PREFACE

This Service Manual describes the technical features and servicing procedures for the KYMCO ***FILLY 50.***

Section 1 contains the precautions for all operations stated in this manual. Read them carefully before starting any operation.

Section 2 is the removal/installation procedures for the frame covers which are subject to higher removal/installation frequency during maintenance and servicing operations.

Section 3 describes the inspection/ adjustment procedures, safety rules and service information for each part, starting from periodic maintenance.

Sections 6 through 17 give instructions for disassembly, assembly and inspection of engine, chassis frame and electrical equipment.

Most sections start with an assembly or system illustration and troubleshooting for the section. The subsequent pages give detailed procedures for the section.

Our company reserves the right to make any alteration in the design.
The information and contents included in this manual may be different from the motorcycle in case specifications are changed.

KWANG YANG MOTOR CO., LTD.
OVERSEAS SALES DEPARTMENT
OVERSEAS SERVICE SECTION

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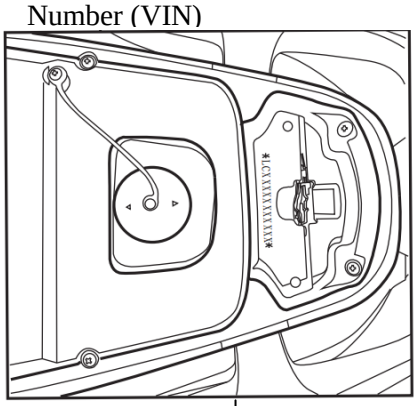
1. GENERAL INFORMATION

ENGINE SERIAL NUMBER

Location of Vehicle Identification Number (VIN)



Location of Engine Serial Number

1

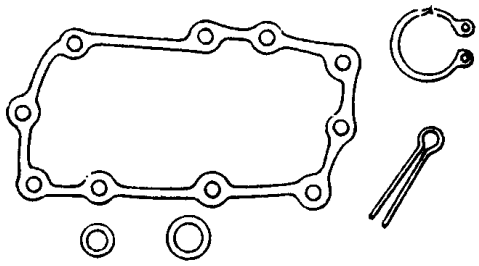
SPECIFICATIONS

Motorcycle Name & Type				FILLY 50
Name & Model No.				YXA7 E5
Overall length (mm)				1820
Overall width (mm)				690
Overall height (mm)				1090
Wheel base (mm)				1270
Engine type				4-stroke scooter
Displacement				50cc
Fuel Used				92# unleaded gasoline
Net weight (kg)			Front wheel	40
			Rear wheel	64
			Total	104
Gross weight(kg)			Front wheel	71
			Rear wheel	108
			Total	254
Tires			Front wheel	100/80-12
			Rear wheel	120/70-12
Ground clearance (mm)				125
Perform-ance	Braking distance (m)			≤4m(20km/h)
Engine	Starting system			Starting motor
	Type			Gasoline, 4-stroke
	Cylinder arrangement			Single cylinder
	Combustion chamber type			Semi-sphere
	Valve arrangement			O.H.C.
	Bore x stroke (mm)			37.0 x 46.4
	Compression ratio			13:1
	Compression pressure (kg/cm²-rpm)			12.5±2
	Max. output			2.4KW(7500rpm)
	Max. torque			3.5N.M/6500rpm
	Port timing	Intake	Open	7°
			Close	15°
		Exhaust	Open	2°
			Close	1°
	Valve clearance (cold) (mm)		Intake	0.05-0.08
			Exhaust	0.05-0.08
	Idle speed (rpm)			2000±100rpm
	Lubrication System	Lubrication type		Forced pressure & wet sump
		Oil pump type		Inner/outer rotor type
		Oil filter type		Full-flow filtration
		Oil capacity		0.7 liter
	Cooling Type			Forced air cooling

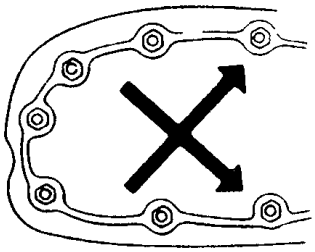
Fuel System	Air cleaner type & No			Paper element, wet
	Fuel capacity			4.6 liter
	Throttle type			Butterfly type
Electrical Equipment	Ignition System	Type		ECU
		Ignition timing		BTDC12°±1°/1800rpm
		Contact breaker		Non-contact point type
		Spark plug		CR6HSA
		Spark plug gap		0.6～0.7mm
	Battery	Capacity		12V6AH
Power Drive System	Clutch	Type		Dry multi-disc clutch
	Transmis-sion Gear	Type		Non-stage transmission
		Operation		Automatic centrifugal type
	Reduction Gear	Type		Two-stage reduction
		Reduction ratio	1st	0.85-2.45
			2nd	13.124
Moving Device	Tire pressure (kg/cm²)		Front	1.90
			Rear	2.10
	Turning angle		Left	40°
			Right	40°
Brake system type			Front	DISK (190) brake
			Rear	DRUM(110) brake
Damping Device	Suspension type		Front	vertical type
			Rear	DUAL-DAMPER
	Shock absorber stroke		Front	90mm
			Rear	70mm
Frame type				Steel Pipel

SERVICE PRECAUTIONS

■ Make sure to install new gaskets, O-rings, circlips, cotter pins, etc. when reassembling.



■ When tightening bolts or nuts, begin with larger-diameter to smaller ones at several times, and tighten to the specified torque diagonally.



■ Use genuine parts and lubricants

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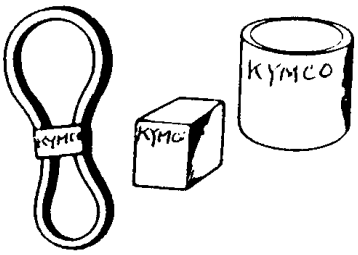
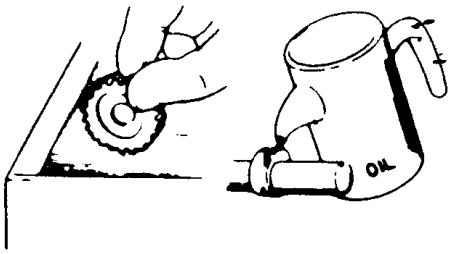
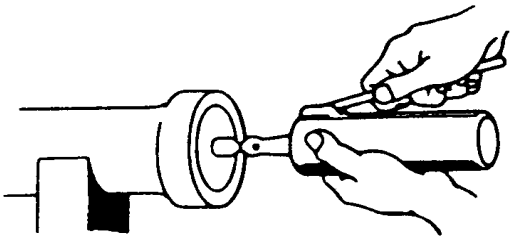


■ When servicing the motorcycle, be sure to use special tools for removal and installation.

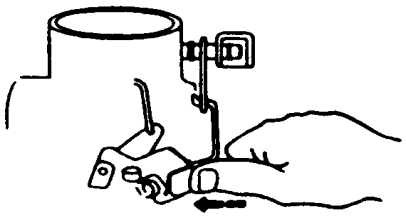
■ After disassembly, clean removed parts. Lubricate sliding surfaces with engine oil before reassembly.



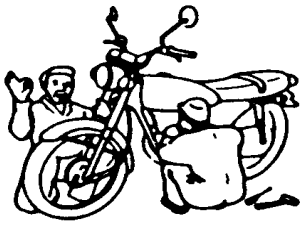
■ Apply or add designated greases and lubricants to the specified lubrication points.



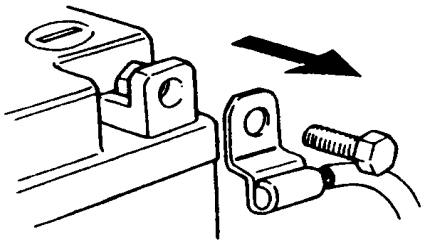
■ After reassembly, check all parts for proper tightening and operation.



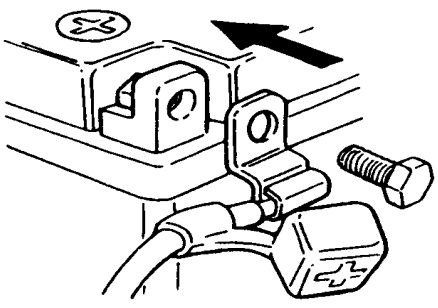
■ When two persons work together, pay attention to the mutual working safety.



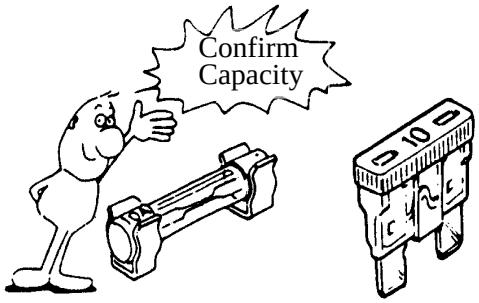
■ Disconnect the battery negative (-) terminal before operation.
■ When using a spanner or other tools, make sure not to damage the motorcycle surface.



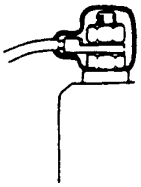
■ After operation, check all connecting points, fasteners, and lines for proper connection and installation.
■ When connecting the battery, the positive (+) terminal must be connected first.
■ After connection, apply grease to the battery terminals.
■ Terminal caps shall be installed securely.



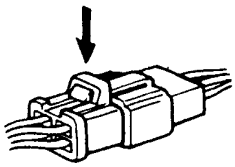
■ If the fuse is burned out, find the cause and repair it. Replace it with a new one according to the specified capacity.



■ After operation, terminal caps shall be installed securely.

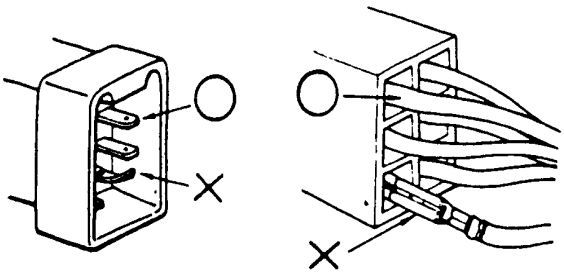


■ When taking out the connector, the lock on the connector shall be released before operation.

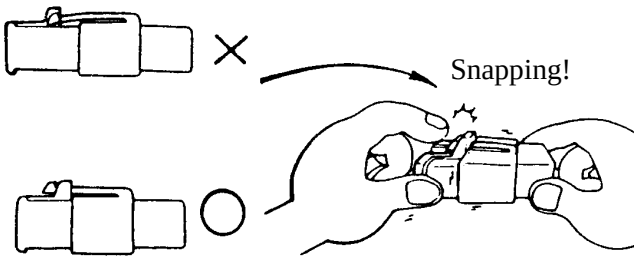


■ Hold the connector body when connecting or disconnecting it.
■ Do not pull the connector wire.

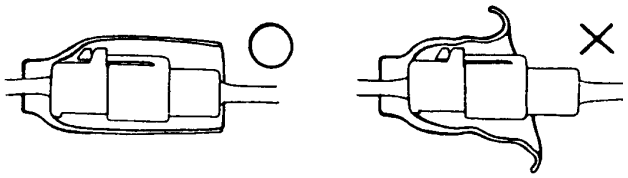
■ Check if any connector terminal is bending, protruding or loose.



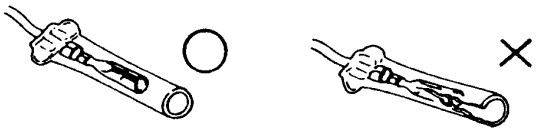
- The connector shall be inserted completely.
- If the double connector has a lock, lock it at the correct position.
- Check if there is any loose wire.



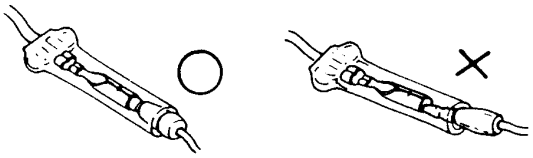
- Before connecting a terminal, check for damaged terminal cover or loose negative terminal.



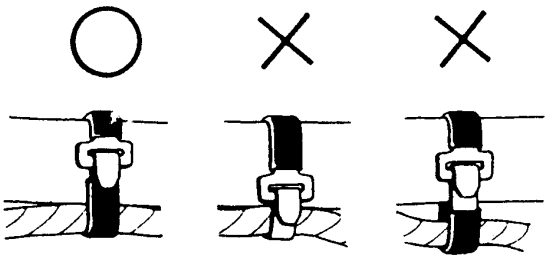
- Check the double connector cover for proper coverage and installation.



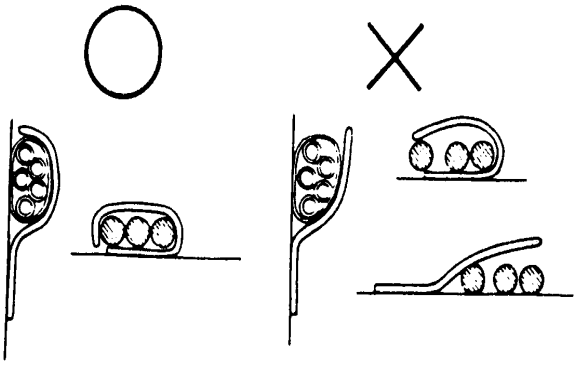
- Insert the terminal completely.
- Check the terminal cover for proper coverage.
- Do not make the terminal cover opening face up.



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



■ After clamping, check each wire to make sure it is secure.



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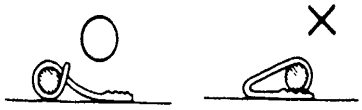
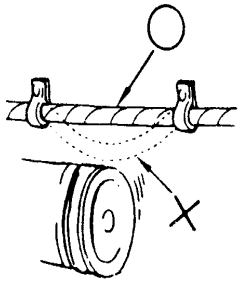
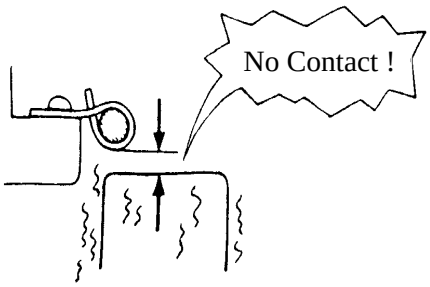
■ Do not squeeze wires against the weld or its clamp



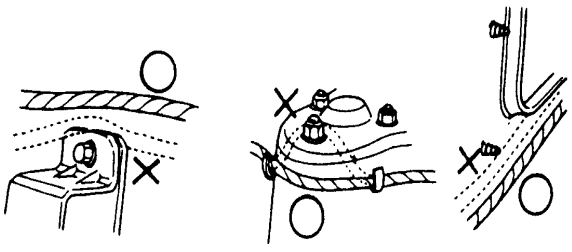
■ After clamping, check each harness to make sure that it is not interfering with any moving or sliding parts.



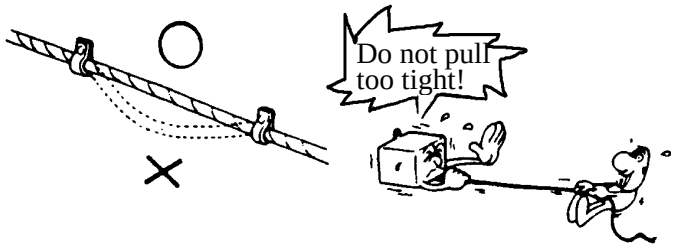
■ When fixing the wire harnesses, do not make it contact the parts which will generate high heat.



■ Route wire harnesses to avoid sharp edges or corners. Avoid the projected ends of bolts and screws.
■ Route wire harnesses passing through the side of bolts and screws. Avoid the projected ends of bolts and screws.



■ Route harnesses so they are neither pulled tight nor have excessive slack.



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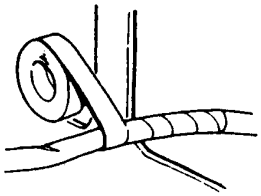
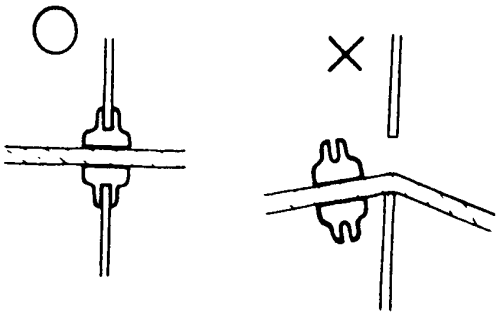
■ Protect wires and harnesses with electrical tape or tube if they contact a sharp edge or corner

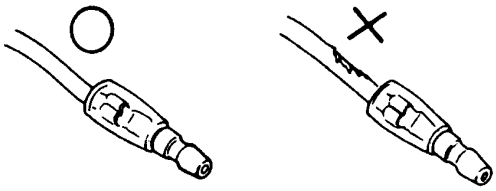


■ When rubber protecting cover is used to protect the wire harnesses, it shall be installed securely.



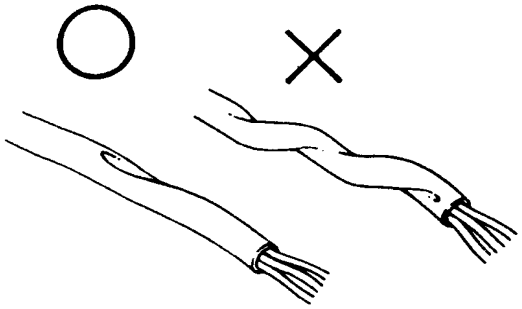
■ Do not break the sheath of wire.

■ If a wire or harness is with a broken sheath, repair by wrapping it with protective tape or replace it.

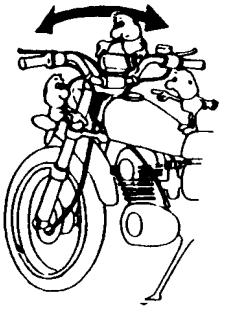


■ When installing other parts, do not press or squeeze the wires.

■ After routing, check that the wire harnesses are not twisted or kinked.

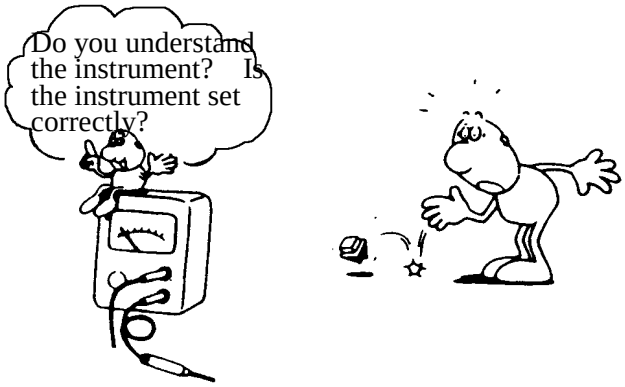


■ Wire harnesses routed along with handlebar should not be pulled tight, have excessive slack or interfere with adjacent or surrounding parts in all steering positions.



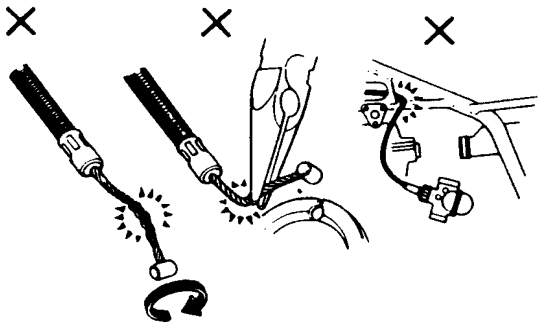
■ When a testing device is used, make sure to understand the operating methods thoroughly and operate according to the operating instructions.

■ Be careful not to drop any parts.



■ When rust is found on a terminal, remove the rust with sand paper or equivalent before connecting.

■ Do not bend or twist control cables. Damaged control cables will not operate smoothly and may stick or bind.



■ Symbols:

The following symbols represent the servicing methods and cautions included in this service manual.

Engine Oil : Apply engine oil to the specified points. (Use designated engine oil for lubrication.)

Grease : Apply grease for lubrication.

Gear Oil : Transmission Gear Oil (90#)

: Use special tool.

* : Caution

: Warning

(⇨12-3) : Refer to page 12-3.

TORQUE VALUES

STANDARD TORQUE VALUES

Item	Torque (kg-m)	Item	Torque (kg-m)
5mm bolt, nut	0.45-0.6	5mm screw	0.35-0.5
6mm bolt, nut	0.6-1.2	6mm screw, SH bolt	0.7-1.1
8mm bolt, nut	1.8-2.5	6mm flange bolt, nut	1.0-1.4
10mm bolt, nut	3.0-4.0	8mm flange bolt, nut	2.4-3.0
12mm bolt, nut	5.0-6.0	10mm flange bolt, nut	3.5-4.5

Torque specifications listed below are for important fasteners.

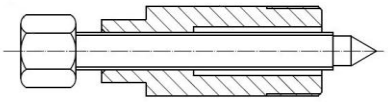
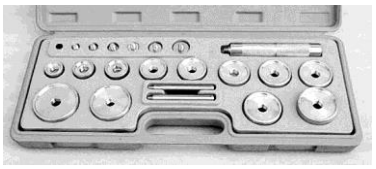
ENGINE

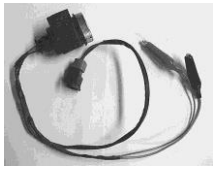
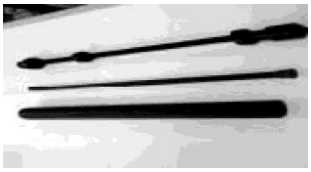
Item	Q'ty	Thread dia.(mm)	Torque (kg-m)	Remarks
Cylinder head bolt A	2	6	0.7-1.1	Double end bolt
Cylinder head bolt B	4	6	0.7-1.1	
Oil filter screen cap	1	30	1.0-2.0	
Exhaust muffler lock bolt	2	6	0.7-1.1	Double end bolt
Cylinder head flange nut	4	7	1.2-1.6	Apply oil to
Valve adjusting lock nut	2	3	0.07-0.09	threads
Cam chain tensioner slipper bolt	1	8	0.4-0.7	
Oil bolt	1	8	1.1-1.5	
Clutch outer nut	1	10	3.5-4.5	
Clutch drive plate nut	1	28	5.0-6.0	
Starter motor mounting bolt	2	6	0.8-1.2	
Oil pump bolt	3	4	0.1-0.3	
Drive face nut	1	10	5.5-6.5	
Spark plug	1	10	1.0-1.4	
A.C. generator stator bolt	2	6	0.8-1.2	
Cam chain tensioner bolt	1	6	0.8-1.2	

FRAME

Item	Q'ty	Thread dia.(mm)	Torque (kg-m)	Remarks
Steering stem lock nut	1	25.4	8.0-12.0	U-nut
Front axle nut	1	10	5.0-7.0	U-nut
Rear axle nut	1	14	11.0-13.0	U-nut
Rear shock absorber upper bolt	1	10	4.0-5.0	
Rear shock absorber lower bolt	1	8	2.0-3.0	
Speedometer cable set screw	1	5	0.45-0.6	
Rear shock absorber lock nut	1	8	3.0-3.6	Apply locking agent

SPECIAL TOOLS

Description	Tool No.	Photo
Flywheel puller	F02050015471 F02050015472	
Oil seal and bearing installer	A120E00014	
Universal holder	A120E00017	
Flywheel holder	A120E00021	
Clutch spring compressor	A120E00034	
Valve adjuster	A120E00036	
Bearing puller	A120E00037	
Cylinder Compression Gauage	A120E00039	

Description	Tool No.	Photo
Valve spring compressor	A120E00040	
Fuel Pressure Gauage	A120E00048	
INJECTOR CLEANER for Synerjet	A120E00075	
Wires Injector Connector	A120E00090	
Lock nut wrench	A120F00002	
Lower/Upper Race Remover & Installer	A120F00008	
Steering Stem Top Thread Wrench (shoter type)	A120F00024	
Steering Stem Top Thread Wrench	A120F00029	
Band Remover/Installer	A120F00030	

Description	Tool No.	Photo
Pliers Fuel Pipe	A120F00031	
Electric Repair Kit	A120F00032	

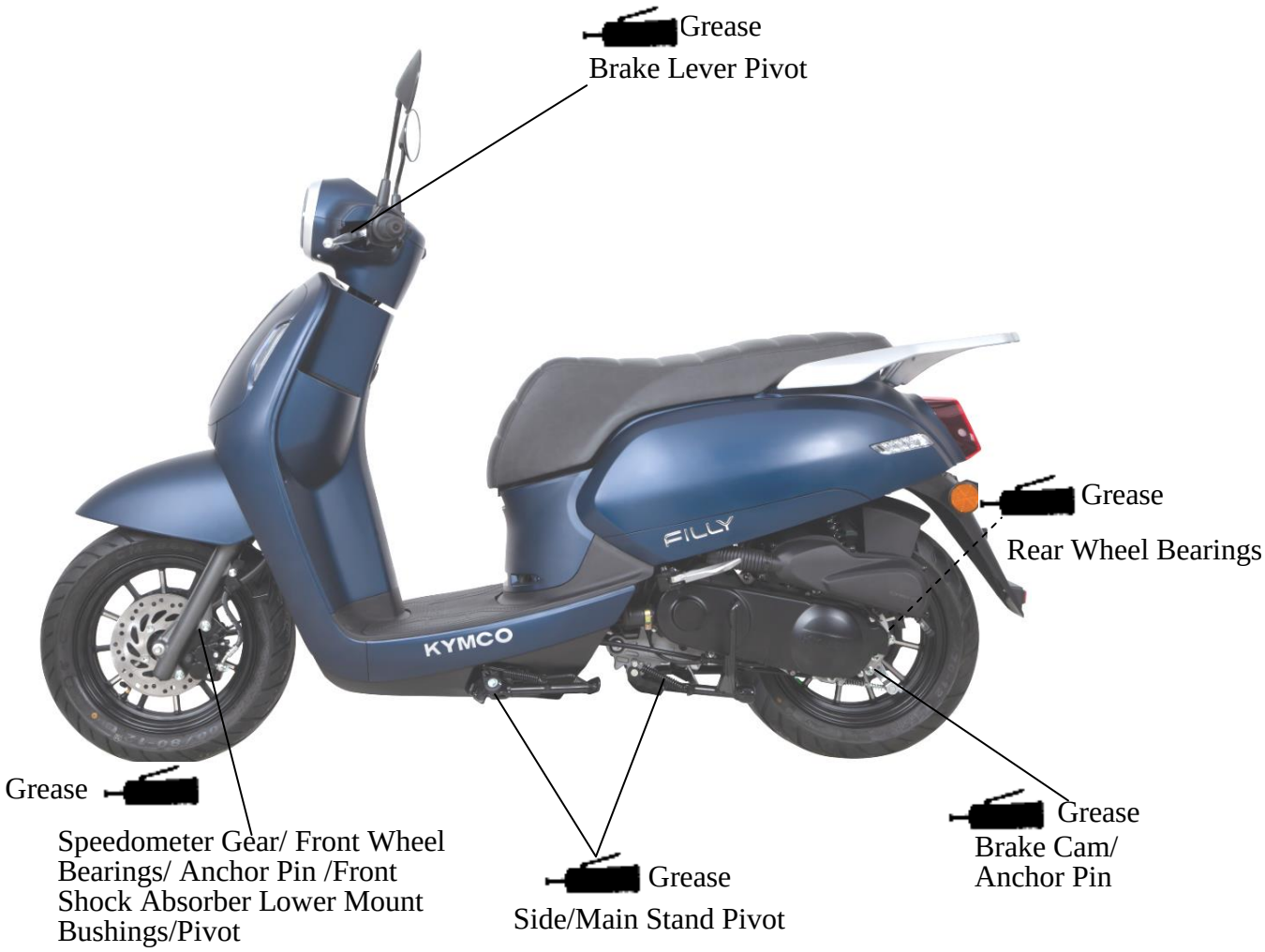
LUBRICATION POINTS

ENGINE

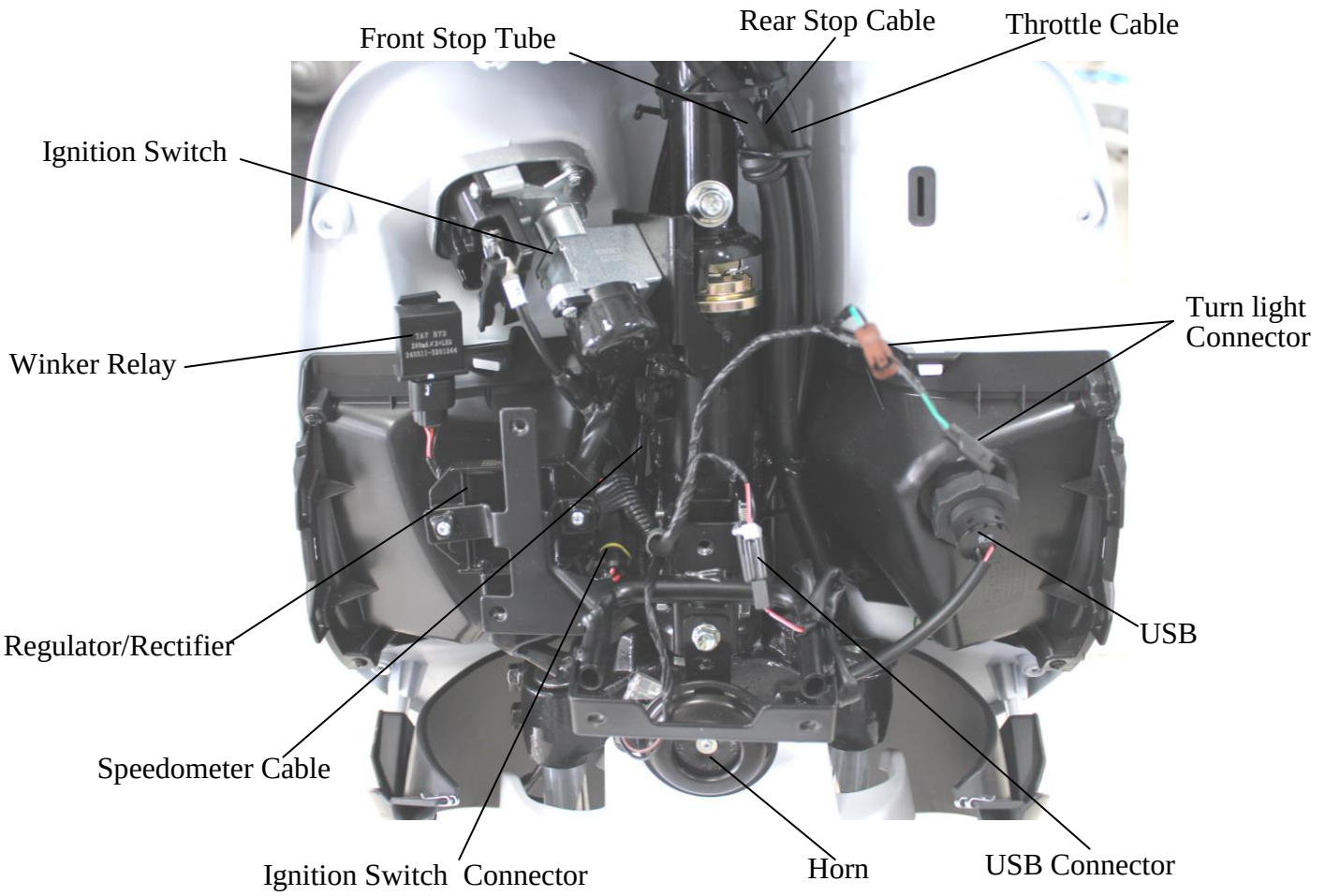
Lubrication Points	Lubricant
Valve guide/valve stem movable part Cam lobes Valve rocker arm friction surface Cam chain Cylinder lock bolt and nut Piston surroundings and piston ring grooves Piston pin surroundings Cylinder inside wall Connecting rod/piston pin hole Connecting rod big end Crankshaft R/L side oil seal Starter reduction gear engaging part Countershaft gear engaging part Final gear engaging part Bearing movable part O-ring face Oil seal lip	•Genuine KYMCO Engine Oil (SAE15W-40) •API–SL Engine Oil
Starter idle gear Friction spring movable part/shaft movable part Shaft movable grooved part Kick starter spindle movable part	High-temperature resistant grease
A.C. generator connector Transmission case breather tube	Adhesive

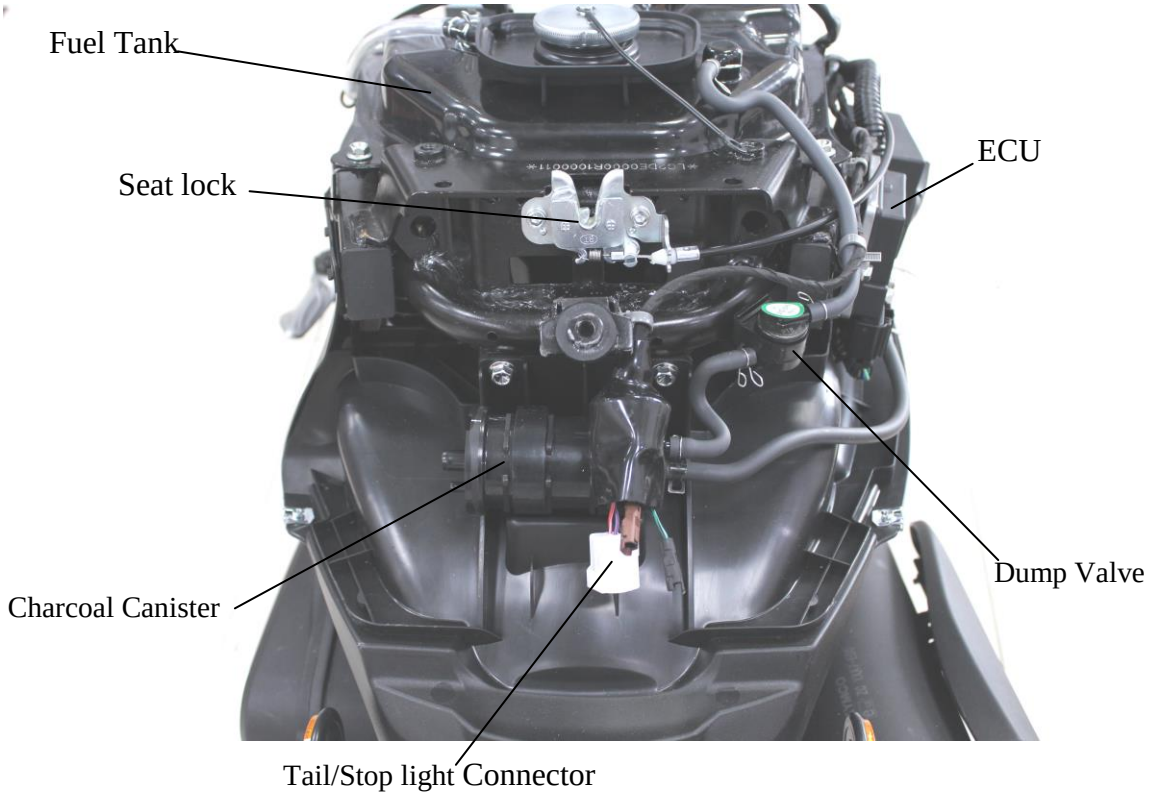
FRAME

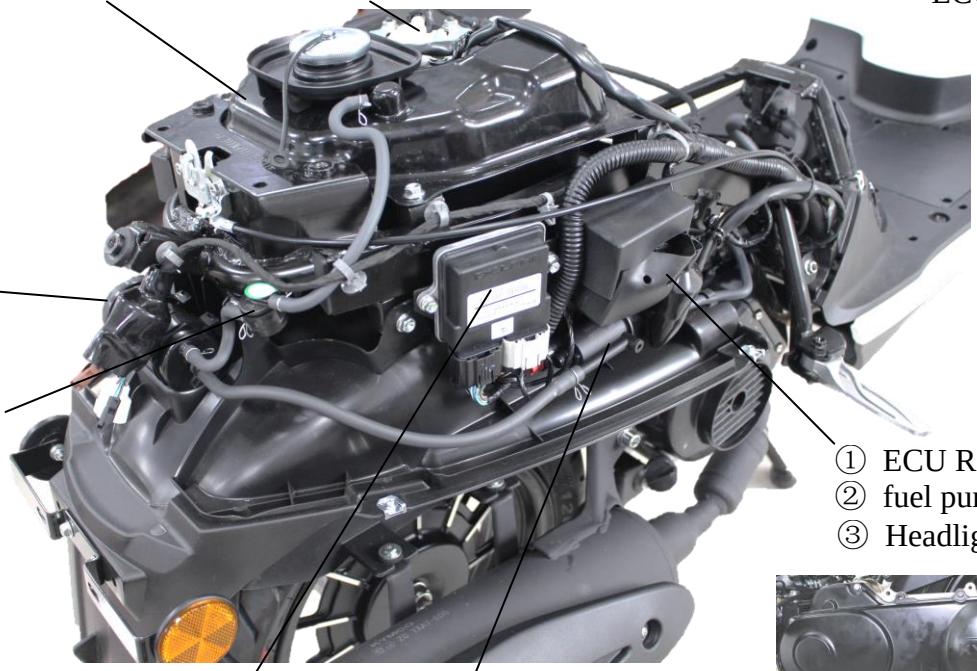
The following is the lubrication points for the frame.
Use general purpose grease for parts not listed.
Apply clean engine oil or grease to cables and movable parts not specified.
This will avoid abnormal noise and rise the durability of the motorcycle.



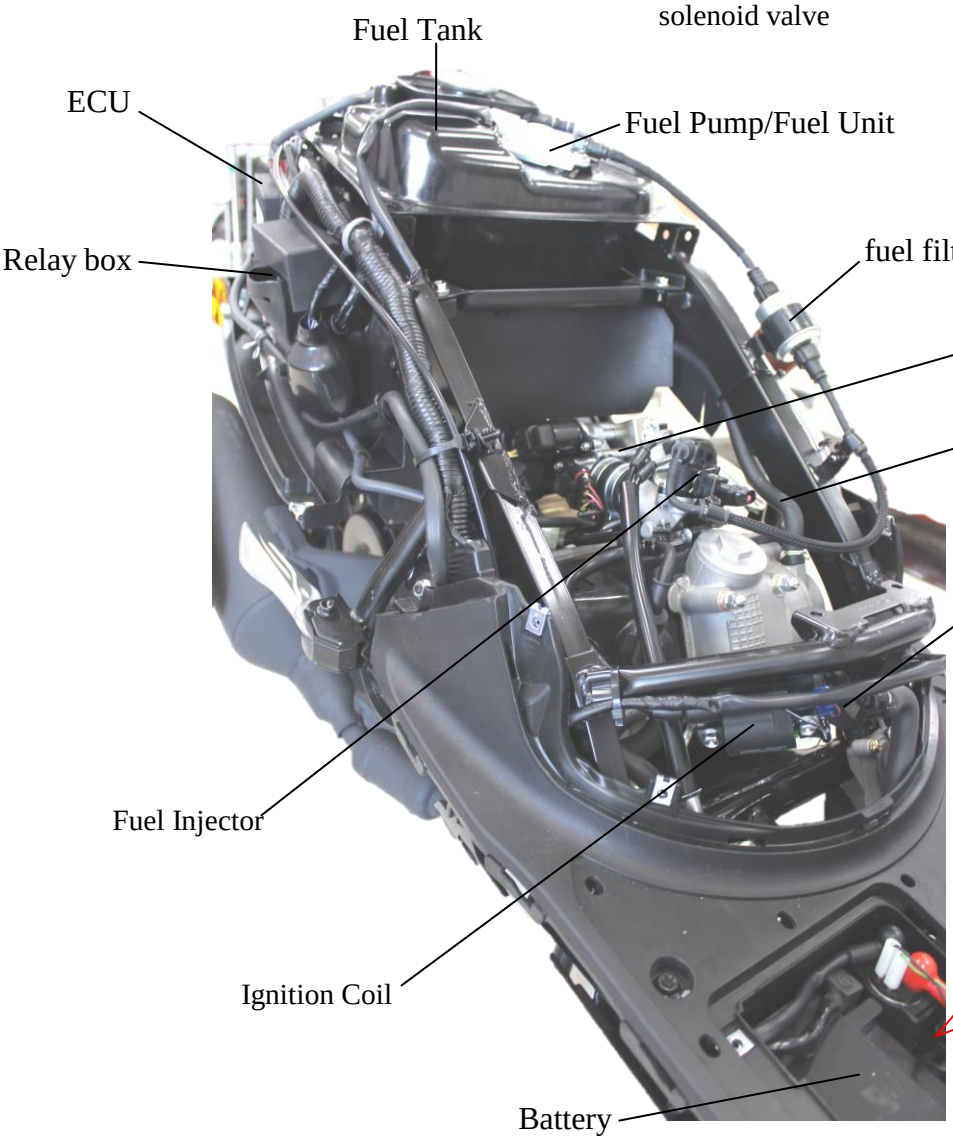
CABLE & HARNESS ROUTING

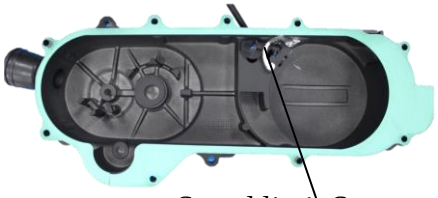


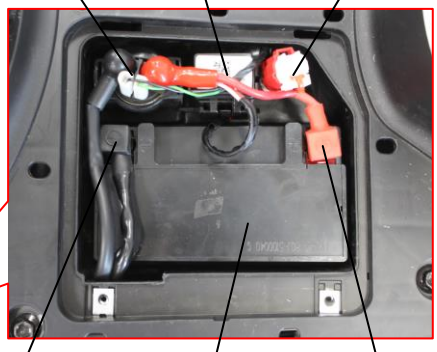


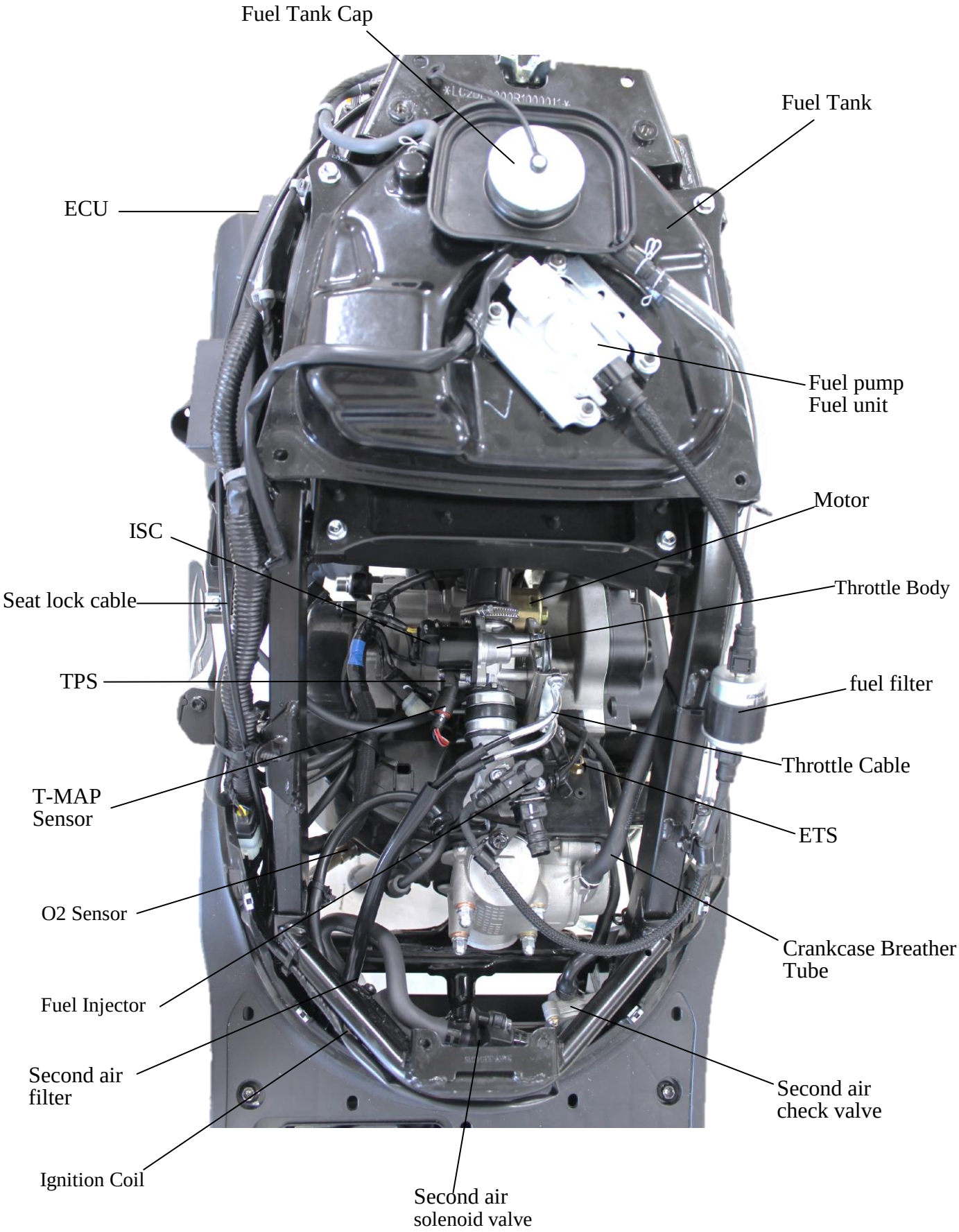

Fuel Tank
Fuel Pump/Fuel Unit
ECU
Charcoal Canister
Dump Valve
① ECU Relay
② fuel pump Relay
③ Headlight Relay
ECU
Charcoal Canister solenoid valve


Speed limit Sensor wire


Fuel Tank
ECU
Fuel Pump/Fuel Unit
Relay box
fuel filter
Throttle Body
Crankcase Breather Tube
Second air solenoid valve
Fuel Injector
Ignition Coil
Battery


Speed limit Sensor


Starter Relay
Fuse
Diagnostic Tool
the negative (-) terminal
Battery
the positive (+) terminal


Fuel Tank Cap
Fuel Tank
ECU
Fuel pump
Fuel unit
Motor
ISC
Seat lock cable
Throttle Body
TPS
fuel filter
Throttle Cable
T-MAP
Sensor
ETS
O2 Sensor
Crankcase Breather
Tube
Fuel Injector
Second air
filter
Second air
check valve
Ignition Coil
Second air
solenoid valve

Troubleshooting

Vehicle can not be started

Preliminary 6 Step Inspection

1. Is the battery fully charged (12 V or higher). See the Battery topic for more information.

2. Key-On and listen for any action with Fuel Pump / Fuel Pump Relay (It will turn off automatically in 5-10 seconds)

3. Key-On to check for any failure lamp light up on dashboard. See the Self-Diagnosis topic for more information.

4. Is the Idle screw of Throttle Valve being changed or loose?

5. Has the vehicle under regular service? Is the gas station a good one?

6. Is the spark plug the correct model of specified by the vehicle builder?

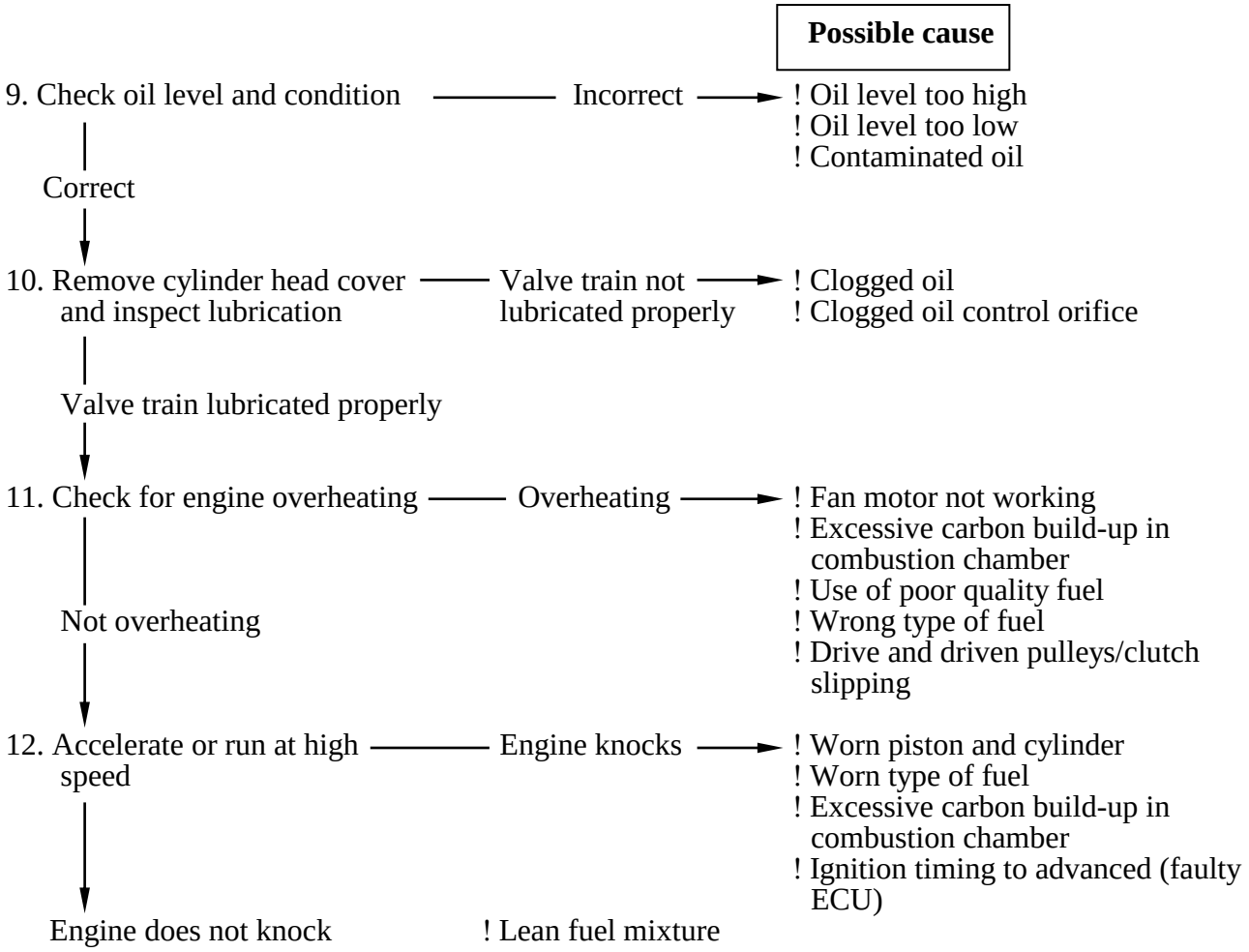
General Troubleshooting

ENGINE WILL NOT START OR IS HARD TO START

		Possible cause
1. Check for operation of the fuel pump	Abnormal	! Faulty fuel pump
Normal		
2. Inspect the fuel flow	Abnormal	! Faulty pressure regulator
Normal		
3. Inspect the fuel injector	Abnormal	! Faulty injector
Normal		
4. Perform spark test	Weak or no spark	! Faulty spark plug ! Fouled spark plug ! Faulty ECU
Good spark		! Broken or shorted spark plug wire ! Faulty ignition switch ! Faulty ignition pulse generator ! Loose or disconnected spark plug wire
5. Test cylinder compression	Low compression	! Valve stuck open ! Worn cylinder and piston ring ! Damaged cylinder head gasket
Compression normal		! Seized valve ! Improper valve timing
6. Starting following normal procedure	Engine start but stops	! Intake pipe leaking ! Improper ignition timing (Faulty ignition coil or ignition pulse generator)
Engine does not start		! Fuel contaminated
7. Remove and inspect spark plug	Wet plug	! Throttle valve open ! Clogged air cleaner

ENGINE LACKS POWER

		Possible cause
1. Raise wheel off the ground and spin by hand	Wheels do not spin freely	! Brake dragging ! Worn or damaged wheel bearing
Wheel spins freely		
2. Check tire pressure	Pressure low	! Faulty tire valve ! Punctured tire
Pressure normal		
3. Accelerate lightly	Engine speed does not increase	! Air cleaner dirty ! Restricted fuel flow ! Clogged muffler ! Pinched fuel tank breather
Engine speed increase		
4. Check ignition timing	Incorrect	! Faulty ECU ! Faulty ignition pulse generator
Correct		
5. Test cylinder compression	Incorrect	! Valve stuck open ! Worn cylinder and piston rings ! Leaking head gasket ! Improper valve timing
Normal		
6. Inspect fuel flow	Abnormal	! Faulty pressure regulator
Normal		
7. Inspect the fuel injector	Abnormal	! Faulty injector
Normal		
8. Remove spark plug	Fouled or discolored	! Faulty spark plug
Not fouled or discolored		


Possible cause
9. Check oil level and condition
Incorrect
! Oil level too high
! Oil level too low
! Contaminated oil
Correct
10. Remove cylinder head cover and inspect lubrication
Valve train not lubricated properly
! Clogged oil
! Clogged oil control orifice
Valve train lubricated properly
11. Check for engine overheating
Overheating
! Fan motor not working
! Excessive carbon build-up in combustion chamber
! Use of poor quality fuel
! Wrong type of fuel
! Drive and driven pulleys/clutch slipping
Not overheating
12. Accelerate or run at high speed
Engine knocks
! Worn piston and cylinder
! Worn type of fuel
! Excessive carbon build-up in combustion chamber
! Ignition timing to advanced (faulty ECU)
Engine does not knock
! Lean fuel mixture

POOR PERFORMANCE AT LOW AND IDLE SPEED

		Possible cause
1. Check ignition timing	Incorrect →	! Improper ignition timing
Correct ↓		
2. Inspect the fuel flow	Abnormal →	! Faulty pressure regulator
Normal ↓		
3. Inspect the fuel injector	Abnormal →	! Faulty injector
Normal ↓		
4. Check for leaks in the intake pipe	Leaking →	! Loose insulator clamp ! Damage insulator
No leak ↓		
5. Perform spark test	Weak or intermittent spark →	! Faulty the spark plug ! Faulty carbon or wet fouled spark plug ! Faulty ECU ! Faulty ignition coil ! Faulty ignition pulse generator ! Faulty ignition switch ! Loose or disconnected spark plug wires
Good spark		

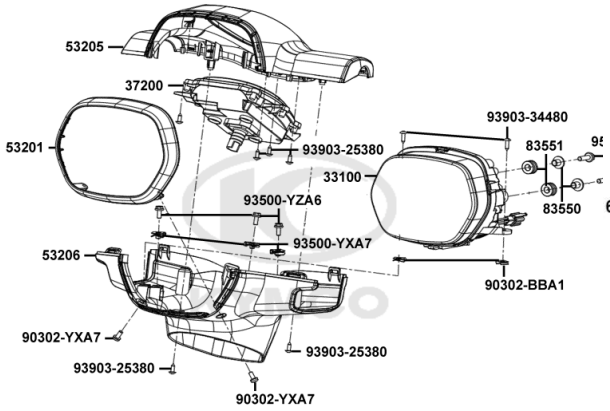
POOR PERFORMANCE AT HIGH SPEED

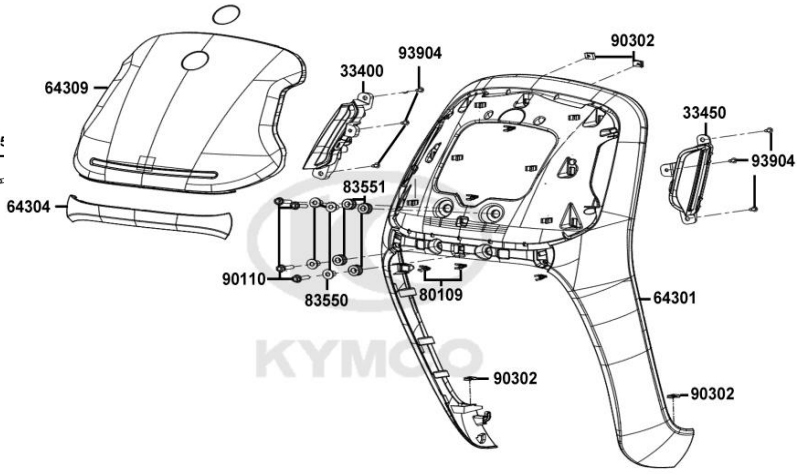
		Possible cause
1. Check ignition timing	Incorrect	! Faulty ECU
Correct ↓		
2. Inspect the fuel flow	Abnormal	! Faulty pressure regulator
Normal ↓		
3. Inspect the fuel injector	Abnormal	! Faulty injector
Normal ↓		
4. Check valve timing	Incorrect	! Camshaft not installed properly
Correct ↓		
5. Check valve spring	Weak	! Faulty valve spring
Not weak		

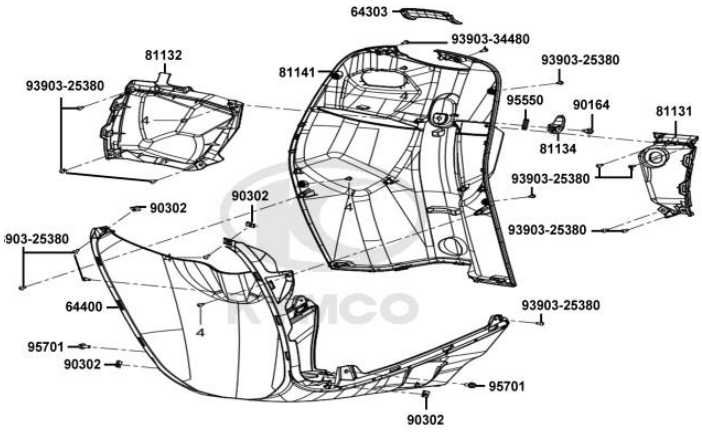
POOR HANDLING

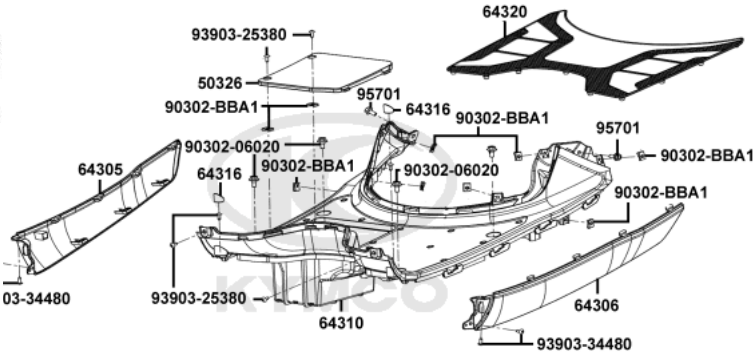
	Possible cause
1. If steering is heavy	! Steering stem adjusting nut too tight ! Damaged steering head bearings
2. If either wheel is wobbling	! Excessive wheel bearing play ! Bent rim ! Improper installed wheel hub ! Swing arm pivot bearing excessively worn ! Bent frame
3. If the motorcycle pulled to one side	! Faulty the shock absorber ! Front and rear wheel not aligned ! Bent fork ! Bent swing arm ! Bent axle

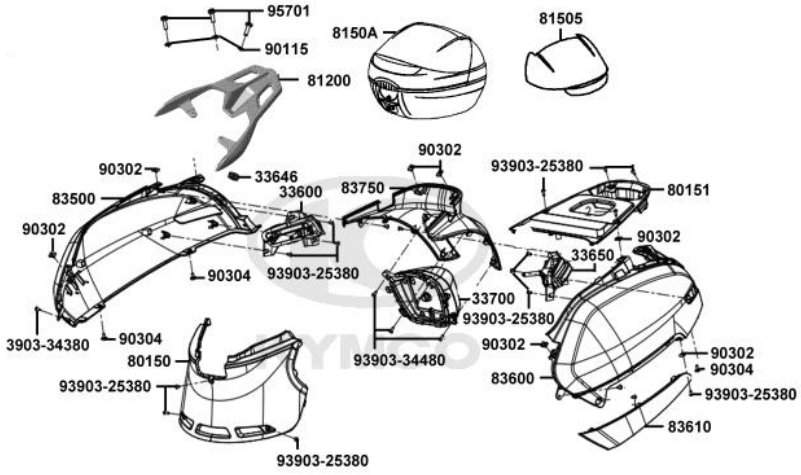
SCHEMATIC DRAWING

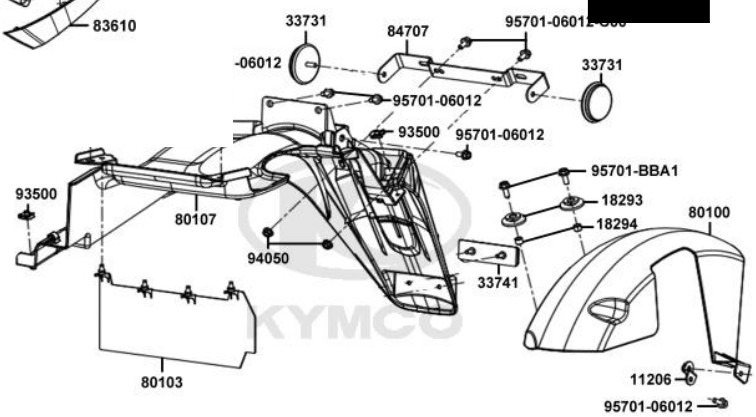












2

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- When removing frame covers, use special care not to pull them by force because the cover joint claws may be damaged.

Items Related for Removal

- Handlebar front cover ——— Handlebar rear cover
  Headlight wire connector
- Handlebar rear cover ——— Speedometer cable and instrument light wire connectors, etc.
- Frame body cover ——— Met-in box, rear grip, rear turn signal lights, floor board
- Floor board ——— Frame body cover
  Battery and wire connectors
- Front tool box ——— Front cover, floor board

TORQUE VALUES

Exhaust muffler joint lock nut	1.0~1.4kgf-m
Exhaust muffler lock bolt	3.0~3.6kgf-m

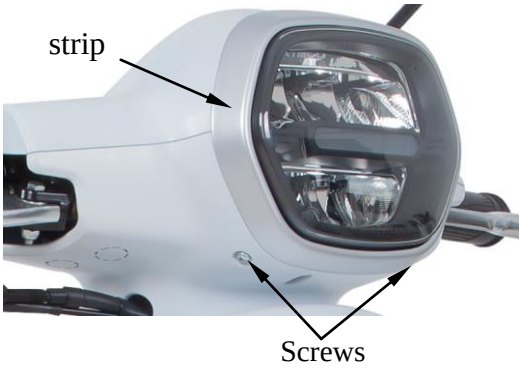
FRAME COVERS

HANDLEBAR REAR COVER REMOVAL

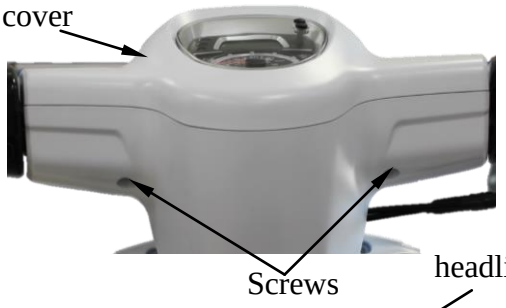
HANDLEBAR FRONT COVER REMOVAL

Remove the two screws attaching the headlight strip.

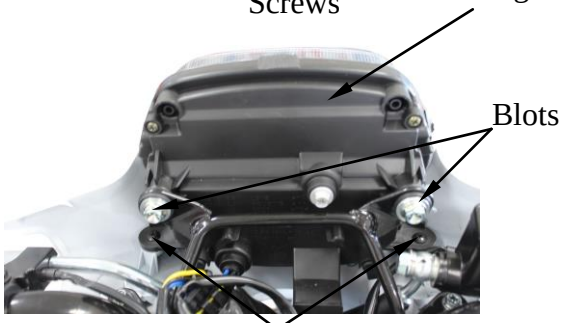
Remove the headlight strip.



Remove the two screws attaching the handlebar up cover.
Disconnect the instrument connector .
Remove the up cover.



Remove the two screws and two bolts attaching the headlight .
Remove the headlight.



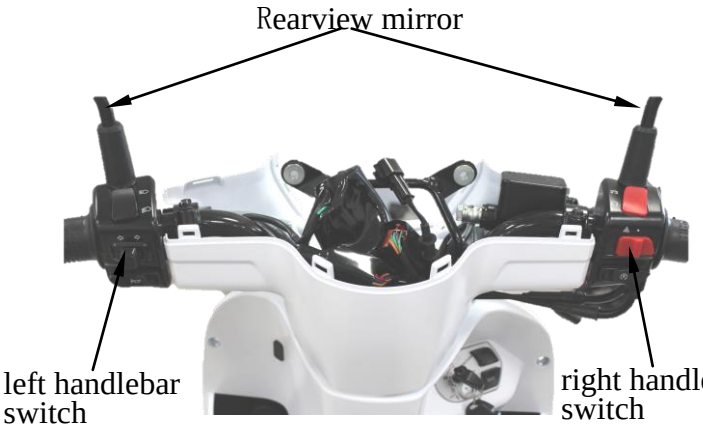
Remove the rearview mirror.
Remove the two bolts attaching each of the front and rear brake levers.
Remove the front and rear brake levers.

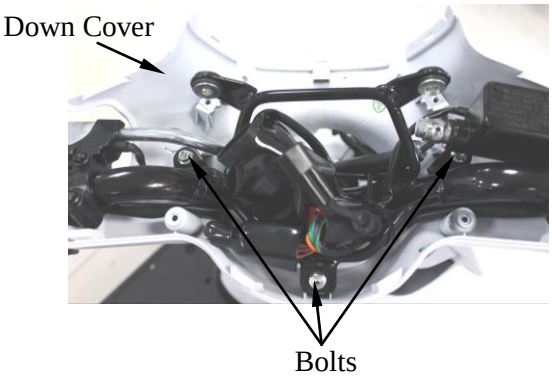
Remove two screws attaching to the right handlebar switch.
Disconnect the throttle cable from the throttle grip.
Remove the right handlebar switch.

Remove two screws and then remove the left handlebar switch.

Remove three bolts attaching to the down cover.
Remove the handlebar lock nut and take out the bolt.
Remove the handlebar and collar.

Remove the down cover.

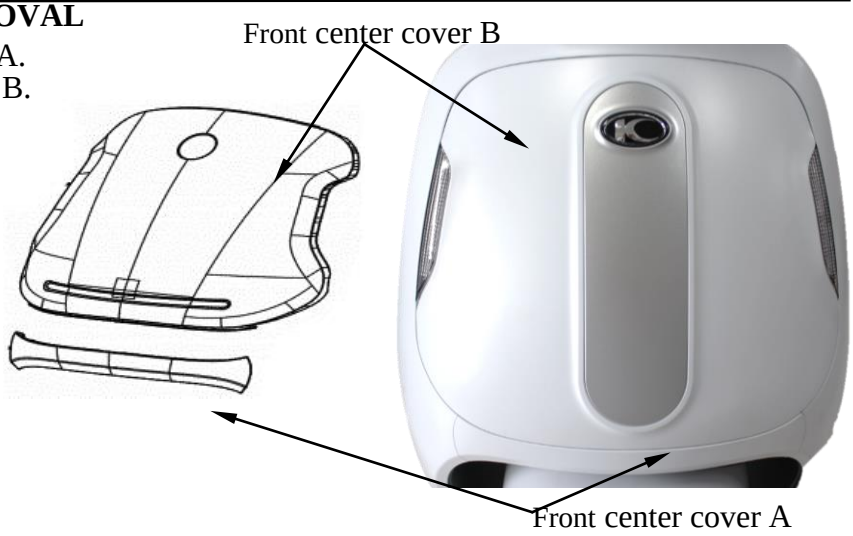




The installation sequence is the reverse of removal.

FRONT CENTER COVER REMOVAL

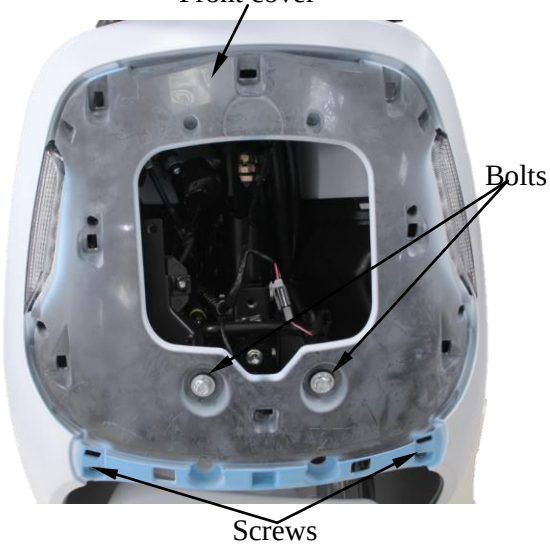
First remove the front center cover A.
Then remove the front center cover B.



The installation sequence is the reverse of removal.

FRONT COVER REMOVAL

Remove the two bolts and the two screws attaching the front of the front cover.



Remove the eight screws attaching the rear of the front cover.

Disconnect the turn light wire connector.

Remove the front cover.

The installation sequence is the reverse of removal.

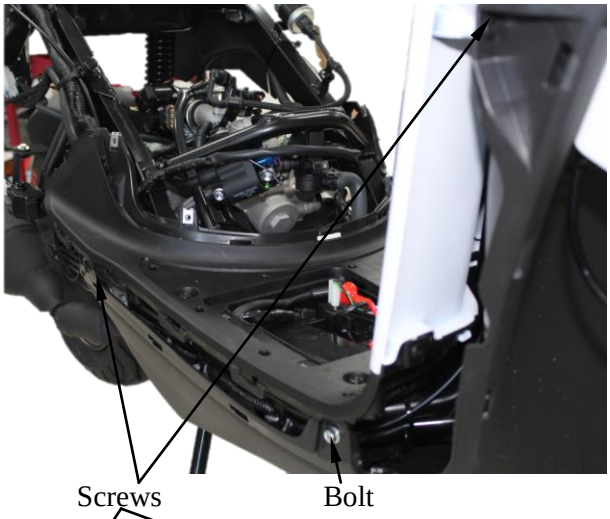
RIGHT/LEFT FOOT SKIRT

Remove the front cover(2-3).
Remove the two screws attaching each of the right /left foot skirt..
Remove the right /left foot skirt..

The installation sequence is the reverse of removal.

BOTTOM PROTECTOR COVER REMOVAL

Remove the front cover(2-3).
Remove the right /left foot skirt(2-4).
Remove the 2 bolts and four screws on the bottom protector cover.



Remove the bottom protector cover.

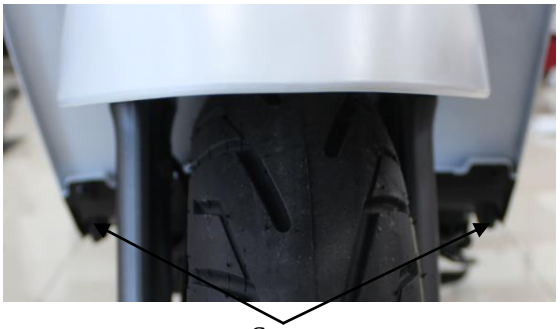
The installation sequence is the reverse of removal.

LEG SHIELD REMOVAL

Remove the front cover.(2-3)
Remove the right /left foot skirt(2-4).
Remove the bottom protector cover(2-4).
Remove the up cover plate starry.

up cover plate starry.

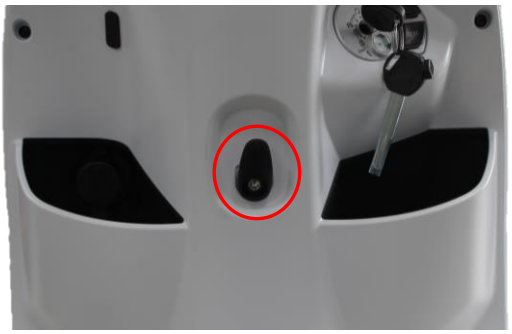
Remove the two screws attaching the leg shield.



Screws

Remove the bolt attaching the leg shield.

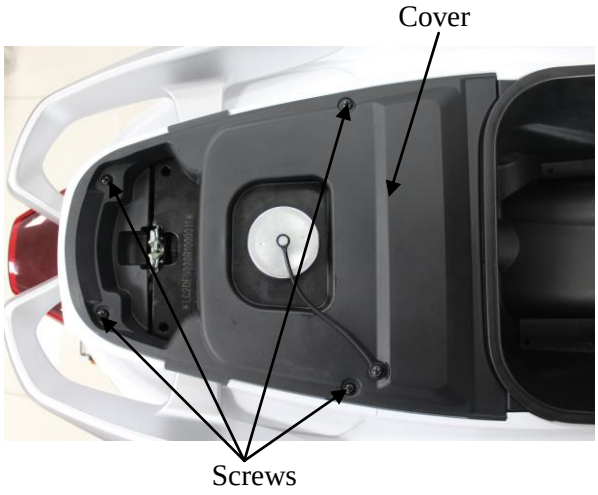
Remove the leg shield.



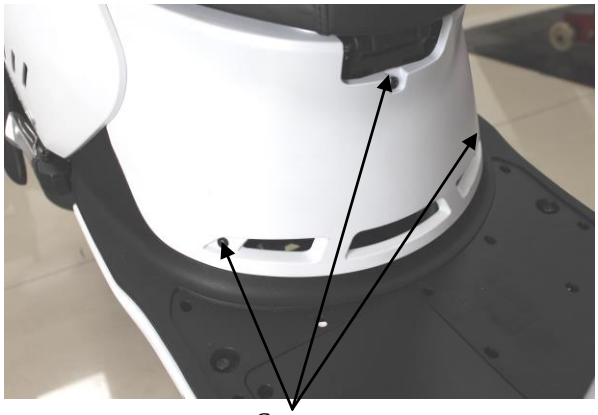
The installation sequence is the reverse of removal.

MET-IN BOX REMOVAL

Open the seat
Remove the four screws attaching the fuel tank top cover.
Remove the fuel tank top cover.



Remove the three screws attaching the center cover.
Remove the center cover.



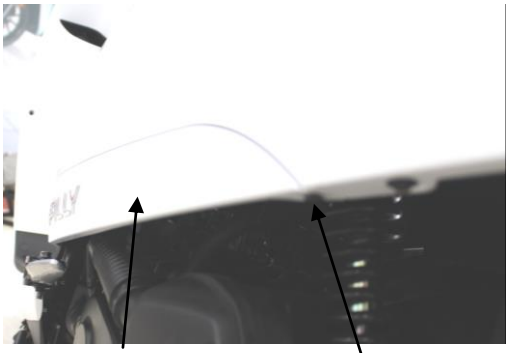
Remove the four bolts attaching the met-in box.
Remove the met-in box.

The installation sequence is the reverse of removal.

FRAME BODY COVER AND REAR CARRIER REMOVAL

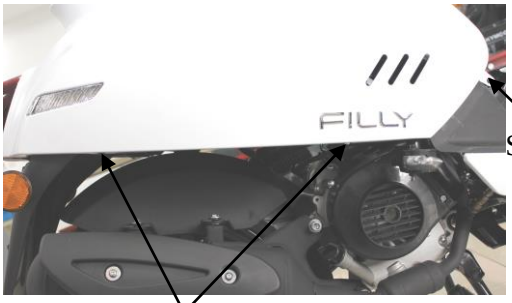
Remove the met-in box (2-6).
Remove the three bolts attaching the rear carrier.
Remove the rear carrier.

Remove the screw attaching the left side cover.
Remove the left side cover.

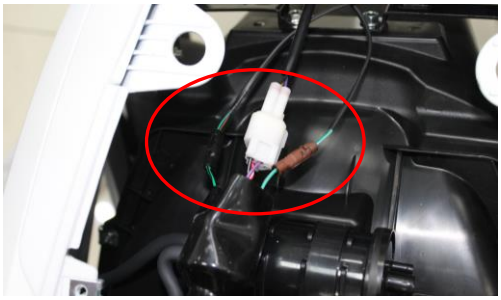


Remove the two screws and the bolt attaching the left frame body cover.

Remove the screw and the two bolts attaching the right frame body cover.



Disconnect the turn light wire connector and Tail/stop light connector.

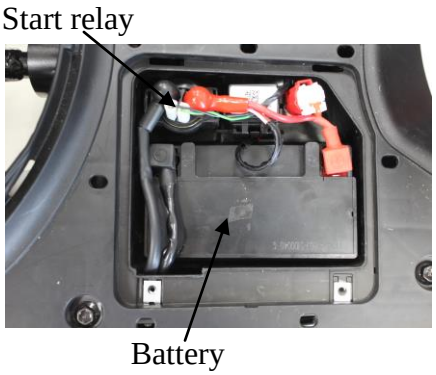


The installation sequence is the reverse of removal.

FLOOR BOARD REMOVAL

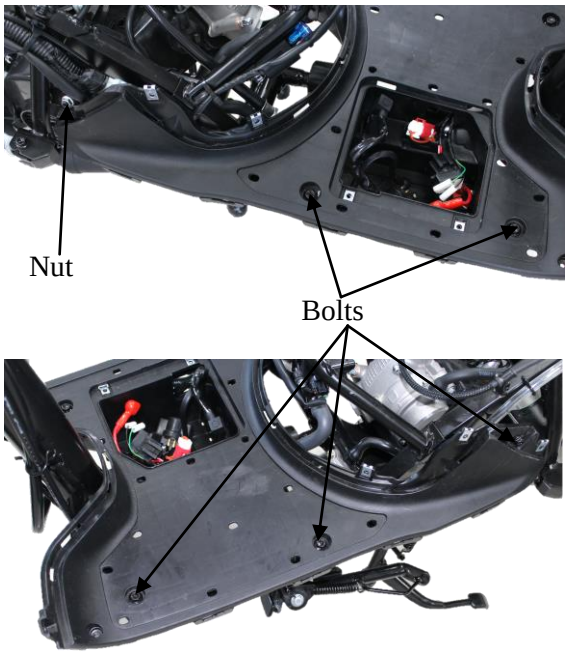
Remove the front cover.
Remove the bottom protector cover.
Remove the leg shield.
Remove the met-in box.
Remove the frame body cover.

Remove the electric bottle caps and battery.
Remove the start relay.



Remove the five bolts and the nut attaching the floor board.

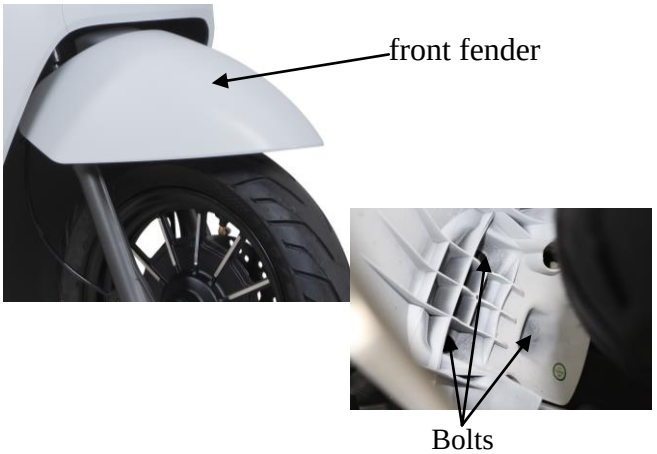
Remove the floor board.



FRONT FENDER REMOVAL

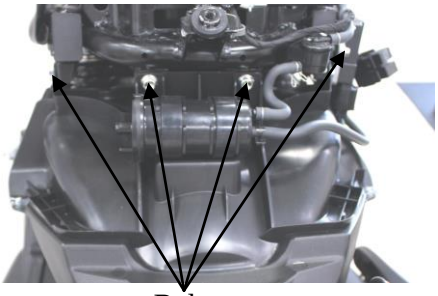
Remove the three bolts attaching the front fender .

Remove the front fender.



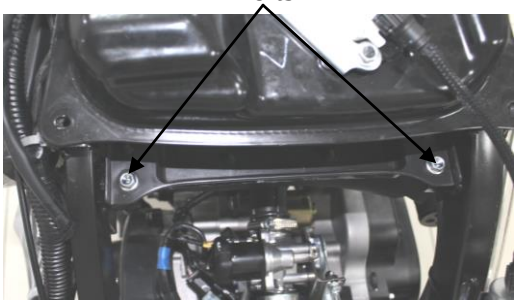
REAR UP FENDER REMOVAL

Remove the met-in box.
Remove the frame body cover.
Remove the six bolts attaching the rear up fender.
Remove the rear up fender.



REAR FENDER REMOVAL

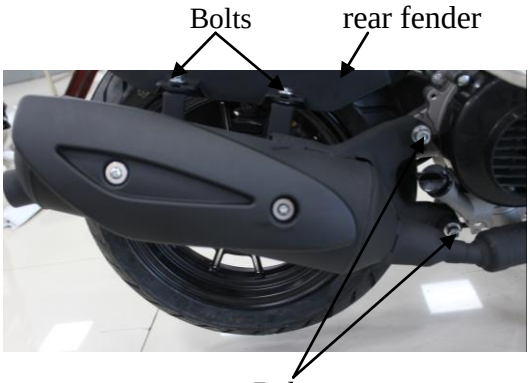
Remove the three bolts attaching the rear fender.
Remove the rear fender.

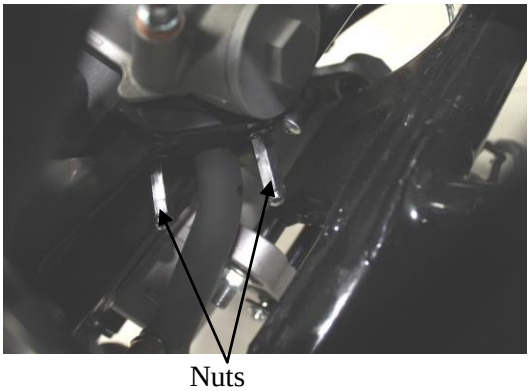


EXHAUST MUFFLER REMOVAL

Remove the two bolts attaching the rear fender.
Remove the two exhaust muffler joint lock nuts.
Disconnect the connector with O2 sensor.
Remove the two exhaust muffler lock bolts.
Remove the exhaust muffler.
Remove the exhaust muffler joint packing collar.

When installing, first install the exhaust muffler packing collar and then install the exhaust muffler.
First install and tighten the exhaust muffler joint lock nuts. Then, install and tighten the exhaust muffler lock bolts.
Install the connector with O2 sensor..





Torques:

Exhaust muffler lock bolt: 3.0~3.6kgf-m
Exhaust muffler joint lock nut: 1.0~1.4kgf-m

* Be sure to install a new exhaust muffler packing collar.

SERVICE INFORMATION

GENERAL

⚠ WARNING

- Before running the engine, make sure that the working area is well-ventilated. Never run the engine in a closed area. The exhaust contains poisonous carbon monoxide gas which may cause death to people.
- Gasoline is extremely flammable and is explosive under some conditions. The working area must be well-ventilated and do not smoke or allow flames or sparks near the working area or fuel storage area.

SPECIFICATIONS

ENGINE

Throttle grip free play	: 2～6mm
Spark plug gap	: 0.6～0.7mm
Spark plug	: CR6HSA
Valve clearance	: IN:0.05~ 0.08mm
	: EX:0.05~ 0.08mm
Idle speed	: 2000 ±100rpm
Engine oil capacity:	
At disassembly	: 0.7 liter
At change	: 0.65 liter
Gear oil capacity	:
At disassembly	: 0.12 liter
At change	: 0.11 liter

3

Cylinder compression : 12.5±2 kg/cm2
Ignition timing: BTDC 12˚±1˚/1800rpm
CHASSIS
Front brake free play: 10～20mm
Rear brake free play : 10～20mm

TIRE PRESSURE

	1 Rider	2 Riders
Front	1.90kg/cm2	1.90kg/cm2
Rear	2.10kg/cm2	2.10kg/cm2

TIRE SIZE:
Front : 100/80-12
Rear : 120/70-12

TORQUE VALUES
Front axle nut 5.5～6.2kgf-m
Rear axle nut 10～11.3kgf-m

MAINTENANCE SCHEDULE

This interval should be judged by odometer reading or months, whichever comes first.

Maintenance schedule legend:

I: INSPECT AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY

C: CLEAN R: REPLACE A: ADJUST L: LUBRICATE

The maintenance schedule on the flowing specifies the maintenance required to keep your **FILLY 50** scooter in peak operating condition. Maintenance work should be performed in accordance with KYMCO standards and specifications by properly trained and equipped technicians. Your KYMCO dealer meets all of these requirements.

Maintenance schedule notes:

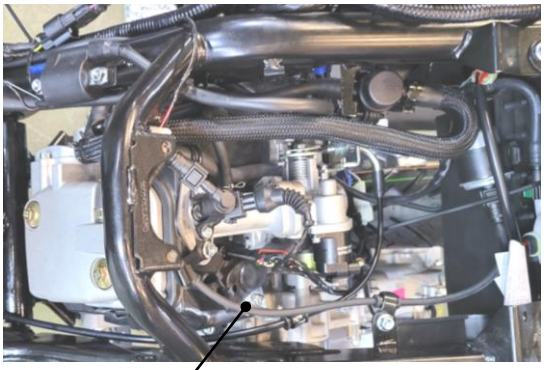
1. At higher odometer readings, repeat at the frequency interval established here.
2. Service more frequently if the scooter is ridden in unusually wet or dusty areas.
3. Service more frequently when riding in rain or at full throttle.
4. Clean every 1,200 mi (2,000 km) after replacement and replace every 3,000 mi (5,000 km).
5. Replace every 2,500 mi (4,000 km).
6. Replace every 2 years. Replacement requires mechanical skill.

FREQUENCY / ITEM	WHICHEVER COMES FIRST / NOTE	MONTH	ODOMETER READING [NOTE (1)]						
		X 1000 km	0.3	1	3	5	7	9	11
		X 1000 mi	0.2	0.6	1.8	3	4.2	5.4	6.6
				3	6	12	18	24	30
AIR CLEANER	NOTE 2			I	R	I	R	I	R
SPARK PLUGS	NOTE 4					R			
THROTTLE OPERATION						I		I	
VALVE CLEARANCE			A		A		A		A
FUEL LINE						I		I	
CRANKCASE BREATHER	NOTE 3			C	C	C	C	C	C
ENGINE OIL			R	R	R	R	R	R	R
ENGINE OIL STRAINER SCREEN			C		C		C		C
ENGINE IDLE SPEED					I		I		I
TRANSMISSION OIL	NOTE 5		R		R		R		R
DRIVE BELT							I		
BATTERY				I	I	I	I	I	I
CLUTCH SHOE WEAR							I		
AIR FILTER CVT						I			I
BRAKE FLUID	NOTE 6				I	I	I	R	I
BRAKE PAD WEAR				I	I	I	I	I	I
BRAKE SYSTEM				I	I	I	I	I	I
BRAKE LIGHT SWITCH						I		I	
STEERING BEARINGS			I			I		I	
HEADLIGHT AIM						I		I	
NUTS, BOLTS, FASTENERS			I			I		I	
WHEELS/TIRES				I	I	I	I	I	I

FUEL LINE

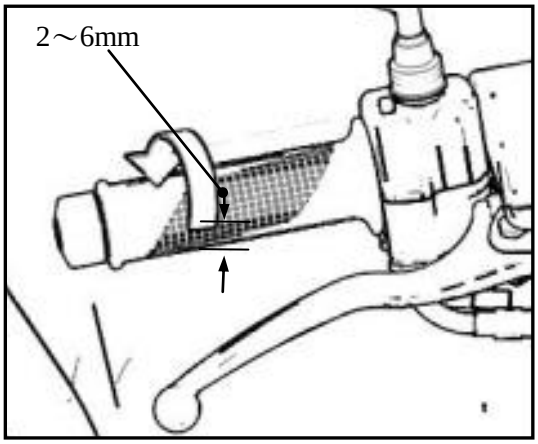
Remove the met-in box.
Check the fuel lines and replace any parts which show signs of deterioration, damage or leakage.

* Do not smoke or allow flames or sparks in your working area.

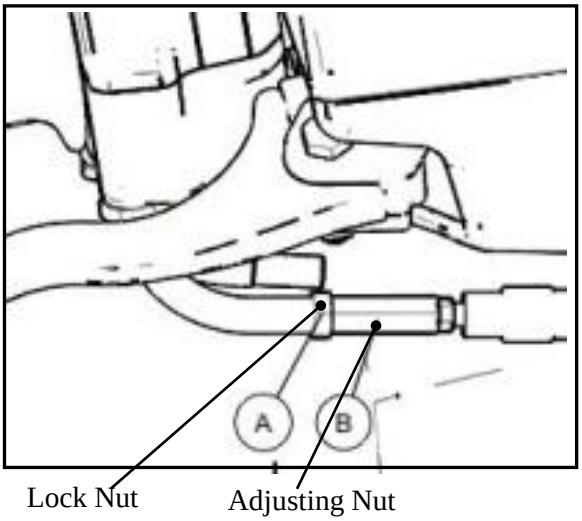


THROTTLE OPERATION

Check the throttle grip for smooth movement.
Measure the throttle grip free play.
Free Play: 2～6mm



Minor adjustment is made with the adjusting nut at the throttle grip side.
Slide the rubber cover out and adjust by loosening the lock nut and turning the adjusting nut.

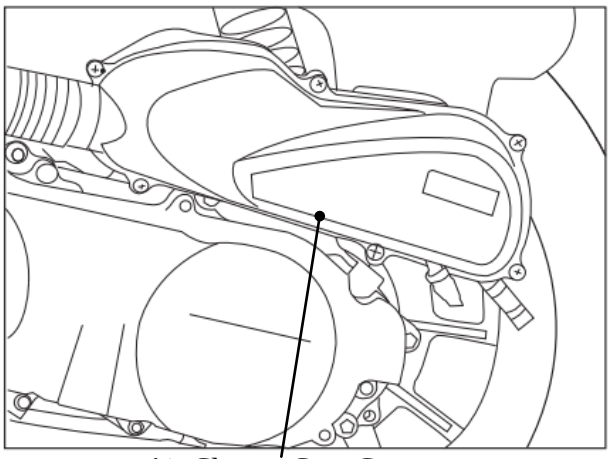


AIR CLEANER

AIR CLEANER REPLACEMENT

Remove the air cleaner case cover screws and the cover by removing the eight screws.

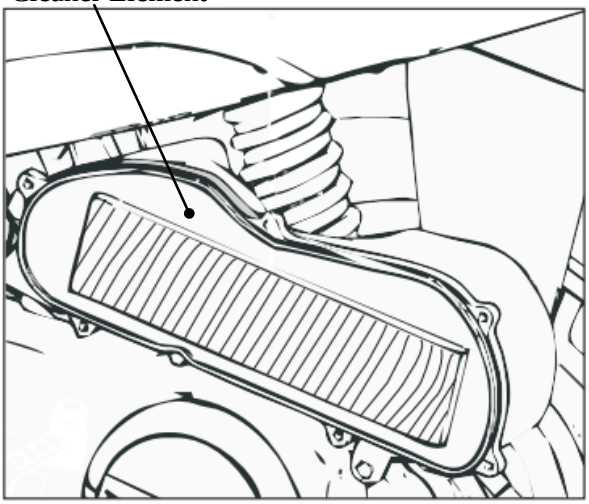
Remove the air cleaner element
Check the element and replace it if it is excessively dirty or damaged.



CHANGE INTERVAL

More frequent replacement is required when riding in unusually dusty or rainy areas.

* • The air cleaner element has a viscous type paper element. Do not clean it with any fluid.
  • Be sure to install the air cleaner element and cover securely.



SPARK PLUG

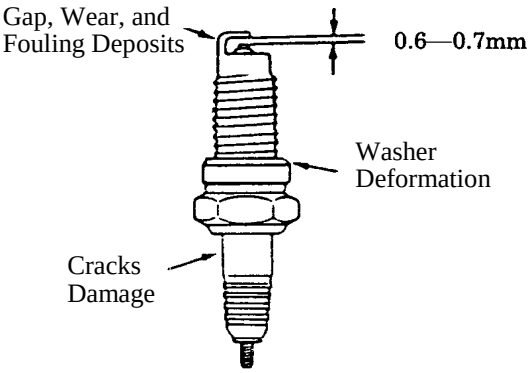
Remove the spark plug.
Check the spark plug for wear and fouling deposits.
Clean any fouling deposits with a spark plug cleaner or a wire brush.

Specified Spark Plug:
CR6HSA

Measure the spark plug gap.

Spark Plug Gap: 0.6～0.7mm

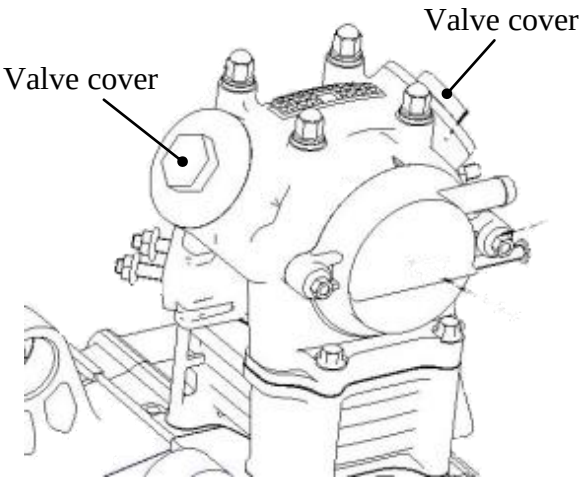
* When installing, first screw in the spark plug by hand and then tighten it with a spark plug wrench.



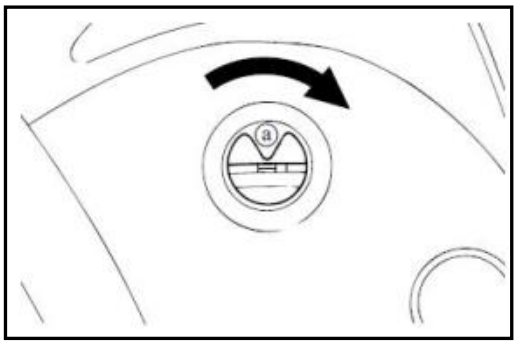
VALVE CLEARANCE

* Inspect and adjust valve clearance while the engine is cold (below 35℃).

Remove the center cover(2-6).
Remove the met-in box(2-6).
Remove the valve cover.



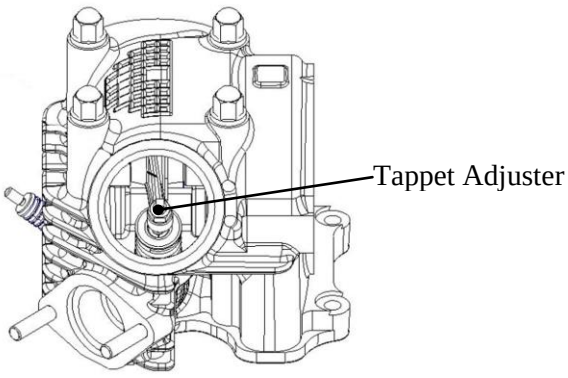
Turn the flywheel counterclockwise so that the "T" mark on the flywheel aligns with the index mark on the crankcase to bring the round hole on the camshaft gear facing up to the top dead center on the compression stroke.

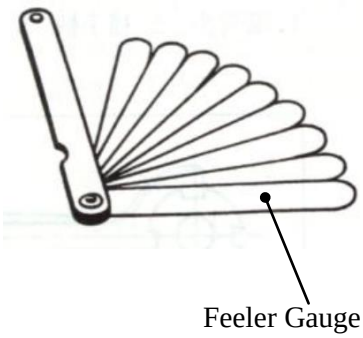


Inspect and adjust the valve clearance.
Valve Clearance: IN : 0.05~0.08mm
EX: 0.05~0.08mm
Loosen the lock nut and adjust by turning the adjusting nut

Special
Tappet Adjuster

* • Check the valve clearance again after the lock nut is tightened.

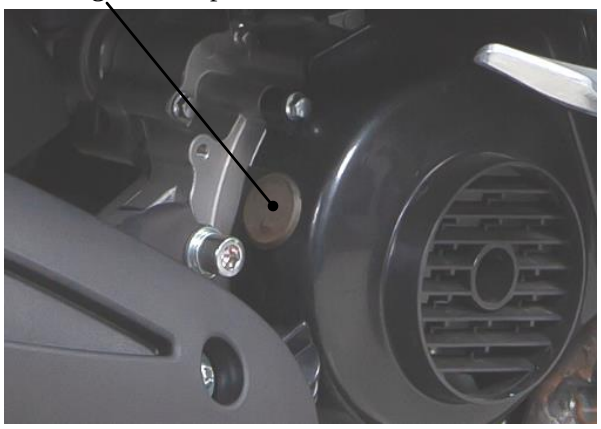




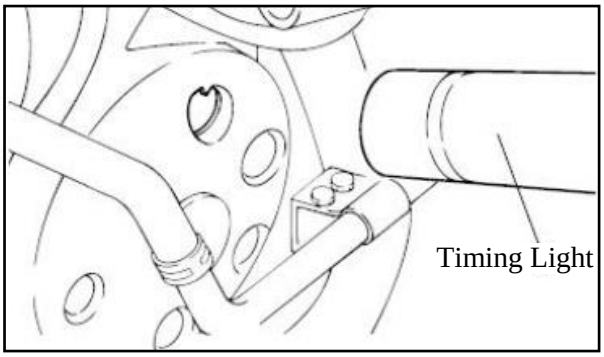
IGNITION TIMING

* If the ignition timing is incorrect, check the ignition system.

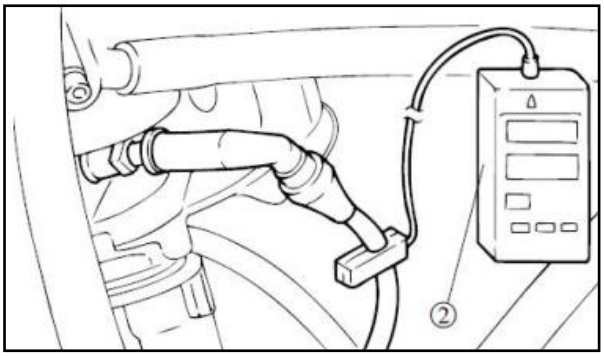
Remove the right of the fan cover.



Check the ignition timing with a timing light. When the engine is running at idle speed, the ignition timing is correct if the "T" mark on the flywheel aligns with the index mark on the crankcase.



Also use a timing light to check the advance. Raise the engine speed to 4,000rpm and the index mark on the crankcase cover should be aligned with the advance mark on the flywheel.



CYLINDER COMPRESSION

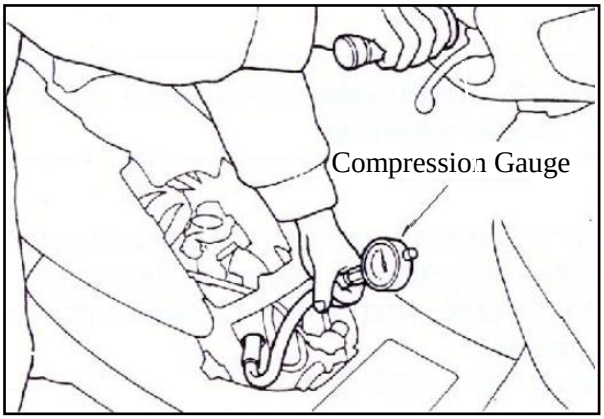
Warm up the engine before compression test.
Remove the met-in box and center cover.
Remove the spark plug.
Insert a compression gauge.
Open the throttle valve fully and push the starter button to test the compression.

Compression: 12.5kg/cm^2

If the compression is low, check for the following:

- Leaky valves
- Valve clearance to small
- Leaking cylinder head gasket
- Worn piston rings
- Worn piston/cylinder

If the compression is high, it indicates that carbon deposits have accumulated on the combustion chamber and the piston head.



ENGINE OIL

Engine oil recommendation

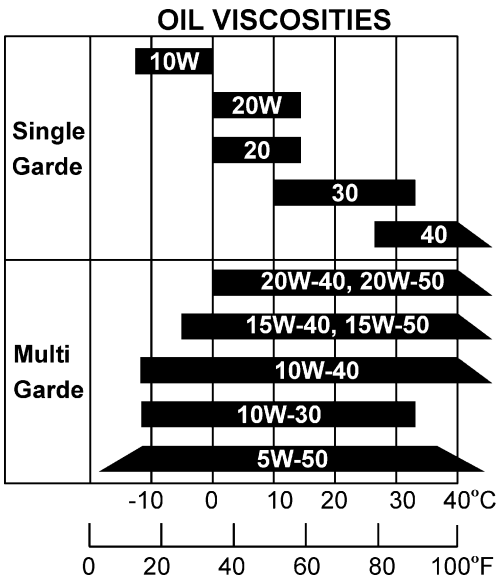
Use a premium quality 4-stroke motor oil to ensure longer service life of your scooter.

Use only oils which are rated, SL under the API

service classification. The recommended viscosity

is SAE 15W-40.

If SAE 15W-40 motor oil is not available, select an alternative according to the right chart.



Engine oil capacity:

At disassembly: 0.7 L

At change: 0.65 L

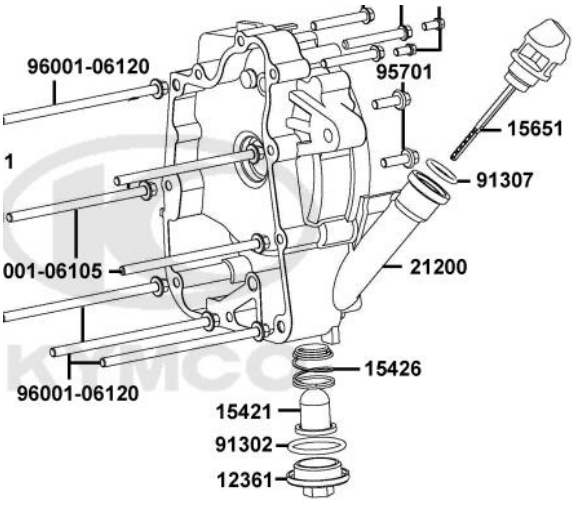
Drain

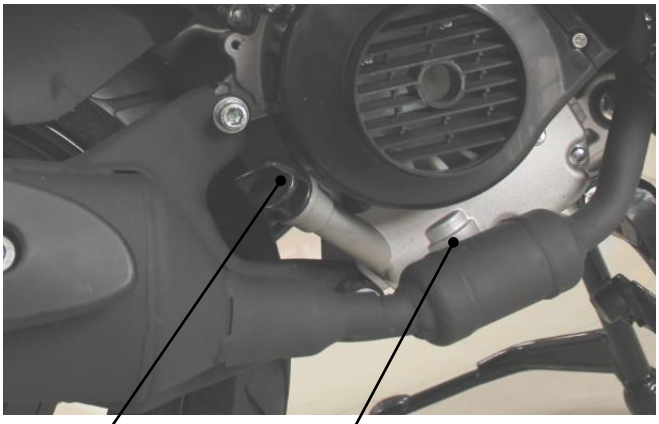
Oil strainer screen clean

Clean the oil strainer screen.

Check that the oil strainer screen, sealing rubber

and drain plug O-ring are in good condition.





Oil Dipstick Oil Filter Screen Cap

FINAL REDUCTION GEAR OIL

OIL LEVEL CHECK

* Place the scooter on its main stand on level ground for oil level check.

Stop the engine and remove the oil check bolt.
The oil level shall be at the oil check bolt hole.
If the oil level is low, add the recommended oil to the proper level.

Recommended Oil: SAE90#

Install the oil check bolt.

* Make sure that the sealing washer is in good condition.

OIL CHANGE

Remove the oil check bolt.
Remove the oil drain bolt and drain the oil thoroughly.
Install the oil drain bolt.
Torque: 0.8~1.2kgf-m

* Make sure that the sealing washer is in good condition.

Oil Drain Bolt/ Sealing Washer

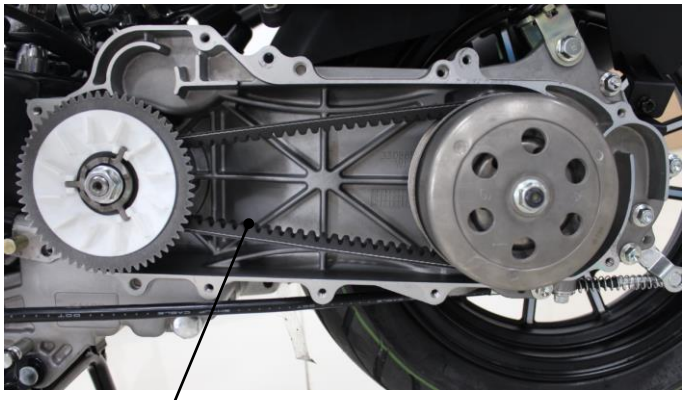
Fill with the recommended oil.

Oil Capacity: At disassembly : 0.12 liter
At change : 0.11 liter

Reinstall the oil check bolt and check for oil leaks.
Torque:0.8~1.2kgf-m

DRIVE BELT

Remove the left crankcase cover.
Inspect the drive belt for cracks or excessive wear.
Replace the drive belt with a new one if necessary and in accordance with the Maintenance Schedule.


Drive Belt

FRONT BRAKE

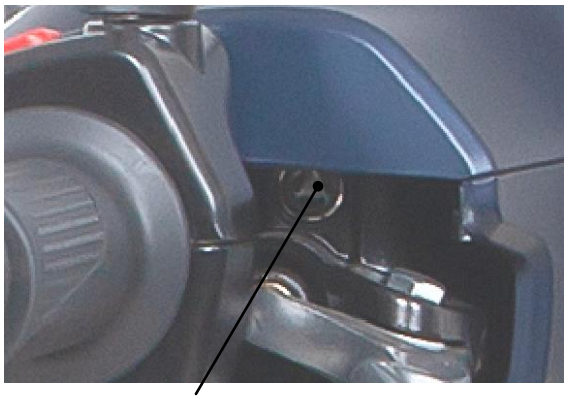
BRAKE FLUID

Brake fluid level:

With the scooter in an upright position, check the front fluid level. It should be above the lower level mark. If the level is at or below the lower level mark "L", check the brake pads for wear.

Worn pads should be replaced. If the pads are not worn, have your brake system inspected for leaks.

The recommended brake fluid is **DOT 4** brake fluid from a sealed container, or an equivalent.



Lower Line

BRAKE PAD WEAR

Brake pad wear depends upon the severity of usage, the type of riding, and road conditions.

(Generally, the pads will wear faster on wet and dirty roads.)

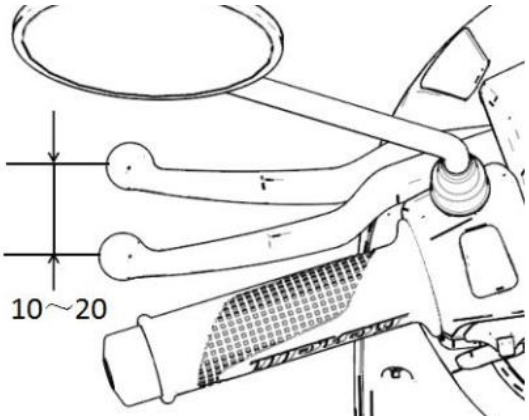
Check the cutout in each pad.

If either pad is worn to the cutout, replace both pads as a set.

REAR BRAKE

Measure the rear brake lever free play.

Free Play: 10～20mm



BRAKE ADJUSTING NUT

If the free play do not fall within the limit, adjust by turning the adjusting nut.

BRAKE SHOE

Replace the brake shoes if the arrow on the wear indicator plate aligns with the punch mark on the brake panel when the brake is fully applied.

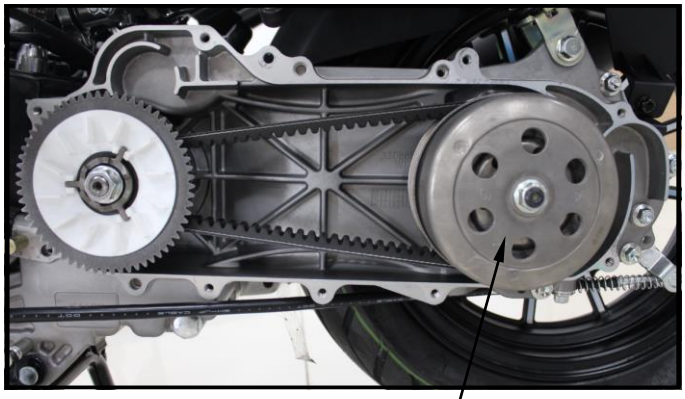
Adjusting nut

HEADLIGHT AIM

Turn the ignition switch ON and start the engine.
Adjust the headlight aim by turning the headlight aim adjusting screw.

CLUTCH SHOE WEAR

Start the engine and check the clutch operation by increasing the engine speed gradually.
If the motorcycle tends to creep, or the engine stalls, check the clutch shoes for wear and replace if necessary.



SUSPENSION

FRONT

Fully apply the front brake lever and check the action of the front shock absorbers by compressing them several times.
Check the entire shock absorber assembly for oil leaks, looseness or damage.

REAR

Check the action of the rear shock absorber by compressing it several times.
Check the entire shock absorber assembly for oil leaks, looseness or damage.
Jack the rear wheel off the ground and move the rear wheel sideways with force to see if the engine hanger bushings are worn.

NUTS/BOLTS/FASTENERS

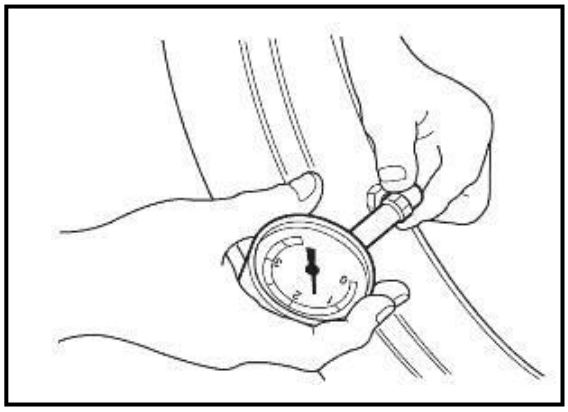
Check all important chassis nuts and bolts for looseness.
Tighten them to their specified torque values if any looseness is found.

WHEELS/TIRES

Check the tires for cuts, imbedded nails or other damages.

Check the tire pressure.

* Tire pressure should be checked when tires are cold.



TIRE PRESSURE

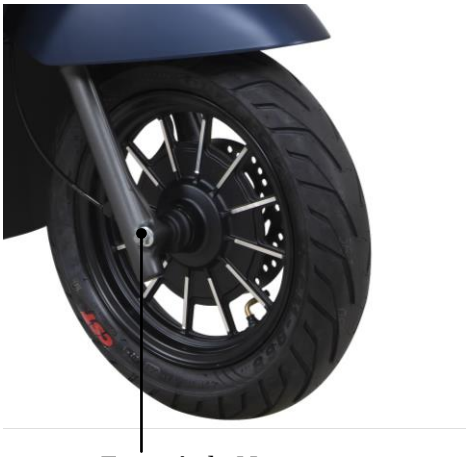
	1 Rider	2 Riders
Front	1.90kg/cm2	1.90kg/cm2
Rear	2.10kg/cm2	2.10kg/cm2

TIRE SIZE

Front: 100/80-12
Rear : 120/70-12

Check the front axle nut for looseness.
Check the rear axle nut for looseness.
If the axle nuts are loose, tighten them to the specified torques.

Torques: **Front** : 5.0～7.0kgf-m
Rear : 11～13kgf-m

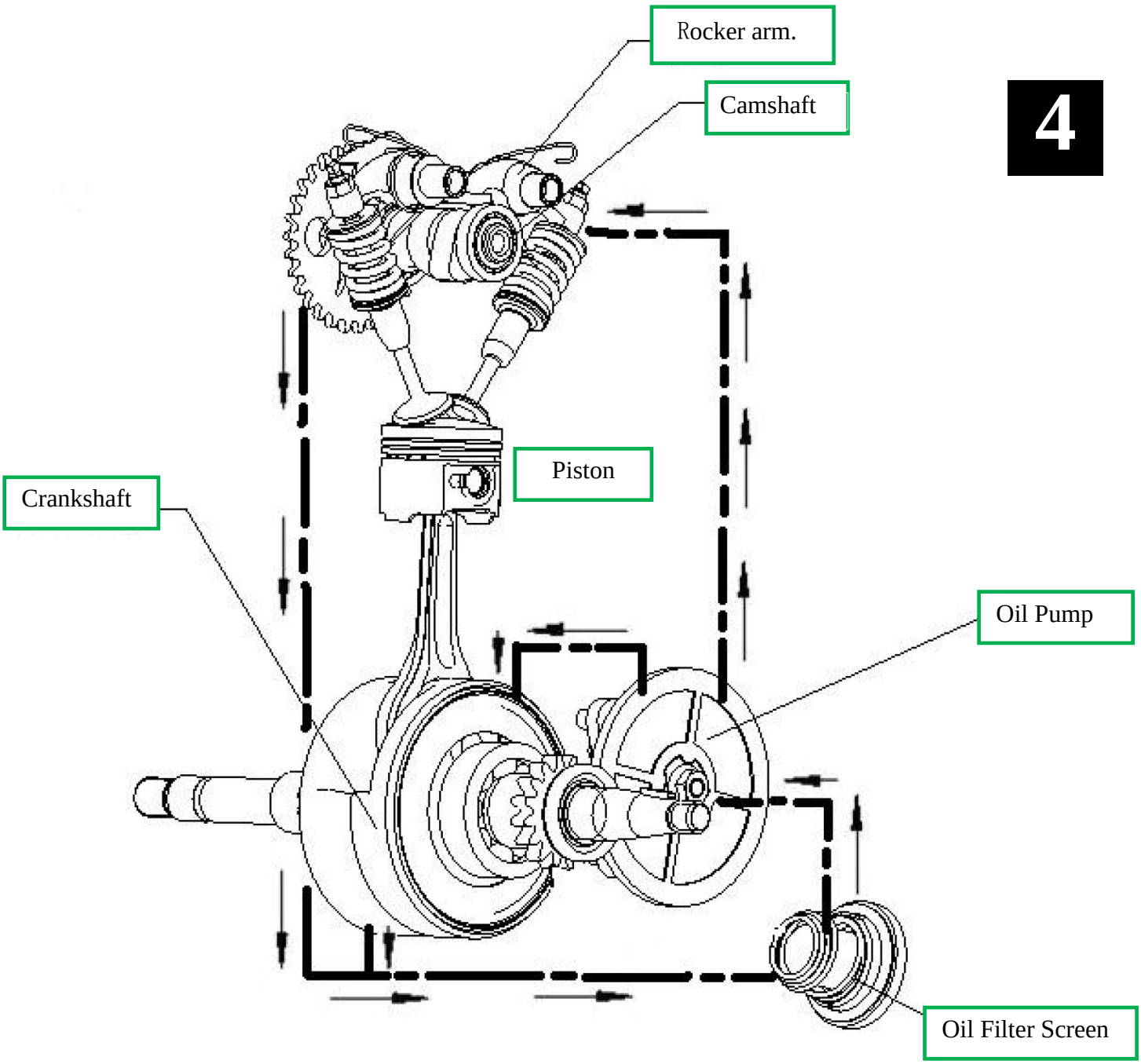


Front Axle Nut

STEERING HANDLEBAR

Check that the control cables do not interfere with handlebar rotation.
Raise the front wheel off the ground and check that the steering handlebar rotates freely.
If the handlebar moves unevenly, binds, or has vertical movement, adjust the steering head bearing.

LUBRICATION SYSTEM



SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The maintenance of lubrication system can be performed with the engine installed in the frame.
- Use care when removing and installing the oil pump not to allow dust and foreign matters to enter the engine and oil line.
- Do not attempt to disassemble the oil pump. The oil pump must be replaced as a set when it reaches its service limit.
- After the oil pump is installed, check each part for oil leaks.

SPECIFICATIONS

Item		Standard (mm)	Service Limit (mm)
Oil pump	Inner rotor-to-outer rotor clearance	0.09-0.19	0.19
	Outer rotor-to-pump body clearance	0.15-0.21	0.21
	Rotor end-to-pump body clearance	0.05～0.11	0.11

TROUBLESHOOTING

Oil level too low

- Natural oil consumption
- Oil leaks
- Worn or poorly installed piston rings
- Worn valve guide or seal

Poor lubrication pressure

- Oil level too low
- Clogged oil filter or oil passages
- Not use the specified oil

4. LUBRICATION SYSTEM

ENGINE OIL/OIL FILTER

OIL LEVEL

* • Place the motorcycle upright on level ground for engine oil level check.
  • Run the engine for 2～3 minutes and check the oil level after the engine is stopped for 1 minutes.

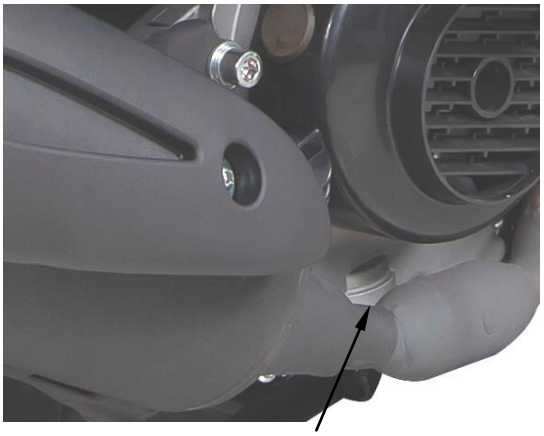
Remove the oil dipstick and check the oil level with the oil dipstick.
If the level is near the lower level, fill to the upper level with the specified engine oil.


Oil Dipstick

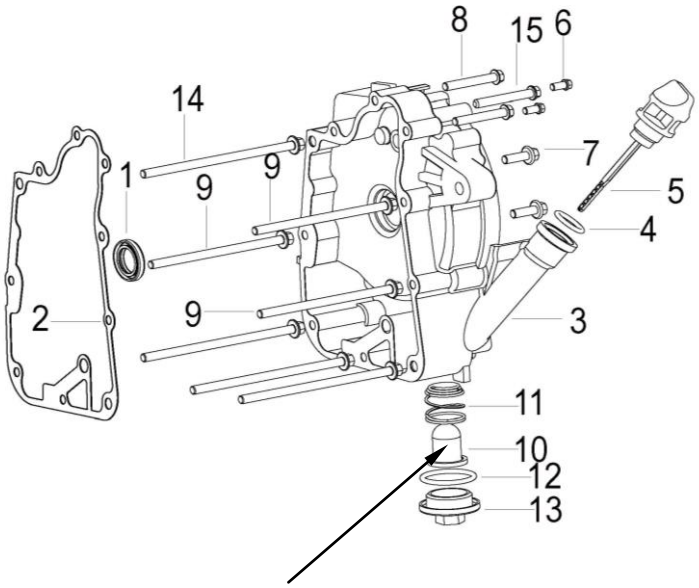
OIL CHANGE

* The engine oil will drain more easily while the engine is warm.

Remove the drain bolt to drain the engine oil thoroughly.
Remove the oil filter screen cap and clean the oil filter screen with compressed air.


Oil Filter Screen Cap

Check the filter screen O-ring for damage and replace if necessary.
Install the oil filter screen, spring and filter screen cap.
Torque: 1.0~2.0kgf-m



Oil Filter Screen

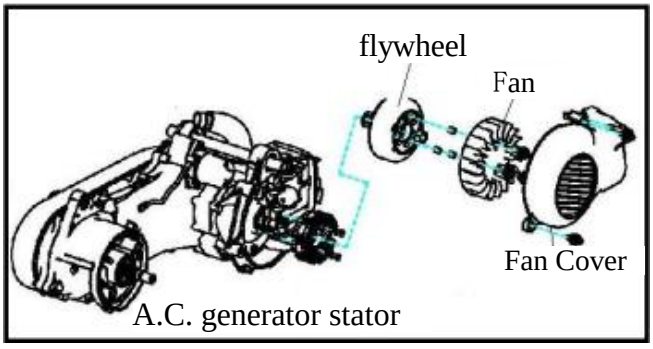
Fill the crankcase with the specified engine oil to the proper level.
Oil Capacity: At disassembly : 0.7 liter
At change : 0.65 liter

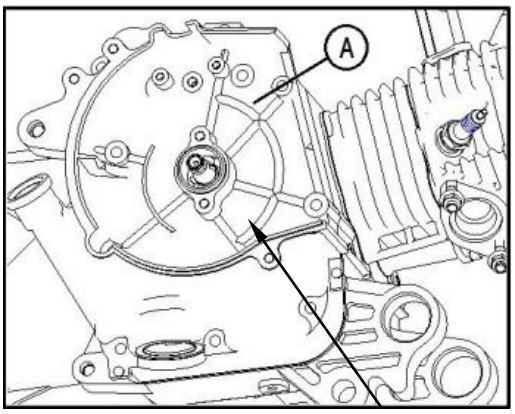
Check for oil leaks and then start the engine and let it idle for few minutes.
Recheck the oil level.

OIL PUMP

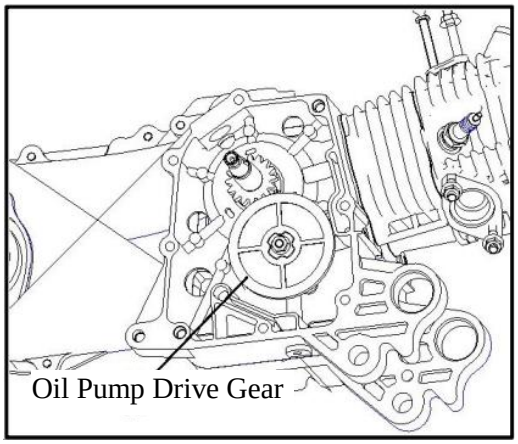
REMOVAL

Remove the Fan Cover and Fan.
Remove the A.C. generator flywheel.
Remove the A.C. generator stator and pulsar coil.
Remove the right crankcase cover bolts and the right crankcase cover.

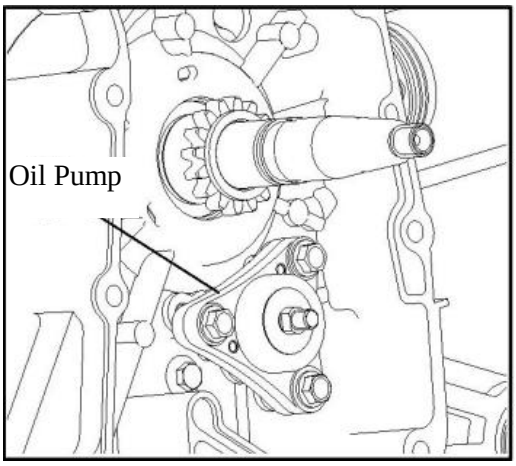




Remove the oil pump drive gear nut.
Remove the oil pump gear.

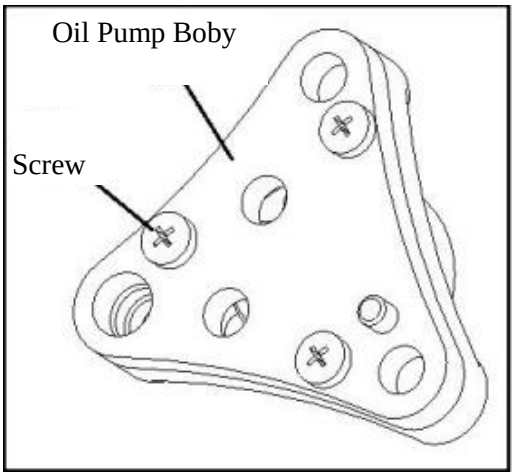


Remove the oil pump mounting bolts.
Remove the oil pump.



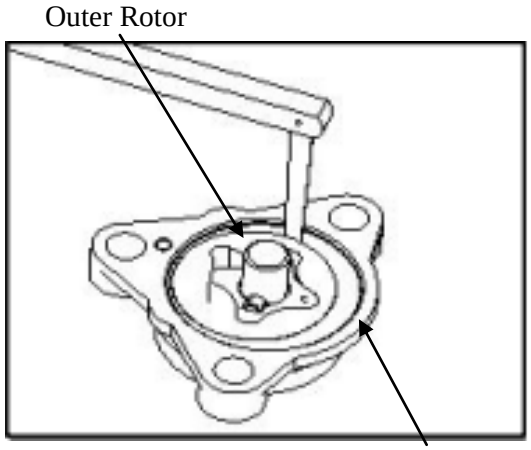
DISASSEMBLY

Remove the oil pump boby screws.
Disassembly the oil pump.

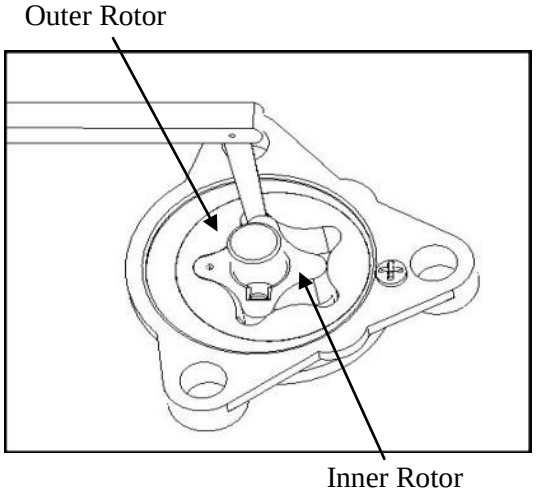


INSPECTION

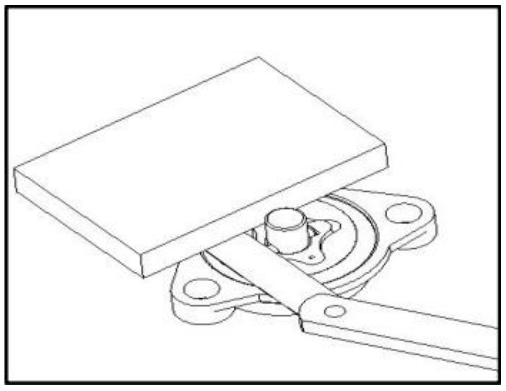
Measure the pump boby-to-outer rotor clearance.
Service Limit: 0.21mm



Measure the inner rotor-to-outer rotor clearance.
Service Limit: 0.19mm



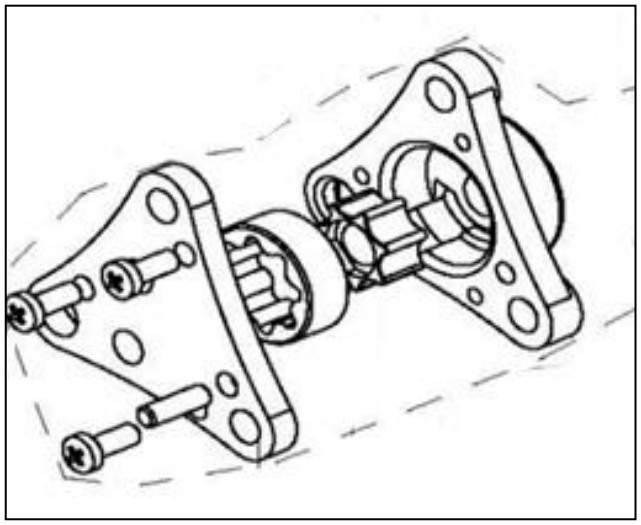
Measure the rotor end-to- pump boby clearance.
Service Limit: 0.11mm



4. LUBRICATION SYSTEM

ASSEMBLY

Install the outer rotor, inner rotor and pump shaft into the pump boby.

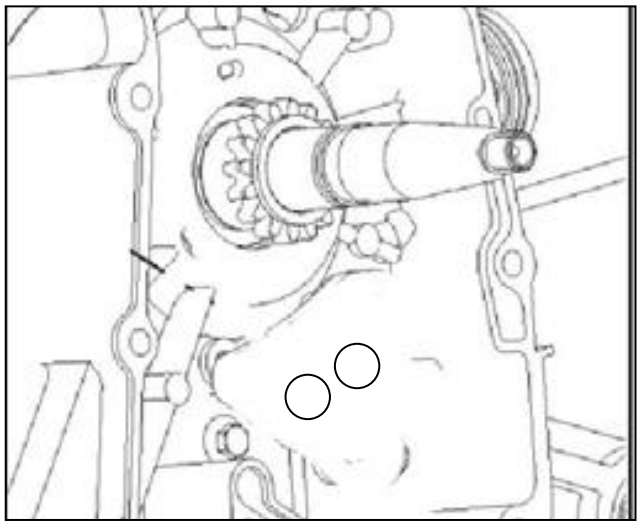


* Install the pump shaft by aligning the flat on the shaft with the flat in the inner rotor.

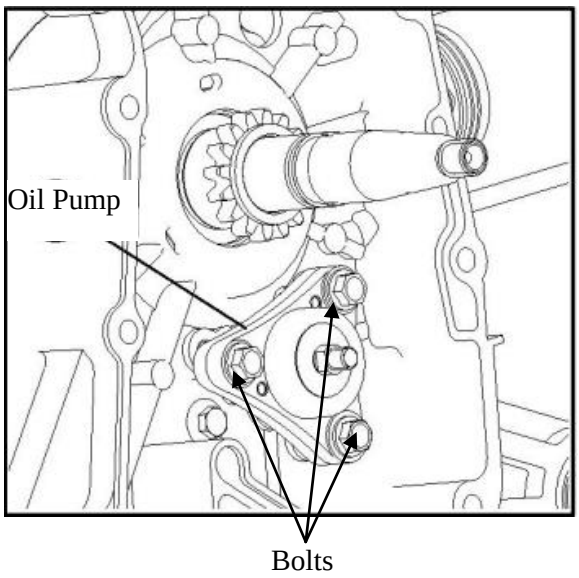
Install the pump cover and tighten the screws to secure the pump cover.

INSTALLATION

First install the two O-rings and dowel pins onto the oil pump base.



Install the oil pump into the crankcase.



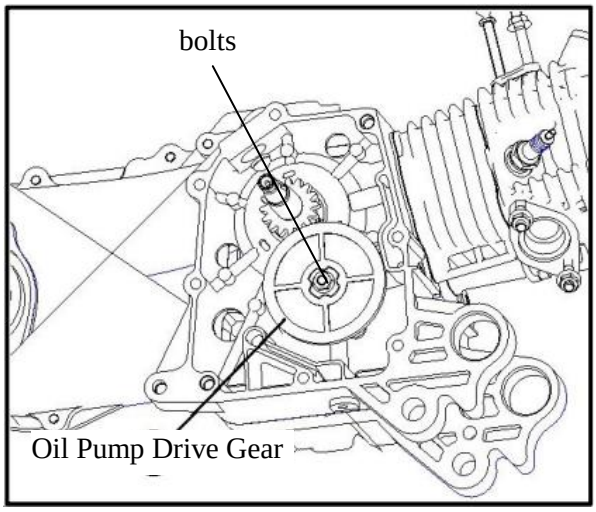
* Fill the oil pump with engine oil before installation.

After the oil pump is installed, tighten the three mounting bolts.

4. LUBRICATION SYSTEM

Install the pump driven gear and tighten the three mounting bolts..

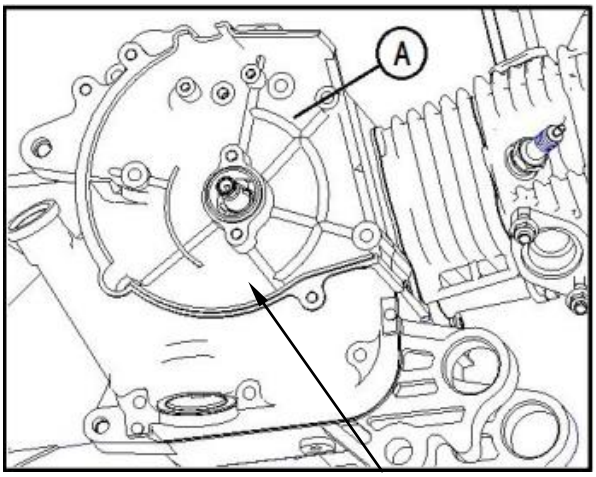
Torque: 0.8～1.2kg-m



Install the right crankcase cover and tighten the bolts.

Torque: 0.8~1.2kgf-m

* Diagonally tighten the bolts in 2～3 times.



Right Crankcase Cover

FUEL INJECTION SYSTEM

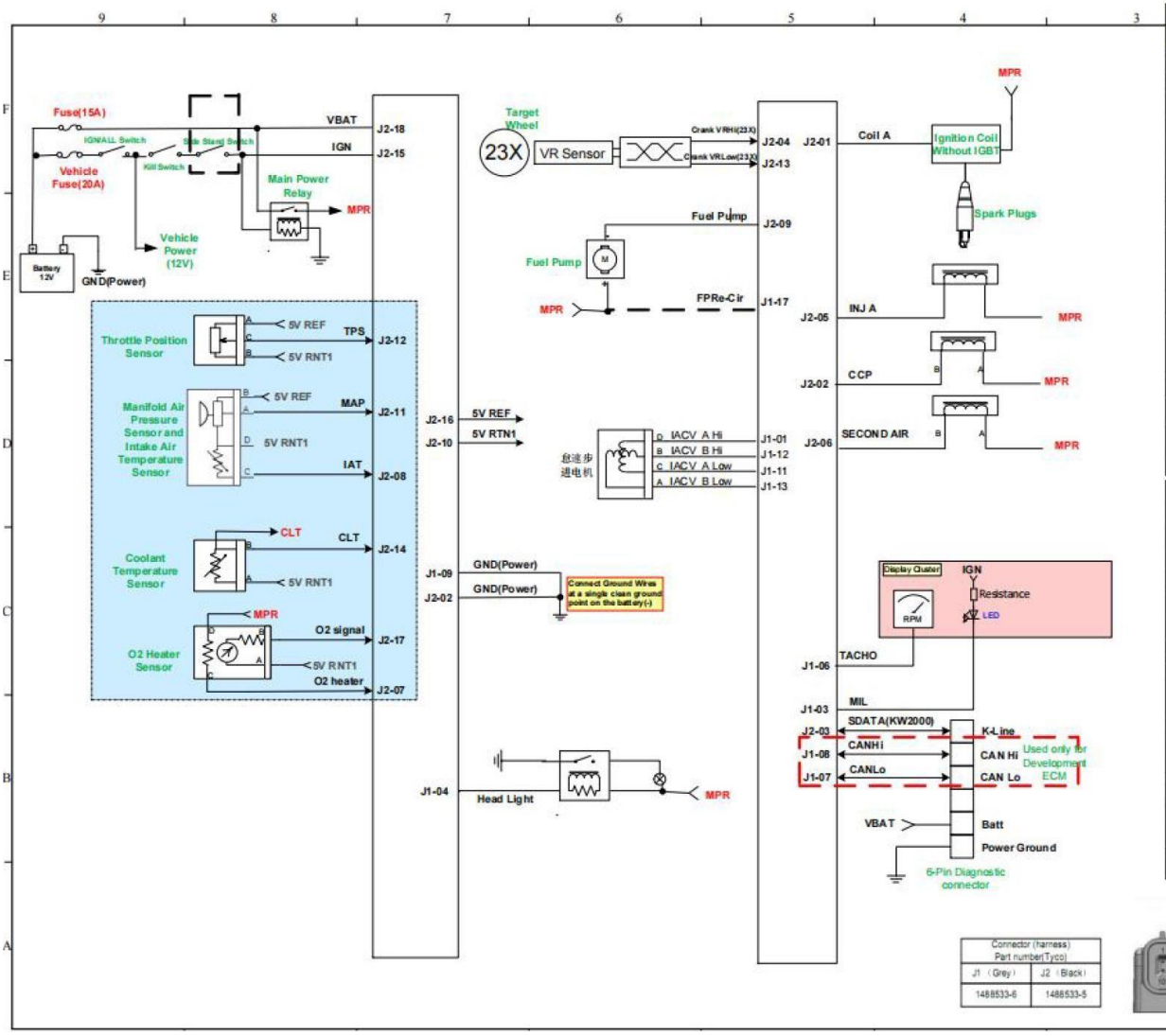
SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Scooter services can be done with the engine installed in the frame.
- Be sure to relieve the fuel pressure before fuel pump or fuel hose removal.
- Bending or twisting the control cables will affect operation and could cause the cables to stick or bind, resulting in loss of vehicle control.
- Work in a fully ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- Do not apply the Carburetor Cleaners to the inside of the throttle body, which is coated with molybdenum.
- Do not snap the throttle valve from fully open to fully close after the throttle cable has been removed; it may cause incorrect idle speed.
- Do not loosen or tighten the painted bolts and screws of the throttle body. Loosening or tighten them can cause throttle and idle valve synchronization failure.
- Seal the cylinder head intake ports with tape or a clean towel to prevent dirt and debris from entering the intake ports after the throttle body has been removed.
- Do not damage the throttle body. It may cause incorrect throttle and idle valve synchronization.
- Do not take the fuel pump on the ground downward.
- Always replace the packing when the fuel pump is removed.
- The electronic fuel injection system is equipped with the self-diagnostic system. If the Check Engine Lamp “CELP” illuminate while riding, follow the self-diagnostic procedures to solve the problem.
- A faulty FI problem is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- When disassembling the fuel injection parts, note the location of the O-rings. Replace them with new ones upon reassembly.
- Do not disconnect the battery negative (-) or positive (+) cable while engine is running, it may cause ECU damage.
- **Do not disconnect or connect the ECU connector during the ignition switch “ON”; it may cause the ECU damage.**

5. FUEL INJECTION SYSTEM

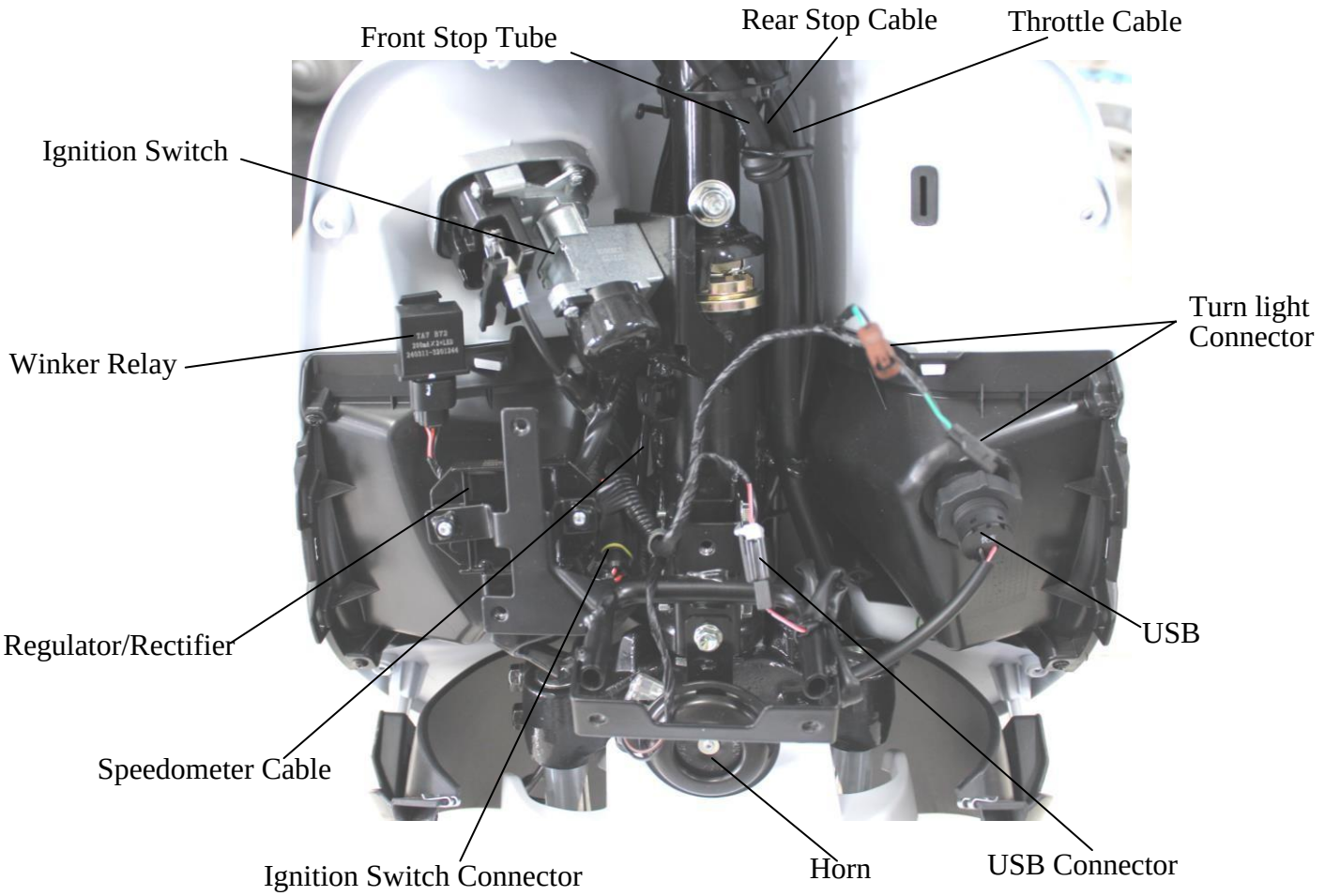
INJECTION SYSTEM DIAGRAM

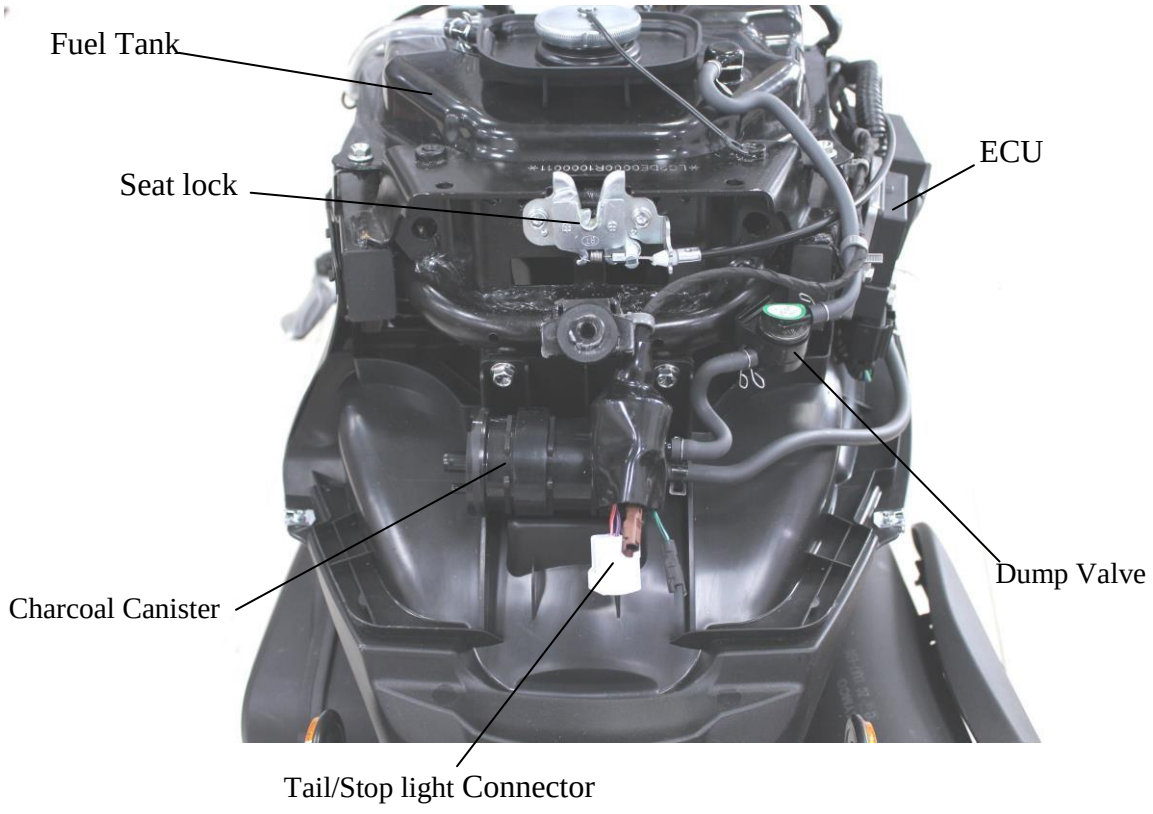


Connector	Function description
J1-1	IACV Ahi
J1-2	CCP
J1-3	MIL
J1-4	Head Light
J1-5	
J1-6	TACHO
J1-7	CANLo
J1-8	CANHi
J1-9	GND(Power)
J1-10	
J1-11	IACV Alow
J1-12	IACV B hi
J1-13	IACV B low
J1-14	Rollover(low active) (reserved function)
J1-15	
J1-16	
J1-17	FPRe-Cir (reserved function)
J1-18	

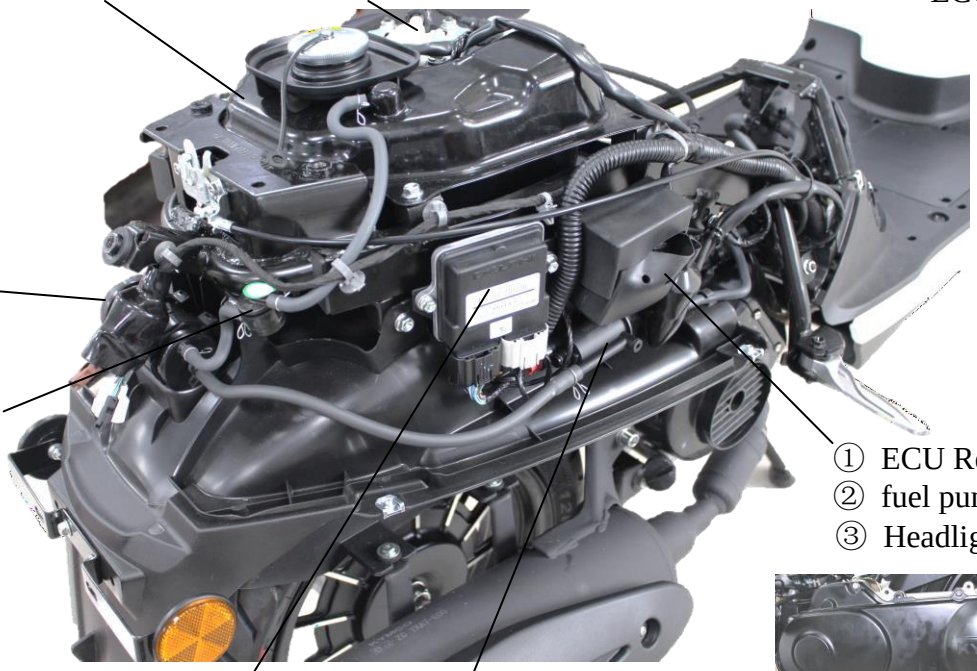
J2-1	Coil A
J2-2	GND(Power)
J2-3	SDATA(KW2000)
J2-4	Crank VRHi(23X)
J2-5	INJ A
J2-6	Second air
J2-7	O2 heaterA
J2-8	IAT
J2-9	Fuel Pump
J2-10	5V RTN1
J2-11	MAP
J2-12	TPS
J2-13	Crank VRLow(23X)
J2-14	CLT
J2-15	IGN
J2-16	5V REF
J2-17	O2 signal A
J2-18	VBAT

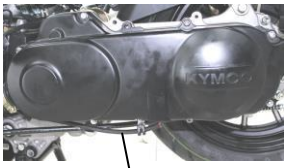
PARTS LOCATION

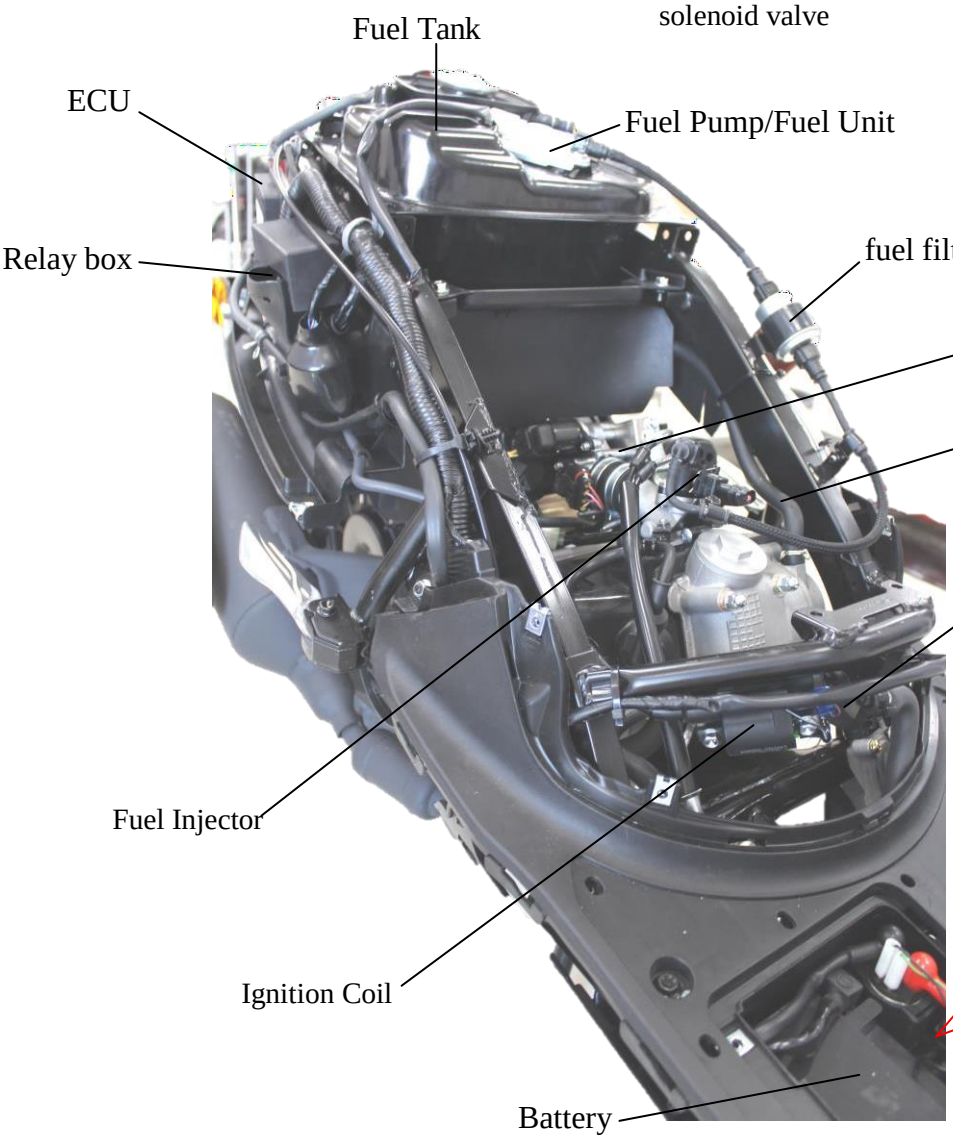


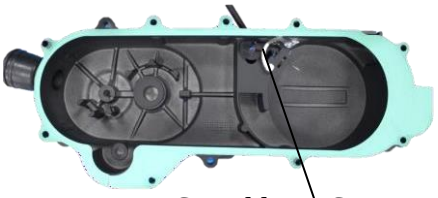


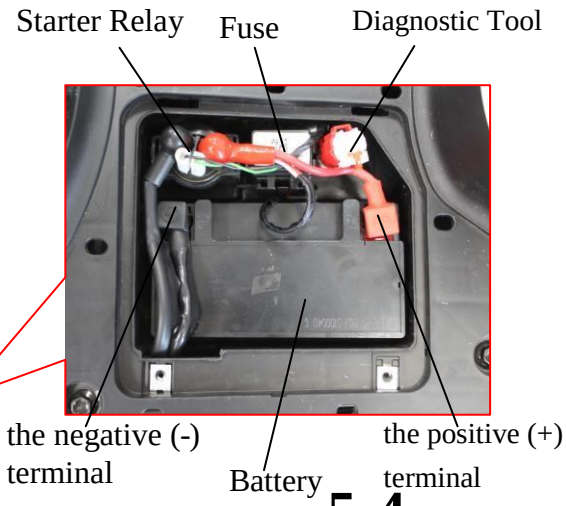
5. FUEL INJECTION SYSTEM

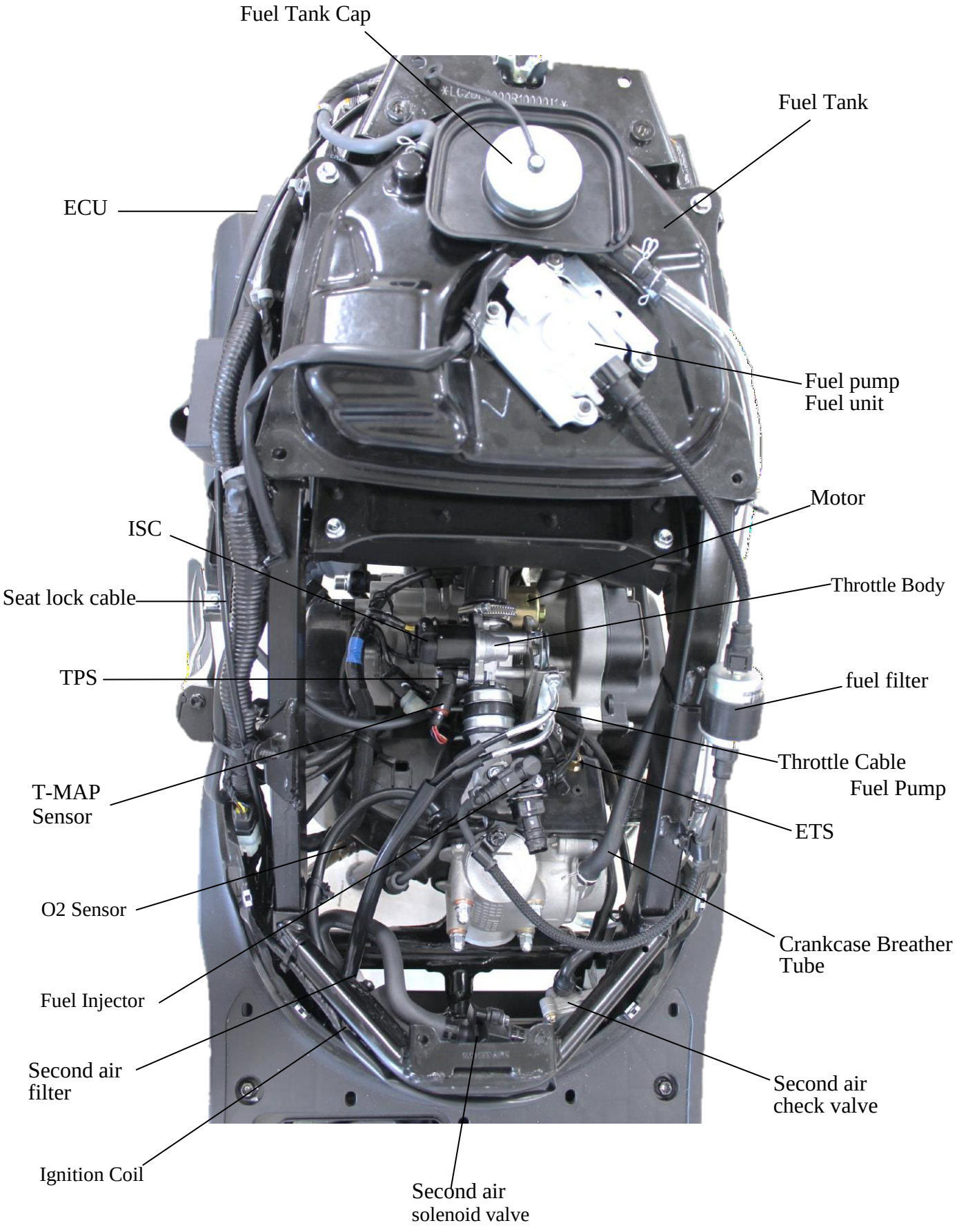











Fuel Tank Cap
Fuel Tank
ECU
Fuel pump
Fuel unit
Motor
ISC
Seat lock cable
Throttle Body
TPS
fuel filter
Throttle Cable
Fuel Pump
T-MAP
Sensor
ETS
O2 Sensor
Crankcase Breather
Tube
Fuel Injector
Second air
filter
Second air
check valve
Ignition Coil
Second air
solenoid valve

TROUBLESHOOTING

Engine fail to start
- Intake manifold air leak
- Fuel contaminated/deteriorated
- Pinched or clogged fuel hose
- Faulty fuel pump
- Clogged fuel filter, throttle body
- Sticking fuel injector needle
- Faulty fuel pump operating system
- Carbon deposit stayed on the fuel injector
- Spark plug dirty
- Fuel pressure incorrect

Backfiring or misfiring during acceleration
- Ignition system malfunction

Engine stall, hard to start, rough idling
- Intake air leak
- Fuel contaminated/deteriorated
- Pinched or clogged fuel hose
- Idle speed fail to adjust
- Fail to perform PTS/ISC reset

Poor performance (drive ability) and poor fuel economy
- Pinched or clogged fuel hose
- Faulty injector

No	Complaint	Symptom	Probable Cause
1	Engine will not start, or is hard to start.	Starter motor does not run	Ignition switch malfunction
			Starter motor malfunction
			Battery low
			Starter relay malfunction
			Start button bad connection
			Open circuit, short circuit
			Start button malfunction
			Engine stop switch malfunction
			Fuse burnt
		Starter motor runs but the engine does not crank	Starter clutch malfunction
			Valve seized
			Rocker arm seized
		Engine does not run	Piston seized
			Big end or small end of the rod seized
			Crankshaft seized
			Drive gear or bearing seized
			Camshaft seized
			Balance shaft bearing seized
		No fuel pass through	Insufficient fuel
			Fuel tank breathe hole clogged
			Fuel filter clogged
			Fuel pump malfunction
			Fuel hose clogged
		Engine overflow	Clean the spark plug
			Starting technical error (the engine cannot be started when the throttle is fully open during overflow, which will make the EMS supply more fuel)
		No spark/ weak spark	Ignition switch turn off
			Engine stop switch is at off
			Gear not at neutral gear
			Battery low
			Spark plug contaminated or broken
			Spark plug cap or high tension lead broken
			Spark plug cap short circuit or poor connection
			Faulty spark plug
			ECU broken
			Open circuit/ Protection switch/ Side stand switch

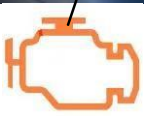
No	Complaint	Symptom	Probable Cause
			malfunction
			Ignition coil malfunction
			A.C. Generator signal cord malfunction
			Ignition switch or engine stop switch short circuit
			Short circuit or open circuit in the harness wire
			Ground wire poor connection
			Fuse burnt
		Air-fuel ratio too lean or too rich	Air cleaner clogged/ no sealed/ no installed
		Compression low	Spark plug loose
			Cylinder head is not tightened
			Cylinder head gasket worn
			Cylinder head distortion
			Cylinder or piston worn
			Piston rings worn/ sized/ elastic fatigue
			Valve has no gap
			Valve spring broken/ fatigue
			Valve is bent/ worn/ carbon deposits on the seat
			Pressure release cam rod is not placed properly
2	Poor performance at low speed	Weak spark	Battery low
			Spark plug contaminated/ broken
			Spark plug cap or high tension lead broken
			Spark plug cap short circuit/ poor connection
			Faulty spark plug
			ECU broken
			Ignition coil malfunction
			Ground wire poor connection
		Air-fuel ratio too lean or too rich	Air cleaner clogged/ no sealed/ no installed
			Fuel tank breath hole clogged
			Throttle body loose
			Fuel pump malfunction
		Compress pressure low	Spark plug loose
			Cylinder head is not tightened
			Cylinder head gasket worn
			Cylinder head distortion
			Cylinder or piston worn
			Gap between piston ring and groove too large
			Valve has no gap
			Valve spring broken/ fatigue

No	Complaint	Symptom	Probable Cause
		Others	ECU broken
			Engine oil viscosity too high/ add too much
			Transmission system malfunction
			Gear oil viscosity too high/ add too much
			Brake delay or interference
			Engine overheat or too cool
			Slipping clutch
3	Engine lacks power at high speed/ poor operation	Faulty ignition timing	Spark plug contaminated/ broken
			Spark plug cap or high tension lead broken
			Spark plug cap shirt circuit/ poor connection
			Faulty spark plug
			ECU broken
			Ignition coil malfunction
			A.C. Generator signal cord malfunction
		Air-fuel ratio too lean or too rich	Air cleaner clogged/ no sealed/ no installed
			Throttle body loose
			Fuel pump malfunction
			Fuel contains water or foreign matters
			Fuel tank breathe hole clogged
			Fuel hose clogged
			Insufficient fuel
		Compress pressure low	Spark plug loose
			Cylinder head is not tightened
			Cylinder head gasket worn
			Cylinder head distortion
			Cylinder or piston worn
			Gap between piston ring and groove too large
			Valve spring broken/ fatigue
			Valve is bent/ worn/ carbon deposits on the seat
		Knock	Carbon deposits stuck in the combustion chamber
			Fuel quality bad or faulty fuel
			Faulty spark plug
		Others	Throttle-down
			Brake delay or interference
			Slippery clutch
			Gear oil viscosity too high/ add too much
			Transmission system malfunction
			Gear oil viscosity too high/ add too much
			Engine overheat

No	Complaint	Symptom	Probable Cause
			Exhaust pipe clogged
4	Excessive smoke	White smoke	Cylinder worn
			Valve oil seal worn
			Piston oil ring worn
			Valve guides or valve stem seals worn
			Too much engine oil
		Black smoke	Air cleaner clogged
		Brown smoke	Air cleaner clogged/ no sealed/ no installed

CHECK ENGINE LAMP (CELP)

Open the Ignition switch, the CLEP indicator will illuminate always.
After starting it will crush out.
If there is any malfunction,
the CLEP indicator will still illuminate,
please take your scooter to a KYMCO dealer for service as soon as possible.



CELP

Fuel Injection System Failure Code

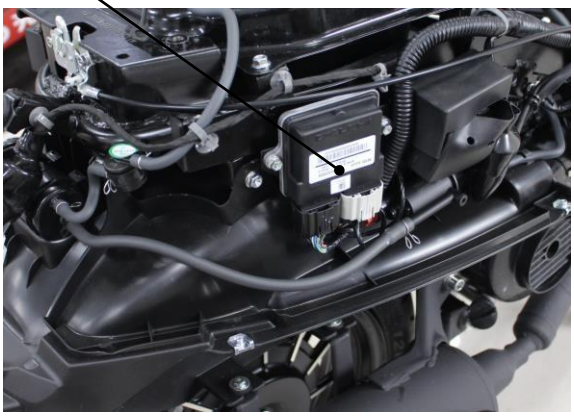
Manifold Absolute Pressure Sensor (MAP)	P0107	MAP Circuit Low Voltage or Open	KsDGDM_MAP_ShortLow
	P0108	MAP Circuit High Voltage	KsDGDM_MAP_ShortHigh
Intake Air Temperature Sensor (IAT)	P0112	IAT Circuit Low Voltage	KsDGDM_IAT_ShortLow
	P0113	IAT Circuit High Voltage or Open	KsDGDM_IAT_ShortHigh
Coolant/Oil Sensor	P0117	Coolant/Oil Temperature Sensor Circuit Low Voltage	KsDGDM_CoolantShortLow
	P0118	Coolant/Oil Temperature Sensor Circuit High Voltage or Open	KsDGDM_CoolantShortHigh
Throttle Position Sensor (TPS)	P0122	TPS Circuit Low Voltage or Open	KsDGDM_TPS_ShortLow
	P0123	TPS Circuit High Voltage	KsDGDM_TPS_ShortHigh
Oxygen Sensor	P0131	O2S 1 Circuit Low Voltage	KsDGDM_O2_1_ShortLow
	P0132	O2S 1 Circuit High Voltage	KsDGDM_O2_1_ShortHigh
Oxygen Sensor Heater	P0031	O2S Heater Circuit High Voltage	KsDGDM_O2_HeaterShortHigh
	P0032	O2S Heater Circuit Low Voltage	KsDGDM_O2_HeaterShortLow
Fuel Injector A	P0201	Injector A Fault	KsDGDM_INJ_CYL_A_FaultHigh
Fuel Injector B	P0202	Injector B Fault	KsDGDM_INJ_CYL_B_FaultHigh
Fuel Pump Relay (FPR)	P0230	FPR Coil Circuit Low Voltage or Open	KsDGDM_FPP_CircuitShortLow
	P0232	FPR Coil Circuit High Voltage	KsDGDM_FPP_CircuitShortHigh
Crankshaft Position Sensor (CKP)	P0336	CKP Sensor Noisy Signal	KsDGDM_CrankNoisySignal
	P0337	CKP Sensor No Signal	KsDGDM_CrankNoSignal
Ignition Coil A	P0351	Cylinder A Ignition Coil fault	KsDGDM_EST_A_Fault
Ignition Coil B	P0352	Cylinder B Ignition Coil fault	KsDGDM_EST_B_Fault

Ignition Coil B	P0352	Cylinder B Ignition Coil fault	KsDGDM_EST_B_Fault
Idle Control System	P0505	Idle Speed Control Error	KsDGDM_IdleControl
System Voltage	P0562	System Voltage Low	KsDGDM_SysVoltLow
	P0563	System Voltage High	KsDGDM_SysVoltHigh
MIL	P0650	MIL Circuit Malfunction	KsDGDM_MIL_Circuit
Tachometer	P1693	Tachometer Circuit Low Voltage	KsDGDM_TAC_Circuit_Low
	P1694	Tachometer Circuit High Voltage	KsDGDM_TAC_Circuit_High
Oxygen Sensor 2	P0137	O2S 2 Circuit Low Voltage	KsDGDM_O2_2_ShortLow
	P0138	O2S 2 Circuit High Voltage	KsDGDM_O2_2_ShortHigh
Oxygen Sensor Heater 2	P0038	O2S Heater 2 Circuit High Voltage	KsDGDM_O2_HeaterShortHigh
	P0037	O2S Heater 2 Circuit Low Voltage	KsDGDM_O2_HeaterShortLow
Vehicle Speed Sensor	P0500	VSS No Signal	KsDGDM_VSS_NoSignal
Park Neutral Switch Diag	P0850	Park Neutral Switch Error	KsDGDM_ParkNeutralSwitch
CCP	P0445	CCP short to high	KsDGDM_CCP_CircuitShortHigh
	P0444	CCP short to low/open	KsDGDM_CCP_CircuitShortLow
Rollover Sensor Diagnostic	P1500	Rollover Sensor malfunction/Triggered	KsDGDM_RolloverSensor
BLM_MaxAdapt	P0171	Several BLM value hit maximum	KsFDIAG_BLM_MaxAdapt
BLM_MinAdapt	P0172	Several BLM value hit minimum	KsFDIAG_BLM_MinAdapt
PESystLean	P0174	PE mode burned AFR keeps lean	KsFDIAG_PESystLean

ELECTRIC CONTROL UNIT (ECU)

REMOVAL

Remove the center cover.(2-6).
Remove the met-in box .(2-6).
Remove the rear carrier.(2-6)
Remove the rear center cover(2-6)
Remove the body cover.(2-7).



* ● Do not disconnect or connect the ECU connector during the ignition switch "ON"; it may cause the ECU damaged.
  ● The throttle position sensor (TPS) and idle air bypass valve (ISC) have to be reset when throttle body, MAP, TPS, ISC or ECU has been reinstalled.

Disconnect the ECU connector and remove the ECU from the frame.

Installation is in the reverse order of the removal.

ECU PIN FUNCTION

Connector	Function description
J1-1	IACV Ahi
J1-2	OCP
J1-3	MIL
J1-4	Head Light
J1-5	
J1-6	TACHO
J1-7	CANLo
J1-8	CANHi
J1-9	GND(Power)
J1-10	
J1-11	IACV Alow
J1-12	IACV B hi
J1-13	IACV B low
J1-14	Rollover(low active) (reserved function)
J1-15	
J1-16	
J1-17	FPRe-Cir (reserved function)
J1-18	

J2-1	Coil A
J2-2	GND(Power)
J2-3	SDATA(KW2000)
J2-4	Crank VRHi(23X)
J2-5	INJ A
J2-6	Second air
J2-7	O2 heaterA
J2-8	IAT
J2-9	Fuel Pump
J2-10	5VRTN1
J2-11	MAP
J2-12	TPS
J2-13	Crank VRLow(23X)
J2-14	CLT
J2-15	IGN
J2-16	5VREF
J2-17	O2 signal A
J2-18	VBAT

FUEL PUMP

INSPECTIION

Put the side stand up and the engine stop switch is at "RUN"

Disconnect the fuel pump/fuel unit connector.

Connect the multimeter (+) probe to the Black/Red terminal and the multi-meter (-) probe to the Green terminal.

Turn the ignition switch to "ON" and measure the voltage between the terminals.

It should be shown the current battery voltage for a few seconds.

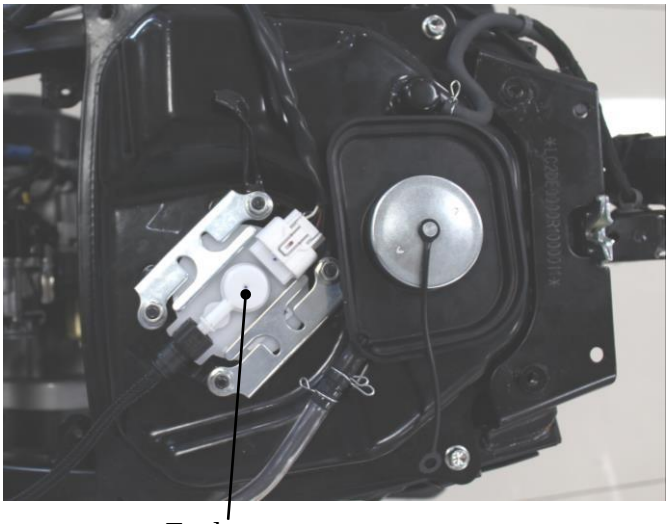
If there is still battery voltage, replace the fuel pump.

If there is not any battery voltage, inspect the following:

- Fuse B (15 A)
- Starting Relay
- ECU

Measure the resistance between the terminals of the fuel pump side connector.

Standard (at 20℃/68℉) **:** About 7 Ω



Fuel pump

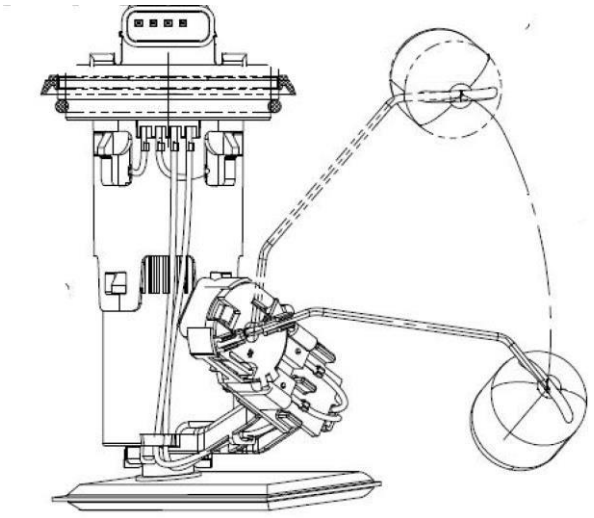
② fuel pump Relay

Fuel Unit

Measure the resistance between the fuel unit wire terminals with the float at upper and lower positions.

RESISTANCES Unit: Ω

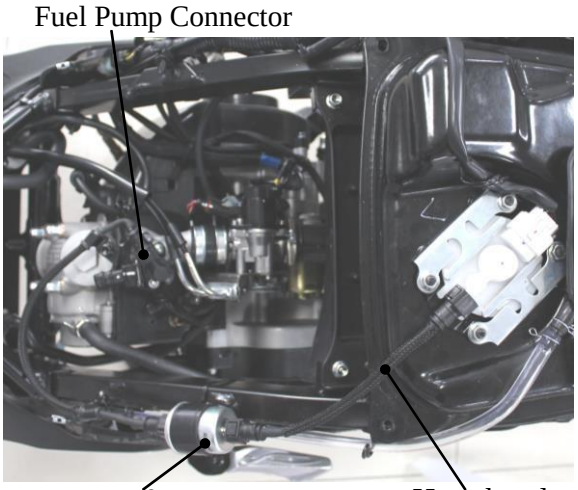
Wire Terminals	Upper	Lower
B～W/Y	7±2	97±3



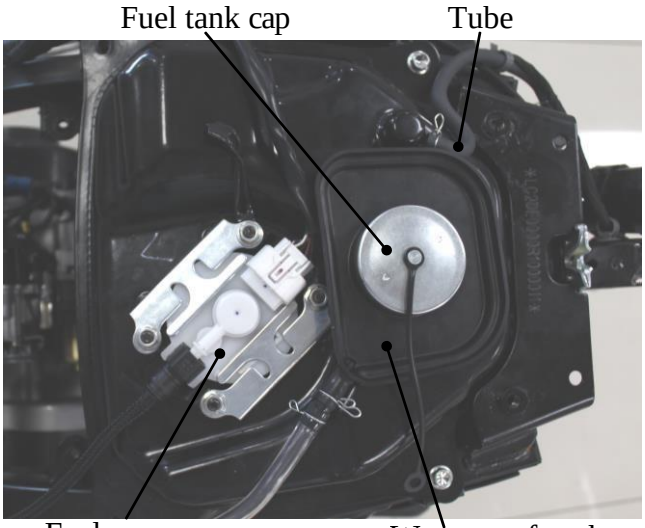
5. FUEL INJECTION SYSTEM

REMOVAL

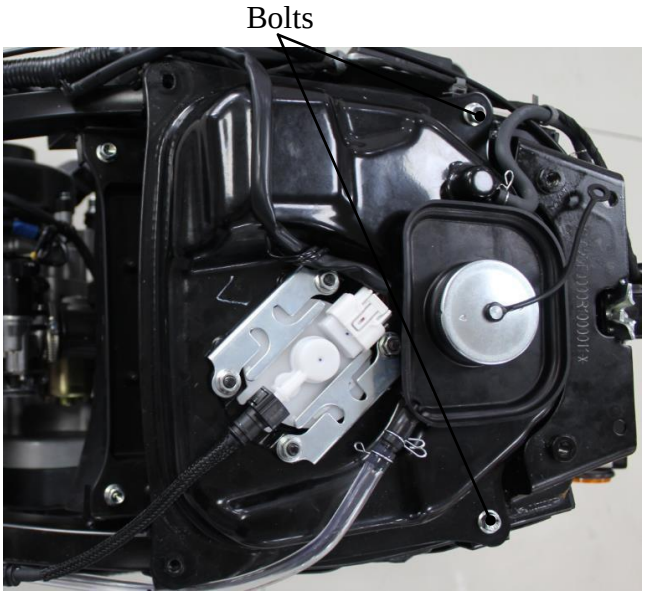
Remove the center cover.(2-6).
Remove the met-in box .(2-6).
Remove the rear carrier.(2-6)
Remove the rear center cover(2-6)
Remove the body cover.(2-7).
Disconnect the connector and fuel band from the fuel pump.



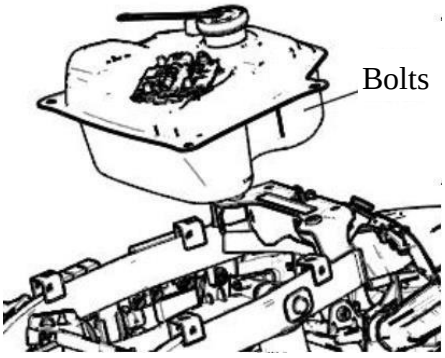
Remove the fuel tank cap and waterproof gasket
Disconnect the tube from the fuel tank.



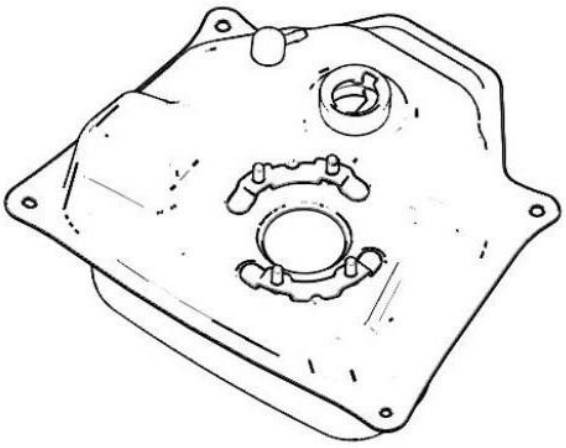
Disconnect the connector of the fuel pump.



Remove the two bolts.
Remove the fuel tank.



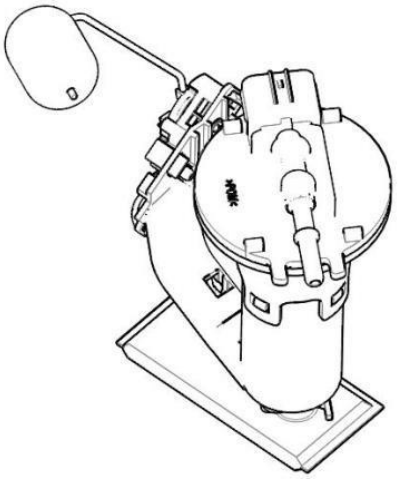
Remove the bolts onto the fuel pump.
Remove the fuel pump and O-ring.



INSTALLATION

Replace a new O-ring on the fuel tank.
Don't damage the fuel pump wire and ensure the connector rearward carefully.

Torque: 0.3~0.4 kgf-m (3~4N-m,)



FUEL OUTPUT PRESSURE INSPECTIION

Turn the key to the OFF position.
Use the fuel hose clamp.
Disconnect the fuel hose from the fuel injector.
Connect the fuel pressure gauge.
Turn the key to the ON position.
Check the fuel pressure.

Standard:3.0 Bar

* If the fuel output pressure is less than 3.0 bar, may fail to start the engine or in trouble in case of riding.

FUEL PUMP RELAY

INSPECTION

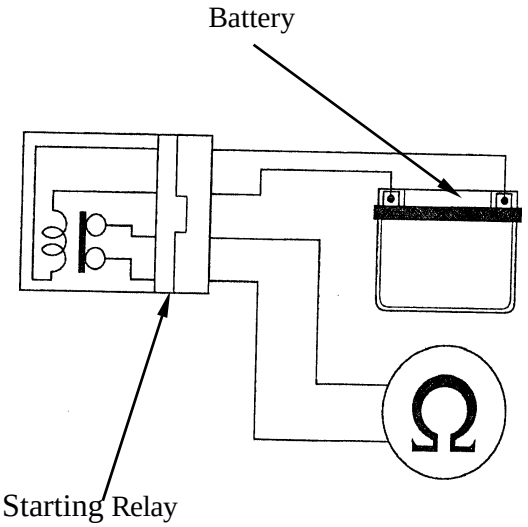
Remove the fuel pump relay.
Connect the ohmmeter to the fuel pump relay connector terminals.

Connection: Pink – Red/Black

Connect 12 V battery with the fuel pump relay connector.

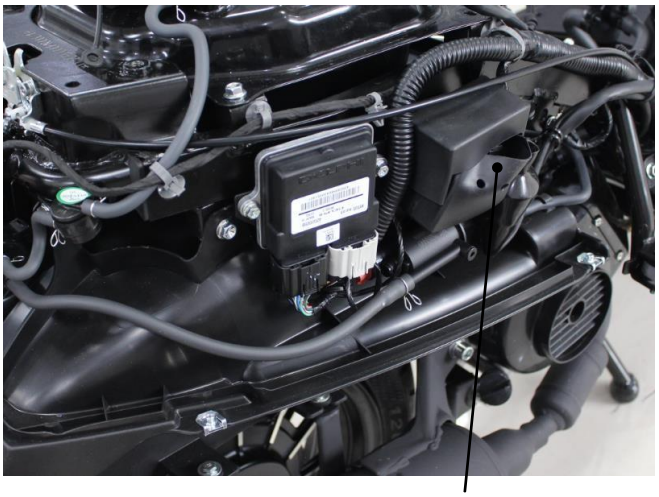
Connection: Red/White – Green/Red

There should be continuity only when 12 V battery connected.
If there is not continuity when the 12 V battery is connected, replace a fuel pump relay.



REMOVAL

Disconnect the fuel pump relay connector and remove it from frame.



FUEL INJECTOR

INSPECTION

Remove the met-in box .(2-5).

Disconnect the fuel injector connector.

Measure the resistance between 2 pins of the fuel injector connector.

Standard: about 10 Ω (at 20°C/68°F)

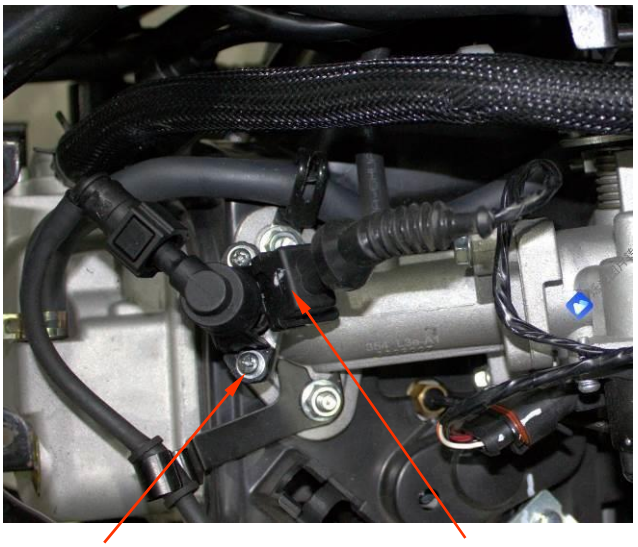
REMOVAL

Disconnect the connector from the fuel injector.

Remove the bolt of the fuel injector.

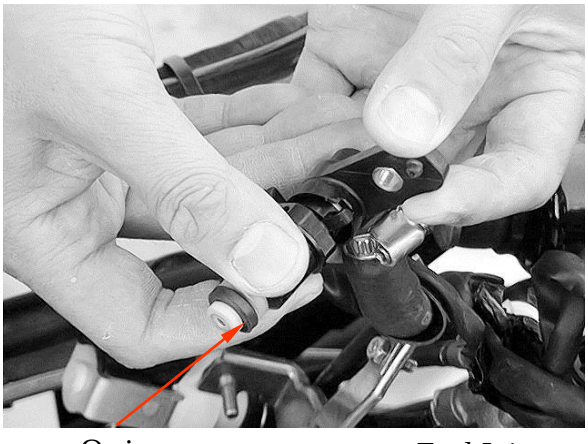
Take out of the fuel pipe and fuel injector from the Inlet pipe.

Remove the fuel injector from the fuel pipe.



Bolt Connector

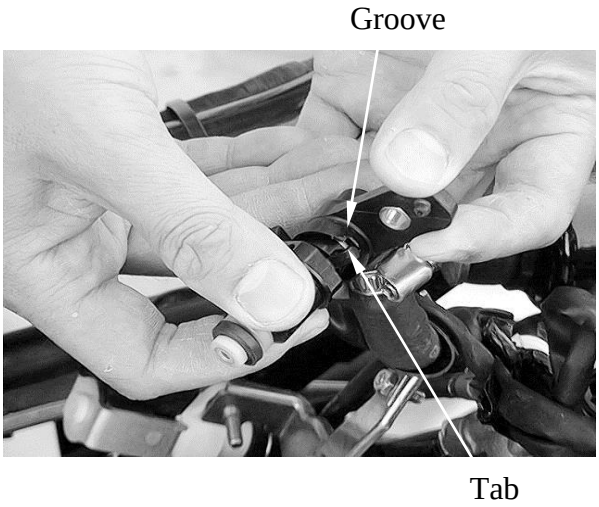
* Ensure the fuel pipe without any pressure, then remove the fuel injector.
  STEP 1: Disconnect the fuel pump relay or fuel pump connector.
  STEP 2: Turn the key to the ON position. Starting the engine till the engine stop working.



O-ring Fuel Injector

INSTALLATION

Apply the engine oil to a new O-ring.
Install the fuel injector into the fuel pipe.
Ensure the tab of the fuel injector inserted into the groove of the fuel pipe.



Install the fuel pipe into the intake manifold by aligning the dowel pin.
Be careful not to damage the O-ring.
Tighten the fuel pipe mounting bolt.

FUEL INJECTOR CLEANING

PROBLEM

1. Fuel Injector cannot output the fuel.
2. The Injector injection time (ms) is shorter or longer.

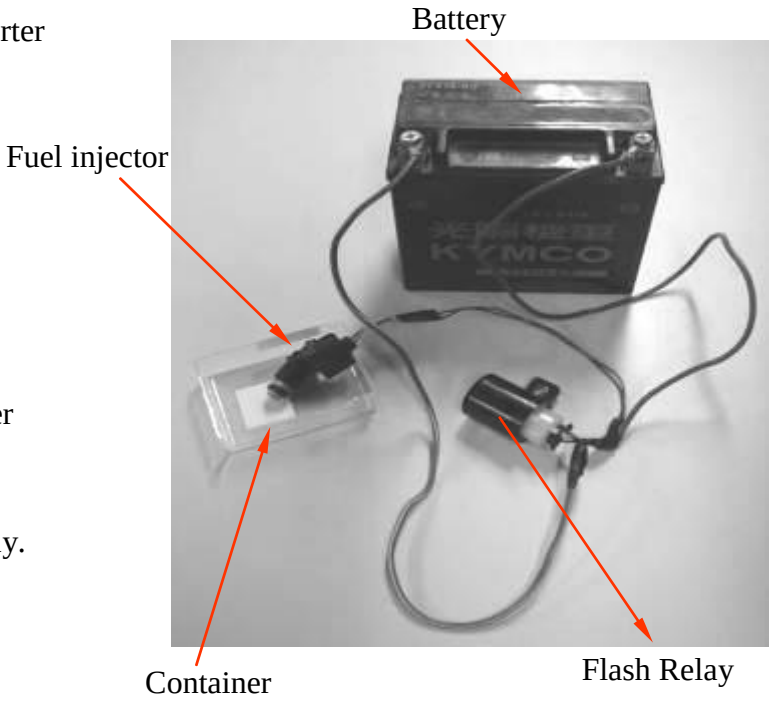
Standard: < 1.6ms

ANALYSIS

Injector block (With some carbons).

TROUBLESHOOTING

1. Use the specified injector cleaner.
2. Pouring the liquid of carburetor cleaner until half container.
3. Connect the battery as picture.
4. The injector cleaner with the flash relay.
5. Keeping the fuel Injector operation.
6. Waiting for 20~30 minutes.
7. Cleaning the carbons completely.



ETS SENSOR (Engine Temperature Sensor)

REMOVAL / INSTALLATION

Remove the met-in box .(2-5).

Disconnect the ETS sensor connector from the sensor.

Remove the ETS sensor and O-ring.

Install a new O-ring and ETS sensor.

* Always replace an O-ring with a new one. one.

Tighten the ETS sensor to the specified torque.

Torque: 1.2 kgf-m (12 N-m, 8.6 lbf-ft)

Connect the ETS sensor connector.

INSPECTION

Measure the resistance at the ETS sensor terminals.

STANDARD

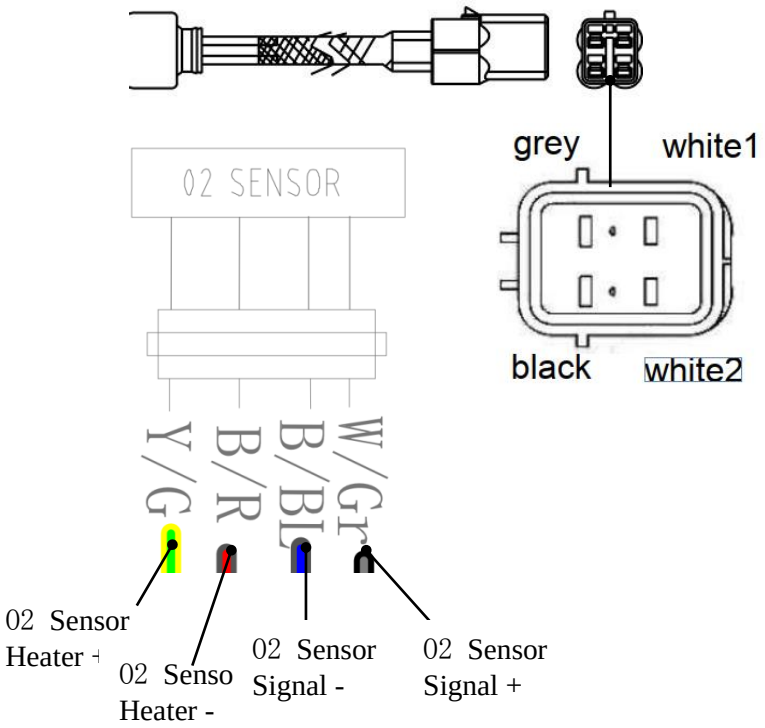
℃	25	100
KΩ	1.9~2.1	0.179~0.187

Measure if the ECU voltage outputs to the **ETS** between the following terminals of the **ETS**

Terminal	Normal
W/N (+) –B/BL (-)	5 V

O_2 SENSOR

The O_2 sensor is located at front part of the exhaust pipe to detect the A/F ratio and then send the data to ECU for controlling the fuel injecting.
The function of O_2 sensor only controls the fuel injector operation.



INSPECTION

Disconnect the O_2 sensor connector.

Measure the resistance between each White wire terminals of the O_2 sensor side connector.

Standard: 13±2 Ω (at 21°C/68°F)

REMOVAL/INSTALLATION

Disconnect the O_2 sensor connector and then remove it from exhaust muffler.

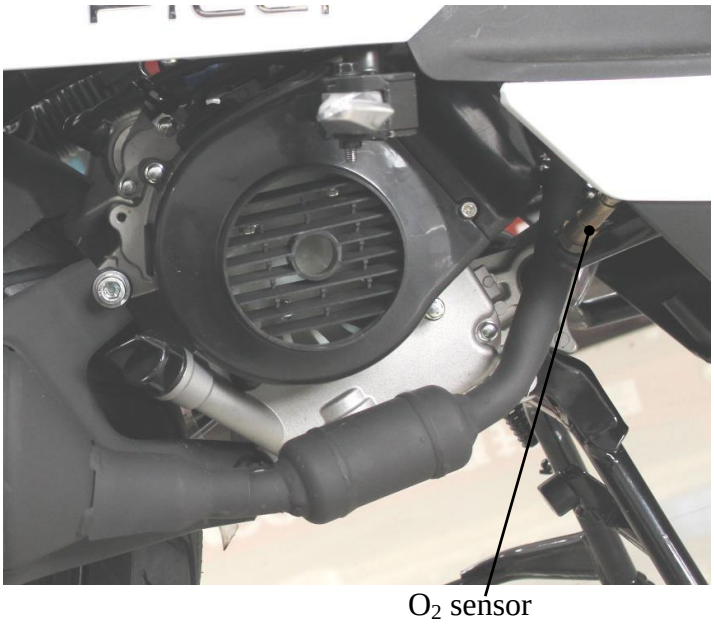
Installation is in the reverse order of removal.

*

Apply anti-seize compound on the surface of thread area before O_2 sensor

Tighten the O_2 sensor to specified torque.

Torque: 2.5 kgf-m (25 N-m, 18 lbf-ft)



THROTTLE BODY/MAP/ISC/TPS

- Turn off the ignition switch while replacement.
- Check and confirm if the voltage is over 12V by a voltmeter after replacement.
- Check and confirm if the other connectors are installed correctly after replacement.
- Do not damage the throttle body, it may cause the throttle and idle valve isn't synchronization.
- The throttle body is preset in KYMCO factory, do not disassemble it by a wrong way.
- Do not loosen or tighten the painted bolts and screws for the throttle body. Loosen or tighten them can cause the throttle and idle valve to synchronization failure.
- TPS and ISC have to be reset after the throttle body MAP, TPS, ISC or ECU has been reinstalled.
- Resetting TPS and ISC can be completed when the engine is above 100 ℃

Clean the throttle body every 10,000 km,
To avoid damage to the ISC and MAP, remove ISC and MAP when cleaning

T-MAP SENSOR INSPECTION

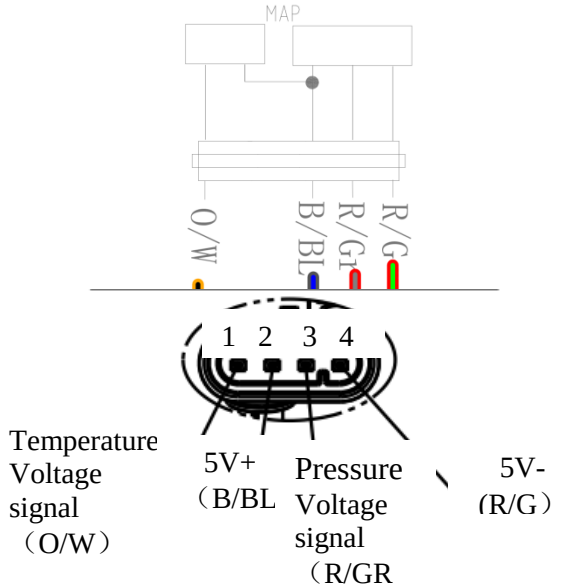
Support the scooter on a level surface.
Put the side stand up.
Turn the ignition switch to "ON" position.

Measure the resistance :

pin	resistance	note
1-2	1.82KΩ	
1-3	101.4KΩ	
1-4	172.3KΩ	
2-3	99.4KΩ	
2-4	169.8KΩ	
3-4	99.4KΩ	

Measure if the ECU voltage outputs to the MAP between the following terminals of the MAP connector.

Terminal	Normal
R/G (+) –B/BL (-)	5 V



TPS INSPECTION

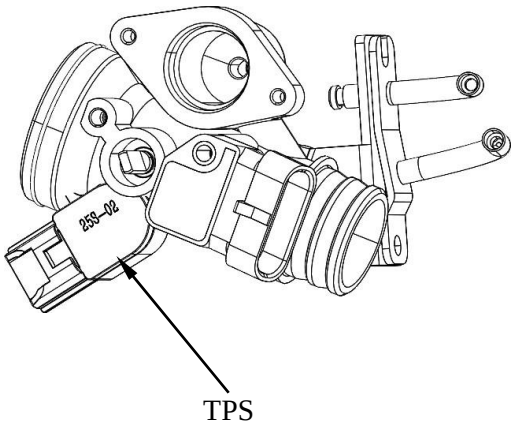
Support the scooter on a level surface.

Put the side stand up.

Turn the ignition switch to "ON" position.

Measure if the ECU voltage outputs to TPS between the following terminals of the TPS connector.

Terminal	Normal
R/G (+) –B/BL (-)	5 V



ISC

The ISC is combined by two sets of independent coils. The operation is controlled by the ECU in small steps to open and restrict the valve through timing.

Measure the resistance

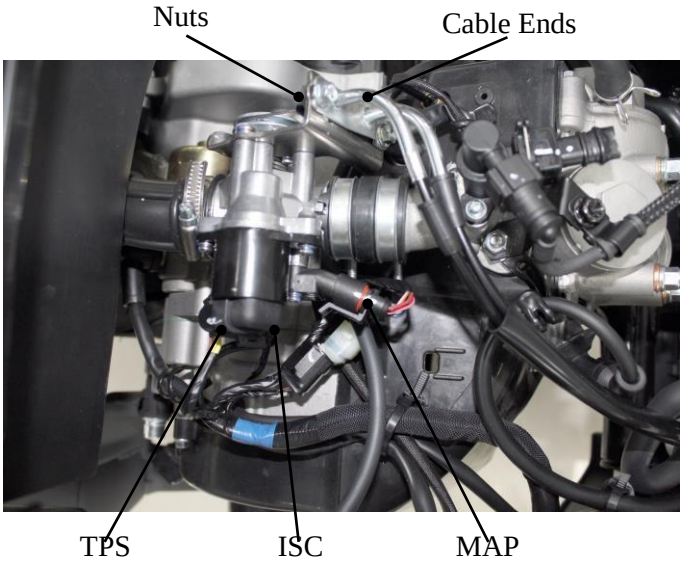
pin	resistance	note
1-2	53.6KΩ	
1-3	0	
1-4	0	
2-3	0	
2-4	0	
3-4	52KΩ	

ISC

REMOVAL

Loosen the throttle cables with the nuts.

Disconnect the throttle cable ends from throttle seat.



Disconnect the TPS, ISC and MAP sensor connectors.

Loosen the air cleaner connecting hose band screw.

Loosen the intake manifold band screw.

Remove the throttle body, MAP sensor, TPS sensor and ISC sensor as a set.

DISASSEMBLY

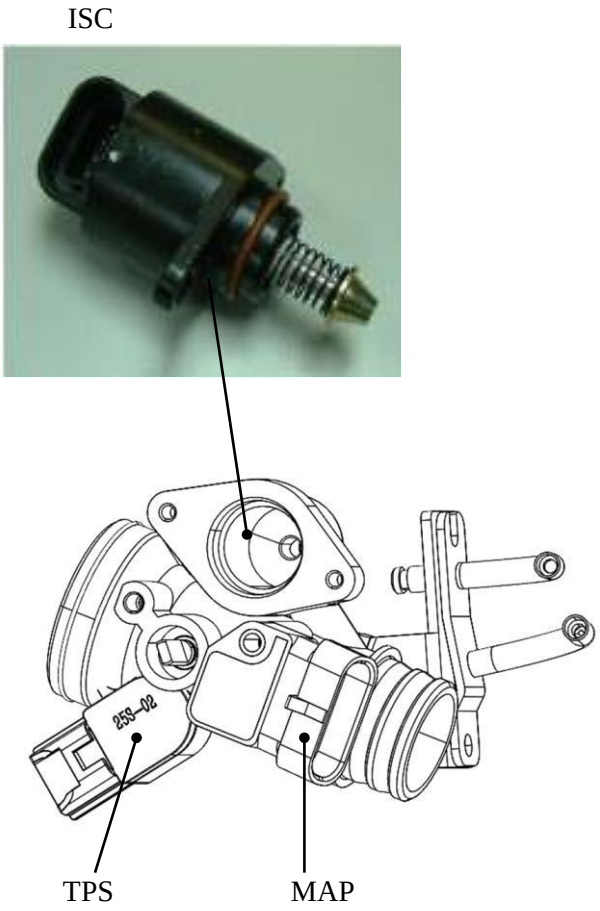
* The throttle position sensor (TPS) and idle air bypass valve (ISC) have to be reset when the throttle body MAP, TPS, ISC or ECU has been reinstalled.

Remove the screw and then remove the ISC and set plate.

Remove the screw and set plate.

Remove the MAP

Remove the screw AND then remove the TPS.



ASSEMBLY

* The throttle position sensor (TPS) and idle air bypass valve (ISC) have to reset when the throttle body MAP, TPS, ISC or ECU has been reinstalled.

Apply oil onto a new O-ring.

When install the TPS onto the throttle body, being careful not to damage the O-ring.

Install and tighten the screw securely.

When install the MAP onto the throttle body, being careful not to damage the O-ring.

* Always replace an O-ring with a new one.

Install the set plate and tighten the screw securely.

Apply oil onto a new O-ring.

When install the ISC and set plate onto the throttle body, being careful not to damage the O-ring.

CPS, Crank Position Sensor

2 Pins	
Grounded	Pulse Signal Output

When the flywheel rotates, the inductive voltage changes. The changes are the data that the ECU determines and computes the engine speed and the crankshaft position. The output voltage over 1V shows that the engine speed is above 200rpm.

The distance between CPS and flywheel tooth is less than 1.0 mm.

CPS resistance (20℃) 150±15Ω

Inductive Ignition Coil

2 Pins	
Power Input	ECU

The ECU controls the operation of the ignition coil through the ground terminal. After the primary circuit forms a magnetic field by power pass through, the power will be cut off by the ECU. The secondary coil will produce the high volt around 20kV for the spark plug to create the arc.

The power of arc can be controlled by the length of the primary coil power-on time. The timing of the primary coil power cut off is the ignition timing.

Ignition coil is a high conversion ratio transformer.

Ignition coil resistance (20℃)

Primary coil 0.58Ω±15%

Secondary coil 13KΩ±15%（with plug cap）

8KΩ±15%(without plug cap)

Maintenance Tools

a) Disassembly of electronic control system parts - commonly used auto machinery parts disassembly tools

b) Electronic control system circuit and system electrical signal - digital multimeter (with buzzer)

c) electronic control system fault diagnosis and engine working condition detection

Electronic control system fault diagnosis instrument (recommended)

d) Electronic control system fault code table (emergency use)

e) Fuel pressure gauge, measuring range 0 ~ 600kPa

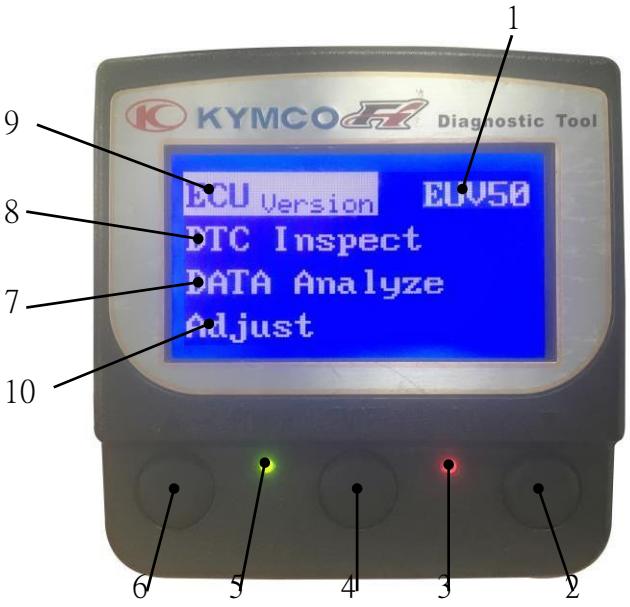
Fi Diagnostic Tool

digital multimeter

Fuel pressure gauge

Cylinder pressure gauge

Fi Diagnostic Tool
Operation Instructions
Part No. 3620A-LEB2-E00

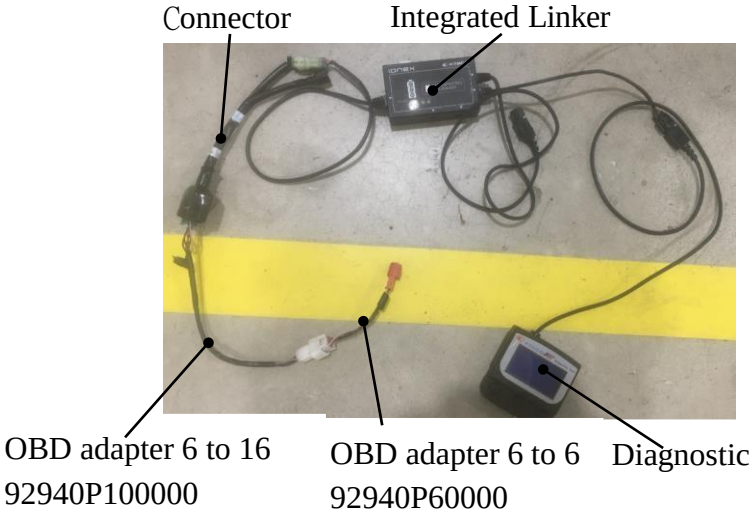


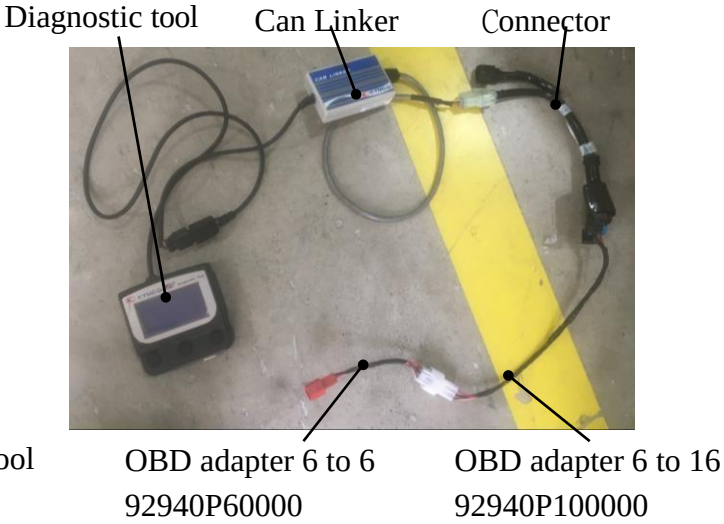
Diagnostic Tool Version

1.Model No. 2.Down Button 3.DTC indicator (Failure codes)
4.Enter or Exit 5.Power indicator 6.UP Button
7.DATA Analyze 8. DTC Inspect 9.ECU Version
10.Adjust(empty)

Note:

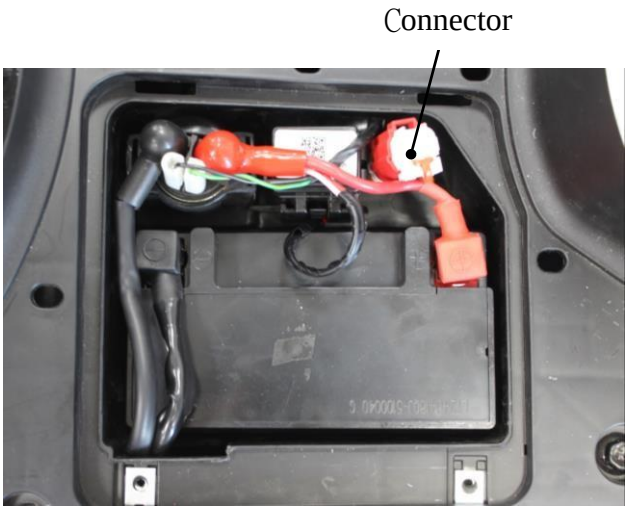
Use the sub-cord, OBD diagnostics, CAN LINKER(3620A-LGC7-E00) or Integrated Linker (3620A-AGD7-900),connector (part number:36205-LFA7- E00) , OBD adapter 6 to 16 (part number:92940P100000) OBD adapter 6 to 6 (part number:92940P60000) to connect between vehicle and diagnostic tool.





Diagnostic Connect

Connect Fi diagnostic tool with the connector of harness wire located beside the Battery.



* • Fi diagnostic tool is electrically After Connect Fi diagnostic tool with the connector of harness,
• The data can only be read after the main switch is turned on

MAP content (edition issue no.)

Diagnostic Tool 3620A-LEB2-xxx Firmware For Euro5 DELPHI Injection Models (MICARE 125)
KYMCO officially released new diagnostic tool firmware version V1PA2(01) for new models MICARE 125 .

Due to diagnostic tool limited memory capacity, version V1PA2(01) is ONLY for Euro5 DELPHI models and NOT for other KY Euro 4/5 models.

If a dealer needs to diagnosis DELPHI models and other KY models at the same time, he must have at least two KY diagnostic tools.

(The PC version (KDS) diagnostic system currently does not support diagnosing the DELPHI system.)

KYMCO provides two update methods, as below:

A. Online Update

i. In a laptop already authorized by KY *important* (with internet connection)

ii. Open KYMCO Fi Diagnostic software (KDS)

iii. Connect to KYMCO server

iv. Select new firmware version and language, begin update.

B. Packet Update

Please select below link and download the main program: KEP300(20230303).exe and map: KEP-36011-LEB2-1PA2(01)_xxxxxxxx.K300.

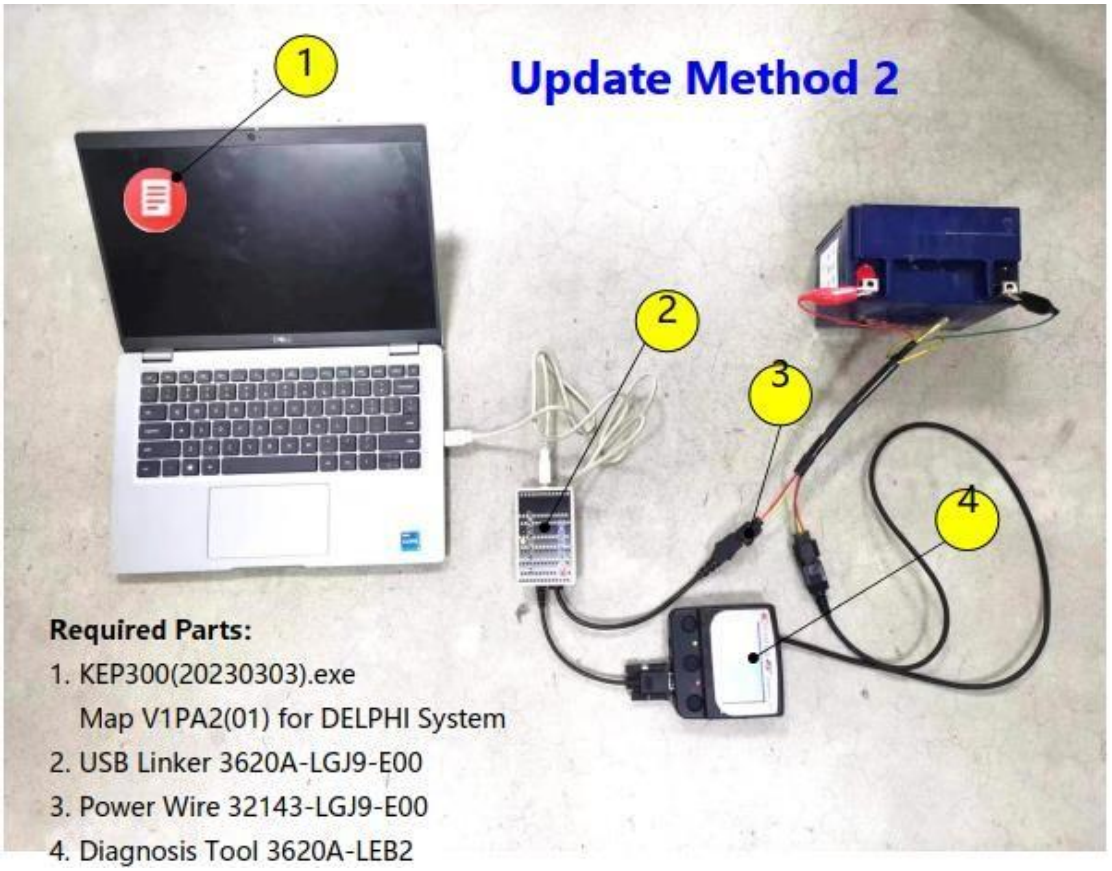
V1PA2(01) English or Italian or French or German or Greek

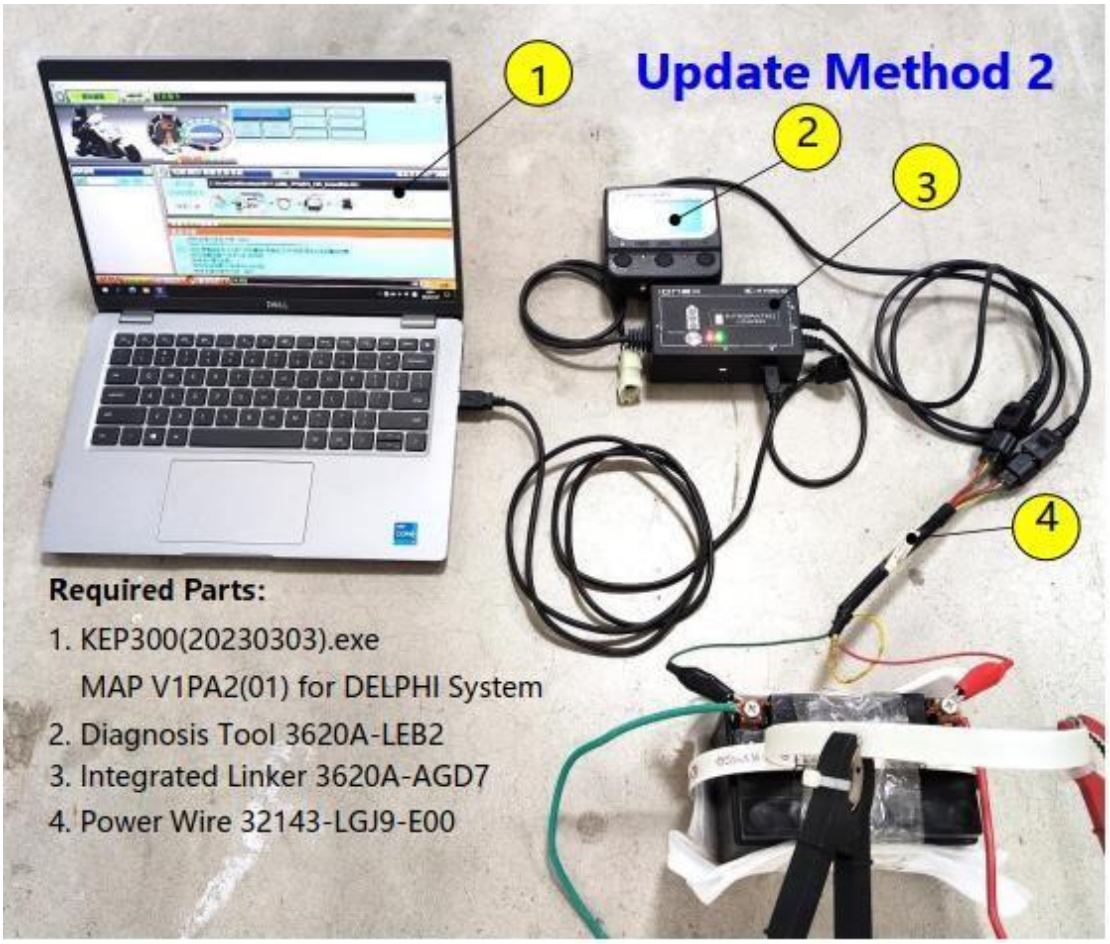
Please refer to KYMCO instructions(attached files) to choose: USB Linker or Integrated Linker for update.

Update Method 1

Required Parts:

1. KEP300(20230303).exe
   Map V1PA2(01) for DELPHI system
2. Integrated Linker 3620A-AGD7
3. Diagnosis Tool 3620A-LEB2
4. OBD Cable 36205-LGC6-E00


Update Method 2
1
2
3
4
Required Parts:
1. KEP300(20230303).exe
Map V1PA2(01) for DELPHI System
2. USB Linker 3620A-LGJ9-E00
3. Power Wire 32143-LGJ9-E00
4. Diagnosis Tool 3620A-LEB2


Update Method 2
1
2
3
4
Required Parts:
1. KEP300(20230303).exe
MAP V1PA2(01) for DELPHI System
2. Diagnosis Tool 3620A-LEB2
3. Integrated Linker 3620A-AGD7
4. Power Wire 32143-LGJ9-E00

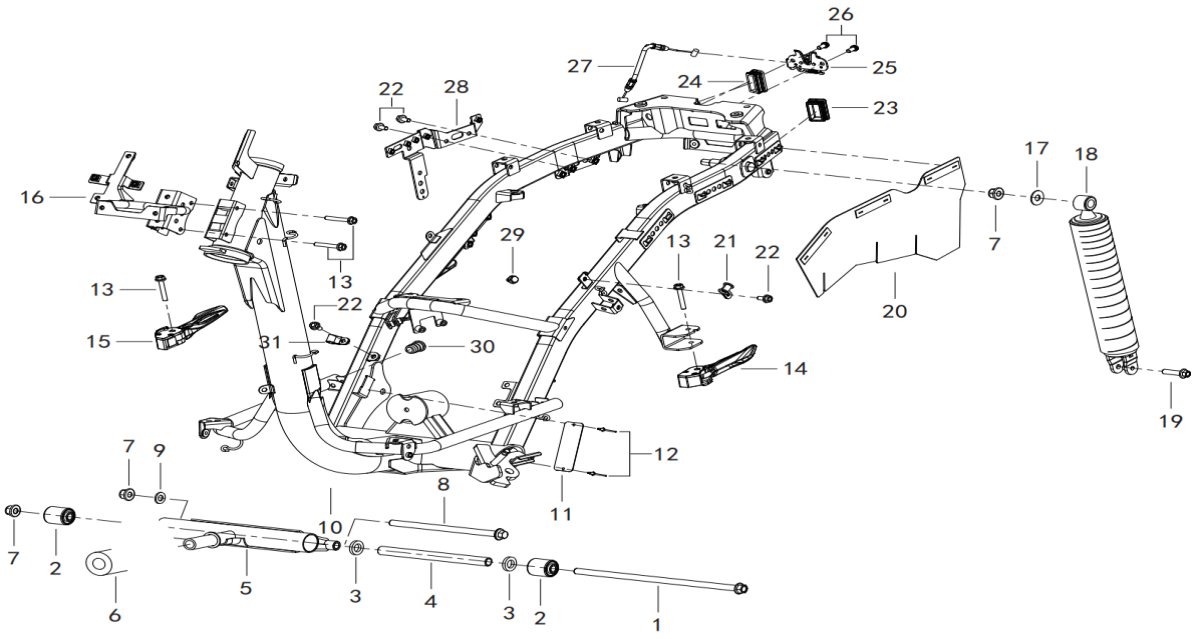
5. FUELINJECTION SYSTEM

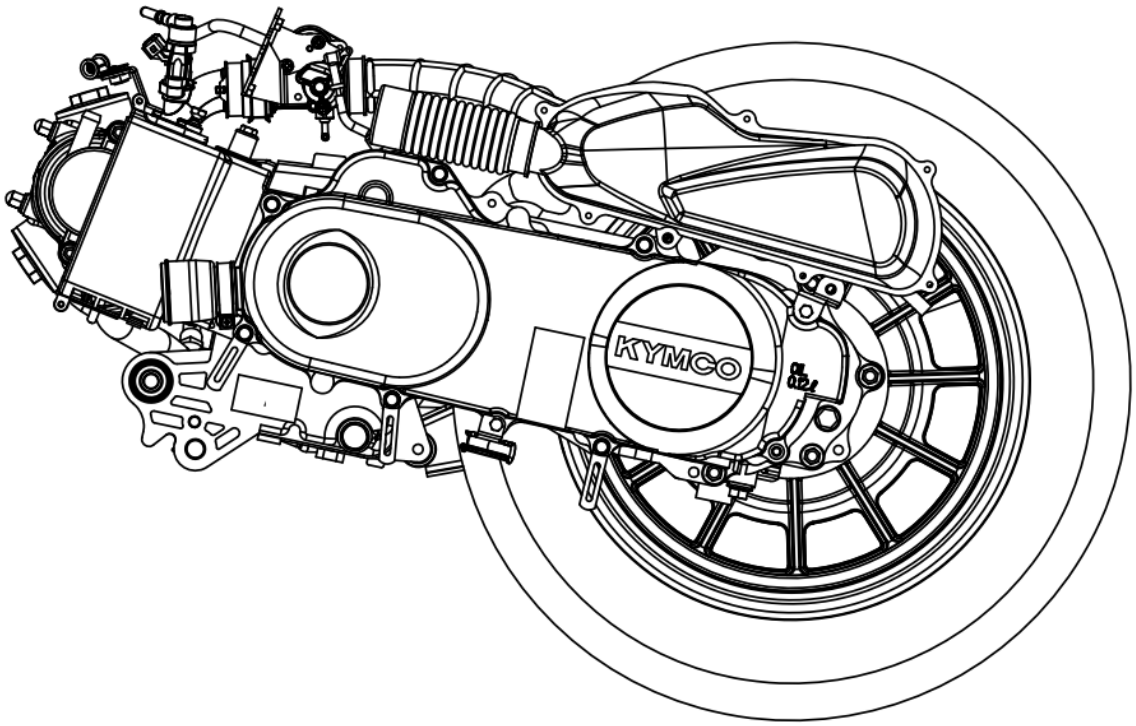
FILLY 50(YXA7) E5 Diagnostic report

SF :	**Customer :**		**Eng. No:**
Production Date :	**Service Date :**		**Mileage :**
Reason of repair: □Maintenance □Breakdown			

	Item	Data	Reference	Memo
ECU Version	ECU No		MT05.3	
	Hardware Ver			
	Software Ver		EUV5027E00000000	
	Calibration Ver		KYAB210110	
DTC	Active			
	Occurred			
	History			
(Cool Engine) Engine Stop	Idle Speed Set point (RPM)		1900±100	
	Air Temp.(℃)		Environ temp ±2 ℃	
	Engine Temp.(Cooling)		Environ temp ±2 ℃	
	Atom. Pressure (kpa.)		101.3 ±3 kpa	The ambient pressure drop about 12kpa at the altitude every 1000m raised
	Throttle Position (%)		0~0.5%	Throttle closed
	Throttle original signal		8000~8900	Throttle closed
	Battery Volt (V)		11.5~12.5 V	
(Hot Engine) Before Repair	Engine Speed IDLE(rpm)		1900 ±100 rpm	Engine runing and Engine Temp100 ℃
	Engine Temp. (℃)		100 ℃	
	Battery Volt (V)		13~14.8 V	
	Injection duration (ms)		3.2~3.8 ms	
	Ign. Advance (°)		3°~16°BTDC	
	Ign.Dwell duration (ms)		0.875~~ 1.062ms	\
	Air Temp.(℃)		45 ℃	
	O^2 sensor Volt (V)		0~950MV	
	O2 sensor heater (0/1)		1	
	O2 Correction		±10%	
	ISC Step (step)		25~70	
(Hot Engine) After Repair	Engine Speed IDLE(rpm)		1900 ±100 rpm	Engine runing and Engine Temp100 ℃
	Engine Temp. (℃)		100 ℃	
	Battery Volt (V)		13~14.8 V	
	Injection duration (ms)		3.2~3.8 ms	
	Ign. Advance (°)		3°~16°BTDC	
	Ign.Dwell duration (ms)		0.875~~ 1.062ms	
	Air Temp.(℃)		45 ℃	
	O^2 sensor Volt (V)		0~950MV	
	O2 sensor heater (0/1)		1	
	O2 Correction		±10%	
	ISC Step (step)		25~70	

6. ENGINE REMOVAL/INSTALLATION





6. ENGINE REMOVAL/INSTALLATION

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- A floor jack or other adjustable support is required to support and maneuver the engine. Be careful not to damage the motorcycle body, cables and wires during engine removal.
- Use shop towels to protect the motorcycle body during engine removal.
- Parts requiring engine removal for servicing:
  — Crankcase
  — Crankshaft

6. ENGINE REMOVAL/INSTALLATION

ENGINE REMOVAL

Remove the met-in box.
Remove the rear carrier.
Remove the frame body cover.
Disconnect the battery negative cable.
Disconnect the engine negative cable.
Disconnect the Secondary air cleaner connecting tube.

Disconnect the starter motor cable.
Remove the spark plug cap and disconnect the ignition coil wire from the set plate.

Disconnect the connector including of ISC, Throttle body, TPS, ETS, MAP sensor and injector.

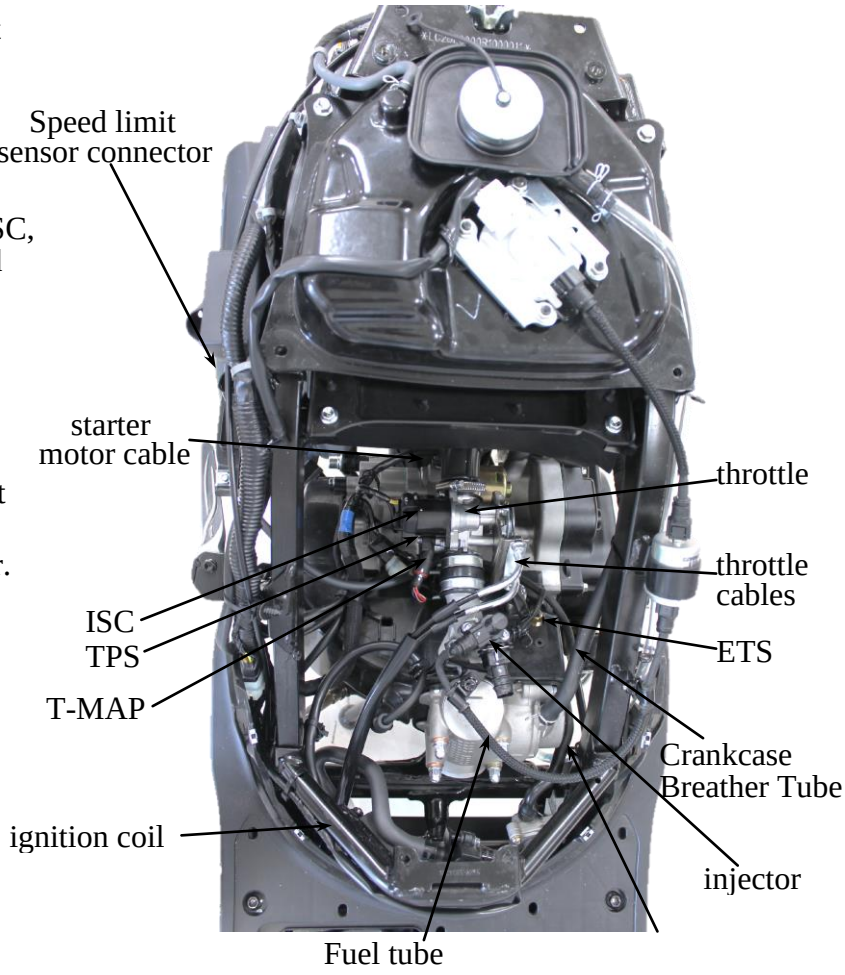
Disconnect the O2 sensor connector.

Disconnect the throttle cables.

Disconnect the Regulator/Rectifier connector.

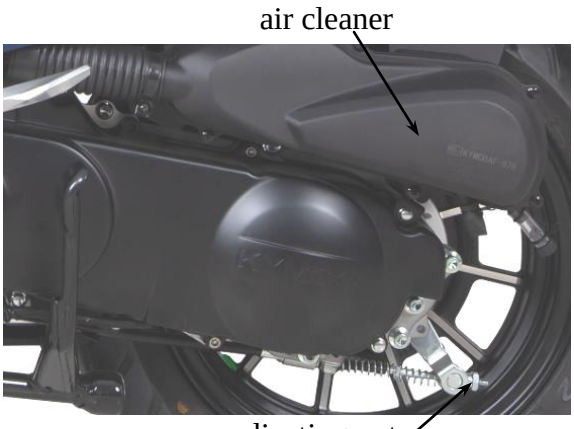
Disconnect the ACG , CPS and Speed limit sensor connector

Disconnect the fuel hose from fuel injector.



Loosen the air cleaner connecting tube band screw .
Remove the two blots.
Remove the air cleaner.

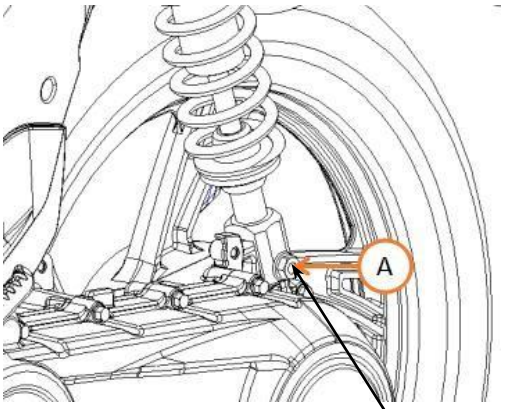
Remove the rear brake adjusting nut, connector pin rear brake cable.



Remove the exhaust muffler

exhaust muffler

Remove the rear shock absorbers mounting bolts.
Remove the rear shock absorber lower mount bolt.



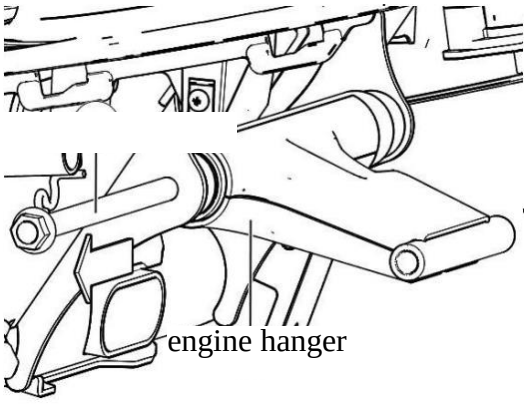
rear shock absorber lower mount bolt

Remove the engine mounting bolt and pull out the engine with the engine hanger bracket backward.

Bolt

ENGINE HANGER BRACKET REMOVAL

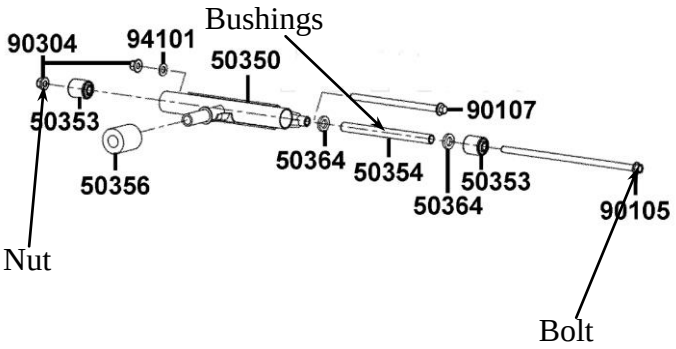
Remove the engine hanger bracket bolt and nut.
Remove the engine hanger bracket.



engine hanger

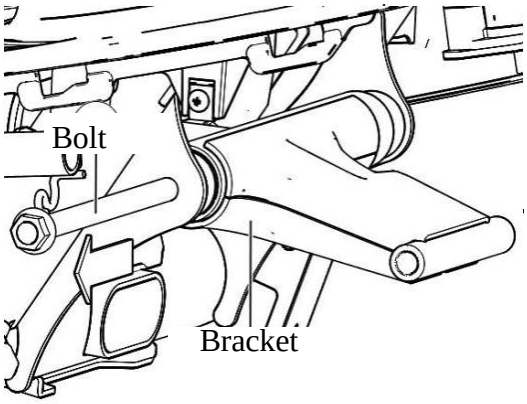
6. ENGINE REMOVAL/INSTALLATION

Inspect the engine hanger bushings and stopper rubbers for wear or damage.



ENGINE HANGER BRACKET INSTALLATION

Install the engine hanger bracket to the fram. Install the engine hanger bracket bolt and tighten the nut.



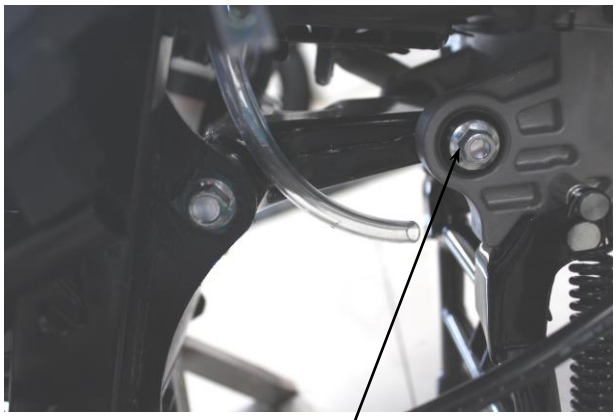
ENGINE INSTALLATION

Install the engine and tighten the engine mounting bolt.

Torque: 7.0kg-m

Tighten the rear shock absorber upper mount bolt.

Torque: 4.0kg-m



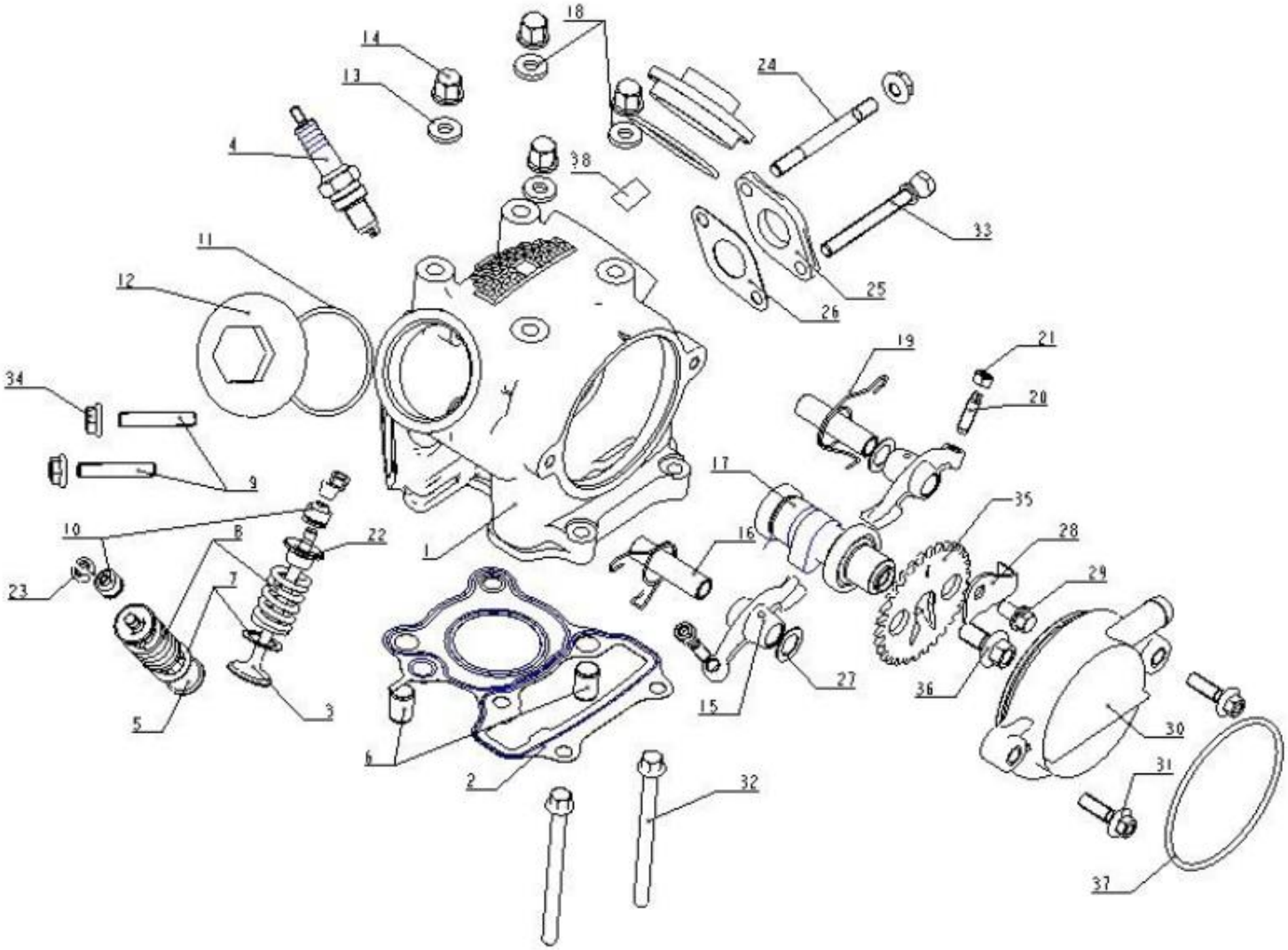
Install the removed parts in the reverse order of removal.

* Route the wires and cables properly.

After installation, inspect and adjust the following:

- Throttle grip free play.
- Rear brake adjustment.

7. CYLINDER HEAD/VALVES



7

7. CYLINDER HEAD/VALVES

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The cylinder head can be serviced with the engine installed in the frame.
- When assembling, apply molybdenum disulfide grease or engine oil to the valve guide movable parts, valve arm and camshaft sliding surfaces for initial lubrication.
- The camshaft is lubricated by engine oil through the cylinder head engine oil passages. Clean and unclog the oil passages before assembling the cylinder head.
- After disassembly, clean the removed parts and dry them with compressed air before inspection.
- After removal, mark and arrange the removed parts in order. When assembling, install them in the reverse order of removal.

SPECIFICATIONS

Item		Standard (mm)	Service Limit (mm)
Valve clearance (cold)	IN	0.05~0.08	—
	EX	0.05~0.08	—
Cylinder head compression pressure		12.5kg/cm^2	
Cylinder head warpage		—	—
Camshaft cam height	IN	25.6	25.46
	EX	25.22	25.07
Valve rocker arm I.D.	IN	10.000～10.012	10.07
	EX	10.000～10.012	10.07
Valve rocker arm shaft O.D.	IN	9.984～9.987	9.94
	EX	9.984～9.987	9.94
Valve seat width	IN	1.0	1.6
	EX	1.0	1.6
Valve stem O.D.	IN	4.97～4.98	4.95
	EX	4.95～4.96	4.94
Valve guide I.D.	IN	5.000～5.012	5.03
	EX	5.000～5.012	5.03
Valve stem-to-guide clearance	IN	0.013～0.028	0.08
	EX	0.013～0.028	0.08

7. CYLINDER HEAD/VALVES

TORQUE VALUES

Cylinder head nut	2.0kg-m	Apply engine oil to threads
Valve clearance adjusting nut	0.9kg-m	Apply engine oil to threads
Stud bolt	0.9~1.1kg-m	

SPECIAL TOOLS

Valve spring compressor

TROUBLESHOOTING

- The poor cylinder head operation can be diagnosed by a compression test or by tracing engine top-end noises.

Poor performance at idle speed
- Compression too low

Compression too low
- Incorrect valve clearance adjustment
- Burned or bend valves
- Incorrect valve timing
- Broken valve spring
- Poor valve and seat contact
- Leaking cylinder head gasket
- Warped or cracked cylinder head
- Poorly installed spark plug

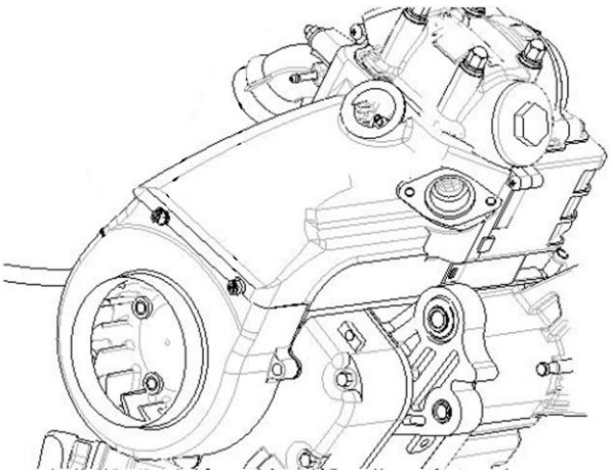
Compression too high
- Excessive carbon build-up in combustion chamber

White smoke from exhaust muffler
- Worn valve stem or valve guide
- Damaged valve stem seal

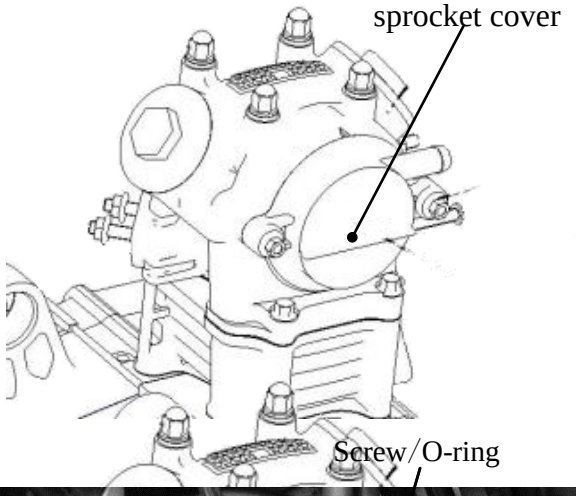
Abnormal noise
- Incorrect valve clearance adjustment
- Sticking valve or broken valve spring
- Damaged or worn camshaft
- Worn cam chain guide
- Worn camshaft and rocker arm

CYLINDER HEAD REMOVAL

Remove the center cover.
Remove the met-in box.
Remove the fan cover、the upper shroud and the lower shroud of engine.

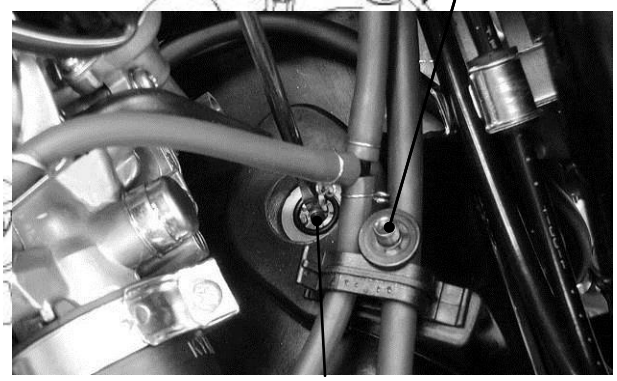


Remove the two sprocket cover assembly bolts to remove the sprocket cover assembly.



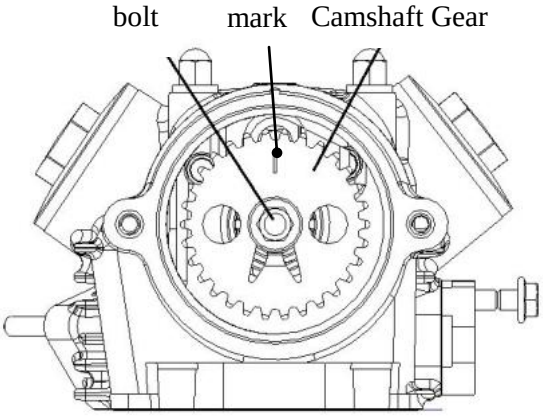
Remove the cam chain tensioner cap screw and the O-ring.

Turn the cam chain tensioner screw clockwise to tighten it.



Turn the flywheel counterclockwise so that the “T” mark on the flywheel aligns with the index mark on the crankcase to bring the round hole on the camshaft gear facing up to the top dead center on the compression stroke.

Remove the camshaft gear bolt to remove gear.

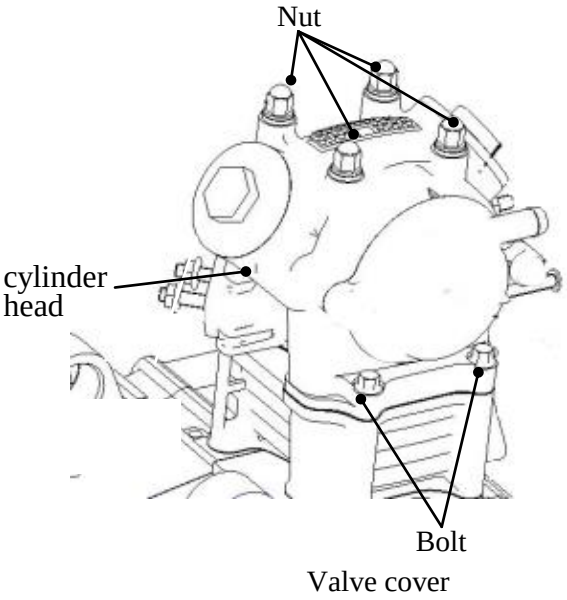


* The chain is suspended by a length of wire to prevent it from falling into the crankcase.

7. CYLINDER HEAD/VALVES

Remove the two cylinder head bolts.
Remove the four cylinder head nuts and washers.

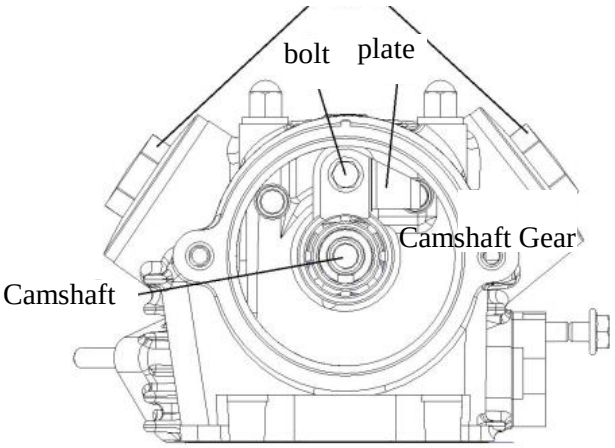
* Diagonally loosen the cylinder head nuts in 2 or 3 times.



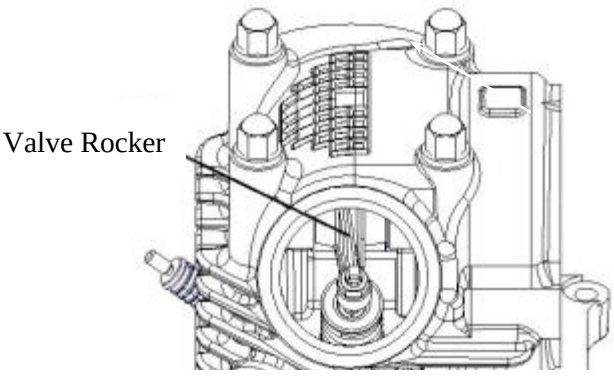
Valve cover

CYLINDER HEAD DISASSEMBLY

Remove the bolt and the plate to remove the camshaft.



Remove the valve cover.
Remove the valve rocker and the rocker arm shaft.

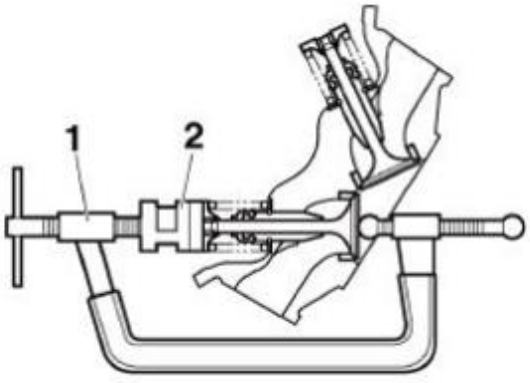


CYLINDER HEAD DISASSEMBLY

Remove the valve spring cotters, retainers, springs, spring seats and valve stem seals using a valve spring compressor.

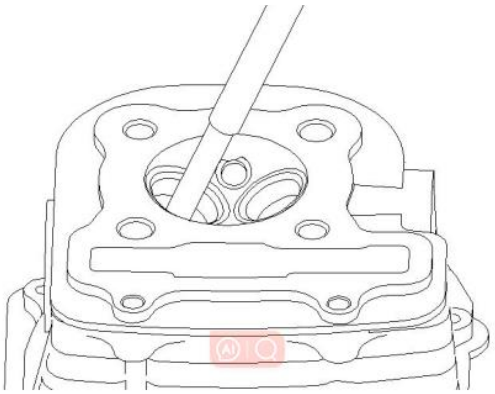
* • Be sure to compress the valve springs with a valve spring compressor.
  • Mark all disassembled parts to ensure correct reassembly.

Special
Valve Spring Compressor



Remove carbon deposits from the combustion chamber.
Clean off any gasket material from the cylinder head mating surface.

* Be careful not to damage the cylinder head mating surface.



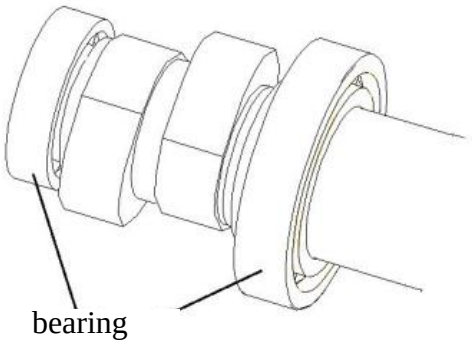
INSPECTION

CAMSHAFT INSPECTION

Check each cam lobe for wear or damage.
Measure the cam lobe height.

Service Limits:

IN : 25.46mm replace if below
EX: 25.07mm replace if below

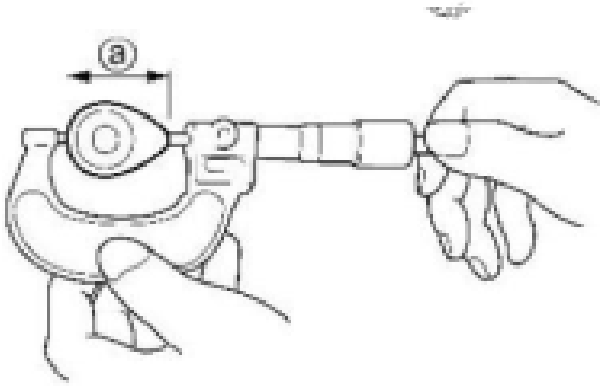


Check each camshaft bearing for play or damage. Replace the camshaft assembly with a new one if the bearings are noisy or have excessive play.

CAMSHAFT HOLDER INSPECTION

Inspect the valve rocker arms and rocker arm shafts for wear or damage.

* If the valve rocker arm contact surface is worn, check each cam lobe for wear or damage.



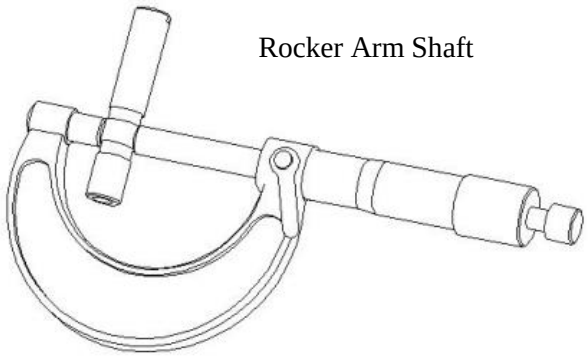
Measure the I.D. of each valve rocker arm.

Service Limits:

IN: 10.07mm replace if over
EX: 10.07mm replace if over

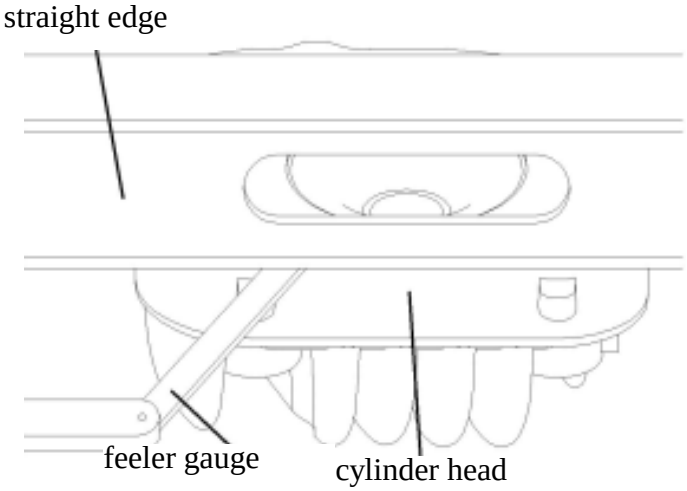
7. CYLINDER HEAD/VALVES

Measure each rocker arm shaft O.D.

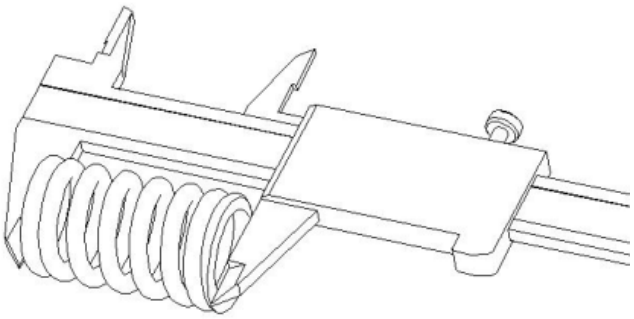


Service Limits:
IN: 9.94mm replace if over
EX: 9.9mm replace if over

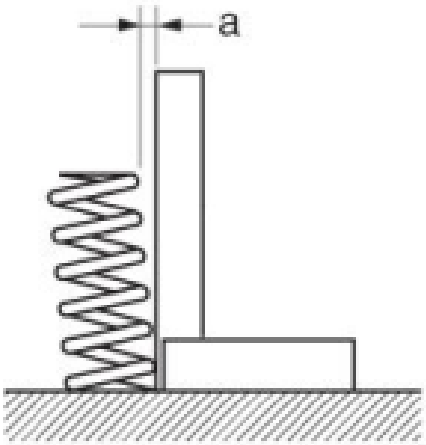
CYLINDER HEAD
Check the spark plug hole and valve areas for cracks.
Check the cylinder head for warpage with a straight edge and feeler gauge.
Service Limit: 0.03mm repair or replace if over



VALVE SPRING FREE LENGTH
Measure the free length of the valve springs.
Service Limits: 29.8mm replace if below



Measure the spring tilt(a).
Replace if out of specification.
Service Limits: 1.6mm replace if below



7. CYLINDER HEAD/VALVES

VALVE /VALVE GUIDE

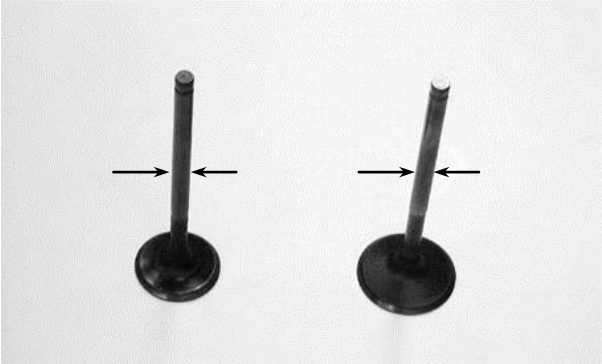
Inspect each valve for bending, burning, scratches or abnormal stem wear.
Check valve movement in the guide.

Measure each valve stem O.D.

Service Limits:

IN : 4.95mm replace if below

EX: 4.94mm replace if below



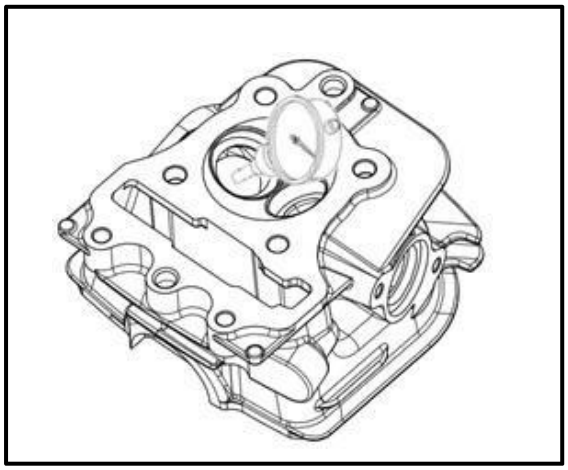
Measure each valve guide I.D.

Service Limits: IN : 5.03mm replace if over
EX: 5.03mm replace if over

Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem-to-guide clearance.

Service Limits:
IN : 0.08mm replace if over
EX: 0.08mm replace if over

* If the stem-to-guide clearance exceeds the service limits, replace the cylinder head as necessary.

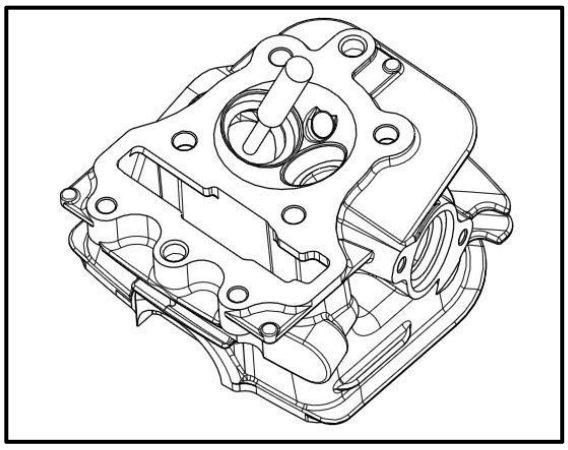


CYLINDER HEAD ASSEMBLY

Install the valve spring seats and valve stem seals.

* Be sure to install new valve stem seals.

Lubricate each valve stem with engine oil and insert the valves into the valve guides.
Install the valve springs and retainers.



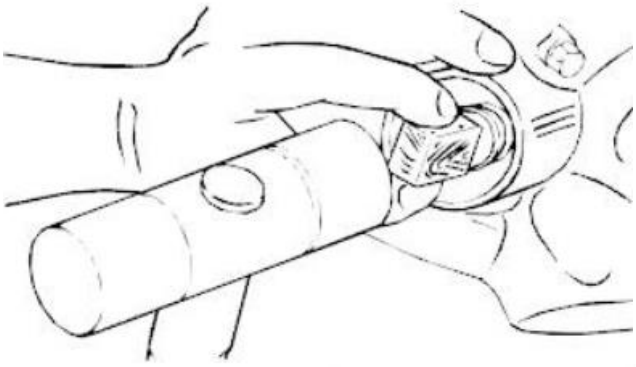
Compress the valve springs using the valve spring compressor, then install the valve cotters.

* • When assembling, a valve spring compressor must be used.
  • Install the cotters with the pointed ends facing down from the upper side of the cylinder head.

Special

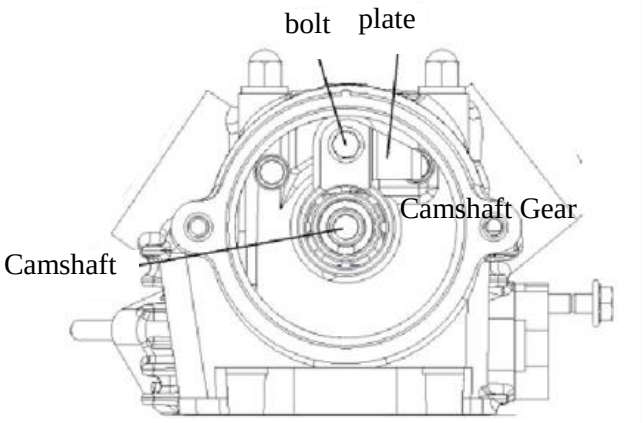
Valve Spring Compressor

Tap the valve stems gently with a plastic hammer for 2～3 times to firmly seat the cotters.



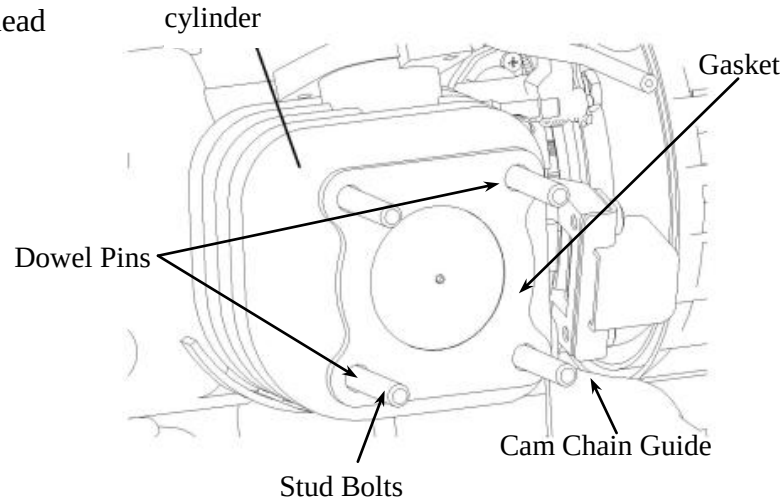
* Be careful not to damage the valves.

Install the camshaft.
Install the valve rocker and the rocker arm shaft.
Install the plate and tighten the bolt.
.



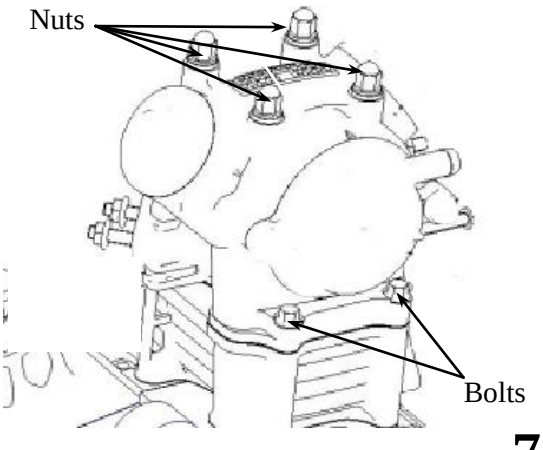
CYLINDER HEAD INSTALLATION

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



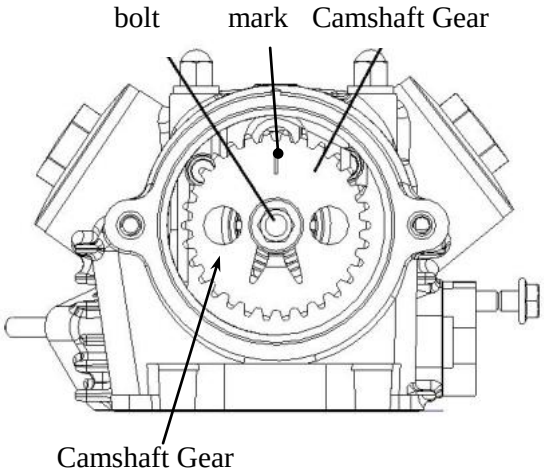
Install the cylinder head.
Tighten the bolts and the Nuts.

* • Apply engine oil to the threads of the cylinder head nuts.
  • Diagonally tighten the cylinder head nuts in 2～3 times.

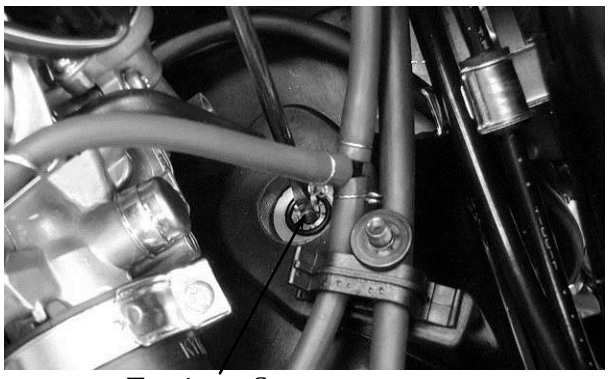


Turn the flywheel so that the "T" mark on the flywheel aligns with the index mark on the crankcase.
Align the punch marks on the camshaft gear with the cylinder head surface (Position the intake and exhaust cam lobes down.) and install the camshaft sprocket onto the camshaft.

Install the cam chain over the camshaft gear.
Tighten the camshaft sprocket bolt.



Turn the cam chain tensioner screw counter-clockwise to release it.

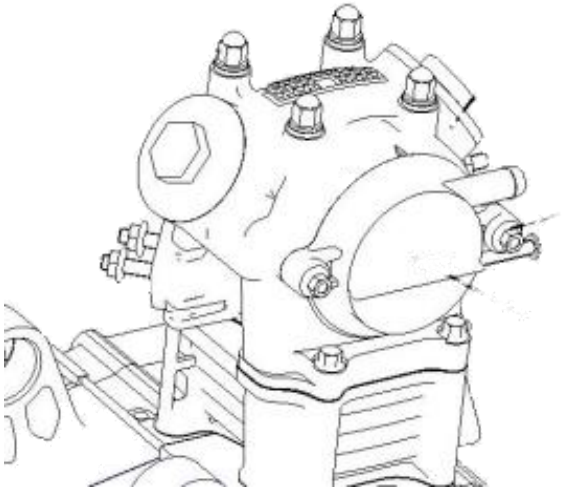


Apply engine oil to a new O-ring and install it.
Tighten the cam chain tensioner cap screw.

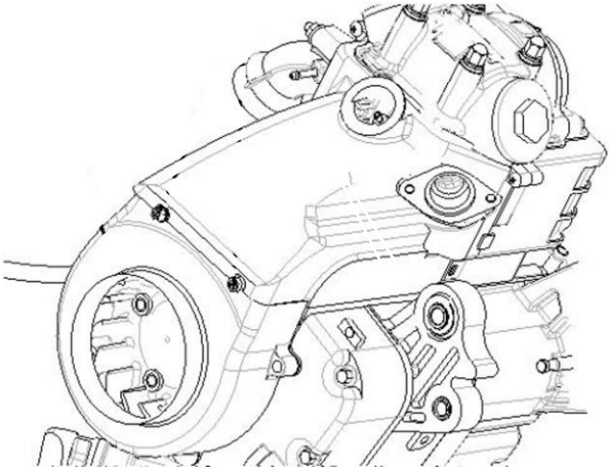
* Be sure to install the O-ring into the groove properly.

Check the valve clearance.
Adjust valve clearance if necessary

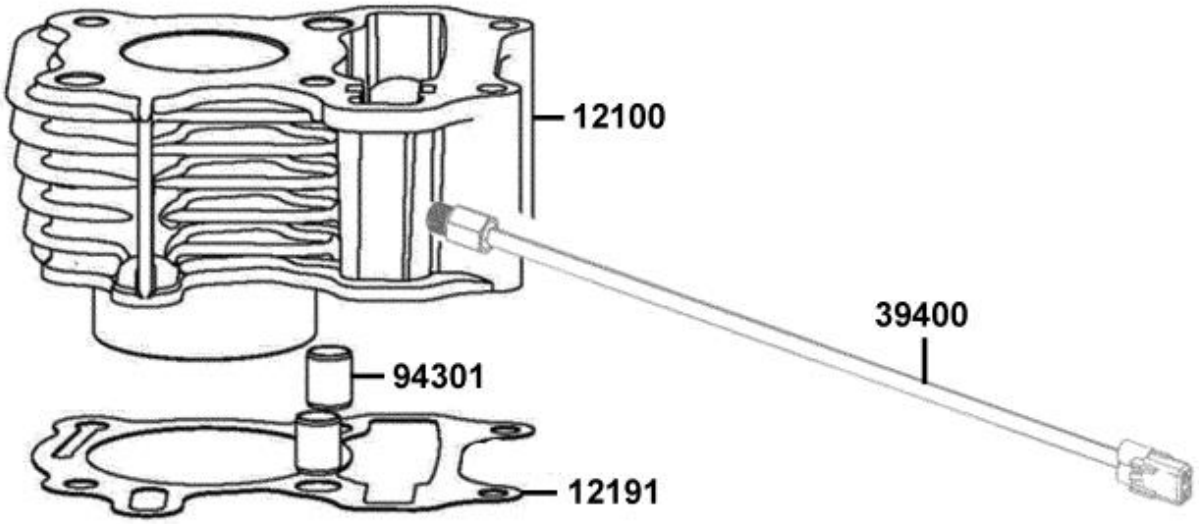
Install the valve cover.

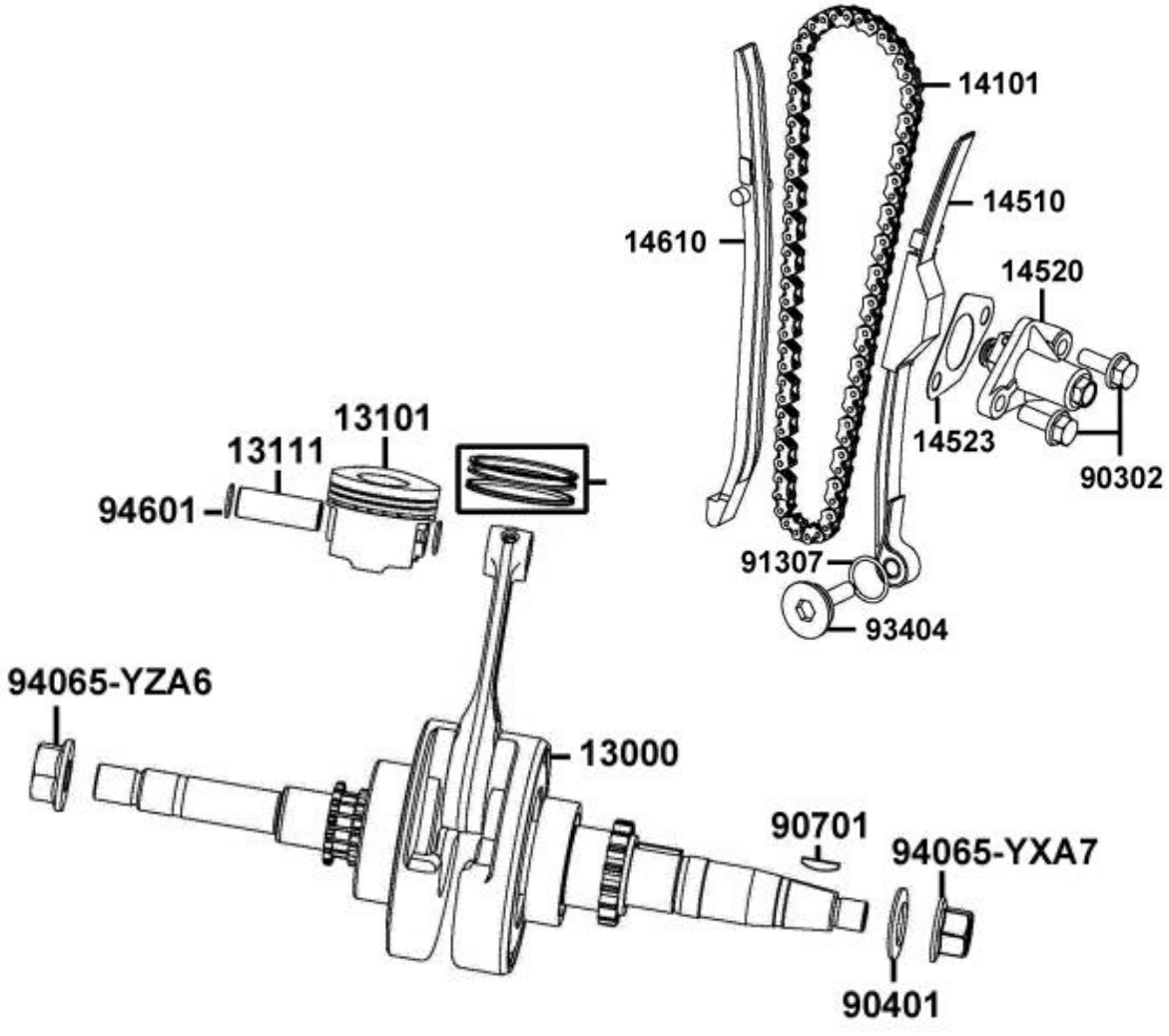


Install the fan cover、the upper shroud and the lower shroud of engine.
Tighten the cover bolts.



8. CYLINDER/PISTON





SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The cylinder and piston can be serviced with the engine installed in the frame.
- After disassembly, clean the removed parts and dry them with compressed air before inspection.

SPECIFICATIONS

Item			Standard (mm)	Service Limit (mm)
Cylinder	I.D.		37~37.01	37.01
	Warpage		-	–
	Cylindricity		0.005	0.005
	planeness		0.03	0.03
Piston,	Ring-to-groove clearance	Top	0.02～0.06	0.06
		Second	0.02～0.06	0.06
	Ring end gap	Top	0.10～0.25	0.25
		Second	0.10～0.25	0.25
	Piston O.D.		36.975～36.985	36.975
	Piston O.D. measuring position		11.5mm from bottom of skirt	—
.	Piston-to-cylinder clearance		0.020～0.030	0.03
	Piston pin hole I.D.		10.002～10.008	10.008
Piston pin O.D			9.994～10	9.994
Piston-to-piston pin clearance			0.002～0.014	0.014
Connecting rod small end I.D. bore			9.995～10.006	above 10.018

TROUBLESHOOTING

- When hard starting or poor performance at low speed occurs, check the crankcase breather for white smoke. If white smoke is found, it means that the piston rings are worn, stuck or broken.

Compression too low or uneven compression

- Worn, stuck or broken piston rings
- Worn or damaged cylinder and piston

Compression too high

- Excessive carbon build-up in combustion chamber or on piston head

Excessive smoke from exhaust muffler

- Worn or damaged piston rings
- Worn or damaged cylinder and piston

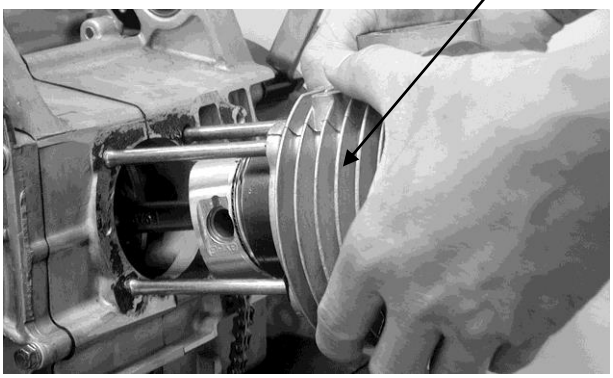
Abnormal noisy piston

- Worn cylinder, piston and piston rings
- Worn piston pin hole and piston pin

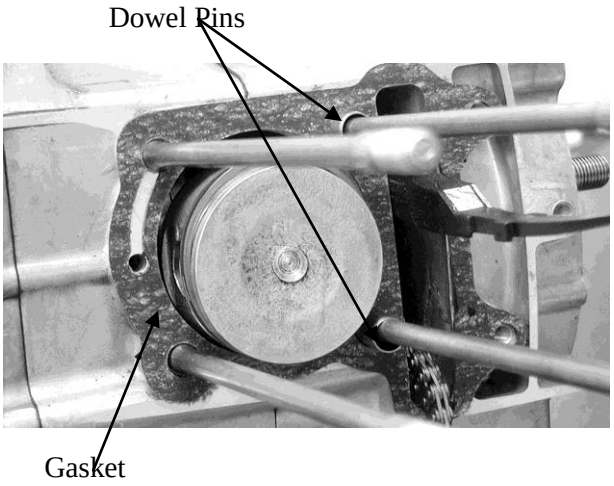
8. CYLINDER/PISTON

CYLINDER REMOVAL

Remove the cylinder head.
Remove the cam chain guide.
Remove the cylinder.



Remove the cylinder gasket and dowel pins.
Clean any gasket material from the cylinder surface.

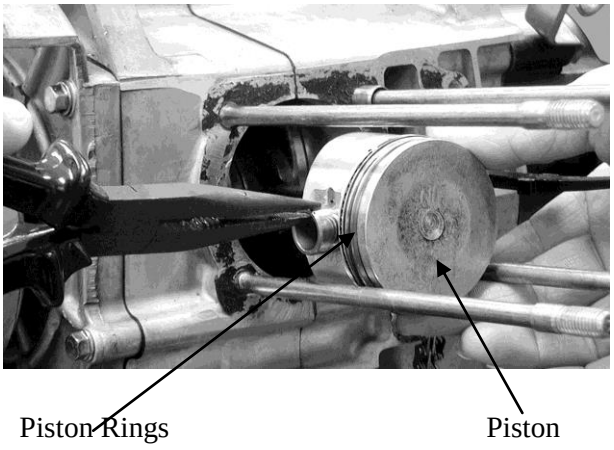


PISTON REMOVAL

Remove the piston pin clip.

* Place a clean shop towel in the crankcase to keep the piston pin clip from falling into the crankcase.

Press the piston pin out of the piston and remove the piston.



8. CYLINDER/PISTON

Inspect the piston, piston pin and piston rings. Remove the piston rings.

* Take care not to damage or break the piston rings during removal.

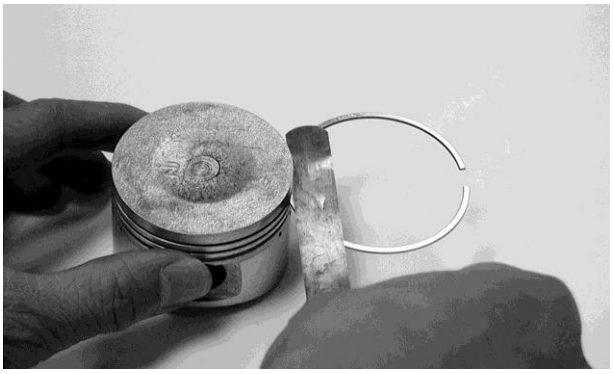
Clean carbon deposits from the piston ring grooves.

Install the piston rings onto the piston and measure the piston ring-to-groove clearance.

Service Limits:

Top: 0.09mm replace if over

2nd: 0.09mm replace if over

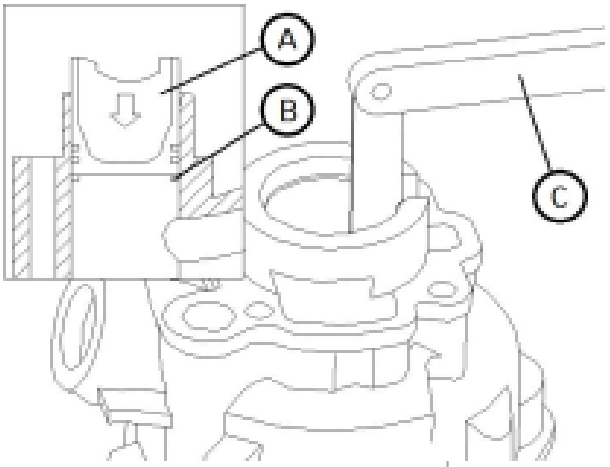


Remove the piston rings (B) and insert each piston ring into the cylinder bottom.

* Use the piston head to push each piston ring into the cylinder.

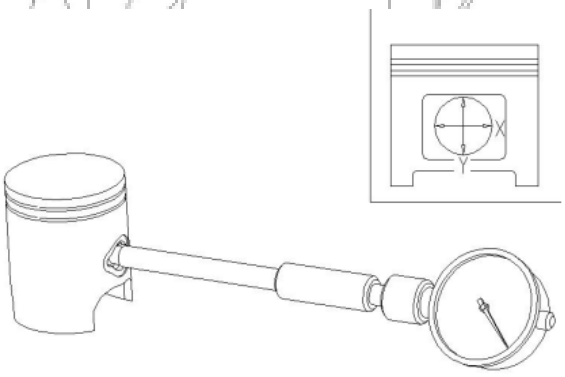
Measure the piston ring end gap.

Service Limit: 0.25mm replace if over



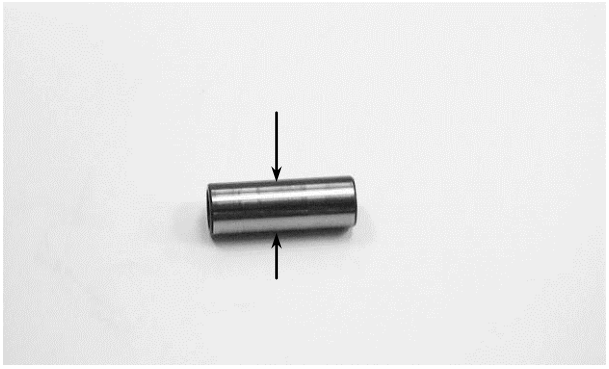
Measure the piston pin hole I.D.

Service Limit: 10.008mm replace if over



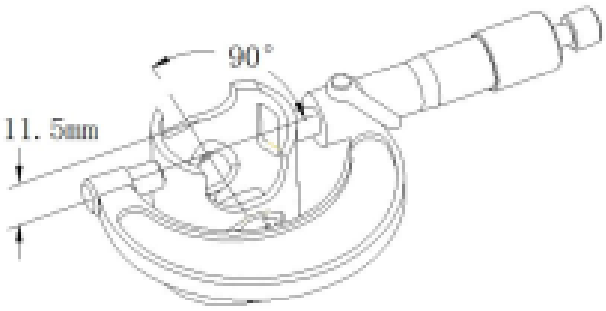
8. CYLINDER/PISTON

Measure the piston pin O.D.
Service Limit: 9.94mm replace if below



Measure the piston O.D.

* Take measurement at 9mm from the bottom and 90° to the piston pin hole.



Service Limit: 36.975 m replace if below

Measure the piston-to-piston pin clearance.
Service Limit: 0.07m replace if over

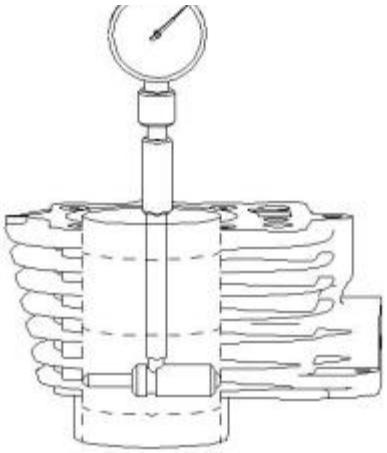
CYLINDER INSPECTION

Inspect the cylinder bore for wear or damage. Measure the cylinder I.D. at three levels of top, middle and bottom at 90° to the piston pin (in both X and Y directions).

Service Limit: 37.01mm repair or replace if over

Measure the cylinder-to-piston clearance.

Service Limit: 0.03mm repair or replace if over

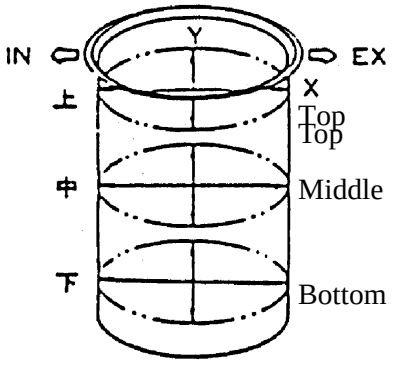


The true roundness is the difference between the values measured in X and Y directions. The cylindricity (difference between the values measured at the three levels) is subject to the maximum value calculated.

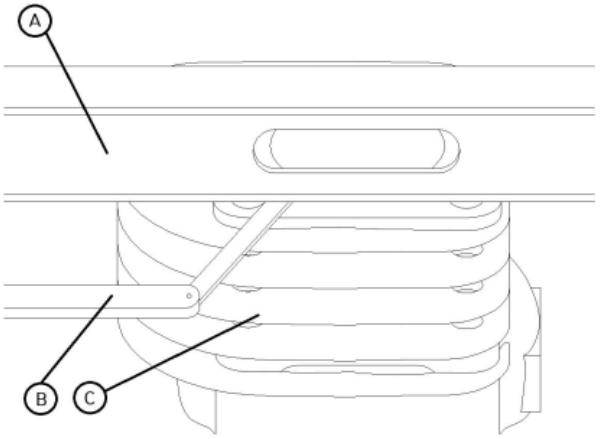
Service Limits:

True Roundness: 0.05mm repair or replace if over

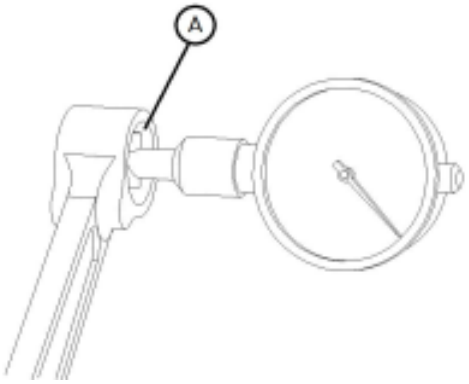
Cylindricity: 0.05mm repair or replace if over



Inspect the top of the cylinder for warpage.
Service Limit: 0.05mm repair or replace if over



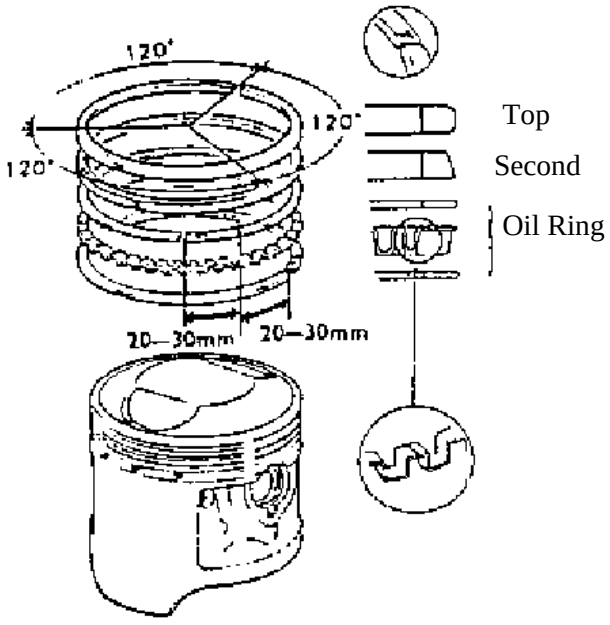
Measure the connecting rod small end I.D.
Service Limit: 10.018mm replace if over



PISTON RING INSTALLATION

Install the piston rings onto the piston.
Apply engine oil to each piston ring.

*
- Be careful not to damage or break the piston and piston rings.
- All rings should be installed with the markings facing up.
- After installing the rings, they should rotate freely without sticking.

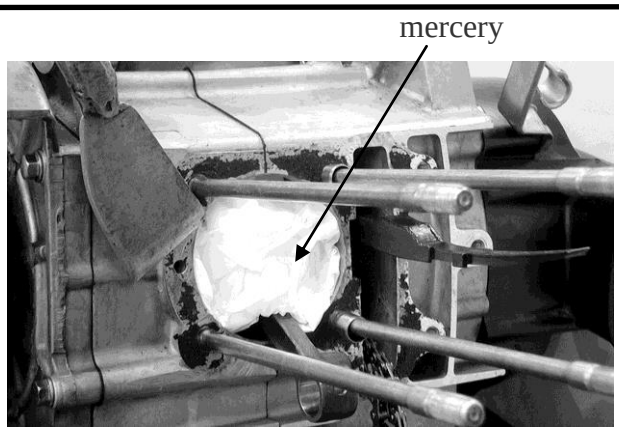


8. CYLINDER/PISTON

PISTON INSTALLATION

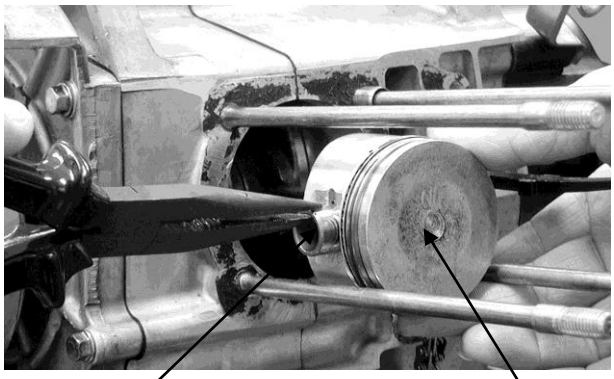
Remove any gasket material from the crankcase surface.

* Be careful not to drop foreign matters into the crankcase.



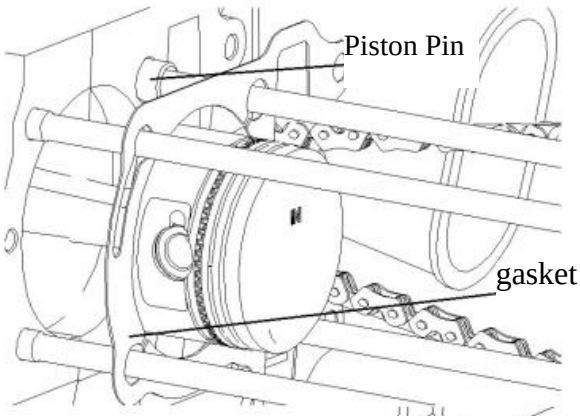
Install the piston, piston pin and a new piston pin clip.

* • Position the piston "IN" mark on the intake valve side.
  • Place a clean shop towel in the crankcase to keep the piston pin clip from falling into the crankcase.



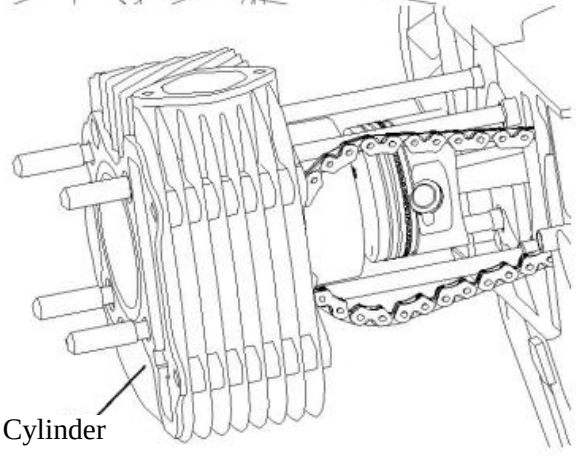
CYLINDER INSTALLATION

Install the dowel pins and a new cylinder gasket on the crankcase.



Coat the cylinder bore, piston and piston rings with clean engine oil.
Carefully lower the cylinder over the piston by compressing the piston rings.

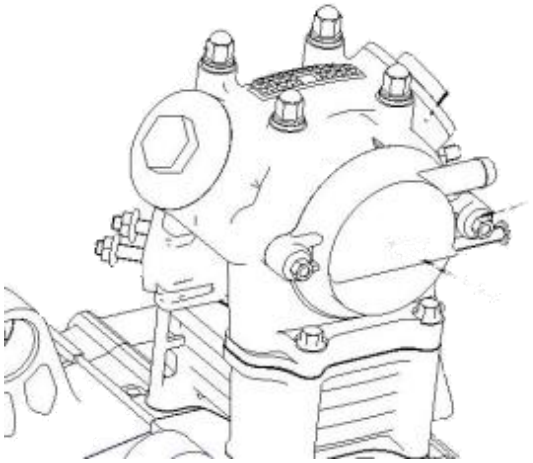
* • Be careful not to damage or break the piston rings.
  • Stagger the ring end gaps at 120° to the piston pin.

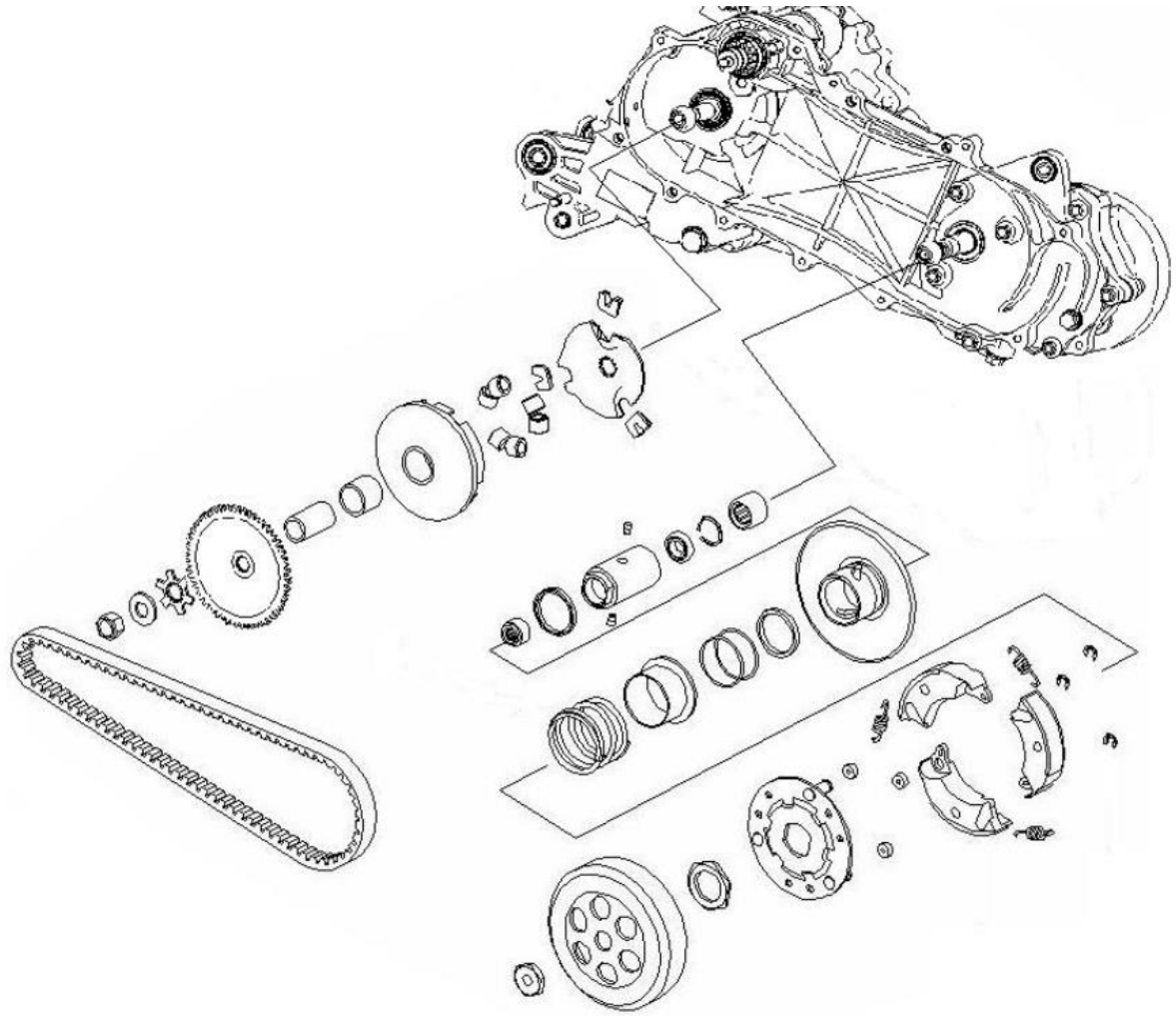


Install the cam chain guide.

* Insert the tab on the cam chain guide into the cylinder groove.

Install the cylinder head.
Tighten the cylinder base bolts.





SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The drive pulley, clutch and driven pulley can be serviced with the engine installed.
- Avoid getting grease and oil on the drive belt and pulley faces. Remove any oil or grease from them to minimize the slipping of drive belt and drive pulley.

SPECIFICATIONS

Item	Standard (mm)	Service Limit (mm)
Drive belt width	18	18
Clutch lining thickness	3.5	3.5
Weight roller O.D.	15.8～16.2	15.8

TORQUE VALUES

Drive face nut	5.5kgf-m
Clutch outer nut	5.5kgf-m
Clutch drive plate nut	5.5kg-m

SPECIAL TOOLS

Universal holder

Clutch spring compressor

TROUBLESHOOTING

Engine starts but motorcycle won‘t move

- Worn drive belt
- Broken ramp plate
- Worn or damaged clutch lining
- Broken driven face spring

Engine stalls or motorcycle creeps

- Broken clutch weight spring

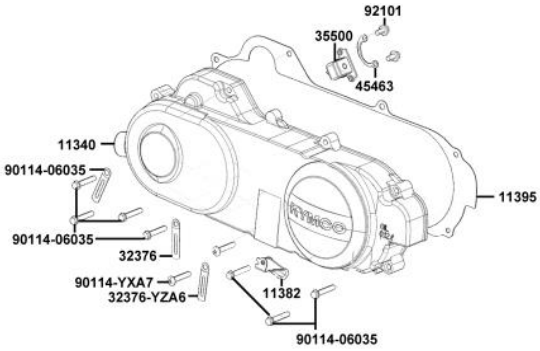
Lack of power

- Worn drive belt
- Weak driven face spring
- Worn weight roller
- Fouled drive face

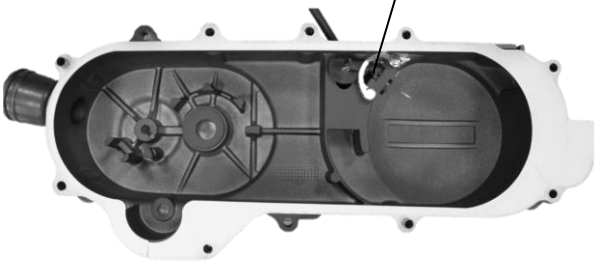
LEFT CRANKCASE COVER

REMOVAL

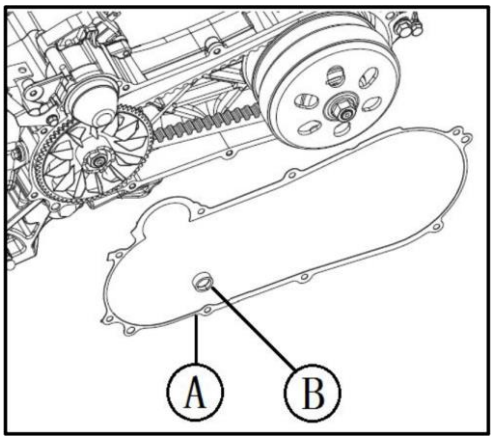
Remove the left crankcase cover bolts.
Remove the Speed limit sensor bolts.
and remove the Speed limit sensor.
Remove the left crankcase cover.



Speed limit sensor



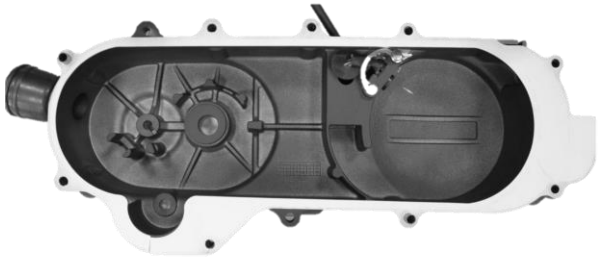
Remove the seal rubber[A] and dowel pins[B].



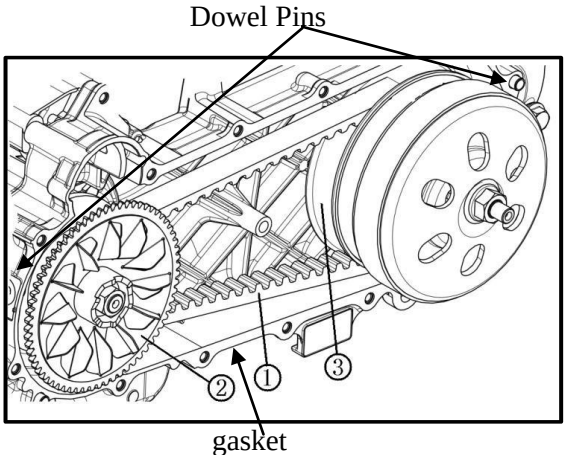
INSTALLATION

Install the dowel pins and gasket.

Install the Speed limit sensor to the left crankcase cover.



Install the left crankcase cover and tighten the left crankcase cover bolts.
Install the cable clamp to the specified location and tighten the bolt.

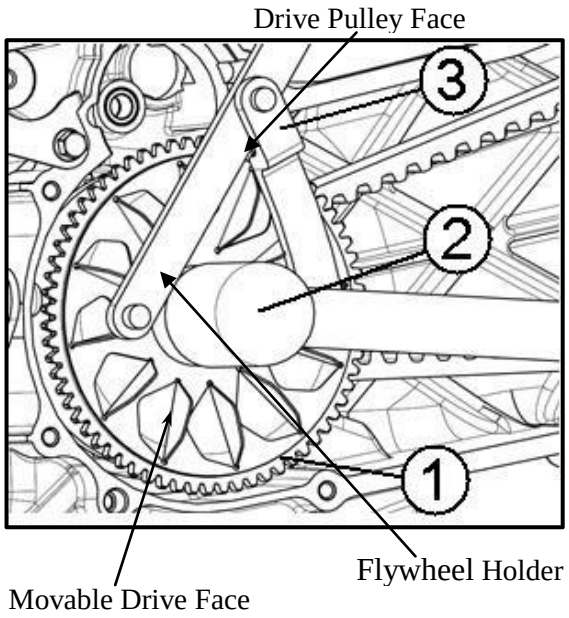


DRIVE PULLEY

REMOVAL

Remove the left crankcase cover.
Hold the drive pulley using an universal holder and remove the drive face nut and starting ratchet.
Remove the drive pulley face.

Special
Flywheel Holder



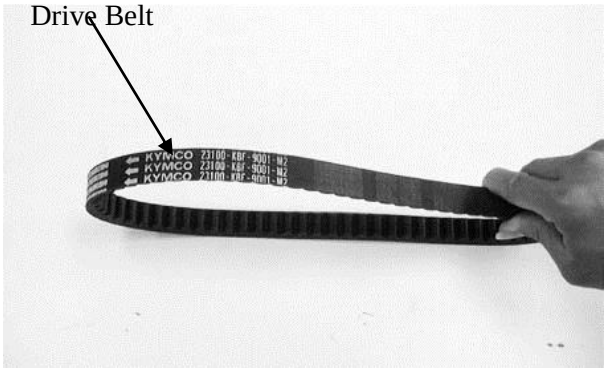
Hold the clutch outer with the universal holder and remove the clutch outer nut.
Remove the clutch/driven pulley and drive belt.

INSPECTION

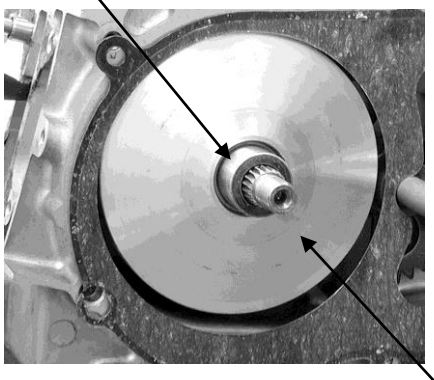
Check the drive belt for cracks, separation or abnormal or excessive wear.
Measure the drive belt width.

Service Limit: 18mm replace if below

* Use specified genuine parts for replace-ment.

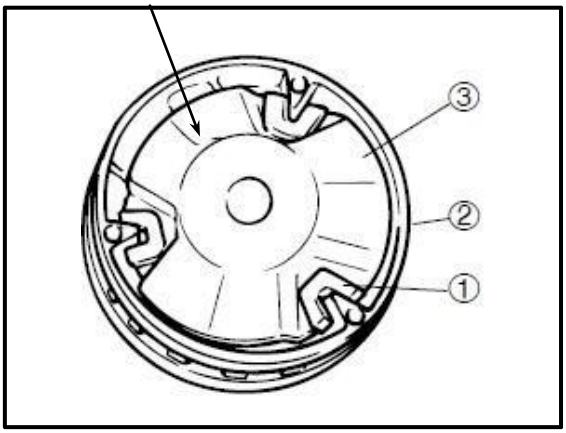


Remove the movable drive face assembly.
Remove the drive pulley collar.

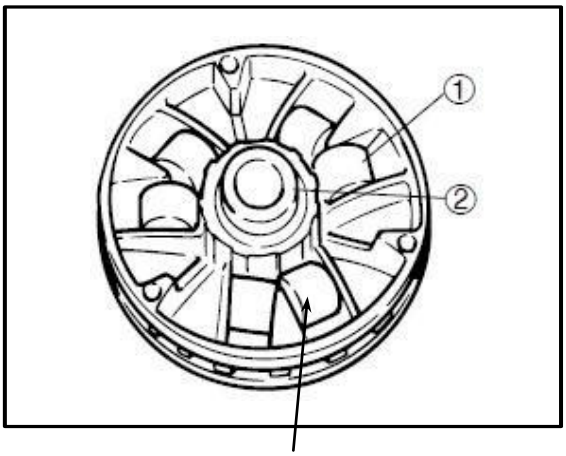


DISASSEMBLY

Remove the ramp plate.

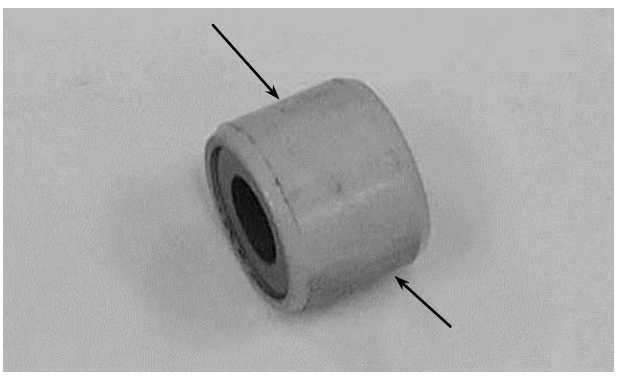


Remove the weight rollers.



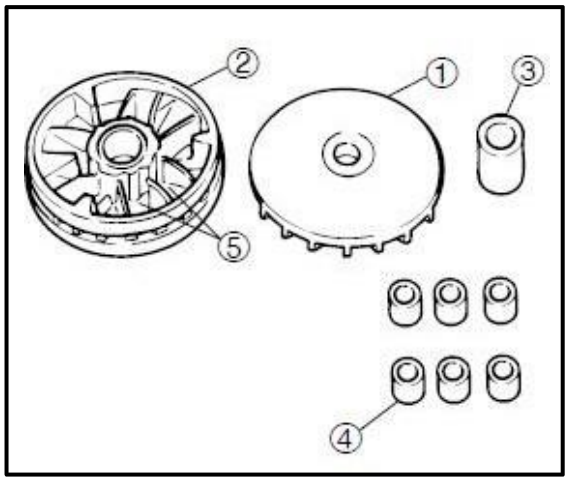
INSPECTION

Check each weight roller for wear or damage.
Measure each weight roller O.D.
Service Limit: 15.8mm replace if below

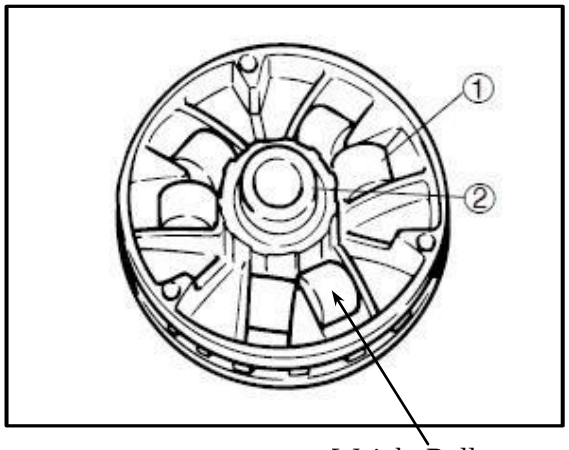


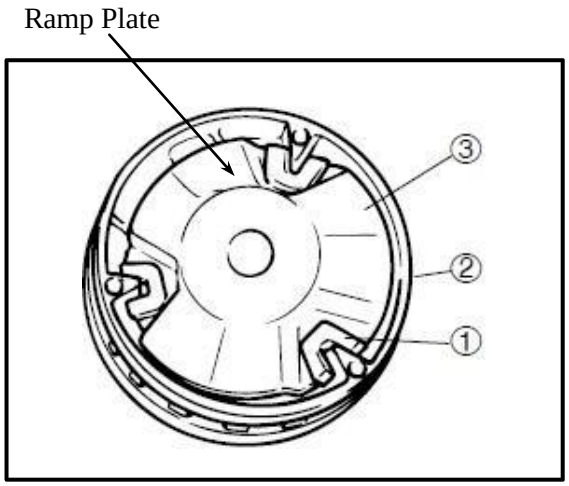
ASSEMBLY

Install the weight rollers into the movable drive face.

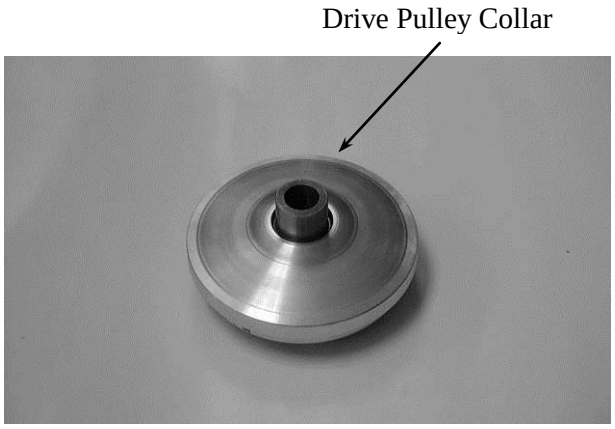


Install the ramp plate.



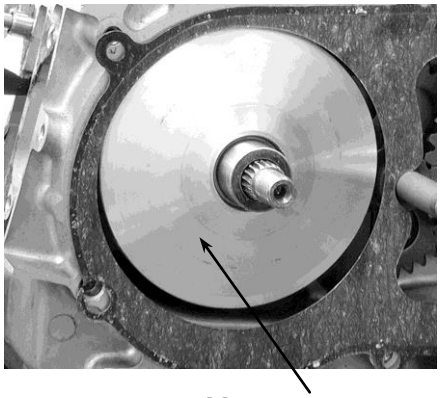


Insert the drive pulley collar into the movable drive face.

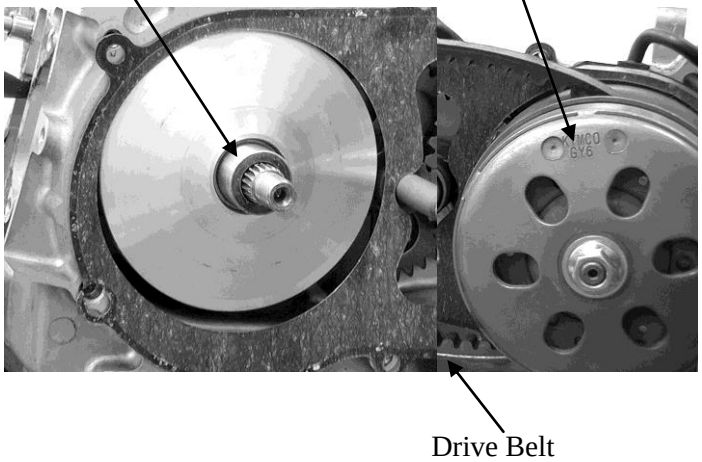


INSTALLATION

Install the movable drive face onto the crankshaft.



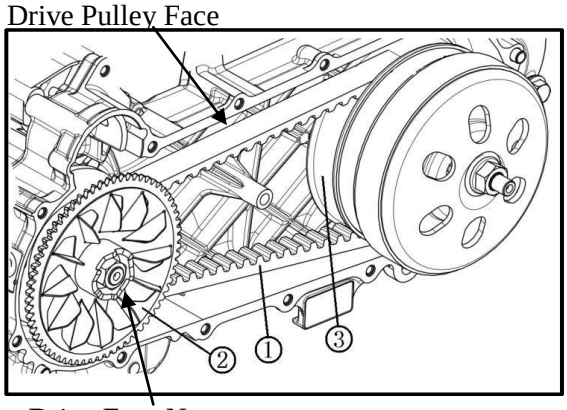
Lay the drive belt on the driven pulley.
Set the drive belt on the drive pulley collar.



Install the drive pulley face, starting ratchet and drive face nut.

* • When installing the drive pulley face, compress it to let the drive belt move downward to the lowest position so that the drive pulley can be tightened.
  • Install the starting ratchet by aligning the starting ratchet teeth with the crankshaft teeth.

Drive Pulley Face



Drive Face Nut

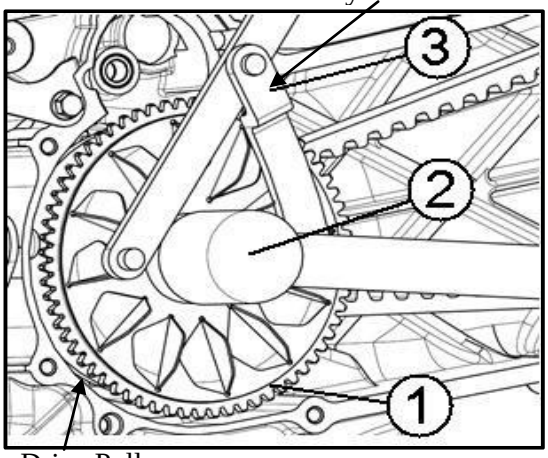
Hold the drive pulley with the universal holder and tighten the drive face nut.

Torque: 5.5kg-m

Special

Flywheel Holder

Flywheel Holder



Drive Pulley

* Do not get oil or grease on the drive belt or pulley faces.

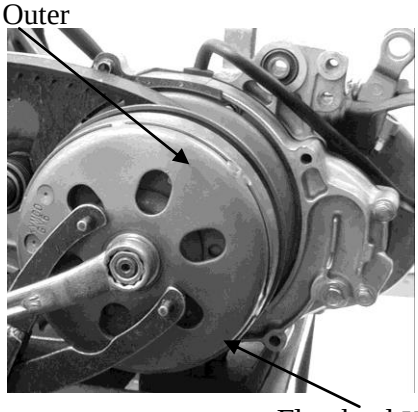
CLUTCH/DRIVEN PULLEY

Remove the left crankcase cover.
Remove the drive pulley and drive belt.
Hold the clutch outer with the universal holder and remove the clutch outer nut.

Special

Flywheel Holder

Clutch Outer

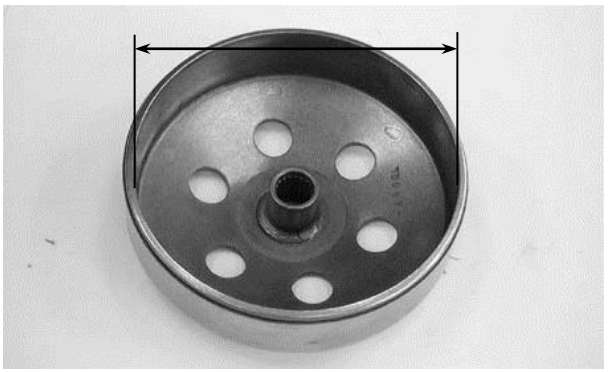


Flywheel Holder

INSPECTION

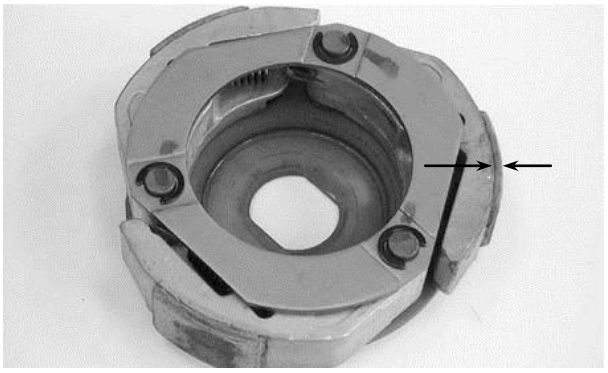
Inspect the clutch outer for wear or damage.
Measure the clutch outer I.D.

Service Limit: 107.2 mm replace if over



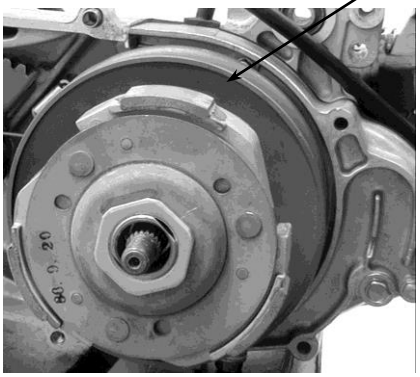
Check the clutch shoes for wear or damage.
Measure the clutch lining thickness.

Service Limit: 3.5mm replace if below



CLUTCH/DRIVEN PULLEY DISASSEMBLY

Clutch/Driven Pulley



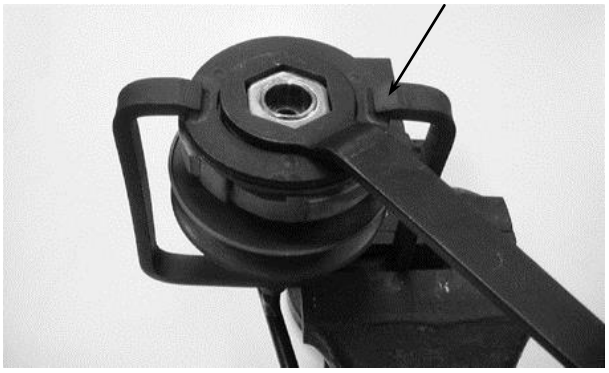
Hold the clutch/driven pulley assembly with the clutch spring compressor.

* Be sure to use a clutch spring compressor to avoid spring damage.

Special

Clutch Spring Compressor

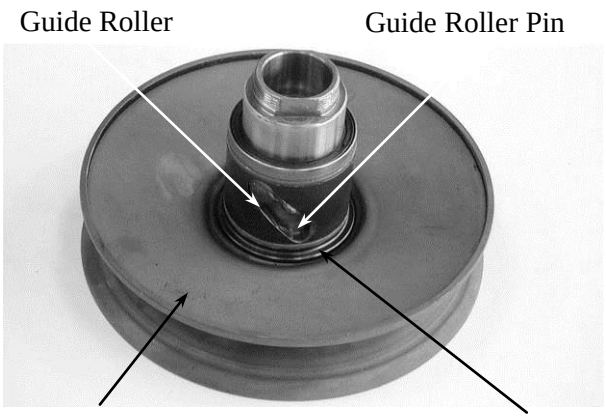
Clutch Spring Compressor



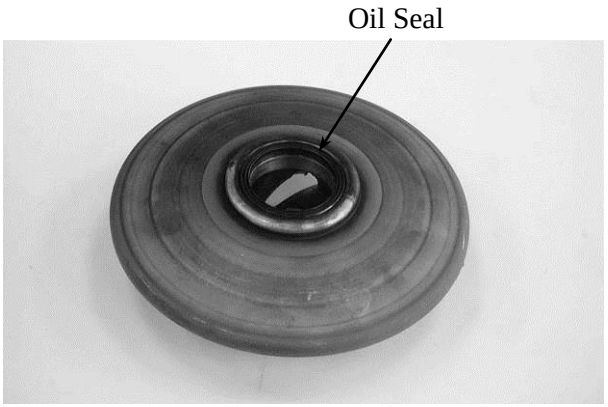
Set the clutch spring compressor in a vise and remove the clutch drive plate nut.

Loosen the clutch spring compressor and disassemble the clutch/driven pulley assembly.
Remove the seal collar.

Pull out the guide roller pins and guide rollers. Remove the movable driven face from the driven face.



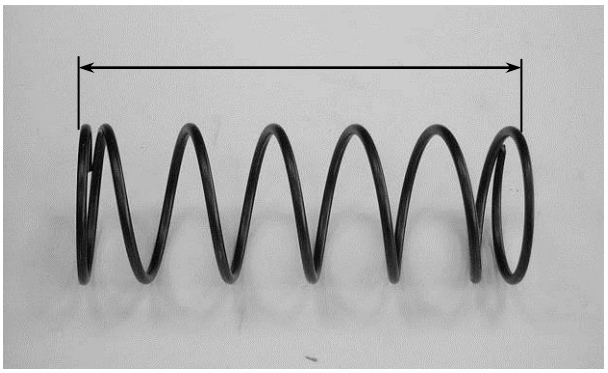
Remove the oil seal from the movable driven face.



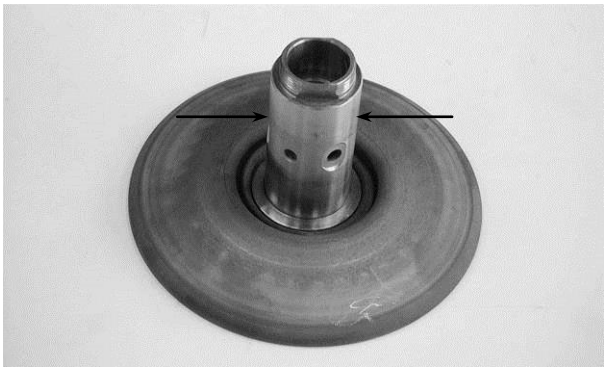
INSPECTION

Check the driven face spring.

Service Limit: 93mm



Check the driven face for wear or damage.

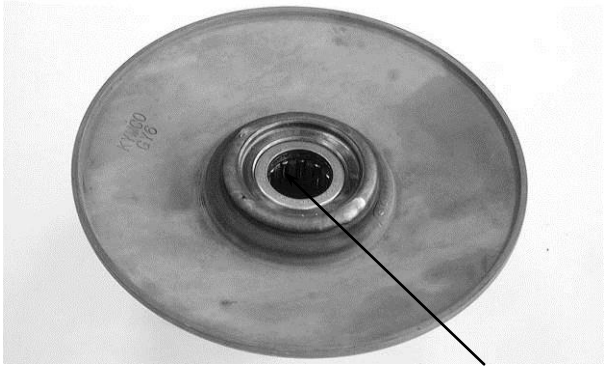


Check the movable driven face for wear or damage.

DRIVEN PULLEY FACE BEARING REPLACEMENT

Drive the inner needle bearing out of the driven pulley face.

* Discard the removed bearing and replace with a new one.



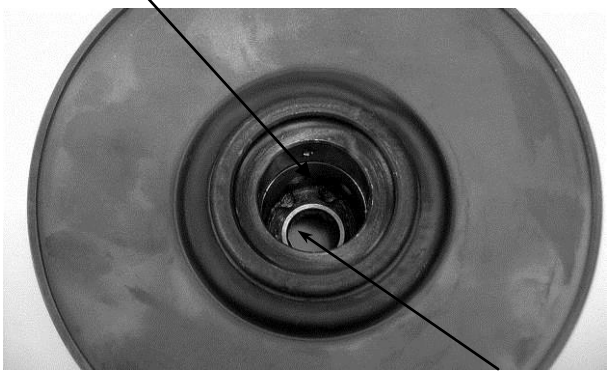
needle bearing

Inner Bearing

Remove the drive the outer bearing out of the driven face.

* Discard the removed bearing and replace with a new one.

Apply grease to the outer bearing.
Drive a new outer bearing into the driven face with the sealed end facing up.

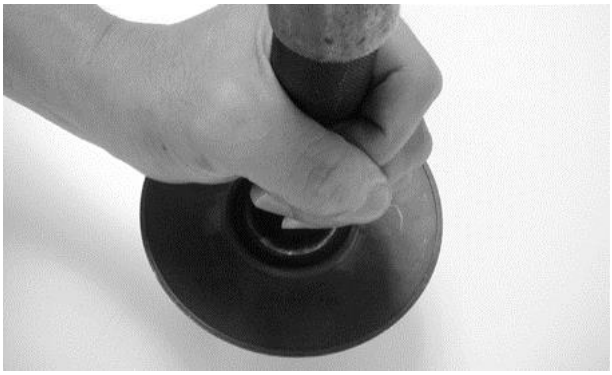


Outer Bearing

Apply grease to the driven face bore areas.

* Pack all bearing cavities with 9～9.5g grease.
  Specified grease: Heat resistance 230°C

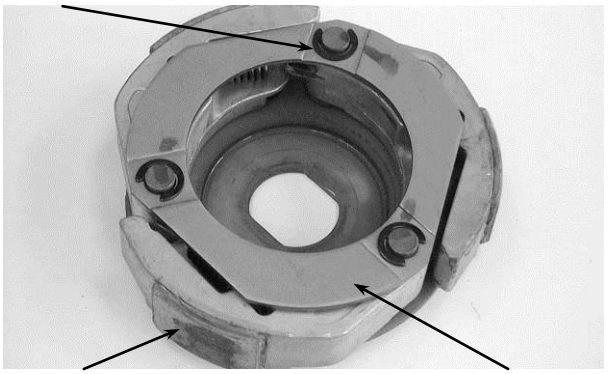
Press a new needle bearing into the driven face.



CLUTCH DISASSEMBLY

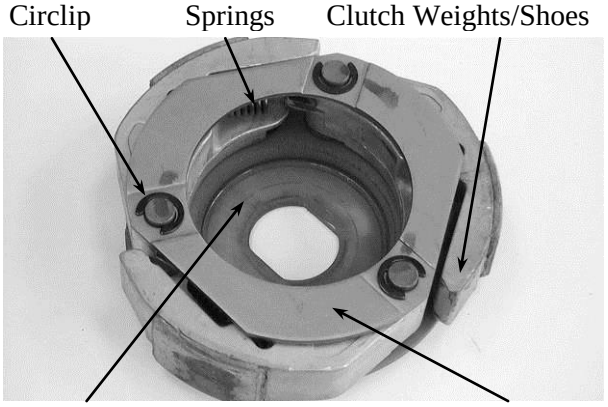
Remove the circlips and retainer plate to disassemble the clutch.

* Keep grease off the clutch linings.



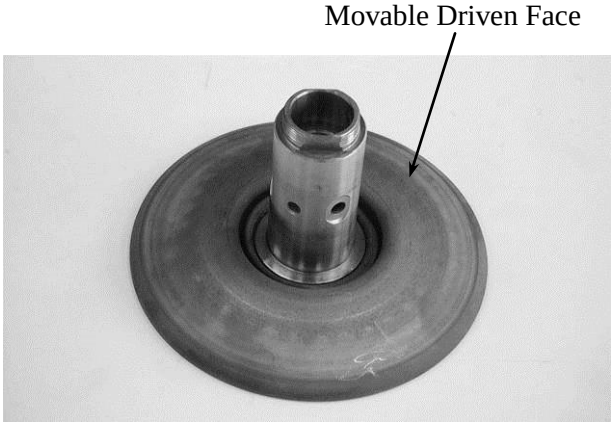
CLUTCH ASSEMBLY

Install the damper rubbers on the drive plate pins.
Install the clutch weights/shoes and clutch springs onto the drive plate.
Install the retainer plate and secure with the circlips.



CLUTCH/DRIVEN PULLEY ASSEMBLY

Clean the driven pulley faces and remove any grease from them.
Install the oil seal onto the moveable driven face.
Apply grease to the O-rings and install them onto the moveable driven face.

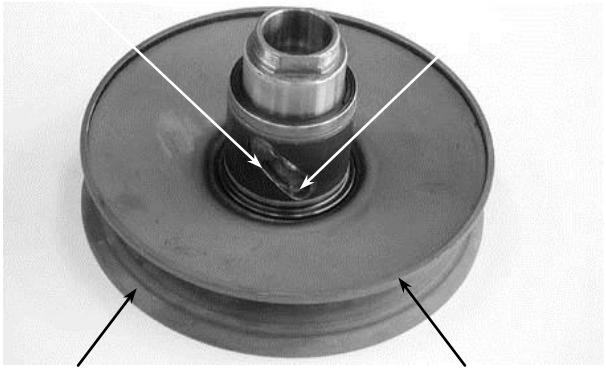


Install the movable driven face onto the driven face.
Apply grease to the guide rollers and guide roller pins and then install them into the holes of the driven face.
Install the seal collar.
Remove any excessive grease.

* Be sure to clean the driven face off any grease.

Guide Roller

Guide Roller Pin



Driven Face

Movable Driven Face

Set the driven pulley assembly, driven face spring and clutch assembly onto the clutch spring compressor.

* Align the flat surface of the driven face with the flat on the clutch drive plate.

Compress the clutch spring compressor and install the drive plate nut.
Set the clutch spring compressor in a vise and tighten the drive plate nut to the specified torque.

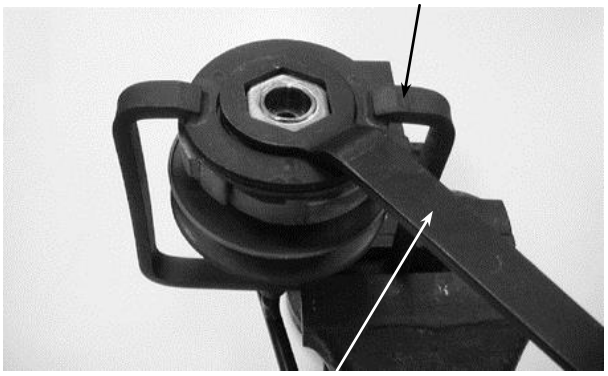
Torque: 5.5kg-m

* Be sure to use a clutch spring compressor to avoid spring damage.

Special

Clutch Spring Compressor

Clutch Spring Compressor

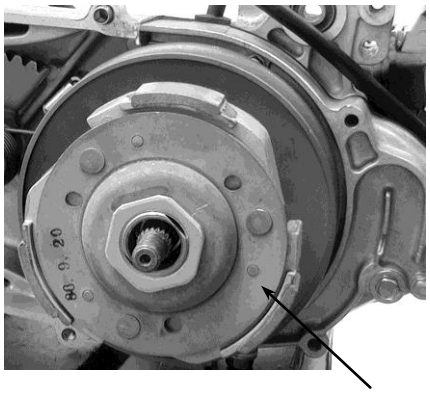


Lock Nut Wrench

INSTALLATION

Install the clutch/driven pulley onto the drive shaft.

* Keep grease off the drive shaft.



Clutch/Driven Pulley

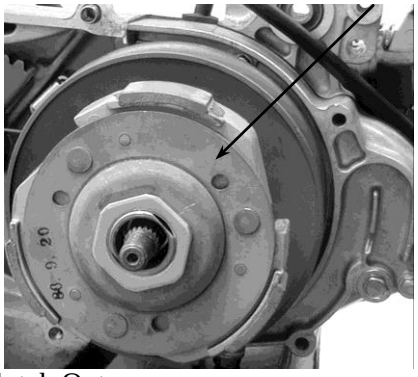
Install the clutch outer.
Hold the clutch outer with the universal holder.
Install and tighten the clutch outer nut.

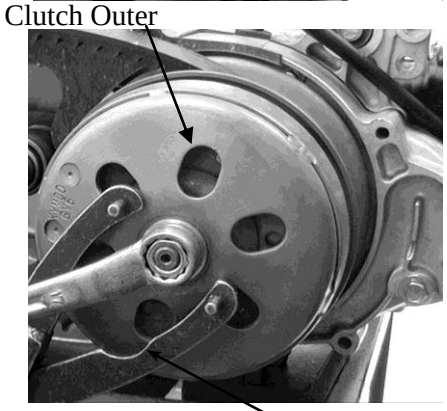
Torque: 5.5kg-m

Special

Flywheel Holder

Install the drive belt.
Install the left crankcase cover.

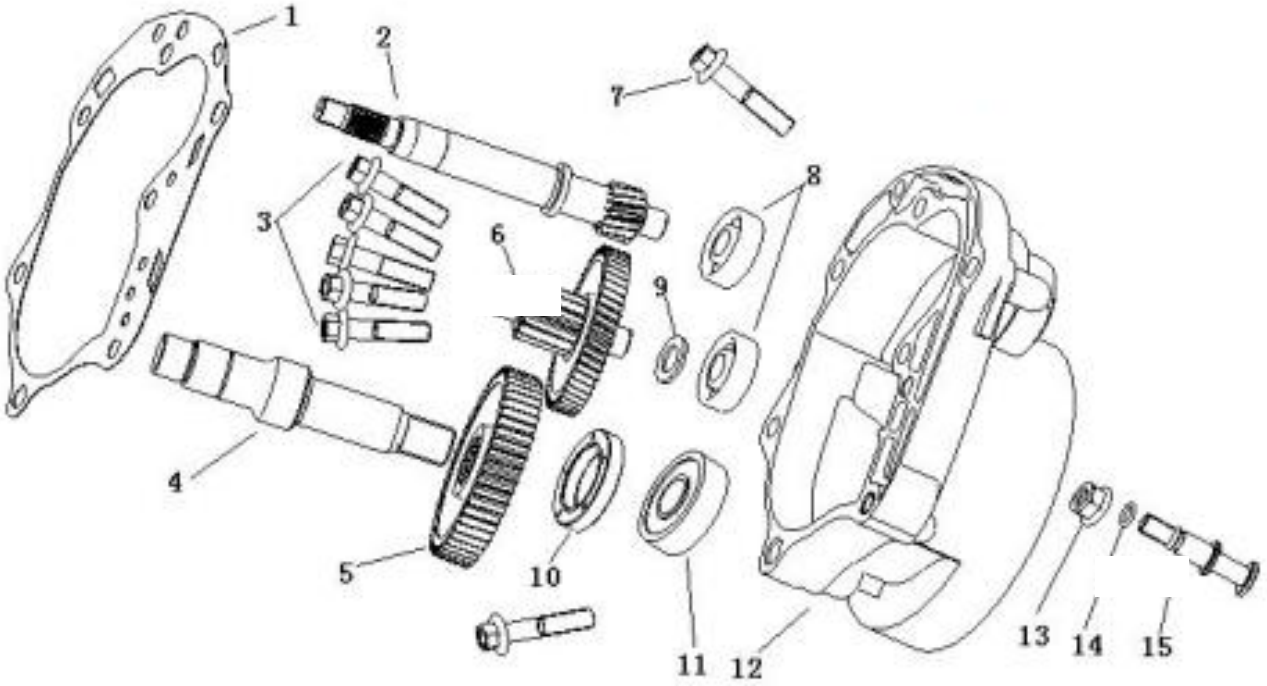




Install the left crankcase cover and tighten the cover bolts diagonally.
Connect the drive belt air tube and tighten the band screw.

* For drum brake, be sure to install the rear brake cable clamp to the specified location and install the brake cable into the brake cable holder.

10. FINAL REDUCTION



SERVICE INFORMATION

SPECIFICATIONS

Specified Oil: GEAR OIL SAE 90#
Oil Capacity: At disassembly : 0.12liter
At change : 0.11liter

SPECIAL TOOLS

Bearing puller,15,17，20mm

TROUBLESHOOTING

Engine starts but motorcycle won‘t move

- Damaged transmission
- Seized or burnt transmission
- Faulty drive belt
- Faulty clutch

Abnormal noise

- Worn, seized or chipped gears
- Worn bearing

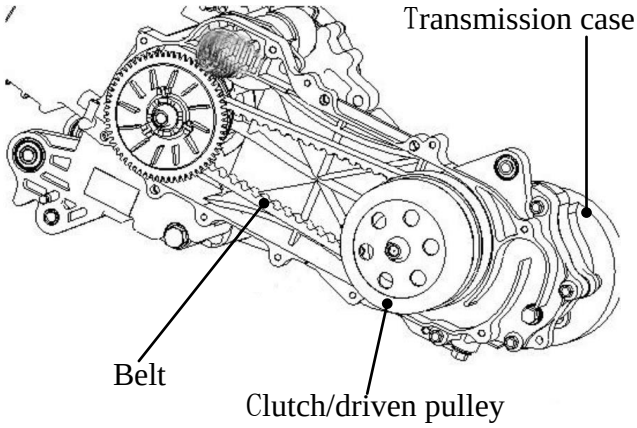
Oil leaks

- Oil level too high
- Worn or damaged oil seal

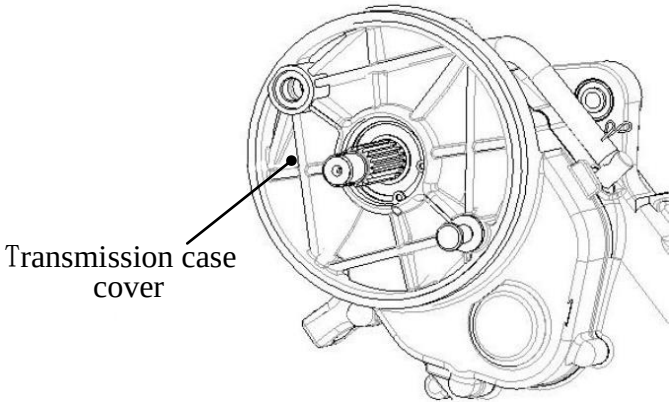
10. FINAL REDUCTION

FINAL REDUCTION DISASSEMBLY

Remove the rear brake cable.
Remove the rear wheel.
Remove the left crankcase cover.
Remove the clutch/driven pulley.
Drain the transmission gear oil into a clean container.
Remove the transmission case cover attaching bolts.
Remove the transmission case cover.
Remove the gasket and dowel pins.



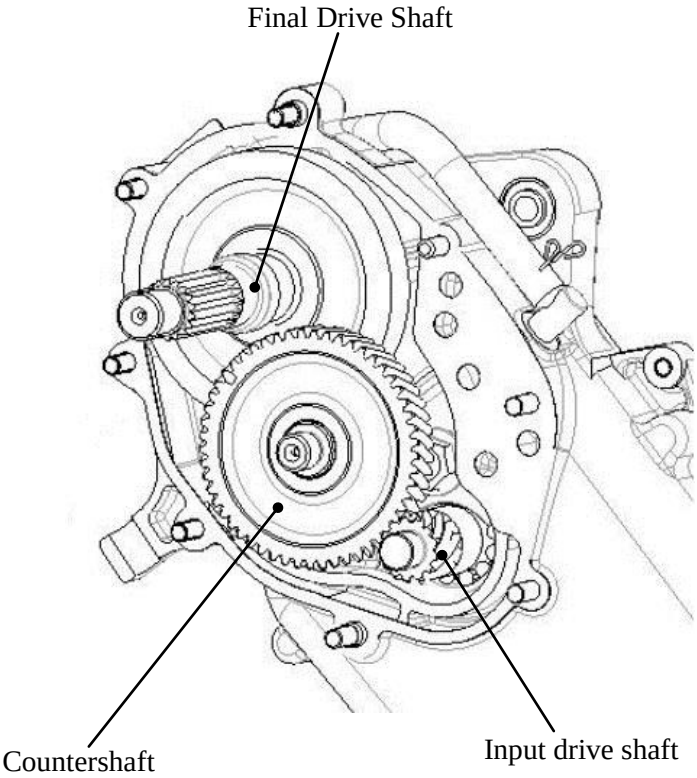
Remove the final gear and countershaft.



FINAL REDUCTION INSPECTION

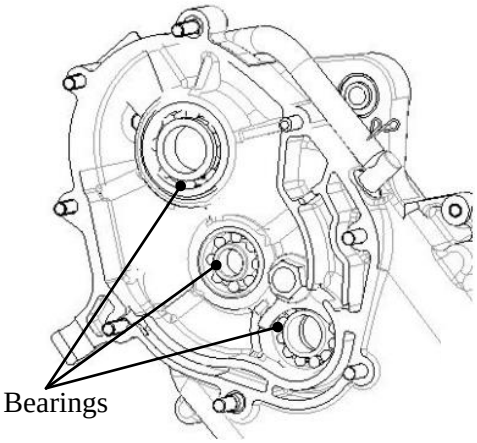
Inspect the countershaft and gear for wear or damage.

Inspect the final gear and final shaft for wear, damage or seizure.



Check the left crankcase bearings for excessive play and inspect the oil seal for wear or damage.

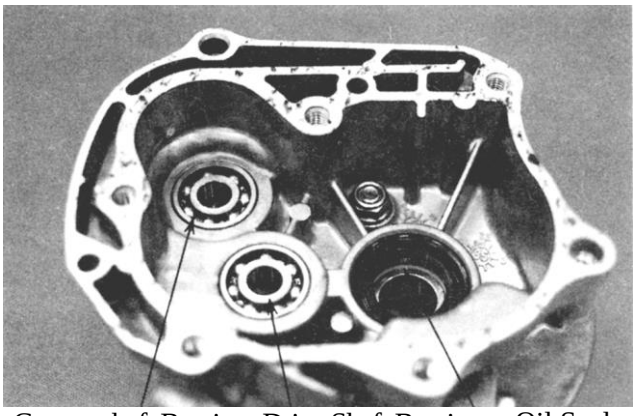
Inspect the drive shaft and gear for wear or damage.
Check the transmission case cover bearings for excessive play and inspect the final shaft bearing oil seal for wear or damage.


Bearings

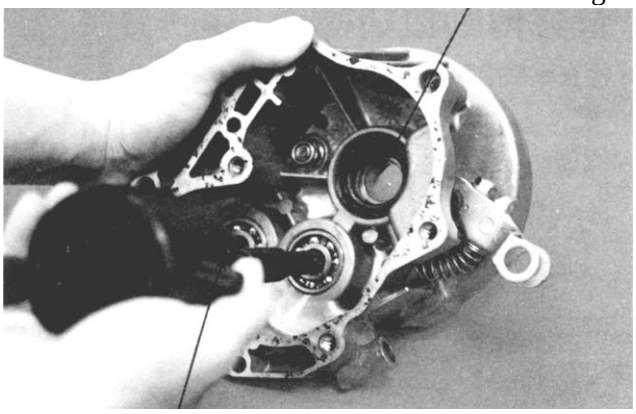
* Do not remove the transmission case cover except for necessary part replace-ment. When replacing the drive shaft, also replace the bearing and

BEARING REPLACEMENT (TRANSMISSION CASE COVER)

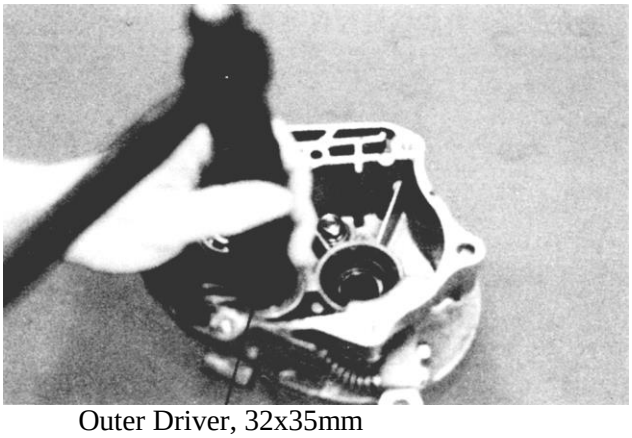
Remove the oil seal and using a bearing puller.


Countershaft Bearing Drive Shaft Bearing Oil Seal
Final Shaft Bearing

Remove the final shaft oil seal.


Bearing Puller

Drive new bearings into the transmission case cover.

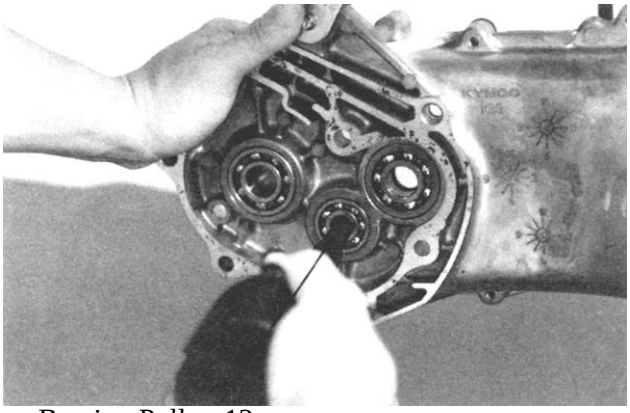

Outer Driver, 32x35mm

10. FINAL REDUCTION

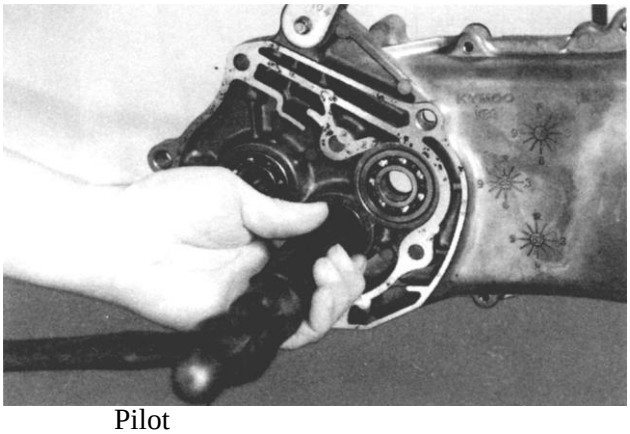
BEARING REPLACEMENT (LEFT CRANKCASE)

Remove the drive shaft.
Remove the drive shaft oil seal.
Remove the left crankcase bearings using a bearing puller.

Special
Bearing Puller

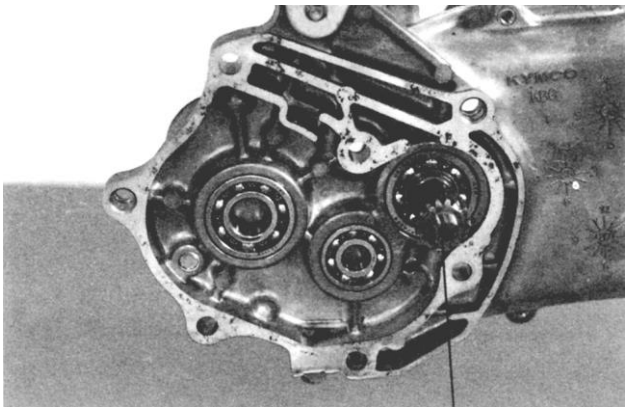

Bearing Puller, 12mm

Drive new bearings into the left crankcase.
Install a new drive shaft oil seal.

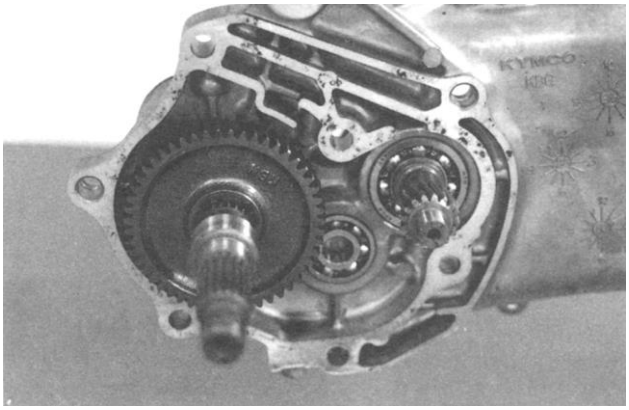

Pilot

FINAL REDUCTION ASSEMBLY

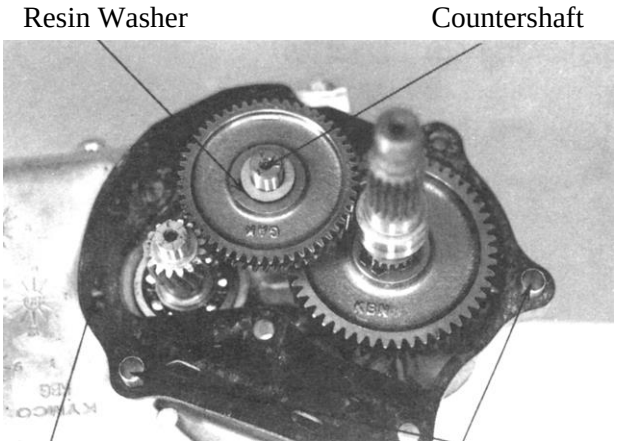
Install the drive shaft into the left crankcase.


Drive Shaft

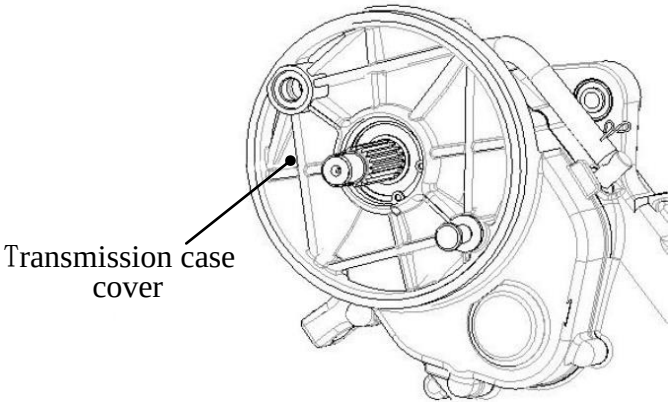
Install the final gear and final shaft into the left crankcase.



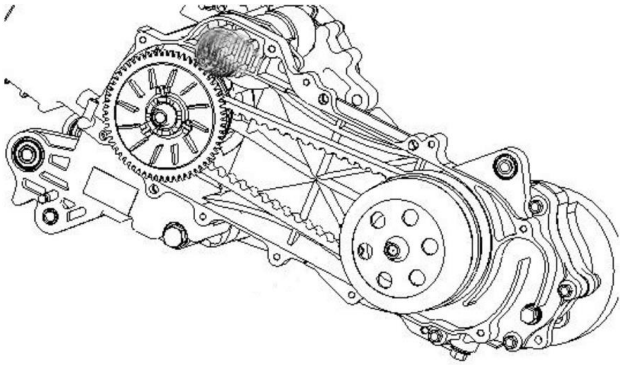
Install the countershaft and gear into the left crankcase.
Install the resin washer onto the countershaft.
Install the dowel pins and a new gasket.



Install the transmission case cover.



Install and tighten the transmission case cover bolts.
Install the clutch/driven pulley.



After installation, fill the transmission case with the specified oil.

*
- Place the motorcycle on its main stand on level ground.
- Check the oil sealing washer for wear or damage.

Specified Gear Oil: SAE90#

Oil Capacity:

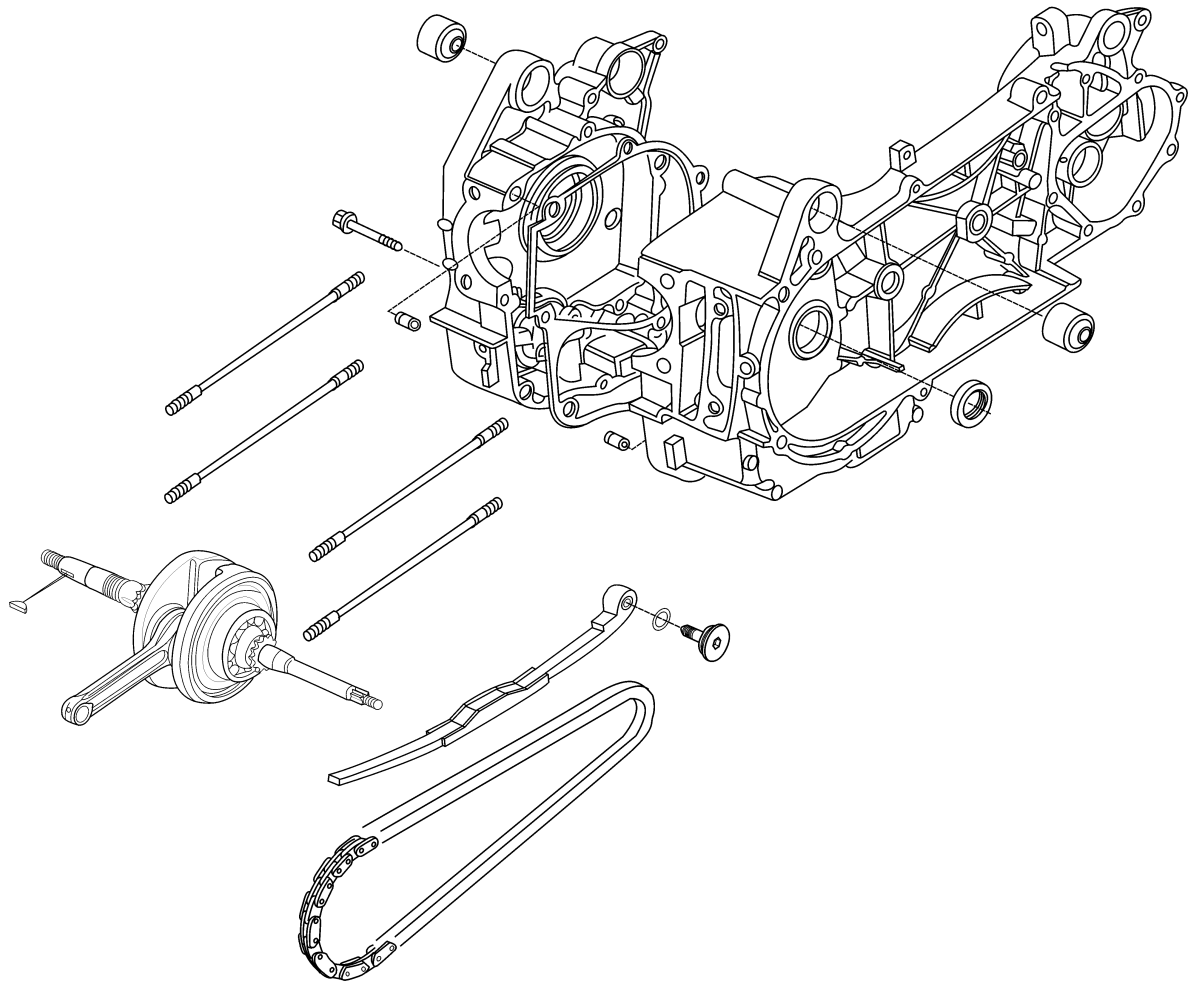
At disassembly : 0.12 liter
At change : 0.11 liter

Install and tighten the oil check bolt.

Torque: 1.0～1.5kgf-m

Start the engine and check for oil leaks. Check the oil level from the oil check bolt hole and add the specified oil to the proper level if the oil level is low.

11. CRANKCASE/CRANKSHAFT



11

11. CRANKCASE/CRANKSHAFT

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- This section covers crankcase separation to service the crankshaft. The engine must be removed for this operation.
- The following parts must be removed before separating the crankcase.
  - –Cylinder head
  - –Cylinder/piston
  - –Drive and driven pulleys
  - –A.C. generator
  - –Carburetor/air cleaner
  - –Rear wheel/rear shock absorber
  - –Starter motor
  - –Oil pump

SPECIFICATIONS

	Item	Standard (mm)	Service Limit (mm)
Crankshaft	Connecting rod big end side clearance	0.10～0.3	0.3
	Connecting rod big end radial clearance	0.008-0.018	0.018
	Runout	0.03	0.10

TORQUE VALUES

Crankcase bolt	0.8~1.2kgf-m
Cam chain tensioner slipper bolt	0.8~1.2kgf-m

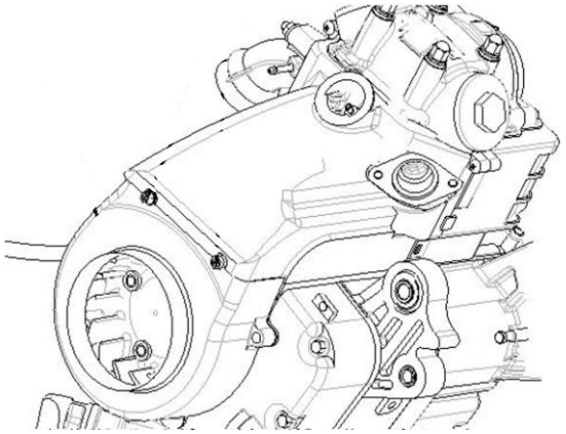
TROUBLESHOOTING

Excessive engine noise

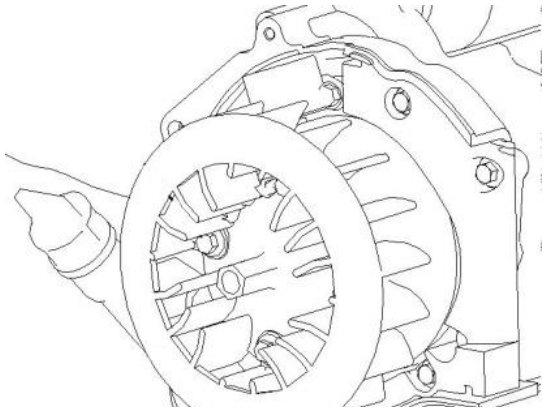
- Excessive bearing play
- Excessive crankpin bearing play

CRANKCASE SEPARATION

Remove the engine from the frame.
Remove the fan cover、the upper shroud and the lower shroud of engine.

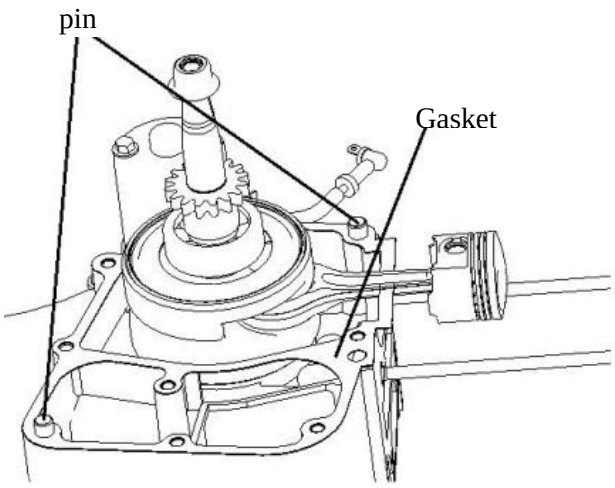


Remove the Fan Cover and Fan.
Remove the A.C. generator flywheel.
Remove the A.C. generator stator and pulsar coil.
Remove the right crankcase cover bolts and the right crankcase cover.
Remove the oil pump gear.
Remove the oil pump.

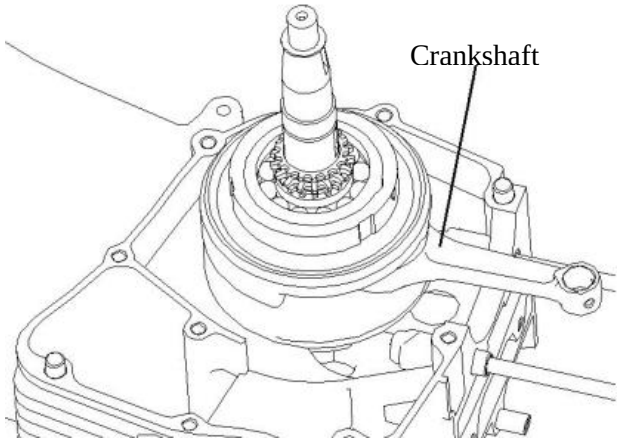


Remove the CVT.
Remove the crank case 1 the retaining bolt
Remove the left and right crankcase

* Do not damage the crankcase gasket surface.

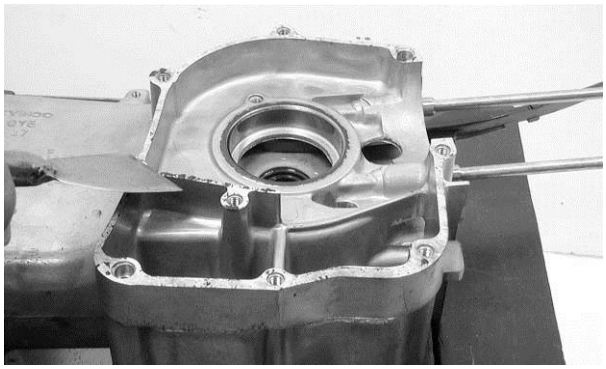


Remove the Gasket, fixed pin.



Remove the crankshaft and cam chain from the left crankcase.

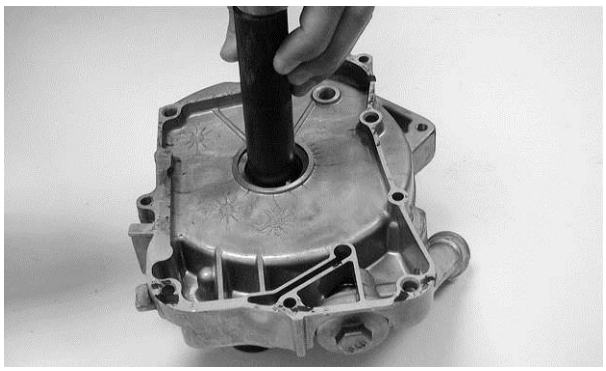
Clean off all gasket material from the crankcase mating surfaces.



* Avoid damaging the crankcase mating surfaces.

Remove the oil seal from the right crankcase.

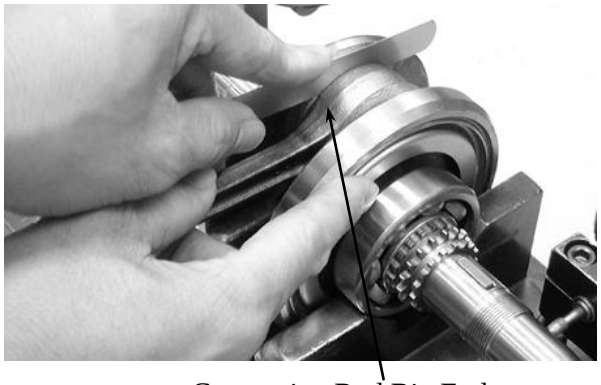
Check the oil seal lip for wear or deterioration.
The installation sequence is the reverse of removal.



CRANKSHAFT INSPECTION

Measure the connecting rod big end side clearance.

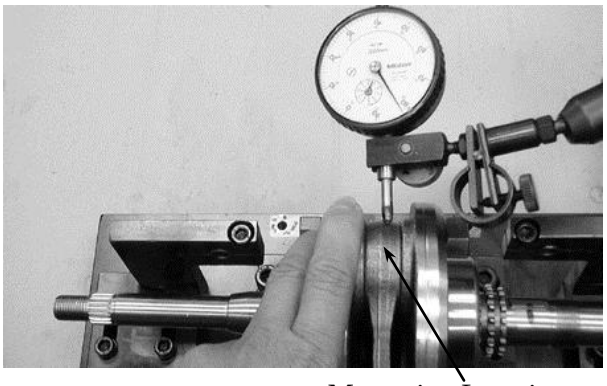
Service Limit: 0.3mm replace if over



Connecting Rod Big End

Measure the connecting rod big end radial clearance at two points at right angels to the shaft.

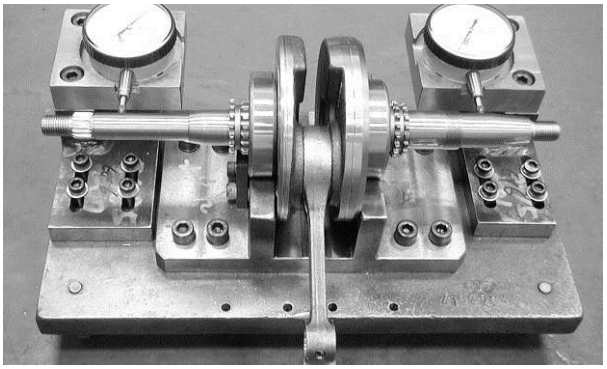
Service Limit: 0.0018mm replace if over



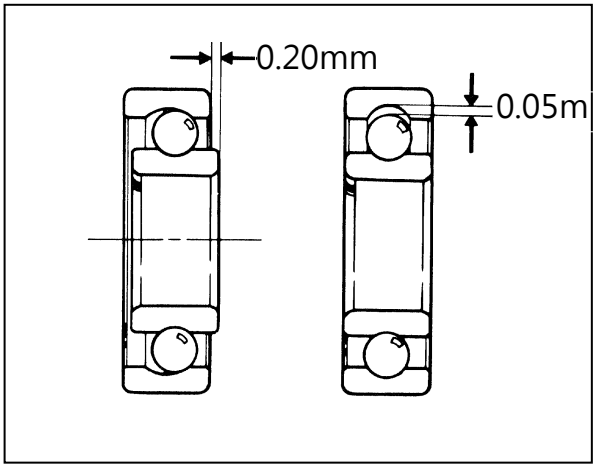
Measuring Location

Measure the crankshaft runout.

Service Limit: 0.10mm replace if over

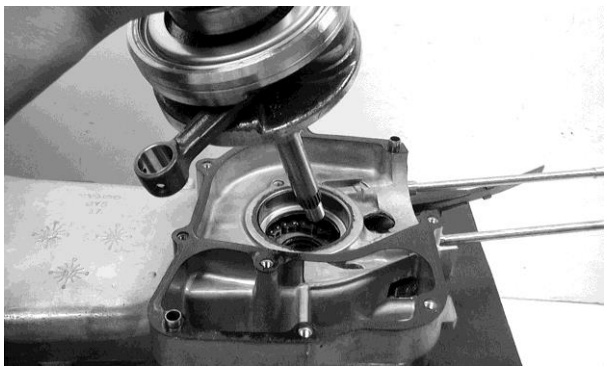


Turn the crankshaft bearings and check for excessive play.
If they do not turn smoothly, quietly or if they fit loosely in the crankshaft, replace the crankshaft as a set.



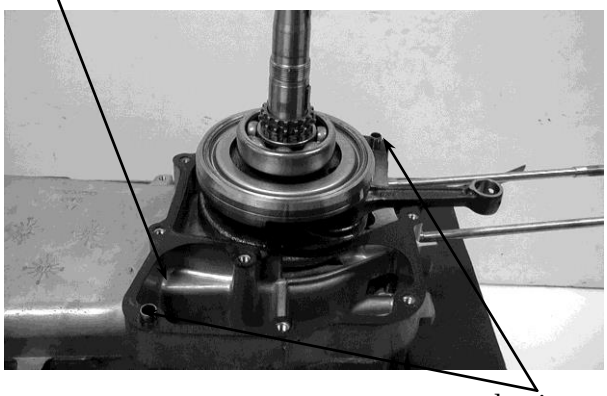
CRANKCASE ASSEMBLY

Install the cam chain into the left crankcase.



Install the crankshaft into the left crankcase.

gasket



steady pin

Install the dowel pins and a new gasket onto the left crankcase.

Tighten the two crankcase attaching bolts.

Torque: 0.9kg-m

* Place the right crankcase over the crankshaft and onto the left crankcase.

Install the left and right crankcase
Tighten the crank case 1 the retaining bolt
Install the oil pump and the oil pump gear.

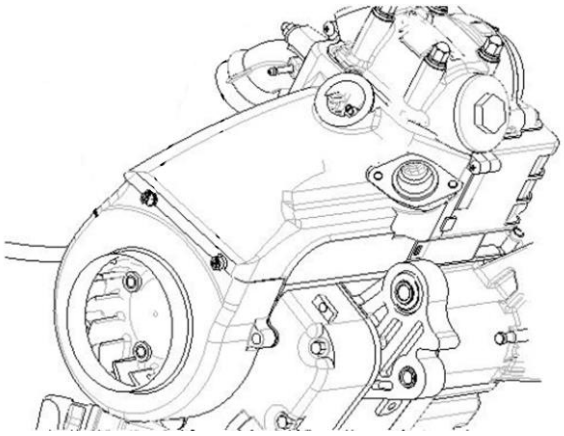
Install the right crankcase cover.

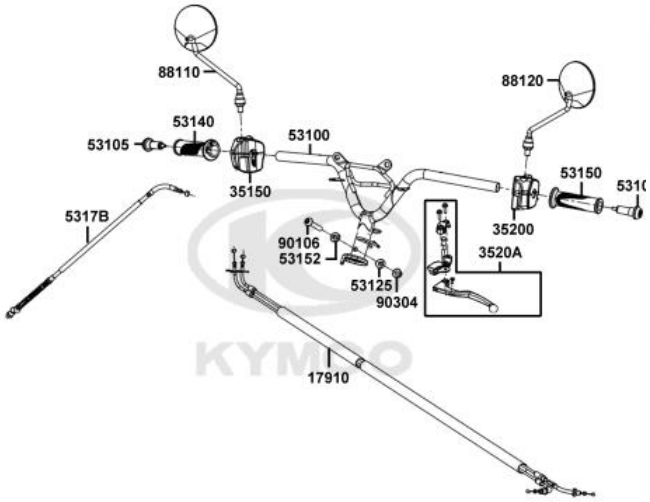
Tighten the right crankcase cover bolts

Install the A.C. generator stator and pulsar coil.
Install A.C. generator flywheel.

Install the Fan Cover and Fan.

Install the fan cover、the upper shroud and the lower shroud of engine.

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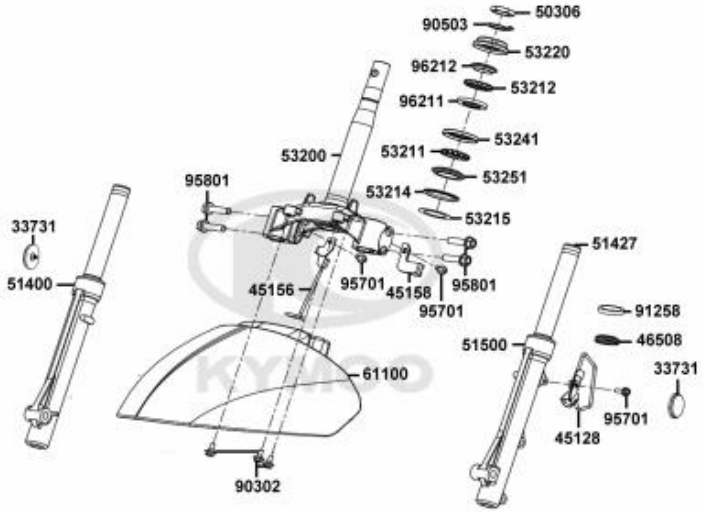
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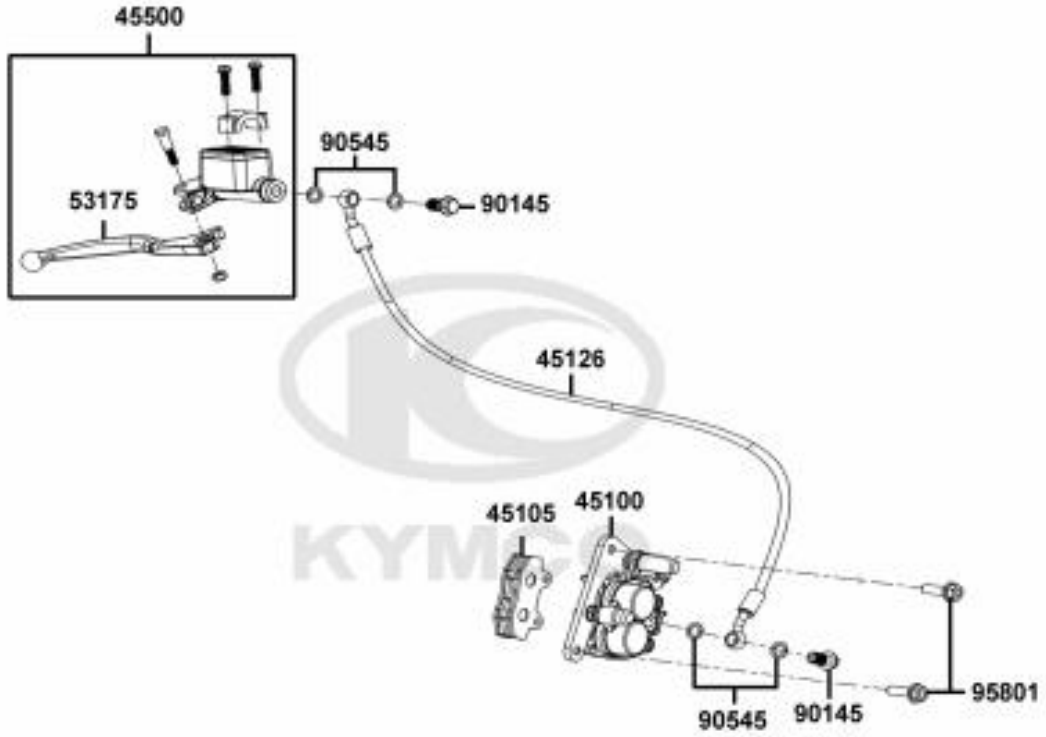
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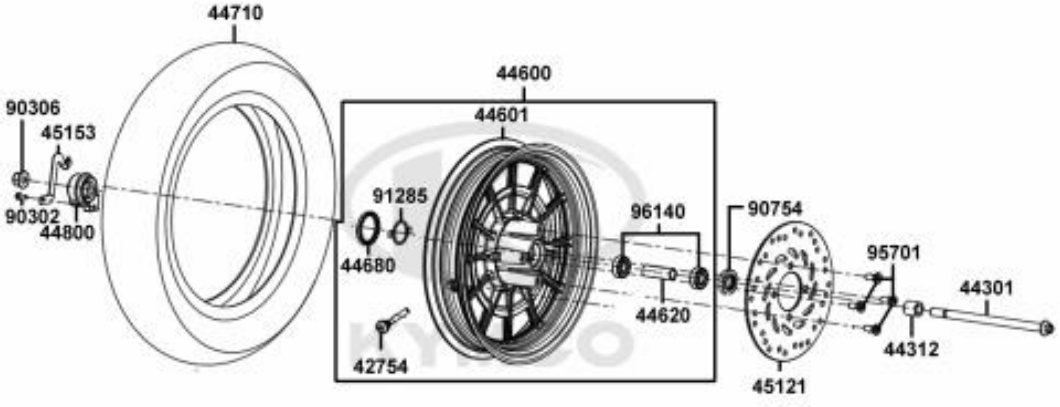
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12

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Remove the motorcycle frame covers before removing the front wheel. Jack the motorcycle front wheel off the ground and be careful to prevent the motorcycle from falling down.
- During servicing, keep oil or grease off the brake drum and brake linings.

SPECIFICATIONS

Item		Standard (mm)	Service Limit (mm)
Axle shaft runout		—	0.2
Front wheel rim runout	Radial	—	2.0
	Axial	—	2.0
Front shock absorber spring free length		321.7±2	319

TORQUE VALUES

Handlebar bolt	4.5~5.5kgf-m
Steering stem lock nut	6.0~8.0kgf-m
Steering top cone race	0.5~1.3kgf-m
Front shock absorber bolt	3.0kgf-m
Front axle nut	5.0~7.0kgf-m
Brake arm bolt	0.8~1.2kgf-m

SPECIAL TOOLS

Long socket wrench,32mm 8angle

TROUBLESHOOTING

Hard steering (heavy)
- Excessively tightened steering stem top cone race
- Broken steering balls
- Insufficient tire pressure

Steers to one side or does not track straight
- Uneven front shock absorbers
- Bent front fork
- Bent front axle or uneven tire

Front wheel wobbling
- Bent rim
- Excessive wheel bearing play
- Bent spoke plate
- Faulty tire
- Improperly tightened axle nut

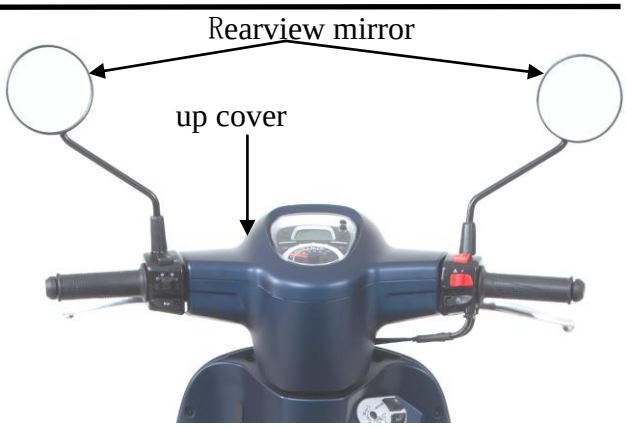
Soft front shock absorber
- Weak shock springs
- Insufficient damper oil

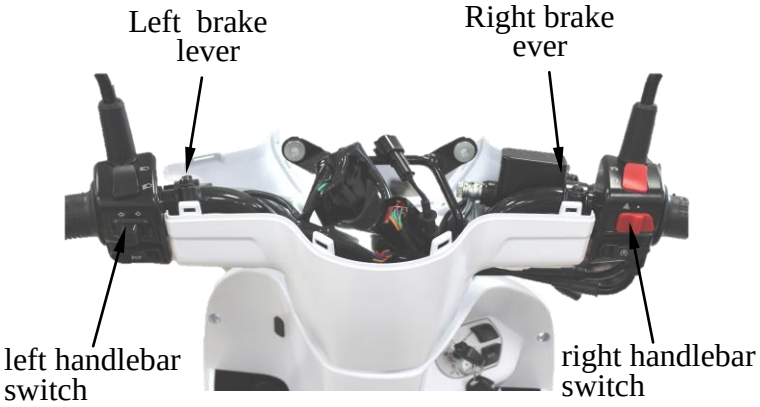
Front shock absorber noise
- Slider bending
- Loose fork fasteners
- Lack of lubrication

STEERING HANDLEBAR

REMOVAL

Remove the rearview mirror.
Remove the handlebar up covers.
Remove the headlight.
Remove the two bolts attaching each of the front and rear brake levers.
Remove the front and rear brake levers.





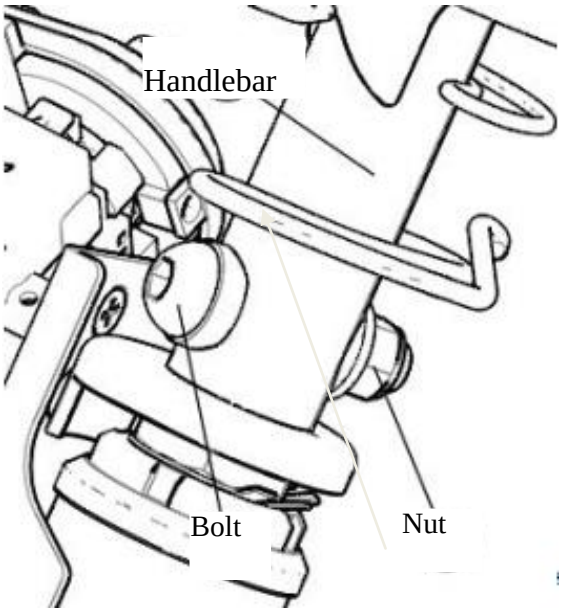
Remove the left handlebar pipe.
Remove the two left handlebar switch set screws to remove the left handlebar switch.

Remove the two throttle holder screws and throttle holder.
Disconnect the throttle cable from the throttle pipe and then remove the throttle pipe from the handlebar.

Remove the handlebar down covers.

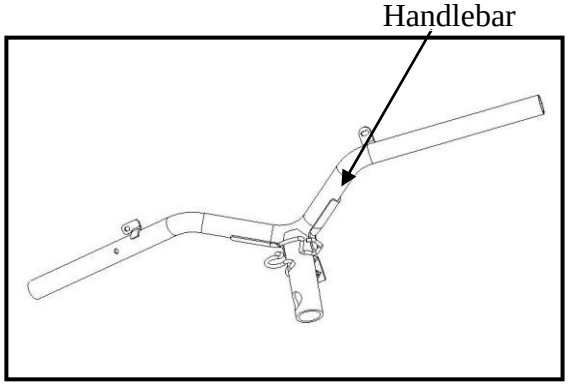
Remove the front center cover
Remove the front cover.
Remove the leg shield.

Remove the handlebar lock nut and bolt to remove the handlebar.

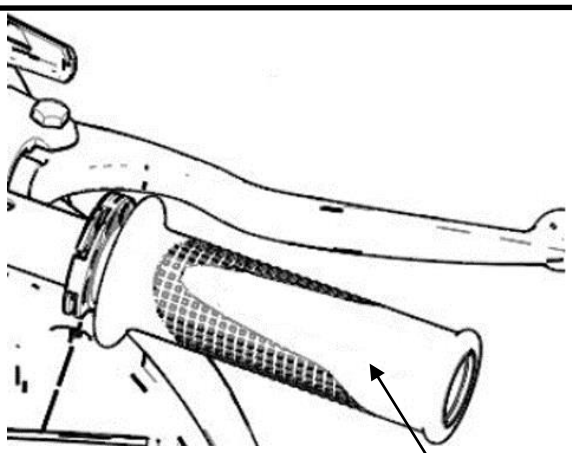


INSTALLATION

Install the handlebar onto the steering stem by aligning the tab on the handlebar with the bolt orifice on the steering stem.
Install and tighten the handlebar bolt and lock nut.
Torque: 4.5～5.5kgf-m



Apply grease to the tip of the throttle pipe.
Install the throttle pipe and connect the throttle cable.



Install in the reverse order of removal.

FRONT WHEEL

REMOVAL

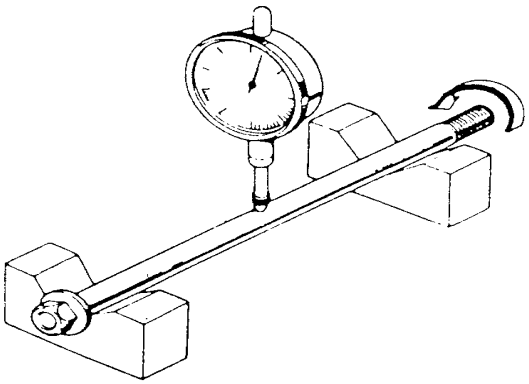
Jack the scooter front wheel off the ground.
Remove the speedometer cable set screw and disconnect the speedometer cable.
Remove the front axle nut and pull out the axle.
Remove the front wheel.
Remove the and speedometer gear box and side collar.

INSPECTION

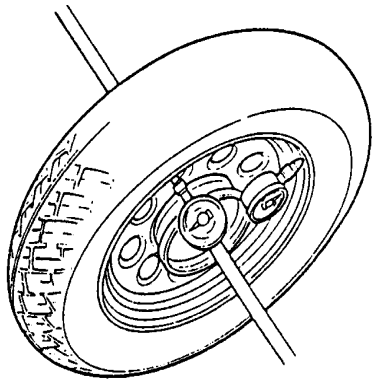
AXLE RUNOUT

Set the axle in V blocks and measure the runout using a dial gauge.
The actual runout is $^1/_2$ of the total indicator reading.

Service Limit: 0.2mm replace if over

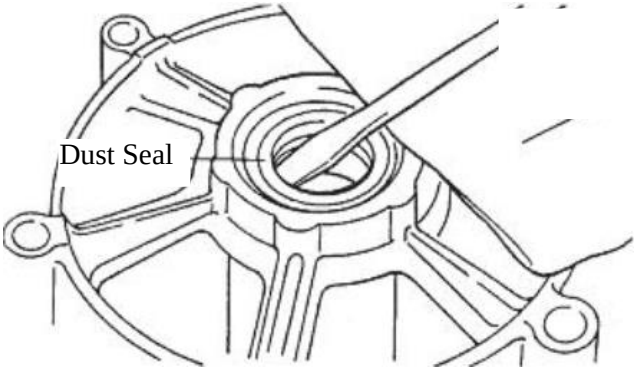


WHEEL RIM
Check the wheel rim runout.
Service Limits:
Radial: 2.0mm replace if over
Axial: 2.0mm replace if over



Turn the wheel bearings and replace the bearings if they are noisy or have excessive play.

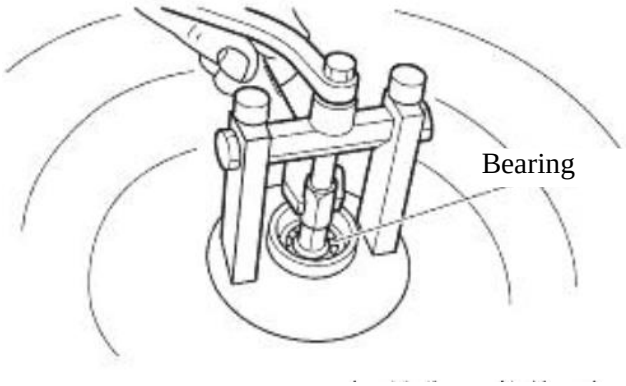
DISASSEMBLY
Remove the dust seal.



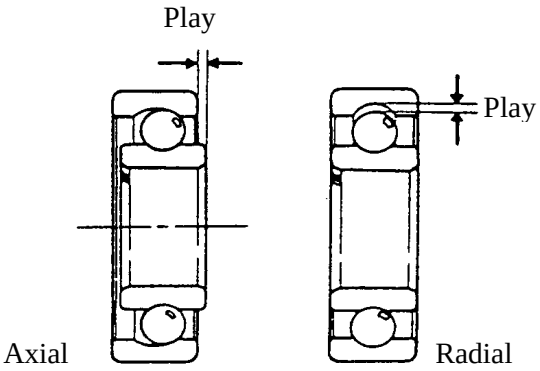
Remove the front wheel bearings and distance collar.

Special

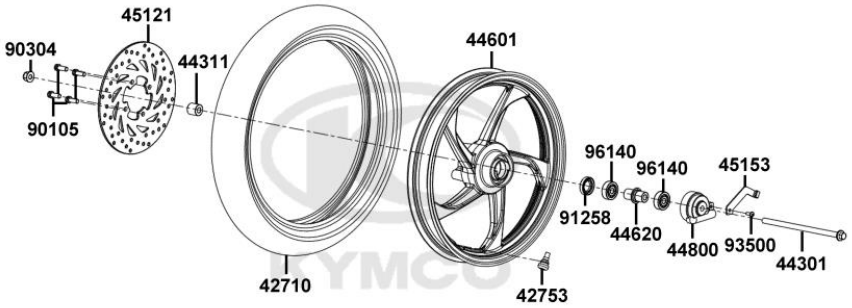
Bearing Puller



Check bearing



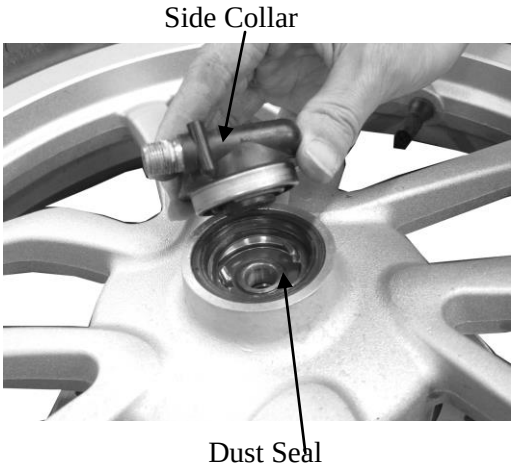
ASSEMBLY



Pack all bearing cavities with grease.
Drive in the left bearing.
Install the distance collar.
Drive in the right bearing.

* Drive in the bearing squarely with the sealed end facing out.

Apply grease to a new dust seal lip and install the dust seal.
Install the side collar.



INSTALLATION

Apply grease to the brake panel dust seal lip.

* If not aligned, the retaining pawl will be deformed when the axle nut is tightened.
After installing the axle, turn the wheel to make sure that the speedometer drive shaft rotates freely.

Apply a thin coat of grease to the axle shaft.
Install the front wheel by aligning the brake panel groove with the front fork tab.
Insert the axle shaft.
Install and tighten the axle nut.

Torque: 5.0~7.0kg-m

Connect the Wheel Speed Sensor .

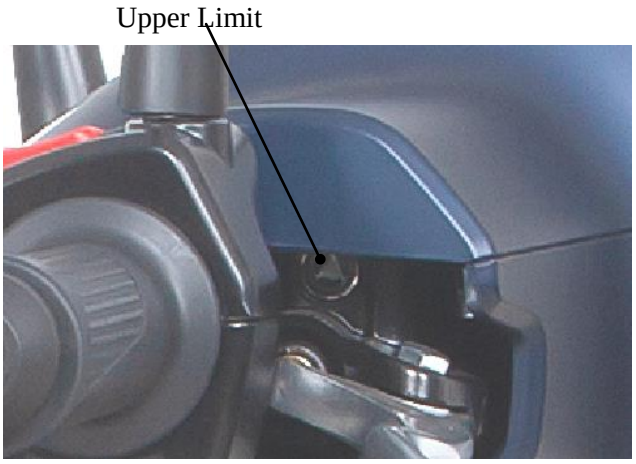
rotate the front tire to check the speedometer if be performed.

HYDRAULIC BRAKE (FRONT BRAKE)

Brake Fluid Replacement/Air Bleeding

Check the brake fluid level on level ground.

*
- When operating the brake lever, the brake reservoir cap must be tightened securely to avoid spill of brake fluid.
- When servicing the brake system, use shop towels to cover plastic parts and coated surfaces to avoid damage caused by spill of brake fluid.



Brake Fluid Bleeding

In order to avoid spill of brake fluid, connect a transparent hose to the bleed valve.

Warning

Brake fluid spilled on brake pads or brake disk will reduce the braking effect. Clean the brake pads and brake disk with a high quality brake degreaser.

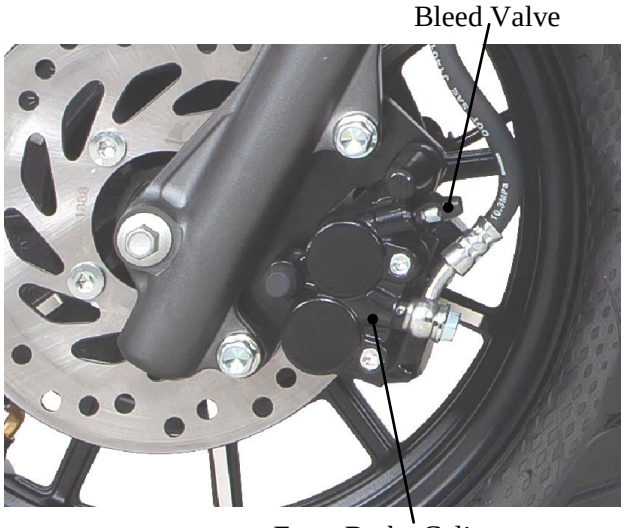
Fully apply the brake lever and then loosen the brake caliper bleed valve to drain the brake fluid until there is no air bubbles in the brake fluid. Then, tighten the bleed valve. Repeat these steps until the brake system is free of air.

Brake Fluid Refilling

Add DOT-4 brake fluid to the brake reservoir.

*
- When bleeding, be careful not to allow air in the brake reservoir flowing into the brake system.
- When using a brake bleeder, follow the manufacturer‘s instructions.
- Never use dirty or unspecified brake fluid or mix different brake fluids be-cause it will damage the brake

Make sure to bleed air from the brake system.

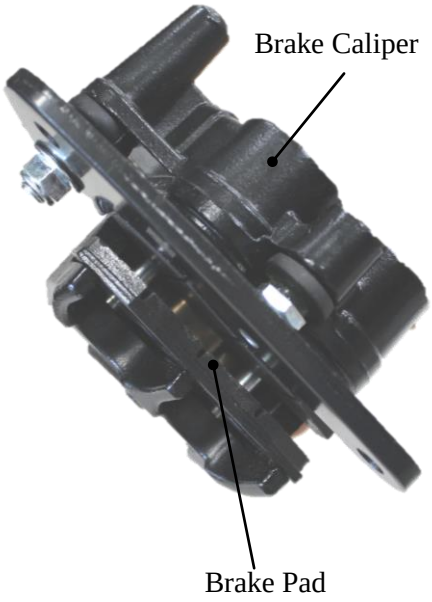


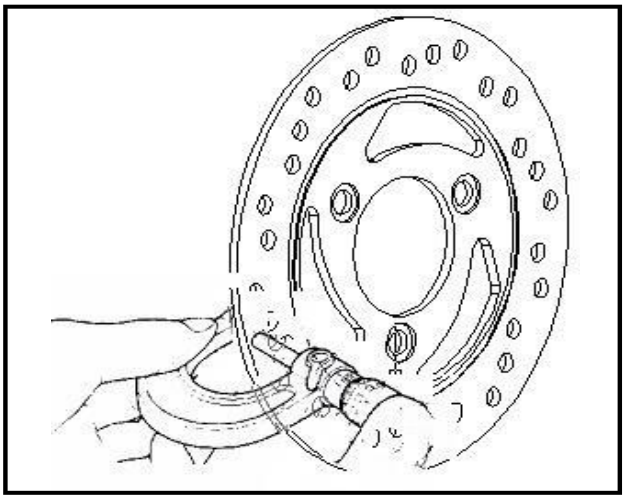
Brake Pad/Disk Replacement

* The brake pads must be replaced as a set to ensure the balance of the brake disk.

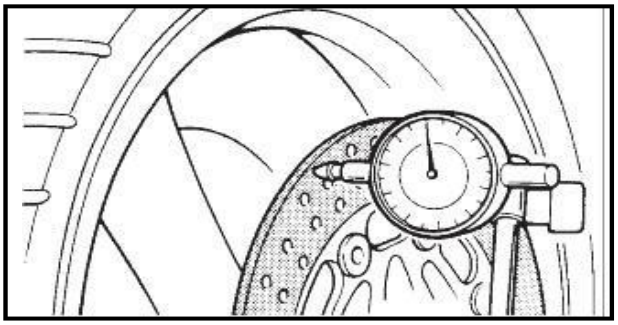
Remove the two bolts attaching the brake caliper.
Remove the brake caliper.
Down press reed and remove the brake pads.
Install the brake pads in the reverse order of removal.

* • Keep grease or oil off the brake pads to avoid brake failure.





Brake Disk
Measure the brake disk thickness.
Service Limit:3.0mm
Measure the brake disk runout.
Service Limit: 0.15mm



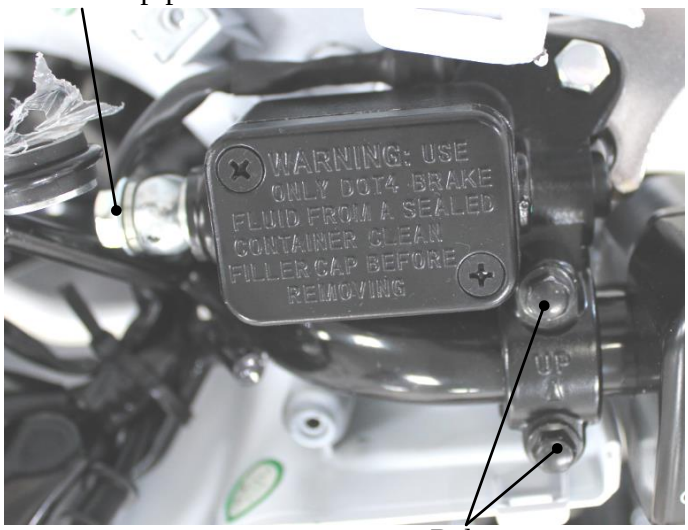
BRAKE MASTER CYLINDER

Removal

First drain the brake fluid from the hydraulic brake system.

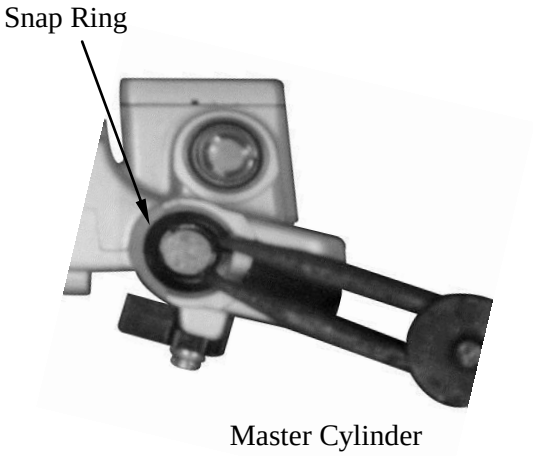
*

- When servicing the brake system, use shop towels to cover rubber and plastic parts and coated surfaces to avoid being contaminated by brake fluid.
- When removing the brake fluid pipe bolt, be sure to plug the pipe to avoid brake fluid leakage.

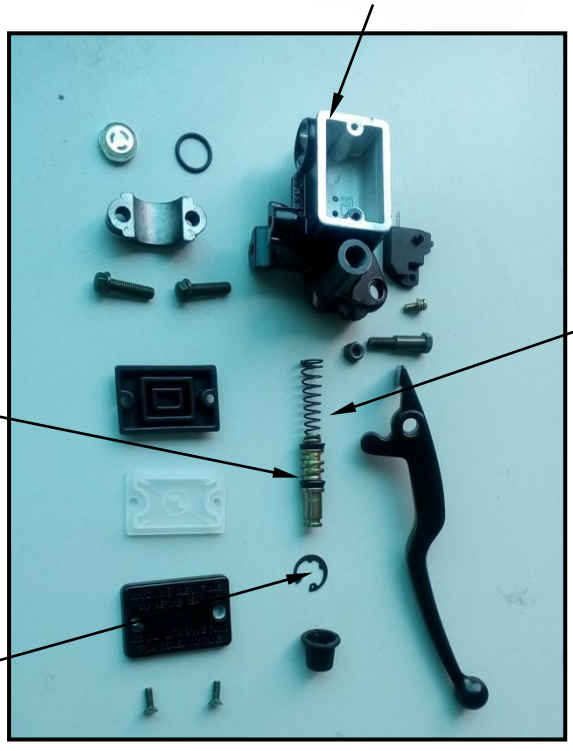


Disassembly

Remove the piston rubber cover and snap ring from the brake master cylinder.



Remove the washer, main piston and spring from the brake master cylinder.
Clean the inside of the master cylinder and brake reservoir with brake fluid.



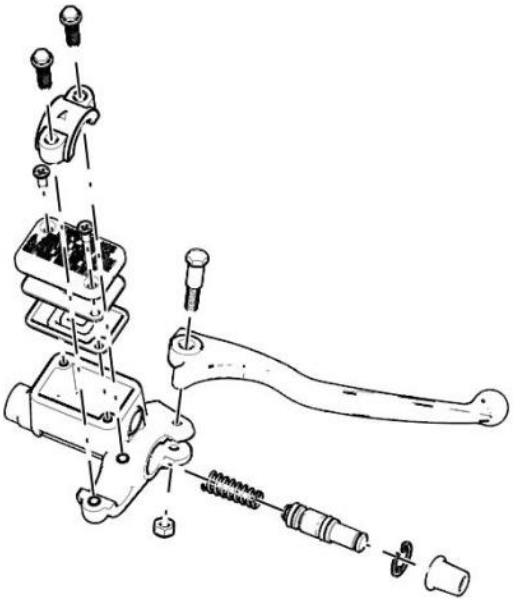
Inspection

Inspect the master cylinder for scratch or crack.

Before assembly, inspect the lst and 2nd rubber cups for wear.

Assembly

Before assembly, apply brake fluid to all removed parts.
Install the spring together with the 1st rubber cup.

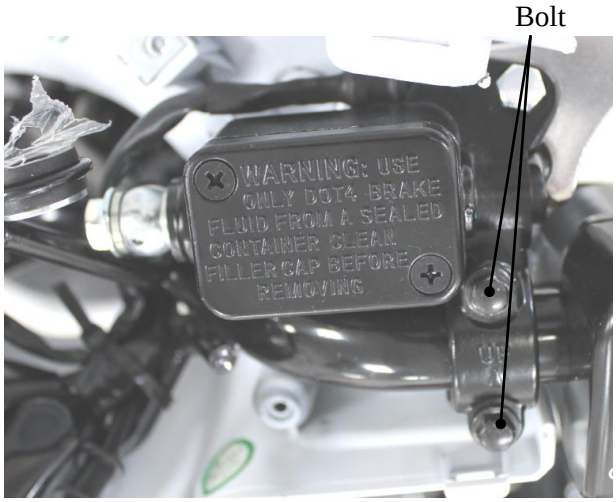


*
- During assembly, the main piston and spring must be installed as a unit without exchange.
- When assembling the piston, soak the cups in brake fluid for a while.
- Install the cups with the cup lips facing the correct direction.

Install the main piston, spring and snap ring.
Install the rubber cover.
Install the brake lever.

Place the brake master cylinder on the handlebar and install the holder with "up" mark facing up. Be sure to align the punch mark with the holder joint.
First tighten the upper bolt and then tighten the lower bolt.

Torque: 3.0～4.0kgf-m



Install the brake fluid pipe with the attaching bolt and two sealing washers.

Install the handlebar covers. (⇨12-3)
Fill the brake reservoir with recommended brake fluid to the upper limit and bleed air according to the method stated in 12-10.

BRAKE CALIPER (FRONT)

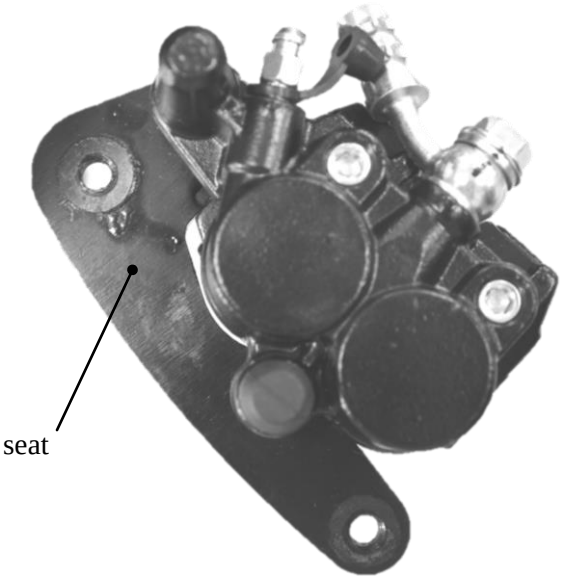
Removal

Remove the brake caliper.
Place a clean container under the brake caliper and disconnect the brake fluid pipe from the caliper.

* Do not spill brake fluid on any coated surfaces.

DISASSEMBLY

Remove the brake caliper seat from the brake caliper.



Remove the pistons from the brake caliper.
If necessary, use compressed air to squeeze out the pistons through the brake fluid inlet opening and place a shop towel under the caliper to avoid contamination caused by the removed pistons.
Check each piston cylinder for scratches or wear and replace if necessary.

* Be careful not to damage the piston surface.

Check the piston for scratch or wear.

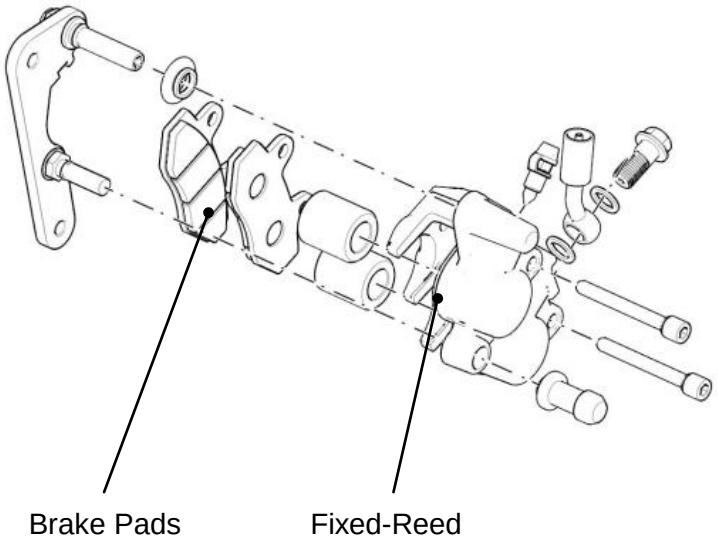
Check the caliper cylinder for scratch or wear and measure the cylinder bore.

Assembly

Clean all removed parts.
Apply silicon grease to the piston and oil seal.
Lubricate the brake caliper cylinder inside wall with brake fluid.
Install the brake caliper piston with grooved side facing out.

* Install the piston with its outer end 3～5mm protruding beyond the brake caliper.

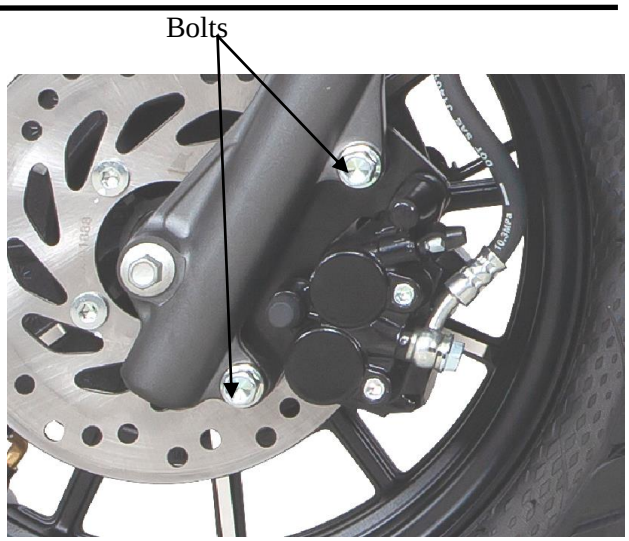
Wipe off excessive brake fluid with a clean shop towel. Apply silicon grease to the brake caliper seat pin and caliper inside.
Install the brake caliper seat.



Installation

Install the brake caliper and tighten the two bolts.

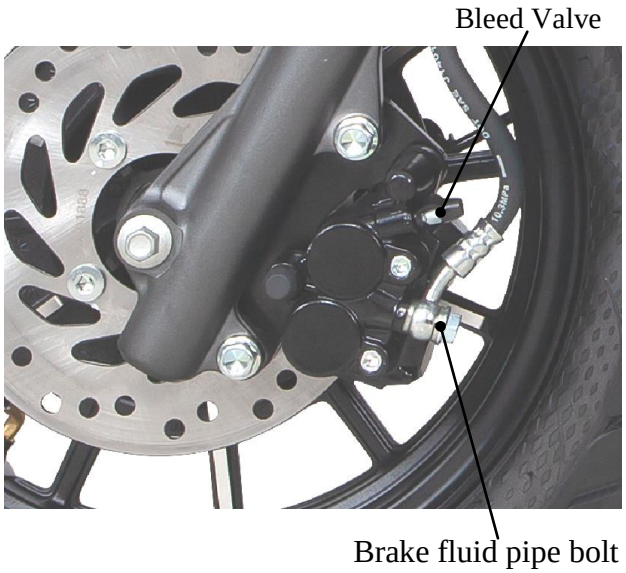
Torque: 2.9～3.5kg-m



Connect the brake fluid pipe to the brake caliper and tighten the fluid pipe bolt.

Torque: 2.5～3.5kg-m

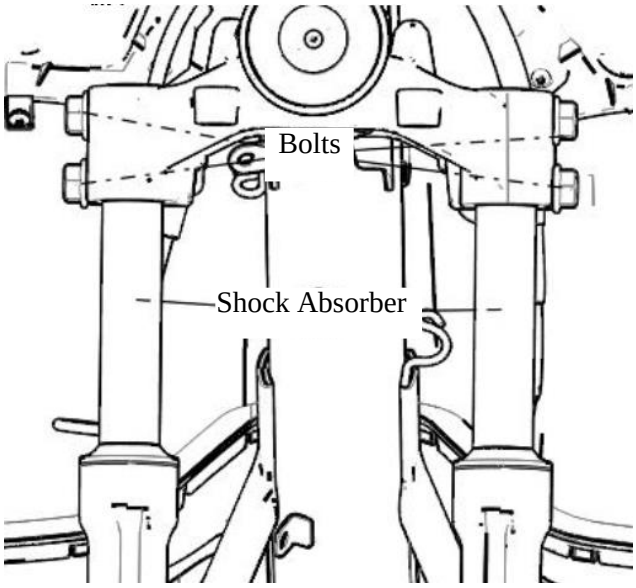
Fill the brake reservoir with recommended brake fluid and bleed air from the brake system. (⇨12-10)



FRONT SHOCK ABSORBER

REMOVAL

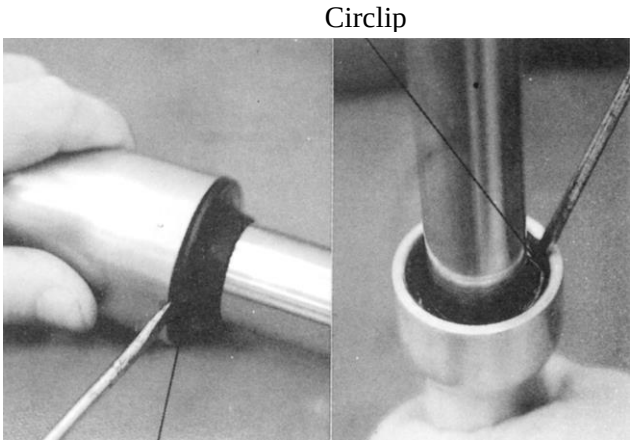
Remove the front wheel. (⇨12-4)
Remove the front lower cover. (⇨2-2)
Remove the front inner fender.
Remove the front shock absorber upper mount bolts.
Loosen the lower mount bolts to remove the front shock absorbers.



DISASSEMBLY

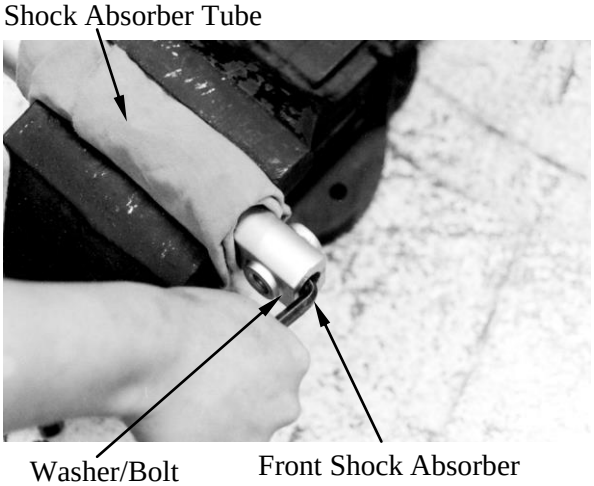
Remove the dust boot.
Remove the circlip.

Set the front shock absorber in a vise.
Remove the damper rod, hex bolt and copper washer.
Pull out the front shock absorber tube.



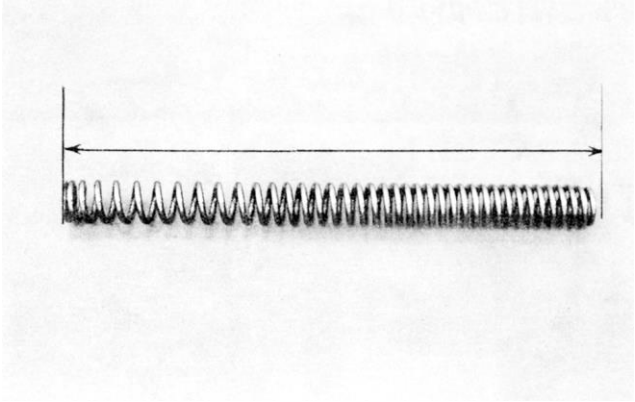
Set the front shock absorber tube in a vise.
Remove the top nut, shock spring, damper, and damper spring from the front shock absorber tube.

* • When holding the shock absorber tube, place a shop towel to protect it and do apply too much force .

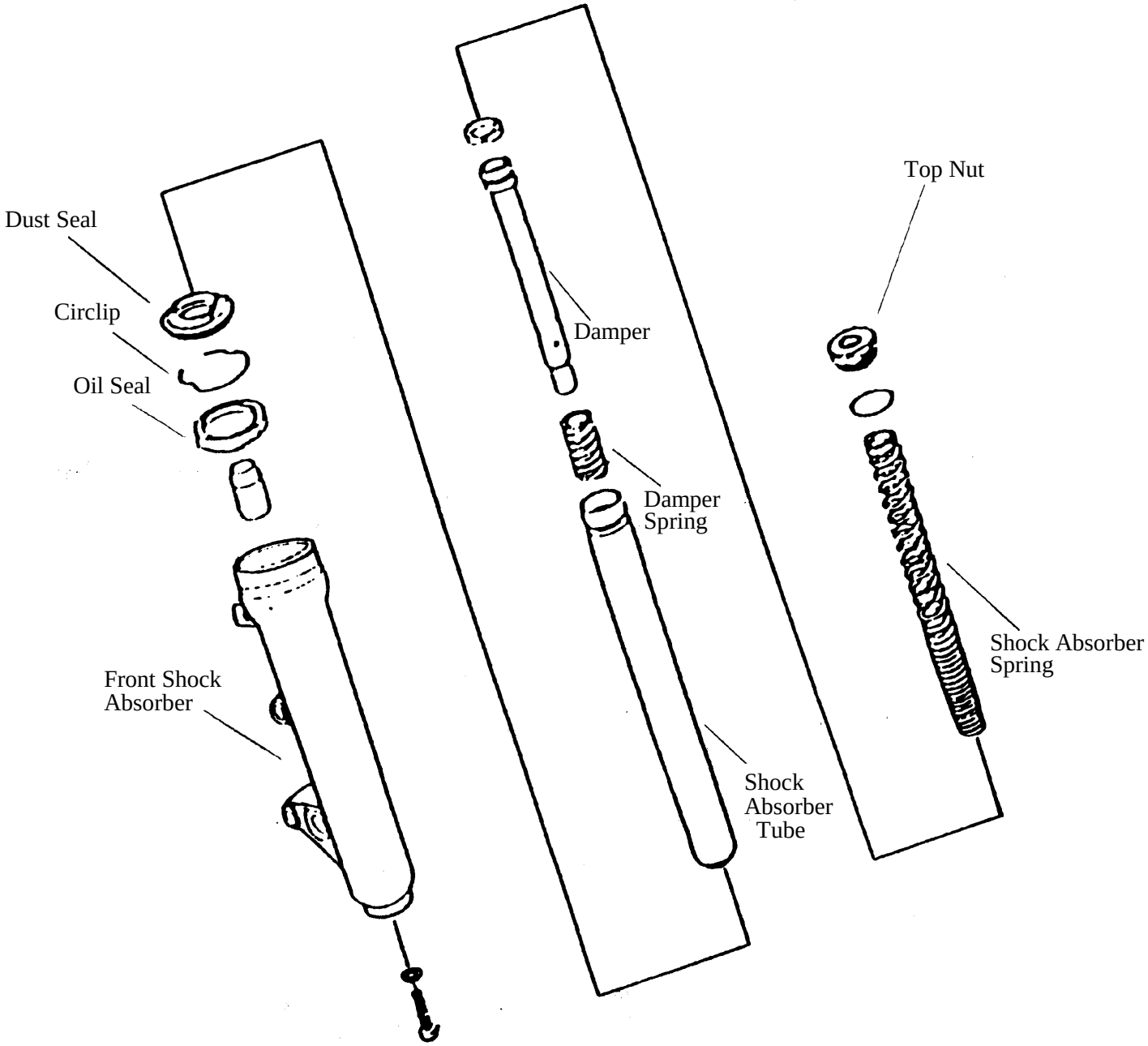


Measure the front shock absorber spring free length.

Service Limits: Right : 318mm
Left : 318mm



ASSEMBLY



Install the damper spring onto the damper rod and then install them into the front shock absorber tube.
Install the shock absorber spring onto the front shock absorber tube and tighten the top nut.

* Install the front shock absorber spring with the closely wound coils facing down.


Shock Absorber Tube

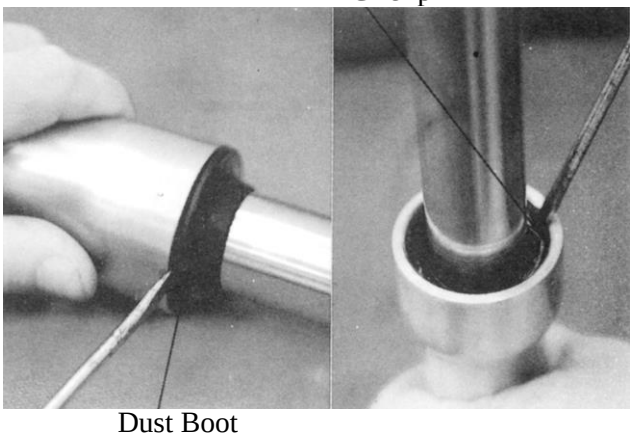
Set the front shock absorber in a vise.
Insert the shock absorber tube into the shock absorber and tighten the hex bolt.
(Apply locking agent to the washer and install it together with the hex bolt.)
Torque: 3.0kgf-m

Add engine oil into the front shock absorber.

Specified Oil: CN30#

Oil Capacity: 55.5±2.5cc

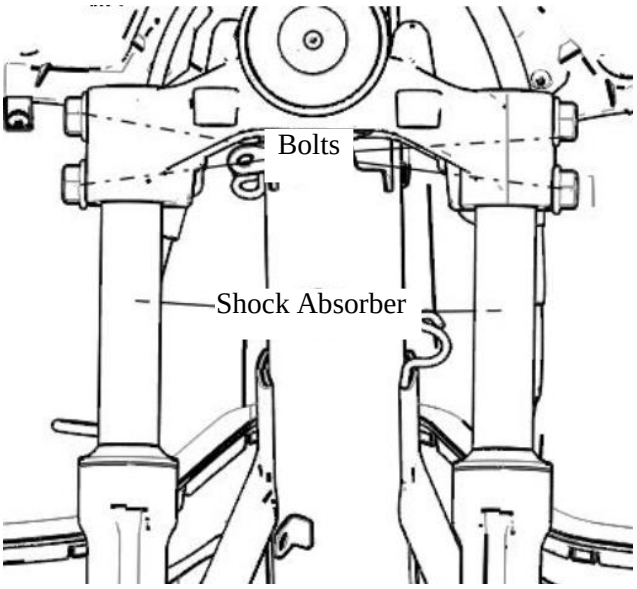
Circlip


Dust Boot

Install the circlip.
Install the dust boot.

INSTALLATION

Install the front shock absorbers onto the steering stem.
Install and tighten the front shock absorber upper mount bolts.
Tighten the lower mount bolts.



* Align the upper mount bolt hole with the groove on the front fork.

Install the front wheel.

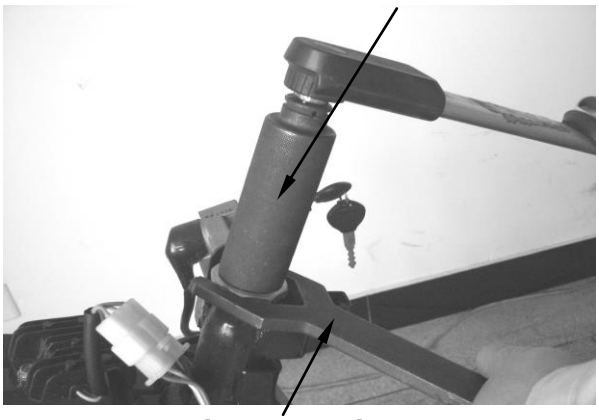
FRONT FORK

REMOVAL

Remove the steering handlebar.
Remove the front wheel.
Disconnect the speedometer cable.
Remove the steering stem lock nut using long socket wrench.

Special

Long Socket Wrench,32mm 8Angle

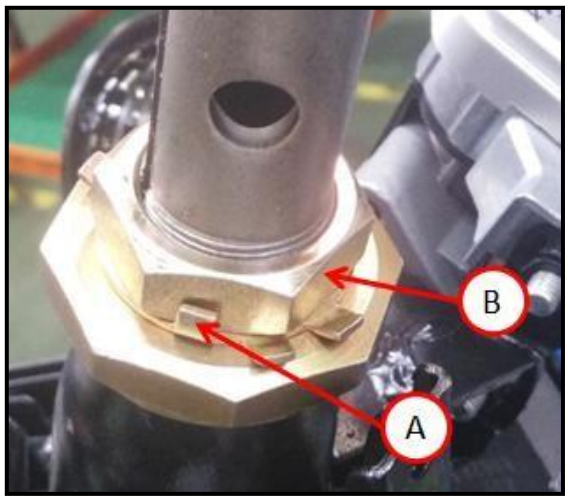


Remove the top cone race and remove the steering stem.

* • Be careful not to lose the steel balls (26 on top race and 29 on bottom race).

Inspect the ball races and cone races for wear or damage and replace if necessary.

.



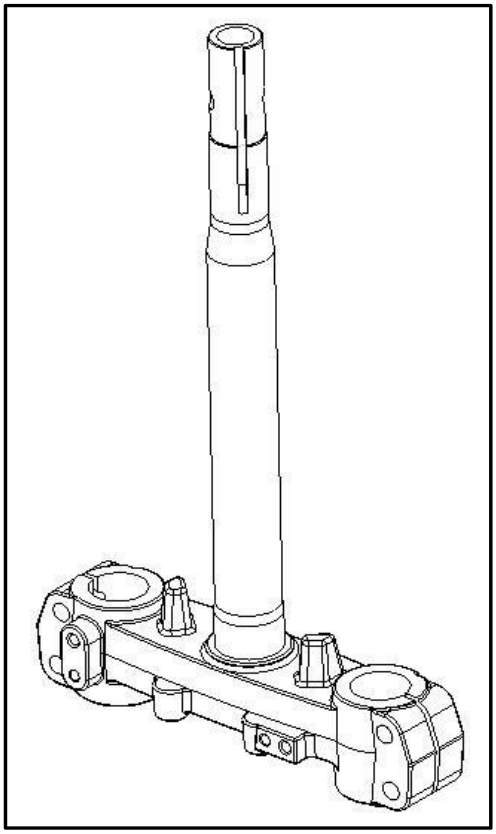
Top Cone Race

BOTTOM CONE RACE REPLACEMENT

Remove the bottom cone race using a chisel.

* Be careful not to damage the steering stem and front fork.

Drive a new bottom cone race into place with a proper driver.



Bottom Cone Race

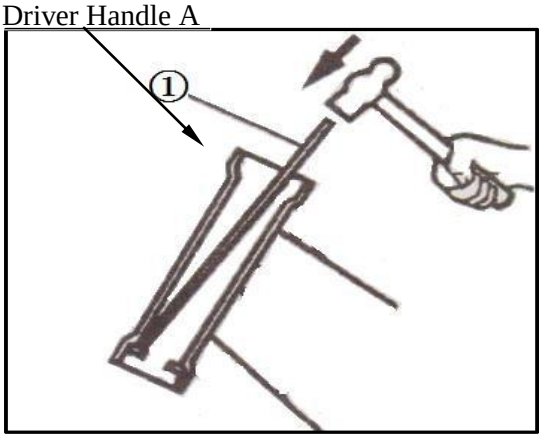
BALL RACE REPLACEMENT

Drive out the top and bottom ball races.

Drive new top and bottom ball races into the steering head using the outer driver.

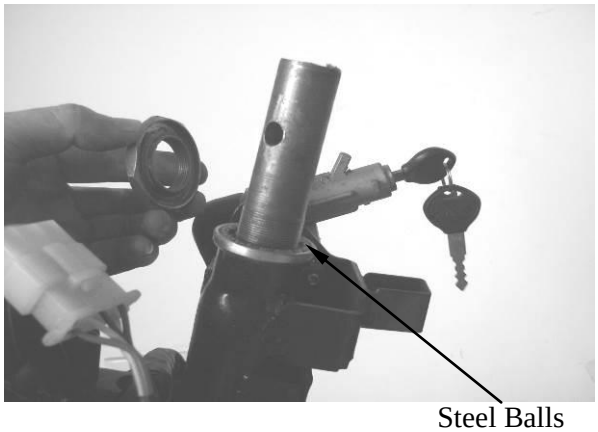
* Be sure to completely drive in the ball races.

Driver Handle A



INSTALLATION

Apply grease to the top and bottom ball races and install 26 steel balls on the top ball race and 29 steel balls on the bottom ball race.
Apply grease to the ball races and install the front fork.

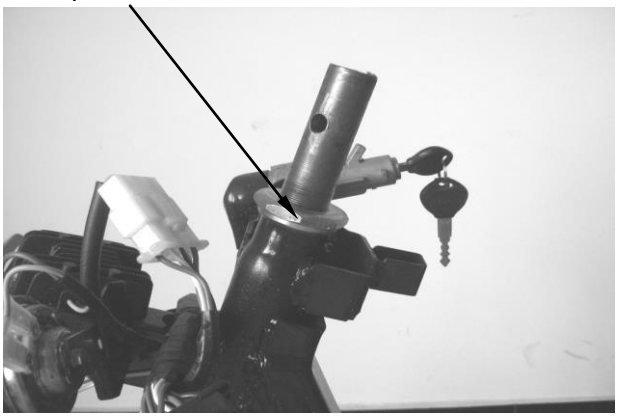


Steel Balls

Apply grease to the top cone race and install it.
Tighten the top cone race and then turn the steering stem right and left several times to make steel balls contact each other closely.

* Check that the steering stem rotates freely without vertical play.

Top Cone Race



Install the steering stem lock nut and tighten it while holding the top cone race.

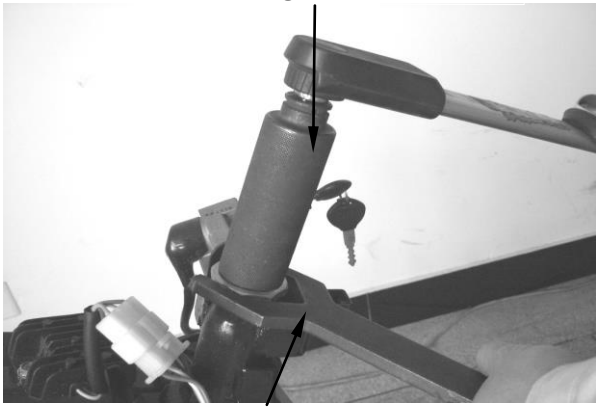
Torque: 6.0～8.0kgf-m

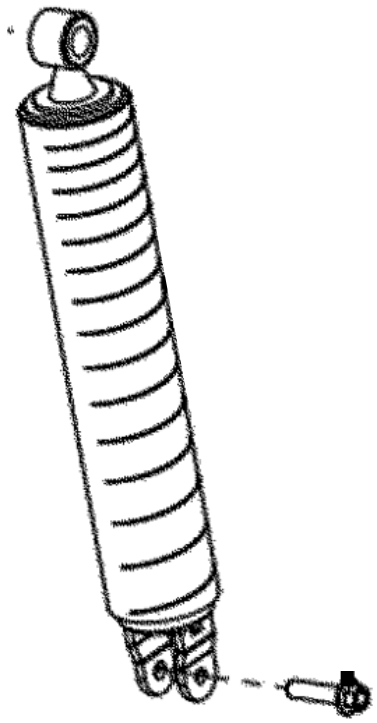
Install the front wheel.
Install the steering handlebar.
Install the speedometer cable.

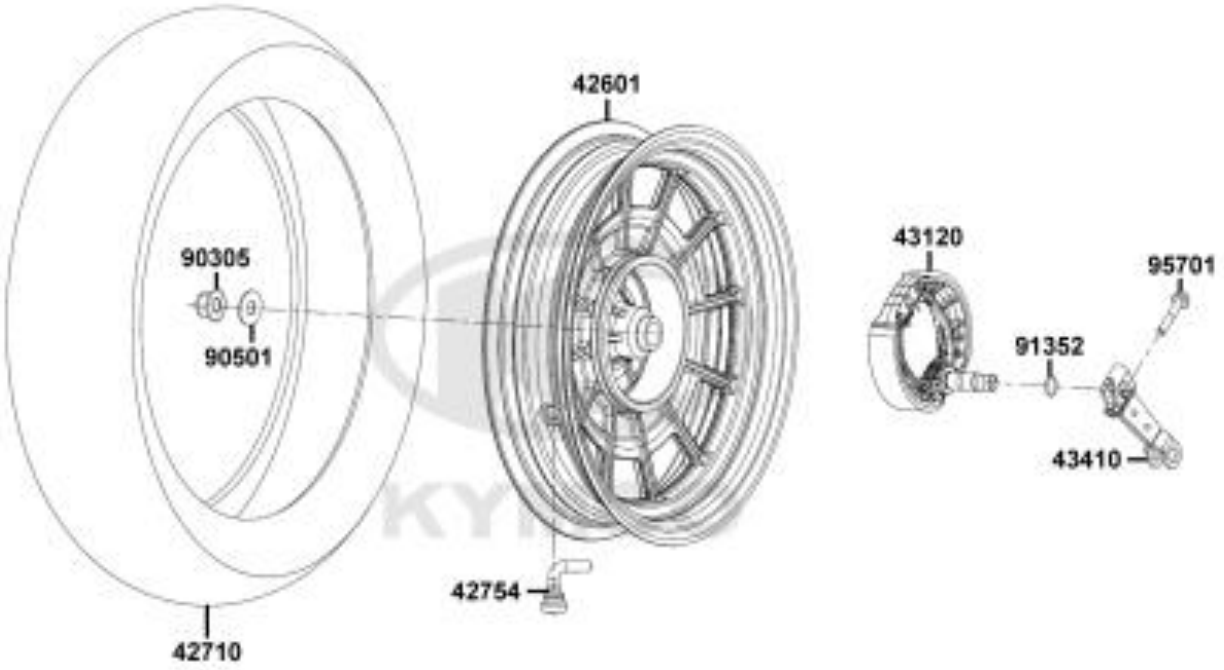
Special

Long Socket Wrench,32mm×8Angle

Long Socket Wrench







13

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- During servicing, keep oil or grease off the brake drum and brake linings.

SPECIFICATIONS

Item			Standard (mm)	Service Limit (mm)
Rear wheel	Rim runout	Radial	—	2.0
		Axial	—	2.0
	Rear brake drum I.D		110	111
Rear brake lining thickness			4.5	3.0

TORQUE VALUES

Rear axle nut	11~13kgf-m
Rear shock absorber upper mount bolt	3.5~4.5kgf-m
Rear shock absorber lower mount bolt	2.4~3.0kgf-m
Exhaust muffler joint lock nut	1.0~1.4kgf-m
Exhaust muffler lock bolt	3.0~3.6kgf-m

Special Tool
Cushion Assemble & Disassemble Tool

TROUBLESHOOTING

Rear wheel wobbling
- Bent rim
- Faulty tire
- Axle not tightened properly

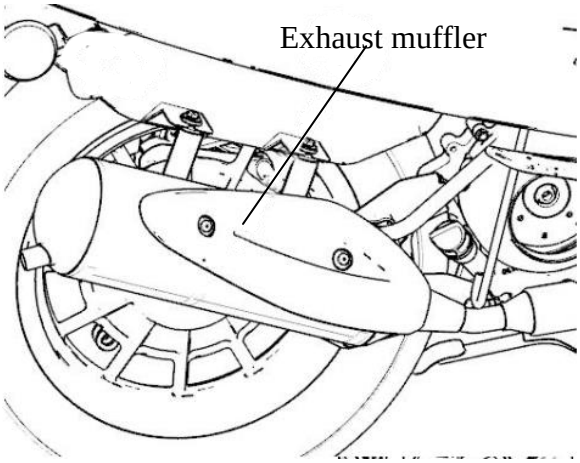
Soft rear shock absorber
- Weak shock absorber spring
- Faulty damper

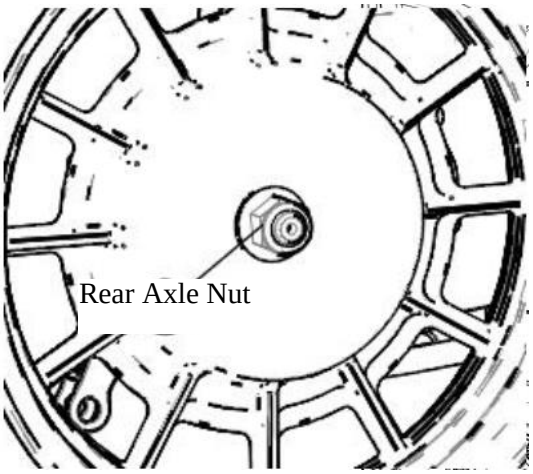
Poor brake performance
- Brake not adjusted properly
- Worn brake linings
- Worn brake shoes at cam contacting area
- Worn brake cam
- Worn brake drum

REAR WHEEL

REMOVAL

Remove the exhaust muffler. (⇨2-9)
Remove the rear axle nut.
Remove the rear wheel.
.

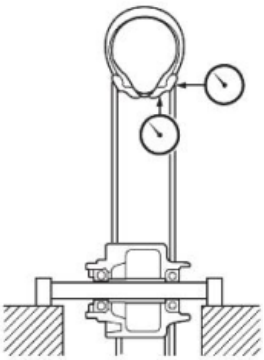


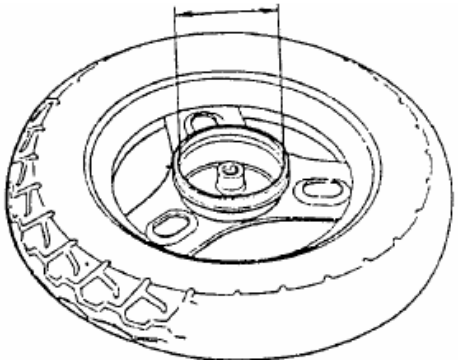


INSPECTION

Measure the rear wheel rim runout.
Service Limits:
Radial: 2.0mm replace if over
Axial: 2.0mm replace if over

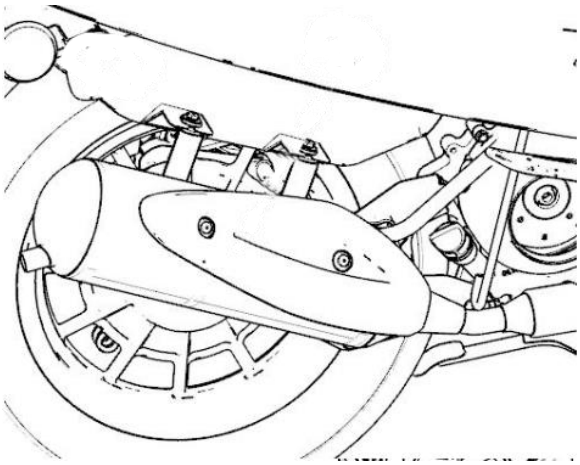
Inspect the rear brake drum.
Measure the rear brake drum I.D.
Service Limits: 111mm replace if over





INSTALLATION

Install the rear wheel in the reverse order of removal.
Tighten the rear axle nut.
Torque: 11.0-13.0kg-m
Install the exhaust muffler.
Torque:
Exhaust muffler joint lock nut: 1.0~1.4kgf-m
Exhaust muffler lock bolt: 3.0~3.6kgf-m



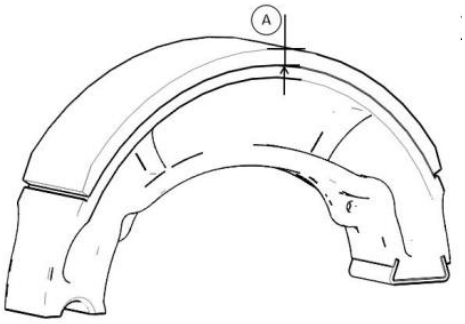
* First install and tighten the exhaust muffler joint lock nuts and then the exhaust muffler lock bolts.

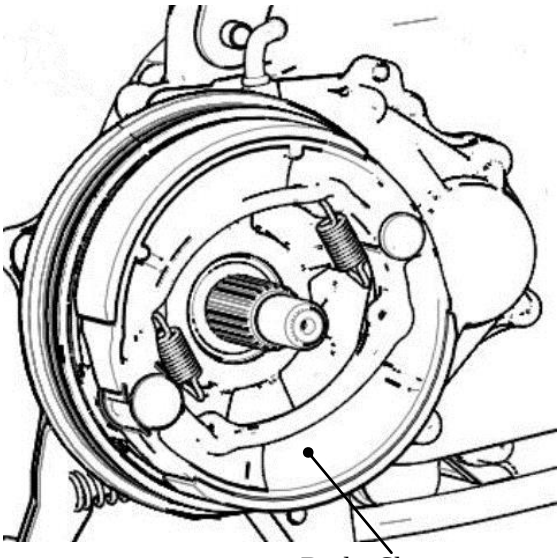
REAR BRAKE

BRAKE LINING INSPECTION

Measure the brake lining thickness.
Service Limit: 3.0mm replace if below

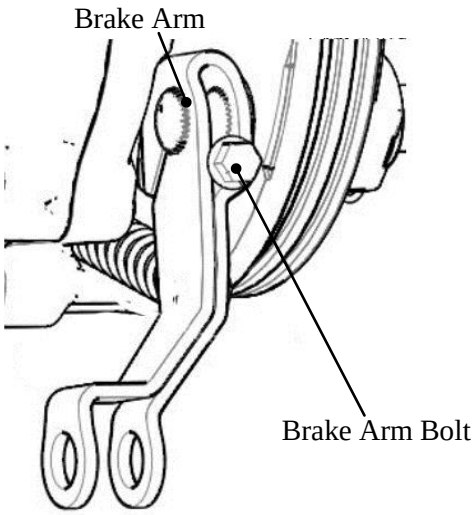
* Keep oil or grease off the brake linings.



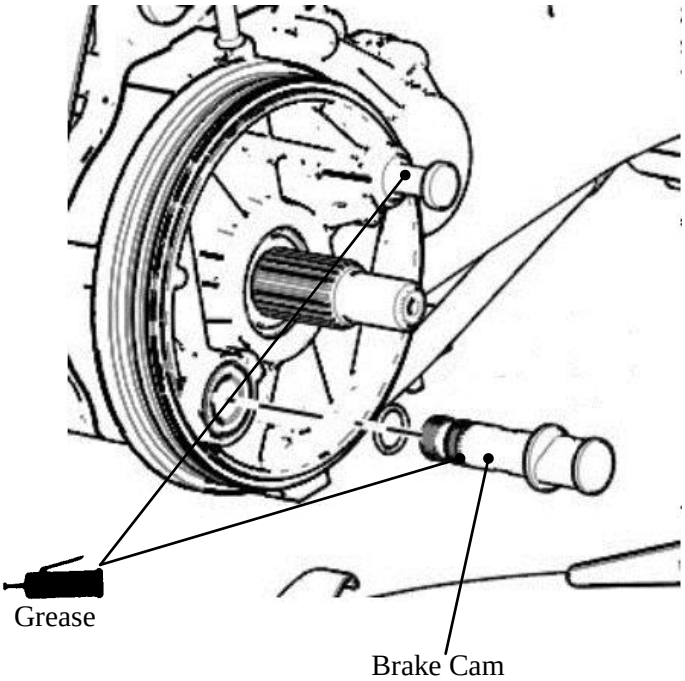


REAR BRAKE DISASSEMBLY

Remove the rear brake adjusting nut and disconnect the rear brake cable.
Remove the rear brake shoes.



Remove the brake arm bolt to remove the brake arm.
Remove the brake cam.



REAR BRAKE ASSEMBLY

Apply grease to the anchor pin.
Apply grease to the brake cam and install it.
Install the brake shoes.

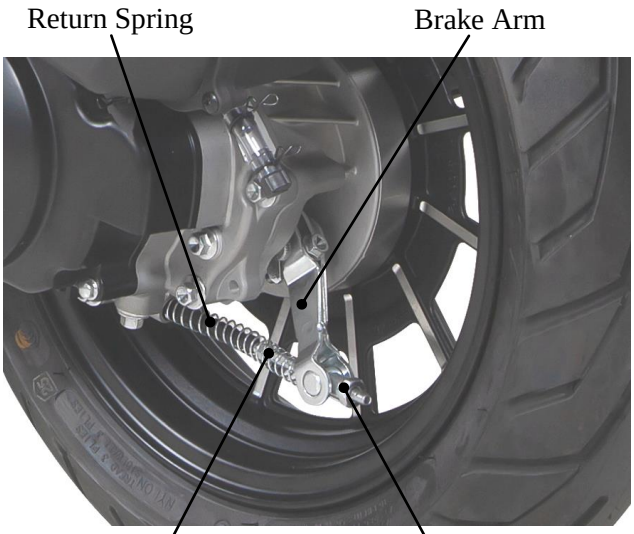
Apply a small amount of engine oil to the felt seal and install it to the brake cam.
Install the brake arm.

* Align the wide groove on the wear indicator plate with the wide tooth of the brake cam.

Install and tighten the brake arm bolt.

* Align the scribed line on the brake arm with the punch mark on the brake cam.

Install the brake arm return spring.
Install the brake arm pin.
Connect the brake cable and install the adjusting nut.
Install the rear wheel. (⇨13-2)
Adjust the rear brake lever free play. (⇨3-8)

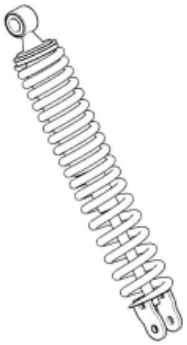


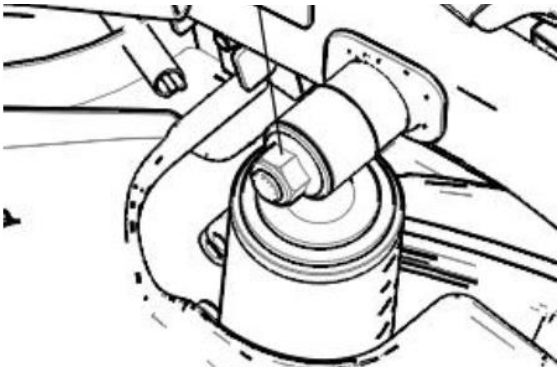
LEFT REAR SHOCK ABSORBER

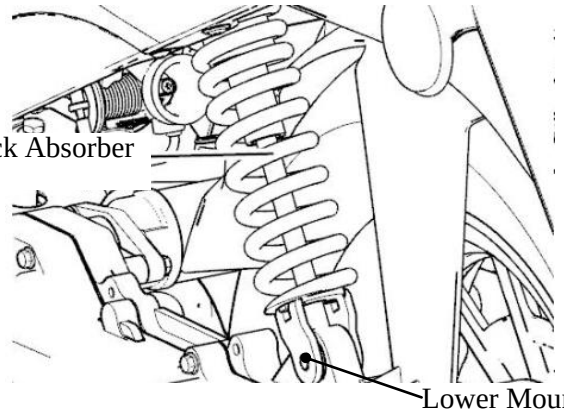
REMOVAL

Remove the frame body cover. (⇨2-3)
Remove the air cleaner case.

Remove the rear shock absorber upper and lower mount bolts.
Remove the rear shock absorber.







DISASSEMBLY

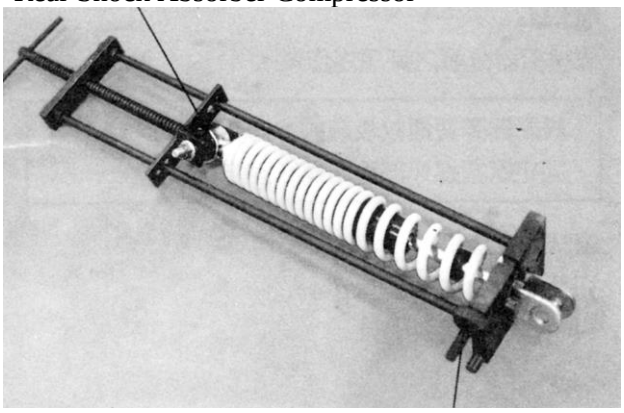
Install the rear shock absorber compressor as the figure shown.

* Install the rear shock absorber lower joint into the rear shock absorber compressor.

Compress the rear shock absorber spring.

Special

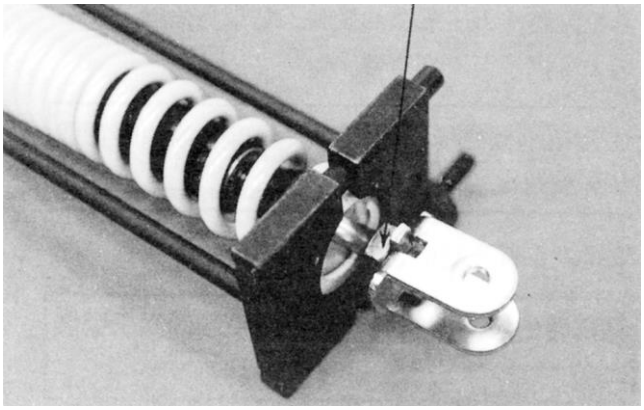
Cushion Assemble & Disassemble Tool



Cushion Assemble & Disassemble Too

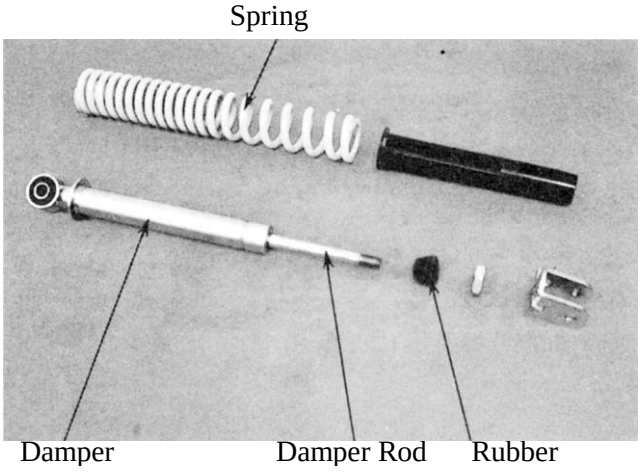
INSPECTION

Inspect the damper rod for bending or damage.
Inspect the damper for oil leaks.
Inspect the damper rubber for deterioration or damage.



Measure the rear shock absorber spring free length.

Service Limit: 210mm replace if over

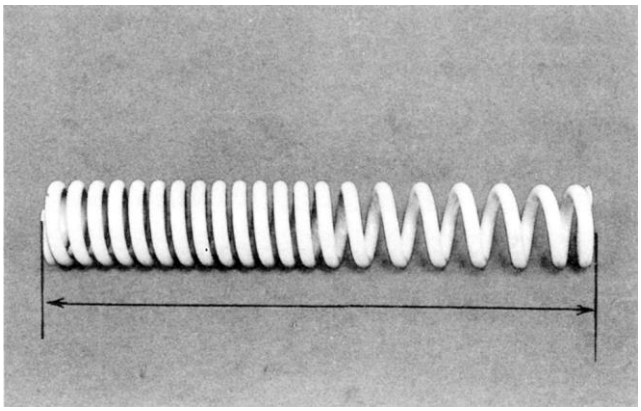


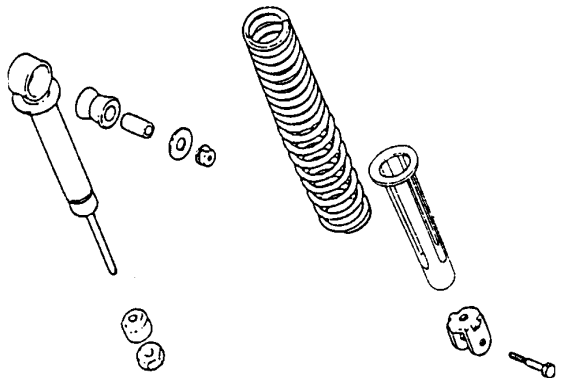
ASSEMBLY

Assemble the rear shock absorbers in the reverse order of disassembly.

*

- Install the shock absorber spring with loosely wound coils facing down.
- Apply locking agent to the lock nut threads and tighten the lock nut.





INSTALLATION

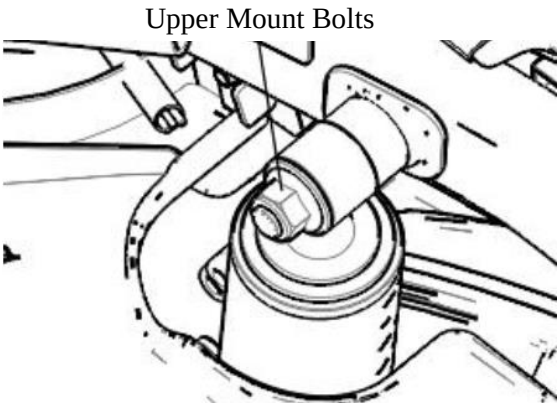
Install the rear shock absorber.
Install the rear shock absorber upper mount bolt and then the lower mount bolt.
Tighten the bolts.

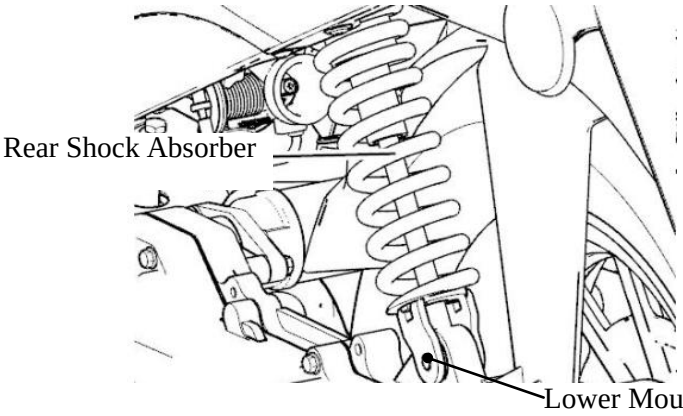
Torque:

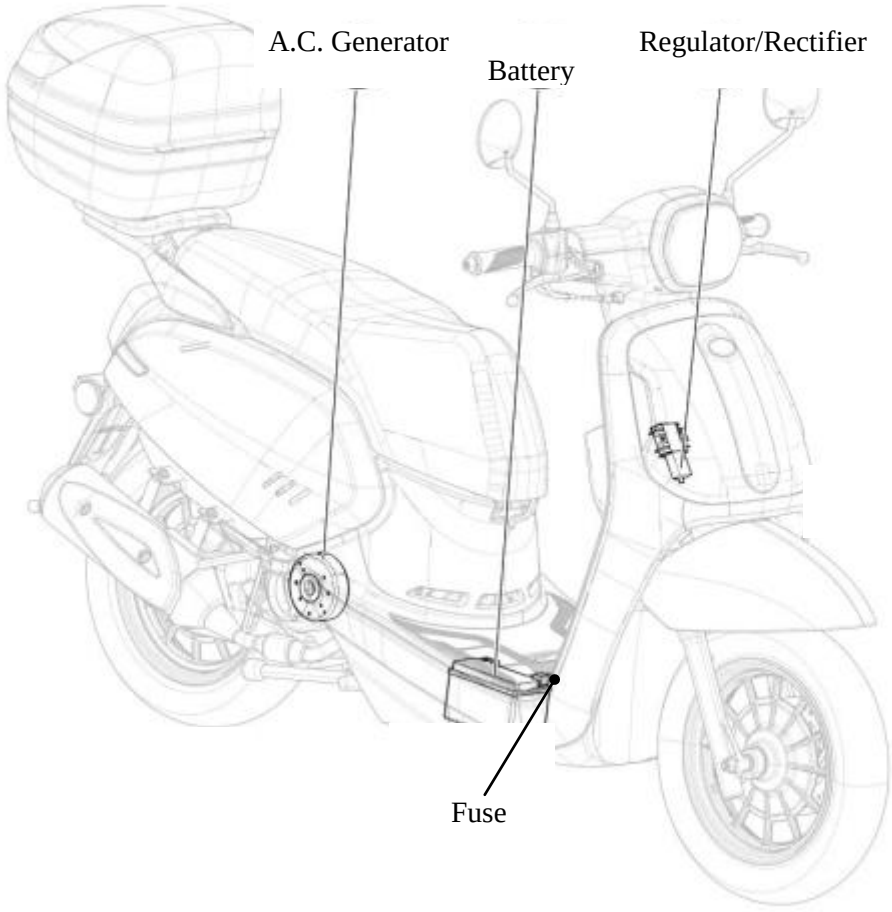
Upper Mount Bolt: 3.5~4.5kgf-m

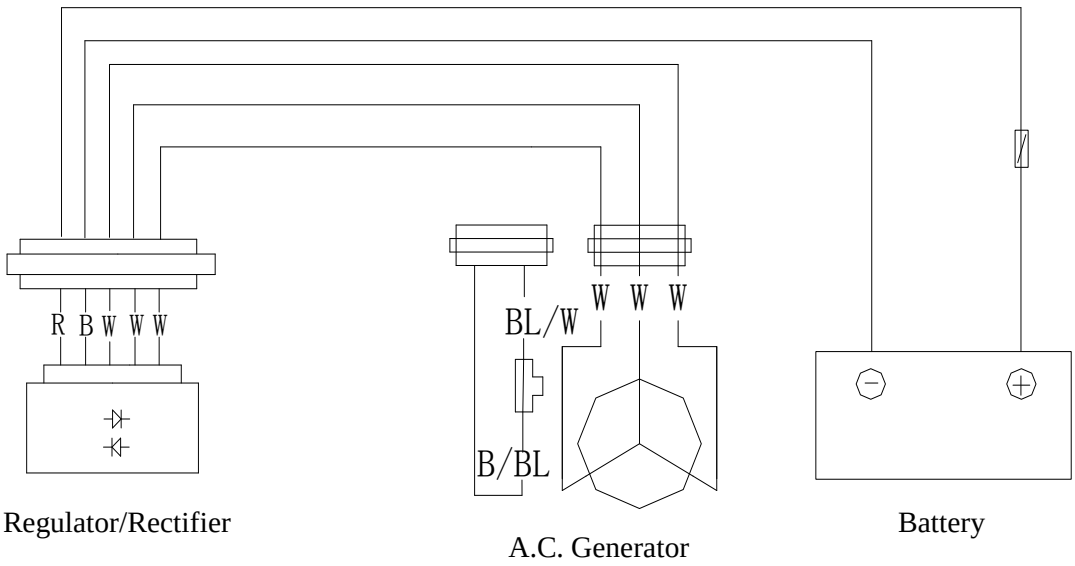
Lower Mount Bolt: 2.4~3.0kgf-m

Install the air cleaner case.
Install the frame body cover. (⇨2-3)






A.C. Generator
Battery
Regulator/Rectifier
Fuse


R B W W W
BL/W
W W W
B/BL
Regulator/Rectifier
A.C. Generator
Battery

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The battery electrolyte (sulfuric acid) is poisonous and may seriously damage the skin and eyes. Avoid contact with skin, eyes, or clothing. In case of contact, flush with water and get prompt medical attention

- The battery can be charged and discharged repeatedly. If a discharged battery is not used for a long time, its service life will be shortened. Generally, the capacity of a battery will decrease after it is used for 2～3 years. A capacity-decreased battery will resume its voltage after it is recharged but its voltage decreases suddenly and then increases when a load is added.
- When a battery is overcharged, some symptoms can be found. If there is a short circuit inside the battery, no voltage is produced on the battery terminals. If the rectifier won't operate, the voltage will become too high and shorten the battery service life.
- If a battery is not used for a long time, it will discharge by itself and should be recharged every 3 months.
- A new battery filled with electrolyte will generate voltage within a certain time and it should be recharged when the capacity is insufficient. Recharging a new battery will prolong its service life.
- Inspect the charging system according to the sequence specified in the Troubleshooting.
- Do not disconnect and soon reconnect the power of any electrical equipment because the electronic parts in the regulator/rectifier will be damaged. Turn off the ignition switch before operation.
- It is not necessary to check the MF battery electrolyte or fill with distilled water.
- Check the load of the whole charging system.
- Do not quick charge the battery. Quick charging should only be done in an emergency.
- Remove the battery from the motorcycle for charging.
- When replacing the battery, do not use a traditional battery.
- When charging, check the voltage with an voltmeter.

SPECIFICATIONS

Item			Standard	
Battery	Capacity/Model		12V–6AH	
	Voltage (20℃)	Fully charged	13.1V	
		Undercharged	12.3V	
	Charging current		STD: 0.6A Quick: 6.0A	
	Charging time		STD: 10～15hr Quick: 30min	
A.C. Generator	Capacity		155W/5000rpm	
	Charging coil resistance (20℃)		White-White	0.8±0.3Ω
Regulator/Rectifier	Type		Single-phase full-wave SCR	
	Limit voltage			
		Charging	14.0±0.5V/5000rpm	

TORQUE VALUES

Pulser coil bolt	0.45~0.6kgf-m
Stator bolt	0.8~1.2kgf-m
Flywheel nut	3.5~4.5kgf-m
Cooling fan bolt	0.8~1.2kgf-m

SPECIAL TOOLS

Universal holder
Flywheel puller

TESTING INSTRUMENTS

Kowa electric tester
Sanwa electric tester

TROUBLESHOOTING

No power

- Dead battery
- Disconnected battery cable
- Fuse burned out
- Faulty ignition switch

Low power

- Weak battery
- Loose battery connection
- Charging system failure
- Faulty regulator/rectifier

Intermittent power

- Loose battery cable connection
- Loose charging system connection
- Loose connection or short circuit in lighting system

Charging system failure

- Loose, broken or shorted wire or connector
- Faulty regulator/rectifier
- Faulty A.C. generator

BATTERY

REMOVAL

Remove the battery cover screws on the floor board.
Open the battery cover and remove the battery by removing the bolt and band.
First disconnect the battery negative (-) cable and then the positive (+) cable.

> When disconnecting the battery positive (+) cable, do not touch the frame with tool; otherwise it will cause short circuit and sparks to fire the fuel.

The installation sequence is the reverse of removal.

> First connect the positive (+) cable and the negative (-) cable to avoid short circuit.

BATTERY VOLTAGE (OPEN CIRCUIT VOLTAGE) INSPECTION

Remove the floor board.
Open the battery cover and disconnect the battery cables.
Measure the voltage between the battery terminals.
Fully charged : 13.1V
Undercharged: 12.3V max.

> Battery charging inspection must be performed with a voltmeter.

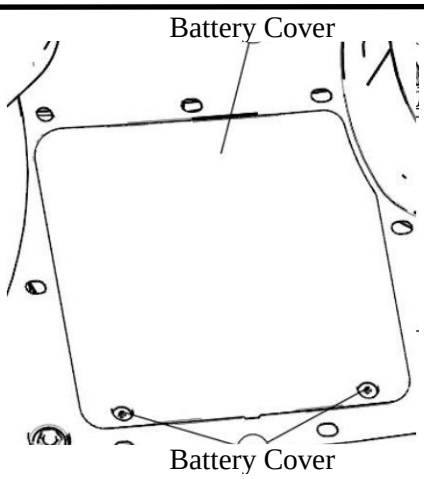
CHARGING

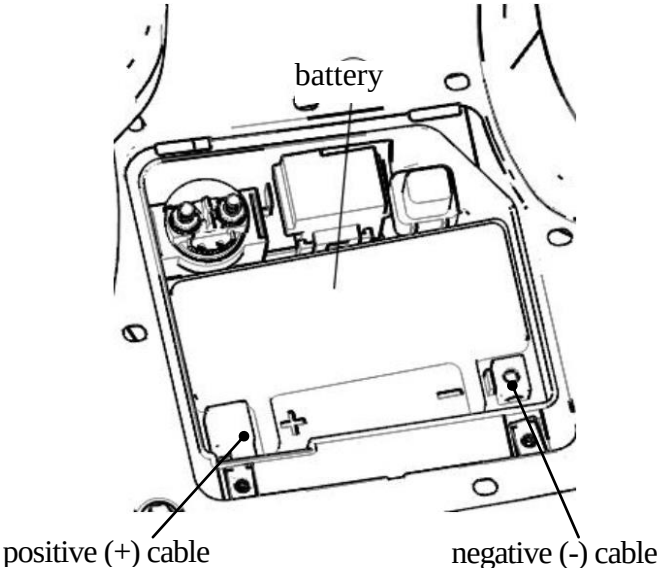
Connect the charger positive (+) cable to the battery positive (+) terminal.
Connect the charger negative (-) cable to the battery negative (-) terminal.

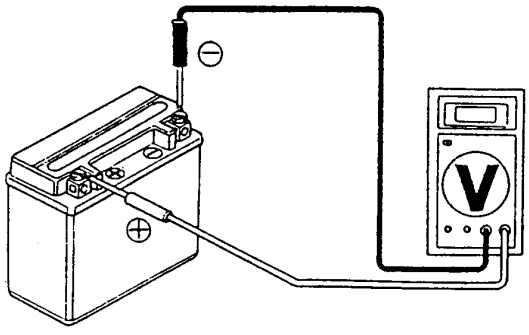
> • Keep flames and sparks away from a charging battery.
> • Turn power ON/OFF at the charger, not at the battery terminals to prevent sparks near the battery to avoid explosion.
> • Charge the battery according to the current specified on the battery.

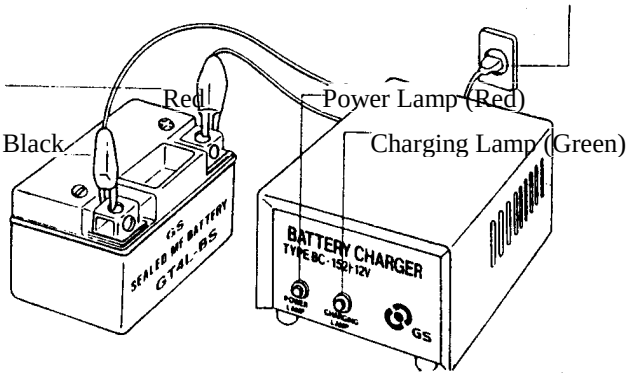
> • Quick charging should only be done in an emergency.
> • Measure the voltage 30 minutes after the battery is charged.

Charging current: Standard : 0.6A
Quick : 6A
Charging time : Standard : 10～15 hours
Quick : 30 minutes
After charging: Open circuit voltage: 12.8V min.
Note: The battery temperature should not exceed 45℃ during charging









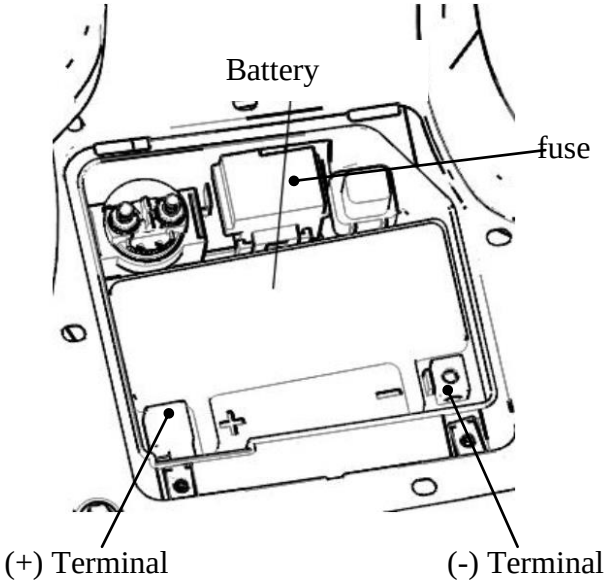
CHARGING SYSTEM

SHORT CIRCUIT TEST

Disconnect the ground wire from the battery and connect an ammeter across the battery negative (-) terminal and the ground wire.
Turn the ignition switch OFF and check for short circuit.

* Connect the electric tester positive (+) terminal to ground wire and the tester negative (-) terminal to the battery negative (-) terminal.

If any abnormality is found, check the ignition switch and wire harness for short circuit .

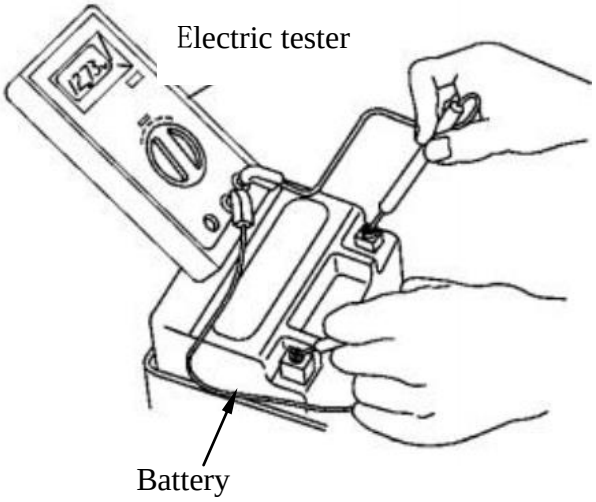


CURRENT TEST

This inspection must be performed with an electric tester when the battery is fully charged.
Warm up the engine for inspection.
Connect the electric tester across the battery terminals. Disconnect the fuse and connect an ammeter between the fuse terminals.
Attach a tachometer to the engine.
Start the engine and gradually increase the engine speed to measure the limit voltage and current

Limit Voltage/Current: 13.5～14.5V/0.5A max. (5000rpm max.)

If the limit voltage is not within the specified range, check the regulator/rectifier. (⇨14-5)

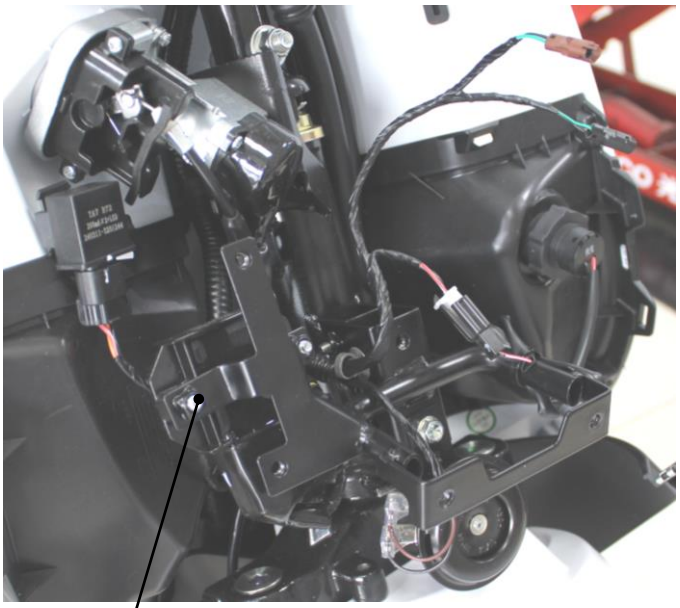


REGULATOR/RECTIFIER INSPECTION

Remove the front cover.

Remove the regulator/rectifier wire coupler.

Check the continuity between the wire terminals.

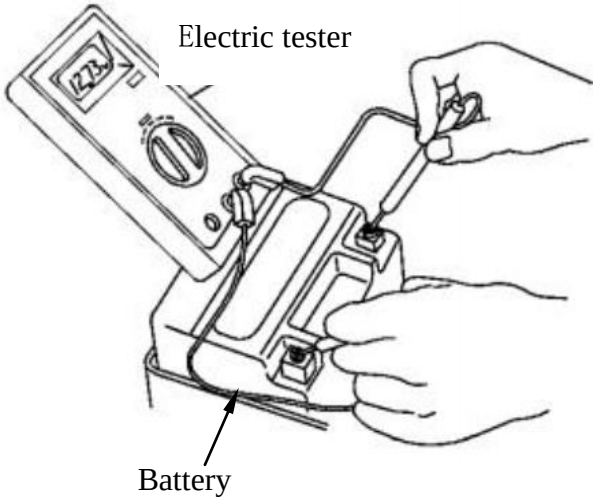


VOLTAGE REGULATION TEST

Connect a colt meter across the battery terminals.

Start the engine and gradually increase the engine speed to 5500 rpm.

The battery terminal voltage should be within 13.5v~14.5V.

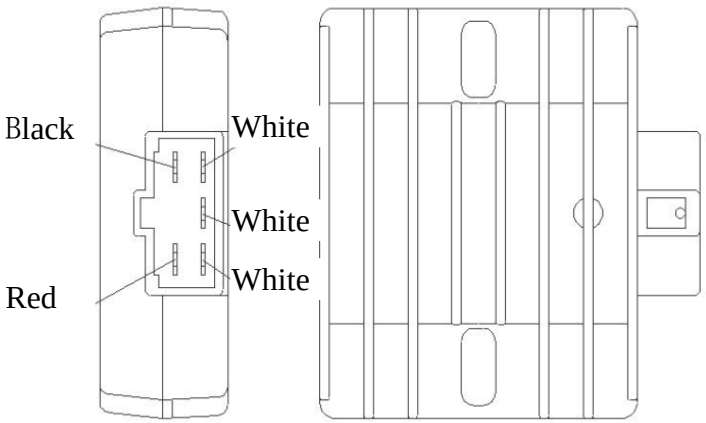


Connect the multimeter positive (+) terminal to the regulator white wire terminal and the multimeter negative (-) terminal to the regulator red wire terminal . There should be continuity.

otherwise it indicates that the regulator is damaged and needs to be replaced.

Connect the multimeter positive (+) terminal to the regulator black wire terminal and the multimeter negative (-) terminal to the regulator white wire terminal . There should be continuity.

otherwise it indicates that the regulator is damaged and needs to be replaced.



A.C. GENERATOR CHARGING COIL

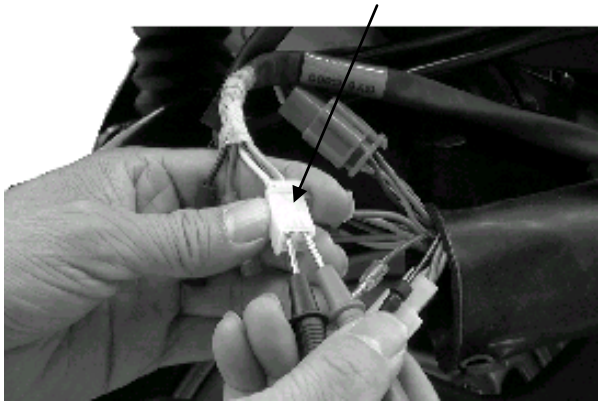
* The inspection of A.C. generator charging coil can be made with the engine installed.

INSPECTION

Disconnect the A.C. generator 2P connector.
Measure the resistance between the A.C. generator white wire and engine ground with an electric tester.

Standard: 0.8±0.3Ω（20℃）

Replace the A.C. generator charging coil if the reading is not within the specifications.

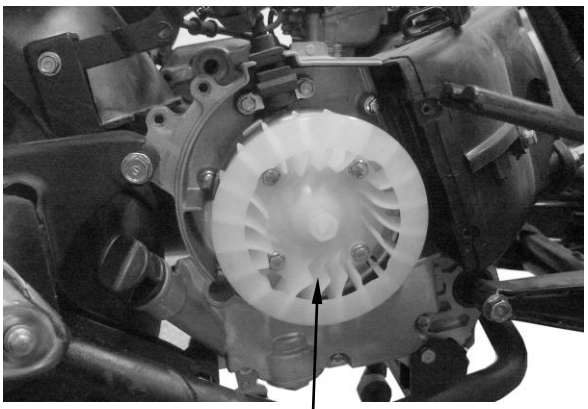


A.C. GENERATOR

REMOVAL

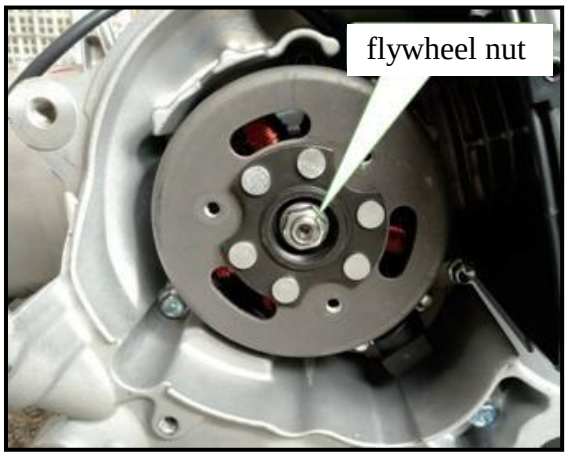
Remove the right side cover.
Remove the four bolts attaching the cooling fan cover to remove the fan cover.

Remove the cooling fan by removing the four cooling fan attaching bolts.



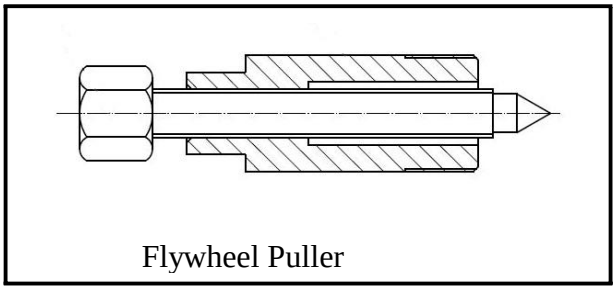
Hold the flywheel with an universal holder.
Remove the flywheel nut.

Special
Universal Holder



Remove the A.C. generator flywheel using the flywheel puller.
Remove the woodruff key.

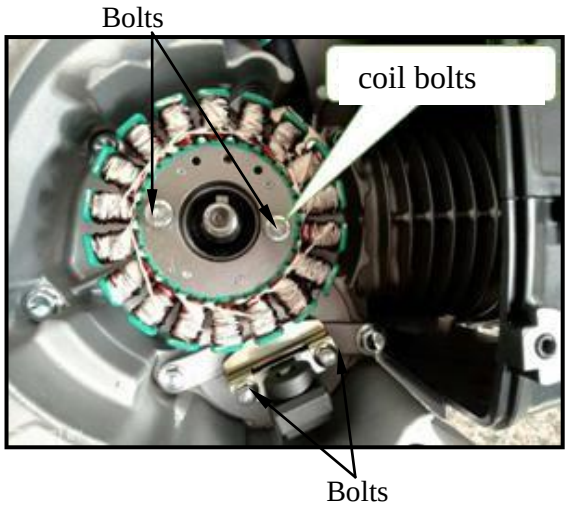
Special
Flywheel Puller



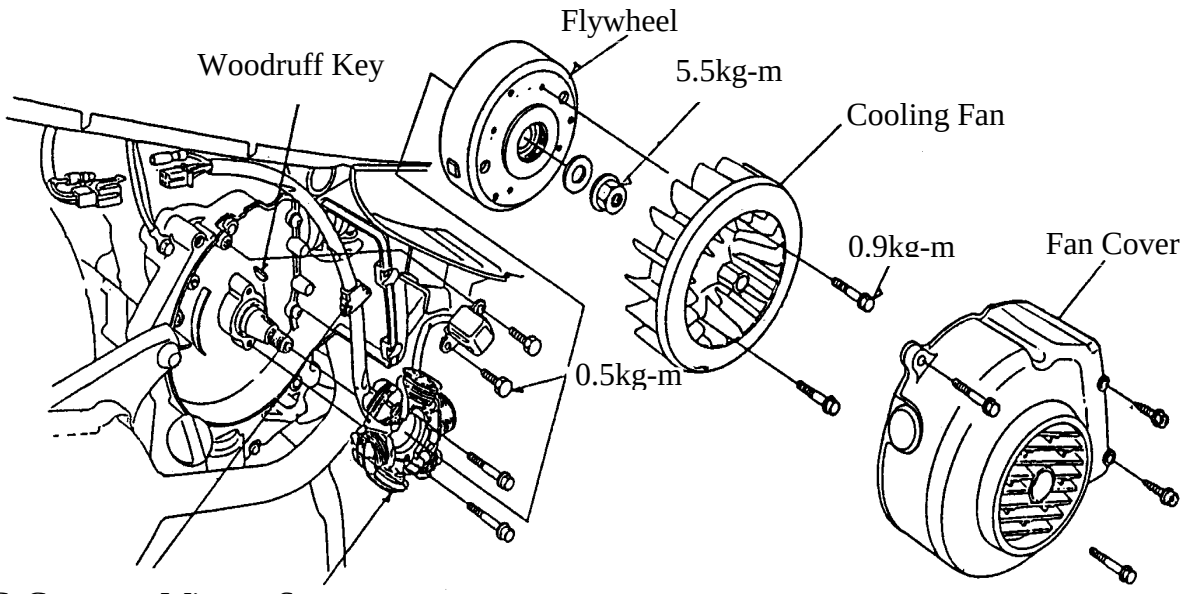
Remove the A.C. generator wire connector.

A.C. Generator Wire Connector

Remove the A.C. generator wire set plate.
Remove the pulser coil bolts.
Remove the A.C. generator wire rubber sleeve and pulser coil from the right crankcase.
Remove the two bolts and A.C. generator stator.



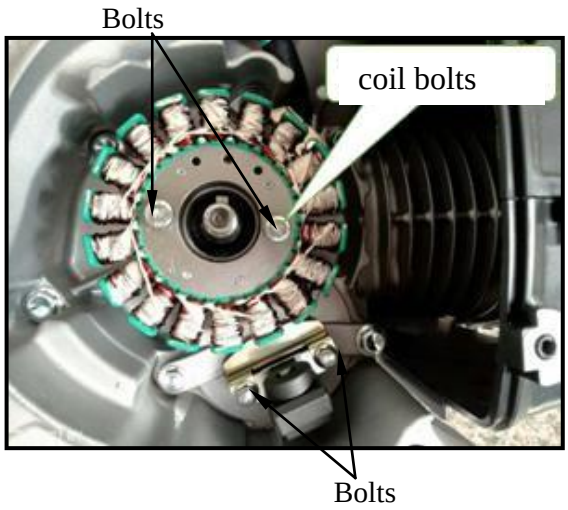
A.C. GNERATOR INSTALLATION



Install the A.C. generator stator and pulser coil onto the right crankcase.
Tighten the stator and pulser coil bolts.

Torques: Pulser Coil : 0.45~0.6kgf-m
Stator : 0.8~1.2kgf-m

Install the A.C. generator wire rubber sleeve and A.C. generator wire set plate.

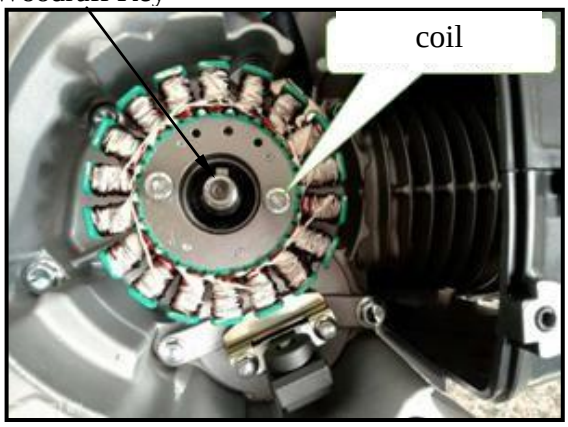


Connect the A.C. generator wire connector.

A.C. Generator Wire Connector

Clean the taper hole in the flywheel off any burrs and dirt.
Install the woodruff key in the crankshaft keyway.

Woodruff Key

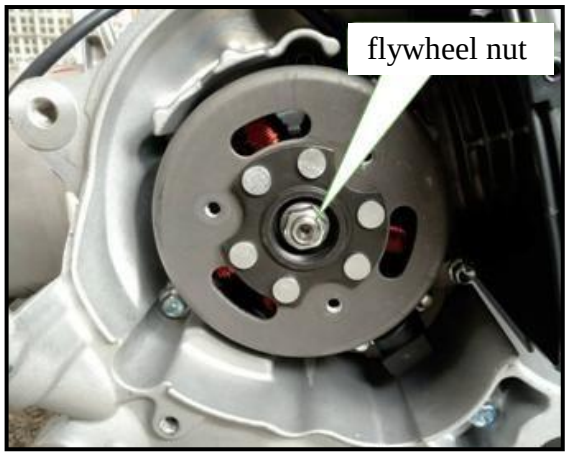


Install the flywheel onto the crankshaft with the flywheel hole aligned with the crankshaft woodruff key.

* The inside of the flywheel is magnetic. Make sure that there is no bolt or nut before installation.

Hold the flywheel with the universal holder and tighten the flywheel nut.

Torque: 3.5~4.5kgf-m

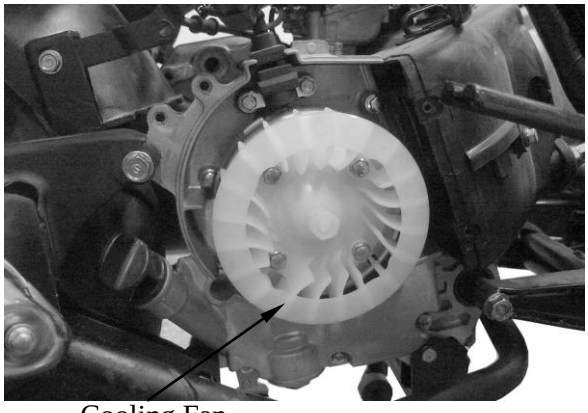


Special

Universal Holder

Install the cooling fan.

Torque: 0.8~1.2kgf-m

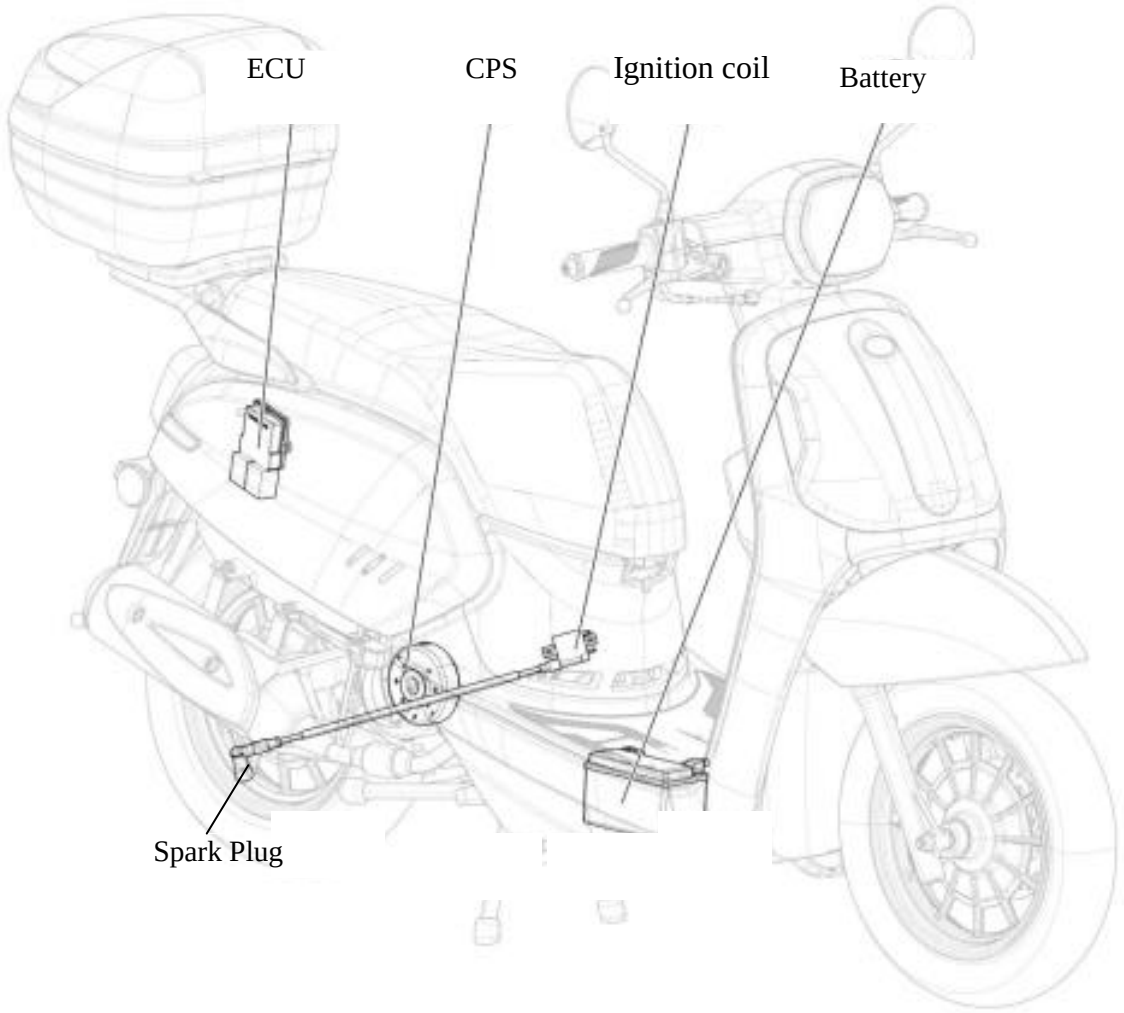


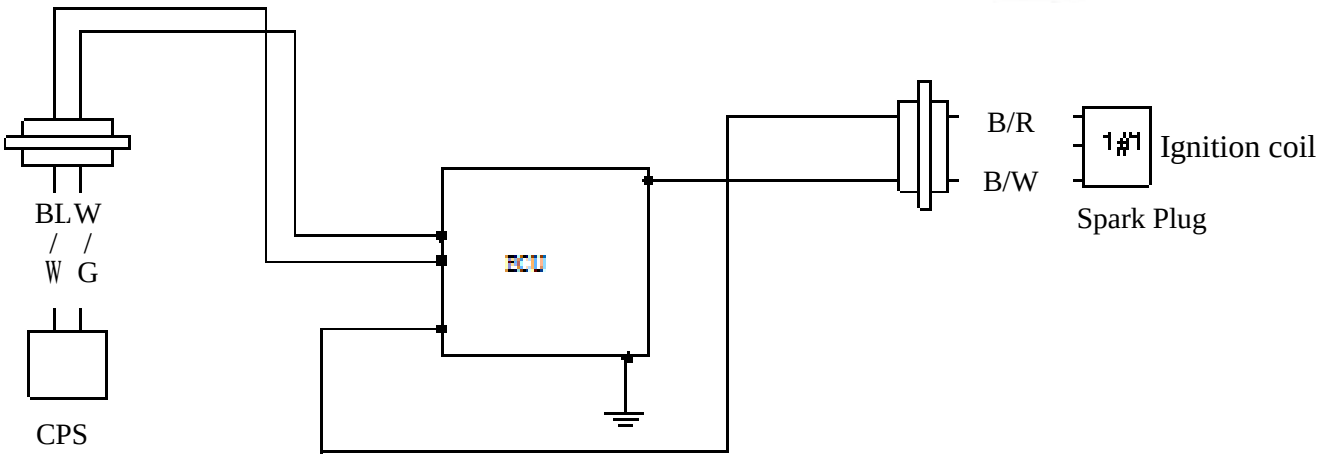
Cooling Fan

Install the fan cover.
Install the right side cover.

Fan Cover

15. IGNITION SYSTEM





SERVICE INFORMATION

GENERAL INSTRUCTIONS

GENERAL INSTRUCTIONS

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is "ON" and current is present.
- When servicing the ignition system, always follow the steps in the troubleshooting on page 17-2.
- The ignition timing cannot be adjusted since the ignition control module is already adjusted in factory.
- The ignition control module or ECU maybe damaged if dropped or the connector is disconnected when the key is " ON ", the excessive voltage may damage the ignition control module or ECU. Always turn off the ignition switch before servicing.
- A faulty ignition system is often related to poor connections. Check those connections before proceeding.
- Make sure the battery is adequately charged. Using the starter motor with weak battery results in a slower engine cranking speed as well as no spark at the spark plug.
- Use a spark plug of the correct heat range. Using spark plug with an incorrect heat range can damage the engine.

SPECIFICATIONS

Item			Standard
	Standard type		CR6HSA(NGK)
Spark plug gap			0.6～0.7mm
Ignition timing	"F" mark		12° BTDC /1,800rpm±100RPM
Ignition coil resistance (20℃)	Primary coil		0.58Ω±10%
	Secondary coil	with plug cap	13KΩ±20%
		without plug cap	8KΩ±10%
Pulser coil resistance (20℃)			135±15Ω
Ignition coil primary side max. voltage			15V min.
Pulser coil max. voltage			1.7V min.

TROUBLESHOOTING

No peak voltage

- Short circuit in engine stop switch or ignition switch wire.
- Faulty engine stop switch or ignition switch.
- Loose or poorly connected ignition control module connectors.
- Open circuit or poor connection in ground wire of the ignition control module.
- Faulty crank position sensor.
- Faulty ignition control module.

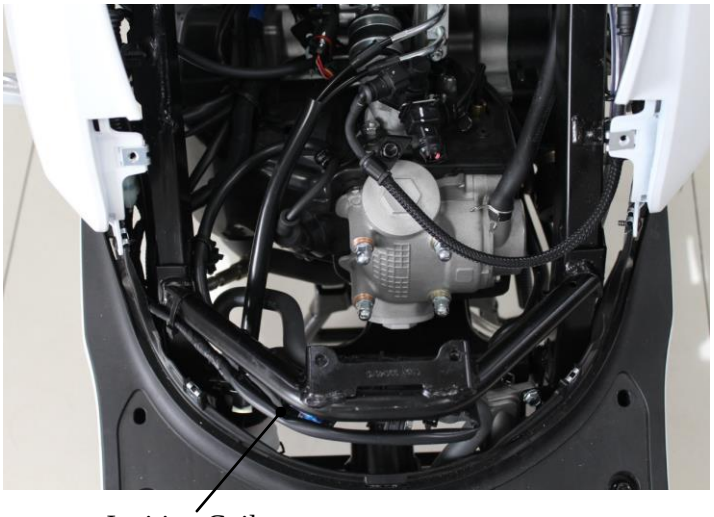
Peak voltage is normal, but no spark jumps at the plug

- Faulty spark plug or leaking ignition coil secondary current.
- Faulty ignition coil.

IGNITION COIL

REMOVAL

Remove the center cover.
Remove the spark plug cap.
Disconnect the ignition coil wires and remove the ignition coil bolt and ignition coil.

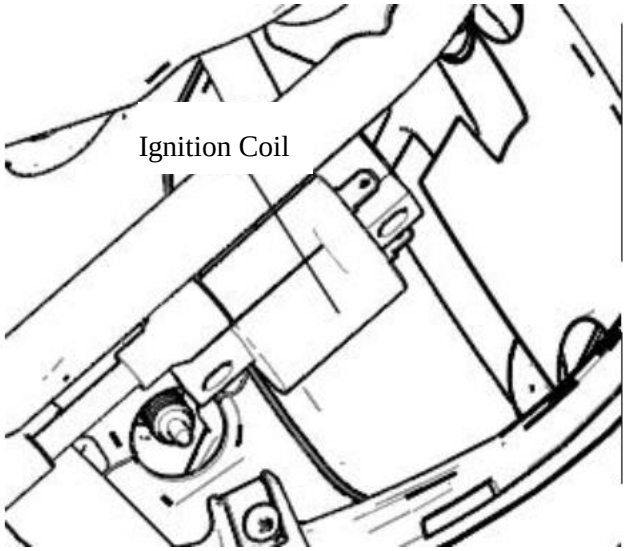


INSPECTION

CONTINUITY TEST

Measure the resistance between the ignition coil primary coil terminals.

Resistance: 0.58Ω±10%

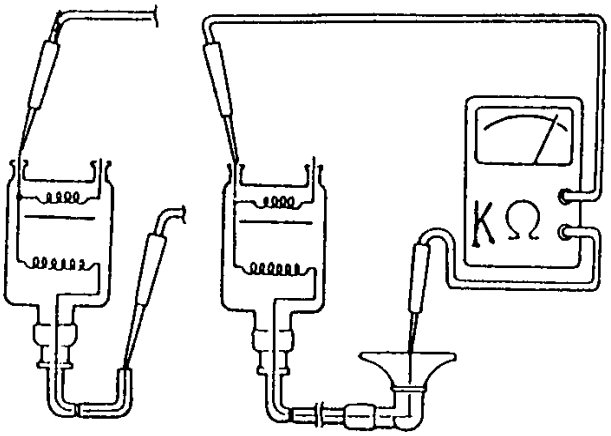


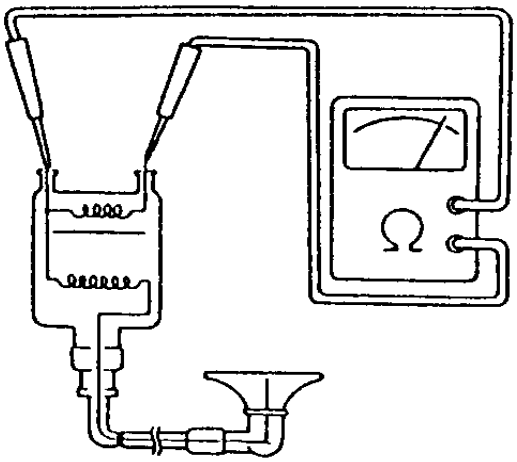
Measure the secondary coil resistances with and without the spark plug cap.

Resistances:

(with plug cap) : 13KΩ±20%
(without plug cap) : 8KΩ±10%

* Correctly operate the tester following the manufacturer's instructions.



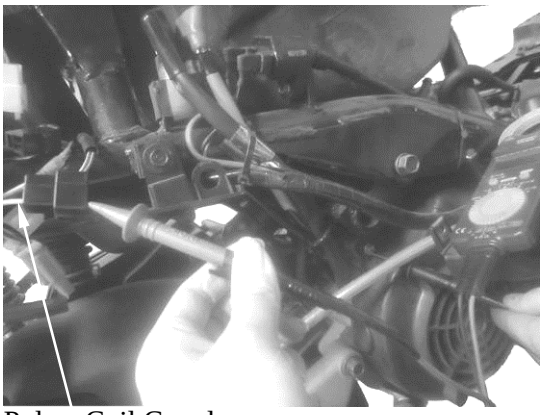


PULSER COIL

INSPECTION

* This test is performed with the stator installed in the engine.

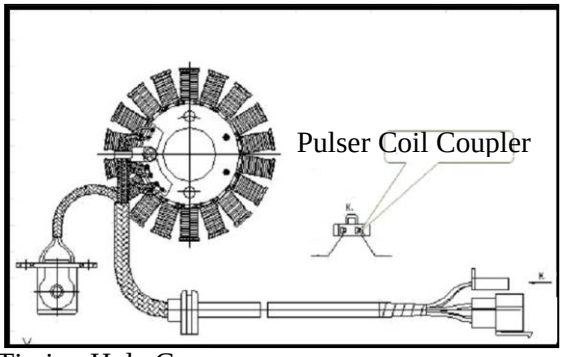
Remove the frame body cover.
Disconnect the A.C. generator connector.


Pulser Coil Coupler

Measure the pulser coil resistance between the blue/yellow and green wire terminals.

Resistance: 135±15Ω

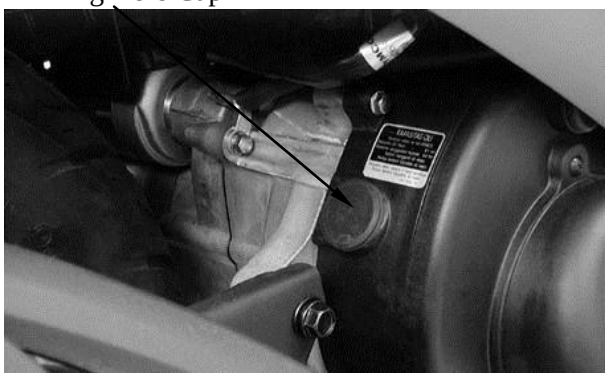
Refer to page 14-6 for the A.C. generator removal.



IGNITION TIMING INSPECTION

* The EFI unit is not adjustable. If the ignition timing is incorrect, inspect the EFI unit, pulser coil and A.C. generator and replace any faulty parts.

Remove the timing hole cap.

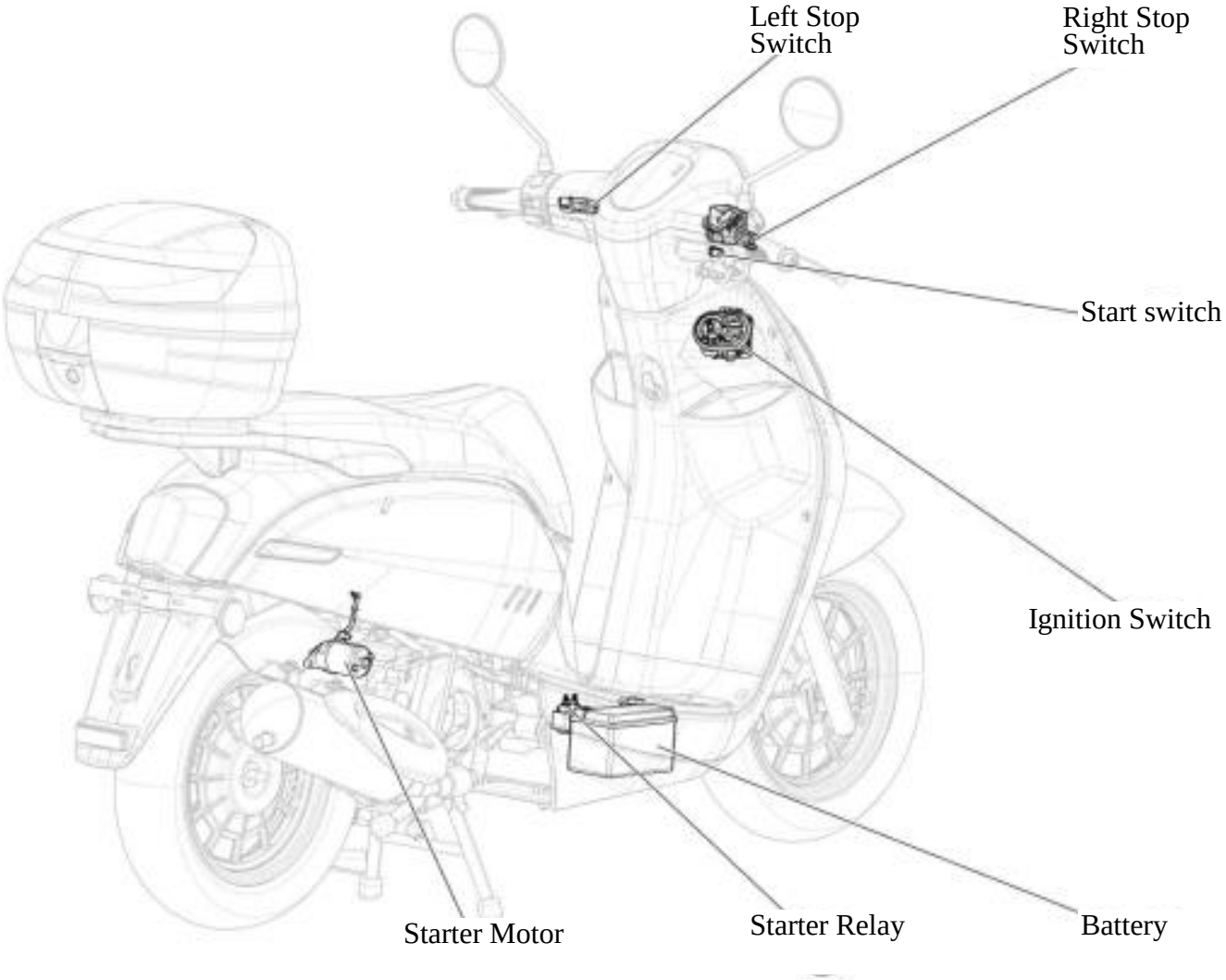

Timing Hole Cap

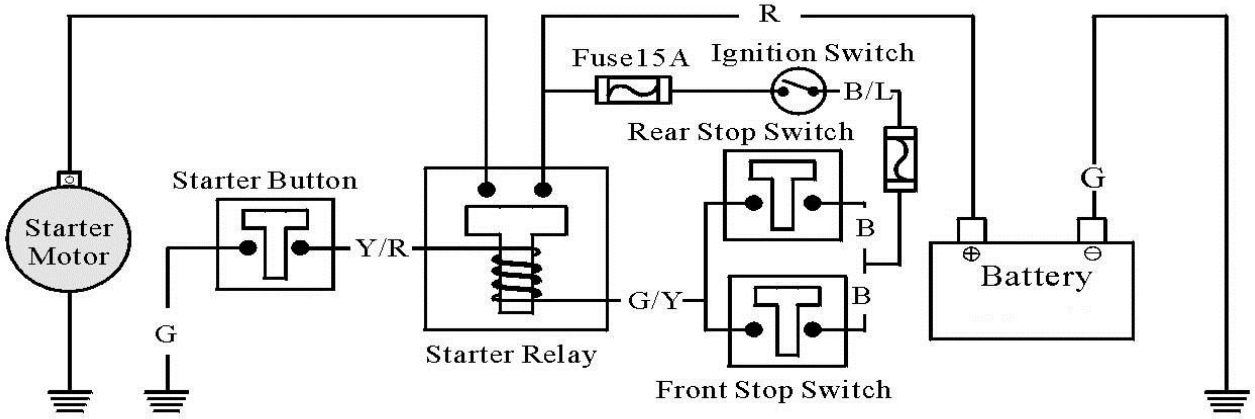
Warm up the engine and check the ignition timing with a timing light.
When the engine is running at the ignition timing is correct if the "F" mark aligns with the index mark within ±2°.

Ignition Timing:
BTDC 12°±2°/1,800rpm±100rpm


"F" Mark

16. STARTING SYSTEM





16

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The removal of starter motor can be accomplished with the engine installed.

SPECIFICATIONS

Item	Standard (mm)	Service Limit (mm)
Starter motor brush length	6.2	3

TORQUE VALUES

Starter clutch cover socket bolt 1.2kg-m
Starter clutch lock nut 9.5kg-m

SPECIAL TOOLS

Flywheel Holder

TROUBLESHOOTING

Starter motor won‘t turn

- Fuse burned out
- Weak battery
- Faulty ignition switch
- Faulty starter clutch
- Faulty front or rear stop switch
- Faulty starter relay
- Poorly connected, broken or shorted wire
- Faulty starter motor

Lack of power

- Weak battery
- Loose wire or connection
- Foreign matter stuck in starter motor or gear

Starter motor rotates but engine does not start

- Faulty starter clutch
- Starter motor rotates reversely
- Weak battery

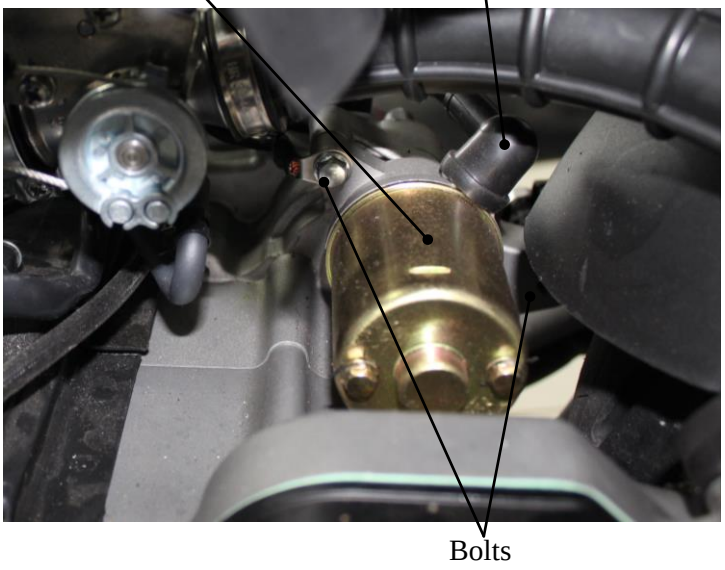
STARTER MOTOR

REMOVAL

* Before removing the starter motor, turn the ignition switch OFF and remove the battery ground. Then, turn on the ignition switch and push the starter button to see if the starter motor operates properly.

Remove the two starter motor mounting bolts and the motor.

Remove the waterproof rubber jacket and disconnect the starter motor cable connector.



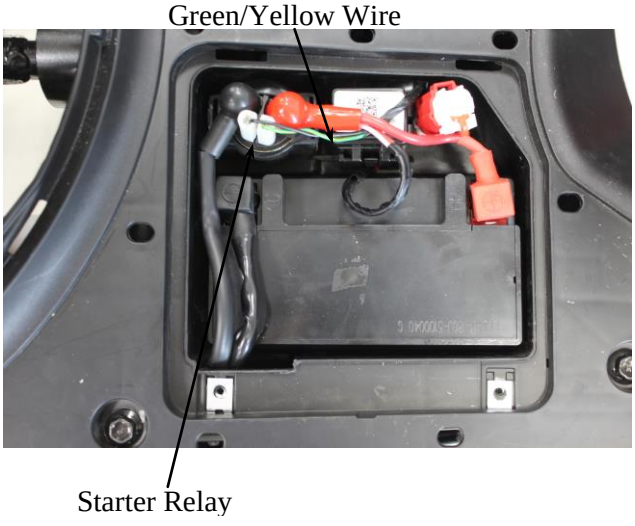
The installation sequence is the reverse of removal.

STARTER RELAY

INSPECTION

Remove the frame body cover.
Turn the ignition switch ON and the starter relay is normal if you hear a click when the starter button is depressed.
If there is no click sound:

- Inspect the starter relay voltage
- Inspect the starter relay ground circuit
- Inspect the starter relay operation



STARTER RELAY VOLTAGE INSPECTION

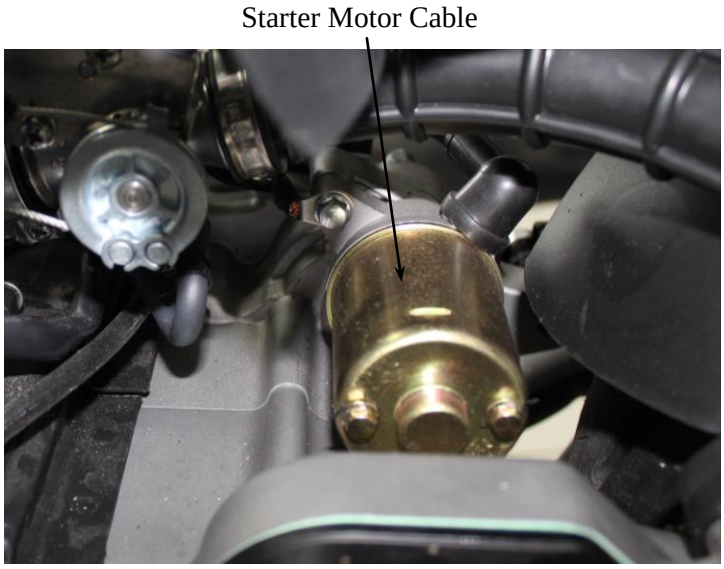
Place the motorcycle on its main stand.
Measure the voltage between the starter relay connector green/yellow wire (-) and engine ground.
Turn the ignition switch ON and the battery voltage should be normal when the brake lever is fully applied.
If the battery has no voltage, inspect the stop switch continuity and cable.

STARTER RELAY GROUND CIRCUIT INSPECTION

Disconnect the starter relay wire connector.
Check for continuity between the black wire terminal and ground.
There should be continuity when the starter button is depressed.
If there is no continuity, check the starter button for continuity and inspect the wire.

OPERATION TEST

Connect the electric tester to the starter relay larger terminals that connect to the battery positive cable and the starter motor cable.
Connect a fully charged battery across the starter relay green/yellow and black wire terminals.
Check for continuity between the starter relay large terminals. The relay is normal if there is continuity.



INSTALLATION

Connect the starter motor cable connector and properly install the waterproof rubber jacket.
Check the O-ring for wear or damage and replace if necessary.
Apply grease to the O-ring and install the starter motor.
Tighten the two mounting bolts.

* The starter motor cable connector must be installed properly.

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- An electric tester is needed to measure or test the electric equipment.
- Be sure to use fuses and bulbs of the same specifications to avoid damage of electrical equipment.
- After installation of each switch, a continuity check must be performed. A continuity check can usually be made without removing the part from the motorcycle.

TROUBLESHOOTING

Lights do not come on when ignition switch is "ON"

- Burned bulb
- Faulty switch
- Broken wire
- Fuse burned out
- Weak battery
- Poorly connected or shorted wire
- Faulty winker

Light dims

- Faulty ignition coil
- Wire or switch resistance too high
- Faulty regulator/rectifier

Headlight does not change when dimmer switch is turn to Hi or Lo

- Faulty or burned bulb
- Faulty dimmer switch

Fuel gauge pointer does not register correctly

- Disconnected wire or connector
- Broken wire
- Faulty float
- Faulty fuel unit
- Faulty instrument

Fuel gauge pointer fluctuates or swings

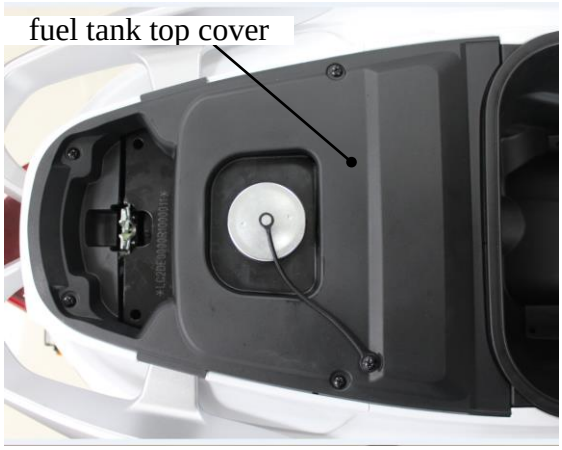
- Loose wire connection
- Faulty fuel unit
- Faulty instrument

FUEL UNIT

* **No Smoking!**

REMOVAL

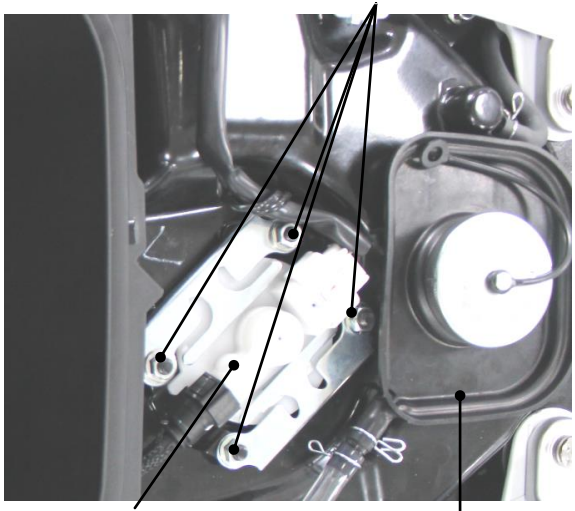
Open the seat
Remove the four screws attaching the fuel tank top cover.
Remove the fuel tank top cover.
Remove the Waterproof rubber.
Remove the four bolts.
Disconnect the fuel pump and unit wire connector.



* Do not damage the fuel pump and unit wire.

Remove the fuel pump .

* Be careful not to bend or damage the fuel unit float arm.

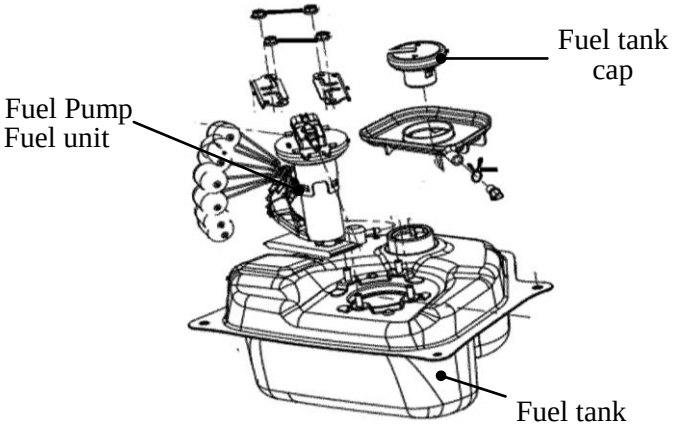


INSTALLATION

The installation sequence is the reverse of removal.
Measure the resistance between the fuel unit wire terminals with the float at upper and lower positions.

RESISTANCES Unit: Ω

Wire Terminals	Upper	Lower
B～W/Y	7±2	97±3



FUEL GAUGE INSPECTION

Connect the fuel unit wire connector and turn the ignition switch “ON”.

* Before performing the following test, operate the turn signals to determine that the battery circuit is normal.

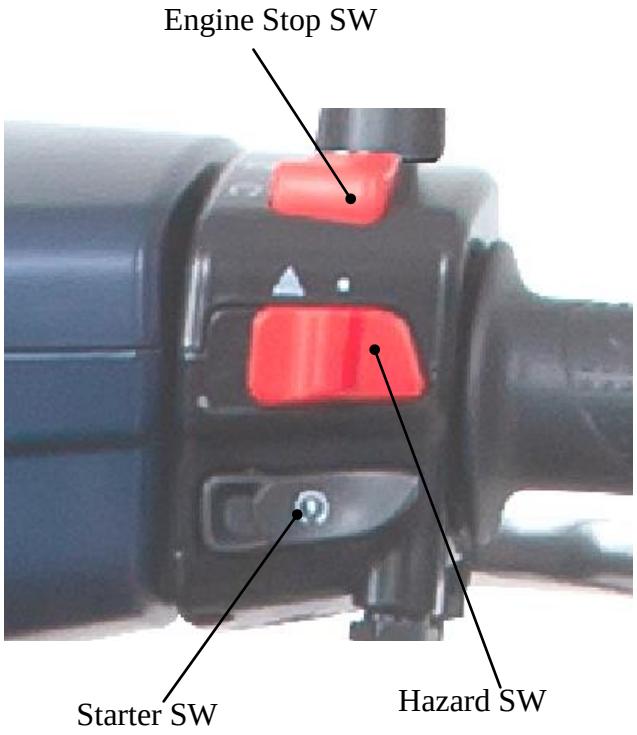
Check the fuel gauge needle for correct indication by moving the fuel unit float up and down.

Float Position	Needle Position
Upper	“F” (Full)
Lower	“E” (Empty)

HANDLEBAR SWITCHES

INSPECTION

Remove the handlebar front cover.
Disconnect the handlebar switch couplers and check for continuity between wire terminals.
If there is any abnormality found, check each switch.



HAZARD SWITCH

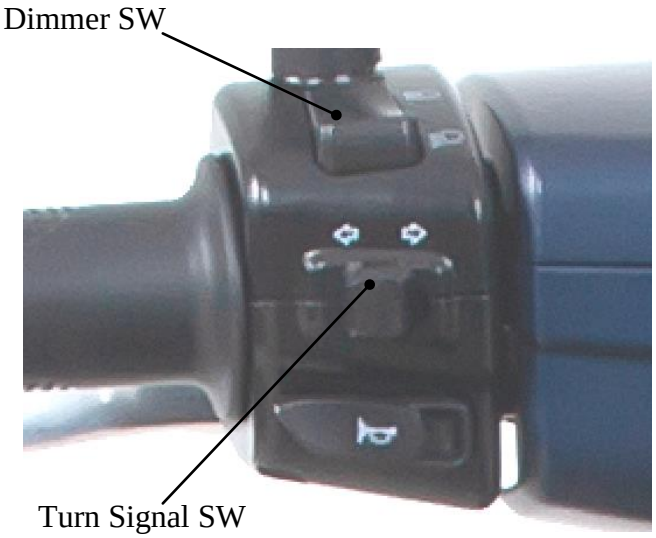
Color	Green/ White	Orange	Green/ Black
●			
△	○	○	○

ENGINE STOP SWITCH

Color	Red	Dark green
⊗		
⟲	○	○

STARTER SWITCH

Color	Green/Yellow	Dark green
FREE		
PUSH	○	○



DIMMER SWITCH

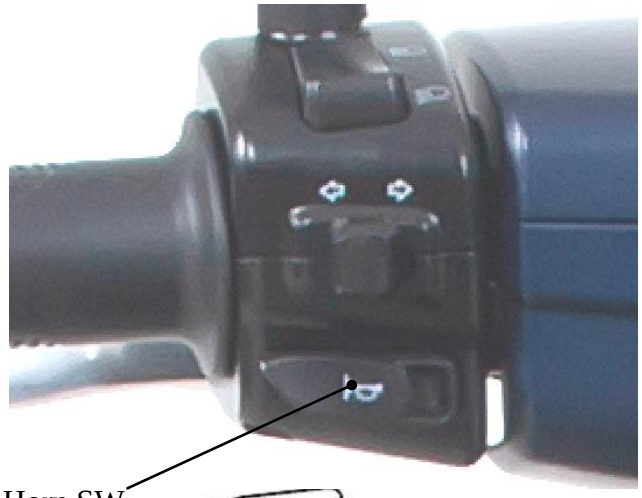
Color	Blue	Yellow /Red	Light Blue
≢D	○	○	
≡D		○	○

TURN SIGNAL SWITCH

Color	Green/ Black	Orange	Green/ White
L	○	○	
N			
R		○	○

HORN SWITCH

Color	Light Green	Green
FREE		
PUSH	○———	———○



SWITCH REPLACEMENT

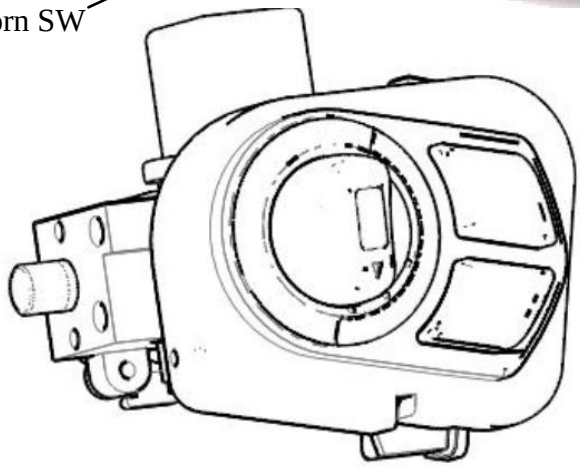
Remove the front covers.
Remove the handlebar up cover.
The installation sequence is the reverse of removal.

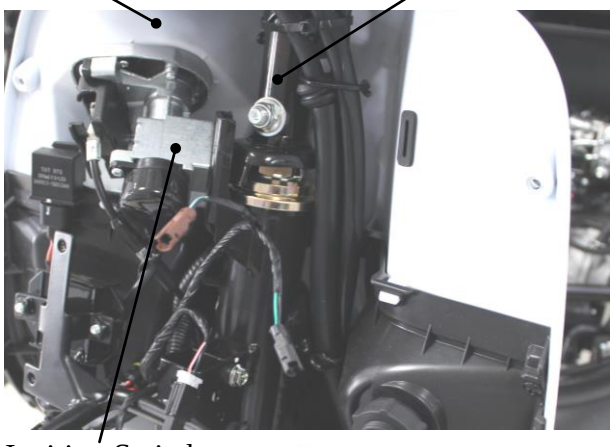
IGNITION SWITCH

INSPECTION

Remove the front covers.
Disconnect the ignition switch wire coupler.
Check for continuity between the wire terminals.

Color	R/W	Red
OFF		
ON	○———	———○
LOCK		

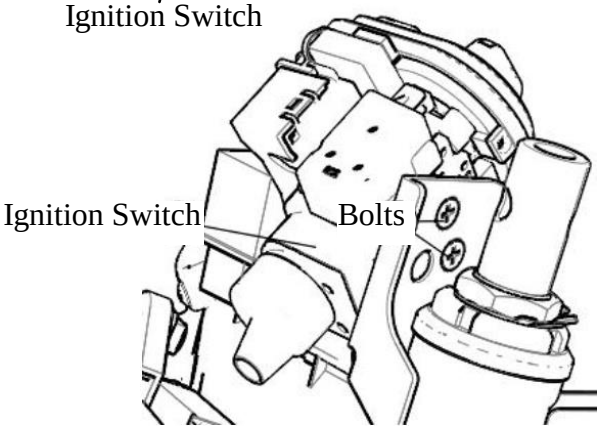




IGNITION SWITCH REPLACEMENT

Remove the front covers.(2-3)
Remove the leg shield.(2-5)
Remove the handlebar lock nut and bolt to remove the handlebar.(12-3)

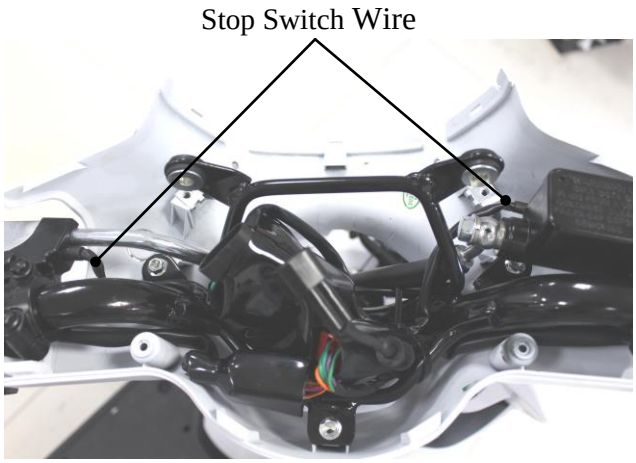
Disconnect the ignition switch wire coupler.
Remove the two mounting bolts to remove the ignition switch decorative ring and holder.
Remove the two screws to remove the ignition switch from the ignition switch holder for replacement.
The installation sequence is the reverse of removal.



STOP SWITCH

INSPECTION

Remove the handlebar up cover.
Disconnect the front stop switch wire coupler.
Check for continuity between the wire terminals when the front brake lever is applied. The switch is normal if there is continuity.
Disconnect the rear stop switch wire coupler.
Check for continuity between the wire terminals when the rear brake lever is applied.
The switch is normal if there is continuity.



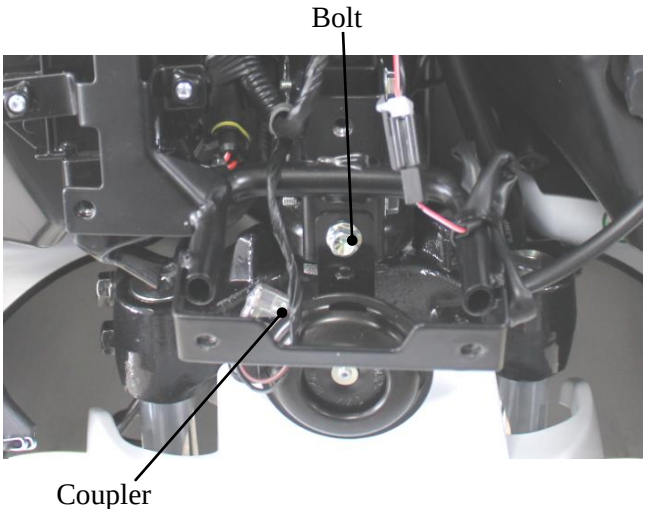
HORN

INSPECTION

Remove the front covers.
Disconnect the horn wire coupler.
The horn is normal if it sounds when a 12V battery is connected across the horn wire terminals.

REPLACEMENT

Disconnect the horn wire coupler.
Remover the two bolts attaching the horn.
Remove the horn.
The installation sequence is the reverse of removal.



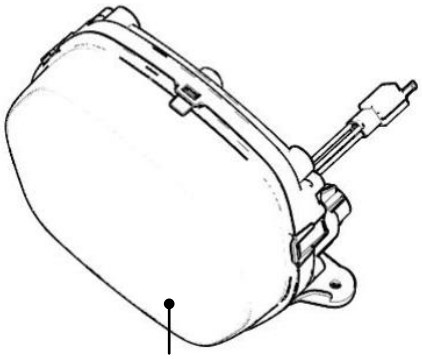
HEADLIGHT

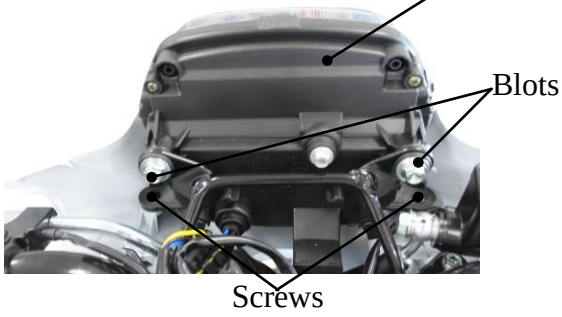
REMOVAL

Remove the headlight strip.(2-2)
Remove the handlebar up cover.(2-2)
Remove the two screws and two bolts attaching the headlight .
Remove the headlight.
Replace with a new assembly.

The installation sequence is the reverse of removal.

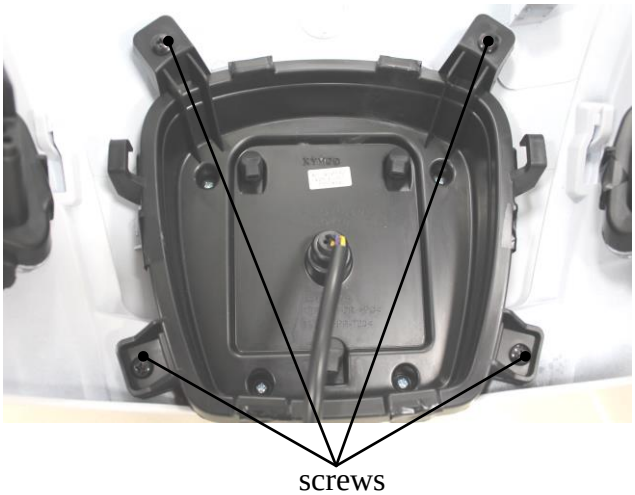
*
- Align the tab on the headlight with the groove on the handlebar cover.
- After installation, adjust the headlight beam.


headlight



TAILLIGHT/STOPLIGHT/REAR TURN SIGNAL LIGHT/LICENSE LIGHT

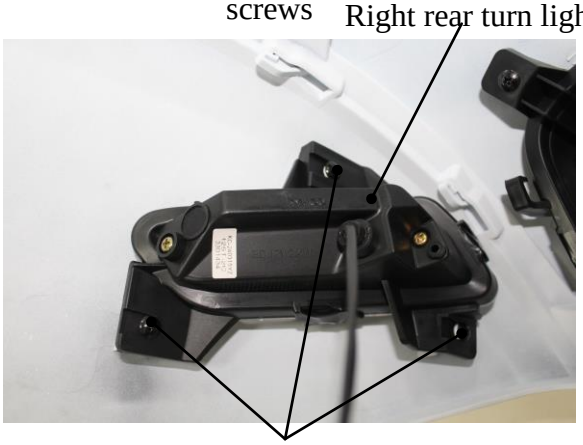
Remove the seat and the met-in box. (2-5)
Remove the body cover. (2-6)
Remove the four screws attaching the rear light .
Replace with a new assembly.



Remove the three screws attaching the each rear turn light .

Replace with a new assembly.

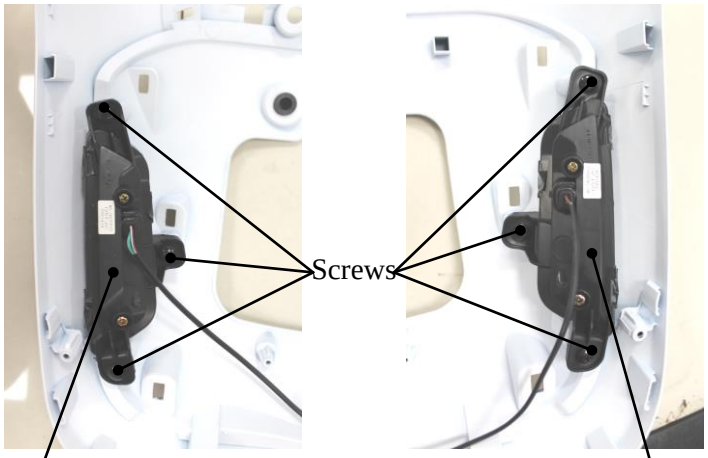
The installation sequence is the reverse of removal.



FRONT RIGHT/LEFT TURN SIGNAL LIGHT

Remove the front center cover.
Remove the front cover.
Remove the three screws attaching the each front turn light .

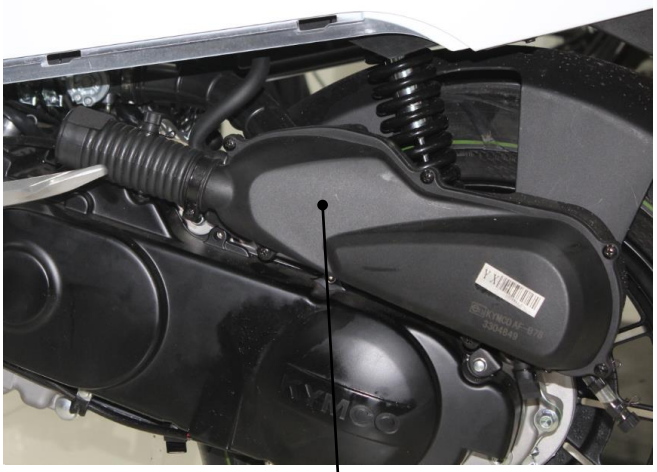
Replace with a new assembly.

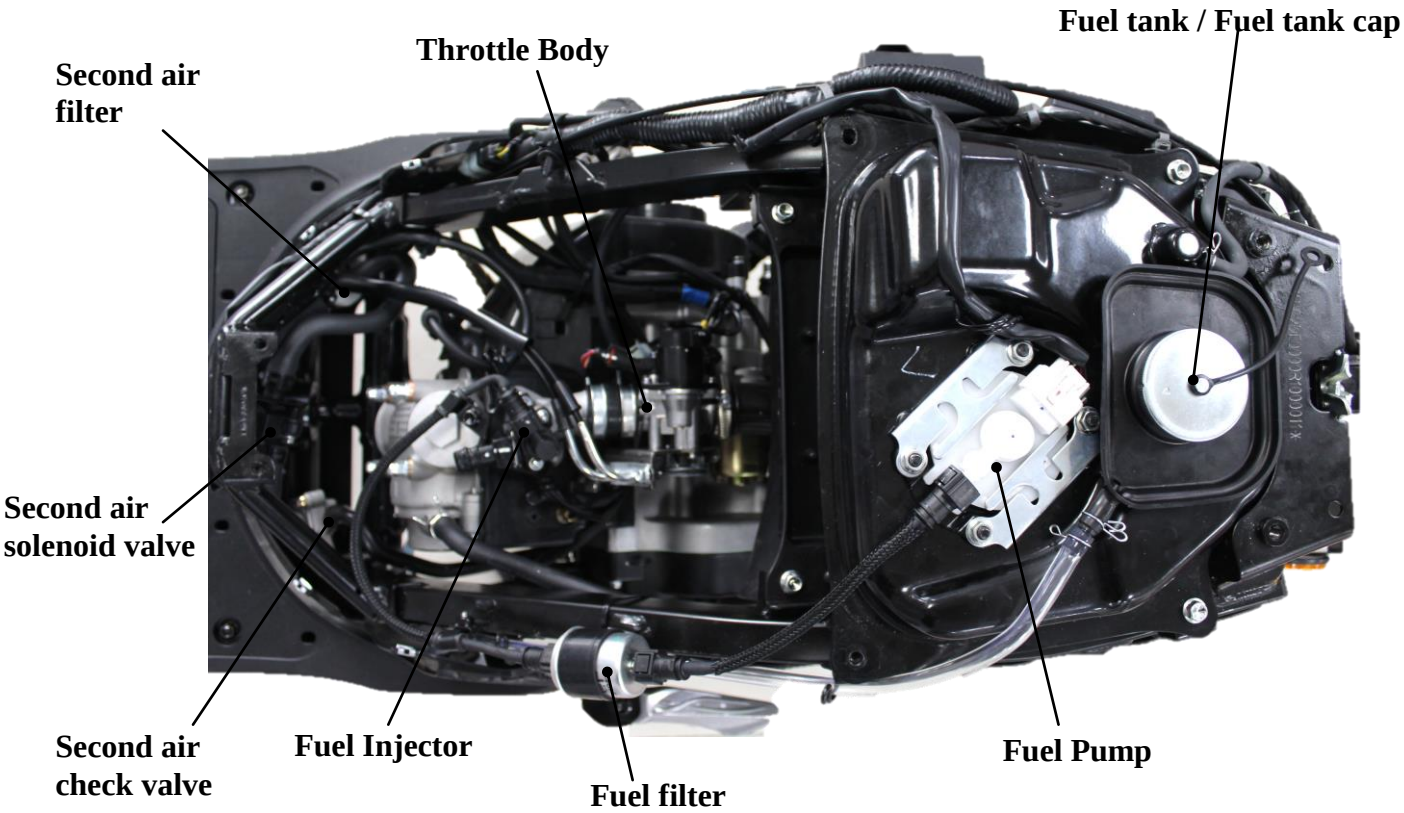


The installation sequence is the reverse of removal.

EVAPORATIVE EMISSION CONTROL SYSTEM

SCHEMATIC DRAWING





EVAPORATIVE EMISSION CONTROL SYSTEM FUNCTION

FUNCTION

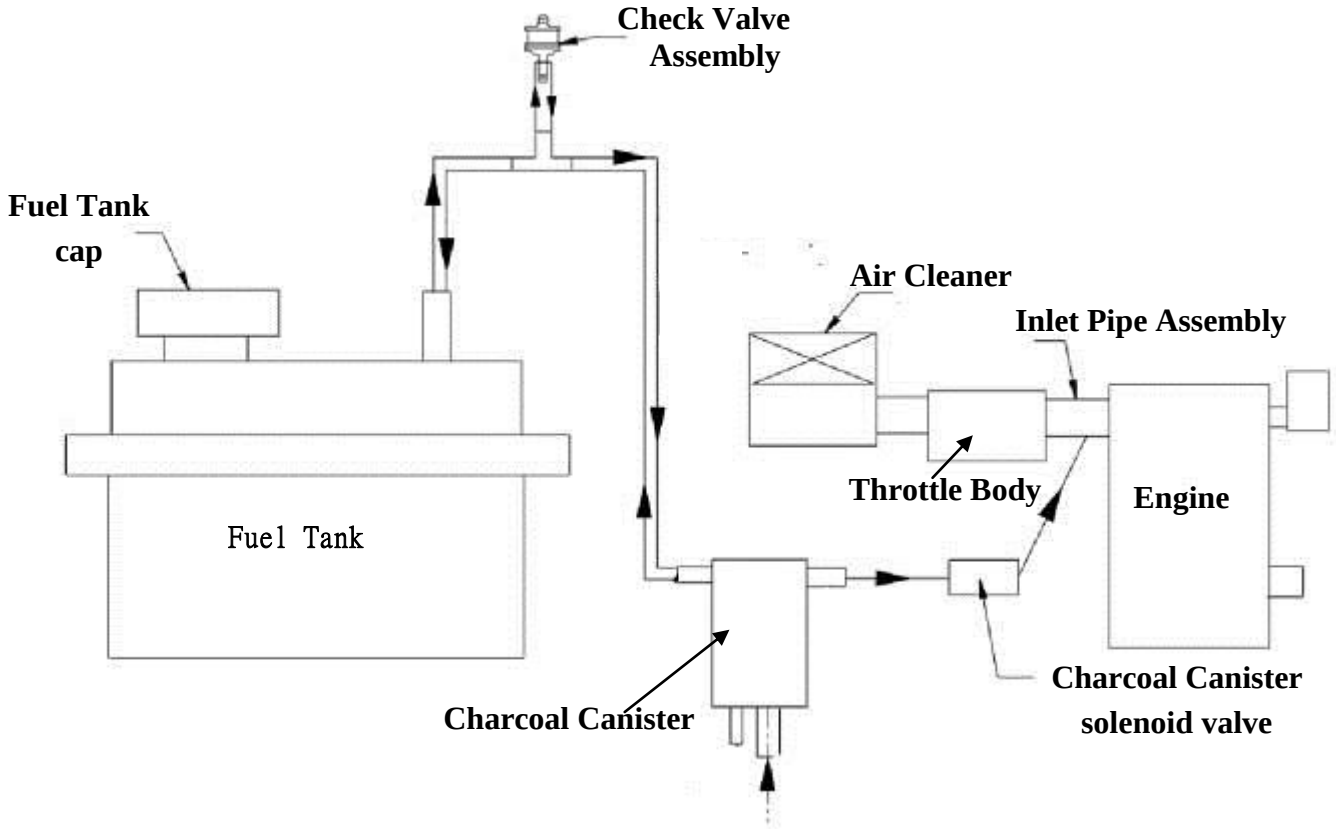
The Evaporative Emission Control System is abbreviated to E.E.C. System. This device collects the fuel vapor from the fuel tank and then the fuel vapor is drawn into the engine through the Charcoal Canister solenoid valve for re-burning to avoid air pollution caused by the fuel vapor diffused into the air.

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Do not smoke or allow flames or sparks near the working area.
- Note the locations of tubes for proper installation.
- Replace any damaged tube with a new one.
- Make sure to tighten the connector of each tube securely.

A. LEAKAGE TEST PIPING DIAGRAM



CHARCOAL CANISTER

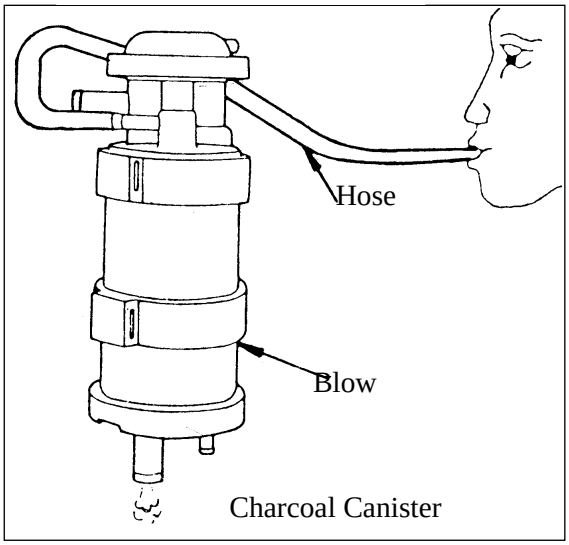
REMOVAL

1. Remove the body cover
2. Disconnect the charcoal canister tubes that go to the fuel tank and purge control valve.
3. Remove the charcoal canister.


Charcoal Canister

INSPECTION

1. Plug the tube that goes to the fuel tank and plug the blow-by tube. Then connect a hose to the canister. Blow the hose with mouth. The charcoal canister is normal if air can be blown into it. If clogged, replace it with a new one.
2. Check the charcoal for cracks and replace if necessary.



INSTALLATION

Install the charcoal canister in the reverse order of removal.

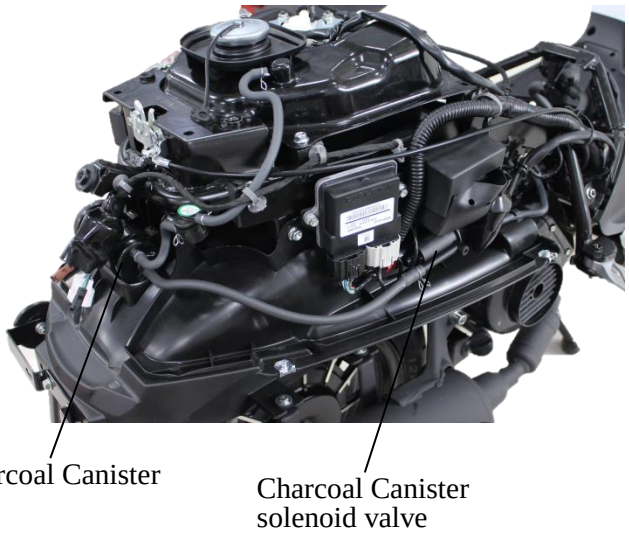
*
- The charcoal canister must be installed to its original position to avoid affecting its performance.
- Do not bend, twist or kink the tubes during installation.

CHARCOAL CANISTER SOLENOID VALVE

REMOVAL

1. Remove the body cover
2. Disconnect the charcoal canister solenoid valve wire connector.
3. Remove the bolt and the charcoal canister solenoid valve

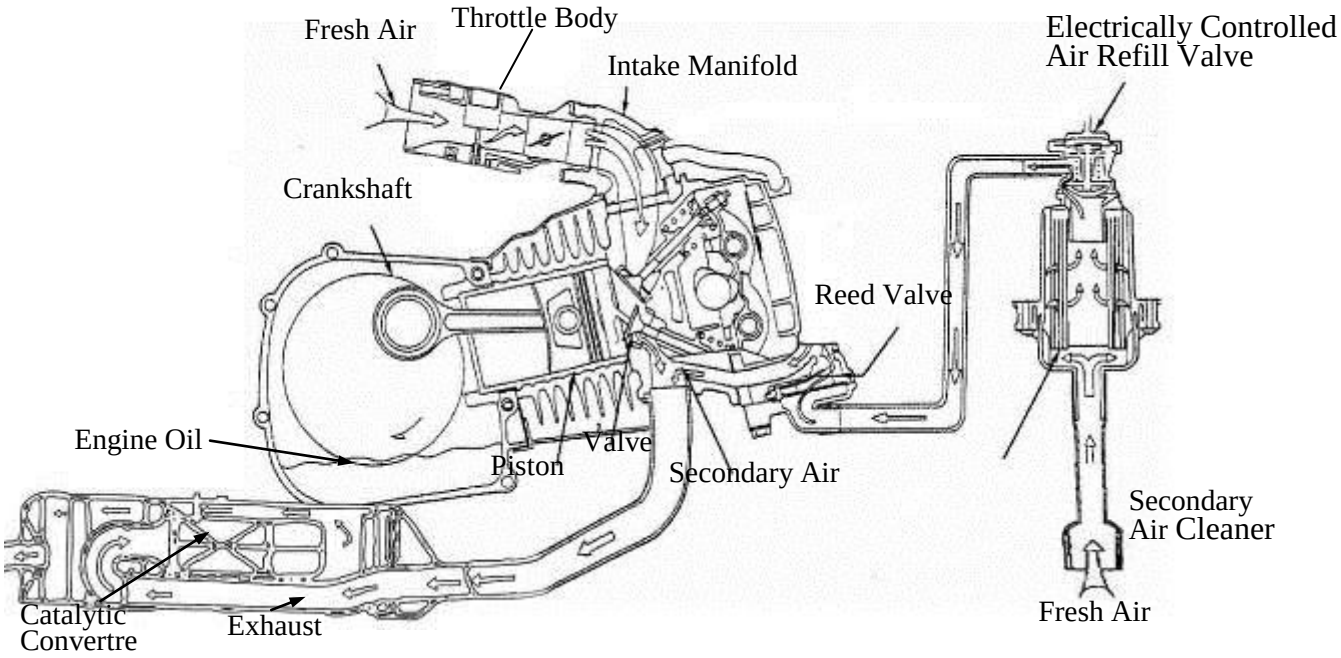
Check the charcoal canister solenoid valve,



INSTALLATION

Install the charcoal canister in the reverse order of removal.

EXHAUST EMISSION CONTROL SYSTEM DIAGRAM



EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system adopted in this model utilizes the reed valve to draw secondary air into the exhaust system for re-combustion by means of exhaust pulsation so as to minimize the exhaust emission.

FUNCTION

Item	Purpose	Function
Secondary Air Cleaner	Filter secondary air.	It filters the fresh air drawn for re-burning to prevent dirt or dust from affecting the operation of the air injection cut-off valve.
Electrically Controlled Air Refill Valve	Prevent exhaust muffler noise and backfiring at sudden deceleration.	The electrically controlled air refill valve usually opens to lead air into the exhaust muffler in which air is re-burned to reduce CO. When the throttle valve closes suddenly, the electrically controlled air refill valve is actuated by vacuum to close and cut off secondary air in order to prevent exhaust muffler backfiring due to air in the exhaust system.
Reed Valve	Control the secondary air inlet to reduce CO.	When the motorcycle speed is less than 50km per hour, the reed valve operates to draw secondary air into the exhaust system for re-combustion.

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- During operation, be careful to avoid scalding caused by the exhaust muffler.
- Note the locations of tubes for proper installation.
- Replace any damaged tube with a new one.
- Make sure to tighten the connector of each tube securely

TROUBLESHOOTING

High CO at idle speed

- Damaged or clogged reed valve
- Damaged or clogged air injection cut-off valve
- Clogged air cleaner

Exhaust muffler noise

- Faulty air injection cut-off valve
- Broken vacuum tube
- Faulty reed valve

MAINTENANCE SCHEDULE

This interval should be judged by odometer reading or months, whichever comes first.

Maintenance schedule legend:

I: INSPECT AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY

C: CLEAN R: REPLACE A: ADJUST L: LUBRICATE

The maintenance schedule on the flowing specifies the maintenance required to keep your **FILLY 50** scooter in peak operating condition. Maintenance work should be performed in accordance with KYMCO standards and specifications by properly trained and equipped technicians. Your KYMCO dealer meets all of these requirements.

Maintenance schedule notes:

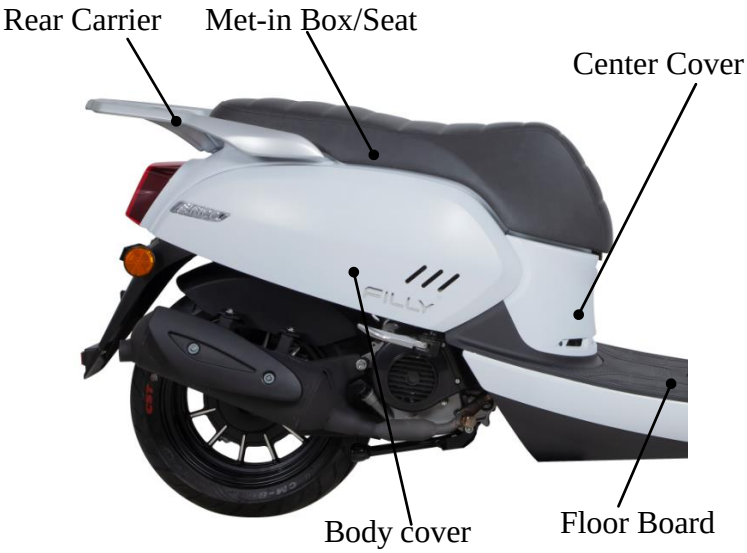
1. At higher odometer readings, repeat at the frequency interval established here.
2. Service more frequently if the scooter is ridden in unusually wet or dusty areas.
3. Service more frequently when riding in rain or at full throttle.
4. Clean every 1,200 mi (2,000 km) after replacement and replace every 3,000 mi (5,000 km).
5. Replace every 2,500 mi (4,000 km).
6. Replace every 2 years. Replacement requires mechanical skill.

FREQUENCY / ITEM	WHICHEVER COMES FIRST → / ↓		ODOMETER READING [NOTE (1)]						
		X 1000 km	0.3	1	3	5	7	9	11
		X 1000 mi	0.2	0.6	1.8	3	4.2	5.4	6.6
ITEM	NOTE	MONTH		3	6	12	18	24	30
AIR CLEANER	NOTE 2			I	R	I	R	I	R
SPARK PLUGS	NOTE 4					R			
THROTTLE OPERATION						I		I	
VALVE CLEARANCE			A		A		A		A
FUEL LINE						I		I	
CRANKCASE BREATHER	NOTE 3			C	C	C	C	C	C
ENGINE OIL			R	R	R	R	R	R	R
ENGINE OIL STRAINER SCREEN			C		C		C		C
ENGINE IDLE SPEED					I		I		I
TRANSMISSION OIL	NOTE 5		R		R		R		R
DRIVE BELT							I		
BATTERY				I	I	I	I	I	I
CLUTCH SHOE WEAR							I		
AIR FILTER CVT						I			I
BRAKE FLUID	NOTE 6				I	I	I	R	I
BRAKE PAD WEAR				I	I	I	I	I	I
BRAKE SYSTEM				I	I	I	I	I	I
BRAKE LIGHT SWITCH						I		I	
STEERING BEARINGS			I			I		I	
HEADLIGHT AIM						I		I	
NUTS, BOLTS, FASTENERS			I			I		I	
WHEELS/TIRES				I	I	I	I	I	I

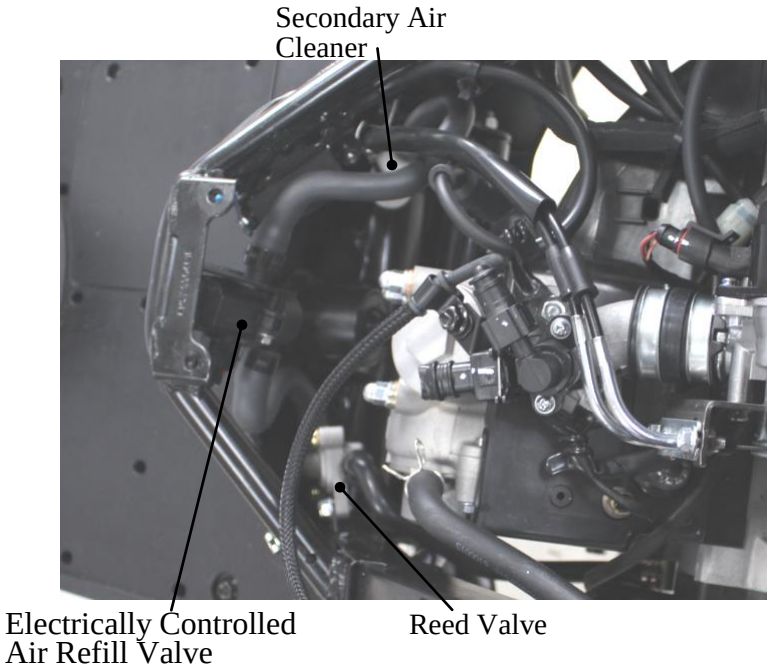
SECONDARY AIR CLEANER

REMOVAL

Remove the center cover.
Remove the met-in box.
Remove the body cover.



Disconnect the secondary air cleaner connecting tube.
Remove the air cleaner



INSTALLATION

The installation sequence is the reverse of removal.

DISASSEMBLY

Remove the two secondary air cleaner replace with new secondary air cleaner.

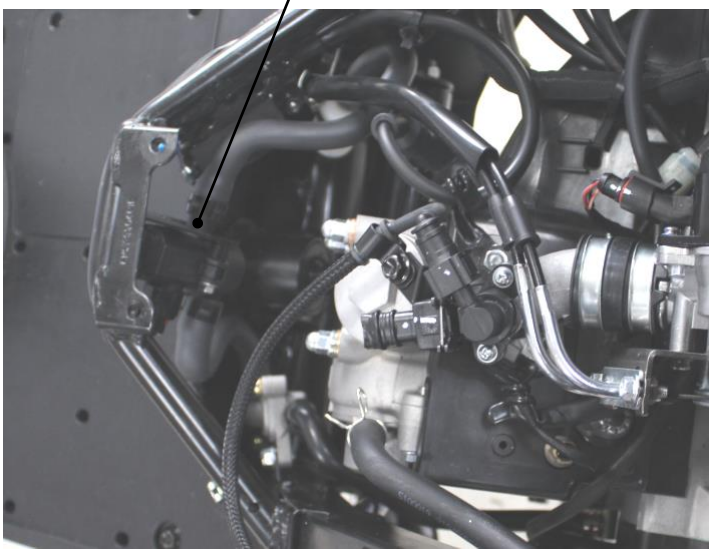
*
- The secondary air cleaner must be assembled and installed properly to avoid dust entering the air cleaner.

ELECTRICALLY CONTROLLED AIR REFILL VALVE

REMOVAL

1. Remove the met-in box.
2. Remove the center cover.
3. Disconnect the electrically controlled air refill valve wire connector.
4. Remove the bolt and the electrically controlled air refill valve.

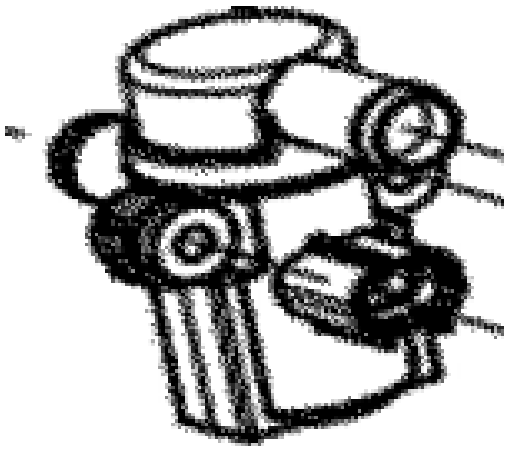
Electrically Controlled Air Refill Valve



INSTALLATION

The installation sequence is the reverse of removal.

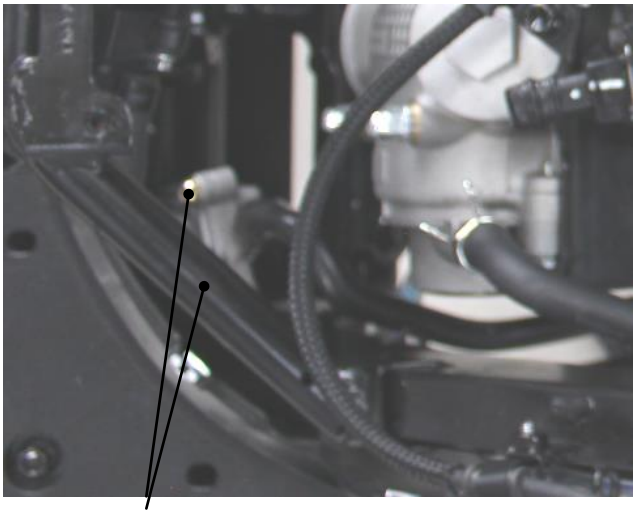
*
- When installing, be careful not to bend or twist the tubes and check for proper installation.
- The tube length is very important to its performance, use the tube of same specification for replacement.



REED VALVE

REMOVAL

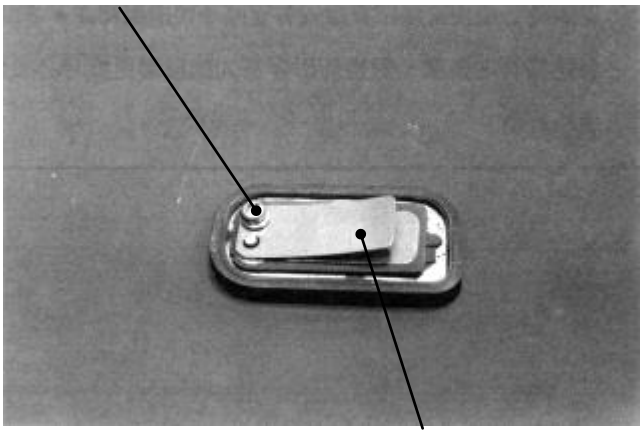
Remove the met-in box and frame center cover.
Disconnect the secondary air inlet tube connector.
Remove the two Reed Valve Cover Bolts.



Reed Valve Cover Bolts

INSPECTION

Remove the three screws attaching the reed valve cover and the reed valve.
Check the reed valve for damaged or weak reeds.
Check the reed valve seat for cracks, damage or clearance between the seat and reed.
Check the gasket and O-ring for damage or deterioration and replace if necessary.



INSTALLATION

Install the reed valve in the reverse order of removal.

*

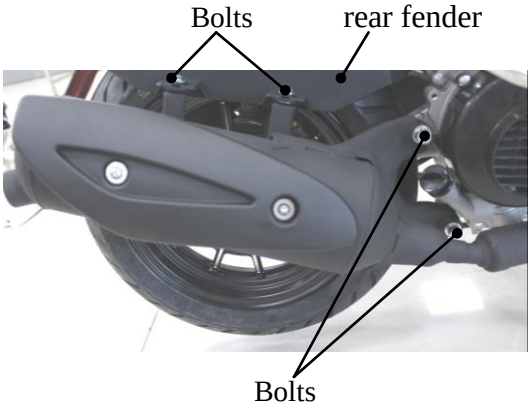
- When installing, be careful not to bend or twist the tubes and check for proper installation.

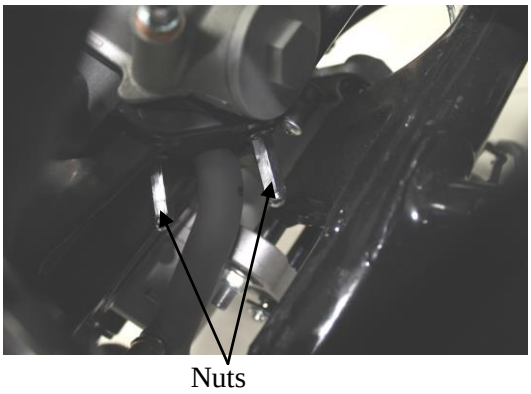
EXHAUST MUFFLER

REMOVAL

Remove the two exhaust muffler joint lock nuts and two exhaust muffler lock bolts. Disconnect the connector with O2 sensor. Remove the exhaust muffler.

*
- The temperature of exhaust muffler is very high. Be careful to avoid burns during working.





INSPECTION

1. Inspect the exhaust muffler and joint for damage or crack. Replace if necessary.
2. Inspect the exhaust muffler joint packing collar for deformation or damage. Replace if necessary.

INSTALLATION

1. Install the exhaust muffler in the reverse order of removal.

*
- A large amount of unburned mixture flowing into the high-heat catalytic converter will burn again and cause damage to the converter due to overheat. Pay attention to the following.
- Use 92# or 95# nonleaded gasoline only. (Leaded gasoline will cause catalytic converter failure.)
- During riding, do not turn the ignition switch OFF to avoid a large amount of unburned mixture flowing into the exhaust muffler.
- Faulty ignition system or fuel system will cause overheat and damage to the catalytic