Standard Motor Corporation

JMAX 700 ATV Service Manual

JMAX702

JMAX701

JMAL701

This service manual contains the technical data of each component inspection and repair for the SMC JMAX 700 ATV. The manual is shown with illustrations and focused on “Service Procedures”, “Operation Key Points”, and “Inspection Adjustment” so that provides technician with service guidelines.

If the style and construction of the ATV, SMC JMAX 700 ATV, are different from that of the photos, pictures shown in this manual, the actual vehicle shall prevail. Designs and specifications are subject to change without notice.

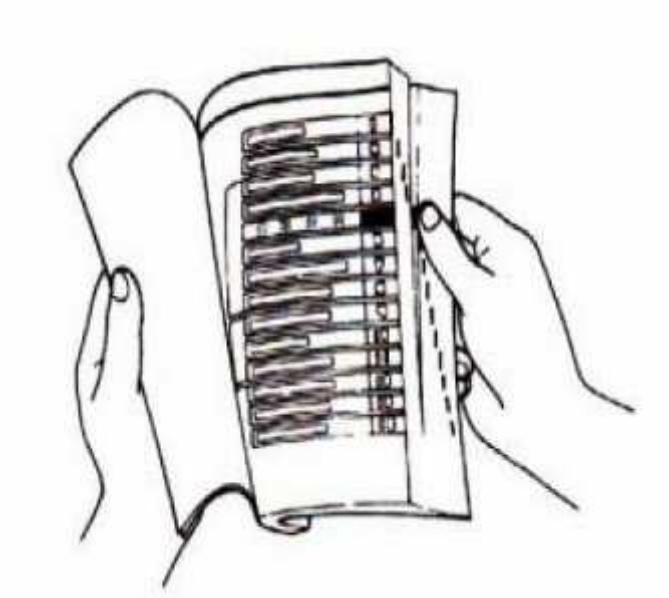
Service Department
Standard Motor Corporation

HOW TO USE THIS MANUAL

This service manual describes basic information of different system parts and system inspection & service for SMC JMAX 700 ATV. In addition, please refer to the manual contents in detailed for the model you serviced in inspection and adjustment.

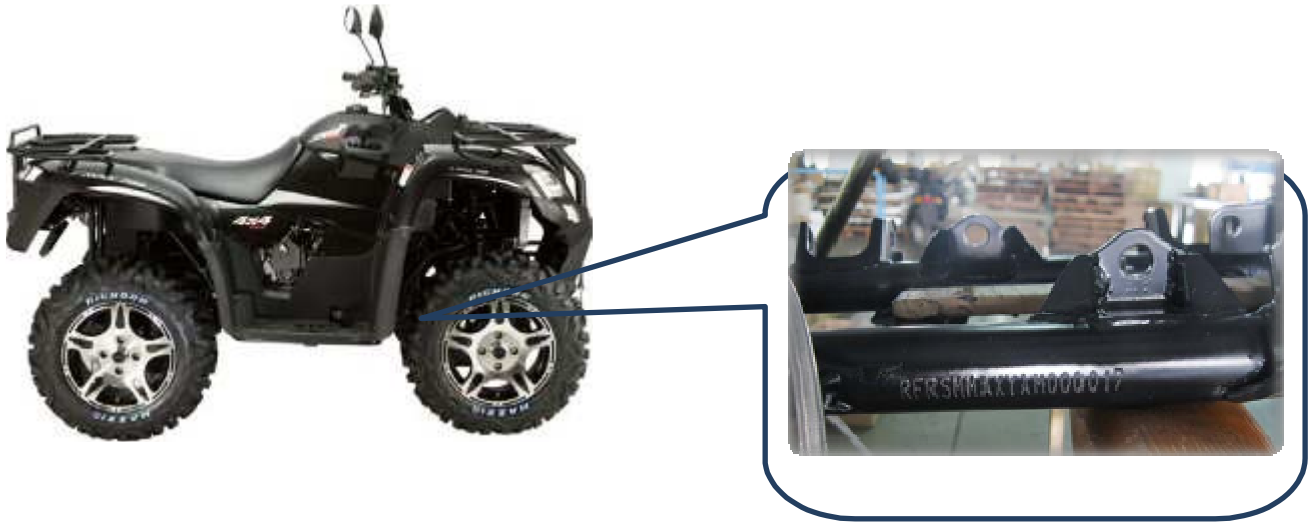
Chapter.1 includes general information and trouble diagnosis.
Chapter 2 includes service maintenance information.
Chapter3~12 includes engine and transmission systems.
Chapter 13 includes cooling system.
Chapter 14~18 includes assembly frame body.
Chapter 19 includes electrical equipment.
Chapter 20 includes wiring diagram.

Please see index of content for quick having the special parts and system information.



SERIAL NUMBER

Frame number:



Engine number:

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1. General Information

This chapter offer you the general information of SMC ATV 700 safety notice, caution and the tools torque setting, please read carefully and make sure you have well acknowledge and skills before start to do any repair/inspection jobs as mentioned at furthering chapters.

1-01. Symbols and Marks

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

Warning	Means that serious injury or even death may result if procedures are not followed.
Caution	Means that equipment damages may result if procedures are not followed.
Engine oil	Limits to use SAE 10W-40 API/SH class or above oil. Warranty will not cover the damage that caused by not apply with the limited engine oil.
Grease	Chassis grease is recommended.
Gear oil	Gear oil serials are recommended. (Gear oil SAE 80/90 is recommended)
Locking sealant	Apply sealant; medium strength sealant should be used unless otherwise specified.
Oil seal	Apply with lubricant.
Renew	Replace with a new part before installation.
Brake fluid	Use recommended brake fluid DOT4.
Special tools	Special tools
Correct	Meaning correct installation.
Wrong	Meaning wrong installation.
Indication	Indication of components.
Directions	Indicates position and operation directions

1-02 General information refer to your own safety

Below are some of the general information to your own safety during the repair/service time.

Carbon monoxide

If you must run your engine, ensure the place is well ventilated. Never run your engine in a closed area. Run your engine in an open area, if you have to run your engine in a closed area, be sure to use an extractor.

⚠ Caution

Exhaust contains toxic gas which may cause one to lose consciousness and even result in death.

Gasoline

Gasoline is a low ignition point and explosive material. Work in a well-ventilated place, no flame or spark should be allowed in the work place or where gasoline is being stored.

⚠ Caution

Gasoline is highly flammable, and may explode under some conditions, keep it away from children.

Used engine oil

⚠ Caution

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

Hot components

⚠ Caution

Components of the engine and exhaust system can become extremely hot after engine running. They remain very hot even after the engine has been stopped for some time. When performing service work on these parts, wear insulated gloves and wait until cooling off.

Battery

⚠ Caution

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

Brake pad

Do not use an air hose or a dry brush to clean components of the brake system; use a vacuum cleaner or the equivalent to avoid dust flying.

⚠ Caution

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

Brake fluid

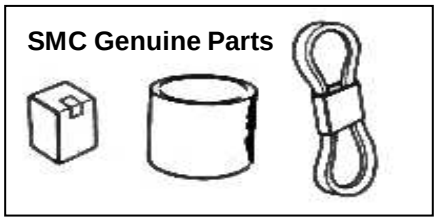
⚠ Caution

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

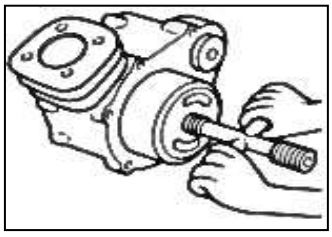
1-03. Service Precautions

1. Always use with SMC genuine parts and recommended oils.

   ➔Using non-genuine parts for SMC ATV may damage the ATV and out of SMC warranty service.



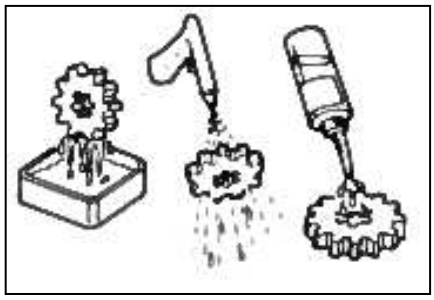
2. Special tools are designed for remove and install of components without damaging the parts being worked on. Using wrong tools may result in parts damaged.



3. When servicing this ATV, use only metric tools. Metric bolts, nuts, and screws are not interchangeable with the English system, using wrong tools and fasteners may damage this vehicle.

4. Clean the outside of the parts or the cover before removing it from the ATV. Otherwise, dirt and deposit accumulated on the part's surface may fall into the engine, chassis, or brake system to cause damage.

5. Wash and clean parts with high ignition point solvent, and blow dry with compressed air. Pay special attention to O-rings or oil seals because most cleaning agents have an adverse effect on them.

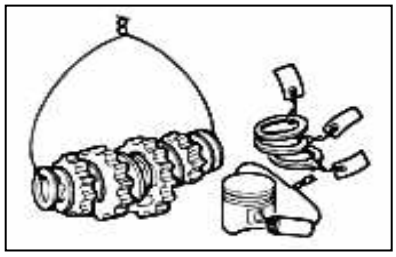


6. Never bend or twist a control cable to prevent unsmooth control and premature worn out.

7. Rubber parts may become deteriorated when old, and prone to be damaged by solvent and oil. Check these parts before installation to make sure that they are in good condition, replace if necessary.

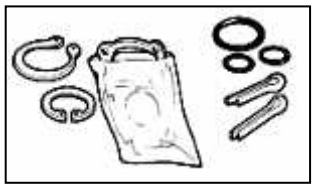
8. When loosening a component which has different sized fasteners, operate with a diagonal pattern and work from inside out. Loosen the small fasteners first. If the bigger ones are loosen first, small fasteners may receive too much stress.

9. Store complex components such as transmission parts in the proper assemble order and tie them together with a wire for ease of installation later or you can label the assembly parts by Arabic number tab for the sequence to avoid the mistake.

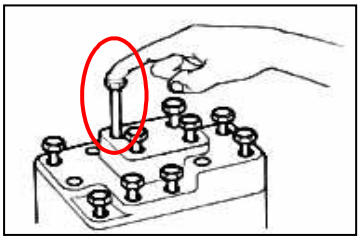


10. Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).

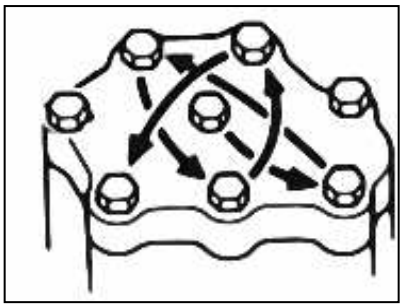
11. Components not to be reused should be replaced when disassembled including gaskets, metal seal rings, O-rings, oil seals, snap rings, and split pins.



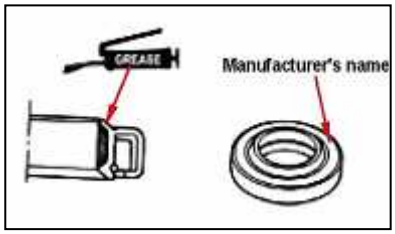
12. The length of bolts and screws for assemblies, cover plates or boxes is different from one another, be sure they are correctly installed. In case of confusion, Insert the bolt into the hole to compare its length with other bolts, if its length outside the hole is the same with other bolts, it is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



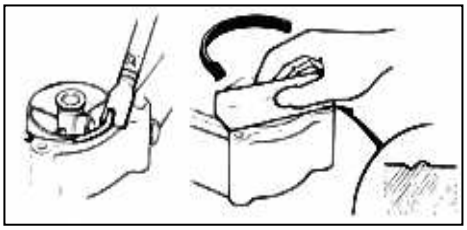
13. Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unless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



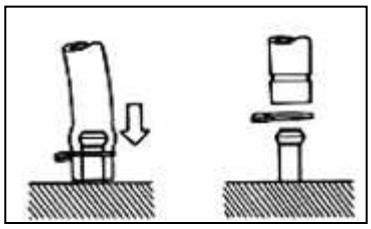
14. When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, and check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.



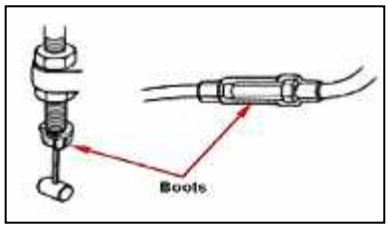
15. Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.



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

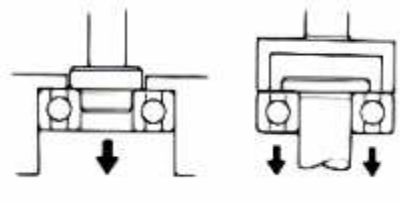


17. Rubber and plastic boots should be properly reinstalled to the original correct positions as designed.

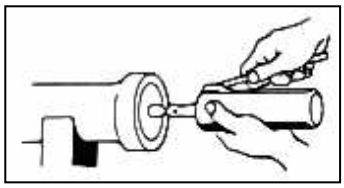


18. The bearing tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force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

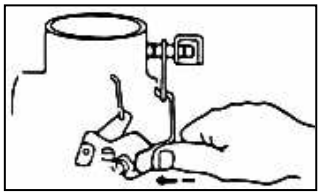
(Both of these examples can result in bearing damage)



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



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

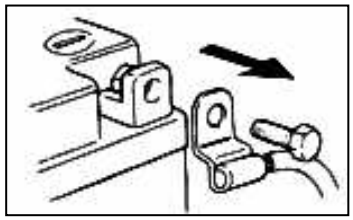


21. Make sure service safety for each other when conducting by two persons.

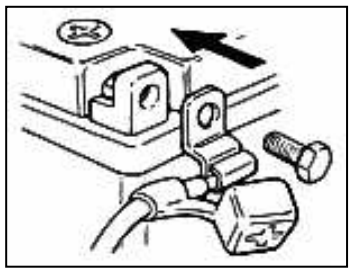
22. Do not let parts fall down.

23. Battery removal/installation.

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

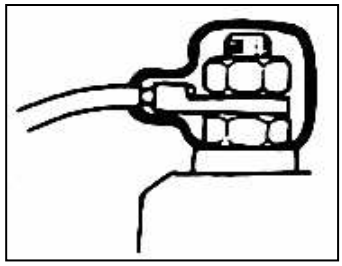


B. After service completed, make sure all connection points is secured. Battery positive (+) cable should be connected firstly when re-install the battery cord. .



C. And the two pole sides of battery have to be greased after connected the cables.

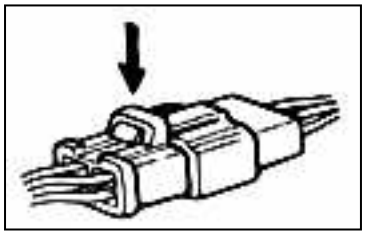
D. Make sure that the battery post caps are located in properly after the battery posts had been serviced.



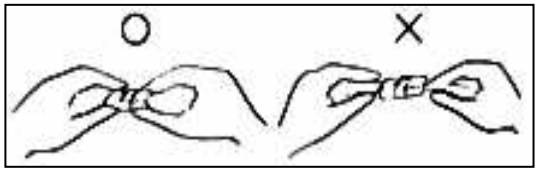
24. If fuse burned, it has to find out the cause and solved it. And then replace with specified capacity fuse.

25. Connector unlock/insert

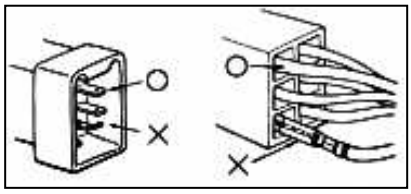
A. When separating a connector, it locker has to Insert the terminal completely, unlocked it first.



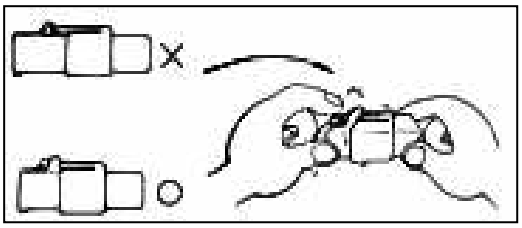
B. Do not pull the wires as removing a connector or wires. Hold the connector body.



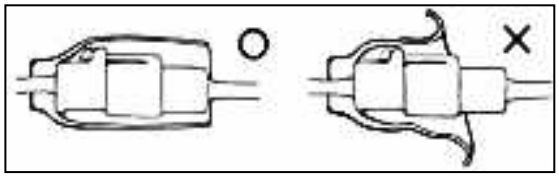
C. Make sure if the connector pins are bent, extruded or loosen.



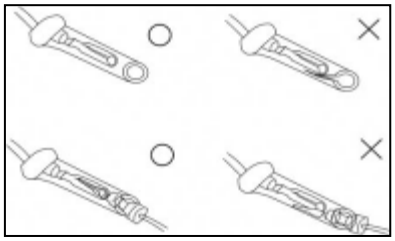
D. Insert the connector completely. If there are two lockers on two connector sides, make sure the lockers are locked in properly. Check if any wire loose.



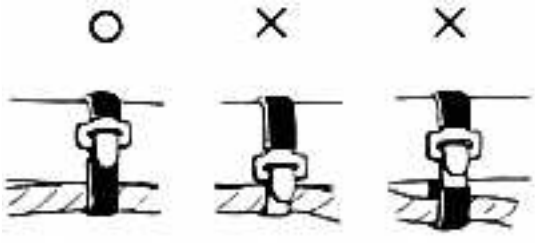
E. Check if the connector is covered by the twin connector boot completely and secured properly.



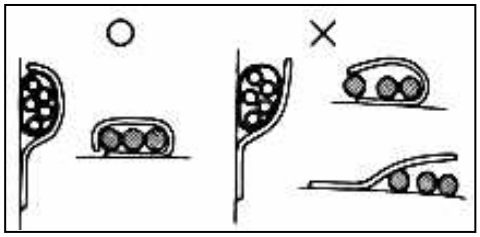
F. Before terminal connection, check if the boot is crack or the terminal is loose.



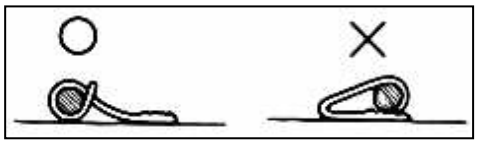
26. Secure wires and wire harnesses to the frame with respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.



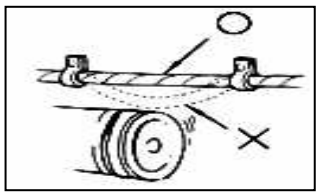
27. Wire band and wire harness have to be clamped secured properly.



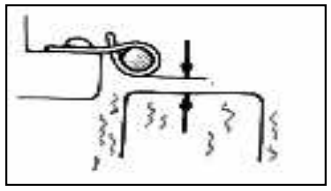
28. Do not squeeze wires against the weld or its clamp.



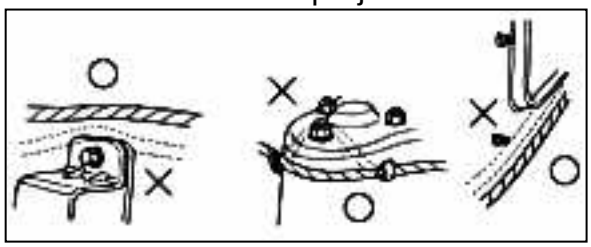
29. Do not let the wire harness contact with rotating, moving or vibrating components as routing the harness.



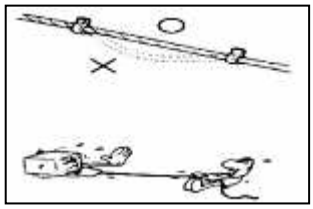
30. Keep wire harnesses far away from the hot parts.



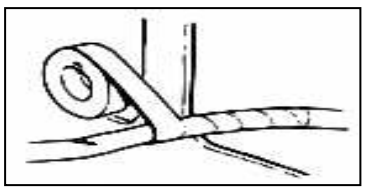
31. Route wire harnesses to avoid sharp edges or corners and also avoid the projected ends of bolts and screws.



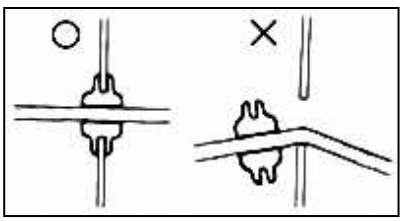
32. Route harnesses so that they neither pull too tight nor have excessive slack.



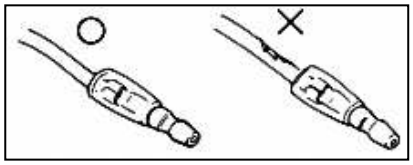
33. Protect wires or wire harnesses with electrical tape or tube if they contact a sharp edge or corner. Thoroughly clean the surface where tape is to be applied.



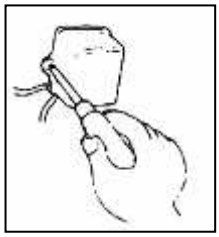
34. Secure the rubber boot firmly as applying it on wire harness.



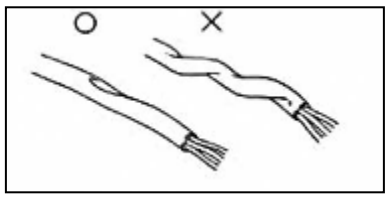
35. Never use wires or harnesses which insulation has been broken. Wrap electrical tape around the damaged parts or replace them.



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



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



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

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

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

1-04 Specification

a. jMAX 700 series

Dimension(LxWxH) : 2125mm/1225mm/1245mm(701/702); 2125mm/1206mm/1150mm(701/702)
Seat height : 930mm(off road); 890mm(off road)
Wheel base : 1290mm
Ground Clearance : 300mm(off road); 215mm(on road)
Weight : Un-laden Mass = 320kg; with fuel Mass = 336 kg (701/702)
Un-laden Mass = 343kg; with fuel Mass = 359 kg (701R/702R)
Engine : SOHC 4 Stroke Liquid Cooled
Cylinder : Single Vertical (Forward Inclined)
Bore * Stroke : 100 x 86mm
Displacement : 675cc
Compression Ratio : 9.5:1
Lubricant : Wet Sump
Carburetor : Mikuni BSR 42 (EEC model: MJ:#130; PJ:#45)
Spark : NGK CR7E x 1
Starting : Electrical starter
Ignition : C.D.I.
Generator : ACG Fly Wheel Magneto 14V/16A above on 1,500 rpm
Engine Oil : 4 Stroke Engine Oil, 10W40 API/SL or above, synthetic base is recommended.
Engine Oil : At change (2.2L);at disassembly (2.5L) with oil filter; Oil filter cartridge=100cc
Air-Filter : Wet type element
Transmission (F-R) : C.V.T Automatic with centrifugal clutch.
Gear Shifting : L-H-N-R-P (shift selector function in reverse with pedal brake)
Final Drive : 3 ways (2WD, Limited slip 4WD, Differential lock 4WD) with shaft drive
Final gear box : SAE 90 API; at change (0,29L) at disassembly (0,30L)
Differential gear box : SAE 90 API; at change (0,29L) at disassembly (0,33L)
RPM limit : Forward limited 7500 +/- 100 and Reverse speed on 15KM/HR.
Radiator (liquid coolant): 2,080 +/- 20 c.c. coolant (standard concentration 50%)
Reservoir tank coolant : 300cc +/- 20 c.c. coolant (standard concentration 50%)
Fuel : Unleaded gasoline (#95 Octane or above is recommended)
Fuel tank : 24L
Chassis : Steel tube frame
Front Suspension : Independent, Double A-arm, 153 mm travel, 5-Section adjustable pre-loaded
Rear Suspension : Independent, Double A-arm, 209 mm travel, 5-Section adjustable pre-loaded
Brake (F/R) : Front dual hydraulic disc φ220mm / Rear single hydraulic disc φ 200mm
F. Brake operation : Front RH side handle brake lever for front wheeler

R. Brake operation : Front LH side handle brake lever for rear wheeler/parking brake; R side footrest brake pedal for integrate front and rear wheeler at the same time
Tire : Tubeless
Front/Rear : (F) AT 25x8-12 (for 12" wheel rim), or AT 26x8-14 (for 14" model)
(R) AT 25x10-12 (for 12" wheel rim), or AT 26x10-14 (for 14" model)
Battery : MF type 12V/18A, i.e. YUASA® YTX 20L-BS or GS Battery® GTX20L-BS
Head Light (701) : (F. Double light) 12V 35W* 2 (Hi-Beam); 12V/35W*2 (Low- beam)
Head Light (702) : (F. Square light) 12V 35/35W* 2 (Hi/Lo Beam)
Position lamp : 12V 5W *2
Rear / Flasher Light : 12V 21/18W* 2 ; 12V 10W* 4
Fuse : Main (30A) / Headlight (15A) / A.DC Jack(10A) / Four-wheel-drive(10A)
Signal system (10A) / Backup (30A/15A/10A)
PS: 701 = double f. light; 702 = square font light, R= Road type version

11-01-02 Specification of jMAL 700 series

Dimension : 2315mm/1207mm/1280mm (701/702) ;
2315mm/1210mm/1205mm (701R/702R)
Wheel base : 1482mm
Seat / G.Clearance : 902mm/ 300 mm (701/702); 820mm/210mm (701R/702R)
Weight : Un-laden Mass = 344kg; with fuel Mass = 360 kg (701/702)
Un-laden Mass = 357kg; with fuel Mass = 373 kg (701R/702R)
Engine : SOHC 4 Stroke Liquid Cooled
Cylinder : Single Vertical (Forward Inclined)
Bore * Stroke : 100 x 86mm
Displacement : 675cc
Compression Ratio : 9.5:1
Lubricant : Wet Sump
Carburetor : Mikuni BSR 42 (EEC model: MJ:#130; PJ:#45)
Spark Plug : NGK CR7E x 1; 0.7-0.8mm
Starting : Electrical starter
Ignition : C.D.I.
Generator : ACG Fly Wheel Magneto 14V/16A @ 1,500 rpm
Engine Oil : 4 Stroke Engine Oil 10W40 API/SL grade or above, synthetic base is recommended.
Engine Oil : At change (2.2L); at disassembly (2.5L) with oil filter; Oil filter cartridge=100cc
Air-Filter : Wet type element
Transmission (F-R) : C.V.T Automatic with centrifugal clutch.
Gear Shifting : L-H-N-R-P (shift selector function in reverse with pedal brake)
Final Drive : 3 ways (2WD, Limited slip 4WD, Differential lock 4WD) with shaft drive
Final gear box oil : SAE 90 API; at change (0,29L) at disassembly (0,30L)

Differential gear box : SAE 90 API; at change (0,29L) at disassembly (0,33L)
RPM limit : Forward limited 7500 +/- 100 and Reverse speed on 15KM/HR.
Radiator (liquid coolant): 2080 c.c. coolant (standard concentration 50%)
Reserve tank coolant : 300 c.c. +/- 20cc coolant (standard concentration 50%)
Fuel : Unleaded gasoline (#95 Octane or above is recommended)
Fuel tank : 24L
Chassis : Steel tube frame
Front Suspension : Independent, Double A-arm/153 mm travel, 5-Section adjustable pre-loaded
Rear Suspension : Independent, Double A-arm/ 209 mm travel, 5-Section adjustable pre-loaded
Brake (F/R) : Front dual hydraulic disc φ220mm / Rear double hydraulic disc φ200mm
F. Brake operation : Front RH side handle brake lever for front wheeler
R. Brake operation : Front LH side handle brake lever for rear wheeler; R side footrest brake pedal for integrate front and rear wheeler at the same time
Tire : Tubeless
Front/Rear : (F) AT 25x8-12 (for 12" wheel rim), or AT 26x8-14 (for 14" model)
(R) AT 25x10-12 (for 12" wheel rim), or AT 26x10-14 (for 14" model)
Battery : MF type 12V/18A, i.e. YUASA® YTX 20L-BS or GS Battery® GTX20L-BS
Head Light (701) : (F. Double light) 12V 35W* 2 (Hi-Beam); 12V/55W*2 (Low- beam)
Head Light (70 2) : (F. Square light) 12V 35/35W* 2 (Hi/Lo Beam)
Position lamp : 12V 5W *2
Rear / Flasher Light : 12V 21/18W* 2 ; 12V 10W* 4
Fuse : Main (30A) / Headlight (15A) / A.DC Jack(10A) / Four-wheel-drive(10A)
Signal system (10A) / Backup (30A/15A/10A)

PS: 701 = double f. light; 702 = square font light, R= Road type version

1-05. Tool Torque value setting

The torque values listed in table are for more important tighten torque values. Please see standard values for not listed in the table. (more details should be taken by dealers/importers)

A. Engine Torque

Item	Q'ty	Thread Dia. (mm)	Tor Value (N-m)	Remarks
Cylinder bolt	3	6	10	
Cylinder head bolt	2	6	10	
Cylinder head bolt	4	12	60	
Cylinder head side cover bolt	2	6	10	
Cylinder head cover bolt	4	6	10	

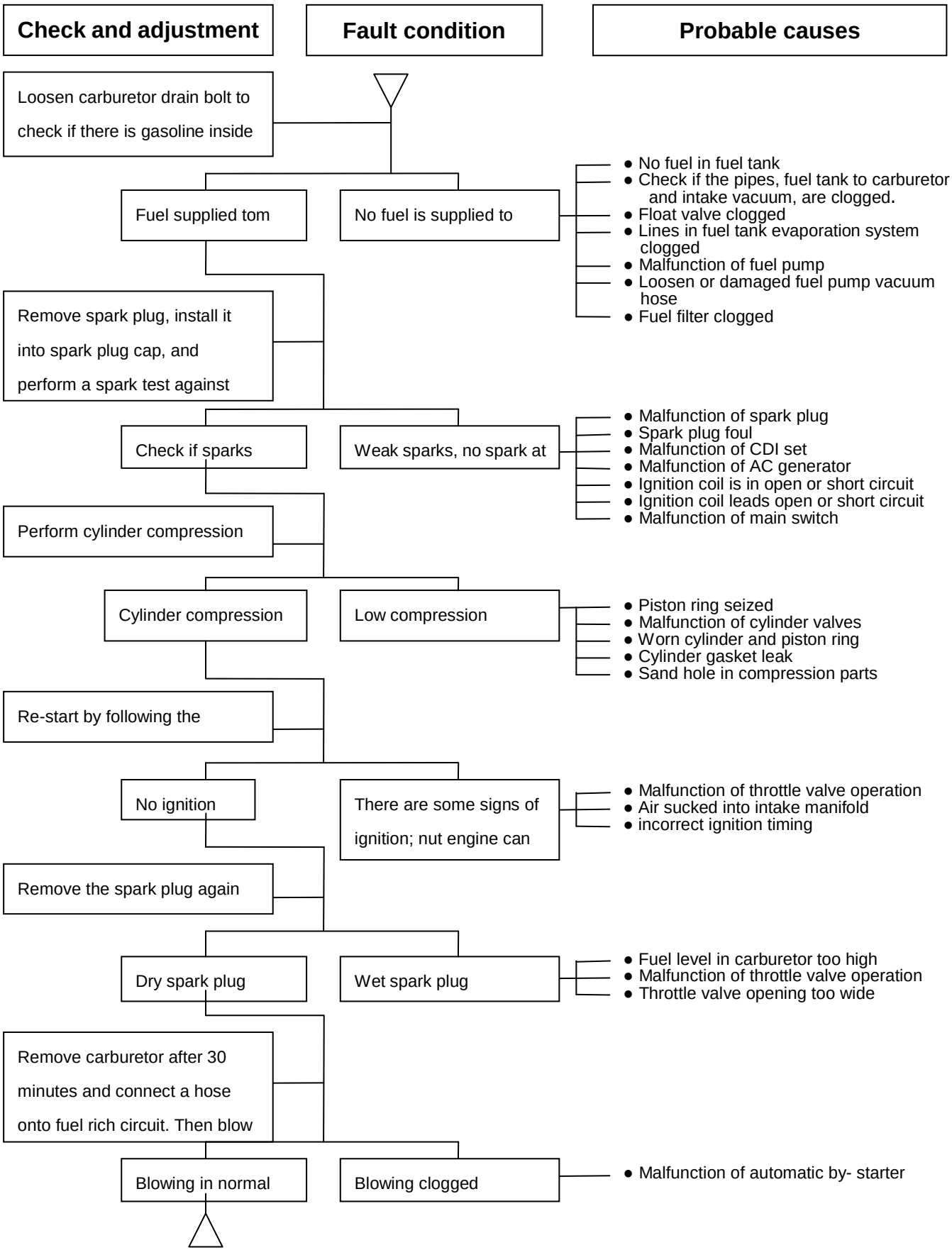
Cylinder head stud bolt (inlet pipe)	2	6	10	
Cylinder head stud bolt (EX. pipe)	2	8	20	
Tappet adjustment screw nut	4	6	14	
Spark plug	1	10	12	
Oil pump screw	3	6	10	
Water pump impeller	2	6	12	
Cover cvt bolt	15	6	10	
Engine oil draining bolt	1	12	20	
Engine oil strainer	1	6	10	
Primary sheave ass”y nut	1	32	180	
Driven sheave ass”y nut	1	20	120	
Clutch carrier ass”y nut	1	25	250	
ACG. Flywheel bolt	1	10	80	
ACG Flywheel nut	1	12	120	
Pivot , cam chain tensioner bolt	1	8	20	
Relief valve body	1	10	20	
Thermo switch	1	--	8	
Shaft rocker arm	1	6	10	
Plate rocker shaft	1	6	10	
Oil filter bolt	1	20	63	
Oil filter	1	20	17	
Bearing retainer	1	55	80	
Oil delivery pipe 1	2	14	25	
Oil delivery pipe 2	1	10	20	
Balancer shaft comp nut	1	12	32	
Sprocket camshaft bolt	1	6	12	
Housing bevel bearing	4	8	32	
Housing output shaft	4	8	32	
Starting clutch ass”y	3	8	33	
Crankcase bolts	5	8	23	
Crankcase bolts	10	6	10	
Plate ventilation	7	4	5	
Pickup coil	2	5	8	
Other bolts	--	6	10	

B. Frame Torque

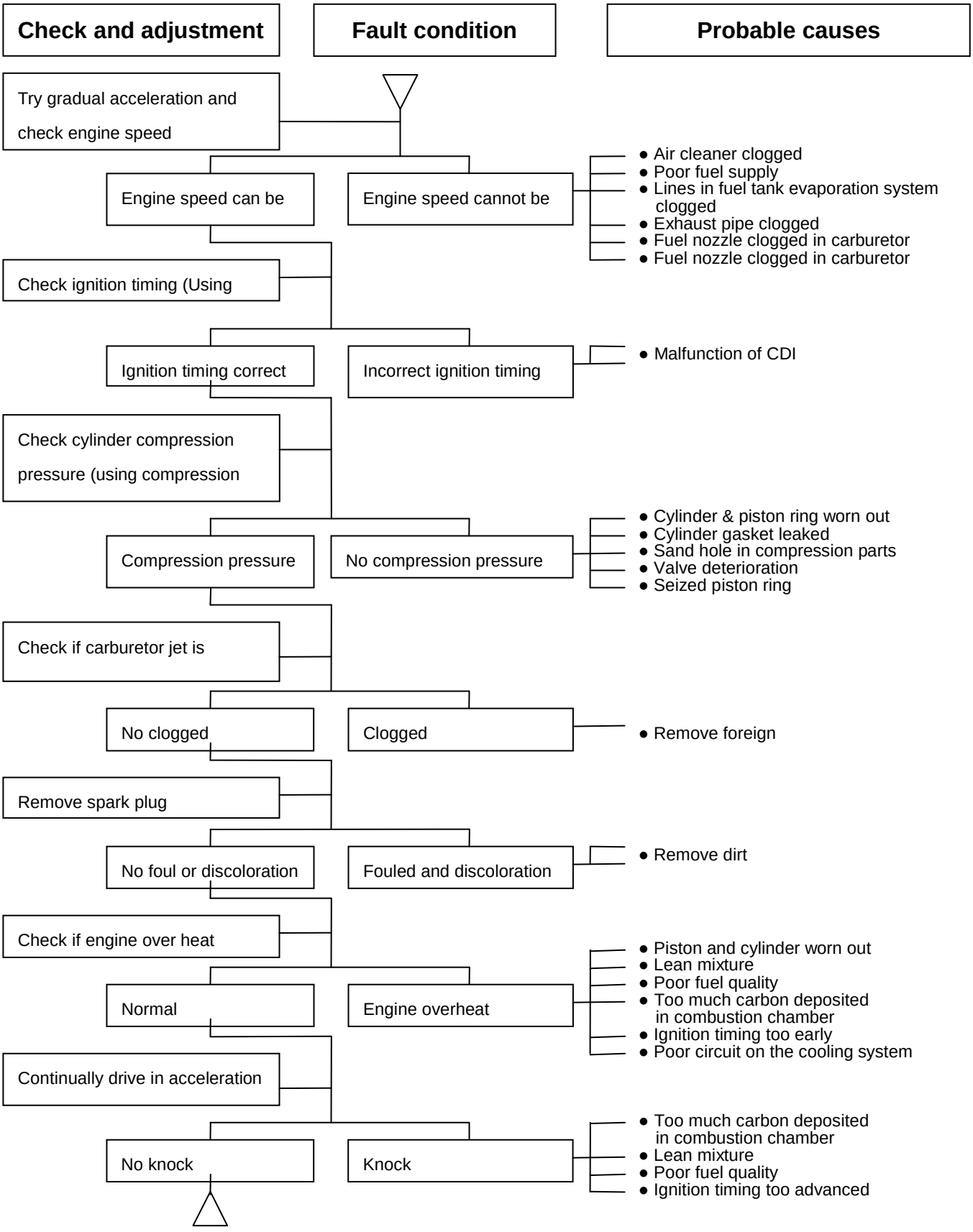
Item	Q'ty	Thread Dia. (mm)	Tor Value (N-m)	Remarks
Handlebar upper holder bolt	4	6	23	
Steering shaft nut	1	14	180	
Steering tie-rod nut	4	10	25	
Knuckle nut	4	10	48	
Steering shaft holder bolt	2	8	23	
Front wheel nut	8	10	55	
Front axle castle nut	2	18	260	
Rear axle castle nut	2	22	260	
Rear wheel nut	8	10	55	
Engine hanger nut	3	10	40	
Drive gear bolt	5	10	55	
Driven gear nut	4	10	55	
Front/Rear suspension arm bolt	8	10	45	
Front / Rear suspension arm nut	8	10	45	
Brake lever bolt	2	5	10	
Brake hose bolt	13	10	30	
Brake caliper bolt(front)	4	8	30	
Brake caliper bolt(rear)	2	10	45	
Air-bleed valve	2	5	5	
Exhaust muffler mounting bolt	2	8	20	
Exhaust muffler connection nut	2	8	15	

1-06.Troubles Diagnosis

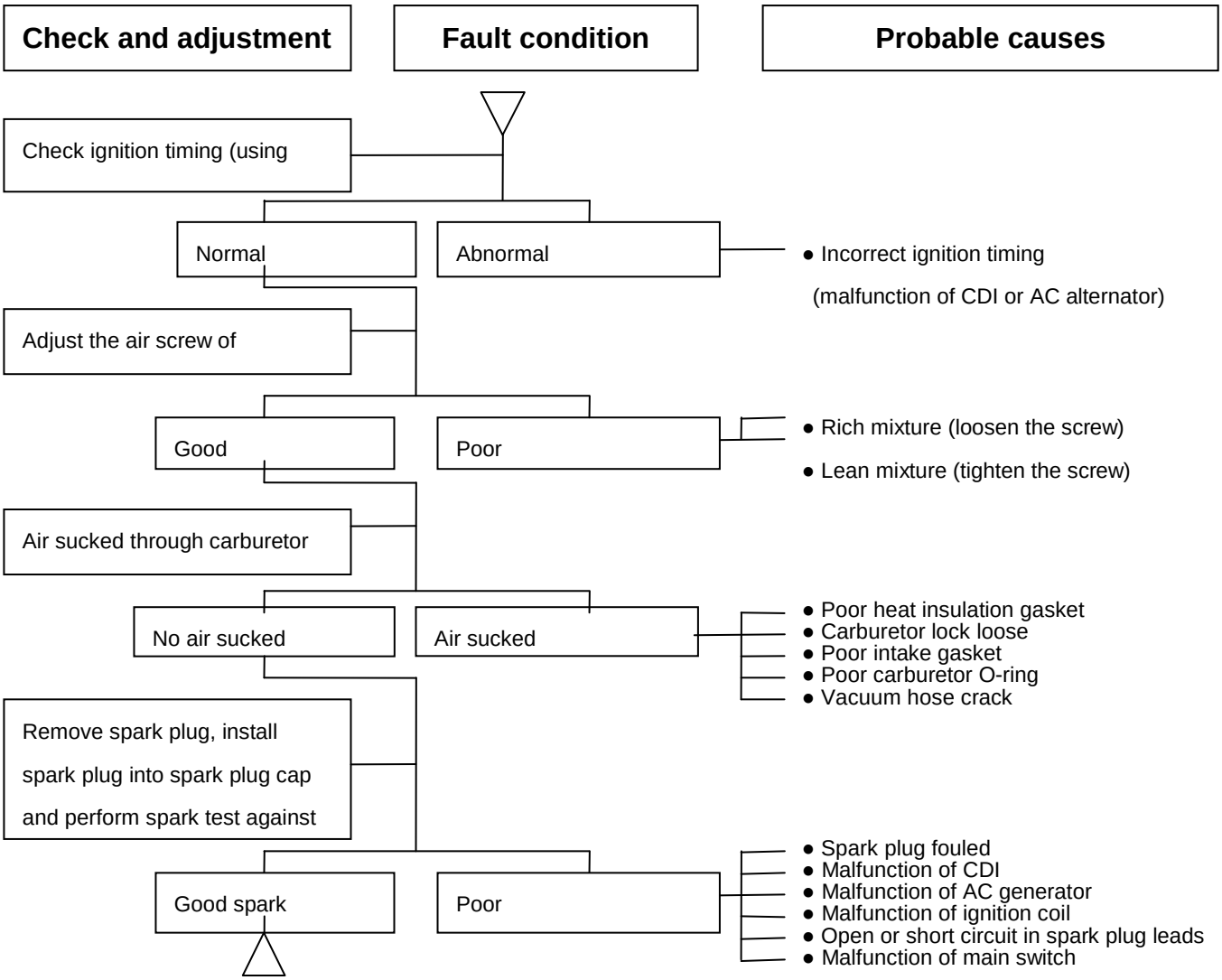
A. Engine hard to start or cannot be started



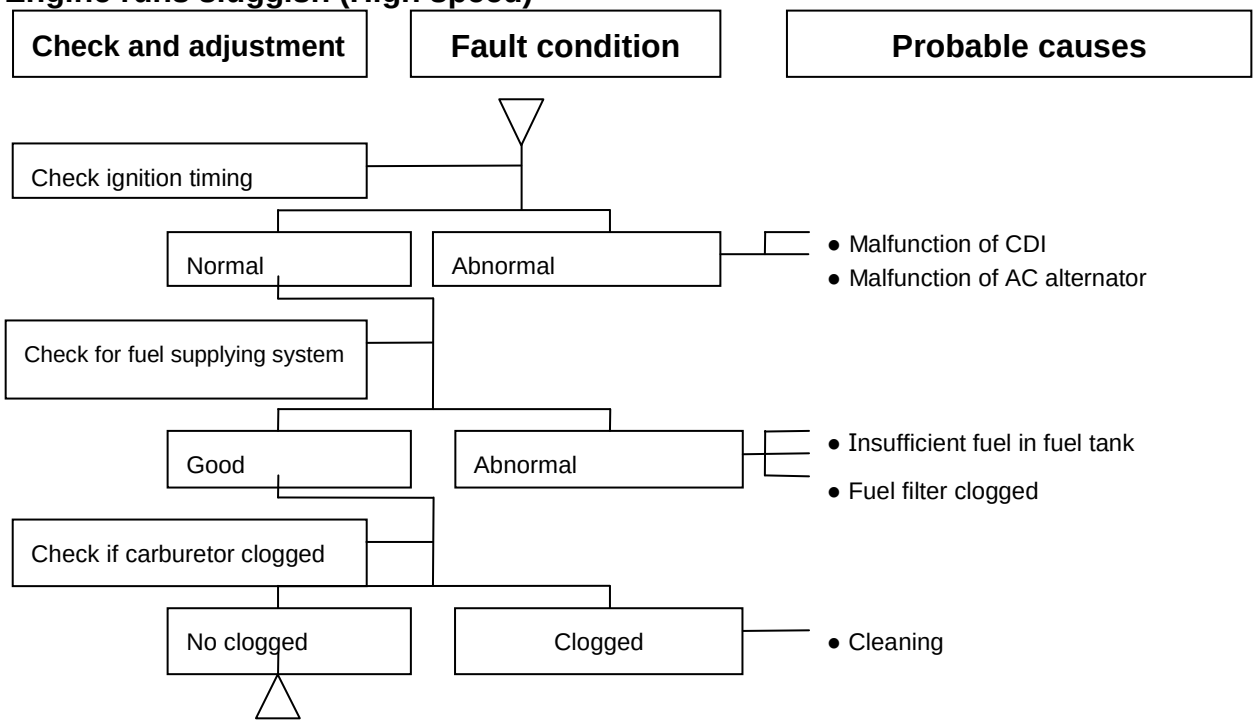
B. Engine run sluggish (speed does not pick up, lack of power)



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



D. Engine runs sluggish (High speed)



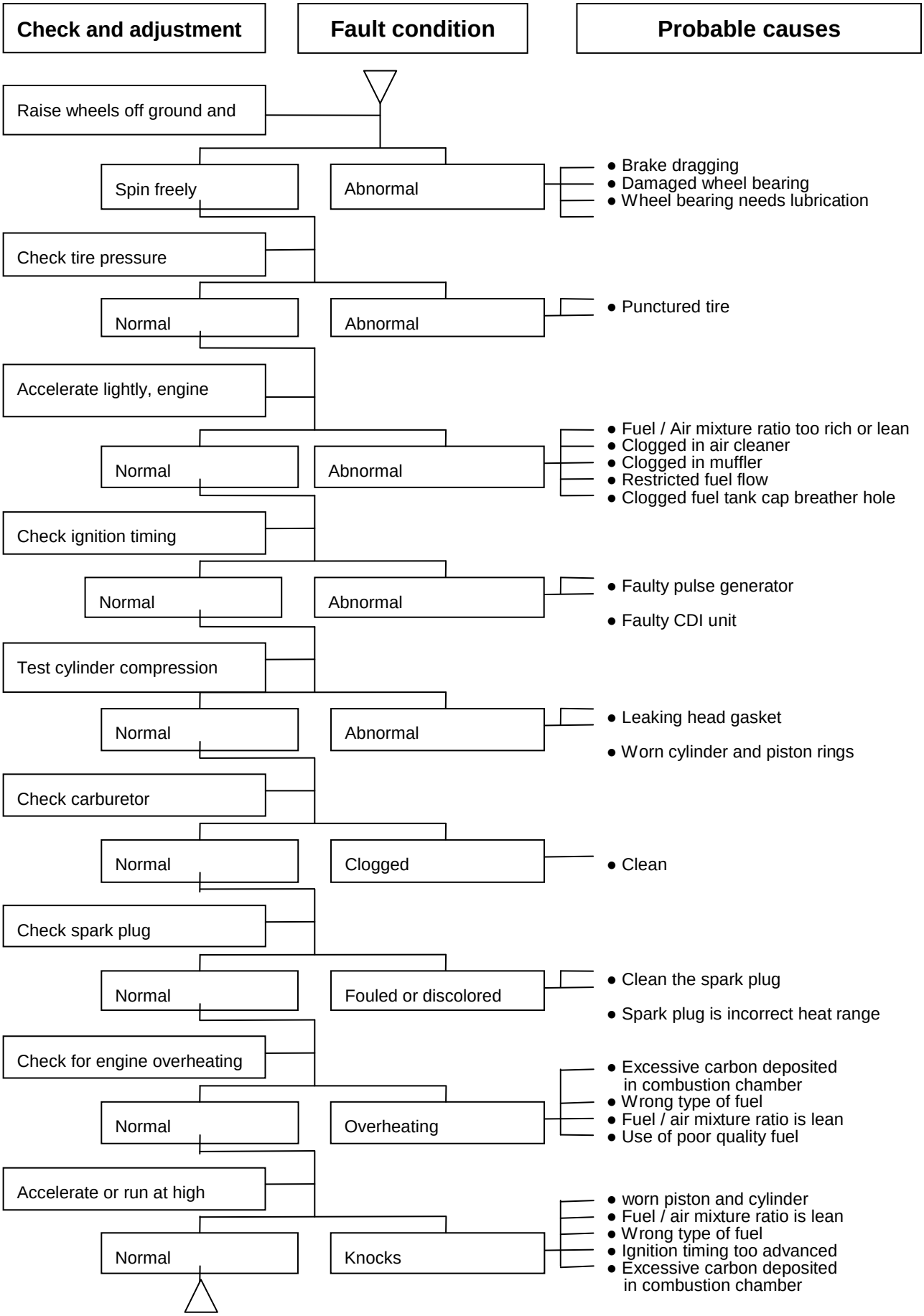
E. Clutch, driving and driving pulley

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

F. Poor handling

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

G.Loss power


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

2-01 Technical Data of Oil & Pressure Capacity

Fuel Tank Capacity		24000 c.c.
Engine Oil	Capacity	2500 c.c.
	Change	2200 c.c.
	Oil and oil filter change	2300c.c.
Front differential oil	Capacity	330c.c
	Change	290c.c
Rear gear box oil	Capacity	300 c.c.
	Change	290 c.c.
Capacity of coolant	Engine + radiator	2080 c.c.
	Reservoir upper	300 c.c.
Clearance of throttle valve		1~3 mm
Spark plug	Type	NGK CR7E
	Gap	0.7~0.8 mm
“F”Mark in idling speed		BTDC 20º/ 1500 rpm
Full timing advanced		BTDC 51º/ 6200 rpm
Idling speed		1600±100 rpm
Cylinder compression pressure		12±2 kgf/cm²
Valve clearance		IN:0.10 ±0.02 mm EX:0.15 ±0.02 mm
Tire dimension	Front	AT25x8-12 / AT26x8-14 or other
	Rear	AT25x10-12 /AT26x10-14 or other
Tire pressure (cold)		8(7)±0.2 psi (On road) / 5(3.5) ±0.2 psi (Off road)
Battery		12V18Ah (type : MF battery)

2-02 Periodical Maintenance Schedule

Have your ATV checked, adjusted, and recorded maintenance data periodically by your SMC Authorized Dealer to maintain the ATV at the optimum condition. The above maintenance schedule is established by taking the hours or kilometers as a reference whichever comes first.

Item		Maintenance Kilometer	300KM	1000KM	2500KM	Every 2500KM	Every 5000 KM	Remarks
	Check Items	Maintenance Interval	20 hr	60 hr	150 hr	150 hr	300hr	
Engine maintenance								
1		Engine oil (Check oil level every 1000~1200KM or after 1500 KM travel)	R	R	R	R	R	
2		Engine Oil filter Cartridge	R	R	R	R	R	
3	*	Engine idle speed	I		I	I	I	
4	*	Valve clearance			I	I	I	
5	*	Ignition timing/Cam Chain			I	I	I	
6		Spark plug check or change			I	I	I	
Fuel and air system								
7		Air cleaner element (Remark)	Clean and replace if necessary for Every 20~40 hours (more often when in wet or dusty areas)					
8	*	Air Cleaner Breather tube	I		I	I	I	
9	*	Carburetor /Choke/ Engine idle Speed		I	I	I	I	
10	*	Throttle operation /Speed limiter	I	I	I	I	I	
11	*	Fuel lines (check or cracks/damage)			I	I	I	
12	*	Fuel filter	I		I	I	I	
Frame/Steering/Suspension/Brake/ Wheel & Tires								
13	*	Upper and low A-Arm	I	I	I	I	I	
14	*	Steering Shaft (lubricant, Toe in check)			I/L	I/L	I/L	
15	*	Front and Rear shock absorber check			I	I	I	
16	*	Front /Rear brake free play check	I	I	I	I	I	
17	*	Front / Rear brake wear	Replace whenever worn to the limited					
18	*	Front and Rear Brake Fluid Level/Leakage Check	I	I	I	I	I	
19	*	Wheel rim check for damage	I		I	I	I	
20	*	Wheel Hub Bearing looseness/damage	I		I	I	I	
21	*	Tire (Wear/Pressure)	I		I	I	I	
22	*	Nuts, Bolt, Bush, fastener check and lubricant.	I	I	I	I	I	
23	*	Engine Mount check			I	I	I	

24	*	Fr. & Rr. Steering Knuckle pivot	L	L	L	L	L	
25	*	Parking Brake/Throttle cable	I/L	I/L	I/L	I/L	I/L	
26		Stabilizer bushes			I	I	I	
Transmission								
27		Differential gear oil	I			I	R	
28		Final gear oil	I			I	R	
29	*	Axle boots	I	I	I	I	I	
30	*	CVT driving belt/weight rollers	I			I	I	
31	*	CVT driving Clutch	I			I	I	
Liquid Cooling system								
32		Radiator (coolant level, flow, leakage)	I	I	I	I	I	
33		Coolant reservoir (level, leakage)	I	I	I	I	I	
34		Coolant	Change every 2 years					
35	*	Cooling Fan function/ Hose leakage	I	I	I	I	I	
Electrical System								
36		Multi-function LCD Display (dashboard/speedometer)	I	I	I	I	I	
37	*	Lights /electrical equipment	I	I	I	I	I	
38	*	Front and rear brake switch	I	I	I	I	I	
39		Battery Voltage	I	I	I	I	I	

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

Remarks:

1. Air cleaner needs to be cleaned every 20-40 hrs drive and requires more frequently cleaning or replacement after riding on (1) dusty rain days (2) sand area (3) snow days.
2. Maintenance should be performed more often if the ATV is frequently operated in high speed and after the ATV has accumulated a higher mileage.
3. Check battery (18A) before riding ATV. Re-charge battery or replace a new battery, if it necessary.
4. Always keeps the coolant level between Max. and Min. mark (coolant reservoir), replace or add coolant or distilled water, if it necessary. Replace all new coolant every 12-16 months! Only use the distilled water to mix coolant (standard concentration 50%)
5. Preventive maintenance
   a. Ignition system: perform maintenance and check when continuous abnormal ignition, misfire, after-burn or overheating occurs.

b. Carbon deposit removal: remove carbon deposits in cylinder head, piston heads, exhaust system when power is obvious lower than ever.

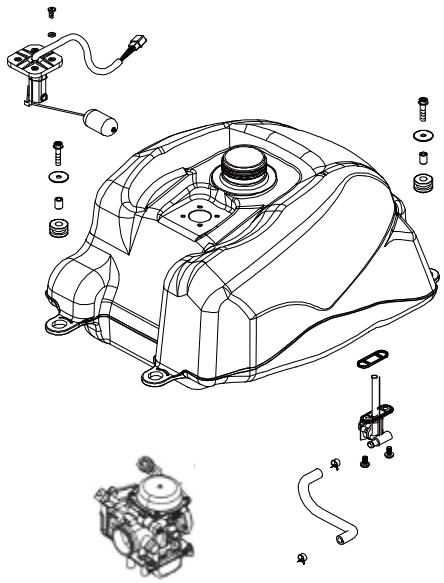
- CAUTION: The user must perform the period check & service and keep the service records all the time, or have SMC dealer for a periodic maintenance program. Failure to follow the periodic maintenance of your vehicle will lead to poor performance, broken of your vehicle and out of product warranty.

-NOTE: The display of speedometer have been designed a “ wrench” shown up in every 150 hours engine running. It reminds you to process necessary period check & service.

2-03 Fuel Hoses

Remove the fuel tank cover.
Loosen screws and bolts, Remove the tank cover, check all lines, and replace it when they are deterioration, damage or leaking

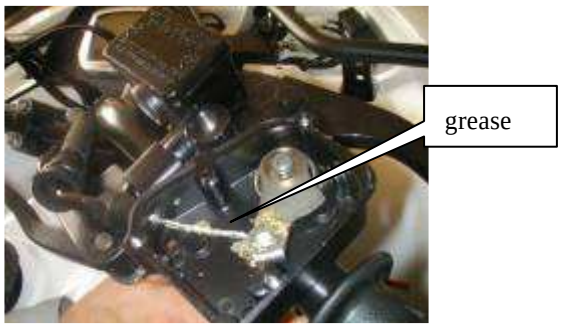
Warning
Gasoline is a low ignition material, any kind of fire is strictly prohibited as dealing it.



2-04 Throttle Cable

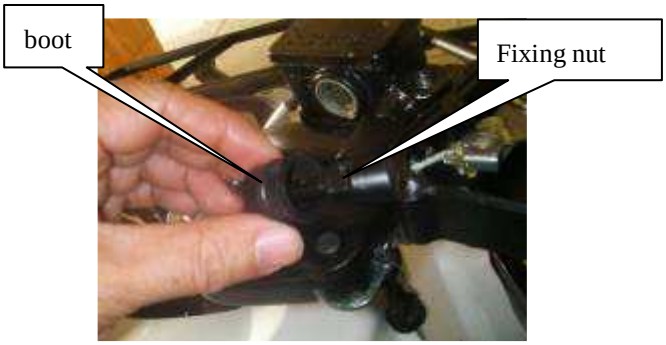
Have a wide open of throttle valve as handle in any position and release it to let back original (full Closed) position.

Check handle-bar operation if it's smooth. Check acceleration cable and replace it if deteriorated, twisted or damaged.



Lubricate the cable if operation is not smooth. Measure the throttle lever free play in its flange part.

Remove rubber boot, loosen fixing nut, and then adjust it by turning the adjustment screw. Tighten the fixing nut, and check acceleration operation condition.



Free play: <u>1~3 mm.</u>

2-05. Air Cleaner

Remove seat, loosen 6 clamps from the air cleaner cover and then remove the cover. Separate the protective wire net and remove

the air cleaner element.
Clean the element with non-flammable or high-flash point solvent and then squeeze it for dry.
Install back the element, ensure yellow side up.

Caution

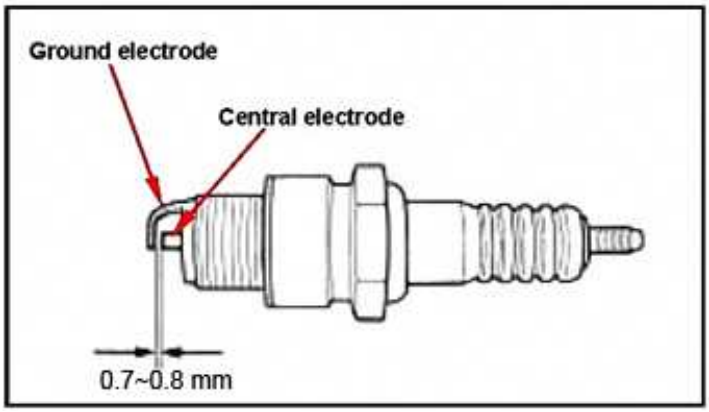
Never use gasoline or acid organized solvent to clean the element.
Soap the element into cleaning engine oil and then squeeze it out. Install the element onto the element seat and then install the air cleaner cover.

1. Protective wire

2-06. Spark Plug

Recommended spark plug : NGK- CR7E

a. Remove spark plug cap.
b. Clean dirt around the spark plug hole.
c. Remove spark plug.
d. central electrode color checking.
   - normal color is a medium-to- light tan color.
e. Measure spark plug gap.



Spark plug gap <u>0.7 ~0.8 mm</u>

f. Carefully bend ground electrode of the plug to adjust the gap if necessary.
g. Hold spark plug washer and install the spark plug by screwing it.
h. Tighten the plug by turning 1/2 turn more with plug socket after installed.

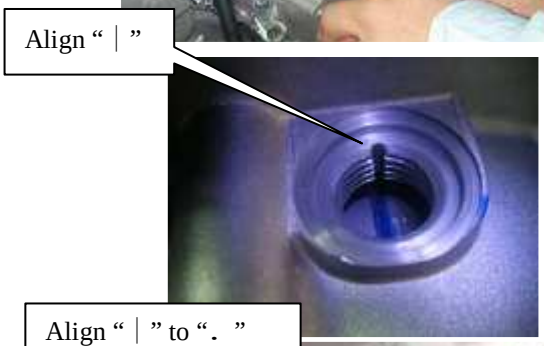
Tighten torque: 1.2kgf-m

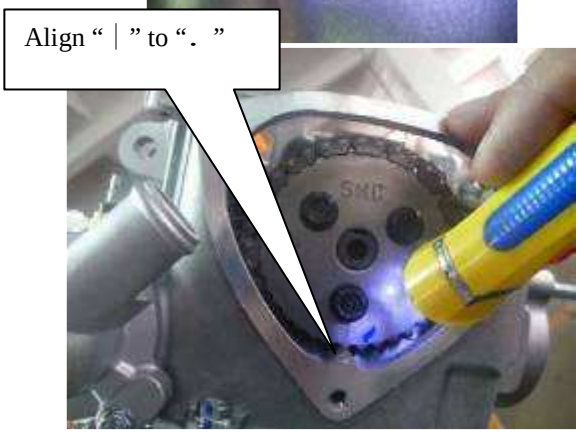
2-07. Valve Clearance

Caution

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

a. Remove necessary covers & spark plug.
b. Remove cylinder head cover.
c. Remove cylinder head side cover.
d. Turn crankshaft in C.W. direction, i)align the "I" on the rotor with the pointer on the cover ii) and align the "I" mark on the camshaft sprocket to the pointer ". " on cylinder head, the piston is at the TDC in compression stroke.





Caution

- Do not turn the bolt in C.C.W. direction.
- When piston is at the TDC on the compression stroke, there should be clearance between valve stem tips and rocker arm adjusting screws. If no, rotate crankshaft one turn.

Valve clearance inspection and adjustment. Check & adjust valve clearance with feeler gauge.

Standard Value: IN 0.10 ± 0.02 mm
EX 0.15 ± 0.02 mm

e. Loosen fixing nut and turn the adjustment nut for adjustment.

Caution

Re-check the valve clearance after tightened the fixing nut by rotating crankshaft two turns.

2-08. Carburetor Idle Speed/ Adjustment

Caution

Inspection & adjustment for idle speed have to be performed after all parts in engine that needed adjustment have been adjusted. Idle speed check and adjustment have to be done after engine is being warm up.

1. Warm up the engine and turn-off.
2. Turn the Idle adjust screw (right side of engine) clockwise until it is lightly seated.
3. Loosen the Idle adjust screw by turning it counterclockwise 1-1/2.
4. Start the engine and switch the dashboard to RPM display mode. (or use tachometer to connect to spark plug end to read RPM)
5. Start the engine and adjust the throttle until around 1,600 +/- 100 rpm.
6. Check and re-adjust the idle speed with the idle speed..

Specified idle speed:

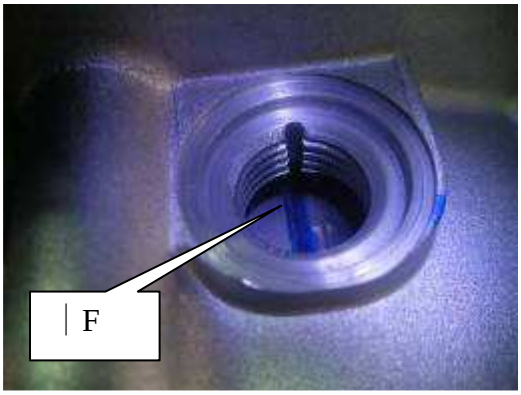
1600 ± 100 rpm

2-09. Ignition System

Caution

Engine idling speed and throttle cable free play should be adjusted properly before checking.
Connect tachometer and ignition light.

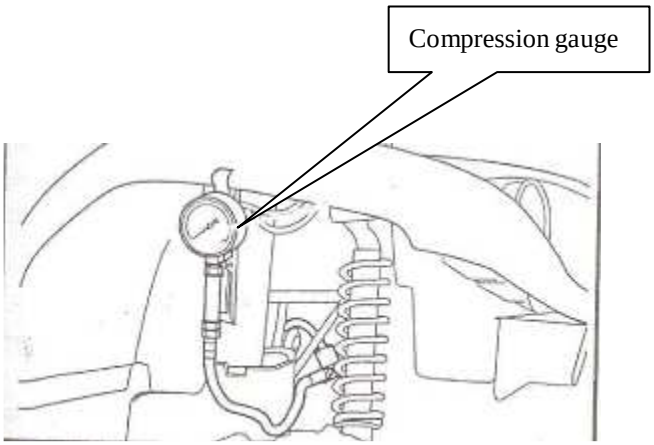
Start engine.
As engine in idle speed: 1600 rpm, aim at the mark “F” on the rotor with the ignition light.



If ignition timing is incorrect, check CDI set, pulser coil of generator. Replace it if malfunction of these parts is found.

2-10. Cylinder Compression Pressure

a. Warm up engine.
b. Turn off the engine.
c. Remove spark plug cap and spark plug
d. Install compression gauge.
e. Crank the engine with the electric starter with throttle wide-open until the compression reading on the gauge stabilizes.



Caution

Usually, the highest pressure reading will be obtained in 4~7 seconds.

Compression pressure: 12 ± 2 Kg/cm^2

Check following items if the pressure is too low:
a. Incorrect valve clearance.
b. Valve leaking.
c. Cylinder head leaking
d. Piston, piston ring and cylinder worn out.

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

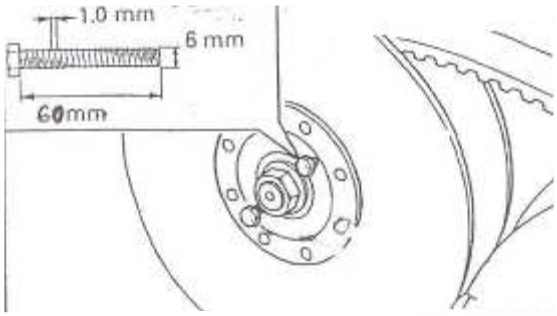
2-11. Drive Belt

a. Release all necessary clamps, ducts & parts.

b. Remove left crankcase cover bolts.

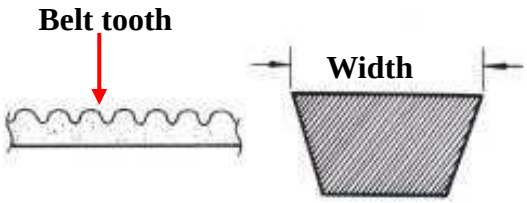
c. Remove the Moveable driving face.

d. Install the bolts into the driven sheave ass'y and tighten the bolts, causing the gap to loosen the belt then remove the belt.



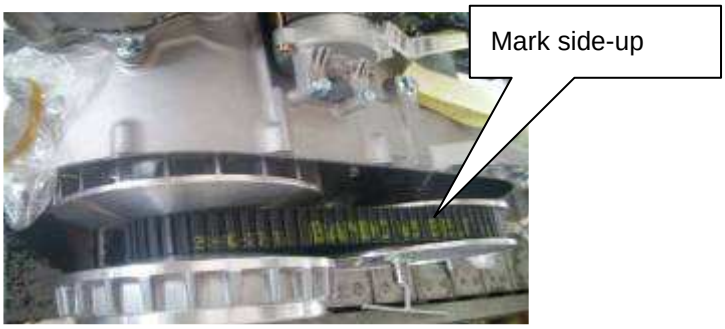
Inspection

Check the drive belt for crack or wear. Replace it if necessary. Measure the width of drive belt as diagram shown.



Service Limit: 28.3 mm(width)

Replace the belt if it's out of specification.



Caution

- Using the SMC genuine parts for replacement.
- The surfaces of drive belt or pulley must be free of grease.
- Clean up all grease or dirt before installation.
- Install back the belt with mark side-up.
- Turn the belt forward for checking movement after finish installing.

2-12. Brake System (Disk Brake)

Brake System Hose

Make sure the brake hoses contain no corrosion or leaking oil.

Brake Fluid

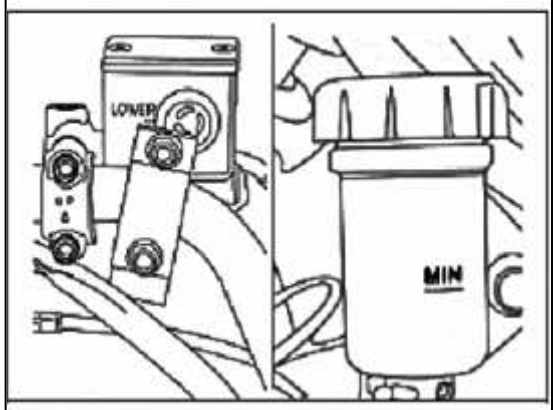
Make sure the brake fluid reservoir top is horizontal. Then check brake fluid level in the brake fluid reservoir. If the level is lower than the LOWER limit, add brake fluid to UPPER limit. Also check brake system for leaking if low brake level found.

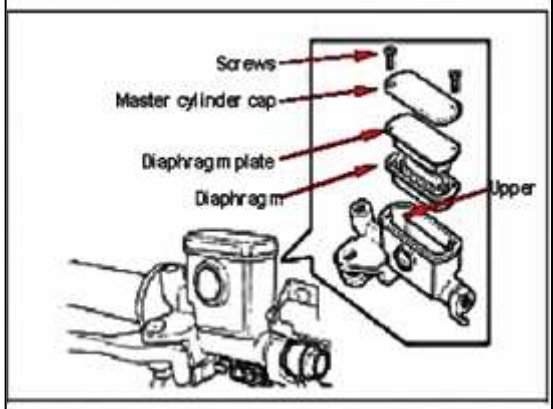
Caution

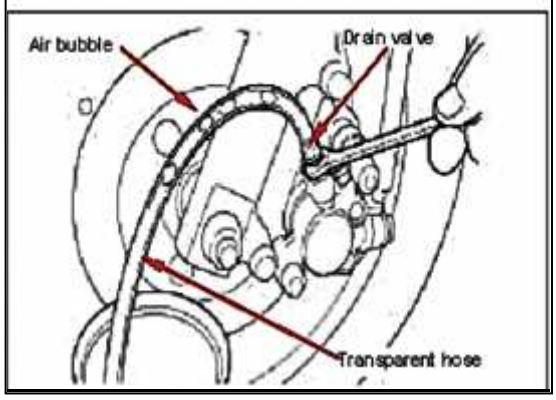
- Brake fluid may damage plastic parts. Always clean up spilled brake fluid right away.
- Do not operate the brake lever after the cap had been removed. Otherwise, the brake fluid will spread out if operate the lever. Do not mix non-compatible brake fluid together.

Air Bleed / Brake fluid Change Operation

a. Open the rubber cap of draining valve on the caliper.
b. Connect a transparent hose to draining valve.
c. Loose the drain valve.
d. Repeat pressing the brake lever and check the fluid that out of caliper, inspect if there still any air bubble being bleed out. Be careful to add the fresh brake fluid on the master cylinder side at same time to avoid extra air into the brake system. Perform this operation until there is no air inside the







brake system hoses. A vacuum machine applied will be very helpful.

e. Closed the drain valve

Added Brake Fluid

Add brake fluid to UPPER limit level.

Recommended brake fluid: DOT4

Caution

- Use only the designed quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.
- Be careful that water does not enter the brake master cylinder when refilling.

Brake Lining Wear

The indicator mark on brake lining is the wear limitation (1mm).

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

Caution

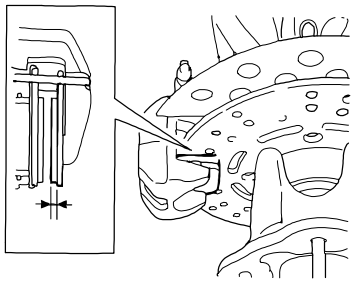
To check front brake lining must be remove front wheel first.

Note:

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

Front Brake

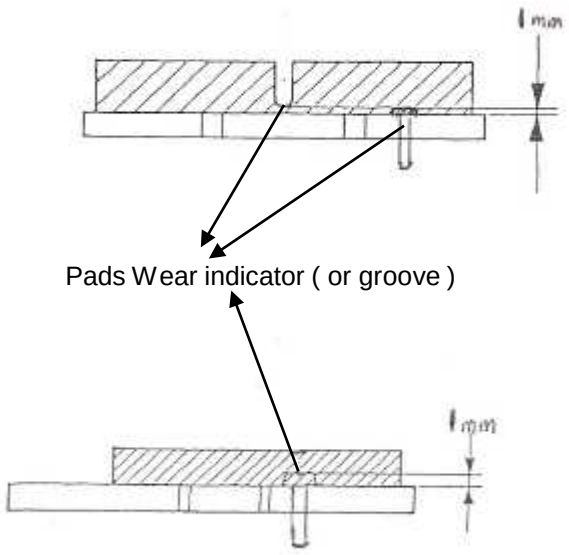
Rear Brake



Check brake lining

Brake Pads Replacement (refer Chapter 14)

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



Caution

Do not operate the brake lever after the caliper being removed to avoid pushing out piston. Be sure the brake pads must be replaced by one set.

2-13. Brake Light Switch/Starting Inhibitor Switch

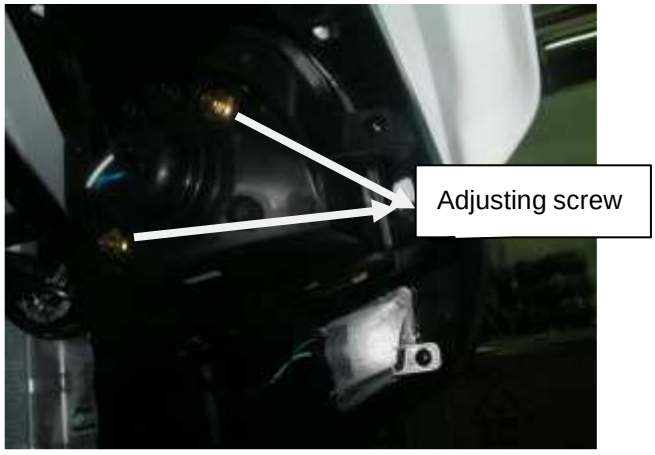
The foot brake light switch is operated by movement of brake pedal. A proper adjusting is necessary when the brake light comes on just before the braking effect starts.

The hand brake light switch is operated by lever movement.

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

2-14. Headlight Beam Distance

Turn on main switch
Headlight beam adjustment. Turn the headlight adjusting screw to adjust headlight beam high.



Caution

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

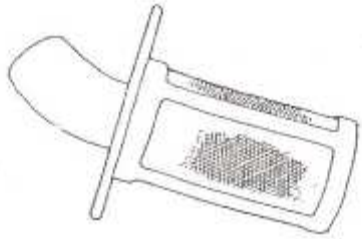
2-15. Cleaning Spark Arrester

Warning

- Always let the exhaust system cool before performing this operation.
- Do not start the engine when removing the tailpipe.

Cleaning step

a) Remove the bolts
b) Remove the gasket and tailpipe out of muffler.
c) Use a wire brush to remove any carton deposits from spark arrester portion of tailpipe and the inner contact surfaces of the muffler.
d) Replace a new gasket
e) Insert back the tailpipe to muffler and align the bolt hole
f) Tighten the bolts



Note:

The arrester may have different type according requests.

2-16. Suspension

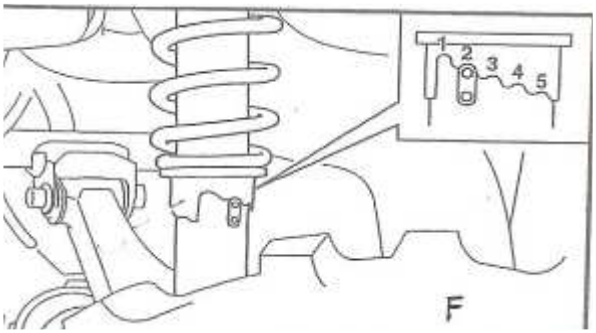
Adjustment

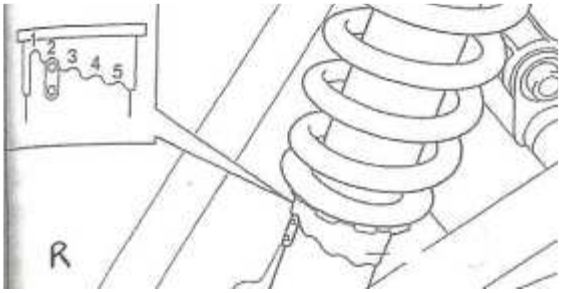
Warning

- Do not ride the ATV with poor suspension. Looseness, wear or damage suspension will make poor stability and drive-ability.
- Always adjust both shock absorbers spring preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.

Use a wrench to turn the adjuster to increase or decrease the spring preload.

Standard position: 2
Min(soft) position: 1
Max(hard) position: 5





Check & Replacement :

Front suspension

- Press down the front suspension for several times to check its operation.
- Check if it is damaged (oil leaking / bad bound & rebound/bend)
- Replace relative parts if damage found.

Rear suspension

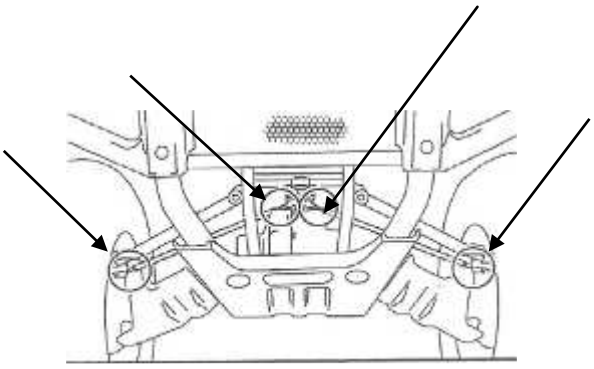
- Press down the rear suspension for several times to check its operation.
- Check if it is damaged (oil leaking / bad bound & rebound/bend)
- Replace relative parts if damage found.

2-17. Steering Handle

1. Place the machine on a level surface.
   - Check steering assembly bushings
     ⇨ Move the handlebar up and down, and /or back and forth.

     Excessive free play ➔ Re-screw the bushings or Replace the steering bushings.
   - Check the tie-rod ends
     ⇨ Move tie rod vertically

     Excessive free play ➔ replace the tie rod ends.(the arrow shown)



2. Lift the front wheel out of ground.
   - Check all wires and cables if they are interfered with the rotation of steering handle bar.
     ⇨ Turn handle from right to left alternative and check if turning is smoothly.
   - Check the ball joints and/or wheel bearings.
     ⇨ Move the wheels laterally back and froth.

     Excessive free play ➔ replace the front arms and/or wheel bearings.

2-18. Wheel/Tire

Caution

- The vehicle is equipped with low pressure tires. It's important that they be inflated correctly and maintained at the proper pressures.
- Tire pressure check should be done before riding.
- Follow the size and characteristics as recommended when the tires need to be replaced

Checking the tires

1. Check if tire surface is ticked with nails, stones or other materials.
2. Check the tire pressures by tire gauage. Out of specification ➔ set the proper pressures when tires are cold.
   Tires pressures should be equal in both tires in front and in rear.

Tire pressure: As recommend in warning labels on the model.

3. Measure tire groove depth from tire central surface. Replace the tire if the depth decrease to 3mm due to wear.

Front & rear tire groove depth limit: 3mm

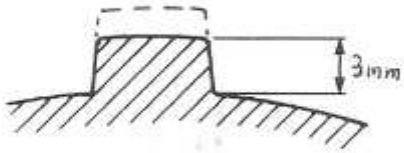
Checking the wheels

Caution

Never attempt repairs to the wheel.

Check the wheels if damage/bends ➔ replace

Tire gauage



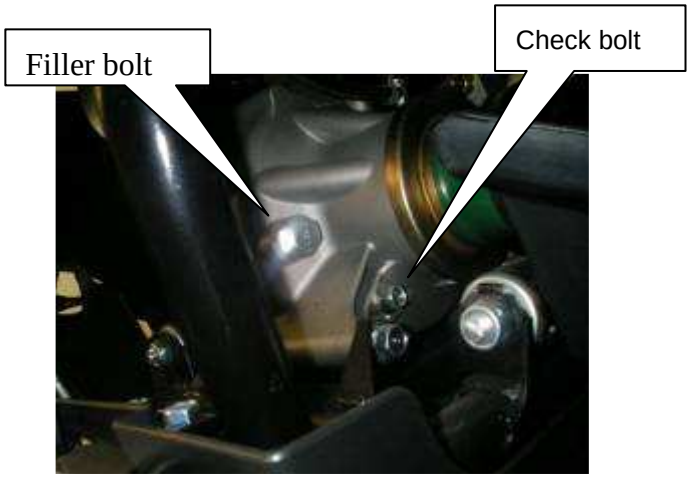
2-19. Check the oil

Always place the machine on a level surface,

then check the oil..

- Engine oil
  refer to 3-04.
- Final gear oil
  - Checking
    1) Loosen oil check bolt

Note: Do not remove the bolt, otherwise the gear oil may come out.

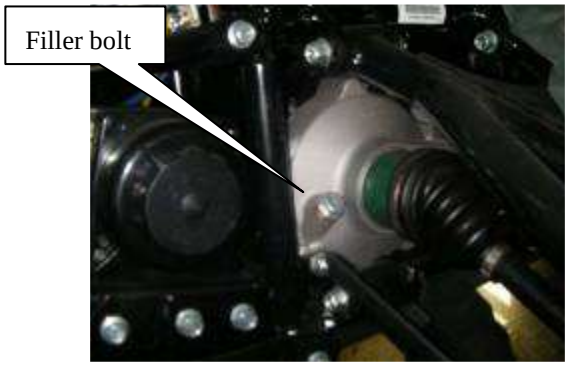


2) Check that gear oil seeps out or not. If no oil seeps out, change the final gear oil.

- Changing
  1. Remove oil filler bolt & drain plug and drain out final gear oil (place a container under the final gear case).
  2. Install back the plug and fill oil to final gear case

Periodic oil change: 290cc
Oil change after disassembling: 330cc
Recommended oil: SAE 90 API "GL-4" Hypoid gear oil.

3) Replace a new gasket and install back the bolt.



- Differential gear oil
  - Checking
    1) Remove the oil filler bolt
    2) Check oil level which should be up to the brim of hole. If oil level low, add oil to proper level.
  - Changing
    1) Remove the oil filler bolt & drain plug and drain out the oil (place a container under the final gear case).

2) Install back oil filler bolt and fill oil to differential gear case.

Periodic oil change: 290cc
Oil change after disassembling: 330cc
Recommended oil: SAE 90 API "GL-4" Hypoid gear oil.

3) Replace a new gasket and install back the filler bolt.

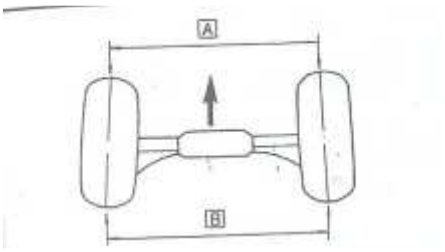
2-20.Toe-In adjustment

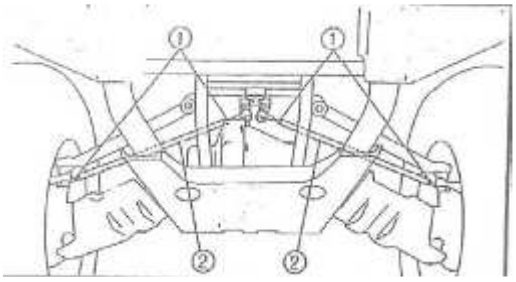
Place the machine on a level surface.
Measurement:

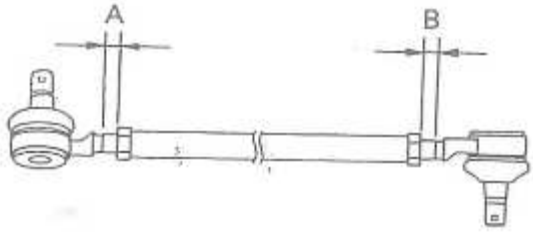
1) Ensure both front tire tread centers.
2) Let handlebar straight ahead
3) Measure the width A between the marks
4) Rotate the front tires 180° until the marks are exactly opposite one another.
5) Measure the width B between the marks.
6) Calculate the toe-in by
   Toe-in = B – A

   Toe-in : 0 ~ 10mm (with tire touching the ground)

7) If toe-in incorrect, adjust it
   - Mark both tie-rods ends.
   - Loosen the locknuts(tie-rod end) ① of both tie-rods.
   - The same number of turns should be given to both the right and left tie-rods ② until the specified toe-in is obtained. This is to keep the length toe-in of the rods the same.
   - Tighten the rod end locknuts of both tie rods, check the A = B roughly.







2-21. C.V. Joint Boot Check

Often to check the C.V joint boot (front and rear),
Damage ➔ Replace (refer to Chapter 17)

2-22. Seat Opening & Installing

- Opening – Stop the engine and turn the key to the left to engage cable and release seat catch.
  - cable should be adjusted to be proper

- Installing – Put seat forward down to the two catches of chassis and hook the catch and insert to the dampers.
  - ensure a damper in the middle, missing ➔ replace.

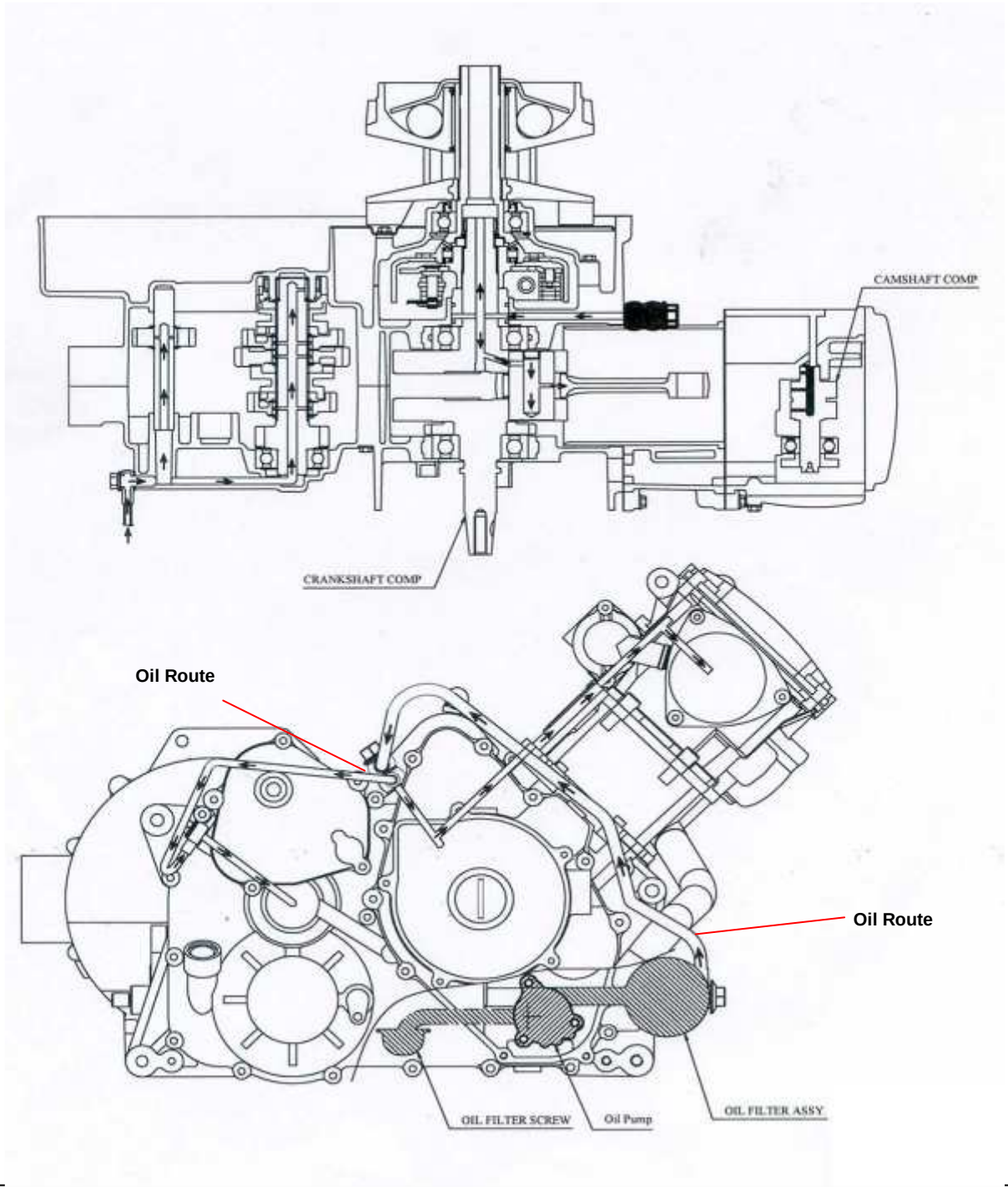
2-23. Nuts, Bolts Tightness

Perform periodical maintenance in accord with the Periodical Maintenance Schedule. Check if all bolts and nuts on the frame are tightened securely.

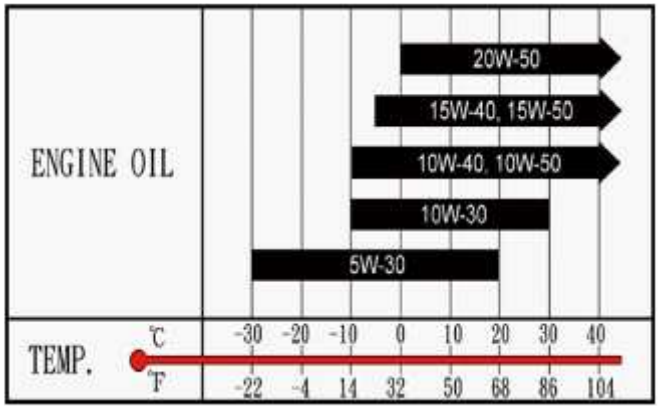
Check all fixing pins, snap rings, hose clamp, and wire holders for security.

Note:

3-01.Mechanism Diagram



3-02.Precautions in Operation



General Information

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

Specifications

Engine oil capacity Disassembly: 2500 c.c.
Replacement: 2200 c.c.
Replacement with oil filter replaced: 2300 c.c.
Oil viscosity SAE 10W-40 MA class
(Recommended: Synthetic base)

Rear axle gear oil replacement: 290c.c.
Front differential gear oil replacement: 290c.c.
Gear oil viscosity SAE 90W

Torque value

Oil strainer cap	1.0~1.4kgf-m
Engine oil drain bolt	1.8~2.2kgf-m
Gear oil drain bolt	1.0~1.4kgf-m

3-03.Troubleshooting

Low engine oil level

- Oil leaking
- Valve guide or seat worn out
- Piston ring worn out
- Abnormal blow-by

Low oil pressure

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

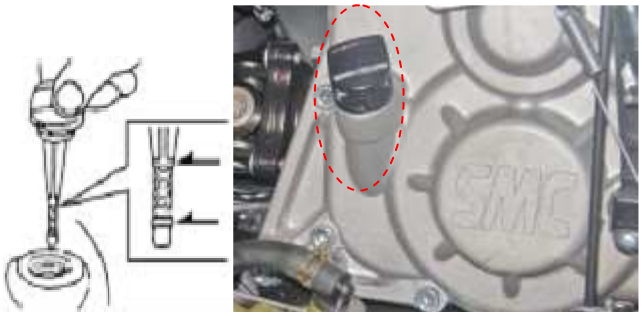
Dirty oil

- No oil change in periodical
- Cylinder head gasket damage
- Piston ring worn out
- Inferior oil quality
- Overheating

3.4 Engine Oil

Oil Check

Turn off engine, and park the ATV in flat surface. Check oil level with oil dipstick.



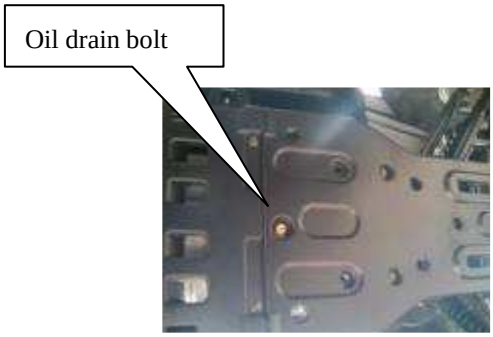
1. Screw out the dipstick, wipe out the oil on the dipstick
2. Plug the dipstick into engine, slightly screw dipstick, and take out for oil level checking.

If oil level is nearly to low level, fill recommended oil to be in the between upper and lower level.

Oil Change

⚠ **Caution**

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



1) Place the machine in flat level.
2) Start the engine and let it warm up for several minutes.
3) Stop the engine and place an oil pan under the ATV, and remove dipstick and oil drain bolt.
4) Drain out the engine oil from crankcase.
5) Replace a new washer and install back oil drain bolt.
6) Fill sufficient oil to reach the specified level and screw back dipstick.
7) Warm-up the engine for a few minutes, then stop the engine .
8) Check again the oil level in the range of levels or not.

Torque value：**2.0kgf-m**

Recommended oil: refer to 3-02.

3-05 Oil Filter Unit

Remove the oil filter unit with special tool.

Special Service Tool: OIL FILTER WRENCH

1) Same steps to drain out the engine oil as 3-04.
2) Remove the oil filter unit by oil filter wrench.
3) Apply few engine oil to lubricant the surface of O-ring on the new oil filter unit. Make sure that the O-ring is properly seated on oil filter unit.
4) Tighten the new oil filter unit to specified torque with oil filter wrench.
5) Same steps to fill engine oil as 3-04.

Torque value：1.8~2.0kgf-m

Special Service Tool: Oil filter Wrench

Caution:

- Genuine parts should be replaced only. Please use SMC genuine oil filter unit.
- To get the best protection to the engine, strongly suggest to replace the oil filter unit all the time when engine oil replacement.

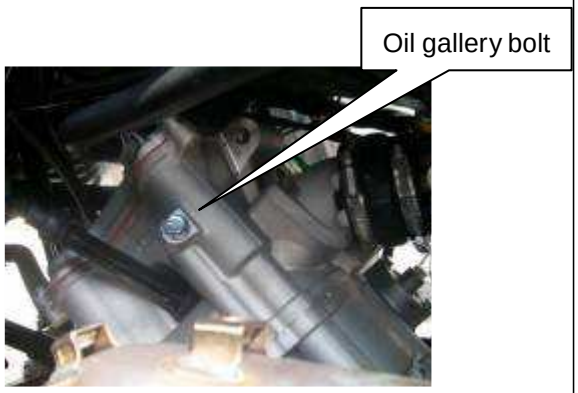
Oil Quantity:

Periodic oil change : 2.2L
With oil filter replacement: 2.3L
Disassembly: 2.5L
Please follow recommended oil chart(3-02).

3-06 Engine Oil Pressure Checking

Always check the engine pressure after replacing the engine oil.

- Slightly loosen the oil gallery bolt on the cylinder head.
- Start the engine to seep from the oil gallery



bolt. If no engine oil comes out after one minute turn engine off so that it will not seize.

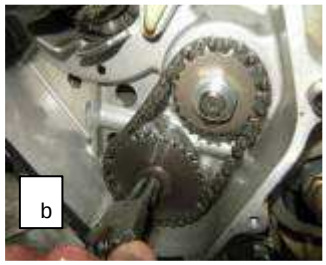
- Check the engine oil passages, oil filter unit and oil pump for damage or leakage.
- After solving the findings, start the engine again and check it again.
- Tighten the oil gallery bolt.

3-07.Oil Pump

A. Oil Pump Removal

a. Remove the AC Generator.(Refer to Chapter 9).

b. Remove the cir-clip on the oil pump driven sprocket.



c. Remove out the nut on oil pump drive sprocket.

d. Remove out the oil pump chain and sprockets.

e. Screw out the 3 screws on the oil pump.

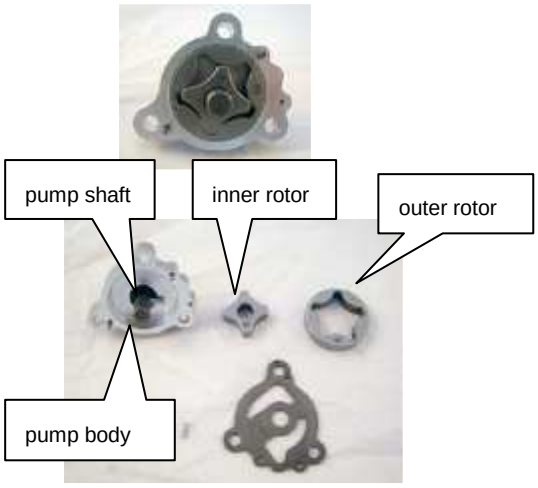
f. Remove the oil pump.

g. Make sure that pump shaft can be rotated freely.

B. Oil Pump Disassembly

a. Remove the screw on oil pump cover and remove the cover.

b. Remove oil pump shaft, inner rotor, outer rotor and cover.



C. Oil Pump Inspection

Check the clearance between oil pump body and outer rotor.

Limit: 0.15 mm

Check clearance between inner and outer rotors.

Limit: <u>0.12 mm</u>

Check clearance between rotor side face and pump body

Limit: <u>0.12 mm</u>

Out of any specification ➔ replace the oil pump.

D. Oil Pump Re-assembly

1. Install the inner and outer rotors into the pump body.
2. Align the indent on driving shaft with that of inner rotor.
3. Install the oil pump shaft and roller.
4. Install the oil pump cover and fixing pins properly.
5. Tighten the oil pump screw.

E. Oil Pump Installation

1. Install the oil pump gasket
   - always install the new one.


2. Install the oil pump, and then tighten screws.

Torque value：**1.0kgf-m**

3. Make sure that oil pump shaft can be rotated freely.

4. Install the oil pump driving and driven sprocket, and then install cir clip onto oil pump shaft, nut to the driving sprocket.

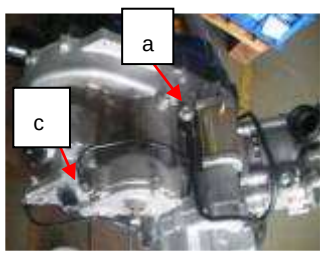
5. Use "-" type screw driver and hammer to stake the skirt of the nut, lock the nut.

3-08.Oil Delivery Pipe

Always check to the two delivery pipes condition / connecting concerning to the oil replacement.

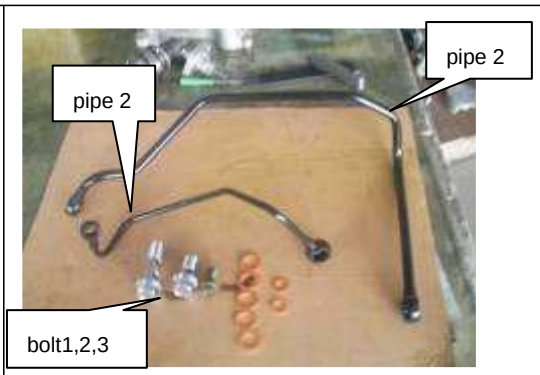
A. Removal two delivery pipes

1) screw out the three union bolts by sequence a, b, c as shown.
2) remove the two delivery pipes and all bolts and washers.



B. Inspect

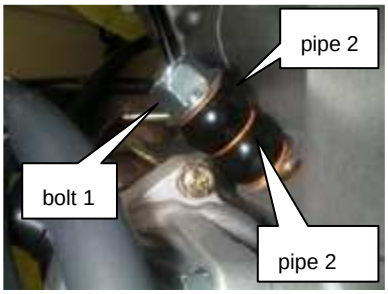
1) delivery pipes
   - bent/crash/damage ➔ replace
   - contact face roughness ➔ replace
2) union bolts/washers
   - damage/block/crash/roughness ➔ replace
   - cooper washer always replace the new one.

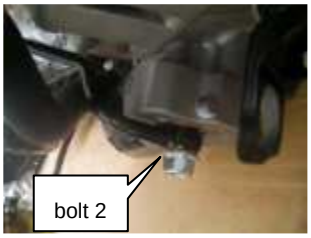


C. Install oil delivery pipe

Sequence steps as below:

1) Screw union bolt 1 through delivery pipe 1 & pipe 2 and three washers as shown into crankcase L by hand. Ensure the pipe 1 to be under pipe 2.
2) Screw union bolt 2 and washers through into crankcase R by hand.
3) Screw union bolt 3 and washers through into crankcase R by hand.
4) Ensure two delivery pipes to be fitted in a freely.
5) tighten the union bolt 1 , 2 then 3 in sequence.
6) Fix the two clamps in freely to the covers as shown.





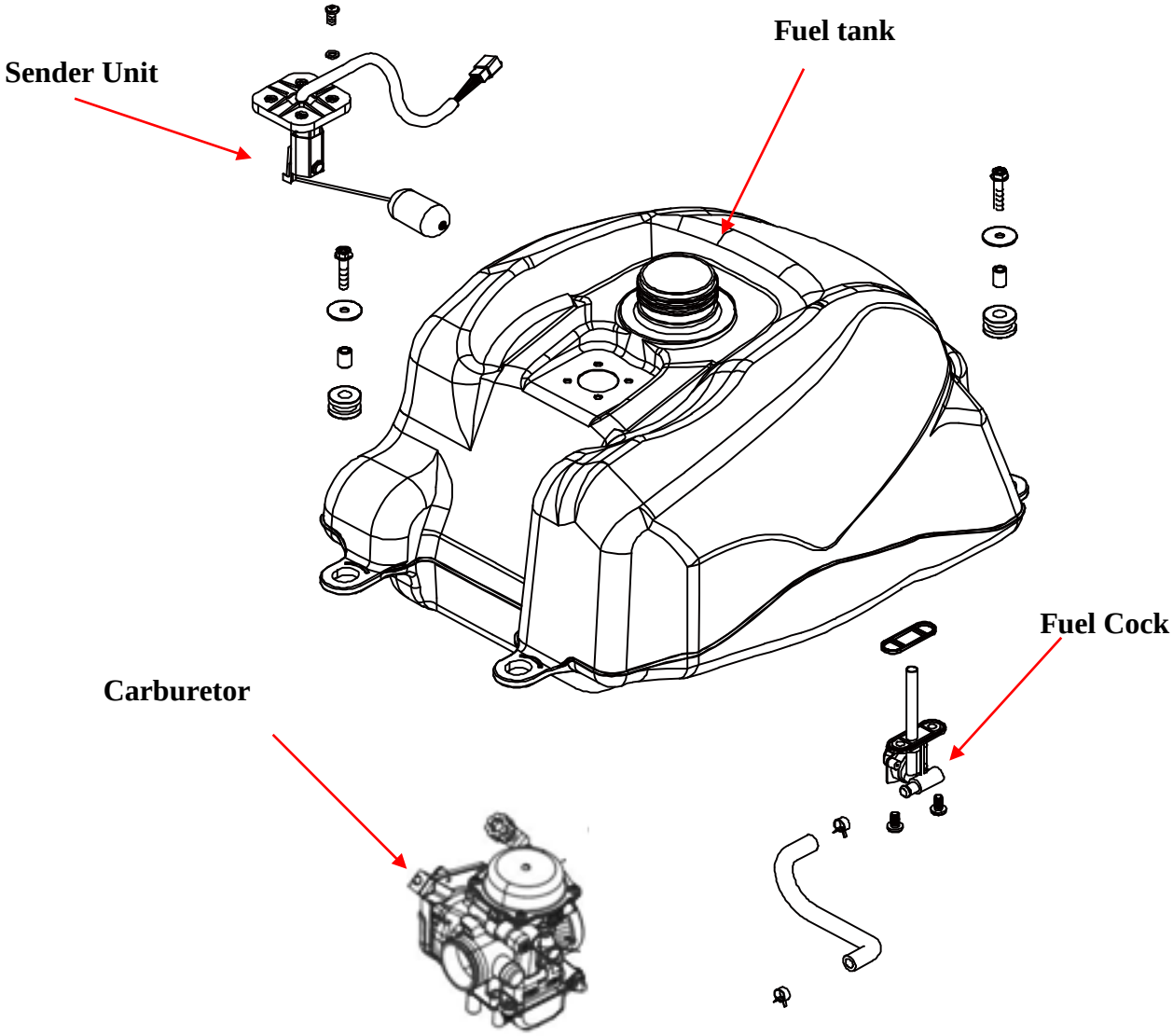
Torque value:

Bolt 1 & 2 : 2.5 kgf-m

Bolt 3 : 2 kgf-m

Notes:

4-01. Mechanism Diagram



4-02. Precautions in Operation

A. General Information

Warning

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

Cautions

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

Specification

ITEM	MIKUNI BSR 42
Carburetor diameter	Ø42mm
I.D. number	BSR42
Fuel level	3.5 mm
Main jet	#152.5 (EEC Homologation Model: #132)
Pilot jet	#45
Idle speed	1600 ± 100rpm
Throttle handle clearance	1~3 mm

C. Tool

Special service tools

Vacuum/air pressure pump

Fuel level gauge

4-03. Trouble Shooting

Poor engine start

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

Stall after started

- Malfunction of carburetor chock
- Incorrect ignition timing
- Malfunction of carburetor
- Dirty engine oil
- Air existing in intake system
- Incorrect idle speed

Rough idling

- Malfunction of ignition system
- Incorrect idle speed
- Malfunction of carburetor
- Dirty fuel

Intermittently misfire as acceleration

- Malfunction of ignition system

Late ignition timing

- Malfunction of ignition system
- Malfunction of carburetor

Power insufficiency and fuel consuming

- Fuel system clogged
- Malfunction of ignition system

Mixture too lean

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

Mixture too rich

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

4-04. Carburetor Remove / Install

A. Removal.

a. Remove the R/L side cover.

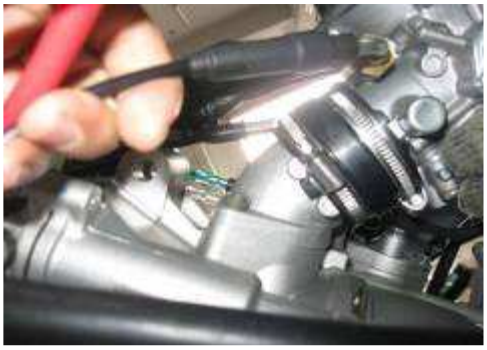
b. Disconnect the throttle cable from Carburetor:

1. Remove 3 screws from throttle cap on carburetor,

2. Remove the throttle seat (PIN) and cable.

3. Loose the throttle cable adjust nut, and then remove throttle cable from carburetor.

4. Disconnect the fuel hose and choke cable



5. Release 2 hose clamps on the carburetor in connecting with air intake and air cleaner.

6. Remove the carburetor.

B. Installation

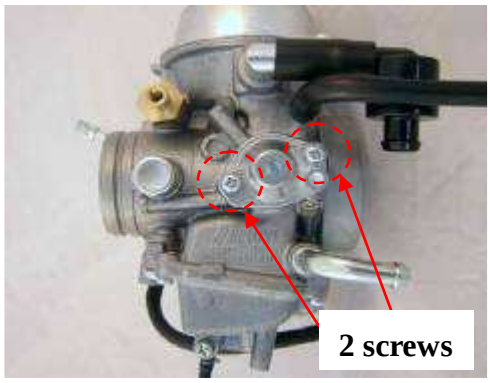
Install in reverse order of removal procedures.

4-05. Carburetor Disassembly.

4-05-01. Air Cut-Off Valve

A. Disassembly

1. Remove 2 screws.



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

B. Inspection

Check the valve/spring are in normal. If normal, it will restrict air-flow. If air-flow is no restriction, replace the valve..

C. Assembly

Install in reverse order of removal procedures.

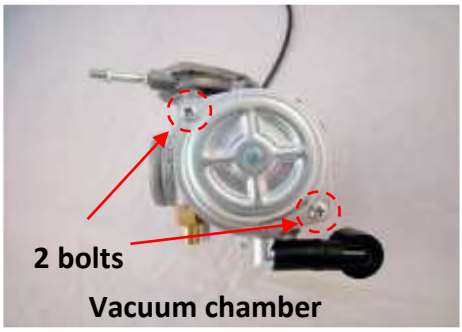
- ensure the spring in correct position
- do not damage the valve and install it very carefully.

4-05-02. Throttle Valve

A. Disassembly

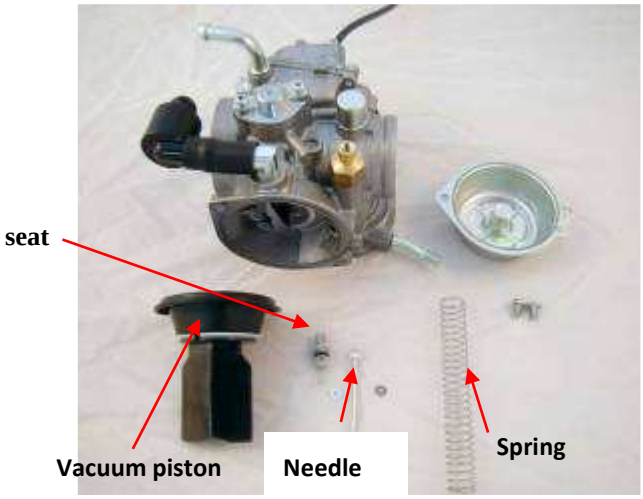
1. Loosen drain screw, and drain out residual fuel in float chamber.

2. Remove screws (2 screws) of vacuum chamber cover and the cover.



3. Remove compress spring and vacuum piston.

4. Remove fuel needle seat, spring, and injector needle.



B. Inspection

1. Check if the vacuum piston for wear out, crack or other damage.
2. Check if the diaphragm of vacuum piston if damage or crack. Replace with new if broken.

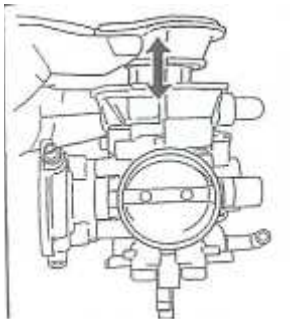
Cautions

Do not damage vacuum diaphragm.

C. Assembly

Install in reverse order of removal procedures.

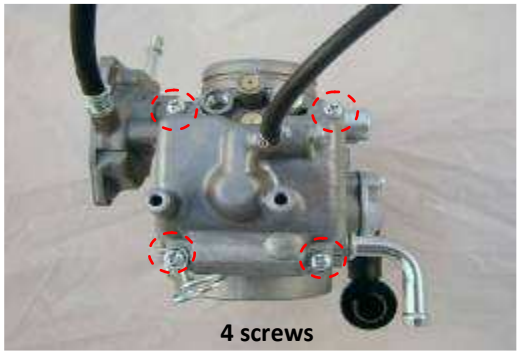
- ensure vacuum piston free movement.
- ensure the needle and needle set connection levels and washers positions.



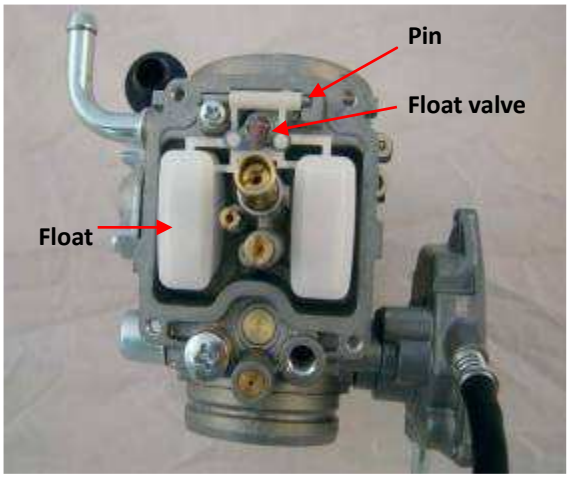
4-05-03 Float chamber

A. Disassembly

1. Remove 4 mounting screws and remove float chamber cover.



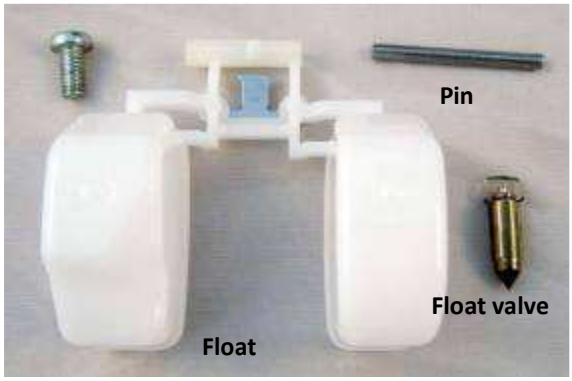
2. Remove the pan head screw and them take out the float pin, float body and float valve.



B. Inspection

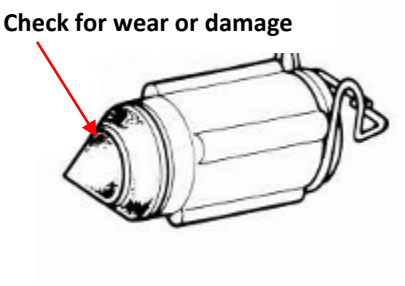
a. Float and float valve.

1. Check float valve and valve seat for damage, blocking. Clean or replace with new if broken.
2. Check float valve for wearing, and check valve seat face for wear, dirt.



Caution

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



b. Main jet, Main Jet extender, Needle jet, pilot jet slow jet.

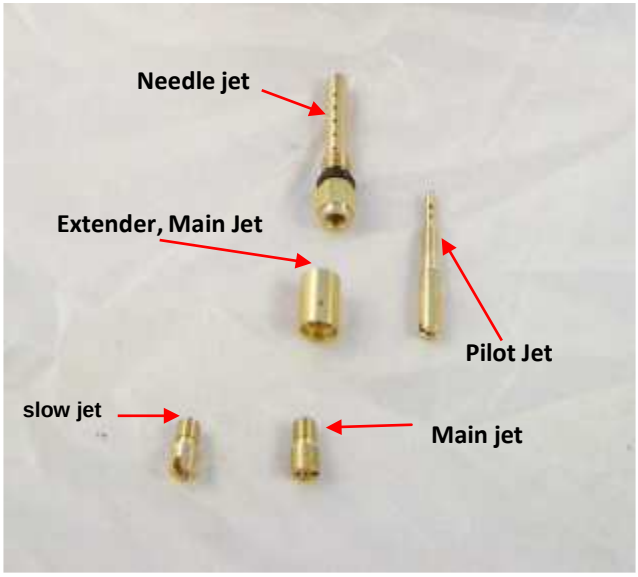
1. Remove Main jet, Main Jet extender, Needle jet, pilot jet slow jet for maintenance (clean and inspection for clog)

Caution

Take care not to damage jets and adjust screw.

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

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



C. Assembly

1. Install main jet, main jet extender, needle jet, slow jet and pilot jet

Caution

Set the pilot jet in according to number of turns noted before it was removed.

2. Install the float valve, float, and float pin.
3. Checking fuel level

Caution

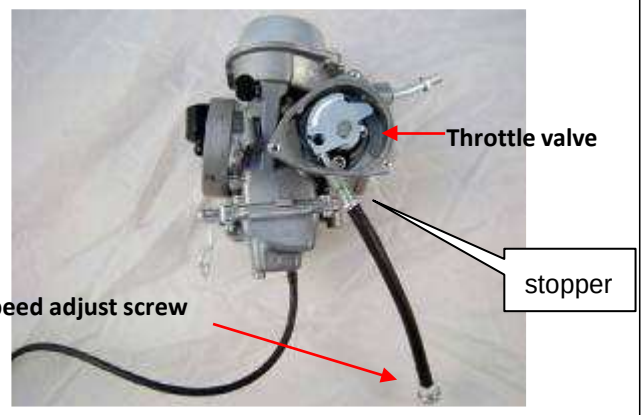
- Check again to ensure float valve, float for proper installation.
- To ensure correct measurement, position the float meter in such a way so that float chamber face is vertical to the main jet.

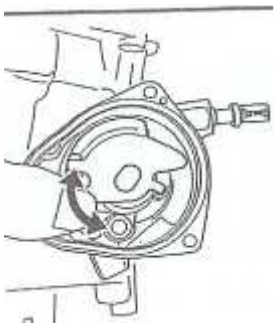
Fuel level: 3.5mm

4. **Carburetor adjustments:**

Following adjustments must be made after installation of carburetor.

- Throttle cable adjustment.
  - Check free movement on throttle valve, if stick, replace it.
  - turn the stopper to be just touching the throttle valve when the cable release.
  - refer to 2-04.





- Idle adjustment

Specified idle speed:

1600 ± 100 rpm

  - Refer to 2-08.

Caution:

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

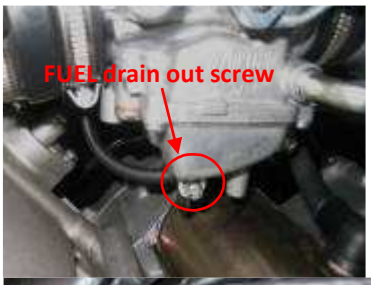
4-06. Fuel Cock / Fuel Tank / Fuel Unit

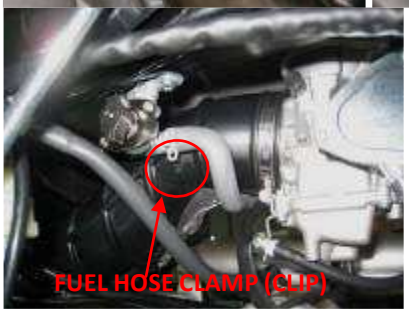
Before the fuel tank remove, please remove the side cover, top cover (as mentioned at chapter 5)

4-06-01. Fuel cock

a. Fuel drain out and hose disconnect

1. Switch the fuel cock switch lever to OFF position.
2. Put a container at the bottom of the carburetor, loose the drain bolt of carburetor to drain out the residual fuel from carburetor and fuel hose.
3. Remove the fuel hose clamp (clip) at carburetor fuel hose side.
4. Guide the fuel hose to the container; turn the fuel cock switch to ON position to drain out the fuel inside the fuel tank.



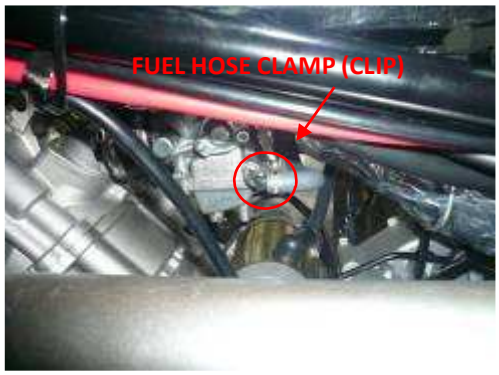


b. Fuel Cock removal (MAX)

1. Drain out the fuel from hose, carburetor and fuel tank side.
2. Remove the two (2) flange bolts at fuel cock side in connection to fuel tank, and then remove the fuel cock.
3. Remove the O-ring and fuel filter from fuel cock.

c. Fuel cock removal (MAL)

1. Drain out the fuel from hose, carburetor and fuel tank side.
2. Remove the hose clamps on FUEL IN hose (from fuel cock joint) and fuel EX hose (to carburetor) and disconnect the 2 fuel hose from fuel tank.
3. Loose the lock nut and screw out the fuel cock joint from fuel tank. Then remove the O-ring, fuel filter from fuel cock joint.
4. Remove the locknut, and then turn



counter-clockwise direction to remove the fuel cock.

d. Inspection.

1. Check the fuel cock if any fuel leaking or clogged
2. Check the fuel filter screen if broken.
3. Check the O-ring if damage.
4. Check the fuel hose if cracks or damage.

⇨ Replace with new if problem found.

4-06-02. Sender unit

a. Removal.

1. Disconnect the sender unit coupler from wire harness.
2. Remove the 4 screws and then take out the sender unit

Caution

- Do not bend the float arm of sender unit
- Do not fill too much fuel to fuel tank.
- Sender unit inspection (Refer to electrical equipment chapter 17).

b. Sender unit installation

Install the gauge in the reverse order of removal.

4-06-03. Fuel tank

Before removal the fuel tank, please process the fuel drain out and fuel hose disconnect / fuel cock removal as previous 4-06-01 mentioned.

a. Removal

1. Disconnect the sender unit wire coupler from tank.
2. Remove 2 flange bolt at front fuel tank side and 2 flange bolts at rear side, then remove fuel tank.

b. Inspection

Check the fuel tank if crack, damage or even fuel leaking. Replace with new if broken.

c. Installation

Install the tank in the reverse order of removal, and connect necessary wires.

Torque: Fuel tank flange bolt :
1.0kgf-m

Caution

- Do not forget to install the gasket of sender unit.
- Do not overfill the fuel tank. Be careful not to spill fuel, especially on the engine or exhaust pipe. Wipe up any spilled fuel immediately. Be sure the fuel tank cap is closed securely.
- Do not refuel right away after the engine has been running and is still very hot.

Note: Accompany fuel cap closed to fuel tank. Twist fuel cap (with a key cover) right to the thread on the opening of tank until torque loosen and lock it by key.

4-07. Air Cleaner

a. Removal

1. Loosen the clamp on air cleaner air duct in connecting with carburetor

2. Release the hose clamp (Clip) on the breathe hose in connecting between cylinder head and air cleaner, then disconnect the breathe hose from air cleaner.

3. Remove the 2 flange bolt and the shift & pull backward the air cleaner to remove it from frame. Special takes care of the air cleaner guide plug at front bottom side.

b. Installation

Install the air cleaner in the reverse order of removal.

Torque: Air cleaner flange bolt (M6*28): 1.0kgf-m

c. Cleaning air cleaner element

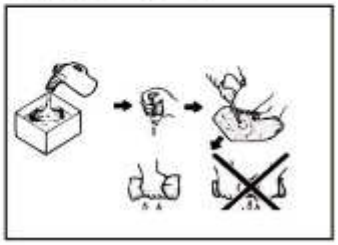
Separate the wire net protector clamp strip of air cleaner element.

1. Remove the air filter cover by release the fixing clip x 6.
2. Remove the air filter element.
3. Wash the element gently but thoroughly in solvent.
4. Squeeze the excess solvent out of the filter and let it dry. Do not twist the filter element when squeezing it.
5. Inspect the element. If damaged, replace it.
6. Apply some motor oil to the element which

1. Air cleaner cover, 6 x fixing clip

1. Air cleaner element

1. Protective wire



element should be wet but not dropping.

7. Reinstall the element to the element guide.
8. Reinstall the element assembly and parts removed for access.

Caution

- Never use gasoline or acid organized solvent to clean the element.
- Element should be yellow part side up.
- Loosen the drain bolt to release the mixtures at the periodic maintenance.

Notes:

5-01. Precautions in Operation

General Information

- The engine has to be supported with special service tools that can be lifted or adjustable.
- The following parts can be serviced as engine being mounted on frame:

  Carburetor

  Start motor.

Specification

Item		Capacity
Engine oil capacity	Replacement	2200 c.c.
	Oil and oil filter change	2300 c.c.
	Disassembly	2500 c.c.
Rear axle gear oil capacity	Replacement	290 c.c.
Front differential gear oil capacity	Replacement	290 c.c.
Coolant capacity	Engine& radiator	2080 c.c.
	Reservoir	300+/- 20 c.c.
	Total	2380 c.c.

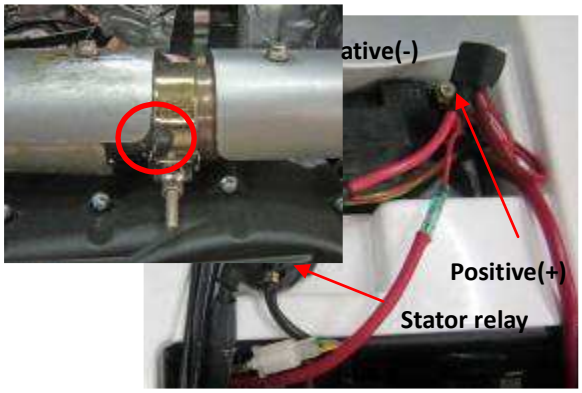
5-02. Engine Removal

a. Remove the seat.

- Switch the ignition switch from “off” to “seat open” to release the seat.
- Remove out the seat.

b. Remove the battery

- Remove the battery cord.
  Firstly remove negative terminal (-) and then remove the battery positive (+) terminal.
- Remove the battery.

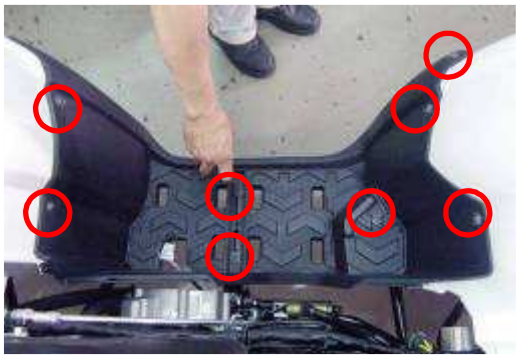


c. Remove the R & L side cover above the footrest cover.

- Screw out the 7 tapping screws at side covers
- Remove out the R and L side cover.

d. Remove R & L footrest cover

- Screw out 8 pan head screws in connecting to R/L footrest bar and front/rear cover.
- Remove the R and L footrest cover



e. Remove the front carrier

- Remove out 4 flange bolts from front carrier.
- Remove out the front carrier

f. Remove out the front top cover.

- Screw out 4 tapping screws as photo show.
- Remove out the front too cover.

g. Remove the Multi-functional display

- Screw out 1 fixing bolt
- Disconnect the meter wire coupler from wire harness.
- Remove the multi-functional display.

h. Remove the top cover (fuel tank cover)

- Remove the fuel tank cap
- Remove out two tapping screws at the front of top cover (fuel tank cover) in connecting with front cover.
- Remove the screw on the gear shifter ball grip, and then remove the gear shifter ball grip
- Turn and remove the ignition switch cap
- Remove the 2 flange bolts at rear side above the fuel tank (co-tighten structure with fuel tank & top cover to the frame)

- Remove the top cover (fuel tank cover).

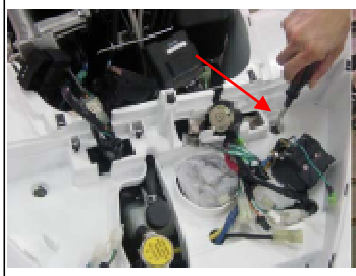
i. Remove the fuel tank.

- Switch off the fuel cock to OFF
- Disconnect the fuel unit wire connector
- Disconnect the fuel hose between fuel cock and carburetor.
- Remove the fuel tank.

(for detail message, please refer to 4-06)

j. Remove the front cover.

- Remove 7 tapping screws on the front cover in connecting with front shield cover.
- Remove out the front cover.



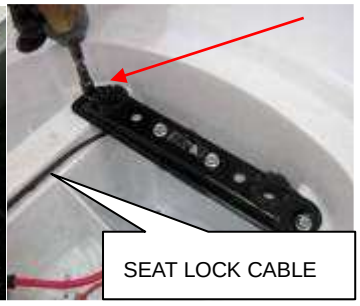
k. remove out the rear carrier

- Remove the 4 flange bolts in connecting between rear carrier and frame behind the rear cover
- Remove out the rear carrier.

l. remove the rear fender.

- Remove tapping screws inside the rear storage box

- Remove the pan head screw M6x15 (96318-06015-G)*3 and tapping screw (96112-51216-K) *10 on the rear cover side in connecting with frame and rear baggage cover.



- Remove the 2 flange bolts, then remove the seat catch stay, disconnect the seat lock cable.

- Disconnect the electrical connectors for tail

light, winkers.

- Remove the rear fender.

m. Remove the muffler

- Loose the clamp at connecting side between exhaust pipe and muffler.
- Remove the two flange bolts on the muffler side.
- Disconnect the muffler from front exhaust pipe.

n. remove the exhaust pipe

- Remove the 2 flange nuts on the front cylinder head side
- Pull the front exhaust pipe out from cylinder head and then remove it.

o. Disconnect the CVT cooling inlet & outlet duct.

- Remove the clamps on CVT outlet duct at rear side of L. Crankcase, and disconnect the air duct.

- Remove the clamps on CVT inlet duct joint between CVT inlet duct and LH crankcase, , then remove air inlet duct and air inlet joint.

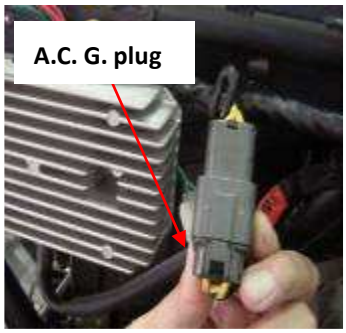
p. Remove the carburetor

- remove 3 screws and remove the throttle cable on the throttle controller box on carburetor
- remove the choke cable from carburetor
- remove the 2 clamps on the air cleaner breather tube and intake pipe.
- Remove the carburetor.

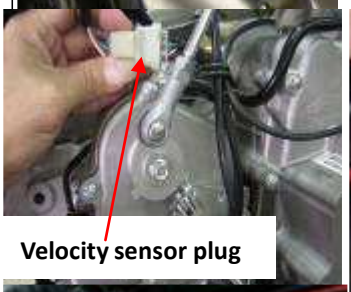
(for detail, refer to 4-04 for detail)

q. Remove electrical wire couplers from engine

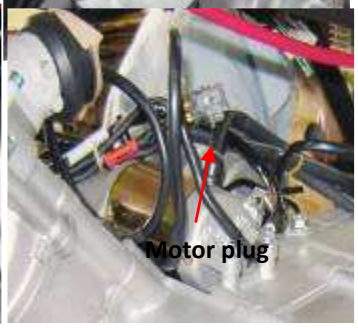
- Remove the spark plug cap



- Remove the A.C. Generator wire couplers and release out from frame clamps.



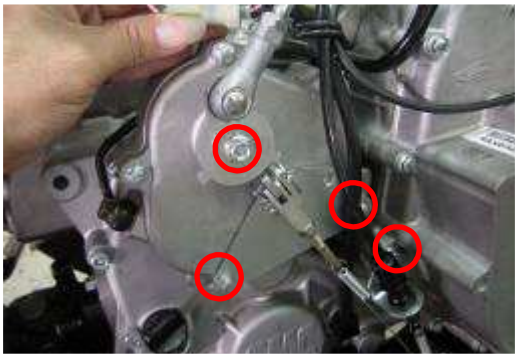
- Disconnect the gear position sensor coupler
- Disconnect the velocity sensor coupler.



- Disconnect the Thermo sensor plug coupler.
- Disconnect the start motor coupler & Ground wire.

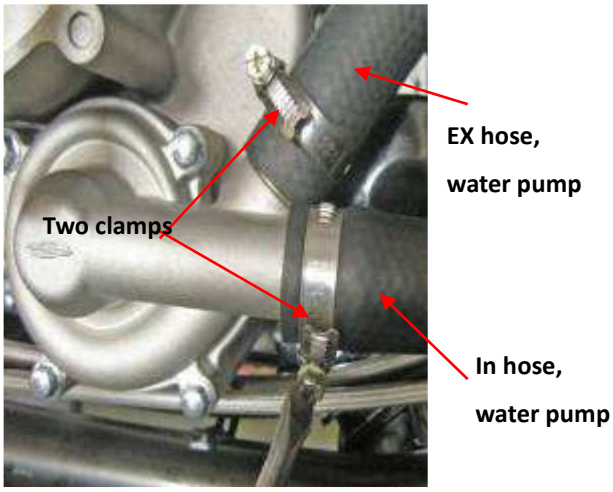
r. remove the gear shifter and gear shifting limiter, brake switch bracket from engine.

- Screw out the flange bolt from shift lever, and remove out gear shifting rod.
- Screw out 2 bolts to remove out shift lever limiter.
- Screw out the bolt to remove the brake switch bracket from engine side..



s. Remove out the liquid cooling pipes from engine

- Drain out coolant.
- Disconnect 2 water pump coolant hose clamps on inlet and outlet side of water pump



- Disconnect the two coolant hose clamps from cylinder head and cylinder side.

t. remove the front and rear drive shaft connector.

- Remove 4 socket bolts on the front universal joint at front gear box side, and remove the front drive shaft.

- Remove 4 socket bolts on the universal joint in connecting with engine output shaft side and then remove the rear propeller shaft.

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

u. engine remove out

- Loosen the front and rear side engine rubber damper mounting locknuts.

- Screw out 2 flange bolts on each side of the engine rubber dampers at front & rear engine hanger side.

- Remove out the engine by left side.

5-03. Engine Installation

Check the engine rubber dampers for any damage.

Install the engine in the reverse procedures of removal.

Caution

- Be careful when removing and installing the engine.
- Do not crash the body covers when removal and installing.
- Follow the recommended torque values for all installing engine and covers.
- Follow the recommended loctitie glue applying when installing.
- Replace all necessary consuming parts.
- Do not bend or twist the wires and tubes.
- Cables wires have to be routed in accordance with normal layout.
- Ensure refill recommended lubricant and sufficient quantity.
- To avoid foreign dropping to CVT cover, to cover the opening of CVT inley and outlet ducts when you assemble parts.

Torque value: Engine hanger (cushion block)

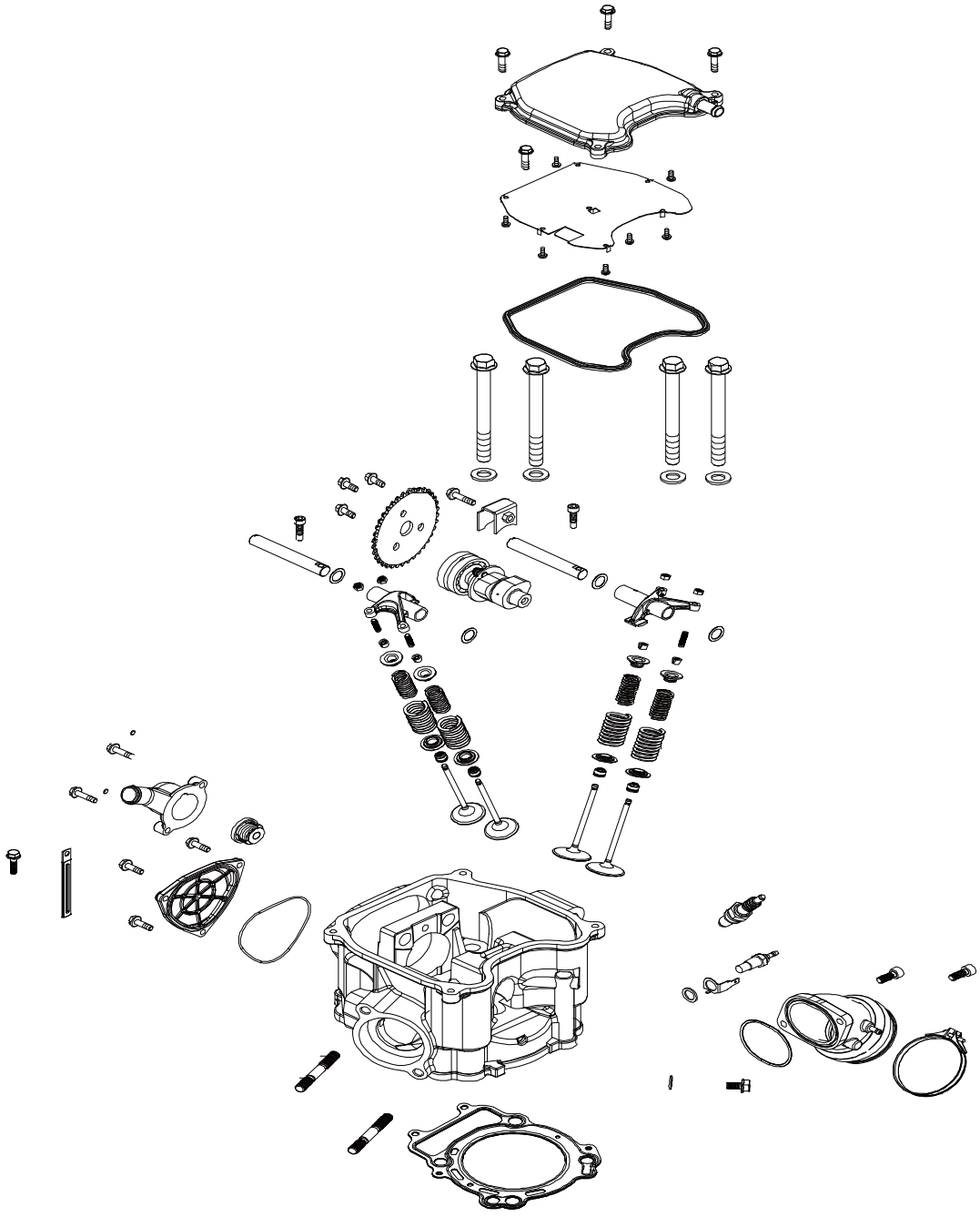
a. Flange bolt M10*20:5.5kgf-m

b. Flange bolt M6*20: 1.0kgf-m

c. Flange Nut M10: 5.5kgf-m

NOTE:

6-01. Mechanism Diagram



6.02 Precautions in Operation

General Information

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

Tools

Special service tools

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

6.3 Troubleshooting

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

Low compression pressure

1. Valve

- Improper valve adjustment
- Burnt or bent valve
- Improper valve timing
- Valve spring damage
- Valve carbon deposit
- Valve worn out

2. Cylinder head

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

3. Piston

- Piston ring worn out.

High compression pressure

- Too much carbon deposit on combustion chamber or piston head

Noise

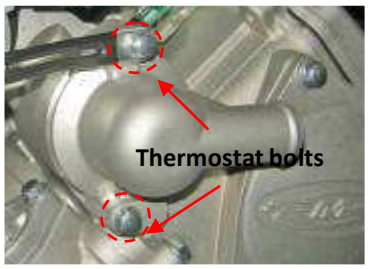
- Improper valve clearance adjustment
- Burnt valve or damaged valve spring
- Camshaft wear out or damage
- Chain wear out or looseness
- Auto-tensioner wear out or damage
- Camshaft sprocket
- Rocker arm or rocker arm shaft wear out

6-04. Cylinder Head Removal

a. Remove the engine from the frame. (Refer to chapter 5)

b. Remove the thermostat

- Remove 2 thermostat bolts and open the thermostat cover.
- Remove the thermostat.



c. Remove the cam chain tensioner

- Remove the 2 flange bolts
- Remove the cam chain tensioner.

d. Remove the spark plug.

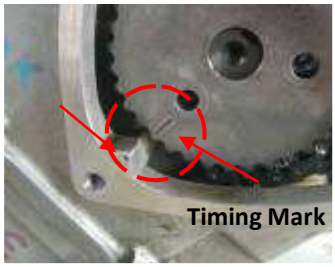
e. Remove 4 bolts from the head cover then remove cylinder head cover.

f. Remove the Cylinder head side cover.

- Remove the 3 side cover mounting blots of cylinder head,
- Then remove the side cover of cylinder head.

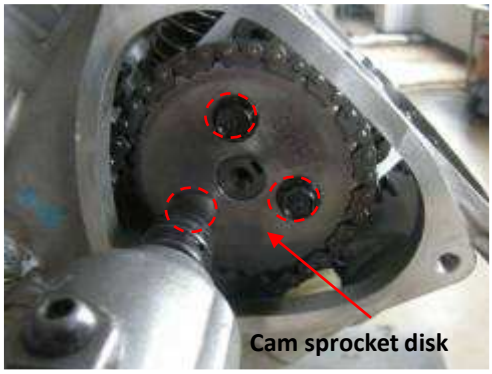
g. Piston TDC position align

- Remove tappet adjusting cap on right crankcase cover, and turn the crank shaft.
- Align the timing mark on the cam sprocket with that of cylinder head to make the piston at TDC position.



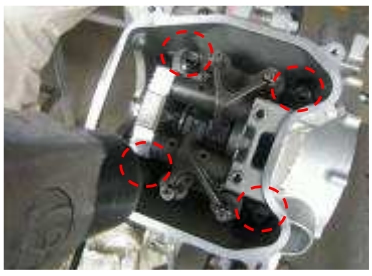
h. Remove the Cam Sprocket

- Remove 3 bolts from the cam sprocket.
- Remove the cam sprocket.



i. Cylinder Head remove

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



j. Remove cylinder head gasket and 2 dowel pins.


k. Remove cam chain guide.

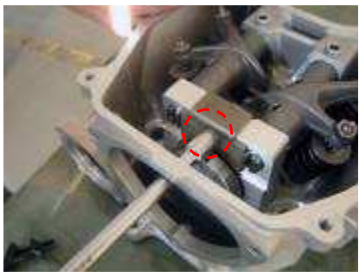
l. Clean up residues from the matching surfaces of cylinder and cylinder head.

Caution

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

m. Remove the rock arm and camshaft

- Screw out the bolt on the stop plate of rock ram shaft and remove the stop plate
- Screw out the 2 fixing bolts of rock arm shaft




- Remove out the rock arm shaft and rock arm.


- Remove the camshaft

o. Remove the valve, cotter, valve spring and seal

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

Caution

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

- Remove valve stem seals.

- Clean carbon deposits in combustion chamber.

- Clean residues and foreign materials on cylinder head matching surface.

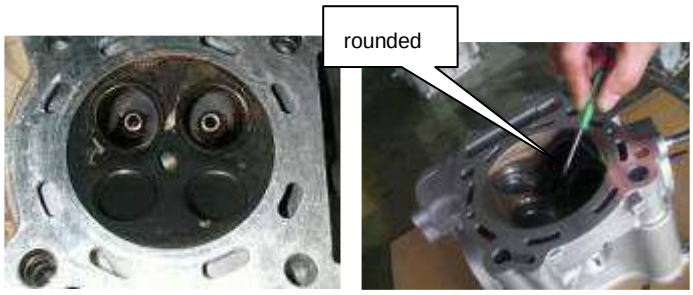
Caution

Do not damage the matching surface of cylinder head.

6-05. Parts inspection

a. Cylinder Head Inspection

- Check if spark plug and valve holes are cracked.
- Eliminate carbon deposits by a rounded scraper then clean it in solvent.
  - avoid damaging valve seats/guide plug threads and matching surface
- Eliminate mineral deposits/rust on wate jacket.
- Measure cylinder head warp with a straightedge and thickness gauge on cross surfaces..



Service limit: 0.05 mm

b. Camshaft

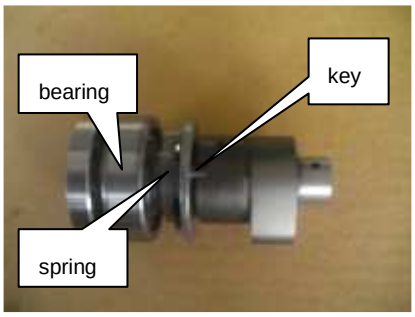
- Inspect cam two lobes height for crash or out of specification ➔ replace.

Service Limit:

IN: Replacement when less than 39.173mm

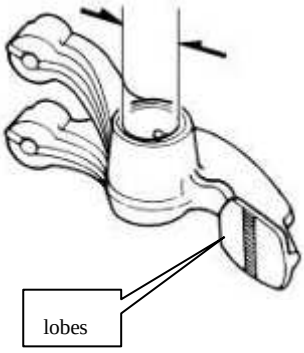
EX: Replacement when less than 39.008mm

- Inspect the camshaft bearing for looseness or wear out. ➔ replace the whole set.
- Inspect the key wearing and spring damage ➔ replace the whole set.



c. Rocker Arm

- Measure the rocker arm I.D., and wear or damage, oil hole clogged? ➔ replace.
- Lobe blue discoloration or scratches ➔ replace



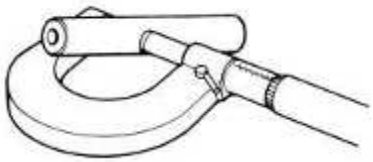
Service Limit: Replace when it is more than 13.034 mm

d. Rocker Arm Shaft

Measure the active O.D. of the cam rocker arm shaft and cam rocker arm.

Service Limit: Replace when it is less than

12.973 mm.



Calculate the clearance between the rocker arm shaft and the rocker arm.

Service Limit: Replace when it is less than 0.06mm.

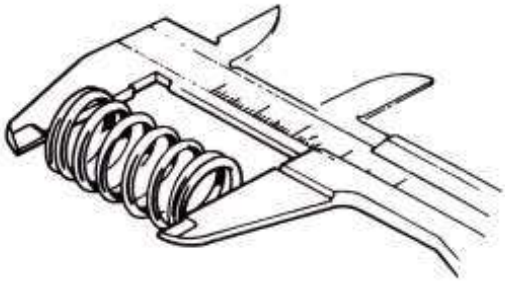
e. Valve spring free length

Measure the free length of intake and exhaust valve springs.

Service limit:

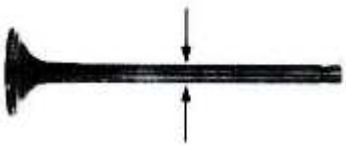
Inner spring 37.70 mm

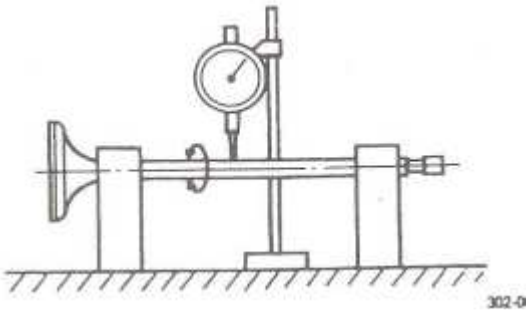
Outer spring 37.30 mm



f. Valve stem

- Check if valve stems are bend, crack or burn.
- Check the operation condition of valve stem in valve guide, and measure & record the valve stem outer diameter.
- Runout measurement if out of specification ➔ replace.





Service Limit:

IN: 4.945 mm

EX: 4.925 mm

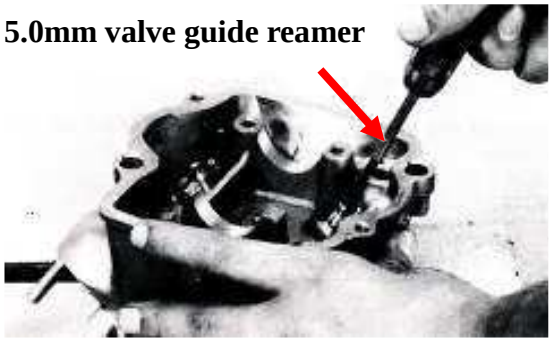
Runout limit: 0.01mm

g. Valve guide

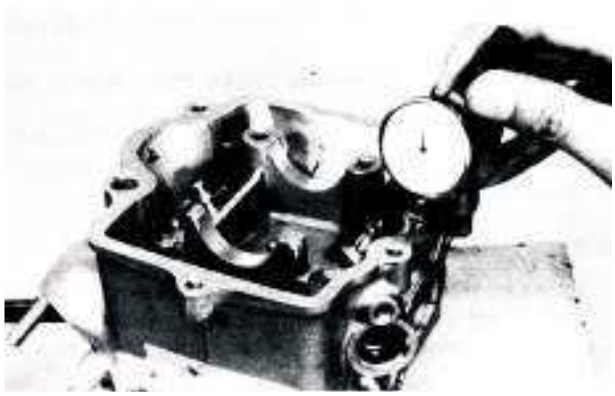
Caution
Before measuring the valve guide, clean carbon deposits with reamer.

Tool: 5.0 mm valve guide reamer

5.0mm valve guide reamer



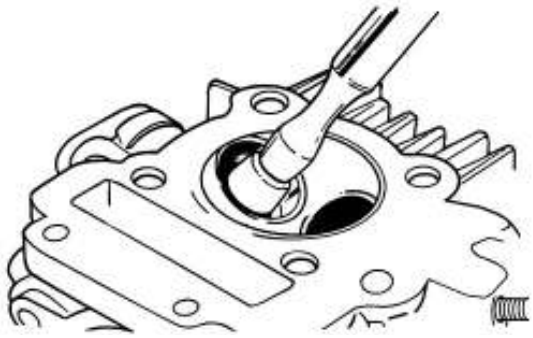
Measure and record each valve guide inner diameters.
Service limit: 5.05 mm



The difference that the inner diameter of valve guide deducts the outer diameter of valve stem is the clearance between the valve stem and valve guide.
Service Limit: IN＜0.08 mm
EX＜0.10 mm

Note:
- When installing a new valve always replace the guide.
- If the valve is removed or replaced always replace the valve oil seal

6-06. Valve Seat/Valve Inspection and Service



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

Caution
Do not let emery enter into between valve stem and valve guide.

Clean up the emery after corrected, and apply with engine oil onto contact faces of valve and valve seat. Remove the valve and check its contact face.

Caution

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

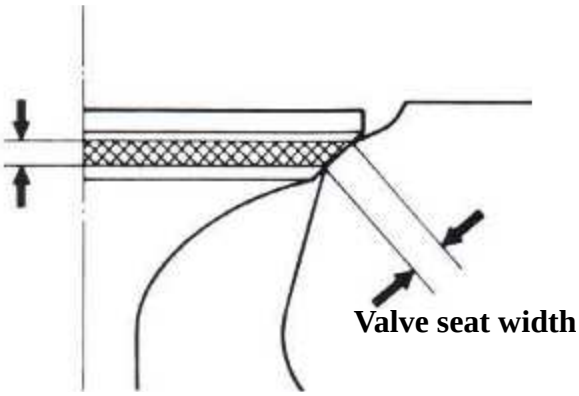
Valve seat inspection

If the valve seat is too width, narrow or rough ➔ replace

Valve seat wide

Service limit: 1.6mm

Check the contact condition of valve seat.

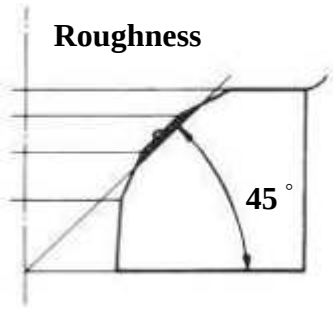


Valve seat grinding

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

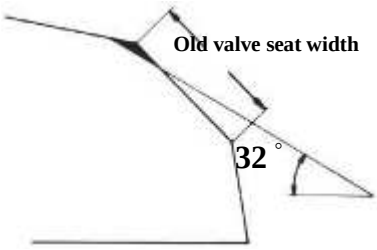
Refer to operation manual of the valve seat chamfer cutter.

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

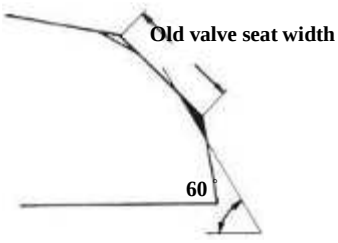


Caution

- After valve guide had been replaced, it has to be ground with 45° valve seal chamfer cutter to correct its seat face.
- Use 32° cutter to cut a quarter upper parts out.

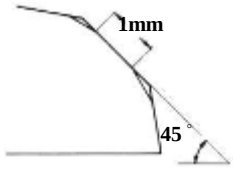


- Use 60° cutter to cut a quarter lower parts out.



Remove the cutter and check new valve seat.

Use 45°cutter to grind the valve seat to specified width (1.0mm).



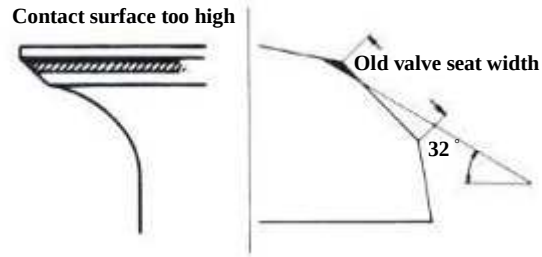
Caution

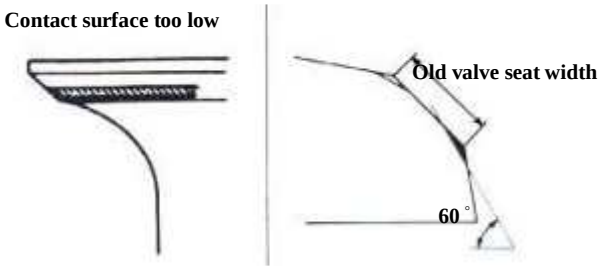
- Make sure that all roughness and uneven faces had been grounded.
- Grind valve seat again if necessary.
- Coat the valve seat surface with red paint.
- Install the valve through valve guide until the valve contacting with valve seat, slightly press down the valve but do not rotate it so that a seal track will be created on contact surface. Then check the contact surface.

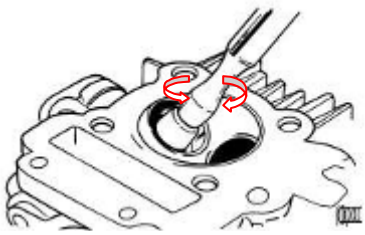
Caution

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

- If the contact surface too high, grind the valve seat with 32°cutter. Then, grind the valve seat to specified width. If the contact surface too low, grind the valve seat with 60°cutter. Then, grind the valve seat to specified width.
- After the valve seat ground, coat valve seat surface with emery and then slightly press the ground surface.
- Clean up all emery coated onto cylinder and valve after ground.





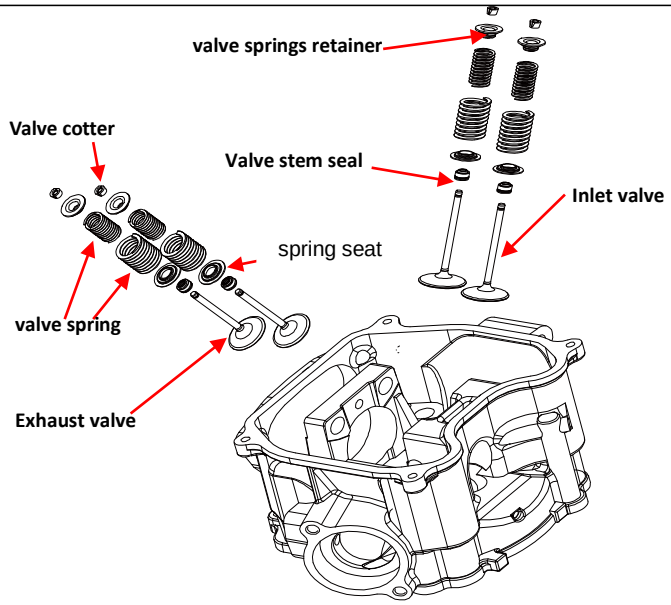


- Install back all components properly & spark plug and test any leaking by filling little fuel to combustion space.

6-07. Cylinder Head Reassembly

a. install the valve

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



Caution

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

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

Caution

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

Special Service Tool:

Valve cotter remove & assembly tool

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

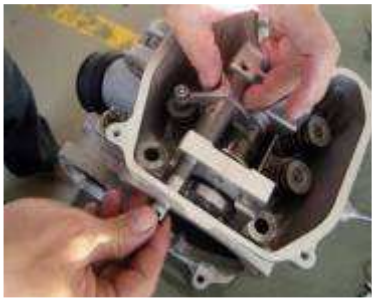
Caution

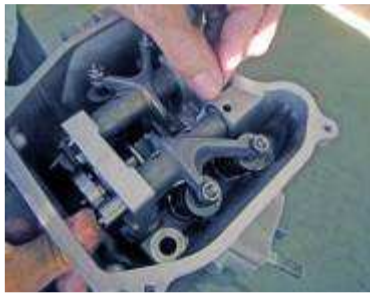
- Place and hold cylinder head on to working table so is can prevent from valve damaged.

b. Install the camshaft and rocker arm

- Apply engine oil to the bearing of camshaft.
- Insert the camshaft to the cylinder head. Be careful to push slightly to avoid the damage.


- Insert the Rocker arm shaft, the rocker arm and plate washer between rocker arm, .adjust the ditch of rocker arm shaft to the vertical





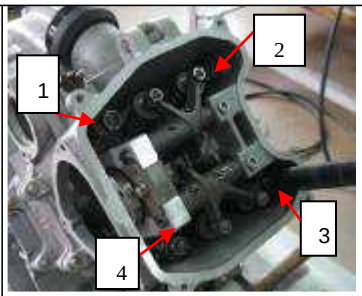

- Tighten the bolt for rocker arm shaft.
- Install the fixing plate of rocker arm.


c. install the cylinder head onto the cylinder.

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

Caution

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



- Install 4 washers and bolts to cylinder head. Tighten the bolts to the specified torque in three steps (4=>5=>6kgf-m) in the proper tightening sequence as shown. Then tighten 2 cylinder head mounting bolts of cylinder head right side.

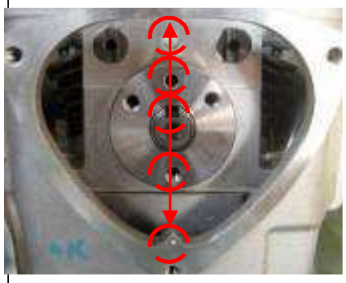
Torque value:

Cylinder head bolt : 6.0kgf-m

Cylinder mounting bolt : 1.0~1.4kgf-m

d. Install the Cam chain sprocket and timing align.

- Open A.C.G. Cap on the R. Crankcase side, double check if the T mark available (make sure crankshaft/piston at TDC position.). if not, adjust it by crank the crankshaft at A.C.G. side for adjusting.



- Align the camshaft 3 fixing holes upright and 1 fixing hole at bottom.
- Install cam chain to sprocket and align:
  " I " mark on the sprocket align to "·" on the cylinder head.

- Tighten the sprocket mounting bolts

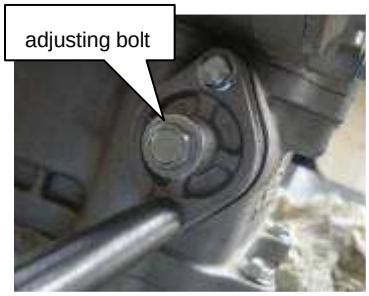
Caution

Make sure timing marks are matched.

e. Install the cylinder head side cover (3 bolts).

f. install the cam chain tensioner

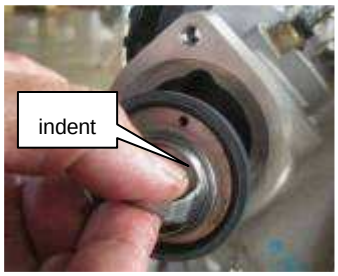
- Loosen auto tensioner adjustment bolt and remove bolt and spring.
  - checking : push the convex and test teeth bar smoothly.
  - check the spring
- Install tensioner with gasket and install spring and adjustment bolt with oil ring.



g. Install the thermostat and thermostat cover (2 bolts).

Caution

Make sure the hole is also being matched to the upper indent on cylinder head.



h. Valve Clearance Adjustment

- Loosen valve clearance adjustment nuts and bolts located on valve rocker arm.
- Measure and adjust valve clearance with feeler gauge.
- After valve clearance had been adjusted to standard value, hold adjustment bolt and then tighten the Adjustment nut (refer to 2-07).

Standard Value:
IN 0.10 ± 0.02 mm
EX 0.15 ± 0.02 mm

- **Check the adjusting bolt contact surface any damage or blue discoloration ➔ replace**
- **Smell sufficient oil to all combinations in the cylinder head.**

i.Install the cylinder head cover

- check any damage on gasket
- insert gasket to the groove of head cover properly and install back bolts.
- ensure the matching perfectly after installing.

j. Install and tighten spark plug (NGK CR7E)

Torque value: 1.1~1.3kgf-m

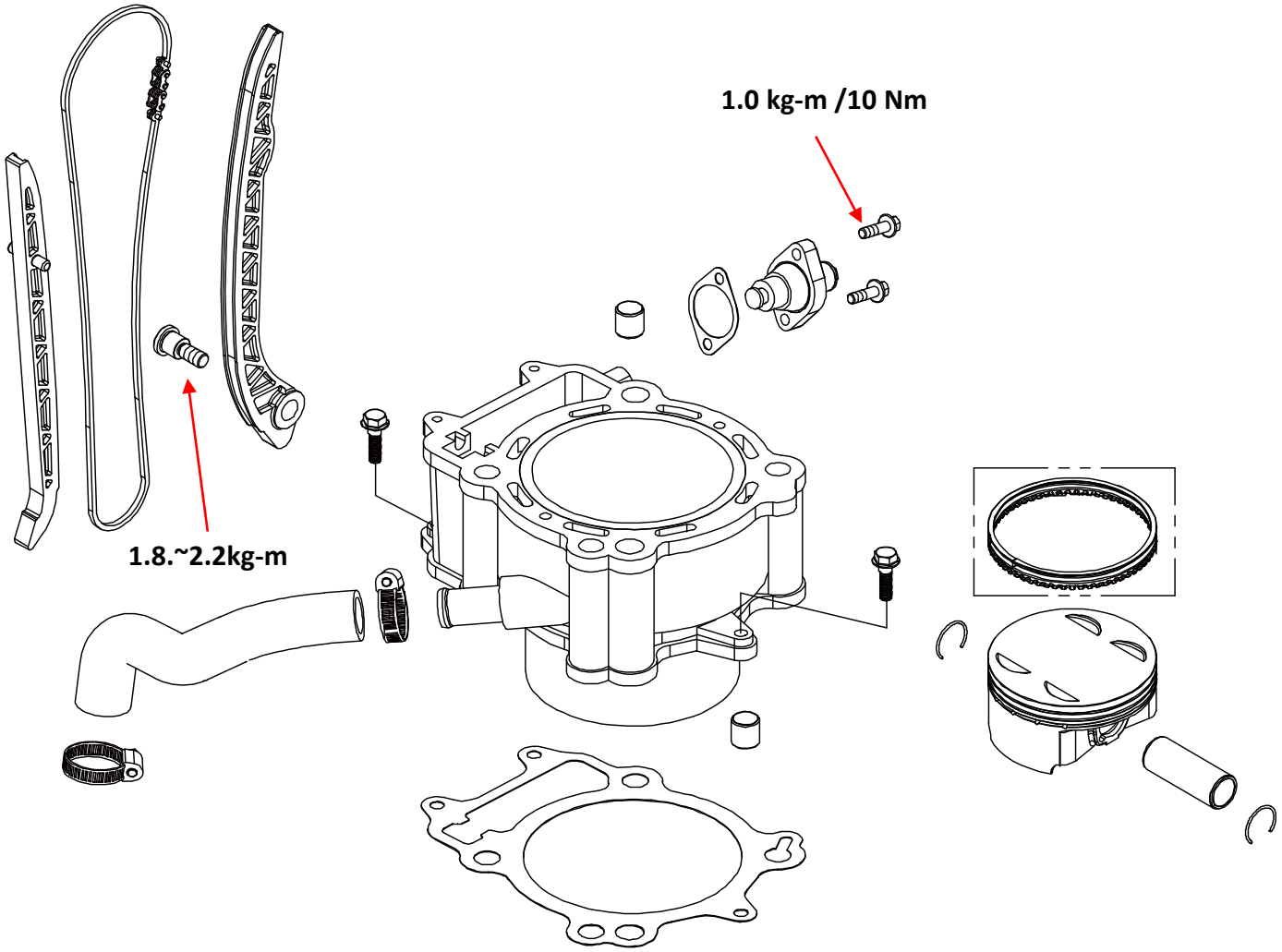
Caution

- This model is equipped with more precision 4-valve mechanism so its tighten torque cannot be exceeded standard value in order to avoid causing cylinder head deformation, engine noise and leaking so that vehicle performance be affected.
- refer to 2-06

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

NOTE:

7-01. Mechanism Diagram



7-02. Precautions in Operation

General Information

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

Specification **Unit：mm**

Item			Limit
Cylinder	ID		100.1
	Bend		0.05
Piston / Piston ring	Clearance between piston rings	Top ring	0.13
		2nd ring	0.13
	Ring-end gap	Top ring	0.70
		2nd ring	0.80
		Oil ring side rail	-
	Clearance between piston and cylinder		0.15
	ID of piston pin boss		23.045
OD of piston pin			22.971
Clearance between piston and pin			0.074

7-03. Trouble Shooting

Low or Unstable Compression Pressure

- Cylinder or piston ring worn out

Smoking in Exhaust Pipe

- Piston or piston ring worn out
- Piston ring installation improperly
- Cylinder or piston damage
- Abnormal blow-by

Knock or Noise

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

Engine Overheat

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

7-04. Cylinder and Piston Removal

a. Remove the cylinder head (refer to chapter 6).

b. release the hose clamps and then remove the Water pump EX hose from cylinder.

c. Screw out the 3 flange bolts (M6*25) on cylinder outer side.

d. Remove the cylinder.

Pull out the cylinder slowly, especially when bottom of the cylinder wall close to piston/piston ring

Caution:

Cover the hole of crankcase and cam chain with a piece of cloth or plate stopper to prevent foreign material falling into the crankcase.

e. remove the piston/pin/clip from crankshaft

- Remove the piston pin clips.
- Remove the piston pin and piston from connecting rod.

f. Remove the cylinder gasket and dowel pins.

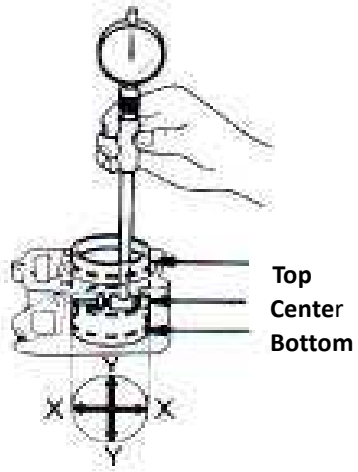
7-05. Inspection on Cylinder /Piston /Ring

a. Cylinder wall check

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

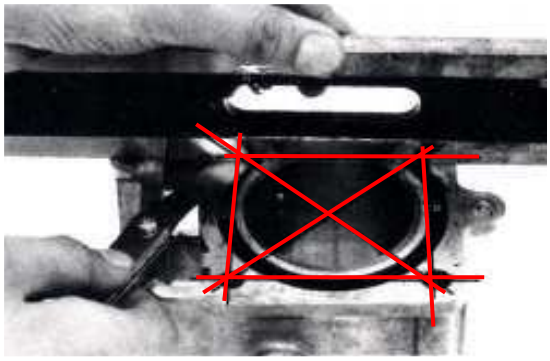
In the 3 positions, top, center and bottom, of cylinder, measure the X and Y values respective in the cylinder.

Service limit: **100.1 mm**



b. Check cylinder if warp.

Service limit: 0.05 mm

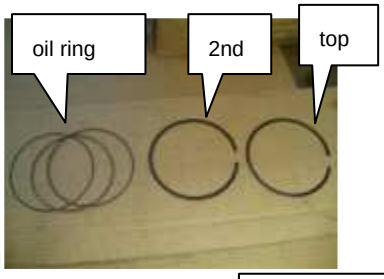


c. Measure clearance between piston rings and grooves.

Service Limit: Top ring: 0.13 mm
2nd ring: 0.13 mm

d. Piston ring check

- Remove piston rings carefully.
- There are 3 rings (top ring/second ring/ oil ring x 1 set (3 pcs)).
- Check if the piston rings are damaged or its grooves are worn.

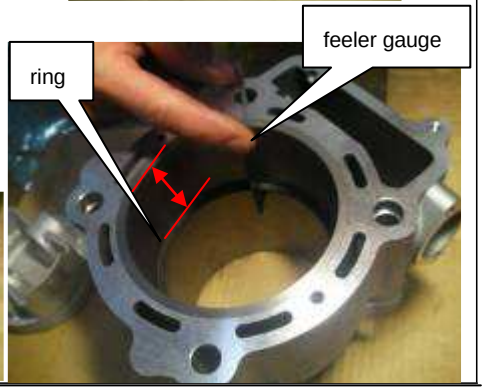


Caution

Pay attention to remove piston rings because they are fragile.

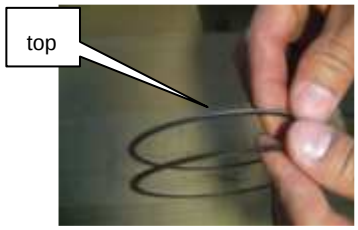
Ring end gap check:

- Place piston rings respective into cylinder below about 50 mm of cylinder top (push the ring with piston crown to be at a right



angle on the cylinder bore) then measure ring end gap by feeler gauge.

- Top ring with chrome coating is different from 2nd ring.



Service Limit: Top ring: 0.70 mm
2nd ring: 0.80 mm

Note: You can't measure the end gap on the expander spacer of the oil ring. If oil ring rails show excessive gap ➔ replace all rings.

e. Measure the outer diameter of piston pin.

Service Limit: 22.971 mm

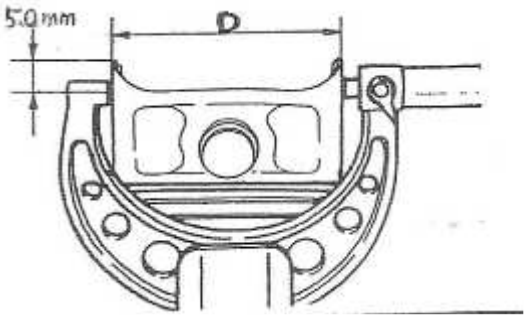
f. Measure the inner diameter of piston pin hole.

Service Limit: 23.045 mm

g. Calculate clearance between piston pin and its hole.

Service Limit: 0.74 mm

h. Measure piston skirt diameter.



Measure piston out-skirt " D". The measurement position is **5.0 mm** from piston bottom edge by micrometer.

Standard skirt diameter:
99.945 ~ 99.995mm

Out of specification ➔ replace

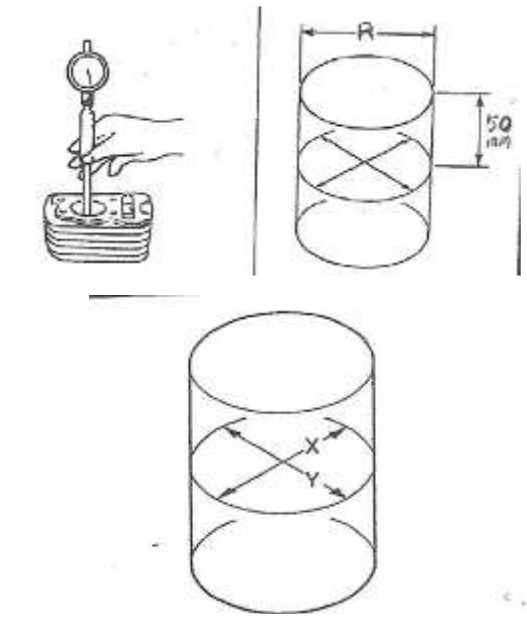
i. Measure cylinder bore diameter

Measure the average value “R” at 50mm from the top of cylinder by cylinder bore gauge.

R = (X+Y)/2

Standard cylinder bore dimater:
100.005 ~ 100.055mm
Service limit : 100.1mm

Out of specification ➔ rebore or replace



j. Calculate clearance between piston and cylinder

- refer to step i & j.
- value R – D = piston-to-cylinder clearance

Service limit：**<u>0.15mm</u>**

Out of specification ➔ rebore or replace cylinder , and replace the piston and piston rings as a set.

7-06. Piston Ring Installation

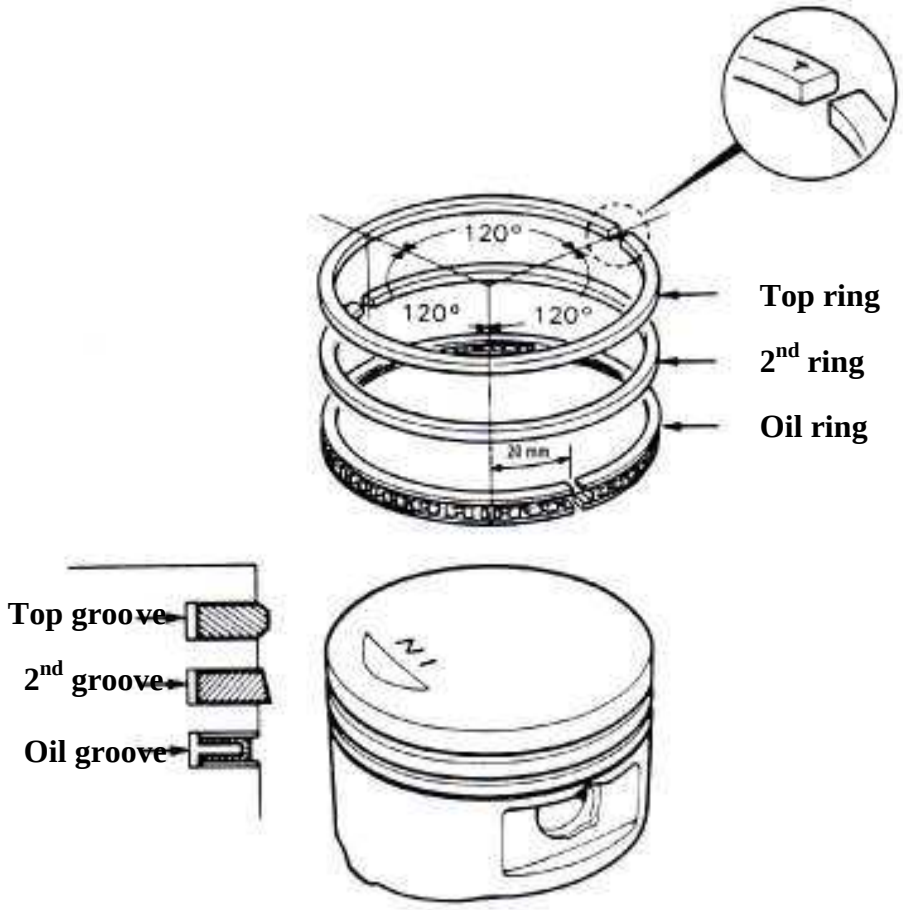
Clean up piston top, ring groove, and piston surface.

Install the piston ring onto piston carefully.

Place the openings of piston ring as diagram shown.

Caution

- Do not damage piston and piston rings in installation.
- All marks (RN)on the piston rings must be forwarded to up side.
- Top ring with chrome coating is different to 2nd ring.
- Make sure that all piston rings can be rotated freely after installed.



7-07. Piston set Installation

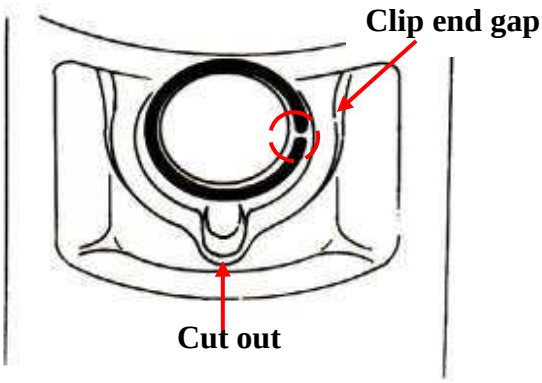
- Before installation of Piston set onto connecting rod, clean up all residues and foreign materials on the contact surface of crankcase. Pay attention not to let these residues and foreign materials fall into crankcase.

Caution

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

- Install piston and piston pin by placing the IN marks on the piston topside forward to inlet valve.

- Install 2 new piston pin clips, avoid the clip end gap too near to cut out groove of piston.



Caution

1. Do not let the opening of piston pin clip align with the piston cut out.
2. Place a piece of cloth or stopper tool between piston and crankcase in order to prevent snap clip from falling into crankcase as during servicing.
3. Match the same grade with piston and cylinder in a new installation.

7-08. Cylinder Installation

- Install dowel pins and new cylinder gasket.

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

- Use piston clamper to hold the piston ring and install the cylinder parallel and gentle to avoid damage the cylinder inner wall. When the piston rings are all installed inside cylinder, remove the clamp and push gently to install cylinder to crankcase.






Caution

- Do not push piston into cylinder forcefully because piston and piston rings will be damaged.
- Be carful not to damage the timing chain damper during installation.
- Pass the timing chain through the timing chain cavity and hold the chain until installing cylinder head.

- Tighten the cylinder to crankcase by 3 flange bolt

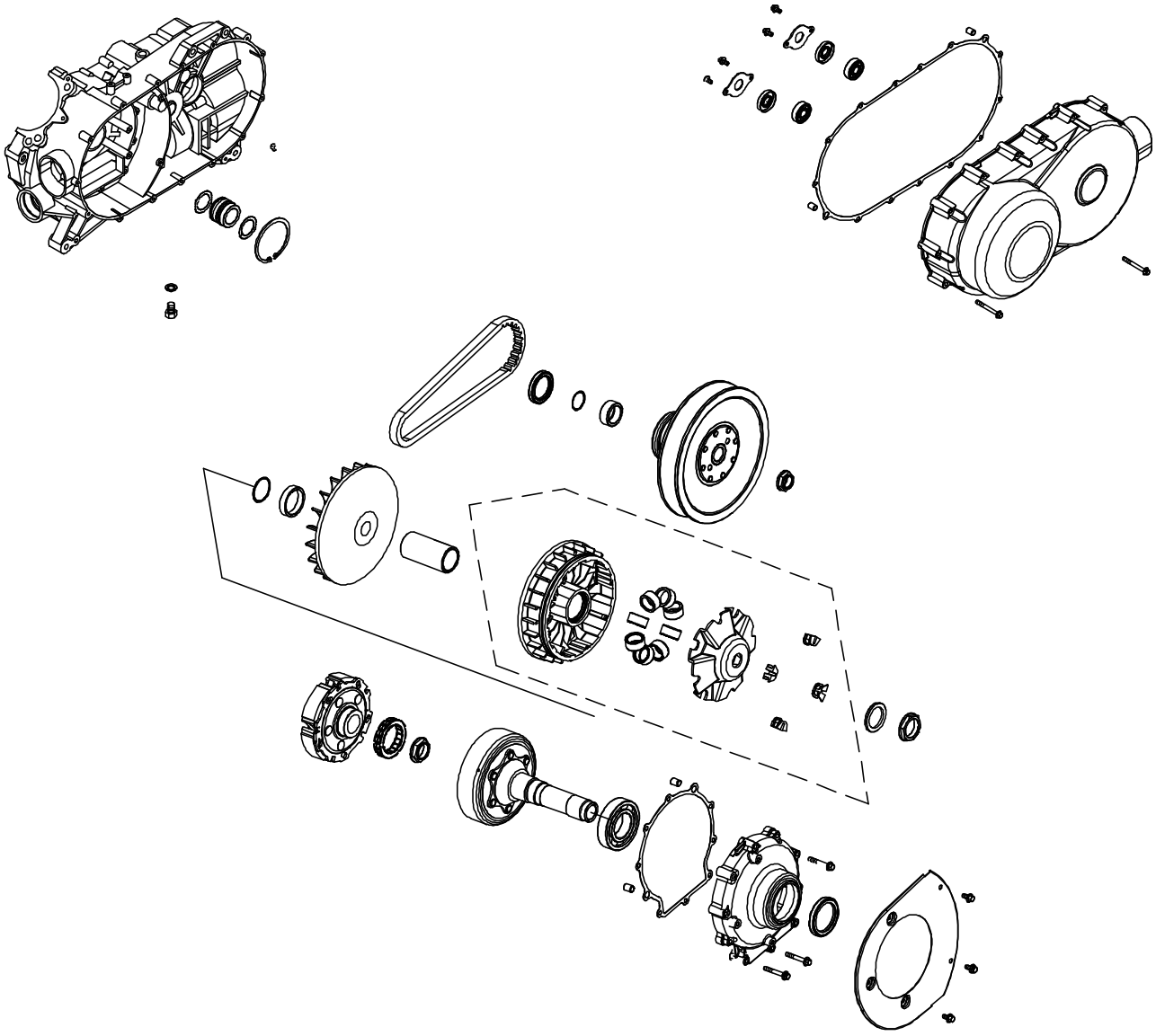
Torque: Cylinder Flange Bolt (M6x25):
1.0kg-m /10Nm

- Install coolant hose with hose clamp onto cylinder and water pump side.

- Install cylinder head (refer to Chapter 6).

NOTE:

8-01. Mechanism Diagram



8-02. Maintenance Description

Precautions in Operation

General Information

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

8-03. Trouble Diagnosis

Engine can be started but ATV can not be moved

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

Shudder or misfire when driving

1. Broken clutch weight
2. Worn clutch weight

Insufficient horsepower or poor high speed performance

1. Worn drive belt
2. Insufficient spring force of driven pulley
3. Worn roller
4. Driven pulley operation un-smoothly
5. Clutch nut not fixed firmly

8-04. Left Crankcase Cover

a. Left crankcase cover removal

1. Release the rear air duct clamps and disconnect the CVT rear air duct from left crankcase. (if engine is not removed).

2. Remove left crankcase cover flange bolts M6*55 (15olts).

3. Remove 2 dowel pin from L. Crankcase and L. Crankcase gasket.

4. Remove the flange bolt M6*12 inside the L. Crankcase cover, and open the bearing cover plate.

5. Remove out the oil seal, and then inside ball bearings (if broken only).

b. Inspection

1. Check the oil seal if cracks or damage. Replace with new if necessary.
2. Rotate the two ball bearings inside the L. crankcase cover, check if it can be rotate smoothly and solid. If not, replace with new bearings by bearing remove and install tools.

c. Left crankcase cover installation

1. Add some grease to the oil seal and ball bearings
2. Install the front and rear bearing cover plate and tighten by flange bolt M6*12.

Torque: flange bolt M6*12: 1.0kg-m / 10Nm

3. Insert the 4 dowel pins
4. Put on the L. crankcase cover and insert the 15 flange bolt (M6*55)

5. Tighten the flange bolt by steps of cross direction

Torque: Flange bolt M6*55.
1.0kg-m /10Nm.

8-05. Primary Sheave , Driven Sheave & Drive Belt, CVT cooling fan plate.

8-05-01 Removal

1. Hold the primary sheave ass'y by holder (special tool), and loosen & remove the nut on the Primary Sheave Assy (or Movable driving face Ass'y).

2. Pull out the primary sheave ass'y, and remove the drive belt (refer to 2-11).

3. Remove the lock nut on the driven sheave, and pull out the driven sheave ass'y. Then remove the slide collar, o-ring and oil seal from primary drive gear.

4. Remove the primary fixed sheave, slide collar out from clutch housing comp.

5. Loose the 5 flange bolt M6*12 and then remove the CVT cooling fan plate.

8-05-02. Inspection

a. Drive Belt Inspection

1. Check the drive belt for crack or wear. Replace it if necessary.
2. Measure the width of drive belt as diagram shown.
3. Refer to 2-11.

Service Limit: 28.3 mm

Replace the belt if exceeds the service limit.

Caution

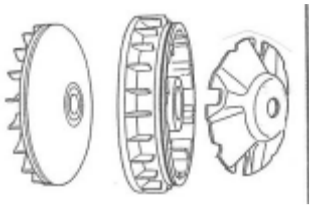
- Using the genuine parts for replacement.
- The surfaces of drive belt or pulley must be free of grease.
- Clean up all grease or dirt before installation.

b. Primary sheave Ass'y Inspection

1. Weight Roller (8 pcs)

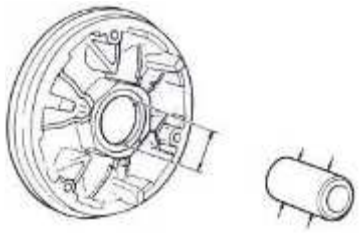
- Check the rollers worn out or damaged. ➔Replace them.
- Measure each roller's outer diameter. Out of specification ➔ Replace them.

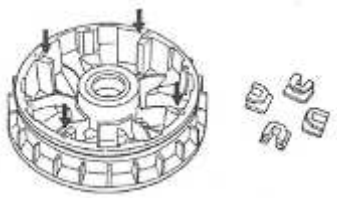
Service limit: 29.50 mm



2. Primary Sheave Comp, Fixed Sheave, Pully Cam & Slide spacer

- Check the sliding surface of Primary sheave comp, Fixed sheave, Pully cam if exceeds worn out, cracks or damage.
- Check the oil seal on the primary sheave.
- Check the slide spacer if exceeds wear out or damage.





3. Slide Piece (4 pcs / set)

Check the slide piece if distort, crash or damaged. Replace with new set if damage.

c. Driven Sheave Assy, Slide Collar, O-ring and Oil seal.

1. Driven Sheave Assy

Check following items:

- Operation smooth on cam groove and guide pin.
- If both sheave surfaces are scratch or damage.
- If guide pin groove is damaged or worn.

➔Replace with new Driven Sheave Ass'y.

- if the spring out of specification ➔ replace **service limit**: 121mm (free length: 124.3mm)

2. Driven sheave bearing Inspection

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

Note:

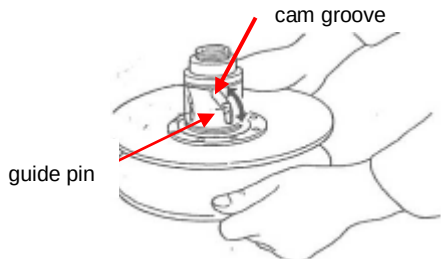
- Do not suggest to dispatch the Driven Sheave ass'y without vise, special tools and helps. Compression spring bounding is dangerous.
- Apply enough grease to groove, seal, o-rings when install back and fix the nut in 9kgf-m.

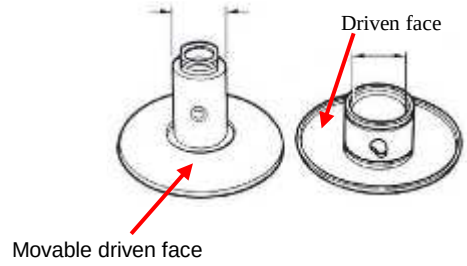
3. Slide Collar / O-Ring / Oil Seal

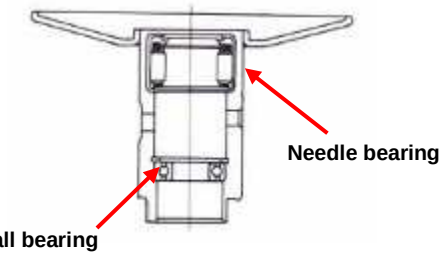
Check slide collar, O-ring, Oil seal if damage or worn out. Replace with new if damaged.

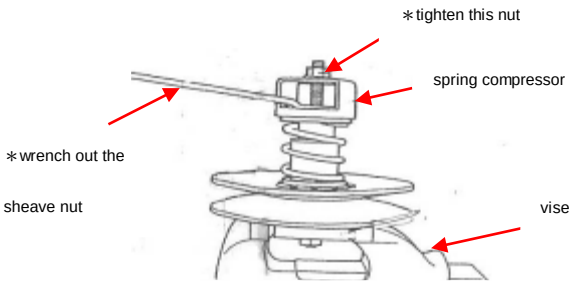
8-05-03. Installation

1. Insert the Oil seal, slide collar to the primary drive gear and use installing tool to install the oil seal & slide collar.
2. Install the cooling fan plate by tighten 5 flange bolt M6x12mm.









Torque: flange bolt M6x12mm: 1.0kg-m /10Nm

3. Insert the O-ring to the primary drive gear.

4. Put on the primary fix sheave, driven sheave ass'y and driving belt. Expand the driven sheave gap for driving belt to hold at inner sheave surface (refer to 2-11).

5. Tighten the nut M20 with little loctite glue on the driven sheave ass'y.

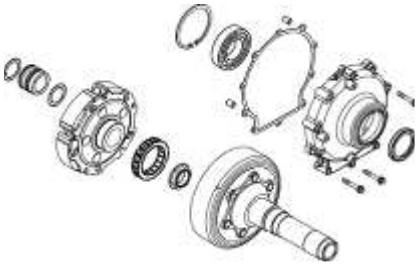
Torque value : 12kgf-m

6. Put the Primary sheave ass'y onto the clutch housing. Insert the plate washer and screw in the plate nut.

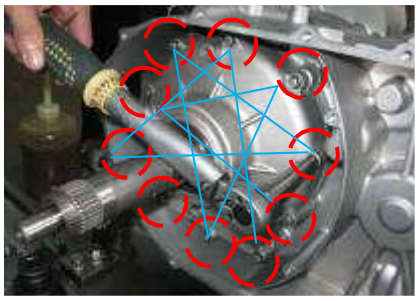
7. Hold the primary sheave by primary sheave holder , and then tighten the lock nut with loctite glue by specific torque.

Torque value: 18kgf-m

8-06 Clutch Housing, One-Way Clutch Bearing and Clutch Carrier.



Caution:
Drain out the engine oil before the clutch service.



a. Removal

1. Loosen each bolt 1/4 of a turn in crisscross pattern working. Remove them after all of them are loosened.

2. Pull the clutch housing shaft to remove the clutch cover, clutch housing and one way clutch (it might be inside clutch housing).

3. Take out the clutch cover gasket, 2 dowel pin

4. Use clutch holder tool to hold the clutch carrier ass'y, then wrench out the nut on the clutch carrier.

5. Remove the clutch carrier

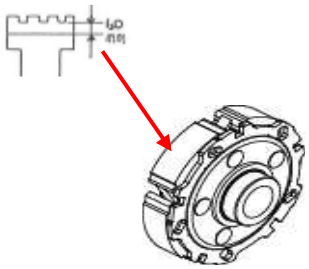
6. Remove the clutch carrier collar with ring x 2.

b. Inspection

1. Clutch carrier ass'y

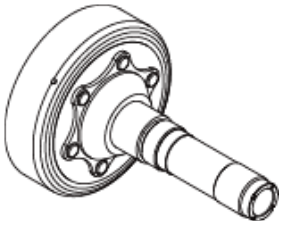
- heat damage ➔ replace
- wearing ==> measure shoe thickness out of specification ➔ replace

Service limit: 1.0mm



2. Clutch housing ass'y

- contact surface heat damage ➔ replace
- contact surface crack/wearing ➔ replace



3. One-way clutch bearing

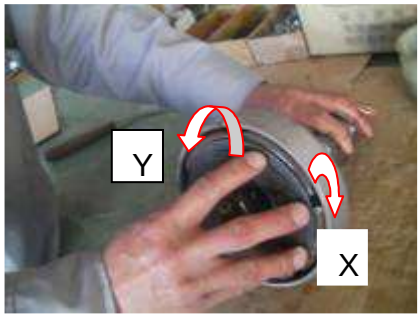
- chafing/wearing/damage ➔ replace
- one way function testing
  a) Install the one-way clutch bearing and clutch carrier to the clutch housing ass'y

and hold the clutch carrier ass'y.

Note: The one-way clutch bearing should be installed with the flange side " → " facing toward the clutch carrier.

b) When turning the clutch housing clockwise X, the clutch housing should turn freely. If not, replace the one-way clutch ass'y.

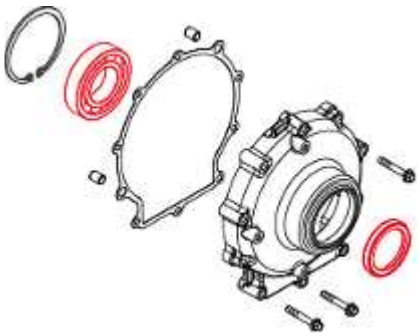
c) When turning the clutch housing counter-clockwise Y, the clutch housing and crankshaft should be engaged. If not, replace the one-way clutch ass'y.



Note: Replace the one-way clutch ass'y (carrier + bearing) and clutch housing as a set.

4. Clutch cover ass'y

- Rotate the ball bearing on the clutch cover if smooth without abnormal noise/friction, replace with new if damage.
- Check the oil seal on the clutch cover if bad sealing or damage, replace with new if broken.



5. Clutch carrier collar with rings

- Collar clogged ➔ clean
- Collar wearing/crack ➔ replace
- Rings wearing/damage ➔ replace
  - Ring installation to collar ==> buckle up two ends, if not ➔ replace

Note: Ensure to install collar in a right direction to the engine

c. Installation

1. Install the two rings onto the clutch carrier collar, and then put onto the crankshaft.

2. Use tool to install the clutch carrier collar with rings. Ensure the right direction to the crankshaft.

3. Put on the clutch carrier assy onto the crankshaft and install the clutch carrier nut.

4. Use universal holder to hold the clutch carrier , use wrench to tighten the clutch carrier nut with specific torque.

Torque value: 25~26kgf-m

5. Use puncher and hammer to knock and lock the clutch carrier nut.

Note: Always replace a new carrier nut and secure it by puncher.

6. Put on the one-way clutch bearing.

Note: The one-way clutch bearing should be installed with the flange side " → " facing toward the clutch carrier.

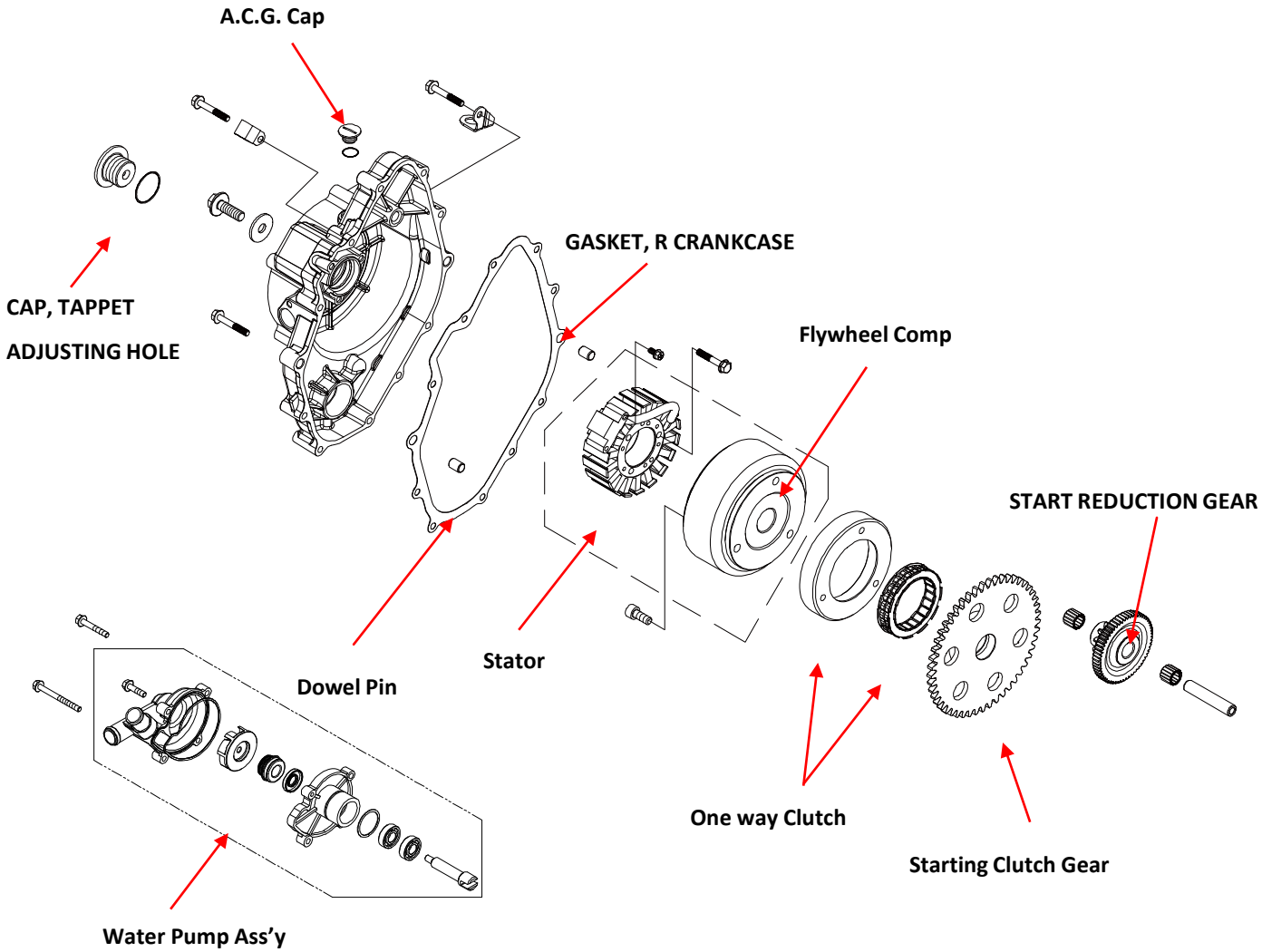
7. Install the clutch housing with clutch cover/dowel pins/gasket and tighten the bolts in stages, using a crisscross pattern.

Note: After tightening the bolts, check the clutch housing ass'y to clockwise rotates smoothly.

Torque value (M6*40): 1~1.2kgf-m

NOTE:

9-01. Mechanism Diagram



9-02. Precautions in Operation

General information

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

Tools

Special tools

A.C.G. flywheel puller

Universal holder

9-03. Right Crankcase Cover & A.C. Generator

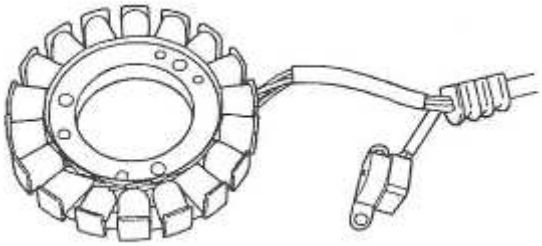
a. Removal

1. Drain the engine oil
2. Unscrew 12 mounted flange bolts from the right crankcase cover and then remove the right crankcase cover with A.C. Generator.

Note: Always working in a crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.

b. Inspection

Check the Generator and Pulse coil if working normal (refer to chapter Electrical Equipment)



c. Installation

1. Install the A.C. Generator (Magneto Ass'y) to the right crankcase cover.

2. Install the dowel pins and R. Crankcase cover gasket to the R. Crankcase.

3. Put on the R. Crankcase cover (with Magneto) and tighten by 12 flange bolts in crisscross pattern.

Torque: Flange Bolt M6*40: 1.0kgf-m

9-04. A.C.G. Flywheel & One-Way Clutch

a. Removal

1. Remove the flange bolt (or nut) and washer from A.C. Generator flywheel.

2. Use flywheel puller to remove flywheel.
   - Screw in the flywheel flange bolt some threads by hand,
   - Screw in flywheel puller clockwise to the crankshaft.
   - Use wench to hold the A.C.G. flywheel puller and clockwise screw in the push shaft of A.C.G. flywheel puller,
   - To pull out the A.C.G. Fly wheel ass'y with one way clutch.



b. Disassemble of One-way Clutch.

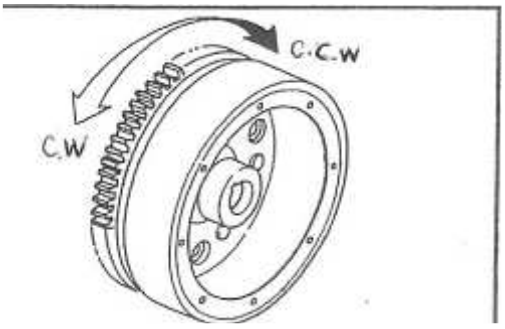
1. Remove 3 socket bolts from the inner side of A.C. G. flywheel.

2. Remove the clutch outer race and one way clutch from A.C.G. flywheel.


c. Outer Race & One-Way Clutch Inspection

1. Check outer race cracks/damage ➔ replace
2. Check roller inside one-way clutch wear/damage ➔ replace

3. One-Way Clutch Function test.
   - Install the starting clutch driven gear onto one way clutch.
   - Hold the flywheel and rotate starting clutch gear.
   - The starting clutch gear should be rotated in C.C.W direction freely, but not C.W direction.



d. **Installation**

1. Put the one way clutch into clutch outer race and then install to A.C.G. Flywheel. Tighten the 3 socket bolts with glue.

Torque value: Socket boot M8*23: 3.3kgf-m

2. Align the flywheel groove with woodruff key, and then install the flywheel Ass'y (including one-way clutch) onto the R. Crankshaft.

3. Insert the plate washer and screw in the flange bolt (or nut). Tighten the flywheel flange bolt (or nut) by specific torque value.

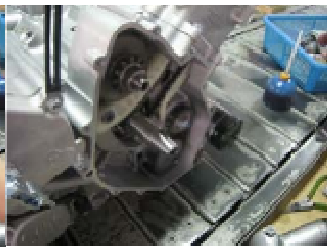
Torque: 8kgf-m for flange bolt
12kgf-m for nut

9-05. Start clutch gear and Start Reduction Gear

a. Removal

1. Use the (-) Screw driver and hammer, to remove out the woodruff key and remove out the start clutch gear.

2. Remove out the Starting clutch driven gear and starting reduction gear, reduction gear shaft and 2 needle bearing.



b. Inspection

1. Starting clutch driven gear tooth

- gear tooth - wear/damage ➔ replace
- inside contact hole - wear/damage ➔ replace
- outside contact surface - wear/pitting/damage ➔ replace

2. Clutch reduction gear set tooth and shaft for wear or damage.

- gear tooth - wear/damage/crack ➔ replace
- shaft - wear/damage/crack ➔ replace
- 2 pcs (set) needle bearings - damage/crack ➔ replace

Clutch reduction gear set

3. Installation

1. Smell some oil and install the reduction gear shaft and reduction gear.

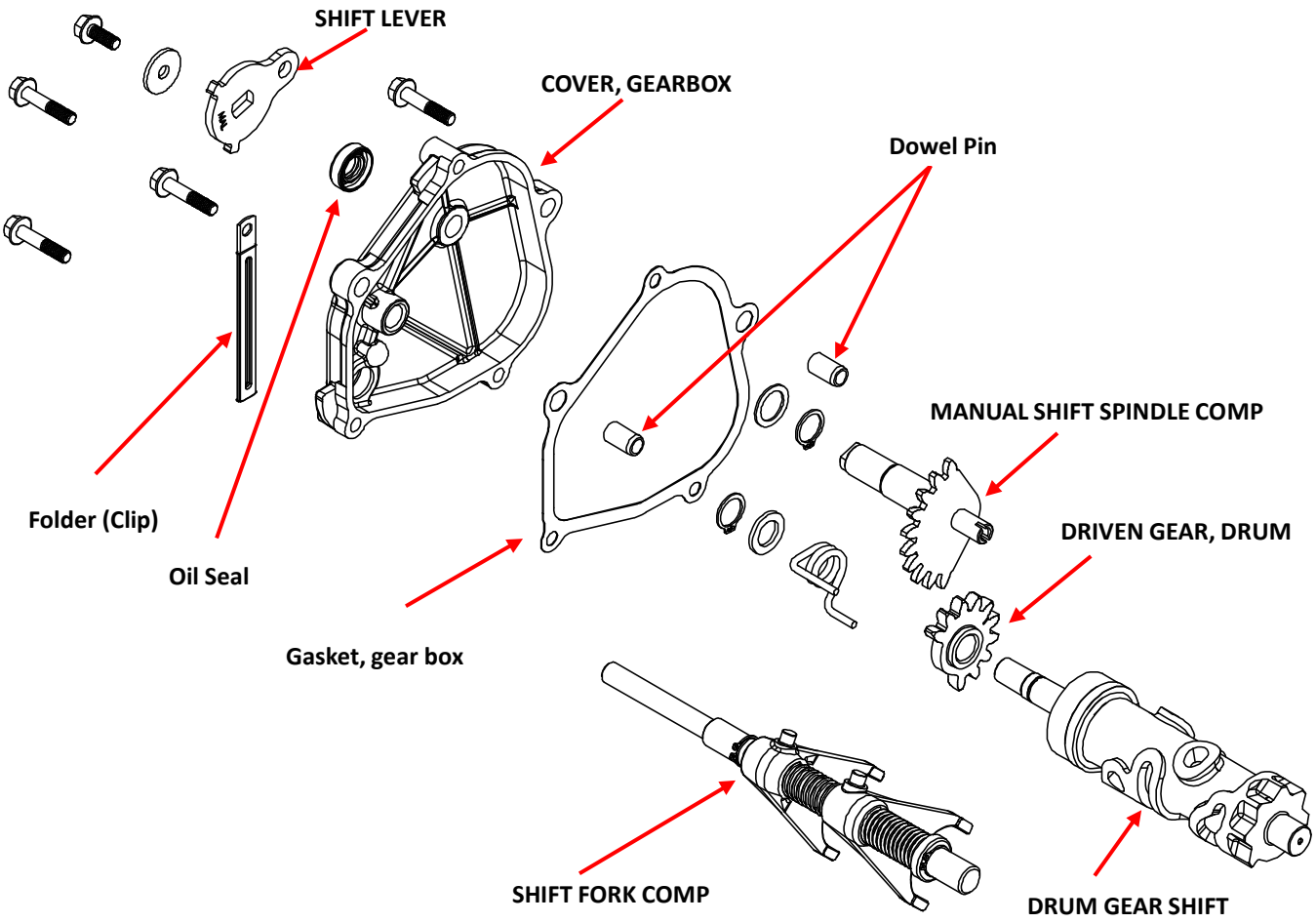
2. Insert the starting clutch gear of the flywheel

3. Insert the woodruff key onto right side of crankshaft

4. Keep continue to install the flywheel as mentioned chapter 9-04

NOTE:

10-01. Mechanism Diagram



10-02. Trouble Diagnosis

Engine can be started but vehicle cannot move.

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

Noise

- Worn or burnt gear
- Worn gear

Gear oil leaks

- Excessive gear oil.
- Worn or damage oil seal

10-03. Gear Shifting Box Disassembly

a. Loose and remove the flange bolt M6*16 to disconnect the gear shift plate and gear shift lever from engine

b. Screw out 5 flange bolts (M6*30) on the gear box cover, and open the gear box cover.


c. Remove the gasket & 2 dowel pins.

d. Remove out the manual shift spindle


e. Remove the shifting drum driving gear.

- Remove the cir-clip on the shaft of shift drum
- Remove the washer and spring from shift drum
- Remove the shift drum driving gear.


10-04. Gear box Inspection

a. Check the gear tooth of manual shift spindle for any wear or damage.

b. Check the gear tooth of shift drum driven gear for any wear or damage.


c. Check the shift drive return spring torsion if normal.

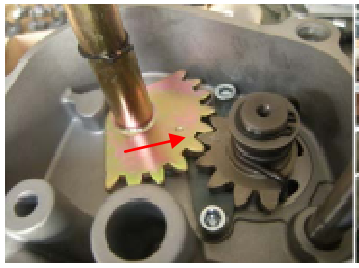
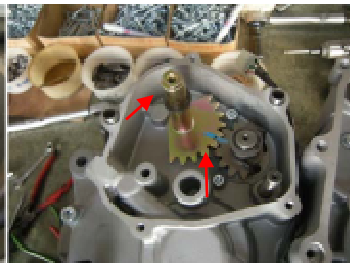
d. Check the oil seal on the gear box cover if oil leaking or damage.

10-05. Gear box re-assembly

1. Put shift drum driven gear on the gear shifting drum


2. Put the shift drive spring, plate washer onto shift driven gear and lock by cir-clip.
   - the two ends of spring should be pushed into the groove of gear shifting drum.


3. Insert the manual shift spindle and align the gear position mark with the shift driven gear.
   - smell some grease on the both teeths and the contact surface on oil seal.

4. Install the 2 dowel pin and gear box gasket

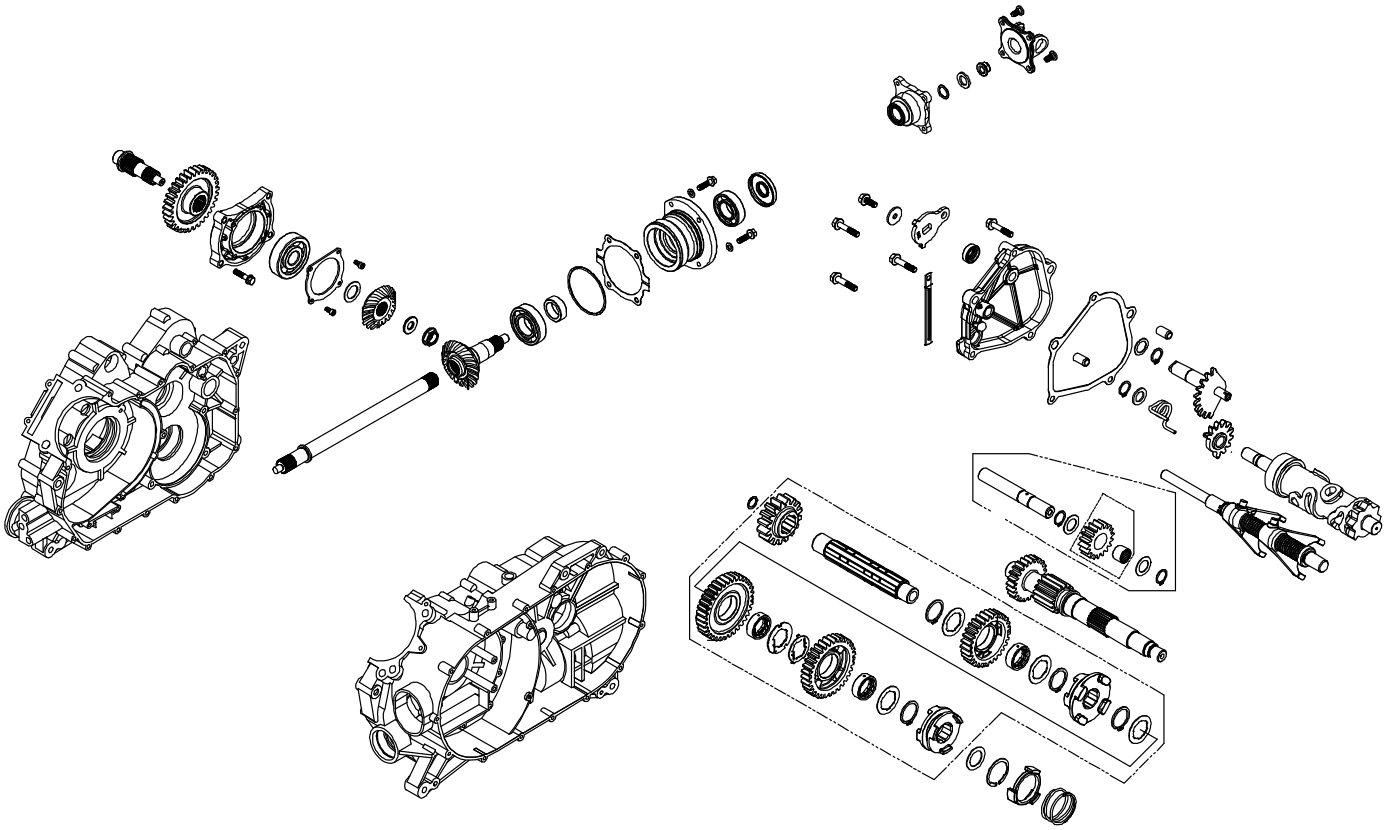
5. Install the gear box cover by tighten the 5 flange bolt.


Torque: value:

M6*30	1kgf-m
M6*16	1kgf-m

NOTE:

11-01. Mechanism Diagram



11-02. Precautions in Operation

This Section concerns disassembly of the crankcase for repair purpose.
Remove following components before disassembling crankcase.

—Engine remove	Chapter 5
—Cylinder head	Chapter 6
—Cylinder and piston	Chapter 7
—Drive face and driven pulley	Chapter 8
—AC generator	Chapter 9
—Gear Shifting box	Chapter 10

11-03. Trouble Diagnosis

Engine can be started but vehicle cannot move.

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

Noise

- Worn or burnt gear
- Worn gear

Gear oil leaks

- Excessive gear oil.
- Worn or damage oil seal

Engine oil leaks

- Worn or damage oil seal/O-ring
- Damage/cracks crankcase
- Crack on mating surfaces of crankcase
- Crack on contact surfaces of delivery pipes.

11-04.Transmission Disassembly

Note:

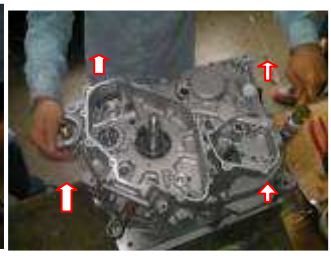
Before disassembly of the transmission, please refer below chapter to remove necessary parts.

Chapter 3 Lubrication System
Chapter 8 CVT driving system
Chapter 9 A.C.Generator
Chapter 10 Shifting Gear box

Lie down the disassembled engine right side up as picture.

a. Remove the Cam chain tensioner pivot bolt and then remove Cam Chain tensioner from R. Crankcase.
b. Remove the socket bolts and stop plate inside the gear shift box chamber.
c. Remove the 17 flange bolts right crankcase from the left crankcase and then remove the R. crankcase..
   - Working in crisscross pattern from center , loosen each bolt 1/4 of a turn, remove them after all of them are loosened.
   - Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase.

Note: Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that crankcase halves separate evenly.



- If hard to separate crankcase R. To use “ detached tool” to help to separate crankcase R and L.

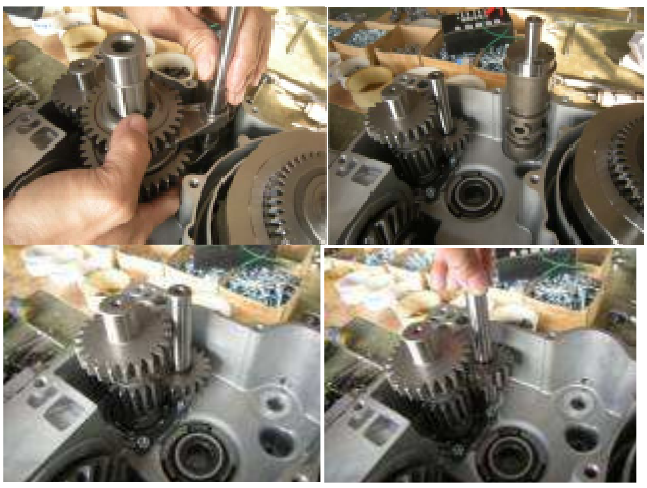
- To fix the flat plate to the crankcase R by four bolts and insert the tool to crankshaft.

- Fix the shaft and screw in the nut step by step (3~5 times)to detach the crankcase R evenly.

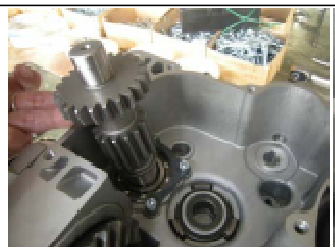
- Remove the dowel pins and separate crankcase L /R.
  Crankcase L with crankshaft, balancer, gear set and gear shift drum…..and so on.
  Crankcase R with pinion gear set, oil filter…and so on.

d. Remove the counter shaft and shift fork as a set.

e. Remove the shift drum.



f. Pull and remove the reverse idle gear axle ass'y and Primary drive gear Ass'y.



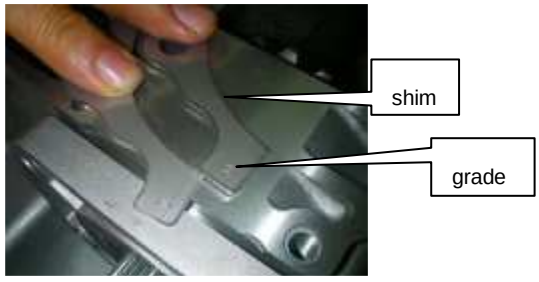

g. Push the gear and clip out the circlip to remove the gear park/spring.


h. Remove out the bolt/cooper washer/spring/ball by wrench.


i. Do not suggest to pull out the bearings/oil seal/stopper/copper plug. If it is necessary to pull out them, please use special tool/puller and handle the operations slowly and carefully.

j. Remove the 4 flange bolts and then remove the output shaft housing.

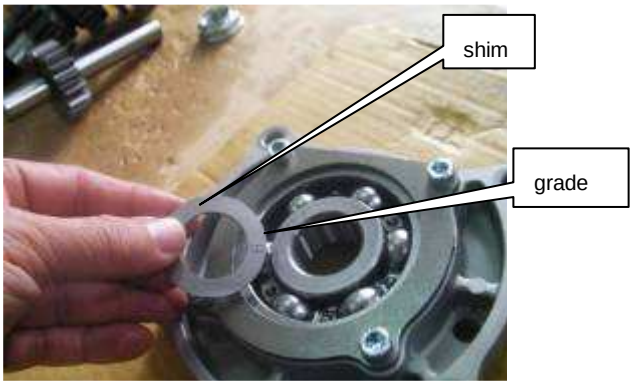

- Take a note on the "grade" of two shims, be sure the same grade when installing back.



k. Remove the bevel drive gear, output shaft, collar, o-ring from the rear LH. crankcase side.


l. Knock back the nut and remove the nut on drive bevel gear on the right crankcase, then remove the gear and the shim.

- Take a note on the grade of shim and put the same grade of shim when reassembling.



m. Remove 4 flange bolts M8*35, then move the Bevel Bearing housing
n. Remove the driven shaft and driven gear.
o. Remove the drive shaft.
p. Remove the output shaft.

q. Screw out the bolt and remove the oil filter set (with alloy washer/o-ring).

r. Remove the relief valve ass'y with copper washer by wrench.

s. Remove out the velocity sensor.

t. Remove out the selector switch.

11-05.Transmission Inspection

a. Shift drum -- groove scratches/wear/damage ➔ replace

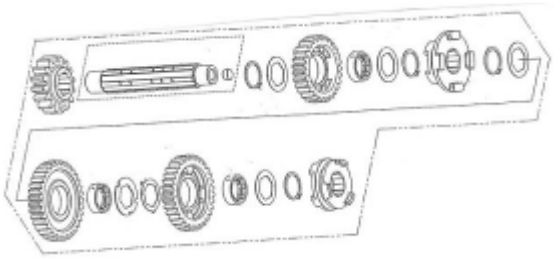
b. Shift fork/ guide bar/spring

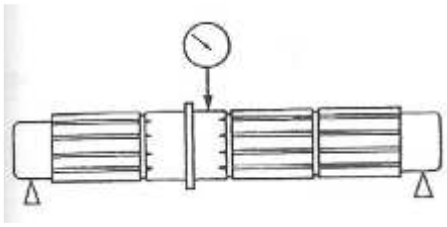
- Shift fork
  - groove follower wear/damage➔replace
  - fork pawl scoring/bend/wear/damage➔ replace
- Guide bar – bends ➔ replace
  - check the movement with fork forward and backward
- Spring – cracks/damage ➔ replace

c. Counter shaft Ass'y

- Remind to take note on the sequence/direction of all components and install them back by notes.
- Gear teeth – blue discoloration/wear➔ replace
- Mated dogs – round edges/cracks/missing portions ➔ replace
- Axle
  - run-out checking by dial gauge – out of specification ➔ replace

  run-out limit: 0.03mm
  - oil passages checking – clogged ➔ blow out with compressed are or clean.
- Washer/bushing checking – blue discoloration/cracks/wear ➔ replace
- Check the movement of countershaft after reassembling as a whole set.





d. Check if the reverse shaft, oil passage and gear teeth – bend, clogged, wear or damage ➔ blow or replace

e. Check if the drive shaft and gear -- burn, wear or damage ➔ replace

f. Gear park checking –

- mated dogs rounded -- edge/cracks/missing portion➔ replace
- compression spring – cracks/damage➔ replace

g. Check bearings on the left and right crankcase. Clean and lubricate, then rotate each bearing's inner race by fingers.

- Check if the bearings can be rotated smoothly and silently and also check if the bearing outer ring is mounted on gear tightly.
- If the bearing rotation is uneven, noising, roughness, loose bearing mounted, then replace it.

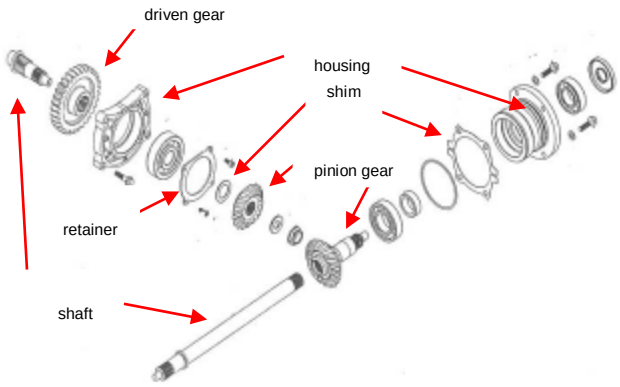
h. Check oil seal for wear or damage, and replace it if necessary.

Caution

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

i. Check the driven system related components.

- check all spindles conditions
- check all gear teeth conditions
- check all bearings operations
- check all housing conditions
- check all threads on the shafts/pinion gear



- check retainer – bent ➔ replace
- check o-ring/oil seal conditions
- remark the grade on the shims
- always replace a new nut

j. Check oil filter and relief valve

- Oil filter
  - contaminants ➔ clean with oil
  - clogged ➔ blow by compression air
  - damage ➔ replace
  - always replace a new o-ring
- Relief valve
  - clogged ➔ blow by compression air
  - **pressure value: 4.8~6.2 kg-cm^2**

k. Check the crankcase

- Thoroughly wash the case halves in a mild solvent.
- Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.
- Check all oil delivery passages – clogged ➔ blow out with compressed air
- Crankcase cracks/damage ➔ replace
- Threads damage ➔ re-tapping/ replace

mating surfaces

11-06. Transmission Re-assembly

Re-install the transmission gears and assembly the RH /LH crankcase in reverse way of dis-assembly.

Attention points as below:

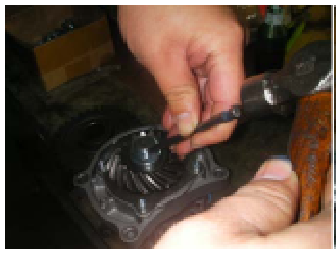
- Always tighten the bolts/screws/nuts in stages, using a crisscross pattern.
- Crankcase R installation
  - install the middle drive shaft/ housing (with bearing and retainer tightened)/ driven gear
  - install the same grade shim as removal

■ install pinion gear & washer


■ apply the loctitie glue on threads(or nut) & tightened the nut. Secure the nut after tightened.

Note: always replace a new nut.


■ install the housing set to the crankcase R.




■ apply the loctitie glue on bolts and tightened.


■ install the oil filter & relief valve

◆ apply enough oil on o-ring and install it a 3mm clearance to the wall and tighten the bolt.

■ follow the **specified torque**

M6*16	**1kgf-m**
M8*35	**3.2kgf-m**
M20 nut	**15kgf-m**
M6*12	**1kgf-m**
Relief valve	**2kgf-m**

● Crankcase L installation

Apply enough oil to the parts before installation (ex. drum, fork, bearings, shafts, gears, oil seal, o-rings…etc).

■ install middle driven shaft/ housing/

pinion gear

- ◆ install pinion gear & housing (assembled with bearings/ collar/ oil seal)


- ◆ install coupling and o-ring and washer


- ◆ apply loctite glue to the nut and lock the nut.

- ■ install middle driven shaft ass'y to crankcase L
  - ◆ put the o-ring t the ass'y & apply proper oil and install it into crankcase L evenly by soft hammer and keep a clearance.
  - ◆ install two shims (same grade as removal) to the clearance and screw in the washers & bolts
  - ◆ apply loctite glue to bolts and lock the bolts.




- ■ follow the **specified torque**

  M14 nut 15kgf-m

  M8*35 3.2kgf-m

- ■ fix the spring, gear park and clip on.
- ■ install shift drum
- ■ install countershaft & shift fork as a set to crankcase and follow the grooves of shift drum


- ■ ensure the contact washers to be placed correctly.

- install the primary gear & reverse idle gear

- apply enough oil to all installations before combining crankcase L & R.

- Combine crankcase L & R ass'y

Before installing and torquing the crankcase holding bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift cam in both direction.

- apply sealant to the mating surfaces of both cases halves and install dowel pins.

- fit the right crankcase onto the left case. tap lightly & evenly on the case with a soft hammer.

Note: lift the connecting rod to the top not to bump the case.

- tighten the bolts from center and in stages, using a crisscross pattern and torque them.
  - M8*65 x 4 in the rear right side are in prior.

- fix the shifting bolt/velocity switch/ selector switch.

◆ apply oil to o-rings and insert the switches to the should-be positions.


◆ long pin side of selector switch is neutral gear.

■ follow the **specified torque**

M8*65	**2.3kgf-m**
M6*65	**1kgf-m**
M6*16	**1kgf-m**
M6*12	**1kgf-m**

■ check the crankshaft and transmission operation by manual
Unsmooth operation ➔ repair


● Assistance for the combinations

If hard to tap crankcase R to L, a special tool " pusher" to be applied.

■ install the pusher to the R side crankshaft.
■ lock the nut to the crankshaft

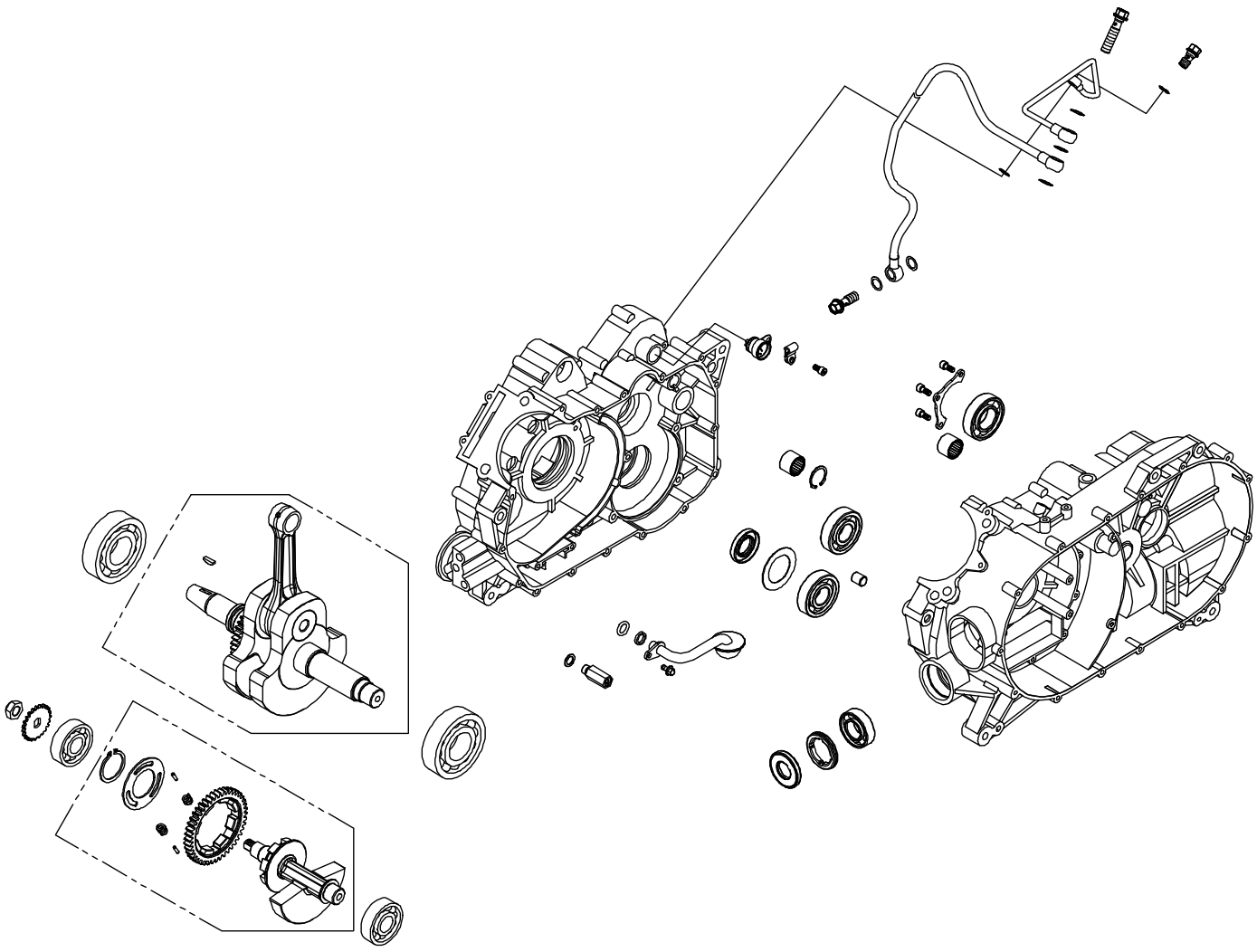
■ hold the bar and lock the nut in slowly and evenly by soft hammer tap the other side.

■ release the nut and take the pusher out
■ process the further steps.

- Manufacture remark “ shim grade “ posed on the crankcase.
  - Just for a reference.
  - to help a parts ordering.

NOTE:

12-01. Mechanism Diagram



12-02. General Information

Operational precautions

This Section concerns disassembly of the crankcase for repair purpose.

Remove following components before disassembling crankcase.

—Engine remove	Section 5
—Cylinder head	Section 6
—Cylinder and piston	Section 7
—Drive face and driven pulley	Section 8
—AC generator/Start one way clutch	Section 9
—Gear Shifting box	Section 10
—Transmission Gears	Section 11

Tools

Special tools

Crankcase Main Bearing Install Tool:

12-03. Trouble Diagnosis

Engine noise

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

12-04. Removal of Crankshaft & Balancer

a. Separating crankcase

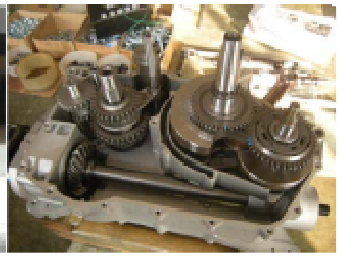
1. Place left crankcase downward and right crankcase up.
2. Loosen 17 bolts on the right crankcase.
3. Tap the right crankcase with a plastic hammer to remove it.

Caution

Do not make damage to the contact faces.

4. Refer to Chapter 11.

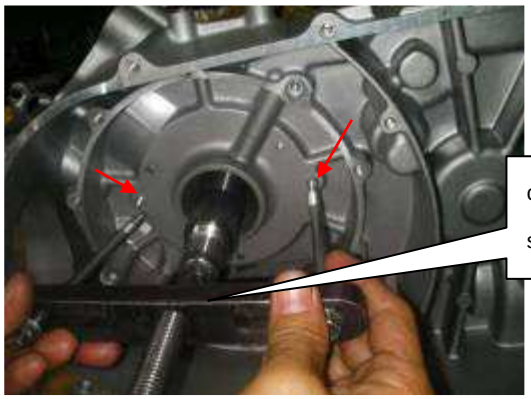




b. Remove balancer shaft comp.


c. Remove crankshaft from crankcase L.

1. use crankshaft separating tool.
2. screw the tool in the two holes on the CVT side of crankcase L and tip the end of crankshaft.



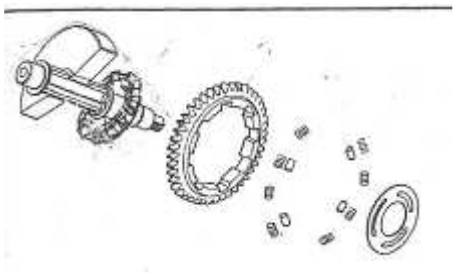
3. turn clockwise to push out the crankshaft

12-05. Inspection

a. Balancer

- check the balancer shaft – damage/ cracks/ bent ➔ replace whole set
- check the drive gear – damage/wear ➔ replace whole set
- excessive noise during operation ➔ replace whole set
- check the pin and spring – wear/damage ➔ replace

Note: align the point to buffer boss and drive gear when installing back.



b. Crankshaft

- Measure
  - crank width A – out of specification ➔ replace crankshaft

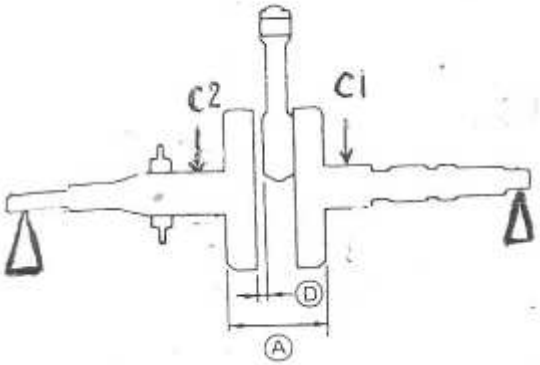
    Crank width : 75.3 ~ 75.4mm

  - crank side clearance D – out of specification ➔ replace crankshaft

    Side clearance: 0.3 ~ 0.65mm
    Service limit : 1mm

  - run-out testing C1 & C2 – out of specification ➔ replace crankshaft

    Service limit: 0.03mm



- **Checking**
  - **t**hread damage ➔ replace
  - gear teeth – wear/damage ➔ replace
  - contact surface – cracks/damage ➔ replace
  - connecting rod – wear/roughness ➔

replace

- oil passage – clogged ➔ blow by compressed air
- heat burn ➔ replace

12-06. Re-assembly

- Install crankshaft to crankcase L
  Use special tool to pull the crankshaft from right side to the bearings race.

Note: ensure the connecting rod not to bump crankcase.

- Install balancer shaft comp to the crankcase L.

Note: Align the gear tooth of the balancer shaft with crankshaft, and insert onto the Crankcase L.

NOTE:

13-01. General Information

WARING:

Removing the radiator cap while the engine is hot can allow the coolant to spray out, seriously scalding you. Always let the engine and radiator cool down before removing the radiator cap.

.

CAUTION:

Radiator coolant is toxic. Keep it away from eyes, mouth, skin and clothes.

Test the cooling system for any leakage after the repair.

- If any coolant get in your eyes, rinse them with water and consult a physician immediately.
- If any coolant in swallowed, induce vomiting, gargle and consult a physician immediately.
- If any coolant gets in your skin or clothes, rinse thoroughly with plenty of water.

NOTE:

Use coolant with silicate inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

13-02. Technical Specification

Item	Specification
Pressure to open filler cap	1.1±0.15 kgf/cm^2
Capacity of coolant: Engine + radiator	2,080 +/- 20 c.c.
Reservoir Tank	300cc +/- 20 c.c.
Thermostat	Begins to activate at 71±1.5℃
Thermos switch (Fan Switch)	Begins to activate at 85±3℃
Boiling point	Not-pressure: 107.7℃ Pressurized: 125.6℃

13-03. Trouble Diagnosis

a. The engine temperature is too high

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

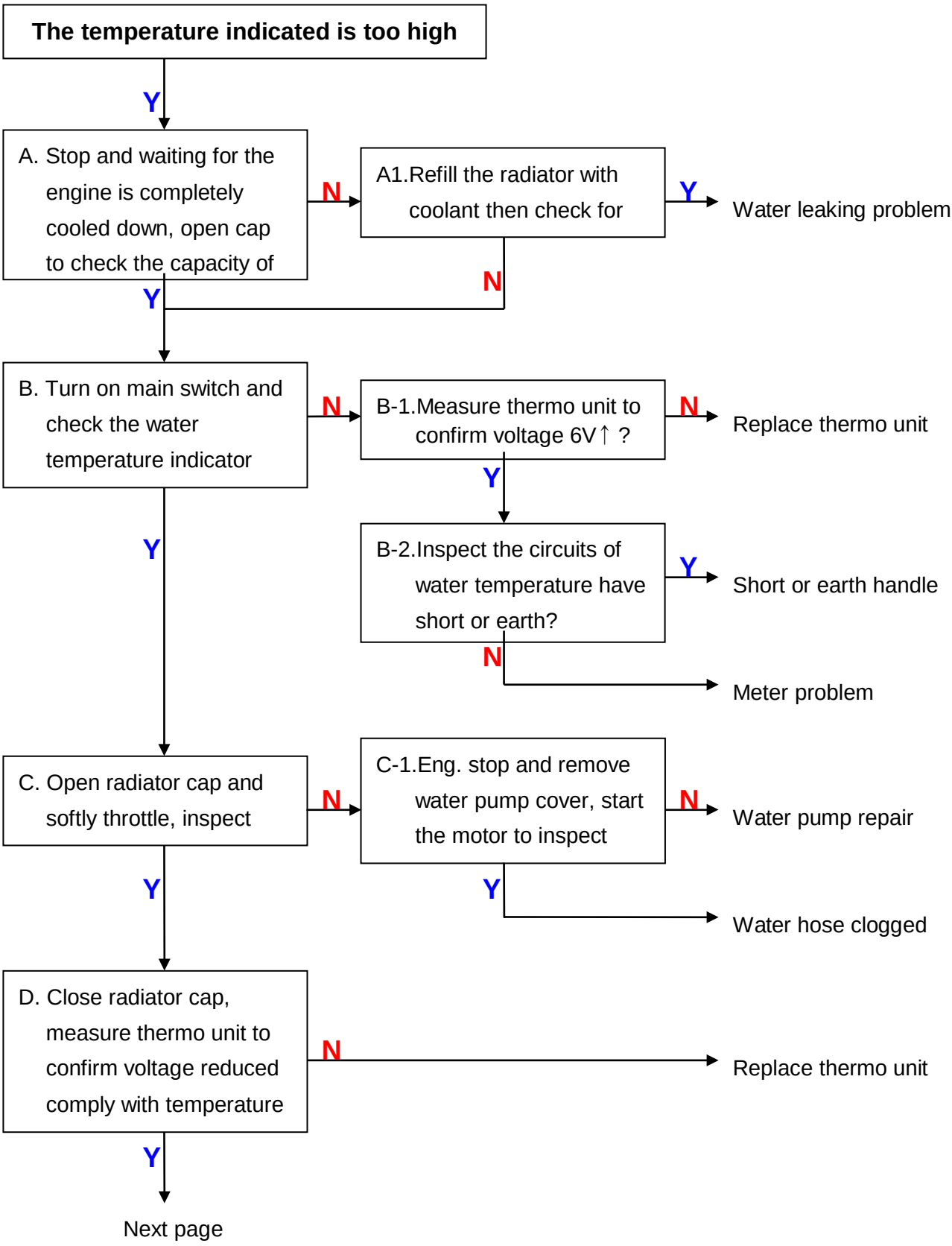
b. The engine temperature is too low

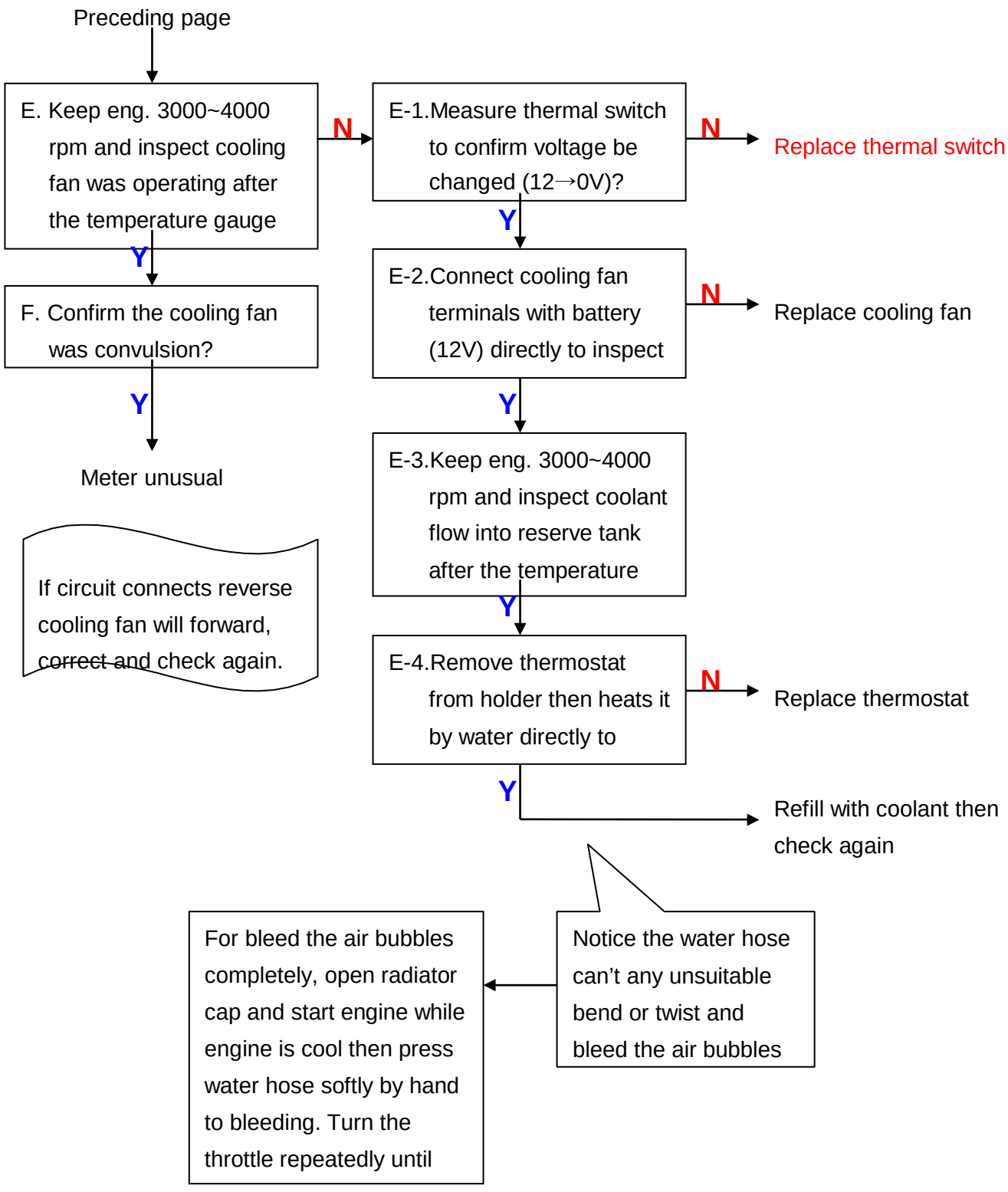
- The water thermometer and the temperature sensor malfunction.
- The thermostat is stuck to open.

c. Coolant is leaking

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

d. Trouble Diagnosis for Cooling System




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

13-04. Coolant Check / Replacement

Warning

Never attempt to work on the cooling system unless the engine is completely cooled down.

a. Coolant check

1. Check the coolant liquid level inside the reservoir tank. Add coolant to the proper level between Min. to Max. if necessary.
2. Remove the front center cover, and then remove reservoir tank filler cap.
3. Add recommended coolant to the Max. level if the coolant is not enough.
4. Reinstall the reserve tank filler cap and the front center cover.

Caution

Do not over fill the coolant to the reserve tank, to avoid split out of liquid coolant while liquid

Caution: Coolant leaking check.

Check the coolant circular system on radiator / cylinder-cylinder head / water pump and hoses-clamp side if any leaking.

b. Coolant replacement

1. Remove the front center cover, and then remove filler cap.
2. Place a water pan under the water pump; loosen the drain bolt to drain out the coolant. After coolant being drained out, reinstall the drain bolt.

Coolant Drain bolt:

Torque: 1 kgf-m

3. Refilling system with recommended coolant through the filler opening up to the filler neck.
   Bleed the air from the system as follow:
   a. Start the engine and let it idle for 2~3 minutes.
   b. Snap the throttle three to four times to bleed air from the system.
   c. Stop the engine and add coolant to the proper level if necessary. Reinstall the radiator cap.
   d. Check the level of coolant in the reserve tank and fill to the upper level if it is low.

Caution

Use recommended coolant only(Long Life Coolant, LLC 50% density).

13-05. Radiator Cap /Reservoir Tank

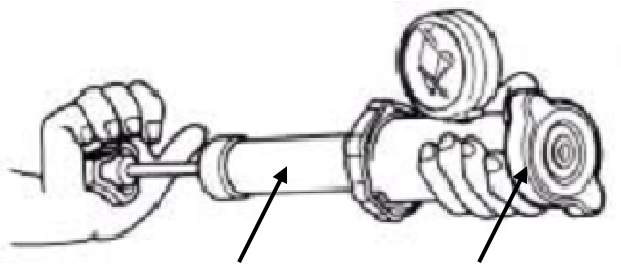
13-05-01 Radiator Cap

a. Removal

1. Open the Front center cover
2. Push down and turn the radiator filler cap by counter-clockwise direction to remove the radiator cap.

b. Inspection

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



Relief pressure for the filler cap:
1.1 kgf/cm^2

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

Caution
High pressure may damage the radiator. Never use pressure which exceeds

1.1 kg/cm^2.

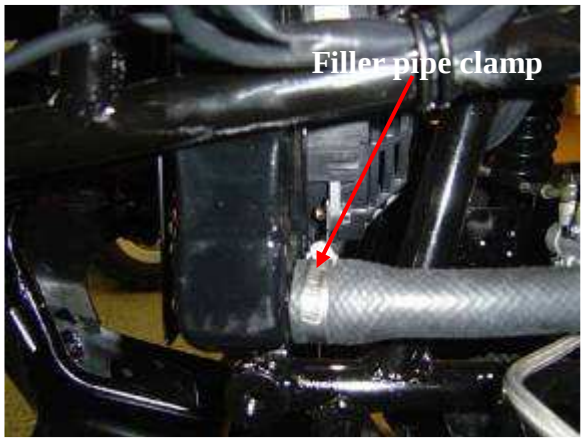
If the system fails to maintain the specified pressure for at least 6 seconds, repair or replace parts.

13-05-02 Reservoir tank.

a. Removal

1. Remove the front covers (refer to Chapter 5, body covers)
2. Use the water pan under the reservoir tank.
3. Disconnect the hose clamp on the radiator filler tube, carefully disconnect the reservoir tank hose from radiator filler tube to drain out the coolant inside the reservoir tank.

Remove the two (2) hex bolt with washer and them remove the reservoir tank from chassis.



b. Inspection

1. Check the reservoir tank if any cracks, deteriorates or broken, replace with new if necessary.
2. Check the reservoir tank water hose (to radiator filler tube) if any cracks, leaking. Replace with new if necessary.
3. Check the hose and hose clamps if it is being well seated and tightened.

c. Installation

1. Install the reservoir tank in the reverse way of dis-assembly. Make sure the hose and hose clamps are well seated and installed.
2. Add the coolant into the reservoir tank to the max. level but not over the limit (please ref. 13-04 for detail)

13-06. Radiator / Cooling Fan

13-06-01 Radiator removal.

Note:

Before the removal of radiator and related parts, please process the coolant drain out process as mentioned on 13-04.

a. Radiator assembly removal

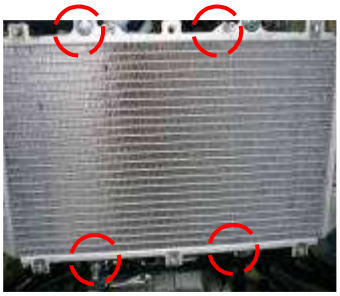
1. Remove the water hose clamps on the right upper /lower side of the radiator (Water pump in hose and radiator in hose) and remove the hoses from radiator.

2. Disconnect the water hose of reservoir tank water from radiator filler tube.

3. Remove the Hex. bolt with washer (M6*16) on the radiator cap set and disconnect the radiator cap set from chassis.

4. Disconnect the couplers for the thermo switch and fan motor from wire harness.

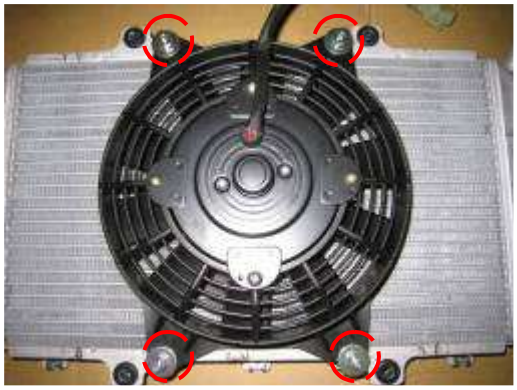
5. Loosen the radiator 4 Hex. bolts with washer (M6*22) and then remove radiator Assy (with cooling fan).



b. Radiator filler tube removal

Remove the hose clamp on the radiator side and then disconnect the radiator cap hose.

Screw out the hex. bolt with washer (M6x16) and remove the radiator filler tube with hose.



c. Disassembly of cooling fan

1. Loosen the 4 Hex. bolts with washer (M6x22) from the rear side of radiator, and then remove the cooling fan.

d. Fan Motor Switch removal

Use wrench, turn counter-clockwise to remove the fan motor switch at left middle side of radiator.

Caution

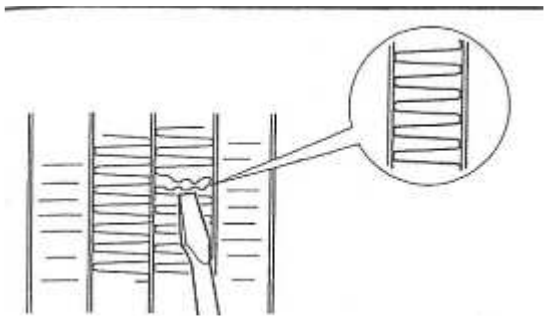
Handle the fan motor switch carefully as it is vulnerable to impact.

13-06-02 Inspection

a. Radiator

1. Use air gun to blow the dust-mud on the radiator and gently clean it by water.

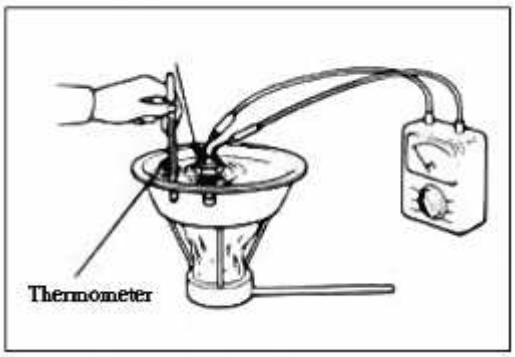
2. Check the radiator if leaking, clogged or damage. Straighten any flattened fins with a thin flat-head screwdriver. Replace with new if necessary.



b. Fan Motor Switch

1. Check the fan motor switch if working correctly.

- Connect an ohm pocket tester (for continuity test) with the thermo switch.
- Fill the water in a container, and heat it.
- Read the temperature by the thermometer gauge while temperature increases by heat.
- Check the continuity on the pocket tester.



The switch continuity at 85°C ± 3°C

c. Cooling Fan

Connect the Fan coupler with battery wire and check the Fan if function properly.

d. Water Hose

Check the water hoses if cracks, leaking or damage. Replace with new if necessary.

13-06-03 Installation of Radiator Assy.

- Install the removed parts in the reverse order of removal.
- Install radiator in the reverse order of removal.
- Upon completion, re-fill the coolant as mentioned at 13-04.

Installation Torque:

a. Hex. Bolt with Washer (M6*22) for Radiator:0.7 kgf-m
b.. Hex. bolts with washer (M6x16) for radiator cap: 0.7 kgf-m
c. Fan Motor Switch (M6*18): 2.8 kgf-m

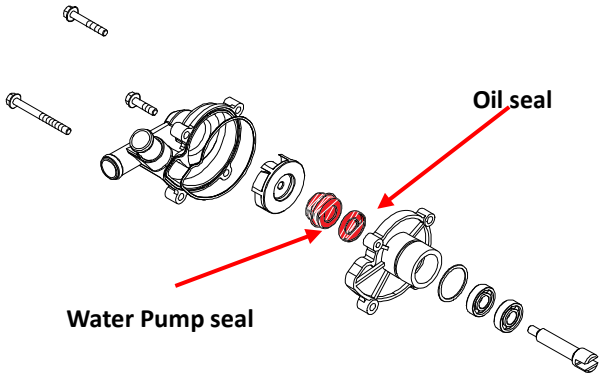
13-07. Water Pump

Check water pump seal / cooling system divulges inspection

Unscrew the drain bolt, overflows little buckles the actually fluid, confirmed overflows the refrigerant whether has the greasy dirt.

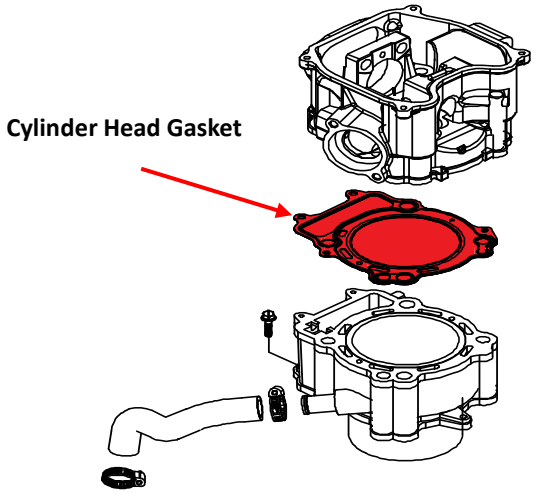
Screw out the engine oil drain bolt and let the inside oil comes a little bit, check the engine oil whether does have bleaches situation of the emulsified.

1. If has the above two kind of interior to divulge the phenomenon, possibly for the water pump inner two seal damages or the cylinder head gasket damages, please: First disassemble the water pump cover, to confirm the replacement of water



pump seal.

2. If after check the seal is confirm ok, then keep to have advance service check on the cylinder head gaskets of sealing between the cylinder / cylinder head side.



a. Removal of water pump

- Loosen the drain bolt to drain out the coolant.
- Remove the water pump water hose IN and EX.
- Loosen 4 bolts and remove the pump cover.
- Turn pump impeller fixing bolt clockwise and remove.

b. Inspection

- water pump housing cover
- water pump housing
- impeller/impeller shaft
- water pump seal
- oil seal
- bearings

Replace a new one if they are cracks, damaged, wear.

Caution

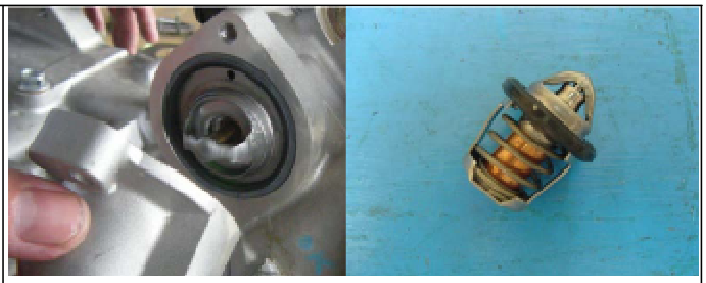
The impeller is provided with left turn thread bolt.

13-08. Thermostat/Thermo Sensor

a. Removal of thermostat

1. Drain out the coolant.

2. Remove the thermostat cover (2 bolts) on the cylinder head.
3. Remove the thermostat.



b. Removal of thermo sensor.

1. Use wrench to remove the thermo sensor from cylinder head side. When removing, take care of the ground terminal and wave washer.

c. Inspection (Thermostat)

1. Visually inspect thermostat for any damage.
2. Place the thermostat into water and slowly heat the water, check its temperature indicated.

Technical Data

Valve begins to open **71±1.5℃**

Valve stroke **0. 5 ~ 8mm**

NOTE:

If the accuracy of the thermostat I sin doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

d. Inspection of Thermo Sensor

1. Place the thermo sensor into heated water and keep the wire connected with wire harness,
2. Read the temp. index at speedometer display, compare with temperature gauge at hot water side to check its operation.

Caution

Whenever the thermometer sensor is in contact to the wall of heated water container, the reading displayed may not be correct.

If the valve of the thermostat remains open at room temperature or the valve operation is not corresponding to the temperature change, then it must be replaced.

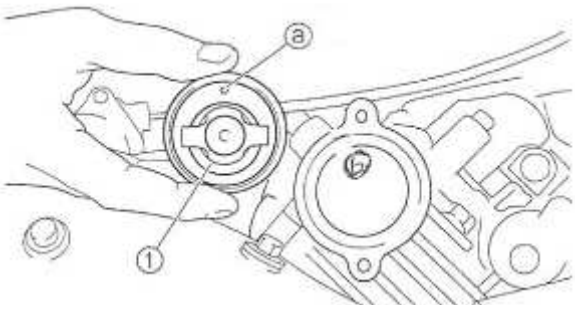
3. Installation

- Install the thermostat.
  - install the thermostat ① with its breather hole (a) facing up to the inley (b) of cylinder head.
- Install the thermostat cover. (2 bolts)

Torque: Flange Bolt (M6*25): 1.0 kg-m/10Nm

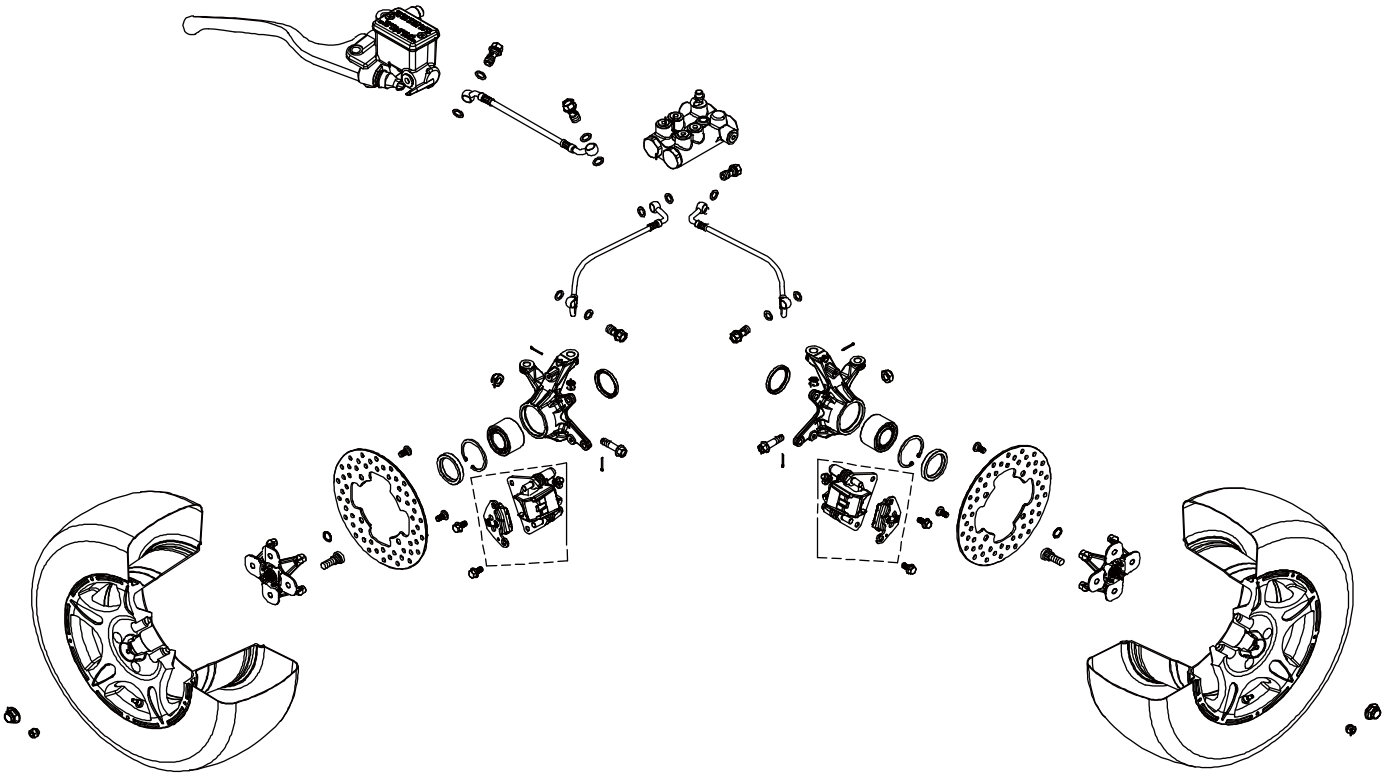
- Install the wave washer, ground terminal and then the thermo sensor with specific torque:

- Refill the coolant and bleed out the air bubble



NOTE:

14-01 Mechanism Diagram



14-02. Maintenance Description

a. Operational precautions

Caution

- During servicing, keep oil or grease off the brake pads and disk.
- Drain the brake fluid from the hydraulic brake system before disassembly.
- Clean the contaminated brake disk with high-performance brake degreaser and replace the brake pads.
- The brake caliper can be removed without removing the hydraulic system.
- After the hydraulic system is removed, or the brake system is soft, bleed the air out of hydraulic system.
- While refilling brake fluid, care should be taken not to let the foreign material entering into the brake system.
- Do not spill brake fluid on the painted surfaces, plastic or rubber parts to avoid damage.
- Check the operation of the brake system before riding.
- Make sure to use recommended brake fluid.
- Please refer to the service manual of tubeless tire in respect to the removal, repair and installation of the tire.

b. Specifications

Item	Standard (mm)	Limit (mm)
The thickness of front brake disk	3.50	3.0
The thickness rear brake disk	5.0	4.5
Front and rear brake disk eccentricity	< 0.1	0.3
Master cylinder inner diameter	14.000~14.043	14.055
Master cylinder piston outer diameter	13.957~13.984	13.945
Diameter of front disk	220mm	-
Diameter of rear disk	200mm	-
Thickness of brake lining	4.5	1.5

Tire pressure as cold: **8(7) psi (on road tire)**
5(3.5) psi (off road tire)

14-03. Trouble Diagnosis

Soft brake lever

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

Uneven brake

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

Brake noise

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

Steers to one side

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

Hard operation of brake lever

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

Tight brake

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

Hard steering

1. Faulty tire
2. Insufficient tire pressure

Front wheel wobbling

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

14-04. Front Wheel/Tire

a. Removal

Raise the front wheels with tires off the ground by placing a jack or other support under the frame.

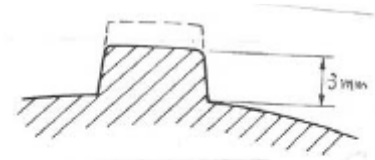
Remove the front wheel nuts, and then remove front wheels.

4 nuts

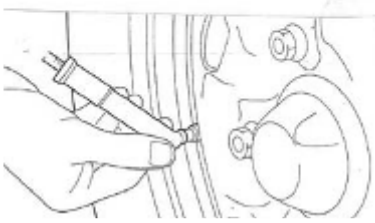
b. Inspection (refer to 2-08)

1. Check the wheel rim if any cracks, distorts or damaged. Replace with new if necessary.
2. Check the tire
   - Surface – wear/damage ➔ replace

     Tire wear limit front/rear : 3.0mm

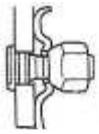


   - Measure cold tire pressure refer to standard tire pressure.
     Out of specification ➔ adjust



c. Installation

1. Install the front wheel/tire and tighten the nuts.
   - Install each nut with its tapered side towards the wheel.
   - The arrow mark on the tire must point in the direction of wheel rotation.



Torque: <u>5.5kg-m / 55 N-m</u>

Note: Always balance the wheel when tire or wheel has been changed or replaced.

Warning:

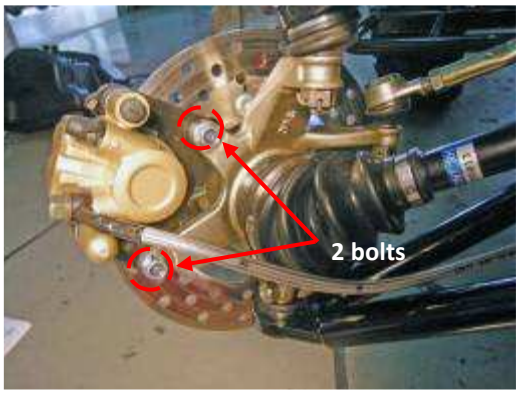
- Never attempt even small repairs to the wheel.
- Ride conservatively after installing a tires to allow it to seat itself properly on the rim.
- It's dangerous to ride with a worn-out

tire when tire wear is out of specification, replace the tire immediately.

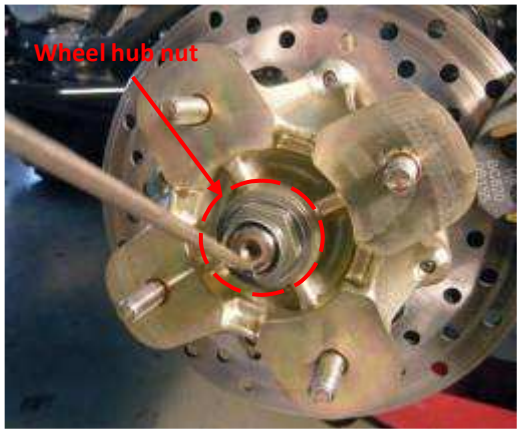
14-05. Front Wheel Hub

a. Removal

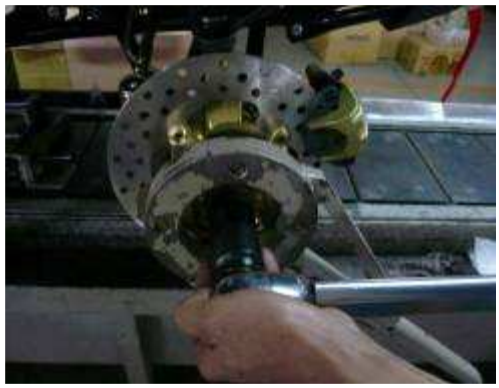
- Remove the 2 flange bolts (M8*16) between caliper bracket and knuckle, and then remove front brake caliper.



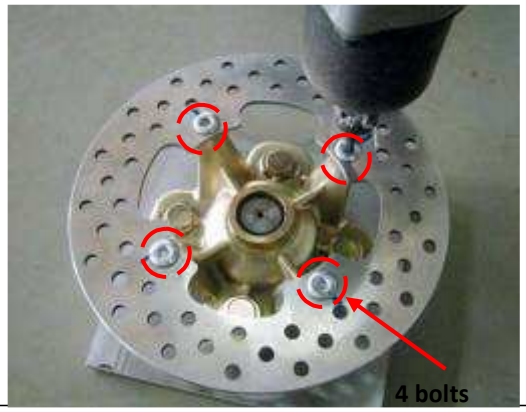
- Use screw driver and hammer, to knock back the locked wall of wheel flange bolt.



- Remove the front LH/RH wheel hub nut and washer and remove wheel hub with brake disk.

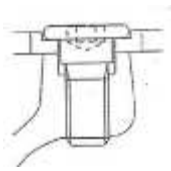


- Remove 4 button bolts (M8*17), and then remove the brake disk from wheel hub.



c. Installation

1. Install the brake disc to the front wheel hub. Be aware the recessed portion of the bolt hole faces away from the hub.



Torque: Brake disk button bolts (M8*17) 3.5kgf-m

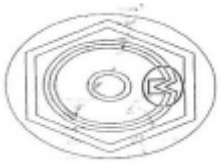
2. Clean and grease the front LH/RH drive axle (outside of Knuckle)

3. Put the O-ring onto the front LH/RH drive axle

4. Install wheel hub into the front LH/RH drive axle.
5. Apply the glue to the wheel hub locknut

6. Tighten the wheel hub nut with specific torque. Stake the collar wall of the nut into the notch of the shaft.

- Always replace a new nut.



Note: Install wheel hub nut (M20).
Torque: 26kgf-m / 260 N-m

7. Install the caliper (with bracket) to the knuckle by tighten the flange bolt (M8*16)

Note: Install front brake caliper.

Torque: Bolt, brake caliper bracket (M8*16) 2.5kgf-m/25 N-m

14-06.Disk Brake System Inspection

a. Inspection

1. By visual examination whether fluid leaking or the damage on the brake hose side, the connecting bolts washer side, and caliper body side.
2. Turn the handle left and right, pressure to the front shock, to check if there any interfere, abnormal pull & push on the hose side.
3. Check the brake from inside the brake caliper. The brake pad must be replaced with new lining when the brake pad wears to the service limit.

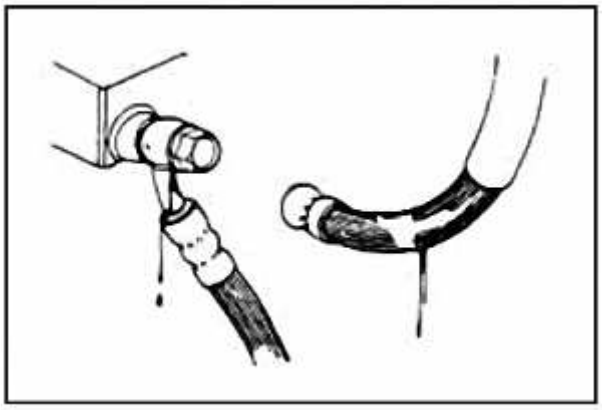
Note:
Remove the front wheel rim before the front brake lining check.

- Park the ATV on a plane ground, and check the master cylinder screen if fluid level is under the “LOWER” mark. If yes, check the brake system if any leaking, and add the sufficient brake oil into the master cylinder.

Recommended Brake Fluid:
BRAKE FLUID (DOT 4).

Caution

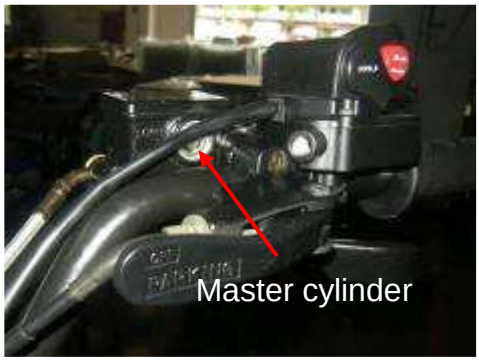
a. If the vehicles being parked inclined or just stopped, the survey of brake oil level could not be accurate, it is better to settle the vehicle 3~5 minute before checking.
b. In order to prevent chemical deteriorate and cause bad performance on braking power or even lead to a accident, please always use recommended brake fluid.



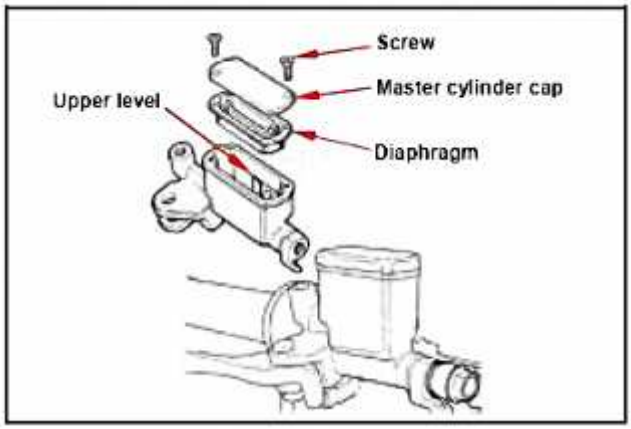
c. Do not mix different specs. of the brake fluid.
d. Replace brake fluid at once it's dirty.
e. Always check brake fluid level before riding.

14-07. Adding Brake Fluid

Note:
Before the brake fluid reservoir cap is removed, turn the handle to keep the fluid inside the master cylinder at horizontal.



a. Screw out 2 screw on the master cylinder cap and remove the master cylinder cap and diaphragm.



b. Add high quality brake fluid, uses only trade mark brake fluid joins in master cylinder.

c. Put back the diaphragm and master cylinder cap, and press the brake lever slightly, to check if brake force is firm and solid. If there is soft still while apply the brake lever, check and do the air bleeding procedure to get rid out of air inside the brake system.

d. Check again the oil level between the upper and lower limit, and tighten the bolts to close the master cylinder

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

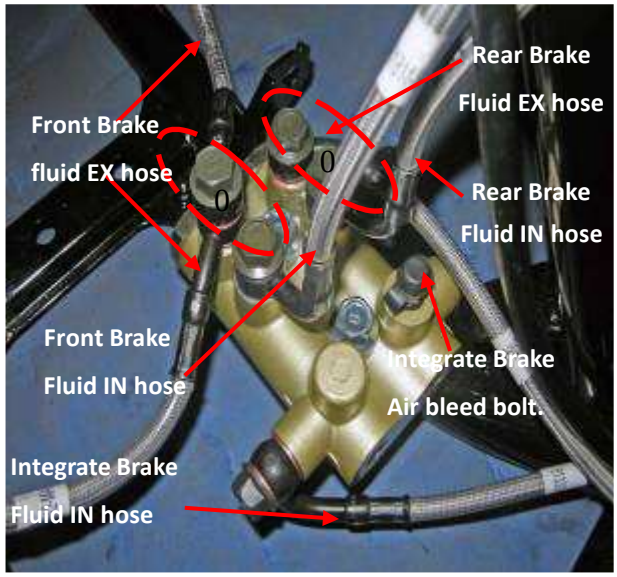
Caution

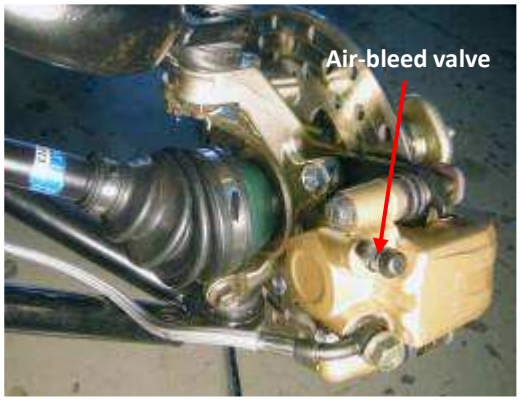
- The dirty brake lining or disk will reduce the brake performance.
- To mixed non-compatible brake fluid will reduce brake performance.
- Foreign materials will block the system causing brake performance to be reduced or totally lost.
- Be careful that water doesn't enter the brake master cylinder when refill. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.

14-08. Front Brake fluid replacement / Air-bleed

Do the air bleeding / brake fluid replacement process below when there is soft while apply the front brake lever or replace the new brake fluid.

a. Connect a transparent drain hose to air-bleed valve on the one side of the front caliper and place an oil container to collect the exhaust brake fluid.
b. Open the master cylinder cap and diaphragm at right side of handle bar,, check and add the brake fluid while doing the below air bleeding process.
c. Open the drain valve around 1/4 turns on the caliper and keep applying the front brake lever.
d. Checks the drain hose for the air bubble flow while apply the brake lever. Close the air bleeding bolt until there is no air bubble comes out/ brake fluid become clear (new)
e. Do the same procedures on another front caliper to drain out the air bubble / replace the brake fluid.
f. Apply the brake lever to check if the brake feeling is firm and solid.





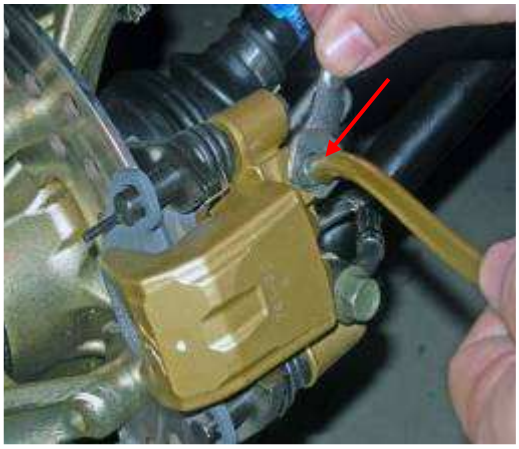
g. Add front master cylinder the brake fluid to the level between upper and lower limit and closed the master cylinder.

Note:

- You can use the vacuum machine to drain out the air bubble /replace the brake fluid, instead of applying the brake lever.

- Use shop towels to cover plastic parts and coated surfaces to avoid damage caused by splash of brake fluid.

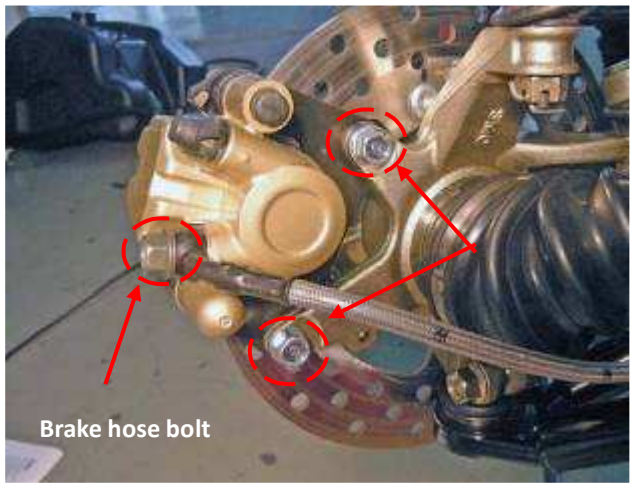
Recommended brake fluid:
DOT 4 brake fluid



14-09. Front Brake Caliper

a. Front Caliper Removal

- Remove the 4 flange nuts (M10) and remove the front wheel.
- Remove the 2 flange bolt (M8*16) on the knuckle and remove caliper (with bracket) from knuckle firstly.
- Place a container under the brake caliper, and loosen the brake hose bolt, to drain out the brake fluid and finally remove the brake hose. *(No need to do this while inspection/replace of the brake pad, unless you have to replace defect caliper/brake hose)*



b. Brake pad removal(if brake pad lining reach to the service limit)

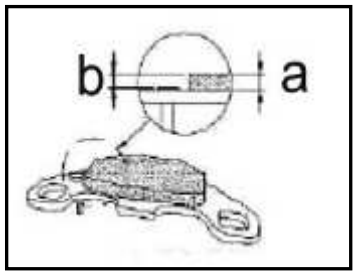
1. Push the bracket and take out the brake pad set.
2. Push the brake piston back to the inner of caliper, if there no symptom of brake fluid leaking.

c. Inspection

1. Check the oil hose if any cracks, oil leaking at connecting or hose itself side. Replace with new if leaking found.

2. Check the caliper inner piston/ oil seal if any oil leaking. Replace with new caliper ass'y when oil leaking found.

3. Check the brake pad lining thickness:
   Standard: 4.5mm (a)
   Service limit: 1.5mm (b)



d. Installation of brake pad and caliper to the knuckle.

1. Install the brake pad set into brake caliper.

2. Use two copper washers and hose union bolts (M10*22) to lock the brake hose and install the brake house to the caliper. (If the brake hose is being removed from caliper.)

Torque: Union bolt (M10*22) for brake hose
3.0kgf-m / 30 N-m

3. Install the brake caliper and tighten the bolts securely.

Torque: Caliper bracket bolt (M8x16mm)
3.0kgf-m/30 Nm

Caution

1. Use M8 x 16 mm flange bolt only.
2. Longer bolts will interfere the operation of brake disk.
3. Process the air bleeding/brake fluid replacement procedures that mentioned at 14-08.

14-10. Front Brake Disk

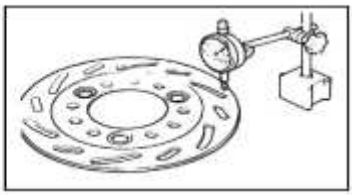
a. Inspection

1. Visually check the brake disk for wear/ break or distorted.
2. Measure the thickness of the disk by dial gauge at several places. Replace the disk if it has exceeded the service limit.

Standard Value: 3.5mm
Service limit: 3.0 mm

3. Remove the brake disk from wheel hub.
4. Check the disk for deformation.

Standard: 0.20 mm or below
Service limit: 0.30 mm



Caution

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

14-11. Front Brake Master Cylinder

a. Front Master Cylinder Removal

1. Disconnect the front brake switch wire coupler from wire harness.
2. Remove the two socket bolts on the master cylinder holder, and them remove the front master cylinder set.
3. Put the oil pan at ground, remove the union bolt (M10*22) and two copper washer, and disconnect the front upper brake hose with Fr. Master cylinder. Be careful not to split out the brake fluid onto any plastic / paint items. (only for service need if necessary)

Caution

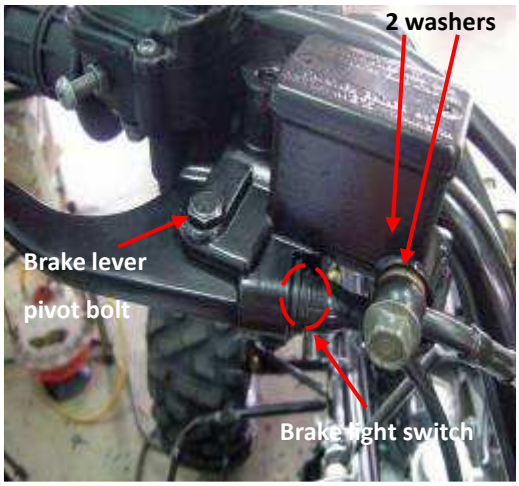
1. Do not let foreign materials enter into the master cylinder oil reservoir tank.
2. For your own safety and reliability of braking power, factory do not suggest customer to repair a defect master cylinder / caliper. If possible, always replace with master cylinder assy (master cylinder, piston, spring, diaphragm and cir-clip) when parts being diagnose as defect.

b. Master Cylinder Install

1. Align the installation punch mark on the handle bar, place the master cylinder onto handlebar, and install the socket bolts.
2. Connect brake hoses with union bolt (M10*22) and 2 new copper washers. Tighten the brake hose union bolt to the specified torque value.

Torque: <u>3.0 kg-m / 30 N-m</u>

3. Install brake switch to the master cylinder .

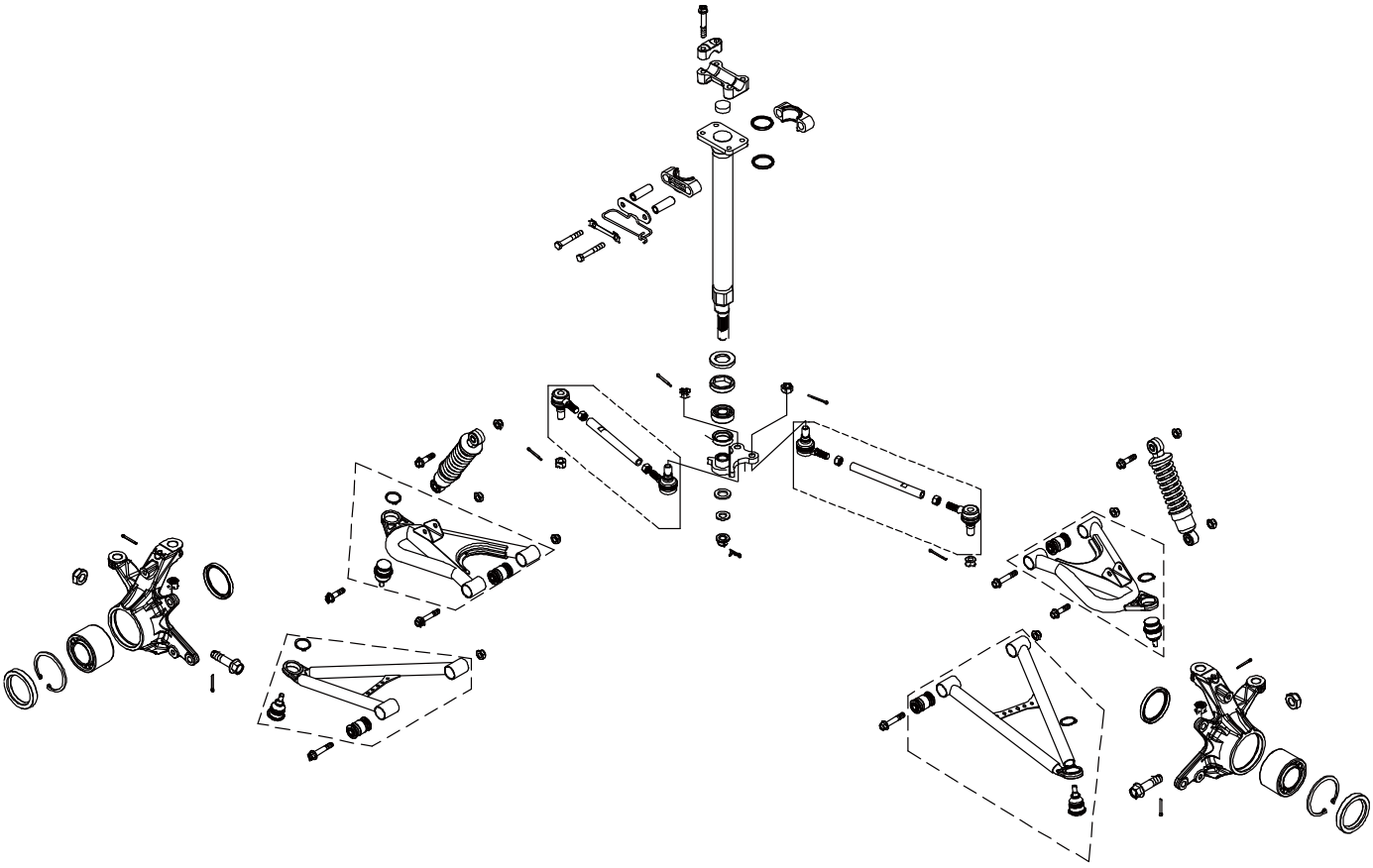


Caution

1. Improper hose routing may damage leads, hoses or pipes.
2. Wrong brake leads, hose or pipe may reduce brake performance.
3. Add specified brake fluid and bleed the system.

Notes:

15-01. Mechanism Diagram



15-02. Operational Precautions

Torque

Handlebar upper holder bolt(M8*50)	**2.3kg-m/23 Nm**
Steering column (stem) holder bolt(M8*60)	**2.3kg-m/23 Nm**
Steering column (stem) lower lock nut(M14)	**18 kg-m/180 Nm**
Steering tie-rod castle nut (M10)	**3.0 kg-m/30 Nm**
Knuckle nut (M10)	**4.8 kg-m/48 Nm**
Suspension arm nut (M10)	**4.5 kg-m/45 Nm**
Front shock absorber mounting nut(M10)	**4.5 kg-m/45 Nm**

15-03. Trouble Diagnosis

Hard to steer

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

Front wheel wobbling

- Faulty tire.
- Worn front knuckle bearing.
- Bent rim.
- Axle nut not tightened properly.

Steers to one side

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

Front suspension noise

- Loose front suspension fasteners.
- Binding suspension link.

Hard suspension

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

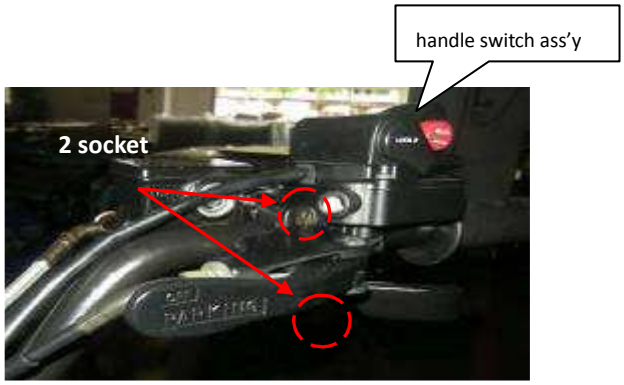
Soft suspension

- Weak front shock absorber springs.
- Worn or damage front swing arm bushings.

15-04. Steering Handle

- **Removal**
- Remove the handlebar upper cover.

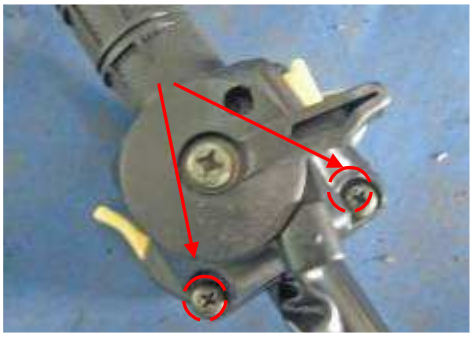
- Loosen the two socket bolts at right handle side, and then remove the front brake master cylinder and parking brake lever set.
- Remove 2 socket bolts, and then remove RH Handle switch ass'y from right handle side.



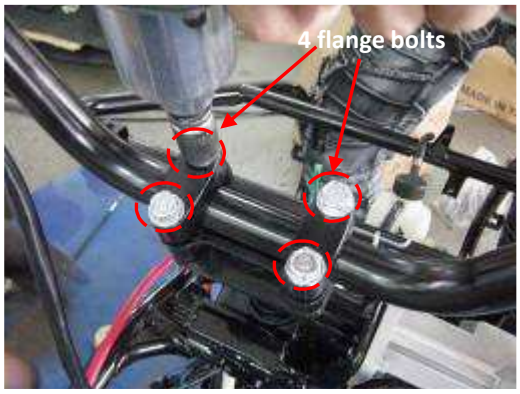
- Remove the 2 socket bolts on the winch control switch bracket, and remove the winch switch.

- Loosen the 2 socket bolts for the rear brake master cylinder & parking brake, and remove rear brake master cylinder.

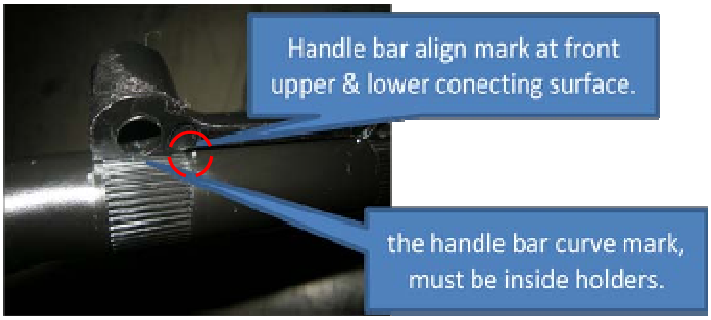
- Remove the 2 pan head screws (M5*30 &M5*40) on the left handle switch assy, and remove the left handle switch assy.



- Remove handle mounting flange bolt (M8*50), and then remove the handle upper holder and handle bar.

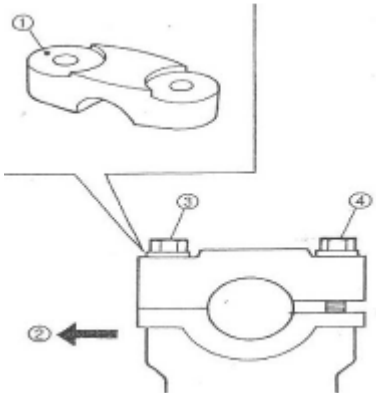


- **Inspection**
  Handlebar – Bends/Cranks/Damaged ➔ Replace



- **Installation**

1. Install in reverse order of removal procedures.
2. When install the handle bar in the middle side of the handle bar, be sure to aim the align point in the front horizontal connecting surface
3. The upper handlebar holder should be installed with the punched mark ① forward ②.
4. First tighten the bolts ③ on the front side of the handlebar holder, and then tighten the bolts ④ on the rear side.



5. When install the RH handle switch, be sure to align the punch point mark
6. Torque value

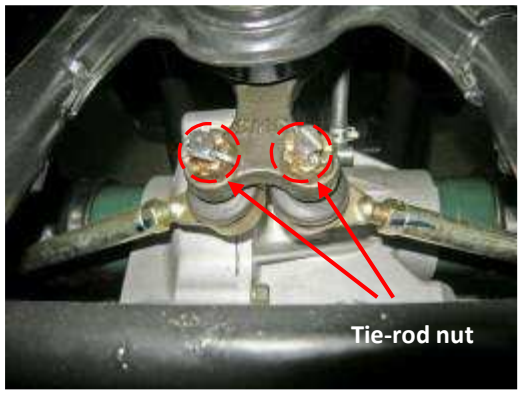
- Handle mounting flange bolt (M8*50) **2.3kgf-m/23Nm**

- Pan head screw (M5*30&M5*40) for LH Handle switch.
  0.45~0.60 kg-m /4.5~6 Nm
- RH Handle Switch socket bolt(M6x22mm):
  1.0 kgf-m/ 10 Nm
- Master Cylinder (RH/LH) socket bolt (M10):
  3.0kgf-m/30Nm
- Pan head screw (M6) for choke cable.
  0.8~1.0 kgf-m /8~10 Nm

15-05. Steering Column

a. Remove

1. Remove cotter pins, and loosen right and left steering tie-rod nuts, then remove the tie-rod.



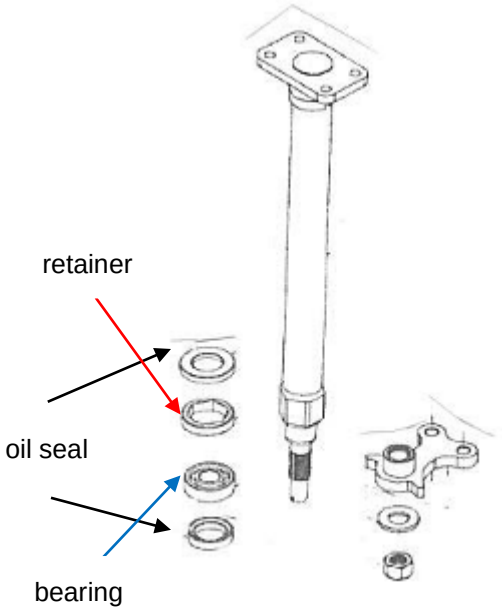
2. Remove the cotter pin of steering column, and remove column flange nut (M14) and washer. Then take out the pitman arm from spindle of column.

3. Loosen 2 Hex. bolts (M8*60) , and then remove steering column (stem) cable guide plate, lock washer and steering column.

4. Pull out steering column upward out.

b. Inspection

- Check column – wear/ damage/ bend ➔replace
- Check steering stem bushings -- wear/damage ➔ replace
- Check bearing/oil seal inside chassis – roughness/damage ➔ replace
  - Bearing had been installed into chassis and stopped by retainer.
  - Retainer had been screwed into chassis with loctite glue by tool.
    - **Torque value: 6.5 kgf-m**
  - Covered by two oil seals to be away from water and dust.
- refer to 2-17.



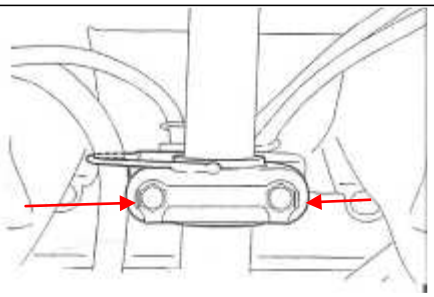
c. Installation

- Install in reverse order of removal procedures.
- Apply with grease onto steering column and pitman arm.

Note:

- Steering column spindle groove should be inlayed to spindle groove of pitman arm on matching “ - ”.

- Bend the lock washer tab along a flat side of the bolt.



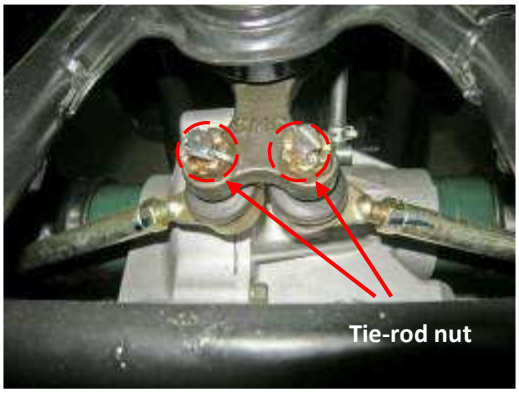
Torque:

- Steering column (stem) holder hex. Bolt **(M8*60): 2.3 kgf-m /23Nm.**
- Steering column flange nut (M14): **18 kgf-m/180 Nm**
- Steering tie-rod castle nut (M10): **2.5 kgf-m / 25Nm**

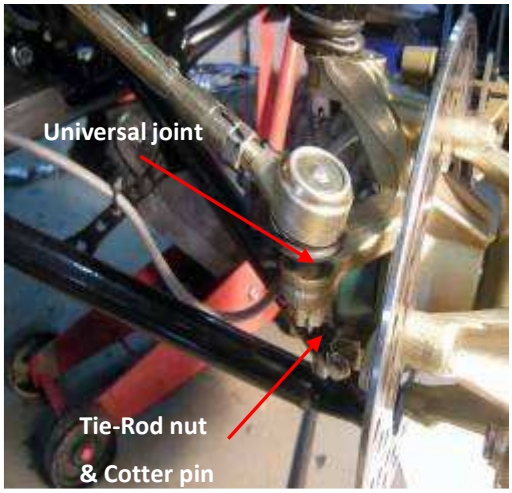
15-06. Steering Tie-Rod

a. Remove

1. Remove the LH/RH front wheel & Hub (refer to Chapter 14)

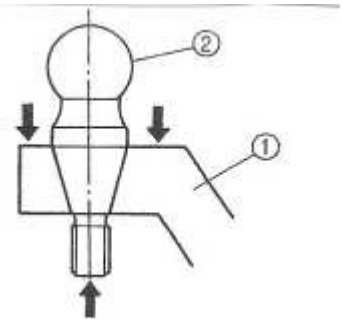


2. Remove cotter pin and tie-rod nut from lower steering column side and disconnect the LH/RH tie rod from pitman arm.



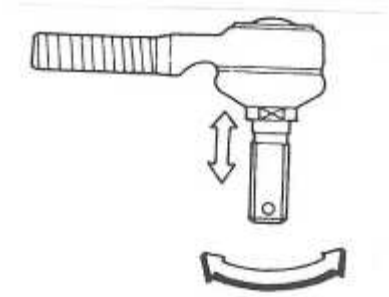
3. Remove cotter pin and tie-rod nut from LH/RH steering knuckle side, and then remove the tie-rod.

Note: Use a general puller to separate the ball joint ② and steering knuckle ①.



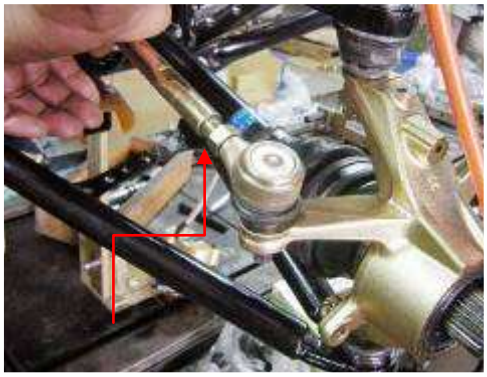
b. Inspection

1. Inspect the tie-rod for damage or bending ➔ replace
2. Inspect on tie-rod ends if damage, wear or deterioration ➔ replace
3. Turn roughly ➔ replace the tie-rod ends.



c. Installation

1. Install by the reverse way of removal.
2. Adjust the adjusting nuts on both sides to process toe-in adjustment (refer to 2-20).
3. Install tie-rod castle nuts, and tighten the nuts



Torque: Steering tie-rod castle nut (M10):
2.5kgf-m / 25Nm

4. After tightened the tie-rod nut, install the cotter pin.

15-07. Front Steering Knuckle

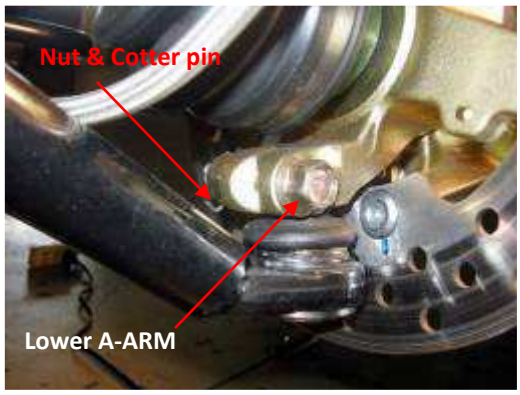
a. Remove

1. Remove front wheel, front brake caliper, front wheel hub and brake disk as mentioned on chapter 14.

2. Remove cotter pin and tie-rod castle nut, then remove tie rod on the Fr. LH/RH knuckle side as mentioned on 15-06.

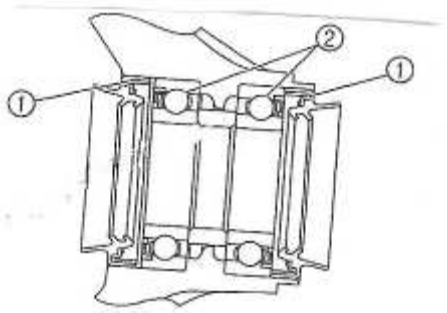
3. Remove cotter pin, universal joint castle nut, and then disconnect the knuckle with upper A-arm.

4. Remove cotter pin, universal joint keyhole bolt & nut at lower A-arm side, and then remove the knuckle from Front LH / RH drive axle.



b. Inspection

1. Inspect on universal joint at rubbers if damage, wear or deterioration.
2. Turn the universal joint with fingers. The ball joints should turn smoothly and soild.
3. Check the two bearings ② inside the Fr. LH/RH knuckle. Replace it with bearing puller if bearing is wear/ damage or turn roughly.
4. Check the two side of oil seal ① inside the Fr. LH/RH knuckle if damage. Replace it with new if necessary.



c. Installation

1. Install in reverse order of removal procedures.
2. If replace the bearings:
   Steps as followings:

- Clean the outside of steering knuckle
- Remove the oil seals ①
- Drive out he bearing ②
- Apply lithium base grease to the bearings and oil seals.
- Replace a new cir-clip to the steering knuckle and correctly installing.

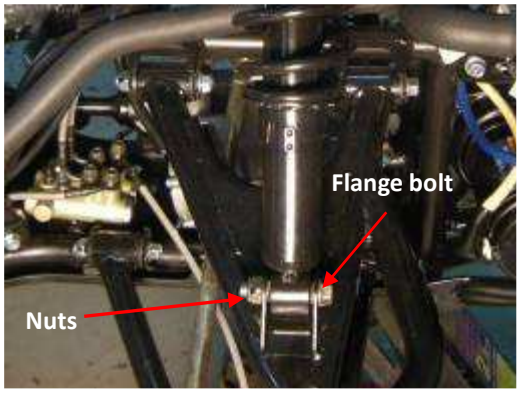
Torque: Upper & Lower A-ARM universal joint nut (M10): 4.8 kg-m / 48Nm

3. After tightened the nuts, install the cotter pins.

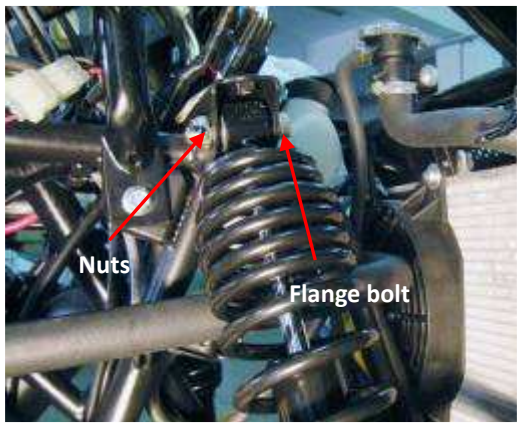
15-08. Front Suspension

a. Remove

1. Remove front shock absorber under nut and flange bolt on the upper A-arm.

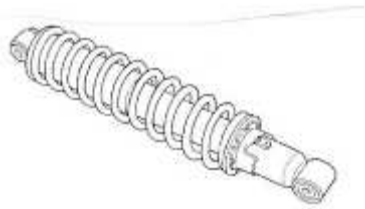


2. Remove front shock absorber upper nut & flange bolt , and then remove the front shock absorber.



b. Inspection

- Shock absorber rod
  Bends/damage ➔ replace
- Shock absorber ass'y
  Oil leaks ➔ replace
- Spring
  Fatigue ➔ Replace
  Move the spring up and down.



Warning:
Unbalance setting on the RH & LH front shock absorber may lead to steering difficult, lean or even roll, end in result with accident (refer to 2-16).

3. Installation

- Install in reverse order of removal procedures.
- Refer to 15-08

Torque:
Fr. shock absorber upper and lower nylon nut:4.5 kgf-m(45 N-m)

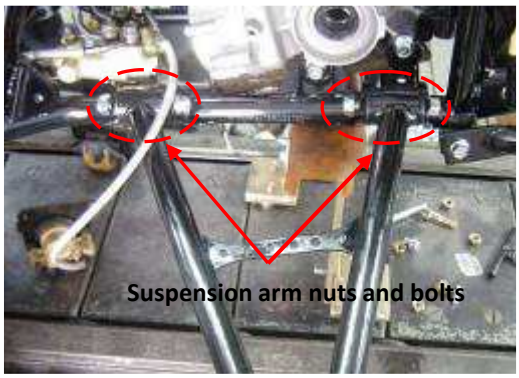
15-09. Suspension A-Arm

a. Remove

- Remove front wheel, wheel hub, and brake caliper, brake disk, tie-rod, knuckle and front shock absorber as mentioned at previous section. .

- Loosen upper suspension arm nuts (M10), remove A arm flange bolts (M10*70), and then remove the upper suspension arm. (Upper A-arm).

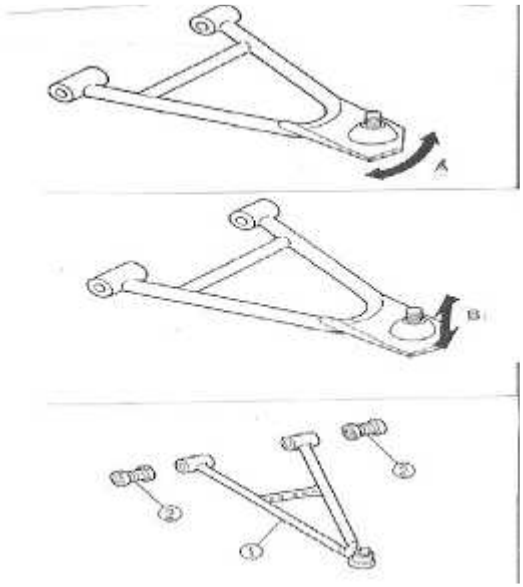
- Loosen under suspension arm nuts, remove swing arm bolts and then remove under suspension arm (lower A-arm).



b. Inspection

Checking steps:

- Check the front arm side play A by moving it from side to side.
  If side play is noticeable, check the bushings.
- Check the front arm vertical movement B by moving it up and down.
  If the vertical movement is light or rough, or if there is binding, checking the bushings.



Checking the front arm:

- Front arms ① – Bends/damage ➔ replace
- Bushings ② – wear/damage ➔ replace

c. Installation

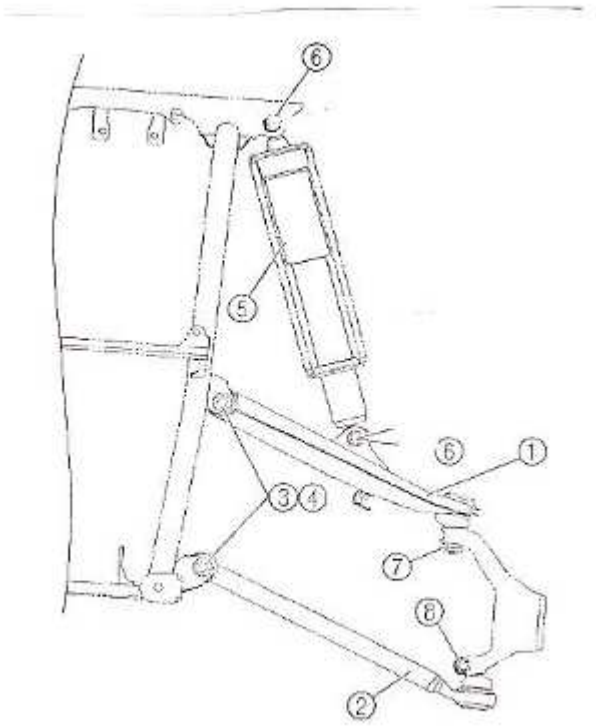
- Install in reverse order of removal procedures.
- Install front arms and shock absorbers Steps:
  - Install the front arm (upper) ① and front arm (lower) ②.

Note:

a. Lubricate the bolts ③ with grease.
b. Be sure to position the bolts ③ so that the bolt head faces outward.
c. Temporarity tighten the nuts ④.
d. Install the front shock absorber ⑤.
e. Install the ball joints.
f. Install the new cotter pins.
g. tighten the nuts ④.

Torque value:

Nut ④ :4.5 kgf-m
Nut ⑥ : 4.5 kgf-m
Nut ⑦ : 2.5 kgf-m
Nut ⑧ : 4.8 kgf-m



15-10. Toe-In

When repair or disassemble steering system parts, must to adjustment the toe-in.

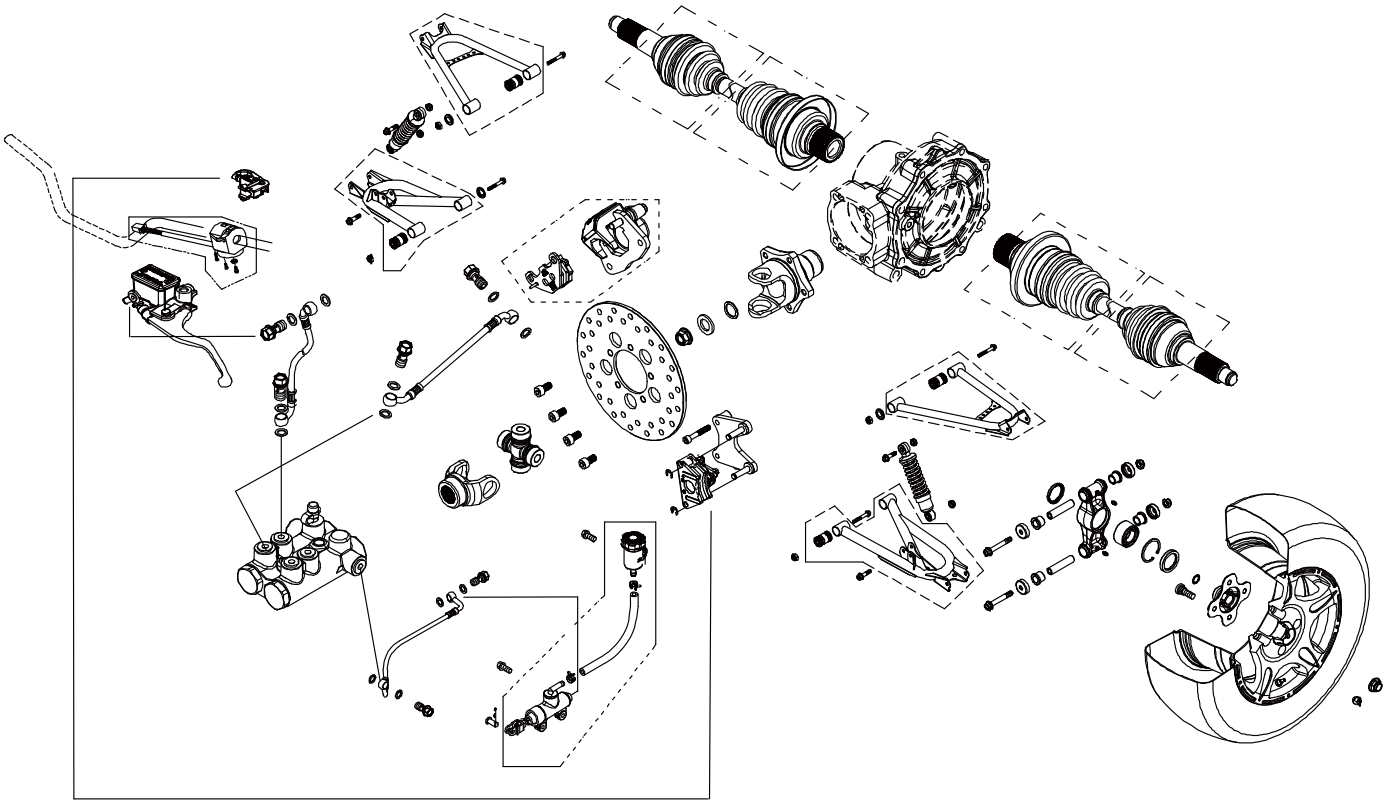
- refer to 2-20.
- Tighten the locknut (rod end): 1.5kgf-m. and mark them.
- After setting the toe-in to specification, run the machine slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

Toe-in:

0~10mm (with tire touching ground)

NOTE:

16-01. Mechanism Diagram



16-02. Maintenance Description

a. Operational precautions

Caution/Notice

1. Use vacuum cleaner or other authorized tool instead to clean the dust on brake disc and caliper.
2. The brake caliper can be removed without removing the hydraulic system.
3. After the hydraulic system is removed, or the brake system is felt to be too soft or sponge feel, bleed the hydraulic system.
4. While refilling brake fluid, care should be taken not to let the foreign material entering into the brake system.
5. Do not spill brake fluid on the painted surfaces, plastic or rubber parts to avoid damage. Check the operation of the brake system before each riding.
6. Please refer to the Maintenance Manual of tubeless tire in respect to the removal, repair and installation of the tire.

b. Specifications

Item	Standard (mm)	Limit (mm)
The thickness of front brake disk	3.5	3.0
The thickness rear brake disk	5.0	4.5
Front and rear brake disk eccentricity	< 0.1	0.3
Master cylinder inner diameter	14.000~14.043	14.055
Master cylinder piston outer diameter	13.957~13.984	13.945
Diameter of front disk	220	-
Diameter of rear disk	200	-
Thickness of brake lining	4.5	1.5

Tire pressure as cold : **8(7)psi (On-road)**
5(3.5)psi (Off-road)

16-03. Trouble Diagnosis

a. Soft/sponge feel when apply the brake lever / brake paddle

- Air inside the hydraulic system
- Hydraulic system leaking
- Worn master piston
- Worn brake pad
- Poor brake caliper
- Worn brake lining/disk
- Low brake fluid
- Blocked brake hose
- Bent brake lever

b. Hard operation of brake lever

- Blocked brake system
- Poor brake caliper
- Blocked brake pipe
- Seized/worn master cylinder piston
- Bent brake lever

c. Uneven brake

- Dirty brake lining/disk
- Poor wheel alignment
- Clogged brake hose
- Deformed or warped brake disk
- Restricted brake hose and fittings

d. Tight brake

- Dirty brake lining/disk
- Poor wheel alignment
- Deformed or warped brake disk

e. Brake noise

- Dirty lining
- Deformed brake disk
- Poor brake caliper installation
- Imbalance brake disk or wheel

16-04. Rear Wheel/Tire

a. Removal

- Raise the rear wheels off ground by placing a jack or other support under the frame.

- Remove the four rear wheel lock nuts, and the remove rear wheel.

b. Inspection

- Check the wheel rim cracks, bends, damage ➔ Replace a new
- Check the tire (refer to 14-04)

Note: Always balance the wheel when a tire or wheel has been changed or replaced.

c. Installation

- Install the rear wheel and tighten the lock nuts.
- Refer to 14-04

Torque for wheel lock nut M10: 5.5 kgf-m

16-05. Rear Hub, Knuckle and Drive Axle

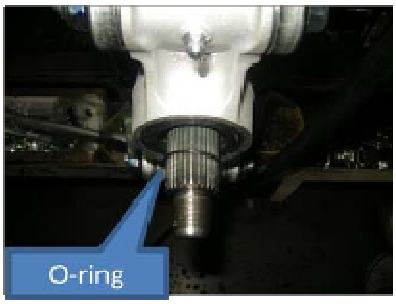
a. Remove

1. **Remove the rear hub.**

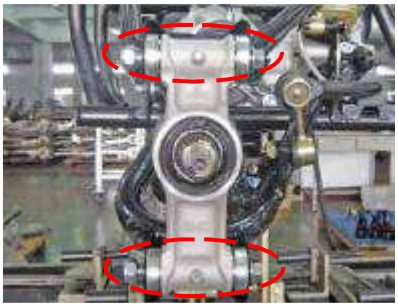
- Remove the flange nut (M20) from rear wheel hub, then pull out the LH/RH rear

2. **Remove the rear wheel knuckle**

- Remove the o-ring from LH/RH rear drive axle.
- Use wrench to hold the flange bolt (M10*95) head side, then loosen and remove the upper and lower fixing 2 flange bolts / Nuts on the rear wheel knuckle (R/L).
- Remove the thrust covers on the rear knuckle
- Remove the rear knuckle.



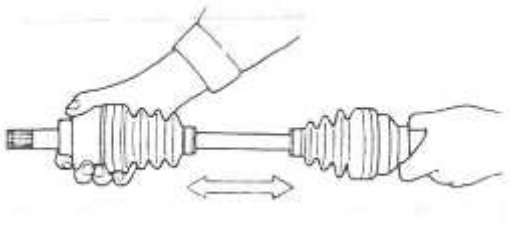
3. Pull out the rear LH/RH drive axle from rear transmission gear box.



b. Inspection

1. Rear Hub – damage/cracks/ worn spindles ➔ replace
2. Rear Knuckle
   - Oil seal – cracks/damage ➔ replace
   - Bearing – roughness ➔ replace (refer to 15-06)
   - Inner collar/bush/cir-clip/grease nipple ➔ replace

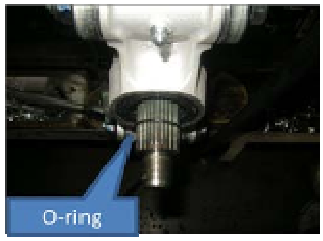
3. Constant Velocity Joint
   Excessive play ➔ Replace the joint ass'y.
   Refer to Chapter 17.
   Recommended repairing boot:
   42533-MAX-00 (Boot set)
   42838-MAX-00 (Boot set)



c. Installation

1. Install the LH / RH drive axles assy to the rear gear box.
2. Install rear wheel knuckle and tighten the flange nuts & bolts at upper ad lower knuckle side.
   Torque:5.5 kgf-m


3. insert the O-ring to the rear drive axle, then Install rear wheel hub.
   - Add loctite glue to the rear drive axle and flange nut , then stake collar of the nut into the notch of the shaft.
   - Always replace a new nut



Torque:26kgf-m

16-06. Rear Brake System Inspection

a. Inspection

- By visual examination whether fluid leaking or the damage on the brake hose side, the connecting bolts washer side, and caliper body side.
- Turn the handle left and right, pressure to the rear shock, to check if there any interfere, abnormal pull & push on the hose side.
- Check the brake from inside the brake caliper. The brake pad must be replaced with new lining when the brake pad wears to the service limit.
- Park the ATV on a plane ground, and check the master cylinder screen if fluid level is under the “LOWER” mark. If yes, check the brake system if any leaking, and add the sufficient brake oil into the master cylinder.




Recommended Brake Fluid:
Brake Fluid (DOT 4).

- Apply the brake lever on left hand side (rear brake & parking brake) and on the right foot pedal side, check the free play, brake power, if perform normal. Adjust the parking brake cables or do the air bleeding on the hydraulic brake system.
- Refer to 14-06.

16-07.Adding Brake Fluid

- Refer to 14-07.
- Before the brake fluid reservoir is removed, turn the handle so that the brake fluid reservoir becomes horizontal.
- Check the rear brake fluid reservoir tank on the front left master cylinder and right footrest side, if the brake fluid lever is above the lower limit.
- If the brake fluid level is lower to the limit, remove the brake fluid cap and diaphragm and add the recommended brake fluid.

Clean the dirty brake disk

16-08. Brake Fluid Replacement / Air-bleed

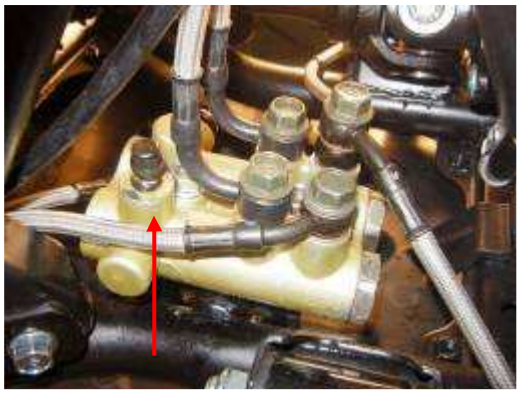
- Refer to 14-08

Before Air bleeding on the hydraulic brake system, please apply the brake pedal, front and rear brake lever, to distinguish where the air bubble is located.

Do the air bleeding / brake fluid replacement process below when there is a sponge feel while apply the rear pedal or replace the new brake fluid.

a. Air bleeding on the brake shunt Assy side.

a. Connect a transparent drain hose to air-bleed valve on the brake shunt, and place an oil container under the brake shunt to collect the exhaust brake fluid.
b. Open the brake fluid reservoir cap at right footrest side, check and add the brake fluid while doing the below air bleeding process.
c. Open the drain valve around 1/4 turns on the brake shunt and keep applying the brake pedal.
d. Checks the drain hose for the air bubble flow while apply the brake pedal. Close the air bleeding bolt until there is no air bubble comes out/ brake fluid become clear (new)
e. Apply the brake pedal to check if the brake feeling is firm and solid.
f. Add brake fluid on rear brake fluid reservoir the level between upper and lower limit and closed the reservoir cap.



Recommended brake fluid:
DOT 4 brake fluid

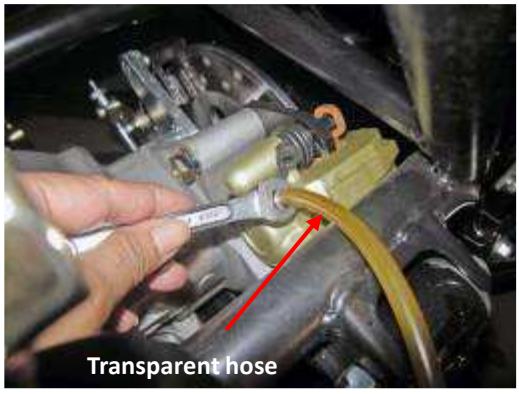
b. Air bleeding on the rear brake caliper side.

- Refer to 14-08

Caution:

Before doing the rear caliper air bleeding, please make sure the there is no air bubble between rear master cylinder to brake shunt side.

a. Connect a transparent drain hose to air-bleed valve on the rear brake caliper, and place an oil container under the rear brake caliper to collect the exhaust brake fluid.
b. Open the rear brake master cylinder cap at left handle bar side, check and add the brake fluid while doing the below air bleeding process.
c. Open the drain valve around 1/4 turns on the rear brake caliper and keep applying the brake pedal.
d. Checks the drain hose for the air bubble flow while apply the brake lever. Close the air bleeding bolt until there is no air bubble comes out/ brake fluid become clear.
e. Apply the brake lever to check if the brake feeling is firm and solid.
f. Add brake fluid on rear brake master cylinder at the level between upper and lower limit and closed the reservoir cap.



Recommended brake fluid:
DOT 4 brake fluid

16-09. Rear Brake Caliper

- Refer to 14-09

Note:

It is un-necessary to remove the brake hose on the normal service work only if the rear caliper is defect.

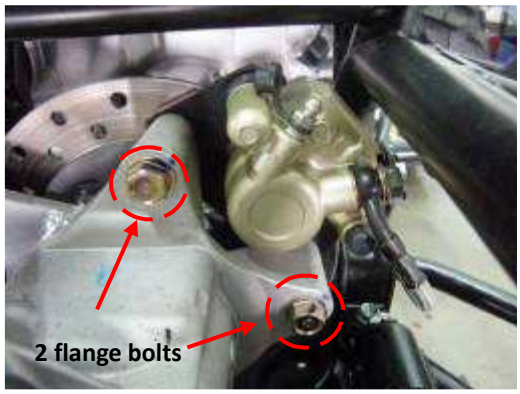
a. Removal

1. Place a container under the rear caliper,
2. Loosen the fluid hose bolt on the caliper.
3. After brake fluid out completely, remove the brake hose union bolt, two copper washer and then finally remove the brake hose.

Caution

Do not spill brake fluid on painted surfaces.

4. Remove two caliper bracket bolts on the rear gear box side and remove the rear caliper(with bracket).



b. Inspection

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

c. Installation

- Install the brake caliper and tighten the attaching bolts securely.

Torque: 4.5 kg-m/45 Nm

Caution

1. Use **M10 x 50 mm** flange bolt only.
2. Long bolt will impair the operation of brake disk.

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

Torque: 4.5kg-m / 45Nm

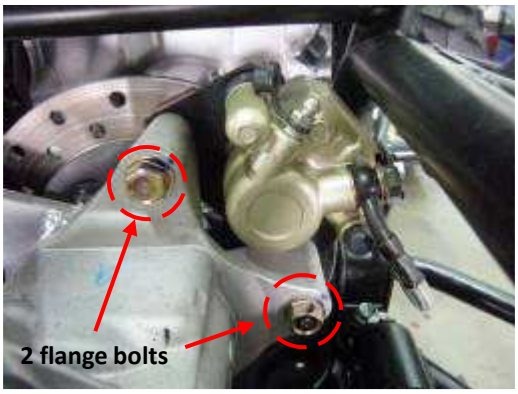
- Refill up the brake fluid to the reservoir and make necessary air bleeding.

16-10. Rear Brake Disk

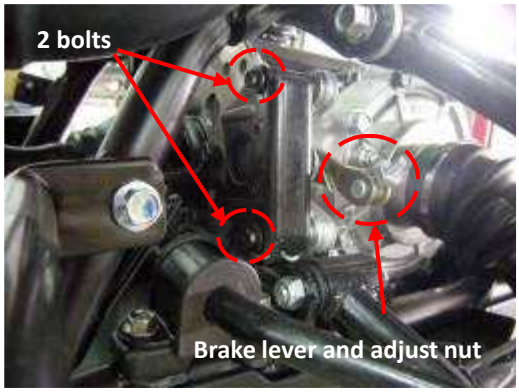
a. Removal

1. Stand the frame off the ground; remove the right and left side of rear wheel rim and footrest cover.
2. Remove the ANTI-ROLL BAR
   - Remove the right and left side of the fixing bolt of ball joint at the lower of suspension arm.
   - Remove the fixing bolt of the anti-roll bar holder and then remove the anti-roll bar.

3. Remove 2 bolts on rear gear box and remove the rear caliper with bracket.



4. Remove parking brake caliper
   1. Remove out the parking brake adjust nut and remove the parking brake cable from brake arm.
   2. Remove the 2 flange bolts on the parking brake caliper side and remove the parking brake caliper.



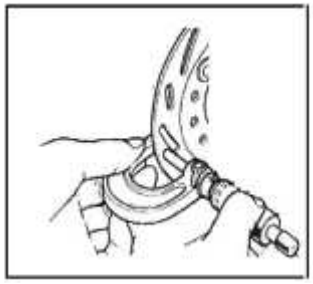
5. Remove 4 socket bolts and pull out the rear drive shaft

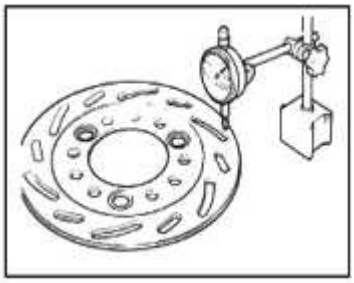
6. Use G-clamp to hold two side of needle bearing cap at rear brake disc side, add the pressure, remove the cir-clip on the cross joint side, then remove the universal joint (with cross joint on it)

7. Pull out the Remove the 4 socket bolt on the rear brake disc and remove the brake disc.

8. Inspection

- refer to 2-12/14-10
- Visually check the brake disk for wear or break.
- Measure the thickness of the disk at several places. Replace the disk if it has exceeded the service limit.





Allowable limit: <u>4.5 mm</u>

- Check the disk for deformation and bend.

Allowable limit: <u>0.30 mm</u>

Caution

1. The dirty brake lining or disk will reduce the brake performance.
2. Please do not use the air-gun to be clean, the operator should use vacuum cleaner to clean it.

- Check the universal joint at anti-roll bar, if any deform, rubber seal damage, oil leaking, un-smooth bearing operation. Replace with new if necessary.

- Check the anti-roller bar, holder and bush side, if any deform, damage, replace with new if necessary.

9. Installation

Do the reverse way of removal. Grease the bearing, oil seal on the rear propeller shaft before install.

Torque setting:

1. Install the rear brake disk and tighten the socket bolts (M8*17) refer to 14-05.

Torque: 3.5kg-m

2. Install the anti-roll bar and tighten the holder bolts (M8*12).

Torque: 3 kgf-m

3. Install the anti-roll bar universal joint to the rear lower suspension arm and tighten the flange nuts.

Torque: 4.8 kgf-m

4. Installation of parking brake caliper socket bolt(M8*45)

Torque: 3kgf-m

5. Installation of rear brake caliper bracket flange bolt (M10*50):

Torque:4.0kgf-m

6. Installation of the rear drive shaft the socket bolts (M8*17) with loctite glue.

Torque:4.0 kg-m

16-11. Rear Suspension ARM

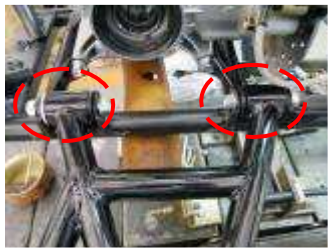
a. Removal

1. Removal of rear shock absorber

- Shift the vehicle to let the vehicle off ground.
- Remove the rear wheel R/L
- Remove the lower and then upper fixing bolts and removes the rear shock absorber.

2. Remove the upper and lower rear suspension arm

- Remove the anti-roll bar, wheel hub, knuckle, rear axle, rear shock absorber as mentioned at previous section of Chapters.
- Remove 2 flange bolts (M10*70) and nuts (M10) on the upper suspension arm, then remove the upper suspension arm.

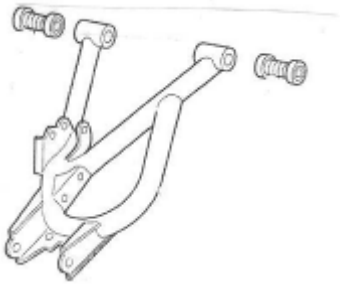


- Remove 2 flange bolts (M10*70) and flange nuts (M10) on the lower suspension arm, and then remove the lower suspension arm.
- Remove the thrust cover at rear side of upper & lower A-arm

b. Inspection

1. Rear shock absorber
   - Check the absorber if any oil leaking, damage.
   - Check the bushings on the two side of absorber, if any break, deform. Replace with new if necessary.

2. Upper and lower rear suspension arm
   - Check the bushings at the frame installation side, if any break, damage,



replace with new if necessary.

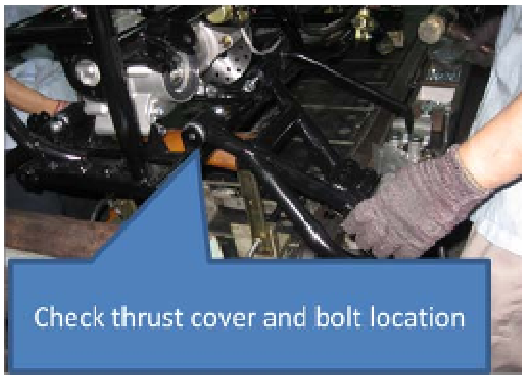
- Check the suspension arm body, if any deforms, crack, wear, and replace with new if necessary.

c. Installation

- Put a thrust cover at rear side of A-arm, install the rear arm lower and tighten the flange bolt (M10*70) and flange nut (M10).

Torque: 4.5 kg-m /45 Nm

- Put a thrust cover at rear side of A-arm, install the rear arm upper and tighten the flange bolt (M10*70) and flange nut (M10).



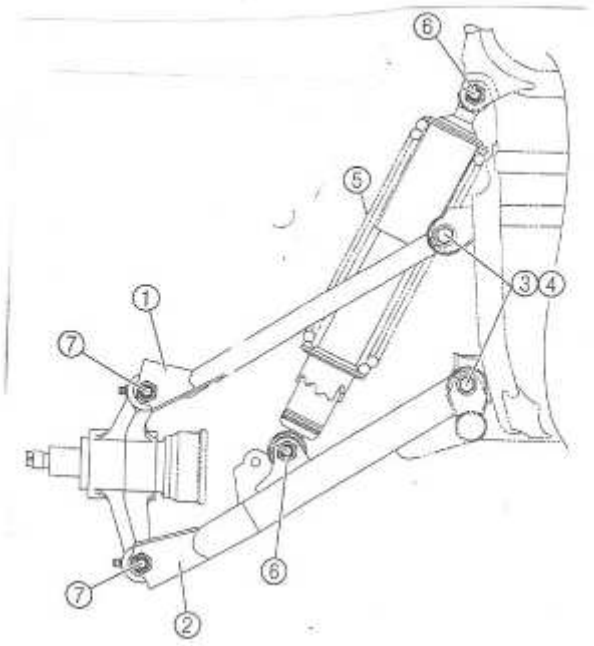
Torque: 4.5 kg-m /45 Nm

- Installation steps:

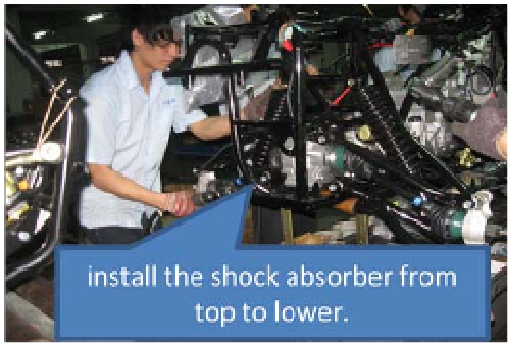
1. Install the rear arm (upper) ① and rear arm (lower) ②.
2. Lubricate the bolts ③ with grease.
3. Be sure to position the bolts ③ so that the bolt head faces outward.
4. Temporarily tighten the nuts ④.
5. Install the rear shock absorber ⑤ from top to lower.
6. Install the rear knuclkle.
7. Tighten the nuts ④.

Torque value:

Nut ④: 4.5kgf-m
Nut ⑥ 4.5kgf-m
Nut ⑦ 4.5kgf-m



- Install the anti-roll bar, wheel hub and wheel rim as mentioned at previous section of this Chapter.



16-12. Rear Brake Master Cylinder

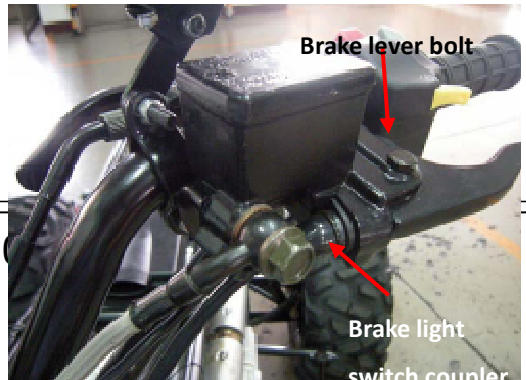
a. Master Cylinder Removal

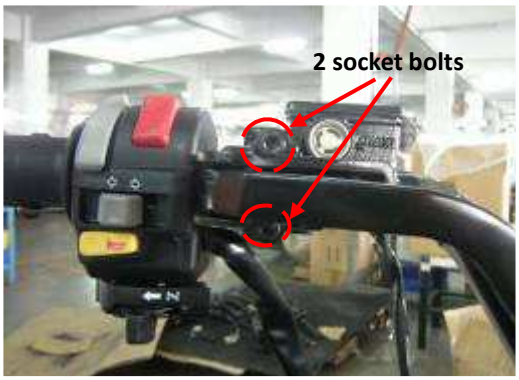
Caution

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

1. Handle left side – rear brake master cylinder

- Remove brake light switch coupler.
- Loose the brake fluid hose bolt on the left master cylinder side, drain out the brake fluid.
- Remove the brake hose.
- Remove the brake lever pivot bolt, and remove the brake lever from the brake master cylinder.
- Remove the master cylinder socket bolts and the master cylinder.

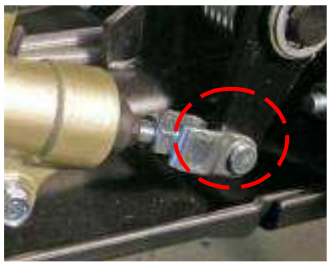



2 socket bolts

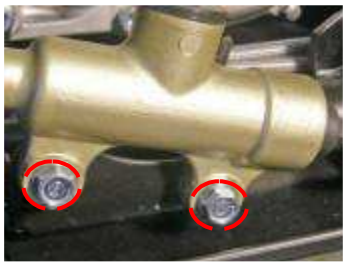
2. Right footrest side – rear brake master cylinder

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

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



- Remove the cotter pin from clevis pin in connecting with brake pedal and rear master cylinder, then remove the clevis pin.



- Remove the master cylinder 2 flange bolts and then remove the rear master cylinder.

b. Master Cylinder Inspection

- Check the master cylinder for damage or scratch. Replace it if necessary.
- Do not suggest to disassemble the brake related components (ex. master cylinder/caliper/shunt).

c. Master Cylinder Install

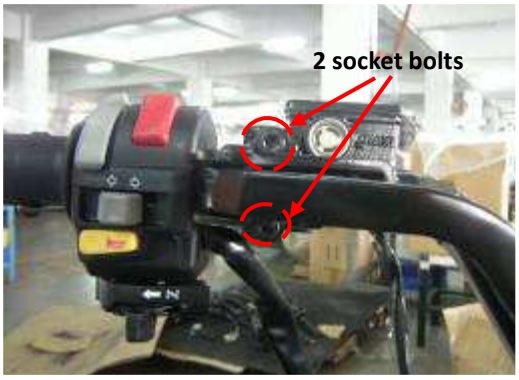
Caution
Improper routing may damage leads, hoses or pipes.

Caution
Wrong brake leads, hose or pipe may reduce brake performance.

1. Handle left side – rear brake master cylinder
   - Install the master cylinder onto handlebar, and install the bolts.
   - Install the brake lever, and connect the brake light switch.
   - Connect brake hoses with 2 new washers; tighten the brake hose bolt to the specified torque value.

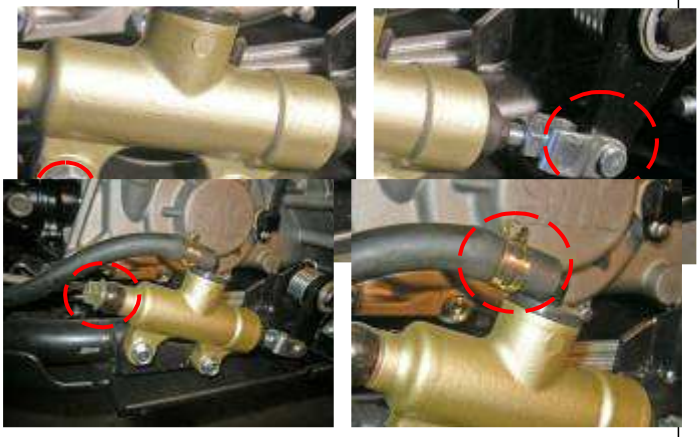
Torque: 3.0 kg-m / 30 Nm

   - Make sure the hose is installed correctly.
   - Add specified brake fluid and bleed the system.



2. Right footrest side – rear brake master cylinder
   - Install the master cylinder bolts and the master cylinder.
   - Install brake push rod to the brake pedal, and install cotter pin onto clevis pin.
   - Connect brake hoses with 2 new washers. Tighten the brake hose bolt to the specified torque.

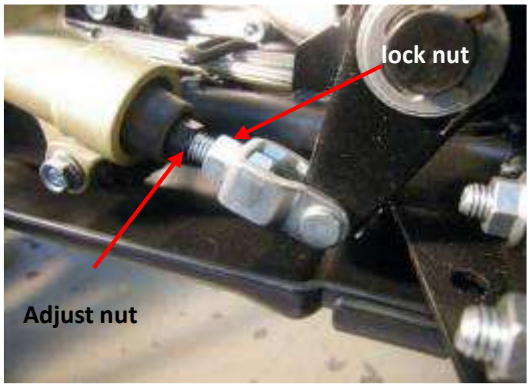
Torque: 3.0 kg-m/ 30 N-m



   - Install the fluid reservoir hose to rear master cylinder, and tighten with hose clamp. Make sure the hose is installed correctly.

   - Add specified brake fluid and bleed the system.

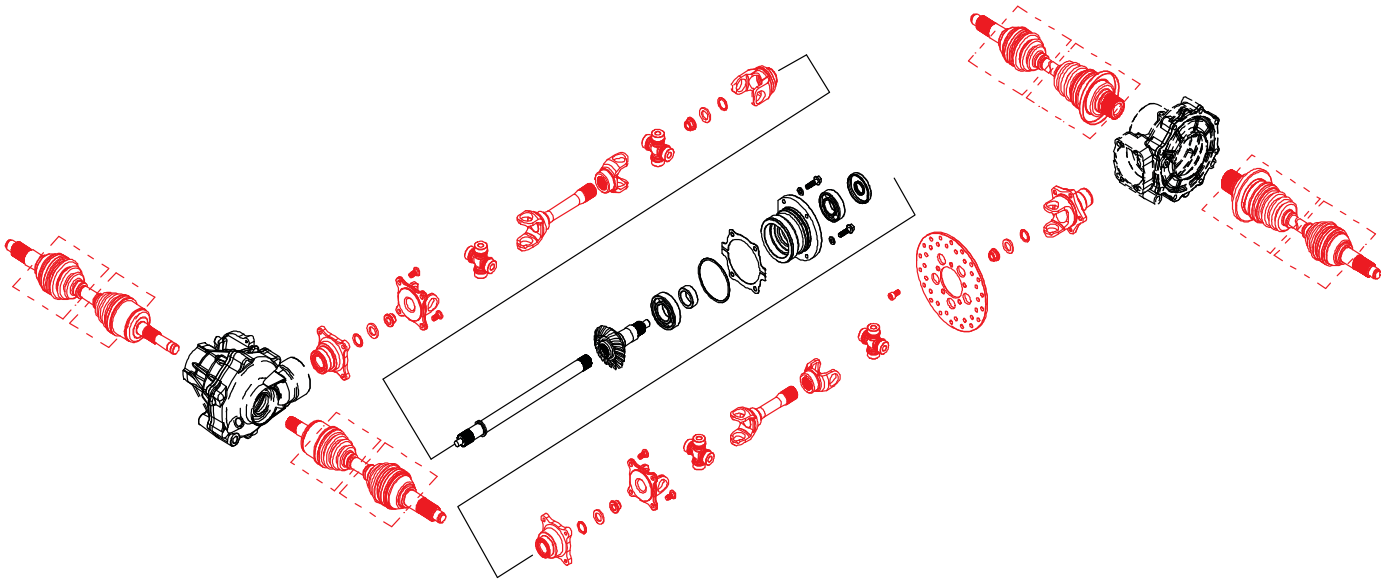
   - Adjust the brake pedal with correct free play setting. Loosen lock nut, and turn adjustment nut and apply brake pedal to adjust brake free play.



Suggest Free play: 2~4mm

NOTE:

17-01.Mechanism Diagram



17-02. Trouble Diagnosis

a. Engine can be started but vehicle cannot move.

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

b. Noise

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

c. Gear oil leaks

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

17-03. Wheel Drive Shaft Removal

a. Front wheel drive shaft removal

- Remove the front right / rear wheel.
- Remove the front right / rear brake caliper ,disk and wheel hub..

- Remove the cotter pin, castle nuts, and then remove the tie-rod and steering knuckle.
- Remove the front right / left wheel drive axle

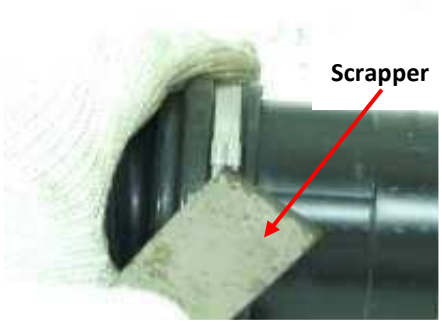
b. Rear wheel drive axle removal

- Remove the rear right / left wheel.
- Remove the rear right / left wheel hub.
- Remove the right / left wheel knuckle
- Remove the rear right / left wheel drive shaft.

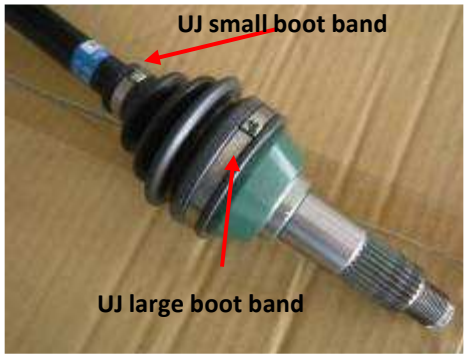
17-04. Wheel Drive Axle Disassembly

a. Universal joint disassembly

- Open the boot band clip with scrapper.



- Remove the rubber boot bands.



- Remove the UJ rubber boot.

- Disassemble the wheel drive shaft UJ assembly with rubber hammer & special tool.

Caution

Do not disassemble UJ assembly by using the steel hammer.

- Remove 6 steel balls from UJ assembly outer race.

- Remove the inner race and cage from the outer race.

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

b. Double Offset Joint Disassembly

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

- Remove the inner cir-clip with screw drive.

- Disassemble DOJ assembly.

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

- Remove the steel balls from cage.

17-05. Wheel Drive Axle Inspection

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

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

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

17-06. Repair Pack

a. Check if DOJ & UJ boot is damaged. Replace DOJ or UJ assembly if it is damaged.

b. Remove the DOJ & UJ boot band.

c. Remove the DOJ & UJ cage.

d. Remove the DOJ & UJ boot.

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

f. Clean the DOJ & UJ cage.

g. Unpack DOJ Repair Pack.
- Front: 42538-MAX-00
- Rear: 42838-MAX-00

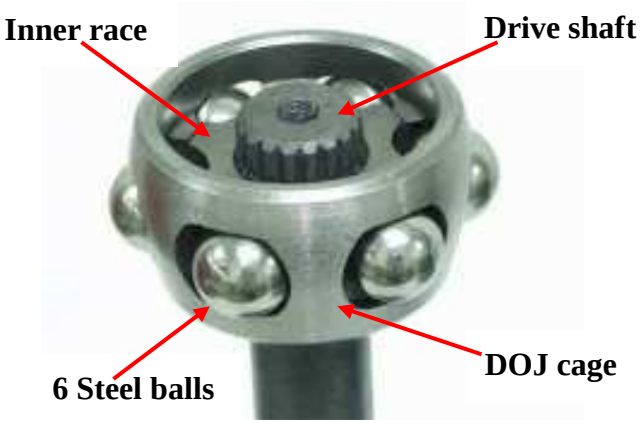
h. Unpack UJ Repair Pack.
- Front: 42533-MAX-00
- Rear: 42533-MAX-00

17-07.Wheel Drive axle Assembly

a. DOJ assembly

- Assemble the DOJ boot.

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



- Assemble exit cir-clip onto drive shaft.

- Grease into the DOJ outer race.

Caution

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

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

- Install DOJ boot outside band.

- Install DOJ boot.

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

- Deduct DOJ band closely with rubber hammer.

b. assembly

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

- Pour grease into the UJ boot inside.

Caution

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

- Assemble cir-clip with the tool.

- Strike the wheel drive shaft by rubber hammer.

- Install UJ boot.

- Pull and open DOJ boot to balance the inside and outside pressure.

- Install band with rubber hammer.

17-08. Front and Rear Drive Shaft

a. Rear Drive Shaft Remove

- Loosen 4 bolts from the rear drive shaft connector.(rear coupling)

- Pull out and remove the universal joint, cross joint and rear drive shaft

b. Remove of front propeller shaft assy.

- Loosen and remove 4 socket bolts from the front drive shaft connector.(front coupling)

- Pull out and remove the universal joint, cross joint and front drive shaft

c. Disassembly of the Front/Rear propeller shaft assy (universal joint and cross joint)

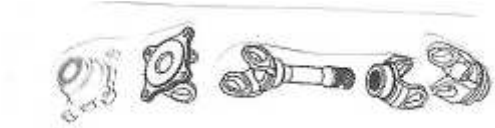
- Use the G-clamp to push two side of the cross joint cap and remove the fixing cir-clip.

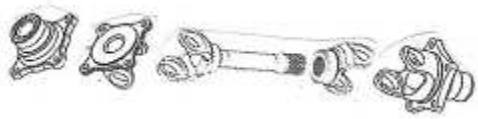
- Remove the Cap of the cross joint.

(apply to all the universal joint dis-assembly of front and rear propeller shafts)

d. Inspection of the front and rear propeller shafts, universal joints, cross joints

- Clean all the parts.
- Check all couplings for wear or scratch, damage ➔ Replace with new if necessary.
- Check spindles/ threads of couplings for wear/scratch/damage ➔ Replace





- Turn the cross joint cap, check if smoothly (check the condition of inside needle bearing if normal)

- Check needle bearing , fixing C-clips on the cross joint. Replace with new one if wear/damage
  - Always replace the cross joint, needle bearings, (joint cap), C-clips as a set.

e. Assembly of the universal joint/cross joint

- Grease the needle bearing inside the cap.
  - Lithium soap base grease.


- Install one side of cap to the cross joint through the universal joint hole, and close it by fixing cir-clip.
  - Always replace a new cir-clip.


- Put another side of the cap onto cross joint through opposite side the universal joint.

- Put the G-clamp to push the two edges of the cross joint cap, and install the fixing cir-clip.


- Turn the cross joint, and check if bearing, oil seal function well.

- Follow above, to install another universal joint on the same cross joint.

f. Install the front / rear drive/driven shafts.

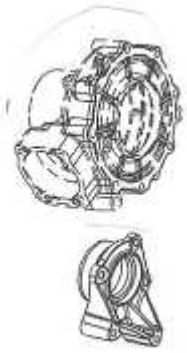
- Grease the shaft gear before install the propeller shaft to the universal joint.

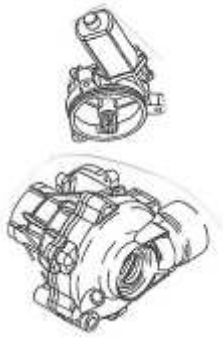
- Follow reverse process of removal to install the front / rear propeller shaft.

Torque of the drive shaft connecting socket bolt: 4kgf-m

NOTE:

18-01. Mechanism Diagram





18-02. Trouble Diagnosis

a. Engine can be started but vehicle cannot move.

- Disconnect couplings
- Damaged propeller shaft
- Damaged front differential or rear gear box

b. Noise

- Worn or burnt driving/drive pinion gear
- Shims adjusting
- Not correct engagement on gears
- Less gear oil/ not correct gear oil/ no oil replacement

c. Gear oil leaks

- Excessive gear oil
- Worn or damage oil seal/o-ring
- Damage on the gear box.

18-03. Rear Gear Box

a. Rear gear box removal

Refer to 17-08 to disconnect/install the couplings with engine.

Clean gear box before removing.

- Drain out the gear oil by loosening drain bolt under the gear box.

- Unscrew two bolts to remove rear caliper.

- Unscrew two bolts and remove bolts/washers/nuts.
  - Loosen all bolts in stages, then remove.

- Release the breath pipe/park cable and remove the rear gear box out.
  - suggest to remove gear box as a whole set with disc and park caliper.

b. Inspect

- Lash adjustment have been done inside the gear box. Do not suggest to open the gear box without experience.
- Adjusted shims remarked the “grade” in the case of gear box.
- Check the oil seals/o-ring damaged ➔ replace
- Check bearings damaged ➔ replace
- Check bevel gears damaged ➔ replace
- Check the breath hose pipe broken/crack/damaged ➔ replace

c. Gear box installation

- Assemble gear box sets as reverse steps.

- Ensure to follow specific torque

  Torque value:
  M10 Nut for Gear box: 8kgf-m
  M10*50 bolt for caliper: 4kgf-m

- Ensure breath hose pipe fixing to the upper chassis pipe.

- Install back the drain bolt (& drive rear axles) then refill gear box oil then fix filler bolt.
  - replace a new washer
  - apply enough grease on oil seals/drive shaft/axles.
  - gear oil (refer to 2-19)

Periodic oil change: 290cc
Oil change after disassembling: 330cc
Recommended oil: SAE 90 API "GL-4" Hypoid gear oil.

- **Torque value:**
  M12 drain bolt: 2.6kgf-m
  M16 filler bolt: 2.6kgf-m

18-04. Front Differential Gear Box

a. Rear gear box removal

Refer to 17-08 to disconnect/install the couplings with engine.
Clean gear box before removing.

- Drain out the gear oil by loosening drain bolt under the gear box.

- Unscrew three bolts and remove nuts/washers. differential gear box..
  - Loosen the all bolts in stage, then remove them.

- Release the breath pipe/ wire harness and remove the front differential gear box out.
  - Be careful to disconnect the coupling.
  - Remove differential gear box with gear motor and driven shaft as a set.

b. Inspection

- Never dismantle gear motor ass'y, replace it as whole component, if necessary.
- Lash adjustment have been done inside the

differential gear box. Do not suggest to open the differential gear box without experience.

- Adjusted shims remarked the “grade” in the case of differential gear box.
- Check bearings damaged ➔ replace
- Check bevel gears damaged ➔ replace
- Check the breath hose pipe broken/crack/damaged ➔ replace

c. Differential Gear Box Installation

- Assemble front differential gear box sets as reverse steps.
  - tighten the bolts in stages, and toque the bolts as:

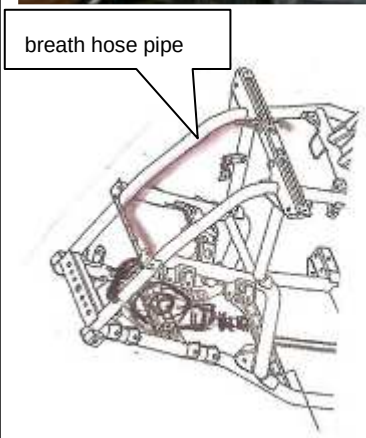
    Toque value:
    M10 Nut : 5.5kgf-m
    M10*30 bolt: 5.5kgf-m

  - apply loctite glue to M10*30 blot
  - Put the gear box from left side of chassis and be careful to the gear motor and connect the drive shaft to the engine.

- Install back the drain bolt (& drive rear axles) then refill gear box oil then fix filler bolt.
  - replace a new washer
  - apply enough grease on oil seals/drive shaft/axles.
  - gear oil (refer to 2-19)

Periodic oil change: 290cc
Oil change after disassembling: 330cc
Recommended oil: SAE 90 API “GL-4” Hypoid gear oil.

■ **Torque value:**
M12 drain bolt: 2.6kgf-m
M16 filler bolt: 2.6kgf-m

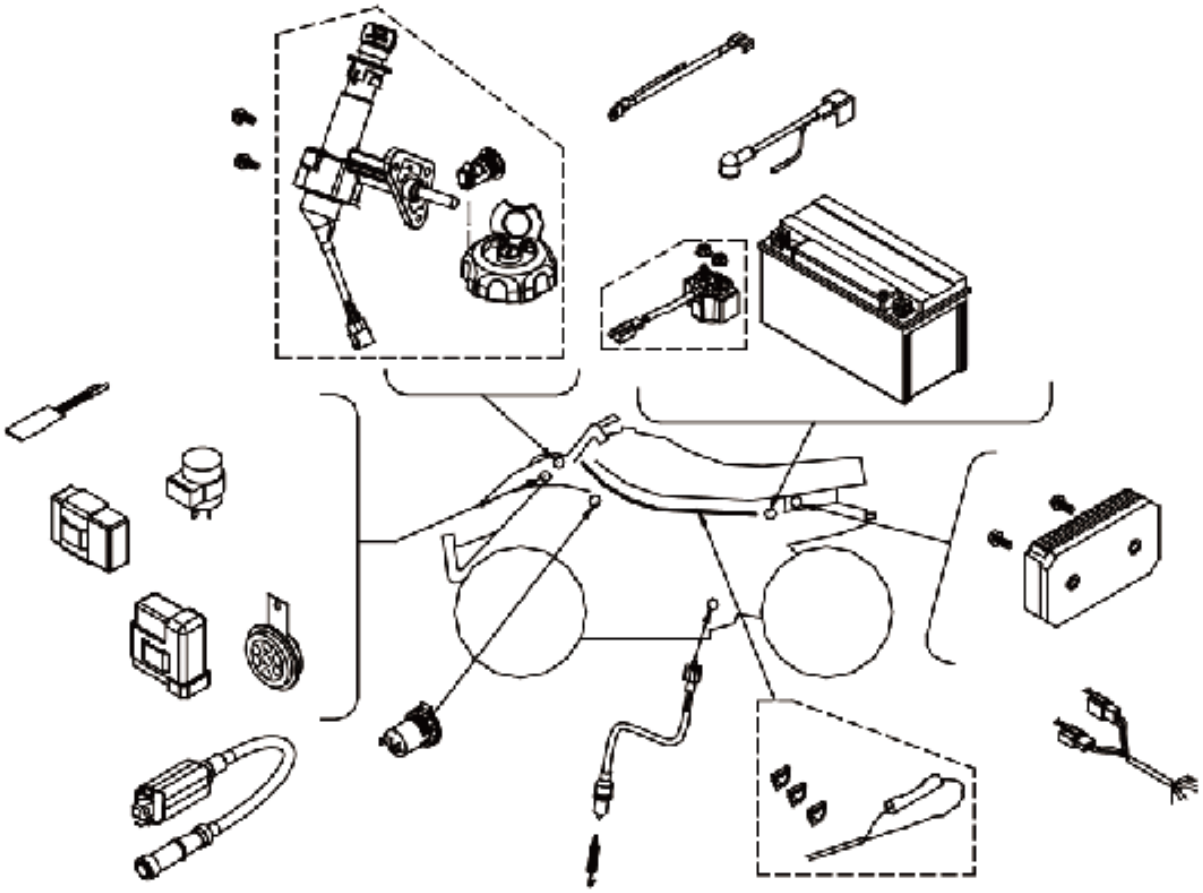


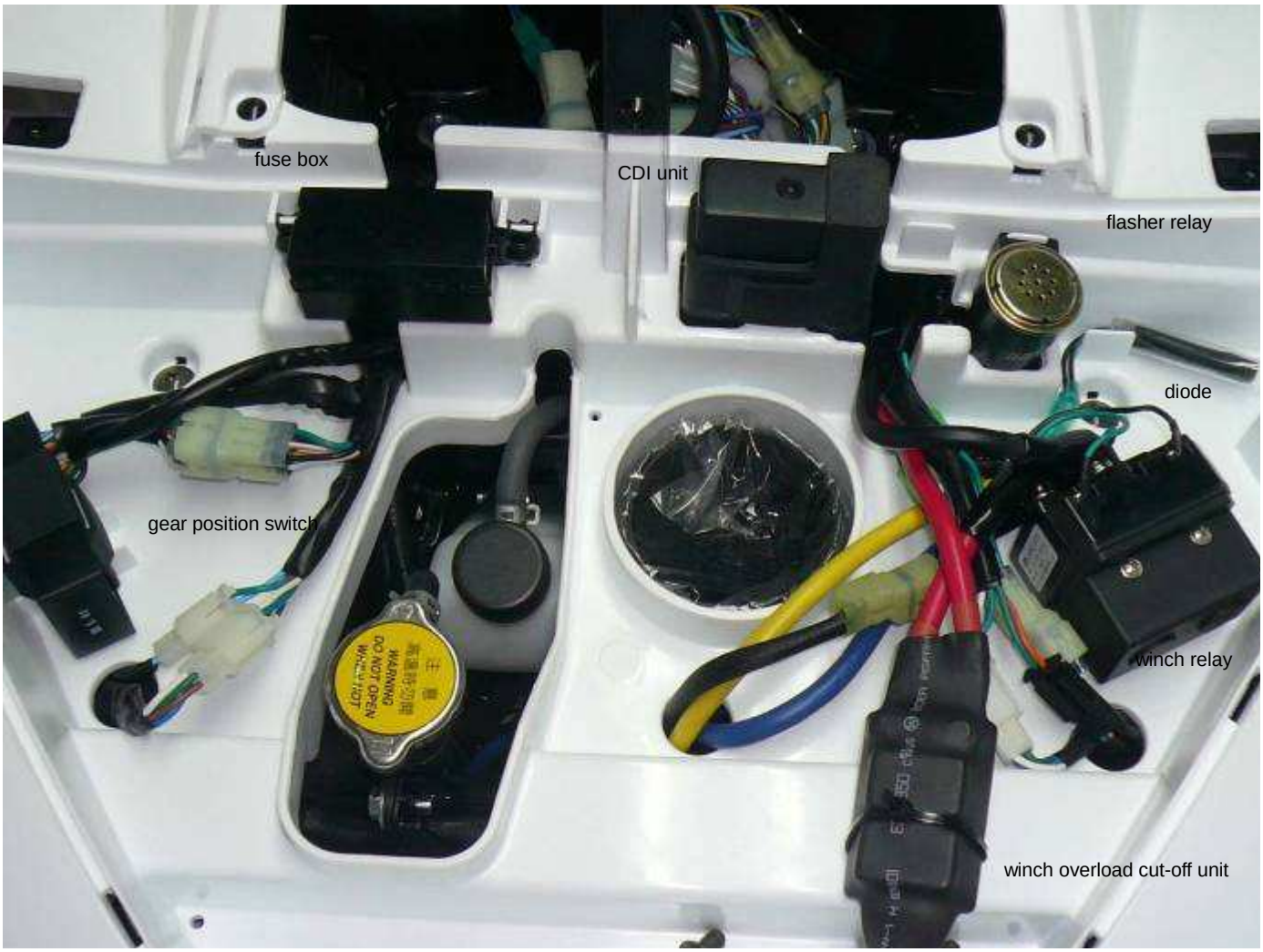
- Ensure breath hose pipe to follow the chassis pipe

- Connect wire harness of gear motor.

NOTE:

19-01. Mechanism Diagram




fuse box
CDI unit
flasher relay
diode
gear position switch
winch relay
winch overload cut-off unit

19-02. Maintenance Data

Operational precaution

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

19-03. Technical Specification

a. Charging system

Description		Specification
Battery	Type	MF type, factory default: GS or YUASA Brand
	Capacity	12V18Ah (GTX20L-BS or YTX20L-BS)
	Charging rate	1.4A / 5 ~ 10 hours (standard) hour 9A / 0.5(fast charging)
Leak current		< 1mA
Charging current		1.2 A / 1500rpm
Control voltage in charging		14.5 + 0.5 V / 1500rpm

b. Ignition system

Description		Specification
Spark plug	Model	NGK CR7E(Recommended)
	Gap	0.7~0.8mm

Ignition coil and resistance	Primary winding	2.9 ±10%Ω
	Secondary winding	Without cap:2.9 ±10%Ω
		With cap: 15 ±10%KΩ
Ignition timing “F” mark		15◦TDC/1700rpm
		46◦TDC/4200rpm

19-04. Trouble Diagnosis

a. No voltage

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

b. Low voltage

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

c. No spark produced by spark plug

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

d. Starter motor does not work

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

e. Intermittent power supply

- The connector of the charging system

f. Charging system does not operate properly

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

g. Engine does not crank smoothly

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

h. Weak starter motor

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

i. Starter motor is working, but engine does not crank

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

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

19-05. Battery

a. Removal

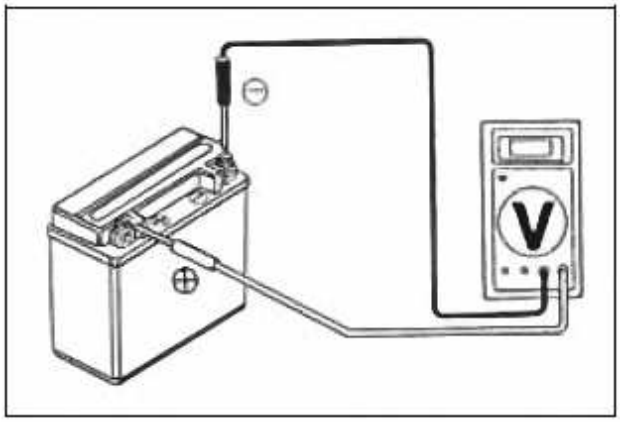
- Remove the seat, and then you can see the battery.
- Disconnect the negative cable terminal (green) first, then the positive cable terminal(red).
- Remove the battery.

b. Voltage Check

Use the digital voltmeter to check the voltage of the battery.

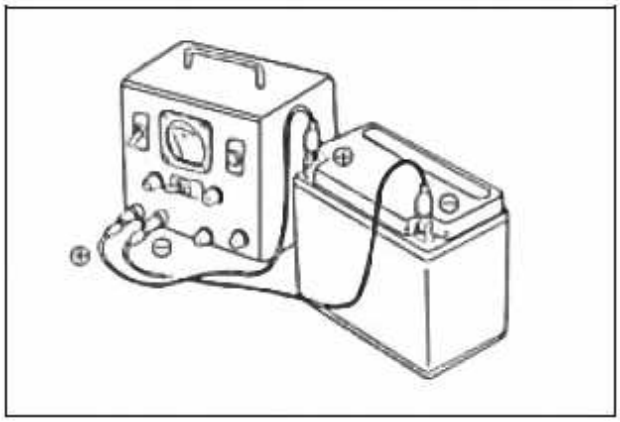
Voltage:

Fully charged: 13.0~13.2 V at 20℃
Undercharged: Below 12.3 V at 20℃



c. Charging

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



	Standard	
Maximum		
Charging current	**1.4A**	**9.0A**
Charging time	**5~10H**	**1H**

Warning

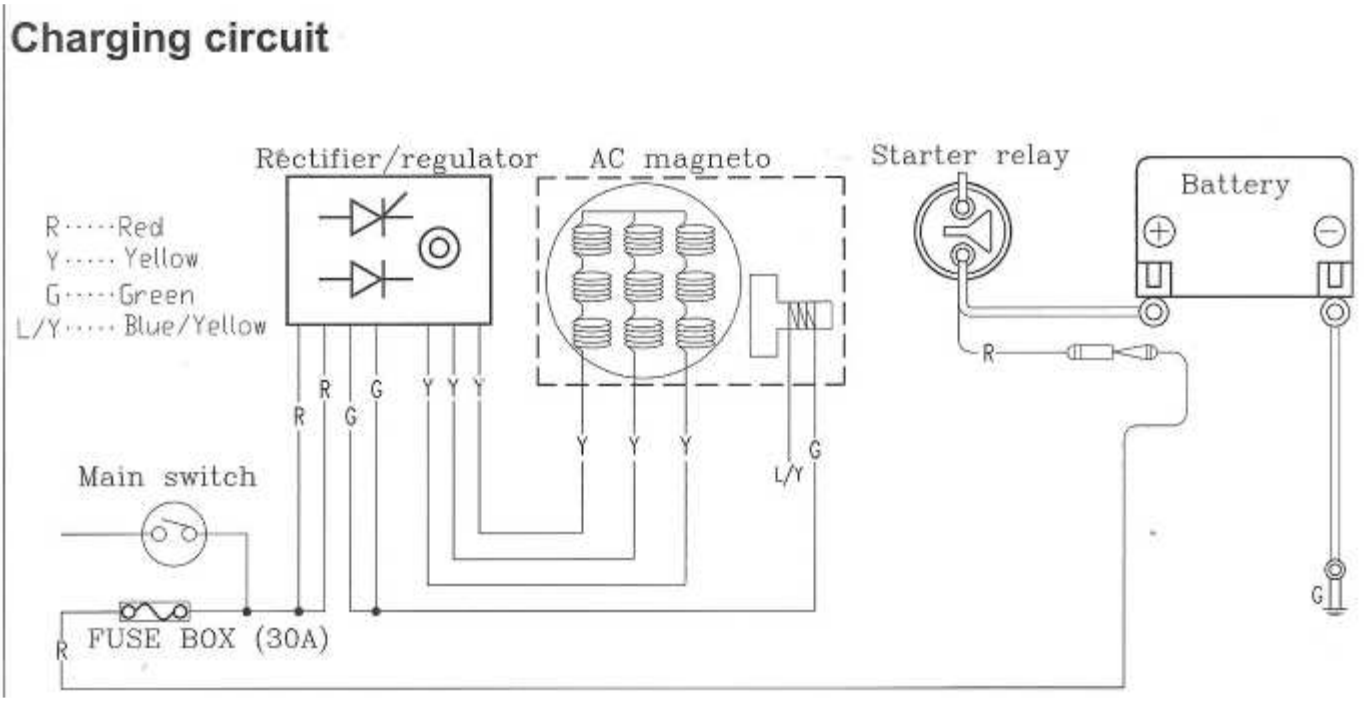
1. Keep flames away while recharging.
2. Charging is completely controlled by the ON/OFF switch on the charger, not by battery cables.

Caution

1. Never rapid charge the battery unless in emergency.
2. Verify the battery is recharged with current and duration prescribed above.
3. Large current and fast time charging could cause damage to the battery.
4. When installing the battery, coat the cable terminal with grease

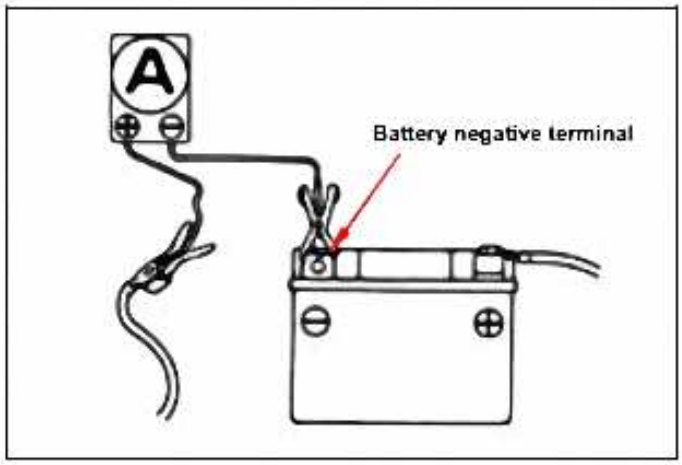
19-06. Charging System

a. Charging circuit



b. Current Leakage Inspection

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

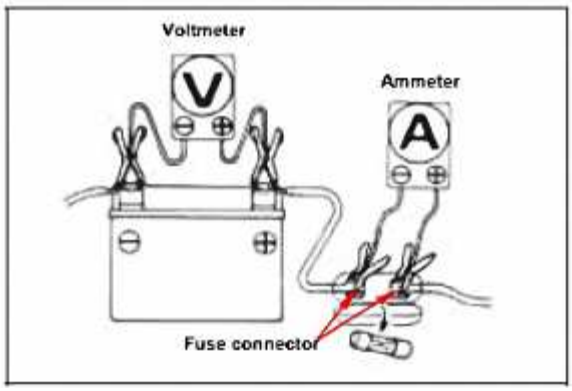


Caution

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

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

c. Inspection on Charging Voltage



Caution

1. Before conducting the inspection, make sure that the battery is fully charged. If undercharged, the current changes dramatically.
2. Use a fully charged battery having a voltage larger than 13.0 V
3. While starting the engine, the starter motor draws large amount of current from the battery.
4. After the engine is warmed up, replace original battery with a fully charged battery.

- Connect a digital voltmeter to the battery terminals.
- Connect an ammeter between both ends of the main fuse.

Caution

When the probe is reversibly connected, use a voltmeter having an indication that the current flows from the positive or the negative direction and the measurement should be at zero, ammeter at one direction only.

Caution

It is possible to measure the current by connecting an ammeter between the battery positive terminal and the cable position terminal,

- Connect a tachometer.
- Turn on the headlight to high beam and start the engine.
- Accelerate the engine to the specified revolution per minute and measure the charging voltage.

Specified Charging Current:

1.2 A / 6000 rpm

Control Charging Voltage:

14.5 + 0.5 V / 2000 rpm

Caution

1. To replace the old battery, use a new battery with the same current and voltage.
2. The following problems are related to the charging system; follow the instructions provided in the checking list to correct it if any one of the problems takes place.

(1) The charging voltage can not exceed the voltage between two battery terminals and the charging current is in the discharging direction.

(2) The charging voltage and current are too much higher than the standard values.

The following problems are not related to the charging system; correct it if any by following steps indicate in the checking list.

(1) The standard charging voltage and current can only reach when the operation of the engine exceeds the specified rpm.

- Bulbs used exceed their rate and consume too much power.
- The replacement battery is aged and does not have enough capacity.

(2) The charging voltage is normal, but the

however, while the starter motor is activated, the surge current the motor draws from the battery may damage the ammeter.

- Use the kick starter to start the engine.
- The main switch shall be turned to OFF position during the process of inspection.
- Never tamper with the ammeter and the cable while there is current flowing through. It may damage the ammeter.

current is not.

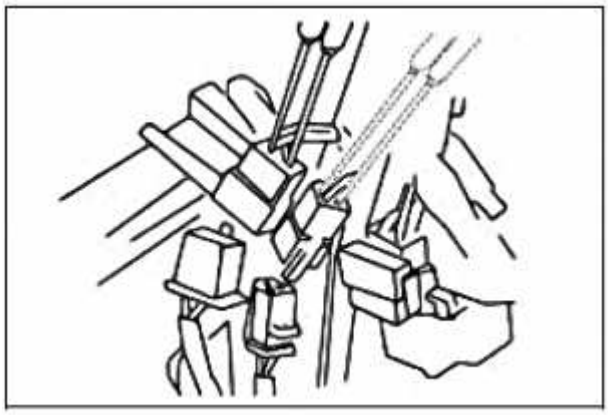
- The replacement battery is aged and does not have enough capacity.
- Battery used does not have enough electricity or is over charged.
- The fuse of the ammeter is blown.
- The ammeter is improperly connected.

(3) The charging current is normal, but the voltage is not.

- The fuse of the voltmeter is blown.

Inspection on regulator rectifier

- Remove the seat, RH side cover
- Disconnect two couplers of the regulator



Rectifier.

Inspection the rectifier coupler to the wire harness passes the condition.

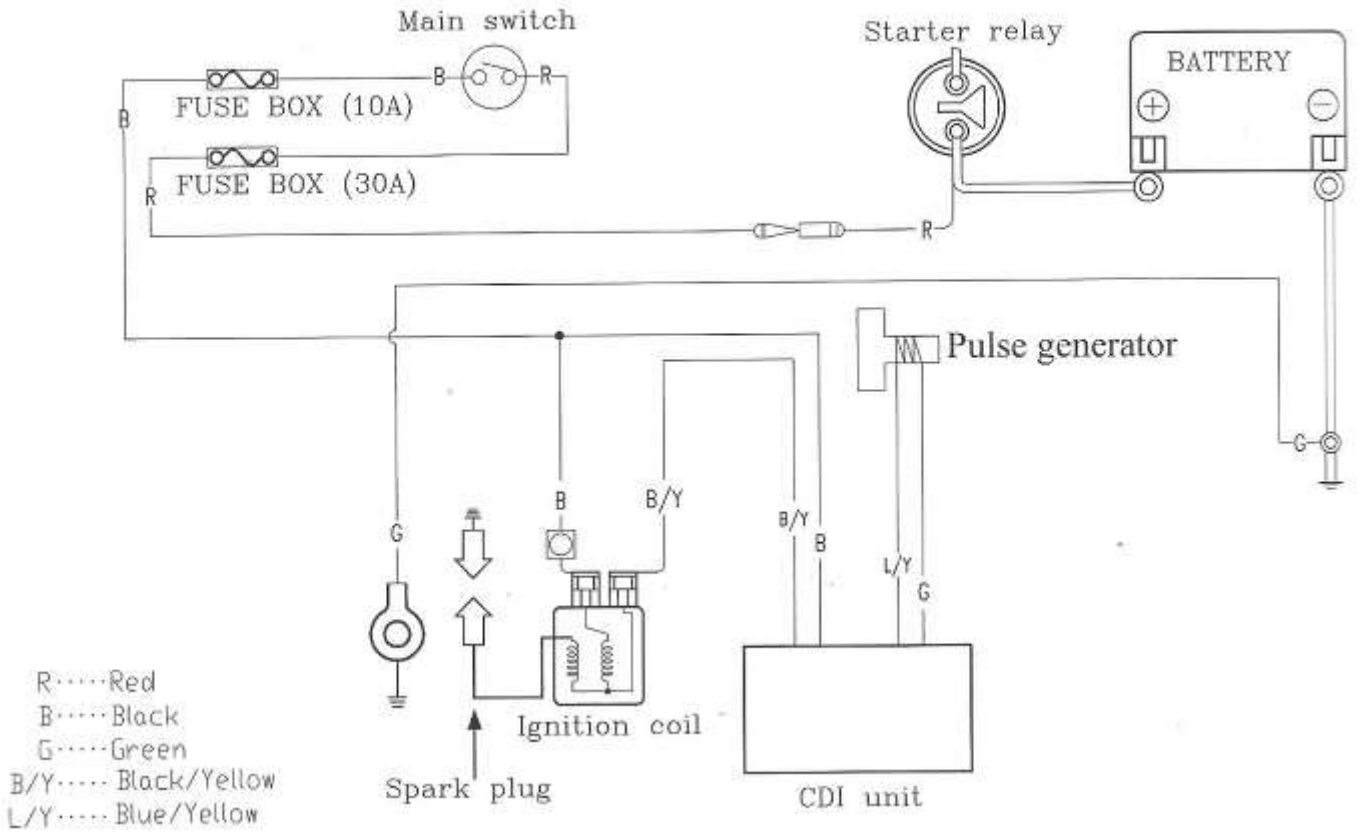
Item	Check Points	Standard Value
Main switch Connection	**R – B**	**Battery voltage (ON)**
Battery connection	**R---G**	**Battery voltage**
Charging coil	**Y---Y**	**0.235±20%Ω**

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

19-07. Ignition System

Ignition circuit diagram

Ignition circuit diagram



C.D.I unit

Disconnect connectors of the C.D.I unit.

Check the following connectors as indicated in the table at the harness side.

Item		Points to check	Result
Main switch turn to "ON"position		B ~ W/B	Battery voltage
Pulse generator		B ~ G	495±20%Ω
Ignition coil	Primary circuit	B/Y ~ GND	2.9±10%Ω
	Secondary circuit	B/Y ~ with no cap	2.9±10%Ω
		B/Y ~ with cap	15.0±10%KΩ

Inspection on Ignition Coil

- Disengage the connector of the ignition coil and the spark plug cap.
- Measure the resistance between the terminals of the primary winding.
- Standard resistance: **2.9Ω±10%**
- Remove the cap from the spark plug and measure the resistance between the spark plug and the primary winding.

Standard resistance:

With no cap: **2.9±10%Ω**

With cap: **15.0±10% KΩ**

Ignition Coil Replacement

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

Connect wire harness in a right colors, ensure to earth green one.

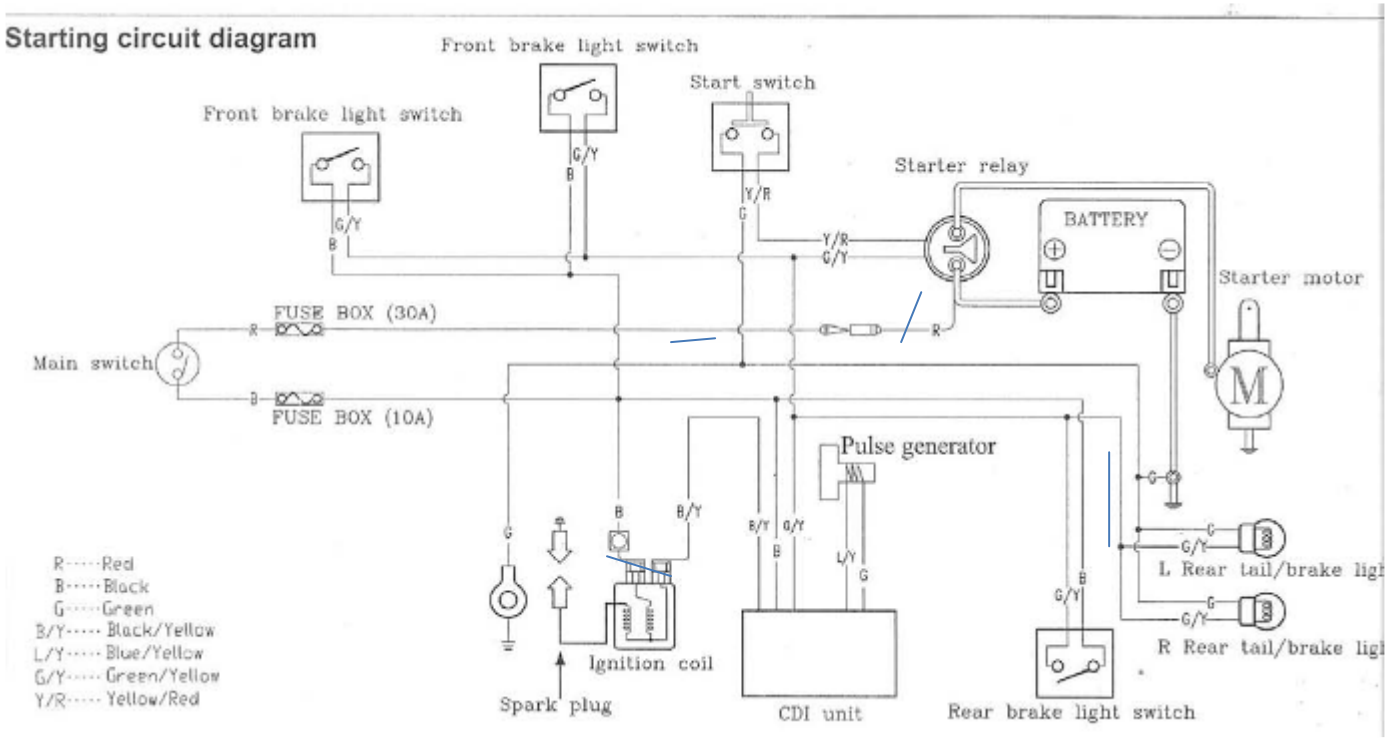
Inspection of Pulse Generator

Disconnect the coupler of the pulse generator and measure the resistance between the terminals of blue and green.

Standard resistance: 495Ω±20%

19-08. Starting System

Starting circuit diagram



Inspection on starter relay

Open the main switch.

Press the brake.

Push down the starter switch.

If a sound of .”Looh Looh”. is heard, it indicates the relay function normally.

Remove the seat.

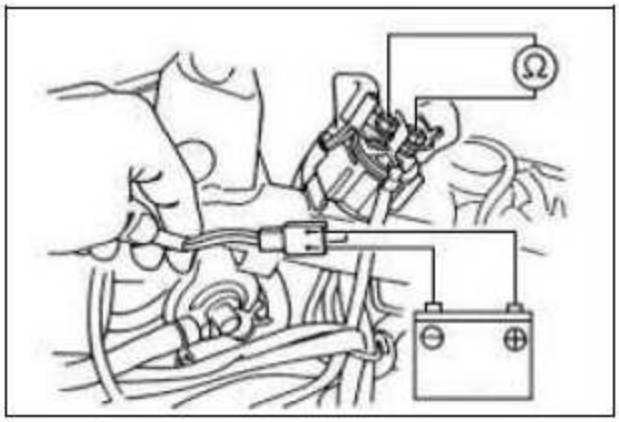
Disconnect the negative cable terminal of the battery.

Disconnect the cable positive terminal from the relay.

Disconnect the positive cable of the starter motor.

Disconnect the coupler of the relay.

Connect an ohmmeter to the large terminal end.



Connect the yellow/red cable to the battery positive terminal and the yellow/black cable to the battery negative terminal. Check the continuity of the large terminal end. If there is no continuity, replace the relay.	

Removal of Starter motor

Remove the seat.

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

Remove starter motor cable.

Loosen the lock bolts and remove the starter motor.

Installation of Starter motor

Install in reverse order of removal procedures.

19-09.Meters

Refer to Instruction of Speedometer.

19-10. Light / Bulb

Replacing Bulb for Headlight

Remove waterproof cover for the headlight.

Remove bulb setting hook.

Take out the bulb connector and the bulb.
Replace with new bulb if necessary.
(Hight light H1 12V 35W)
(Low light H7 12V 35W)

Caution

Never touch the bulb with finger, which will create a heat point.
Clean the fingerprint left on the bulb with alcohol.
Install the bulb of the headlight in reverse order of removal.
Upon completion of replacement, turn on the main switch to ensure the headlight works well.
Adjust the beam and distance of the headlight if necessary.

Replacing the Front winker light Bulb

Pull out the front winker light bulb seat.

Replace with new front winker light bulb.
(12V 10W)

Replacing Bulb of Position Light

Pull out the position light bulb seat.

Replace with new position light bulb.
(12V 5W)

Replacing Bulb of Taillight and Rear Winker Light

Take out the rubber caps.

Turn the taillight and rear winker light bulb connectors by CCW.

Replace with new rear winker light bulb.
(12V 10W)

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

Be sure to cover back the rubber caps.

Replacing Bulb of License Light

Pull the license light bulb connector out.
Replace with new license light bulb.

Replace with new license light bulb.
(12V 5W/)

19-11. Switch / Horn

Main Switch

Inspection

Remove the front center cover.

Disconnect the main switch coupler.

Check the continuity between three points as indicted below:

MAIN SWITCH	B	R	Br
OFF			
1	○—○		
2	○—○	○—○	

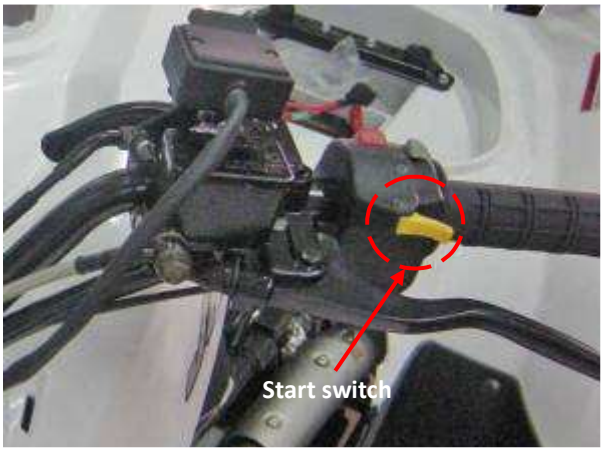
Replacement of main switch

Disconnect the coupler of the main switch.

Push out the main switch.

Align the main switch stopper with the meter cover groove, and install main switch.

Install the main switch coupler.



Handle switches

Disconnect the coupler of handle from front fender left side.

Check the continuity between two points as indicated in the table below.

Start Switch

START	G	Y/R
FREE		
PUSH	○—○	

2WD/4WD/Diff Lock switch

LOCK SWITCH				
	G	W/L	Y/B	L/B
2WD	○	○		
4WD	○		○	
LOCK	○			○

Headlight Switch

LIGHT SWITCH			
	L	Br	W
≡D	○	○	
≡D		○	○
≡D			

Winker switch

DIRECTION LIGHT			
	Lb	Gr	O
⇨	○	○	
N			
⇦		○	○

Horn switch

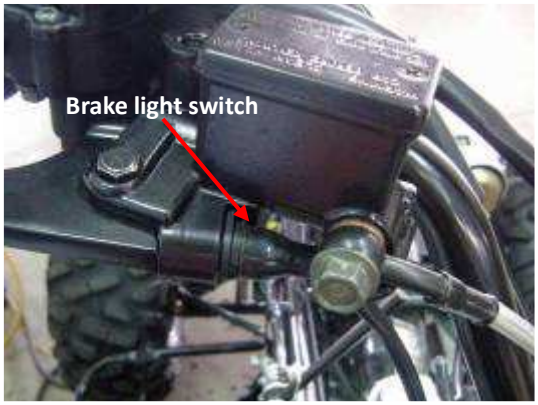
HORN		
	G	Lg
FREE		
PUSH	○	○

Warning Light (Hazard)

WARNING LIGHT			
	Lb	Gr	O
△	○	○	○
○			

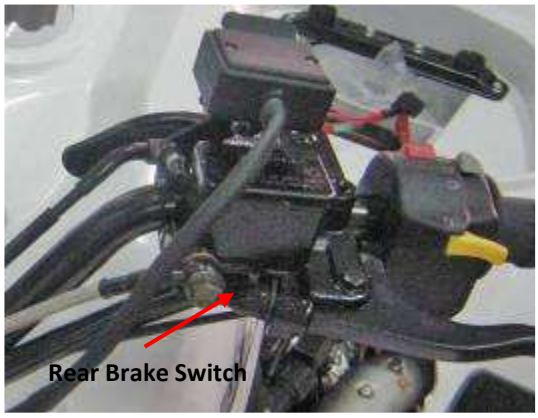
Front Brake Switch

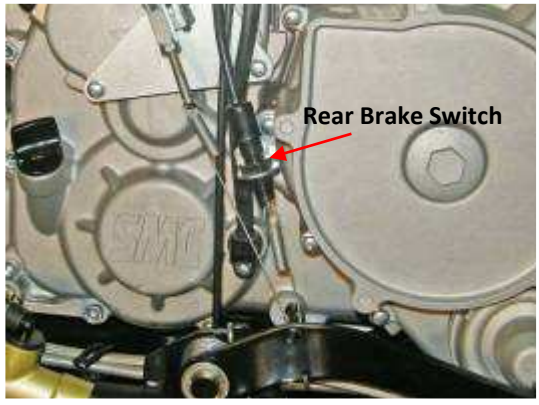
While grasp the brake lever firmly, the terminals of brown/blue and green/yellow of the brake should have continuity.
Replace the switch if damaged.



Rear Brake Switch

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





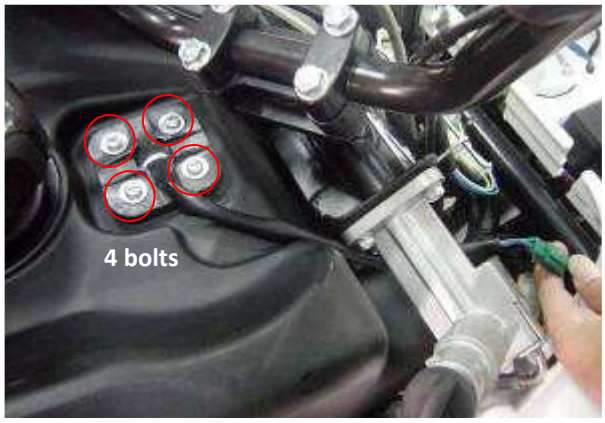
Horn

Remove the horn under front fender.

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

19-12. Sender Unit

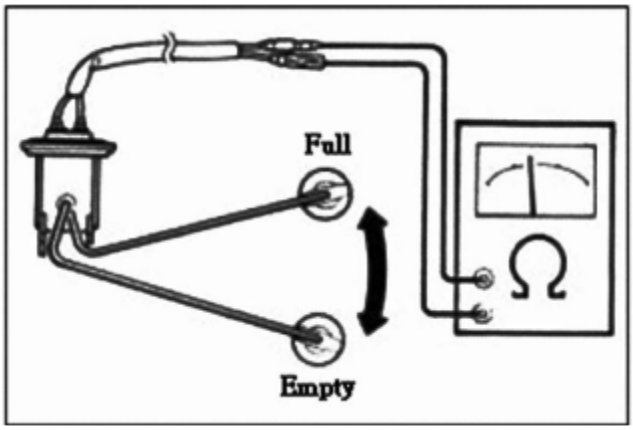
Remove the seat.
Remove the fuel tank cap.
Remove the upper center cover and front fender (refer chapter 13).
Disconnect the coupler of the fuel unit.
Remove the fuel unit (4 bolts).
Caution
Great care shall be taken not to damage or bend the float arm of the gauge.



When the float arm shifts to the F position or the E position, the resistance measured shall be as follows:

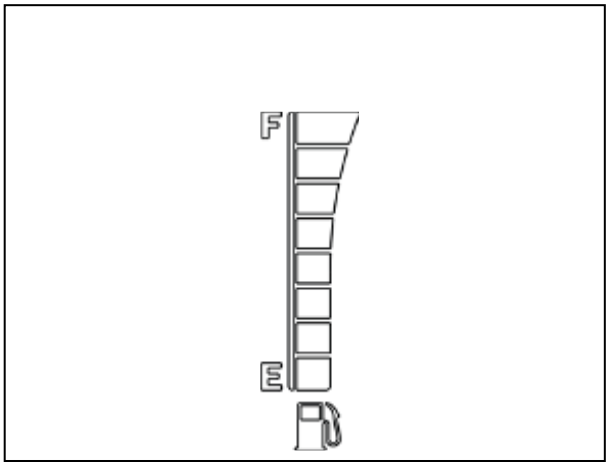
Position	Resistance
E (Empty)	90~100Ω
F (Full)	4-10Ω

Connect the wiring to the fuel unit and the ohmmeter as shown.



Connect the fuel unit coupler to the wire harness.
Turn on the main switch.
Move the float arm to verify the proper position the fuel gauge needle indicates.

Arm Position	Needle Position
Up (Full)	F (Full)
Down (Empty)	E (Empty)



Caution

While conducting the test, turn on the direction indication lamp to make sure that the battery is in serviceable condition.

19-13. Cooling Fan Thermo Switch

The thermo switch mounted on the radiator controls the operation of the cooling fan motor. In case that the fan motor fails to work, disconnect the green and black/blue leads and connect jump wires to the terminals, then, turn on the main switch, the fan motor should operate.

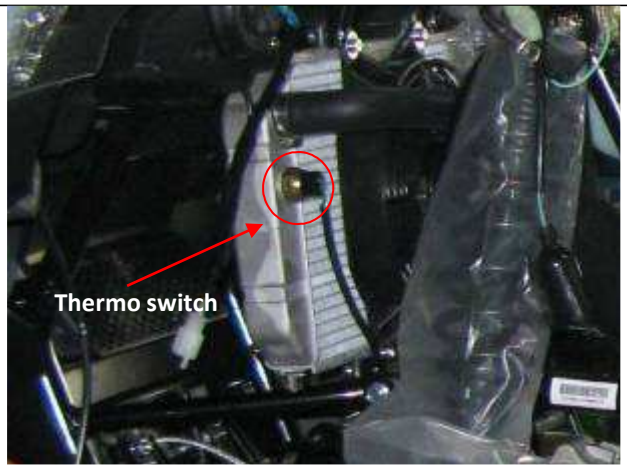
If the fan motor still fails to run, measure battery voltage between the green and black/blue leads.

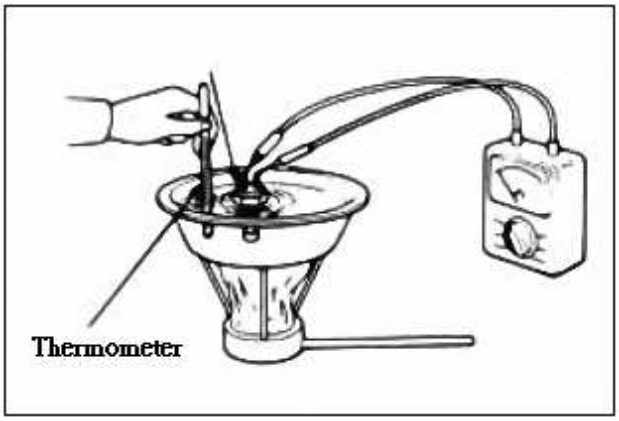
If there is no voltage, check for blown fuse, loose connection or short-circuit.

If the fan motor runs, check the thermo switch in the manner as described below:

Hang the thermo switch on the bowl filled with coolant to check the switch's opening and closing temperatures, confirm the switch is open circuited at room temperature, and increase the coolant temperature gradually.

The switch should have continuity at **85±3**℃.





Caution

Keep the coolant at a constant temperature at least for three minutes. Sudden increase the coolant temperature will cause the thermometer and the tester to indicate wrong readings.

Never let the thermometer and the thermo switch contact the wall of the bowl, which may result in wrong readings.

The thermo switch shall be placed in the coolant until the teeth are completely submerged.

19-14. Thermo unit

Remove the thermo unit.

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

temperature	50℃	80℃	100℃	120℃
Standard(Ω)	154	52.5	27	16

Ω±**10%**

Caution

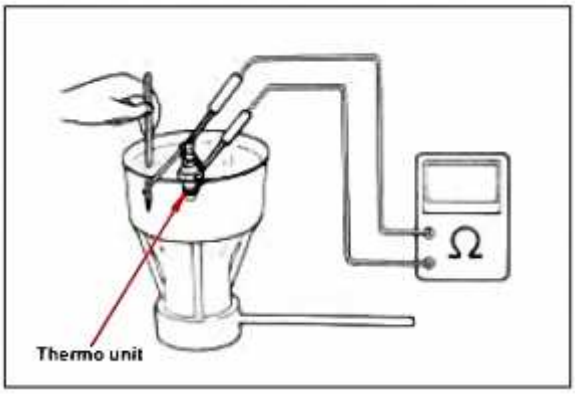
Wear gloves and goggles when performing this test.

Caution

Engine oil should be used as a heating medium as the test temperature must be higher than **100℃.**

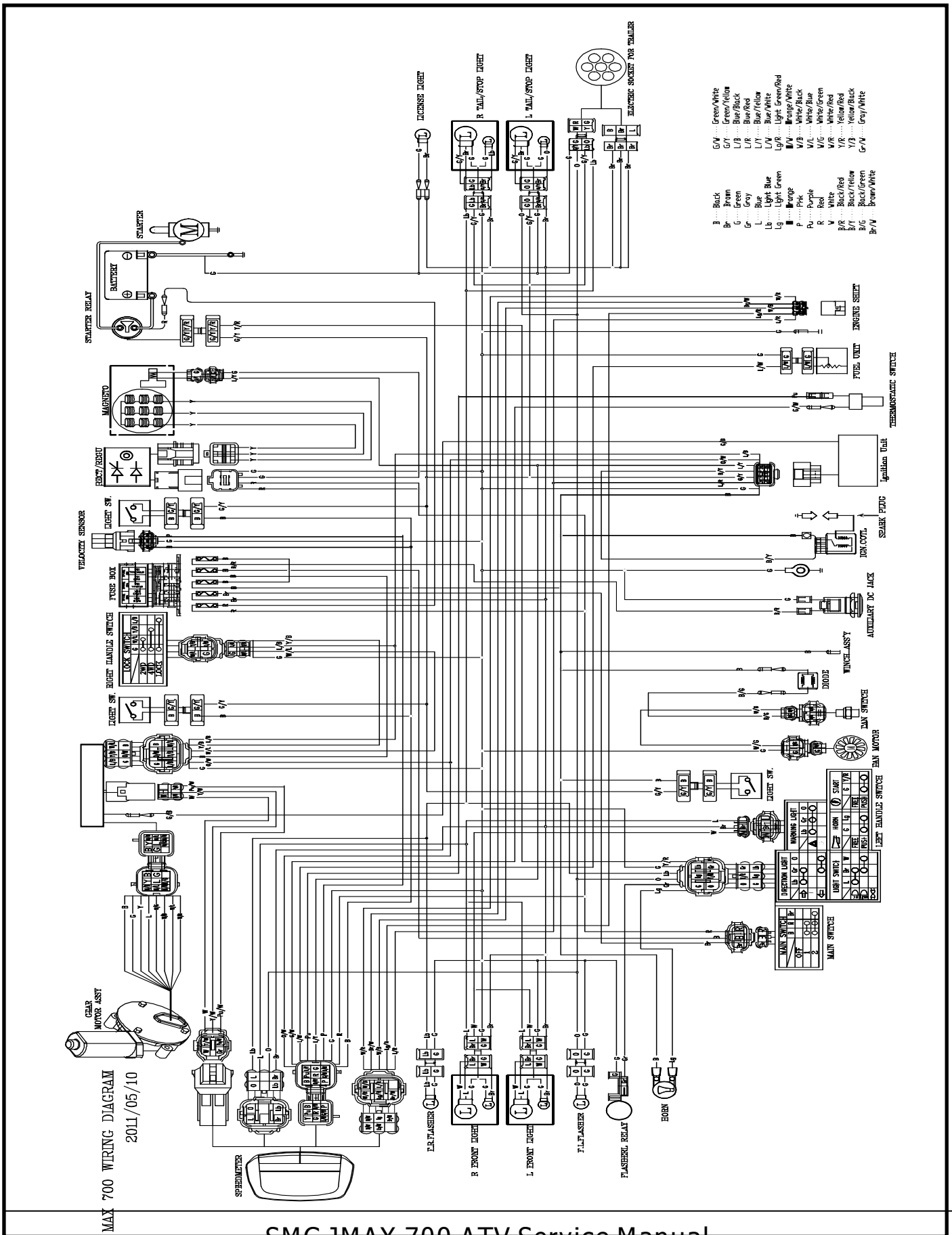
Contacting the container wall by the thermometer and the thermo unit may result in wrong readings.

Check the water temp indicator on the display.



Notes:

20-01. Electrical Diagram



Notes: