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Symbols and Marks

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

	Warning	Means that serious injury or loss of life may happen if procedures are not correctly followed.
	Caution	Means that equipment damages may result if procedures are not followed.
	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	King Mate G-3 is recommended.
	Locking sealant	Apply sealant; medium strength sealant should be used unless otherwise specified.
	Oil seal	Apply with lubricant. °
	Renew	Replace with a new part before installation.
	Brake fluid	Use recommended brake fluid DOT3 or WELLRUN brake fluid.
	Special tools	Special tools
	Correct	Meaning correct installation.
	Wrong	Meaning wrong installation.
	Indication	Indication of components.
	Directions	Indicates position and operation directions
		Components assembly directions each other.
		Indicates where the bolt installation direction, --- means that bolt cross through the component (invisibility).

General Safety

Carbon Monoxide

Before you start the engine, make sure the place is well ventilated. Never start the engine in an unventilated place. If you have to start the engine in an unventilated place, an exhaust fume extractor is needed.

Caution

Exhaust fume contains toxic gas which may cause one to lose consciousness and even result in loss of life.

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 the children.

Used Engine Oil

Caution

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

Hot Components

Caution

Components of the engine and exhaust system can be extremely hot after engine running. They remain very hot even after the engine has been stopped for a period of time. Before performing service work on these parts, wear the heat insulation gloves or wait until the temperature drops.

Battery

Caution

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

Brake Shoes

Do not use compressed air or brush to clean the components of the brake system. Use a vacuum cleaner or the equivalent to avoid dust drifting in the air.

Caution

Inhaling brake shoes dust may cause disease or even cancer of the respiratory system.

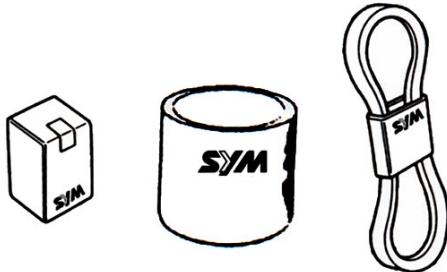
Brake Fluid

Caution

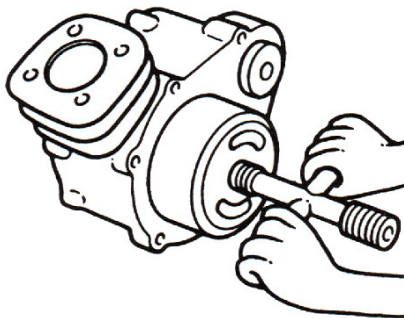
Brake fluid spilled on painted, plastic, or rubber parts may cause damage to the parts. Place a clean towel on the top of the parts for protection when servicing the brake system. Keep the brake fluid beyond reach of the children.

Before Servicing

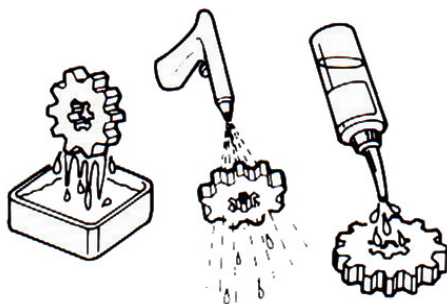
- Always use SANYANG genuine parts and recommended oil. Using improper parts may cause damage to or destruction of the vehicle.



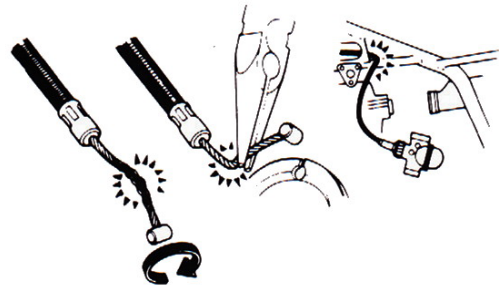
- Special tools are designed for removal and installation of component parts without damaging them. Using wrong tools may result in parts damage.



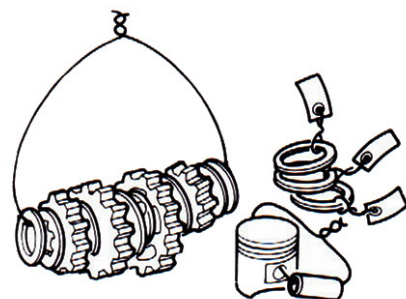
- When servicing this vehicle, use only metric tools. Metric bolts, nuts, and screws are not interchangeable with the Britain system, using wrong tools and fasteners may damage this vehicle.
- Clean the outside of the parts or the cover before removing it from the vehicle. Otherwise, dirt and deposit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



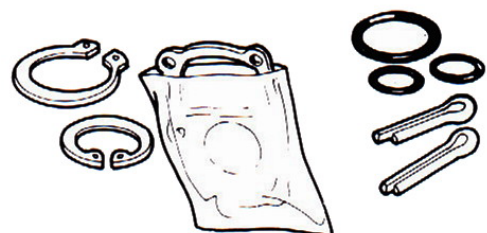
- Never bend or twist control cables to avoid unsmooth control and premature worn out.



- Rubber parts may become deteriorated when old, and be damaged by solvent and oil easily. 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.

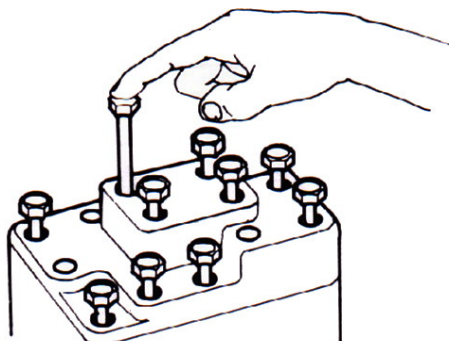


- Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).
- Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap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

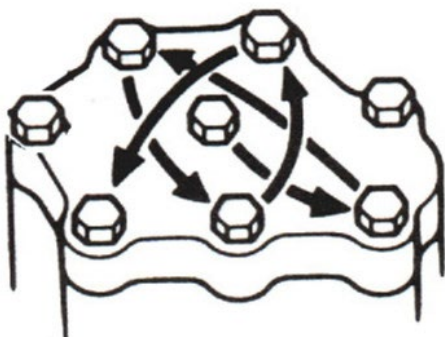


1. General Information

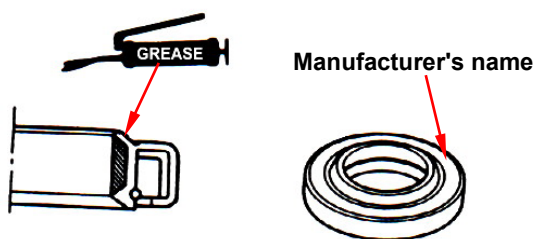
- The length of bolts and screws for assemblies, cover plates or boxes is different from one another, be sure they are correctly installed. In case of confusion, Insert the bolt into the hole to compare its length with other bolts, if its length out side the hole is the same with other bolts, it is a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



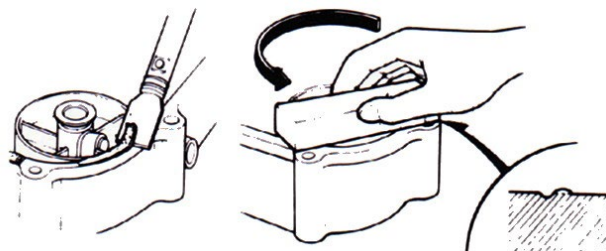
- Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unless otherwise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



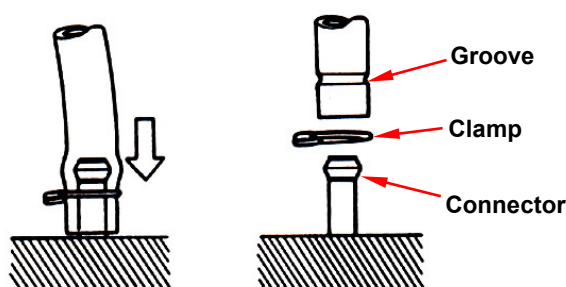
- When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, and check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.



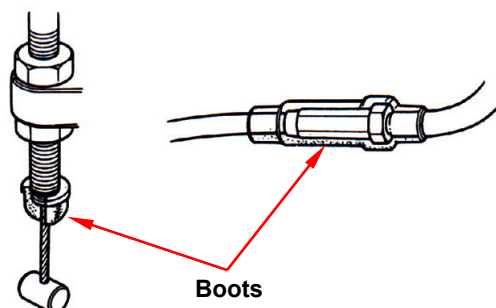
- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.



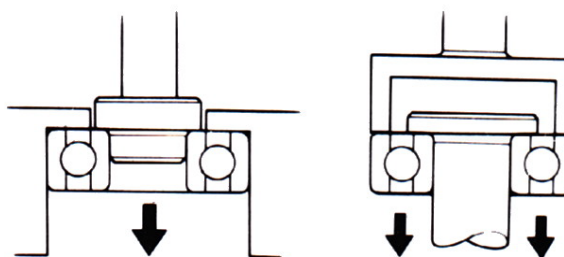
- The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections so that there is enough room below the enlarged ends for tightening the clamps.



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

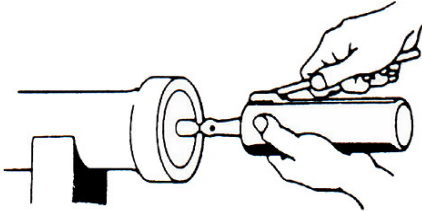


- The tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force on both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

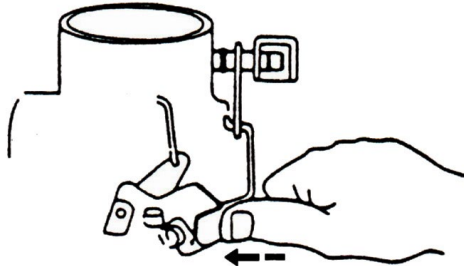


Both of these examples can result in bearing damage.

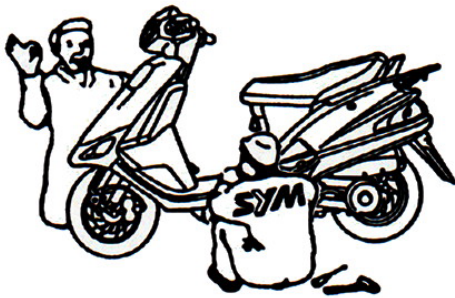
- Lubricate the rotation face with specified lubricant on the lubrication points before assembling.



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



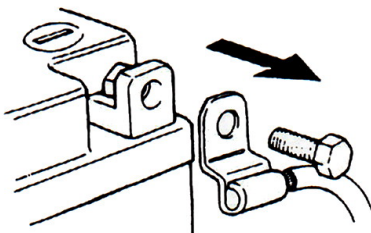
- Make sure service safety each other when conducting by two persons.



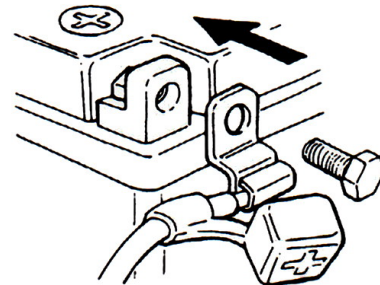
- Note that do not let parts fall down.



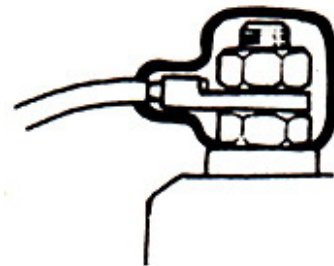
- Before battery removal operation, it has to remove the battery negative (-) cable firstly. Notre tools like open-end wrench do not contact with body to prevent from circuit short and create spark.



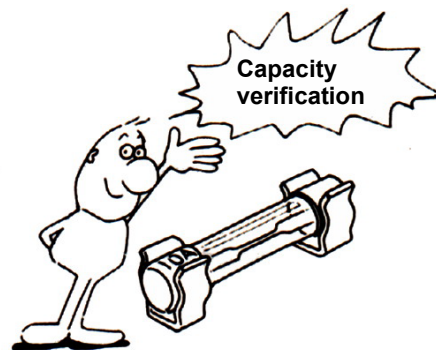
- After service completed, make sure all connection points is secured. Battery positive (+) cable should be connected firstly.
- And the two posts of battery have to be greased after connected the cables.



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

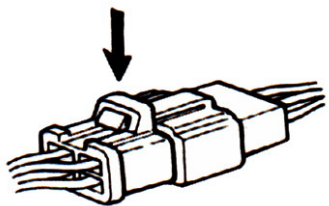


- If fuse burned, it has to find out the cause and solved it. And then replace with specified capacity fuse.



1. General Information

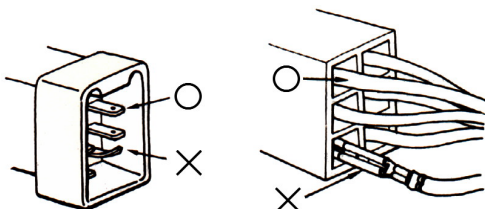
- When separating a connector, it locker has to be unlocked firstly. Then, conduct the service operation.



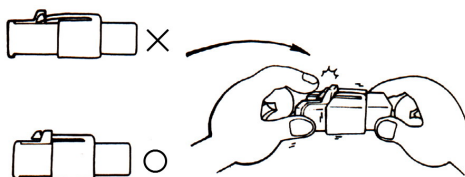
- Do not pull the wires as removing a connector or wires. Hold the connector body.



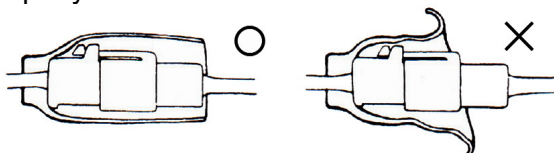
- Make sure if the connector pins are bent, extruded or loosen.



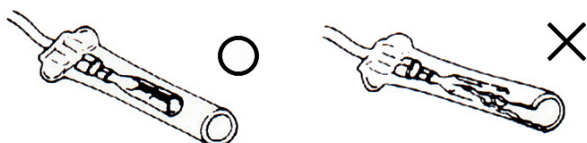
- Insert the connector completely.
If there are two lockers on two connector sides, make sure the lockers are locked in properly.
Check if any wire loose.



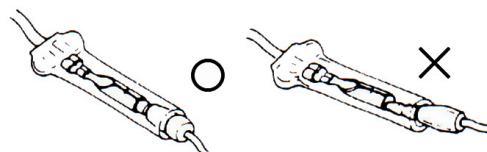
- Check if the connector is covered by the twin connector boot completely and secured properly.



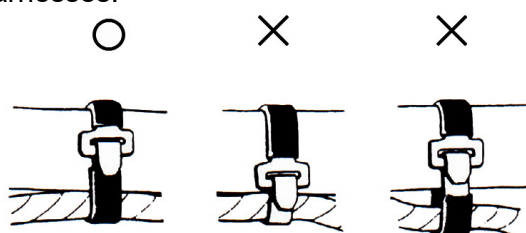
- Before terminal connection, check if the boot is crack or the terminal is loose.



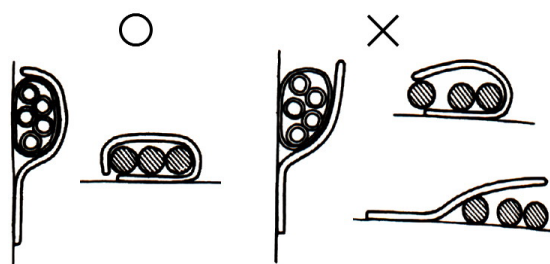
- Insert the terminal completely.
Check if the terminal is covered by the boot.
Do not let boot open facing up.



- 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.



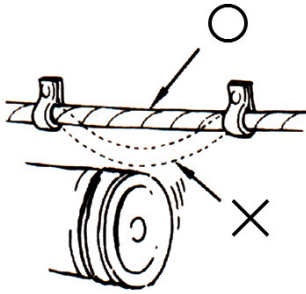
- Wire band and wire harness have to be clamped secured properly.



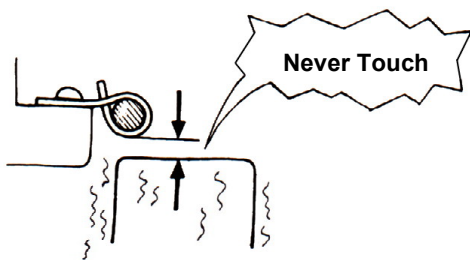
- Do not squeeze wires against the weld or its clamp.



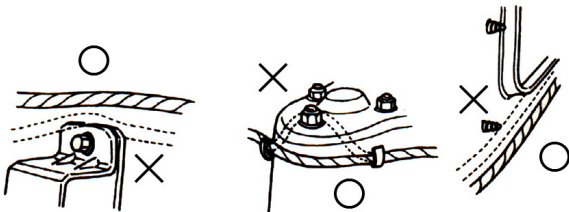
- Do not let the wire harness contact with rotating, moving or vibrating components as routing the harness.



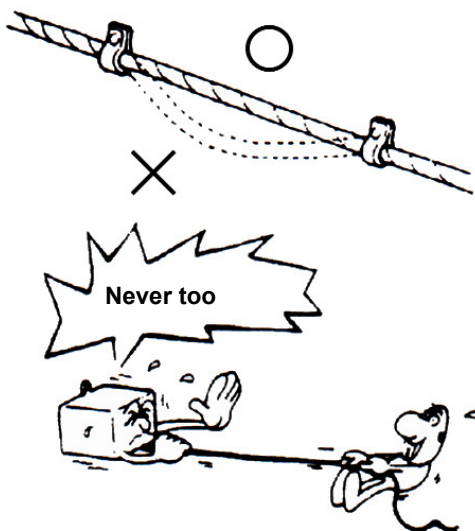
- Keep wire harnesses far away from the hot parts.



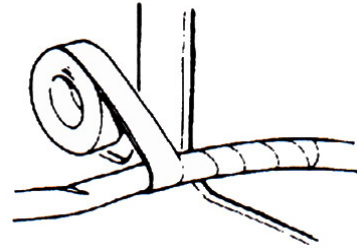
- Route wire harnesses to avoid sharp edges or corners and also avoid the projected ends of bolts and screws.



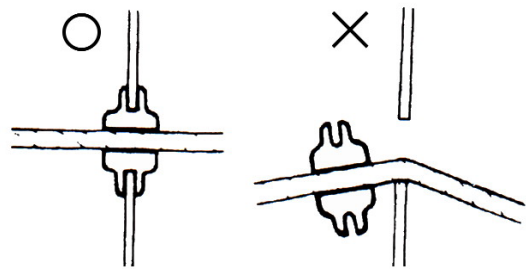
- Route harnesses so that they neither pull too tight nor have excessive slack.



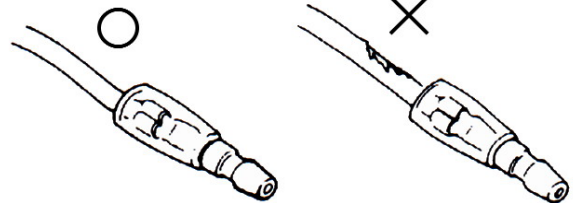
- Protect wires or wire harnesses with electrical tape or tube if they contact a sharp edge or corner. Thoroughly clean the surface where tape is to be applied.



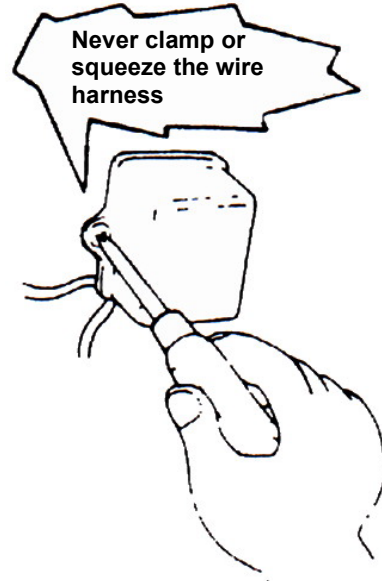
- Secure the rubber boot firmly as applying it on wire harness.



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

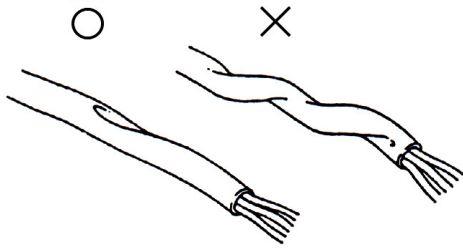


- Never clamp or squeeze the wire harness as installing other components.

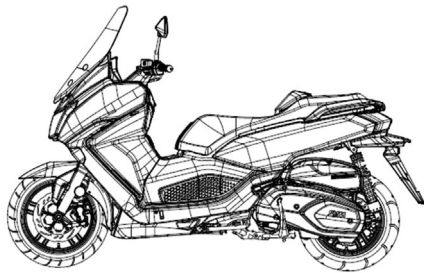


1. General Information

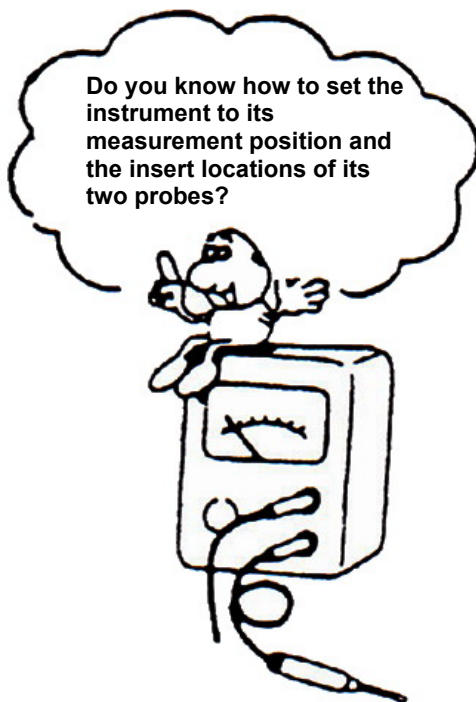
- Do not let the wire harness been twisted as installation.



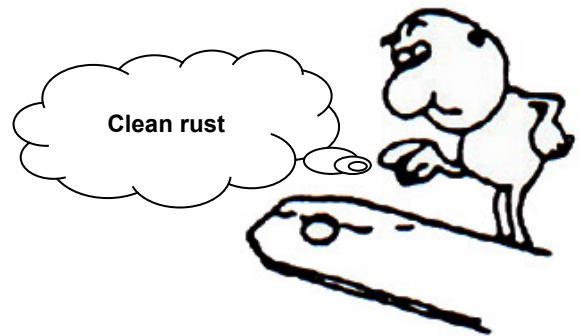
- Wire harnesses routed along the handlebar should not be pulled too tight or have excessive slack, be rubbed against or interfere with adjacent or surrounding parts in all steering positions.



- 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		LZ40W1-EU
Dimension	Overall Length		2230 mm	Suspension System	Front	TELESCOPIC FORK
	Overall Width		820 mm		Rear	UNIT SWING
	Overall Height		1455 mm	Tire Specifications	Front	120 / 70-R15
	Wheel Base		1555 mm		Rear	160 / 60-R14
Weight	Curb Weight	Front	91 kg	Brake System	Front	DOUBLE DISK (ø 275 mm)
		Rear	124 kg		Rear	DISK (ø 275 mm)
		Total	215 kg			
	Passengers/Weight		Two / 190 kg	Performance	Max. Speed	>39 km/hr
	Total Weight	Front	146 kg		Climb Ability	<27°
		Rear	259 kg	Reduction	Primary Reduction	Belt
		Total	405 kg		Secondary Reduction	Gear
	Type		4-STROKE ENGINE		Clutch	Centrifugal, dry type
Installation and arrangement		Vertical, below center, incline 80°	Transmission	CVT		
Engine	Fuel		Above 92 unleaded	Speedometer		0 ~ 180 km/hr
	Cycle/ Cooling		4-stroke/ Liquid-cooled	Horn		93~112 dB/A
	Cylinder	Bore	Ø 83.0 mm	Muffler		Expansion & Pulse Type
		Stroke	73.8 mm	Exhaust Pipe Position and Direction		Right side, and Backward
		Number/Arrange ment	SINGLE CYLINDER	Lubrication System		Forced circulation & splashing
	Displacement		399 cc	Exhaust Concentratio n	CO	<1.0 g/km
	Compression Ratio		10.5 : 1		HC	<0.1 g/km
	Max. HP		34.0 ps / 6750 rpm		NOx	<0.06 g/km
	Max. Torque		4.03 kg-m / 5250 rpm	E.E.C.		√-
	Ignition		Full transistor ignition	P.C.V.		√
	Starting System		Electrical starter	Catalytic reaction control system		√

Torque Values

The torque values listed in below are for more important tightening torque values. Please see standard values for those 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

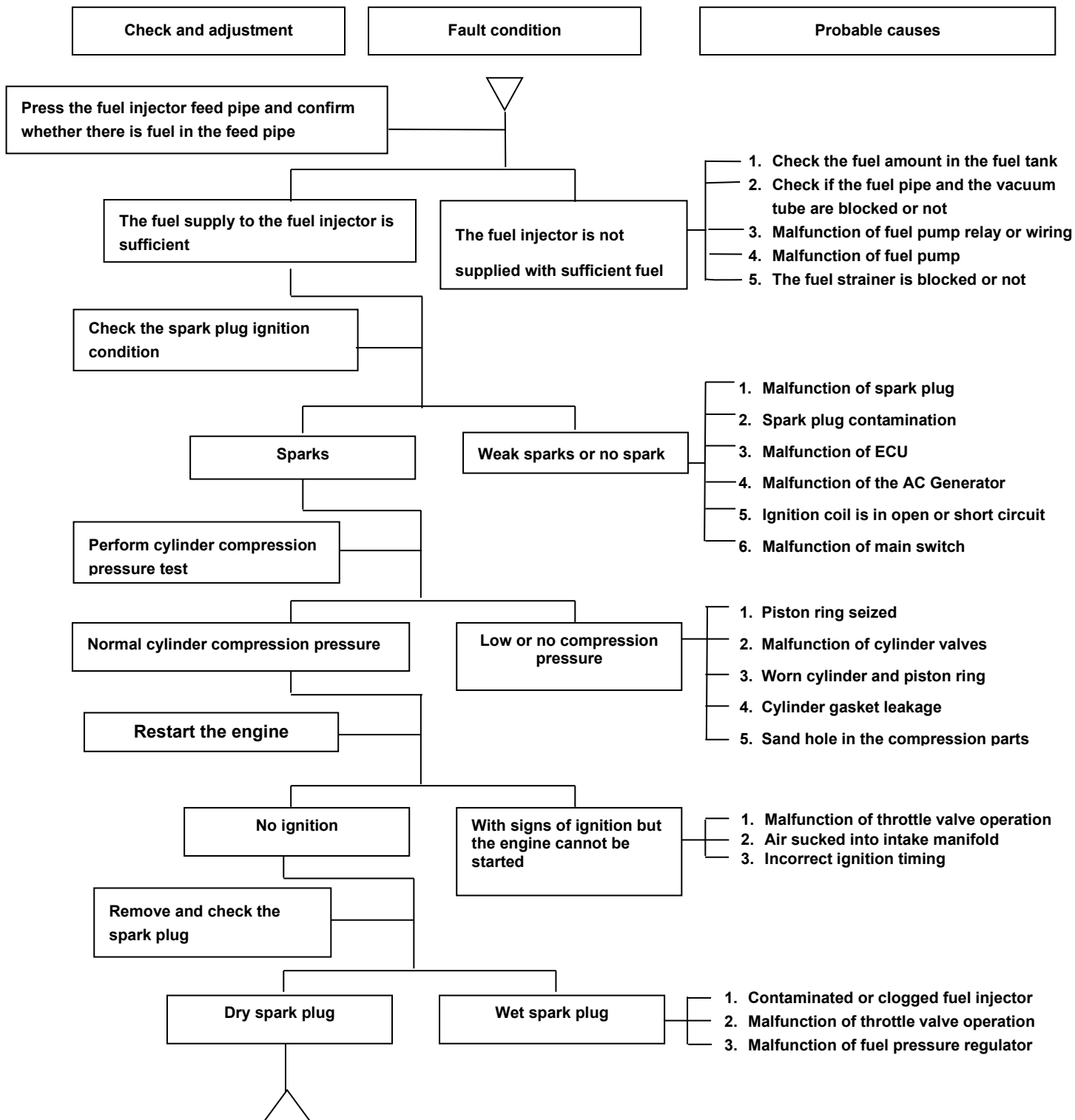
Item	Q'ty	Thread Dia. (mm)	Torque Value(kgf-m)	Remarks
Cylinder stud bolt	4	10	1.0~1.4	Apply oil to thread
Cylinder head nut	4	8	3.6~4.0	
Cylinder head right bolt	2	8	2.0~2.4	
Cylinder head side cover bolt	2	6	1.0~1.4	
Cylinder head cover bolt	4	6	1.0~1.4	
Cylinder head stud bolt (inlet pipe)	2	6	1.0~1.4	
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	
Spark plug	1	10	1.0~1.2	
Camshaft Chain Tensioner bolt	2	6	1.0~1.4	
Carburetor insulator bolt	2	6	0.7~1.1	
Oil pump screw	3	6	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	0.8~1.2	
Mission filling bolt	1	10	1.0~1.4	
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	8.5~10.5	
Crankcase bolt	7	6	0.8~1.2	
Mission case bolt	7	8	2.6~3.0	
Muffler mounting bolt	3	10	3.2 ~3.8	
Muffler mounting nut	2	8	1.0 ~1.2	

Frame Torque Values

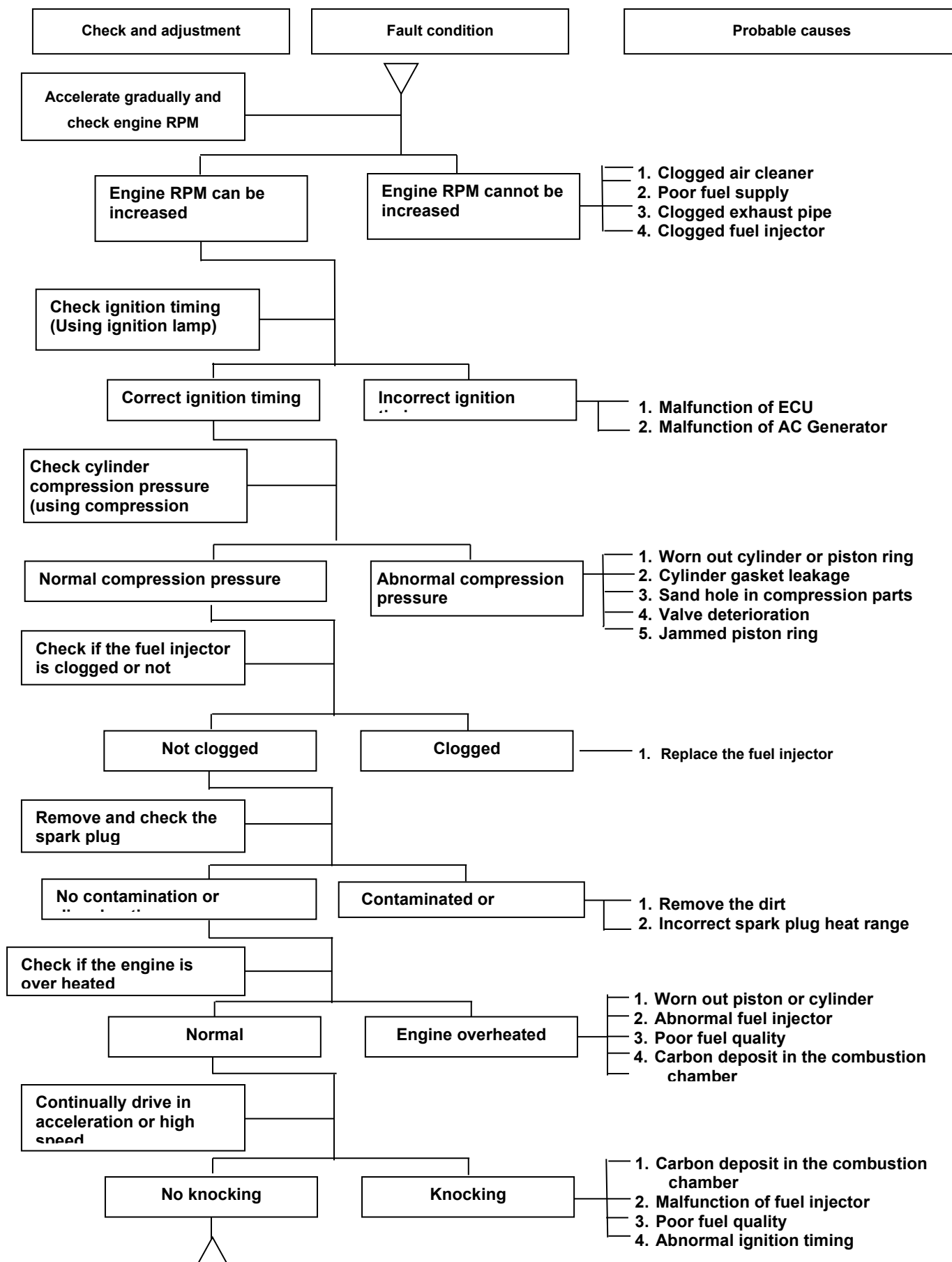
Item	Q'ty	Thread Dia. (mm)	Torque Value (Kg-m)	Remarks
Mounting bolt for steering handle post	1	10	4.0~5.0	
Lock nut for steering stem	1	BC1	1.0~2.0	
Steering top cone race	1	BC1	2.0~3.0	
Front wheel axle nut	1	12	5.0~7.0	
Rear wheel axle nut	1	16	11.0~13.0	
Front cushion mounting bolt	4	10	3.5~4.5	
Rear cushion upper connection bolt	1	10	3.5~4.5	
Rear cushion under connection bolt	1	8	2.4~3.0	
Rear fork mounting bolt	2	10	4.0~5.0	
Brake hose bolt	2	10	3.0~4.0	
Brake air-bleeding valve	1	6	0.8~1.0	
Front brake disc mounting bolt	5	8	4.0~4.5	
Rear brake disc mounting bolt	5	8	4.0~4.5	
Brake clipper mounting bolt	2	8	2.9~3.5	
Engine hanger link bolt	2	12	7.5~9.5	On frame side
Engine hanger link nut	1	12	7.5~9.5	On engine side
Main standard nut	1	10	4.0~5.0	
Air cleaner bolts	2	6	1.0~1.4	

Troubleshooting

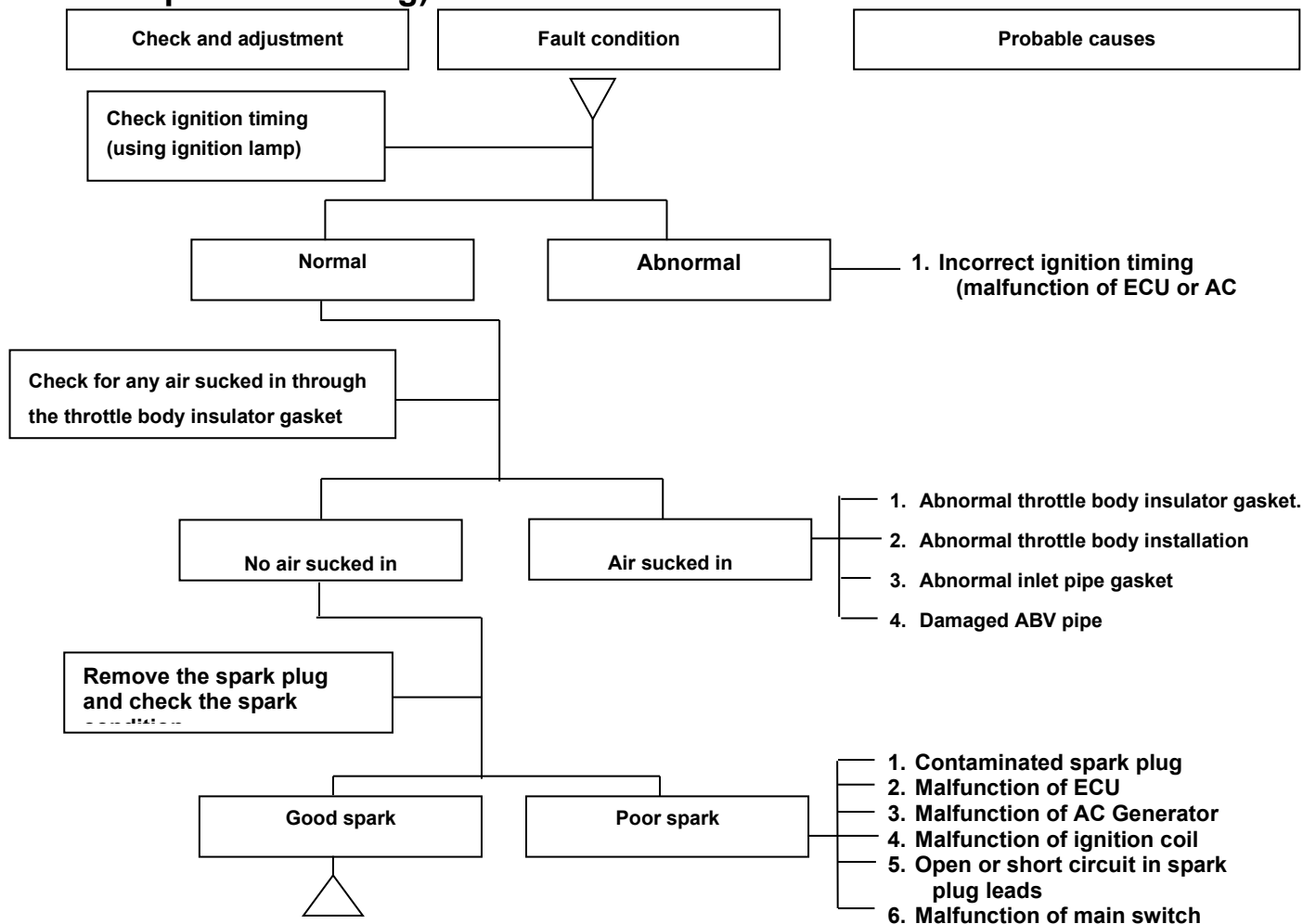
A. Engine cannot be started or difficult to be started



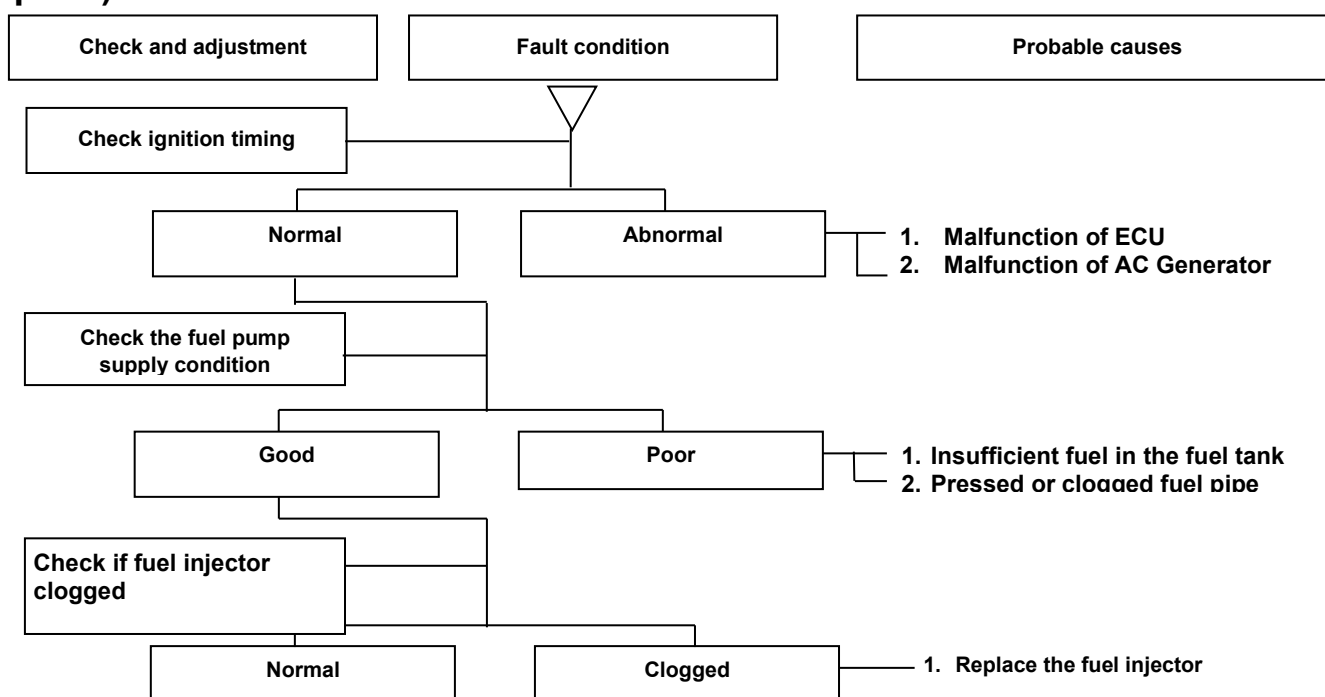
B. Engine runs sluggish (Speed does not pick up, lack of power)



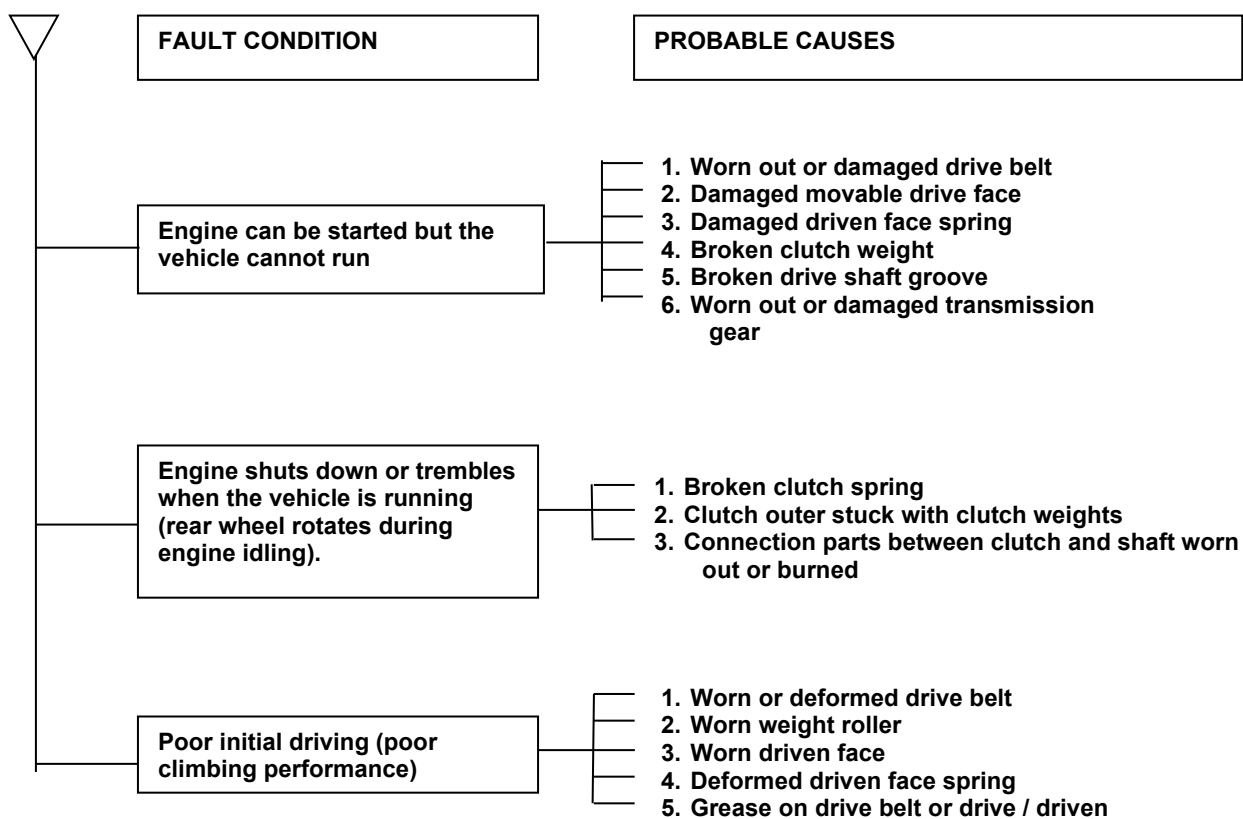
C. Engine runs sluggish (especially in low speed and idling)



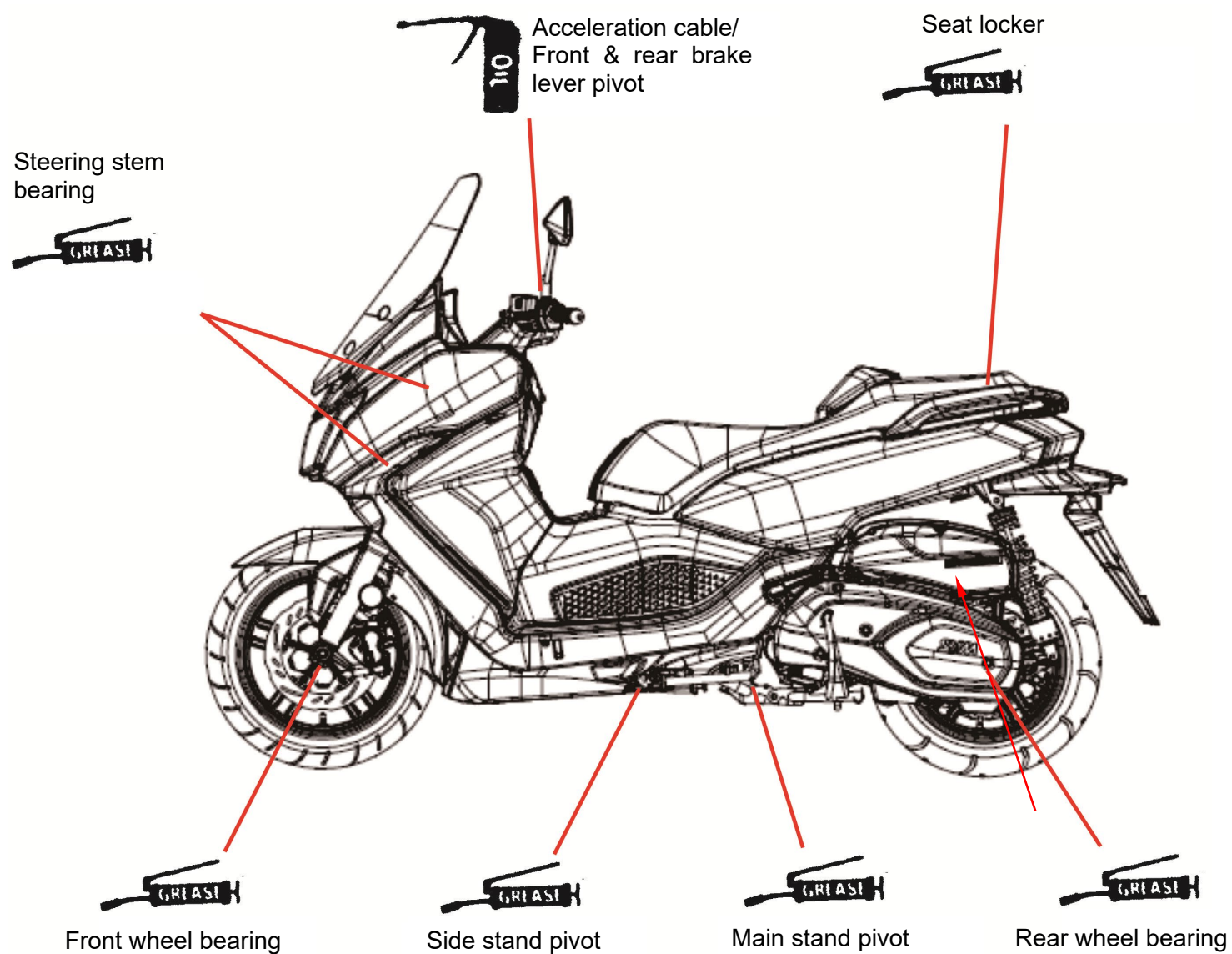
D. Engine runs sluggish (High speed)



E. CLUTCH AND DRIVING PULLEY



Lubrication Points



Precautions in Operation	2-1	Cylinder Compression Pressure	2-8
Periodical Maintenance Schedule	2-2	Drive Belt	2-8
Engine Oil	2-3	Steering Handle Top Bearing	2-9
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Precautions in Operation

Model		LZ40W1-EU
Fuel Tank Capacity		13,000±100 c.c.
Engine Oil	capacity	2,000 c.c.
	change (with oil filter replaced)	1,900 c.c.
	change	1,800 c.c.
Transmission Gear oil	capacity	350 c.c.
	change	330 c.c.
Capacity of coolant	Engine + radiator	1400 c.c.
	Reservoir upper	170 c.c.
Clearance of throttle valve		2~6 mm
Spark plug		CPR8EA-9 (gap:0.8~0.9 mm)
Timing advance idle speed		BTDC 10° / 1,650 rpm
Idling speed		1,650±150 rpm
Cylinder compression pressure		12.5 ± 2 kgf/cm ²
Valve clearance	IN	0.10±0.02 mm
	EX	0.15±0.02 mm
Tire dimension	Front	120/70-15 56S
Tire dimension	Rear	160/60-14 65H
Tire pressure (cold)		Front: 2.30 kg/cm ² Rear: 2.50 kg/cm ²
Battery		12V8.6Ah (MF battery) / TTZ10S

2. Maintenance Information



Periodical Maintenance Schedule

No	item	1 month every 1,000KM	3 months every 5,000KM	6 months every 10,000KM	1 year every 15,000KM
1	☆Air cleaner element	I	C	R	
2	☆Fuel filter			I	R
3	☆Oil filter (paper)	R	Second replacement at 10,000km Further replacement every 20,000km		
4	☆Oil filter screen	C	Second replacement at 5,000km Further replacement every 5,000km		
5	☆Engine oil change	R	Second replacement at 5,000km Further replacement every 5,000km		
6	Tire pressure	I	I		
7	Battery inspection	I	I		
8	Brake free play check	I	I		
9	Steering handle check	I	I	L	
10	Cushion operation check	I	I		
11	Every screw tightening check	I	I		
12	Gear oil check for leaking	I	I		
13	☆Spark plug check or change	I	I	I/R	I
14	☆Gear oil change	R	Replacement for every 10,000 km		
15	Frame lubrication			L	L
16	Exhaust pipe	I	I	I	I
17	☆Ignition timing	I	I	I	I
18	☆Emission check in Idling	I	I	I	I
19	☆Throttle operation		I	I	I
20	☆Engine bolt tightening		I	I	I
21	☆CVT driving device(belt)			I	R
22	☆CVT driving device(roller)			I	R
23	Lights/electrical equipment/multi-meters	I	I	I	I
24	Main/side stands & springs			I	I
25	Fuel lines		I	I	I
26	Cam chain	I		I	
27	☆Valve clearance	I		I	
28	☆Crankcase evaporative control system	I		I	
29	☆Evaporative control system		I	I	I
30	Lines & connections in cooling system	I	I		
31	Coolant reservoir	I	I		
32	Coolant	I			R
33	ECU input voltage			I	
34	EFI sensor coupler			I	

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

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

The above maintenance schedule is established by taking the monthly 1,000 kilometers as a reference which ever comes first.

Remarks: 1. **These marks "☆" in the schedule are emission control items. According to EPA regulations, these items must be performed normally periodical maintenance following the user manual instructions. They are prohibited to be adjusted or repaired by unauthorized people. Otherwise, SYM is no responsible for the charge.**

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

Engine Oil

Turn off engine, and park the vehicle in a flat surface with main stand.
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 to make sure oil can be drained smoothly and completely.

Place an oil pan under the vehicle, and remove oil drain bolt.

After draining, make sure washer can be re-used.
Install oil drain bolt.

Torque value: 3.5~4.5kgf-m

Add oil to crankcase (oil viscosity SAE 10W-40)
Recommended using King serial oil.

Engine oil capacity:

Disassembly - 2000c.c.

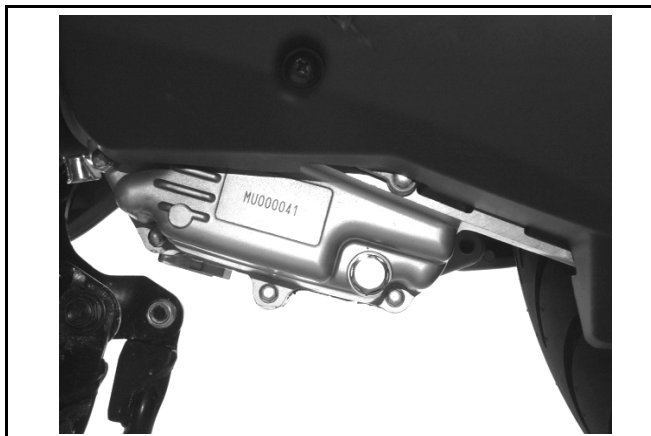
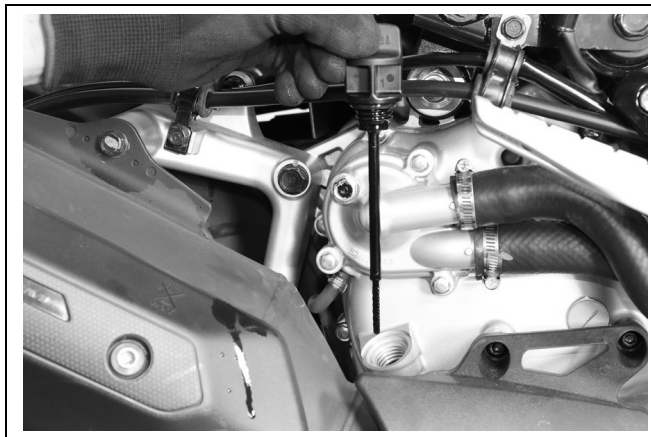
Replacement (oil filter replaced) - 1900c.c.

Replacement - 1800c.c.

Install dipstick, start the engine for running several minutes.

Turn off engine, and check oil level again.

Check if engine oil leaks.



Engine Oil Strainer Clean

Drain engine oil out.

Remove oil strainer and spring.

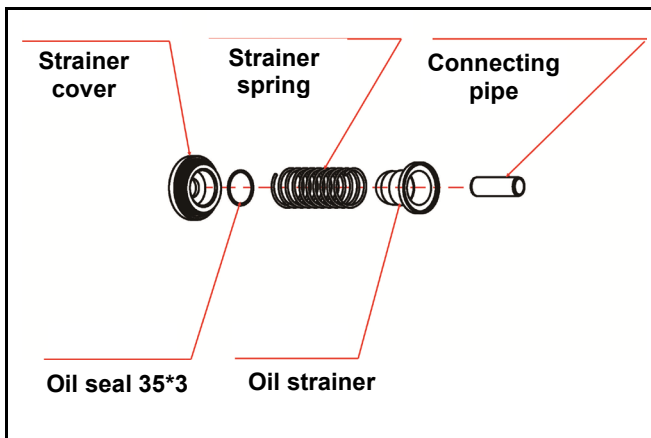
Clean oil strainer.

Check if O-ring can be re-used.

Install oil strainer and spring.

Install oil strainer cap.

Torque value : 1.0~2.0kgf-m



2. Maintenance Information



Gear Oil

Oil level inspection

Park the vehicle on a flat surface with main stand.

Turn off the engine.

Gear Oil Change

Remove oil inspection bolt.

Remove oil drain bot and drain oil out.

Install the drain plug after draining.

Torque value: 0.8~1.2kgf-m

Add gear oil to specified quantity from the inspection hole.

Install the inspection bolt.

Torque value: 1.0~1.4kgf-m

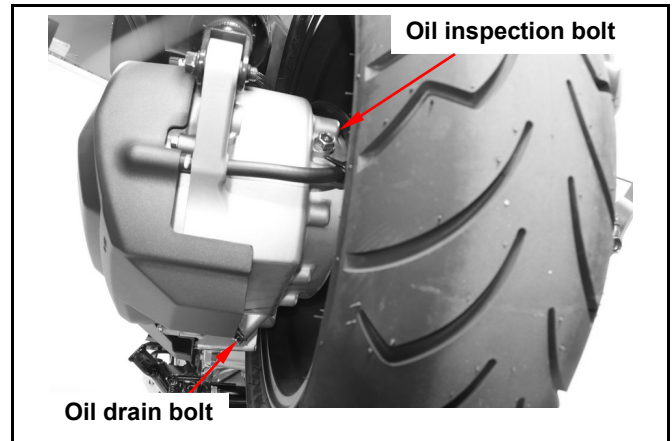
Gear Oil Quantity: 330 c.c. when replacing it.

Make sure that the bolt washer can be re-used, and install the bolt.

Start engine and run engine for 2-3 minutes.

Turn off engine and make sure that oil level is in correct level.

Make sure that no oil leaking.



Fuel Lines / Cable

Remove luggage box.

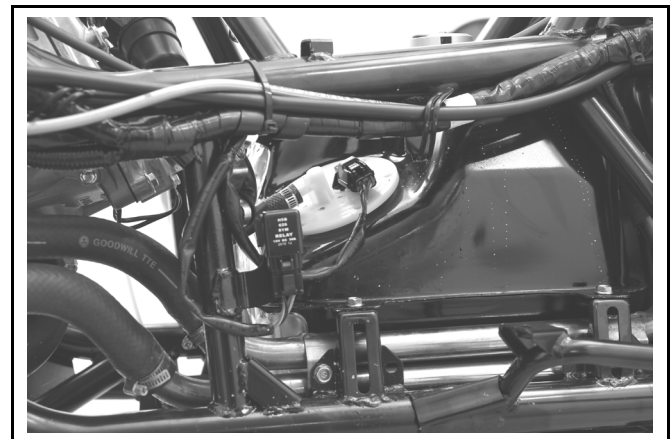
Remove rear carrier.

Remove body covers.

Check all lines, and replace it 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 bar in any position and release it to let back original (full closed) position.

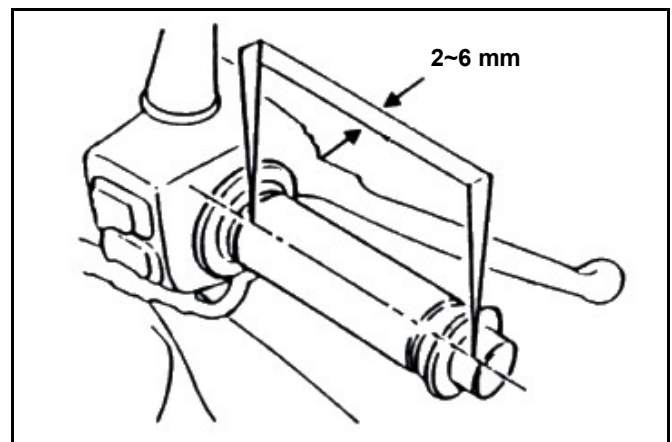
Check handle bar if its operation is smooth.

Check acceleration cable and replace it if deteriorated, twisted or damaged.

Lubricate the cable if operation is not smooth

Measure handle bar free play in its flange part.

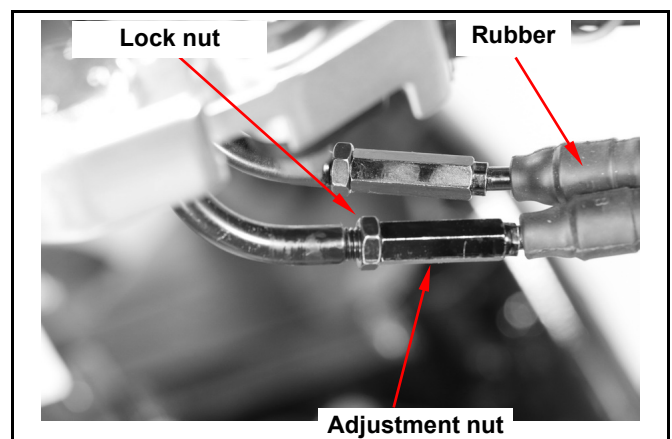
Free play: 2~6 mm.



Adjustment can be done in either end.

Secondary adjustment is conducted from top side.

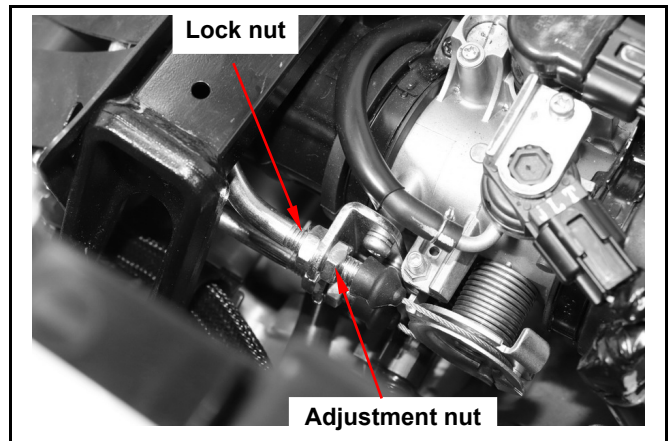
Remove rubber boot, loosen fixing nut, and then adjust it by turning the adjustment nut.



Primary adjustment is conducted from bottom side.

Loosen fixing nut, and adjust by turning the adjustment nut.

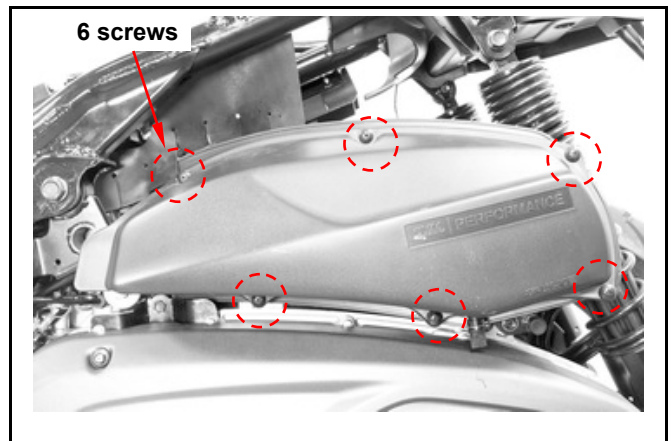
Tighten the fixing nut, and check acceleration operation condition.



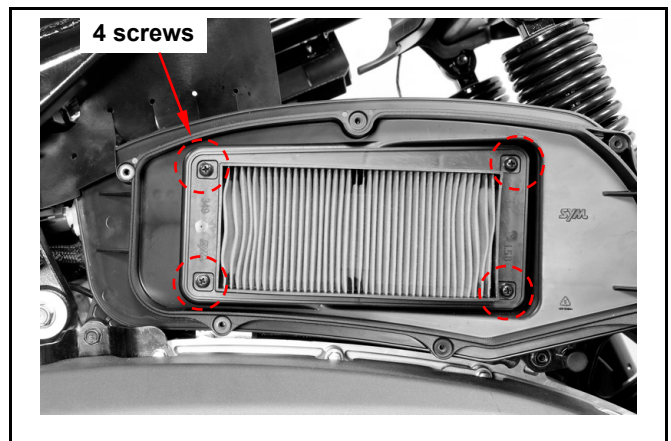
Air Cleaner

Air Cleaner Element

Remove 6 screws from the air cleaner cover.



Remove the air cleaner element.



Caution

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

P.C.V. system

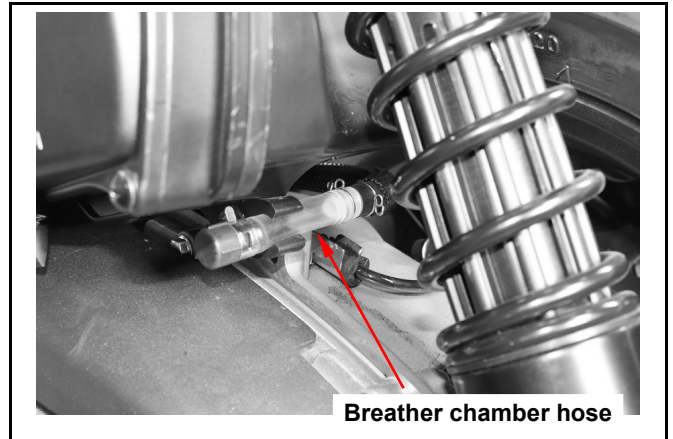
Remove the plug from lower of the breather chamber hose.

Release the dry internal deposit.

Every 5,000 kilometers release oil

Caution

- In releases the breather chamber hose in the transparent section is worthy of looking at as any deposit
- In the multi-rain or the accelerator in the situation rides, must reduce the maintenance traveling schedule
- In releases the breather chamber hose in the transparent section is worthy of looking at as any deposit



Valve Clearance

Caution

- Checks and adjustment must be performed when the engine temperature is below 35°C.

Remove luggage box.

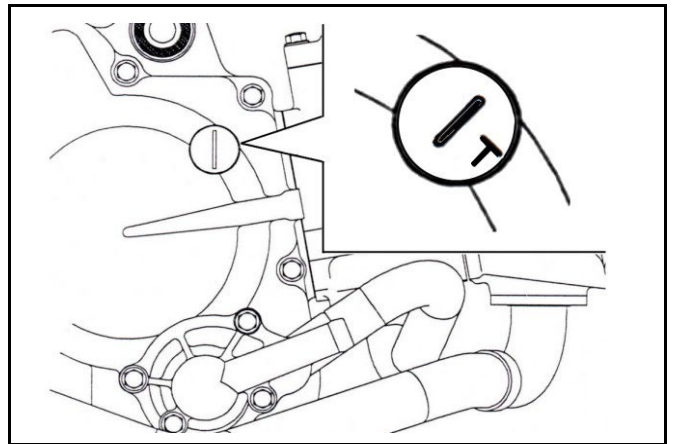
Remove cylinder head cover & side cover.

Remove ignition timing hole cap located in front upper side of engine right cover

Turn camshaft bolt in C.W. direction and let the "T" mark on the camshaft sprocket aligns 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 from camshaft bolt looseness.



Valve clearance inspection and adjustment:

Check & adjust valve clearance with feeler gauge.

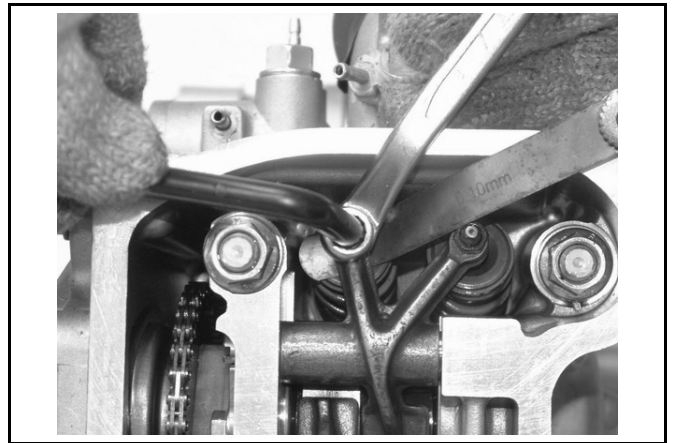
Valve clearance (IN) : 0.10 ± 0.02 mm.

Valve clearance (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.



Special tool: Tappet adjuster

SYM-9001200-08

SYM-9001200-09

SYM-9001200-10

Special tool: Tappet adjuster wrench

SYM-9001200

Spark Plug

Recommended spark plug: CPR8EA-9

Remove luggage box

Remove central cover.

Remove spark plug cap.

Clean dirt around the spark plug hole.

Remove spark plug.

Measure spark plug gap.

Spark plug gap: 0.8~0.9 mm

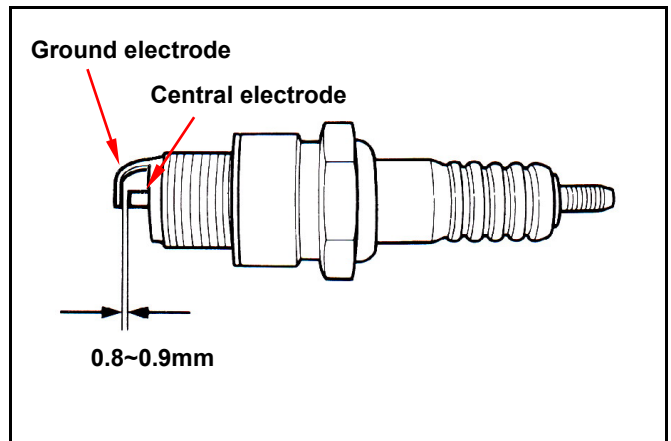
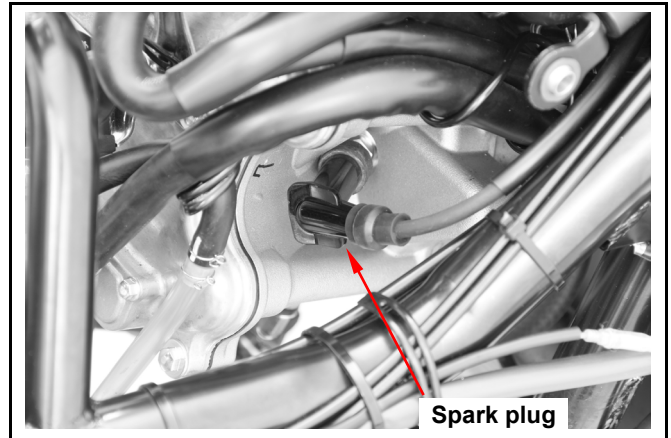
Carefully bend ground electrode of the plug to adjust the gap if necessary.

Hold 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

Connect spark plug cap



Cylinder Compression Pressure

Warm up engine.

Turn off the engine.

Remove luggage box and 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

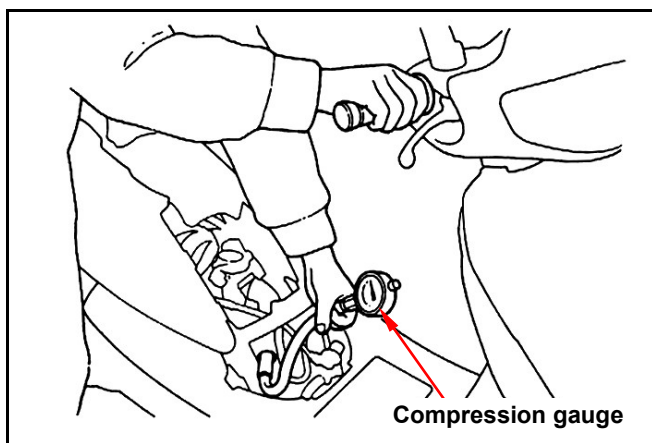
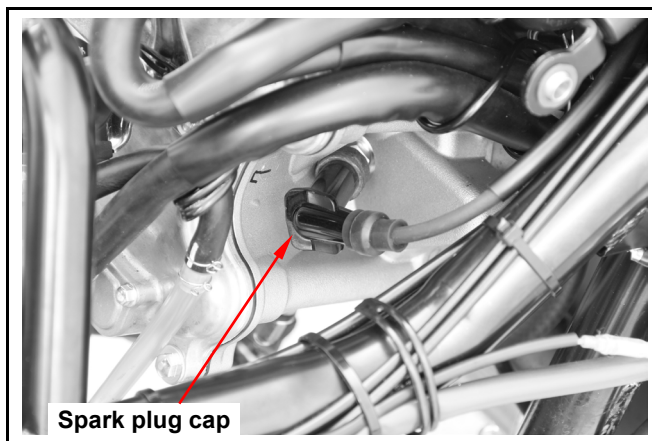
- Rotate the engine until the reading in the gauge no more increasing.
- Usually, the highest pressure reading will be obtained in 4~7 seconds.

Compression pressure : $12.5 \pm 2 \text{ Kg/cm}^2$

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

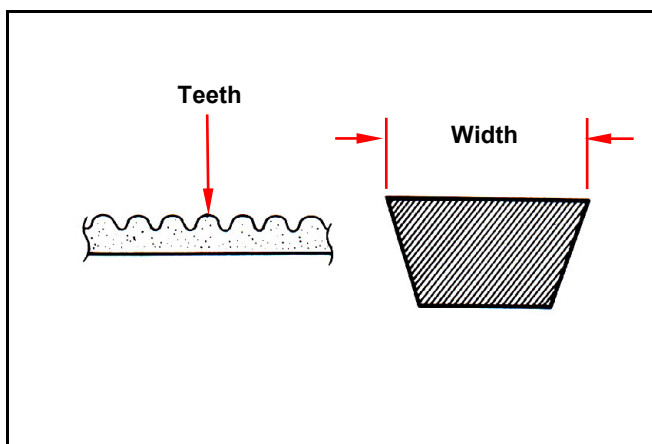
Remove mounting bolt located under air cleaner.

Remove the engine left side cover and the cover.

Check if the belt is crack or worn out.

Replace the belt if necessary or in accord with the periodical maintenance schedule to replace it.

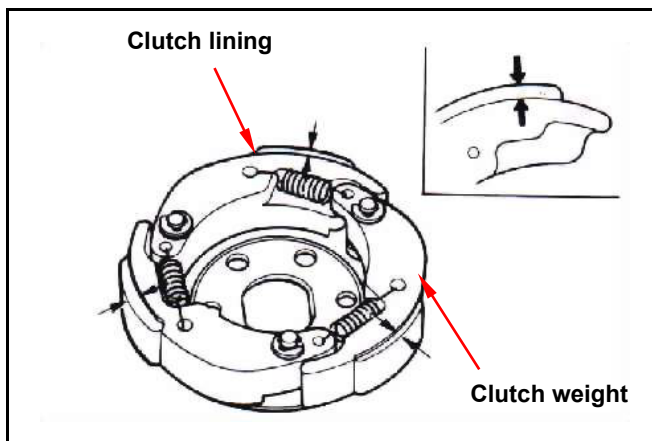
Width limit: 26.5 mm or above



Clutch Disc Wear

Run the motorcycle and increase throttle valve opening gradually to check clutch operation.

If the motorcycle is in forward moving and shaking, check clutch disc condition then replace it.



Steering Handle Top Bearing

Caution

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

Lift the front wheel out of 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 adjust the handle top bearing.

Cushion

Caution

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

Front cushion

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

Rear Cushion

Press down the front cushion for several times to check it operation.
Check if it is damage
Replace relative parts if damage found.
Park motorcycle with main stand.
Turn the rear wheel forcefully and check if engine bracket bushing worn out
Replace the bushing if looseness found.
Tighten all nuts and bolts.



Disk Brake System

Brake System Hose

Make sure 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 fulfilled inside the brake system hoses.

Added Brake Fluid

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

⚠ Caution

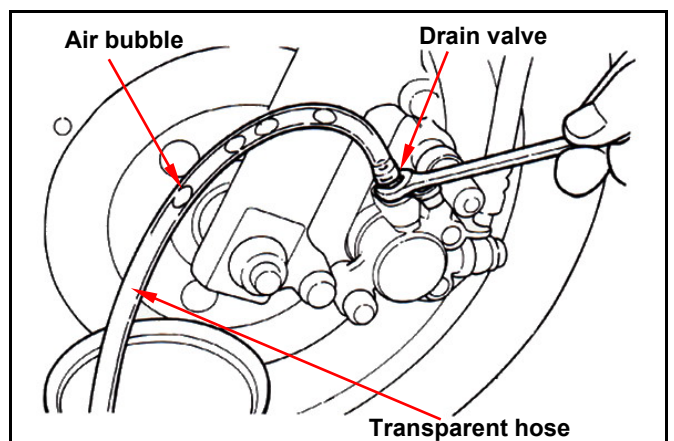
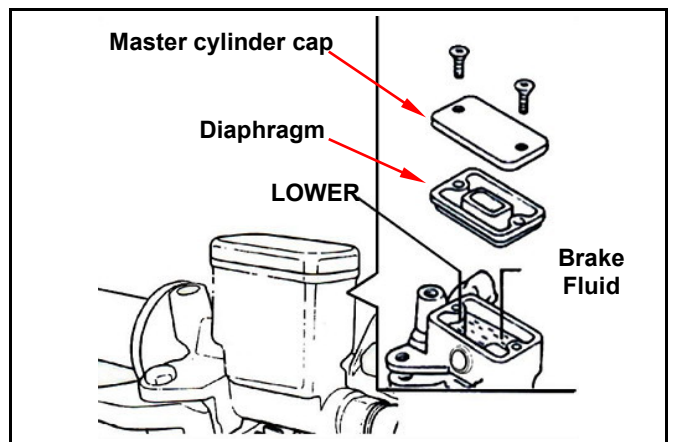
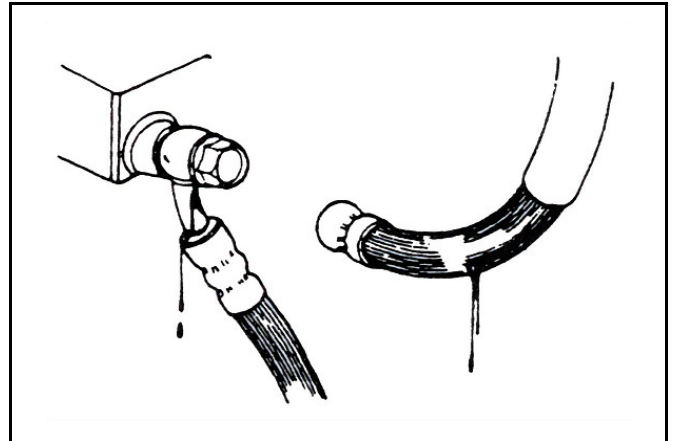
- Never mix or use dirty brake fluid to prevent from damaging brake system or reducing brake performance.

Air Bleeding 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 bleeding valve, do not release the brake lever.



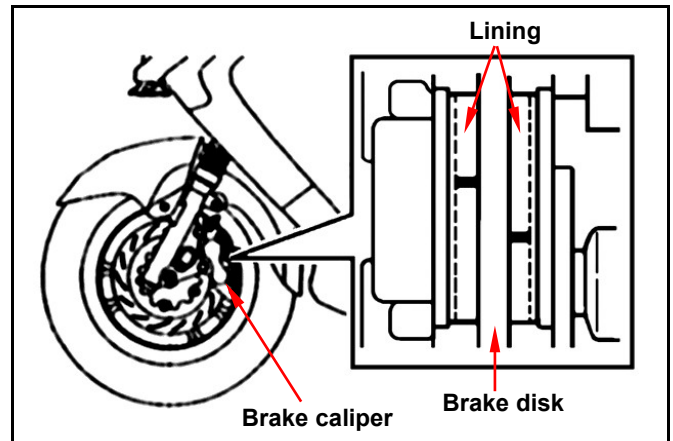
Brake Lining Wear

The indent mark on brake lining is the wear limitation.

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

Caution

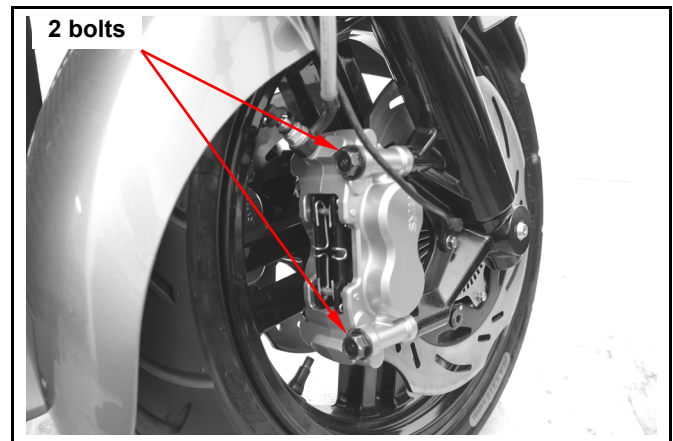
- It is not necessary to remove brake hose when replacing the brake lining.



Remove the brake clipper bolt, and take out the clipper.

Caution

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

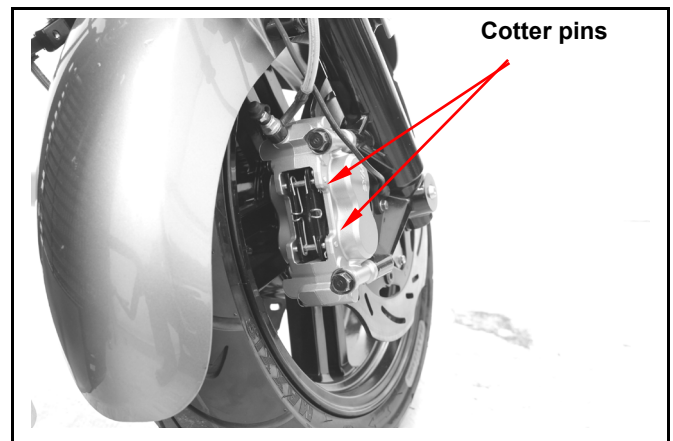


Pry out the brake lining with a flat driver if lining is clipped.

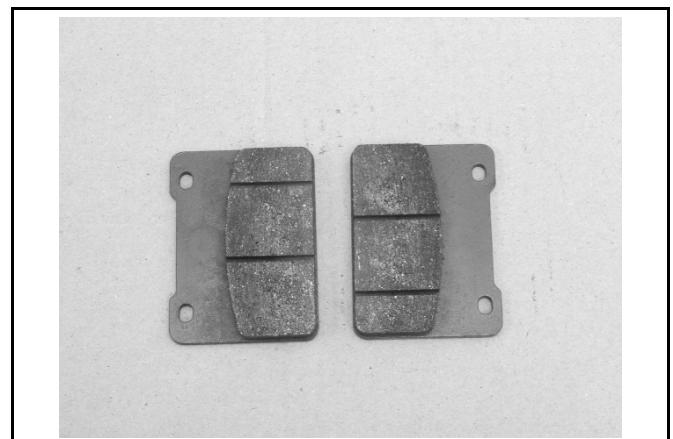
Remove 2 cotter pins

Caution

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



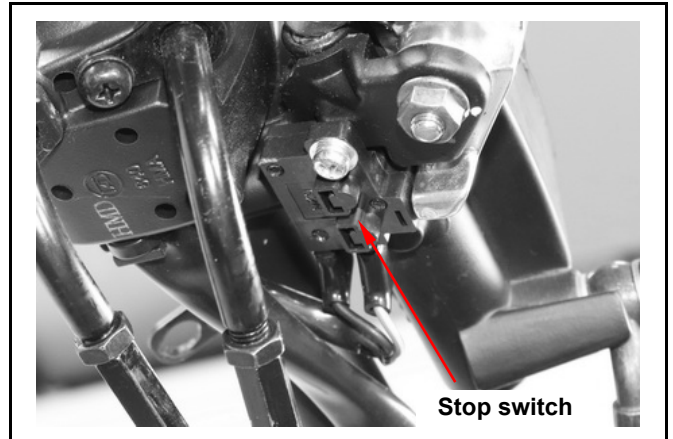
Remove the brake pad shafts and pads.



Brake Light Switch / Start Switch

The brake light switch is to light up brake lamp as brake applied.

Make sure that starter motor can be operated only under brake applying.



Wheel / Tire

Caution

- Tire pressure check should be done as cold engine. °

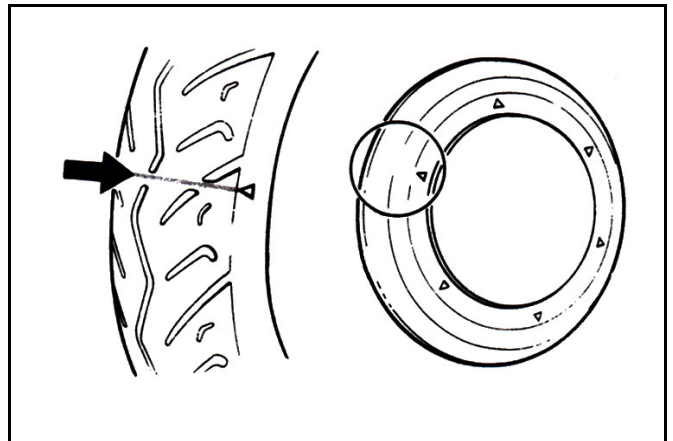
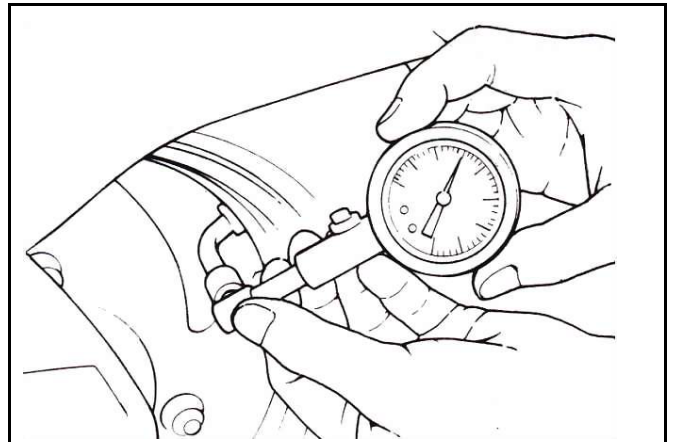
Appointed tire pressure

Tire size	Front tire	Rear tire
Tire pressure as cold engine (Kg/cm ²)	2.30	2.50

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

Check if front and rear tires' pressure is in normal. Measure tire thread depth from tire central surface.

Replace the tire when the tread is level in height with the tread wear indicator.



Battery

Removal

Remove the rear carrier and the luggage box.

Battery cable remove :

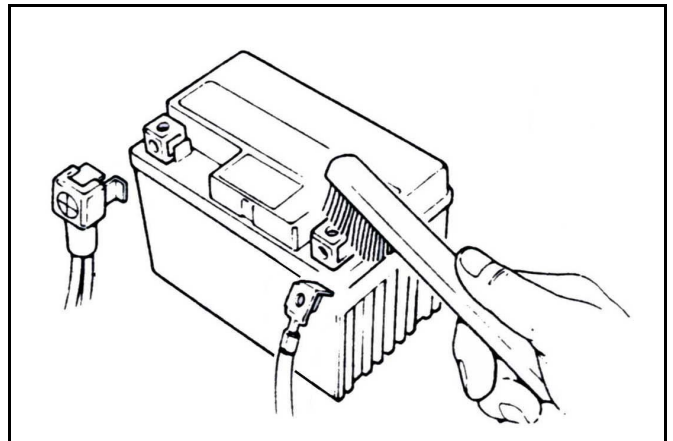
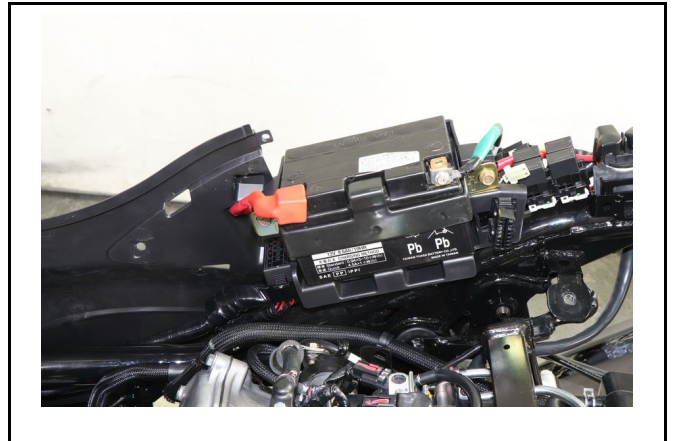
1. Disconnect the cable negative terminal (-),
2. then the cable positive terminal (+)
3. Remove the battery from the motorcycle. °

If there is some rust on battery posts, clean it with steel brush

Install the battery in the reverse procedures of removal

Caution

- If there is rust on the posts very serious, spray some hot water on the posts. Then, clean it with steel brush so that can remove rust for more easily.
- Apply some grease on the posts after rust removed to prevent from rust again.



Nuts, Bolts Tightness

Perform periodical maintenance in accord with the Periodical Maintenance Schedule.

Check if all bolts and nuts on the frame are tightened securely.

Check all fixing pins, snap rings, hose (pipe) clamps, and wire holders for security.

2. Maintenance Information



Special Tools List

					
NAME	Valve rocker arm shaft disassemble tool	NAME	L/Cover Radial Ball Brg 6006 Drive	NAME	Valve cotter remove & assembly tool
NO	SYM-1445100-01	NO	SYM-9615010-REA 6006	NO	SYM-1471110/20
					
NAME	Clutch spring compressor	NAME	Tappet adjusting wrench	NAME	Oil seal driver 45*65*10
NO	SYM-2301000-L4A	NO	SYM-9001200	NO	SYM-9125500-L4A
					
NAME	Crank Shift Oil Seal Driver 35*55*7	NAME	PULLEY DRIVEN FACE OPENER	NAME	Drive Shaft 25*40*7 Oil Seal Drive
NO	SYM-9120900-L4A	NO	SYM-2321000-REA	NO	SYM-9120200-L4A
					
NAME	Inner bearing puller	NAME	Inner Bearing Driver	NAME	Outer bearing puller
NO	SYM-6204022	NO	SYM-6204024	NO	SYM-6204010

					
NAME	Driven pulley bearing installer	NAME	Drive shaft bearing installer	NAME	Counter shaft bearing driver
NO	SYM-9100600-L4A DPB	NO	SYM-9100420-A6305	NO	SYM-9610000-L4A N1820
					
NAME	Clutch nut wrench	NAME	Universal holder	NAME	AC.G. FLYWHEEL PULLER
NO	SYM-9020200	NO	SYM-2210100	NO	SYM-3110000-HMA
					
NAME	Final shaft bearing installer	NAME	Water pump bearing installer	NAME	Balance shaft bearing installer
NO	SYM-9615000-L4A A6206	NO	SYM-1923100-L4A A6203	NO	SYM-1333200-L4A A6304
					
NAME	Water pump seal driver	NAME	Water pump mechanical seal driver	NAME	Water pump mechanical bearing driver N1010
NO	SYM-9120500-L4A	NO	SYM-1721700-H9A	NO	SYM-9100100-L4A

2. Maintenance Information

					
NAME	Crankshaft bearing install / remove tool	NAME	Crankshaft bearing install tool	NAME	Fuel pressure gauge
NO	SYM-9100310-L4A	NO	SYM-9100310-L4A	NO	SYM-HT07010
					
NAME	Vacuum pressure gauge	NAME	Cylinder pressure gauge	NAME	Vehicle circuit test tool kit
NO	SYM-HT07011	NO	SYM-HT07008	NO	SYM-HE170008
					
NAME	Vehicle circuit test harness kit	NAME	Efi System Diagnostic tool		Multi-meter
NO	SYM-HE170008-01	NO			SYM-HE07007-01

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Engine Oil Strainer Clean	2-3	Cushion.....	2-9
Gear Oil.....	2-4	Disk Brake System	2-10
Fuel Lines / Cable.....	2-4	Brake Light Switch / Start Switch	2-12
Air Cleaner	2-5	Wheel / Tire.....	2-12
P.C.V. System	2-6	Battery	2-13
Valve Clearance	2-6	Nuts, Bolts Tightness	2-13
Spark Plug.....	2-7	Special Tools List.....	2-14

Precautions in Operation

Model		LZ40W1-EU
Fuel Tank Capacity		13,000±100 c.c.
Engine Oil	capacity	2,000 c.c.
	change (with oil filter replaced)	1,900 c.c.
	change	1,800 c.c.
Transmission Gear oil	capacity	350 c.c.
	change	330 c.c.
Capacity of coolant	Engine + radiator	1400 c.c.
	Reservoir upper	170 c.c.
Clearance of throttle valve		2~6 mm
Spark plug		CPR8EA-9 (gap:0.8~0.9 mm)
Timing advance idle speed		BTDC 10° / 1,650 rpm
Idling speed		1,650±150 rpm
Cylinder compression pressure		12.5 ± 2 kgf/cm ²
Valve clearance	IN	0.10±0.02 mm
	EX	0.15±0.02 mm
Tire dimension	Front	120/70-15 56S
Tire dimension	Rear	160/60-14 65H
Tire pressure (cold)		Front: 2.30 kg/cm ² Rear: 2.50 kg/cm ²
Battery		12V8.6Ah (MF battery) / TTZ10S

2. Maintenance Information



Periodical Maintenance Schedule

No	item	1 month every 1,000KM	3 months every 5,000KM	6 months every 10,000KM	1 year every 15,000KM
1	☆Air cleaner element	I	C	R	
2	☆Fuel filter			I	R
3	☆Oil filter (paper)	R	Second replacement at 10,000km Further replacement every 20,000km		
4	☆Oil filter screen	C	Second replacement at 5,000km Further replacement every 5,000km		
5	☆Engine oil change	R	Second replacement at 5,000km Further replacement every 5,000km		
6	Tire pressure	I	I		
7	Battery inspection	I	I		
8	Brake free play check	I	I		
9	Steering handle check	I	I	L	
10	Cushion operation check	I	I		
11	Every screw tightening check	I	I		
12	Gear oil check for leaking	I	I		
13	☆Spark plug check or change	I	I	I/R	I
14	☆Gear oil change	R	Replacement for every 10,000 km		
15	Frame lubrication			L	L
16	Exhaust pipe	I	I	I	I
17	☆Ignition timing	I	I	I	I
18	☆Emission check in Idling	I	I	I	I
19	☆Throttle operation		I	I	I
20	☆Engine bolt tightening		I	I	I
21	☆CVT driving device(belt)			I	R
22	☆CVT driving device(roller)			I	R
23	Lights/electrical equipment/multi-meters	I	I	I	I
24	Main/side stands & springs			I	I
25	Fuel lines		I	I	I
26	Cam chain	I		I	
27	☆Valve clearance	I		I	
28	☆Crankcase evaporative control system	I		I	
29	☆Evaporative control system		I	I	I
30	Lines & connections in cooling system	I	I		
31	Coolant reservoir	I	I		
32	Coolant	I			R
33	ECU input voltage			I	
34	EFi sensor coupler			I	

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

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

The above maintenance schedule is established by taking the monthly 1,000 kilometers as a reference which ever comes first.

Remarks: 1. **These marks "☆" in the schedule are emission control items. According to EPA regulations, these items must be performed normally periodical maintenance following the user manual instructions. They are prohibited to be adjusted or repaired by unauthorized people. Otherwise, SYM is no responsible for the charge.**

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

Engine Oil

Turn off engine, and park the vehicle in a flat surface with main stand.
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 to make sure oil can be drained smoothly and completely.

Place an oil pan under the vehicle, and remove oil drain bolt.

After draining, make sure washer can be re-used.
Install oil drain bolt.

Torque value: 3.5~4.5kgf-m

Add oil to crankcase (oil viscosity SAE 10W-40)
Recommended using King serial oil.

Engine oil capacity:

Disassembly - 2000c.c.

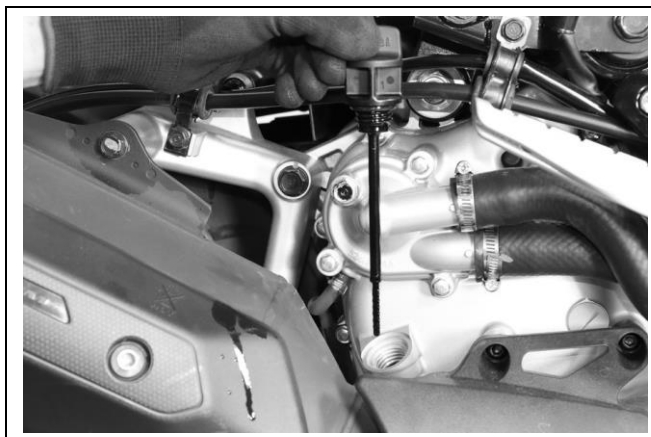
Replacement (oil filter replaced) - 1900c.c.

Replacement - 1800c.c.

Install dipstick, start the engine for running several minutes.

Turn off engine, and check oil level again.

Check if engine oil leaks.



Engine Oil Strainer Clean

Drain engine oil out.

Remove oil strainer and spring.

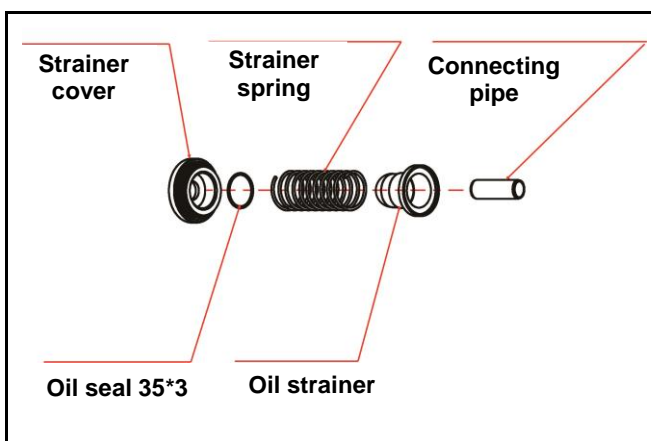
Clean oil strainer.

Check if O-ring can be re-used.

Install oil strainer and spring.

Install oil strainer cap.

Torque value : 1.0~2.0kgf-m



Gear Oil

Oil level inspection
Park the vehicle on a flat surface with main stand.
Turn off the engine.

Gear Oil Change

Remove oil inspection bolt.
Remove oil drain bot and drain oil out.
Install the drain plug after draining.

Torque value: 0.8~1.2kgf-m

Add gear oil to specified quantity from the inspection hole.

Install the inspection bolt.

Torque value: 1.0~1.4kgf-m

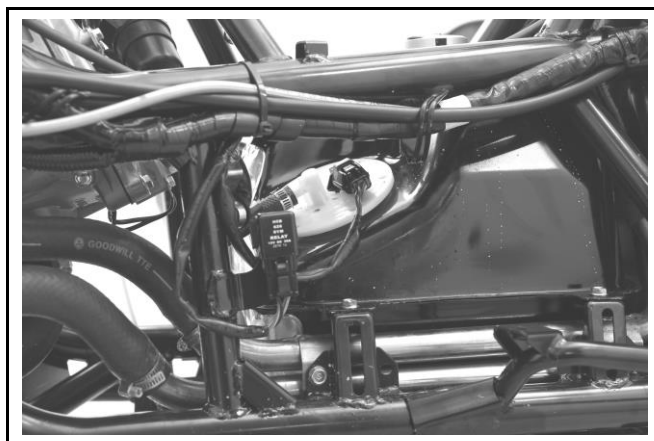
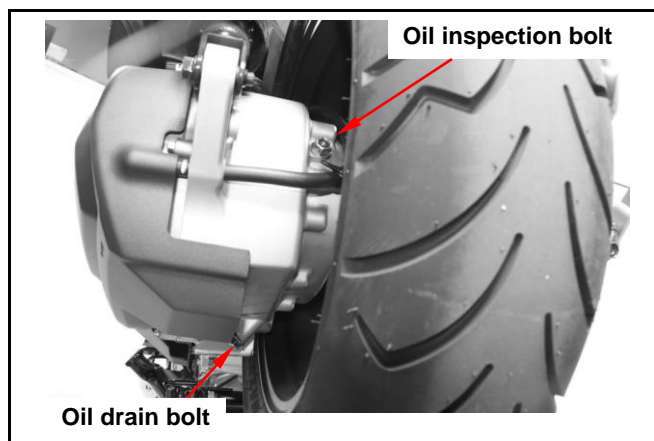
Gear Oil Quantity: 330 c.c. when replacing it.

Make sure that the bolt washer can be re-used, and install the bolt.

Start engine and run engine for 2-3 minutes.

Turn off engine and make sure that oil level is in correct level.

Make sure that no oil leaking.



Fuel Lines / Cable

Remove luggage box.

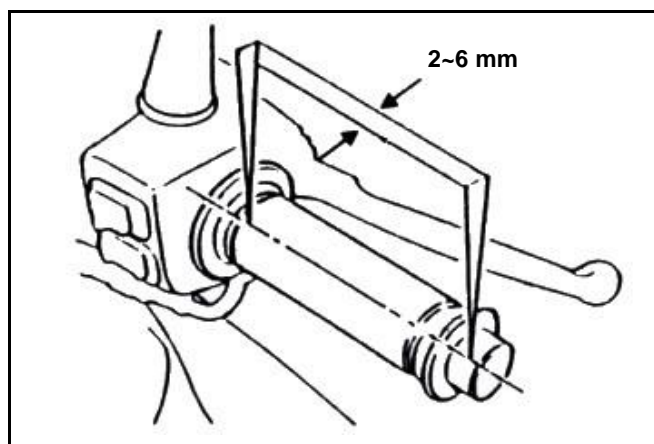
Remove rear carrier.

Remove body covers.

Check all lines, and replace it 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 bar in any position and release it to let back original (full closed) position.

Check handle bar if its operation is smooth.

Check acceleration cable and replace it if deteriorated, twisted or damaged.

Lubricate the cable if operation is not smooth

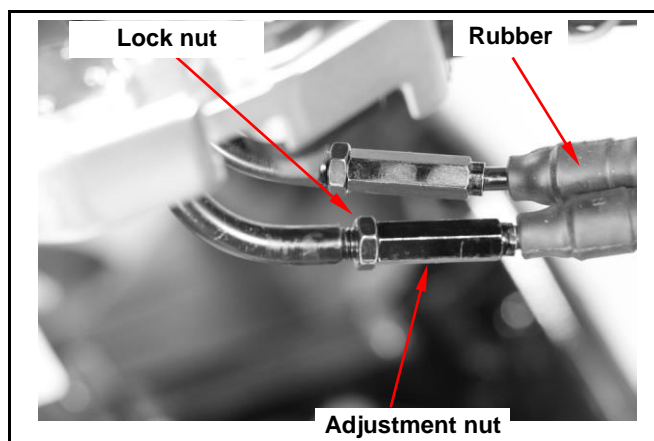
Measure handle bar free play in its flange part.

Free play: 2~6 mm.

Adjustment can be done in either end.

Secondary adjustment is conducted from top side.

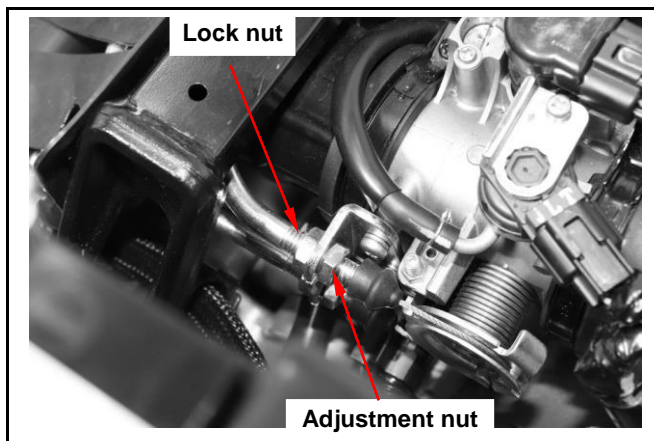
Remove rubber boot, loosen fixing nut, and then adjust it by turning the adjustment nut.



Primary adjustment is conducted from bottom side.

Loosen fixing nut, and adjust by turning the adjustment nut.

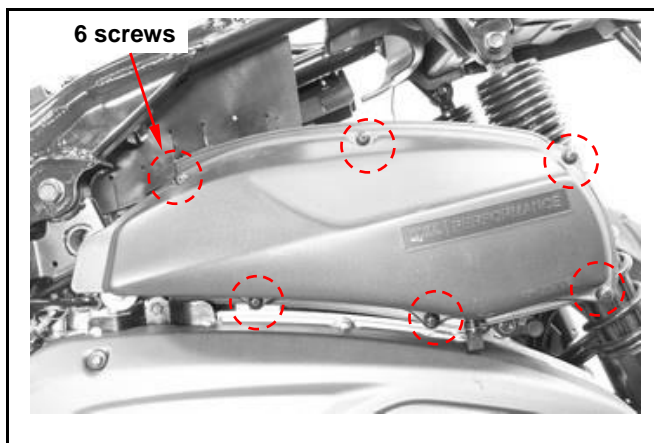
Tighten the fixing nut, and check acceleration operation condition.



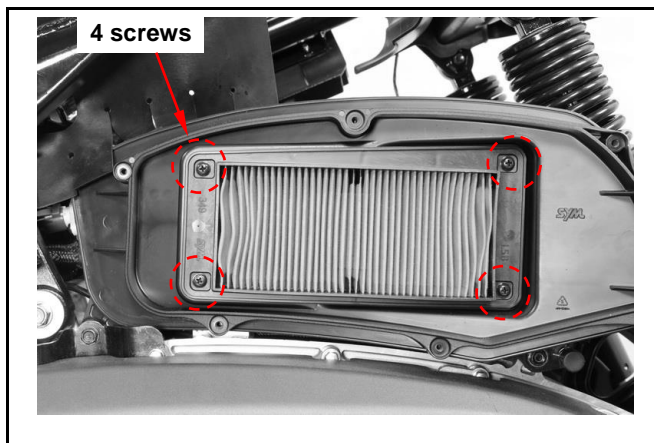
Air Cleaner

Air Cleaner Element

Remove 6 screws from the air cleaner cover.



Remove the air cleaner element.



Caution

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

P.C.V. system

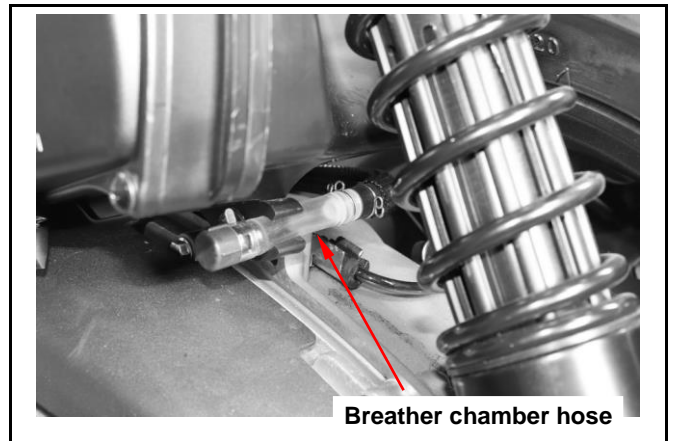
Remove the plug from lower of the breather chamber hose.

Release the dry internal deposit.

Every 5,000 kilometers release oil

Caution

- In releases the breather chamber hose in the transparent section is worthy of looking at as any deposit
- In the multi-rain or the accelerator in the situation rides, must reduce the maintenance traveling schedule
- In releases the breather chamber hose in the transparent section is worthy of looking at as any deposit



Valve Clearance

Caution

- Checks and adjustment must be performed when the engine temperature is below 35°C.

Remove luggage box.

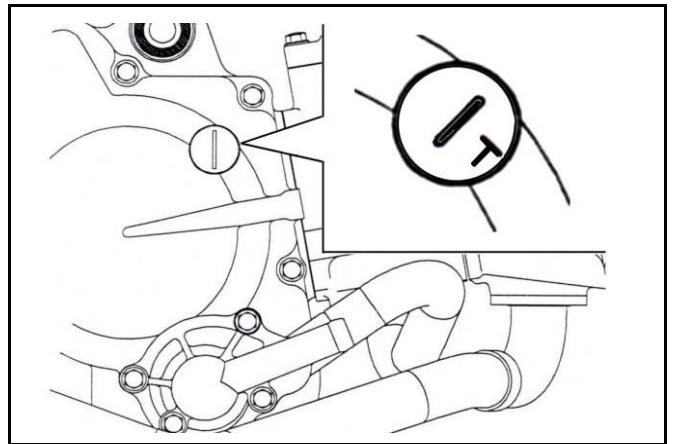
Remove cylinder head cover & side cover.

Remove ignition timing hole cap located in front upper side of engine right cover

Turn camshaft bolt in C.W. direction and let the "T" mark on the camshaft sprocket aligns 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 from camshaft bolt looseness.



Valve clearance inspection and adjustment:

Check & adjust valve clearance with feeler gauge.

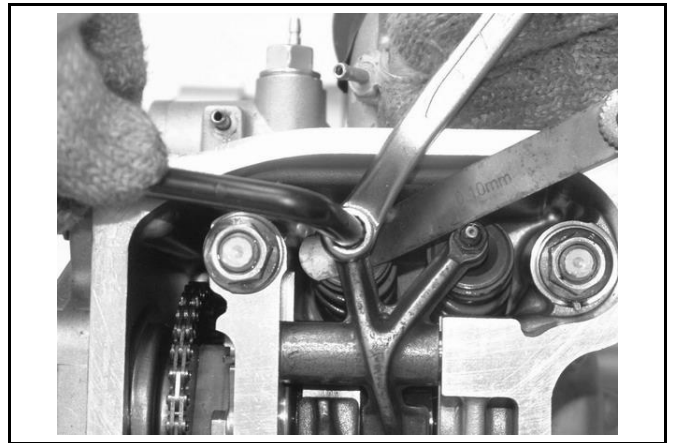
Valve clearance (IN) : 0.10 ± 0.02 mm.

Valve clearance (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.



Special tool: Tappet adjuster

SYM-9001200-08

SYM-9001200-09

SYM-9001200-10

Special tool: Tappet adjuster wrench

SYM-9001200

Spark Plug

Recommended spark plug: CPR8EA-9

Remove luggage box

Remove central cover.

Remove spark plug cap.

Clean dirt around the spark plug hole.

Remove spark plug.

Measure spark plug gap.

Spark plug gap: 0.8~0.9 mm

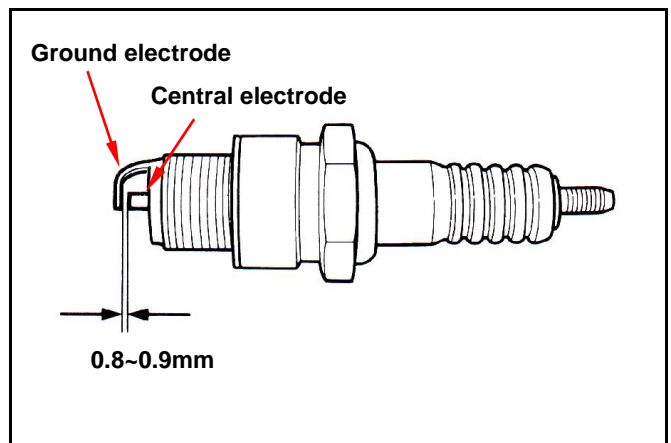
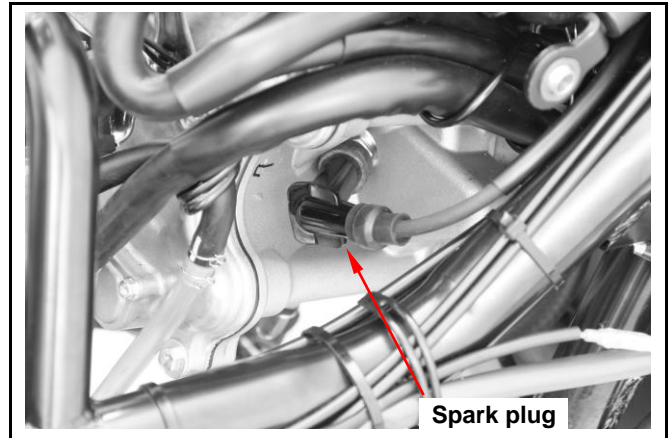
Carefully bend ground electrode of the plug to adjust the gap if necessary.

Hold 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

Connect spark plug cap



Cylinder Compression Pressure

Warm up engine.

Turn off the engine.

Remove luggage box and 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

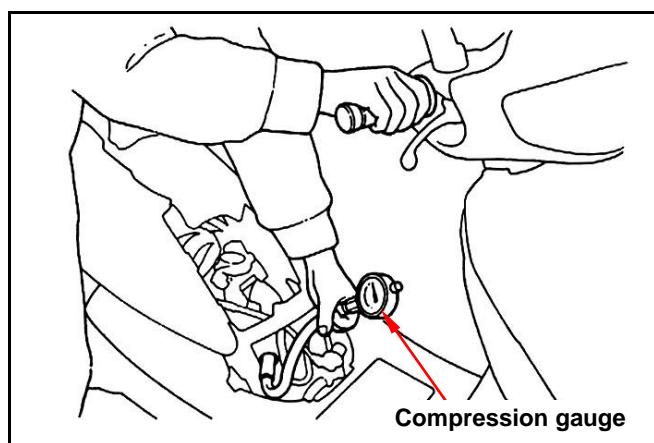
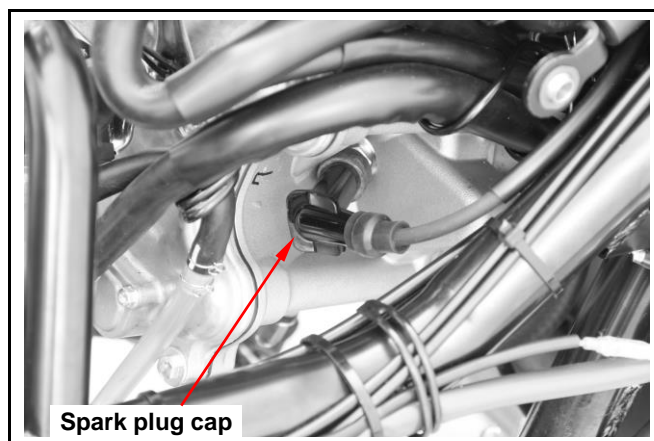
- Rotate the engine until the reading in the gauge no more increasing.
- Usually, the highest pressure reading will be obtained in 4~7 seconds.

Compression pressure : 12.5 ± 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

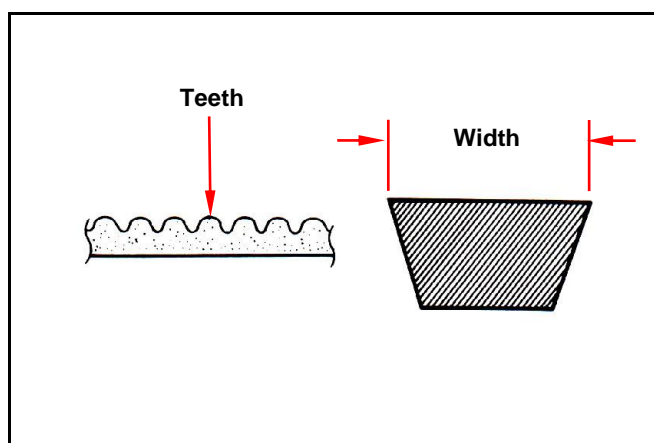
Remove mounting bolt located under air cleaner.

Remove the engine left side cover and the cover.

Check if the belt is crack or worn out.

Replace the belt if necessary or in accord with the periodical maintenance schedule to replace it.

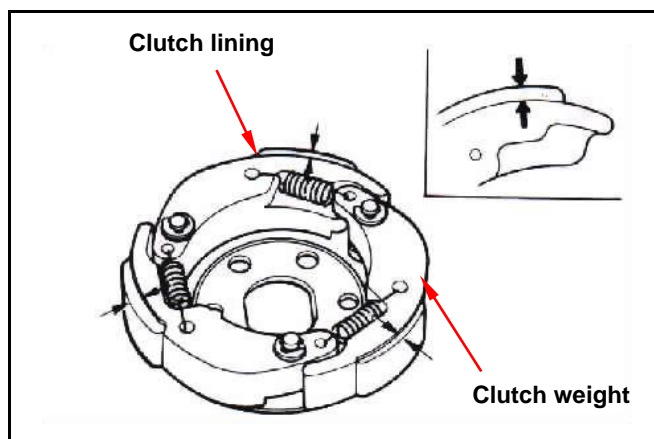
Width limit: 26.5 mm or above



Clutch Disc Wear

Run the motorcycle and increase throttle valve opening gradually to check clutch operation.

If the motorcycle is in forward moving and shaking, check clutch disc condition then replace it.



Steering Handle Top Bearing

⚠ Caution

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

Lift the front wheel out of 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 adjust the handle top bearing.

Cushion

⚠ Caution

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

Front cushion

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

Rear Cushion

Press down the front cushion for several times to check it operation.
Check if it is damage
Replace relative parts if damage found.
Park motorcycle with main stand.
Turn the rear wheel forcefully and check if engine bracket bushing worn out
Replace the bushing if looseness found.
Tighten all nuts and bolts.



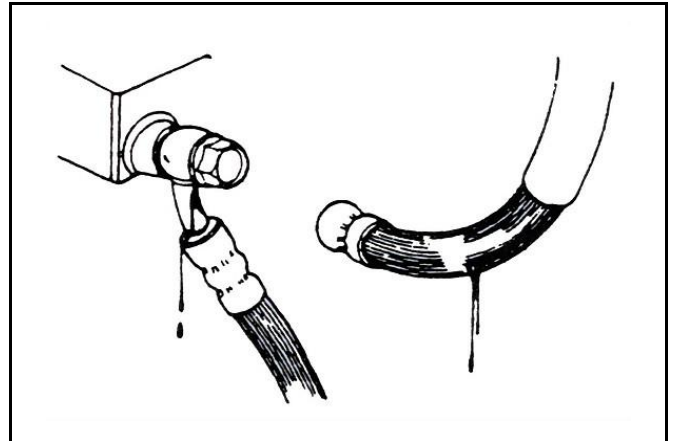
2. Maintenance Information



Disk Brake System

Brake System Hose

Make sure 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

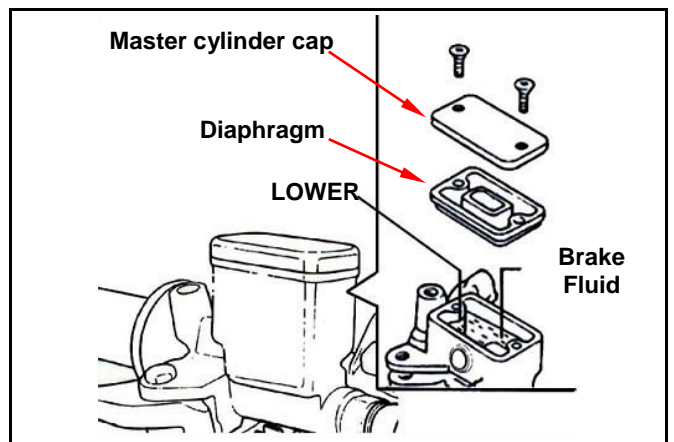
Tighten the drain valve, and add brake fluid. Operate the brake lever so that brake fluid fulfilled inside the brake system hoses.

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 damaging brake system or reducing brake performance.

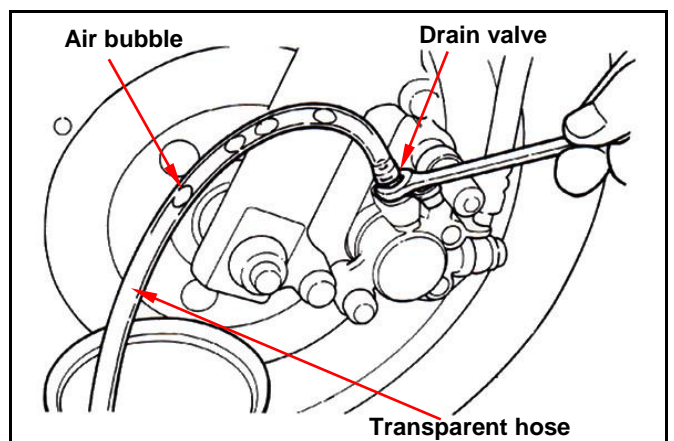


Air Bleeding Operation

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 bleeding valve, do not release the brake lever.



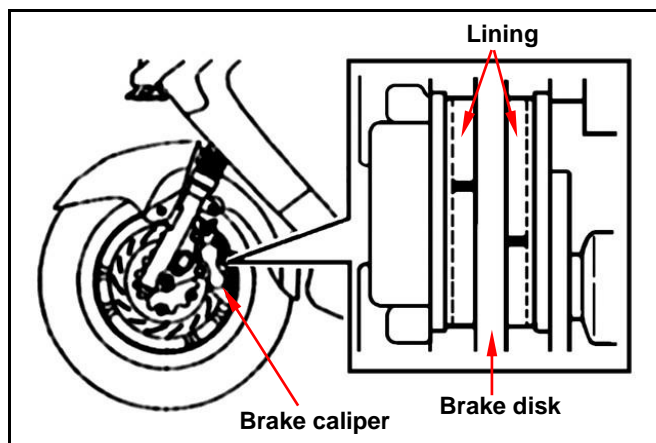
Brake Lining Wear

The indent mark on brake lining is the wear limitation.

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

Caution

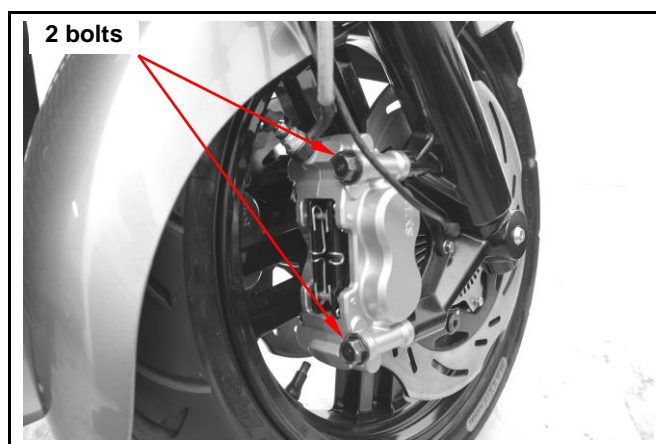
- It is not necessary to remove brake hose when replacing the brake lining.



Remove the brake clipper bolt, and take out the clipper.

Caution

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

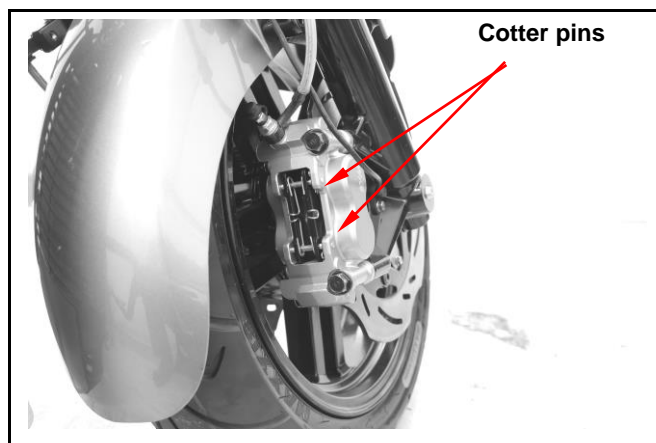


Pry out the brake lining with a flat driver if lining is clipped.

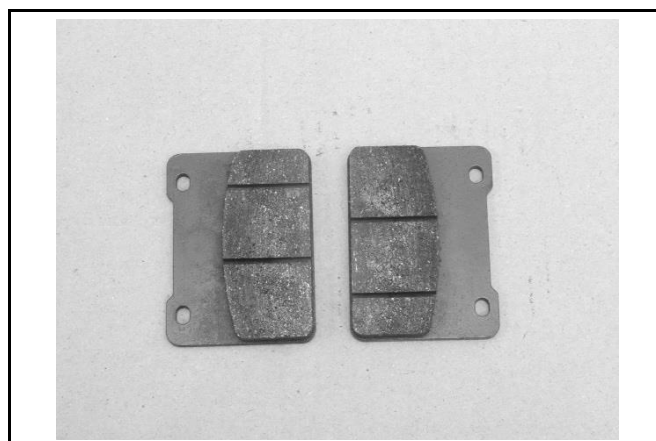
Remove 2 cotter pins

Caution

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



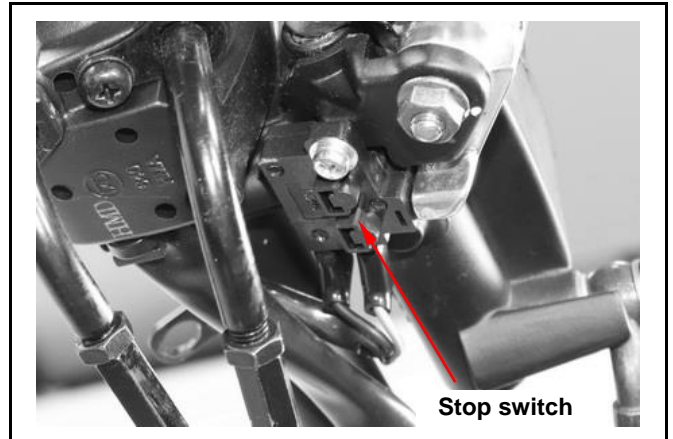
Remove the brake pad shafts and pads.



Brake Light Switch / Start Switch

The brake light switch is to light up brake lamp as brake applied.

Make sure that starter motor can be operated only under brake applying.



Wheel / Tire

Caution

- Tire pressure check should be done as cold engine. °

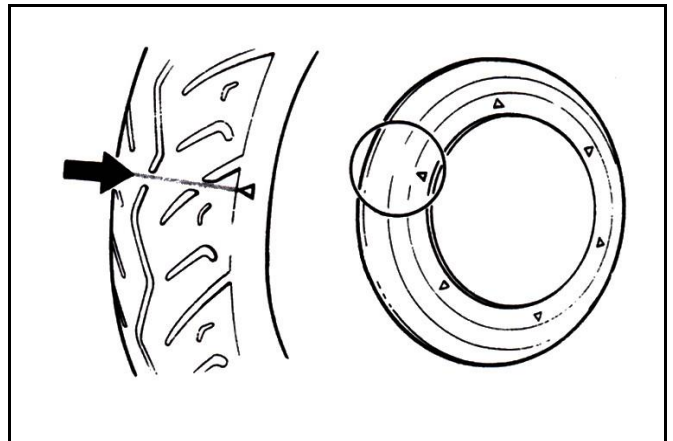
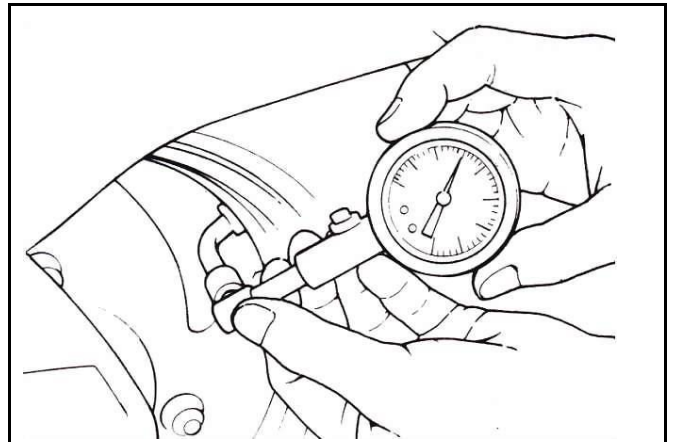
Appointed tire pressure

Tire size	Front tire	Rear tire
Tire pressure as cold engine (Kg/cm ²)	2.30	2.50

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

Check if front and rear tires' pressure is in normal. Measure tire thread depth from tire central surface.

Replace the tire when the tread is level in height with the tread wear indicator.



Battery

Removal

Remove the rear carrier and the luggage box.

Battery cable remove :

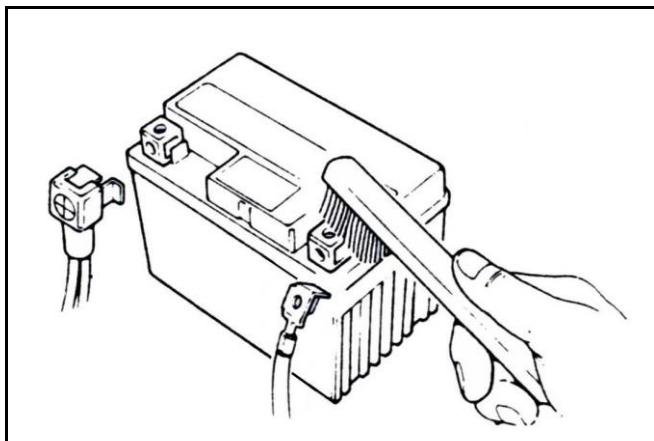
1. Disconnect the cable negative terminal (-),
2. then the cable positive terminal (+)
3. Remove the battery from the motorcycle. °

If there is some rust on battery posts, clean it with steel brush

Install the battery in the reverse procedures of removal

Caution

- If there is rust on the posts very serious, spray some hot water on the posts. Then, clean it with steel brush so that can remove rust for more easily.
- Apply some grease on the posts after rust removed to prevent from rust again.



Nuts, Bolts Tightness

Perform periodical maintenance in accord with the Periodical Maintenance Schedule.

Check if all bolts and nuts on the frame are tightened securely.

Check all fixing pins, snap rings, hose (pipe) clamps, and wire holders for security.

2. Maintenance Information



Special Tools List

					
NAME	Valve rocker arm shaft disassemble tool	NAME	L/Cover Radial Ball Brg 6006 Drive	NAME	Valve cotter remove & assembly tool
NO	SYM-1445100-01	NO	SYM-9615010-REA 6006	NO	SYM-1471110/20
					
NAME	Clutch spring compressor	NAME	Tappet adjusting wrench	NAME	Oil seal driver 45*65*10
NO	SYM-2301000-L4A	NO	SYM-9001200	NO	SYM-9125500-L4A
					
NAME	Crank Shift Oil Seal Driver 35*55*7	NAME	PULLEY DRIVEN FACE OPENER	NAME	Drive Shaft 25*40*7 Oil Seal Drive
NO	SYM-9120900-L4A	NO	SYM-2321000-REA	NO	SYM-9120200-L4A
					
NAME	Inner bearing puller	NAME	Inner Bearing Driver	NAME	Outer bearing puller
NO	SYM-6204022	NO	SYM-6204024	NO	SYM-6204010

					
NAME	Driven pulley bearing installer	NAME	Drive shaft bearing installer	NAME	Counter shaft bearing driver
NO	SYM-9100600-L4A DPB	NO	SYM-9100420-A6305	NO	SYM-9610000-L4A N1820
					
NAME	Clutch nut wrench	NAME	Universal holder	NAME	AC.G. FLYWHEEL PULLER
NO	SYM-9020200	NO	SYM-2210100	NO	SYM-3110000-HMA
					
NAME	Final shaft bearing installer	NAME	Water pump bearing installer	NAME	Balance shaft bearing installer
NO	SYM-9615000-L4A A6206	NO	SYM-1923100-L4A A6203	NO	SYM-1333200-L4A A6304
					
NAME	Water pump seal driver	NAME	Water pump mechanical seal driver	NAME	Water pump mechanical bearing driver N1010
NO	SYM-9120500-L4A	NO	SYM-1721700-H9A	NO	SYM-9100100-L4A

2. Maintenance Information

					
NAME	Crankshaft bearing install / remove tool	NAME	Crankshaft bearing install tool	NAME	Fuel pressure gauge
NO	SYM-9100310-L4A	NO	SYM-9100310-L4A	NO	SYM-HT07010
					
NAME	Vacuum pressure gauge	NAME	Cylinder pressure gauge	NAME	Vehicle circuit test tool kit
NO	SYM-HT07011	NO	SYM-HT07008	NO	SYM-HE170008
					
NAME	Vehicle circuit test harness kit	NAME	Efi System Diagnostic tool		Multi-meter
NO	SYM-HE170008-01	NO			SYM-HE07007-01

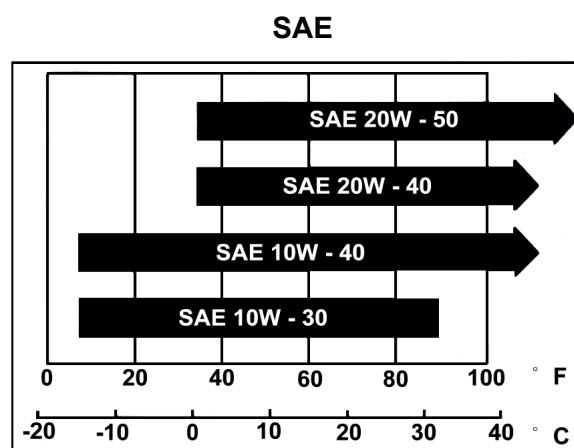
Precautions in Operations	3-1	Oil Pump Inspection.....	3-4
Troubleshooting.....	3-1	Oil Pump Reassembly.....	3-4
Engine Oil	3-2	Oil Pump Installation.....	3-5
Oil Pump Removal	3-3	Gear Oil	3-6
Oil Pump Disassembly	3-3		

Precautions in Operation

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

Specifications

Engine oil quantity	Disassembly : 2000 c.c. Change (with oil filter replaced) : 1900 c.c.
Gear oil	Change : 1800 c.c. Disassembly: 350 c.c. Change: 300 c.c.
Oil	Oil viscosity SAE 10W-40 API SJ (Recommended King serial oils)
Gear oil	Gear oil viscosity SEA 85W-140 (Recommended SYM Hypoid gear oils)



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 oil strainer	1.3~1.7 Kgf-m
Gear oil drain plug	1.1~1.4 Kgf-m
Gear oil inspection bolt	1.1~1.4 Kgf-m
Oil pump connection bolt	0.8~1.2 Kgf-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 in periodical
- Cylinder head gasket damage
- Piston ring worn out

3. Lubrication System



Engine Oil

Turn off engine, and park the vehicle in a flat surface with main stand.

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

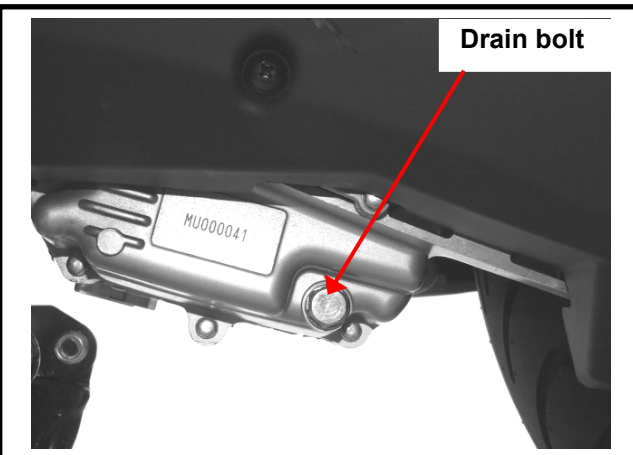
Drain oil as engine warmed up so that to make sure oil can be drained smoothly and completely.

Place an oil pan under the vehicle, and remove oil drain bolt.

After draining, make sure washer can be re-used. Install oil drain bolt.

Torque value: 1.1~1.5 Kgf-m

Fill out engine oil (oil viscosity SEA 10W-40).
Recommended using King serial oil.



Install dipstick, start the engine for running several minutes.

Turn off engine, and check oil level again.

Check if engine oil leaks.



Engine Oil Strainer Clean

Drain engine oil.

Remove oil strainer and spring.

Clean oil strainer.

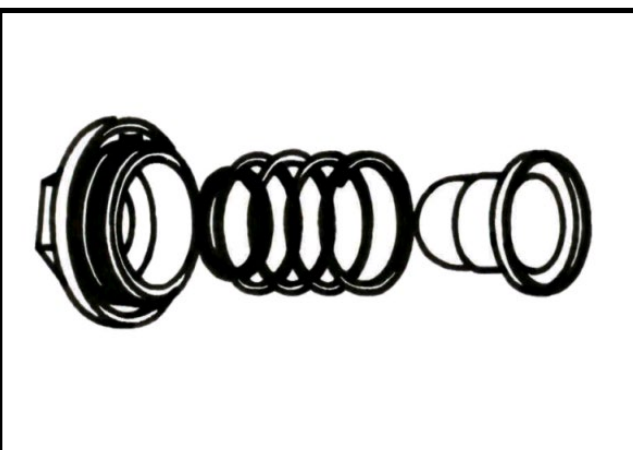
Check if O-ring can be re-used.

Install oil strainer and spring.

Install oil strainer cap.

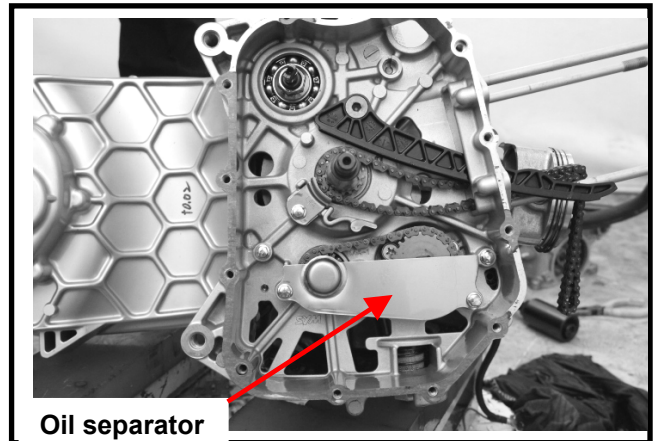
Torque value: 1.3~1.7 Kgf-m

Add oil to crankcase (oil viscosity SAE 10W-40)
Recommended using King serial oil.

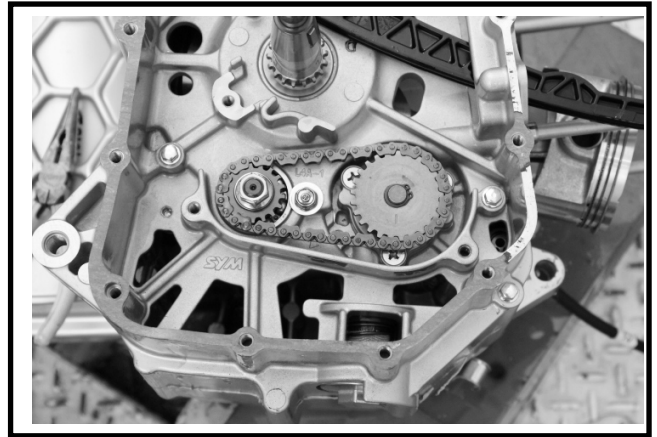


Oil Pump Removal

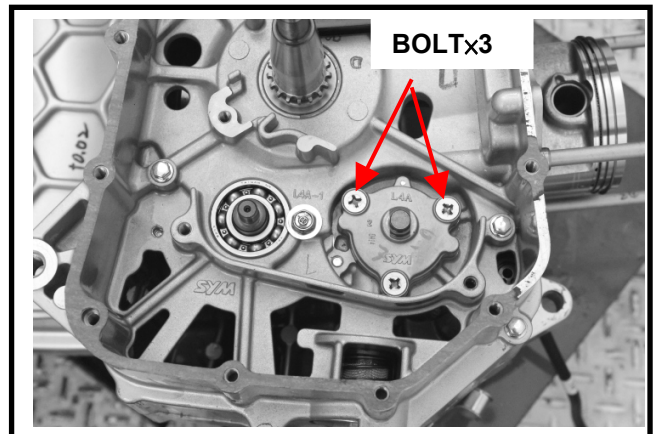
Remove generator and starting gear.
Remove the oil separator (bolt x 2).



Remove snap ring and take out oil pump driving chain and sprocket.
Torque value: 0.8~1.2 Kg-m
Make sure that pump shaft can be rotated freely.

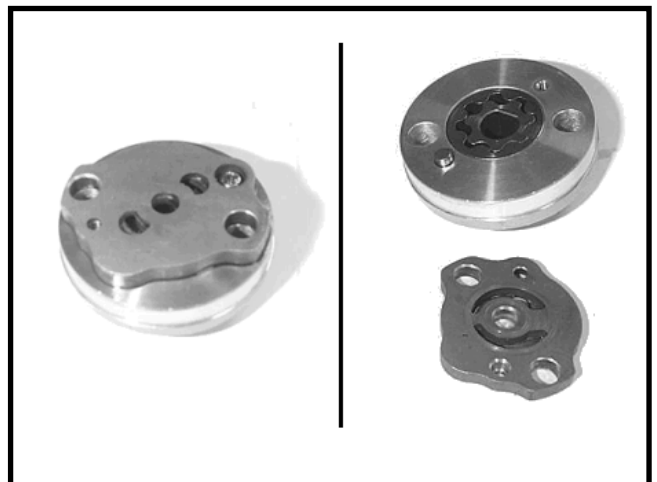


Remove 3 bolts on the oil pump, and then remove oil pump.



Oil Pump Disassembly

Remove the screws on oil pump cover and disassemble the pump as illustration shown.



3. Lubrication System

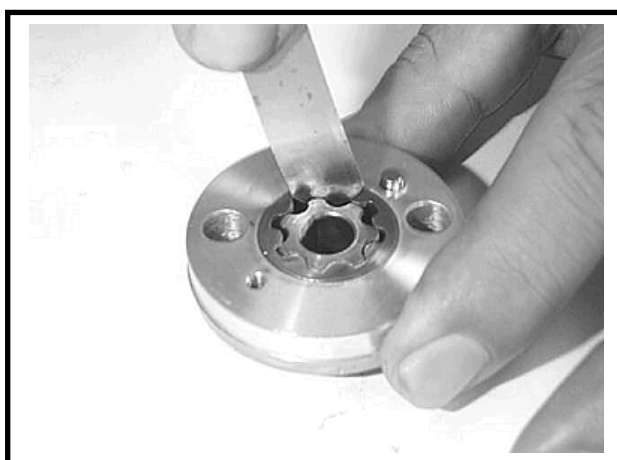


Oil Pump Inspection

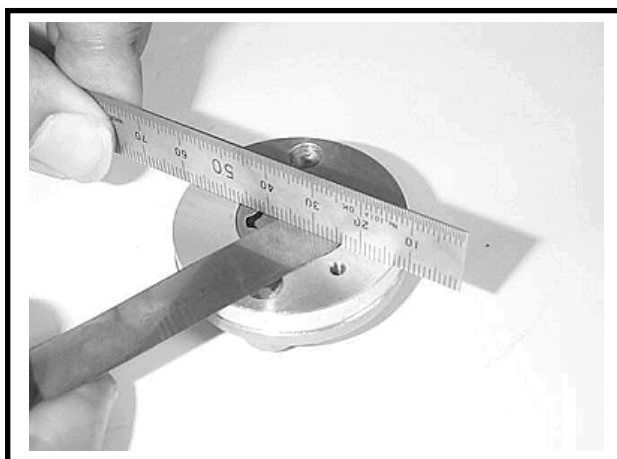
Check the clearance between oil pump body and outer rotor.
Limit: 0.25 mm



Check clearance between inner and outer rotors.
Limit: 0.20 mm

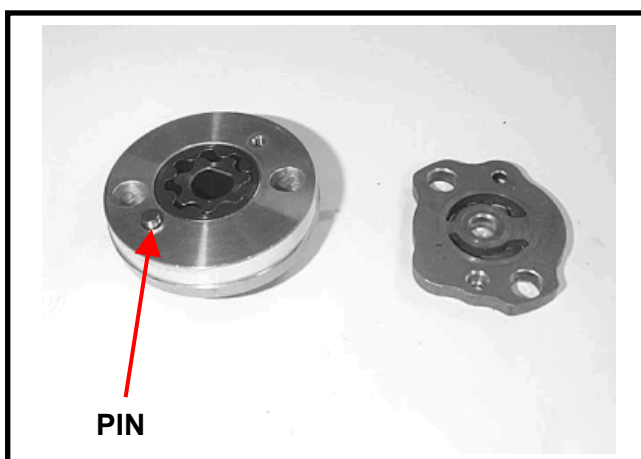


Check clearance between rotor side face and pump body
Limit: 0.12 mm

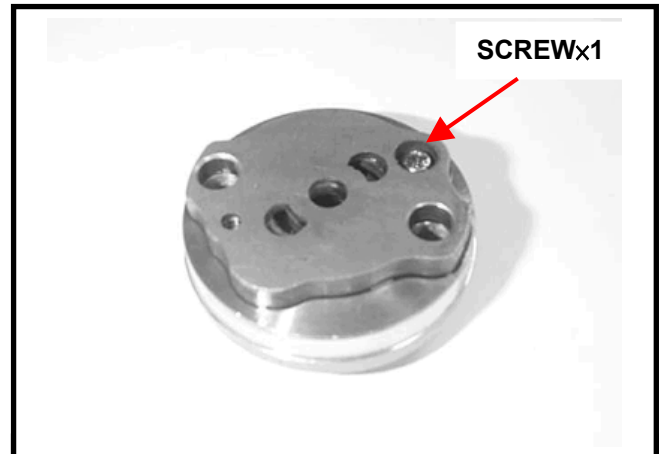


Oil Pump Reassembly

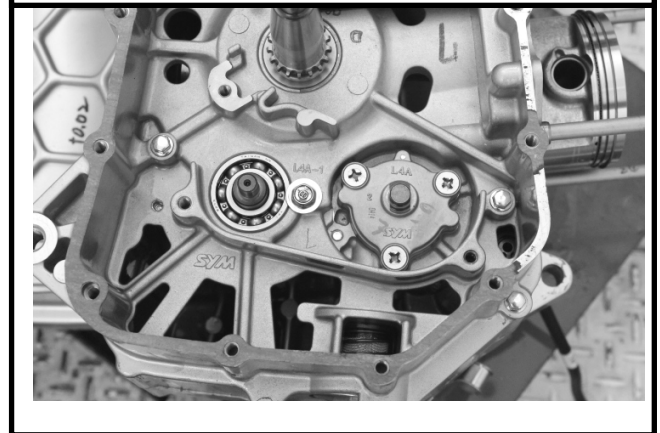
Install inner and outer rotors into the pump body
Align the indent on driving shaft with that of the inner rotor.
Install the driving shaft.
Install fixing pin.



Install the oil pump cover and fixing pin properly



Tighten screw
Make sure that oil pump shaft can be rotated freely.



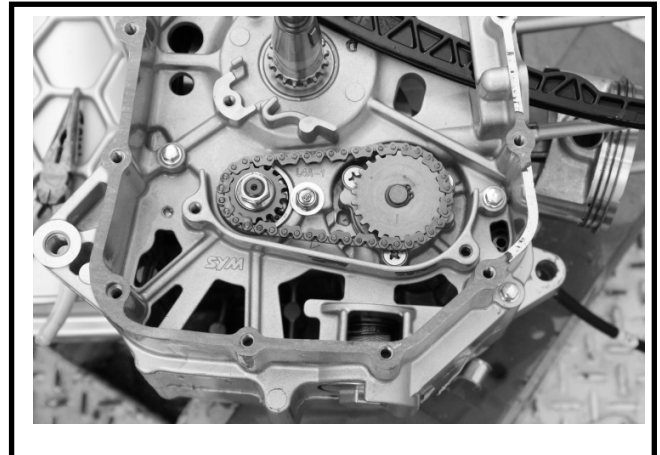
Oil Pump Installation

Install the oil pump, and then tighten bolts.

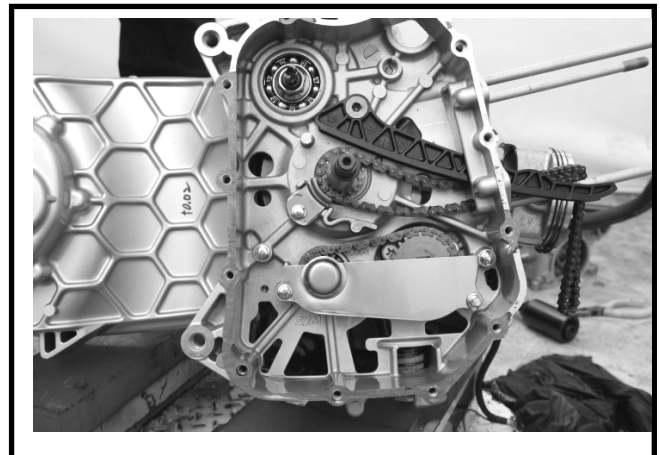
Torque value: 0.8~1.2 Kg-m

Make sure that oil pump shaft can be rotated freely.

Install oil pump driving chain and sprocket, and then install snap ring onto oil pump shaft.



Install starting gear and generator.



3. Lubrication System

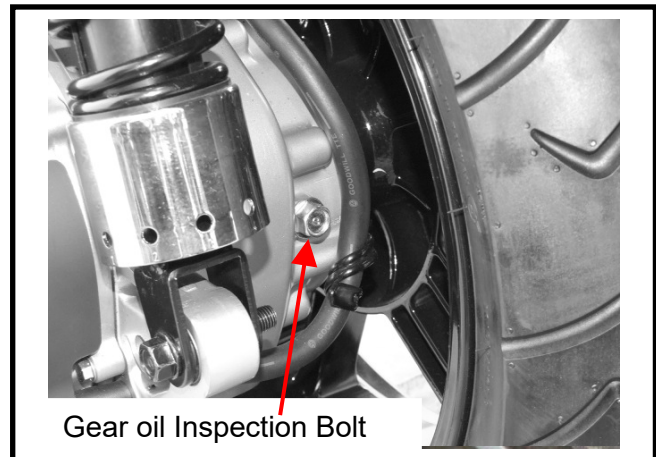


Gear Oil

Oil level inspection

Park the motorcycle on flat surface with main stand.

Turn off the engine and remove oil inspection bolt.



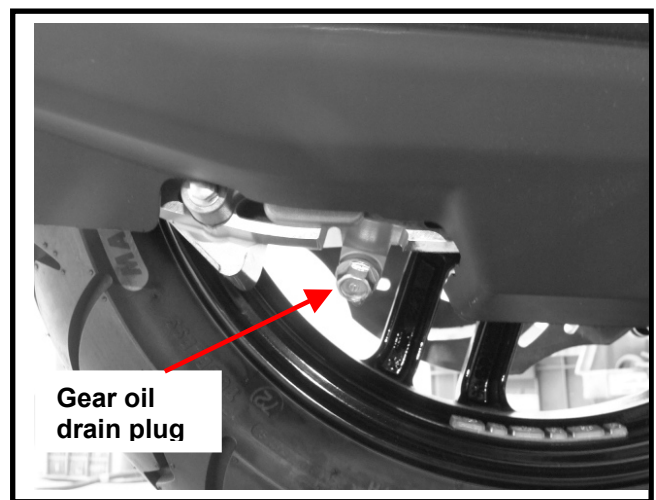
Gear lubrication oil quantity has to be measured with measurement device.

If oil level is too low, add gear oil.

Recommended using King serial oils.

Install oil inspection bolt.

Torque value: 1.0~1.4 Kgf-m



Gear Oil Change

Remove oil level inspection bolt.

Remove drain plug and drain oil out.

Install the drain plug after draining.

Torque value: 1.0~1.4 Kgf-m

Make sure that the drain plug washer can be reused.

Add oil to specified quantity from the inspection hole.

Gear Oil Quantity: 300 c.c. when replacing it.

Make sure that the bolt washer can be re-used, and install the bolt.

Start engine and run engine for 2-3 minutes.

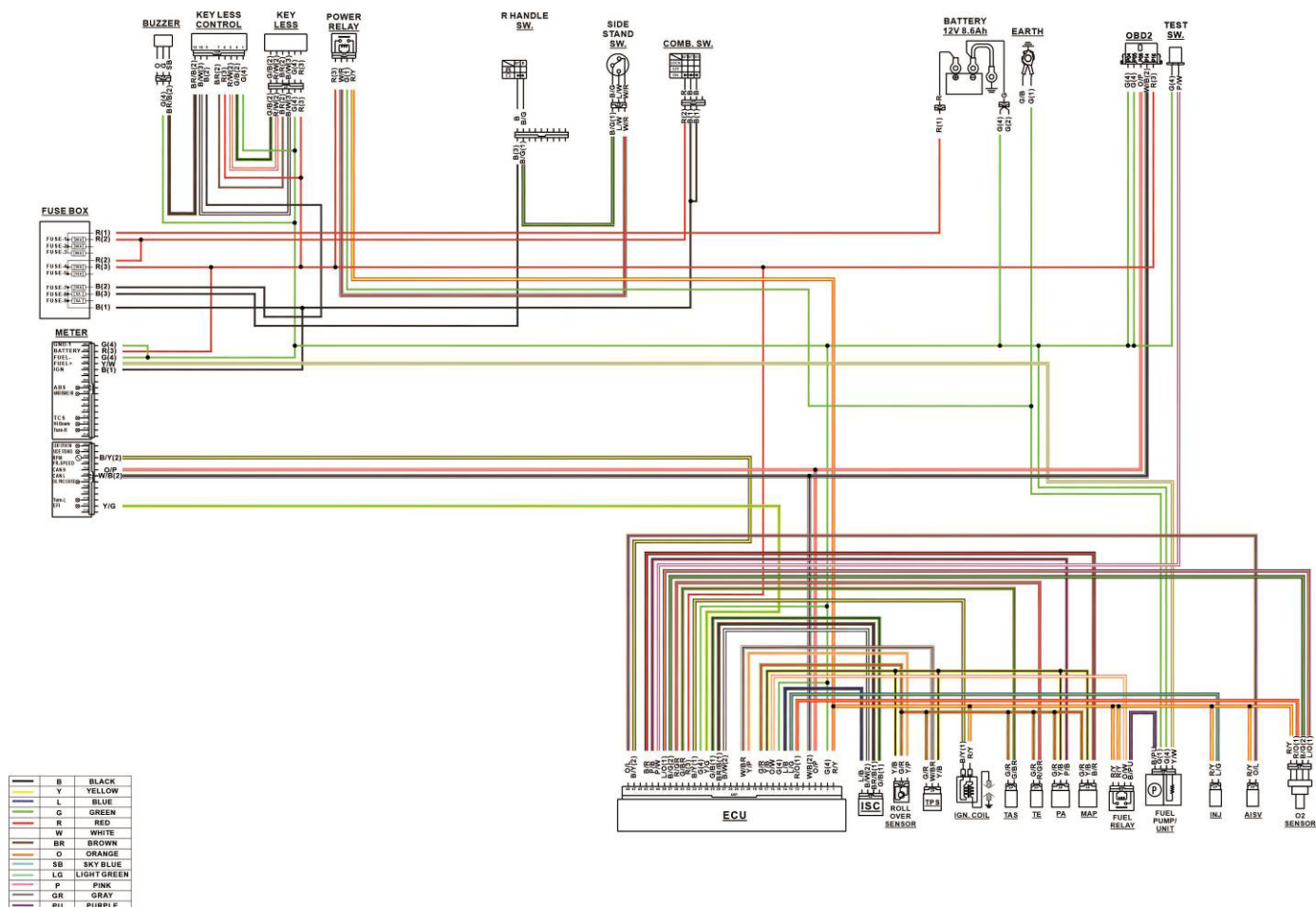
Turn off the engine and make sure that oil level is in correct level.

Make sure that no oil leaking.

4. Fuel Injection System

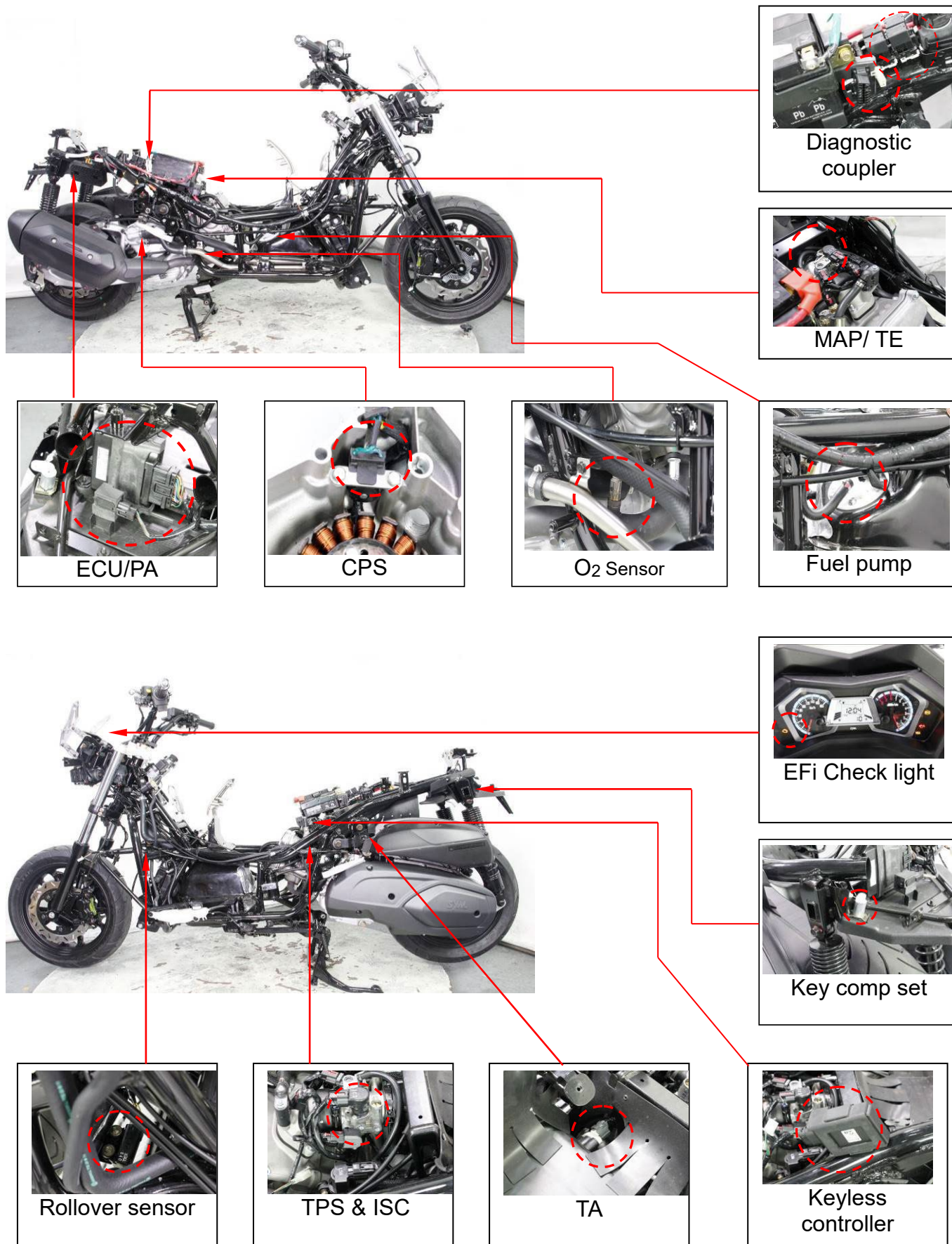
EFi System Components	4-1	EFi System Circuit	4-29
EFi System Vehicle Configuration	4-2	ECU Pin Configuration	4-30
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EFi System Components



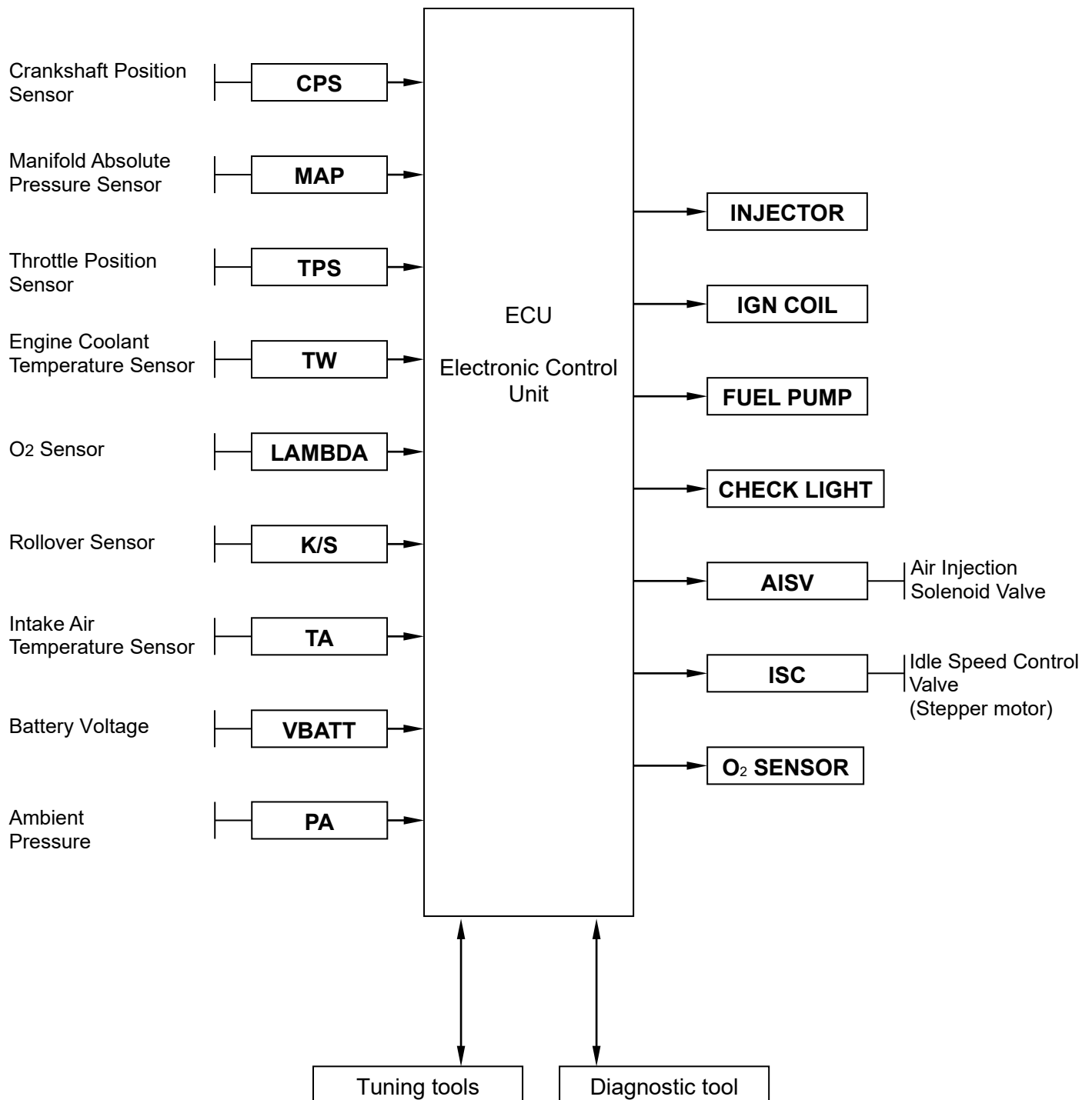
4. Fuel Injection System

EFi System Vehicle Configuration





EFI System Operation



4. Fuel Injection System

EFI System Introduction

Based on 4-stroke SOHC engine, displacement 399 c.c. for LZ40 electronically controlled fuel injection, fuel vapor absorbed by activated carbon canister. The engine burns off the blow-by fuel-gas in the crankcase through the fuel-air separating device. The O₂ sensor enhances the efficiency of the catalytic converter, by dynamically controlling the Fuel/Air ratio.

Electronic Fuel Injection Devices

Consist of fuel supply devices: fuel tank, fuel pump, fuel filter and fuel pressure regulator. And fuel control devices: fuel injector and ECU.

The fuel is pumped from electrical fuel pump in the fuel tank, to the injector on the inlet pipe. The fuel pressure regulator keeps the fuel pressure around 294 ± 6 kPa. The signals from ECU enable the injector to spray fuel into the combustion chamber once every two crankshaft revolutions. The excessive fuel flows back to the fuel tank through the fuel pressure regulator. Fuel pump is placed within the tank to reduce the working noise, and the complicity of fuel pipes. Electronically controlled ignition and injection system effectively reduce the fuel consumption rate and pollution.

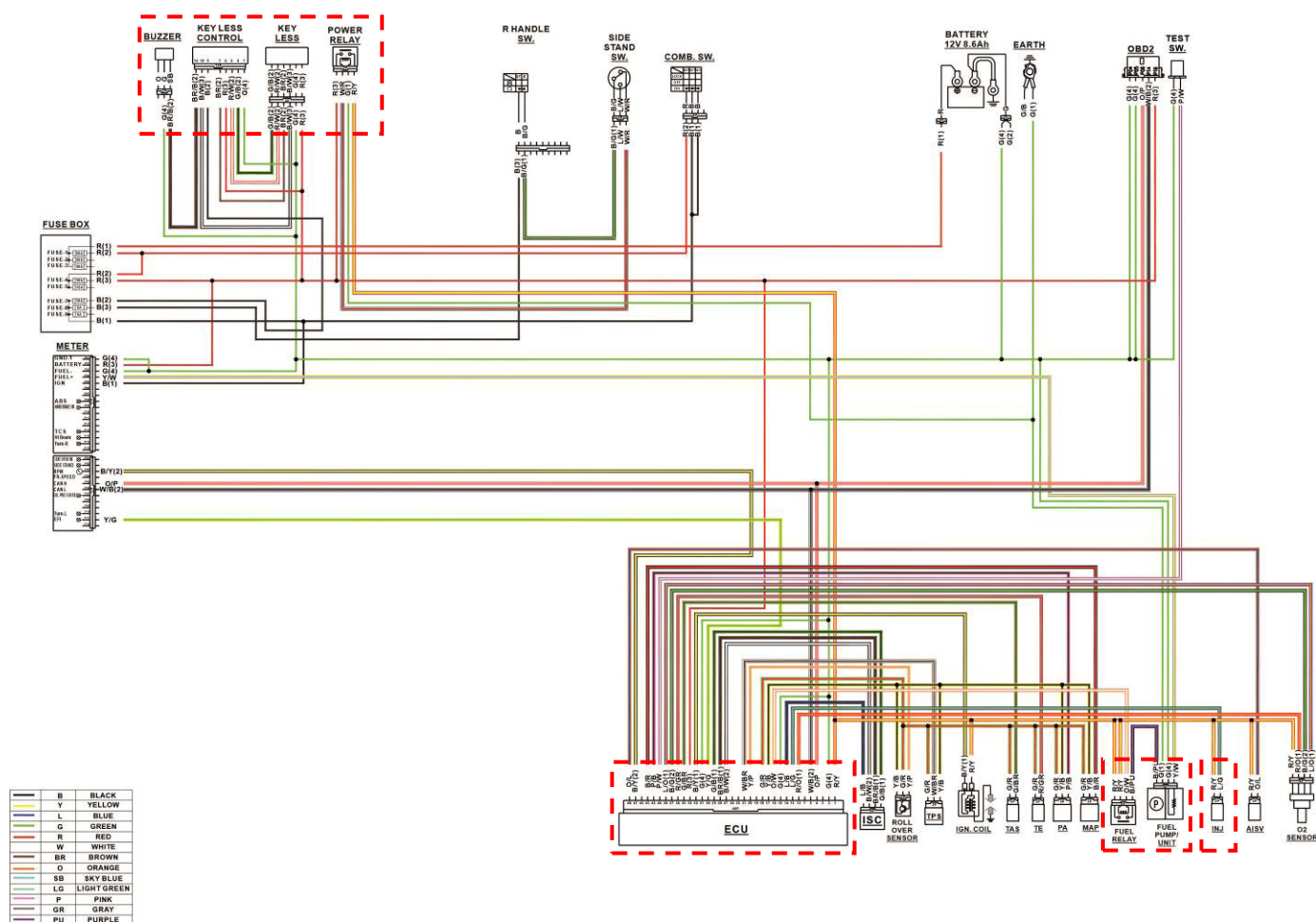
Electronic Fuel Injection System distributes the three major processes to three different devices:

1. MAP / TA sensor measures the air quantity and temperature and sends the signal to ECU as a reference.
2. ECU determines the amount of fuel to be injected, according to the default A/F rate.
3. ECU enables the injector to spray appropriate fuel amount. The independence of these three functions will raise the accuracy of the whole process.

EFI engine uses computer-programmed fuel injection, the main features are:

1. The quantity of fuel injected is decided according the condition of the engine. The engine RPM, and throttle position determines the fuel quantity and injection time-length. This throttle-controlled fuel injection is better responding and more accurate.
2. The quantity of fuel injection, and the determination of injection time length, are all controlled by 32-bit microcomputer.
3. The fuel pressure regulator maintains a 294 ± 6 kPa pressure difference between intake pipe and fuel pipe, raising the accuracy of fuel injection.
4. By measuring the air pressure of intake pipe, this system gives the vehicle better accommodation to the environment.
5. Idle air by-pass system supplies fuel and air to stabilize the idle running, and cold starting.
6. O₂ sensor feeds back the signal to minimize the exhaust pollution.

Fuel System



System Description

1. After Key-on, the sensors signal to be sent to the ECU. ECU controls the fuel pump relay to make the fuel pump operate. If the engine is not started, the fuel pump will be shut down within 3 to 5 seconds in order to save electricity.
Fuel pressure regulator maintains fuel pressure at $294 \pm 6\text{kPa}$ (about 3 kg / cm^2). According to the operating conditions and environmental compensation coefficient, appropriate fuel will be injected. After Key-off or engine stopped operating, the fuel pump stops running.
2. Fuel impurities filtered by the fuel filter should be cleaned regularly.
3. When the engine cannot be started, do not keep start motor running continuously which may lead to lack of battery power (less than 10 V) and the fuel pump will not be able to operate. The correct way is to use a new battery.

Injector

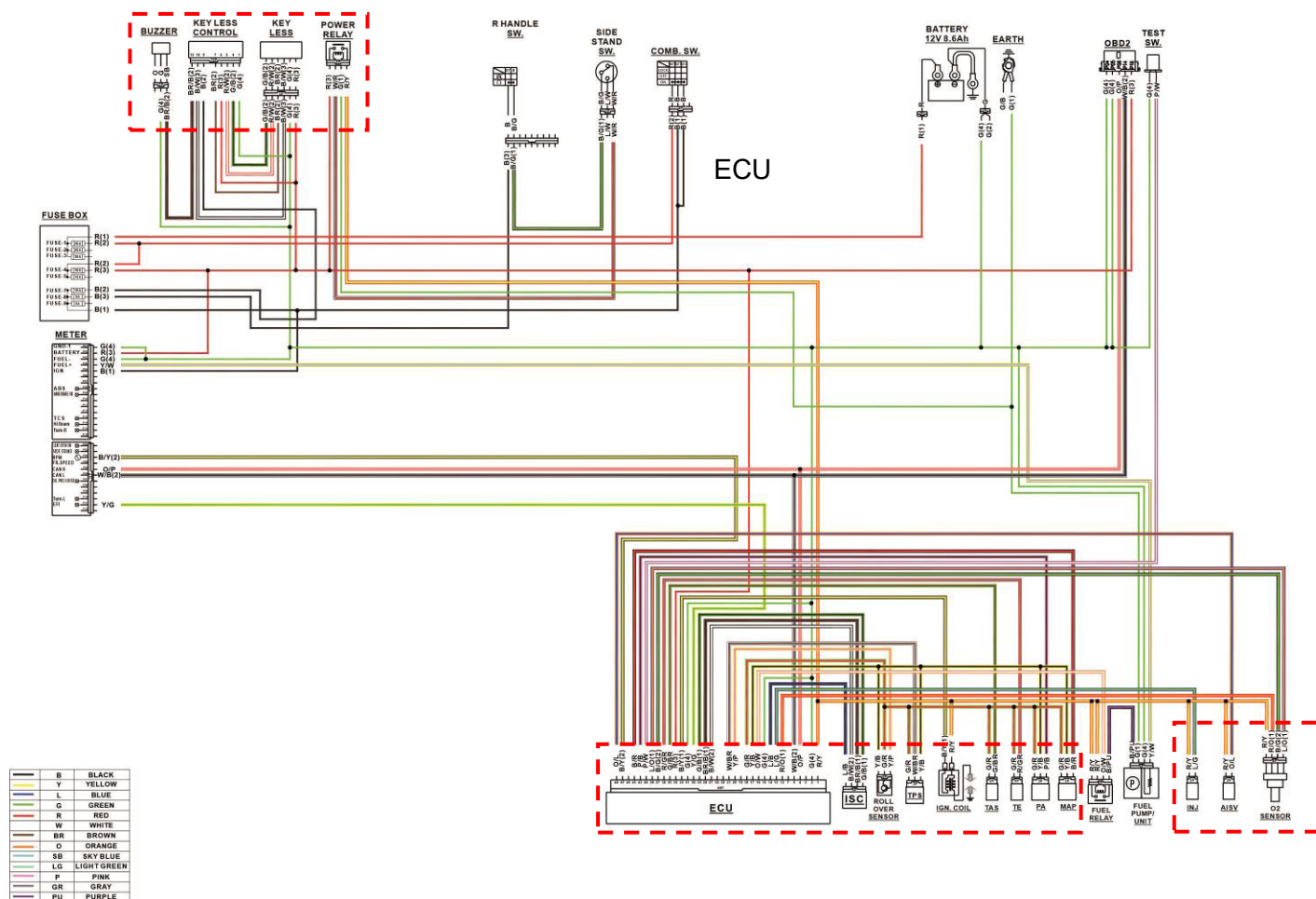
Injector enhances the effect of fuel atomization, and reduces HC emissions. Short-type injector cap can easily fix the injector, receive the fuel from the fuel pump, and limit injector rotation sliding. The signals from ECU control the fuel pressure regulator, using the diaphragm and spring to maintain the fuel pressure in $294 \pm 6\text{kPa}$ (about 3 kg / cm^2), and determine the fuel injection quantity by adjusting injection time width under different engine conditions.

Fuel Pump

Electrical fuel pump is placed inside the fuel tank, powered by the battery and controlled by ECU. Fuel pressure: $294 \pm 6\text{kPa}$ (about 3 kg / cm^2)

4. Fuel Injection System

Ignition System



Principle

The computer programmed ignition system receives the signals from the Crankshaft position sensor, Throttle position sensor, O₂ Sensor, MAP sensor, Intake air temperature sensor, Engine coolant temperature sensor. Calculating the engine RPM, the microcomputer determines the appropriate ignition timing, controls the ignition coil and triggers the spark plug. This way can not only make the engine achieve the maximum power output, but also help improve fuel consumption rate.

Specifications

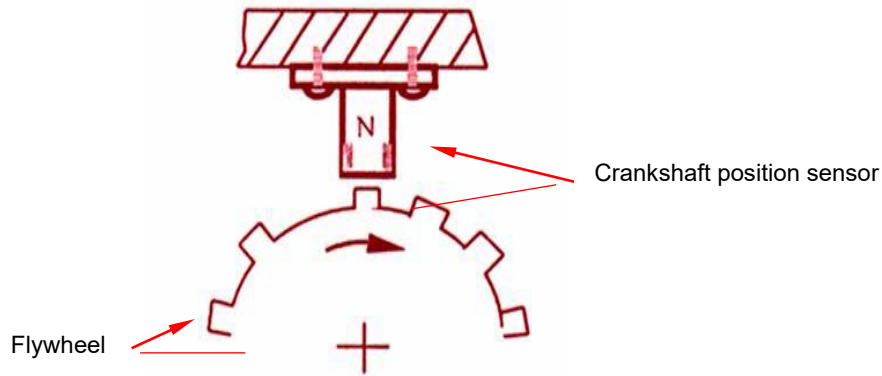
1. Ignition timing: BTDC 10 ° / 1650RPM
2. Spark plug: NGK CPR8EA-9 Clearance: 0.8 to 0.9 mm
3. ACG crankshaft position sensor coil resistance: 120Ω ± 20% (20 ° C) (G/ W - L/ Y)
4. Ignition coil primary circuit resistance: 2.8 Ω ± 15% (20 ° C) (R/Y - B/ Y)
5. Battery Type / Capacity: TTZ10S / 12V 8.6Ah

Sensors / Drivers

Crankshaft Position Sensor (CPS)

Function

Detect the teeth sequence on the flywheel, and transmit the voltage (signal) to ECU.



Description

Right after the engine is started; the crankshaft position sensor identifies the TDC position by detecting the empty tooth on the flywheel and ignites at the fixed angle. When the engine RPM reaches the specified speed, the ignition timing will change to the software mode.

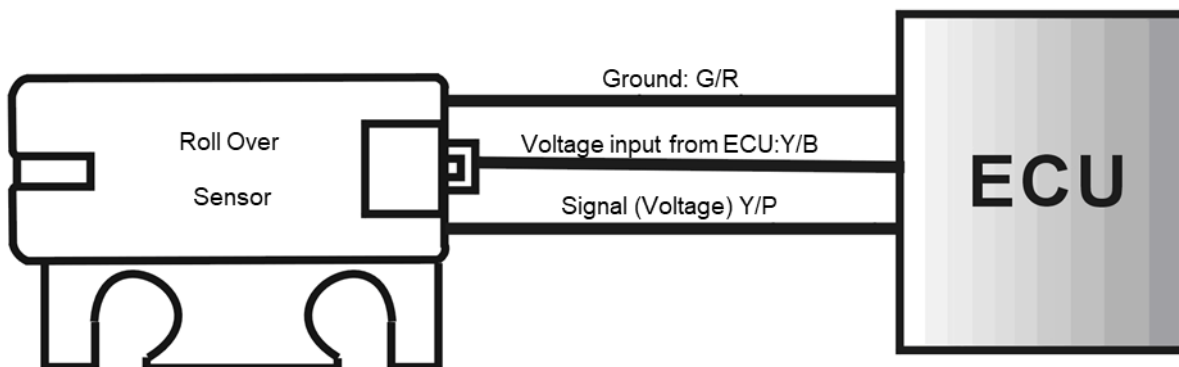
Rollover sensor

Function

A security equipment that informs ECU to shut the engine when the scooter is fell over.

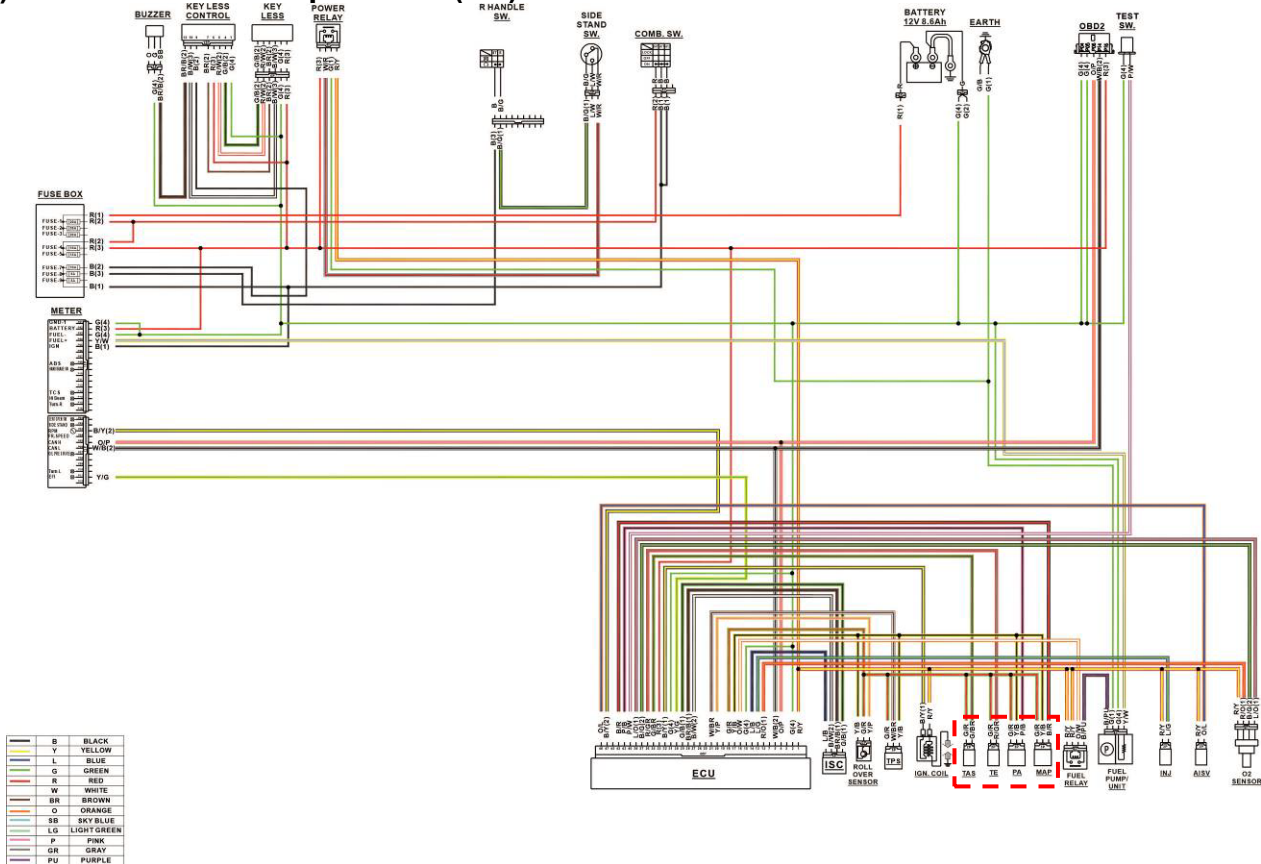
Description

The pendulum-type rollover sensor will cut off the power supply of ECU. Main switch should be turned Key-on again before the engine can be restarted.



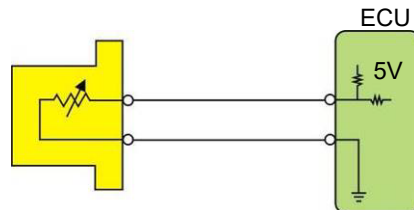
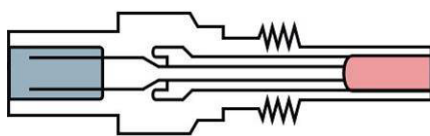
4. Fuel Injection System

Manifold Absolute Pressure (MAP) / Coolant Temperature (TE) / Intake Air Temperature (TA) Sensors / Ambient pressure (PA)



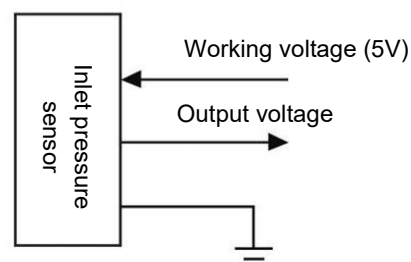
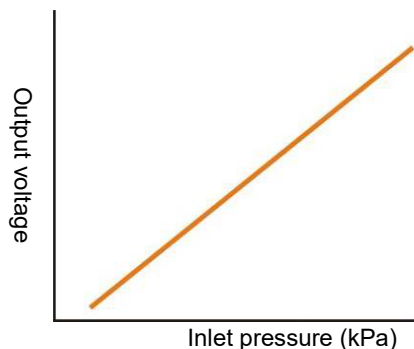
Coolant temperature / Intake air temperature sensor

Use the variable resistor of negative temperature coefficient (thermistor) to sense the outside temperature. The electrical resistance value goes down when the temperature rises. On the contrary, the electrical resistance value becomes higher when the temperature falls. Sensors provide the temperature of the engine coolant and intake air to ECU to determine the injection and ignition timing.

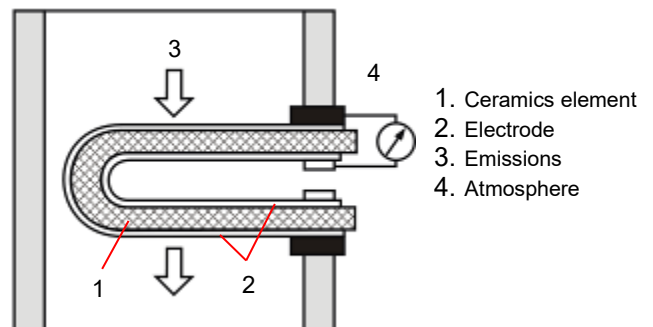
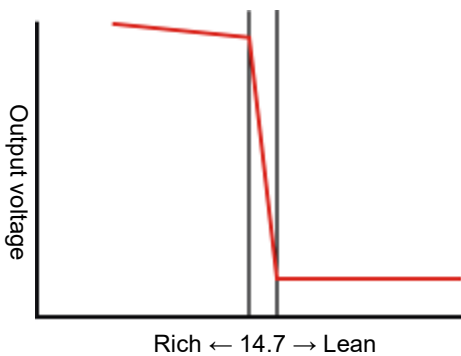
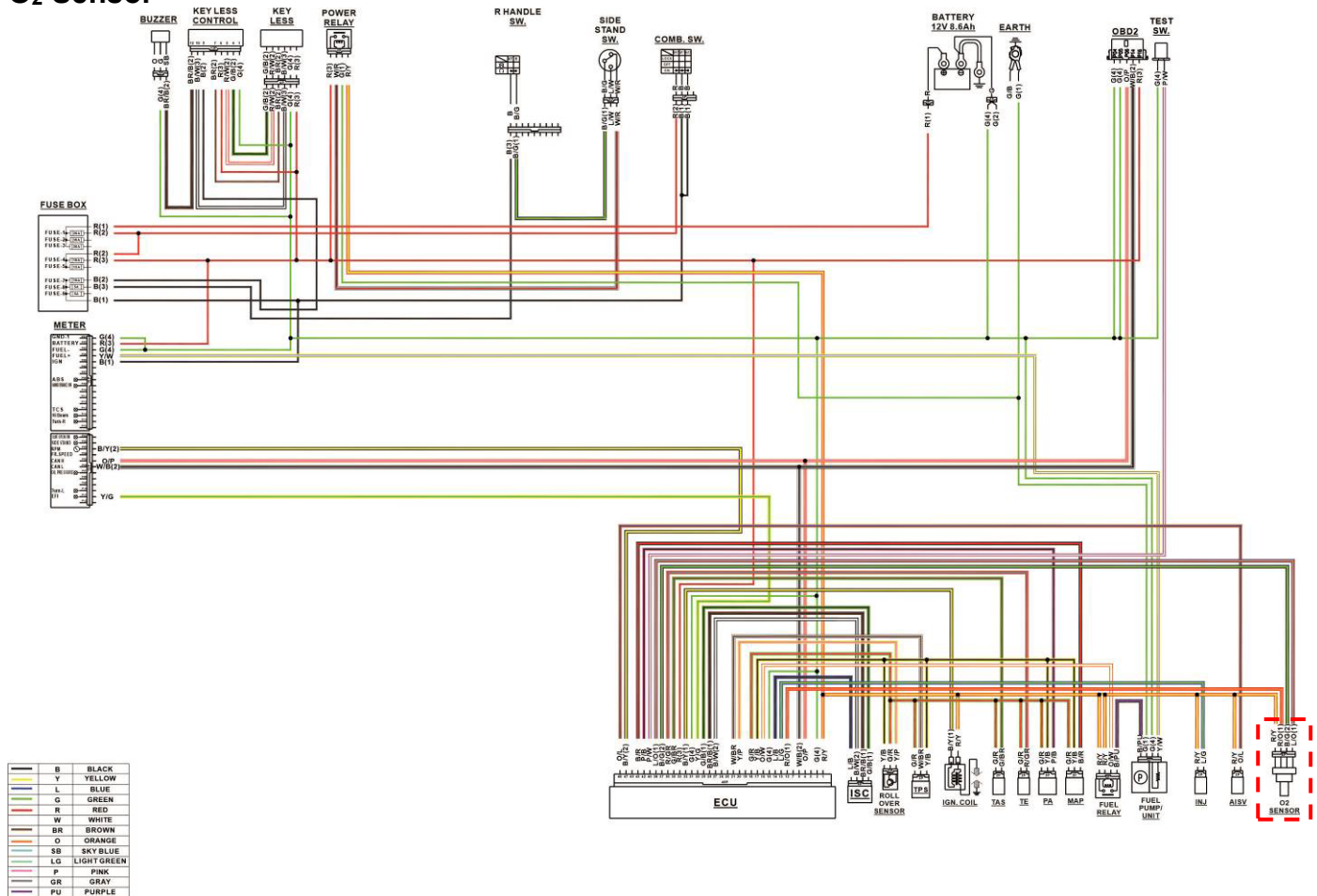


Manifold absolute pressure sensor

Manifold absolute pressure sensor (MAP Sensor) uses the piezoresistive resistor composed of silicon diaphragm, forming the Wheatstone bridge circuit to measure the atmospheric pressure and the intake manifold pressure, which are both transmitted to ECU for reference of engine control.



O₂ Sensor



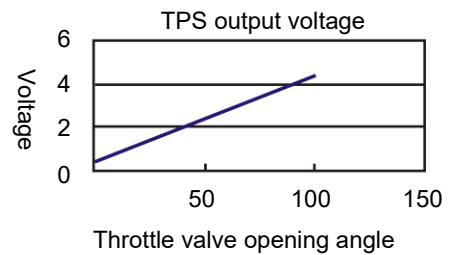
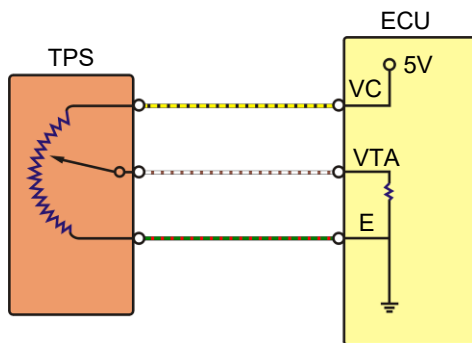
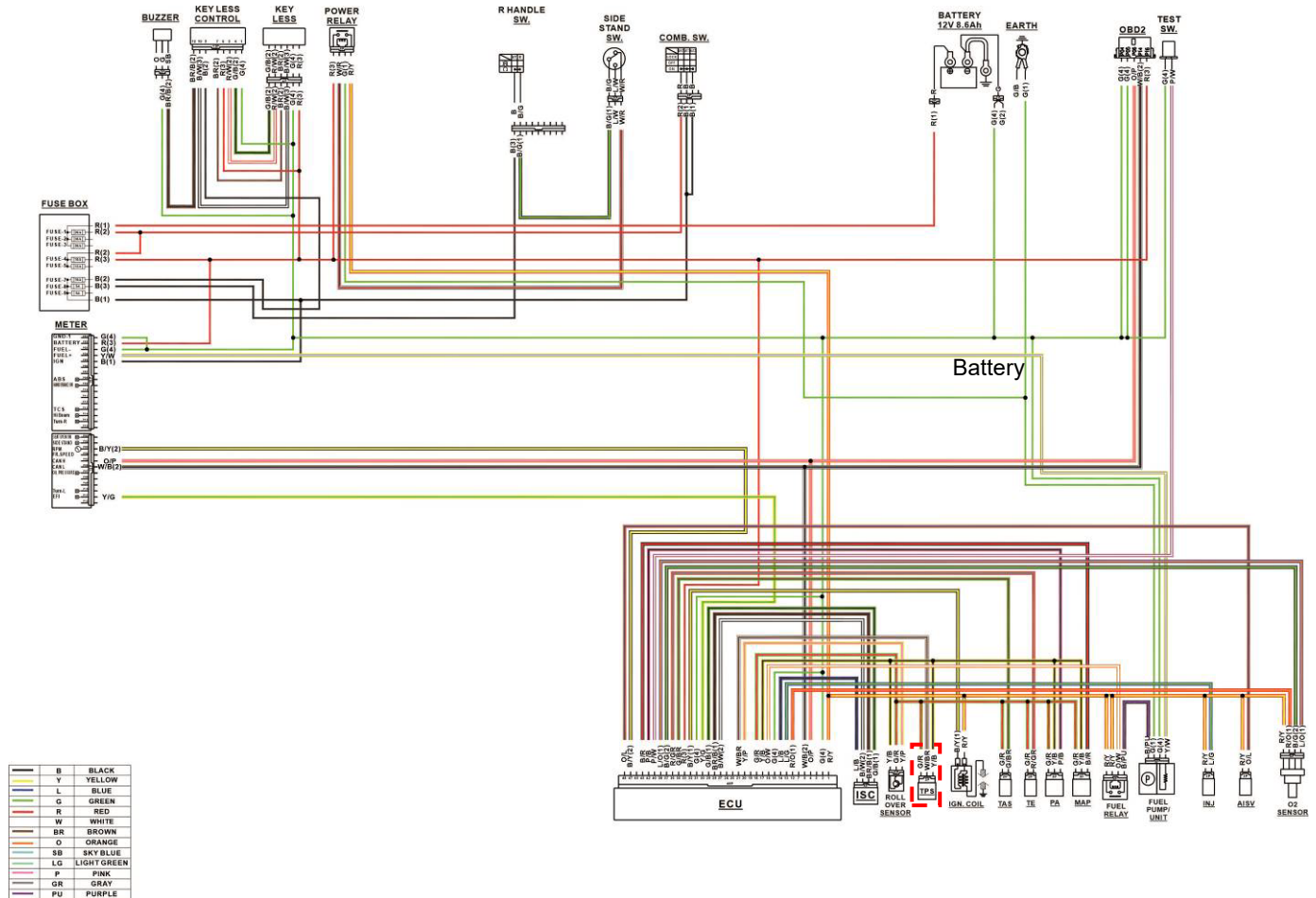
Function

O₂ Sensor measures the proportion of oxygen in the exhaust gas, sending signals to ECU which adjusts the air-fuel ratio by changing the fuel injection time. If the proportion of oxygen is too low, it means the rich air-fuel mixture with higher HC & CO concentration in the exhaust gas. If the proportion of oxygen is too high, it means the lean air-fuel mixture with higher temperature and higher NO_x concentration.

1. O₂ Sensor outputs feedback signal to ECU which keeps the air-fuel mixture near the stoichiometric ratio approximately 14.6 and forms the closed loop control system.
2. When the air-fuel mixture is near the stoichiometric ratio, CO / HC / NO_x are converted most efficiently.
3. O₂ Sensor produces a rapidly fluctuating output voltage between approximately :1500 ~ 2500 mV

4. Fuel Injection System

Throttle Position Sensor (TPS)



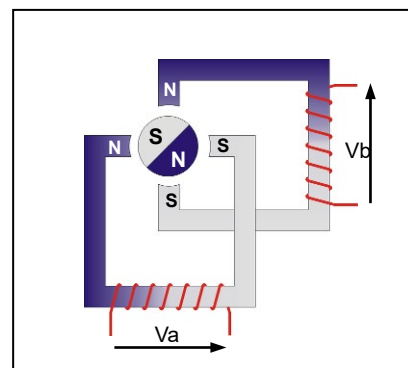
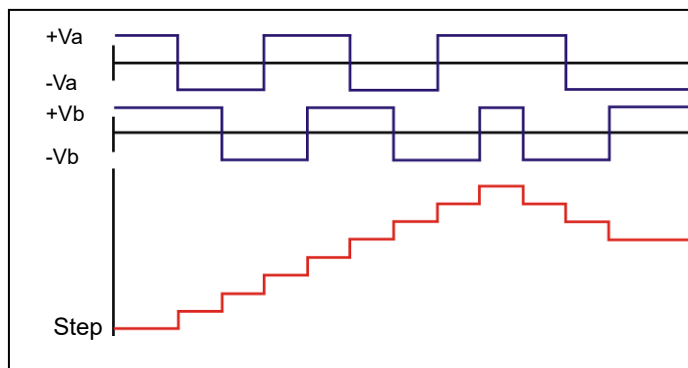
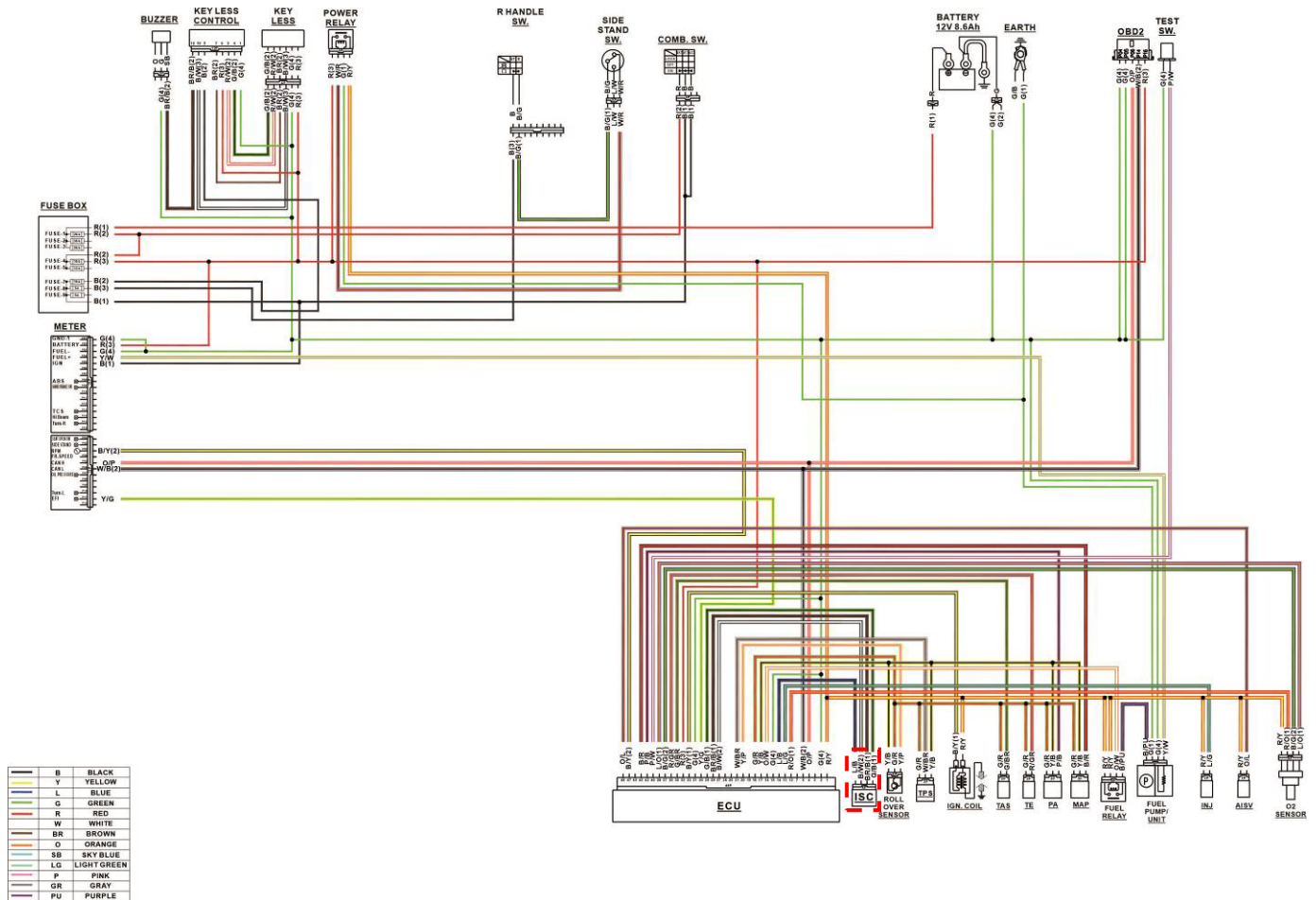
Basic Principle

TPS is a rotary variable electric resistor. When it is rotated, both electric resistance and voltage value change, determining the throttle position.

Function

TPS determines the throttle valve position and sends signal to ECU as reference of engine control.

Idle Speed Control Valve (ISC stepper motor)



Function

ECU controls ISC stepper motor to adjust the bypass intake air quantity and stabilized the engine idle speed.

4. Fuel Injection System

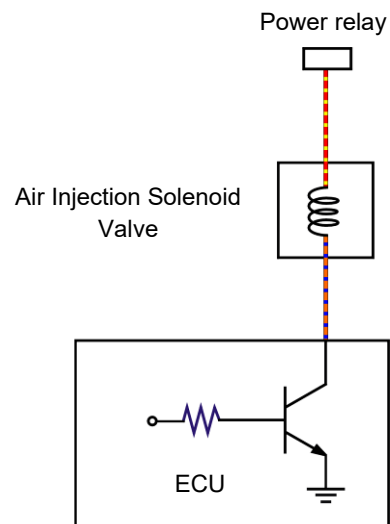
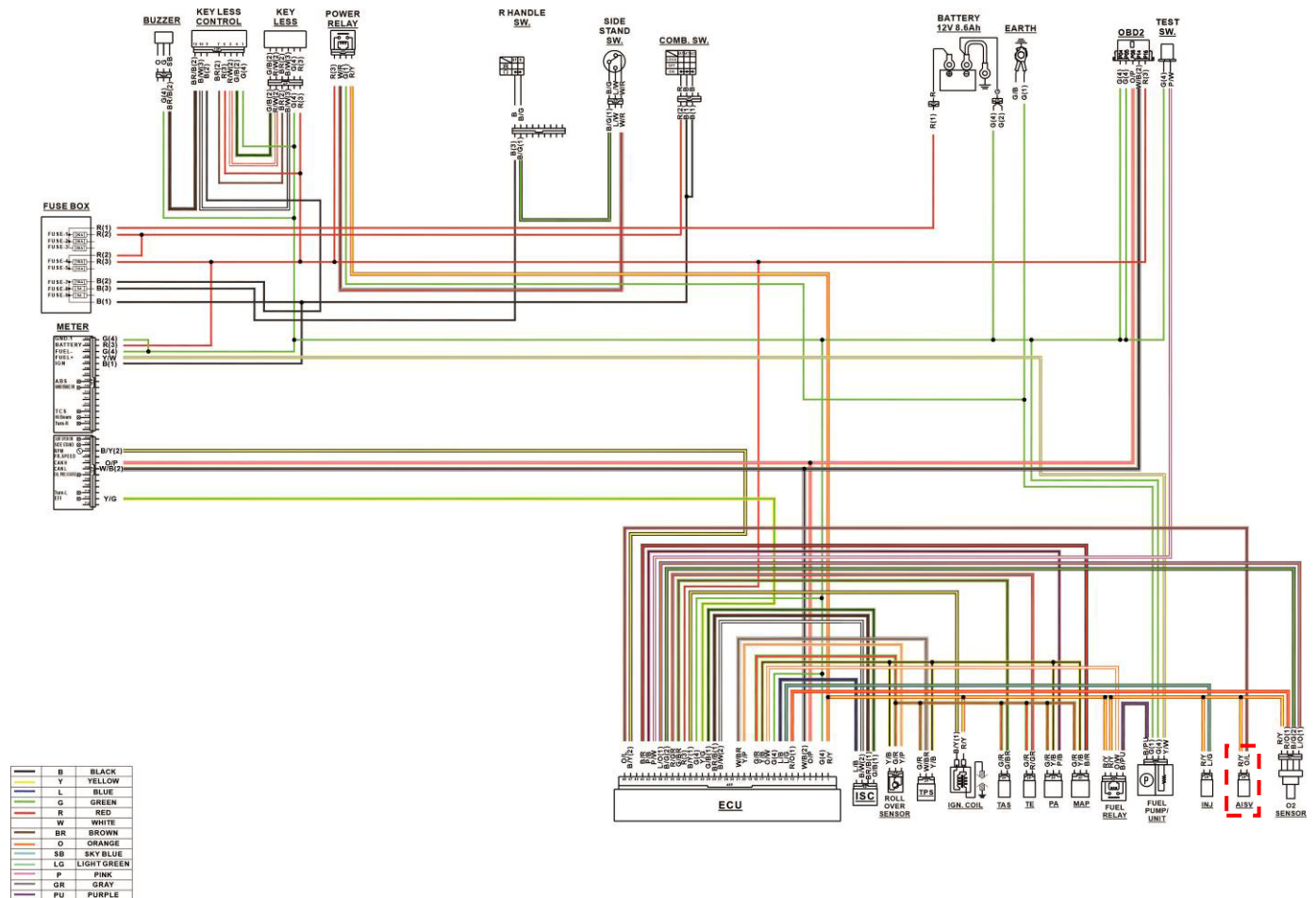
Air Injection Solenoid Valve (AISV)

Function

AISV introduces appropriate air quantity to reduce pollutant emission.

Basic Principle

When the engine speed and throttle opening are higher than the default value, ECU controls AISV opening or closure.





Precautions in Operation

General information

Warning

- Gasoline is a low fire point and explosive material. Always work in a well-ventilated place and flame is strictly prohibited when working with gasoline.
- Before dismantling fuel system parts, leak fuel out first, or grip the fuel pipe by using pliers to prevent fuel from splashing.

Cautions

- Do not bend or twist the throttle cable. Damaged cable will lead to unstable driving.
- When disassembling fuel system parts, pay attention to O-ring position, replace with new one as re-assembly.

Method of releasing fuel pressure:

Remove the fuel pump relay, and turn on the engine till it shuts down due to exhausted of fuel.

Specification

Item	Specifications
Engine idle speed	1650±150 rpm
Throttle handle free play	5~10 °
Fuel pressure	294±6kPa (about 3.0kg/cm ²)

Torque value

Engine Temperature sensor 0.74~0.88 kgf-m

O₂ Sensor 3.6~4.6 kgf-m

Special Tools

Vacuum Gauge

Fuel Pressure Gauge

EFi System Diagnostic Scanner

Fuel Pipe Pliers

4. Fuel Injection System

EFI System Components Description

ECU (Electronic Control Unit)



Functional Description

- Powered by DC 8~16V, and has 48-pin socket on the unit.
- The hardware component consists of a microcomputer that is its control center. It contains the functional circuit interface of engine condition sensing and the driving actuator for the fuel injector, fuel pump, as well as ignition coil.
- Its major software is a monitor strategy operation program that includes controlling strategy and self-diagnosis programs.

Testing Procedures

1. Connect the diagnostic scanner with CAN bus box to the diagnostic coupler on the vehicle.
2. Key-on but not to start engine, confirm ECU and the diagnostic scanner can be connected or not.
3. Diagnostic scanner will automatically display Version "certification" of the screen.
4. Confirm the application model, version is correct or not.
5. Check if the fault codes exist.
6. Remove the fault codes.
7. Start engine and check the parameters which shown on the diagnostic scanner.

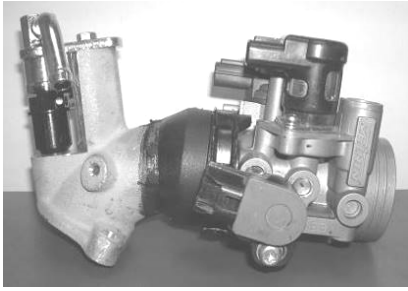
Detection judge

- Fault codes can be read and cleaned, and the fault codes will not appear again after re-start.

Treatment of abnormal phenomena

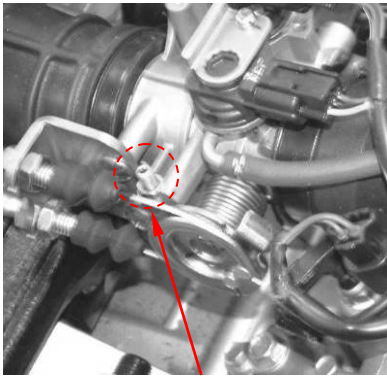
1. Disconnected→ First, check whether the cartridge is correct and ECU is normal or not.
2. Unable to start→ ECU or relevant parts abnormal. Re-confirm after the replacement of abnormal parts.
3. Fault codes appear→ ECU or relevant parts abnormal. Troubleshoot and re-confirm.

Throttle Body



Functional Description

- Throttle body is the inlet air flow regulating device (similar to the carburetor).
- Throttle valve pivot drives the throttle position sensor synchronously and makes ECU detect the throttle opening immediately.
- Throttle valve positioning screw has been adjusted and marked on the production line. Readjustment is not suggested.



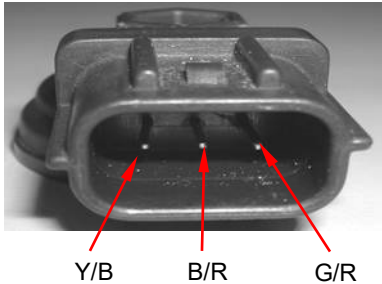
Throttle positioning screw

Treatment of abnormal phenomena

- If all fuel injection associated components identified no adverse, and other traditional engine components are also normal, the engine is still not smooth, please confirm whether the throttle body coke serious.
- If coke serious, please clean throttle body, and then adjust the injection system.

4. Fuel Injection System

Manifold Absolute Pressure (MAP)



Functional Description:

- Powered by 5V DC from ECU. It has 3-pin sockets on the sensor. One terminal is for power, and 1 terminal are for signal output. And, the rest one is for ground.
- The major component of the intake pressure sensor is a variable transistor IC. Its reference voltage is DC 5V, and output voltage range is DC 0~5V.
- It is a sensor by sensing pressure, and can measure the absolute pressure in intake process. It also conducts fuel injection quantity correction based on environmental position level.

Pin	Wire color	Function
Left	Y/B	5V voltage input
center	B/R	Signal output
Right	G/R	Ground

Testing Procedures:

1. Inlet pressure sensor connector to properly (using the probe tool).
2. Open the main switch, but not to start engine.
3. Use "voltage meter" DC stalls (DCV) to check inlet pressure sensor voltage.
4. Confirmed working voltage:
 - Voltage meter negative access to the inlet pressure sensor pin (G/R).
 - Voltage meter positive access to the inlet pressure sensor pin (Y/B).
5. Confirmed plains output voltage values:
 - Voltage meter negative access to the inlet pressure sensor pin (G/R).
 - Voltage meter positive access to the inlet pressure sensor pin (B/R)

⚠ Cautions

- Attentions to the tools required close to the probe wire waterproof apron penetrate skin and internal terminal before measurements to the correct value.



Working voltage measurement



Output voltage measurement
plains

Detection judge:

- Working voltage value: $5.0 \pm 0.1V$
- Plains output voltage values: $2.9 \pm 0.03V$ (Conditions: In the plains 101.3 kPa Measurement)

⚠ Cautions

- The higher the altitude, the measurement value to the lower voltage.
- Sea-level atmospheric pressure = 1Atm = 101.3kPa = 760mmHg = 1013mbar

Treatment of abnormal phenomena:

- Inlet pressure sensor damaged, or poor contact couplers.
- Check whether the abnormal wire harness lines.
- Inlet pressure sensor anomaly, the proposed replacement of the sensor to measure the output voltage.
- ECU anomaly, the proposed replacement of the ECU to measure the working voltage.

Intake Air Temperature (TA)



Functional Description

- Use ECU DC 5V power supply provided, has the two-pin coupler, a voltage output pin; another one for a grounding pin.
- Its main component is a negative temperature coefficient (resistance temperature rise smaller) thermistor.
- Installed in the air cleaner on the intake temperature sensor within the resistance, with the induction to the temperature change, and converted into voltage signals sent to the ECU then calculated the temperature and, in accordance with the ECU temperature and state amendments injection time and ignition angle.

Testing Procedures

Resistance Value Measurement:

- Dismantled inlet temperature sensor connector.
- Use of the "Ohmmeter" Ohm stalls, inspection sensor resistance.

Detection judge

Resistance value and the temperature between relationships as follows

Temperature (°C)	Resistance value (KΩ)
-20	18.8 ± 2.4
40	1.136 ± 0.1
100	0.1553 ± 0.007



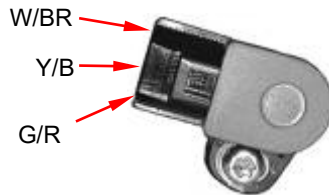
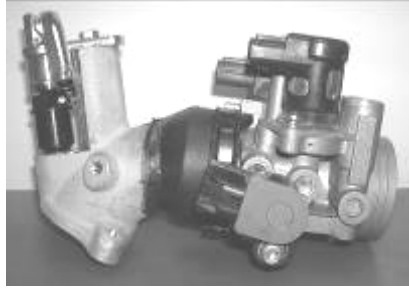
Resistance value measurement

Treatment of abnormal phenomena

- Temperature sensor damaged or connector poor contact.
- Check whether the abnormal wire harness lines.
- Temperature sensor anomaly, the proposed replacement of the temperature sensor.

4. Fuel Injection System

Throttle Position Sensor (TPS)



Functional Description:

- Use ECU provided DC 5V power supply, has the three-pin coupler, one for the power supply pin; one for a voltage output pin; one for a grounding pin.
- Its main component is a sophisticated type of variable resistor.
- Installed on the throttle body beside the throttle through (the accelerator) rotates, the output of linear voltage signal provided ECU perception and judgement then throttle position (opening), and in this signal with have the most appropriate fuel injection and ignition timing control.

Pins	Wire color	Function
Upper	W/ BR	Signal output
Center	Y/B	5V voltage input
Under	G/R	Ground



Working voltage measurement



Throttle output signal measurement - full closed



Throttle output signal

Testing Procedures:

1. Sensor connected properly (using the probe tool), or can be removed connector to voltage measurements (direct measurement).
2. Opened the main switch, but not to start engine.
3. Use "voltage meter" DC stalls (DCV) to check sensor voltage.
4. Confirmed working voltage:
 - Voltage meter negative access to the inlet pressure sensor pin (G/R).
 - Voltage meter positive access to the inlet pressure sensor pin (Y/B).
5. Throttle output signal recognition (using the probe tool)
 - Voltage meter negative access to the sensor pin (G/ R).
 - Voltage meter positive access to the sensor pin (W/BR).
 - Measurements were full throttle at full throttle closed the values of the output voltage.

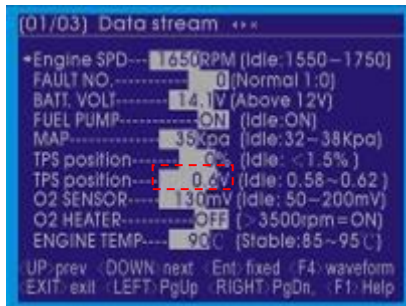


Cautions

- Attentions to the tools required close to the probe wire waterproof apron penetrate skin and internal terminal before measurements to the correct value.

Detection judge

- Working voltage value: $5.0 \pm 0.1V$
- Full throttle voltage value: $0.6 \pm 0.02V$
- Full throttle closed voltage value: $3.77 \pm 0.1V$



Throttle output signal measurement

Also, can be used for diagnosis tool confirm to the throttle output signal.

1. Connected to the "diagnosis tool", and open the main switch, but not to start engine.
2. "Diagnosis tool" screen switches to a "data analysis (01 / 03)" screen.
3. Rotations throttle and check voltages.

Treatment of abnormal phenomena:

- Throttle sensor damage or connector poor contact.
- Check whether the abnormal wire harness lines.
- Throttle sensor anomaly, the proposed replacement of the throttle sensor to measure the voltage.



Warning

- Throttle sensor prohibited removed from the throttle body to do any testing.

4. Fuel Injection System

Engine Coolant Temperature (TW)



Functional Description

- Powered by 5V DC from ECU. It has the two-pin socket on the sensor. One terminal is for power output, and 1 terminal are for ground.
- Its main component is a negative temperature coefficient (resistance temperature rise smaller) thermistor.
- Installed in the cylinder head, the engine temperature sensor resistance, with the induction to the temperature change, and converted into voltage signals sent to the ECU was calculated engine temperature, ECU accordance with the engine warm up to amendment the injection time and ignition angle.



Resistivity measurements

Testing Procedures

- Dismantled engine temperature sensor.
- Use of the "Ohmmeter" Ohm stalls, inspection sensor resistance.

Detection judge

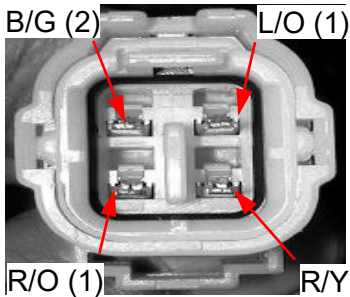
Resistance value and the temperature between relationships as follows:

Temperature (°C)	Resistance value (KΩ)
-20	18.8 ± 2.4
40	1.136 ± 0.1
100	0.1553 ± 0.007

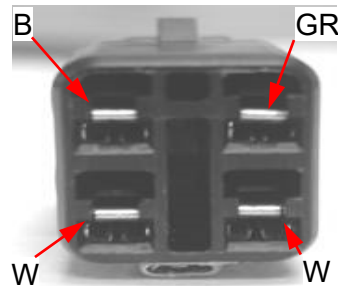
Treatment of abnormal phenomena:

- Temperature sensor damaged or couplers to poor contact.
- Check whether the abnormal wire harness lines.
- Temperature sensor anomaly, the proposed replacement of the temperature sensor.

O₂ Sensor



Working voltage measurement



Resistivity measurements

Functional Description

1. Powered by DC 8~16V, and has 4 terminals connector on the sensor.
 - 1st terminal is for power input;
 - 2nd terminal is for heating coil.
 - 3rd terminal is for ground, and
 - 4th terminal is for signal output.
2. O₂ sensor produces feedback signal to the ECU which keeps the air/fuel mixture ratio control in the vicinity of 14.5 ~ 14.7 to minimize emissions, which is referred to as fuel "closed loop" control.
3. When the air/fuel mixture ratio control in the near equivalent, CO / HC / NOx to have the highest conversion efficiency.

Testing Procedures

1. Working voltage measurement
 - Disconnect the O₂ sensor coupler (wire harness side).
 - Opened the main switch, but do not to start engine.
 - Use "voltage meter" DC stalls (DCV) to check sensor voltage.
 - Confirmed working voltage:
 - i. Voltage meter negative access to the R/O (1) pin.
 - ii. Voltage meter positive access to the R/Y pin.
2. Resistivity measurements
 - Disconnect the O₂ sensor couple (O₂ sensor side).
 - Use of the "Ohmmeter" Ohm stalls, inspection O₂ sensor resistance.
 - Confirmed working resistance:
 - i. Ohmmeter negative access to the W pin.
 - ii. Ohmmeter positive access to the W pin.

4. Fuel Injection System

Rollover sensor



Functional Description:

- Control the power of power relay with three-pin socket.
- When vehicles tilt angle is greater than 65 degrees, rollover sensor will cut off the power supply of ECU. If want to restart the engine, need to re-open the main switch.
- Rollover sensor is a safety device when the vehicle turnover. It will cut off the power supply of ECU, and stop the engine.

Testing Procedures:

- Rollover sensor is an electronic control device, cannot be measured after removal.
- Check the rollover sensor output voltage. Replace a new rollover sensor if the value is out of specification

Detection judge:

Voltage: Normal: 0.4~1.4V

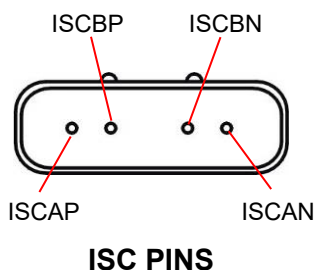
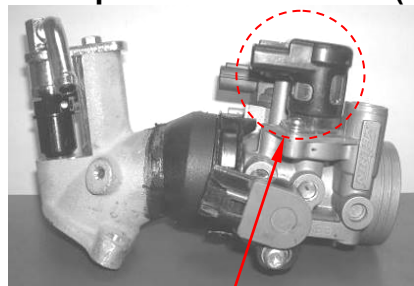
Rollover: 3.7~4.4V

Treatment of abnormal phenomena:

Vehicle state vertical, power relays or ECU without electric supply.

- Rollover sensor internal short circuit or open circuit, or bad contact connection.
- Check whether the wire harness is abnormal.
- Replace a new rollover sensor if there is any damage.

Idle Speed Control Valve (ISC) stepper motor



Functional Description

- Power supply from ECU, it has the four-pin socket.
- The sockets with 4 pins are the power and ground of the two sets of motor coils. The ECU manages the operation of the stepping motor through the control of the power grounding.
- ISC is a low power consumption DC motors, that drives the movement of the idle speed control valve (ISC) to adjust the idle air flow channel and control the idle speed when the car is cold or hot.

Testing Procedures

Resistance Confirmation:

- Disconnect the couplet of ISC (measurement directly on the ISC is also possible).
- Use of the "Ohmmeter" Ohm stalls (Ω), measurement of the two step motor coil resistance values.

Phase A: ISCAP and ISCAN

Phase B: ISCBP and ISCBN

Inspection of the actuation:

- Turn off the main switch.
- Use hand to touch Idle Air Control Valve body.
- Turn on the main switch.
- Feel whether the ISC is activated.



Cautions

- Dynamic checking for ISC, can only be tested on the engine, not a single test.



Phase A measurement of the resistance value



Phase B measurement of the resistance value

Detection judge

1. Resistance value:

Phase A: $80 \pm 10\Omega$ (Environmental conditions: $15 \sim 25^\circ\text{C}$)

Phase B: $80 \pm 10\Omega$ (Environmental conditions: $15 \sim 25^\circ\text{C}$)

2. Actuator inspection:

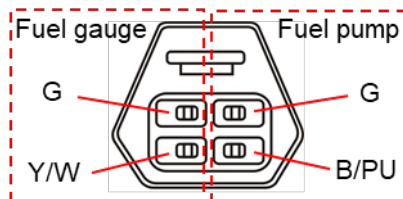
In the above checking steps for ISC Idling motor actuator control inspection, ISC will be slightly vibration or "... da... da..." continuous sound.

Treatment of abnormal phenomena

- ISC damage, or bad contact connection.
- Check whether the wire harness is abnormal.
- Replace a new ISC if ISC is abnormally, and conduct a further inspection of its actuator.

4. Fuel Injection System

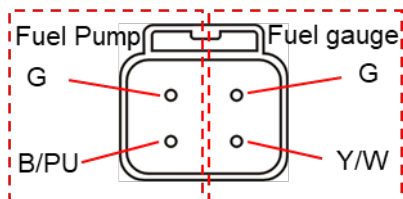
Fuel Pump



Fuel gauge/Fuel pump PINS



Confirmed working voltage



Fuel gauge/Fuel pump PINS



Fuel gauge resistance measurement

Functional Description

- Powered by DC 8~16V, and has four-pin socket on the pump.
- The two terminals are connected to power source and ground respective. The ECU is to control and manage the operation of fuel pump through electrical power.
- Its major component is a driving fan pump that equipped with a low electric consumption DC motor. Powered by 12V voltage and keep fuel pressure inside the fuel pump in $294 \pm 6 \text{ kPa}$ (about 3 kg / cm^2).
- The fuel pump is located inside of the fuel tank, and installed a filter in front of its inlet so that can prevent from foreign materials sucking into the fuel pump to damage it and the fuel injector.

Testing Procedures 1

Fuel pump working voltage confirmed:

- Fuel pump coupler to properly (using the probe tool), or can be removed coupler working voltage measurements (direct measurement).
- Turn on the main switch, but do not start engine.
- Use "voltage meter" DC stalls (DCV) to check fuel pump voltage.
- Confirmed working voltage:
Voltage meter negative access to the wire harness fuel pump coupler G pin.
Voltage meter positive access to the wire harness fuel pump coupler B/PU pin.



Cautions

- Conducting fuel pump voltage measurement, if the main switch to open 5 seconds after the engine did not started, the ECU will automatically cut off the fuel pump power supply.

Detection judge 1:

1. Working voltage value: Above 10V
2. Resistance value: $1.5 \pm 0.5 \Omega$
3. Fuel pressure: $294 \pm 6 \text{ kPa}$ (about 3 kg/cm^2)

Testing Procedures 2

Fuel gauge working resistance confirmed:

- Disconnect the coupler of fuel pump.
- Use of the "Ohmmeter" Ohm stalls (Ω), to measure fuel gauge resistance values (wire Y/W & G).

Detection judge 2:

- Resistance when fuel tank is empty: 95~105 Ω
- Resistance when fuel tank is full: 1130~1170 Ω

4. Fuel Injection System



Fuel system pressure measurement

Testing Procedures 3:

Fuel pressure measurement:

- Use fuel pressure gauge to connect between the injector and the fuel tank.



Cautions

- In the implementation of the fuel pressure measurement, it will remove the fuel hose. After measuring the fuel pressure, be sure to confirm whether there is a fuel leaks to avoid danger.



Fuel pressure measurement

Detection judge 3:

1. Fuel pressure: $294 \pm 6 \text{ kPa}$ (about 3 kg/cm^2)

Treatment of abnormal phenomena:

1. Fuel pump damages internal coil break, or bad contact connection.
2. Fuel filter blockage.
3. Fuel pump anomaly, the proposed replacement of the fuel pump.
4. Fuel unit anomaly, the proposed replacement of the fuel unit.



Fuel pressure measurement demolition - fuel pump

4. Fuel Injection System

Fuel Injector



Functional Description

- Powered by DC 8~16V, and it has two-pin socket on the injector.
- Its major component is the solenoid valve of high resistance driven by electronic current.
- 2 terminals are connected to power source and ground respective. It is controlled by ECU to decide the injection timing, and the injector pulse width.

Testing Procedures

1. Resistance Confirmation:
Use of the "Ohmmeter" Ohm stalls(Ω), measurement of the injector resistance value.
2. Injector injection status examination:
 - Removed the injector fixed bolt and removed the injector from intake manifold, but not removal of harness coupler.
 - Injector and injector cap tightly by hands, fuel spills should not be the case.
 - Key-on and start the engine, inspect injection status of injector.



Injector resistance confirmation

Detection judge

1. Between the two pin resistance values: $10.5 \pm 0.53 \Omega$
2. injection status:
 - Fuel atomizing good, with a clear scattering angle \rightarrow judged as normal.
 - Injection-state such as water, no obvious scattering angle \rightarrow found abnormal.



Injection-state atomizing good

Treatment of abnormal phenomena

1. Injector Resistance abnormal, the proposed replacement of the new one injector.
2. Injection-state abnormal, for the following reasons:
 - Injector obstructive \rightarrow the proposed replacement of the new one injector.
 - Fuel pressure shortage \rightarrow confirmed hydraulic pressure, the proposed replacement fuel pump to confirm.

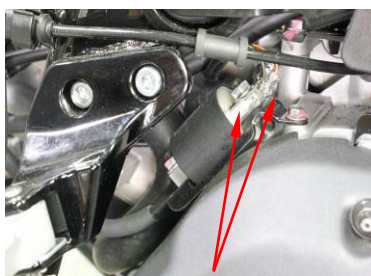
Warning

- Gasoline is low-flammable and explosive material. Work in the ventilation place, and prohibited fire.
- When inspecting the fuel injection status of the injector, the gasoline flowing out of the fuel injector should be collected in an appropriate container to avoid danger.



Injection-state unusual

Transistor ignition coil



First circuit coil resistance measurement

Functional Description:

- Use 8 ~ 16V DC power supply, it has two-pin socket.
- Two-pin socket for the power supply and grounding. Its main components for the high conversion ratio transformer.
- Through computer programs when the ignition is controlled, from ignition timing (TDC) / crank position sensor, the throttle valve position sensor, engine temperature sensor, the inlet pressure sensor and O₂ Sensor, issued by the signal, with the engine Speed through the ECU to determine the appropriate ignition is, by the current of a crystal intermittent control, a 25000-30000 volts of secondary hypertension, flashover triggered spark plug, this approach will not only enable the engine to achieve maximum output function, also help to improve the efficiency of fuel consumption and pollution improvements.

Testing Procedures:

Resistance Confirmation:

- Removed coil first circuit plugs on the ignition coil (wire R/Y & B/Y).
- Use of the "Ohmmeter" Ohm stalls (Ω), measurement of the ignition coil resistance value.

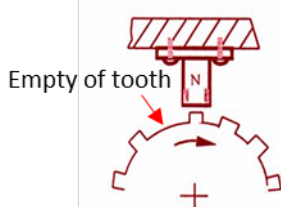
Detection judge:

- 1st circuit coil resistance: $2.8\Omega \pm 15\%$ (20°C)
- 2nd circuit coil resistance: $9.0\Omega \pm 20\%$ (20°C)

Treatment of abnormal phenomena:

- Ignition coil internal coil disconnection damaged, or plugs bad contact.
- Ignition coil ignition is not abnormal, proposes to replace the ignition coil.

Crankshaft position sensor



Measurement resistance value

Functional Description:

- Do not need for an external power supply, has two-pin of signal plug.
- Constitutes a major change in its reluctance induction coil.
- The spacing of flywheel and sensor should be 0.7 to 1.1 mm.
- Magnetic induction sensor is the use of flywheel on the Gear (24-2 tooth) rotary cutting induction coil changes in the magnetic field sensor with the inductive voltage signal for ECU judgment, calculated at the engine speed and crankshaft position, and with a most appropriate time of fuel injection and ignition control.

Testing Procedures:

Resistance Confirmation:

- Removed crankshaft position sensor coupler (B/Y & G/W).
- Use of the "Ohmmeter" Ohm stalls (Ω), measurement of the crankshaft position sensor resistance value.

Detection judge:

- Resistance value: 80~160 Ω (20°C)

Treatment of abnormal phenomena:

1. Sensor internal coil interrupted damaged, or coupler bad contact.
2. Check whether the abnormal wire harness lines.
3. Sensor coil anomaly, the proposed replacement of the new one.

4. Fuel Injection System

Air Injection Solenoid Valve (AISV)



Functional Description

- Control power, has two-pin socket, one for the power supply pin, one for grounding pin.
- Secondary air injection solenoid valve at the Idle (3500 rpm below) actuator.
- At Idling, ECU control solenoid valve by the grounding circuit to be moving or closing.

Testing Procedures

Resistance Confirmation:

- Use of the "Ohmmeter" Ohm stalls (Ω), measurement of the secondary air injection solenoid valve resistance value.

Detection judge

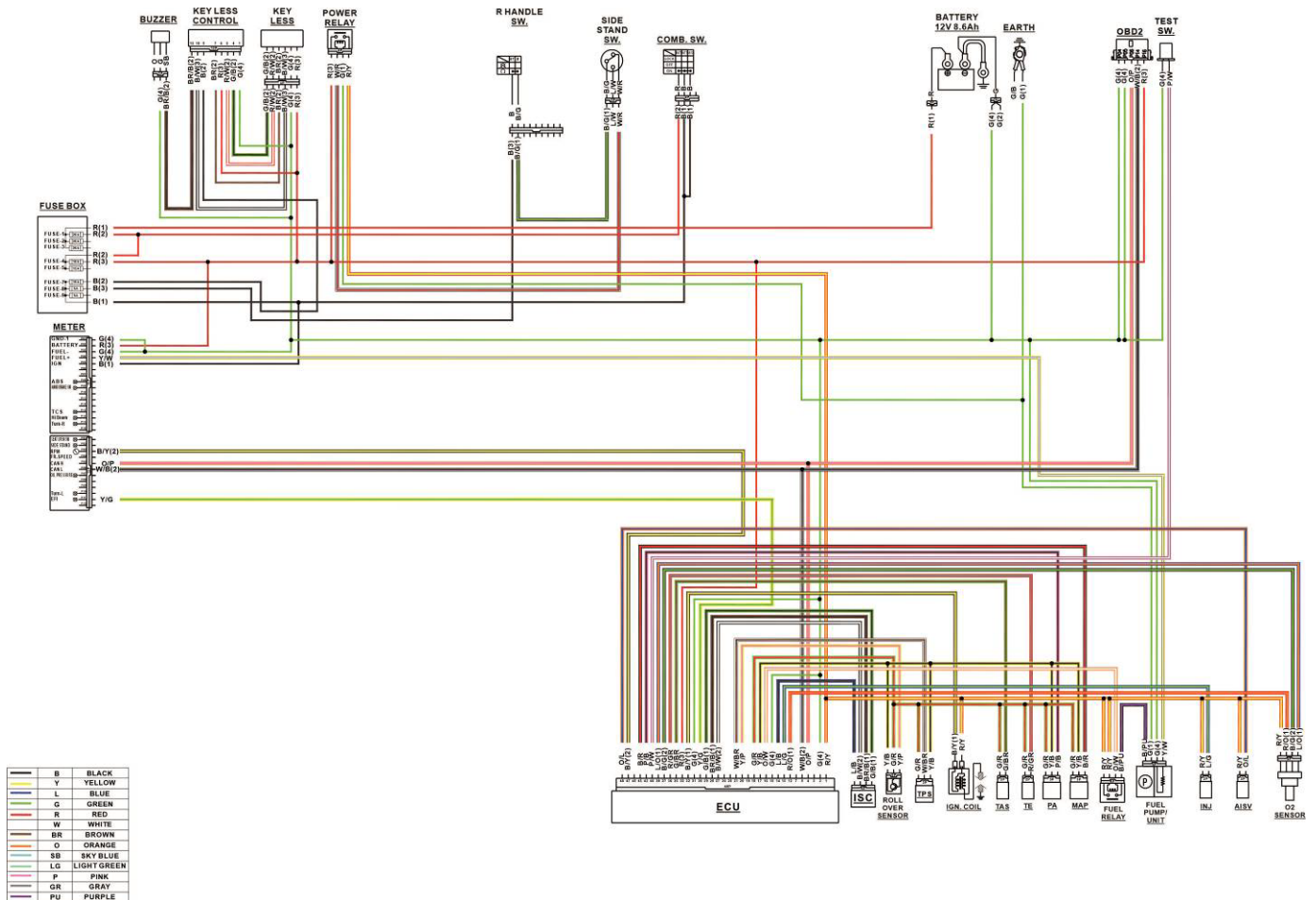
Resistance value = $25.1 \pm 1.7 \Omega$ (20°C)

Treatment of abnormal phenomena

- Secondary air injection solenoid valve internal short circuit or open circuit, or coupler bad contact.
- Check whether the abnormal wire harness lines.
- Secondary air injection solenoid valve anomaly, the proposed replacement of the new one.



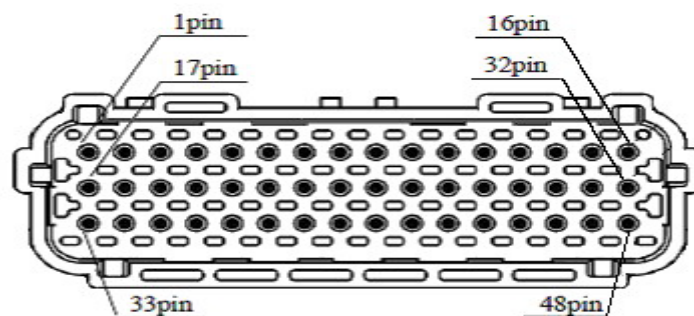
Efi System Circuit



4. Fuel Injection System

ECU Pin Configuration

(ECU side)



ECU Pin Note

Pin NO.	Pin code	Wire color	Note
1	IGP	R/Y	Ignition power input
2	LG	G(4)	Logic ground
3	FAN	B/L	Fan relay output
4	CAN-H	O/PR	High level CAN voltage
5	CAN-L	W/B(2)	Low level CAN voltage
6			
7	CRK-M	G/W	Crank pulse sensor GNS input
8			
9			
10			
11			
12	O ₂ HT-F	R/O(1)	O ₂ sensor heater front
13	INJ	L/G	
14	ISC AP	L/B	ISC AP output
15	PG1	G(4)	Power ground
16	FPR	O/W	Fuel pump relay output
17	VCC	Y/B	Sensor power output (+5V)
18	SG	G/R	Sensor ground
19	TRC SW	PU(1)	Traction control SW input
20	ROLL	Y/PR	Rollover sensor input
21	TH	W/BR	Throttle position sensor input
22			
23			
24			
25	CRK-P	L/Y(1)	Crank pulse sensor input
26	H/L RLY	L/W(1)	Headlight relay output
27	ICS BN	B/W(2)	ISC BN output
28	ISC AN	BR/B(1)	ISC AN output
29	ICS BP	G/B(1)	ISC BP output
30	MIL	Y/G	Malfunction indicator lamp output
31	PG2	G(4)	Power ground
32	IG	B/Y	Ignition coil output
33	VBU	R(3)	Back up voltage input
34			



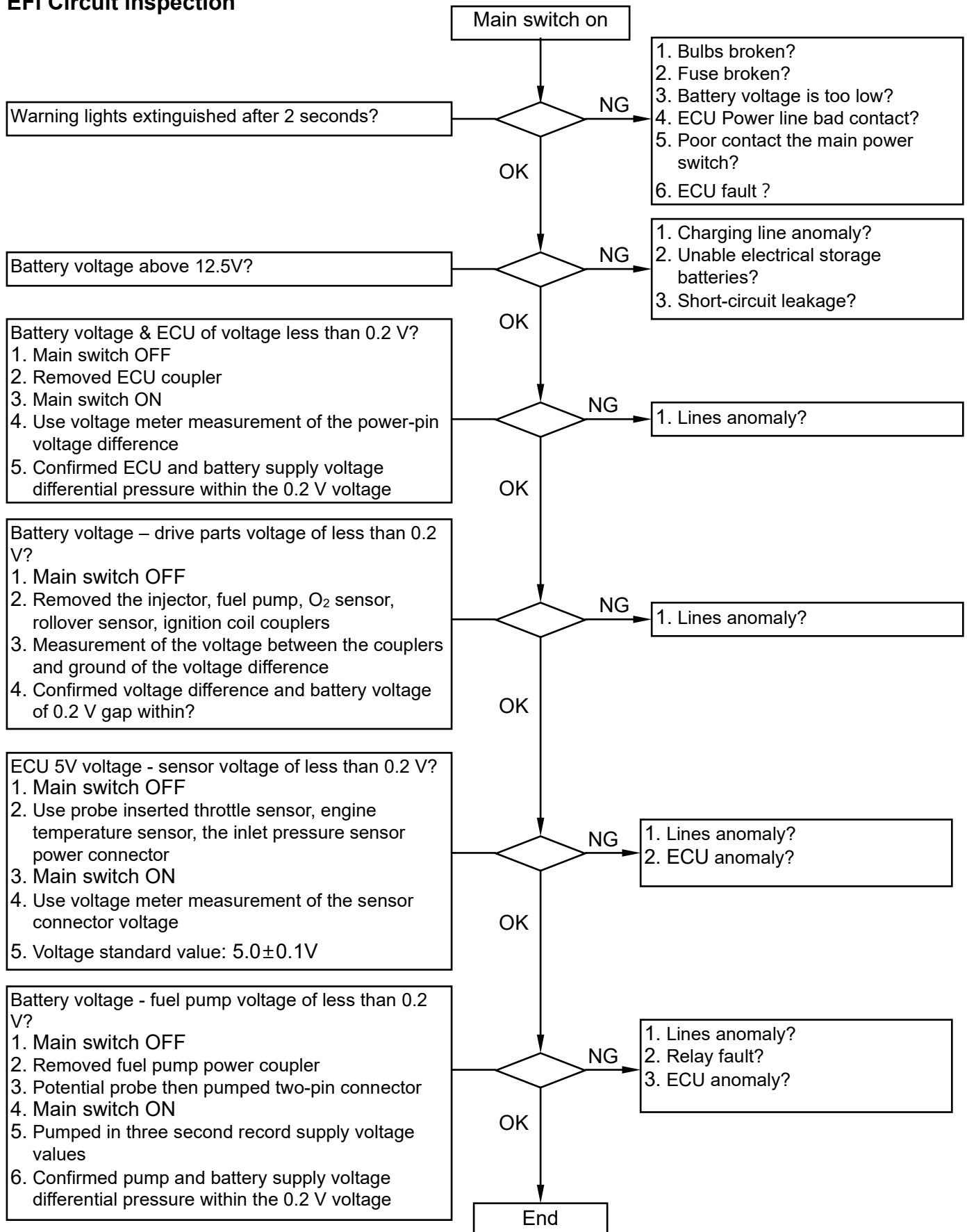
4. Fuel Injection System

Pin NO.	Pin code	Wire color	Note
35	TA	G/BR	Air temp. sensor input
36	TW	R/GR	Water temp. sensor input
37	O ₂ F-GND	B/G(2)	HEGO sensor front GND
38	O ₂ -F	L/O(1)	HEGO sensor rear GND
39			
40	TEST	PR/W	Test switch input
41			
42	PA	PR/B	Air pressure sensor
43	PM	B/R	Manifold air pressure sensor input
44			
45	TRC-IND	PU(2)	Traction control indicator lamp output
46			
47	TACHO	B/Y(2)	TACHO output
48	EXAI	O/L	Exhaust air injection output

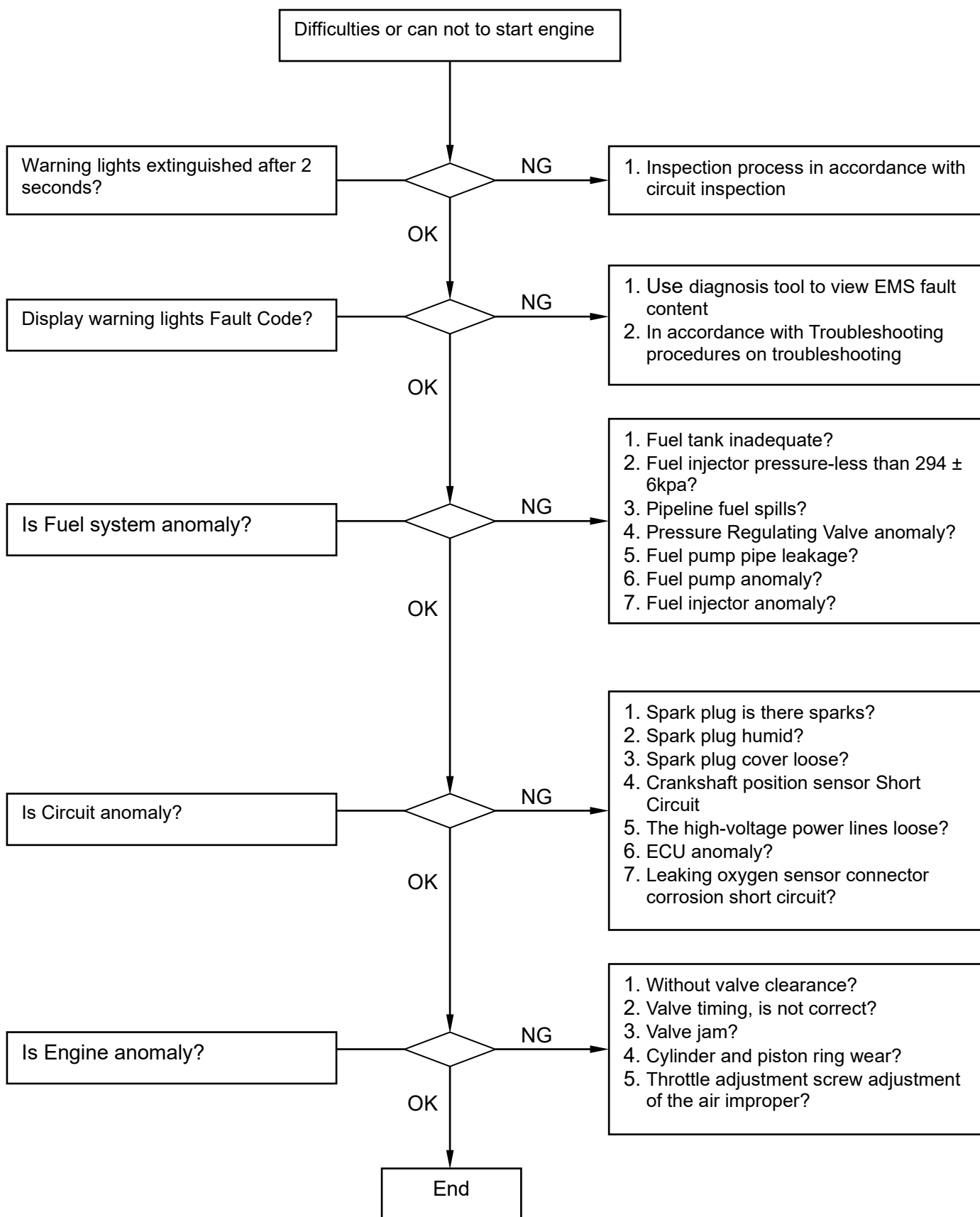
4. Fuel Injection System

Troubleshooting

EFI Circuit inspection

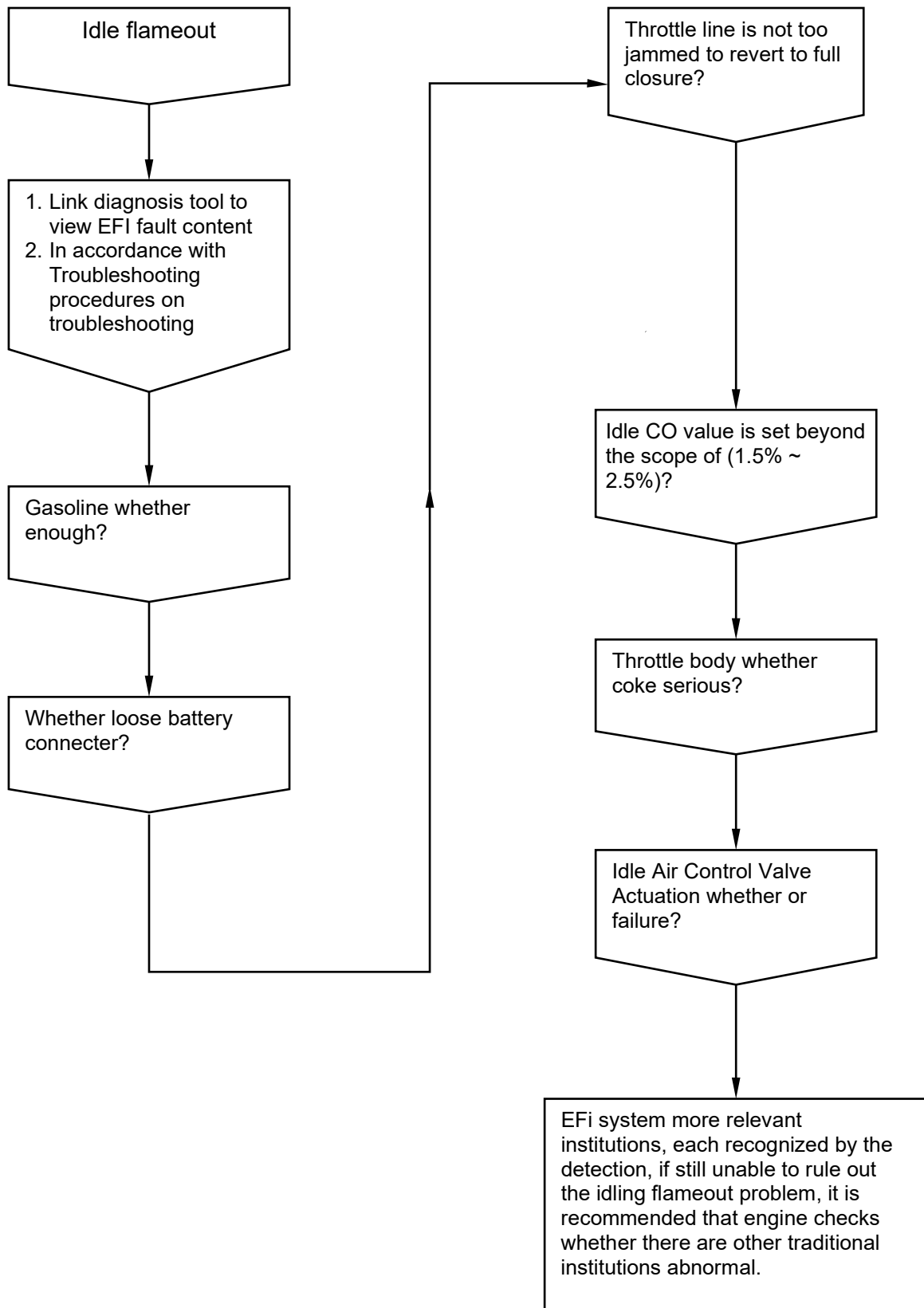


Cannot Start the engine or difficult to start inspection



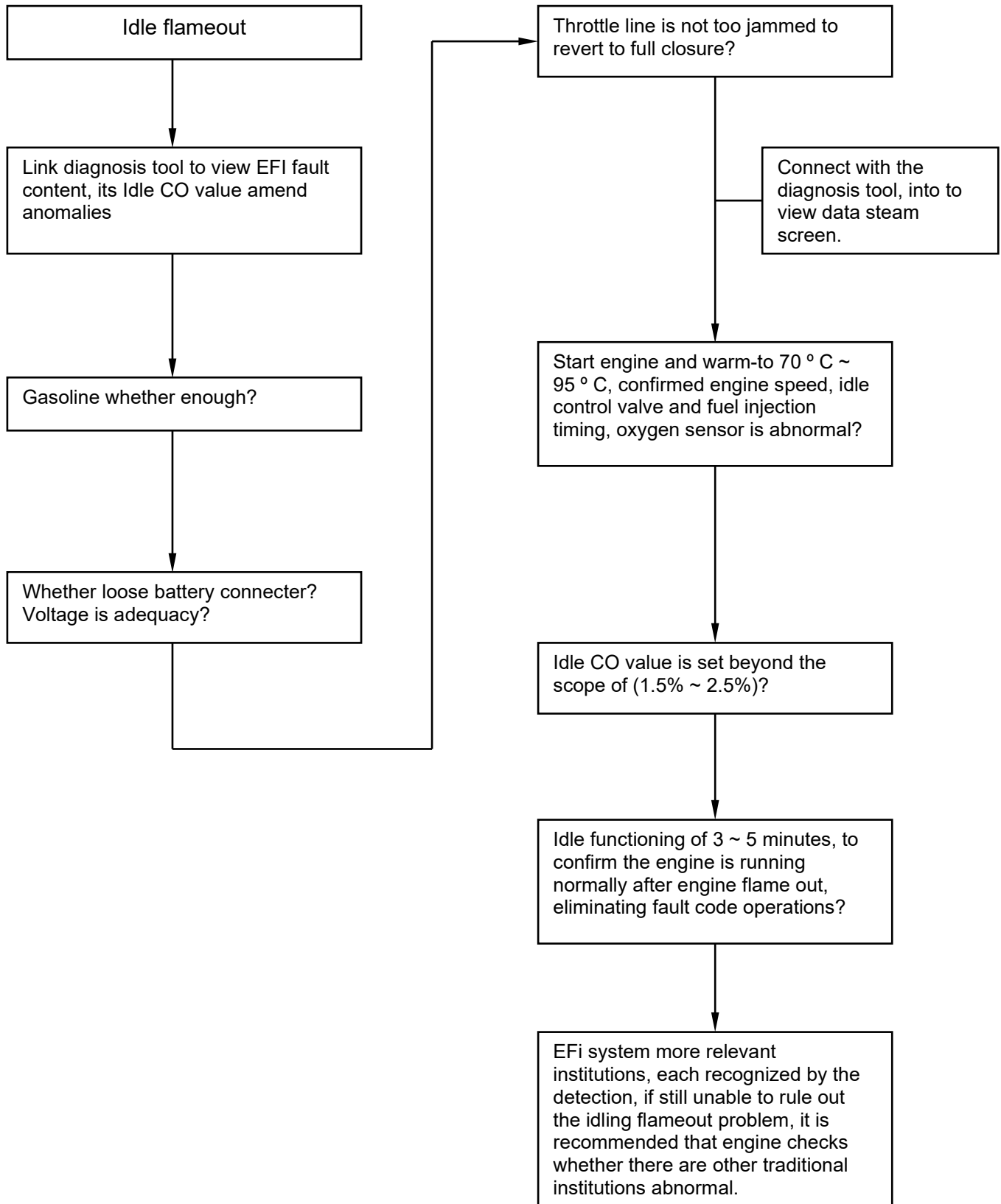
4. Fuel Injection System

Idle flameout diagnosis



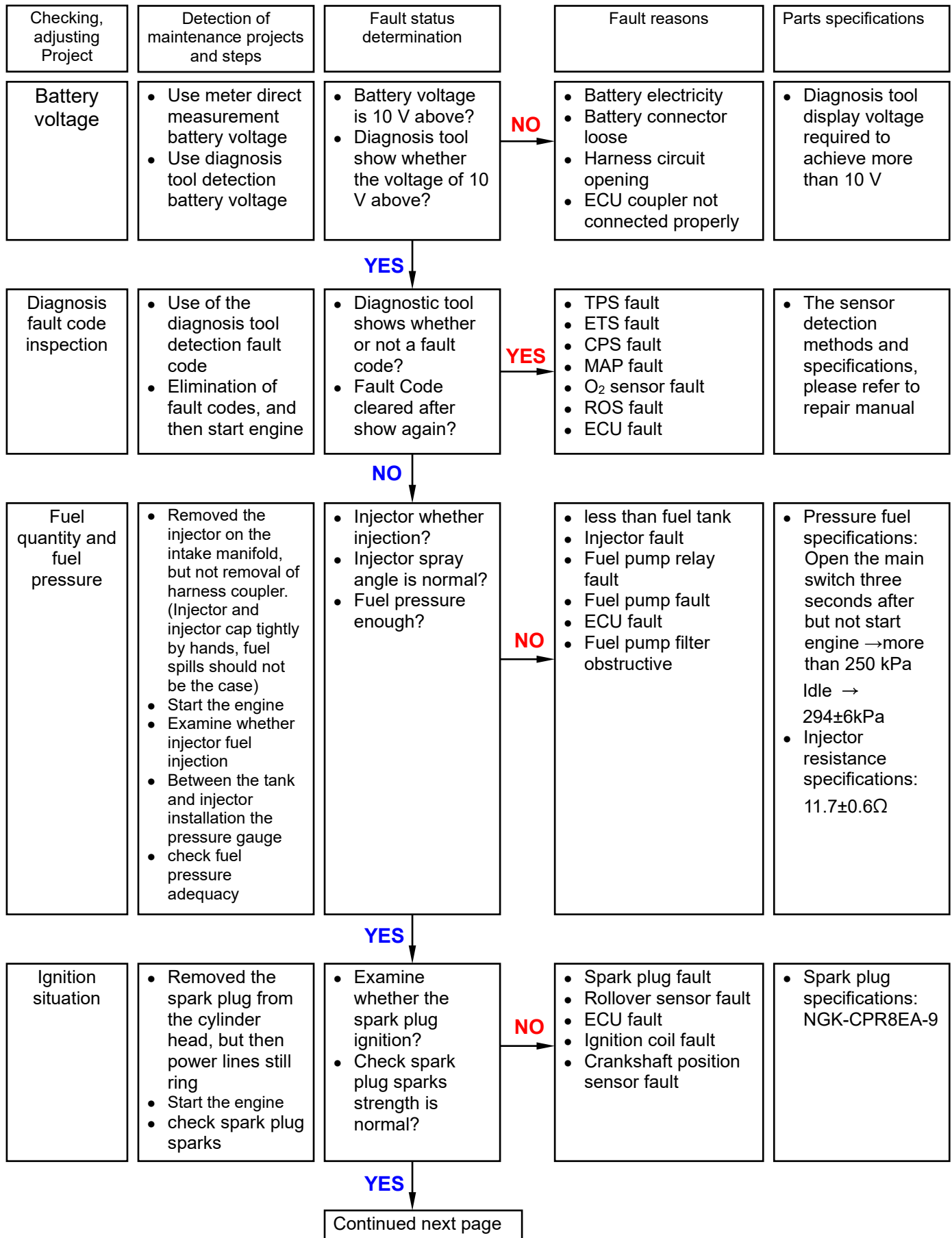
CO value revised anomaly

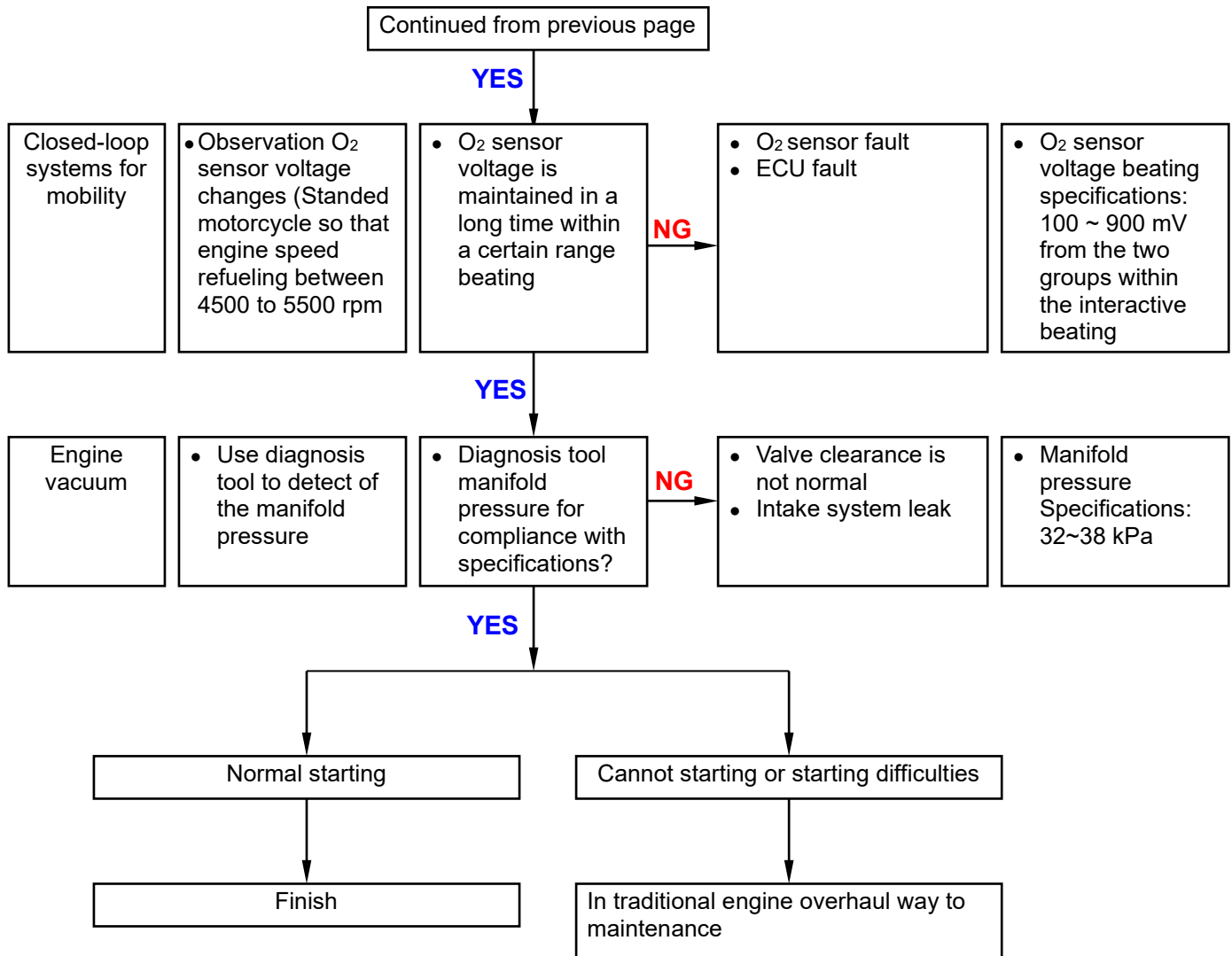
O₂ Sensor equipped with the system, in principle, not adjusted CO value; such as CO value deviated from the normal range, check O₂ Sensor and other agencies anomaly.



4. Fuel Injection System

Integrated Troubleshooting Procedure



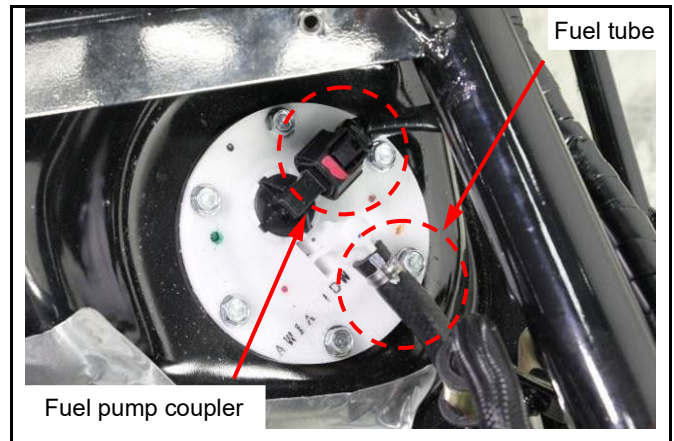


4. Fuel Injection System

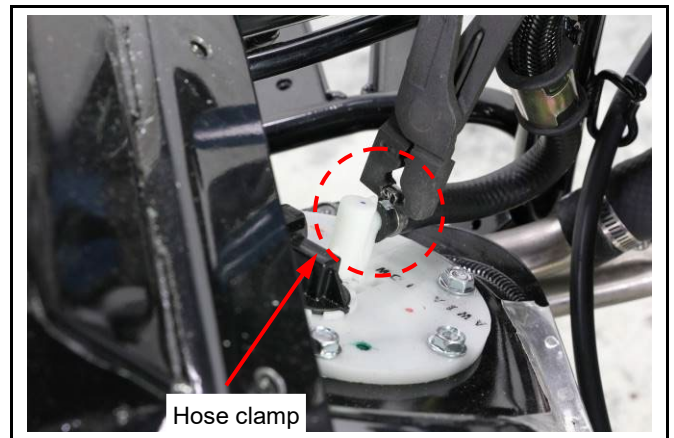
Fuel pump

Remove fuel pump/fuel unit

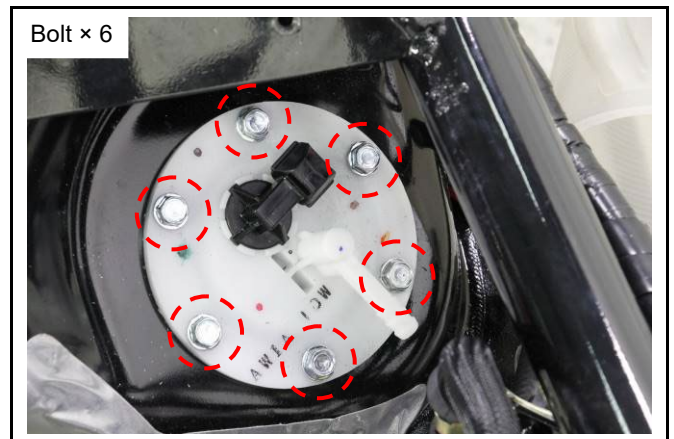
Remove luggage box and seat.
(Refer to chapter 13)



Remove fuel pump coupler.
Release the fuel hose clamp, remove the fuel tube.



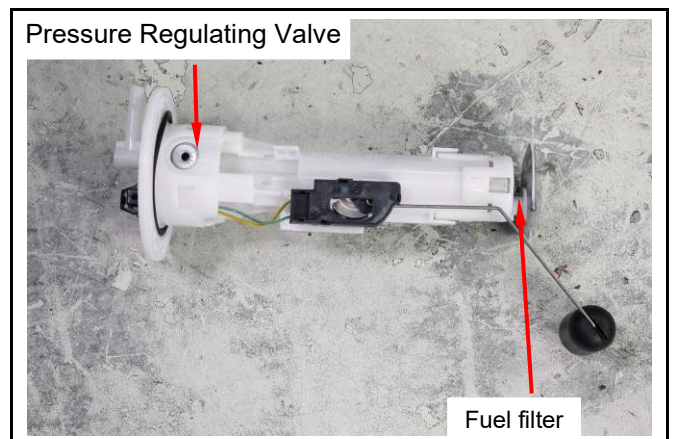
Remove the fuel tank fixed bolts (Bolt × 6).
Remove the fuel tank.



For installation procedure, reverse the steps.

Cautions

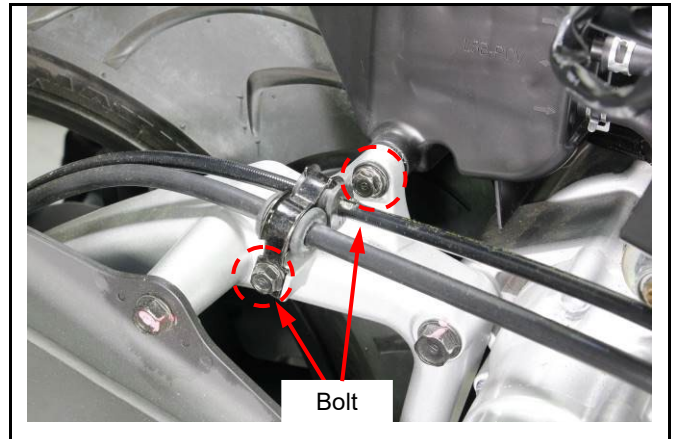
- Then remove fuel pump, fuel in fuel tank internal to confirm not excessive.
- Then install fuel pump and fuel unit, attention direction.
- Confirm whether the fuel filter dirt, obstructive.
- Fuel pump installation, to confirm whether it is normal to the fuel out (the pressure about 3 kg/cm²).



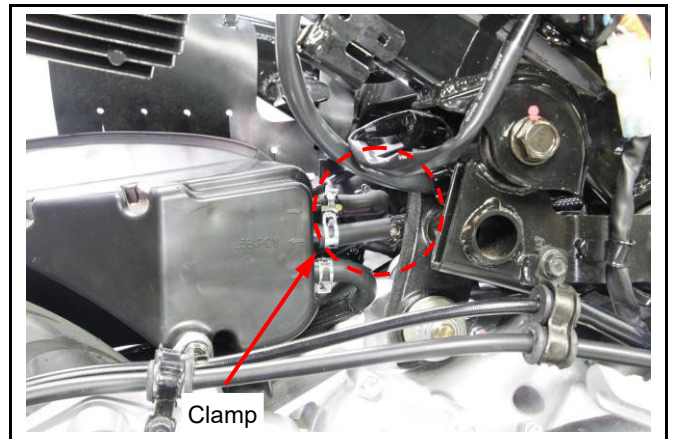
4. Fuel Injection System

Air Cleaner

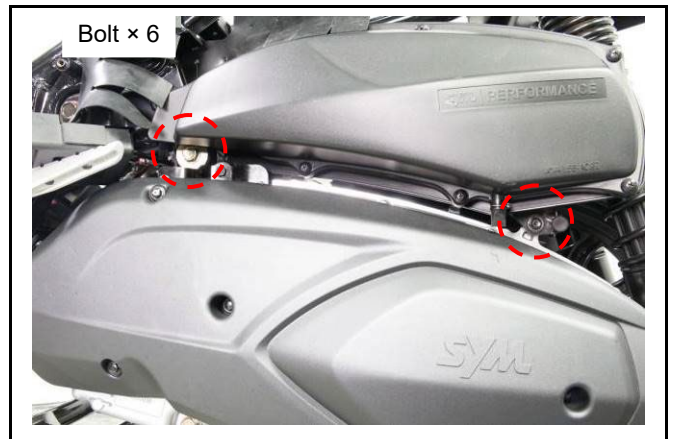
Remove luggage box.
Remove the bolt of rear brake hose and wheel speed sensor.
Remove the bolt of air cleaner.



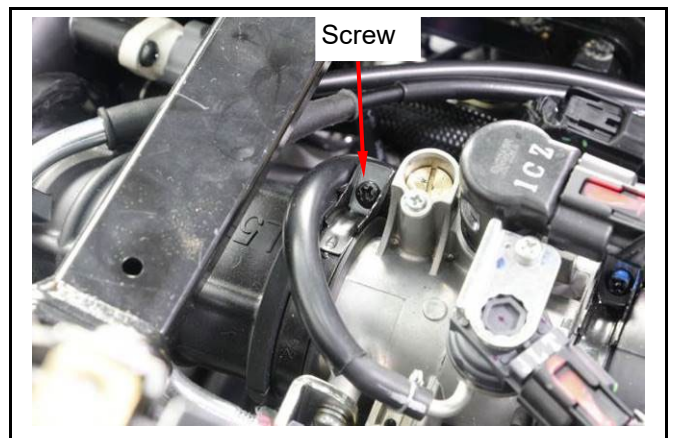
Remove PCV hose clamp.



Remove 2 bolts of air cleaner.



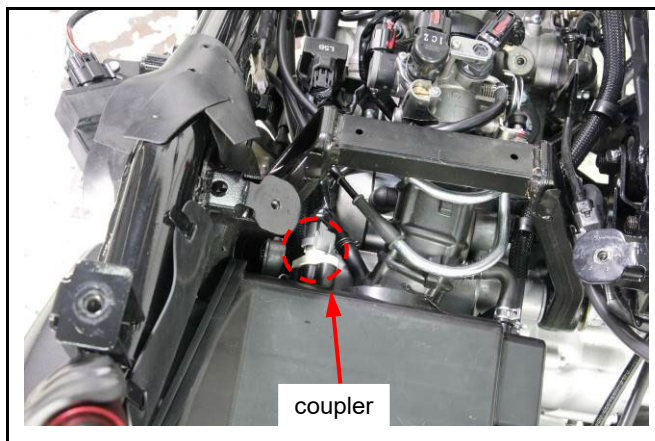
Remove the screw of air cleaner and throttle body.



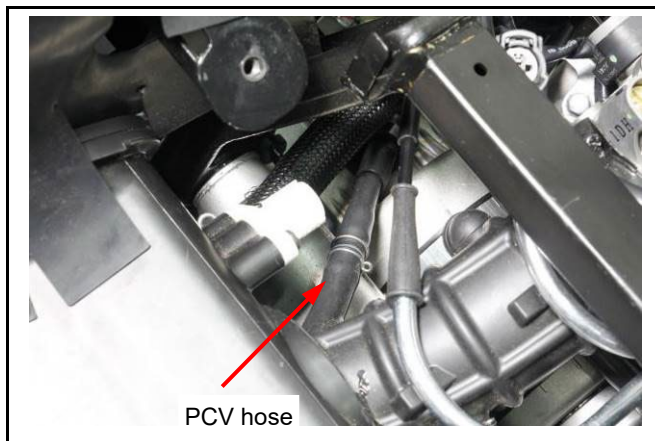
4. Fuel Injection System



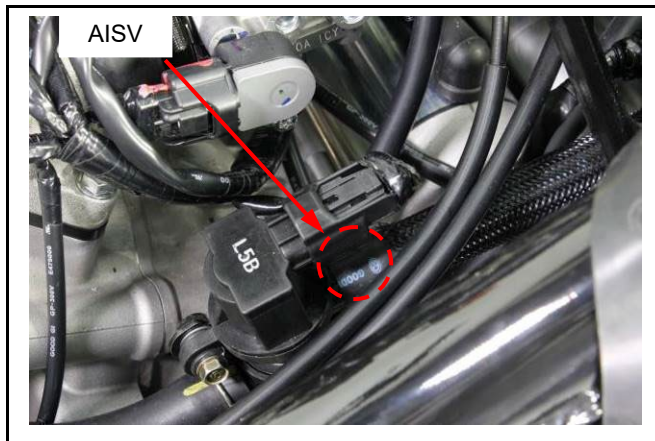
Disconnect the coupler of intake air temperature sensor.



Remove PCV hose.



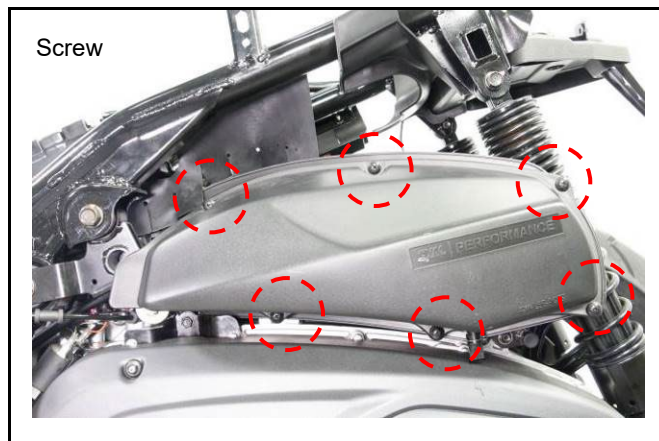
Remove air cleaner and AISV.



For installation procedure, reverse the steps.

Air Cleaner Element

Remove 6 screws of air cleaner cover.

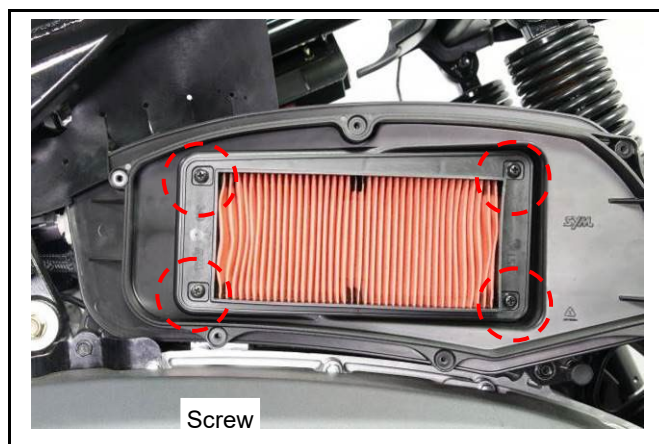


Remove 4 screws of air cleaner element.
Take off the air cleaner element.

Replace a new one if air cleaner element is dirty.

Caution

- Do not soak air cleaner element.



For installation procedure, reverse the steps.

Caution

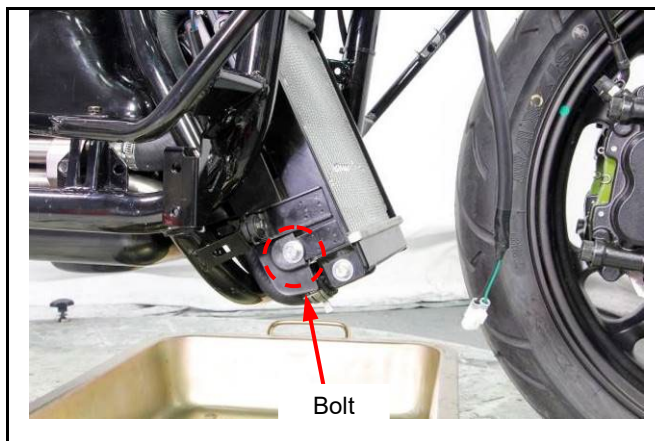
- Make sure air cleaner element is installed properly.

4. Fuel Injection System

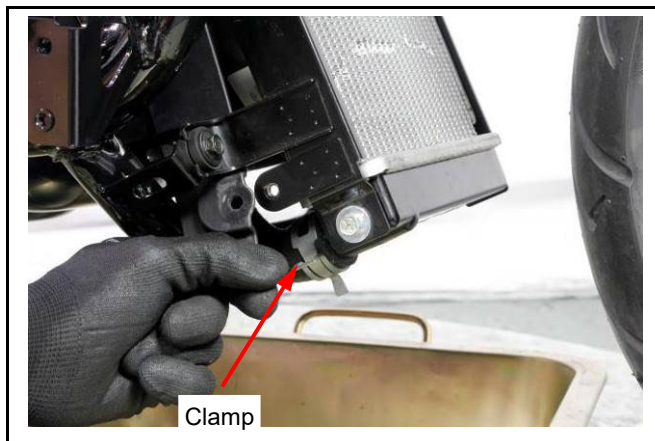


Fuel tank

Remove body cover (refer to the Chapter 13).
Remove the bolt of radiator cover.
Place a container under radiator.



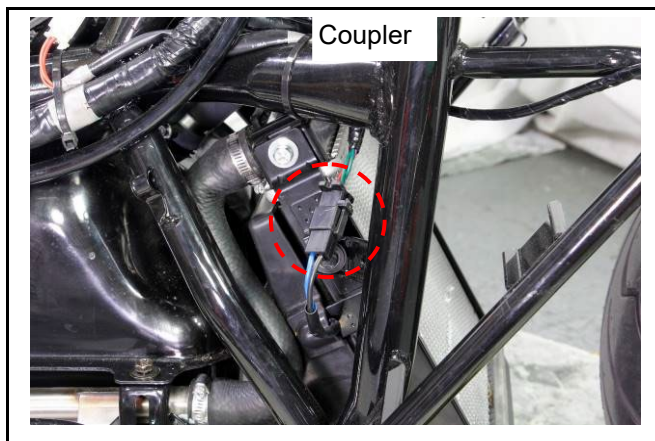
Remove the water hose clamp.



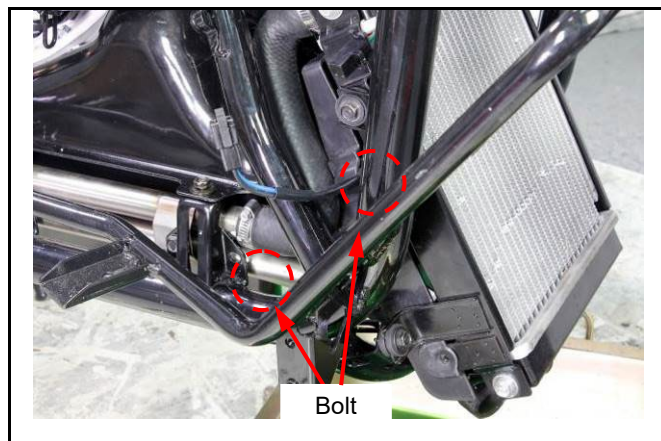
Remove the water hose, and drain out the coolant.



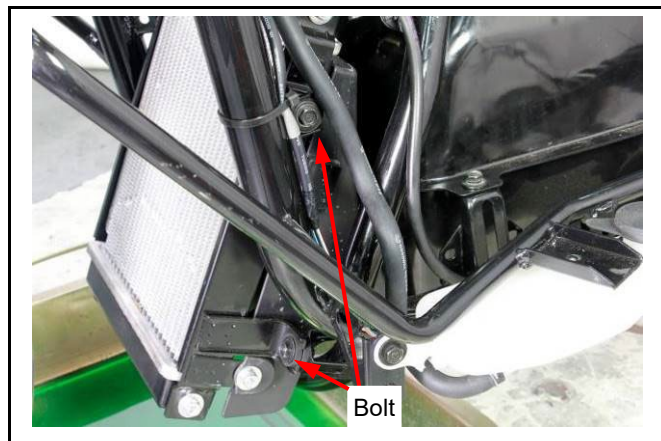
Disconnect the coupler of cooling fan.



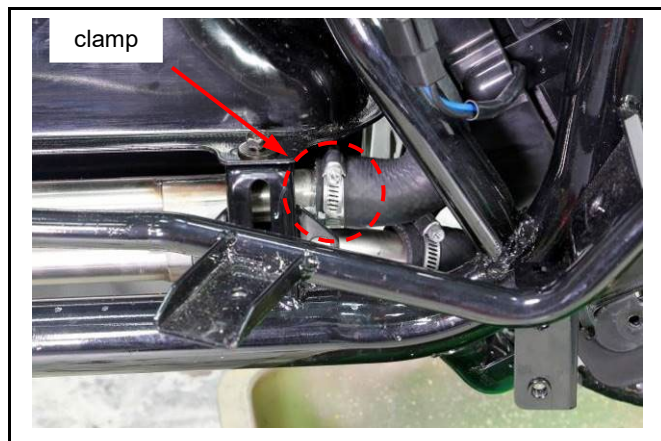
Remove 2 bolts of radiator right side.



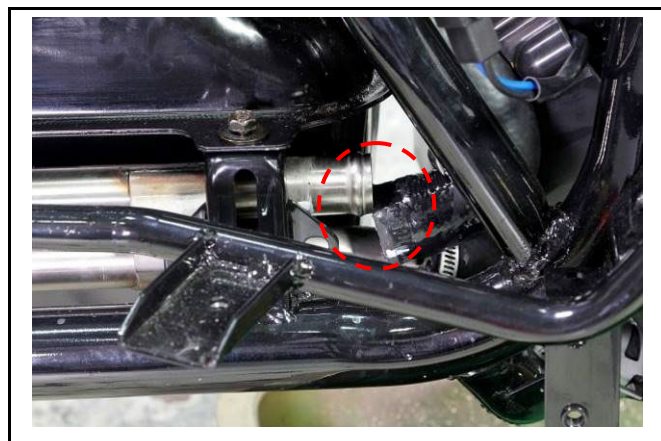
Remove 2 bolts of radiator left side.



Remove the clamp of water hose.



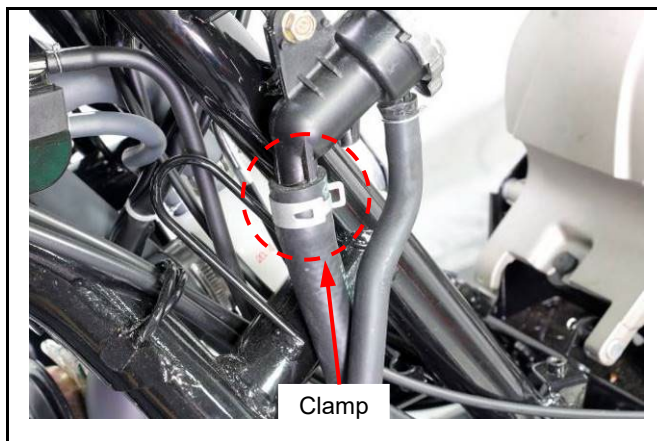
Remove the water hose.



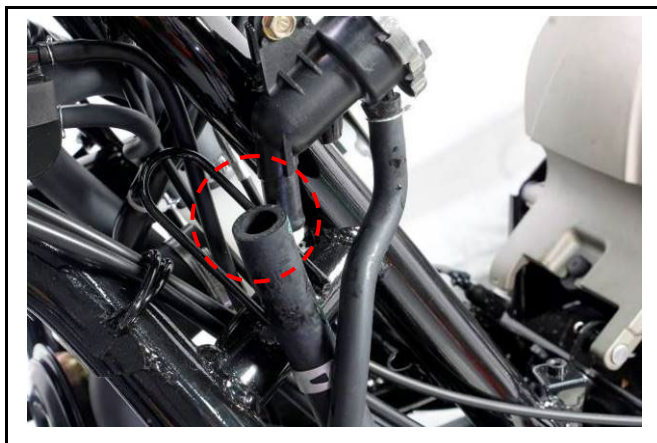
4. Fuel Injection System



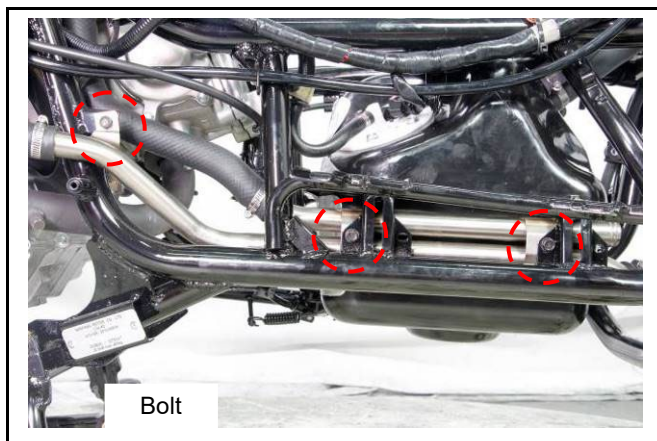
Remove the clamp of water hose.



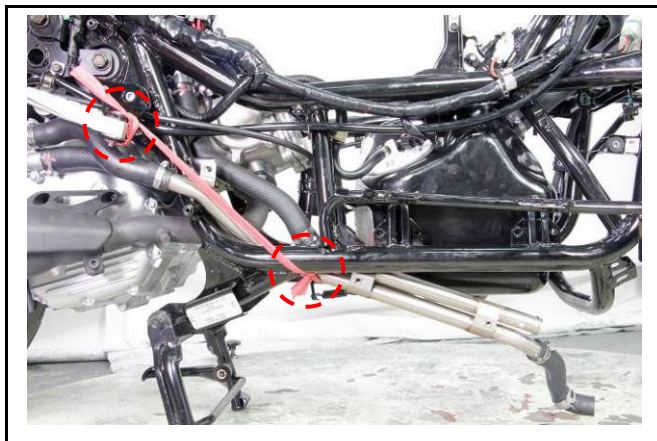
Remove water hose.
Take off the radiator.



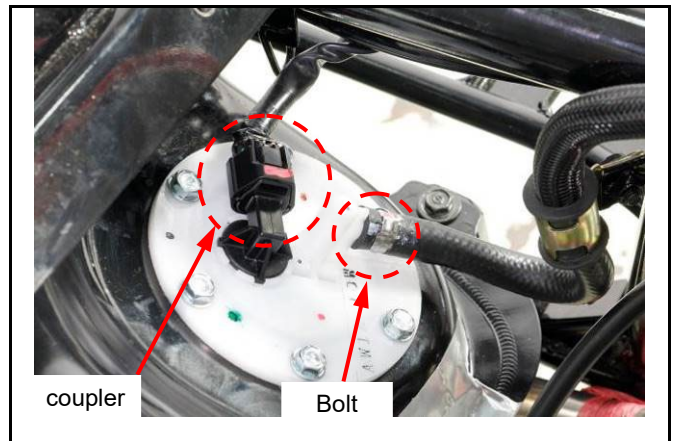
Remove 3 bolts of metal water pipe.



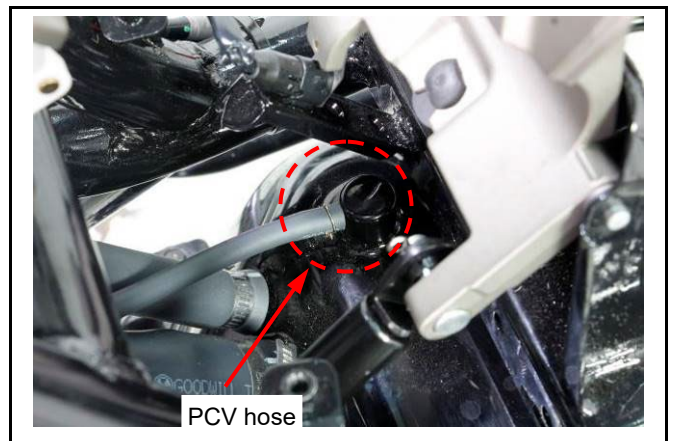
Fix the metal water pipe to the frame.



Remove the coupler of fuel pump.
Remove the clamp of fuel hose.
Remove the fuel hose.



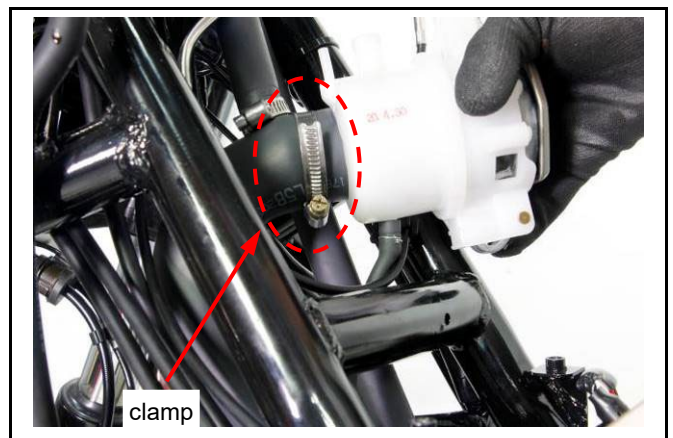
Remove PCV hose.



Remove the clamp of filler pipe.
Remove the filler pipe and FCV tube.



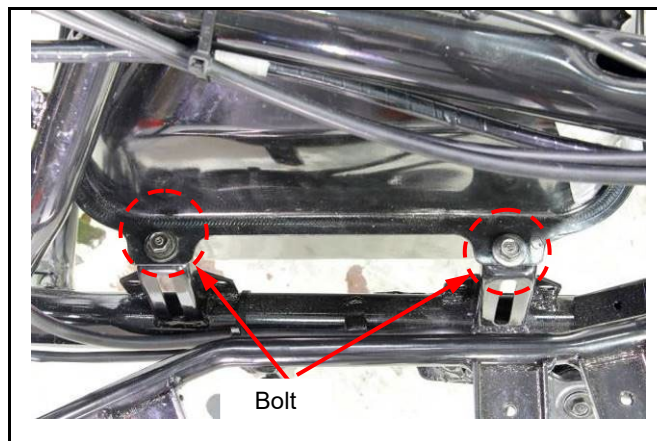
Remove the clamp of fuel tube.
Remove the fuel tube.



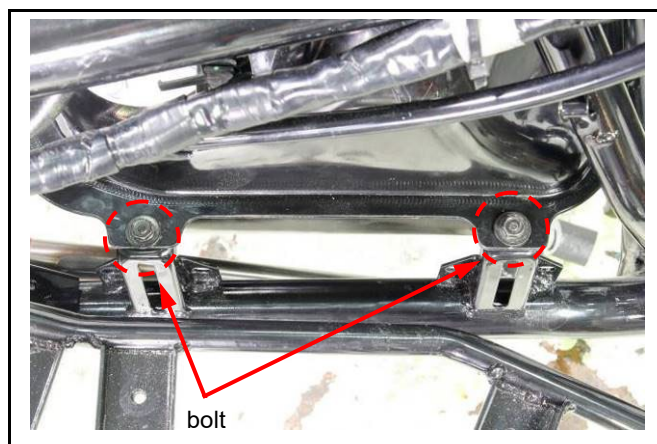
4. Fuel Injection System



Remove 2 bolts of fuel tank right side.



Remove 2 bolts of fuel tank left side.

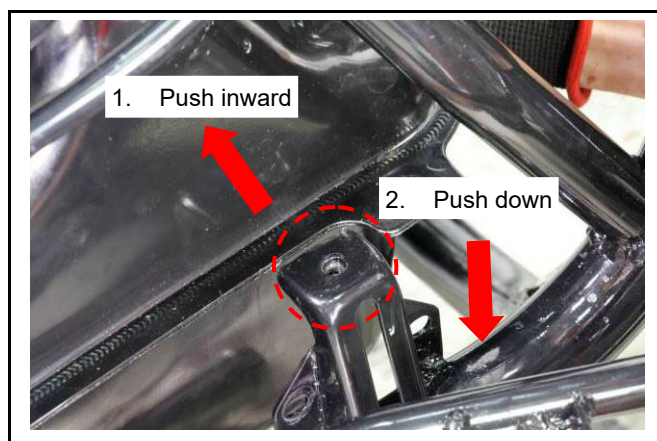


Push the fuel tank forward.



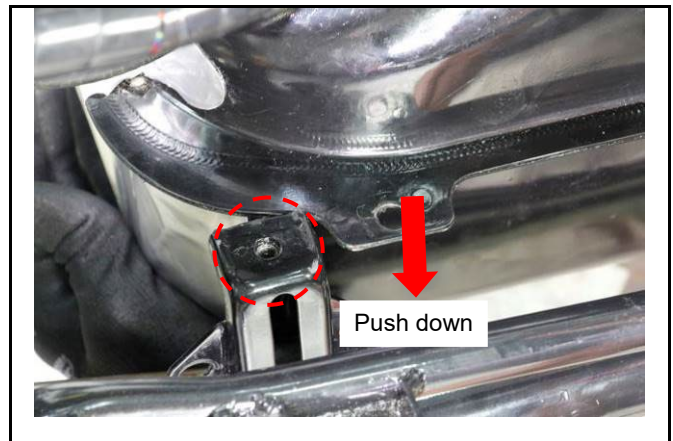
Keep the right front mounting hole of fuel tank away from the stay by 2 steps below.

1. Push inward
2. Push down



Keep the right rear mounting hole of fuel tank away from the stay.

Push the fuel tank down



Take out the fuel tank downward.



Take out fuel tank.



4. Fuel Injection System

EFi System Diagnosis Methods

When the motorcycle injection system in the wrong signal, causing abnormal functioning of the engine or cannot start engine, warning light at the meter will be lighting, to inform drivers to carry out maintenance.

Overhaul, the diagnosis tool can be used for troubleshooting, or manually by the meter warning light inspection revealed that the fault codes (refer to checking signal fault codes discriminate method), the two methods for maintenance.

If the fault has been ruled out or repaired after the inspection light will be extinguished, but ECU fault code will be recorded, so the need to get rid of fault codes. If a fault exists, this system has two kinds of methods to eliminate fault codes respectively in the diagnosis tool removal and manual removal.

Using diagnostic tool for overhaul

Diagnosis tool will connect to the motorcycle for coupler diagnosis, according to the use of diagnostic tool testing methods, when belong fuel injection system fault or parts fault, according to the diagnosis tool of the fault code display messages do describe parts of the inspection testing maintenance and replacement parts. When after the maintenance, the need to get rid of fault codes (Please refer to detailed steps diagnosis tool of instructions), or fault code will always be stored in the ECU.

Manual inspection

Use of cross-wiring (wire or paper clips, etc.) to Cross-Joints Test Switch for grounding, in the meter of this check light are flashing, it means that the injection system or parts of abnormal situations, but not in the diagnosis tool can be - for the detection, inspection can enjoy for a long time flashing lights flashing and the short period of time to inform the cause of the malfunction (refer to check light fault information fault code table).

4. Fuel Injection System

Trouble Code and Sensor Table

List of all active and stored trouble codes in the ECU and their description

No.	DTC	Monitoring strategy	Component
1	P0335	The sensor circuit malfunction	CRANKSHAFT POSITION SENSOR
2	P0123	Too high input voltage	THROTTLE POSITION SENSOR
	P0120	Too low input voltage or open circuit	
3	P0107	Too low input voltage	MANIFOLD PRESSURE SENSOR
	P0105	Too high input voltage or open	
4	P0117	Too low input voltage	ENGINE COOLANT TEMPERATURE SENSOR
	P0115	Too high input voltage or open circuit	
5	P0112	Too low input voltage	INTAKE AIR TEMPERATURE SENSOR
	P0110	Too high input voltage	
6	P2228	Too low input voltage	BAROMETRIC PRESSURE SENSOR
	P2226	Too high input voltage or open circuit	
7	P0500	The sensor circuit malfunction (Front)	WHEEL SPEED SENSOR(FRONT)
	P2158	The sensor circuit malfunction (Rear)	WHEEL SPEED ENSOR(REAR)
8	P0130	Short circuit to battery or open circuit	O ₂ (BINARY) SIGNAL
	P0131	Short circuit to ground	
9	P0201	Injector circuit malfunction	FUEL INJECTOR
10	P0351	Ignition coil circuit malfunction	IGNITION COIL
11	P0030	Short circuit to ground or open circuit	O ₂ SENSOR HEATER
12	P0230	Fuel pump relay circuit malfunction	FUEL PUMP RELAY
13	P0480	Radiator fan relay circuit malfunction	FAN RELAY
14	P0511	Short circuit to ground or open circuit	IDLE AIR CONTROL SYSTEM
15	P1471	Short circuit to ground or open circuit	HEAD LIGHT RELAY
	P1472	Short circuit to battery	
16	P044F	Short circuit to battery	SECONDARY AIR INJECTION SYSTEM
	P0412	Short circuit to ground or open circuit	
17	P0301	Engine misfire	IGNITION SYSTEM

4. Fuel Injection System

No.	DTC	Monitoring strategy	Component
18	P0134	Primary HEGO Sensor Circuit Inactive Malfunction	O ₂ SENSOR
	P0133	Primary HEGO Sensor deterioration	
19	P0053	Primary HEGO Sensor Heater Resistance	O ₂ SENSOR
20	P0068	Engine Load correlation - PM and TPS error	MAP/MAF
	P0069	PM and PA - Correlation error	MAP
21	P011B	1. Soaked time is greater than or equal to predetermined value; 2. Engine coolant temperature sensor and Intake air temperature sensor deviation value is greater than predetermined value.	ENGINE COOLANT TEMPERATURE AND INTAKE AIR TEMPERATURE SENSOR
22	P0125	Estimation virtual coolant temperature greater than or equal to predetermined value.	ENGINE COOLANT TEMPERATURE SENSOR
	P050C	3. Soaked time is greater than or equal to predetermined value. 4. Coolant temperature is greater than predetermined value.	
23	P0111	When sensor input voltage within the range of Out of Range and the time has passed longer than predetermined value.	INTAKE AIR TEMPERATURE SENSOR
24	P0507	1. Engine is idling. 2. Engine temperature is more than or equal to predetermined value; 3. Below the prescribed vehicle speed; 4. Engine RPM is more than or equal to predetermined (high) value, is kept over predetermined time.	IDEL AIR CONTROL SYSTEM
	P0506	1. Engine is idling; 2. Engine temperature is more than or equal to predetermined value; 3. Below the prescribed vehicle speed; 4. Engine RPM is more than or equal to predetermined (low) value, is kept over predetermined time.	
25	P1630	Too low input voltage	ROLLOVER SENSOR

Troubleshooting Table

Test items Abnormal phenomena		Comprehensive testing program							Parts		
		Power voltage	Fuel press.	Ignition state	Engine vacuum	Injection state	closed-loop control system	Fault Code Detection	ECU	Throttle position sensor	Engine temp. sensor
Start state	Can't start	○	○	○	○	○		○	○		
	Difficult to start	○	○		○			○		○	○
Idle state	Without idle			○	○	○		○		○	○
	Idle not smooth					○	○	○	○	○	
	RPM NG							○	○		
	CO NG		○			○	○	○	○		
Acceleration	Not smooth		○	○	○	○		○	○	○	○
	Inability and slow		○	○	○	○		○	○	○	○
Flameout	Idle flameout				○			○			
	Acceleration flameout							○	○		
Related spare parts		Rollover sensor	Fuel pump	Ignition coil	Inlet pipe	Injector	O ₂ sensor				
		Power relay	Fuel pressure adjustment valve	Spark plug	Cylinder head	Fuel pump	Secondary air injection solenoid valve				
		Security unit	Fuel pump relay		Inlet pressure sensor	Fuel pressure adjustment valve					
		Main switch	Fuel filter								
		Battery									

Notes: 1. Integrated test motorcycle, according to the "Comprehensive Maintenance list" implementation.
 2. Spare parts, according to the "EFI System components description" implementation.

4. Fuel Injection System

Comprehensive Maintenance List

No.	Maintenance Project	Testing Procedures	Test items	Determine benchmarks	Fault reasons
1	Power and voltage	<ul style="list-style-type: none"> • Use meter direct measurement battery voltage • Use diagnosis tool detection of battery voltage 	<ul style="list-style-type: none"> • Battery voltage 	<ul style="list-style-type: none"> • Battery voltage = 10V Above 	<ul style="list-style-type: none"> • Battery electricity • Battery connector loose • Harness circuit opening • ECU coupler not connected properly
2	Fuel pressure	<ul style="list-style-type: none"> • Use fuel pressure gauge, connected in series between the injector and the Pressure Regulating Valve • Main switch ON, but not start engine • Check fuel pressure • Start engine (idle) • Check change of the fuel pressure • throttle several rotation • check to the change of fuel pressure again 	<ul style="list-style-type: none"> • Open the main switch, but do not to start the engine of pressure • Pressure in idle • Rotating throttle, situation of pressure changes 	<ul style="list-style-type: none"> • Open main switch, but do not start the engine of pressure: = 250kPa (Stable value) • Idle state: pressure = 294±6kPa (Beating situation from top to bottom) • rotation throttle moment: pressure = 294±6kPa (Slightly beating) 	<ul style="list-style-type: none"> • Fuel not enough • Security switch not disarm • Fuel pump relay fault • Fuel pump fault • Injector fault • ECU fault
3	Ignition state	<ul style="list-style-type: none"> • The spark plug removed from the cylinder head, but the power lines still ring • Start engines or use for the diagnosis tool of output View spark plug ignition conditions 	<ul style="list-style-type: none"> • Spark plug specifications • Whether the spark plug ignition • Spark plug sparks whether it is normal strength 	<ul style="list-style-type: none"> • Specifications: NGK-CPR8EA-9 • Ignition conditions: With traditional engines found ways 	<ul style="list-style-type: none"> • Spark plug fault • Rollover sensor fault • ECU No. 5 pin fault • Ignition coil fault • Crankshaft position sensor fault
4	Engine vacuum	<ul style="list-style-type: none"> • Diagnosis tool to detect the use of 	<ul style="list-style-type: none"> • Manifold pressure of diagnosis tool 	<ul style="list-style-type: none"> • Manifold pressure = 32~38kPa 	<ul style="list-style-type: none"> • Valve clearance abnormal • Intake system leak
5	Injection state	<ul style="list-style-type: none"> • The injector removed from the throttle body, but not dismantle pipeline • Main switch ON, but not start 	<ul style="list-style-type: none"> • Open the main switch, but did not start engine the injection situation • Injector state 	<ul style="list-style-type: none"> • Not started, injector not leaking fuel • In started, the injection state must show fan shape 	<ul style="list-style-type: none"> • Security unit is configured not disarm • Fuel pump relay fault • Fuel pump fault • Injector fault

4. Fuel Injection System

No.	Maintenance Project	Testing Procedures	Test items	Determine benchmarks	Fault reasons
		engine <ul style="list-style-type: none"> Investigation the injector it's leaking fuel? Once again start engines or use for the diagnosis tool of output function Check injector fuel injection and the injection situation 	when start		<ul style="list-style-type: none"> ECU fault
6	Closed - loop control system	<ul style="list-style-type: none"> Use of diagnostic tool observation O₂ Sensor voltage changes 	<ul style="list-style-type: none"> Stable condition, sensor voltage variation (Idle continued 5 minutes later to measurement) 	<ul style="list-style-type: none"> Idle stable condition: O₂ Sensor voltage = 50 ~ 200mV (Show from top to bottom beating phenomenon) 	<ul style="list-style-type: none"> O₂ Sensor fault ECU fault
7	Fault Code Detection	<ul style="list-style-type: none"> Use of the diagnosis tool existing fault-detection code or historical Fault Code Elimination of the implementation of fault codes, check can be eliminated Once again start engine Check fault is it happen again 	<ul style="list-style-type: none"> Diagnosis tool of the fault code is it can be eliminated Start again, the fault is it will happen again 	<ul style="list-style-type: none"> Without any residual Fault Code If residual Fault Code, according to the "Fault Code Maintenance Form" implementation of troubleshooting 	<ul style="list-style-type: none"> throttle position sensor fault Engine temperature sensor fault Intake temperature sensor fault Manifold pressure sensor fault O₂ Sensor fault Crankshaft position sensor fault ECU fault Rollover sensor fault

Notes: 1. Fuel pressure gauge connected between the fuel tank and injector, open the main switch to repeatedly shut down, fuel system makes pressure stability.
 2. Injector and injector cap tightly by hands, fuel spills should not be the case

4. Fuel Injection System



NOTE:



5. Engine Removal

Precautions in Operation..... 5-1	Engine Hanger..... 5-11
Engine Removal & Installation..... 5-2	Engine Hanger Rubber Bush 5-12

Precautions in Operation

- The engine has to be supported with special service tools that can be lifted or adjustable.
- The following parts can be maintained without removing the engine from the frame.
 - 1.Carburetor or EFi injection system parts.
 - 2.Cylinder head, cylinder, and piston.
 - 3.Driving pulley, driving belt, clutch, and driving disc assembly.
 - 4.Final gear reduction mechanism.

Specification

Item		Standard
Engine oil capacity	Replacement	1800 c.c.
	Disassembly (oil filter replaced)	1900 c.c.
	Disassembly	2000 c.c.
Gear oil capacity	Replacement	330 c.c.
	Disassembly	350 c.c.
Coolant capacity	Engine & radiator	1700 c.c.
	Reservoir	170 c.c. as indicator shown
	Total	1870 c.c.

Torque Value

Engine hanger bolt	7.0~9.0 kgf-m
Engine hanger nut	5.0~7.0 kgf-m
Rear cushion bolt (upper/lower)	3.5~4.5 kgf-m
Rear wheel axle nut	11.0~13.0 kgf-m
Rear arm bolt	3.4~4.5 kgf-m
Rear brake caliper bolt	2.9~3.5 kgf-m
Muffler mounting bolt	2.4~3.0 kgf-m
Muffler band bolt	1.8~2.5 kgf-m
Muffler protector bolt	1.0~1.4 kgf-m

5. ENGINE REMOVAL

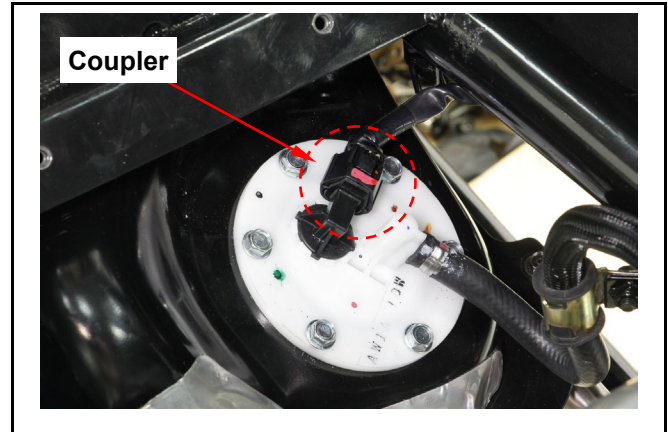
Engine Removal & Installation

Removal

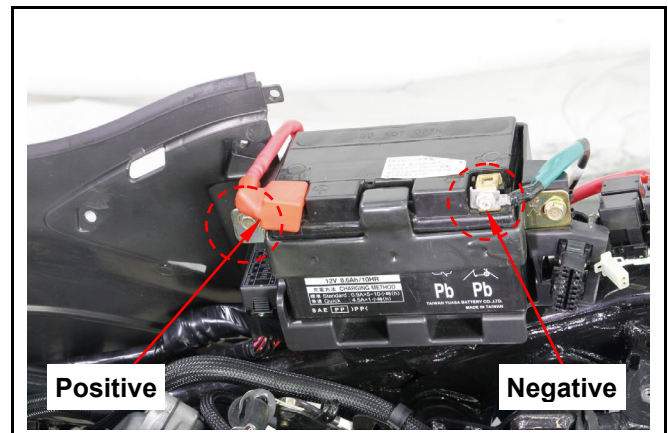
Remove the luggage box, seat, rear carrier, rear body Cover, taillight, rear fender, L/R side covers, fuel tank cap garnish, center cover, R/L floor panels. (Refer to chapter 13)

Disconnect fuel pump coupler.

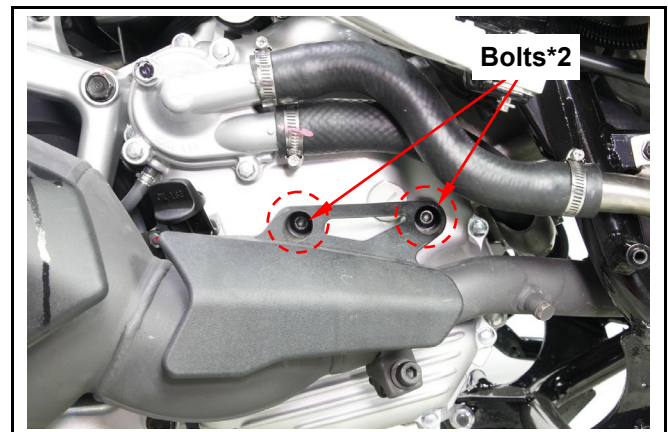
Turn on the engine to use up residual fuel in fuel pipe until stalling.



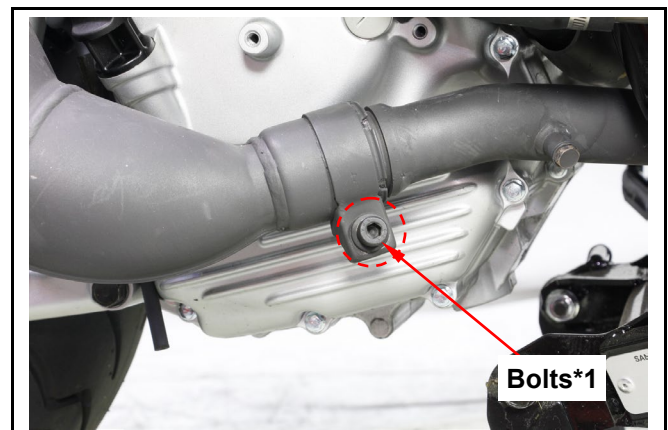
Remove negative cable first, and then remove positive cable for battery.



Remove muffler protector bolts.



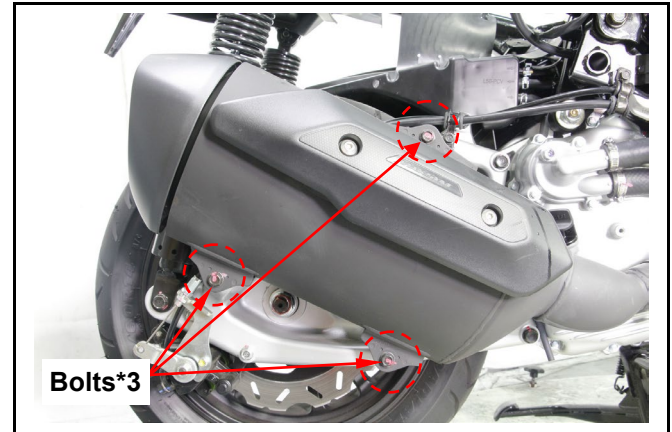
Remove muffler band bolt.



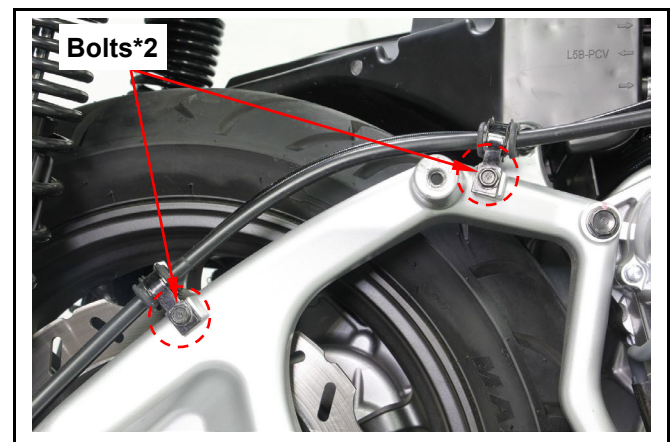


5. ENGINE REMOVAL

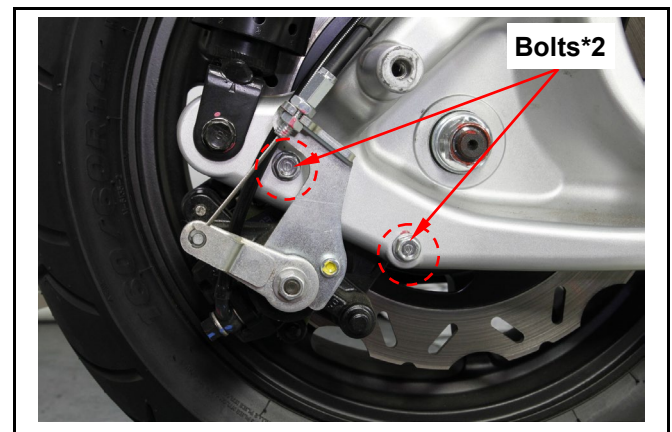
Remove muffler mounting bolts.
Remove the exhaust muffler.



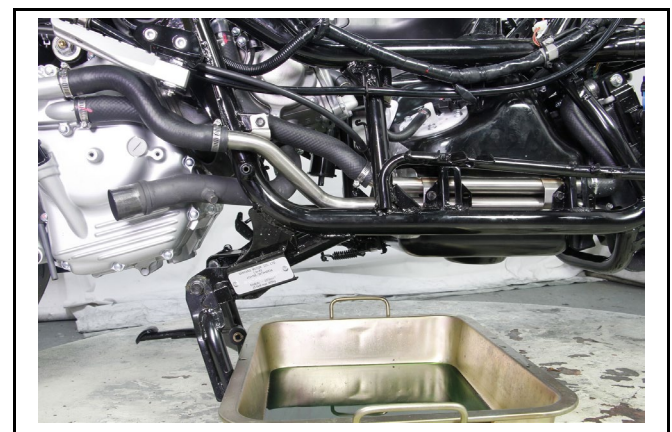
Remove the clamp bolts for rear brake hose.



Remove the mounting bolts for rear brake caliper.



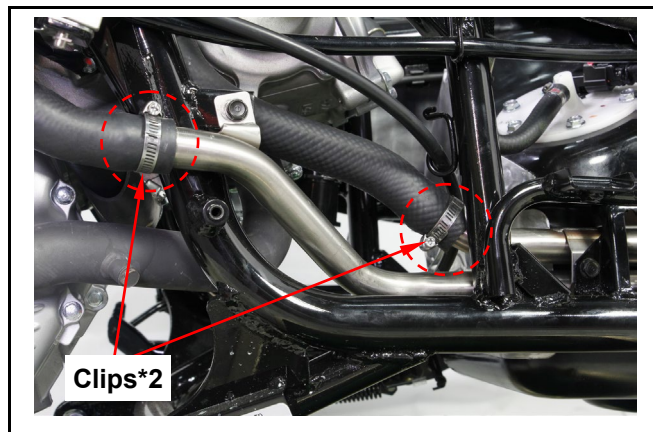
Place a water basin under the engine.



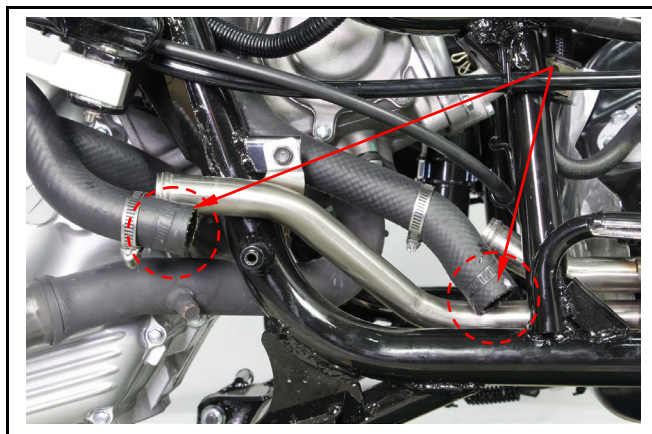
5. ENGINE REMOVAL



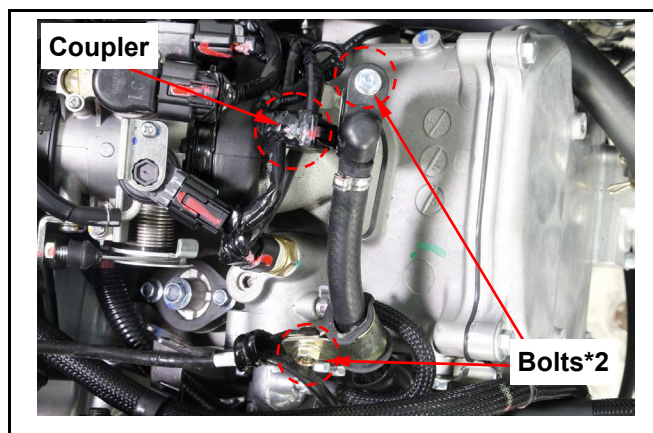
Remove clips for coolant hoses.



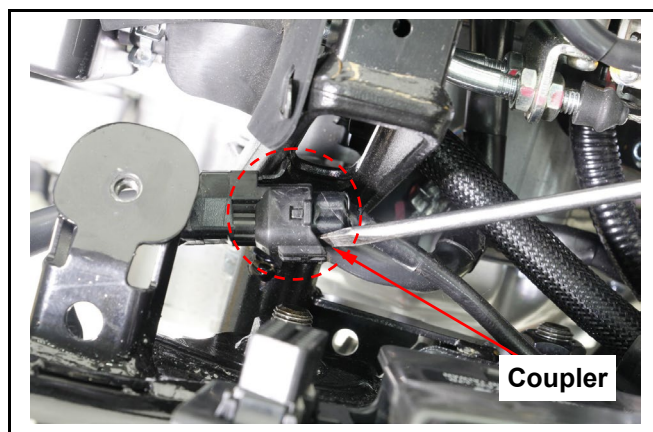
Remove the coolant hoses.



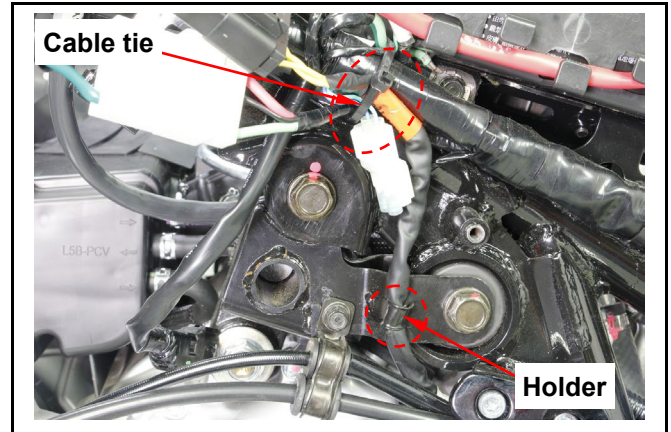
Remove the coupler and bolt for fuel injector.
Remove bolts for clip.



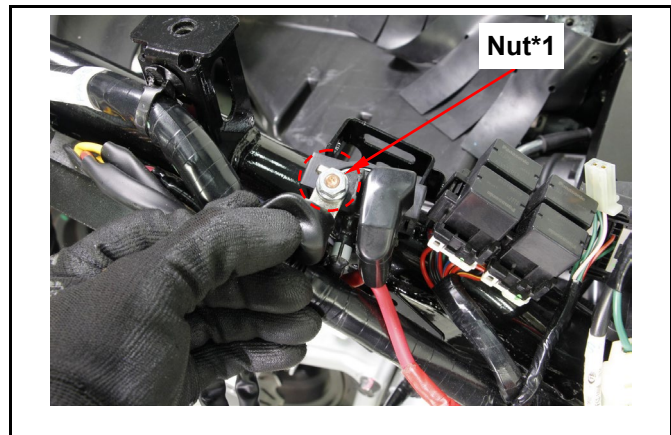
Remove coupler for O₂ sensor.



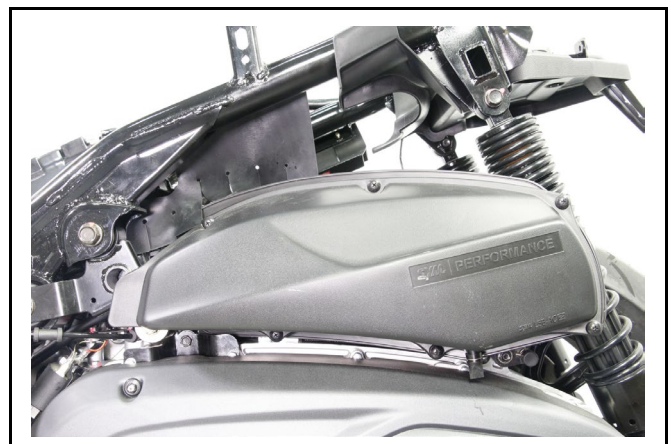
Open holder for A.G.C wire.
Remove cable tie for A.G.C wire.



Remove nut for wire.

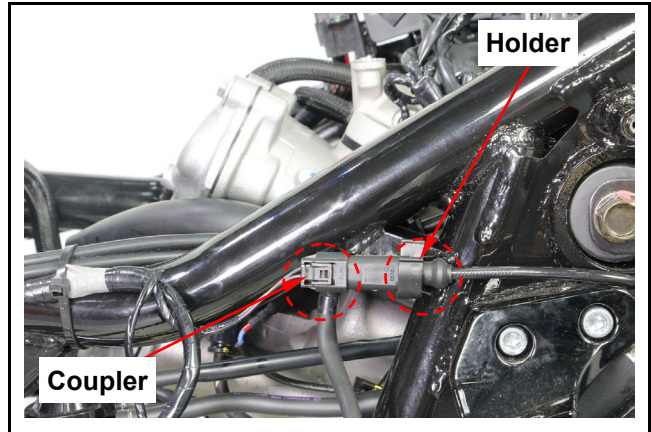


Remove air cleaner (Refer to chapter 4, page 39).

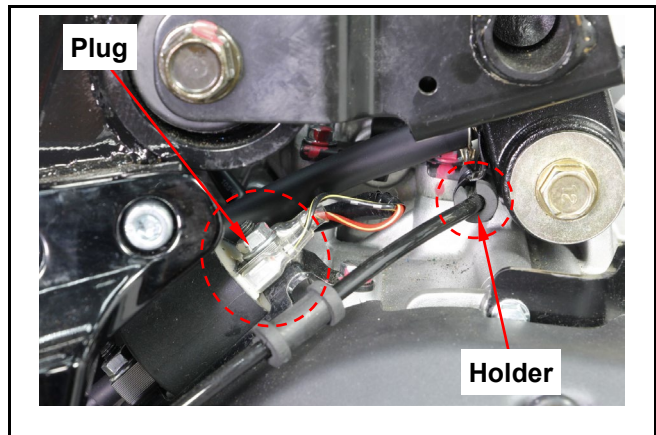


5. ENGINE REMOVAL

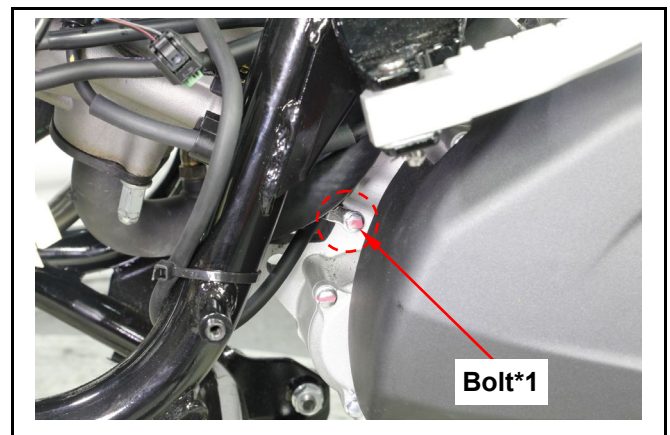
Remove coupler for speed sensor.
Take out wire of speed sensor from wire holder.



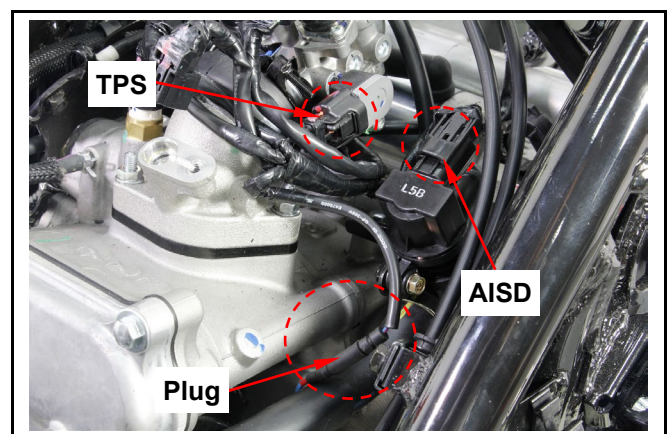
Disconnect plug for ignition coil.



Remove grounding bolt.



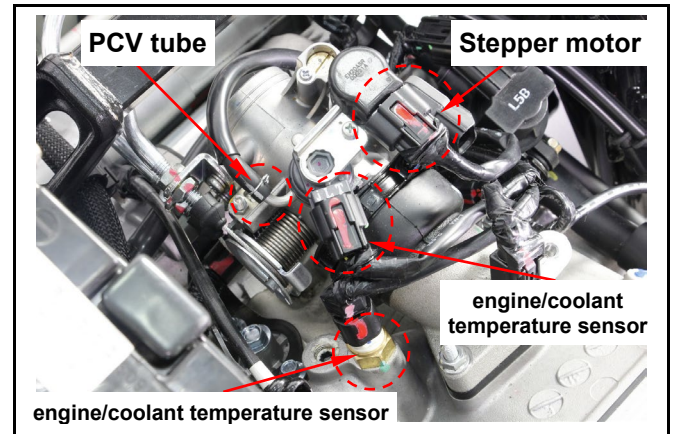
Disconnect couplers for throttle position sensor (TPS) and air injection solenoid valve (AISD).
Disconnect plug for oil pressure switch.



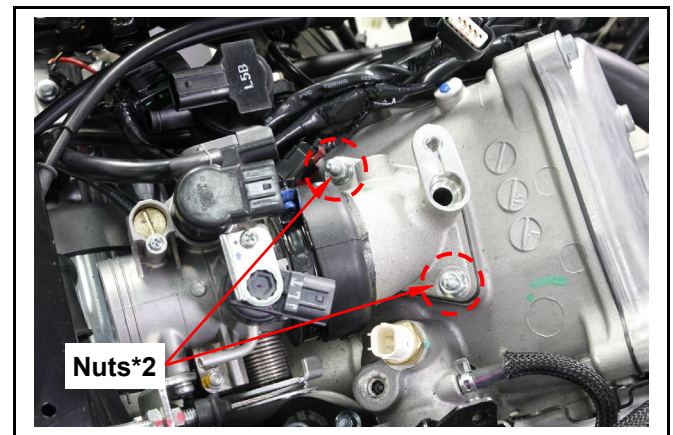


5. ENGINE REMOVAL

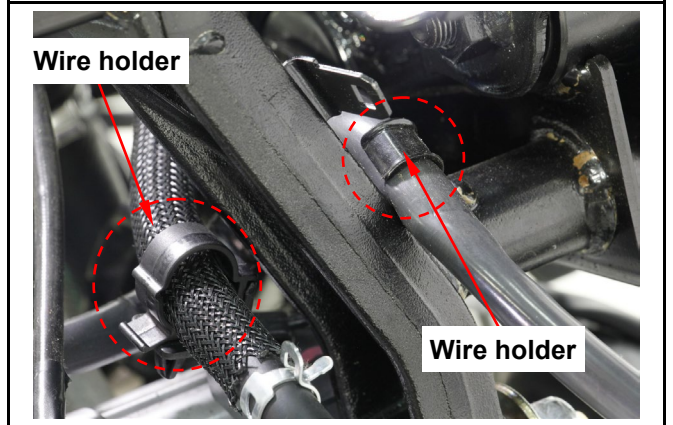
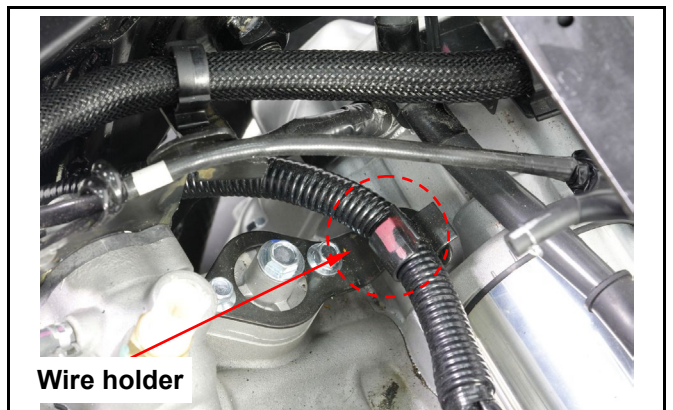
Disconnect couplers for stepper motor, air pressure / temperature sensor, and engine / coolant temperature sensor
Remove PCV tube.



Remove nuts for inlet air pipe.
Remove inlet air pipe and throttle body.

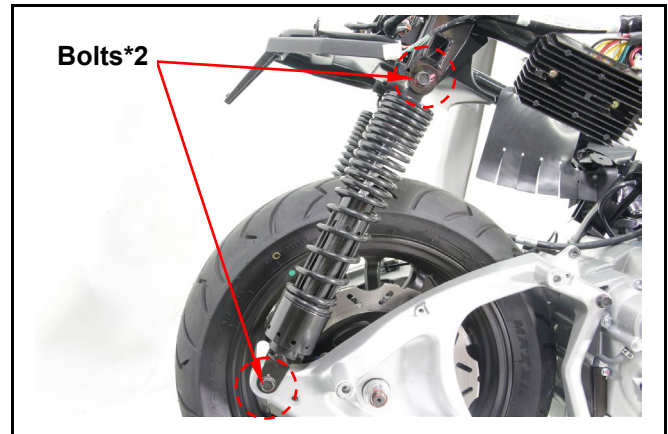


Open the wire holders to take wire out.

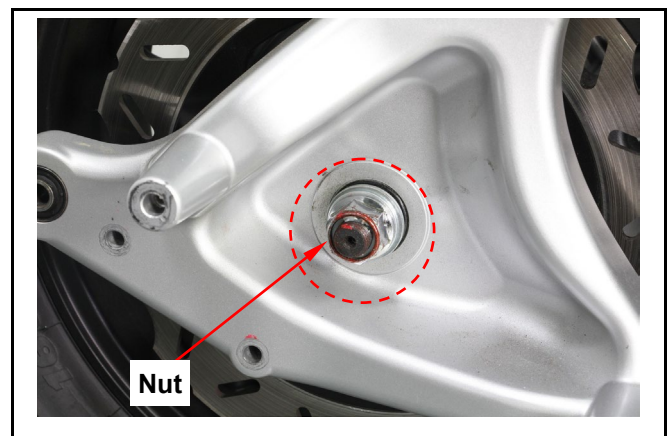


5. ENGINE REMOVAL

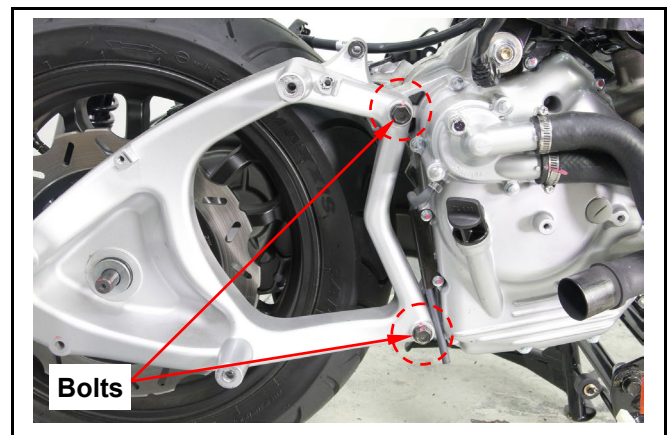
Remove RR cushion bolts.



Remove rear wheel axle nut.



Remove rear arm mounting bolts.



Remove the rear arm.



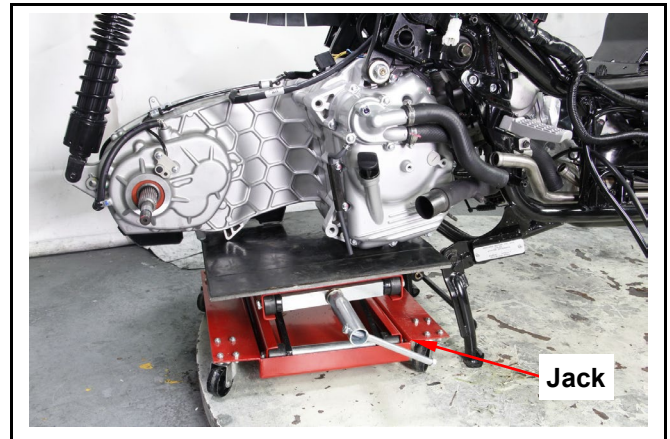


5. ENGINE REMOVAL

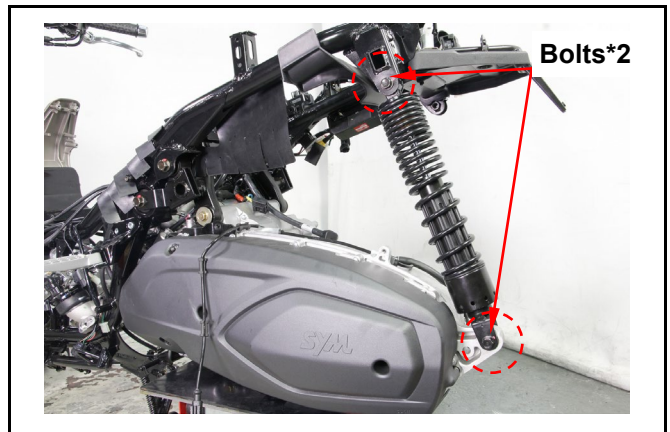
Remove the rear wheel.



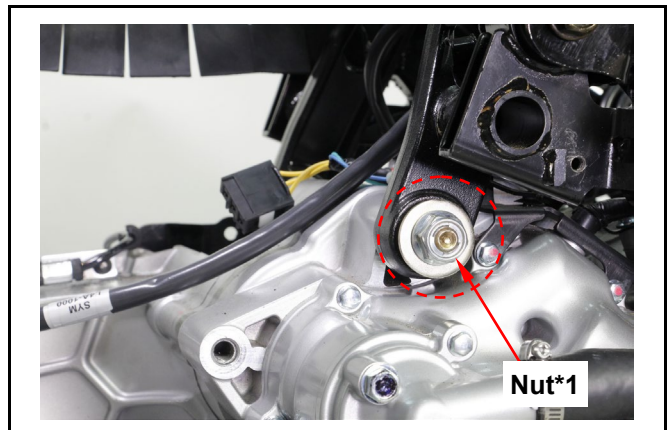
Use a jack to hold the engine.



Remove RL cushion bolts.



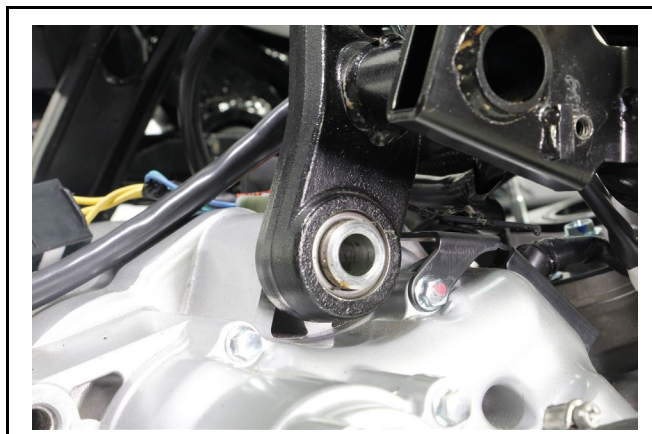
Remove engine hanger nut.



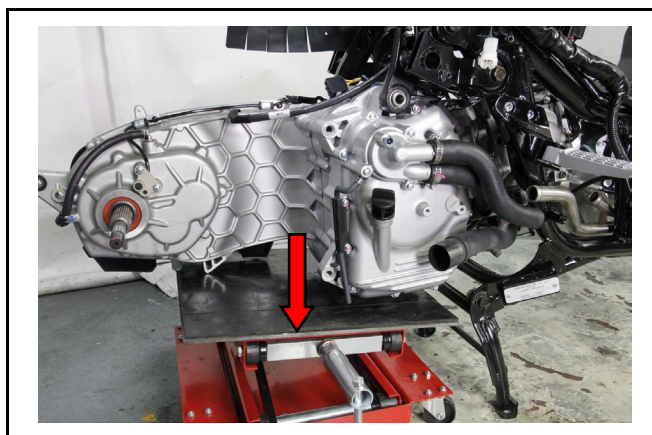
5. ENGINE REMOVAL



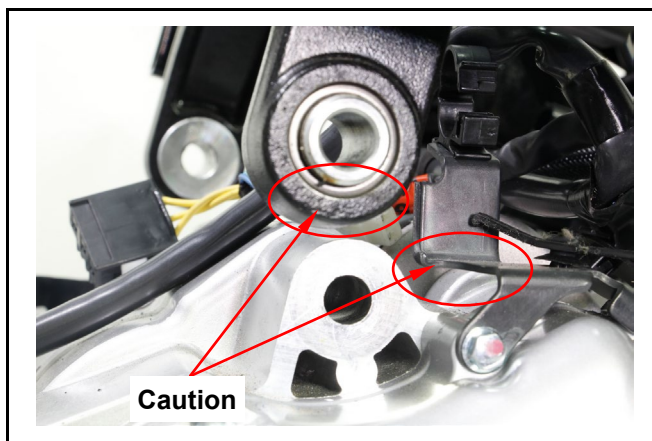
Remove the bolt for engine hanger.



Adjust the height for jack,



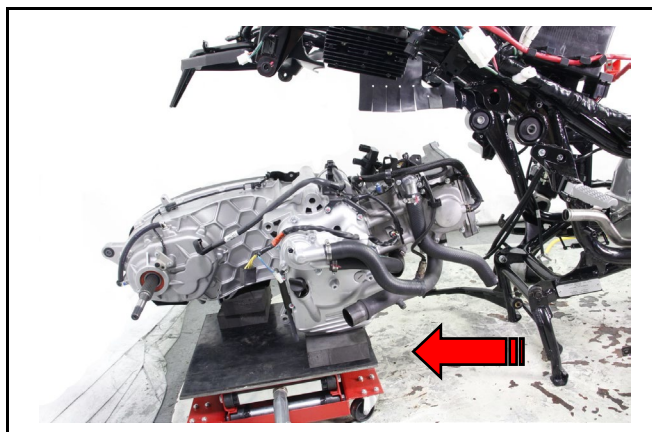
Carefully separate the engine and frame.



Move the jack backwards to separate the engine from frame.

Installation

Installation is in the reverse order of removal.

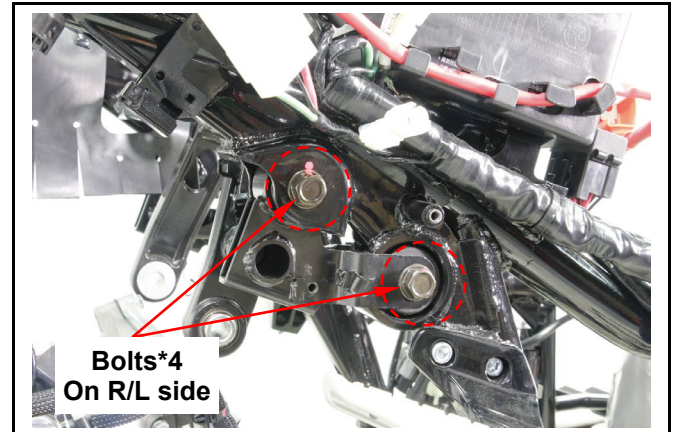


Engine Hanger

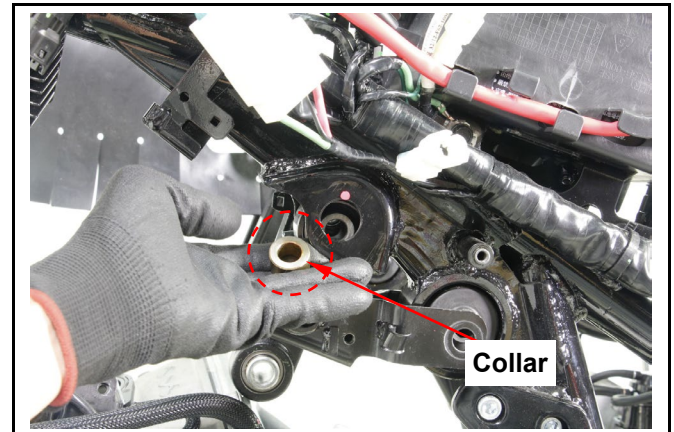
Removal

Remove the engine hanger bolts on R and L side of engine.

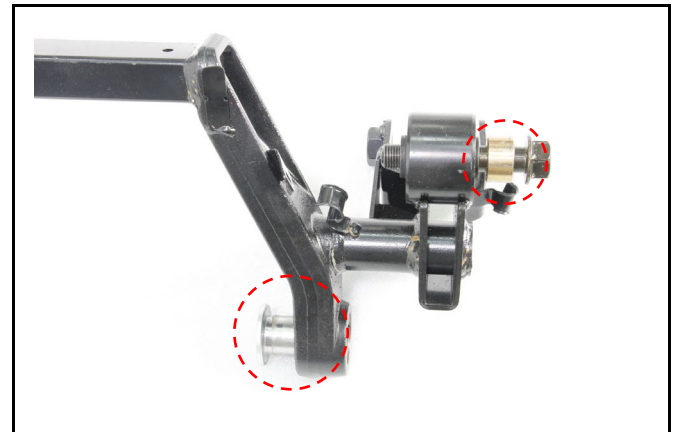
Check if the rubber bush of engine hanger is damaged or not, replace it if necessary.



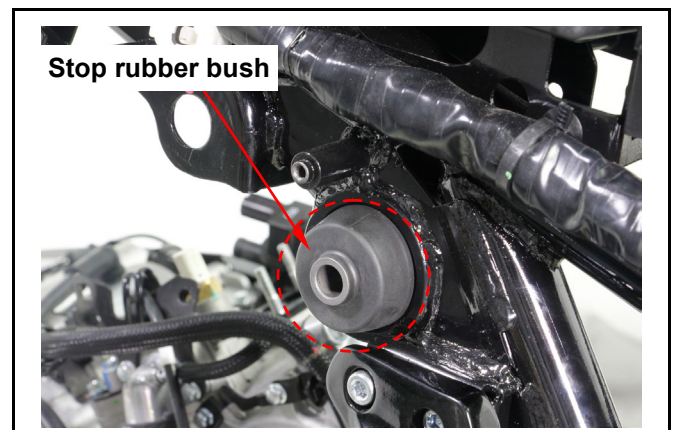
Be careful not to lose the collar when removal.



The position of the engine collars.



Push the stop rubber bush gently to remove it with hand.



5. ENGINE REMOVAL

Engine Hanger Rubber Bush

Inspection

Check if the rubber bush of the engine hanger and rear cushion is damaged.

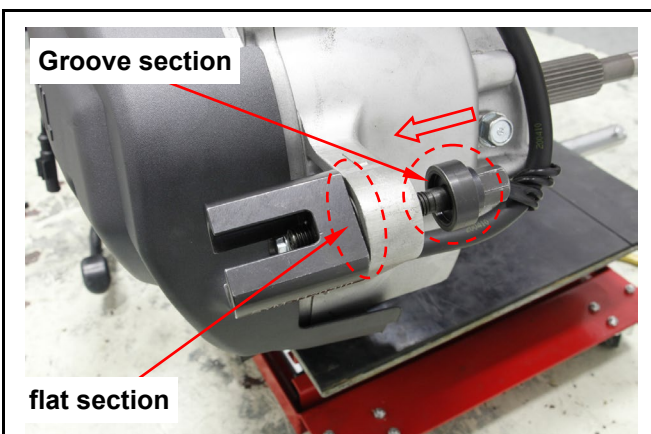
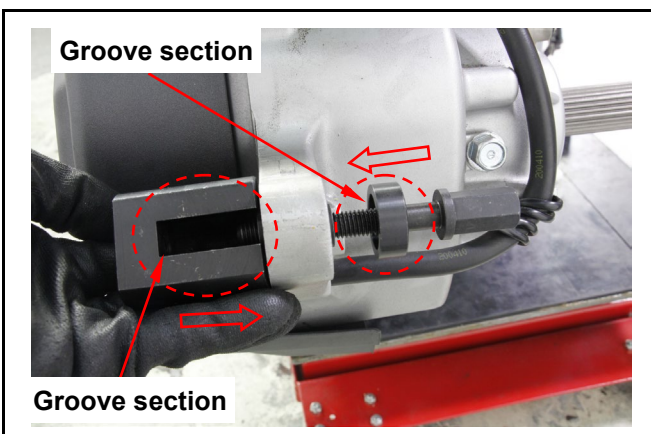
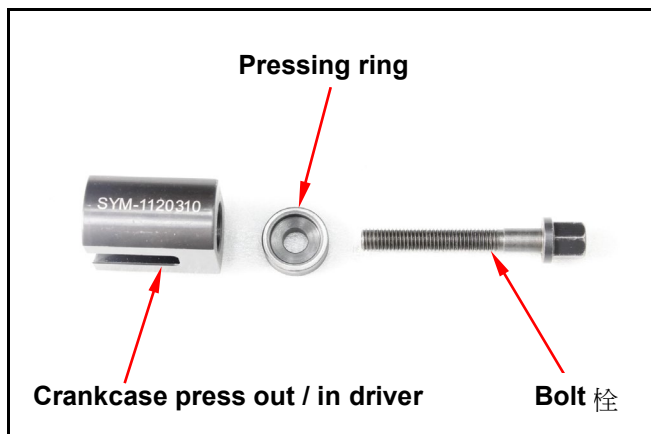
- Special tool :
Crankcase press out / in driver
No. SYM-1120310

Pressing out

Place the groove of the special tool toward the bush, then tighten in pressing ring and bolt to press the bush out.

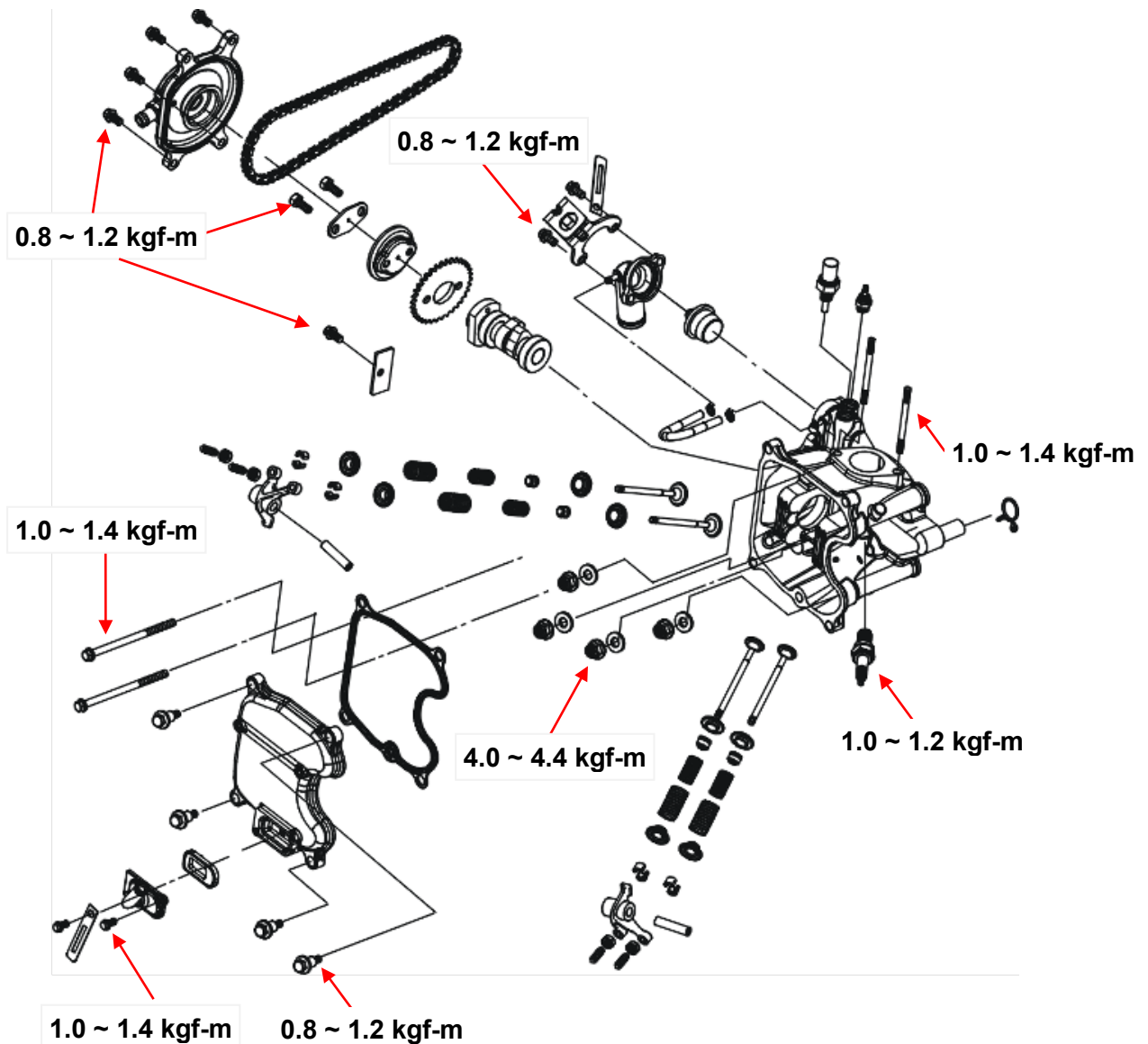
Pressing in

Place the flat section of the special tool toward the bush, then drive the bush, pressing ring and bolt in to install the bush.



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



6. Cylinder Head / Valve

Precautions in Operation

General Information

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

Troubleshooting

Engine performance will be affected by engine troubles. The problems usually can be diagnosed by performing a cylinder compression test or tracing unexpected noise.

Rough idle

- Low cylinder compression

Low cylinder compression

Valve

- Incorrect valve adjustment
- Burned or bent valve
- Incorrect valve timing
- Broken valve spring
- Carbon deposit
- Uneven valve seating
- Incorrect spark plug installation

Cylinder head

- Leaking or damaged cylinder head gasket
- Skewed or cracked cylinder surface

Piston

- Broken Piston ring
- High cylinder compression
- Excessive carbon build-up on piston head or in combustion chamber

Excessive noise

- Incorrect valve clearance
- Burned valve or broken valve spring
- Timing chain looseness
- Worn or damaged timing chain
- Worn or damaged camshaft
- Worn or damaged Auto-tensioner
- Worn or damaged camshaft sprocket
- Worn or damaged rocker arm or rocker arm shaft

Excessive smoke

- Worn valve stem
- Damaged stem seal



6. Cylinder Head / Valve

Specification

Unit: mm

Item			Standard	Limit
Compression pressure			>6 kg/cm ²	---
Camshaft	Height of cam lobe	Intake	35.650~35.830	35.550
		Exhaust	35.271~35.451	35.171
Rocker arm	ID of valve rocker arm		13.000~13.018	13.100
	OD of valve rocker arm shaft		12.973~12.984	12.910
Valve	OD of valve stem	Intake	4.975~4.990	4.920
		Exhaust	4.955~4.970	4.900
	Guide seat		5.000~5.012	5.030
	Clearance between valve stem and guide	Intake	0.010~0.037	0.07
		Exhaust	0.030~0.057	0.09
	Free length of valve spring	Inner	33.70	33.0
		Outer	39.11	38.4
	Valve seat width		0.90~1.10	1.5
Tilt angle of cylinder head			---	0.10

Torque Value

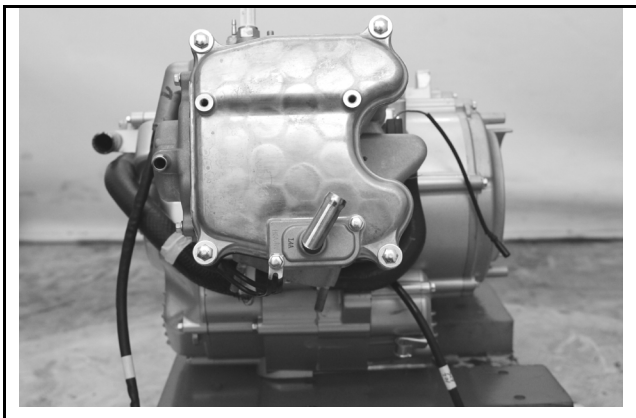
Cylinder head bolt	0.8~1.2 kgf-m
Cylinder head nut	4.0~4.4 kgf-m
Sealing bolt of cam chain auto-tensioner	1.0~1.4 kg-m
Bolt of cam chain auto-tensioner	1.2~1.6 kg-m
Cam sprocket cover bolts	0.8~1.2 kg-m
Cam sprocket bolt	0.8~1.2 kg-m

6. Cylinder Head / Valve



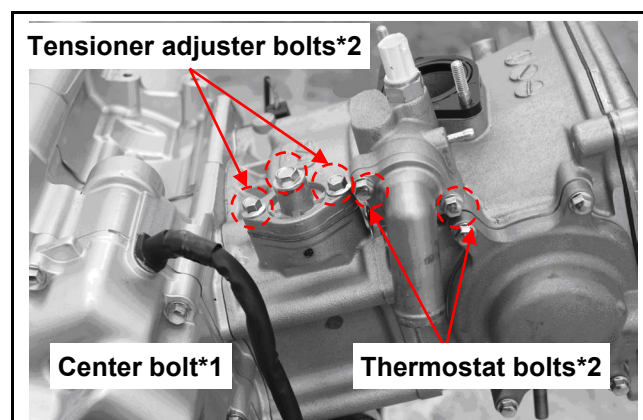
Cylinder Head Removal

Remove the engine. (Refer to Chapter 5)



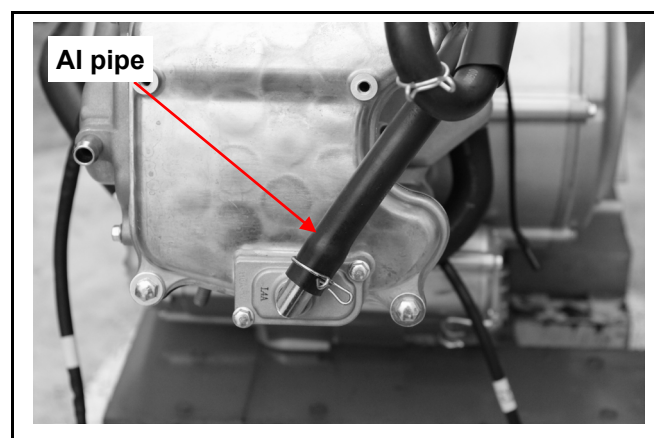
Remove center bolt, spring, and bolts for the tensioner adjuster, and then remove tension adjuster.

Remove 2 bolts for thermostat and then remove the thermostat.

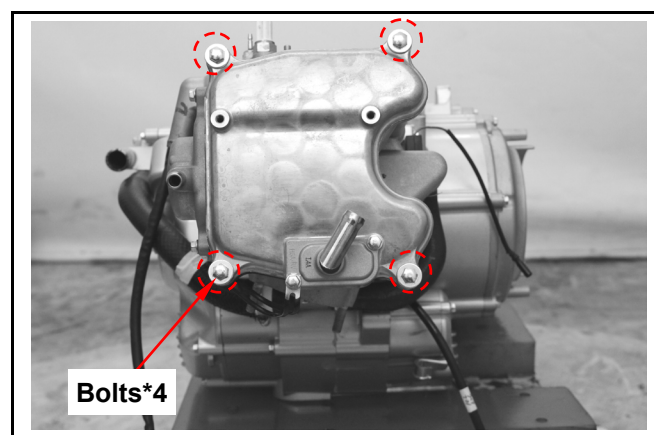


Remove Air Injection system (AI) pipe mounting bolts.

Remove spark plug.

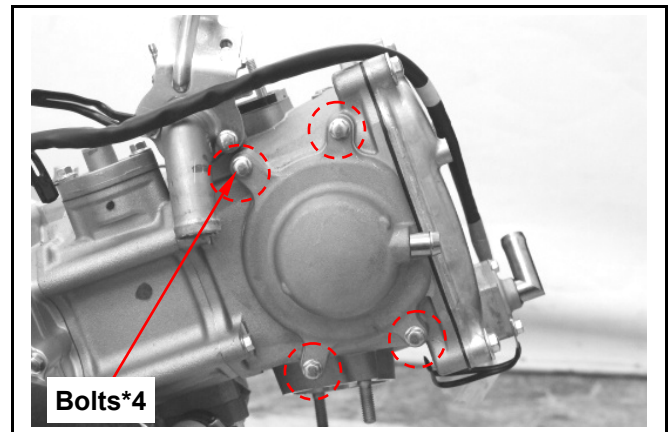


Remove cylinder head cover.

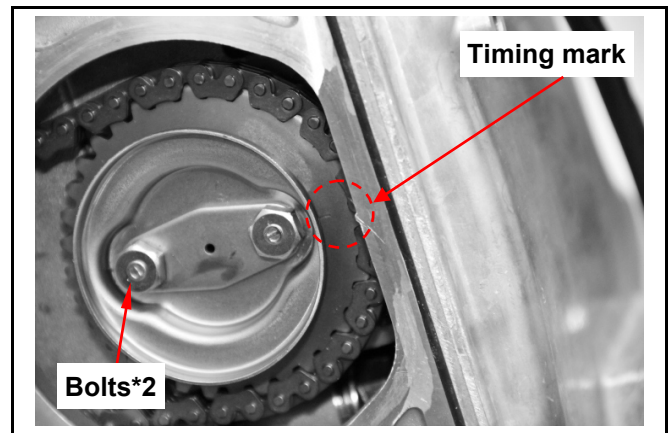


6. Cylinder Head / Valve

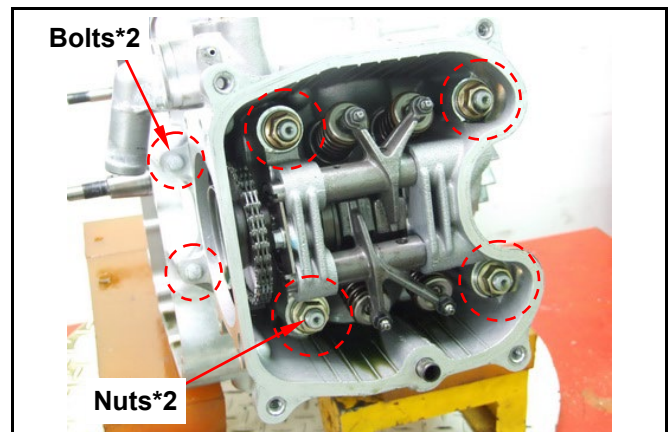
Remove bolts for side cover.
Remove side cover.



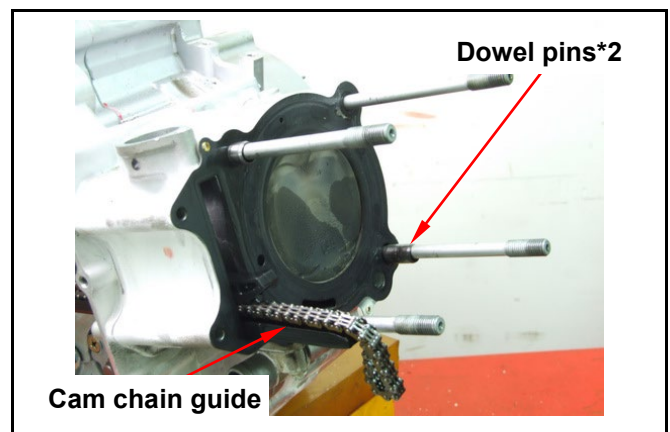
Remove inspection window cap on left crankcase cover for checking Timing mark.
Turn the flywheel counterclockwise, make the "Timing mark" can align the corresponding mark on the crankcase and cam sprocket.
Remove bolts for cam sprocket and then remove the cam sprocket.



Remove mounting bolts for cylinder head, and then remove nuts and washers from cylinder head.
Remove the cylinder head.



Remove cylinder head gasket and dowel pins.
Remove Cam chain guide.
Clean carbon deposit on the surface of cylinder head and valves.
Clean all residues of cylinder head gasket on cylinder surface.

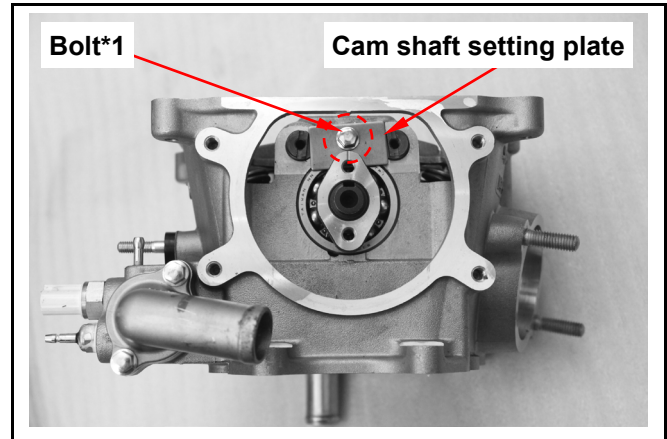


6. Cylinder Head / Valve



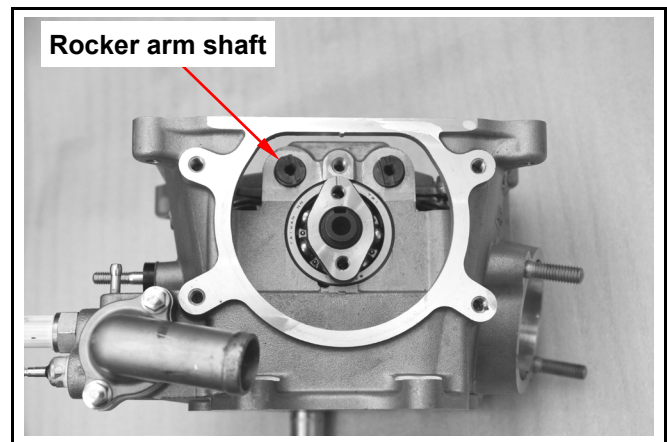
Cylinder Head Disassembly

Remove cam shaft setting plate.



Remove rocker arm shafts and rocker arms.

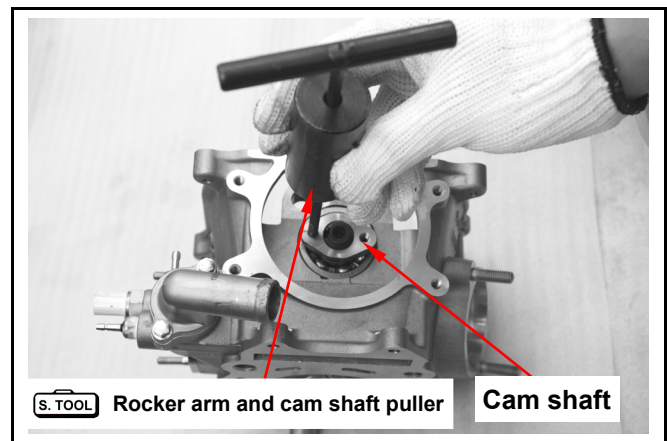
- Special Tool:
Rocker arm and cam shaft puller
No. SYM-1445100-ALL



Remove cam shafts with special tool.

- Special Service Tool:
Rocker arm and cam shaft puller
No. SYM-1445100-ALL

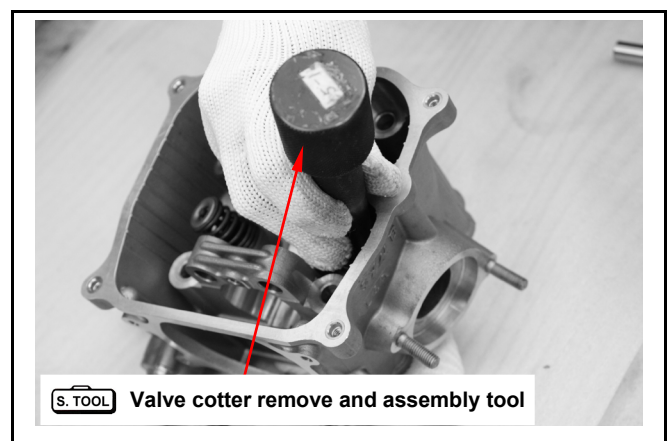
Use a valve cotter remove & assembly tool to press the valve spring, and then remove valve springs, valve locks and valves.



⚠ Caution

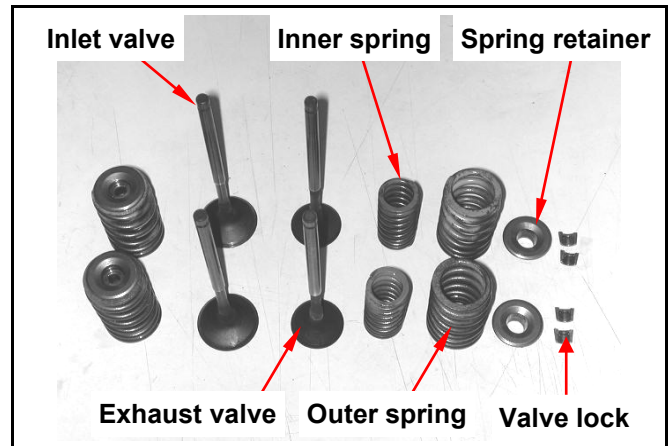
- When pushing down with the valve guide driver, place a soft thing like cloth under the combustion chamber surface to avoid valve stem bent or damaged.

- Special Service Tool:
Valve cotter remove & assembly tool
No. SYM-1471110-SY125

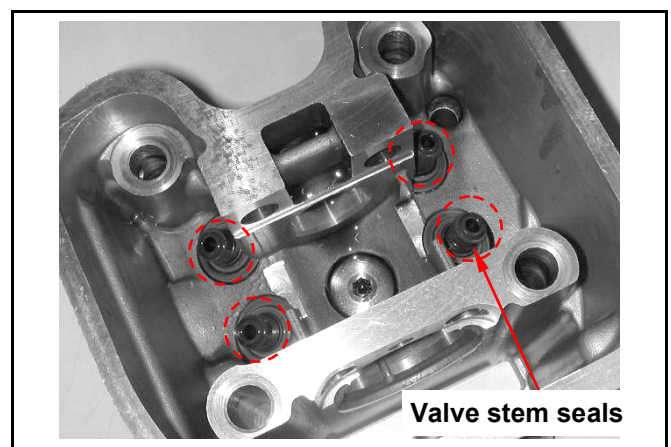


6. Cylinder Head / Valve

Remove valve cotters, spring retainers, springs and valves.



Remove valve stem seals.



Clean carbon deposits in combustion chamber.
Remove hardened residues on aluminum surfaces.

Caution

- Do not damage the aluminum surface of cylinder head.

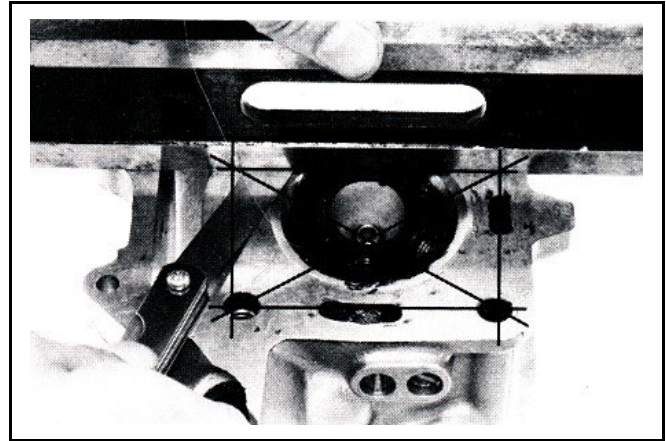


6. Cylinder Head / Valve

Cylinder Head Inspection

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

- Service limit: 0.10 mm

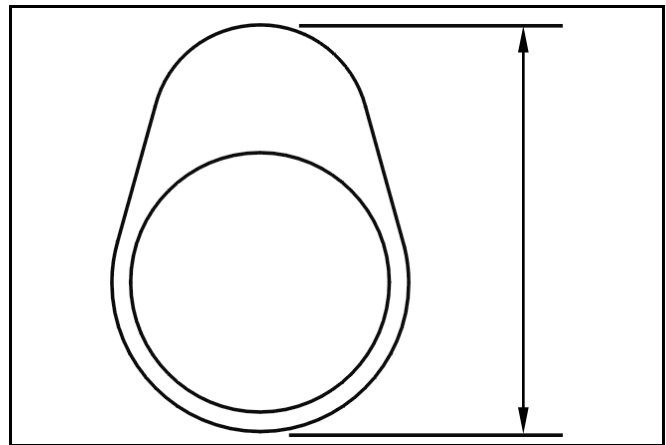


Camshaft

Measure cam lobe height with micrometer. Replace it if necessary.

- Service Limit:
IN: 35.550 mm
EX: 35.171 mm

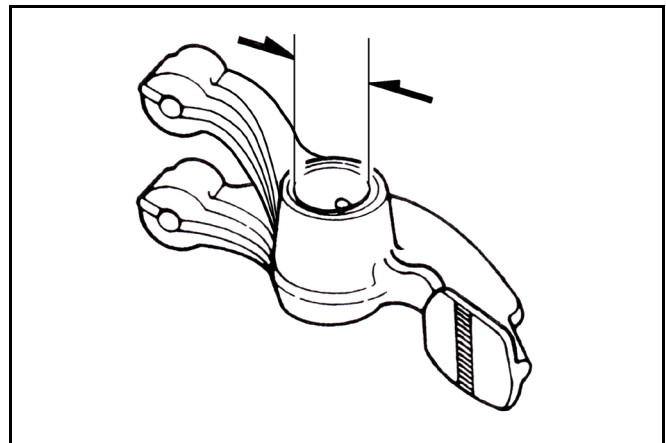
Check if camshaft bearing is loosening or worn. Replace it if necessary.



Rocker Arm

Measure the I.D. for cam rocker arm and check if oil passage of cam rocker is clogged. Replace it if necessary.

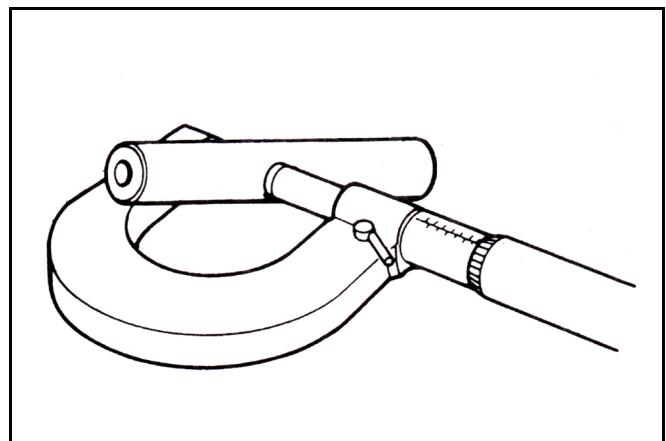
- Service Limit: 13.100 mm.



Rocker Arm Shaft

Measure the O.D. for cam rocker arm shaft. Replace it if necessary.

- Service Limit: 12.910 mm.



Valve spring free length

Measure the free length of intake and exhaust valve springs.

- Service limit:
Inner spring 33.0 mm
Outer spring 38.4 mm

Valve stem

Check if valve stems are bent, cracked or burnt.
Check the operation condition in valve guide for valve stem, and measure & record the valve stem outer diameter.

- Service Limit:
IN: 4.920 mm
EX: 4.900 mm

Valve guide

- Tool: 5.0 mm valve guide reamer
- Measure and record each valve guide inner diameters.

- Service limit: 5.03 mm

Caution

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

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.

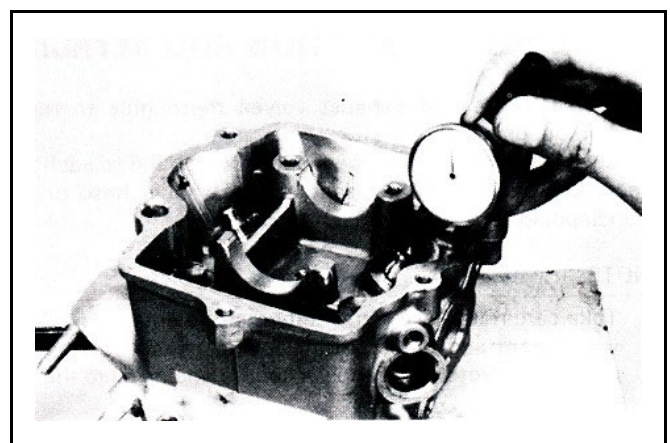
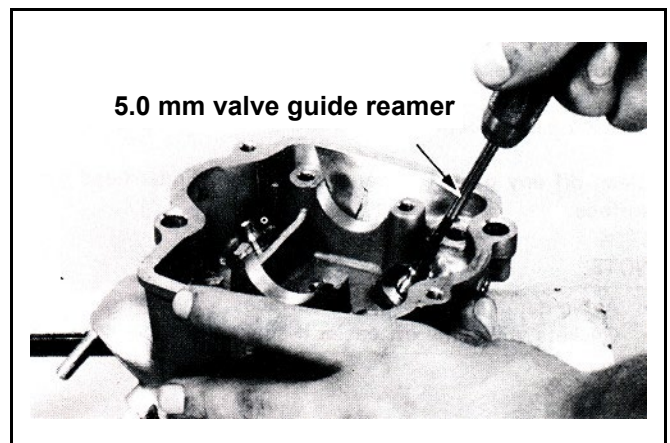
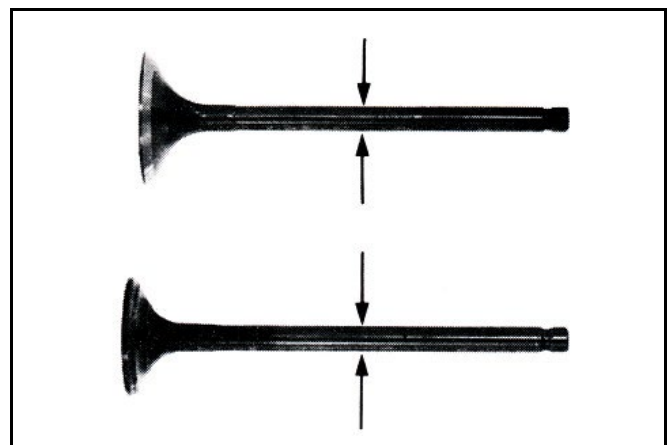
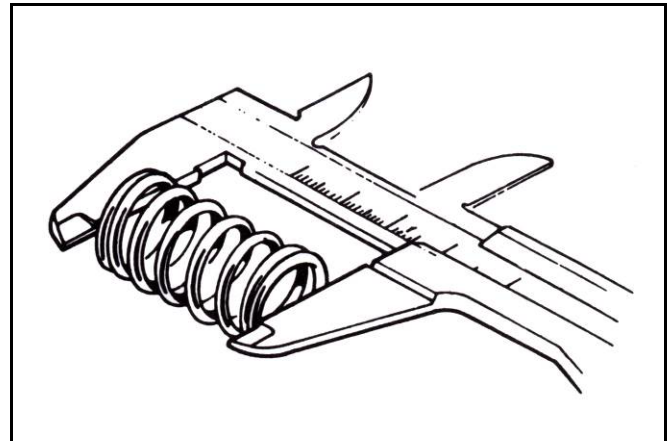
- Service Limit:
IN→0.07 mm
EX→0.09 mm

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.
- It has to correct valve seat when replacing valve guide.

Correct it with reamer after replacement.

If clearance still exceeds service limit after replacing valve guide, replace valve stem too.



6. Cylinder Head / Valve

Valve Stem Replacement

Heat up cylinder head to 100~150 °C with heating panel 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 damaged after installation.
- When install new valve guide into cylinder head, cylinder head temperature still needs to be maintained at 100~150°C.

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

Press in new valve guide from rocker arm side.

- Tool: Valve guide driver: 5.0 mm

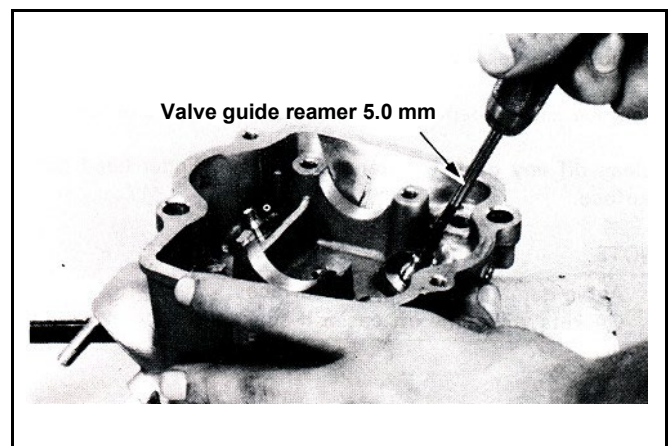
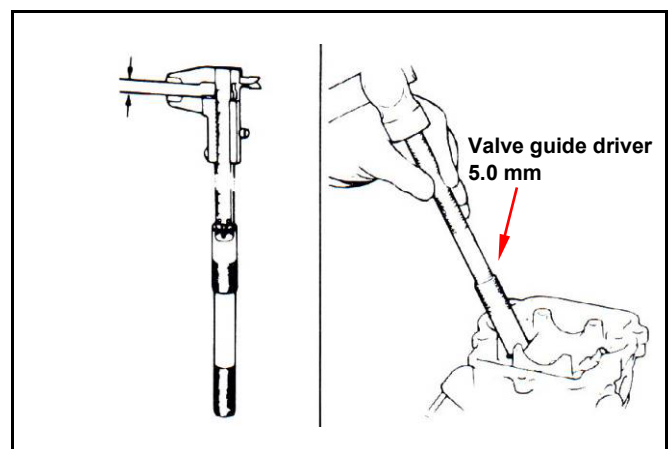
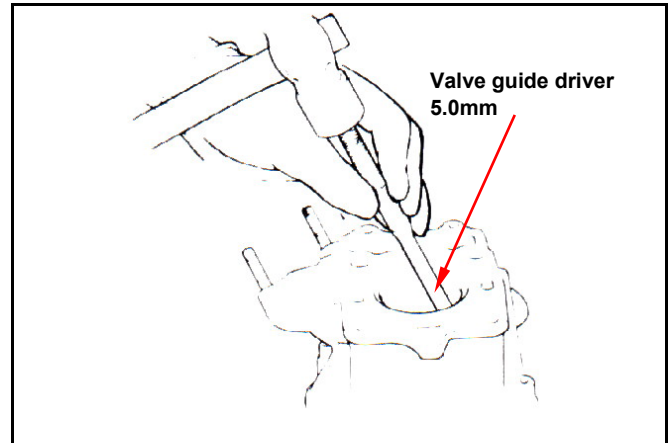
Waiting for the temperature of cylinder head drops to room temperature, correct the new valve guide with reamer.

⚠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 on valve seats including intake and exhaust sides. Coat the contact surface between the valve and the valve seat with emery, and use a special grinding tool to drive the valve to grind each other.

⚠Caution

- Do not let emery remain on the surface between valve stem and valve guide.
- Remove the emery after grinding, and coat engine oil on contact faces between valve and valve seat.

Remove the valve and check whether contact surface is fit.

⚠Caution

- After grinding the contact surface between valve and the valve seat, if the surface still fails to fit, replace it.

Valve seat inspection

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

Valve seat width

- Service limit: 1.5 mm

Check the contact condition for valve seat.

Valve seat grinding

The worn valve seat need to be ground with valve seat chamfer cutter.

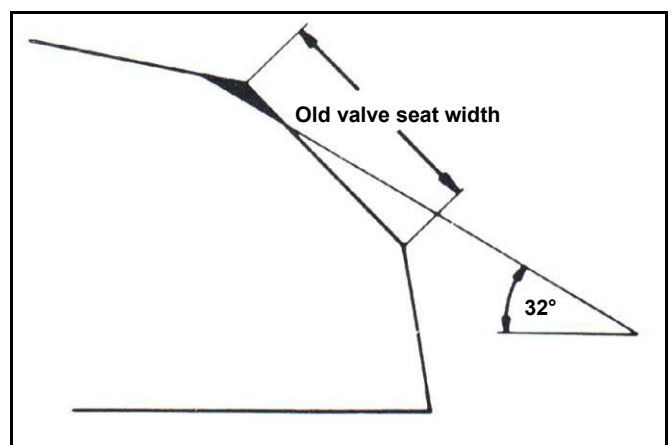
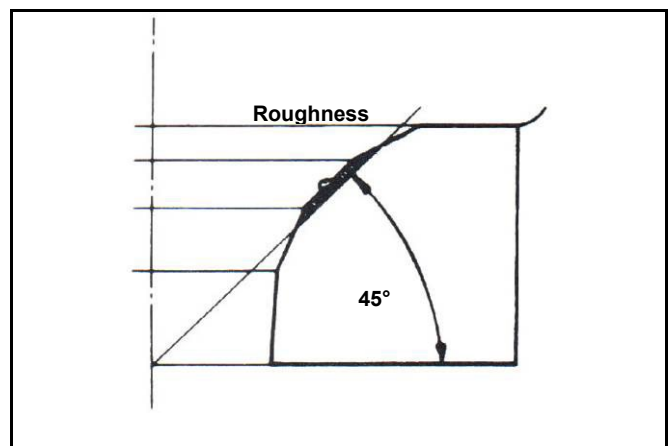
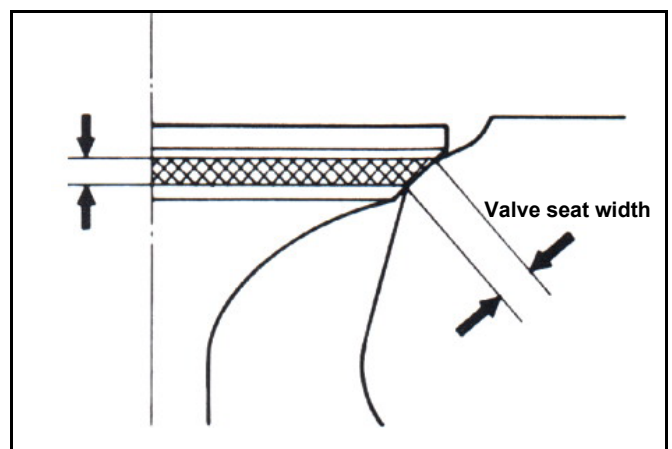
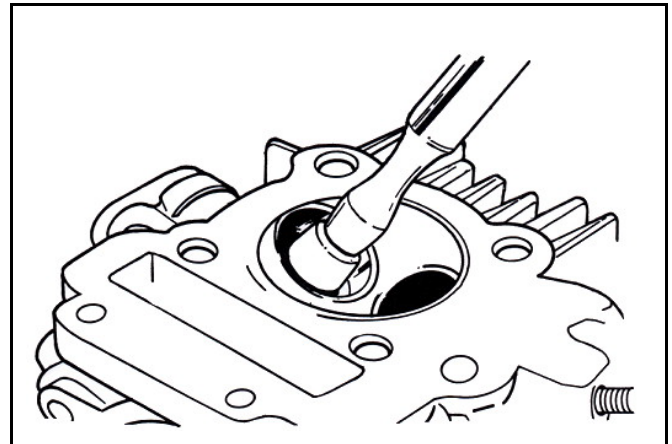
Refer to operation manual of the valve seat chamfer cutter.

Use 45° valve seat chamfer cutter to cut rough or uneven surface of valve seat.

⚠Caution

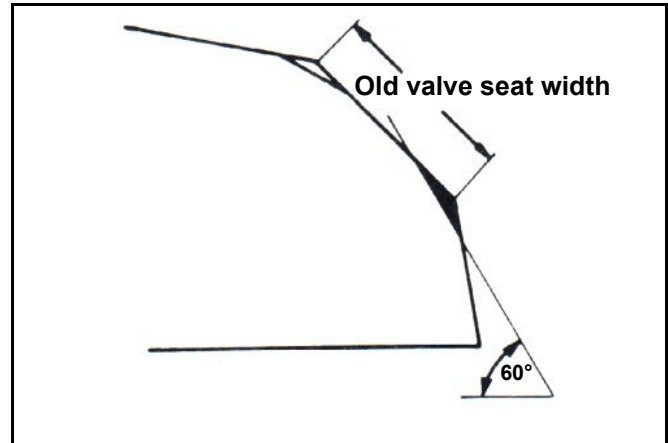
- After replacing valve guide, it has to be ground with 45° valve seal chamfer cutter to correct its seat face.

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



6. Cylinder Head / Valve

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

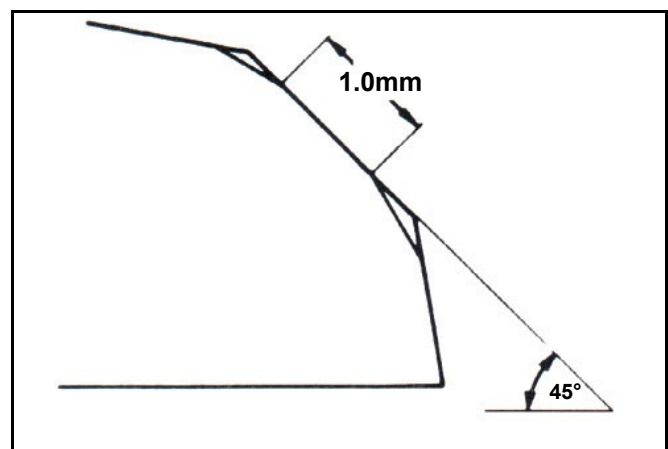


Use 45° cutter to grind the valve seat to specified width.

Caution

- Make sure that all rough and uneven surfaces have been removed.

Grind valve seat again if necessary.



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

Caution

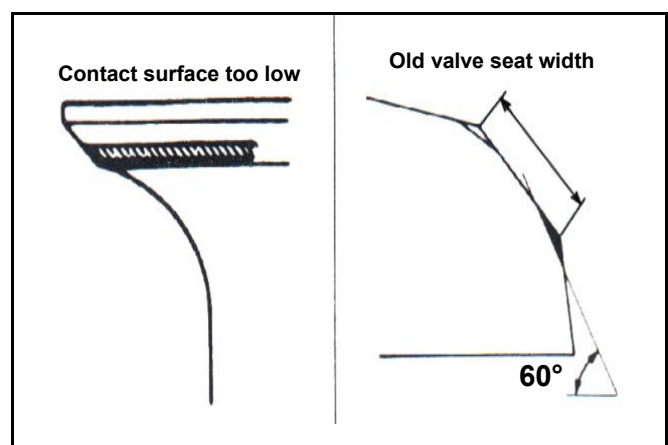
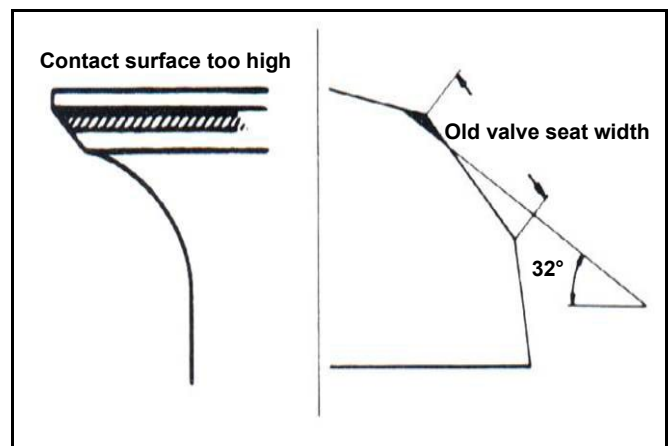
- The contact surfaces of valve and valve seat are very important to the valve sealing capacity.

If the contact surface too high, grind the valve seat with 32° cutter.

Then, grind the valve seat to specified width with 45° cutter.

If the contact surface too low, grind the valve seat with 60° cutter.

Then, grind the valve seat to specified width with 45° cutter.



After grinding valve seat, coat valve seat surface with emery and then slightly press the ground surface.

Clean up all emery coated on cylinder and valve after ground.

Cylinder Head Reassembly

Lubricate valve stem with engine oil, and then insert the valve into valve guide.

Install new valve stem oil seal.

Install valve springs and retainers.

Caution

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

Put the valve cotters onto valve spring retainer.

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

Caution

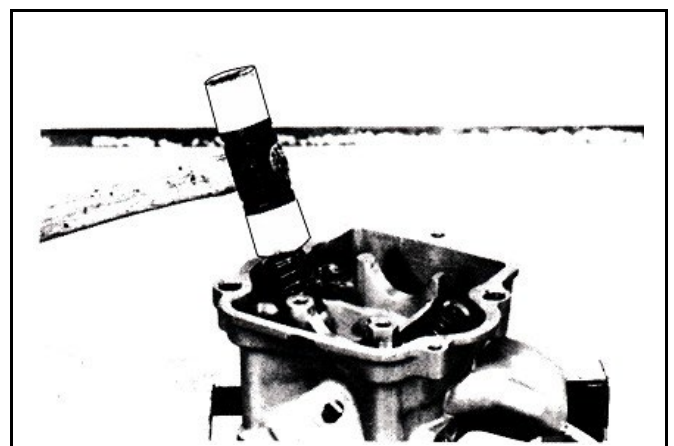
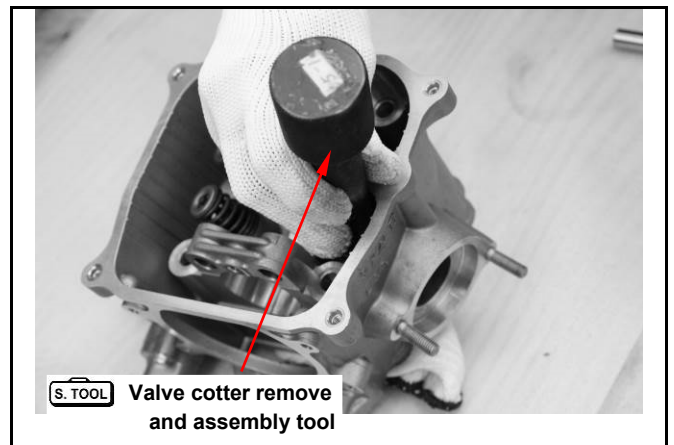
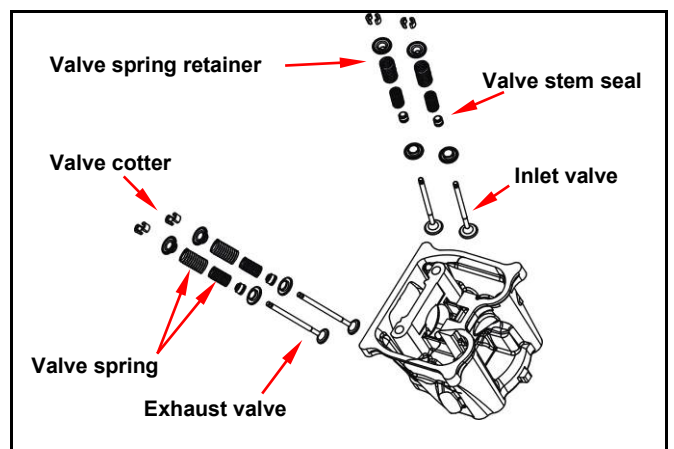
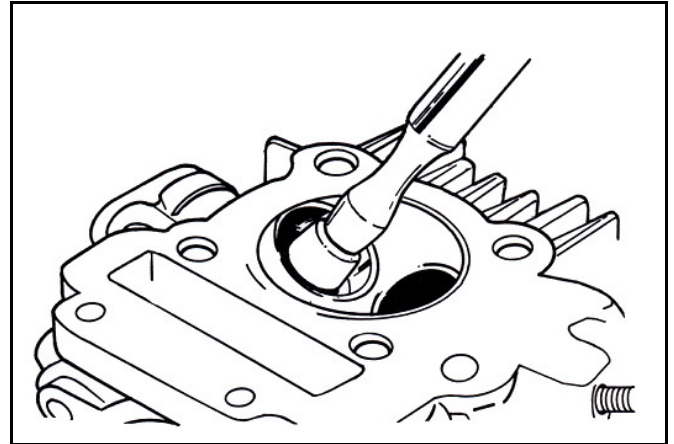
- In order to avoid damaging the valve stem and the cylinder head, in the combustion chamber place a rag between the valve spring remover/installer as compressing the valve spring directly.

- Special Tool:
Valve cotter remove & assembly tool
No. SYM-1471110-SY125

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

Caution

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



6. Cylinder Head / Valve

Install camshaft into cylinder head.

Install valve rocker arm, rocker arm shaft and cam shaft setting plate.

Cylinder Head Installation

Clean up all residues on the contacting surfaces of both cylinder and cylinder head.

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

Caution

- Do not damage the contacting surfaces of cylinder and cylinder head.
- Avoid residues of gasket or foreign objects falling into crankcase.

Install cylinder head.

Install 4 washers and tighten 4 nuts for cylinder head, and then tighten 2 cylinder head mounting bolts on right side of cylinder head.

- Torque value:
Nut: 4.0~4.4 kgf-m
Bolt: 1.0~1.4 kgf-m

Turn the flywheel, make the "T mark" can align the corresponding mark on the crankcase.

Install cam chain on cam sprocket and align the timing mark on the sprocket with corresponding mark on cylinder head.

Tighten the sprocket mounting bolts.

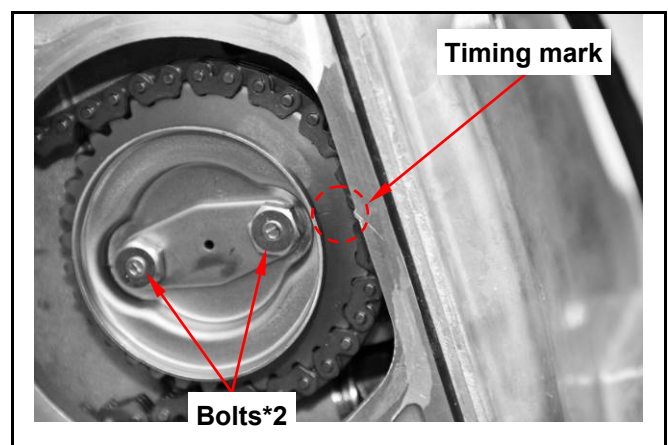
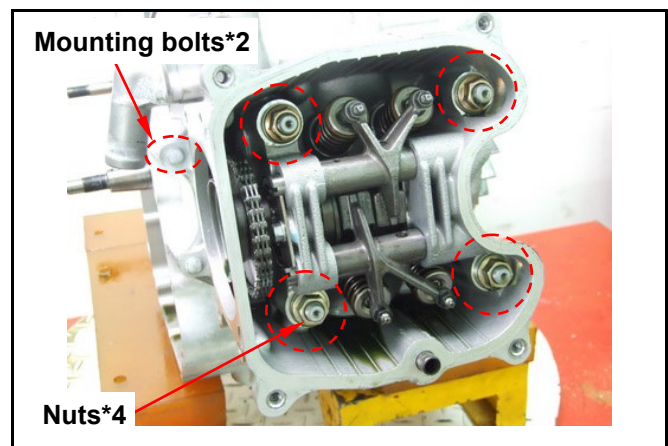
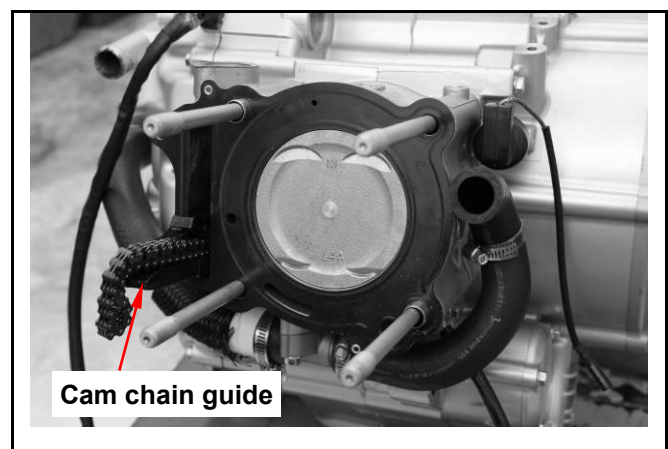
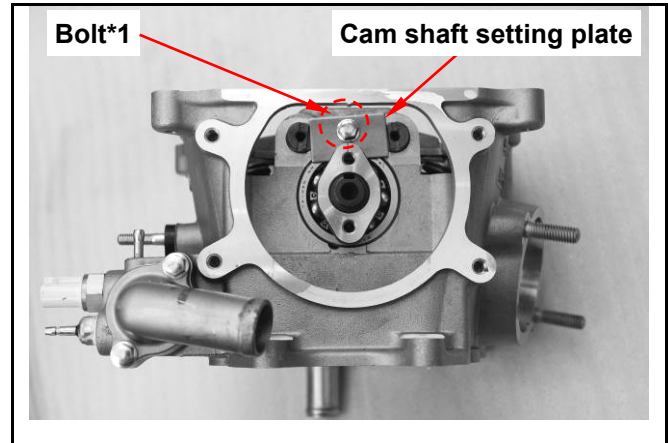
- Torque value:
Sprocket mounting bolts: 0.8~1.2 kgf-m

Install spark plug.

- Torque value: 1.0~1.2 kgf-m

Caution

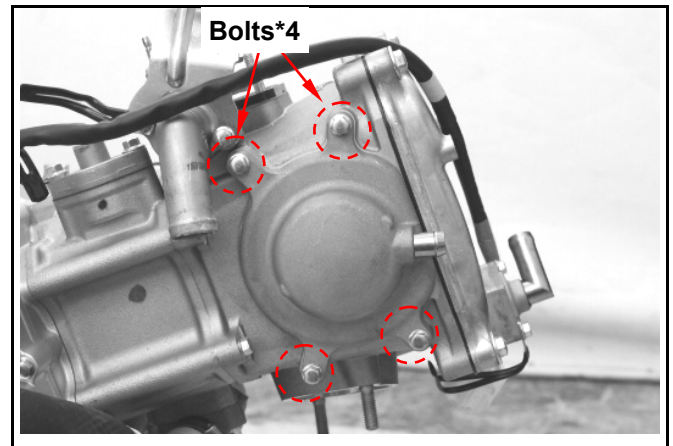
- The timing mark must be correctly aligned.





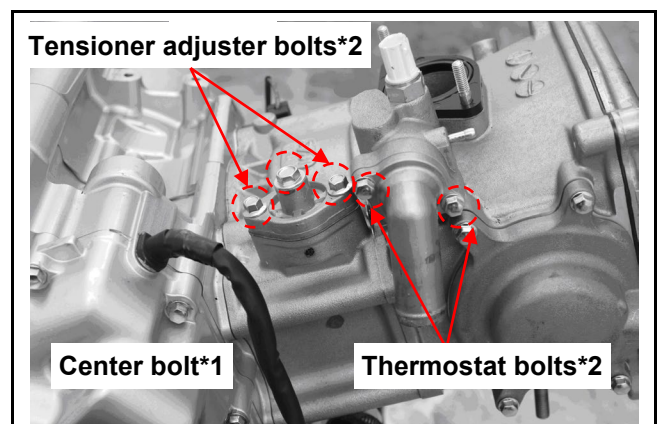
6. Cylinder Head / Valve

Install cylinder head side cover.

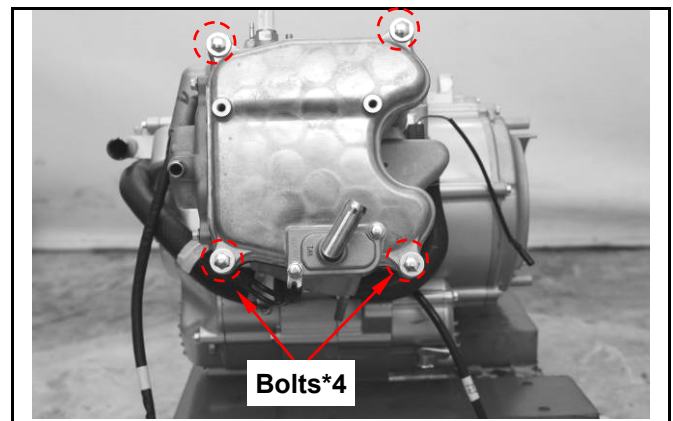


Install thermostat.

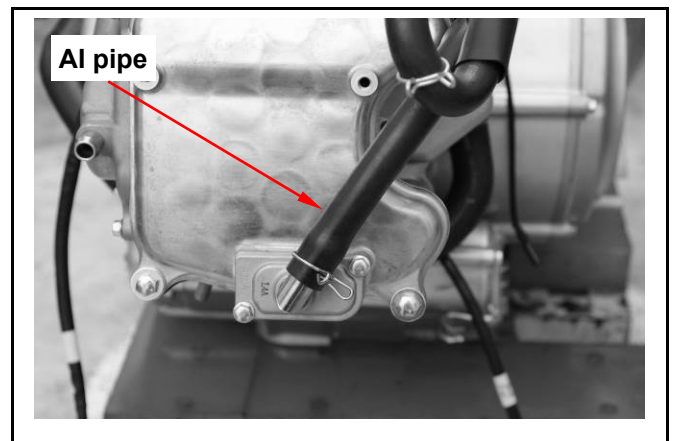
Install bolts, spring, and center bolt for tension adjuster.



Install cylinder cover.



Install Air Injection system (AI) pipe.



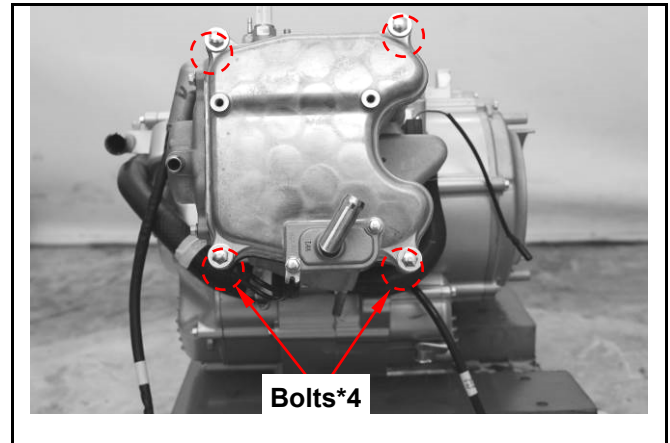
Install the engine onto frame (refer to chapter 5).

6. Cylinder Head / Valve

Valve Clearance Adjustment

Loosen Air Injection system (AI) pipe..

Remove cylinder head cover.



Remove the cylinder head side cover.

Remove inspection window cap on left crankcase cover for checking Timing mark.

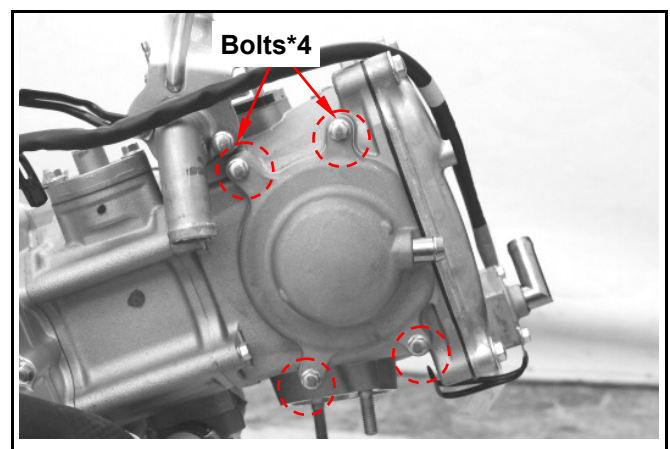
Turn the flywheel counterclockwise, make the "Timing mark" can align the corresponding mark on the crankcase and cam sprocket.

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 adjusting valve clearance 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.

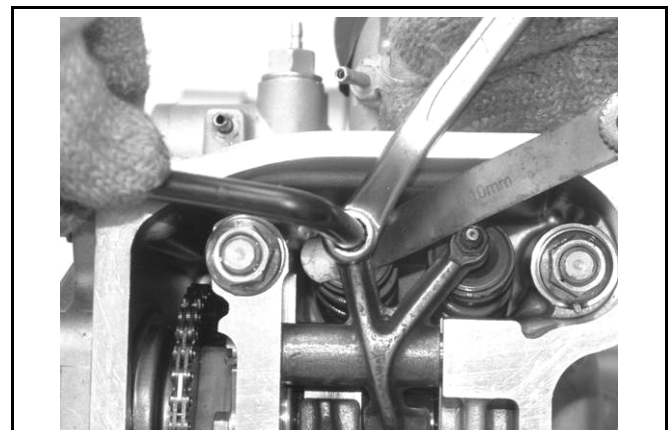
Start the engine and make sure that engine oil could flow onto the cylinder head.

After check, turn off the engine, and then install the cylinder head cover and AI pipe.



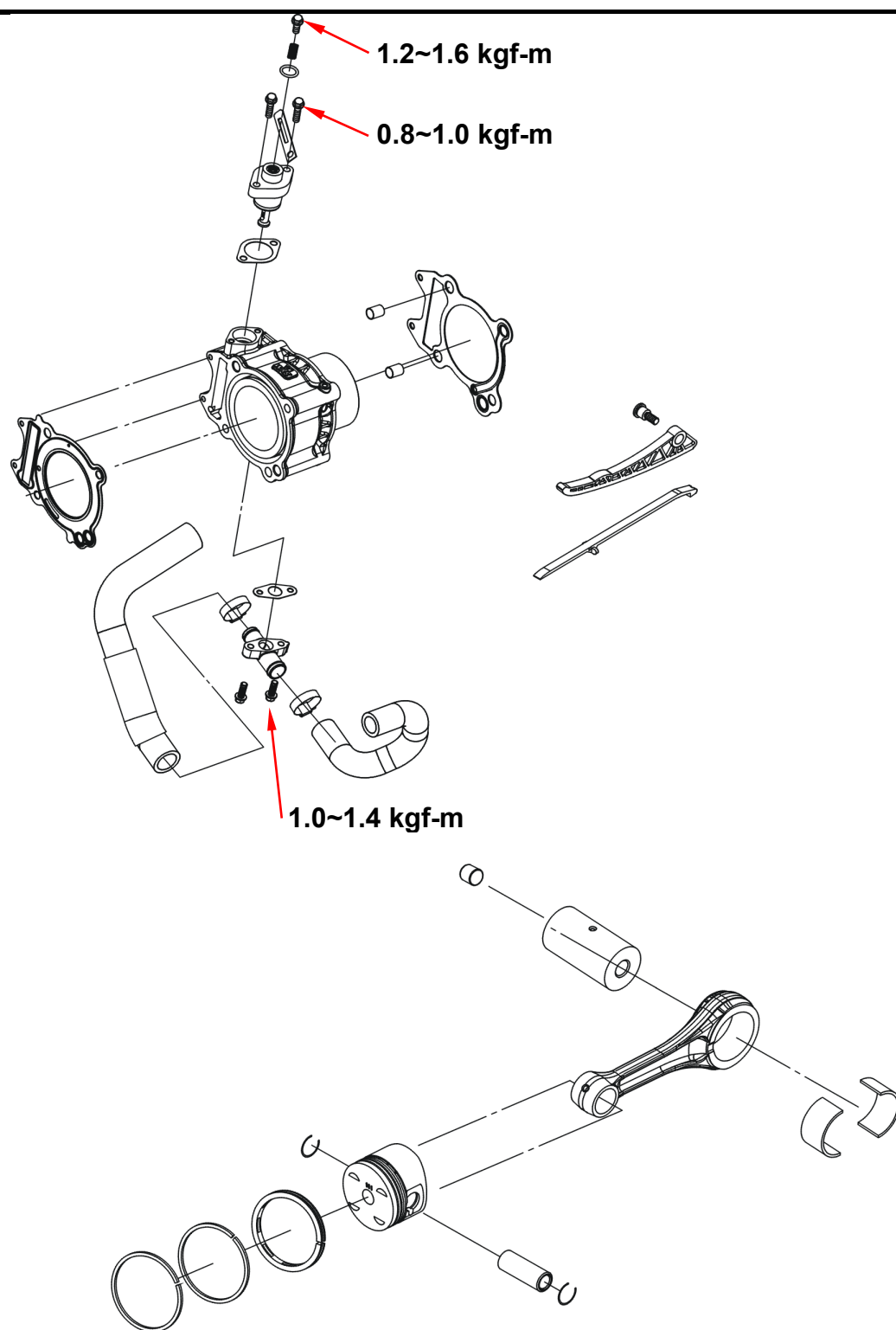
Caution

- If engine oil does not flow to cylinder head, engine components will be worn or damaged seriously. Thus, it must be confirmed.
- When checking oil flow condition, run the engine in idle speed.



Mechanism Diagram 7-Error! Bookmark not defined. Precautions in Operation 7-Error! Bookmark not defined. Troubleshooting 7-2 Cylinder & Piston Removal 7-Error! Bookmark not defined.	Cylinder & Piston Inspection .. 7-3 Piston Ring Installation 7-6 Piston Installation 7-7 Cylinder Installation 7-7
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Mechanism Diagram



Precautions in Operation

General Information

- Cylinder or piston service cannot be conducted when the engine is mounted on the frame.

Specification

Unit: mm

Item			Standard	Limit
Cylinder	I.D.		82.995~83.015	83.100
	Out of round		-	0.05
	Taper		-	0.05
	Warpage		-	0.10
Piston/ Piston ring	Piston ring to ring-groove clearance	Top	0.02~0.06	0.08
		2 nd	0.02~0.06	0.08
	Piston ring end gap	Too	0.25~0.45	0.60
		2 nd	0.25~0.45	0.60
		Oil (side rail)	0.200~0.700	0.90
	Piston O.D. (2 nd)		82.450~82.500	82.400
	Clearance between piston and cylinder		0.040~0.050	0.100
	ID of piston pin boss		20.002~20.008	20.020
	Piston pin O.D.		19.994~20.000	19.980
Clearance between piston and piston pin		0.002~0.014	0.020	
Connecting rod small end I.D.		20.016~20.034	20.044	

Troubleshooting

Compression too low or poor performance

- Leaking cylinder head gasket
- Worn or damaged cylinder and piston

Compression too high, overheating

- Excessive carbon built-up on piston head or combustion chamber
- Insufficient coolant
- Blocked passages in water hose, jacket or radiator

Knocking or Abnormal noise

- Worn cylinder, piston or piston ring
- Worn piston pin or piston pin hole

Excessive smoke

- Worn cylinder, piston or piston ring
- Improper installation of piston rings
- Worn or damaged cylinder and piston

Cylinder & Piston Removal

Remove cylinder head. (Refer to Chapter 6)

Remove coolant hose from cylinder.

Remove cylinder.



Use clean cloth blocking the crankcase hole to avoid piston pin clip dropping in crankcase hole.

Remove one of piston pin clip with needle nose pliers.

Remove piston pin and piston.



Remove cylinder head gasket.

Remove dowel pins.

Use scraper knife to scrape residues of cylinder head gasket.



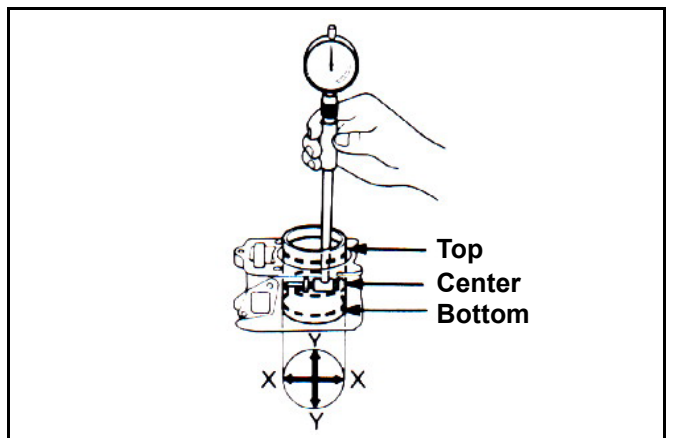
Caution

- Use some solution to wet residues of cylinder head gasket for easier clean.

Cylinder & Piston Inspection

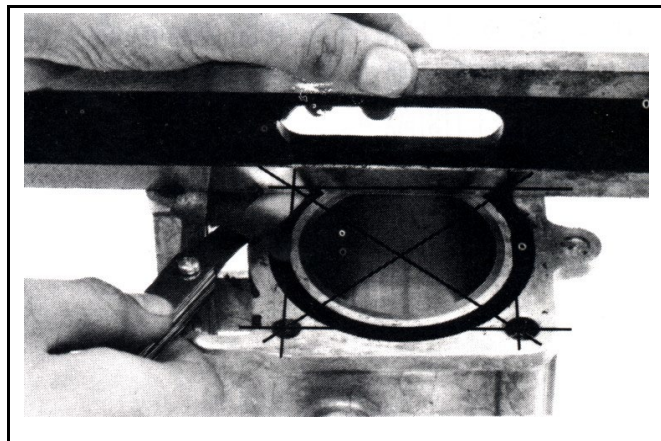
Check if the inner diameter of cylinder is worn or damaged.

Measure and record the value of the cylinder inner diameter from the upper, middle and lower positions in the X and Y axis directions respectively.



Check the cylinder head for warpage, replace it if necessary.

- Service limit: 0.10 mm



Check piston ring to ring-groove clearance

- Service Limit:
Top ring: 0.08 mm
2nd ring: 0.08 mm

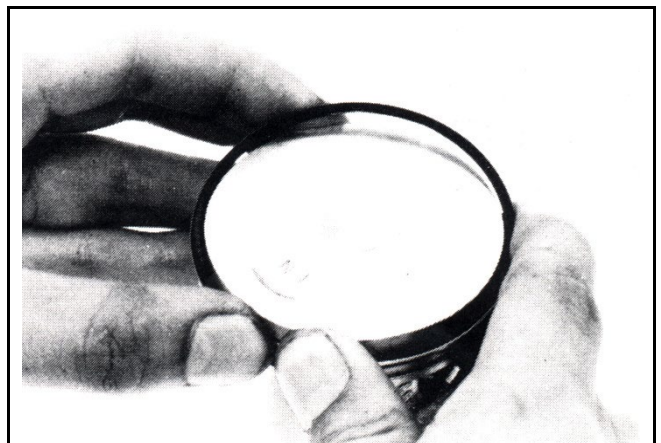


Remove piston rings.

Check if the piston rings and ring-groove are damaged or worn, replace them if necessary.

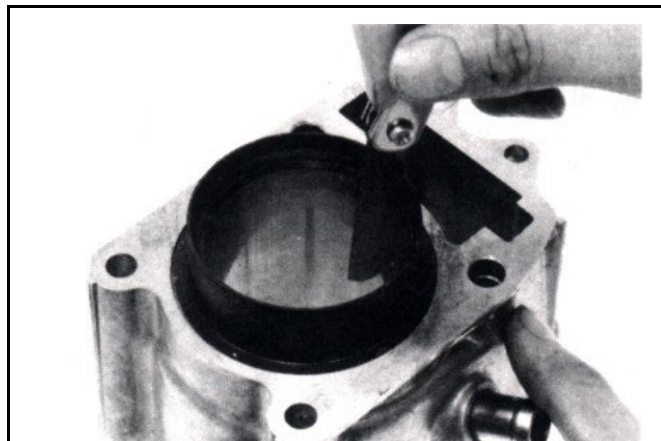
Caution

- Pay attention to remove piston rings because they are fragile.



Install piston rings into the bottom of cylinder respectively and push piston rings to a position below 20 mm of cylinder top with piston to keep the piston rings in a horizontal level in cylinder. After that, measure the piston ring end gap.

- Service Limit:
Top ring: 0.60 mm
2nd ring: 0.60 mm
Oil ring: 0.90 mm



Check the outer diameter of piston pin.

- Service limit: 19.980 mm



Check the inner diameter of connecting rod small end.

- Service limit: 20.044 mm

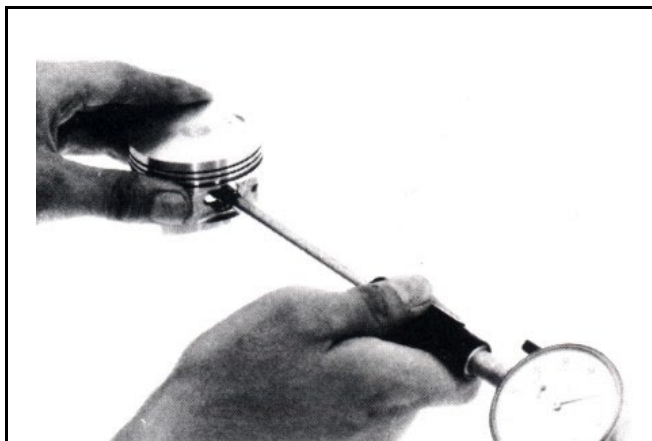


Measure the inner diameter of piston pin hole.

- Service limit: 20.02 mm

Calculate clearance between piston pin and its hole.

- Service Limit: 0.02 mm



Measure the piston outer diameter.

- Service limit: 82.40 mm

Caution

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

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



Piston Ring Installation

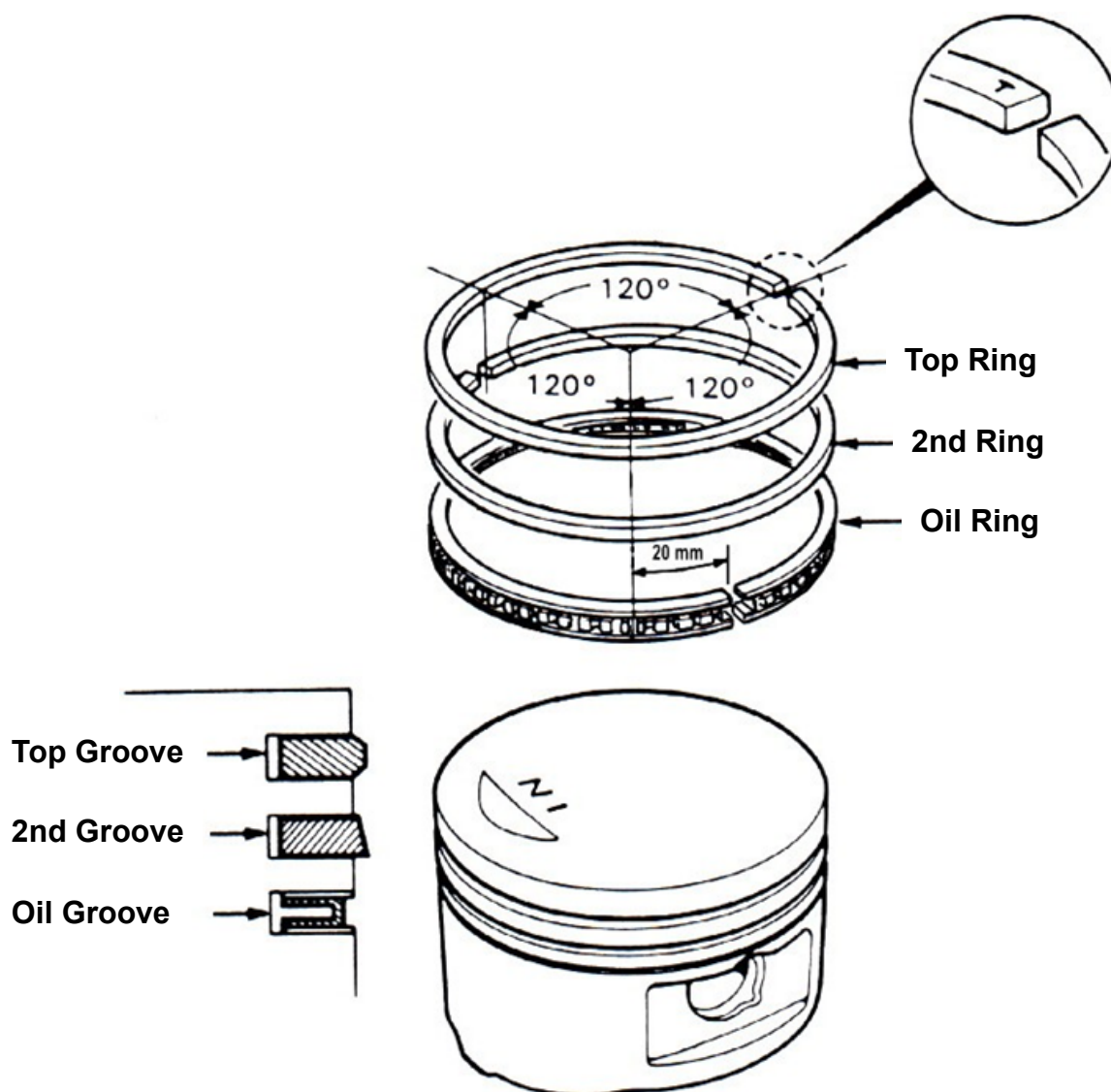
Clean up piston top, piston ring groove, and piston surface.

Install the piston ring into piston carefully.

Place the opening of piston ring as shown below.

Caution

- Do not damage piston or piston rings while installing.
- All marks on the piston rings must face upwards.
- Having installed piston rings ensures each one can be rotated freely.



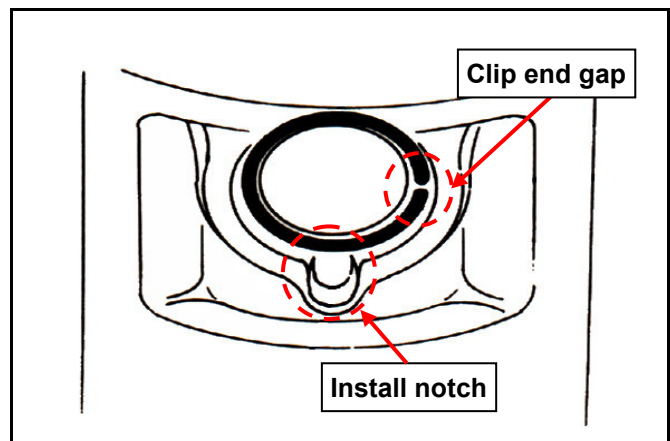
Piston Installation

Install piston and piston pin, and set the IN marks on the top of piston toward inlet valve.

Renew piston pin clip.

Caution

- Do not let the piston pin clip notch align with its install notch.
- Use clean cloth blocking the crankcase hole to avoid piston pin clip dropping in crankcase hole.



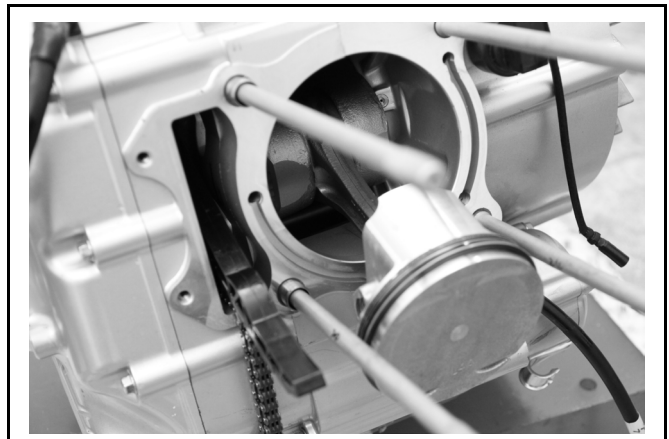
Cylinder Installation

Remove hardened residues from aluminum surface.

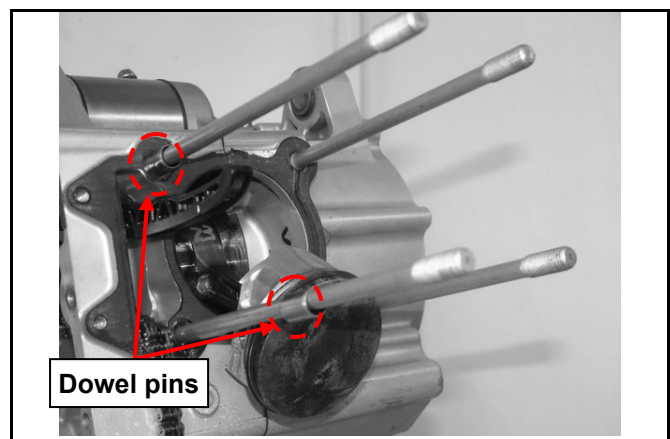
Pay attention to not let these residues and foreign materials fall into crankcase.

Caution

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



Install dowel pins and new cylinder head gasket.



Coat some engine oil on cylinder wall, piston and piston rings.

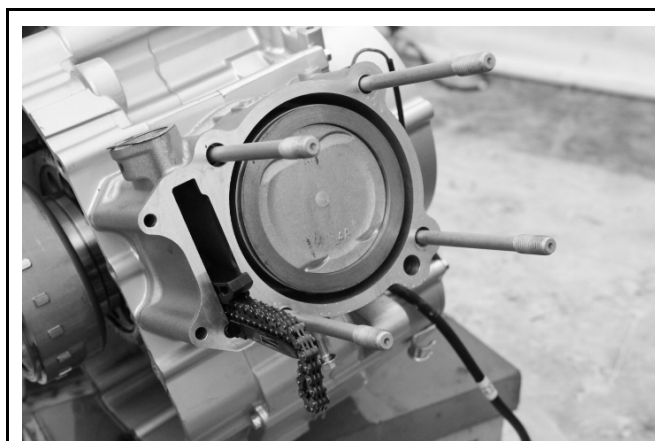
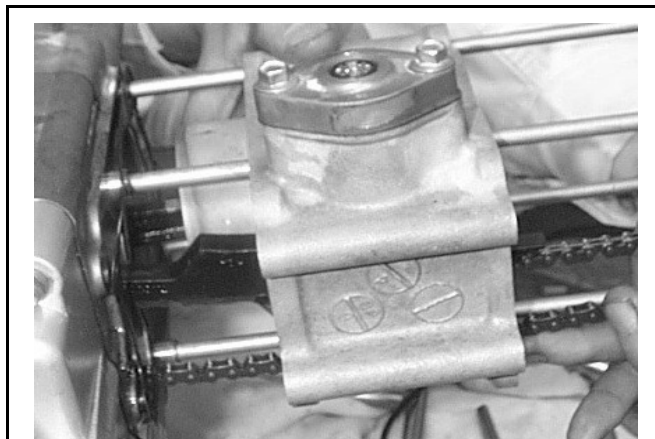
Carefully install piston into cylinder step by step to avoid damaging piston rings.

⚠ Caution

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

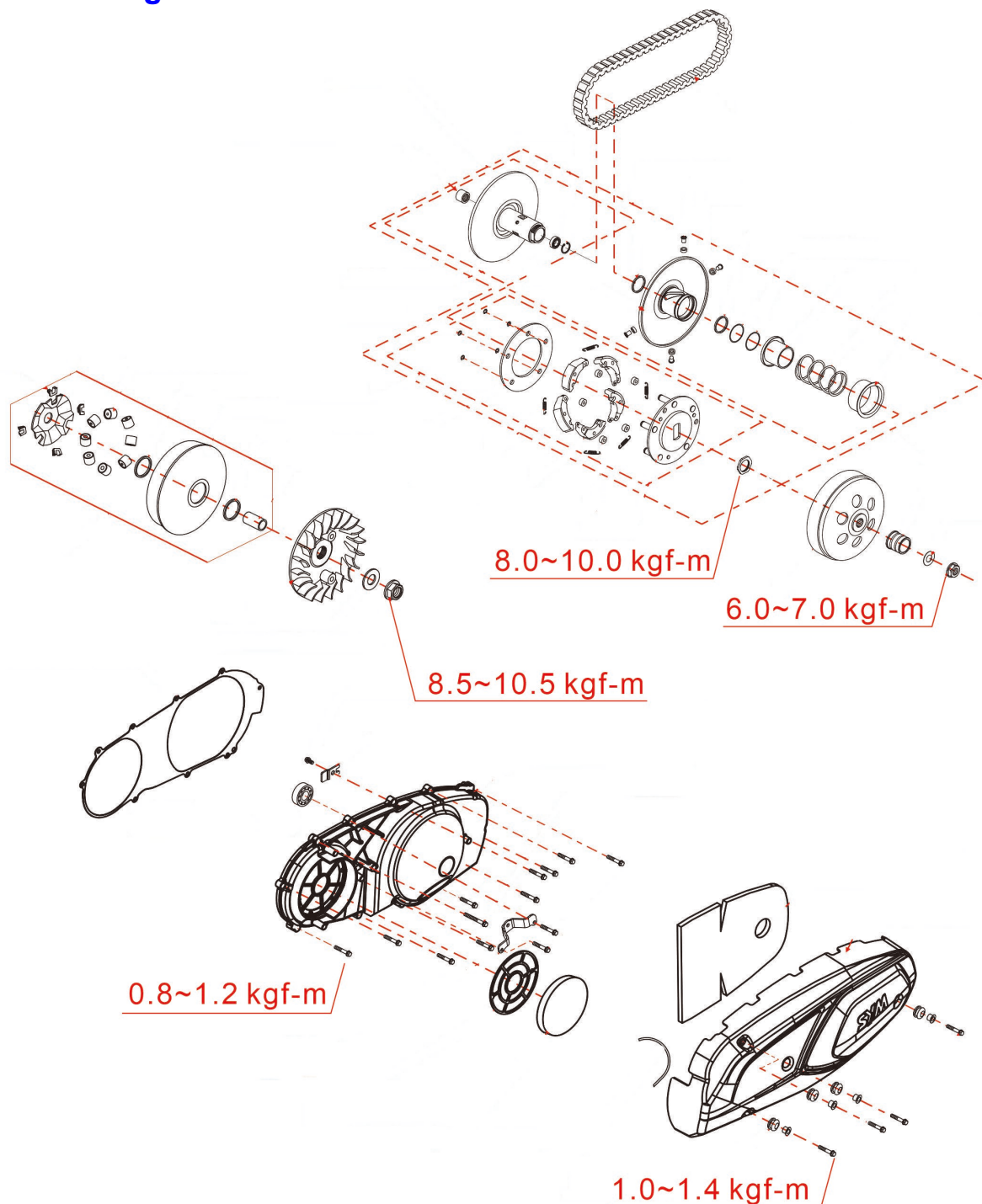
Install coolant hose for cylinder.

Install cylinder head (Refer to Chapter 6).



Mechanism Diagram.....	1	Drive Belt.....	4
Precautions in Operation	2	Drive Face	6
Troubleshooting	2	Clutch / Driven Pulley	9
Left crankcase cover	3		

Mechanism Diagram



8. V-Belt Drive System



Precautions in Operation

General Information

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

Specification

Item	Standard value (mm)	Limit
Driving belt width	28.1~29.3 mm	26.500 mm
OD of movable drive face boss	31.009~31.034 mm	31.054 mm
ID of movable drive face	30.967~30.988 mm	30.907 mm
OD of roller	29.920~30.080 mm	29.000 mm
ID of clutch outer	159.900~160.150 mm	160.450 mm
Thickness of clutch weight	6.000 mm	3.000 mm
Free length of driven pulley spring	108.500 mm	-
OD of driven pulley boss	40.960~40.990 mm	40.940 mm
ID of driven face	41.000~41.035 mm	41.050 mm
Weight of weight roller	10.7~11.3 g	10.2 g

Torque value

- Drive face nut: 8.5~10.5kgf-m
- Clutch outer nut: 6.0~7.0kgf-m
- Drive plate nut: 8.0~10.0kgf-m

Special Service Tools

Clutch spring compressor	SYM-2301000
Inner bearing puller	SYM-6204025
Clutch nut wrench 39 x 46 mm	SYM-9020220
Universal holder	SYM-2210100
Bearing driver	SYM-6204024
Driven pulley push tool	SYM-2321000-REA
Driven pulley bearing installer tool	SYM-9100610-L4A DPB
Crankcase bearing 6201 assemblies tool	SYM-9614000-HMA 6201

Troubleshooting

Engine can be started but motorcycle cannot be moved

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

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

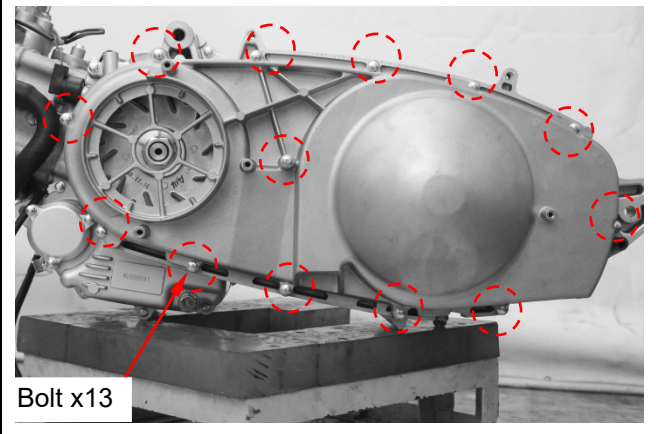
Shudder or misfire when driving

1. Broken clutch weight
2. Worn clutch weight

Left crankcase cover

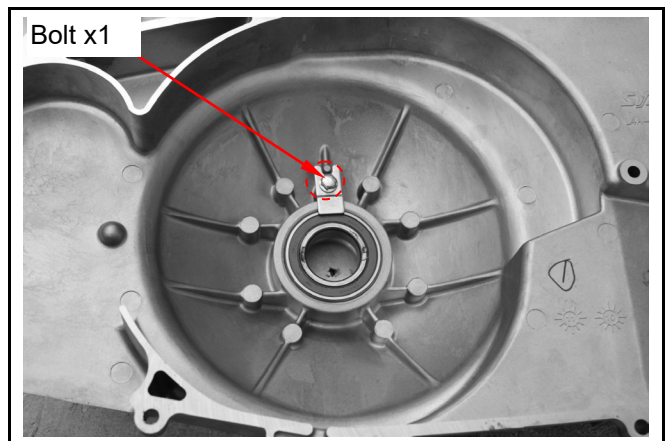
Removal

Remove left crankcase outer cover.
Remove left crankcase cover. (Bolt x13)
Remove guide pin and gasket.



Inspection

Remove left crankcase bearing setting plate. (Bolt x1)
Check the bearing.
Rotate bearing's inner ring.
Check if bearing 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.

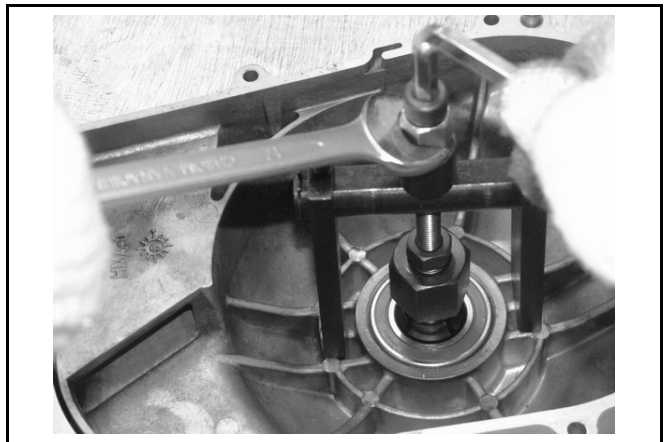


Bearing replacement

Remove bearing with special service tools.

Special tools

Inner bearing puller SYM-6204022



Install bearing with special service tools.

Special tools

Left crankcase bearing 6201 assembles tool
SYM-9614000-HMA 6201



Installation

Install in the reverse procedures of removal.

8. V-Belt Drive System

Drive Belt

Removal

Remove left crankcase cover.

Hold drive face with universal holder, and remove nut and drive face.

Special Tools

Universal holder

SYM-2210100

Hold clutch outer with universal holder, and remove nut, bearing stay collar and clutch outer.

Caution

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

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

Inspection

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

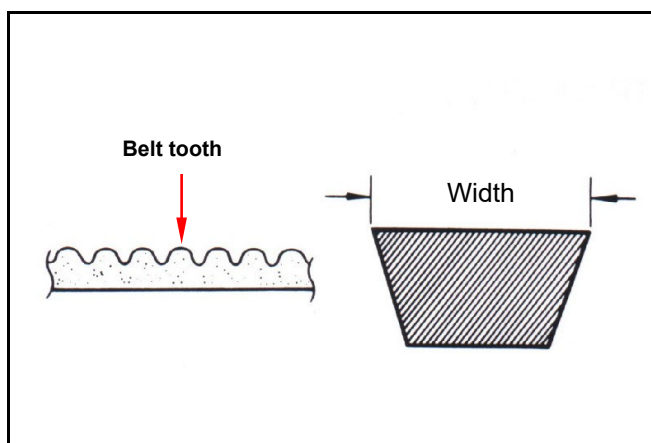
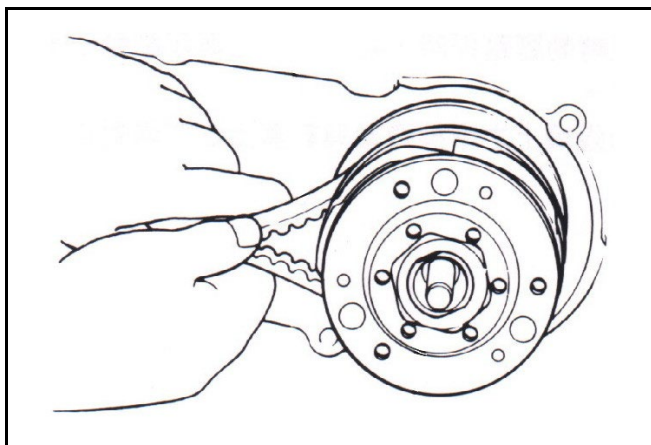
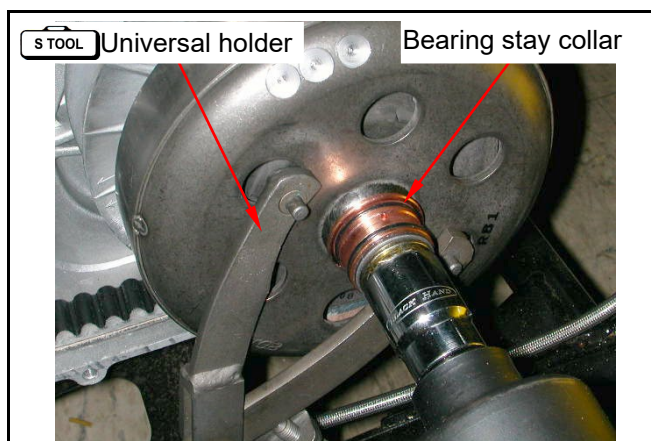
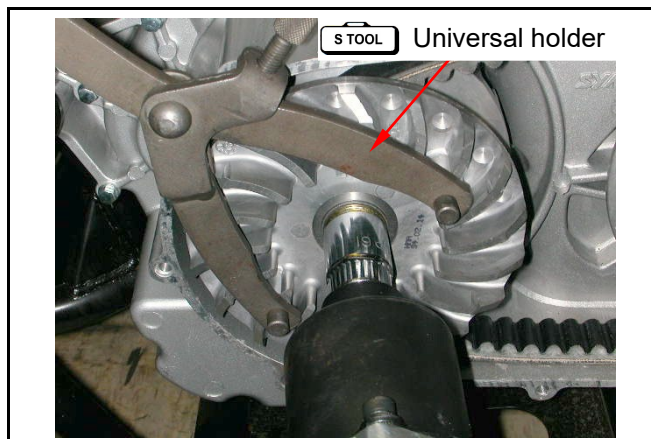
Measure the width of drive belt as diagram shown.

Service Limit: 26.5 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.



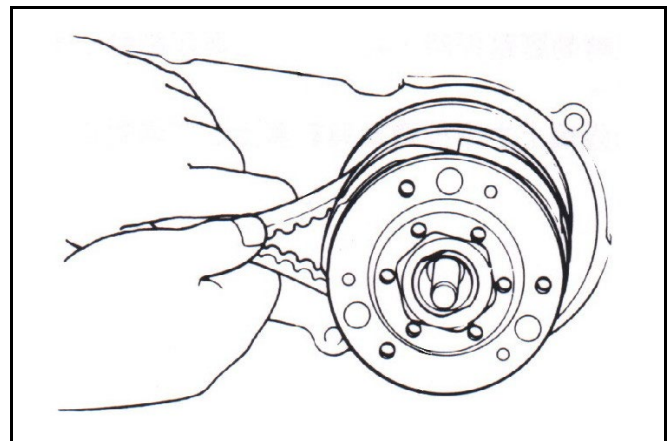
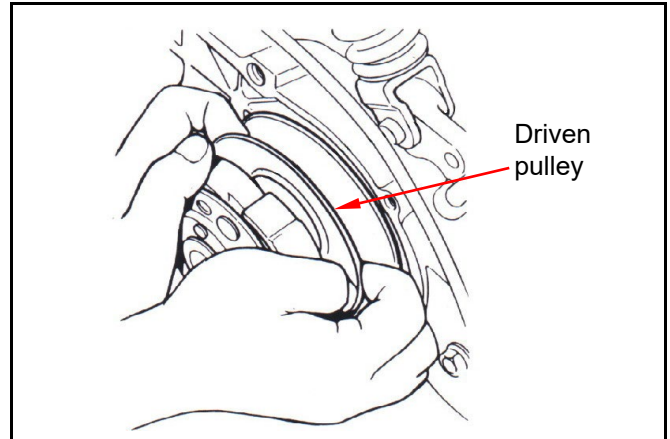
Installation

Caution

- Pull out driven face to avoid it closing.
- Cannot oppress friction plate comp in order to avoid creates the distortion or the damage.

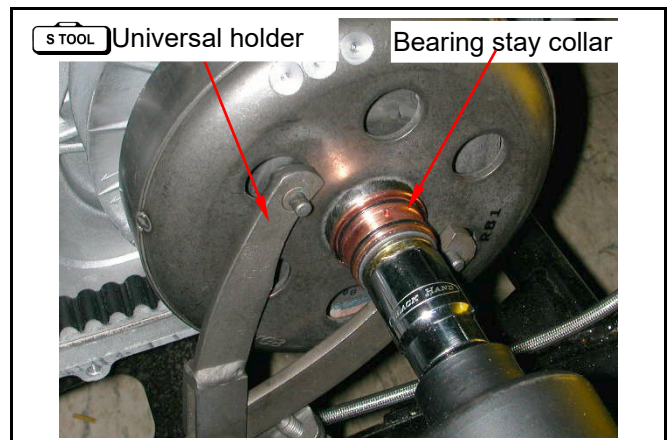
Install drive belt onto driven pulley.

Install the driven pulley that has installed the belt onto drive shaft.
On the drive belt another end to the movable drive face.



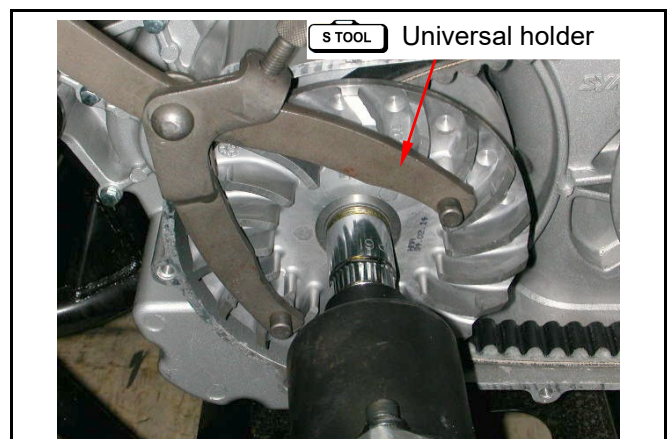
Install the clutch outer and bearing stay collar.
Hold the clutch outer with universal holder, and then tighten nut to specified torque value.

Torque value: 6.0~7.0kgf-m



Install the drive face, washer and drive face nut.
Hold drive face with universal holder, and then tighten nut to specified torque value.

Torque value: 8.0~10.0kgf-m



8. V-Belt Drive System

Drive Face

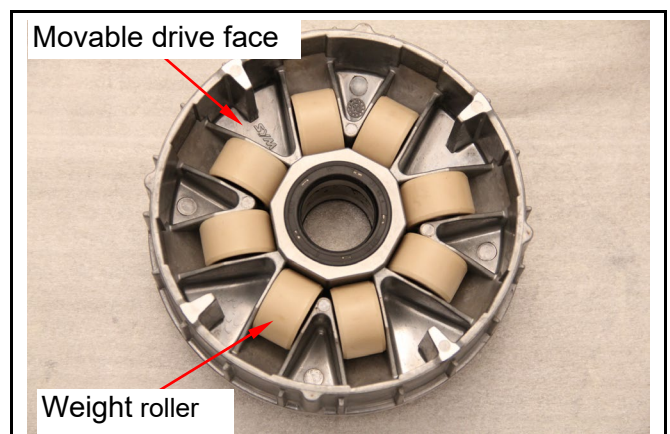
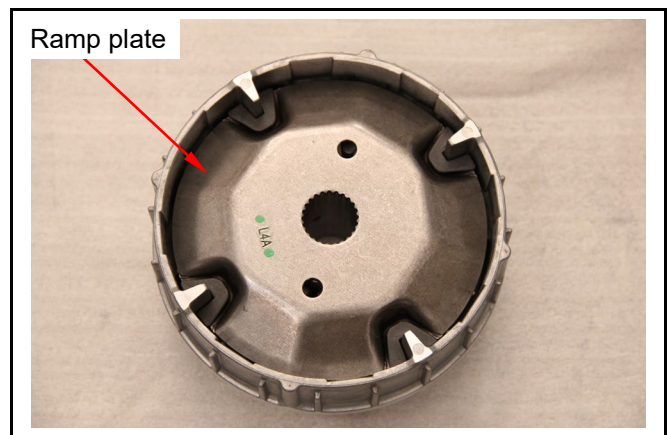
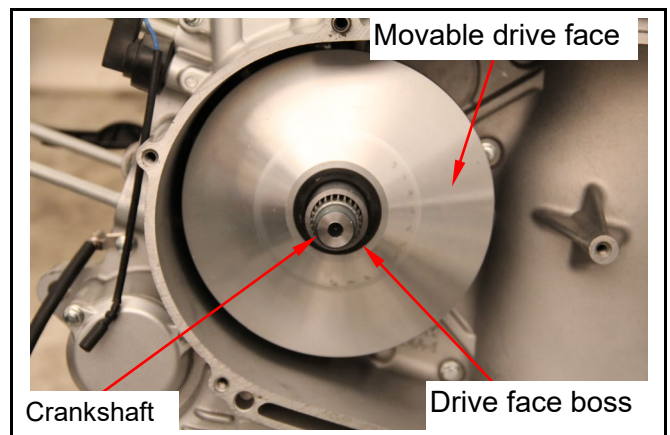
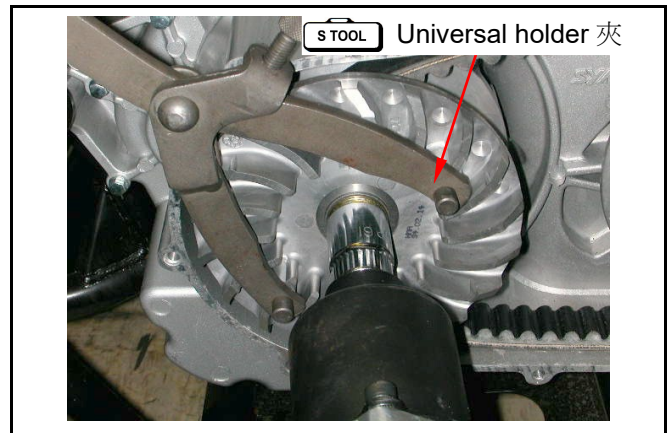
Removal

Remove left crankcase cover.
Hold drive face with universal holder, and then
remove drive face nut.
Remove drive face and drive belt.

Remove movable drive face comp and drive face
boss from crankshaft.

Remove ramp plate.

Remove weight roller from movable drive face.



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 or damaged. Replace it if necessary.

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

Service limit: 19.0 mm

Weight: 17.2g

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 exceeds service limit.

Service limit: 30.907 mm

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

Service limit: 31.054 mm °

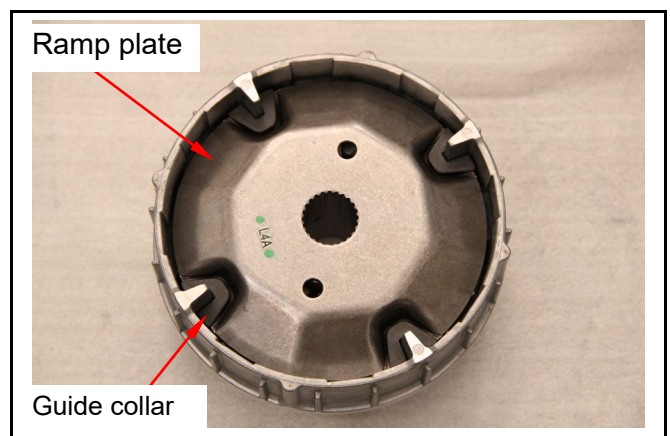
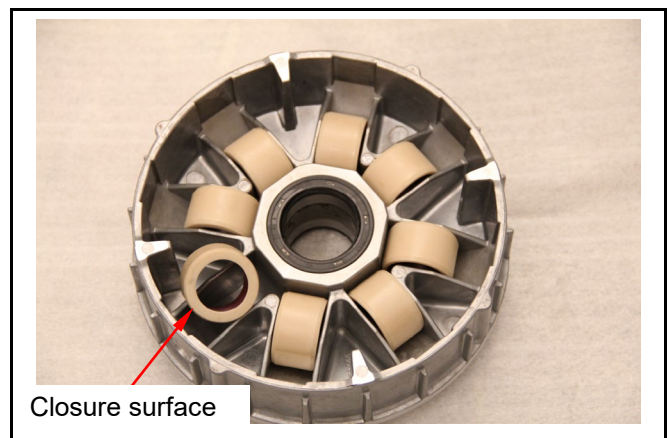
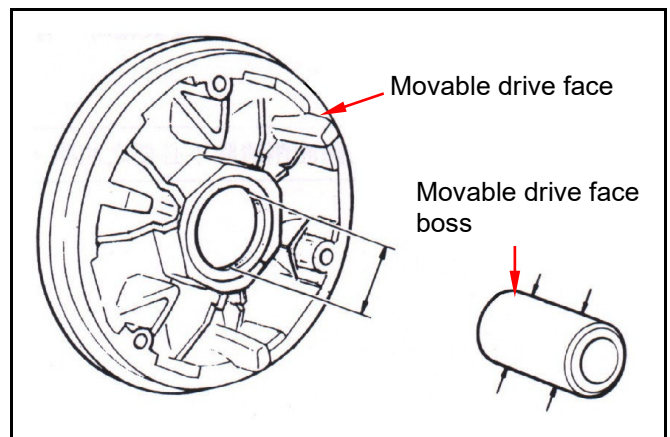
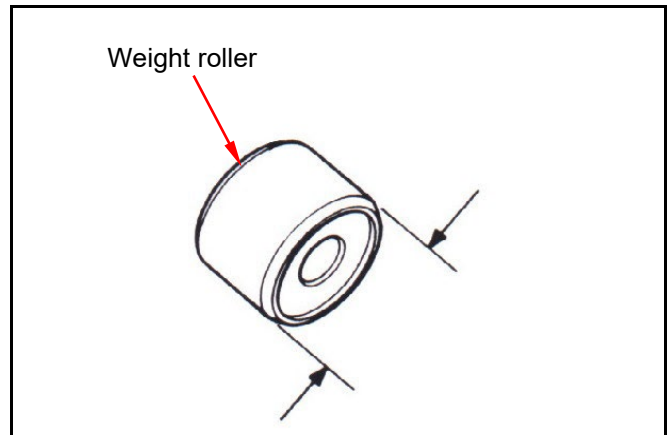
assembly/installation

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.



8. V-Belt Drive System

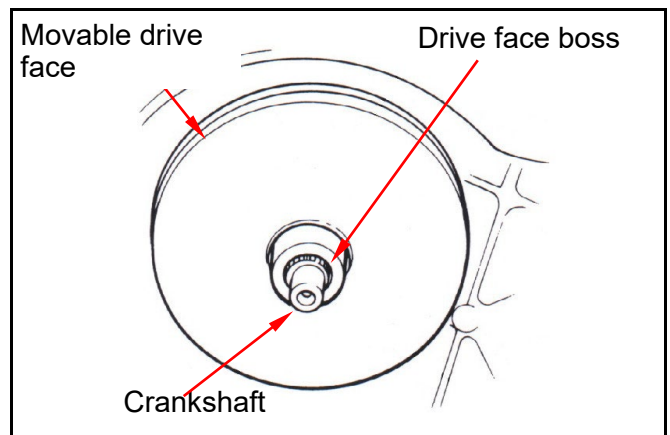
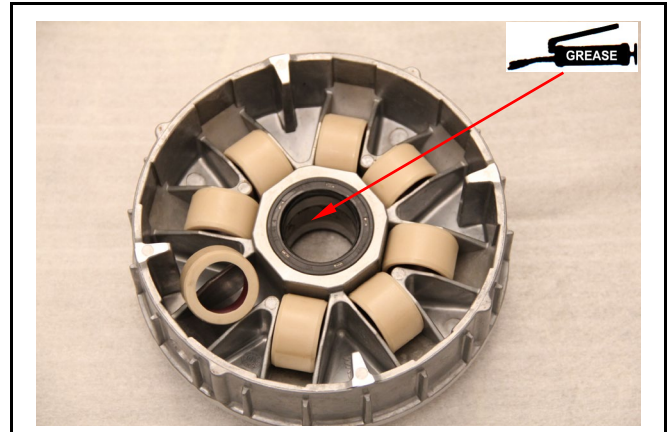
With a bit grease spreads in the movable drive face axis hole.

Install drive face boss.

Caution

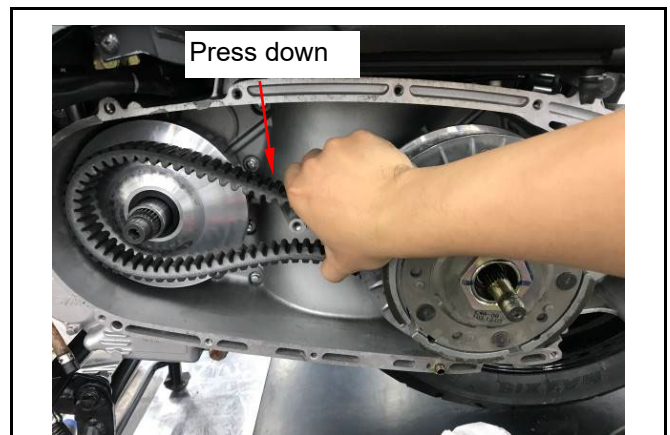
- The movable drive face surface has to be free of grease. Clean it with cleaning solvent.

Install movable drive face comp. onto crankshaft.



Driven pulley installation

Press drive belt into pulley groove, and then pull the belt onto drive shaft.



Install drive face, washer and nut.

Caution

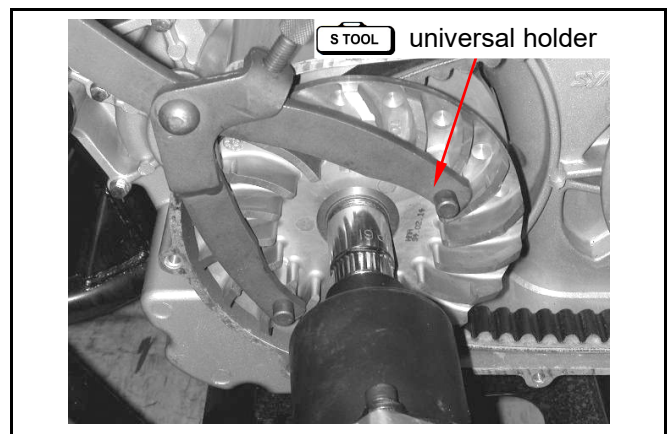
- Make sure that two sides of pulley surfaces have to be free of grease. Clean it with cleaning solvent.

Hold drives face with universal holder.

Tighten nut to specified torque.

Torque value: 8.5~10.5kgf-m

Install left crankcase cover.



Clutch / Driven Pulley

Disassemble / reassemble driven pulley with special tool.

Special tool

Clutch spring compressor
SYM-2301000-L4A

39-46 Clutch nut wrench
SYM-9020220

Driven pulley disassemble

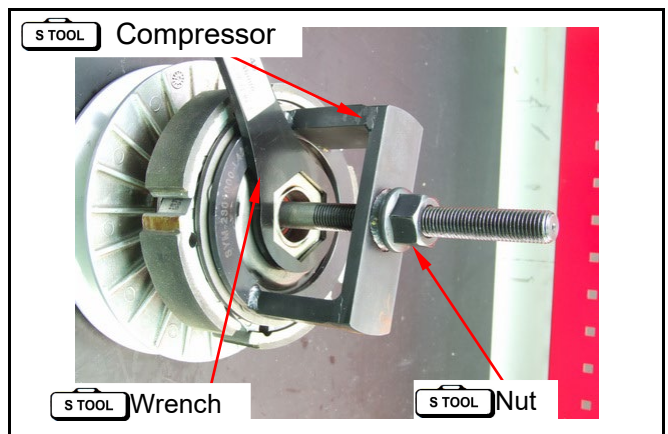
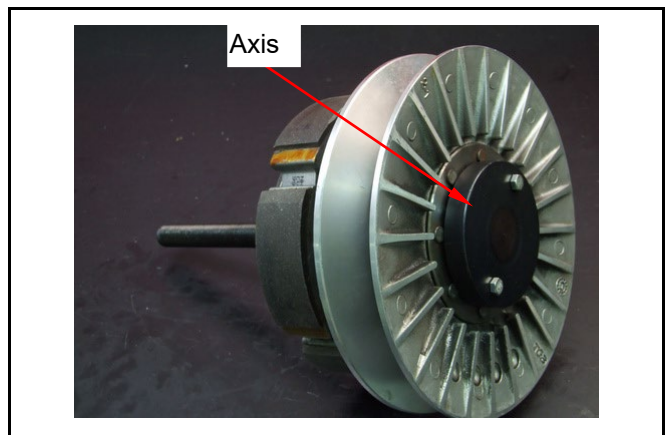
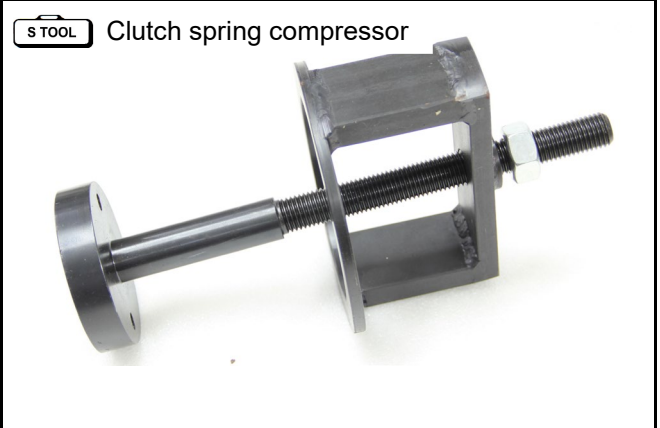
Clutch Disassemble

Pass the axis of the tool through the center of the driven pulley, and tighten bolts.

Install the spring compressor and wrench, then tighten the nut.
Disassemble clutch nut with wrench.

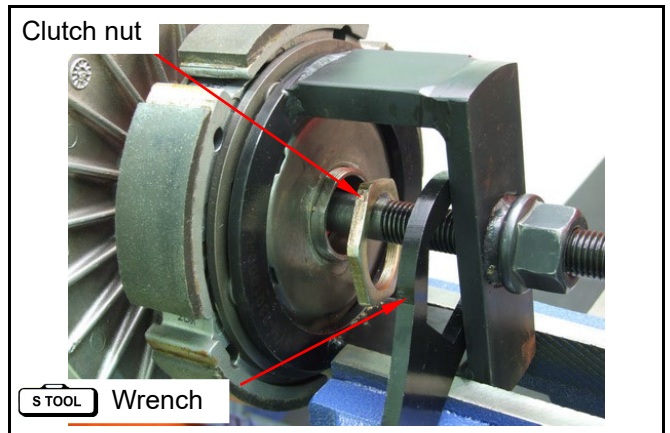
Caution

- Do not press the compressor too much.

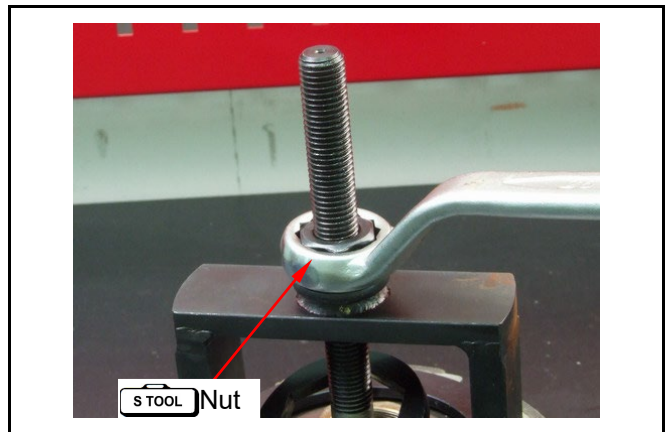


8. V-Belt Drive System

Disassemble clutch nut with wrench.



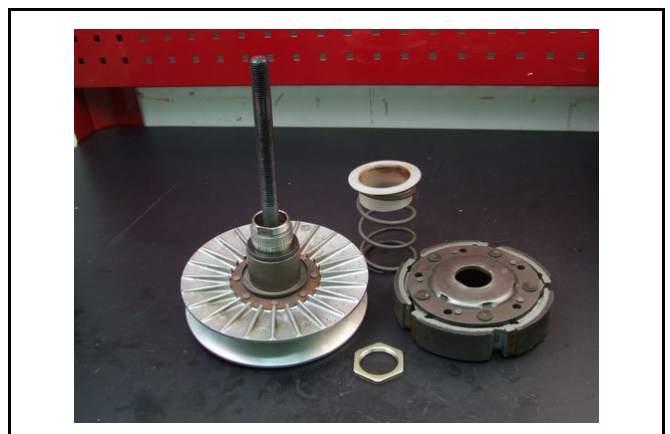
Loosen the nut.



Remove compressor and wrench.

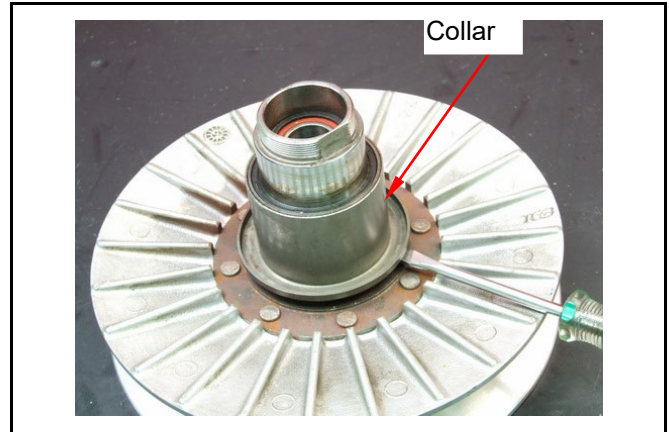


Remove parts of driven pulley.

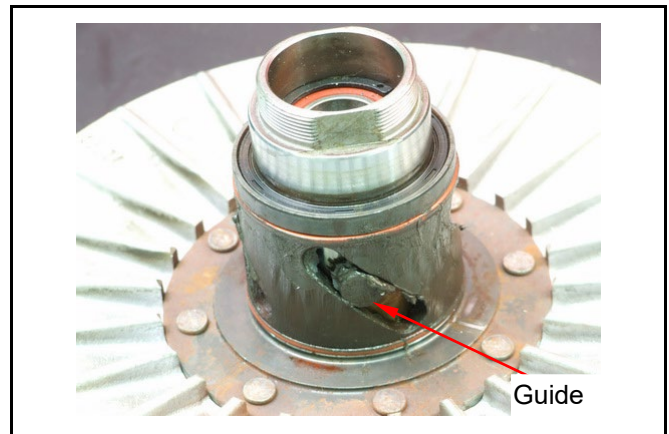


Driven pulley dissemble

Remove seal collar from driven pulley.



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



Inspection

Driven pulley

Check following items:

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

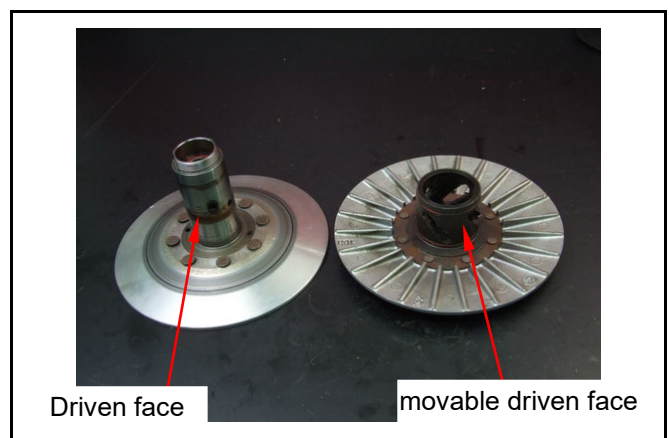
Replace damaged or worn components.

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 of driven face: 40.94 mm

Inner diameter of movable driven face: 41.05 mm

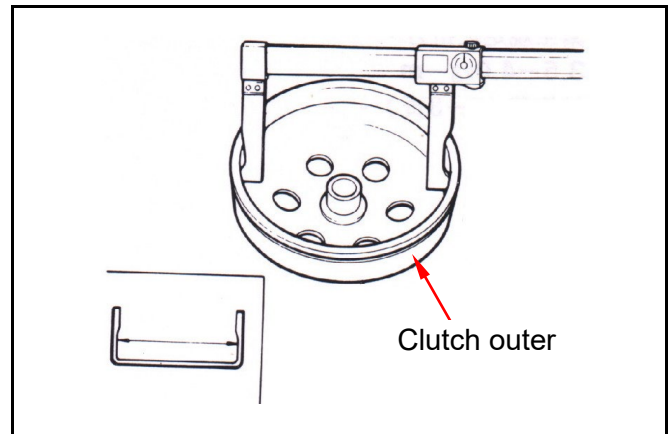


8. V-Belt Drive System

Clutch outer

Measure the inner diameter of clutch outer.
Replace the clutch outer if exceed service limit.

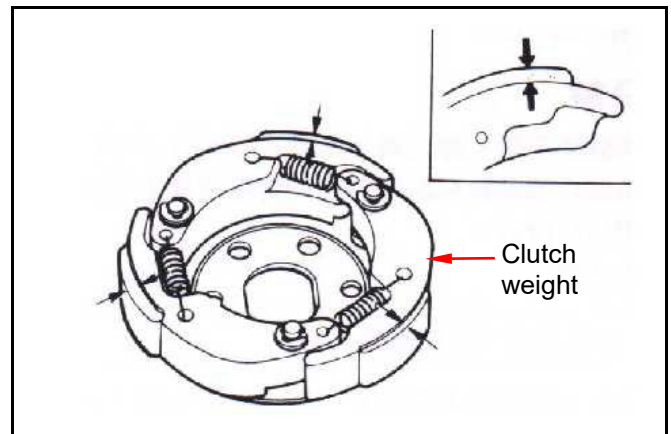
Service limit: 160.450 mm



Clutch weight

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

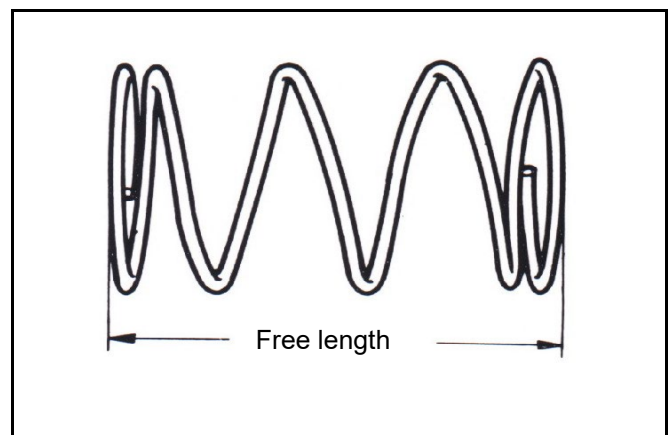
Service limit: 3.0 mm



Driven pulley spring

Measure the length of driven pulley spring.
Replace it if exceeds service limit.

Service limit: 103.500 mm



Clutch weight Replacement

Remove snap ring and washer, and then remove clutch weight and spring from driving plate. Check if spring is damage or insufficient elasticity.

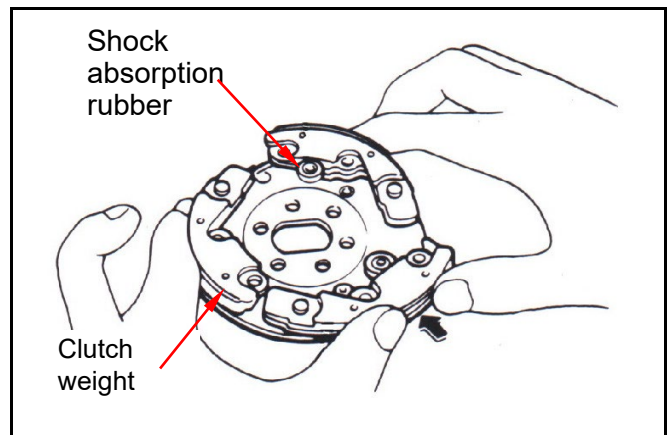
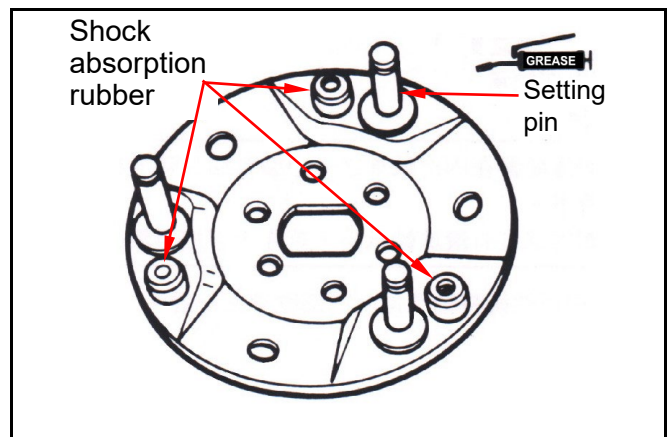
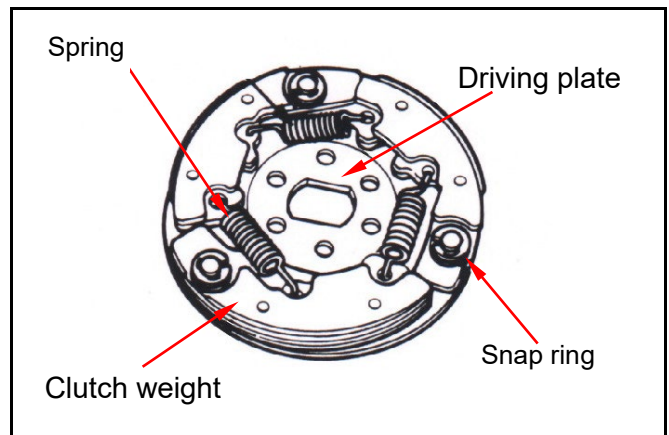
Check if shock absorption rubber is damage or deformation. Replace it if necessary. Apply with grease onto setting pins.

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

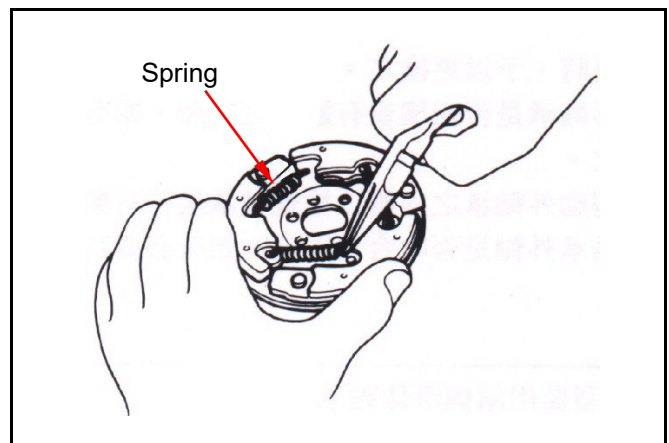


Caution

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



Install the spring into groove with pliers.



8. V-Belt Drive System

Install snap ring and mounting plate onto setting pin.

Replacement of Driven Pulley Bearing

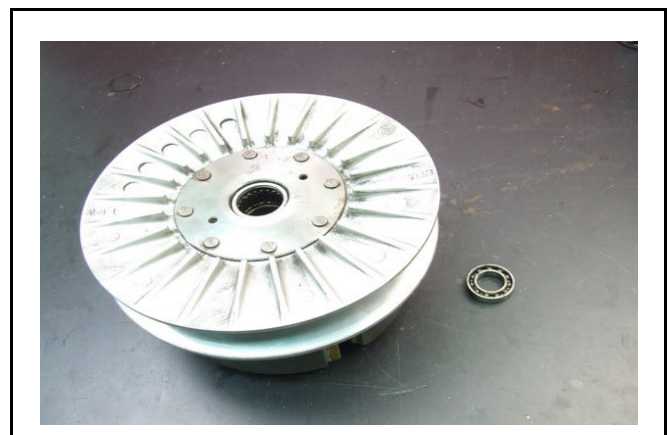
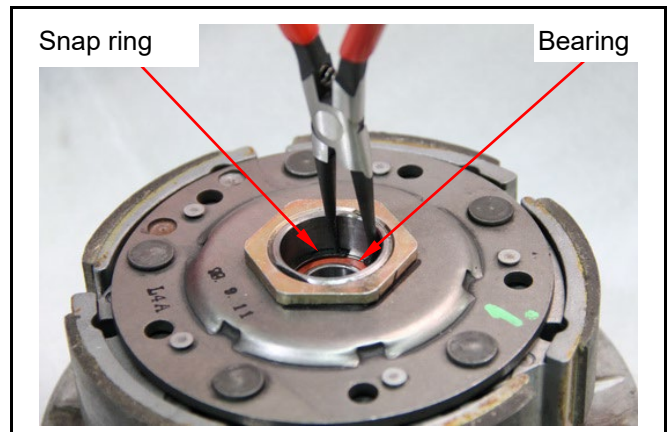
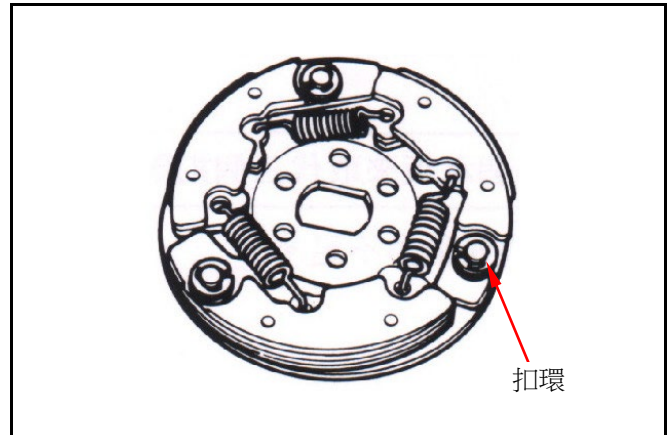
Remove inner bearing.



Caution

Snap ring must be removed first, then removed the bearing.

Push bearing with appropriate tool.

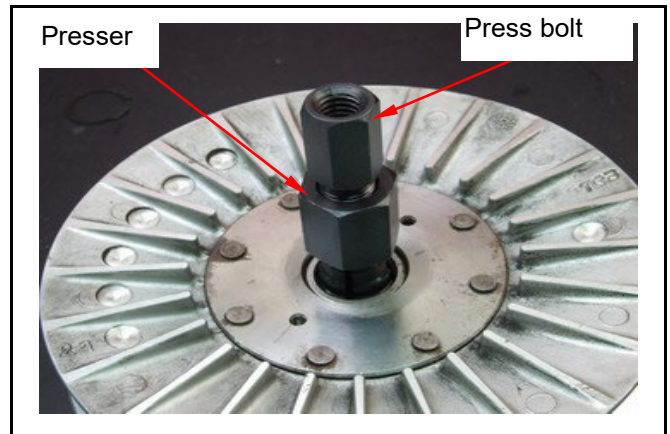
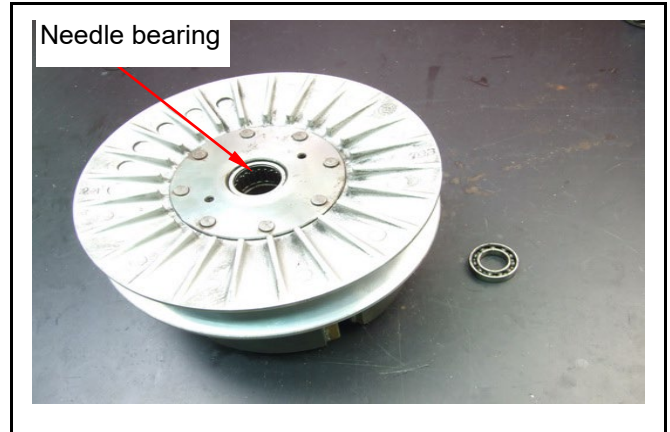


Remove needle bearing.

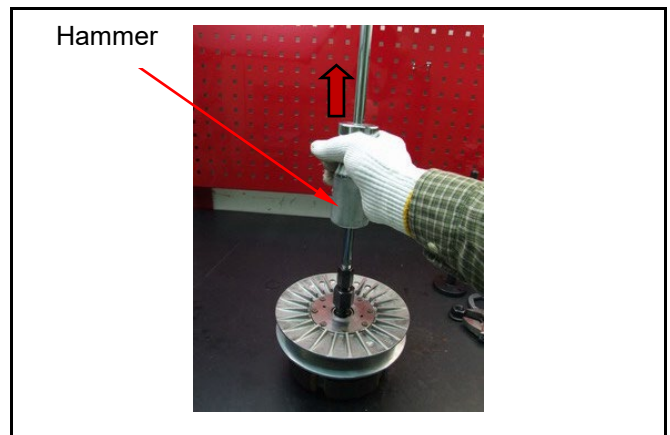
Remove needle bearing with inner bearing puller.

Special tool

Inner bearing puller
SYM-6204025



Connect press bolt and impact tool.
Remove needle bearing with impact tool and hammer.

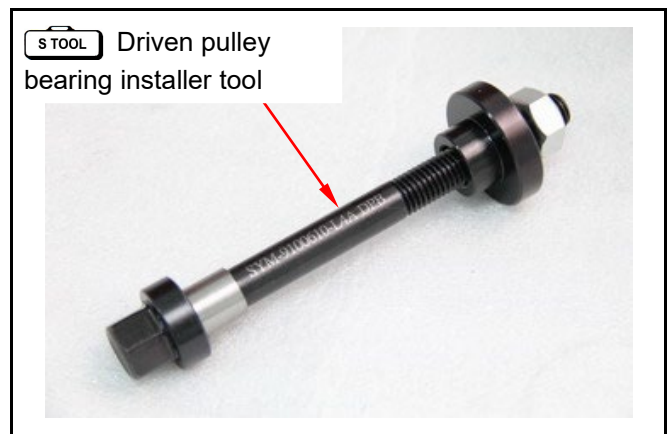


Bearing assembly

Assemble bearing with driven pulley bearing installer tool.

Special tool

Driven pulley bearing installer tool
SYM-9100610-L4A DPB



8. V-Belt Drive System

Put bearing 6903 into the tool.

⚠ Caution

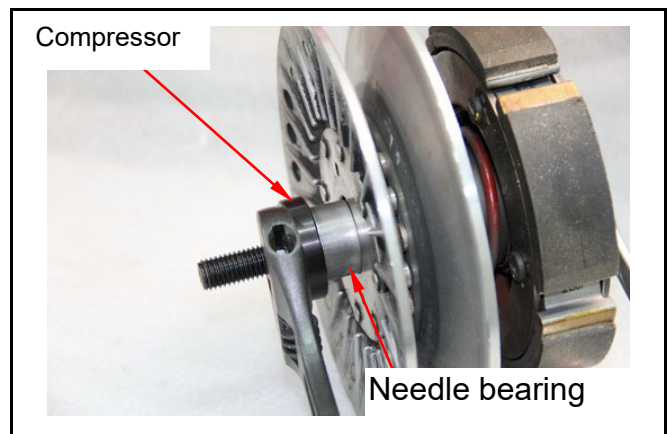
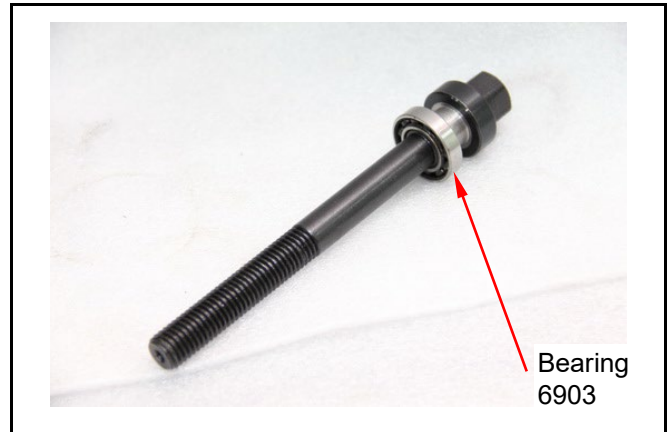
- Please end closure surface of bearing outside.

Pass tool through the driven pulley. Put compressor and needle bearing into the tool.

Fix one side and tighten the compressor of tool to install the bearing.

⚠ Caution

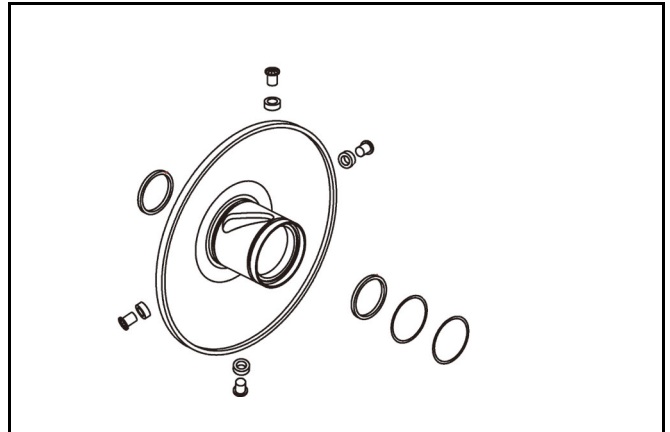
- Make sure bearing in position.



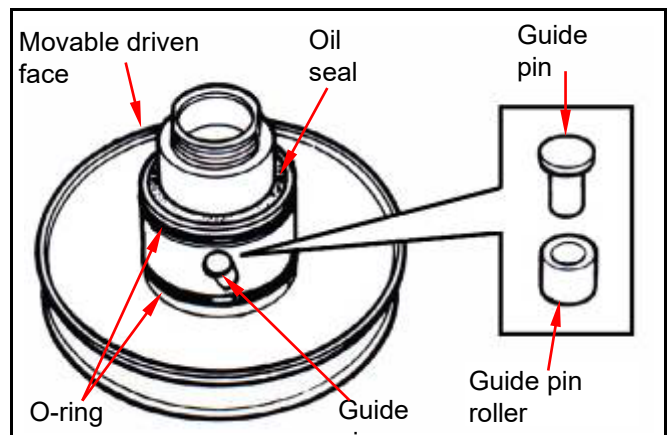
Installation of Clutch Outer/Driven Pulley

Install new oil seal and O-ring onto movable driven face.

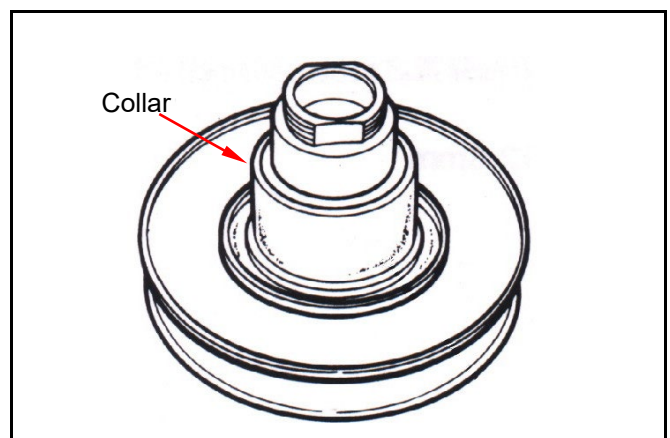
Apply with specified grease to lubricate the inside of movable driven face.



Install the movable driven face onto driven face.
Install the guide pin and guide pin roller.



Install the collar.



Pass the axis of the tool through the center of the driven pulley.
Install clutch spring, spring collar, clutch weight and clutch nut.

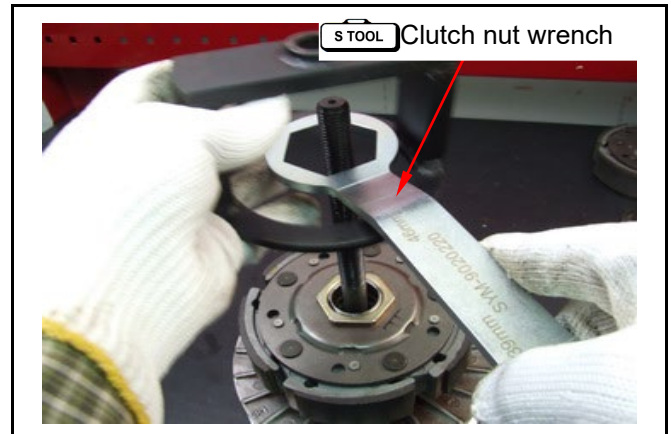


8. V-Belt Drive System

Install the spring compressor and wrench, then tighten the nut.

Special tool

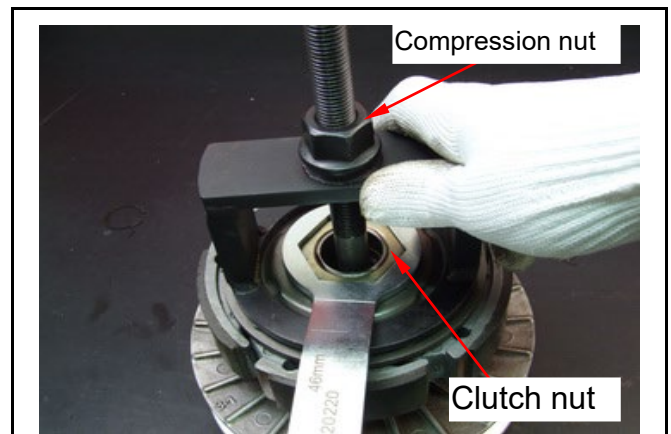
Clutch nut wrench 39 x 46 mm
SYM-9020220



Tighten compression nut until clutch nut can be installed to clutch.

Tighten clutch nut to specified torque with clutch nut wrench.

Remove the clutch spring compressor.



Push the driven pulley open.



Install the drive belt.

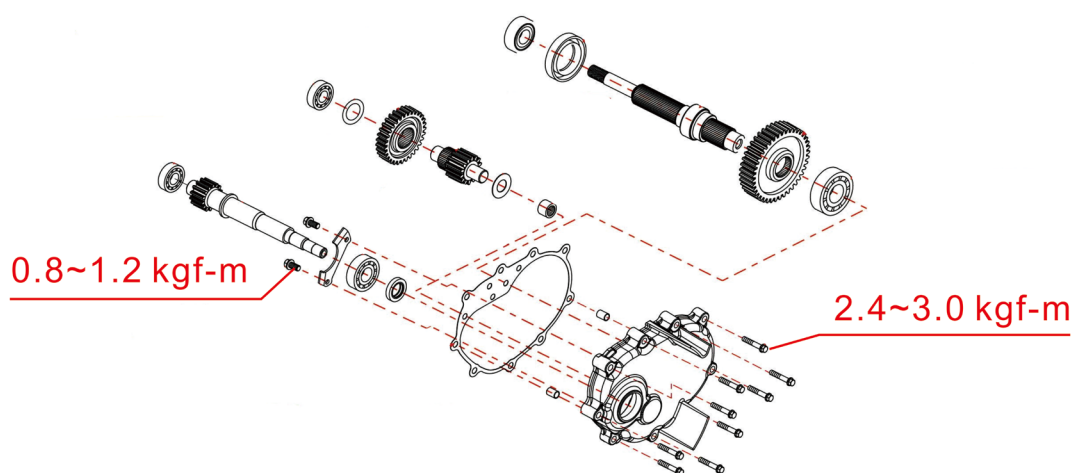
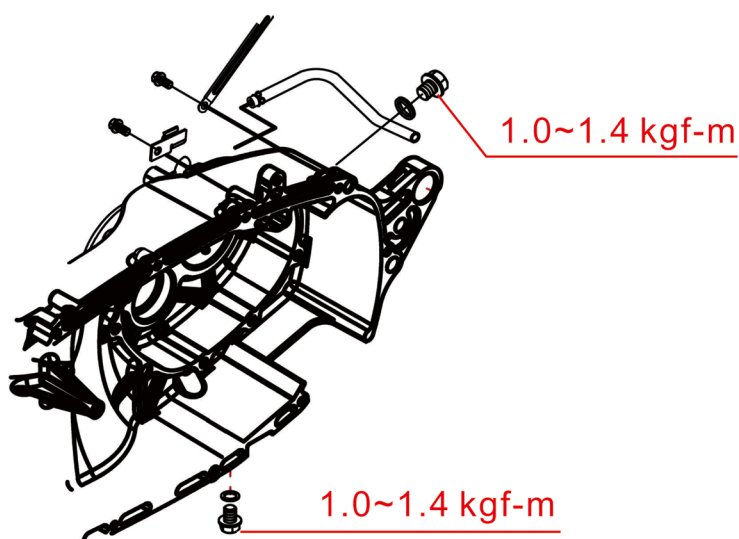
Install clutch outer/driven pulley and drive belt onto drive shaft.



機構圖示	軸承更換
.....9-Err9-Err
or! Bookmark not defined.	or! Bookmark not defined.
作業上的注意事項	齒輪油箱蓋
.....9-Err9-Err
or! Bookmark not defined.	or! Bookmark not defined.
故障診斷	最終傳動機構組合
.....9-Err9-Err
or! Bookmark not defined.	or! Bookmark not defined.
最終傳動機構分解/檢查	
.....9-Err	
or! Bookmark not defined.	

9 Final Drive Mechanism

Mechanism Diagram



Precautions in Operation

Specification

Application oil: Scooter gear oil

Recommended oil: SAE 85W-140 or similarity gear oil.

Oil quantity: 350 c.c. (300 c.c. when replacing)

Torque value

Gear box cover bolt: 2.4~3.0 kg-m

Tools

Bearing driver (6205)

Bearing driver (6204)

Bearing driver (6206)

Oil seal driver (25*40*7)

Inner bearing puller

Outer bearing puller

Troubleshooting

Engine can be started but motorcycle cannot be moved.

- Damaged driving gear
- Burnt out driving gear

Noise

- Worn or burnt gear
- Worn gear

Gear oil leaks

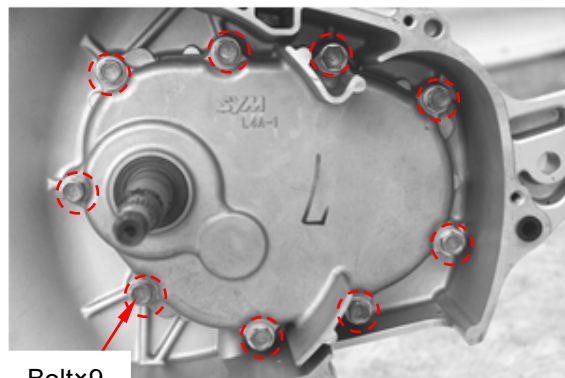
- Excessive gear oil.
- Worn or damage oil seal

9 Final Drive Mechanism



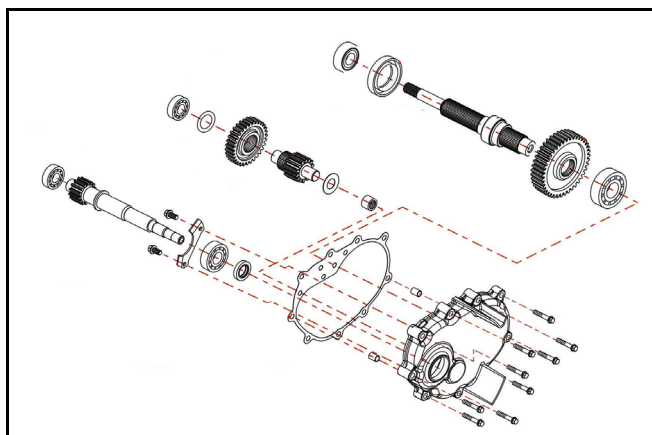
Final Drive Mechanism Disassembly

Remove driven pulley.
Drain gear oil out from gear box.
Remove gear box cover bolts and then remove the cover.
Remove gasket and dowel pin.



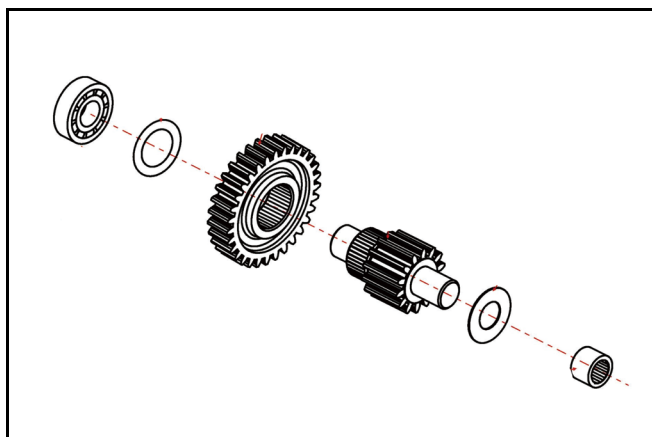
Bolt×9

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

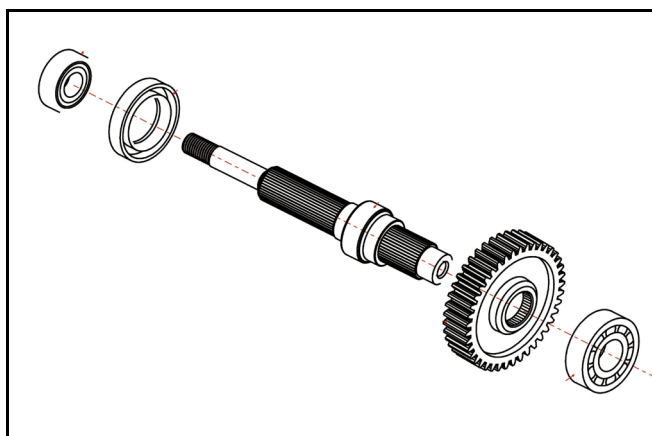


Inspection

Check if the countershaft is wear or damage.



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



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

⚠ Caution

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

Check drive shaft and gear for wear or damage.

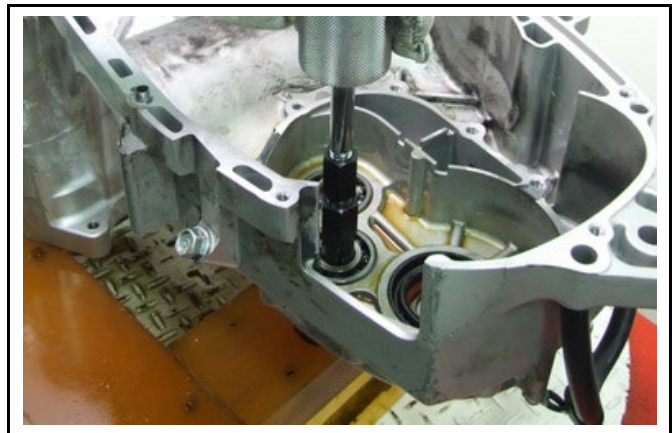
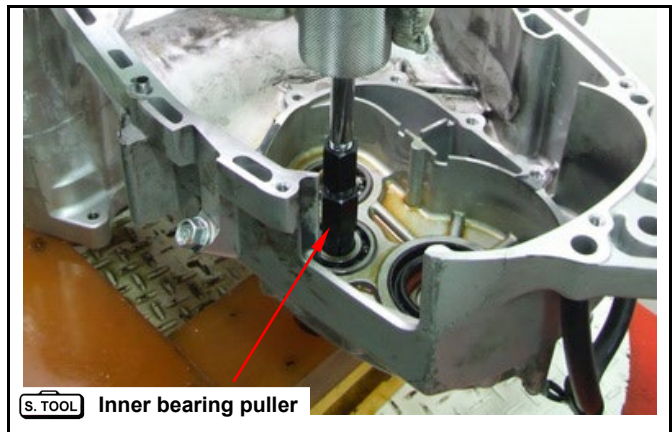
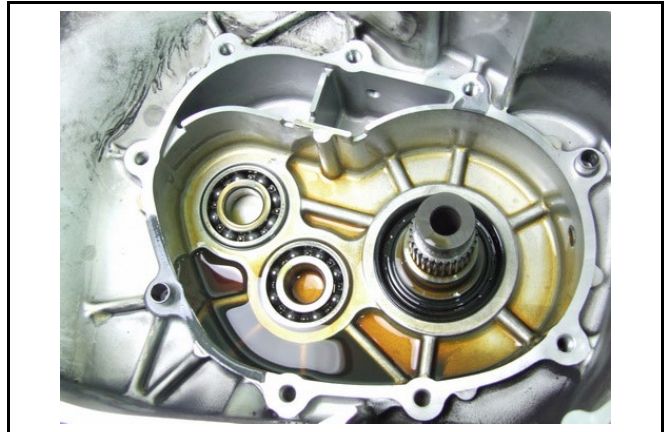
Bearing replacement

⚠ Caution

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

Special tool

Inner bearing puller
 SYM-6204025



Install new driving shaft bearing into left crankcase.

Special Tool

Bearing driver (6204)
 SYM-6204024

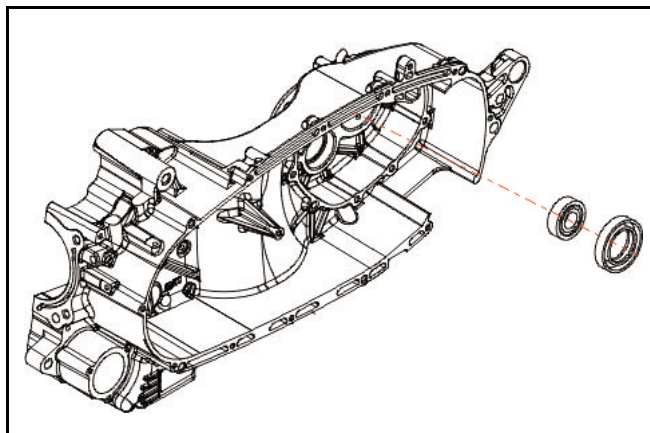


Final shaft bearing replacement

Remove driving shaft bearing from left crankcase with inner bearing puller.

Caution

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



Install new driving shaft bearing into left crankcase.

Special tool

Bearing drive (6206)
SYM-9615000- A6206



Assemble new bearing onto tool.

Put tool and bearing into left crankcase.
Put guide plate and nut on the outside of gear box.



Fix one side with wrench, and tighten the nut in the other side. Push bearing to position. Make sure the bearing is in position.




Greased some lube on final shaft oil seal.
Put oil seal groove surface upside into gearbox.

Special tool

45*65*10 Oil seal drive

SYM-9125500-L4A 45 65 10

 45*65*10 Oil seal drive

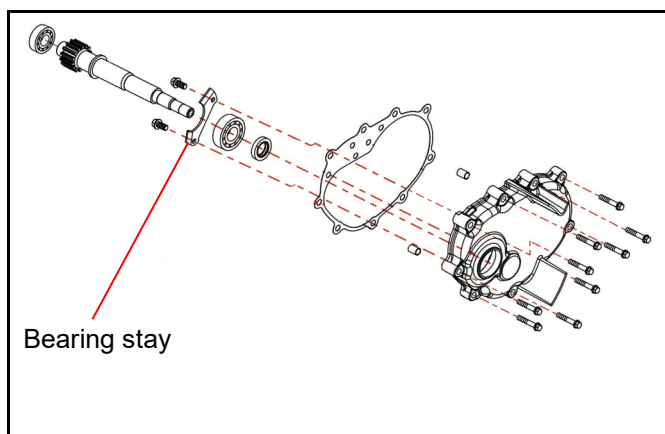


Knock oil seal in position with hammer.



Mission cover

Remove mission cover bearing stay.



Knock driving shaft and bearing out with rubber hammer.

Check if driving shaft is defective.



Remove bearing with outer bearing puller.

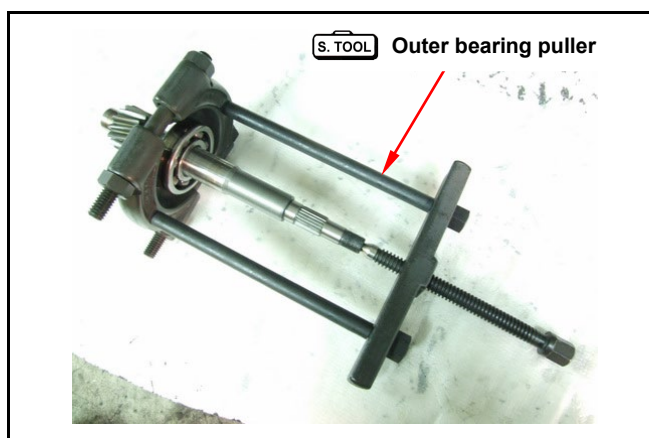
Special tool

Outer bearing puller

SYM-6204010

Caution

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



Needle bearing replacement

Remove needle bearing with inner bearing puller.

Special tool

Inner bearing puller.

SYM-6204025



Caution

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

Install new needle bearing with tool.

Special tool

Needle bearing driver

SYM-9610000-L4A N1820

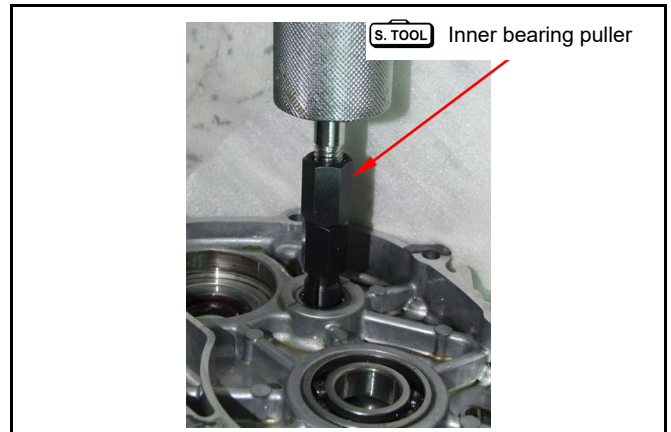
Or

Bearing driver

SYM-6204024

Assemble new needle bearing onto tool.

Knock needle bearing in mission cover with hammer.



Bearing installation

Special tool

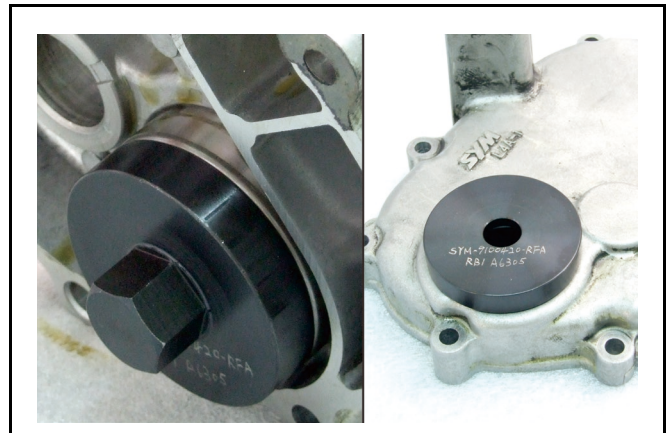
Bearing driver (6305)
SYM-9100420-A6305



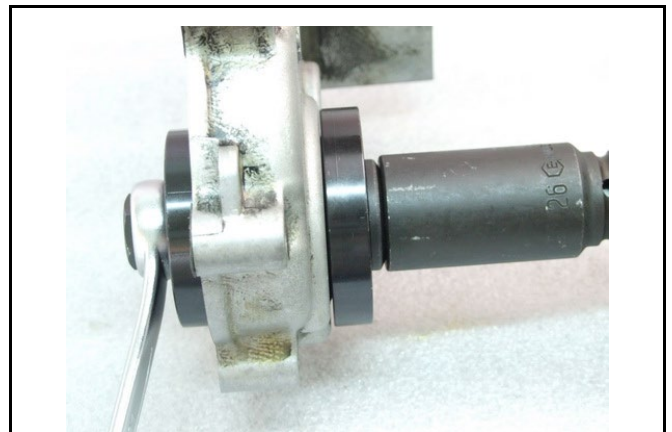
Assemble new bearing onto tool.



Put tool and bearing into inside of mission cover.
Put guide plate and nut on the other side of mission cover.



Fix one side with wrench, and tighten the nut in the other side. Push bearing to position.
Make sure the bearing is in position.



9 Final Drive Mechanism

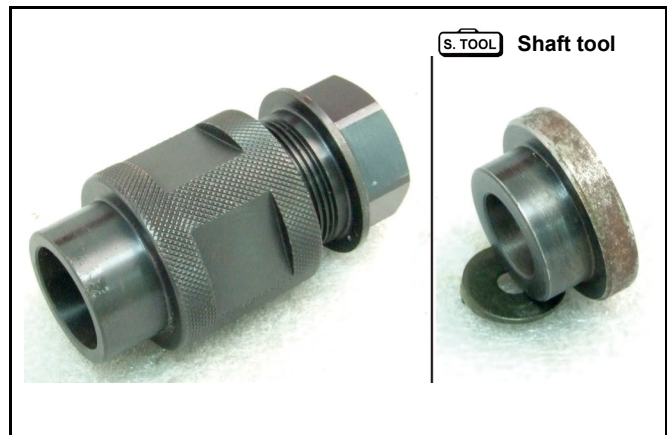


Driving shaft installation

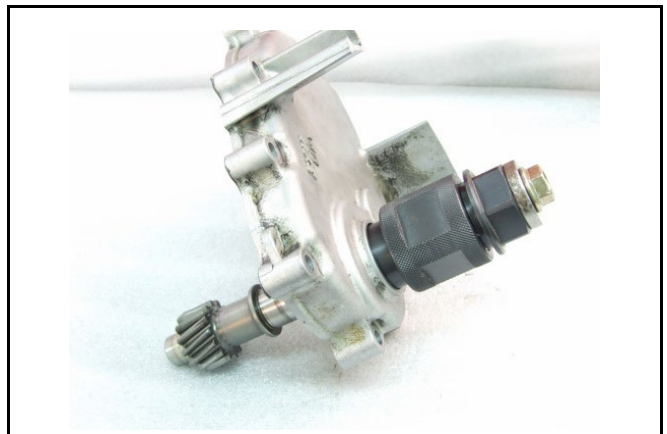
Special tool

Shaft tool

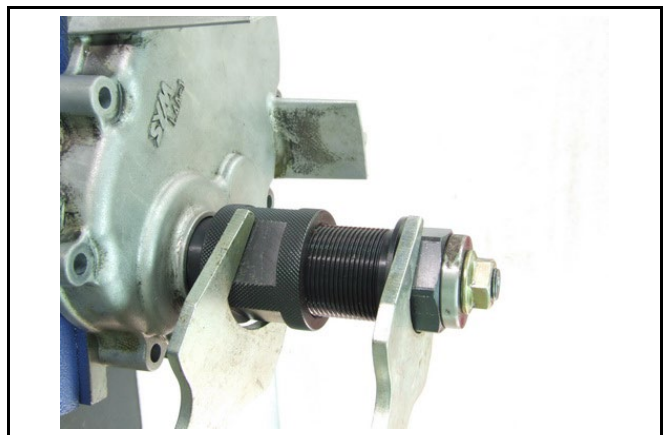
SYM-1120000-ALL



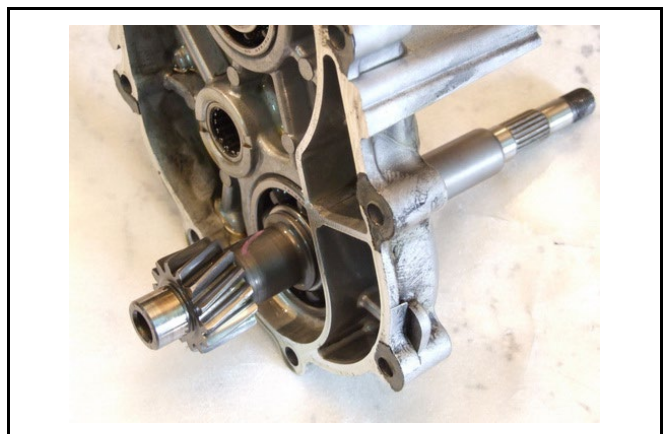
Pass the driving shaft through the bearing.
Put the tool onto outside of mission cover, and
install the nut into driving shaft.



Rotate tool's nut with wrench clockwise.
Pull driving shaft into mission cover.



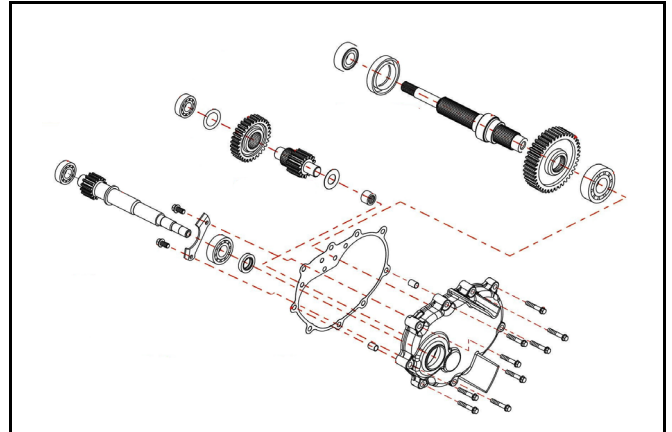
Make sure driving shaft in position.



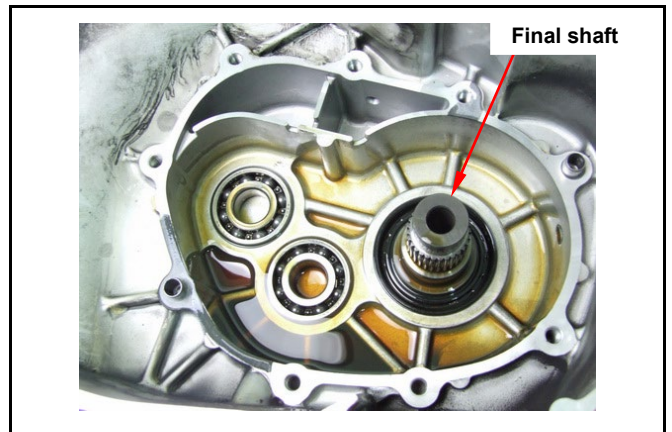
Final drive installation

Caution

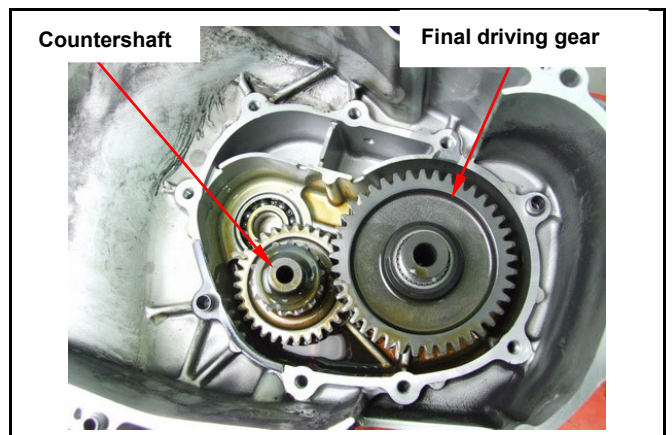
When assemble gearbox, thrust washer cannot be lost.
Remaining gasket must be cleaned.



Install final shaft.

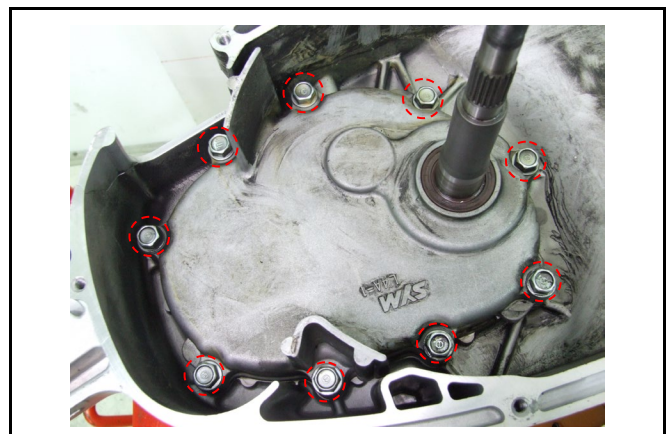


Install countershaft and final driving gear.



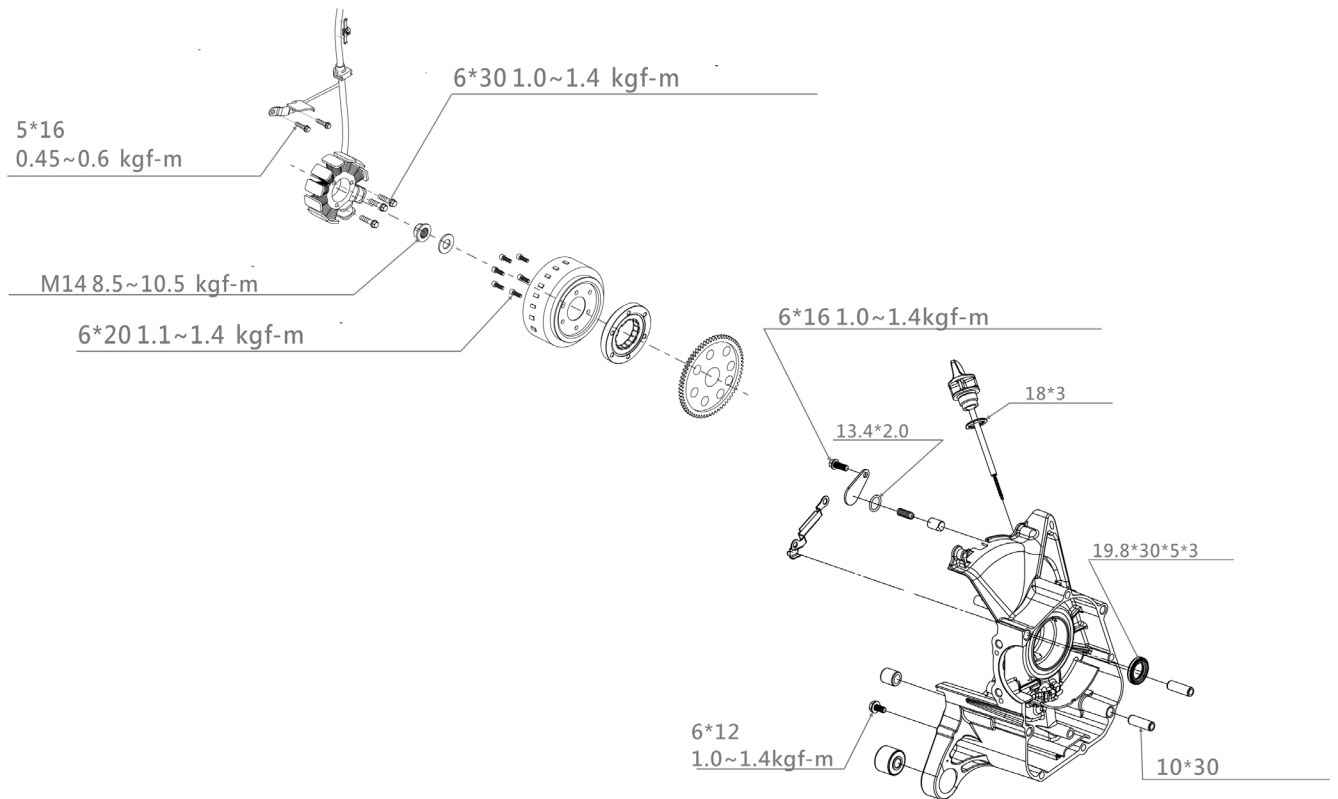
Install dowel pin and new gasket.

Install mission cover and tighten bolts.
Torque value: 2.4~3.0 kgf-m
Install driven pulley/clutch outer/belt.
Install movable drive face, drive face and left crankcase.
Install rear wheel.
Add gear oil.



Mechanism Diagram	10-1	Flywheel Removal.....	10-3
Precautions in Operation	10-2	Flywheel Installation.....	10-4
Right Crankcase Cover Removal.	10-3	A.C.G. Set Installation	10-4
A.C.G. Set Removal.....	10-3	Right Crankcase Installation.....	10-4

Mechanism Diagram



10. AC Generator / Starting Clutch

Precautions in Operation

- Refer to chapter 5: Engine removal and installation
- Refer to chapter 16: The troubleshooting and inspection of alternator
- Refer to chapter 16: The service procedures and precaution items of starter motor

Specification

Item	Standard value (mm)	Limit (mm)
ID of starting clutch gear	25.026~25.045	25.100
OD of starting clutch gear	45.657~45.673	45.640

Torque value

Flywheel nut	8.5~10.5 kgf-m
Starting clutch hexagon bolt	1.1~1.4 kgf-m with adhesive
6 mm bolts	0.8~1.2 kgf-m
5 mm bolts	0.45~0.6 kgf-m

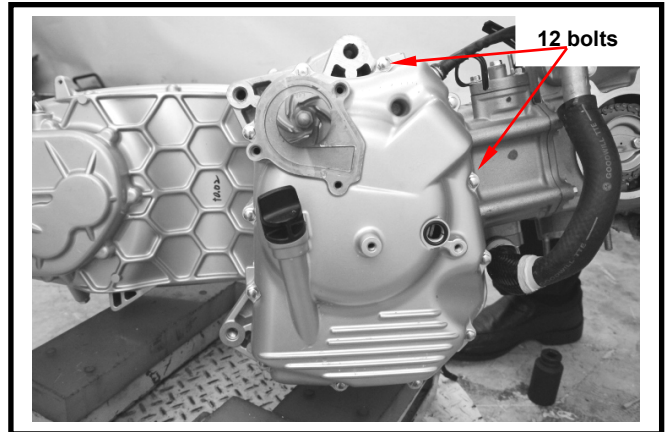
Tools

Special tools

A.C.G. flywheel puller
Universal holder

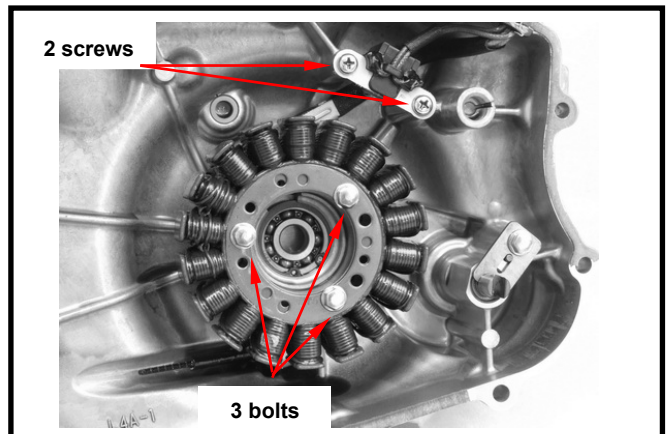
Right Crankcase Cover Removal

Remove 12 bolts from the right crankcase cover.
Remove the right crankcase cover.
Remove dowel pin and gasket.



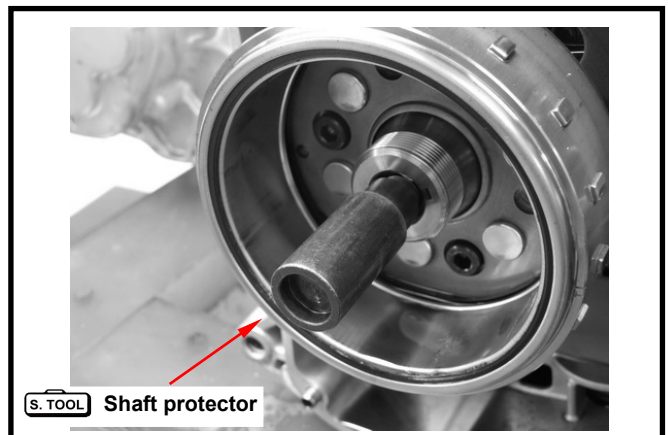
A.C.G. Set Removal

Remove 2 screws from pulse generator and then remove it.
Remove 3 bolts from right crankcase cover and A.C.G. set.



Flywheel Removal

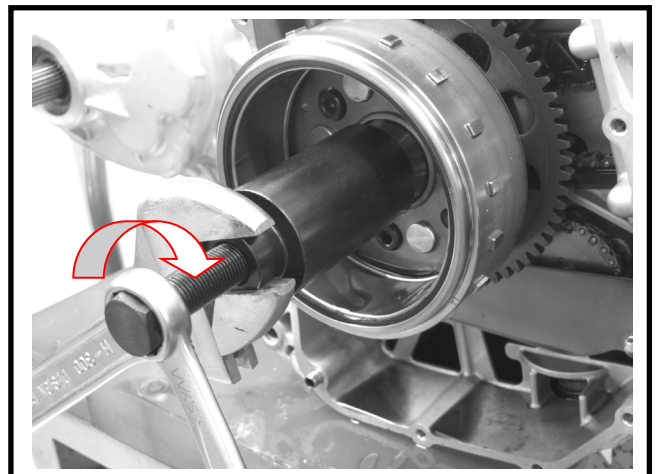
Remove the flywheel nut.
Install the shaft protector to the crankshaft.



Pull out flywheel with A.C.G. flywheel puller.

Tool:

A.C.G. Flywheel puller



10. AC Generator / Starting Clutch

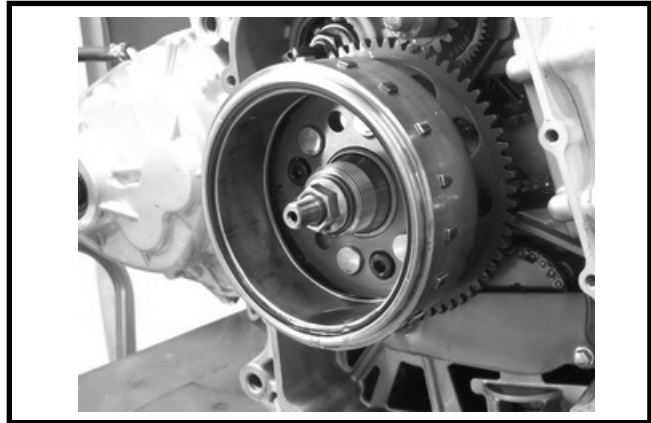
Flywheel Installation

Insert the pin onto crankshaft.
Align the key on crankshaft with the flywheel groove, and then install the flywheel.
Hold the flywheel with flywheel holder, and tighten its nut.

Torque value: 8.5~10.5 kg-m

Tool:

Flywheel holder



A.C.G. Set Installation

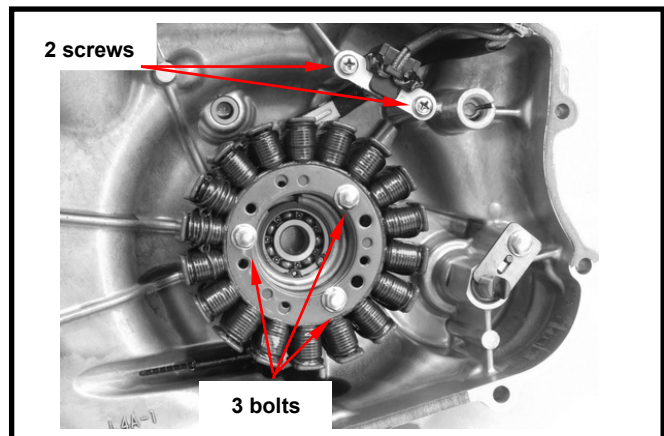
Install the A.C.G. set onto right crankcase cover (3 bolts).

Install 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.



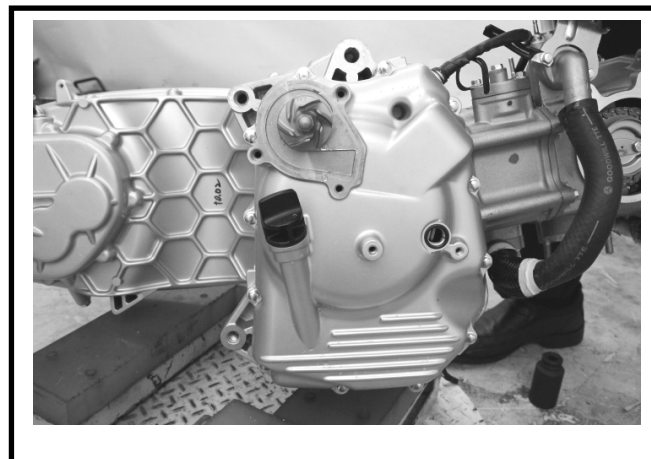
Right Crankcase Cover Installation

Install dowel pin and new gasket.

Install right crankcase cover onto the crankcase.

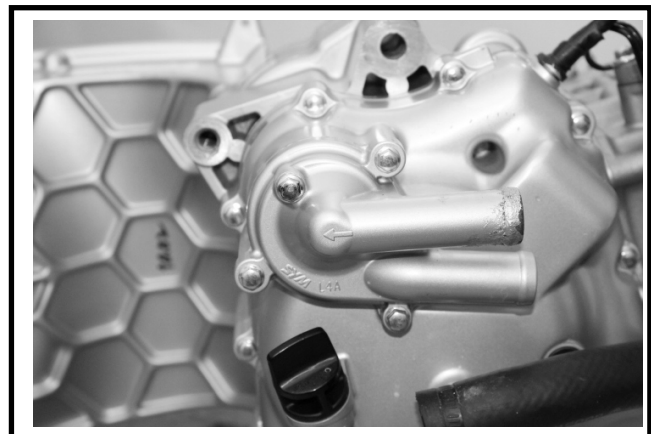
Note that align the water pump shaft indent with the oil pump shaft.

Install right crankcase cover (12 bolts).



Connect water hose to the right crankcase cover.

Install the water pump cover onto crankcase cover.



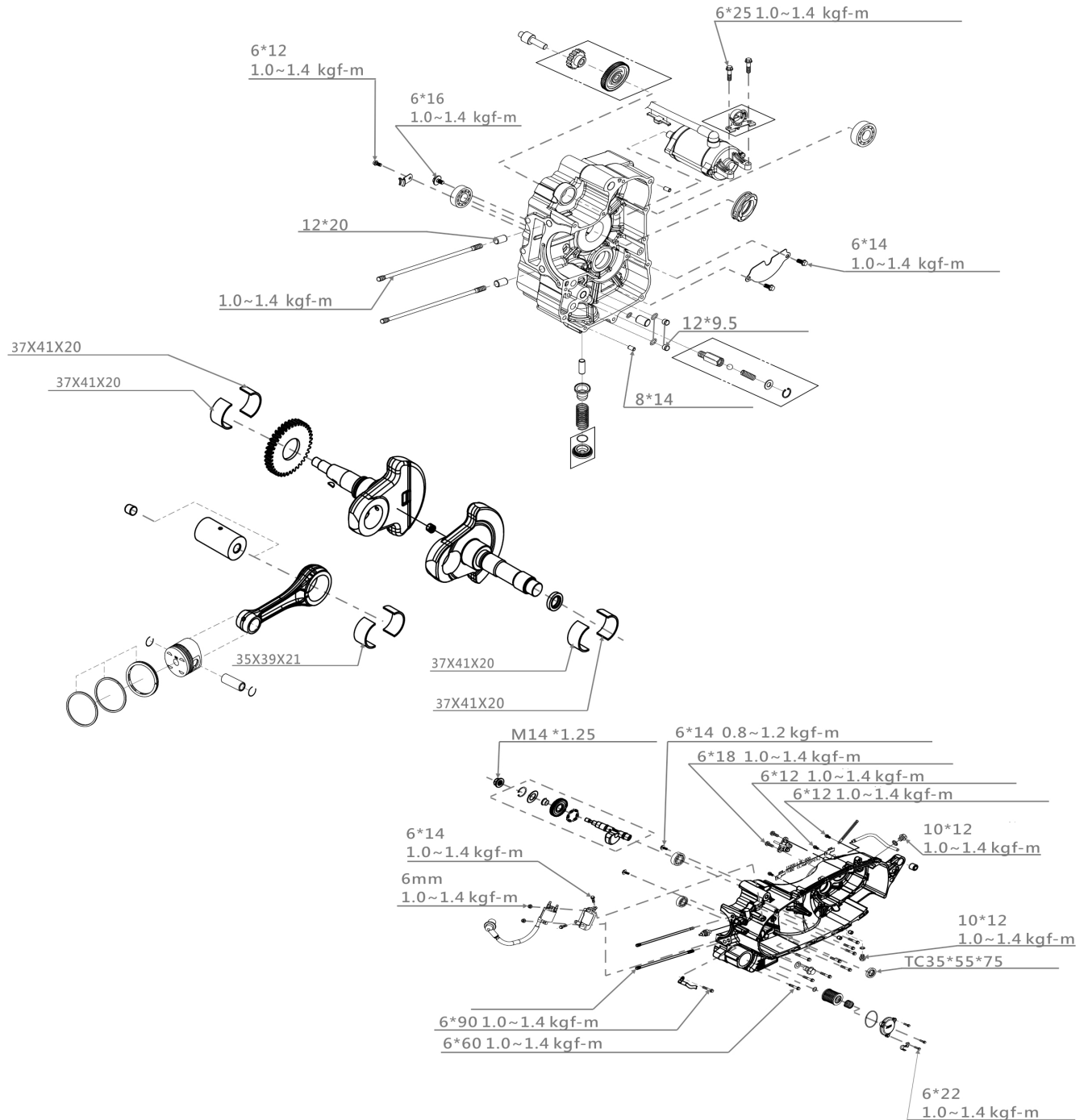


10. AC Generator / Starting Clutch

NOTE:

Mechanism Diagram	11-1	Crankshaft bearing replacement ..	11-5
Precautions in Operation	11-2	Crankshaft bearing installation	11-5
Troubleshooting.....	11-2	Crankcase Assembly	11-6
Crankcase Disassembly	11-3		

Mechanism Diagram – LZ40W



Precautions in Operation

- This Section concerns disassembly of the crankcase for repair purpose.
- Remove following components before disassembling crankcase.
 - Engine Section 5
 - Cylinder head Section 6
 - Cylinder and piston Section 7
 - Drive pulley and driven pulley Section 8
 - AC generator/Start driven gear Section 10
 - Starting motor Section 16
- 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.

Service data

Unit: mm

	Item	Standard	Limit
Crankshaft	Connecting rod side clearance of the big end	0.150~0.450	0.600
	Vertical clearance of the big end of the connecting rod	0.018~0.036	0.050
	Run-out	-	0.100

Torque value

Bolts for crankcase	0.8~1.2kgf-m
Bolts for cam chain adjuster	1.2~1.6kgf-m

Tools

Special tools

R/L. crank disassemble/ install tool
L. crank shaft bearing driver
Crank shaft bearing fixing socket
Crank shaft puller
Outer bearing puller
Inner bearing puller

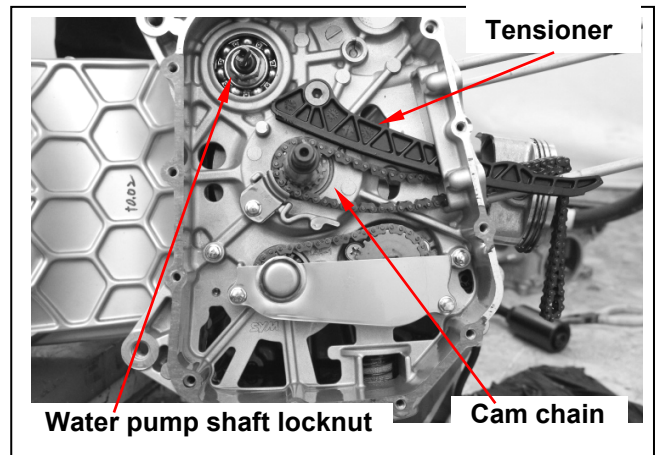
Troubleshooting

Engine noise

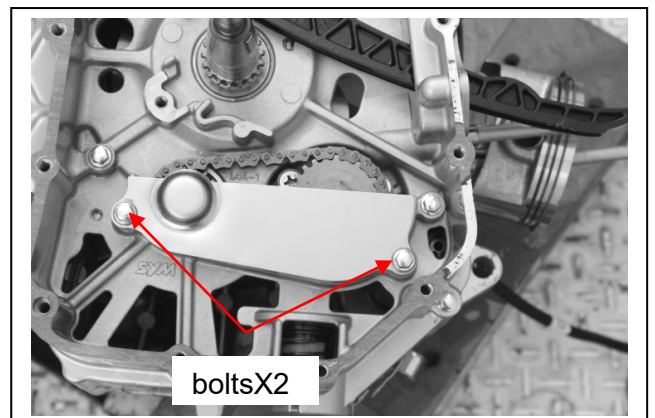
- Loose crankshaft bearing
- Loose crankshaft pin bearing
- Worn out piston pin and pin hole

Crankcase Disassembly

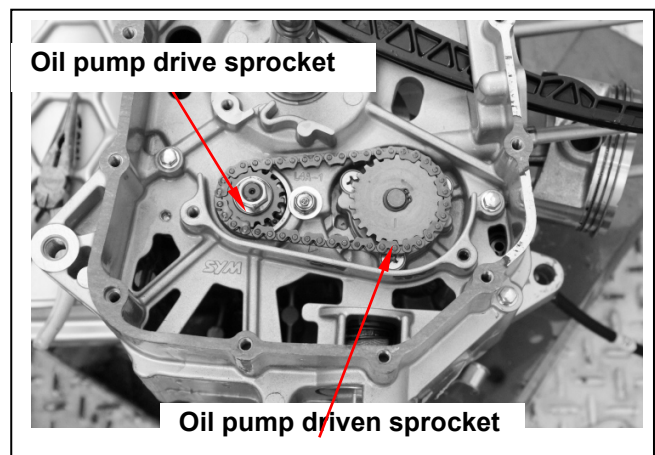
Remove the cam chain.
Loosen the bolt and remove the tensioner.
Remove the water pump shaft locknut.



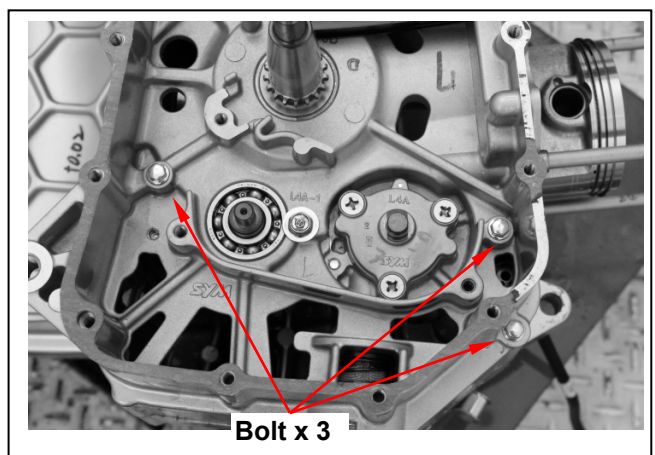
Remove the oil separator (bolt x 2).



Remove the oil pump drive sprocket, driven sprocket and drive chain.



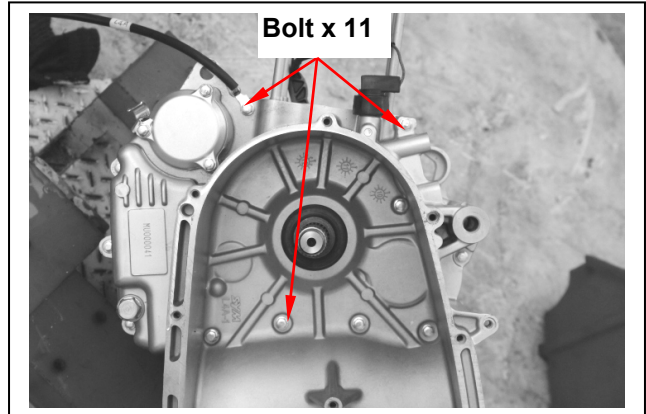
Remove the right crankcase bolts (bolt x 3).



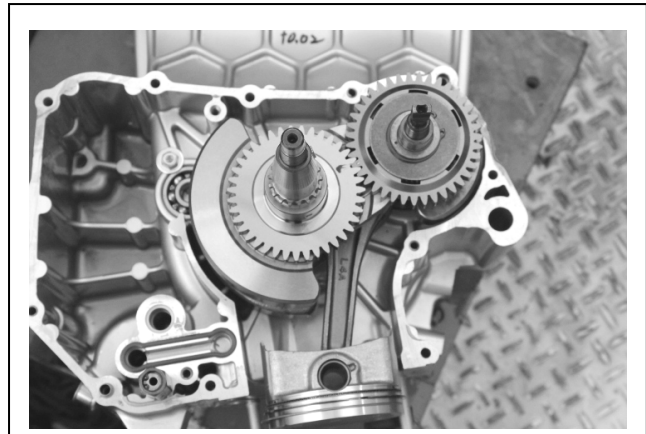
11. Crankshaft / Crankcase



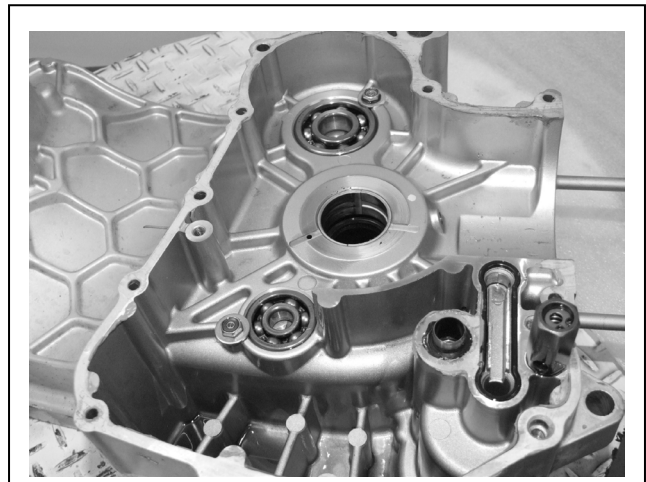
Remove the left crankcase bolts (bolt x 11).



Remove the right crankcase from the left crankcase.



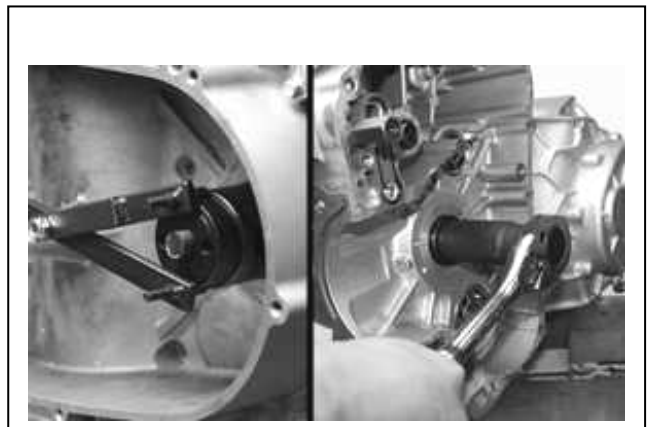
Remove the crankshaft and balancer shaft from the left crankcase.
Check the main bearing on the crankcase for any wear.
Replace the main bearing with special tool if necessary.



Crankshaft bearing replacement

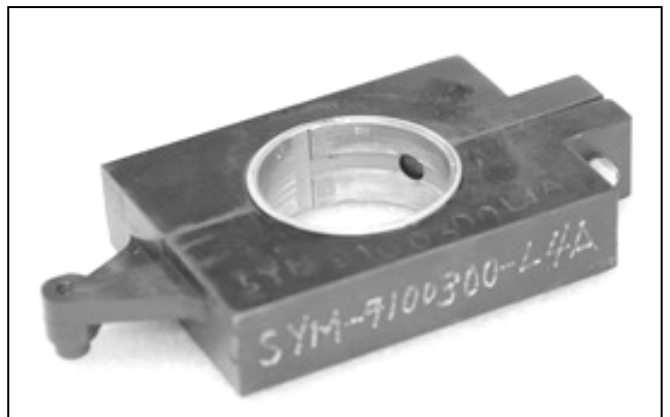
Align the main bearing remover with the main bearing.

Fix the remover with the universal holder and press out the main bearing.



Crankshaft bearing installation

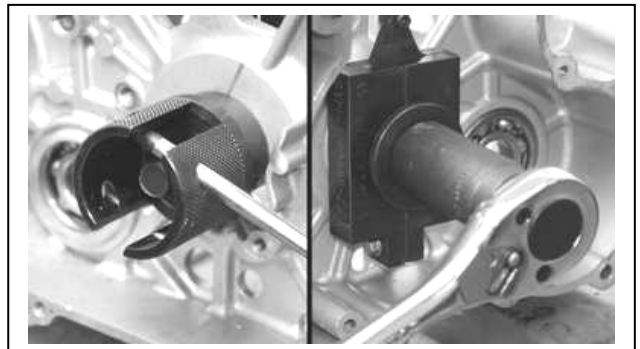
Use the crankshaft main bearing holder to fasten the upper and lower main bearing.



Align the oil path on the main bearing and the crankcase.

Press the main bearing into the crankcase.

Special tool: main bearing installer / remover
SYM-9100310-L4A

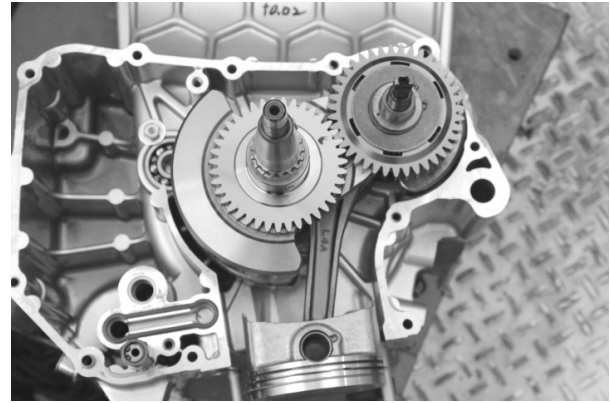


11. Crankshaft / Crankcase



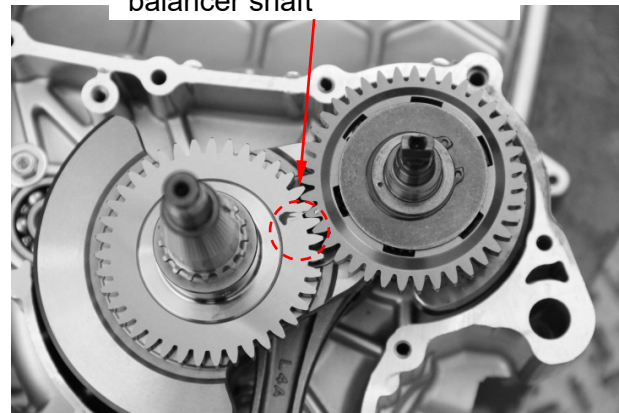
Crankcase assembly

Install the crankshaft and balancer shaft to the left crankcase.



The marks on the crankshaft and balancer shaft must be aligned.

Marks on the crankshaft and balancer shaft



Assemble the right crankcase to the left crankcase.
Tighten the bolts on the right crankcase.



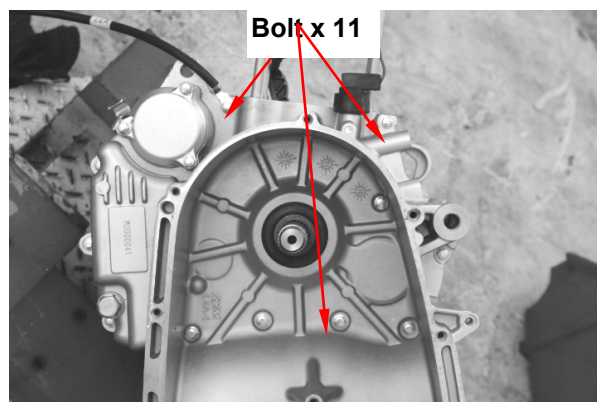
Install the oil pump drive sprocket, driven sprocket and drive chain.



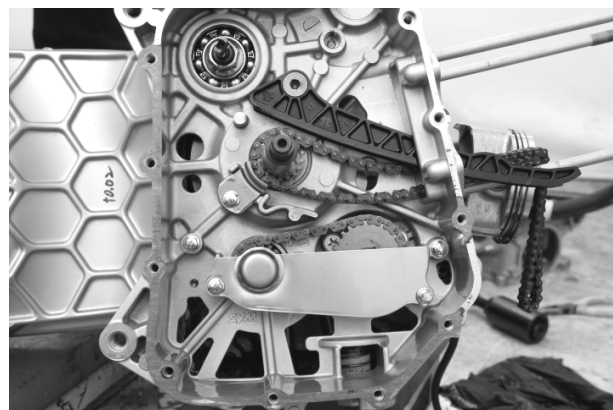
Install the oil separator (bolt x2).



Tighten the bolts on the left crankcase (bolt x 11).



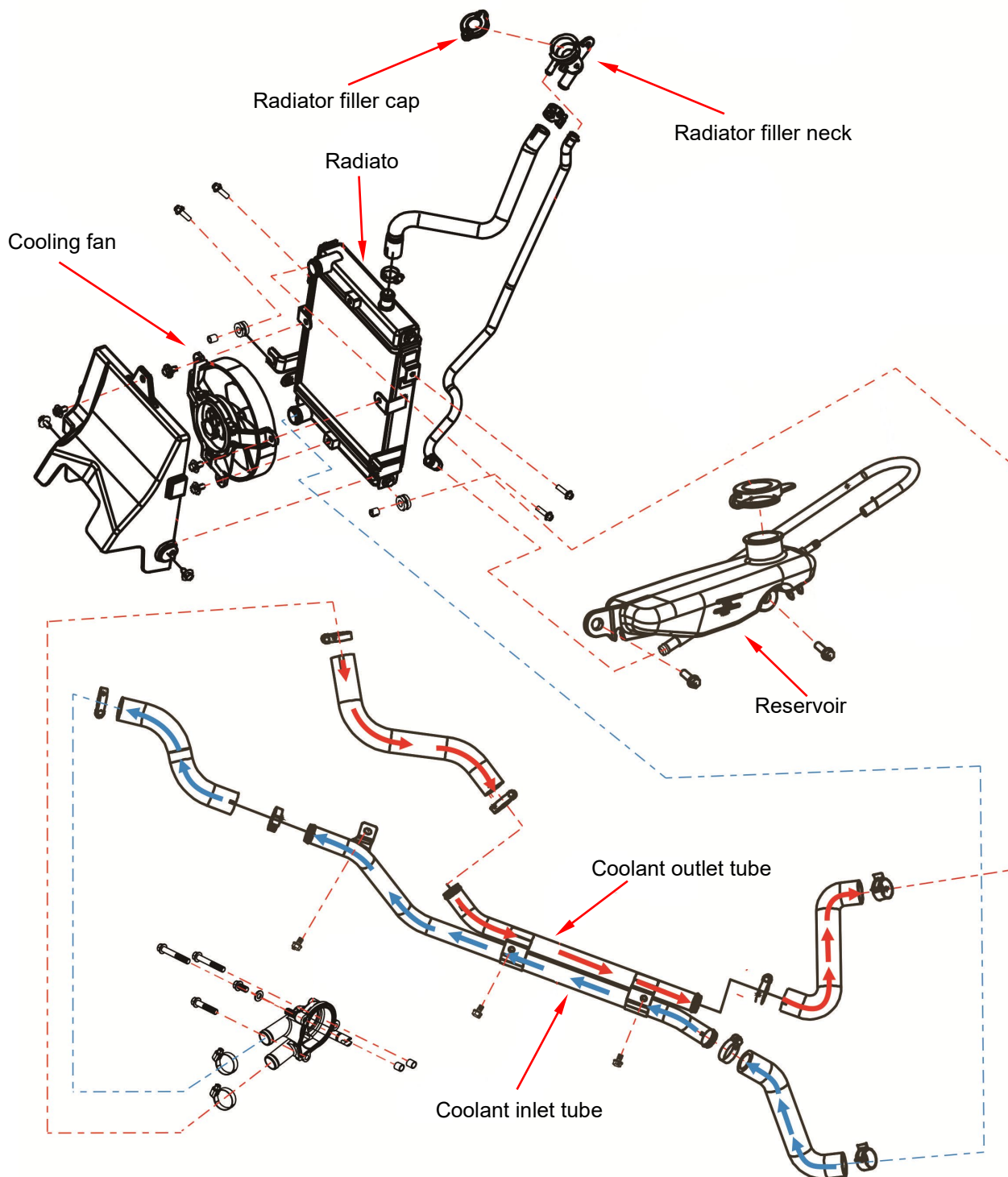
Tighten the water pump shaft locknut.
Install the cam chain and tensioner.



NOTE:

Mechanism Diagram	12-1	Radiator	12-9
Precautions in Operation	12-2	Water Pump	12-14
Troubleshooting	12-3	Thermostat	12-18
Coolant Replacement	12-4		

Mechanism Diagram



12. Cooling System



Precautions in Operation

General Information

Caution

- While the engine is running, never attempt to open the radiator filler cap, the pressurized hot coolant may shoot out and cause serious scalding injury. No maintenance work is allowed to perform unless the engine is completely cooled down.
- Refill the radiator with distilled water or specified additives.
- Add coolant to the reservoir.
- The cooling system can be serviced on the motorcycle.
- Avoiding spilling the coolant on the painted surface.
- Test the cooling system for any leakage after the repair.
- Please refer to Section 17 for inspection of the temperature sensor switch for the fan motor and the water thermometer.

Technical Specification

Item	Specification
Pressure to open filler cap	1.1±0.15 kgf/cm ²
Capacity of coolant: Engine + radiator Reservoir upper / lower	1400c.c. Upper 170 / lower 100c.c.
Thermostat	Begins to activate at : 82~95°C Stroke : 0.05~3.5mm
Boiling point	Not pressurized: 107.7°C Pressureized : 125.6°C

Torque value

Water pump rotor 1.0~1.4kgf-m

Special Tool

Water pump oil seal driver SYM-9120500-H9A

Mechanical seal driver SYM-1721700-H9A

Troubleshooting

The engine temperature is too high

- The water thermometer and the temperature sensor do not work properly.
- The thermostat is stuck to close.
- Insufficient coolant.
- The water hose and jacket are clogged.
- Fan motor malfunction.
- The malfunction of the radiator filler cap.

The engine temperature is too low

- The malfunction of the water thermometer and the temperature sensor.
- 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

12. Cooling System



Coolant Replacement

Remove the right front cover, right side cover, and under cover.

Remove two bolts on the right side of radiator air duct and radiator bracket.

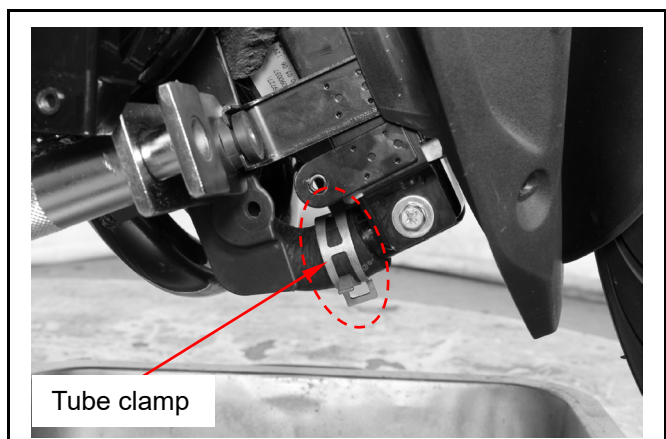
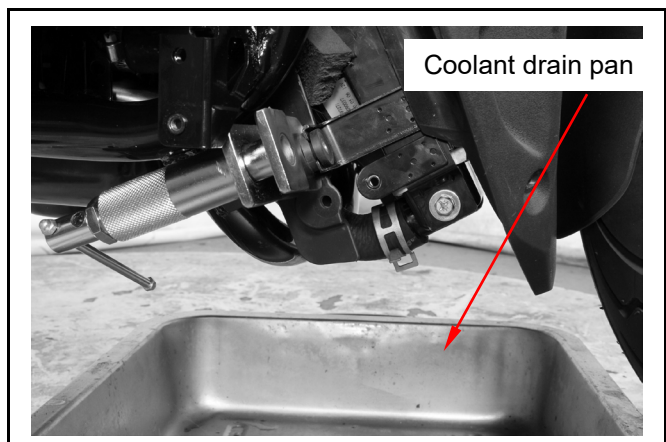
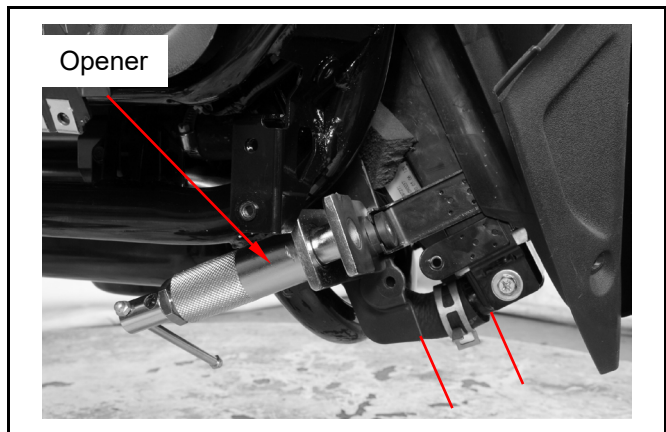
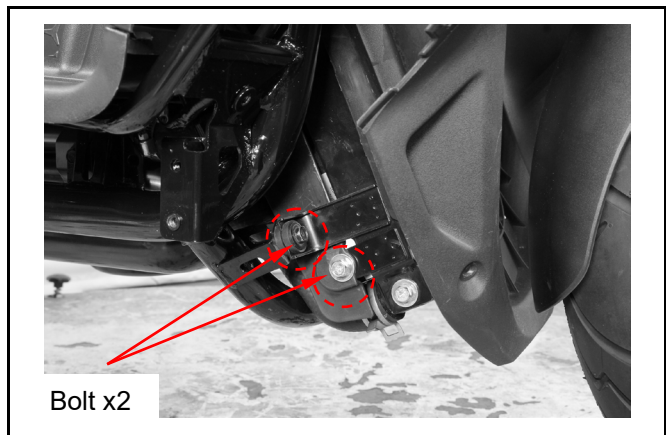
Warning

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

Use the tool to separate the radiator slightly and pull out the coolant tube.

Place the coolant drain pan under the scooter.

Remove the coolant outlet tube clamp.



Loosen the coolant outlet tube by using the tube pliers.

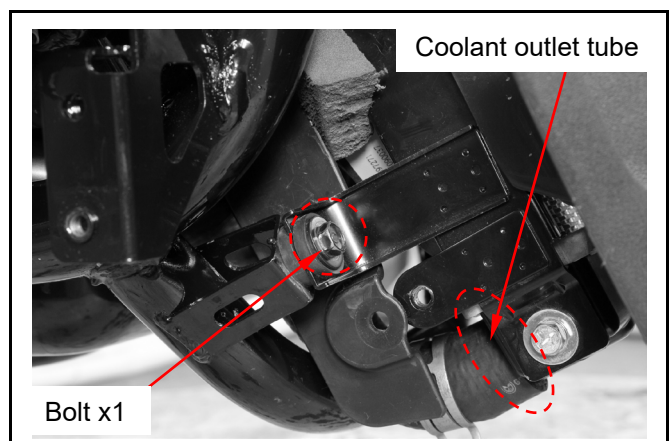
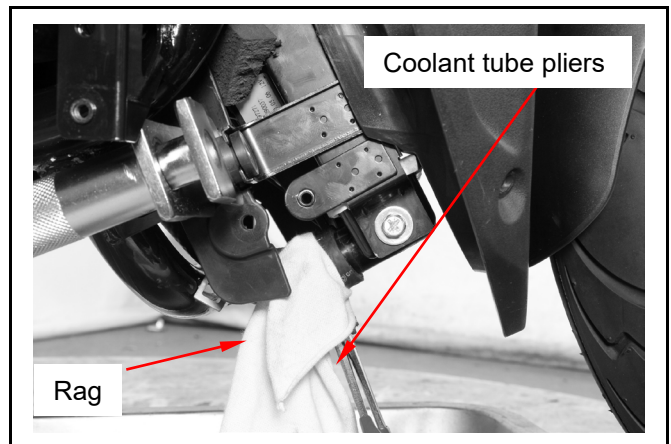
Caution

- Cover the coolant outlet tube with rag to avoid damaging the tube.

Drain the coolant.

Blow out the rest of the coolant from the cylinder and the radiator by using compressed air.

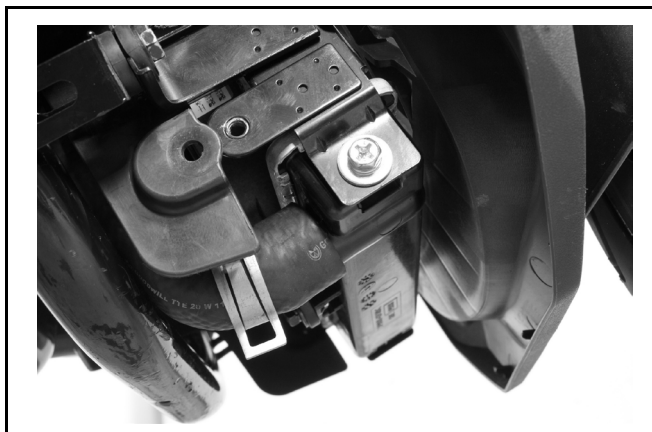
Finish draining the coolant.
Install the coolant outlet tube.
Remove the opener.
Install and tighten the bolt on the right side of radiator bracket.



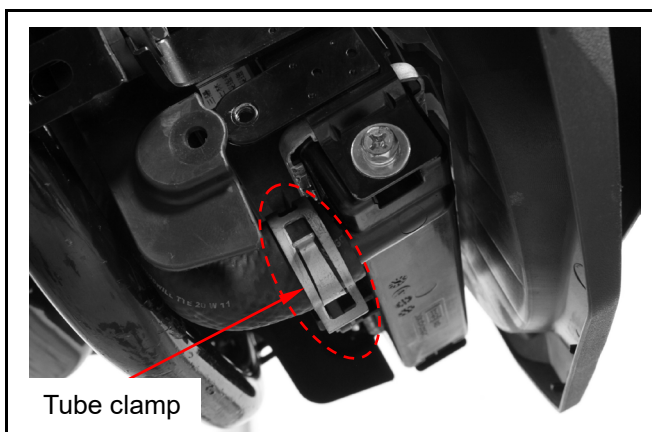
12. Cooling System



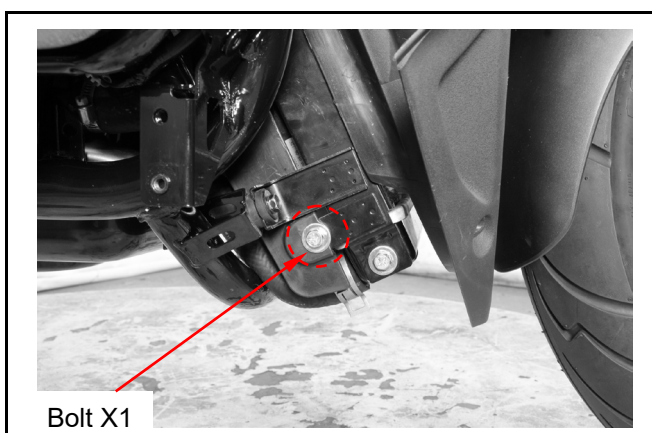
Confirm the coolant tube's assembled to the correct position.



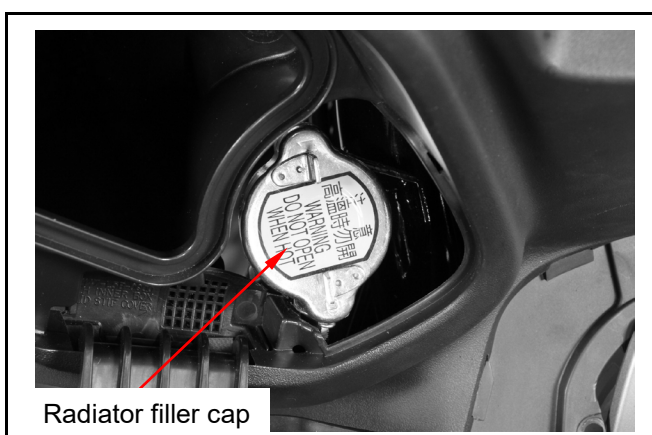
Install the tube clamp.



Tighten the bolt on the right side of radiator air duct.



Open the radiator filler cap.



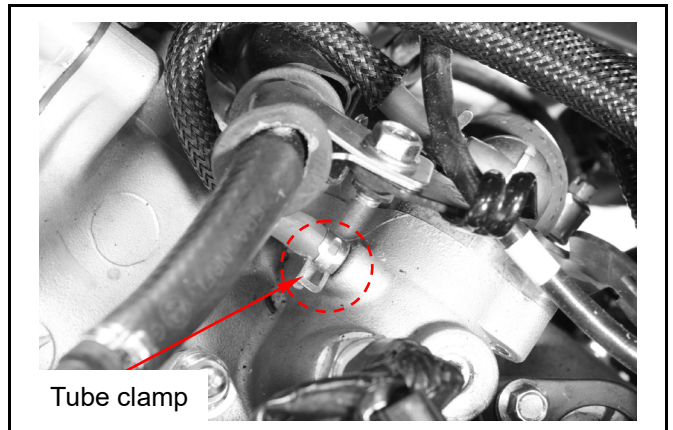
Add the coolant from the filler neck.
Add the coolant when the coolant level is too low.

⚠ Caution

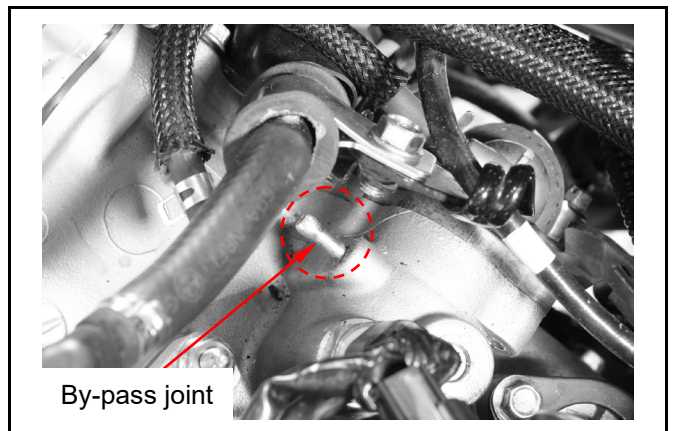
- Low-quality coolant might lead to rust inside the radiator.



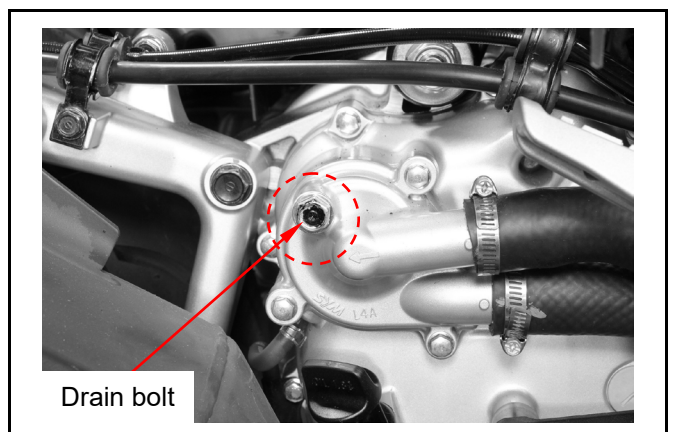
Remove the by-pass tube clamp and disconnect the tube.



Confirm the coolant flow out.
Install the by-pass tube and the clamp.
Add the coolant when the level is too low.



Start the engine and loosen the drain bolt on the water pump cover to release the air from the cooling system.



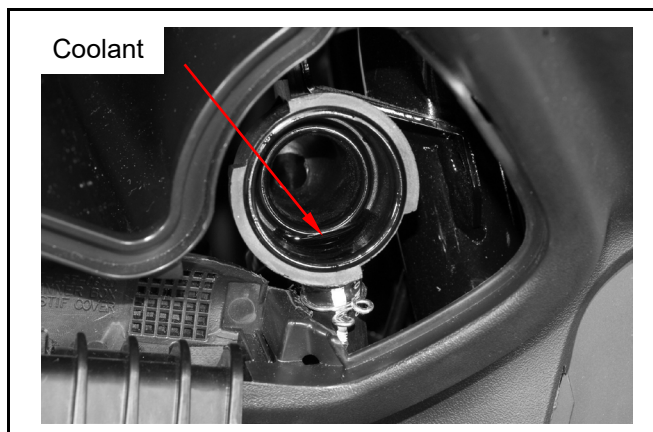
12. Cooling System



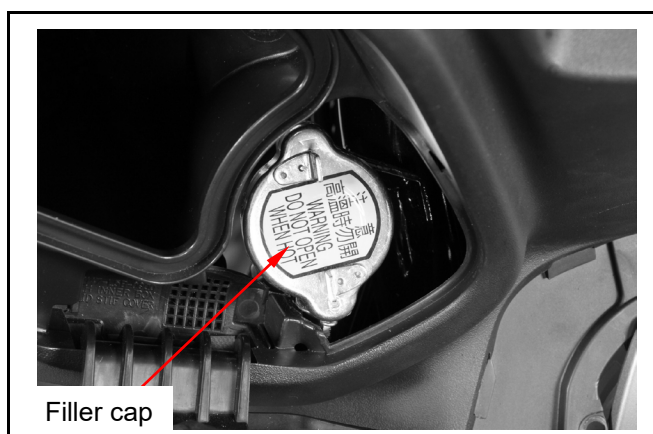
Warm up the engine till the cooling fan starts to operate.

Confirm no air bubble's popping out and shut down the engine.

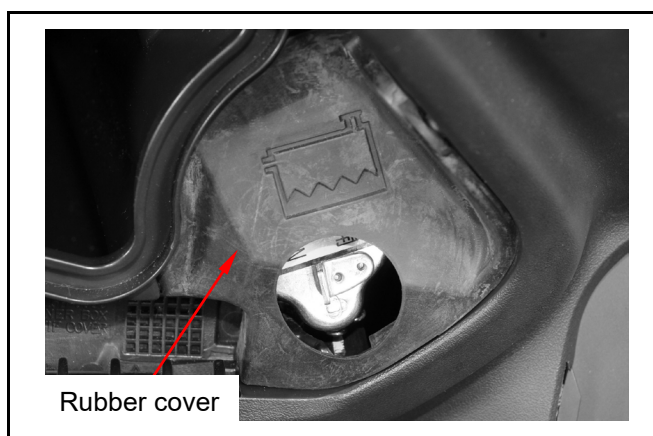
Add the coolant if necessary.



Close the radiator filler cap.

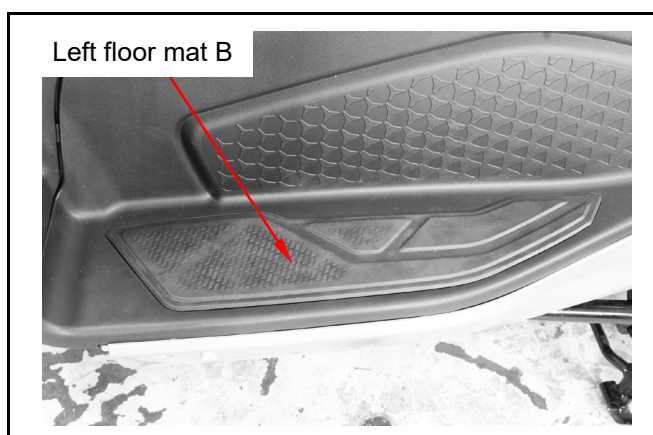


Install the rubber cover.

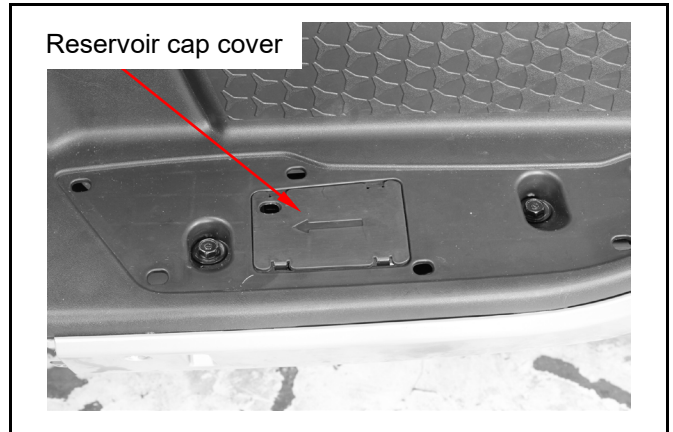


Reservoir coolant level inspection

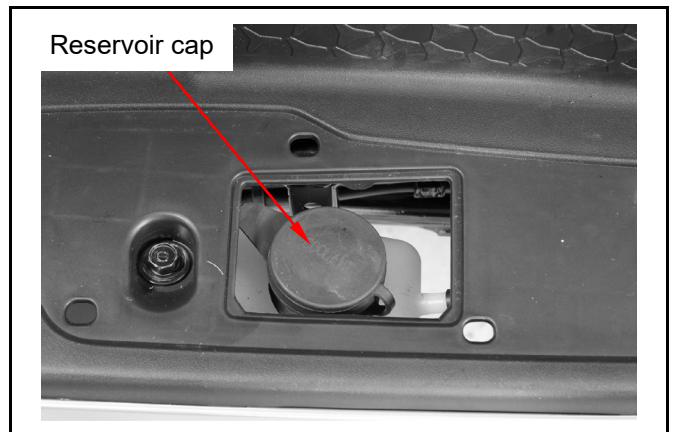
Remove the left floor mat B.



Remove the reservoir cap cover.



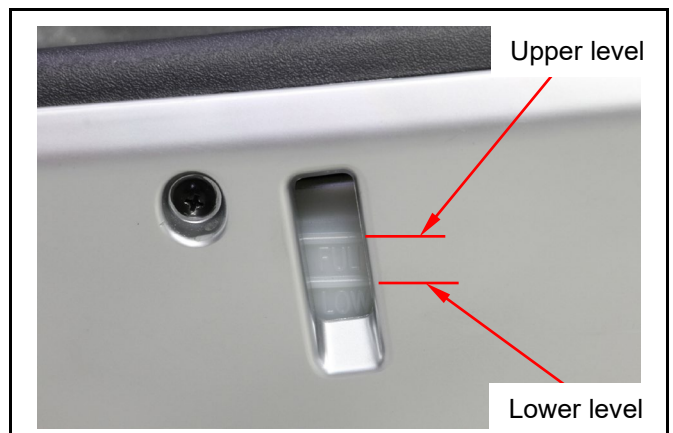
Open the reservoir cap and add the coolant.



Check the coolant level from the left side cover.

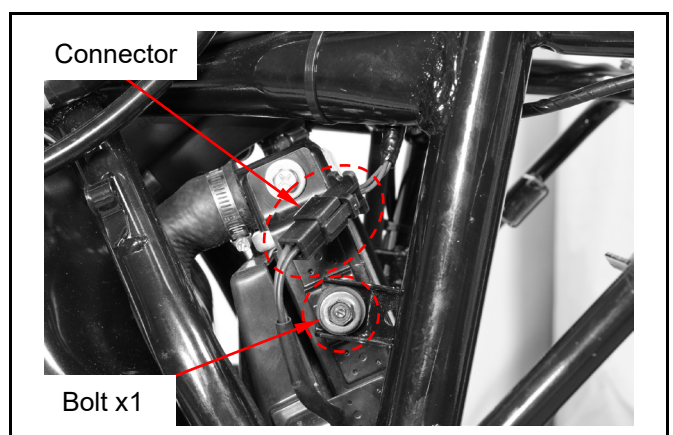
Caution

- Do not add too much coolant or the coolant might over-flow when the engine is warmed up.



Radiator

Disconnect the cooling fan connector.
Remove the bolt from the right upper side of radiator bracket.

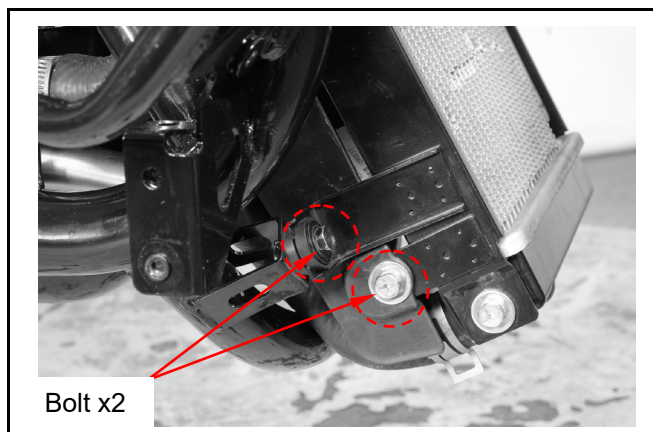


12. Cooling System

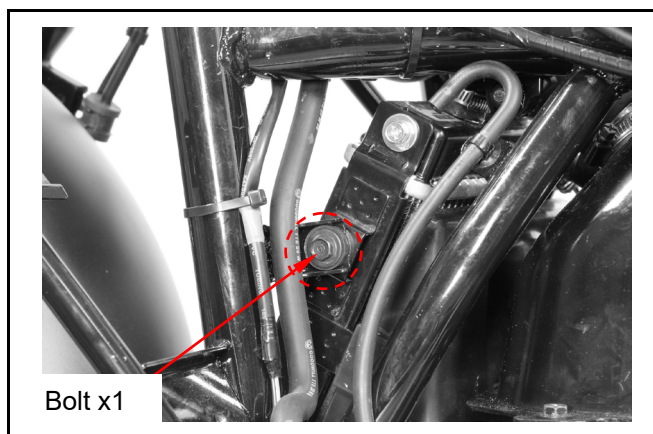


Remove the bolt from the right lower side of radiator bracket.

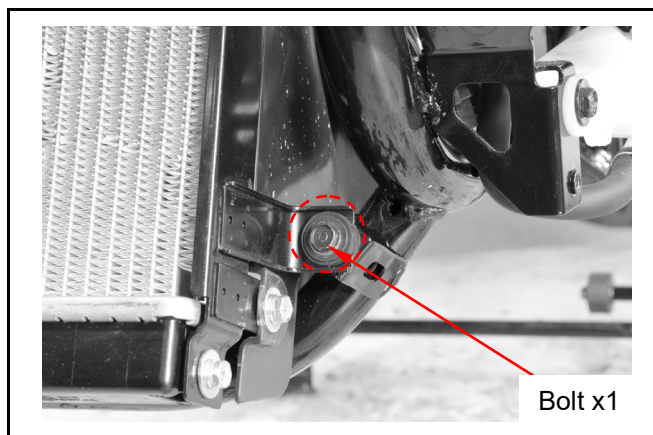
Remove the bolt from the right side of radiator air duct.



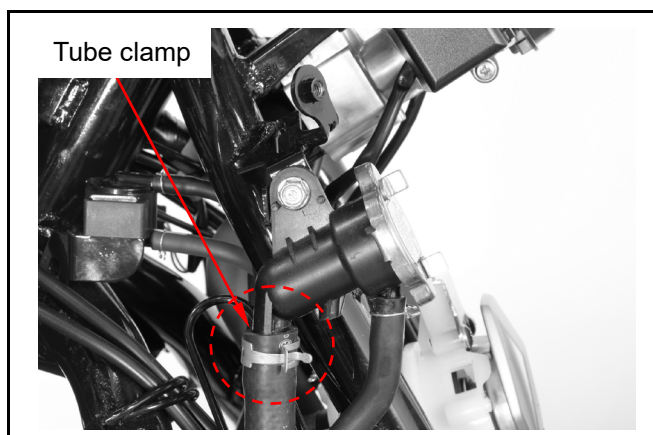
Remove the bolt from the left upper side of radiator bracket.



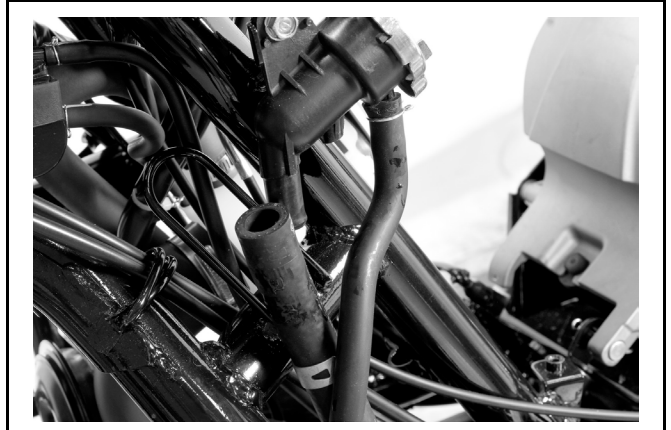
Remove the bolt from the left lower side of radiator bracket.



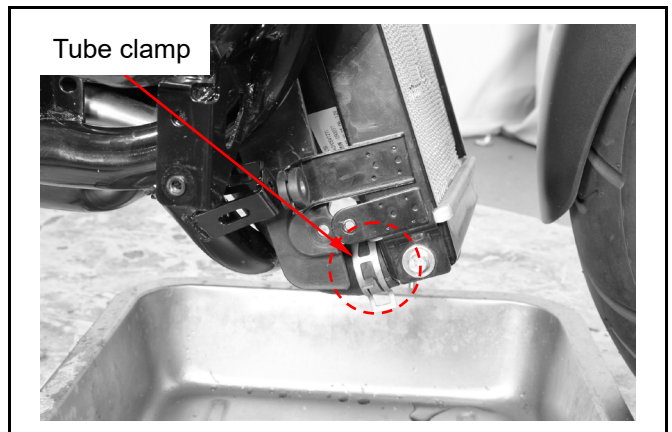
Remove the coolant tube clamp.



Remove the coolant tube.



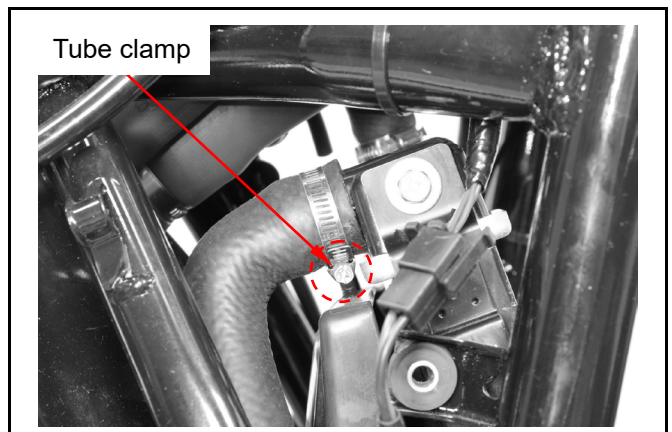
Place the coolant drain pan under the scooter.
Remove the coolant tube clamp.



Remove the coolant tube.
Drain the coolant.



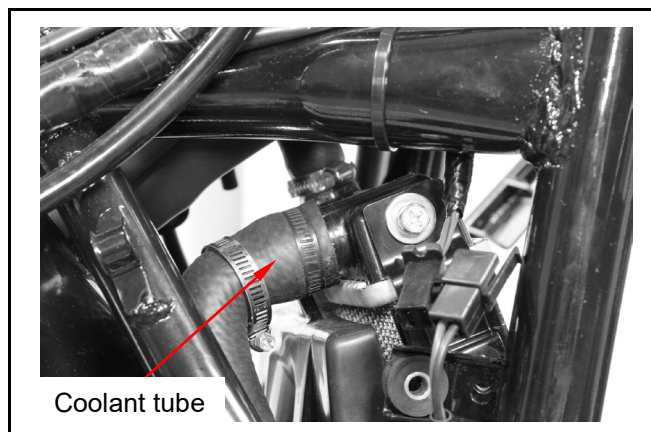
Remove the tube clamp.



12. Cooling System



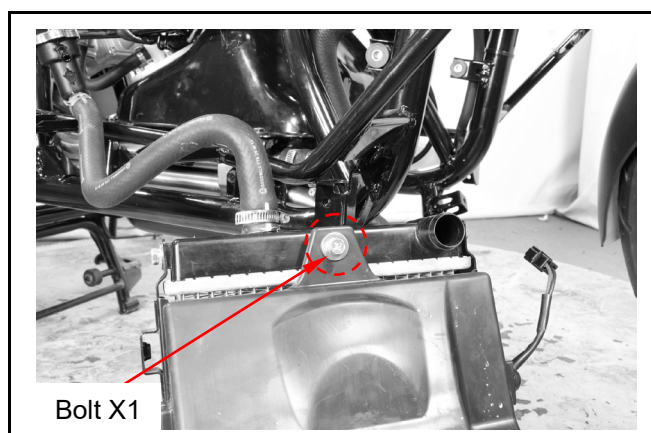
Remove the coolant tube.



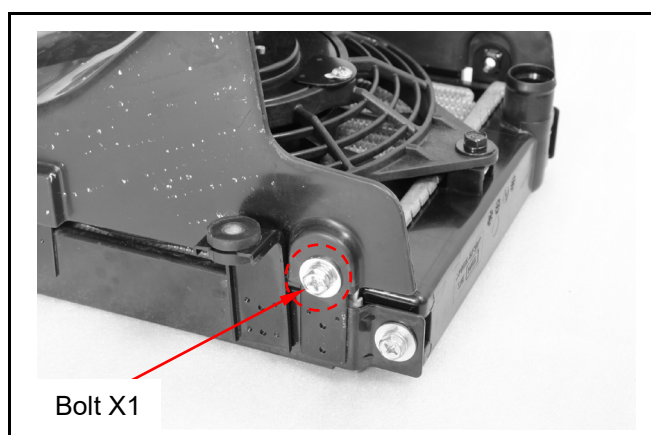
Remove the radiator.



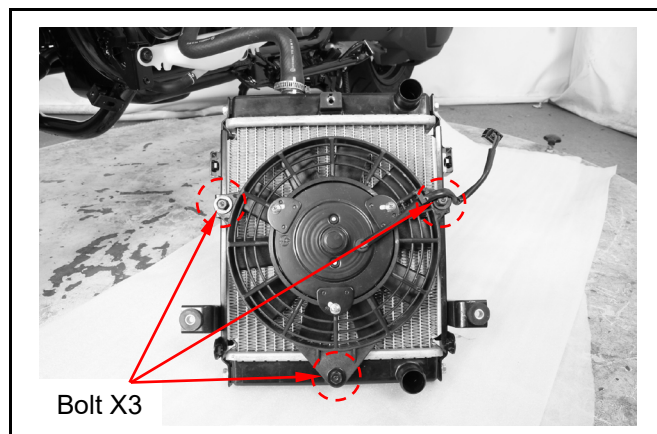
Remove the bolt from the upper side of radiator air duct.



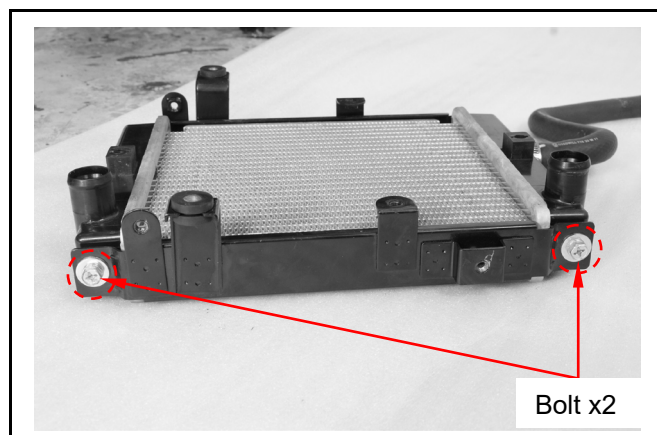
Remove the bolt from the left side of radiator air duct.
Remove the radiator air duct.



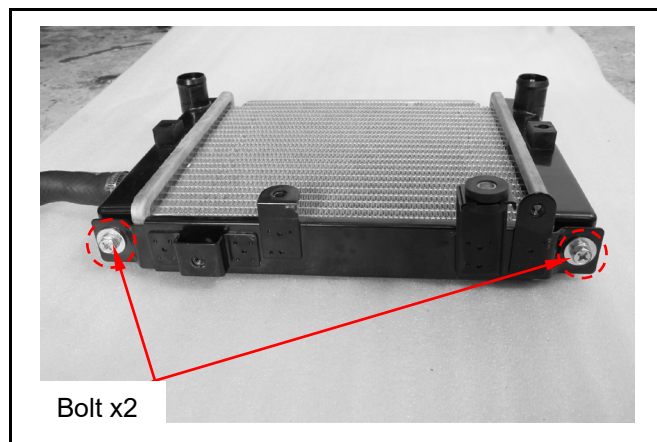
Remove the cooling fan from the radiator (bolt X3).



Remove the right radiator bracket (bolt X2).

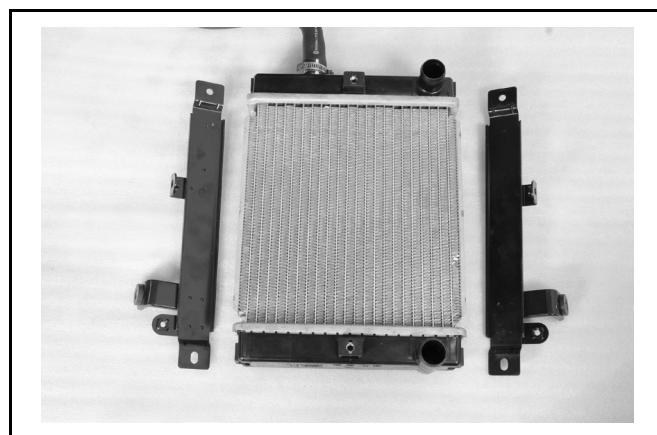


Remove the left radiator bracket (bolt X2).



Installation

Install in the reverse order of removal.
Check for any coolant leakage after reassembly.



12. Cooling System

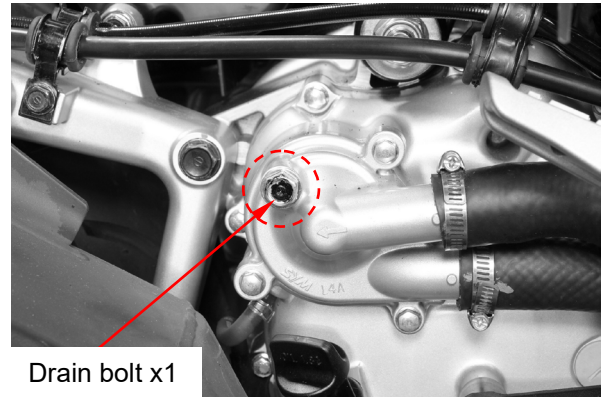


Water Pump

Water pump / coolant leakage inspection

- Loosen the coolant drain bolt and check if the coolant is mixed with oil.
- Check the engine oil to see if the oil is mixed with coolant.

The mixture of coolant and engine oil could be caused by the internal leakage. If the broken oil seal do not cause the internal leakage, then check the cylinder head and gasket.



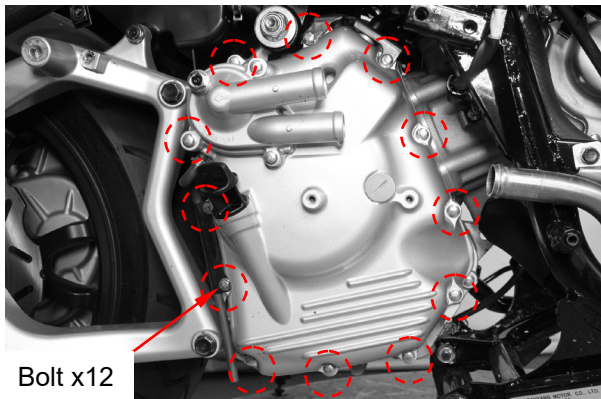
Water pump removal

Remove the right side cover and the muffler.

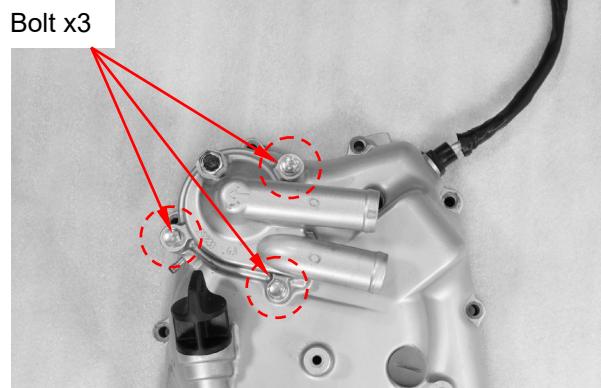
Drain the engine oil.

Remove the engine coolant tubes.


Remove the right crankcase cover (bolt X12).



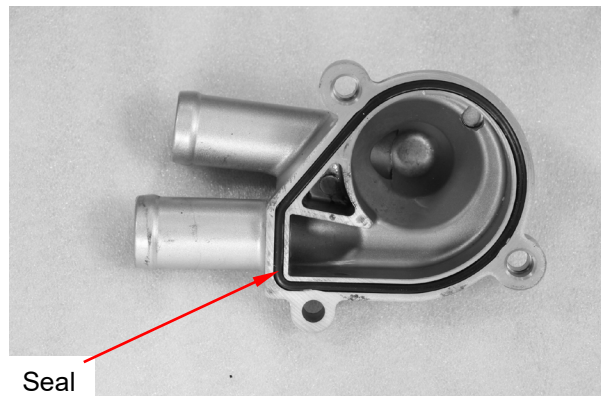
Remove three bolts from the water pump cover.



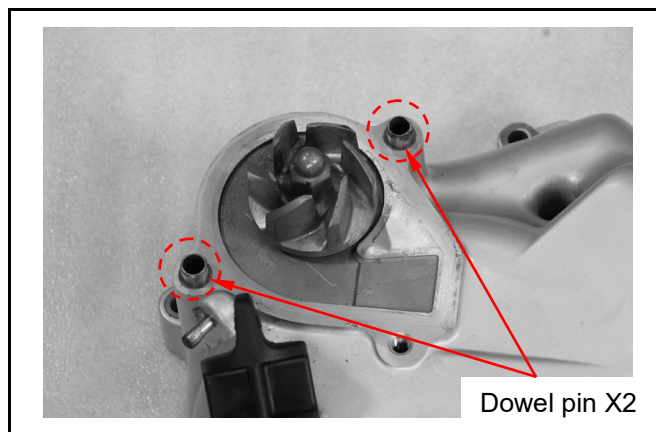
Check if the seal on the water pump cover is damaged or not.

 Caution

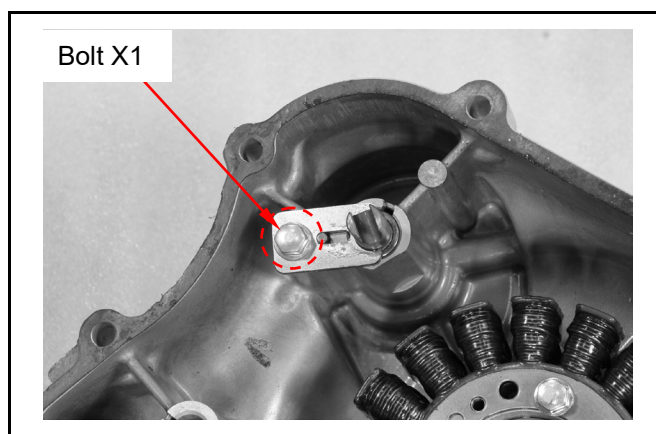
- Replace the seal after disassembly.



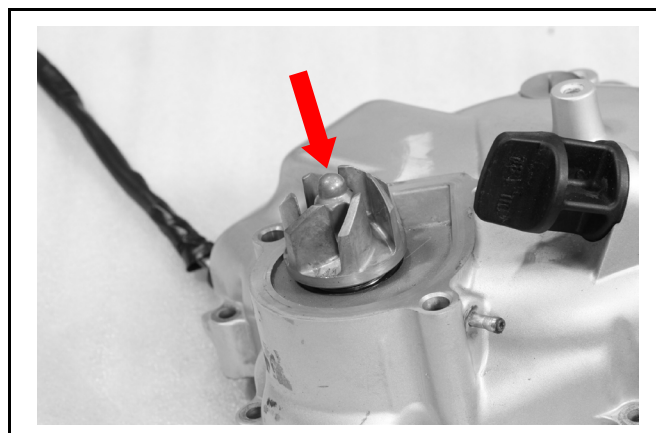
Remove two water pump cover dowel pins.



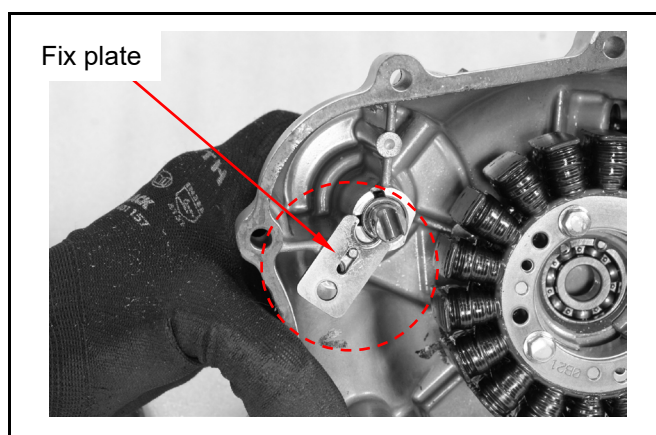
Remove the bolt on the fix plate for water pump shaft.



Press the water pump impeller.



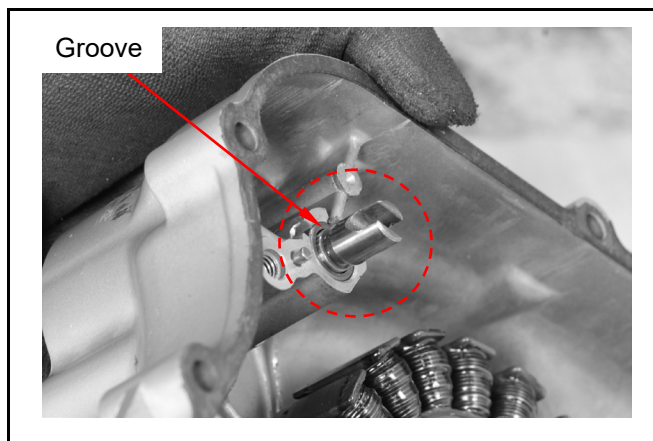
Remove the fix plate from the groove on the water pump shaft.



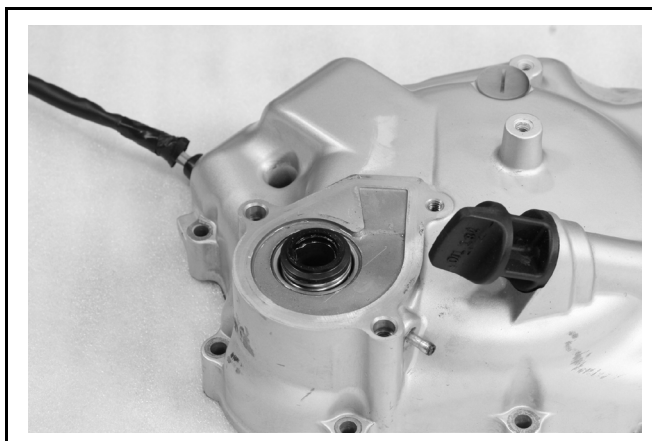
12. Cooling System



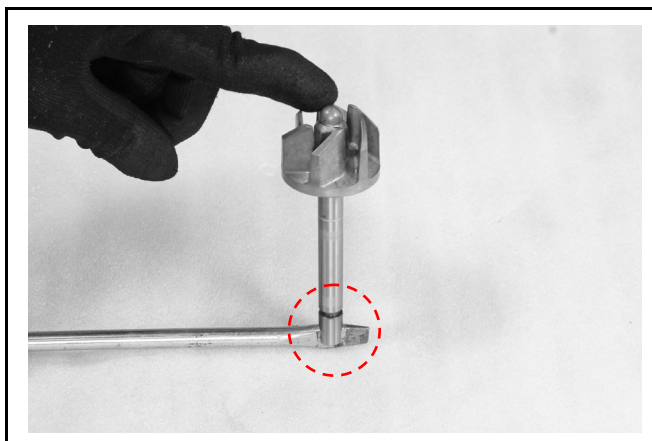
Check if the groove on the water pump shaft is damaged or not.



Remove the water pump impeller and the shaft.



Fix the groove on the water shaft groove by the flathead screwdriver.



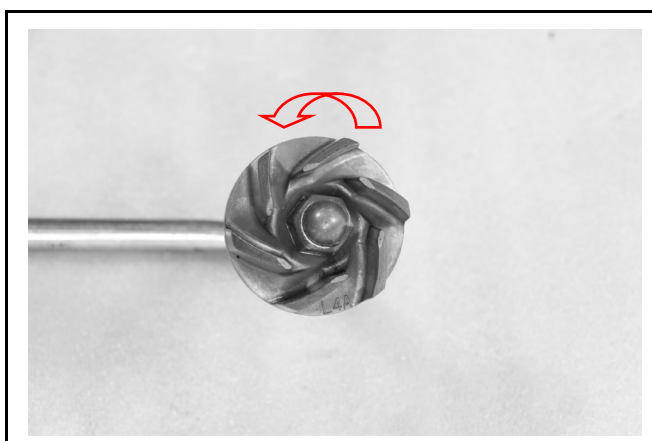
Remove the impeller from the shaft.

Cause

- Use the hand tool to avoid damaging the groove.

Torque value

Water pump impeller 1.0~1.4kgf-m



Be carefully during disassembling the water pump impeller.

Caution

- The mechanical seal could be damaged due to the damaged shaft.

Check if the ceramic part of water pump impeller is damaged or not.

Caution

- Replace the impeller if the ceramic part is damaged.

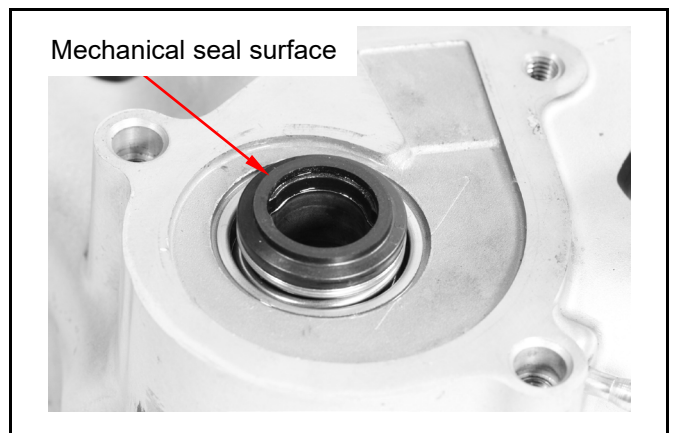
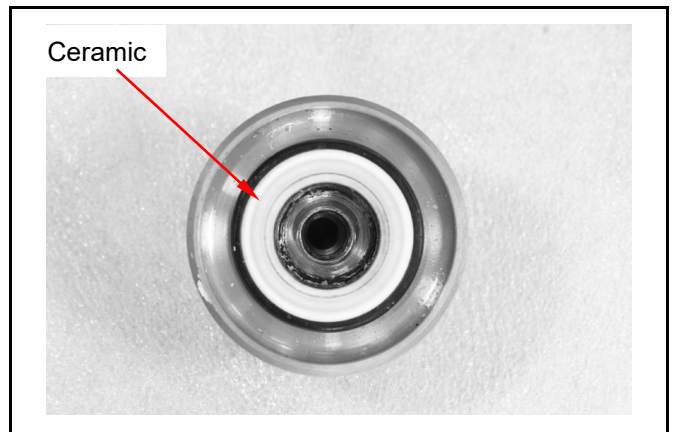
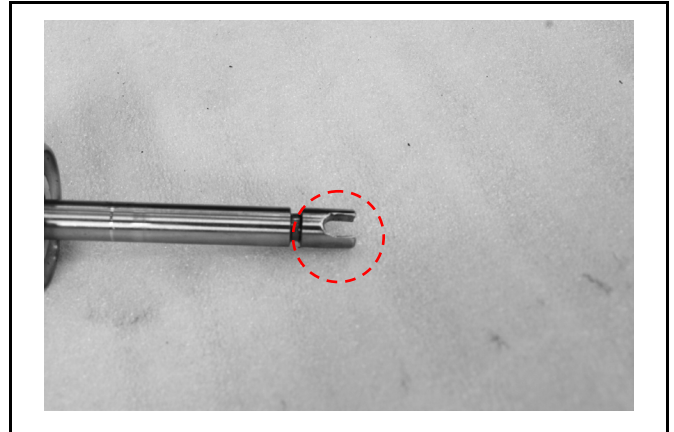
Check if the surface of mechanical seal is damaged or not.

Caution

- Replace the mechanical seal and oil seal at the same time if necessary.

Installation

Install in the reverse order of removal.



12. Cooling System

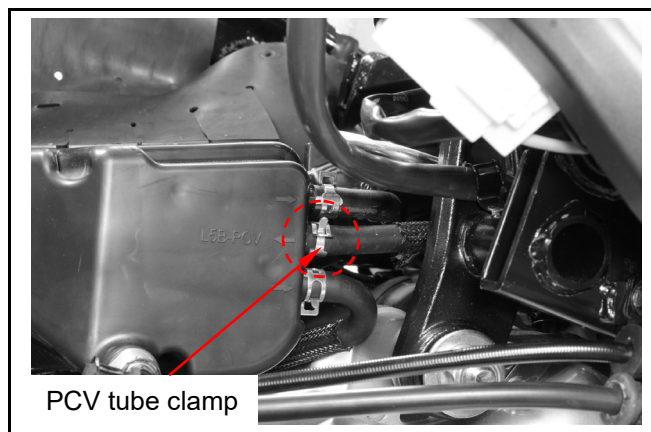
Thermostat

Removal

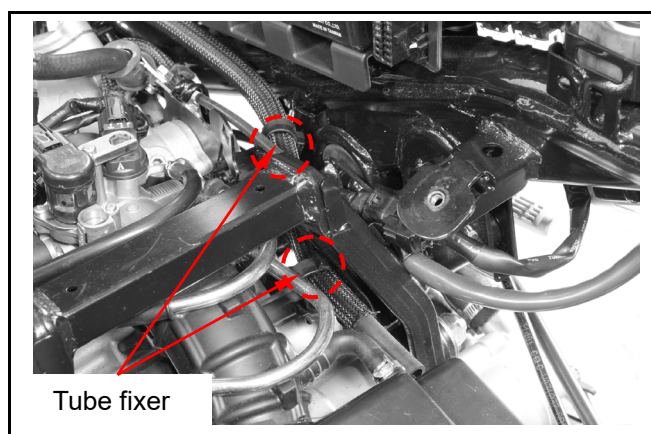
Remove the luggage box.

Drain the coolant.

Remove the PCV tube clamp.

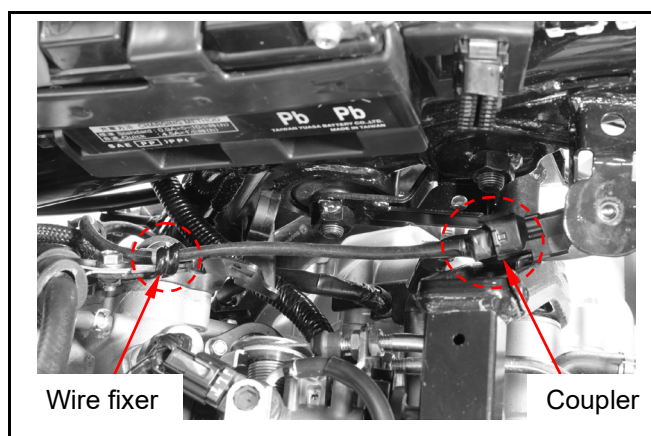


Remove the PCV tube.



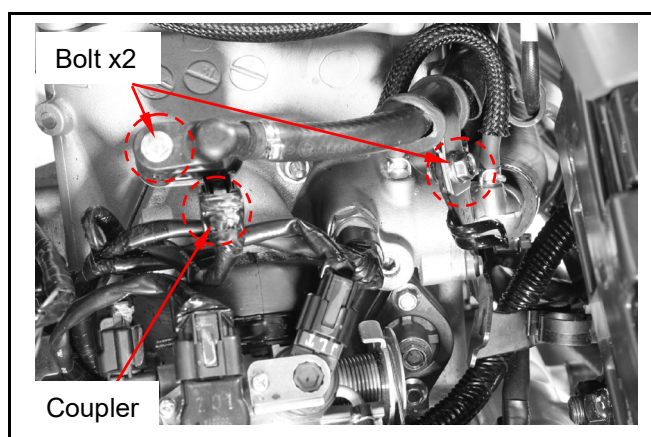
Disconnect the O2 sensor coupler.

Open the O2 sensor wire fixer.



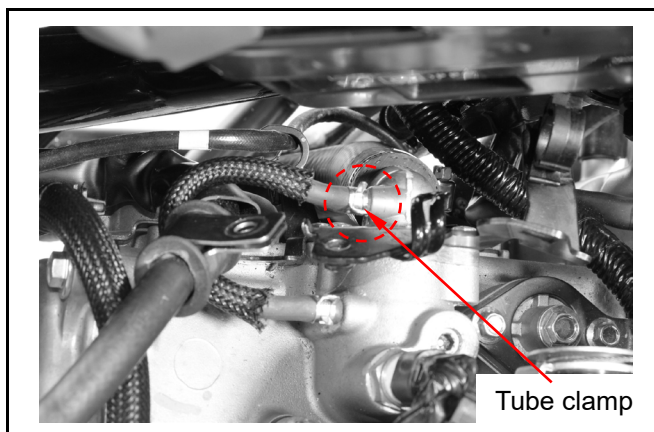
Disconnect the fuel injector coupler and remove the bolt.

Remove the fuel tube fixer (bolt X1).

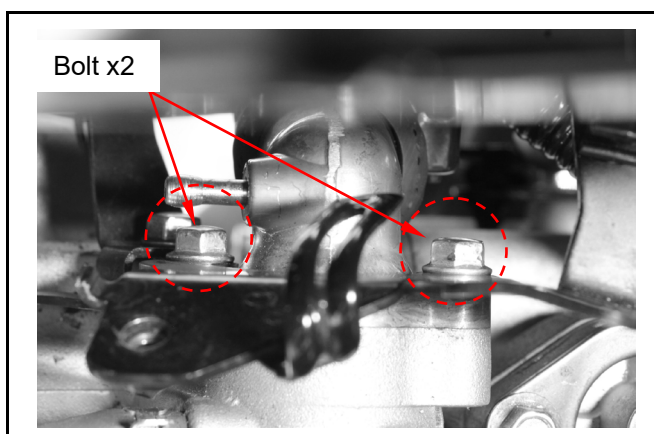


Remove the tube clamp from the thermostat cover circulation tube.

Remove the circulation tube.

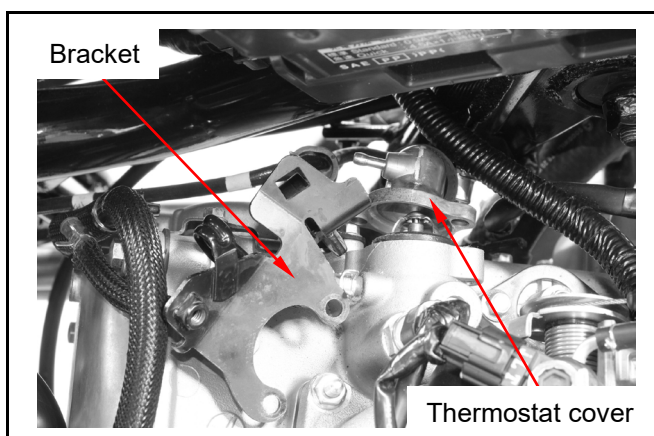


Remove two bolts from the thermostat cover.



Remove the bracket.

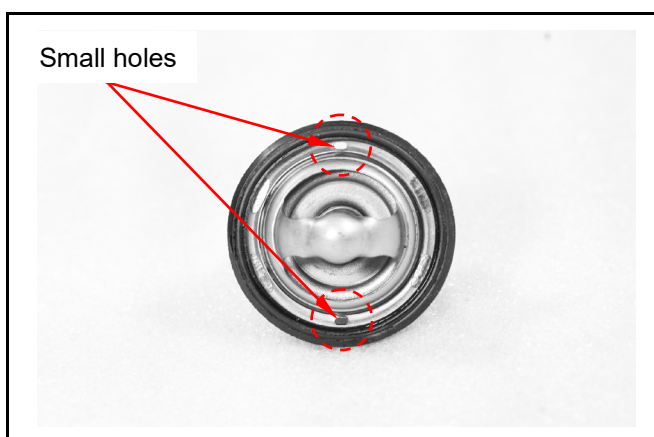
Open the thermostat cover.



Remove the thermostat

Caution

- Mind the direction of the small holes on the thermostat.



12. Cooling System



Place the thermostat in the container of hot water for inspection.

Caution

- Replace the thermostat if necessary.

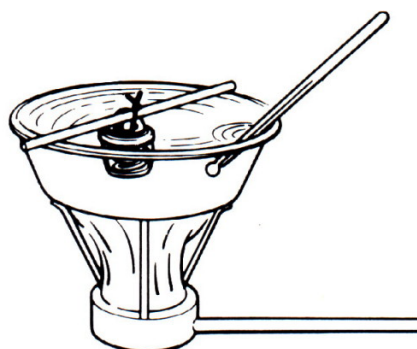


Technical data

Operational temperature	82~95°C
Stroke	0.05~3.5mm

Installation

Install in the reverse order of removal.
Install the coolant tubes, refill the coolant and bleed the air out.



Mechanism Diagram	13-1	Under Cover	13-10
Maintenance	13-2	Front Fender	13-10
Wind Screen	13-3	Radiator Air Duct	13-10
Upper/Lower Meter Cover	13-3	Luggage Box	13-11
Left/Right Front Cover	13-4	Seat	13-12
Front Cover/Headlight	13-5	Rear Carrier	13-12
Meter Panel	13-6	Body Cover/Taillight/Rear Fender	13-13
Handle Cover	13-7	Fuel Tank Cap/Center Cover	13-14
Left/Right Side Cover	13-8	Left/Right Floor Panel	13-16
Left/Right Front Side Cover	13-8	FR. Inner Box	13-17

Mechanism Diagram

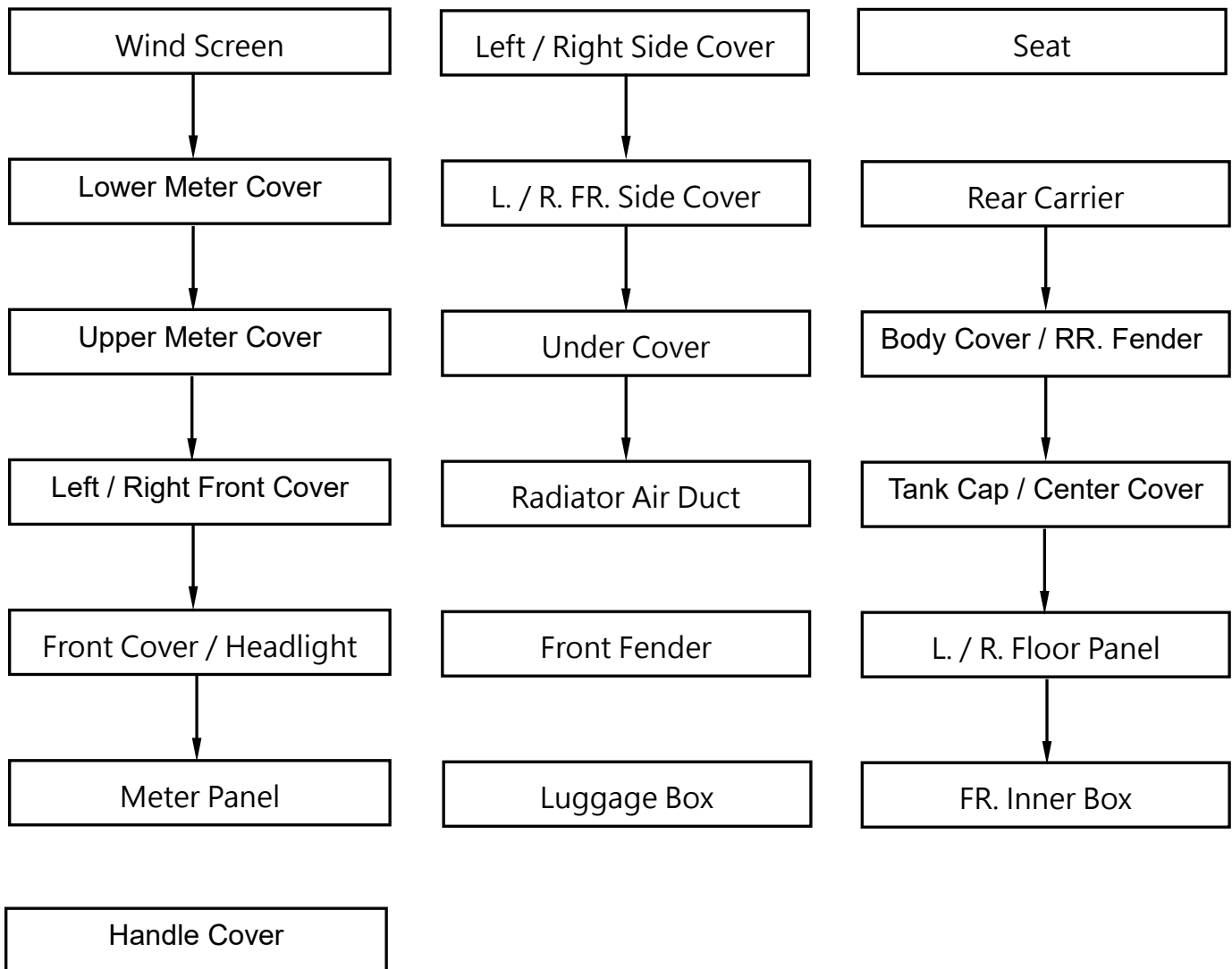


13. Body Cover



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.

Wind Screen

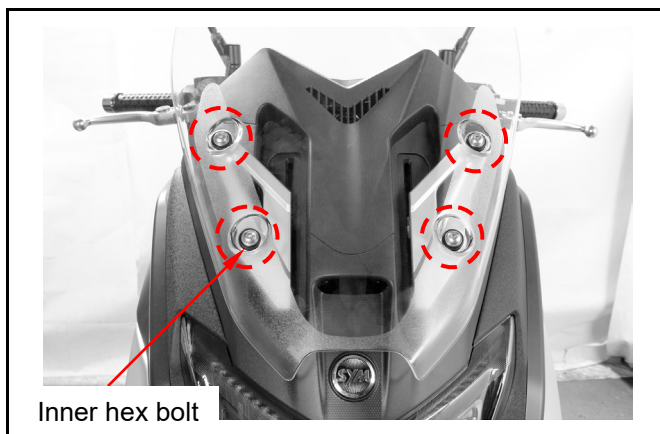
Removal

Remove four inner hex bolts.

Remove the wind screen.

Installation

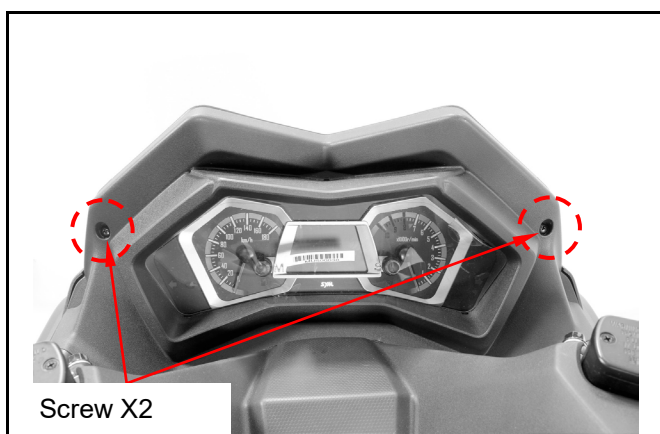
Install in the reverse order of removal.



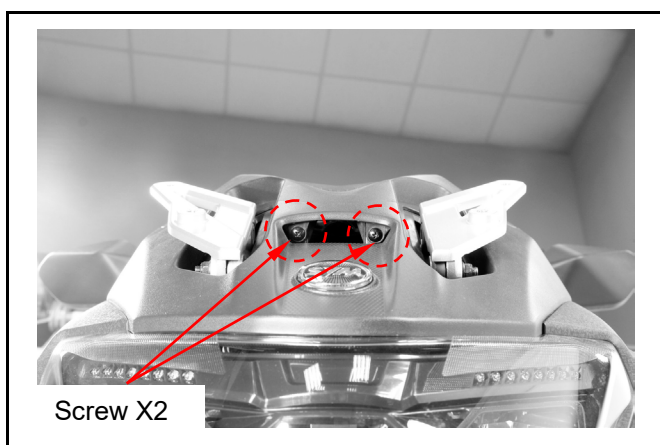
Upper / Lower Meter Cover

Removal

Remove the screws from the upper meter cover (screw X2).



Remove the screws from the lower meter cover (screw X2).

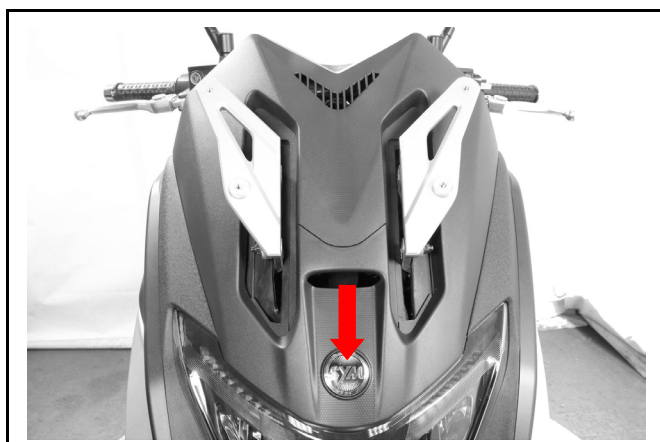


Adjust the wind screen bracket to the middle position.

Remove the lower meter cover.

Installation

Install in the reverse order of removal.



13. Body Cover



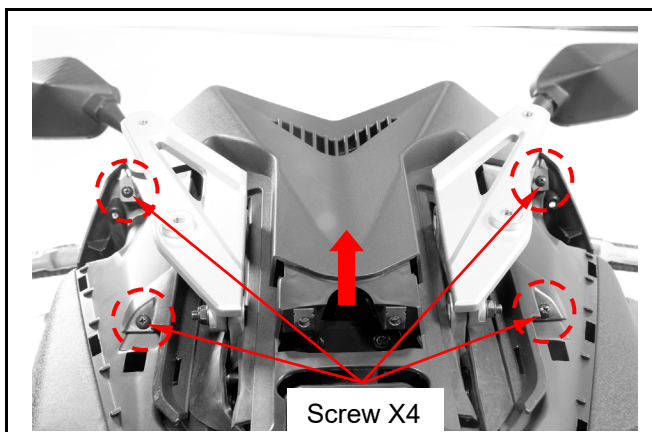
Removal

Remove four screws from the upper meter cover.

Remove the upper meter cover.

Installation

Installation in the reverse order of removal.

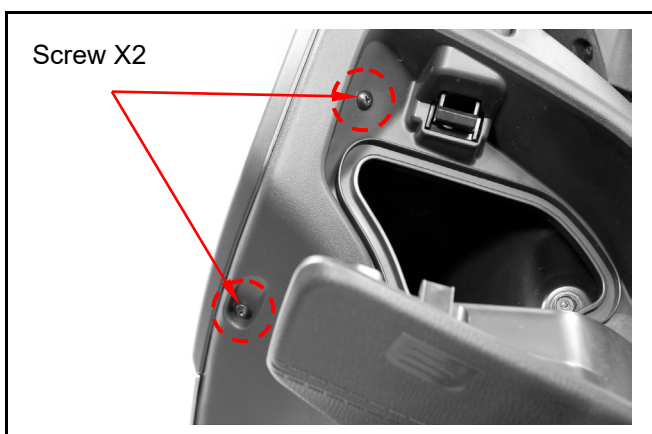


Left / Right Front Cover

Removal

Open the left inner box cover.

Remove two screws from the inner box.

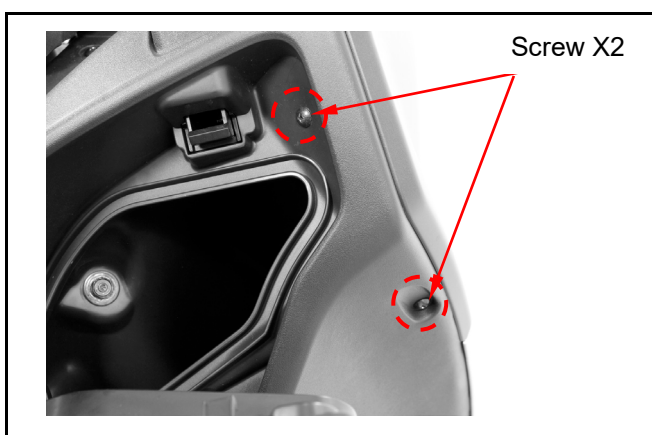


Remove the left front cover.



Open the right inner box cover.

Remove two screws from the front inner box.



Remove the right front cover.

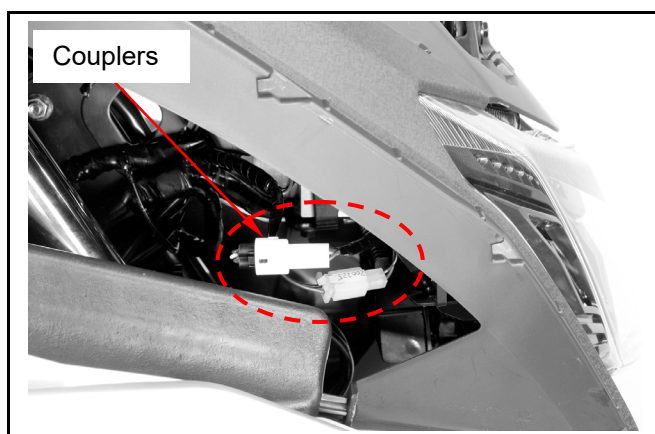
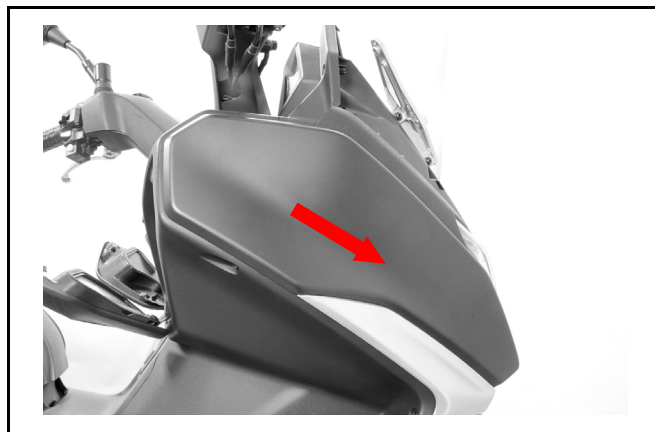
Installation

Install in the reverse order of removal.

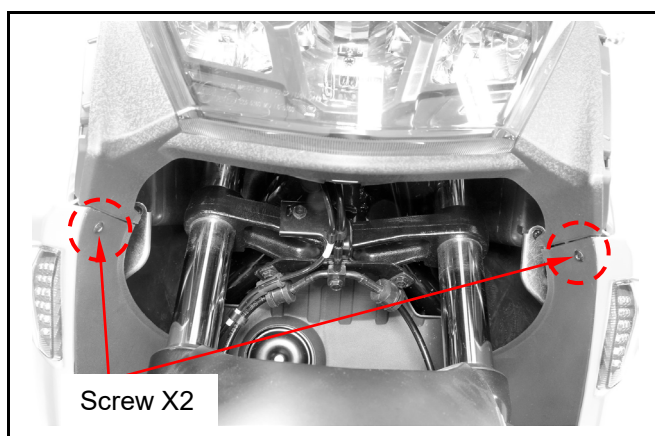
Front Cover / Headlight

Removal

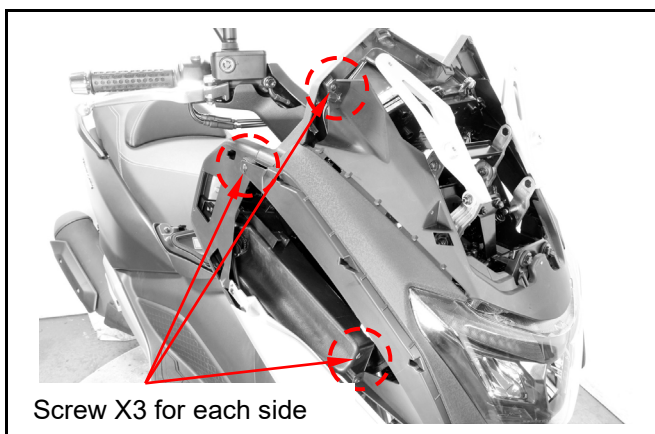
Disconnect the headlight and position light couplers.



Remove two screws from the front lower side.



Remove six screws from left and right side on the front cover.



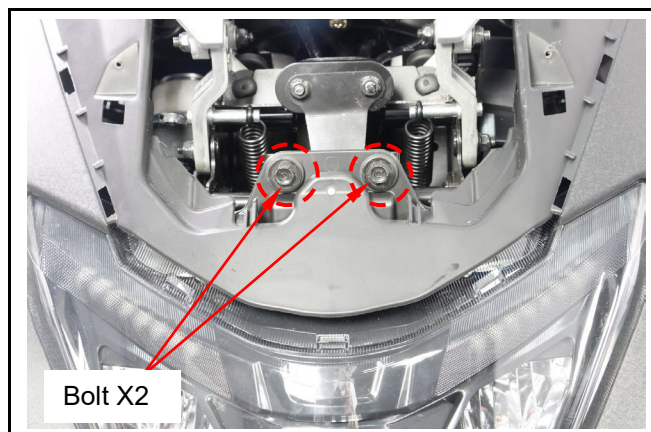
13. Body Cover



Remove two bolts from the front side.
Remove the front cover and the headlight.

Installation

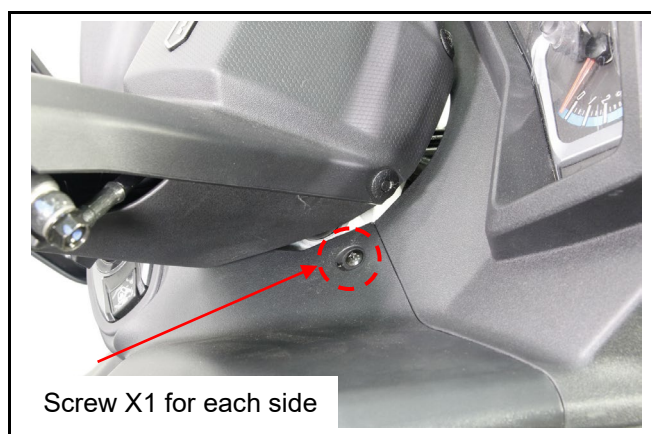
Install in the reverse order of removal



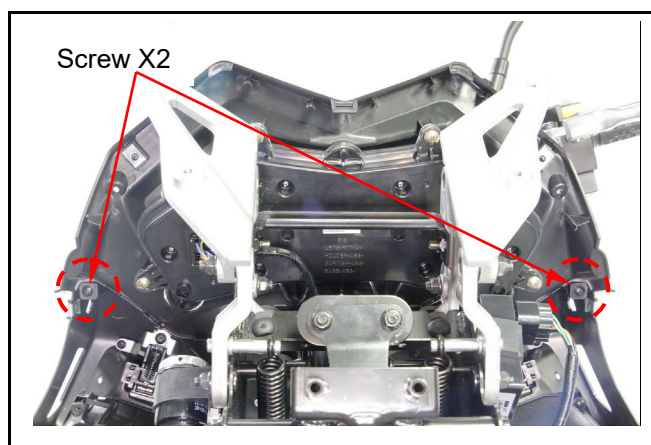
Meter Panel

Removal

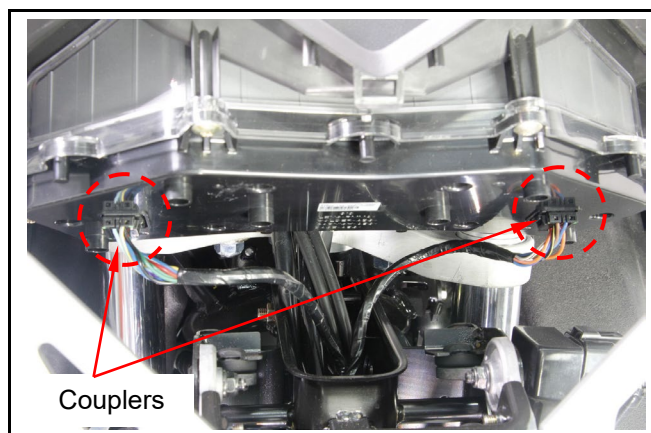
Remove two screws from the upper side on the meter panel.



Remove two screws from the front side.



Disconnect the speedometer couplers.
Remove the meter panel.



Installation

Install in the reverse order of removal.

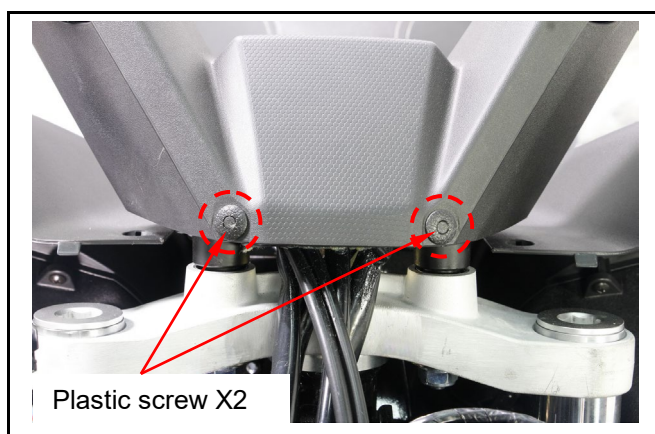
Handle Cover

Removal

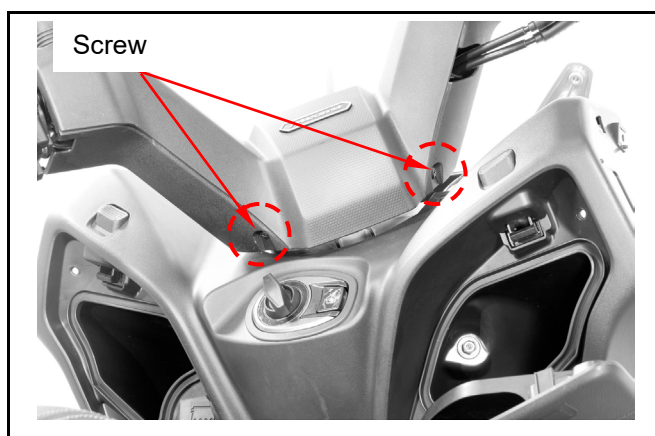
Remove the left and right back mirrors.



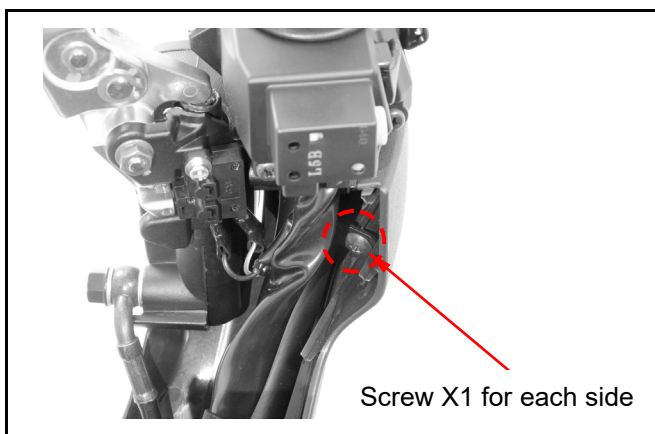
Remove two plastic screws from the front side of handle cover.



Remove the left and right lower handle covers (screw X2).



Remove two screws from the lower side of upper handle cover (screw X1 for each side).
Remove the upper handle cover.



Installation

Install in the reverse order of removal.

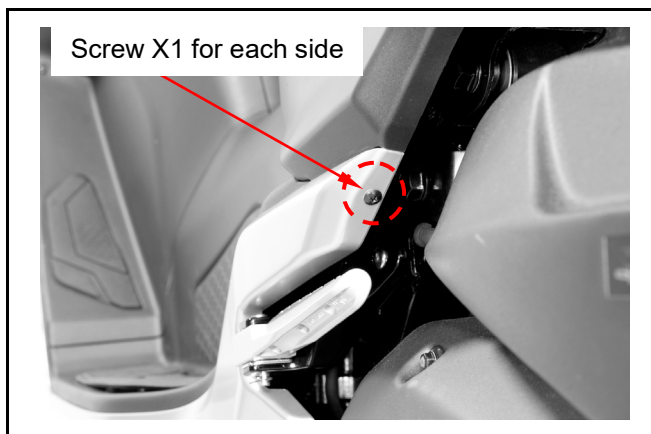
13. Body Cover



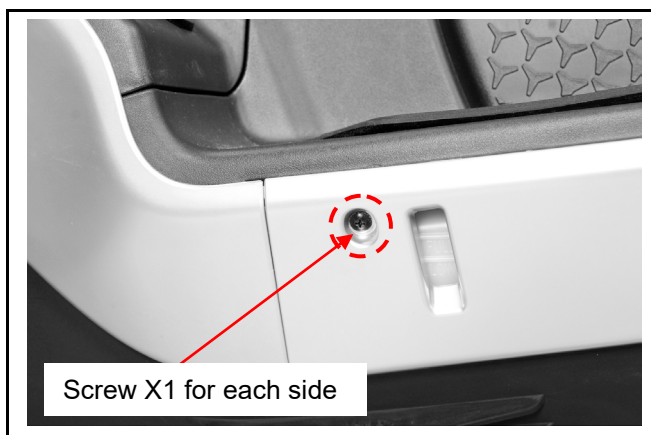
Left / Right Side Cover

Removal

Remove two screws from the rear side of left and right side cover (screw X1 for each side).



Remove two screws from the front side of left and right side cover (screw X1 for each side).
Remove the left / right side cover.



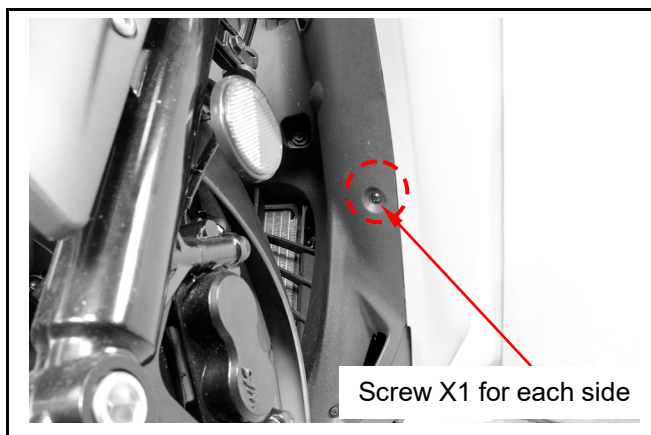
Installation

Install in the reverse order of removal.

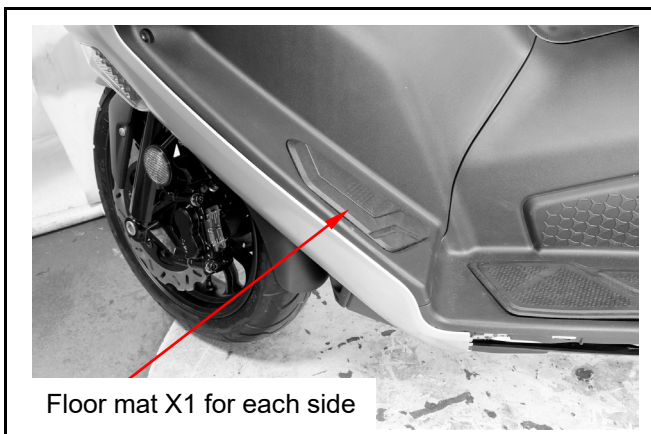
Left / Right Front Side Cover

Removal

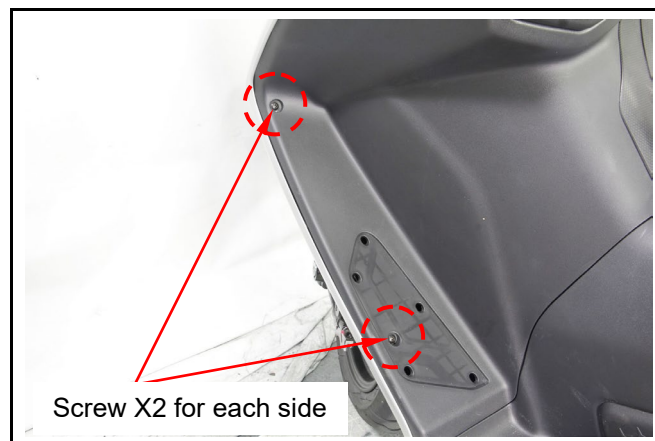
Remove two screws from the front side of left and right front side cover (screw X1 for each side).



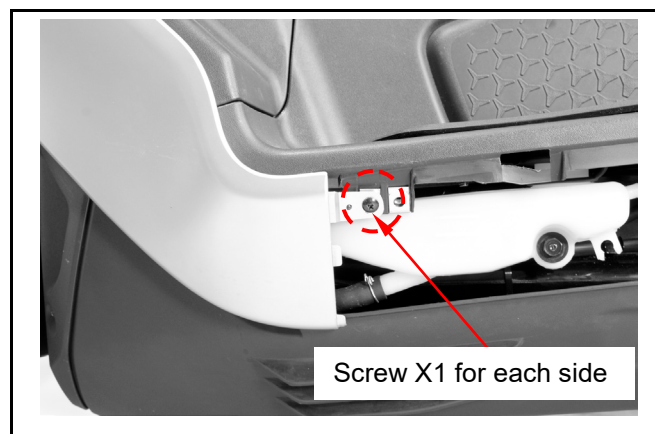
Remove two front floor mats (floor mat X1 for each side). °



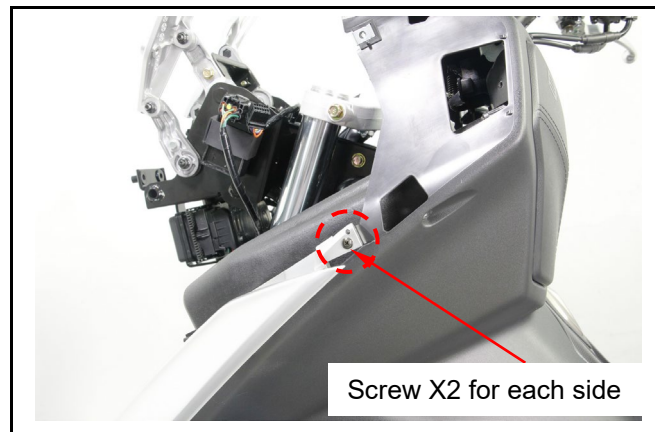
Remove four screws from the middle side (screw X2 for each side).



Remove two screws from the lower side (screw X1 for each side).



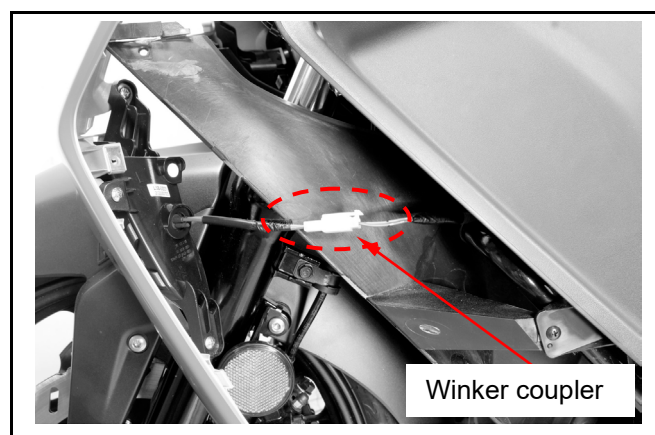
Remove two screws from the upper side (screw X1 for each side).



Open the left and right front side cover.
Disconnect the left and right winker connectors.
Remove the left and right front side cover.

Installation

Install in the reverse order of removal.



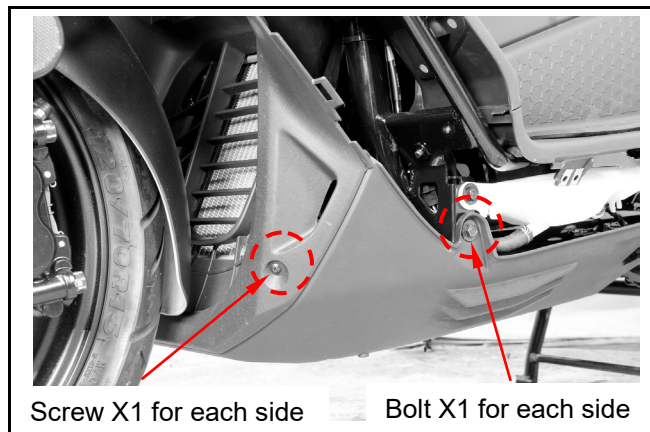
13. Body Cover



Under Cover

Removal

Remove two screws from the front side of under cover (screw X1 for each side).
Remove two bolts from the middle side of under cover (bolt x1 for each side).

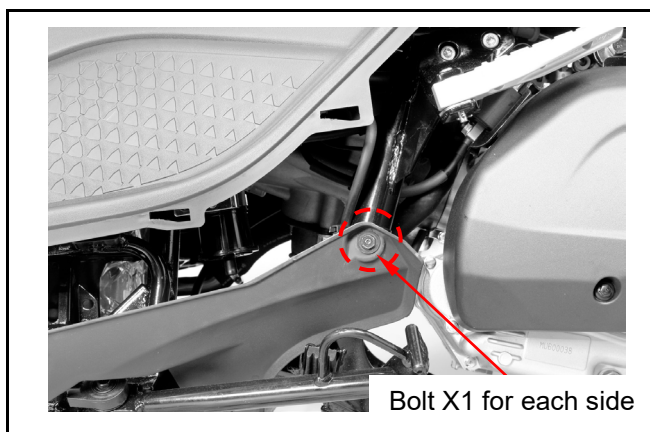


Remove two bolts from the rear side of under cover (bolt X1 for each side).

Lay down the side stand and remove the under cover.

Installation

Install in the reverse order of removal.



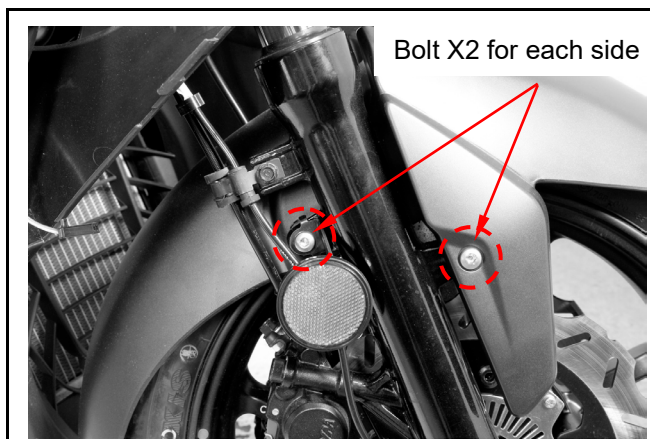
Front Fender

Removal

Remove four bolts from both sides.
Remove the reflectors.
Remove the front fender.

Installation

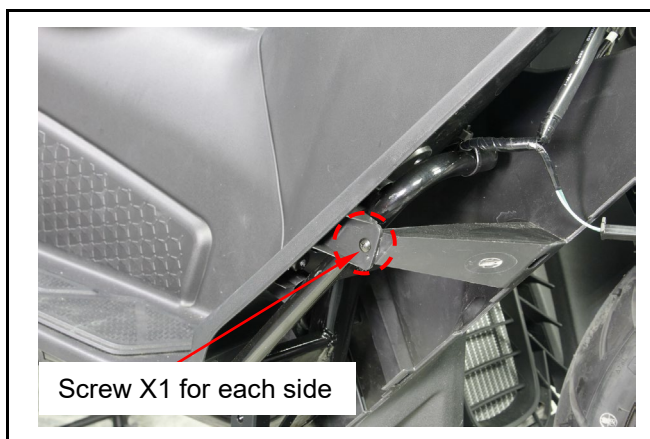
Install in the reverse order of removal.



Radiator Air Duct

Removal

Remove two screws from both sides.



Remove two bolts from the inner side.
Remove the radiator air duct.

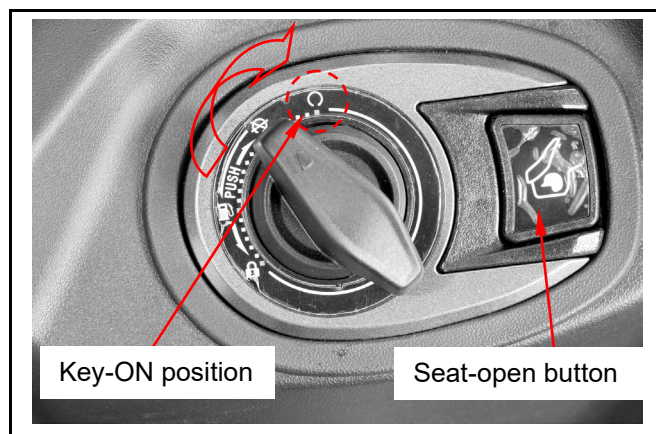
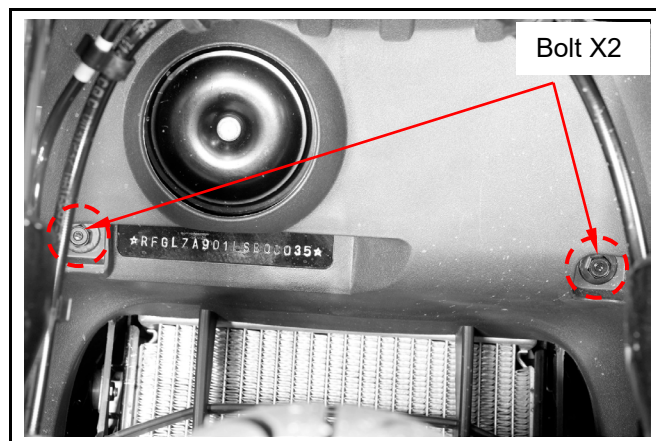
Installation

Install in the reverse order of removal.

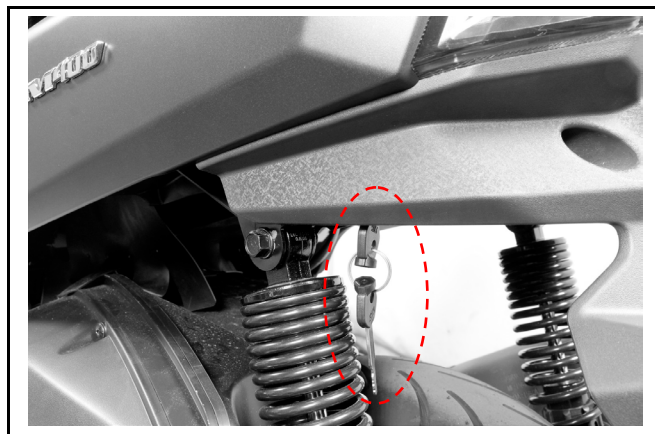
Luggage Box

Removal

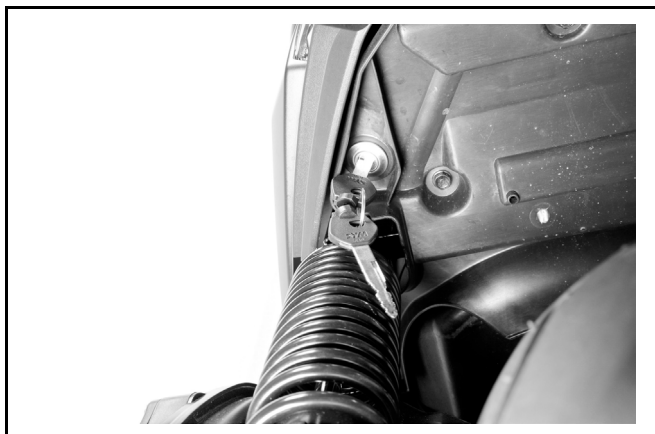
Turn the main switch to the key-on position.



The seat can also be opened by key.



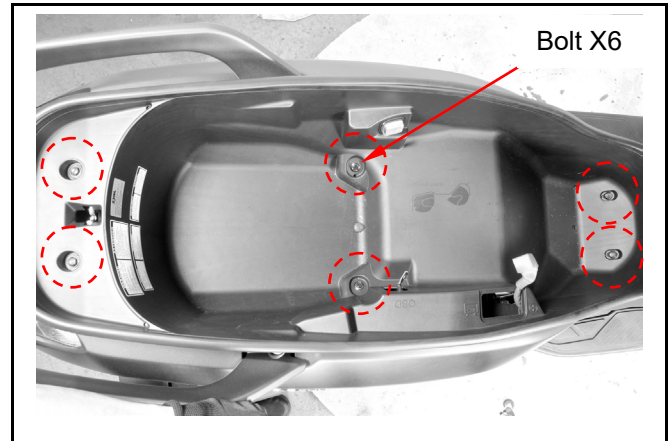
The seat-open keyhole is close to the upper end of the left rear cushion.



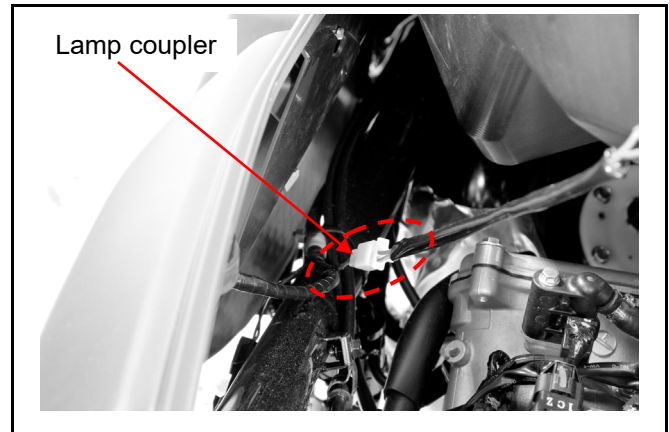
13. Body Cover



Remove six bolts from the inside of luggage box.



Disconnect the luggage box lamp coupler.
Remove the luggage box.



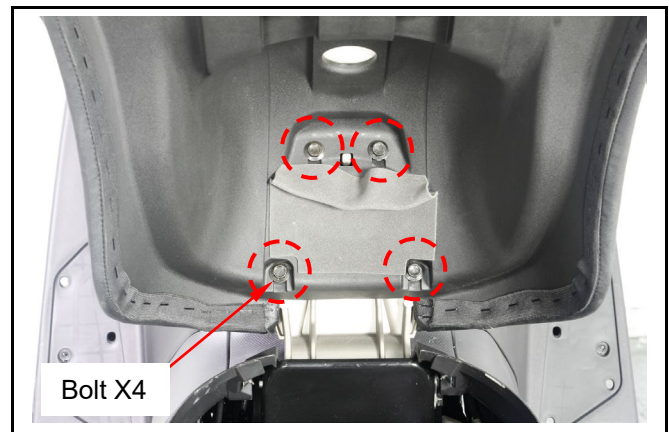
Installation

Install in the reverse order of removal.

Seat

Removal

Remove four bolts from the seat.
Remove the seat.



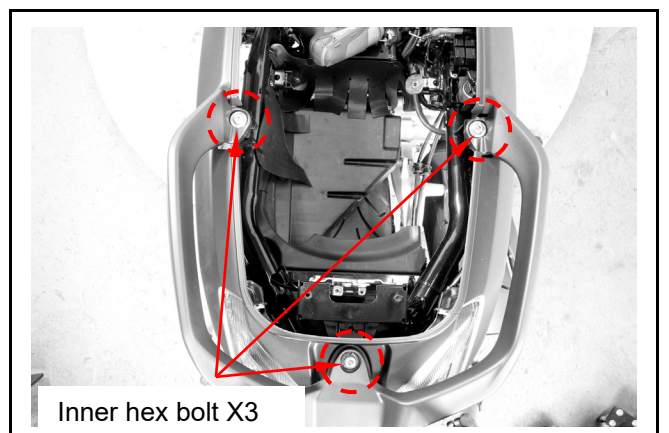
Installation

Install in the reverse order of removal.

Rear Carrier

Removal

Remove three inner hex bolts from the rear carrier.
Remove the rear carrier.



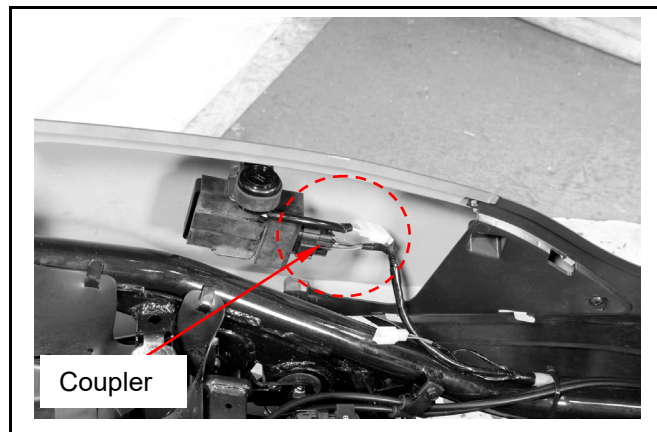
Installation

Install in the reverse order of removal.

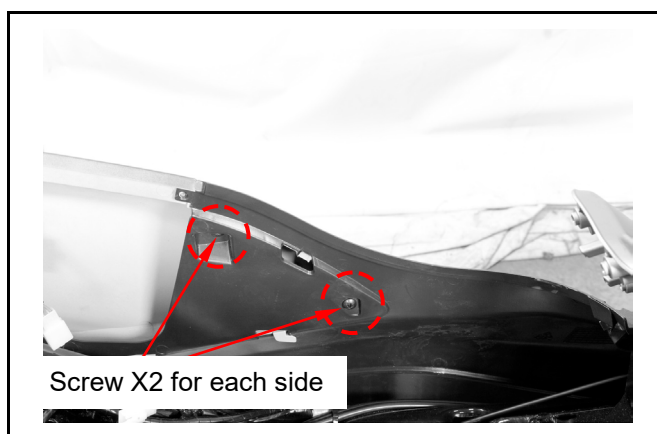
Body Cover / Taillight / Rear Fender

Removal

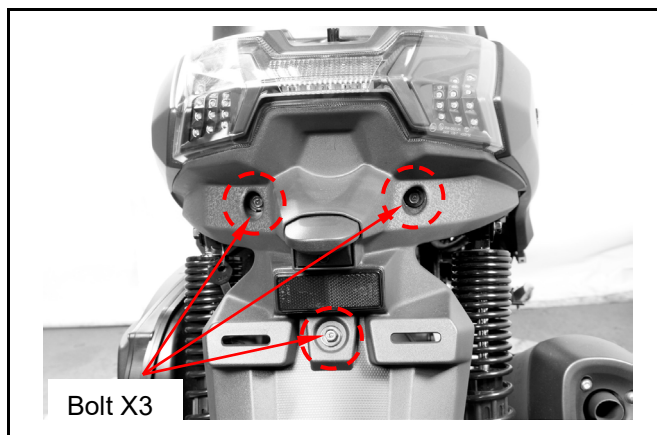
Disconnect the keyless switch controller coupler.



Remove four screws from the inside of body covers (two screws for each side).

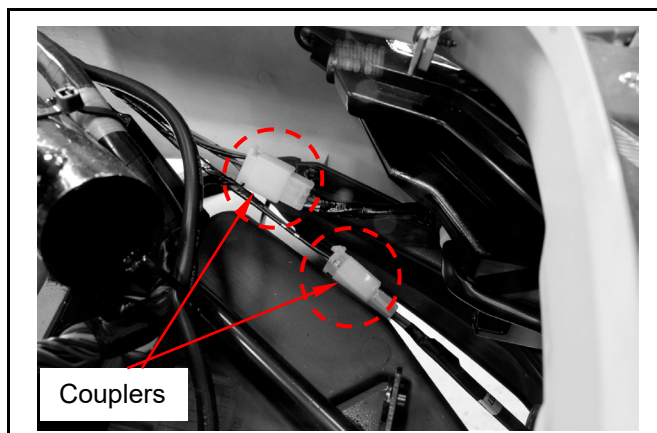


Remove three bolts from the rear fender.



Disconnect the taillight and license plate lamp couplers.

Remove the body cover, taillight and rear fender.



Installation

Install in the reverse order of removal.

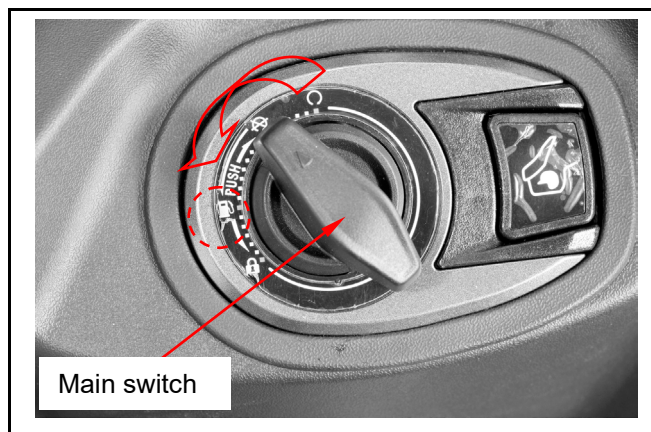
13. Body Cover



Fuel Tank Cap Garnish / Center Cover

Removal

Push the main switch and turn to fuel-filling position.



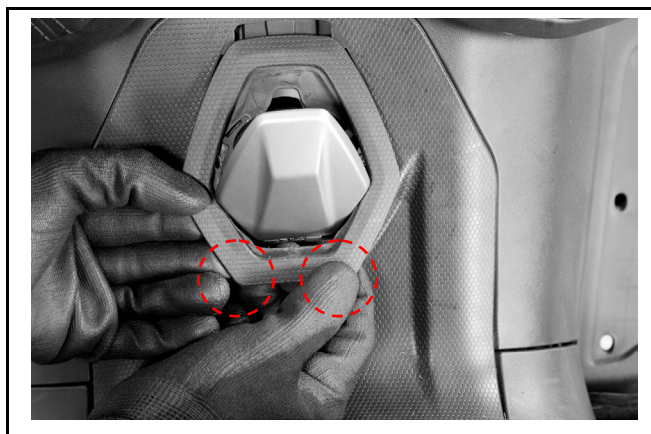
Open the fuel tank cap.



Loosen the fuel tank cap garnish.



Push the fuel tank cap garnish to detach from the center cover.



Rotate the fuel tank cap garnish and remove it.

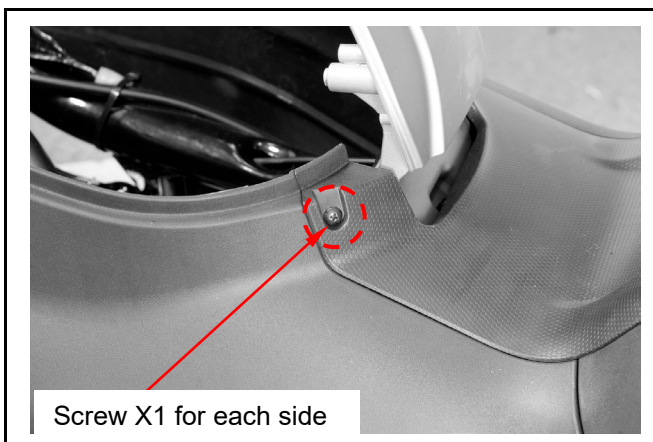


Caution

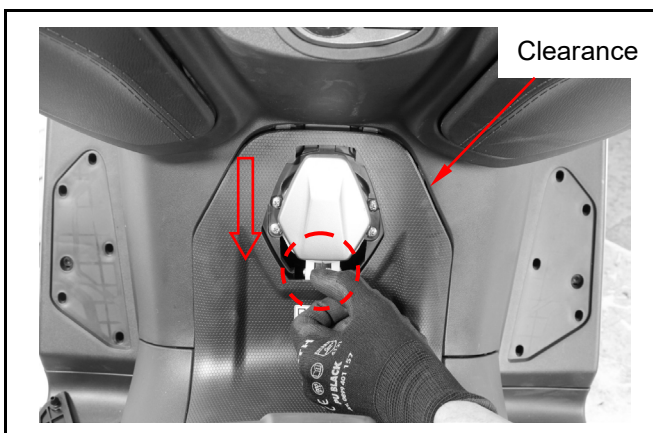
- Close the fuel tank cap for safety.



Remove two screws from the center cover.



Push the center cover slightly to create the clearance on the upper side.



13. Body Cover



Detach the latch of center cover by using a plastic stick.



Remove the center cover.



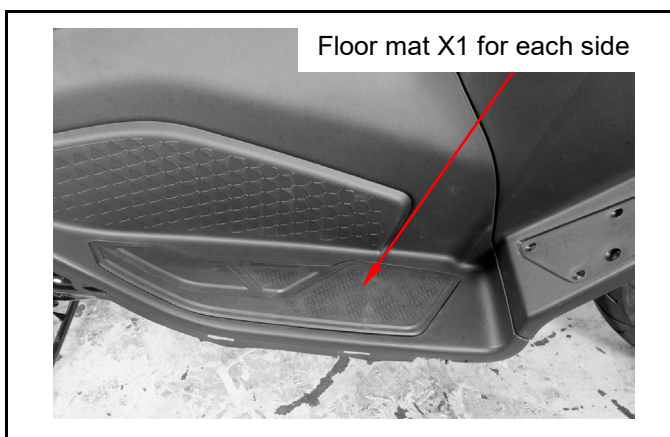
Installation

Install in the reverse order of removal.

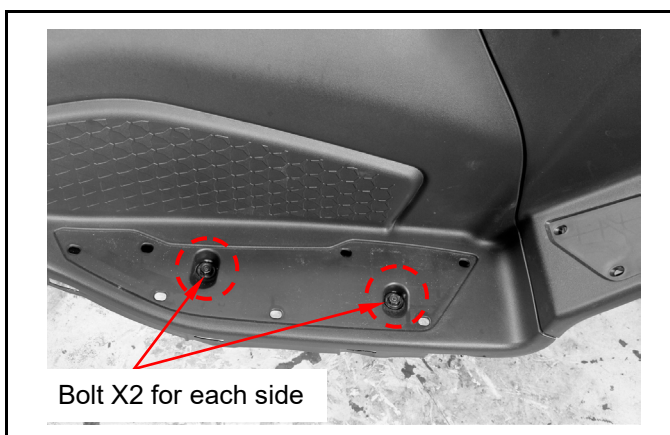
Left / Right Floor Panel

Removal

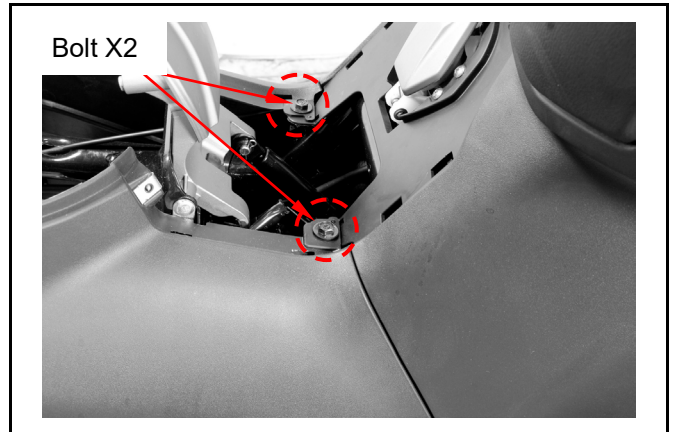
Remove the rear floor mats from both sides.



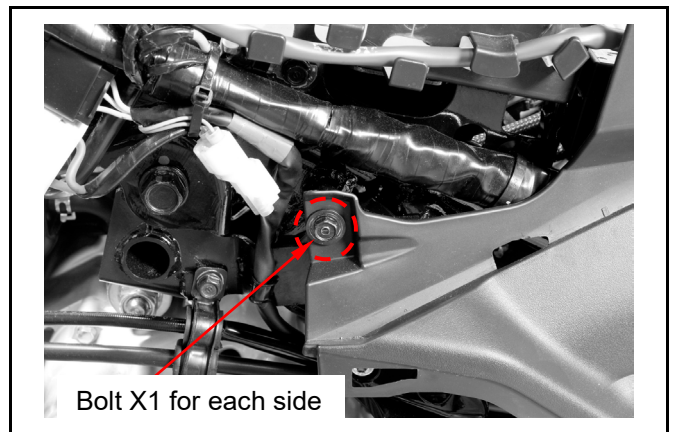
Remove four bolts from both sides.



Remove two bolts from the upper side.



Remove two bolts from the rear side of floor panel.
Remove the left and right floor panel.

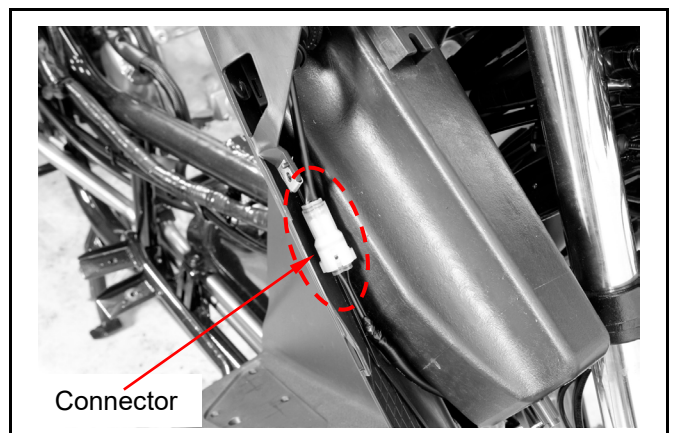


Installation
Install in the reverse order of removal.

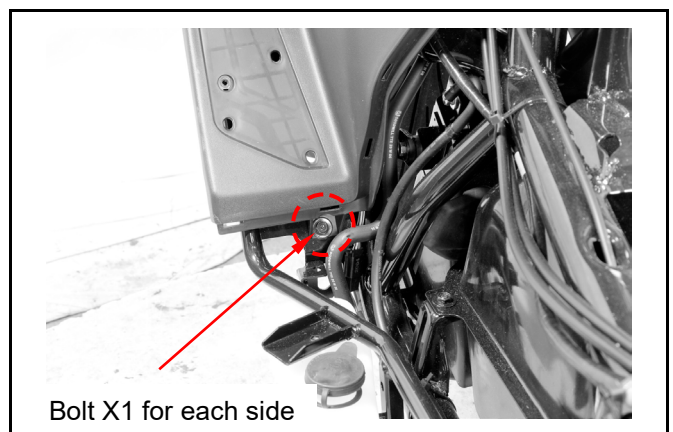
Inner Box

Removal

Disconnect the USB charger connector.



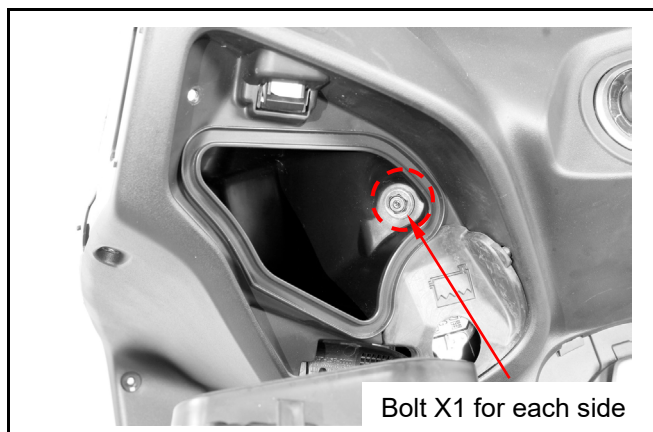
Remove two bolts from the lower side of inner box.



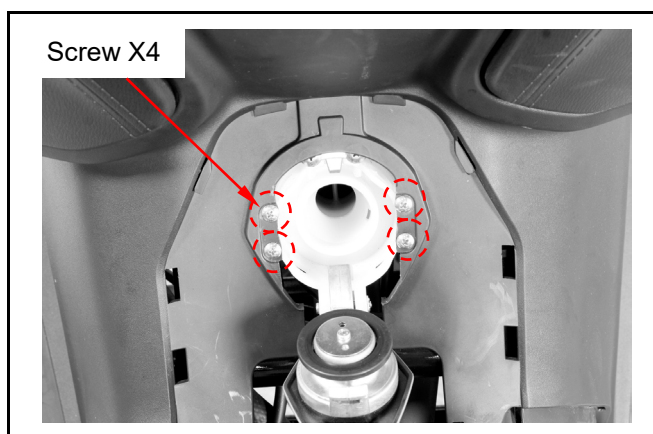
13. Body Cover



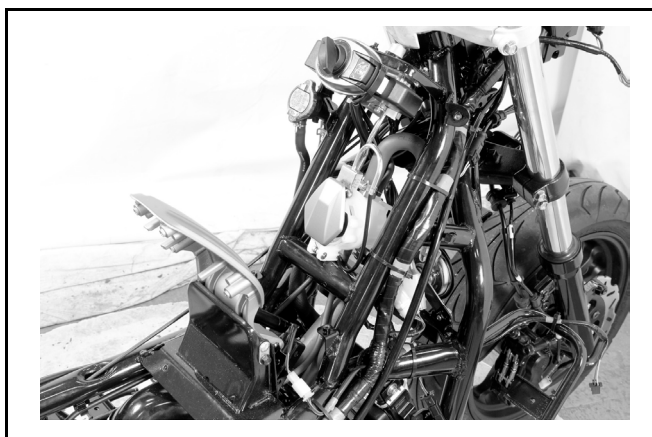
Remove two bolts from the inside of inner box.



Open the fuel tank cap.
Remove four screws.



Remove the inner box.



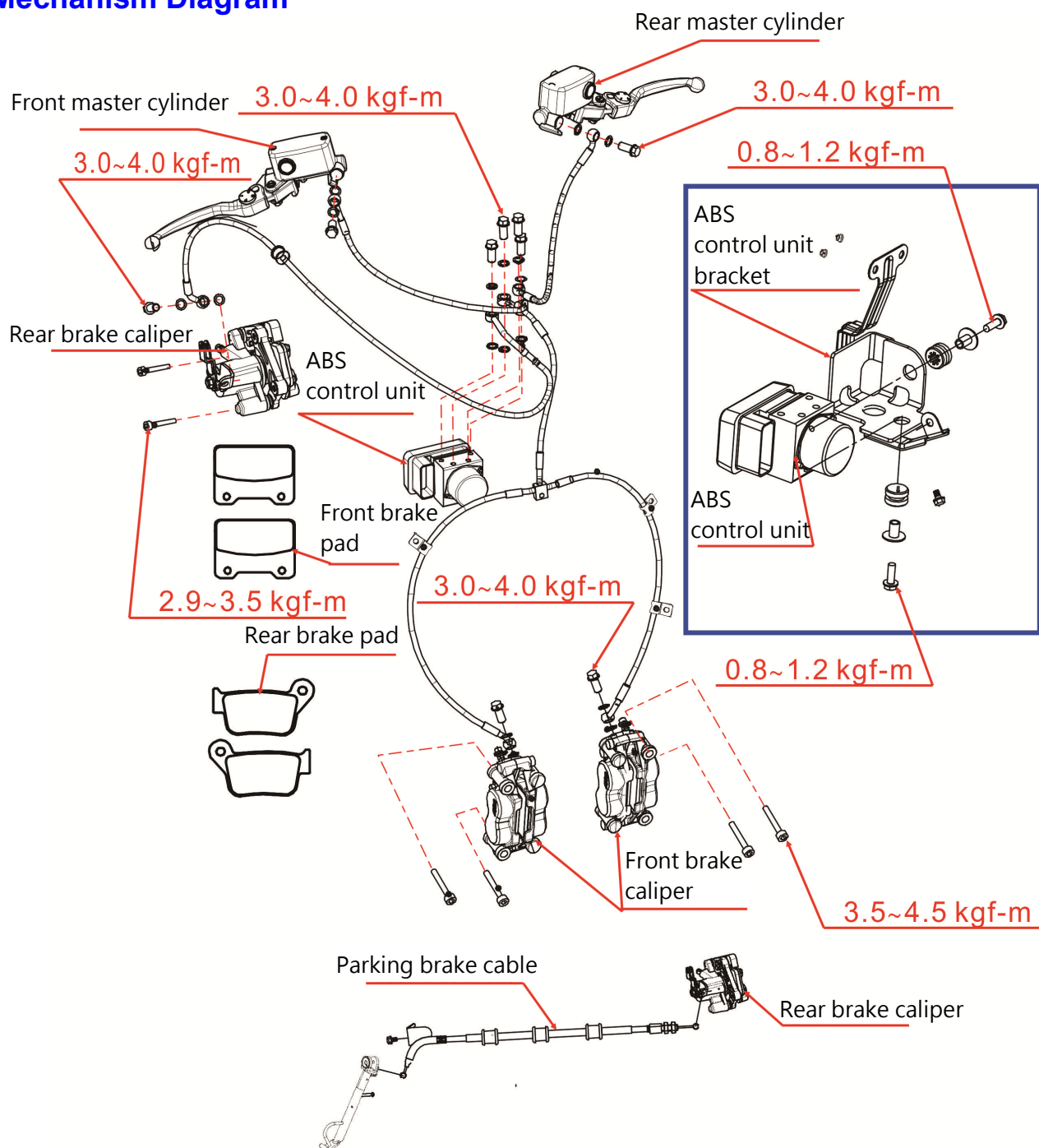
Installation

Install in the reverse order of removal.

Mechanism Diagram	14-1	Rear Brake Caliper	16-7
Precautions in Operation		Brake Disk	
.....	14-Err	16-Err
or! Bookmark not defined.		or! Bookmark not defined.	
Torque Value		Brake Master Cylinder	
.....	14-Err	16-Err
or! Bookmark not defined.		or! Bookmark not defined.	
Troubleshooting		ABS Introduction	16-12
.....	14-Err	ABS Component Location	16-15
or! Bookmark not defined.		ABS Operation	
Disk Brake System Inspection		16-Err
.....	14-Err	or! Bookmark not defined.	
or! Bookmark not defined.		ABS Control Unit Replacement	16-19
Adding Brake Fluid			
.....	14-Err		
or! Bookmark not defined.			
Brake Fluid Replacement / Air-bleed			
.....	14-Err		
or! Bookmark not defined.			
Front Brake Caliper			
.....	14-Err		
or! Bookmark not defined.			

14. Brake System

Mechanism Diagram



Precautions in Operation

- The brake caliper can be removed without removing the hydraulic system.
- Air should be bled from the hydraulic system when remove it or the brake system is slack.
- While refilling brake fluid, avoid mixing any other substances.
- Do not spill brake fluid on the painted surfaces, because plastic or rubber parts might be damaged.
- Check the operation of the brake system before riding.

Specifications

unit : mm

Item	Standard	Service limit
Thickness of front brake disk	4.000	3.500
Thickness of rear brake disk	5.000	4.000
Front and rear brake disk eccentricity	0.100	0.300
Front brake master cylinder inner diameter	14.000~14.043	14.055
Front brake master cylinder piston outer diameter	13.957~13.984	13.945
Rear brake master cylinder inner diameter	12.700~12.743	12.755
Rear brake master cylinder piston outer diameter	12.657~12.684	12.645
Diameter of front brake disk	275.000	—
Diameter of rear brake disk	275.000	—
Thickness of front brake pad	4.800	1.800
Thickness of rear brake pad	8.000	2.000

Torque Value

Brake hose bolt	3.0~4.0kgf-m
Bolt for front brake caliper	3.5~4.5kgf-m
Bolt for rear brake caliper	2.9~3.5kgf-m
Bolt for ABS control unit	0.8~1.25kgf-m
Brake lever nut	0.8~1.0kgf-m
Air-bleed valve	0.8~1.0kgf-m

Troubleshooting

Slack 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 pad / disk
7. Low brake fluid
8. Blocked brake hose
9. Deformed/ bent brake disk
10. Bent brake lever

Malfunction of the 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 pad / disk
2. Poor wheel alignment
3. Clogged brake hose
4. Deformed or bent brake disk

Tight brake

1. Dirty brake pad / disk
2. Poor wheel alignment
3. Deformed or bent brake disk

Brake abnormal noise

1. Dirty brake pad / disk
2. Deformed brake disk
3. Poor brake caliper installation
4. Imbalance of brake disk or wheel

Disk Brake System Inspection

Inspection

Examine for leaking or damage visually.
Inspect brake tube seam with spanner to check if it becomes loose.

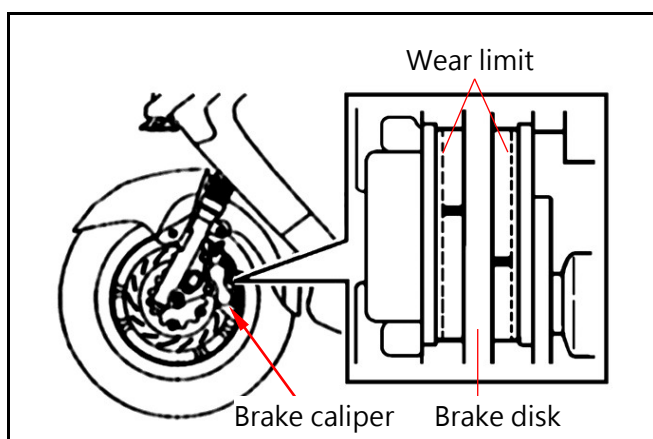
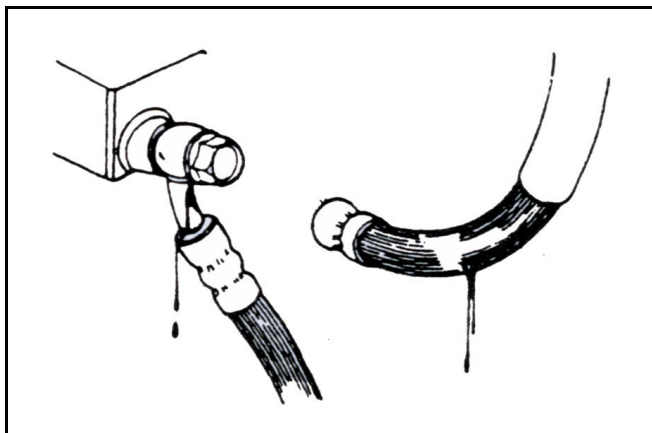
Checking if there is any interferes, contacts between protected pipeline and other parts by turning the handle bar right or left, pressing the cushion up and down

The brake pad must be replaced when it reaches the wear limit.

Park the scooter on an even ground, and check if fluid level is under the "LOWER" mark.
Recommended Brake Fluid: SYM BRAKE OIL (DOT 4).

Caution

- Inclined or just stopped vehicles could not be measured oil level accurately. For accuracy, vehicles should stay in still position for 3-to minutes.
- In order to prevent chemical change, please do not use counterfeiting or other uncertified brake fluid.
- Please use the same brand of brake fluid consistently for brake efficiency.



14. Brake System



Adding Brake Fluid

Before the brake fluid reservoir is removed, turn the handle so that the brake fluid reservoir becomes horizontal, and then remove the brake fluid reservoir.

When maintain the brake system, it is supposed to cover the surface of rubber parts by rags.

Caution

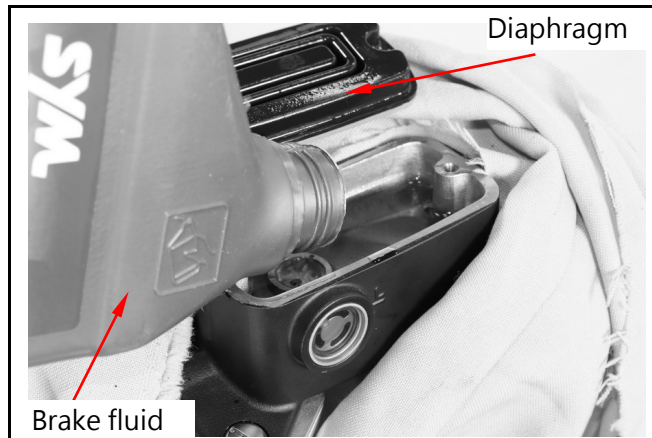
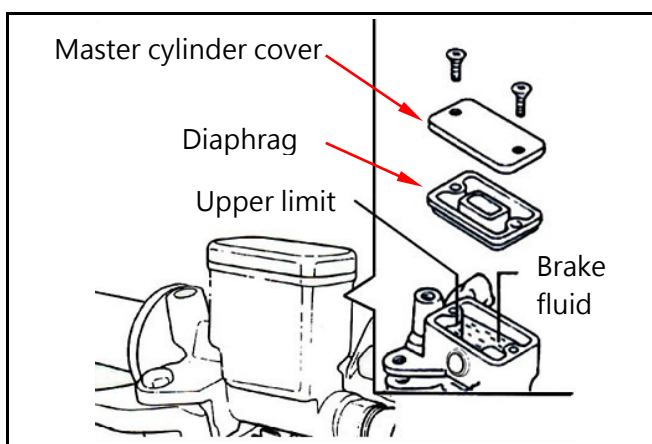
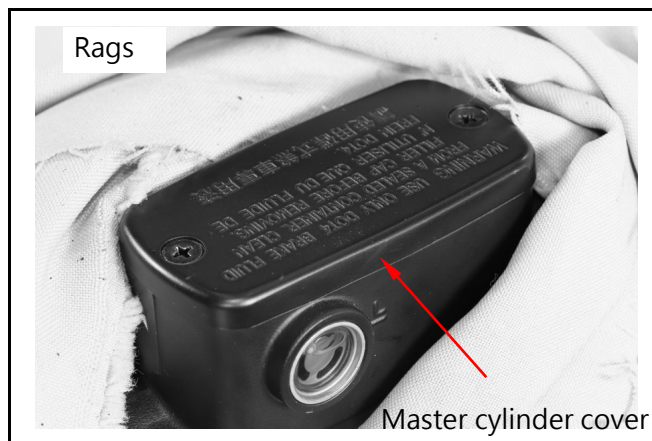
Please do not refill the brake fluid over upper limit. Overflow may result in damages on painted surface such as rubber or plastic parts.

Remove the master cylinder cap and diaphragm. Fill high quality brake fluid with same brand into master cylinder.

Clean the dirty brake disk.

Caution

- Dirty brake lining or disk will reduce the brake performance.
- Mix incompatible brake fluid will reduce brake performance.
- Other substance will block the brake fluid system, and lead to reduce the brake performance or lose brake ability completely.



Brake Fluid Replacement / Air-bleed

Connect drain hose to air-bleed valve.

Open the drain valve on the calipers and delay valve, hold and release 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.

Caution

- Reusing the used brake fluid would weaken the braking efficiency.

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 turn, and at the same time hold the brake lever until there is no air bubble in the drain hose and also feeling resistance on the brake lever.

Close the drain valve when finish 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 loose, please bleed the system as described below:

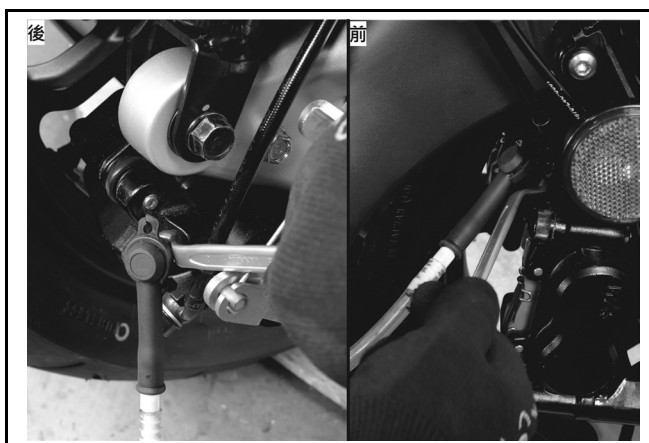
Caution

- 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.

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

Caution

- May use fluid the replacement machine, the replacement fluid, the time is quicker, the air bubble also Compared with cannot remain



14. Brake System



Front Brake Caliper

Removal

Place the oil drain pan under the caliper.
Remove the brake hose bolt and the brake hose.

⚠ Caution

Prevent the brake fluid from contaminating the painted surface.

Remove the front caliper (bolt ×2).

Installation

Install the caliper and tighten the bolts.

Torque value : 3.5~4.5kgf-m

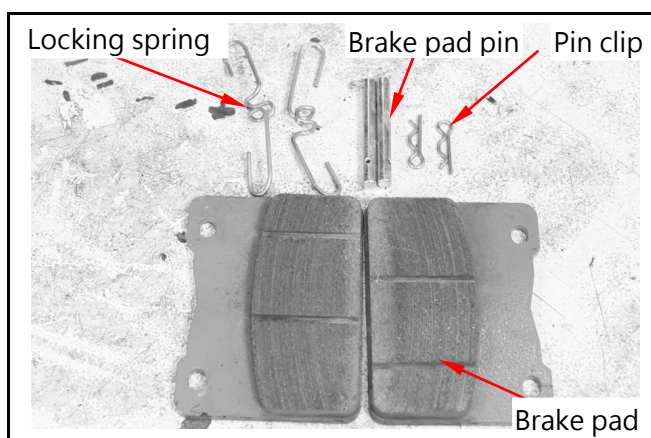
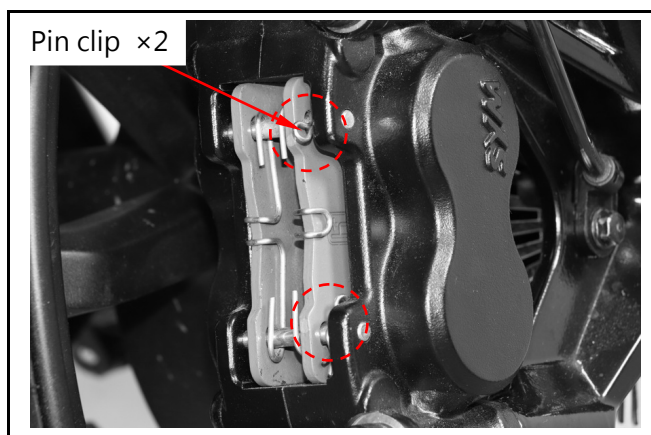
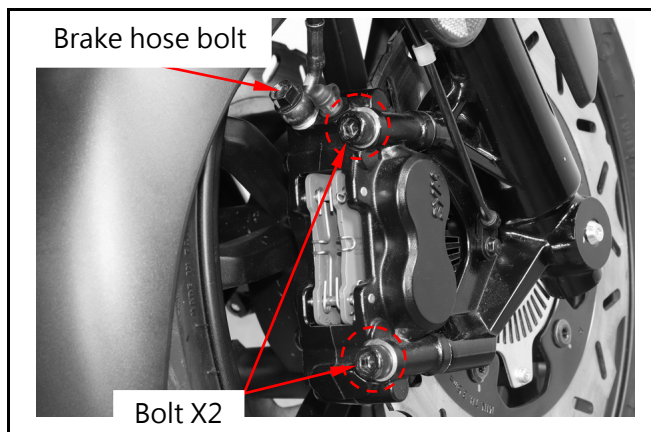
⚠ Caution

- Use M8 x 50 mm bolt.

Install the brake hose and tighten the hose bolt.

Torque value : 3.0~4.0kgf-m

Add the brake fluid and bleed the air.



Front brake pad replacement

Remove the brake pad pin clip and the pin.

Remove the brake pad and the locking spring.

Install the new brake pads, pad pins and locking springs.

Install the

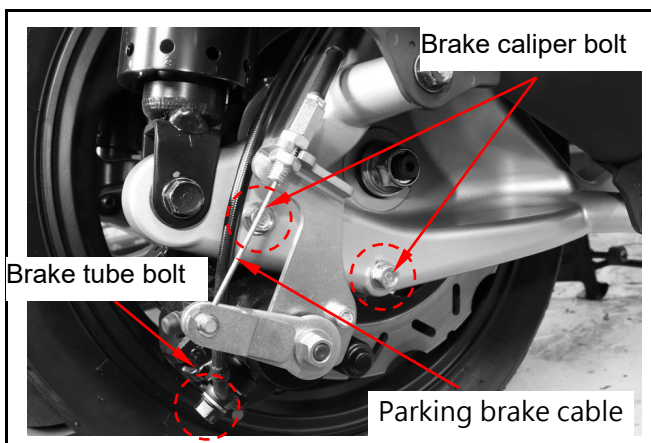
Rear Brake Caliper

Removal

Loosen the parking brake cable nuts.

Remove the parking brake cable.

Place the oil drain pan under the caliper, loosen the tube bolt and remove the brake tube.



⚠ Caution

Prevent the brake fluid from contaminating the painted surface.

Remove the rear brake caliper (bolt ×2).

Installation

Install the rear brake caliper (bolt X2).

Torque value : 2.9~3.5kgf-m

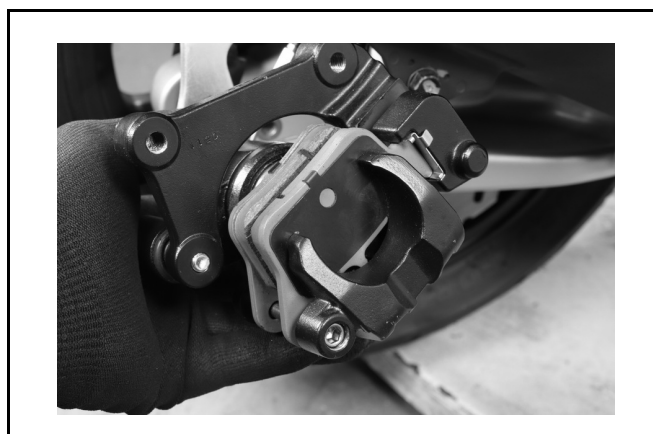
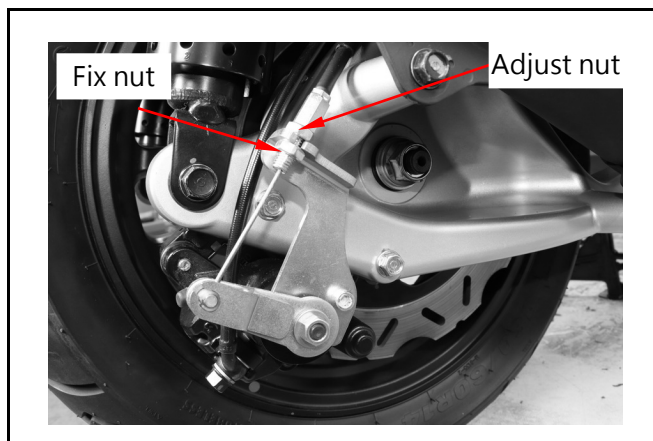
⚠ Caution

- Use M8 x 38 mm bolt ◦

Install the brake hose bolt with washers.

Torque value : 3.0~4.0kgf-m

Add the brake fluid and bleed the air.



Rear brake pad replacement

Remove the brake pads.

Install the new brake pads.

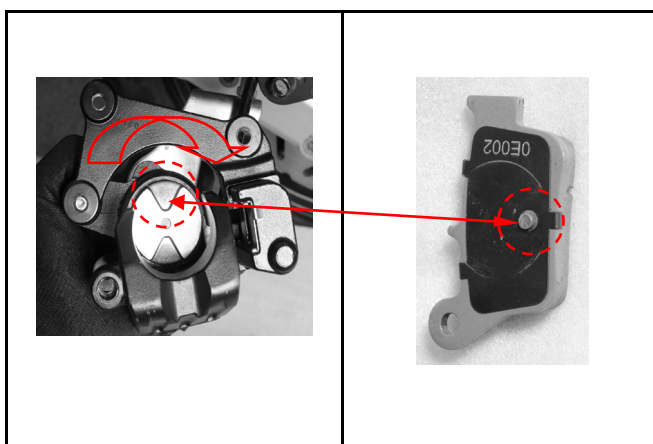
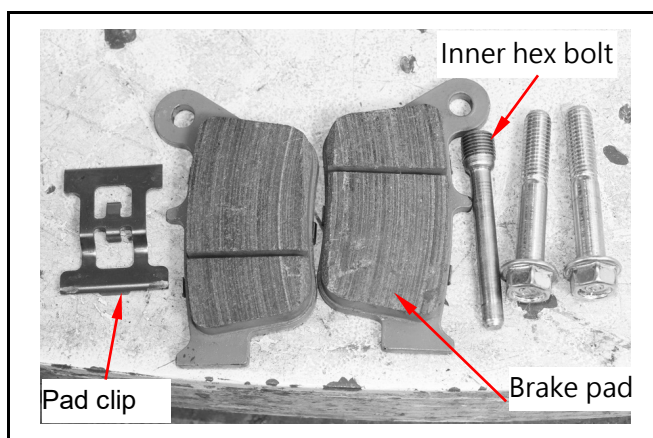
Tighten the inner hex bolt.

⚠ Caution

- Do not pull the brake lever while removing the brake pads.
- Rotate the brake caliper piston clockwise to let it retreat if the piston was pushed out.
- Remove the parking brake cable before removing the rear brake caliper or replacing the brake pads to avoid damage.

Make sure the groove of piston upward during assembly.

Install the brake pad with the little bump to the groove of the piston.



14. Brake System



Brake Disk

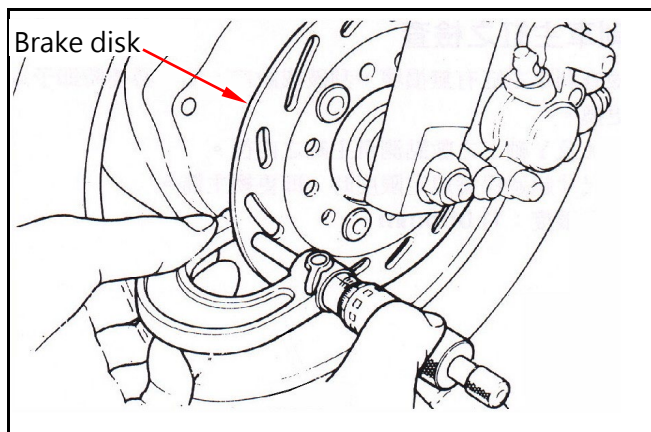
Inspection

Check the brake disk visually for any excessive wear or damage.

Replace the brake disk if necessary.

Service limit : Front brake disk 3.5 mm

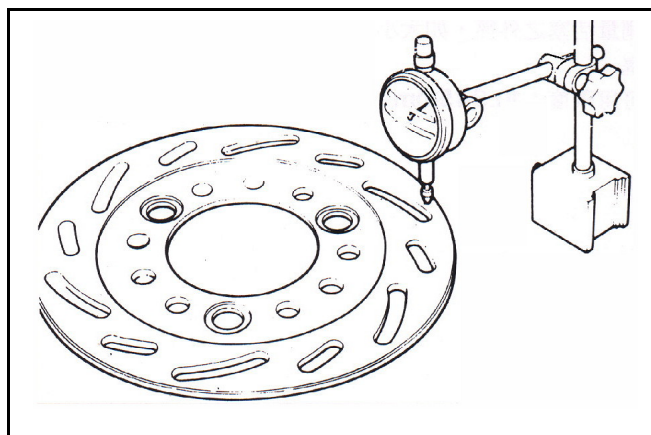
Rear brake disk 4.0 mm



Remove the brake disk from the wheel rim.
Check if the brake disk is deformed or bent.

⚠ Caution

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



Brake Master Cylinder

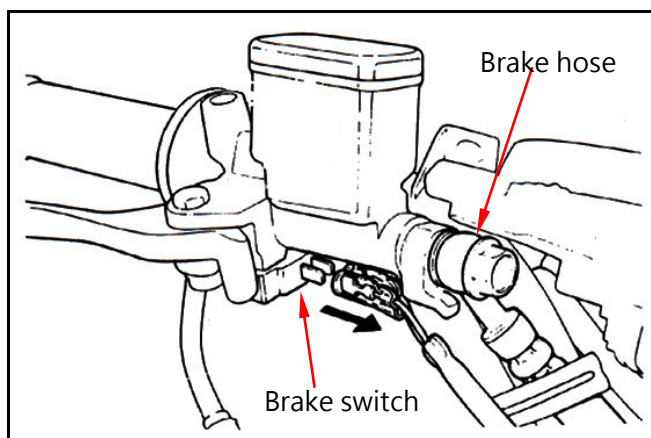
Removal

⚠ Caution

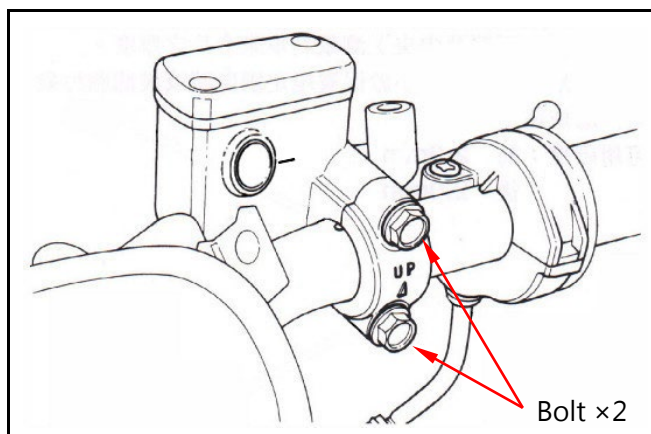
Do not let other substance enter into the cylinder.

⚠ Caution

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



Remove the handlebar covers.
Remove the leads of 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 bolts and the master cylinder.



Remove the rubber pad.
Remove the circlip.
Remove the piston and the spring.
Clean the master cylinder with recommended brake fluid.

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.

Service limit : front : 14.055 mm
rear : 12.755 mm

Measure the outer diameter of the piston.
Replace the piston if the measured value exceeds allowable limit.

Service limit : front : 13.945 mm
rear : 12.645 mm

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.

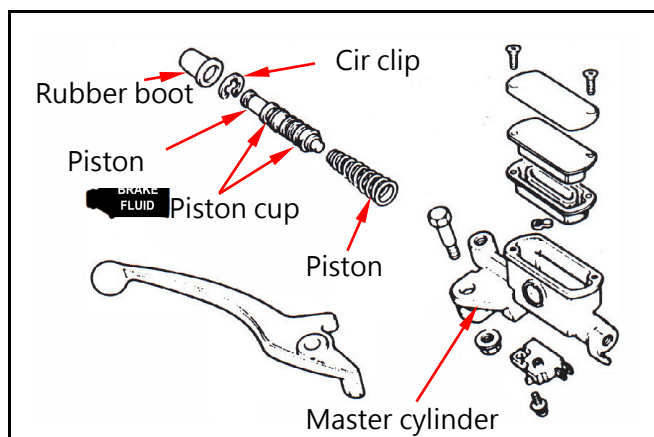
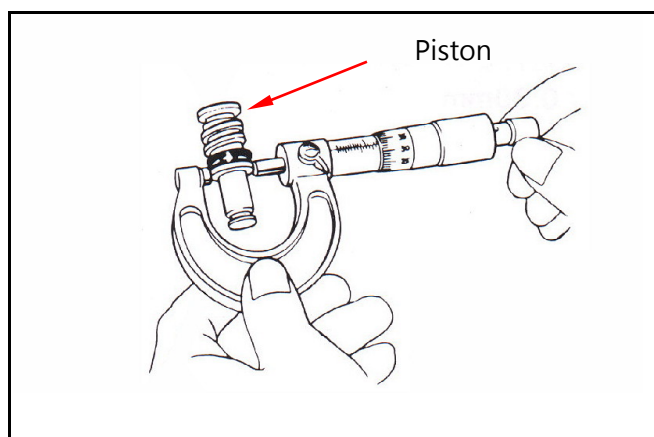
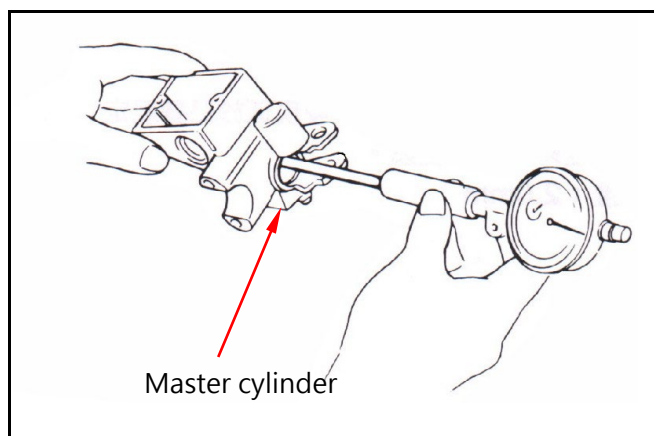
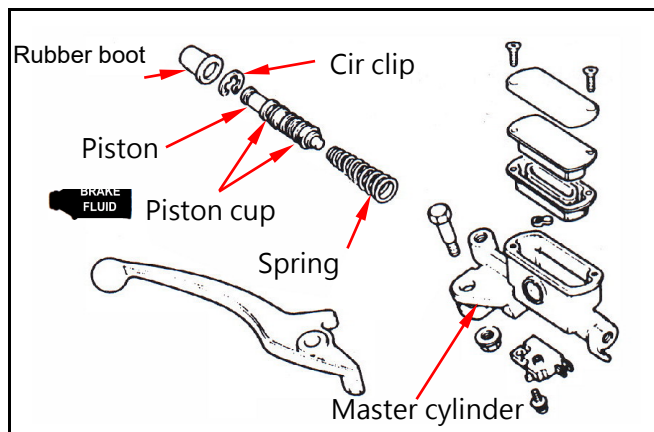
Install the larger end of the spring onto the master cylinder.

The master cup's cavity should be faced inside of master cylinder while 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 pad into groove properly.



14. Brake System



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.
Make sure the hose is installed correctly.
Install all wires, hoses, and components carefully to avoid twisting them together.

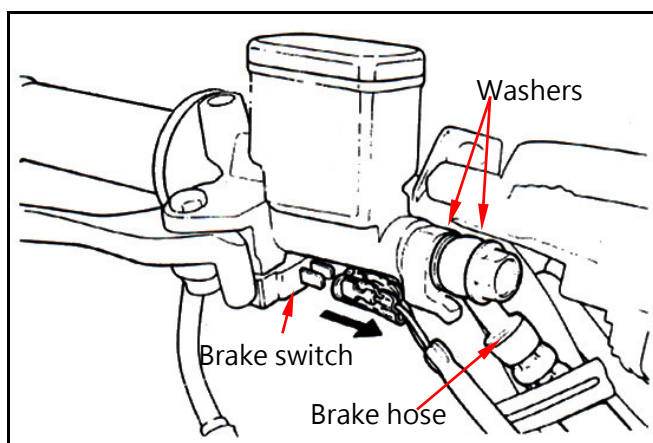
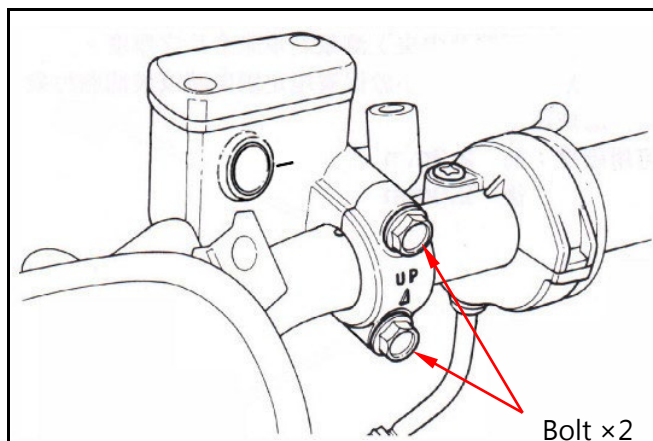
Caution

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.



ABS (Anti-lock Brake System)

ABS is designed to help prevent the wheel from locking up when hard brakes are applied while running straight. The ABS automatically regulates the brake force. Intermittently gaining gripping force and braking force helps prevent wheel lock-up and allows stable steering control while stopping. Brake control function is identical to that of a conventional scooter. The right brake lever is used for the front brake and the left brake lever for the rear brake.

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance. The rider could have an accident as a result. Always use recommended standard tires for this scooter.

When the ABS is functioning, rider may feel a pulsing in the brake lever. This is normal.

ABS does not function at the speed of approx. 5 km/h or below.

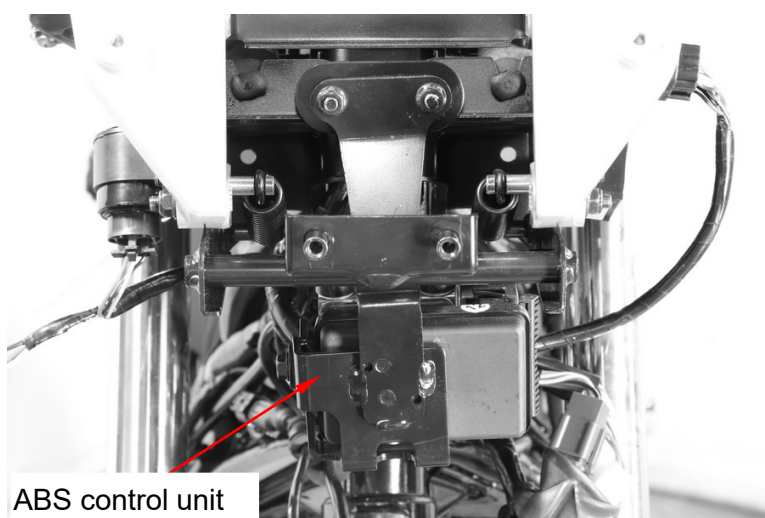
ABS does not function if the battery is discharged.

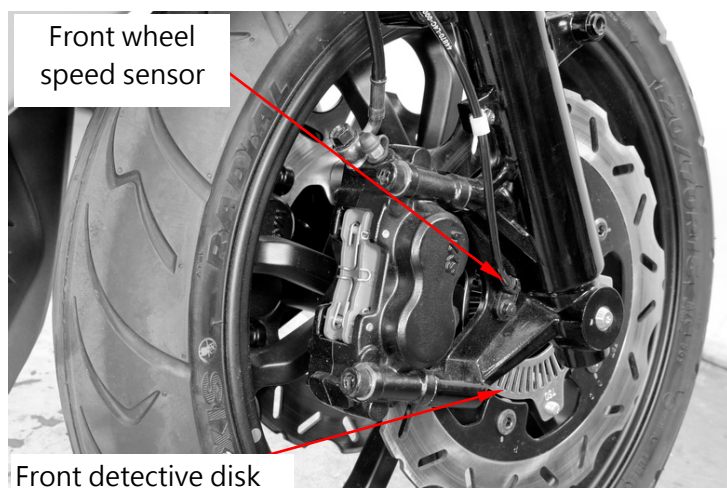
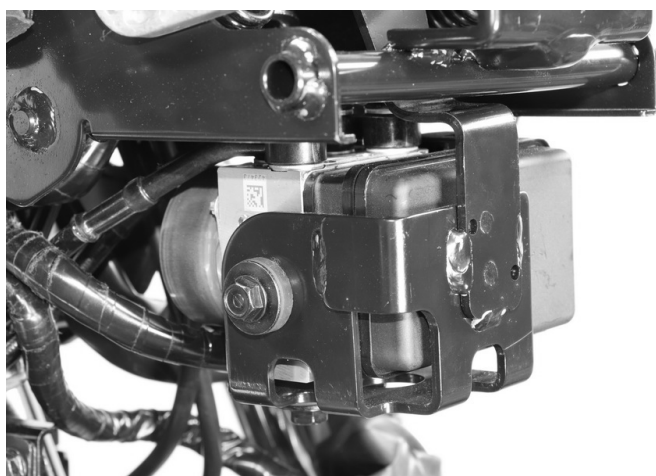
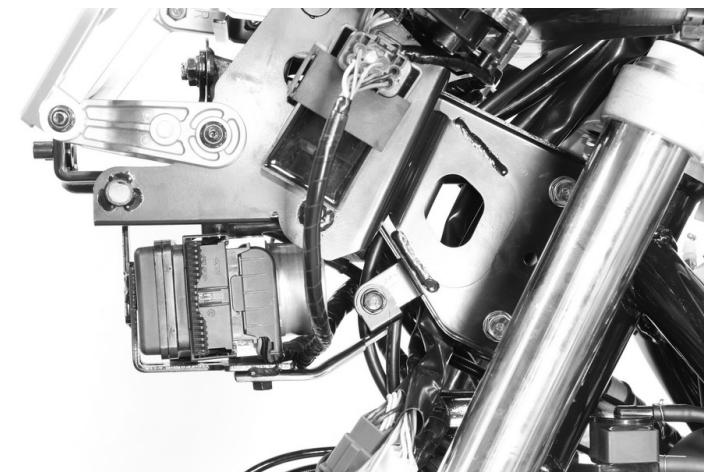
14. Brake System

ABS indicator light:

The ABS indicator light goes on when the ignition switch is turned on and goes off shortly after the scooter speed is over 5km/hr.

If the indicator light is on, ABS may be out of function. However, the brake system can still work properly. You should have the ABS checked.





Front wheel
speed sensor

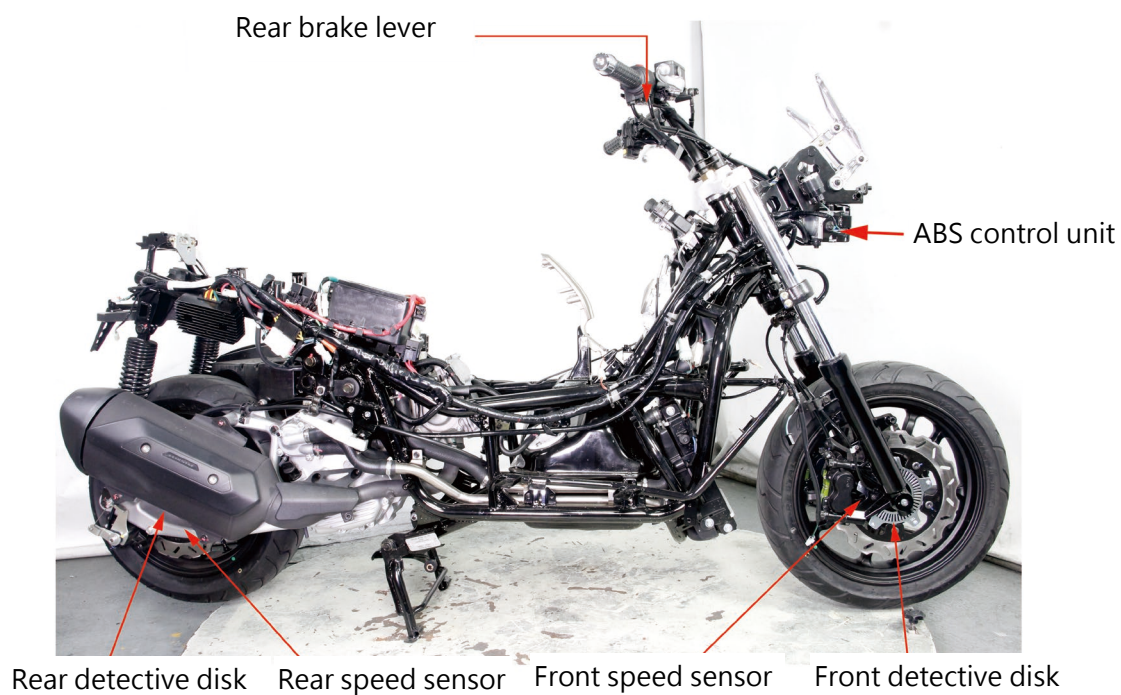
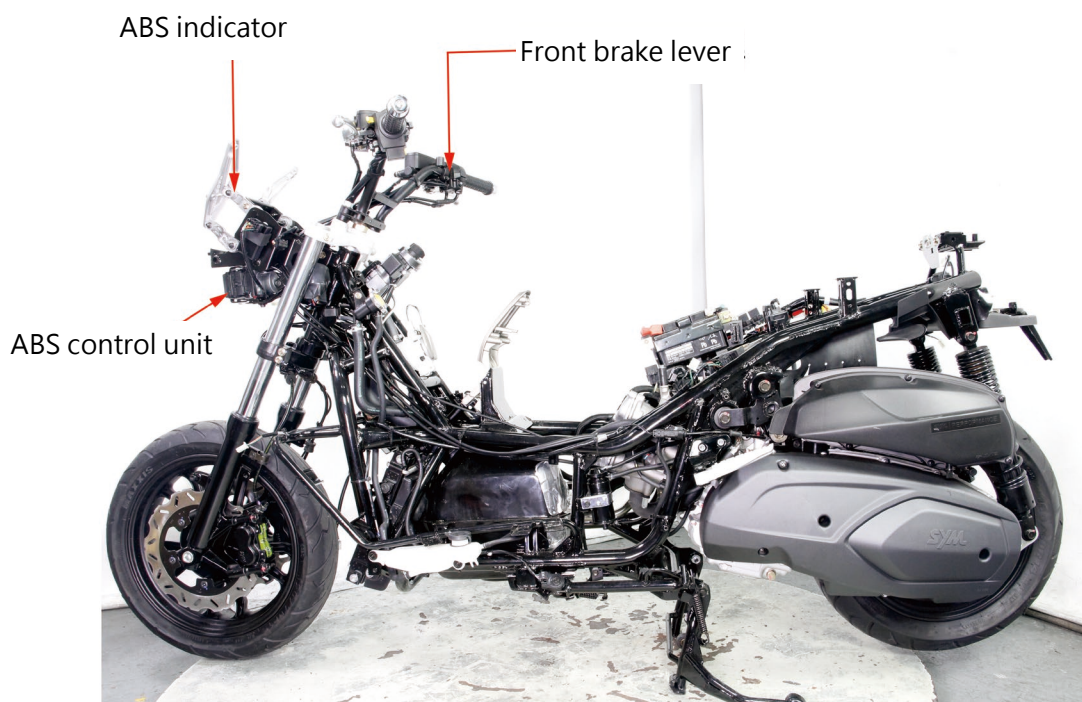
Front detective disk

⚠ Caution

Do not remove the ABS control unit coupler when the main switch is ON, or the ABS control unit will be damaged.

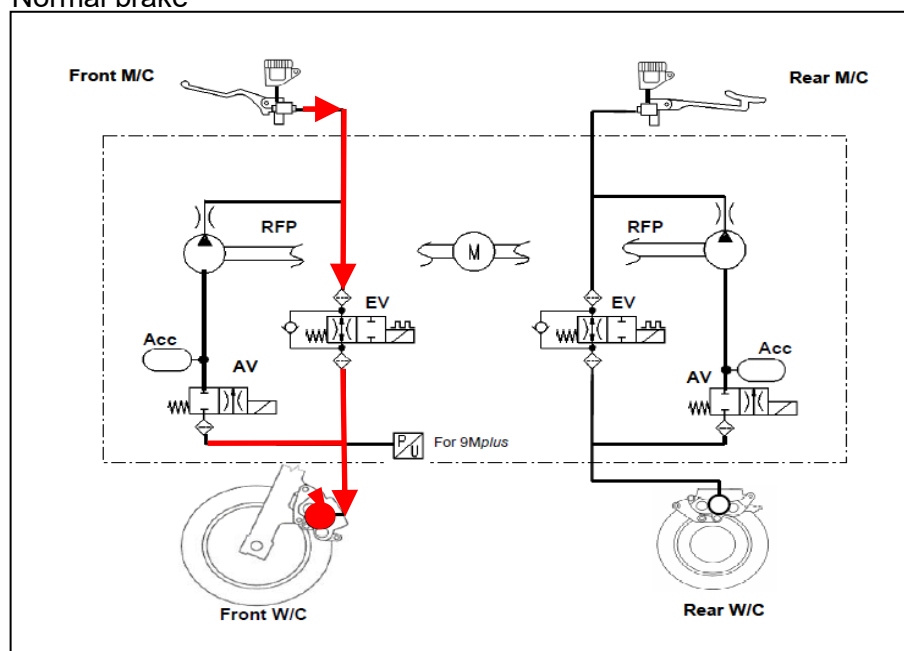
14. Brake System

ABS components location



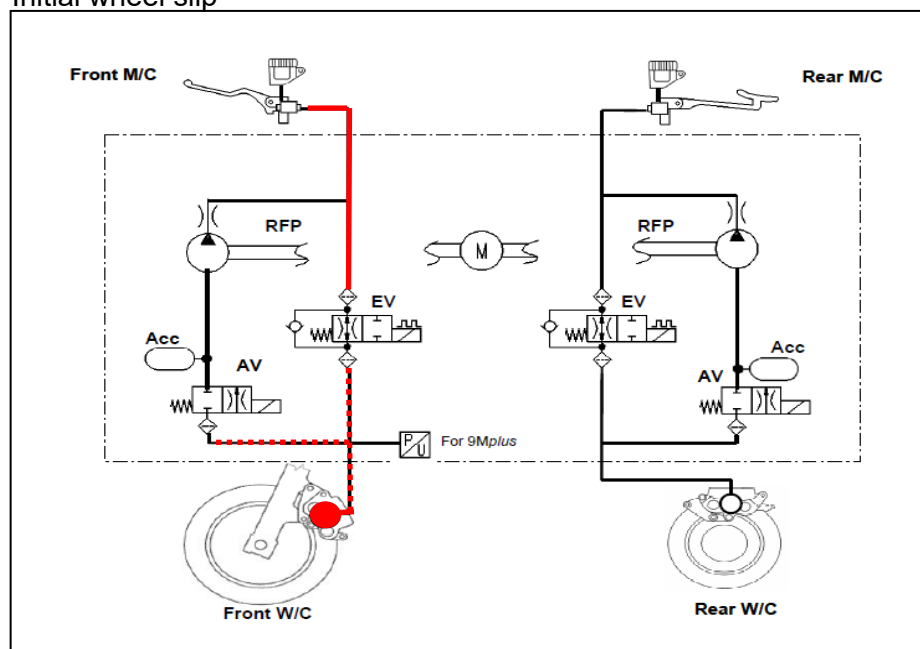
ABS description

Normal brake



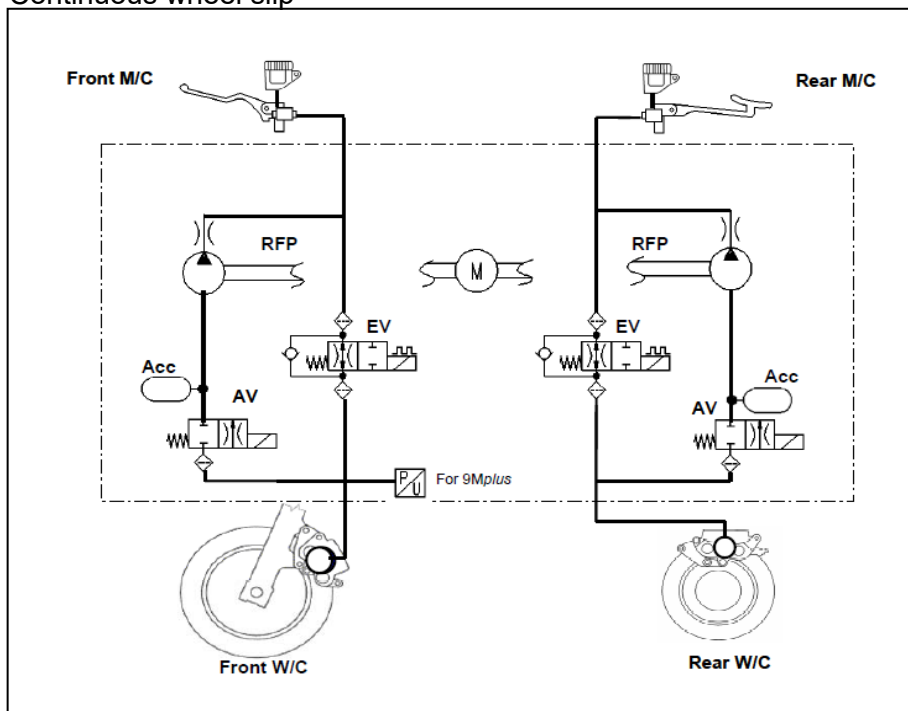
When the brake is applied, speed sensors detect the front and rear wheel speed. When there is no wheel slip, EV (inlet valve for maintaining pressure) keeps open and AV (outlet valve for pressure reduction) is closed. Brake calipers receive pressure for master cylinders and brake normally.

Initial wheel slip



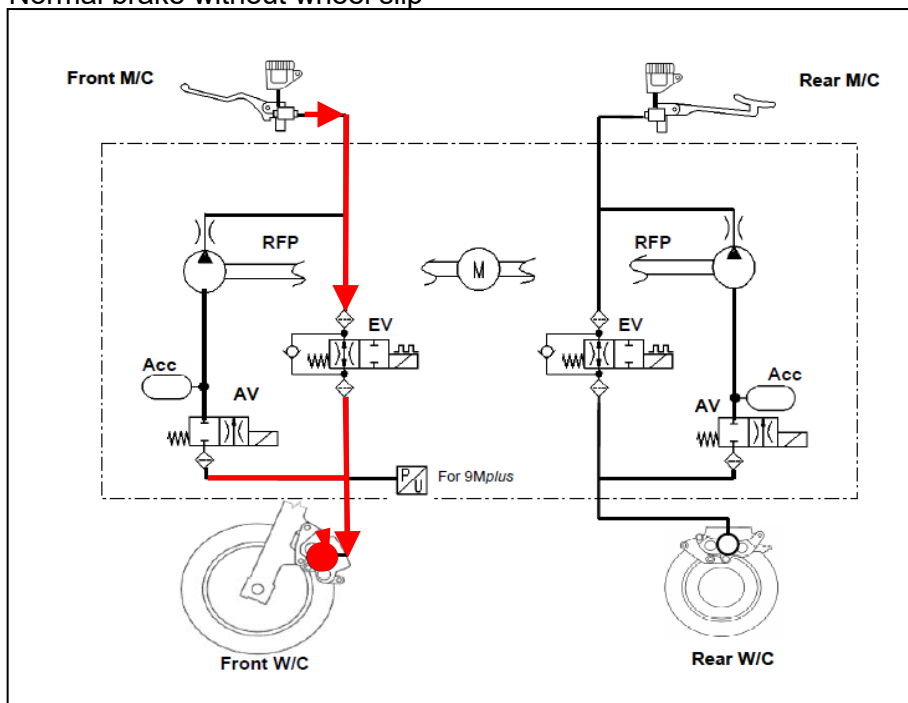
When the initial wheel slip is detected by the wheel speed sensors, EV and AV are both closed. Brake caliper keeps the pressure and brake continues.

Continuous wheel slip



When the wheel speed sensors detect continuous wheel slip, EV keeps closed and AV is open. Brake pressure is reduced (pulsing in the brake lever). Brake caliper lowers the pressure and braking force.

Normal brake without wheel slip



When the pressure reduction continues, the wheel speed sensors detect no wheel slip. EV keeps open and AV is closed. Brake caliper receives pressure from master cylinder and normal brake is applied.

ABS trouble code

C1043	Front speed sensor disconnection or circuit failure
C1042	Abnormal front speed sensor
C1045	Rear speed sensor disconnection or circuit failure
C1044	Abnormal rear speed sensor
C1025	Abnormal front / rear speed difference
C1017	Abnormal front EV
C1018	Abnormal front AV
C1013	Abnormal rear EV
C1014	Abnormal rear AV
C1035	Abnormal fluid pump motor
C1019	Abnormal valve relay
C1055	Abnormal ABS control unit
C1052	Abnormal power supply (too low)
C1053	Abnormal power supply (too high)

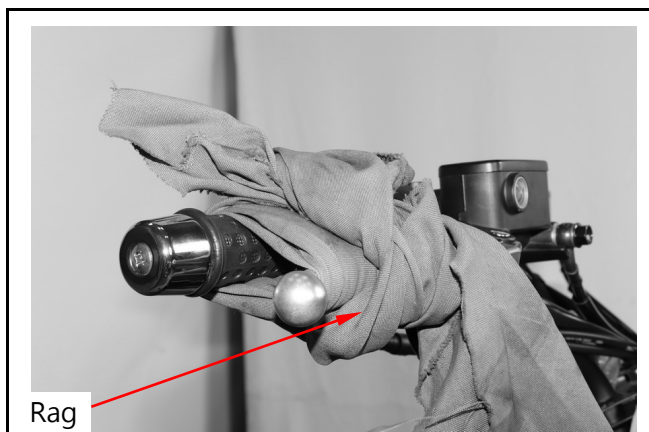
14. Brake System

ABS Control Unit Replacement

Removal :

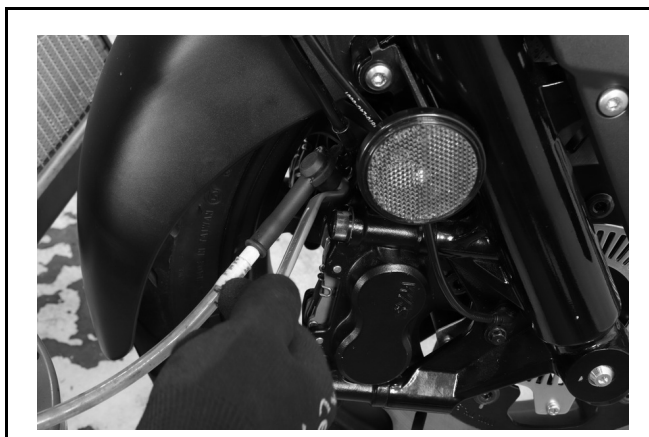
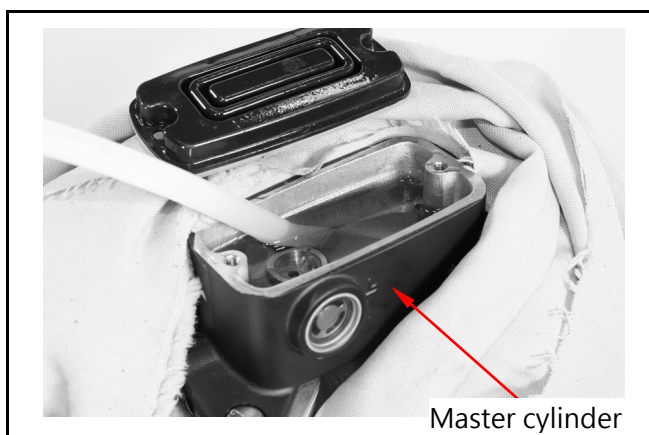
Cover the plastic parts and electric wires by rag.

Pull the brake lever and fix it.



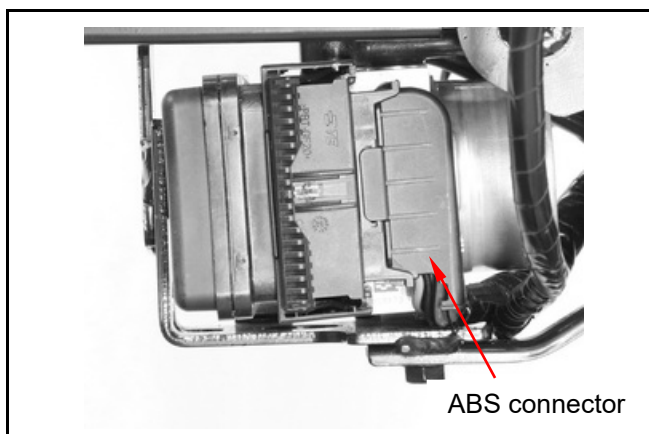
Brake fluid removal

Pump out the brake fluid from the master cylinder and brake caliper.

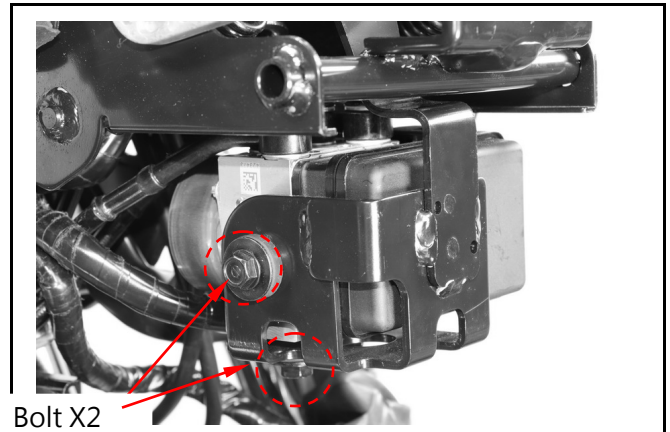


Press the latch of ABS control unit connector

Remove the ABS control unit connector.



Remove the bolts from the bracket of ABS control unit (bolt X2).



Remove the brake hose bolts from the ABS control unit (bolt X4)

⚠ Caution

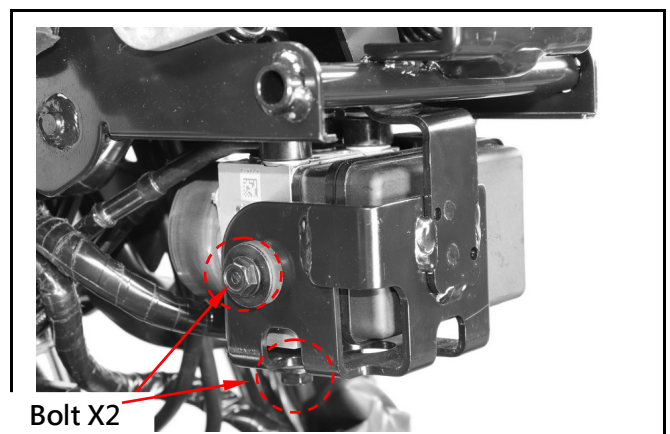
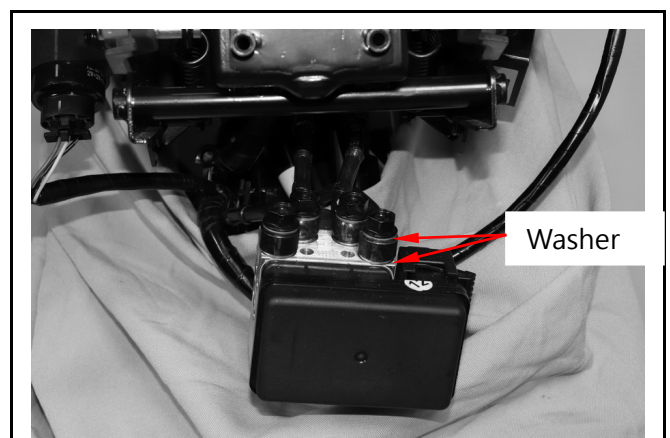
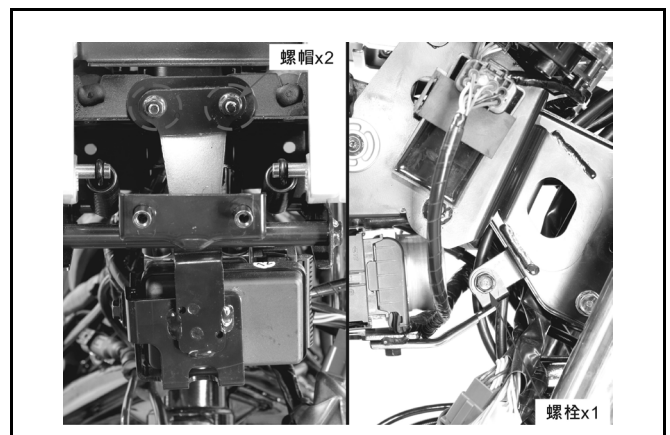
- Cover the plastic parts with rag before removing the brake hose bolts.
- The brake hose must be installed in the correct position without missing the washers.

Replace the ABS control unit.
Install the brake hose bolts.

Torque value :
3.0~4.0 kgf-m

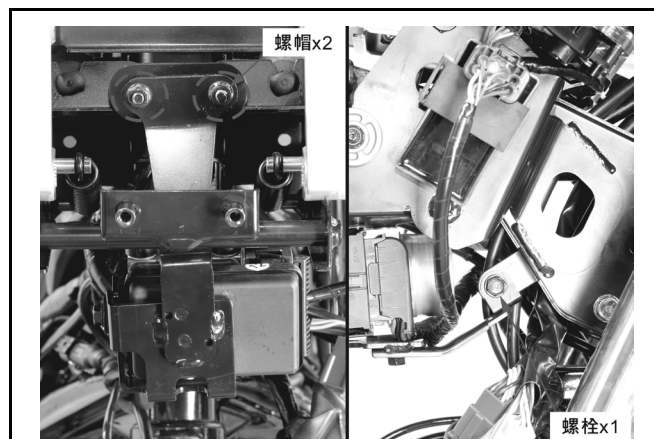
Install the ABS control unit to the bracket (bolt x2).

Torque value : 0.8~1.2 kgf-m



14. Brake System

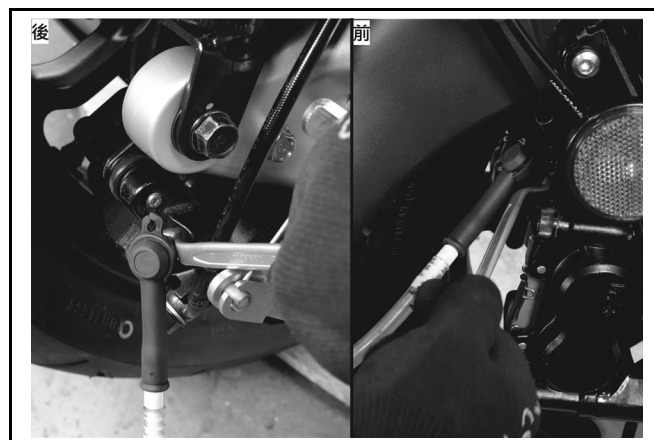
Install the ABS control unit bracket (nut X2 and bolt X1)



Add the brake fluid to the master cylinder.



Bleed the air from the front and rear calipers.



Make sure no air remains in the brake system.

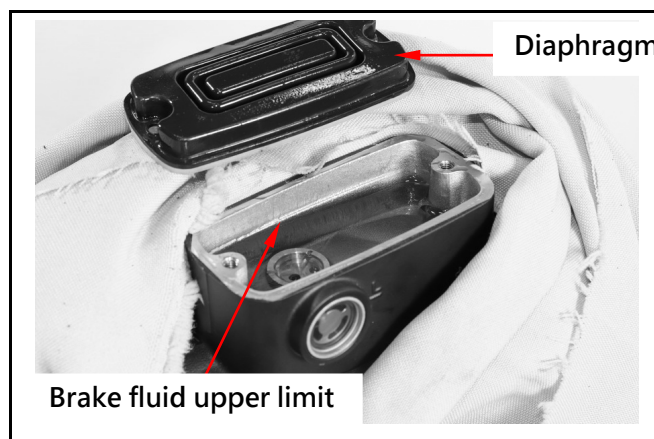
Brake fluid :

"SYM OIL DOT4 brake fluid.

Check if the diaphragm was deformed or broken.
Replace with new diaphragm if necessary.

⚠ Caution

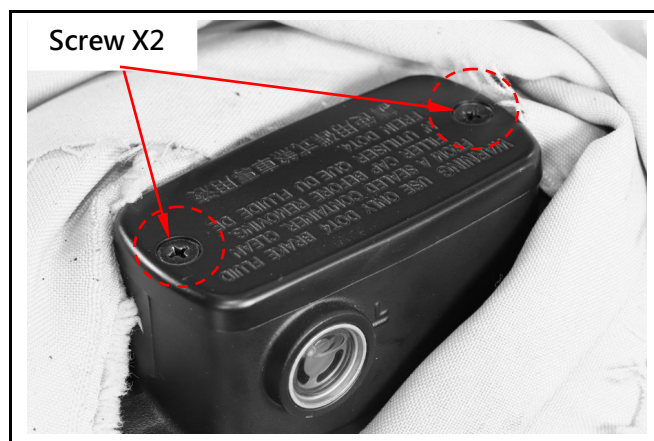
Deformed or broken diaphragm could result in the leakage of brake fluid, damaging other parts.



Install the diaphragm and the master cylinder cover (screw X2).

Torque value :

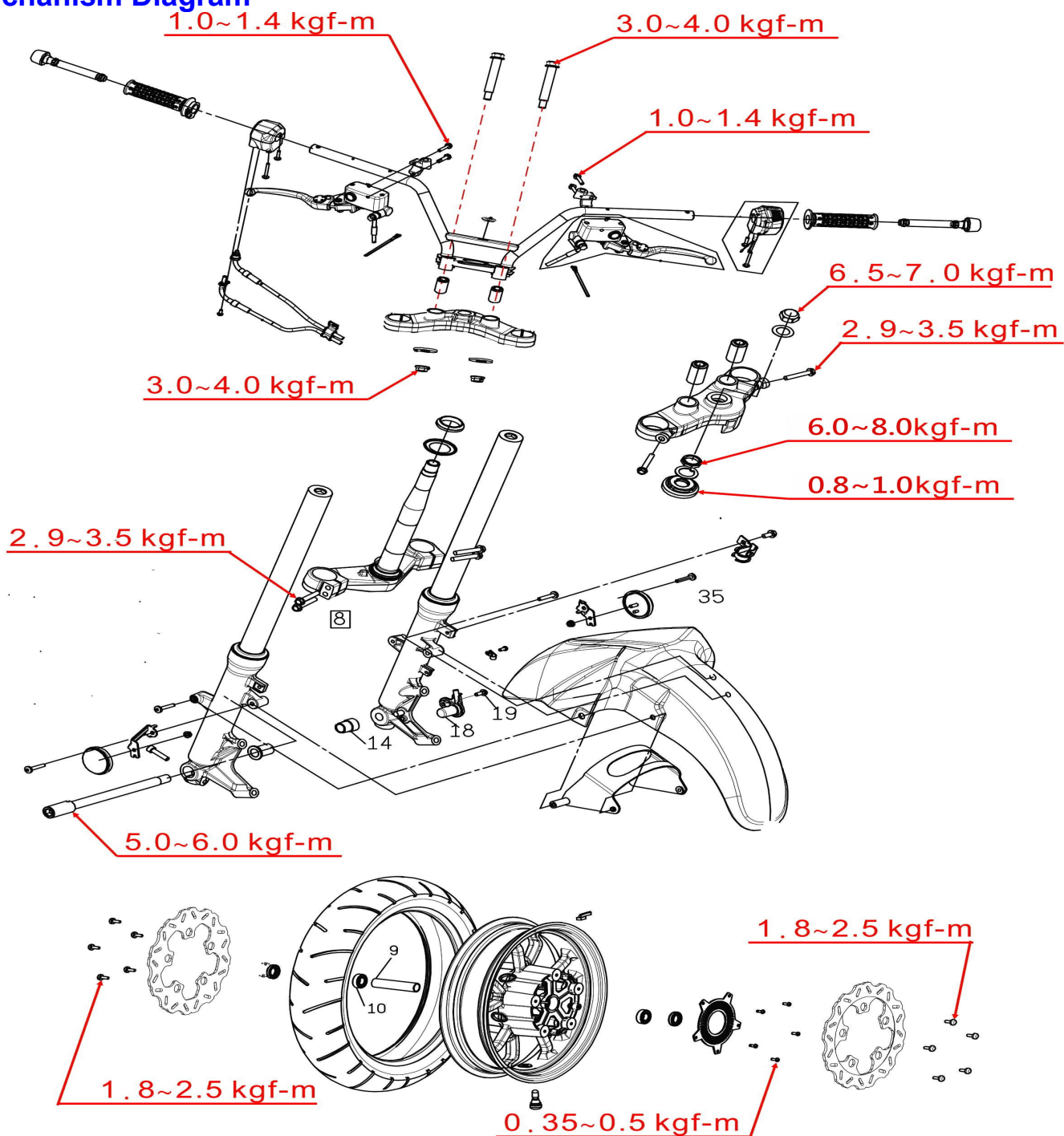
0.1~0.2 kgf-m



<p>Mechanism Diagram 15-Error! Bookmark not defined.</p> <p>Precautions in Operation15-Error! Bookmark not defined.</p> <p>Troubleshooting..... 15-Error! Bookmark not defined.</p> <p>Steering Handle 15-Error! Bookmark not defined.</p>	<p>Top Bridge.. 15-Error! Bookmark not defined.</p> <p>Front Wheel 15-Error! Bookmark not defined.</p> <p>Front Cushion 15-Error! Bookmark not defined.</p> <p>Steering Stem..... 15-Error! Bookmark not defined.</p>
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15. Steering / Front Wheel / Front Cushion

Mechanism Diagram



Precautions in Operation**Torque value**

Front wheel axle	5.0~6.0kgf-m
Steering stem nut	6.5~7.0kgf-m
Handlebar fixing nut	3.0~4.0kgf-m
Steering stem lock nut	0.8~1.0kgf-m
Steering stem lock nut	6.0~8.0kgf-m
Front cushion upper bolt	2.9~3.5kgf-m
Front cushion lower bolt	2.9~3.5kgf-m
Front brake caliper bolt	3.5~4.5kgf-m
Socket bolt (left front cushion)	1.8~2.0kgf-m
Brake master cylinder bolt	1.0~1.4kgf-m

Special Tools

Steering stem box socket	SYM-5030600
Steering head top thread wrench	SYM-5030601
Steering ball race tool set	SYM-5321010
Inner bearing puller	SYM-6204025 46mm
Box socket	29mm

Troubleshooting**Hard to steer**

- The steering handle stem nut is too tight.
- The ball and the top crown of the steering handle stem are damaged.
- Insufficient tire pressure.

The steering handlebar is tilted

- Uneven arrangement of the front cushion.
- The front fork is bent.
- The front wheel axle is bent.

The front wheel rim run-out

- The rim is bent.
- The wheel axle nut is not tightened enough.
- Side-worn or poor tire.
- The bearing clearance of the wheel axle is too large.

Soft front cushion

- The front cushion spring is worn out.
- The oil seal of the front cushion is leaking.

Noise in front cushion

- Front cushion is bent.
- Front cushion is loose.

Steering Handle

Removal

Remove windscreen, meter panel, lower meter visor, right and left front cover, front cover, headlight, speedometer, back mirrors, and handle covers.

Special tool:

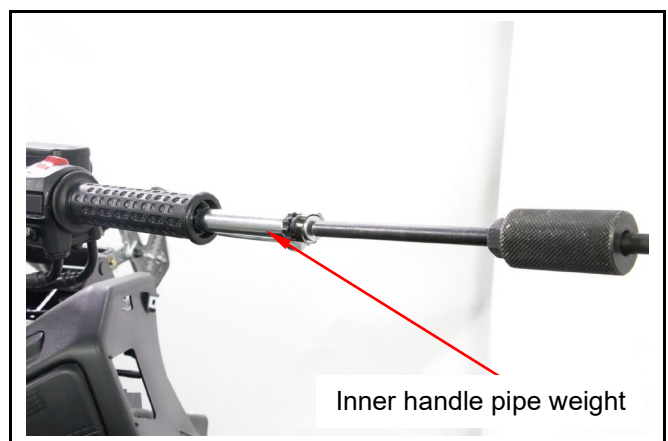
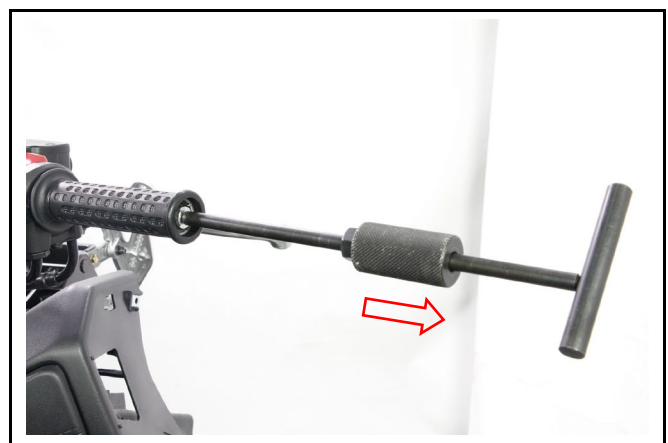
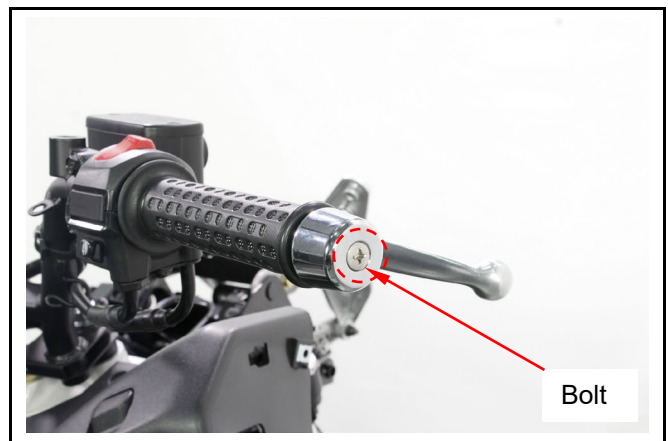
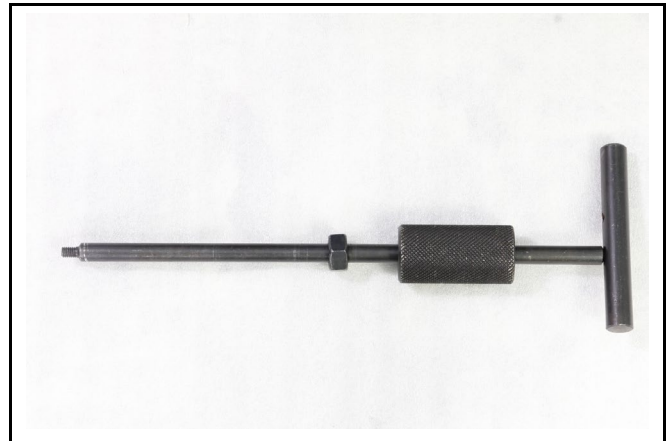
ROCKER ARM SHAFT DISASSEMBLE TOOL
SYM-1445100-125

Remove bolts from right and left handle pipe weights. (2 bolts)

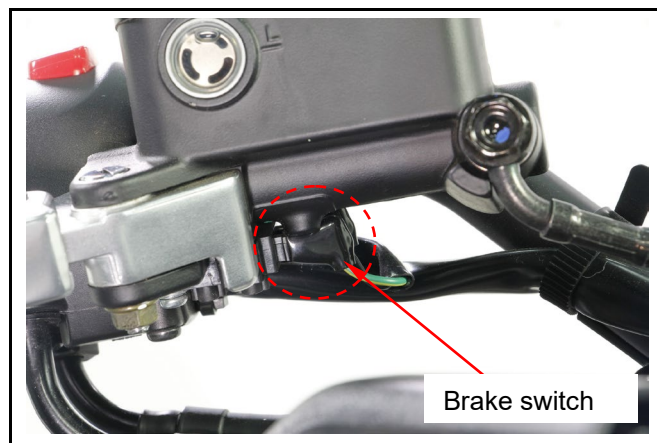
Remove right and left handle pipe weights.

Apply special tool.
Hammer toward outside.

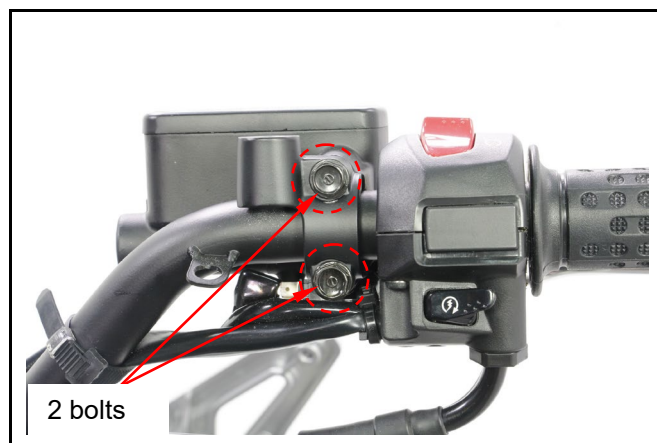
Remove right and left inner handle pipe weights.



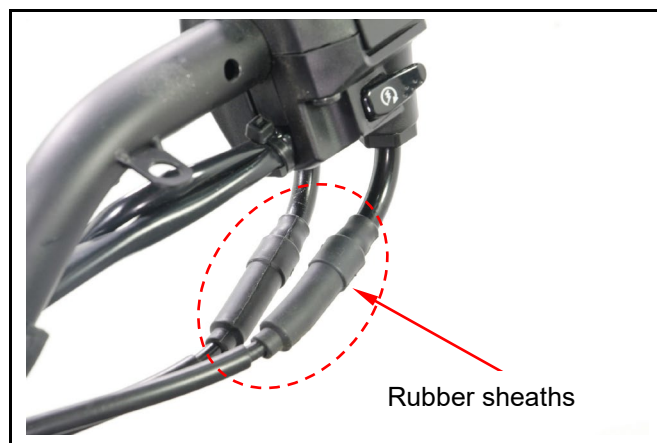
Disconnect right brake switch.



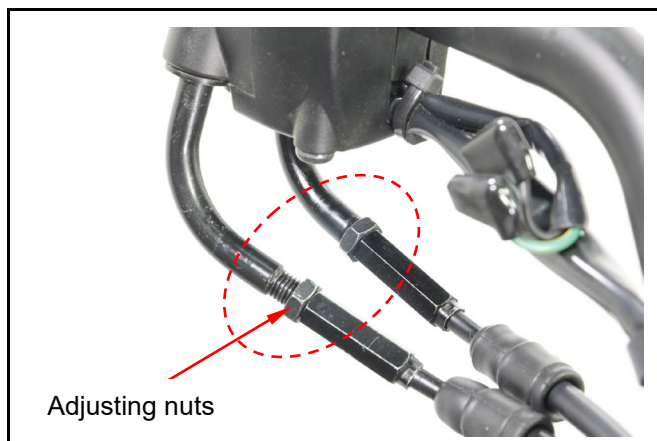
Remove bolts from right brake master cylinder.
(2 bolts)
Remove right brake master cylinder and holder.



Remove rubber sheaths from throttle cables.



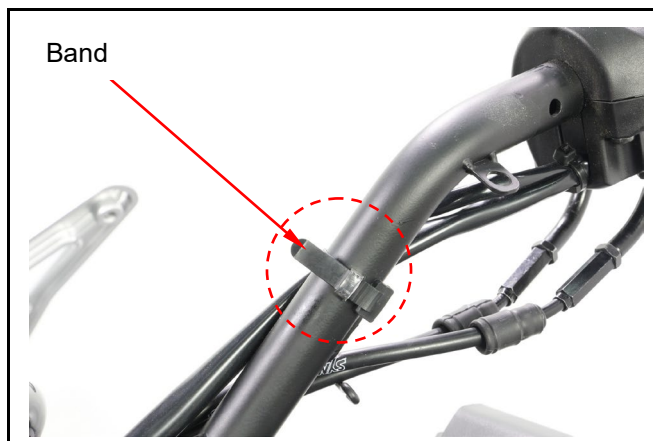
Adjust the adjusting nuts to bottom.



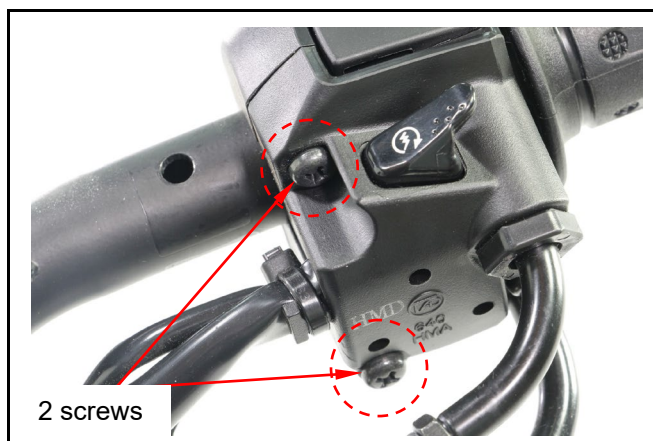
15. Steering / Front Wheel / Front Cushion



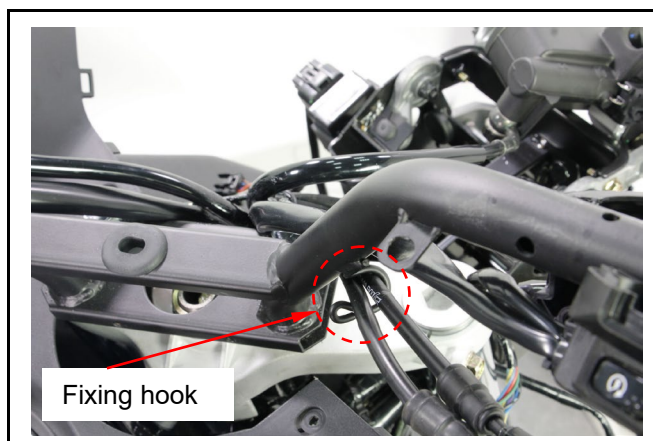
Remove wire band.



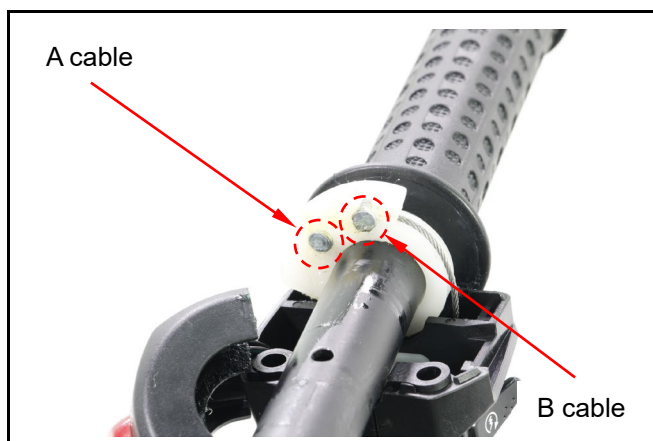
Remove screws from right handle switch. (2 screws)
Remove right handle switch.



Detach throttle cables from fixing hook.

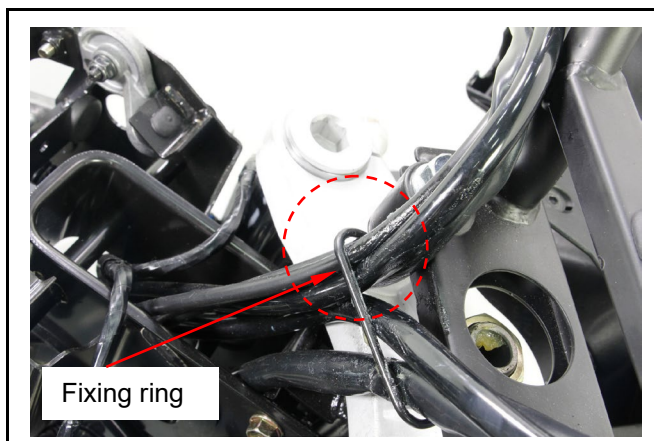


Remove throttle cables. (A cable first, then B cable)
Remove throttle grip and right handle switch.

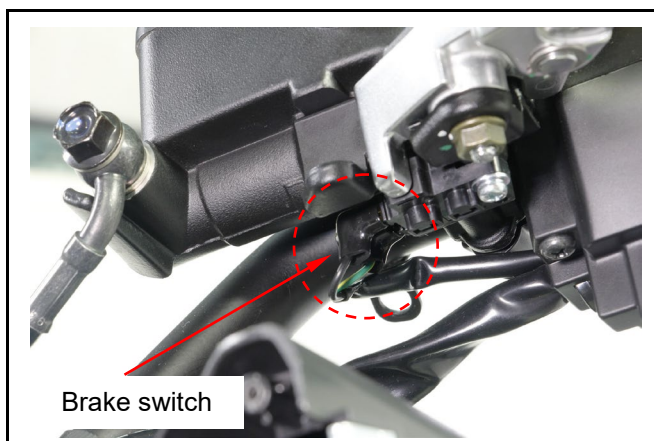


Detach throttle cables, switch wires, and brake hose from fixing ring in sequence.

1. Throttle cables 2. Switch wires 3. Brake hose

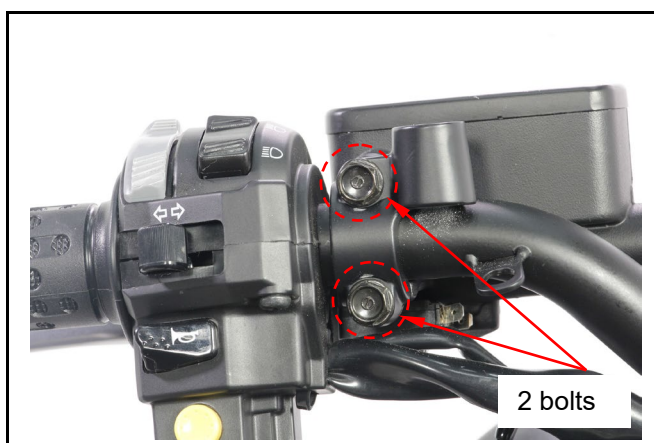


Disconnect left brake switch.

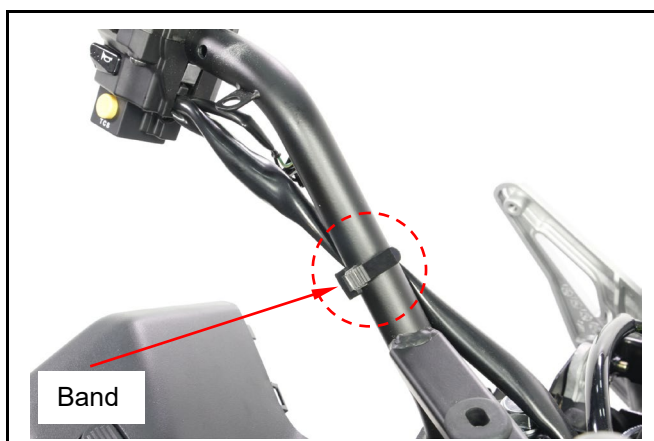


Remove bolts from left brake master cylinder.
(2 bolts)

Remove left brake master cylinder and holder.



Remove wire band.

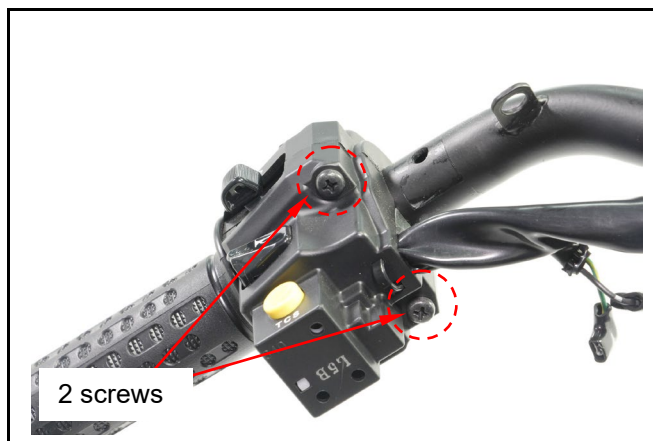


15. Steering / Front Wheel / Front Cushion



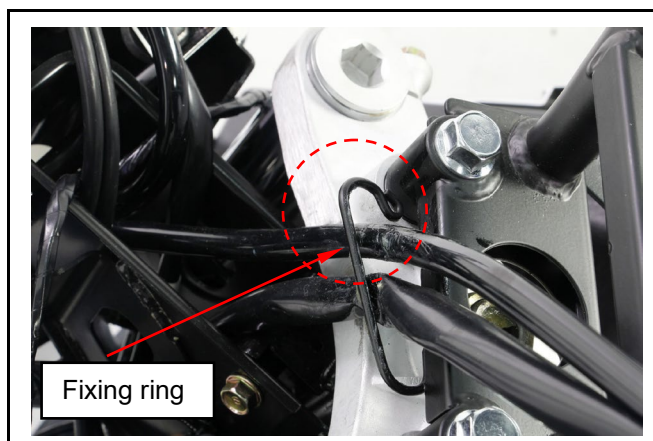
Remove screws from left handle switch. (2 screws)

Remove left handle switch.

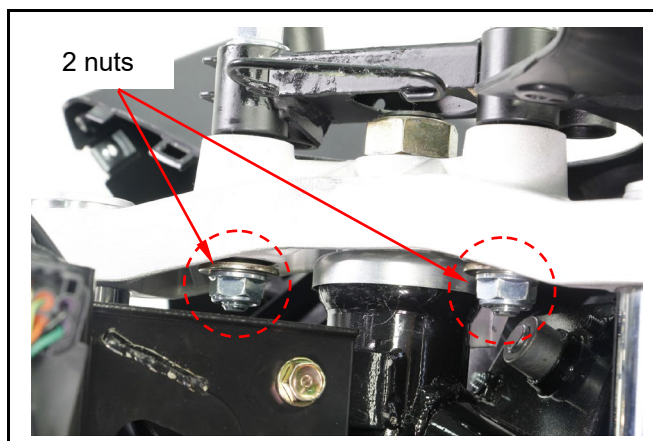


Detach brake hose and switch cables from fixing ring in consequence.

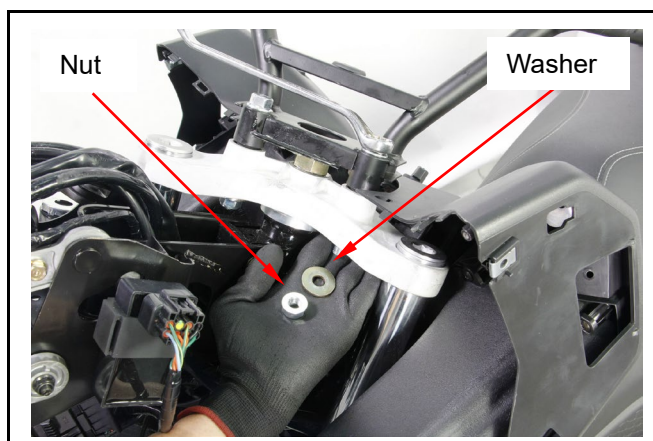
1. Brake hose 2. Switch cables



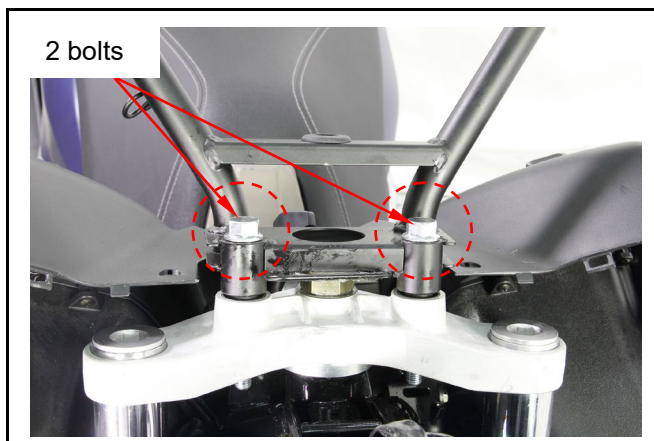
Remove handlebar fixing nuts. (2 nuts)



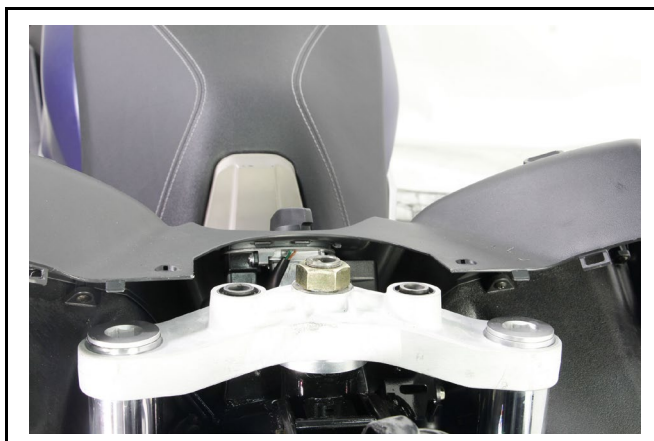
Remove nuts and washers.



Remove bolts. (2 bolts)



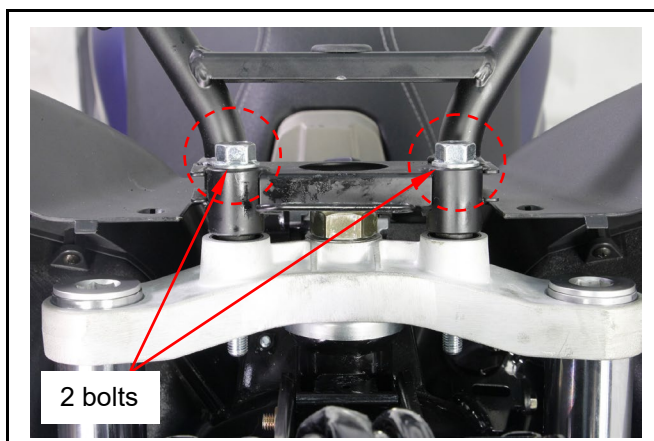
Remove handlebar.



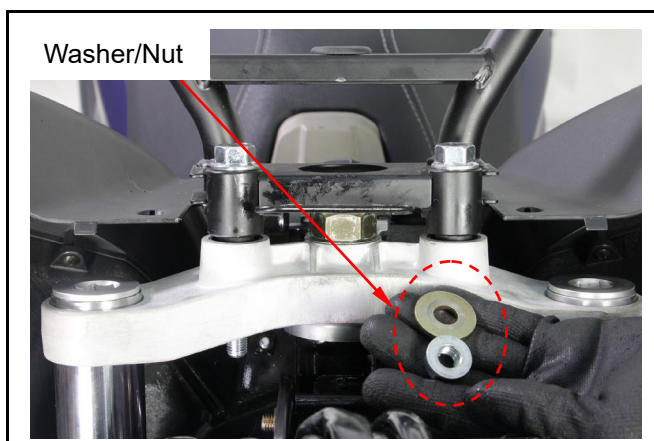
Installation

Install handlebar.

Install bolts. (2 bolts)



Install washers and nuts.



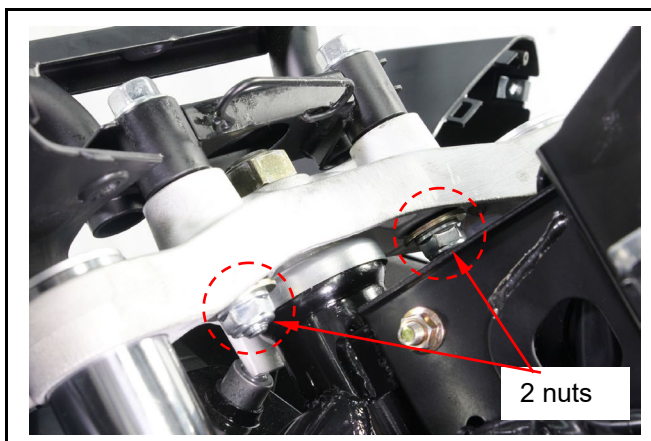
15. Steering / Front Wheel / Front Cushion



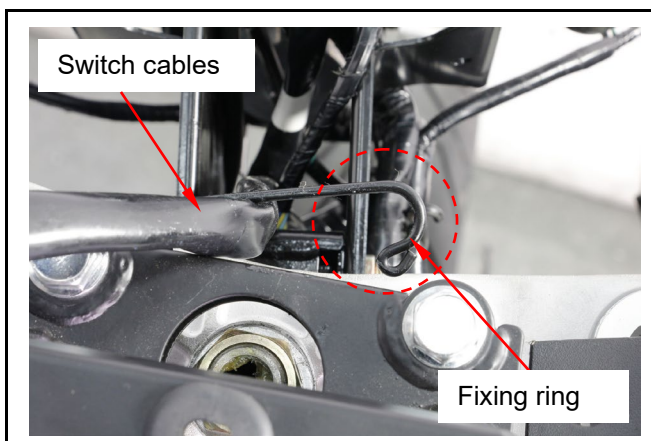
Tighten nuts. (2 nuts)

Torque value:

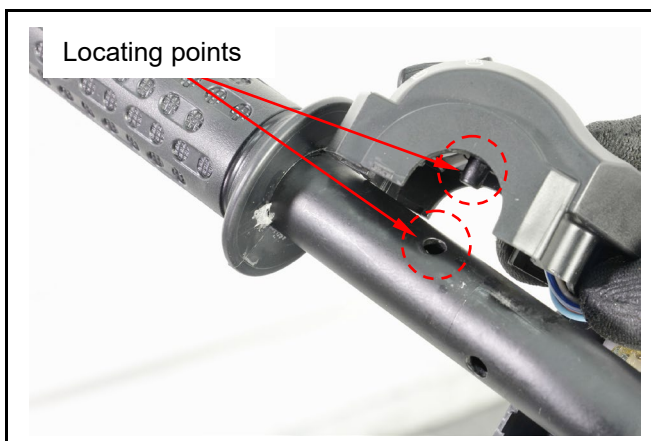
Handlebar fixing nut: 3.0~4.0kgf-m



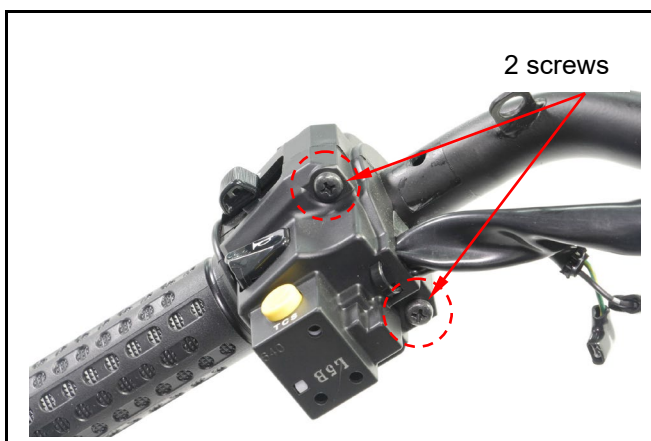
Arrange left handle switch cables into fixing ring.



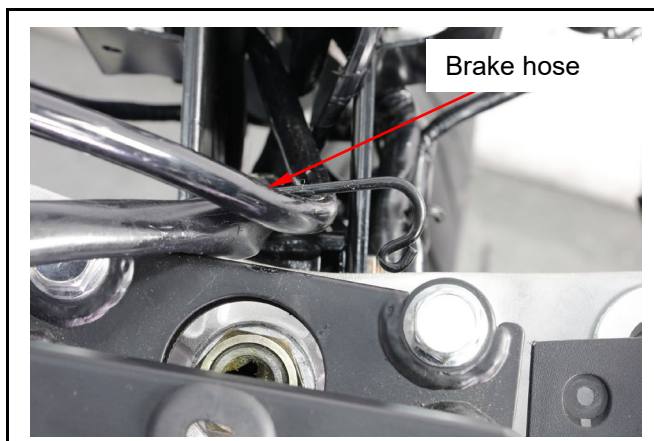
Align the locating points on left handle switch and handlebar.



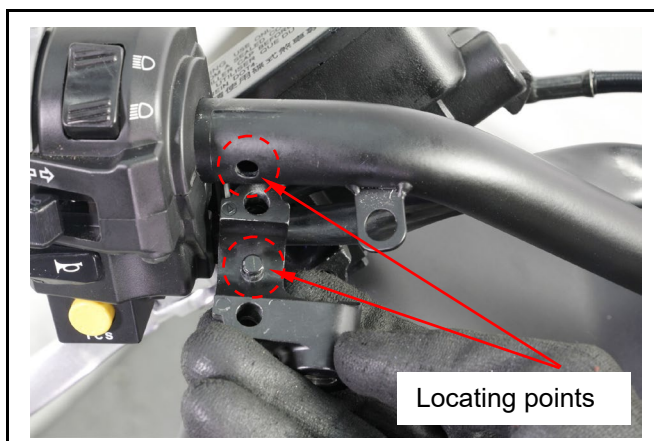
Tighten the screws of left handle switch. (2 screws)



Arrange brake hose into fixing ring.



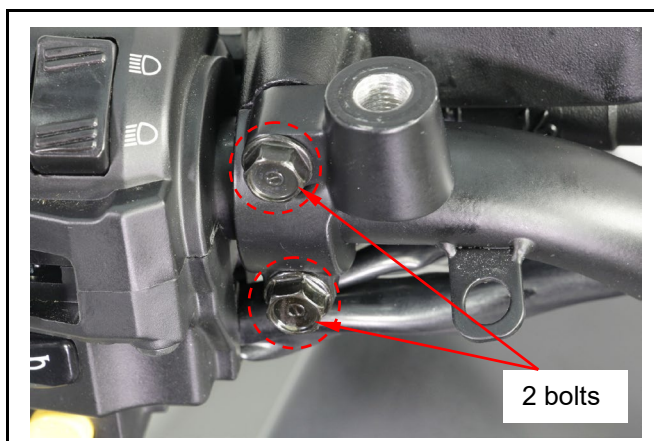
Align the locating points on left brake master cylinder and handlebar.



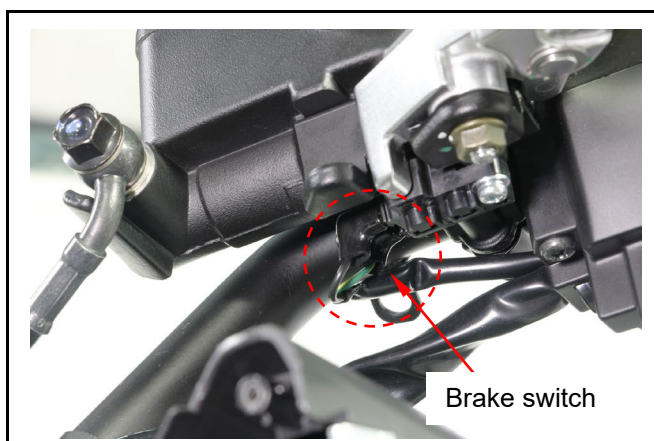
Tighten the bolts of left brake master cylinder.
(2 bolts)

Torque value:

Fixing bolts 1.0~1.4kgf-m

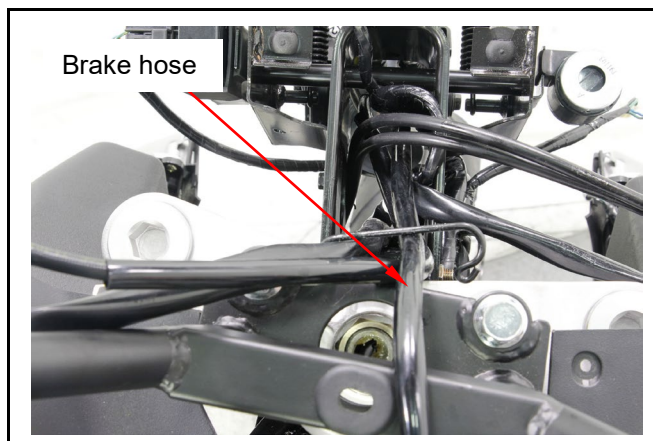


Connect left brake switch.

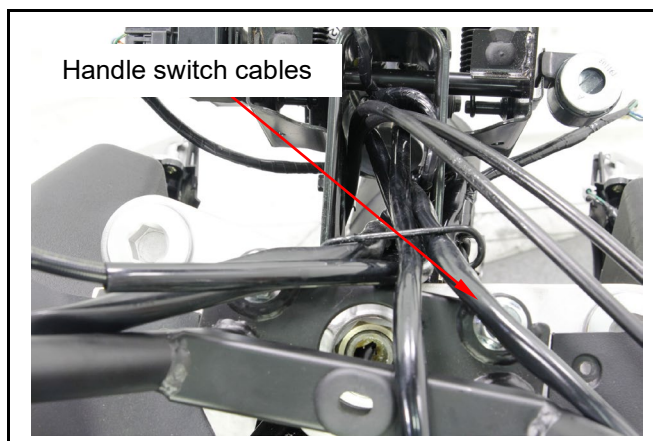


15. Steering / Front Wheel / Front Cushion

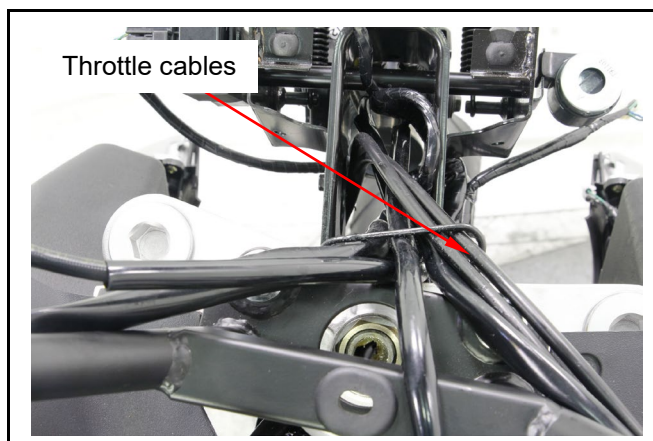
Arrange brake hose into fixing ring.



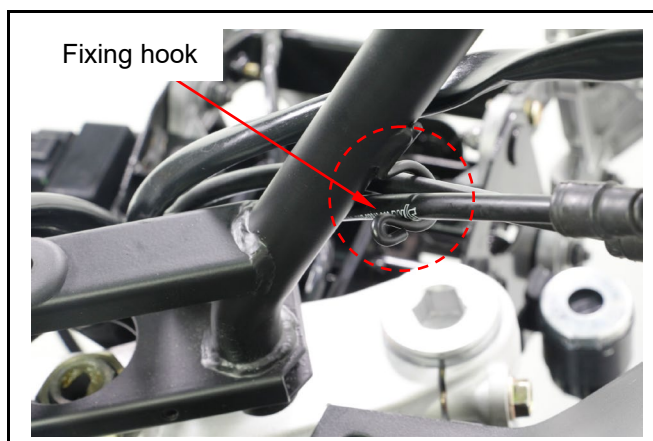
Arrange right handle switch cables into fixing ring.



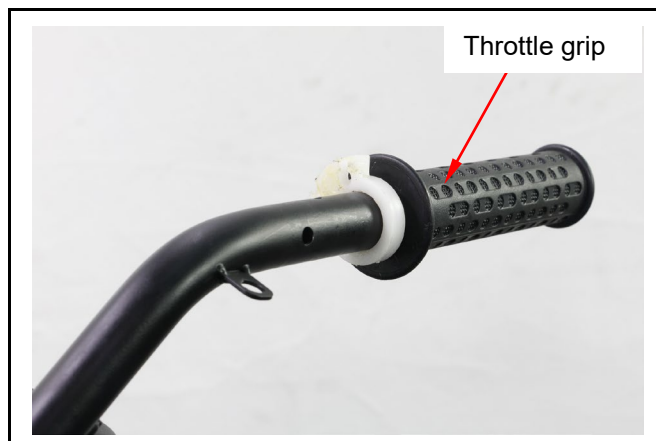
Arrange throttle cables into fixing ring.



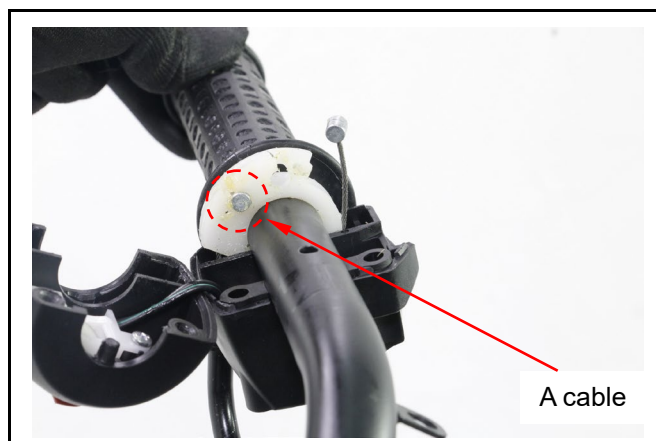
Arrange throttle cables into fixing hook.



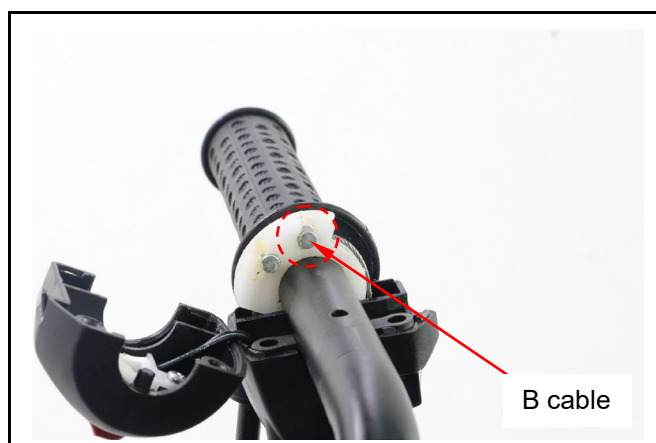
Install throttle grip.



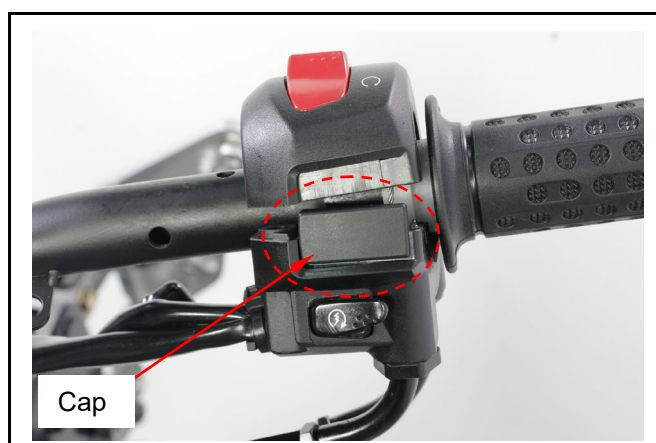
Install throttle cable A first.



Then install throttle cable B.



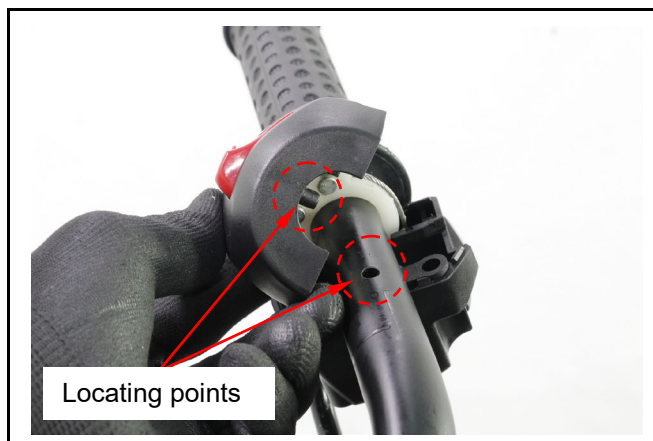
Install right handle switch cap.



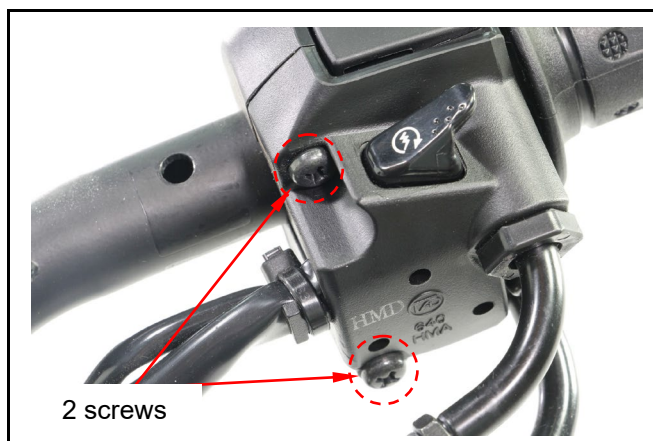
15. Steering / Front Wheel / Front Cushion



Align the locating points on the right handle switch and handlebar.



Tighten the screws of right handle switch. (2 screws)



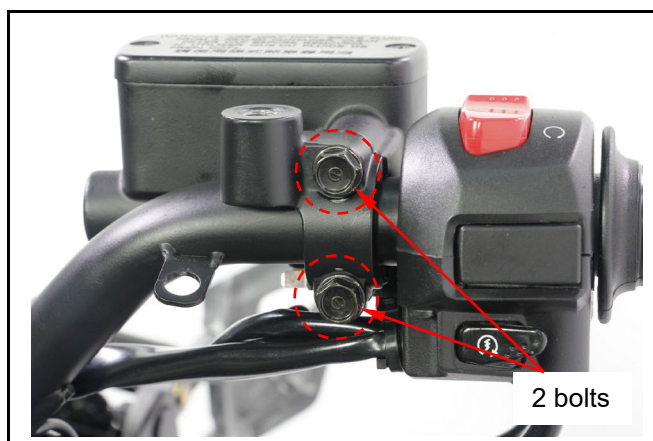
Align the locating points on right brake master cylinder and handlebar.



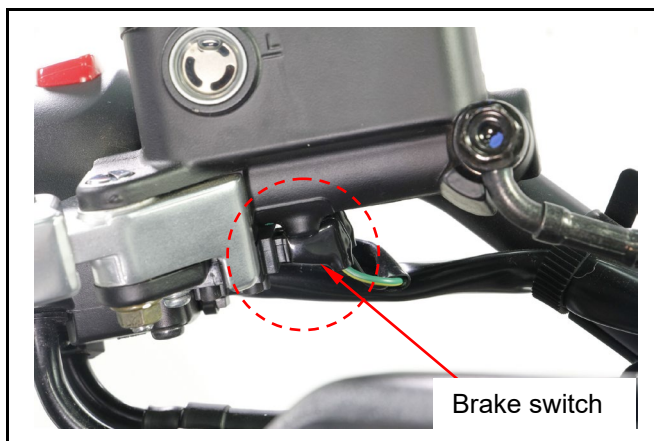
Tighten the bolts of right brake master cylinder. (2 bolts)

Torque value:

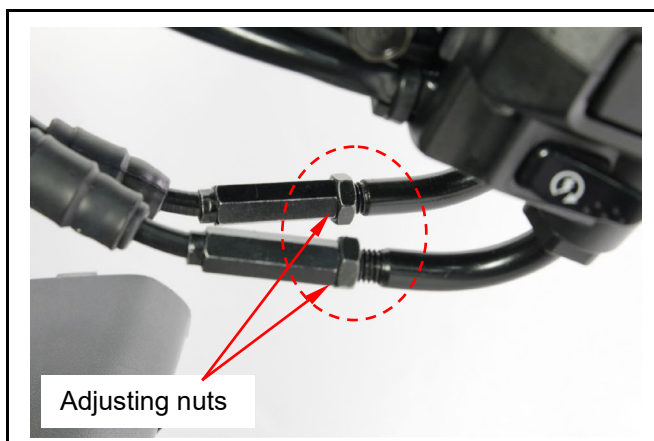
Fixing bolts 1.0~1.4kgf-m



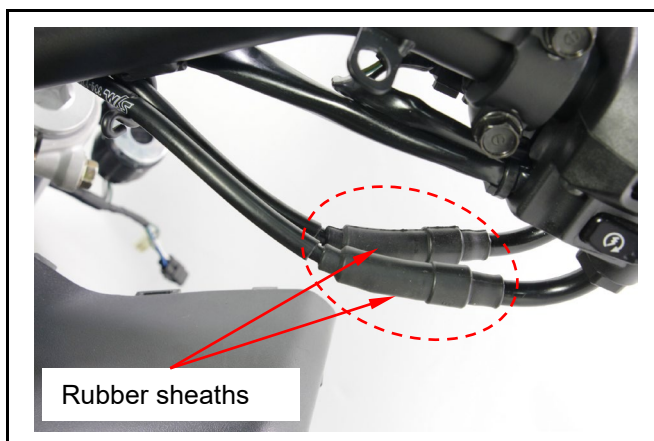
Connect right brake switch.



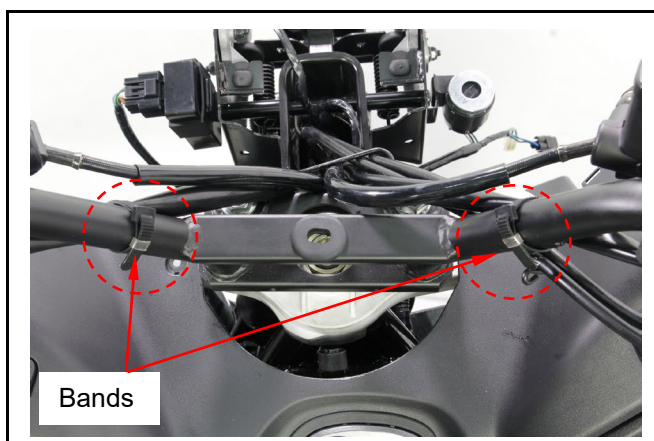
Adjust the adjusting nuts to proper position and then tighten.



Cover with rubber sheaths.



Install right and left wire bands.

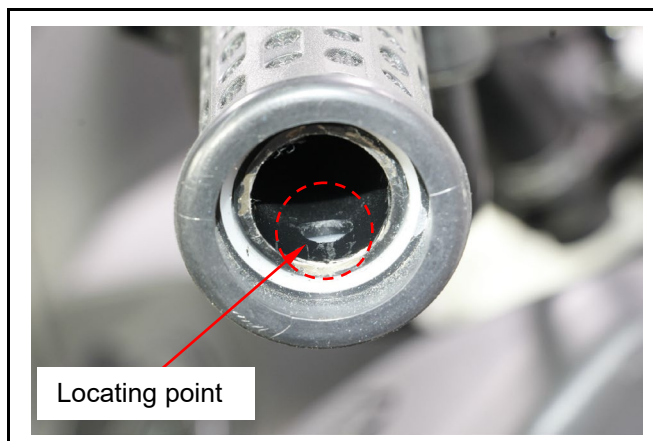


15. Steering / Front Wheel / Front Cushion

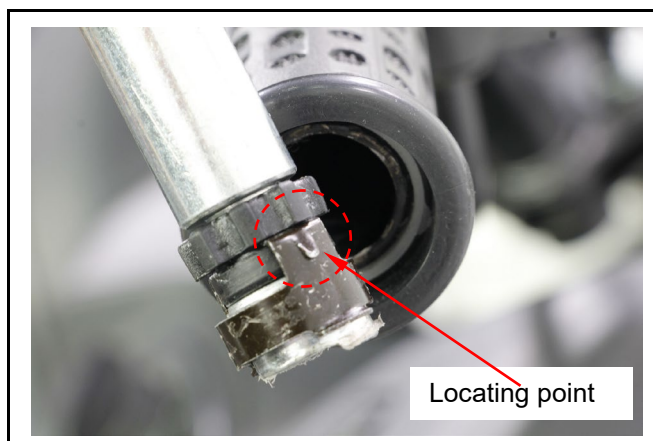


Handle pipe weight installation

The locating point inside the handlebar.



The locating point on the inner handle pipe weight.



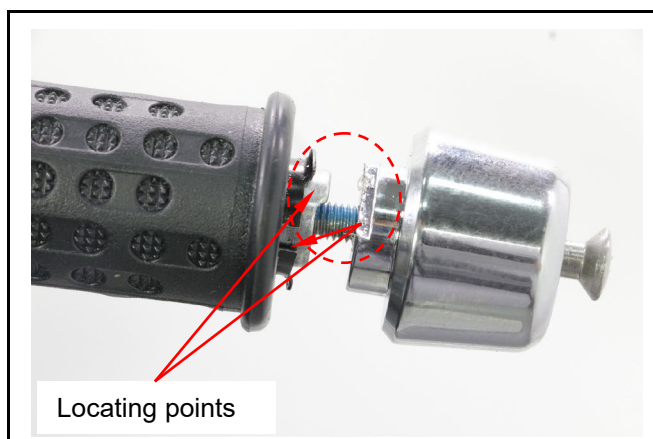
Insert the inner handle pipe weight into handlebar.



Install the handle pipe weight.

Caution

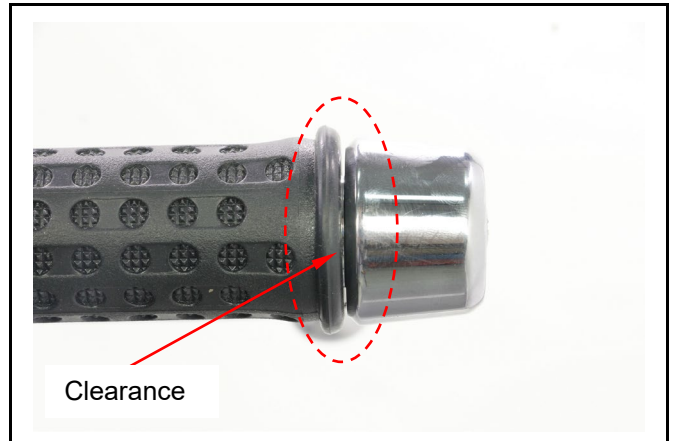
- Align the locating points on the handle pipe weight and handlebar.



Tighten the bolt.

Caution

- Rotate the handle pipe weight to check the clearance between handlebar.
- Check if the throttle grip can be operated smoothly.
- Install again if the throttle grip cannot be operated smoothly.



Top Bridge

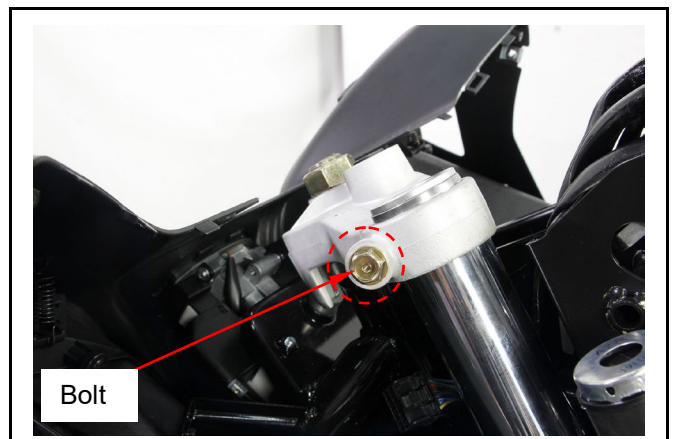
Remove windscreen, meter panel, lower meter visor, right and left front cover, front cover, headlight, speedometer, back mirrors, and handle covers.



Loosen right front cushion upper fixing bolt. (1 bolt)

Torque value:

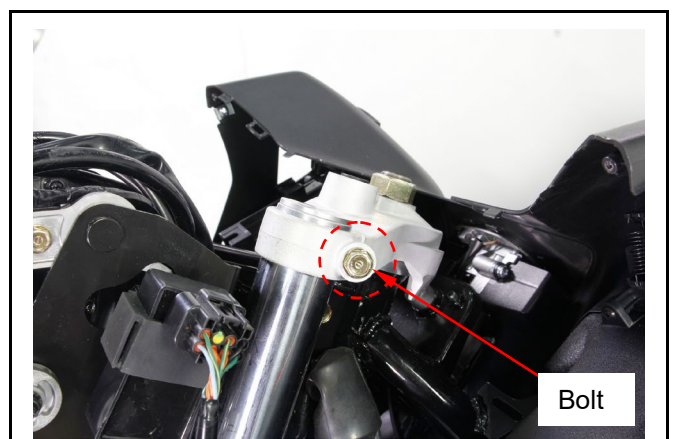
Front cushion upper fixing bolt
2.9~3.5kgf-m



Loosen left front cushion upper fixing bolt. (1 bolt)

Torque value:

Front cushion upper fixing bolt
2.9~3.5kgf-m



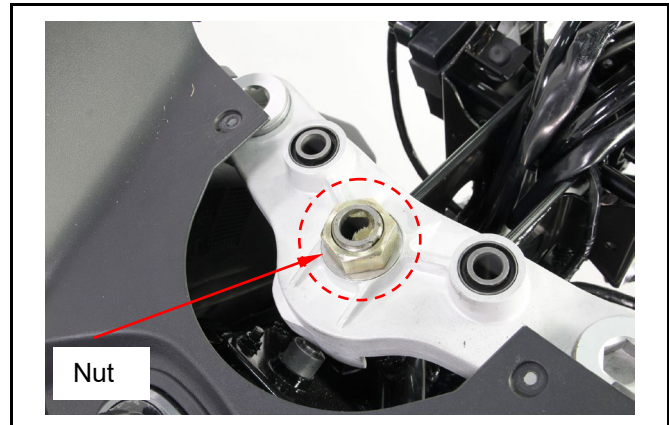
15. Steering / Front Wheel / Front Cushion



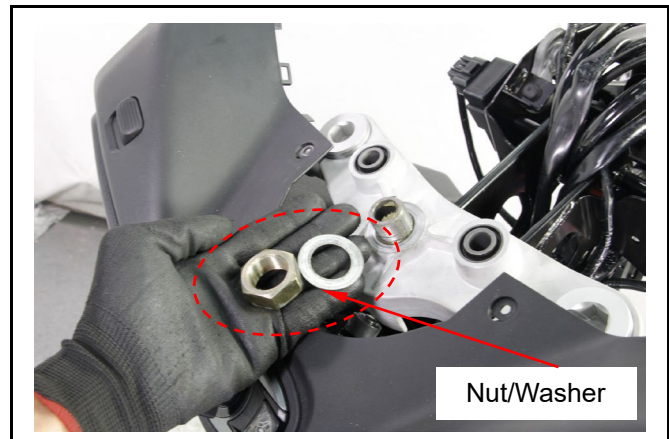
Remove steering stem nut. (1 nut)
Apply 29mm box socket.

Torque value:

Steering stem nut 6.5~7.0kgf-m



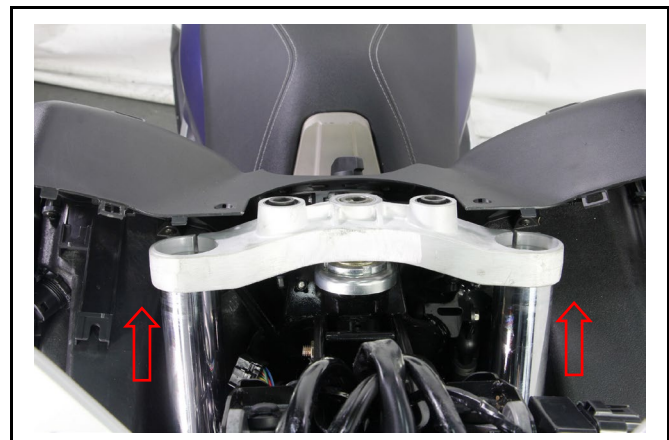
Remove nut and washer.



Hammer lightly with wood hammer.

Installation

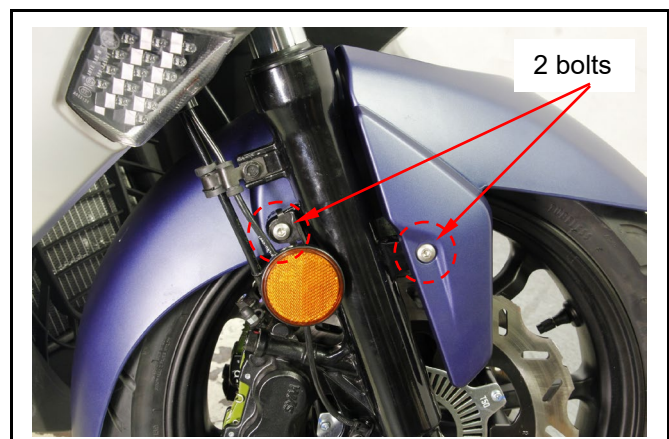
Install in reverse order of removal procedures.



Front Wheel

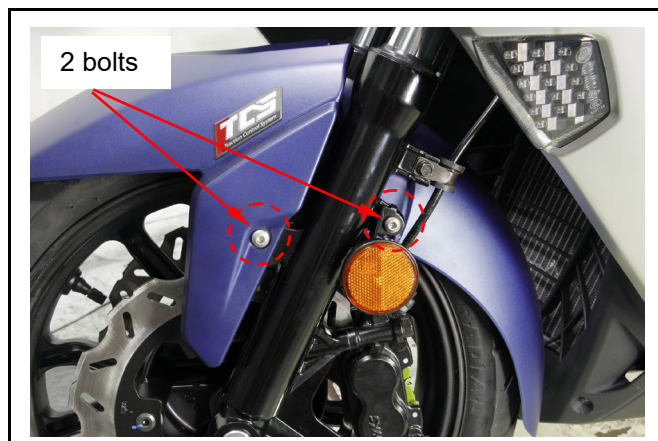
Removal

Remove the bolts on the right side of front fender. (2 bolts)
Remove side reflector.



Remove the bolts on the left side of front fender. (2 bolts)

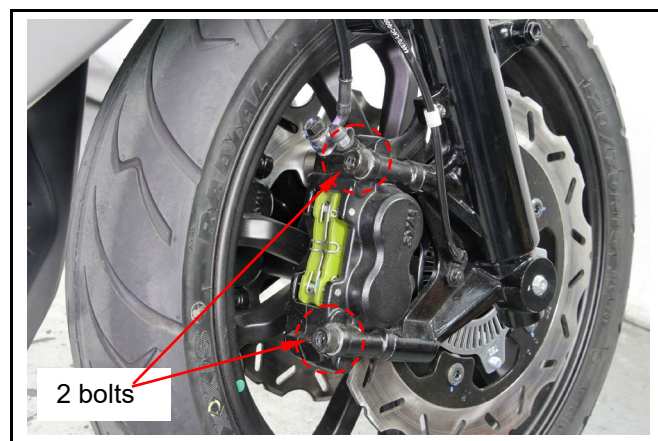
Remove side reflector and front fender.



Remove the bolts from right caliper. (2 bolts)
Remove right caliper.

⚠ Caution

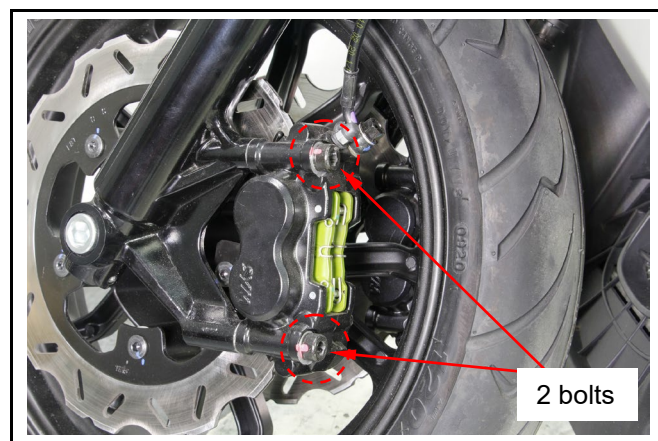
- After removing the caliper, do not pull brake lever. Or the brake pads will be pressed out.



Remove the bolts from left caliper. (2 bolts)
Remove left caliper.

⚠ Caution

- After removing the caliper, do not pull brake lever. Or the brake pads will be pressed out.



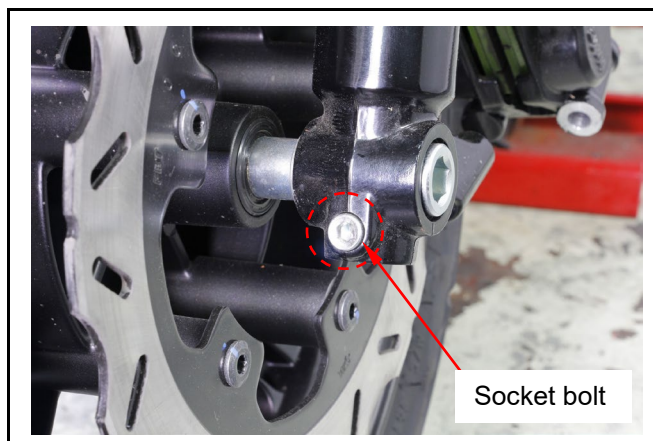
Place a bike lifter under the vehicle and adjust to a proper height.



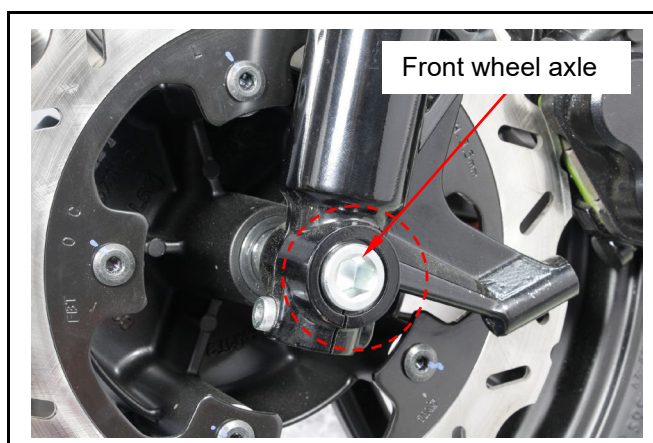
15. Steering / Front Wheel / Front Cushion



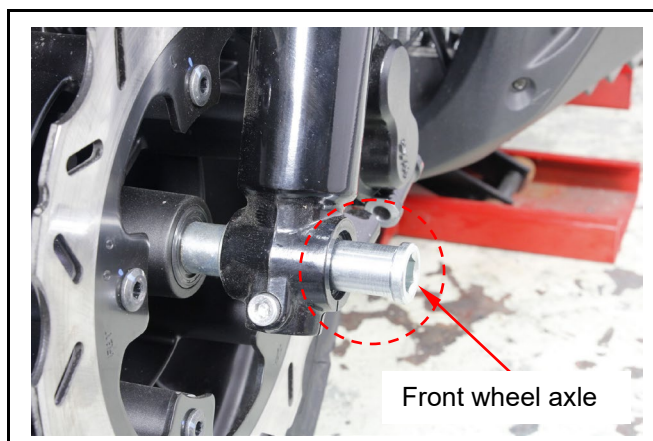
Loosen the socket bolt on the left front cushion. (1 bolt)



Loosen the front wheel axle.



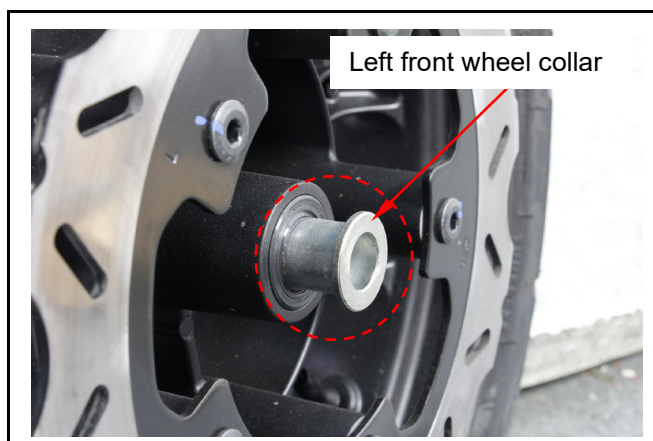
Remove the front wheel axle.



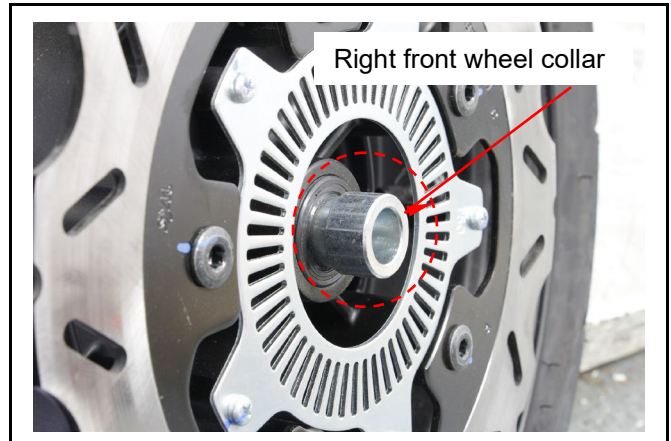
Remove the front wheel.
Left front wheel collar.

Caution

- Check the appearance of right and left front wheel collars when removing the wheel.



Right front wheel collar.



Installation



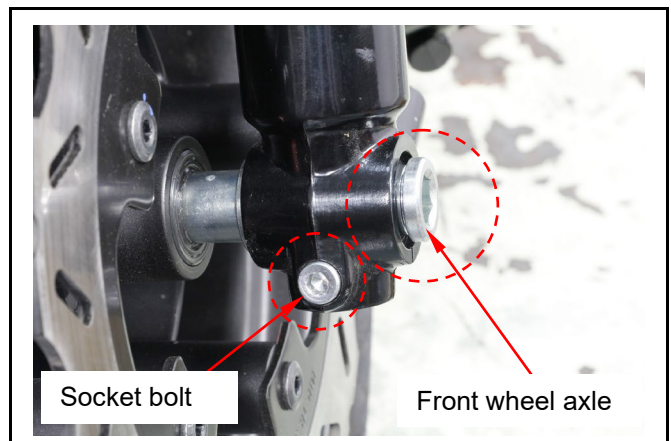
Install the front wheel.

Install the front wheel axle.

Install the socket bolt on the left front cushion.
(1 bolt)

Caution

- First slightly tighten the socket bolt to 1.0kgf-m.

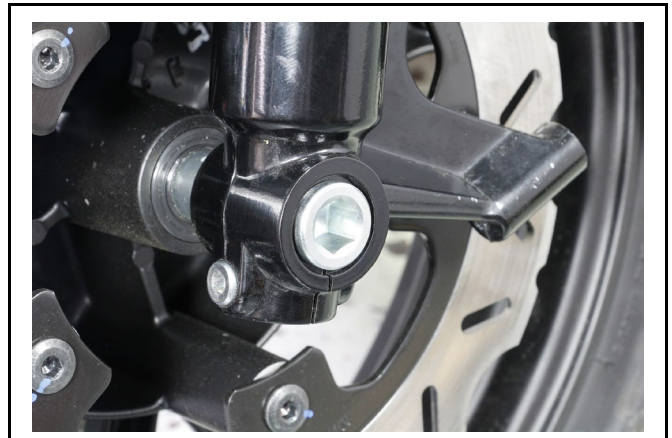


Tighten the front wheel axle.

Tighten the socket bolt on the left front cushion. (1 bolt)

Torque value:

Front wheel axle	5.0~6.0kgf-m
Socket bolt	1.8~2.0kgf-m



15. Steering / Front Wheel / Front Cushion



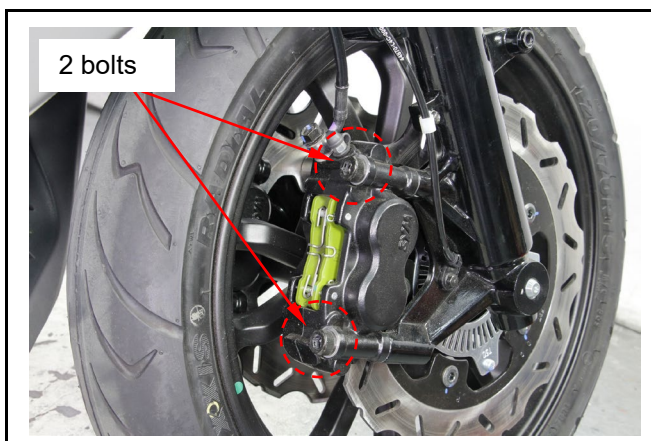
Remove the bike lifter.



Tighten the bolts on the right front caliper. (2 bolts)

Torque value:

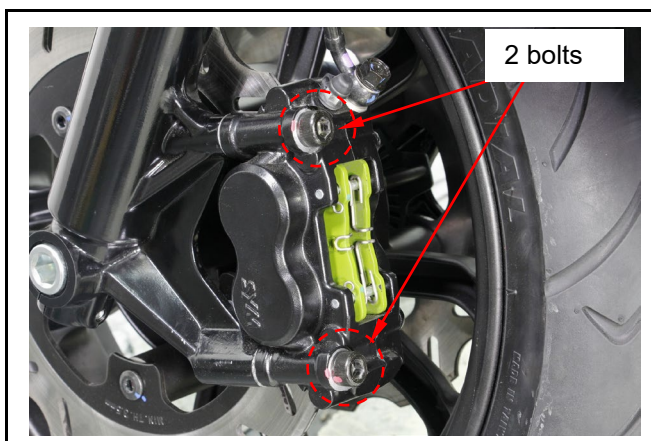
Caliper bolt 3.5~4.5kgf-m



Tighten the bolts on the left front caliper. (2 bolts)

Torque value:

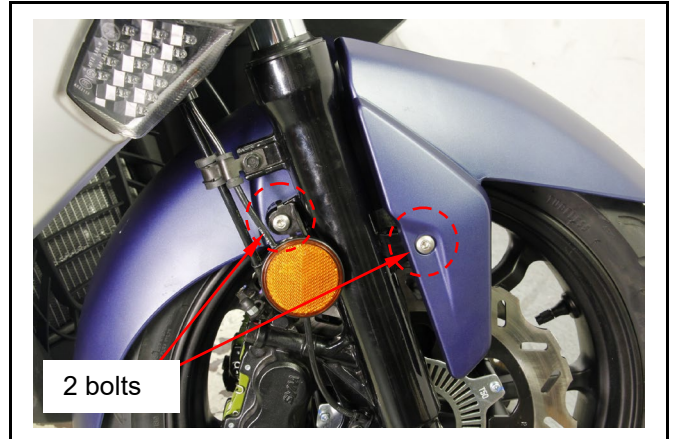
Caliper bolt 3.5~4.5kgf-m



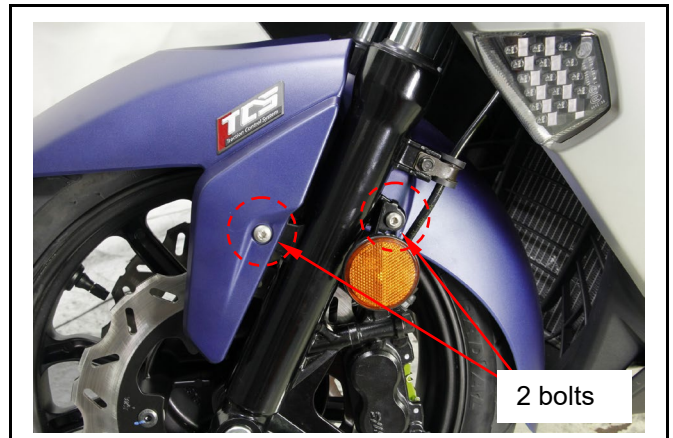
Install front fender.



Tighten the bolts and side reflector on the right side of front fender. (2 bolts)



Tighten the bolts and side reflector on the left side of front fender. (2 bolts)

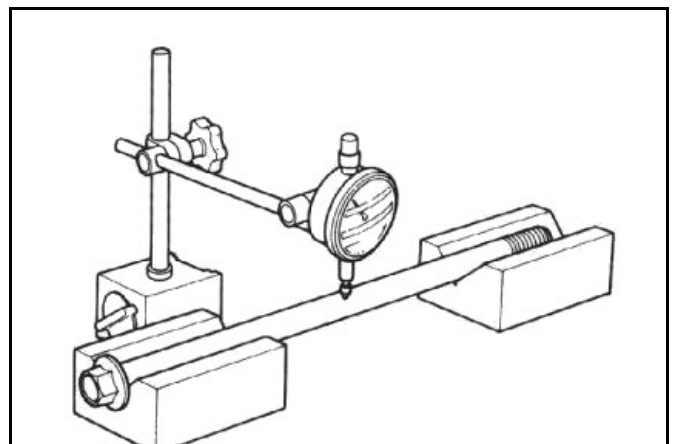


Inspection

Wheel axle

Place the wheel axle on a V block, measure its runout.

Service limit: 0.2 mm



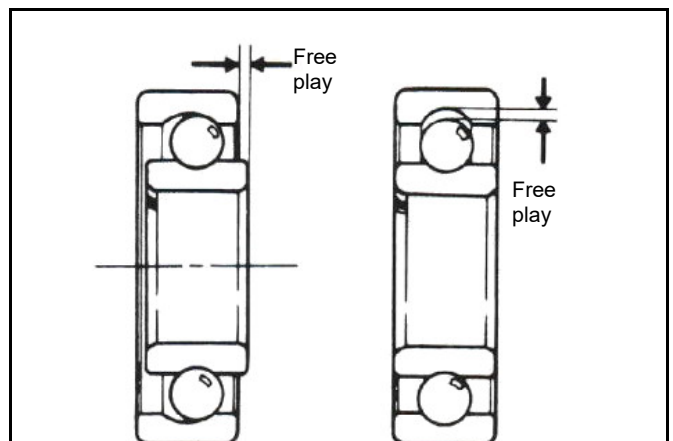
Bearing

Rotate each bearing's inner ring with fingers. Check if bearings can be turned smoothly and silently, and also check if bearing outer ring is mounted tightly on rim.

Replace the bearing, if the rotation is uneven, noisy, or loose bearing mounted.

Caution

- The bearing shall be replaced in pair.



15. Steering / Front Wheel / Front Cushion



Wheel

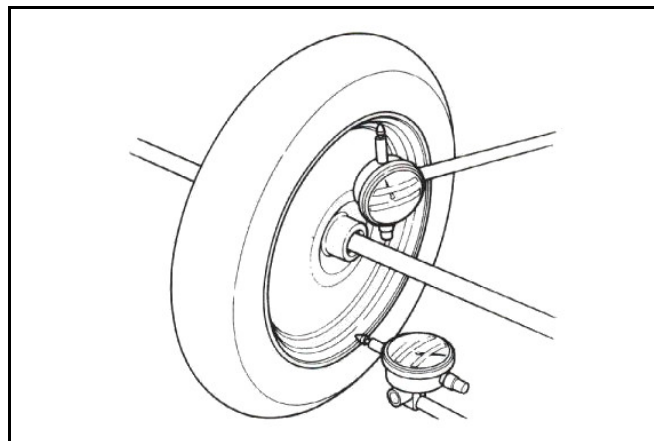
Place the wheel on to a rotation seat to check its rim runout.

Turn the wheel with hand and measure its rim runout value with a dial gauge.

Service limit:

Radial: 2.0 mm

Axial: 2.0 mm



Disassembly

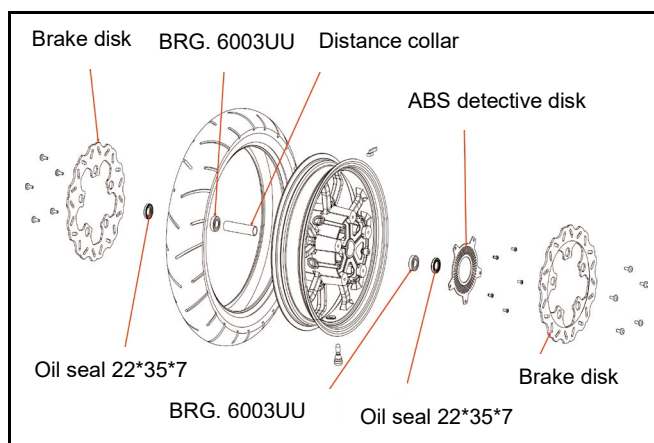
Remove right and left brake disks. (10 bolts)

Remove dust seal from left. Remove the bearing from left by using inner bearing puller. Remove distance collar.

Remove dust seal from right. Remove the bearing from right by using inner bearing puller.

Special tools:

Inner bearing puller SYM-6204020



Assembly

Apply grease on the bearing housing of rim.

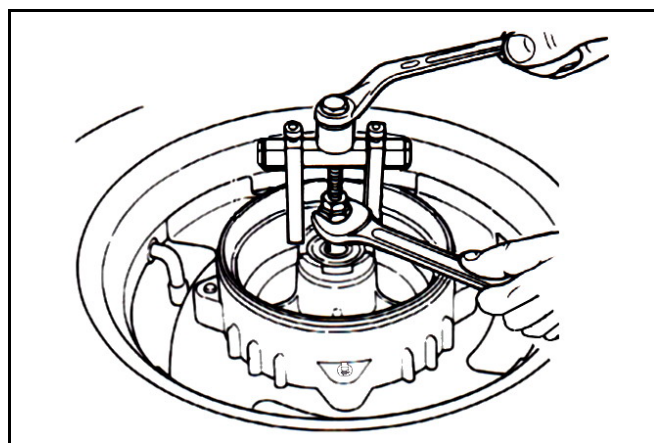
Install the left bearing.

Install distance collar and the right bearing.

Install new dust seal on both sides.

⚠ Caution

- Install the bearing correctly and evenly.
- Never install used bearings. Once the bearing is removed, replace with a new one.



Install right and left brake disks. (10 bolts)

Torque value: 4.0~4.5kgf-m

Front Cushion

Removal

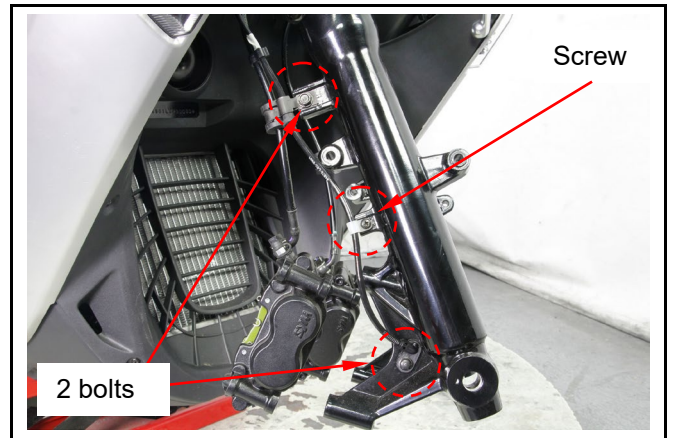
Remove windscreen, meter panel, lower meter visor, right and left front cover, front cover, headlight, speedometer, back mirrors, handle covers, front fender, front wheel, and right/left brake calipers.



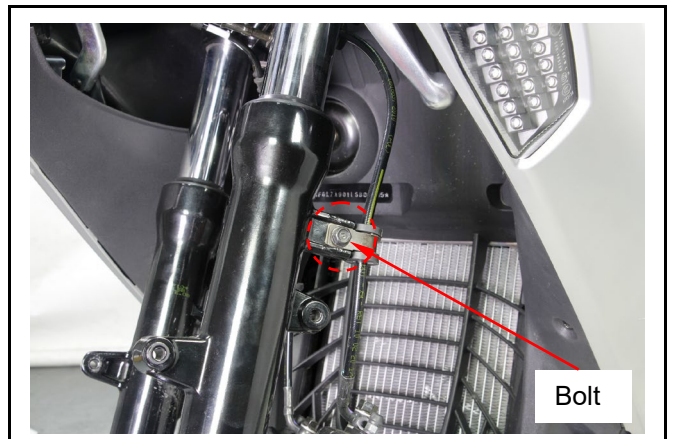
Remove bolt from speed sensor. (1 bolt)

Remove screw from speed sensor cable clamp. (1 screw)

Remove bolt from brake hose/speed sensor clamp. (1 bolt)

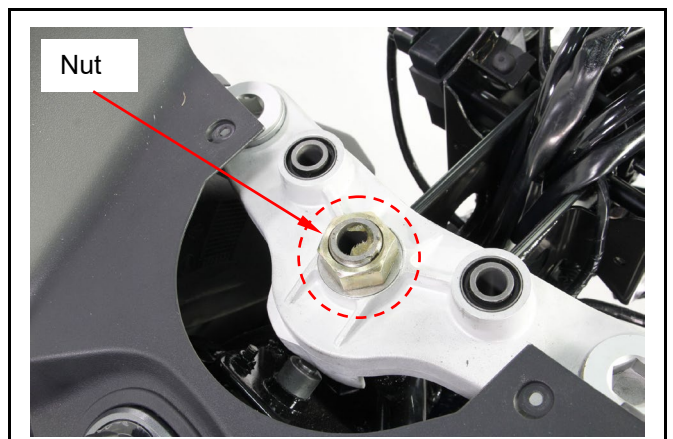


Remove bolt from brake hose clamp. (1 bolt)



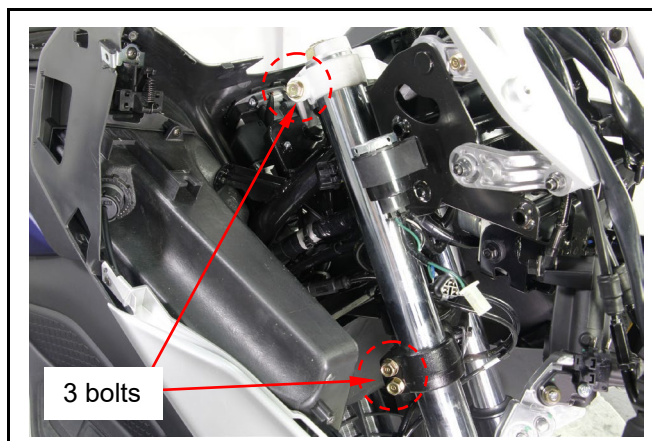
Loosen steering stem nut. (1 nut)

Apply 29mm box socket.

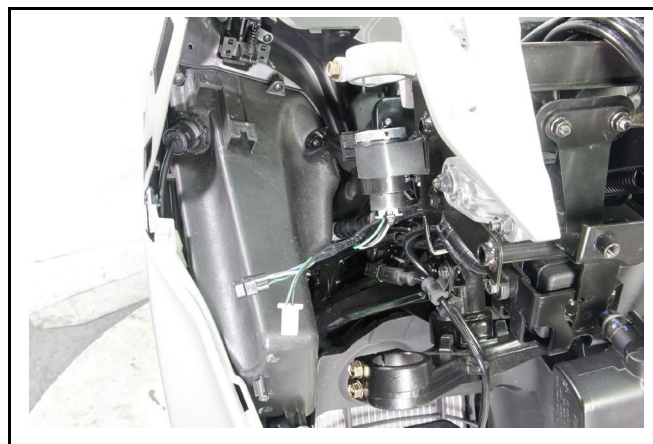


15. Steering / Front Wheel / Front Cushion

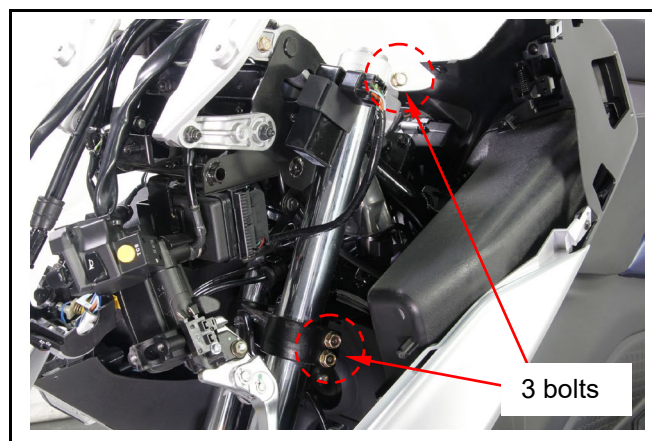
Loosen bolts from right front cushion. (3 bolts)



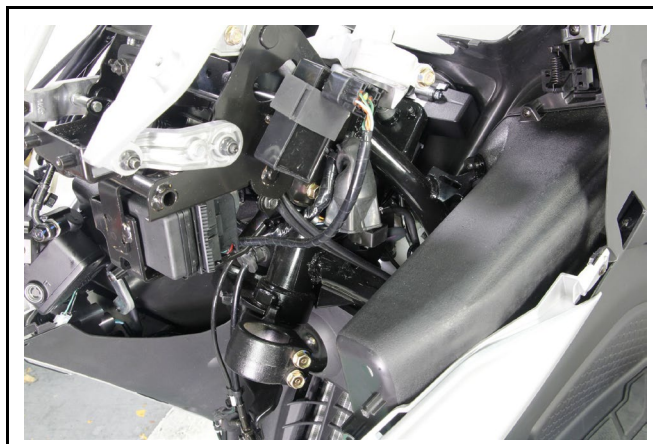
Remove right front cushion.



Loosen bolts from left front cushion. (3 bolts)

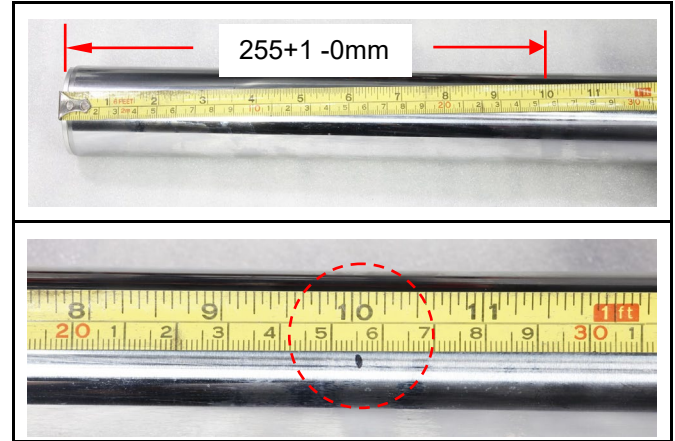


Remove left front cushion.

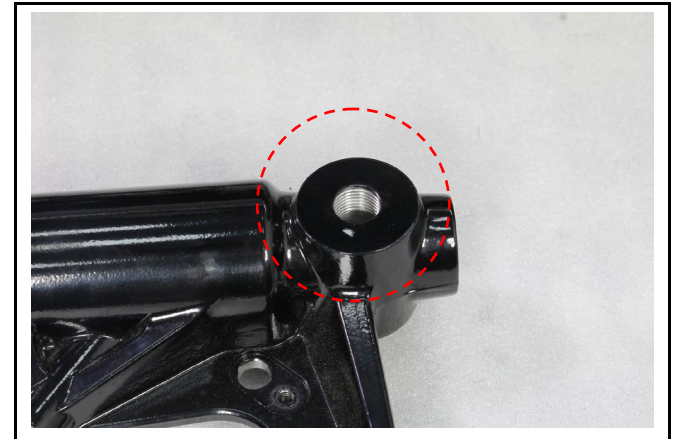


Installation

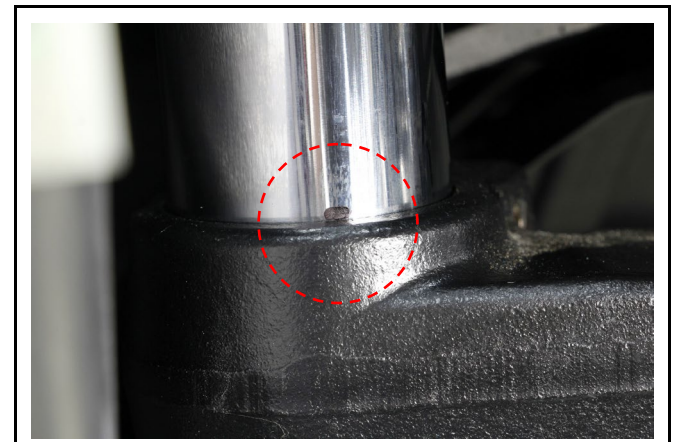
Measure right and left front cushions from top.
Mark at 255+1 -0mm.



The front cushion with thread is the right front cushion.



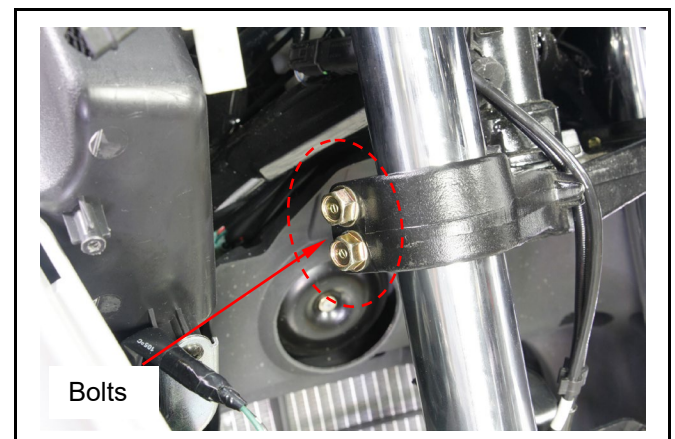
Install right and left front cushions from the bottom of steering stem.
Align the marks on right and left front cushion with the upper end of steering stem.



Tighten right and left lower cushion bolts.

Torque value:

Front cushion lower bolt 2.9~3.5kgf-m



15. Steering / Front Wheel / Front Cushion



Apply 29mm box socket.



Tighten steering stem nut. (1 nut)

Torque value:

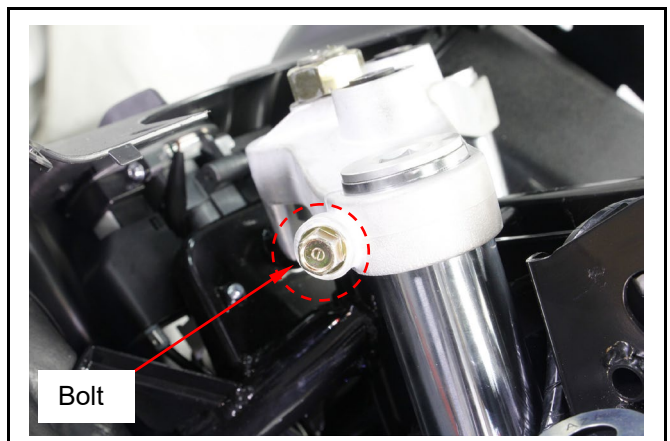
Steering stem nut 6.5~7.0kgf-m



Tighten right and left upper cushion bolts. (2 bolts)

Torque value:

Front cushion upper bolt 2.9~3.5kgf-m

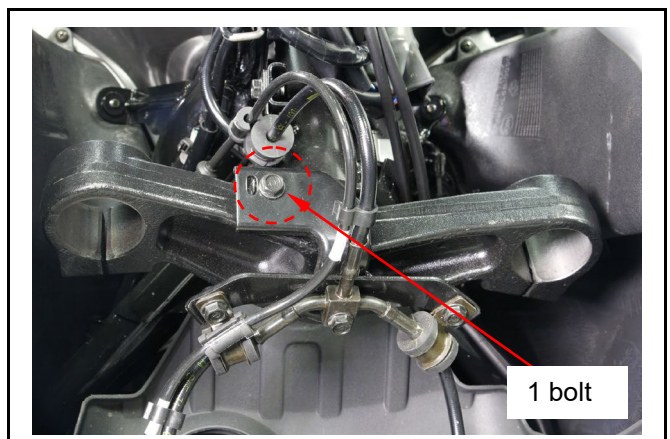


Steering Stem

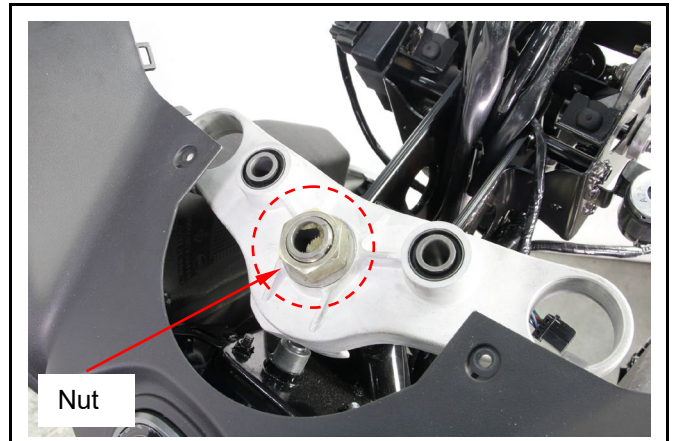
Removal

Remove windscreen, meter panel, lower meter visor, right and left front cover, front cover, headlight, speedometer, back mirrors, handle covers, steering stem, front fender, front wheel, right/left brake calipers, and front cushions.

Remove bolt from front brake stay. (1 bolt)



Remove steering stem nut. (1 nut)
Apply 29mm box socket.



Remove top bridge.



Special Tools:

Steering stem box socket

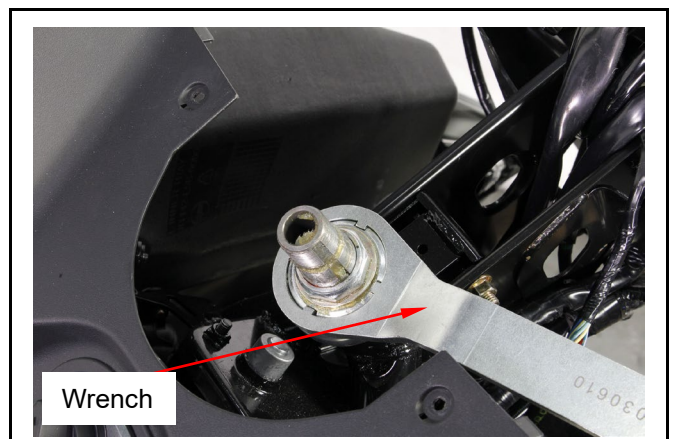
SYM-5030600

Steering head top thread wrench

SYM-5030601

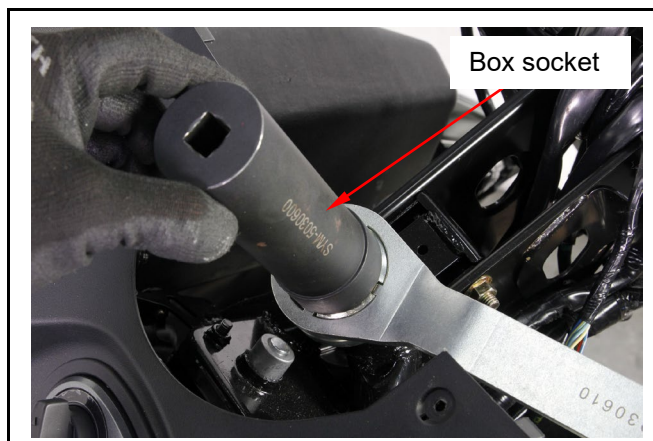


Fix steering head top thread with wrench.

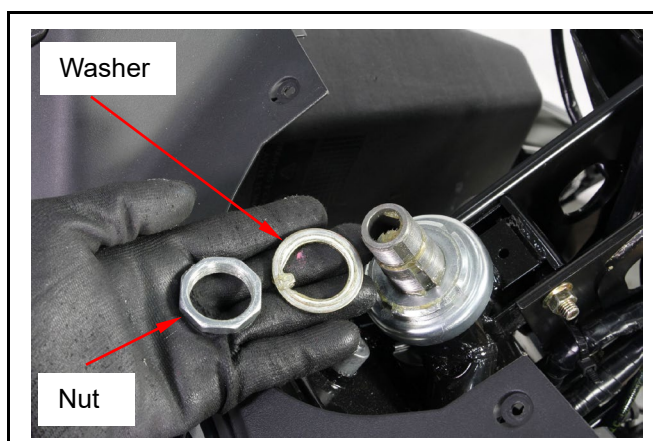


15. Steering / Front Wheel / Front Cushion

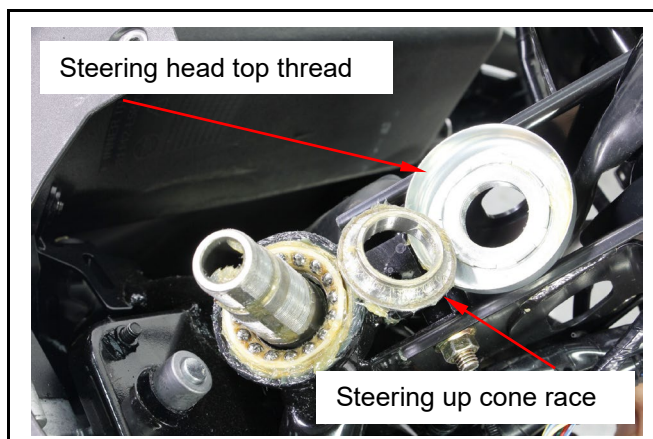
Apply box socket.



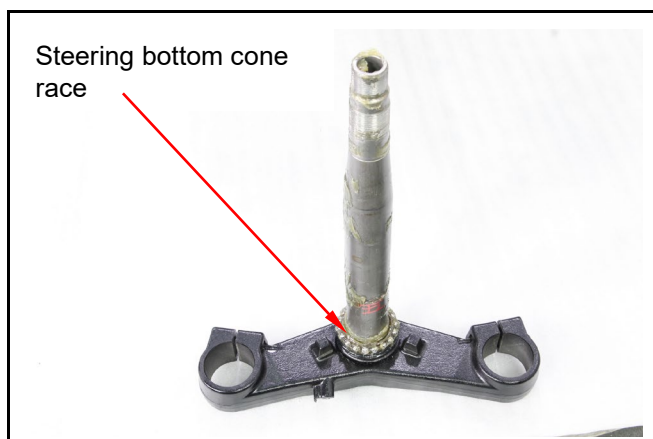
Remove steering stem lock nut.
Remove washer.



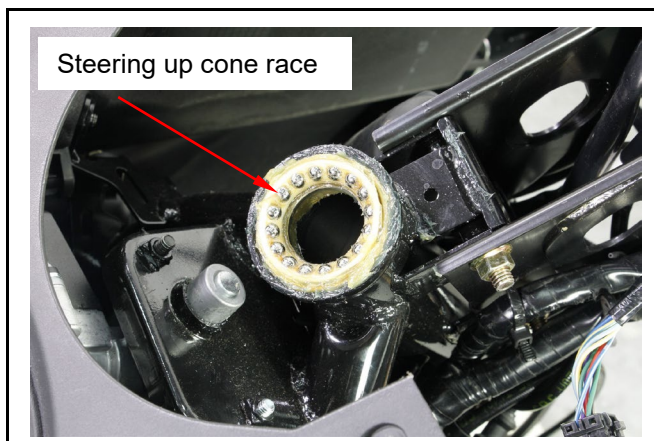
Remove steering head top thread.
Remove steering up cone race.



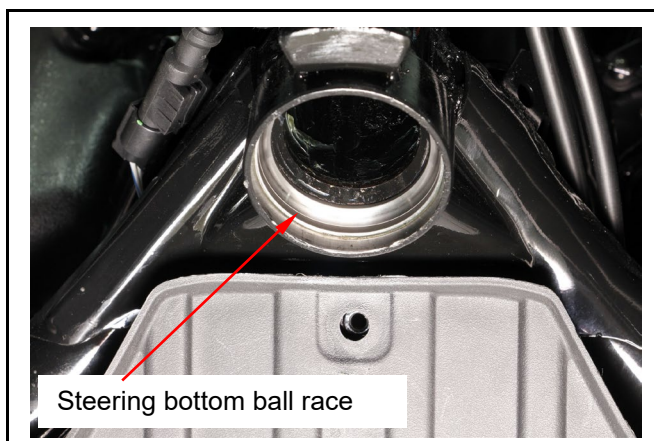
Remove steering stem and steering bottom cone race.



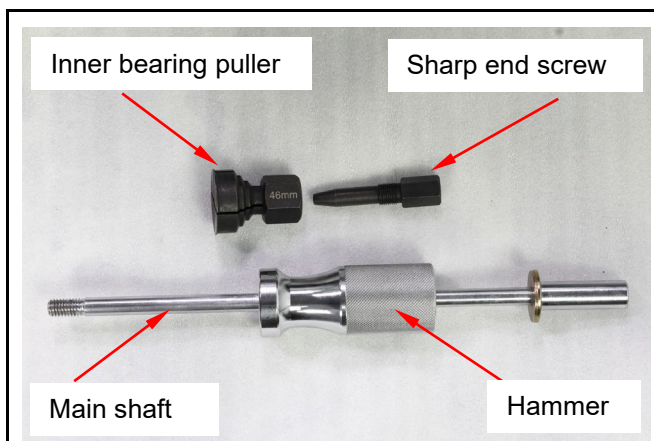
Remove steering up cone race.



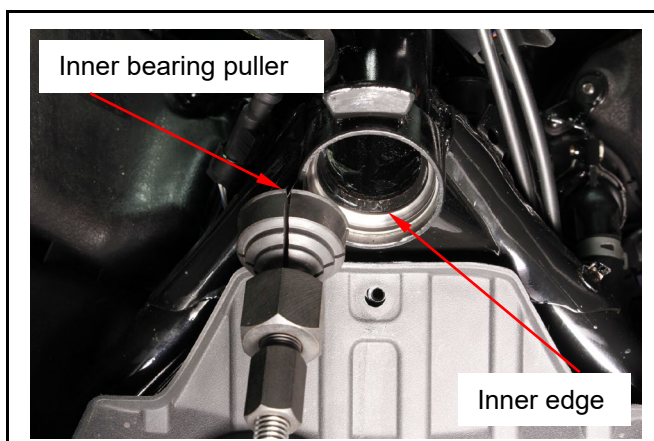
Removal
Steering bottom ball race.



Special tools:
Inner bearing puller 46mm



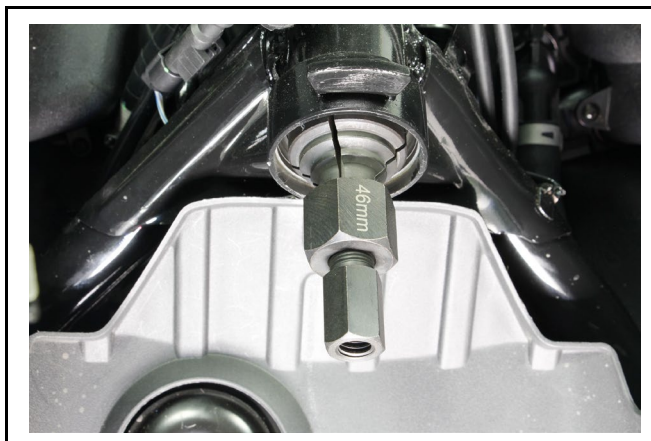
Hook the inner edge of the steering bottom ball race with inner bearing puller.



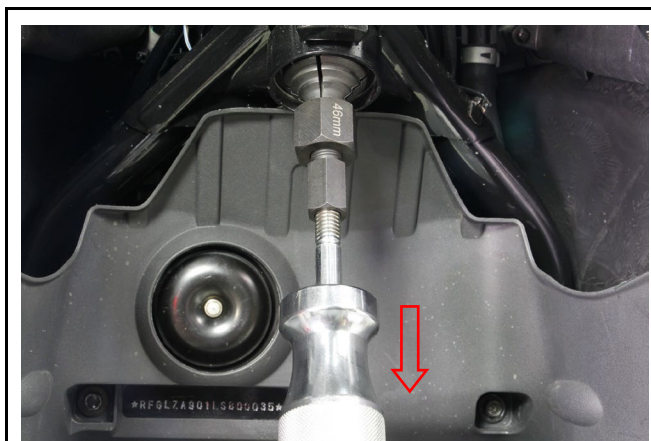
15. Steering / Front Wheel / Front Cushion



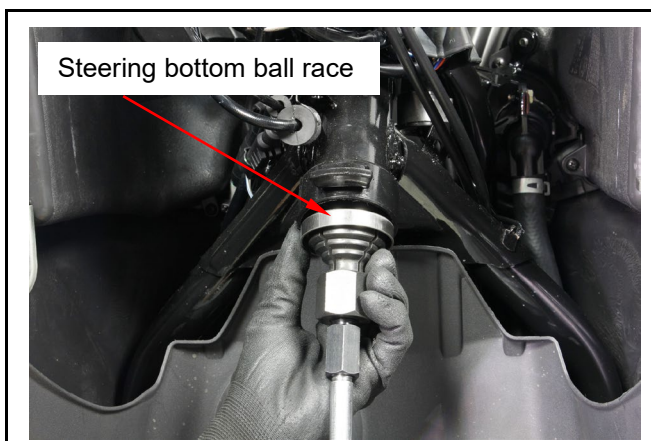
Tighten sharp end screw.



Install main shaft and hammer.
Hammer downward.



Remove steering bottom ball race.



Removal

Steering up ball race

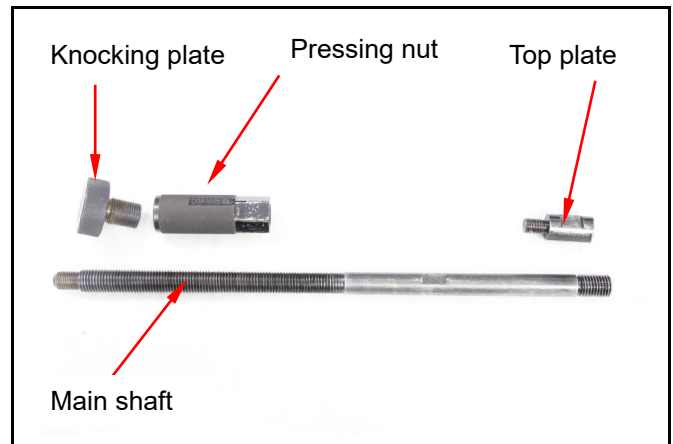
Special Tools:

Steering ball race tool set

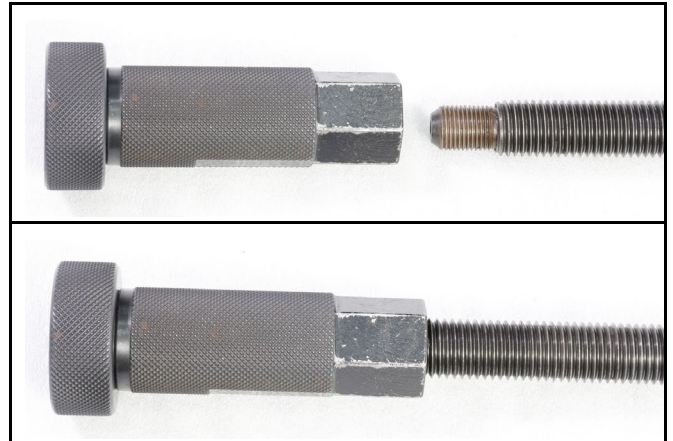
SYM-5321010



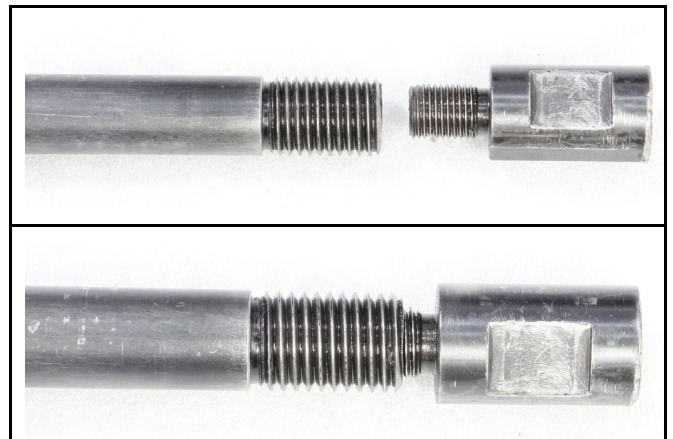
Choose proper tools.



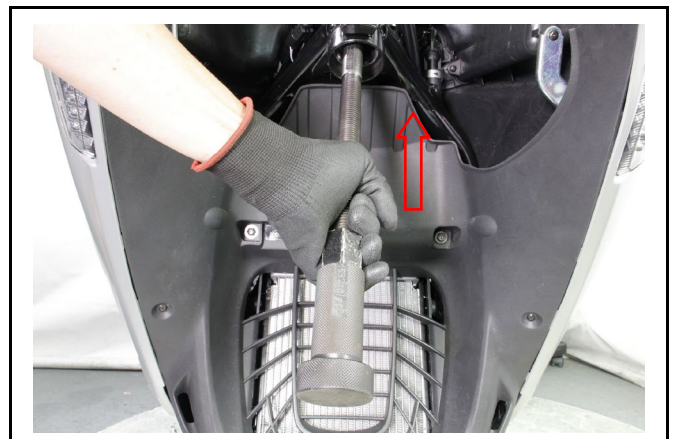
Assemble the lower part.



Assemble the upper part.



Insert tool from lower side of main pipe.



15. Steering / Front Wheel / Front Cushion

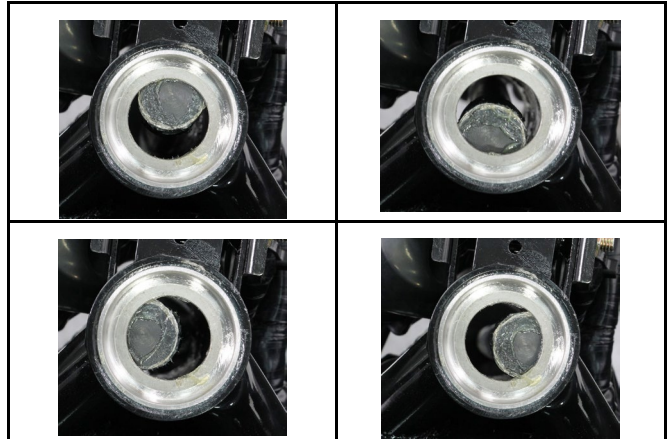


Hammer steering ball race in the consequence of different directions. "▲"

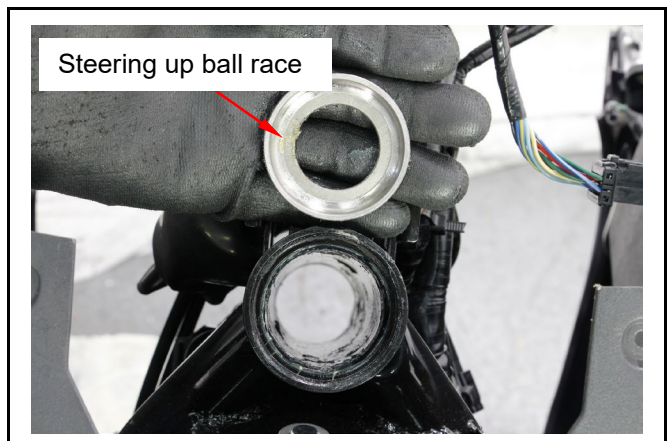
"▼" "◀" "▶"

⚠ Caution

- Do not hammer out the ball race at one time, or the ball race can possibly be damaged.



Remove steering up ball race.



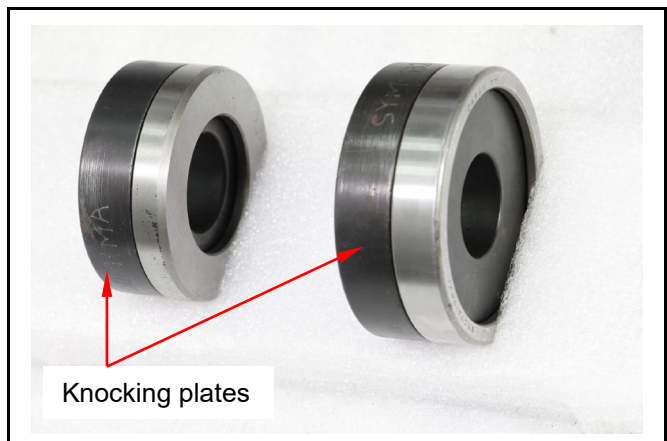
Installation

Steering up/bottom ball race

Special Tools:

Steering ball race tool set SYM-5321010

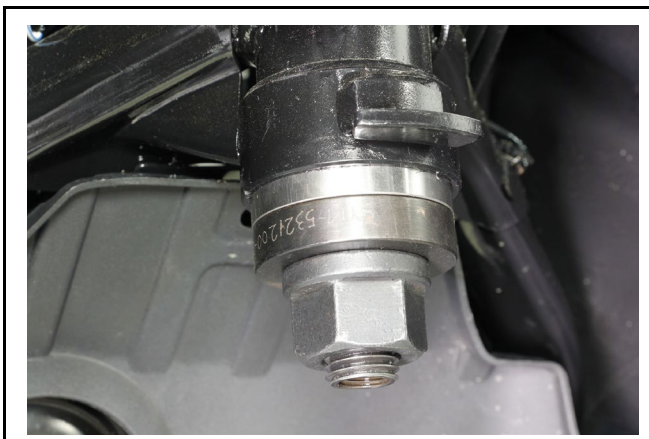
Choose proper knocking plates.



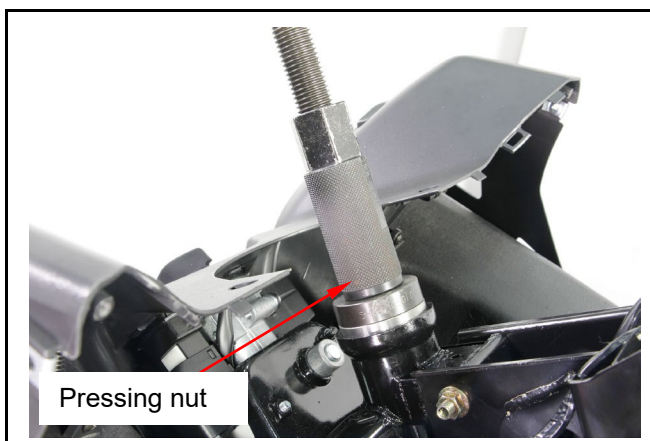
Assemble the knocking plates.



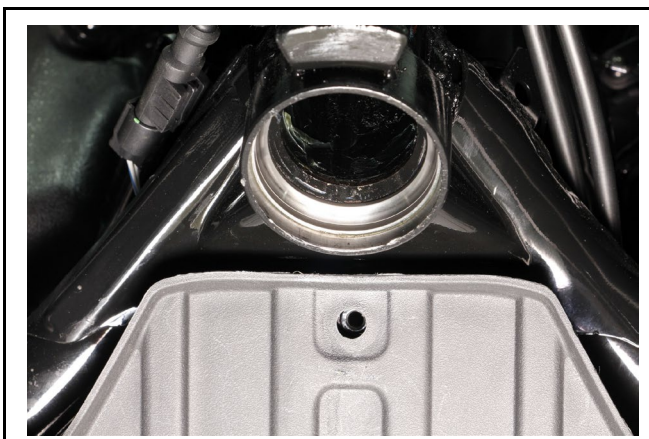
After assembly, insert the tool from the lower part of main pipe.



Install up ball race knocking plate.
Gradually tighten the pressing nut.



Install up/bottom ball race to correct position.



Apply grease on bottom ball race.



15. Steering / Front Wheel / Front Cushion



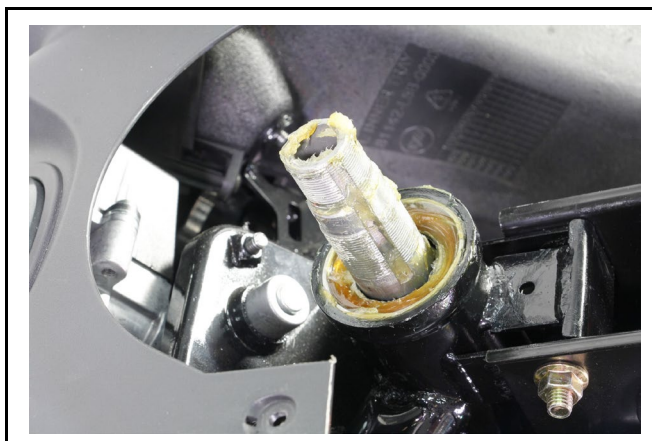
Apply grease on up ball race.



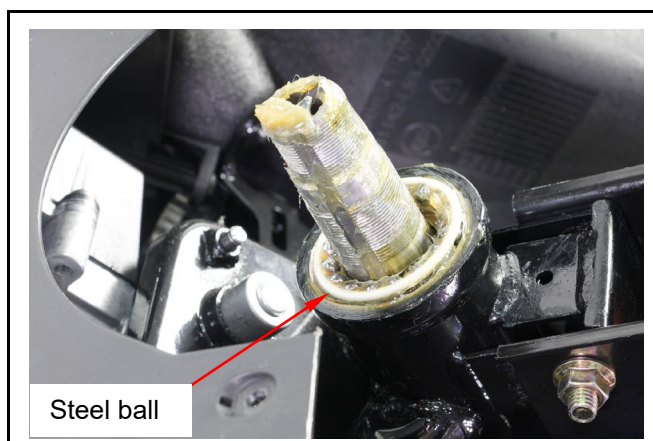
Install steel ball on steering stem and apply grease.



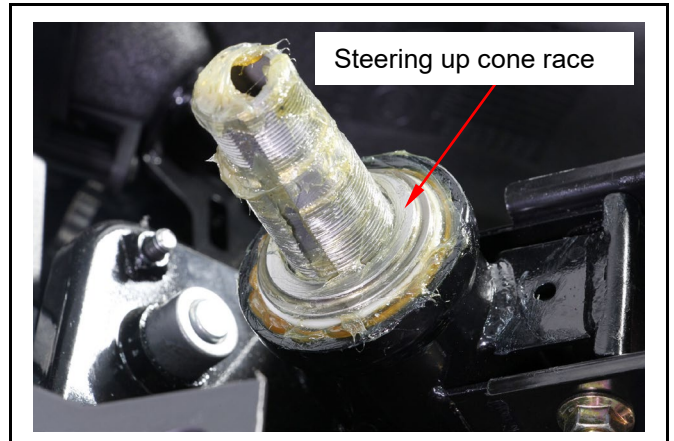
Install steering stem from the bottom of main pipe.



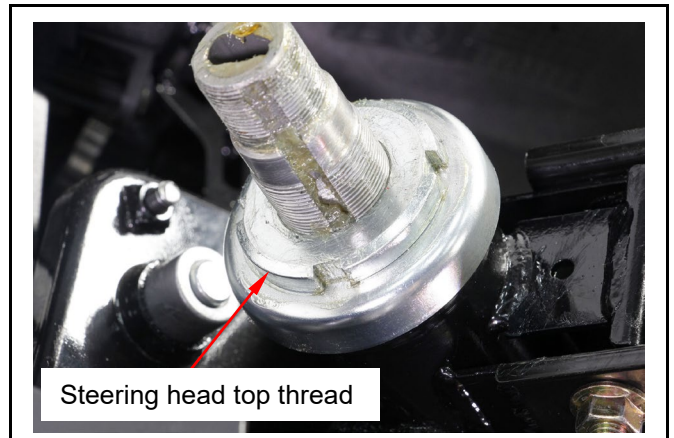
Install steel ball and apply grease.



Install steering up cone race.



Install steering head top thread.



Install washer.



Install steering stem lock nut.



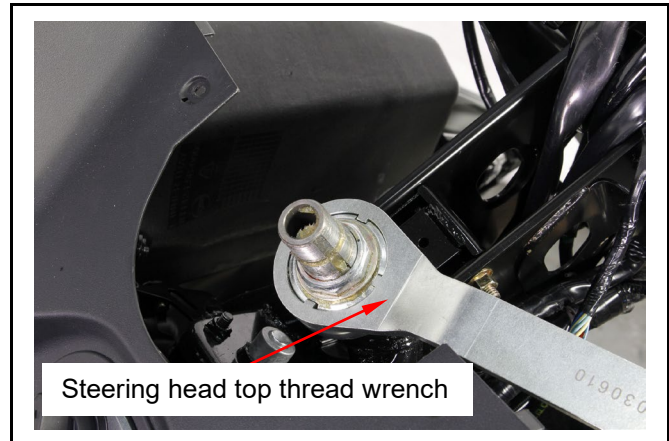
15. Steering / Front Wheel / Front Cushion



Tighten steering head top thread with wrench.

Torque value:

Steering stem lock nut
0.8~1.0kgf-m



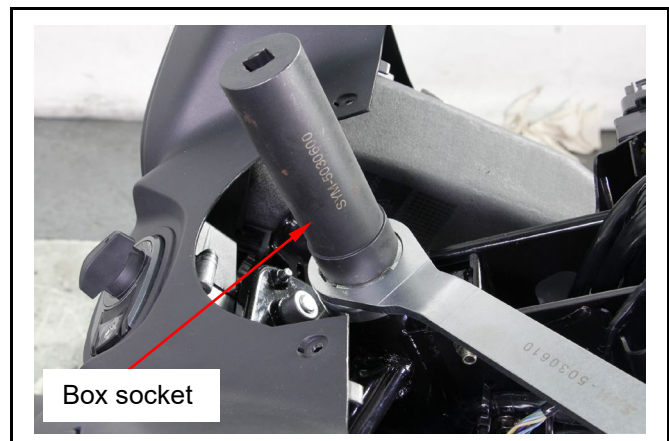
Tighten steering head top thread with wrench.
Apply steering stem box socket.
Tighten steering stem lock nut. (1 nut)

Torque value:

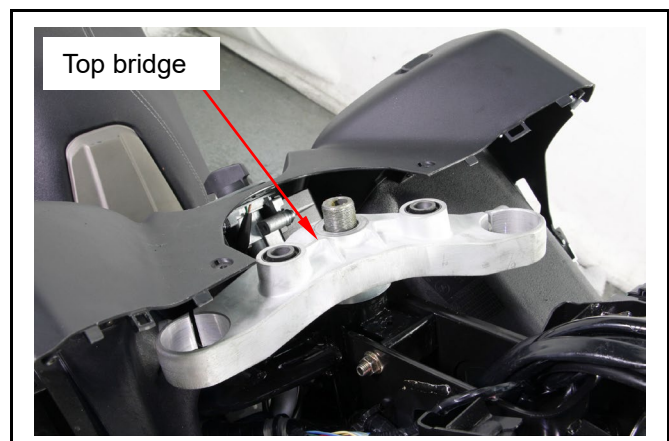
Steering stem lock nut
6.0~8.0kgf-m

⚠ Caution

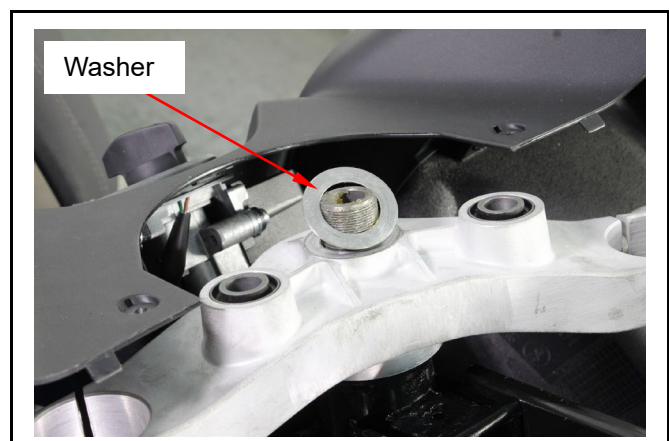
- Check the steering stem that should be rotated freely and no clearance in vertical direction.



Install top bridge.



Install washer.

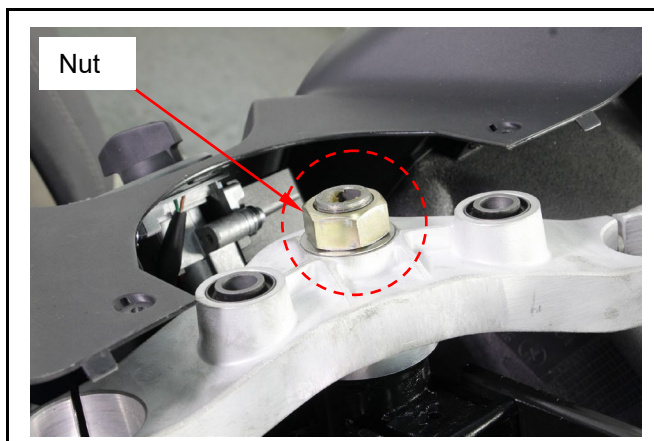


Install steering stem nut.
Apple 29mm box socket.

Install front cushions. (Refer to 15-26)
Tighten steering stem nut.
Install handlebar and front wheel.

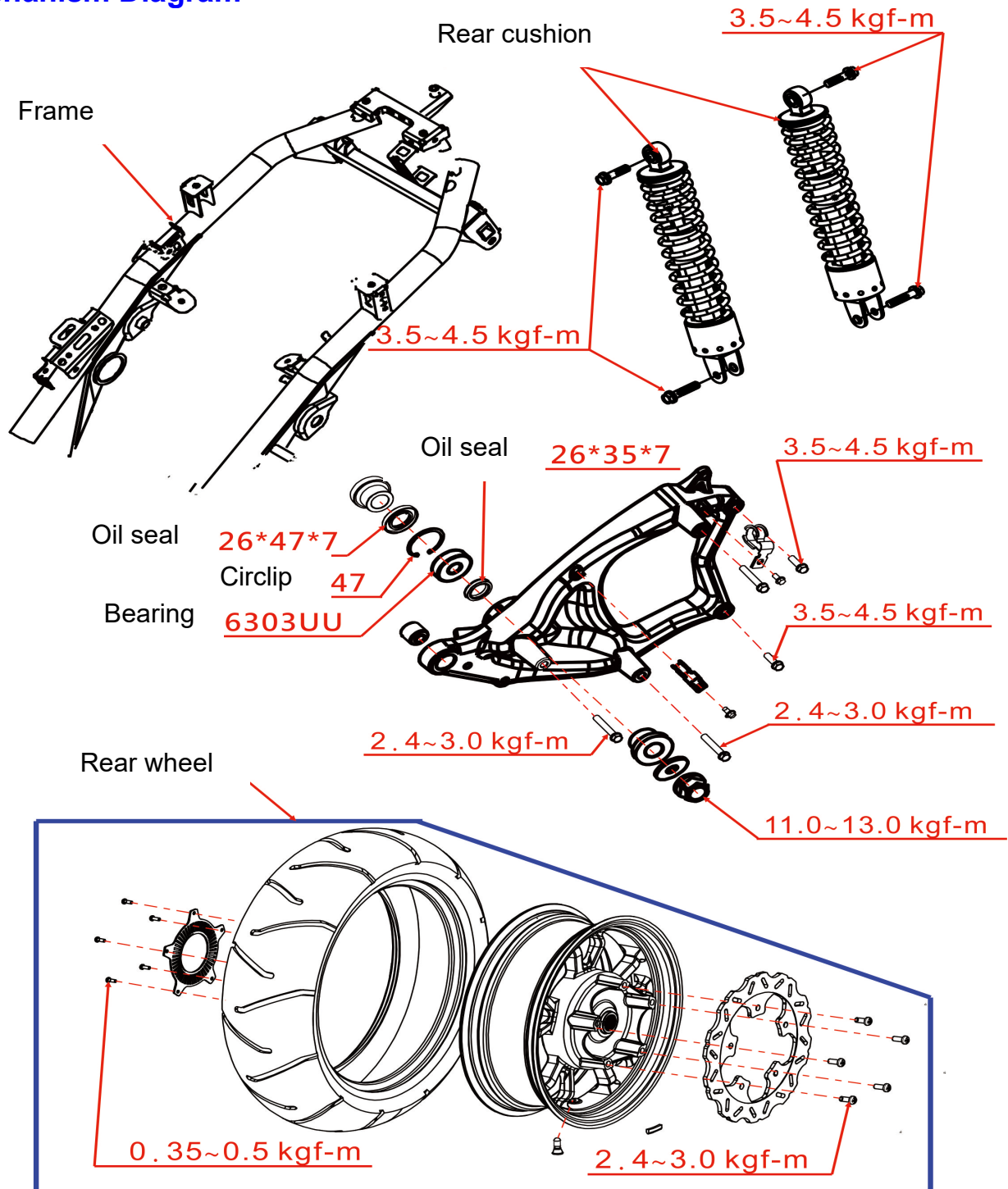
Torque value:

Steering stem nut 6.5~7.0kgf-m



Mechanism Diagram	16-1	Rear Wheel	16-3
Precautions in Operation	16-2	Rear Fork	16-6
Troubleshooting	16-2	Rear Cushion	16-11
Muffler	16-3		

Mechanism Diagram



Precautions in Operation

General Information

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

Service data

mm

Item		Standard	Allowable Limit
Run-out of rear rim	Radial	-	2.0
	Axial	-	2.0

Torque Value

Rear wheel axle nut	11.0~13.0kgf-m
Rear cushion upper bolt	3.5~4.5kgf-m
Rear fork mounting bolt	3.4~4.5kgf-m
Exhaust muffler connecting bolt	1.5~2.5kgf-m
Exhaust muffler mounting bolt	2.4~3.0kgf-m
Brake clipper mounting bolt	2.9~3.5kgf-m
Exhaust muffler protector mounting bolt	0.8~1.2kgf-m

Troubleshooting

Run-out of rear wheel

- Deformed or bent wheel hub.
- Improper tires.
- Loose wheel shaft.

Soft Cushion

- Weak spring.

Noisy Brake

- Worn brake lining.
- Offset brake disc.
- Improper assembly of brake caliper.
- Brake disc or wheel imbalance.

Poor Performance of Brake

- Improperly adjusted brake.
- Contaminated brake lining.
- Worn brake lining.
- Air inside brake fluid pipe.
- Grease on brake disc.
- The brake fluid pipe is clogged.
- The brake fluid pipe is deformed or bent.
- Insufficient amount of brake fluid in the reservoir

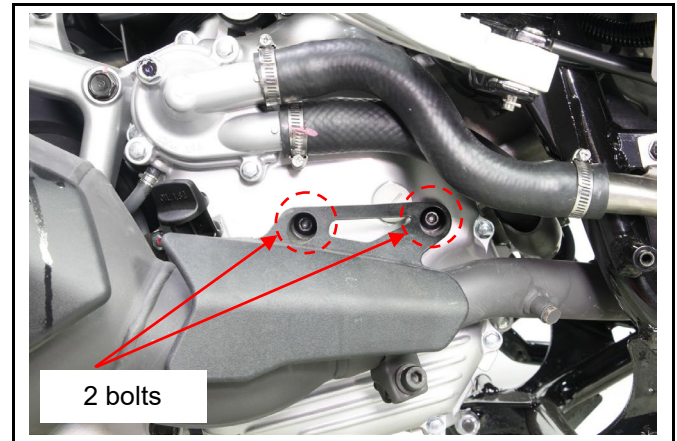
Muffler

Removal

Remove exhaust muffler protector mounting bolt. (2 bolts)

Torque Value:

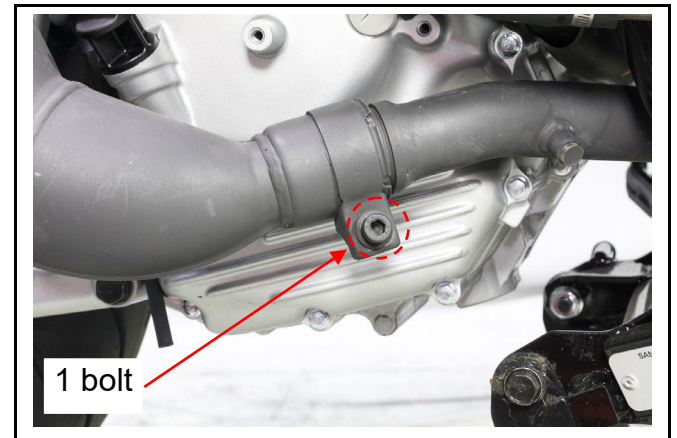
Exhaust muffler protector mounting bolt
0.8 ~ 1.2kgf-m



Loosen exhaust muffler connecting bolt. (1 bolt)

Torque Value:

Exhaust muffler connecting bolt
1.5 ~ 2.5kgf-m



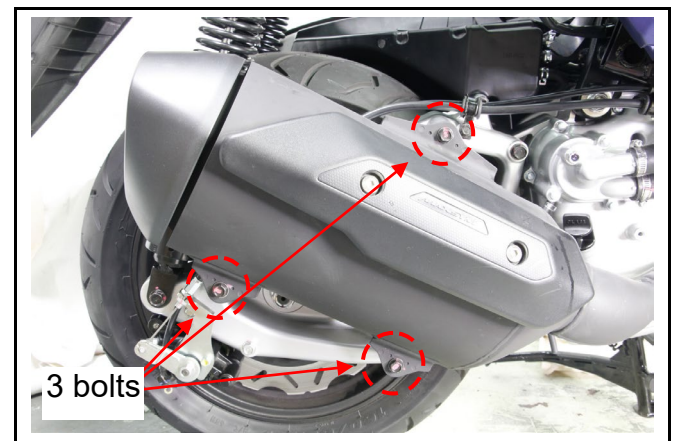
Remove muffler mounting bolts. (3 bolts) ◦
Remove muffler.

Installation

Install in reverse order of removal procedures.

Torque Value:

Exhaust muffler mounting bolt
2.4 ~ 3.0kgf-m

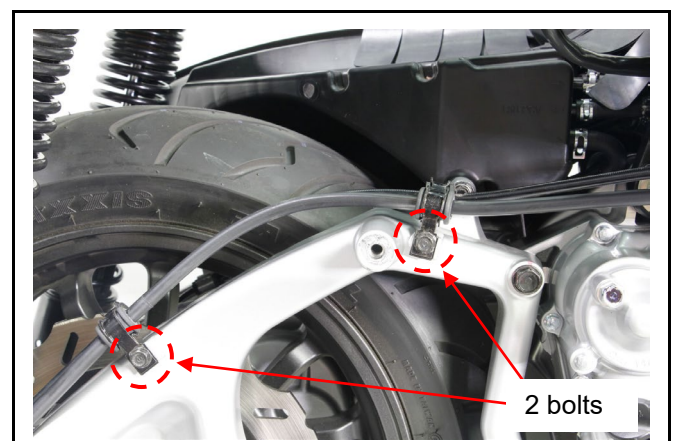


Rear Wheel

Removal

Remove muffler.

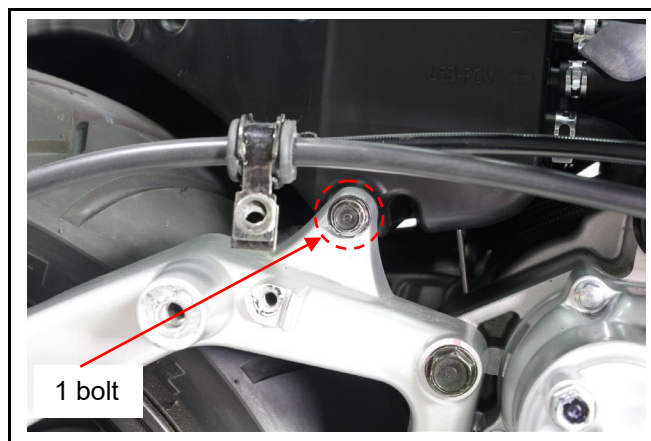
Remove brake hose clamp. (2 bolts)



16. Rear Wheel / Rear Fork / Rear Cushion



Remove bolt from air cleaner box. (1 bolt)



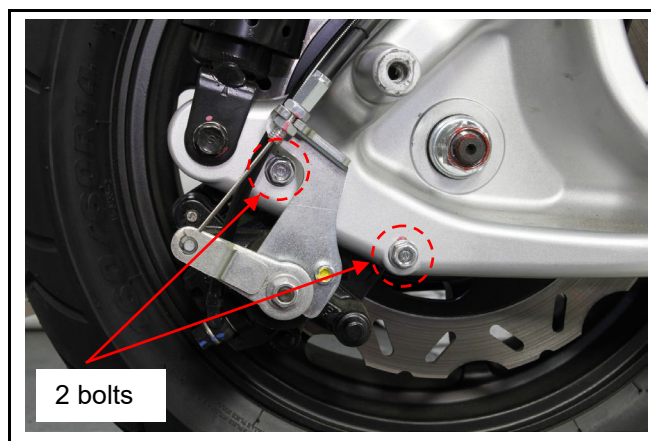
Remove bolts from rear caliper. (2 bolts) °
Remove rear caliper.

 Caution

- When caliper is removed, do not pull brake lever or put down side stand, or the brake pad will be pressed out.

Torque Value:

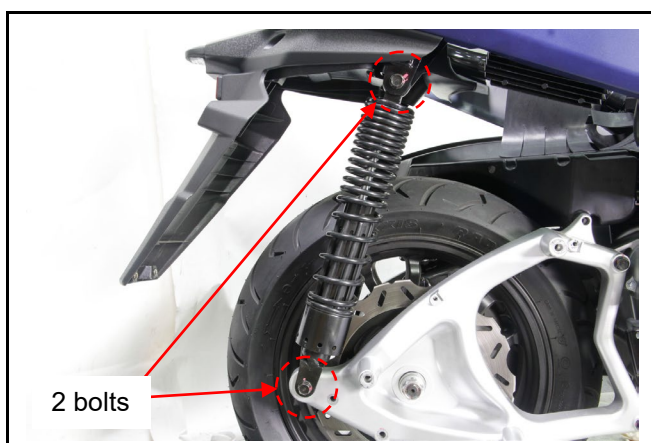
Brake clipper mounting bolt
2.9~3.5kgf-m



Remove the upper and lower bolts from the right rear cushion. (2 bolts)

Torque Value:

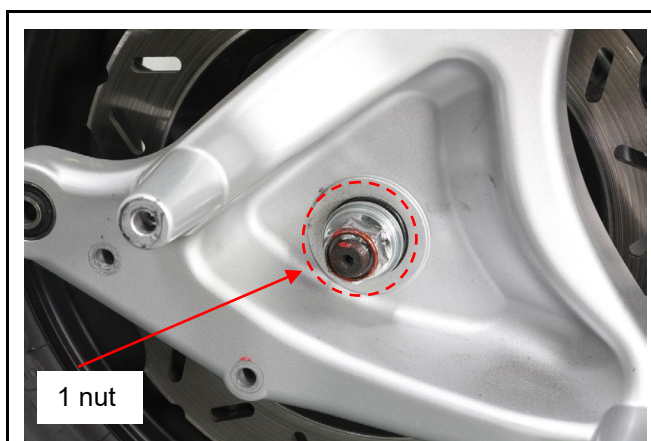
Rear cushion bolt
3.4~4.5kgf-m



Remove rear wheel axle nut. (1 nut) °

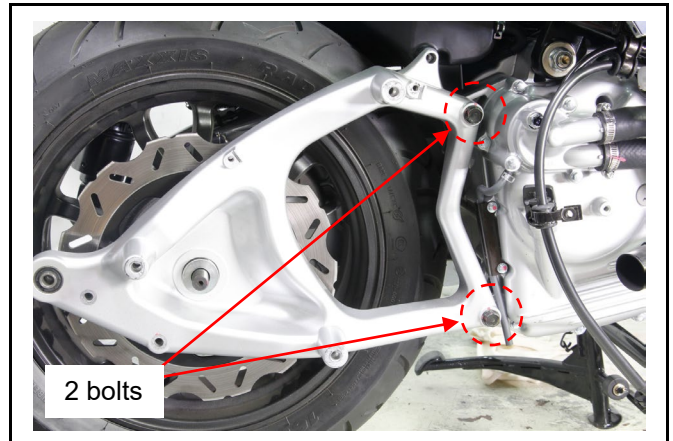
Torque Value:

Rear wheel axle nut
11.0~13.0kgf-m



Remove bolts from the rear fork. (2 bolts)

Torque Value:
Rear fork mounting bolt
3.4~4.5kgf-m

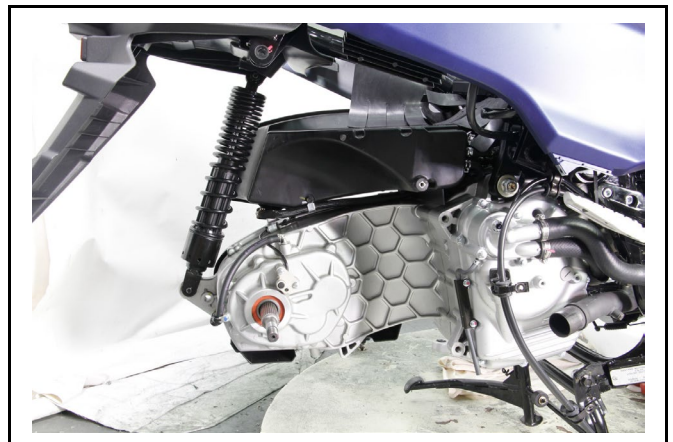


Remove rear fork.

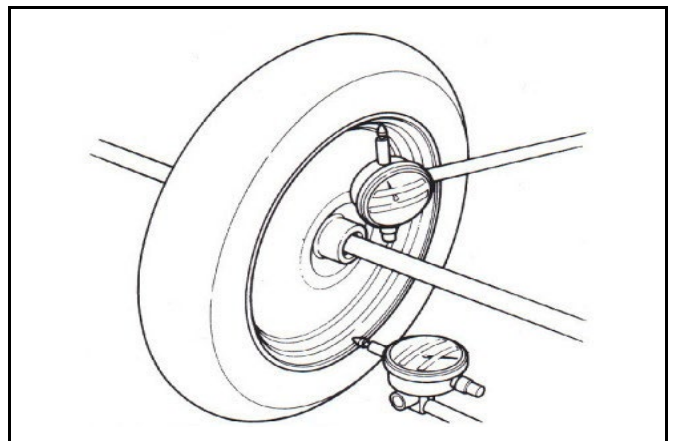


Remove rear wheel.

Installation
 Install in reverse order of removal procedures.



Inspection of rear wheel rim
 Place the wheel rim on a rotational support.
 Rotate it by hand and measure the run-out
 with a dial indicator.
Run-out limit: 2.0 mm

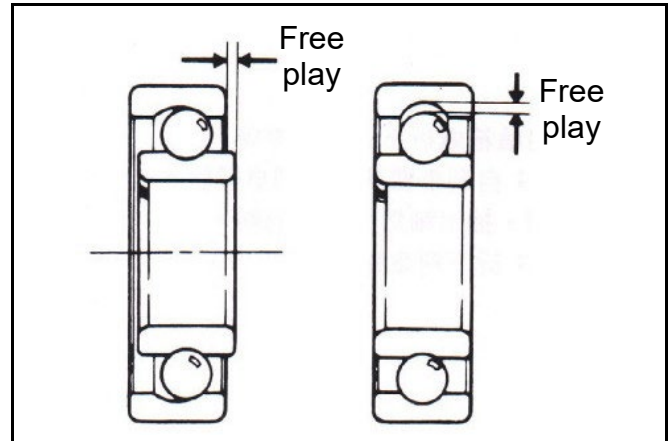


Rear Fork

Inspection of rear fork bearing

Rotate each bearing's inner ring with fingers. Check if bearings can be turned smoothly and silently, and also check if bearing outer ring is mounted tightly on rear fork.

Replace the bearing, if the rotation is uneven, noisy, or loose bearing mounted.



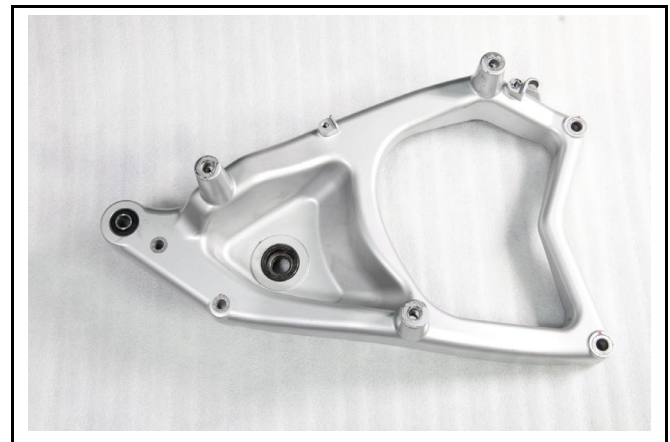
Oil seal removal.

Oil seal removing tool.

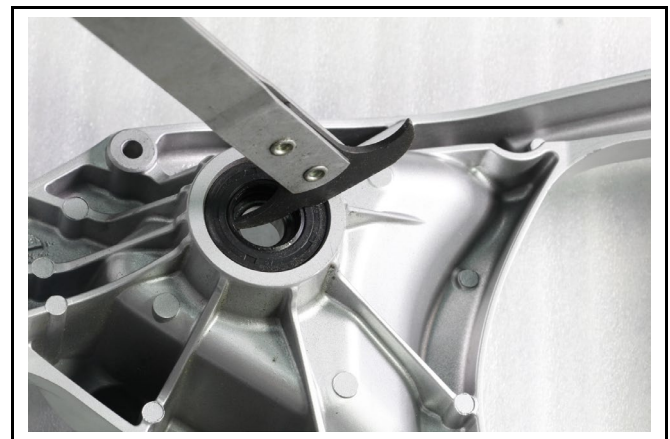
Circlip pliers.



Rear fork bearings removal



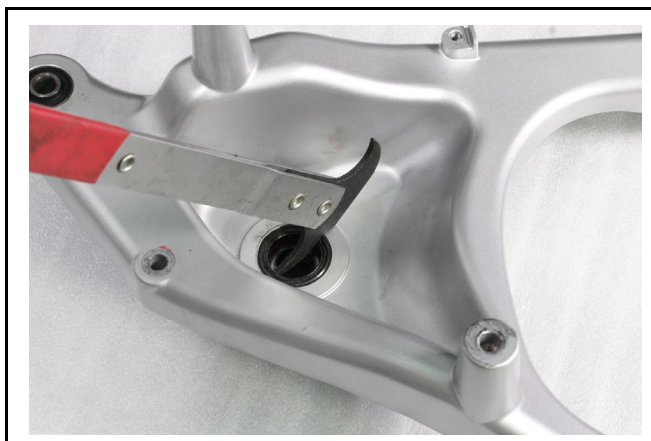
Remove the oil seal from the inner side of rear fork by using oil seal removing tool.



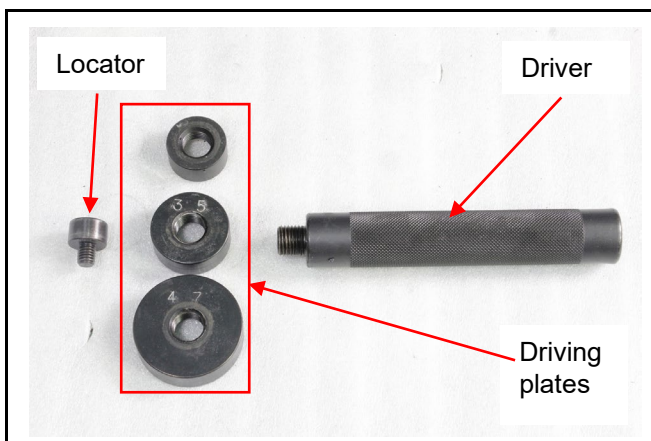
Remove circlip by circlip pliers.



Remove the oil seal from the outer side of rear fork by using oil seal removing tool.



Special tools:
BEARING INSTALL DRIVER SYM-6204024



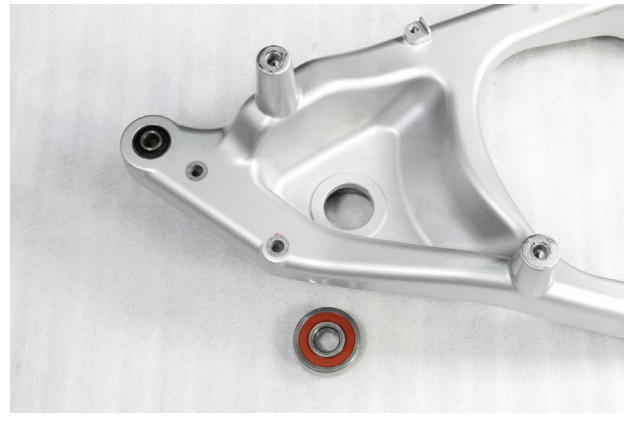
Choose and assemble the suitable locator (17mm), driving plate (28mm), and driver. Place the bearing install driver onto the position of bearing.



16. Rear Wheel / Rear Fork / Rear Cushion



Drive out the bearing.

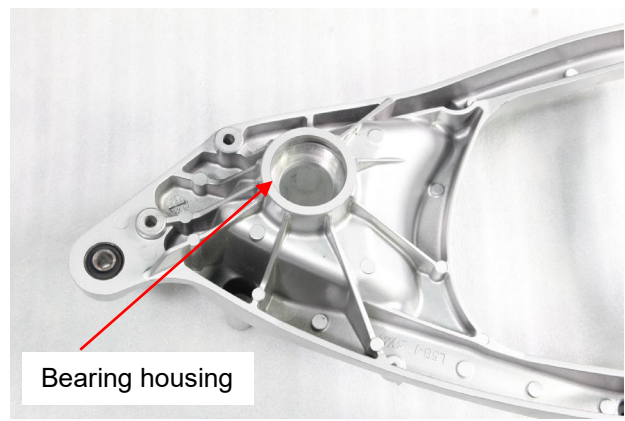


Bearing installation

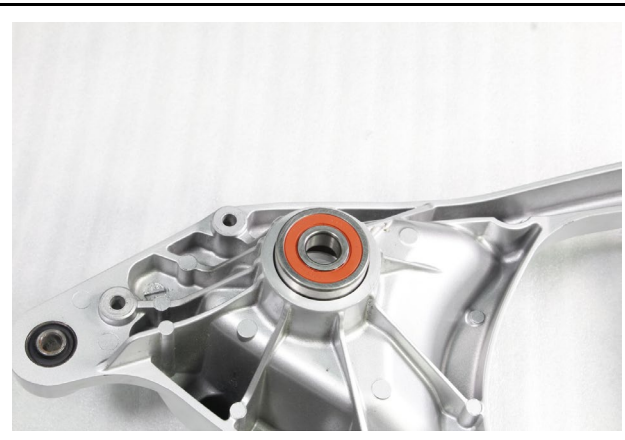
Install a new bearings from the inner side of rear fork.

 Caution

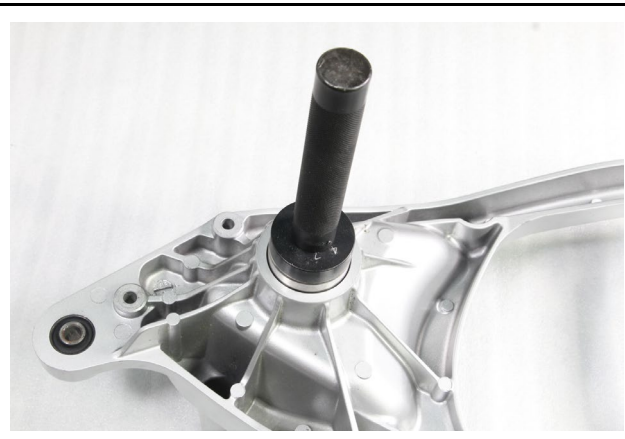
- Never use a used bearing. Replace with a new bearing, if the bearing is removed.



Place a new bearings onto the rear fork.
Bearings: 6303UU



Choose and assemble the suitable locator (17mm), driving plate (47mm), and driver.
Place the bearing install driver onto the position of bearings.
Drive the bearings into the correct position.

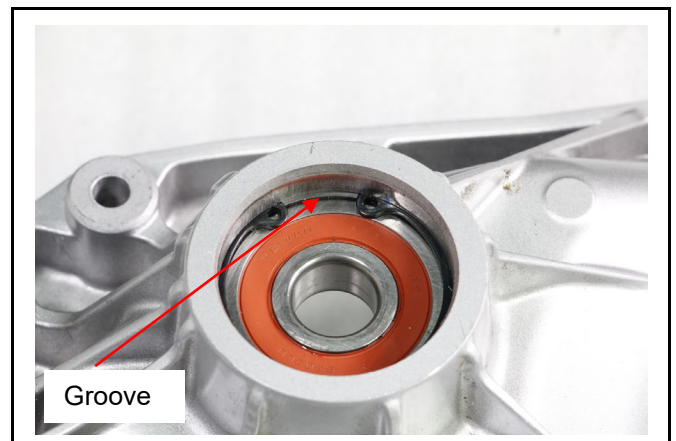


Check if bearing is on the correct position.



Install circlip.

Check if circlip is installed correctly into the groove.



Place a new oil seal onto the position of bearings.



Caution

- Replace with a new oil seal, if the oil seal is removed.

Oil seal: 26*47*7



Choose and assemble the suitable locator (12mm), driving plate (47mm), and driver. Place the bearing install driver onto the position of oil seal.

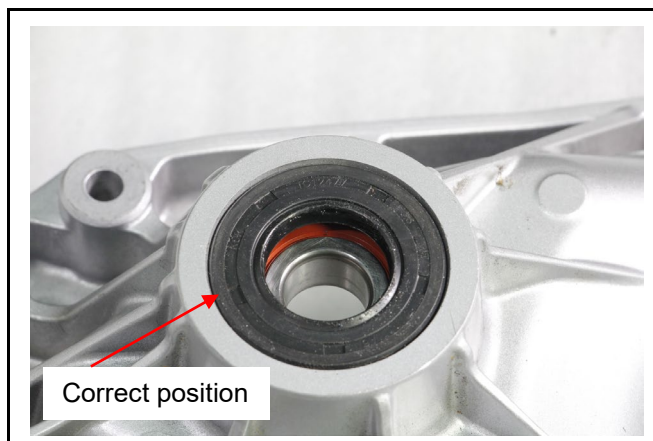
Drive the oil seal into the correct position.



16. Rear Wheel / Rear Fork / Rear Cushion



Check if oil seal is on the correct position.



Install the oil seal from the outer side of the rear fork.



Place a new oil seal on the outer side of the rear fork.

 Caution

- Replace with a new oil seal, if the oil seal is removed.

Oil seal: 26*35*7



Choose and assemble the suitable locator (12mm), driving plate (35mm), and driver. Place the bearing install driver onto the position of oil seal. Drive the oil seal into the correct position.



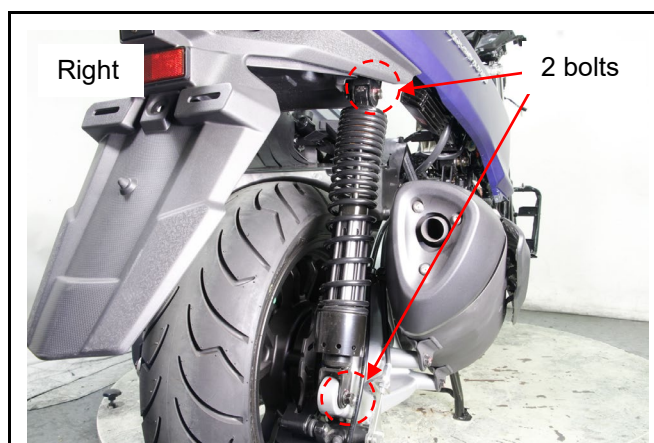
Check if oil seal is on the correct position.



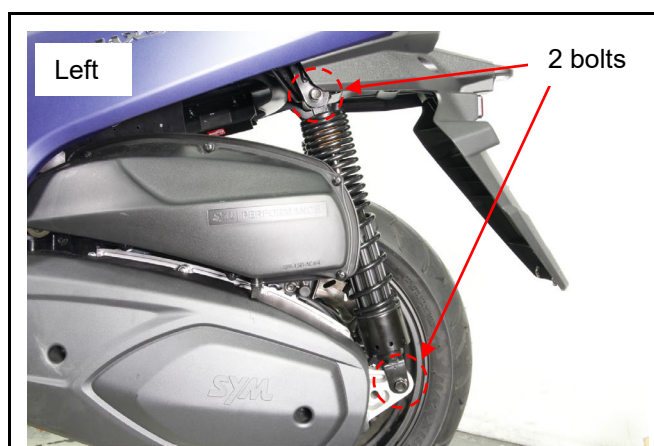
Rear Cushion

Removal

Remove the upper and lower bolts from one side of the rear cushions. (2 bolts)
Remove the rear cushion.



Remove the upper and lower bolts from the other side of the rear cushions. (2 bolts)
Remove the rear cushion.



Installation

Install in reverse order of removal procedures.

Caution

- The rear cushion must be replaced as a unit. Never disassemble the rear cushion, or structure and rubber boot will be damaged.

Torque Value:

Rear cushion upper and lower bolt:
3.5~4.5kgf-m

