By KWANG YANG Motor Co., Ltd.
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4121-LBA7-S00

PREFACE

This Service Manual describes the technical features and servicing procedures for the KYMCO ***Mongoose/KXR 25***0.

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 4 through 19 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.

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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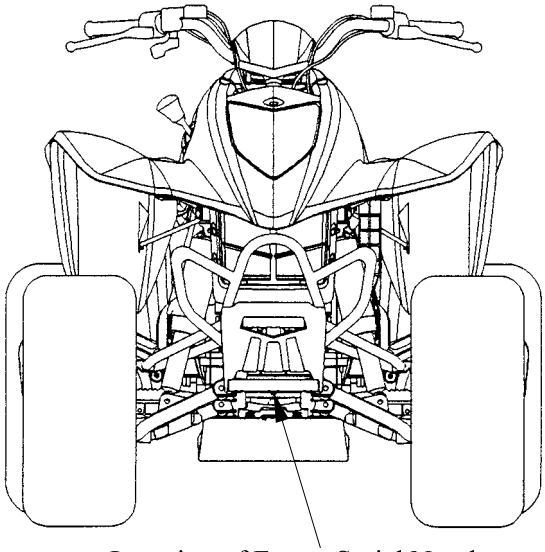
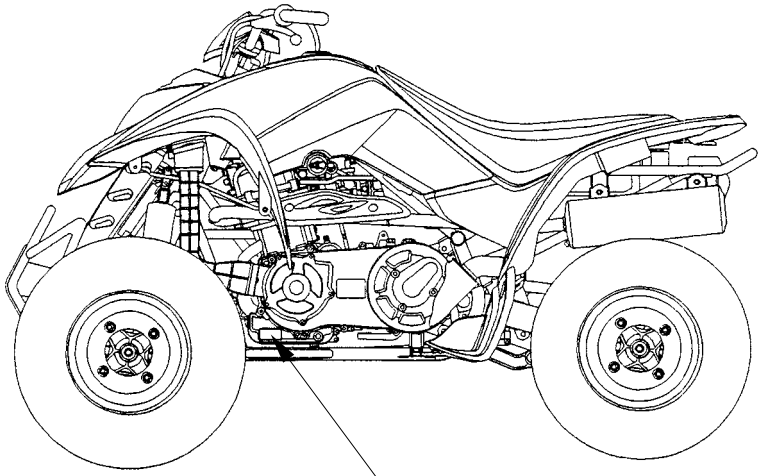
GENERAL INFORMATION

SERIAL NUMBER



Location of Frame Serial Number



Location of Engine Serial Number

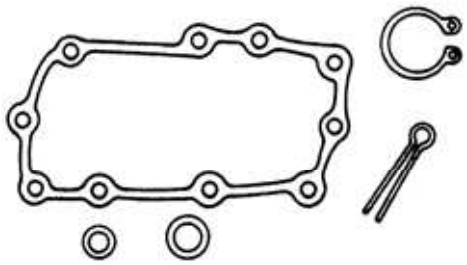
SPECIFICATIONS

Name & Model No.			LA50AA/AB
Motorcycle Name & Type			Mongoose/KXR
Overall length (mm)			1700
Overall width (mm)			1070
Overall height (mm)			1080
Wheel base (mm)			1180
Engine type			O.H.C.
Displacement (cc)			249
Fuel Used			92# nonleaded gasoline
Net weight (kg)		Front wheel	93.1
		Rear wheel	84.9
		Total	178
Gross weight(kg)		Front wheel	100
		Rear wheel	91
		Total	191
Tires		Front wheel	21*7-10
		Rear wheel	20*11-9
Ground clearance (mm)			130
Perform-ance	Breaking distance (m)(30KPH)		29.27 below
	Min. turning radius (m)		2.865
Engine	Starting system		Starting motor
	Type		Gasoline, 4-stroke
	Cylinder arrangement		Single cylinder
	Combustion chamber type		Semi-sphere
	Valve arrangement		O.H.C., chain drive
	Bore x stroke (mm)		72.7 x 60
	Compression ratio		10.3:1
	Compression pressure (kg/cm²)		15.0
	Max. output (ps/rpm)		17/7000
	Max. torque (kg m/rpm)		2.0/5500
	Port timing	Intake (1mm) Open	8.1° BTDC
		Close	41° ABDC
		Exhaust (1mm) Open	37° BBDC
		Close	7.9° ATDC
	Valve clearance (cold) (mm)	Intake	0.1
		Exhaust	0.1
	Idle speed (rpm)		1500rpm
	Lubrication System	Lubrication type	Forced pressure & Wet sump
		Oil pump type	Inner/outer rotor type
		Oil filter type	Full-flow filtration
		Oil capacity	1.6 liter
		Oil exchanging capacity	1.4 liter
	Cooling Type		Water cooling

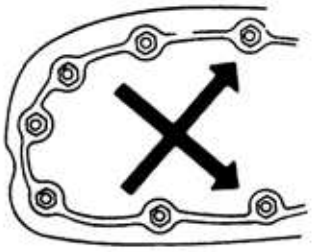
Fuel System	Air cleaner type & No			Sponge
	Fuel capacity			13 liters
	Carburetor	Type		PD
		Float lever		14.8mm
		Venturi dia.(mm)		ϕ22
		Throttle type		PISTON
Electrical Equipment	Ignition System	Type		CDI
		Ignition timing		5°BTDC/2000rpm
		Contact breaker		Non-contact point type
		Spark plug		DPR7EA-9
		Spark plug gap		0.6～0.7mm
	Battery	Capacity		12V12AH
Power Drive System	Clutch	Type		CVT
	Transmis-sion Gear	Type		Helical gear/spur gear
		Operation		Automatic centrifugal Type
	Reduction Gear	Type		Chain drive
		Reduction ratio	1st	24.7
			2nd	9.33
	Reverse ratio			47.4
Moving Device	FR/RR tire rolling circumference(mm)			1675/1596
	Tire pressure (kg/cm²)		Front	0.28
			Rear	0.28
	Turning angle		Left	40°
			Right	40°
Brake system type			Rear	Disk brake
			Front	Disk brake
Damping Device	Suspension type		Front	Double wishbone
			Rear	Link suspension
Frame type				Steel tube frame

SERVICE PRECAUTIONS

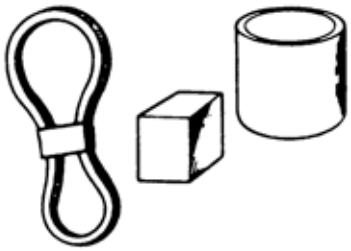
■ Make sure to install new gaskets, O-rings, circlips, cotter pins, etc. when reassembling.



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



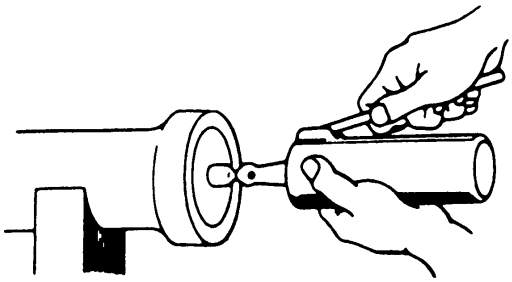
■ Use genuine parts and lubricants.



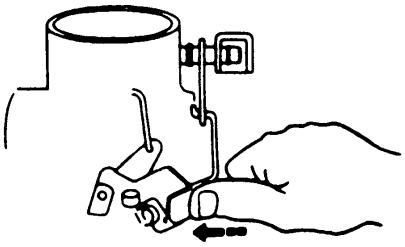
■ When servicing the motorcycle, be sure to use special tools for removal and installation.

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

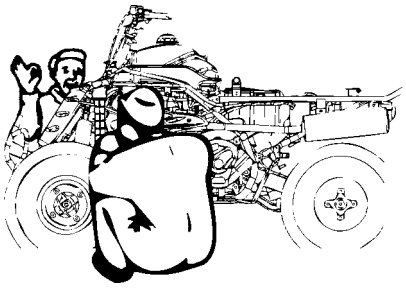
■ Apply or add designated greases and lubricants to the specified lubrication points.



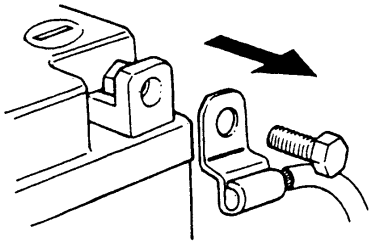
■ After reassembly, check all parts for proper tightening and operation.



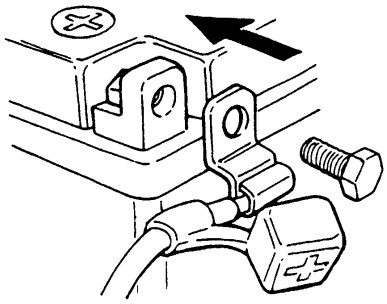
■ When two persons work together, pay attention to the mutual working safety.



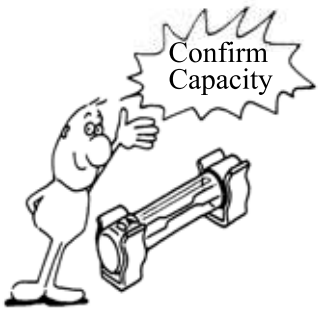
■ Disconnect the battery negative (-) terminal before operation.
■ When using a spanner or other tools, make sure not to damage the motorcycle surface.



■ 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.

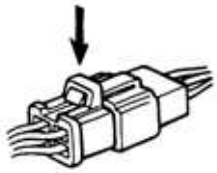


■ If the fuse is burned out, find the cause and repair it. Replace it with a new one according to the specified capacity.



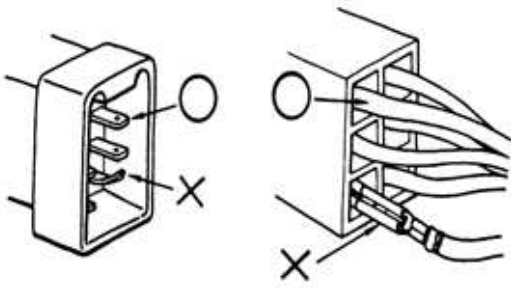
■ After operation, terminal caps shall be installed securely.

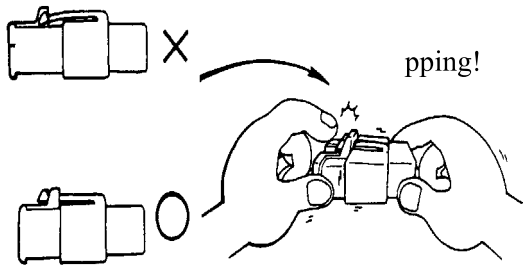
■ When taking out the connector, the lock on the connector shall be released before operation.



■ 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.

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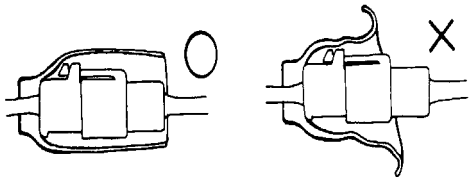
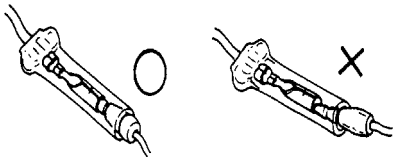
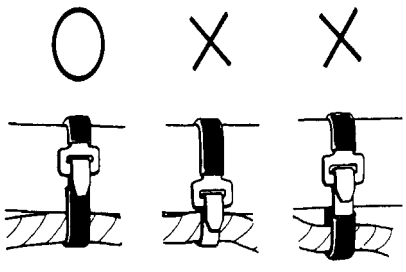
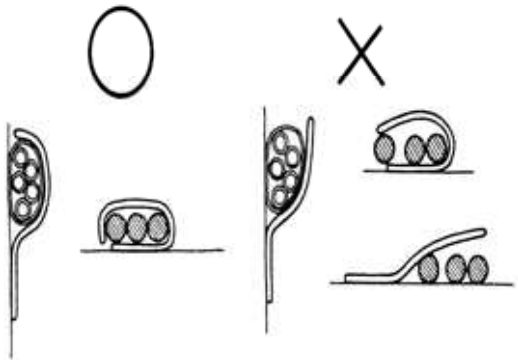


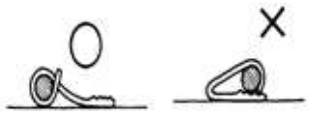




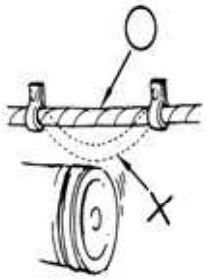
■ After clamping, check each wire to make sure it is secure.



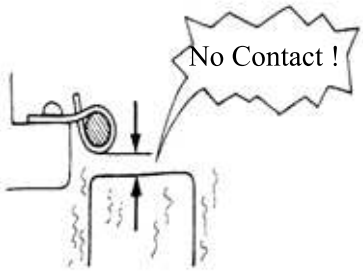
■ Do not squeeze wires against the weld or its clamp.



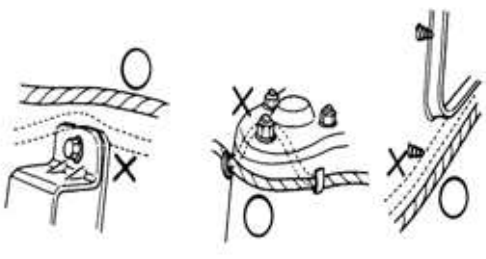
■ After clamping, check each harness to make sure that it is not interfering with any moving or sliding parts.

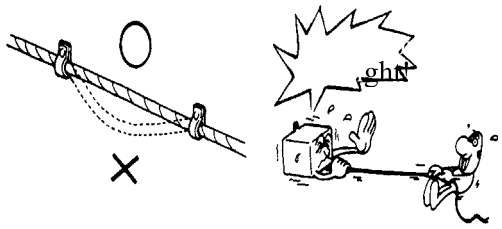


■ When fixing the wire harnesses, do not make it contact the parts which will generate high heat.



■ 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.

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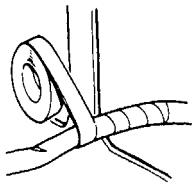
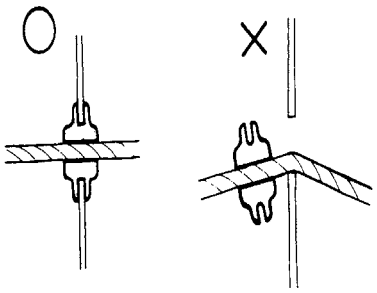
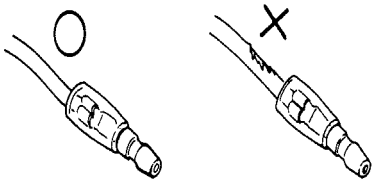
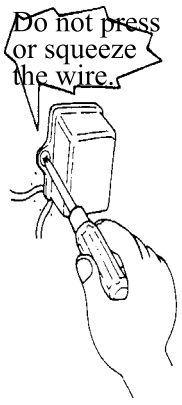
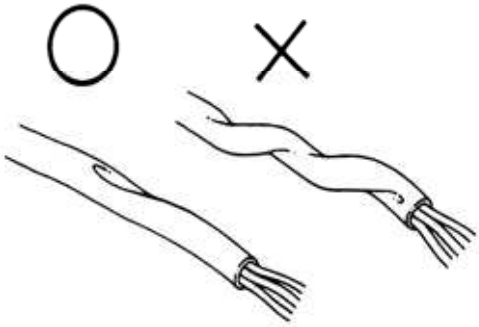




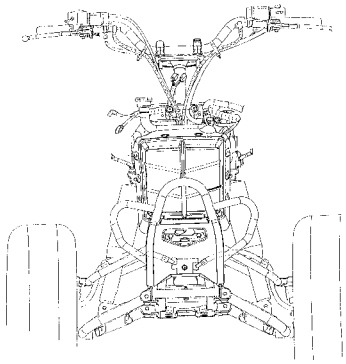



Do not press
or squeeze
the wire.

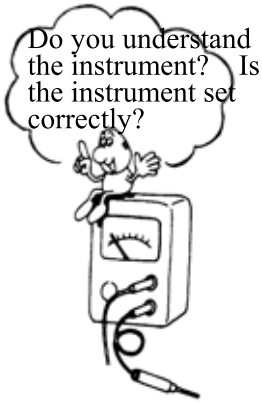
■ After routing, check that the wire harnesses are not twisted or kinked.



■ 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.

■ 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

TORQUE VALUES

STANDARD TORQUE VALUES

Item	Torque (kgf-m)	Item	Torque (kgf-m)
5mm bolt and nut	0.45～0.6	4mm screw	0.2～0.4
6mm bolt and nut	0.8～1.2	5mm screw	0.35～0.5
8mm bolt and nut	1.8～2.5	6mm screw, SH bolt	0.7～1.1
10mm bolt and nut	3.0～4.0	6mm flange bolt and nut	1.0～1.4
12mm bolt and nut	5.0～6.0	8mm flange bolt and nut	2.4～3.0
14mm bolt and nut	6.0～8.0	10mm flange bolt and nut	3.5～4.5

Torque specifications listed below are for important fasteners.

ENGINE

Item	Q'ty	Thread dia.(mm)	Torque (kgf-m)	Remarks
Stud bolt	4	8	0.7～1.1	
Oil filter screen cap	1	30	1.0～2.0	
Seat ball stopper bolt	1	14	4.5～5.0	
L cover	10	6	1.0～1.4	
Cam shaft holder	4	8	2.3～2.7	Apply oil
Tappet ADJ nut	2	5	0.7～1.1	Apply oil
Pivot tensioner bolt	1	8	0.8～1.2	
Lifter tensioner bolt	2	6	1.0～1.4	
Lifter tensioner cap	1	6	0.35～0.5	
Mission case bolt	9	8	2.4～3.0	
Mission fill bolt	1	12	2.0～3.0	
Driver face nut	1	14	9.0～10.0	Apply oil
Clutch outer nut	1	12	5.0～6.0	
Drive plate nut	1	28	5.0～6.0	
Oneway clutch bolt	3	8	1.8～2.2	Apply thread
ACG flywheel nut	1	14	5.5～6.5	lock
Spark plug	1	12	1.5～2.0	
Water pump impeller	1	7	1.0～1.4	
Drain plug	1	12	2.0～3.0	
Oil pump screw	1	3	0.1～0.3	
Head CYL stud bolt (IN pipe)	2	6	0.7～1.1	
Head CYL stud bolt (EX pipe)	2	8	0.7～1.1	
A.C.G Startor	3	5	0.8～1.0	

FRAME

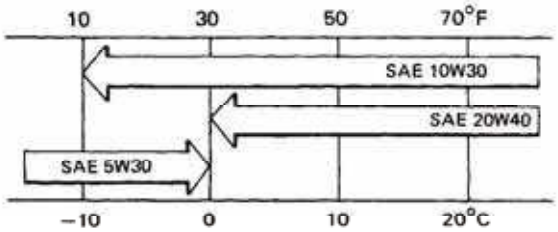
Item	Q'ty	Thread dia.(mm)	Torque (kgf-m)	Remarks
Steering stem nut	1	14	6.0～8.0	
Front swing arm nut	8	10	4.0～5.0	
Front wheel nut	8	12	4.0～5.0	
Rear wheel nut	8	12	4.0～5.0	
Front wheel hub nut	2	14	6.0～8.0	
Rear wheel hub nut	2	16	9.0～11.0	
Front shock absorber upper mount bolt	2	10	3.5～4.5	
Front shock absorber lower mount bolt	2	10	3.5～4.5	
Rear shock absorber upper mount bolt	1	10	3.5～4.5	
Rear shock absorber lower mount bolt	1	10	3.5～4.5	
Rear swing arm axle	1	14	6.0～8.0	
Rear hub nut	2	10	3.5～4.5	
Rear wheel shaft nut	2	40	11.0～13.0	
Rear engine bracket upper bolt	1	10	3.5～4.5	
Rear engine bracket lower bolt	1	10	3.5～4.5	
Engine hanger bracket bolt	1	10	3.5～4.5	
Exhaust muffler lock bolt (frame)	2	8	3.2～3.8	
Exhaust muffler lock nut (engine)	2	8	1.8～2.2	
Rod-end nut	4	8	2.5～3.5	

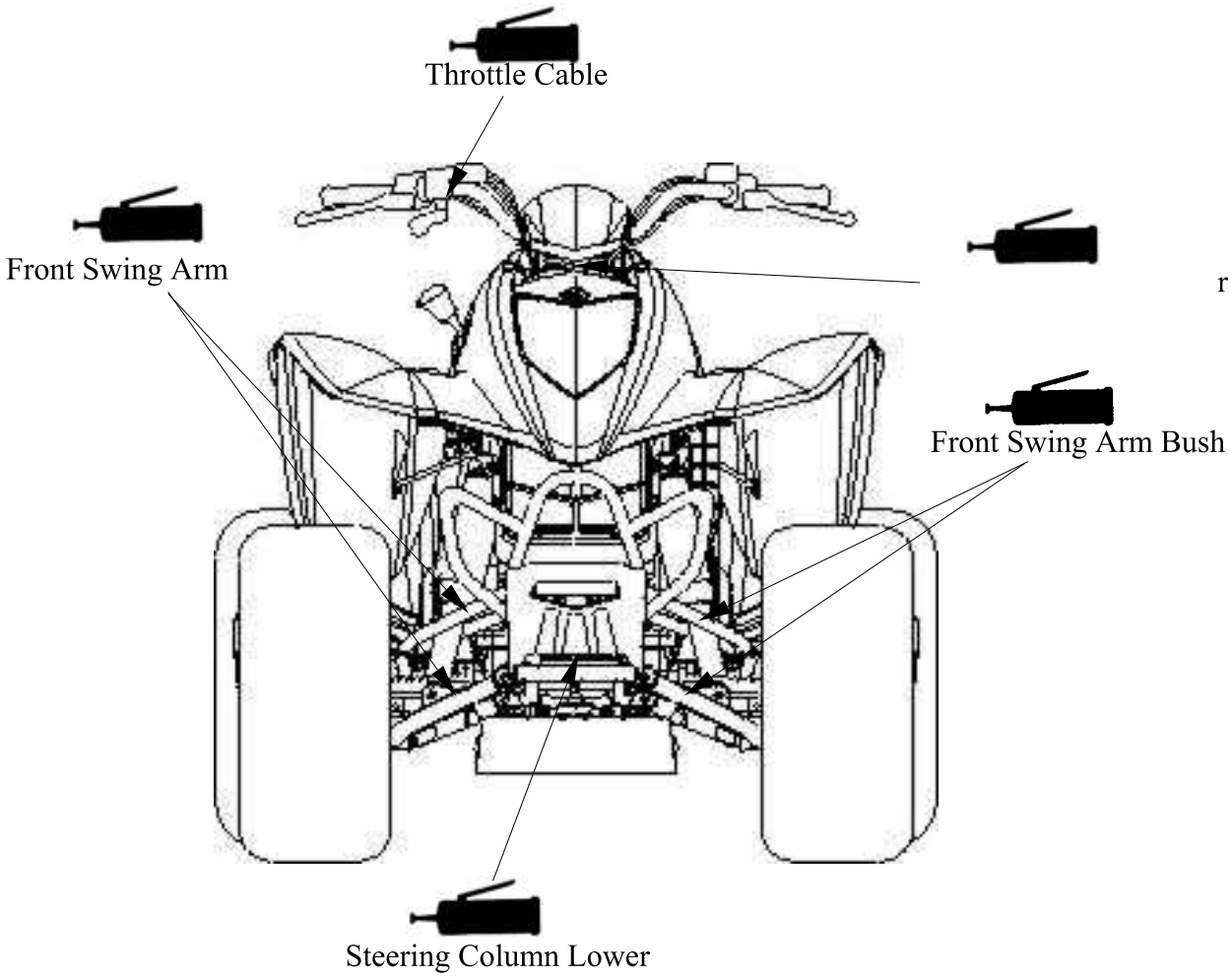
SPECIAL TOOLS

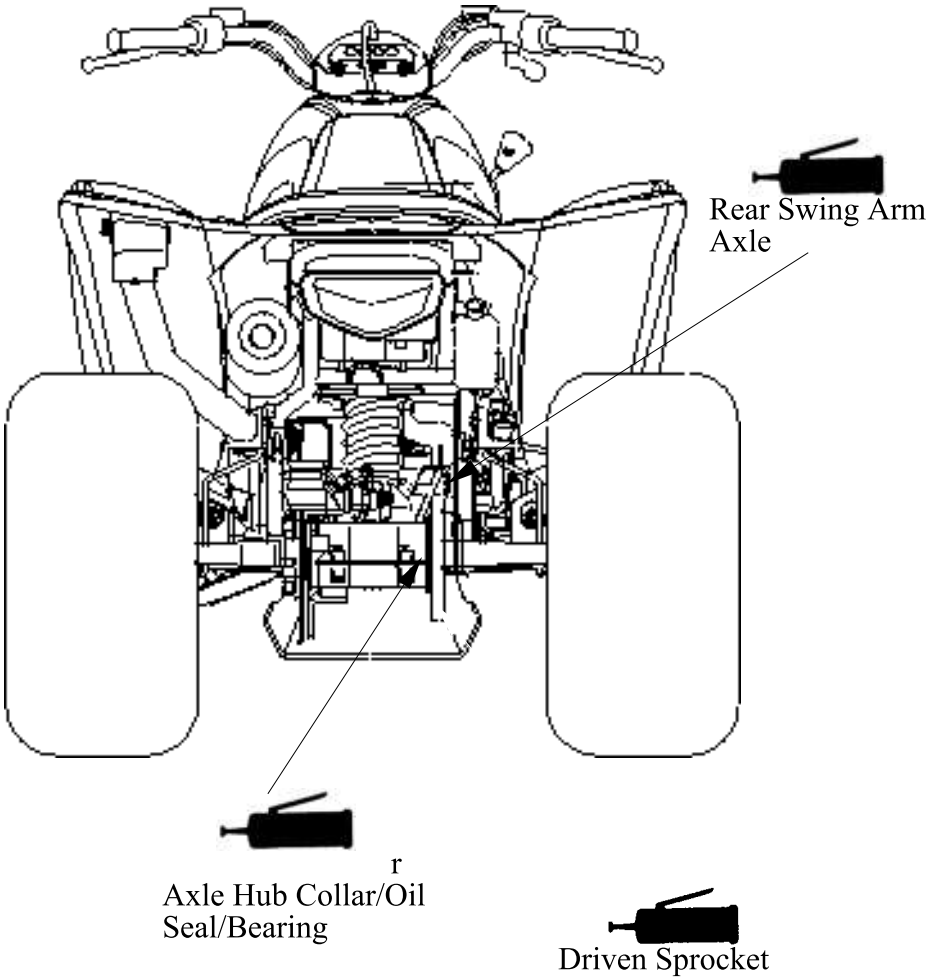
Tool Name	Tool No.	Remarks Ref. Page
Flywheel puller	E003	
Valve adjuster	E012	
Valve spring compressor	E040	
Oil seal and bearing install	E014	
Universal holder	E017	
Flywheel holder	E021	
Clutch spring compressor	E034	
Bearing puller	E037	
Nut wrench	F010	

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 right side oil seal Crankshaft one-way clutch movable part Oil pump drive chain Balance gear A.C. generator Starter one-way clutch Bearing movable part O-ring face Oil seal lip	•Genuine KYMCO Engine Oil (SAE15W-40) •API SG Engine Oil 
Transmission gear and movable parts	Gear oil: SAE90#


Throttle Cable
Front Swing Arm
r
Front Swing Arm Bush
Steering Column Lower


Rear Swing Arm
Axle
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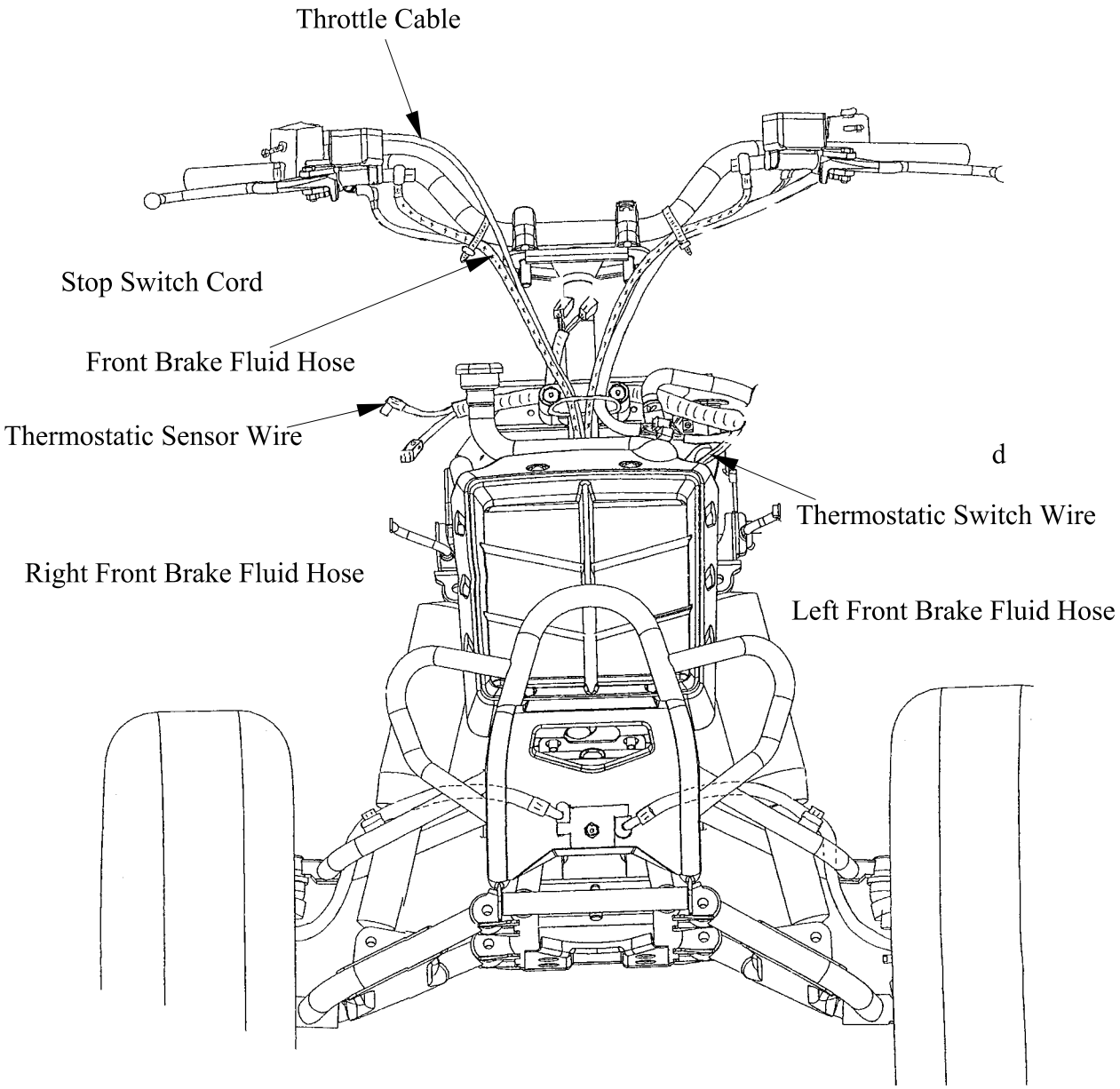
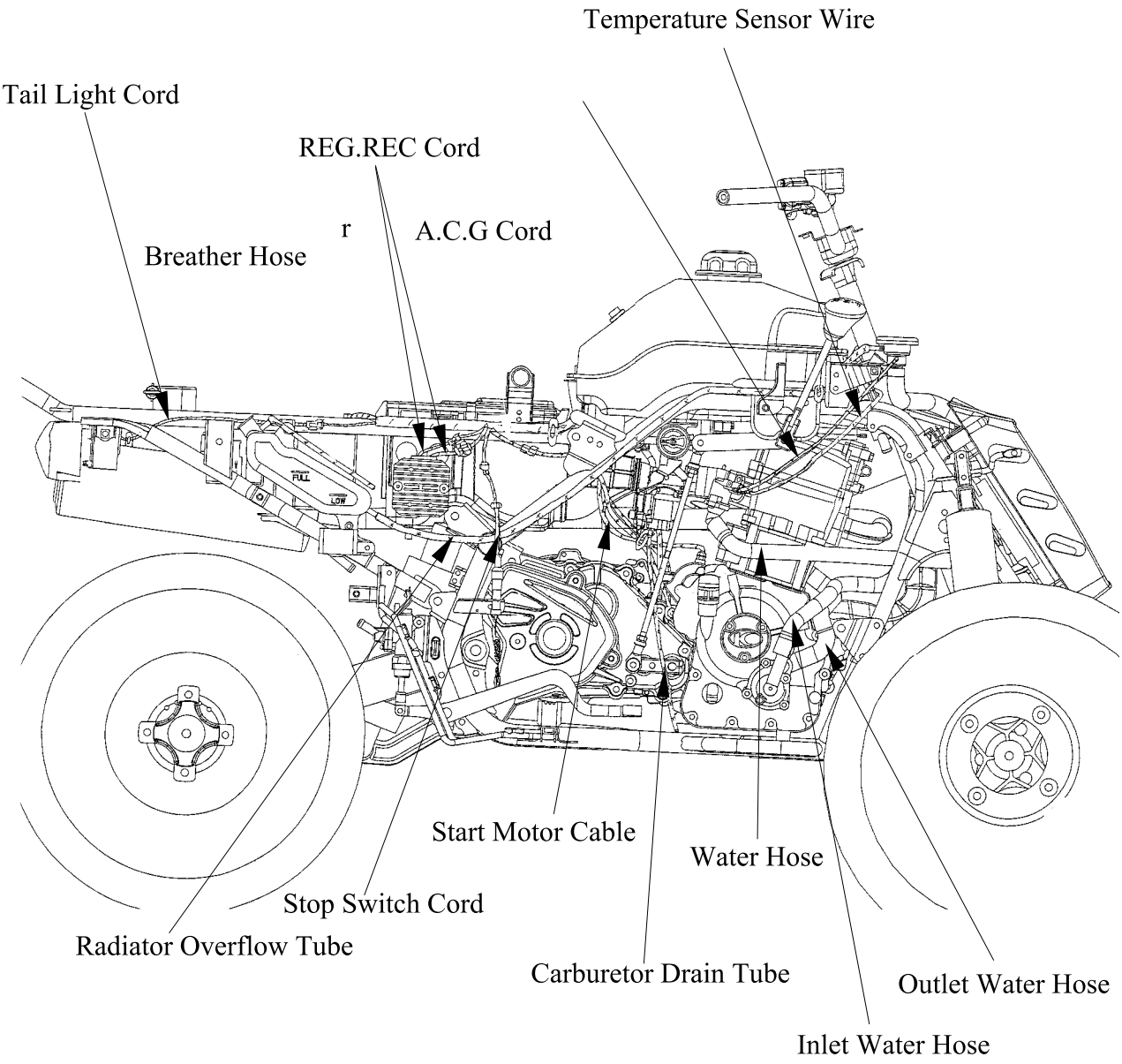
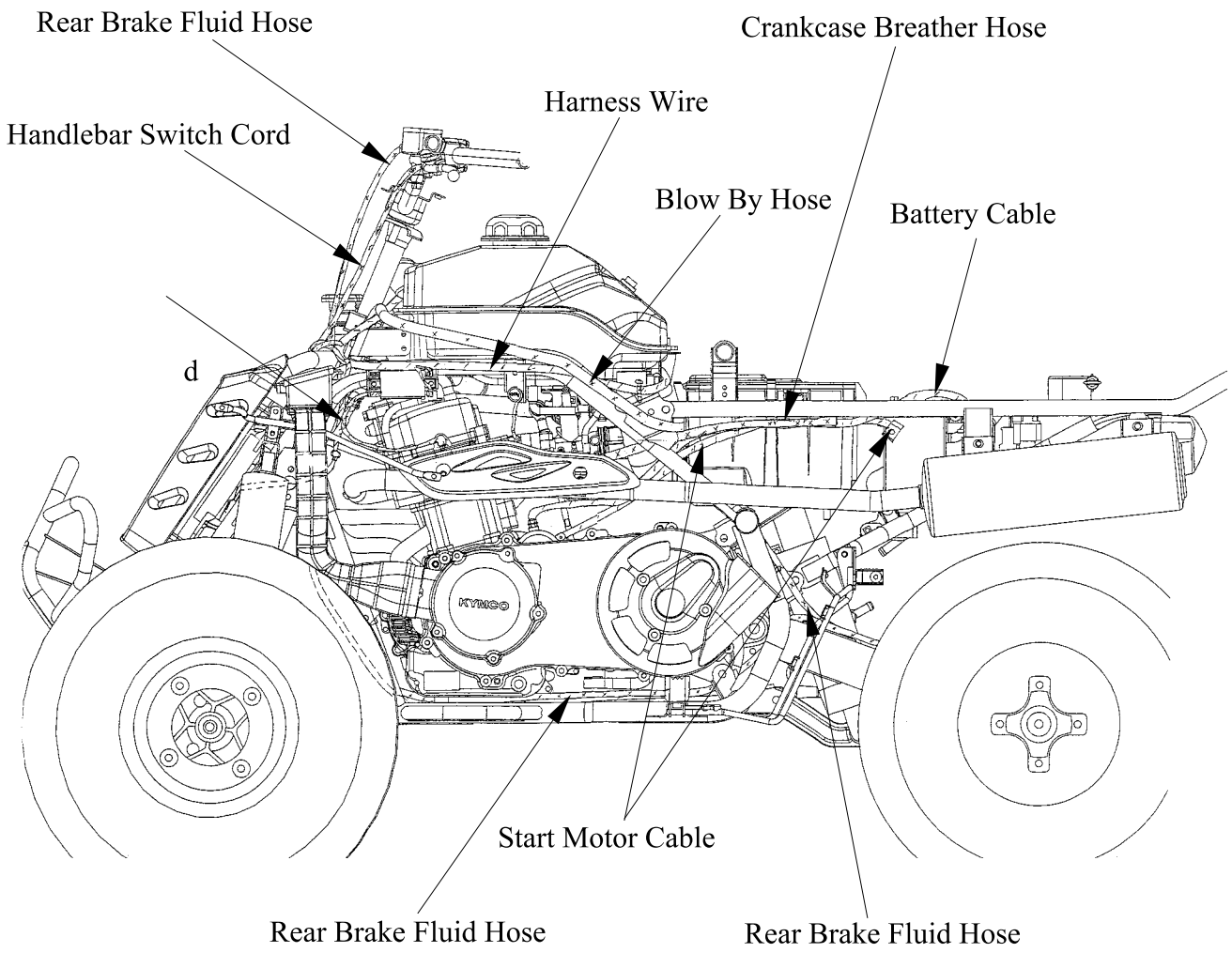
Axle Hub Collar/Oil
Seal/Bearing
Driven Sprocket

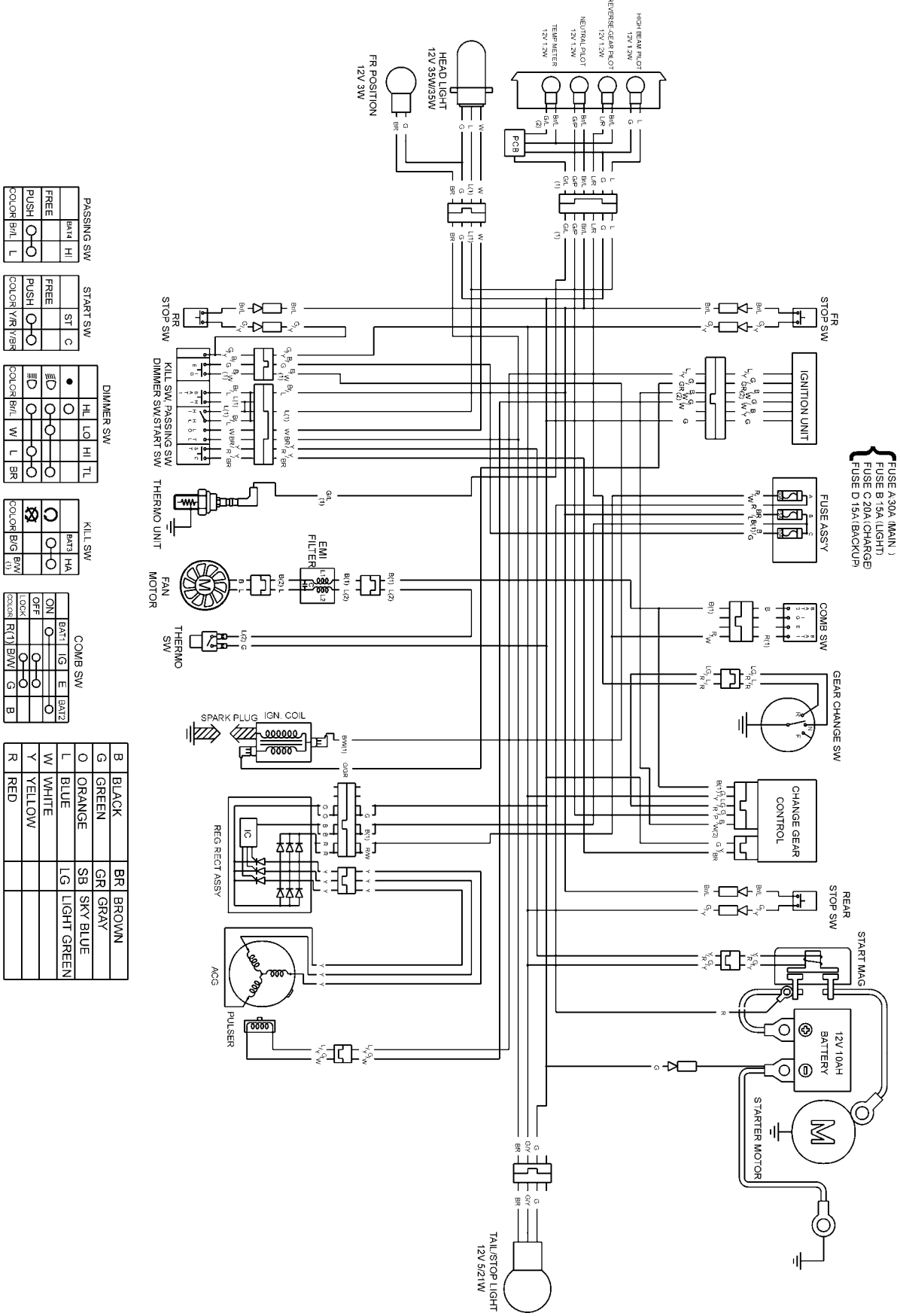
CABLE & HARNESS ROUTING



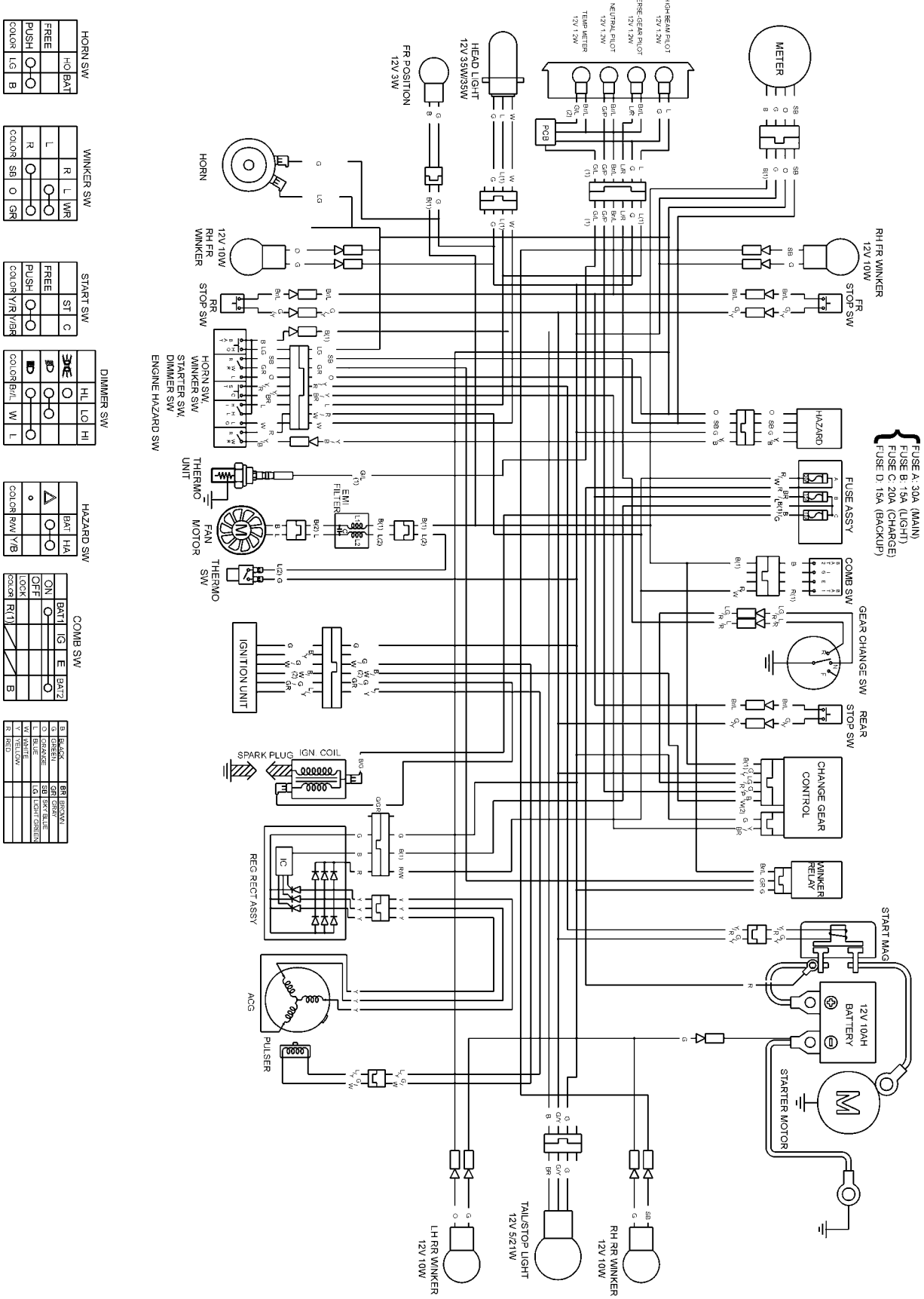

Temperature Sensor Wire
Tail Light Cord
REG.REC Cord
r
A.C.G Cord
Breather Hose
Start Motor Cable
Water Hose
Stop Switch Cord
Radiator Overflow Tube
Carburetor Drain Tube
Outlet Water Hose
Inlet Water Hose


Rear Brake Fluid Hose
Crankcase Breather Hose
Harness Wire
Handlebar Switch Cord
Blow By Hose
Battery Cable
d
Start Motor Cable
Rear Brake Fluid Hose
Rear Brake Fluid Hose

WIRING DIAGRAM (OFF ROAD)

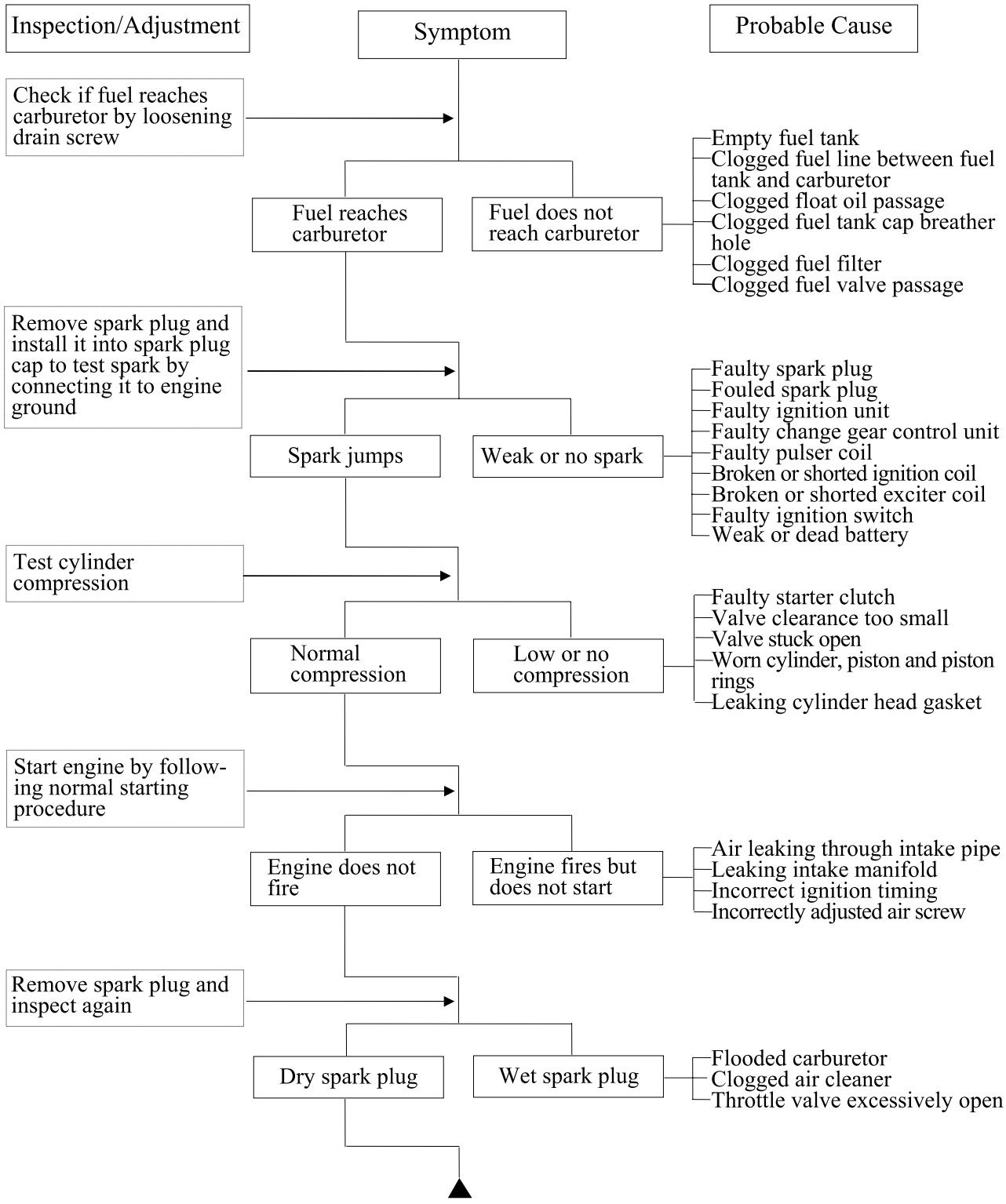


WIRING DIAGRAM (ON ROAD)

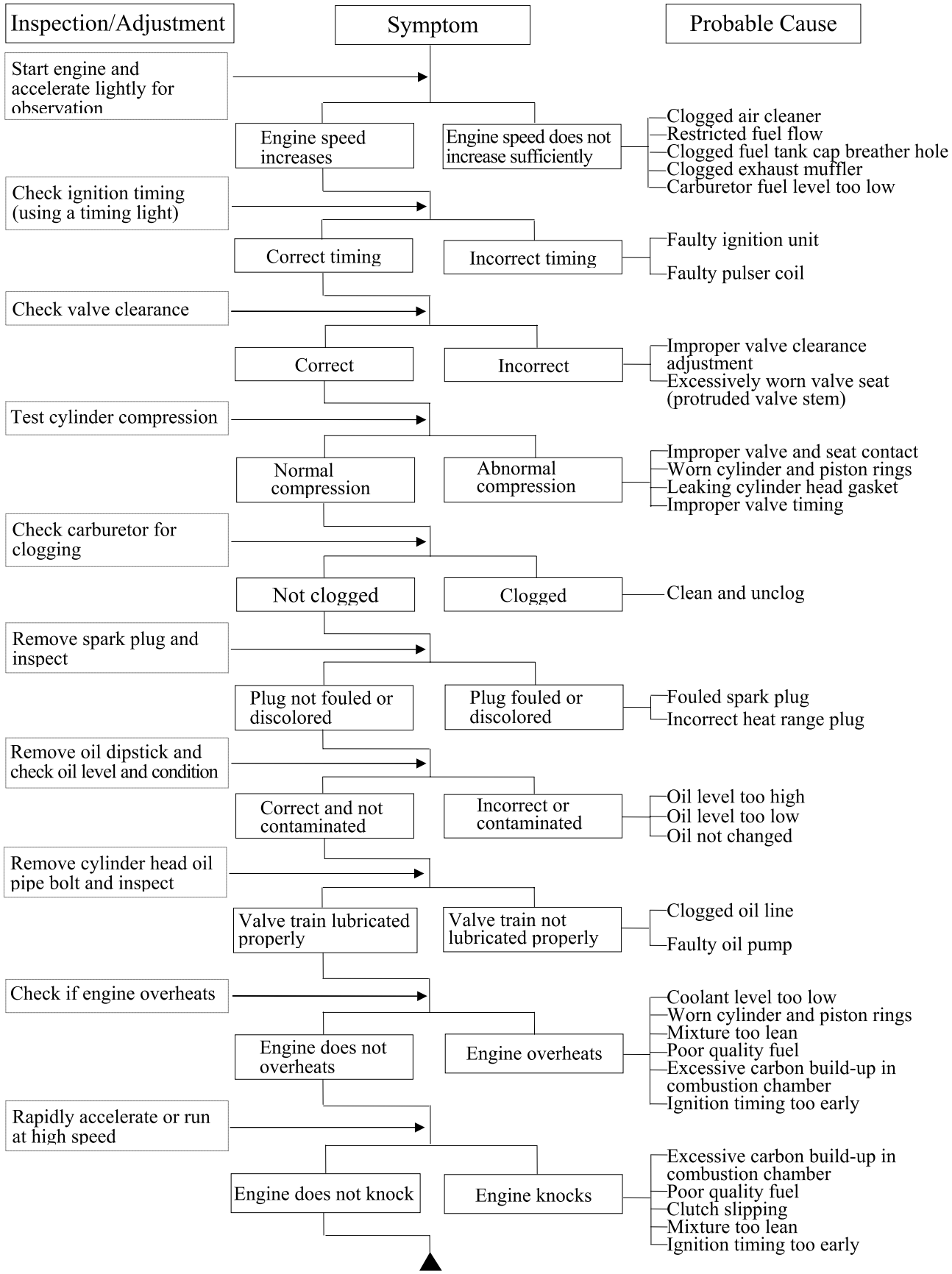


TROUBLESHOOTING

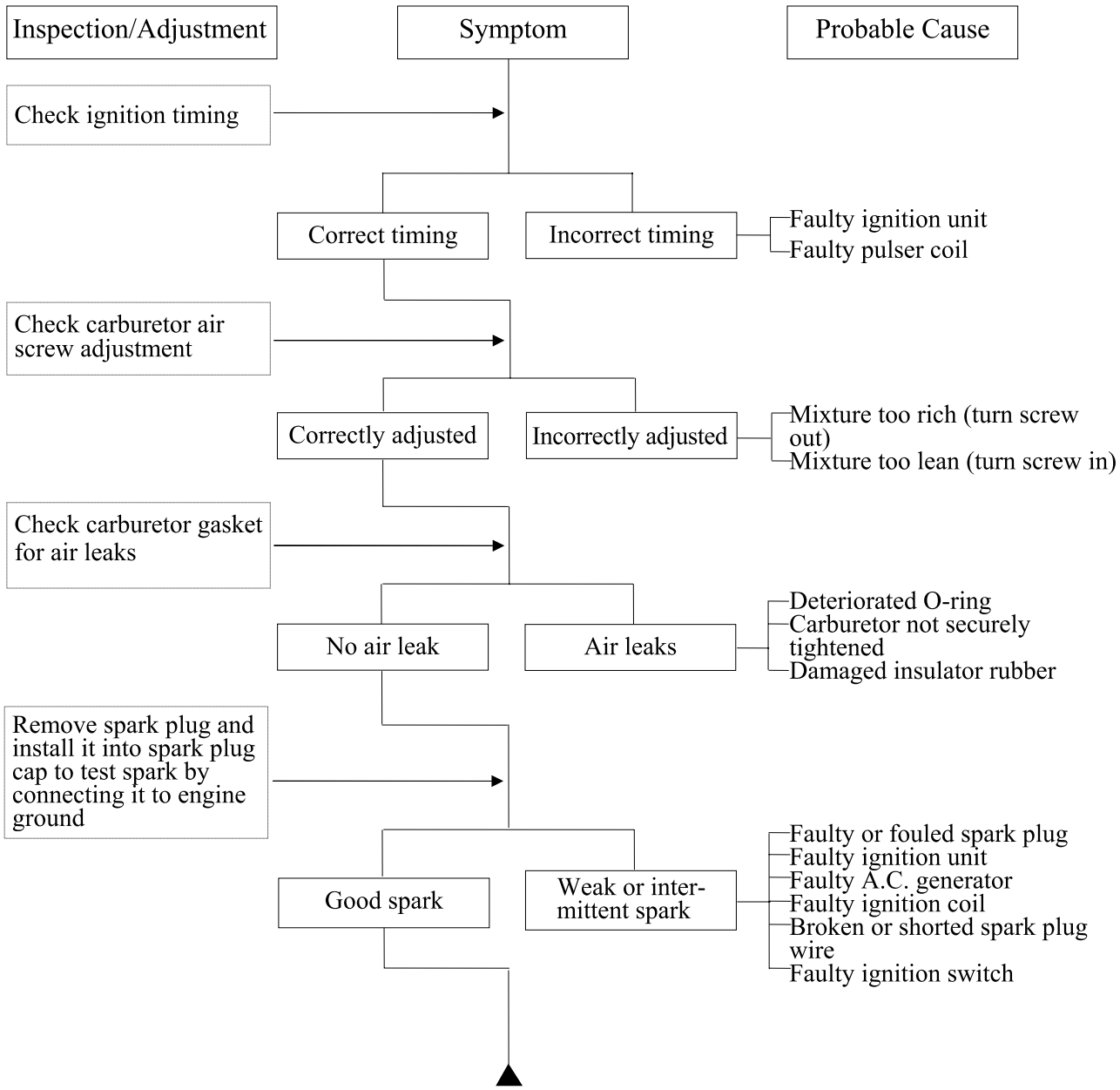
ENGINE WILL NOT START OR IS HARD TO START



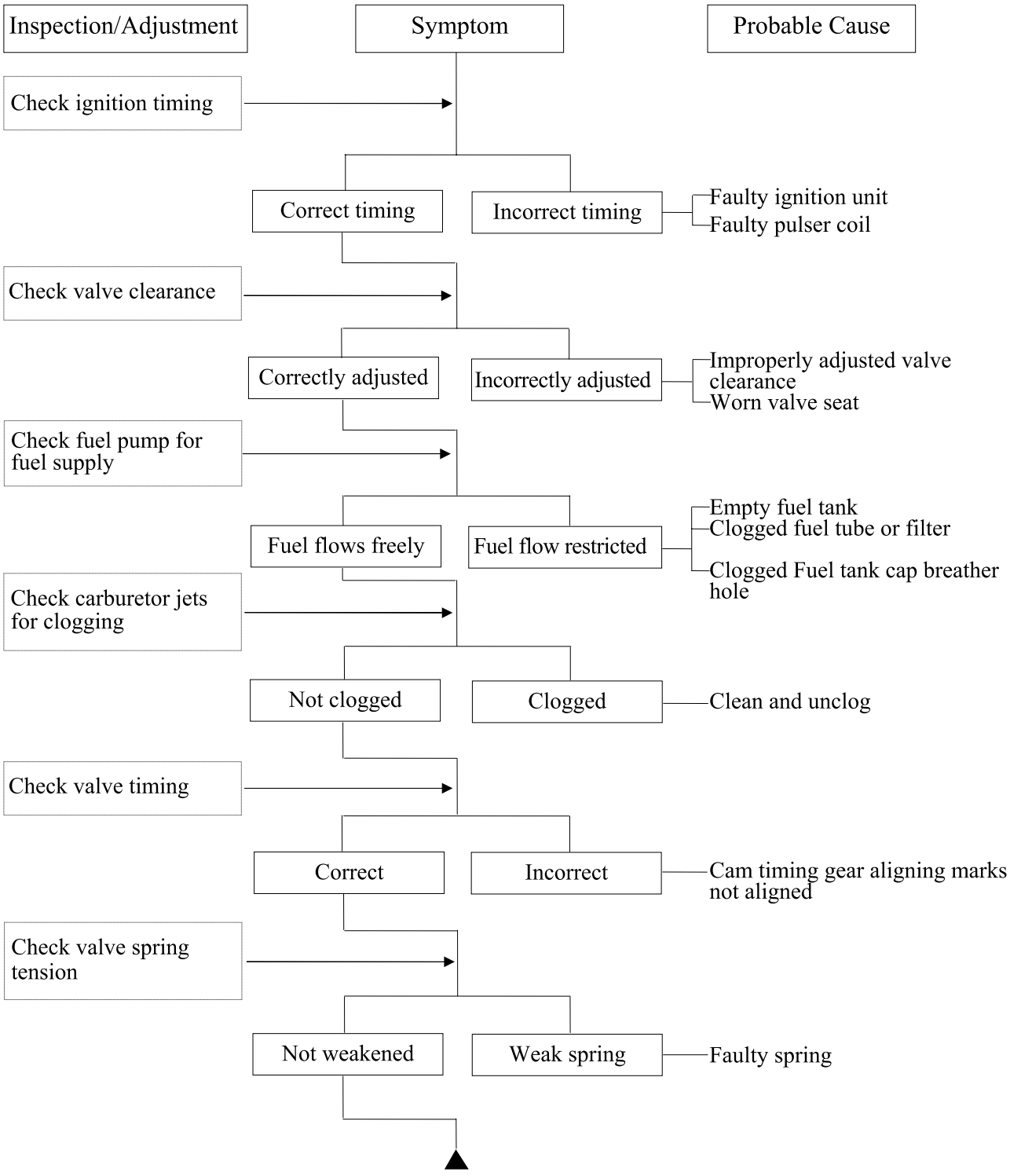
ENGINE LACKS POWER



POOR PERFORMANCE (ESPECIALLY AT IDLE AND LOW SPEEDS)

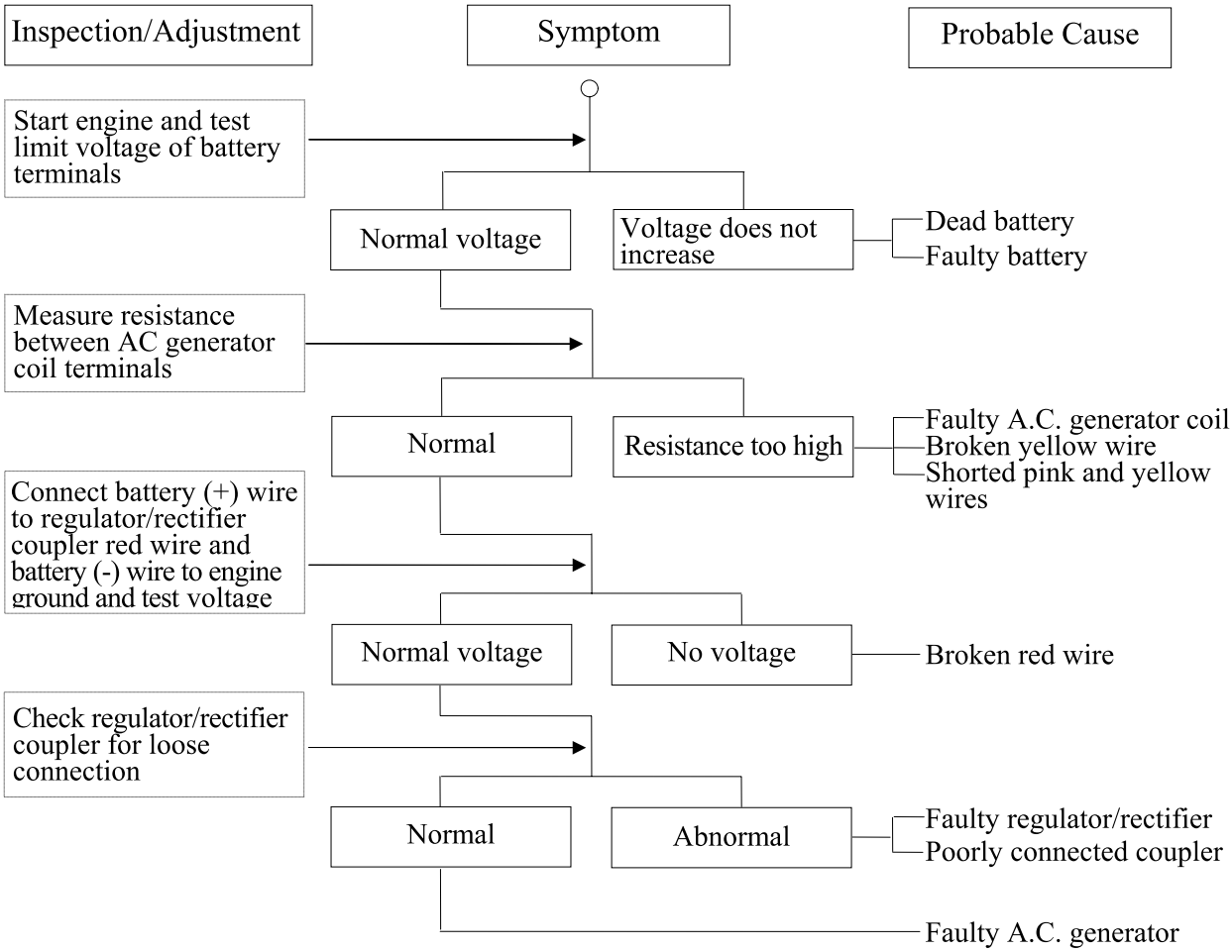


POOR PERFORMANCE (AT HIGH SPEED)

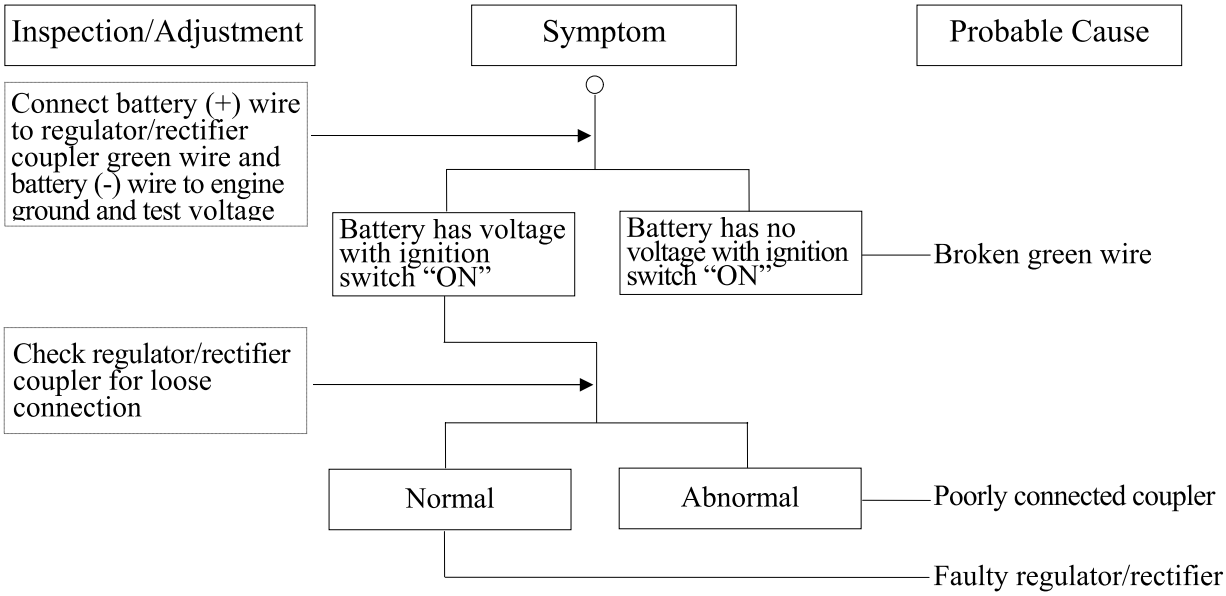


POOR CHARGING (BATTERY OVER DISCHARGING OR OVERCHARGING)

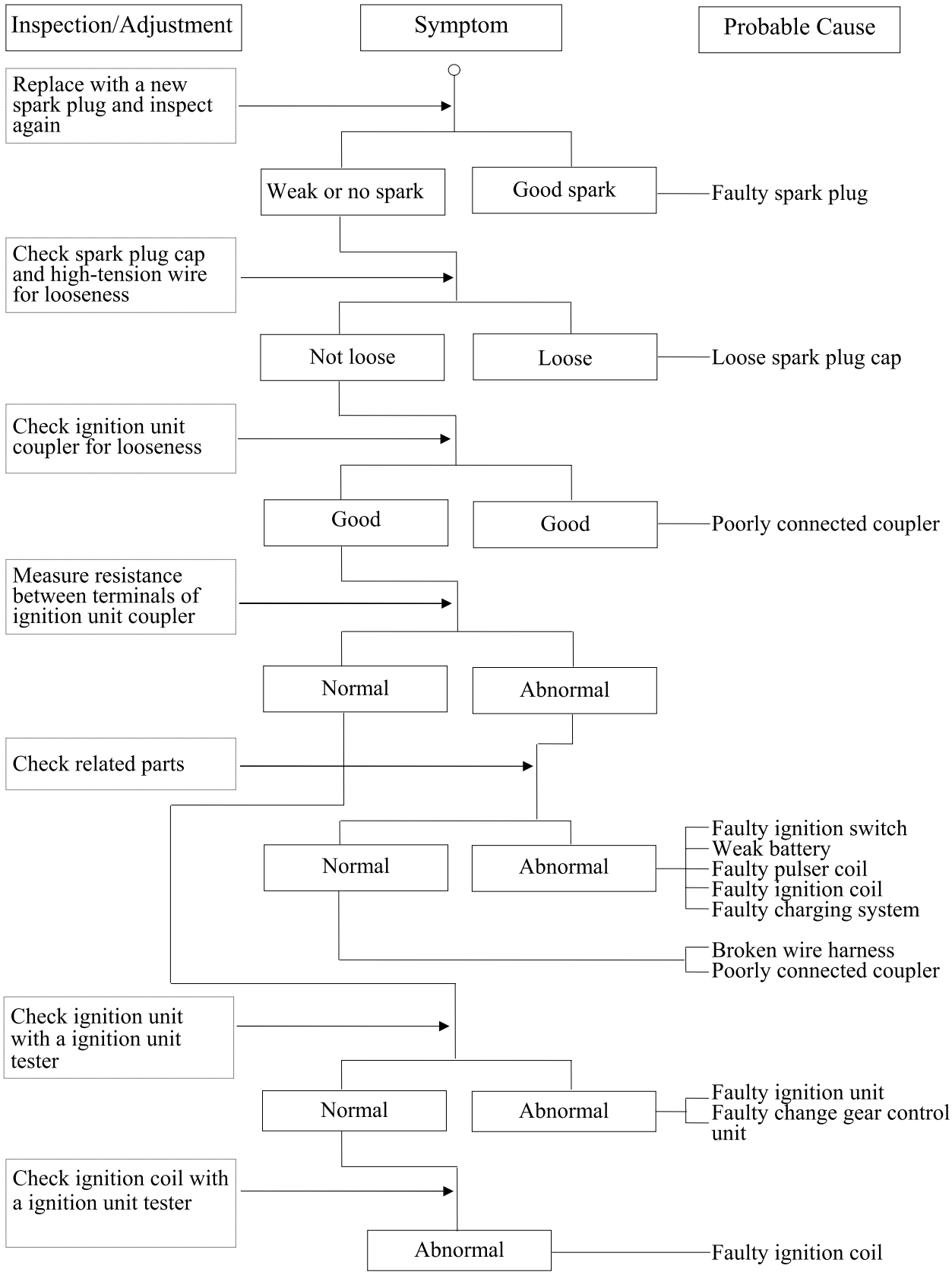
Undercharging



Overcharging



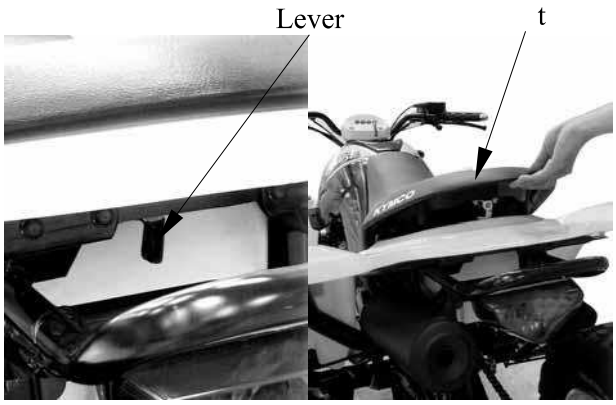
NO SPARK AT SPARK PLUG

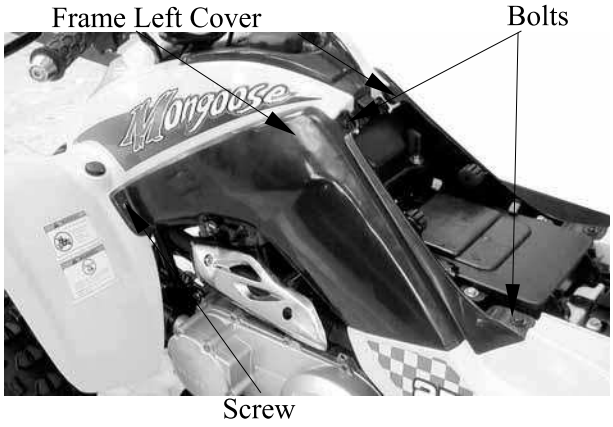


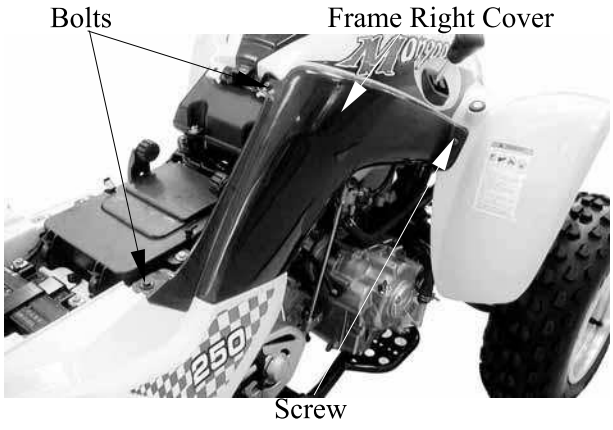
2. FRAME COVERS/EXHAUST MUFFLER

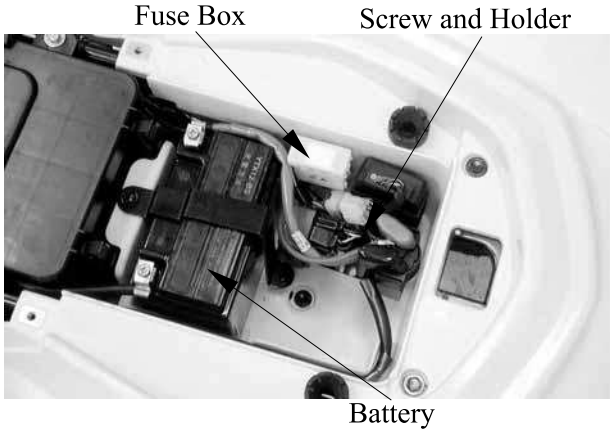
2. FRAME COVERS/EXHAUST MUFFLER

2. FRAME COVERS/EXHAUST MUFFLER



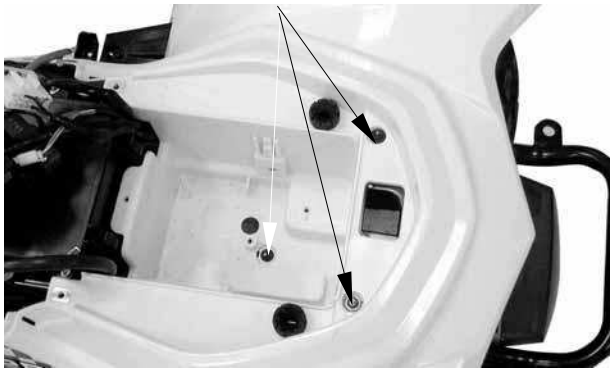


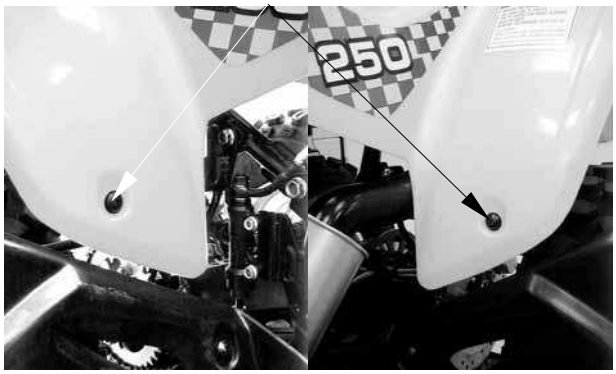




* During removal, do not pull the joint claws forcedly to avoid damage.

2. FRAME COVERS/EXHAUST MUFFLER





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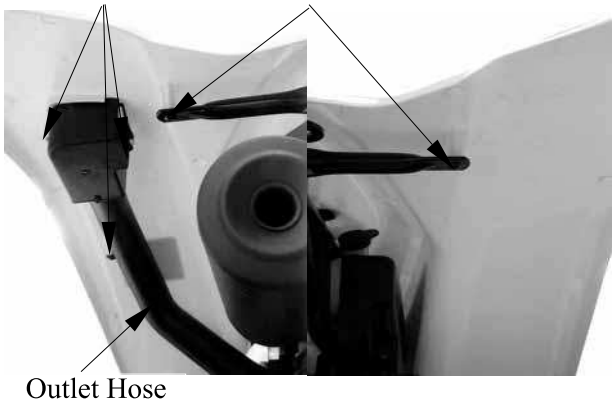
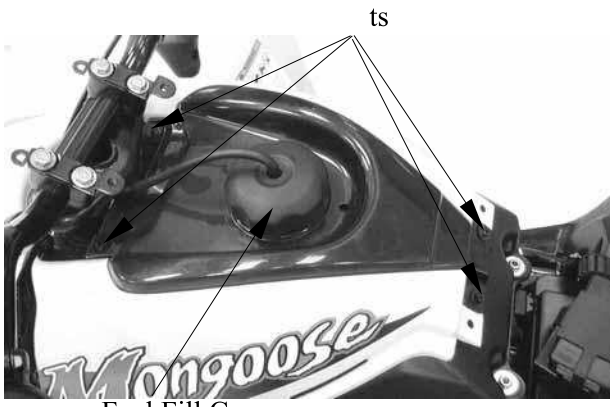


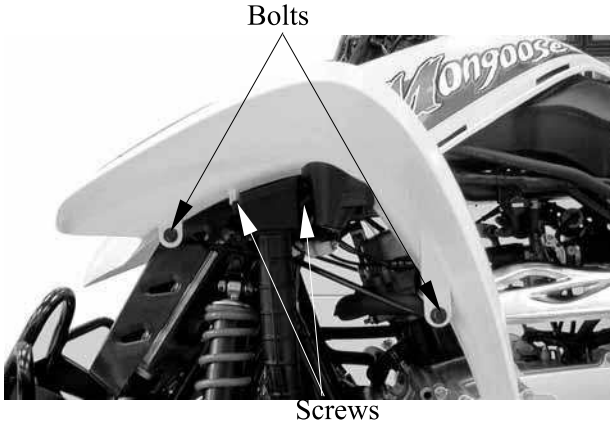
Outlet Hose

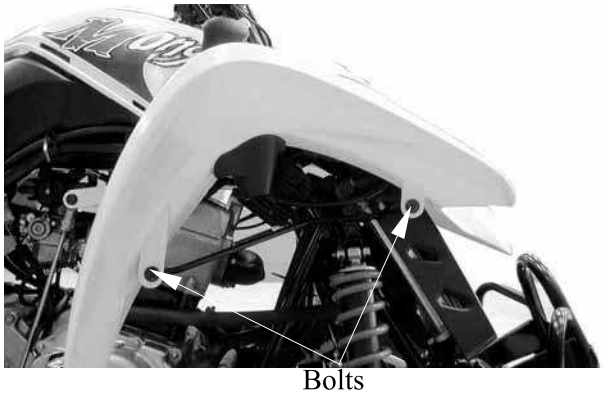
Indicator Lamp coupler

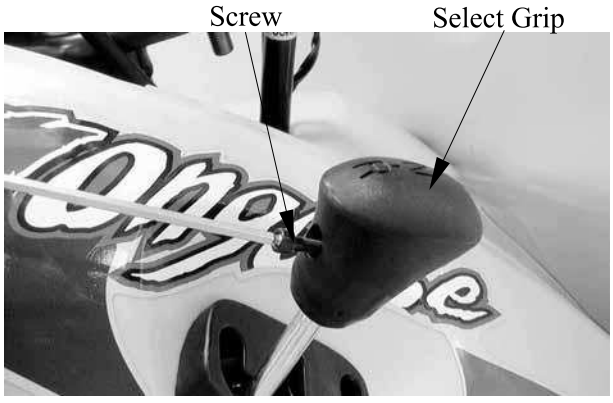
2. FRAME COVERS/EXHAUST MUFFLER

* After remove, be sure to tighten the fuel fill cap.



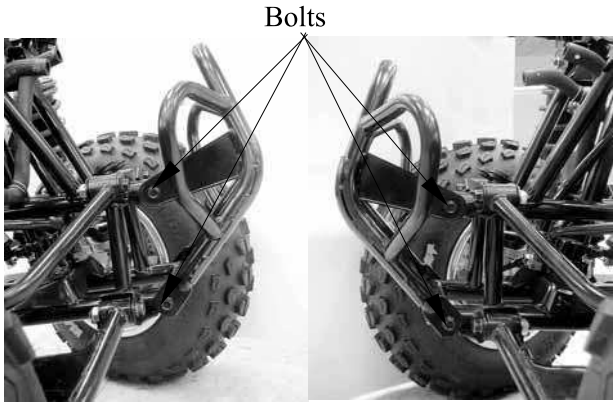




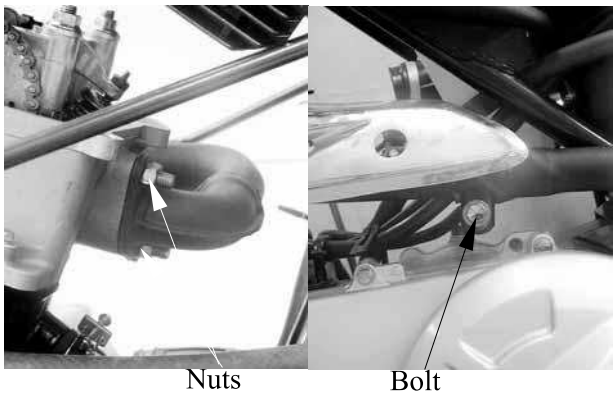


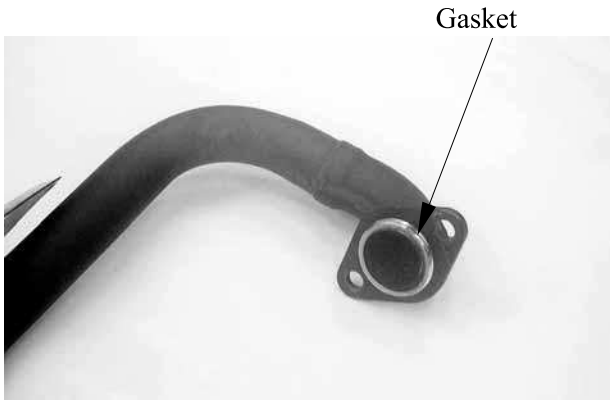

Ignition Coupler
Headlight Coupler


Screws

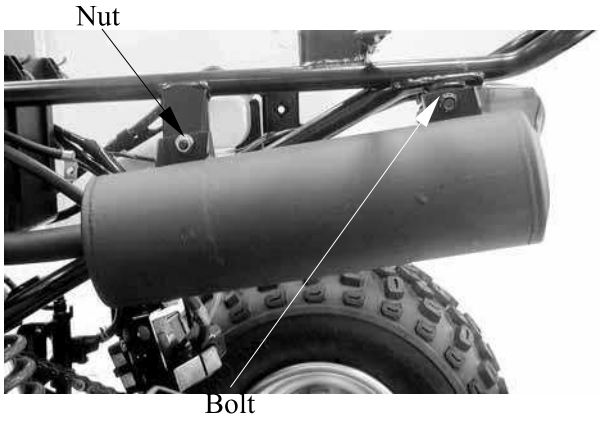

Bolts

2. FRAME COVERS/EXHAUST MUFFLER





* Be sure to install a new exhaust gasket.



						year
Valves	Check valve clearance. Adjust if necessary.	○		○	○	○
Spark plug	Check condition. Adjust gap and clean. Replace if necessary.	○	○	○	○	○
Air filter element (for engine and drive belt compartment)	Clean. Replace if necessary.	Every 20~40 hours (more often in wet or dusty areas.)				
Carburetor	Check idle speed/starter operation. Adjust if necessary.		○	○	○	○
Fuel line	Check fuel hose for cracks or damage. Replace if necessary.			○	○	○
Engine oil	Replace (Warm engine before draining).	○		○	○	○
Coolant	Check coolant leakage. Replace if necessary. Replace coolant every 24 months.	○	○	○	○	○
Oil strainer	Clean. Replace if necessary.	○		○		○
Drive chain	Check and adjust slack/alignment/clean/lube.	○	○	○	○	○
Transmission oil	Check oil leakage. Replace every 12 months.	○				○
Brake system	Check operation and brake fluid. Replace brake pad if necessary.	○	○	○	○	○
Drive belt	Check operation/replace if damage or excessive wear.	○				○
Wheels	Check balance/damage/runout. Replace if necessary.	○		○	○	○
Wheel bearings	Check bearing assembly for looseness/damage. Replace if damaged.	○		○	○	○
Steering system	Check operation/replace if damage. Check toe-in/adjust if necessary.	○	○	○	○	○
Rear swing arm shafts	Lubricate every 6 months.			○	○	○
Fitting/Fasteners	Check all chassis fittings and fasteners. Correct if necessary.	○	○	○	○	○

•In the interest of safety, we recommend these items should be serviced only by an authorized KYMCO motorcycle dealer.

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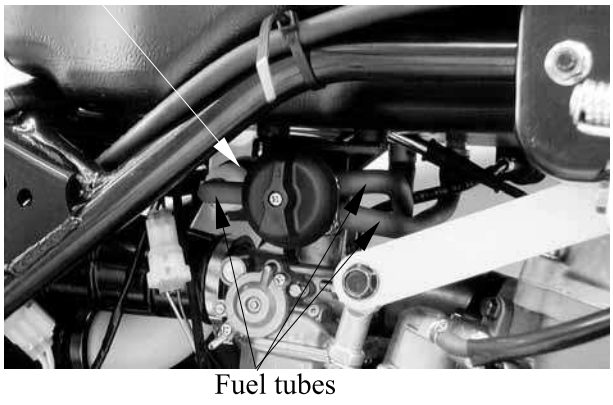
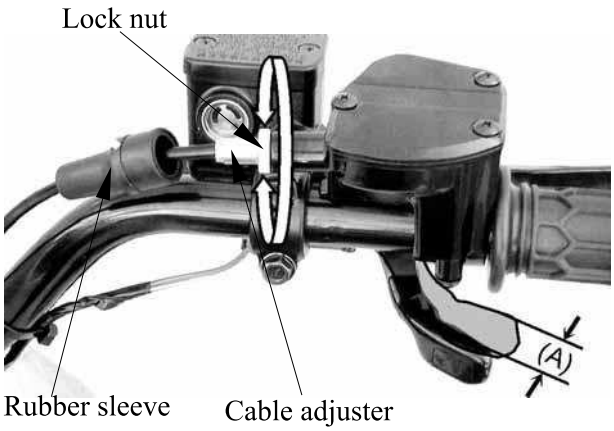
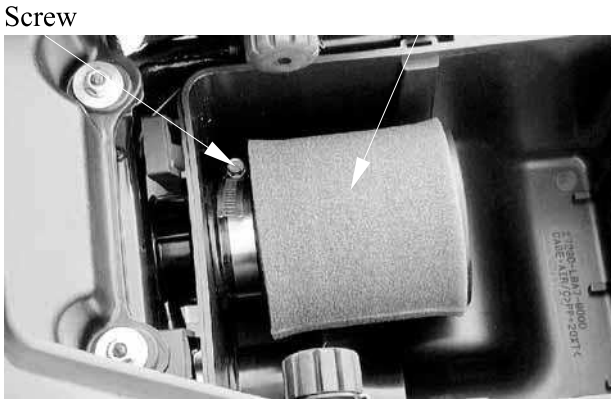
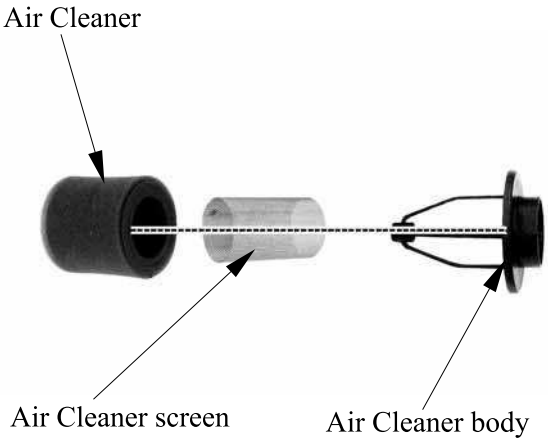

Fuel Filter
Fuel tubes

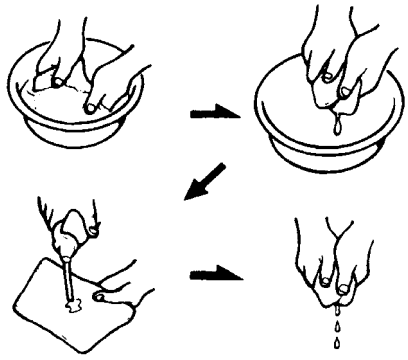

Lock nut
(A)
Rubber sleeve
Cable adjuster


Air Cleaner Housing Cover
Retainer Clips


Screw


Screw
Air Cleaner Holder

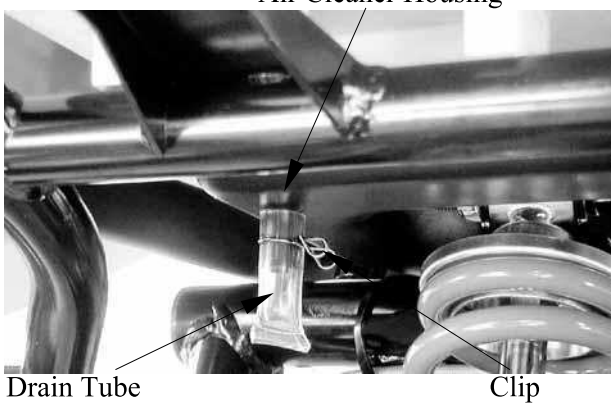

Air Cleaner
Air Cleaner screen
Air Cleaner body



* r
use gasoline or low flash point solvents which may lead to a fire or explosion.

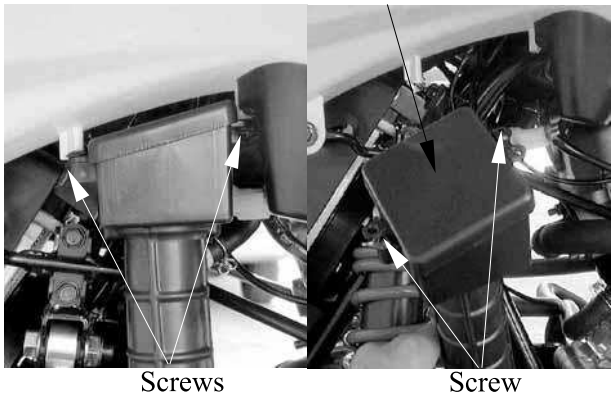
* Do not twist or wring out the foam element. This could damage the foam material.

* The element should be wet but not dripping.



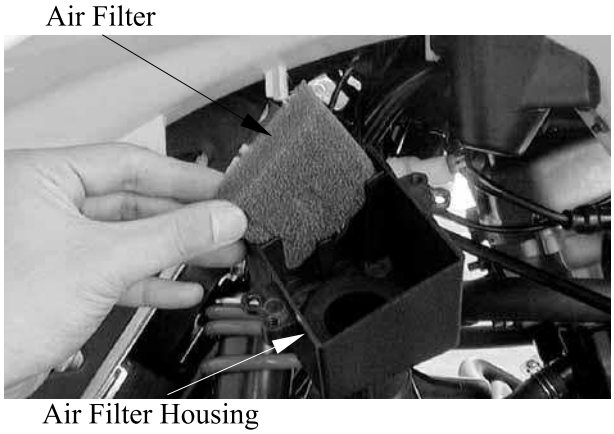
AIR FILTER FOR DRIVE BELT

To clean the air filter:
Remove the two screws attaching front fender and remove air filter housing.
Remove the two screws and remove air filter housing cover.



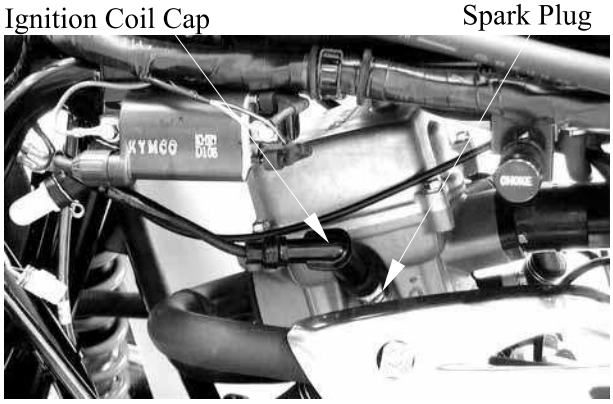
Remove the air filter from the housing.
Tap the air filter lightly to remove most of the dust and dirt.
Blow out the remaining dirt with compressed air.
If the element is damaged, replace it.

Reassemble by reversing the disassembly sequence.



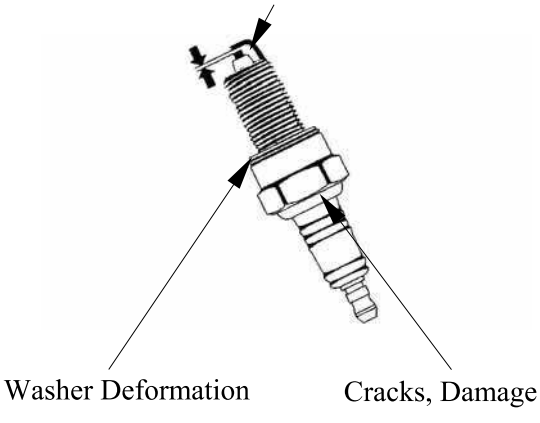
SPARK PLUG

Remove ignition coil cap and 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: DPR7EA-9



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.



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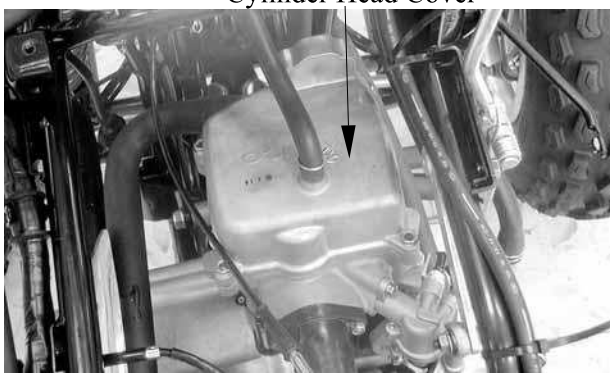
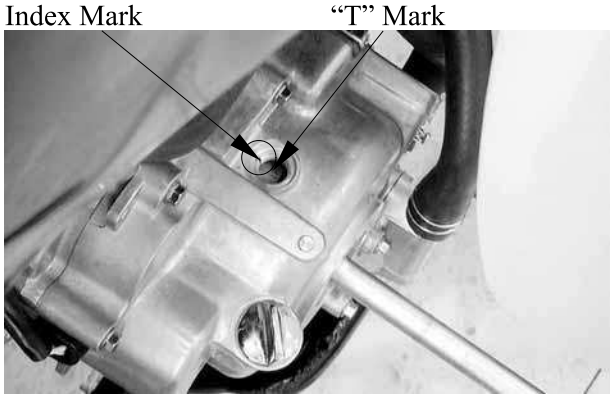
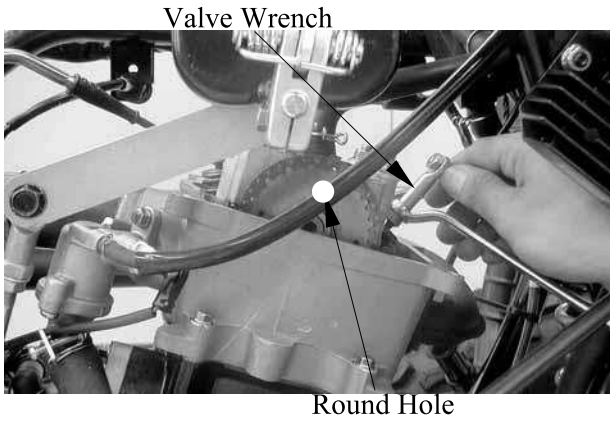
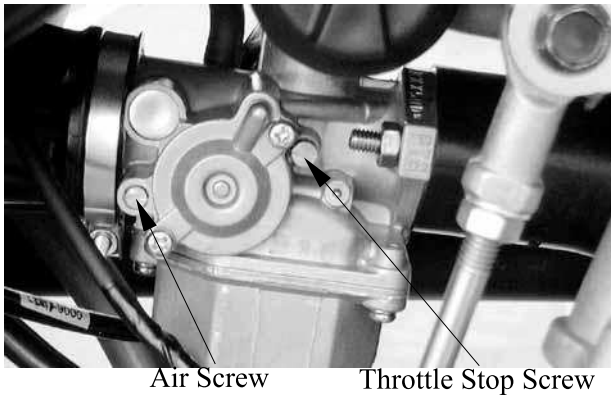






* • Check the valve clearance again after the lock nut is tightened.

* • The engine must be warm for accurate idle speed inspection and adjustment.



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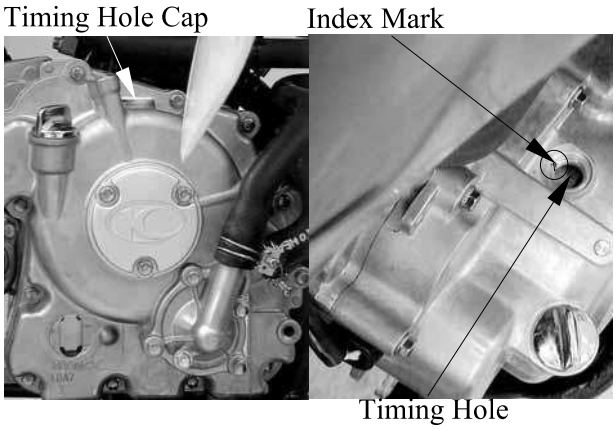
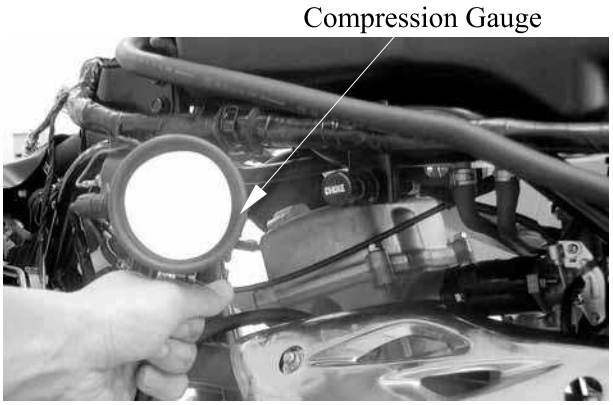
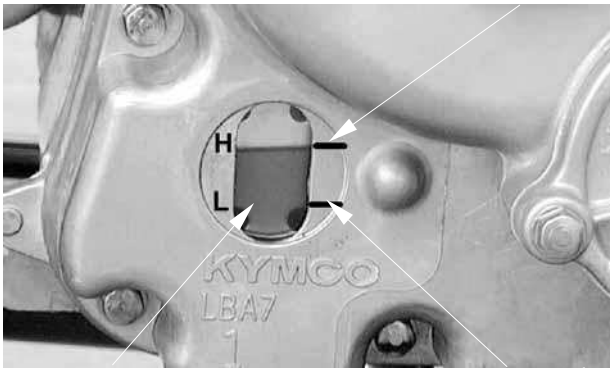
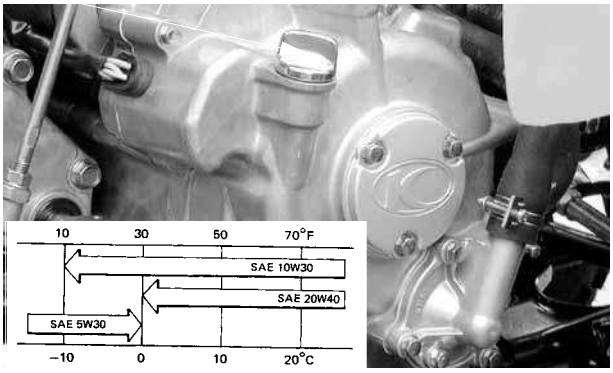
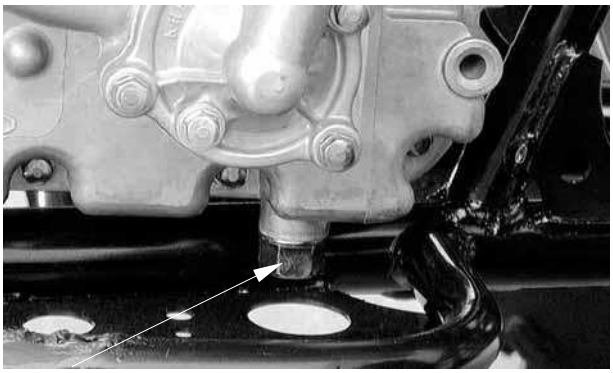

Timing Hole Cap
Index Mark
Timing Hole


Compression Gauge



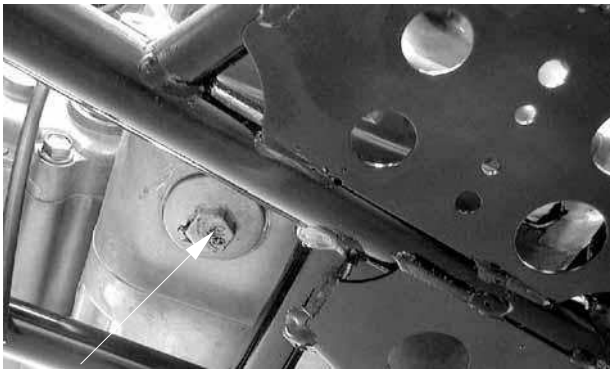
* Run the engine for 2～3 minutes and check the oil level after the engine is stopped for 2～3 minutes.





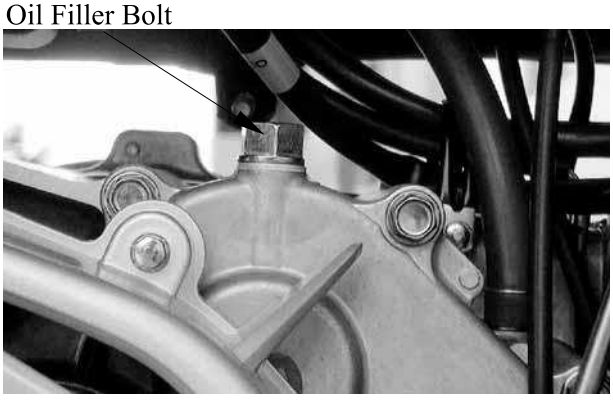
* The engine oil will drain more easily while the engine is warm.

g

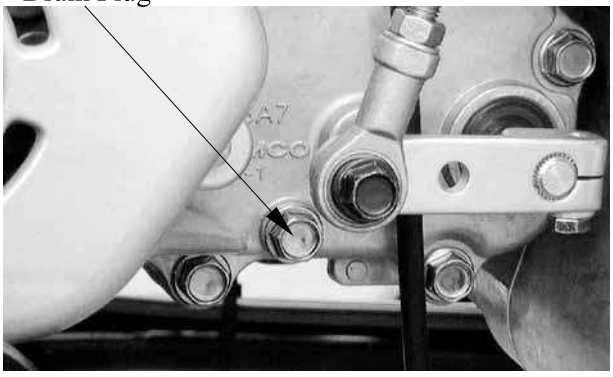


p

Oil Filler Bolt

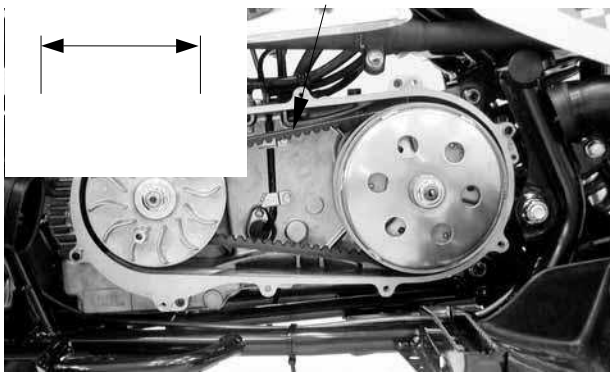


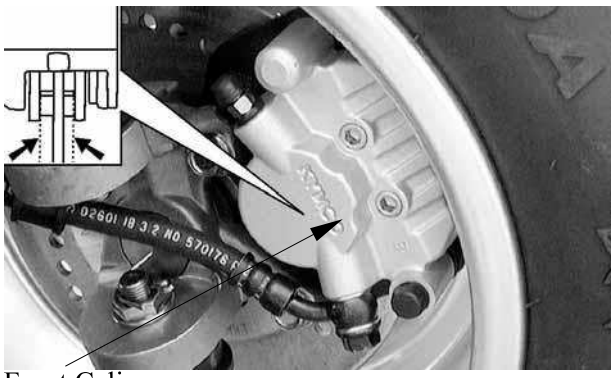
Drain Plug



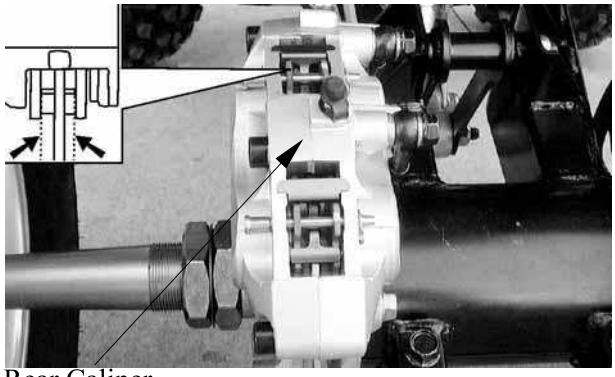
* Make sure that the sealing washer is in good condition.

Drive Belt



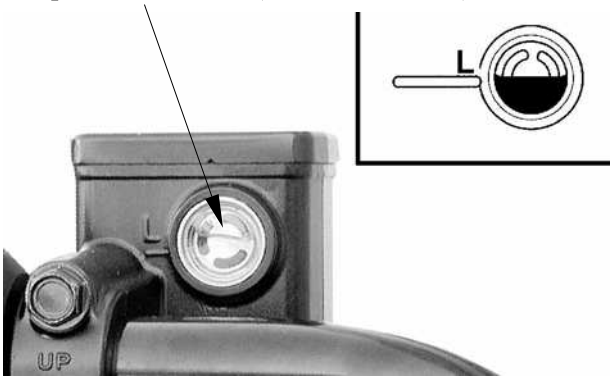


Front Caliper

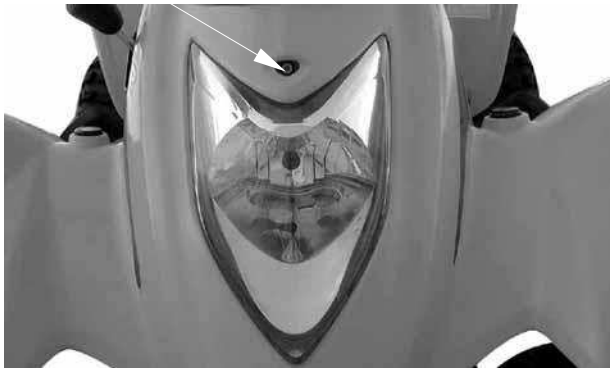


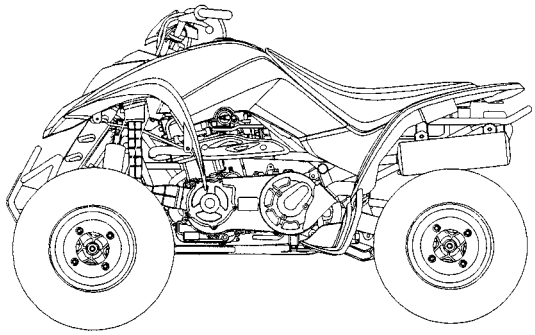
Rear Caliper

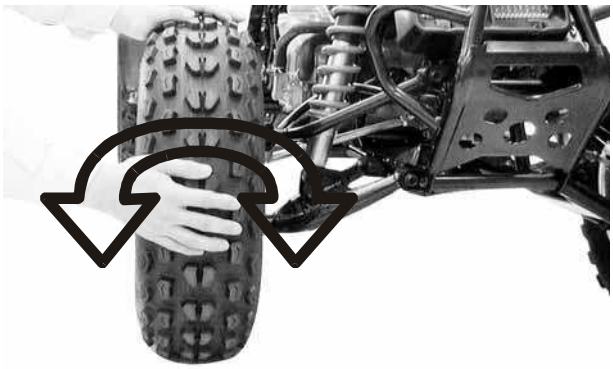
Inspection Window (R/L Brake Lever)

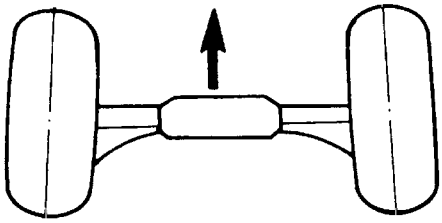


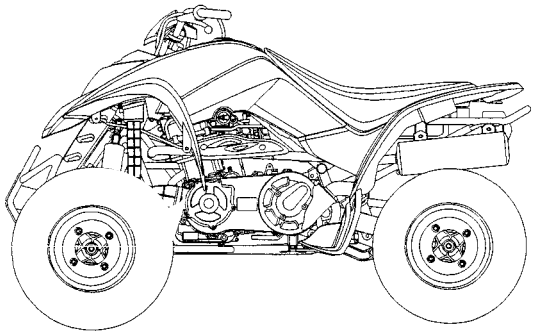

UPPER
LOWER

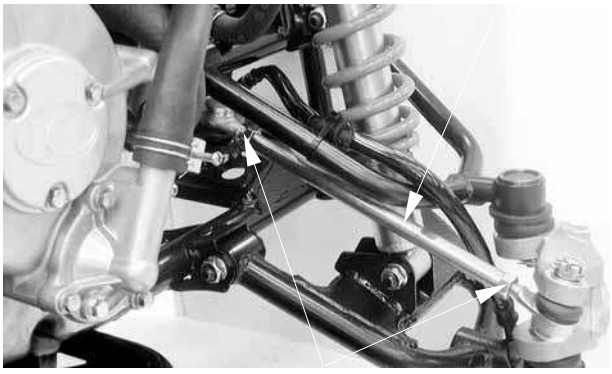






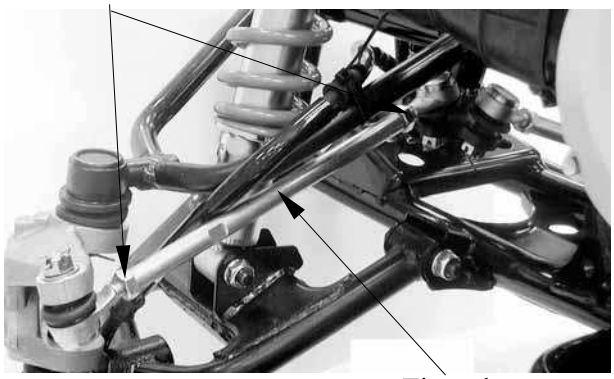






* • Be sure that both tie-rod are turned the same amount. If not, the machine will drift tight or left even though the handlebar is positioned straight which may lead to mishandling and accident.
• After setting the toe-in to specification, run the machine slowly for some distance with hands placed lightly on the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

Tie-rod End Nuts

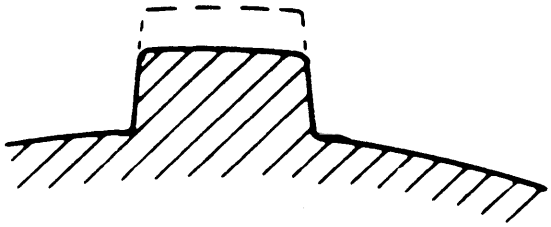


Tie-rod

* Tire pressure should be checked when tires are cold.

Rear Axle Nut

t

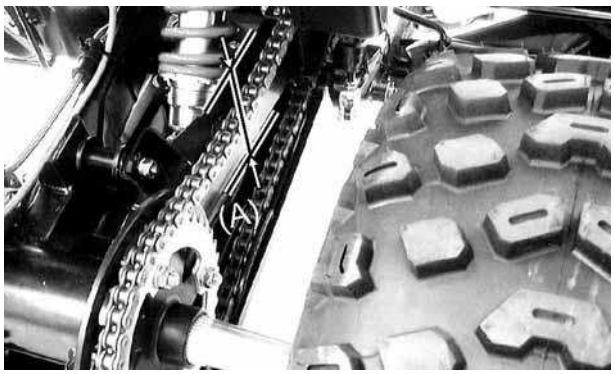


* It is dangerous to ride with a worn out tire. When a tire wear is out of specification, replace the tire immediately.

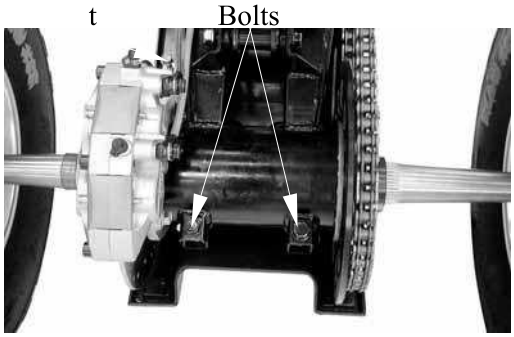
*

* Too little of chain slack will overload the engine and other vital parts; keep the slack within the specified limits.

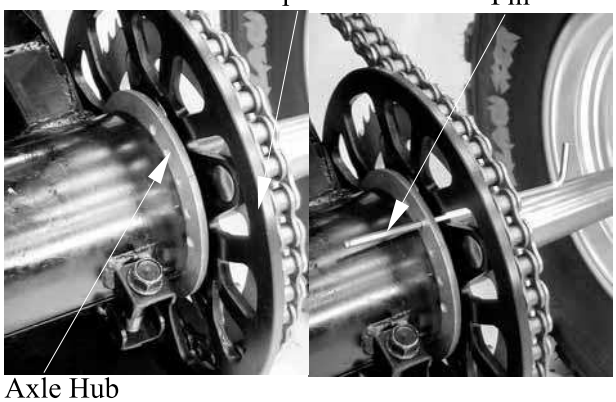
* Wheels should be on the ground without the rider on it.



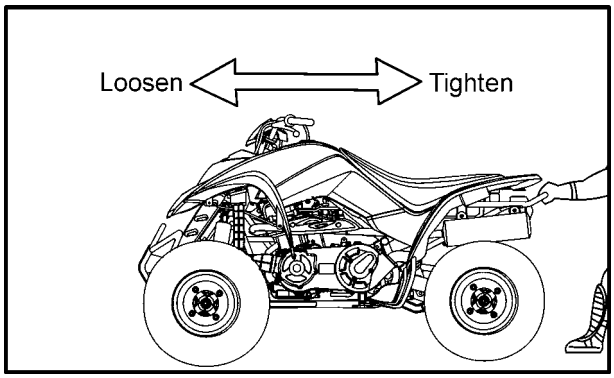
t Bolts

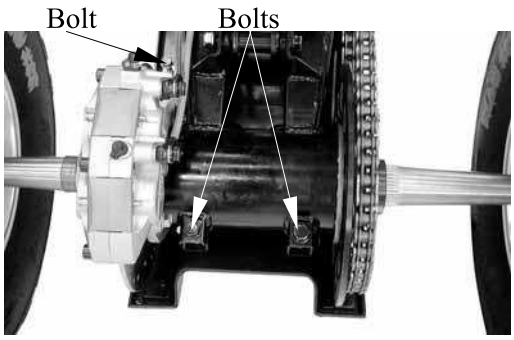


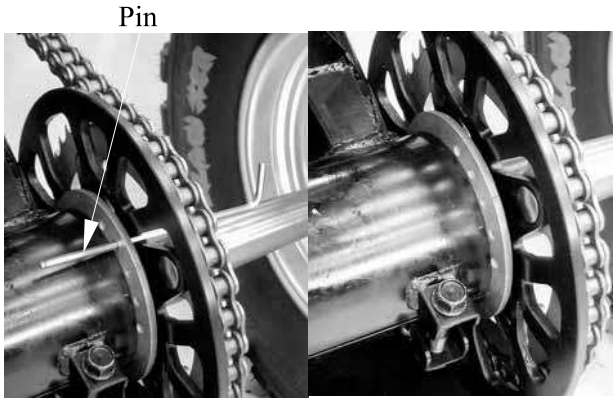
Driven Sprocket Pin



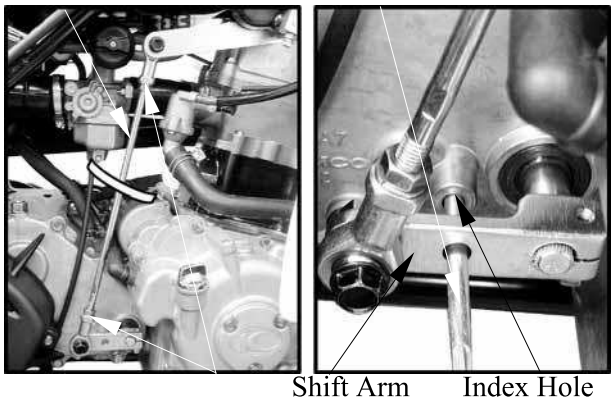
Axle Hub


Loosen
Tighten

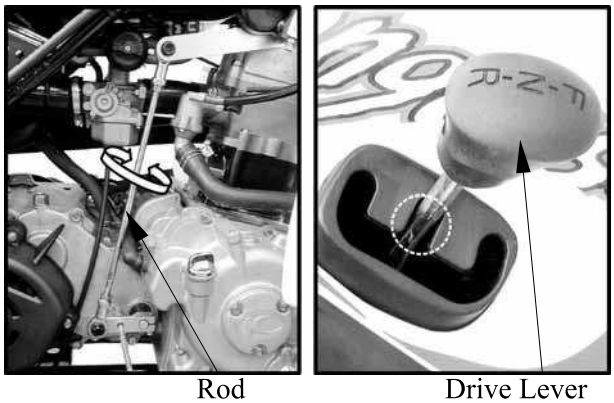

Bolt
Bolts


Pin

r



Shift Arm Index Hole



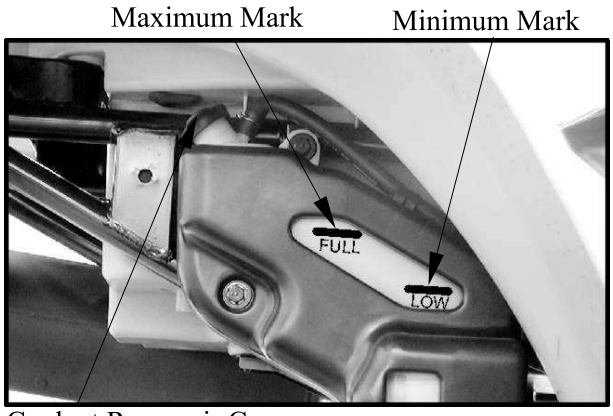
Rod Drive Lever

* Damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result so replace such cable as soon as possible.

* Hold cable end high and apply several drops of lubricant to cable.

* Wipe off the excess grease.

Nipple

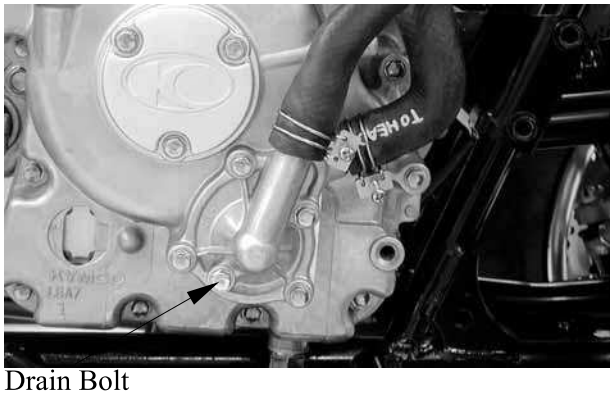


Coolant Reservoir Cap

*

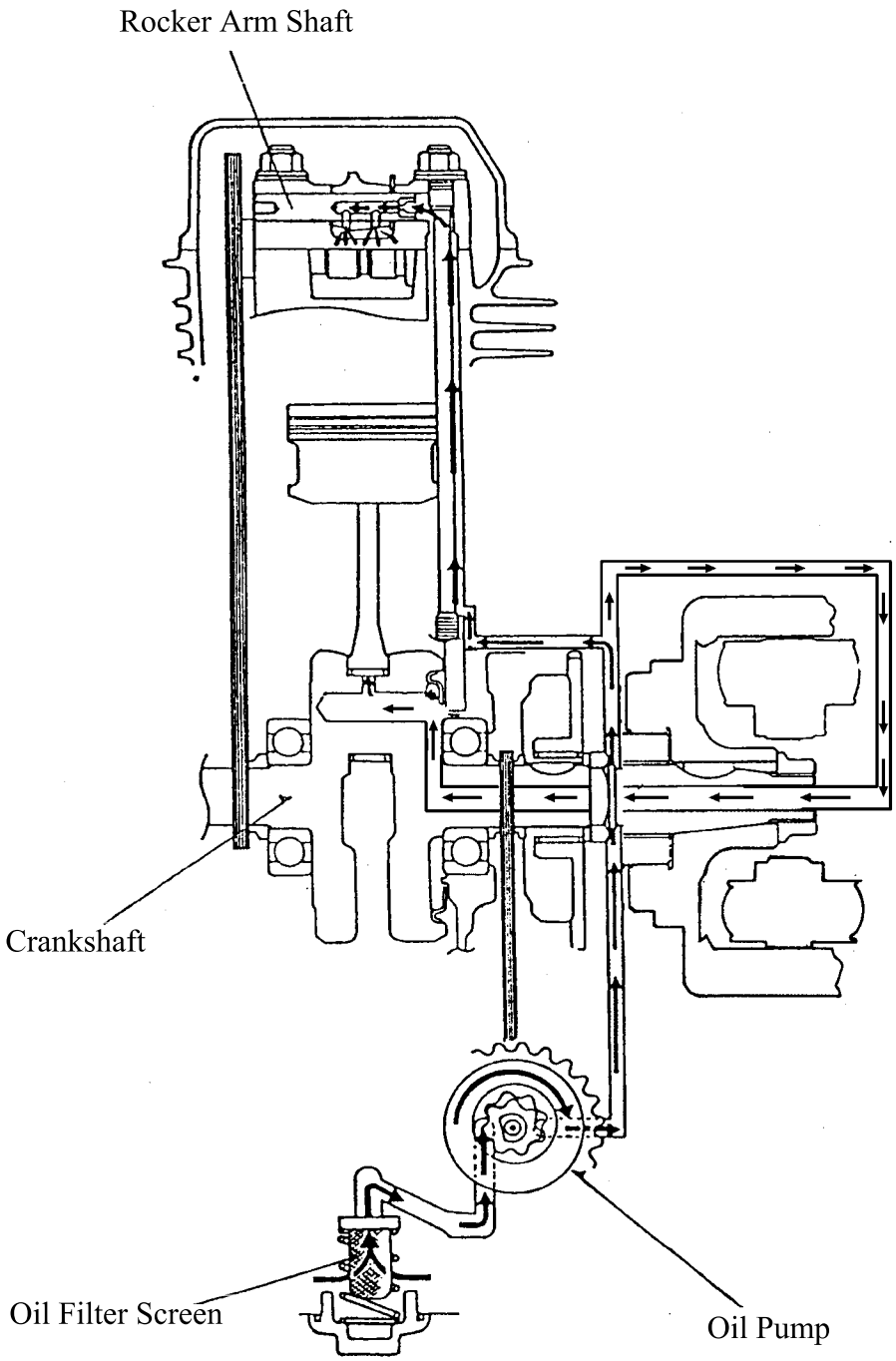
* Perform this operation when the engine is cold.

* The coolant freezing point should be 5 °C lower than the temprature of the riding area.


Drain Bolt

4

LUBRICATION SYSTEM


Rocker Arm Shaft
Crankshaft
Oil Filter Screen
Oil Pump

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	0.15	0.20
	Outer rotor-to-pump body clearance	0.15～0.20	0.25
	Rotor end-to-pump body clearance	0.04～0.09	0.12

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

ENGINE OIL/OIL FILTER

OIL LEVEL AND OIL CHANGE

Refer to the “ENGINE OIL” section in the chapter 3 to check the oil level and replacement and oil filter cleaning.

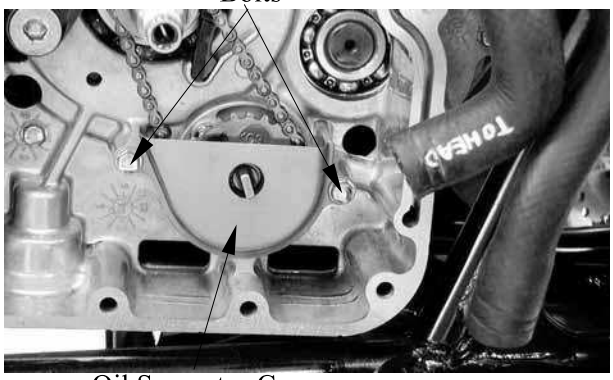
OIL PUMP

REMOVAL

Remove the right crankcase cover and the A.C. generator flywheel. (Refer to the “A.C. GENERATOR/FLYWHEEL” section in the chapter 16)

Remove the starter clutch gear. (Refer to the “STARTER CLUTCH” section in the chapter 18)

Remove the two bolts and oil separator cover.

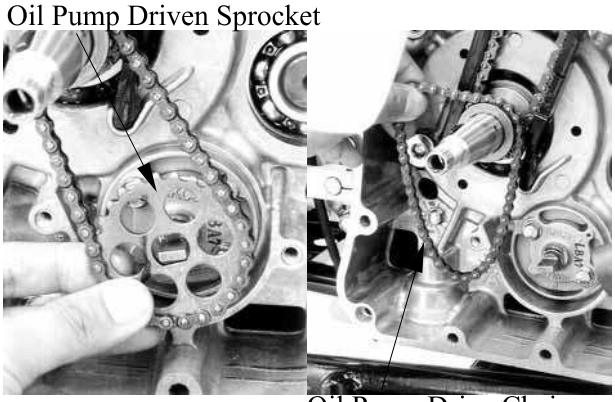


Oil Separator Cover

Pry the circlip off and remove the oil pump driven gear, then remove the oil pump drive chain and oil driven sprocket.

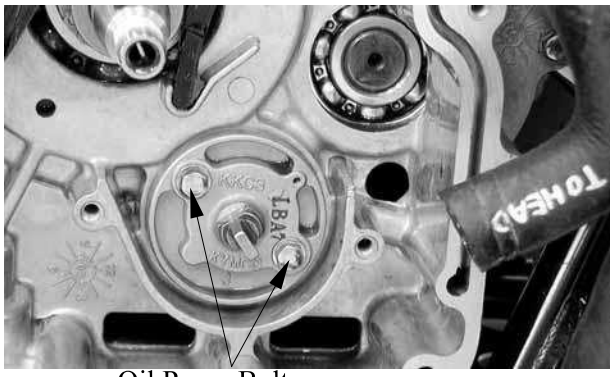

Circlip

Oil Pump Driven Sprocket



Oil Pump Drive Chain

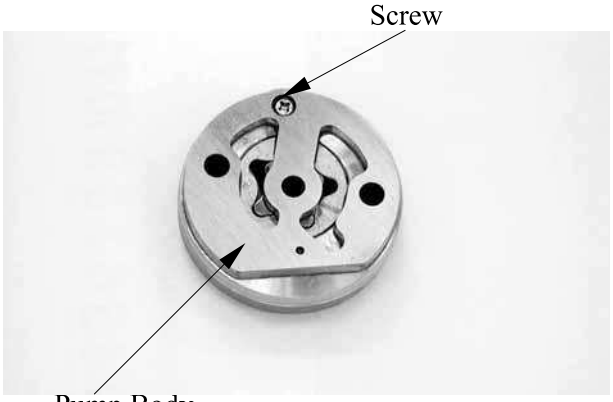
Remove the two oil pump bolts for remove the oil pump.



Oil Pump Bolts

OIL PUMP DISASSEMBLY

Remove the screw and disassemble the oil pump.



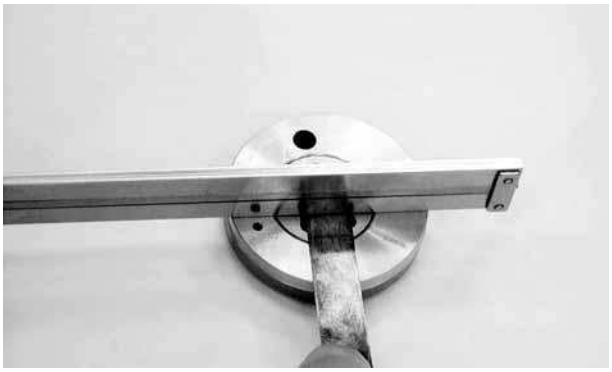
Screw

Pump Body

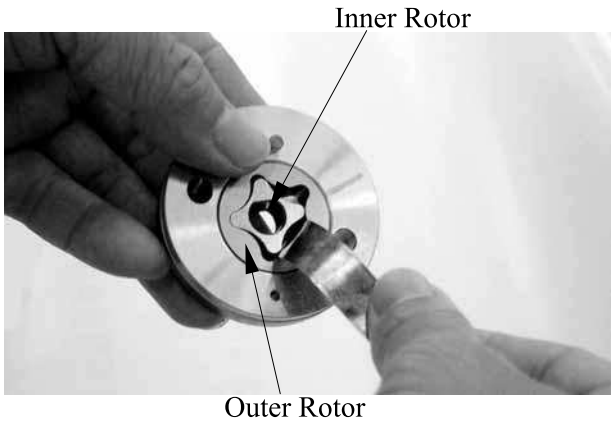
INSPECTION

Measure the rotor end-to-pump body clearance.

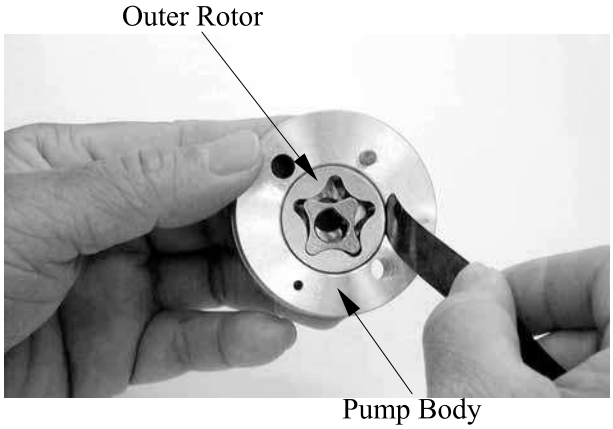
Service Limit: 0.12mm



Measure the inner rotor-to-outer rotor clearance.
Service Limit: 0.2mm



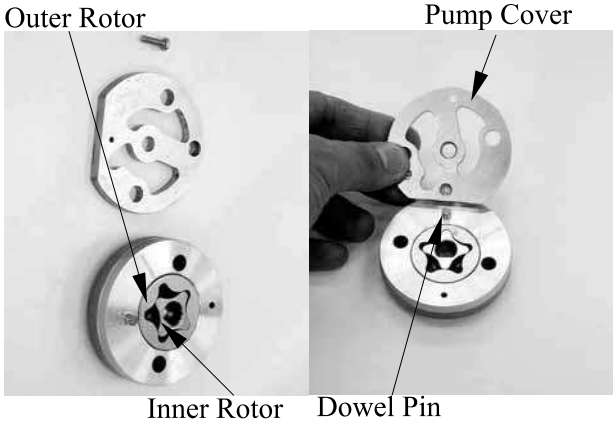
Measure the pump body-to-outer rotor clearance.
Service Limit: 0.25mm



ASSEMBLY
Install the outer rotor, inner rotor and pump shaft into the pump body.

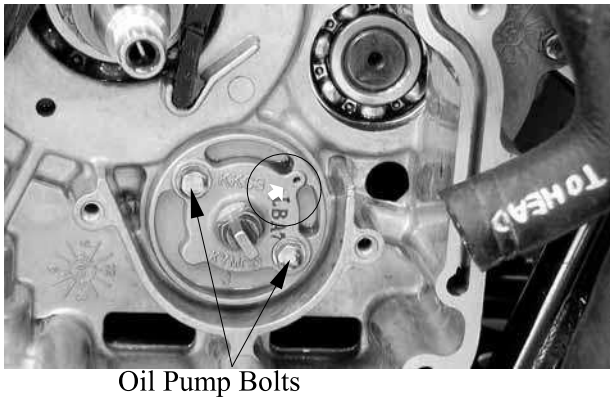
* Insert the pump shaft by aligning the flat on the shaft with the flat in the inner rotor.

Install the dowel pin.
Install the pump cover by aligning the hole in the cover with the dowel pin.
Tighten the screw to secure the pump cover.

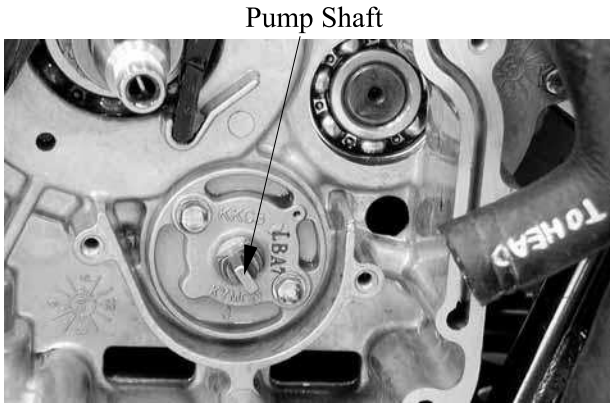


INSTALLATION
Reverse the "OIL PUMP REMOVAL" procedures.

* Install the oil pump with the arrow on the pump body facing up and fill the oil pump with engine oil before installation.



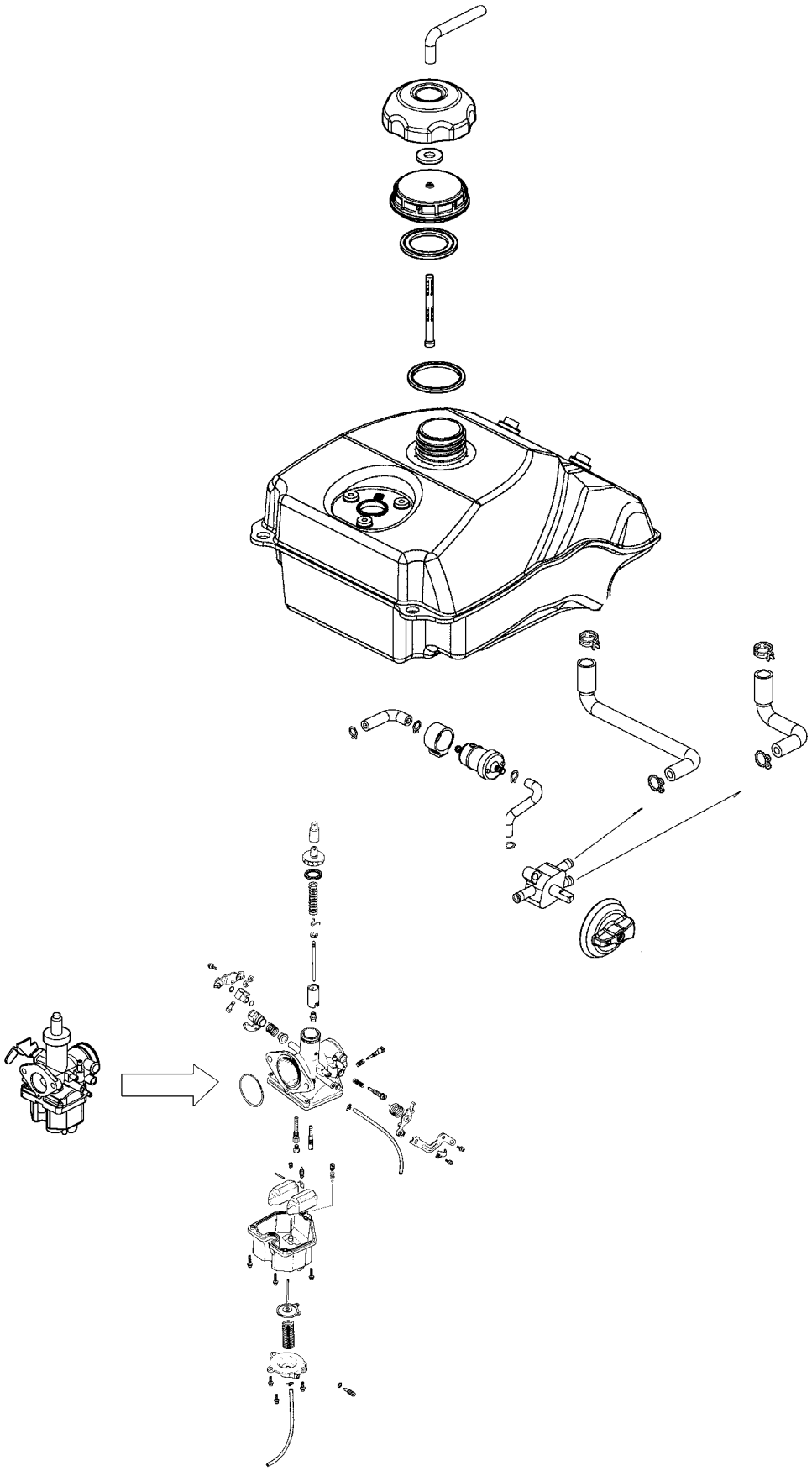
Make sure that the pump shaft rotates freely without binding.



Install oil pump driven sprocket and drive chain, circlip and oil separator cover.

5

FUEL SYSTEM



SERVICE INFORMATION

GENERAL INSTRUCTIONS

Gasoline is very dangerous. When working with gasoline, keep sparks and flames away from the working area.
Gasoline is extremely flammable and is explosive under certain conditions. Be sure to work in a well-ventilated area.

- Do not bend or twist control cables. Damaged control cables will not operate smoothly.
- When disassembling fuel system parts, note the locations of O-rings. Replace them with new ones during reassembly.
- Before float chamber disassembly, loosen the drain screw to drain the residual gasoline into a clean container.
- After the carburetor is removed, plug the intake manifold side with a clean shop towel to prevent foreign matters from entering.
- When cleaning the carburetor air and fuel jets, the O-rings and diaphragm must be removed first to avoid damage. Then, clean with compressed air.
- When the motorcycle is not used for over one month, drain the residual gasoline from the float chamber to avoid erratic idling and clogged slow jet due to deteriorated fuel.

SPECIFICATIONS

Item	Standard
Type	PD
Venturi dia.	ϕ22
Float level	14.8mm
Main jet No.	98
Adjust method	Piston
Idle speed	1500±100rpm
Throttle grip free play	1～4mm
Air screw opening	1 1/8±1/2

SPECIAL TOOL
Float level gauge

TROUBLESHOOTING

Engine cranks but won't start
- No fuel in tank
- No fuel to carburetor
- Cylinder flooded with fuel
- No spark at plug
- Clogged air cleaner
- Intake air leak
- Improper throttle operation

Engine idles roughly, stalls or runs poorly
- Excessively used choke
- Ignition malfunction
- Faulty carburetor
- Poor quality fuel
- Lean or rich mixture
- Incorrect idle speed

Misfiring during acceleration
- Faulty ignition system
- Faulty carburetor

Backfiring at deceleration
- Float level too low
- Incorrectly adjusted carburetor
- Faulty exhaust muffler

Engine lacks power
- Clogged air cleaner
- Faulty carburetor
- Faulty ignition system

Lean mixture
- Clogged carburetor fuel jets
- Float level too low
- Intake air leak
- Clogged fuel tank cap breather hole
- Kinked or restricted fuel line

Rich mixture
- Float level too high
- Clogged air jets
- Clogged air cleaner

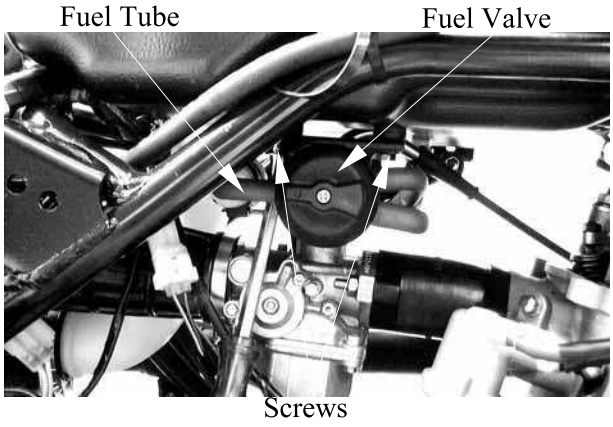
FUEL TANK

REMOVAL

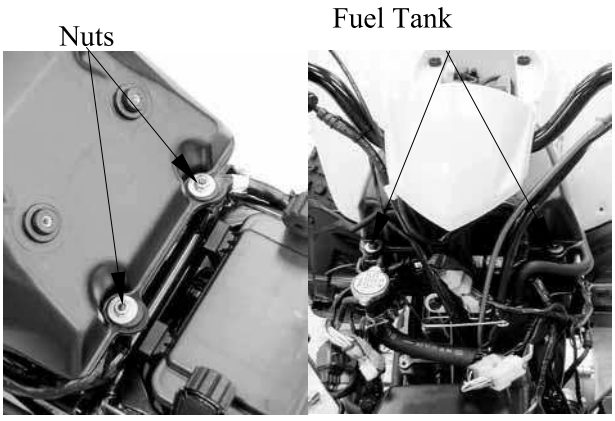
- Keep sparks and flames away from the work area.
- Wipe off any spilled gasoline.

Remove the seat, right and left side frame cover (See page 2-3) and center frame cover (See page 2-5).

Switch the fuel valve “OFF”.
Disconnect the fuel tube from carburetor and remove two screws at the fuel valve holder.



Remove the two bolts and two nuts at the fuel tank, then remove the fuel tank.



INSTALLATION

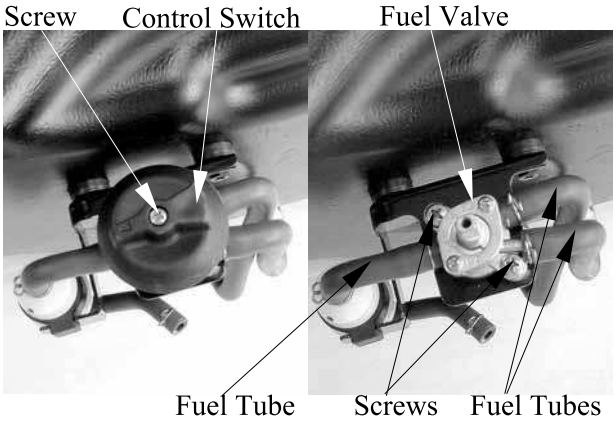
Reverse the “FUEL TANK REMOVAL” procedures.

FUEL VALVE

REMOVAL

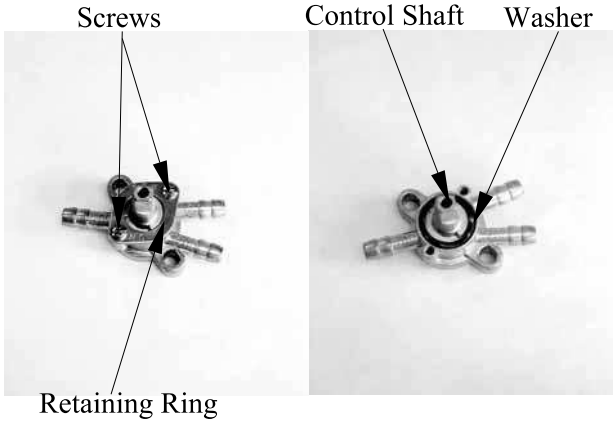
- Keep sparks and flames away from the work area.
- Drain gasoline into a clean container.

Remove the screw and then remove control switch.
Disconnect all fuel tubes and remove the two screws, then remove fuel valve.

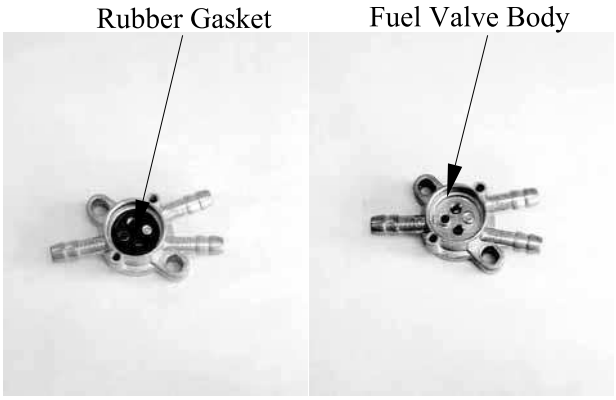


DISASSEMBLY

Remove the two screws on the retaining ring and then remove retaining ring.
Remove the washer and control shaft.



Remove the rubber gasket from the fuel valve body.

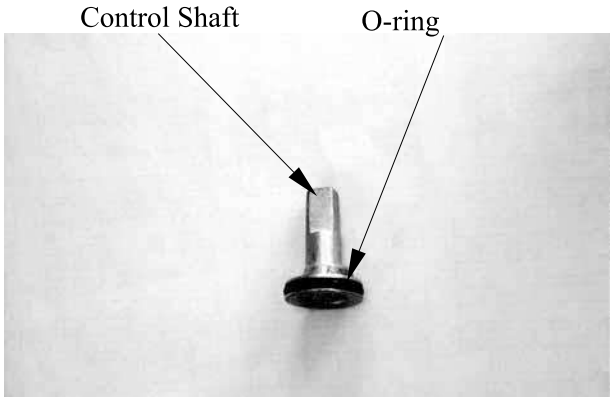


INSPECTION

Inspect the fuel valve body for dirt and clog. Clean if necessary.

Replace the rubber gasket with new ones if they are damaged or deteriorated.

Replace the O-rings with new ones if they are damaged or deteriorated.

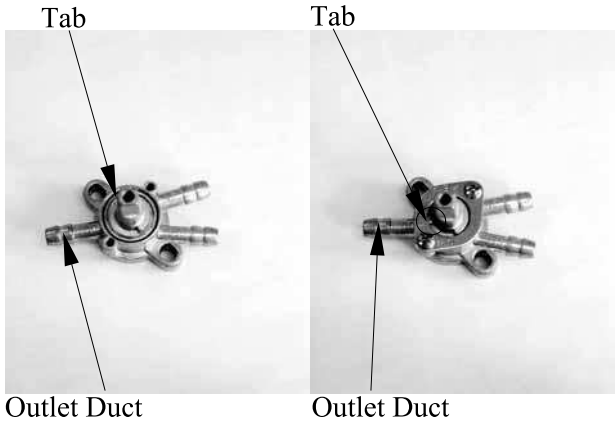


ASSEMBLY

Reverse the “DISASSEMBLY” procedures.

Install rubber gasket, control shaft, washer and retaining ring.

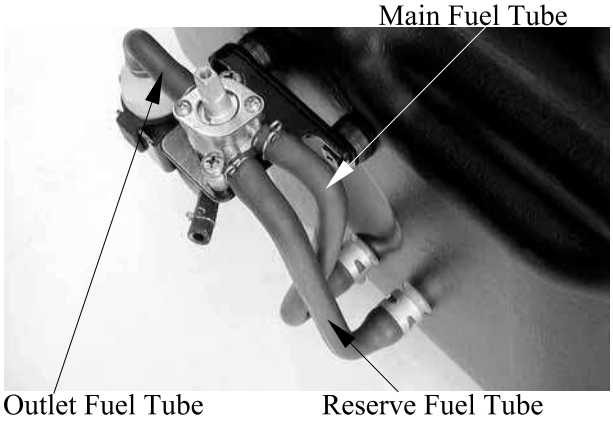
*
- Aligning the tab on the control shaft with the outlet duct in the fuel valve body.
- Aligning the tab on the retaining ring with the outlet duct in the fuel valve body.



INSTALLATION

Reverse the “FUEL VALVE REMOVEAL” procedures.

Connect all fuel tube.

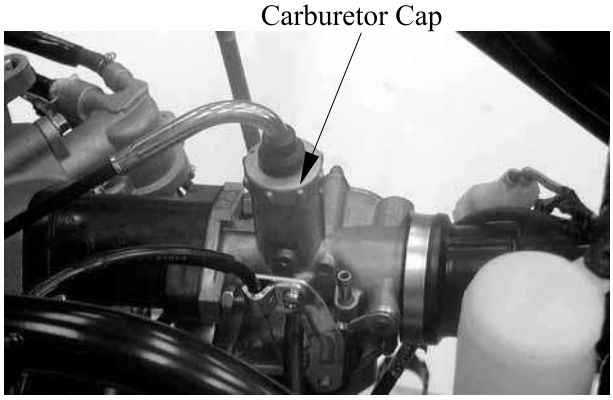


THROTTLE VALVE

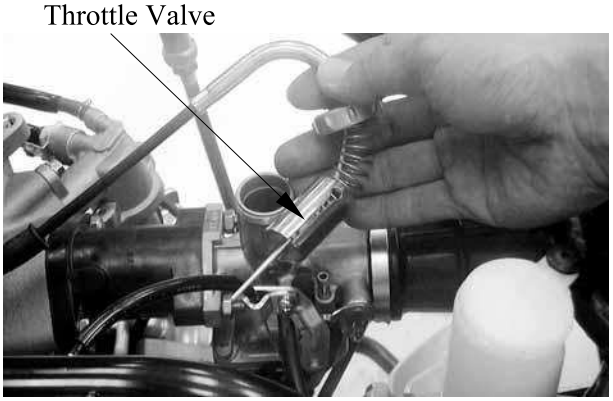
DISASSEMBLY

Remove the fuel tank. (Refer to "FUEL TANK" section in the chapter 5)

Remove the carburetor cap.

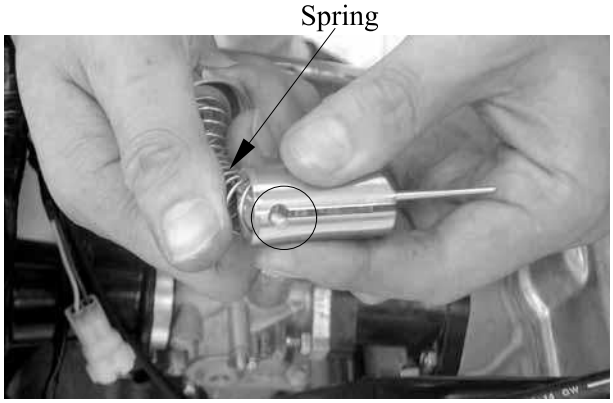


Pull out the throttle valve.

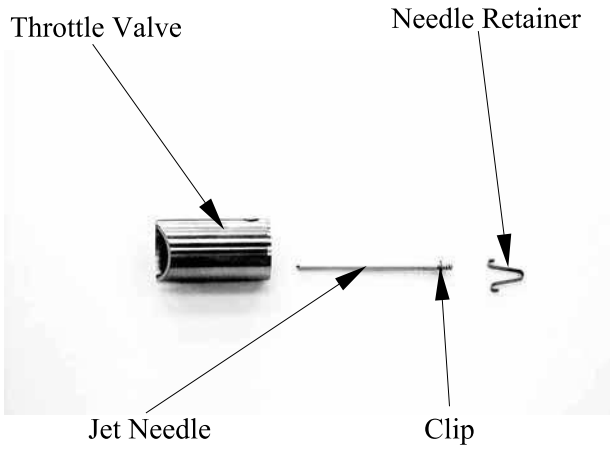


Compress the spring to disconnect the throttle cable by hand.

Remove the spring from the throttle valve



Pry off the needle retainer and remove the jet needle.
Check the throttle valve and jet needle for wear or damage.

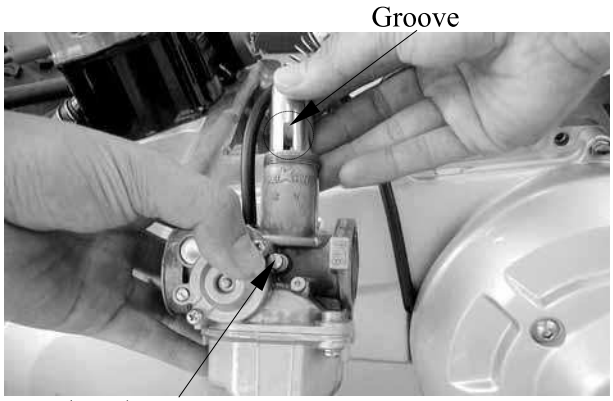


ASSEMBLY

Reverse the "DISASSEMBLY" procedures.

Install the throttle valve into the carburetor body.

* Align the groove in the throttle valve with the throttle stop screw on the carburetor body.

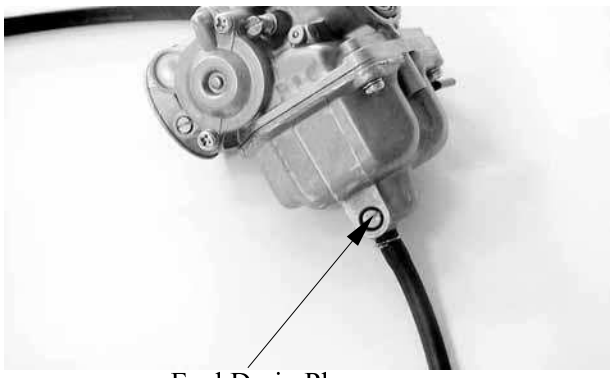


CARBURETOR

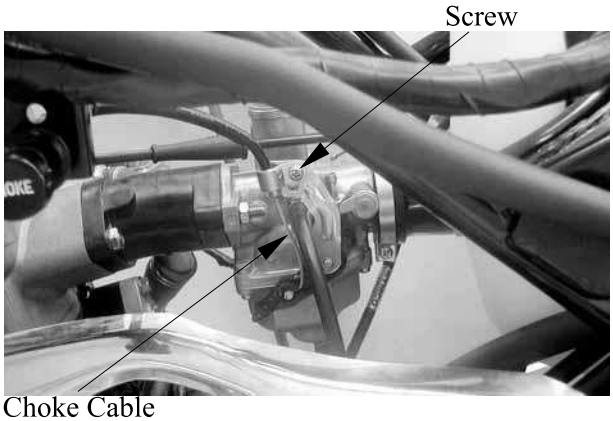
REMOVAL

Remove the fuel tank and carburetor cap. (Refer to "FUEL TANK" and "THROTTLE VALVE DISASSEMBLY" section in the chapter 5)
Loosen the drain screw to drain the gasoline from the float chamber.

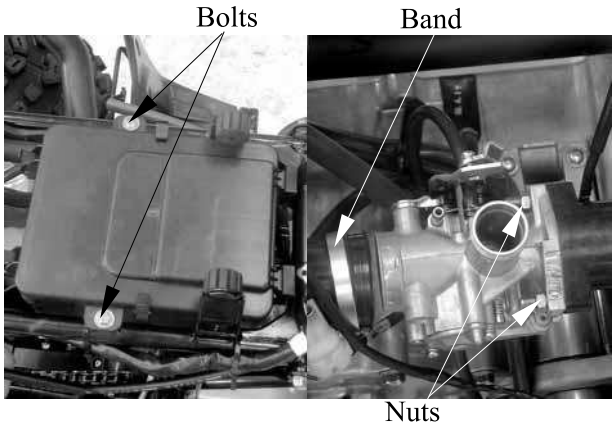
* • Keep sparks and flames away from the work area.
  • Drain gasoline into a clean container.



Loosen the screw on the lock plate for disconnect the choke cable.

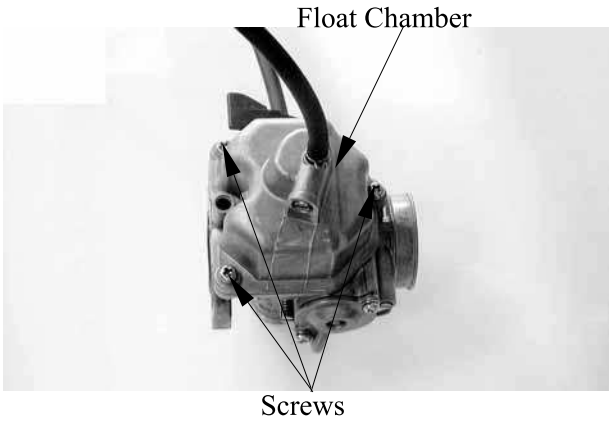


Remove the two bolts at the air cleaner case.
Loosen the air cleaner connecting tube band screw.
Remove the two carburetor lock nuts attaching the inlet pipe.
Remove the carburetor



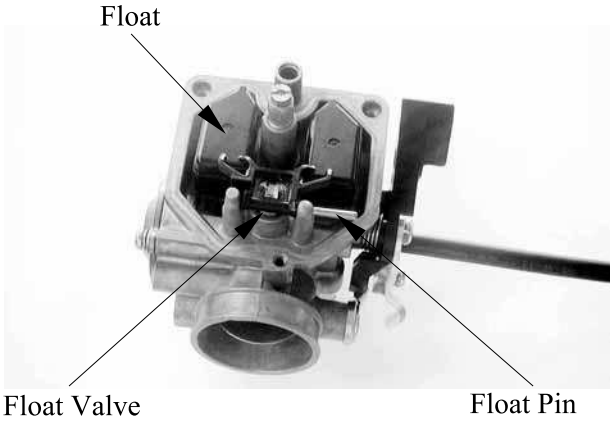
DISASSEMBLY

Remove the float chamber attaching three screws and remove the float chamber.

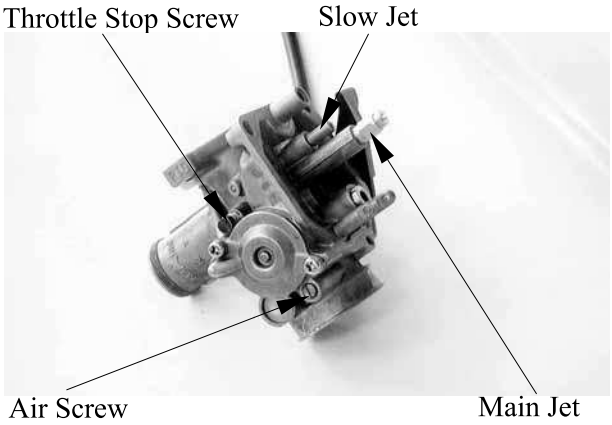


Remove the jet holder.

Pull out the float pin, then remove float and float valve.

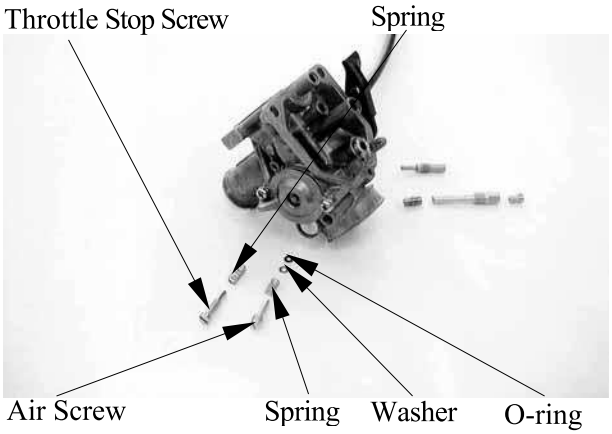


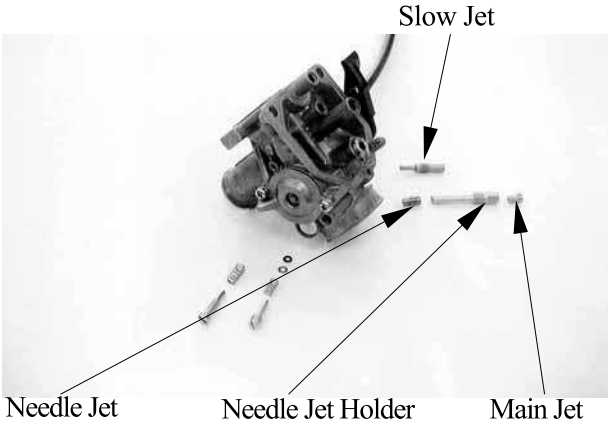
Remove the main jet, needle jet holder, and needle jet.
Remove the slow jet.
Remove the air screw and throttle stop screw.



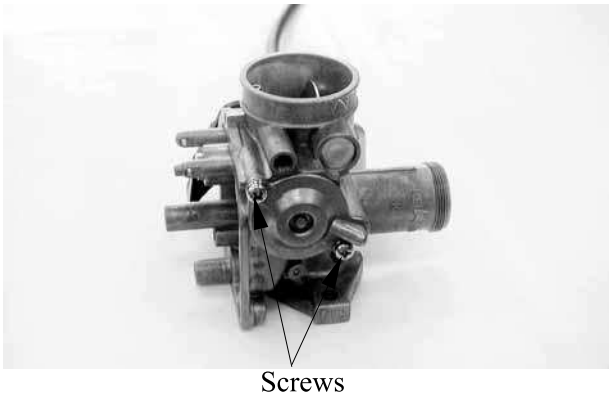
CAUTIONS!

*
- Be careful not to damage the jets and jet holder when removing them.
- Before removal, turn the throttle stop screw and air screw in and count the number of turns until they seat lightly and then make a note of this.
- Do not force the screw against its seat to avoid seat damage.
- Be sure to install the O-ring in the reverse order of removal.

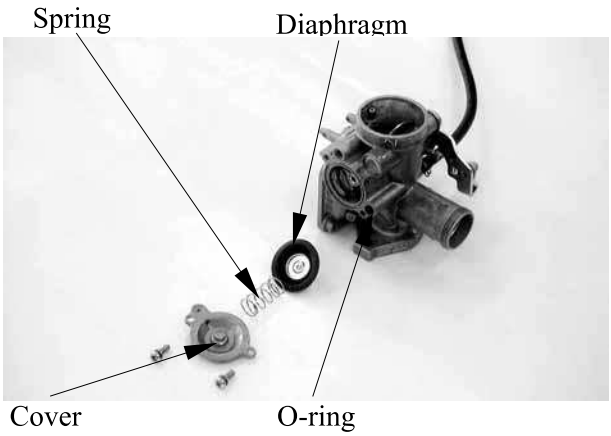




Remove the two screws and the air cut-off valve cover.

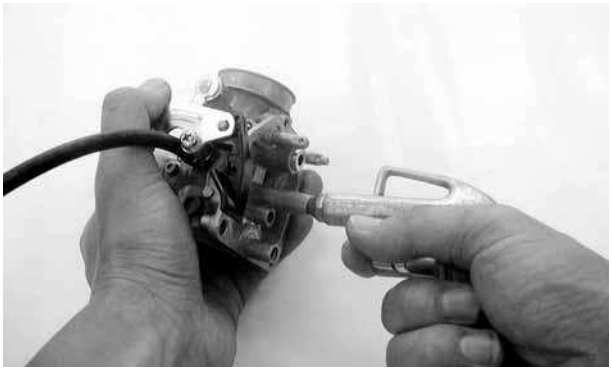


Remove the spring, diaphragm and O-rings.
Inspect the diaphragm and spring for wear or damage.



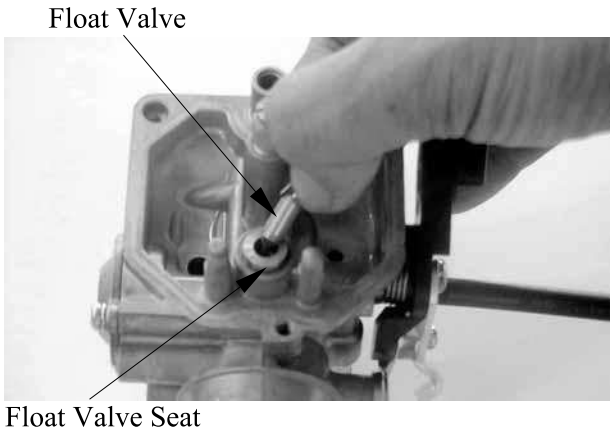
CARBURETOR CLEANING

Blow compressed air through all passages of the carburetor body.



FLOAT/FLOAT VALVE INSPECTION

Inspect the float valve seat for wear or damage.
Inspect the float for damage or fuel level inside the float chamber.

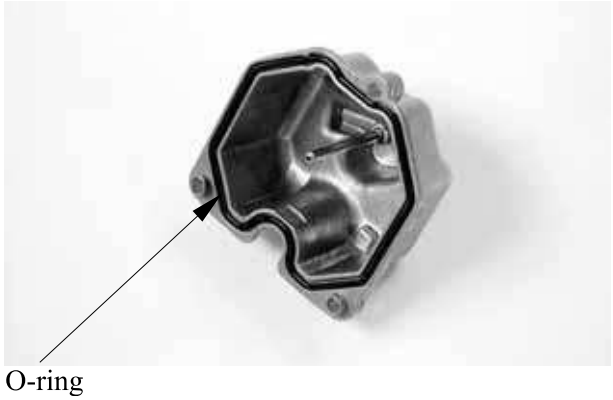


FUEL RESERVOIR O-RING CHECK

Remove the O-ring.

INSPECTION

Inspect the check the O-ring for damage.
Replace with new ones if necessary



ASSEMBLY

Install the slow jet.
Install the needle jet, needle jet holder and main jet.
Install the throttle stop screw and air screw
Install the spring, diaphragm and O-rings.

* • When installing the air screw, return it to the original position as noted during removal
  • After the carburetor is installed, be sure to perform the Exhaust Emission

Install the float valve, float and float pin.

FLOAT LEVEL INSPECTION

Turn the carburetor upside down so that the float will go down to make the float valve contact the float valve seat.
Then slowly tilt the carburetor and measure the float level with the float level gauge while the float pin just contacts with float valve.

Float Level: 14.8mm

When adjusting, carefully bend the float pin.

Check the float for proper operation.

Install the jet holder, aligning the jet holder groove with the carburetor tab and then install the float chamber.

INSTALLATION

Reverse the " CARBURETOR REMOVAL" procedures.

AIR CLEANER

Refer to the "AIR CLEANER" section in the chapter 3 for air cleaner replacement and cleaning.

ENGINE REMOVAL

6

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 machine body, cables and wires during engine removal.
- Use shop towels to protect the machine body during engine removal.
- Parts requiring engine removal for servicing:
  — Crankcase
  — Crankshaft

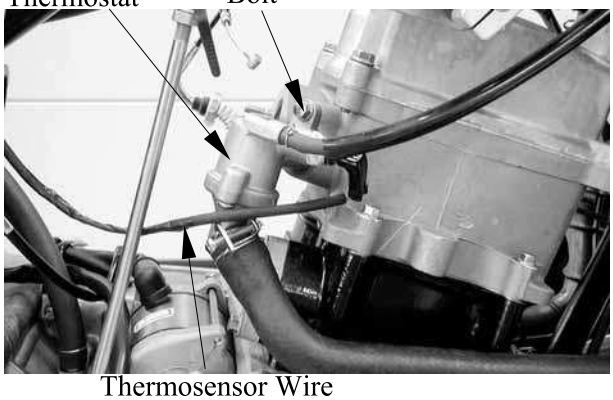
ENGINE REMOVAL

Drain engine oil and transmission oil. (Refer to chapter 3)
Remove frame covers and exhaust pipe. (Refer chapter 2)
Remove the carburetor. (Refer to chapter 5)

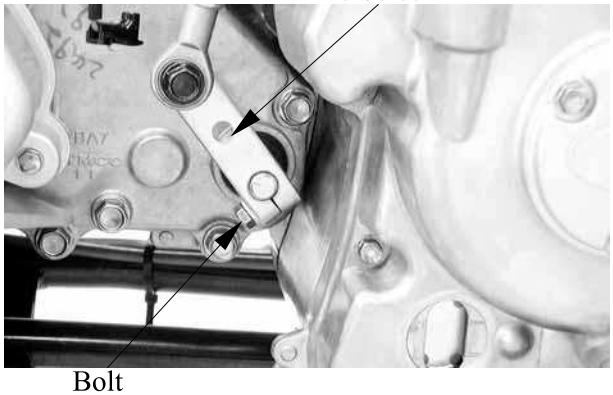
Disconnect the oil recycle tube at the cylinder head cover.

Disconnect the water hose from water pump cover.

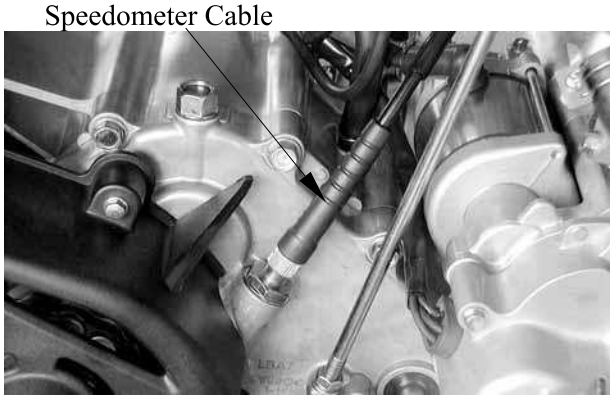
Remove the bolt at the thermostat and disconnect the thermosensor wire, then disconnect the thermostat from the cylinder head.



Remove the bolt at the drive select arm, then disconnect the drive select arm from engine assembly.

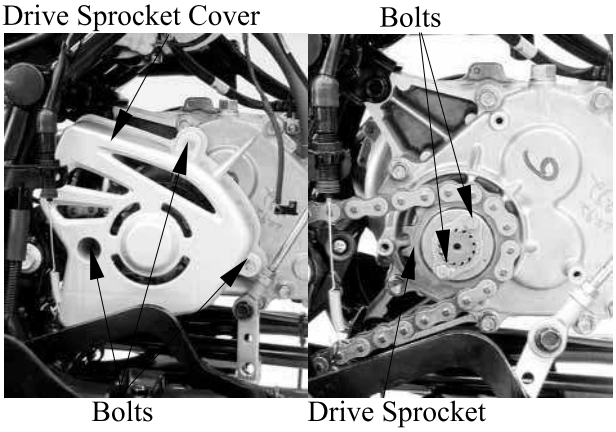


Disconnect the speedometer cable (ON ROAD only).



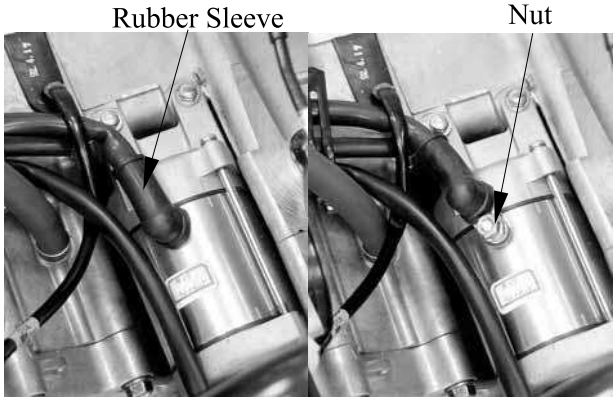
Remove the three bolts at the drive sprocket cover and then remove the drive sprocket cover.

Remove the two bolts on the drive sprocket. Remove the drive sprocket and washer.

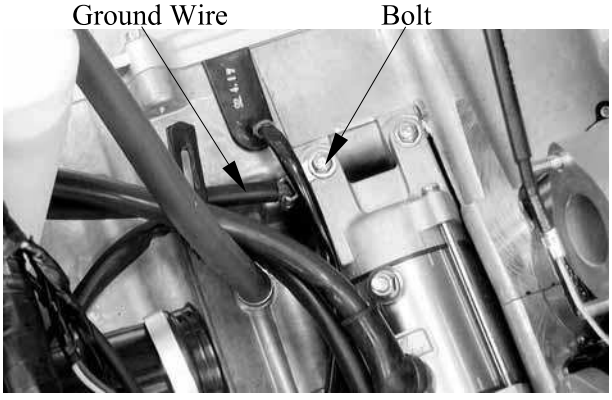


Slide the rubber sleeve back to expose the starter motor wire nut.

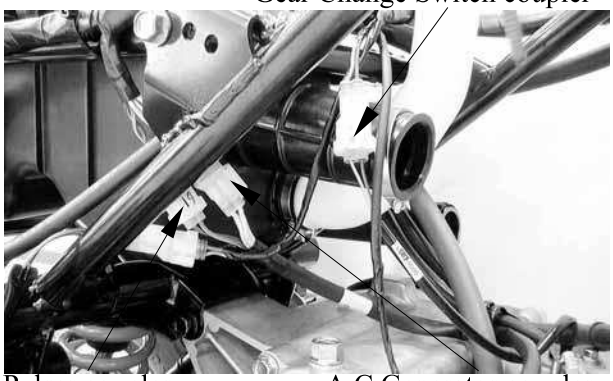
Remove the starter motor wire nut for disconnect the starter motor wire.



Remove the bolt at the starter motor for disconnect the ground wire lead.

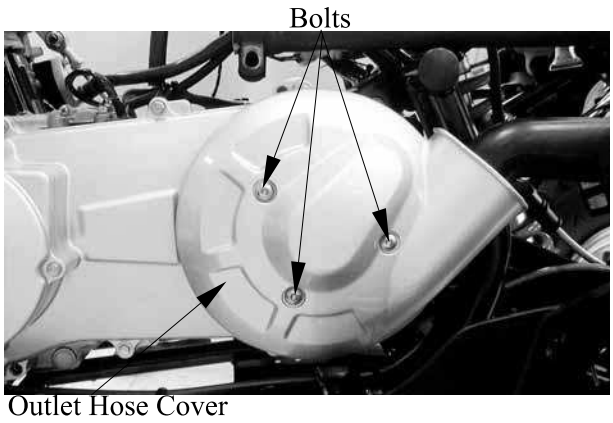


Remove the A.C.Generator, pulser and gear change switch couplers.



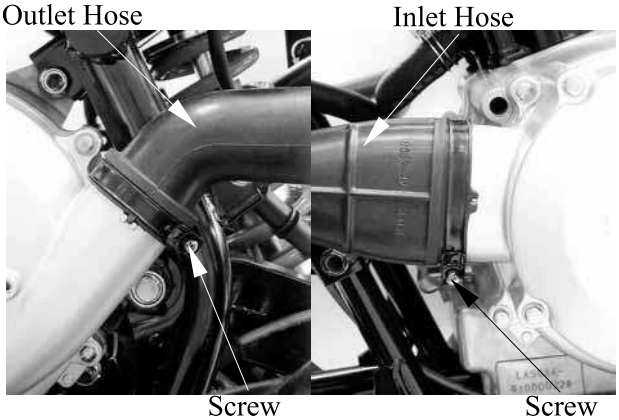
Disconnect the spark plug cap.

Remove the three bolts and remove the outlet hose cover.

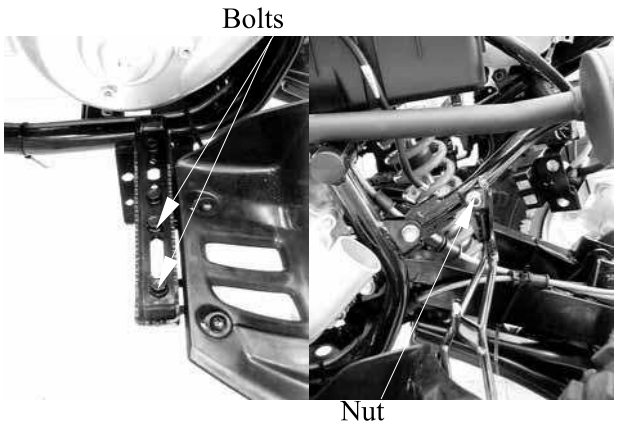


Unscrew the clamp and then disconnect the outlet hose from the left crankcase cover.

Unscrew the clamp and then disconnect the inlet hose from the left crankcase cover.

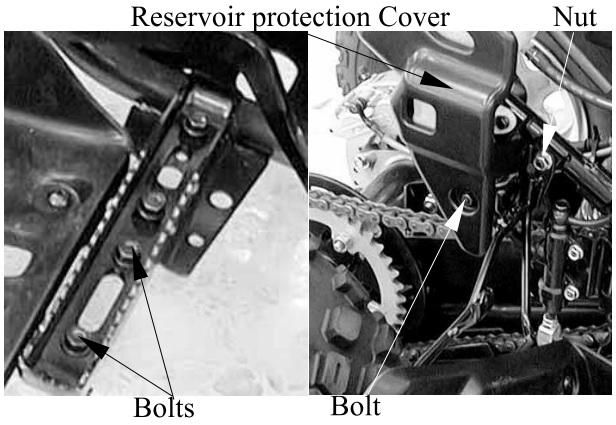


Remove the two bolts at the left foot peg attaching the left floor board holder and remove the nut at the left floor board holder, then remove the left floor board holder.

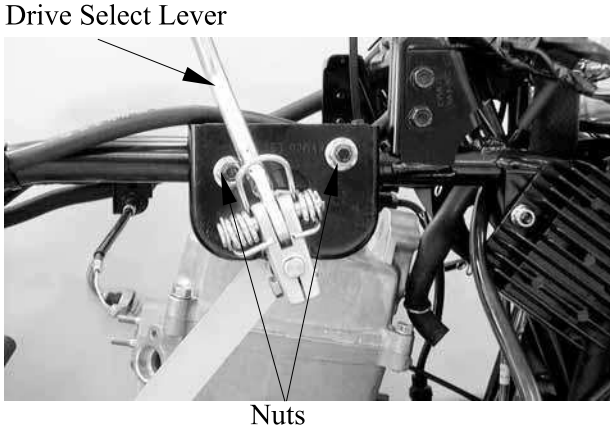


Remove the two bolts at the right foot peg attaching the right floor board holder.

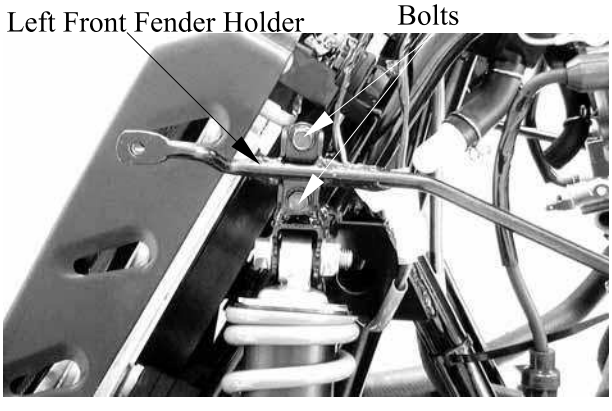
Remove the nut at the right floor board holder and bolt attaching the reservoir protection cover, then remove the right floor board holder.



Remove the two nuts and then remove the drive select lever.

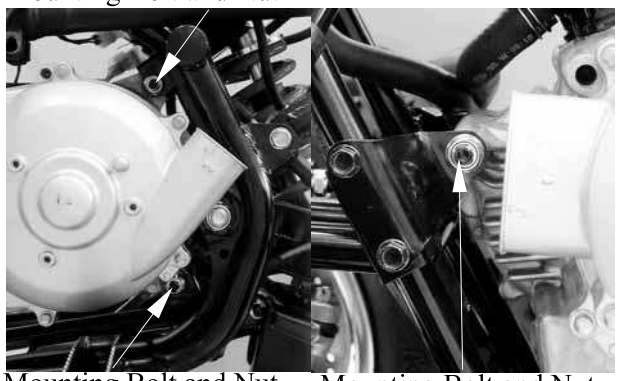


Remove the two bolts at the left front fender holder for remove the left front fender holder.



Remove the rear lower mounting bolt and nut.
Remove the rear upper mounting bolt and nut.
Remove the front mounting bolts and nuts.

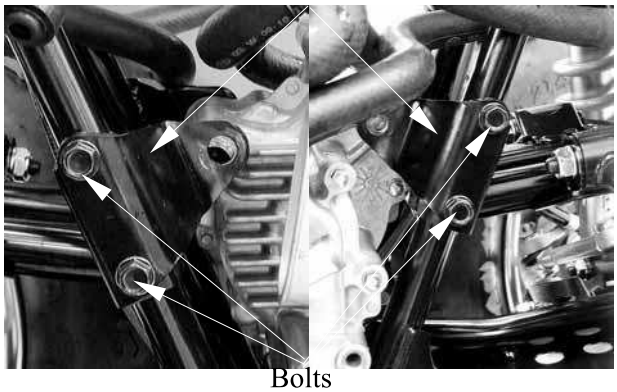
Mounting Bolt and Nut



Mounting Bolt and Nut
Mounting Bolt and Nut

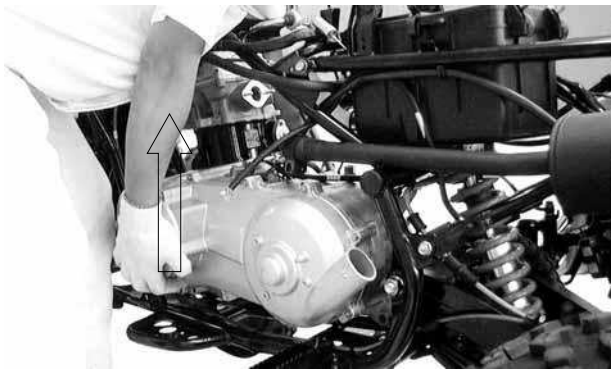
Remove the four bolts for remove the left and right engine brackets.

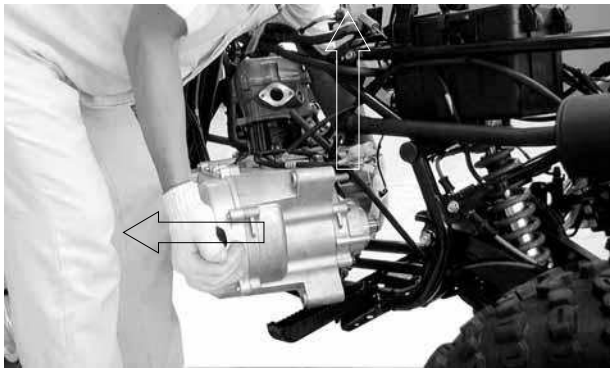
Brackets



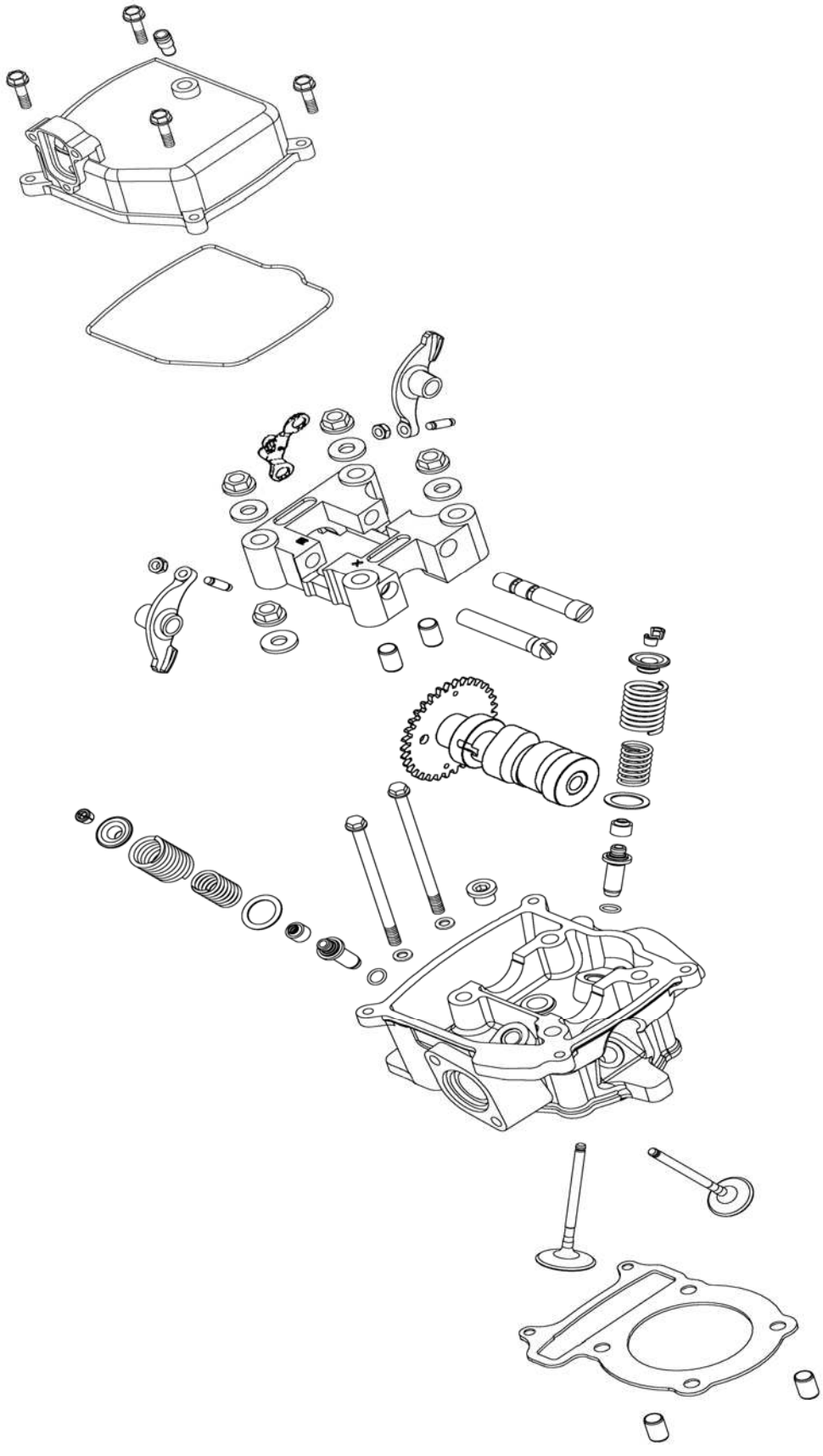
Bolts

Remove the engine assembly to the left side of the machine.





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	0.1	—
	EX	0.1	—
Cylinder head compression pressure		15±2kg/cm²	
Cylinder head warpage		—	0.05
Camshaft cam height	IN	34.287	34.15
	EX	34.1721	34.05
Valve rocker arm to shaft clearance		0.034～0.09	0.1
Valve stem-to-guide clearance	IN	0.010～0.037	0.06
	EX	0.025～0.052	0.08
Valve spring free length	IN	30.9	29.4
	EX	41	39
Valve spring compressed force	IN	10.20～11.84kg(at 18.05mm)	—
	EX	19.14～22.02kg(at 21.5mm)	—
Valve spring tilt	IN	0.8	—
	EX	1.07	—

TORQUE VALUES

Cylinder head cover bolt	0.8～1.2kgf-m	
Cam shaft hold nut	2.3～2.7kgf-m	Apply engine oil to threads
Tappet adjusting nut	0.7～1.1kgf-m	

SPECIAL TOOLS

Valve spring compressor	E040
Tappet adjuster	E012

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

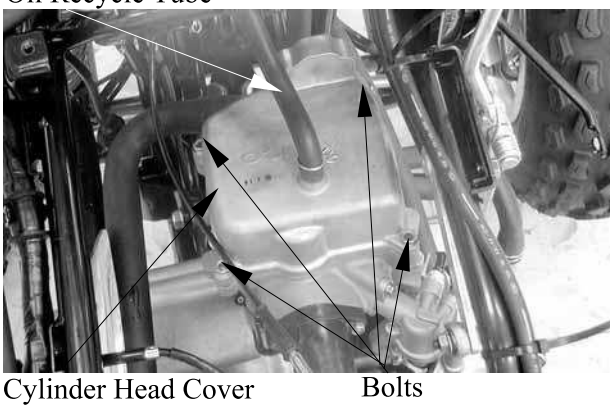
CYLINDER HEAD COVER

REMOVAL

Remove fuel tank. (Refer to the chapter 5)

Disconnect the oil recycle tube at the cylinder head cover.

Remove the four bolts at the cylinder head cover, then remove the cylinder head cover.

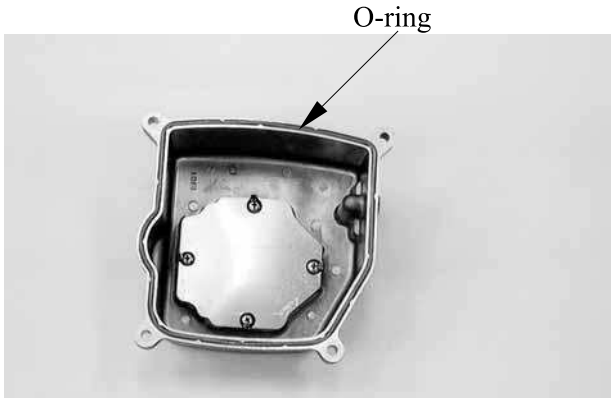


INSTALLATION

Install a new cylinder head cover O-ring and install the cylinder head cover.
Install and tighten the cylinder head cover bolts.

Torque: 0.8～1.2kgf-m

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

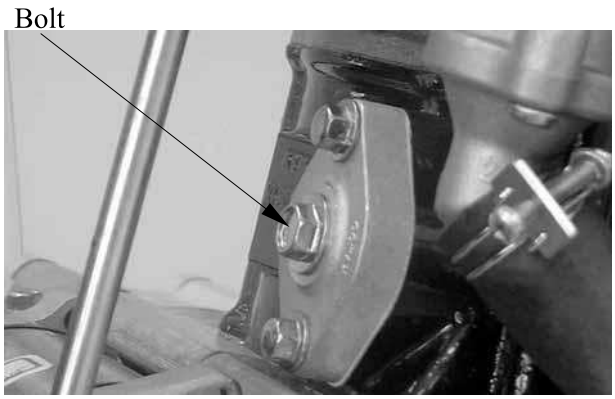


CAMSHAFT/CAMSHAFT HOLDER

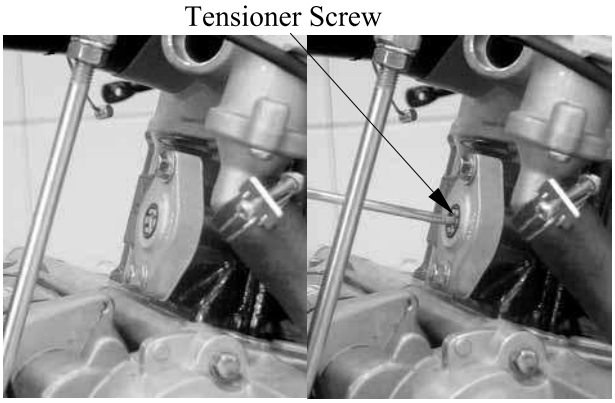
REMOVAL

Remove the cylinder head cover. (Refer to the cylinder head cover removal)

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



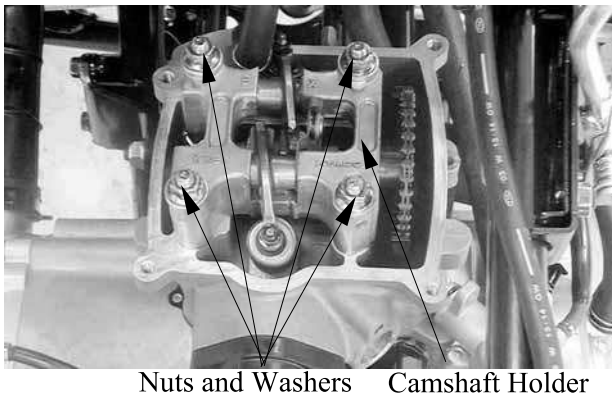
Turn the cam chain tensioner screw clockwise to tighten it.



Remove the four camshaft holder nuts and washers.

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

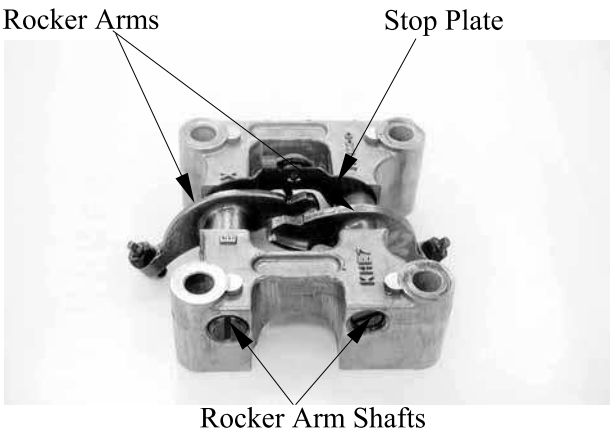
Remove the camshaft holder and dowel pins.


Nuts and Washers Camshaft Holder

Remove the camshaft gear from the cam chain and remove the camshaft.

CAMSHAFT HOLDER DISASSEMBLY

Take out the valve rocker arm shafts. Remove the valve rocker arms, arm shafts and stop plate.

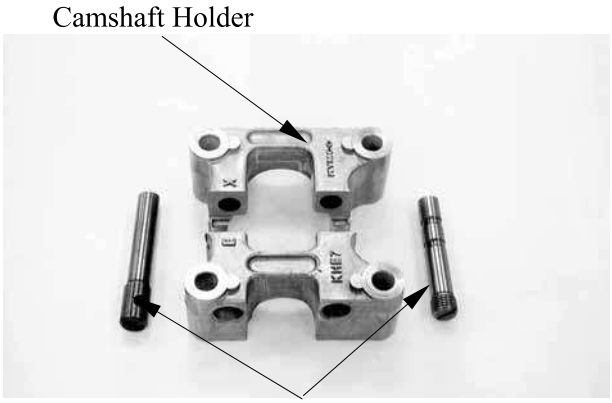


CAMSHAFT HOLDER INSPECTION

Inspect the camshaft holder for wear or damage.

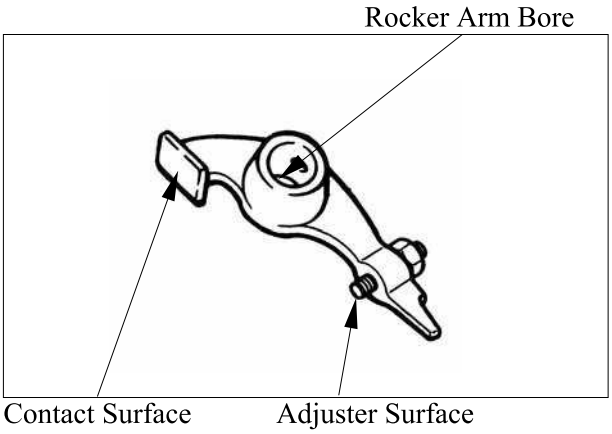
Inspect the rocker arm shaft for blue discoloration or grooves.

If any defects are found, replace the rocker arm shaft with a new one, then inspect lubrication system.



Inspect the rocker arm bore, cam lobe contact surface and adjuster surface for wear/pitting/scratches/blue discoloration.

If any defects are found, replace the rocker arm shaft with a new one, then inspect lubrication system.



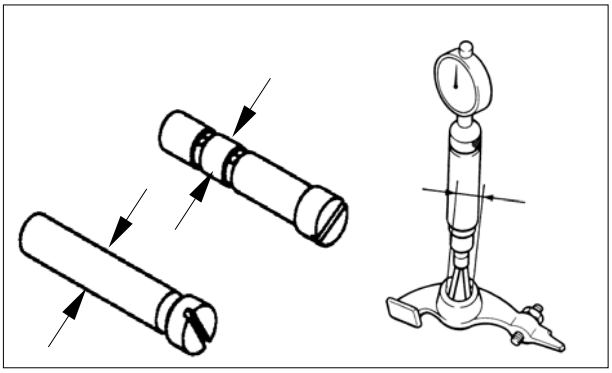
Measure each rocker arm shaft O.D.

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

Measure arm to shaft clearance.

Replace as a set if out of specification.

Service limits: 0.10mm



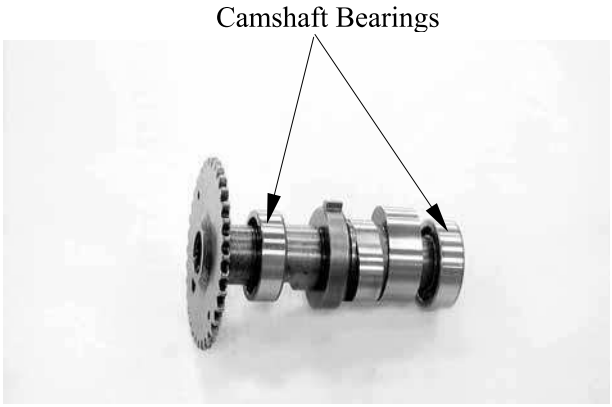
CAMSHAFT HOLDER ASSEMBLY

Reverse the "CAMSHAFT HOLDER DISASSEMBLY" procedures.

* Align the cross cutout on the exhaust valve rocker arm shaft with the bolt of the camshaft holder.

CAMSHAFT INSPECTION

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.



Inspect camshaft lobes for pitting/scratches/blue discoloration.

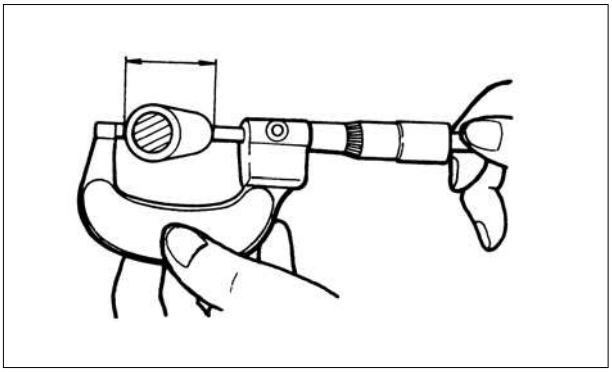
Measure the cam lobe height.

Service Limits:

IN : 34.15mm replace if below

EX: 34.05mm replace if below

If any defects are found, replace the camshaft with a new one, then inspect lubrication system.



INSTALLATION

Reverse the "CAMSHAFT REMOVAL" procedures.

Note the following points:

1. Turn the flywheel so that the "T" mark on the flywheel aligns with the index mark on the crankcase.
   Keep the round hole on the camshaft gear facing up and 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 onto the cylinder head. (Refer to the "VALVE CLEARANCE" section in the chapter 3)

   Install the camshaft dowel pins and holder.

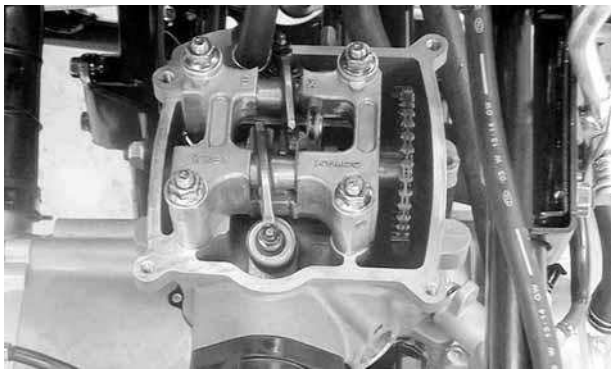

Dowel Pins

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

Torque:

Cam shaft hold nut: 2.3～2.7kgf-m

2. 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 bolt.



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

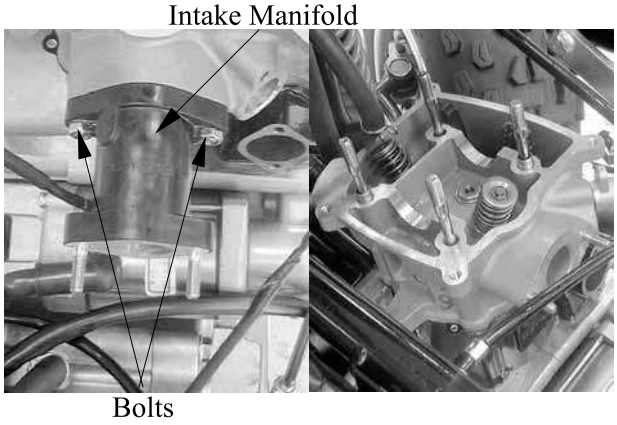
3. Adjust the valve clearance. (Refer to the "VALVE CLEARANCE" section in the chapter 3)

CYLINDER HEAD

REMOVE

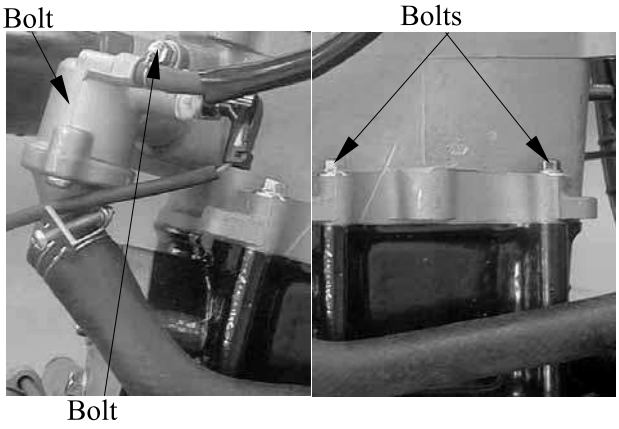
Remove the camshaft. (Refer to the "camshaft remove" section in the chapter 7)
Remove the carburetor. (Refer to the "carburetor remove" section in the chapter 5)
Remove the exhaust muffler. (Refer to the "exhaust muffler remove" section in the chapter 2)

Remove the two bolts and then remove the carburetor intake manifold.



Remove the bolt and disconnect the thermostat.

Remove the two cylinder head bolts.
Remove the cylinder head.

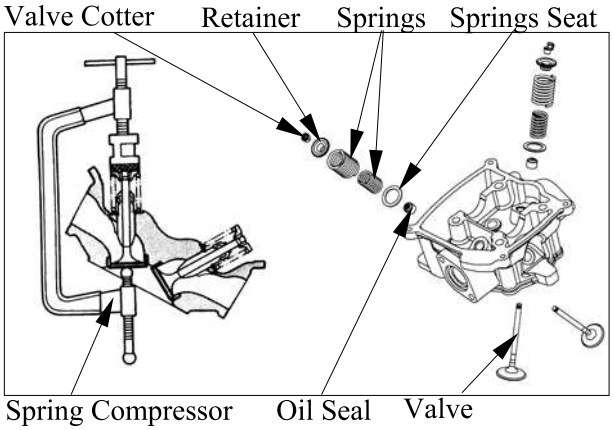


CYLINDER HEAD DISASSEMBLY

Remove the valve spring cotters, retainers, springs, spring seats, oil seals and valves 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.

Valve Spring Compressor E040



VALVE /VALVE GUIDE INSPECTION

Inspect each valve for bending, burning, scratches or abnormal stem wear.
If any defects are found, replace the valve with a new one.

Check valve movement in the guide.

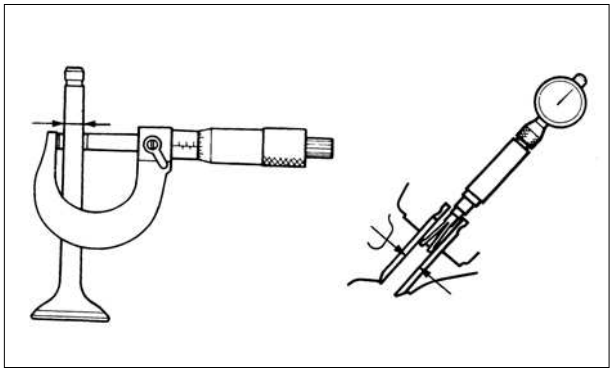
Measure each valve stem O.D.

Measure each valve guide I.D.

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

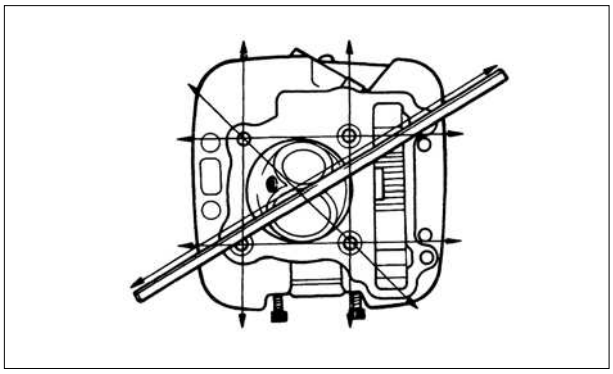
Service limits: IN : 0.06mm replace if over
EX: 0.08mm replace if over

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



CYLINDER HEAD INPECTION

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: 0.05mm repair or replace if over



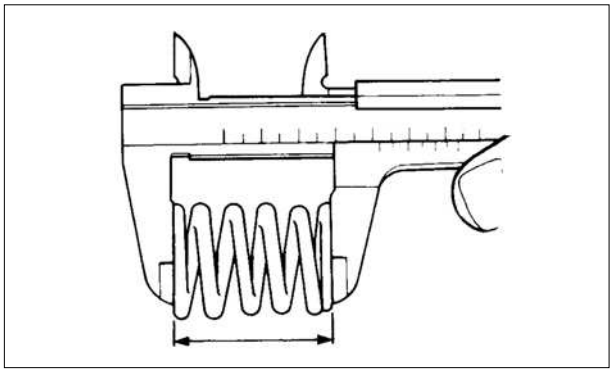
VALVE SPRING INSPECTION

Measure the free length of the inner and outer valve springs.

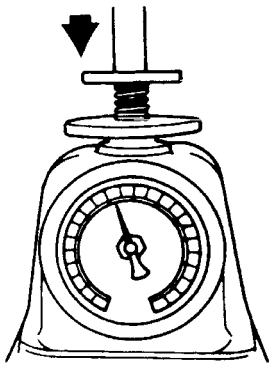
Service Limit:

Inner: 29.4mm replace if below

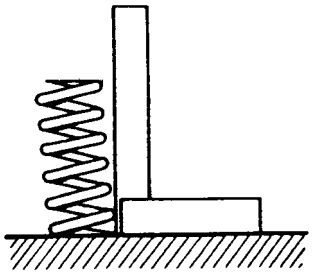
Outer: 39mm replace if below



Measure compressed force (valve spring) and installed length.
Replace if out of specification.
Service limits:
IN : 10.20～11.84kg(at 18.05mm)
EX : 19.14～22.02kg(at 21.5mm)



Measure the spring tilt.
Replace if out of specification.
Service limits: IN : 0.8mm
EX : 1.07mm



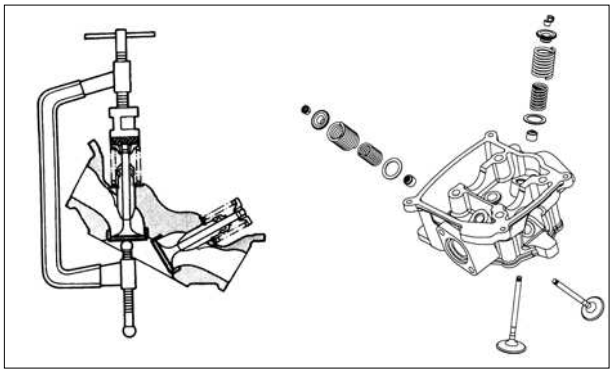
ASSEMBLY

Install the valve spring seats and oil seal.

*

Lubricate each valve 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.

Valve Spring Compressor E040

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.

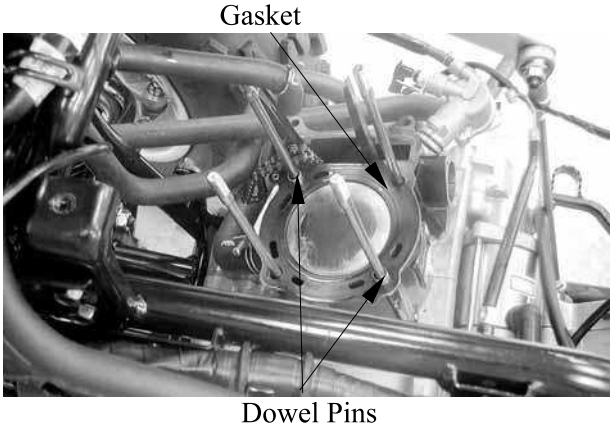
INSTALLATION

Install the dowel pins and a new cylinder head gasket.

Reverse the "CYLINDER HEAD REMOVAL" procedures.

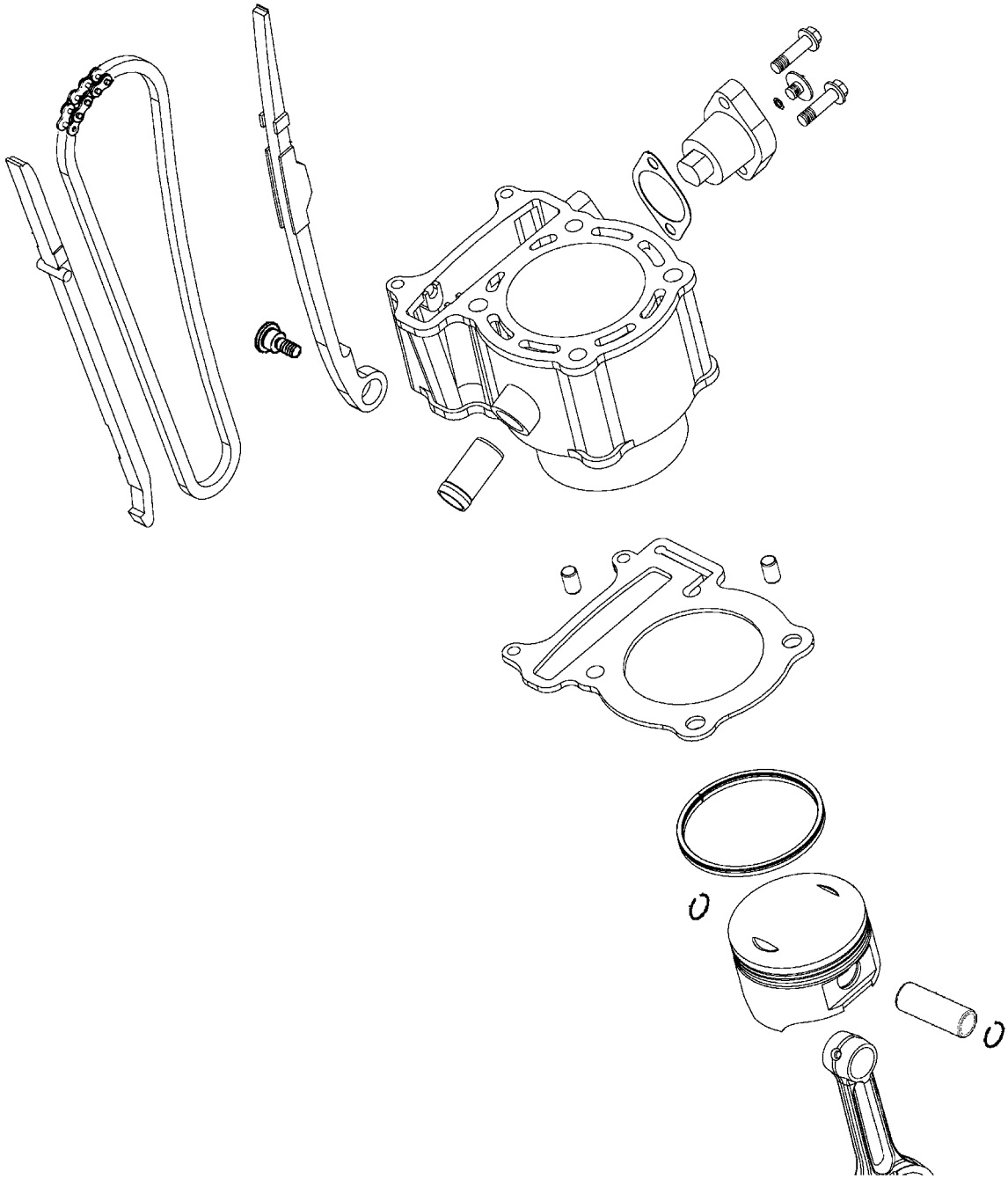
Torque:

Cylinder head bolt: 0.8～1.2kgf-m



CYLINDER /PISTON

8



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.

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

SPECIFICATIONS

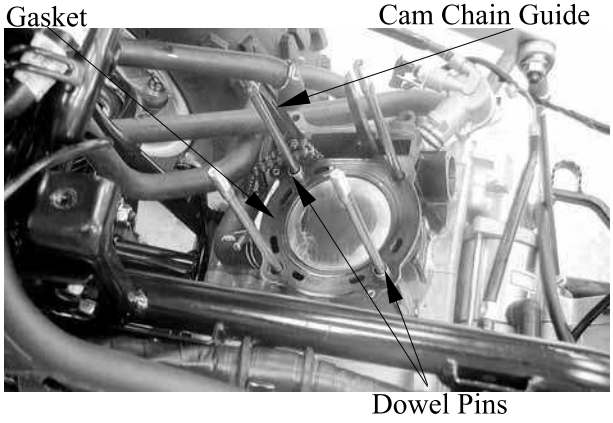
			Standard (mm)	Service Limit (mm)
Cylinder	I.D.		72.705～72.715	72.8
	Warpage		—	0.05
	Cylindricity		—	0.05
	True roundness		—	0.05
Piston, piston ring	Ring-to-groove clearance	Top	0.015～0.055	0.09
		Second	0.015～0.055	0.09
	Ring end gap	Top	0.15～0.3	0.5
		Second	0.3～0.45	0.65
		Oil ring	0.2～0.7	0.9
	Piston O.D.		72.67～72.69	72.6
	Piston O.D. measuring position		10mm from bottom of skirt	—
.	Piston-to-cylinder clearance		0.010～0.040	0.1
	Piston pin hole I.D.		17.002～17.008	17.04
Piston pin O.D			16.994～17.000	16.96
Piston-to-piston pin clearance			0.002～0.014	0.02
Connecting rod small end I.D. bore			17.016～17.034	17.06

CYLINDER/PISTON

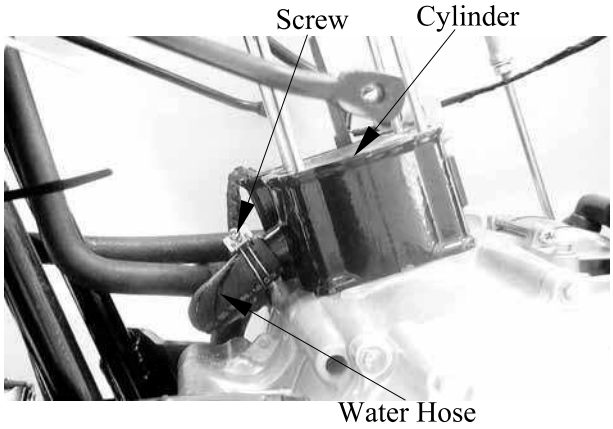
REMOVAL

Remove the cylinder head. (Refer to the chapter 7)

Remove the two dowel pins, cylinder head gasket and cam chain guide.

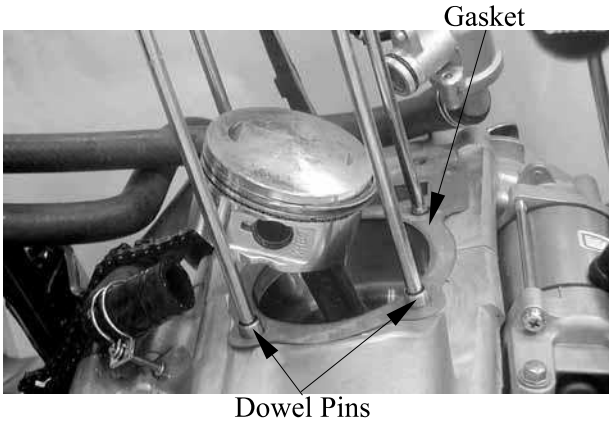


Unscrew the clamp and disconnect the water hose.
Remove the cylinder



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

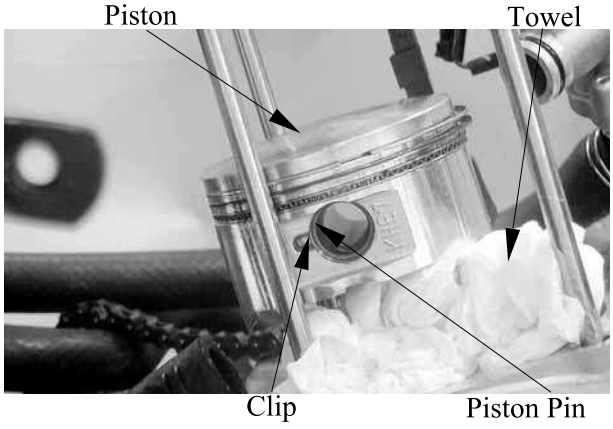
* Be careful not to drop foreign matters into the crankcase.



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.



INSPECTION

Inspect the piston, piston pin and piston rings.

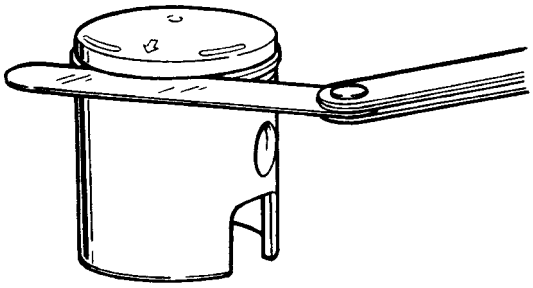
Remove the piston rings.

*

Clean carbon deposits from the piston ring grooves.

Inspect the piston wall for wear/scratches/damage.

If any defects are found, replace the piston with a new one.

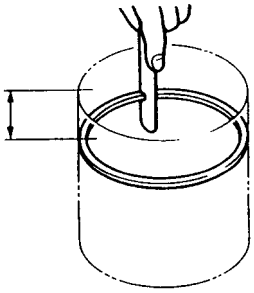


Install the piston rings onto the piston and measure the piston ring-to-groove clearance.

Service Limits: **Top**: 0.09mm replace if over

2nd: 0.09mm replace if over

Remove the piston rings 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.

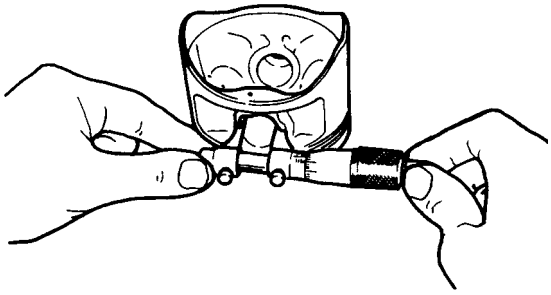
Service Limit: Top: 0.5mm replace if over

2nd: 0.65mm replace if over

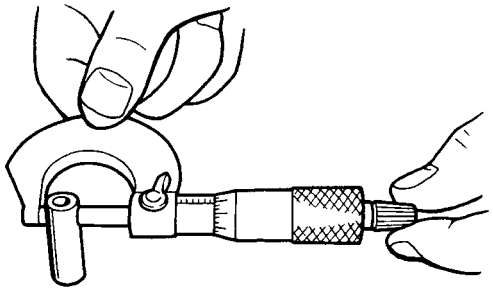
Oil ring: 0.9mm replace if over

Measure the piston pin hole I.D.

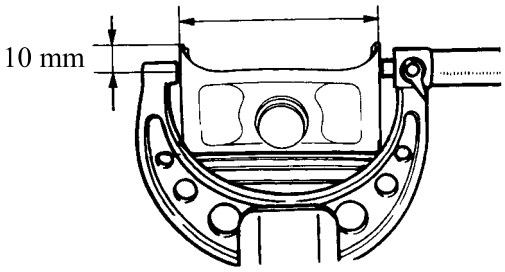
Service Limit: 17.04mm replace if over



Measure the piston pin O.D.
Service Limit: 16.96mm replace if below



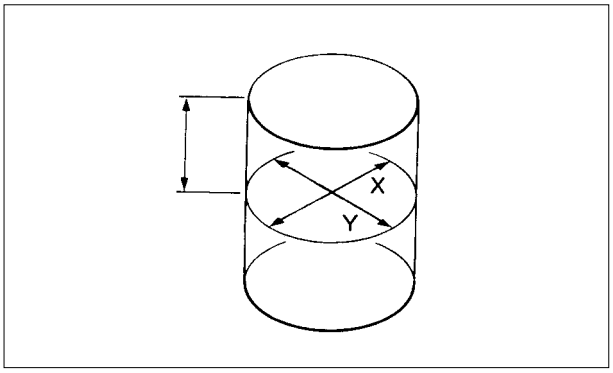
Measure the piston O.D.
*



Service Limit: 72.6mm replace if below

Measure the piston-to-piston pin clearance.
Service Limit: 0.02mm 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).
Cylinder I.D.:
Service Limit: 72.8mm replace if over



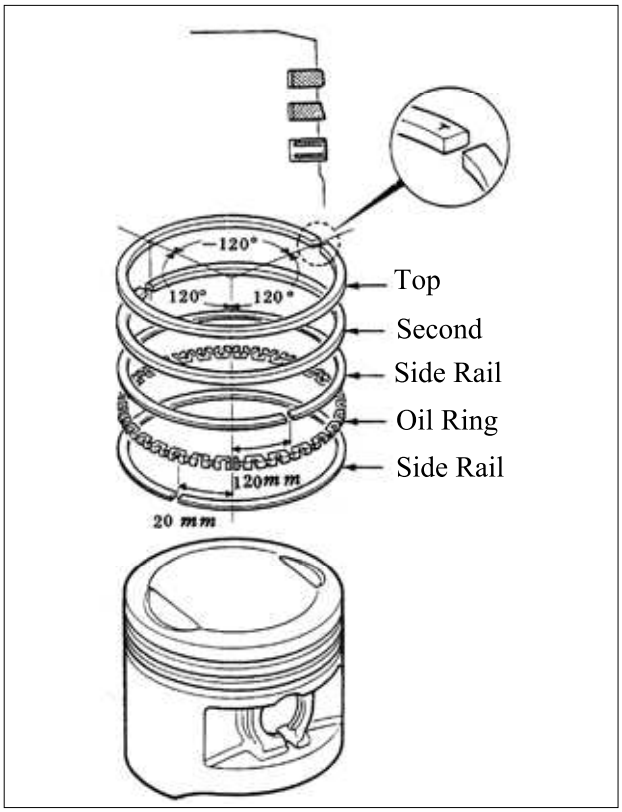
Measure the cylinder-to-piston clearance.
Service Limit: 0.1mm repair or replace if over

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

PISTON RING INSTALLATION

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

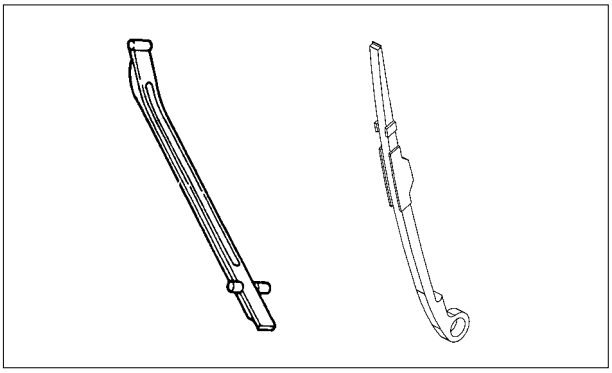
*
- Be careful not to damage or break the piston and piston rings.
- All rings should be installed with the markings facing up.
- After installing the rings, they should rotate freely without sticking.



Measure the connecting rod small end I.D.
Service Limit: 17.06mm replace if over

Measure the connecting rod to piston pin clearance.
Service Limit: 0.06mm replace if over

Inspect the exhaust side and intake side chain guides.
Wear/Damage → Replace.



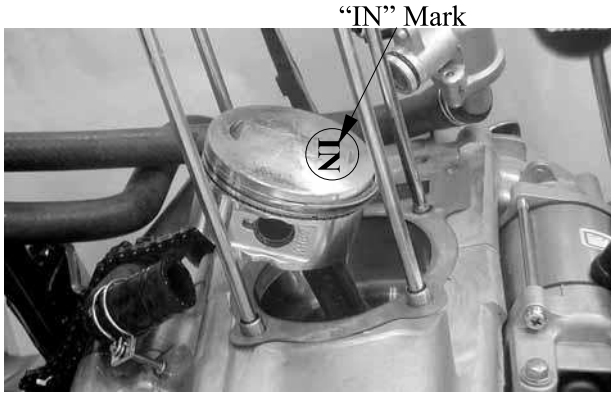
PISTON INSTALLATION

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

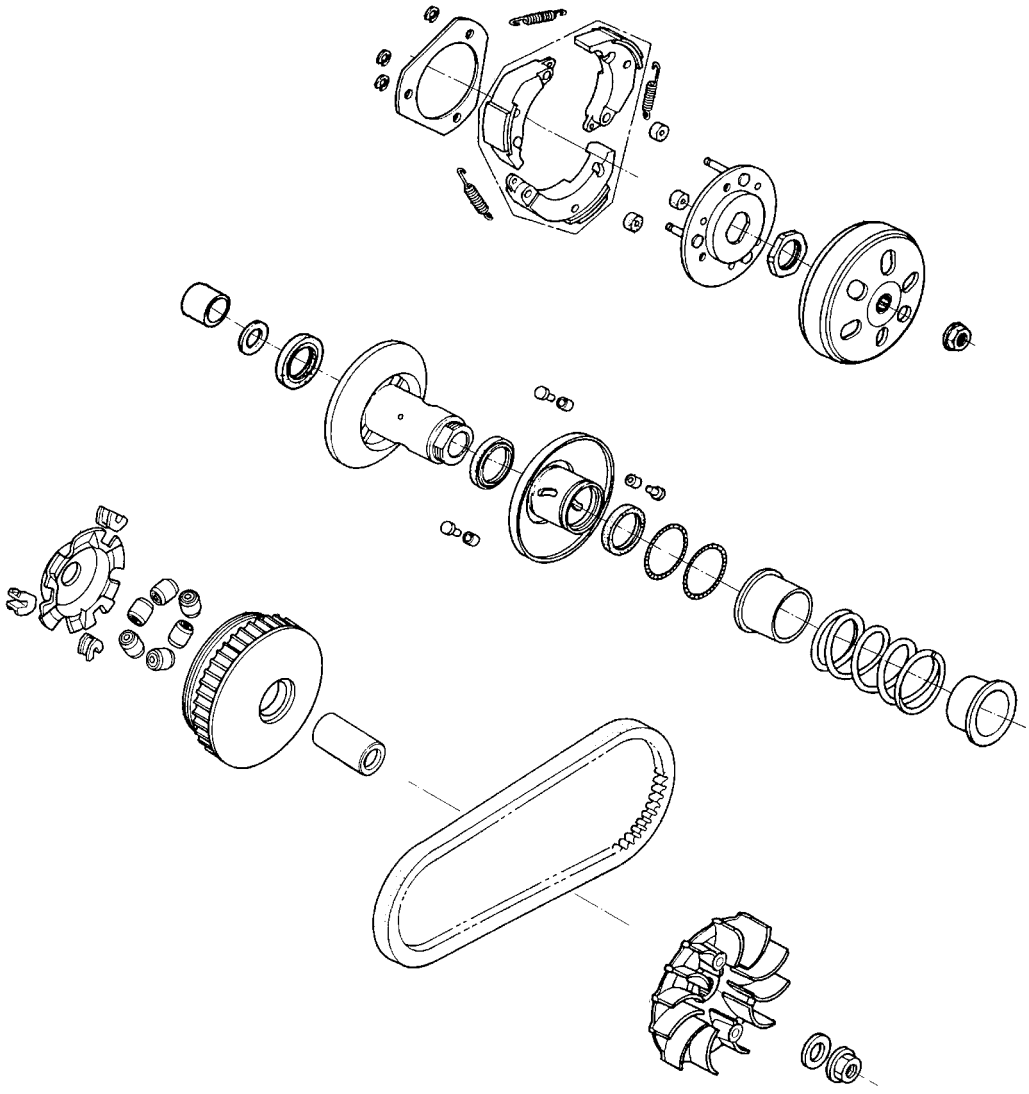
Install the dowel pins and a new cylinder gasket on the crankcase.

Coat the cylinder bore, piston and piston rings with clean engine oil.

Carefully lower the cylinder over the piston by compressing the piston rings.

* • Apply proper clean engine oil around cylinder wall.
  • Be careful not to damage or break the piston rings.
  • Stagger the ring end gaps at 120° to the piston pin.

DRIVE AND DRIVEN PULLEYS



SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The drive pulley, clutch and driven pulley can be serviced with the engine installed in the frame.
- 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)
Movable drive face bushing I.D.	26.989～27.052	27.06
Drive face collar O.D.	26.96～26.974	26.94
Drive belt width	23.6～24.4	22
Clutch lining thickness	—	0.5
Clutch outer I.D.	153.0～153.2	153.5
Driven face spring free length	—	131
Driven face O.D.	39.965～39.985	39.94
Movable driven face I.D.	40.000～40.025	40.06
Weight roller O.D.	22.92～23.08	22.8

TORQUE VALUES

Drive face nut	9.0～10.0kgf-m
Clutch outer nut	5.0～6.0kgf-m
Drive plat nut	5.0～6.0kgf-m

SPECIAL TOOLS

Universal holder	E017	Clutch spring compressor	E027
Bearing puller	E008	Oil seal and bearing install	E014

TROUBLESHOOTING

Engine starts but motorcycle won't move

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

Lack of power

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

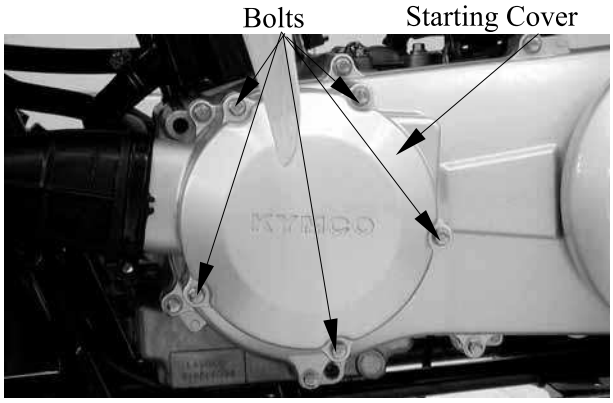
Engine stalls or motorcycle creeps

- Broken clutch weight spring

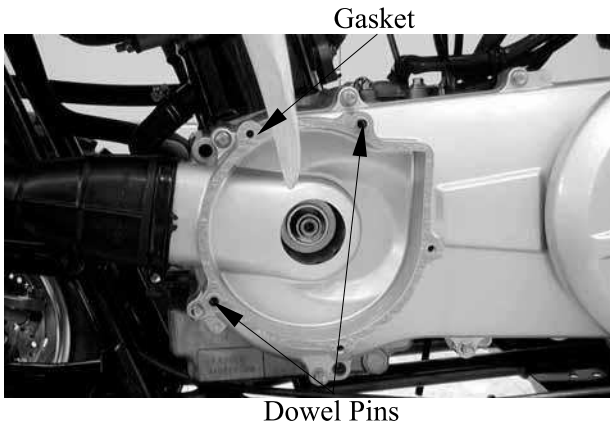
LEFT CRANKCASE COVER

REMOVAL

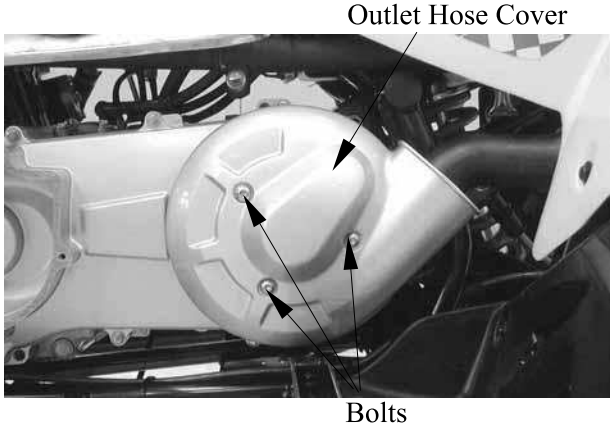
Remove the five bolts.
Remove the starting cover.



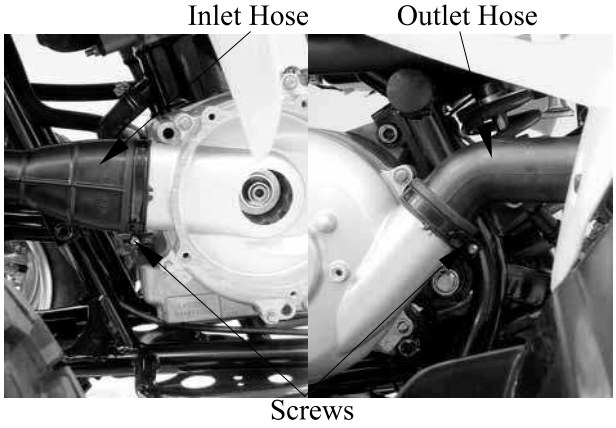
Remove the dowel pins and gasket.



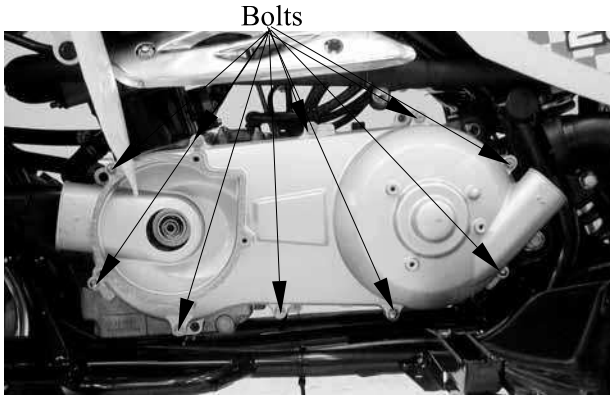
Remove the three bolts.
Remove the outlet hose cover.



Loosen the drive belt air inlet and outlet hose band screws and disconnect them from the left crankcase cover.

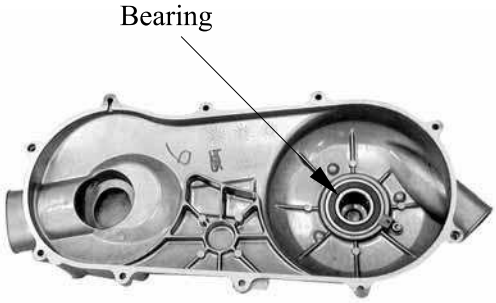


Remove the left crankcase cover bolts and left crankcase cover.
Remove the gasket and dowel pins.



INSPECTION

Inspect the bearing for allow play in the left crankcase cover or the bearing turns roughly → Replace.



INSTALLATION

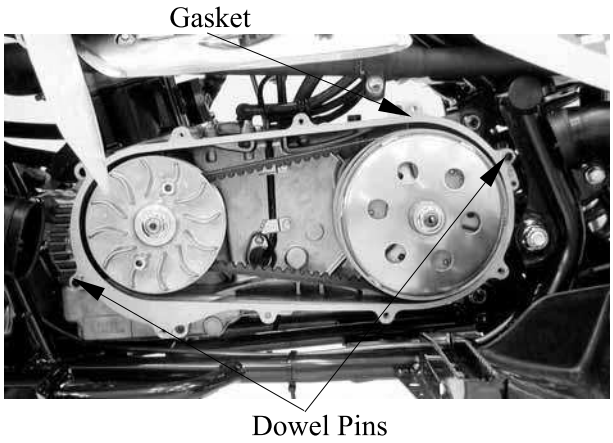
Install the dowel pins and new gasket.

Reverse the "LEFT CRANKCASE COVER REMOVAL" procedures.

Install the left crankcase cover and tighten the bolts.

Connect the drive belt air inlet and outlet hose and tighten band screws.

Install the starting cover and outlet hose cover.

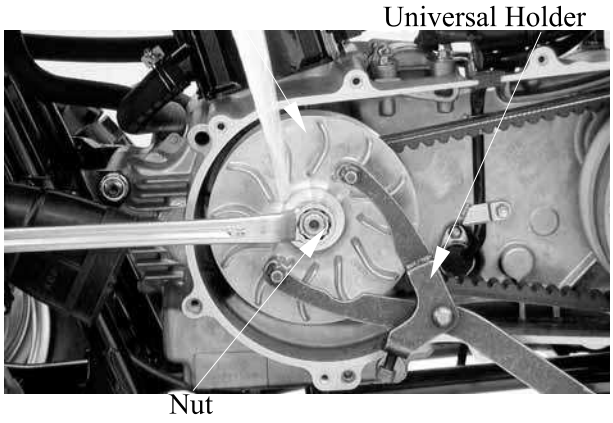


DRIVE PULLEY

REMOVAL

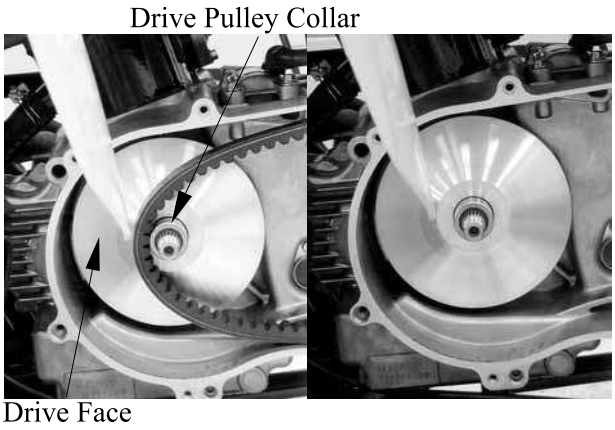
Remove the left crankcase cover. (Refer to the "LEFT CRANKCASE COVER REMOVAL" section in the chapter 9)

Hold the drive pulley using a universal holder and remove the drive face nut and washer.
Remove the drive pulley.



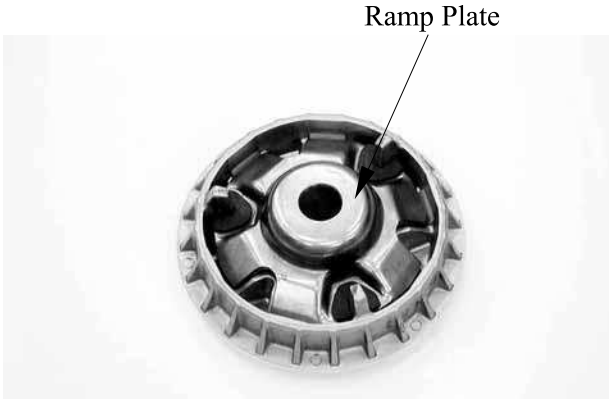
Universal Holder E017

Remove the movable drive face assembly and drive pulley collar.

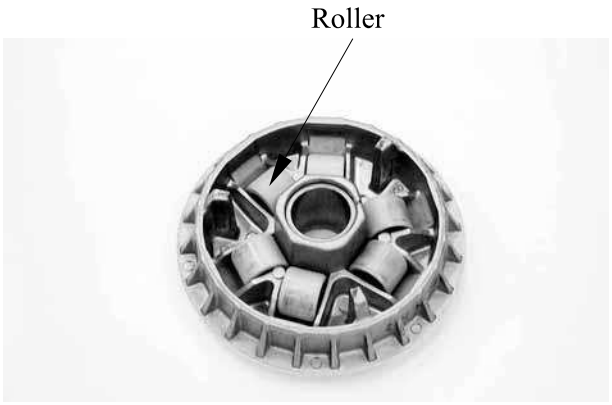


DISASSEMBLY

Remove the ramp plate.



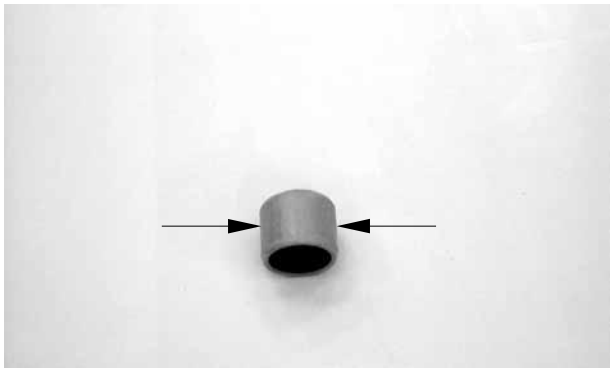
Remove the six weight rollers.



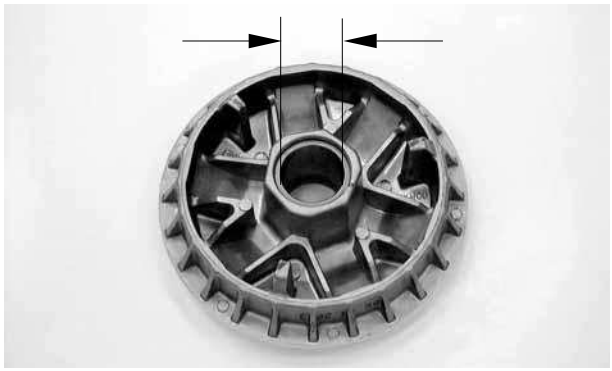
INSPECTION

Check each weight roller for wear or damage.
Measure each weight roller O.D.

Service Limit: 22.8mm replace if below.

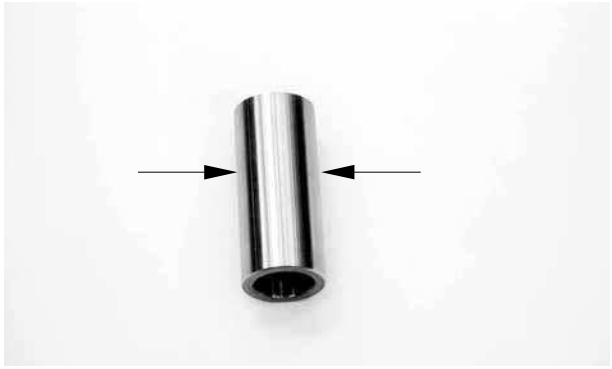


Measure the movable drive face bushing I.D.
Service Limit: 27.06mm replace if over

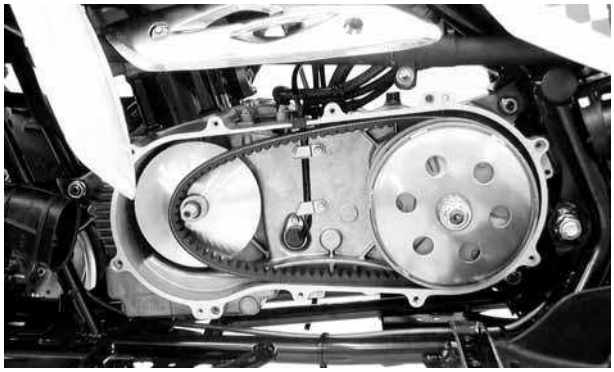


ASSEMBLY
Install the weight rollers into the movable drive face.
Install the ramp plate.

Check the drive pulley collar for wear or damage.
Measure the O.D. of the drive pulley collar sliding surface.
Service Limit: 26.94mm replace if below

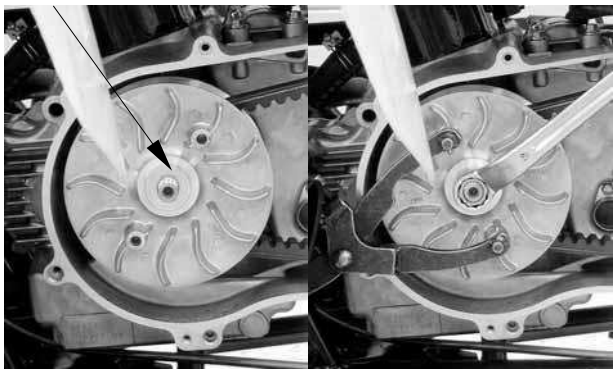


INSTALLATION
Install the drive pulley face assembly and collar.



Install the drive pulley, wash and nut.

Washer



* 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 washer with the "OUT SIDE" mark facing out.
Do not get oil or grease on the drive belt or pulley faces.

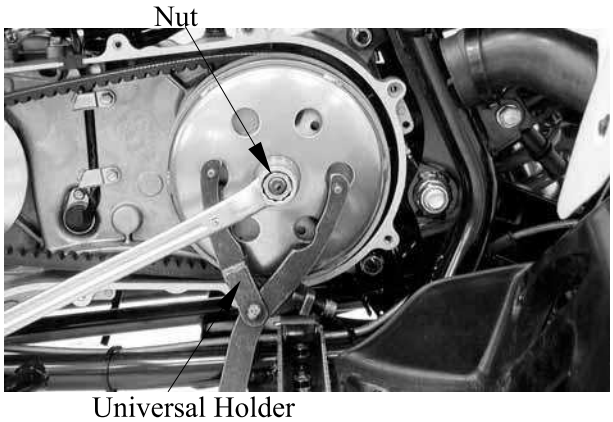
Torque: 9.0～10.0kgf-m

CLUTCH/DRIVEN PULLEY

REMOVAL

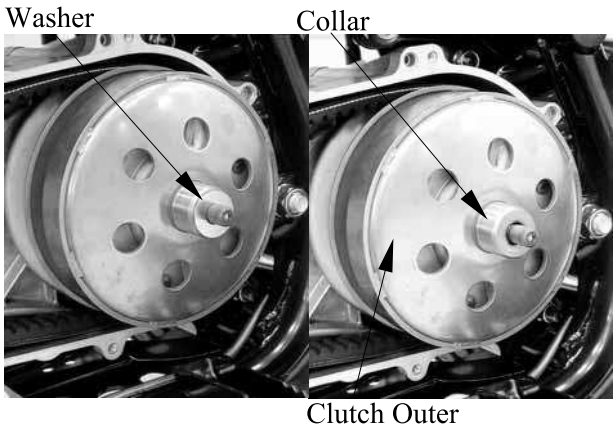
Remove the left crankcase cover. (Refer to the "LEFT CRANKCASE COVER REMOVAL" section in the chapter 9)
Remove the drive pulley. (Refer to the "DRIVE PULLEY REMOVAL" section in the chapter 9)

Hold the clutch outer with the universal holder and remove the clutch outer nut.

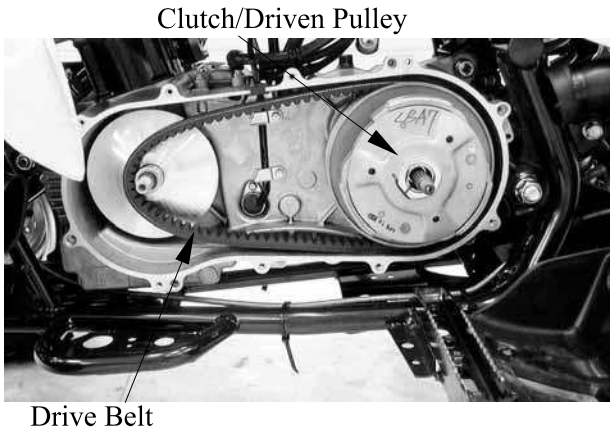


Universal Holder E017

Remove the wash, collar and clutch outer.

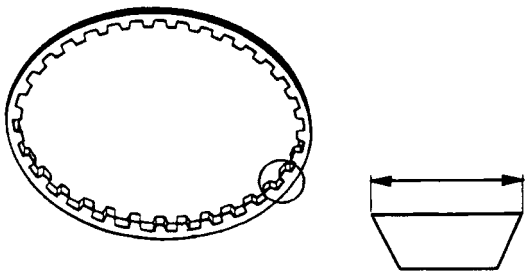


Remove the clutch/driven pulley and drive belt.



DRIVE BELT INSPECTION

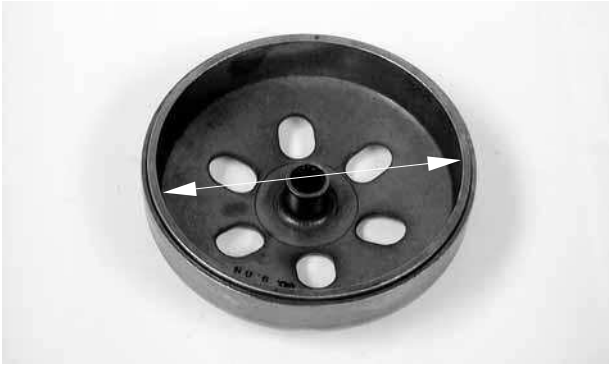
Check the drive belt for cracks, separation or abnormal or excessive wear.
Measure the drive belt width.
Service Limit: 22.0mm replace if below
*



CLUTCH OUTER INSPECTION

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

Service Limit: 153.5mm replace if over



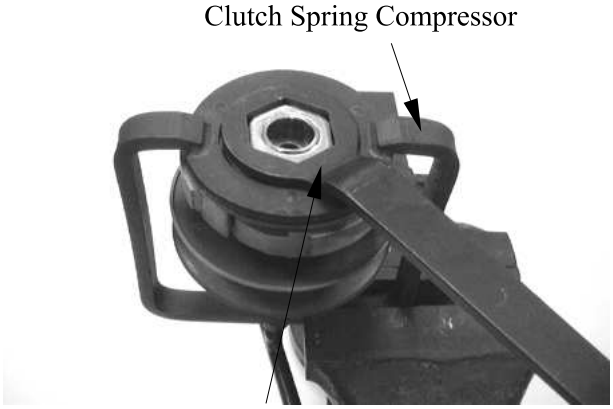
CLUTCH/DRIVEN PULLEY DISASSEMBLY

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

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

Special

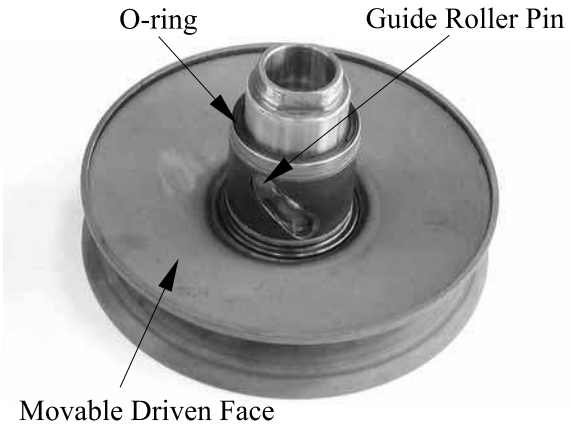
Clutch Spring Compressor E027



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.

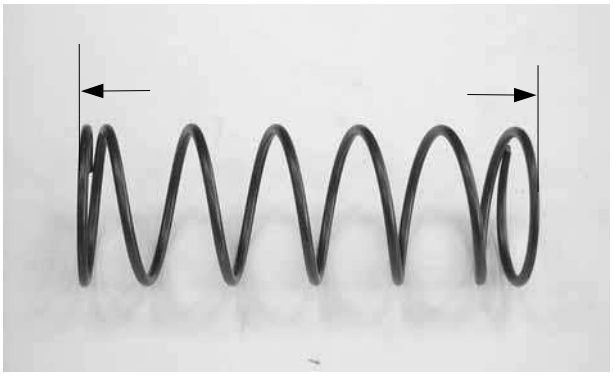


Remove the oil seal from the movable driven face.

Measure the clutch lining thickness.
Service Limit: 0.5mm replace if below

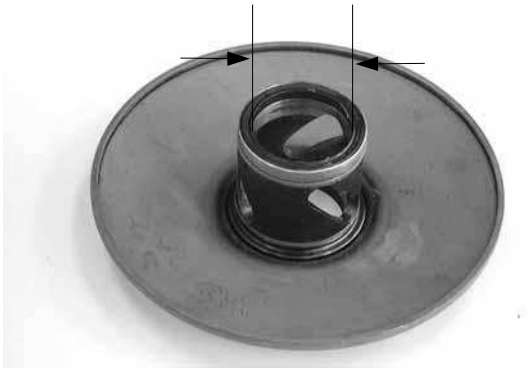
INSPECTION

Measure the driven face spring free length.
Service Limit: 131mm replace if below



Check the driven face for wear or damage.
Measure the driven face O.D.
Service Limit: 39.94mm replace if below

Check the movable driven face for wear or damage.
Measure the movable driven face I.D.
Service Limit: 40.06mm replace if over

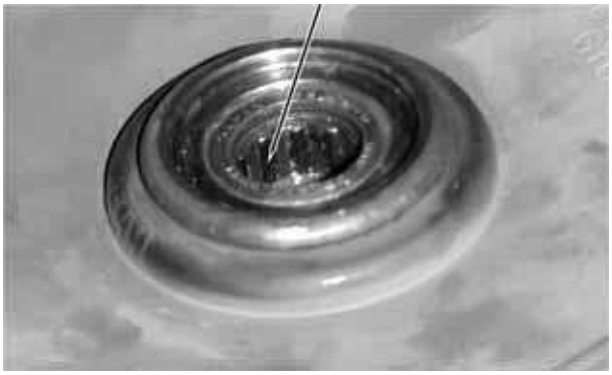


DRIVEN PULLEY FACE BEARING REPLACEMENT

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

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

Inner Bearing



Remove the snap ring and drive the outer bearing out of the driven face.

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

Outer Bearing

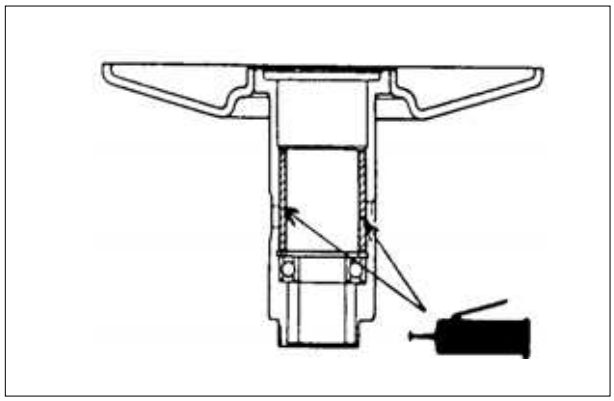
Apply grease to the outer bearing.
Drive a new outer bearing into the driven face with the sealed end facing up.

Special

Bearing Puller E008

Seat the snap ring in its groove.
Apply grease to the driven face bore areas.

* Pack all bearing cavities with proper grease.
  Specified grease: Heat resistance 230°C



Press a new needle bearing into the driven face.

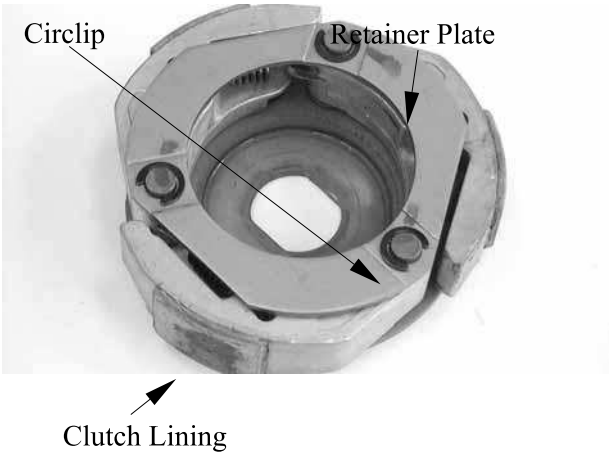
Special

Oil Seal And Bearing Install E014

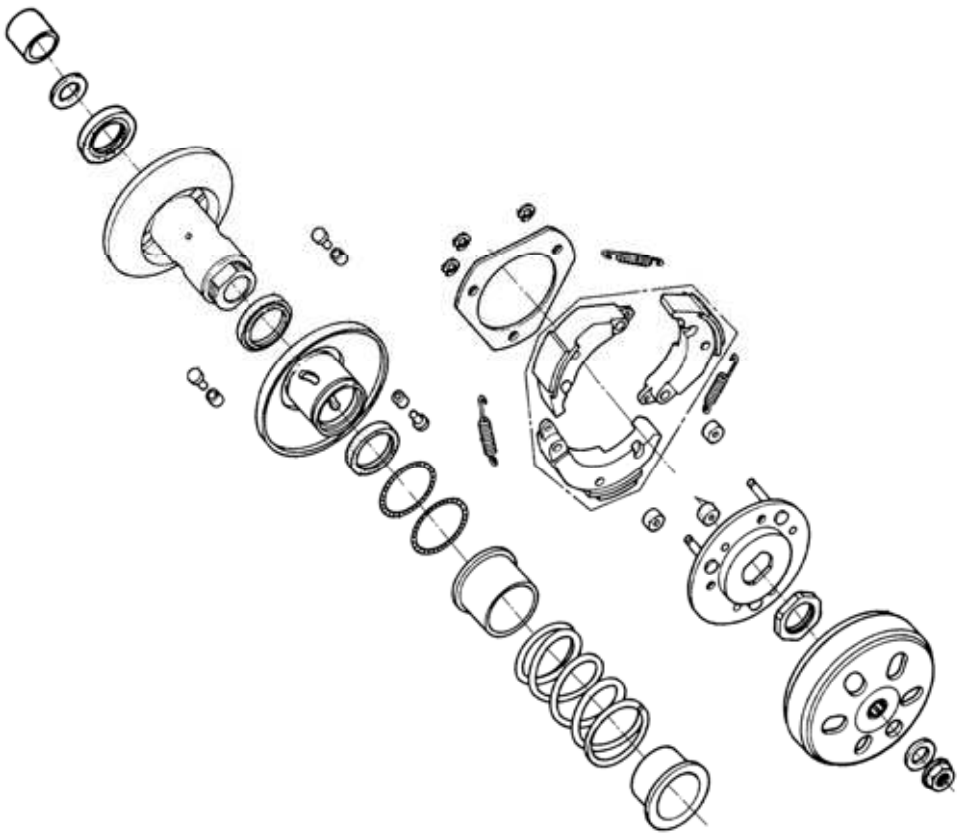
CLUTCH DISASSEMBLY

Remove the circlips and retainer plate to disassemble the clutch.

* Keep grease off the clutch linings.



CLUTCH / DRIVEN PULLEY 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.

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

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.

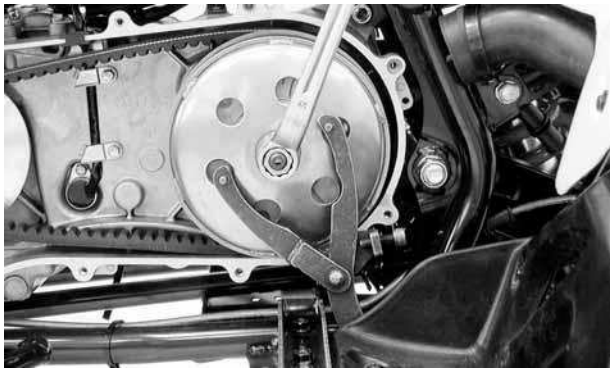
Compress the clutch spring compressor and install the drive plate nut.
Set the clutch spring compressor in a vise and tighten the drive plate nut to the specified torque.
Torque: 5.0～6.0kgf-m

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

Special
Clutch Spring Compressor E027

INSTALLATION

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



* Keep grease off the drive shaft.

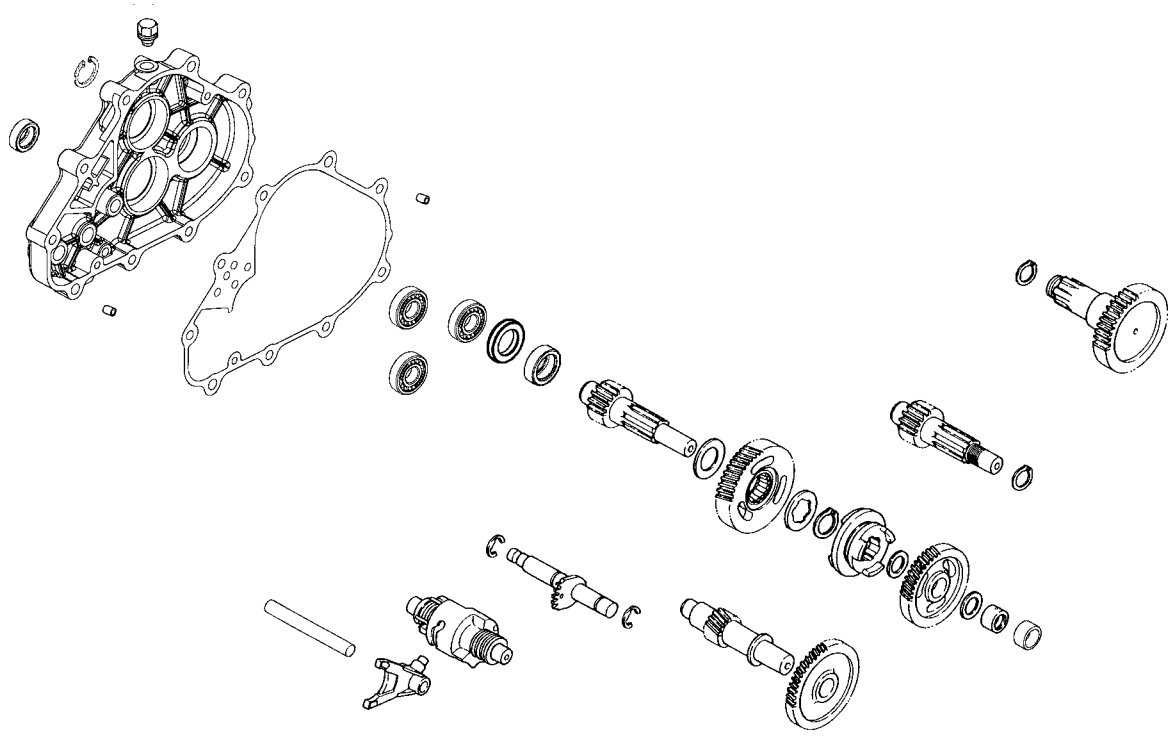
Install the clutch outer, collar and washer.
Hold the clutch outer with the flywheel holder.
Install and tighten the clutch outer nut.

Torque: 5.0～6.0kg-m

Special

Universal Holder E017

FINAL REDUCTION/TRANSMISSION SYSTEM



SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The transmission system can be serviced with the engine installed in the frame.
- When replacing the drive shaft, use a special tool to hold the bearing inner race for this operation.

SPECIFICATIONS

Specified Oil: GEAR OIL SAE 90#

Oil Capacity:	At change	: 0.3 liter
	At disassembly	: 0.4 liter

TORQUE VALUES

Transmission case cover bolt	2.4～3.0kgf-m

TROUBLESHOOTING

Engine starts but motorcycle won‘t move

- Damaged transmission
- Seized or burnt transmission

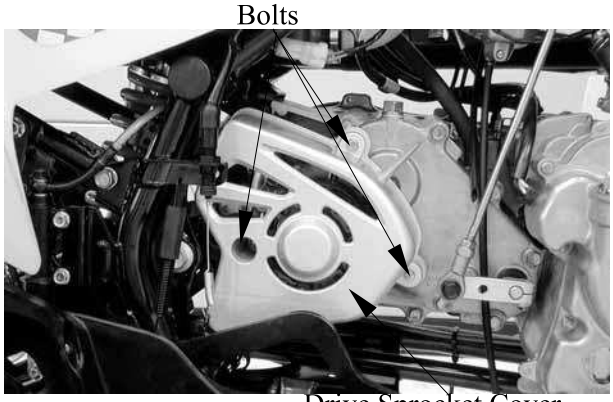
Oil leaks

- Oil too rich
- Worn or damaged oil seal

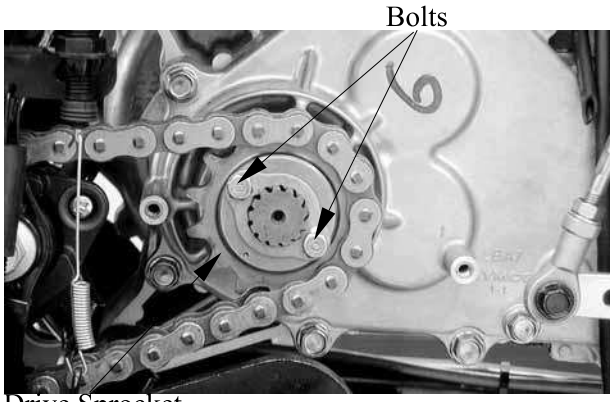
TRANSMISSION CASE COVER REMOVAL

Drain transmission gear oil into a clean container. (Refer to the "TRANSMISSION OIL REPLACEMENT" section in the chapter 3)

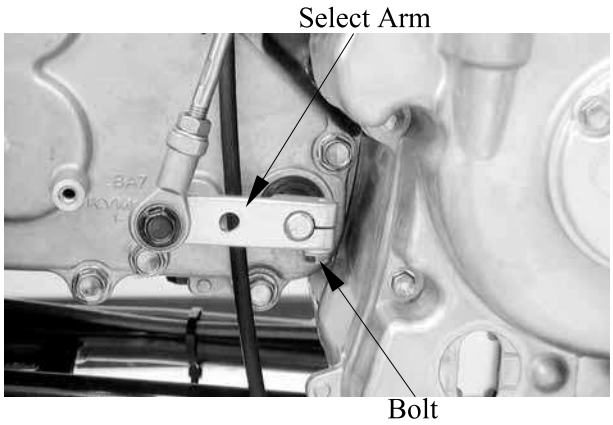
Remove the three and then remove the drive sprocket cover.



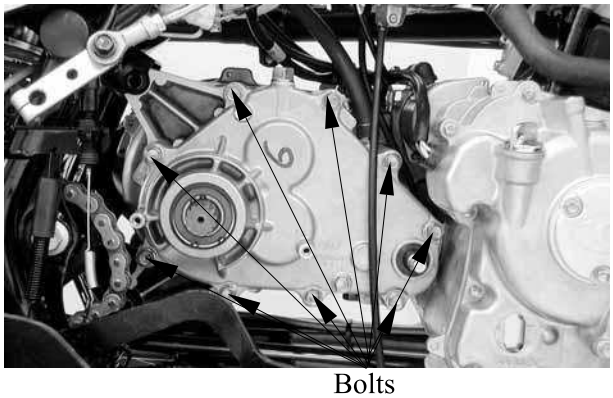
Remove the two bolts and then remove the washer and drive sprocket.



Remove the bolt and then disconnect the drive shift arm from the shift shaft.

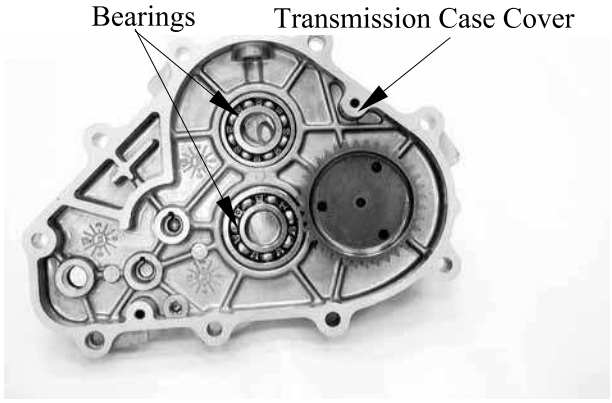


Remove the transmission case cover attaching bolts.



Remove the transmission case cover, dowel pins and gasket.

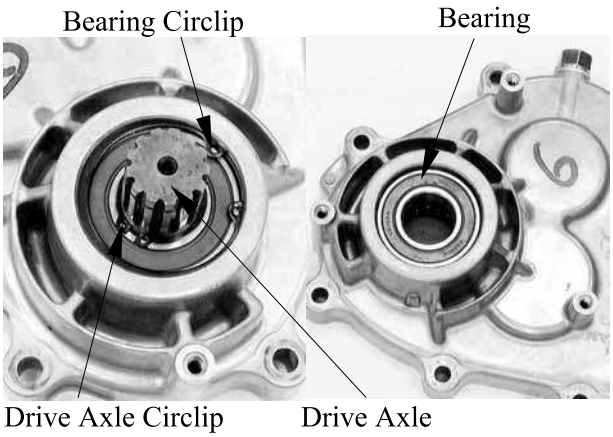
Inspect the bearings for allow play in the transmission case cover or the bearings turn roughly.
If any defects are found, replace the bearing with a new one.



TRANSMISSION CASE COVER DISASSEMBLY

Remove the drive axle circlip.
Remove the drive axle from the transmission case cover.
Remove the bearing circlip for remove the bearing.

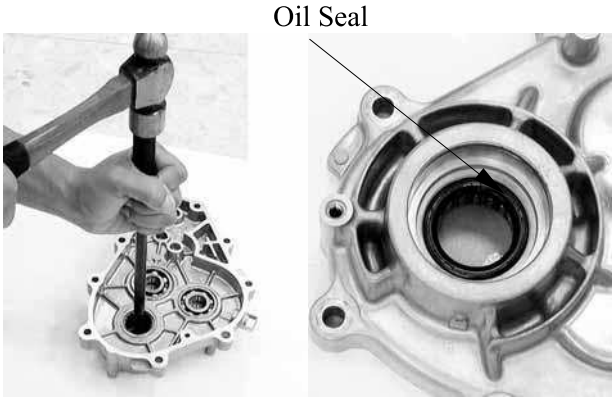
Inspect the bearing for allow play in the transmission case cover or the bearing turns roughly .
If any defects are found, replace the bearing with a new one.



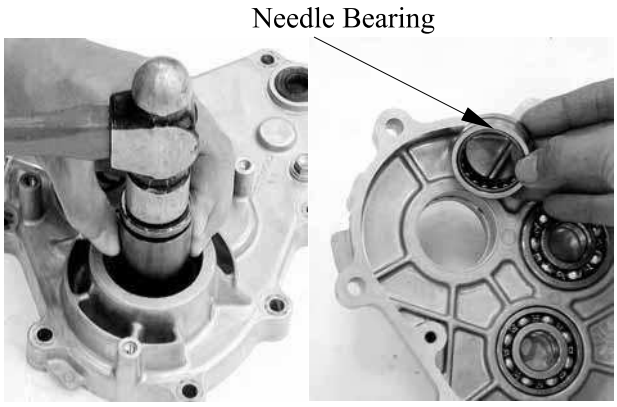
Inspect the drive axle gear teeth for wear or damage.

Remove the bearing to expose the oil seal.

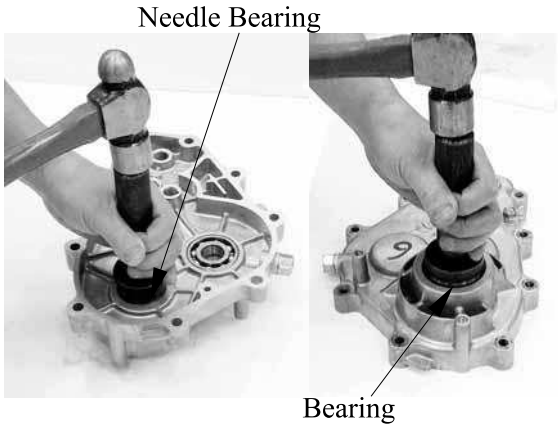
Inspect the oil seal for wear or damage.
If any defects are found, replace the oil seal with a new one.



Inspect the needle bearing for allow play in the transmission case cover or the bearing turns roughly.
If any defects are found, replace the bearing with a new one.

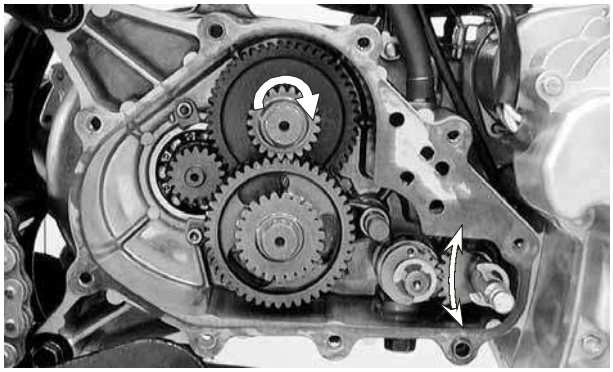


ASSEMBLY
Install the needle bearing.
Install the oil seal and bearing.
Install the bearing circlip.
Install the drive axle and drive axle cirelip.

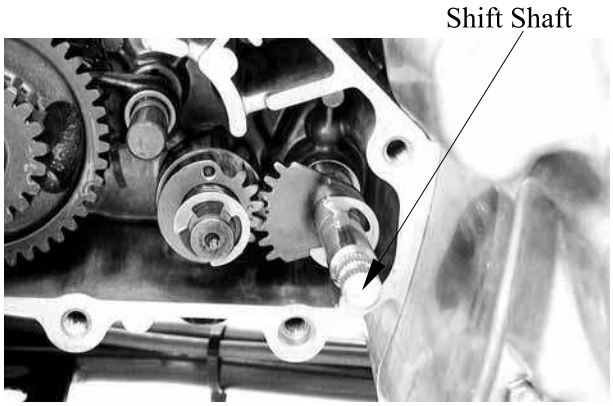


TRANSMISSION
REMOVAL
Remove the transmission cover. (Refer to the "TRANSMISSION CASE COVER REMOVAL" in the chapter 10)

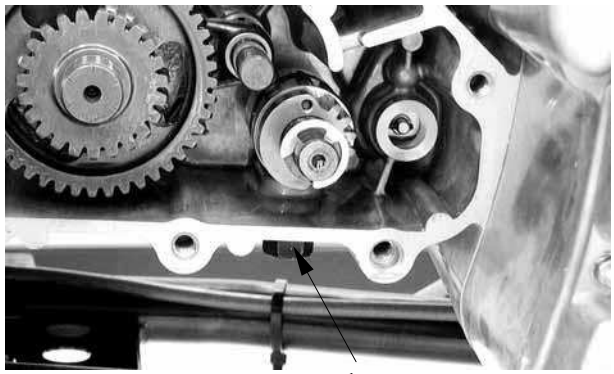
Check the transmission operation.
Unsmooth operation → Repair.



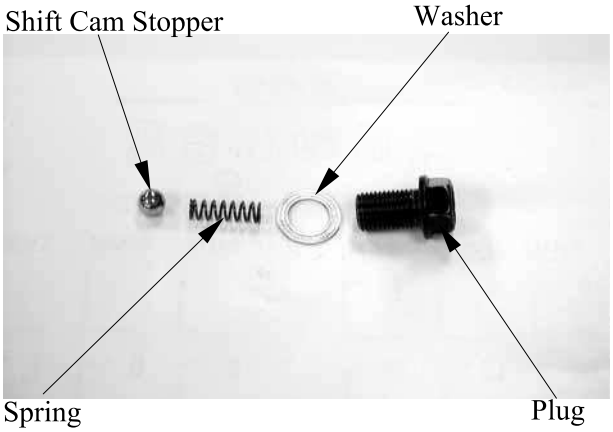
Remove the shift shaft.



Remove the stopper plug.

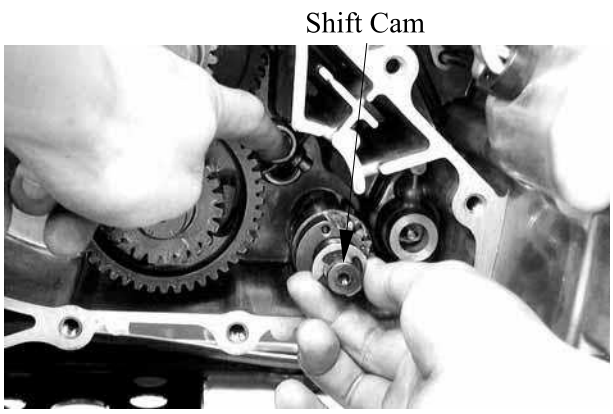


Remove spring, washer and shift cam stopper.

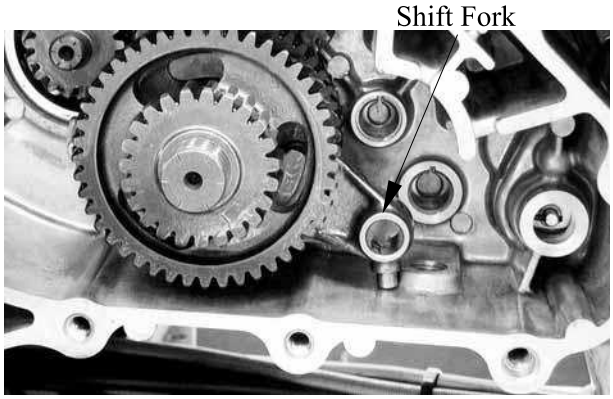


Remove the transmission guide bar.

Remove shift cam.



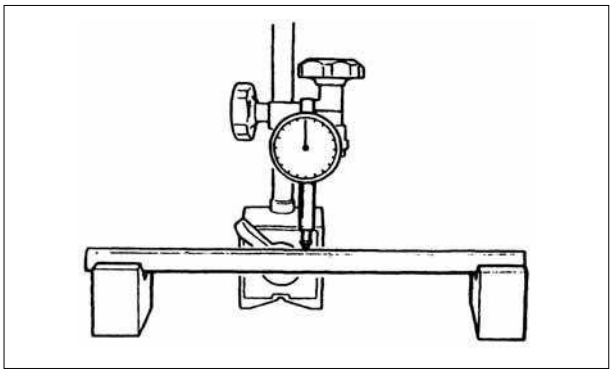
Remove the shift fork.



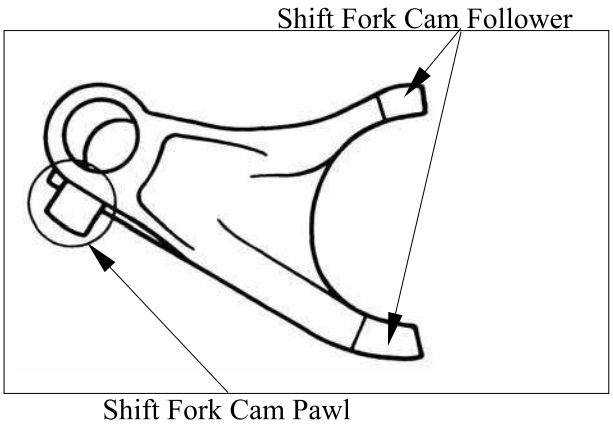
Measure the guide bar runout.
Out of specification → Replace.

Service Limit: Less than 0.03 mm

* Do not attempt to straighten a bent guide bar.

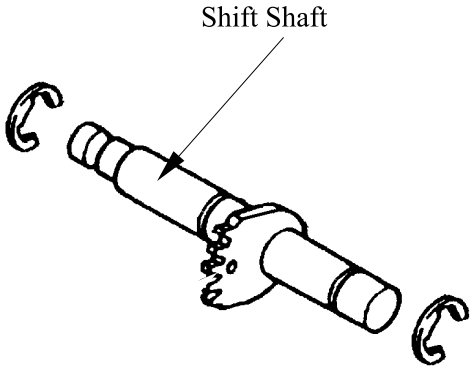


Inspect the shift fork cam follower and shift fork pawl.
Scoring/beads/wear → Replace.



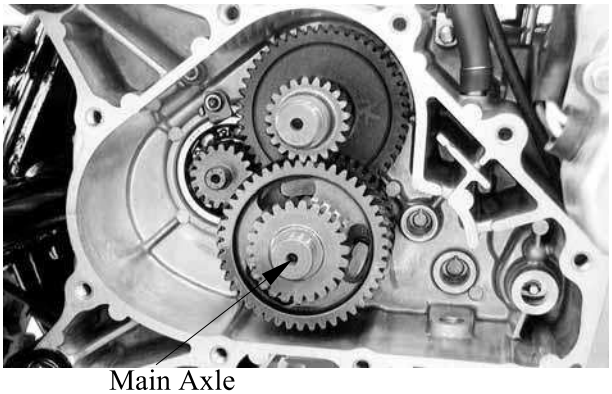
Check the shift cam groove and shift cam gear.
Wear or damage → Replace.

Inspect shift shaft gear.
Damage → Replace.
Inspect shift shaft.
Damage/bends/wear → Replace.

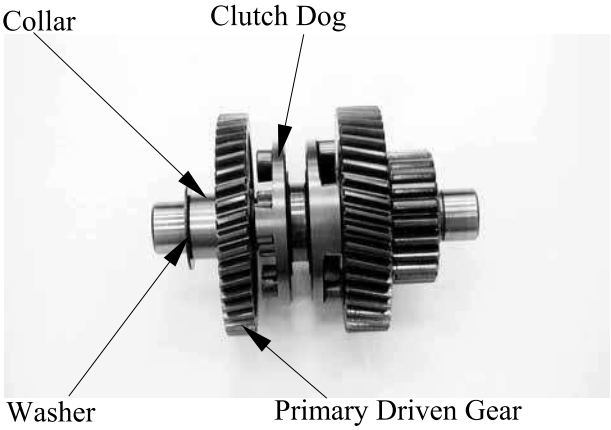


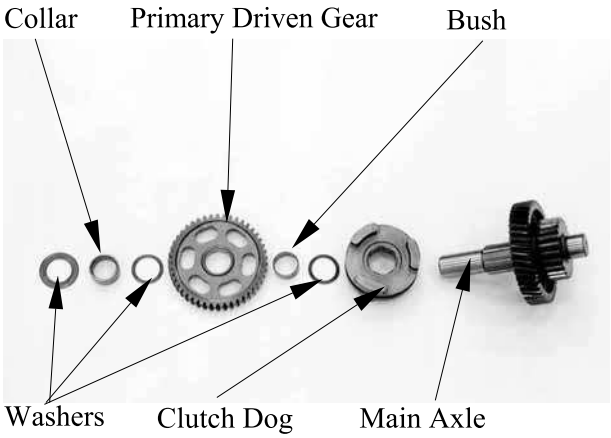
r

Remove the main axle.

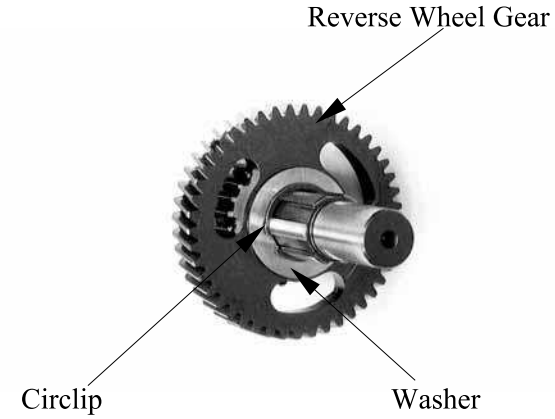


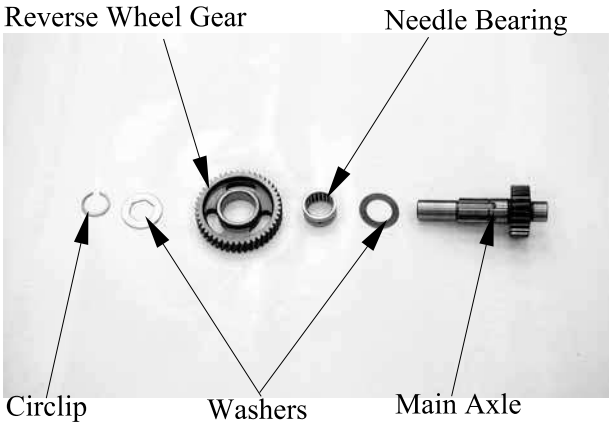
MAIN AXLE DISASSEMBLY
Remove the washers, collar, primary driven gear, bush and clutch dog.





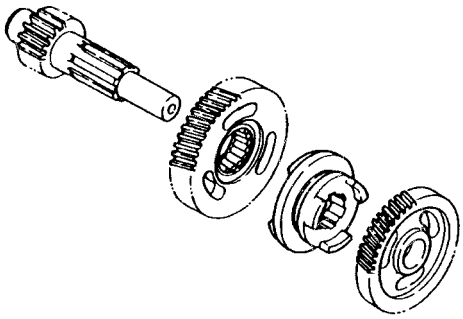
Remove the circlip and then remove the washers, reverse wheel gear and needle bearing.





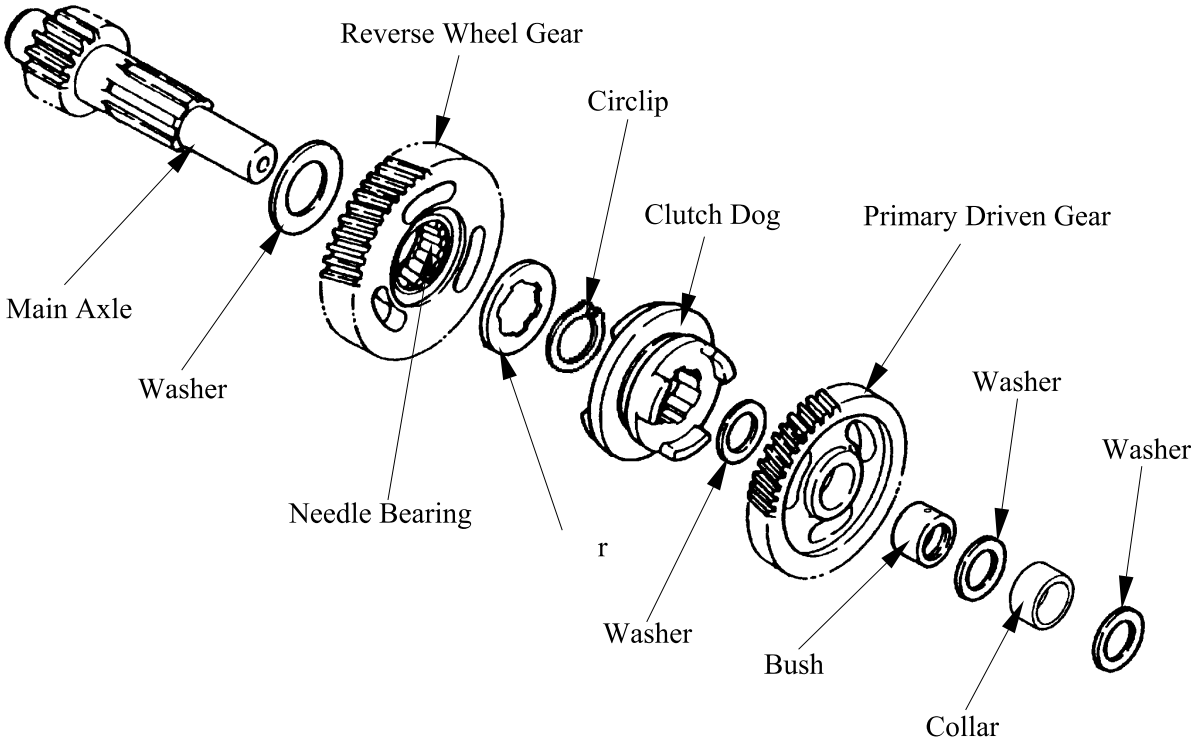
Inspect the gear teeth.
Blue discoloration/pitting/wear → Replace.

Inspect the mated dogs.
Rounded edges/cracks/missing portions → Replace.

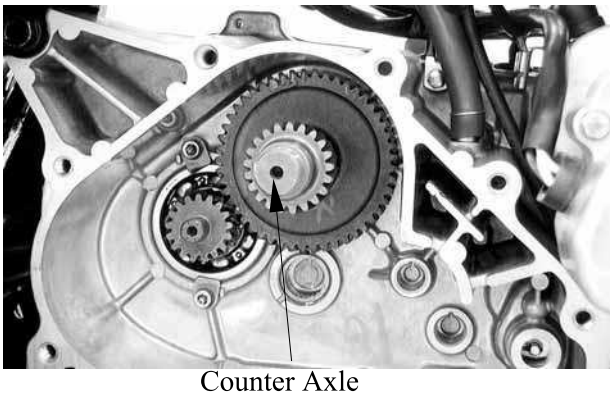


MAIN AXLE ASSEMBLY

Reverse the “MAIN AXLE DISASSEMBLY” procedures.



Remove the counter axle.



Counter Axle

Inspect the gear teeth.
Blue discoloration/pitting/wear → Replace.

PRIMARY DRIVE AXLE REMOVAL

Remove the clutch/driven pulley. (Refer to the chapter 9)

Remove the oil seal, circlip, screw and plate.

Remove the primary drive axle.

t Primary Drive Axle Oil Seal

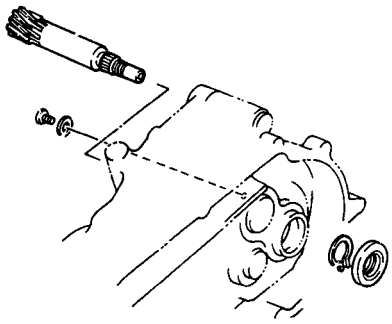
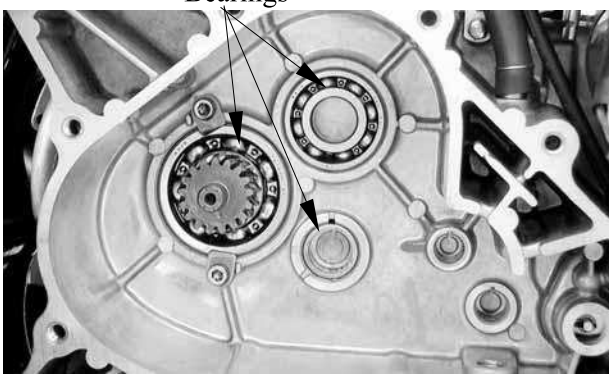


Plate Circlip

Bearings

Inspect the bearings for allow play in the transmission case cover or the bearing turns roughly.

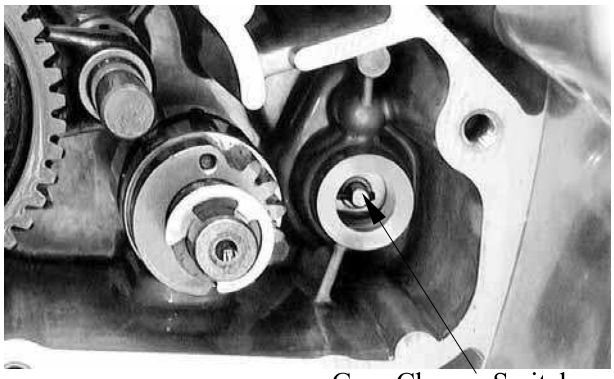
If any defects are found, replace the bearing with a new one.



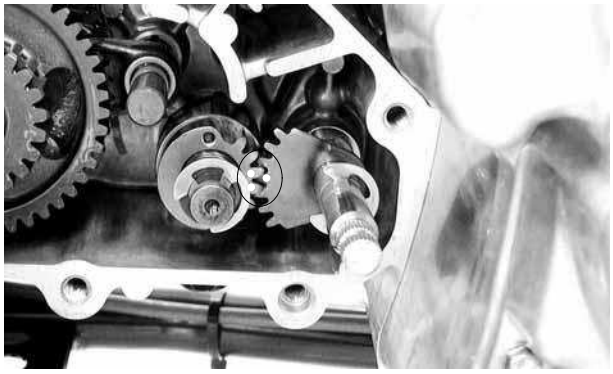
INSTALLATION

Reverse the "TRANSMISSION REVOVAL" section procedures.
Install the primary drive axle. (Reverse the "PRIMARY DRIVE AXLE" procedures.)

Install the counter axle.
Install the main axle.
Install the shift cam.
Install the shift fork.
Install the guide bar.
Install the shift shaft.


Gear Change Switch

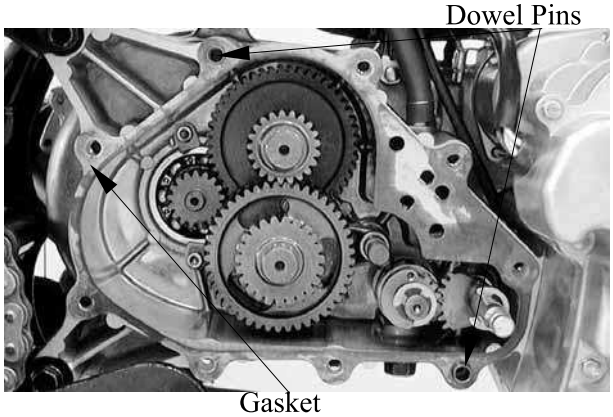
* Make sure that the lever on the gear change switch correctly engages with the locating slot on the shift shaft.
Align the mark on the shift shaft gear with the mark on the shift cam gear.



Install the shift cam stopper and tighten the plug.

Torque: 4.5～5.0kgf-m

Dowel Pins


Gasket

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

Install the transmission case cover and tighten the transmission case cover bolt.

Torque: 2.4～3.0kgf-m

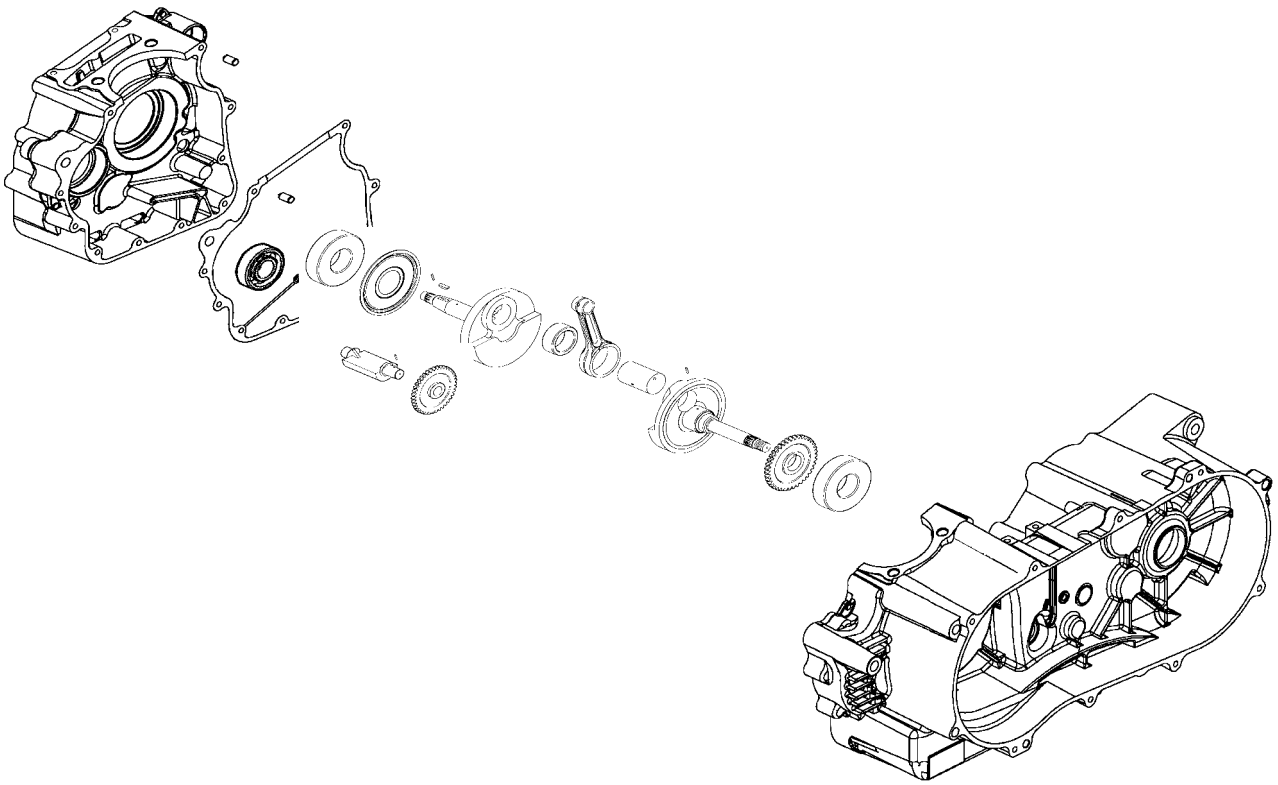
Fill the engine with oil and install the oil filler bolt. (Refer to the "TRANSMISSION OIL REPLACEMENT" section in the chapter 3)

Specified Gear Oil:
KYMCO SIGMA GEAR OIL 90#
Oil Capacity:

At disassembly : 0.4 liter
At change : 0.3liter

CRANKCASE/CRANKSHAFT/BALANCE SHAFT

11.CRANKCASE/CRANKSHAFT/ BALANCE SHAFT



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 (⇨Chapter 7)
  –Cylinder/piston (⇨Chapter 8)
  –Drive and driven pulleys (⇨Chapter 9)
  –A.C. generator (⇨Chapter 16)
  –Starter clutch (⇨Chapter 18)
  –Oil pump (⇨Chapter 4)

SPECIFICATIONS

	Item	Standard (mm)	Service Limit (mm)
Crankshaft	Connecting rod big end side clearance	0.05～0.4	0.6
	Connecting rod big end radial clearance	0～0.008	0.05
	Run out	—	0.10

TORQUE VALUES

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

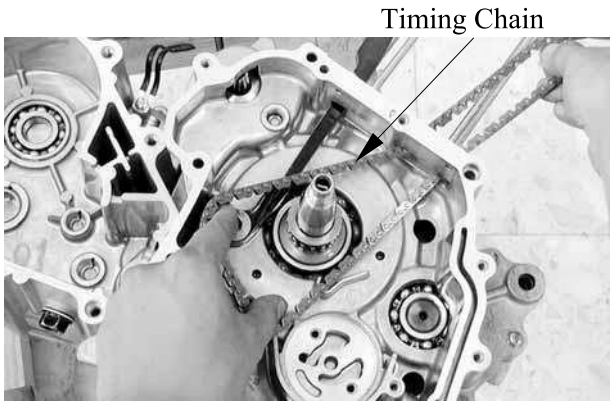
TROUBLESHOOTING

Excessive engine noise
Excessive bearing play

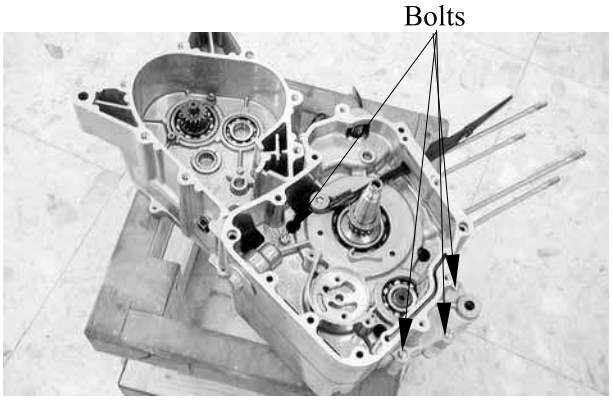
CRANKCASE/CRANKSHAFT/BALANCE SHAFT

REMOVAL

Remove the timing chain from right crankcase.



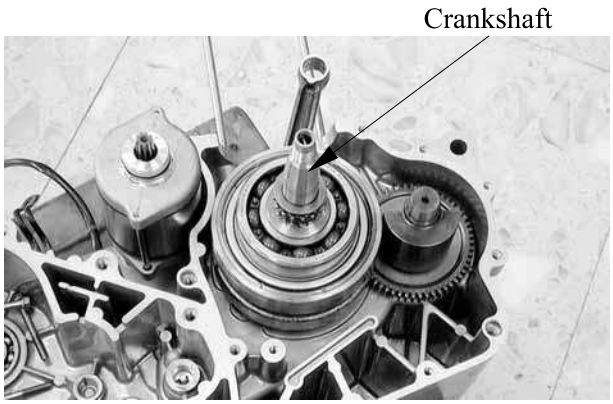
Remove the left and right crankcase attaching bolts.
Separate the left and right crankcase halves.



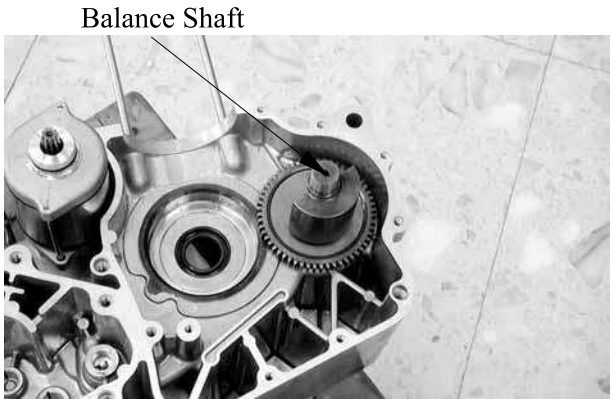
* Do not damage the crankcase gasket surface.

Remove the gasket and dowel pins.

Remove the crankshaft from the left crankcase.



Remove balance shaft from the left crankcase.



Clean off all gasket material from the crankcase mating surfaces.

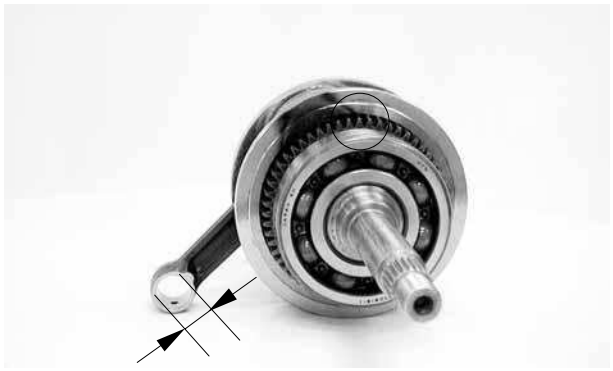
* Avoid damaging the crankcase mating surfaces.

Inspect the balance shaft gear teeth.
Burrs/chips/roughness/wear → Replace.

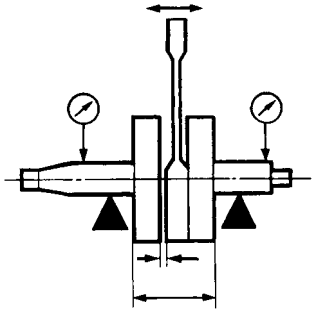
CRANKSHAFT INSPECTION

Inspect the crankshaft gear teeth.
Burrs/chips/roughness/wear → Replace.

Measure the connecting rod small end I.D.
Service Limit: 17.06 mm replace if over



Measure the connecting rod small end free play (A).
Out of specification (0.8 ~ 1.0 mm) → Replace the crankshaft.

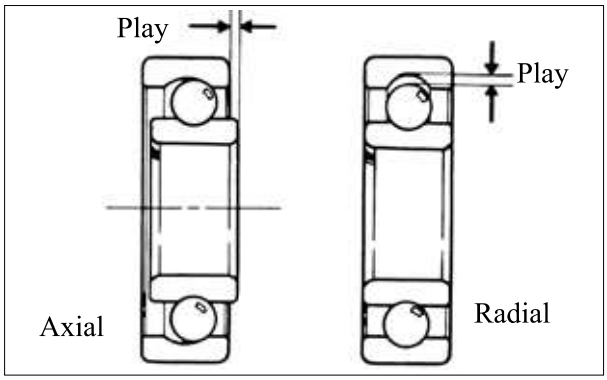


Measure the crankshaft run out (B).
Service Limit: 0.10mm replace if over

Measure the connecting rod big end side clearance (C).
Service Limit: 0.6mm replace if over

Measure the crank width (D).
Out of specification (55.15 ~ 55.2 mm) → Replace the crankshaft.

Turn the crankshaft bearings and check for excessive play.
Measure the crankshaft bearing play.
Service Limit:
Axial : 0.20mm replace if over
Radial : 0.05mm replace if over

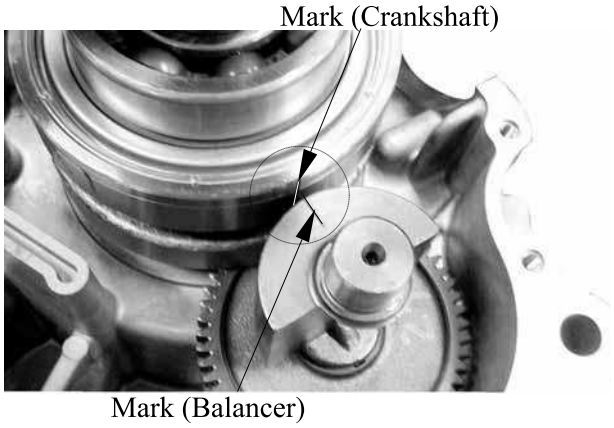


CRANKCASE/BALANCER INSTALLATION

Install the balance shaft and crankshaft into the left crankcase.

* Align the mark on the balance shaft with the mark on the crankshaft.

Install the dowel pins and new gasket.
Install the right crankcase and tighten the crankcase attach bolts.
Install the timing chain.



COOLING SYSTEM

SERVICE INFORMATION

GENERAL INSTRUCTIONS

- The water pump must be serviced after removing the engine.
  Other cooling system service can be done with the engine installed in the frame.
- The engine must be cool before servicing the cooling system.
  When the coolant temperature is over 100℃, never remove the radiator cap to release the pressure because the boiling coolant may cause danger.
- Avoid spilling coolant on painted surfaces because the coolant will corrode the painted surfaces. Wash off any spilled coolant with fresh water as soon as possible.
- After servicing the system, check for leaks with a cooling system tester.

SPECIAL TOOL

Mechanical seal driver

TORQUE VALUES

Water pump impeller	1.0～1.4kgf-m
Water pump cover bolt	0.8～1.2kgf-m

TROUBLESHOOTING

Engine temperature too high

- Faulty temperature gauge or thermosensor
- Faulty radiator cap
- Faulty thermostat
- Insufficient coolant
- Passages blocked in hoses or water jacket
- Clogged radiator fins
- Passages blocked in radiator
- Faulty water pump

Temperature gauge pointer does not register the correct coolant temperature

- Faulty temperature gauge or thermosensor
- Faulty thermostat

Coolant leaks

- Faulty pump mechanical (water) seal
- Deteriorated O-rings
- Damaged or deteriorated water hoses

SPECIFICATIONS

Radiator cap relief pressure		075~1.05kg/cm²	
Thermostat temperature	Begins to open	80±2℃	
	Full-open	90℃	
	Valve lift	3.5～4.5mm	
Coolant capacity		Total system 1400±20cc	Radiator: 1100±20cc Reserve tank: 300±20cc

COOLANT GRAVITY

Temp. ℃ / Coolant concentration	0	5	10	15	20	25	30	35	40	45	50
5%	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.009	0.997
10%	1.018	1.107	1.017	1.016	1.015	1.014	0.013	1.011	1.009	1.007	1.005
15%	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
20%	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
25%	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
30%	1.053	1.051	1.051	1.049	1.047	1.045	1.043	1.041	1.038	1.035	1.032
35%	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
40%	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
45%	1.080	1.078	1.076	1.074	1.072	1.069	1.056	1.063	1.062	1.057	1.054
50%	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
55%	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
60%	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071

COOLANT MIXTURE (WITH ANTI-RUST AND ANTI-FREEZING EFFECTS)

Freezing Point	Mixing Rate	KYMCO SIGMA Coolant Concentrate	Distilled Water
-9℃	20%		
-15℃	30%	425cc	975cc
-25℃	40%		
-37℃	50%		
-44.5℃	55%		

Cautions for Using Coolant:
- Use coolant of specified mixing rate. (The mixing rate of 425cc KYMCO SIGMA coolant concentrate + 975cc distilled water is 30%.)
- Do not mix coolant concentrate of different brands.
- Do not drink the coolant which is poisonous.
- The freezing point of coolant mixture shall be 5℃ lower than the freezing point of the riding area.

COOLING SYSTEM TESTING

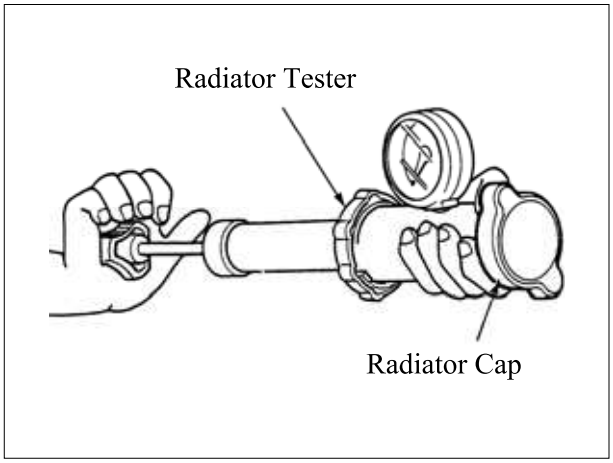
RADIATOR CAP INSPECTION

Install the radiator cap onto the radiator tester and apply specified pressure to it. It must hold specified pressure for at least six seconds.

* Apply water to the cap sealing surface before testing.

Radiator Cap Relief Pressure:

0.75~1.05kg/cm^2



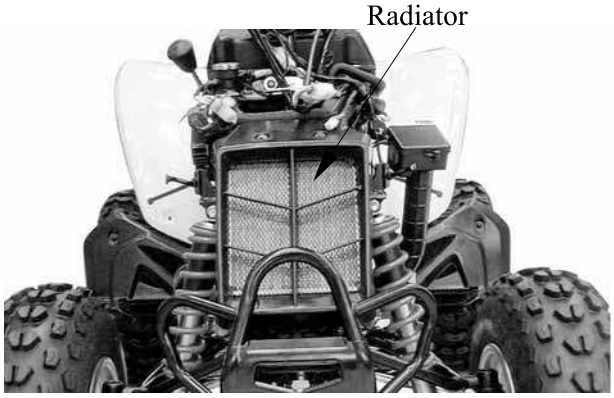
Install the radiator tester onto the radiator and apply specified pressure to it. It must hold specified pressure for at least six seconds.
Check the water hoses and connectors for leaks.

* The test pressure should not exceed 1.05 kg/cm^2. Excessive pressure can damage the radiator and its hose

RADIATOR

RADIATOR INSPECTION

Remove the front fender. (⇨2-5)
Inspect the radiator soldered joints and seams for leaks.
Blow dirt out from between core fins with compressed air. If insects, etc., are clogging the radiator, wash them off.
Carefully straighten any bent fins.

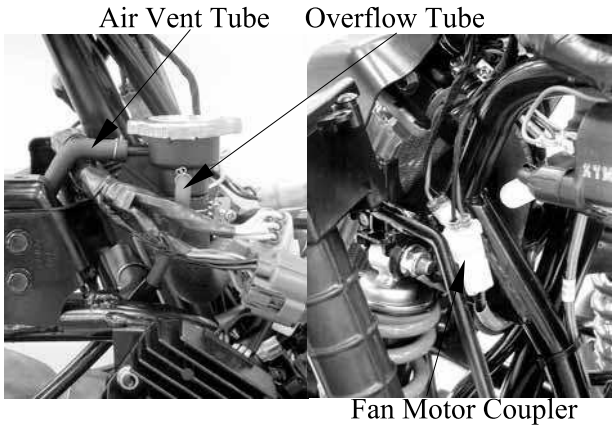


RADIATOR REMOVAL

Drain the coolant. (⇨3-20)
Remove the front fender. (⇨2-5)

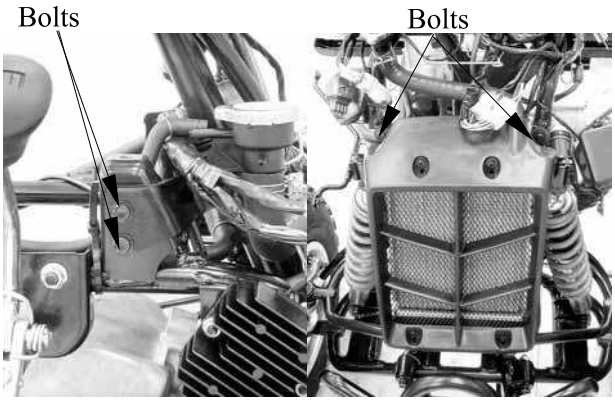
Disconnect the air vent tube from the radiator filler.
Remove the overflow tube clamp and disconnect the overflow tube.

Disconnect the fan motor wire coupler.



Remove the two bolts on the radiator filler hold plate.

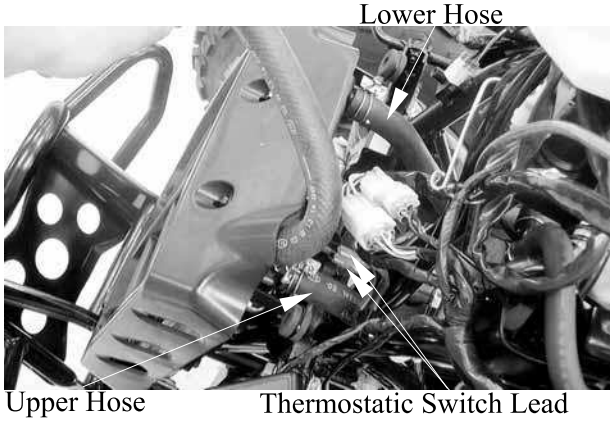
Remove the two bolts on the radiator.



Disconnect the thermostatic switch wire leads.

Loosen the hose bands and disconnect the upper hose and lower hose from the radiator.

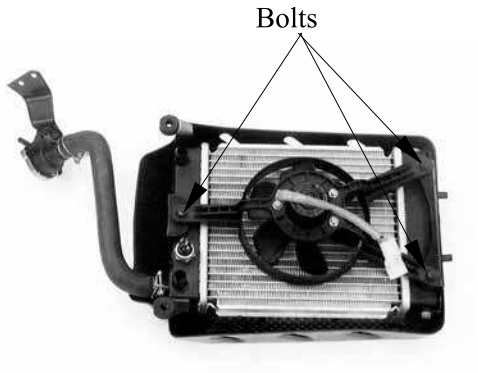
Pull the radiator upward to remove the radiator.



RADIATOR DISASSEMBLY

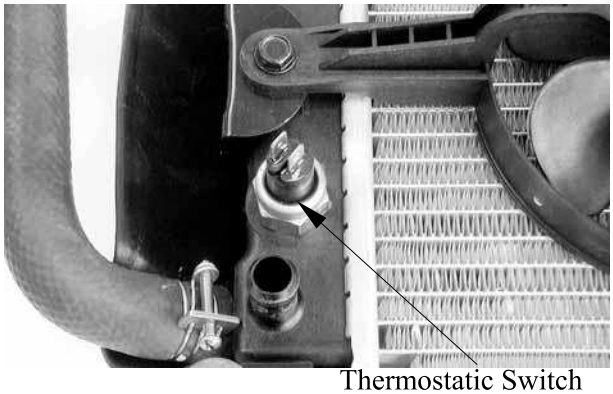
Remove the three bolts and then remove the fan/shroud from the radiator.

Check fan motor by battery.



CHECK THERMOSTATIC SWITCH

When coolant temperature lower then 85~90℃ the thermostatic switch OFF.
When coolant temperature over 85~90℃ the thermostatic switch ON.



RADIATOR ASSEMBLY

Install the fan shroud on the radiator with the three bolts.

RADIATOR INSTALLATION

Reverse the “RADIATOR REMOVAL” procedures.
Fill the radiator with coolant. (⇨3-20)
Connect the vent tube to the radiator filler.
After installation, check for coolant leaks.

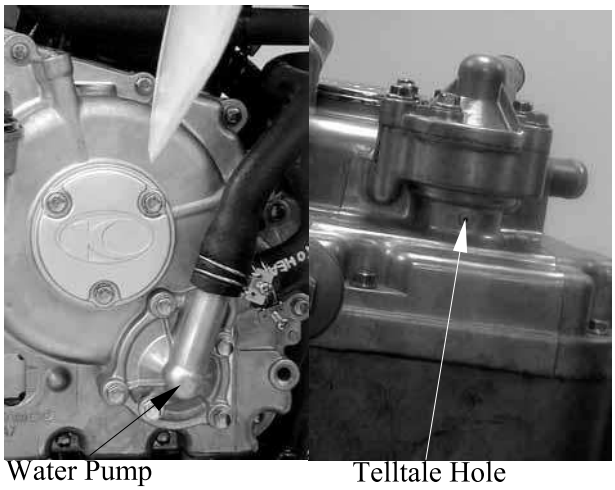
＊ If you want to refill the coolant , the following procedure must be checked.

1. Please make the radiator filler and the air vent tube to be separated.
2. Then start the engine , filled in the coolant till the coolant flowed out from the air vent tube.
3. Put the air vent tube on.

WATER PUMP

MECHANICAL SEAL (WATER SEAL) INSPECTION

Inspect the telltale hole for signs of mechanical seal coolant leakage.
If the mechanical seal is leaking, remove the right crankcase cover and replace the mechanical seal.

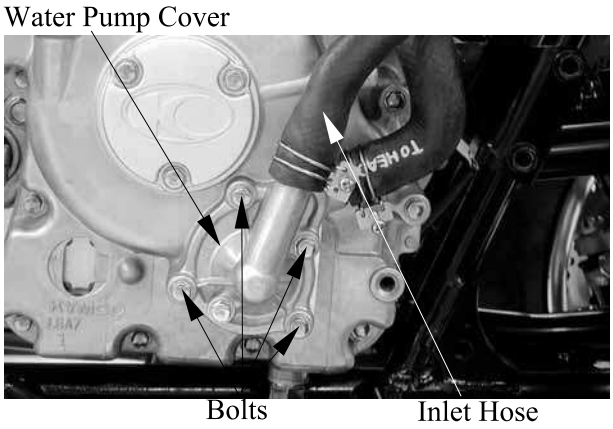


WATER PUMP/IMPELLER REMOVAL

Drain the coolant. (⇨3-20)

Loosen the screw and disconnect the coolant inlet hose.

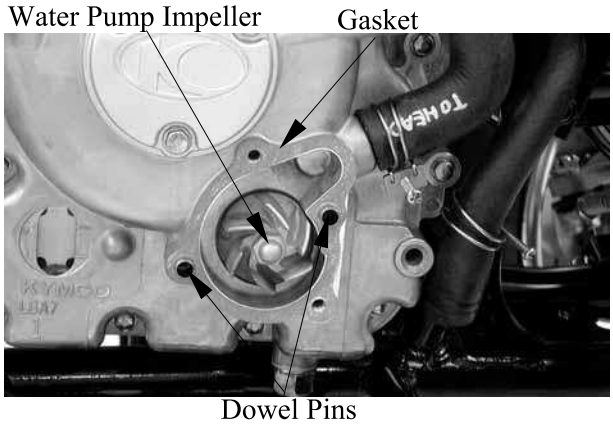
Remove the four bolts and the water pump cover.



Remove the gasket and 2 dowel pins

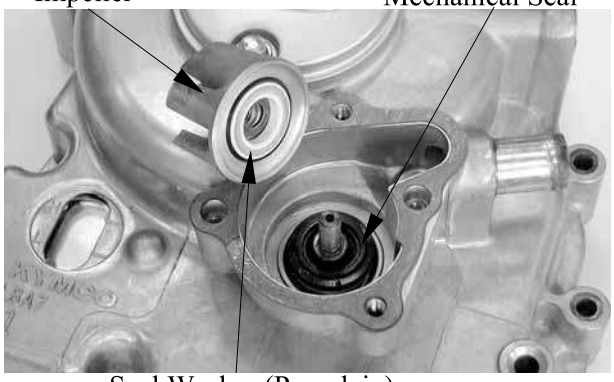
Remove the water pump impeller, washer and seal washer (porcelain).

* The impeller has left hand threads.



Inspect the mechanical (water) seal and seal washer for wear or damage.

* The mechanical seal and seal washer must be replace as a set.

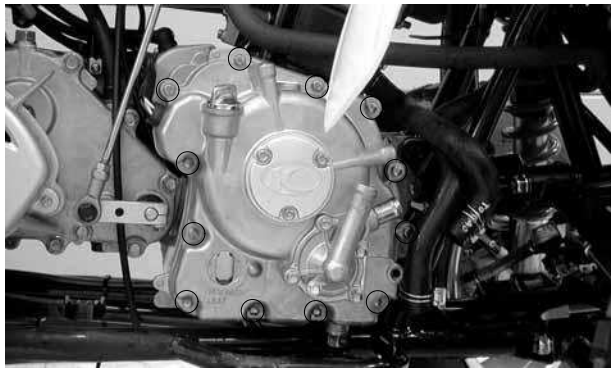


WATER PUMP SHAFT REMOVAL

Remove the water pump impeller. (⇨12-6)

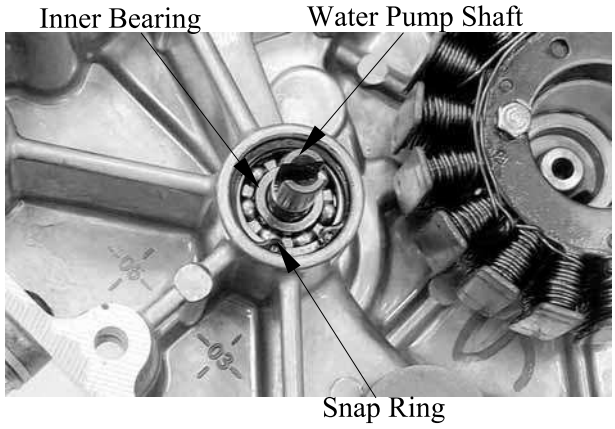
Disconnect the water hose from the right crankcase cover.

Remove the twelve bolts attaching the right crankcase cover.

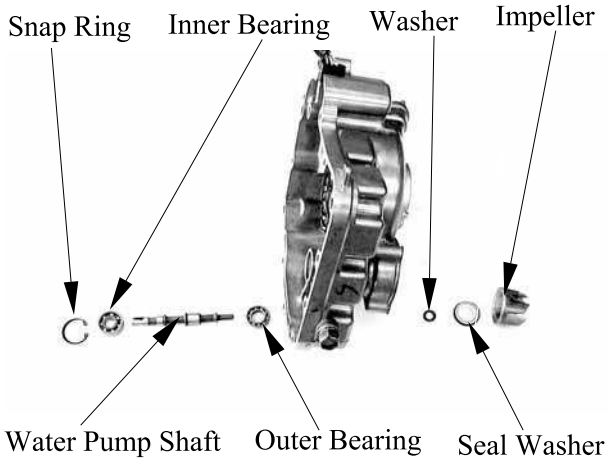


Remove the water pump bearing snap ring from the water pump assembly.

Remove the water pump shaft and inner bearing.

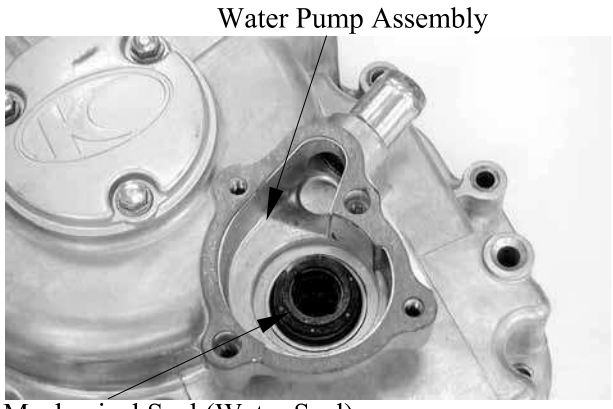


Remove the water pump shaft outer bearing.



MECHANICAL SEAL REPLACEMENT

Drive the mechanical seal out of the water pump assembly from the inside.



Drive in a new mechanical seal using a mechanical seal driver.

* Apply sealant to the right crankcase cover fitting surface of a new mechanical seal and then drive in the mechanical seal.

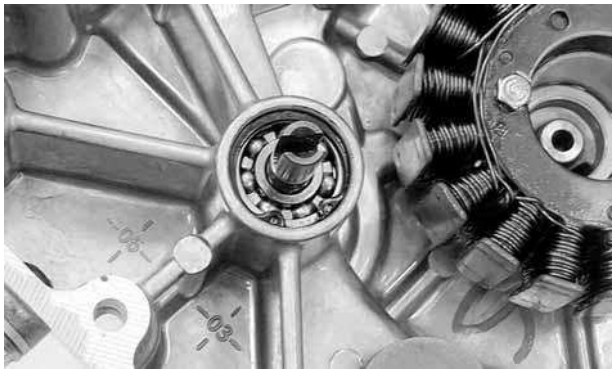
WATER PUMP SHAFT INSTALLATION

Drive a new water pump shaft outer bearing into the water pump assembly from the inside.

Install the water pump shaft and shaft inner bearing into the waster pump assembly. Install the snap ring to secure the inner bearing properly.

Install the dowel pins and a new gasket and then install the water pump assembly to the right crankcase cover.

Tighten the twelve bolts to secure the right crankcase cover.



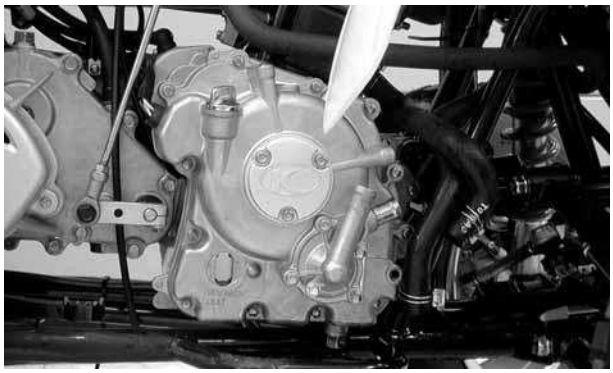
* When installing the water pump assembly, aligning the groove on the water pump shaft with the tab on the oil pump shaft.

WATER PUMP/IMPELLER INSTALLATION

When the mechanical seal is replaced, a new seal washer must be installed to the impeller.

Install the impeller onto the water pump shaft.

Torque: 1.0～1.4kgf-m



* The impeller has left hand threads.

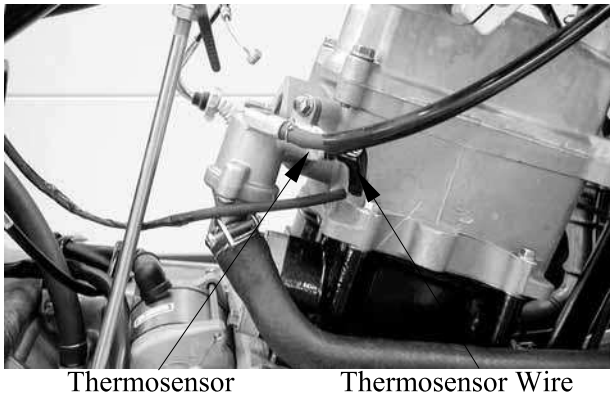
Install the two dowel pins and a new gasket. Install the water pump cover and tighten the four bolts.

Torque: 0.8～1.2 kgf-m

THERMOSENSOR

THERMOSENSOR REMOVAL

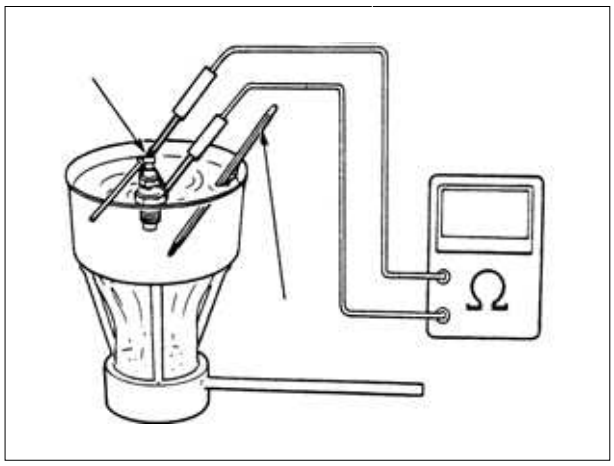
Drain the coolant. (⇨3-20)
Disconnect the thermosensor wire.
Remove the thermosensor from the thermostat.



THERMOSENSOR INSPECTION

Suspend the thermosensor in a pan of water over a burner and measure the resistance through the sensor as the water heats up.

Temperature(℃)	50	80	100	120
Resistance(Ω)	154	52	27	16



THERMOSENSOR INSTALLATION

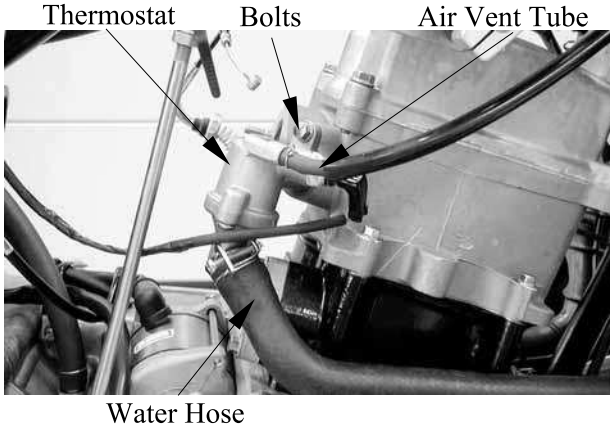
Apply 3-BOND No. 1212 sealant or equivalent to the thermosensor threads and install it into the thermostat housing.
Connect the thermosensor wire.
Fill the radiator with coolant. (⇨3-20)

* Be sure to bleed air from the cooling system.

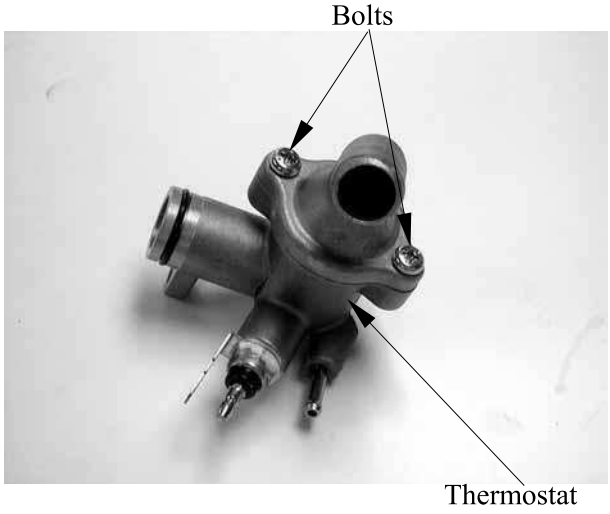
THERMOSTAT

THERMOSTAT REMOVAL

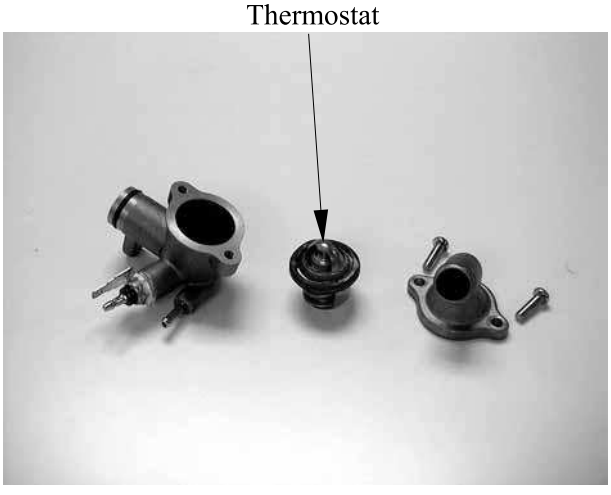
Drain the coolant. (⇨3-20)
Disconnect the thermosensor wire from the thermosensor.
Disconnect the water hose from the thermostat housing.
Disconnect the air vent tube from the thermostat housing.
Remove the mounting bolt and the thermostat housing from the cylinder head.



Remove the two screws and separate the thermostat housing halves.



Remove the thermostat from the thermostat housing.

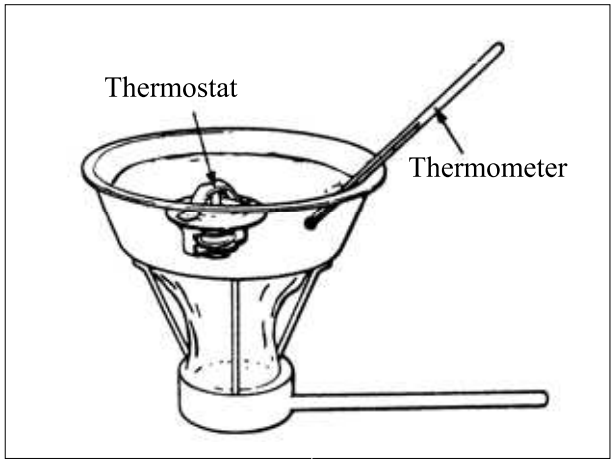


THERMOSTAT INSPECTION

Suspend the thermostat in a pan of water over a burner and gradually raise the water temperature to check its operation.

Technical Data

Begins to open	80±2℃
Full-open	90℃
Valve lift	3.5～4.5mm



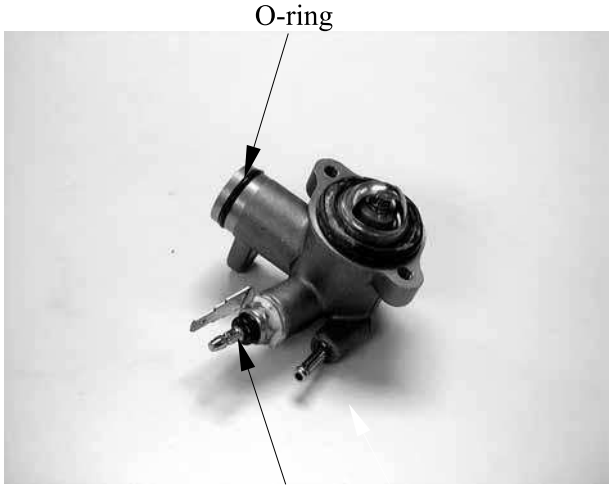
* • Do not let the thermostat touch the pan as it will give a false reading.
  • Replace the thermostat if the valve stays open at room temperature.
  • Test the thermostat after it is opened for about 5 minutes and holds the temperature at 70℃.

THERMOSTAT INSTALLATION

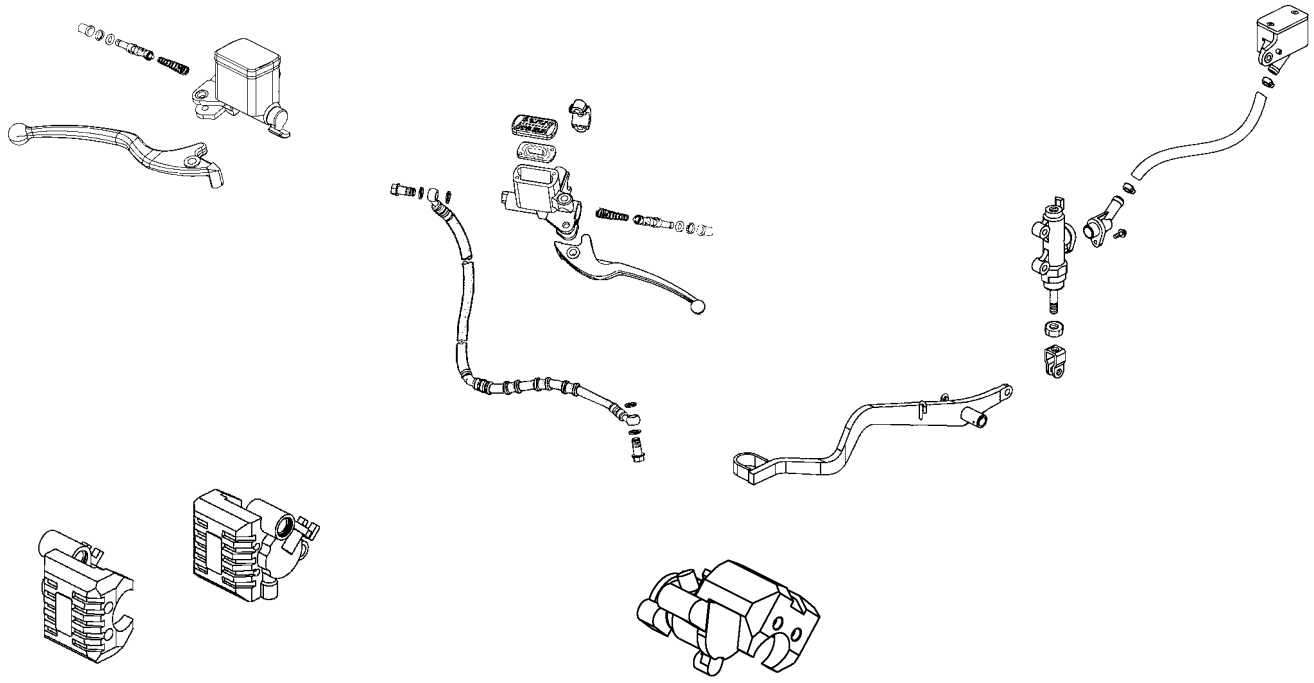
The installation sequence is the reverse of removal.

* Replace the O-ring with a new one and apply grease to it.

Fill the cooling system with the specified coolant. (⇨3-20)



13. BRAKE SYSTEM



m	Standard (mm)	Service Limit (mm)
Brake disk thickness	3.8～4.2	3.0
Brake disk runout	—	0.30

TROUBLESHOOTING

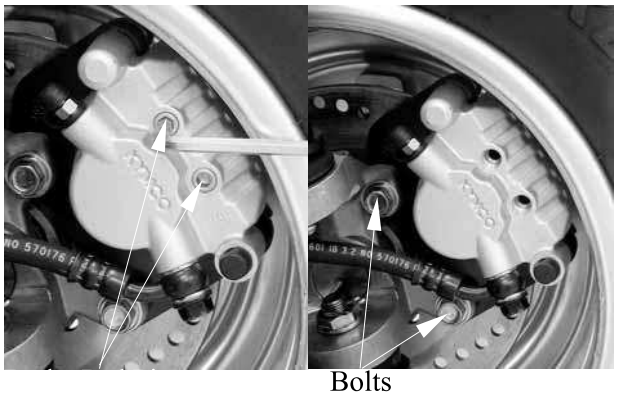
Loose brake lever
- Air in hydraulic brake system
- Brake fluid level too low
- Hydraulic brake system leakage

Poor brake performance
- Air in brake system
- Deteriorated brake fluid
- Contaminated brake pads and brake disk
- Worn brake pads
- Worn brake master cylinder piston oil seal
- Clogged brake fluid line
- Deformed brake disk
- Unevenly worn brake caliper

Tight brake lever
- Seized piston
- Clogged hydraulic brake system
- Smooth or worn brake pad

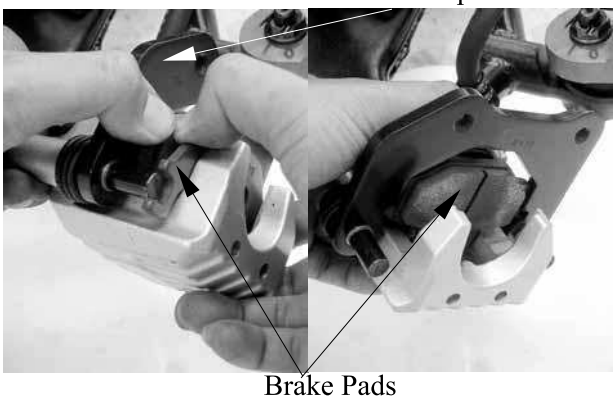
Brake noise
- Contaminated brake pad surface
- Excessive brake disk run out
- Incorrectly installed caliper
- Brake disk or wheel not aligned

Hard braking
- Seized hydraulic brake system
- Seized piston

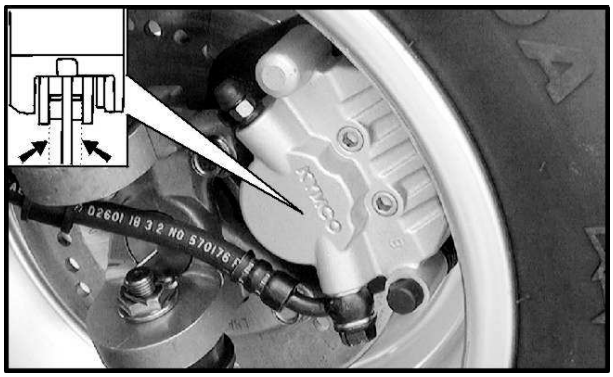


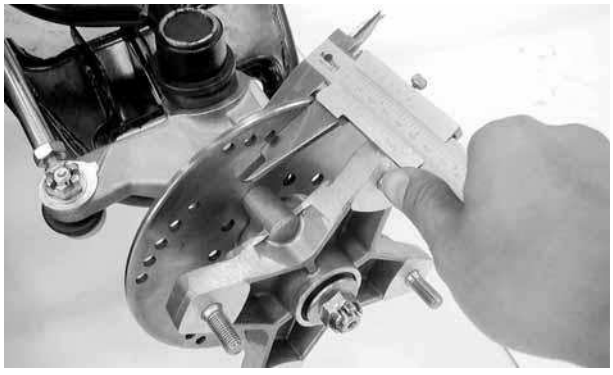
Bolts

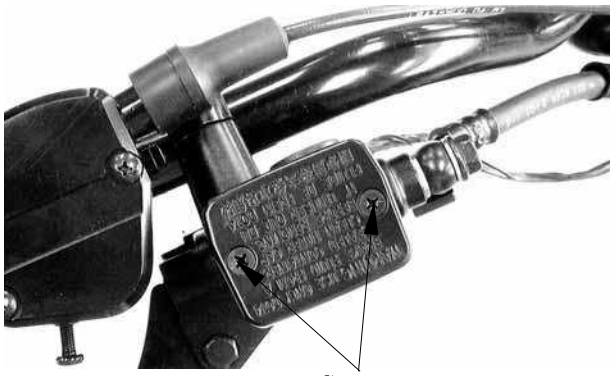
Brake Caliper Holder

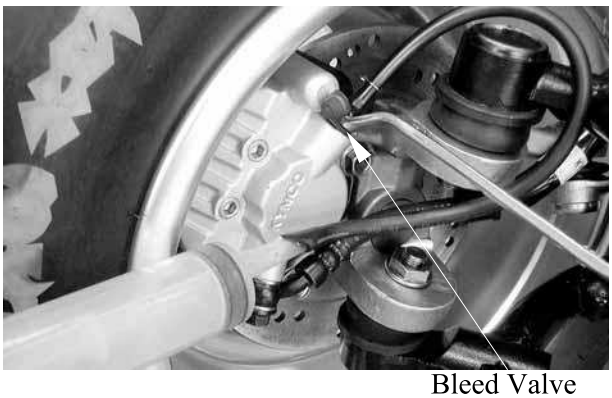


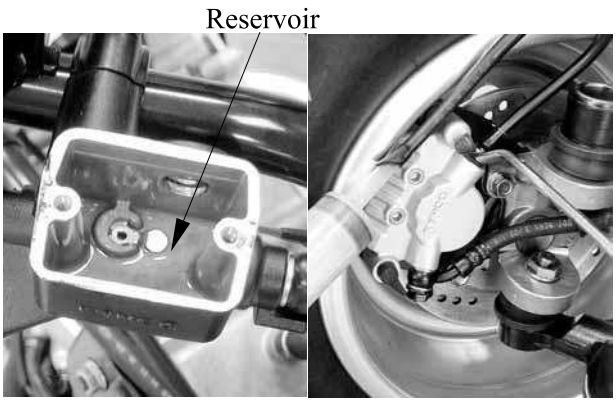
Brake Pads



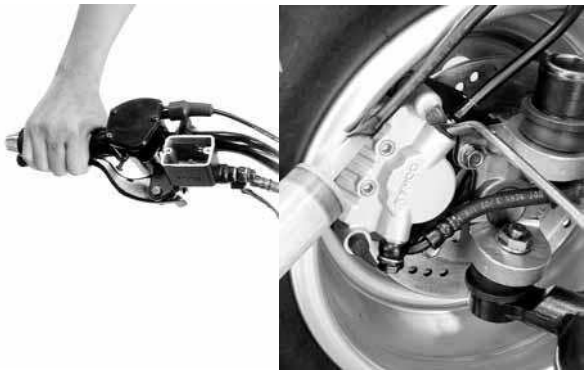




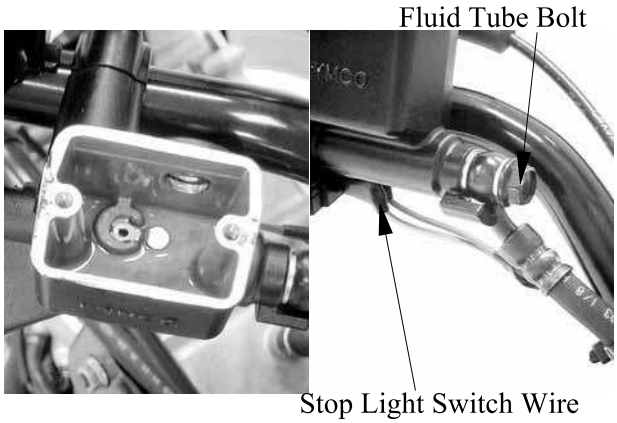




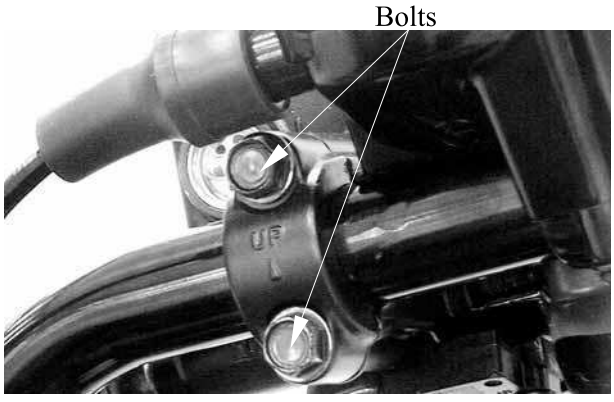
- When drawing brake fluid with the syringe, the brake fluid level should be kept over 1/2 of the brake reservoir height.
- Use only the recommended brake fluid.

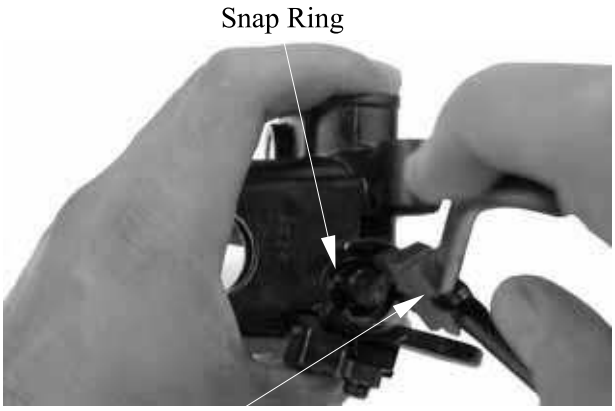


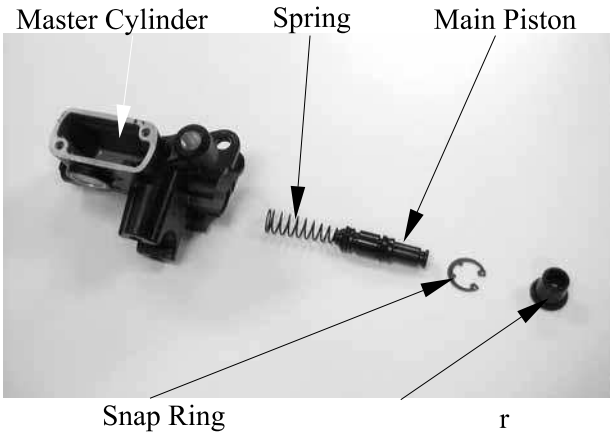
When bleeding air from the brake system, the brake fluid level should be kept over 1/2 of the brake reservoir height.



When removing the brake fluid tube bolt, be sure to place towels under the tube and plug the tube end to avoid brake fluid leakage and contamination.




Snap Ring
Snap Ring Pliers (Close)

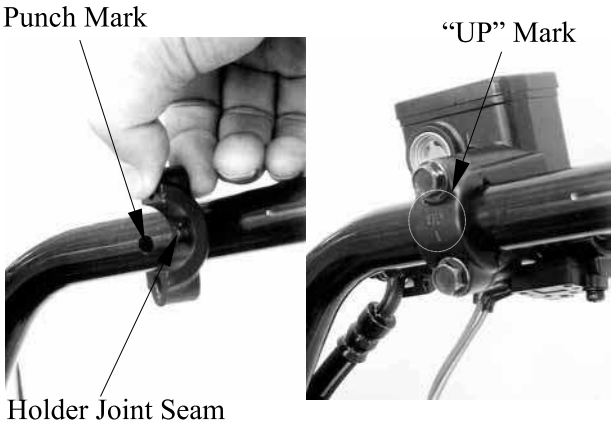

Master Cylinder
Spring
Main Piston
Snap Ring
r

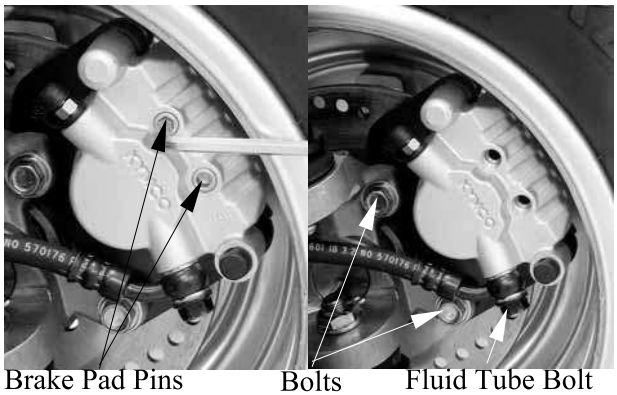
*

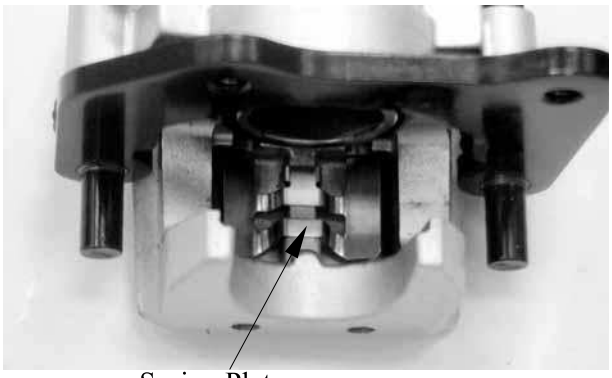
d

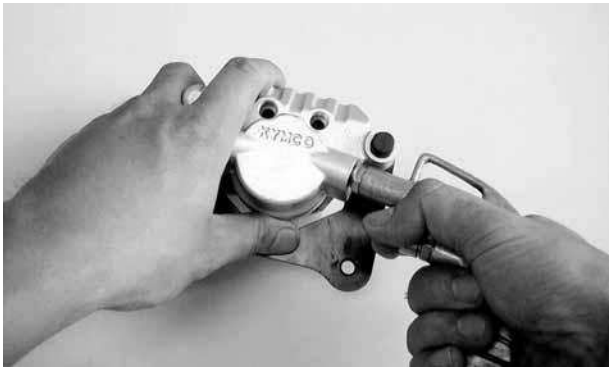
spring must be installed as a unit without exchange.

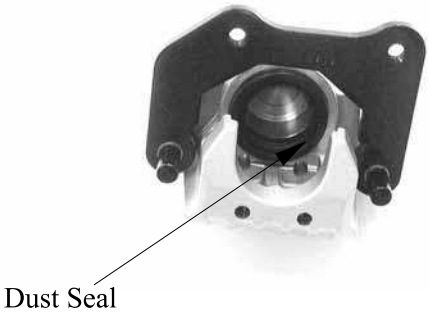
- When assembling the piston, soak the cups in brake fluid for a while.
- Install the cups with the cup lips facing the correct direction.




Brake Pad Pins
Bolts
Fluid Tube Bolt


Spring Plate

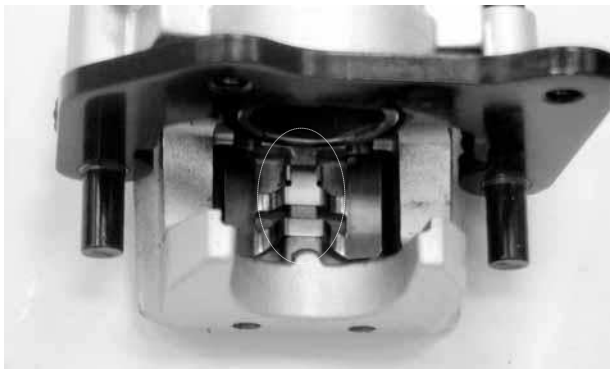



Dust Seal

Inner Oil Seal

*

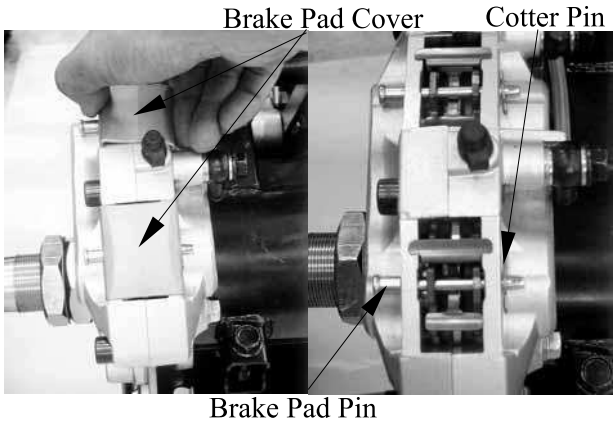
* Install the piston with its outer end protruding 3～5mm beyond the brake caliper.

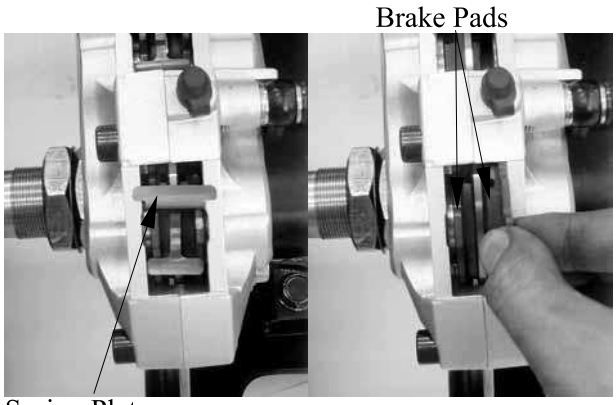


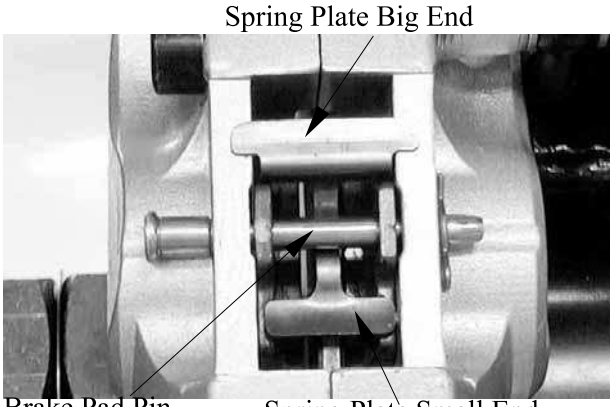
* r
correctly engages with the locating slot on the caliper spring plate.

* When installing the brake caliper, be sure to position the brake disk between the two brake pads.

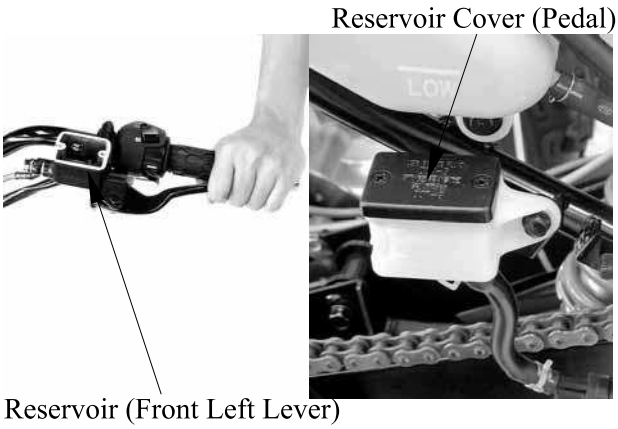
* When installing the brake fluid tube, be sure to install the two sealing washers.



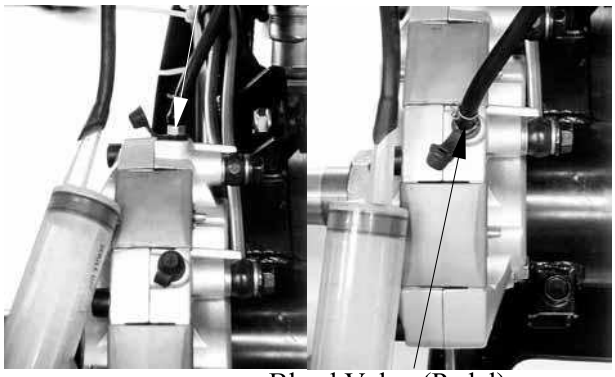




✻
- Make sure put the spring plate big end on the rear caliper.
- Make sure put the spring plate small end on the rear pads.
- Make sure brake pad pin over the spring plate.



Bleed Valve (Front Left Lever)



Bleed Valve (Pedal)

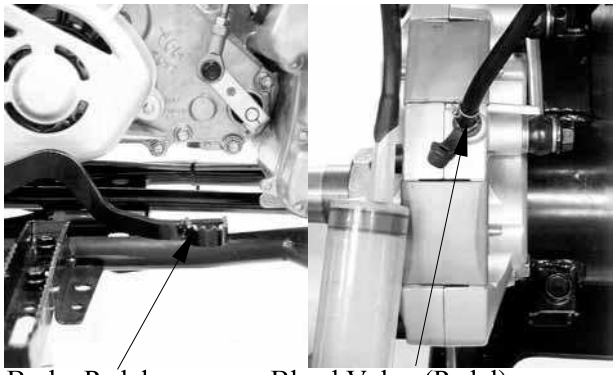
Bleed Valve (Front Left Lever)

Reservoir (Front Left Lever) Bleed Valve (Pedal)

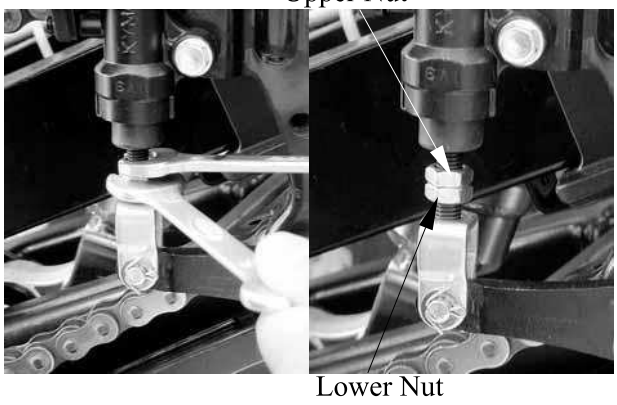
- When drawing brake fluid with the syringe, the brake fluid level (pedal) should be kept over 1/2 of the brake reservoir height.
- Use only the recommended brake fluid.

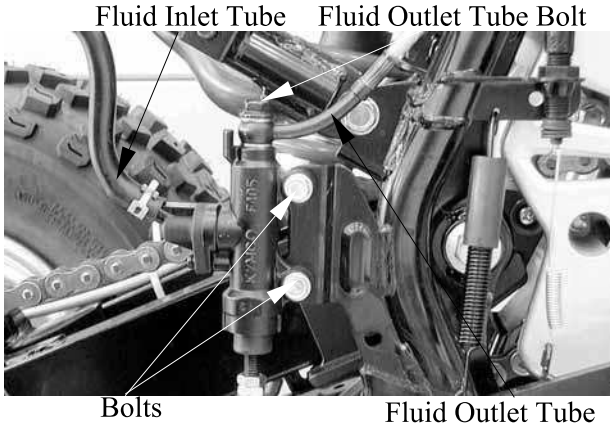
Reservoir Cover (Pedal)

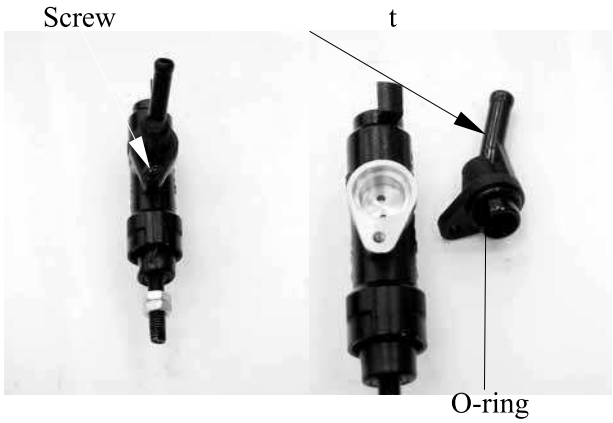
Reservoir (Pedal) Reservoir Protection Cover

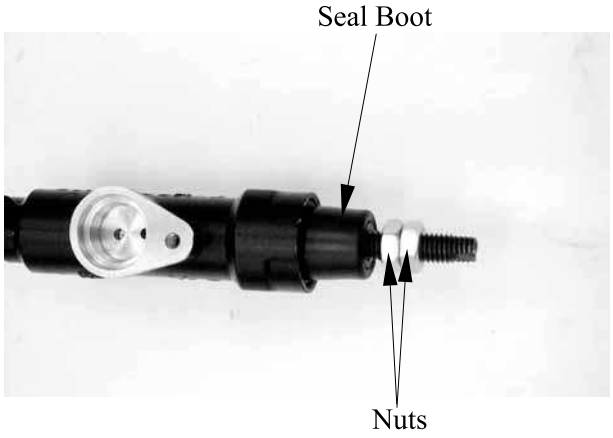


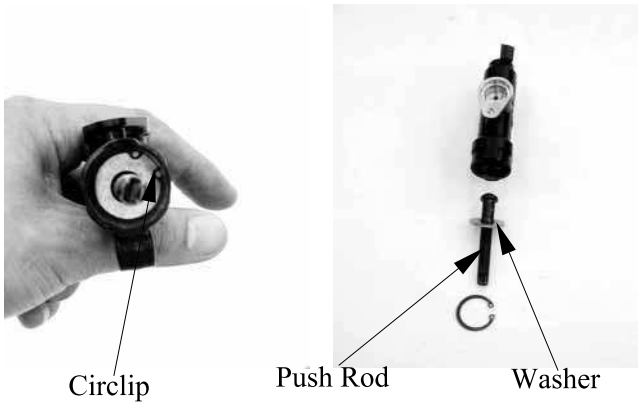
Brake Pedal Bleed Valve (Pedal)

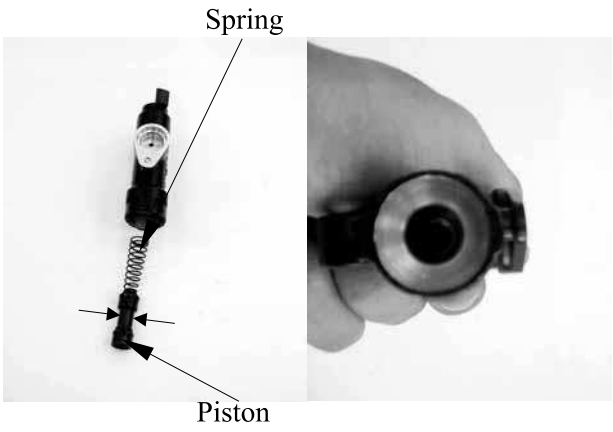

Upper Nut
Lower Nut


Fluid Inlet Tube
Fluid Outlet Tube Bolt
Bolts
Fluid Outlet Tube

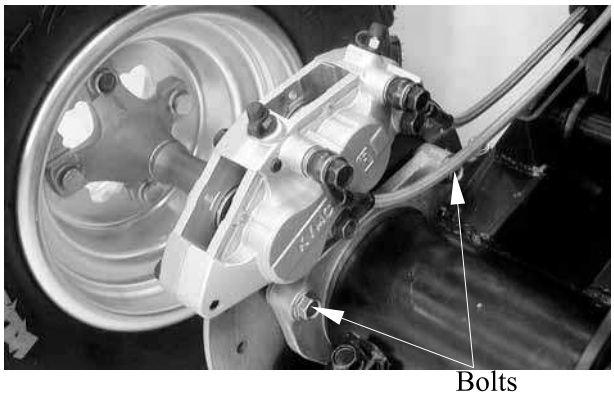

Screw
t
O-ring


Seal Boot
Nuts

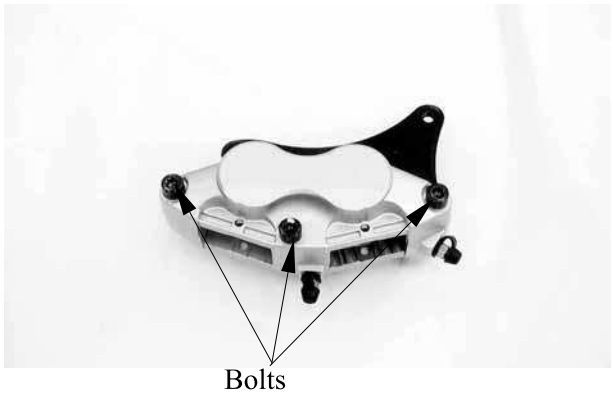

Circlip
Push Rod
Washer


Spring
Piston


Washers

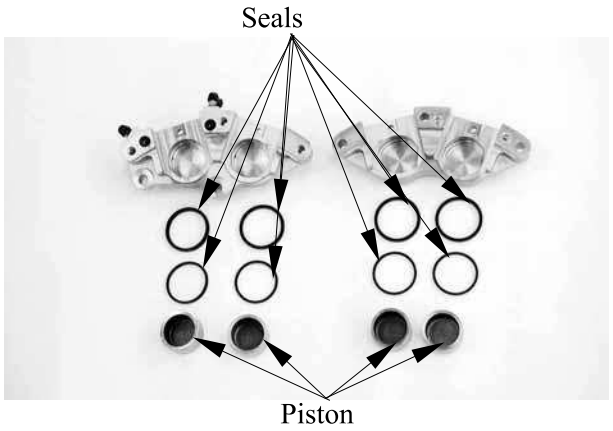


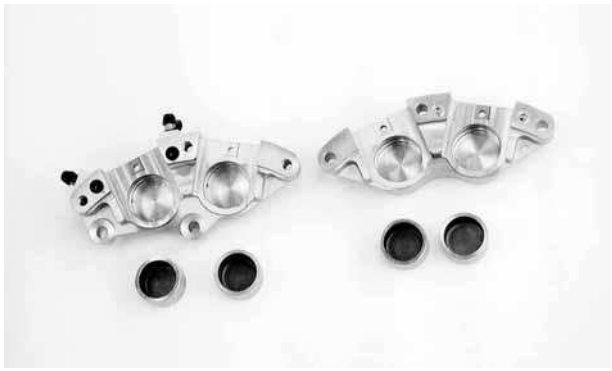
Slightly loosen the caliper housing bolts before removing the caliper mounting bolts to facilitate later disassembly.

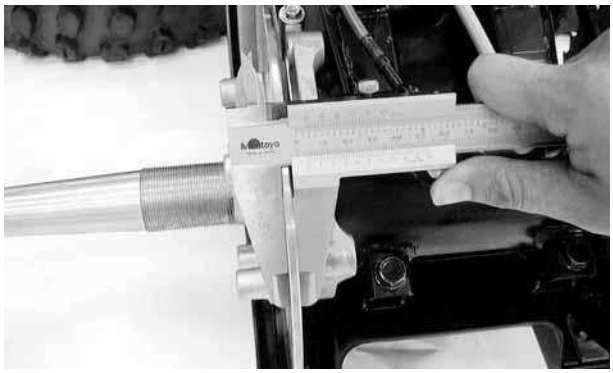


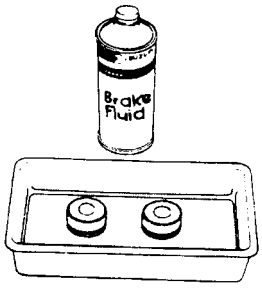
Place a rag over the piston to prevent it from popping out and flying and keep hand off the piston.
Be careful of brake fluid which can possibly splash.
Do not use high pressure air but increase the pressure gradually.

Use care not to cause scratch on the cylinder bore.
Do not reuse the piston seal and dust seal that have been removed.



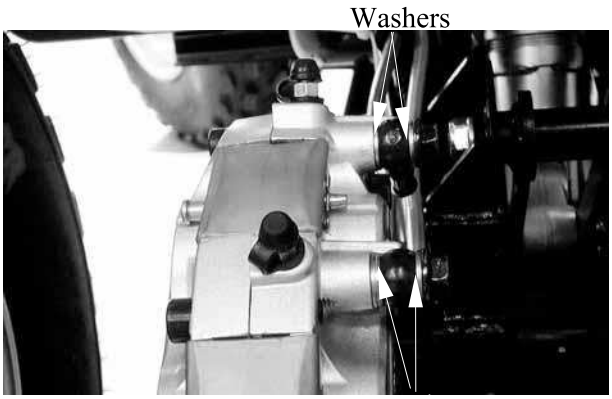




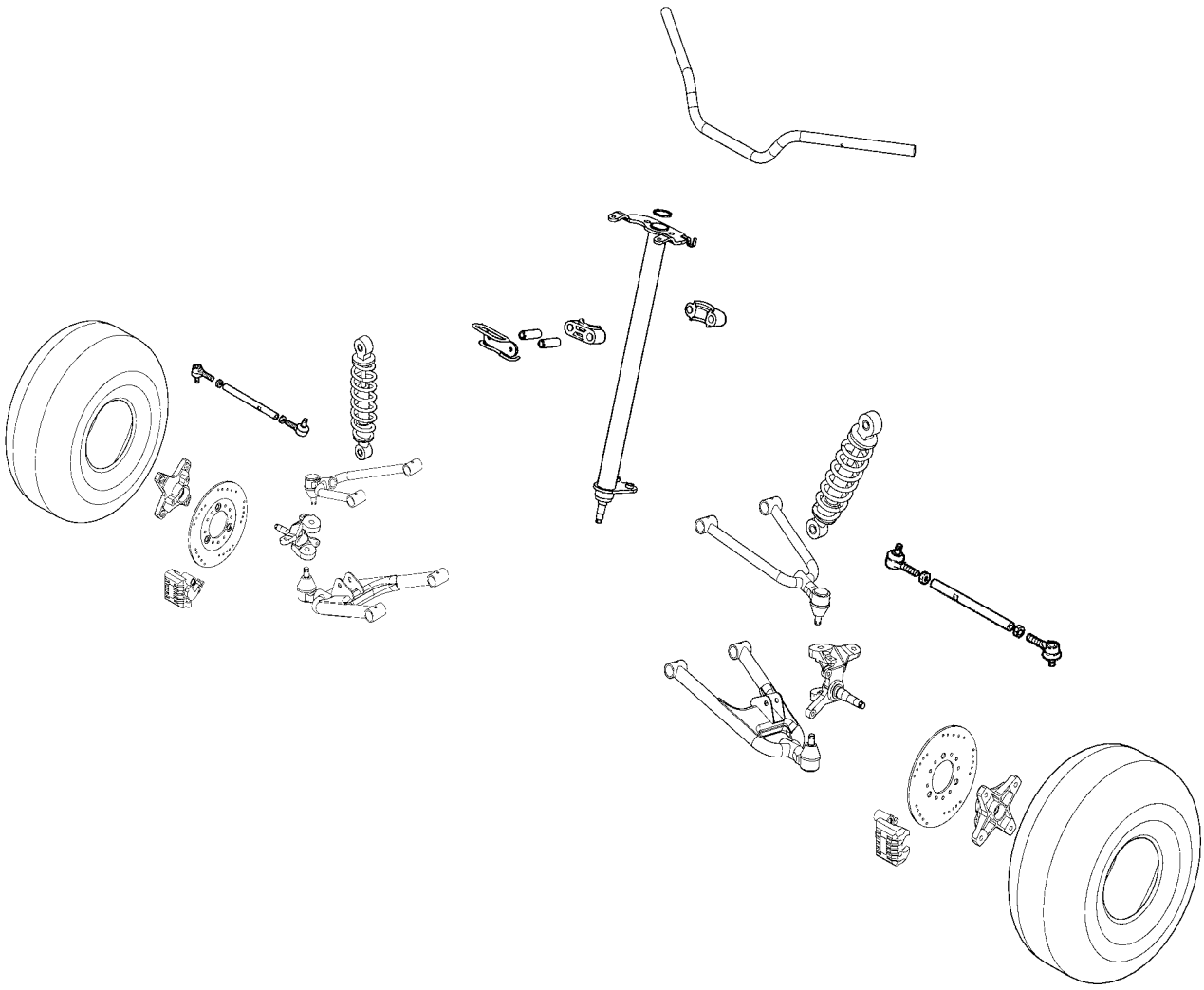


Wash the caliper components with fresh brake fluid before assembly. Do not wipe off brake fluid after washing the components.

Replace the piston seal and dust seal with new ones with brake fluid applied.


Washers

14. FRONT WHEEL/FRONT SUSPENSION/ STEERING SYSTEM



m		Standard (mm)	Service Limit (mm)
Front wheel rim run out	Radial	—	2.0
	Axial	—	2.0
Tie rod length		299.5±0.5	—
Rod-end (tie rod) angle		180°	—

TORQUE VALUES

Steering stem nut	6.0～8.0kgf-m
Front swing arm nut	4.0～5.0kgf-m
Front wheel nut	4.0～5.0kgf-m
Front wheel hub nut	6.0~8.0kgf-m
Steering knuckle nut	3.0～4.0kgf-m
Front shock absorber upper mount bolt	3.5～4.5kgf-m
Front shock absorber lower mount bolt	3.5～4.5kgf-m

SPECIAL TOOLS

Oil seal and bearing install E014

TROUBLESHOOTING

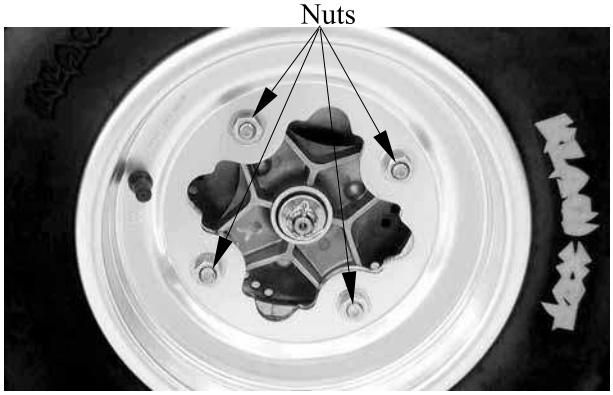
Hard steering (heavy)
- Insufficient tire pressure

Steers to one side or does not track straight
- Uneven front shock absorbers
- Bent front arm
- Bent steering knuckle

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

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



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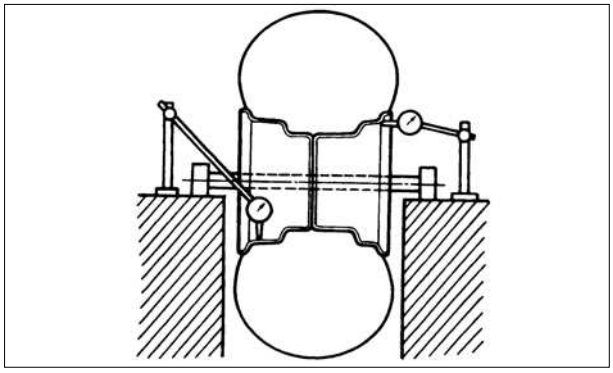
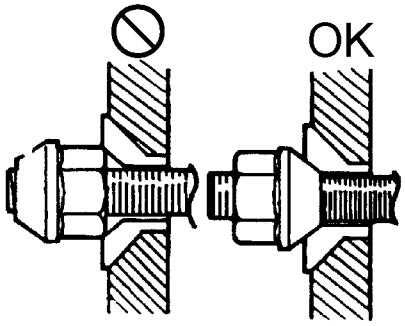
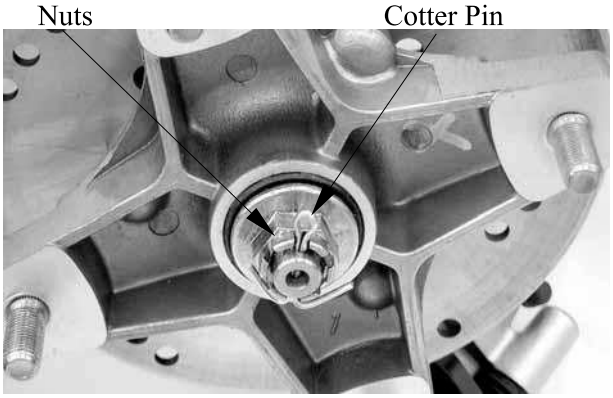




* **Be sure the tapered side of the wheel nuts face the wheel rim.**



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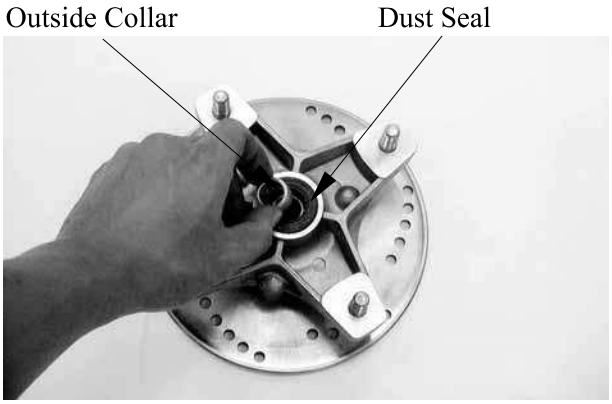
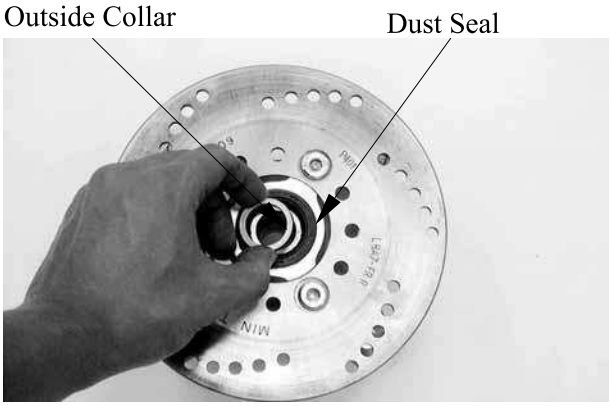
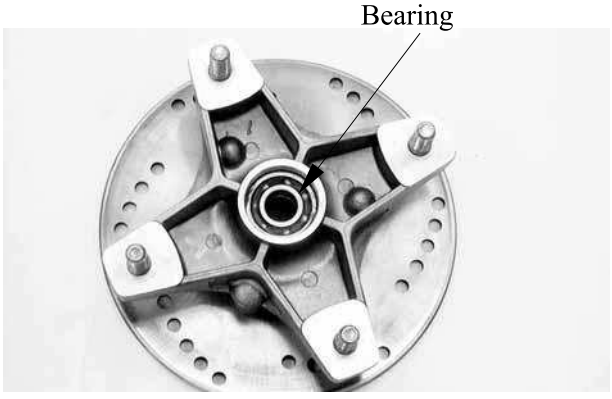


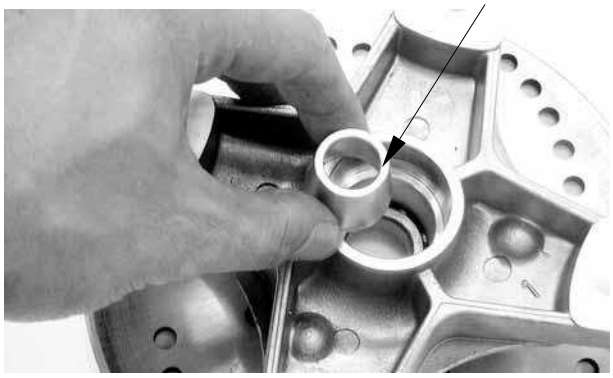
* **Place a wood block against the outer edge to protect this edge.**

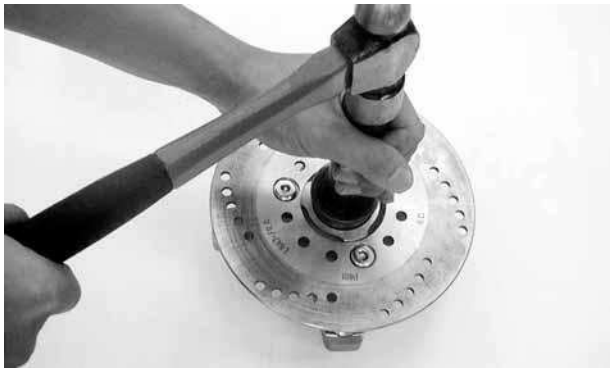




Bearing

Distance Collar





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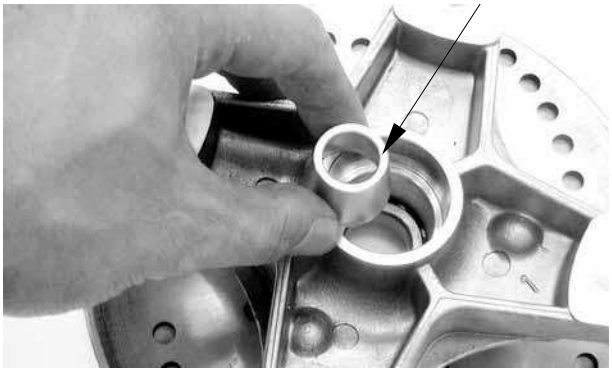
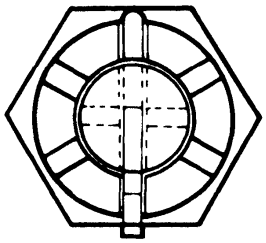


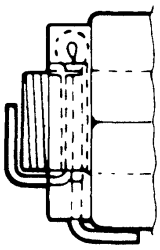
* Apply the grease onto the oil seal lips, bearing.

*
- Do not allow the bearings to tilt while driving them in.
- Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.
- Pack all bearing cavities with grease.
- Drive in the bearing squarely with the sealed end facing out.

*

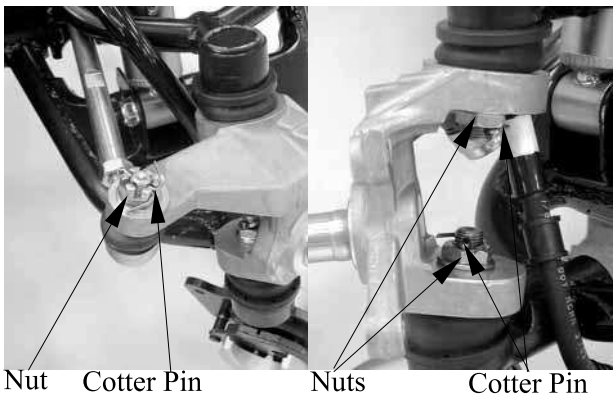
*

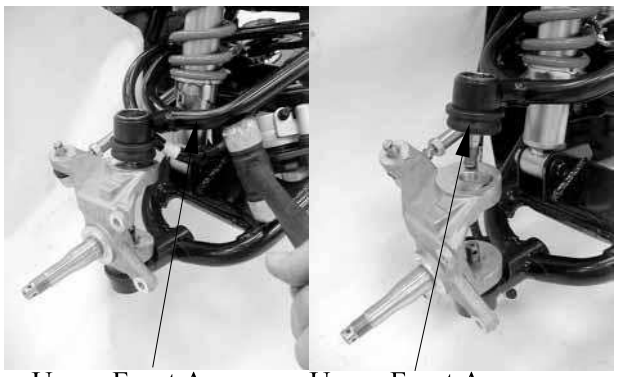


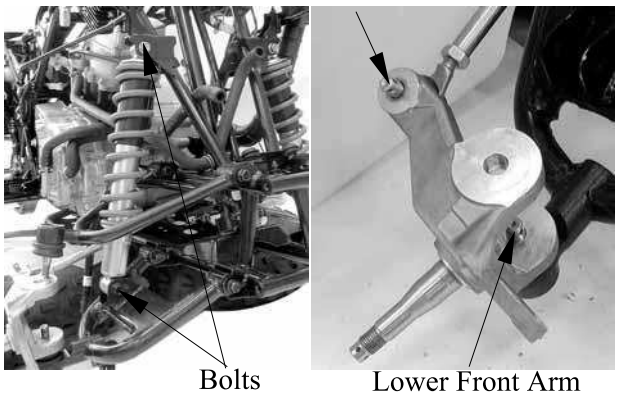


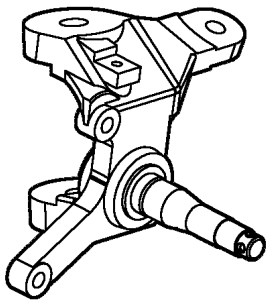
*

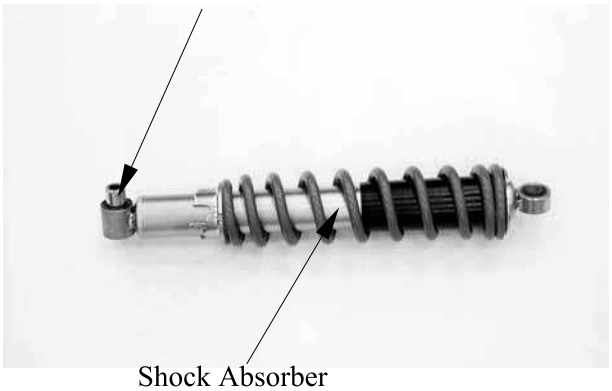
* Support the machine securely so there is no danger of it falling over.

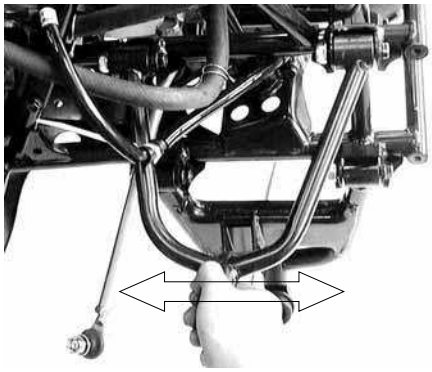


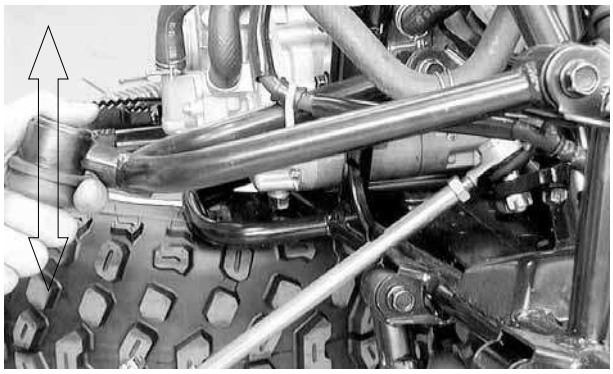


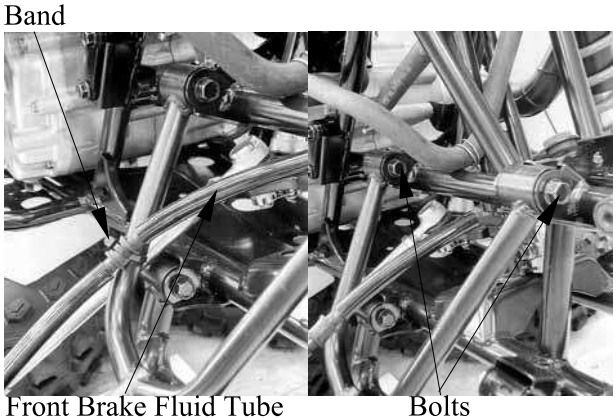




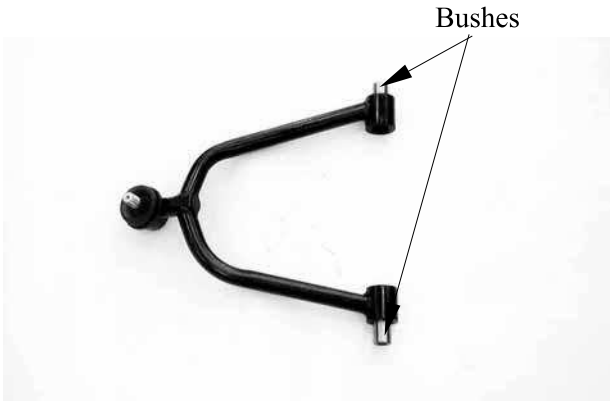

Bush
Shock Absorber

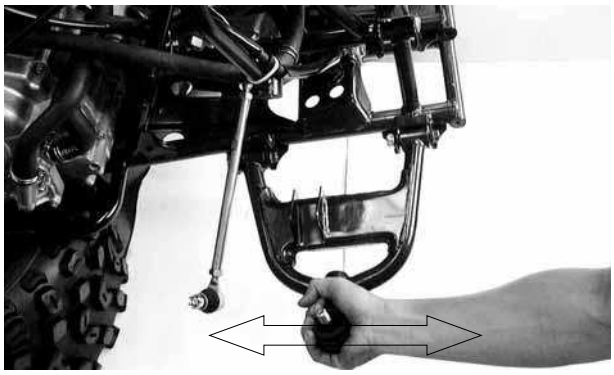


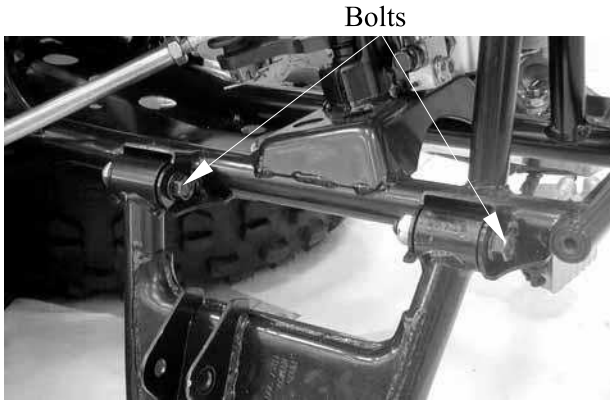


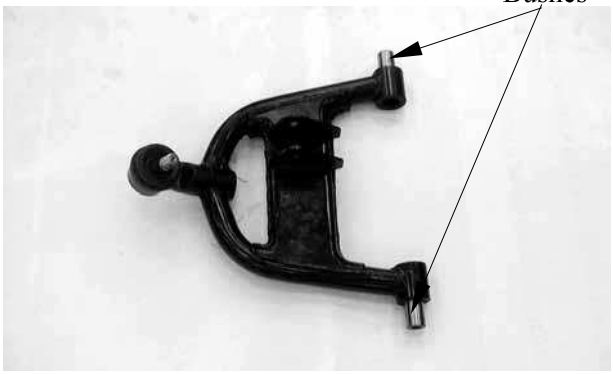

Band
Front Brake Fluid Tube
Bolts

*


Bushes




Bolts



*

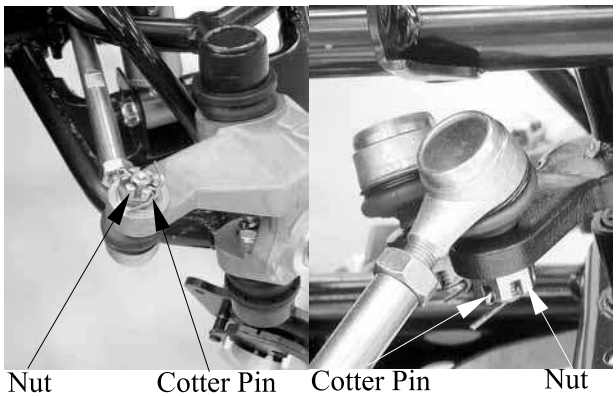
y dangerously weaken the arm.

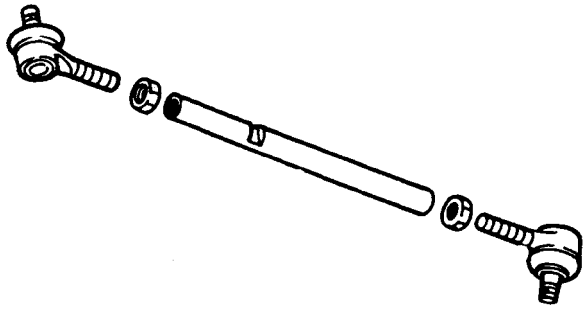
*

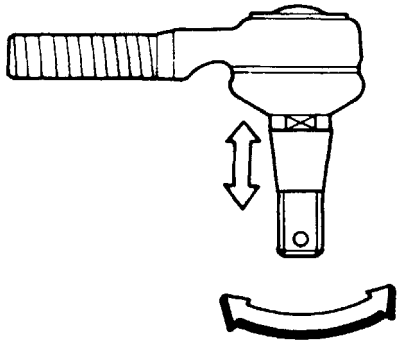
Apply the grease onto the bushes and inner collars

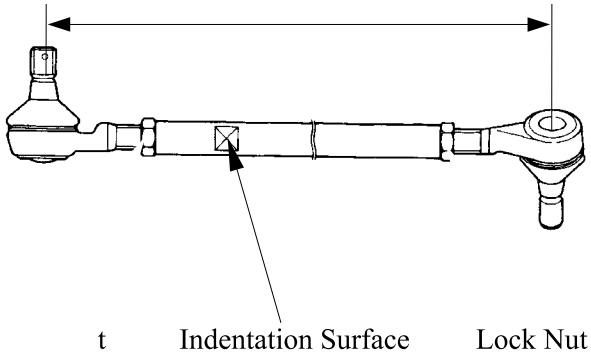
*

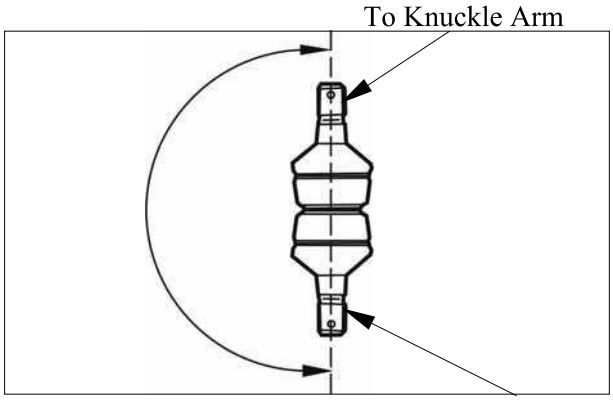
Always use a new cotter pin.


Nut
Cotter Pin
Cotter Pin
Nut



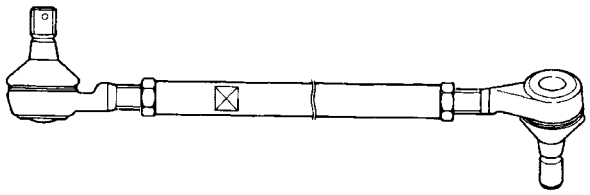



t
Indentation Surface
Lock Nut



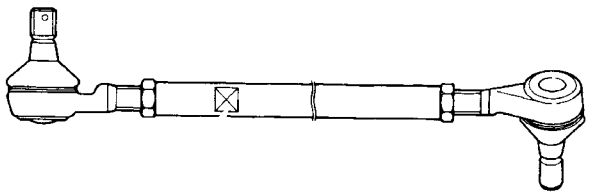
*

identification.



*

The threads on both rod-end must be of the same length.

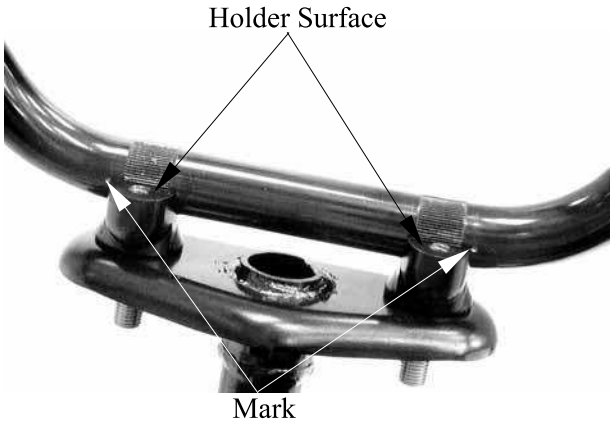


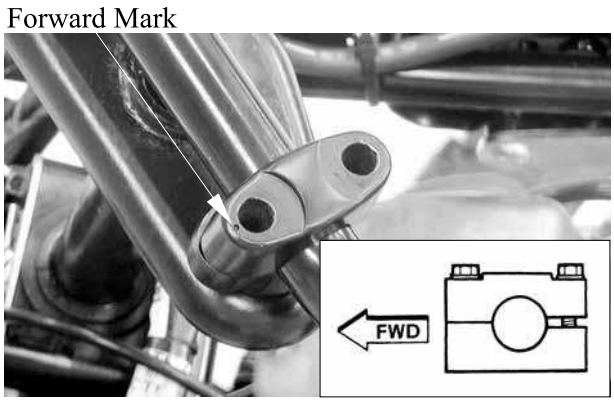
*

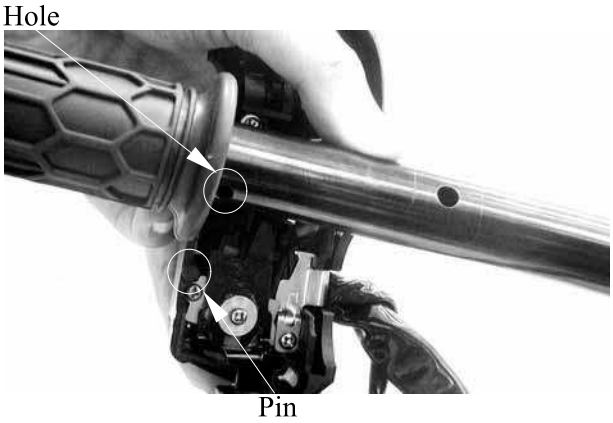
Be sure that the rod-end on the indentation surface side is connected to the steering knuckle.

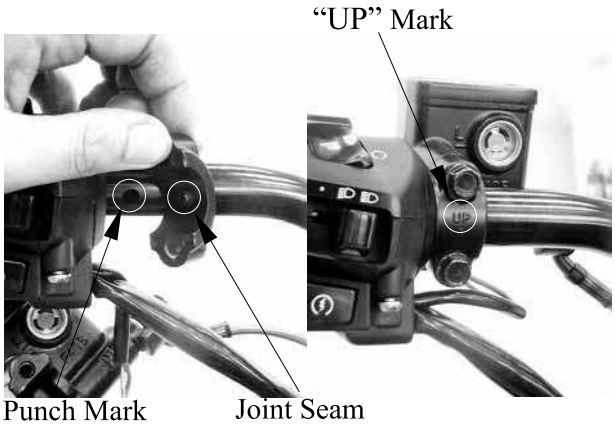
*

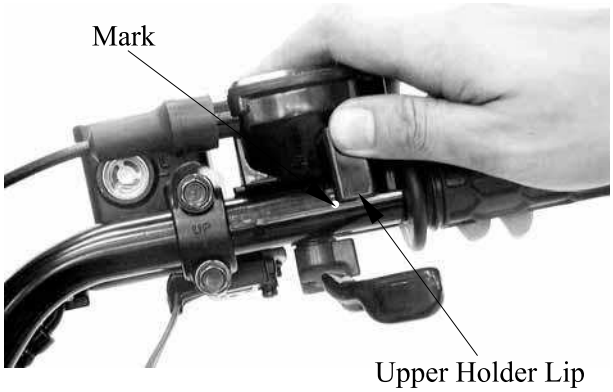
*

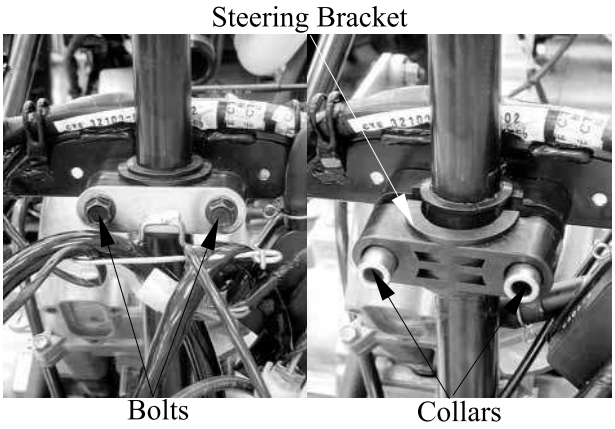

Holder Surface
Mark

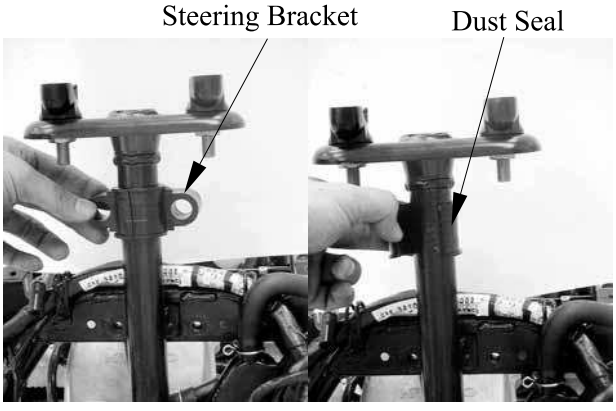

Forward Mark
FWD


Hole
Pin

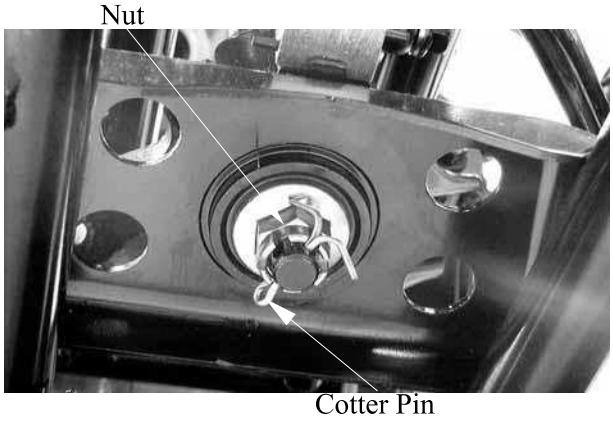

"UP" Mark
Punch Mark
Joint Seam

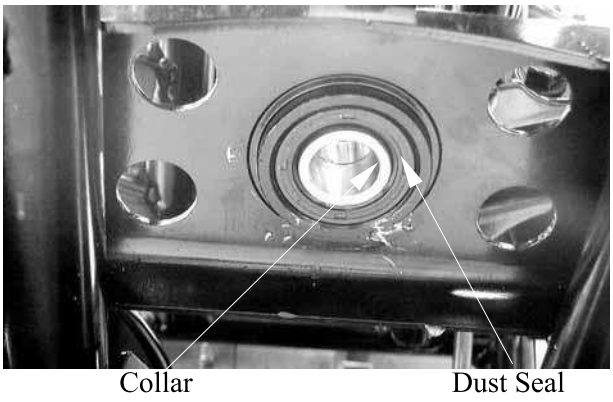

Mark
Upper Holder Lip

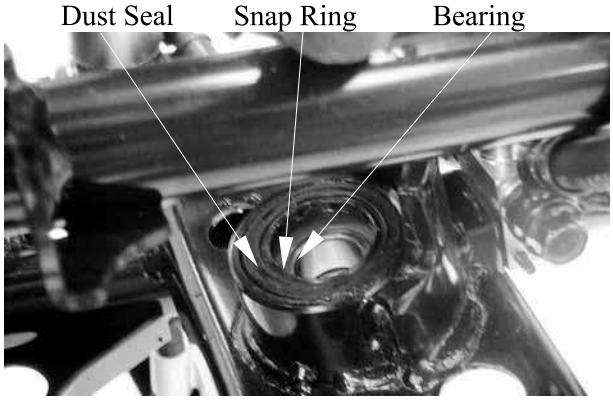

Steering Bracket
Bolts
Collars


Steering Bracket
Dust Seal


Cotter Pin
Nut

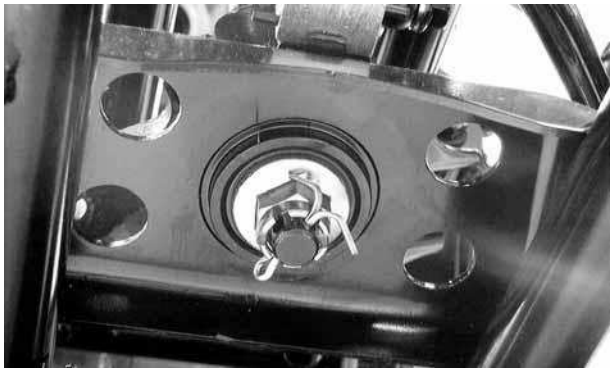

Nut
Cotter Pin


Collar
Dust Seal

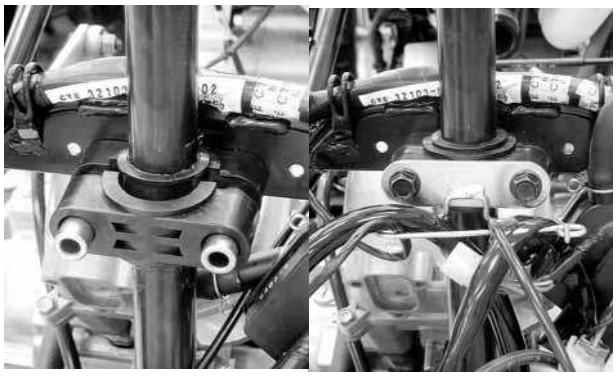

Dust Seal
Snap Ring
Bearing

* Do not attempt to straighten a bent shaft, this may dangerously weaken the shaft.

* Apply the grease onto the collar, dust seals, and bearing.



* Always use a new cotter pin.

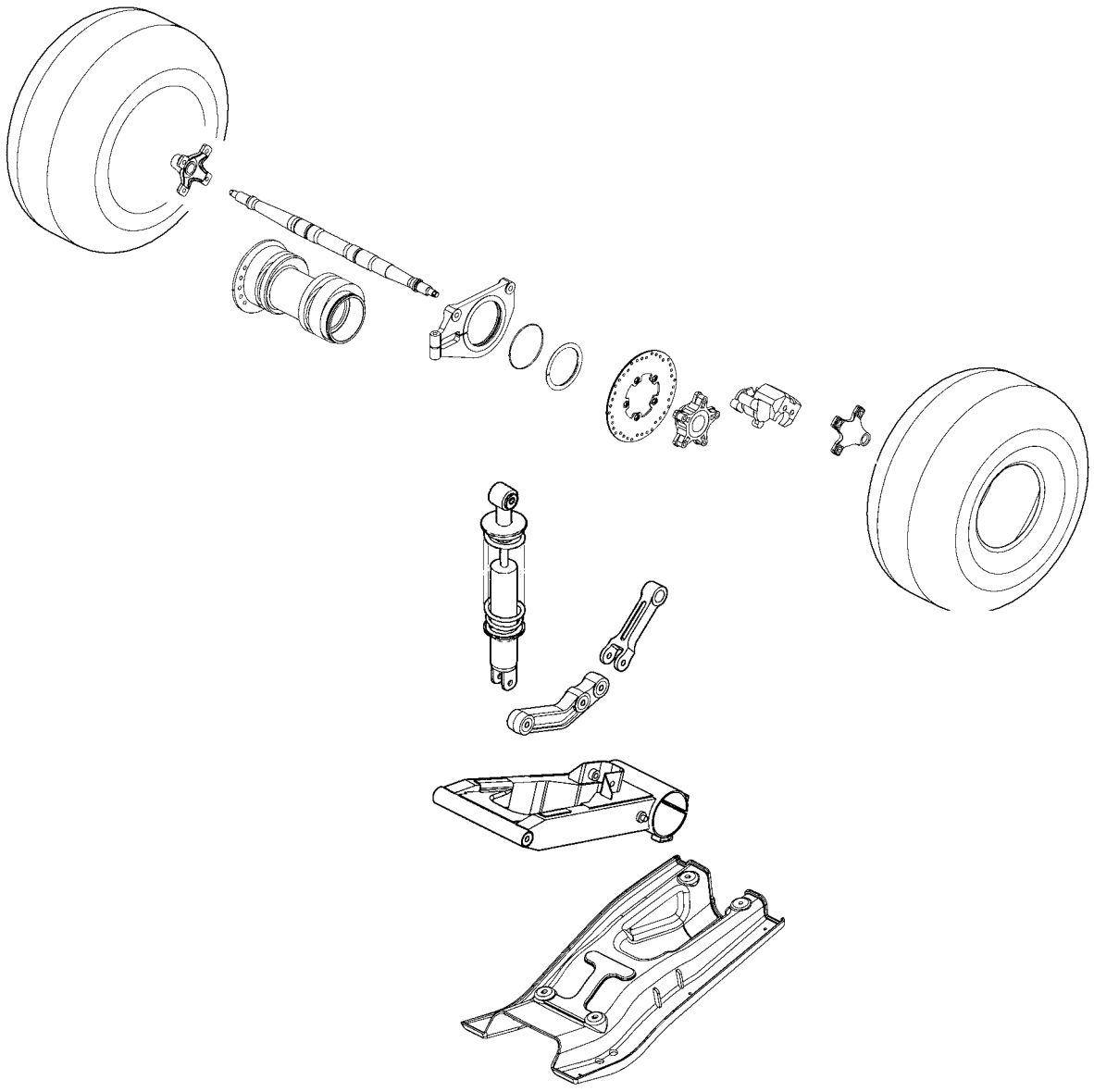


* Always use a new cotter pin.

15

REAR WHEEL/AXLE/SUSPENSION

15. REAR WHEEL/AXLE/SUSPENSION



SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Jack the machine front wheel off the ground and be careful to prevent the machine from falling down.
- During servicing, keep oil or grease off the brake disk
- Inspect the brake system before riding.

SPECIFICATIONS

Item			Standard (mm)	Service Limit (mm)
Rear wheel	Rim run out	Radial	—	2.0
		Axial	—	2.0

TORQUE VALUES

Rear wheel nut	4.0～5.0kgf-m
Rear shock absorber upper mount bolt	3.5～4.5kgf-m
Rear shock absorber lower mount bolt	3.5～4.5kgf-m
Rear fork axle	6.0～8.0kgf-m
Rear wheel hub nut	9.0～11.0kgf-m
Rear wheel shaft nut	11.0～13.0kgf-m
Caliper holder bolt	1.8～2.5kgf-m

SPECIAL TOOLS

Nut wrench F010

TROUBLESHOOTING

Rear wheel wobbling

- Bent rim
- Faulty tire
- Axle not tightened properly

Soft rear shock absorber

- Weak shock absorber spring
- Faulty damper

REAR WHEEL/AXLE/AXLE HUB

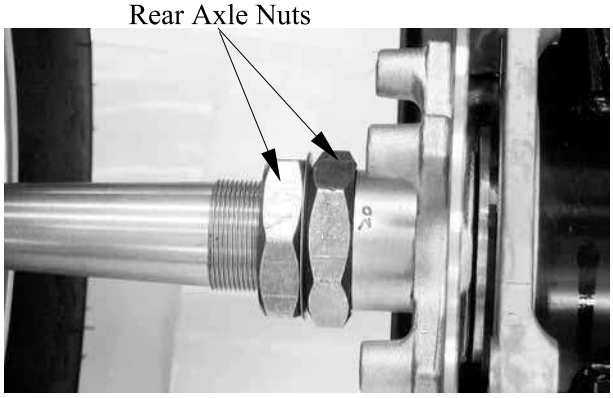
REMOVAL AND INSPECTION

Place the machine on a level place.
Remove the rear caliper. (Refer to the "REAR BRAKE CALIPER REMOVAL" section in chapter 13)

Use the nut wrench to loosen two rear axle nuts (inner and outer) of the rear axle.

*

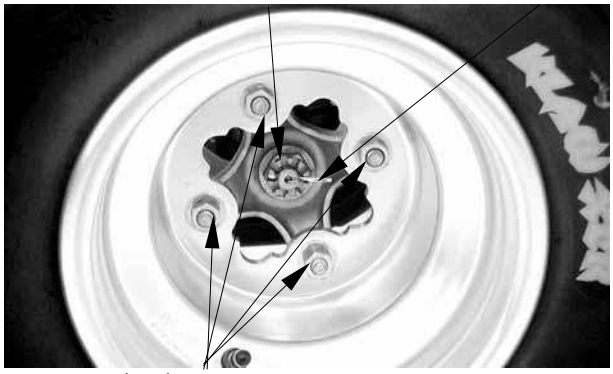
Nut wrench F010



Remove four nuts attaching the rear wheel hub of the both rear wheels, then remove the both rear wheels.

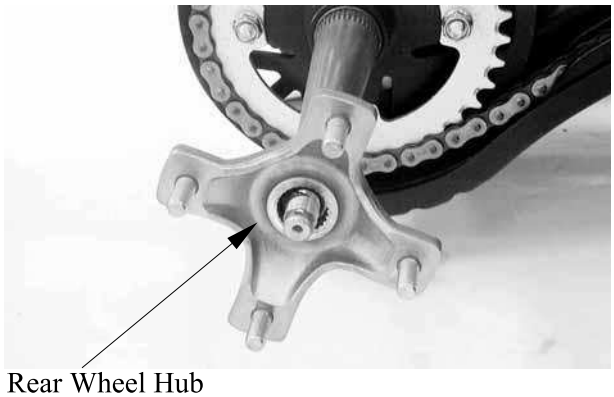
*

Elevate the rear wheels by placing a suitable stand under the rear of frame. Support the machine securely so there is no danger of it falling over.



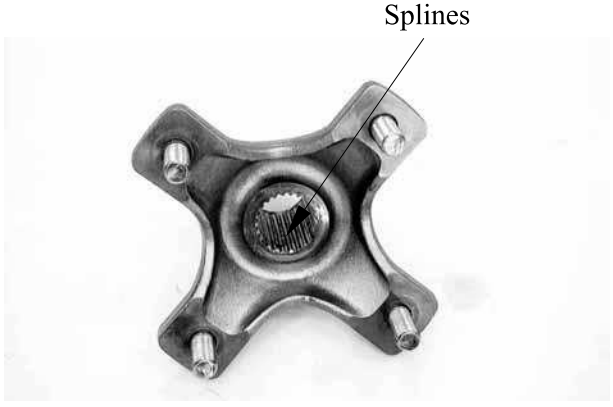
Remove the cotter pin and then remove nut.

Remove the rear wheel hub.

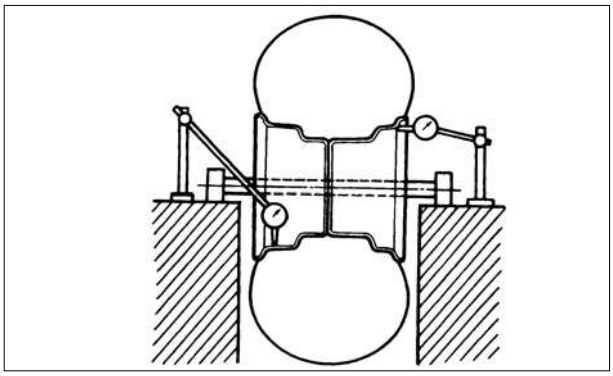


Inspect the rear wheel hub.
Cracks/damage → Replace.

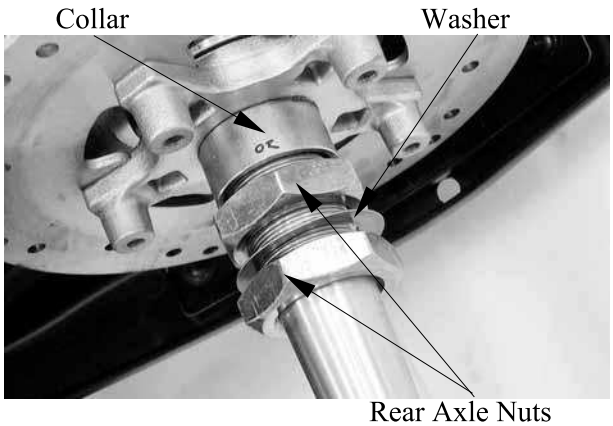
Inspect the rear wheel hub splines.
Wear/damage → Replace.



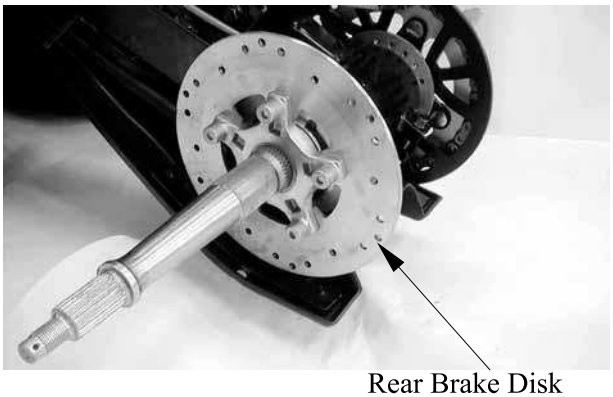
Measure the wheel runout.
Service Limit:
Vertical: 2.0 mm
Lateral: 2.0mm
Out of specification → Replace wheel.



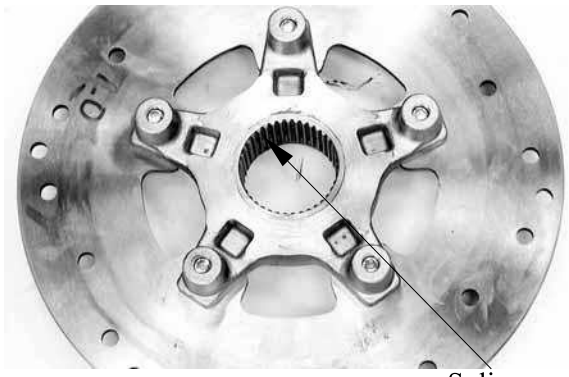
Remove the two rear axle nuts (outer and inner), washer and collar.



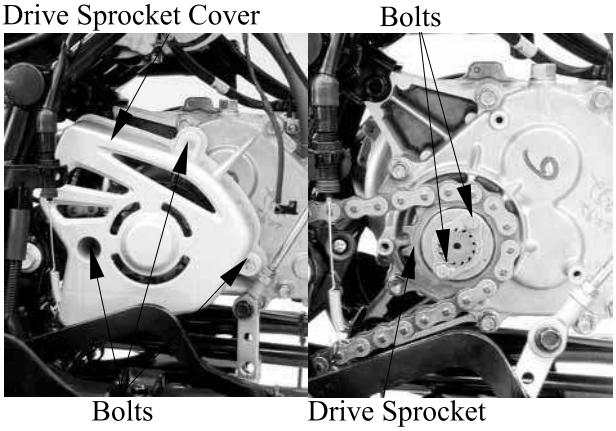
Remove the rear brake disk.

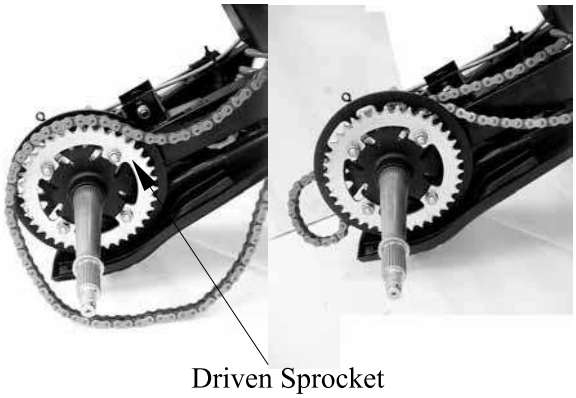


Inspect the brake disk
Cracks/damage → Replace.
Inspect the brake disk splines.
Wear/damage → Replace.



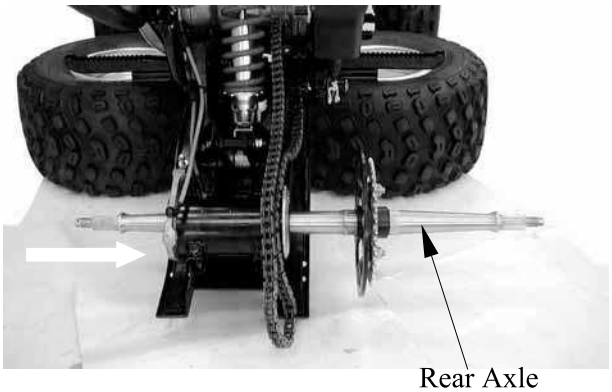
Loosen the driven chain (refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the chapter 3) and remove the two bolts at the drive sprocket (refer to the chapter 6), then disconnect the drive chain from the driven sprocket.





Remove the rear axle from right side.

* Tap the axle and with a rubber hammer, this will avoid damage the axle thread.



REAR AXLE DISASSEMBLY

Remove the driven sprocket clip at the rear axle and then remove the driven sprocket.

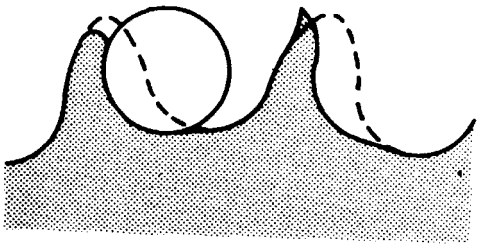
Remove the four nuts attaching the driven sprocket holder at the driven sprocket and then remove driven sprocket.

Nuts

Inspect the drive sprocket and driven sprocket.

More than 1/4 teeth wear → Replace.

Bent teeth → Replace.



Inspect the driven sprocket holder splines.
Wear/damage → Replace.

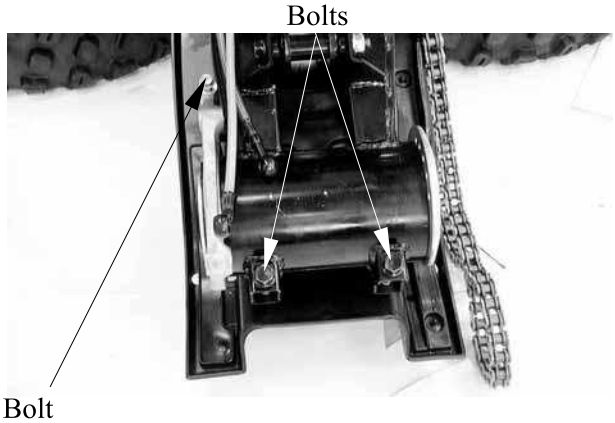
Inspect the rear axle.
Scratched (excessively)/damage → Replace.
Inspect the splines and threads of the rear axle
Wear/damage → Replace.

Measure the rear axle run out.
Service limit: less than 1.5mm
Out of specification → Replace.
*

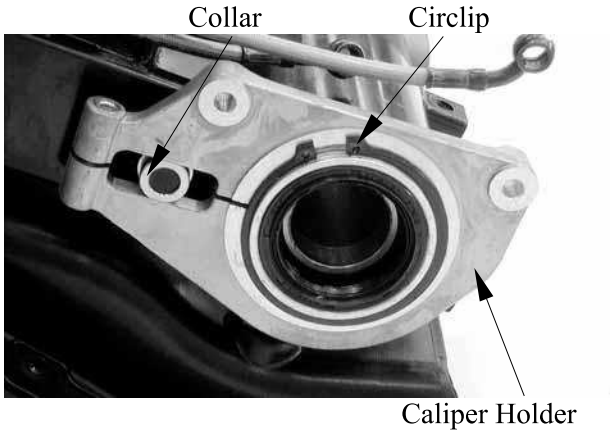

REAR AXLE ASSEMBLY
Reverse the "REAR AXLE DISASSEMBLY" procedures.
*

Apply grease onto the rear axle splines.

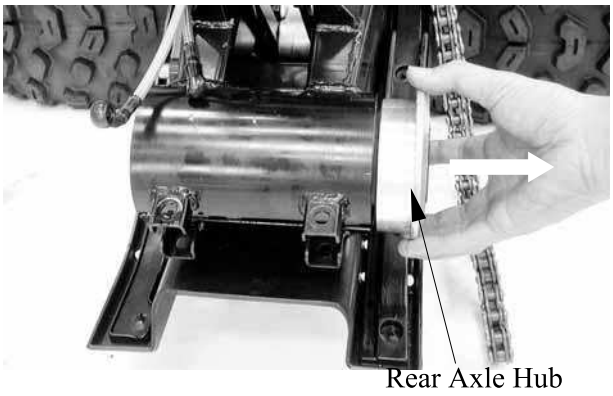
Remove the bolt at the rear caliper holder.
Remove the two bolts attaching the rear axle hub at the rear fork.



Remove the circlip at the caliper holder and then remove the caliper holder and collar.



Remove the rear axle hub from right side.



Inspect rear axle hub.

Bearings allow play in the axle hub or the bearing turns roughly → Replace.

Oil seals is wear/damage → Replace.

Axle hub is cracks/bend/damage → Replace.

REAR AXLE HUB DISASSEMBLY

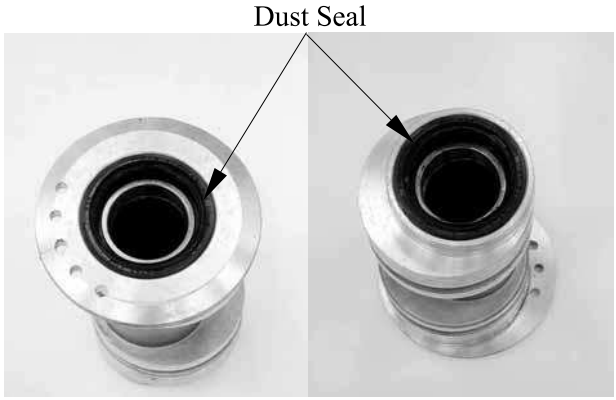
Bearing and dust seal replacement steps:

Clean the outside of the rear axle hub.

Remove the dust seal by a flat-head screw driver.

✻ Place a wood block against the outer edge to protect this edge.

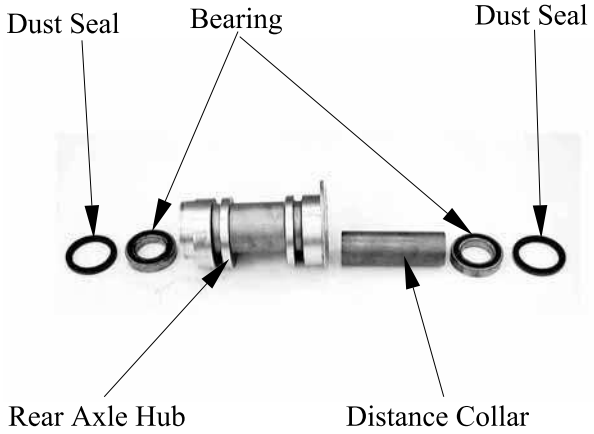
Remove the bearing by a general bearing puller.



REAR AXLE HUB ASSEMBLY

Install the new bearing and dust seal by reversing the previous steps.

✻ Do not strike the center race or balls of the bearing.
Contact should be made only with the outer race.
Make sure install the distance collar into the rear axle hub



INSTALLATION

Reverse the "REAR WHEEL/AXLE/AXLE HUB REMOVAL AND INSPECTION" procedures.

*

Apply grease onto the dust seal lips and bearings.

Install the rear axle hub.

*

Install the rear axle.

Connect the drive chain.

Install the rear brake disk, collar inner nut, washer and outer nut.

*

At this time, the nuts should not be tightened completely.

Install the rear wheel hub and tighten the nut.

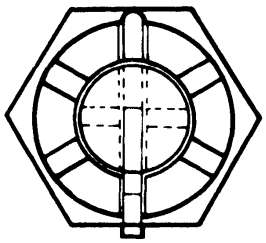
Torque: 9.0～11.0kgf-m

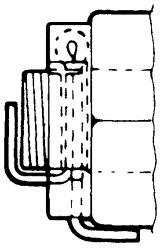
Install cotter pin (new)

*

Do not loosen the wheel hub nut after torque tightening. If the wheel hub nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the wheel hub nut.

Always use a new cotter pin.

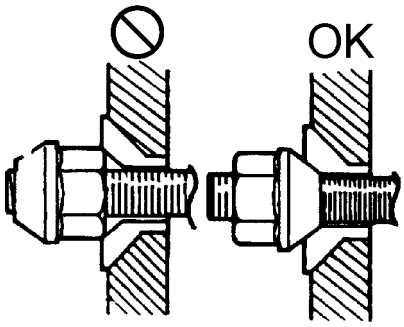




Install the rear wheel and tighten the four nuts.

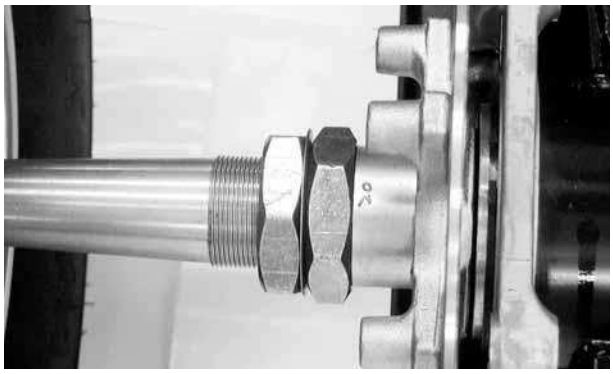
Torque: 4.0～5.0kgf-m

*



Tighten the two rear axle nuts (inner and outer).

*



Nut wrench F010

Torque: 11.0～13.0kgf-m

Adjust drive chain slack. (Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.)

Drive chain slack: 30 ~ 40mm

REAR FORK/SWIM ARM/SHOCK ABSORBER

REMOVAL AND INSPECTION

Place the machine on a level place.

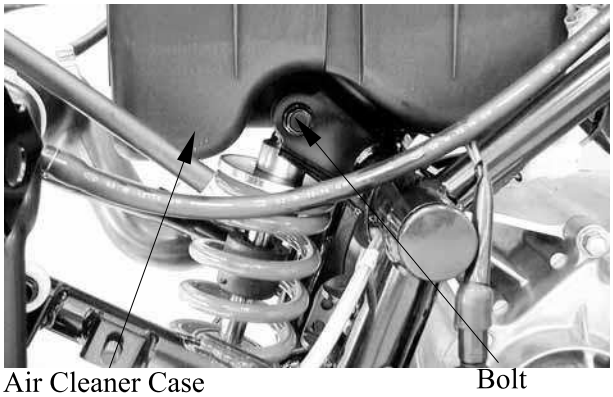
Elevate the rear wheels by placing a suitable stand under the rear of frame.

* Support the machine securely so there is no danger of it falling over.

Remove the rear wheels, rear axle and rear hub.

Refer to the “REAR WHEEL/AXLE/AXLE HUB REMOVAL AND INSPECTION” section in chapter 15.

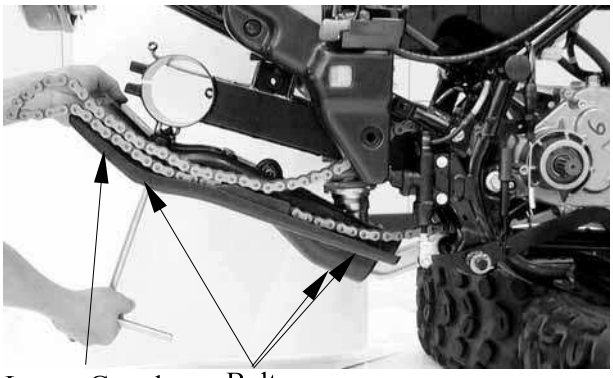
Remove the two bolts at the air cleaner case. (Refer to the “CARBURETOR REMOVAL” section in chapter 5.)



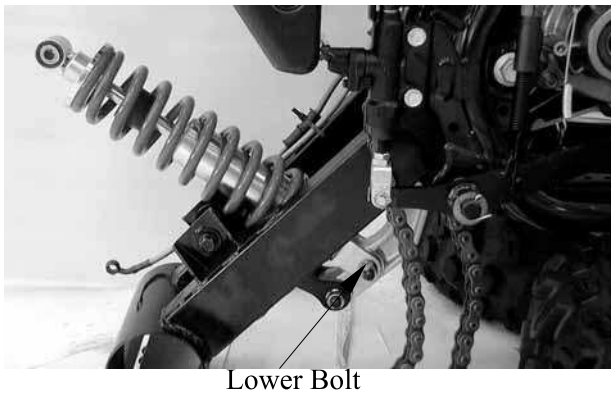
Elevate the air cleaner case and remove the upper mount bolt at the rear shock absorber

Remove the four bolts at the lower guard and then remove the lower guard.

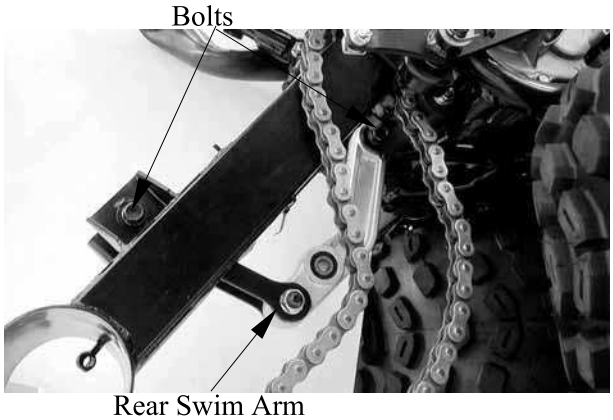
* When removing the lower guard, hold the swing arm so that it does not drop downwards when the lower guard is removed.



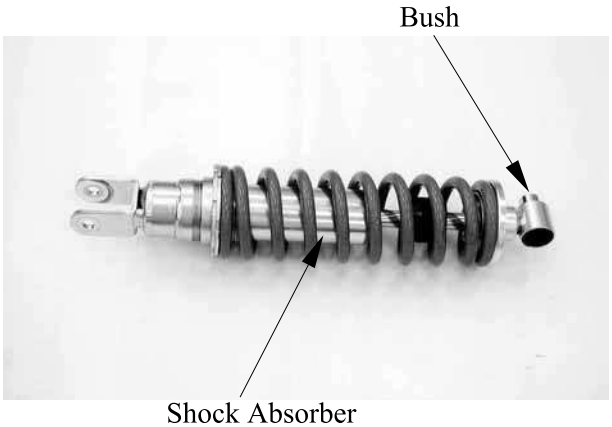
Remove the lower mount bolt at the rear shock absorber and then remove the shock absorber and bush.



Remove the two bolts attaching the rear swing arm at the rear fork and then remove the rear swing arm.

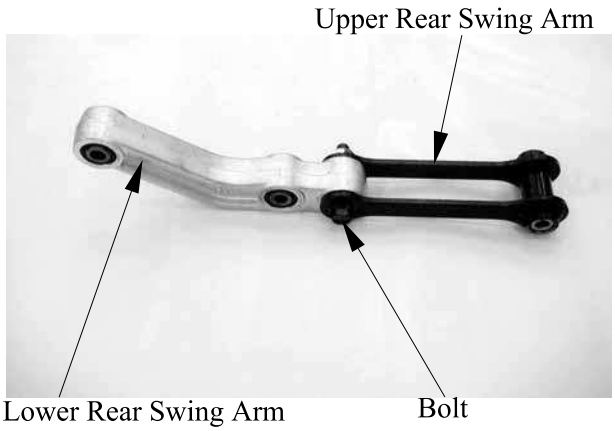


Inspect the shock absorber rod.
Bends/damage → Replace the shock absorber assembly.
Inspect the shock absorber.
Oil leaks → Replace the shock absorber assembly.
Inspect the spring.
Fatigue → Replace the shock absorber assembly.
Move the spring up and down.
Inspect the bush.
Wear/damage → Replace.

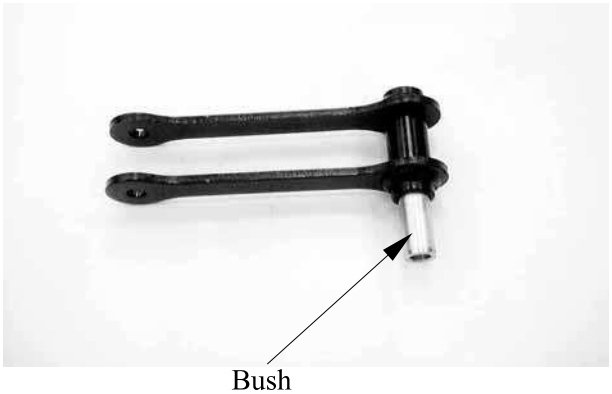


REAR SWING ARM DISASSEMBLY

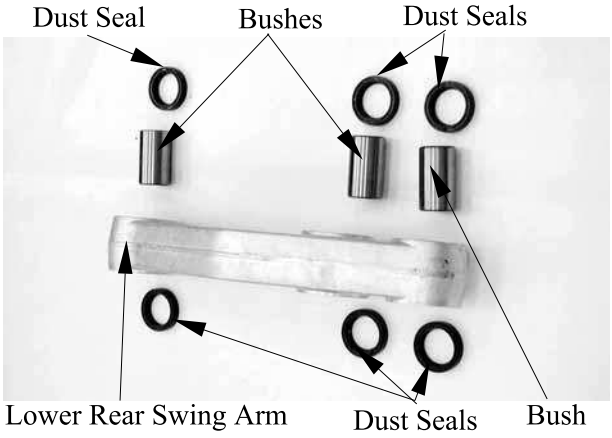
Remove the bolt attaching the lower rear swing arm at the upper rear swing arm and then disconnect the upper rear swing arm from the lower rear swing arm.



Inspect the upper rear swing arm.
Bends/damage → Replace.
Inspect the bush.
Wear/damage → Replace.

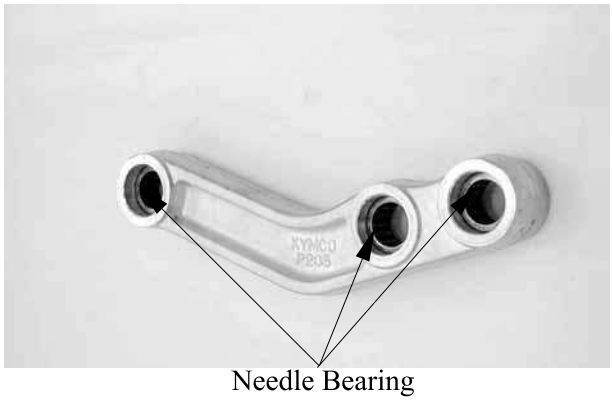


Remove the dust seals and the bushes from the lower rear swing arm.



Inspect the lower rear swing arm.
Wear/damage → Replace.
Inspect the bush.
Wear/damage → Replace.

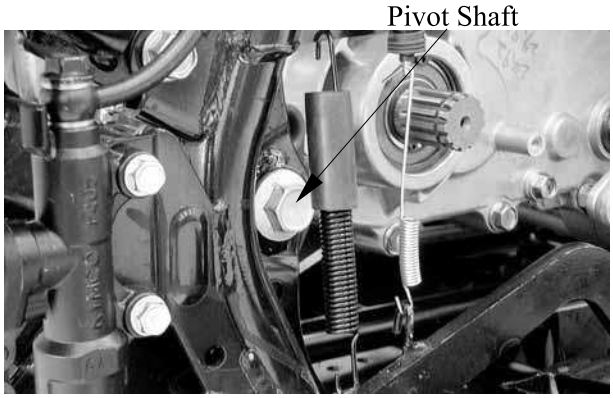
Inspect the needle bearings.
Bring allow play in the lower rear swing arm or bearing turns roughly → Replace.



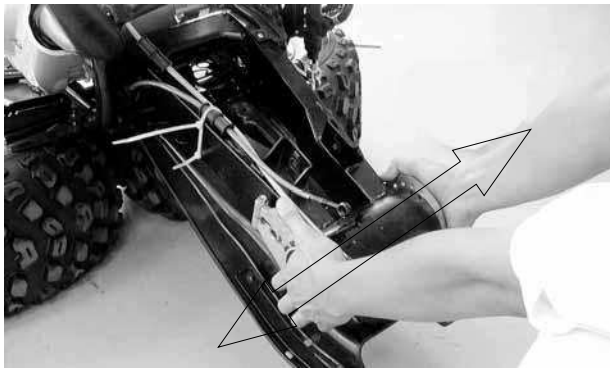
REAR SWING ARM ASSEMBLY
Reverse the "REAR SWING ARM DISASSEMBLY" procedures.

* Apply grease onto the oil seal lips, needle bearing and bushes.

Install the upper rear swing arm and tighten the bolt.
Torque: 3.5～4.5kgf-m



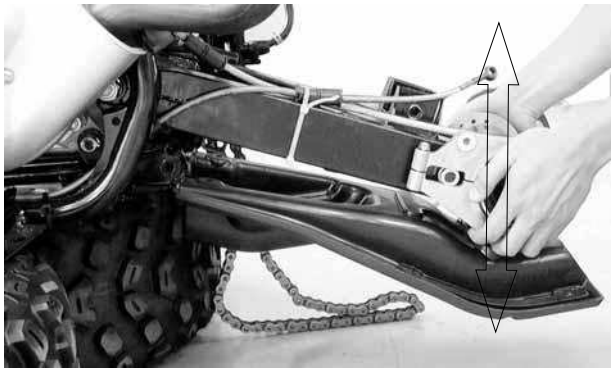
Check the tightening torque of the pivot shaft (rear fork) securing nut.
Torque: 6.0～8.0kgf-m



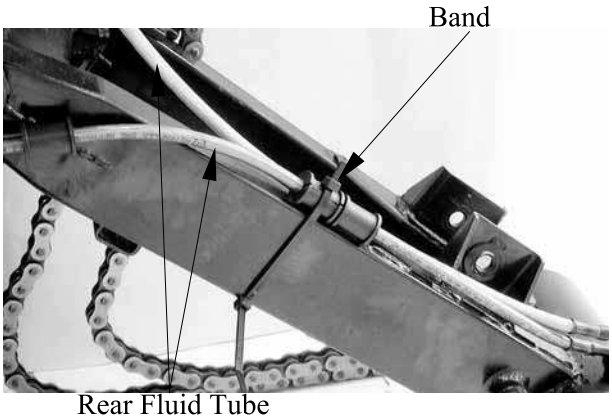
Check the rear fork side play by moving it from side to side.
If side play noticeable, check the inner collar, bearing, bushing and thrust cover, or adjust the shim.

Check the rear fork vertical movement by moving it up and down.

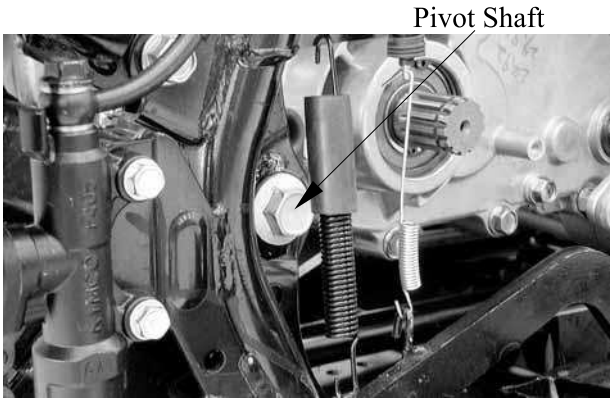
If vertical movement is tight, binding or rough, check the inner collar, bearing, bushing and thrust cover, or adjust the shim.



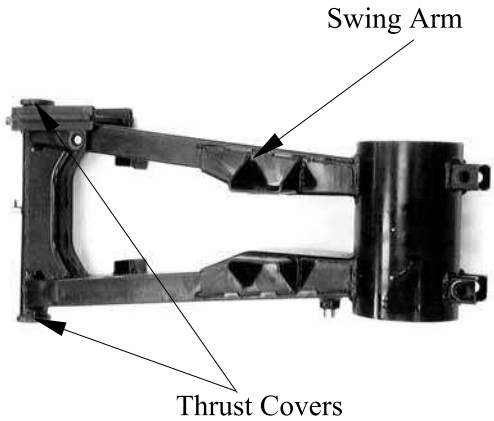
Remove the band and then disconnect the rear brake fluid tubes from the rear fork.



Remove the nut and pivot shaft, then remove rear fork and drive chain.



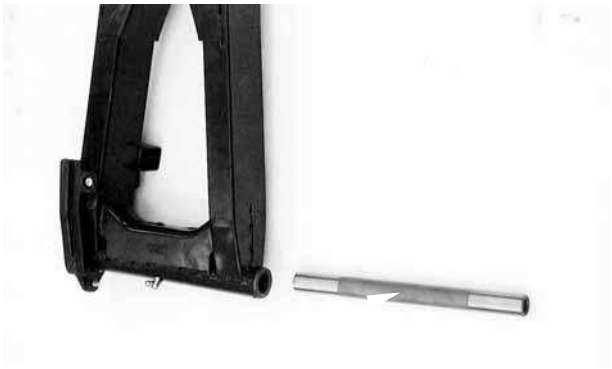
Remove the thrust covers.



Inspect the rear fork.
Crack/bend/damage → Replace.
Roll the axle on a flat surface to inspect the pivot shaft.
Bends → Replace.

* Do not attempt to straighten a bent axle.

Inspect the thrust covers, collar and bushes.
Wear/damage → Replace.



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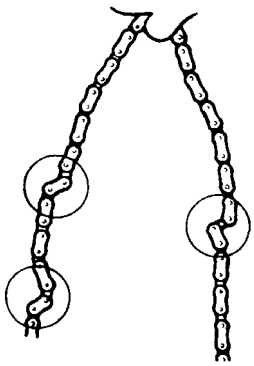
Inspect the drive chain stiffness.
Stiff →Clean and lubricate or replace.



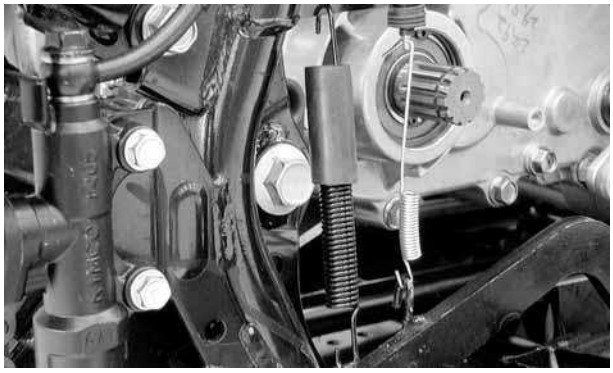
INSTALLATION

Reverse the "REAR FORK/SWIM ARM/SHOCK ABSORBER REMOVAL AND INSPECTION" procedure.

Apply grease onto the collar, bush, pivot shaft and thrust cover.

Install the rear fork and tightening the nut and pivot shaft.

Torque: 6.0～8.0kgf-m



Install the rear swing arm and tightening the bolts.

Torque: 3.5～4.5kgf-m

Install the shock absorber and tightening the bolts.

Torque: 3.5～4.5kgf-m

Install the rear hub and rear wheels.

Refer to the "REAR WHEEL INSTALLATION" section.

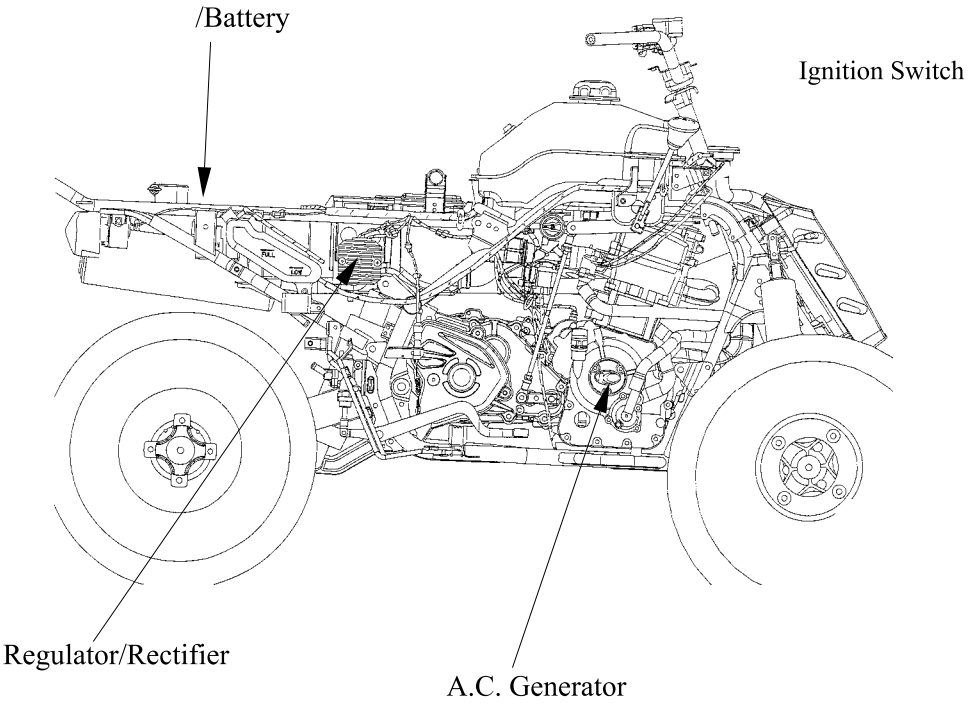
Adjust the drive chain slack.

Refer to the "DRIVE CHAIN SLACK ADJUSTMENT" section in the CHAPTER 3.

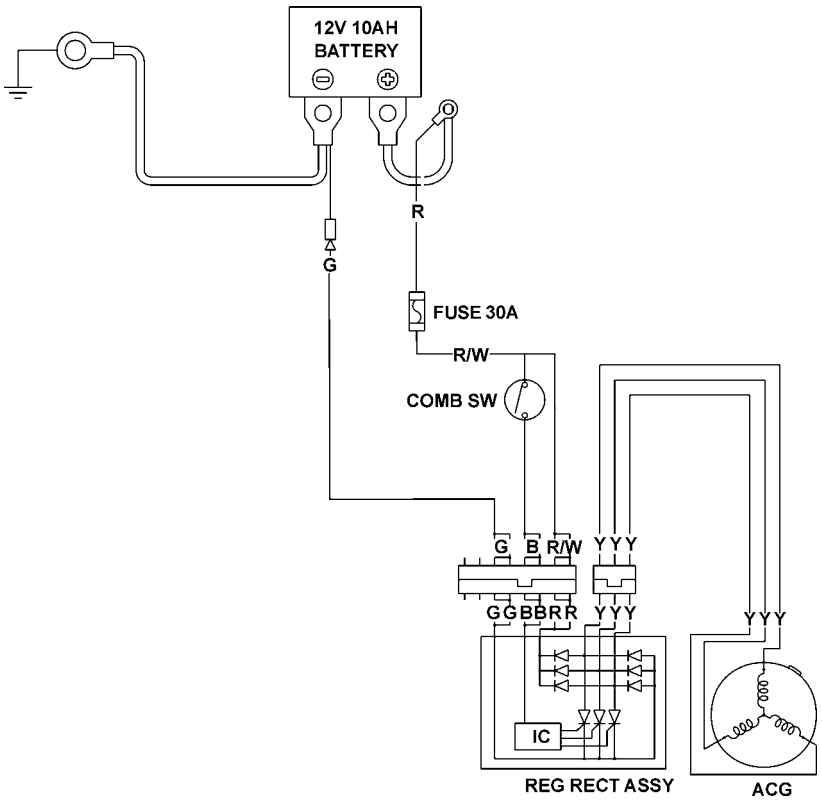
Drive chain slack: 30 ~ 40mm

16

BATTER/CHARGING SYSTEM/ A.C. GENERATOR



CHARGING CIRCUIT



SERVICE INFORMATIONN

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–12AH
	Voltage (20℃)	Fully charged	13.1V
		Undercharged	12.3V
	Charging current		STD: 1.2A Quick: 3.0A
	Charging time		STD: 5～10hr Quick: 30min
A.C. Generator	Capacity		150W
Regulator/Rectifier	Limit voltage	Lighting	12.0～14.0V
			10～13.0V
		Charging	13.5～15.5V

TESTING INSTRUMENTS
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

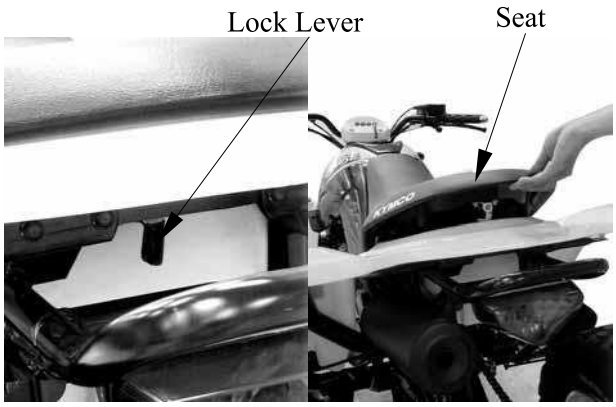
Charging system failure
- Loose, broken or shorted wire or connector
- Faulty regulator/rectifier
- Faulty A.C. generator

BATTERY REMOVAL

Pull right the lock lever and pull up the seat at the rear.
Remove the battery holder, by removing the mount bolts. (Make sure the ignition switch is oFF)

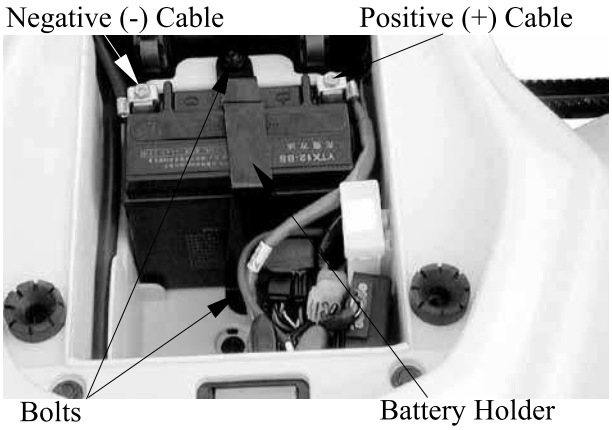
Remove the battery by removing the bolt. First disconnect the battery negative (-) cable and then the positive (+) cable.

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 then negative (-) cable to avoid short circuit.



BATTERY VOLTAGE (OPEN CIRCUIT VOLTAGE) INSPECTION

Remove the seat.
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

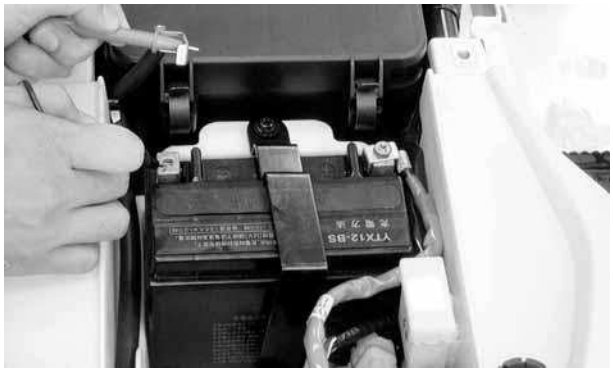
*
- Quick charging should only be done in an emergency.
- Measure the voltage 30 minutes after the battery is charged.

Charging current: Standard : 1.2A
Quick : 3.0A
Charging time : Standard : 5～10 hours
Quick : 30 minutes
After charging: Open circuit voltage: 12.8V min.

CHARGING SYSTEM

SHORT CIRCUIT TEST

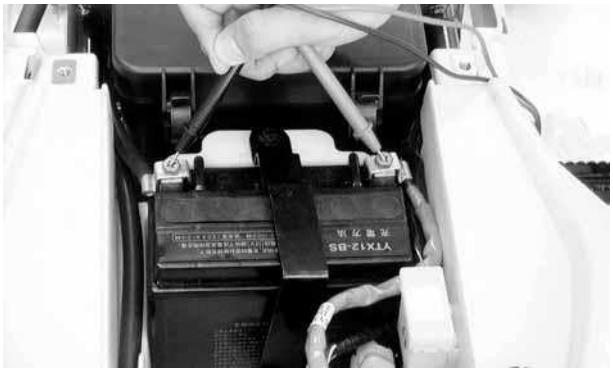
Disconnect the ground wire from the battery and connect an ammeter across the battery negative (-) terminal and the ground wire.
Turn the ignition switch OFF and check for short circuit.



* 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.

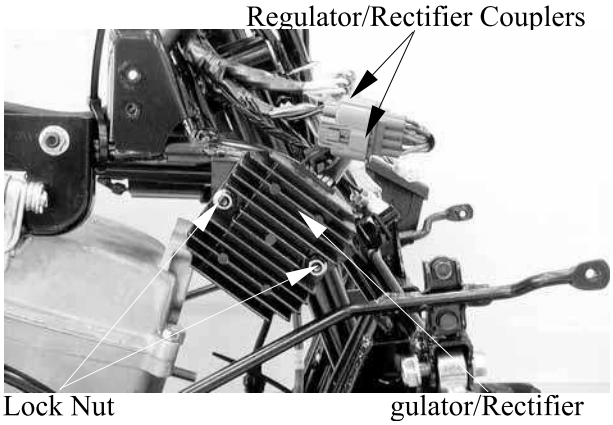
CURRENT TEST

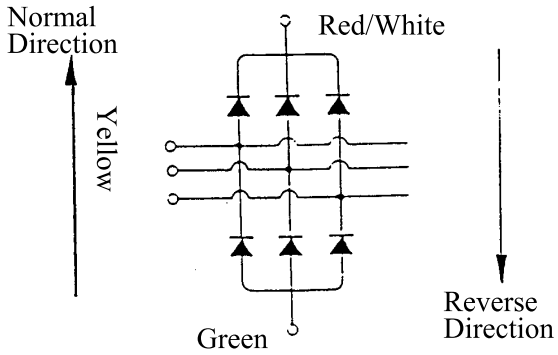


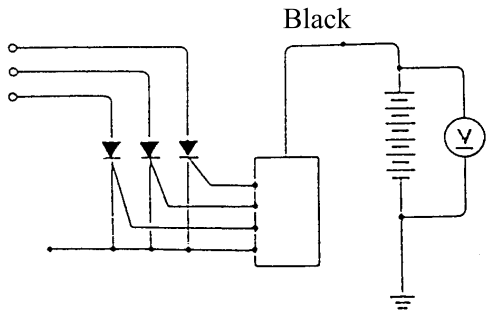
This inspection must be performed with an electric tester when the battery is fully charged.
Warm up the engine for inspection.
Connect the electric tester across the battery terminals. Disconnect the red wire from the fuse terminal and connect an ammeter between the red wire lead and the fuse terminal as shown.
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: 13.5～15.5V/0.5A max.

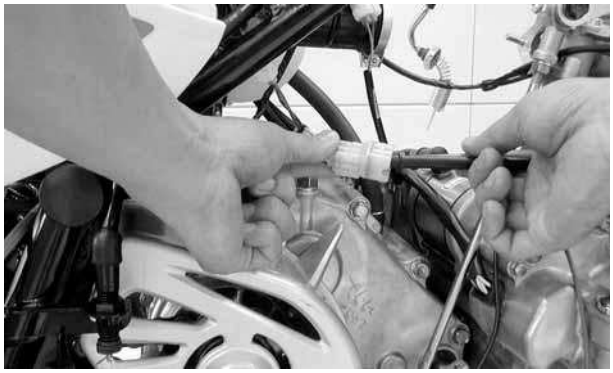
If the limit voltage is not within the specified range, check the regulator/rectifier.


Regulator/Rectifier Couplers
Lock Nut
gulator/Rectifier


Normal
Direction
Yellow
Red/White
Green
Reverse
Direction


Black
V

A.C. GENERATOR INSPECTION



* This test can be made without removing the stator from the engine.

Disconnect the A.C. generator connector.
Check the continuity between the yellow wires and ground.
There should be continuity between the yellow wires and no continuity between each yellow wire and ground.

Resistance (at 20°C):

Yellow～Yellow	1.6～2.5Ω

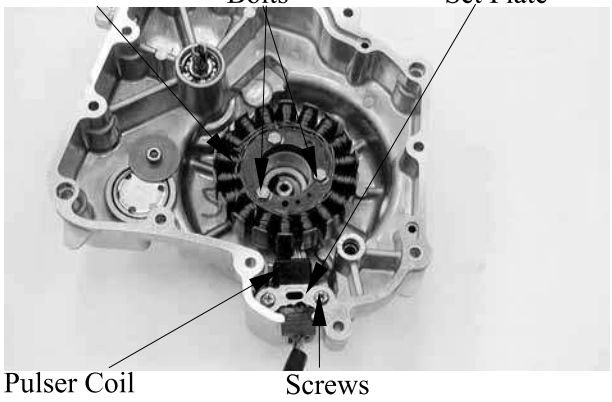
A.C. GENERATOR/FLYWHEEL

REMOVAL

Remove the right crankcase cover. (Refer to the "WATER PUMP SHAFT REMOVAL" section in the chapter 12)

Remove the pulser coil screws and then remove the A.C. generator wire set plate.

Remove the A.C. generator bolts and then remove A.C. generator and pulser coil from right crankcase cover.

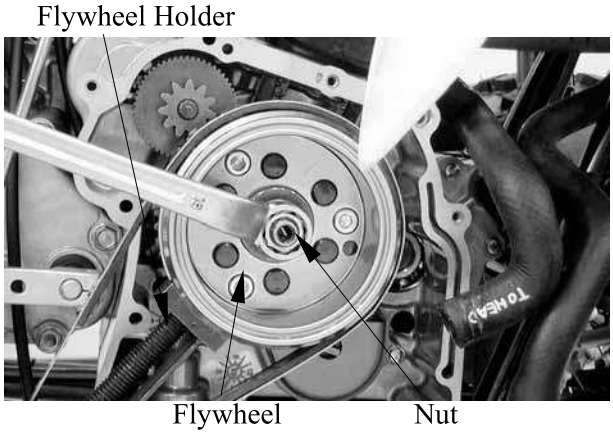


* When removing the pulser coil and stator, be careful not to damage them to avoid shorted or broken wire.

Remove the oil through guide and spring.

Hold the flywheel with a flywheel holder and remove flywheel nut and wash.

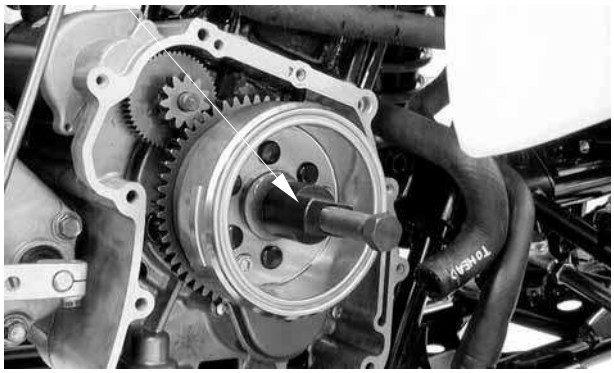
Flywheel holder E021



Remove the flywheel with a flywheel puller.

Flywheel puller E003

r



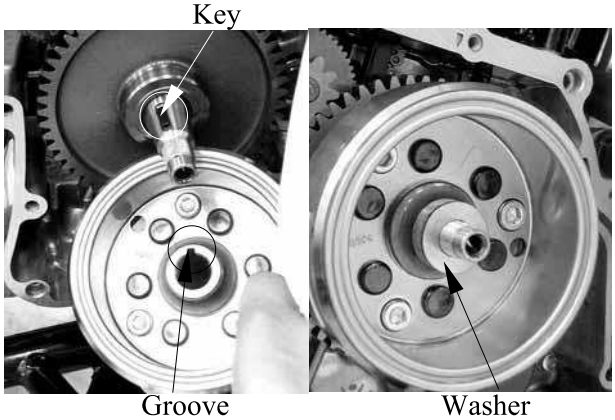
INSTALLATION

Reverse the "REMOVAL" procedures.

Install the flywheel, washer and tighten the nut.

Torque: 5.5～6.5kgf-m

Key



Groove Washer

✻

- Before installation, check and make sure that the inside of the flywheel is not contaminated.
- Make sure install the flywheel onto the crankshaft by aligning the key on the crankshaft with the groove in the flywheel.

Install the oil through guide and spring.

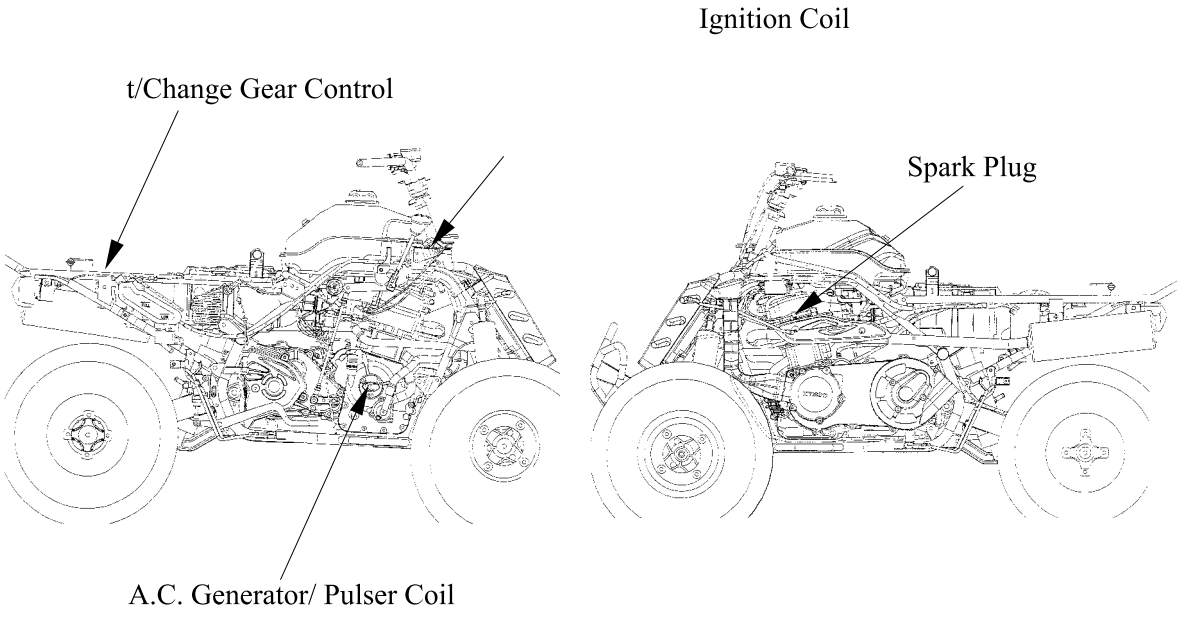
Install the A.C. generator onto the right crankcase cover and tighten the bolts.

Torque: 0.8～1.0kgf-m

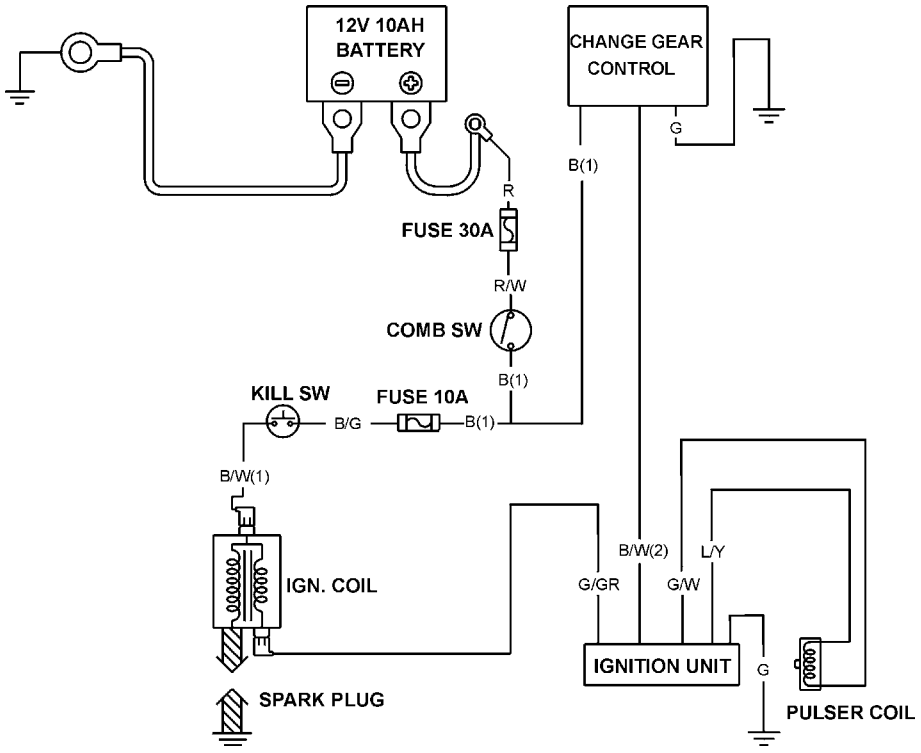
Install the right crankcase cover.

17

IGNITION SYSTEM



IGNITION CIRCUIT



SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Check the ignition system according to the sequence specified in the Troubleshooting.
- The ignition system adopts ignition unit, change gear control and the ignition timing cannot be adjusted.
- If the timing is incorrect, inspect the ignition unit, A.C. generator, change gear control and replace any faulty parts. Inspect the ignition unit with a ignition unit tester
- Loose connector and poor wire connection are the main causes of faulty ignition system. Check each connector before operation.
- Use of spark plug with improper heat range is the main cause of poor engine performance.
- The inspections in this section are focused on maximum voltage. The inspection of ignition coil resistance is also described in this section.
- Inspect the spark plug referring to chapter 3.

SPECIFICATIONS

Item			Standard
Spark plug	Standard type		DPR7EA-9
Spark plug gap			0.6～0.7mm
Ignition timing	"F" mark Full advance		5º±1ºBTDC/2000RPM
Ignition coil resistance (20℃)	Primary coil		3.4～4.1Ω
	Secondary coil	without plug cap	14.45KΩ
		with plug cap	19.8KΩ
Pulser coil resistance (20℃)			105～110Ω
Ignition coil primary side max. voltage			14V
Pulser coil max. voltage			1.6V
Exciter coil max. voltage			14V

TESTING INSTRUMENT

Commercially available electric tester with resistance over 10MΩ/CDV.

TROUBLESHOOTING

High voltage too low
- Weak battery or low engine speed
- Loose ignition system connection
- Faulty ignition unit
- Faulty ignition coil
- Faulty pulser coil

Normal high voltage but no spark at plug
- Faulty spark plug
- Electric leakage in ignition secondary circuit
- Faulty ignition coil

Good spark at plug but engine won‘t start
- Faulty ignition unit or incorrect ignition timing
- Faulty change gear control unit
- Improperly tightened A.C. generator flywheel

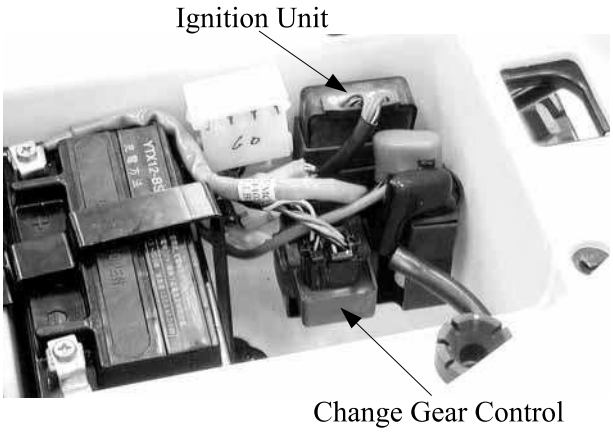
No high voltage
- Faulty ignition switch
- Faulty ignition unit
- Poorly connected or broken ignition unit ground wire
- Dead battery or faulty regulator/rectifier
- Faulty ignition coil connector
- Faulty pulser coil

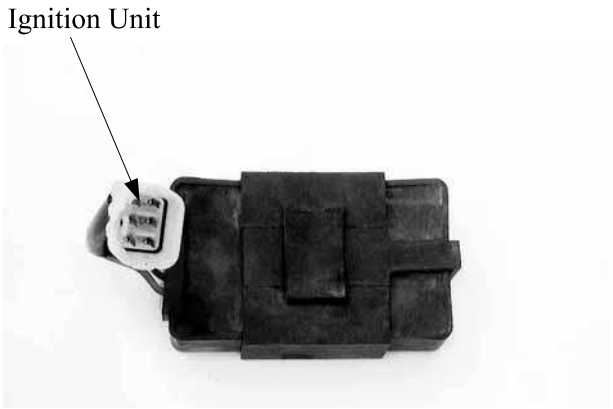
IGNITION UNIT /CHANGE GEAR CONTROL INSPECTION

Remove the seat. (Refer to the chapter 2)
Disconnect the ignition unit coupler and remove the ignition unit.
Disconnect the change gear control coupler and remove the change gear control.

Measure the resistance between the terminals using the electric tester.

✳
- Due to the semiconductor in circuit, it is necessary to use a specified tester for accurate testing. Use of an improper tester in an improper range may give false readings.
- Use a YF-3501 Electric Tester.
- In this table, "Needle swings then returns" indicates that there is a charging current applied to a condenser. The needle will then remain at "∞" unless the condenser is discharged.





IGNITION UNIT INSPECTION

Testing Range (at 20°C)

Unit: Ω

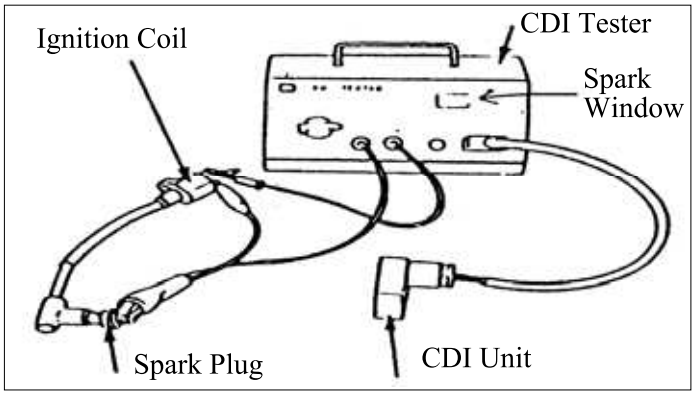
Probe⊕ / (-)Probe	Blue/ Yellow	Green / Gray	Black / White	Green/ White	Black/ Yellow	Green
Blue/ Yellow		∞	10.56M	90.4K	10.56M	46K
Green / Gray	12.73M		∞	12.73M	∞	12.73M
Black / White	∞	∞		∞	999	∞
Green/ White	90.4K	∞	10.56M		10.56M	46K
Black/ Yellow	∞	∞	999	∞		∞
Green	44.4K	∞	10.56M	44.4K	10.56M	

Note: The readings in this table are taken with a YF-3501 Tester.

Test the ignition unit using the ignition unit tester.

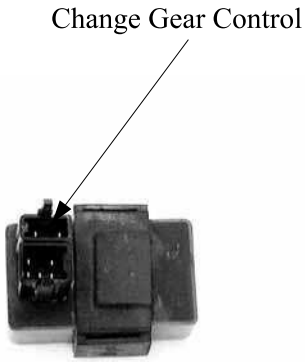
* Operate the ignition unit tester by following the manufacturer's instructions.

Connect the special connector to the ignition unit coupler and ignition unit tester.



Switch Range	Good CDI	Faulty CDI
1. OFF	No spark	——
2. P	No spark	——
3. EXT	No spark	Good spark
4. ON1	Good spark	No spark
5. ON2	Good spark	No spark

If the ignition unit is faulty, replace it with a new one.



CHANGE REAR CONTROL

INSPECTION

Testing Range(at 20°C)

Unit: Ω

Probe⊕ / (-)Probe	Green	Yellow/ Brown	Light Green/ Red	Green/ Pink	Green/ Yellow	Black/ White	Black
Green		14	∞	∞	7.85M	7.85M	10K
Yellow/ Brown	18		∞	∞	7.85M	7.85M	10K
Light Green/ Red	7.85M	7.85M		11	∞	∞	7.85M
Green/ Pink	7.85M	7.85M	9		∞	∞	7.85M
Green/ Yellow	∞	∞	∞	∞			∞
Black/ White	∞	∞	∞	∞	11		∞
Black	10K	10K	∞	∞	7.85M	7.85M	

Note: The readings in this table are taken with a YF-3501 Tester.

IGNITION COIL INSPECTION

CONTINUITY TEST

Remove the front fender. (Refer to the chapter 2)
Remove the spark plug cap. (Refer to the chapter 6)
Disconnect the ignition coil wires.

* This test is to inspect the continuity of ignition coil.

Measure the resistance between the ignition coil primary coil terminals.
Resistance: 3.4～4.1Ω/20◦C

Ignition Coil

Remove the spark plug cap and measure the secondary coil resistance between the spark plug wire and the primary coil terminal.
Resistance:
(with plug cap): 19.8KΩ/20◦C
(without plug cap): 14.45KΩ/20◦C

* This test is for reference only. Accurate test should be performed with a CDI tester.

Measure the spark plug cap resistance.
Remove the spark plug cap and measure the spark plug resistance.
Resistance: 4.2～5.2KΩ/20◦C

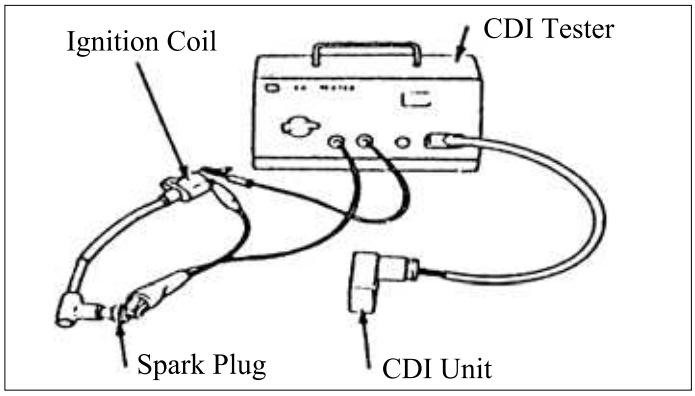
* Measure the resistance in the XKΩ range of the electric tester.

PERFORMANCE TEST

Test the performance with a ignition unit tester.

* • Operate the ignition unit tester by following the manufacturer's instructions.
  • Use the special connector to connect the ignition unit.

If the spark is weak, inspect the spark plug and CDI unit. If both of them are normal, replace the ignition coil with a new one.



PULSER COIL

INSPECTION

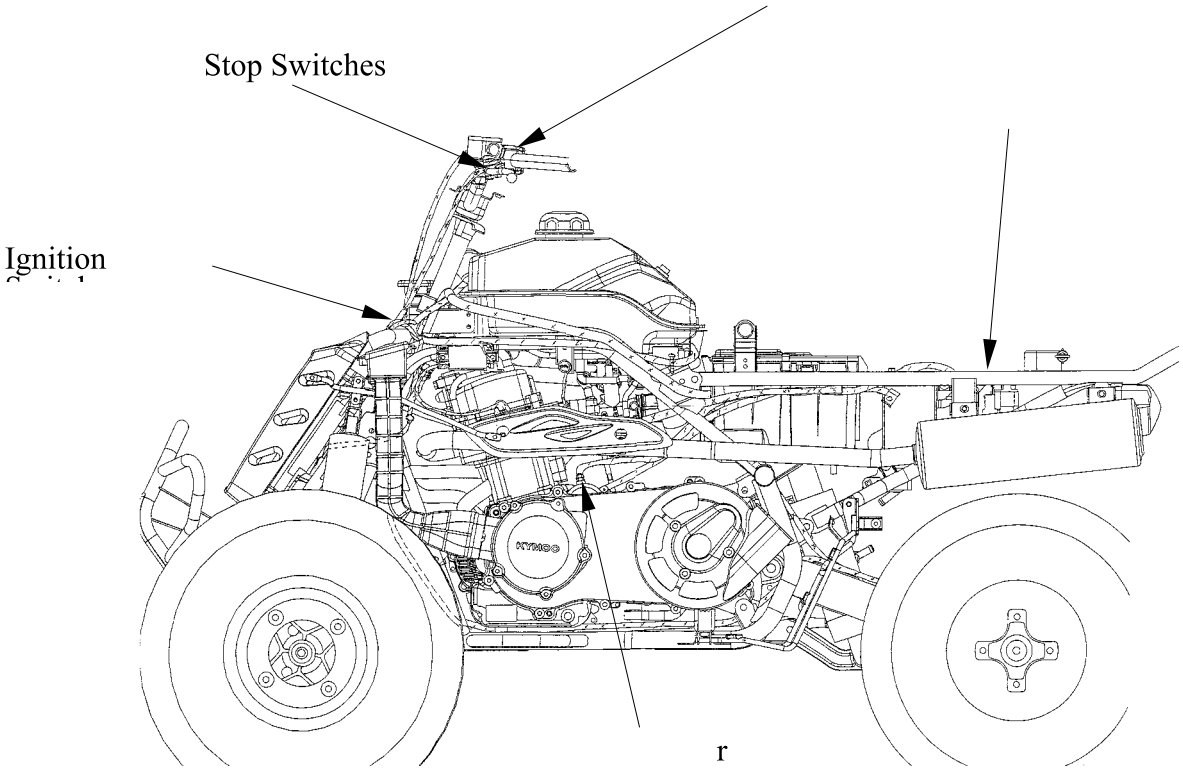
Remove the front fender. (Refer to the chapter 2)

Disconnect the pulser coil wire coupler and measure the resistance between the blue/yellow and green/white wire terminals.
Resistance: 105～110Ω/20◦C

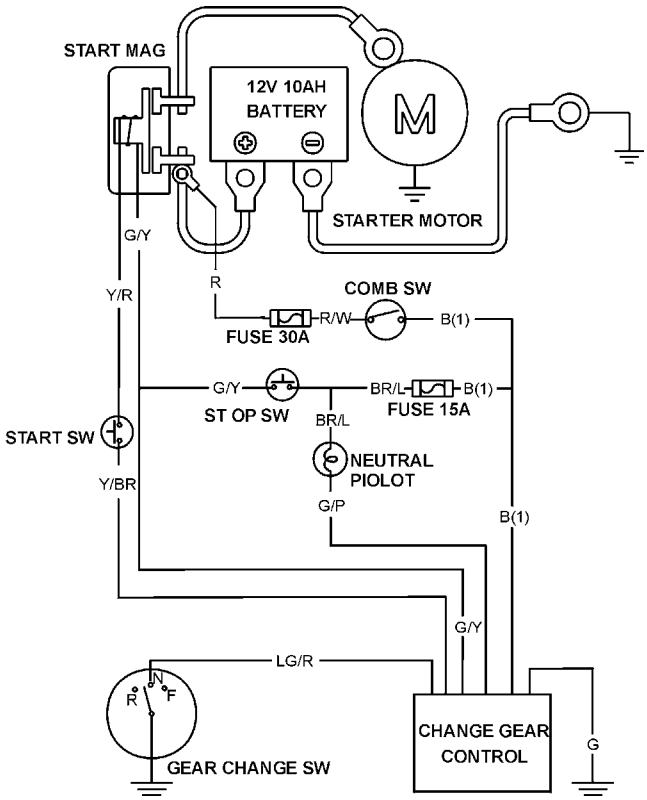
Refer to the "A.C. GENERATOR/FLYWHEEL" section in the chapter 16 to remove or install.

STARTING SYSTEM

18



STARTING CIRCUIT



SERVICE INFORMATION

GENERAL INSTRUCTIONS

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

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
- Faulty change gear control unit

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

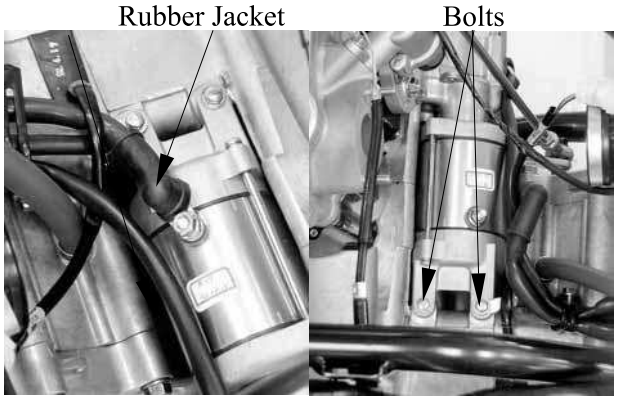
- Faulty starter clutch
- Starter motor rotates reversely
- Weak battery

STARTER MOTOR

REMOVAL

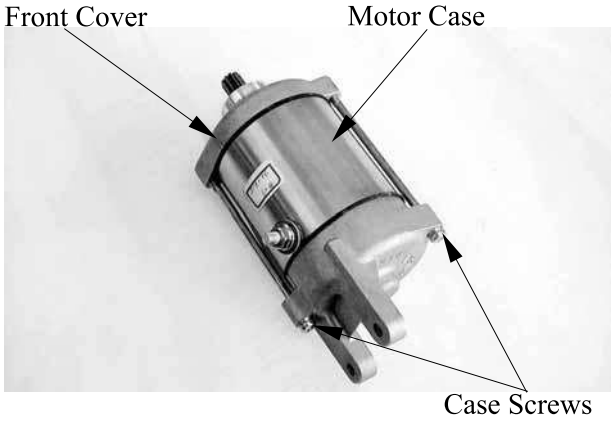
* Before removing the starter motor, turn the ignition switch OFF and remove the battery ground. Then, turn on the ignition switch and push the starter button to see if the starter motor operates properly.

Remove the waterproof rubber jacket and remove nut to disconnect the starter motor cable connector.
Remove the two starter motor mounting bolts and the motor.



DISASSEMBLY

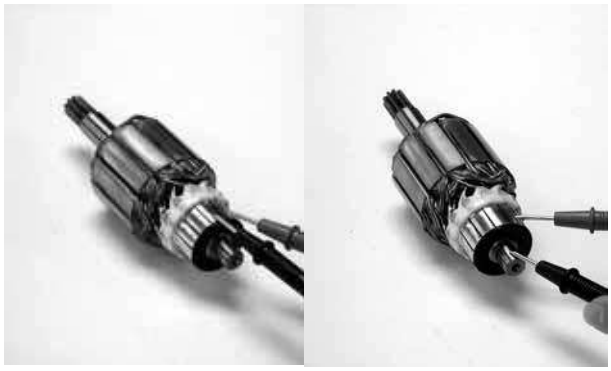
Remove the two starter motor case screws, front cover, motor case and other parts.



INSPECTION

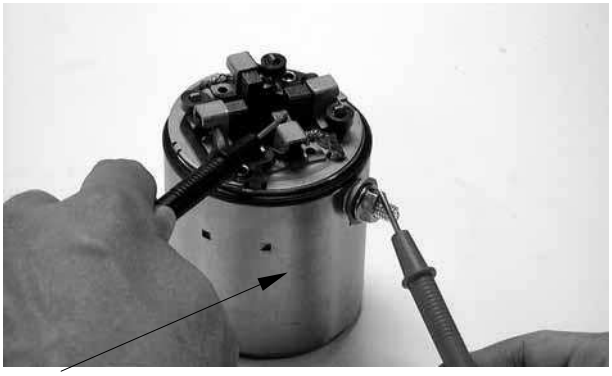
Inspect the removed parts for wear, damage or discoloration and replace if necessary. Clean the commutator if there is metal powder between the segments.

Check for continuity between pairs of the commutator segments and there should be continuity.
Also, make a continuity check between individual commutator segments and the armature shaft. There should be no continuity.



STARTER MOTOR CASE CONTINUITY CHECK

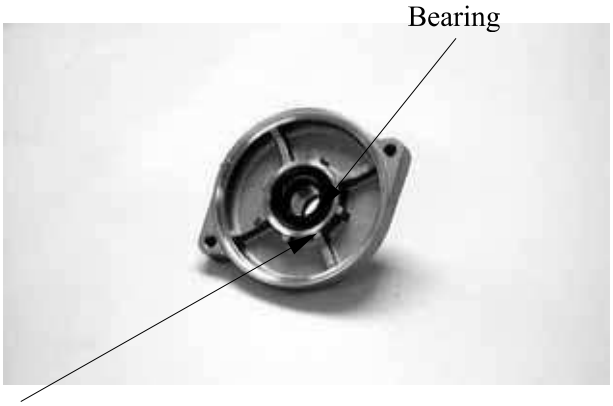
Check to confirm that there is no continuity between the starter motor wire terminal and the motor front cover.
Also check for the continuity between the wire terminal and each brush.
Replace if necessary.



Measure the length of the brushes.
Service Limit: 8.5mm replace if below

Check for continuity between the brushes. If there is continuity, replace with new ones.

Check if the needle bearing in the front cover turns freely and has no excessive play.
Replace if necessary.
Check the dust seal for wear or damage.



ASSEMBLY

Apply grease to the dust seal in the front cover.
Install the brushes onto the brush holders.
Apply a thin coat of grease to the two ends of the armature shaft.
Insert the commutator into the front cover.

* • Be careful not to damage the brush and armature shaft mating surfaces.
  • When installing the commutator, the armature shaft should not damage the dust seal lip.

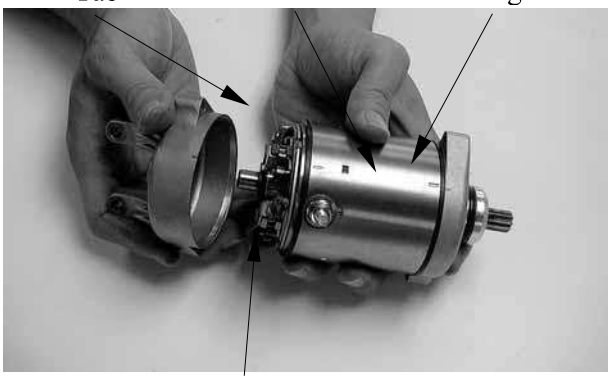
Commutator

Front Cover

Install a new O-ring to the front cover.
Install the starter motor case, aligning the tab on the motor case with the groove on the front cover.
Tighten the starter motor case screws.

* When assembling the front cover and motor case, slightly press down the armature shaft to assemble them.

Tab Groove O-ring



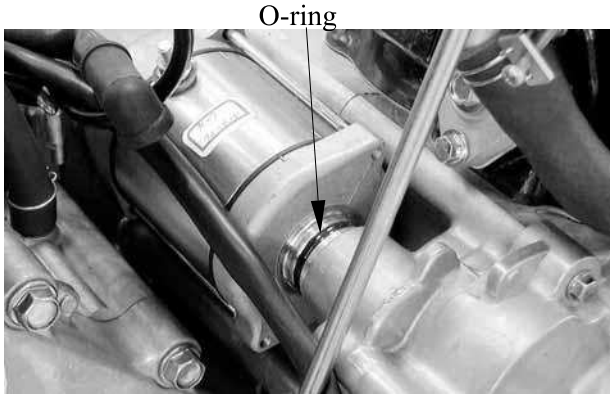
Motor Case

STARTER MOTOR 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.
Torque: 0.8～1.2kgf-m

* The starter motor cable connector must be installed properly.

O-ring



STARTER RELAY

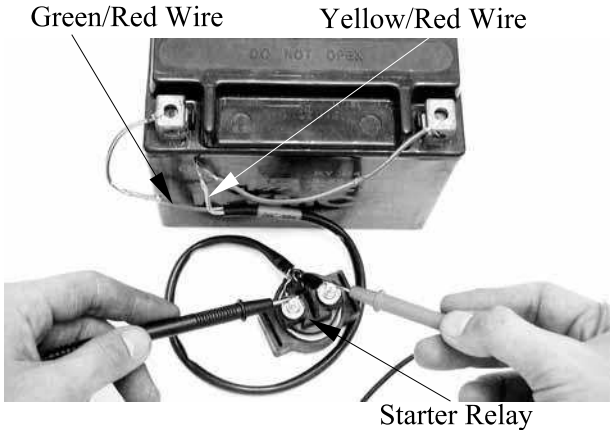
INSPECTION

Remove the seat. (Refer to the chapter 2)
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
- Check for continuity between the starter relay yellow/red and green/red wire terminals

STARTER RELAY VOLTAGE INSPECTION

Connect a 12V battery across the starter relay yellow/red and green/red wire terminals.
Connect an electric tester between the starter relay large terminals and check for continuity between the two terminals.
The relay is normal if there is continuity.
Replace the starter relay with a new one if there is no continuity.



STARTER CLUTCH

REMOVAL

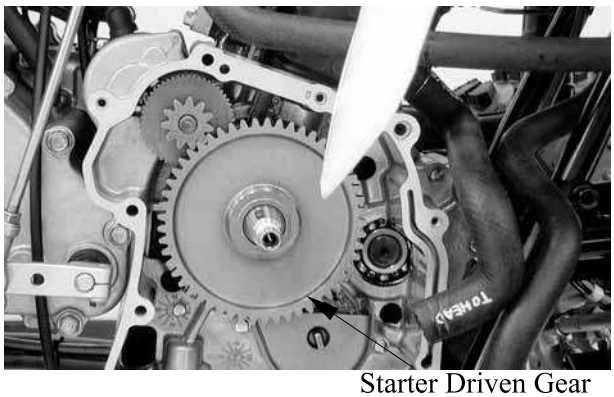
Remove the right crankcase cover. (Refer to the “WATER PUMP SHAFT REMOVAL” section in the chapter 12)

Remove the flywheel. (Refer to the “A.C. GENERATOR/FLYWHEEL REMOVAL” section in the chapter 16）

Inspect the starter one-way clutch for wear or damage.

Starter Relay

Remove the starter driven gear.

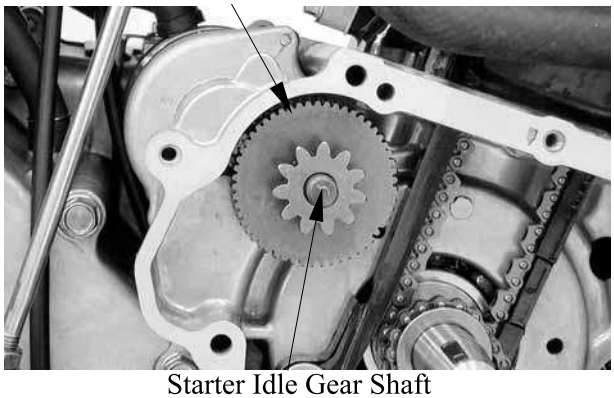


Starter Driven Gear

Inspect the starter driven gear for wear or damage.

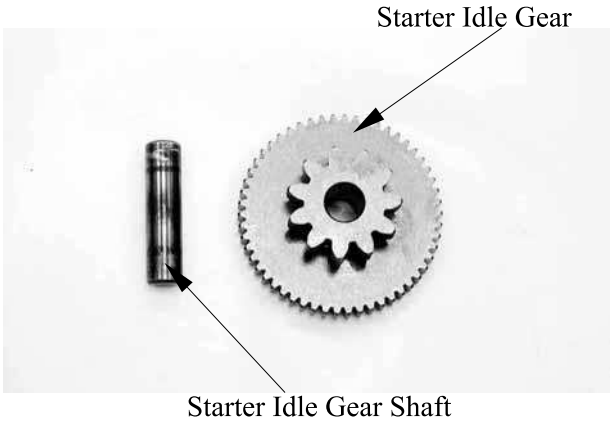
Remove the starter idle gear and shaft.

Starter Idle Gear



Starter Idle Gear Shaft

Inspect the starter idle gear and shaft for wear or damage.



INSTALLATION

Reverse the “REMOVAL” procedures.

Install the starter idle gear and shaft.

Install the starter driven gear.

Install flywheel and right crankcase cover. (Refer to the “A.C. GENERATOR/FLYWHEEL INSTALLATION” section in the chapter 16)

BULBS REMOVAL/INSTRUMENT/HORN

BULBS REMOVAL

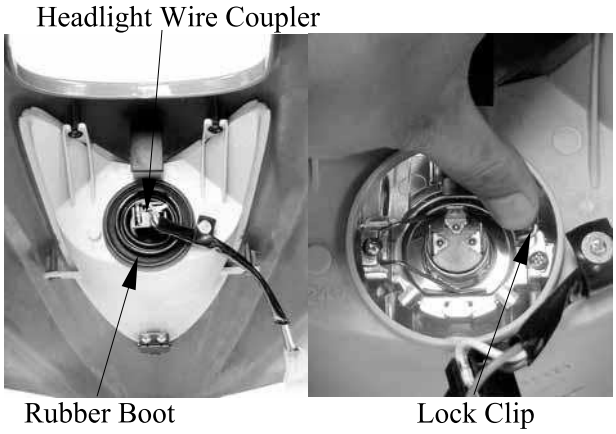
HEADLIGHT

Remove the front fender. (See page 2-5)

Disconnect the headlight wire coupler.

Remove the rubber boot from the bulb socket.

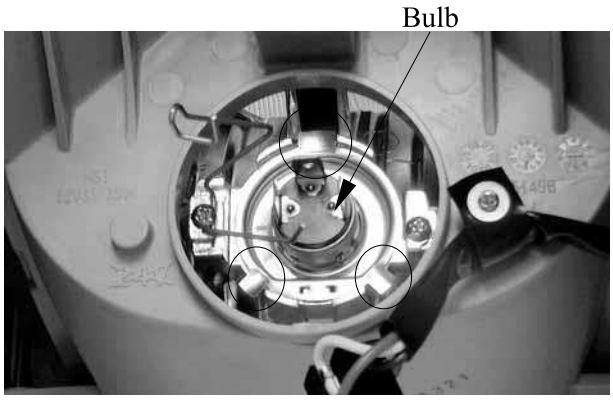
Relax the lock clip to remove the bulb and replace with a new one.



Install the bulb, aligning the bulb socket groove with the bulb tab and set the lock clip.

Install the rubber boot.

Install the front fender in the reverse order of removal.

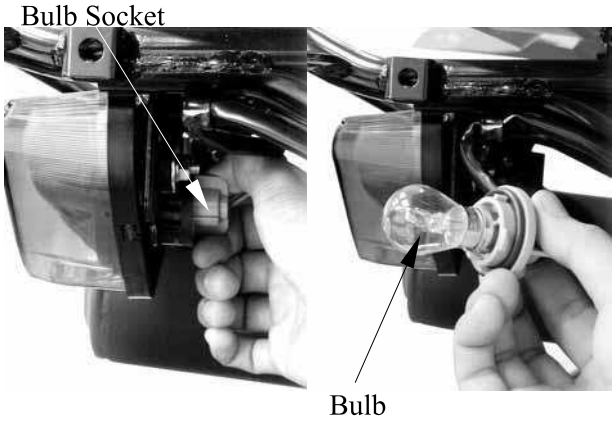


TAIL/BRAKE LIGHT

Remove the bulb socket by turning it counterclockwise.

Remove the bulb.

Install the bulb in the reverse order of removal.

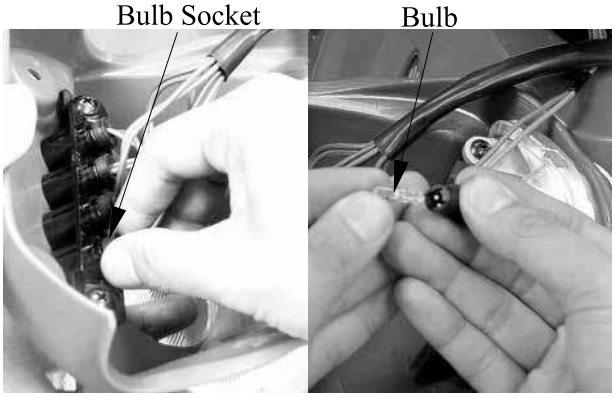


INDICATOR LIGHT
Remove the handlebar cover. (See page 2-4)

Remove the bulb sockets by pulling them out.

Remove the bulb.

Install the bulb in the reverse order of removal.

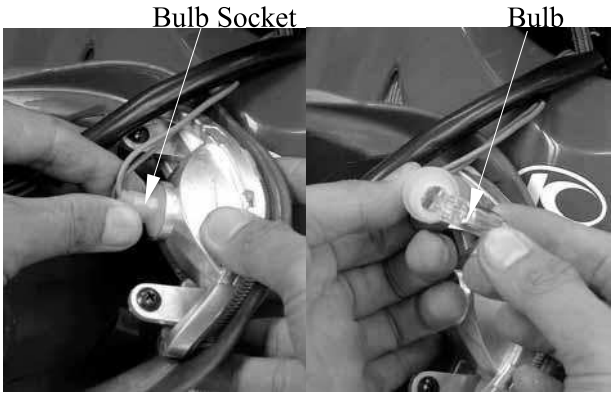


POSITION LIGHT (ON ROAD ONLY)
Remove the handlebar cover. (See page 2-4)

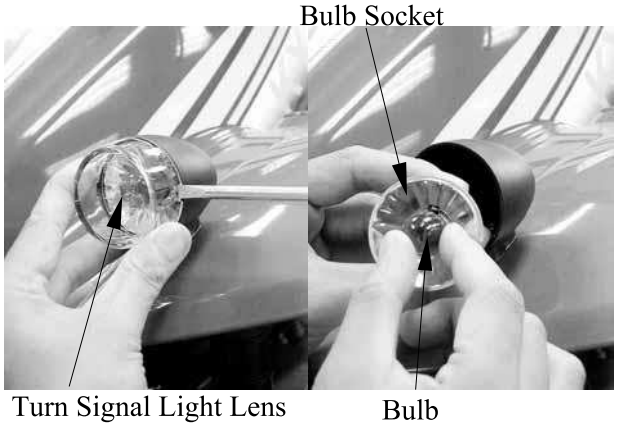
Remove the bulb socket by pulling it out.

Remove the bulb.

Install the bulb in the reverse order of removal.

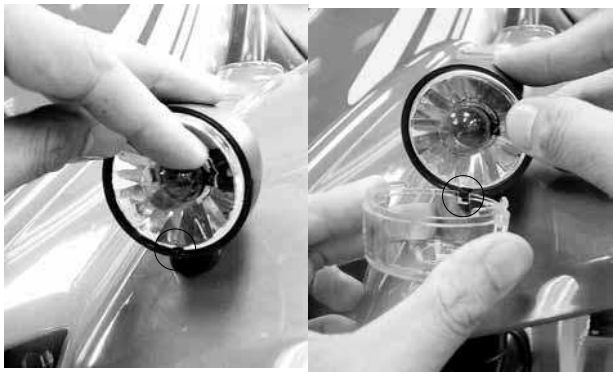


FRONT TURN SIGNAL LIGHT (ON ROAD ONLY)
Remove the turn signal light lens by a standard screwdriver.
Pull the bulb socket out from the signal light case and remove bulb.

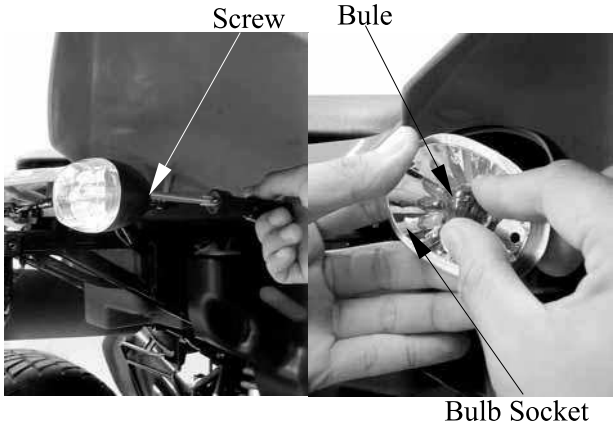


Install the bulb, aligning the bulb socket groove with the bulb tab.

Install the bulb socket, aligning the bulb socket groove with the turn signal case tab.
Install the turn signal lens, aligning the turn signal lens groove with the turn signal case tab.



REAR TURN SIGNAL LIGHT (ON ROAD ONLY)
Remove the screw and remove the turn signal light lens.
Pull the bulb socket outside from the signal light case and remove bulb.



Install the bulb, aligning the bulb socket groove with the bulb tab.

Install the bulb in the reverse order of removal.

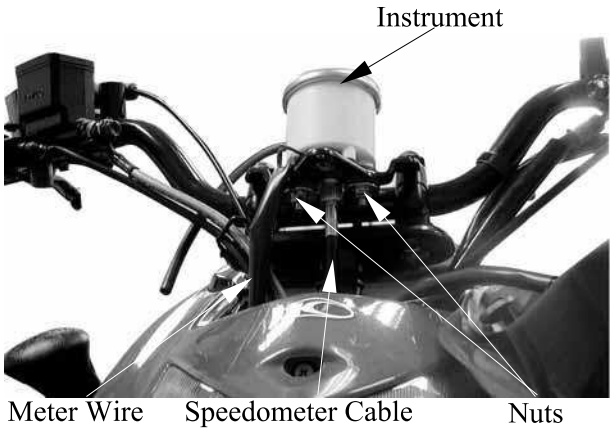
INSTRUMENT (ON ROAD)

REMOVAL

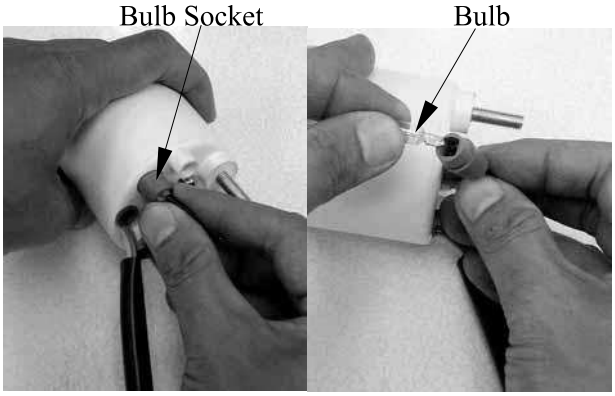
Remove the handlebar cover. (See page 2-4)

Disconnect the meter wire coupler and speedometer cable.

Remove the two nuts and then remove the instrument.



Pull the bulb socket out and then remove the instrument bulb.

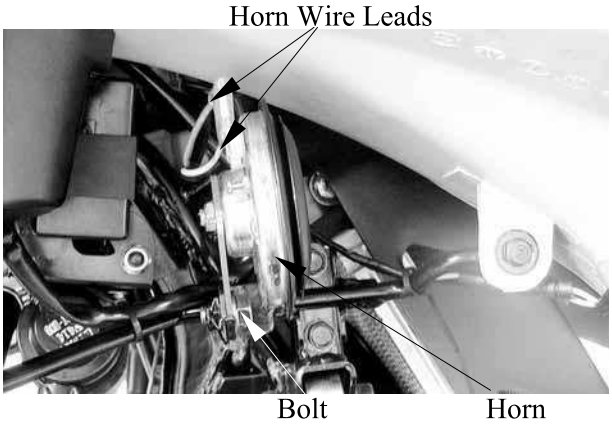


Install the instrument in the reverse order of removal.

HORN (ON ROAD)

REMOVAL

Disconnect the horn wire leads.
Remove the bolt and remove horn.



INSTALLATION

The installation sequence is the reverse of removal.