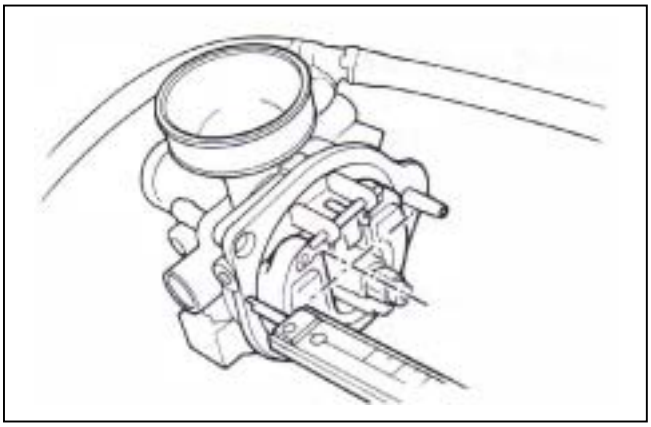
FLOAT/FLOAT VALVE/JET INSTALLATION

Install the idle jet, the needle jet seat and main jet. Then install the throttle valve stopper and air screws to their original position according to the marks as removal. Adjust the screws if replace with new ones.



FLAOT LEVEL INSPECTION

Measure float fuel level to have the upper end of float just contact with the float.
Float fuel level: 8.6 mm
Carefully bend the float arm for adjustment.
Check the float operation and the install it.



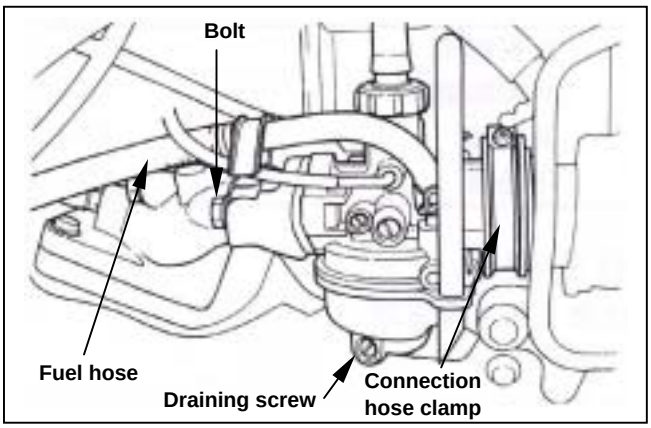
CARBURETOR INSTALLATION

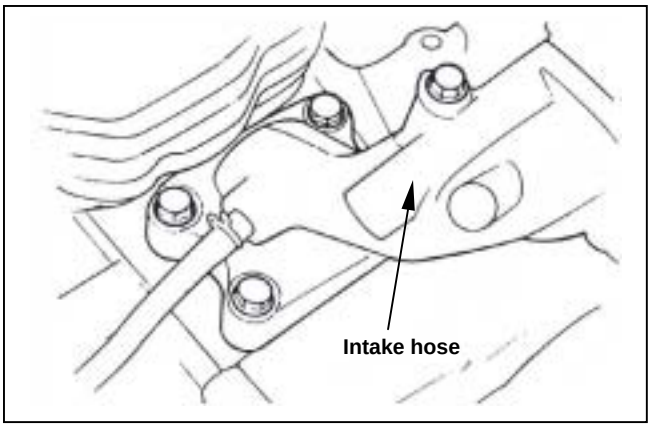
⚠ Caution

Do not let foreign materials into the carburetor.

Install the carburetor and insulator onto intake pipe with bolts.
Install fuel and vent pipes onto carburetor.
Install the carburetor upper part.
Tighten the connection hose.
Tighten the draining screw.
Connect the automatic by-starter connector.
Install air cleaner cap.
Conduct following operations

- Adjustment of throttle valve cable.
- Adjustment of oil pump.
- Adjustment of idle speed.

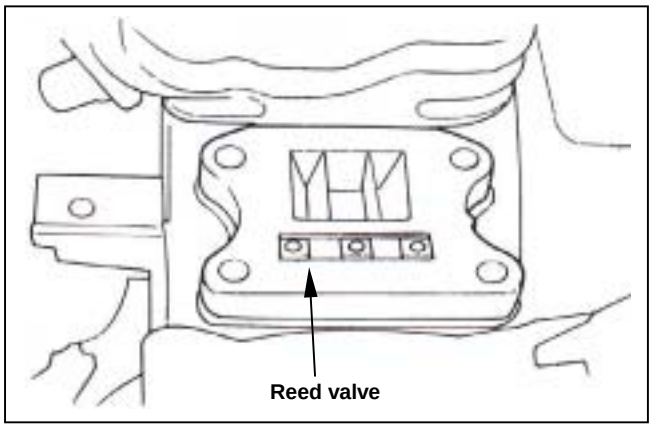




REED VALVE

REMOVAL

Remove the body cover.
Remove the carburetor.
Remove engine shield.
Remove intake hose.
Remove the reed valve.

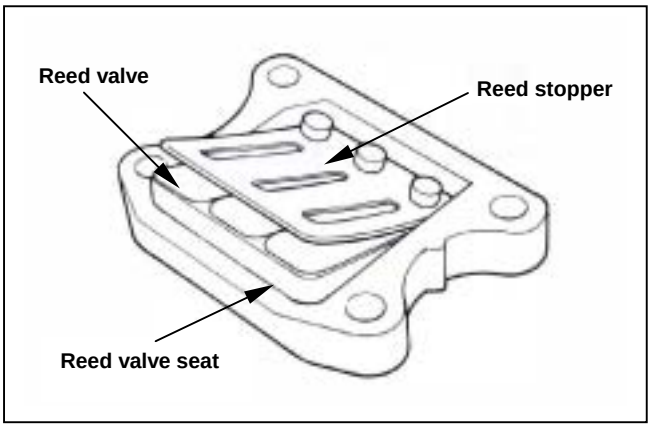


INSPECTION

Check the reed valve for damage and its reed strength.
Check the reed valve seat for crack, damage and the clearance between the seat and the valve.
Replace reed valve if necessary.

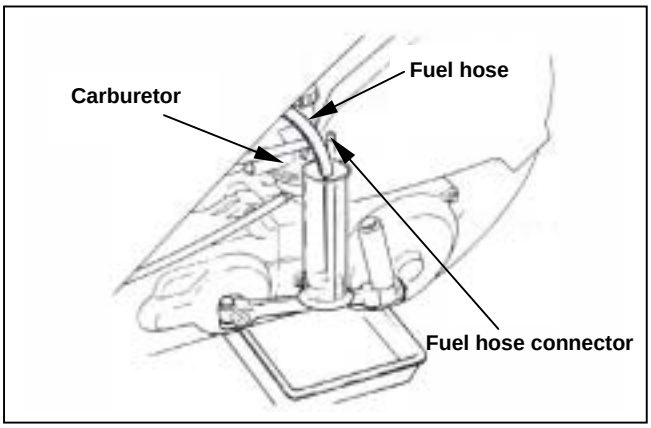
⚠ Caution

Do not bend the reed valve stopper. Otherwise, it will cause its strength insufficient and rough engine running. If the reed valve or its seat is damaged, replace with a set.



INSTALLATION

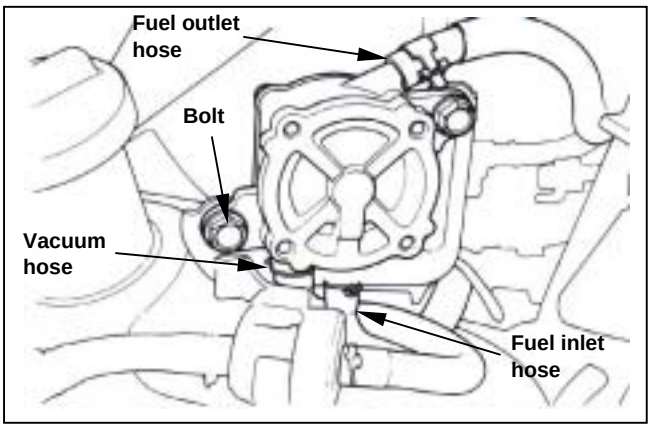
Install in the reverse order of removal procedures.
Check for leaking after installed.



FUEL PUMP

INSPECTION

Remove the body cover.
Warm up the engine and adjust idle speed.
Remove fuel hose from carburetor and then wait for 5 minutes.
Measure the output of fuel pump. Its output time is 10 seconds.
Output quantity: Min. 20 c.c.
If the output quantity is lower than 20 c.c., check fuel hose, vacuum hose and fuel filter.



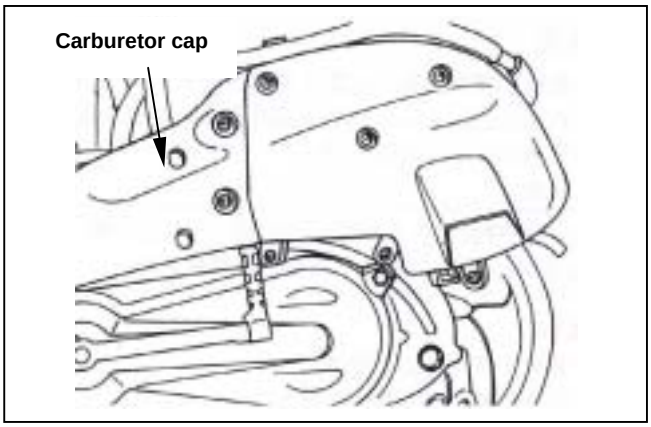
REMOVAL/INSTALLATION

Remove floor plate.
Remove fuel inlet, outlet and vacuum hoses.
Remove 2 bolts and fuel pump.
Install the fuel pump in the reverse order of removal procedures.

AIR CLEANER

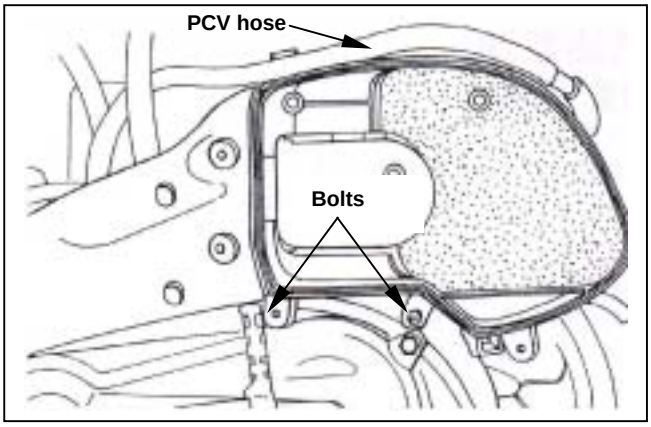
REMOVAL/INSTALLATION

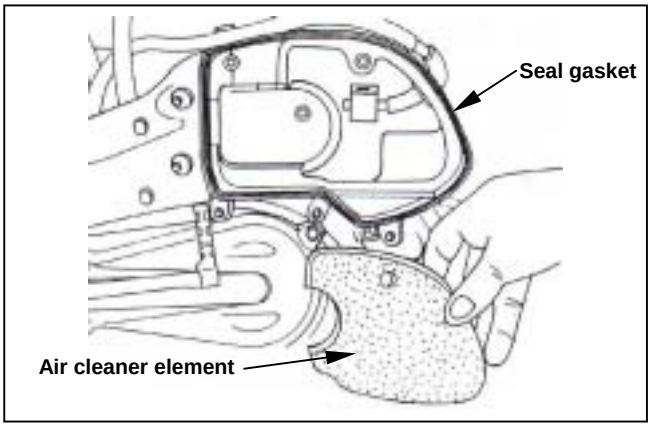
Remove the body cover.
Remove 5 bolts and then remove the carburetor cap.



Remove the PCV hose from the air cleaner outer case.
Loosen connection hose clamp.
Remove 2 bolts and then remove the air cleaner outer case.
Install in the reverse order of removal procedures.

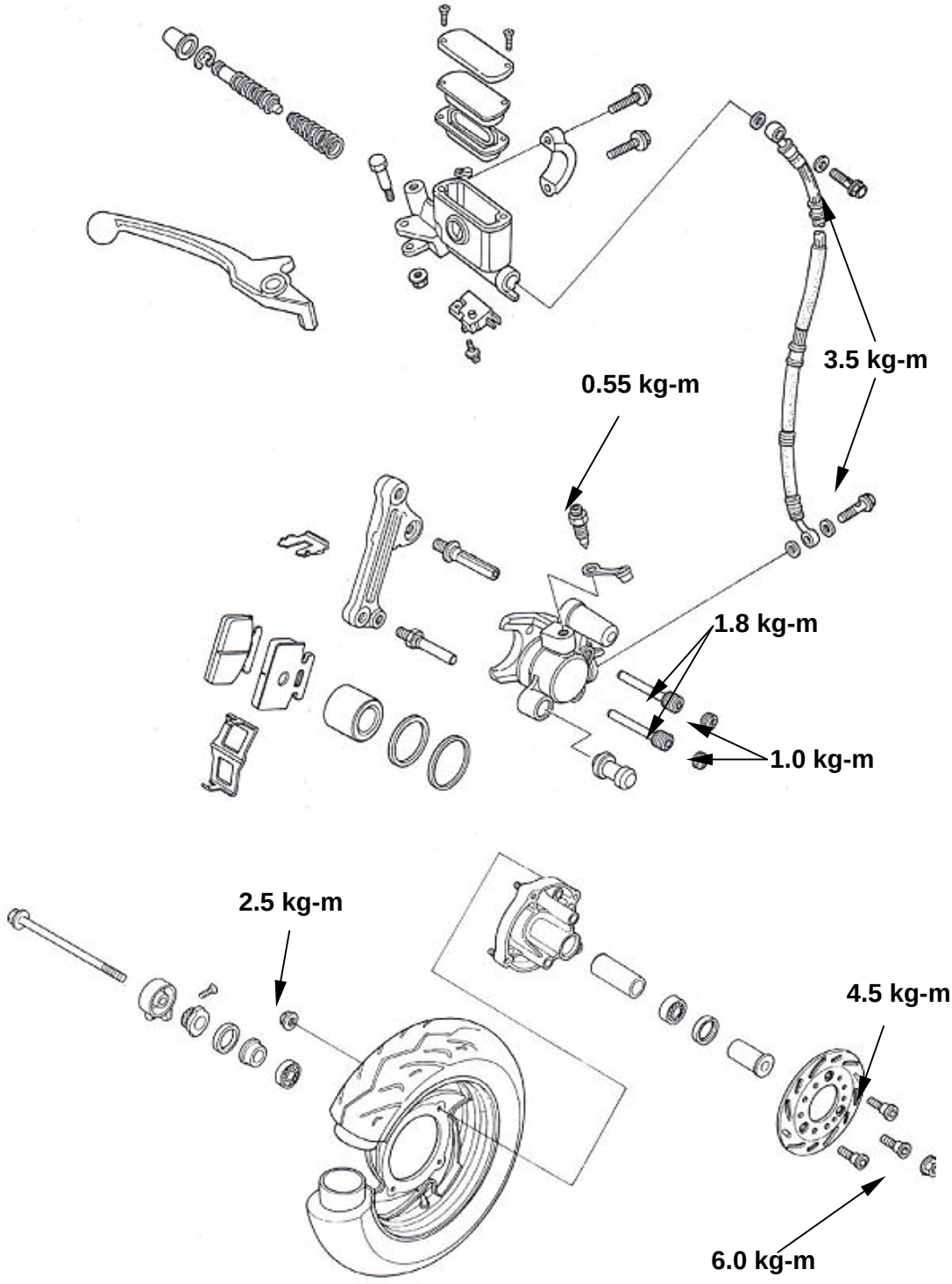
Install the air cleaner outer case.



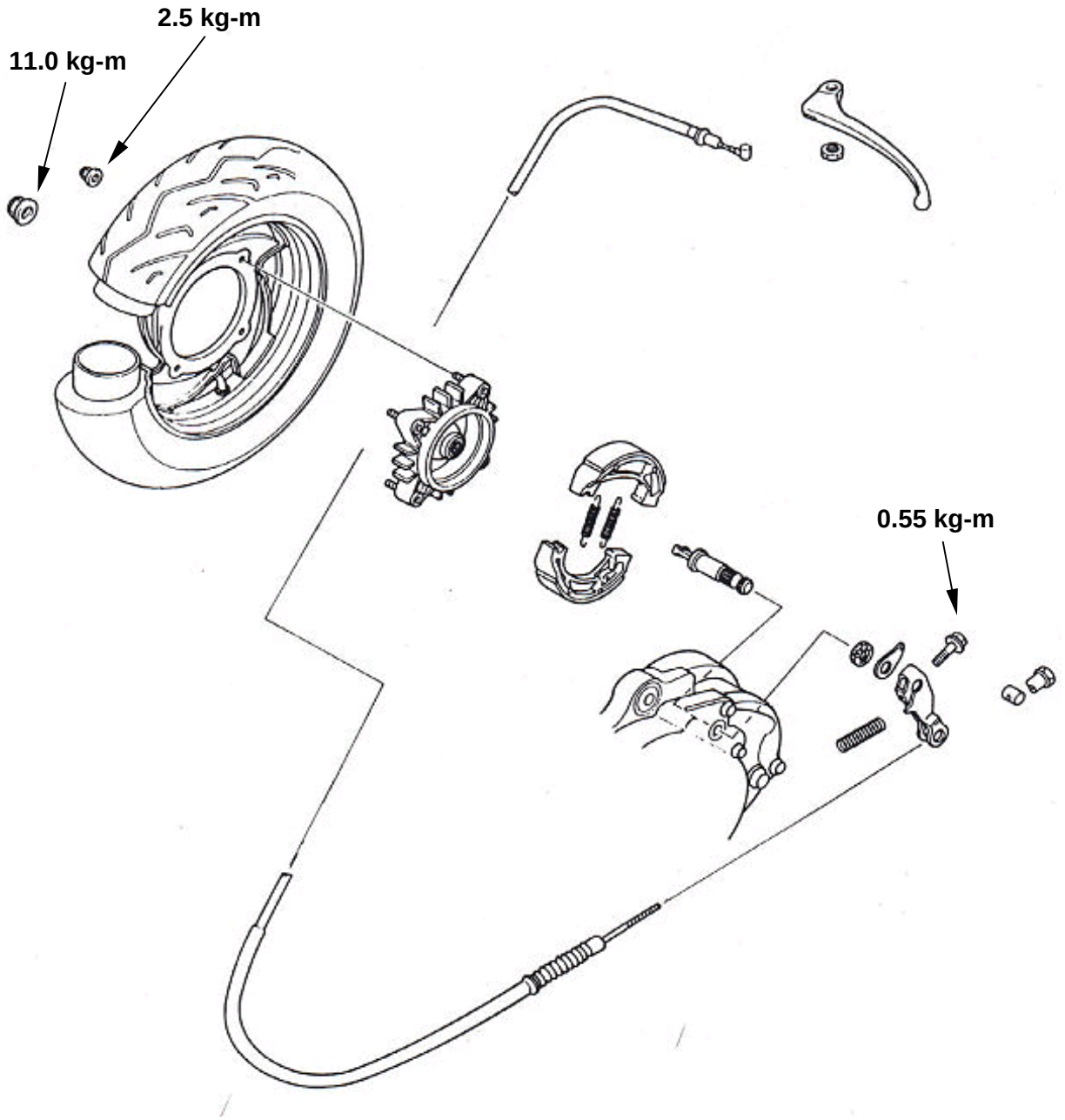


NOTES

Front Disc Brake System



Rear Drum Brake System



MAINTENANCE INFORMATION

Precautions in Operation

⚠ Caution

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

- The brake caliper can be removed without removing the hydraulic system.
- After the hydraulic system is removed, or the brake system is felt to be too soft, bleed the hydraulic system.
- While refilling brake fluid, care should be taken not to let the foreign material entering into the brake system.
- Do not spill brake fluid on the painted surfaces, plastic or rubber parts to avoid damage.
- Check the operation of the brake system before you go.

Specifications

Item	Standard (mm)	Limit (mm)
The thickness of front brake disc	3.5	2.0
Front brake disc run-out	< 0.10	0.3
Master cylinder inner diameter	11.000 - 11.043	11.055
Master cylinder piston outer diameter	10.957 - 10.984	10.945
ID of rear brake drum	95.0	95.5
Thickness of front brake lining	4.0	2.0
Thickness of rear brake lining	4.0	2.0

Torque values

Brake hose bolt	3.5 kg-m
Bolt for brake caliper	3.3 kg-m
Bolts for the lining guide pin	1.8 kg-m
Bolts for the lining guide pin cap	1.0 kg-m
Air-bleed valve	0.55 kg-m
Bolt for rear brake arm	0.55 kg-m

TROUBLESHOOTING

DISC BRAKE

Soft brake lever

1. Air inside the hydraulic system
2. Hydraulic system leaking
3. Worn master piston
4. Worn brake pad
5. Poor brake caliper
6. Worn brake lining/disc
7. Low brake fluid
8. Blocked brake pipe
9. Warp/bent brake disc
10. Bent brake lever

Hard operation of brake lever

1. Blocked brake system
2. Poor brake caliper
3. Blocked brake pipe
4. Seized/worn master cylinder piston
5. Bent brake lever

Uneven brake

1. Dirty brake lining/disc
2. Poor wheel alignment
3. Clogged brake hose
4. Deformed or warped brake disc
5. Restricted brake hose and fittings

Tight brake

1. Dirty brake lining/disc
2. Poor wheel alignment
3. Deformed or warped brake disc

Brake noise

1. Dirty lining
2. Deformed brake disc
3. Poor brake caliper installation
4. Imbalance brake disc or wheel

DRUM BRAKE

Poor brake performance

1. Improper brake adjustment
2. Worn brake lining
3. Worn brake drum
4. Worn brake cam
5. Improper brake lining installation
6. Seized brake cable
7. Dirty brake lining
8. Dirty brake drum
9. Brake pad worn in brake cam area.
10. Poor contact between brake arm and camshaft indent

Tight operation or low return speed of brake lever

1. Worn/broken/crack return spring
2. Worn drum
3. Dirty brake lining
4. Brake seized caused from dirty brake drum
5. Seized brake cable
6. Worn brake cam
7. Improper brake lining installation

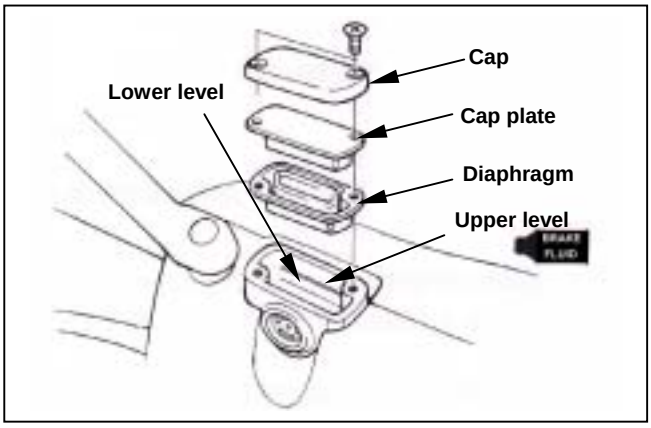
Brake noise

1. Worn brake lining
2. Worn drum
3. Dirty brake lining
4. Dirty brake drum

HYDRAULIC DISC BRAKE

- Close the drain valve of the hydraulic disc brake.
- Replace the brake fluid.

Before the brake fluid reservoir is removed, turn the handle so that the brake fluid reservoir becomes horizontal, then remove the brake fluid reservoir.
Cover the painted surfaces, plastic or rubber components with a rag when servicing brake system.



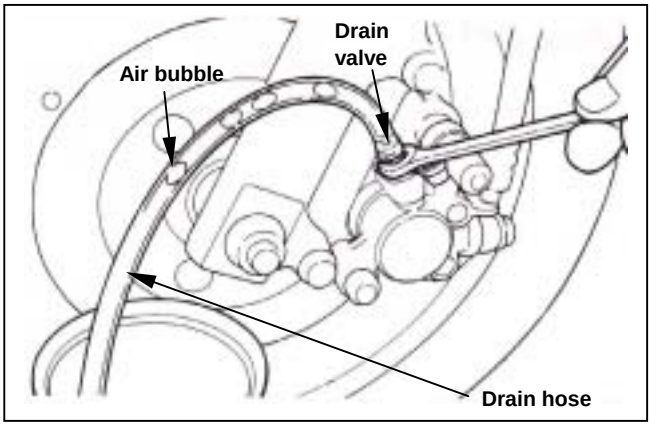
⚠ Caution

Spilled brake fluid on painted surfaces, plastic or rubber components may result in their damages.

Remove the master cylinder cap and diaphragm.
Use brake fluid to clean the dirty brake disc.

⚠ Caution

The dirty brake lining or disc will reduce the brake performance.



Refill up same grade brake fluid into the reservoir.

⚠ Caution

To mixed non-compatible brake fluid will reduce brake performance. Foreign materials will block the system causing brake performance to be reduced or totally lost.

Connect drain hose to drain valve.
Open the drain valve on the caliper and operate the brake lever until the old brake fluid is entirely drained out. Close the drain valve and add specified brake fluid into the brake master cylinder.
Recommended brake fluid: WELLRUN DOT 3 brake fluid

⚠ Caution

To reuse the spent brake fluid will effect brake performance.

Connect one end of transparent hose to the drain valve, and put the other end into a container.
Open the drain valve around 1/4 turns, and at the same time hold the brake lever until the there is no air bubble in the drain hose and also feeling resistance on the brake lever.
Close the drain valve when finishing the brake system refilling fluid procedure, and operate the brake lever to check whether air bubble is in brake system or not. If brake is still soft, please bleed the system as described below.

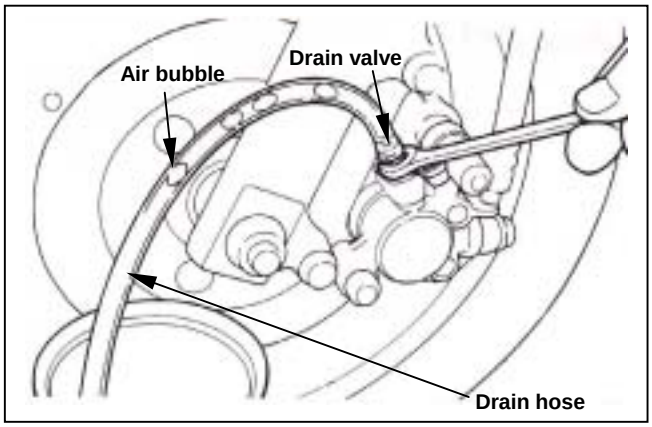
Air Bleed

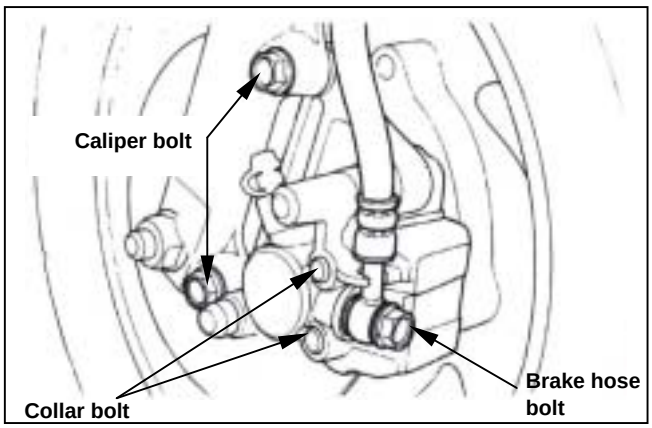
1. Tightly hold the brake lever and open the drain valve around 1/4 turns, and then close the valve.

Caution

- Do not release the brake lever before the drain valve is closed.
- Always check the brake fluid level when carrying out the air bleeding procedure to avoid air enter into the system.

2. Slowly release the brake lever, and wait for a few seconds until it reaches its top position.
3. Repeat the steps 1 and 2 until there is no air bubble at the end of the hose.
4. Tightly close the drain valve.
5. Make sure the brake fluid is in the UPPER level of the master cylinder, and refill the fluid if necessary.
6. Cover the cap.





Brake Caliper Removal

Place a container under the brake caliper, and loosen the brake hose bolt and finally remove the brake hoses.

Caution

Do not spill brake fluid on painted surfaces.

Remove the bolt cap and loosen the lining guide bolts.
Remove two caliper bolts and the caliper.

Brake Caliper Installation

Install the brake caliper and tighten the attaching bolts securely.
Torque: 3.3 kg-m

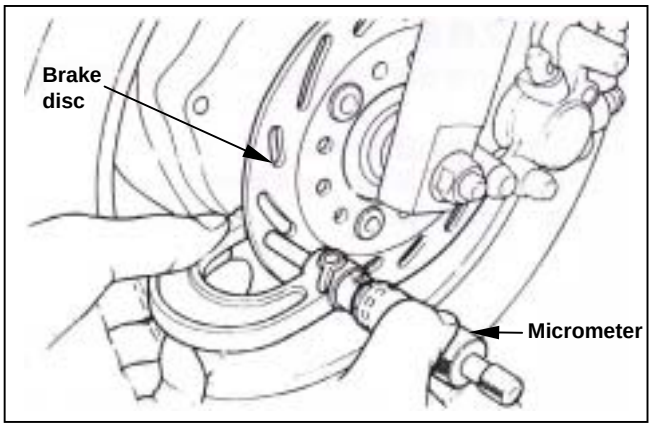
Caution

- Use M8 x 35 mm flange bolt only.
- Long bolt will impair the operation of brake disc.

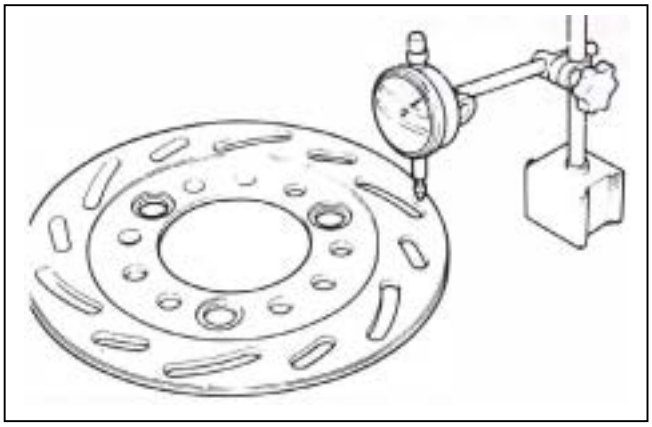
Tighten the lining guide bolt.
Torque: 1.8 kg-m
Install bolt cap.
Torque: 1.0 kg-m
Use two seal washers and hose bolts to lock the hose and brake caliper in place.
Torque: 3.5 kg-m
Refill up the brake fluid to the reservoir and make necessary air bleeding.

Brake Disc Inspection

Visually check the brake disc for wear or break.
Measure the thickness of the disc at several places. Replace the disc if it has exceeded the service limit.
Allowable limit: 2.0 mm



Remove the brake disc from wheel.
Check the disc for deformation and bend.
Allowable limit: 0.30 mm



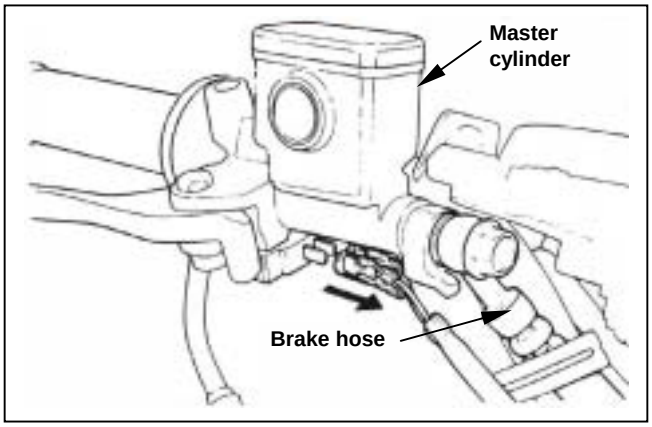
Brake Master Cylinder Removal

⚠ Caution

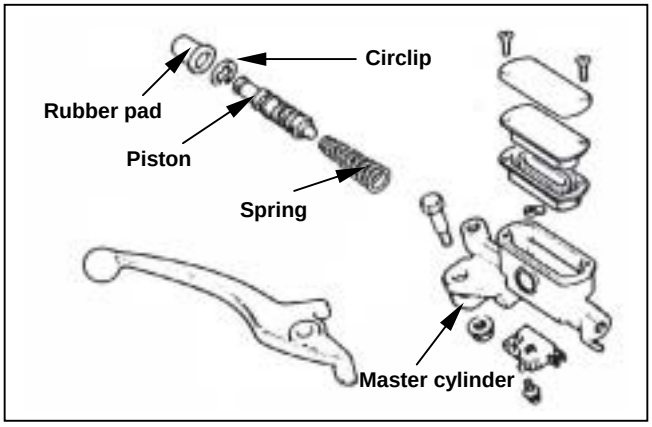
Do not let foreign materials enter into the cylinder.

⚠ Caution

The whole set of master cylinder, piston, spring, diaphragm and circlip should be replaced as a set.

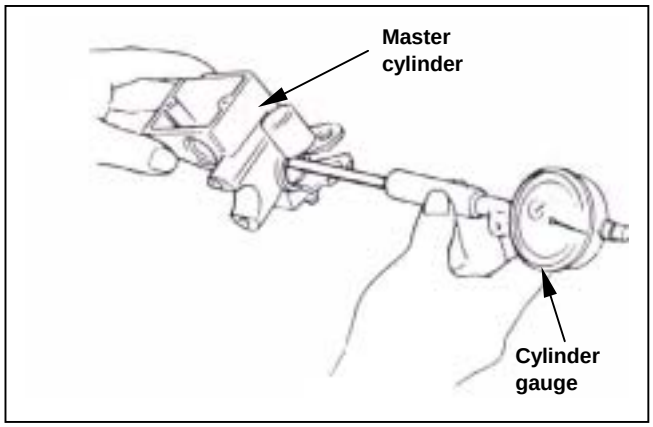


Remove the front and rear handlebar guards.
Remove the leads of brake lamp switch.
Drain out the brake fluid.
Remove the brake lever from the brake master cylinder.
Remove the brake hose.
Remove the master cylinder seat and the master cylinder.
Remove the rubber pad.
Remove the circlip.
Remove the piston and the spring.
Clean the master cylinder with recommended brake fluid.

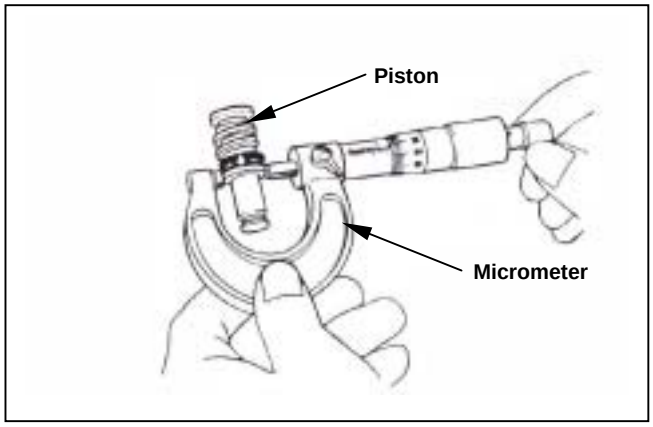


Master Cylinder Inspection

Check the master cylinder for damage or scratch. Replace it if necessary.
Measure the cylinder inner diameter at several points along both X and Y directions.
Replace the cylinder if the measured values exceed allowable limit.
Allowable limit: 11.055 mm



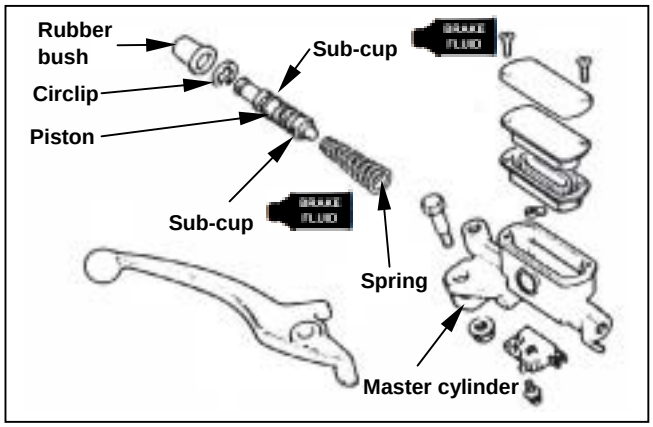
Measure the outer diameter of the piston.
Replace the piston if its measured value exceeds allowable limit.
Allowable limit: 10.945 mm



Master Cylinder Assembly

⚠ Caution

- It is necessary to replace the whole set comprising piston, spring, piston cup, and circlip.
- Make sure there is no dust on all components before assembling.



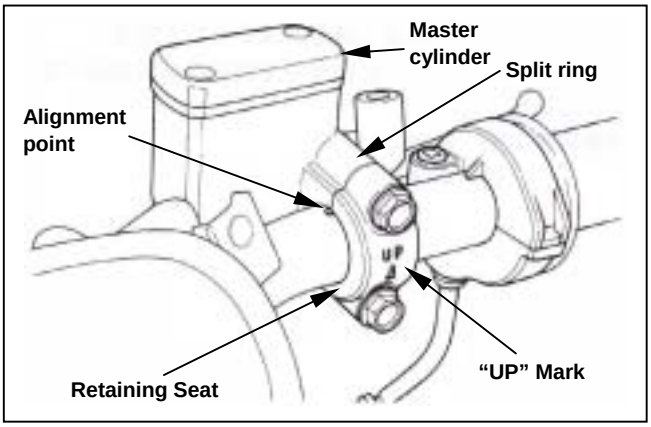
Apply clean brake fluid to the piston cup, and then install the cup onto the piston.
Install the larger end of the spring onto the master cylinder.
The master cup's cavity should be face inside of master cylinder when installing the master cup.
Install the circlip.

⚠ Caution

- Never install cup lip in the opposite direction.
- Make sure the circlip is seated securely in the groove.

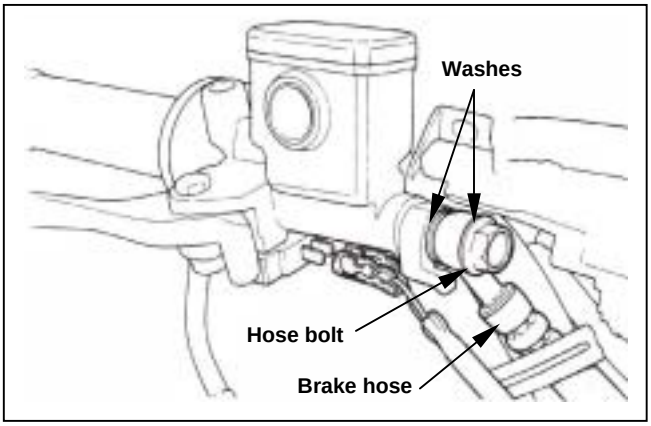
Install the rubber pad into groove properly.

Install the rubber pad into the groove correctly.
Place the master cylinder onto handlebar, and install the master cylinder seat and its bolts.
The “UP” mark on the seat should face upward.
Align the split ring on the master cylinder seat with the alignment point on the handlebar.
Tighten the upper bolt of the seat to specified torque value, and then tighten lower bolt to the same specified torque value.
Install the brake lever, and connect leads to brake lamp switch.
Connect brake hoses with 2 new washes.
Tighten the brake hose bolt to the specified torque value.
Make sure the hose is installed correctly.
Install all wires, hoses, and components carefully so avoid to twisting them together.



⚠ Caution

Improper routing may damage leads, hoses or pipes.



⚠ Caution

Kink of brake leads, hose or pipe may reduce brake performance.

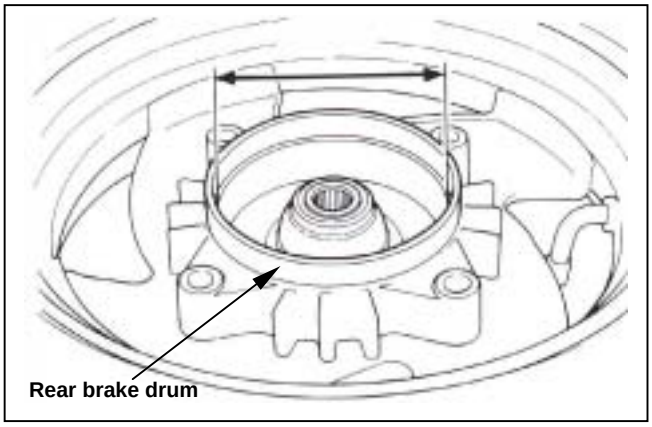
Add specified brake fluid and bleed the system.

DRUM BRAKE

To use vacuum cleaner or other alternatives to avoid danger caused from dusts.

Caution

- Inhaling brake lining ashes may cause disorders of respiration system, therefore, never use compressed air or dry brush to clean brake parts.
- Brake performance will be reduced by grease on brake lining.



Remove wheel, and then remove brake disc from front wheel hub.

Inspection

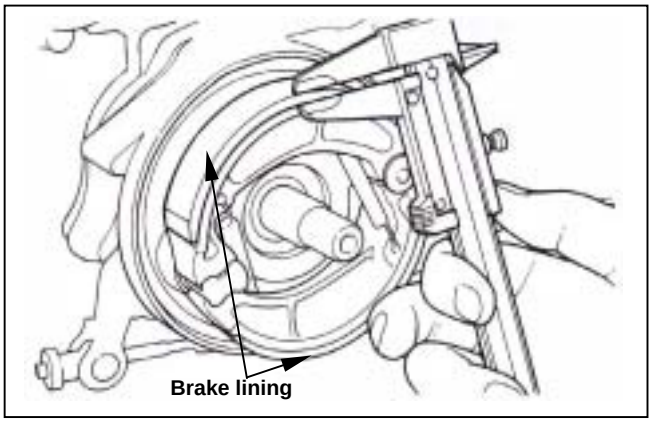
Check brake drum for damage or wear out, and replace it if necessary.

Measure the inner diameter of brake drum and record the max. value.

Allowable limit: rear (95.5mm)

Caution

- Clean the rust onto the brake drum with #120 sand-paper
- Measure the inner diameter of brake drum with micrometer.



Measure the thickness of brake lining at three points (both ends and center).

If the thickness is less than specified value or if it is contaminated by oil or grease, replace as a set.

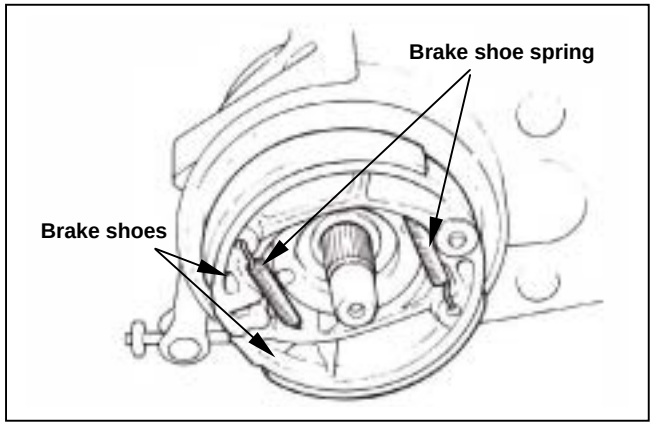
Service limit: Rear: 2.0 mm

REMOVAL

Caution

- Brake linings must be replaced as a set.

Remove the brake linings from brake panel.

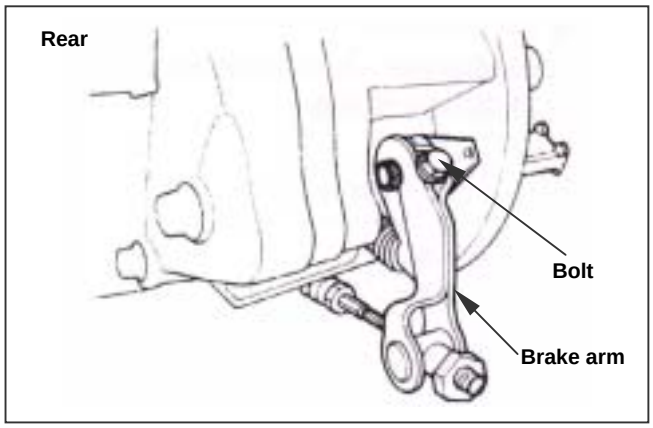


INSTALLATION

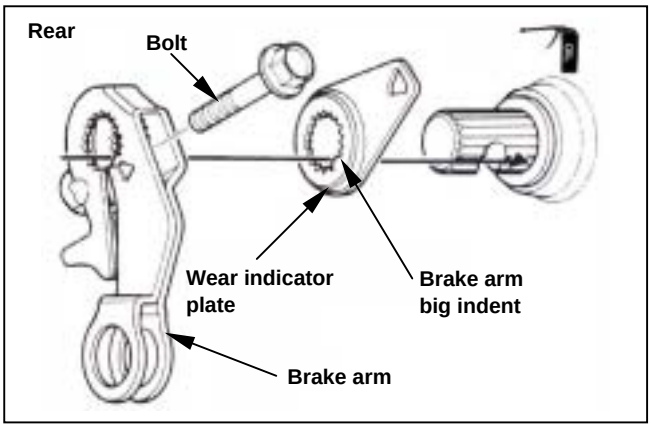
Apply with a thin coat of grease to the brake cam and the anchor pin.
Install brake cam.
Never allow brake linings to be contaminated by oil or grease.
Wipe off the excessive grease from brake cam and the anchor pin.

⚠ Caution

Brake efficiency will be reduced if brake linings is contaminated by oil or grease.



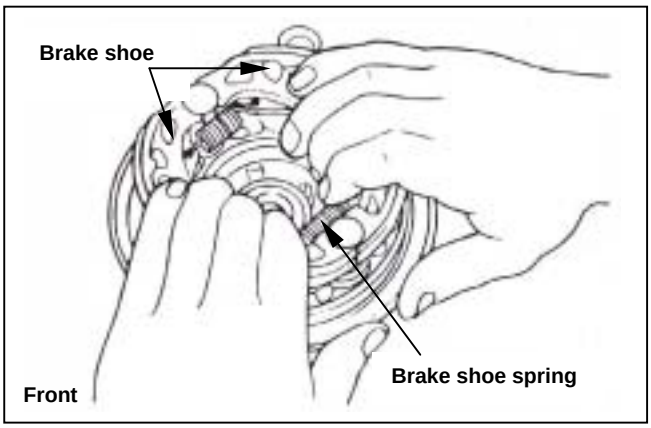
Install return spring of the brake cam onto front brake disc.
Install the brake cam after aligning it with the punched point.
Tighten the bolts and nuts to specified torque:
Torque value: **Front: 0.8-1.2 kg-m**
Rear: 0.4-0.7 kg-m



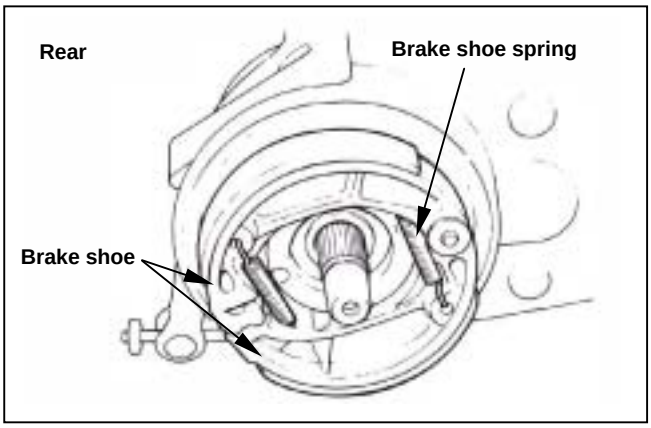
Reinstall return spring of the brake arm to the rear brake.
Never allow brake linings to be contaminated by oil or grease.
Use a brake cleaner to clean brake hub and replace the two brake shoes if brake linings are contaminated.

⚠ Caution

Brake efficiency will be reduced if brake linings is contaminated by oil or grease.



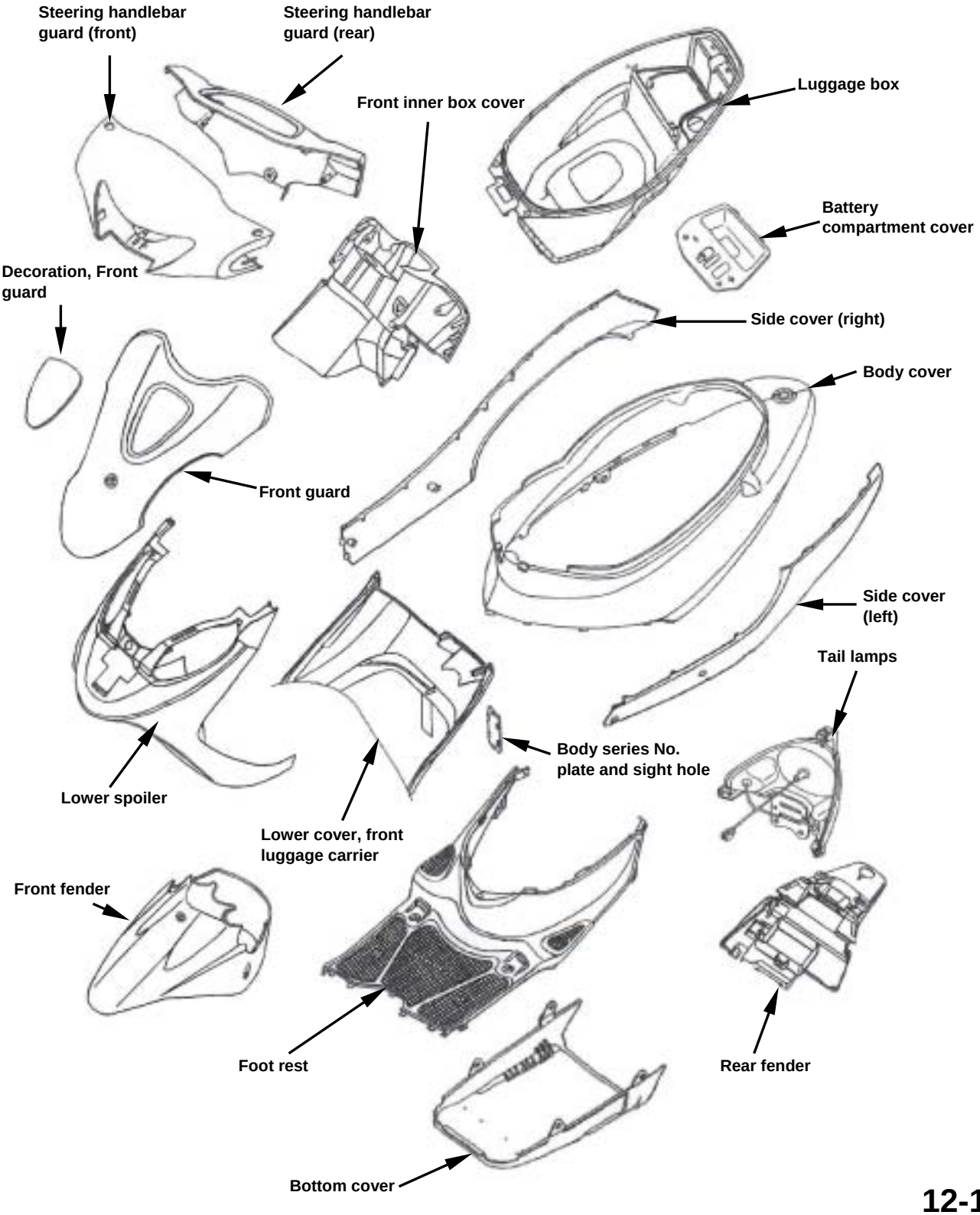
Install spring onto the brake shoes.
Install the brake shoes to the brake panel one after one, and make sure the shoe springs are in correct position.
Mount the brake panel onto the front hub.
Install the wheel.



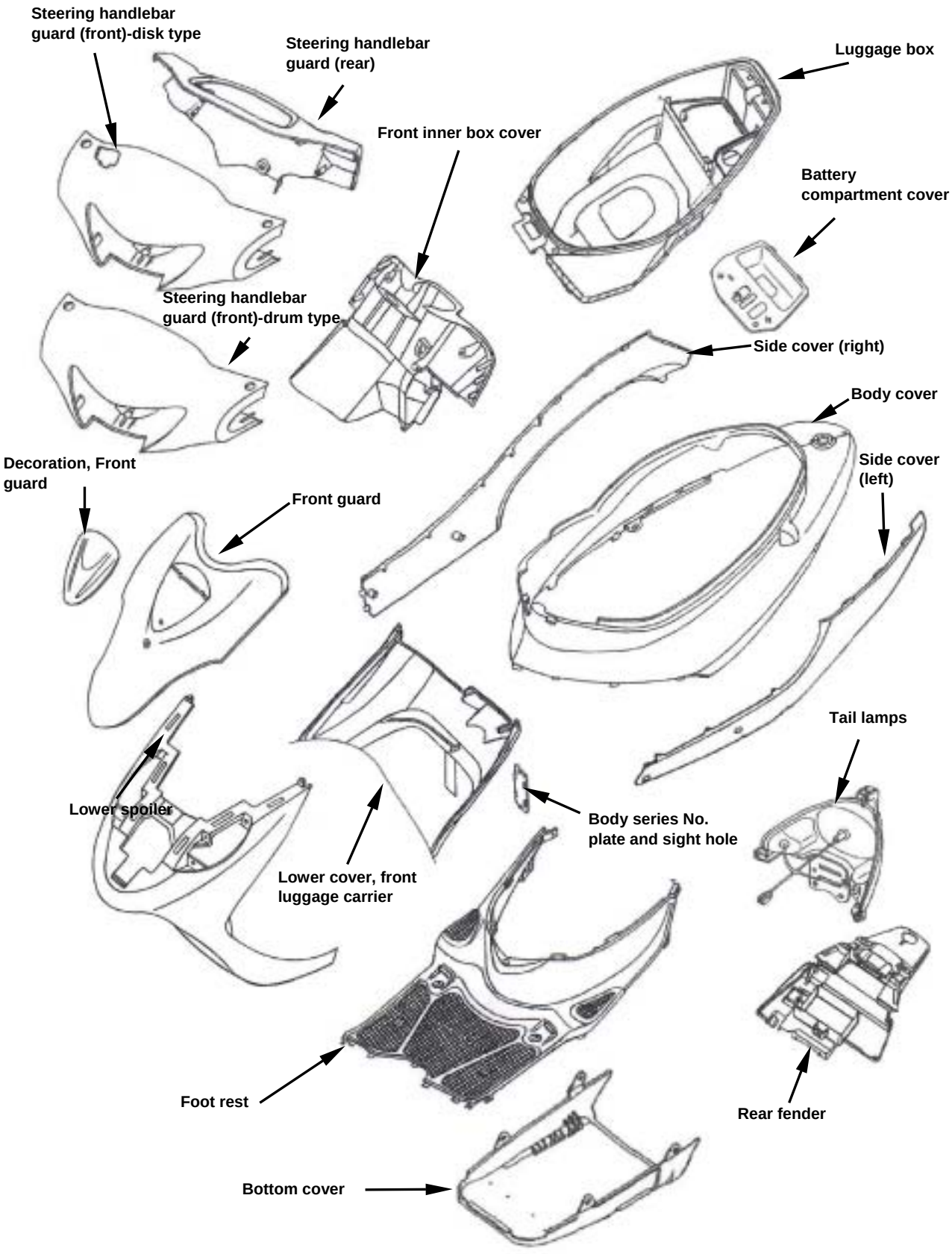
NOTES

Body Overview

FT05U SERIES

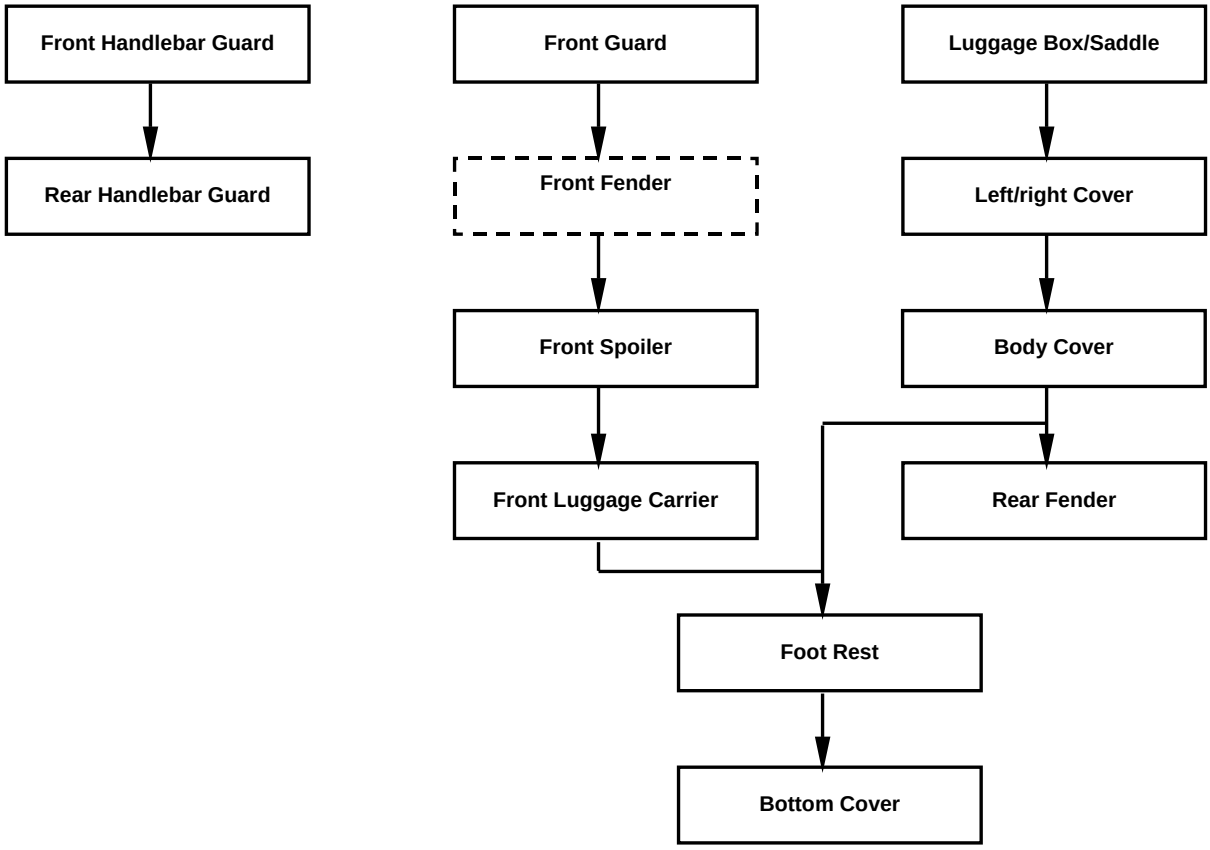


FT05T/V SERIES



MAINTENANCE INFORMATION

Body covers disassemble sequence:



- Be careful not to damage various covers in disassembly or re-assembly operation.
- Never injure hooks molded on the body covers in disassembly or re-assembly operation.
- Align the buckles on the guards with slot on the covers.
- Make sure that each hook is properly installed during the assembly.
- Never compact forcefully or hammer the guard and the covers during assembly.

SIDE COVERS

1. REMOVAL:

- Remove 2 bolts (front/middle) from two side covers.
- Slide the side cover backward so that their hooks are out of slots.
- Take out the side cover end part and then remove the cover.

2. INSTALLATION:

Install in reverse order of removal procedures.

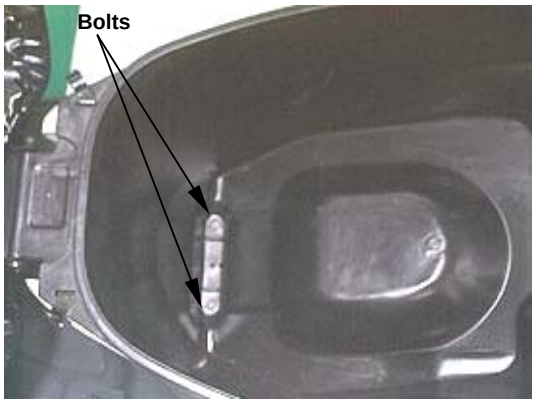
⚠ Caution

The tail of each cover is held with buckles and slot, never pull them with force, or it would crack the buckles.

LUGGAGE BOX

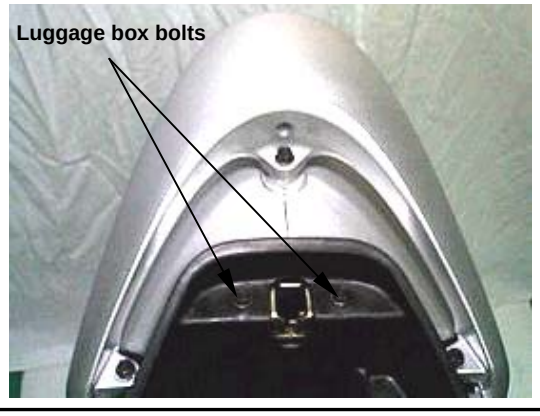
1. REMOVAL:

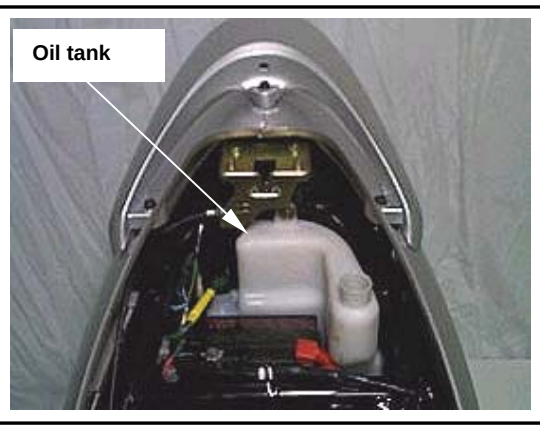
- Lift up seat cushion.
- Remove battery compartment screw and cover.
- Remove luggage box mounting screws (4 screws).
- Remove oil box cover and gasket.
- Hold the luggage box in both front and rear sides by two hands, and then lift up the box to remove it.



2. INSTALLATION:

- Install in reverse order of removal procedures.

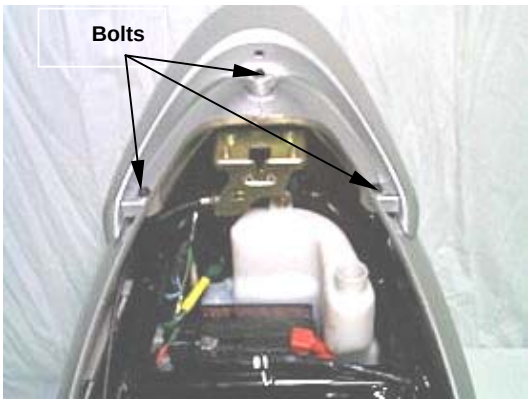




BODY COVER

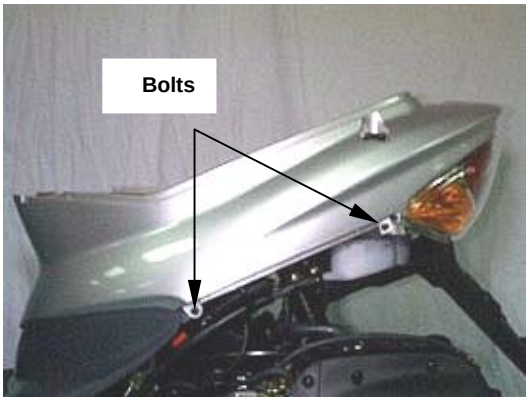
1. REMOVAL:

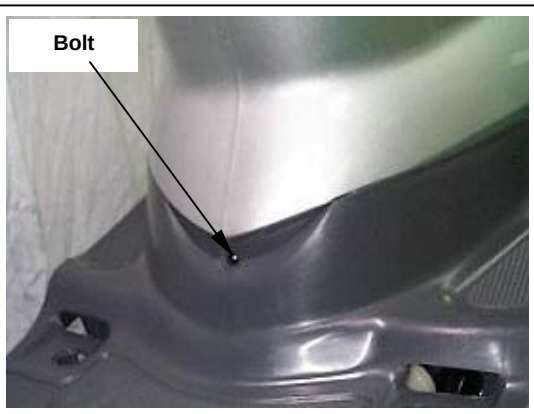
- Remove 3 bolts from rear carrier, and then remove rear carrier.
- Remove 5 screws from the front and both sides.
- Remove the body cover.



2. INSTALLATION:

- Install in reverse order of removal procedures.





FRONT GUARD

1. REMOVAL:

- Remove 2 bolts from the front inner box and front guard.
- Remove 1 screw from the front side of front guard.
- Push the front guard up and then remove it.

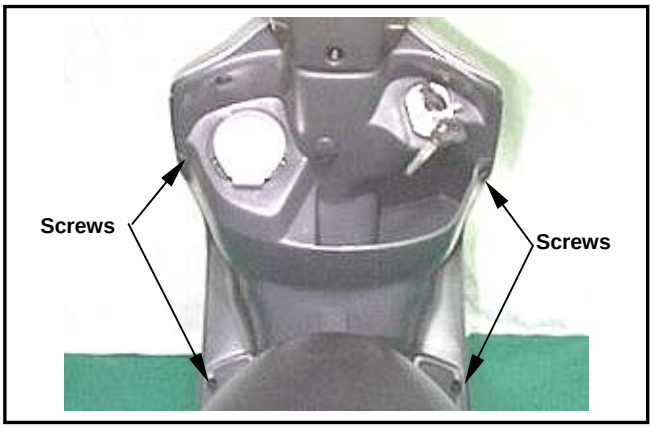
2. INSTALLATION

- Install in reverse order of removal procedures.

FRONT LOWER SPOILER

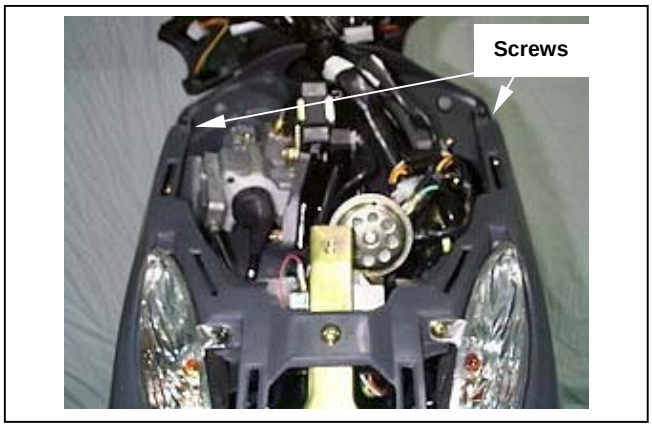
1. REMOVAL:

- Remove 4 screws from the front inner box.
- Remove 2 mounting bolts from the front upper part of the front spoiler and the front inner box.
- Remove 1 screw of front bracket.
- Remove speedometer cable mounting screw.
- Remove front wheel bolt and wheel.
- Remove 2 screws from the lower part of the front spoiler.
- Remove the front spoiler.



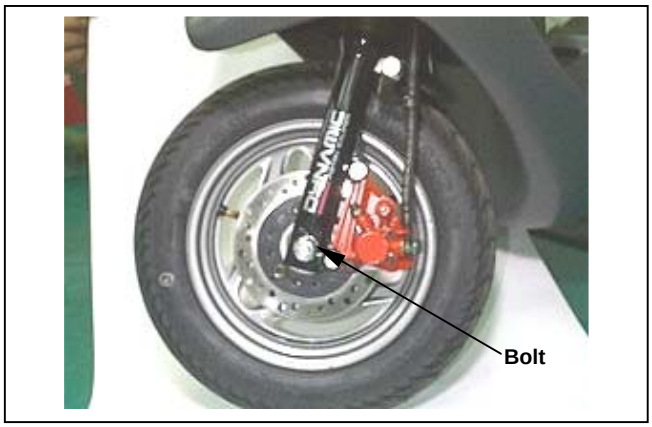
2. INSTALLATION:

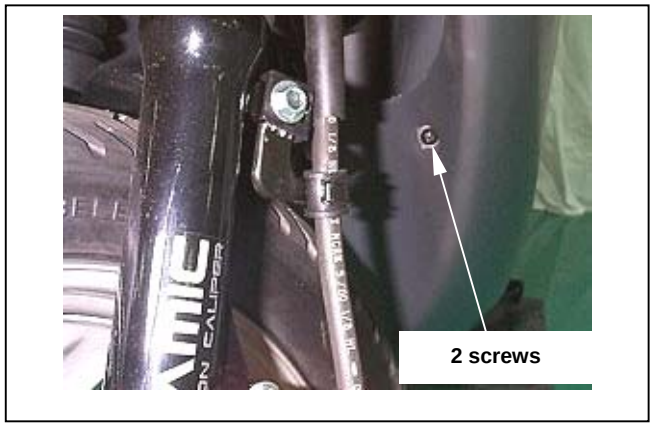
- Install in reverse order of removal procedures.



⚠ Caution

After front wheel removed, it has to place a carton box board (cardboard) between brake pads and do not operate the front brake lever.

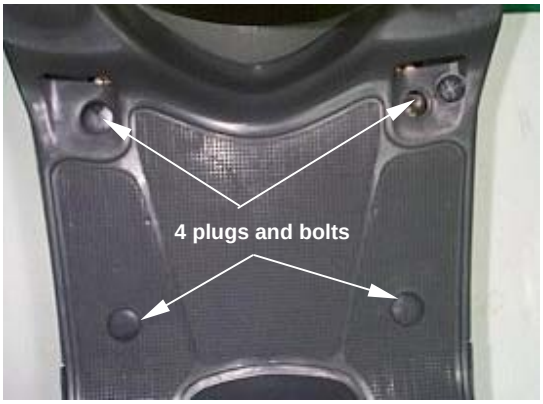




FOOT REST

1. REMOVAL:

- Remove 4 plugs of the foot rest.
- Remove 4 bolts.
- Remove the foot rest.



2. INSTALLATION:

- Install in reverse order of removal procedures.

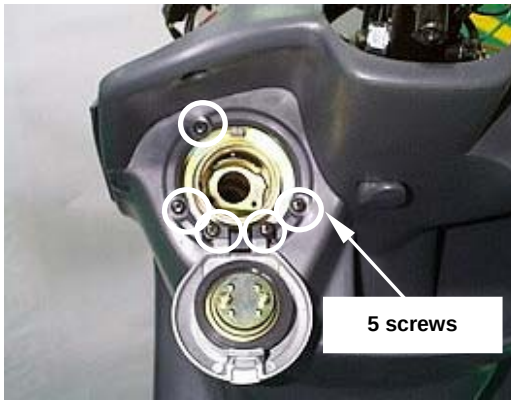
FRONT INNER BOX

1. REMOVAL:

- Remove hook and 1 screw.
- Remove 5 screws of the fuel filling cap.
- Remove the fuel filling cap.
- Remove 1 screw from main switch cover.
- Remove main switch cover.
- Remove the front inner box.

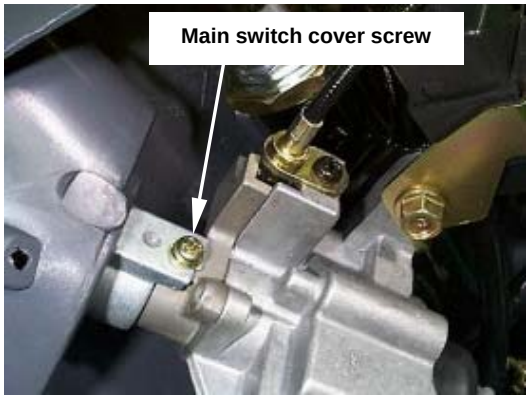
⚠ Caution

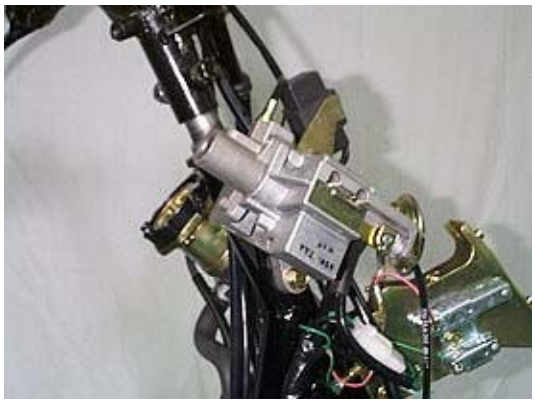
- While taking off the fuel filling cap, do not let it fall to the ground that may cause damage to the cap or personal injury.
- Cover the fuel filling hole with an object to prevent screws from falling into the fuel tank as removing the



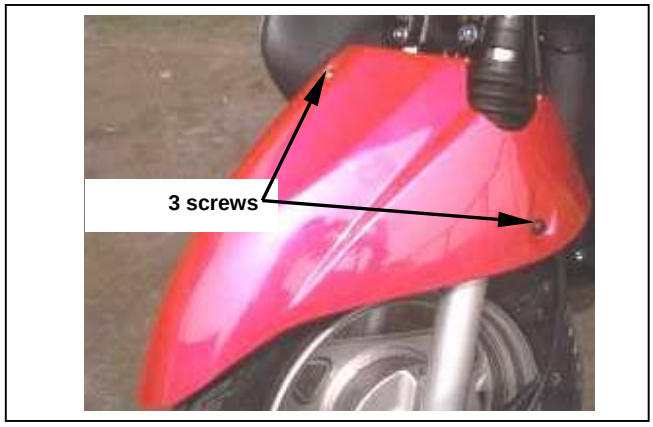
2. INSTALLATION:

- Install in reverse order of removal procedures.





FRONT FENDER



1. REMOVAL:

- Remove odometer screw and cable.
- Remove front wheel bolt and then remove the wheel.
- Remove 3 screws of front fender.
- Remove the front fender.

2. INSTALLATION:

- Install in reverse order of removal procedures.

STEERING HANDLEBAR GUARD

1. REMOVAL:

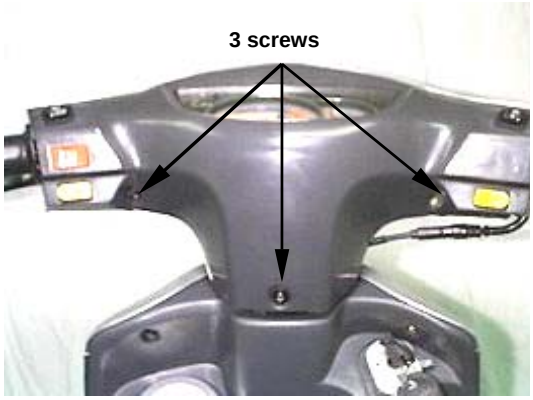
- Remove 1 screw of front lamp.
- Remove 3 screws from the rear handlebar guard.
- Remove front handlebar guard.
- Remove 2 inner screws.
- Disconnect each switch connectors.
- Remove speedometer cable.
- Remove rear handlebar guard.

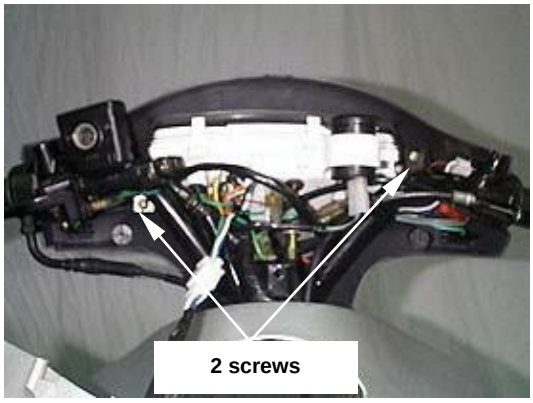
2. INSTALLATION:

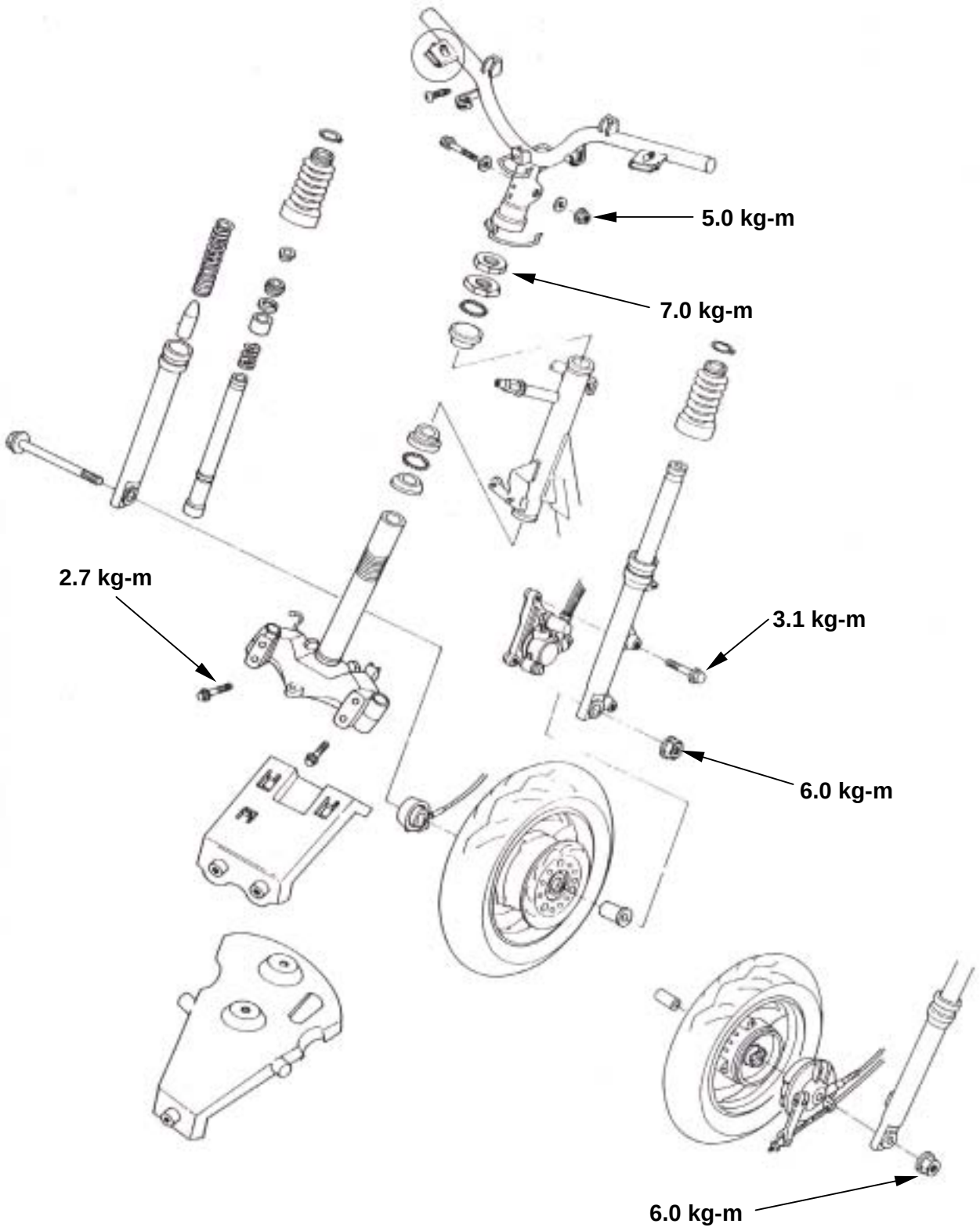
- Install in reverse order of removal procedures.

⚠ Caution

- Push the front connection part of rear handle guard at first when removing front guard so that the buckles are out of the guard. Never push it forcefully to cause buckles broken or guard damaged.







MAINTANANCE INFORMATION

SPECIFICATION

Item		Standard value (mm)	Limit (mm)
Shaft bending		—	**0.2 (0.01 in)**
Rim wobbling	Radial	—	**2.0 (0.08 in)**
	Axial	—	**2.0 (0.08 in)**

TORQUE VALUE

Steering column mounting nut	**7.0 kg-m**	Handlebar mounting bolt	**5.0 kg-m**
Front shaft nut	**6.0 kg-m**	Front wheel hub mounting nut	**2.5 kg-m**
Front shock absorber mounting nut	**2.7 kg-m**	Front wheel hub mounting bolt	**4.5 kg-m**

TOOLS

General tool
Driver
Adapter 32 x 35 mm
Pilot 12 mm

TROUBLESHOOTING

Hard to steer

1. The steering shaft bolt is too tight.
2. The steering shaft bearing are damaged
3. The ball and the top cone of the steering shaft are damaged.
4. Insufficient tire pressure.

The steering handlebar is tilted

1. Uneven arrangement of the front shock absorbers.
2. The front fork is bent.
3. The front wheel axle is bent.

The front wheel wobbling

1. The rim is bent.
2. The wheel axle nut is not tightened improperly
3. Bend wheel rim
4. Side-worn or poor tire.
5. The bearing play of the wheel axle is too large.

Soft shock absorber

1. Weak front shock absorber spring

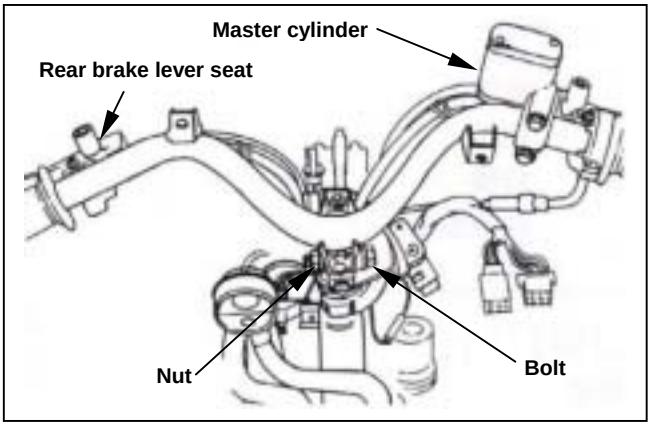
Noise in front shock absorber

1. Shock absorber outer tube noise
2. The joint of the shock absorber gets loose.

STEERING HANDLEBAR

REMOVAL

Remove handlebar guard and inner box.
Remove throttle grip after mounting screw removed.
Remove master cylinder **(disc brake)** after 2 bolts removed.

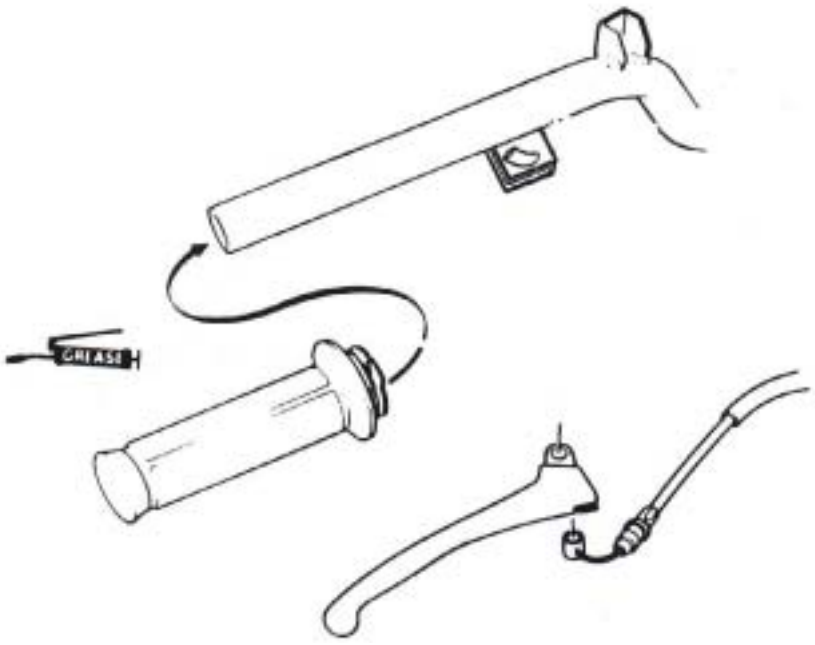


Remove rear brake lever bracket after mounting bolt removed.
Remove handlebar mounting bolt and nut, and then remove the handlebar.

INSTALLATION

Install handlebar and align with bolt hole.
Install bolt and nut and then tighten it.
Torque value: 5.0 kg-m
Apply with grease onto throttle cable and the sliding surface of handlebar.
Align the lock pin of the handlebar outer tube with the hole on the handlebar, and then install the handlebar.
Tighten the bolt.

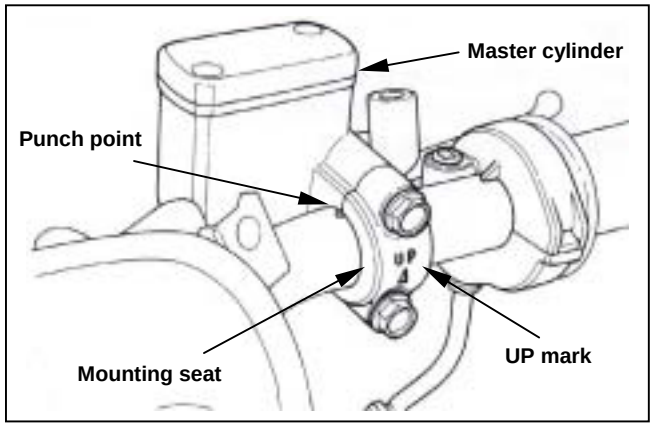
Align the lock pin with the hole on the handlebar and also install brake lever seat. Then, tighten the lever with clamp and bolt.



Place master cylinder onto handlebar and align its connection surface with punch point on the handlebar **(disc brake).**
Install the mounting seat, and let its “UP” mark face up.
Tighten the upper part bolt, and then tighten lower bolt.
Install all components in reverse order of removal procedures.
Conduct following adjustment:

- Oil pump control cable.
- Throttle operation.

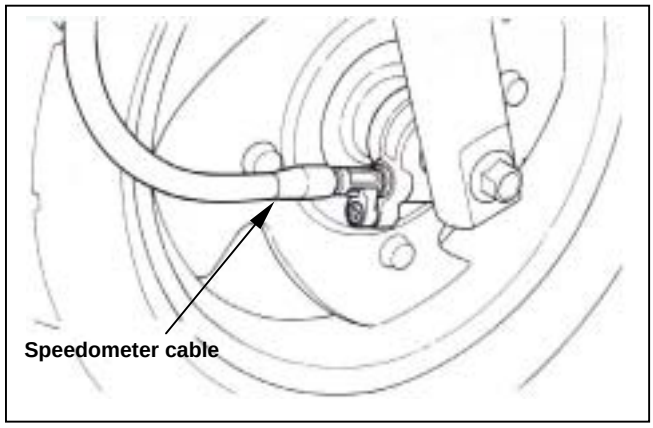
Brake lever free play

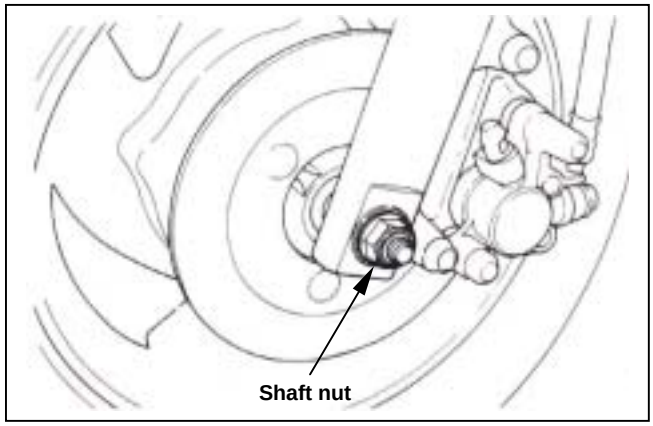


FRONT WHEEL

REMOVAL

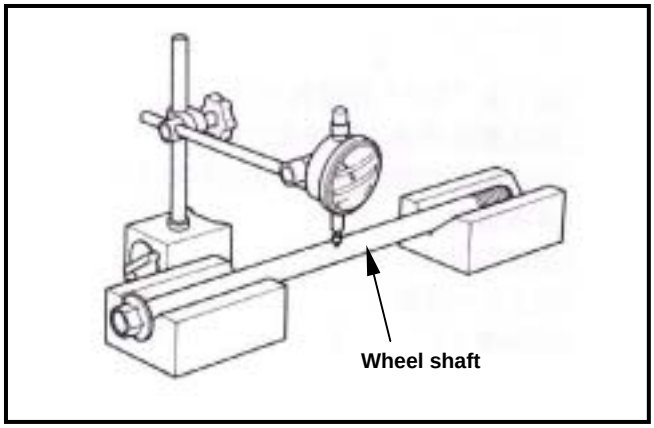
Remove speedometer cable from speedometer gear box.
Remove the guide pipe from brake arm.
Remove wheel shaft nut, and then pull out the shaft and remove the wheel.
Remove brake disc.



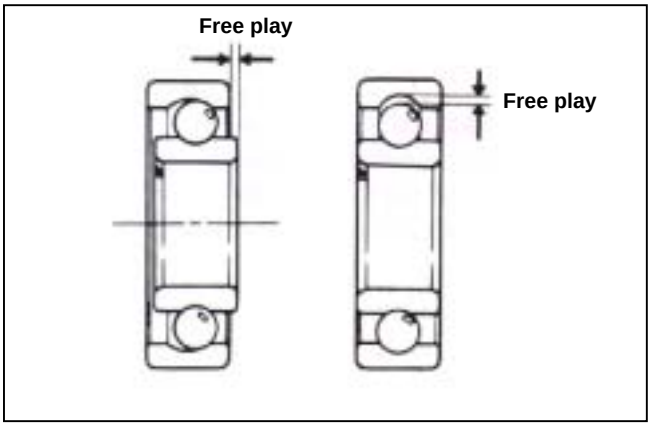


INSPECTION

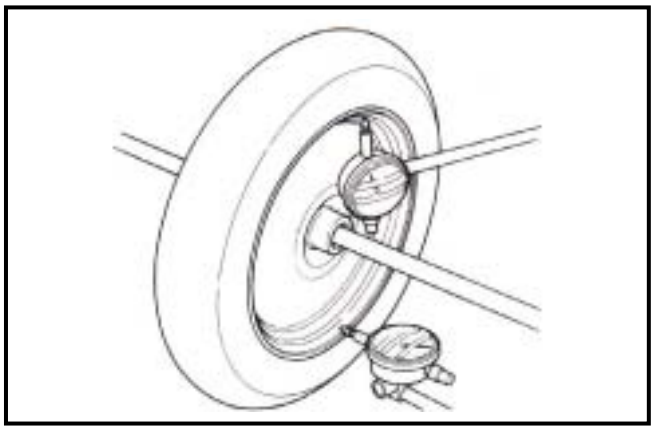
Place the shaft onto a V-block to measure its run-out with a dial gauge.
The dial gauge indicated 1/2 run-out.
Service limit: 0.20 mm



Place the wheel on to a rotation seat, and turn the wheel to check its bearing free play. If the bearing is noisy or its free play is too much, replace it.

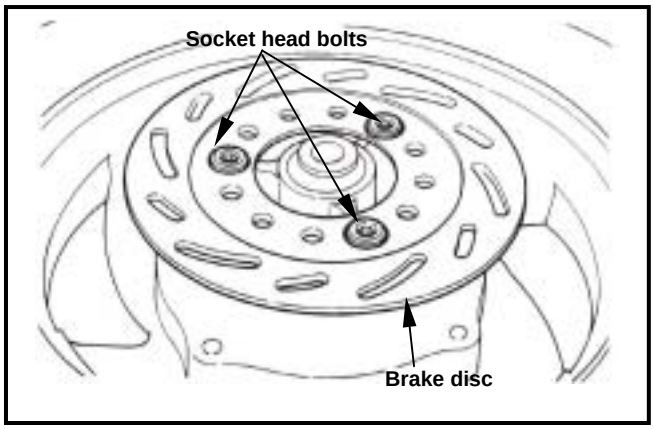


Place the wheel on to a rotation seat to check its rim wobbling. Turn the wheel with hand and measure its rim wobbling value with a dial gauge.
Service limit:
Radial: 2.0 mm (0.08 in)
Axial: 2.0 mm (0.08 in)

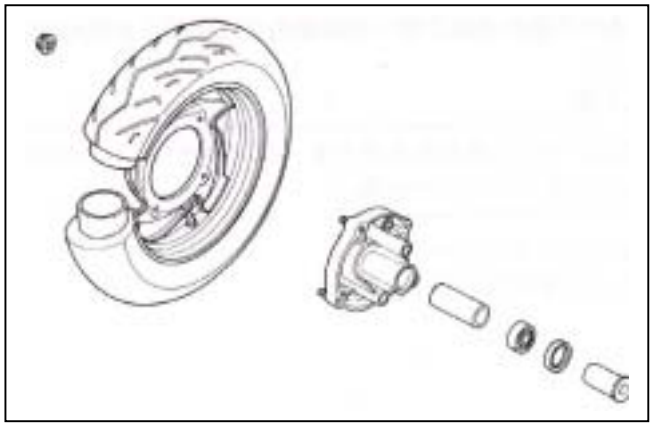


REMOVAL

Remove 3 socket head bolts and brake disc.



Remove dust seal, bearing and side collar.
Remove wheel hub from wheel rim after 4 nut removed.



INSTALLATION

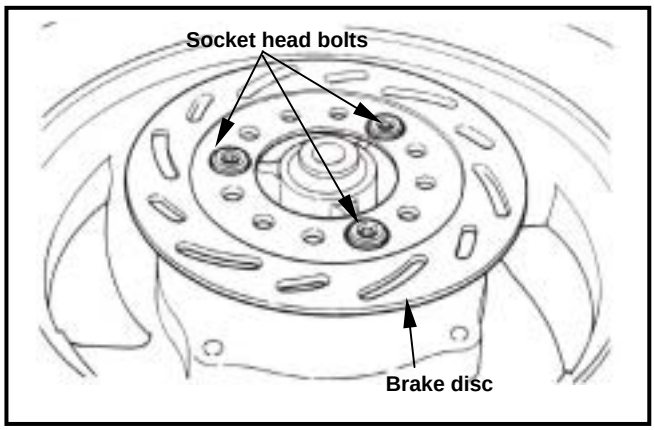
Install the wheel hub into the wheel rim and then tighten the flange nut.
Torque value: 2.5 kg-m
Fill out the block of bearing by grease.
Drive the left bearing and install the side collar.
Install the right bearing.

⚠ Caution

- Carefully install the bearing in correct and evenly.
- Bearing outer face should be faced up as bearing installation.

Adapter 32 × 35 mm
Pilot 12 mm
Driver

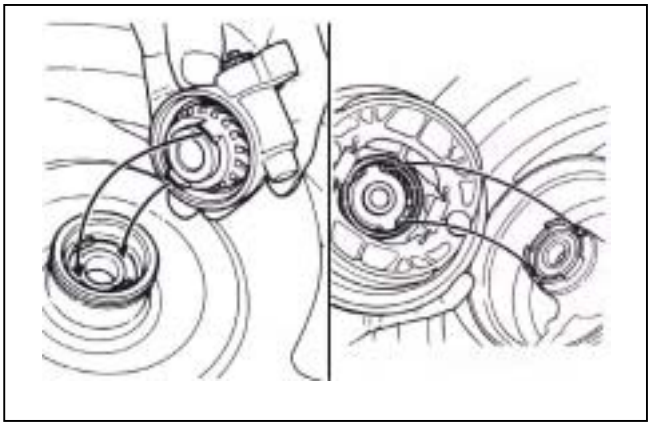
Install the brake disc and then tighten the socket head bolts **(disc brake).**
Torque value: 4.5 kg-m



INSTALLATION

Lubricate the speedometer gear with grease and install the gear into the brake disc.

Align the flange part on the speedometer gear with the slot of wheel hub, and then install the brake disc.

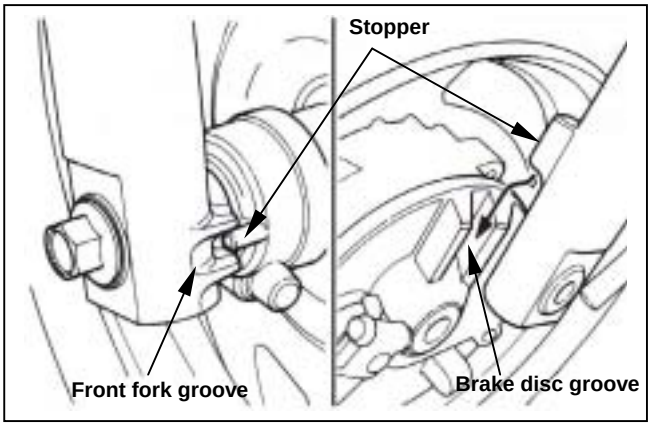


⚠ Caution

Contaminated brake lining will reduce brake performance so the brake lining, brake drum and disc must be free of grease.

Apply with grease onto the dust seal.
Install the dust seal and side collar.

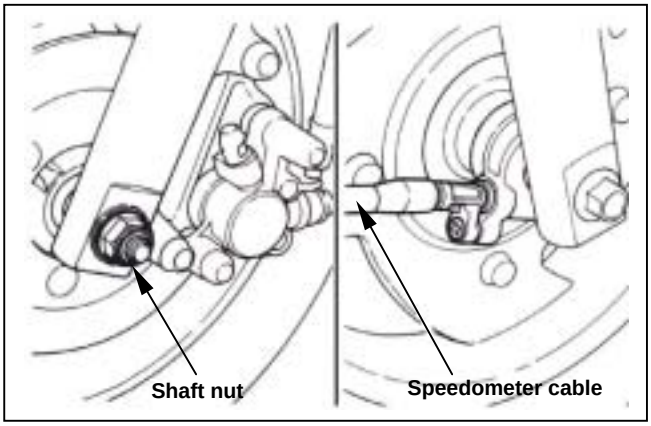
Place the front wheel between the front shock absorbers.



⚠ Caution

Align the brake disc groove with the stopper flange.

Insert the wheel shaft into the wheel and the install the wheel shaft nut.
Tighten the nut to specified torque.
Torque value: 6.0 kg-m
Connect the speedometer cable to the speedometer gear.



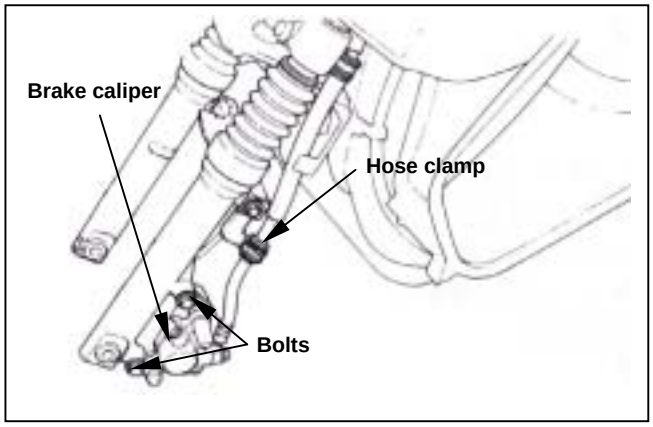
FRONT SHOCK ABSORBER

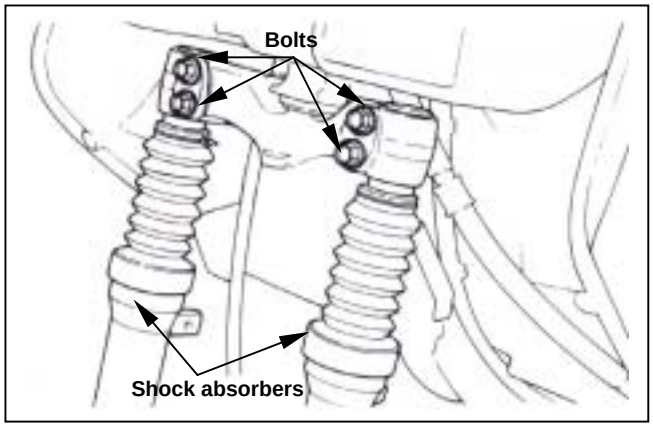
REMOVAL

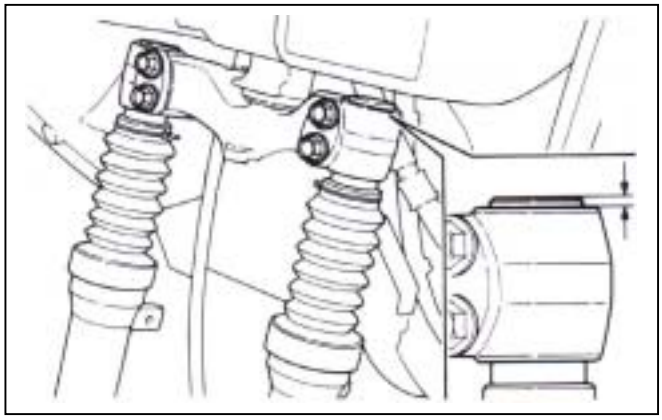
- front cover
- front lower spoiler
- front guard
- front wheel

Disc Brake

Remove the caliper mounting bolt and the caliper.
Take out the hose from hose clamp.
Remove front guard mounting bolt and the guard.
Remove the front shock absorber upper bolt and the shock absorber.







INSTALLATION

Align the cover flange with upper level of the shock absorber clamp, and then tighten nut.
Torque value: 2.7 kg-m
Install the removed components in reverse order of removal procedures.

FRONT FORK

REMOVAL

- handlebar
- front wheel
- front shock absorber

Remove the steering stem mounting nut.
Remove top cone race and front fork.

Caution

Place the steel ball onto a parts container to prevent from missing.

Slightly tap the top and bottom ball bearing seats with a plastic hammer to remove the seats.
Remove bottom cone race body with a punch.

Caution

Do not damage the steering stem.

INSTALLATION

Install a new bottom cone race onto the steering stem.
Push the cone race until to mounted position.

Caution

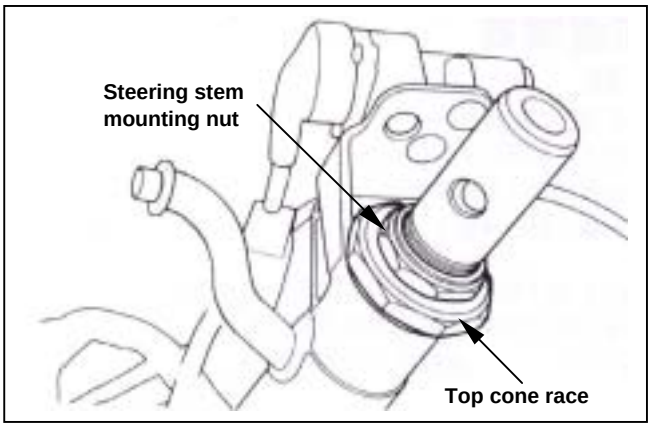
Do not tilt the ball bearing seats as installation.

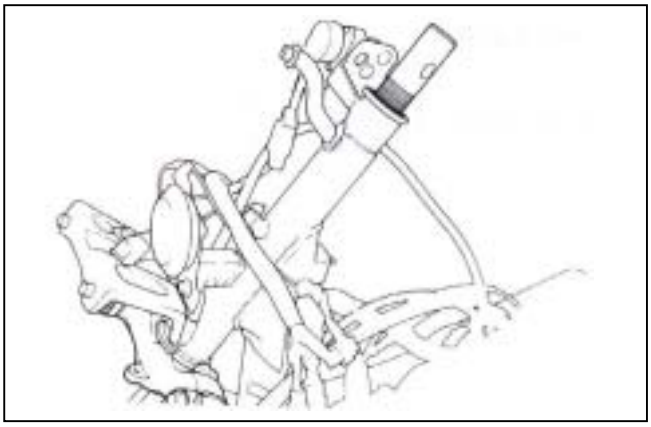
Apply with grease onto the ball bearing seats, and install steel balls onto the seats.
(Top: 26 balls, bottom: 29 balls)
Lubricate the top cone race seat with grease.
Screw the cone race in to top ball bearing seat till touching, and then screw out the cane race 1/8 turns.

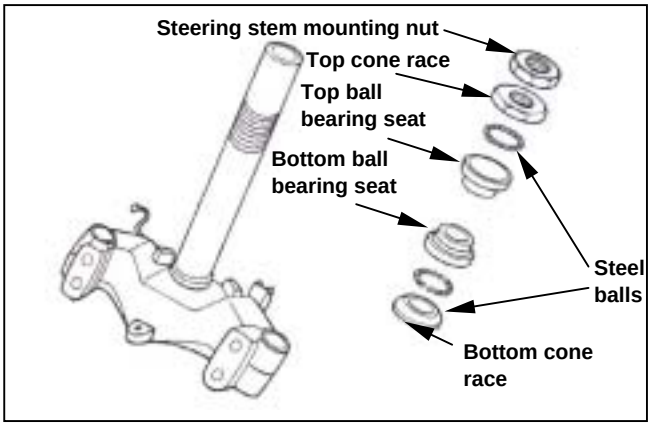
Caution

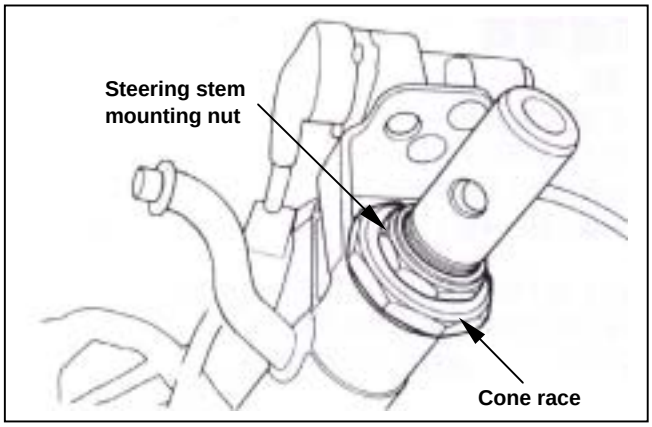
Check the steering stem that should be rotated freely and no clearance in vertical direction.

Install the steering stem mounting nut and tighten the nut by means of holding the top cone race body.
Torque value: 7.0 kg-m
Install in reverse order of removal procedures.









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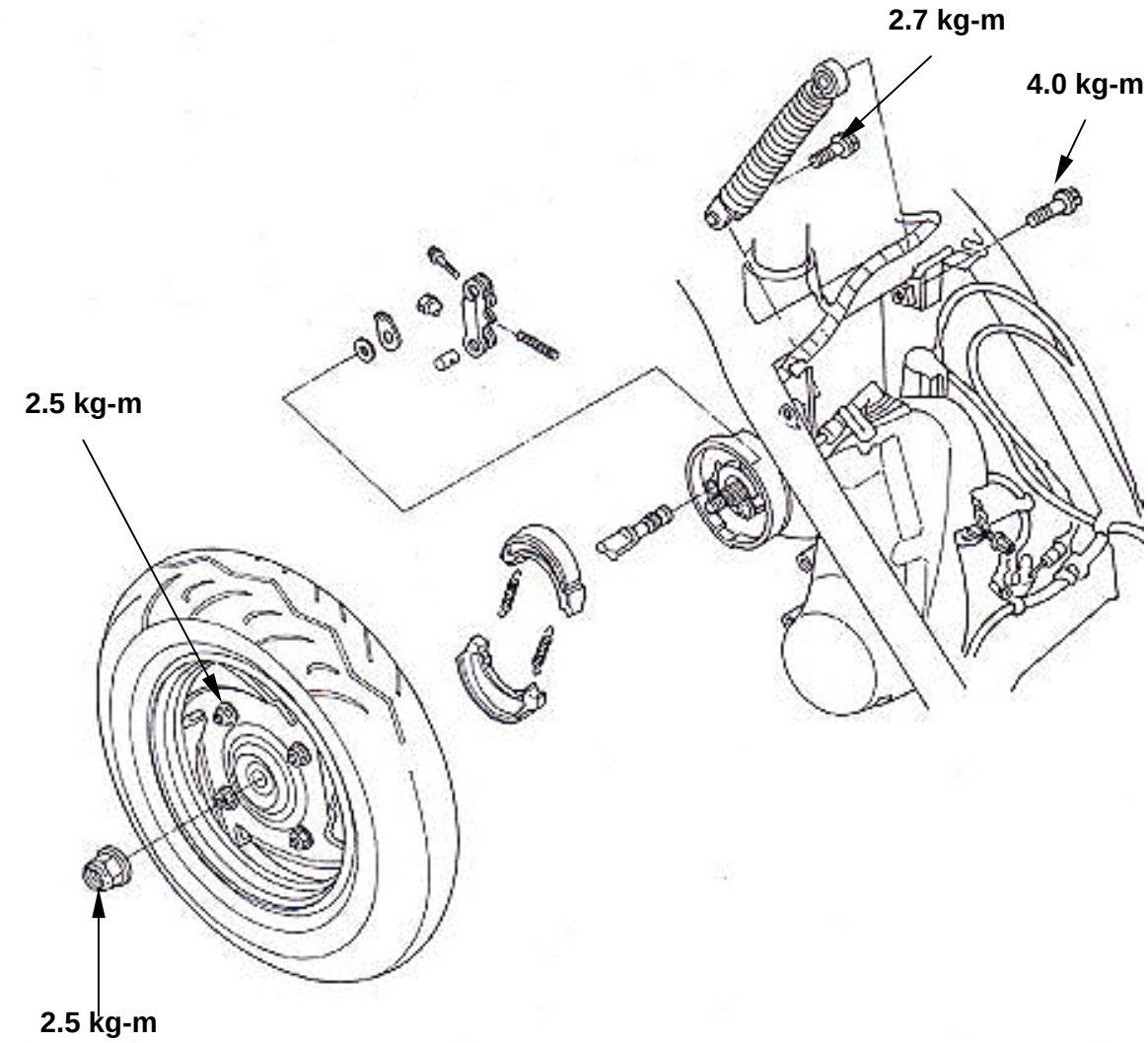
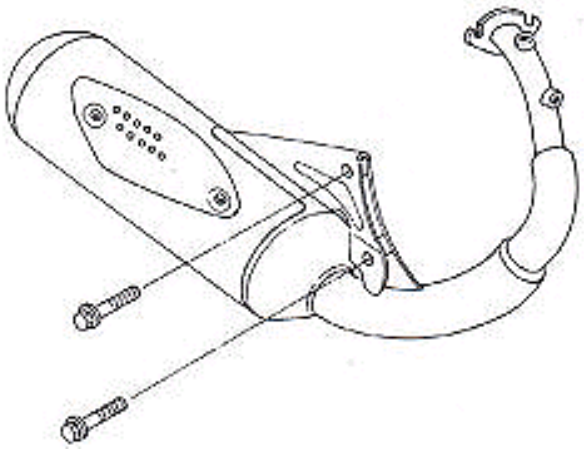




MAINTENANCE INFORMATION

SPECIFICATION

Item	Standard value (mm)	Limit (mm)
Rear wheel rim run out		2.0 (0.08 in)
Rear shock absorber spring free length	172	166.8

TORQUE VALUE

Rear shock absorber upper mounting bolt: 4.0 kg-m
Rear shock absorber lower mounting bolt: 2.7 kg-m
Rear wheel nut: 11.0 kg-m
Rear wheel hub: 2.5 kg-m

Tools

Rear shock absorber adapter
Spring adapter
Rear shock absorber compressor

TROUBLESHOOTING

Rear wheel wobbling

1. bend wheel rim
2. poor tire
3. loosen wheel shaft

Shock absorber too soft

1. insufficient shock absorber spring force

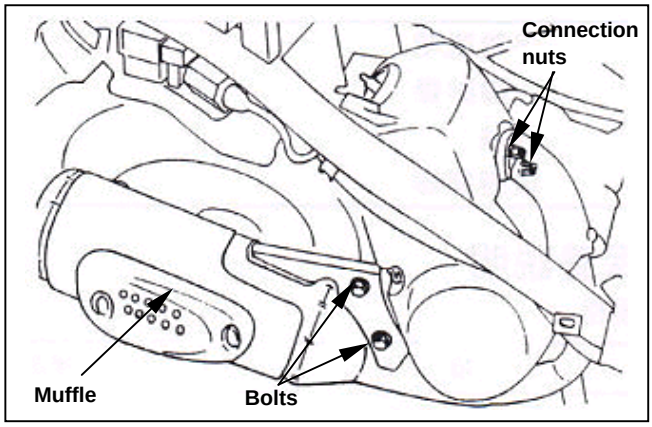
Poor brake performance

1. Poor brake adjustment
2. contaminated brake lining
3. worn brake lining cam
4. worn brake cam lever
5. worn brake drum
6. improper installation of brake arm gear set.

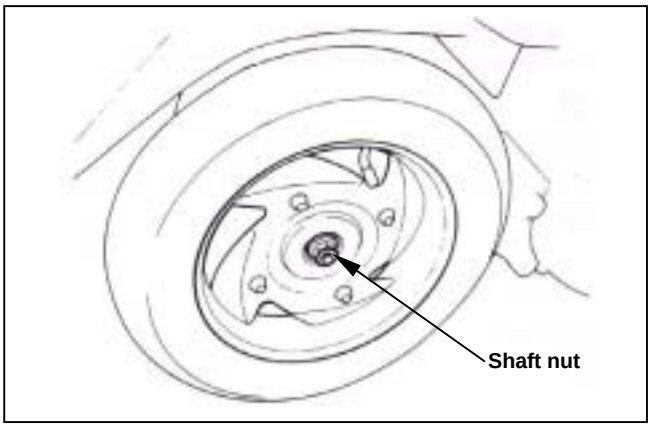
REAR WHEEL

Remove

body cover.
Remove exhaust pipe and muffler.

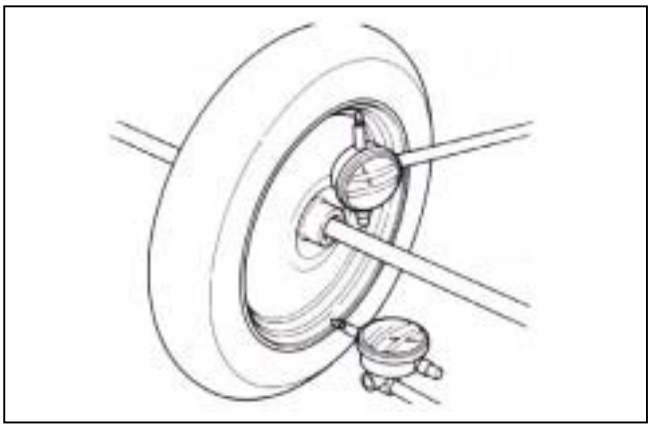


Remove rear wheel shaft nut and then remove the rear wheel.



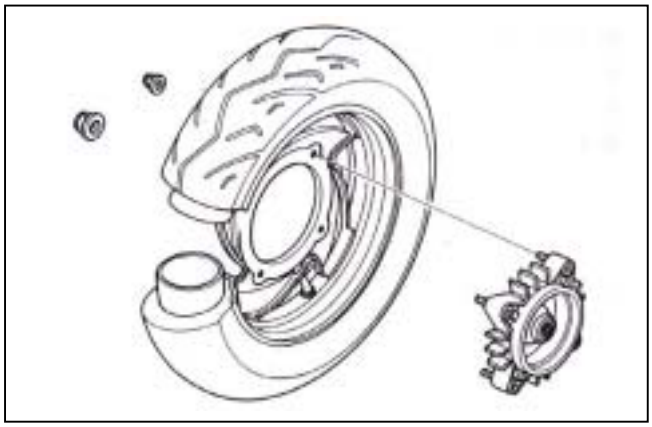
INSPECTION

As the diagram shown, measure wheel rim wobbling with a dial gauge.
Service limit:
Radial: 2.0 mm (0.08 in)
Axial: 2.0 mm (0.08 in)



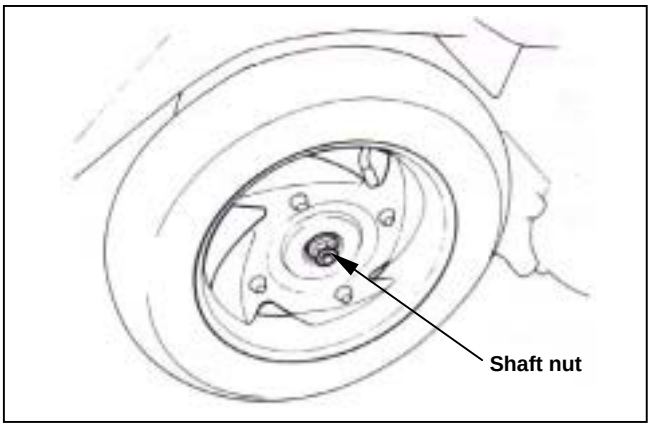
BRAKE HUB REPLACEMENT

Remove 4 nuts of cover and wheel rim, and then remove the wheel hub.
Install the wheel hub and tighten the nuts.
Tighten torque: 2.5 kg-m



INSTALLATION

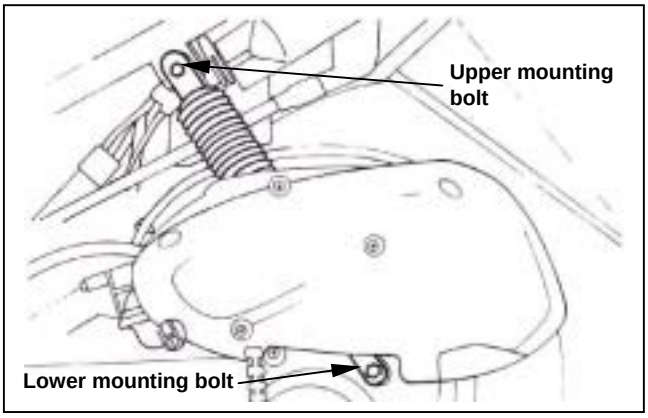
Install the rear wheel and tighten the nut.
Tighten torque: 11.0 kg-m
Install exhaust pipe & muffler.
Tighten torque: 3.3 kg-m
Install the body cover.



REAR SHOCK ABSORBER

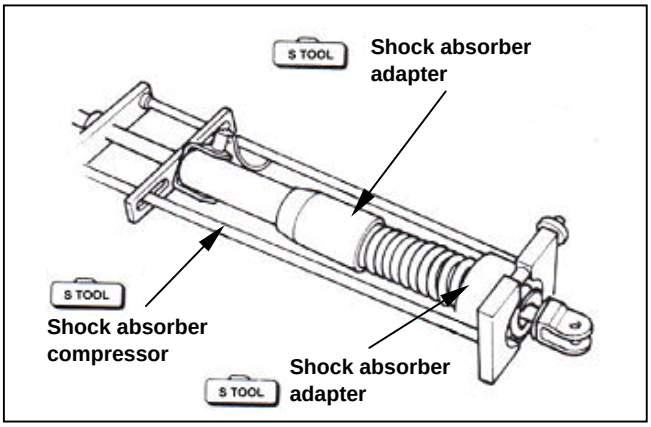
REMOVAL

Remove body cover.
Remove rear shock absorber upper & lower bolts.
Remove rear shock absorber.

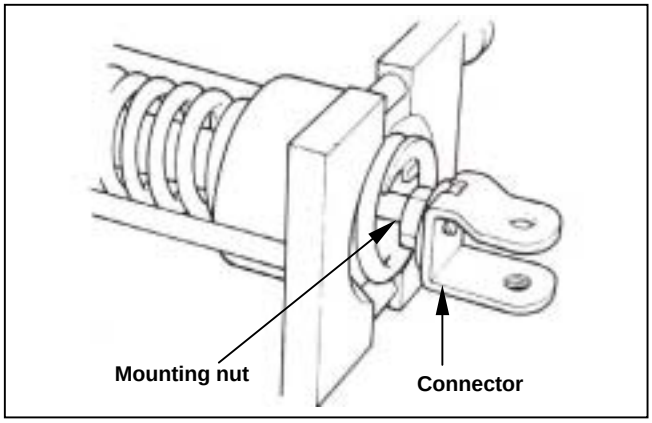


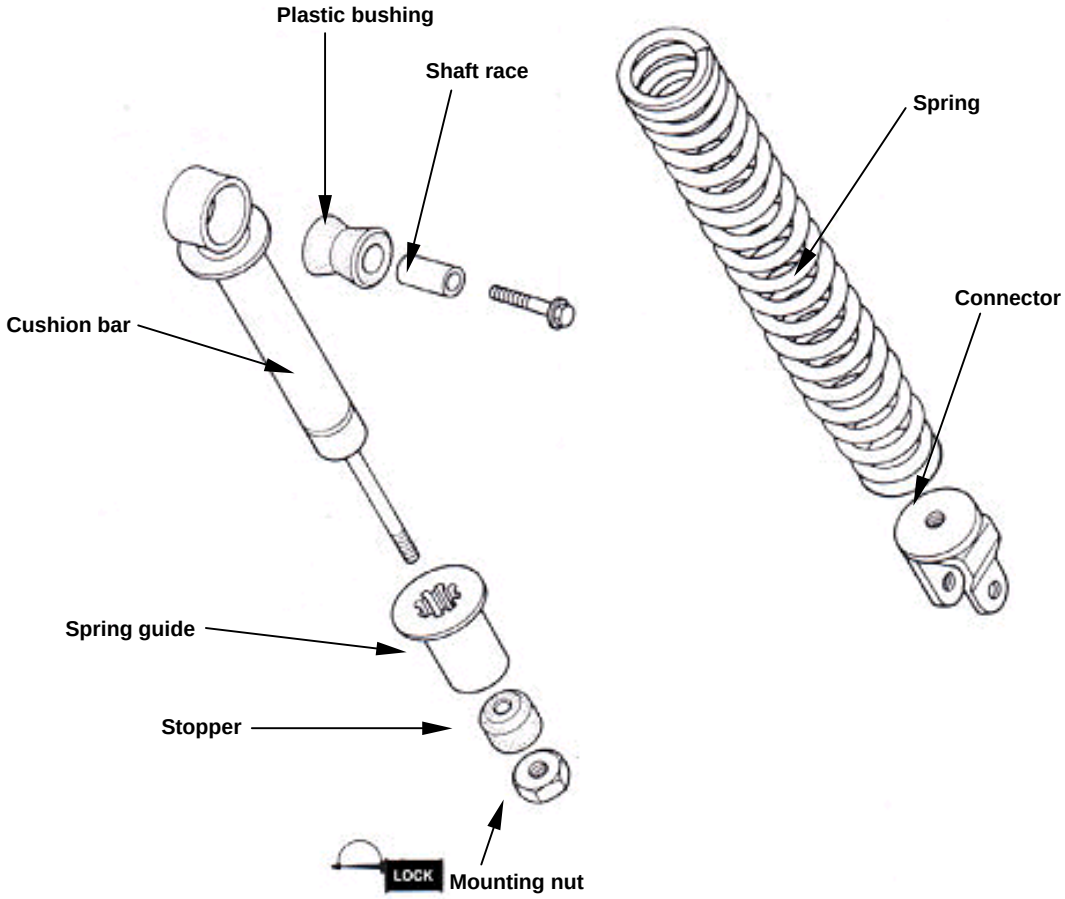
DISASSEMBLY

Compress the shock absorber with compressor.



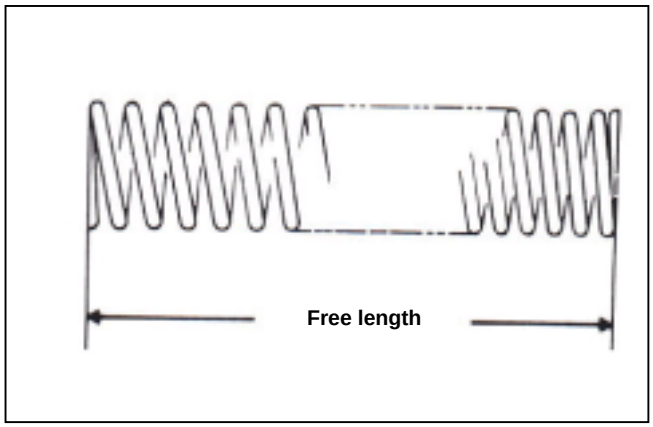
Hold the connector and then loosen mounting nut.
Remove the connector, and then remove the shock absorber spring.





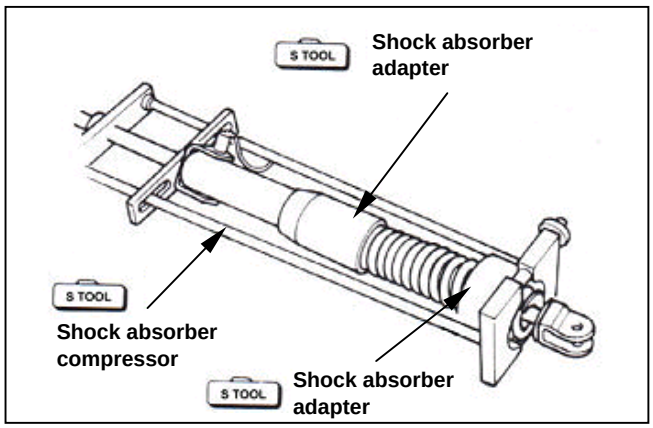
SPRING FREE LENGTH

Measure the spring free length.
Service limit: 172 mm

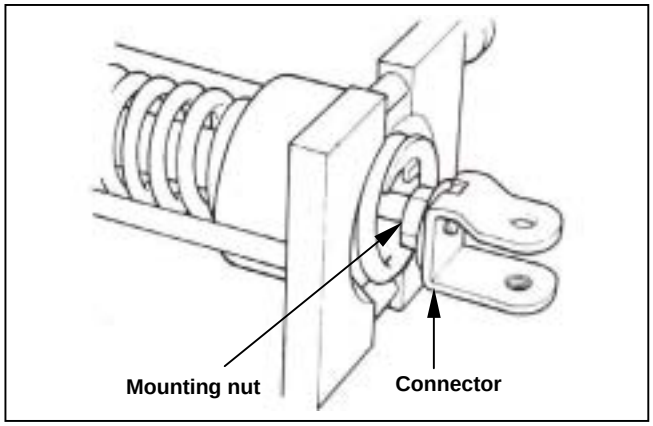


RE-ASSEMBLY

Install the more intensive coils of the spring onto upper side.
Compress the shock absorber with compressor.

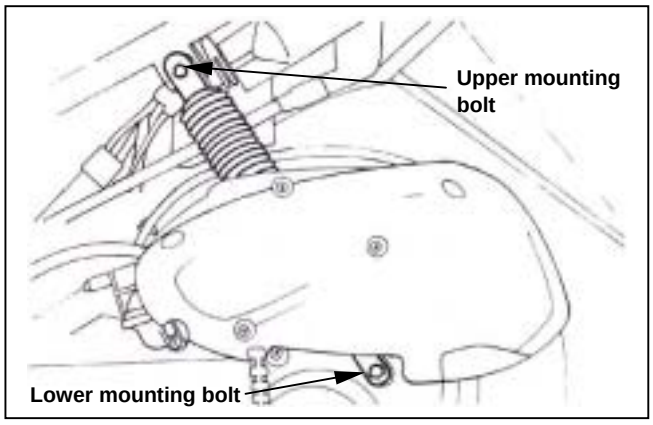


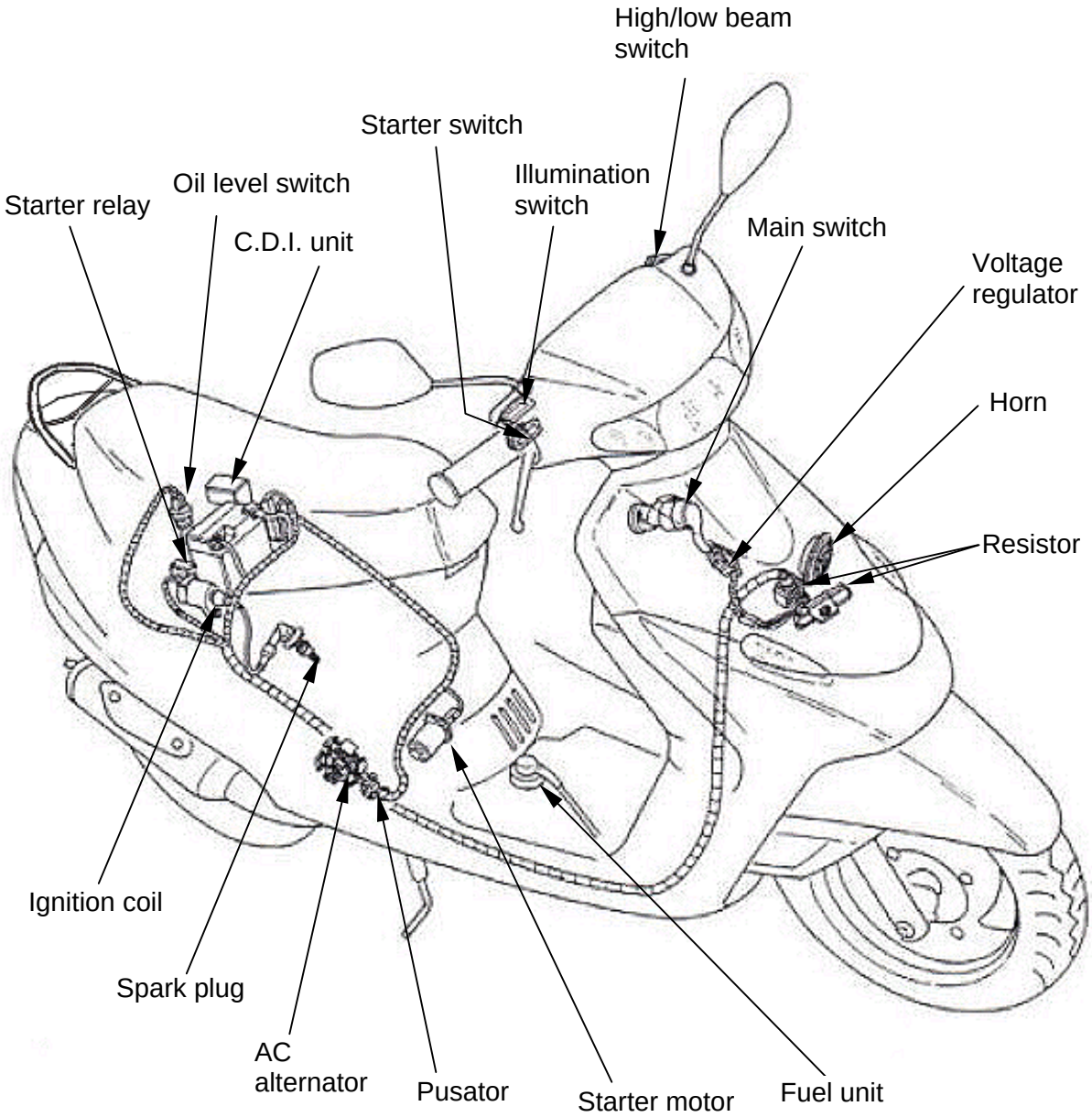
Apply with locking sealant onto mounting nut, and screw the mounting nut and connector into the cushion stem.
Hold the connector and tighten the mounting nut.
Remove the compressor.



INSTALLATION

Install the rear shock absorber.
Tighten the upper & lower mounting bolts to specified torque.
Torque value:
Upper mounting bolt: 4.0 kg-m
Lower mounting bolt: 2.7 kg-m
Press down the tail of the scooter for several times to check shock absorber operation.
Installation all components in reverse order of removal procedures.





15. ELECTRICAL EQUIPMENT

MAINTENANCE INFORMATION

Precautions in Operation

- When remove the battery, the disconnection sequence of cable terminals shall be strictly observed. (First disconnect the negative cable terminal, next, the positive cable terminal.)
- The model of the spark plug and the tightening torque.
- The ignition timing.
- Adjustment of headlamp.
- Removal and installation of AC generator.
- The maintenance-free battery requires no inspection of electrolyte level and refilling of distilled water.
- To recharge the battery, remove the battery from the motorcycle without removing ventilation caps.
- Unless in emergency, never rapid charge the battery.
- The voltage must be checked with the voltmeter while charging the battery.
- As C.D.I assembly does not require an ignition timing check. In case ignition timing is incorrect, check C.D.I and AC generator. Verify with an ignition timing lamp after replacement if necessary.
- The starter motor can be removed after the engine is removed.

Specification

Charging System

Item		Specification
Battery	Capacity	12V3Ah
	Charging rate	0.4A / 5 hours (standard), 4A / 0.5 hour (fast charging)
Leak current		< 1 mA
Charging current		1.2 A / 5000 rpm
Control voltage in charging		. 14.0 - 15.0 V / 5000 rpm
Control voltage in headlamp		12.6 - 13.6 V / 5000 rpm

Ignition System

Item		Specification
Spark plug	Model	NGK BR8HSA (Recommended)
	Gap	0.6 - 0.7 mm
Ignition coil and resistance	Primary coil	0.19 – 0.23 Ω
	Secondary coil	2.8 – 3.4 KΩ
Ignition timing “F” mark		. 17° BTDC / 1800 rpm

TROUBLESHOOTING

No voltage

- Battery discharged
- The cable disconnected
- The fuse is blown
- Improper operation of the main switch

Low voltage

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

No spark produced by spark plug

- The spark plug is out of work
- The cable is poorly connected, open or short-circuited
  - Between AC.G. and C.D.I.
- Poor connection between C.D.I. and ignition coil
  - Poor connection between C.D.I. and the main switch
- Poor main switch
- Poor C.D.I.
- AC.G. is out of work

Starter motor does not work

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

Intermittent power supply

- The connector of the charging system becomes loose
- Poor connection of the battery cable
- Poor connection or short-circuit of the discharging system
- Poor connection or short-circuit of the power generation system

Charging system does not operate properly

- Burnt fuse
- Poor contact, open or short circuit
- Poor regulator
- Poor ACG

Engine does not crank smoothly

- Primary coil circuit
  - Poor ignition coil
  - Poor connection of cable and connectors
  - Poor main switch
- Secondary coil circuit
  - Poor ignition coil
  - Poor spark plug
  - Poor ignition coil cable
  - Current leakage in the spark plug cap
- Incorrect ignition timing
  - Poor AC.G.
  - Improper installation of the pulse sensor
  - Poor C.D.I.

Weak starter motor

- Poor charging system
- The battery is not fully charged
- Poor connection in the windings
- The motor gear is jammed by foreign material

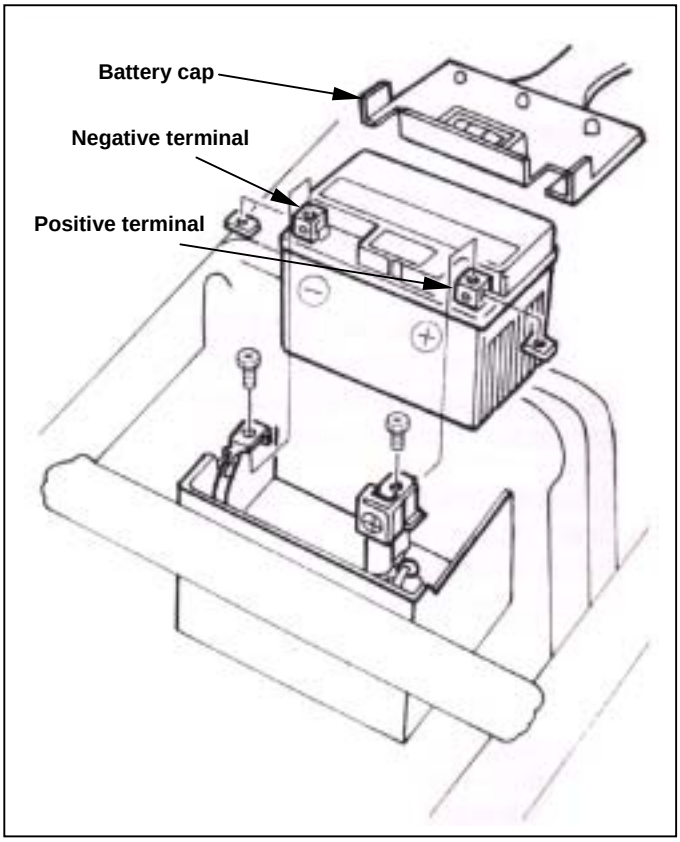
Starter motor is working, but engine does not crank

- Poor starter motor pinion
- The starter motor run in reverse direction
- Poor battery

Battery

Battery Removal/Installation

Turn off main switch.
Open seat and oil tank cap.
Remove screw and the open battery cap.
Disconnect the negative cable terminal first, then the positive cable terminal.
Remove the battery from the motorcycle.
Install the battery in reverse order of removal.



Voltage Check

Open cushion seat and battery cap.
Remove wires from battery.
Check battery voltage.
Voltage:
Fully charged: 13.0 – 13.2V
Undercharged: 12 V

Charging

Remove the battery.
Connect the positive terminal (+) of the charger to the battery positive terminal (+).
Connect the negative terminal (-) of the charger to the battery negative terminal (-).
Standard charging current/time: 0.4A/5 hrs.
Fast charging current/hrs: 4A/0.5 hr.

⚠ Caution

Strictly keep flames and sparks away while recharging to avoid to explosion causing by hydrogen.
Stop charging battery when electrolyte temperature is over 45℃(117℉).

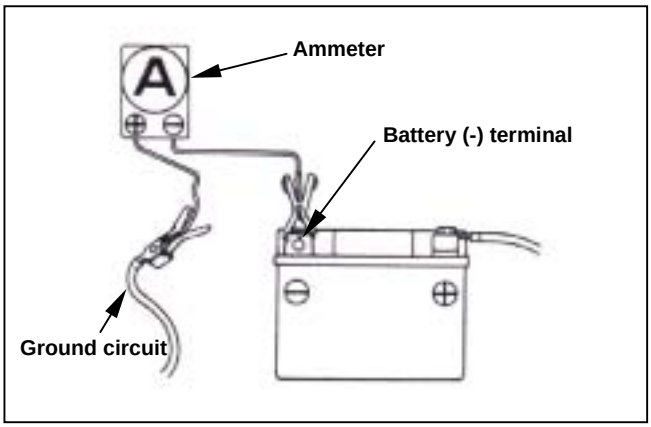
⚠ Caution

Fast charging the battery is for in emergency only. Battery should be charged in standard.

Charging System

Current Leakage Inspection

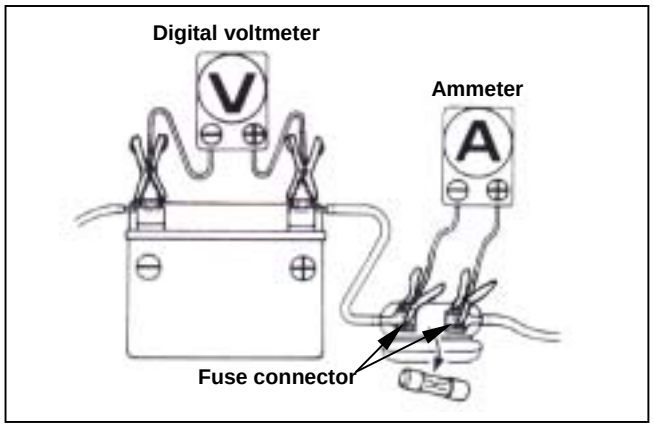
Turn the main switch to OFF position, and remove the negative cable terminal (-) from the battery.
Connect an ammeter between the negative cable terminal and the battery negative terminal.



⚠ Caution

- In the current leakage test, set the current range at larger 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 the main switch to ON position during test.

If the leaked current exceeds the specified value, it may indicate a short circuit.
Allowable current leakage: Less than 1 mA
Disconnect each cable one by one and take measurement of the current of each cable to locate the short circuit.



CHARGING VOLTAGE INSPECTION

⚠ Caution

- Before conducting the inspection, be sure that the battery is fully charged. If undercharged, the current changes dramatically.
- Use a fully charged battery having a voltage larger than 13.0 V
- While starting the engine, the starter motor draws large amount of current from the battery.

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

⚠ Caution

When the probe is reversibly connected, use an ammeter having an indication that shows both positive and negative direction current. The measurement would be at zero, if the ammeter is one direction only.

⚠ Caution

- Do not use short-circuit cable.
- It is possible to measure the current by connecting an ammeter between the battery positive terminal and the + cable position terminal, however, while the starter motor is activated, the surge current of the motor draws from the battery 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 ammeter and the cable while there is current flowing through. It may damage the ammeter.

Connect a tachometer.
Turn on the headlamp to high beam and start the engine.
Accelerate the engine to the specified revolution per minute and measure the charging voltage.
Specified Charging Current: 1.2 A / 5000 rpm
Control Charging Voltage: 14.0~15.0 V / 5000 rpm

Caution

- To replace the old battery, use a new battery with the same current and voltage.

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.

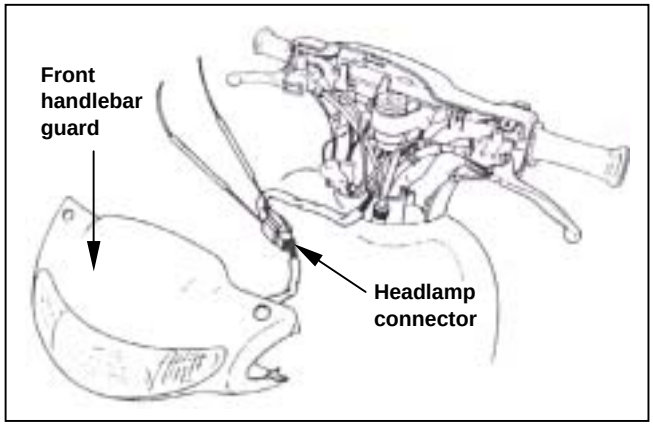
(3) The charging current is normal, but the voltage is not.
- The fuse of the voltmeter is blown.

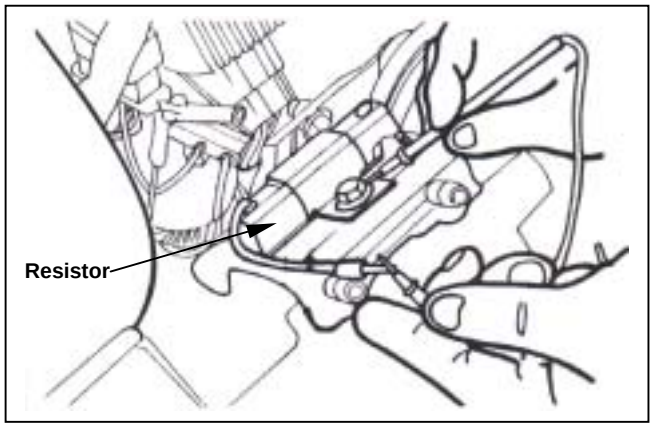
HEADLAMP VOLTAGE INSPECTION

Connect a tachometer.
Do not disconnect the headlamp harness connector after engine started.
Turn the headlamp ON and to high beam position.
Measure the voltage between the blue wire (+) and green wire (-) while the headlamp harness is still in connection.
Gradually increase engine speed and read the voltage in each specified rpm.
Control voltage: 12.0~14.0 V / 5000 rpm
Measure AC voltage with a voltmeter.

- Needle type voltmeter: 12.0~14.0 V / 5000 rpm
- Digital type voltmeter: 10.0~13.0 V / 5000 rpm

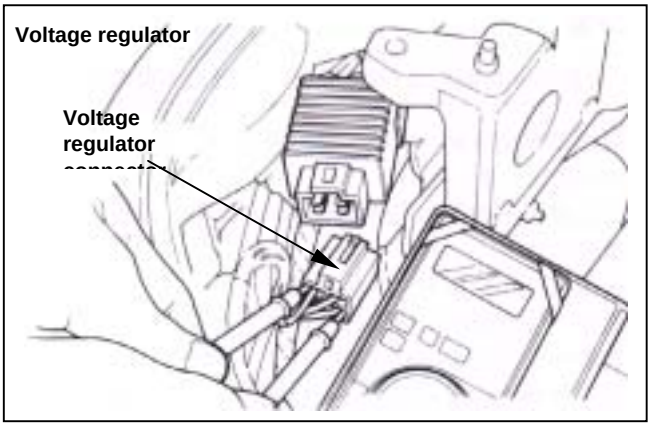
Resistance Measurement of Resistor
Resistance:
Resistor (5.9Ω30W) at 20℃.
One Body ground: 5.6Ω~6.2Ω
Resistor (10.2Ω5W) at 20℃.
Green/black Body ground: 9.0Ω~10.0Ω





VOLTAGE REGULATOR INSPECTION

Check the each pins of connector on the voltage regulator.



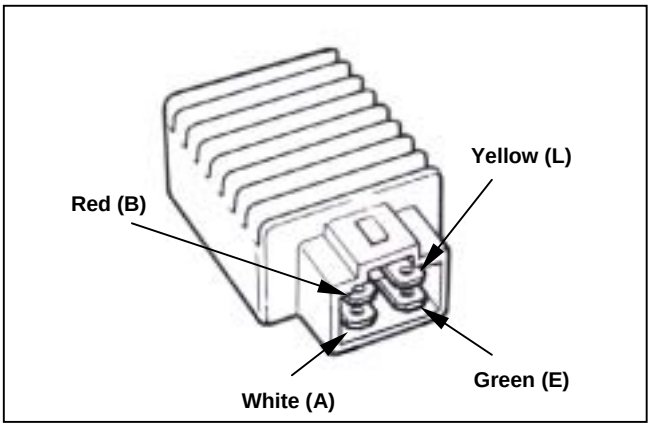
Inspection	Probable cause
Check voltage between battery terminal (red) and ground (green).	Blown fuse or poor main switch contact
Check continuity between ground and frame.	Open-circuit wire
Check charging coil (white to ground) if its resistance is within 0.2~1.0Ω	Open-circuit in alternator charging coil or in illumination switch.
Check charging /illumination coil (yellow to ground) if its resistance is within 0.2~0.8Ω	

If wire circuit check is in normal and there is no loose in the pins of voltage regulator connector, then measure the resistance among pins on the connectors of voltage regulator.

Voltage Regulator

Multi-meter(+) / Multi-meter (-)	White A	Yellow L	Red B	Green E
White A		∞	4~7	
Yellow B	∞		∞	2.4~4.8
Red B	4~7	∞		∞
Green E	∞	2.4~4.8	∞	

If the resistance values are abnormal among the pins, replace the voltage regulator.



⚠ Caution

- If the probe is touched by finger, then the resistance values will be incorrect.
- It contains semi-conductor in circuit so the measured resistance value will be in different if different testers are used. Thus, these values cannot be judged with standards.

Multi-meter type;

—KOWA - digital type

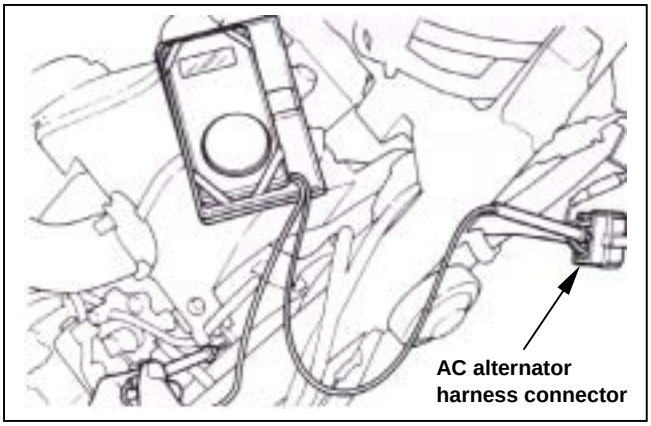
—SANWA - digital type

—TH-5H - analog type

- **SANAWA tester: range x KΩ**
- **KOWA tester: range x 100Ω**

AC Alternator Inspection

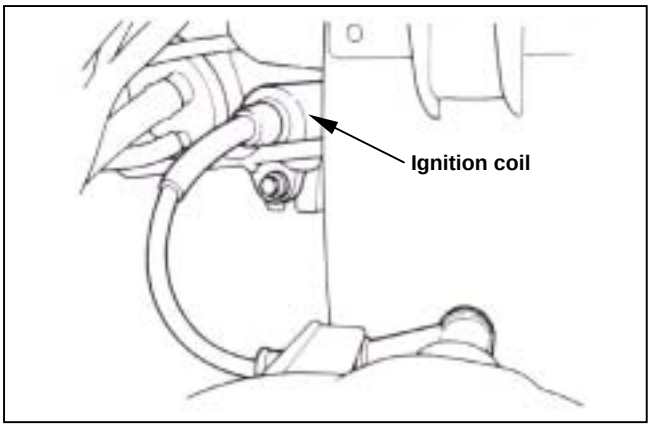
Remove body cover.
Disconnect the alternator harness connector.
Measure the resistance on both charging coil (the white to ground) and illumination coil (the yellow to ground).
Resistance Measurement: (20℃)
Charging coil (white - green): 0.2~1.0Ω
Illumination coil (yellow - green): 0.1~0.8Ω



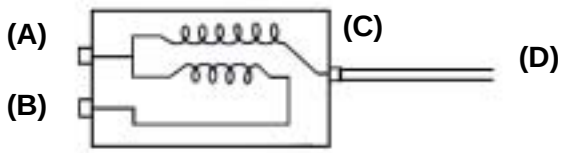
IGNITION SYSTEM

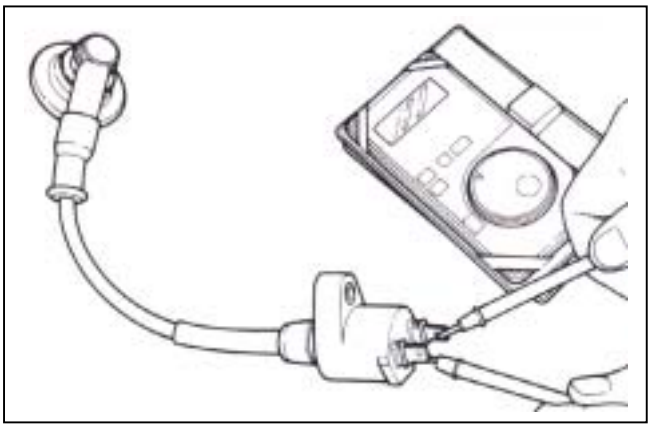
Ignition Coil Inspection

- Remove body cover.

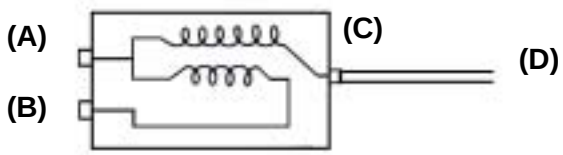


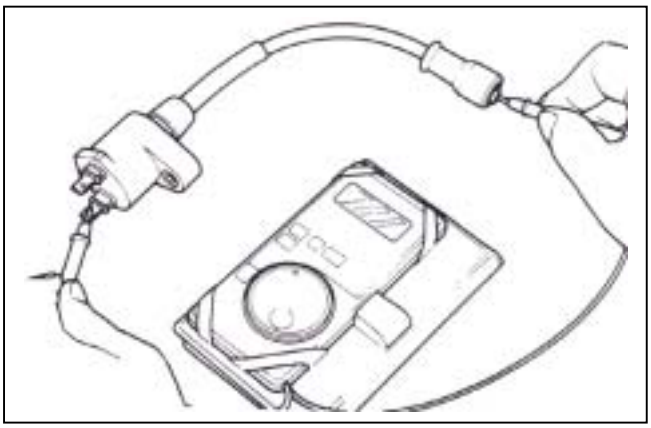
Measure the primary coil resistance
Resistance :0.19~0.23KΩ (A)→(B)
Measure the secondary coil resistance
Resistance : 8.2~9.3KΩ (A)→(C)





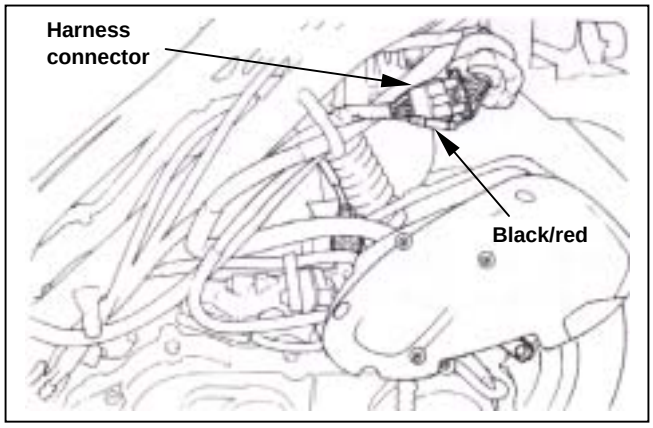
Remove the high voltage coil cap, and measure its negative (-) terminal for the secondary coil resistance.
Resistance : 3.1~3.2KΩ (A)→(D)





Electrical System Circuit Inspection

Remove body cover.
Disconnect the CDI set connector, and check its circuit to diagnosis related ignition components.



Pulse Generator/Exciting Coil

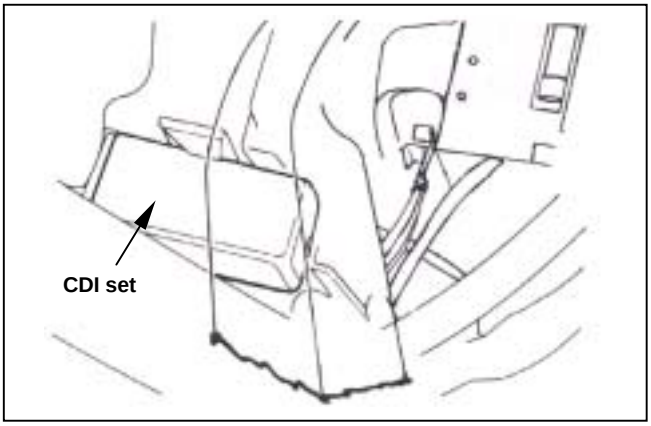
Remove body cover.

- Disconnect alternator connector.

Resistance Measurement: (20℃)
Pulse generator coil (blue/yellow - ground): 50~200Ω
Exciting (blue/yellow - ground): 400~800Ω

CDI Electrical System Circuit Inspection

Remove body cover.
Disconnect the CDI set connector, and check its circuit to diagnosis related ignition components.



CDI Electrical System Circuit Inspection

Inspection Item	Diagnosis
Main switch harness	Check continuity between body ground and black/white wire as the main switch in ON position.
Exciting coil	Check resistance between body ground and black/red wire for 400~800Ω(20℃)
Pulse generator coil	Check resistance between body ground and blue/yellow wire for 50~200Ω(20℃)
Primary coil resistance	Check resistance between body ground and black/yellow wire for 0.19~0.23Ω(20℃)

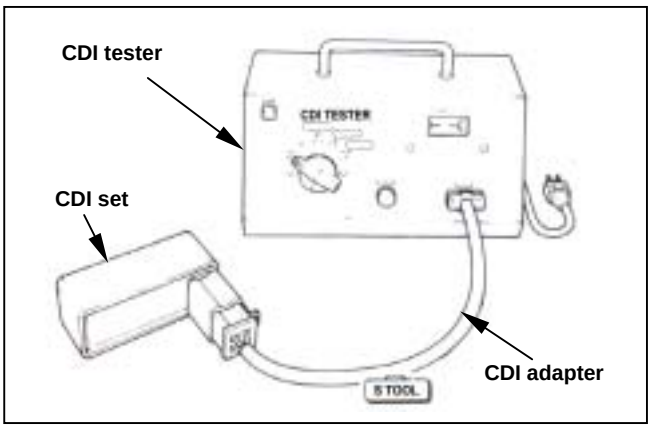
- If above checks are in normal but spark plug is still no spark. Then it probable causes from CDI set or high voltage coil. Test the CDI set and high voltage coil with CDI tester.
- If abnormal circuits are found in above checks, at first check all items, and then check each item one by one.

CDI Performance Test

Connect CDI to CDI tester with CDI adapter.
Conduct following connection and test according to CDI tester instruction.

Switch	Good condition	Poor condition
OFF	No spark	—
P	No spark	—
EXT	No spark	Spark
ON1	Spark	No spark
ON2	Spark	No spark

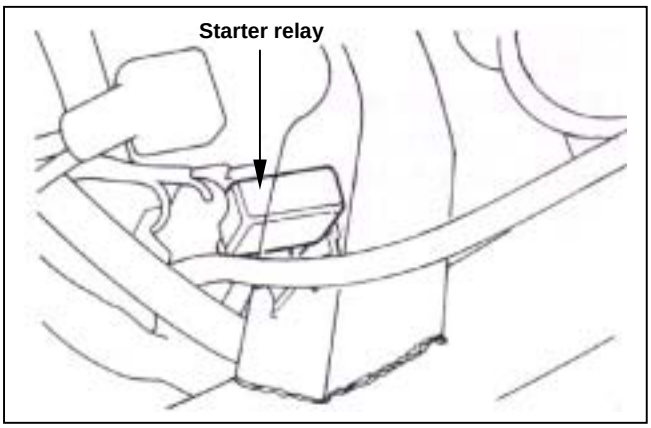
If any abnormal condition is found, replace the CDI set.



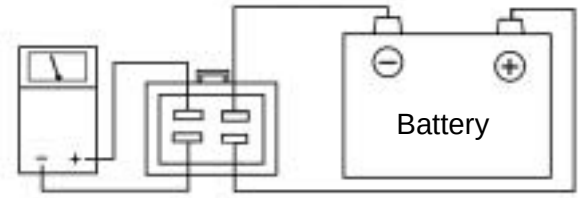
STARTING SYSTEM

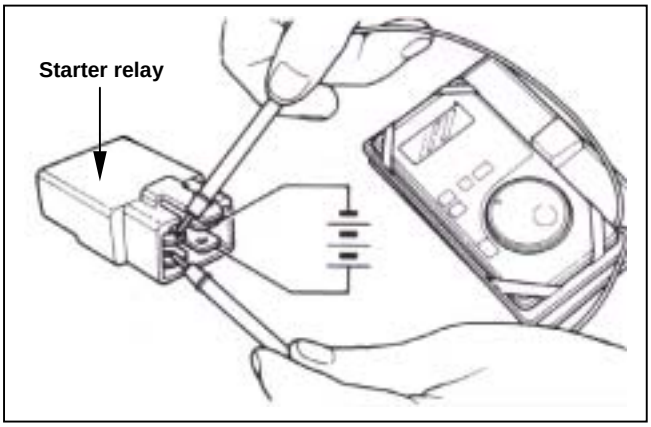
STARTER RELAY INSPECTION

Remove luggage box.



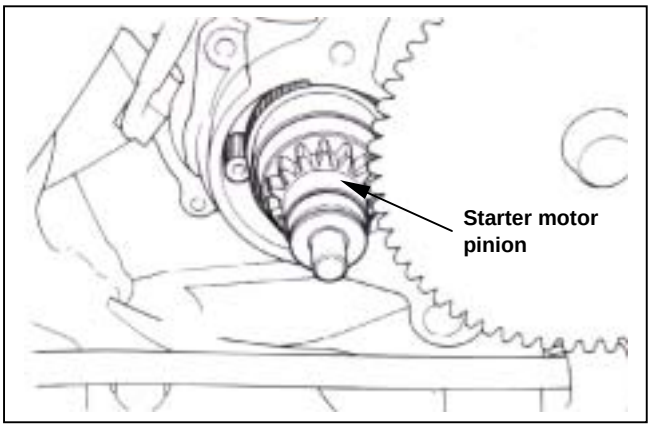
Connect both the green/yellow (-) and the yellow/red (+) pins to battery posts directly.
If the red and red/white pins are also in continuity, it means it is in normal.





STARTER MOTOR PINION REMOVAL/INSTALLATION

Remove left crankcase cover.
Remove starter motor pinion.
Install the starter motor pinion in reverse order of removal.

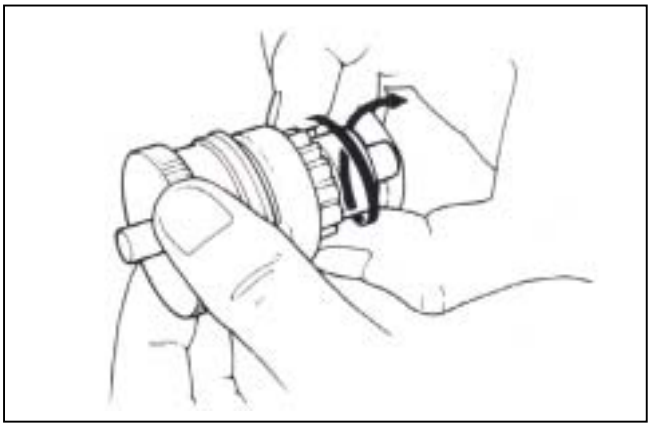


STARTER MOTOR PINION INSPECTION

- Pinion, reduction gear for wear out or damage → replace it with new one.
- Gear journal for wear out or damage → replace it with new one.

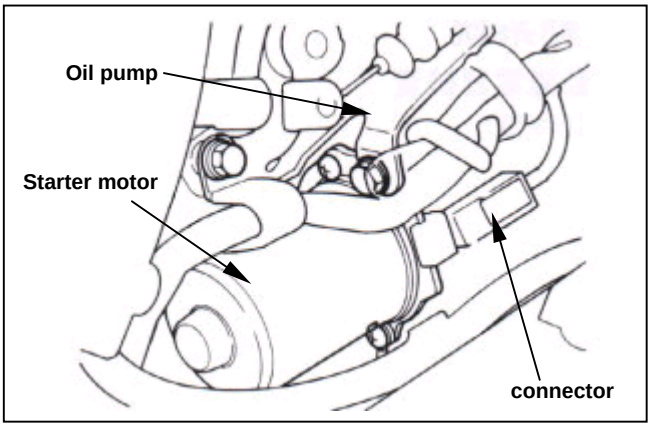
Check the pinion for sliding in axial direction smoothly.

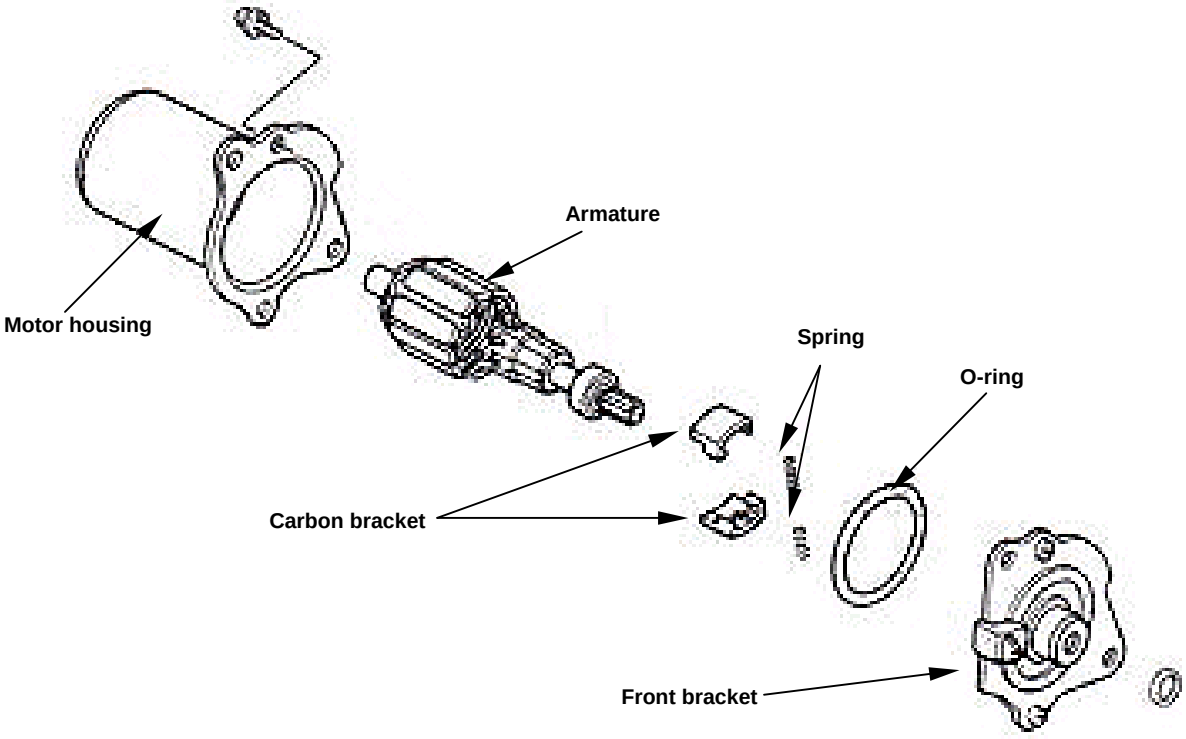
- The pinion sliding in axial direction not in smooth → replace it with new one.



STARTER MOTOR REMOVAL/DISASSEMBLY

Remove body cover.
Remove bolt and oil pump control cable.
Disconnect starter motor harness connector.
Remove 2 bolts for separation starter motor and gasket.
Remove 2 bolts for disassembly the starter motor.





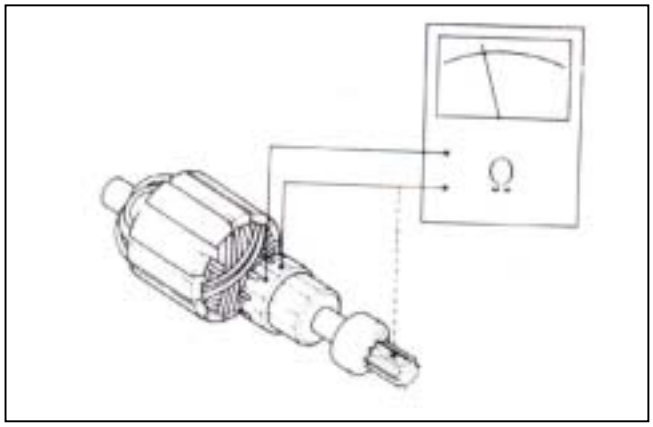
ARMATURE INSPECTION

Check the armature for discoloration or other damage. It may be short-circuit if dark surface on the shifter found.

⚠ Caution

Do not clean the shifter surface with sandpaper.

Check continuity 1) both the shifter surface and shaft, 2) among the shifter surfaces. It can be in continuity among the shifter surfaces, but both the shifter surface and the shaft can not be in continuity.



STARTER MOTOR RE-ASSEMBLY/INSTALLATION

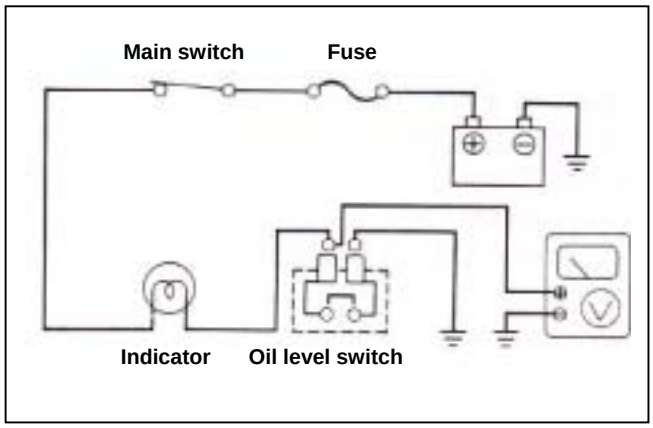
Re-assemble and install the starter motor in reverse order of removal procedures.

OIL LEVEL SWITCH

Troubleshooting

◎ If the oil level in oil tank is in specified level, but the oil level indicator still goes on.

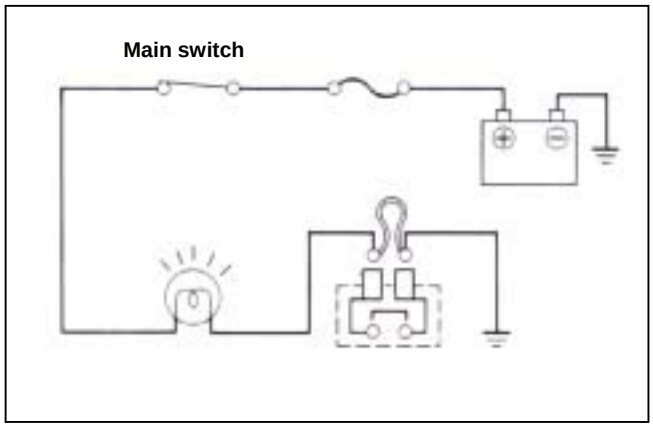
1. Remove body cover.
2. Disconnect oil gauge wire, and turn the main switch to ON position.



Indicator light up	Indicator not light up
↓	↓
Short-circuit between indicator and oil gauge	Malfunction of oil gauge

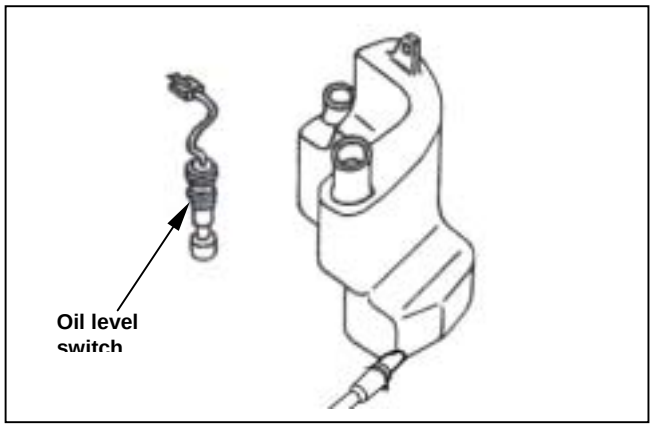
◎ If there is no oil in oil tank or low oil level, but the oil level indicator still not goes on.

1. Remove body cover.
2. Disconnect oil gauge wire and connect a jump wire among connector, and then turn the main switch to ON position.



Indicator not light up	Indicator light up
↓	↓
Poor wire connection	Malfunction of oil gauge
↓	

3. Disconnect oil gauge connector, and check voltage between wire and ground.



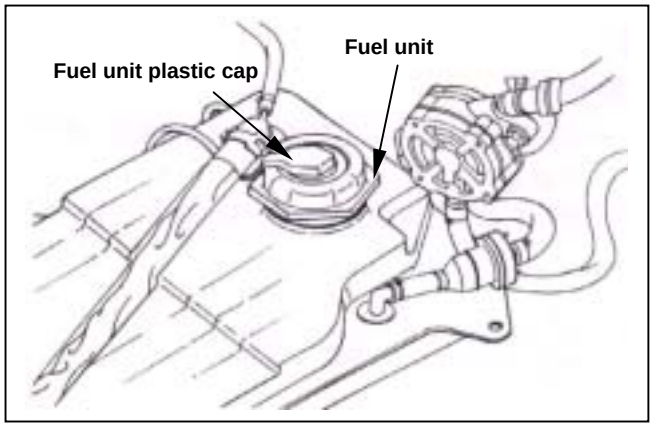
No voltage	Voltage
↓	↓
• Open-circuit between oil gauge and indicator. • Blown bulb	• Malfunction of oil gauge • Poor connection of oil gauge

REMOVAL/INSTALLATION

Remove oil tank.
Remove oil level switch from the oil tank.
Install the oil level switch in reverse order of removal procedures.

FUEL UNIT

REMOVAL/INSTALLATION



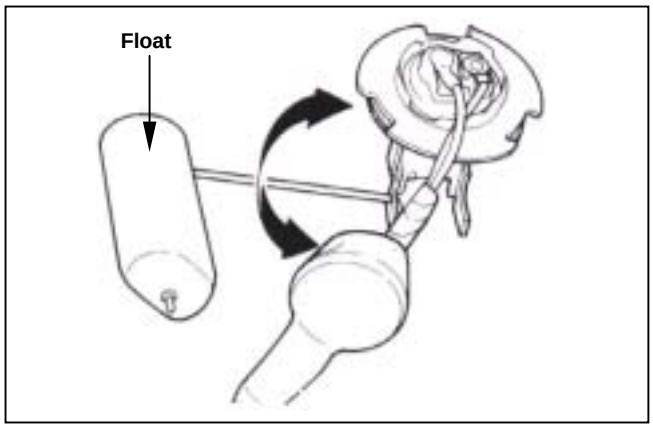
Remove 4 bolts and foot board.
Disconnect fuel unit connector.
Remove the fuel unit plastic cap.
Turn the snap ring in CCW direction and then remove the fuel unit.

⚠ Caution

Do not bend the float arm.

Install in reverse order of removal procedures.
Remark: Aligning the slot of fuel unit with the ring of oil tank as installation, and then turn the snap ring in CW direction until matching to the arrow.

INSPECTION



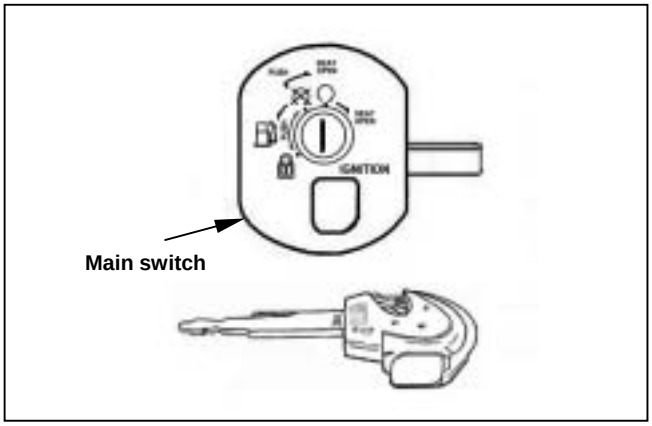
1. Connect the fuel unit connector.
   Turn the main switch ON.
   Move the float in up and down, and make sure that the fuel indicator can be reached to F (Full) and E (Empty) positions.
   Conduct the step 2 if the needle on the fuel indicator is not moved.
2. Measure the connector resistance while the float in up and down positions.

Float position	Resistance value
Up (full)	3~10Ω
Down (empty)	90~100Ω

Check the fuel indicator if the resistance is in normal.
Replace the fuel gauge if the resistance is abnormal.

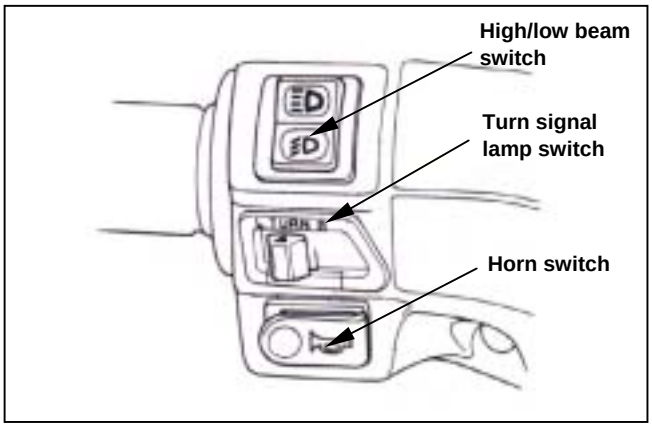
SWITCH/HORN

Remove handlebar and front guards.
Remove handlebar lower guard and front inner box.
Check continuity on each switch.
The connected circles with a line are that they should be in continuity.



Main Switch

Wire color	Black	Black / White	Green	Red
Mark	BAT2	IG	E	BAT1
LOCK		○———	———○	
OFF		○———	———○	
ON	○———			———○



Turn signal lamp switch

Wire color	Gray	Light blue	Orange
Mark	WR	R	L
R	○———	———○	
N			
L	○———	———	———○

Horn Switch

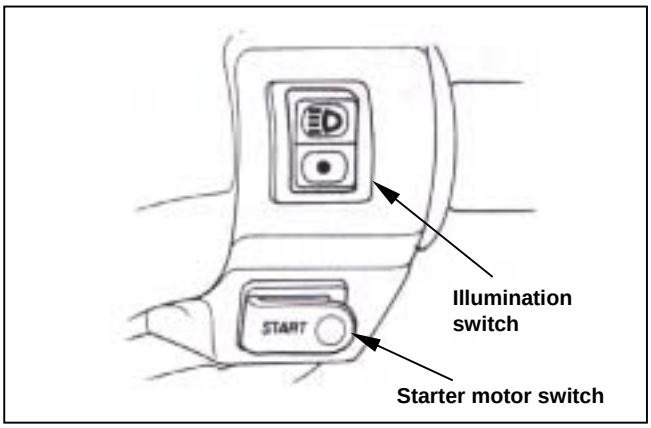
Wire color	Light green	Black
Mark	HO	BAT2
FREE		
PUSH	○———	———○

High/Low Beam switch

Wire color	Brown	White	Blue
Mark	HL	LO	HI
LO	○———	———○	
(N)	○———	———○	———○
HI	○———	———	———○

Illumination Switch

Wire color	Brown	Yellow	Light red
Mark	HL	CI	RE
OFF		○———	———○
ON	○———	———○	

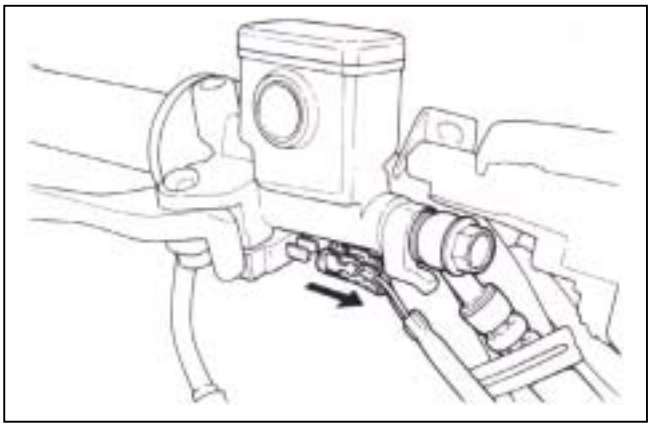


Starter Motor Switch

Wire color	Yellow / Red	Green
Mark	ST	E
FREE		
PUSH	○———	———○

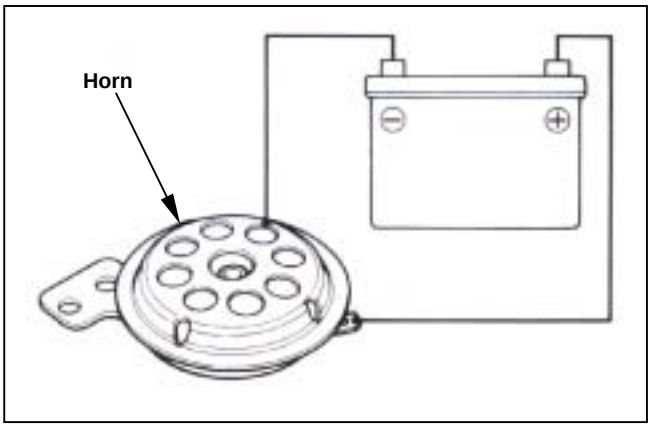
Front / Rear Brake Lamp Switch

If the switch is in continuity as braking, it is in normal. The switch is non-adjustable.



Horn

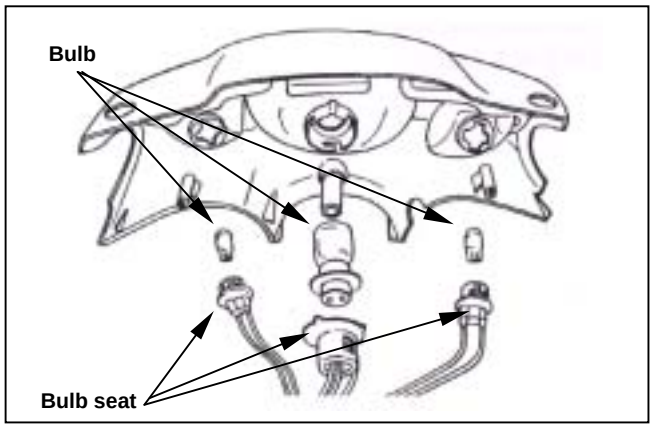
If the horn give out sound as connecting to 12V battery, it means that it is in normal.



BULB REPLACEMENT

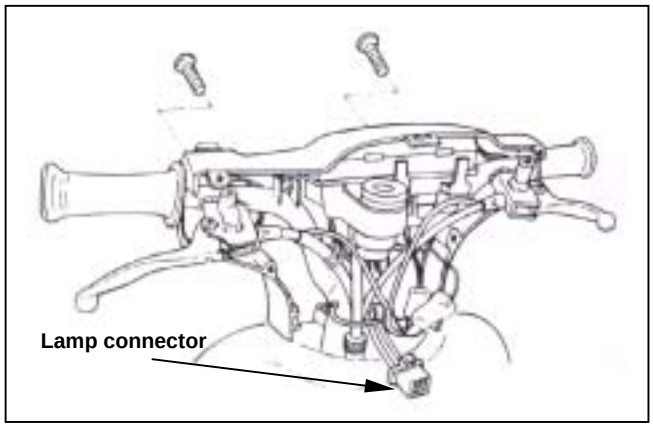
Headlamp/Turn signal lamp

Remove front handlebar guard.
Remove bulb seat and replace the bulb.
Install the all removed parts.



Instrument panel

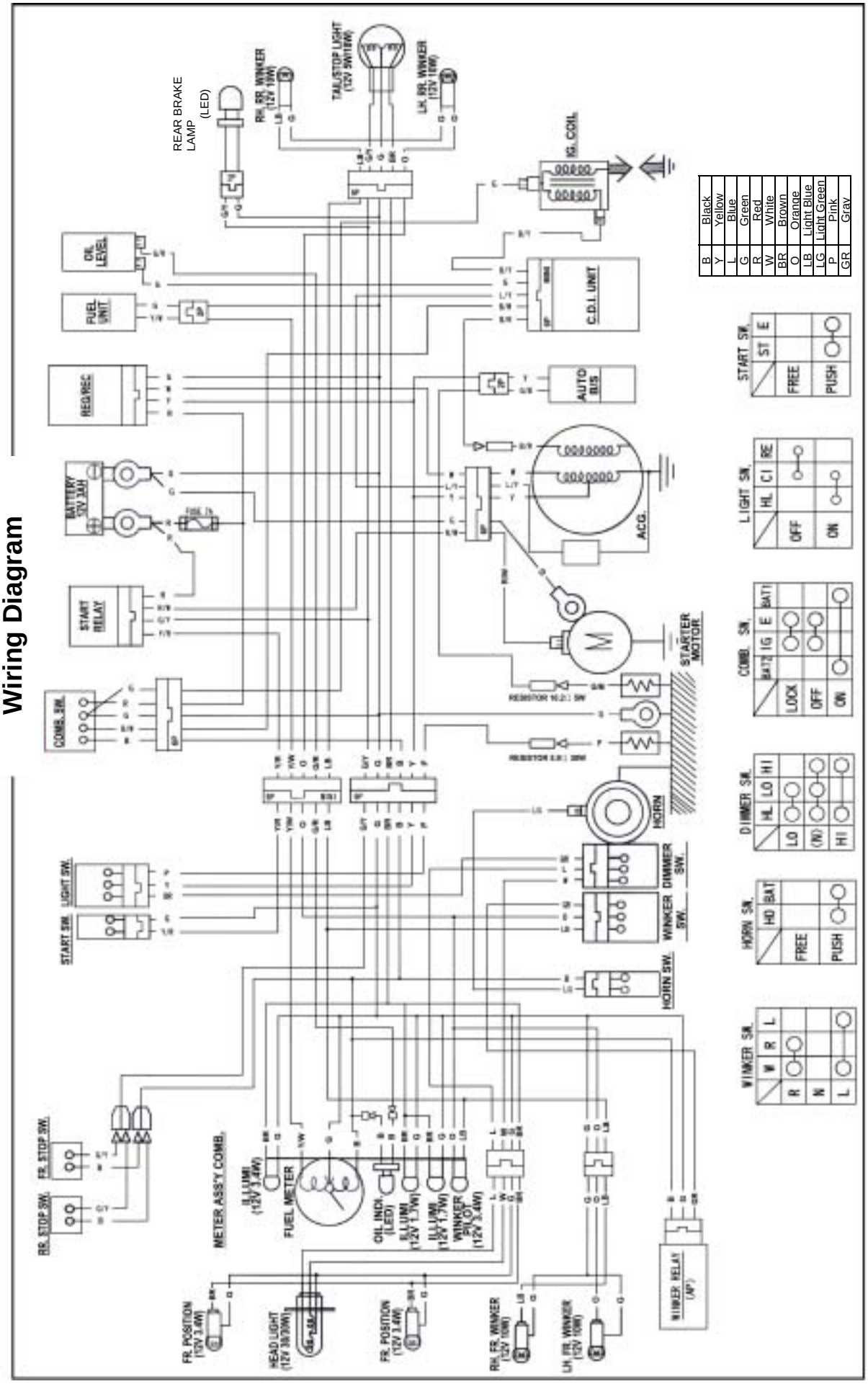
Remove handlebar guard.
Take out the bulb seat from the bottom of instrument panel.
Install the all removed parts.



Tail lamp / Brake lamp / Rear winker lamp

Remove 2 screws and then remove outer cover.
Remove 2 screws and then remove inner cover.
Replace tail lamp or winker lamp bulb.
Install the all removed parts.

Wiring Diagram



NOTES