FOREWORD

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HOW TO USE THIS MANUAL

SERIAL NUMBER

Quad Lander 600

SERVICE MANUAL

FOREWORD

This service manual contains the technical data of each component inspection and repair for the SANYANG Quad Lander 600 ATV. The manual is shown with illustrations and focused on “Service Procedures”, “Operation Key Points”, and “Inspection Adjustment”, providing technician with service guidelines.

If the style and construction of the ATV, Quad Lander 600, are different from the photos, pictures shown in this manual, the actual vehicle shall prevail. Specifications are subject to change without notice.

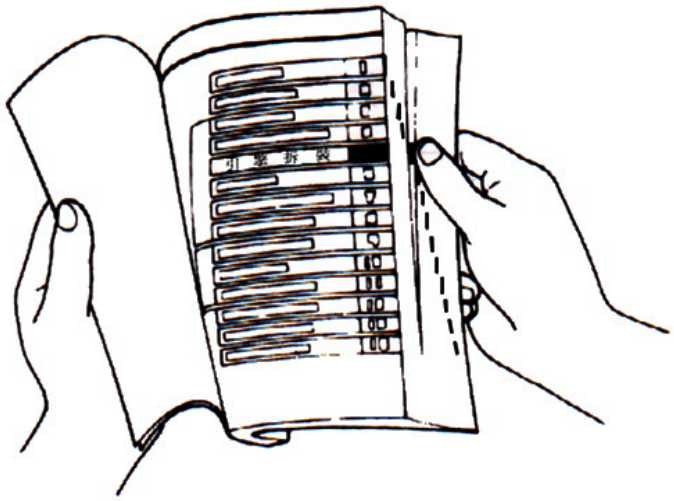
Service Department

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 Quad Lander 600ATV. 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 and special tools information.
The third to the 11th chapters cover engine and driving systems.
The 12th chapter is cooling system.
The 13th to the 16th chapter contain the parts set of assembly frame body.
The 17th chapter is electrical equipment.
The 18th chapter is wiring diagram.
Please see index of content to acquire the special parts and system information quickly.

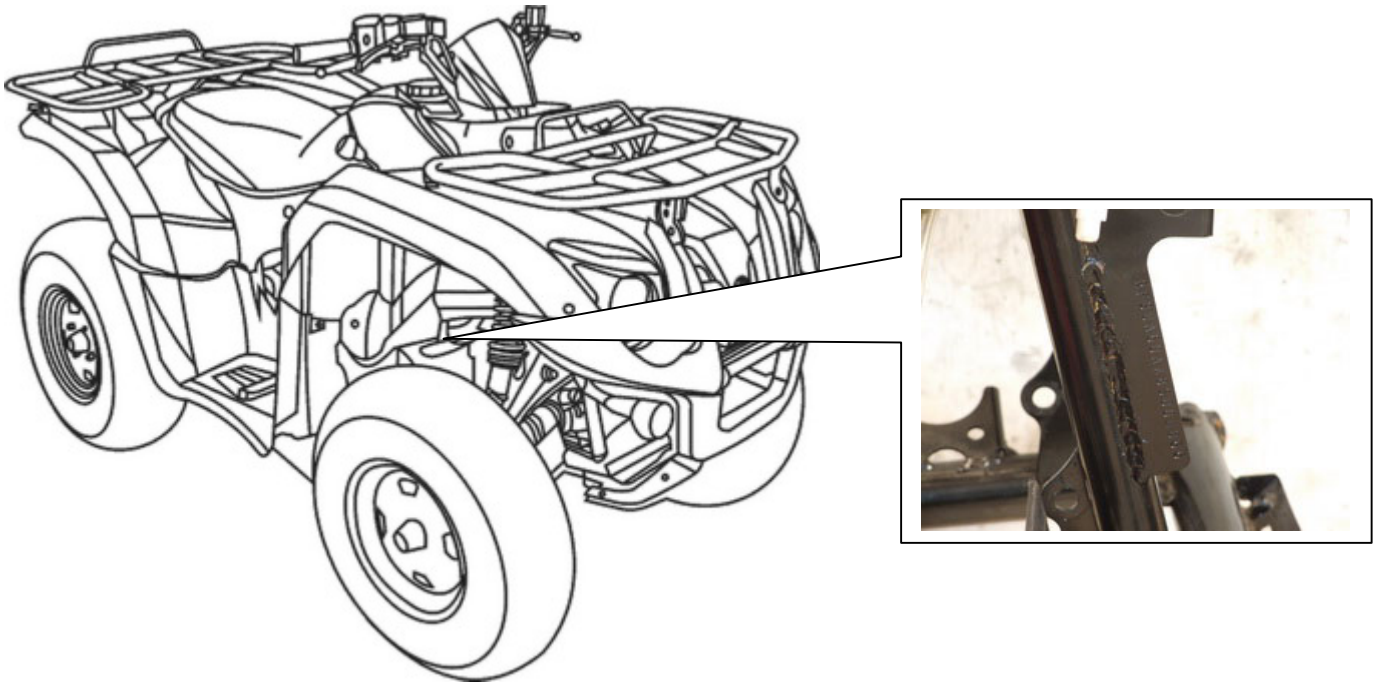


There are 4 buttons, “Foreword”, “Contents”, “How to use this manual” and “Mechanism Illustrations” on the PDF version, and can be access to these items by clicking on them.

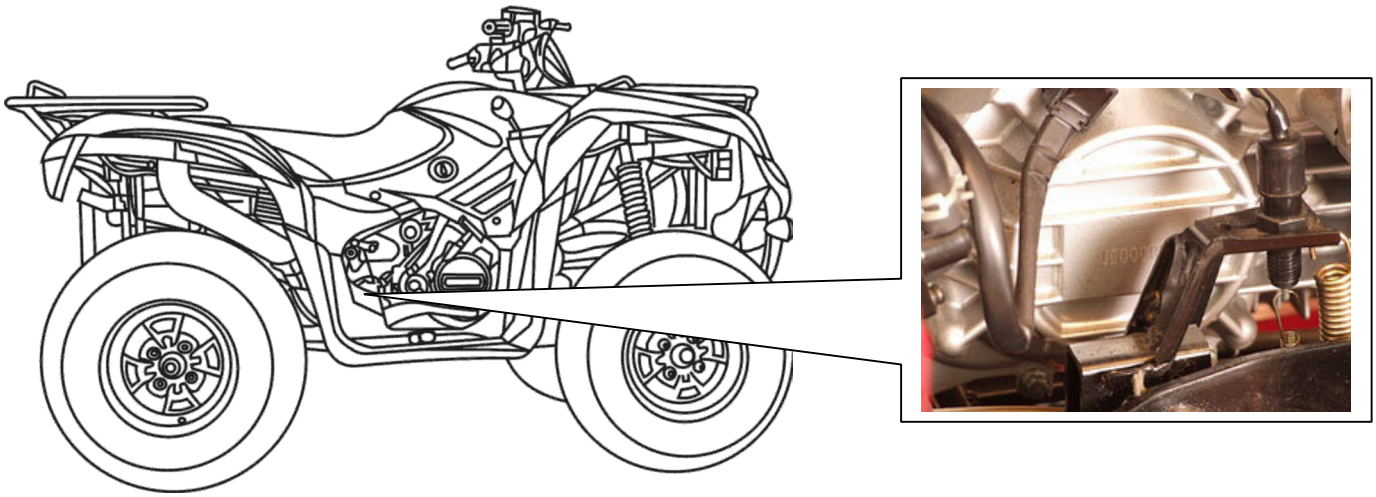
If user wants to look for the content of each chapter, selecting the words of each chapter on the contents can link to each chapter. There are two buttons, “Homepage and contents, onto the top line of first page of the each chapter. Thus, if the user needs to check other chapters, he can click the top buttons to back to the homepage or contents. The content of each chapter can be selected too. Therefore, when the user needs to check the content of the chapter, click the content words of the chapter so that can back to the initial section of the content. In addition, there is a “To this chapter contents” button on the top of the following pages; clicking the button can back to the contents of this chapter.

SERIAL NUMBER

Frame number



Engine number



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.
OIL Engine oil	Limits to use SAE 10W-30 API SG class oil. Warranty will not cover the damage that caused by not apply with the limited engine oil. (Recommended oil: KING MATE G-3 oil)
GREASE Grease	King Mate G-3 is recommended.
OIL Gear oil	King Mate gear oil serials are recommended. (Bramax HYPOID GEAR OIL # 140)
LOCK Locking sealant	Apply sealant; medium strength sealant should be used unless otherwise specified.
SEAL Oil seal	Apply with lubricant. ◦
NEW Renew	Replace with a new part before installation.
BRAKE FLUID Brake fluid	Use recommended brake fluid DOT3 or WELLRUN brake fluid.
S TOOL 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).

1

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. Keeps 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 brake shoe or pad ash may cause disorders and cancer of the breathing system

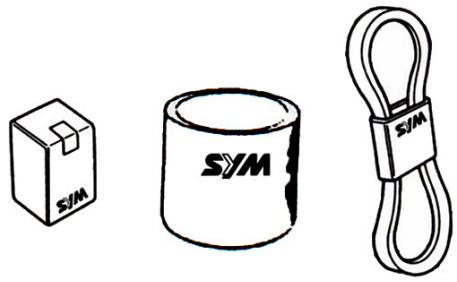
Brake fluid

⚠ Caution

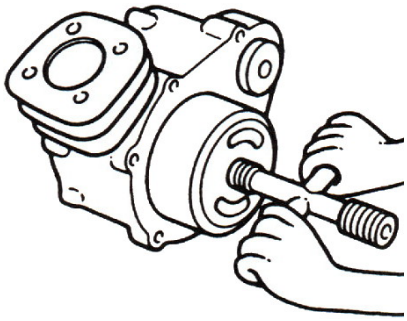
Spilling brake fluid on painted, plastic, or rubber parts may cause damage to the parts. Place a clean towel on the above-mentioned parts for protection when servicing the brake system. Keep the brake fluid beyond reach of children.

Service Precautions

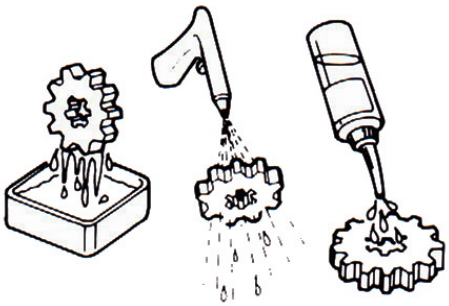
- Always use with SANYANG genuine parts and recommended oils. Using non-designed parts for SANYANG ATV may damage the ATV.



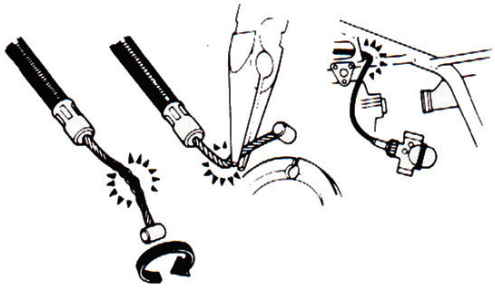
- Special tools are designed for remove and install of components without damaging the parts being worked on. Using wrong tools may result in parts damaged.



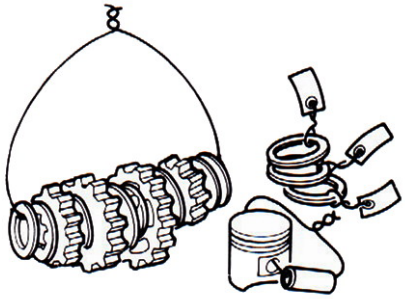
- When servicing this ATV, use only metric tools. Metric bolts, nuts, and screws are not interchangeable with the English system, using wrong tools and fasteners may damage this vehicle.
- Clean the outside of the parts or the cover before removing it from the ATV. Otherwise, dirt and deposit accumulated on the part's surface may fall into the engine, chassis, or brake system to cause damage.
- Wash and clean parts with high ignition point solvent, and blow dry with compressed air. Pay special attention to O-rings or oil seals because most cleaning agents have an adverse effect on them.



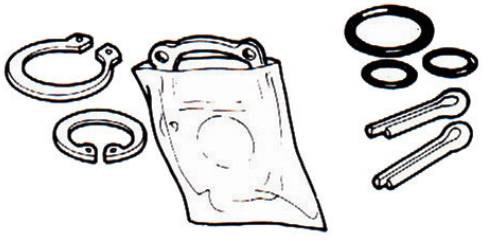
- Never bend or twist a control cable to prevent unsmooth control and premature worn out.



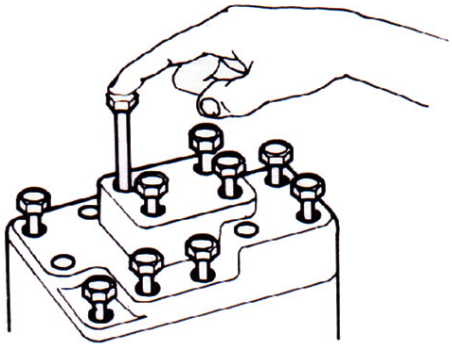
- Rubber parts may become deteriorated when old, and prone to be damaged by solvent and oil. Check these parts before installation to make sure that they are in good condition, replace if necessary.
- When loosening a component, which has different sized fasteners, operate with a diagonal pattern and 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.



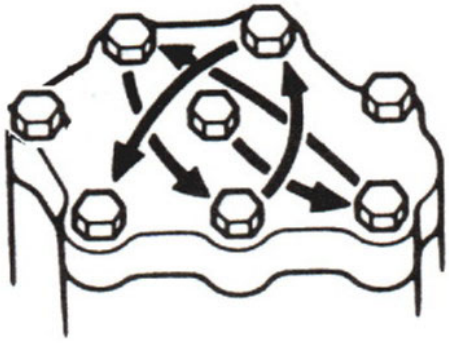
- Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).
- Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap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



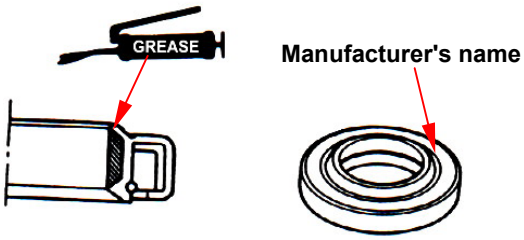
- The length of bolts and screws for assemblies, cover plates or boxes is different from one another, be sure they are correctly installed. In case of confusion, Insert the bolt into the hole to compare its length with other bolts, if its length out side the hole is the same with other bolts, it is a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



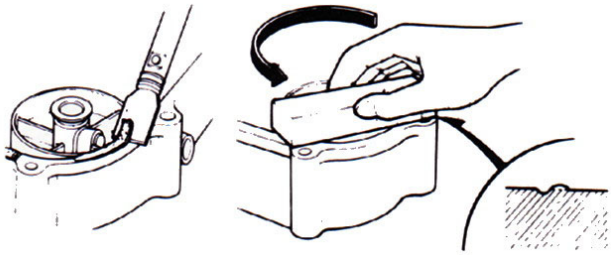
- Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unless otherwise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



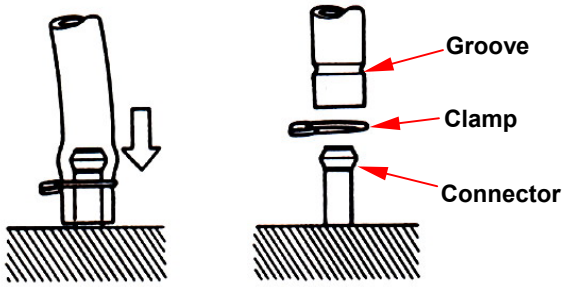
- When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, and check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.



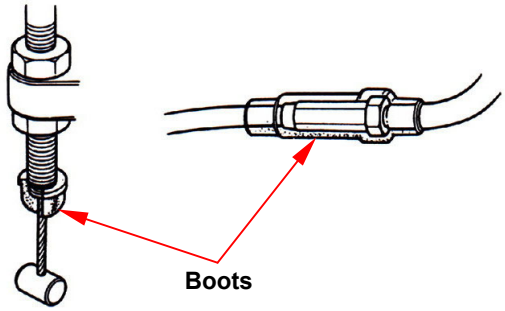
- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.



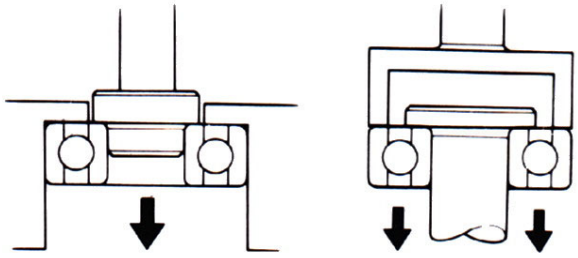
- The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections so that there is enough room below the enlarged ends for tightening the clamps.



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

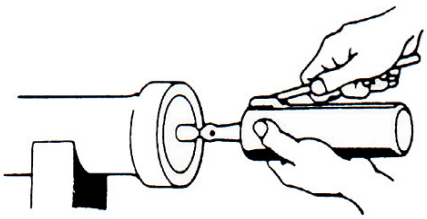


- The tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force on both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

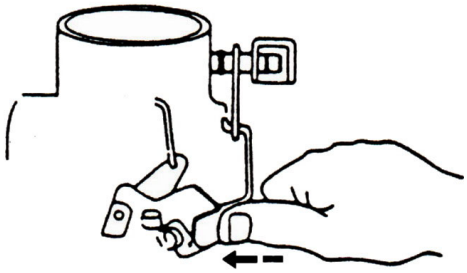


Both of these examples can result in bearing damage.

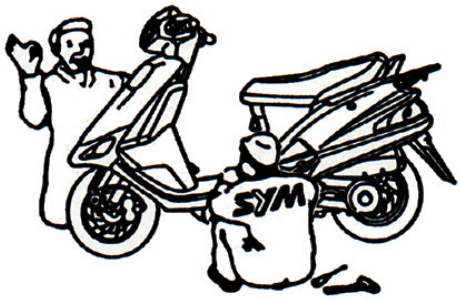
- Lubricate the rotation face with specified lubricant on the lubrication points before assembling.



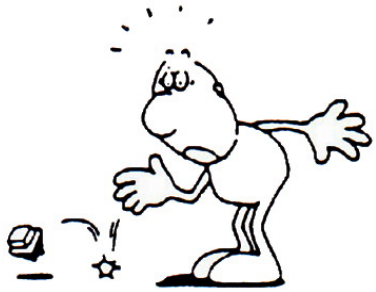
- Check if positions and operation for installed parts is in correct and properly.



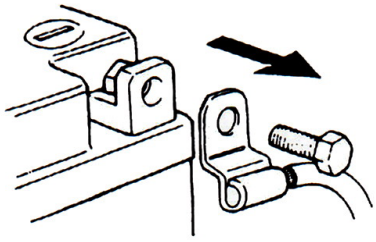
- Make sure service safety each other when conducting by two persons.



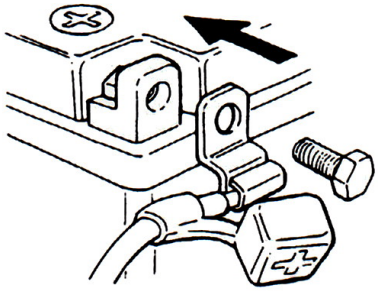
- Note that do not let parts fall down.



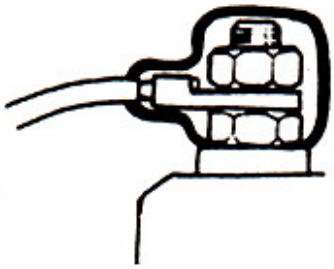
- Before battery removal operation, it has to remove the battery negative (-) cable firstly. Notre tools like open-end wrench do not contact with body to prevent from circuit short and create spark.



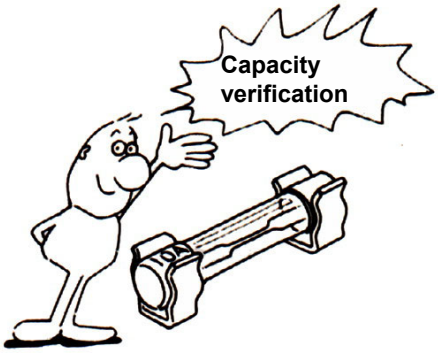
- After service completed, make sure all connection points is secured.
  Battery positive (+) cable should be connected firstly.
- And the two posts of battery have to be greased after connected the cables.



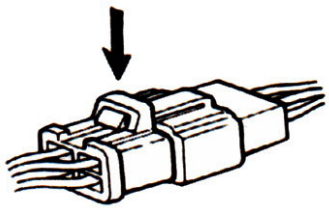
- Make sure that the battery post caps are located in properly after the battery posts had been serviced.



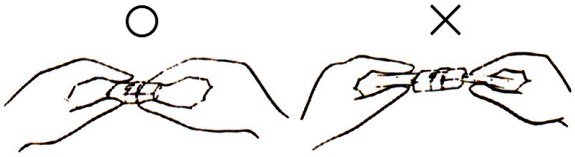
- If fuse burned, it has to find out the cause and solved it. And then replace with specified capacity fuse.



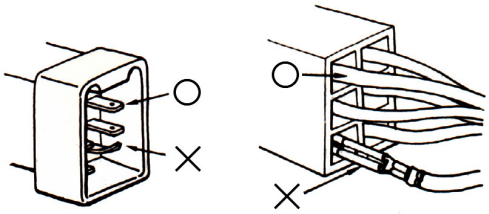
- When separating a connector, it locker has to be unlocked firstly. Then, conduct the service operation.



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



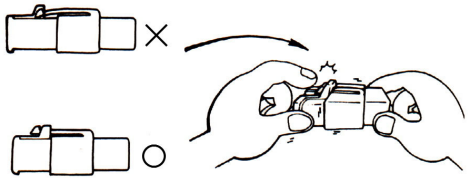
- Make sure if the connector pins are bent, extruded or loosen.



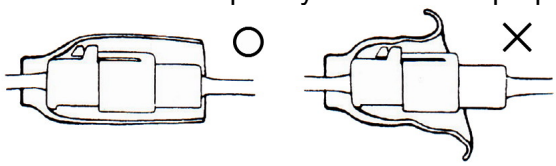
- Insert the connector completely.

  If there are two lockers on two connector sides, make sure the lockers are locked in properly.

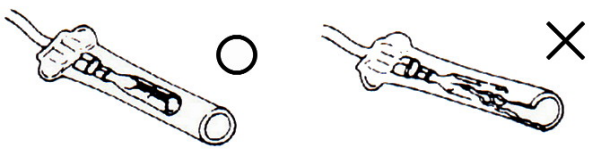
  Check if any wire loose.



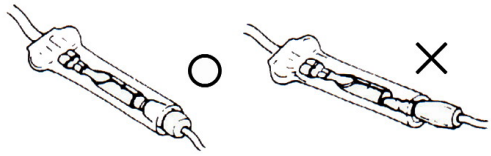
- Check if the connector is covered by the twin connector boot completely and secured properly.



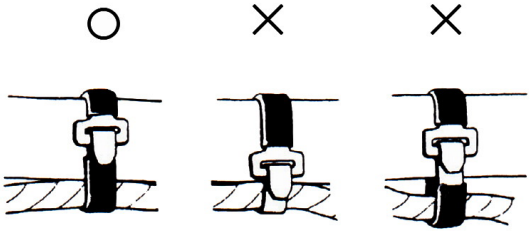
- Before terminal connection, check if the boot is crack or the terminal is loose.



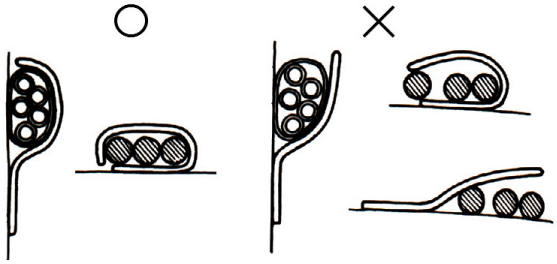
- Insert the terminal completely.
  Check if the boot covers the terminal.
  Do not let boot open facing up.



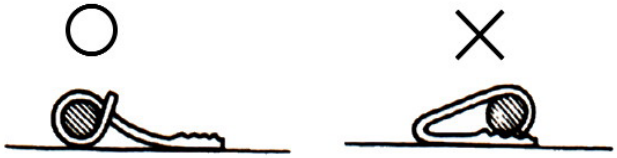
- Secure wires and wire harnesses to the frame with respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.



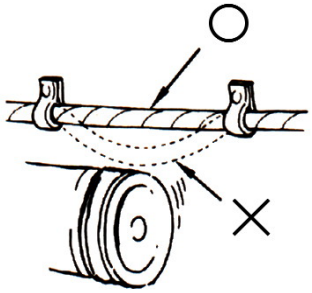
- Wire band and wire harness have to be clamped secured properly.



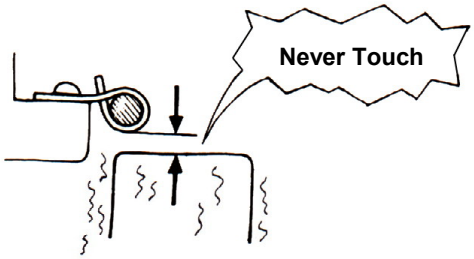
- Do not squeeze wires against the weld or its clamp.



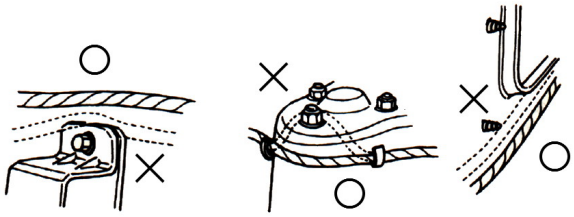
- Do not let the wire harness contact with rotating, moving or vibrating components as routing the harness.



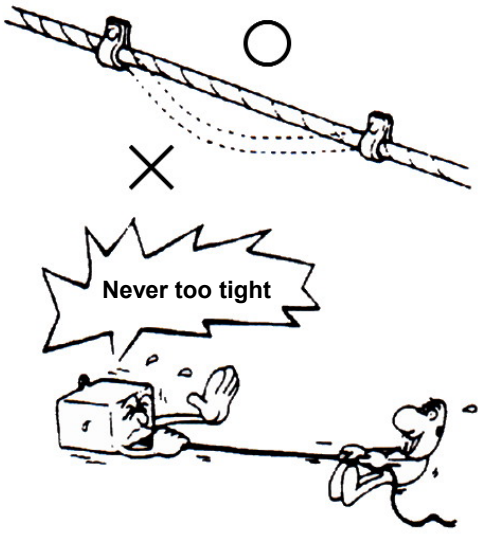
- Keep wire harnesses far away from the hot parts.



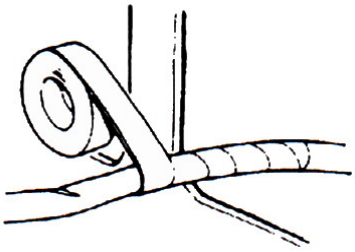
- Route wire harnesses to avoid sharp edges or corners and also avoid the projected ends of bolts and screws.



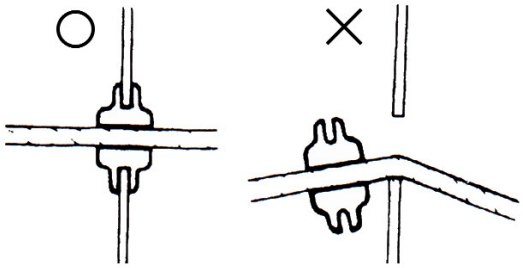
- Route harnesses so that they neither pull too tight nor have excessive slack.



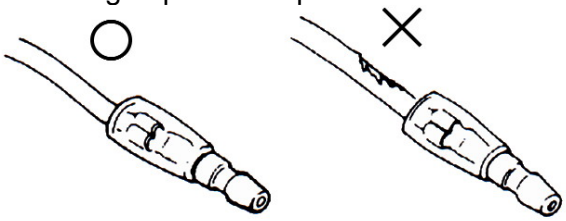
- Protect wires or wire harnesses with electrical tape or tube if they contact a sharp edge or corner. Thoroughly clean the surface where tape is to be applied.



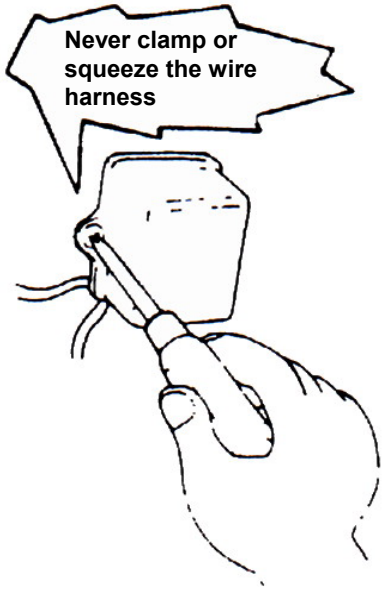
- Secure the rubber boot firmly as applying it on wire harness.



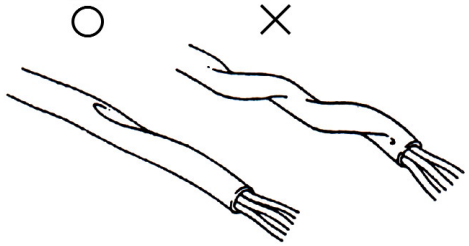
- Never use wires or harnesses which insulation has been broken. Wrap electrical tape around the damaged parts or replace them.



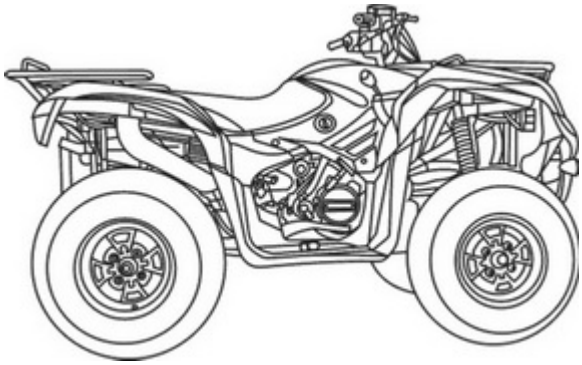
- Never clamp or squeeze the wire harness as installing other components.



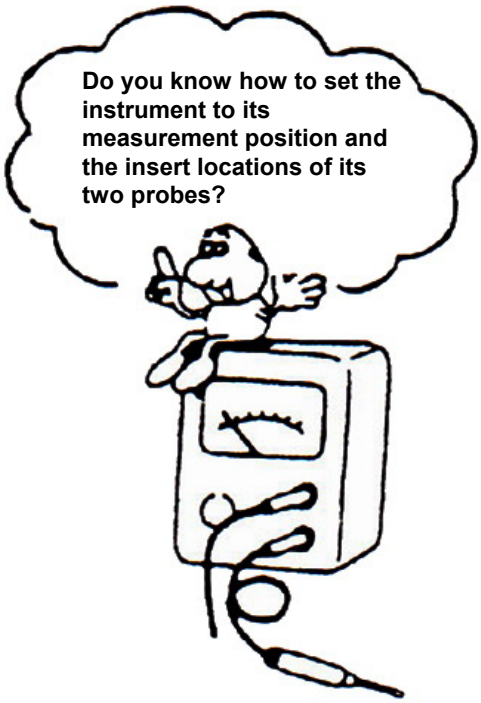
- Do not let the wire harness been twisted as installation.



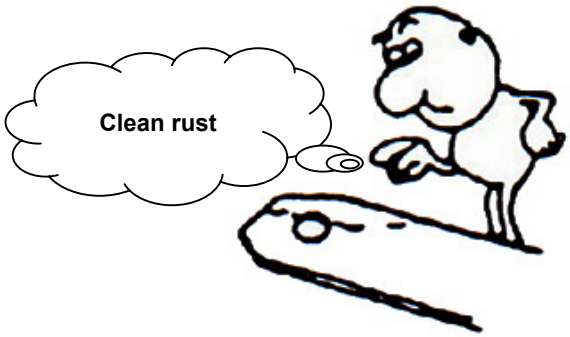
- Wire harnesses routed along the handlebar should not be pulled too tight or have excessive slack, be rubbed against or interfere with adjacent or surrounding parts in all steering positions.



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



- With sand paper to clean rust on connector pins/terminals if found. And then conduct connection operation later.



Specifications

MAKER			SANYANG	MODEL		UA60A-6
Dimension	Overall Length		2110 mm	Suspension System	Front	Double arm
	Overall Width		1150 mm		Rear	Double arm
	Overall Height		1220 mm	Tire Specifications	Front	AT25x8-12 (off road)
	Wheel Base		1300 mm		Rear	AT25x10-12 (off road)
	Wheel tread	Front	900 mm	Rim		Aluminum
		Rear	895 mm	Brake System	Front	Disk (ϕ 220mm)
Weight	Dry Weight	Front	180 kg		Rear	Disk (ϕ 180mm)
		Rear	165 kg	Performance	Max. Speed	Above 80 km/hr
		Total	345 kg		Climb Ability	Below 25°
	Passenger	1	75 kg	Reduction	Primary Reduction	Belt
	Total Weight	Front	205 kg			
		Rear	215 kg		Secondary Reduction	Gear / Sprocket
		Total	420 kg			
Engine	Type		4-Stroke Engine		Clutch	Centrifugal, dry type
	Installation and arrangement		Vertical, below center, incline		Transmission	C.V.T., auto speed change
	Fuel Used		Above 92 unleaded	Speedometer		0 ~ 100 km/hr
	Cycle/Cooling		4-stroke/water cooled	Horn		93~112 dB/A
	Cylinder	Bore	Ø92 mm	Muffler		Expansion & Pulse Type
		Stroke	85 mm	Exhaust Pipe Position and Direction		Left side, and Backward
		Number/Arrangement	Single Cylinder	Lubrication System		Forced circulation & splashing
	Displacement		565cc	Exhaust Concentration	Solid Particulate	
	Compression Ratio		10.2		CO	Below 7.0g/ km
	Max. HP		20.4ps / 6000rpm		HC	Below 1.5g/ km
	Max. Torque		3.52 Kg-m / 3000rpm		Nox	Below 0.4g/ km
	Ignition		Full Transistor Ignition	E.E.C.		—
	Starting System		Electrical Starter/ Recoil Starter	P.C.V.		—
	Air filtration		Sponge	Catalytic reaction control system		Equipped

Torque Values

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

Standard Torque Values for Reference

Type	Tighten Torque	Type	Tighten Torque
5 mm bolt、nut	0.45~0.6kgf-m	5 mm screw	0.35~0.5kgf-m
6 mm bolt、nut	0.8~1.2kgf-m	6 mm screw、SH nut	0.7~ 1.1kgf-m
8 mm bolt、nut	1.8~2.5kgf-m	6 mm bolt、nut	1.0 ~1.4kgf-m
10 mm bolt、nut	3.0~4.0kgf-m	8 mm bolt、nut	2.4 ~3.0kgf-m
12 mm bolt、nut	5.0~6.0kgf-m	10 mm bolt、nut	3.5~4.5kgf-m

Engine Torque Values

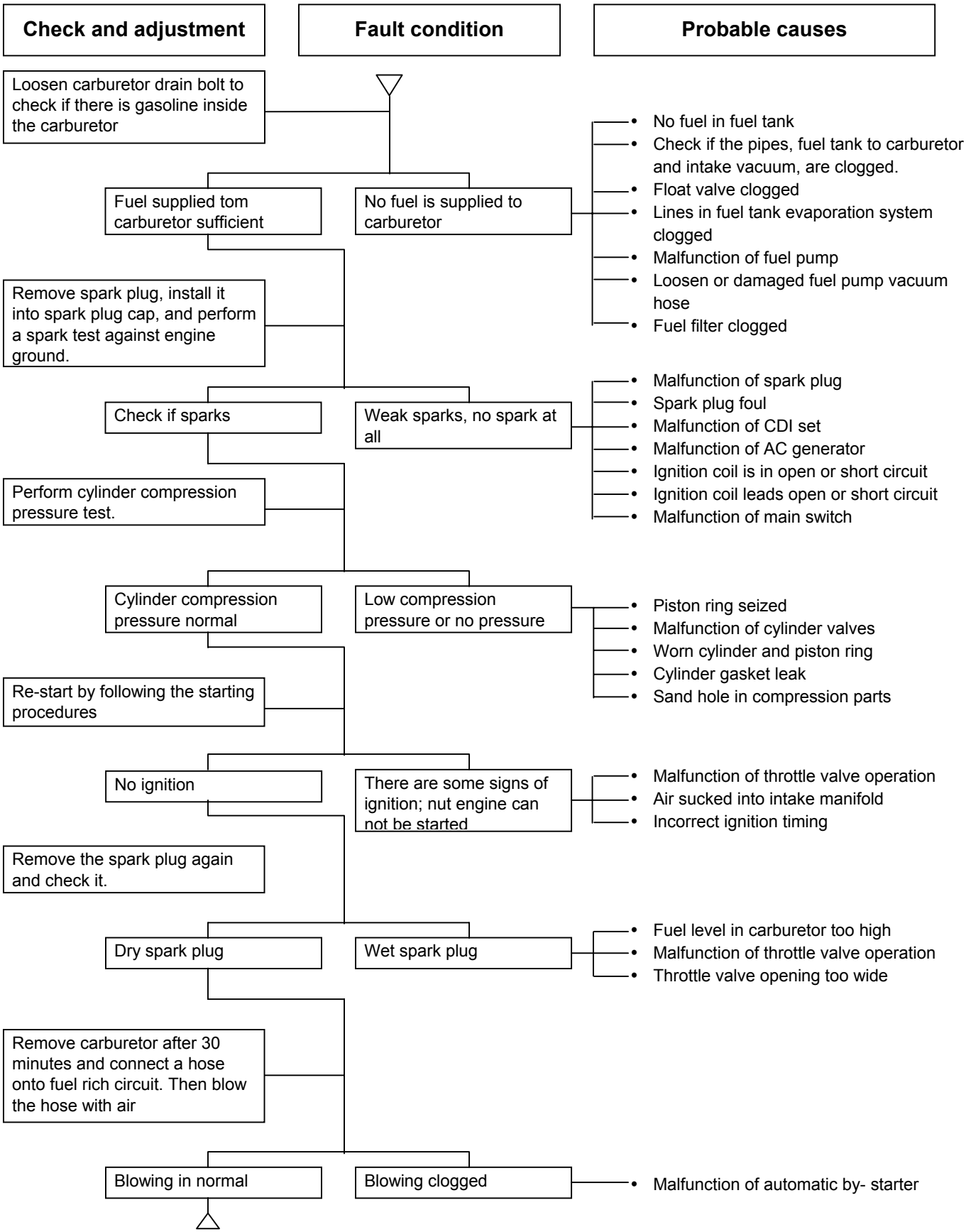
Item	Q'ty	Thread Dia. (mm)	Torque Value(kgf-m)	Remarks
Cylinder stud bolt	4	10	1.0~1.4	
Cylinder head nut	4	8	3.6~4.0	
Cylinder head right bolt	2	8	2.0~2.4	
Cylinder head side cover bolt	2	6	1.0~1.4	
Cylinder head cover bolt	4	6	1.0~1.4	
Cylinder head stud bolt (inlet pipe)	2	6	1.0~1.4	
Cylinder head stud bolt (EX. pipe)	2	8	2.4~3.0	
Air inject pipe bolt	4	6	1.0~1.4	
Air inject reed valve bolt	2	3	0.07~0.09	
Tappet adjustment screw nut	4	5	0.7~1.1	Apply oil to thread
Spark plug	1	10	1.0~1.2	
Tensioner lifter bolt	2	6	1.0~1.4	
Carburetor insulator bolt	2	6	0.7~1.1	
Oil pump screw	2	3	0.1~0.3	
Water pump impeller	1	7	1.0~1.4	
Engine left cover bolt	9	6	1.1~1.5	
Engine oil draining bolt	1	12	3.5~4.5	
Engine oil strainer cap	1	30	1.3~1.7	
Mission draining bolt	1	8	1.1~1.5	
Mission filling bolt	1	12	3.5~4.5	
Shift drum fixing bolt	1	14	3.5~4.5	
Clutch driving plate nut	1	28	5.0~6.0	
Clutch outer nut	1	14	5.0~6.0	
Drive face nut	1	14	8.5~10.5	
ACG. Flywheel nut	1	14	5.0~6.0	
Crankcase bolts	7	6	0.8~1.2	
Mission case bolt	7	8	2.6~3.0	

Frame Torque Values

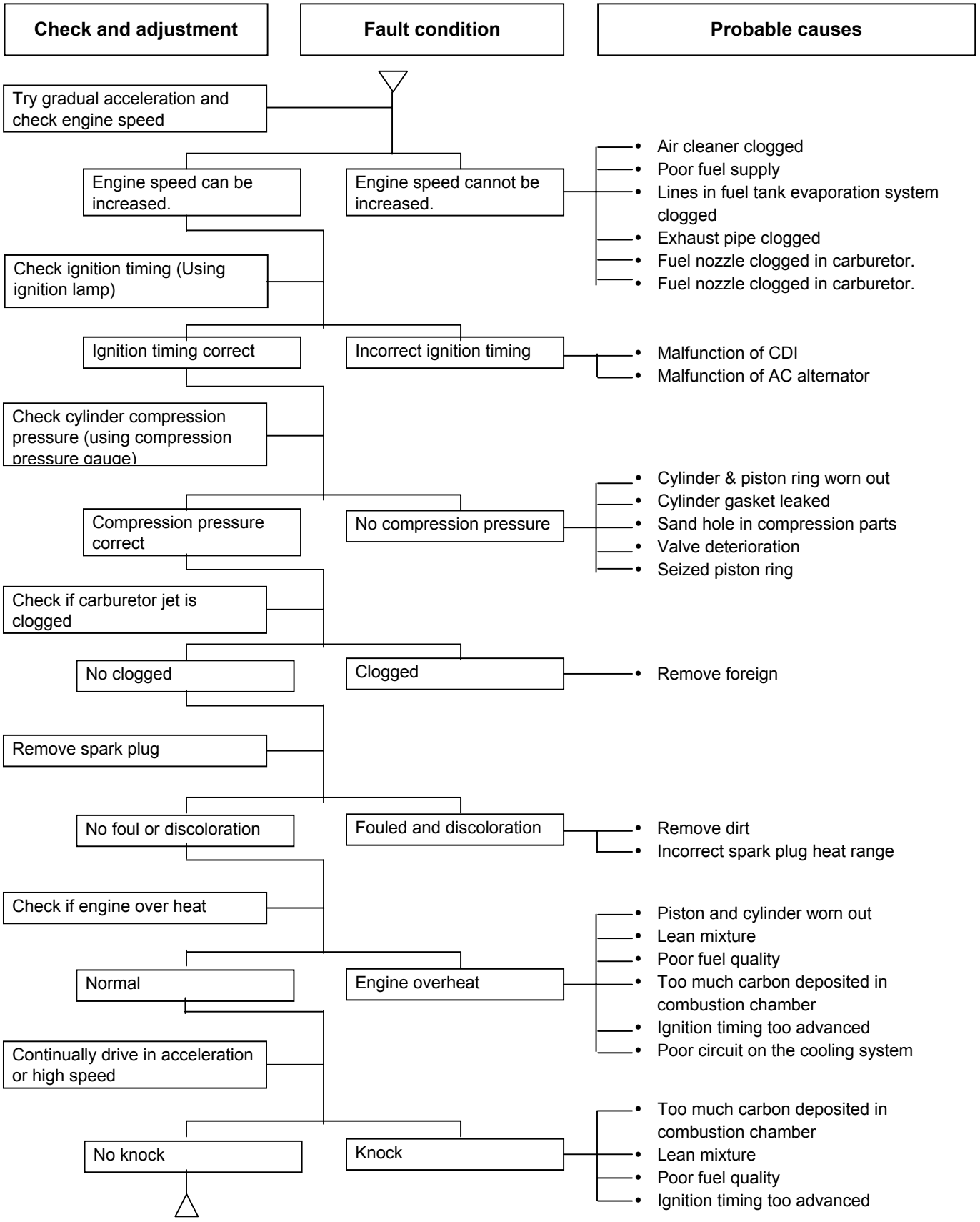
Item	Q'ty	Thread Dia. (mm)	Torque Value(kgf-m)	Remarks
Handlebar upper holder bolt	4	6	2.40	
Steering shaft nut	1	10	5.00	
Steering tie-rod nut	4	10	5.00	
Knuckle nut	2	10	5.00	
Steering shaft holder bolt	2	8	3.40	
Tie rod lock nut	4	10	3.60	
Handlebar under holder nut	2	8	4.00	
Front wheel nut	8	10	2.40	
Front axle castle nut	2	14	5.00	
Rear axle castle nut	2	14	5.00	
Rear wheel nut	8	10	2.40	
Engine hanger nut	4	12	8.50	
Rear axle holder bolt	4	12	9.20	
Drive gear bolt	2	10	4.6	
Driven gear nut	4	10	4.6	
Swing arm pivot bolt	1	14	9.20	
Front suspension arm nut	4	10	5.00	
Front / Rear cushion mounting bolt	6	10	4.60	
Brake lever nut	2	6	1.00	
Brake hose bolt	13	10	3.50	
Brake caliper bolt	6	6	3.25	
Brake disk mounting bolt	11	8	4.25	
Air-bleed valve	3	5	0.50	
Exhaust muffler mounting bolt	2	8	3.00	
Exhaust muffler connection nut	2	7	1.20	

Troubles Diagnosis

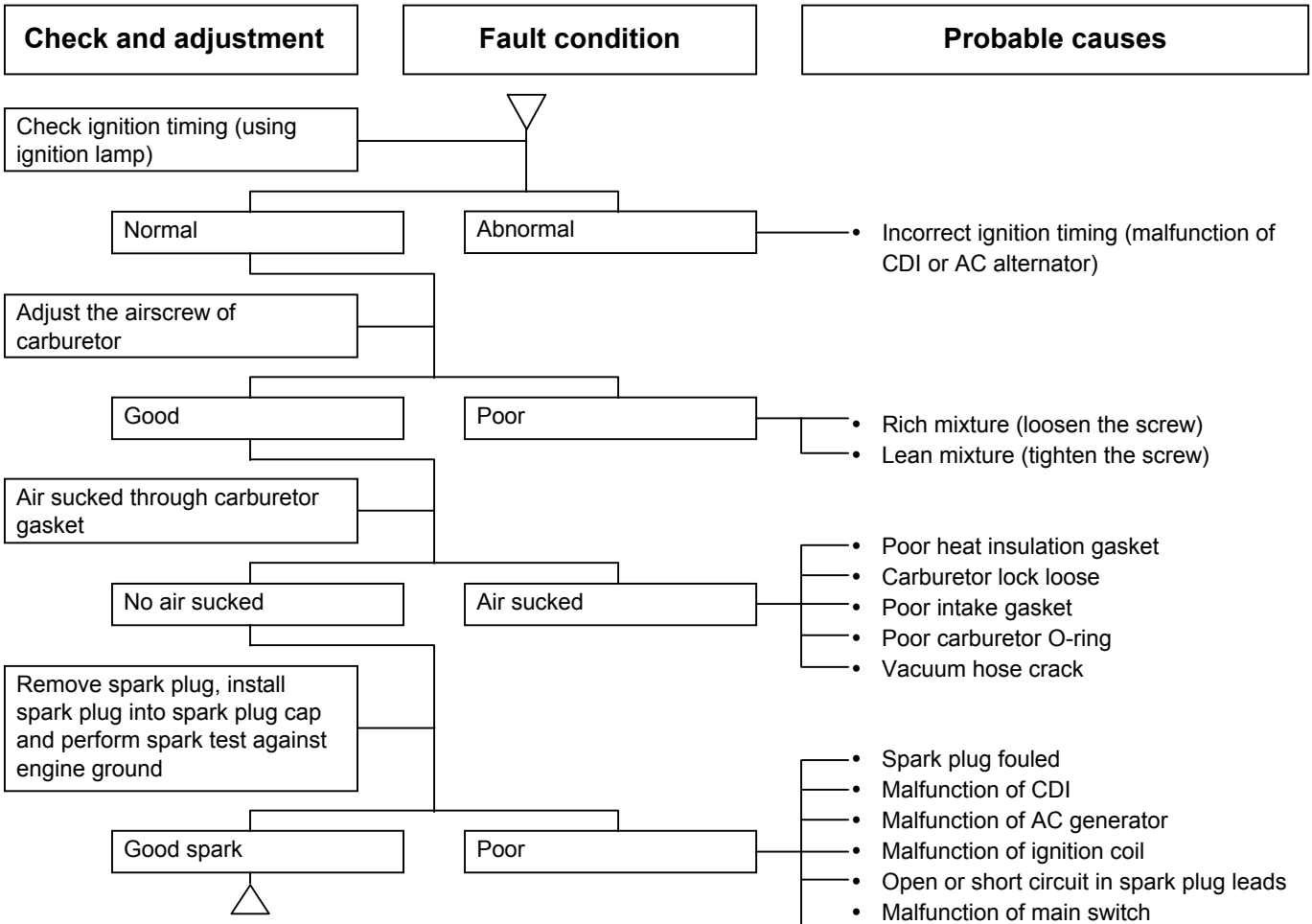
A. Engine hard to start or can not be started



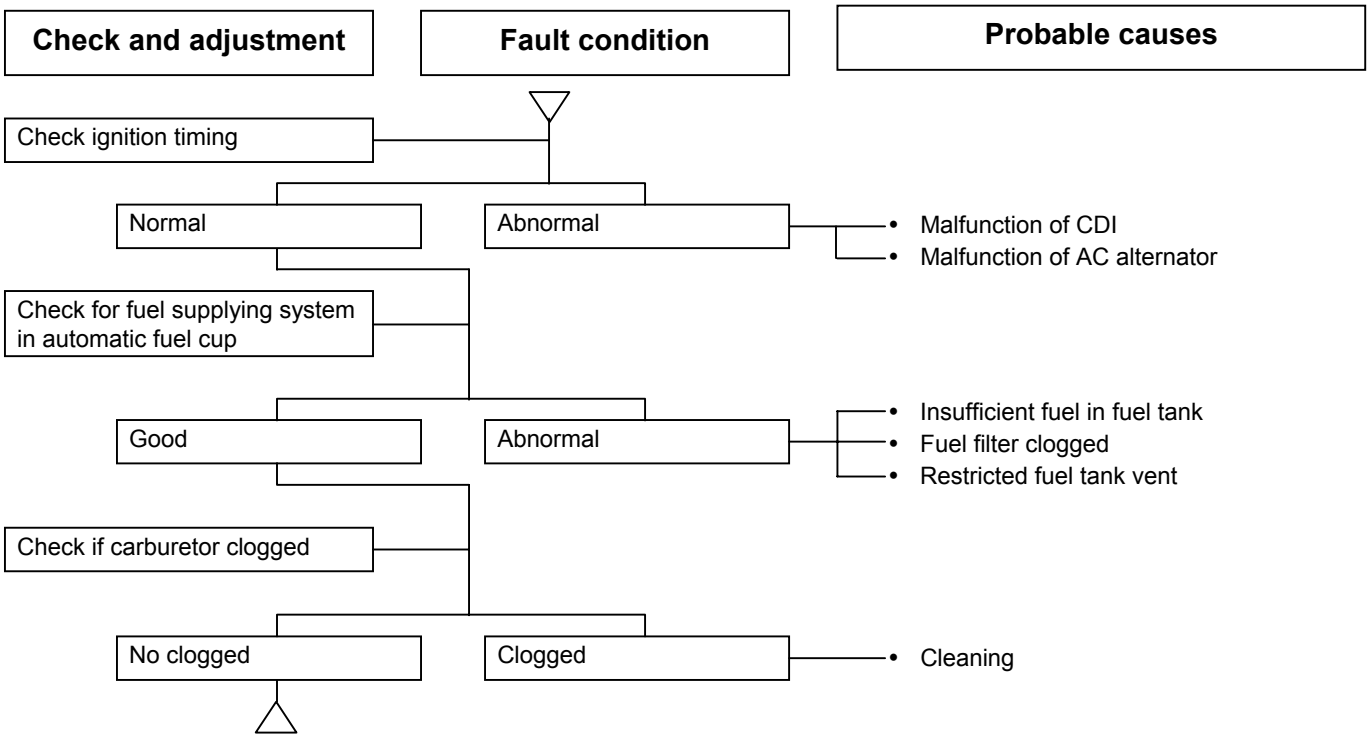
B. Engine run sluggish (Speed does not pick up, lack of power)



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



D. Engine runs sluggish (High speed)



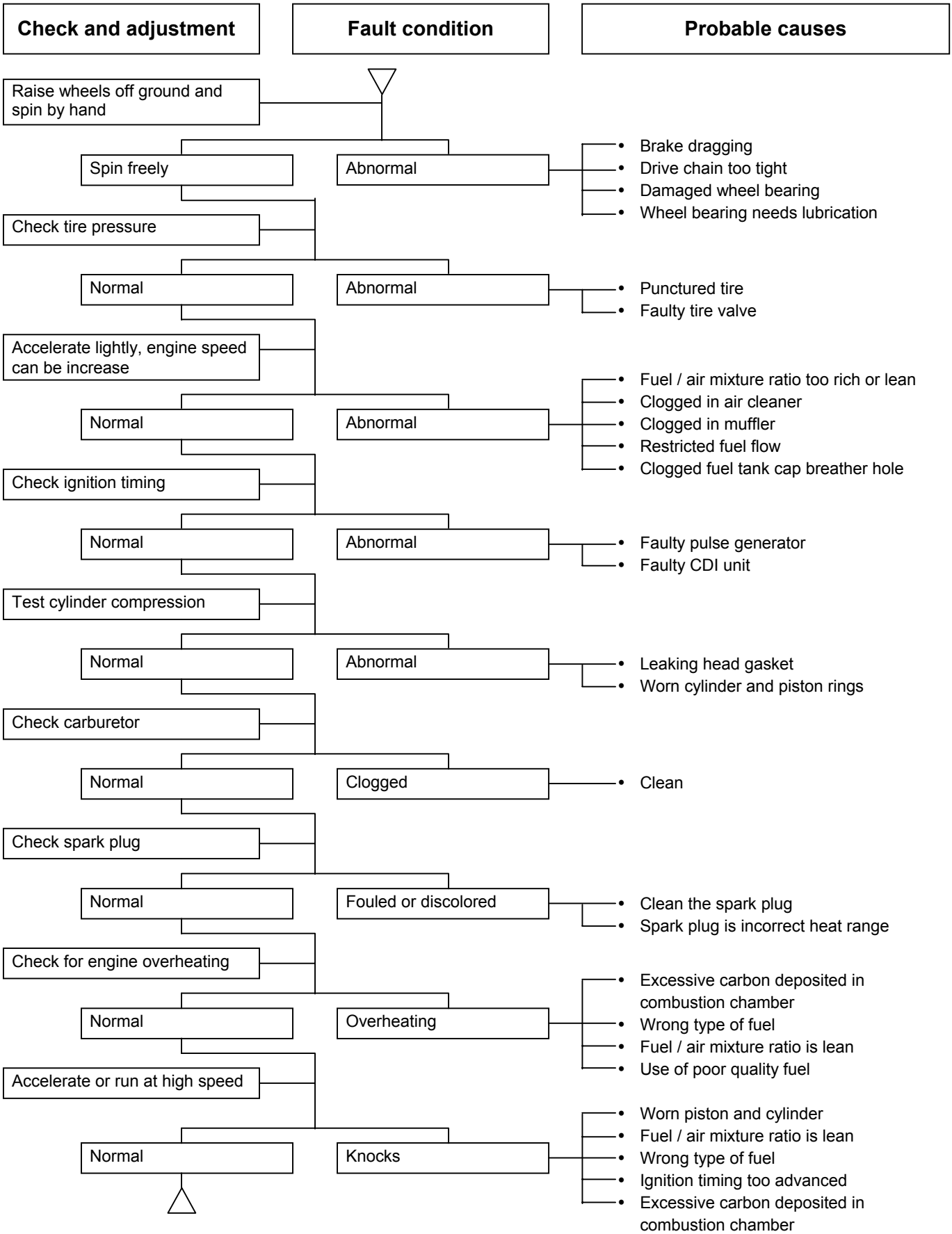
E. Clutch, driving and driving pulley

FAULT CONDITIONS	PROBABLE CAUSES
Engine can be started but motorcycle can not be moved.	• Drive belt worn out or deformation • Ramp plate of movable drive face damaged • Driving pulley spring broken • Clutch weights broken • Drive slide-shaft gear groove broken • Transmission gear damaged
Engine running and misfire as motorcycle initial forward moving or jumping suddenly (rear wheel rotating as engine in running)	• Clutch weights spring broken • Clutch outer stuck with clutch weights • Connection parts in clutch and shaft worn out or burned
Poor initial driving (Poor climbing performance)	• Drive belt worn out or deformation • Weight roller worn out • Movable drive face shaft worn out • Driven pulley spring deformation • Driven pulley shaft worn out • Greased in drive belt and driven face.

F. Poor handling

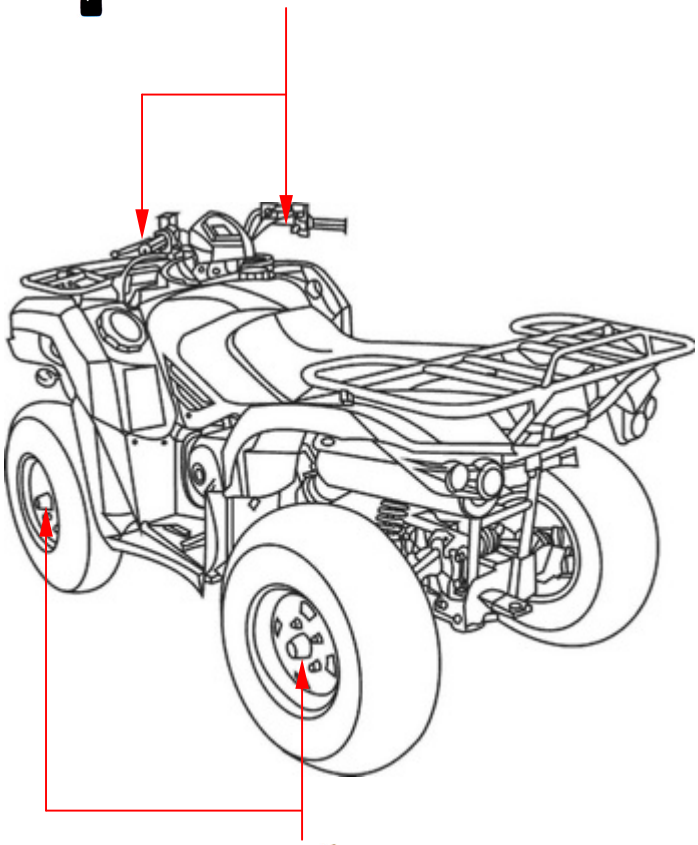
FAULT CONDITIONS	PROBABLE CAUSES
Steering is heavy	• Damaged steering bearing • Damaged steering shaft bushing
One wheel is wobbling	• Bent rim • Improperly installed wheel hub • Excessive wheel bearing play • Bent swing arm • Bent frame • Swing arm pivot bushing excessively • Worn
Vehicle pulls to one side	• Bent tie-rod • Incorrect tie-rod adjustment • Rear tie air pressure incorrect • Improper wheel alignment • Bent frame

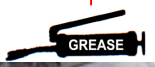
G. Loss power


Check and adjustment
Fault condition
Probable causes
Raise wheels off ground and spin by hand
Spin freely
Abnormal
• Brake dragging
• Drive chain too tight
• Damaged wheel bearing
• Wheel bearing needs lubrication
Check tire pressure
Normal
Abnormal
• Punctured tire
• Faulty tire valve
Accelerate lightly, engine speed can be increase
Normal
Abnormal
• Fuel / air mixture ratio too rich or lean
• Clogged in air cleaner
• Clogged in muffler
• Restricted fuel flow
• Clogged fuel tank cap breather hole
Check ignition timing
Normal
Abnormal
• Faulty pulse generator
• Faulty CDI unit
Test cylinder compression
Normal
Abnormal
• Leaking head gasket
• Worn cylinder and piston rings
Check carburetor
Normal
Clogged
• Clean
Check spark plug
Normal
Fouled or discolored
• Clean the spark plug
• Spark plug is incorrect heat range
Check for engine overheating
Normal
Overheating
• Excessive carbon deposited in combustion chamber
• Wrong type of fuel
• Fuel / air mixture ratio is lean
• Use of poor quality fuel
Accelerate or run at high speed
Normal
Knocks
• Worn piston and cylinder
• Fuel / air mixture ratio is lean
• Wrong type of fuel
• Ignition timing too advanced
• Excessive carbon deposited in combustion chamber

Lubrication Points

Acceleration cable/ Front & rear brake/ Lever Pivot





Wheel bearing

Precautions in Operation

Specification

Fuel Tank Capacity		17000±200c.c.
Engine Oil	Capacity	3000 c.c.
	Change	2400 c.c.
	Replace oil filter	2700 c.c.
Rear axle gear oil	Capacity	100 c.c.
Front differential gear oil	Capacity	200 c.c.
Capacity of coolant	Engine + radiator	1750 c.c.
	Reservoir upper	350 c.c.
Clearance of throttle valve		1~3 mm
Spark plug	Type	NGK CR8E
	Gap	0.8 mm
“F” Mark in idling speed		BTDC 10º / 1700 rpm
Full timing advanced		BTDC 30º / 6000~7000 rpm
Idling speed		1700±100 rpm
Cylinder compression pressure		12.0 ±2 kgf/cm²
Valve clearance		IN: 0.10 ± 0.02 mm EX: 0.15 ± 0.02 mm
Tire dimension	Front	AT25x8-12
	Rear	AT25x10-12
Tire pressure (cold)		4.8±0.2 psi / 4.1±0.2 psi
Battery		12V10Ah (MF battery) type: GTX12-BS

Periodical Maintenance Schedule

Code	Check Items / Maintenance Kilometer / Maintenance Interval	300 km	Every 500 km	Every 1,000 km	Every 2000 km	Every 4,000 km	Remarks
	Maintenance Interval		1 Month	3 Months	6 Months	12 Months	
1	Air cleaner element	I	C			R	
2	Fuel filter	I			I	R	
3	Oil filter cartridge	R	Replacement for every 4,000 km or 12 months				
4	Engine oil change	R	Replacement for every 2,000 km or 6 months				
5	Tire, pressure	I	I				
6	Battery inspection	I	I				
7	Front/ rear brake fluid level, leakage, brake pad & free play check	I	I				Replace brake hose every 4 years
8	Steering system: check operation smoothness and toe-in	I			I		
9	Cushion operation check	I			I		
10	Every screw tightening check	I	I				
11	Gear oil check for leaking	I	I				
12	Spark plug	I		I	R		
13	Differential gear oil	R	Replacement for every 4,000 km or 12 months				
14	Final gear oil	R	Replacement for every 4,000 km or 12 months				
15	Frame lubrication				L		
16	Exhaust system: gasket/ screws/ leakage	I	I				
17	Emission check in Idling	I	I				
18	Throttle lever housing, cable lubrication/ free play	A	I				
19	CVT driving device(belt)	I	I				
20	CVT driving device(roller)	I		I			
21	Lights/ electrical equipment/ multi-meters				I	R	
22	Fuel lines				C		
23	Cam chain	I / L	I / L		C	I / R	
24	Valve clearance	I	I				
25	Lines, connections in cooling system	I		I			
26	Coolant level/ leakage check	I		I			Replace coolant every 12 months
27	Wheels	I		A			
28	RR. hub bearing	I	I				
29	Coolant reservoir	I	I				Lubricate with lithium-soap-based
30	Knuckle pivot/ shaft	I	I			R	Lubricate with lithium-soap-based
31	Stabilizer bushes						Check for cracks or other damage
32	Engine mount						Check for cracks or other damage
33	FR/ RR. Propeller shaft						Check for cracks or other damage

Code: I ~ Inspection, cleaning, and adjustment **R ~ Replacement**

C ~ Cleaning (replaced if necessary) **L ~ Lubrication**

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

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

Remarks:

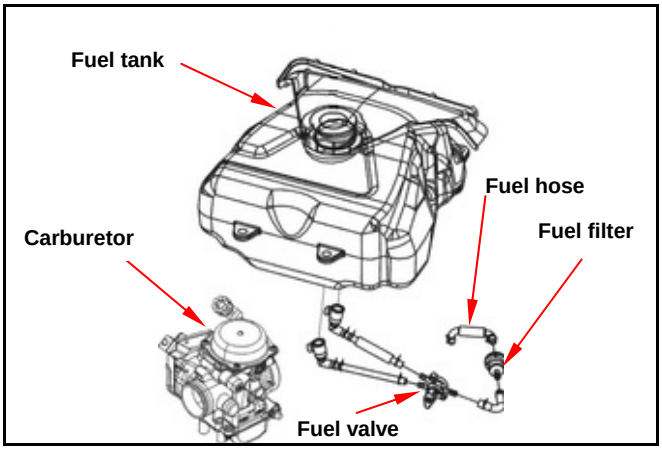
1. Clean or replace the air cleaner element more often when the ATV is operated on dusty roads or in the Heavily- polluted environment.
2. Maintenance should be performed more often if the ATV is frequently operated in high speed and after the ATV has accumulated a higher mileage.
3. Preventive maintenance
   a. Ignition system—Perform maintenance and check when continuous abnormal ignition, misfire, after-burn, overheating occur.
   b. Carbon deposit removal—Remove carbon deposits in cylinder head, piston heads, exhaust system when power is obvious lower.

Fuel Lines

Remove the seat.
Loosen 2 screws and 2 bolts
Remove the tank cover.
Check all lines, and replace the lines when they are deteriorated, damaged or leaking.

⚠ Warning

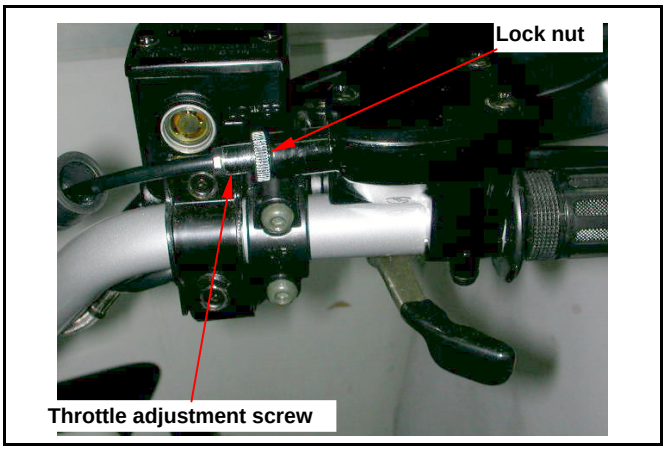
Gasoline is a low ignition material so any kind of fire is strictly prohibited as dealing it.



Acceleration Operation

Have a wide open of throttle valve as handle in any position and release it to let back original (full closed) position.
Check handle if its operation is smooth.
Check acceleration cable and replace it if deteriorated, twisted or damaged.
Lubricate the cable if operation is not smooth.
Measure the throttle lever free play in its flange part.
Remove rubber boot, loosen fixing nut, and then adjust it by turning the adjusting screw.
Tighten the fixing nut, and check acceleration operation condition.

Free play: 1~3 mm.



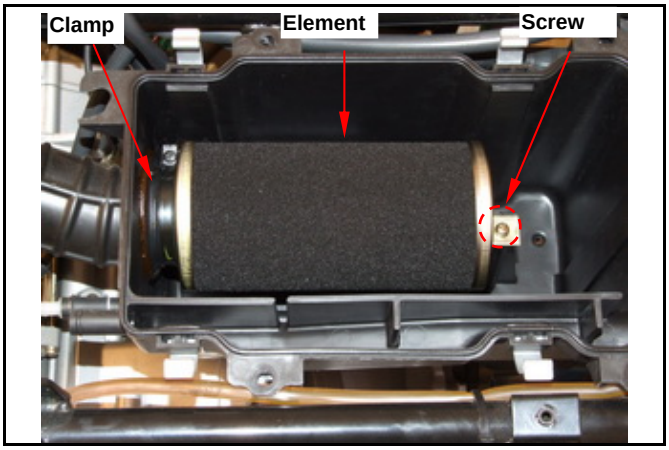
Air Cleaner

Remove the seat.
Loosen 5 hooks from the air cleaner cover and then remove the cover.
Loosen the clamp strip and 1 screw of air cleaner element, and then remove the air cleaner element.
Clean the element with non-flammable or high-flash point solvent and then squeeze it for dry.

⚠ Caution

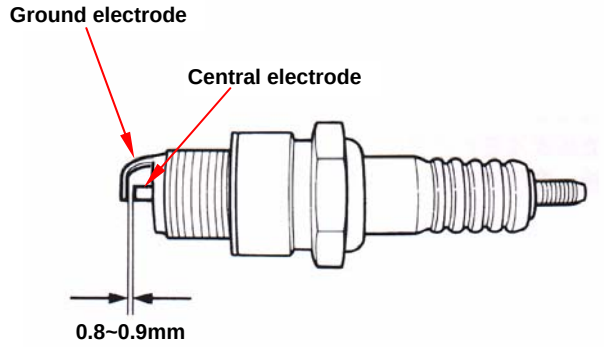
Never use gasoline or acid organized solvent to clean the element.

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



Spark Plug

Recommended spark plug: CR8E
Remove the spark plug cap.
Clean the dirt around the spark plug hole.
Remove the spark plug.
Measure the spark plug gap.
Spark plug gap：0.8 mm
Carefully bend ground electrode of the plug to adjust the gap if necessary.
Hold the spark plug washer and install the spark plug by screwing it.
Tighten the plug by turning 1/2 turn more with plug socket after installed.
Tighten torque: 1.0~1.2kgf-m

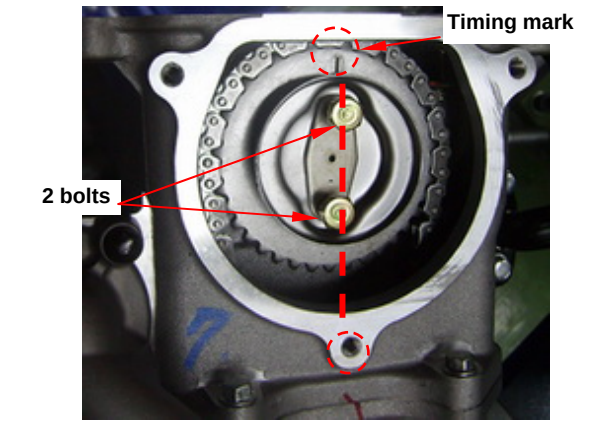


Valve Clearance

⚠ Caution

Checks and adjustment must be performed when the engine temperature is below 35℃.

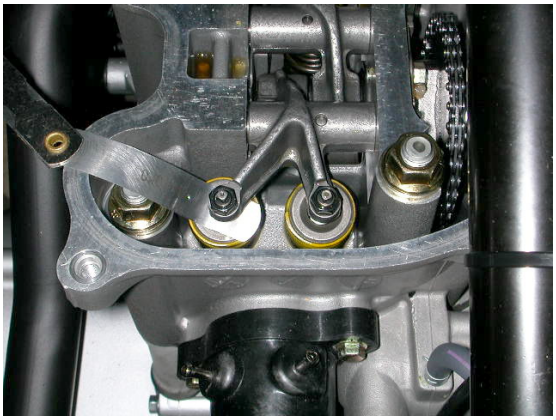
Remove front fender, fuel tank cover and fuel tank.
Remove cylinder head cover.
Remove cylinder head side cover.
Turn camshaft bolt in C.W. direction and let the “T” mark on the camshaft sprocket align with cylinder head mark so that piston is placed at TDC position in compression stroke.



⚠ Caution

Do not turn the bolt in C.C.W. direction to prevent camshaft bolt looseness.

Valve clearance inspection and adjustment
Check & adjust valve clearance with feeler gauge.
Standard Value: IN 0.10 ± 0.02 mm
EX 0.15 ± 0.02 mm
Loosen fixing nut and turn the adjustment nut for adjustment.



⚠ Caution

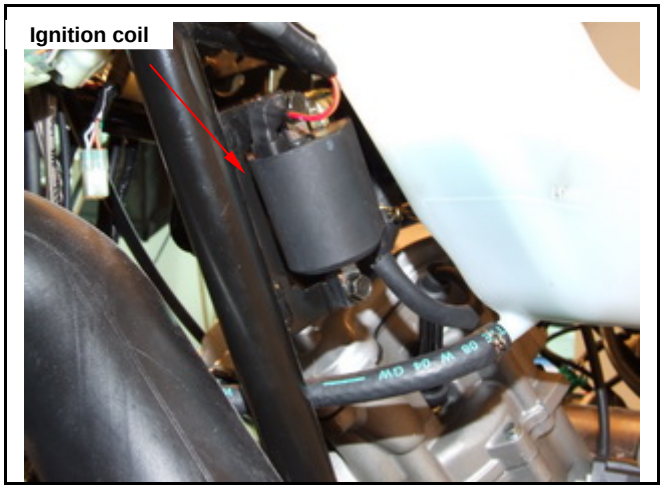
Re-check the valve clearance after tightened the fixing nut.

Carburetor Idle Speed Adjustment

⚠ Caution

- Inspection & adjustment for idle speed have to be performed after all parts in engine that needed adjustment have been adjusted.
- Idle speed check and adjustment have to be done after engine being warmed up. (It is enough that operates engine from stop to running for 10 minutes.)

Park the ATV warm up engine.
Connect tachometer (the wire clamp of tachometer is connected to the high tension cable).
Turn the throttle valve stopper screw to specified idle speed.
Specified idle speed: 1700 ± 100 rpm

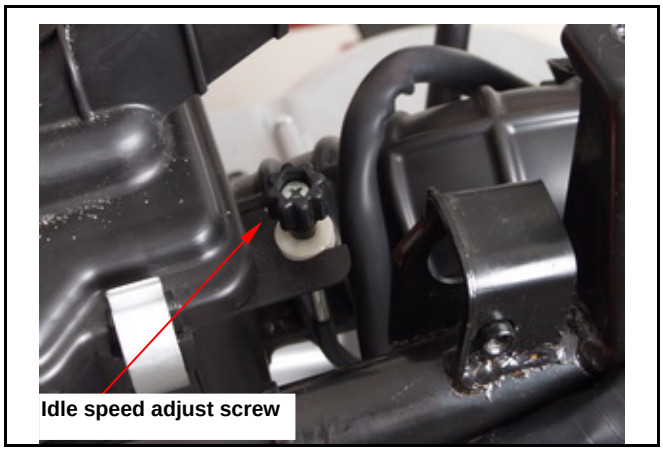


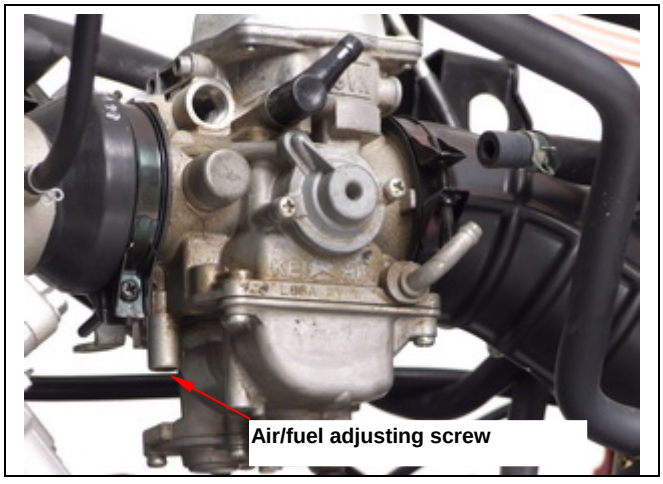
Emission adjustment in idle speed

Warm up the engine for around 10 minutes and then conduct this adjustment.

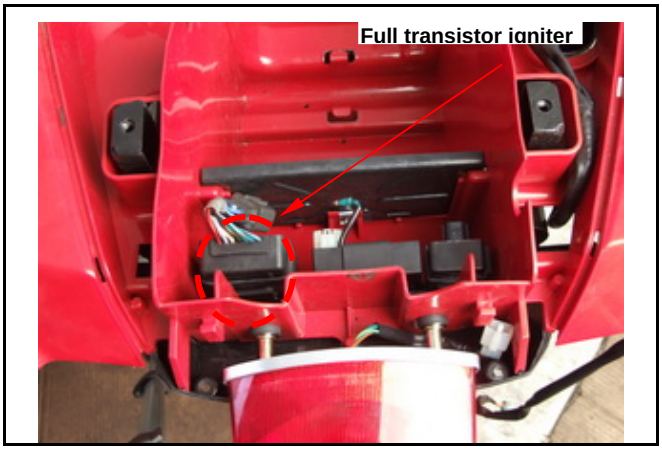
1. Connect the tachometer onto engine.
2. Adjust the throttle valve stopper screw and let engine runs in 1600±100 rpm.
3. Insert the exhaust sampling pipe of exhaust analyzer into the front section of exhaust pipe. Adjust the air adjustment screw so that emission value in idle speed is within standard.
4. Slightly accelerate the throttle valve and release it immediately. Repeat this for 2~3 times.
5. Read engine RPM and value on the exhaust analyzer. Repeat step 2 to step 4 procedures until measured value within standard.

Emission standard **CO: below 0,8~1.5%**
HC: below 900ppm





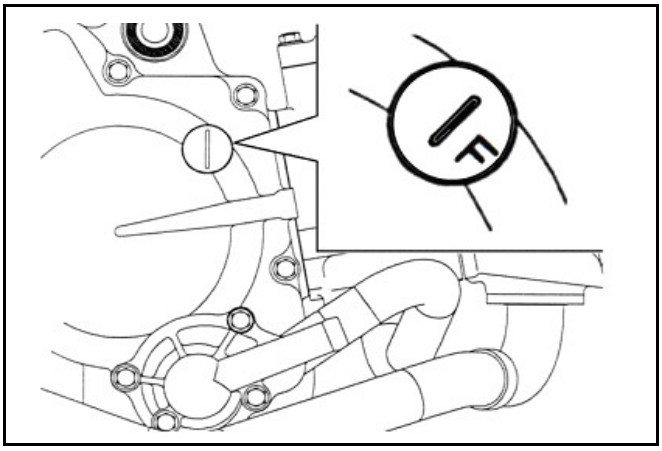
Ignition System



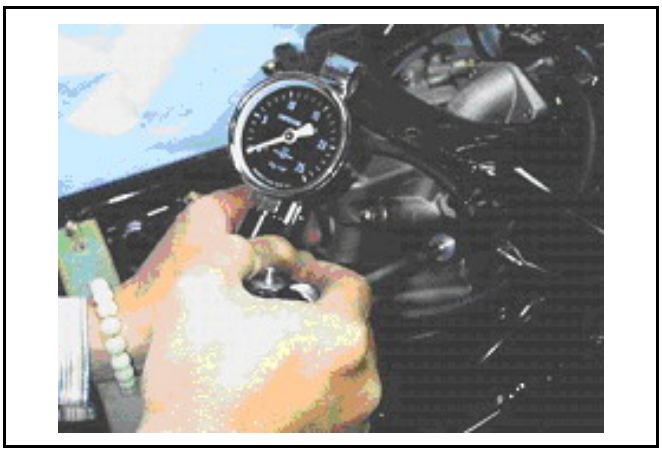
⚠ Caution

- Full transistor ignition system is setup by the manufacturer so it cannot be adjusted.
- Ignition timing check procedure is for checking whether ignition function is in normal or not.

Connect tachometer and ignition light.
Start engine.
As engine in idle speed: 1700 rpm, aim at the mark “F” with the ignition light which means that ignition timing is correct.
Increase engine speed to 6000 rpm to check ignition advance degree. If indent is located within the ignition advance degrees, it means that the ignition advance degree is normal.
If ignition timing is incorrect, check the full transistor ignition set, rotor and pulse generator. Replace it if malfunction of these parts is found.



Cylinder Compression Pressure



Warm up engine.
Turn off the engine.
Remove the trunk.
Remove the central cover.
Remove spark plug cap and spark plug.
Install compression gauge.
Full open the throttle valve, and rotate the engine by means of starter motor.

⚠ Caution

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

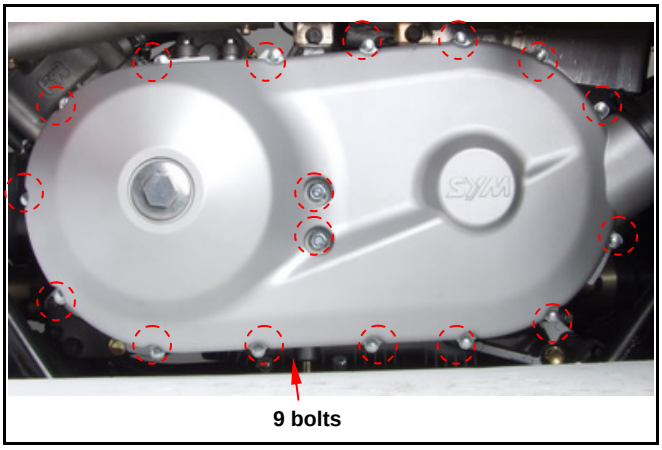
Compression pressure: 12 ± 2 Kg/cm²
Check following items if the pressure is too low:

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

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

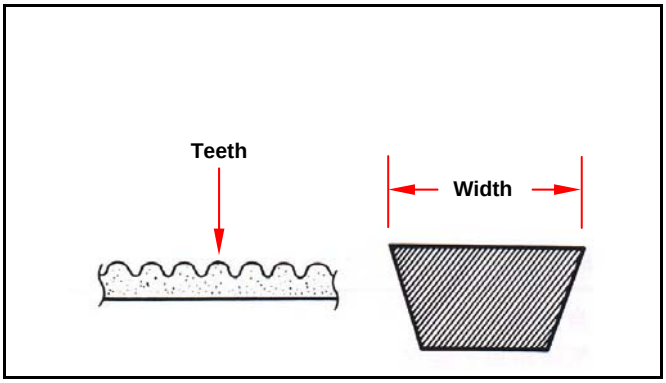
Drive Belt

Loosen the 2 clamp strips of left crankcase cover, and then remove the left crankcase cover ventilation pipe.
Remove 17 bolts.
Remove the left crankcase cover.



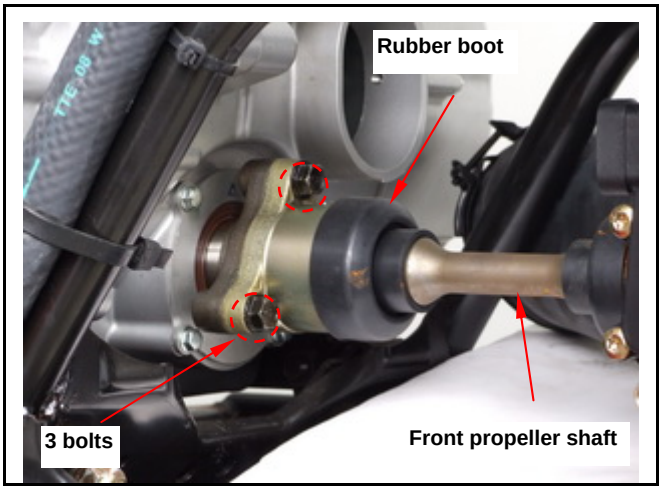
Check if the belt is cracked or worn out.
Replace the belt if necessary or in accordance with the periodical maintenance schedule to replace it.

Width limit: 32.7 mm or above



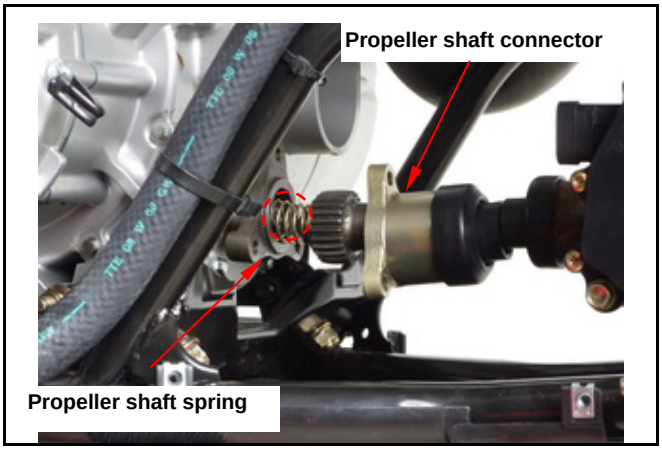
Propeller Shaft

Remove 3 bolts from the propeller shaft connector.
Check the propeller shaft for any wear.
Check the rubber boots for any damage.



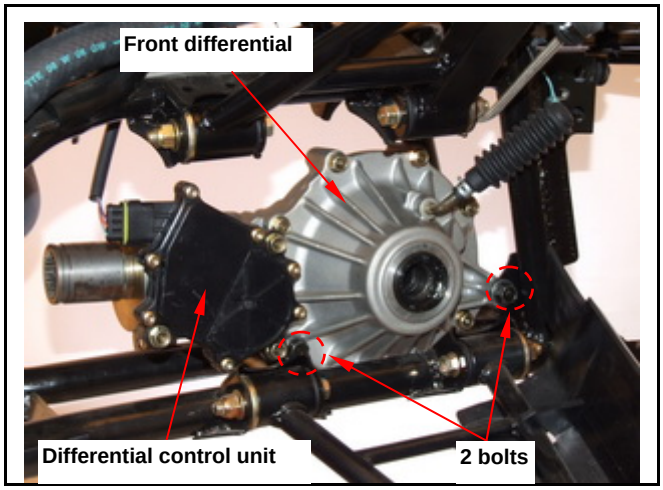
⚠ Caution

Don't lose the propeller shaft spring.
Coat the propeller shaft gear with grease before assembling the propeller shaft.



Front Differential

Check the front differential for abnormal noise or unsmooth rotation.

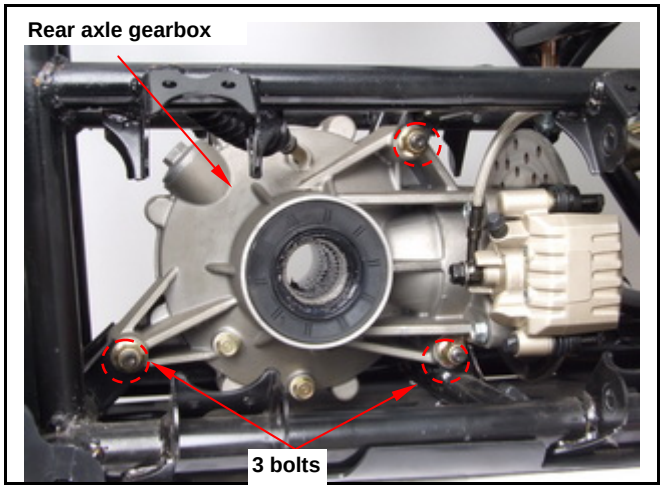


⚠ Caution

- Do not attempt to disassemble the Front Differential. Please exchange the whole assembly if necessary.

Rear Axle Gearbox

Check the rear axle gearbox for abnormal noise or unsmooth rotation.



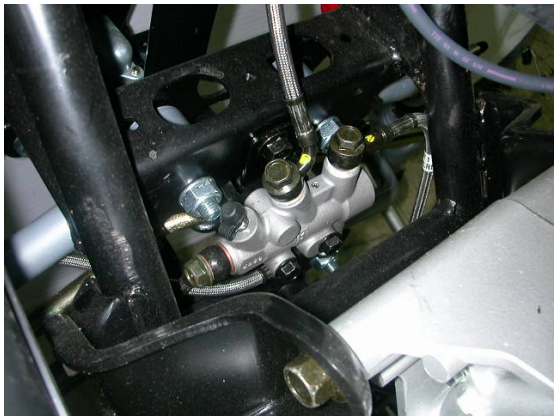
⚠ Caution

- Do not attempt to disassemble the Rear Gear Box. Please exchange the whole assembly if necessary.

Brake System

Brake System Hose

Check the brake hoses for corrosion or leaking oil.

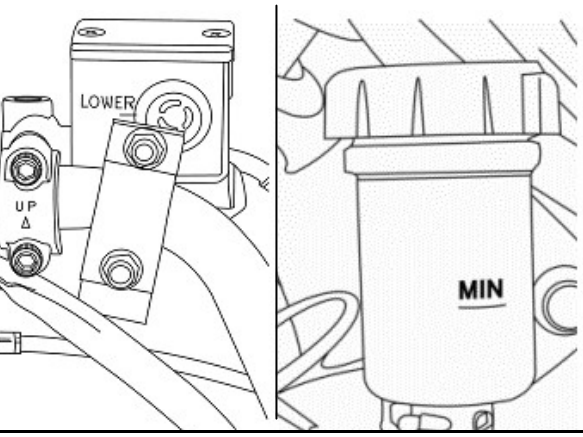


Brake Fluid

Check brake fluid level in the brake fluid reservoir. If the level is lower than the LOWER limit, add brake fluid 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 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.



Filling Out Brake Fluid

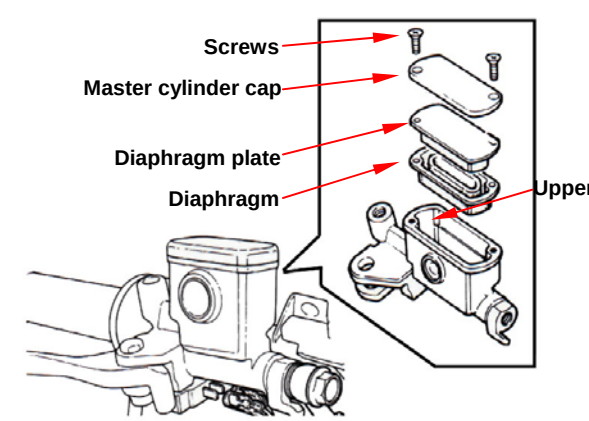
Tighten the drain valve, and add brake fluid. Operate the brake lever so that brake fluid contents inside the brake system hoses.

Air Bleed Operation

Connect a transparent hose to draining valve. Hold the brake lever and open air bleeding valve. Perform this operation alternative until there is no air inside the brake system hoses.

⚠ Caution

Before closing the air bleed valve, do not release the brake lever.

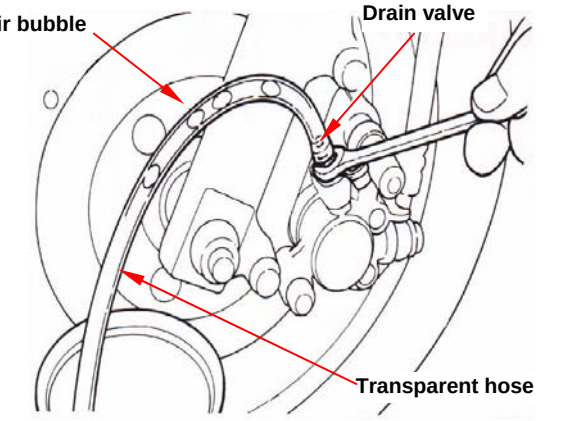


Added Brake Fluid

Add brake fluid to UPPER limit lever. Recommended brake fluid: DOT3 or DOT4 WELL RUN brake fluid.

⚠ Caution

Never mix or use dirty brake fluid to prevent from damage brake system or reducing brake performance.

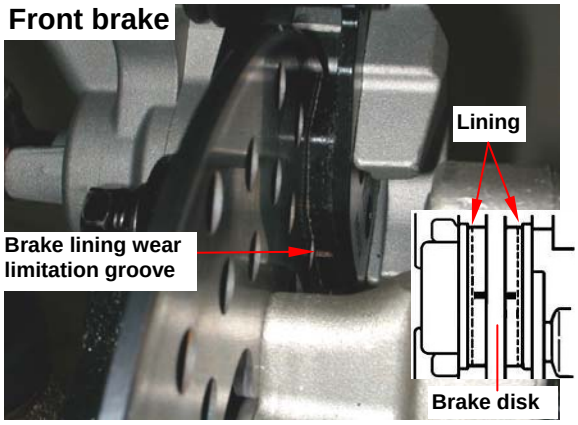


Brake Lining Wear

The indent 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

- To check front brake lining must be remove front wheel first.
- It is not necessary to remove brake hose when replacing the brake lining.

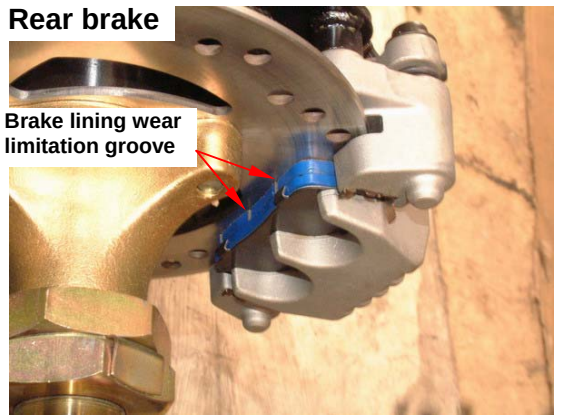


Brake Lining Replacement (refer chapter 14)

Make sure the brake lining condition. Replace the lining if the brake lining wear limitation groove close to the brake disc.

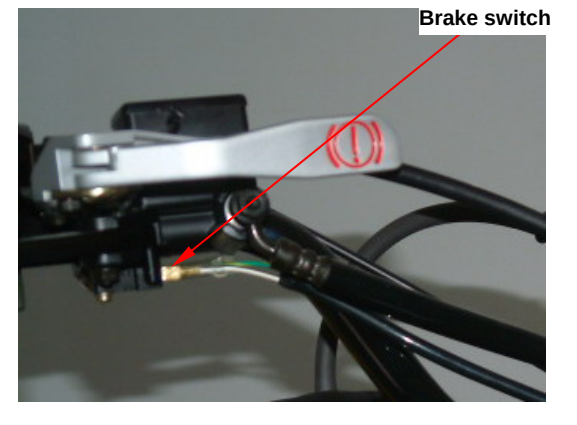
Caution

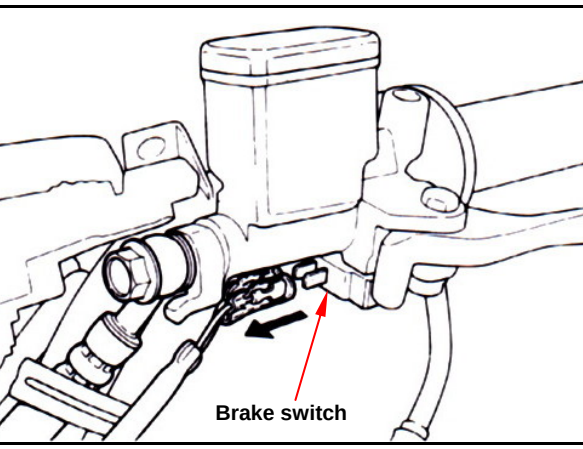
- Do not operate the brake lever after the clipper removed to avoid clipping the brake lining.
- In order to maintain brake power balance, the brake lining must be replaced with one set.



Brake Light Switch

The brake light switch is to light up brake light as brake applied.
Make sure that electrical starter can be operated only under brake applying.



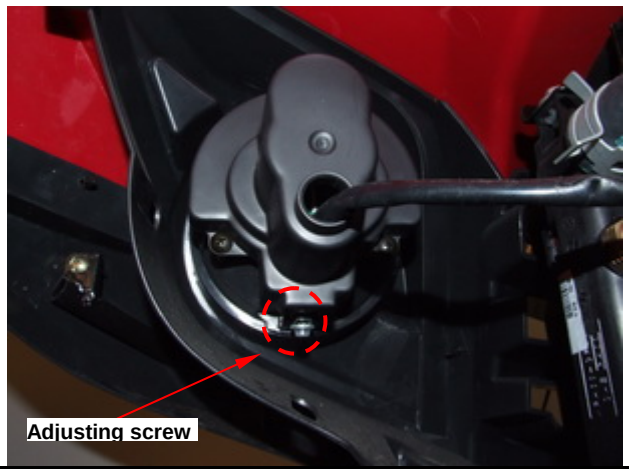


Headlight Beam Distance

Turn on main switch.
Turn the headlight adjusting screw to adjust headlight beam height.

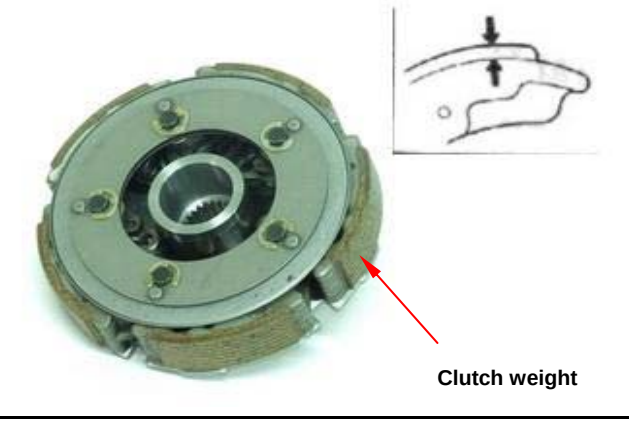
⚠ Caution

- To adjust the headlight beam follows related regulations.
- Improper headlight beam adjustment will make in coming driver dazzled or insufficient lighting.



Clutch Weight

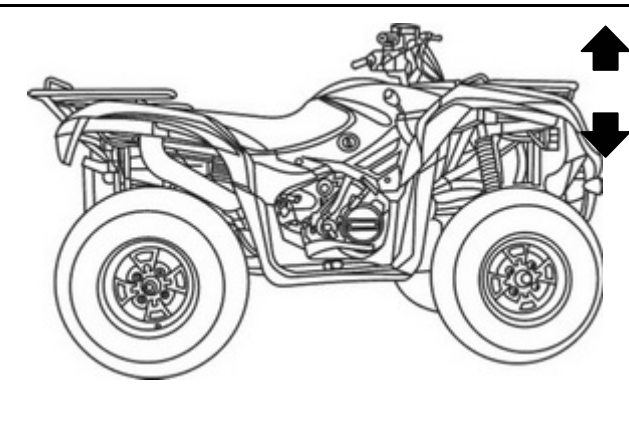
Run the ATV and increase throttle valve opening gradually to check the clutch operation.
If the ATV is in forward moving and shaking, check clutch disc condition. Replace it



Cushion

Front cushion

Press down the front cushion for several times to check it operation.
Check if it is damage
Replace relative parts if damage found.
Tighten all nuts and bolts.

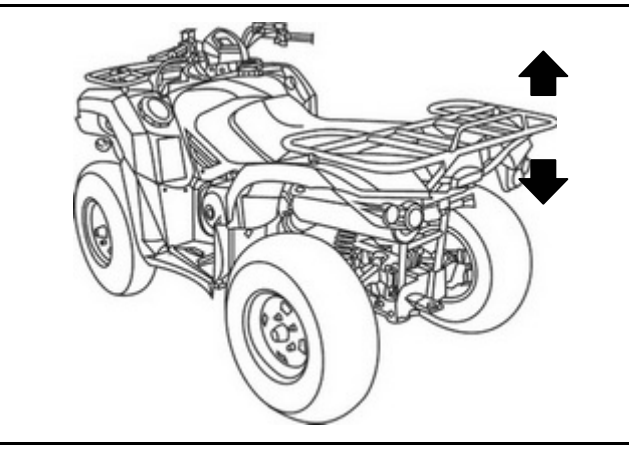


Rear Cushion

Press down the rear cushion for several times to check it operation.
Check if it is damage
Replace relative parts if damage found.

⚠ Warning

- Do not ride the ATV with poor cushion.
- Looseness, wear or damage cushion will make poor stability and drive-ability.

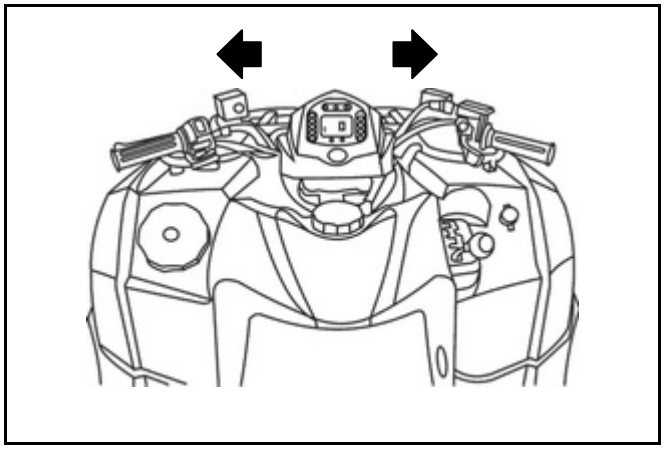


Steering Handle

Caution

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

Lift the front wheel off ground.
Turn handle from right to left alternative and check if turning is smoothly.
If handle turning is uneven and bending, or the handle can be operated in vertical direction, then check the handle top bearing.

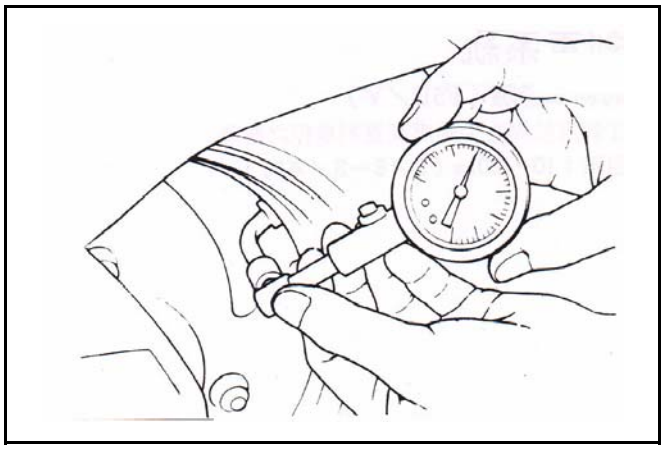


Wheel/Tire

Caution

Tire pressure check should be done as cold engine.

Check if tire surface is ticked with nails, stones or other materials.



Appointed tire pressure

Tire size	Front tire	Rear tire
Tire pressure as cold	4.8±0.2psi	4.1±0.2psi

Check if front and rear tires' pressure is normal.
Measure tire thread depth from tire central surface.
Replace the tire if the depth is not come with following specification:

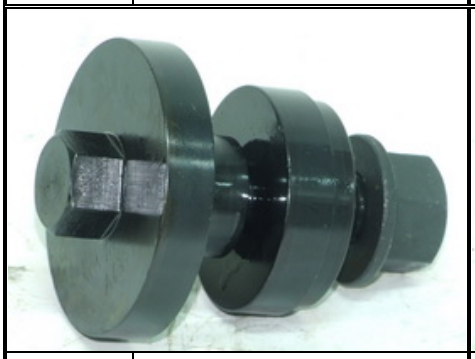
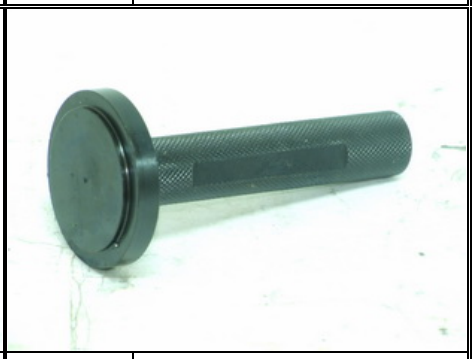
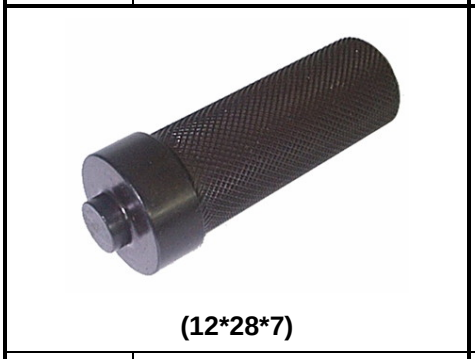
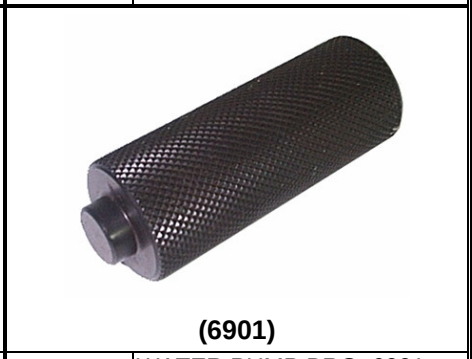
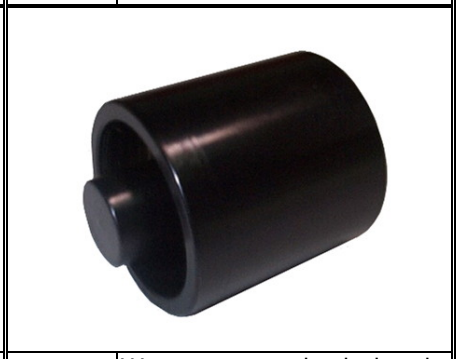
Front tire: 1.5 mm
Rear tire: 2.0 mm

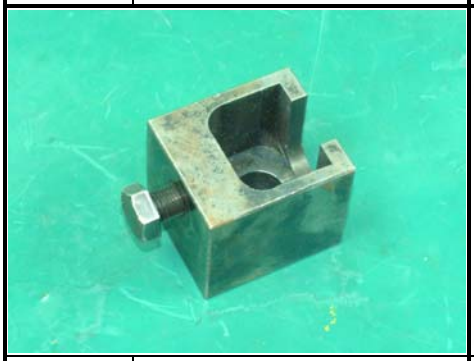
Nuts, Bolts Tightness

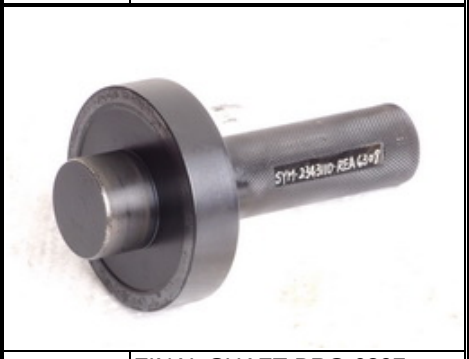
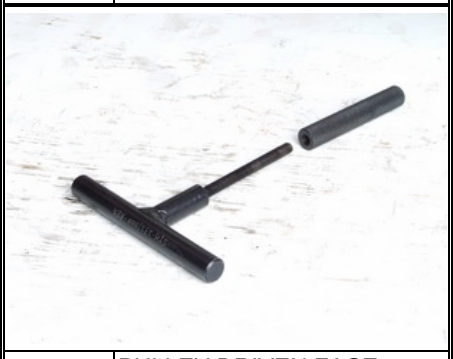
Perform periodical maintenance in accordance with the Periodical Maintenance Schedule.
Check if all bolts and nuts on the frame are tightened securely.
Check all fixing pins, snap rings, hose clamp, and wire holders for security.

Special Tools List

					
NAME	Rocker arm pin puller	NAME	Tappet adjusting wrench	NAME	Tappet adjusting wrench
NO	SYM-1445100	NO	SYM-9001200	NO	SYM-1472100
					
NAME	Tappet adjuster	NAME	Valve cotter remove & assembly tool	NAME	AC.G. Flywheel puller
NO	SYM-2301000-HMA	NO	SYM-1471110/20	NO	SYM-3110000-HMA
					
NAME	KNUCKLE BODY BRG. 6006 driver	NAME	Drive shaft puller	NAME	Driveshaft BRG. 6228 driver
NO	SYM-5024000-REA 6006	NO	SYM-2341120-REA	NO	SYM-2341110-REA 6228
					
NAME	BEVEL GEAR HOUSHING BRG 6306 driver	NAME	WHEEL DRIVE SHAFT BALL SET tool	NAME	Countershaft OIL SEAL 20*40*5
NO	SYM-2343700-REA A6306	NO	SYM-4423500-REA	NO	SYM-9121000-REA

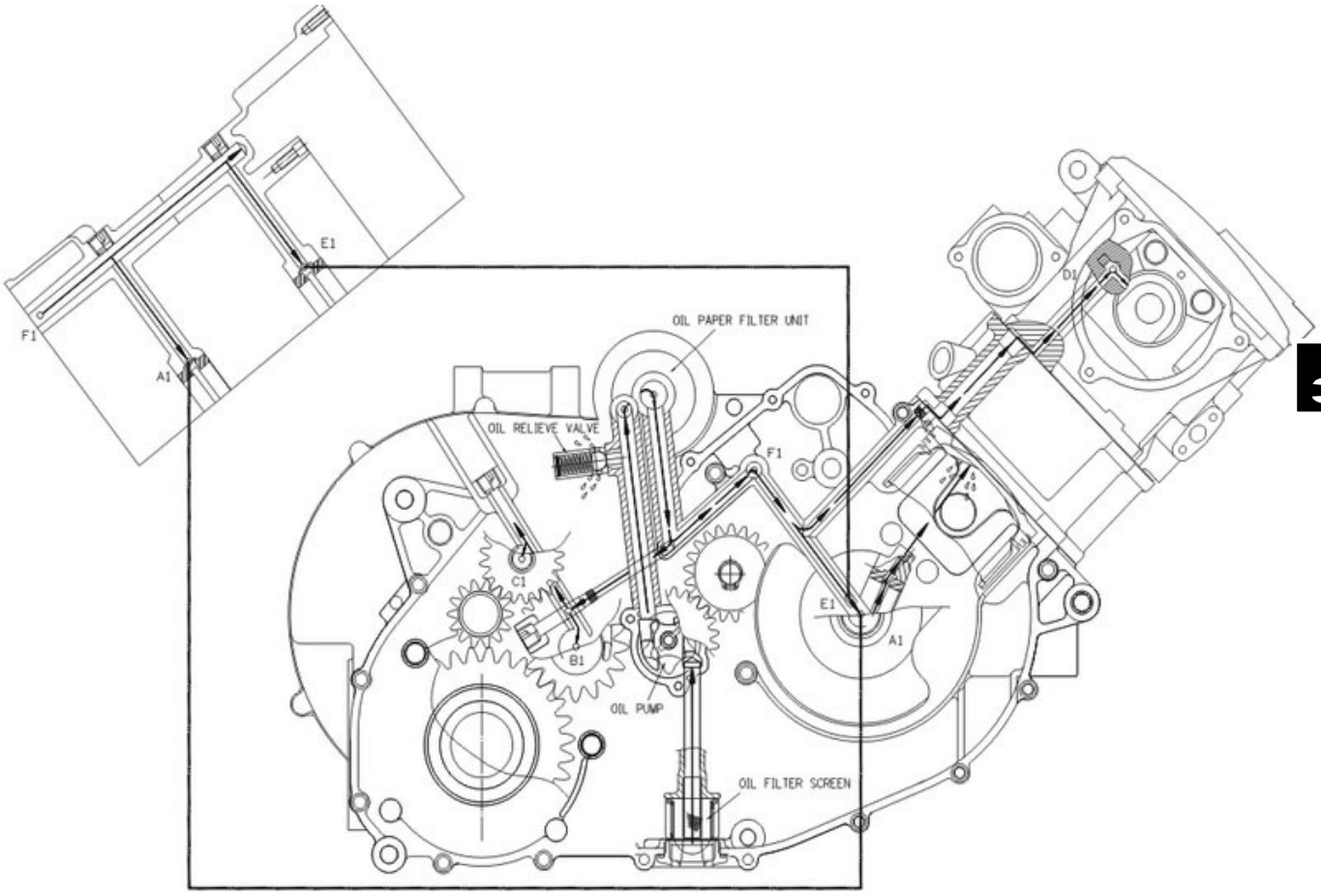
					
NAME	NEEDLE BRG. 2220C driver	NAME	MDF. Fixer	NAME	Final shaft gear stopper
NO	SYM-9100400-REA 2220	NO	SYM-2211000-REA	NO	SYM-2343100-REA
					
NAME	Driveshaft BRG. 6328 driver	NAME	OUTPUT SHAFT OIL SEAL 42*52*7	NAME	OUTPUT SHAFT OIL SEAL 38*52*7
NO	SYM-9100500-REA A6328	NO	SYM-9120900-REA	NO	SYM-9120800-REA
					
(12*28*7)		**(6901)**			
NAME	Water pump oil seal driver	NAME	WATER PUMP BRG. 6001 driver	NAME	Water pump mechanical seal driver
NO	SYM-9120200-REA	NO	SYM-6001300-REA A6001	NO	SYM-1721700-H9A
					
NAME	CLUTCH COVER BRG. 6207 driver	NAME	R COVER OIL SEAL GUIDE	NAME	Lock nut driver
NO	SYM-9610000- REA A6207	NO	SYM-1133000-REA	NO	SYM-9020100

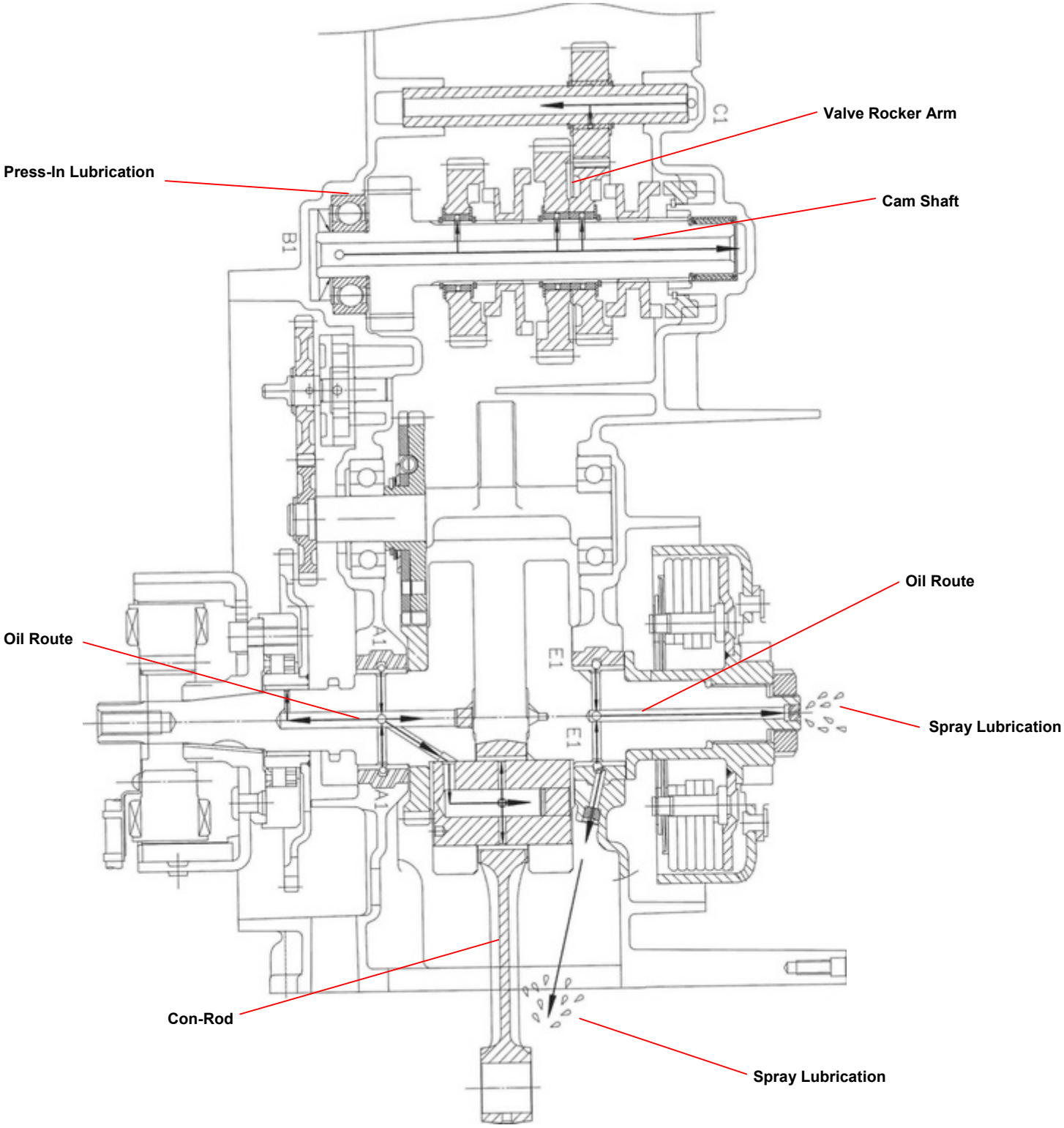
					
NAME	Inner bearing puller	NAME	Inner bearing puller	NAME	Outer bearing puller
NO	SYM-6204002	NO	SYM-6204022	NO	SYM-6204001
					
NAME	Universal holder	NAME	Clutch nut wrench	NAME	Crankcase tool
NO	SYM-2210100	NO	SYM-9020200	NO	SYM-1120000-ALL
 (55mm)				 (55mm)	
NAME	Rear axle nut wrench	NAME	Torque wrench	NAME	Rear axle nut torque wrench
NO	SYM-HT06007	NO	SYM-HT07004-RA1	NO	SYM-4230200
					
NAME	ARM SUSPENSION	NAME	WHEEL KNUCKLE BODY SEAL 40*55*8 driver	NAME	WHEEL KNUCKLE BODY SEAL 40*50*6.5 driver
NO	SYM-2300000	NO	SYM-9123200-REA	NO	SYM-9123000-REA

					
NAME	MAIN BRG. UP/LWR 40*44*20 driver	NAME		NAME	PULLEY DRIVEN FACE 41*44*4 OIL SEAL GUIDE
NO	SYM-9100110-REA	NO	SYM-9100400 G5A ADA	NO	SYM-9121100-REA
					
NAME	ENG L COVER RADIAL BALL BRG. 6006 driver	NAME	FINAL SHAFT BRG 6307 driver	NAME	PULLEY DRIVEN FACE expander
NO	SYM-9615010-REA 6006	NO	SYM-2343110-REA 6307	NO	SYM-2321000-REA
					
NAME	CLUTCH COVER 35*55*8 OIL SEAL	NAME	DRIVEN PULLEY Disassemble tool	NAME	PULLEY DRIVEN FACE SEAL COLLER tool
NO	SYM-9120300-REA	NO	SYM-2301000-REA	NO	SYM-2323700-REA
					
NAME	R CASE PARK GEAR CLIP GUIDE & installer	NAME	Driveshaft oil seal driver	NAME	OUTPUT SHAFT BRG 6307 driver
NO	SYM-9060200-REA	NO	SYM-9120600-REA	NO	SYM-2346000-REA A6307

					
NAME	MAIN BRG. UP/LWR 40*44*20 assemble tool	NAME	L COVER FR. BRG. 6302 driver	NAME	Drive plate fixer
NO	SYM-9100100-REA	NO	SYM-9615000-REA 6302	NO	SYM-2230000-REA
NAME		NAME		NAME	
NO		NO		NO	
NAME		NAME		NAME	
NO		NO		NO	
NAME		NAME		NAME	
NO		NO		NO	

Mechanism Diagram




Valve Rocker Arm
Press-In Lubrication
Cam Shaft
Oil Route
Oil Route
Spray Lubrication
Con-Rod
Spray Lubrication
C1
B1
A1
E1
E1
A1

Precautions in Operation

General Information:

- This chapter contains maintenance operation for the engine oil pump and gear oil replacement.

Specifications

Engine oil capacity Disassembly: 3000 c.c.

Replacement: 2400 c.c.

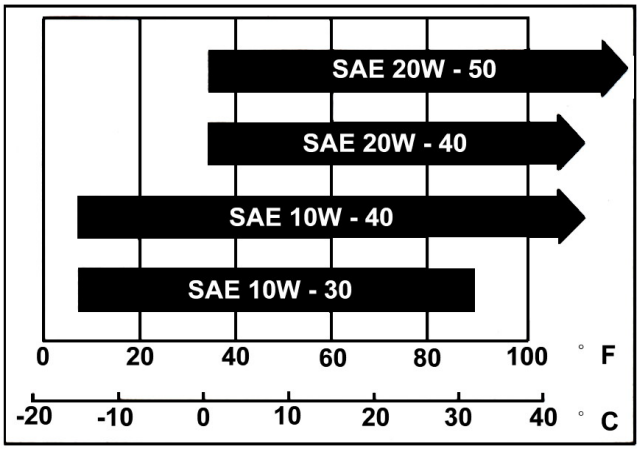
Replacement with oil filter replaced: 2700 c.c.

Oil viscosity SAE 10W-30 (Recommended King serial oils)

Rear axle gear oil replacement: 100c.c.

Front differential gear oil replacement: 200c.c.

Gear oil viscosity SAE 80 or 90
(Recommended SYM Hypoid gear oil)



Items		Standard (mm)	Limit (mm)
Oil pump	Inner rotor clearance	0.15	0.20
	Clearance between outer rotor and body	0.15~0.20	0.25
	Clearance between rotor side and body	0.04~0.09	0.12

Torque value

Torque value oil strainer cap	1.3~1.7kgf-m
Engine oil drain bolt	3.5~4.5kgf-m
Gear oil drain bolt	1.1~1.5kgf-m
Gear oil join bolt	3.5~4.5kgf-m
Oil pump connection screw	0.1~0.3kgf-m

Troubleshooting

Low engine oil level

- Oil leaking
- Valve guide or seat worn out
- Piston ring worn out

Low oil pressure

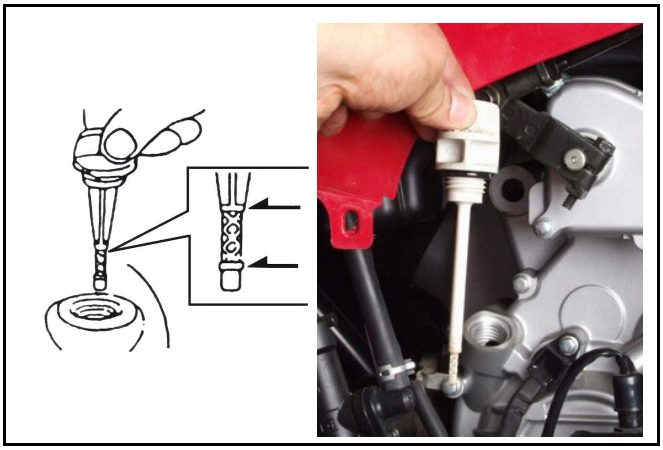
- Low engine oil level
- Clogged in oil strainer, circuits or pipes
- Oil pump damage

Dirty oil

- No oil change periodically
- Cylinder head gasket damage
- Piston ring worn out

Engine Oil

Turn off engine, and park the ATV in flat surface.
Check oil level with oil dipstick.
Do not screw the dipstick into engine as checking.
If oil level is nearly low level, fill out recommended oil to upper level.



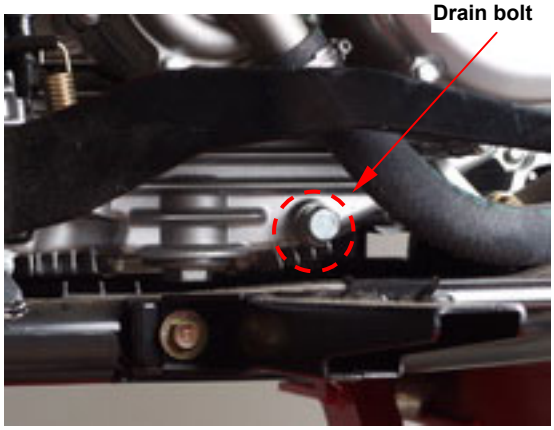
Oil Change

⚠ Caution

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

Place an oil pan under the ATV, and remove oil drain bolt.
After drained, make sure washer can be re-used.
Install oil drain bolt.

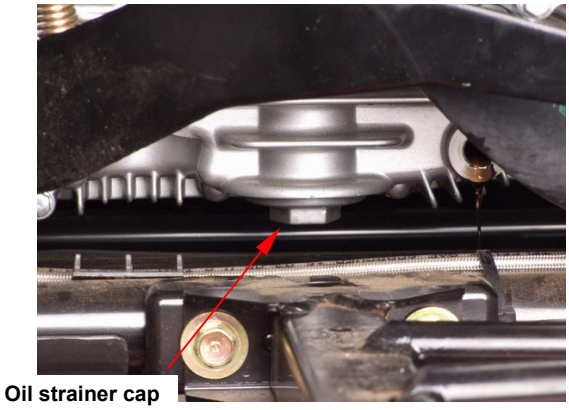
Torque value：3.5~4.5kgf-m



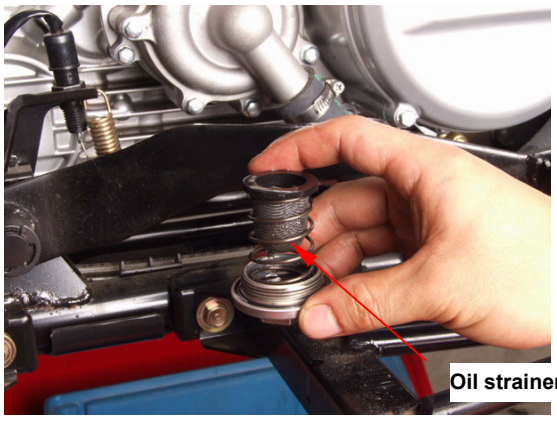
Engine Oil Strainer Clean

Drain engine oil out.
Remove the oil strainer and spring.
Clean the oil strainer.
Check if the `O-ring can be re-used.
Install oil strainer and spring.
Install oil strainer cap.

Torque value：1.3~1.7kgf-m

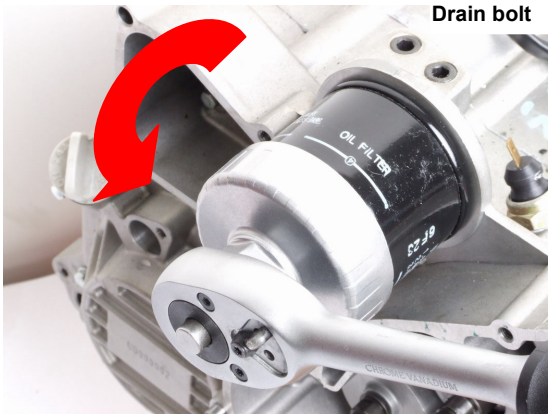


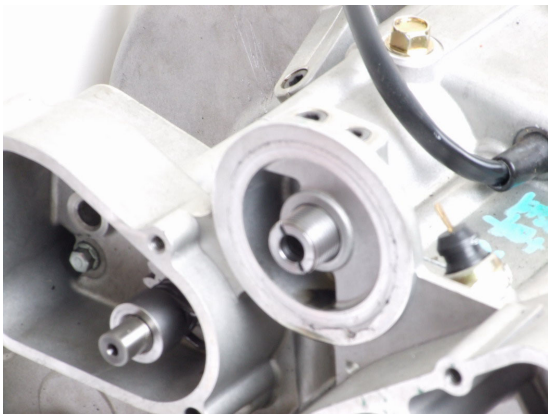
Refill oil to crankcase (oil viscosity SAE 10W-30)
Recommended using King serial oil.
Engine oil capacity: 2400c.c. when replacing
Install dipstick, start the engine for running several minutes.
Turn off engine, and check oil level again.
Check if engine oil leaks.



Oil Filter Unit

Remove the oil filter unit with special tool.
Special Service Tool:
Tool No: SYM-1445100





Install the oil filter unit by hand.

Lock the oil filter unit with special tool.
Special Service Tool:
Tool No: SYM-1445100

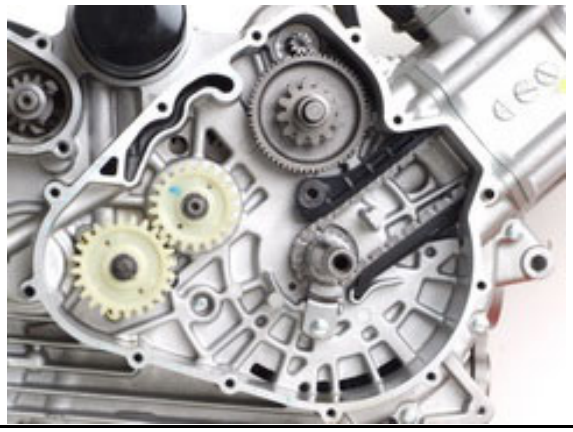
Torque value：1.3~1.7kgf-m

Oil Pump

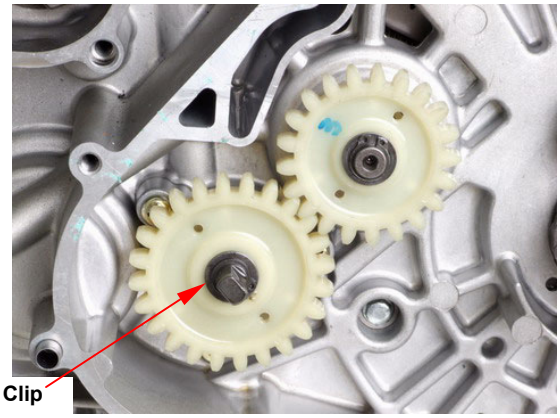
Oil Pump Removal

Remove the recoil starter and the AC Generator.

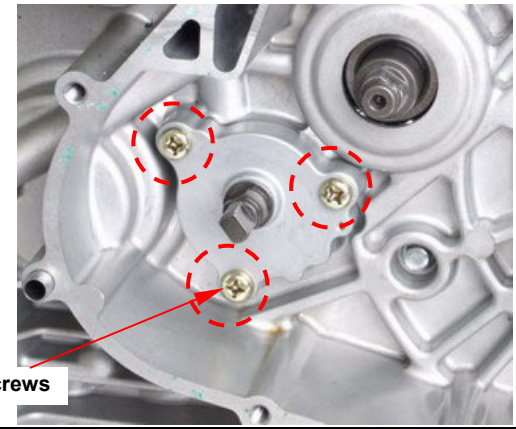
(Refer to chapter 10) 。



Remove the cir clip and take out the oil pump sprocket.

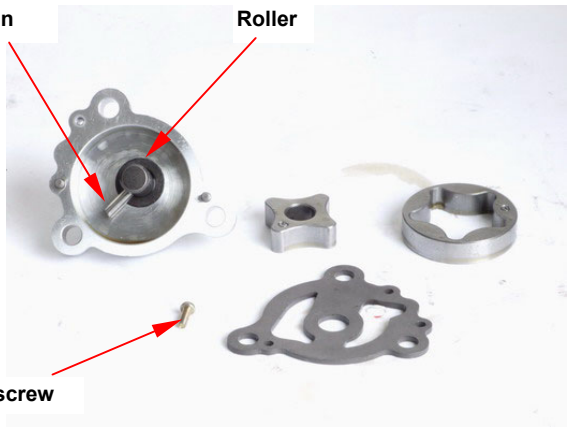


Make sure that pump shaft can be rotated freely.
Remove 3 screws on the oil pump, and then remove the oil pump.



Oil Pump Disassembly

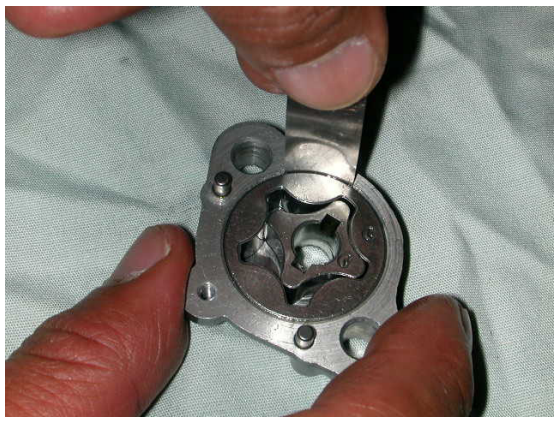
Remove the screws on oil pump cover and remove the cover.
Remove the oil pump shaft roller and shaft.



Oil Pump Inspection

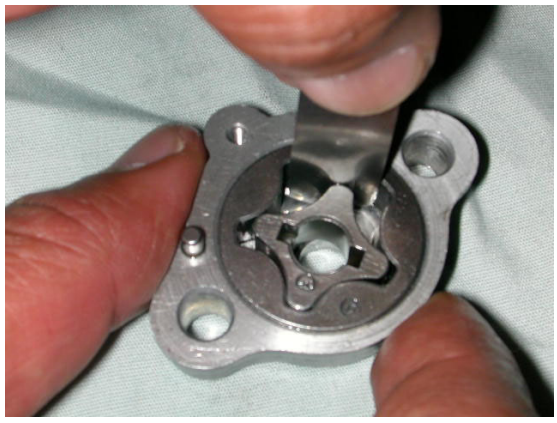
Check the clearance between oil pump body and outer rotor.

Limit: 0.25 mm



Check clearance between inner and outer rotors.

Limit: 0.20 mm



Check clearance between rotor side face and pump body

Limit: 0.12 mm

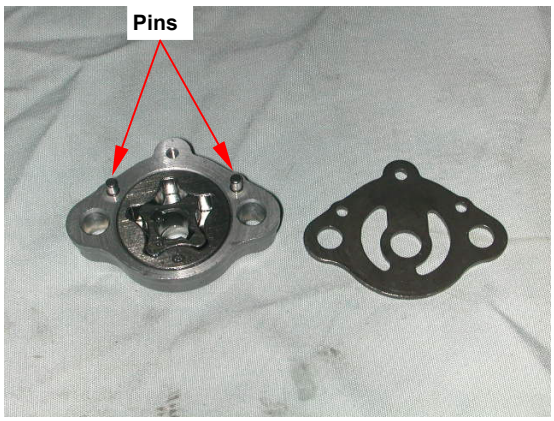
Oil Pump Re-assembly

Install the inner and outer rotors into the pump body.

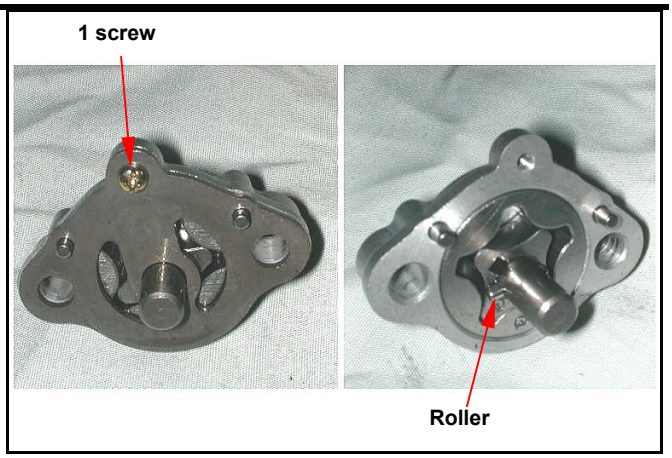
Align the indent on driving shaft with that of inner rotor.

Install the oil pump shaft and roller.

Install the oil pump cover and fixing pins properly.



Tighten the oil pump screw.

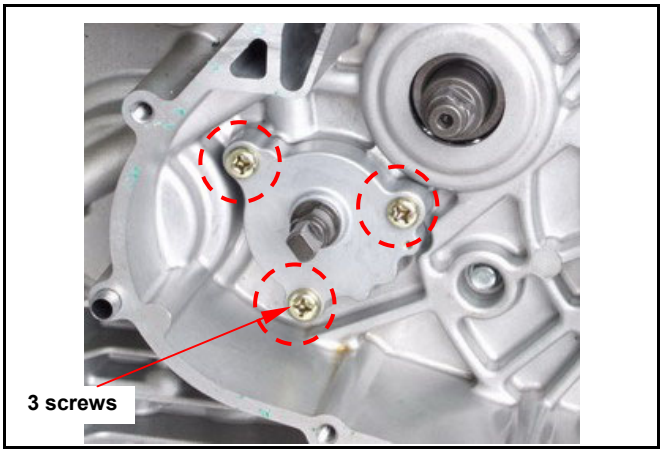


Oil Pump Installation

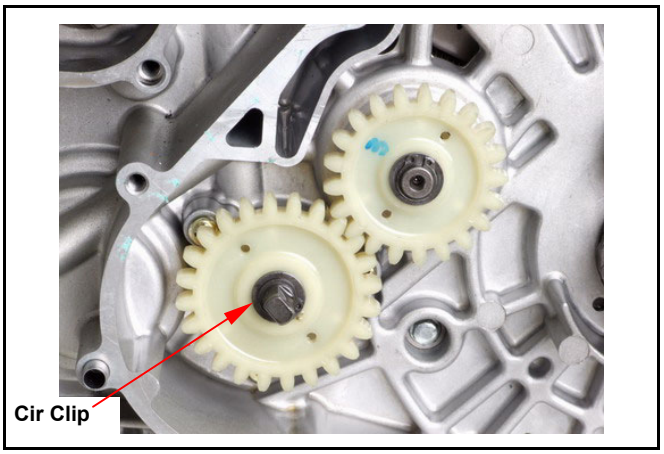
Install the oil pump, and then tighten screws.

Torque value：0.1~0.3kgf-m

Make sure that oil pump shaft can be rotated freely.



Install the oil pump sprocket, and then install cir clip onto oil pump shaft.



Notes:

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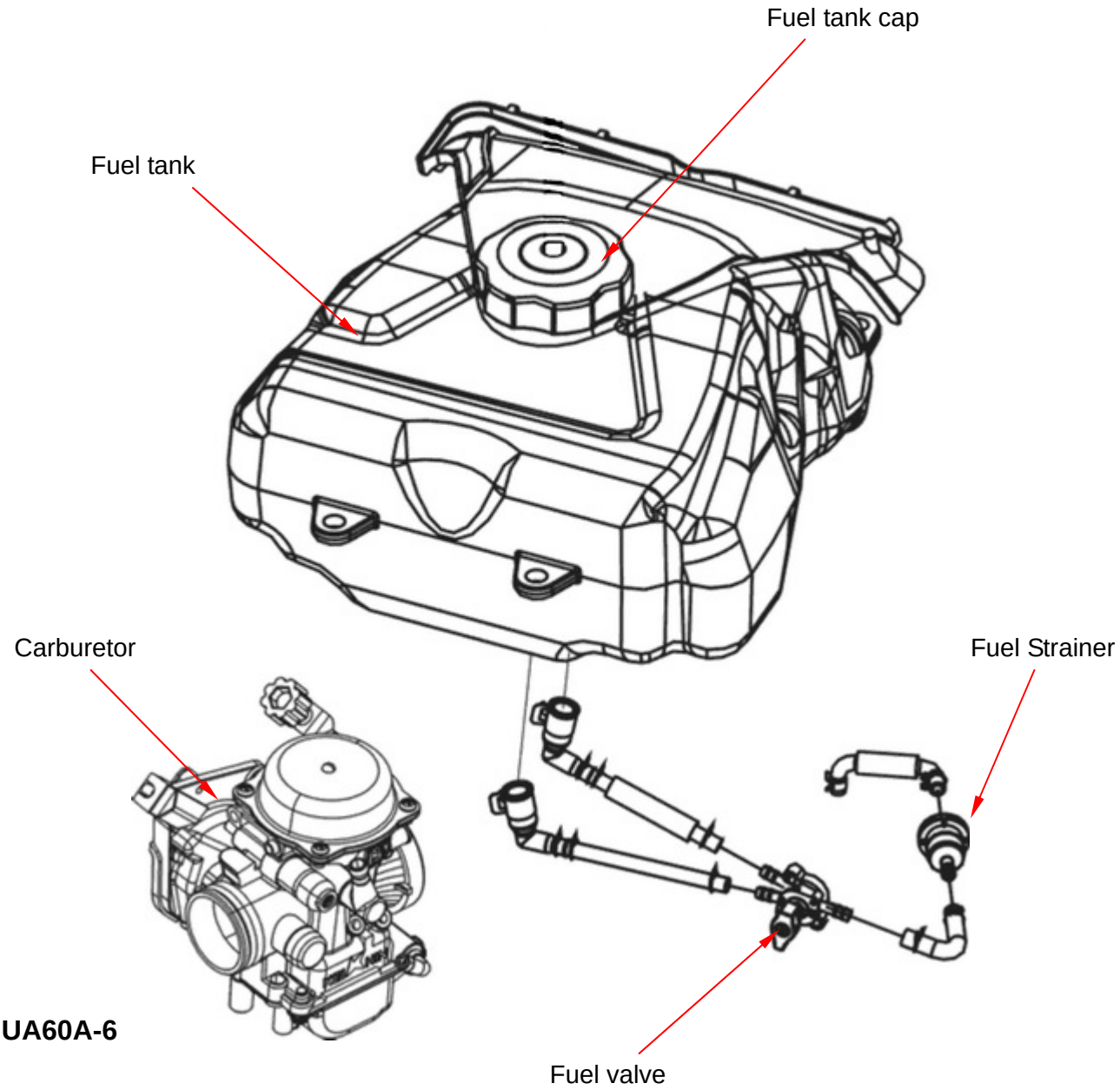
Mechanism Diagram



UA60A-6

Precautions in Operation

General Information

⚠ Warning

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

⚠ Cautions

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

Specification

ITEM	UA60A-6
Carburetor diameter	35 mm
I.D. number	AG8
Fuel level	17 ±0.5mm
Main injector	#132
Idle injector	#92
Idle speed	1700±100 rpm
Throttle handle clearance	1~3
Pilot screw	2 1/2

Tool

Special service tools

Vacuum/air pressure pump
Fuel level gauge

Trouble Diagnosis

Poor engine start
•No fuel in fuel tank
•Clogged fuel tube
•Too much fuel in cylinder
•No spark from spark plug(malfunction of ignition system)
•Clogged air cleaner
•Malfunction of carburetor chock
•Malfunction of throttle operation

Stall after started
•Malfunction of carburetor chock
•Incorrect ignition timing
•Malfunction of carburetor
•Dirty engine oil
•Air existing in intake system
•Incorrect idle speed

Rough idle
•Malfunction of ignition system
•Incorrect idle speed
•Malfunction of carburetor
•Dirty fuel

Intermittently misfire as acceleration
•Malfunction of ignition system

Late ignition timing
•Malfunction of ignition system
•Malfunction of carburetor

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

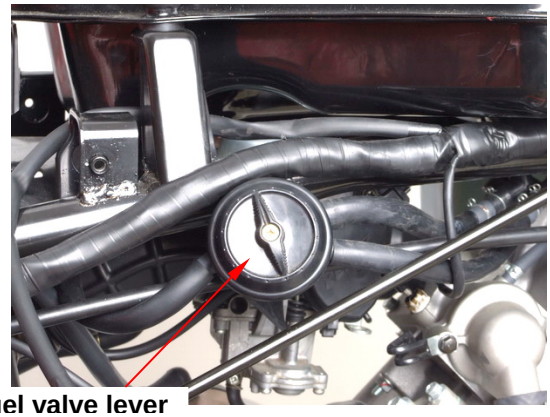
Mixture too lean
•Clogged fuel injector
•Vacuum piston stick and closed
•Malfunction of float valve
•Fuel level too low in float chamber
•Clogged fuel tank cap vent
•Clogged fuel filter
•Obstructed fuel pipe
•Clogged air vent hose
•Air existing in intake system

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

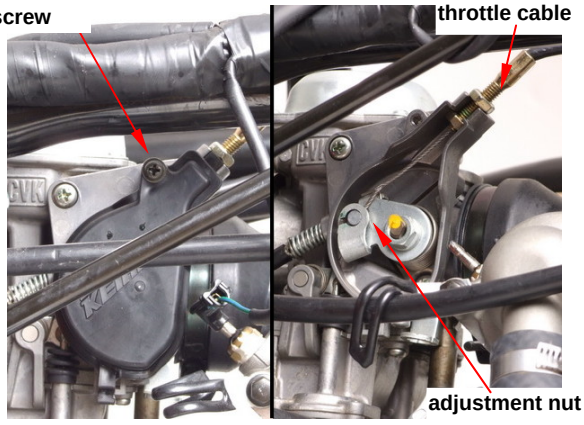
Carburetor Removal / Installation

Removal

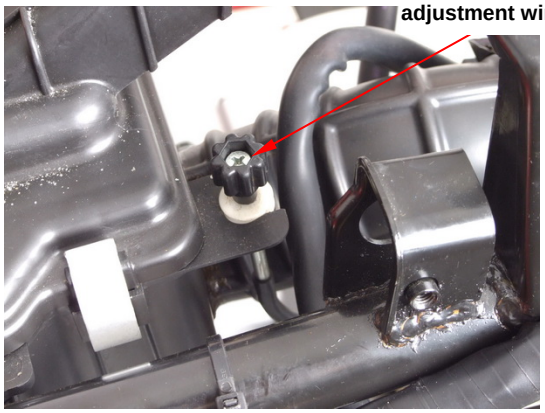
Remove the fuel tank.
Turn the fuel valve lever on off.



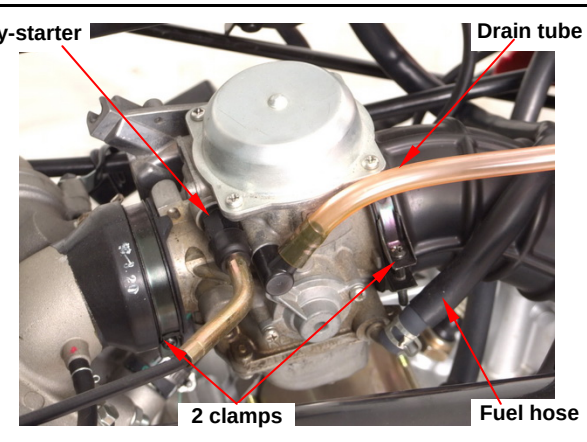
Remove 1 screw from throttle lever cap them remove throttle lever cap.
Loosen throttle cable adjustment nut and remove throttle cable



Remove the sleep adjustment wire.



Disconnect the fuel hose and by-starter and drain tube
Release 2 clamps strip of air cleaner and inner pipe.
Remove the carburetor.



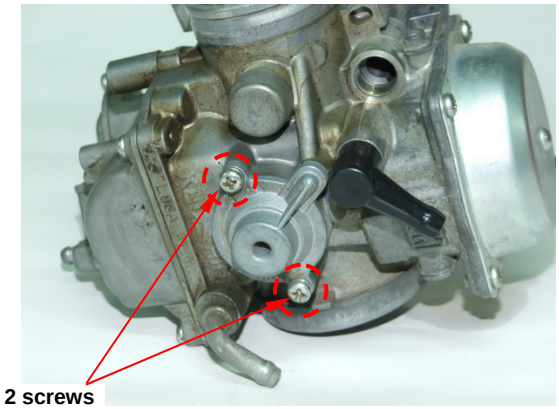
Installation

Install in reverse order of removal procedures.

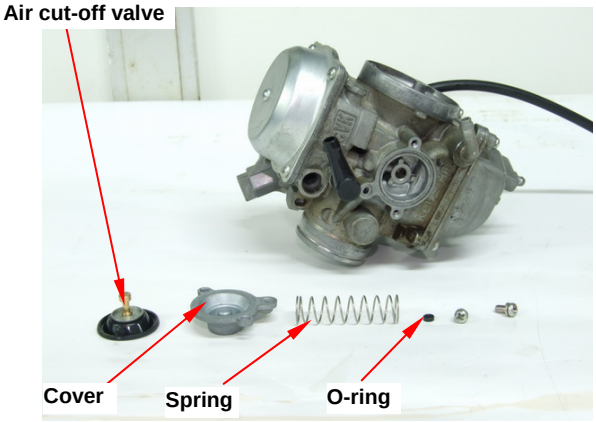
Air Cut-Off Valve

Disassembly

Remove 2 screws.



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



Inspection

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

Assembly

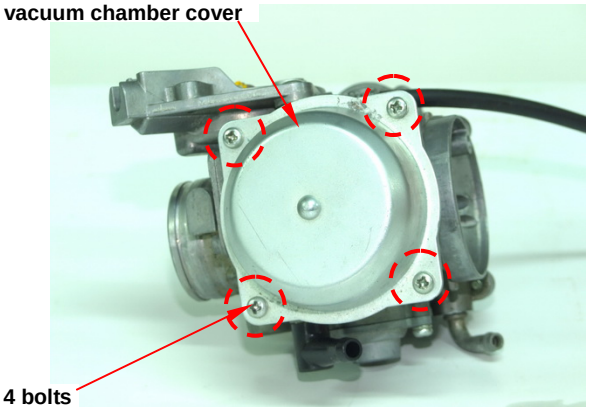
Install in reverse order of removal procedures.

Vacuum Chamber

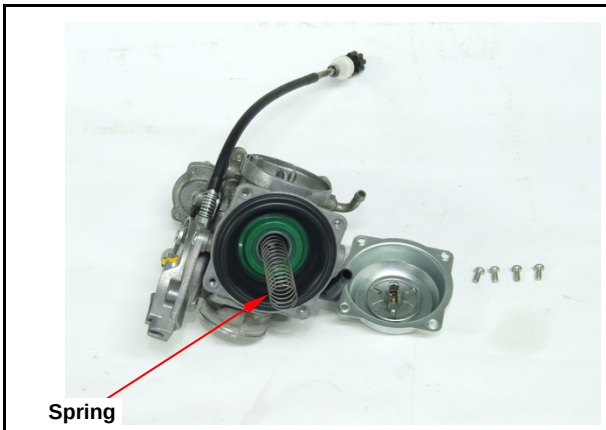
Disassembly

Removal

Loosen drain screw, and drain out residual fuel in float chamber.
Remove screws (4 screws) of vacuum chamber cover and the cover.



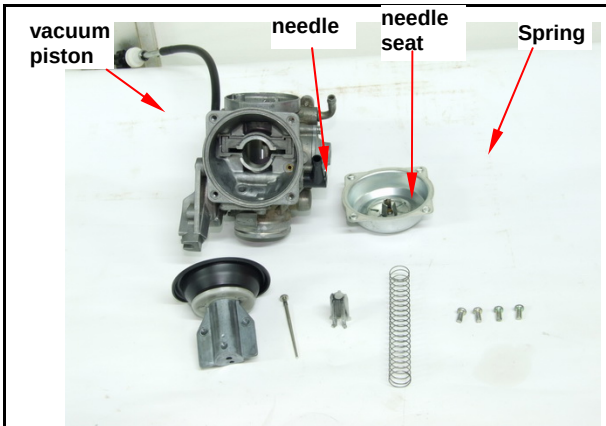
Remove compress spring and vacuum piston.
.



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

⚠ Cautions

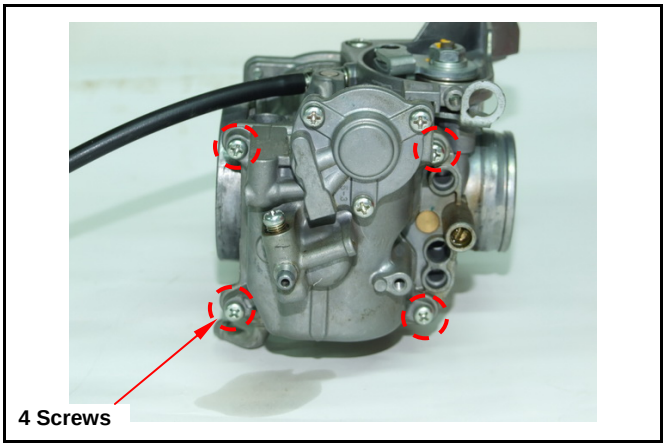
Do not damage vacuum diaphragm.



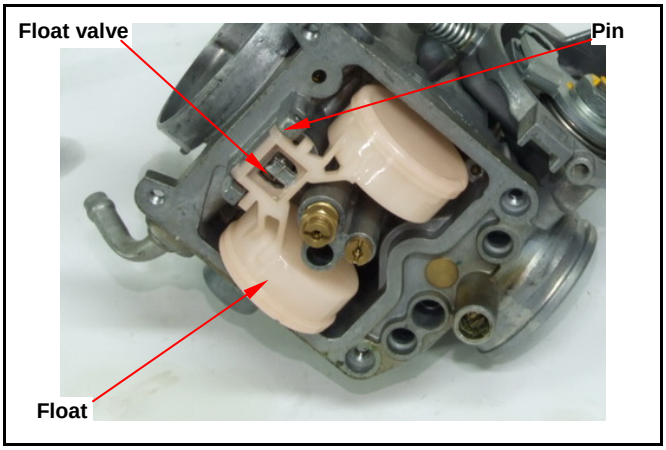
Float Chamber

Disassembly

Remove 4 mounting screws and remove float chamber cover.

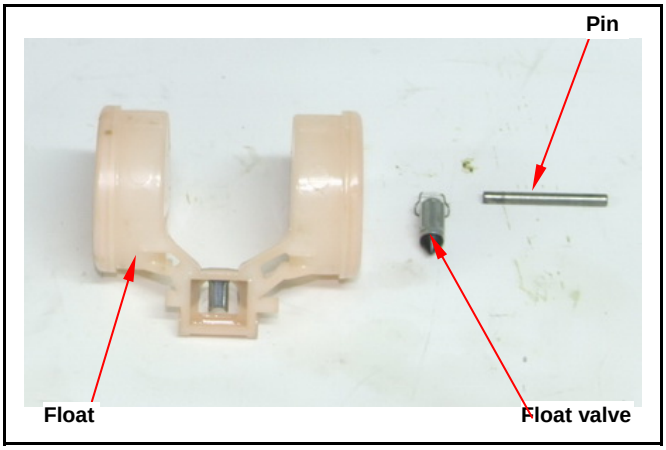


Remove the float pin, float and float valve.



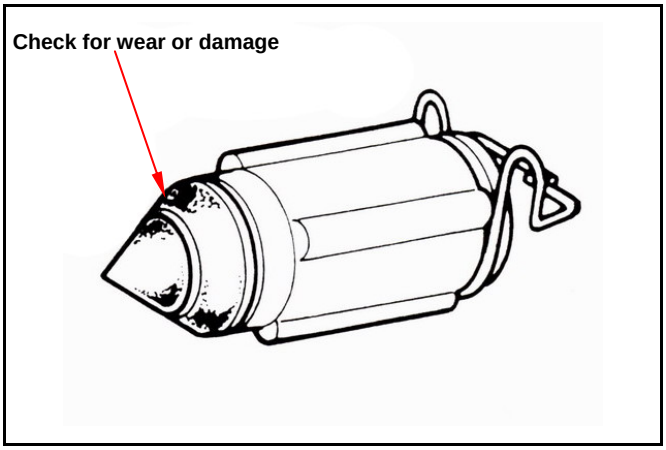
Inspection

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



⚠ Caution

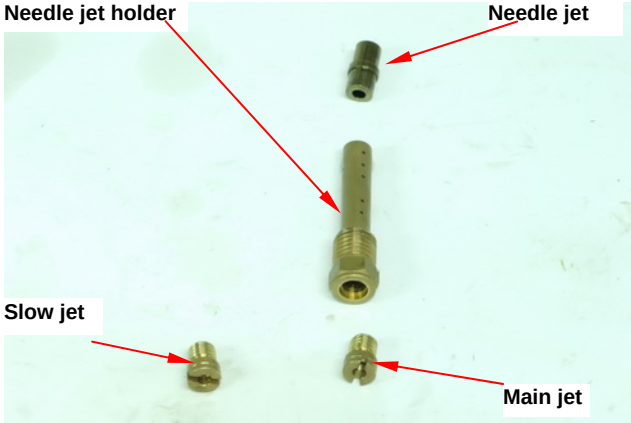
In case of worn out or dirt, the float valve and valve seat will not tightly close causing fuel level to increase and as a result, fuel flooding. A worn out or dirty float valve must be replaced with a new a new one.



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

⚠ Caution

Take care not to damage jets and adjust screw.
- Before removing adjustment screw, turn it all the way down and note the number of turns.
- Does not turn adjust screw forcefully to avoid damaging valve seat face.



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

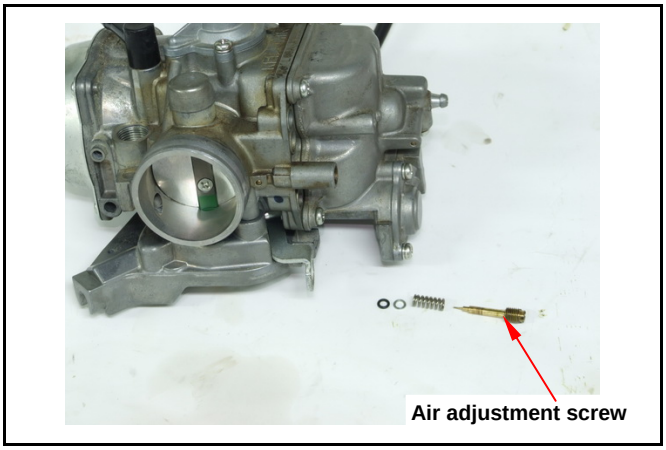
Assembly

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

⚠ Caution

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

Install the float valve, float, and float pin.

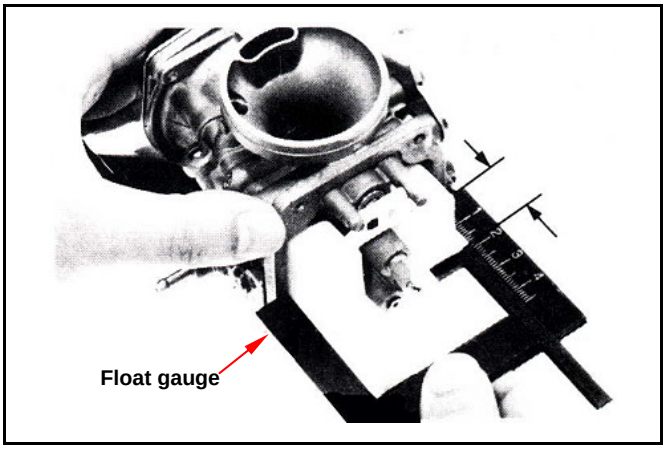


Checking fuel level

⚠ Caution

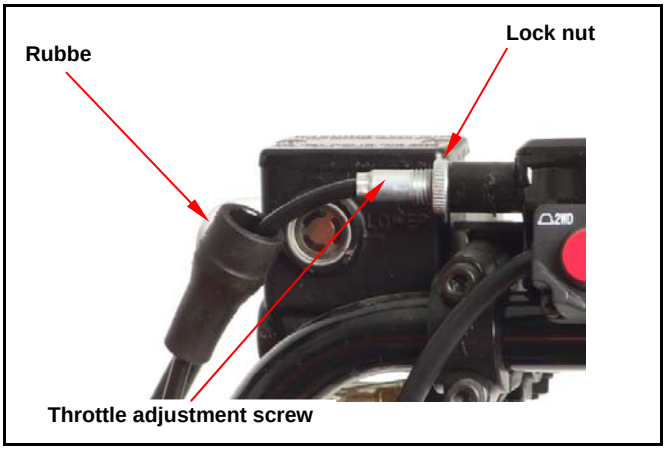
- Check again to ensure float valve, float for proper installation.
- To ensure correct measurement, position the float meter in such a way so that float chamber face is vertical to the main jet.

Fuel level: 17 ± 0.5mm



Installation of carburetor

Install carburetor in the reverse order of removal.
Following adjustments must be made after installation.
- Throttle cable adjustment.
- Idle adjustment

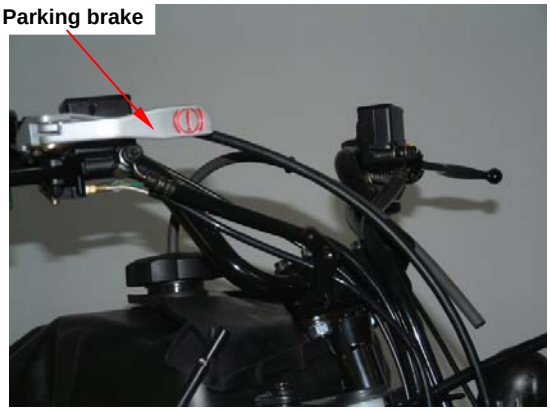


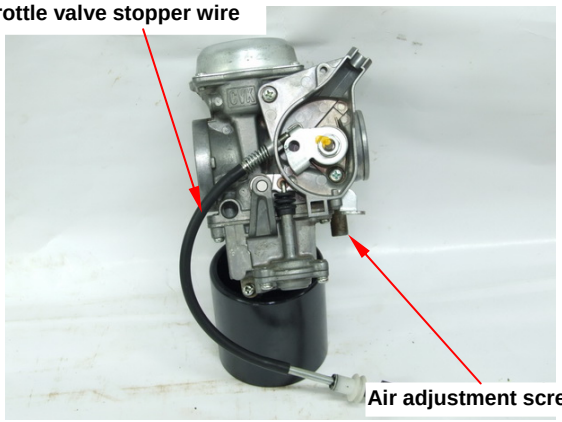
Adjustment of Idle Speed

⚠ Caution

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

Use a tachometer when adjusting engine RPM.
Screw in air adjustment screw gently, then back up to standard turns.
Standard turns: 2 1/2 turns
Warm up engine; adjust the throttle stopper wire of throttle valve to standard RPM.
Idle speed rpm: 1700 ± 100 rpm
Connect the hose of exhaust analyzer to exhaust front end. Press test key on the analyzer.
Adjust the pilot screw and read CO reading on the analyzer
CO standard value: 0.5~1.0 %
Accelerate in gradual increments; make sure rpm and CO value are in standard value after engine running in stable. If rpm and CO value fluctuated, repeat the procedures described above for adjusting to standard value.

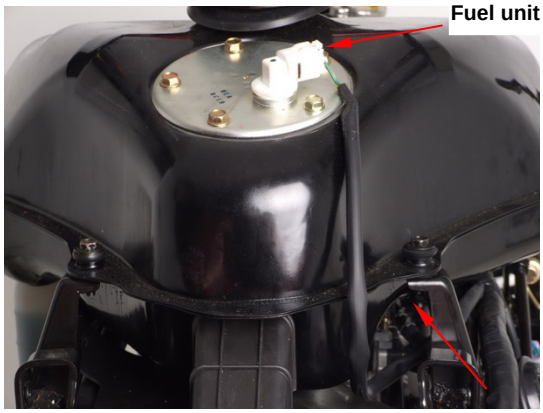




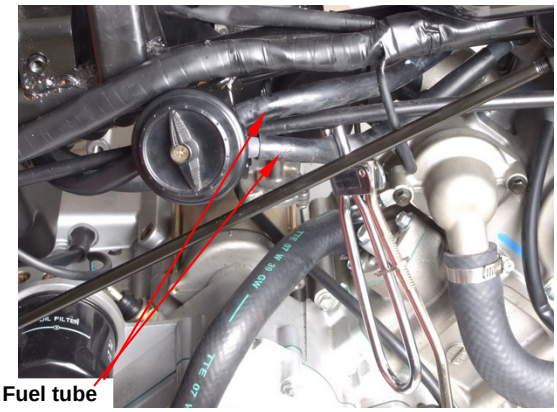
Fuel Tank

Fuel tank removal

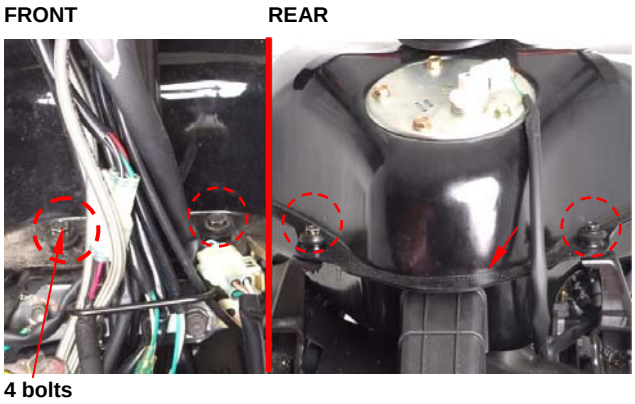
Open the seat.
Remove the front cover and front top center cover.
Remove the side covers and lower side covers.
Remove the front fender.
Remove fuel unit wire from tank.
(Covers remove please refer chapter 13)



remove 2 fuel tubes from fuel valve.



Remove 4 bolts from tank rear side & front side and then remove fuel tank.
.



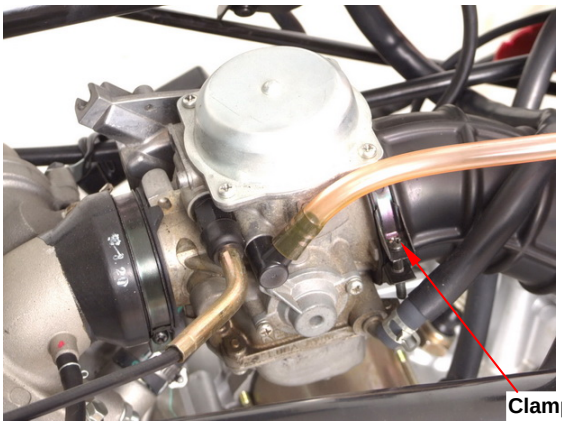
Installation

Install the tank in the reverse order of removal.

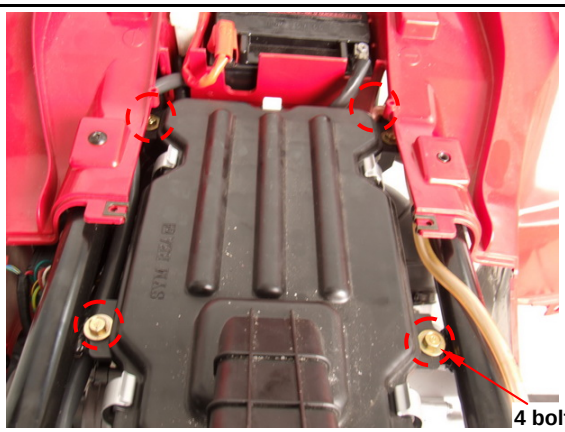
Air Cleaner

Removal

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



Loosen the clamp strip of air cleaner, and then remove the air cleaner vapor hose.
Remove the air cleaner (4 bolts).

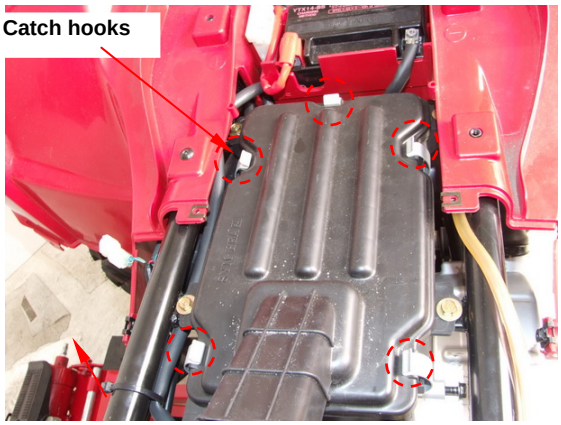


Installation

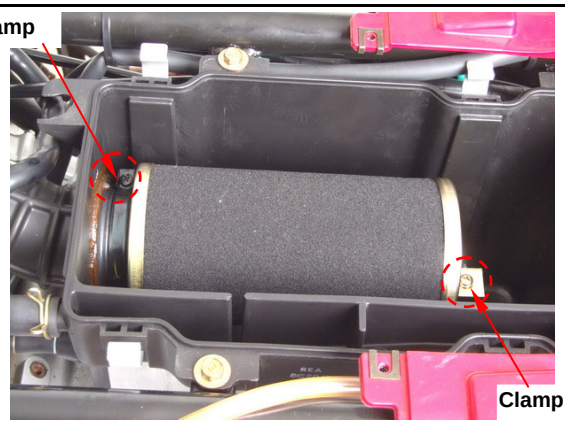
Install the tank in the reverse order of removal.

Cleaning air cleaner element

Remove the air cleaner cover (5 catch hooks).



Remove element mounting screw.
Loosen the clamp strip of air cleaner element.

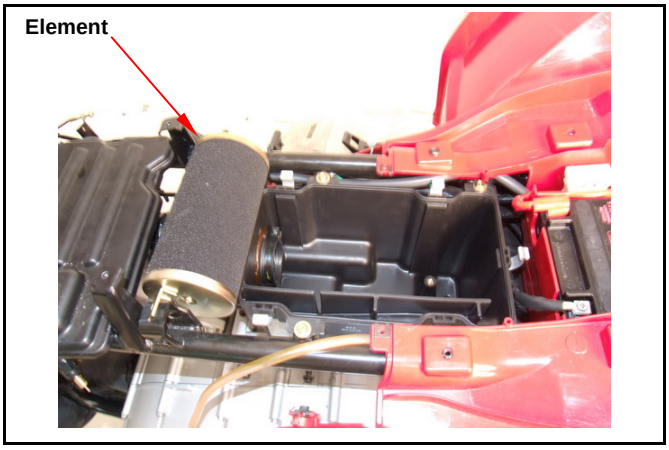


Remove the air cleaner element.
Clean the element with non-flammable or high-flash point solvent and then squeeze it for dry.

⚠ Caution

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

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



Notes:

Precautions in Operation

General Information

- The engine has to be supported with special service tools that can be lifted or adjustable.
- The following parts can be serviced as engine being mounted on frame:
  Carburetor
  Drive pulley, drive belt, clutch, and movable drive face assembly.
  Start motor.
  AC. Generator, oil pump and start one-way clutch.

Specification

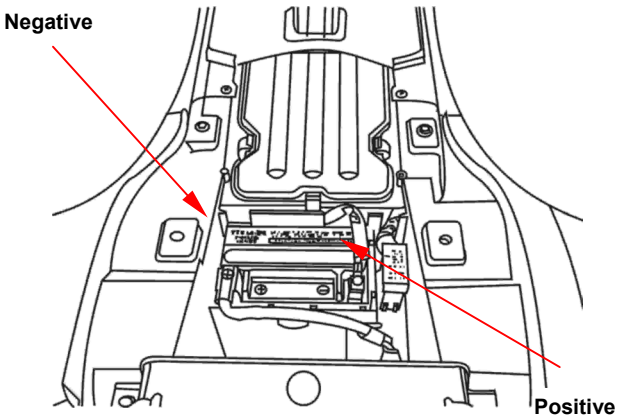
Item		Capacity
Engine oil capacity	Replacement	2400 c.c.
	Replacement with oil filter changed	2700 c.c.
	Disassembly	3000 c.c.
Rear axle gear oil capacity	Replacement	100 c.c.
Front differential gear oil capacity	Replacement	200 c.c.
Coolant capacity	Engine & radiator	1750 c.c.
	Reservoir	350 c.c.
	Total	2100 c.c.

Torque Value

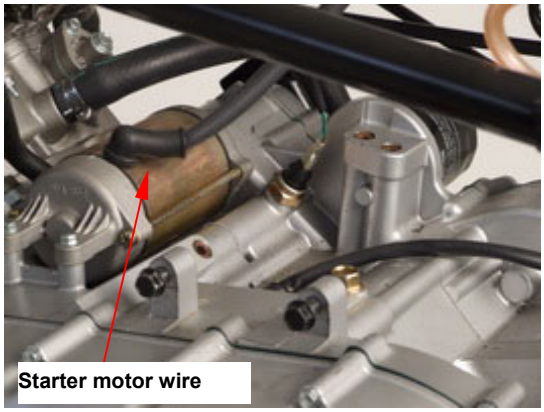
Engine hanger bolt	7.5~9.5kgf-m
Exhaust muffler mounting bolt	2.8~3.2kgf-m
Exhaust muffler connection nut	1.0~1.4kgf-m

Engine Removal

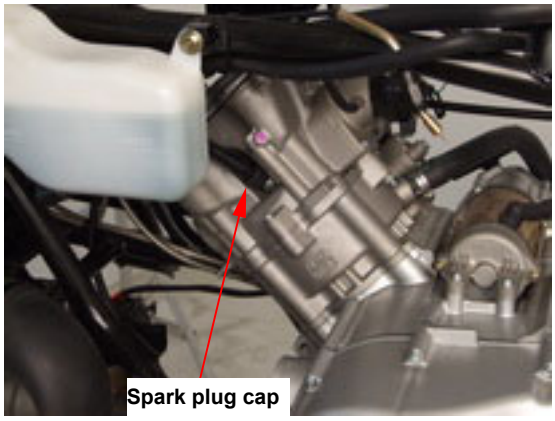
Remove the seat.
Remove the battery negative terminal (-).
Remove the battery positive (+) terminal.
Remove front fender and the footrest (refer chapter 13).



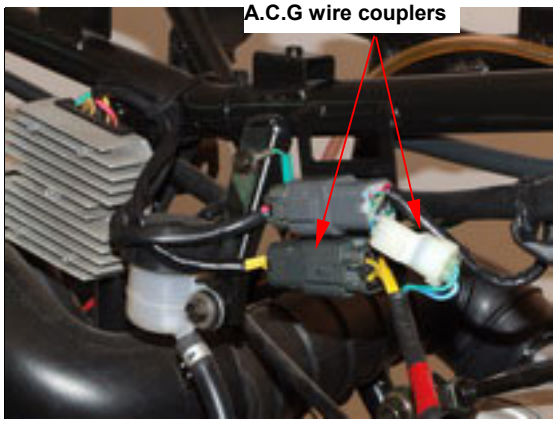
Remove the starter motor wire.



Remove the spark plug cap.

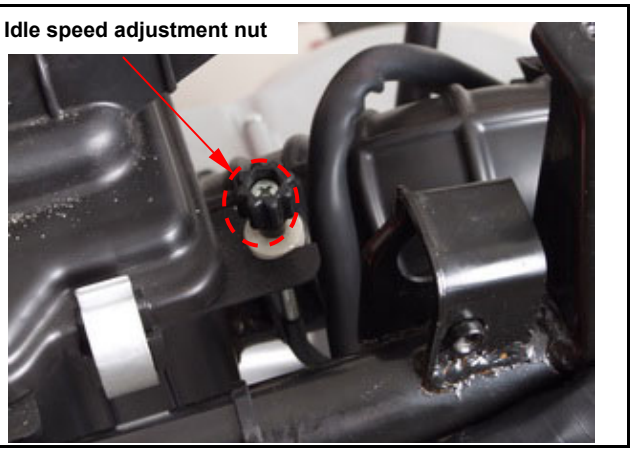


Disconnect A.C. Generator wire couplers.

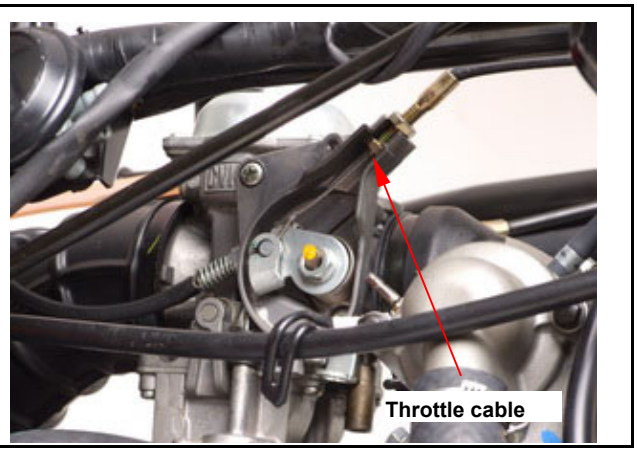


Remove the front left and rear left tires.

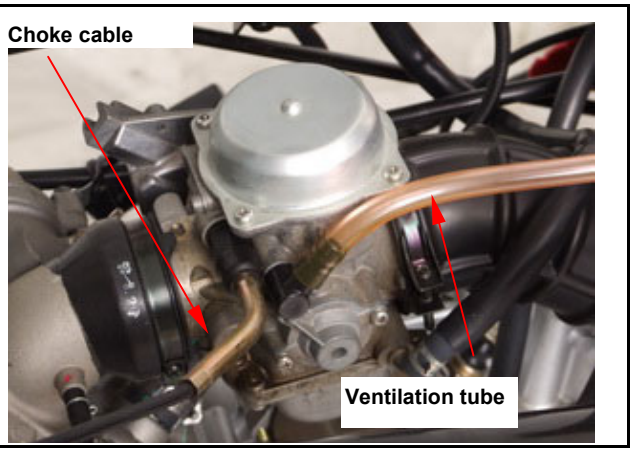
Remove the idle speed adjustment nut.
Remove 2 bolt on the muffler.
Remove the muffler.



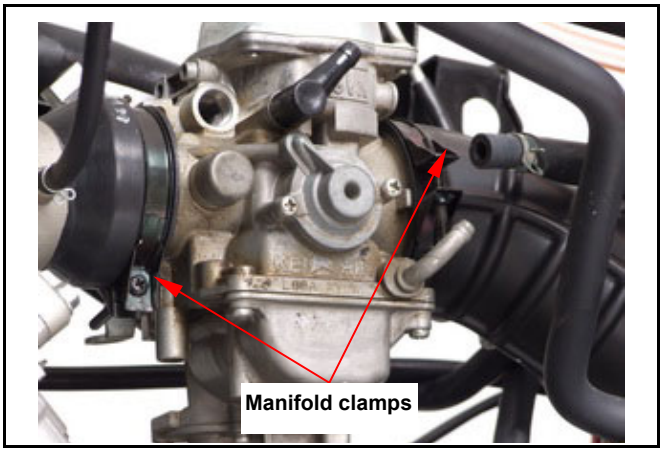
Remove the throttle cable.
Remove 2 nuts and 1 bolt.
Remove the exhaust pipe.



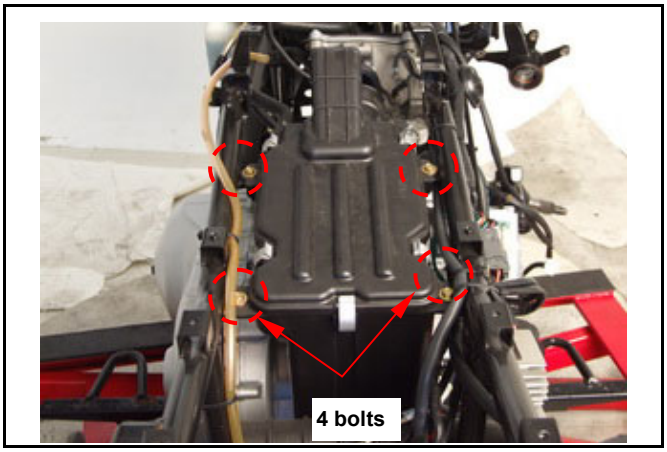
Remove the choke cable and ventilation tube.
Remove 2 nuts, and then remove exhaust pipe.



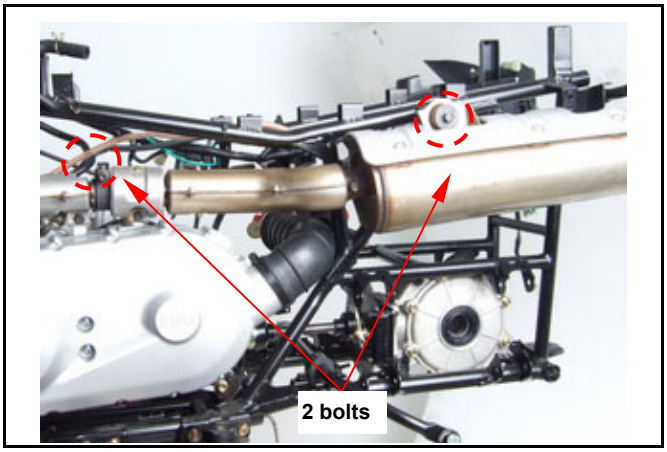
Remove 2 manifold clamps.
Remove the carburetor.



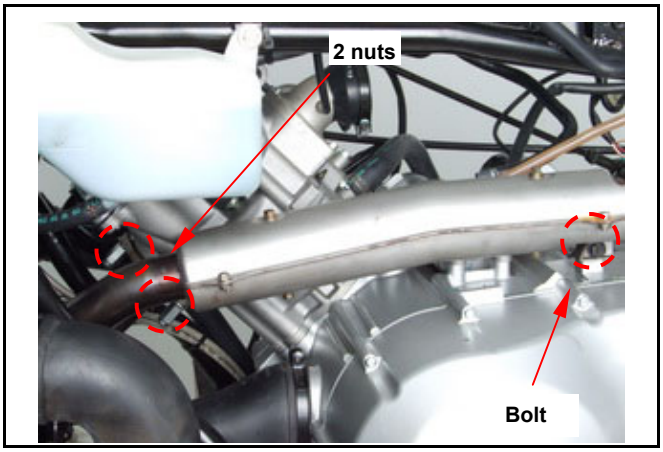
Remove 4 bolts.
Remove the air cleaner.



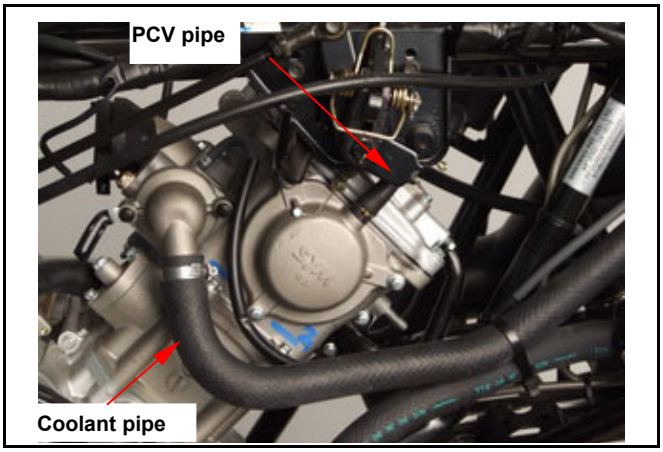
Remove 2 bolts.
Remove the muffler.



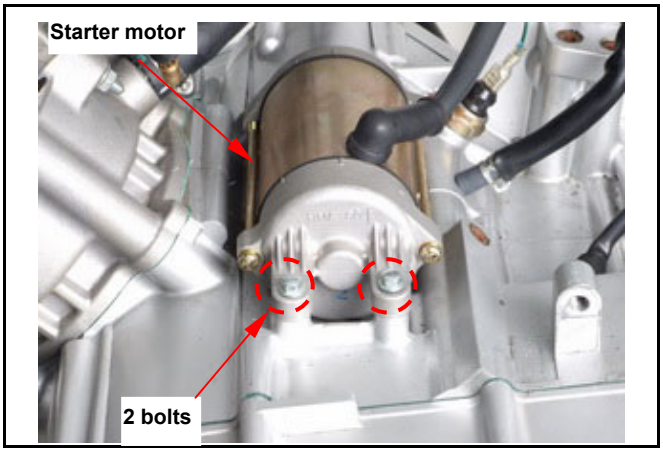
Remove 2 nuts and 1 bolt.
Remove the exhaust pipe.



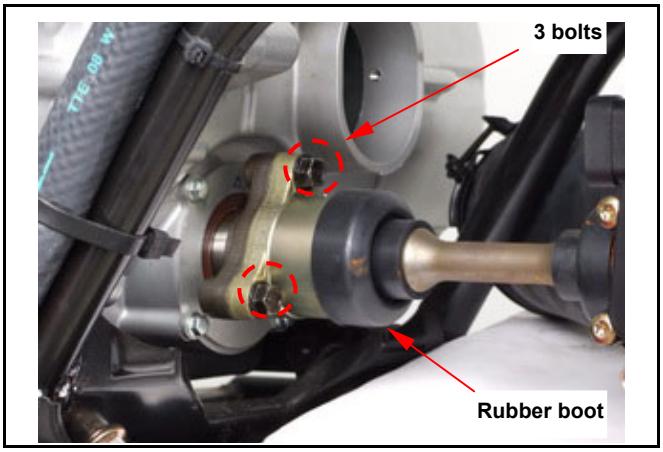
Remove the coolant drain bolt and drain out coolant.
Remove the coolant inlet pipe from the water pump cover and the outlet pipe from the thermostat cover.
Remove the PCV pipe.



Remove 2 bolts.
Remove the starter motor.

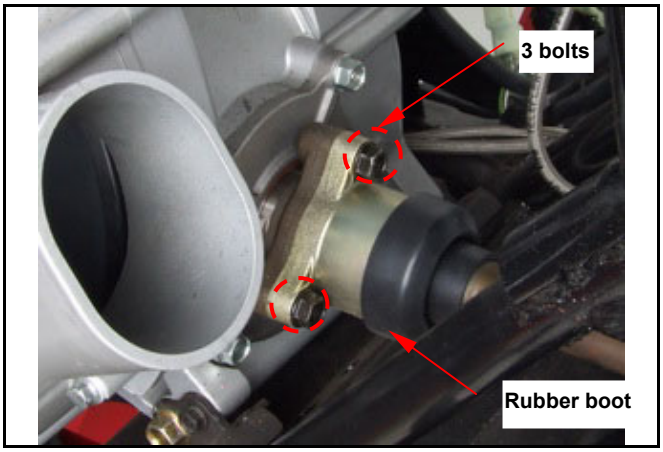


Remove 3 bolts on the front propeller shaft connector.
Remove the front propeller shaft.

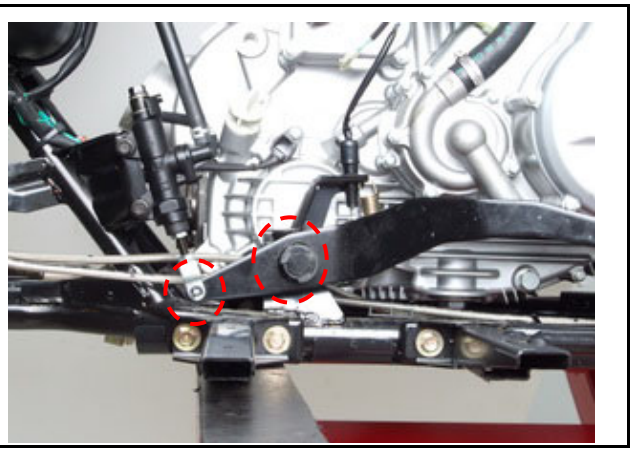


Remove 3 bolts on the rear propeller shaft connector.
Remove the rear propeller shaft.

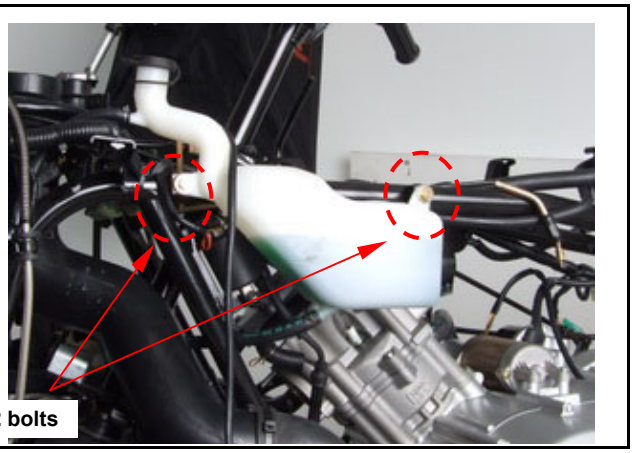
Be careful not to do any damage to the rubber boot.



Remove the rear brake pedal.

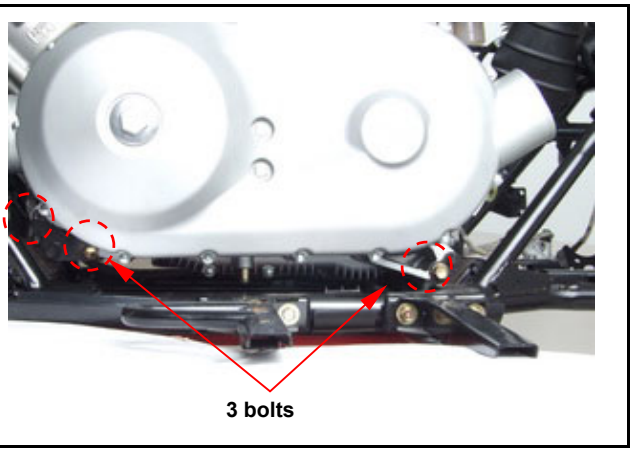


Remove the coolant reserve tank.



Remove the front and rear side engine hanger mounting nuts and bolts.

Remove left side engine hanger, and then remove engine by left side.



Engine Installation

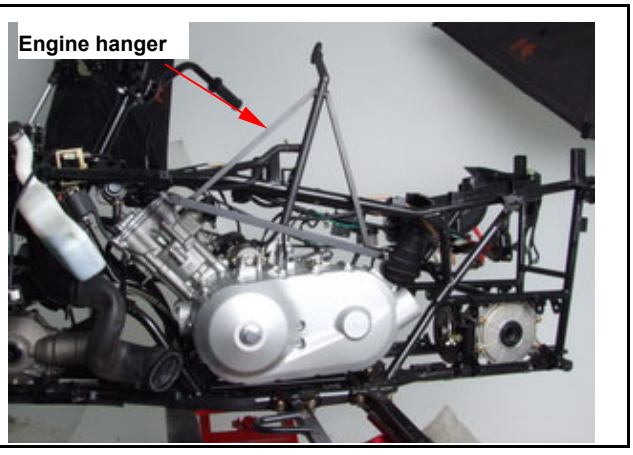
Check the bush of engine hanger parts for any damage.
Install the engine in the reverse procedures of removal.

⚠ Caution

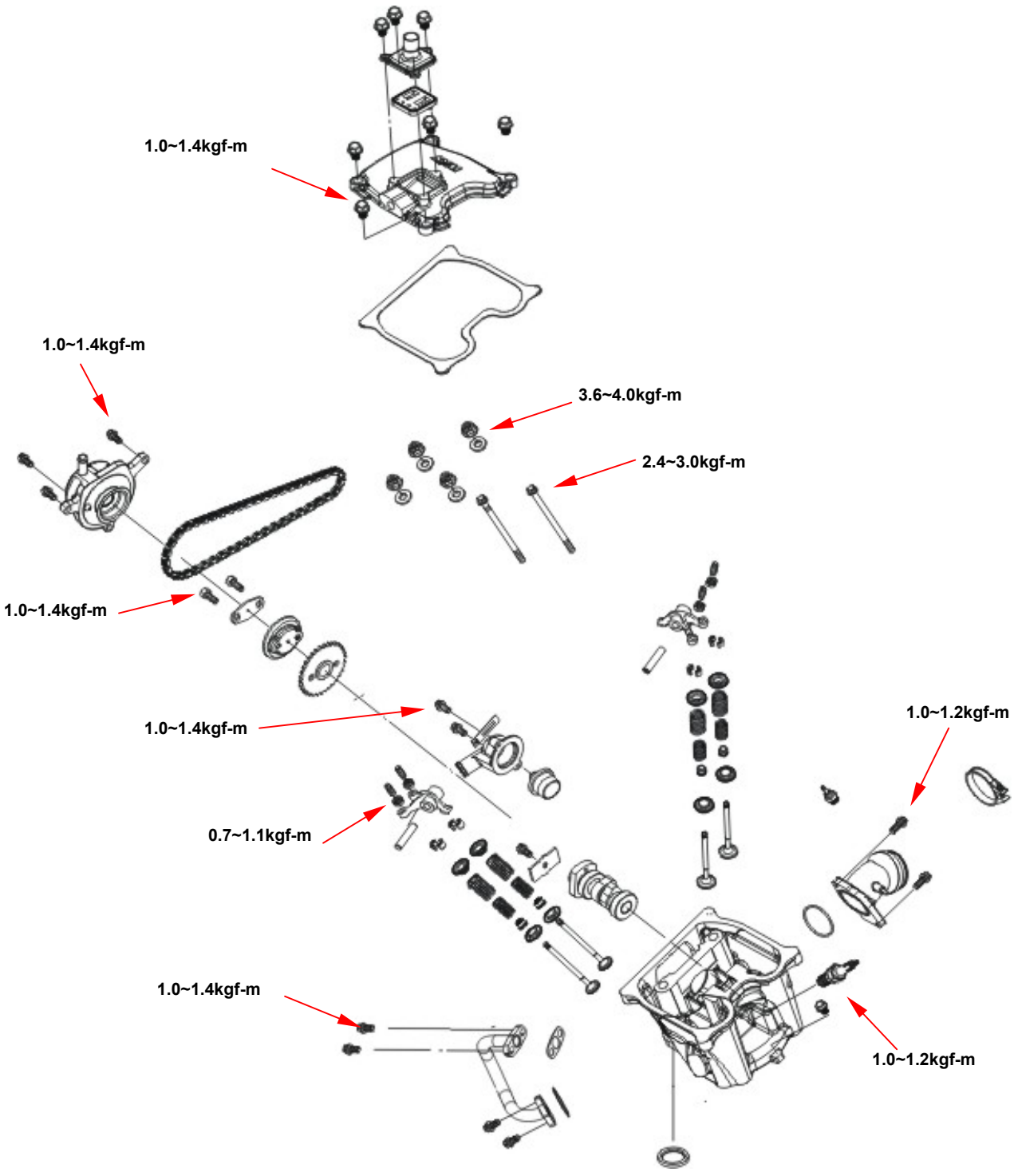
- Be careful when removing and installing the engine.
- Do not bend or twist the wires and tubes.
- Cables wires have to be routed in accordance with normal layout.

Engine hanger Bolt:

Torque value: 7.5~9.5kgf-m



Mechanism Diagram



Precautions in Operation

General Information

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

Specification

Item			Standard	Limit
Compression pressure			12±2 kg/cm2	---
Camshaft	Height of cam lobe	Intake	36.478	36.458
		Exhaust	36.847	36.832
Rocker arm	ID of valve rocker arm		13.000~13.018	13.098
	OD of valve rocker arm shaft		12.991~13.009	11.936
Valve	OD of valve stem	Intake	4.975~4.990	4.900
		Exhaust	4.955~4.970	4.900
	ID of valve guide		5.000~5.012	5.030
	Clearance between valve stem and guide	Intake	0.010~0.037	0.080
		Exhaust	0.025~0.062	0.100
	Free length of valve spring	Inner	33.700	30.100
		outer	38.800	35.200
	Valve seat width		1.600	---
	Valve clearance	Intake	0.10±0.02mm	---
		Exhaust	0.15±0.02mm	---
Tilt angle of cylinder head			---	0.050

Torque Value

Cylinder head cover bolt	1.0~1.4kgf-m
Exhaust pipe stud bolt	2.4~3.0kgf-m
Cylinder head bolt	1.0~1.4kgf-m
Cylinder head Nut	3.6~4.0kgf-m
Sealing bolt of cam chain auto-tensioner	0.8~1.2kgf-m
Bolt of cam chain auto-tensioner	1.2~1.6kgf-m
Cylinder side cover bolt	1.0~1.4kgf-m
Cam sprocket bolt	1.0~1.4kgf-m
Tappet adjustment screw nut	0.7~1.1kgf-m
Spark plug	1.0~1.2kgf-m

Tools

Special service tools

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

Troubleshooting

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

Low compression pressure

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

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

3. Piston
- Piston ring worn out.

High compression pressure

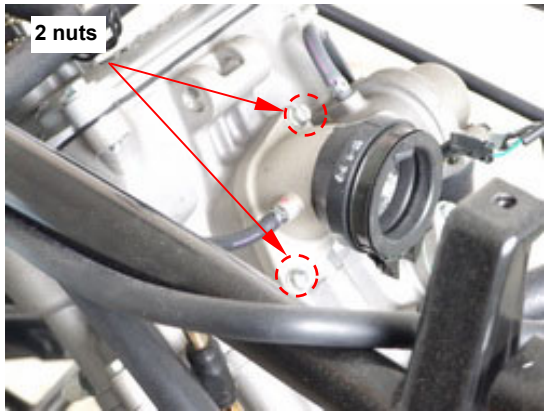
- Too much carbon deposit on combustion chamber or piston head

Noise

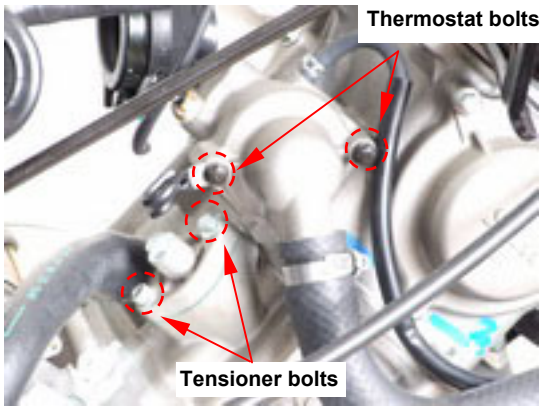
- Improper valve clearance adjustment
- Burnt valve or damaged valve spring
- Camshaft wear out or damage
- Chain wear out or looseness
- Auto-tensioner wear out or damage
- Camshaft sprocket
- Rocker arm or rocker arm shaft wear out

Cylinder Head Removal

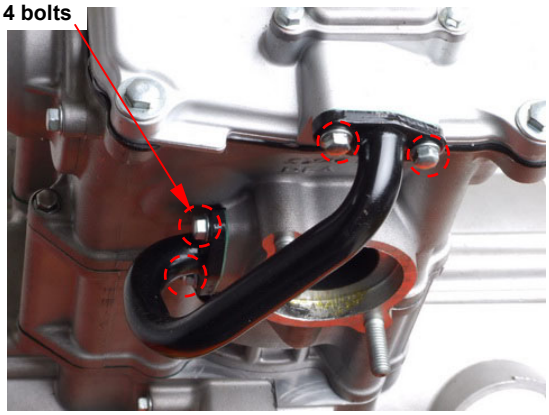
Remove the engine from the frame. (Refer to chapter 5)
Remove the inlet pipe (2 nuts).



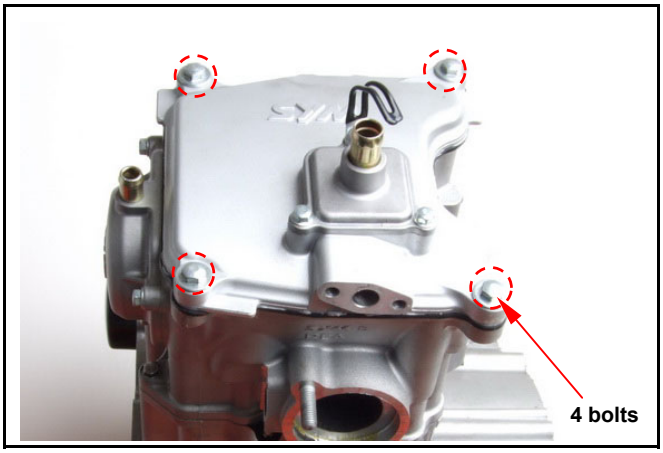
Remove 2 thermostat bolts and then remove the thermostat.
Remove the bolt and spring of the cam chain tensioner.
Loosen 2 bolts, and then remove tensioner.
Remove thermostat (2 bolts).



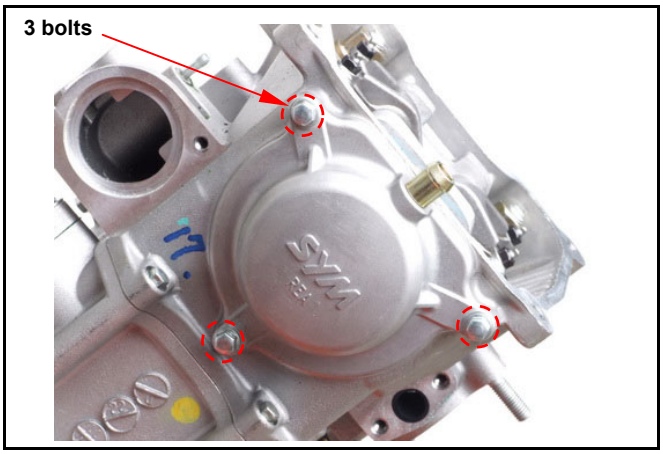
Remove Air Injection system (AI) pipe mounting bolts.
Remove the spark plug.



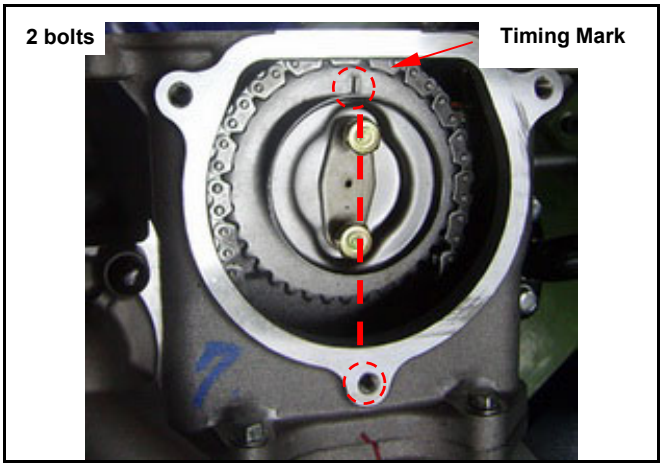
Loosen 4 bolts from the head cover then remove head cover.



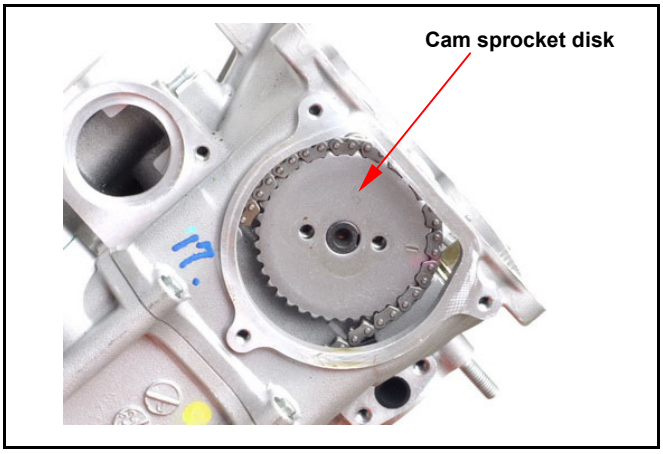
Remove the side cover mounting blots of cylinder head, and then remove the side cover.



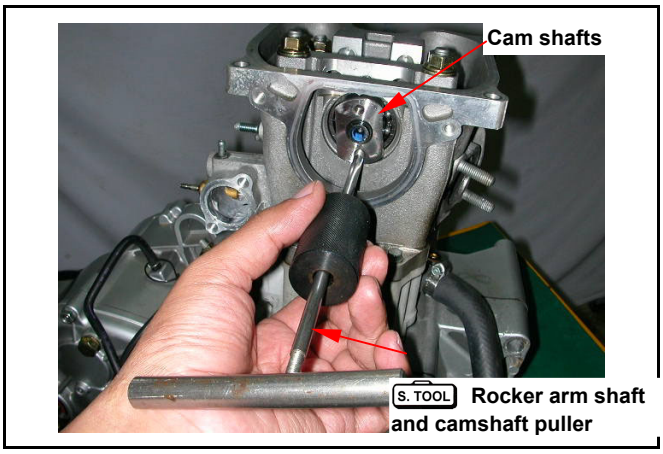
Remove left crankcase cover, and turn the drive face.
Align the timing mark on the cam sprocket with that of cylinder head to make the piston at TDC position.



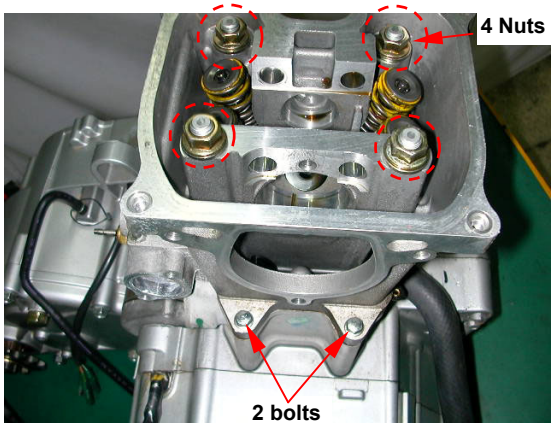
Loosen 2 bolts from the cam sprocket.
Remove the cam sprocket disk and washer.
Remove the cam sprocket.



Special Service Tool:
Tool no: SYM-1445100
TOOL number: rocker arm and camshaft puller



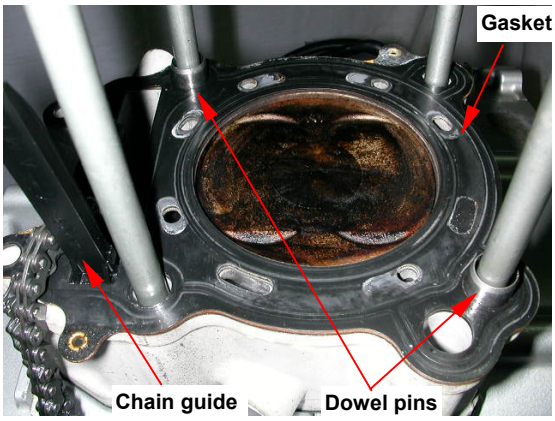
Remove the 2 cylinder head mounting bolts from cylinder head right side, and then remove 4 nuts and washers from cylinder head upper side. Remove the cylinder head.



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

Caution

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

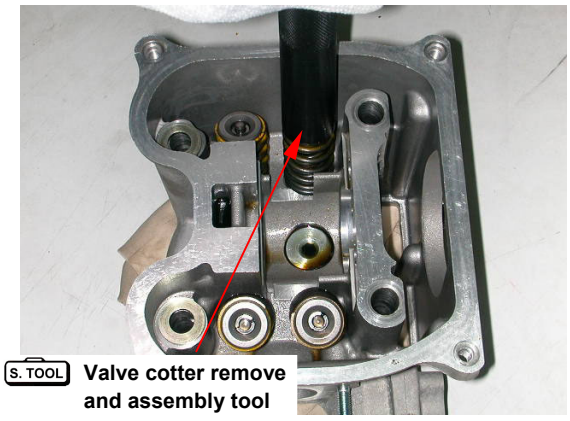


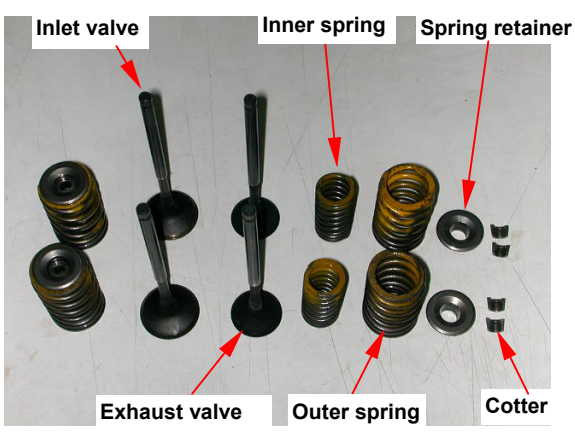
Use a valve cotter remove & assembly tool to press the valve spring, and then remove valves.

Caution

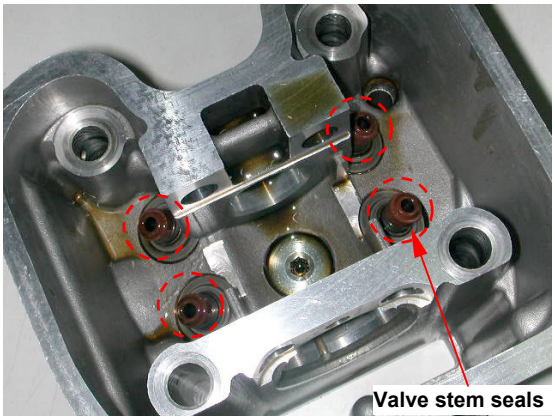
- In order to avoid loosing spring elasticity, do not press the spring too much. Thus, press length is based on the valve cotter in which can be removed.

Special Service Tool:
Tool no: SYM-1471110/20-4v
TOOL number: valve cotter remove & assembly tool





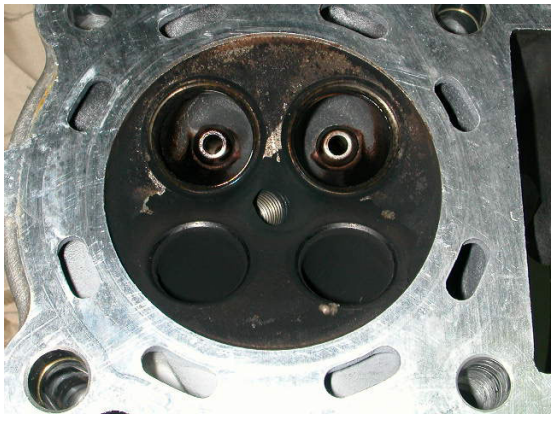
Remove the valve stem seals.



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

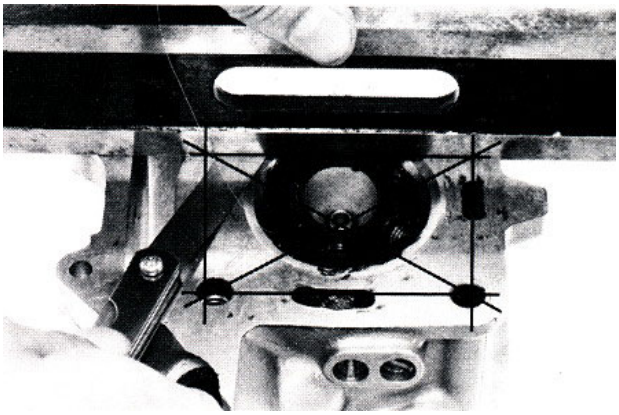
⚠ Caution

Do not damage the matching surface of cylinder head.

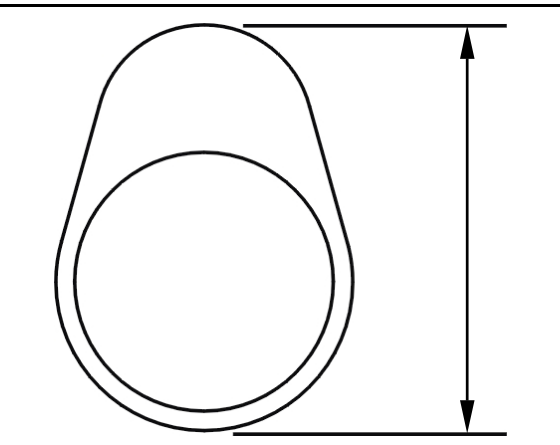


Cylinder Head Inspection

Check if spark plug and valve holes are cracked. Measure cylinder head warp with a straightedge and thickness gauge.
Service limit: 0.05 mm

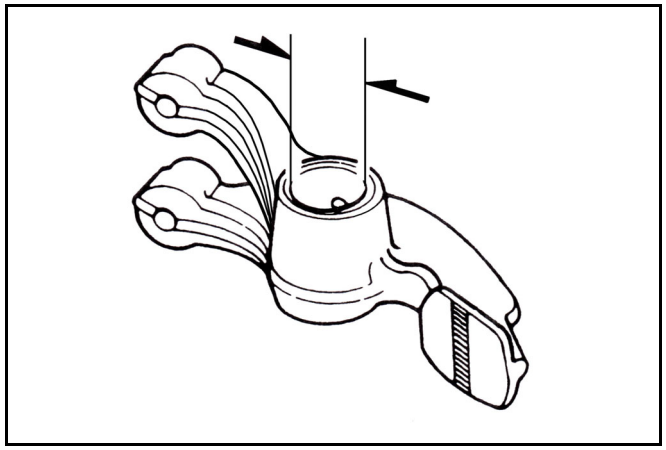


Camshaft
Inspect cam lobe height for damaged.
Service Limit:
IN: Replacement when less than 34.860mm
EX: Replacement when less than 34.725mm
Inspect the camshaft bearing for looseness or wear out. If any damage, replace whole set of camshaft and bearing.



Rocker Arm

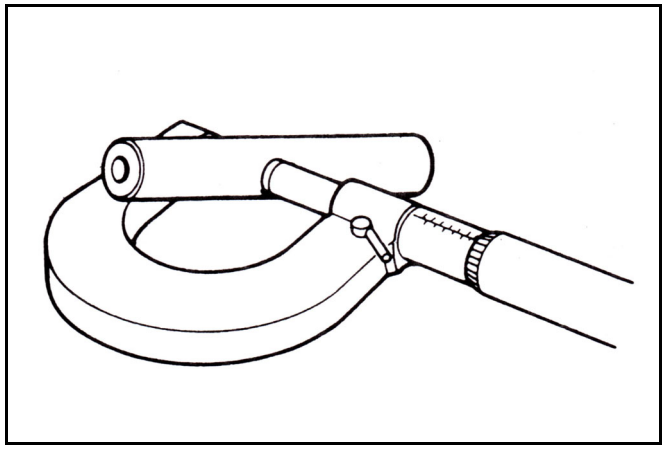
Measure the cam rocker arm I.D., and wear or damage, oil hole clogged?
Service Limit: Replace when it is less than 12.080 mm.



Rocker Arm Shaft

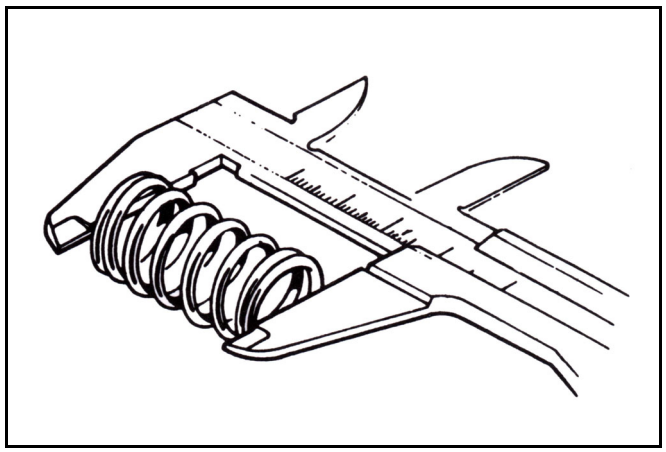
Measure the active O.D. of the cam rocker arm shaft and cam rocker arm.
Service Limit: Replace when it is less than 11.936 mm.

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



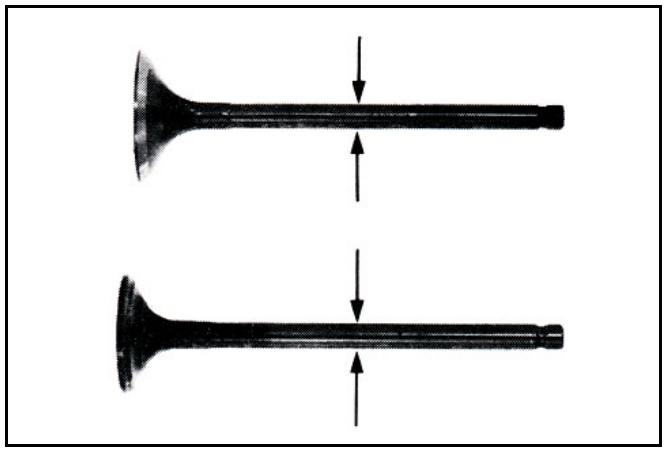
Valve spring free length

Measure the free length of intake and exhaust valve springs.
Service limit:
Inner spring 35.20 mm
Outer spring 36.90 mm



Valve stem

Check if valve stems are bend, crack or burn.
Check the operation condition of valve stem in valve guide, and measure & record the valve stem outer diameter.
Service Limit: IN: 4.90 mm
EX: 4.90 mm

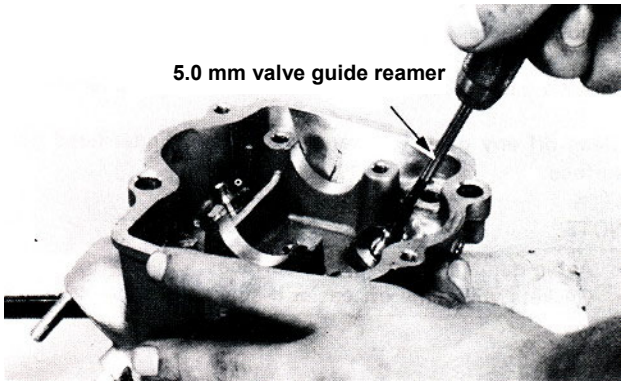


Valve guide

⚠ Caution

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

Tool: 5.0 mm valve guide reamer

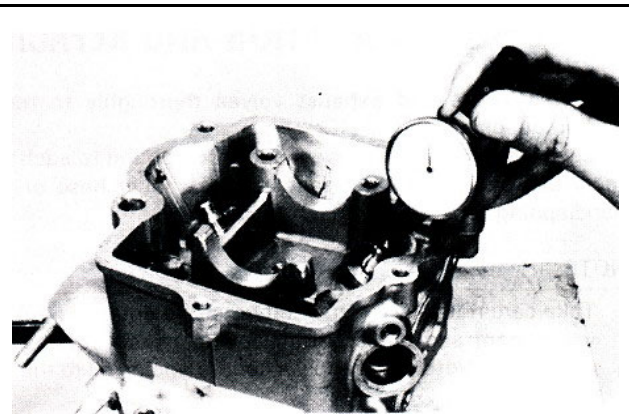


Measure and record each valve guide inner diameters.

Service limit: 5.03 mm

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

Service Limit: IN→0.08 mm
EX→0.10 mm



⚠ Caution

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

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

⚠ Caution

It has to correct valve seat when replacing valve guide.

Valve Stem Replacement

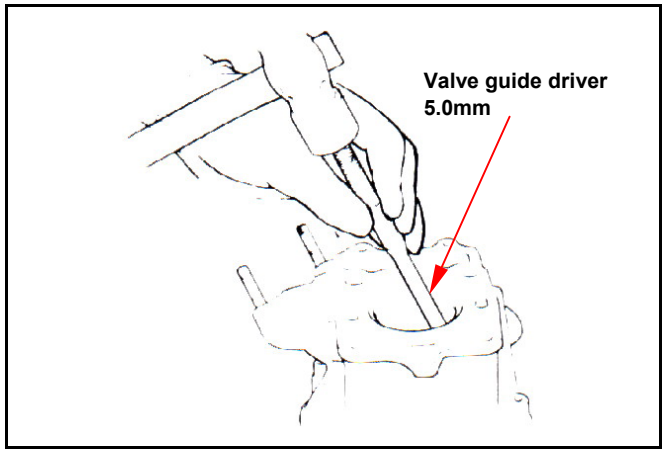
Heat up cylinder head to 100~150 ℃ with heated plate or toaster.

⚠ Caution

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

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

Tool: Valve guide driver: 5.0 mm



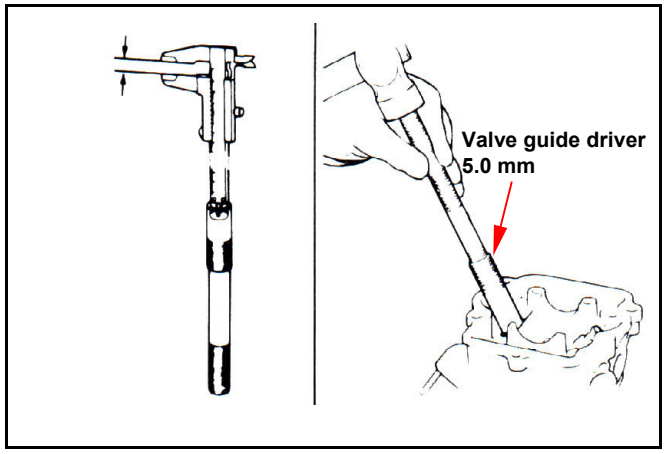
⚠ Caution

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

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

Press in new valve guide from rocker arm side.

Tool: Valve guide driver: 5.0 mm



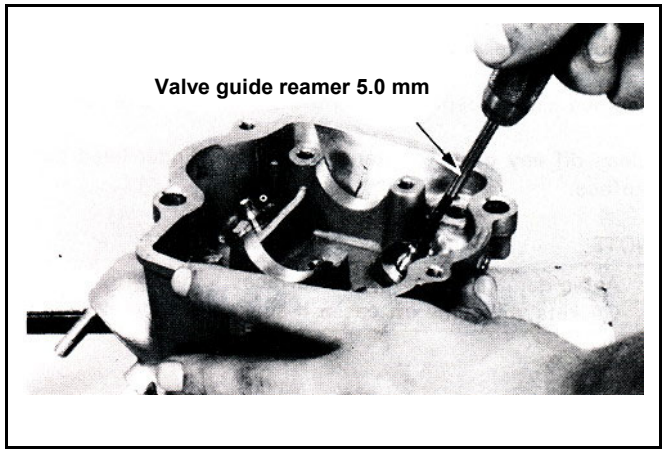
Wait for the cylinder head cooling down to room temperature, and then correct the new valve guide with reamer.

⚠ Caution

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

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

Tool: Valve guide reamer: 5.0 mm



Valve Seat Inspection and Service

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

⚠ Caution

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

Remove the valve and check its contact face.

⚠ Caution

Replace the valve with new one if valve seal is roughness, wear out, or incomplete contacted with valve seat.

Valve seat inspection

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

Valve seat width

Service limit: 1.6mm

Check the contact condition of valve seat.

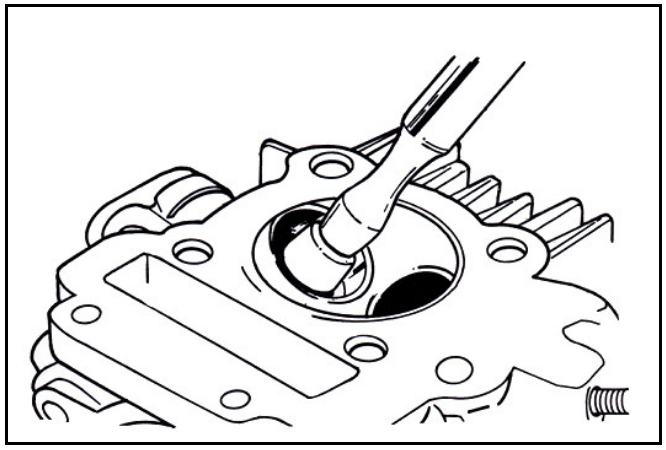
Valve seat grinding

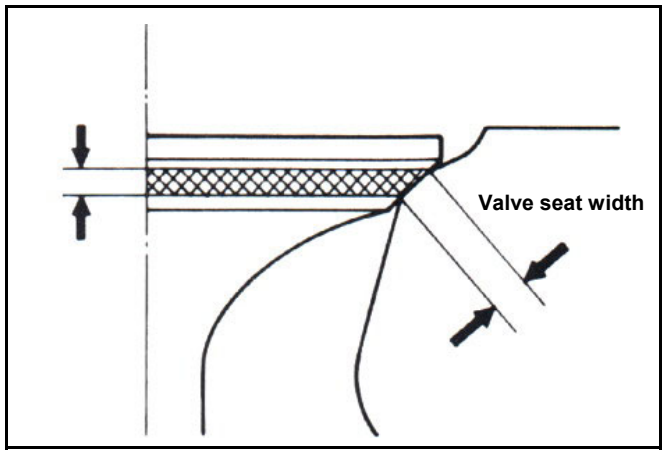
The worn valve seat has to be ground with valve seat chamfer cutter.
Refer to operation manual of the valve seat chamfer cutter.
Use 45° valve seat chamfer cutter to cut any rough or uneven surface from valve seat.

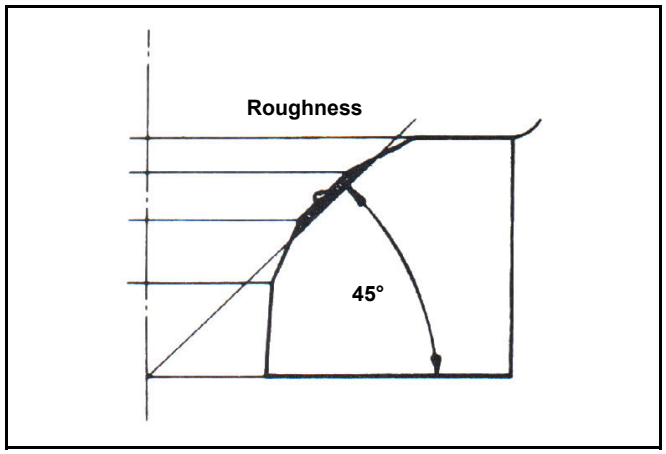
⚠ Caution

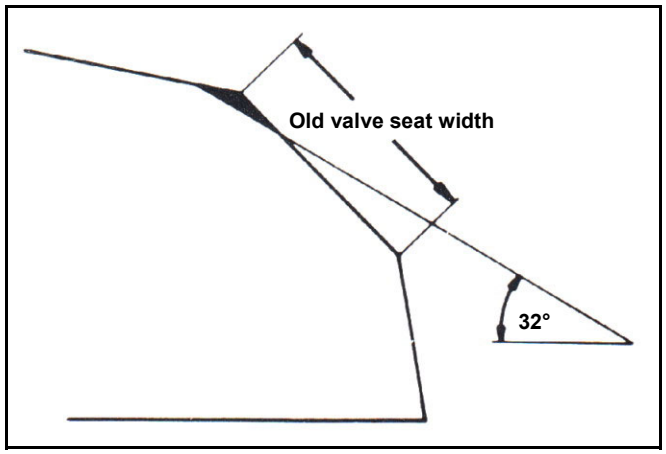
After valve guide had been replaced, it has to be ground with 45° valve seal chamfer cutter to correct its seat face.

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

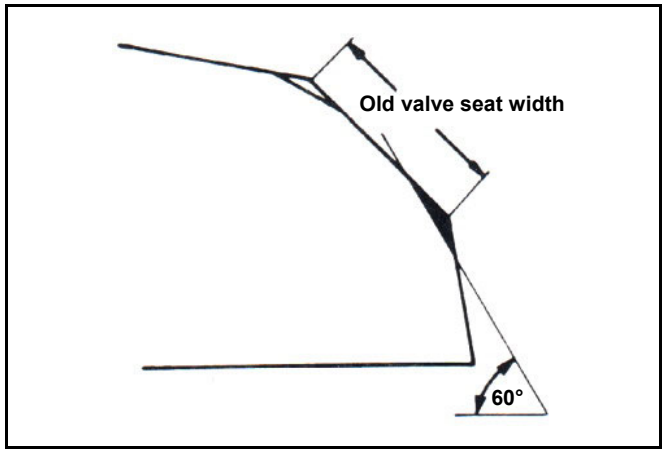








Use 60° cutter to cut a quarter lower parts out.
Remove the cutter and check new valve seat.

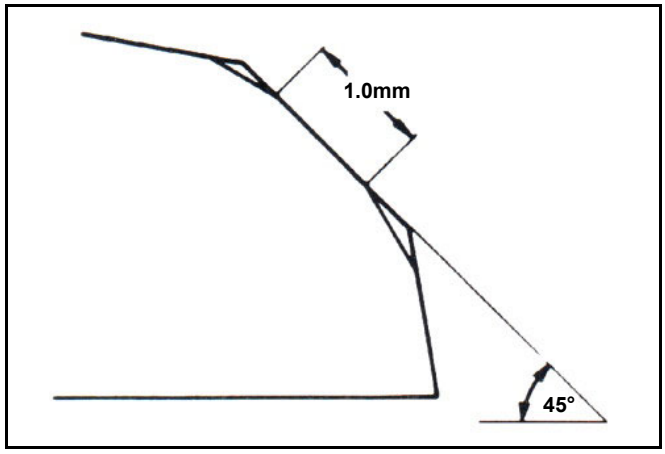


Use 45° cutter to grind the valve seat to specified width.

⚠ Caution

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

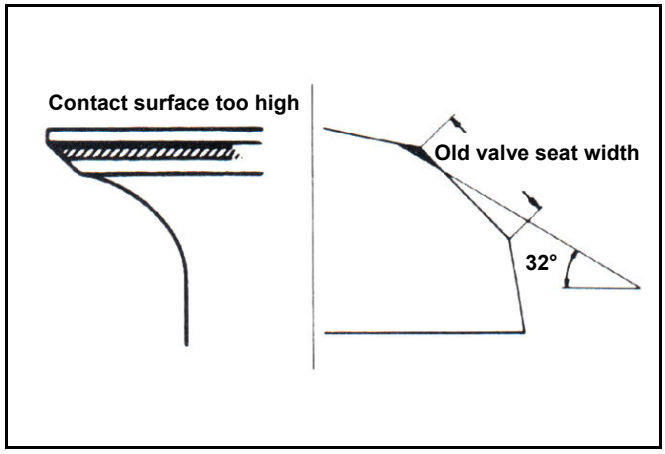
Grind valve seat again if necessary.



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

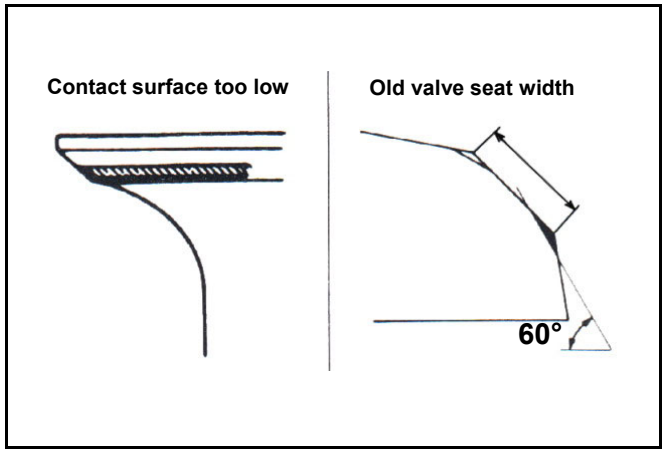
⚠ Caution

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

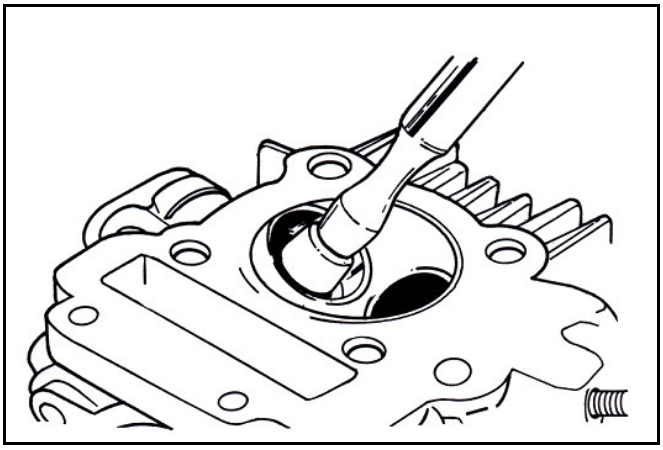


If the contact surface is too high, grind the valve seat with 32° cutter.
Then, grind the valve seat to specified width.

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



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

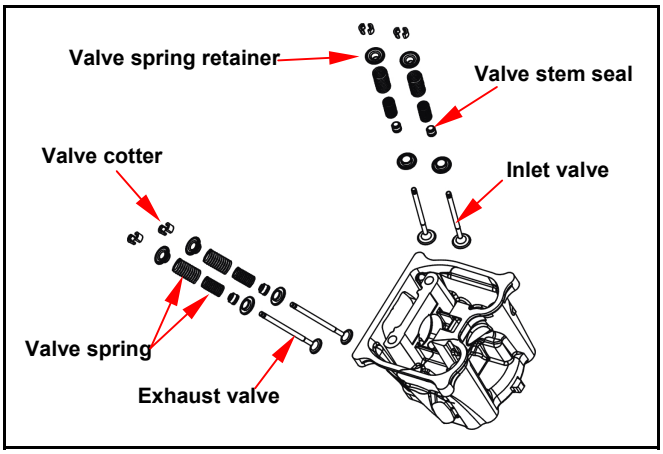


Cylinder Head Reassembly

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

⚠ Caution

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

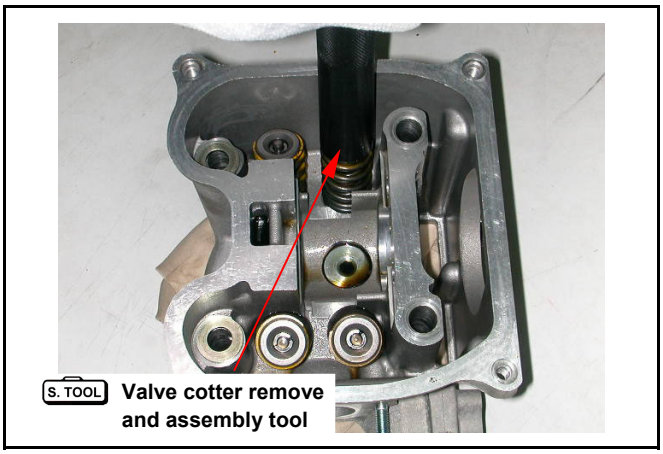


Use a valve cotter remove & assembly tool to press the valve spring, and then remove the valves.

⚠ Caution

To avoid damaging the valve stem and the cylinder head, in the combustion chamber place a rag between the valve spring remover/installer as compressing the valve spring directly.

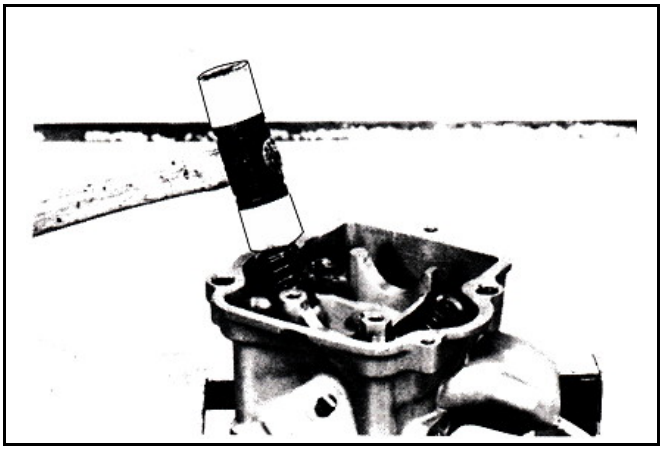
Special Service Tool:
Valve cotter remove & assembly tool



Tap the valve stems gently with a plastic hammer to make sure valve retainer and valve cotter is settled.

⚠ Caution

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

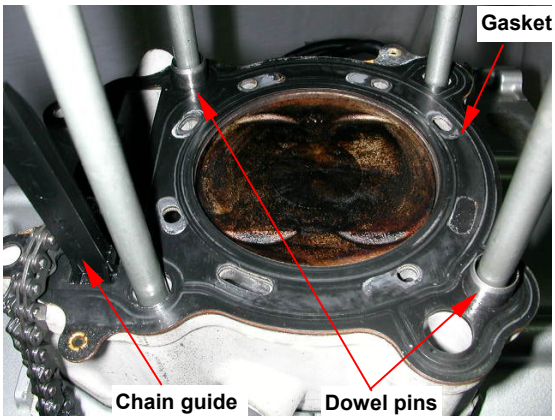


Cylinder Head Installation

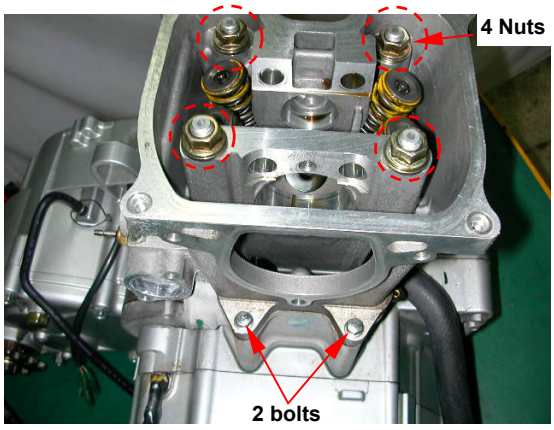
Clean up all residues and foreign materials onto the matching surfaces of both cylinder and cylinder head.
Install chain guide, dowel pins and a new cylinder head gasket onto the cylinder.

⚠ Caution

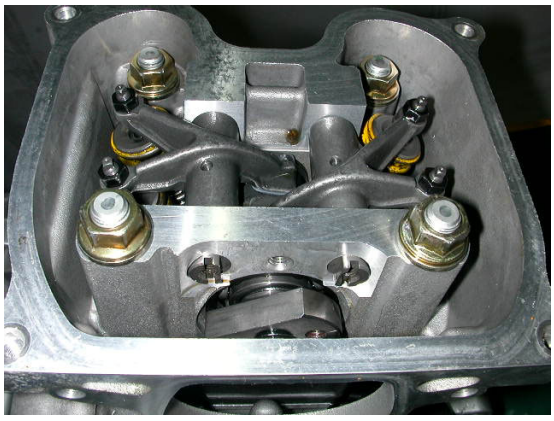
Do not damage the matching surfaces of cylinder and cylinder head.
Prevent the residues of gasket or foreign materials falling into crankcase as cleaning.



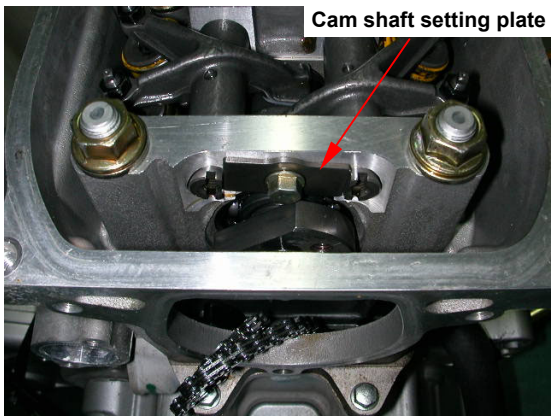
Install 4 washers and tighten 4 nuts on the cylinder head upper side, and then tighten 2 cylinder head mounting bolts of cylinder head right side.
Torque value:
Nut 3.6~4.0kgf-m
Bolt 1.0~1.4kgf-m



Install camshaft into cylinder head, and install rocker arm, rocker arm shaft.



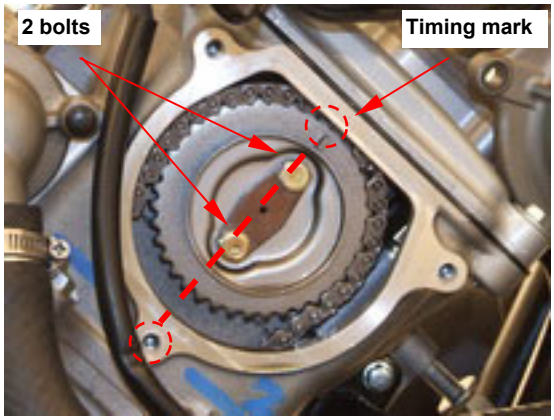
Install rocker arm pin mounting plate.



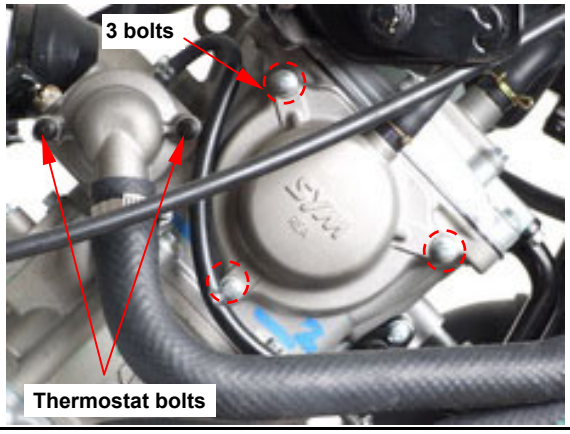
Install cam chain on to sprocket and align the timing mark on the sprocket with the two sprocket bolt holes and the lower bolt hole of the cylinder side cover.
Align sprocket bolt hole with camshaft bolt hole.
Tighten the sprocket mounting bolts.

⚠ Caution

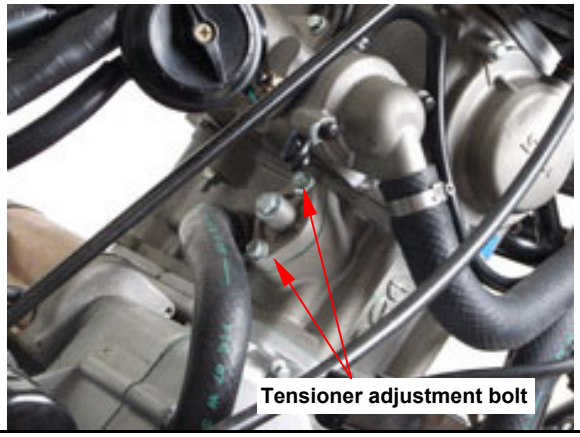
Make sure timing marks are matched.



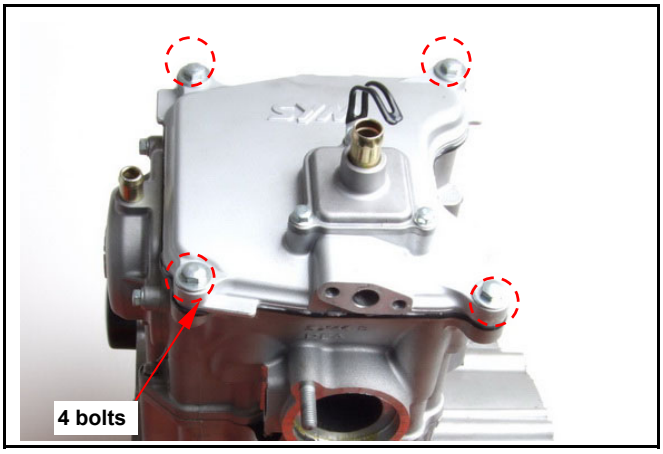
Install the cylinder head side cover (3 bolts).
Install the thermostat (2 bolts).



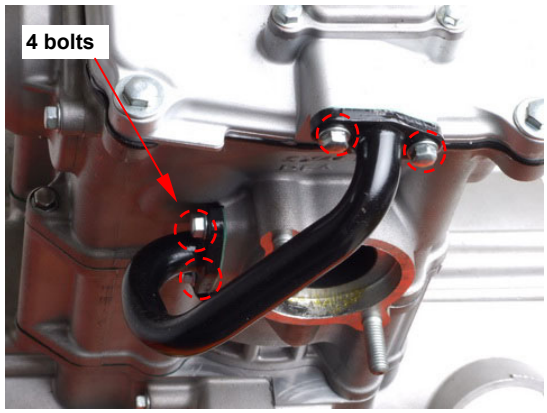
Loosen auto tensioner adjustment bolt and remove bolt and spring.
Install tensioner and install spring and adjustment bolt.



Install cylinder head cover (4 bolts).



Install Air Injection system (AI) pipe. (4 bolts)
Install inlet pipe onto cylinder
Install and tighten spark plug
Torque value: 1.0~2.0kgf-m



⚠ Caution

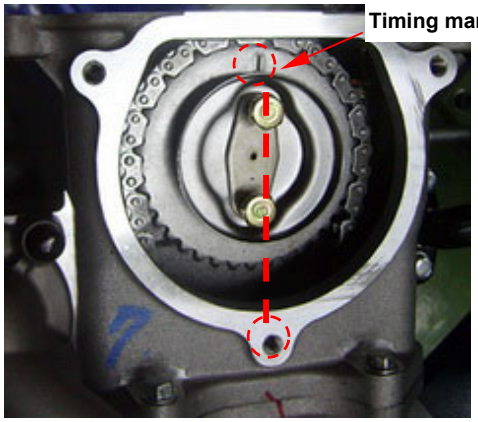
This model is equipped with more precision 4-valve mechanism so its tighten torque can not be exceeded standard value in order to avoid causing cylinder head deformation, engine noise and leaking so that vehicle performance be affected.

Install the engine onto frame (refer chapter 5).

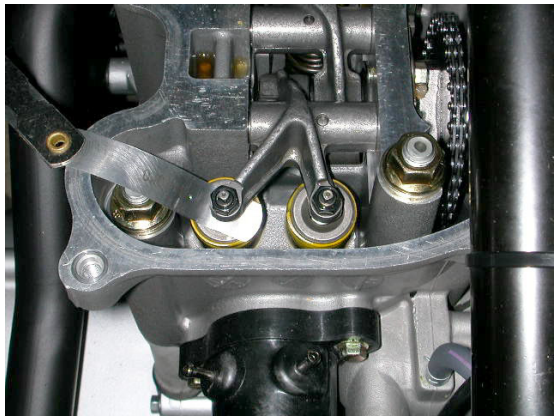
Valve Clearance Adjustment

Loosen Air Injection system (AI) pipe upper side bolt (2 bolts).
Remove the cylinder head cover.

Remove the cylinder head side cover.
Remove left crankcase cover, and turn the drive face, and align the timing mark on the cam sprocket with that of cylinder head, piston is at TDC position.



Loosen valve clearance adjustment nuts and bolts located on valve rocker arm.
Measure and adjust valve clearance with feeler gauge.
After valve clearance had been adjusted to standard value, hold adjustment bolt and then tighten the Adjustment nut.
Standard Value: IN 0.10 ± 0.02 mm
EX 0.15 ± 0.02 mm
Install the cylinder head side cover.
Start the engine and make sure that engine oil flows onto the cylinder head.
Stop the engine after confirmed, and then install the cylinder head cover and AI pipe.

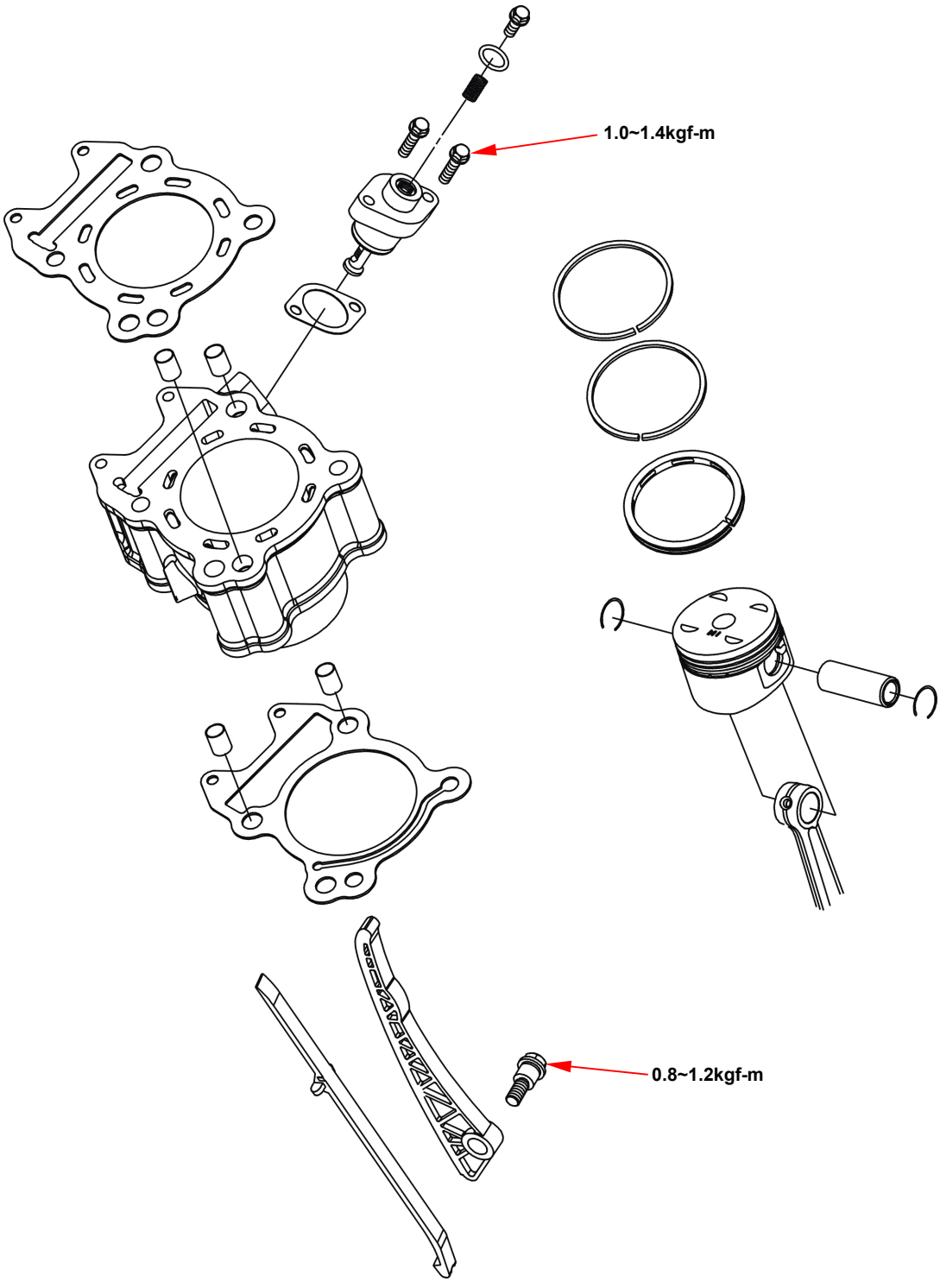


⚠ Caution

- If lubricant does not flow to cylinder head, engine components will be worn out seriously. Thus, it must be confirmed.
- When checking lubricant flowing condition, run the engine at idle speed. Do not accelerate engine speed.

Notes:

Mechanism Diagram



Precautions in Operation

General Information

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

UA25A

Specification **Unit：mm**

Item			Standard	Limit
Cylinder	ID		92.00	92.100
	Bend		-	0.050
Piston/ Piston ring	Clearance between piston rings	Top ring	0.015~0.050	0.090
		2nd ring	0.015~0.050	0.090
	Ring-end gap	Top ring	0.150~0.300	0.500
		2nd ring	0.300~0.450	0.650
		Oil ring side rail	0.200~0.700	-
	OD of piston (2nd)		74.430~75.480	75.380
	Clearance between piston and cylinder		0.010~0.040	0.100
	ID of piston pin boss		17.002~17.008	17.020
OD of piston pin			16.994~17.000	16.960
Clearance between piston and piston pin			0.002~0.014	0.020
ID of connecting rod small-end			17.016~17.034	17.064

Trouble Diagnosis

Low or Unstable Compression Pressure

- Cylinder or piston ring worn out

Smoking in Exhaust Pipe

- Piston or piston ring worn out
- Piston ring installation improperly
- Cylinder or piston damage

Knock or Noise

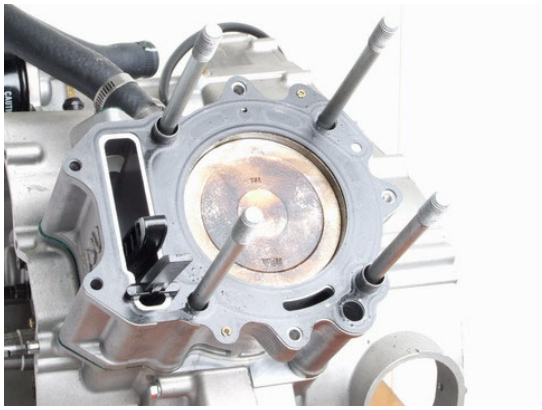
- Cylinder or piston ring worn out
- Carbon deposits on cylinder head top-side
- Piston pin hole and piston pin wear out

Engine Overheat

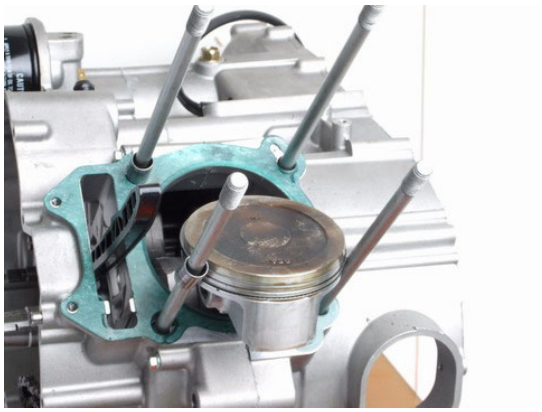
- Carbon deposits on cylinder head top side
- Cooling pipe clogged or not enough in coolant flow

Cylinder and Piston Removal

Remove the cylinder head (refer to chapter 6).
Remove the coolant hose from cylinder.
Remove the cylinder.



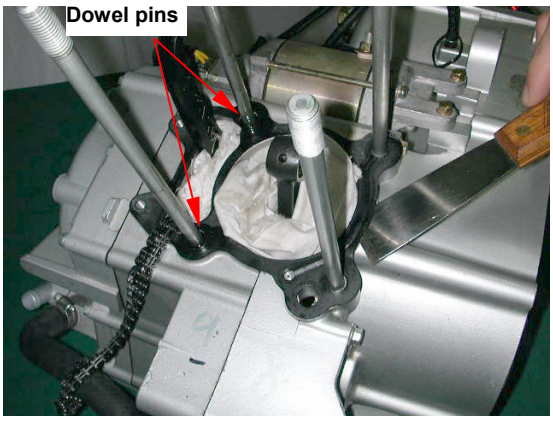
Cover the holes of crankcase and cam chain with a piece of cloth to prevent foreign material falling into the crankcase.
Remove the piston pin clip, and then remove the piston pin and piston.



Remove the cylinder gasket and dowel pin.
Clean up all residues or foreign materials from the two contact surfaces of cylinder and crankcase.

⚠ Caution

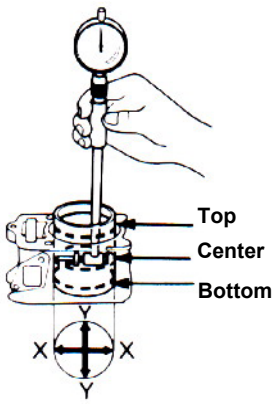
- Wet the residues by solvent so that the residues can be removed more easily.



Inspection

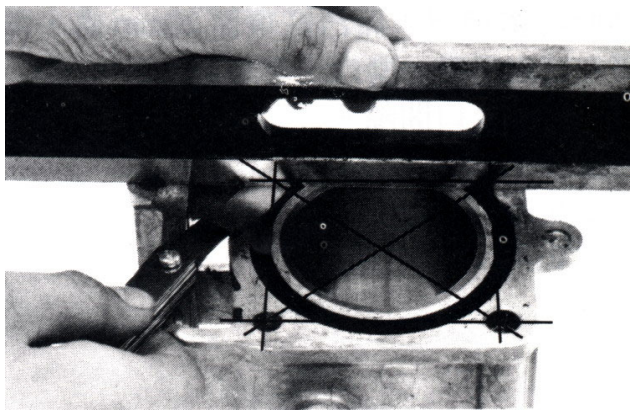
Check if the inner diameter of cylinder is worn out or damaged.
In the 3 positions, top, center and bottom, of cylinder, measure the X and Y values respective in the cylinder.

Service limit: 75.100 mm



Check cylinder if warp.

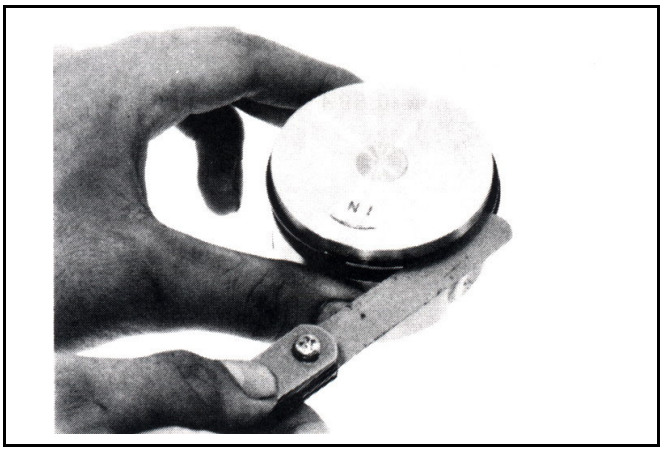
Service limit: 0.05 mm



Measure the clearance between piston rings and grooves.

Service Limit: Top ring: 0.09 mm

2nd ring: 0.09 mm

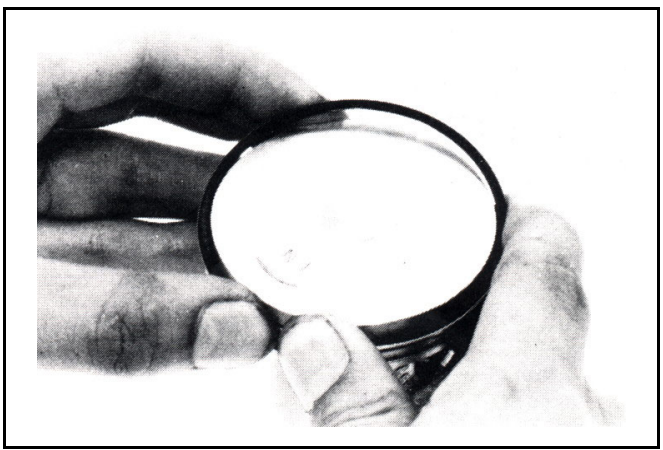


Remove piston rings

Check if the piston rings are damaged or its grooves are worn.

⚠ Caution

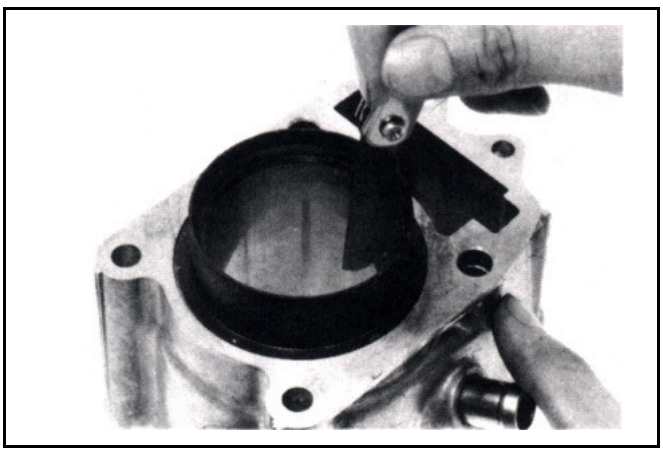
Pay attention to remove piston rings because they are fragile.



Place piston rings respective into cylinder below 20 mm of cylinder top. In order to keep the piston rings in horizontal level in cylinder, push the rings with piston.

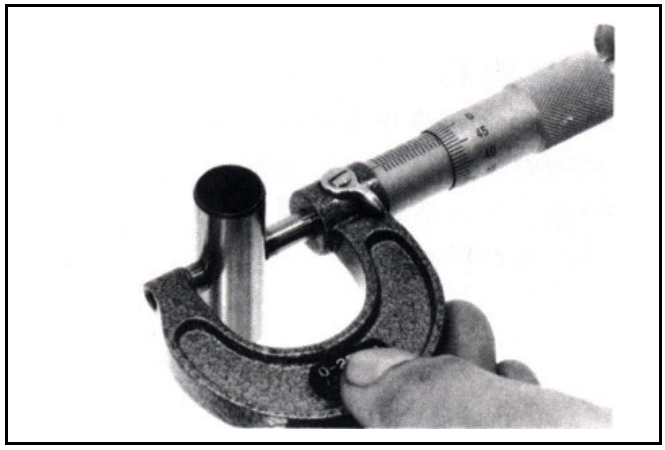
Service Limit: Top ring: 0.50 mm

2nd ring: 0.65 mm



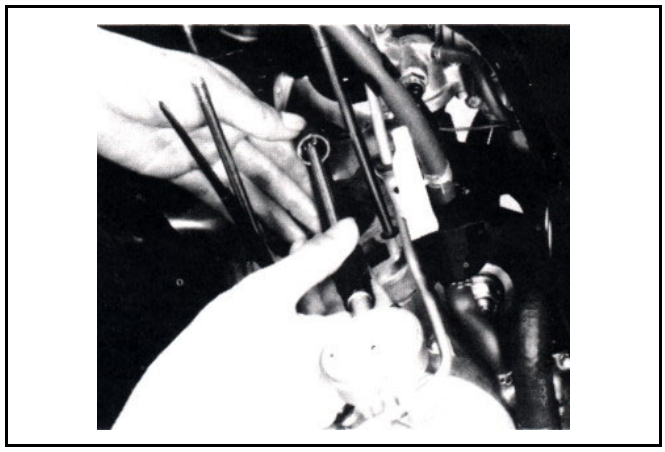
Measure the outer diameter of piston pin.

Service Limit: 16.96 mm



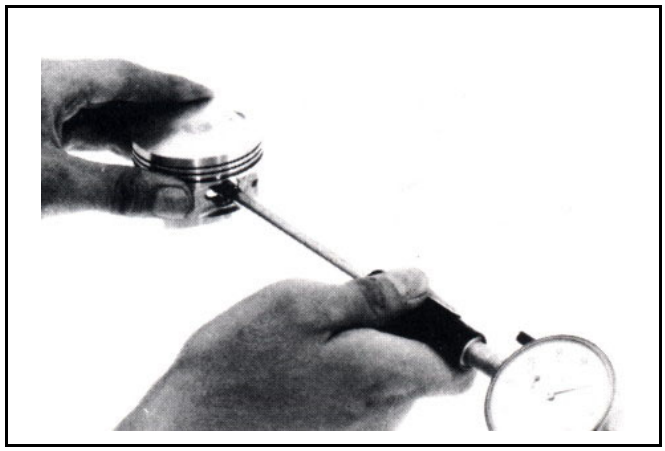
Measure the inner diameter of connecting rod small end.

Service Limit: 17.064 mm



Measure the inner diameter of piston pin hole.
Service Limit: **17.02 mm**
Calculate clearance between piston pin and its hole.

Service Limit: **0.02 mm**



Measure the piston outer diameter.

⚠ Caution

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

Service limit : 75.380 mm

Compare measured value with service limit to calculate the clearance between piston and cylinder.

Piston Ring Installation

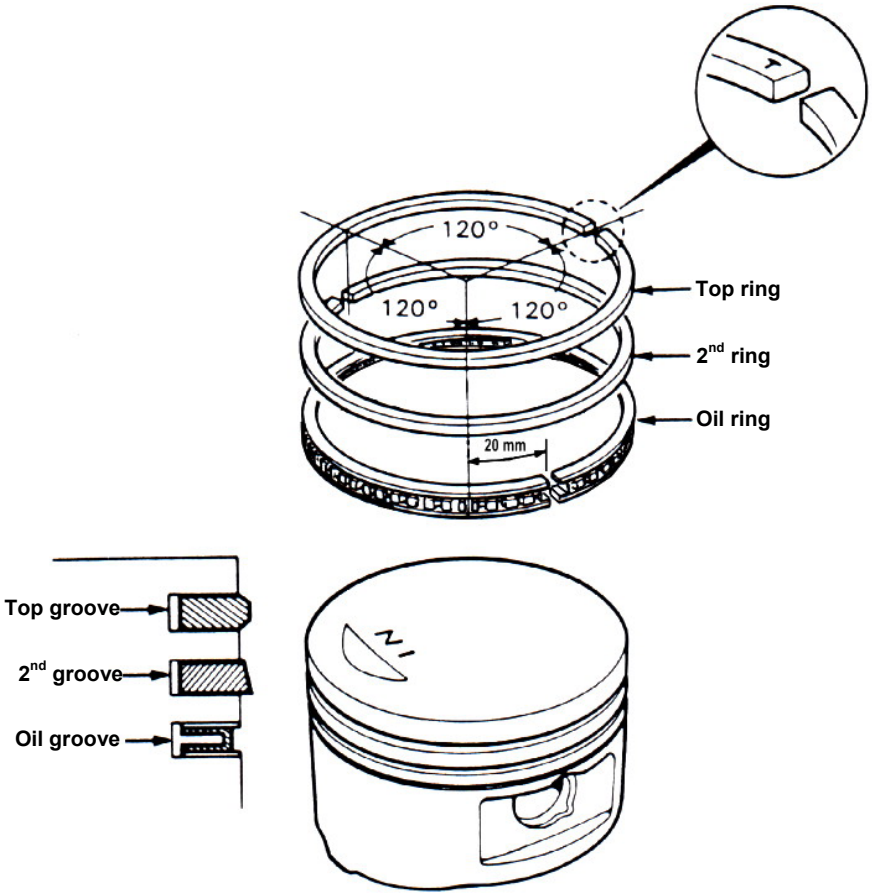
Clean up piston top, ring groove, and piston surface.

Install the piston ring onto piston carefully.

Place the openings of piston ring as diagram shown.

⚠ Caution

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



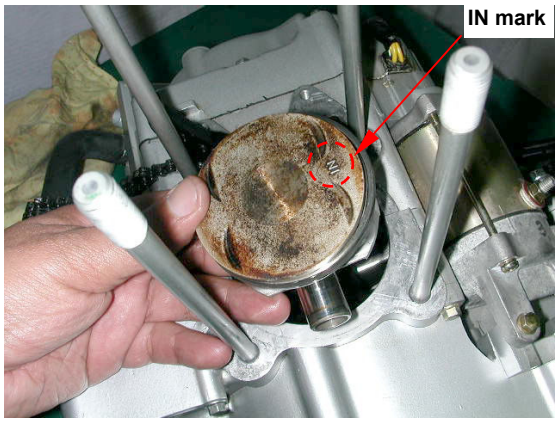
Clean up all residues and foreign materials on the contact surface of crankcase. Pay attention to not let these residues and foreign materials fall into crankcase.

⚠ Caution

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

Piston Installation

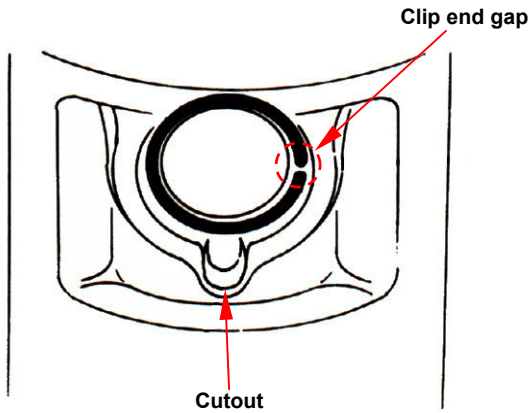
Install the piston and piston pin, and place the IN marks on the piston topside forward to inlet valve.



Install new piston pin clip.

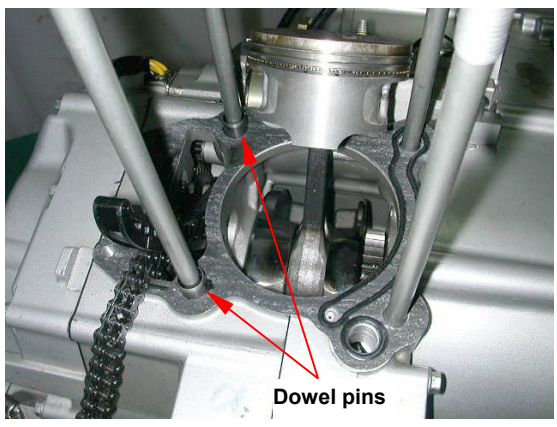
⚠ Caution

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



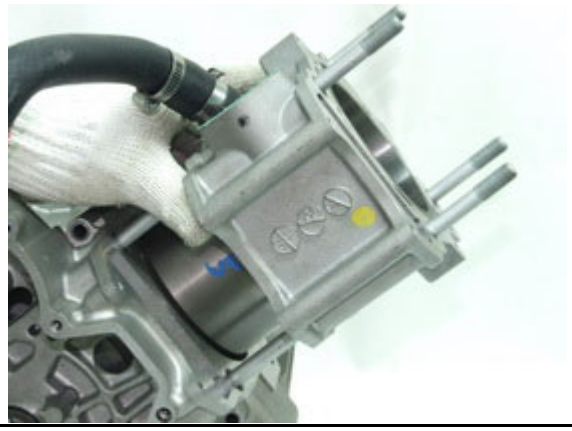
Cylinder Installation

Install dowel pins and new gasket.



Coat some engine oil to inside of cylinder, piston and piston rings.

Care to be taken when installing piston into cylinder. Press piston rings in one by one as installation.

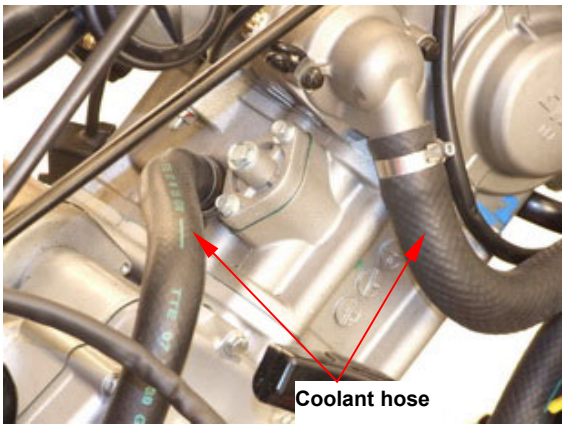


⚠ Caution

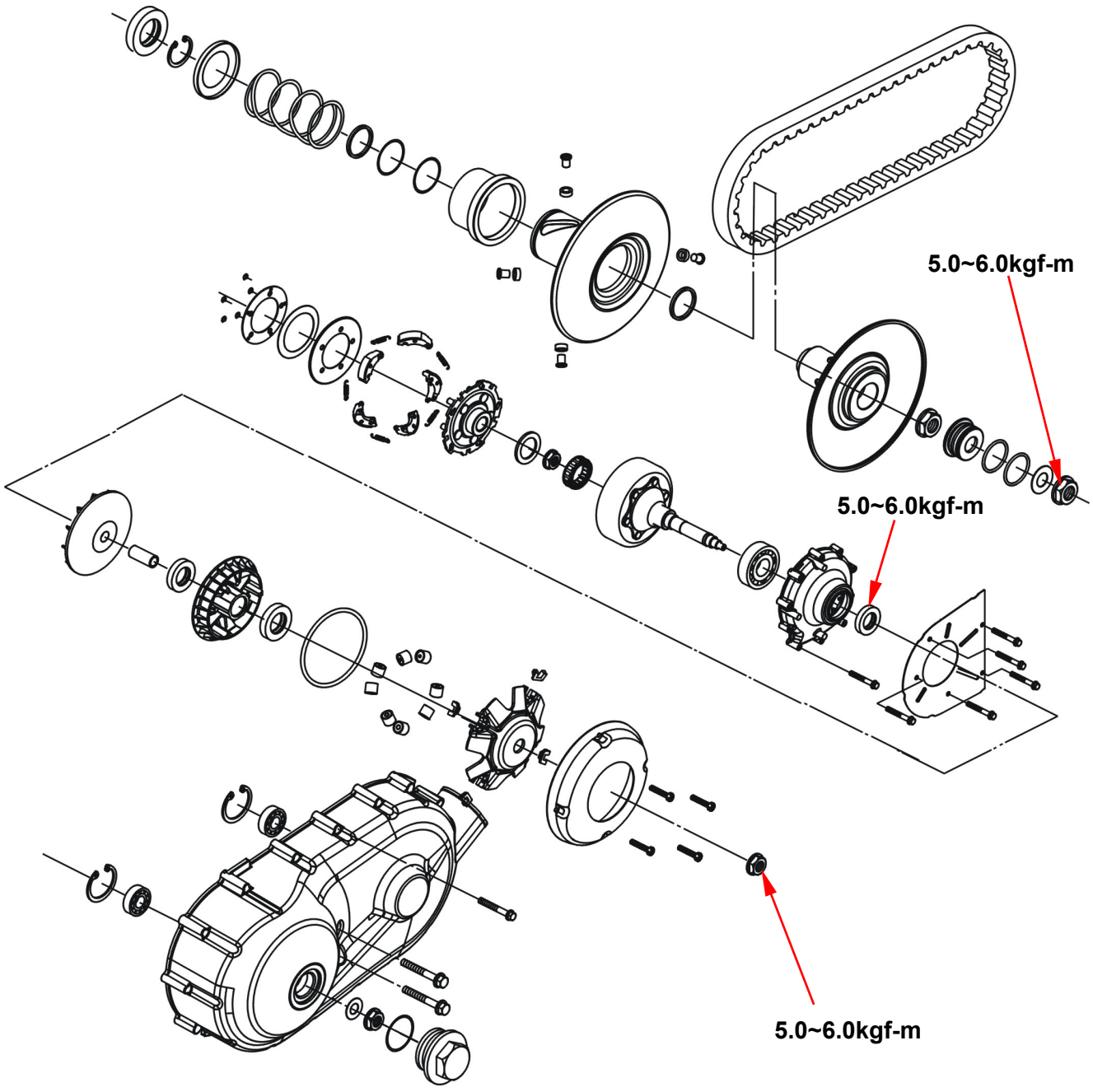
Do not push piston into cylinder forcefully because piston and piston rings will be damaged. ◦

Install coolant hose onto cylinder.

Install cylinder head (refer to Chapter 6).



Mechanism Diagram



Maintenance Description

Precautions in Operation

General Information

- Drive face, clutch outer, and driven pulley can be serviced on the vehicle.
- Drive belt and drive pulley must be free of any grease.

Specification

Item	Standard value	Limit
Driving belt width	30.700 mm	29.200 mm
OD of movable drive face boss	35.970~35.990 mm	35.950 mm
ID of movable drive face	36.010~36.035 mm	36.055 mm
OD of weight roller	29.992~30.008 mm	29.950 mm
ID of clutch outer	140.000~140.200 mm	140.500 mm
Thickness of clutch weight	6.000 mm	3.000 mm
Free length of driven pulley spring	124.5 mm	119.500 mm
OD of driven pulley boss	40.965~40.985 mm	40.945 mm
ID of driven face	41.000~41.050 mm	41.070 mm
Weight of weight roller	19.700~20.300 g	19.200 g

Torque value

- Drive face nut: 8.5~10.5kgf-m
- Clutch outer nut: 5.0~6.0kgf-m
- Drive plate nut: 5.0~6.0kgf-m

Special Service Tools

Clutch spring compressor: SYM-2301000
Inner bearing puller: SYM-6204002
Clutch nut wrench 39 x 41 mm: SYM-9020200
Universal holder: SYM-2210100
Bearing driver: SYM-9100100

Trouble Diagnosis

Engine can be started but vehicle can not move

1. Worn drive Belt
2. Worn drive face
3. Worn or damaged clutch weight
4. Broken driven pulley

Shudder or misfire when driving

1. Broken clutch weight
2. Worn clutch weight

Insufficient horsepower or poor high speed performance

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

Left Crankcase Cover

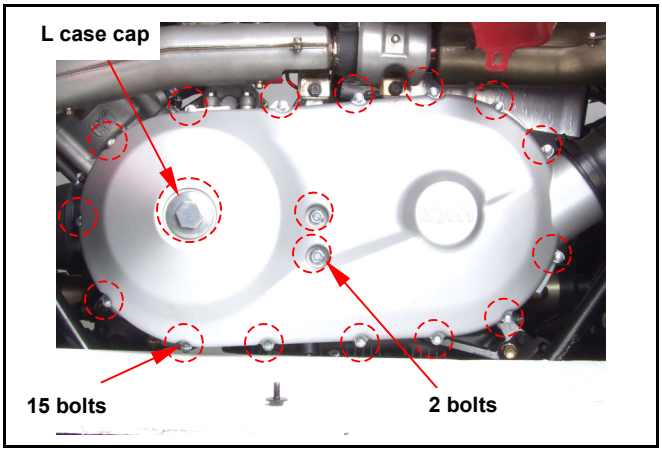
Left crankcase cover removal

Release 2 clamp strips of left crankcase cover ducts, and then remove the ducts.

Remove left crankcase cover cap.

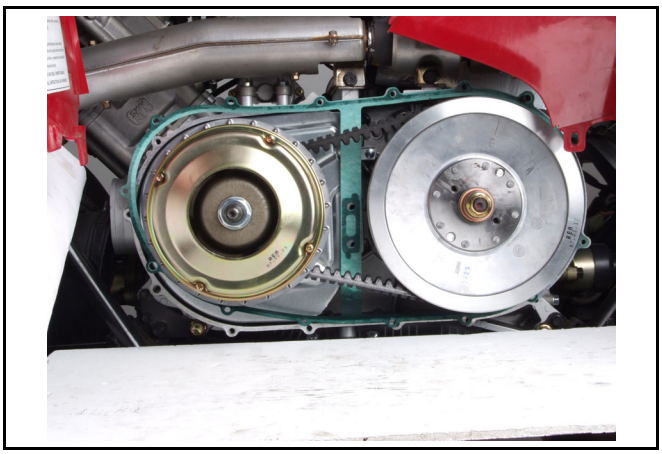
Remove left crankcase cover bolts (17bolts).

Remove 2 dowel pin and gasket.



Left crankcase cover installation

Install left crankcase cover in the reverse procedure of removal.

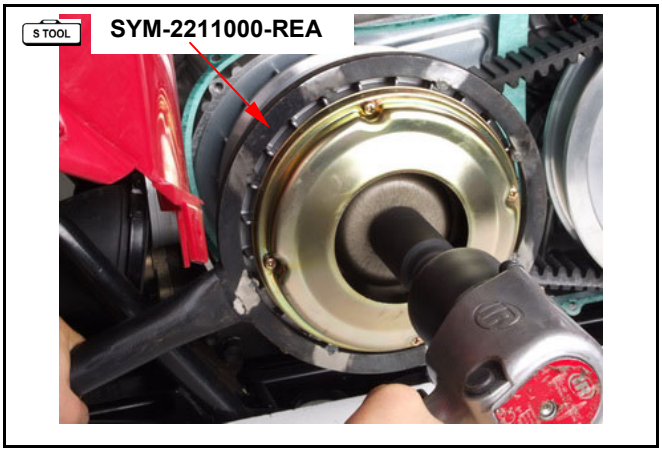


Drive Belt

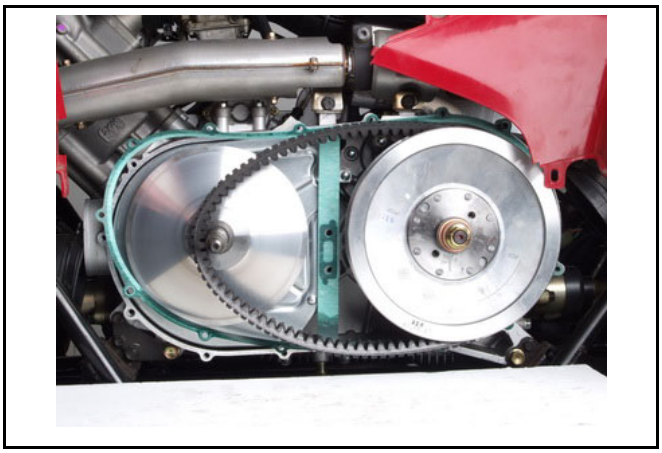
Loosen 1nut from the drive face with Special tool.

Tool name: Movable Drive Face Holder

Tool NO: SYM-2211000-REA



Remove the movable drive face.

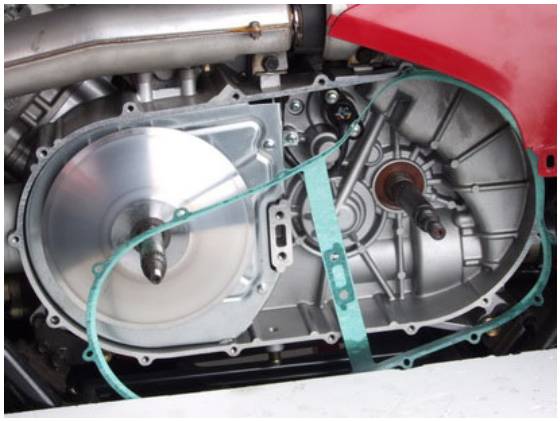


Loosen 1nut from the driven pulley with Special tool.

Tool name: Universal holder

Tool NO: SYM-2210100

Remove the drive pulley and belt.



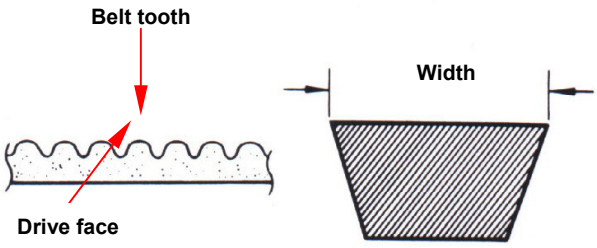
Inspection

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

Measure the width of drive belt as diagram shown.

Service Limit: 29.2 mm

Replace the belt if exceeds the service limit.



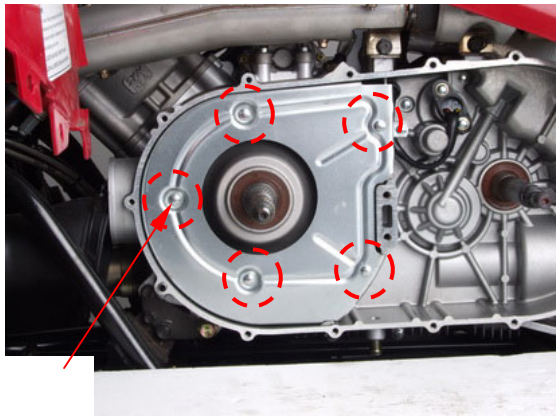
⚠ Caution

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

Drive Plate

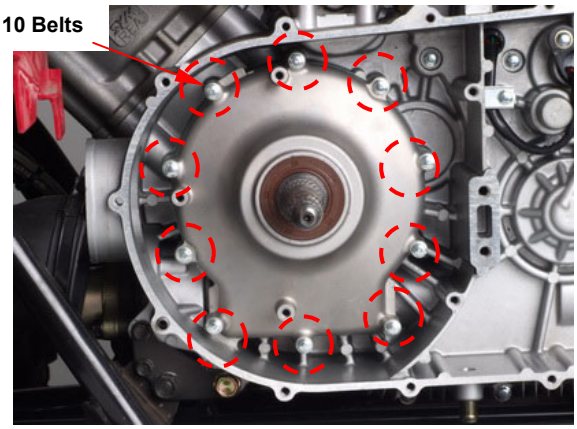
Remove the drive face.

Loosen 5 bolts from the CVT cooling plate then remove it.

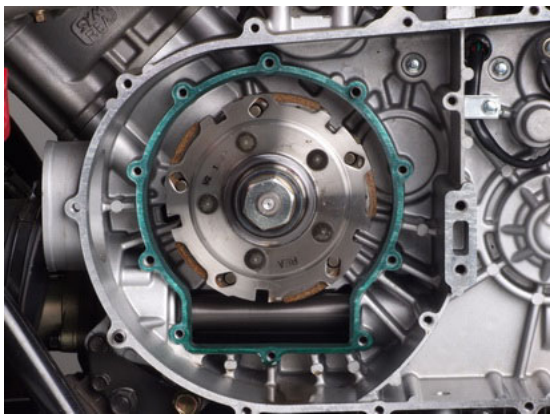


Loosen 10 bolts from the clutch cover.

Remove the clutch cover.



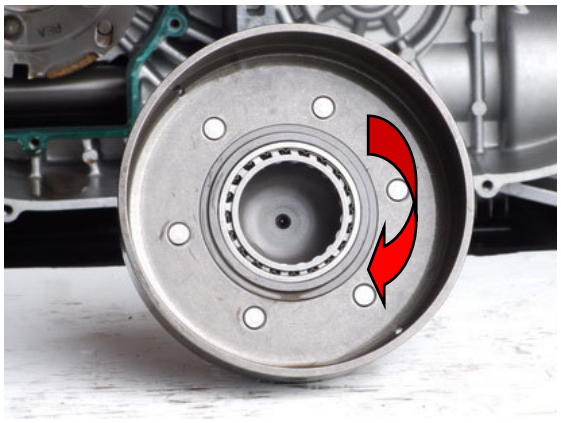
Remove the clutch outer.



One-way Clutch Inspection

Check each roller for wear or damage.

Hold the clutch outer and turning the one way clutch for right side. .



Loosen the drive plate nut with special tool.

Remove the drive plate.

Tool name: drive plate holder

Tool NO: SYM-2230000-REA

Movable Drive Face Disassembly

Loosen 4 bolts form the drive face.

Remove the drive face plate

Remove the drive face plate

Remove the ramp plate and weight roller (8pcs).

Inspection

The weight rollers are to press movable drive face by means of centrifuge force.

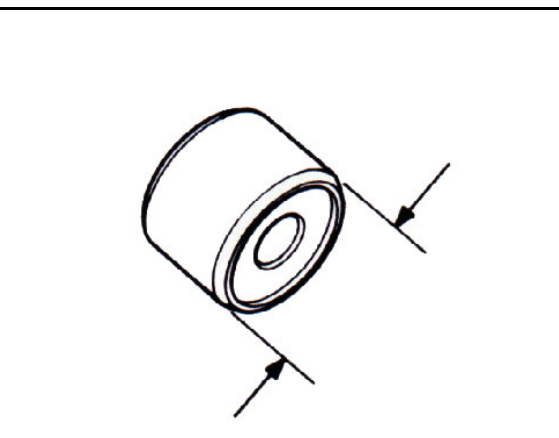
Thus, if weight rollers are worn out or damaged, the centrifuge force will be affected.

Check if rollers are worn out or damaged.

Replace it if necessary.

Measure each roller's outer diameter. Replace it if exceed the service limit.

Service limit: 29.50 mm



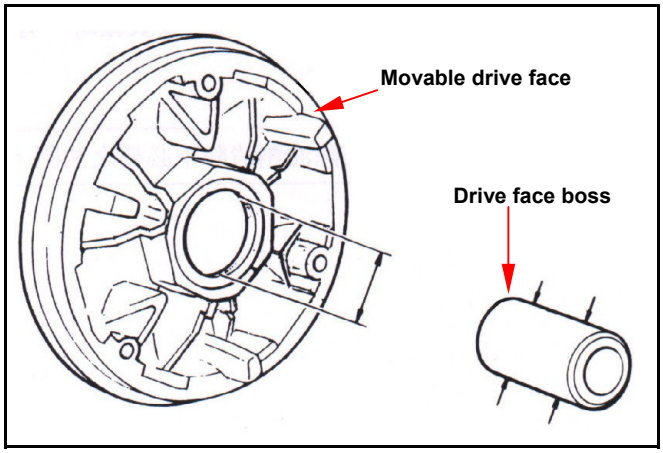
Check if drive face boss is worn or damaged and replace it if necessary.

Measure the outer diameter of movable drive face boss, and replace it if it exceed service limit.

Service limit: 35.950 mm

Measure the inner diameter of movable drive face, and replace it if it exceed service limit.

Service limit: 36.055 mm



Reassembly/installation

Install weight rollers.

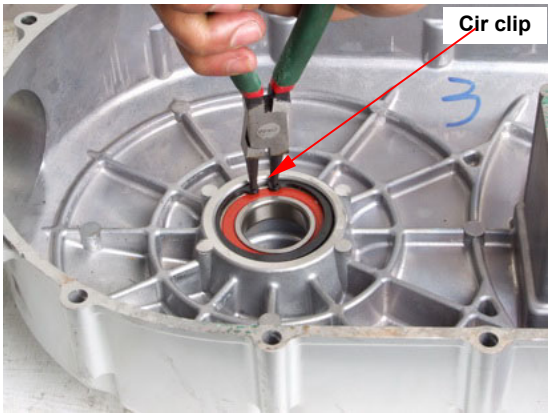
⚠ Caution

The weight roller two end surfaces are not certainly same. In order to lengthen the roller life and prevented exceptionally wears the occurrence, Please end surface of the closure surface counter clockwise assembles onto movable drive face.

Install ramp plate.

Left crankcase cover inspection

Remove cir clip with inner cir clip pliers



Check bearing on left crankcase cover.

Rotate bearing's inner ring with fingers.

Check if bearings can be turned in smooth and silent, and also check if bearing outer ring is mounted on cover tightly.

If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.

Remove the bearing 6302 with inner bearing puller.

Tools number: SYM-6204025

Tools name: INNER BEARING PULLER.

Remove the bearing 6006 with inner bearing puller.

Tools number: SYM-6204025

Tools name: INNER BEARING PULLER.

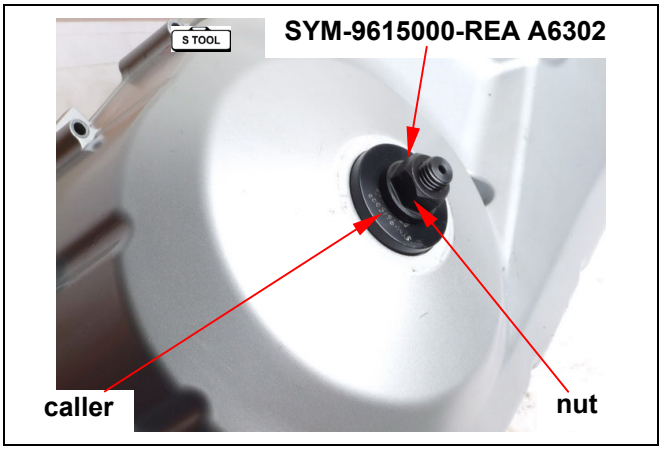
Bearing installation

Install the bearing 6302 with special tool

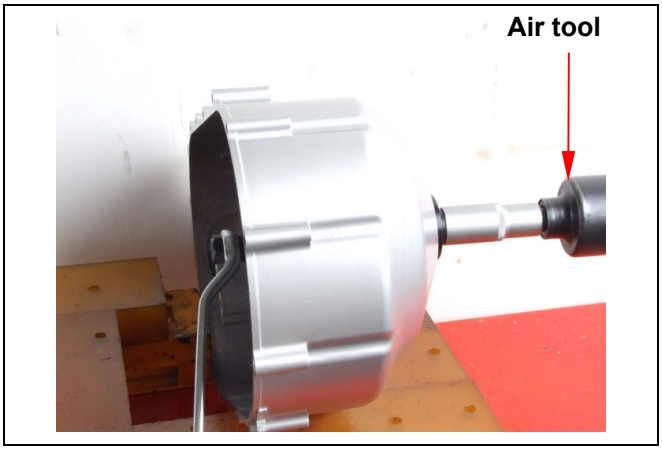
Tool name: L COVER FR BRG. 6302 bearing IN. puller with air

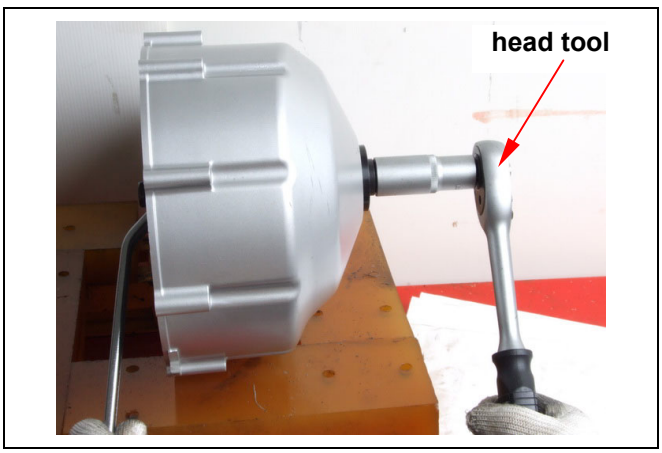
Tool NO. : SYM-9615000-REA A6302

Put the caller and nut.



Install the bearing with air or head tool.





Make sure the bearing code and put the bearing.

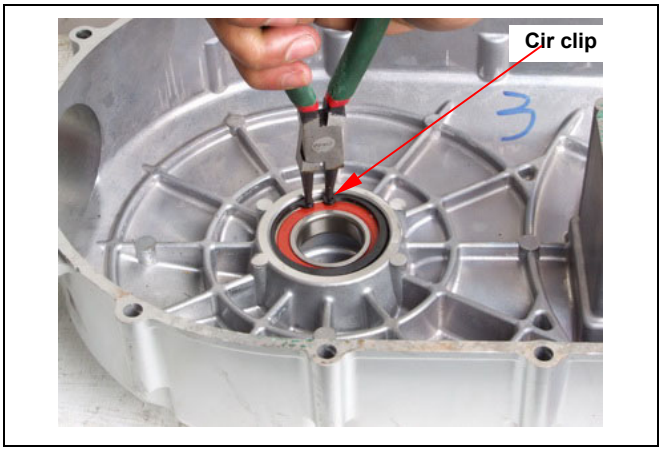
Install the bearing 6006 with special tool

Tool name: L COVER FR BRG. 6006 bearing driver

Tool NO. : SYM-9615010-REA 6006

Knock the bearing to the objected position.

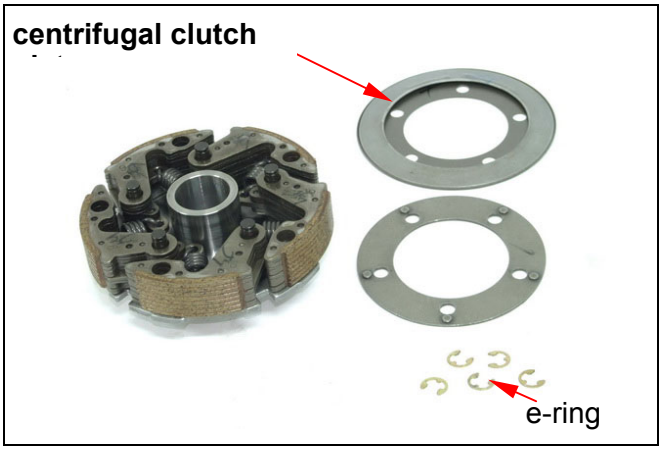
Install the cir clip.



Drive plate Disassembly

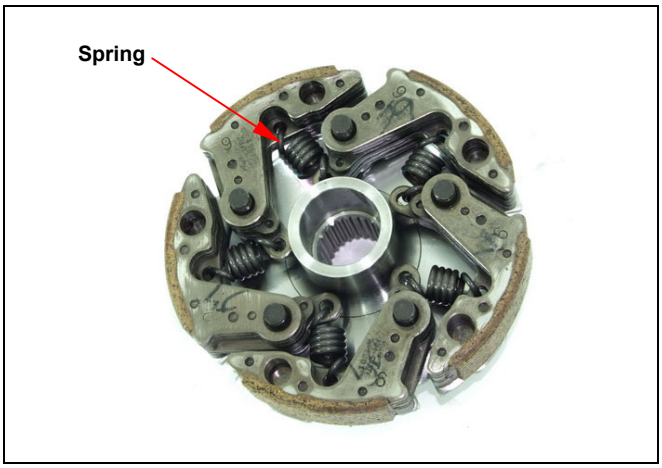
Remove 5 e-ring from drive plate.

Remove the spring plate and centrifugal clutch plate.



Remove 5 springs from the drive plate

Check if spring is damaged or insufficient elasticity.

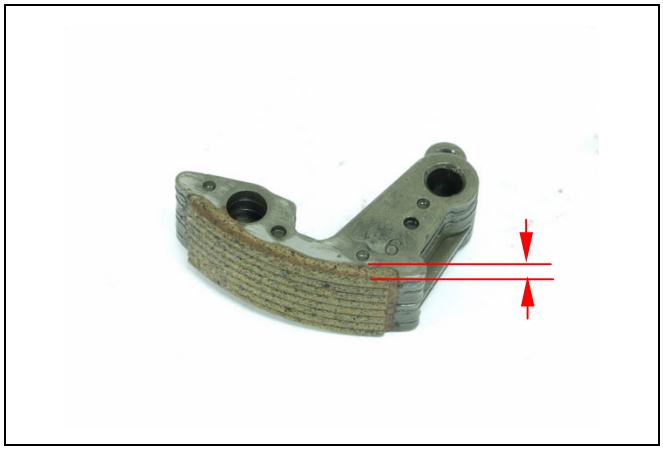


Remove 5 clutch weights.

Check if spring is damaged or insufficient elasticity.

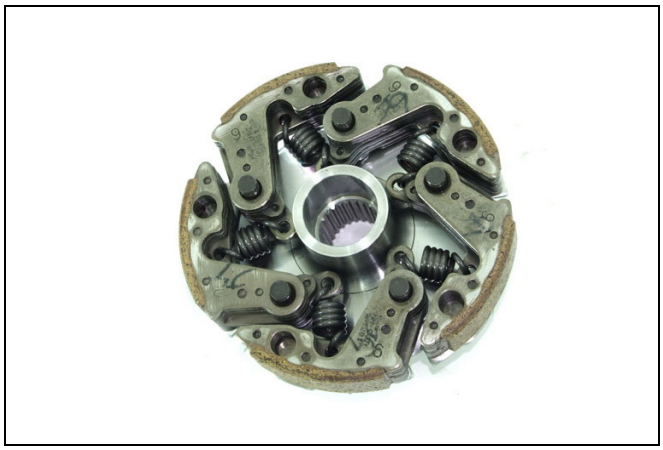
Measure each clutch weight thickness. Replace it if exceeds service limit.

Service limit: 3.0 mm



Apply grease onto setting pins.

Install the spring into groove with pliers.



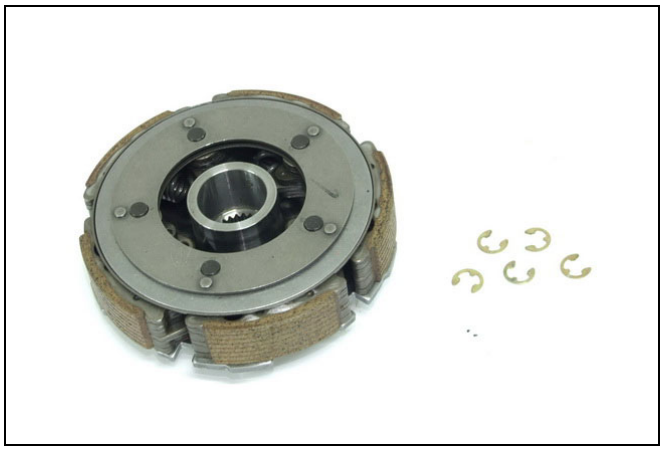
Install new clutch weight onto setting pin and then push to the specified location.

Apply with grease onto setting pins.

⚠ Caution

Grease or lubricant will damage the clutch weight and affect the block's connection capacity.

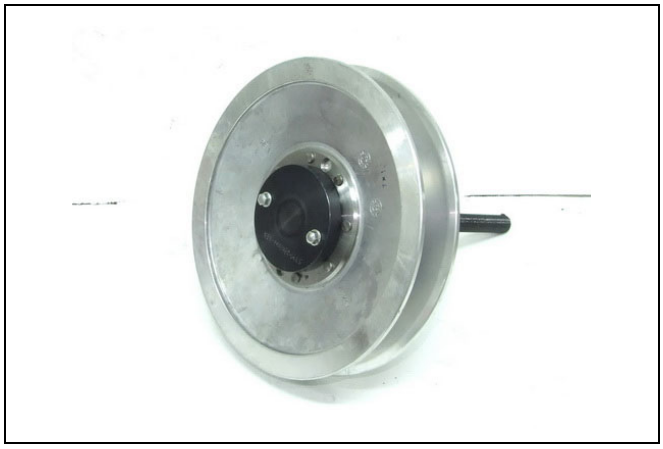
Install the spring plate and centrifugal clutch plate.



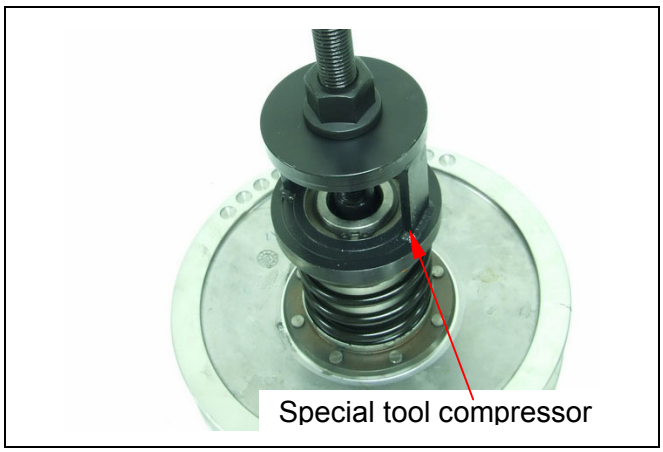
Install 5 e-ring in the drive plate.

Driven Pulley Disassembly

Disassemble the driven pulley with special tool.

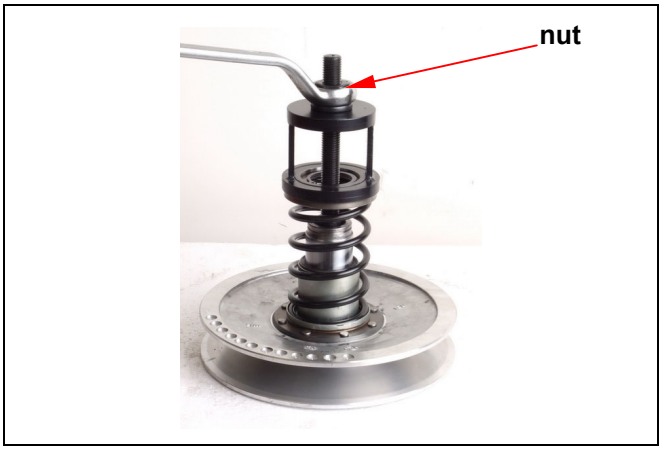


Apply special tool compressor onto the pulley

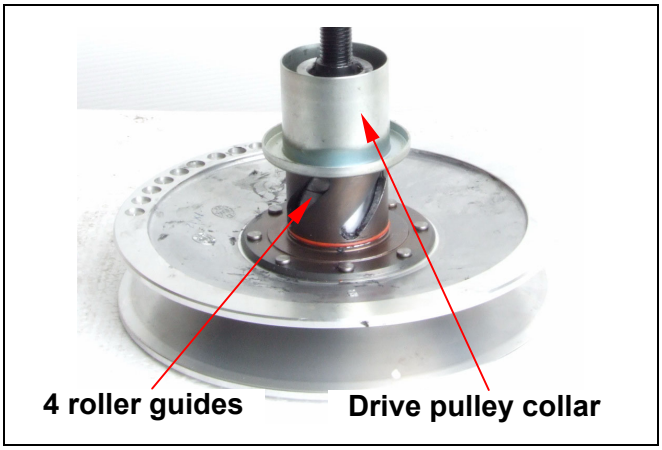


Remove cir clip with pliers.

Loosen the special tools nut



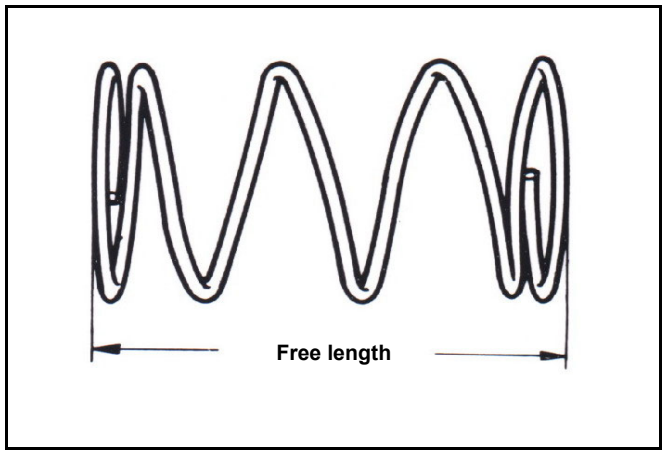
Remove the driven pulley collar and 4 roller guides.



Remove the movable driven face.

Driven pulley spring

Measure the length of driven pulley spring.
Replace it if exceeds service limit.
Service limit: 119.5 mm

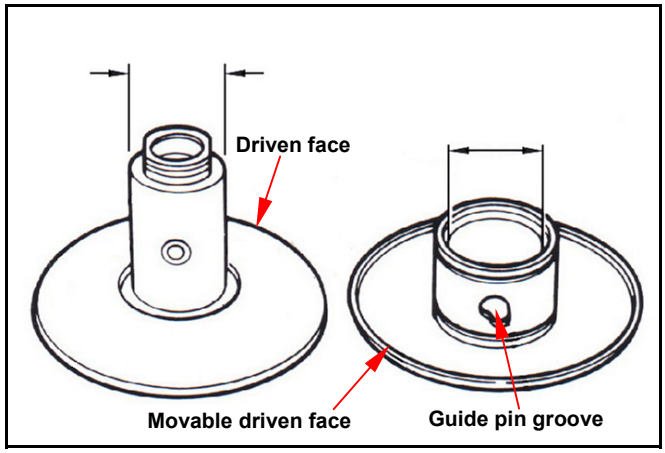


Driven pulley

Check following items:

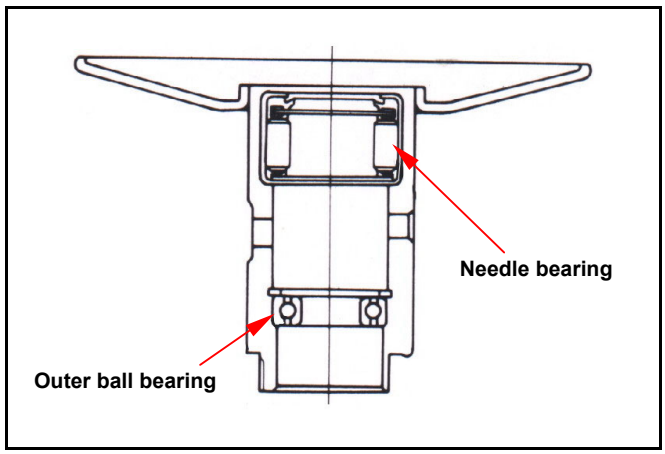
- If both surfaces are damaged or worn.
- If guide pin groove is damaged or worn.

Replace damaged or worn components.
Measure the outer diameter of driven face and the inner diameter of movable driven face. Replace it if exceeds service limit.
Service limit: Outer diameter 40.945 mm
Inner diameter 41.070 mm



Driven Pulley Bearing Inspection

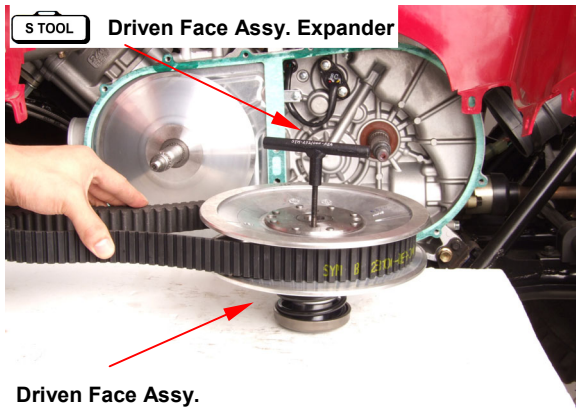
Check if the inner bearing oil seal is damage. Replace it if necessary.
Check if needle bearing is damage or too big clearance. Replace it if necessary.
Rotate the inside of inner bearing with fingers to check if the bearing rotation is in smooth and silent.
Check if the bearing outer parts are closed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



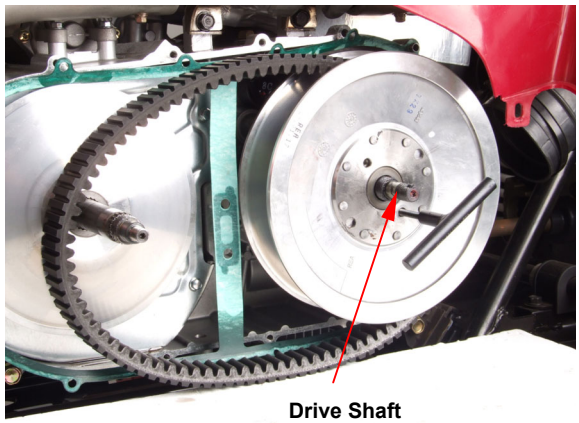
Installation

Use the driven face assy. expander to expand the driven face assy.
Put the drive belt into the driven face assy. and hold it tight by hand.

Special Tool
Tool number: SYM-2321000-REA
Tool name: Driven Face Assy. Expander



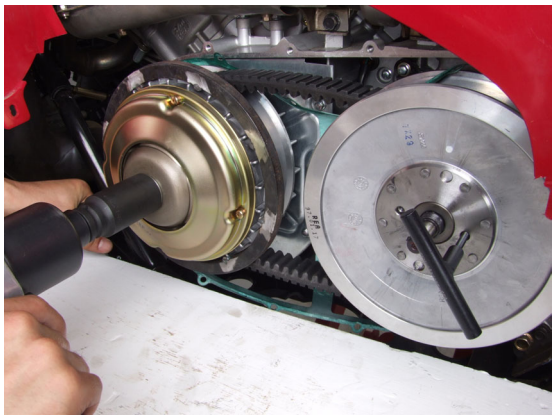
Put the driven face assy. onto the drive shaft.



⚠ Caution

- Use special tool to keep the driven face assy. open.
- Do not oppress friction plate in order to avoid distortion or damage.

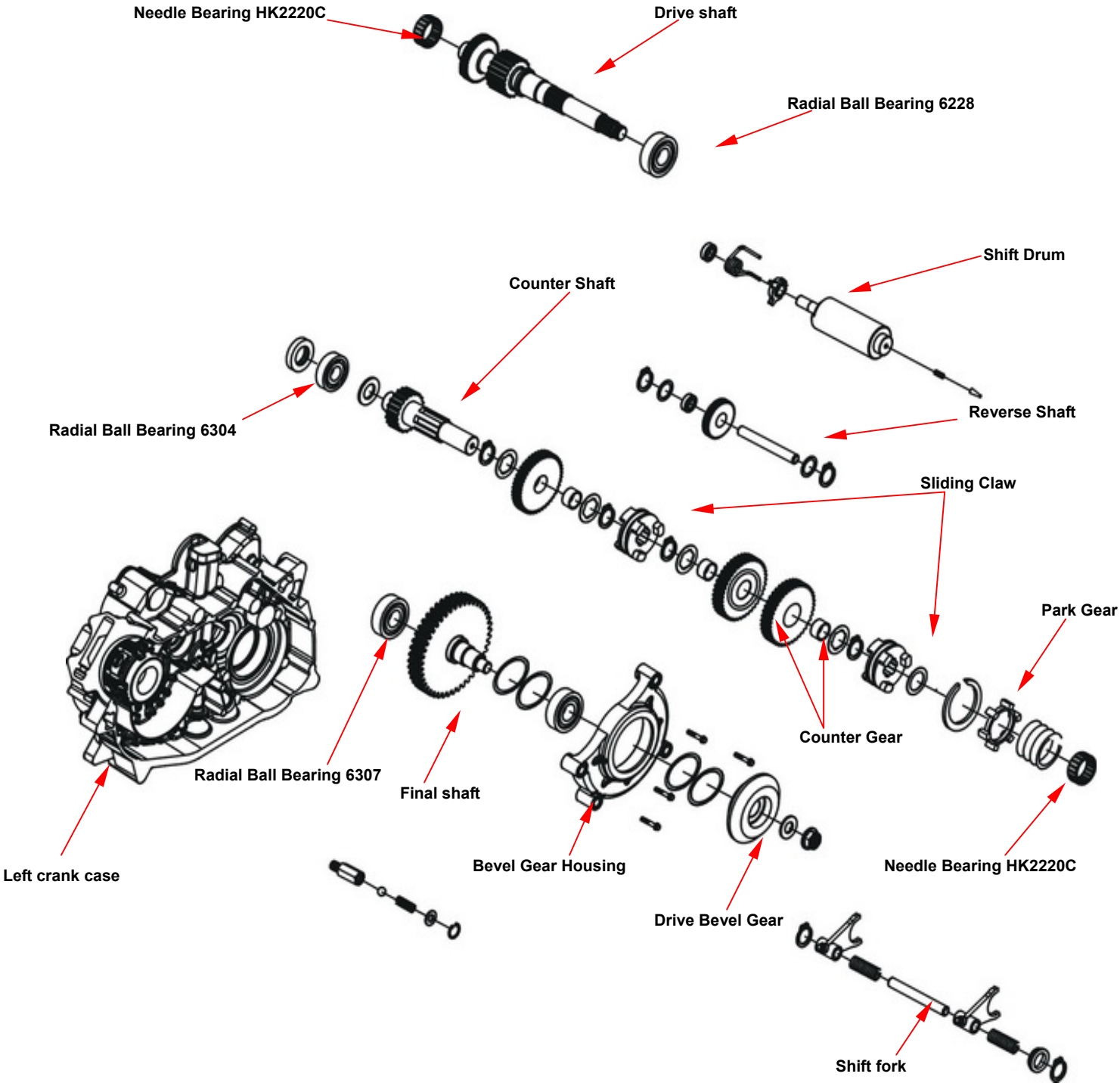
Install the movable drive face assy.
Hold the movable drive face assy. with the MDF holder, and then tighten nut to specified torque value.
Torque value: 8.5~10.5kgf-m



Hold the driven face with universal holder, and then tighten nut to specified torque value.
Torque value: 5.0~6.0kgf-m

Notes:

Mechanism Diagram



Precautions in Operation

Specification

Item	Standard value	Limit (mm)
OD of shift fork shaft	13.984~14.000 mm	13.966 mm
ID of shift fork	14.000~14.016 mm	14.034 mm
Shift fork claw thickness	5.930~6.000 mm	5.730 mm

Torque value

Gear oil drain bolt 1.1~1.5kgf-m
Gear oil fill bolt 3.5~4.5kgf-m

Tools

Special tools

Bearing driver (6228): SYM-2341110-REA A6228
Bearing driver (6307): SYM-2343110-REA 6307
Bearing driver (2220): SYM-9100400-REA 2220
Bearing driver (6307): SYM-2346000-REA A6307
Final shaft gear stopper: SYM-2343100-REA
Needle bearing driver (HK2016): SYM-9100300-RB1
Drive shaft and oil seal driver: SYM-9120200-HMA
Drive shaft puller: SYM-2341100
Inner bearing puller: SYM-6204002

Trouble Diagnosis

Engine can be started but vehicle cannot move.

- Damaged drive gear
- Burnt out drive gear
- Damaged gear shift system

Noise

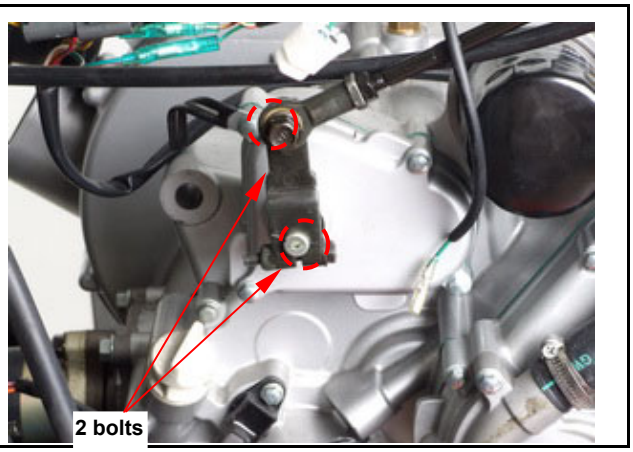
- Worn or burnt gear
- Worn gear

Gear oil leaks

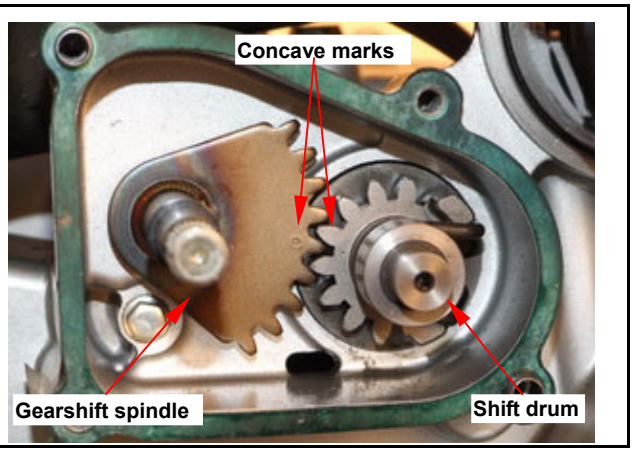
- Excessive gear oil.
- Worn or damage oil seal

Transmission Disassembly

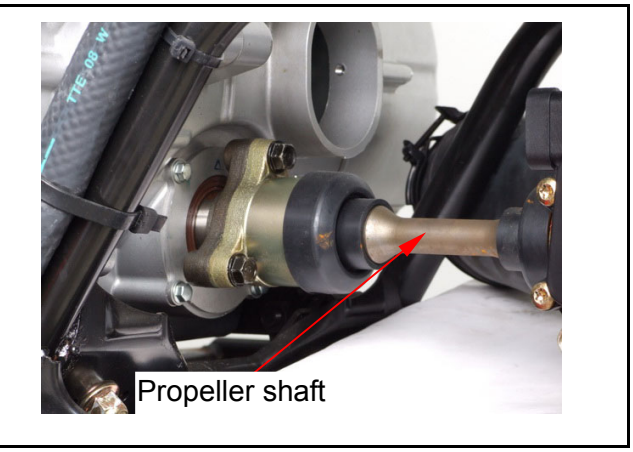
Remove gear change lever (2 bolts).
Remove the gear change lever.



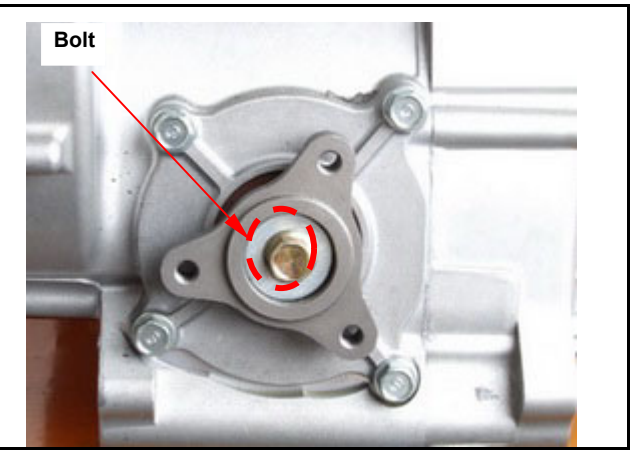
Remove 2 c clips from brake pedal.
Remove brake spring & stop switch spring
Remove brake penal.



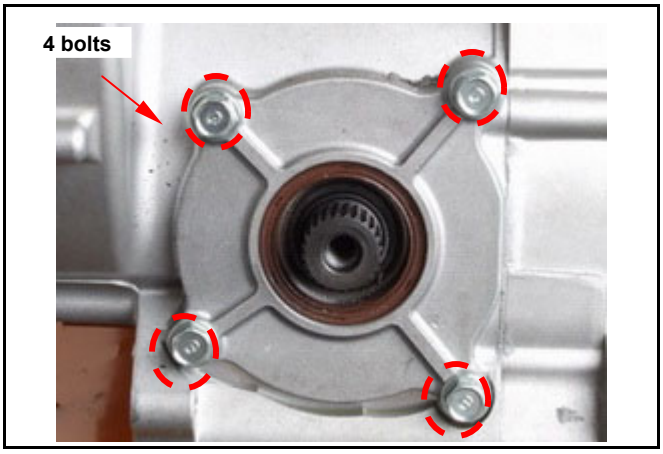
Remove the front and rear propeller shaft.
Remove the engine from the frame before performing the transmission disassembly.



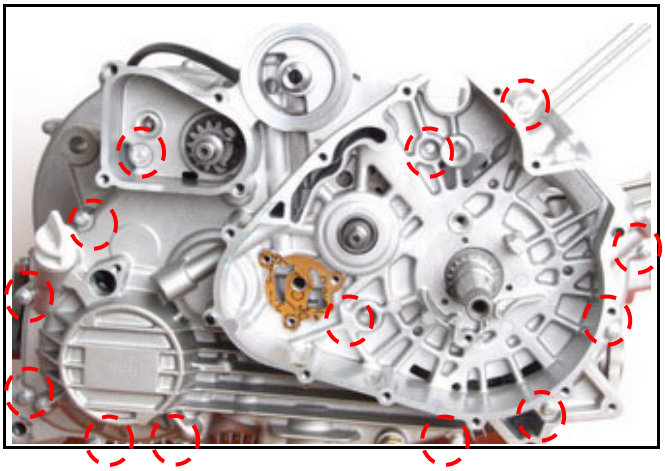
Remove the front and rear output shaft connectors.



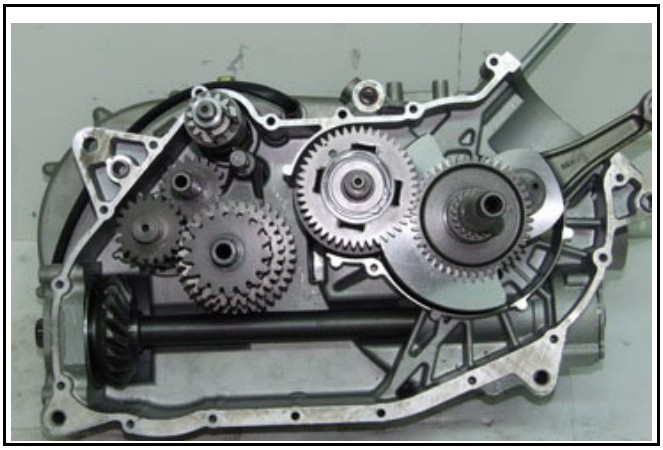
Remove the front and rear output shaft covers.



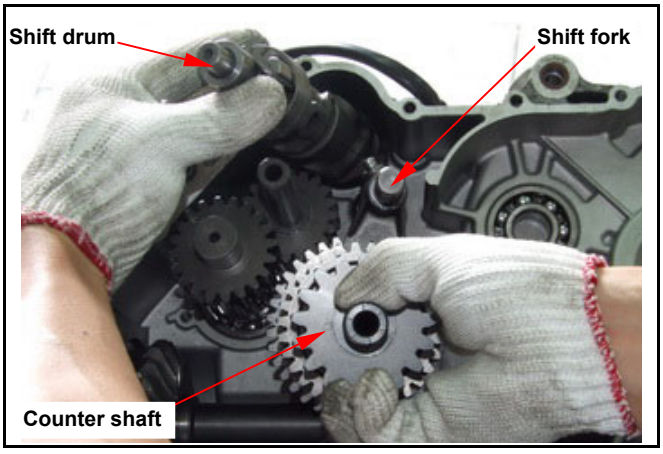
Remove 13 bolts from the right crankcase.



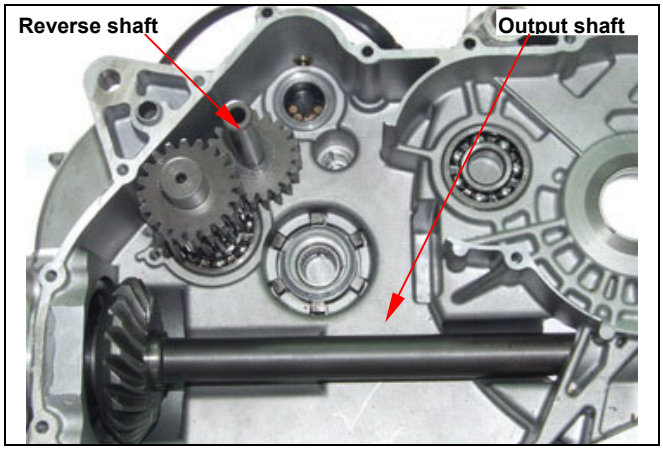
Remove the right crankcase from the left crankcase.



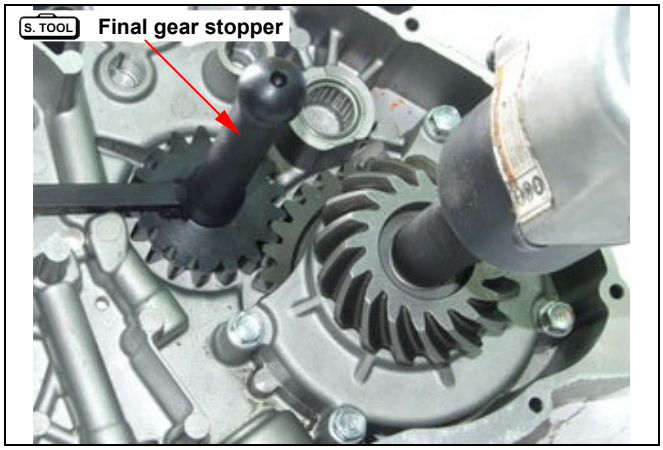
Remove the counter shaft, shift fork and the shift drum.



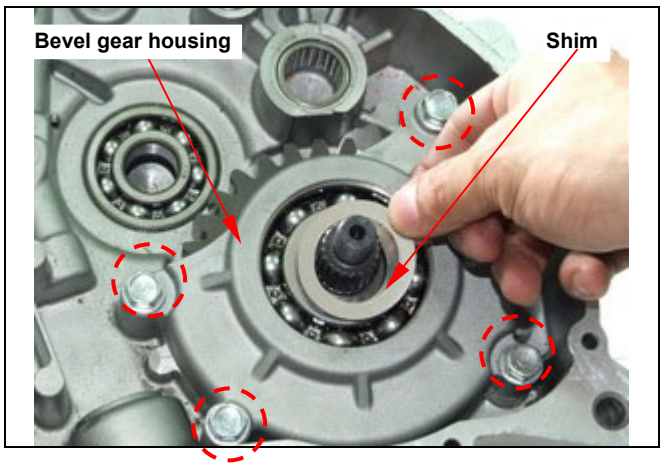
Remove the reverse shaft and the output shaft.



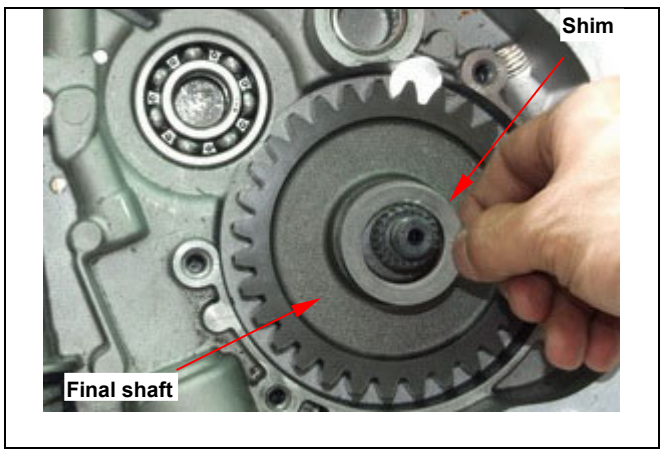
Remove the bevel gear with the final shaft stopper.
Special tool:
Tool number：SYM-2343100-REA
Tool name：Final shaft stopper.



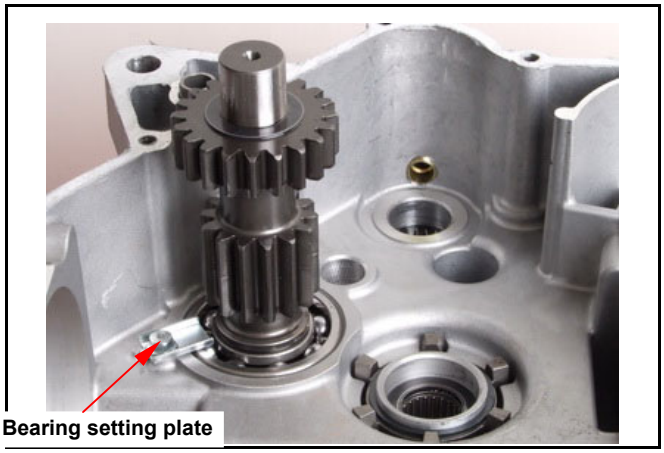
Remove 4 bolts.
Remove the shims from the bevel gear housing.
Remember the number of the shims and put the same number of shims when reassembling.



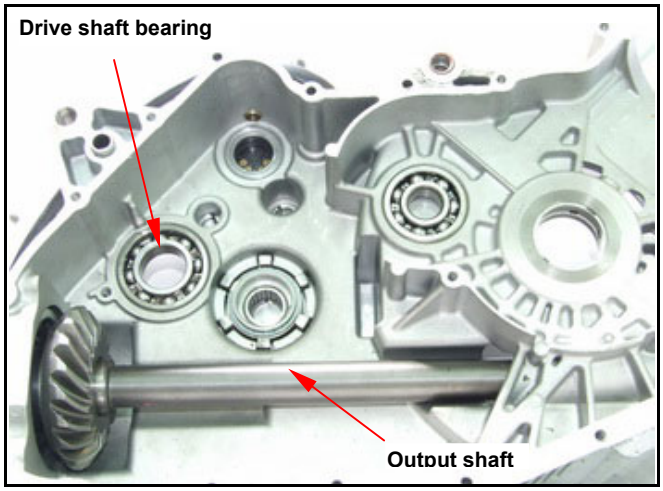
Remove the shims from the final shaft.
Remember the number of shims and put the same number o shims when reassembling.
Remove the final shaft.



Remove the drive shaft bearing setting plate (1 bolt).

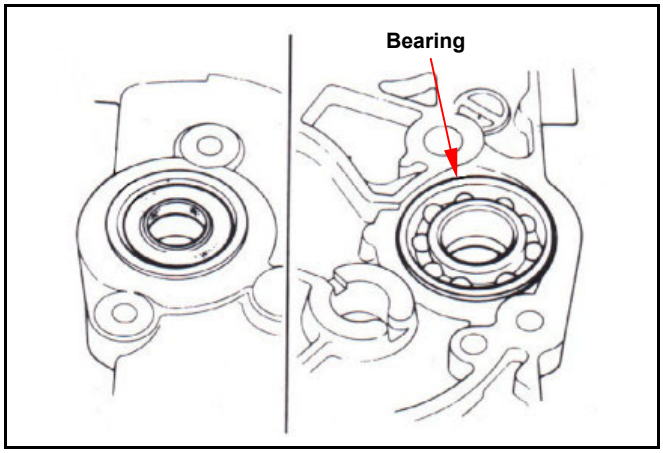


Remove the drive shaft.
Remove the output shaft.



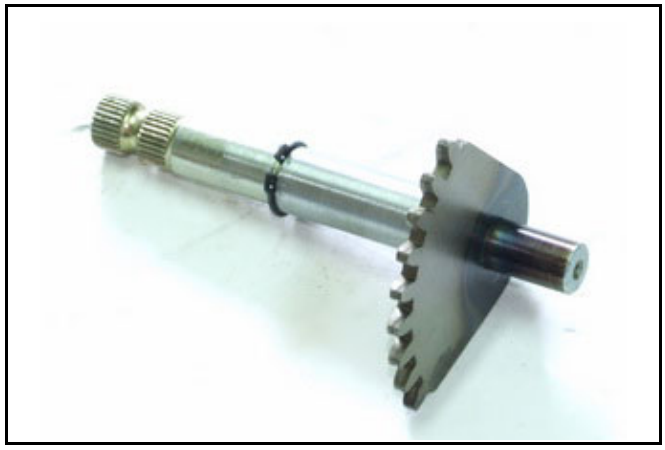
⚠ Caution

- Do not remove the drive shaft from the crankcase if unnecessary.
- When removing the drive shaft from the crankcase, then the bearing has to be replaced.



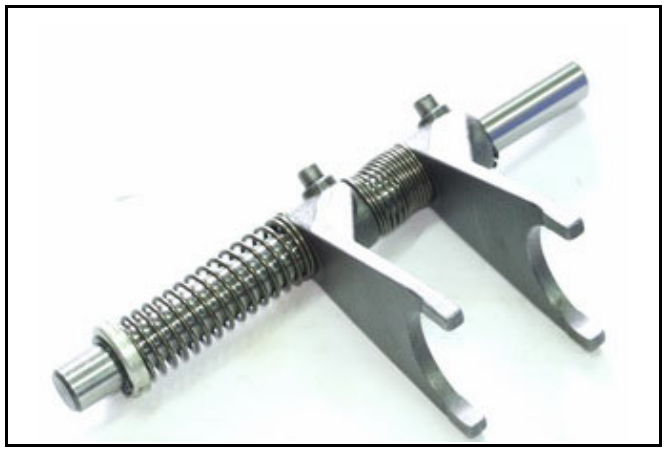
Transmission Inspection

Check the shift spindle for any wear or damage.



Check if the shift drum is worn or damaged.

Check if the shift fork and shaft is worn or damaged.
Measure the outer diameter of shift fork shaft.
Replace it if it exceed service limit.
Service limit: 13.966 mm
Measure the inner diameter of shift fork.
Replace it if it exceed service limit.
Service limit: 14.043 mm
Measure the thickness of shift fork claw.
Replace it if it exceed service limit.
Service limit: 5.930 mm

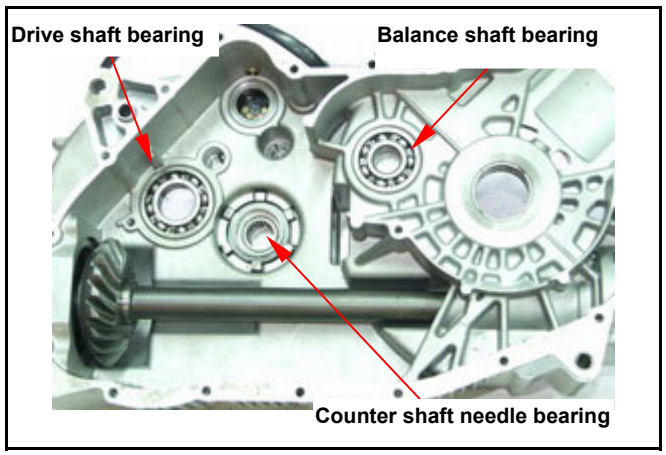


Check if the counter shaft is worn or damaged.

Check if the reverse shaft is wear or damage.

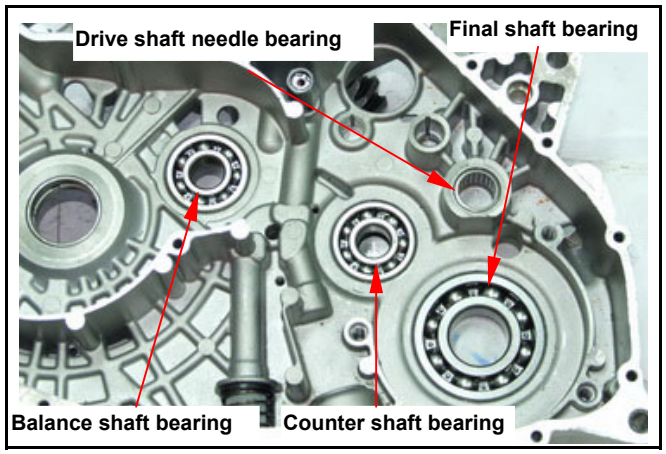
Check if the final shaft and gear are burn, wear or damage.

Check bearings on the left and right crankcase.
Rotate each bearing's inner ring by fingers.
Check if the bearings can be rotated smoothly and silently and also check if the bearing outer ring is mounted on gear tightly.
If the bearing rotation is uneven, noising, or loose bearing mounted, then replace it.
Check oil seal for wear or damage, and replace it if necessary.



⚠ Caution

- The bearings should be replaced with new one after they are removed from the crankcase by the bearing puller.



Bearing Replacement

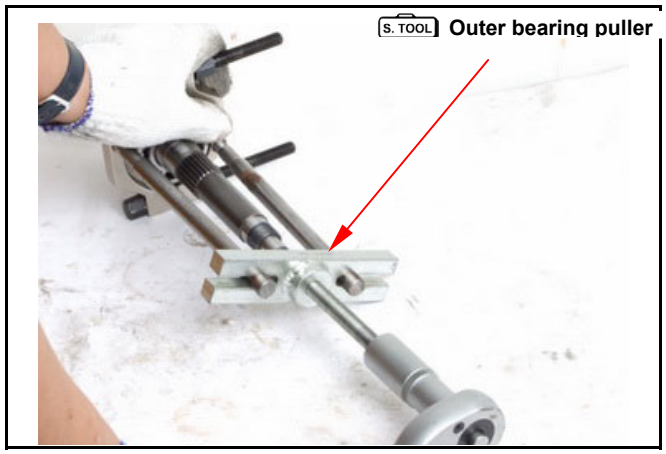
⚠ Caution

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

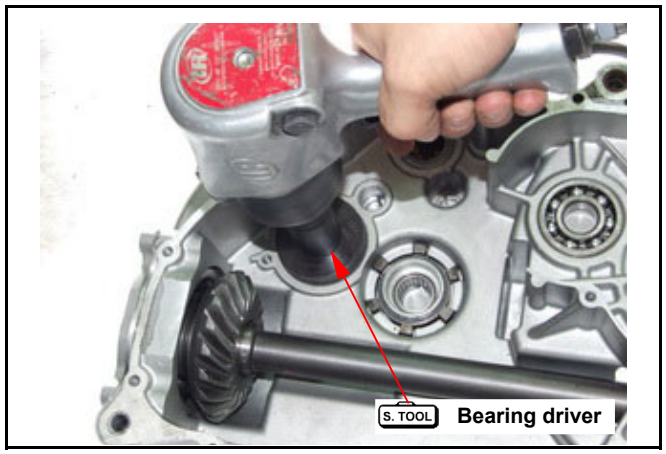
Left crankcase side

Remove the drive shaft and bearing from the left crankcase.

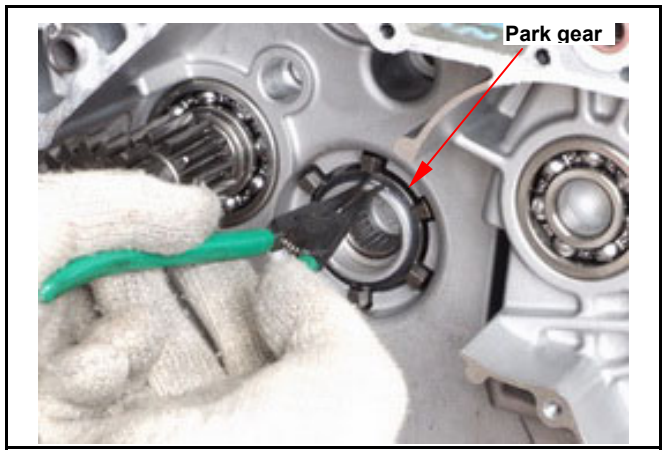
Remove the drive shaft bearing from the shaft by outer bearing puller.



Replace the drive shaft bearing with new one by bearing driver.
Special tool:
Tool number：SYM-2341110-REA A6228
Tool name：Bearing driver (6228)

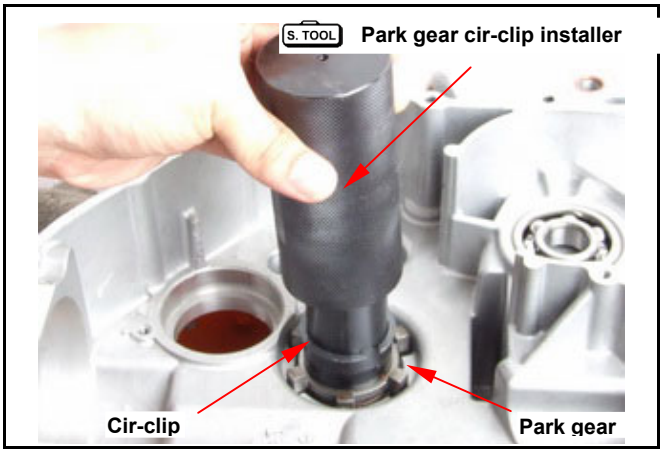


Remove the cir-clip and the park gear.
Remove the counter gear needle bearing.



Install the park gear cir-clip by using cir-clip installer.
Special tool:
Tool number：SYM-9060200-REA

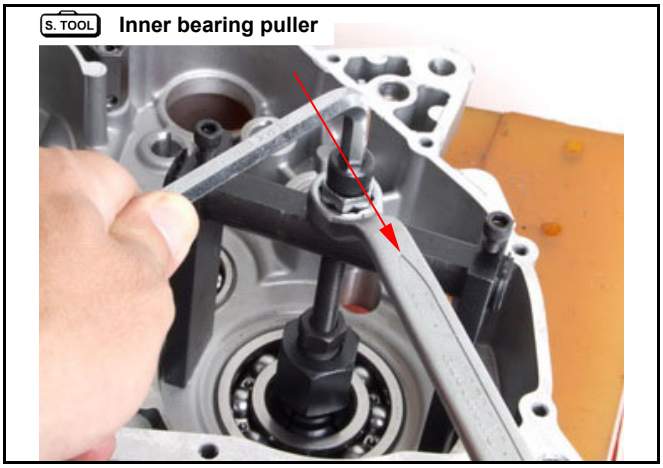
Tool name：Park gear cir-clip installer



Right crankcase side

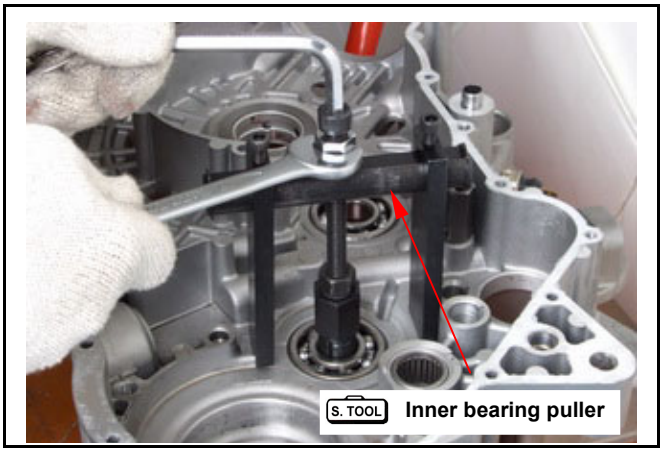
Remove the final shaft bearing on the right crankcase with inner bearing puller.

Special tool:
Tool number：SYM-6204025
Tool name：Inner bearing puller



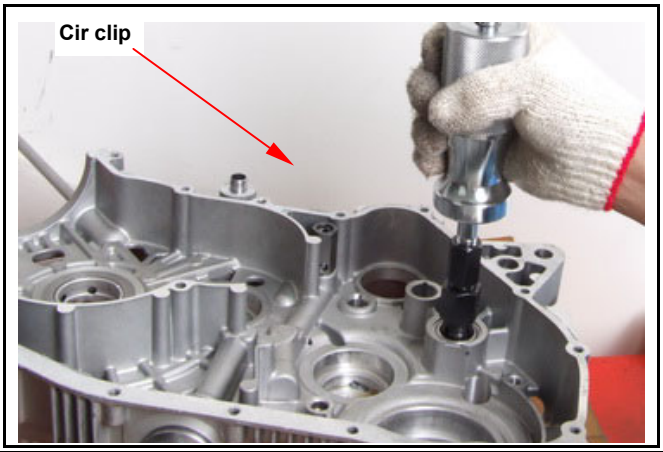
Remove the counter shaft bearing on the right crankcase with inner bearing puller.

Special tool:
Tool number：SYM-6204025
Tool name：Inner bearing puller

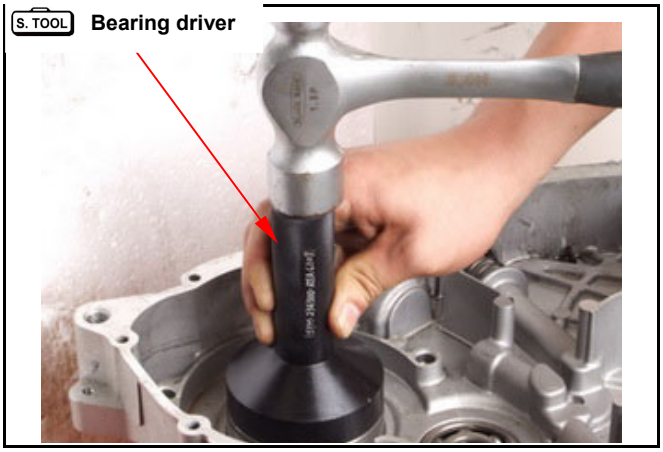


Remove the drive shaft needle bearing on the right crankcase with inner bearing puller.

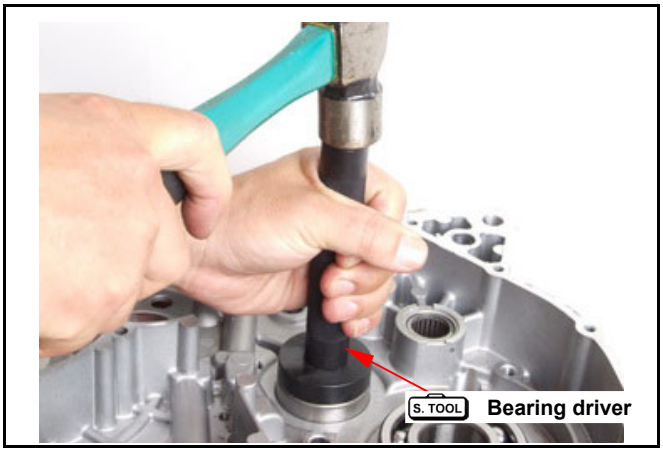
Special tool:
Tool number：SYM-6204025
Tool name：Inner bearing puller



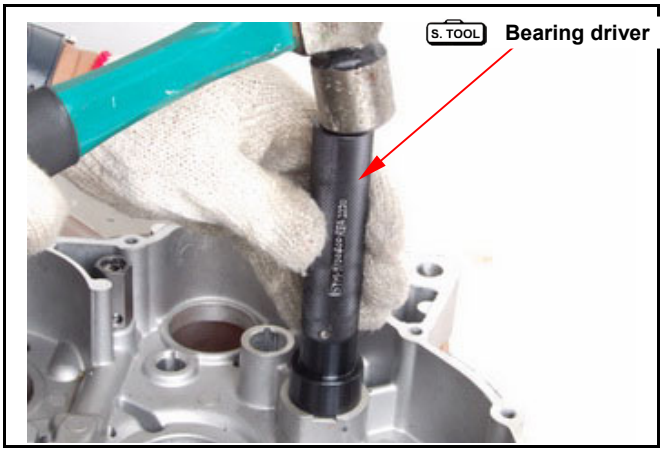
Install the final shaft bearing with the bearing driver.
Special tool:
Tool number：SYM-2343110-REA 6307
Tool name：Final shaft bearing driver



Install the counter shaft bearing with the bearing driver.
Special tool:
Tool number：SYM-
Tool name：Counter shaft bearing driver

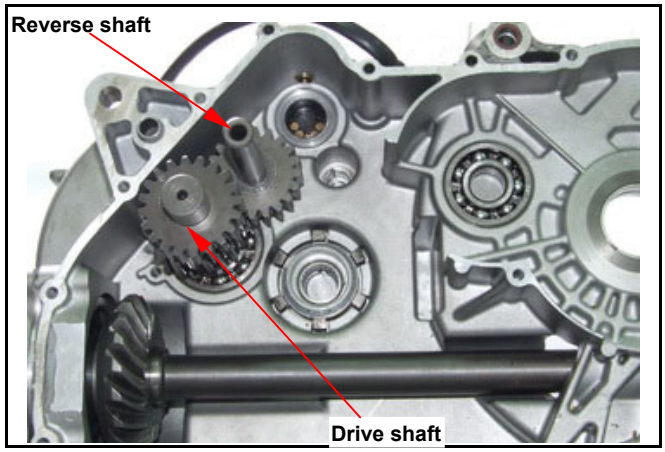


Install the drive shaft needle bearing with the bearing driver.
Special tool:
Tool number：SYM-9100400-REA 2220
Tool name：Drive shaft needle bearing driver

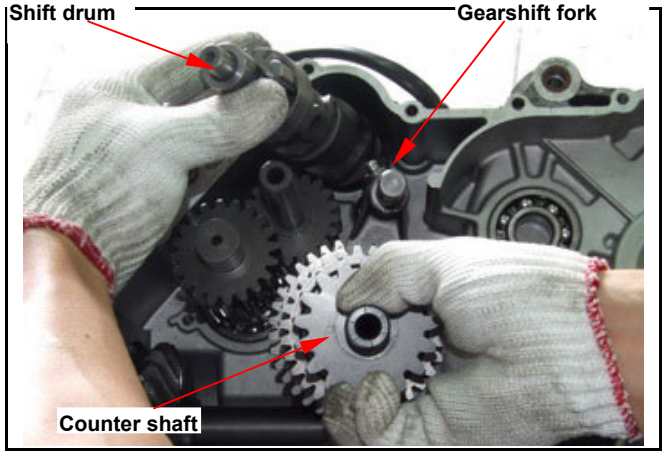


Transmission Reassembly

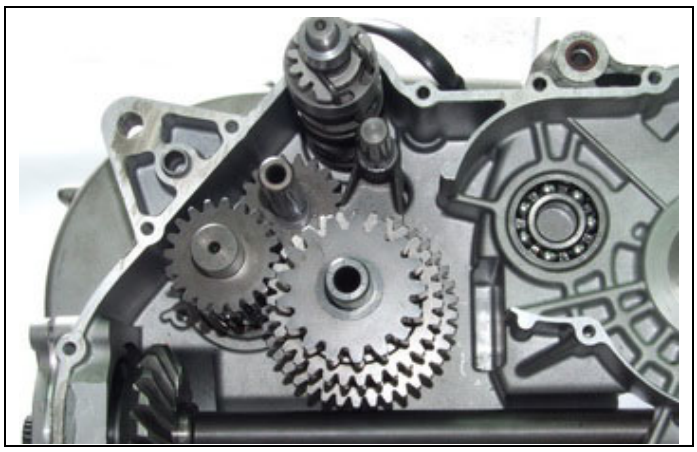
Install the reverse shaft onto the left crankcase.



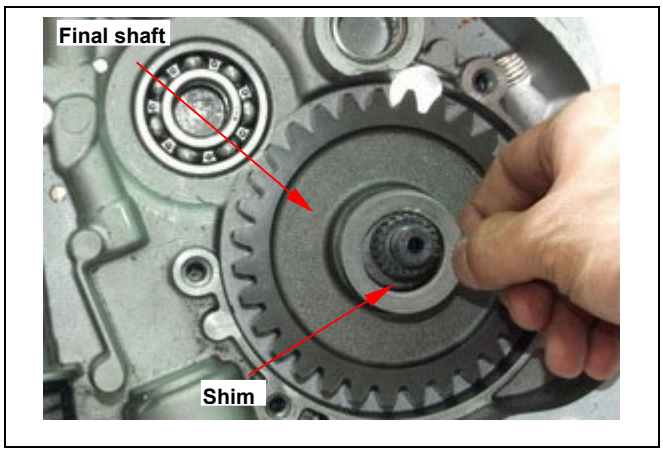
Install the counter shaft and gearshift fork.



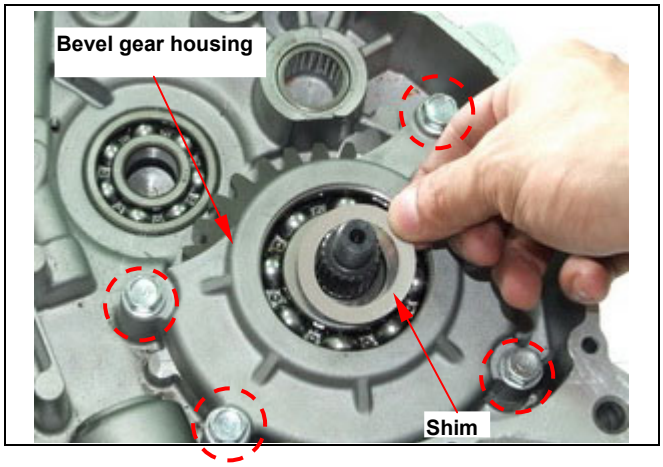
Install the shift drum.
Rotate the shift drum and make sure it can rotate smoothly.



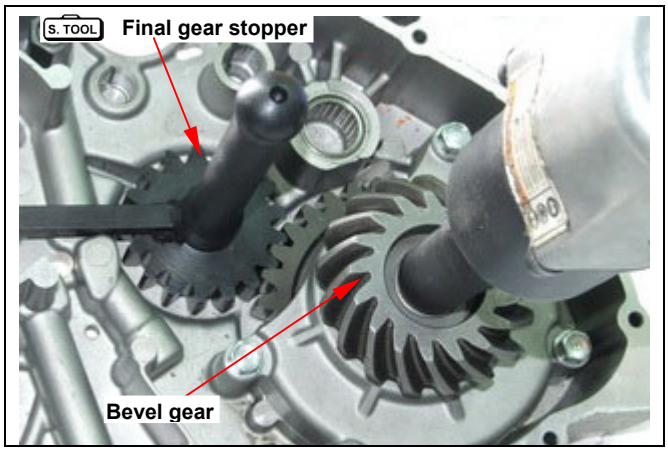
Install the final shaft onto the right crankcase.
Put the same numbers of shim, which were removed during removal, on the final shaft.



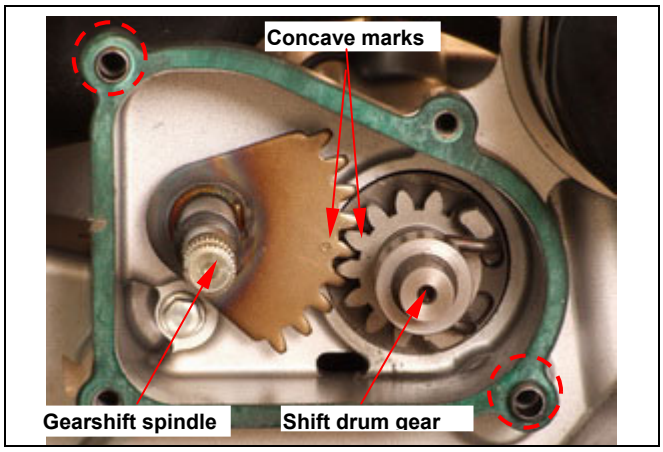
Install the bevel gear housing
Put the same numbers of shim, which were removed during removal, on the bevel gear housing.



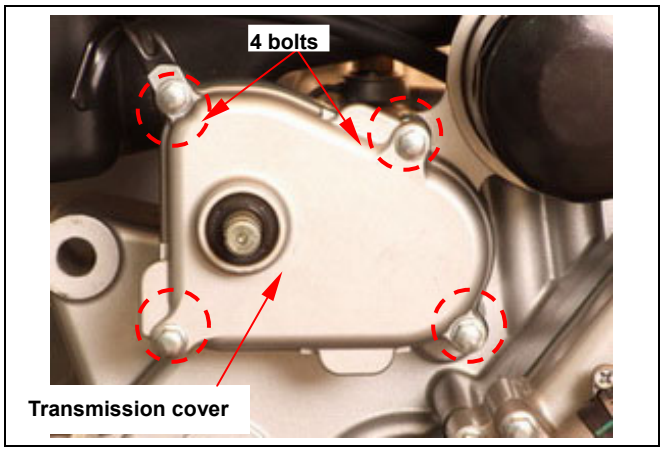
Install the bevel gear.
Lock the nut by using final shaft stopper.
Special tool:
Tool number：SYM-2343100-REA
Tool name：Final shaft stopper.



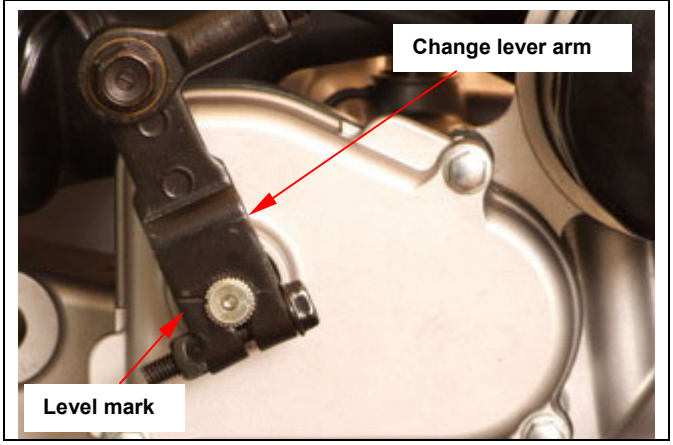
Reassemble the right and left crankcase.
Install the gearshift spindle.
Align the concave marks on the shift gear and the shift drum gear.
Install 2 dowel pins and transmission cover gasket.



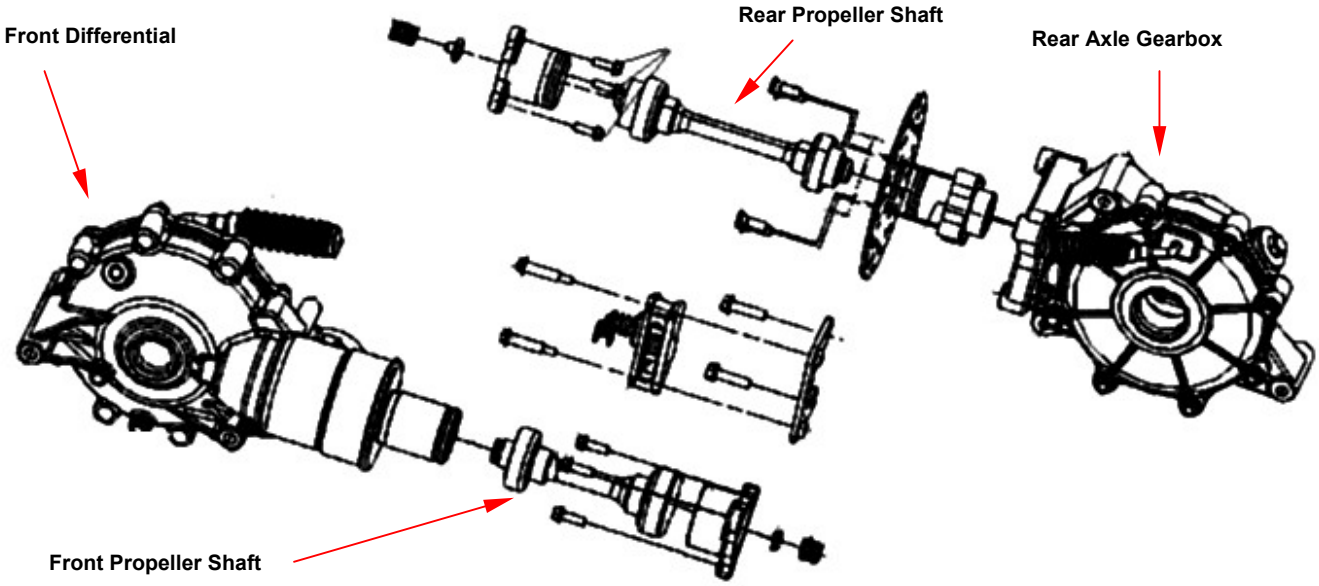
Install the transmission cover.

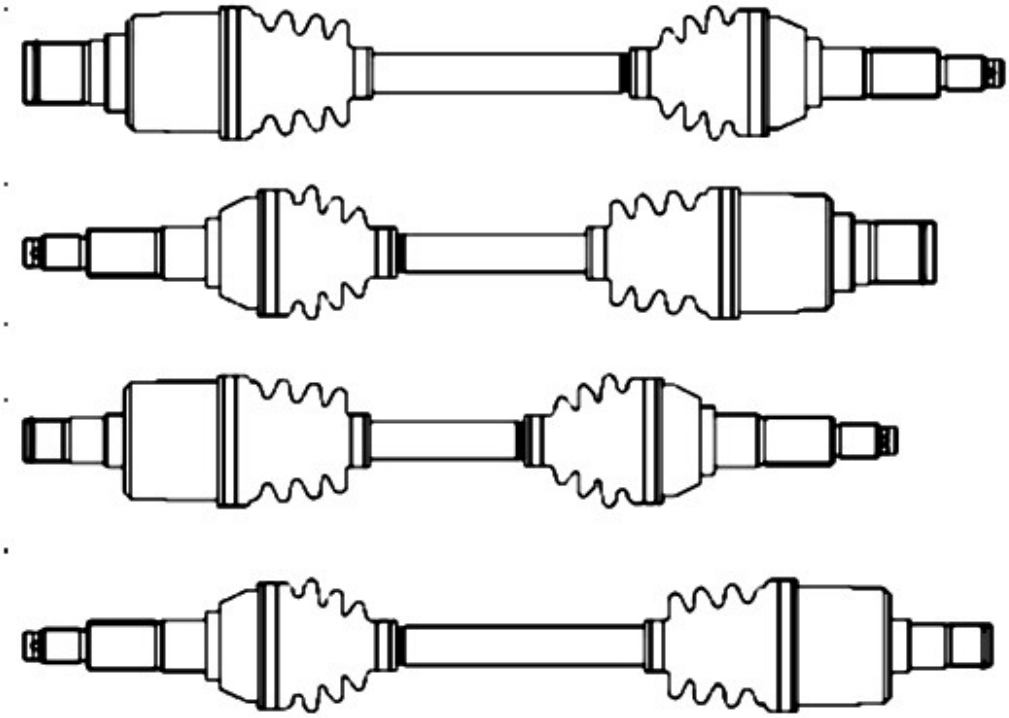


Install the change lever arm.
Keep the level mark on the change lever arm horizontal.



Mechanism Diagram





Trouble Diagnosis

Engine can be started but vehicle cannot move.

- Damaged wheel drive shaft
- Damaged propeller shaft
- Damaged front differential or rear axle gear box

Noise

- Worn or burnt drive shaft
- Worn or burnt steel ball
- Worn or burnt gear

Gear oil leaks

- Excessive gear oil
- Worn or damaged rubber boot
- Worn or damage oil seal

Wheel Drive Shaft Removal

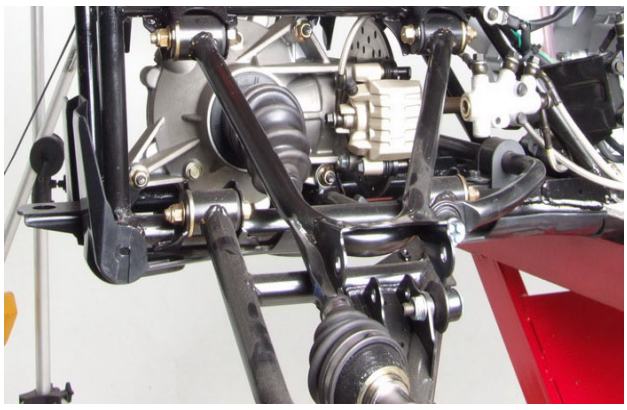
Front wheel drive shaft removal

Remove the front wheel.
Remove the front brake caliper and disk.
Remove the tie-rod.
Remove the knuckle body.

Remove the wheel drive shaft with special tool.

Rear wheel drive shaft removal

Remove the rear wheel.
Remove the rear wheel connecter.
Remove the rear wheel hub.
Remove the rear cushion.

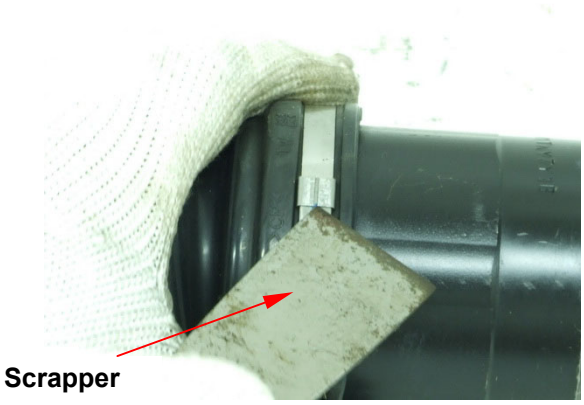


Remove the rear wheel drive shaft with special tool.

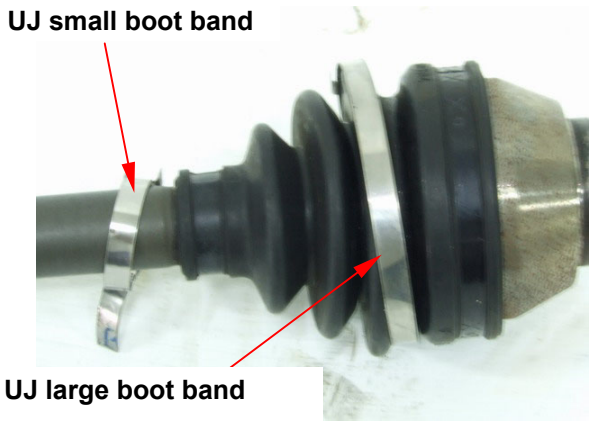
Wheel Drive Shaft Disassembly

Universal joint disassembly

Open the boot band clip with scrapper.



Remove the rubber boot bands.

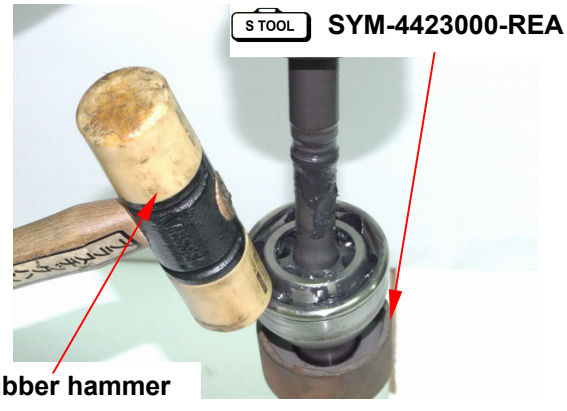


Remove the UJ rubber boot.

Disassemble the wheel drive shaft UJ assembly with rubber hammer & special tool.
Tools name：Wheel driveshaft assembly seat
Tools number：SYM-4423000-REA

⚠ Caution

Do not disassemble UJ assembly by using the steel hammer.

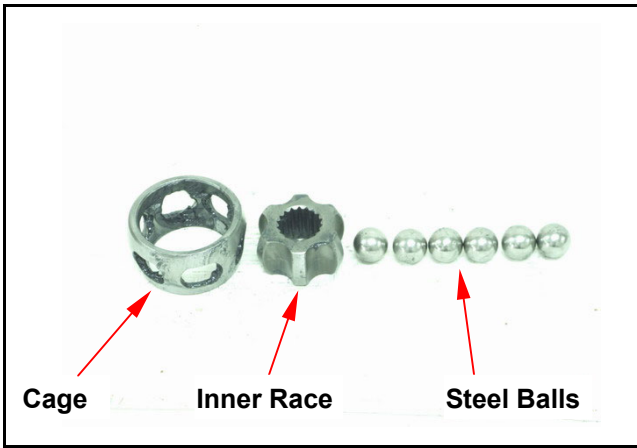


Remove 6 steel balls from UJ assembly outer race.

Tools name：Wheel drive shaft assembly seat
Tools number：SYM-4423500-REA

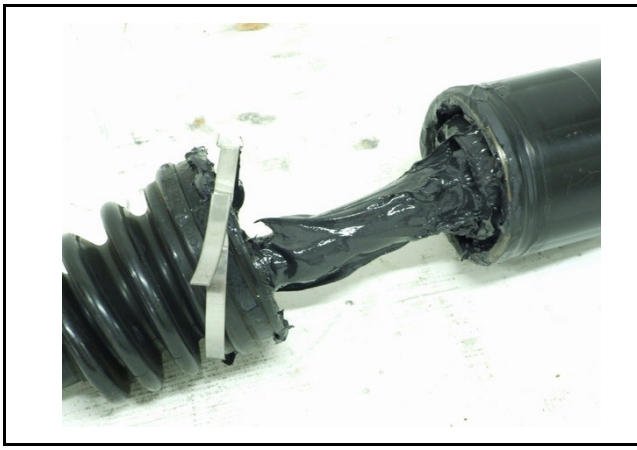
Remove the inner race and cage from the outer race.

Clean the inner race, outer race, steel balls and cage.



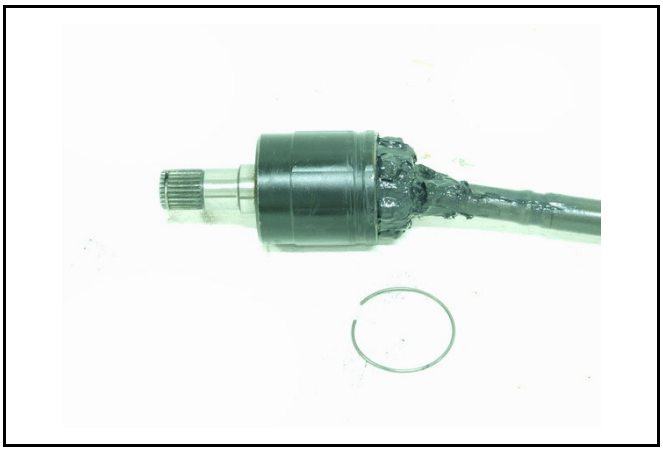
Double Offset Joint Disassembly

Open DOJ band clip with scrapper.
Remove the wheel drive shaft boot band.
Remove the DOJ rubber boot.



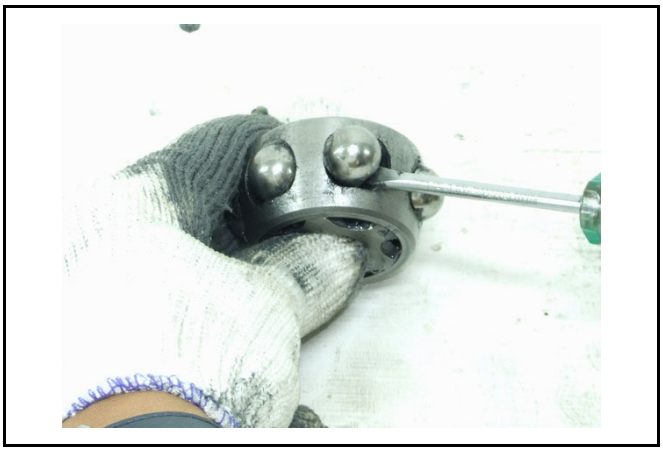
Remove the inner cir-clip with screw drive.

Disassemble DOJ assembly.



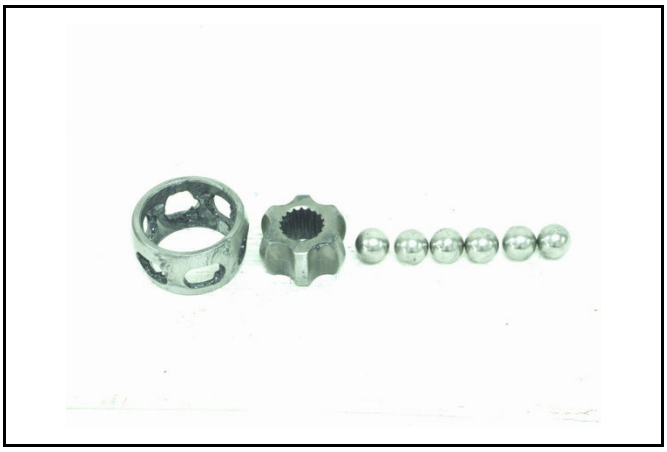
Clean the DOJ assembly.
Remove the cir-clip from the drive shaft.

Remove the steel balls from cage.



Wheel Drive Shaft Inspection

Clean all spare parts. Check the surface of these parts for wear or scratch.
Replace DOJ or UJ assembly if any stepped scratch is found.



Check the inside surface of UJ outer race.
Replace UJ assembly if it is damaged.

Check the inside surface of DOJ assembly outer race.
Replace double offset joint assembly if it is damaged.

Repair Pack

Check if DOJ & UJ boot is damaged

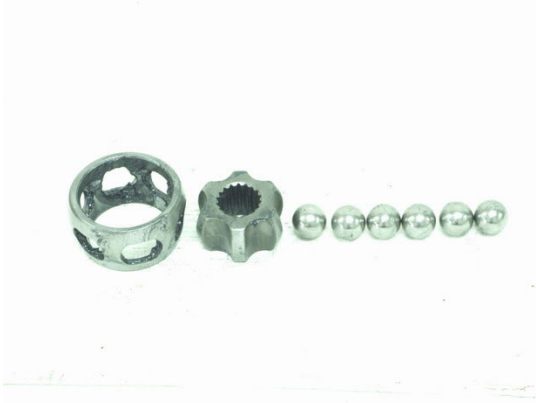
Replace DOJ or UJ assembly if it is damaged.

Remove the DOJ & UJ boot.

Remove the DOJ & UJ cage.

Remove the DOJ & UJ boot.

Disassemble and clean all spare parts. Check if there is any corrosion on the surface of these parts. Replace DOJ or UJ assembly if any damaged part is found.



Clean the DOJ & UJ cage.

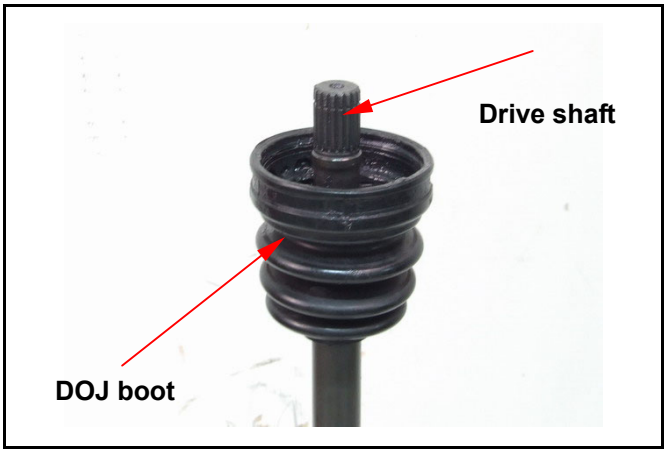
Unpack DOJ Repair Pack.

Unpack UJ Repair Pack.

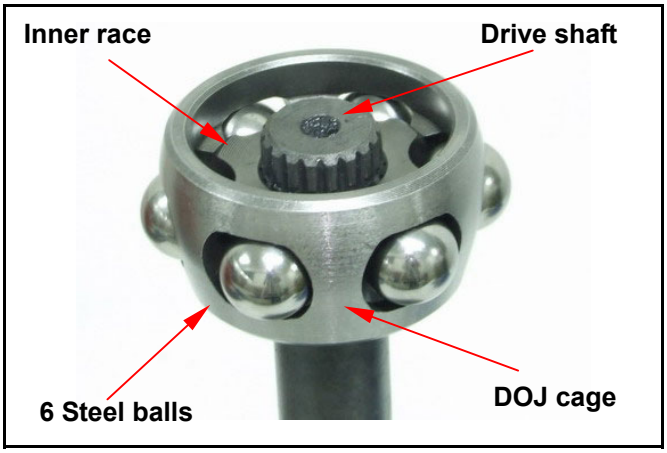
Wheel Drive Shaft Assembly

DOJ assembly

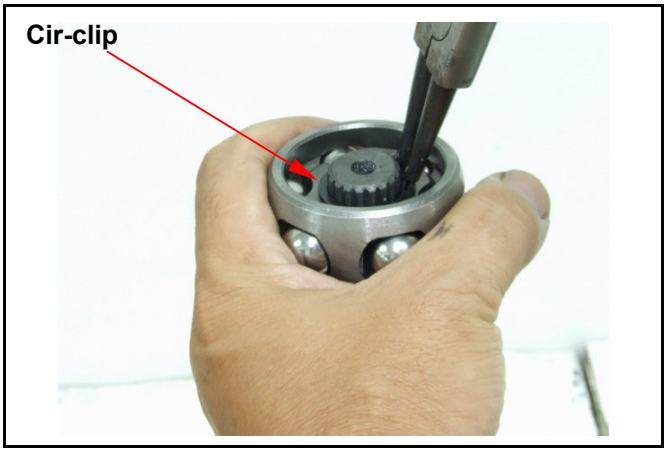
Assemble the DOJ boot.



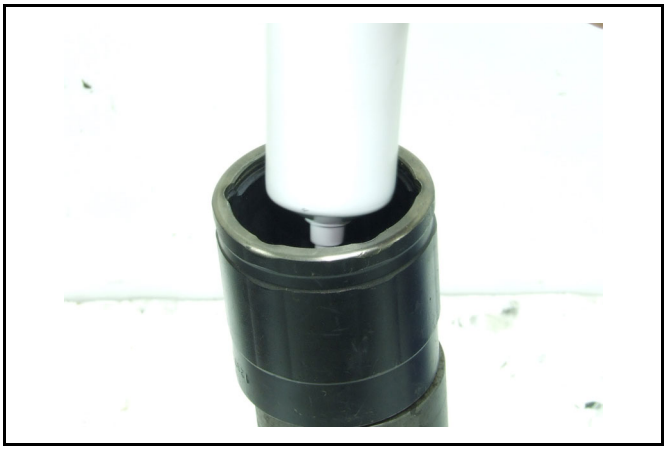
Assemble 6 steel balls, inner race and cage then drive shaft into the assembly.



Assemble exit cir-clip onto drive shaft.



Grease into the DOJ outer race.



⚠ Caution

Please use the grease of the repair pack. Using other oil may cause the part to be damaged.

Install the wheel drive shaft and cir-clip into DOJ outer race.

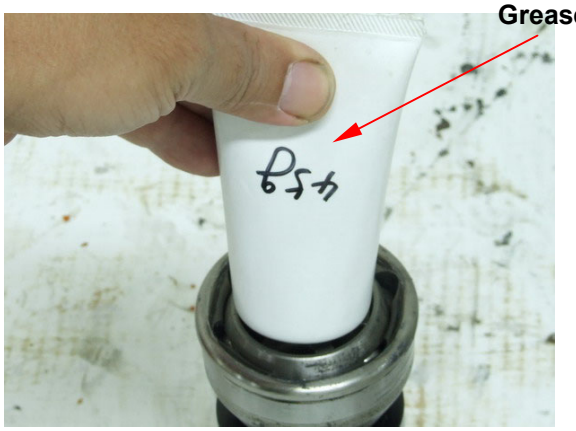
Install DOJ boot outside band.

Install DOJ boot.
Pull and open DOJ boot Pressure balancing that make it inside and external.

Deduct DOJ band closely with rubber hammer.

UJ assembly

Assemble universal joint and UJ boot and Pour into the grease.



Pour grease into the UJ boot inside.

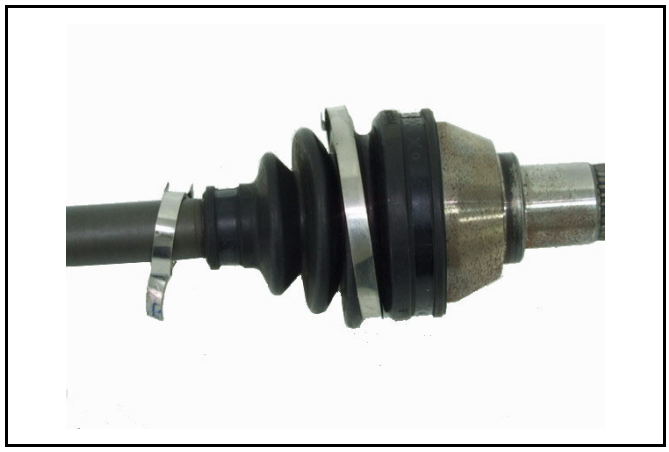
⚠ Caution

Please use the grease of the repair pack. Using other oil may cause the part to be damaged.

Assemble cir-clip with the tool.

Strike the wheel drive shaft by rubber hammer.

Install UJ boot.

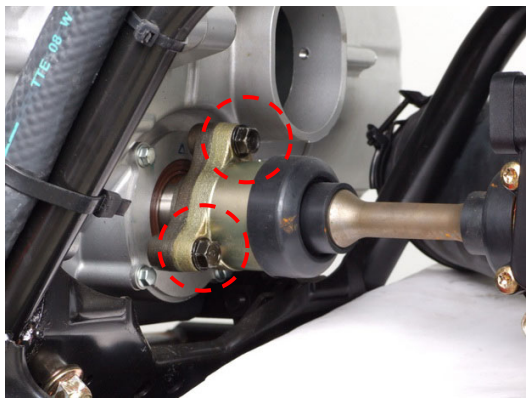


Pull and open DOJ boot to balance the inside and outside pressure.
Install band with rubber hammer.

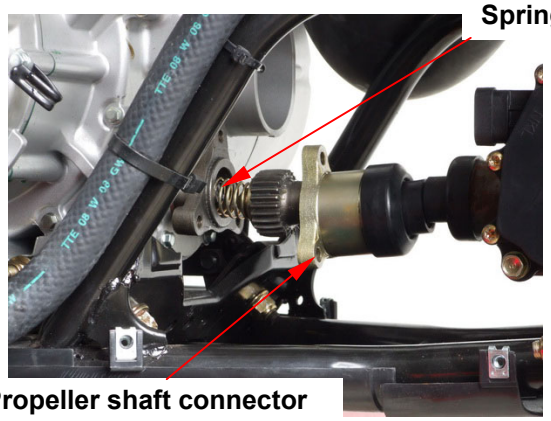
Front and Rear Propeller Shaft

Remove

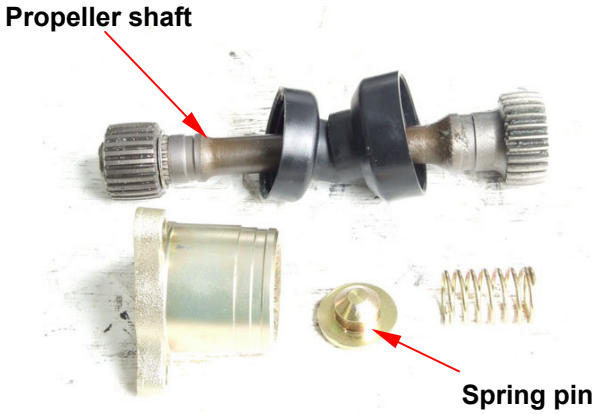
Loosen 3 bolts from the front propeller connector.



Disassemble the engine and propeller connector.
Remove the front propeller shaft connector

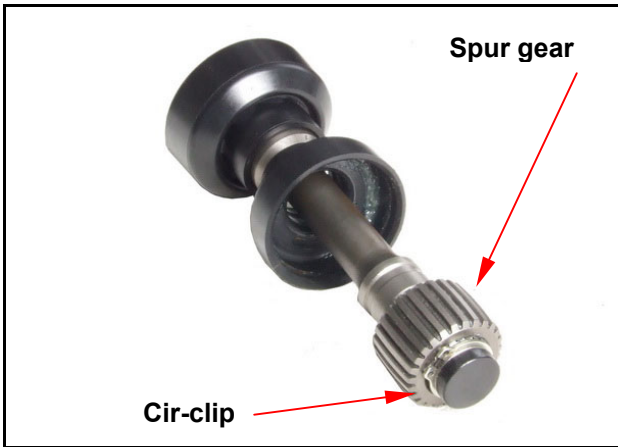


Remove the front propeller shaft connector, spring, spring pin and shaft.

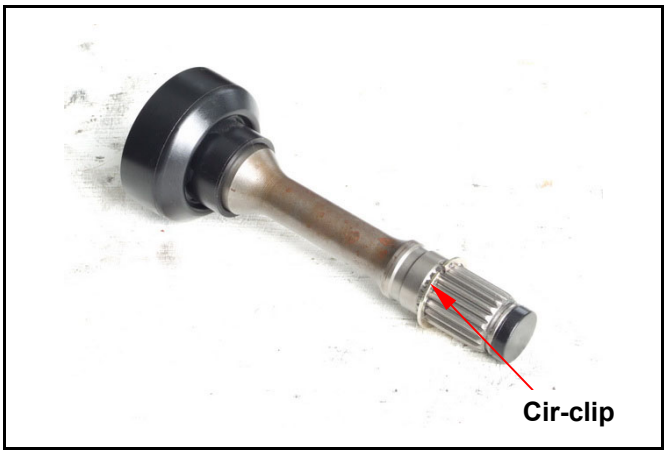


Propeller shaft disassembly

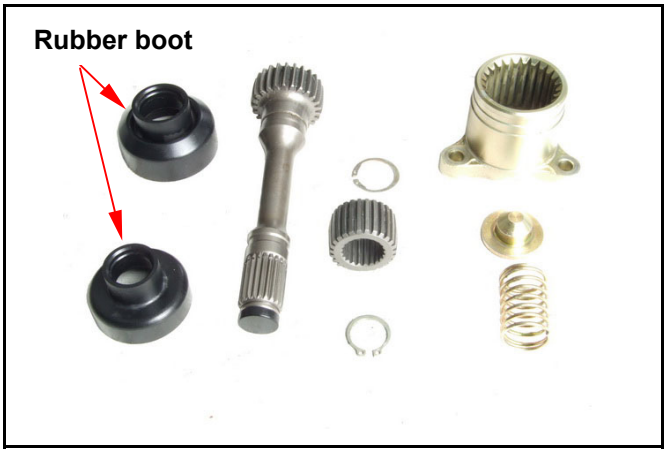
Remove the front side exit cir-clip.
Remove the propeller spur gear.



Remove the rear side exit cir-clip.

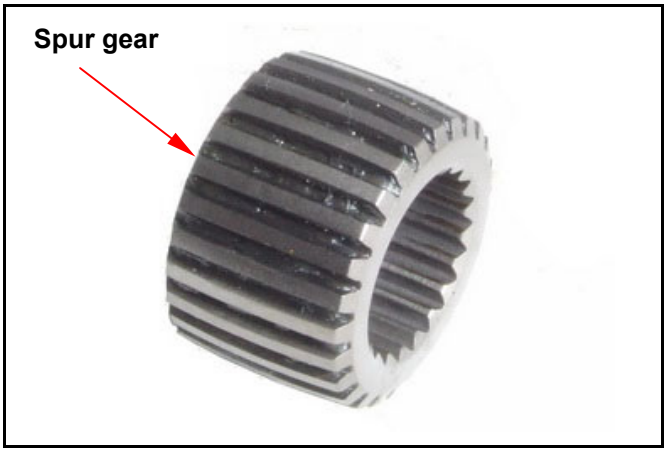


Remove propeller shaft and rubber boots.

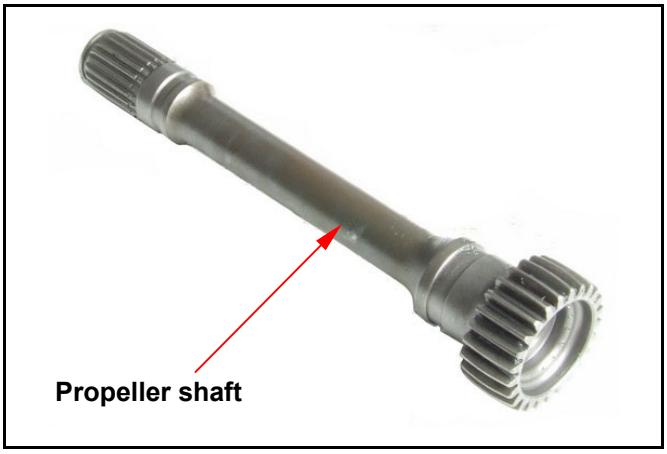


Drive shaft inspection

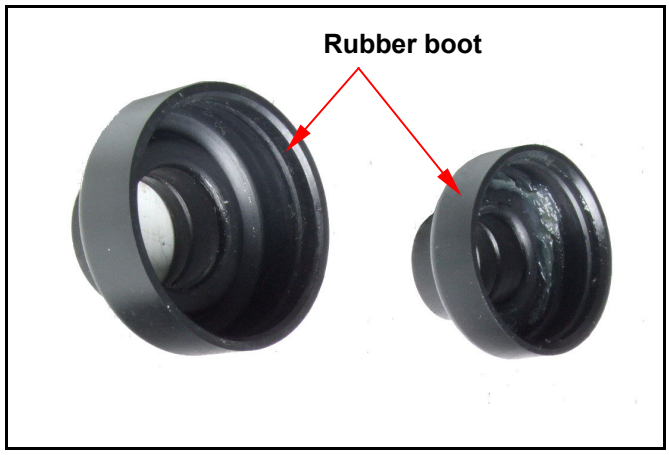
Check if the spur gear has is damaged or not. Please replace new parts if it has split or damaged.



Check if the propeller shaft is split or damaged. Please replace new parts if it is split or damaged.



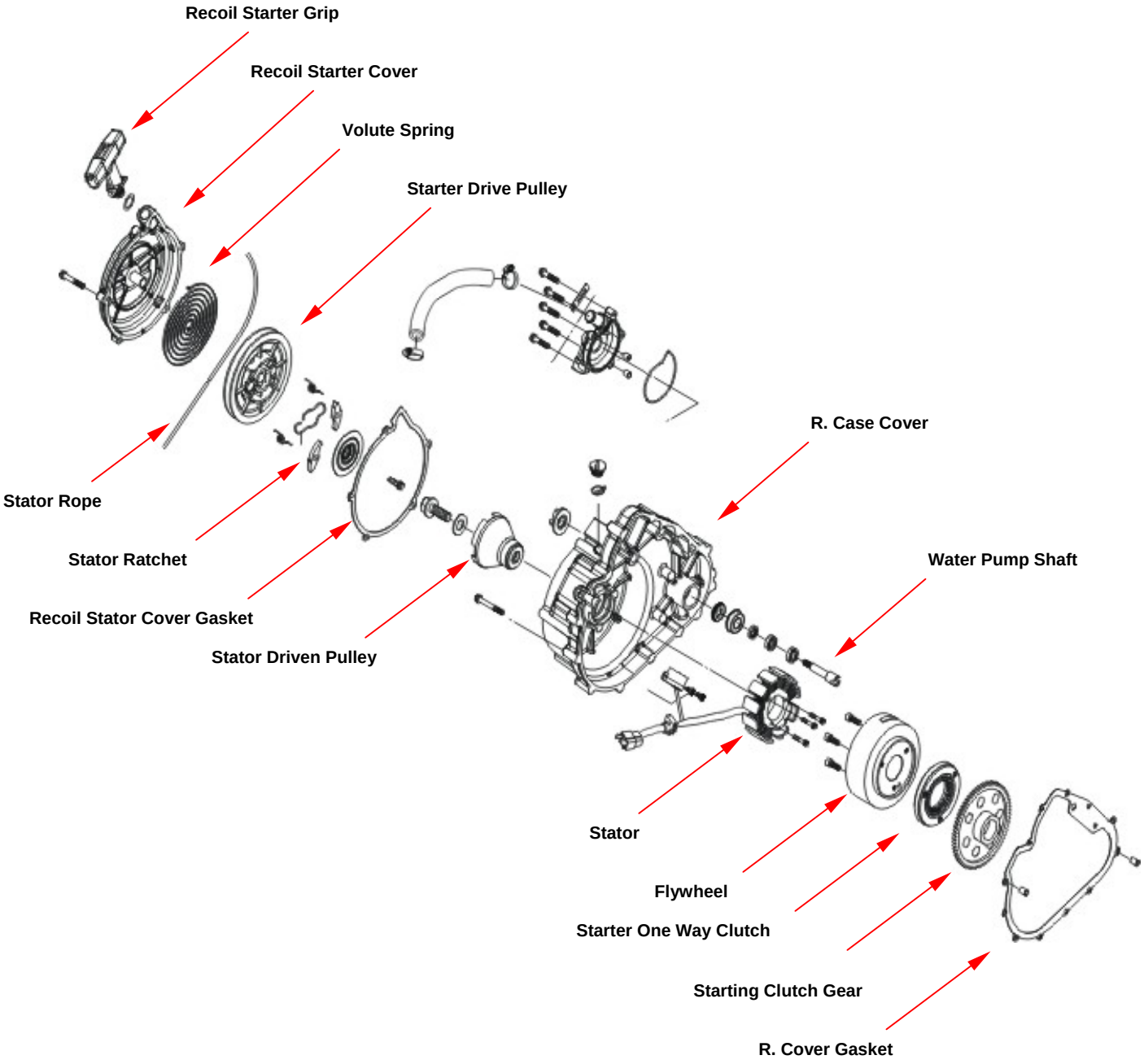
Check if the propeller shaft rubber boot is damaged or not.



Propeller shaft installation

Install in the reverse order of removal procedures.

Mechanism Diagram



Precautions in Operation

General information

- Refer to chapter 18: The troubleshooting and inspection of alternator
- Refer to chapter 18: The service procedures and precaution items of starter motor

Specification

Item	Standard value (mm)	Limit (mm)
ID of starting clutch gear	27.026~27.045	27.050
OD of starting clutch gear	45.192~45.283	45.183

Torque value

Flywheel nut	5.0~6.0kgf-m
Starting clutch hexagon bolt	1.0~1.4kgf-m with adhesive
8 mm bolts	0.8~1.2kgf-m
12 mm bolts	1.0~1.4kgf-m

Tools

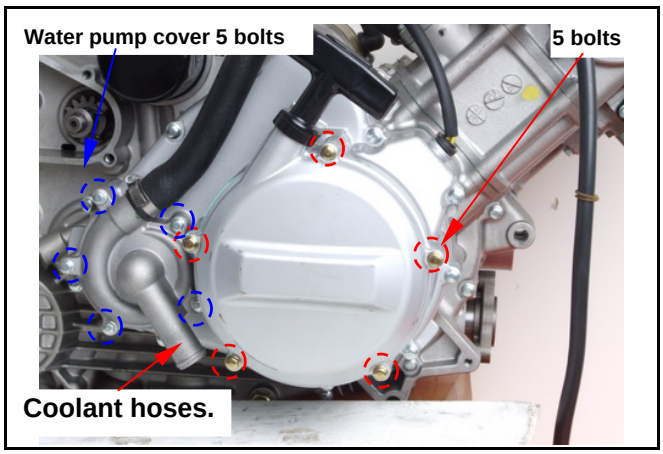
Special tools

A.C.G. flywheel puller: SYM-3110000-HMA

Universal holder: SYM-2210100

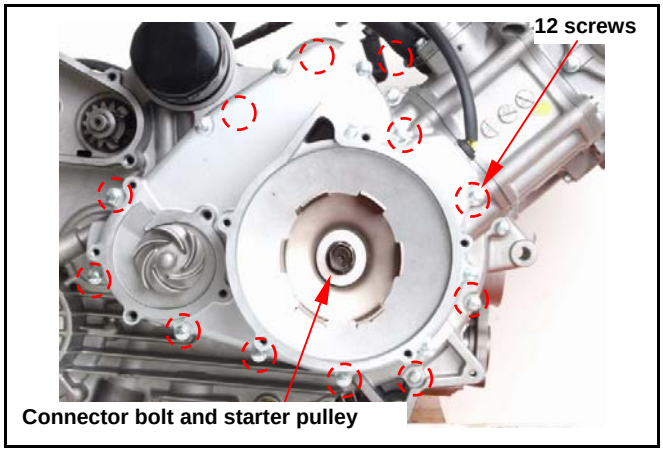
Right Crankcase Cover Removal

Remove the left footrest.
Drain the engine oil and coolant, and then remove coolant hoses.
Remove 5 bolts from the recoil starter cover.
Remove the recoil starter cover and gasket.
Remove the water pump cover (5 bolts)

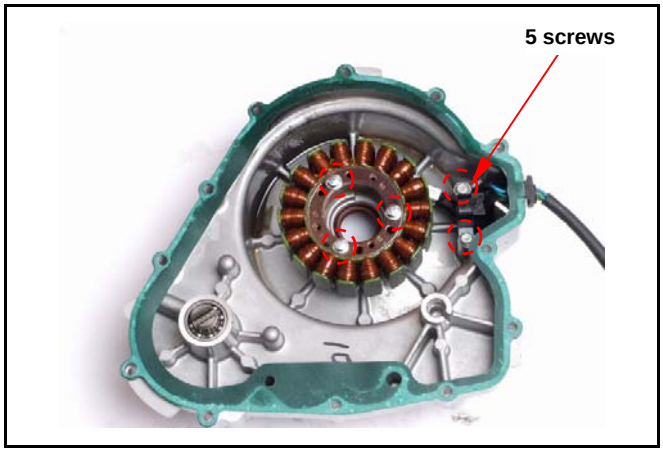


A.C. Generator Removal

Remove the connector bolt and starter pulley.
Remove 12 mounted screws from the right crankcase cover and then remove it.



Remove 5 screws from right crankcase cover.



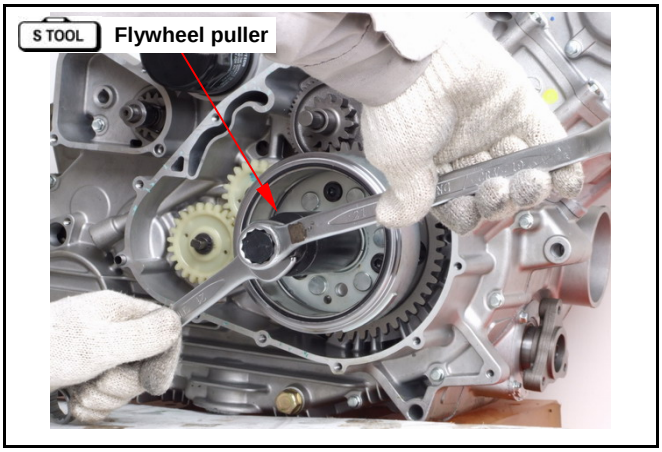
Remove the stator.

Flywheel Removal

Remove the A.C. Generator flywheel with special tool.

Tool name：**A.C.G. flywheel puller**

Tool number：SYM-3110000-HMA



Starting Clutch Gear Inspection

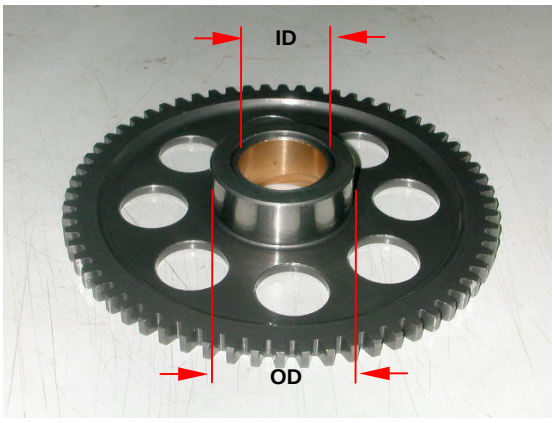
Remove the starting clutch driven gear.

Check the gear for wear or damage.

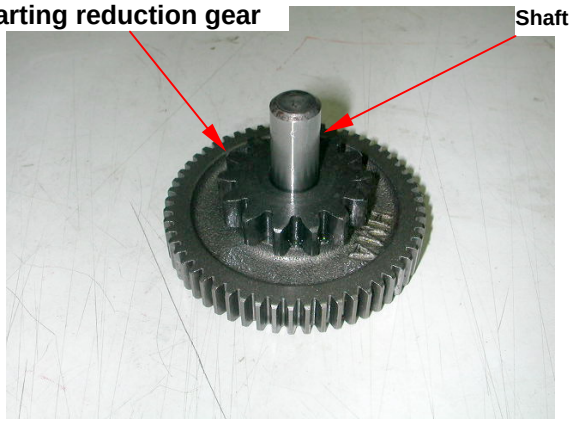
Measure the ID and OD of the starting clutch driven gear.

Service Limit: ID: 27.050 mm

OD: 45.183 mm



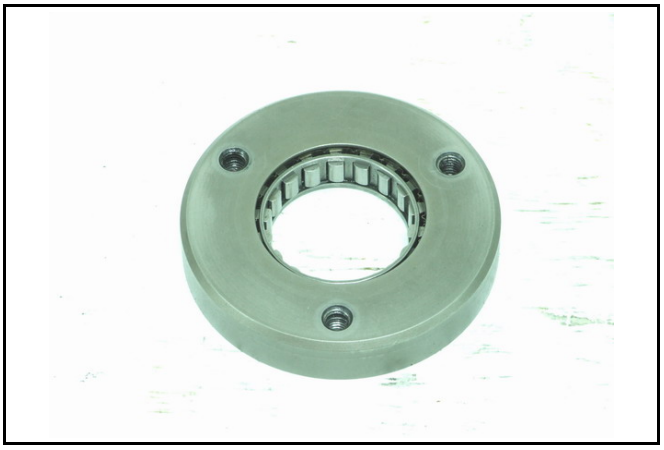
Check the starting reduction gear and shaft for wear or damage.



Starter One-way Clutch Removal

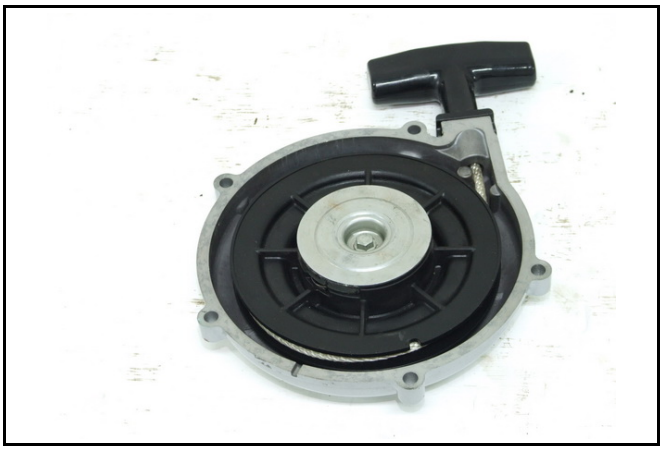
Remove 3 bolts from the A.C. Generator flywheel.

Check each roller for wear or damage.

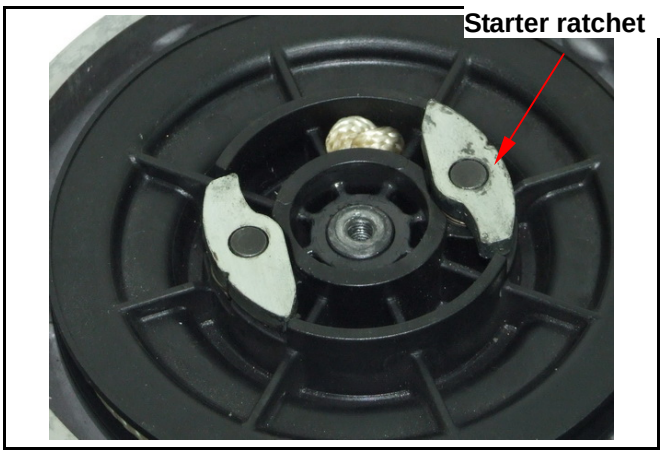


Recoil Starter Cover Removal

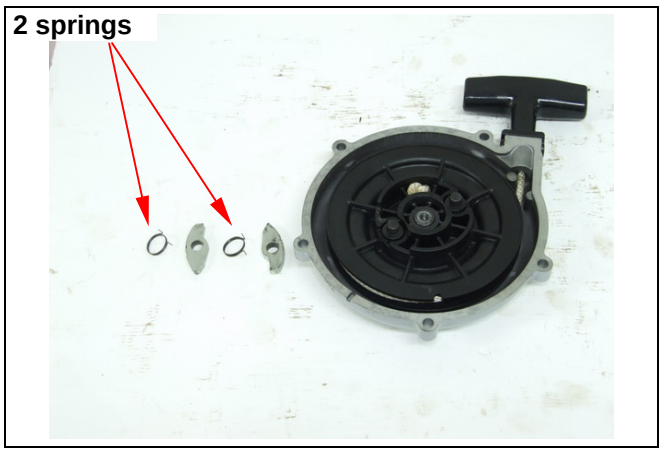
Loosen bolt on the ratchet cover then remove ratchet cover.



Remove the starter ratchets from the ratchet cover.

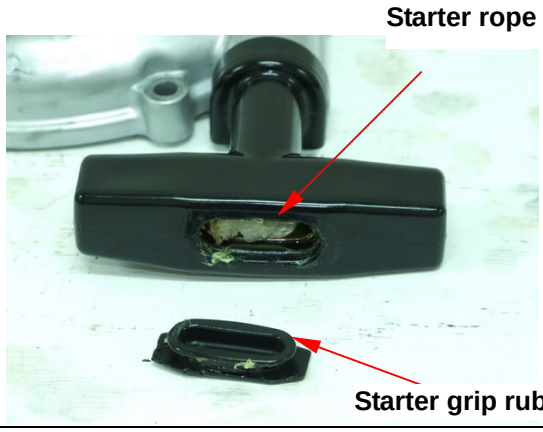


Remove the 2 springs from the ratchet cover.



Do not remove the volute spring from the recoil starter cover unless the spring is broken. If the volute spring is removed from the recoil starter cover, it should be replaced with a new one.

Remove the starter grip rubber.
Disassemble the starter grip and rope.



Installation

Install in reverse order of removal procedures

⚠ Caution

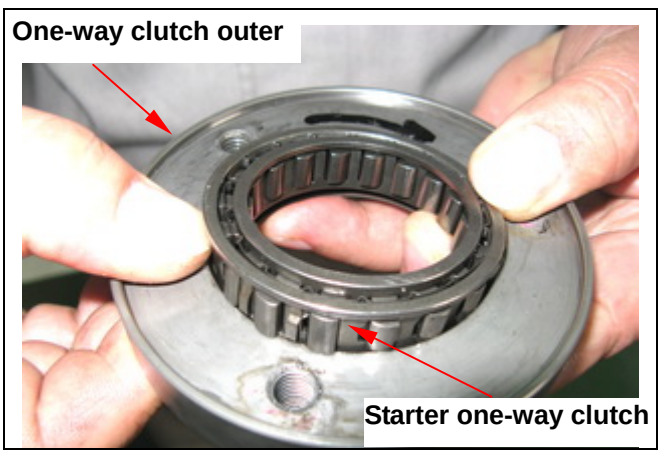
First before installing the drive pulley must establish 2 1/2 of the pressures transferred to pressure springs.

Starter One-way Clutch Installation

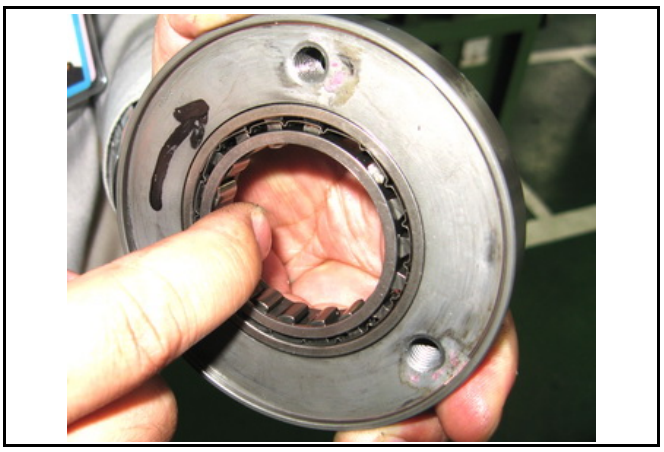
Install the starter one-way clutch into the one-way clutch outer.

⚠ Caution

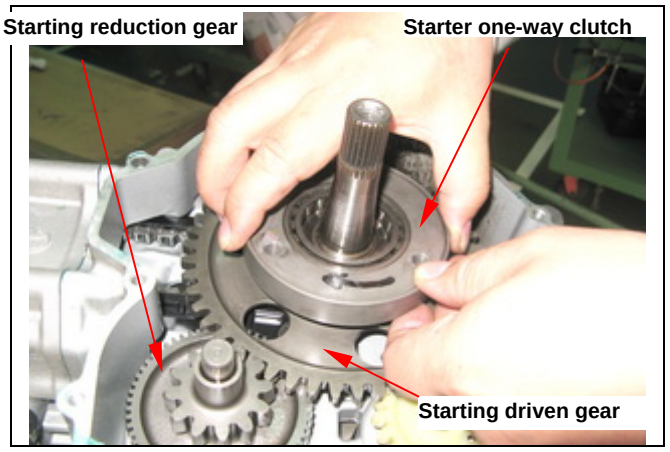
Please pay attention to the installation direction. Install the starter one-way clutch into the one-way clutch outer gently as the photo shows. Do not push the one-way clutch forcibly into the clutch outer or it may be damaged.



Rotate the inner part of the starter one-way clutch to make sure it is installed correctly and works properly.



Install the starting reduction gear first and then install the starting driven gear to the crankshaft. Install the starter one-way clutch. Rotate the starter one-way clutch clockwise to make smooth and precise installation as the photo shows.



⚠ Caution

Pay attention to the installation direction. Do not install the starter one-way clutch reversely or it will not work properly.

Flywheel Installation

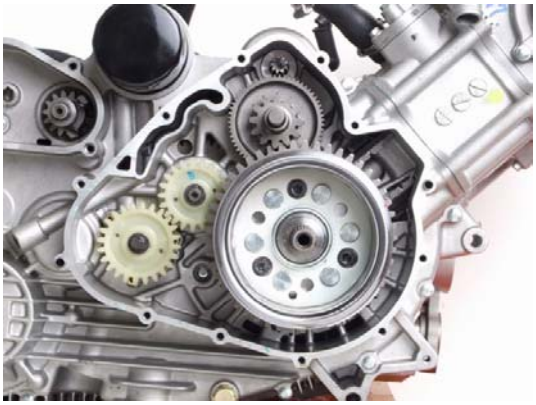
Install the flywheel onto the crankshaft.

⚠ Caution

Pay attention to the flywheel key way and make it fit the crankshaft properly. Do not install the flywheel forcibly or it may be damaged.

Rotate the starter one-way clutch to make the three boltholes aim at the flywheel.

Screw in the three flywheel bolts evenly
Torque value: 1.0~1.4kgf-m.
Rotate the flywheel to make sure it is installed well and works properly.

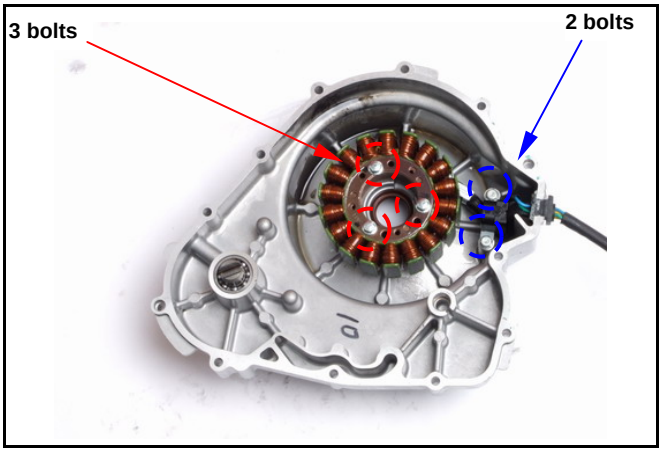


A.C. Generator Installation

Install the A.C. Generator stator set onto right crankcase cover (3 screws).
Install the pulse generator (2 screws).
Tie the wire harness securely onto the indent of crankcase.

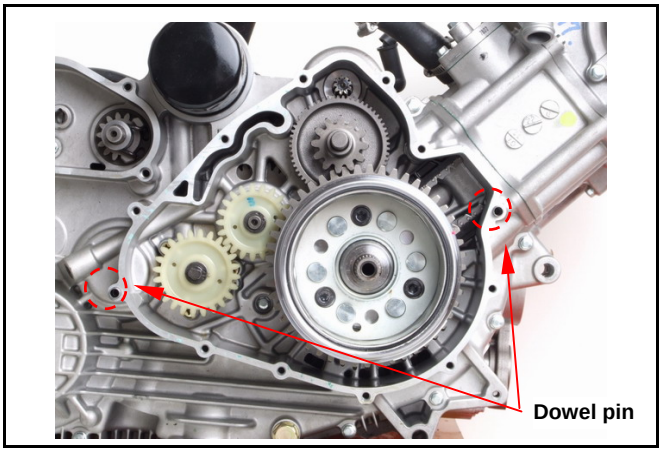
⚠ Caution

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



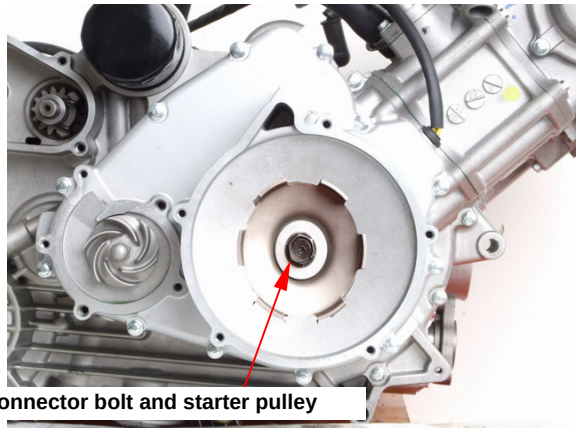
Right Crankcase Cover Installation

Install the dowel pin and new gasket.

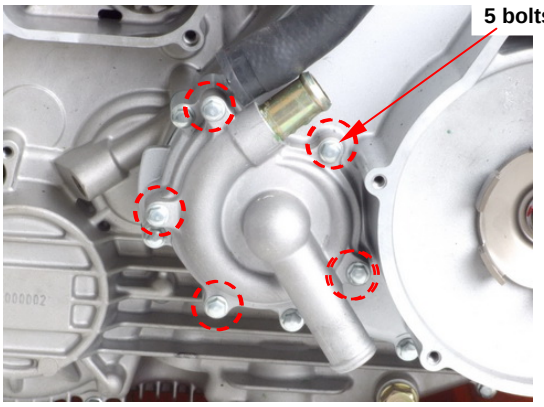


Remove the water pump cover.
Install the right crankcase cover onto the crankcase.
Note: Align the water pump shaft indent with the oil pump shaft.

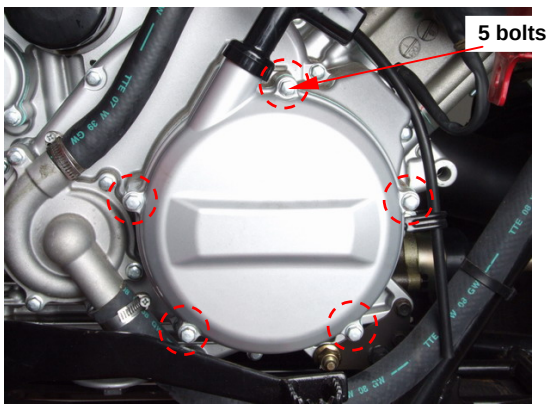
Assemble the connector bolt and starter pulley on the right crankcase cover.
Assembly 12 bolts on the right case cover.



Install the water pump cover (5 bolts)

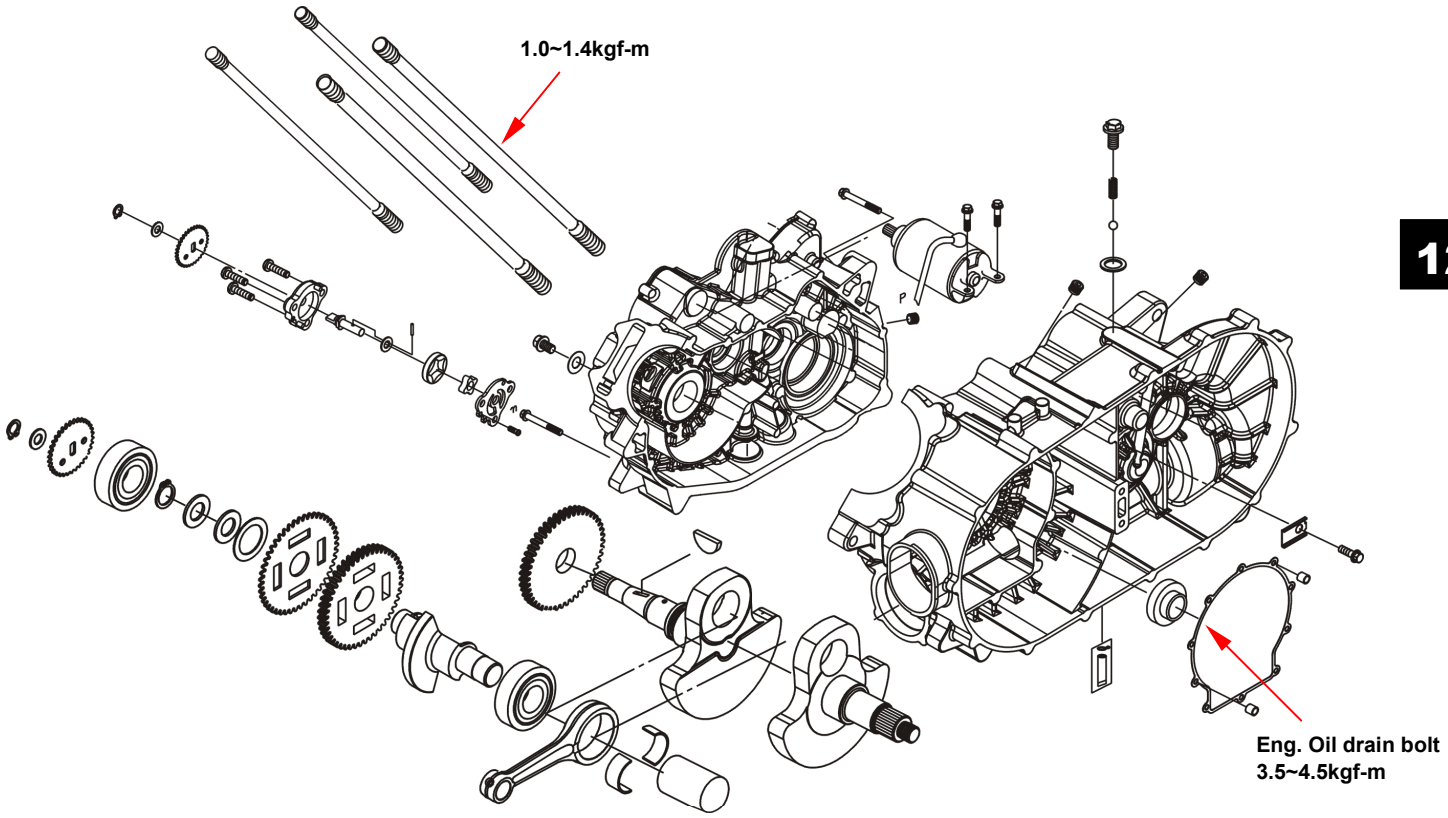


Assemble the gasket.
Assemble the starter cover on the right crankcase cover.



Note:

Mechanism Diagram



General Information

Operational precautions

- This Section concerns disassembly of the crankcase for repair purpose.
- Remove following components before disassembling crankcase.
  - —Engine remove Section 5
  - —Cylinder head Section 6
  - —Cylinder and piston Section 7
  - —Drive face and driven pulley Section 8
  - —AC generator/Start one way clutch Section 10

- In case it requires replacing the crankshaft bearing, the driving chain of engine oil pump or the timing chain, it is preferably to replace crankshaft as a unit.

Specification

Unit: mm

	Item	Standard	Limit
Crankshaft	Connecting rod side clearance of the big end	0.100~0.400	0.600
	Vertical clearance of the big end of the connecting rod	0~0.008	0.050
	Run-out	-	0.100

Torque value

Bolts for crankcase	0.8~1.2kgf-m
Engine oil drain bolt	3.5~4.5kgf-m
Cylinder stud bolt	1.0~1.4kgf-m

Tools

Special tools

Crankcase Main Bearing Install Tool: SYM-9100100-REA

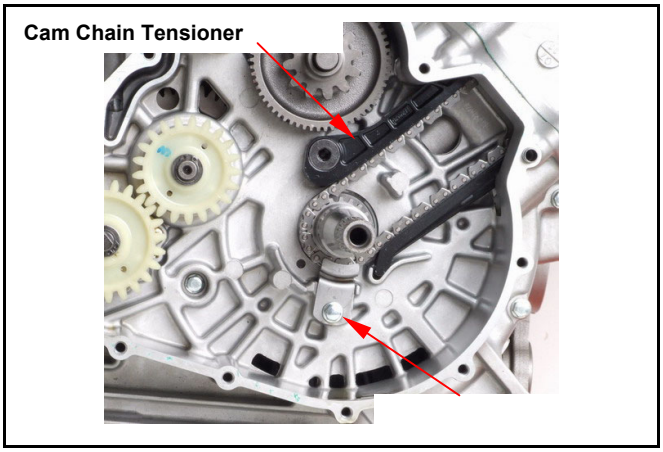
Trouble Diagnosis

Engine noise

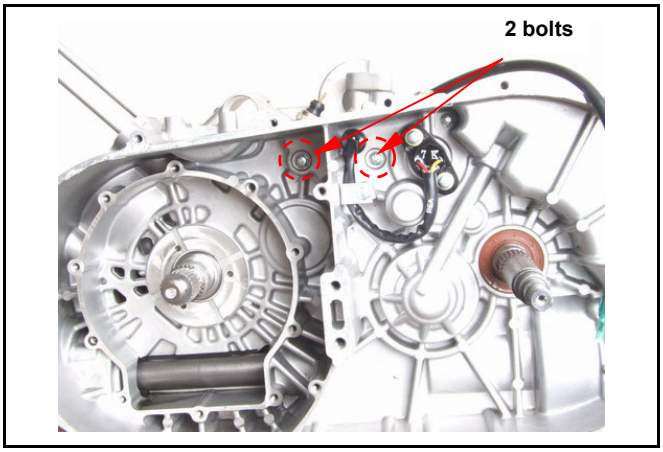
- Loose crankshaft bearing
- Loose crankshaft pin bearing
- Worn out piston pin and pin hole

Crankcase Disassembly

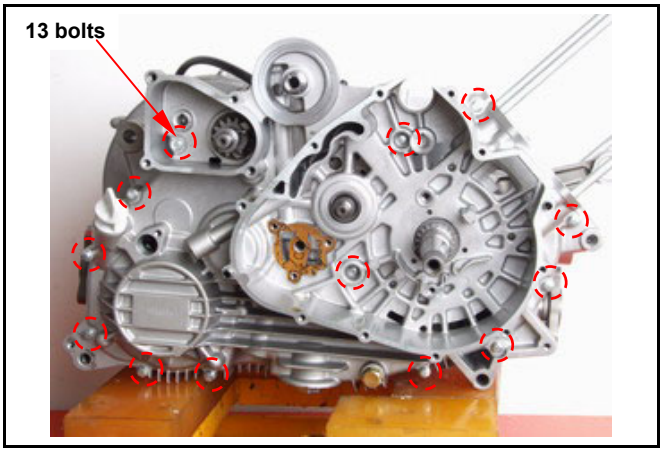
Remove the cam chain setting plate, and then remove cam chain.
Loosen the pivot bolt and remove the cam chain tensioner.



Loosen 2 bolts on the left crankcase.



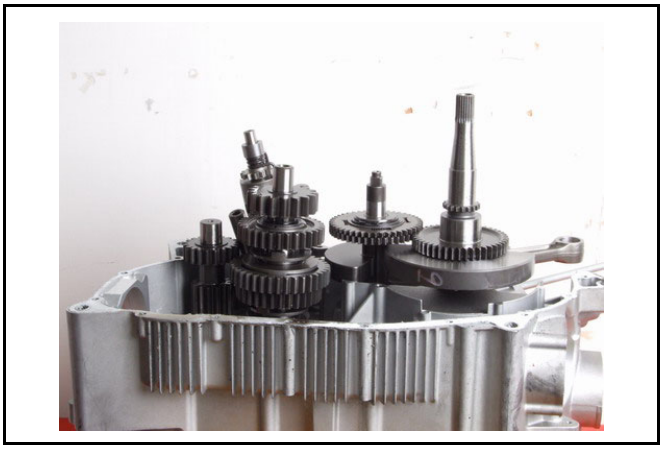
Loosen 13 bolts on the right crankcase.



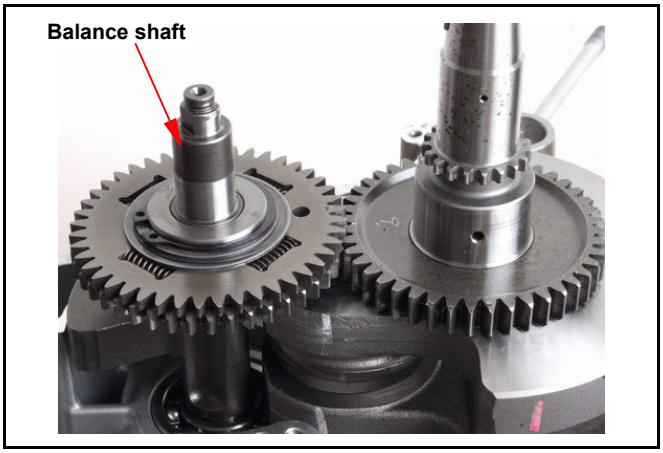
Place left crankcase downward and right crankcase up.
Tap the right crankcase with a plastic hammer to remove it.

⚠ Caution

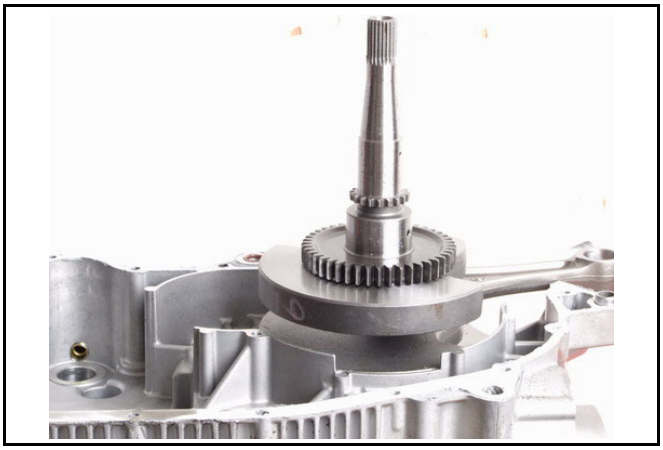
Do not make damage to the contact faces.



Remove balance shaft from left crankcase.



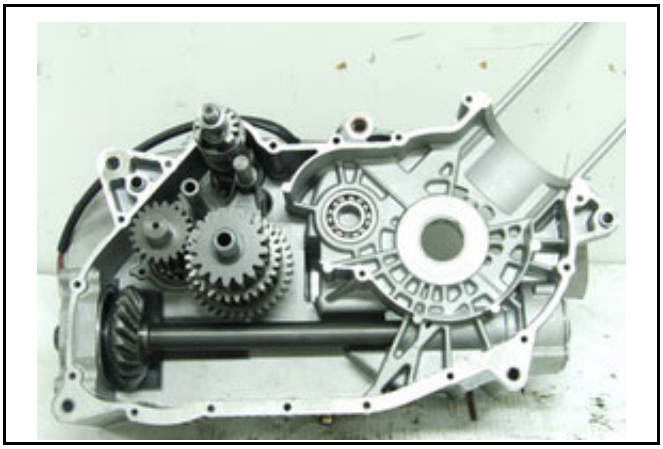
Remove crankshaft from left crankcase.
Remove gasket and dowel pins.
Scrape gasket residues off the crankcase contact surface.



⚠ Caution

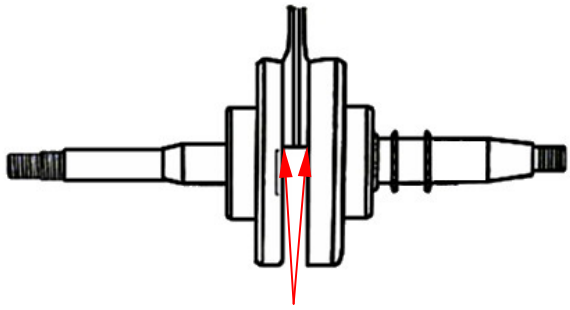
Do not damage the contact face of the gasket. It is better to moisten the gasket residue for easy scrapping.

Replace crankcase main bearings if necessary.



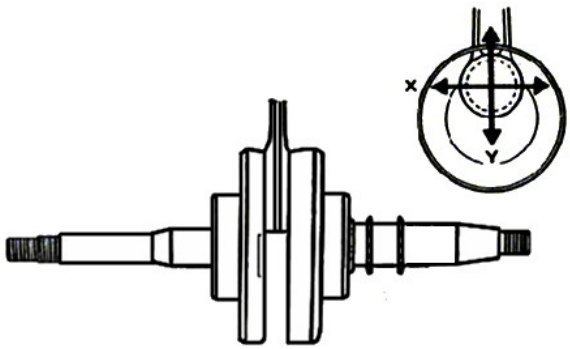
Crankshaft Inspection

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

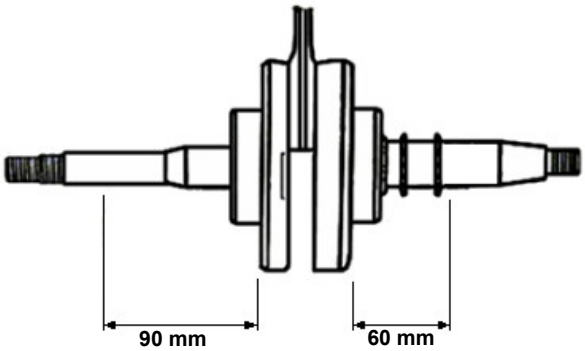


Measure point for the crank big end of the connecting rod.

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



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



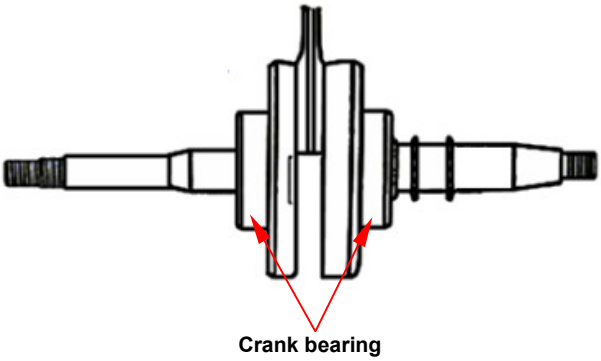
Check crankshaft bearing

Use hand to crank the bearing to see if it moves freely, smoothly and noiseless.
Check the inner ring to see if it links firmly on the bearing.
If any roughness, noise and loose linkage are detected, replace the bearing with new one.

⚠ Caution

The bearing shall be replaced in pair.

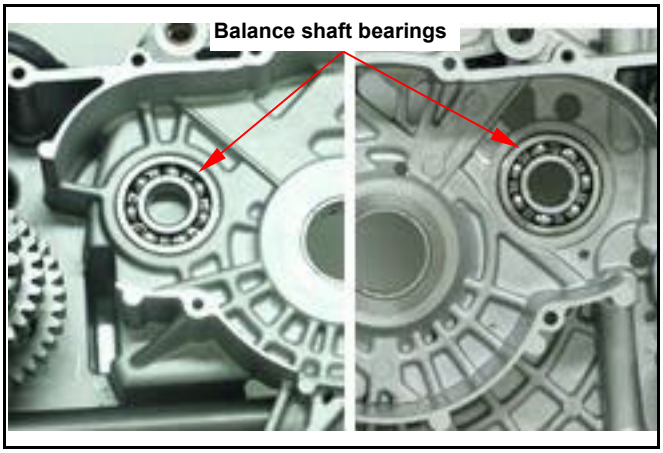
Special tool: outer bearing puller



Crank bearing

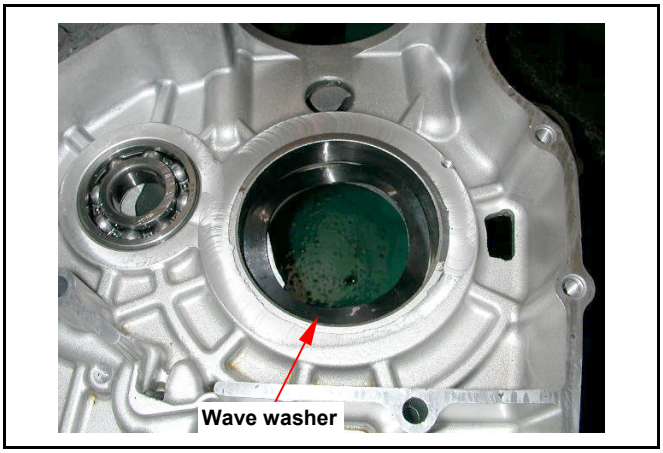
Check balance shaft bearing

Check bearings on right and left crankcase.
Rotate each bearings inner ring with fingers.
Check if bearings can be turned in smooth and silent, and also check if bearing outer ring is mounted on gear tightly.
If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.
Special tool:
Tool number：SYM-6204024
Tool name：Inner bearing puller bearing driver



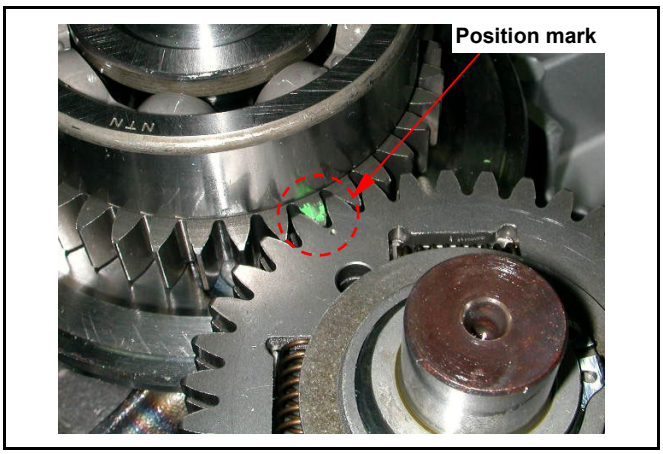
Crankcase Assembly

Install wave washer into right crank bearing seat.

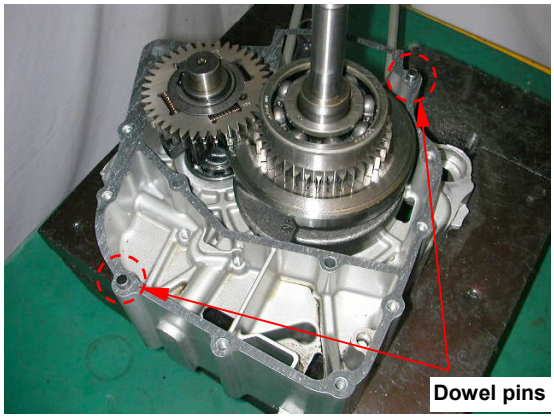


Install crank shaft on the right crankcase.

Align the position mark on the balance shaft drive gear with that of balance shaft driven gear, and then install balance shaft onto right crankcase.

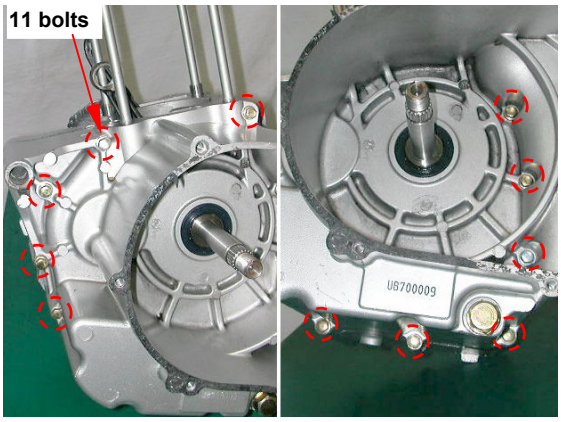


Install 2 dowel pins and new gasket.

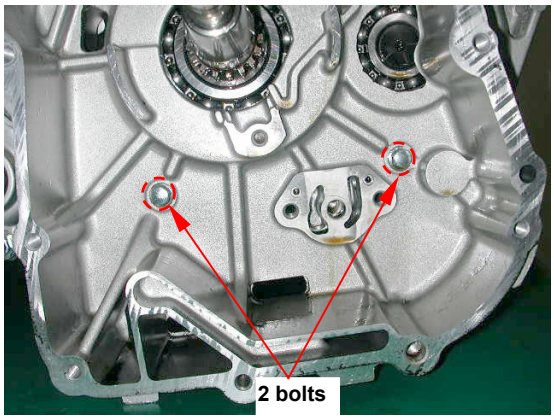


Install the left crankcase onto the right crankcase.

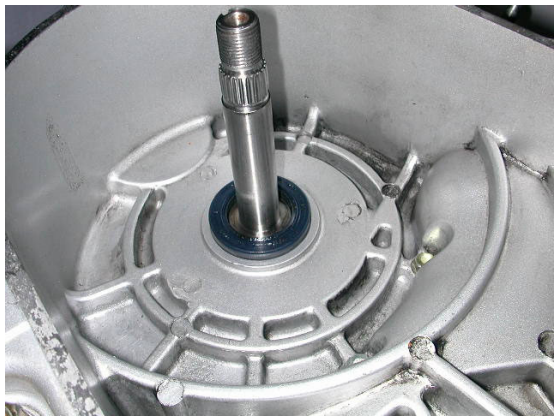
Tighten 11 bolts on the left crankcase.
Torque value: 0.8~1.2kgf-m



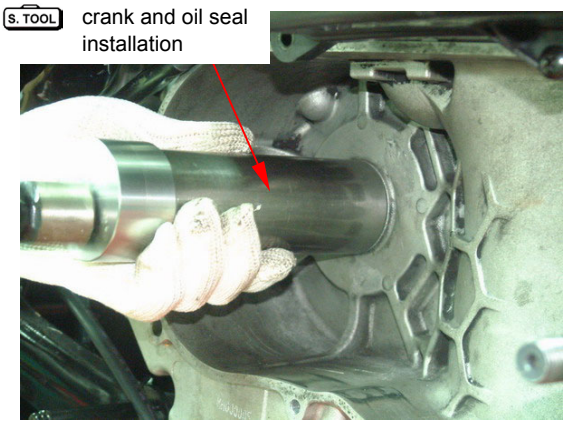
Tighten 2 bolts on the right crankcase.
Torque value: 0.8~1.2kgf-m



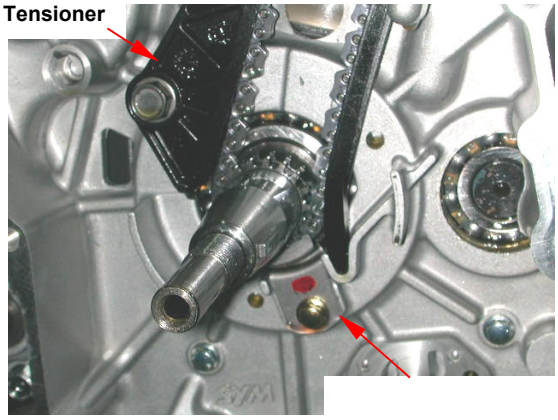
Clean the crankshaft.
Apply a layer of grease on the lip of oil seal, Puts on the left crank shaft.
Install the oil seal in the left crankcase with care not to damage the lip of the oil seal.



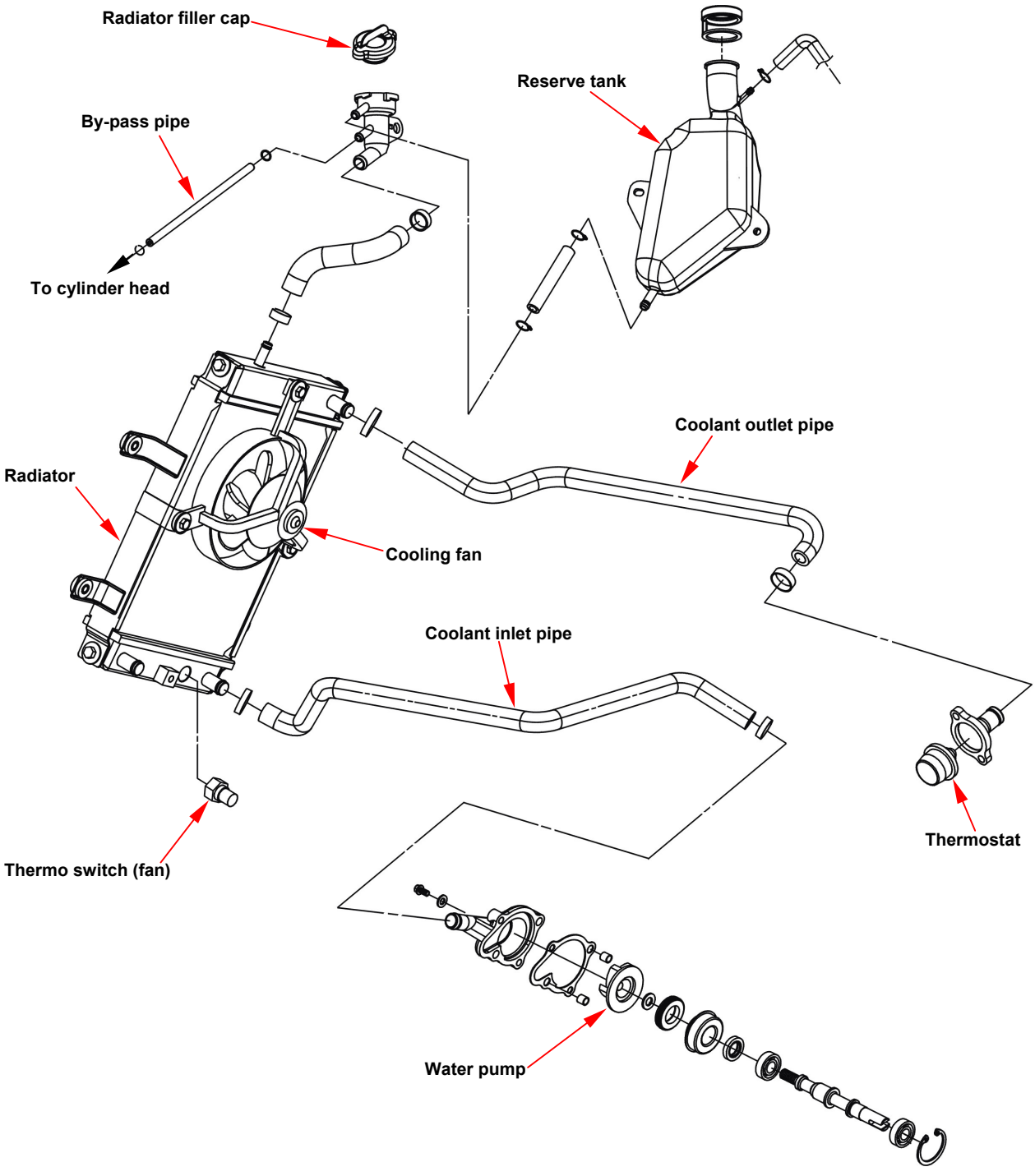
By oil seal driver (27×42×7), oil seal will knock into located.
Special tool:
Tool number：SYM-11332100-HMA RB1
Tool name：Crank and oil seal installation.



Install the tensioner and tighten the pivot bolt.
Torque value: 0.8 ~1.2kgf-m
Install the cam chain.
Install the cam chain setting plate.



Mechanism Diagram



General Information

General

Warning:

While the engine is running, do not attempt to open the radiator cap, the pressurized hot coolant may shoot out and cause serious injury. No maintenance work is allowed to perform until the engine is completely cooled down.

- Refill the radiator with distilled water or specified additives.
- Add coolant to the reserve tank.
- The cooling system maintenance can be serviced on the ATV.
- Never spill the coolant to the painted surface.
- Test the cooling system for any leakage after the servicing.
- Please refer to Section 17 for inspection of the thermo switch for the fan motor and the coolant temperature sensor.

Technical Specification

Item	Specification
Pressure to open filler cap	0.9±0.15 kgf/cm^2
Capacity of coolant: Engine + radiator Reserve tank upper	1750c.c. 350c.c.
Thermostat	Begins to activate at 82~95℃ Stroke: 0.05~3mm
Thermos switch (fan)	Begins to activate at 98±3℃
Boiling point	Not-pressure: 107.7℃ Pressurized: 125.6℃

Torque Value

For water pump impeller 1.0~1.4kgf-m

Tools Requirement

Special tools

Water pump bearing driver (6901): SYM-9100100
Water pump oil seal driver (Inner): SYM-9120500-H9A
Water pump mechanical seal driver: SYM-1721700-H9A
Inner bearing puller: SYM-6204020

Trouble Diagnosis

The engine temperature is too high

- The water temperature sensor or the thermo switch (fan) does not work properly.
- The thermostat is stuck to close.
- Insufficient coolant.
- The water hose and jacket are clogged.
- Fan motor malfunction.
- The radiator filler cap malfunction.

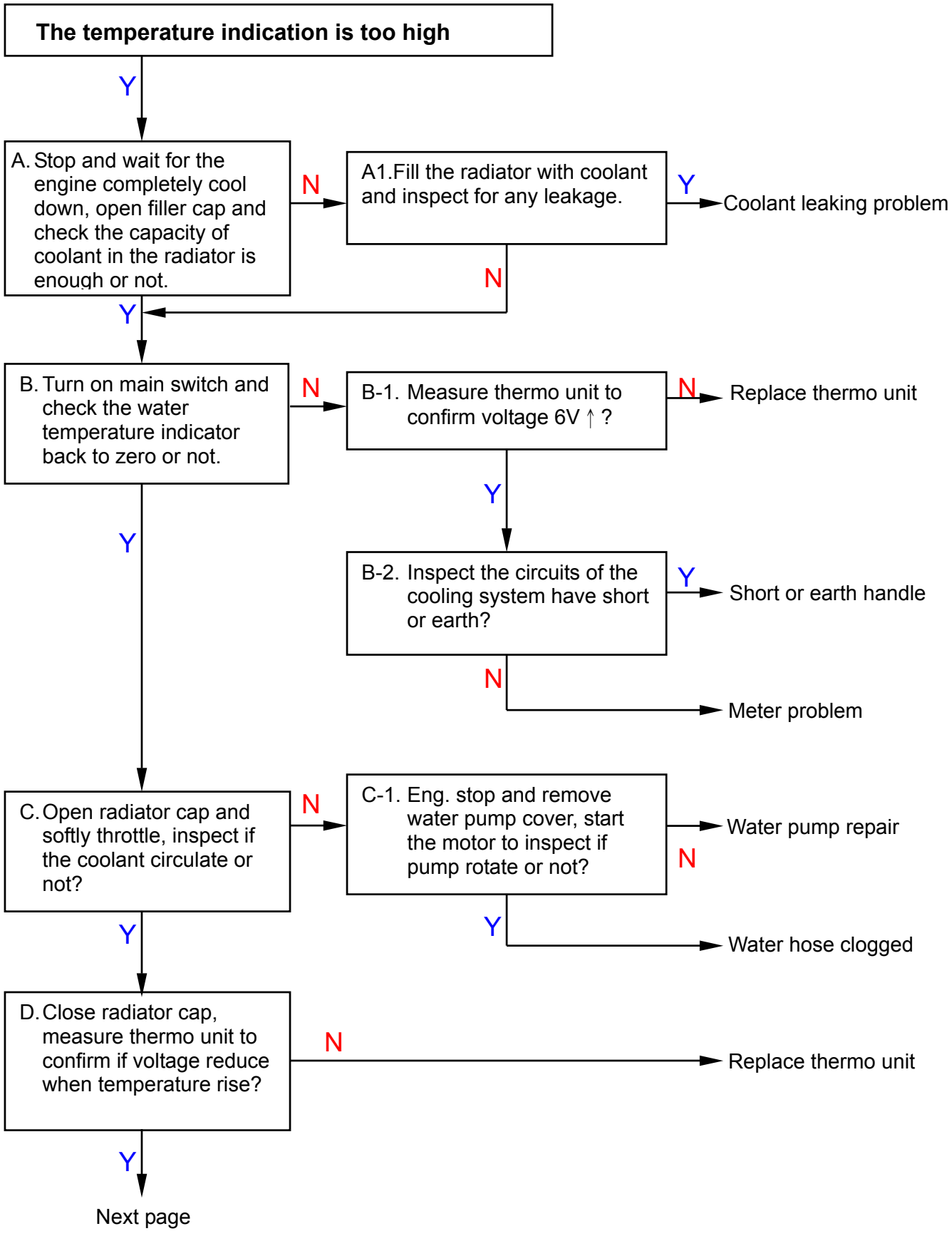
The engine temperature is too low

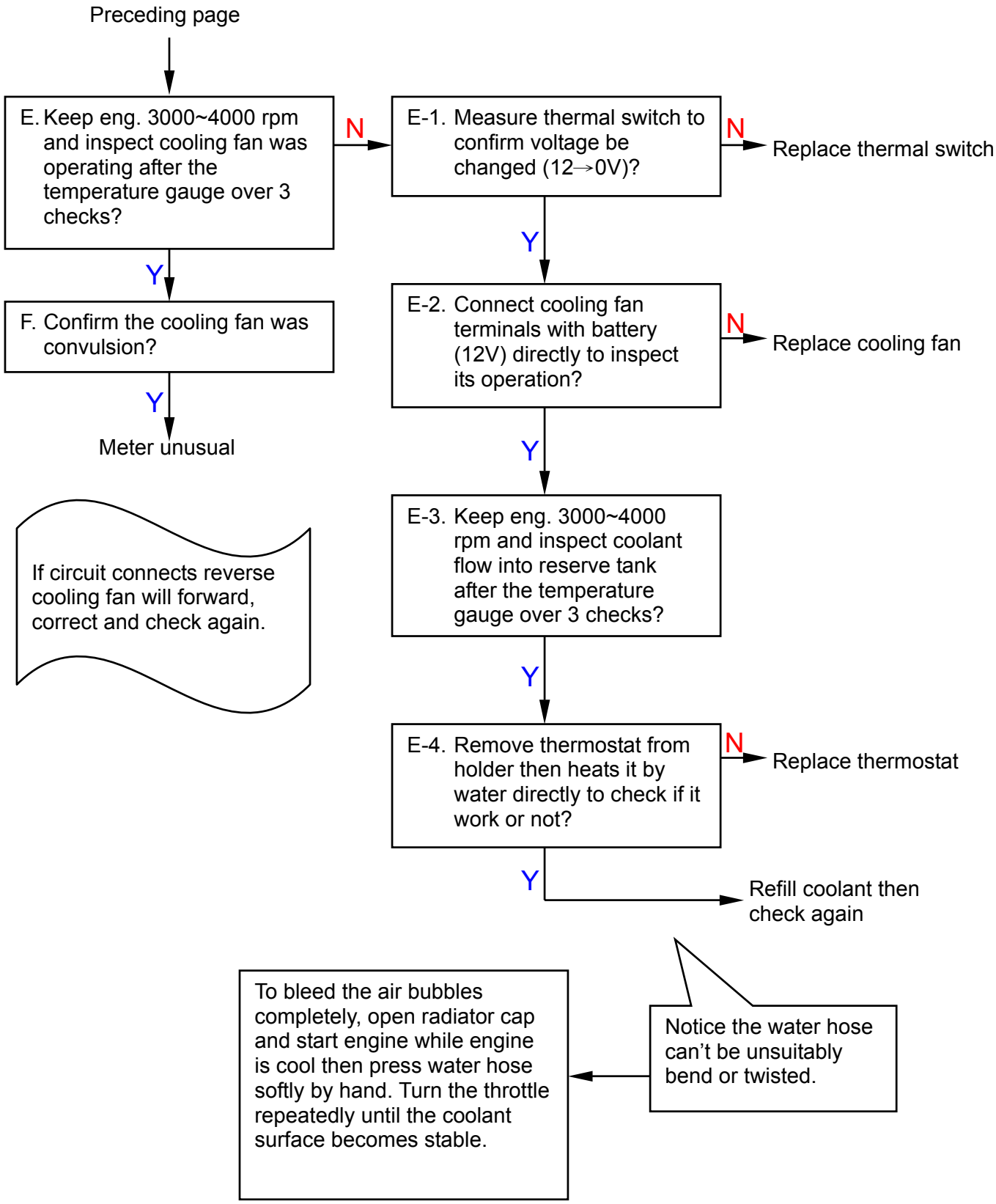
- The water temperature sensor or the thermo switch malfunction.
- The thermostat is stuck to open.

Coolant is leaking

- The water pump mechanical seal does not function properly.
- The O ring is deteriorated.
- The water hose is broken or aged.

Cooling System Troubleshooting




Preceding page
E. Keep eng. 3000~4000 rpm and inspect cooling fan was operating after the temperature gauge over 3 checks?
N
E-1. Measure thermal switch to confirm voltage be changed (12→0V)?
N
Replace thermal switch
Y
Y
F. Confirm the cooling fan was convulsion?
E-2. Connect cooling fan terminals with battery (12V) directly to inspect its operation?
N
Replace cooling fan
Y
Y
Meter unusual
If circuit connects reverse cooling fan will forward, correct and check again.
E-3. Keep eng. 3000~4000 rpm and inspect coolant flow into reserve tank after the temperature gauge over 3 checks?
Y
E-4. Remove thermostat from holder then heats it by water directly to check if it work or not?
N
Replace thermostat
Y
Refill coolant then check again
Notice the water hose can't be unsuitably bend or twisted.
To bleed the air bubbles completely, open radiator cap and start engine while engine is cool then press water hose softly by hand. Turn the throttle repeatedly until the coolant surface becomes stable.

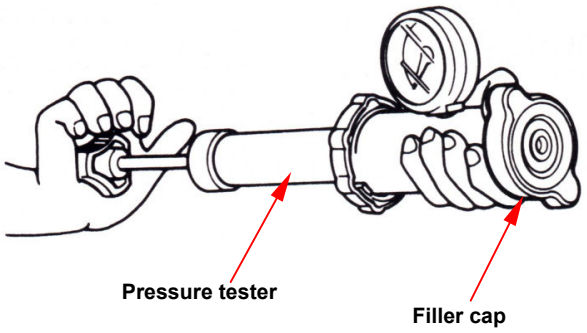
System Test

Test on the filler cap

Hermetically seal the filler cap, apply water and pressure to the filler cap. Replace it with new one if found failing to maintain the specified pressure within a given time limit, or the opening pressure is too high or too low. The specified pressure shall be maintained at least for 6 seconds in the test

Relief pressure for the filler cap: 0.9-0.15 kgf/cm^2

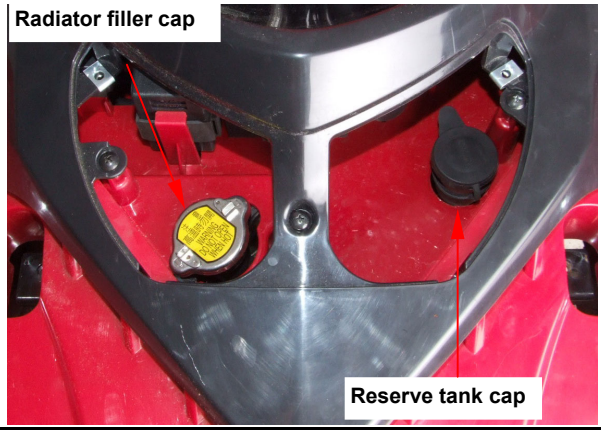
Apply pressure to the radiator, engine and water hose to check for any leakage



⚠ Caution

Too high pressure may damage the radiator. Never make pressure, which exceeds 1.05 kg/cm^2.

If the system fails to maintain the specified pressure for at least 6 seconds, repair or replace parts.



Change of coolant

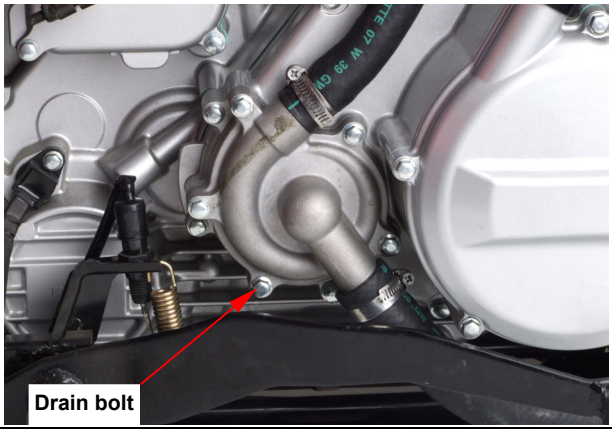
⚠ Warning

Never attempt to carry out service work on the cooling system until the engine is completely cooled down; otherwise, you may get scalded.

Remove the front center cover, and then remove filler cap.

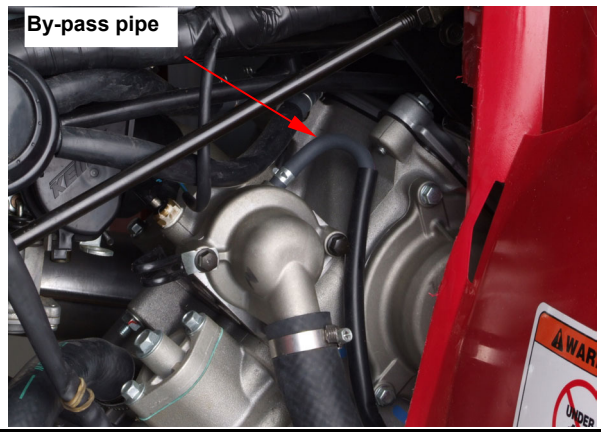
Place a water pan under the water pump; loosen the drain bolt to drain out the coolant.

Reinstall the drain bolt.



Refill system with coolant and bleed the air from the cooling system.

- Run the engine, and remove by-pass pipe.
- Check by-pass hole whether has the air bubble to emit.
- If emits without the air bubble, only has the coolant to flow out, then backflow pipe joint on, engine flameout.
- Remove radiator filler cap.
- Starts the engine, inspects does not have the air bubble in the radiator coolant, also the coolant liquid level is stable.
- Stop the engine. Add coolant to proper level if necessary.
- Screw and tighten up the radiator filler cap.



⚠ Caution

In order to avoid the water tank rusting, please do not use the unidentified coolant.

Coolant recommended: SYM Bramax radiator agent.

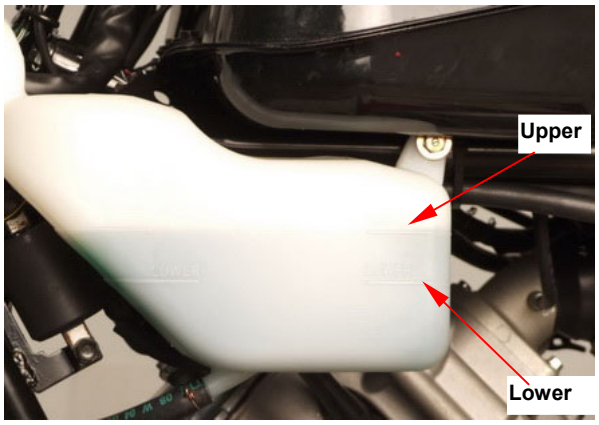
Concentration: 50%

Check reserve tank

- Remove the front center cover, and then remove reserve tank filler cap.
- Check the liquid level in the front fender right side. Add coolant to proper level if too low.
- Reinstall the reserve tank filler cap.

⚠ Caution

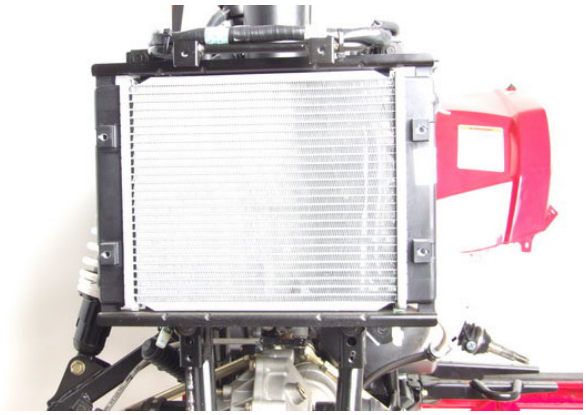
Do not add too much coolant to prevent the coolant backflow flooding when the temperature rises.



Radiator

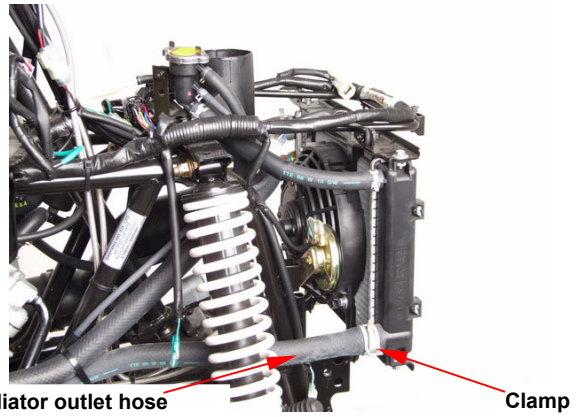
Check

Remove the front center cover, side covers and front fender. (Refer to chapter 13), check for any leakage from weld seam.
Blow the radiator fins with compressed air. If the radiator is blocked by dirt, use low-pressured water jet to clean it.
Be careful straightening the radiator fins.

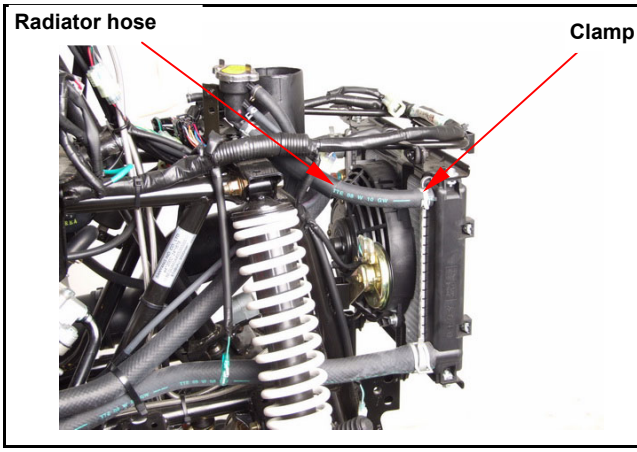


Removal

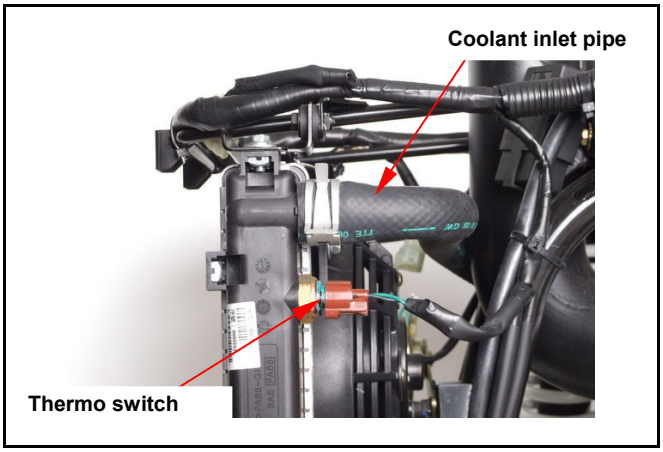
Remove the radiator outlet hose to drain out the coolant.



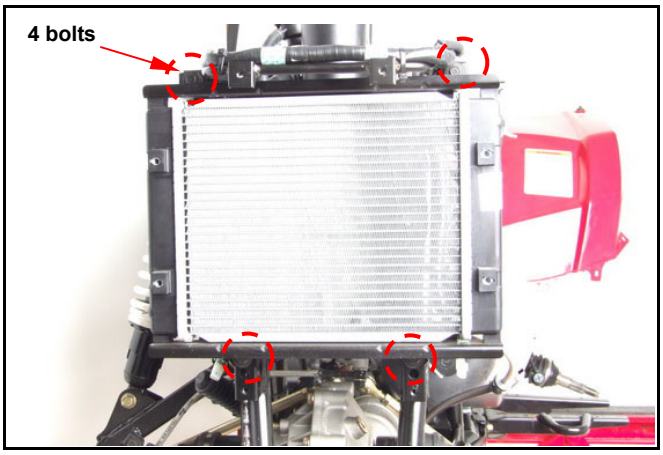
Remove the radiator hose clamp and hose.



Disconnect the couplers for the thermo switch.
Remove the radiator inner hose clamp, water hose, fan motor, and then remove radiator and cooling fan.

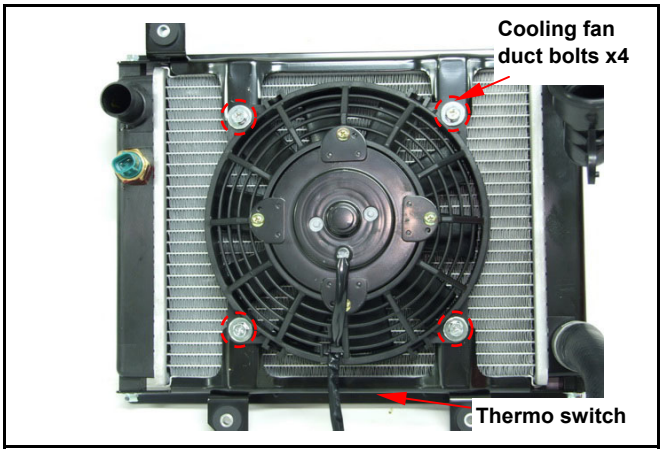


Loosen the radiator 4 bolts and remove the radiator tank.



Disassembly

Loosen the 4 bolts from the fan duct, and then remove the fan duct.
Remove nut to remove the fan from fan motor.
Loosen 4 screws from the fan motor, and take off the fan motor.

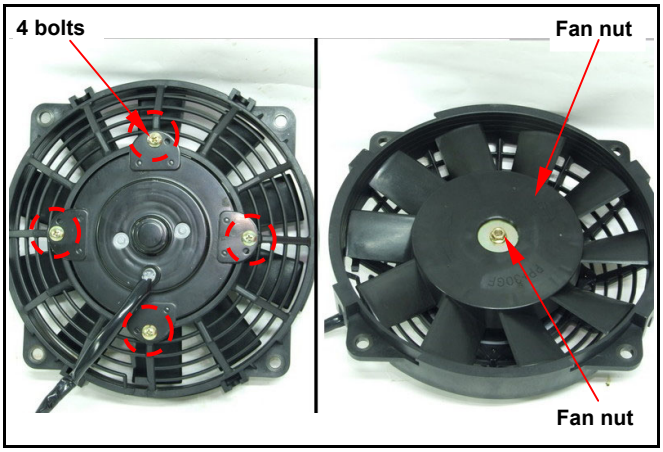


Assembly

Install fan motor onto fan duct and insert the fan into the motor shaft.
Apply a coat of the adhesive to the shaft thread of the motor, and then install the washer and the lock nut.
Tighten the fan duct onto the radiator with 3 bolts.
Please refer to chapter 17 for the inspection of the thermo switch.

⚠ Caution

Liquid packing must be applied to the thermo switch before installing to avoid damaging the radiator.



Installation

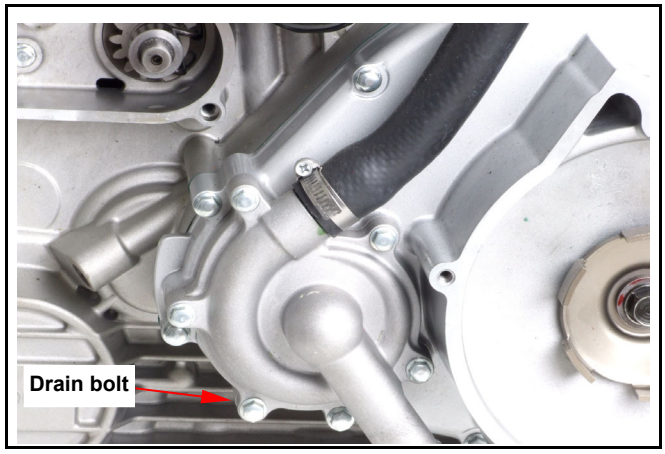
Install the removed parts in the reverse order of removal.
Install radiator in the reverse order of removal.
Upon completion, check for any leakage.

Water Pump

Check water pump seal / cooling system divulges inspection

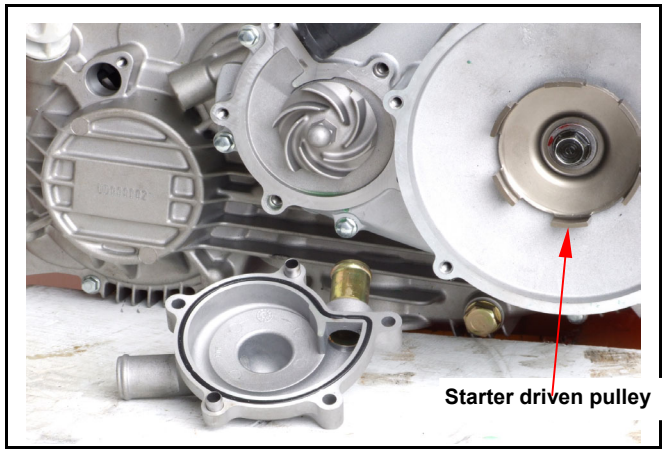
- Disassembles the coolant drain bolt, overflow some coolant, check if the coolant has the oil pollution or not.
- Turn off the oil filler plug, check if the engine oil becomes milky white or not.

If the above two kinds of interior leaking situation occur, possibly caused by the water pump inner seals damage, the engine cooling system damage or the cylinder head gasket damage. Check the water pump seals first. If the water pump seals are ok, inspect the cooling system of the cylinder and the cylinder head.



Water pump removal

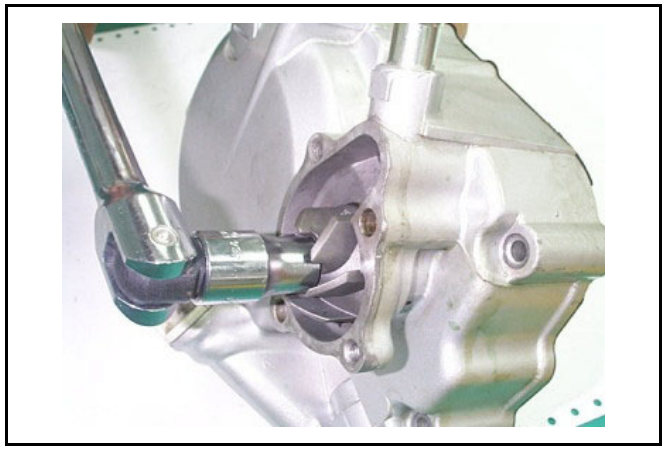
Remove the recoil starter cover assy. and the starter driven pulley.
Loosen the drain bolt to drain the coolant.
Remove the water hose.
Loosen 5 bolts and remove the pump cover.
Loosen 12 bolts and remove the right cover.
Take off the gasket and dowel pins.



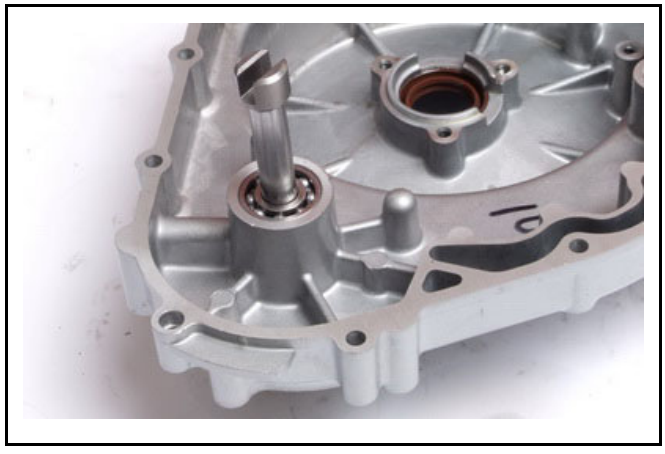
Unscrew the pump impeller clockwise and remove it.

⚠ Caution

The impeller is provided with left turn thread.



Remove the water pump shaft



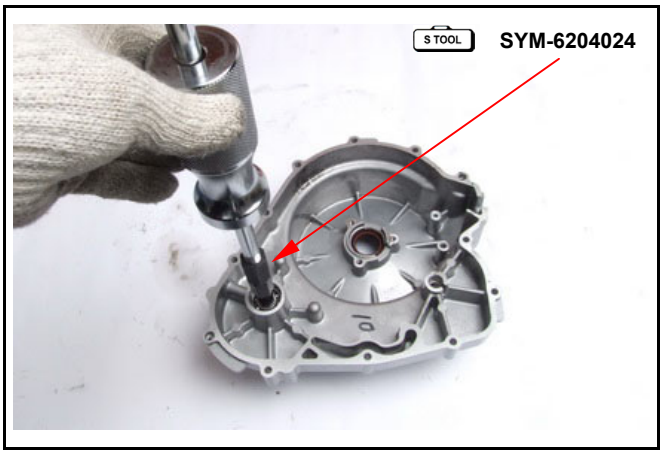
Remove the outside bearing by inner bearing puller.
Rotate the inner ring of bearing, the bearing shall move smoothly and quietly.
If the bearing does not rotate smoothly or produces a noise, replace it with new one.

Special tool:

Tool number：SYM-6204024

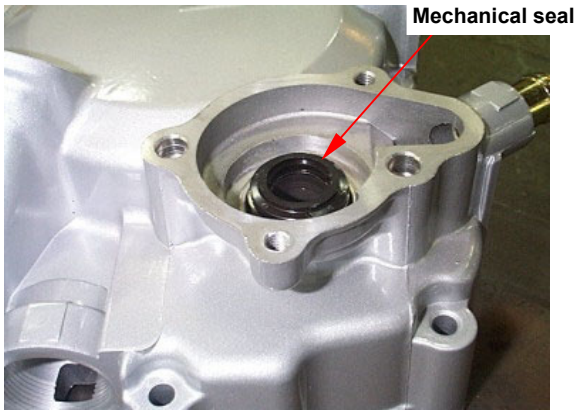
Tool name：Inner bearing puller

Check any wear and damage of the mechanical seal and inside seal.



⚠ Caution

The mechanical seal and inside seal must be replaced as a unit.



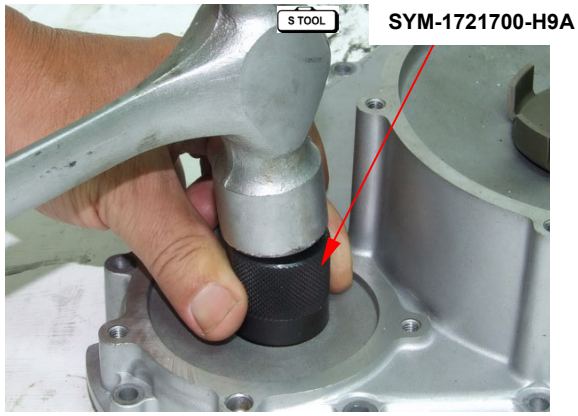
Replacement of Mechanical Seal

Remove the inside bearing by inner bearing puller.
Drive the mechanical seal and inner seal out of the right crankcase.

Special tools:

Tool number：SYM-6204024

Tool name：Inner bearing puller.



⚠ Caution

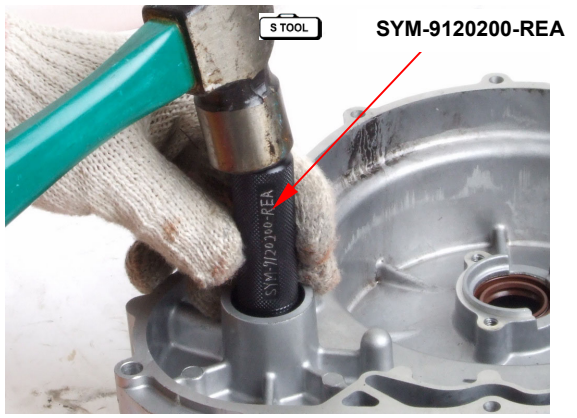
Replace a new mechanical seal after removing it.

Apply a coat of sealant to the mating surfaces of the right crankcase before installing the new mechanical seal.
Install the mechanical seal onto the right crankcase.

Special tools:

Tool number：SYM-1721700-H9A

Tool name：Water pump mechanical seal driver



Install the water pump oil seal onto the right crankcase.

Special tools:

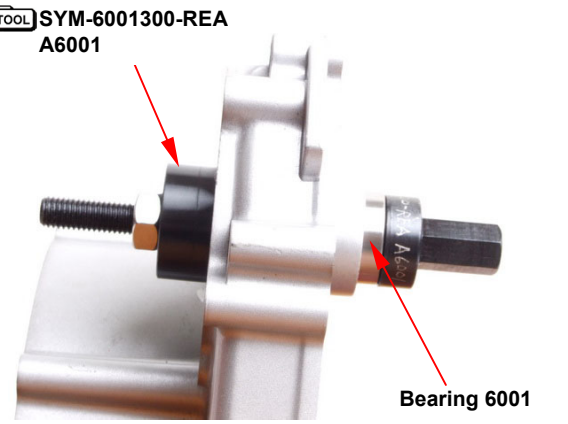
Tool number：SYM-9120200-REA

Tool name：Water pump oil seal driver

Water pump bearing installation

Take the bearing on the special tool.
Put the special tool cap on the right crankcase.
Special tools:
Tool number：SYM-6001300-REA A6001
Tool name：Water pump bearing 6001 inner puller.

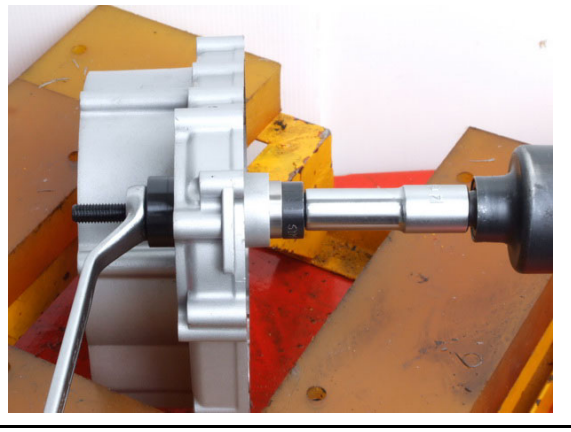
Assemble the bearing for the crankcase with special tool.

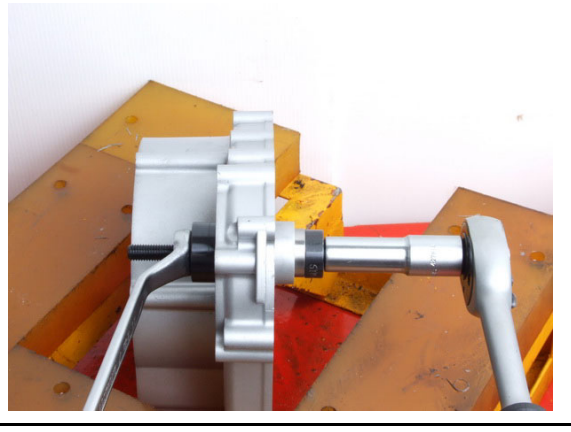


Install the bearing with head or air tool.

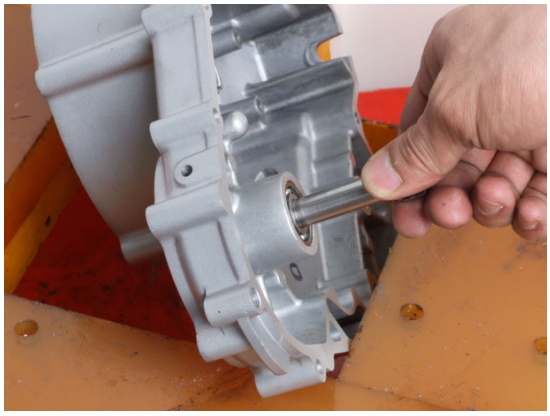
⚠ Caution

Do not reuse old bearing. It must be replaced with a new one once it has been removed.





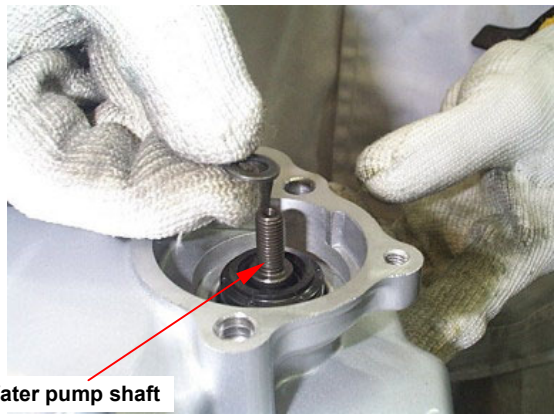
Mount the water pump shaft to the right crankcase cover.



Install the seal washer into the impeller.

⚠ Caution

Washer must be replaced together with the mechanical seal.

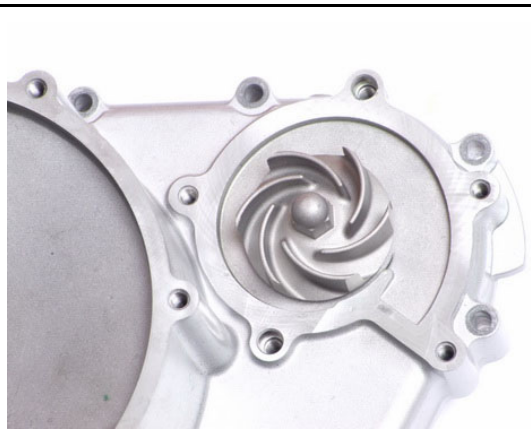


Install the impeller onto the water pump shaft and tighten.

Torque Value: 1.0~1.4kgf-m

⚠ Caution

The impeller is left thread.

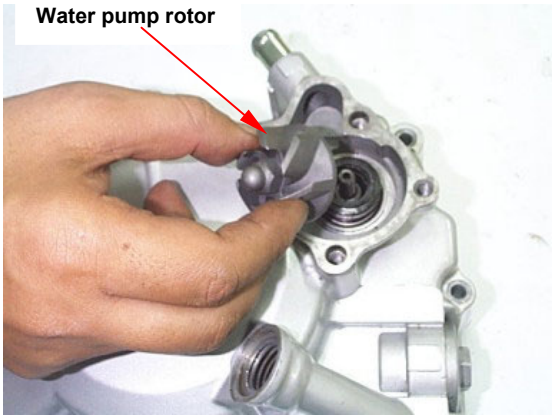


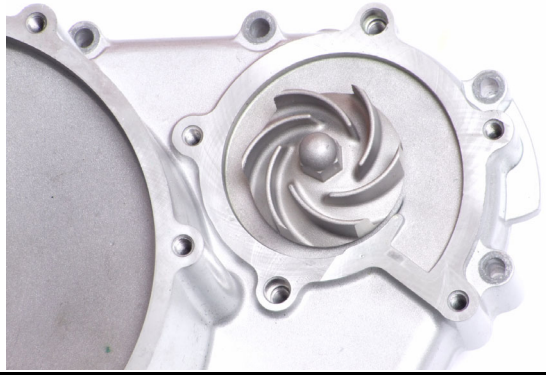
Install the impeller onto the water pump shaft and tighten.
Torque Value: 1.0~1.4kgf-m

⚠ Caution

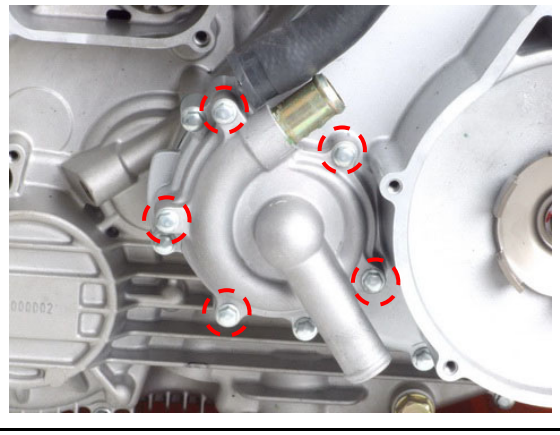
The impeller is left thread.

Install the dowel pin and right cover gasket.
The rotation water pump impeller, causes the water pump drive shaft scoop channel, aligns the oil pump drive shaft flange, install the right crankcase. (9 bolts)





Install the dowel pin and new gasket.
Install the water pump cover with 5 bolts.

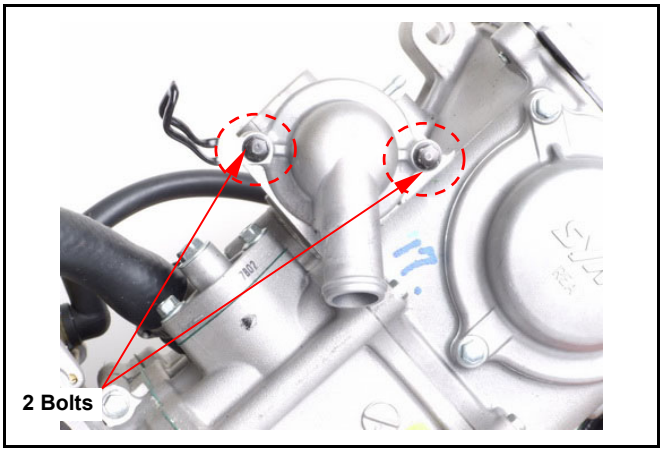


Thermostat

Please refer to chapter 17 for inspection of temperature sensor.

Removal

Drain out the coolant.
Remove the thermostat set. (2 bolts)



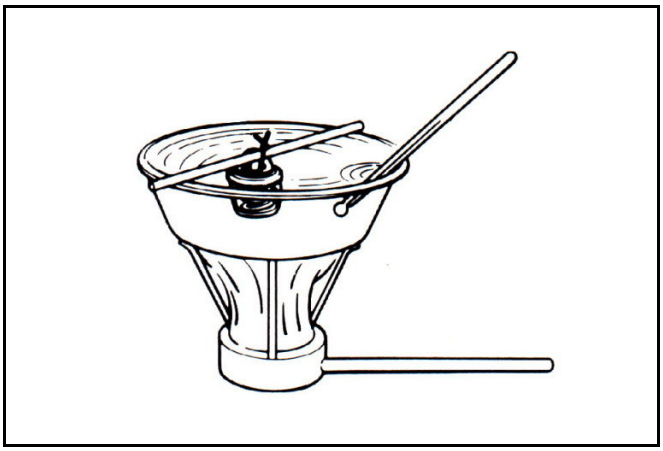
Inspection

Visually inspect thermostat for any damage.

Place the thermostat into heated water to check its operation.

⚠ Caution

Whenever the thermostat and the thermometer are in contact to the wall of heated water container, the reading displayed is incorrect. If the valve of the thermostat remains open at room temperature or the valve operation is not corresponding to the temperature change, then it must be replaced.

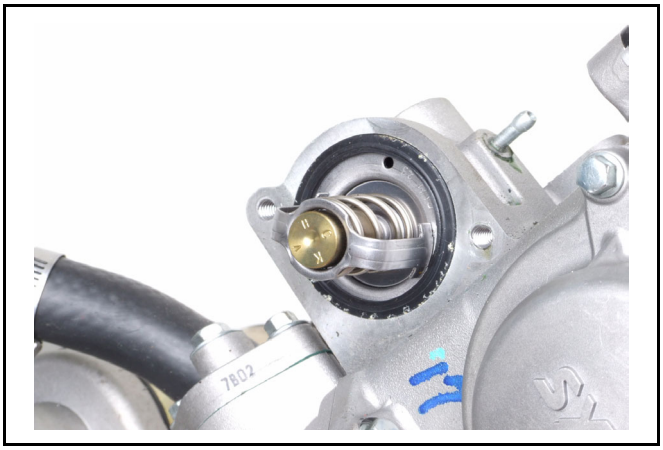


Technical Data

Valve begins to open	82~95℃
Valve stroke	0.05 ~ 3mm

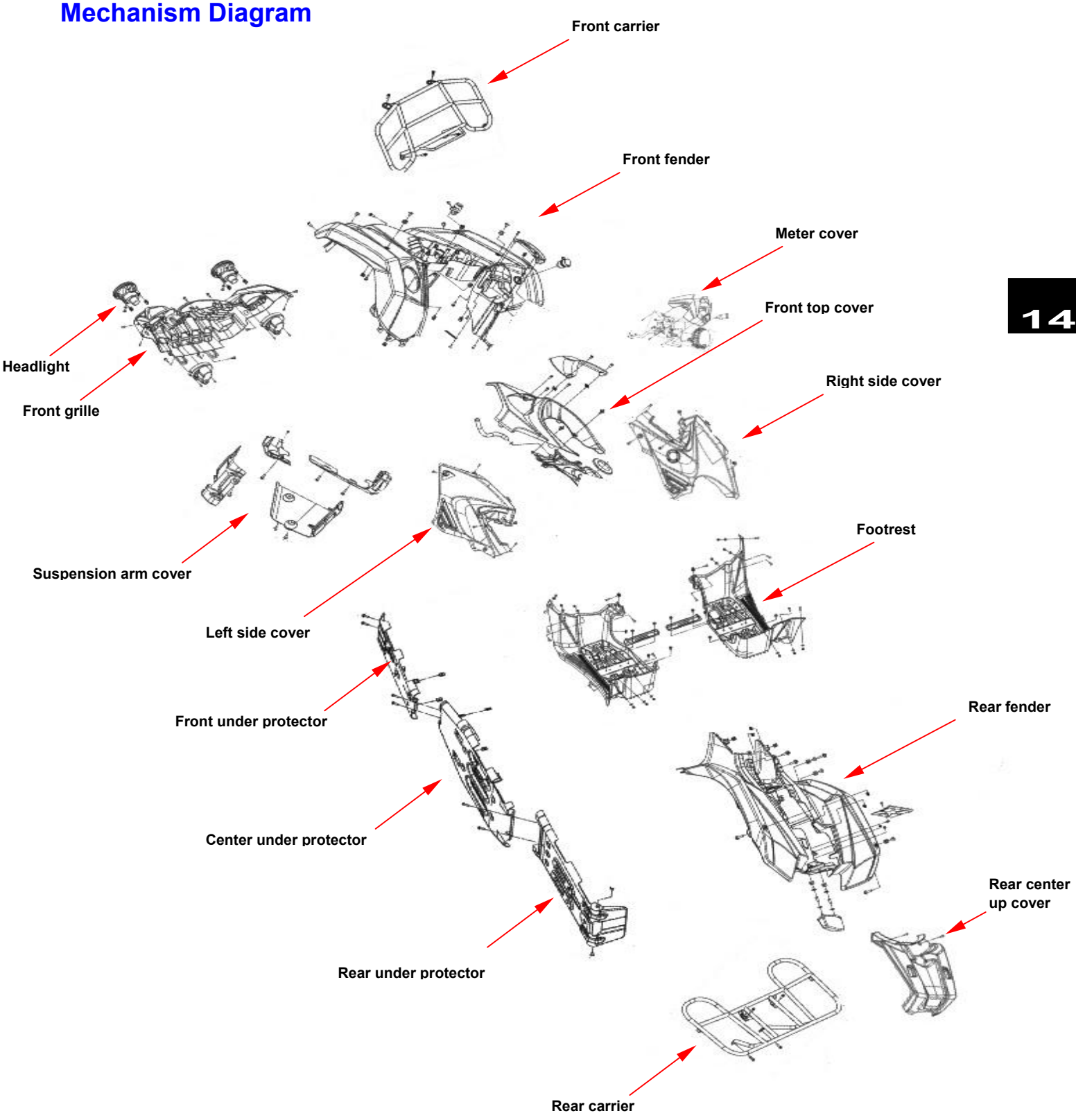
Installation

Install the thermostat.
Install the thermostat cover. (2 bolts)
Refill the coolant and bleed the air from the cooling system (Page 12-5).



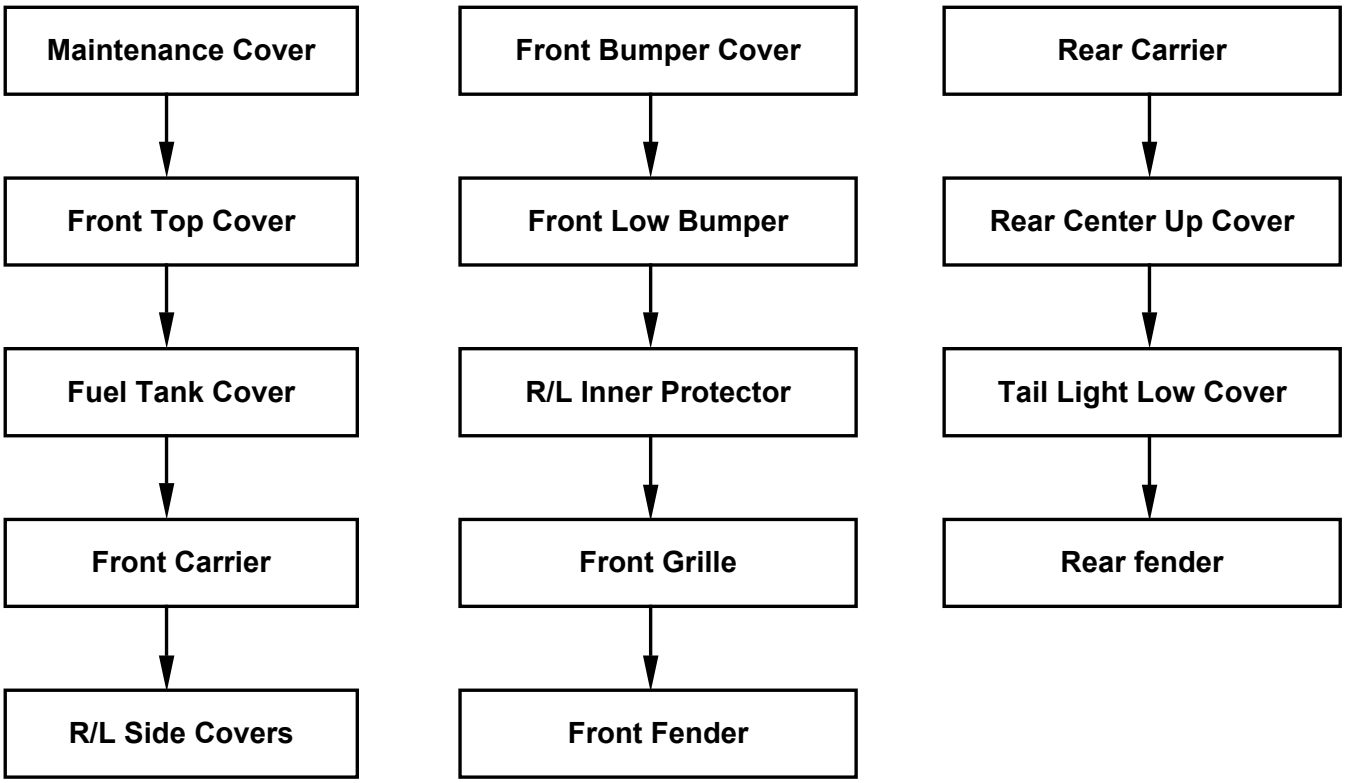
NOTES:

Mechanism Diagram



Maintenance

Body covers disassemble sequence:



- Be careful not to damage various covers in assembly or disassembly operation.
- Never injure hooks molded on the body covers.
- 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.

Front Carrier

Removal

Loosen 6 bolts from the front carrier.

Remove the front carrier.

Installation

Install in the reverse order of removal procedures.

Fuel Tank Cover

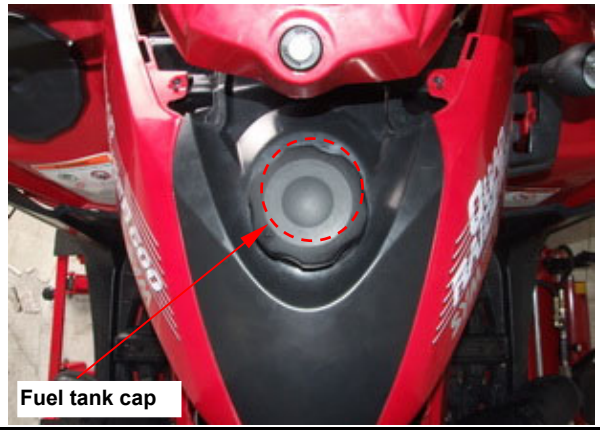
Removal

Remove the maintenance cover.

Remove the front top cover.

Remove the seat.

Remove the fuel tank cap



Remove the fuel tank cover.

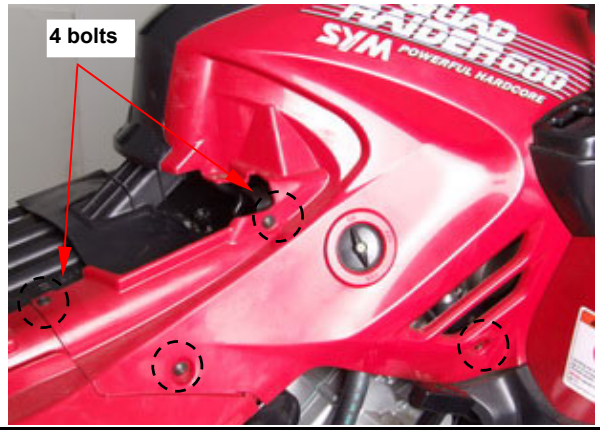
Installation

Install in the reverse order of removal procedures.

Front Fender

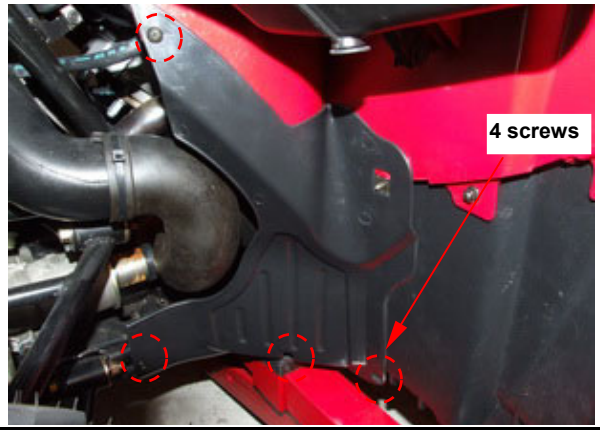
Removal

Remove the seat.
Remove the maintenance cover and front top cover.
Remove the fuel tank cap and fuel tank cover.
Remove the right and left side covers.



Remove 4 screws from footrest.

Remove 4 screws from the right and left inner protectors.
Remove the inner protectors.



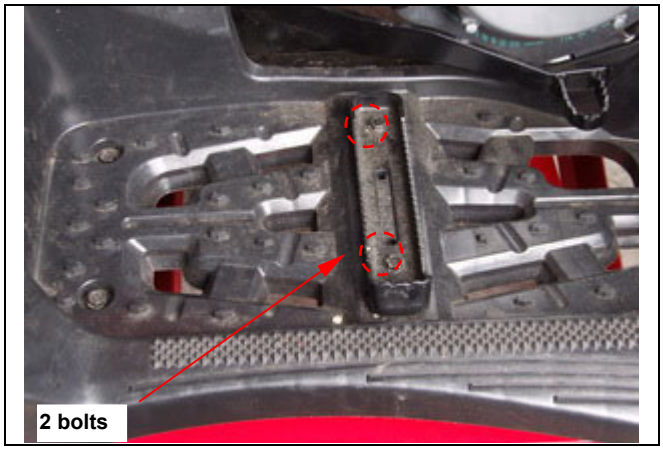
Disconnect the hazard control unit, shift gear control unit, electricity relay and winker relay on the front fender.
Remove the front fender.

Installation

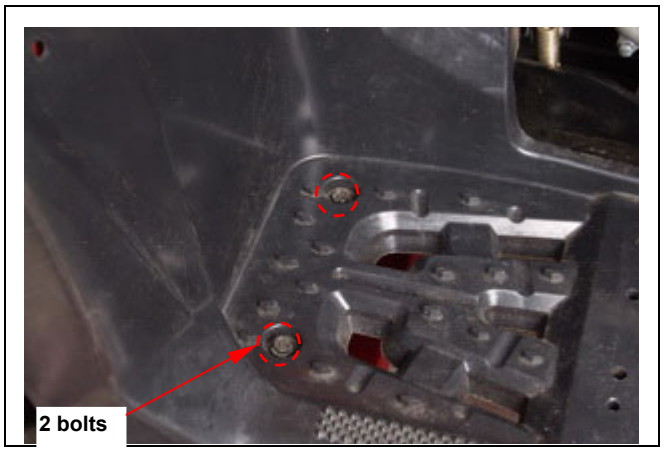
Install in the reverse order of removal procedures.

Footrest

Removal
Remove right and left foot peg bolts (each side 2 bolts).
Remove the foot pegs.

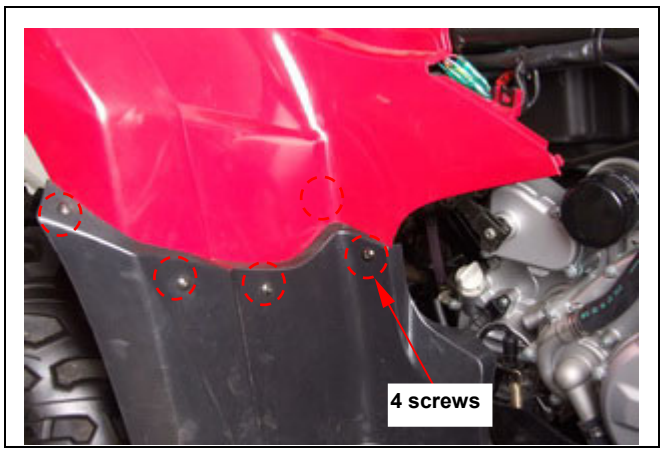


Remove 2 bolts from the right and left footrests.



Remove 4 screws from the rear part of the footrest.

Remove the right and left footrests.



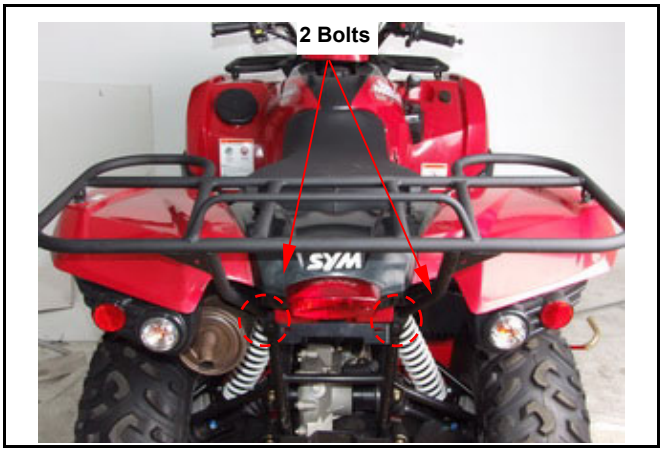
Installation

Install in reverse order of removal procedures

Rear Carrier

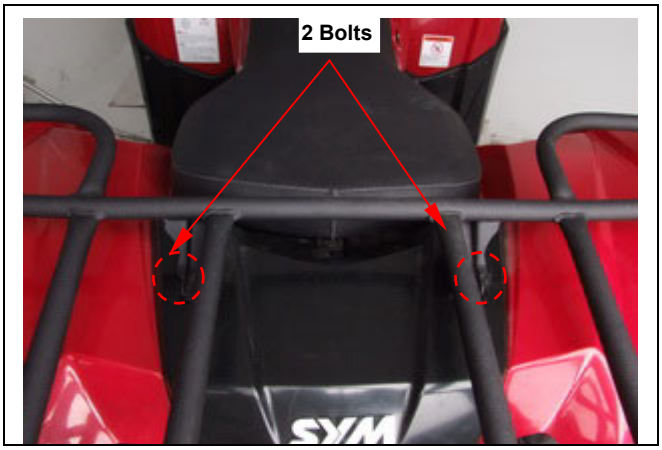
Removal

Loosen 4 bolts from the rear carrier.
Remove the rear carrier.



Installation

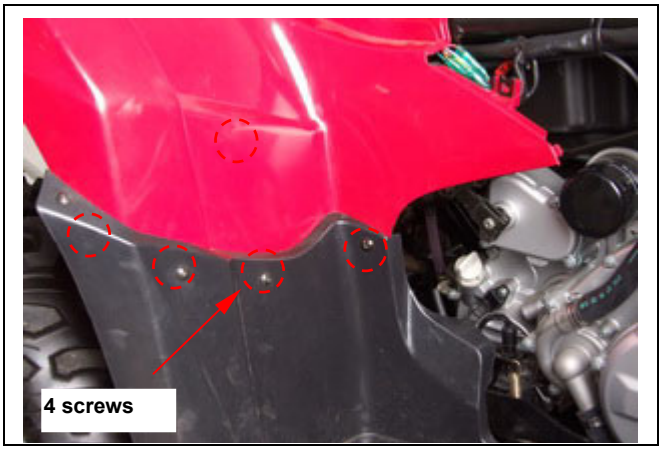
Install in the reverse order of removal procedures.



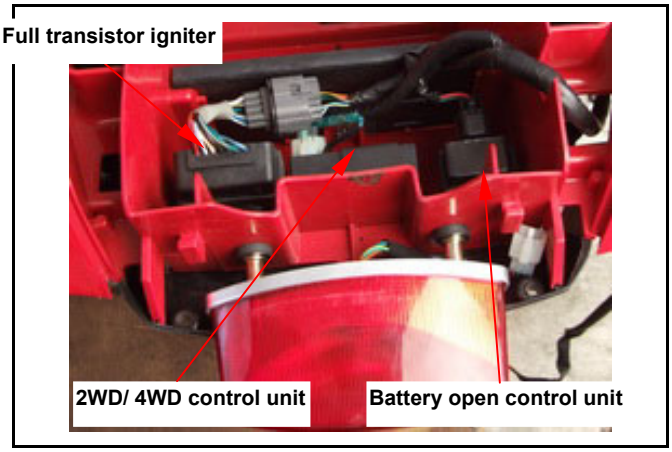
Rear Fender

Remove the rear carrier.
Remove the seat.
Remove the rear center up cover.

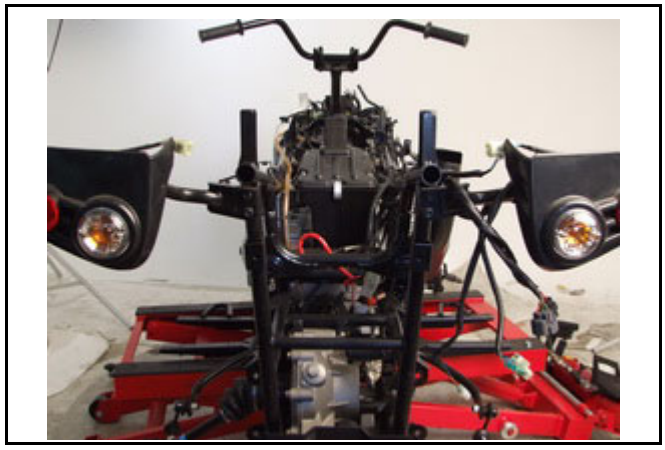
Remove 4 screws on the rear side of the footrest.



Disconnect the full transistor igniter, 2WD/ 4WD control unit and battery open control unit.



Remove the rear fender.

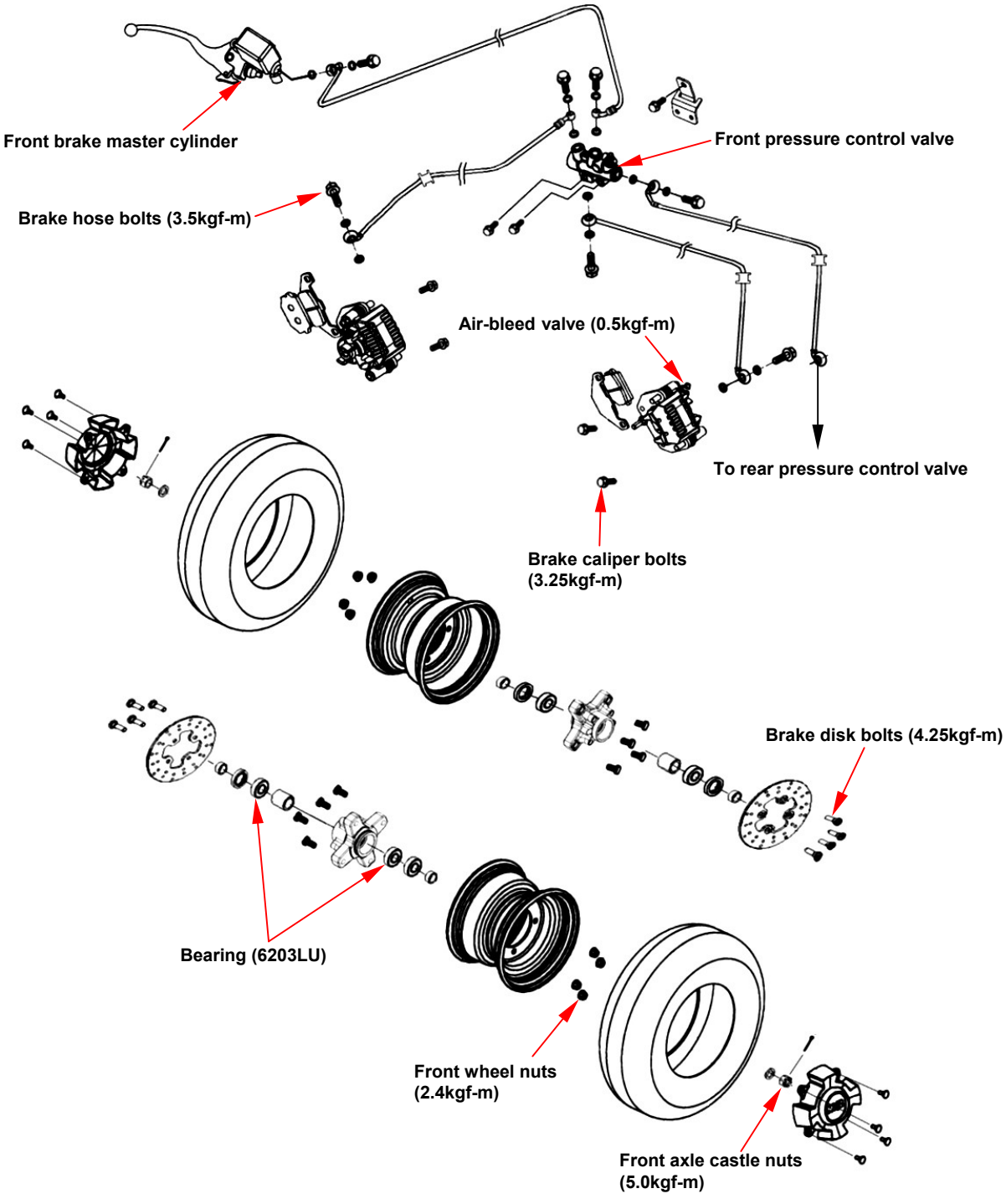


Installation

Install in the reverse order of removal procedures.

NOTES:

Mechanism Diagram



Maintenance Description

Operational precautions

⚠ Caution

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

- Do not remove brake caliper before removing the hydraulic system.
- After the hydraulic system is removed, or the brake system is felt to be too weak, bleed out the air from the hydraulic system.
- While refilling brake fluid, do not let the foreign material enter 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 riding.
- Please refer to the Maintenance Manual of tubeless tire in respect to the removal, repair and installation of the tire.

Specifications

Item	Standard (mm)	Limit (mm)
The thickness of front and rear brake disk	3.500	2.000
Front and rear brake disk eccentricity	< 0.100	0.300
Master cylinder inner diameter	14.000~14.043	14.055
Master cylinder piston outer diameter	13.957~13.984	13.945
Diameter of front /rear disk	175.000/220.000	-
Thickness of front brake lining	5.500	2.000

Tire pressure as cold: 0.8 kg/cm² (12 psi)

Torque values

Brake hose bolts	3.50kgf-m
Bolt for brake caliper	3.25kgf-m
Bolts for the brake disk	4.25kgf-m
Brake lever nut	1.00kgf-m
Air-bleed valve	0.50kgf-m
Front wheel nut	2.40kgf-m
Front axle castle nut	5.00kgf-m

Trouble Diagnosis

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/disk
7. Low brake fluid
8. Blocked brake hose
9. Warp/bent brake disk
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 braking force

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

Tight brake

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

Brake noise

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

Hard steering

1. Faulty tire
2. Insufficient tire pressure

Front wheel wobbling

1. Faulty tire
2. Worn front brake drum bearing
3. Bent rim
4. Axle nut not tightened properly

Steers to one side

1. Bent tie rods
2. Wheel installed incorrectly
3. Unequal tire pressure
4. Incorrect wheel alignment

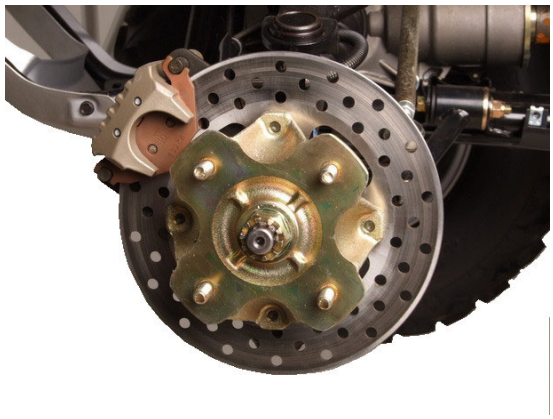
Front Wheel

Removal

Raise the front wheels off the ground by placing a jack or other support under the frame.
Remove 4 nuts from the front wheel.
Remove the front wheel.

Installation

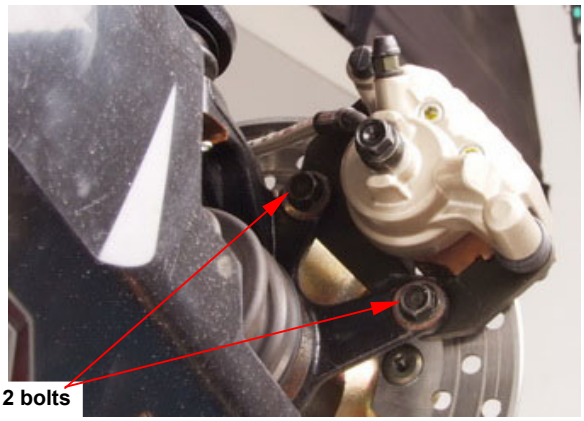
Install the front wheel and tighten the nuts.
Torque: 2.4kgf-m



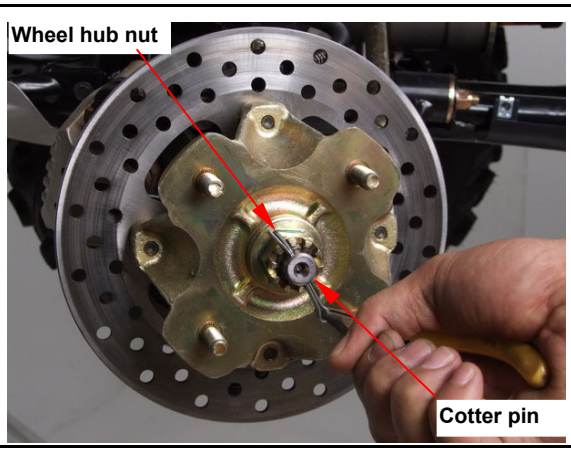
Front Wheel Hub

Removal

Remove front brake caliper (2 bolts).



Remove cotter pin, wheel hub nut and washer.
Remove wheel hub and brake disk.

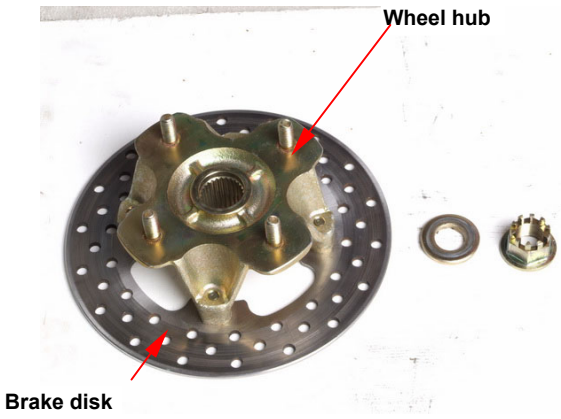


Inspection

Check disk & hub for wear or damage, and replace it if necessary.

Installation

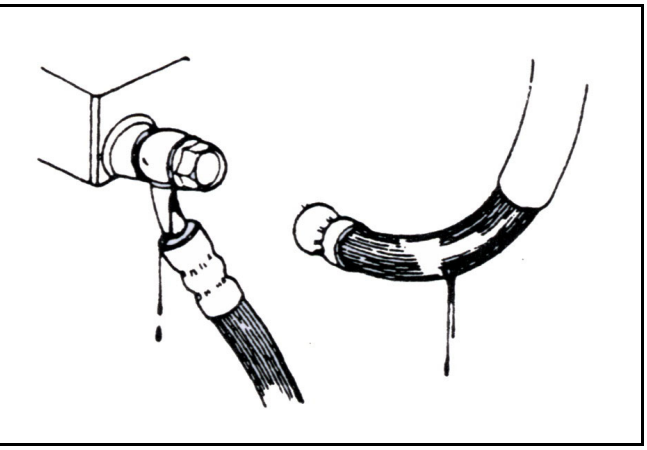
Install the front wheel disk and hub.



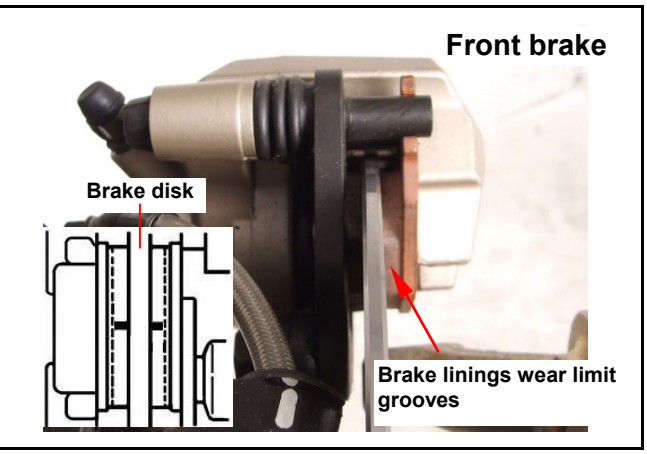
Disk Brake System Inspection

Inspection

By visual examination whether divulges or the damage, with spanner inspection brake tube seam whether becomes less crowded, and the inspection handle bar turn right or turn left, or pressure the cushion, whether besides the pipeline protection department, whether there is interferes, contacts other parts of.



Check the brake from behind the brake caliper. The brake pad must be replaced with new lining when the brake pad wear limit reaches the brake disk.



⚠ Caution

- Before checking the front brake lining, front wheel must be removed first.

Park the ATV on a level ground, and check if fluid level is under the “LOWER” mark.
Recommended Brake Fluid: WELL-RUN BRAKE OIL (DOT 3).

⚠ Caution

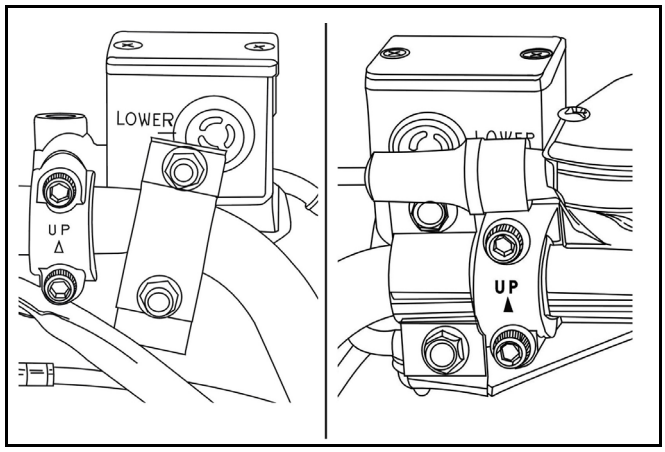
- When the vehicle is inclined or just stopped, the brake fluid level could not be accurate, settle it for 3~5 minutes.
- In order to prevent the chemical change, please do not use counterfeiting or other unidentified trade marks brake fluid.
- Use the same brake fluid to guarantee the braking efficiency.

Adding Brake Fluid

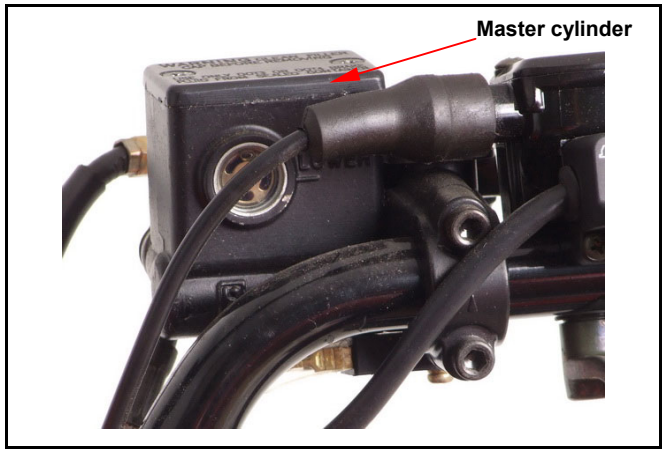
Before removing the brake fluid reservoir, turn the handle to make the brake fluid reservoir become horizontal, and then remove the brake fluid reservoir.
Before serving the brake system, cover the surface of the painted or the rubber parts by the rags.

Caution

Supplement brake fluid please do not surpass the upper limit, spilled brake fluid on painted surfaces, plastic or rubber components may result in their damages.



Remove the master cylinder cap and diaphragm.
Add the high quality brake fluid; use by all means must with the trademark brake fluid joins in the master cylinder.
Clean the dirty brake disk.

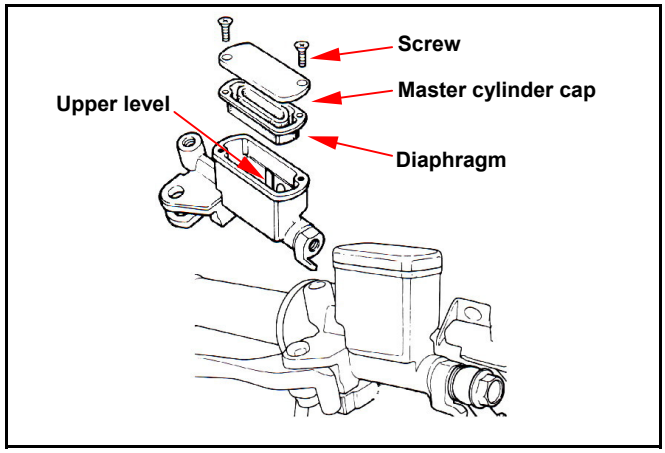


Caution

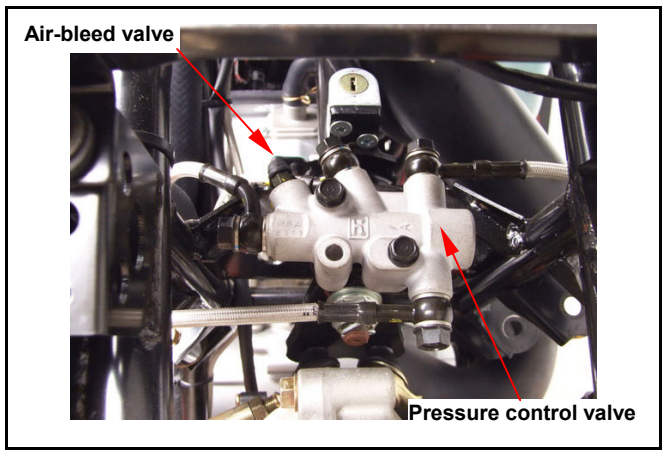
- The dirty brake lining or disk will reduce the brake performance.
- To mixed non-compatible brake fluid will reduce brake performance.
- Foreign materials will block the system causing brake performance to be reduced or totally lost.

Brake Fluid Replacement / Air-bleed

Connect drain hose to air-bleed 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



Air-bleed must from pressure control valve fist.
Connect one end of transparent hose to the air-bleed 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 in brake system or not.

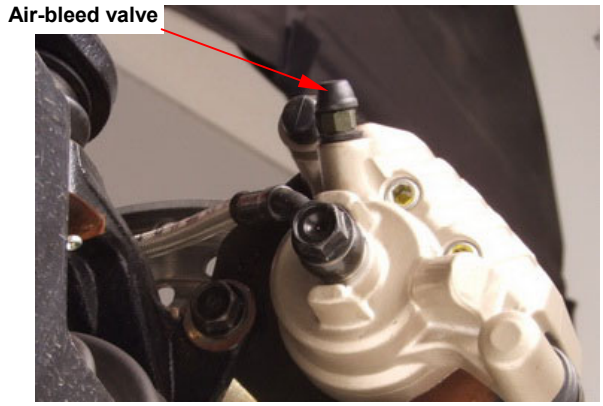
If brake is still soft, please bleed the system as described below:

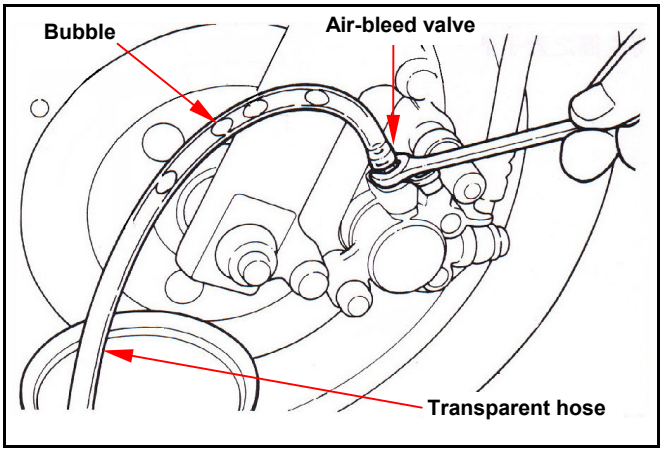
1. Hold the brake lever tightly and open the drain valve around 1/4 turns, and then close the valve.

⚠ 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 enters 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 at the UPPER level of the master cylinder, and refill the fluid if necessary.
6. Cover the cap.





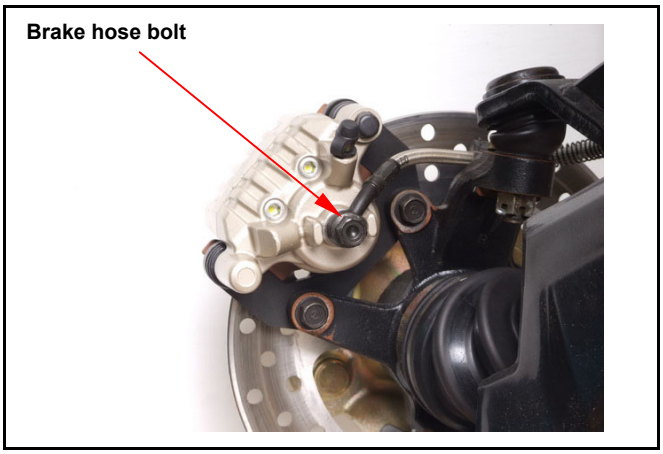
Front Brake Caliper

Removal

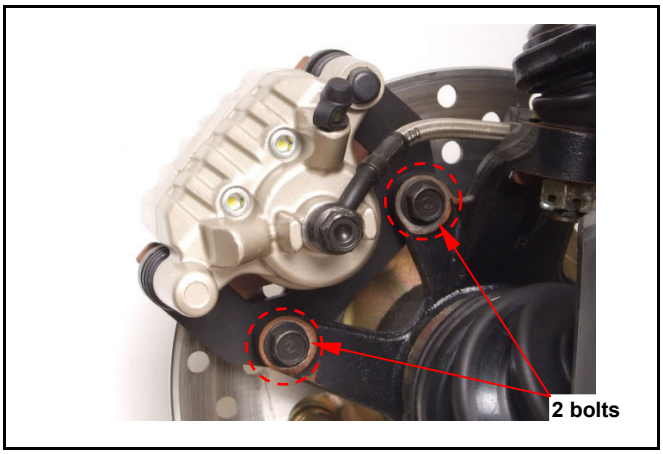
Place a container under the brake caliper, and loosen the brake hose bolt and finally remove the brake hose.

⚠ Caution

Do not spill the brake fluid on painted surfaces.



Remove two caliper bolts and the caliper.

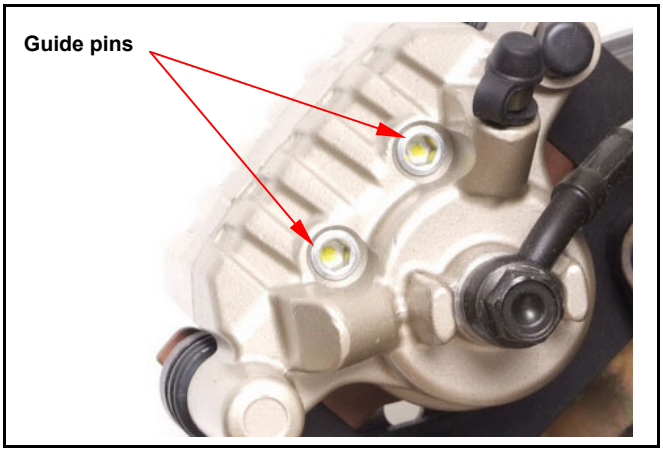


Inspection

Make sure the brake linings condition. Replace the linings if the brake linings wear limitation groove close to the brake disk.

Brake lining replacement

Remove two guide pins.
Compress caliper-mounting plate, and then remove brake linings.
Install new linings, and tighten the guide pins.



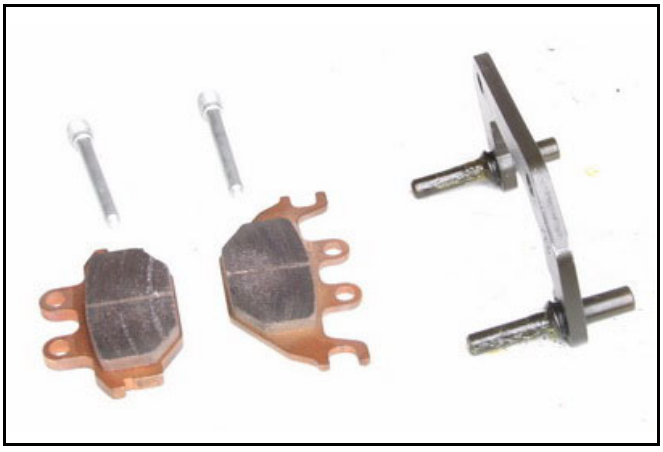
Installation

Install the brake caliper and tighten the attaching bolts securely.

Torque: 3.25kgf-m

⚠ Caution

- Use M8 x 20 mm flange bolt only.
- Long bolt will impair the operation of brake disk.

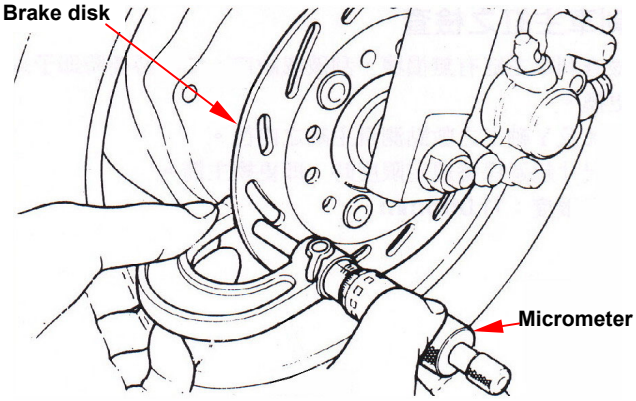


Use two seal washers and hose bolts to lock the hose and brake caliper in place.
Torque: 3.5kgf-m
Refill up the brake fluid to the reservoir and make necessary air bleeding.

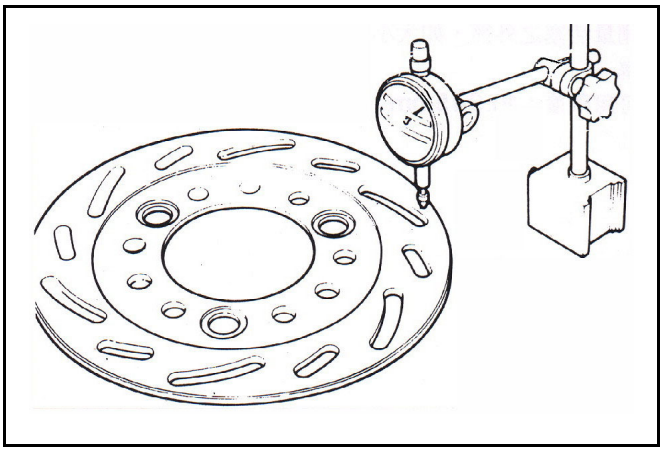
Brake Disk

Inspection

Visually check the brake disk for wear or spoilage. Measure the thickness of the disk at several places. Replace the disk if it has exceeded the service limit.
Allowable limit: 2.5 mm



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



⚠ Caution

- The dirty brake lining or disk will reduce the braking performance.
- Brake lining includes the asbestos ingredient; do not use the air-gun clean the caliper, the operator should dress the mouthpiece and the glove, use vacuum cleaner to clean it.

Front Brake Master Cylinder

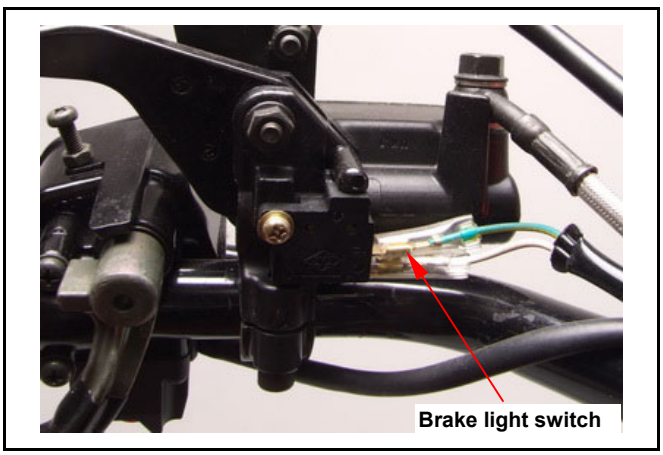
Master Cylinder Removal

⚠ Caution

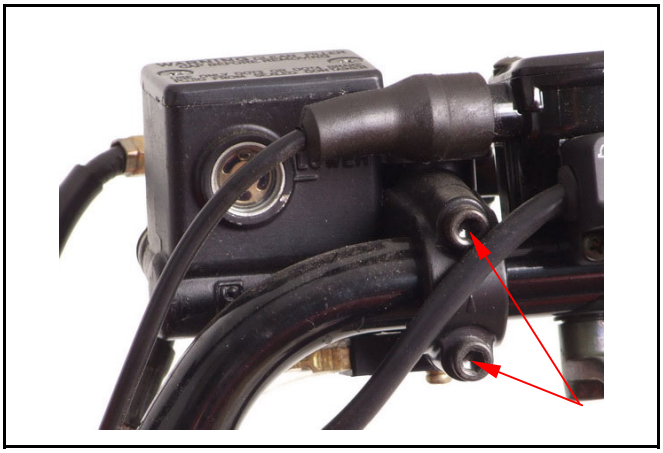
Do not let foreign materials enter the cylinder.

⚠ Caution

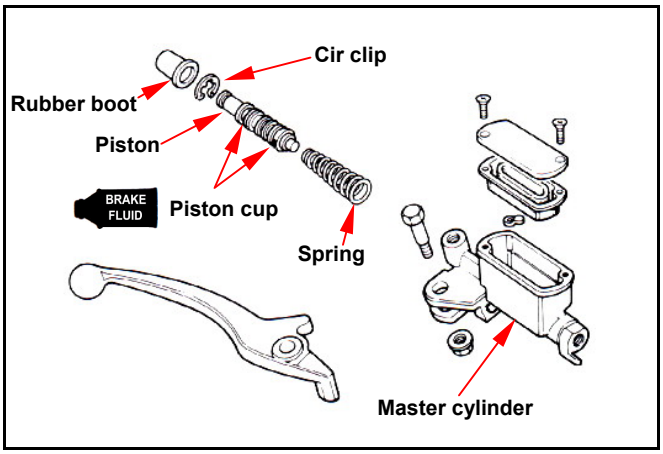
The whole set of master cylinder, piston, spring, diaphragm and circlip should be replaced as a set.



Push the lead of brake light switch, and then remove brake light switch.
Drain out the brake fluid.
Remove the brake lever from the brake master cylinder.
Remove the brake hose.
Remove the master cylinder socket bolts and the master cylinder.

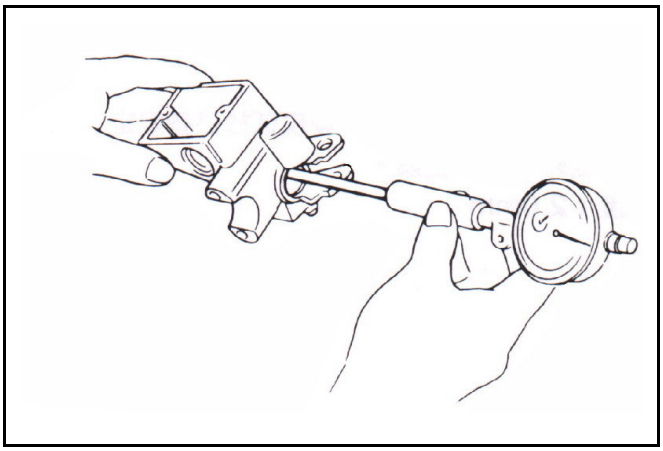


Remove the rubber boot.
Remove the cir clip.
Remove the piston and the spring.
Clean the master cylinder with recommended brake fluid.

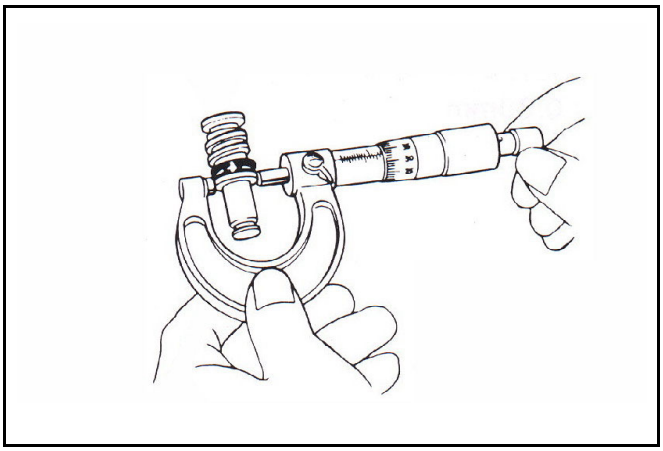


Master Cylinder Inspection

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: 14.055 mm



Measure the outer diameter of the piston.
Replace the piston if its measured value exceeds allowable limit.
Allowable limit: 13.945 mm



Master Cylinder Assembly

⚠ Caution

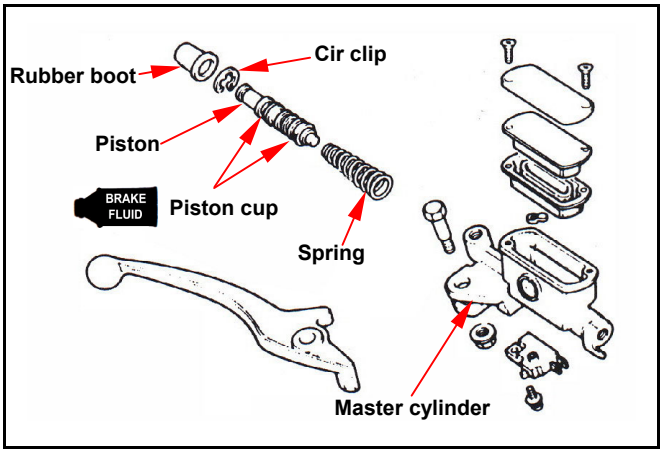
- It is necessary to replace the whole set comprising piston, spring, piston cup, and cir clip.
- Make sure there is no dust on all components before assembling.

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 cir clip.

⚠ Caution

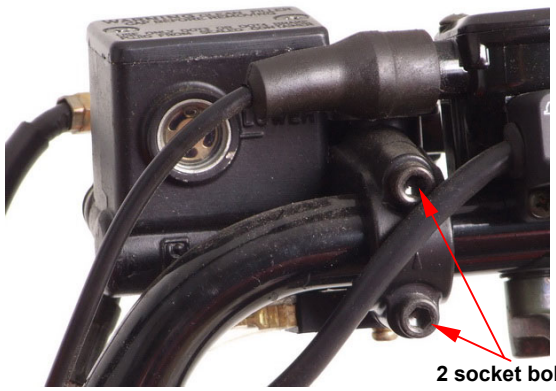
- Never install cup lip in the opposite direction.
- Make sure the cir clip is seated securely in the groove.

Install the rubber boot into groove properly.

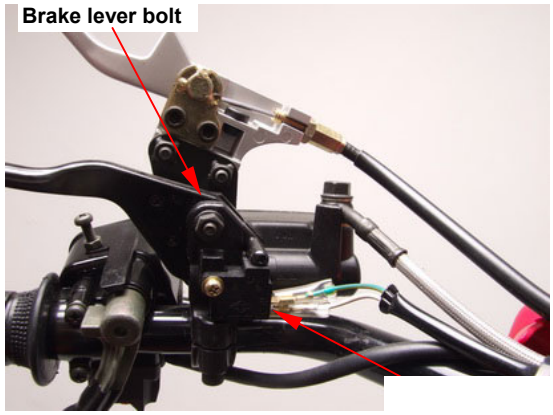


Master Cylinder Installation

Install the rubber pad into the groove correctly. Place the master cylinder onto handlebar, and install the bolts.



Install the brake lever, and connect leads to brake light switch.

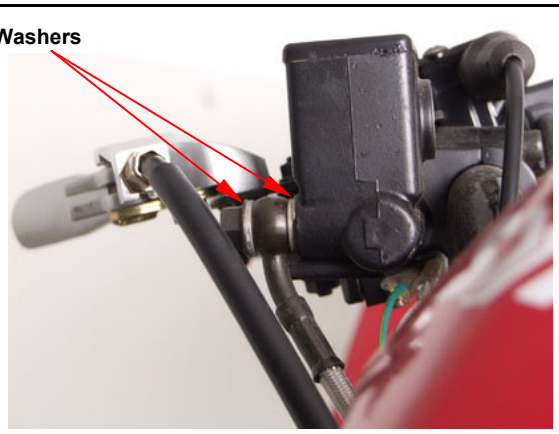


Connect brake hoses with 2 new washers. Tighten the brake hose bolt to the specified torque value.

Torque: 3.5kgf-m

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.

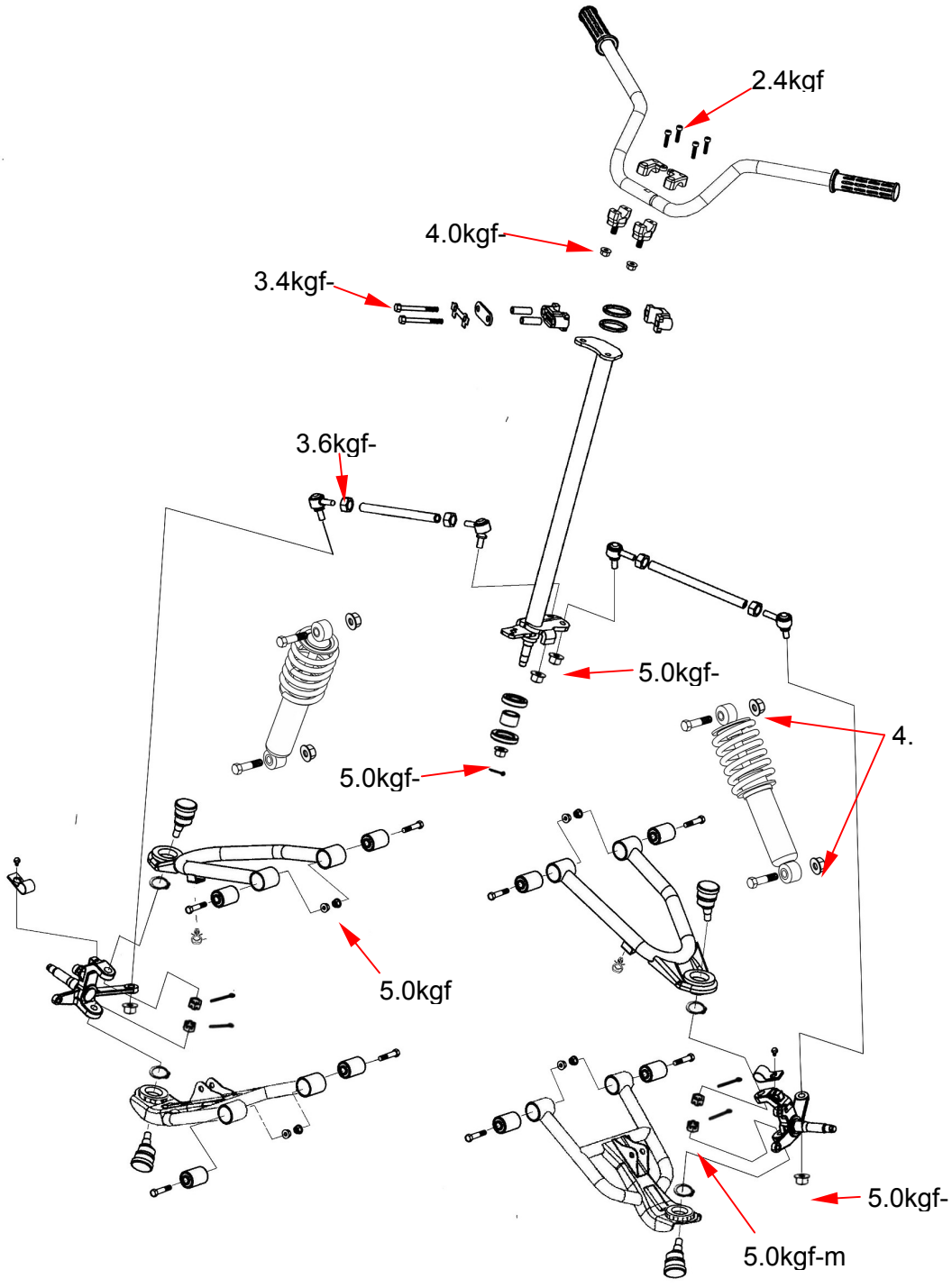
⚠ Caution

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

Add specified brake fluid and bleed the system.

Notes:

Mechanism Diagram



Precautions in Operation

Torque Values

Handlebar upper holder bolt	2.4kgf-m
Handlebar under holder nut	4.0kgf-m
Steering shaft holder bolt	3.4kgf-m
Steering shaft nut	5.0kgf-m
Steering tie-rod nut	5.0kgf-m
Knuckle nut	5.0kgf-m
Tie rod lock nut	3.6kgf-m
Suspension arm nut	5.0kgf-m
Front cushion mounting nut	4.6kgf-m

Trouble Diagnosis

Hard to steer
- Faulty tire.
- Steering shaft holder too tight.
- Insufficient tire pressure.
- Faulty steering shaft bushing.
- Damaged steering shaft bushing.

Front wheel wobbling
- Faulty tire.
- Worn front brake drum bearing.
- Bent rim.
- Axle nut not tightened properly.

Steers to one side
- Bent tie rods.
- Wheel installed incorrectly.
- Unequal tire pressure.
- Bent frame.
- Worn swing arm pivot bushings.
- Incorrect wheel alignment.

Front suspension noise
- Loose front suspension fasteners.
- Binding suspension link.

Hard suspension
- Faulty front swing arm bushings.
- Improperly installed front swing arms.
- Bent front shock absorber swing rod.

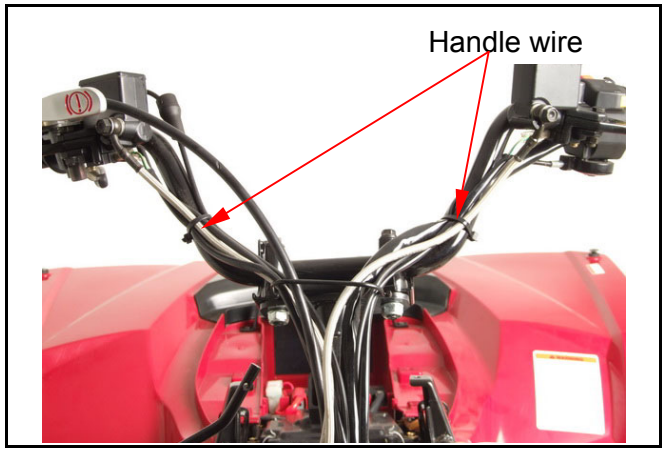
Soft suspension
- Weak front shock absorber springs.
- Worn or damaged front swing arm bushings.

Steering Handle

Removal

Remove the handle cover, meter set, handle protect cover and front fender. (Refer to chapter 13)

Remove the handle wire band.



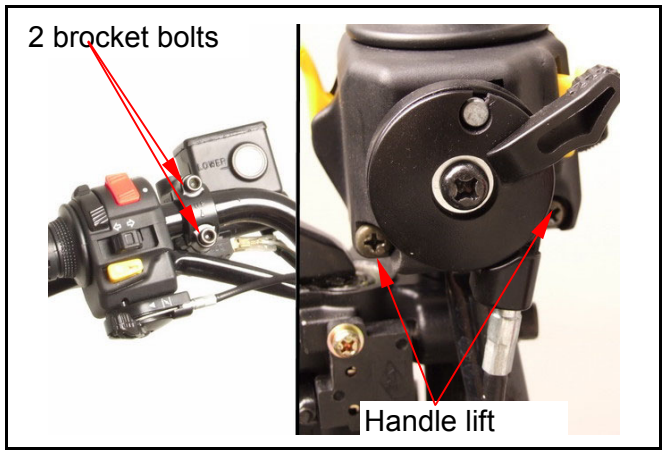
Loosen the socket bolts from the rear brake master cylinder, and remove front brake master cylinder.

⚠ Caution

Do not let foreign materials enter the brake master cylinder.

Remove 2 screws, and then remove throttle hosing holder and throttle hosing.

Loosen 2 screws, and then remove handle left switch and choke hosing.

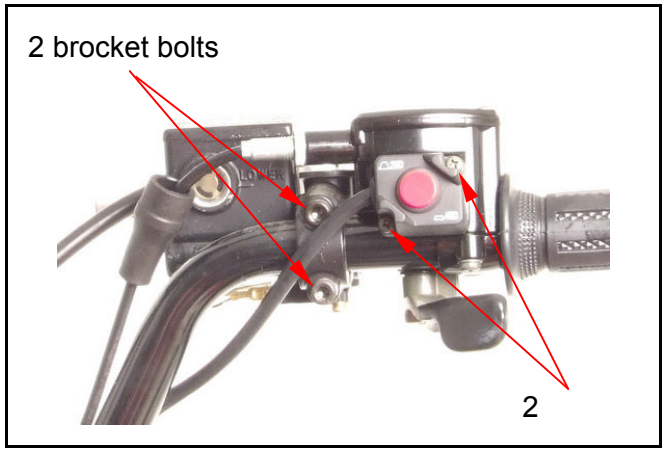


Loosen 2 screws, and then remove 2&4 wheel drive change switch.

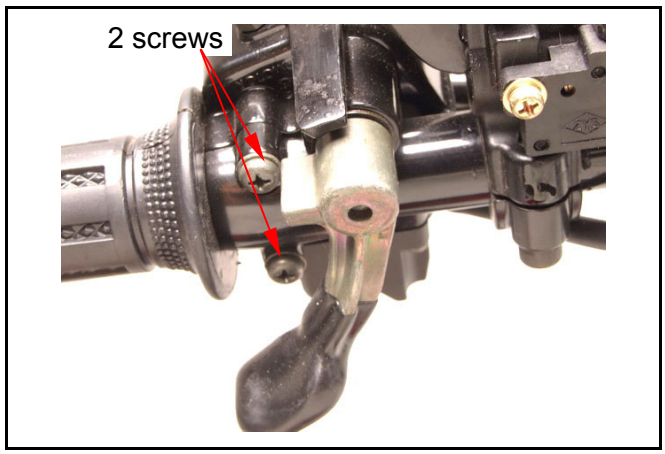
Loosen the 2 socket bolts for the front brake master cylinder, and remove front brake master cylinder.

⚠ Caution

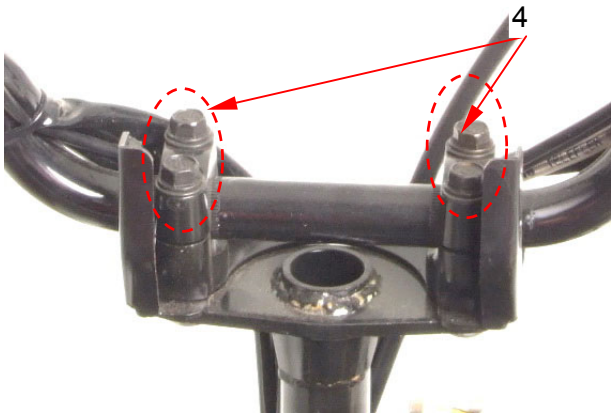
Do not let foreign materials enter the brake master cylinder.



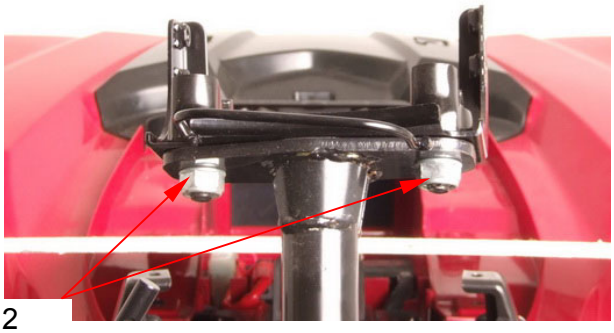
Loosen the 2 screws for throttle hosing holder and remove throttle hosing.



Remove the handle mounting bolt, and then remove the handle upper holder, handle.



Remove 2 nuts to remove handle under holder and meter bracket.



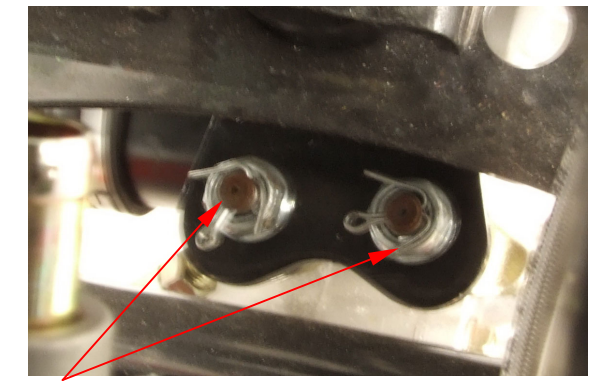
Installation
Install in the reverse order of removal procedures.

Torque value:

Handlebar under holder nut	**4.0kgf-m**
Handlebar upper holder bolt	**2.4kgf-m**

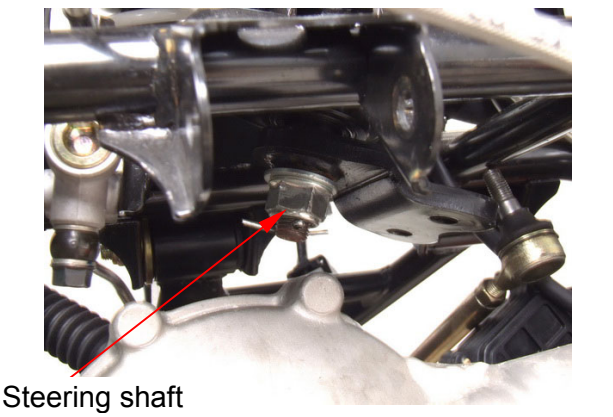
Steering Shaft

Remove
Remove cotter pins, and loosen right and left steering tie-rod nuts.
Remove tie-rod.

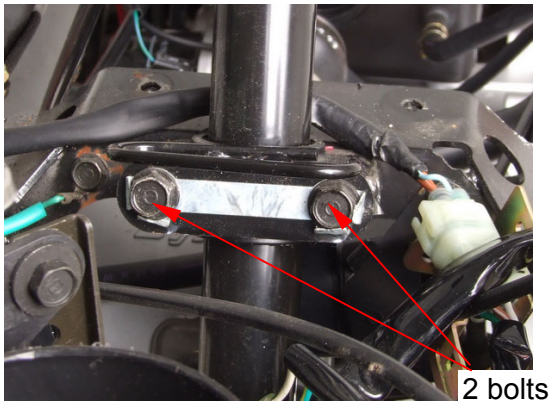


Remove cotter pins, and loosen handle Steering shaft nut

.

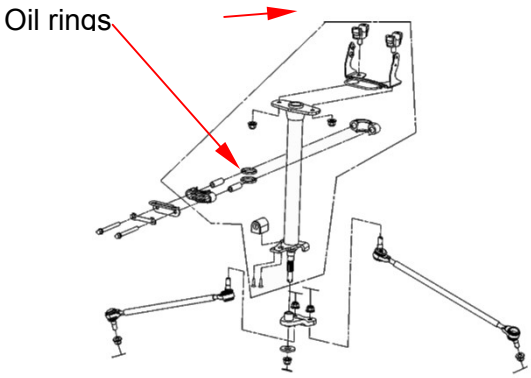


Loosen 2 bolts, and then remove steering shaft holder, nut fixed plate, pressed plate and steering shaft.



Inspection

Check oil rings for wear or damage, and replace it if necessary.
Measure the holder inner diameter.
Maximum limit: Ø39.5 mm



Installation

Install in reverse order of removal procedures.
Apply with grease onto oil liner and holder.

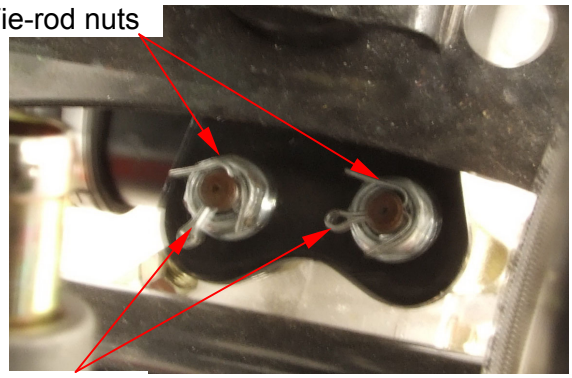
Torque value:

Steering shaft holder bolt	**3.4kgf-m**
Steering shaft nut	**5.0kgf-m**
Steering tie-rod nut	**5.0kgf-m**

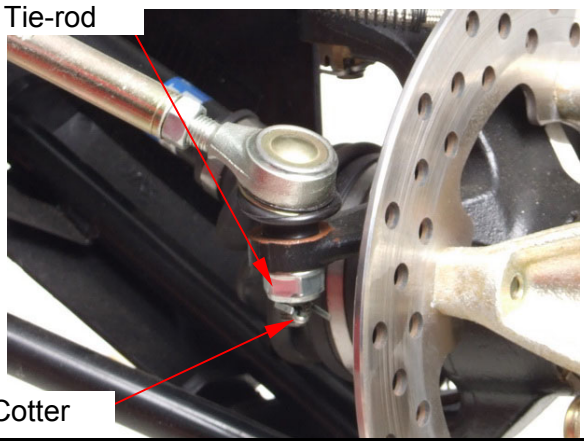
Steering Tie-Rod

Removal

Remove the cotter pin and the tie-rod nut from the steering shaft side.



Remove the cotter pin and the tie-rod nut from the wheel side.



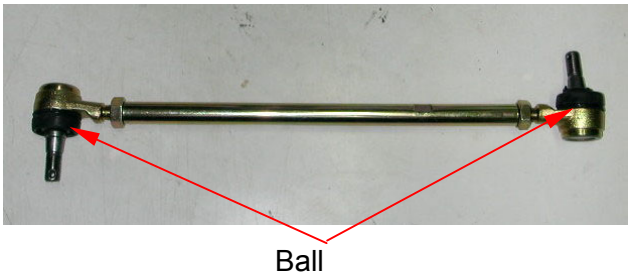
Inspection

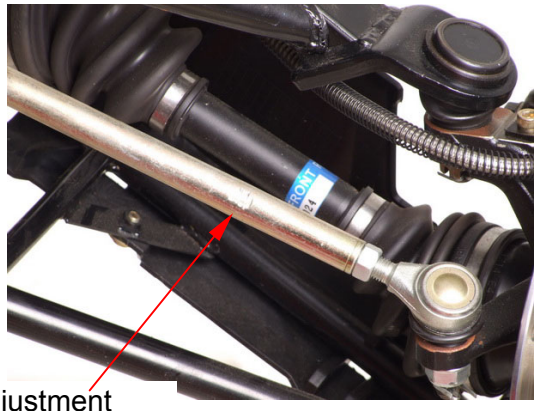
Inspect the tie-rod for damage or bending.
Inspect the ball joint rubbers for damage, wear or deterioration.
Turn the ball joints with fingers. The ball joints should turn smoothly and quietly.

Installation

Install the ball joint with “adjustment groove” on the wheel side.
Install the tie-rod nuts, and tighten the nuts.
Torque value: 5.0kgf-m

After tightening the tie-rod nut, install the cotter pin.



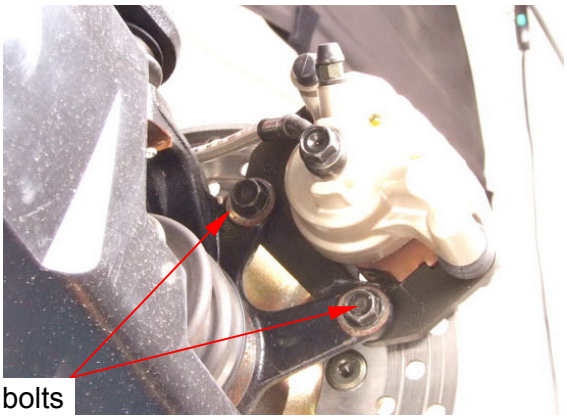


Knuckle

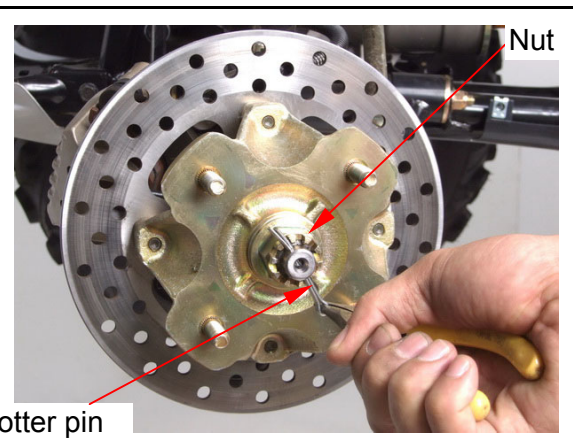
Remove

Remove front wheel, front brake caliper, front wheel hub and brake disk.

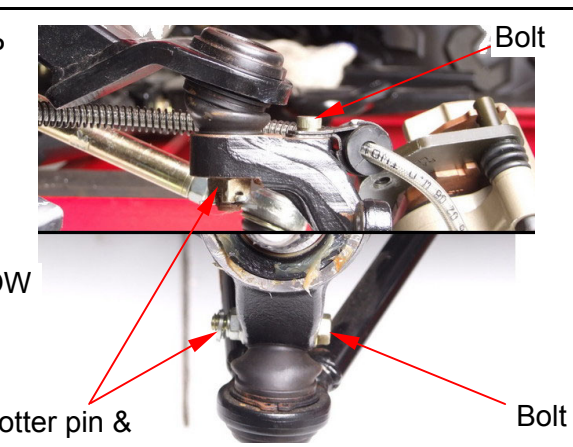
Remove 2 bolts from front brake caliper them remove front brake caliper



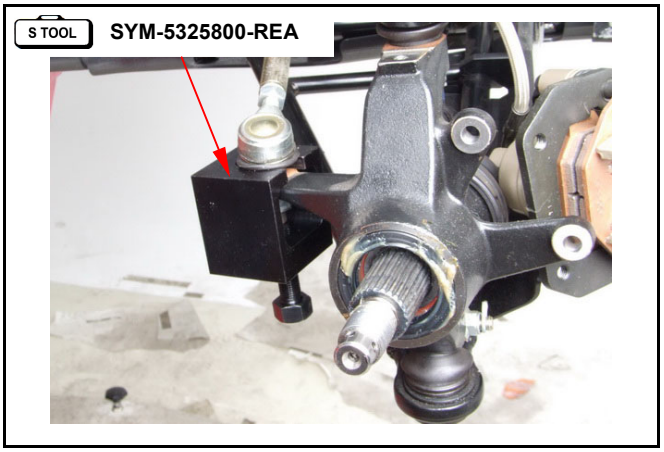
Remove cotter pin and nut, remove front brake disk.
After tightened the nuts, install the cotter pins.



Remove cotter pin and castle nut from front upper and lower arm suspension.
Remove 1 bolt front brake caliper clamp then remove clamp.



Remove cotter pin and tie-rod nut, remove tie rod with special tool.
Tools number: SYM-5325800-REA
Tools name: ball joint driver

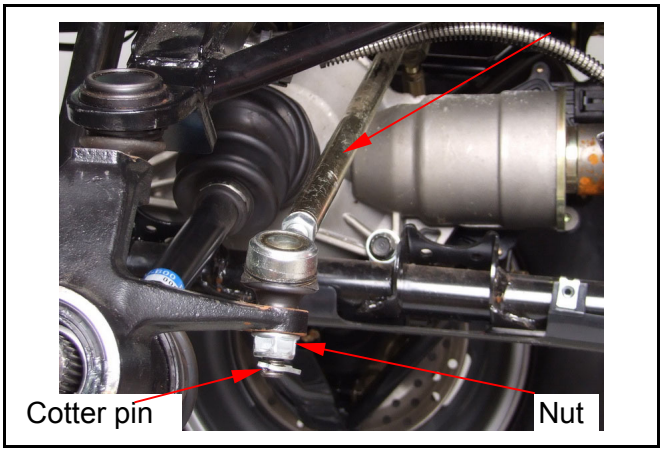


Remove the knuckle body.

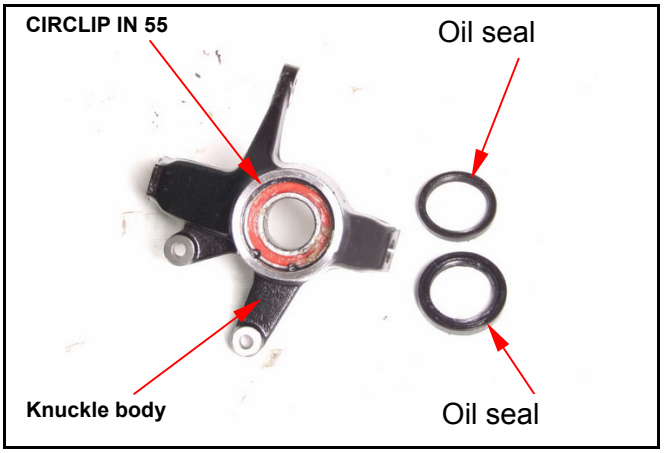
Inspection
Inspect the upper and under ball joints and knuckle for damaging or cracking.

Installation
Install in the reverse order of removal procedures.
Torque value:

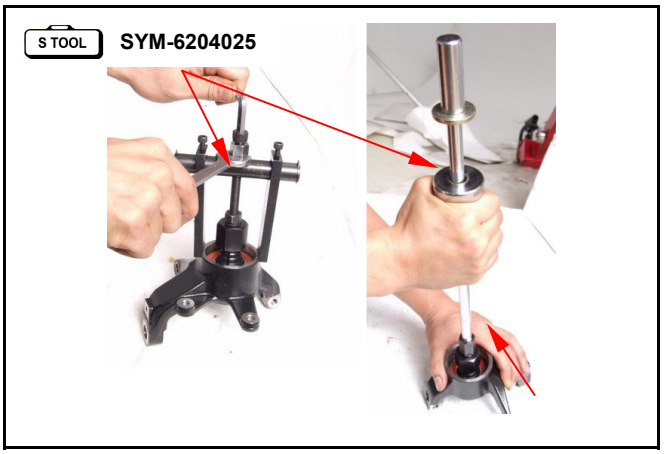
Steering tie-rod nut	**5.0kgf-m**
Ball joint nut	**5.0kgf-m**



Knuckle Disassembly
Remove oil seal 40*50*6.5 & 40*55*8 from knuckle body.
Remove cir-clip in 55 from knuckle body.

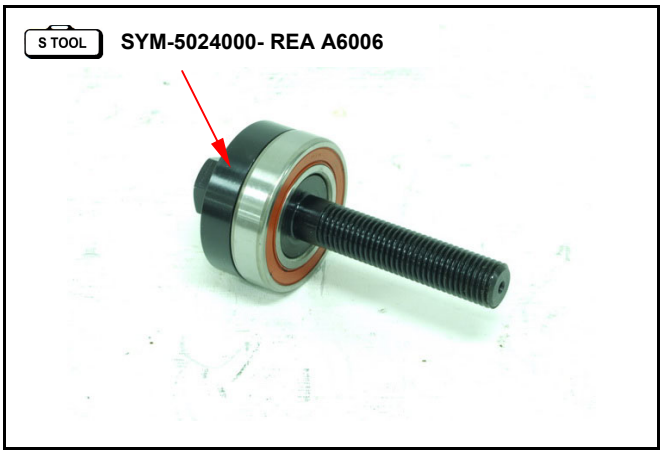


Remove bearing 6007uu with special tool.
Tools number:SYM-6204025
Tools name: INNER BEARING OUTER PULLER.

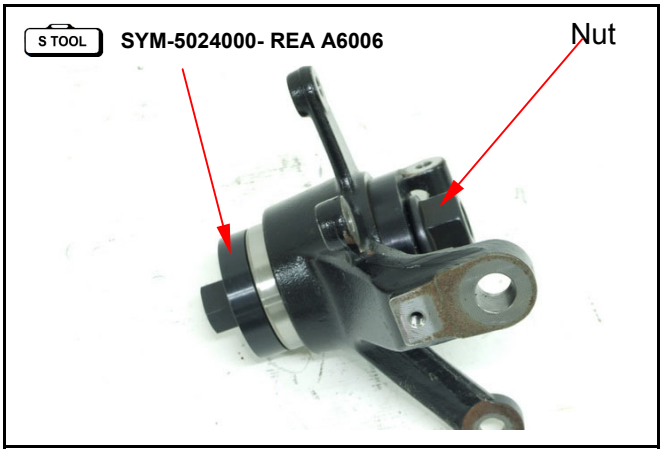


Knuckle Assembly

Assemble bearing 6006uu by special tool.

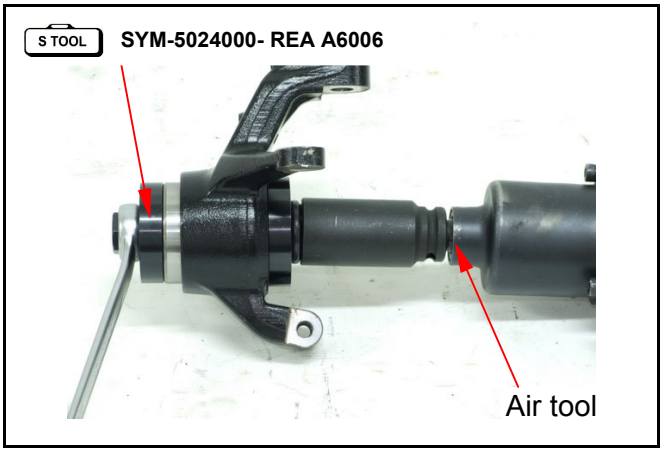


Assemble bearing 6006uu by special tool in the knuckle then lock the nut.

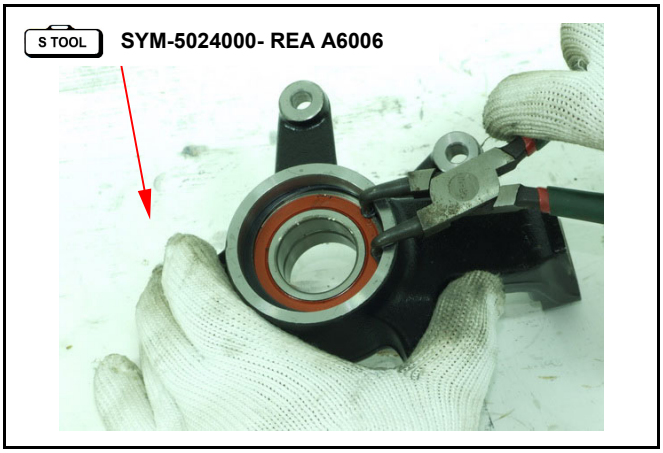


Install the bearing with special tool & air tool.

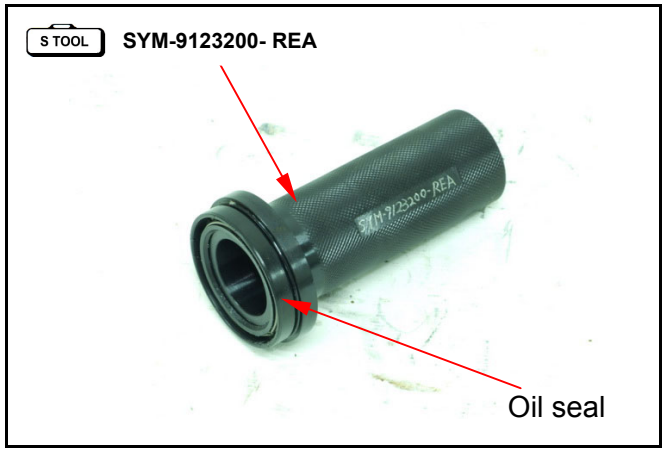
Tools number: SYM-5024000- REA A6006
Tools name: wheel knuckle body bearing 6006 in puller with air.



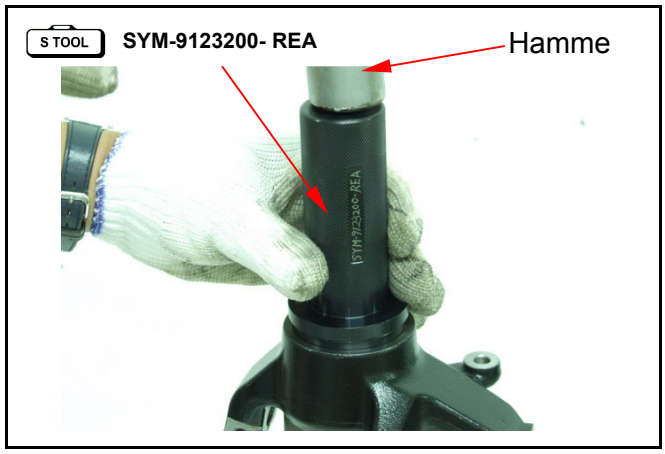
Install the cir clip in 55 into knuckle body.



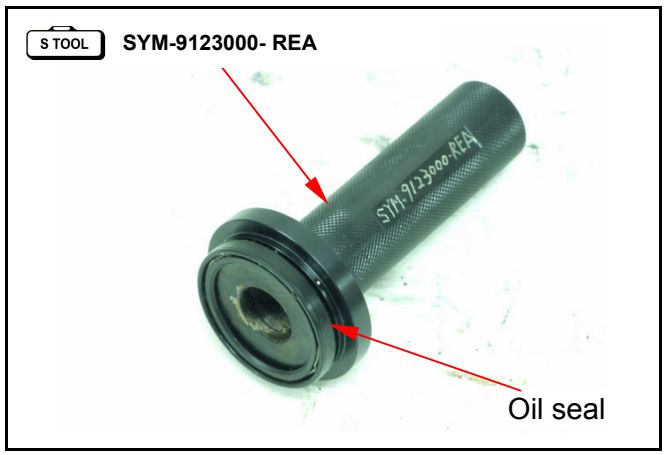
Assemble oil seal 40*55*8 by special tool.



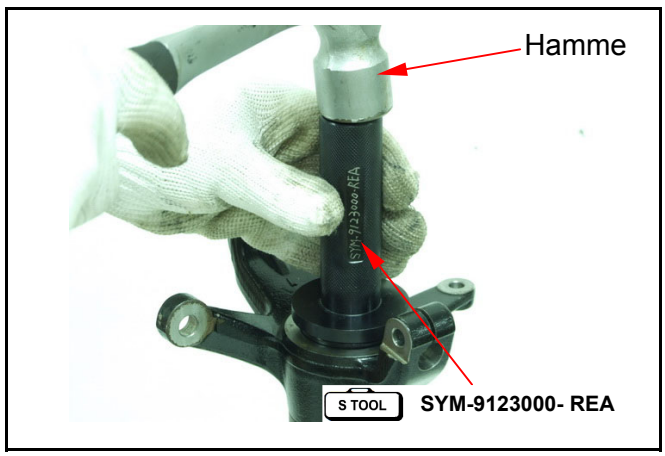
Install oil seal into the knuckle body with hammer.
Tools number: SYM-9123200- REA
Tools name: wheel knuckle body seal 40*55*8 in driver.



Assemble oil seal 40*50*6.5 by special tool.



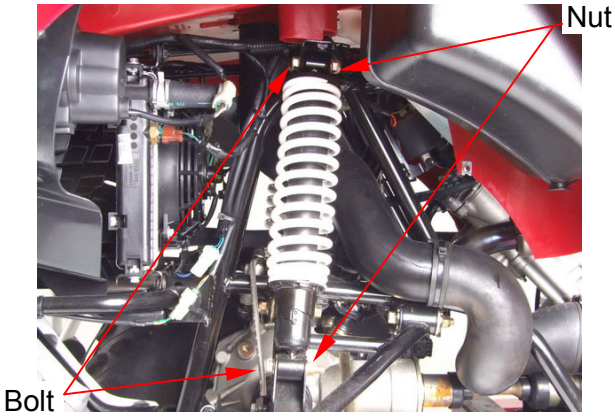
Install oil seal into the knuckle body with hammer.
Tools number: SYM-9123000- REA
Tools name: wheel knuckle body seal 40*50*6.5 in driver.



Front Cushion

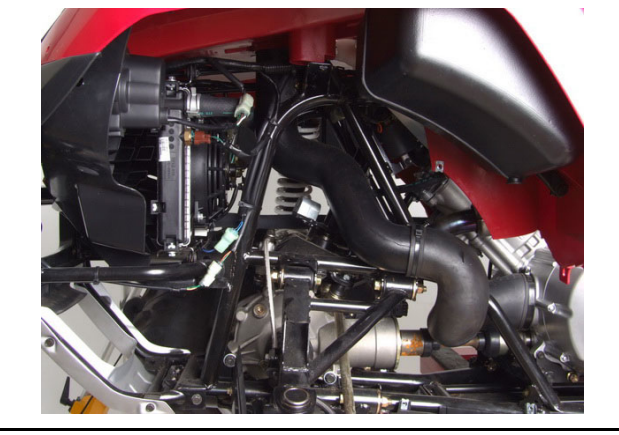
Removal

Remove the front cushion under bolt nut, and remove the bolt.
Remove the front cushion upper bolt nut, and remove the bolt and the cushion.



Installation

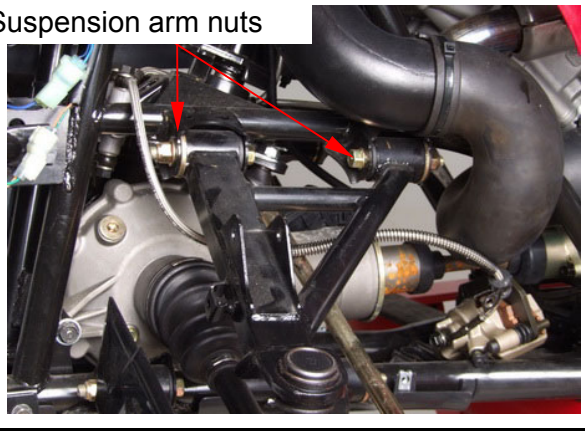
Install in the reverse order of removal procedures.
Torque value:
Front cushion nut **4.6kgf-m**



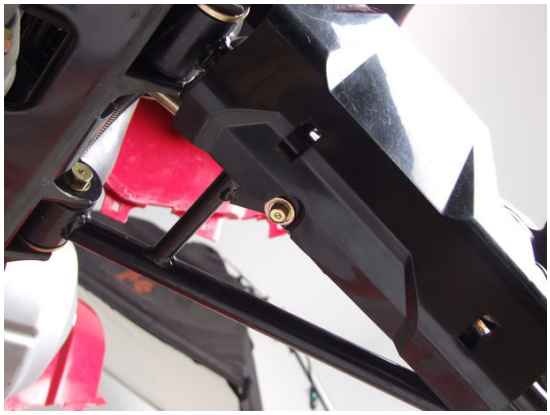
Suspension Arm

Removal

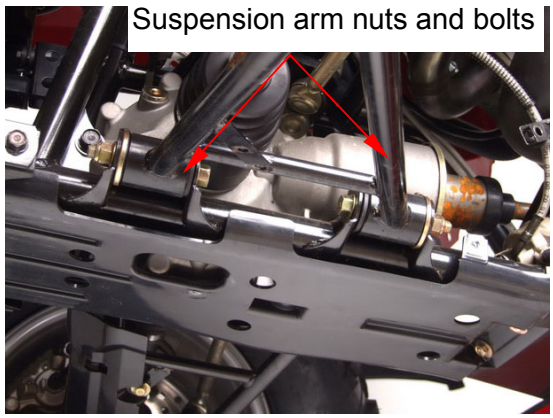
Remove the front wheel, wheel hub, and brake caliper, brake disk, tie-rod, knuckle and front cushion.
Loosen upper suspension arm nuts.
Remove swing arm bolts.



Loosen 1 bolt from under suspension arm cover and then remove the cover.



Loosen under suspension arm nuts.
Remove the swing arm bolts.
Remove under suspension arm.



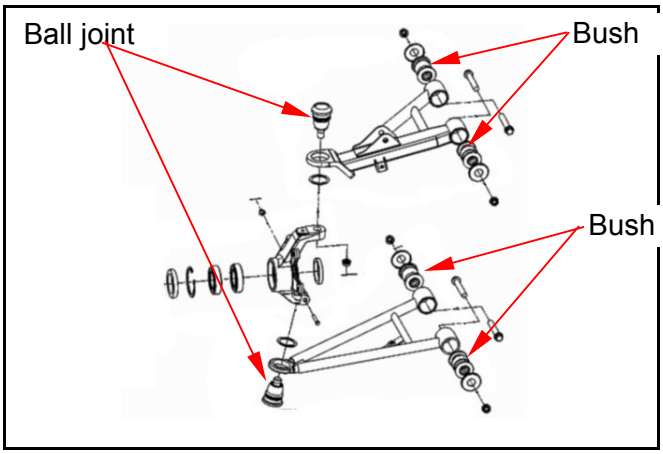
Inspection

Inspect the suspension arm, ball joint and bush for damage or bending.

Installation

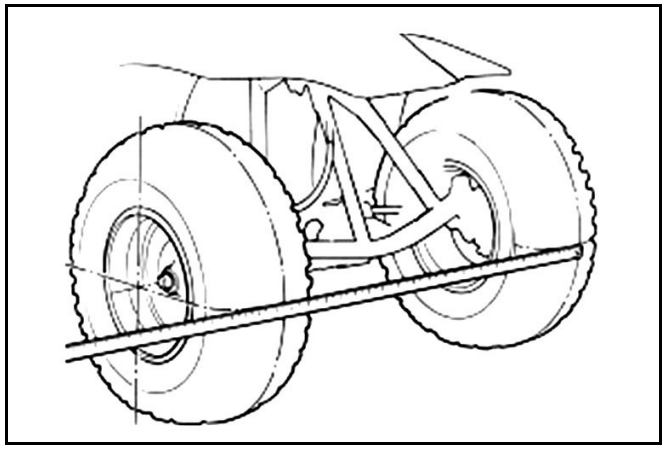
Install in the reverse order of removal procedures.
Torque value:
Suspension arm nut 5.0kgf-m

Lubricate with grease into suspension arm.



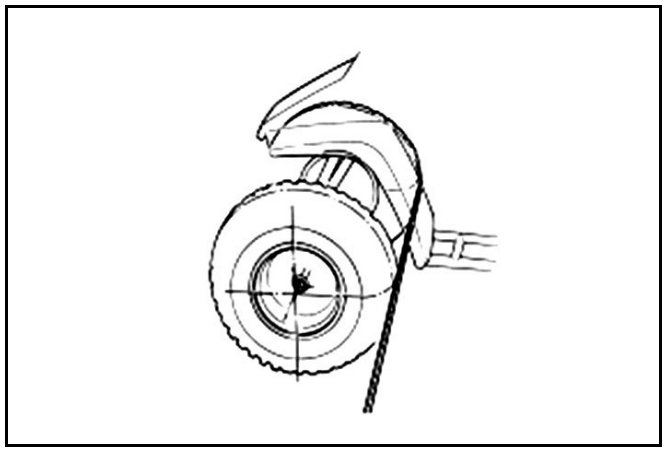
Toe-In

After repair or disassembly of the steering system parts, adjustment of toe-in is required.
Keep the vehicle on level ground and the front wheels facing forward.
Mark the centers of the tires to indicate the axle center height.
Measure the distance between the marks.

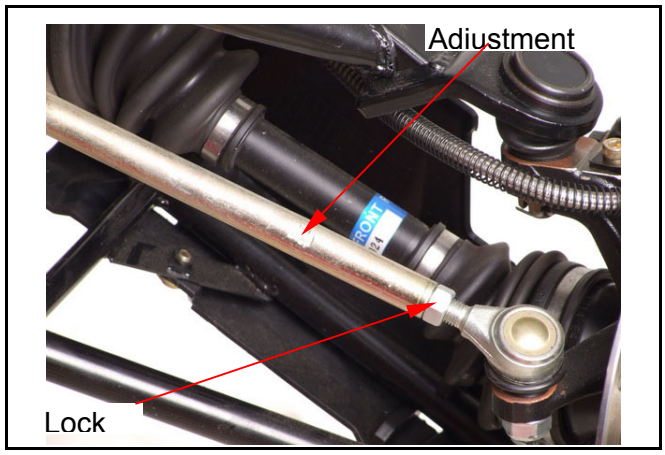


Move the vehicle back carefully and let the wheels turn 180 degree, so the marks on the tires are aligned with the axle center height.
Measure the distance between the marks.
Calculate the difference in the front and rear measurements.

Toe-in: 5±10mm

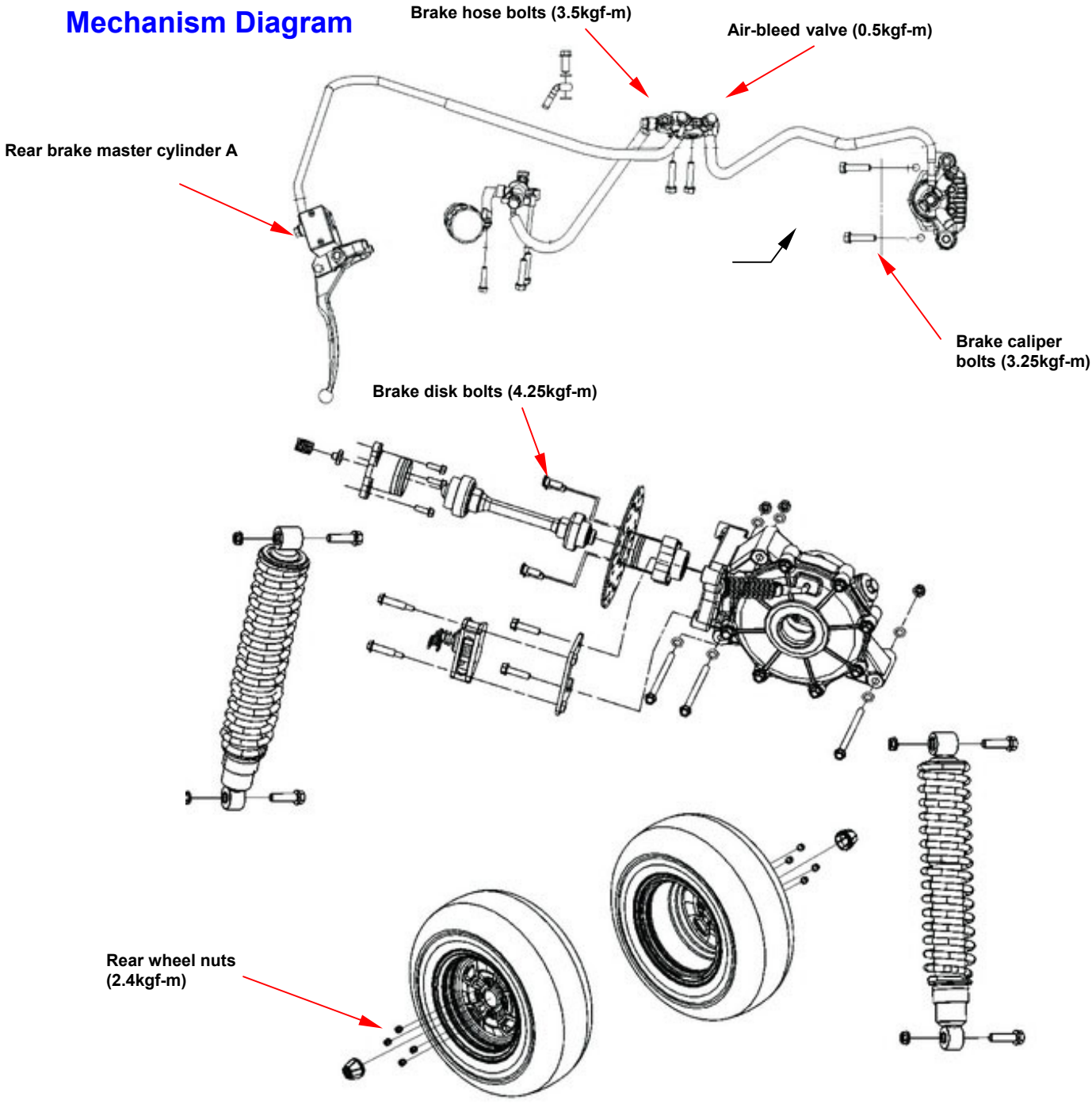


If the toe-in is out of standard, adjust it by hanging the length of the tie-rods equally by turning the tie-rod while holding the ball joint.
Loosen two side tie-rod lock nuts; turn the tie-rods to adjustment toe-in.
Tighten the lock nuts.
Torque value: 3.6kgf-m



17. REAR BRAKE & REAR WHEEL & REAR CUSHION

Mechanism Diagram



Maintenance Description

Operational precautions

⚠ Caution

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

- 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 riding.
- Please refer to the Maintenance Manual of tubeless tire in respect to the removal, repair and installation of the tire.

Specifications

Item	Standard (mm)	Limit (mm)
The thickness of front and rear brake disk	4.000	2.500
Front and rear brake disk eccentricity	< 0.100	0.300
Master cylinder inner diameter (hand brake)	14.000 ~ 14.043	14.055
Master cylinder piston outer diameter (hand brake)	13.957 ~ 13.984	13.945
Master cylinder inner diameter (foot brake)	15.900 ~ 15.943	15.955
Master cylinder piston outer diameter (foot brake)	15.857 ~ 15.884	15.845
Diameter of rear disk	220.000	-
Thickness of rear brake lining	7.000	2.000

Tire pressure as cold: 0.8 kg/cm² (12psi)

Torque values

Brake hose bolt	3.50kgf-m	Rear axle castle nut	5.00kgf-m
Bolt for brake caliper	3.25kgf-m	Rear axle holder bolt	9.20kgf-m
Bolts for the brake disk	4.25kgf-m	Rear wheel axle nut	9.20kgf-m
Brake lever nut	1.00kgf-m	Rear cushion mounting bolt	4.6kgf-m
Air-bleed valve	0.50kgf-m	Swing arm pivot bolt	9.2kgf-m
Rear wheel nut	2.40kgf-m		

Special tools

Inner bearing puller: SYM-6204022
Rear axle bearing driver (6007LLU): SYM-9100100 RA1 A3017

Trouble Diagnosis

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/disk
7. Low brake fluid
8. Blocked brake hose
9. Warp/bent brake disk
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/disk
2. Poor wheel alignment
3. Clogged brake hose
4. Deformed or warped brake disk
5. Restricted brake hose and fittings

Tight brake

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

Brake noise

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

Vibration or Wobble

1. Axle is not tightened well
2. Bent rim
3. Axle bearings are worn
4. Faulty tires
5. Rear axle bearing holder is faulty

Hard Suspension

1. Bent damper rod
2. Faulty swing arm pivot bushings

Soft Suspension

1. Weak shock absorber damper
2. Weak shock absorber spring

Rear Wheel

Removal

Raise the rear wheels off the ground by placing a jack or other support under the frame.
Remove the rear wheel nuts, and then remove rear wheels.

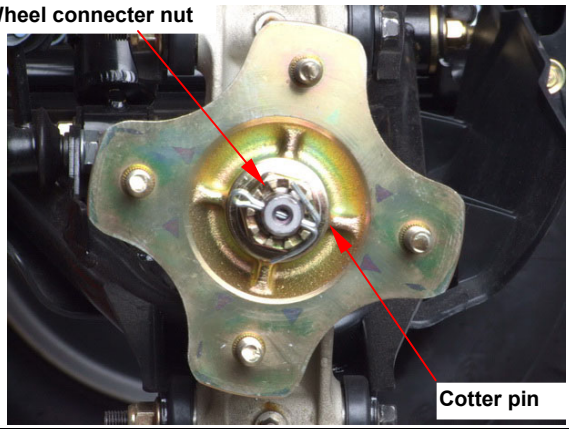
Installation

Install the rear wheel and tighten the nuts.
Torque: 2.4kgf-m

Rear Wheel Connecter

Removal

Remove cotter pin, rear wheel connecter nut and washer.



Remove right and left rear wheel connecter.

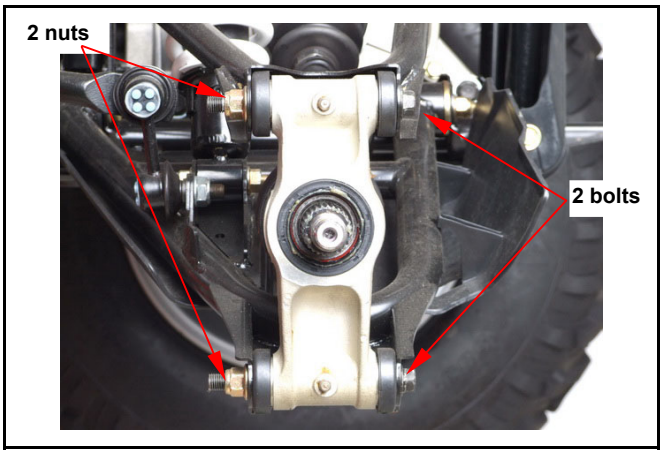
Installation

Install the rear wheel connecter.
Install wheel connecter wheel connecter nut.
Torque: 2.4kgf-m
Install cotter pin.

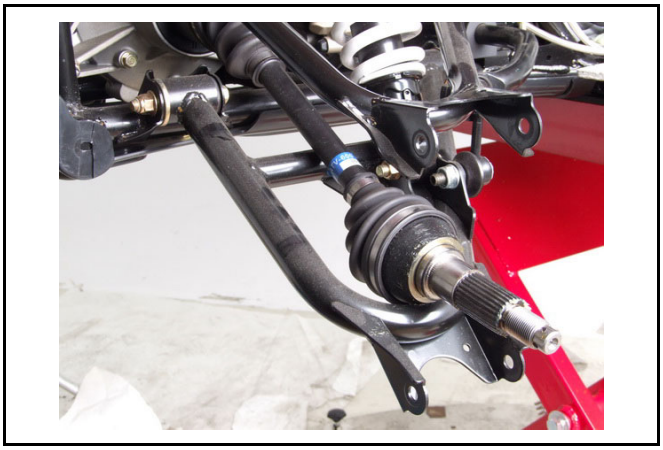
Rear Wheel Hub

Remove

Loosen 2 nuts then 2 flange bolts

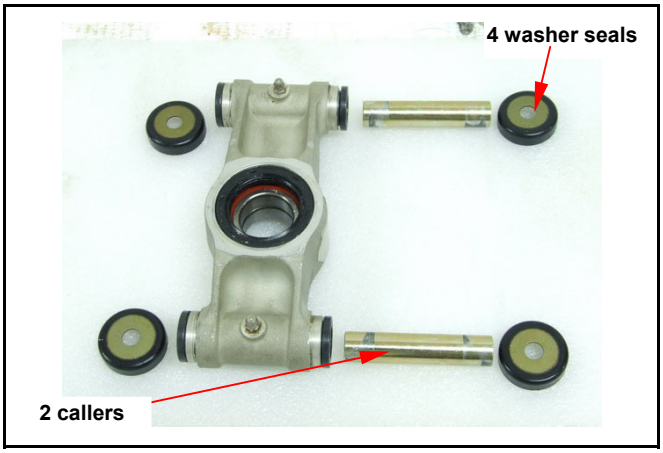


Remove the rear wheel hub.

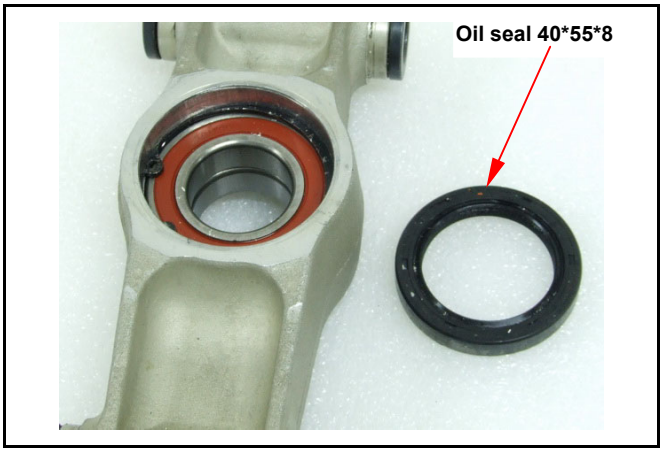


Wheel Hub Disassembly

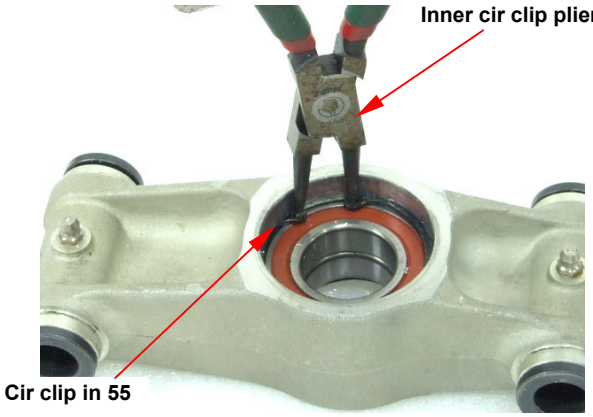
Remove 4 washer seals & 2 callers from rear wheel hub.



Remove the oil seal 40*55*8 from rear wheel hub.



Remove the cir clip in 55 with Inner cir clip pliers

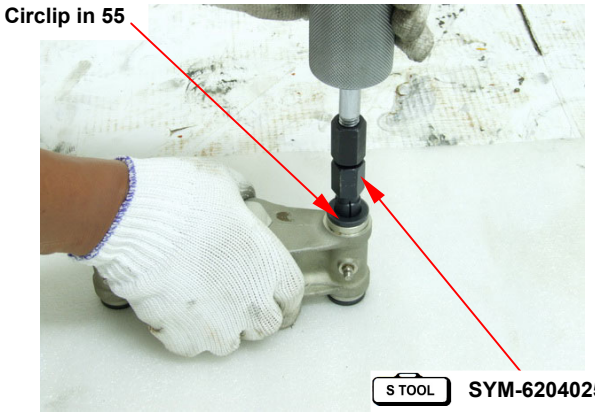


Remove the 2 bearing from rear wheel hub with special tool.

Tools number: SYM-6204025
Tools name: inner bearing outer puller.

Remove the 4 oiled from rear wheel hub with special tool.

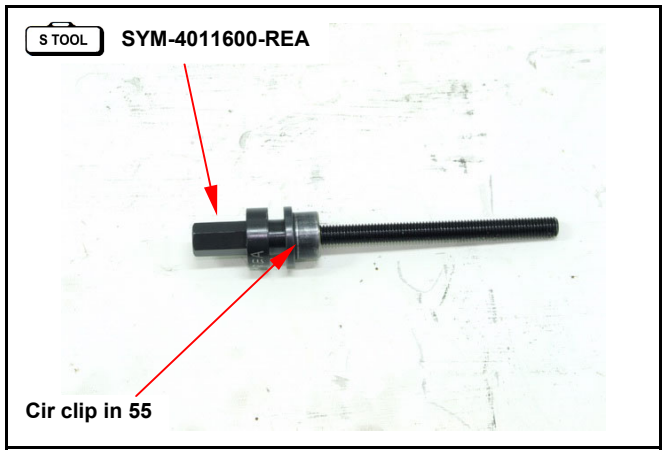
Tools number: SYM-6204025
Tools name: inner bearing outer puller.



Wheel Hub Assembly

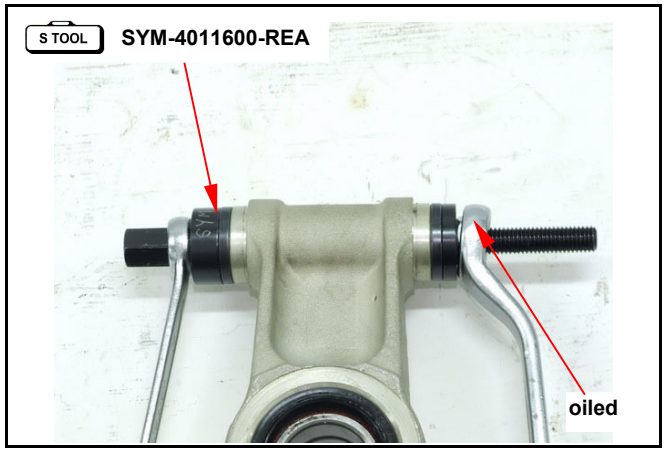
Assembly oiled & special tool.

Tools number: SYM-4011600-REA
Tools name: RR. wheel hub oiled install tool.
.



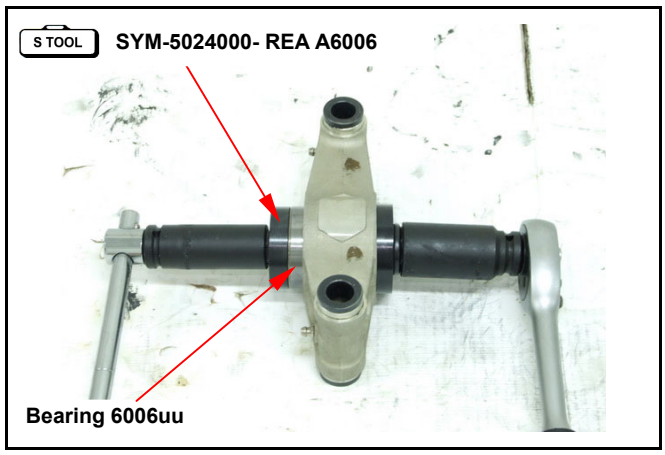
Assembly oiled & special tool into the rear wheel hub with special tool.

Tools number: SYM-4011600-REA
Tools name: RR. wheel hub oiled install tool.



Install 2 bearing 6006uu into the rear wheel hub with special tool.

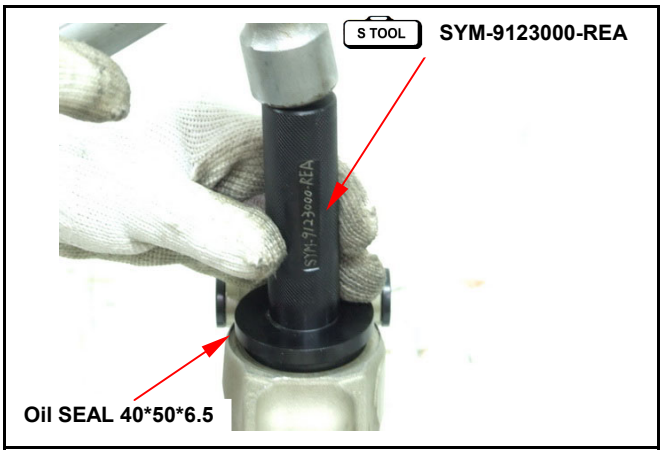
Tools number: SYM-5024000- REA A6006
Tools name: wheel knuckle body bearing 6006 in puller with air or head tool.



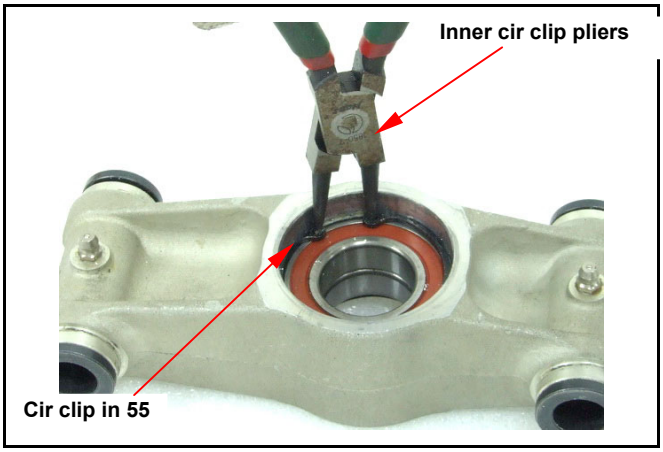
Assembly oil seal 40*50*6.5 by special tool

Tools number: SYM-9123000- REA
Tools name: wheel knuckle body seal 40*50*6.5 in driver.

Install the oil seal with special tool & hammer.

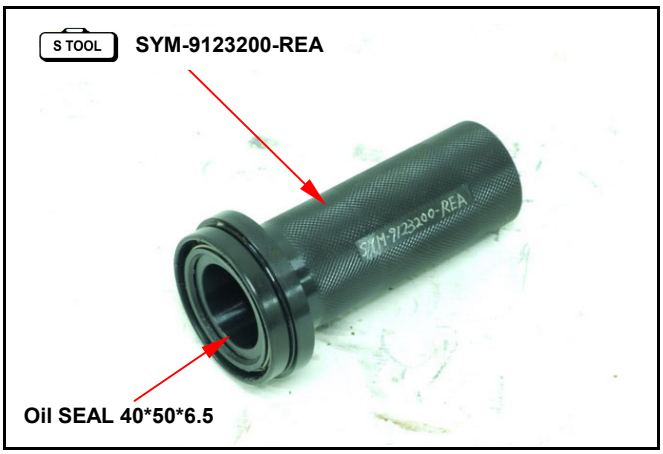


Install the cir clip in 55 into the rear wheel hub.

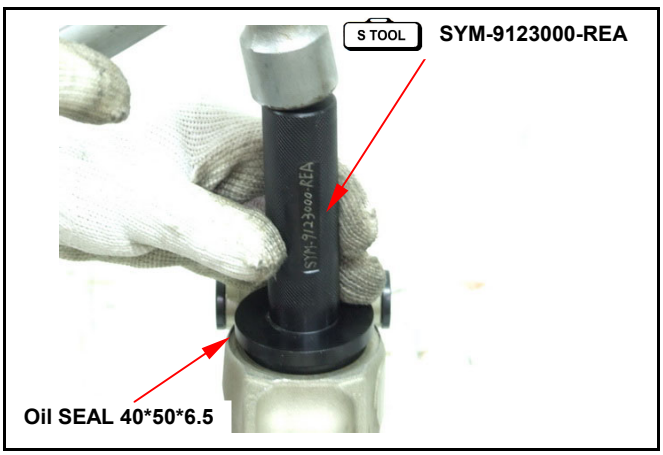


Assembly oil seal 40*55*8 by special tool

Tools number: SYM-9123200- REA
Tools name: wheel knuckle body seal 40*55*8 in driver.



Install the oil seal with special tool & hammer

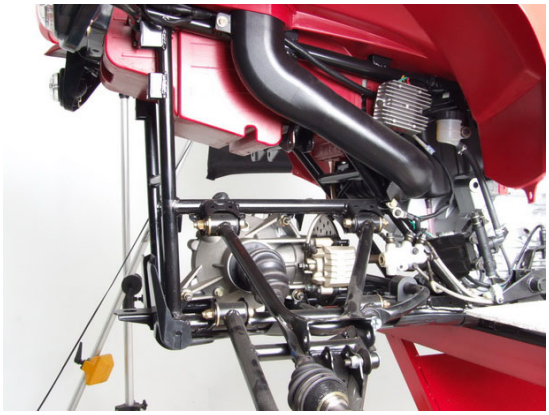


Rear Cushion

Removal

Remove the rear wheels.
Remove the rear wheel connecter.
Loosen 2 bolts from the rear cushion.

Remove the rear cushion.



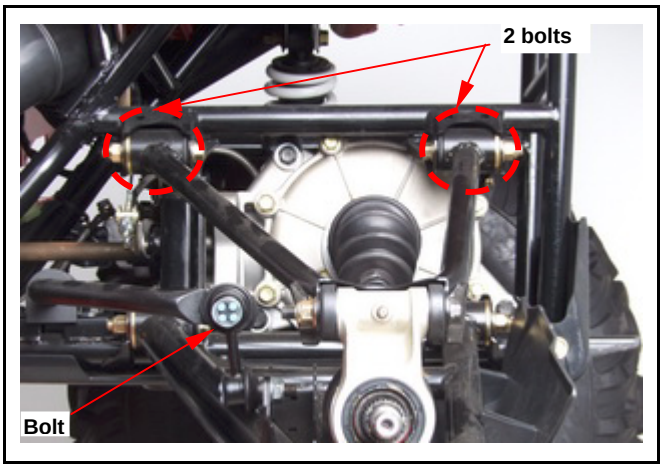
Installation

Install rear cushion, and install rear cushion upper bolt.
Install rear cushion under bolt, and install nut.
Tighten the rear cushion upper bolt and under nut to the specified torque value.
Torque: 4.6kgf-m

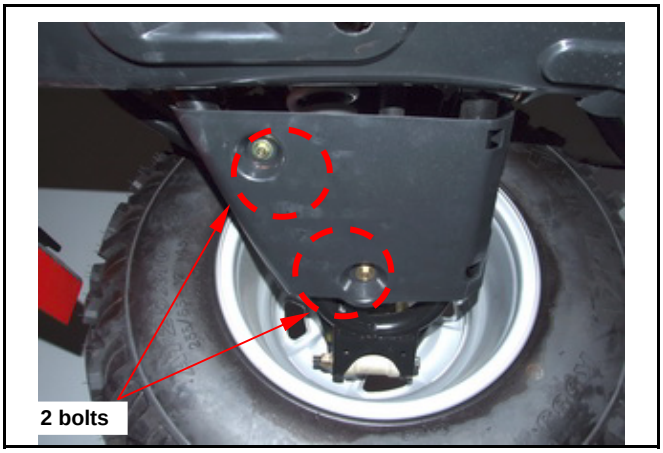
Suspension Arm

Removal

Remove the rear wheel, wheel hub and rear cushion.
Loosen upper suspension arm nuts.
Remove swing arm bolts.



Loosen 2 bolts from under suspension arm cover and then remove the cover.
Loosen under suspension arm nuts.
Remove the swing arm bolts.
Remove under suspension arm.



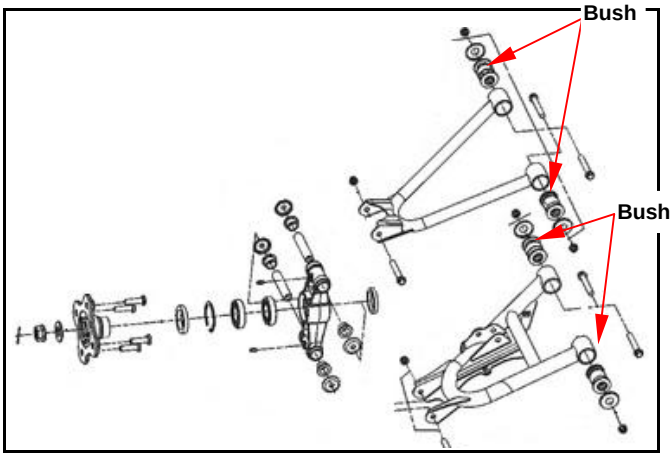
Inspection

Inspect the suspension arm for damage or bending.

Installation

Install in the reverse order of removal procedures.
Torque value:
Suspension arm nut 5.0kgf-m

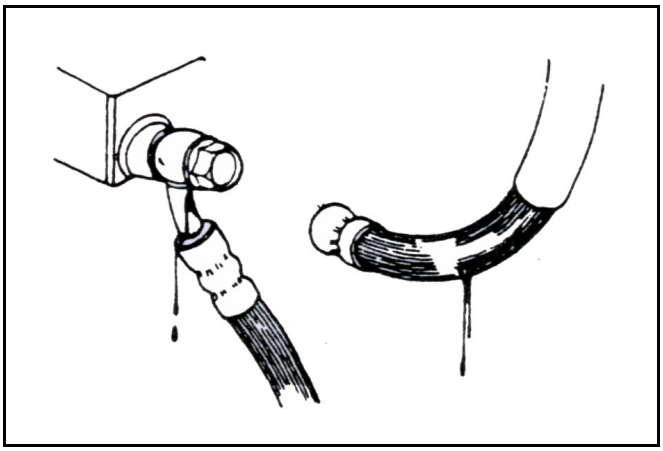
Lubricate with grease into suspension arm.



Disk Brake System Inspection

Inspection

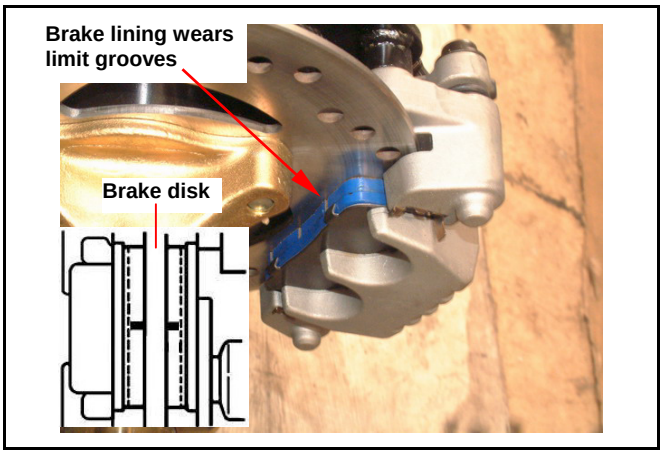
By visual examination whether divulges or the damage, with spanner inspection brake tube seam whether becomes less crowded, and the inspection handle bar turn right or turn left, or pressure the cushion, whether besides the pipeline protection department, whether there is interferes, contacts other parts.



Check the brake from behind the brake caliper. The brake pad must be replaced with new lining when the brake pad wear limit reaches the brake disk.

⚠ Caution

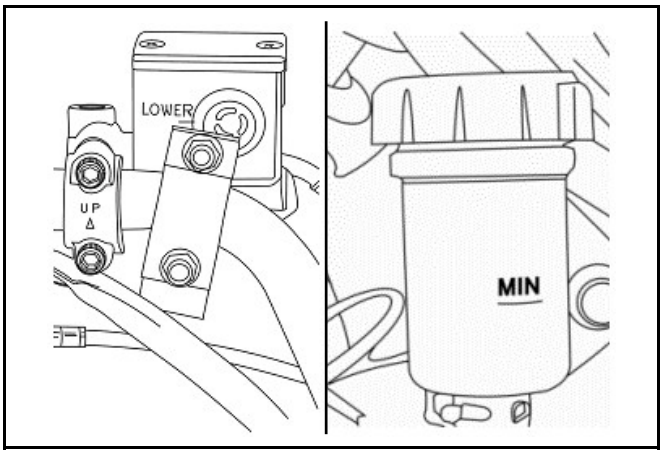
- Before checking the rear brake lining, remove rear wheel first.



Park the ATV on a level ground, and check if fluid level is under the “LOWER” mark.
Recommended Brake Fluid: WELL-RUN BRAKE OIL (DOT 3).

⚠ Caution

- When the vehicle is inclined or just stopped, the oil level could not be accurate, settle it for the 3~5 minutes.
- In order to prevent the chemical change, please do not use counterfeiting or other unclear trademarks brake fluid.
- Use the same trademark brake fluid to guarantee the braking efficiency.



Adding Brake Fluid

Before removing the brake fluid reservoir, turn the handle to make the brake fluid reservoir become horizontal, and then remove the brake fluid reservoir.
Before serving the brake system, cover the surface of the painted or the rubber parts by the rags.

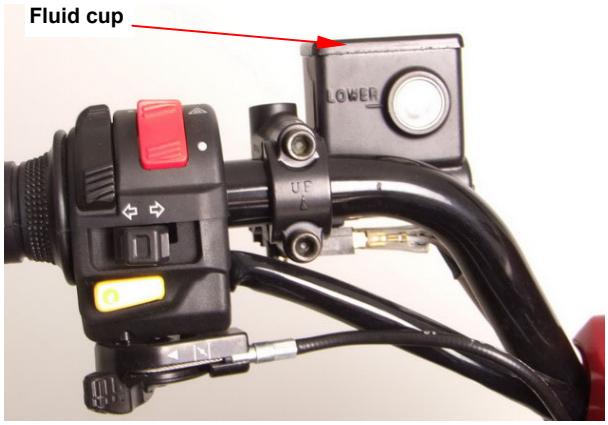
⚠ Caution

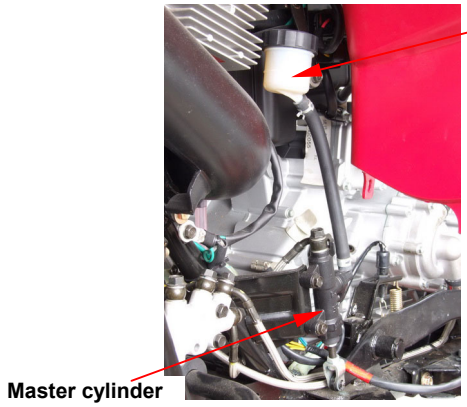
Supplement brake fluid please do not surpass the upper limit, spilled brake fluid on painted surfaces, plastic or rubber components may result in their damages.

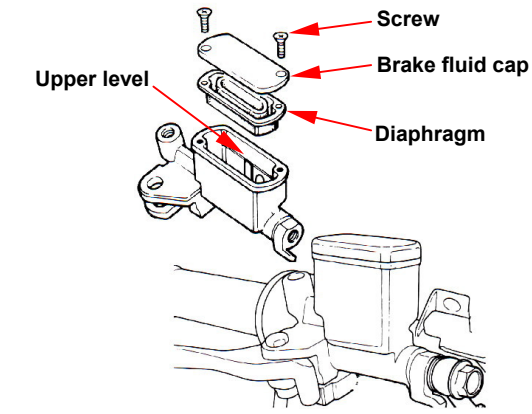
Remove the brake fluid cap and diaphragm.
Increases the high quality brake fluid, uses by all means must with the trade mark brake fluid joins in the master cylinder.
Clean the dirty brake disk.

⚠ Caution

- The dirty brake lining or disk will reduce the brake performance.
- Mixed non-compatible brake fluid will reduce braking performance.
- Foreign materials will block the system, causing braking performance to be reduced or totally lost.

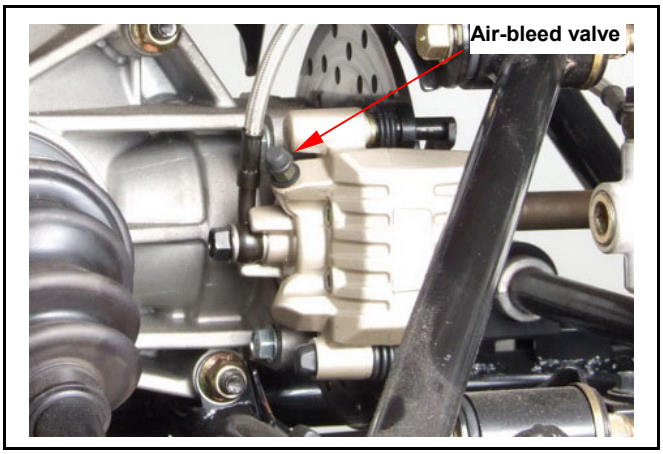




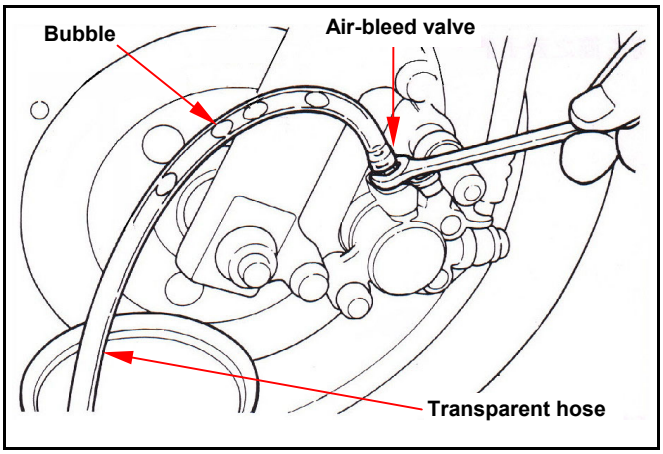


Brake Fluid Replacement / Air-bleed

Connect drain hose to air-bleed 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



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:

1. Hold the brake lever tightly and open the drain valve around 1/4 turn, 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 entering 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. Close the drain valve tightly.
5. Make sure the brake fluid is at the UPPER level of the master cylinder, and refill the fluid if necessary.
6. Cover the cap.

Rear Brake Caliper

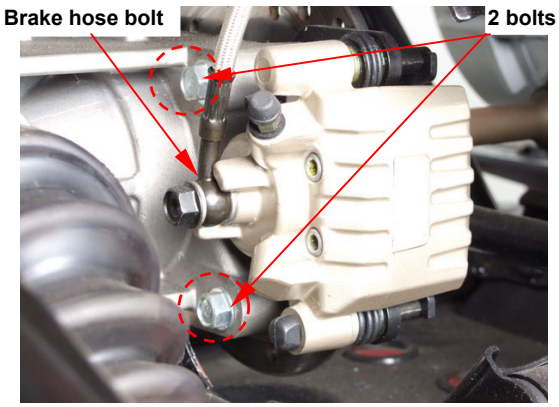
Removal

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

⚠ Caution

Do not spill brake fluid on painted surfaces.

Remove two caliper bolts and the caliper.



Inspection

Make sure the brake linings condition. Replace the linings if the brake linings wear limitation groove close to the brake disk.

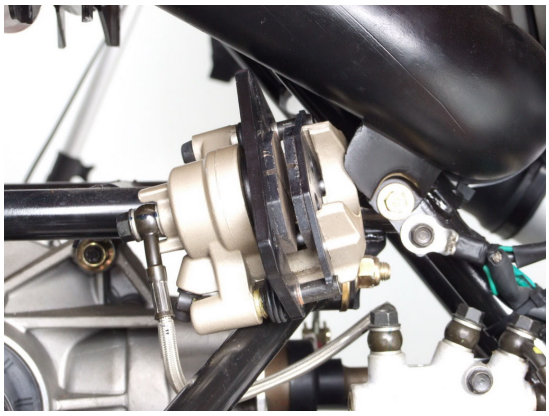
Installation

Install the brake caliper and tighten the attaching bolts securely.

Torque: 3.25kgf-m

⚠ Caution

- Use M8 x 20 mm flange bolt only.
- Long bolt will impair the operation of brake disk.



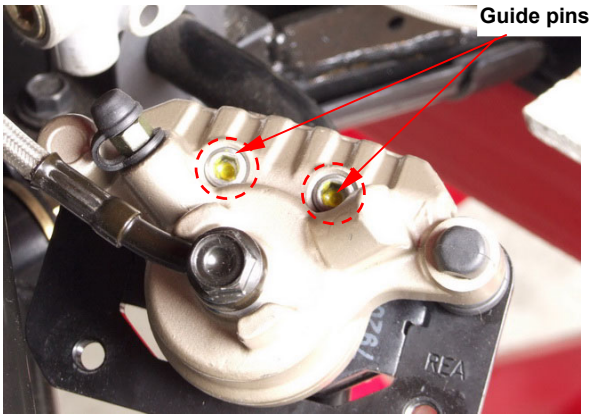
Use two seal washers and hose bolts to lock the hose and brake caliper in place.

Torque: 3.5kgf-m

Refill up the brake fluid to the reservoir and make necessary air bleeding.

Brake lining replacement

Remove two guide pins.

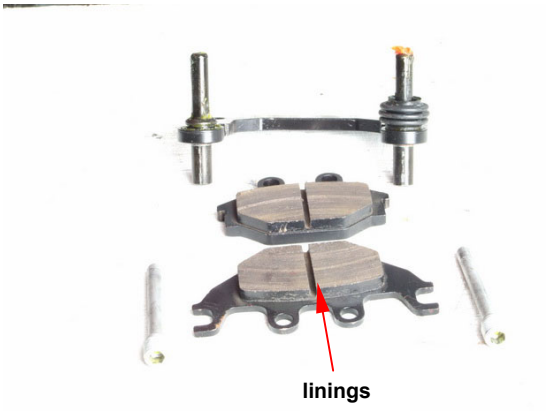


Remove brake caliper cylinder, and then remove brake linings.

Install new linings and brake caliper cylinder.

Tighten the guide pins.

Torque: 1.8kgf-m

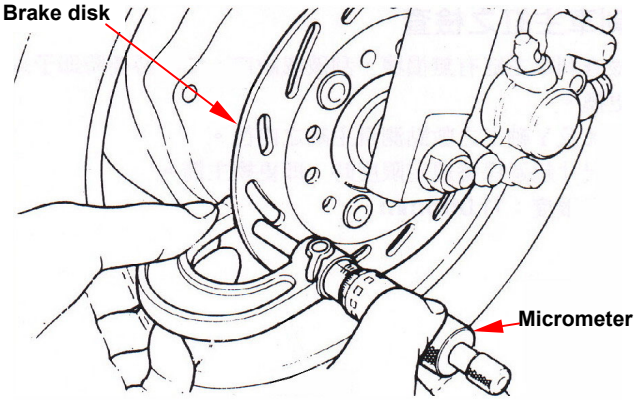


Brake Disk

Inspection

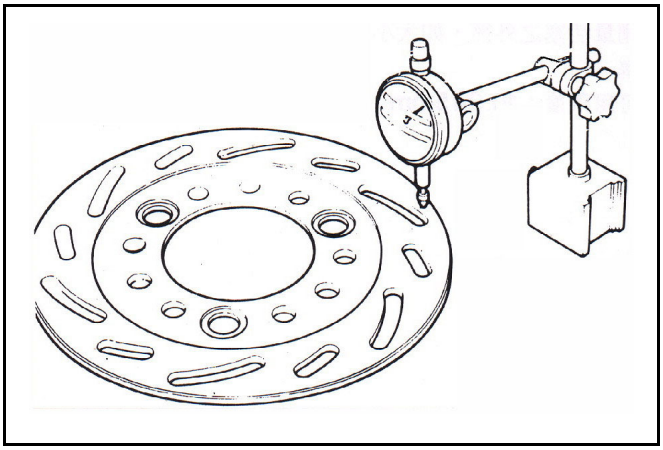
Visually check the brake disk for wear or break. Measure the thickness of the disk at several places. Replace the disk if it has exceeded the service limit.

Allowable limit: 2.5 mm



Remove the brake disk from rear wheel axle.
Check the disk for deformation and bend.

Allowable limit: 0.30 mm



⚠ Caution

- The dirty brake lining or disk will reduce the brake performance.
- Brake lining includes the asbestos ingredient, cannot use the air gun to be clean, the operator should dress the mouthpiece and the glove, and use vacuum cleaner clean it.

Rear Brake Master Cylinder

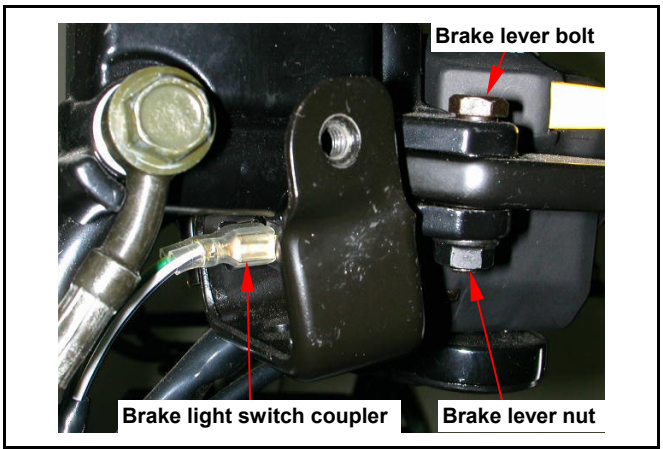
Master Cylinder Removal

⚠ Caution

Do not let foreign materials enter into the cylinder.

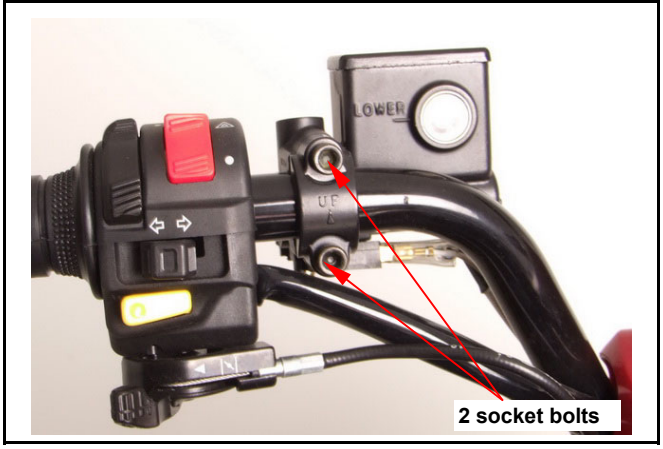
⚠ Caution

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



Handle left side – rear brake master cylinder A

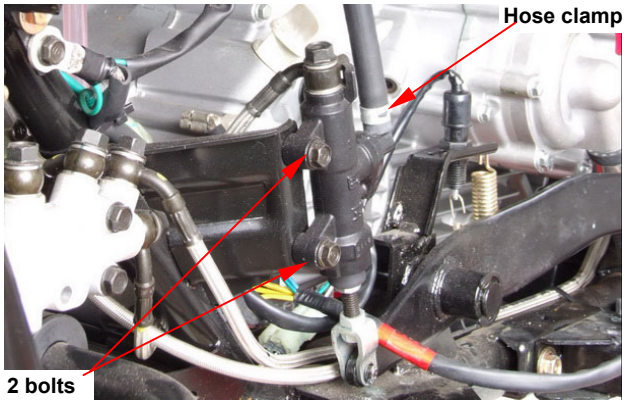
Remove brake light switch coupler.
Drain out the brake fluid.
Remove the brake hose.
Remove the brake lever from the brake master cylinder.
Remove the master cylinder socket bolts and the master cylinder.



Right footrest side – rear brake master cylinder B

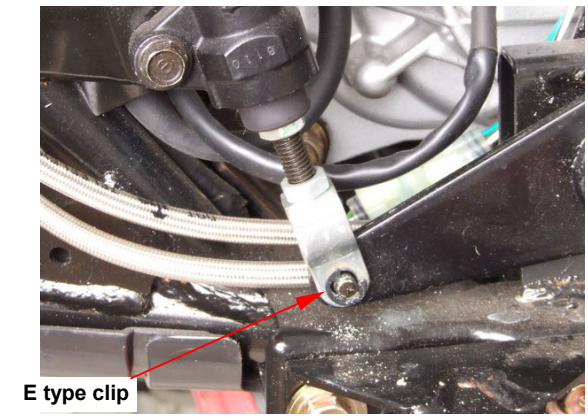
Place a container under the brake master cylinder, remove fluid hose clamp, and drain out the brake fluid.

Loosen the brake hose bolt and finally remove the brake hose.



Remove the E type clip, and remove brake push rod pin.

Remove the master cylinder socket bolts and the master cylinder.



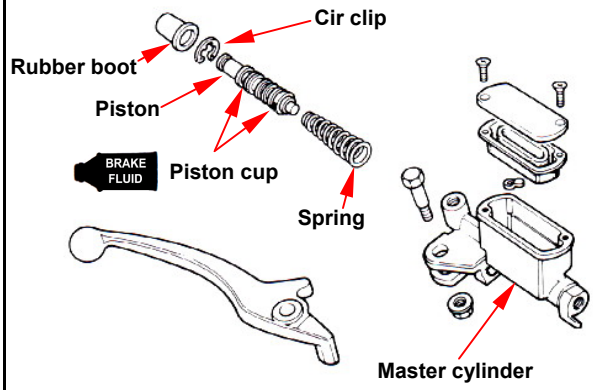
Disassembly

Remove the rubber boot.

Remove the cir clip.

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.

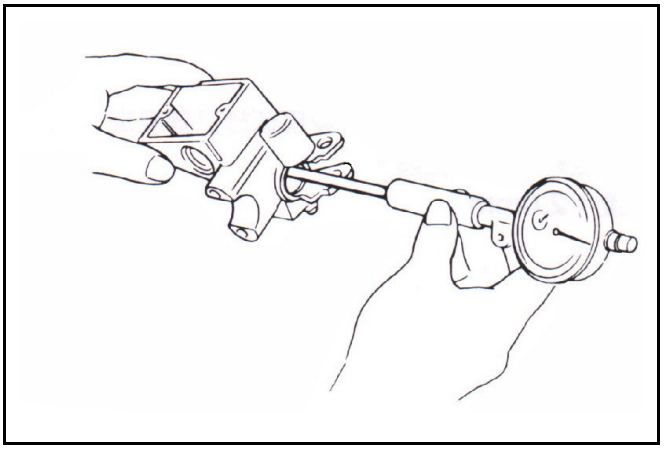
Measure the cylinder inner diameter at several points along both X and Y directions.

Replace the cylinder if the measured values exceed allowable limit.

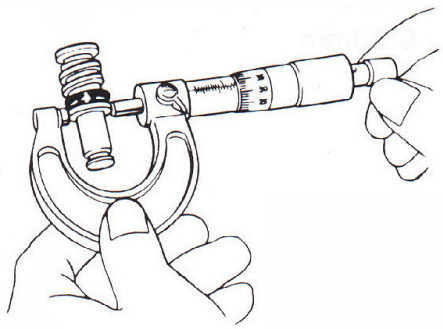
Allowable limit:

Hand brake 14.050 mm

Foot brake 15.950 mm



Measure the outer diameter of the piston.
Replace the piston if its measured value exceeds allowable limit.
Allowable limit:
Hand brake 13.954 mm
Foot brake 15.850 mm

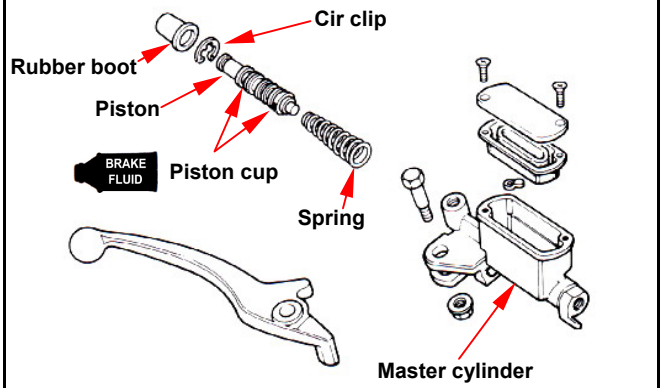


Master Cylinder Assembly

⚠ Caution

- It is necessary to replace the whole set comprising piston, spring, piston cup, and cir clip.
- 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 cir clip.



⚠ Caution

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

Install the rubber boot into groove properly.

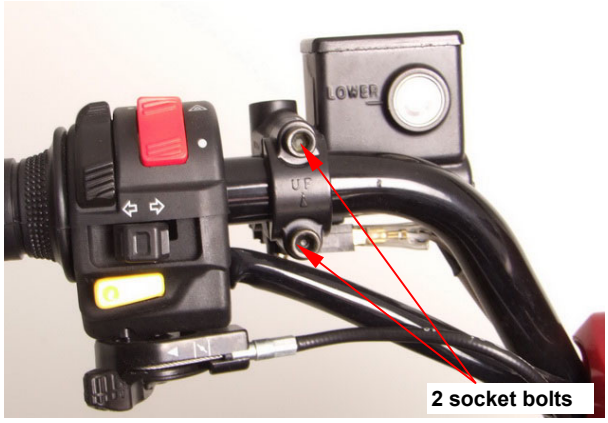
Master Cylinder Install

⚠ Caution

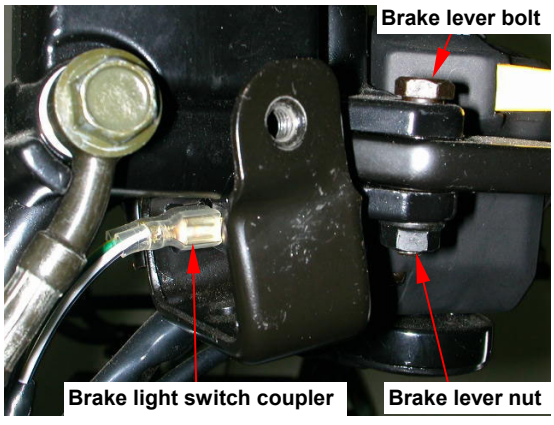
Improper routing may damage leads, hoses or pipes.

⚠ Caution

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

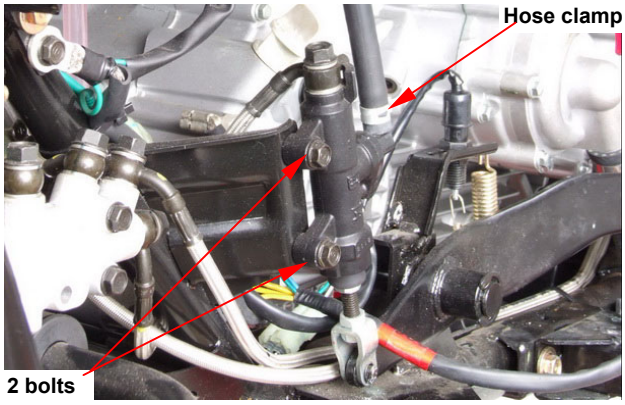


Handle left side – rear brake master cylinder A
Install the rubber pad into the groove correctly.
Place the master cylinder onto handlebar, and install the bolts.
Install the brake lever, and connect coupler to brake light switch.
Connect brake hoses with 2 new washers.
Tighten the brake hose bolt to the specified torque value.
Torque: 3.5kgf-m
Make sure the hose is installed correctly.
Install all wires, hoses, and components carefully so avoid to twisting them together.
Add specified brake fluid and bleed the system.



Right footrest side – rear brake master cylinder B

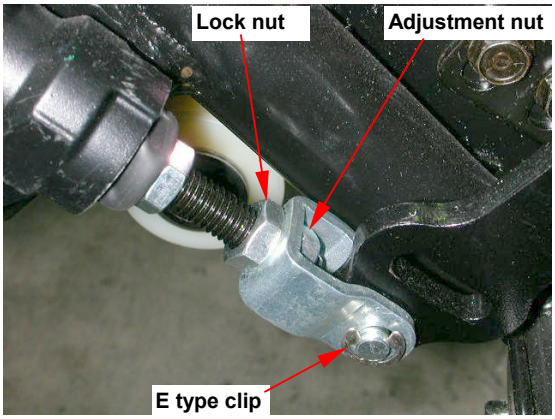
Install the master cylinder bolts and the master cylinder.



Install brake push rod to the brake pedal, and install pin and E type clip.

⚠ Caution

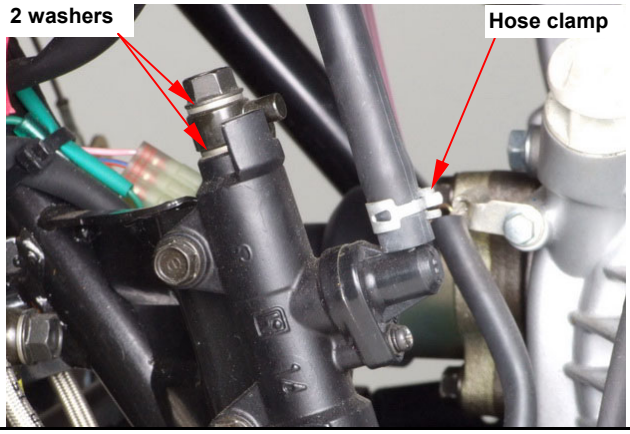
To adjustment brake pedal, you must be removed push rod pin fist.
Loosen lock nut, and turn adjustment nut and push rod bracket to adjustment brake free play.



Install fluid hose and clamp.
Connect brake hoses with 2 new washers.
Tighten the brake hose bolt to the specified torque value.

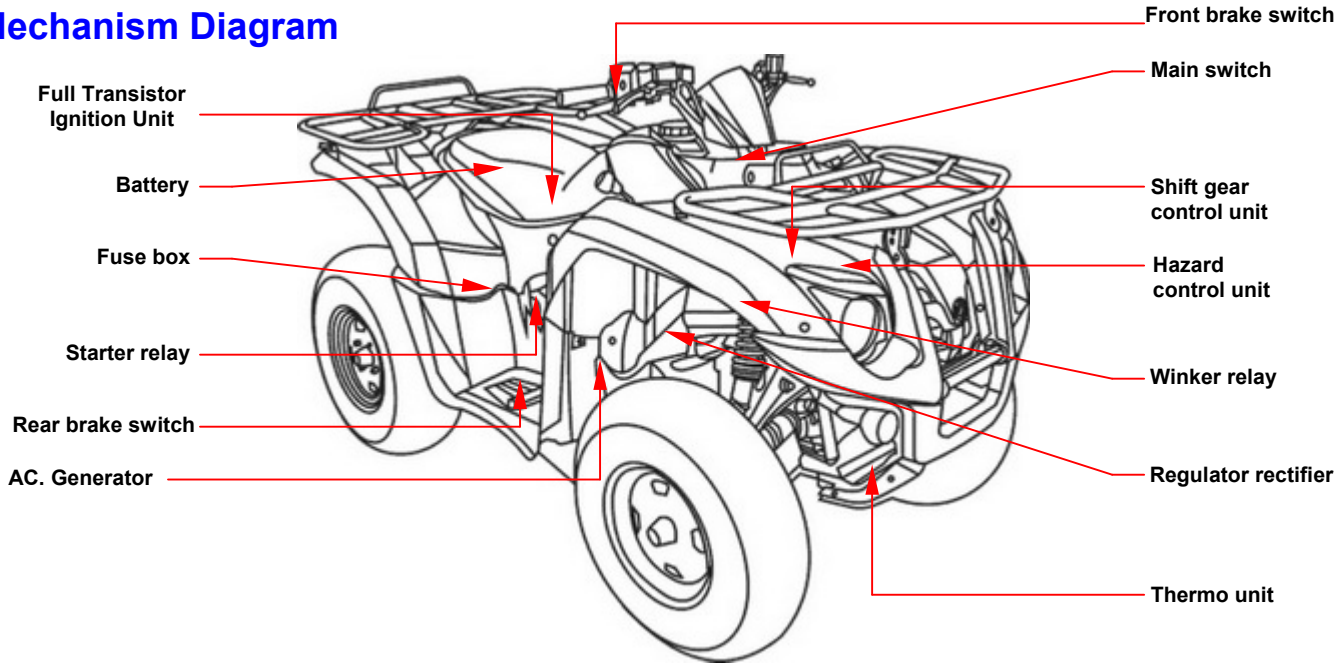
Torque: 3.5kgf-m

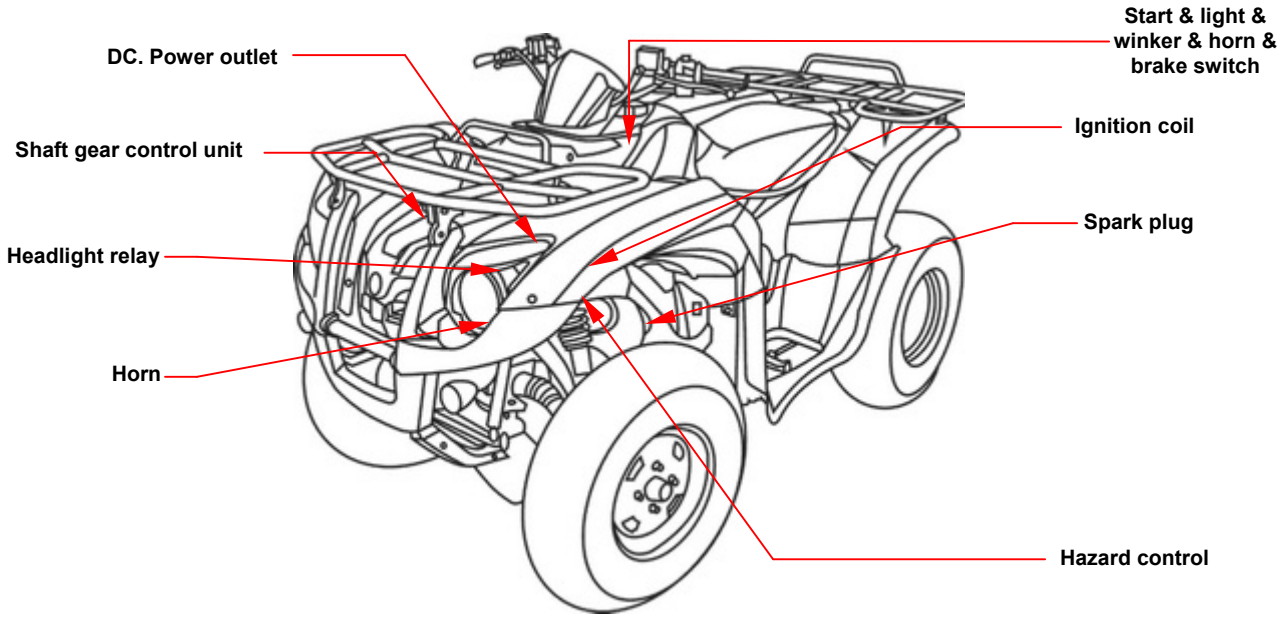
Make sure the hose is installed correctly.
Install all wires, hoses, and components carefully so avoid to twisting them together.
Add specified brake fluid and bleed the system.



Notes:

Mechanism Diagram





Maintenance Data

Operational precaution

- When removing the battery, the disconnection sequence of cable terminals shall be strictly observed. (First disconnect the negative cable terminal then the positive cable terminal.)
- The model of the spark plug and the tightening torque.
- The ignition timing.
- Adjustment of headlight.
- 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 rack without removing ventilation caps.
- Unless in emergency, never recharge the battery rapidly.
- The voltage must be checked with the voltmeter while charging the battery.
- As Full-Transistor Igniter assembly does not require an ignition timing check. In case ignition timing is incorrect, check Full-Transistor Igniter and AC generator. Verify with an ignition timing light after replacement if necessary.

Technical Specification

Charging system

Description		Specification
Battery	Capacity	12V12Ah
	Charging rate	1A / 5 hours (standard) 4A / 1 hour (fast charging)
Leak current		< 1mA
Charging current		1.2 A / 1500rpm
Control voltage in charging		14.5 + 0.5 V / 1500rpm

Ignition system

Description		Specification
Spark plug	Model	NGK CR8E (Recommended)
	Gap	0.8mm
Ignition coil and resistance	Primary winding	2.8 ± 15%Ω
	Secondary winding	Without cap: 9.0 ± 20KΩ
		With cap: 14.0 ± 20KΩ
Ignition timing “F” mark		10° BTDC / 1500 rpm
		26° BTDC / 3500~5500 rpm
		30° BTDC / 6000~7000 rpm
		10° BTDC / 7300 rpm

Trouble Diagnosis

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 Full-Transistor Igniter
- Poor connection between Full-Transistor Igniter and ignition coil
  - Poor connection between Full-Transistor Igniter and the main switch
- Poor main switch
- Poor Full-Transistor Igniter
- 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
- Burned fuse
- Poor contact, open or short circuit
- Poor regulator
- Poor ACG

Engine does not crank smoothly
- Primary winding circuit
  - Poor ignition coil
  - Poor connection of cable and connectors
  - Poor main switch
- Secondary winding circuit
  - Poor ignition coil
  - Poor spark plug
  - Poor ignition coil cable
  - Current leakage in the spark plug
- Incorrect ignition timing
  - Poor AC.G.
  - Improper installation of the pulse sensor
  - Poor Full-Transistor Igniter

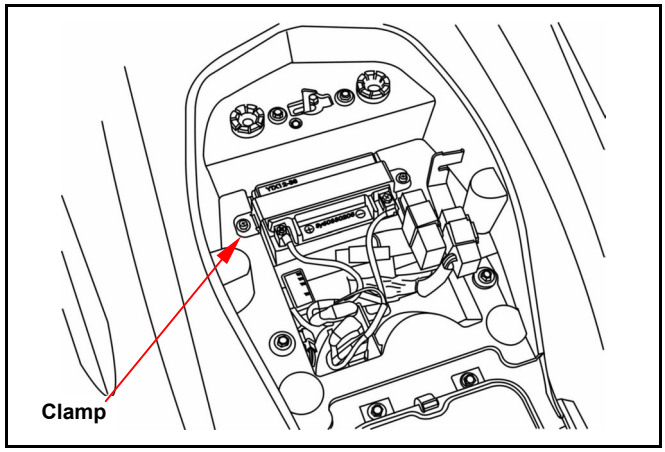
Weak starter motor
- Poor charging system
- The battery is not fully charged
- Poor connection in the windings
- The motor gear is jammed by foreign material

Starter motor is working, but engine does not crank
- Poor starter motor pinion
- The starter motor run in reverse direction
- Poor battery

Battery

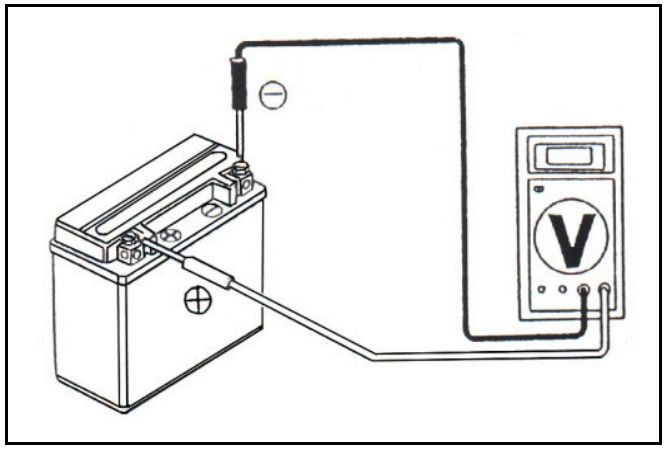
Removal

Remove the seat, and then you can see the battery.
Disconnect the negative cable terminal first, then the positive cable terminal.
Remove the battery clamp, and then remove the battery.



Voltage Check

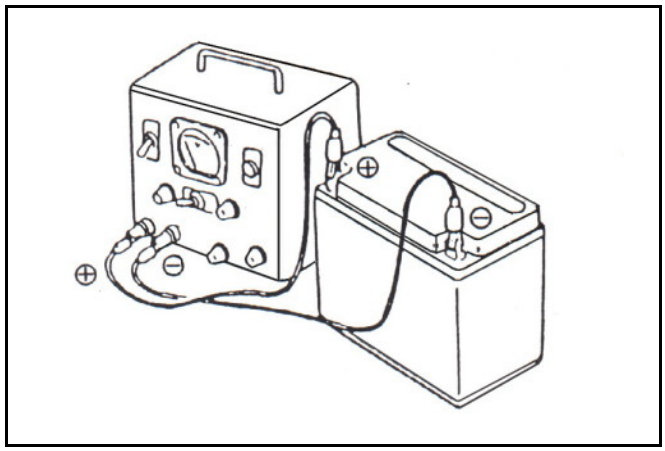
Use the digital voltmeter to check the voltage of the battery.
Voltage:
Fully charged: 13.0~13.2 V at 20℃
Undercharged: Below 12.3 V at 20℃



Charging

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	Maximum
Charging current	1A	4.0A
Charging time	5H	1H



⚠ Warning

- Keep flames away while recharging.
- Charging is completely controlled by the ON/OFF switch on the charger, not by battery cables.

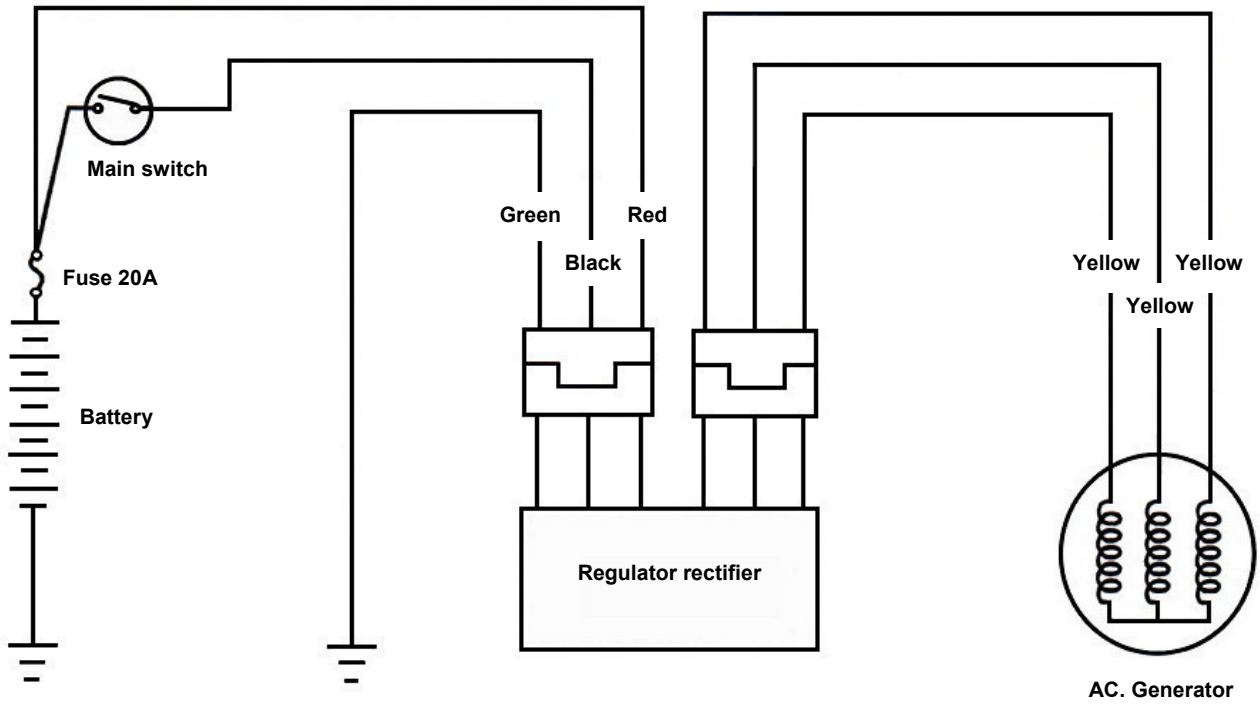
⚠ Caution

- Never rapid charge the battery unless in emergency.
- Verify the battery is recharged with correct current and duration prescribed above.
- Large current and fast time to charge will render damage to the battery.

When installing the battery, coat the cable terminal with grease.

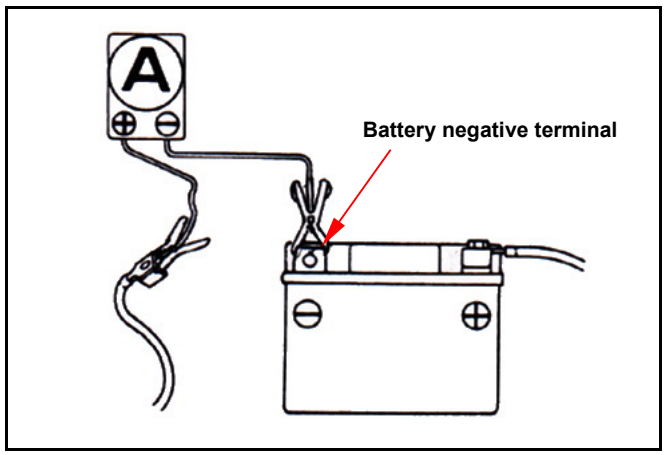
Charging System

Charging circuit



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

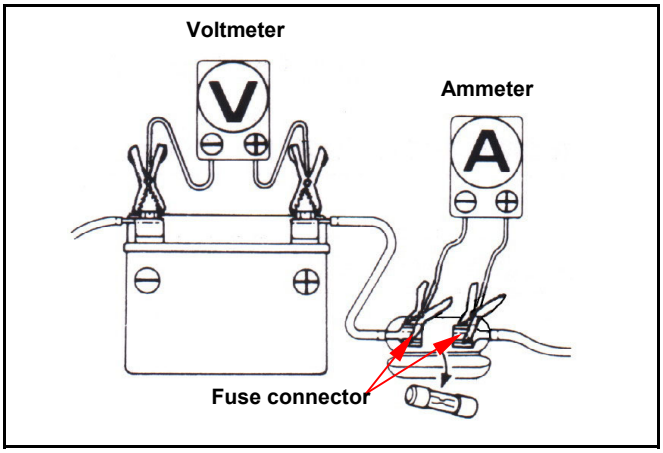
- In the current leakage test, set the current range at the largest scale, then gradually decrease to the lower scale as the test process goes to avoid possible damage to the ammeter and the fuse.
- Do not turn the main switch to ON position during test.

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

Allowable current leakage: Less than 1mA

Disconnect each cable one by one and take measurement of the current of each cable to locate the short circuit.

Inspection on Charging Voltage



⚠ 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 a voltmeter having an indication that the current flows from the positive or the negative direction and the measurement should be at zero, ammeter at one direction only.

⚠ Caution

- Does 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 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 headlight 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 / 6000 rpm
Control Charging Voltage:
14.5 + 0.5 V / 2000 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 does not have enough electricity or is over charged.
- The fuse of the ammeter is blown.
- The ammeter is improperly connected.

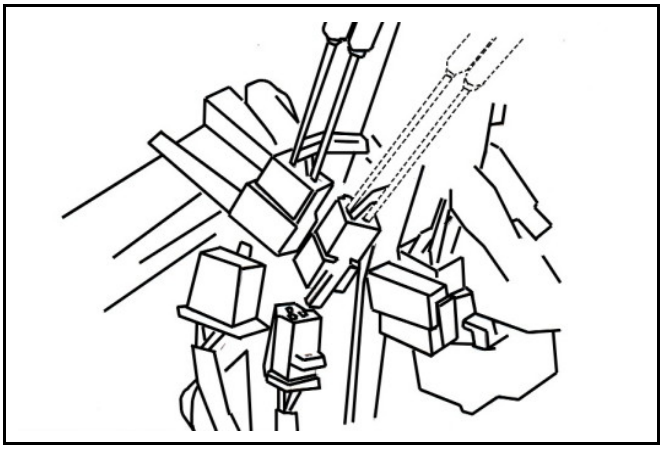
(3) The charging current is normal, but the voltage is not.
- The fuse of the voltmeter is blown.

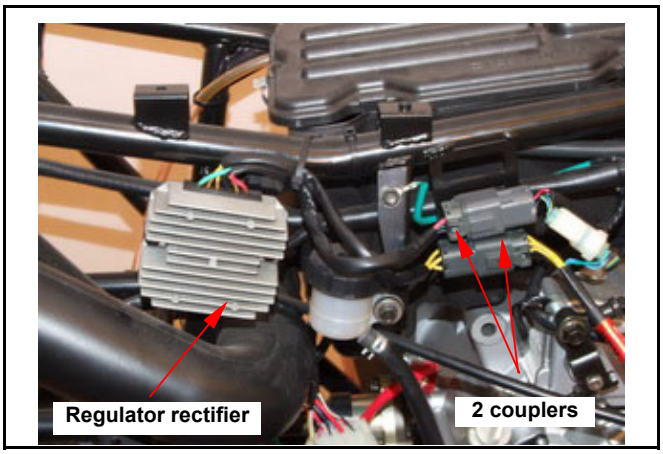
Inspection on regulator rectifier

Remove the seat, rear carrier and rear fender.
Disconnect two 3-pin couplers of the regulator rectifier.
Inspection the rectifier coupler to the wire harness passes the condition.

Item	Check Points	Standard Value
Main switch connection	R – B	Battery voltage (ON)
Battery connection	R – G	Battery voltage
Charging coil	Y – Y	0.17 ~ 0.8Ω

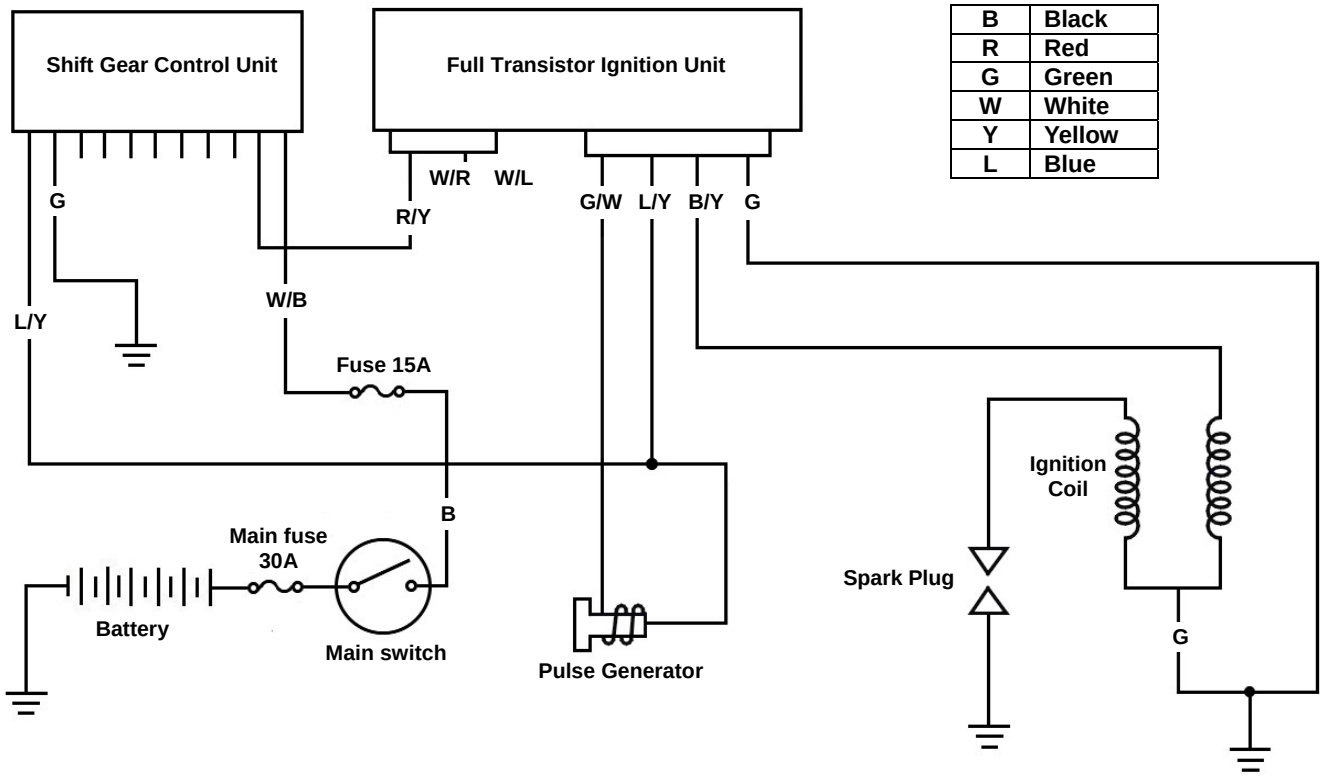
If the readings measured are not normal, check parts in the circuit.
If the parts are normal, then trouble is in the wiring.
If there is nothing wrong with parts and wiring, replace the regulator rectifier.





Ignition System

Ignition circuit diagram



Full Transistor Ignition Unit

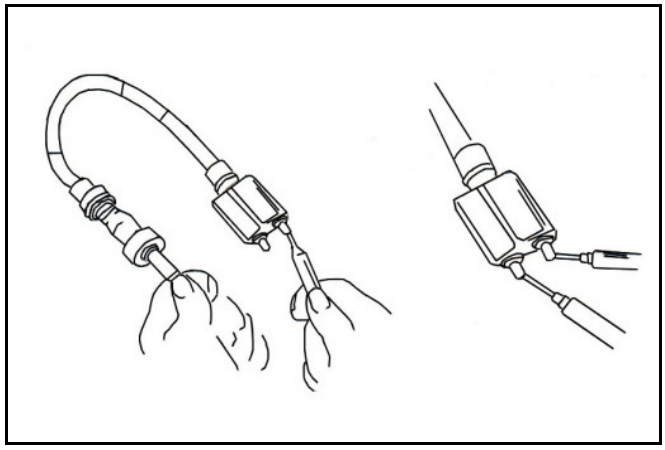
Disconnect connectors of the full transistor ignition unit.
Check the following connectors as indicated in the table at the harness side.

Item		Points to check	Result
Main switch turn to “ON” position		Red/Yellow ~ Green	Battery voltage
Pulse generator		Green/White ~ Blue/Yellow	480~550Ω
Ignition coil	Primary circuit	Black/Yellow ~ Green	2.8±15%Ω
	Secondary circuit	Black/Yellow ~ with no cap	9.0K±20%Ω
		Black/Yellow ~ with cap	14.0K±20%Ω

Inspection on Ignition Coil

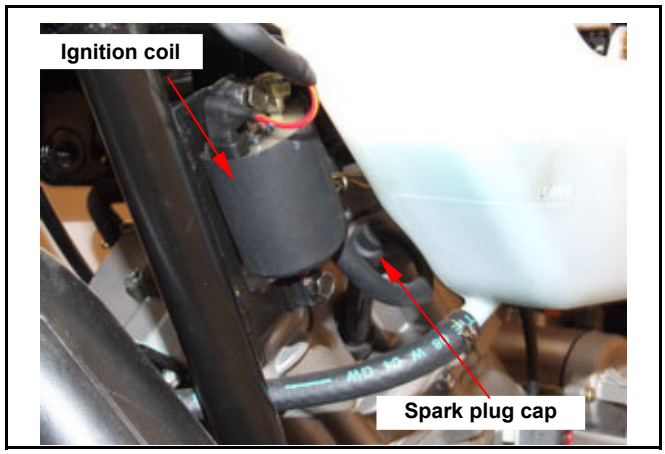
Disengage the connector of the ignition coil and the spark plug cap.
Measure the resistance between the terminals of the primary winding.
Standard resistance: 2.8 ± 10% Ω
Remove the cap from the spark plug and measure the resistance between the spark plug and the primary winding.
Standard resistance:

With no cap: 9.0 ± 20% KΩ
With cap: 14.0 ± 20% KΩ



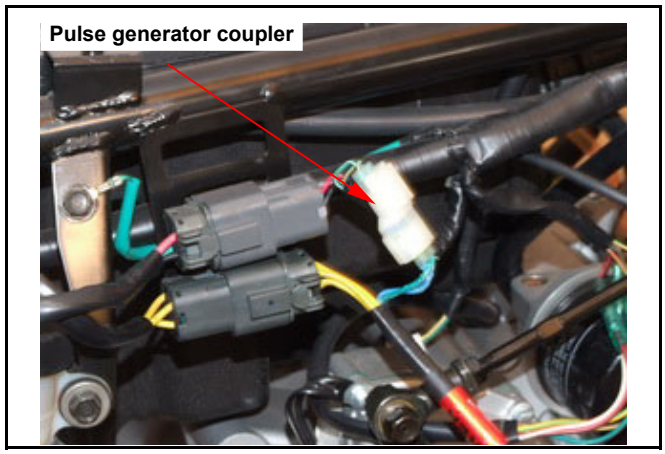
Ignition Coil Replacement

Loosen the lock bolt and replace the ignition coil if necessary.



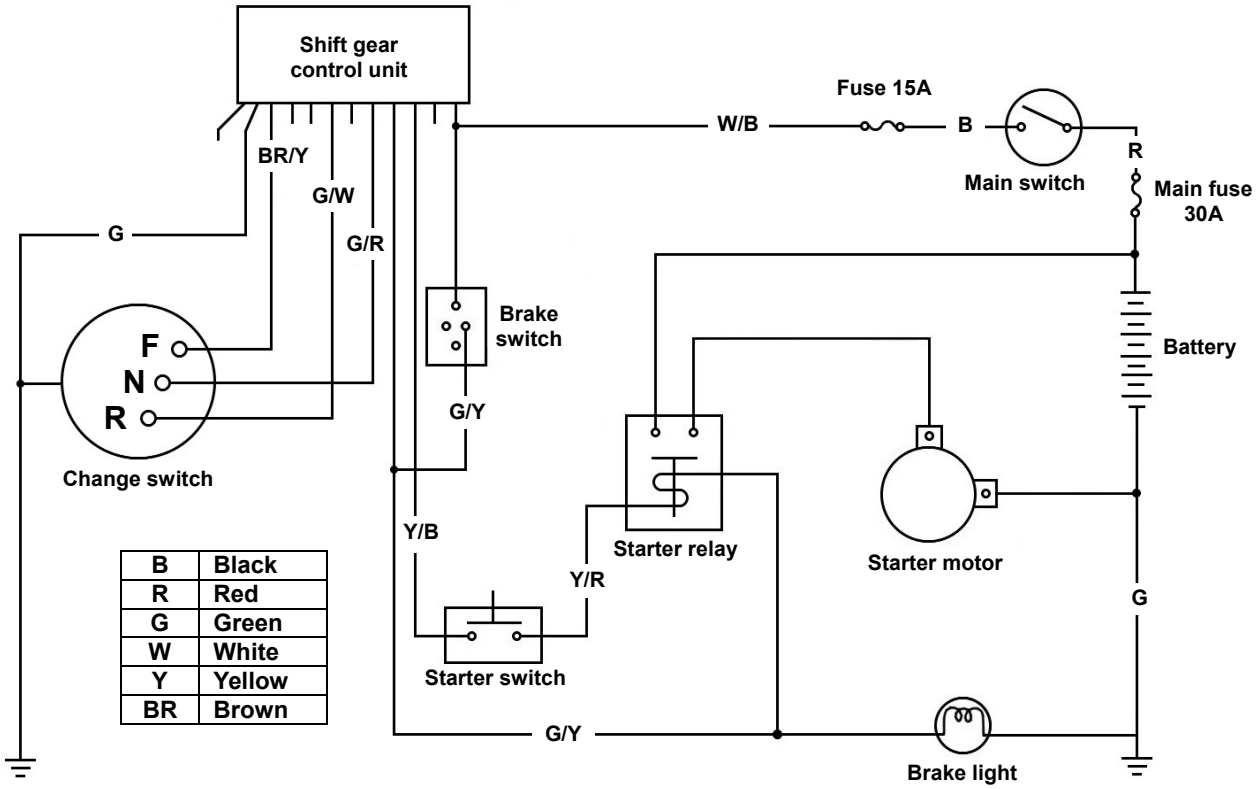
Inspection of Pulse Generator

Disconnect the coupler of the pulse generator and measure the resistance between the terminals of green/white and blue/yellow.
Standard resistance: 50~170Ω



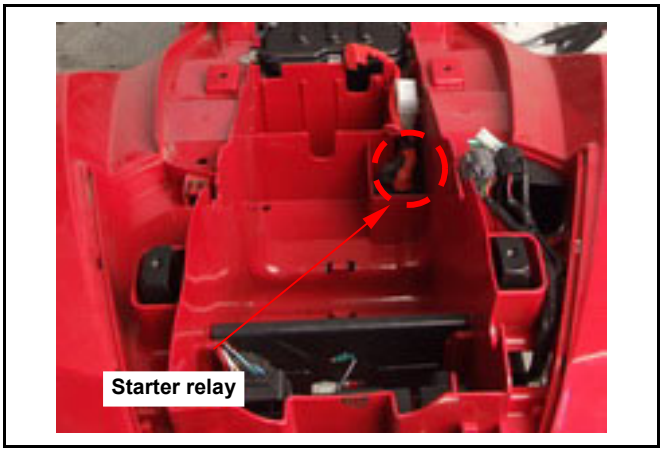
Starting System

Starting circuit diagram

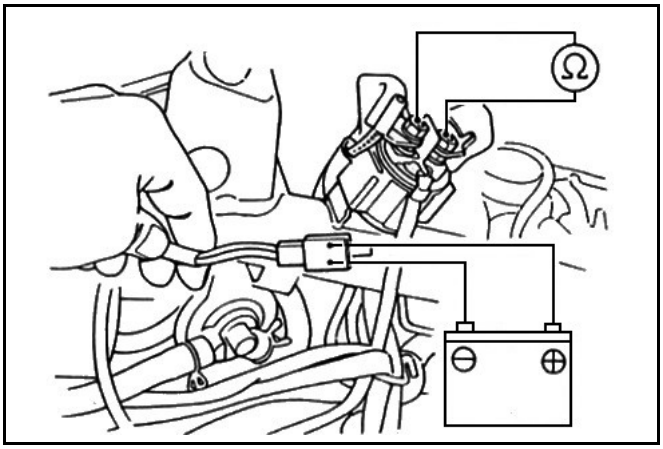


Inspection on starter relay

Open the main switch.
Press the brake.
Push down the starter switch.
If a sound of “Looh Looh” is heard, it indicates the relay function normally.

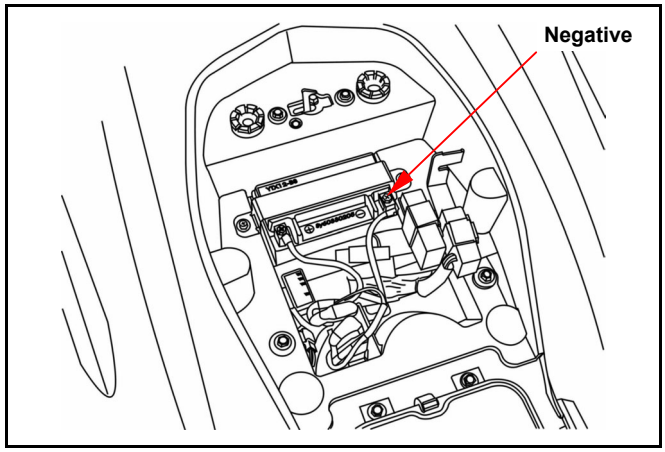


Remove the seat.
Disconnect the negative cable terminal of the battery.
Disconnect the cable positive terminal from the relay.
Disconnect the positive cable of the starter motor.
Disconnect the coupler of the relay.
Connect an ohmmeter to the large terminal end.
Connect the yellow/red cable to the battery positive terminal and the yellow/black cable to the battery negative terminal.
Check the continuity of the large terminal end.
If there is no continuity, replace the relay.

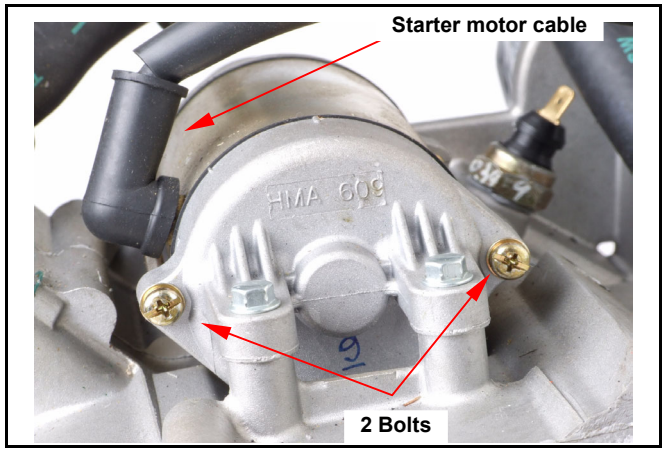


Removal of Starter motor

Remove the seat.
Disconnect the cable negative terminal (-), then the cable positive terminal (+).



Remove starter motor cable.
Loosen the lock bolts and remove the starter motor.



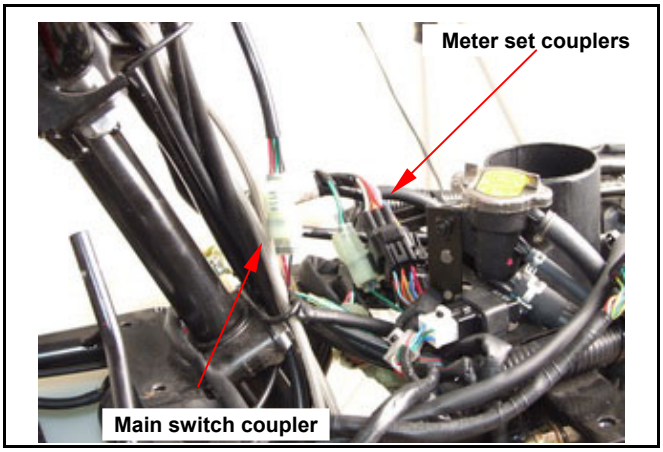
Installation of Starter motor

Install in the reverse order of removal procedures.

Meters

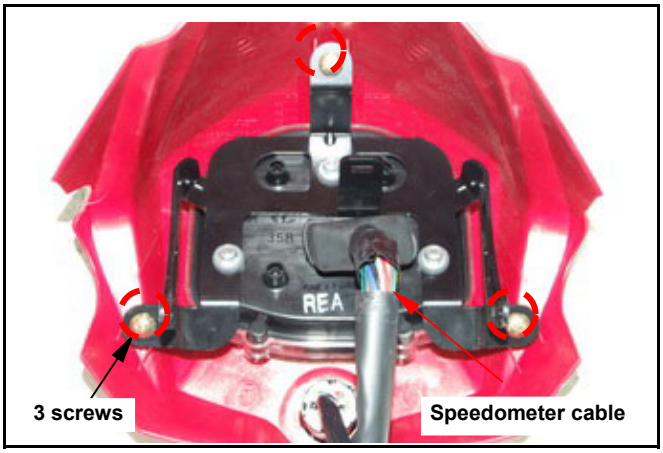
Removal

Remove the front fender.
Remove couplers of meter and main switch couplers.



Remove 4 bolts from meter stay.

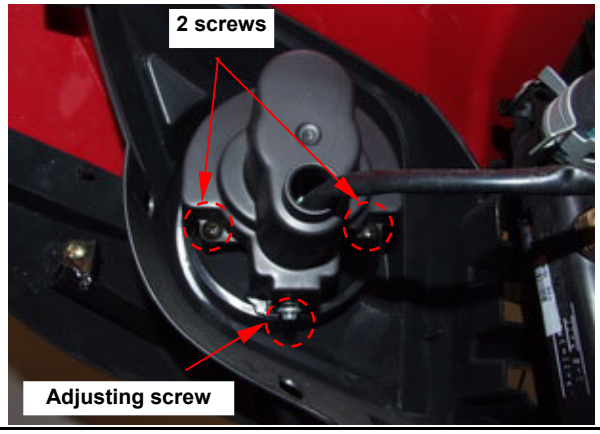
Remove 3 screws and speedometer cable.
Disassemble speedometer cover and speedometer.



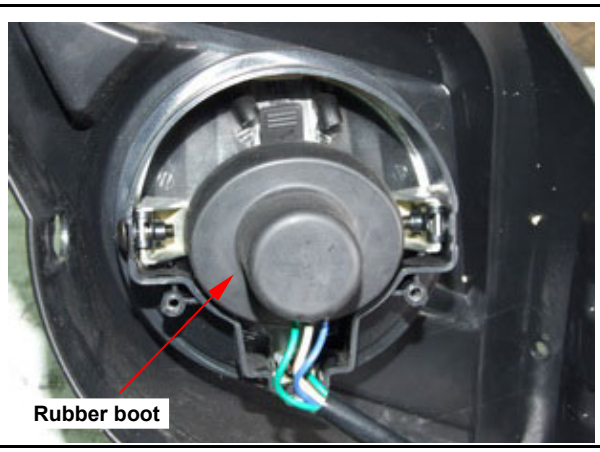
Light / Bulb

Headlight bulb replacement

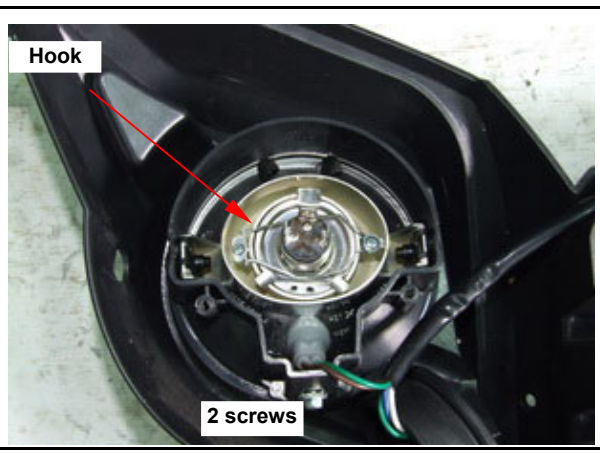
Remove 2 screws for the headlight cover, and remove the cover.



Remove the rubber boot.



Press the bulb setting hook.
Remove the bulb connector and the bulb.
Replace with new bulb if necessary.
(H7 12V 35W)



⚠ Caution

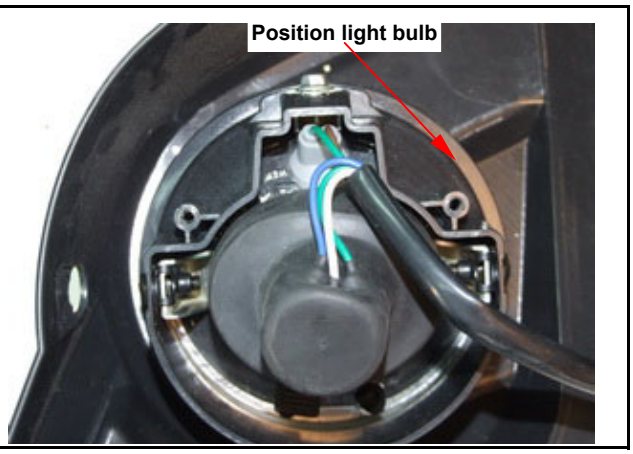
- Never touch the bulb with finger, which will create a heat point and reduce the lifetime of the bulb.
- Clean the fingerprint left on the bulb with alcohol.

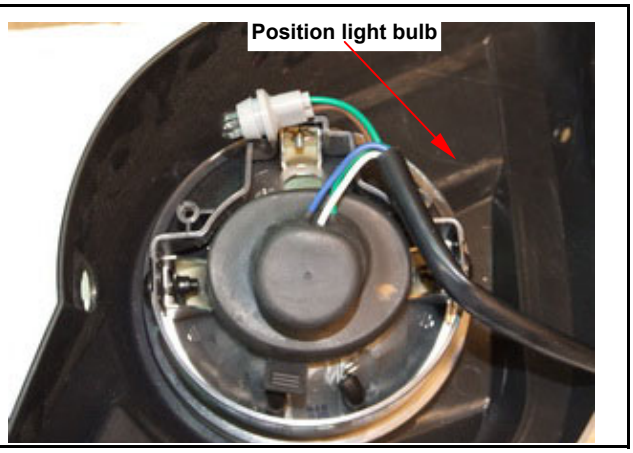
Install the bulb of the headlight in reverse order of removal.
Upon completion of replacement, turn on the main switch to ensure the headlight works well.
Adjust the beam and distance of the headlight if necessary.

Front winker light bulb replacement
Remove 2 screws from the winker light cover.
Remove the winker light cover.

Replace with new front winker light bulb.
(12V 21W)

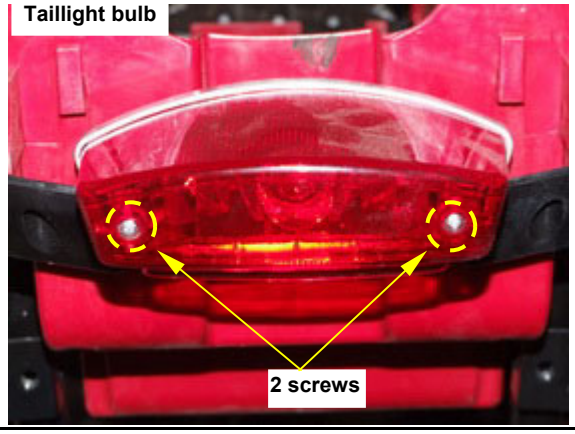
Replacing Bulb of Position Light
Pull out the position light bulb seat.
Replace with new position light bulb.
(12V 5W)





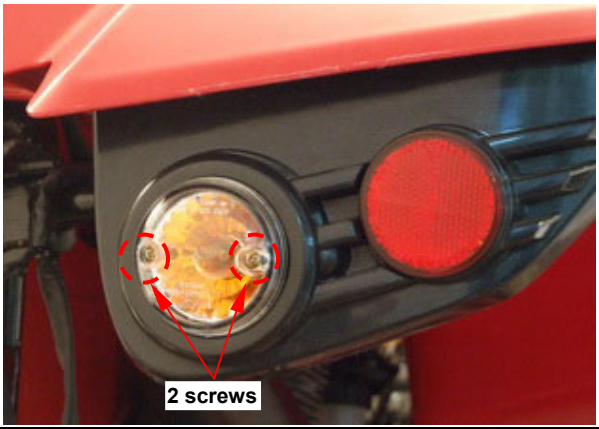
Replacing Bulb of Taillight and Rear Winker Light

Remove 2 screws.
Remove the taillight cover.

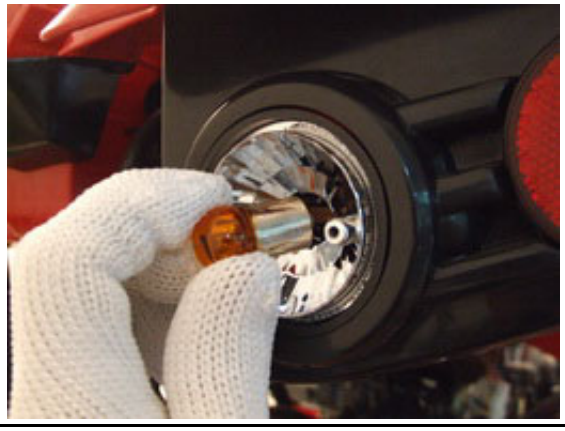


Replace with new taillight bulb.
(12V 5W/21W)

Remove 2 screws.
Remove the rear winker light cover.



Pull out the rear winker bulb.
Replace the rear winker bulb with new one.
(12V 10W)



⚠ Caution

- Never touch the bulb with finger, which will create a heat point and reduce the lifetime of the bulb.
- Clean any grease left on the bulb with alcohol.

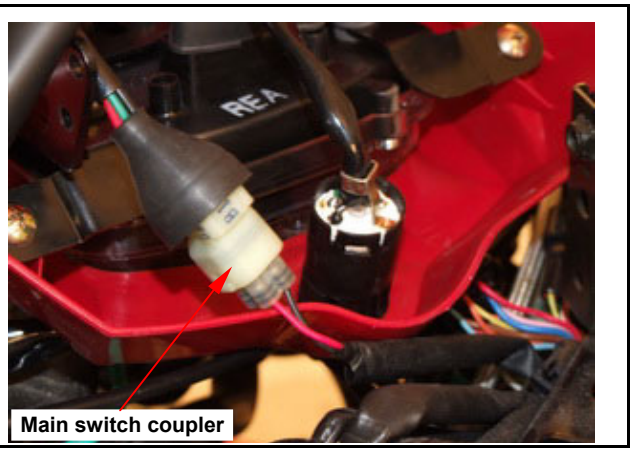
Switch / Horn

Main Switch

Inspection

Remove the front center cover.
Disconnect the main switch coupler.
Check the continuity between two points as indicted below:

Pin / Position	BAT1	BAT2
OFF		
ON	○	○
Wire Color	Red	Black

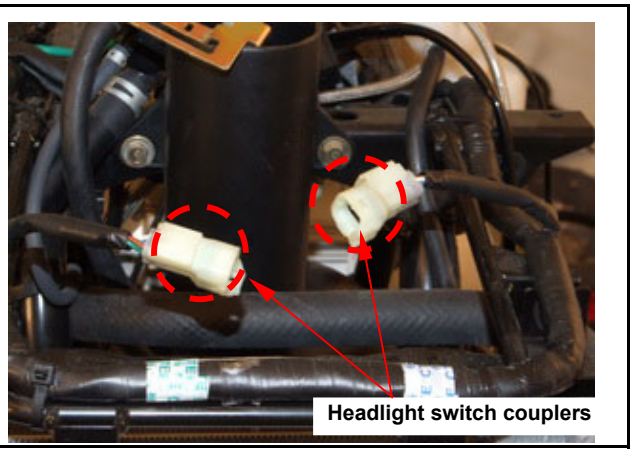


Replacement of main switch

Disconnect the coupler of the main switch.
Push out the main switch.
Align the main switch stopper with the meter cover groove, and install main switch.
Install the main switch coupler.

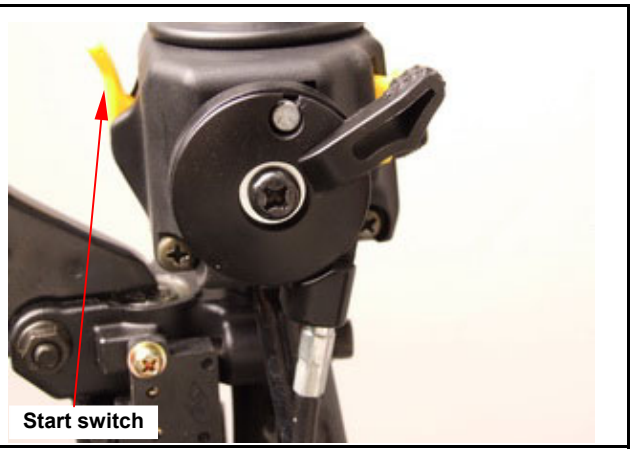
Handle switches

Disconnect the coupler of handle from front fender left side.
Check the continuity between two points as indicated in the table below.



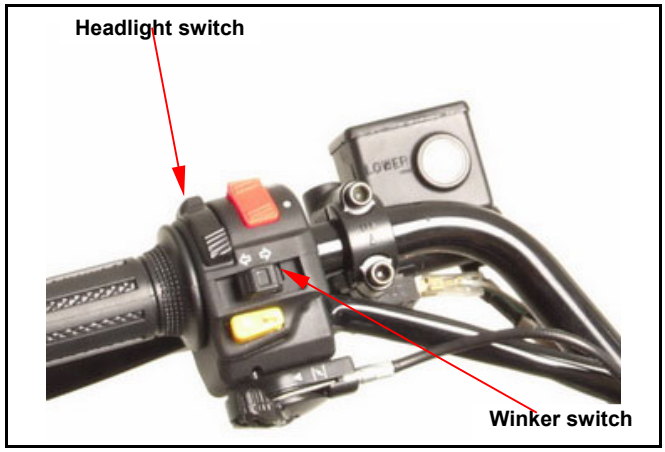
Start Switch

Pin / Position	ST	SG
FREE		
⚡	○	○
Wire Color	Yellow / Red	Yellow / Black



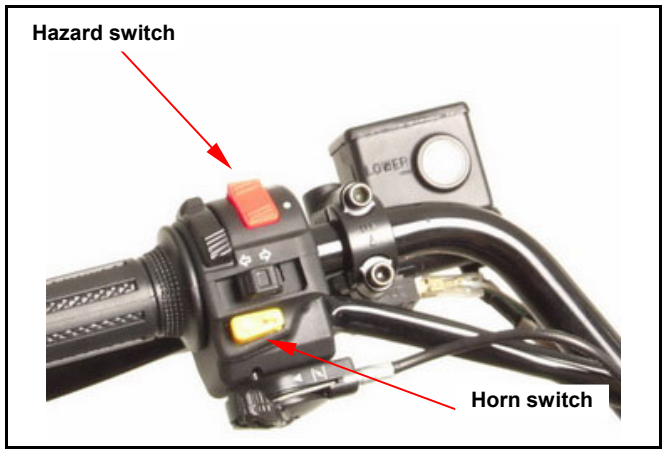
Headlight Switch

Position \ Pin	BAT3	LO	HI	PL
●				
≡D	○——	——○		——○
≡D	○——		——○	——○
Wire color	White / Black	White	Blue	Brown



Winker switch

Position \ Pin	L	WR	R
⇦	○——	——○	
N PUSH OFF			
⇨		○——	——○
Wire color	Pink	Black	Brown / White



Horn switch

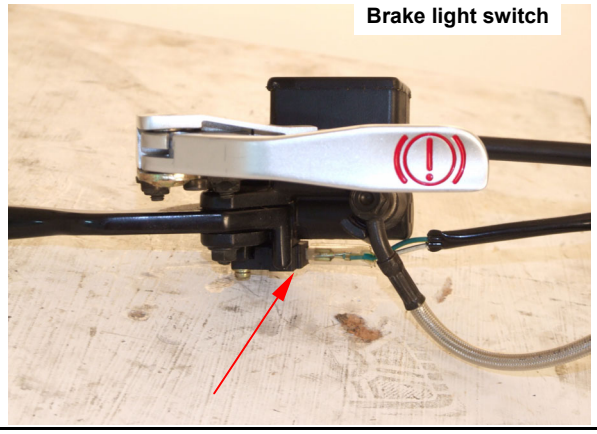
Position \ Pin	BAT3	HO
FREE		
📯	○——	——○
Wire Color	White/ Black	Light green

Hazard switch

Position \ Pin	HD	E
△	○——	——○
●		
Wire Color	Green / Red	Green

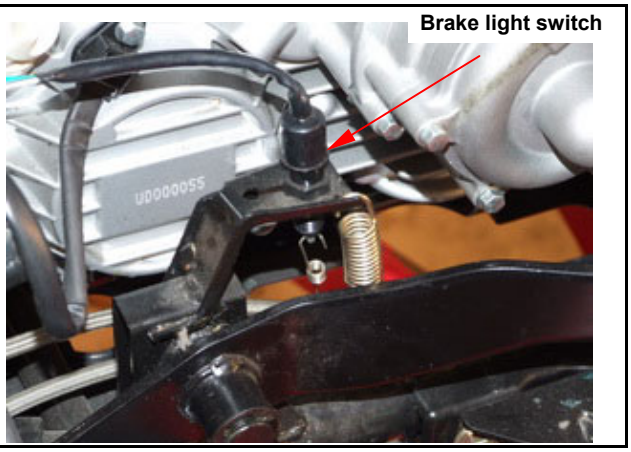
Front Brake Switch

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



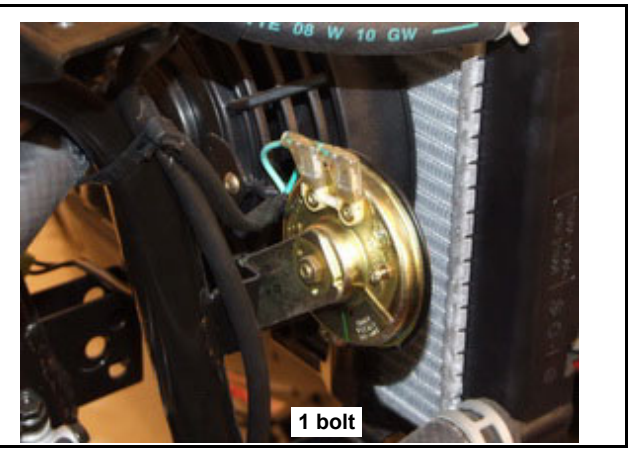
Rear Brake Switch

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

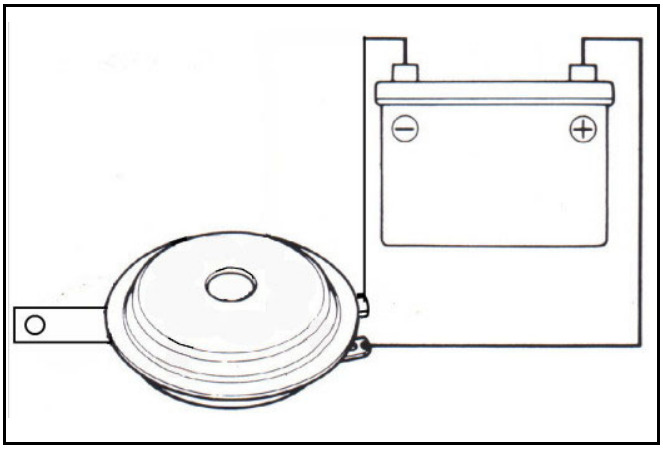


Horn

Remove the horn from front fender right side.



Apply 12 V power source to two terminals of the horn, the horn should sound.
Replace the horn if necessary.

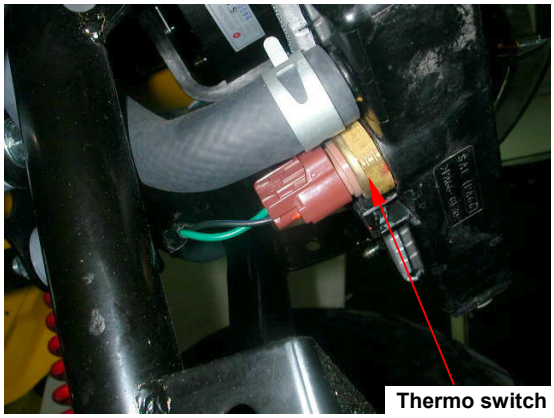


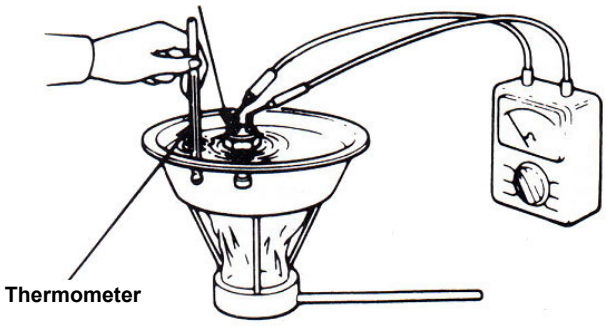
Cooling Fan Thermo Switch

The thermo switch mounted on the radiator controls the operation of the cooling fan motor.
In case that the fan motor fails to work, disconnect the green and black/blue leads and connect jump wires to the terminals, then, turn on the main switch, the fan motor should operate.
If the fan motor still fails to run, measure the battery voltage between the green and black/blue leads.
If there is no voltage, check for blown fuse, loose connection or short-circuit.
If the fan motor runs, check the thermo switch in the manner as described below:
Hang the thermo switch on the bowl filled with coolant to check the switch's opening and closing temperatures. Confirm the switch is open circuited at room temperature. Increase the coolant temperature gradually. The switch should have continuity at 98±3℃.

⚠ Caution

- Keep the coolant at a constant temperature at least for three minutes. Sudden increase the coolant temperature will cause the thermometer and the tester to indicate wrong readings.
- Never let the thermometer and the thermo switch contact the wall of the bowl, which may result in wrong readings.
- The thermo switch shall be placed in the coolant until the teeth are completely submerged.





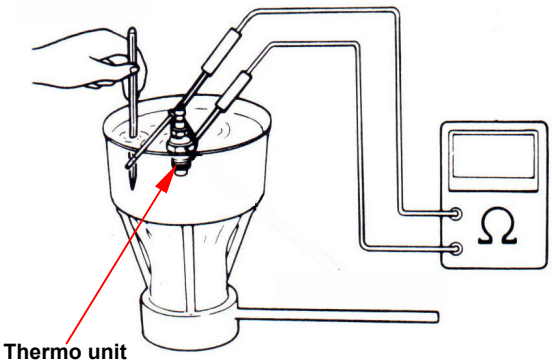
Thermo unit

Remove the thermo unit.
Hang the thermo unit in an oil heater, heat the oil and measure the resistance at each temperature.

Temperature	50°C	80°C	100°C	120°C
Standard (Ω)	134~149	47.5~57.0	26~29	14.8~17.2

⚠ Caution

- Wear gloves and goggles when performing this test.

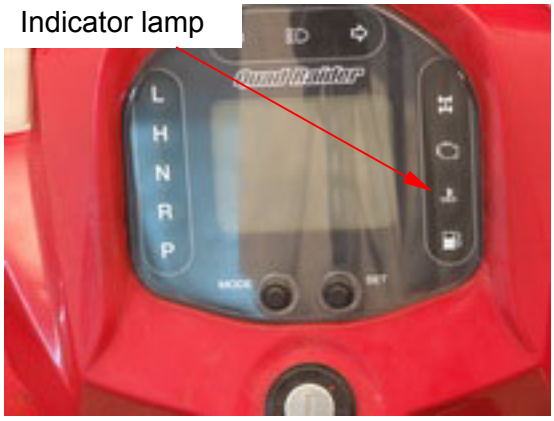


⚠ Caution

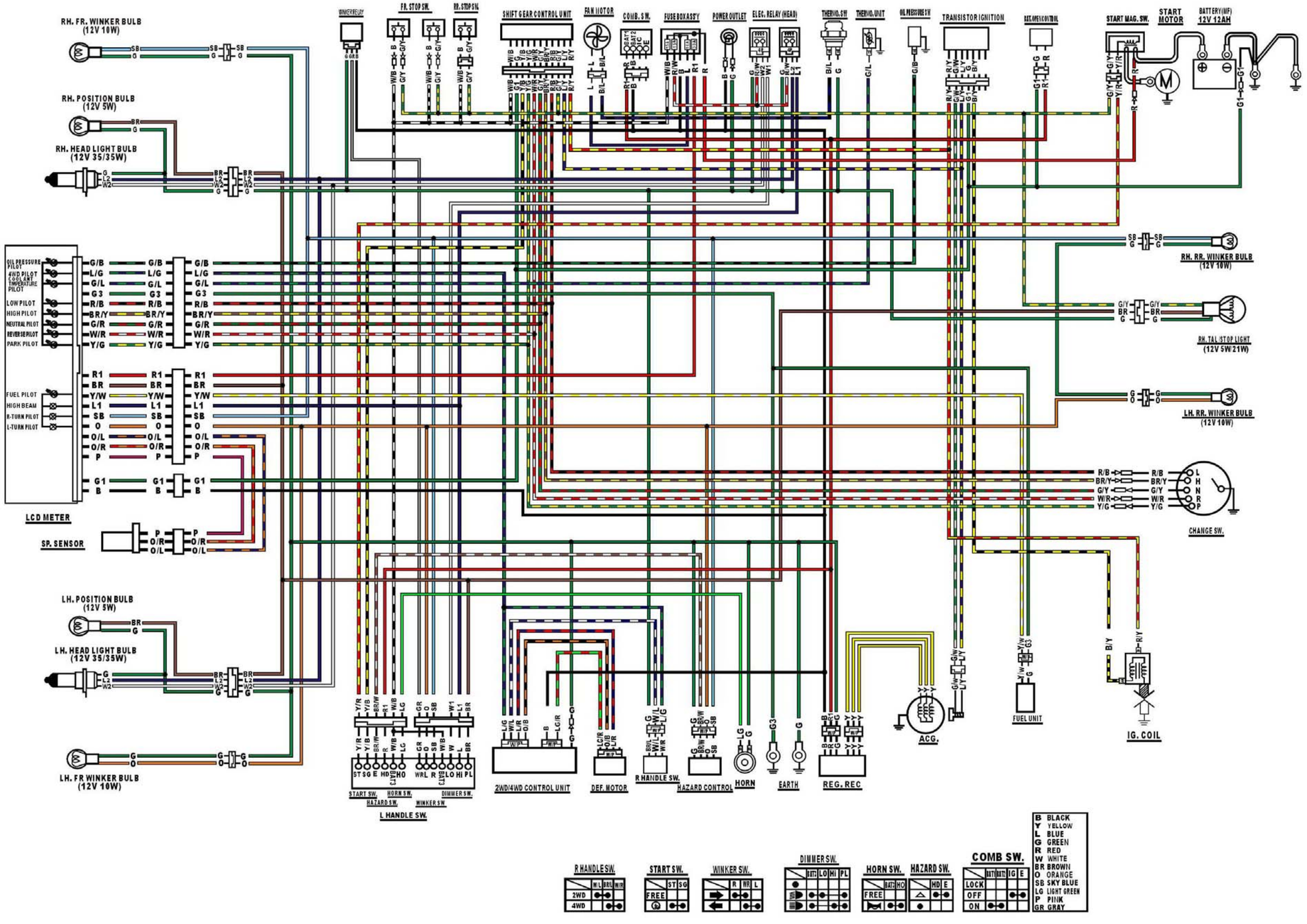
- Engine oil should be used as a heating medium as the test temperature must be higher than 100℃.
- Contacting the container wall by the thermometer and the thermo unit may result in wrong readings.

Coolant Temperature Indicator Lamp

Disconnect the coolant temperature meter and connect it to engine ground.
Turn on the main switch.
The indicator lamp of the fuel meter should be lighting.



Notes:


RH. FR. WINKER BULB (12V 10W)
RH. POSITION BULB (12V 5W)
RH. HEAD LIGHT BULB (12V 35/35W)
LH. POSITION BULB (12V 5W)
LH. HEAD LIGHT BULB (12V 35/35W)
LH. FR WINKER BULB (12V 10W)
WINKER RELAY
FR. STOP SW.
RR. STOP SW.
SHIFT GEAR CONTROL UNIT
FAN MOTOR
COMB. SW.
FUSE BOX ASS'Y
POWER OUTLET
ELEC. RELAY (HEAD)
THERMO. SW
THERMO. UNIT
OIL PRESSURE SW
TRANSISTOR IGNITION
INT. OPEN CONTROL
START MAG. SW.
START MOTOR
BATTERY(MF) 12V 12AH
RH. RR. WINKER BULB (12V 10W)
RH. TAL /STOP LIGHT (12V 5W/21W)
LH. RR. WINKER BULB (12V 10W)
CHANGE SW.
FUEL UNIT
IG. COIL
ACG.
REG. REC
EARTH
HORN
R HANDLE SW.
HAZARD CONTROL
DEF. MOTOR
2WD/4WD CONTROL UNIT
L HANDLE SW.
START SW.
HORN SW.
HAZARD SW.
WINKER SW.
DIMMER SW.
LCD METER
SP. SENSOR
OIL PRESSURE PILOT
4WD PILOT
COOLANT TEMPERATURE PILOT
LOW PILOT
HIGH PILOT
NEUTRAL PILOT
REVERSE PILOT
PARK PILOT
FUEL PILOT
HIGH BEAM
R-TURN PILOT
L-TURN PILOT
R HANDLE SW.
START SW.
WINKER SW.
DIMMER SW.
HORN SW.
HAZARD SW.
COMB SW.
B BLACK
Y YELLOW
L BLUE
G GREEN
R RED
W WHITE
BR BROWN
O ORANGE
SB SKY BLUE
LG LIGHT GREEN
P PINK
GR GRAY

19. ELECTRICAL DIAGRAM

Note: