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SERVICE MANUAL

INTERCEPTOR GTR 250

Forward

This service manual contains the technical data of each component, inspection, and repair, for the Interceptor GTR 250 and the SANYANG RB1 series engine. The manual is shown with illustrations and is focused on “Service Procedures”, “Operation Key Points”, and “Inspection Adjustment”, so that it provides technicians with service guidlines.

If the style and construction of the Interceptor GTR 250 or SANYANG RB1 series engine, are different from that of the photos, or pictures shown in this manual, the actual vehicle shall prevail. Specifications are subject to change without notice.

Service Department

Carter Brothers Manufactoring, Inc.

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How To Use This Manual

This service manual describes basic information of different system parts, system inspection, and service for the SANYANG RB1 series engine. In addition, please refer to the manual contents in detail for the model serviced in inspection and adjustment.

The first chapter covers general information and trouble diagnosis.
The second chapter covers service maintenance information and special tools manual.
The third to the eleventh chapters cover engine, driving systems and cooling system.
Please see index of contents for quick special parts and system information.

Contents

Contents

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Symbols and Marks

Symbols and marks are used in this manual to indicate what and where the special services are needed. In case supplemental information of procedures are 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-30 API SG class oil. Warranty will not cover the damage that is caused by not applying the engine oil. (Recommended oil: KING MATE G-3 oil)
Grease	King Mate G-3 is recommended.
Gear oil	King Mate gear oil serials are recommended. (Bramax HYPOID GEAR OIL # 140)
Locking sealant	Apply sealant; medium strength sealant should be used unless otherwise specified.
Oil seal	Apply with lubricant. ◦
Renew	Replace with a new part before installation.
Brake fluid	Use recommended brake fluid DOT3 or WELLRUN brake fluid.
Special tools	Special tools.
Correct	Meaning correct installation.
Wrong	Meaning wrong installation.
Indication	Indication of components.
Directions	Indicates position and operation directions.
	Components assembly are in direction of each other.
	Indicates the bolts installation direction, --- means that bolt crosses through the component (invisibly).

General Safety

Carbon monoxide

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

⚠ Caution

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

Gasoline

Gasoline has a low ignition point and is an 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.
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 the component has cooled.

Battery

⚠ Caution

- Battery emits explosive gases; flame is strictly prohibited. Keep the place well ventilated when charging the battery.
- Battery contains sulfuric acid (electrolyte) which can cause serious burns so be careful Do not get into 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 immediately with water and then go to out to see an ophthalmologist.
- If you swallow it by mistake, drink a lot of water or milk, and go to hospital immediately.
- Keep electrolyte beyond reach of children.

Brake shoe

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

⚠ Caution

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

Brake fluid

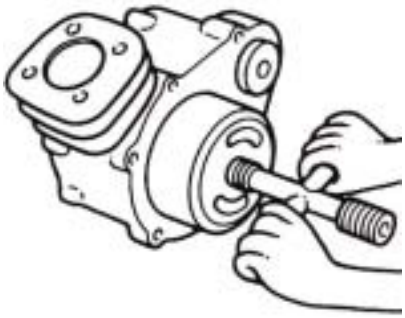
⚠ Caution

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

Service Precautions

- Always use with SANYANG genuine parts and recommended oils. Using non-designed parts for Interceptor 250 may damage the kart.

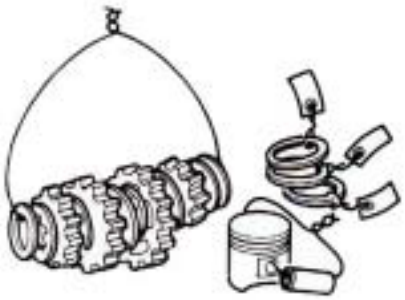
- Special tools are designed for removal and installation of components without damaging the parts being worked on. Using wrong tools may result in damaged parts.



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

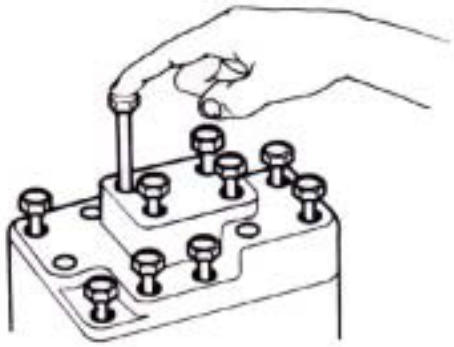
- Never bend or twist a control cable to prevent unsmooth control and premature wear.

- Rubber parts may become deteriorated when old, and are prone to be damaged by solvent and oil. Check these parts before installation to make sure that they are in good condition, Replace if necessary.
- When loosening a component which has different sized fasteners, operate with a diagonal pattern and work from inside out. Loosen the small fasteners first. If the bigger ones are loosened first, small fasteners may receive too much stress.
- Store complex components such as transmission parts in the proper assembly order and tie them together with a wire for ease of installation later.

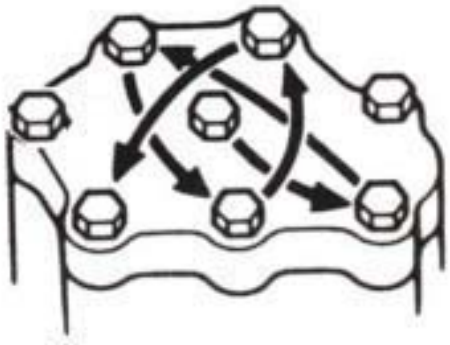


- Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).
- Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap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

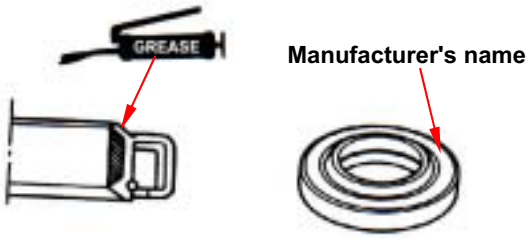
- If the length of bolts and screws for assemblies, cover plates, or boxes, is different from one another, be sure they are correctly installed. In case of confusion, insert the bolt into the hole to compare its length with other bolts, if its length outside the hole is the same with other bolts, it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



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

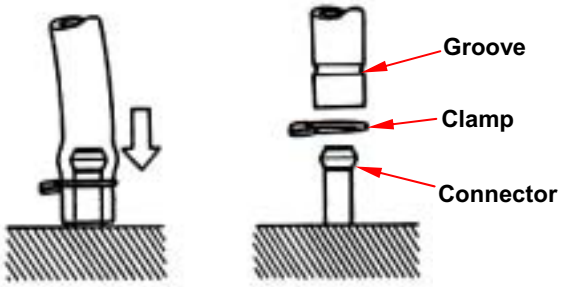


- When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, and check the shaft on which the oil seal is to be installed for smoothness, and for burrs that may damage the oil seal.

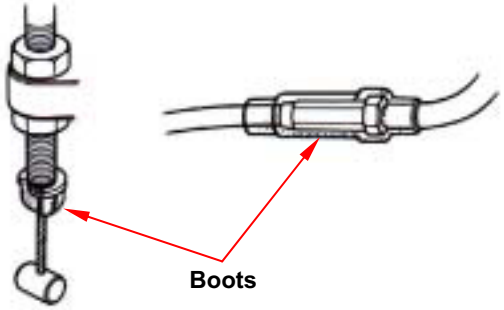


- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.

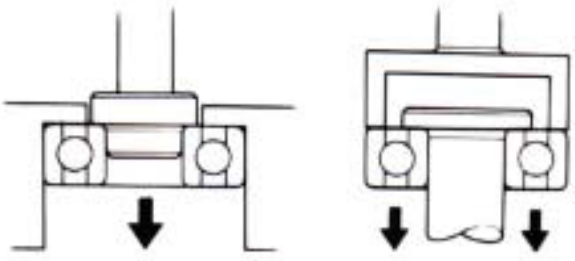
- The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections. This is so that there is enough room below the enlarged ends for tightening the clamps.



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

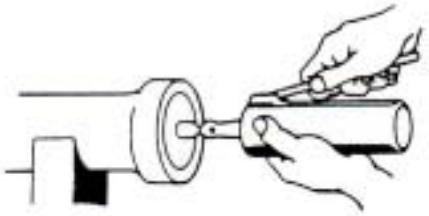


- The tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force on both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



Both of these examples can result in bearing damage.

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



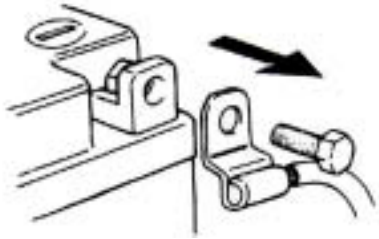
- Check to see if positions and operation for installed parts is in correct and proper.

- Make sure to use safety when service is being conducted by two persons.

⚠ Caution

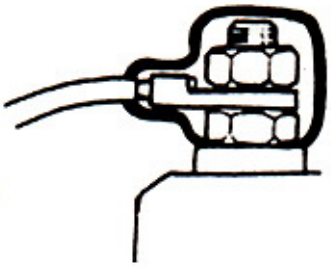
- Note: Do not let parts fall down.

- Before battery removal,
  remove the battery negative (-) cable first.
  Take steps to avoid an electrical short between the battery posts.

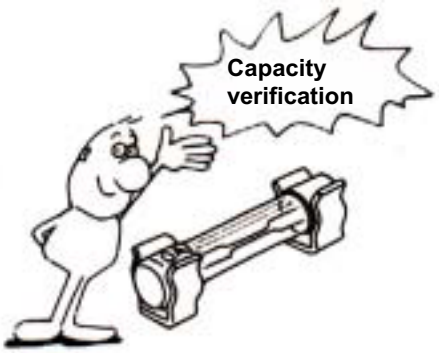


- After service is completed, make sure all connection points are secured.
  Battery positive (+) cable should be connected first.
- the two posts of the battery should be greased after connecting the cables.

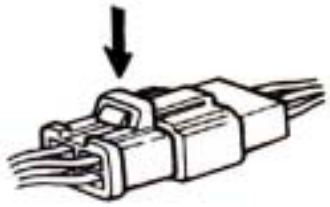
- Make sure that the battery post caps are located properly after the battery posts have been serviced.



- If the fuse is blown, find the cause and correct it. Then replace with specified capacity fuse.

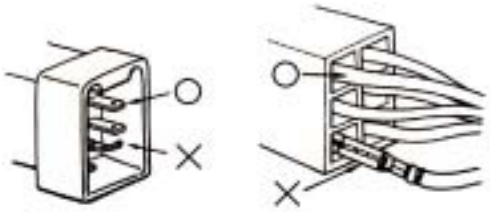


- When separating a connector the locker has to be unlocked first. Then, conduct the service operation.



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

- Make sure the connector pins are not bent, extruded, or loose.

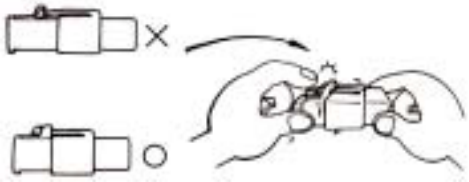


- Insert the connector completely.

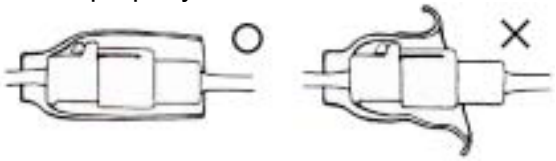
  If there are two lockers on two connector sides,

  make sure the lockers are locked in properly.

  Check to see if any wires are loose.



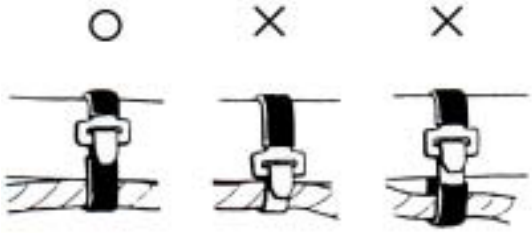
- Check to make sure the connector is covered by the twin connector boot completely, and that it is secured properly.



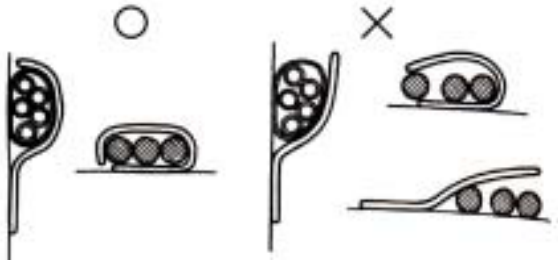
- Before connecting terminal connection, check to see if the boot is cracked or the terminal is loose.

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

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

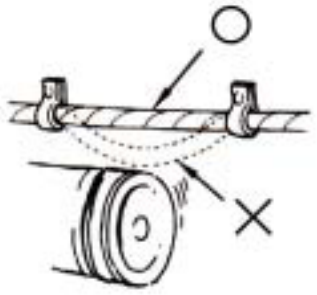


- Wire band and wire harness have to be clamped and secured properly.

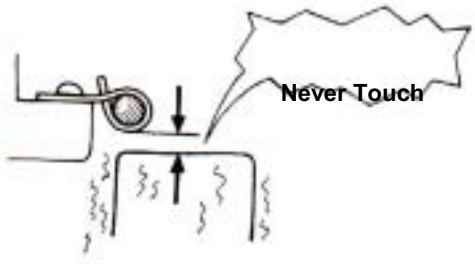


- Do not squeeze wires against the weld or its clamp.

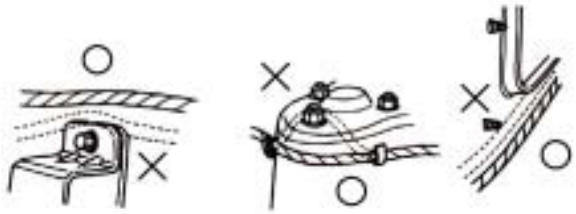
- Do not let the wiring harness come in contact with rotating, moving, or vibrating components when routing the harness.



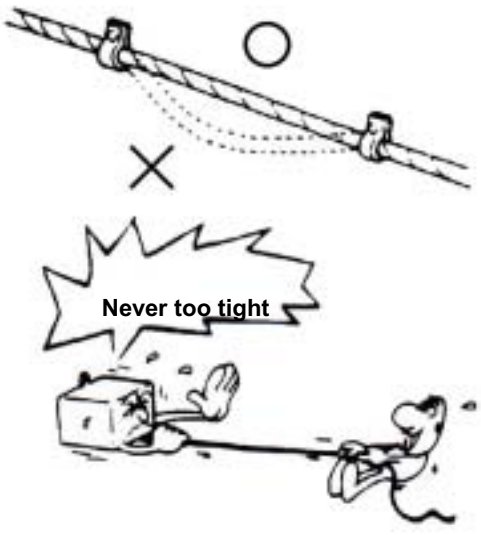
- Keep wiring harnesses far away from the hot parts.



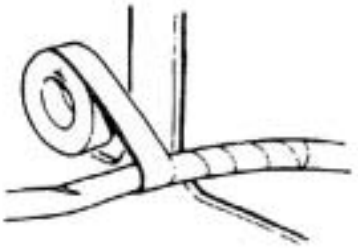
- Route wiring harnesses to avoid sharp edges or corners and also avoid the projected ends of bolts and screws.



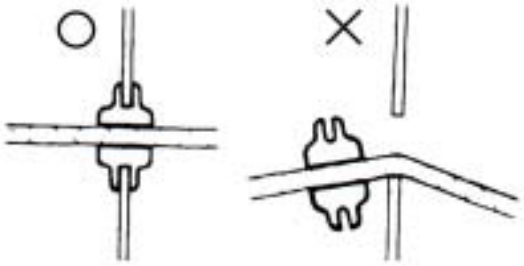
- Route harnesses so that they neither pull too tight, nor have excessive slack.



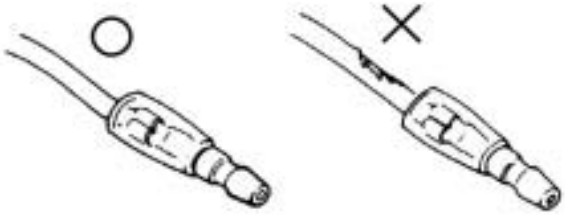
- Protect wires or wire harnesses with electrical tape or tube to protect them from contact with sharp edges or corners. Throroughly clean the surface where tape is to be applied.



- Secure the rubber boot firmly when applying it on wiring harness.

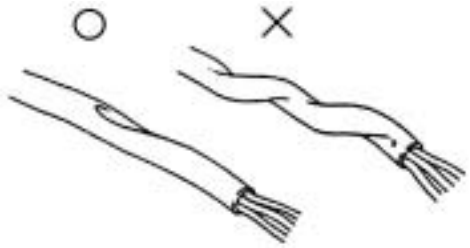


- Never use wiring or harnesses if insulation has been broken. Wrap electrical tape around the damaged parts or replace them.



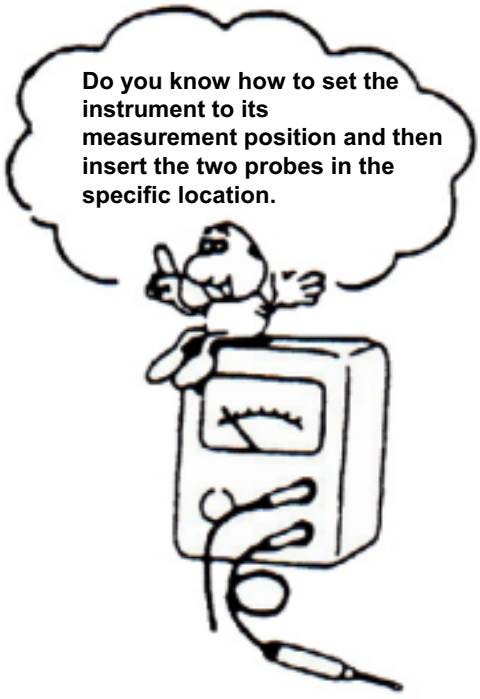
- Never clamp or squeeze the wiring harness when installing other components.

- Do not let the wiring harness get twisted during installation.

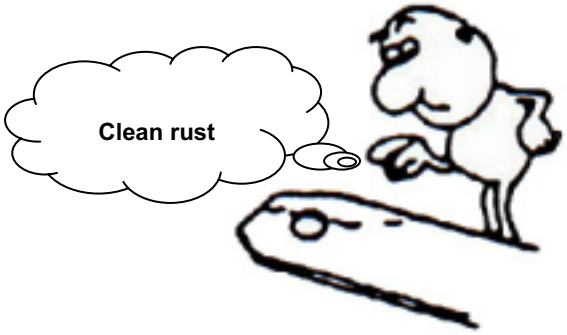


- Wiring harnesses routed along the framebar should not be pulled too tight, have excessive slack, be rubbed against, or interfere with adjacent or surrounding parts in all steering positions.

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



- Use sand paper to clean rust on connector pins/terminals if found. Then conduct connection operation.



Specifications

MAKER		SANYANG
MODEL		**RB1-ENG.**
Type		4-Stroke Engine
Installation and arrangement		Vertical, below center, incline
Fuel Used		Above 92 unleaded
Cycle/Cooling		4-stroke/water cooled
Cylinder	Bore	Ø71 mm
	Stroke	63 mm
	Number/Arrangement	Single Cylinder
Displacement		249.4 cc
Compression Ratio		10.5 : 1
Max. HP		13.2kw / 7000rpm
Max. Torque		20.6Nm / 5500rpm
Ignition		C.D.I.
Starting System		Electrical starter
Air filtration		Sponge
Reduction	Primary Reduction	Belt
	Secondary Reduction	Gear / Sprocket
	Clutch	Centrifugal, dry type
	Transmission	C.V.T., auto speed change
Lubrication System		Forced circulation & splashing

Torque Values

The torque values listed in the following table are important torque values. Please use standard values for bolts not listed in the table.

Standard Torque Values for Reference

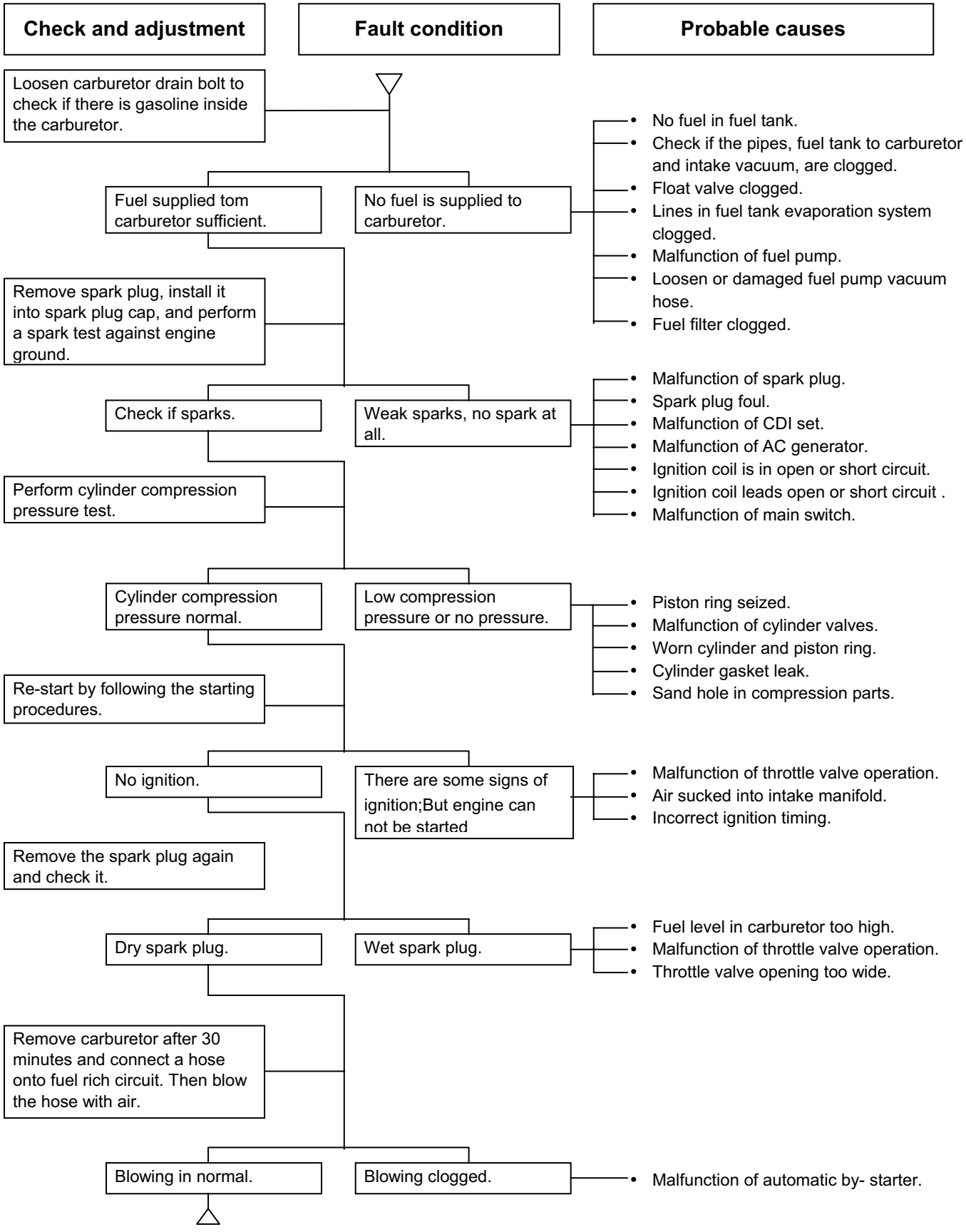
Type	Tighten Torque	Type	Tighten Torque
5 mm bolt、nut	0.45~0.6kgf-m	5 mm screw	0.35~0.5kgf-m
6 mm bolt、nut	0.8~1.2kgf-m	6 mm screw、SH nut	0.7~ 1.1kgf-m
8 mm bolt、nut	1.8~2.5kgf-m	6 mm bolt、nut	1.0 ~1.4kgf-m
10 mm bolt、nut	3.0~4.0kgf-m	8 mm bolt、nut	2.4 ~3.0kgf-m
12 mm bolt、nut	5.0~6.0kgf-m	10 mm bolt、nut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

Engine Torque Values

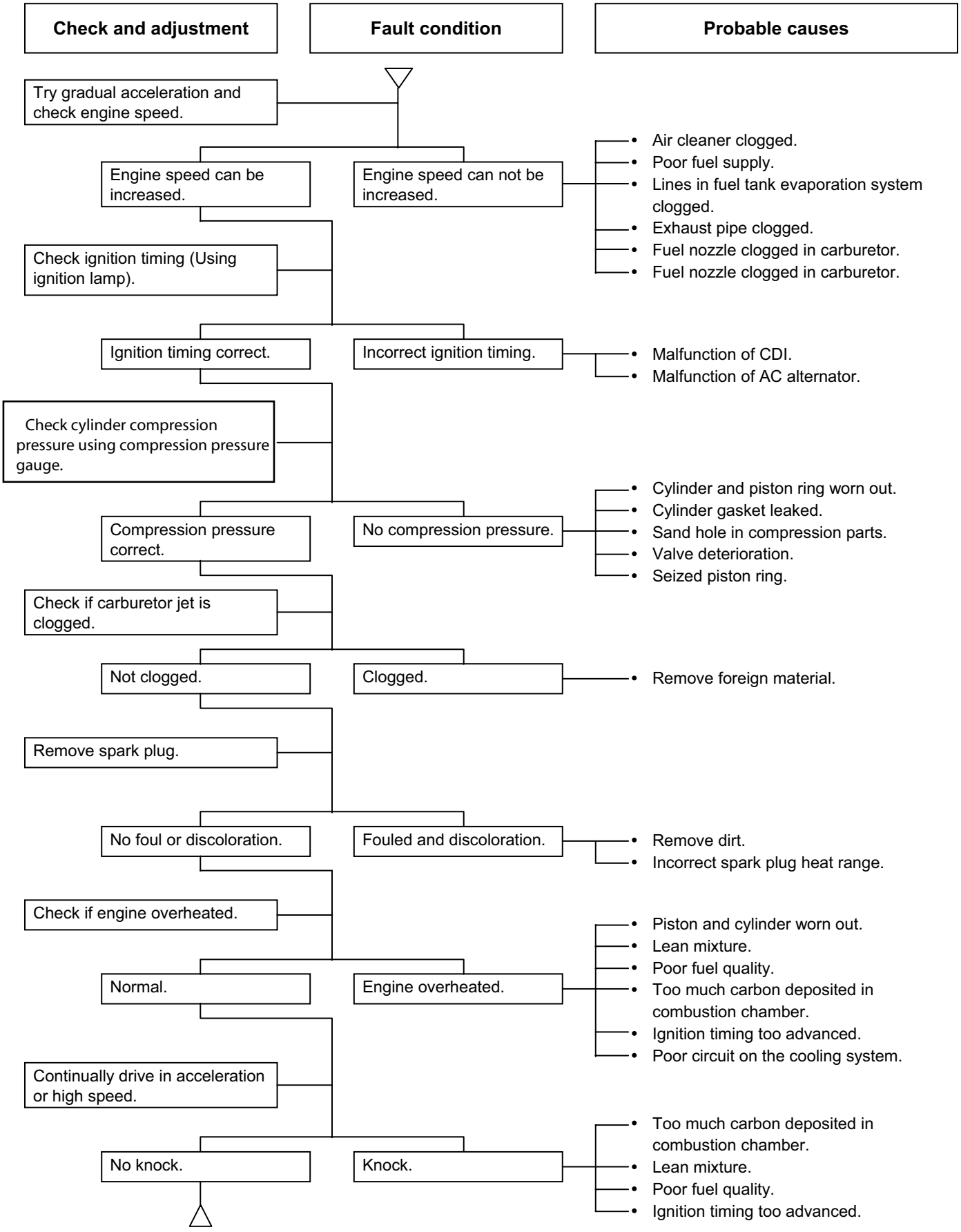
Item	Q'ty	Thread Dia. (mm)	Torque Value(kgf-m)	Remarks
Cylinder stud bolt	4	10	1.0~1.4	
Cylinder head nut	4	8	3.6~4.0	
Cylinder head right bolt	2	8	2.0~2.4	
Cylinder head side cover bolt	2	6	1.0~1.4	
Cylinder head cover bolt	4	6	1.0~1.4	
Cylinder head stud bolt (inlet pipe)	2	6	1.0~1.4	
Cylinder head stud bolt (EX. pipe)	2	8	2.4~3.0	
Air inject pipe bolt	4	6	1.0~1.4	
Air inject reed valve bolt	2	3	0.07~0.09	
Tappet adjustment screw nut	4	5	0.7~1.1	Apply oil to thread
Spark plug	1	10	1.0~1.2	
Tensioner lifter bolt	2	6	1.0~1.4	
Carburetor insulator bolt	2	6	0.7~1.1	
Oil pump screw	2	3	0.1~0.3	
Water pump impeller	1	7	1.0~1.4	
Engine left cover bolt	9	6	1.1~1.5	
Engine oil draining bolt	1	12	3.5~4.5	
Engine oil strainer cap	1	30	1.3~1.7	
Mission draining bolt	1	8	1.1~1.5	
Mission filling bolt	1	12	3.5~4.5	
Shift drum fixing bolt	1	14	3.5~4.5	
Clutch driving plate nut	1	28	5.0~6.0	
Clutch outer nut	1	14	5.0~6.0	
Drive face nut	1	14	8.5~10.5	
ACG. Flywheel nut	1	14	5.0~6.0	
Crankcase bolts	7	6	0.8~1.2	
Mission case bolt	7	8	2.6~3.0	
Exhaust muffler connection nut	2	8	1.0~1.4	
Engine hanger nut	4	12	8.0~9.0	
Drive gear bolt	2	10	4.0~5.0	

Trouble Diagnosis

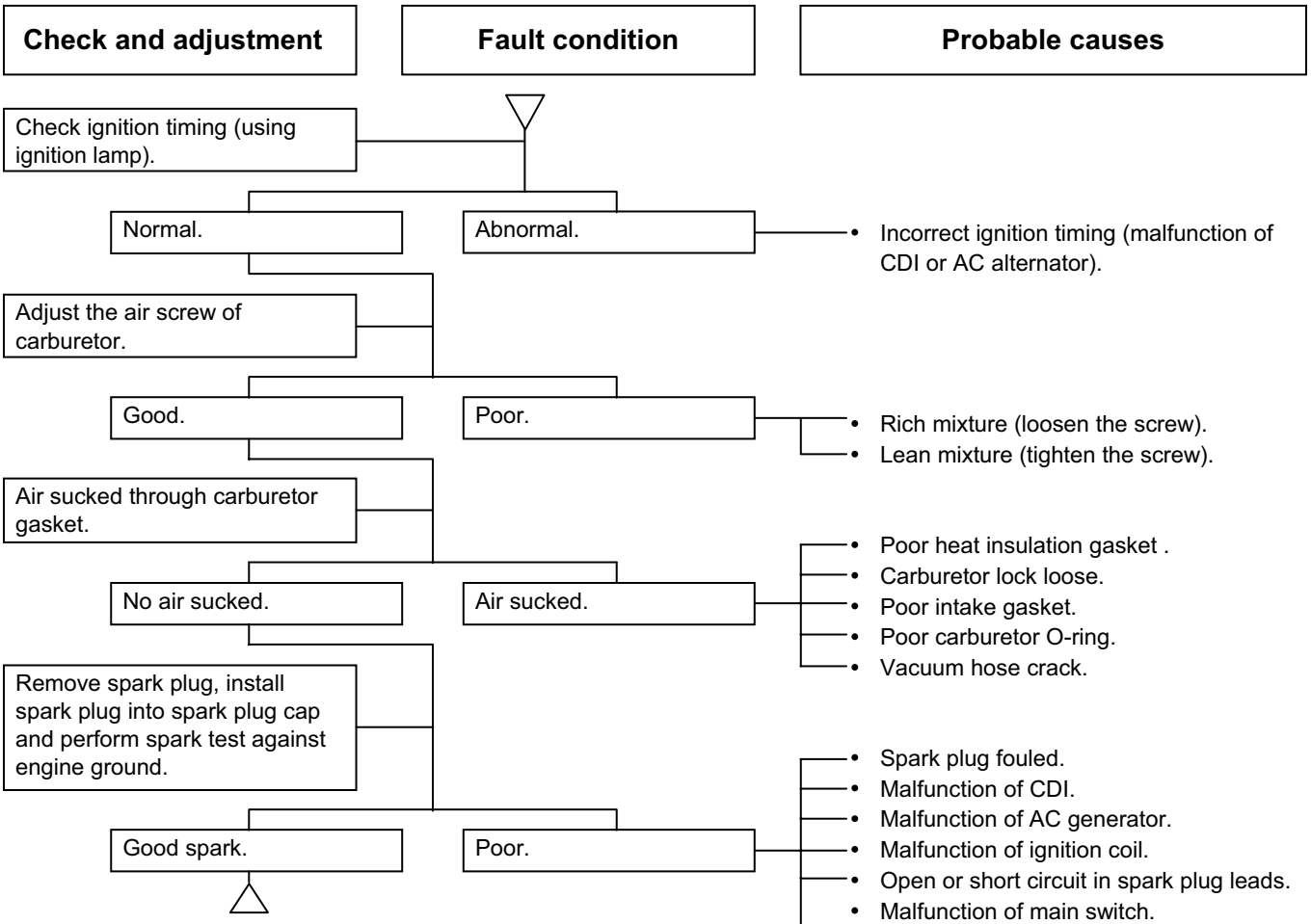
A. Engine hard to start or can not be started



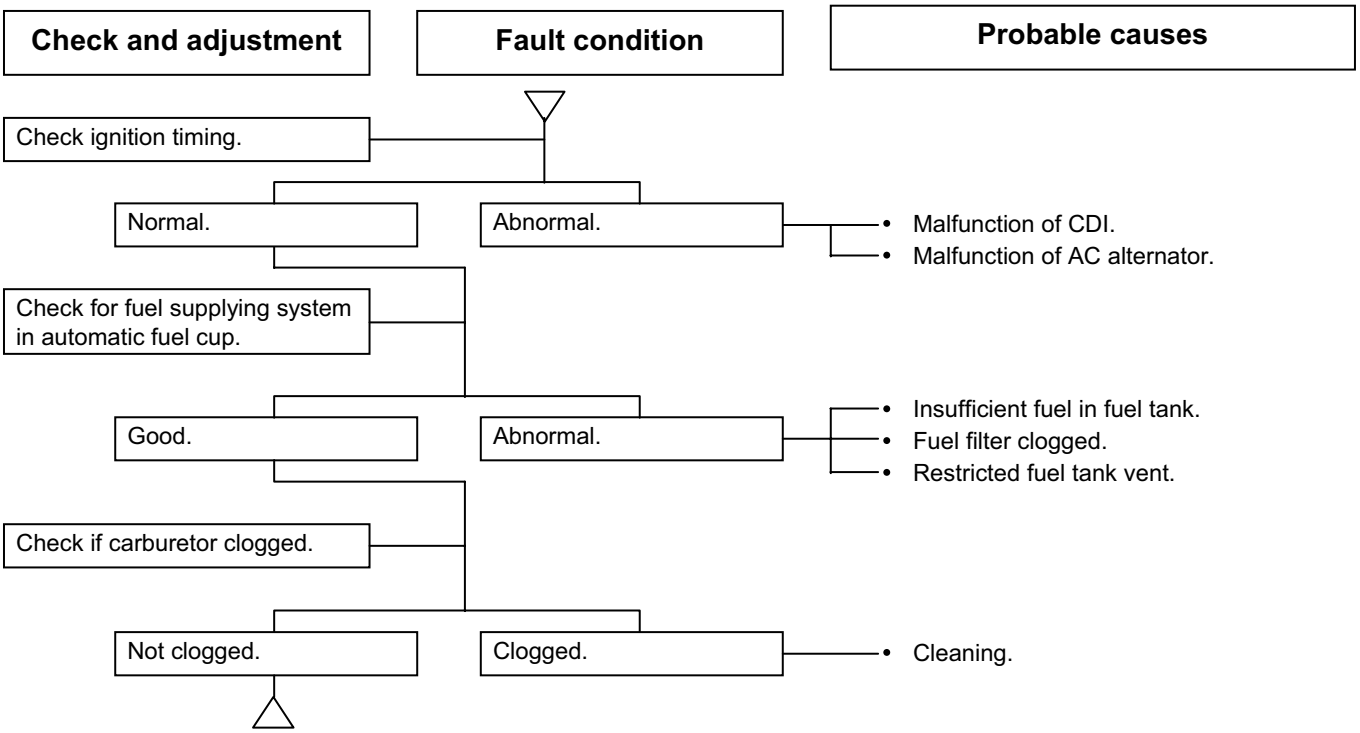
B. Engine runs sluggish (Speed does not pick up, lack of power.



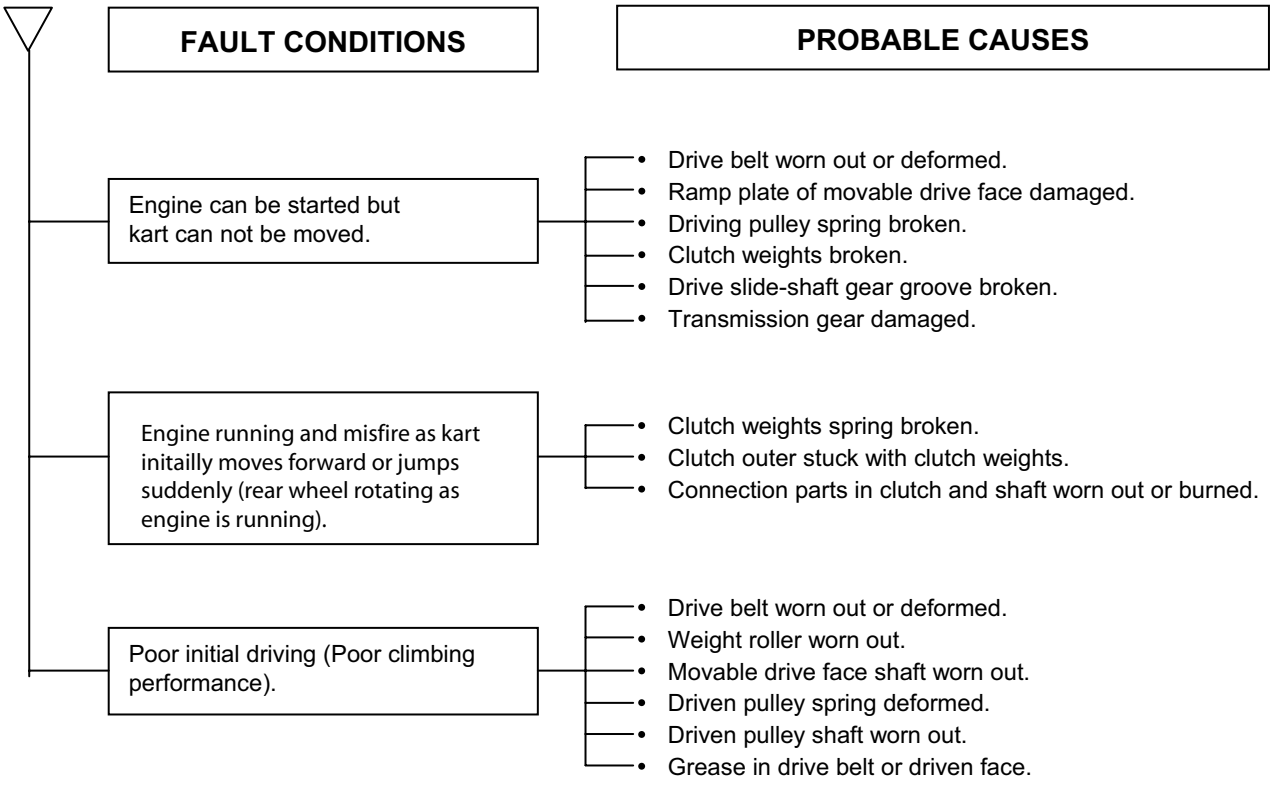
C. Engine runs sluggish (especially in low speed and idling)



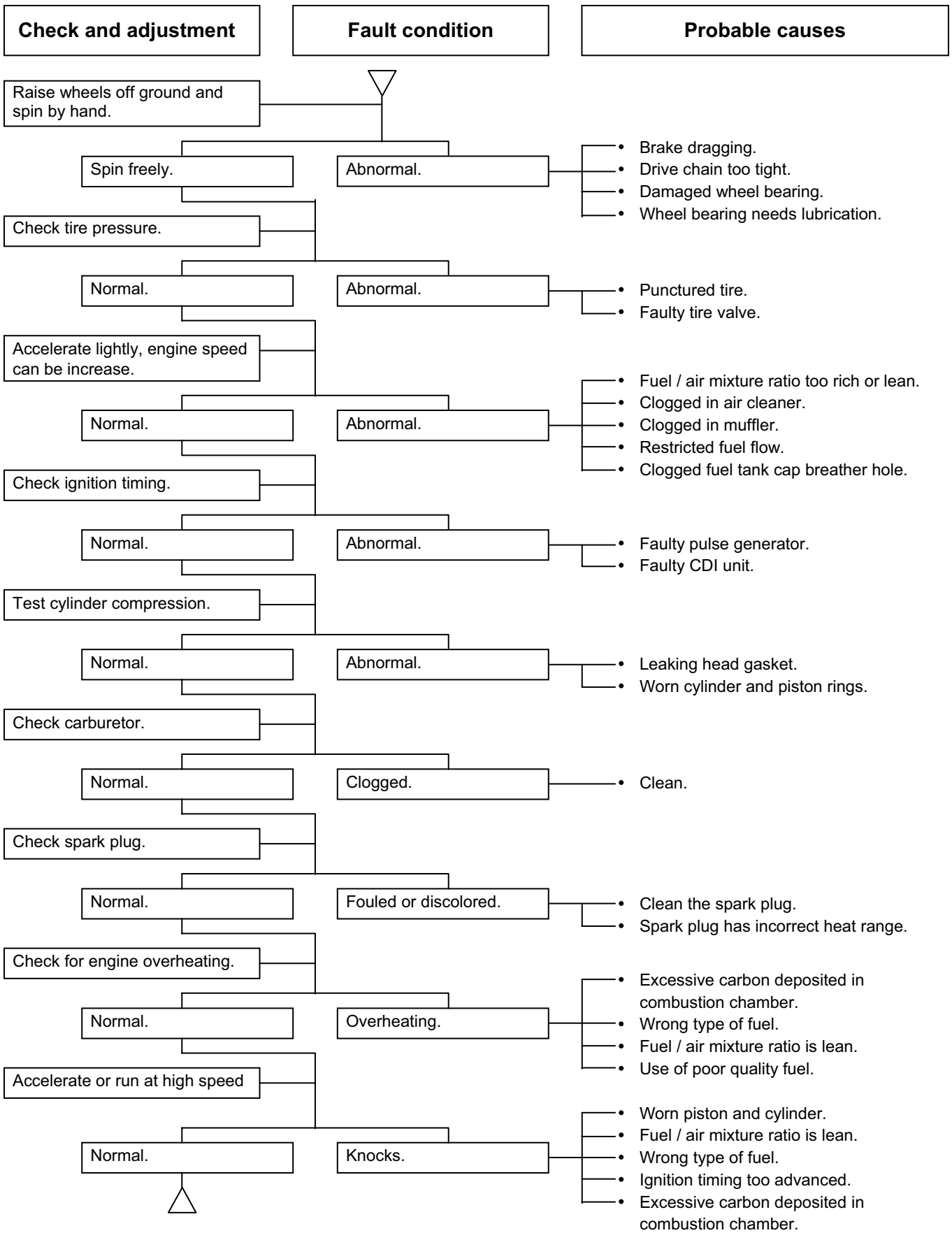
D. Engine runs sluggish (High speed)



E. Clutch, driving and driving pulley



F. Loss of power



Notes:

Precautions in Operation

Specification

Fuel Tank Capacity		1500 c.c.
Engine Oil	Capacity	1400 c.c.
	Change	1200 c.c.
Transmission Gear oil	Capacity	750 c.c.
	Change	650 c.c.
Spark plug	Type	NGK CR8E
	Gap	0.8 mm
"F" Mark in idling speed		BTDC 10º / 1700 rpm
Full timing advanced		BTDC 27º / 4000 rpm
Idling speed		1700±100 rpm
Cylinder compression pressure		12.0 ±2 kgf/cm²
Valve clearance		IN:0.10 ± 0.02 mm EX:0.15 ± 0.02 mm

2. Maintenance Information

Periodical Maintenance Schedule

Maintenance Code	Item	Every 300KM	1 month every 1,000KM	3 months every 3,000KM	6 months every 6000KM	1 year every 12,000KM	15 months every 14,500KM
1	Air cleaner	I	C			R	
2	Fuel filter	I			I	R	
3	Oil filter	C			C		
4	Engine oil change	R	Replacement for every 1000 km				
5	Every screw tightening check	I	I				
6	Gear oil check for leaking	I	I				
7	Spark plug check or change	I		I	R		
8	Gear oil change	R	Replacement for every 5000 km				
9	Ignition timing	I	I				
10	Emission check in idling	A	I				
11	Engine bolt tightening	I		I			
12	CVT driving device(belt)				I	R	
13	CVT driving device(roller)				C		
14	Cam chain	I		I			
15	Valve clearance	I		A			
16	Lines & connections in cooling	I	I				
17	Coolant reservoir	I	I				
18	Coolant	I	I			R	

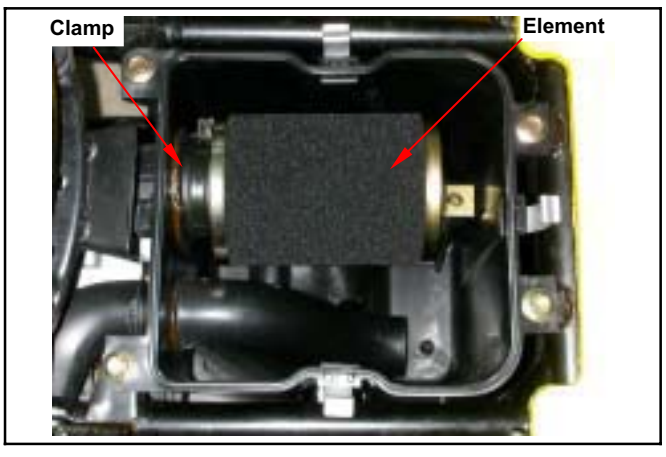
Code: I ~ Inspection, cleaning, and adjustment **R ~ Replacement**
C ~ Cleaning (replaced if necessary) **L ~ Lubrication**

Have your kart checked and adjusted by an authorized Carter Dealer in accordance with the Periodical Maintenance Schedule (please see above table).
The above maintenance schedule is established by taking the monthly 1000 kilometers as a reference, which ever comes first.

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

Air Cleaner

Remove seat.
loosen 4 hooks from the air cleaner cover and then remove the cover.
Loosen the clamp strip and 1 screw of air cleaner element, and then remove the air cleaner element.
Clean the element with non-flammable or high-flash point solvent and then squeeze it for dry.



⚠ Caution

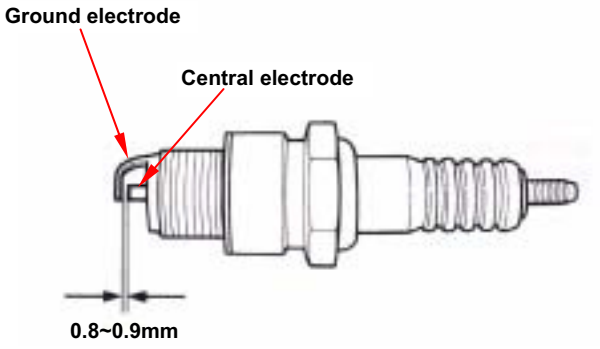
Never use gasoline or acid organized solvent to clean the element.

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

Spark Plug

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

Tighten torque: 1.0~1.2kgf-m

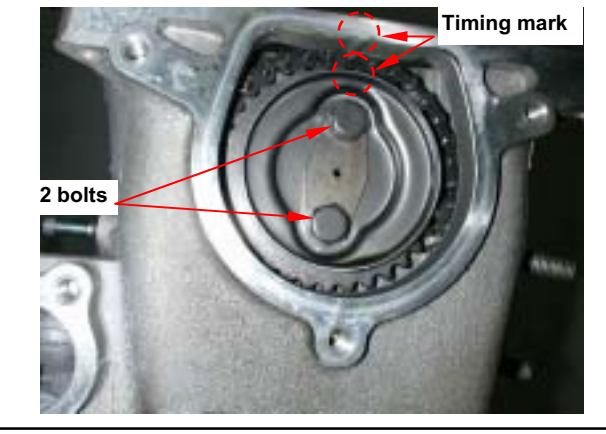


Valve Clearance

Caution

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

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



Caution

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

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

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

Loosen fixing nut and turn the adjustment nut for adjustment.

Caution

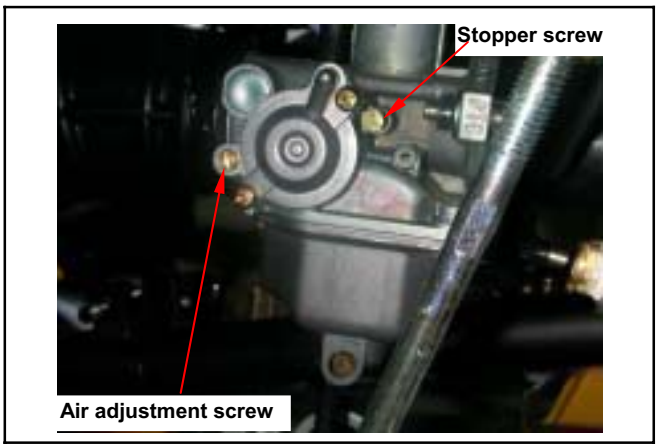
Re-check the valve clearance after tightening the fixing nut.

Carburetor Idle Speed Adjustment

⚠ Caution

- Inspection & adjustment for idle speed must 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 warmed up.

Park the kart, put in neutral, set the parking brake and warm up the engine.
Connect tachometer (the wire clamp of tachometer is connected to the high tension cable).
Turn the throttle valve stopper screw to specified idle speed.
Specified idle speed: 1700 ± 100 rpm



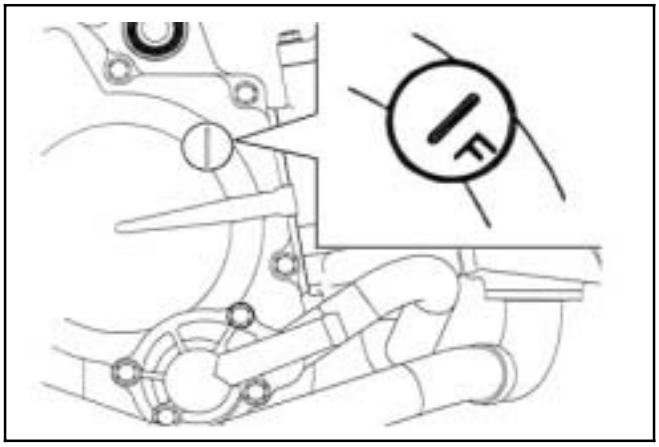
Emission adjustment in idle speed

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

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

Emission standard **CO: below 2.5~3.5%**
HC: below 2000ppm

Ignition System



Caution

- C.D.I ignition system is set by manufacturer so it can not be adjusted.
- Ignition timing check procedure is for checking whether CDI function in normal or not.

Connect tachometer and ignition light.
Start engine.
As engine is in idle speed: 1600 rpm, aim at the mark “F” with the ignition light. Then, it means that ignition timing is correct.
Increase engine speed to 6000 rpm to check ignition advance degree. If indent is located within the ignition advance degrees, it means that the ignition advance degree is normal.
If ignition timing is incorrect, check CDI set, pulse rotor and pulse generator. Replace if malfunction of these parts is found.

Cylinder Compression Pressure

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

Caution

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

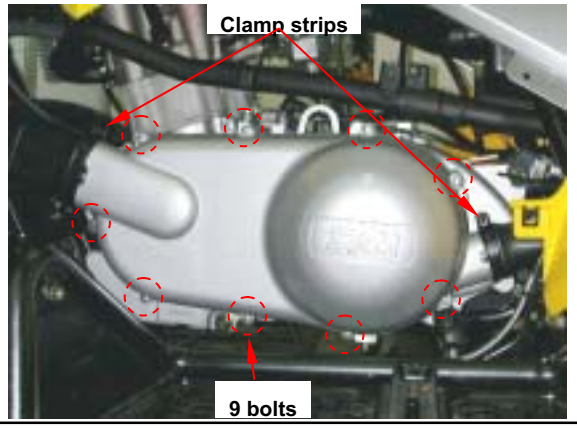
Compression pressure: 12 ± 2 Kg/cm²
Check following items if the pressure is too low:

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

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

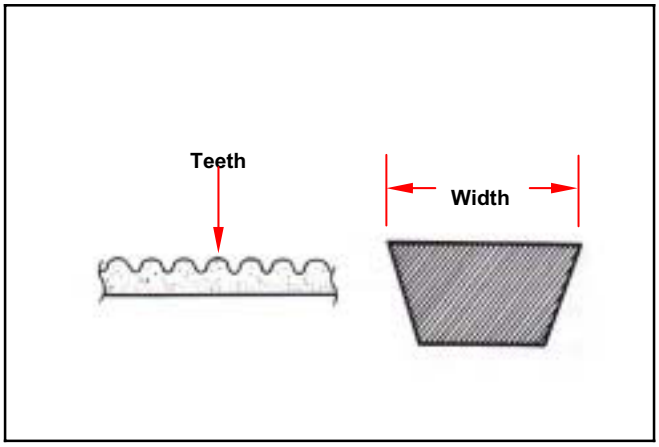
Drive Belt

Loosen the 2 clamp strips of left crankcase cover, and then remove the left crankcase cover vapor hose.
Remove 9 bolts of the engines left side cover and the cover.



Check to see if the belt is cracked or worn out.
Replace the belt if necessary or in accordance with the Periodic Maintenance Schedule.

Width limit: 22.5 mm or above

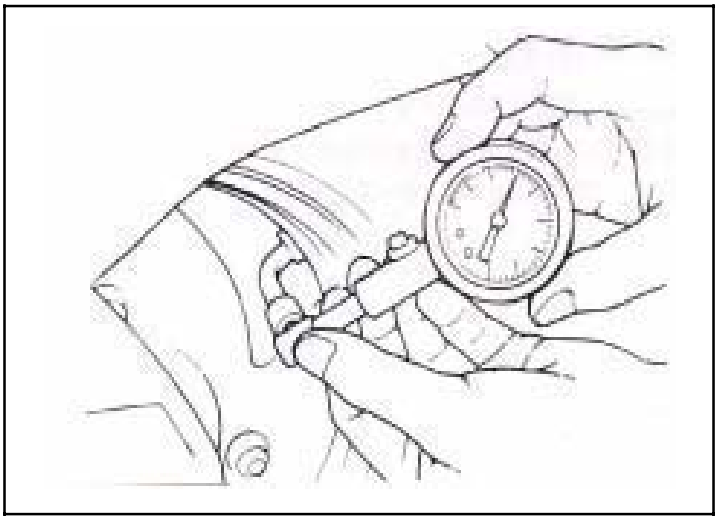


Wheel/Tire

Caution

Tire pressure check should be done as cold engine.

Front Tire	23x7-10 14psi
Rear Tire	25x10-12 14psi



Nuts, Bolts Tightness

Perform periodic maintenance in accord with the Periodic 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.

Brake System (Disk Brake)

Brake System Hose

Check the brake hoses for corrosion or leaking oil.

Brake Fluid

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

Caution

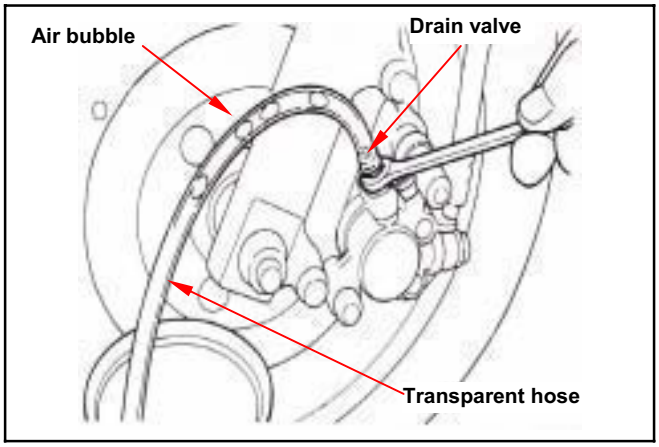
- Do not operate the brake pedal while the cap is removed. Otherwise, the brake fluid will spill.
- Do not mix non-compatible brake fluid together.

Filling Out Brake Fluid

Tighten the drain valve, and add brake fluid. Operate the brake pedal so that brake fluid will build pressure.

Air Bleed Operation

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



Caution

Close the air bleed valve. Before releasing the brake pedal.

Adding Brake Fluid

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

Caution

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

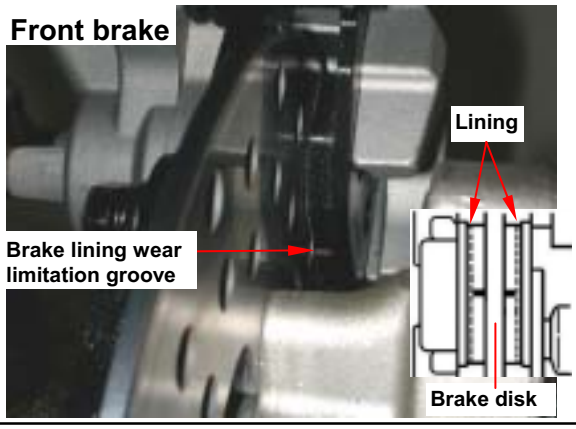
Brake Lining Wear

The indent mark on brake lining is the wear limitation.

Replace the brake lining if the wear limit mark is close to the edge of the brake disc.

⚠ Caution

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



How to Tighten Chain:

a. On this unit, to tighten the chain the entire engine must be “slid” forward.

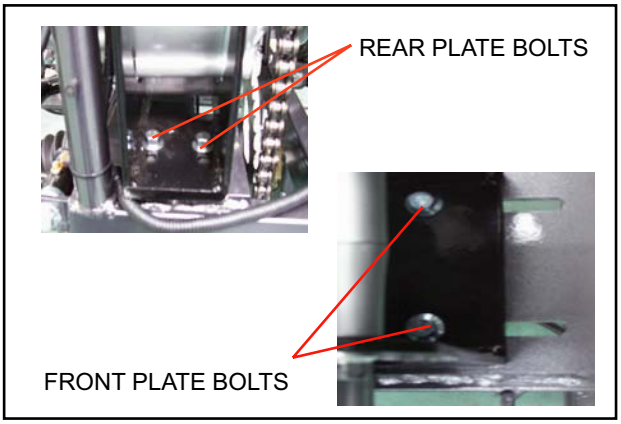
b. Loosen the engine plate bolts (2 front and 2 rear).

c. Loosen air box bolts (4 total).

d. Loosen muffler bolts (2 total).

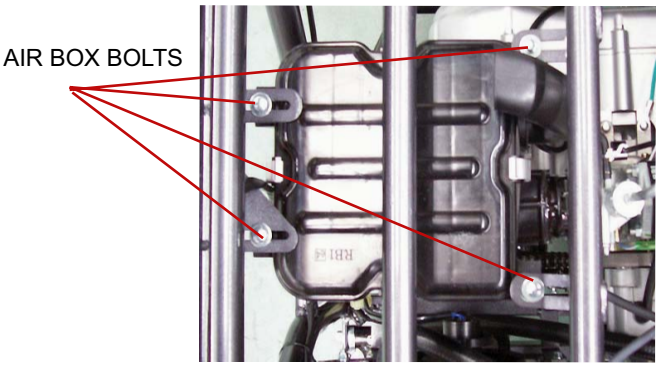
e. Slide engine forward and tighten all bolts.

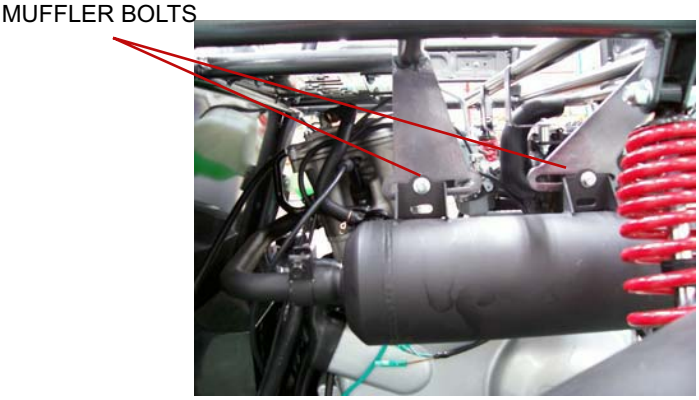
NOTE: When pushing the engine forward the front engine mount will try and tilt forward. This will cause the engine to return to its original position once force is removed. You will need to tap the bottomof the engine plate to keep it from tilting. Check gear positions after adjusting chain.



How to Lubricate Chain:

Lubricate chain with a spray-on type chain lubricant to increase the life of the chain.





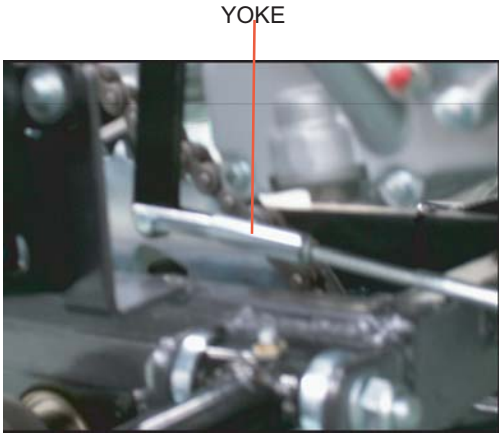
Gear Shift Lever

YOKE ADJUSTMENT

Each end of the cable has a threaded yoke on it.

You must remove the pin or bolt in either end of the cable to which the yoke is attatched.

To adjust an end, loosen the jam nut and turn the yoke the appropriate way.

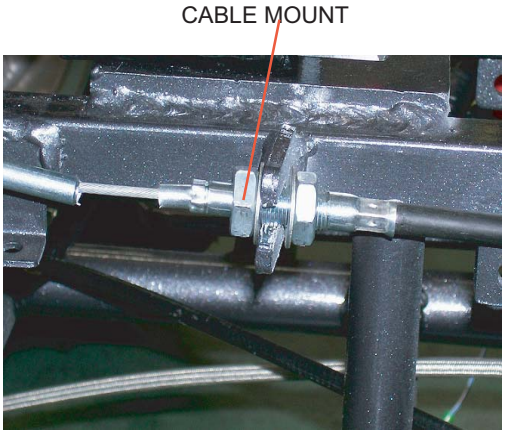


CABLE MOUNT ADJUSTMENT

The cable has a threaded stud and jam nuts on each end that is used to attatch itself to the frame.

To adjust, loosen one jam nut on one or both ends and adjust the appropriate direction.

Tighten jam nuts.



SHIFT LEVER ADJUSTMENT

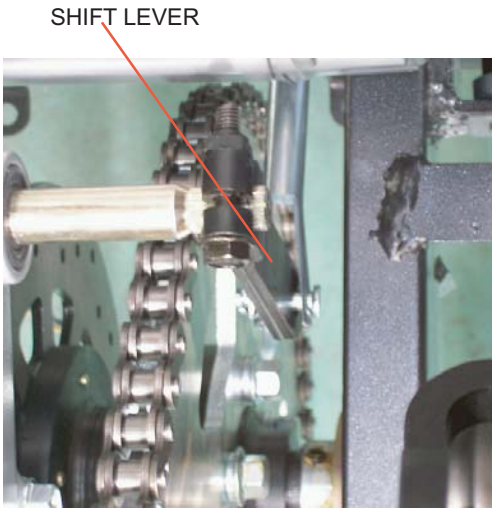
On the rear end of the cable a shift lever is attatched to both it and the engine.

The lever is on a splined shaft protruding from the engine.

Remove the bolt which holds this lever to the engine.

Slide the lever off the shaft and turn the appropriate way, one spline at a time.

Once in the appropriate position tighten all bolts back.



Special Tools List

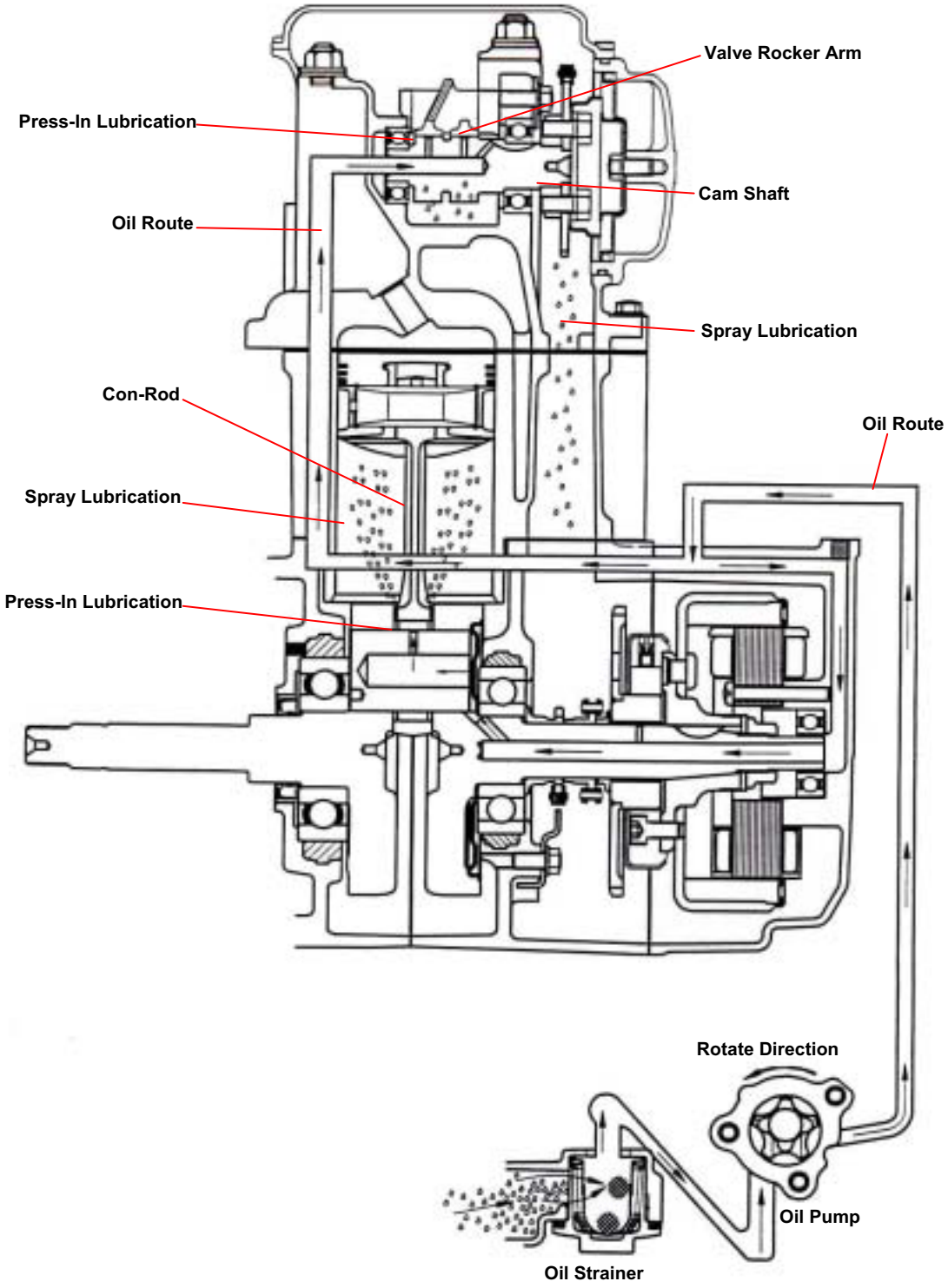
		
NAME Rocker arm pin puller	NAME Allen wrench	NAME Tappet adjusting wrench
NO 8208-0301	NO 8208-0014	NO 8208-0302
		
NAME Tappet adjuster	NAME Valve cotter remove & assembly tool	NAME AC.G. Flywheel puller
NO 8208-0306	NO 8208-0006	NO 8208-0311
		
NAME Left crank seal driver	NAME Drive shaft puller	NAME Driver shaft install bush & seal driver
NO 8208-0309	NO 8208-0310	NO 8208-0315
		
NAME Bearing driver 6305	NAME Counter shaft needle bearing driver HK2016	NAME Counter shaft needle bearing drive HK1516
NO 8108-0007	NO 8208-0312	NO 8208-0313

					
NAME	Bearing driver 6205	NAME	Seal driver 14x28x7 &14x26x6	NAME	Left crank case cover bearing driver 6000
NO	8208-0308	NO	8208-0317	NO	8208-0318
		 **(6301)**		 **(6204)**	
NAME	Seal driver 30x40x5	NAME	BEARING DRIVER	NAME	BEARING DRIVER
NO	8208-0314	NO	8208-0024	NO	8208-0016
 **(12*20*5)**		 **(6901)**			
NAME	Water pump oil seal driver	NAME	Water pump bearing driver	NAME	Water pump mechanical seal driver
NO	8208-0316	NO	8208-0307	NO	8208-0007
					
NAME	Universal holder	NAME	Clutch nut wrench	NAME	Clutch spring compressor
NO	8208-0008	NO	8208-0015	NO	8208-0009

					
NAME	Inner bearing puller	NAME	Inner bearing puller	NAME	Outer bearing puller
NO	8208-0304	NO	S8208-0305	NO	8208-0303

Notes:

Mechanism Diagram



Precautions in Operation

General Information:

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

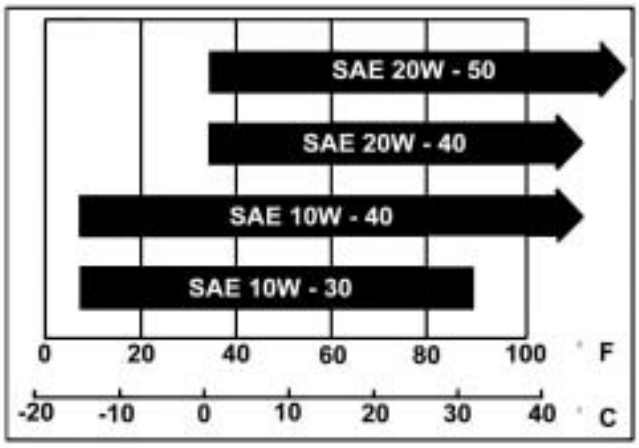
Specifications

Engine oil quantity Disassembly: 1400 c.c.
Change: 1200c.c.

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

Gear oil Disassembly: 750c.c.
Change: 650c.c.

Gear oil viscosity SAE 140
(Recommended SYM Hypoid gear oils)



Unit : mm

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

Torque value

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

Troubleshooting

Low engine oil level

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

Low oil pressure

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

Dirty oil

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

Engine Oil

Turn off engine, and park the kart on a flat surface.
Check oil level with oil dipstick.
Do not screw the dipstick into engine when checking.
If oil level is low, fill up to the upper level
using recommended oil.

Oil Change

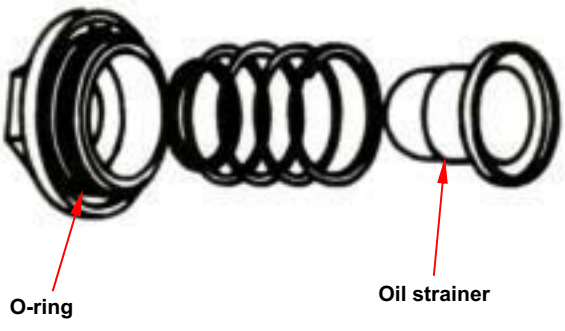
⚠ Caution

Drain oil with engine warm to make sure oil can be drained smoothly and completely.

Place an oil pan under the kart, and remove oil drain bolt.
After drained, make sure washer can be re-used.
Install oil drain bolt.
Torque value：3.5~4.5kgf-m

Engine Oil Strainer Clean

Drain engine oil out.
Remove oil strainer and spring.
Clean oil strainer.
Check if O-ring can be re-used.
Install oil strainer and spring.
Install oil strainer cap.
Torque value：1.3~1.7kgf-m
Add oil to crankcase (oil viscosity SAE 10W-30)
Recommended use of King serial oil.
Engine oil capacity: 1200c.c. when replacing
Install dipstick, start the engine and run for several minutes.
Turn off engine, and check oil level again.
Check for engine oil leaks.



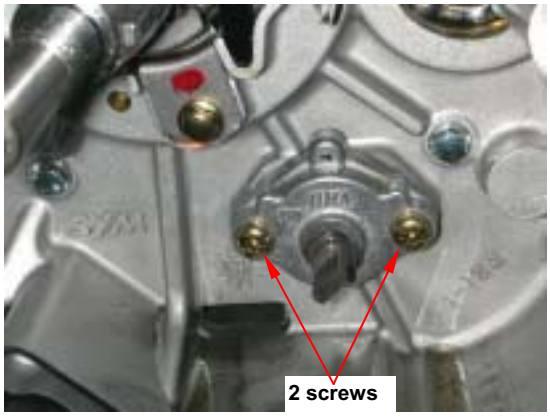
Oil Pump

Oil Pump Removal

Remove generator and starting gear. (Refer to chapter 9)

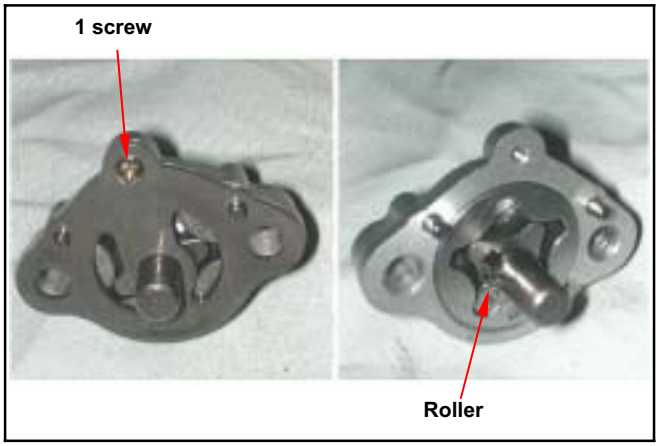
Remove cir clip and take out oil pump driving chain and sprocket.

Make sure that pump shaft can be rotated freely.
Remove 2 screws on the oil pump, and then remove oil pump.



Oil Pump Disassembly

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



Oil Pump Inspection

Check the clearance between oil pump body and outer rotor.

Limit: 0.25 mm

Check clearance between inner and outer rotors.

Limit: 0.20 mm

Check clearance between rotor side face and pump body

Limit: 0.12 mm

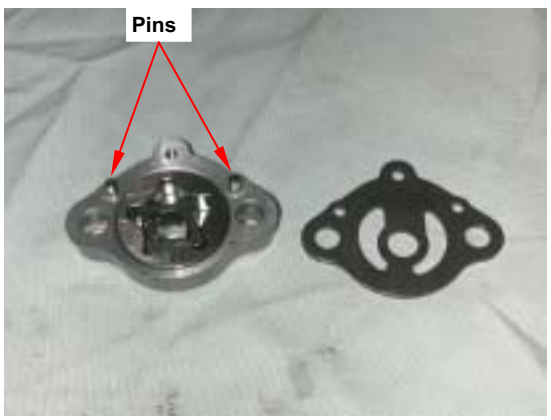
Oil Pump Re-assembly

Install inner and outer rotors into the pump body.

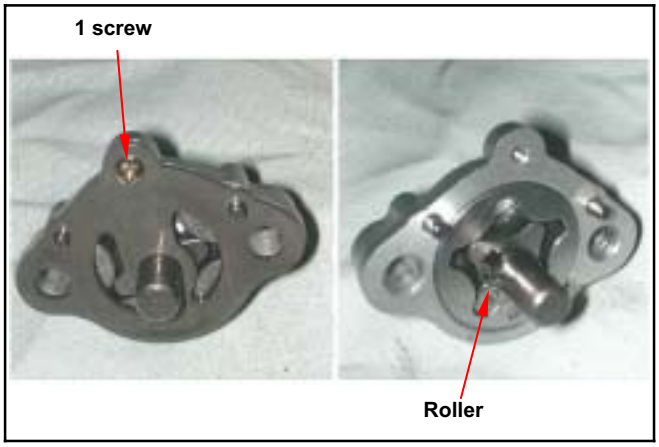
Align the indent on driving shaft with that of inner rotor.

Install the oil pump shaft and roller.

Install the oil pump cover and fixing pins properly.



Tighten the oil pump screw.

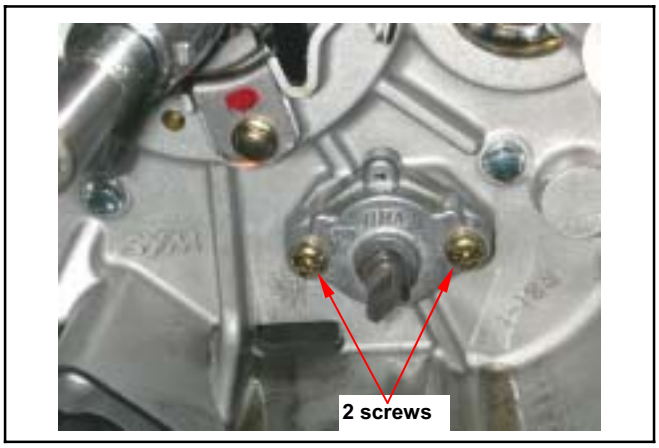


Oil Pump Installation

Install the oil pump, and then tighten screws.

Torque value：0.1~0.3kgf-m

Make sure that oil pump shaft can be rotated freely.



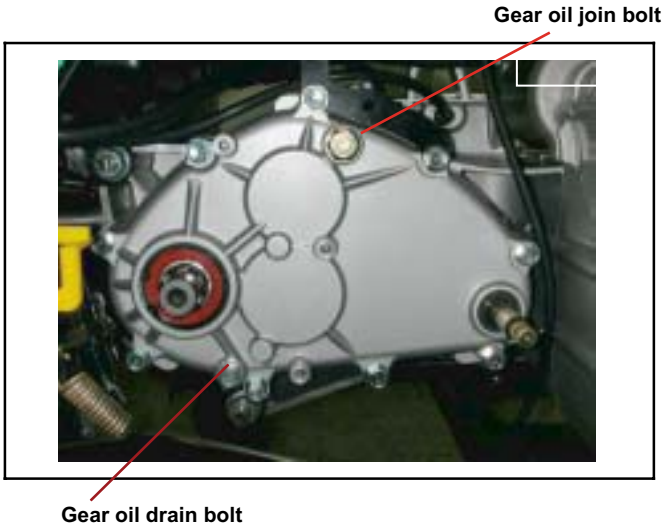
Install oil pump drive chain and sprocket, and then install cir clip onto oil pump shaft.

Install starting gear and generator.
(Refer to chapter 9)

Gear Oil

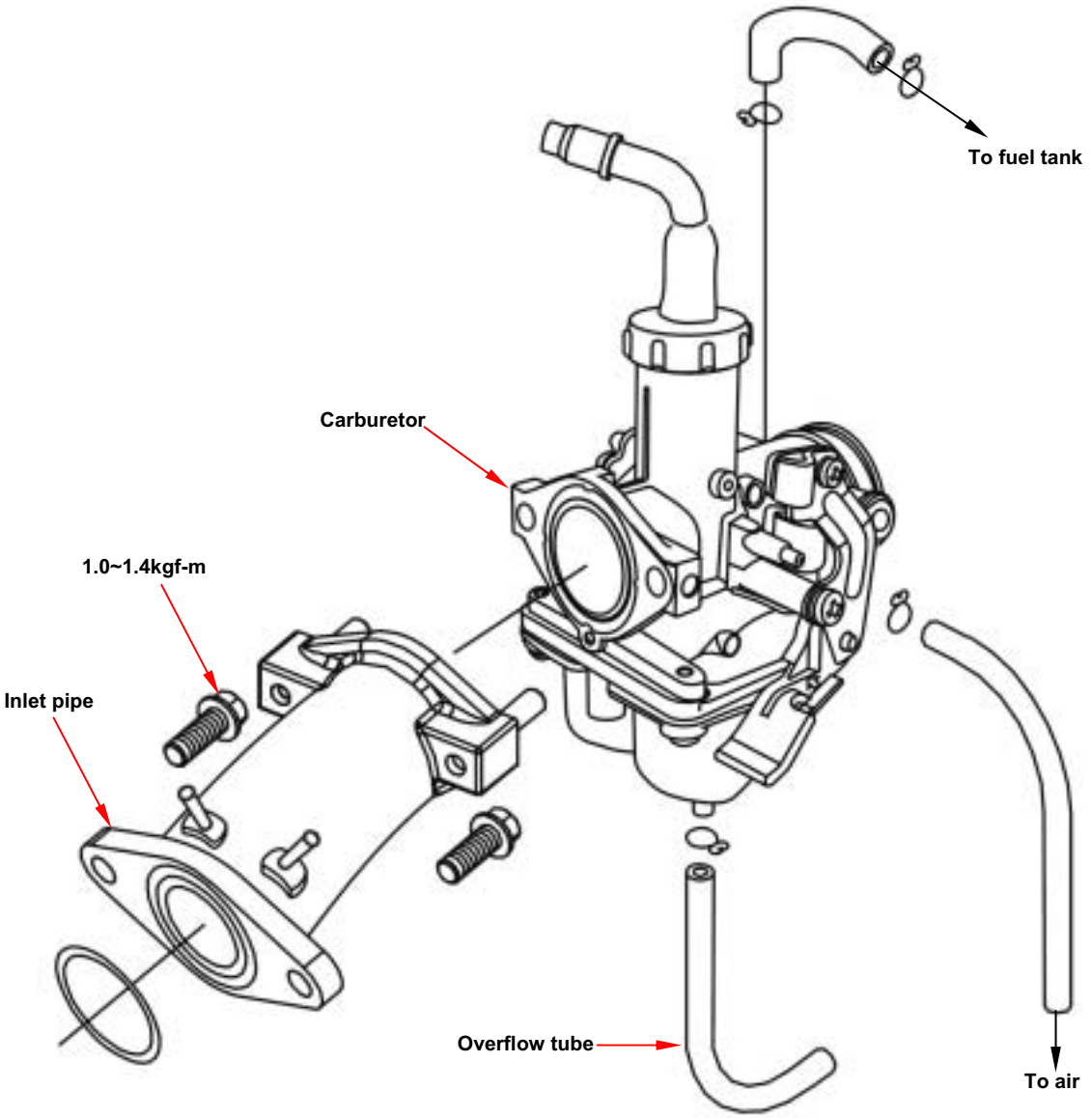
Gear Oil Change

Remove oil join bolt.
Remove drain bolt and drain gear oil out.
Install the drain bolt after drained.
Torque value: 1.1~1.5kgf-m
Make sure that the drain bolt washer can be re-used.
Add oil to specified quantity from the join hole.
Gear Oil Quantity: 650c.c. when replacing
Make sure that the join bolt washer can be re-used, and install the bolt.
Torque value: 3.5~4.5kgf-m
Start engine and run engine for 2-3 minutes.
Turn off engine and make sure that oil level is at correct level.
Make sure that there is no oil leakage.



Notes:

Mechanism Diagram



Precautions in Operation

General Information

⚠ Warning

Gasoline has a low ignition point and explosive materials. Work in a well-ventilated place and strictly prohibit flame when working with gasoline.

⚠ Cautions

- Do not bend or kink throttle cable. A damaged throttle cable may cause an accident, or unsafe driving conditions
- When disassembling fuel system parts, pay attention to O-ring position, replace with new one if it is worn or damaged.
- There is a drain screw in the float chamber for draining residual gasoline.
- Do not disassemble air cut valve arbitrarily.

Specification

ITEM	RB1-ENG
Carburetor diameter	Ø22mm
I.D. number	PTG 050
Fuel level	14.8mm
Main injector	# 110
Idle injector	# 35
Idle speed	1700 ± 100rpm
Throttle handle clearance	1~3 mm
Pilot screw	2 turns

Torque Value

Cylinder head stud bolt (inlet pipe)	1.0~1.4kgf-m
Carburetor mounting nut	1.0~1.4kgf-m

Tool

Special service tools

Vacuum/air pressure pump
Fuel level gauge

Trouble Diagnosis

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

Stall after started
- Malfunction of carburetor choke.
- Incorrect ignition timing.
- Malfunction of carburetor.
- Dirty engine oil.
- Air existing in intake system.
- Incorrect idle speed.

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

Intermittently misfire as acceleration
- Malfunction of ignition system.

Late ignition timing
- Malfunction of ignition system.
- Malfunction of carburetor.

Power insufficiency and fuel consuming
- Fuel system clogged.
- Malfunction of ignition system.

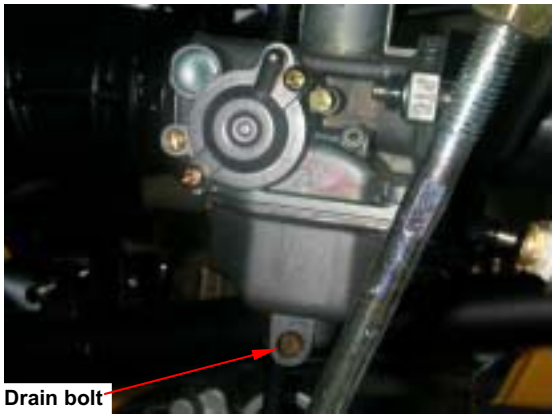
Mixture too lean
- Clogged fuel injector.
- Vacuum piston stuck and closed.
- Malfunction of float valve.
- Fuel level too low in float chamber.
- Clogged fuel tank cap vent.
- Clogged fuel filter.
- Obstructed fuel pipe.
- Clogged air vent hose.
- Air existing in intake system.

Mixture too rich
- Clogged air injector.
- Malfunction of float valve.
- Fuel level too high in float chamber.
- Malfunction of carburetor choke.
- Dirty air cleaner.

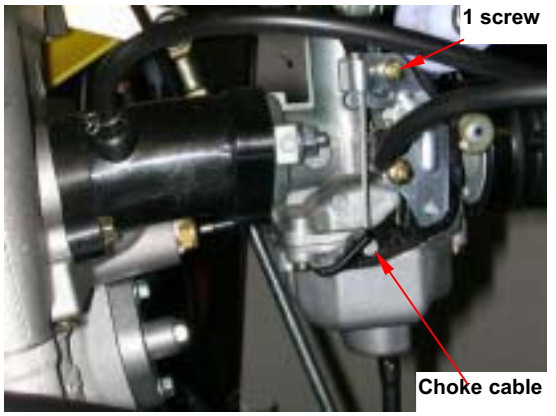
Carburetor Remove / Install

Removal

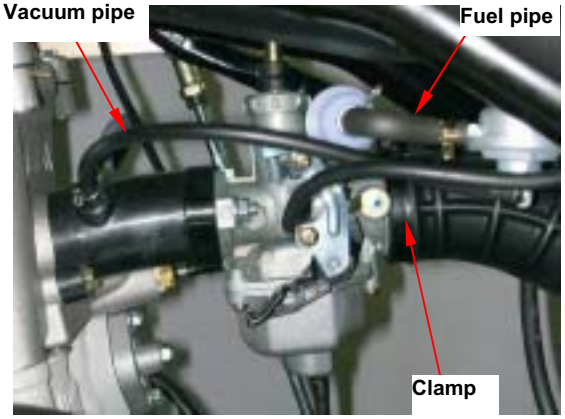
Drain out fuel in the float chamber.



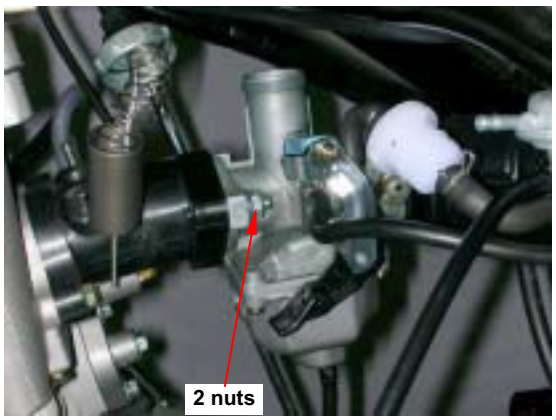
Loosen the choke cable screw from plate.
Remove the choke cable.



Disconnect the fuel hose.
Release the clamp strip of air cleaner.



Remove the carburetor upper parts from the carburetor.
Release the 2 nuts of carburetor insulator, and then remove the carburetor.



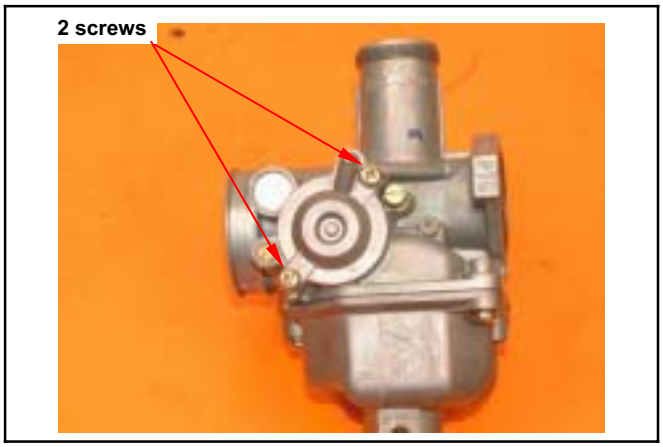
Installation

Install in reverse order of removal procedures.
Torque value:
Carburetor nut 1.0~1.4kgf-m

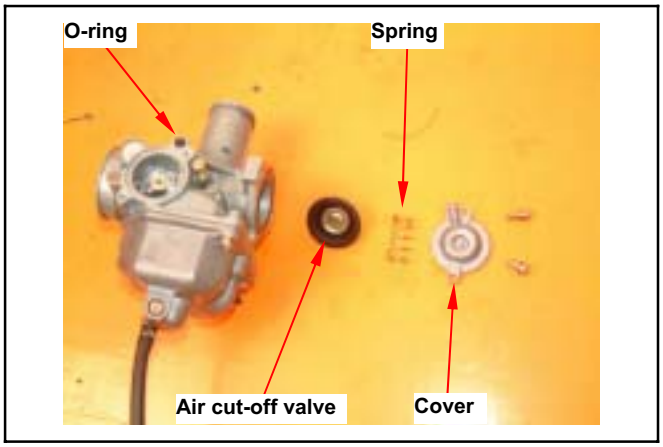
Air Cut-Off Valve

Disassembly

Remove 2 screws.



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



Inspection

Check the valve to see if it is normal.
If the valve is not normal, it will restrict air-flow.
If air-flow is not restricted, replace carburetor assembly.
Check the vacuum pipe o-ring to see if it is normal.

Assembly

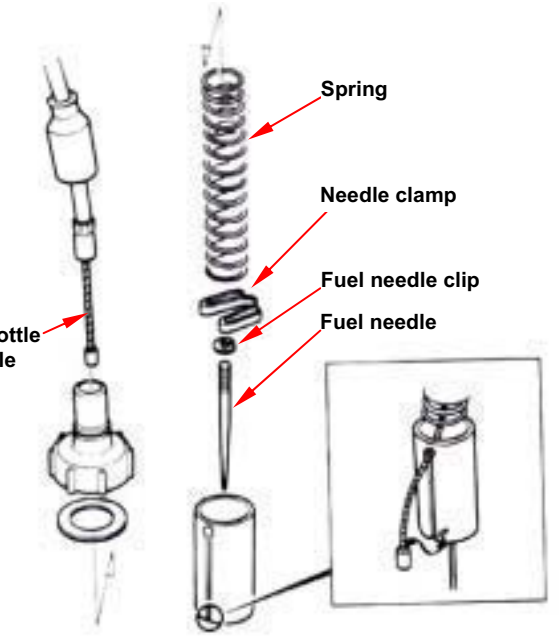
Install in reverse order of removal procedures.

Throttle Valve

Disassembly

Remove carburetor upper parts, and then remove throttle valve and throttle cable.

Disconnect the throttle cable from the throttle valve and remove the valve spring.
Remove the fuel needle clamp and fuel needle.



Assembly

Place the fuel needle onto the throttle valve and clip it with needle clamp.
Install the sealed cap, carburetor upper part, and throttle valve spring.
Connect the throttle valve cable to the throttle valve.
Install the throttle valve into the carburetor body.

⚠ Caution

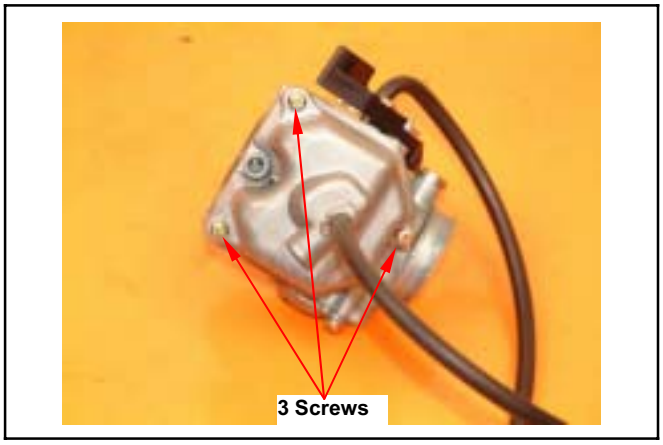
Align the groove inside the throttle valve with the throttle stopper screw of the carburetor body.

Tighten the carburetor upper part.
Adjust the free play of throttle valve cable.

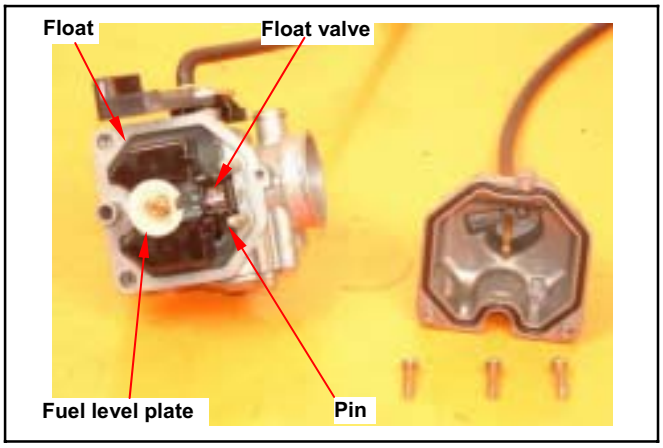
Float Chamber

Disassembly

Remove 3 mounting screws and remove float chamber cover.

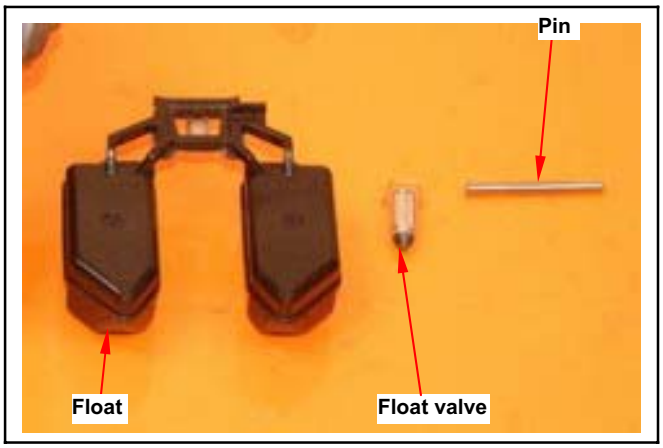


Remove the fuel level plate, float pin, float and float valve.



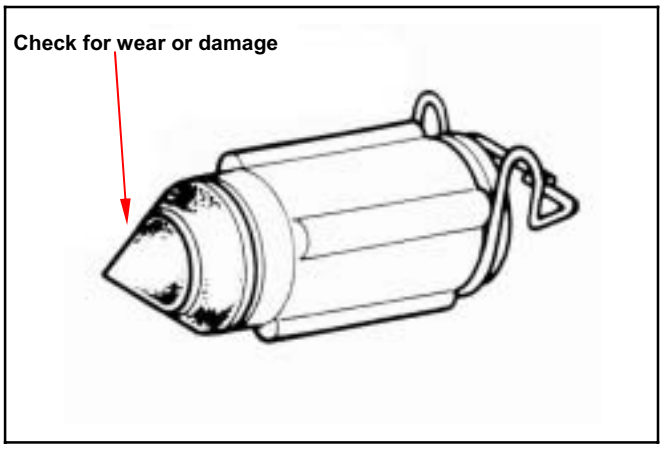
Inspection

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



⚠ Caution

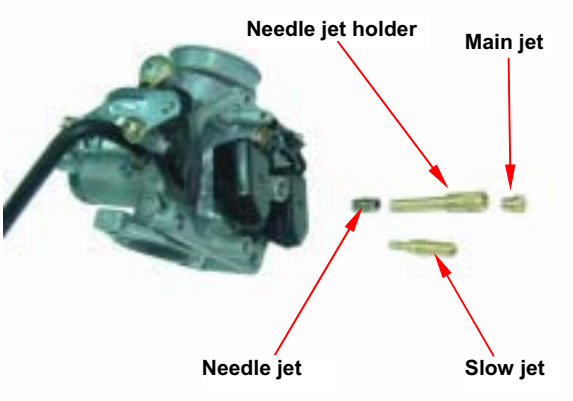
In case of wear or dirt, the float valve and valve seat will not tightly close, causing fuel level to increase and as a result, fuel flooding. A worn out or dirty float valve must be replaced with a new one.



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

Caution

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



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

Assembly

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

Caution

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

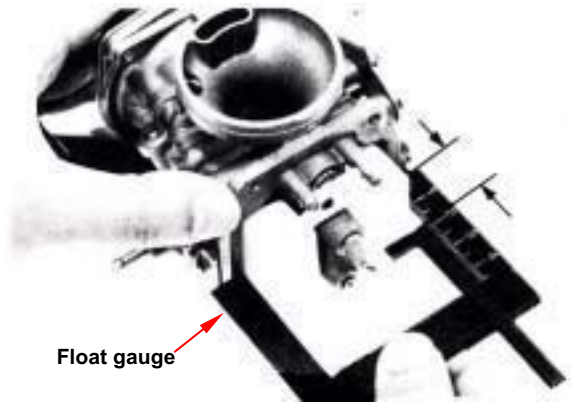
Install the float valve, float, and float pin.

Checking fuel level

Caution

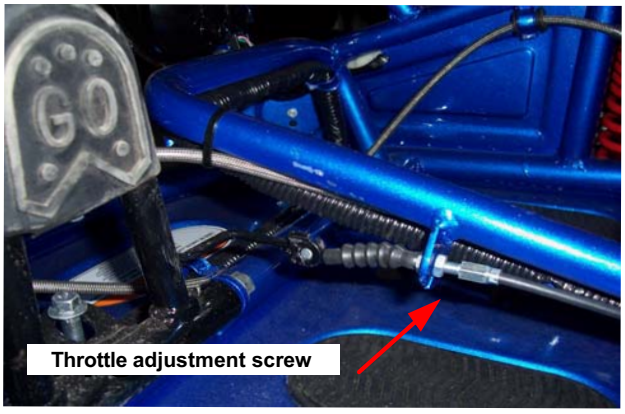
- Check again to ensure float valve, and float for proper installation.
- To ensure correct measurement, position the float meter in such a way so that the float chamber face is vertical to the main jet.

Fuel level: 14.8mm



Installation of carburetor

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



Fuel Pump removal

Use 8mm-10mm wrench and remove 2 M6*10 bolt.

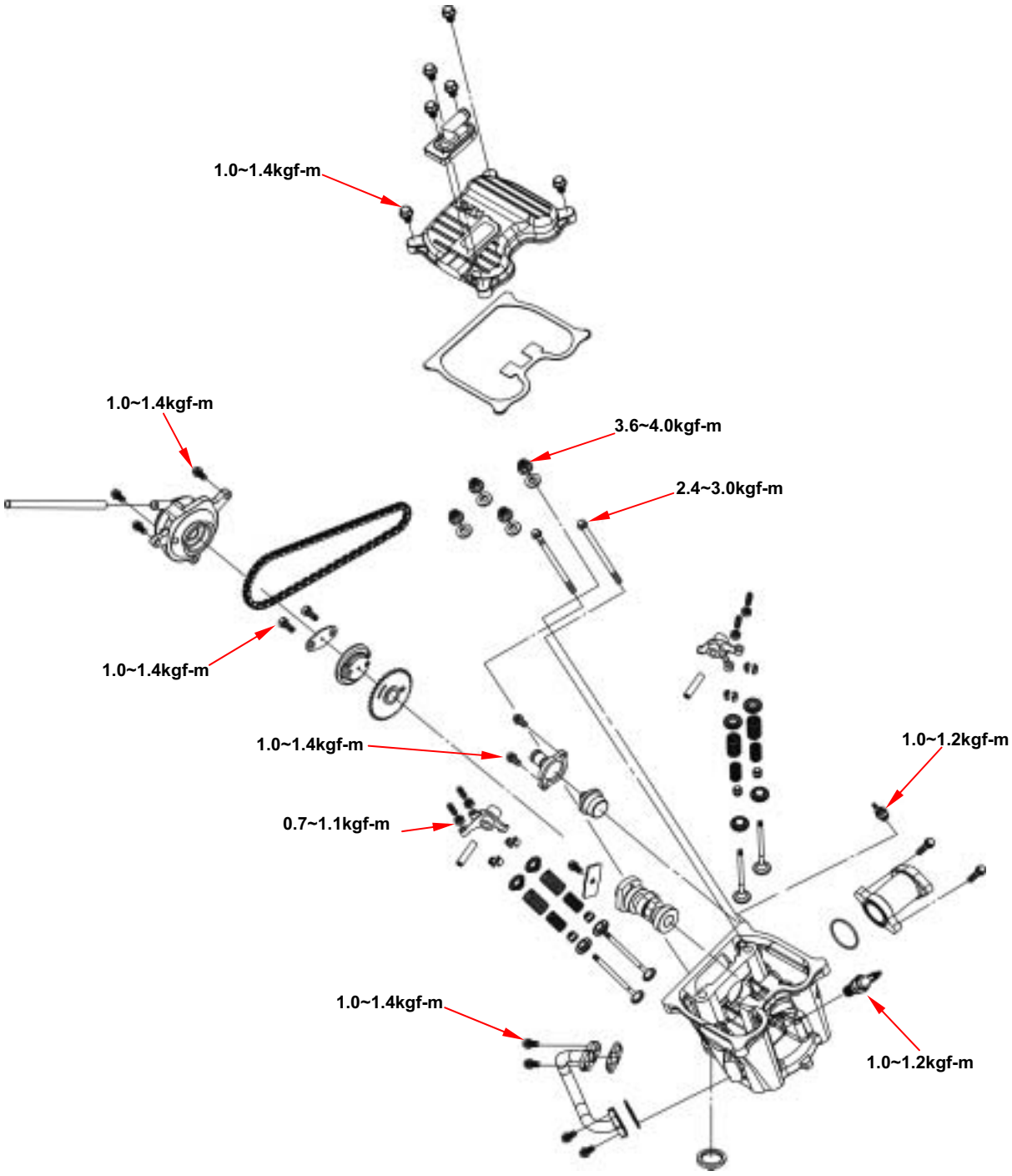
Turn off fuel petcock, then pull out the fuel intake line.

Put out the pump's exit tube.

Remove vacuum tube from the fuel pump.

Notes:

Mechanism Diagram



Precautions in Operation

General Information

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

Specification

Item			Standard	Limit
Compression pressure			12±2 kg/cm2	---
Camshaft	Height of cam lobe	Intake	34.880	34.860
		Exhaust	34.740	34.725
Rocker arm	ID of valve rocker arm		11.982~12.000	12.080
	OD of valve rocker arm shaft		11.966~11.984	11.936
Valve	OD of valve stem	Intake	4.975~4.990	4.900
		Exhaust	4.950~4.975	4.900
	ID of valve guide		5.000~5.012	5.030
	Clearance between valve stem and guide	Intake	0.010~0.037	0.080
		Exhaust	0.025~0.062	0.100
	Free length of valve spring	Inner	38.700	35.200
		outer	40.400	36.900
	Valve seat width		1.600	---
	Valve clearance	Intake	0.10±0.02mm	---
		Exhaust	0.15±0.02mm	---
Tilt angle of cylinder head			---	0.050

Torque Value

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

Tools

Special service tools

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

Troubleshooting

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

Low compression pressure

1. Valve

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

2. Cylinder head

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

3. Piston

- Piston ring worn out.

High compression pressure

- Too much carbon deposit on combustion chamber or piston head .

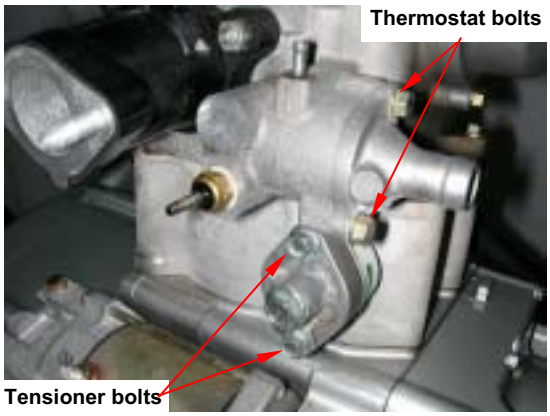
Noise

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

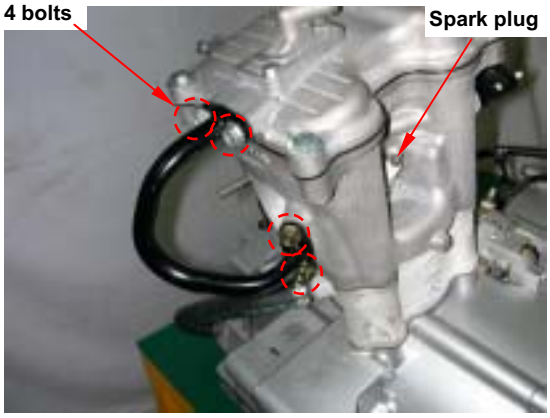
Cylinder Head Removal

Remove engine.
Remove the inlet pipe (2 nuts).

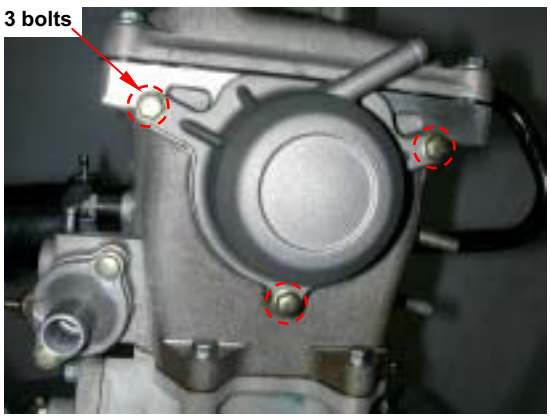
Remove 1 bolt of thermostat and then remove the thermostat.
Remove hole bolt and spring for the cam chain tensioner.
Loosen 2 bolts, and then remove tensioner.
Remove thermostat (2 bolts).



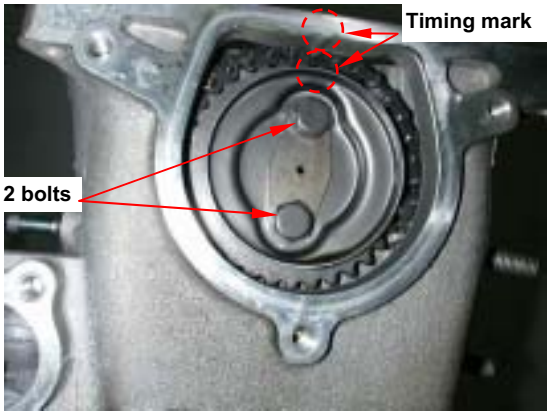
Remove Air Injection system (AI) pipe mounting bolts.
Remove spark plug.



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

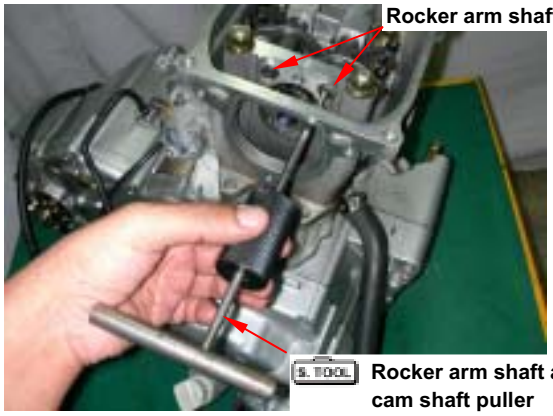


Remove left crankcase cover, and turn the drive face. Align the timing mark on the sprocket with that of cylinder head, piston is at TDC position.
Remove cam sprocket bolts and then remove the sprocket by prying chain out.



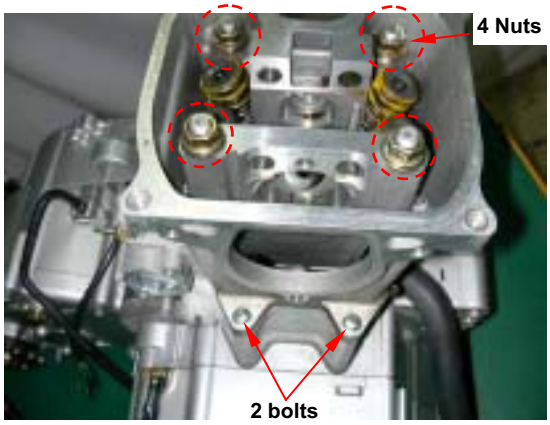
Remove cam shaft setting plate (1 bolt).

Remove rocker arm shafts and rocker arms.
Special Service Tool:
Rocker arm and cam shaft puller



Remove cam shafts.
Special Service Tool:
Rocker arm and cam shaft puller

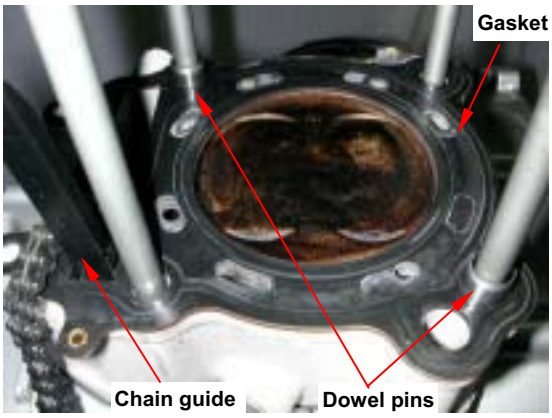
Remove the 2 cylinder head mounting bolts from cylinder head right side, and then remove 4 nuts and washers from cylinder head upper side.
Remove the cylinder head.



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

Caution

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

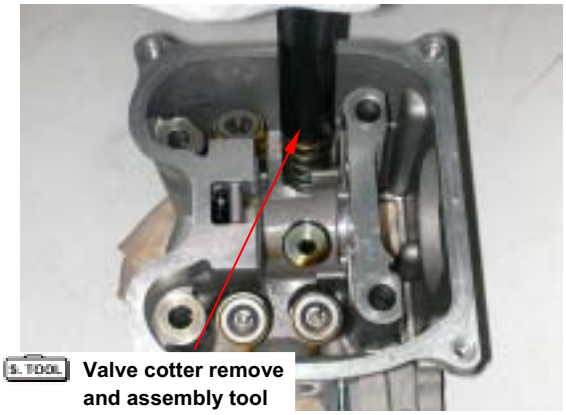


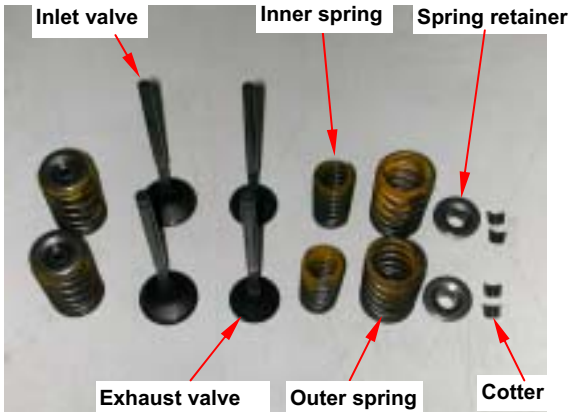
Use a valve cotter remove & assembly tool to press the valve spring, and then remove valves.

Caution

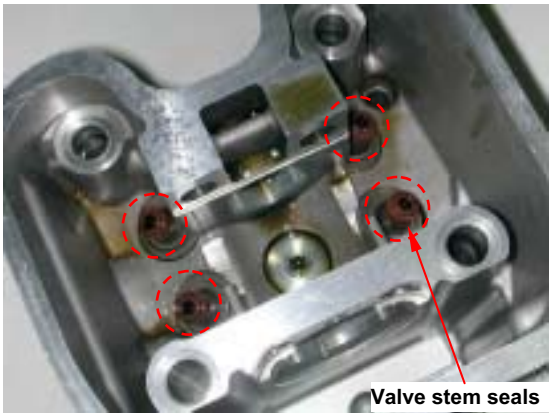
- In order to avoid losing spring elasticity, do not press the spring too much. Thus, press length is based on the valve cotter in which can be removed.

Special Service Tool:
Valve cotter remove & assembly tool





Remove valve stem seals.



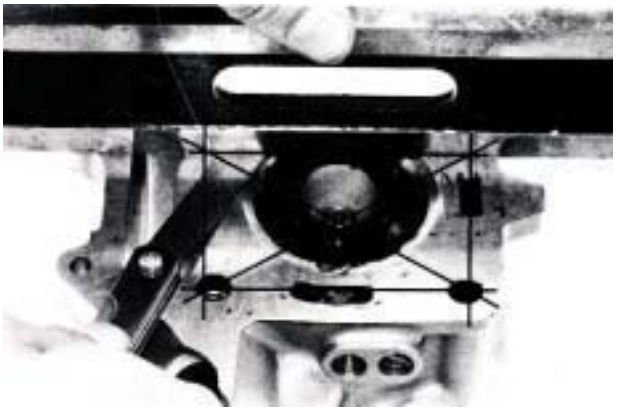
Clean carbon deposits in combustion chamber.
Clean residues and foreign materials on cylinder head matching surface.

Caution

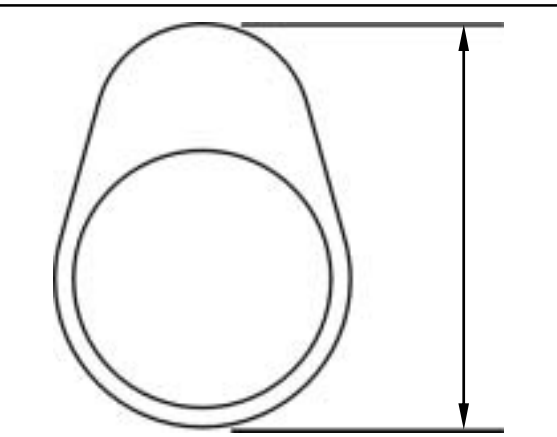
Do not damage the matching surface of cylinder head.

Cylinder Head Inspection

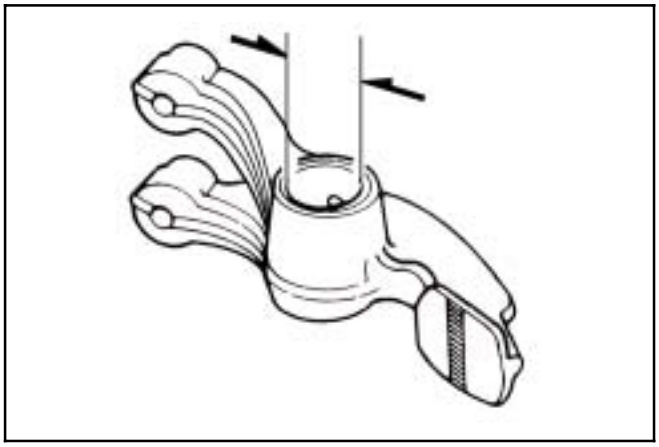
Check if spark plug and valve holes are cracked.
Measure cylinder head warp with a straightedge and thickness gauge.
Service limit: 0.05 mm



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

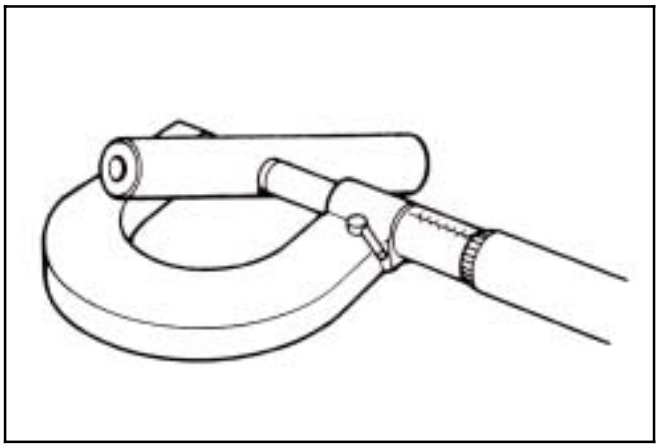


Rocker Arm
Measure the cam rocker arm I.D., wear or damage or oil hole clog.
Service Limit: Replace when it is less than 12.080 mm.

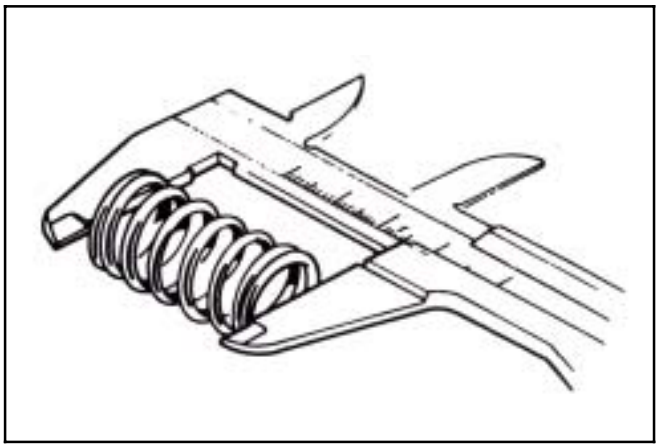


Rocker Arm Shaft
Measure the active O.D. of the cam rocker arm shaft and cam rocker arm.
Service Limit: Replace when it is less than 11.936 mm.

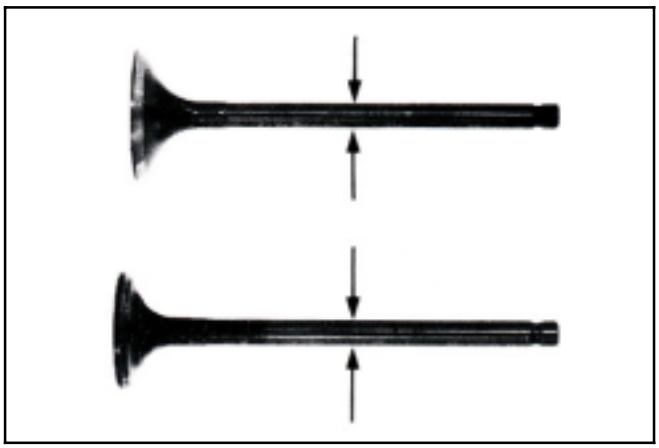
Calculate the clearance between the rocker arm shaft and the rocker arm.
Service Limit: Replace when it is less than 0.10 mm.



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



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

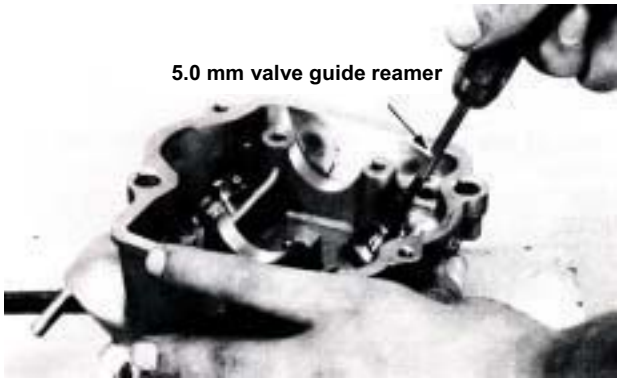


Valve guide

⚠ Caution

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

Tool: 5.0 mm valve guide reamer

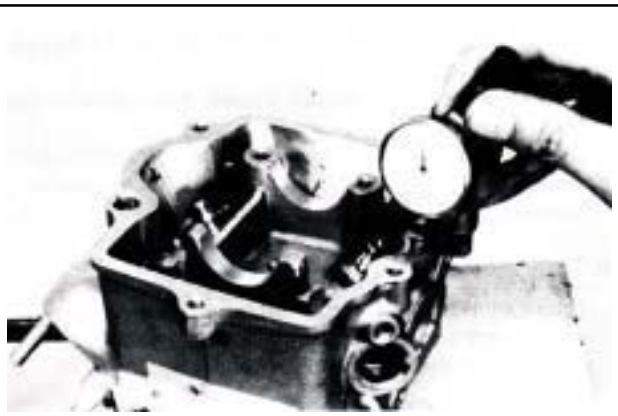


Measure and record each valve guide inner diameters.

Service limit: 5.03 mm

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

Service Limit: IN→0.08 mm
EX→0.10 mm



⚠ Caution

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

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

⚠ Caution

It has to correct valve seat when replacing valve guide.

Valve Stem Replacement

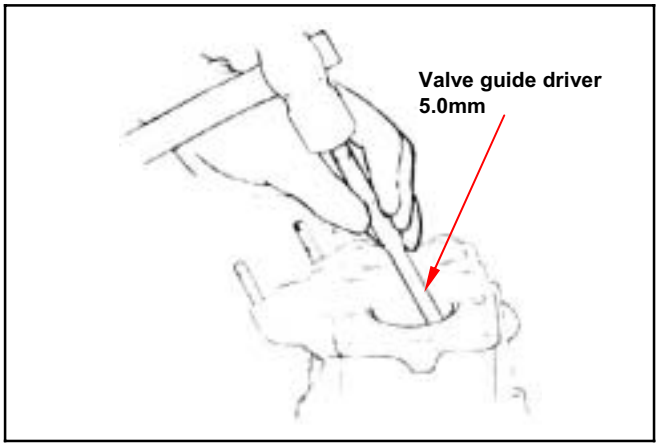
Heat up cylinder head to 100~150 ℃ with heated plate or toaster.

Caution

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

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

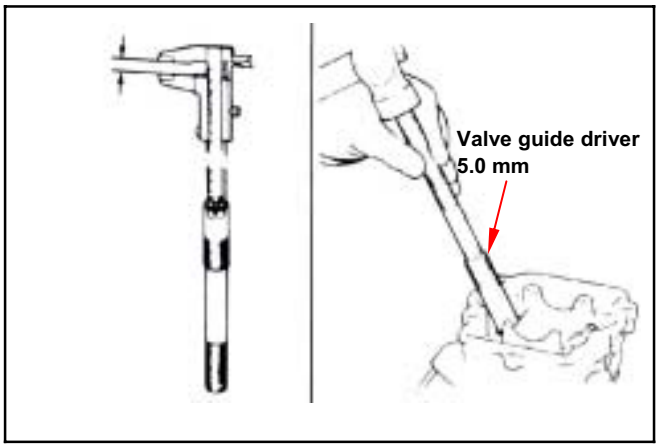
Tool: Valve guide driver: 5.0 mm



Caution

- Check if new valve guide is deformed after pressed in.
- When pressing in the new valve guide, cylinder head must be kept in 100~150 ℃.

With the valve guide driver adjust the valve guide to 13mm.
Press in new valve guide from rocker arm side.
Tool: Valve guide driver: 5.0 mm

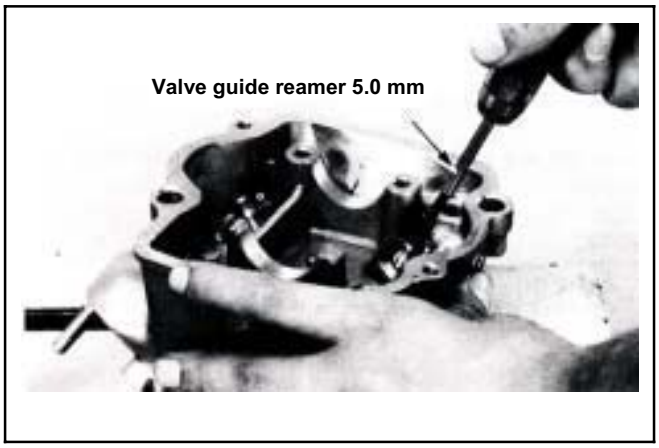


Wait for the cylinder head to cool down to room temperature, then correct the new valve guide with reamer.

Caution

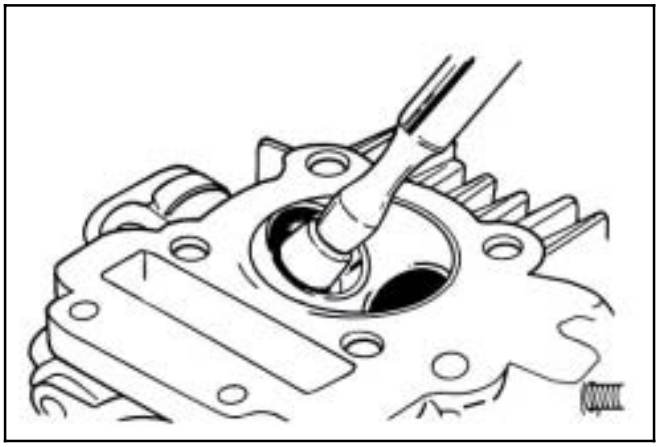
- Using cutting oil when correcting valve guide with a reamer.
- Turn the reamer in same direction when it is inserted or rotated.

Correct valve seat and clean up all metal residues from cylinder head.
Tool: Valve guide reamer: 5.0 mm



Valve Seat Inspection and Service

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



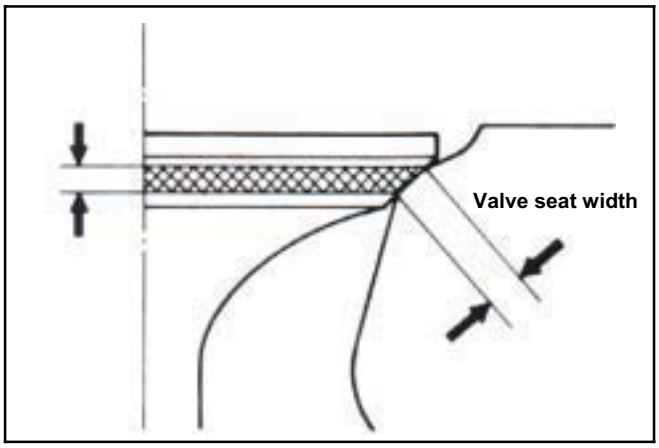
⚠ Caution

- Do not let emery enter between the valve stem and valve guide.
- Clean up the emery after corrected, and apply with engine oil on 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 seal is rough, worn out, or incomplete contact with valve seat.



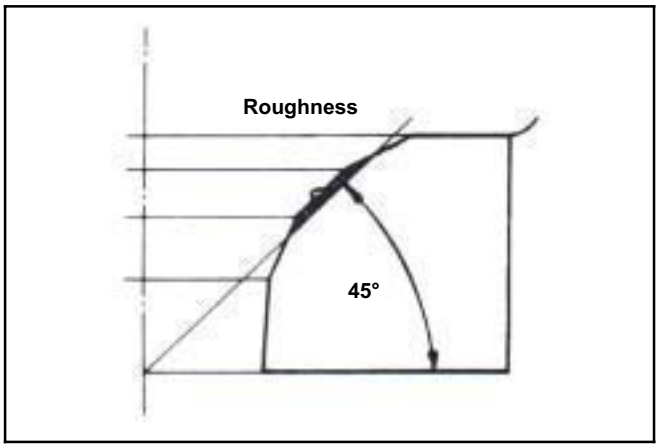
Valve seat inspection

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

Valve seat width

Service limit: 1.6mm

Check the contact condition of valve seat.



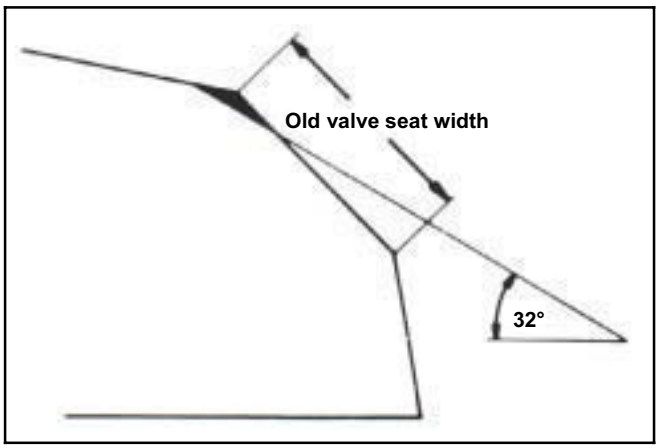
Valve seat grinding

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

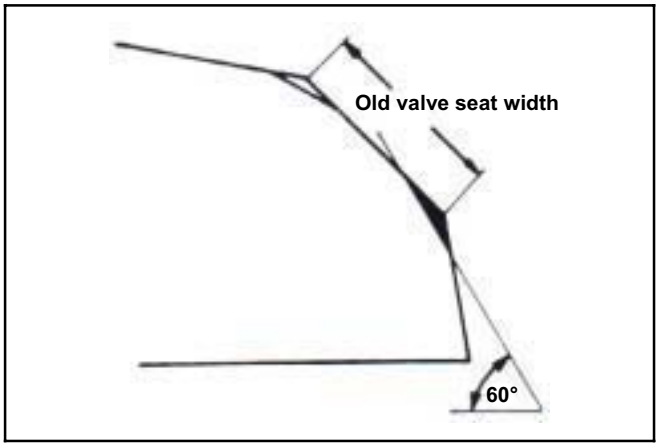
⚠ Caution

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

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



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

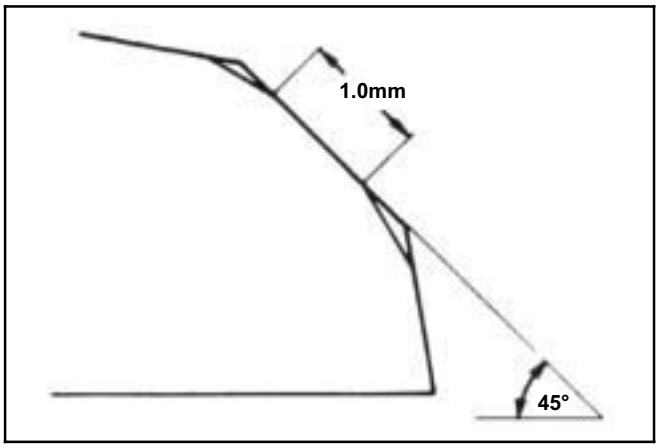


Use 45° cutter to grind the valve seat to specified width.

Caution

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

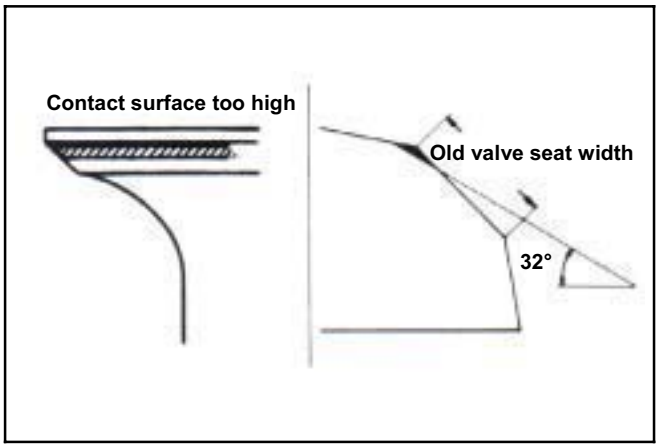
Grind valve seat again if necessary.



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

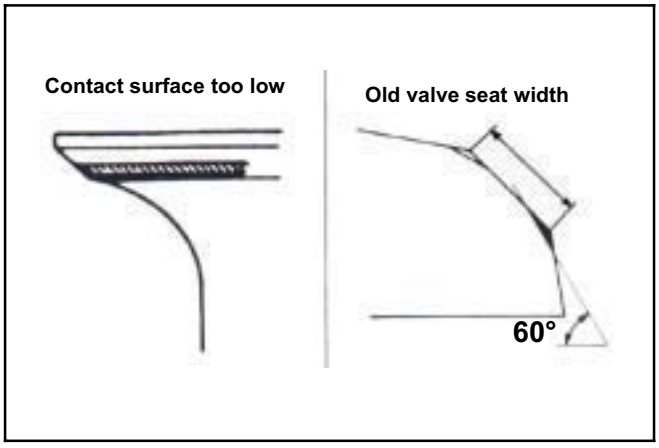
Caution

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

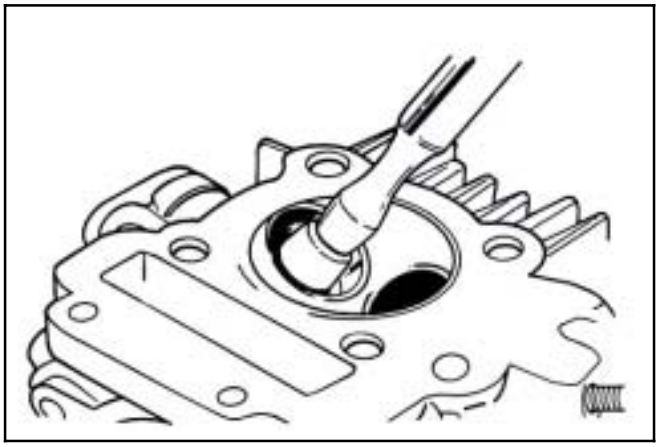


If the contact surface is too high, grind the valve seat with 32° cutter.
Then, grind the valve seat to specified width.

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



After the valve seat is ground, coat valve seat surface with emery and then slightly press the ground surface.
Clean up all emery coating on cylinder and valve after it has been ground.

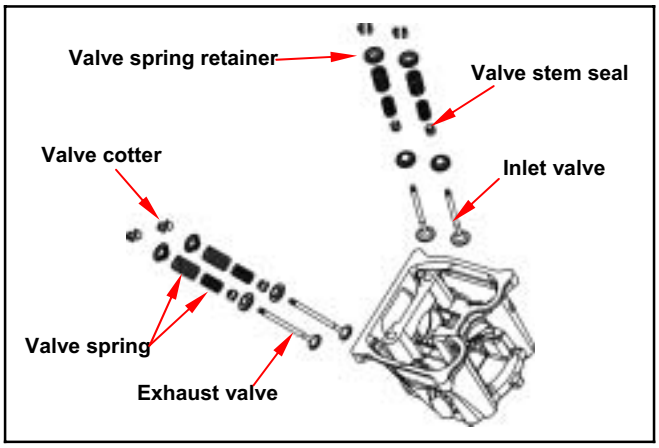


Cylinder Head Reassembly

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

Caution

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

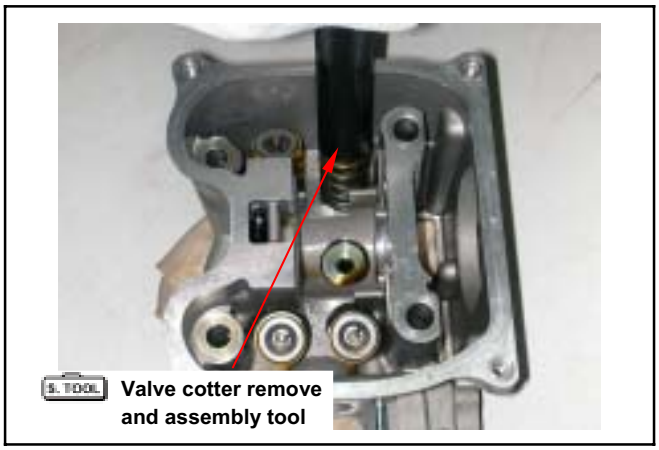


Use a valve cotter removal & assembly tool to press the valve spring, and then remove valves.

Caution

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

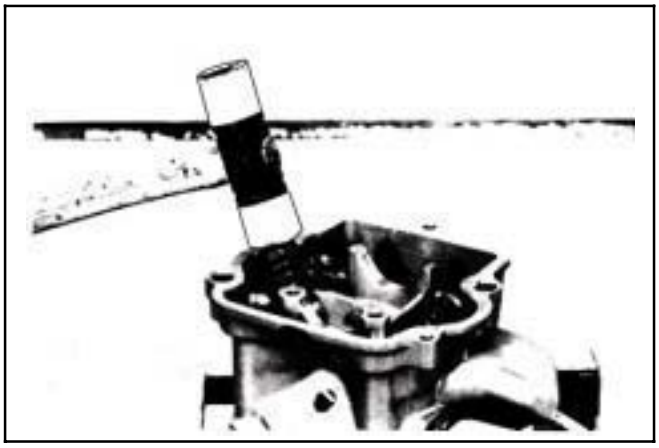
Special Service Tool:
Valve cotter remove & assembly tool



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 a working table to prevent valve damage.

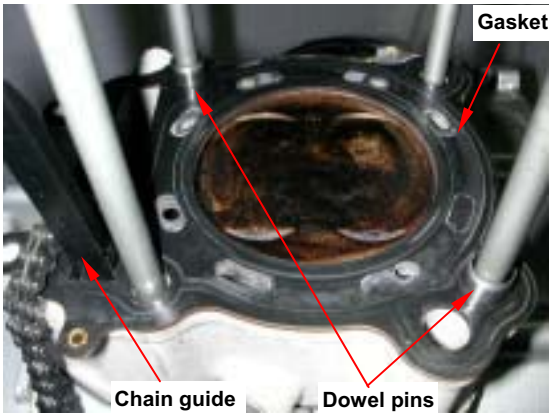


Cylinder Head Installation

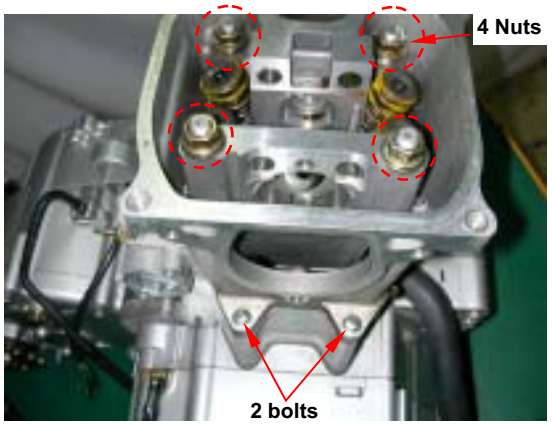
Clean up all residues and foreign materials onto the matching surfaces of both cylinder and cylinder head.
Install chain guide, dowel pins and a new cylinder head gasket onto the cylinder.

Caution

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



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



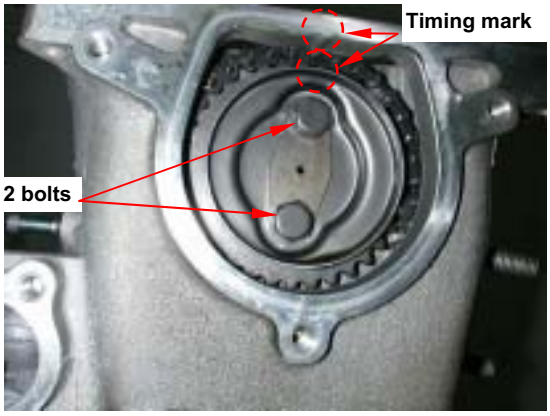
Install camshaft into cylinder head, and install rocker arm and rocker arm shaft.

Install rocker arm pin mounting plate.

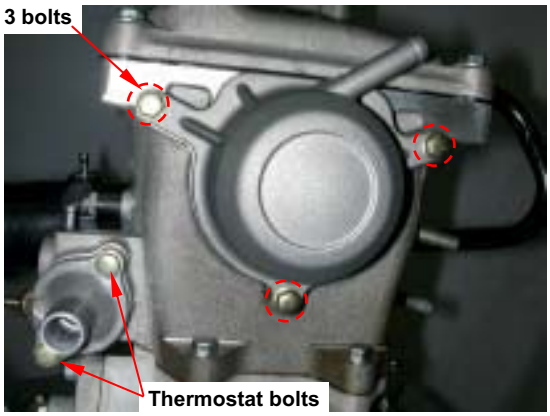
Install cam chain on to sprocket and align the timing mark on the sprocket with that of cylinder head.
Align sprocket bolt hole with camshaft bolt hole.
Tighten the sprocket mounting bolts.

Caution

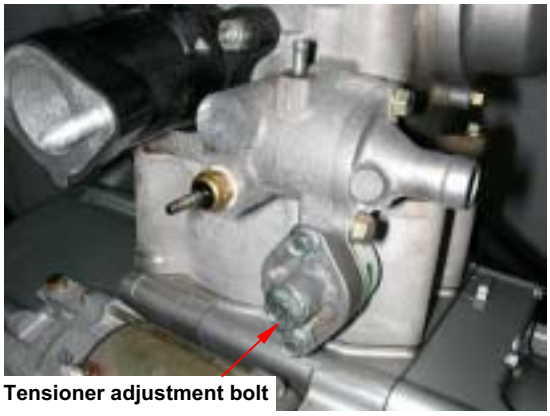
Make sure timing marks are matched.



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

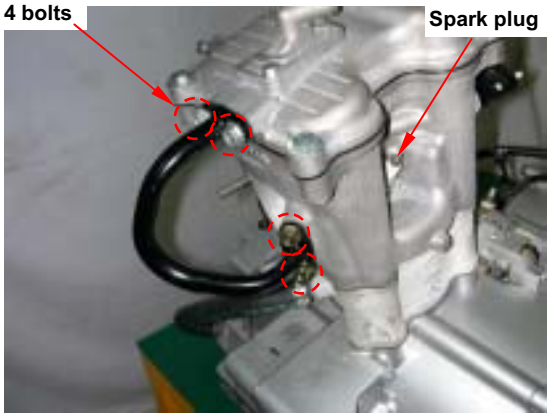


Loosen auto tensioner adjustment bolt and remove bolt and spring.
Install tensioner and install spring and adjustment bolt.



Install cylinder cover (4 bolts).

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



Caution

This model is equipped with a precision 4-valve mechanism so its tighten torque can not exceed standard value in order to avoid causing cylinder head deformation, engine noise and leaking; this is so that the karts performance is not affected.

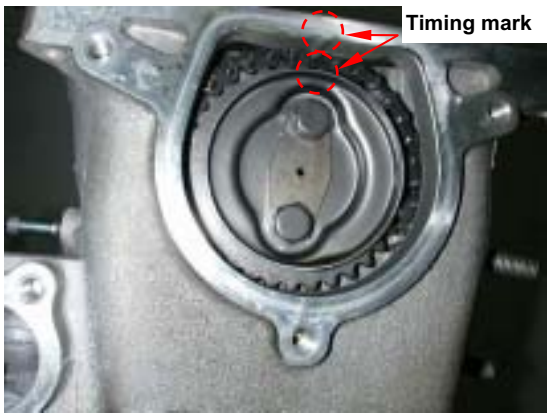
Install the engine onto frame (refer chapter 5).

Valve Clearance Adjustment

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

Remove the cylinder head side cover.
Remove left crankcase cover, and turn the drive face, and align the timing mark on the cam sprocket with that of cylinder head, piston is at TDC position.
Loosen valve clearance adjustment nuts and bolts located on valve rocker arm.
Measure and adjust valve clearance with feeler gauge.
After valve clearance has been adjusted to standard value, hold adjustment bolt and then tighten the Adjustment nut.

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



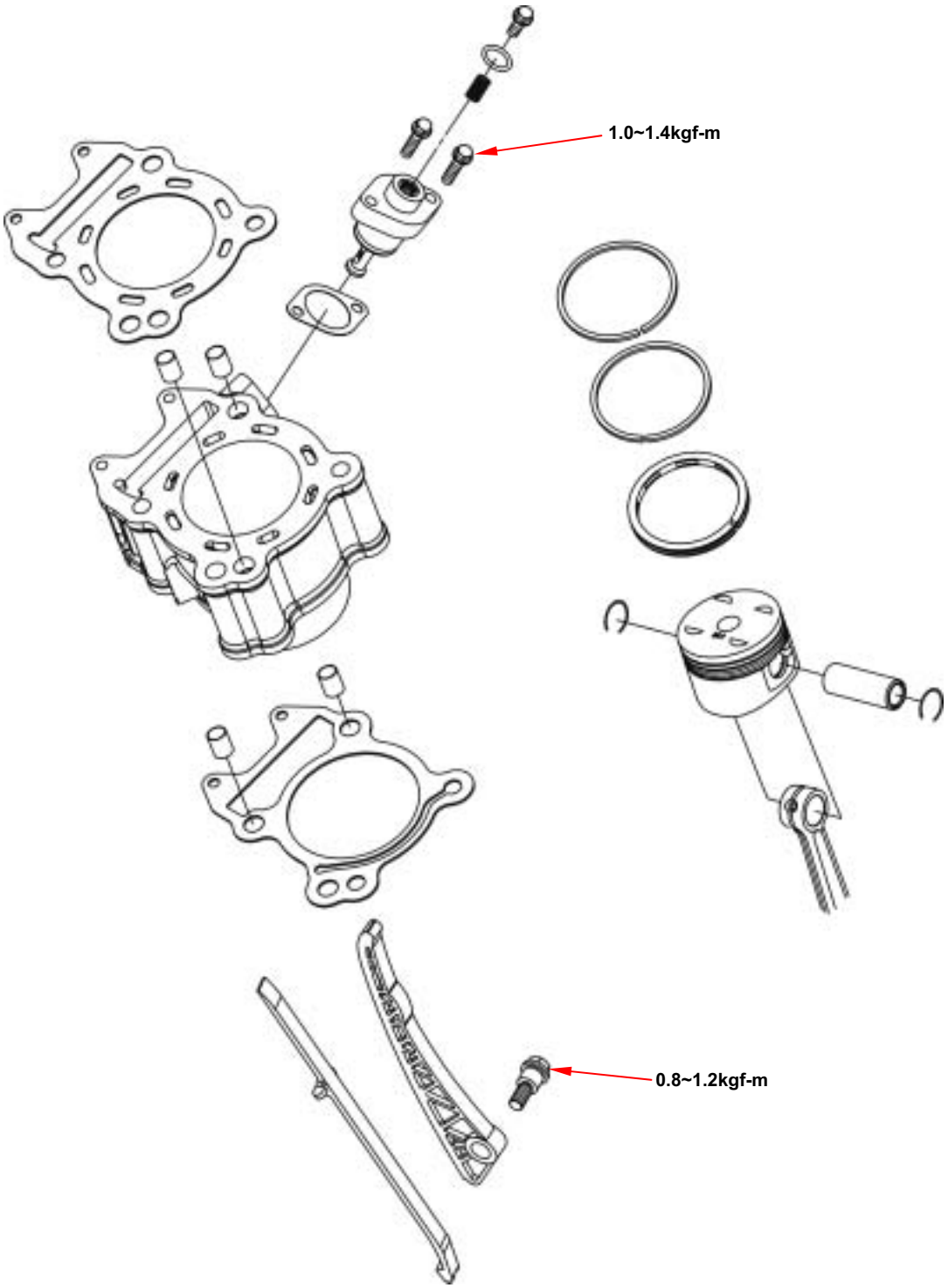
Install the cylinder head side cover.
Start the engine and make sure that engine oil flows onto the cylinder head.
Stop the engine after confirmed, and then install the cylinder head cover and AI pipe.

Caution

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

Notes:

Mechanism Diagram



6. Cylinder / Piston

Precautions in Operation

General Information

- Cylinder and piston service cannot be carried out when engine is mounted on frame.

Specification **Unit：mm**

Item			Standard	Limit
Cylinder	ID		70.995~71.015	71.100
	Bend		-	0.050
Piston/ Piston ring	Clearance between piston rings	Top ring	0.015~0.050	0.090
		2nd ring	0.015~0.050	0.090
	Ring-end gap	Top ring	0.150~0.300	0.500
		2nd ring	0.300~0.450	0.650
		Oil ring side rail	0.200~0.700	-
	OD of piston (2nd)		70.430~70.480	70.380
	Clearance between piston and cylinder		0.010~0.040	0.100
	ID of piston pin boss		17.002~17.008	17.020
OD of piston pin			16.994~17.000	16.960
Clearance between piston and piston pin			0.002~0.014	0.020
ID of connecting rod small-end			17.016~17.034	17.064

Torque Value

Tensioner lifter bolt	1.0~1.4kgf-m
Cam chain tensioner	0.8~1.2kgf-m

Trouble Diagnosis

Low or Unstable Compression Pressure

- Cylinder or piston ring worn out.

Smoking in Exhaust Pipe

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

Knock or Noise

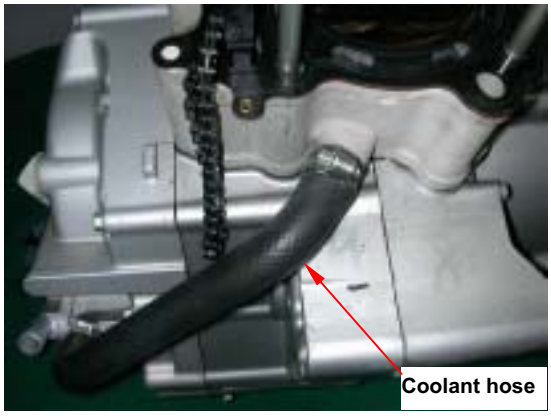
- Cylinder or piston ring worn out.
- Carbon deposits on cylinder head top-side.
- Piston pin hole and piston pin wear out.

Engine Overheat

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

Cylinder and Piston Removal

Remove cylinder head (refer to chapter 5).
Remove coolant hose from cylinder.
Remove cylinder.



Cover the holes of crankcase and cam chain with a piece of cloth.
Remove piston pin clip, and then remove piston pin and piston.

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

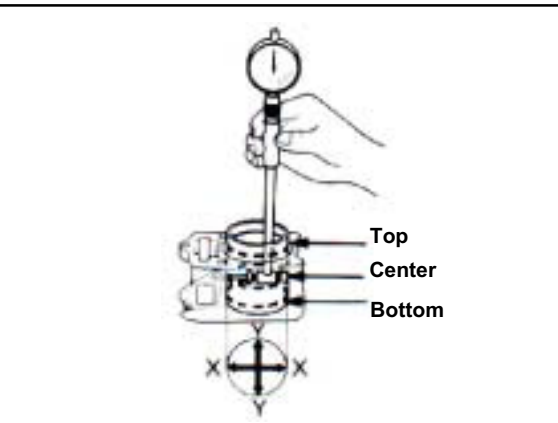
⚠ Caution

- Soak the residues in solvent so that the residues can be removed more easily.

Inspection

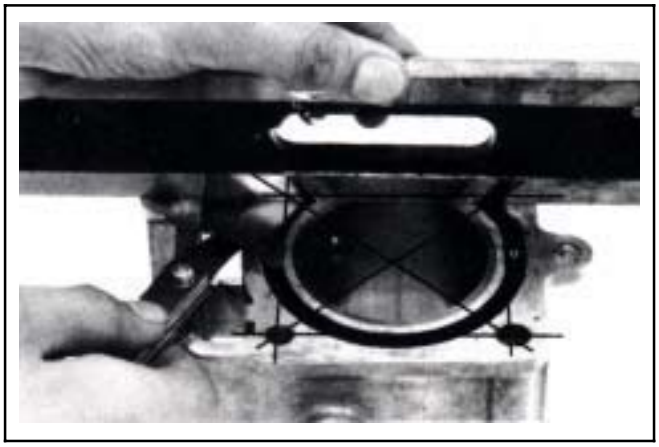
Check to see if the inner diameter of cylinder is worn out or damaged.
In the 3 positions, top, center, and bottom, of cylinder, measure the X and Y values respective in the cylinder.

Service limit: 71.100 mm



Check to see if cylinder is warped.

Service limit: 0.05 mm



Measure clearance between piston rings and grooves.

Service Limit: Top ring: 0.09 mm

2nd ring: 0.09 mm

Remove piston rings

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

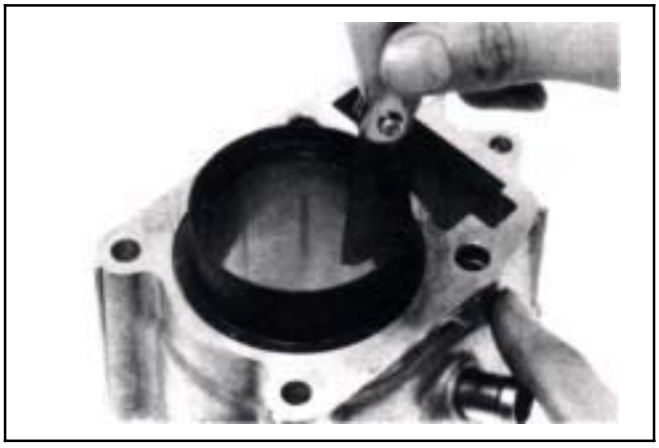
⚠ Caution

Pay attention when removing piston rings because they are fragile.

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

Service Limit: Top ring: 0.50 mm

2nd ring: 0.65 mm

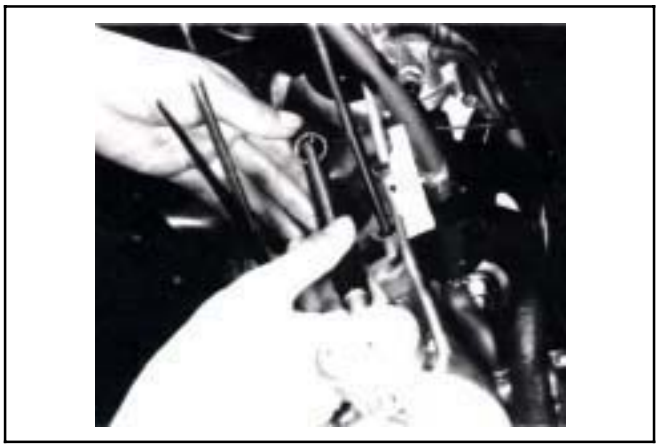


Measure the outer diameter of piston pin.

Service Limit: 16.96 mm

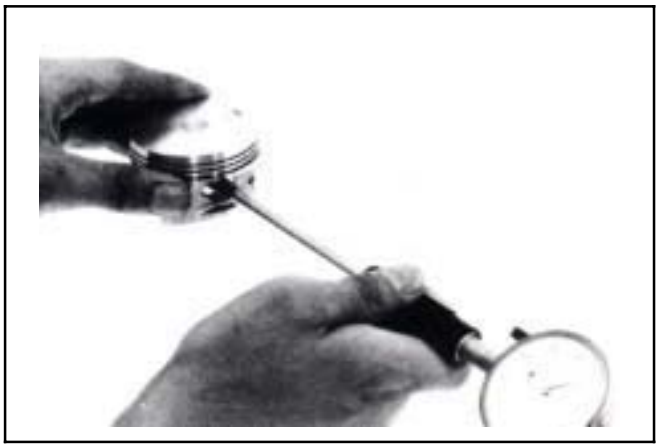
Measure the inner diameter of connecting rod small end.

Service Limit: 17.064 mm



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

Service Limit: **0.02 mm**



Measure piston outer diameter.

⚠ Caution

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

Service limit：70.380 mm

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

Piston Ring Installation

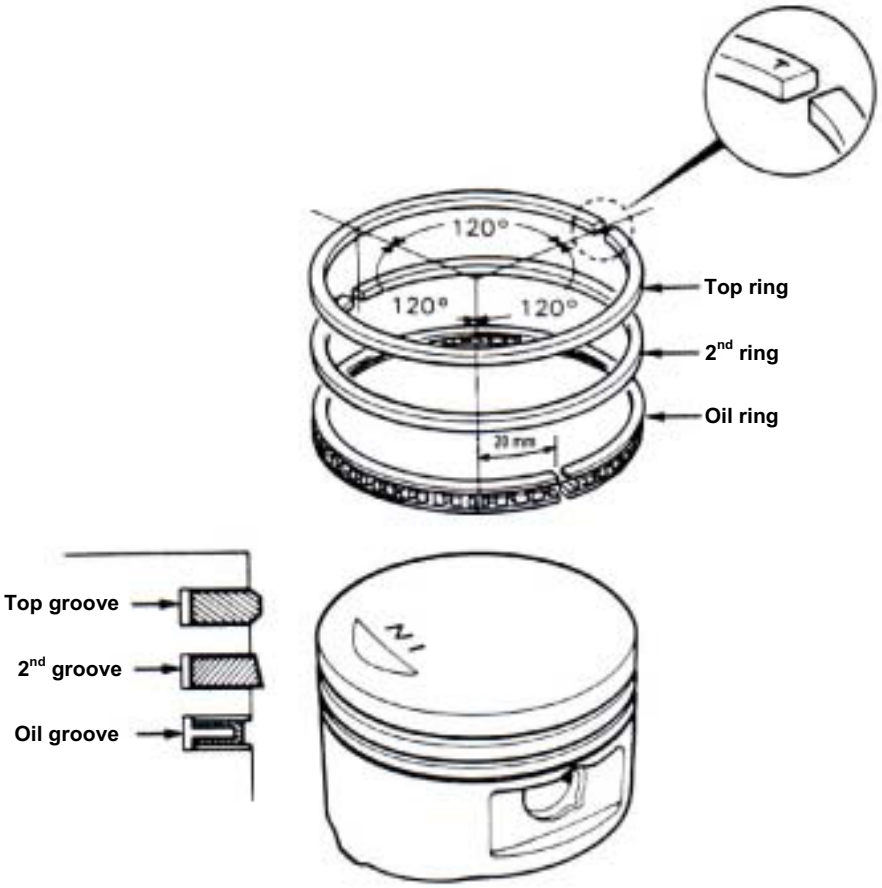
Clean up piston top, ring groove, and piston surface.

Install the piston ring onto piston carefully.

Place the openings of piston ring as diagram shows.

⚠ Caution

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



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

Caution

Soak the residues in solvent so that the residues can be removed more easily.

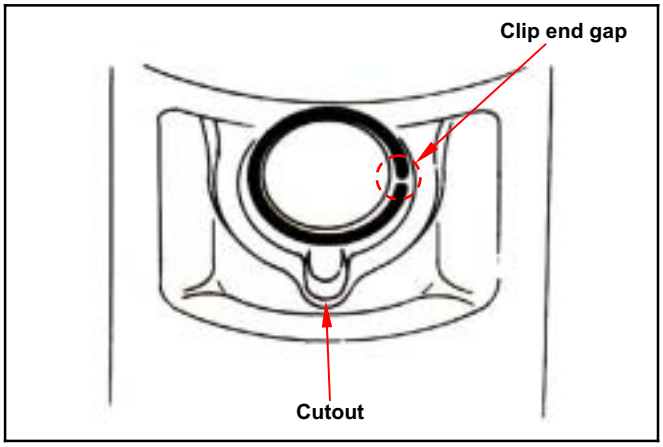
Piston Installation

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

Install new piston pin clip.

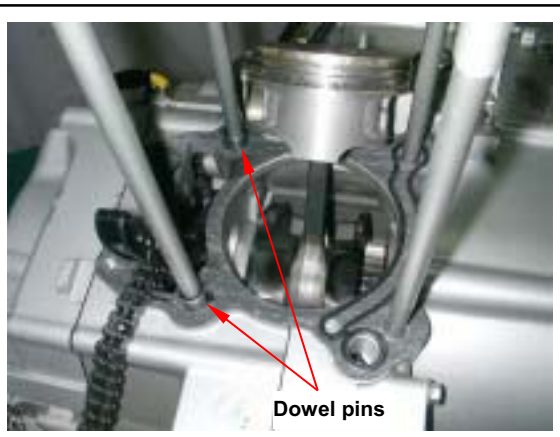
Caution

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



Cylinder Installation

Install dowel pins and new gasket.

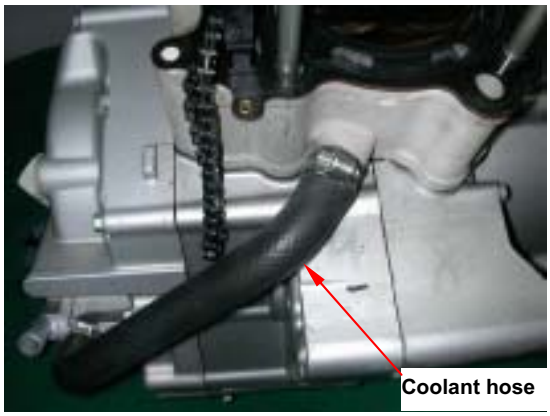


Coat some engine oil on inside of cylinder, piston, and piston rings.
Take care when installing piston into cylinder. Press piston rings in, one by one, when installing.

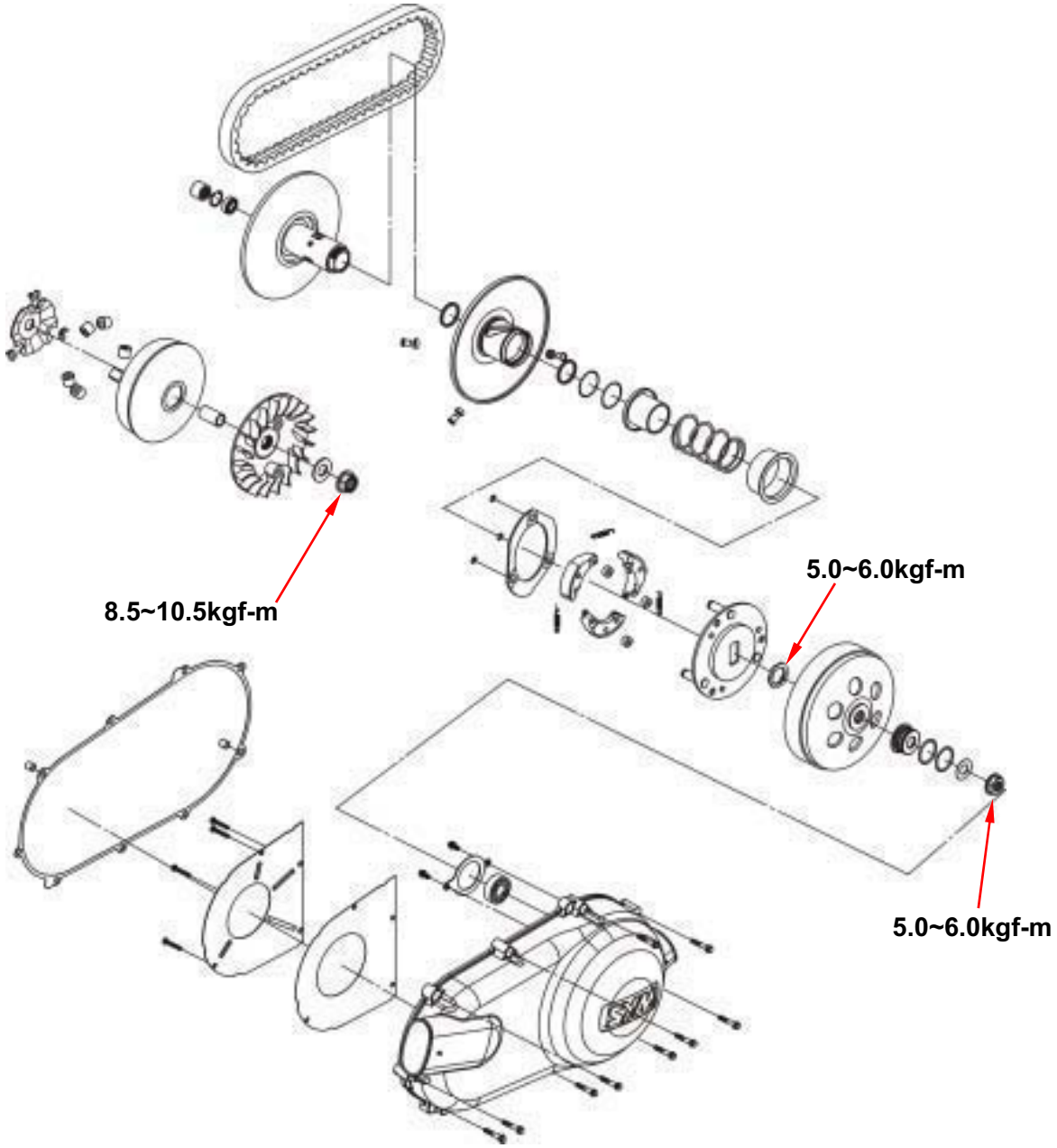
⚠ Caution

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

Install coolant hose on cylinder.
Install cylinder head (refer to Chapter 5).



Mechanism Diagram



7. V-Belt Driving System

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 grease.

Specification

Item	Standard value	Limit
Driving belt width	24.000 mm	22.500 mm
OD of movable drive face boss	29.946~29.980 mm	29.926 mm
ID of movable drive face	30.000~30.040 mm	30.060 mm
OD of weight roller	19.500~20.000 mm	19.000 mm
ID of clutch outer	144.850~145.150 mm	145.450 mm
Thickness of clutch weight	6.000 mm	3.000 mm
Free length of driven pulley spring	102.400 mm	97.400 mm
OD of driven pulley boss	40.950~40.990 mm	40.930 mm
ID of driven face	41.000~41.050 mm	41.070 mm
Weight of weight roller	17.700~18.300 g	17.200 g

Torque value

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

Special Service Tools

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

Trouble Diagnosis

Engine can be started but kart 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.

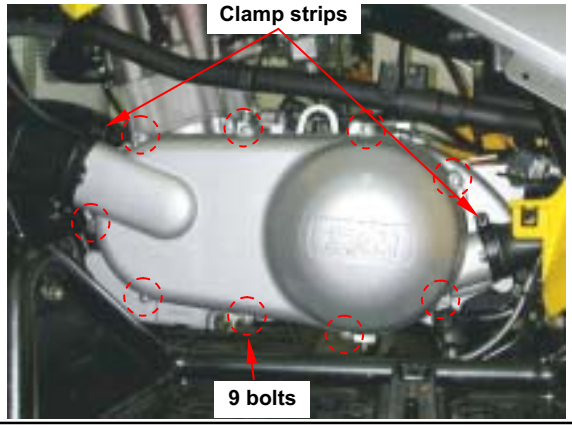
Insufficient horsepower or poor high speed performance

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

Left Crankcase Cover

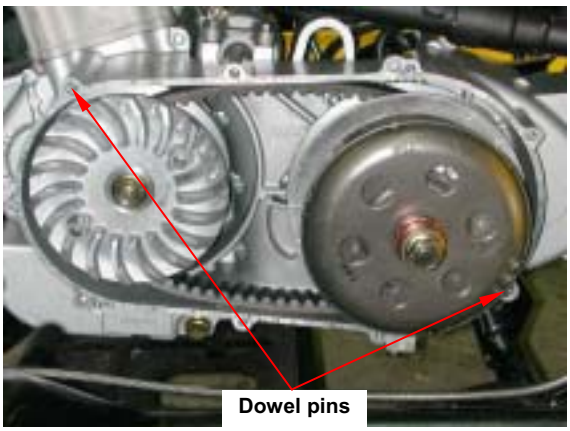
Left crankcase cover removal

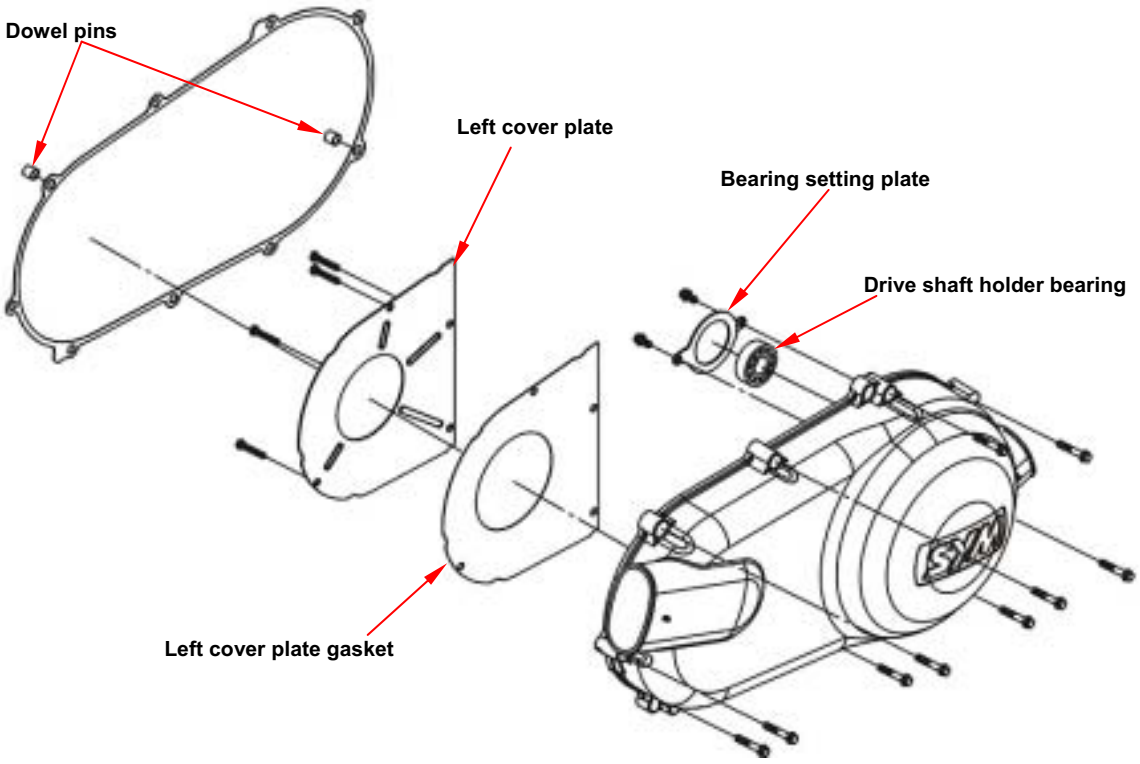
Release the 2 clamp strips of left crankcase cover ducts, and then remove the ducts.
Remove left crankcase cover. (9 bolts)
Remove both dowel pin and gasket.



Left crankcase cover install

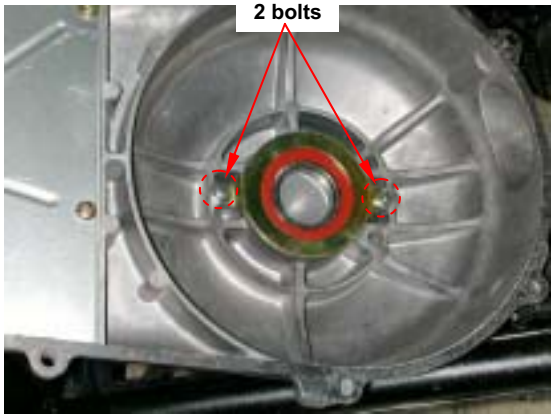
Install left crankcase cover in the reverse procedures of removal.





Left crankcase cover inspection

Remove 2 bolts to remove left crankcase cover bearing setting plate.



Check bearing on left crankcase cover.

Rotate bearing's inner ring with fingers.

Check to see if bearings can be turned smoothly and silently. Also check to see if bearing outer ring is mounted on cover tightly.

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

Drive Belt

Removal

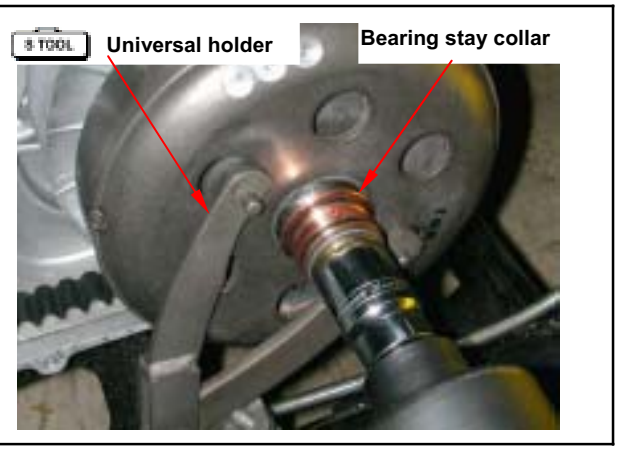
Remove left crankcase cover.

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

Special Tool：

Universal holder　SYM-2210100

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



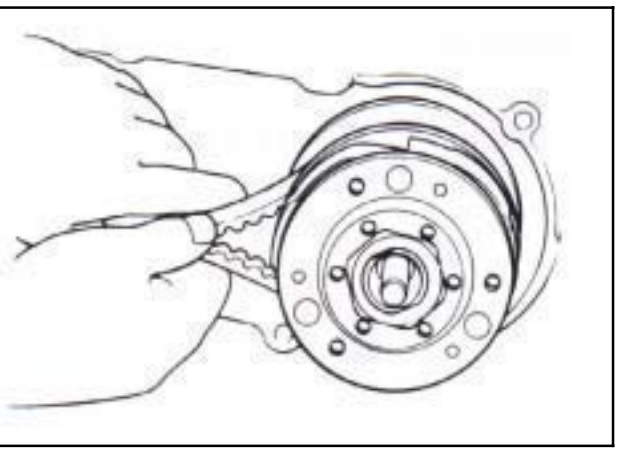
Caution

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

Push the drive belt into belt groove as diagram shows so that the belt can be loosened, and then remove the driven pulley.

Remove driven pulley.　Do not remove drive belt.

Remove the drive belt from the groove of driven pulley.



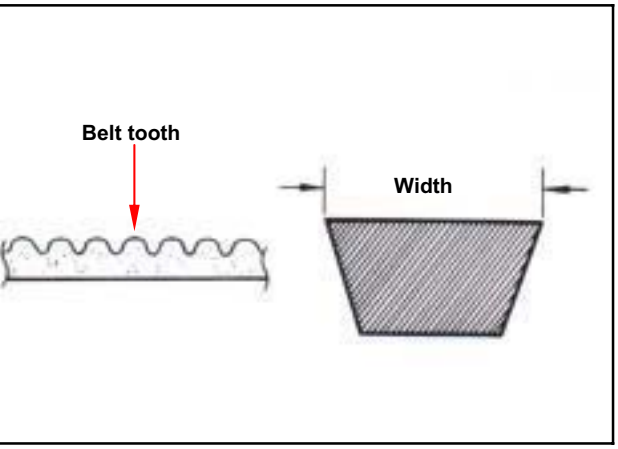
Inspection

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

Measure the width of drive belt as shown in diagram.

Service Limit: 22.5 mm

Replace the belt if it exceeds the service limit.



Caution

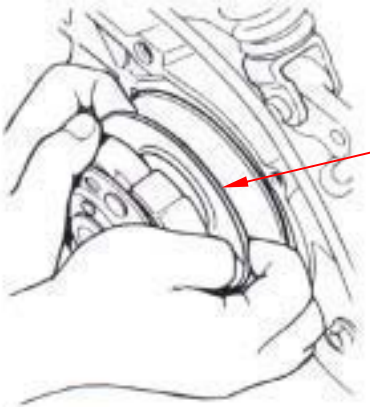
- Using the genuine parts for replacement.
- The surfaces of drive belt or pulley must be free of grease.
- Clean up all grease or dirt before installation.

Installation

⚠ Caution

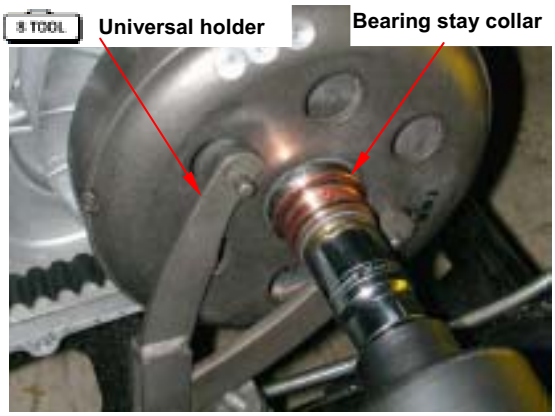
- Pull out driven face to avoid it closing.
- In order to avoid distortion or damage, do not oppress friction plate comp.

Install drive belt onto driven pulley.



Install the driven pulley with belt onto drive shaft.
Install the drive belts other end over the movable drive face.

Install the clutch outer and bearing stay collar.
Hold the clutch outer with universal holder, and then tighten nut to specified torque value.
Torque value: 5.0~6.0kgf-m



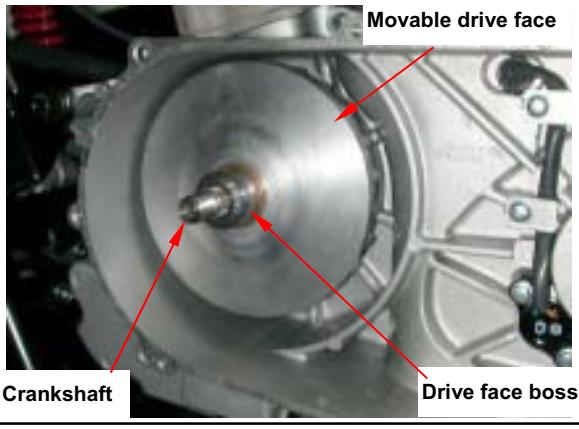
Install the drive face, washer and drive face nut.
Hold drive face with universal holder, and then tighten nut to specified torque value.
Torque value: 8.5~10.5kgf-m

Drive Face

Removal

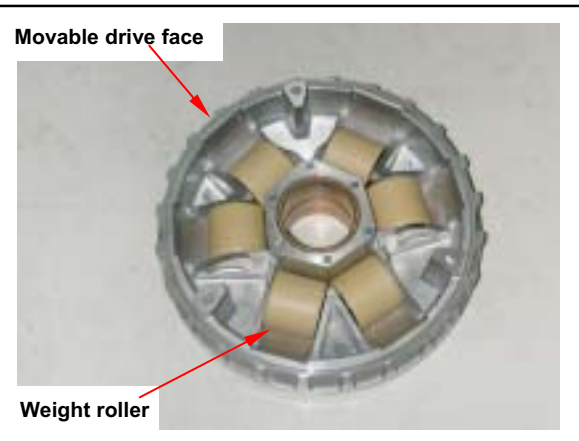
Remove left crankcase cover.
Hold drive face with universal holder, and then remove drive face nut.
Remove drive face and drive belt.

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



Remove ramp plate.

Remove weight rollers from movable drive face.



Inspection

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

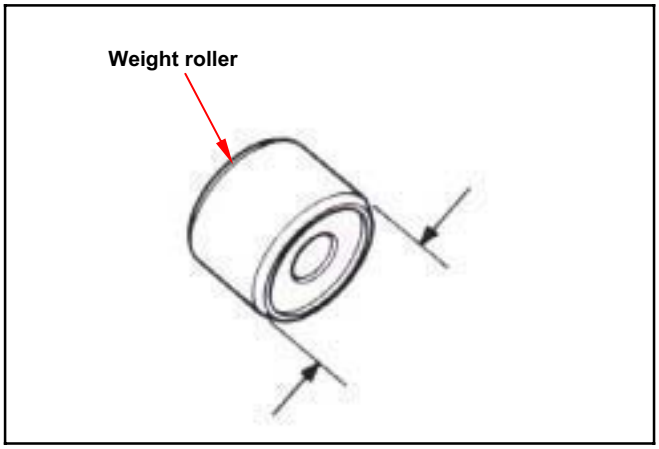
Thus, if weight rollers are worn out or damaged, the centrifuge force will be affected.

Check if rollers are worn or damaged. Replace it if necessary.

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

Service limit: 19.0 mm

Weight: 17.2g



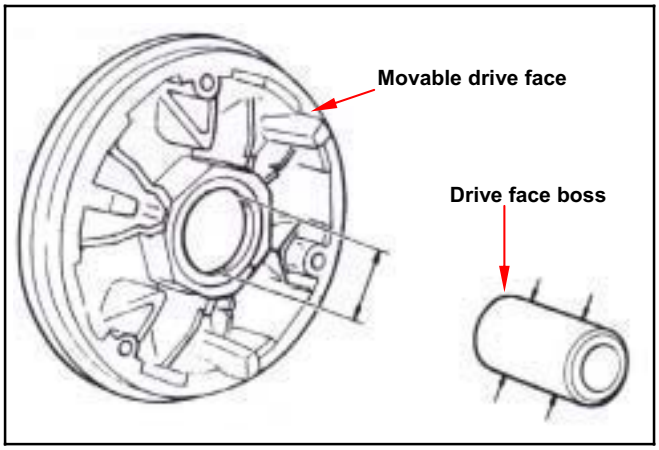
Check if drive face boss is worn or damaged and replace it if necessary.

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

Service limit: 29.962 mm

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

Service limit: 30.060 mm

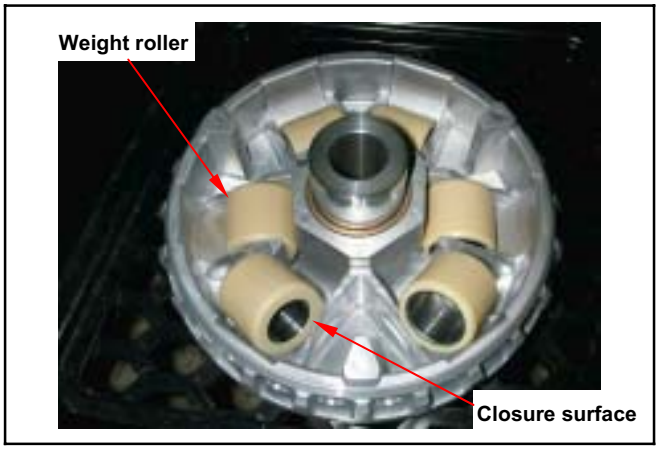


Reassembly/Installation

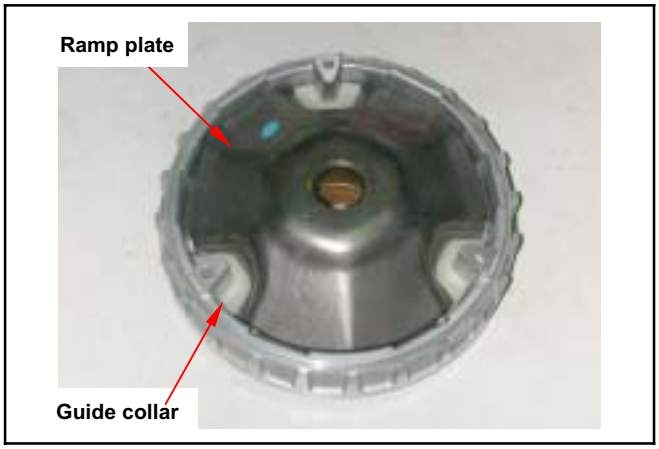
Install weight rollers.

⚠ Caution

The weight roller's two end surfaces are not exactly the same. In order to lengthen the roller life and prevent exceptional wear. Place end surface of closure surface, counter-clockwise, assembling onto movable drive face.

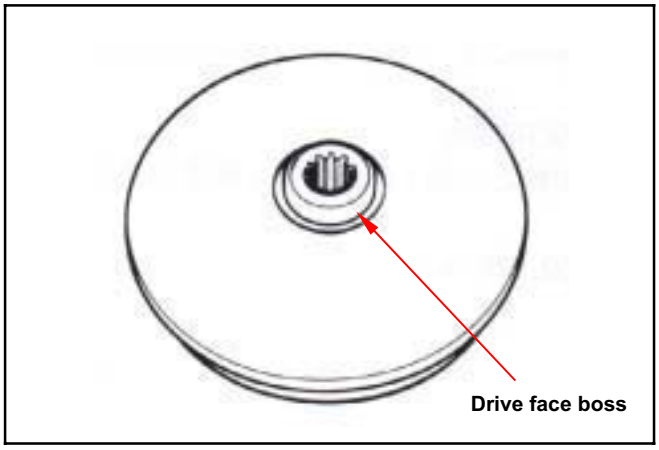


Install ramp plate.



With 4~5g grease wipe drives in the movable drive face axis hole.

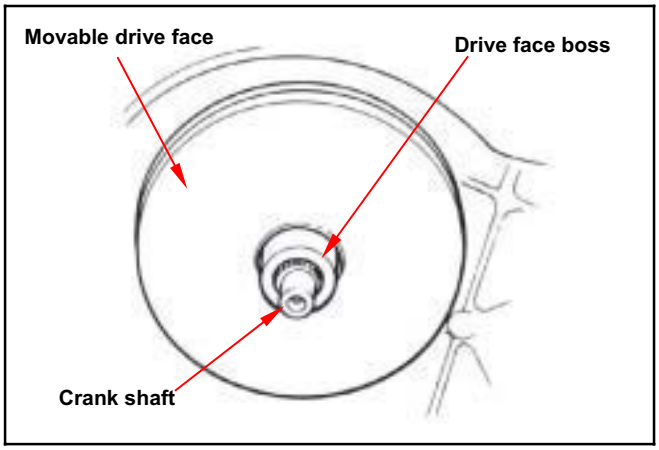
Install drive face boss.



Caution

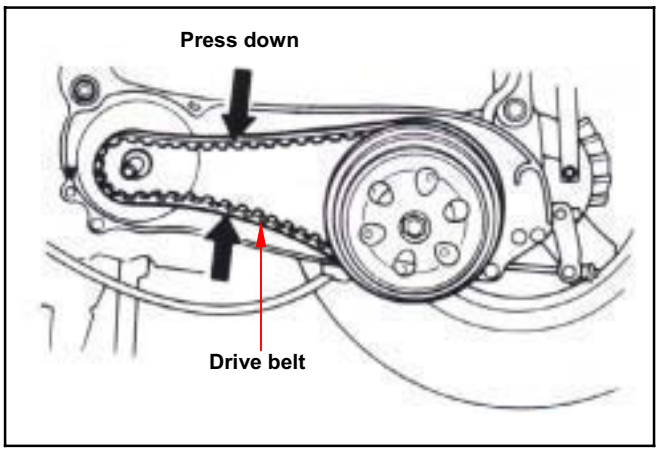
The movable drive face surface has to be free of grease. Clean it with cleaning solvent.

Install movable drive face comp. onto crankshaft.



Driven pulley installation

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



Install drive face, washer and nut.

Caution

Make sure that two sides of pulley surfaces are free of grease. Clean it with cleaning solvent.

Hold drive face with universal holder.

Tighten nut to specified torque.

Torque value: 8.5~10.5kgf-m

Install left crankcase cover.

Clutch Outer/Driven Pulley

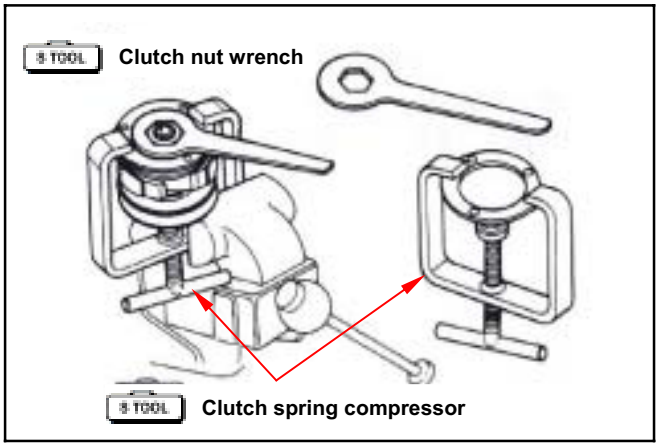
Disassembly

Remove drive belt, clutch outer, and driven pulley.
Install clutch spring compressor onto the pulley assembly, and operate the compressor to let the wrench be installed more easily.

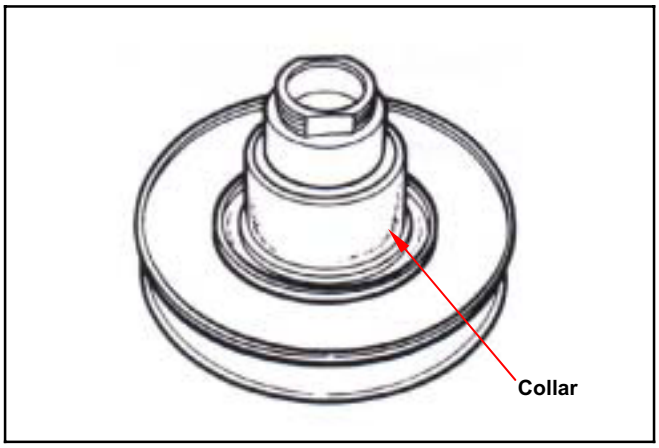
Caution

Do not press the compressor too much.

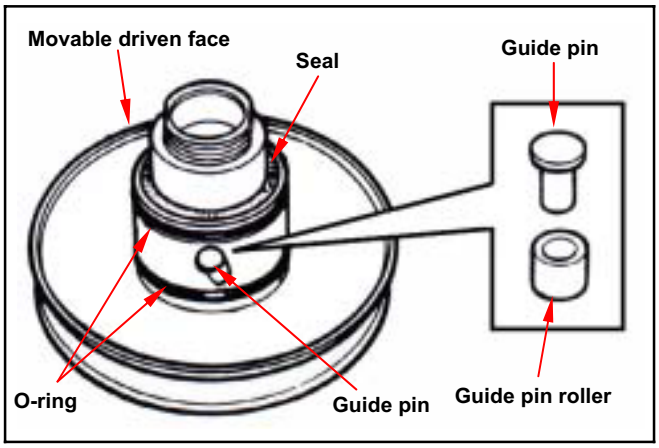
Hold the clutch spring compressor onto bench vise, and then remove mounting nut with special service tool.
Release the clutch spring compressor and remove friction plate, clutch weight, and spring from driven pulley.



Remove seal collar from driven pulley.



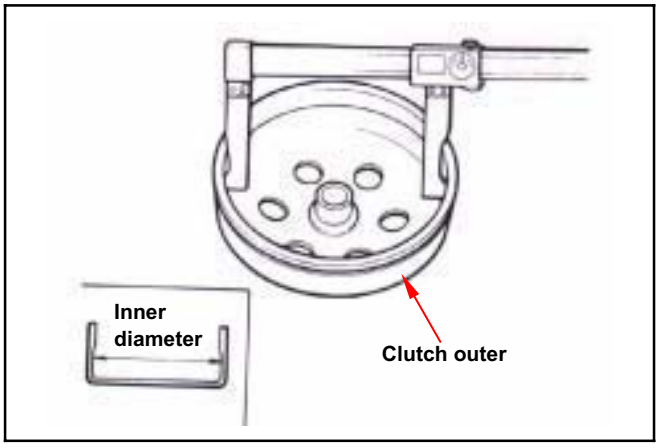
Remove guide pin, guide pin roller, and movable driven face, and then remove O-ring & oil seal seat from movable driven face.



Inspection

Clutch outer

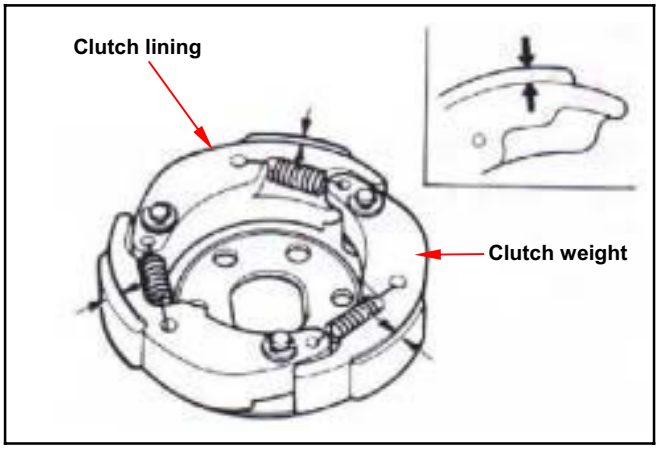
Measure the inner diameter of clutch outer.
Replace the clutch outer if exceeding service limit.
Service limit: 145.450 mm



Clutch lining

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

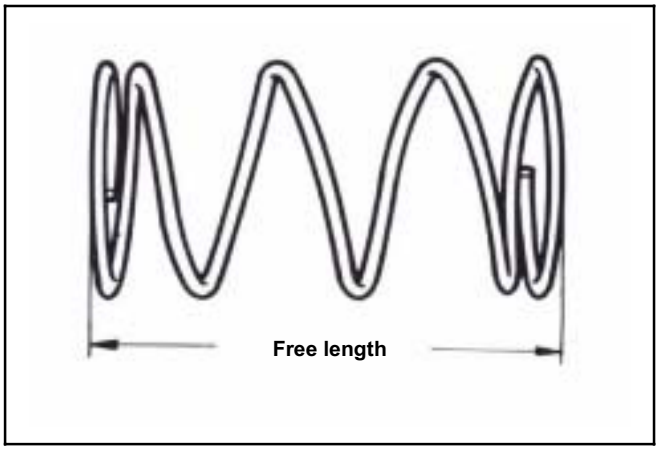
Service limit: 3.0 mm



Driven pulley spring

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

Service limit: 97.4 mm



Driven pulley

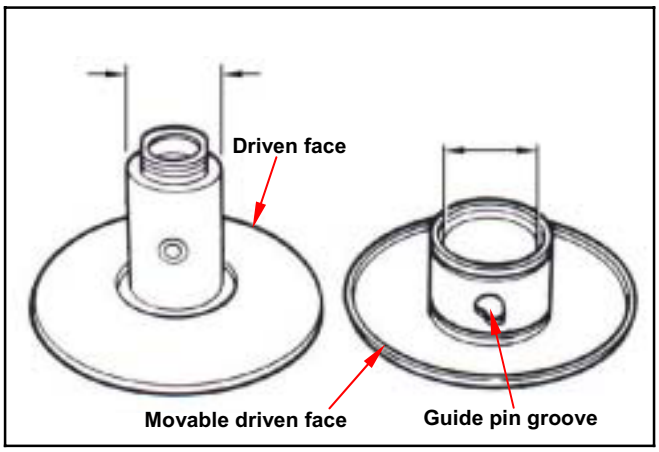
Check following items:

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

Replace damaged or worn components.

Measure the outer diameter of driven face and the inner diameter of movable driven face. Replace it if exceeds service limit.

Service limit: Outer diameter 40.93 mm
Inner diameter 41.07 mm



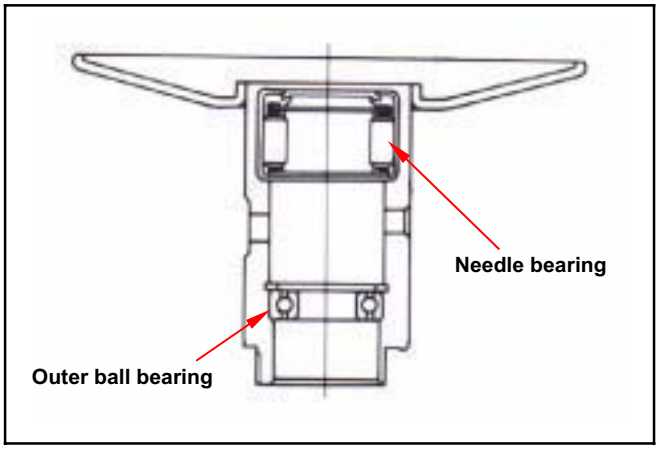
Driven Pulley Bearing Inspection

Check the inner bearing oil seal for damage. Replace it if necessary.

Check if needle bearing is damaged or has too much clearance. Replace it if necessary.

Rotate the inside of inner bearing with fingers to check if the bearing rotation is in smooth and silent.

Check if the bearing outer parts are closed and fixed. Replace it if necessary.



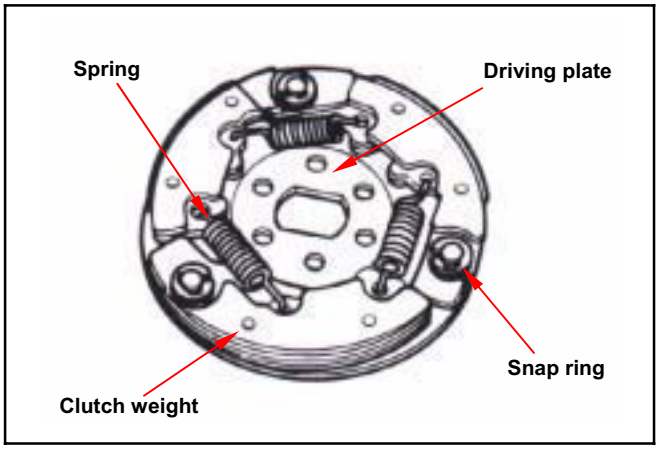
Clutch weight Replacement

Remove snap ring and washer, and then remove clutch weight and spring from driving plate.

⚠ Caution

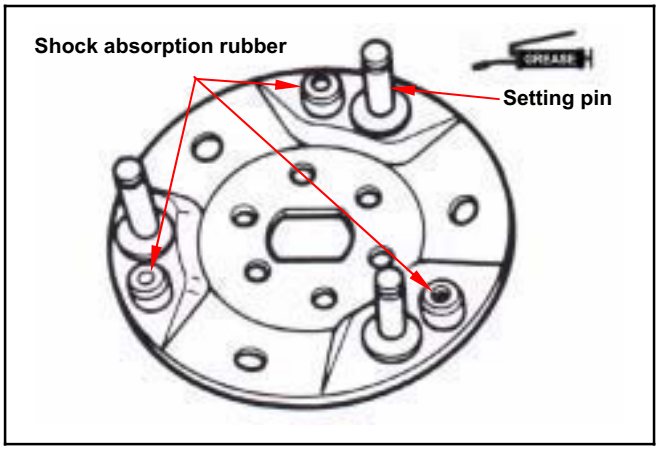
Some models are equipped with one mounting plate instead of 3 snap rings.

Check if spring is damaged or has insufficient elasticity.



Check to see if shock absorption rubber is damaged or deformed. Replace it if necessary.

Apply with grease onto setting pins.



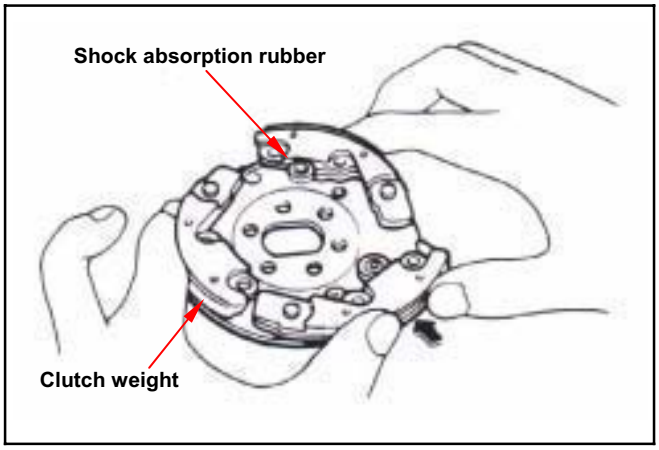
Install new clutch weight onto setting pin and then push to the specified location.

Apply with grease onto setting pins.

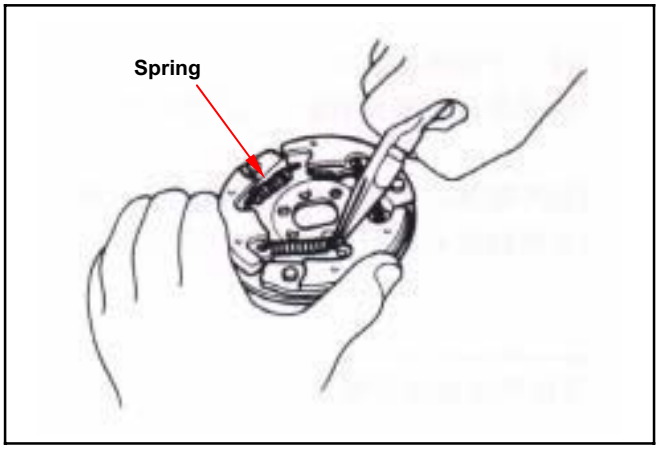
The clutch block should not be greased. If so, replace it.

⚠ Caution

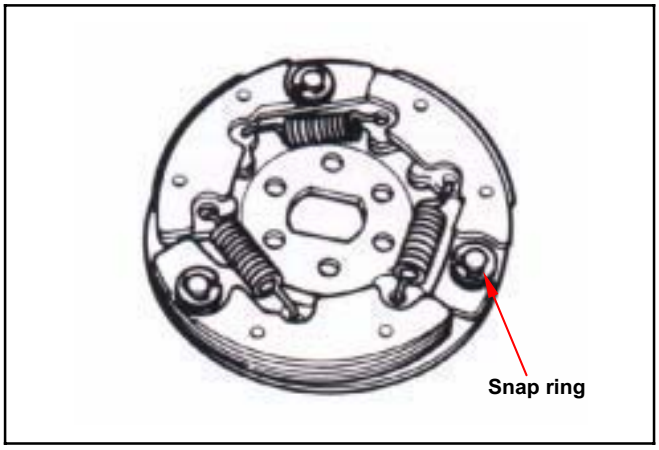
Grease or lubricant will damage the clutch weight and affect the block's connection capacity.



Install the spring into groove with pliers.



Install snap ring and mounting plate onto setting pin.

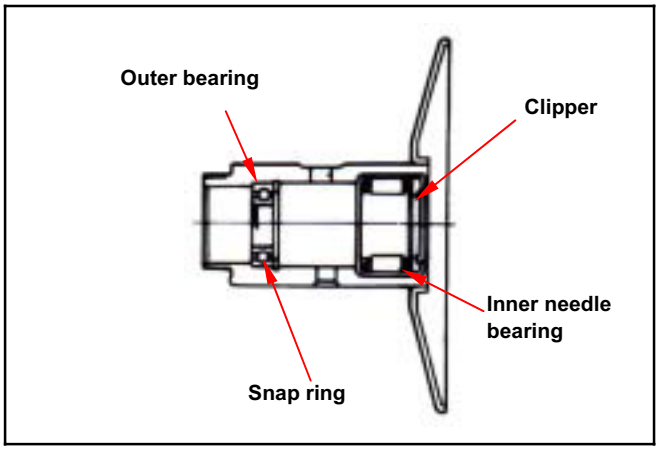


Replacement of Driven Pulley Bearing

Remove inner bearing.

Caution

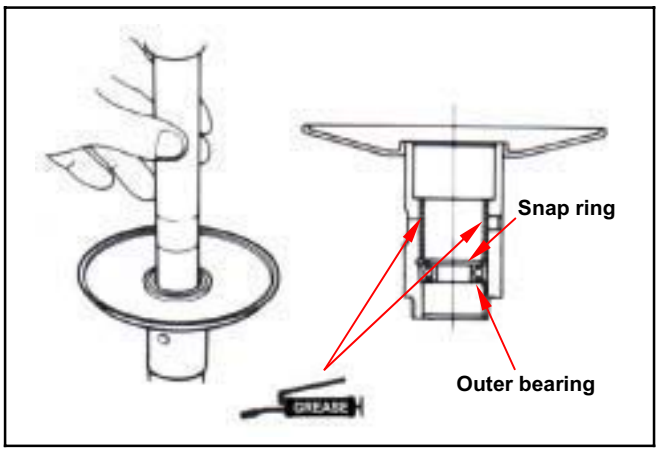
- If the inner bearing is equipped with oil seal on side in the driven pulley, then remove the oil seal first.
- If the pulley is equipped with ball bearing, remove snap ring and then the bearing.



Remove snap ring and then push bearing forward to other side of inner bearing.

Place new bearing onto proper position and its sealing end should be forwarded to outside.

Apply with specified oil.



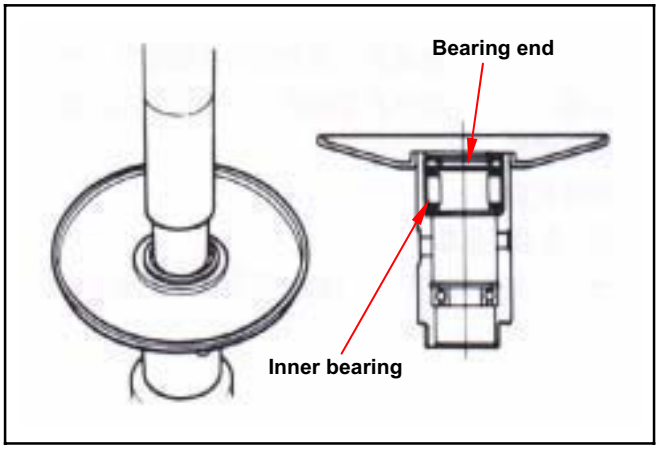
Install new inner bearing.

Caution

- Its sealing end should be forwarded to outside in bearing installation.
- Install needle bearing with hydraulic press. Install ball bearing by means of hydraulic press.

Install snap ring into the groove of drive face.

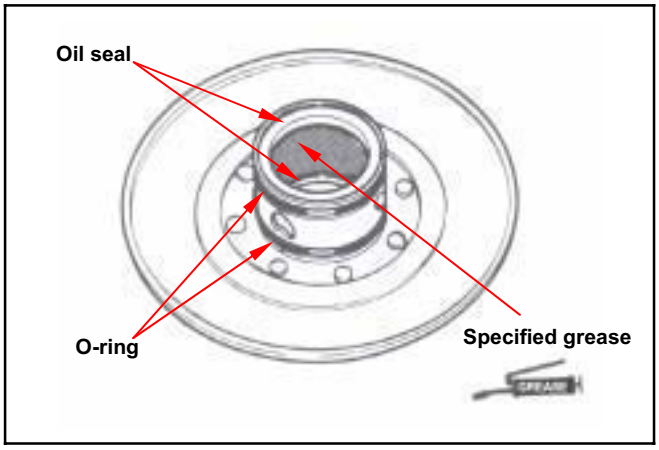
Align oil seal lip with bearing, and then install the new oil seal (if necessary).



Installation of Clutch OUTER/Driven Pulley Assembly

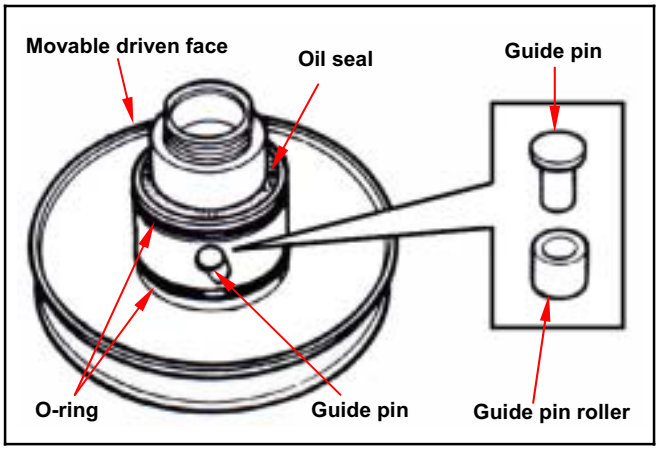
Install new oil seal and O-ring onto movable driven face.

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

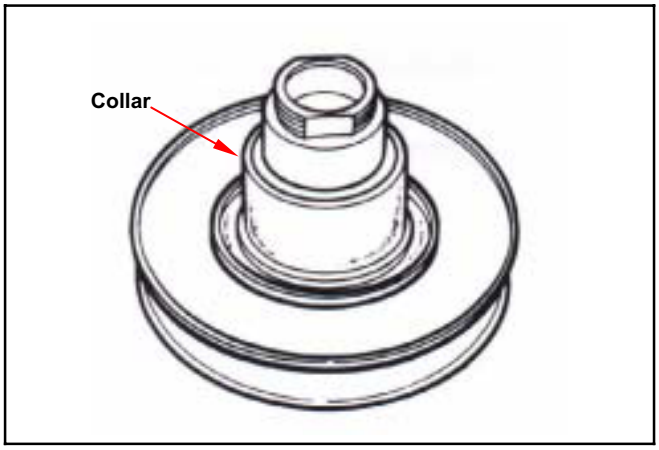


Install the movable driven face onto driven face.

Install the guide pin and guide pin roller.



Install the collar.



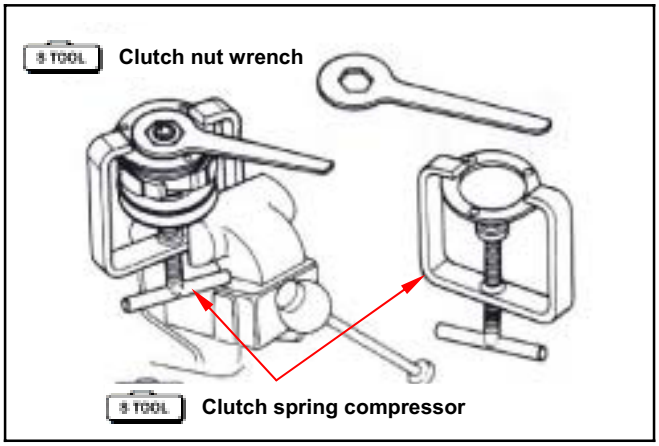
Install friction plate, spring, and clutch weight into clutch spring compressor, and press down the assembly by turning manual lever until mounting nut can be installed.

Hold the compressor by bench vise and tighten the mounting nut to specified torque with clutch nut wrench.

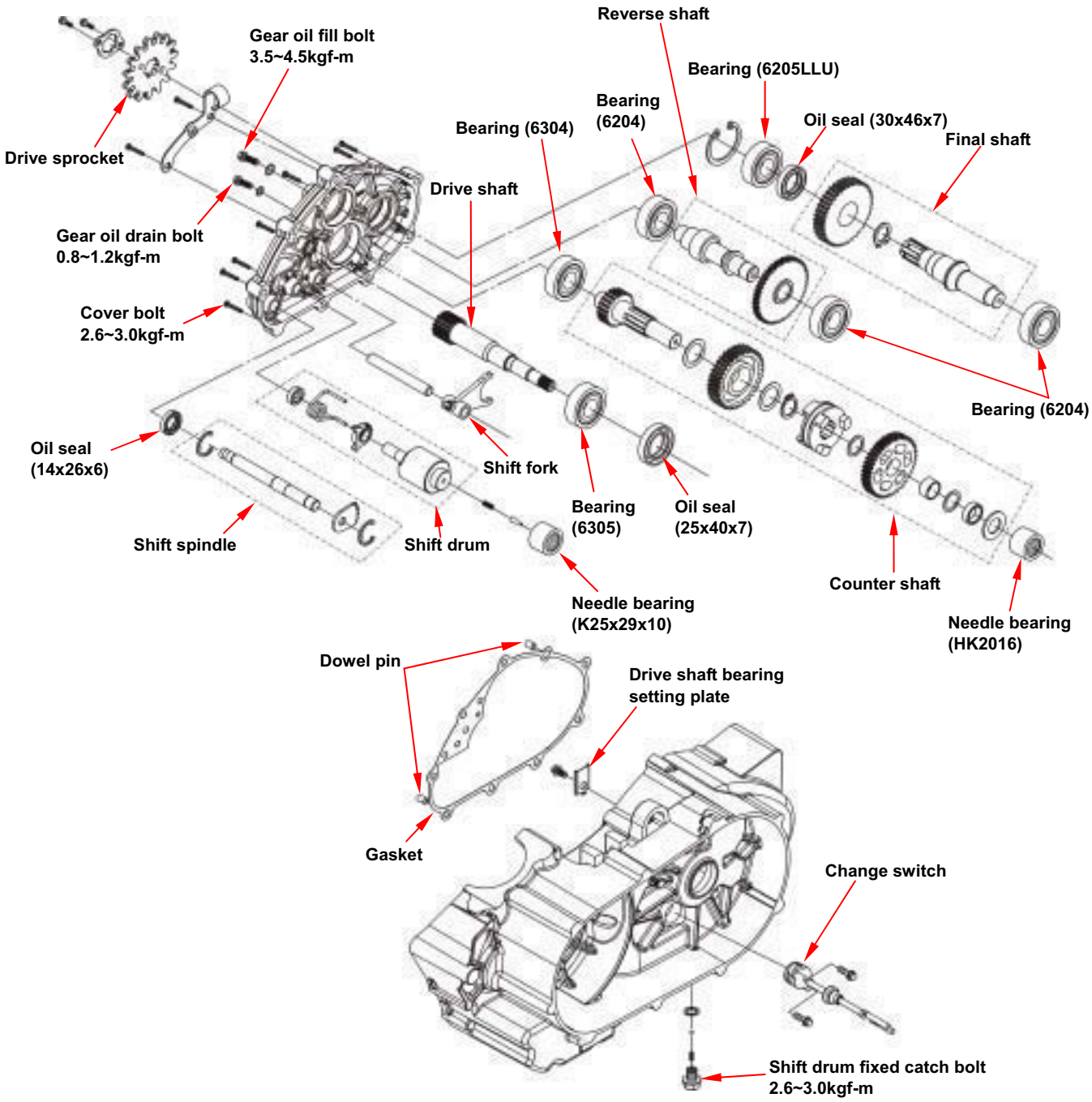
Remove the clutch spring compressor.

Torque value: 5.0~6.0kgf-m

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



Mechanism Diagram - transmission cover



Precautions in operation

Specification

Application oil: scooter gear oil
Recommended oil: KING MATE serial gear oils
Oil quantity: 750c.c. (650c.c. when replacing)

Item	Standard value	Limit (mm)
OD of shift fork shaft	11.982~12.000 mm	11.970 mm
ID of shift fork	12.016~12.043 mm	12.010 mm
Shift fork claw thickness	5.930~6.000 mm	5.730 mm

Torque value

Gear box cover	2.6~3.0kgf-m
Gear oil drain bolt	1.1~1.5kgf-m
Gear oil fill bolt	3.5~4.5kgf-m

Special tools

Bearing driver (6204)	SYM-9110400
Bearing driver (6205LLU)	SYM-9100400-HMA
Bearing driver (6305)	SYM-9100400-RB1
Needle bearing driver (HK2016)	SYM-9100300-RB1
Drive shaft and oil seal driver	SYM-9120200-HMA
Drive shaft puller	SYM-2341100
Inner bearing puller	SYM-6204002

Trouble Diagnosis

Engine can be started but kart can not be moved.

- 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 damaged oil seal.

Disassembly of Transmission

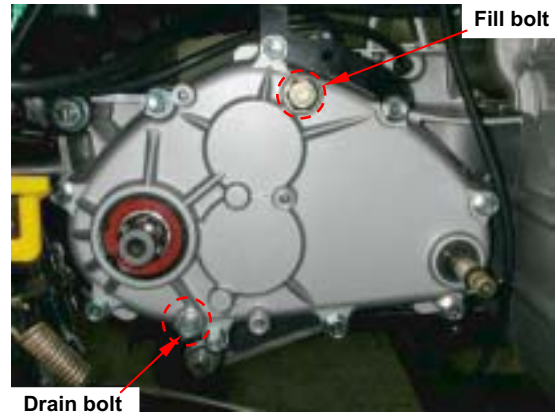
Remove gear change lever (1 bolt).

Remove 2 bolts, and then remove the drive sprocket fixing plate, drive chain and drive sprocket.

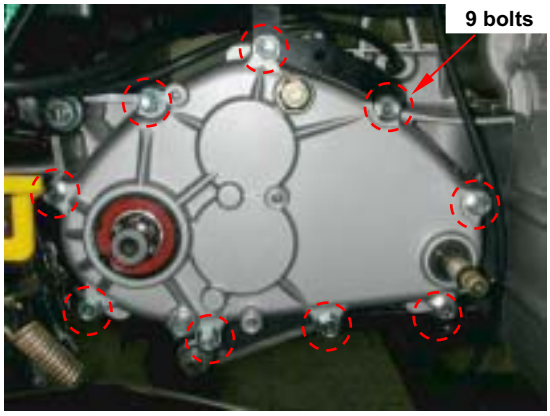
Remove gear fill bolt.
Place an oil pan under the kart, and remove gear oil drain bolt.
After drained, make sure washer can be re-used.
Install oil drain bolt.

Torque value:

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

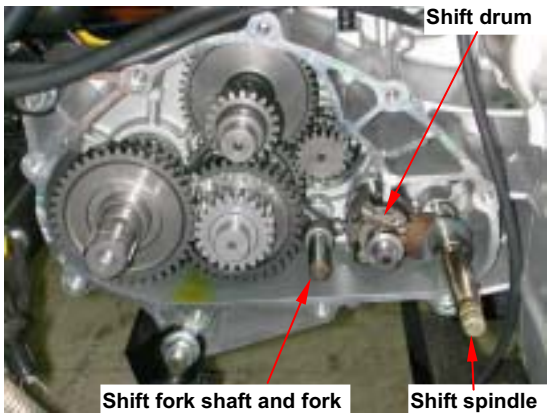


Remove gear box cover bolts (9 bolts) and then remove the cover.

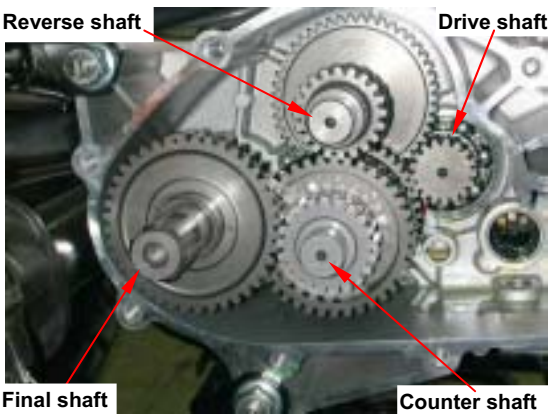


Remove shift drum catch ball, spring, and bolt.

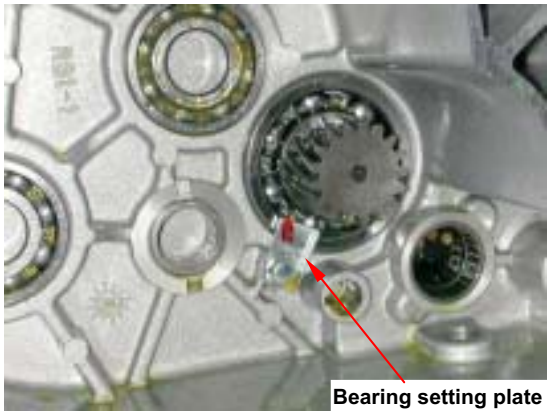
Remove shift spindle, shift fork shaft, shift fork, and shift drum.



Remove final shaft, counter shaft, and reverse shaft.



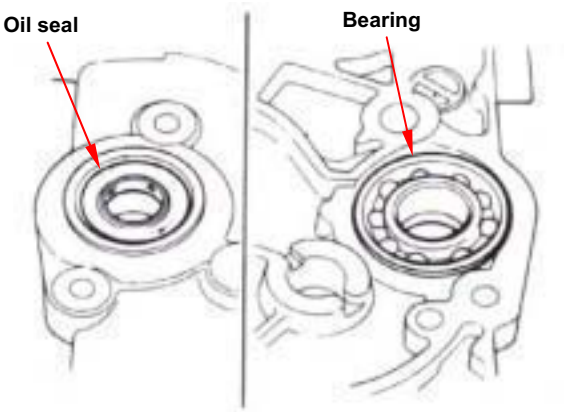
Remove drive shaft bearing setting plate (1 bolt).



Remove the drive shaft.
Special tool:
Shaft protector
Remove gasket and dowel pin.

⚠ Caution

- Do not remove the drive shaft from the case upper side.
- If the drive shaft is removed from the gear box; then, it's bearing and oil seal has to be replaced.



Inspection of Mission Mechanism

Check if the shift spindle is worn or damaged.

Check if the shift drum is worn or damaged.

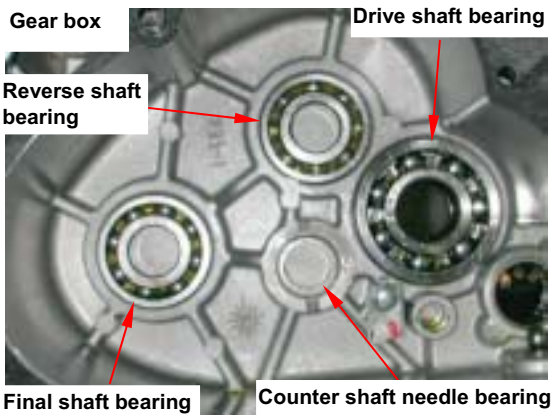
Check if the shift fork and shaft is worn or damaged.
Measure the outer diameter of shift fork shaft, and replace it if it exceeds service limit.
Service limit: 11.970 mm
Measure the inner diameter of shift fork, and replace it if it exceeds service limit.
Service limit: 12.010 mm
Measure the claw thickness of shift fork, and replace it if it exceeds service limit.
Service limit: 5.730 mm

Check if the counter shaft is worn or damaged.

Check to see if the reverse shaft is worn or damaged.

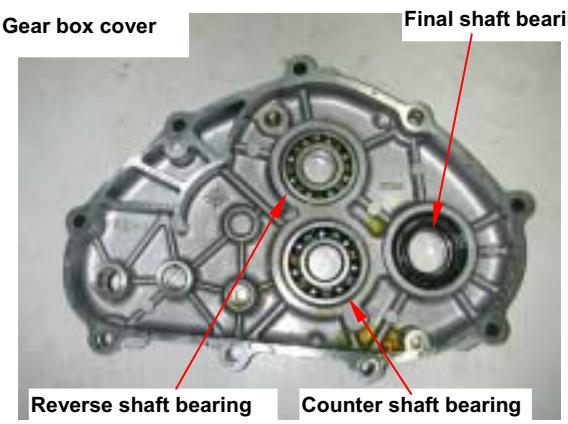
Check to see if the final shaft and gear are burnt, worn, or damaged.

Check bearings on gear box and gear box cover.
Rotate each bearing's inner ring with fingers.
Check to see if bearings turn smooth and silent.
Check to see if bearing outer ring is mounted on gear tightly.
If bearing rotation is uneven, noisy, or has loose bearing mount, then replace it.
Check oil seal for wear or damage, and replace it if necessary.



⚠ Caution

- If the drive shaft is removed from the crankcase upper side, then its bearing has to be replaced.



Bearing Replacement

⚠ Caution

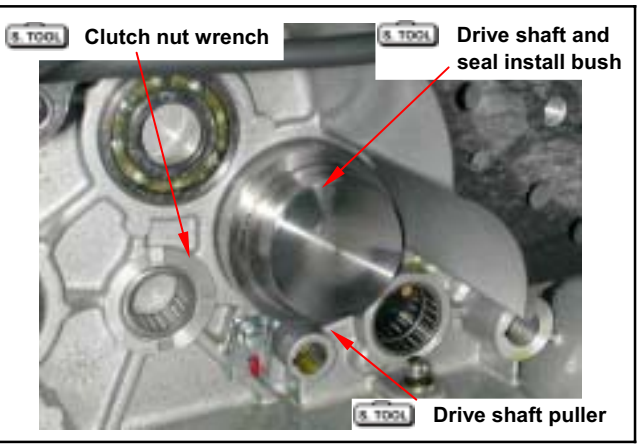
- Never install used bearings. Once bearing is removed, it has to be replaced with new one.

Crankcase side

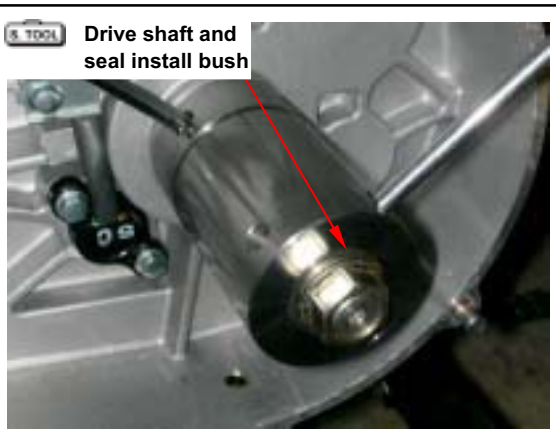
Remove drive shaft bearing setting plate, and then remove drive shaft bearing from left crankcase using following tools.
Remove reverse shaft bearing and counter shaft bearing from left crankcase using following tools.
Remove drive shaft oil seal.
Special tool:
Inner bearing puller

Install new final shaft, counter shaft, and reverse shaft bearings into left crankcase.
Special tool:
Bearing driver (6204)
Needle bearing driver (HK2016)

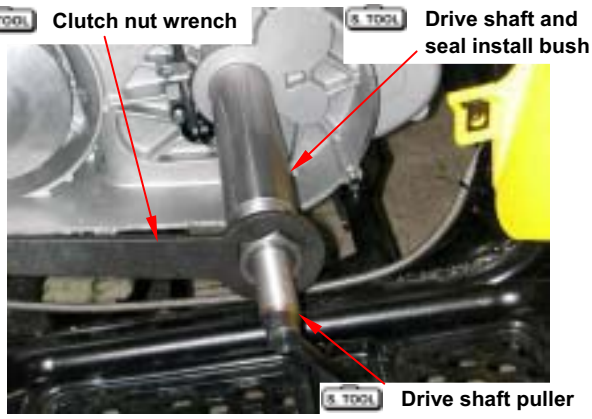
Install new drive shaft bearings and bearing driver into left crankcase.



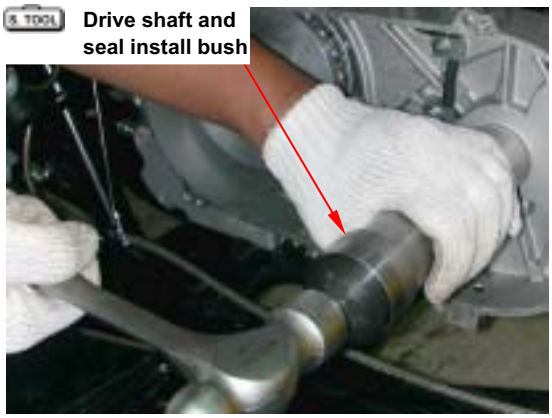
Install the universal bearing puller and bearing driver.
Turn the universal bearing puller to install drive shaft bearing.
Special tool:
Bearing driver (6305)
Universal bearing puller



Install drive shaft.
Special tool:
Drive shaft puller
Drive shaft and oil seal install bush
Clutch nut wrench

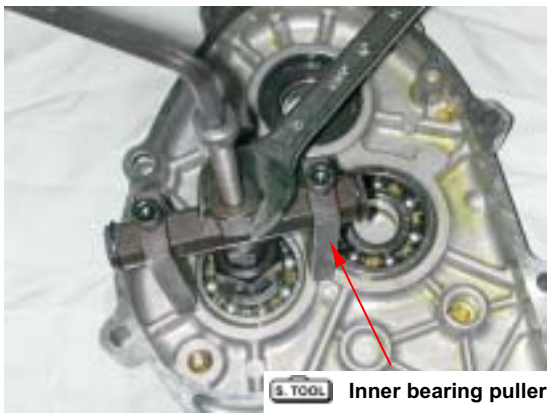


Apply with grease onto new drive shaft oil seal lip, and then install the oil seal.
Special tool:
Drive shaft and oil seal install bush
Install drive shaft bearing setting plate (1 bolt).

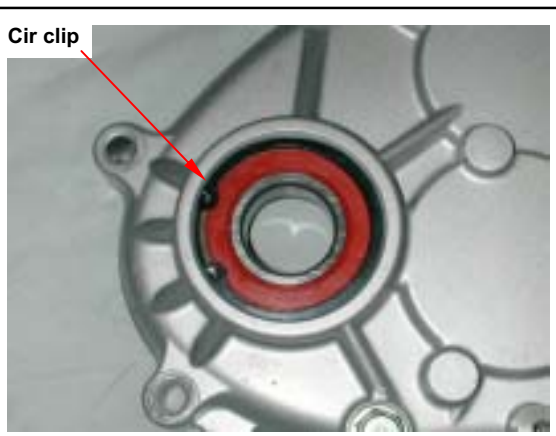


Gear box side

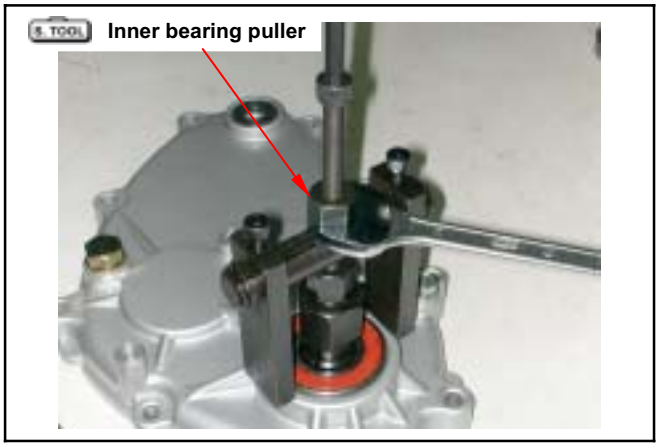
Use inner bearing puller to remove the final shaft needle bearing, gear shift shaft bearing, and counter shaft bearing from the cover inner side.
Special tool:
Inner bearing puller



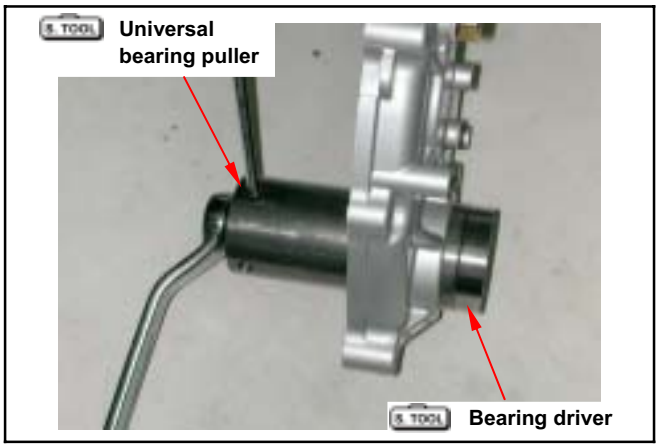
Remove cir clip of final shat out side bearing.
.



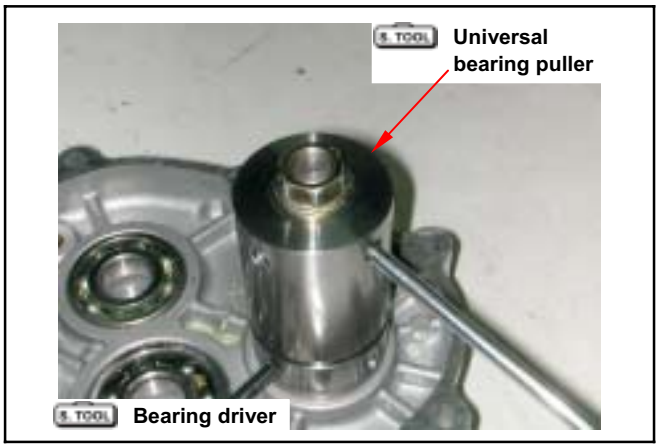
Remove final shaft outside bearing.
Special tool:
Inner bearing puller
Remove oil seal from gear box cover and discard the seal.



Install new bearing and bearing driver into gear box covers outer side.
Install the universal bearing puller and bearing driver.



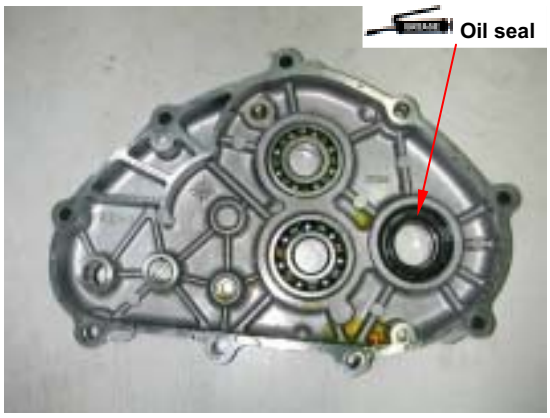
Turn the universal bearing puller to install drive shaft bearing.
Special tool:
Bearing driver (6205)
Universal bearing puller



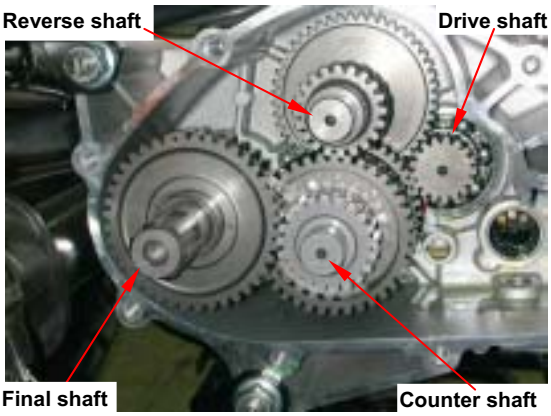
Install new oil seal and bearing driver into gear box covers inner side.
Install the universal bearing puller and bearing driver.
Turn the universal bearing puller to install drive shaft oil seal.
Special tool:
Bearing driver (6205)
Universal bearing puller

Re-assembly of Final Driving Mechanism

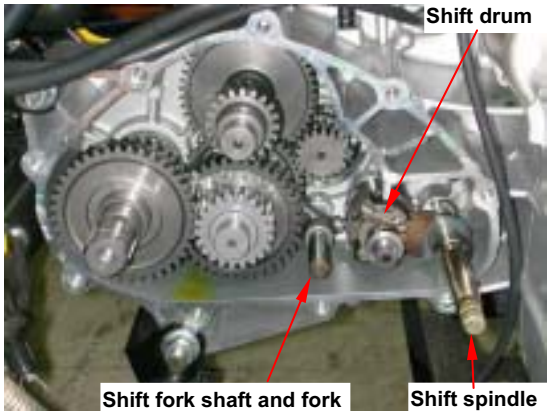
Apply grease onto the oil seal lip of final driving shaft.



Install counter shaft, reverse shaft, and final shaft onto gear box.

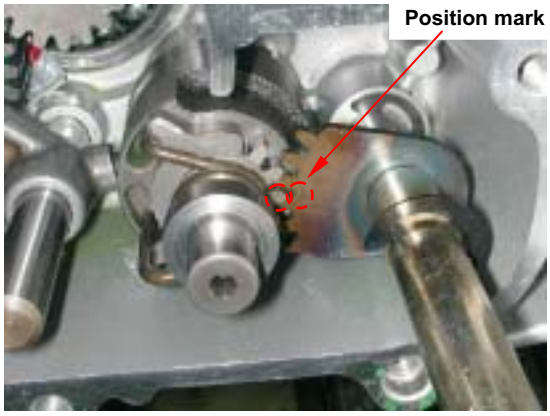


Install shift drum, shift fork, and fork shaft onto gear box.

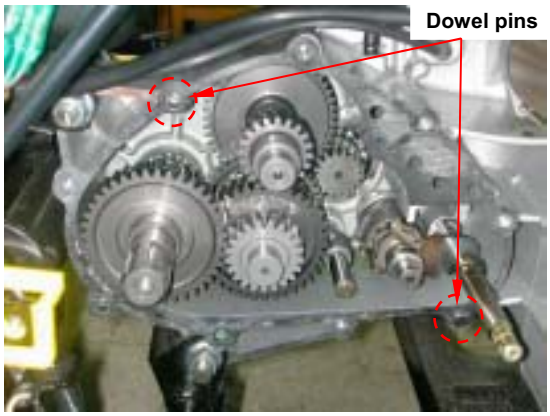


Install shift drum fixed catch ball, spring and bolt, onto gear box.

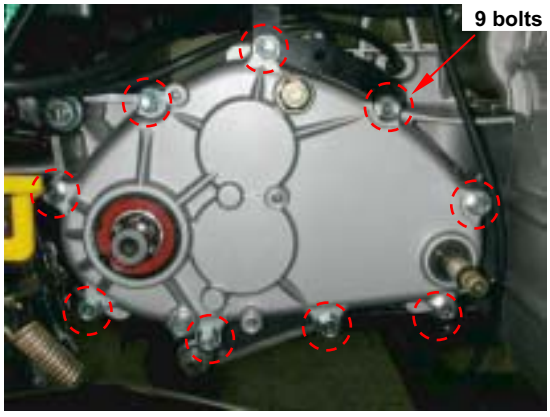
Align the position mark on the shift spindle sprocket with that of shift drum, and then install shift spindle.



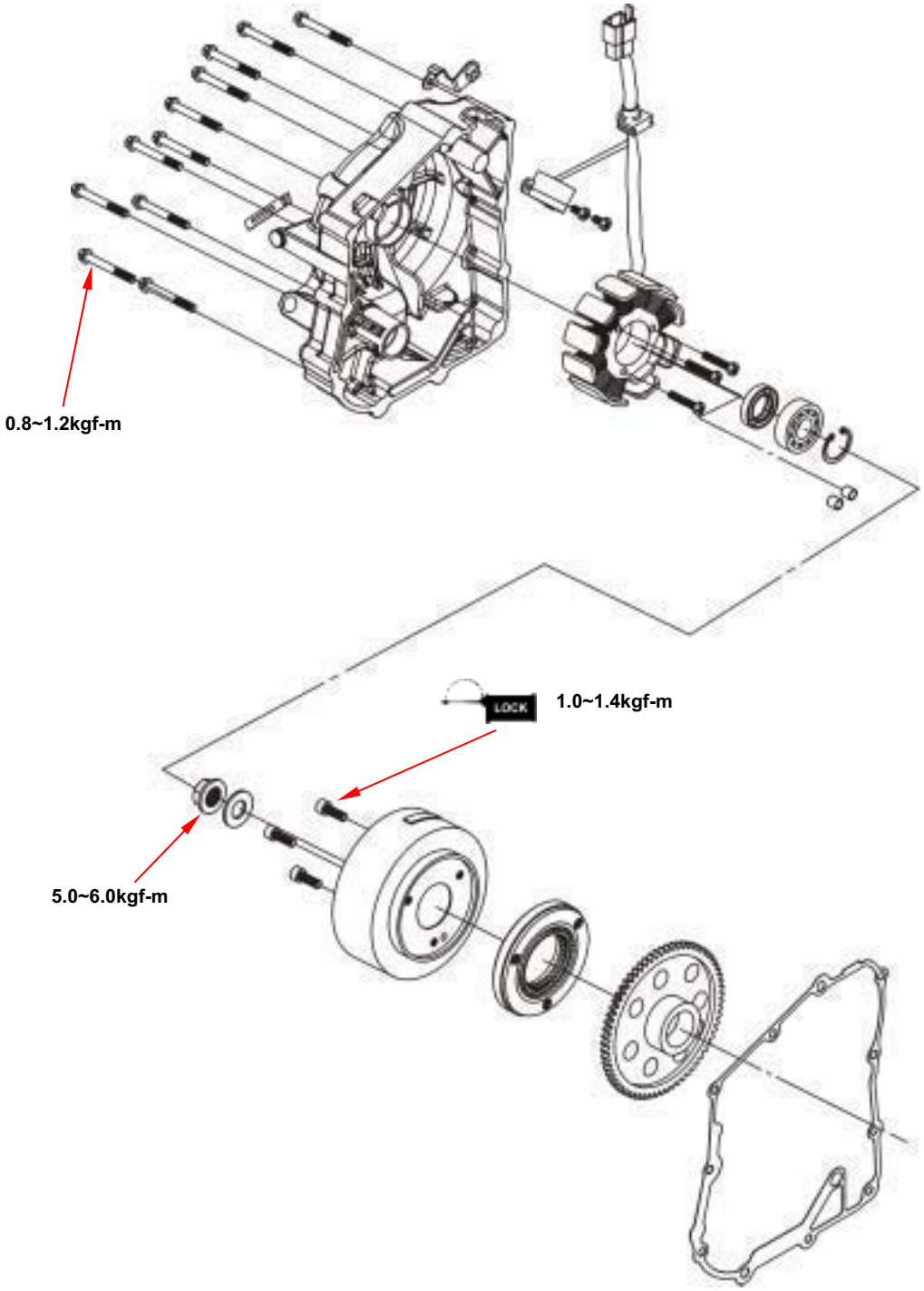
Install dowel pins and new gasket.



Install gear box cover and bolts, and tighten.
Torque value: 1.0~1.4kgf-m
Gear oil quantity: 750c.c.



Mechanism Diagram



9. Alternator / Starting Clutch

Precautions in Operation

General information

- Refer to chapter 17: The troubleshooting and inspection of alternator.
- Refer to chapter 17: The service procedures and precaution items of starter motor.

Specification

Item	Standard value (mm)	Limit (mm)
ID of starting clutch gear	25.026~25.045	25.050
OD of starting clutch gear	42.192~42.208	42.100

Torque value

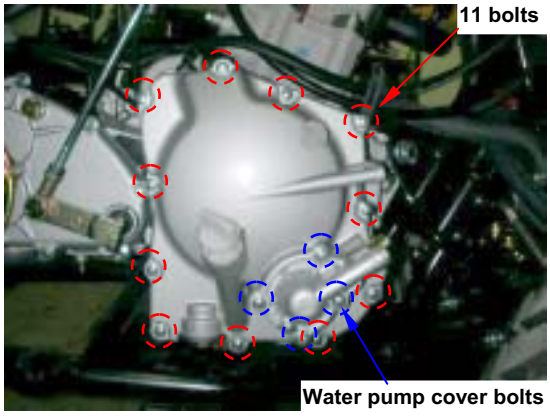
Flywheel nut	5.0~6.0kgf-m
Starting clutch hexagon bolt	1.0~1.4kgf-m with adhesive
8 mm bolts	0.8~1.2kgf-m
12 mm bolts	1.0~1.4kgf-m

Special tools

A.C.G. flywheel puller	SYM-3110A00
Universal holder	SYM-2210100
Inner bearing puller	SYM-6204002
Bearing driver 6205	SYM-9615000

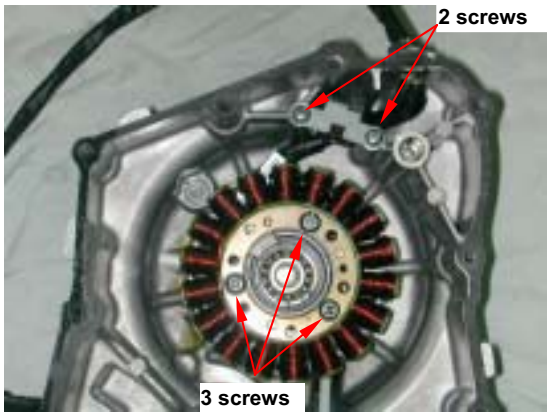
Right Crankcase Cover Removal

Remove left footrest.
Drain out the engine oil and coolant, and then remove coolant hoses.
Remove water pump cover (4 bolts).
Remove 11 bolts from the right crankcase cover.
Remove the right crankcase cover.
Remove dowel pin and gasket.



A.C.G. Set Removal

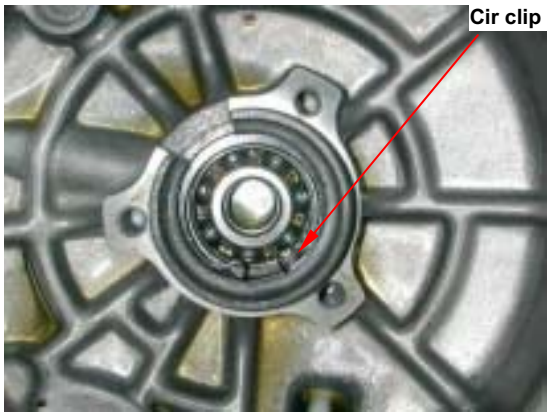
Remove 2 mounted screws from pulse generator and then remove it.
Remove 3 screws from right crankcase cover and then remove generator coil set.



Right Cover Bearing

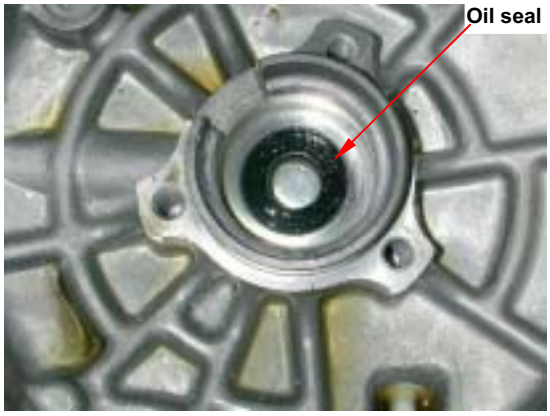
Inspection

Rotate the bearing with finger to check if the bearing rotation is smooth and silent.
Check if the bearing outer parts are closed and fixed. Replace it if necessary.

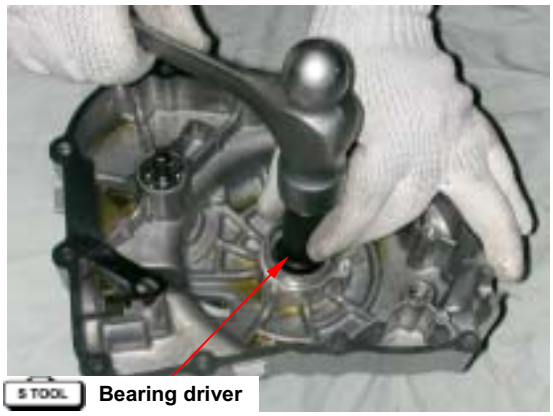


Remove the cir clip, and then remove bearing.
Special tool:
Inner bearing puller SYM-6204002

Check the oil seal for wear or damage. Replace it if necessary.

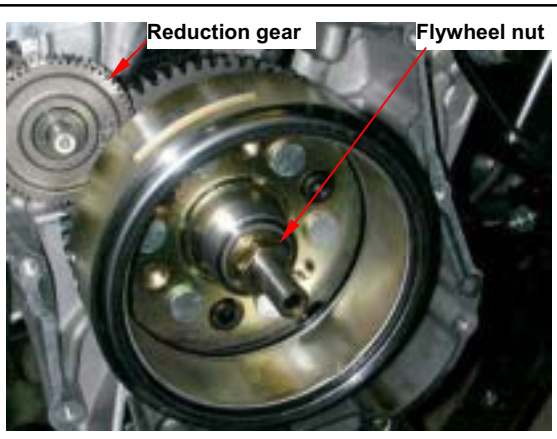


Install a new bearing (6201LU) by bearing driver.
Special tool:
Bearing driver



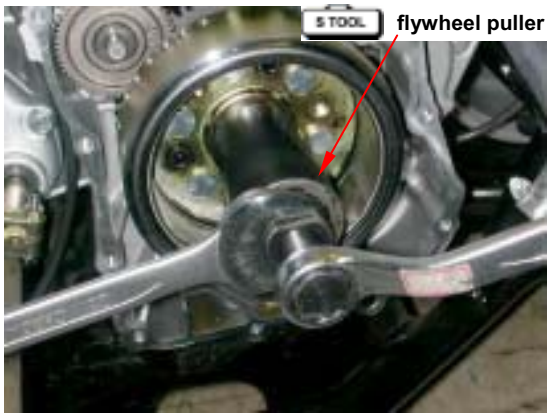
Flywheel Removal

Remove right crankcase cover.



Remove left crankcase cover.
Hold the flywheel by drive face with universal holder.
Remove flywheel nut.
Special tool:
Universal Holder

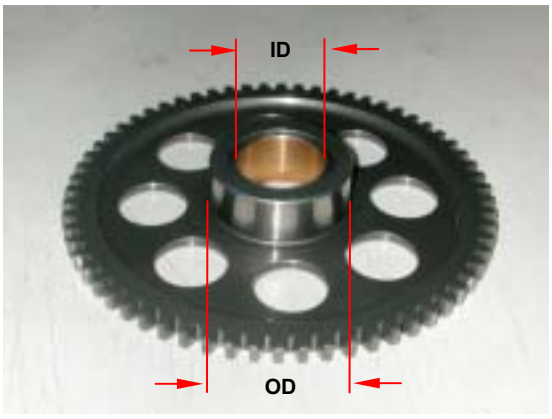
Remove starter reduction gear and shaft.
Pull out flywheel with A.C.G. flywheel puller.
Special tool:
A.C.G. Flywheel puller
Remove flywheel and starting driven gear.



Starting Clutch

Starting Clutch Inspection

Remove starting clutch driven gear.
Check the gear for wear or damage.
Measure the ID and OD of the starting clutch driven gear.
Service Limit: ID: 25.050 mm
OD: 42.100 mm



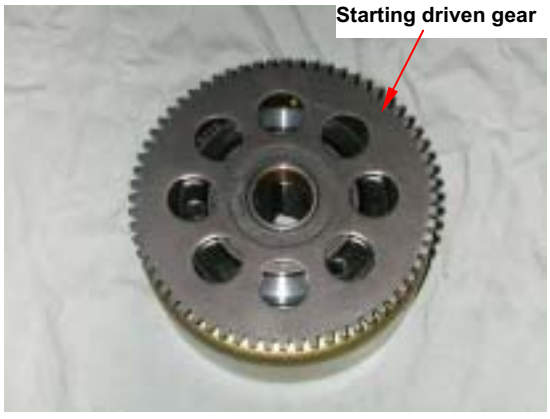
Check the starting reduction gear and shaft for wear or damage.

Check each roller for wear or damage.

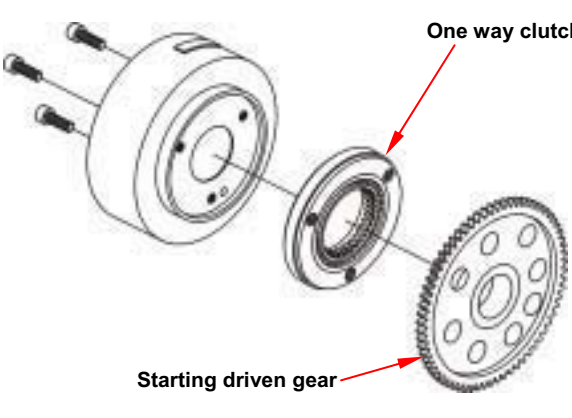
Install starting clutch driven gear onto one way clutch.
Hold flywheel and rotate starting clutch gear. The starting clutch gear should be rotated in C.C.W direction freely, but not C.W direction. (As shown in this figure.)

One way clutch removal

Remove starting driven gear.



Remove 3 socket bolts, and then remove one way clutch.



One way clutch Installation

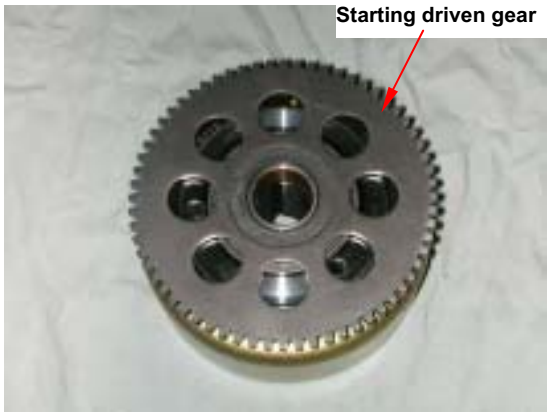
Install the components in the reverse order of removal.

Caution

Tape tightening tape onto the thread of hexagon bolt.

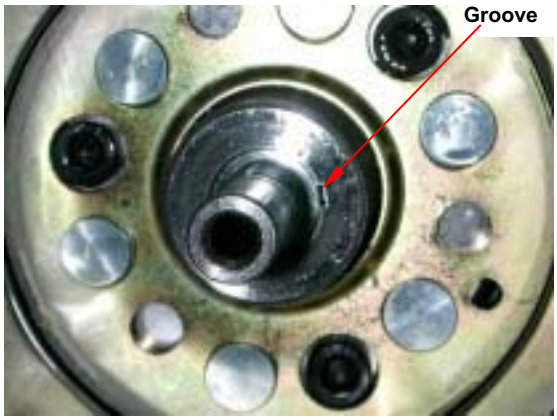
Torque value: 1.0~1.4kgf-m

Install starting driven gear.



Flywheel Installation

Align the key on crankshaft with the flywheel groove, and then install the flywheel.



Hold the flywheel by drive face with universal holder, and tighten flywheel nut.
Torque value: 5.0~6.0kgf-m
Special tool:
Universal Holder

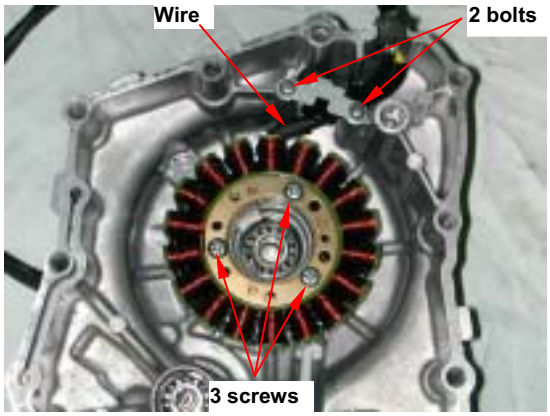
Install reduction gear shaft and reduction gear.

A.C.G. Set Installation

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

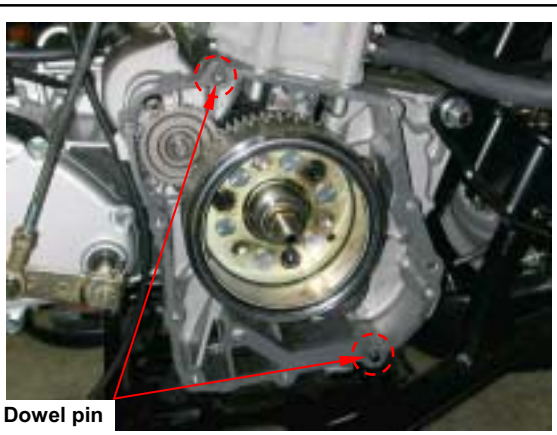
Caution

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



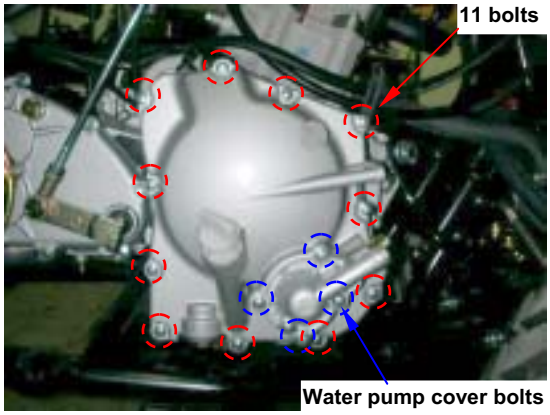
Right Crankcase Cover Installation

Install dowel pin and new gasket.



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

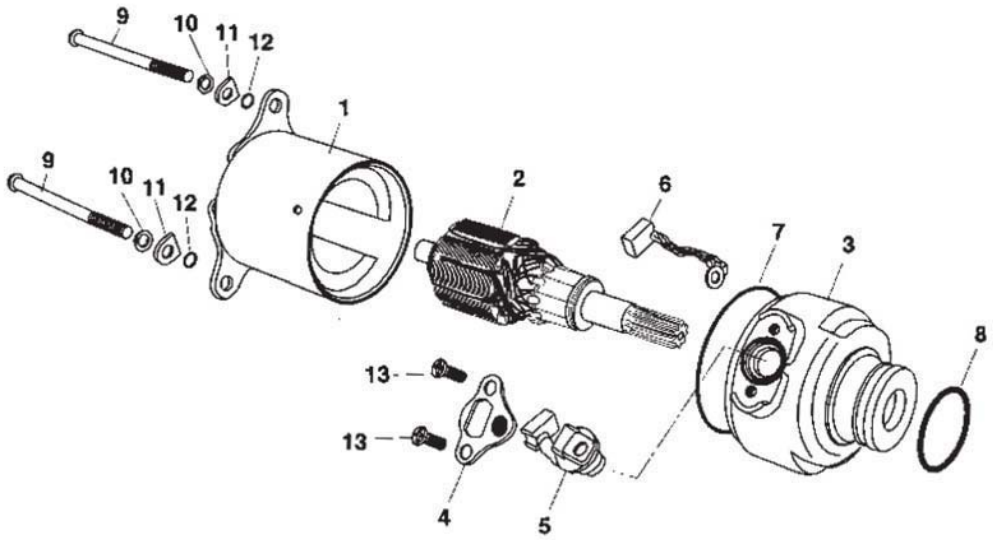
Install right crankcase cover (11 screws).
Install the dowel pin, new gasket and water pump cover onto crankcase cover.



Connect water hoses to the right crankcase cover and water pump cover.

Starter Motor

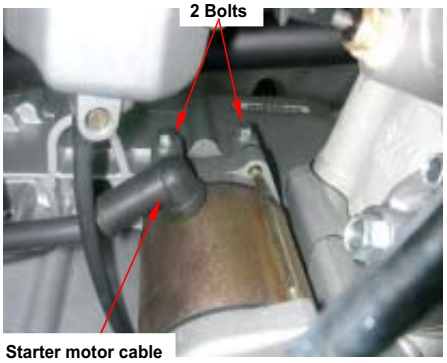
The starter motor is actually a direct current (DC) motor, and its structure is shown in the picture.



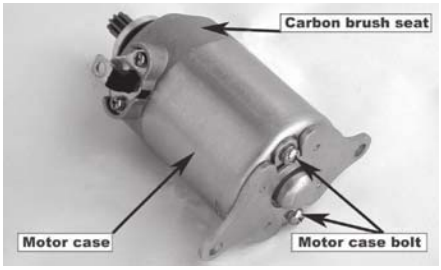
1. Outer Cover, Motor
2. Rotor, Motor
3. Base, Carbon Brush
4. Plate, Positive Electrode
5. Carbon Brush, Positive Electrode
6. Carbon Brush, Negative Electrode
7. O-ring
8. O-ring
9. Bolt
10. Spring Washer
11. Washer
12. O-ring
13. Screw

STARTER MOTOR REMOVAL

Before removal, first shut off the main switch, and disconnect the battery connecting wire. Then press the starting button; at this time the starter motor should not run. Do this to insure safety.

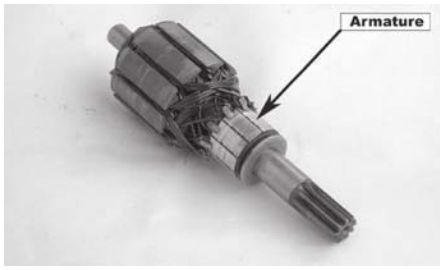


- Remove the starter motor lead wire clamp.
- Remove the starter motor holding bolt, and remove the starter motor.



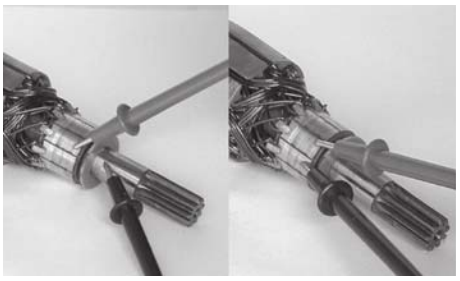
- Roll up the rubber water-resistance cover, and remove the starter motor joint.
- Remove the motor case bolt, the carbon brush seat, and the motor case etc.

ARMATURE INSPECTION



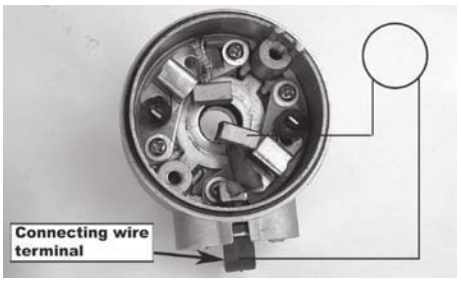
- Inspect the armature surface for uneven wear, damage or burns (changing color).
- When there are metal fines attached to the gap of the armature surface, use a cleaning cloth to remove them.

Do not use sandpaper to grind the armature surface, nor wash it in any solvent which can dissolve or damage its insulation.



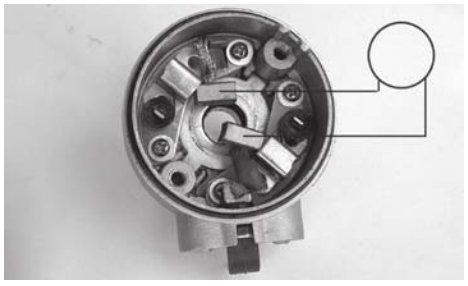
- Measure the conducting condition of the armature coil according to the picture on the immediate right . It should be conductive.
- Measure the conducting condition between the armature coil and the armature according to the far-right picture. It should be non-conductive. If it's conductive, it should be replaced.

CARBON BRUSH INSPECTION

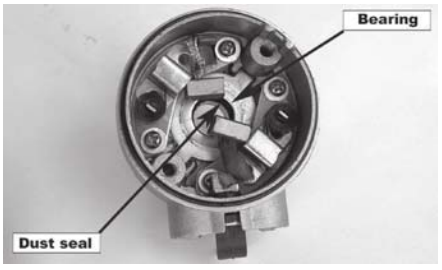


- Inspect the insulating condition between the connecting wire terminal and the starter motor case. It should be nonconductive.

- Inspect the conducting condition between the connecting wire terminal and the carbon brush. It should be conductive. Measure the length of the carbon brush. Replace it if it exceeds service limit.

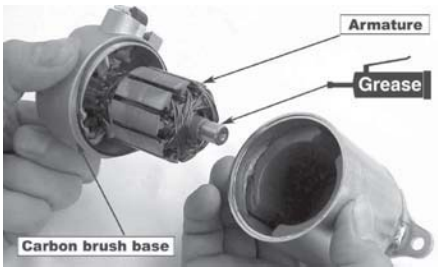


- Measure the insulating condition of the carbon brush bracket. It should be non-conductive; if not, it should be replaced.



- Inspect the needle bearing in the carbon brush base; it should be able to move smoothly with no play.
- Inspect the dust seal for wear or damage.
- If damaged, it should be replaced.

STARTER MOTOR INSTALLATION



- Apply some oil on the dust seal.
- Install the carbon brush on the carbon brush base.
- Apply a little oil on the moving part of the armature ends.
- Put the carbon brush into the bracket, and then install the carbon brush base.

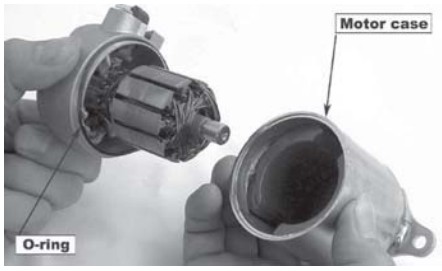
> Do not damage the contact area of the carbon brush and the armature. When installing, do not damage the lip of the dust seal.

- Mount the new O-ring on the carbon brush base.
- Install armature into starter motor case, making sure not to damage the carbon brushes.
- Tighten motor case bolts.

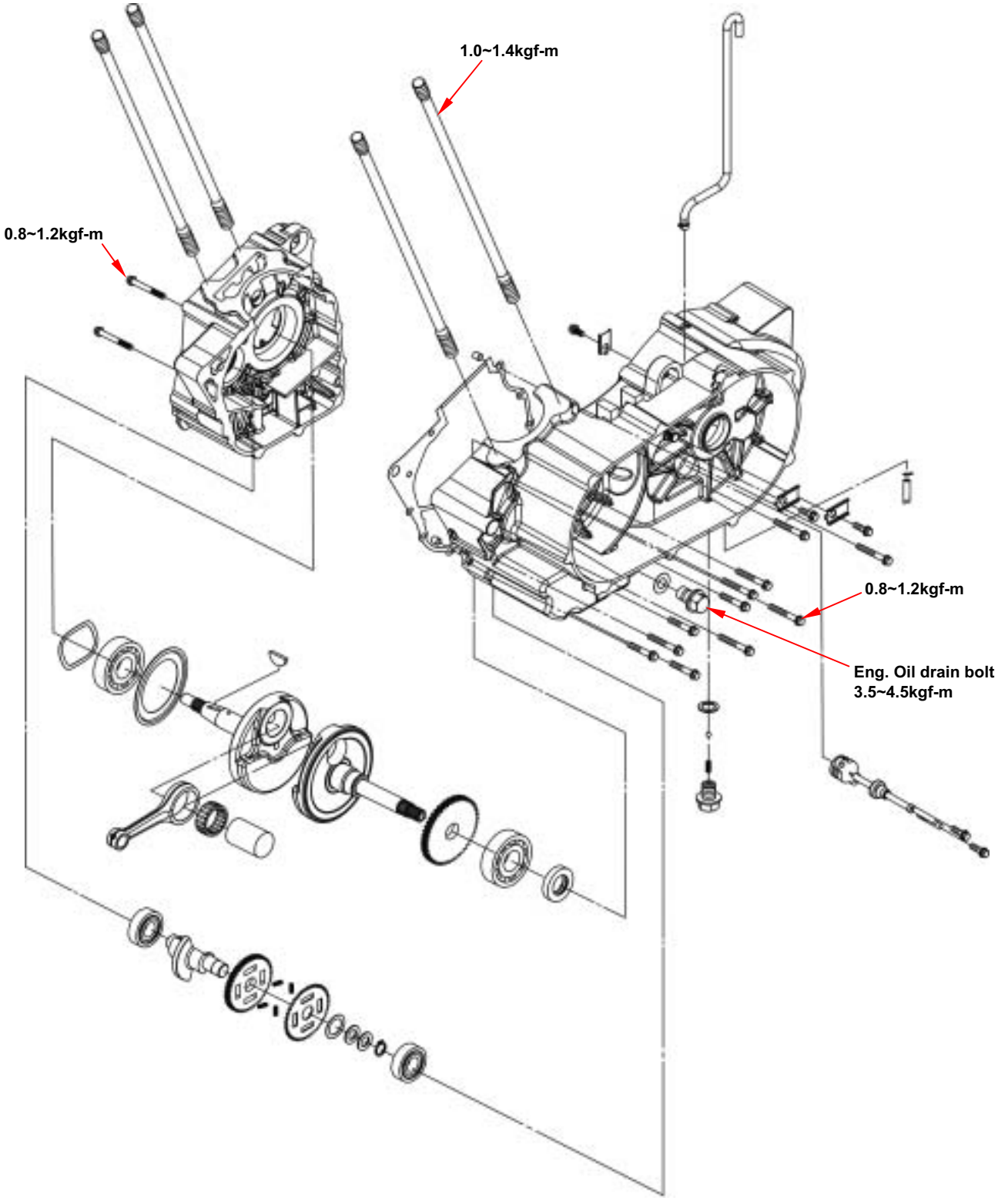
> Make sure the starter motor case is free of metal particles because it is magnetic.

> Before installing the starter motor on the vehicle after assembling it, first connect the lead wires and check that the motor is running normally.

- Apply oil on the O-ring, and install the starter motor.
- Tighten holding bolts.



Mechanism Diagram



10. Crankcase / Crank

General information

Operational precautions

- This Section concerns disassembly of the crankcase for repair purposes.
- Remove following components before disassembling crankcase.
  - —Cylinder head Section 5
  - —Cylinder and piston Section 6
  - —Drive face and driven pulley Section 7
  - —AC generator/Start one way clutch Section 9

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

Specification

Unit: mm

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

Torque value

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

Tools

Special tools

L. crank shaft oil seal driver (27*42*7): SYM-1332100-HMA

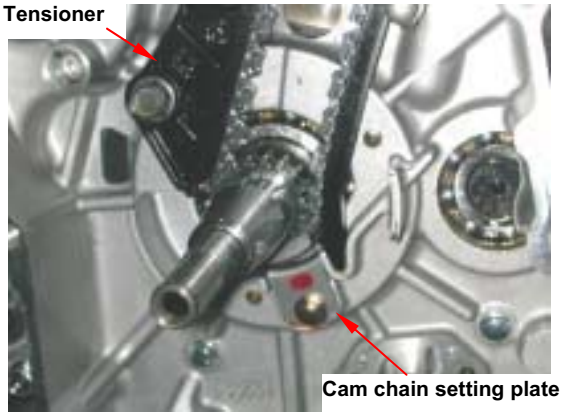
Trouble diagnosis

Engine noise

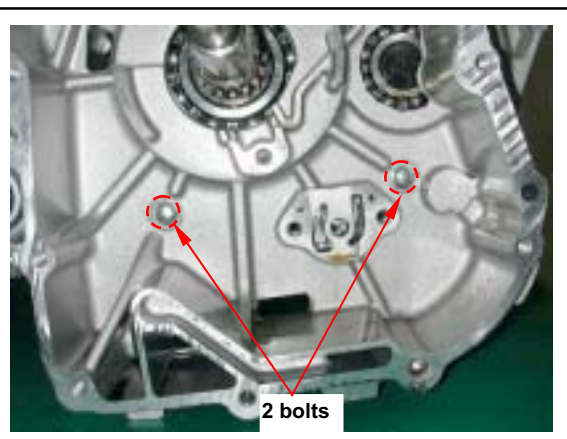
- Loose crankshaft bearing.
- Loose crankshaft pin bearing.
- Worn out piston pin and pin hole.

Disassembly of Crankcase

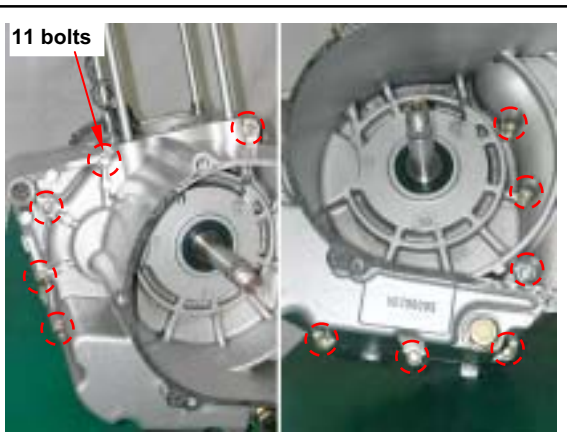
Remove the cam chain setting plate, and then remove cam chain.
Loosen the pivot bolt and remove the tensioner.



Loosen 2 bolts on the right crankcase.



Loosen 11 bolts on the left crankcase.

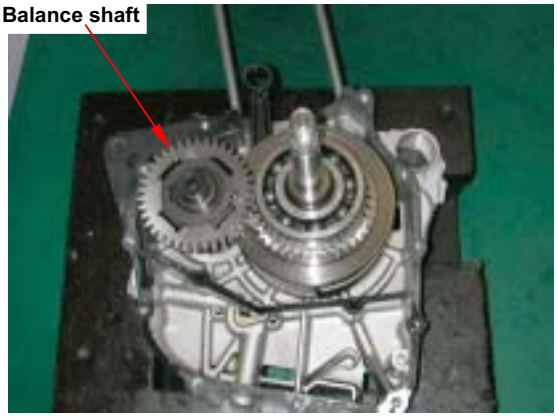


Place right crankcase downward and left crankcase up.
Tap the left crankcase with a plastic hammer to remove it.

⚠ Caution

Care should be taken not to damage the contact surfaces.

Remove balance shaft from right crankcase.



Remove crankshaft from right crankcase.

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

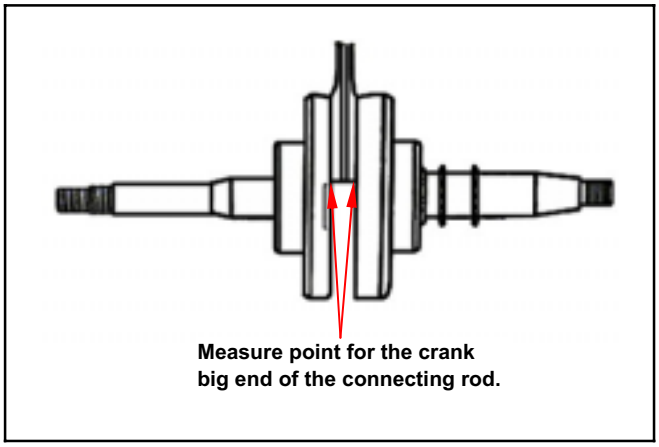
⚠ Caution

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

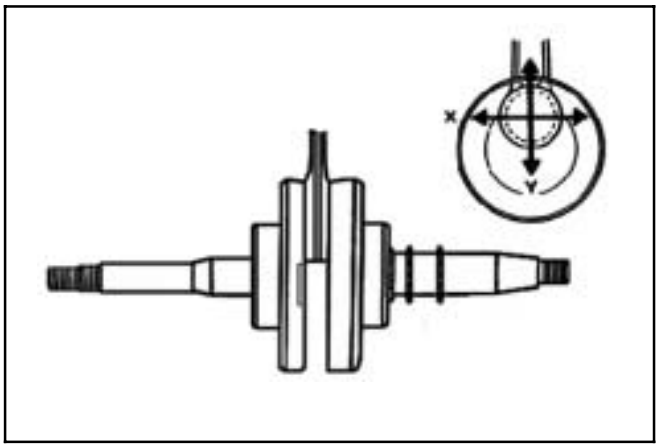
Drive out left crankcase oil seal.

Crankshaft Inspection

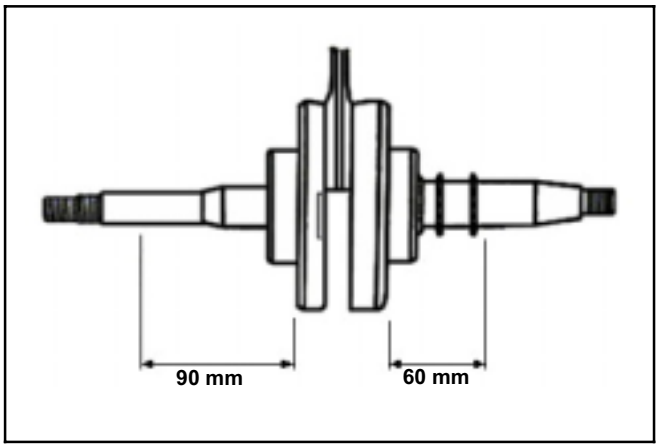
Use a thickness gauge to measure left and right clearance of larger end of connecting rod.
Service limit: 0.6 mm



Measure the clearance of the large end in the vertical direction.
Service limit: 0.05 mm



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



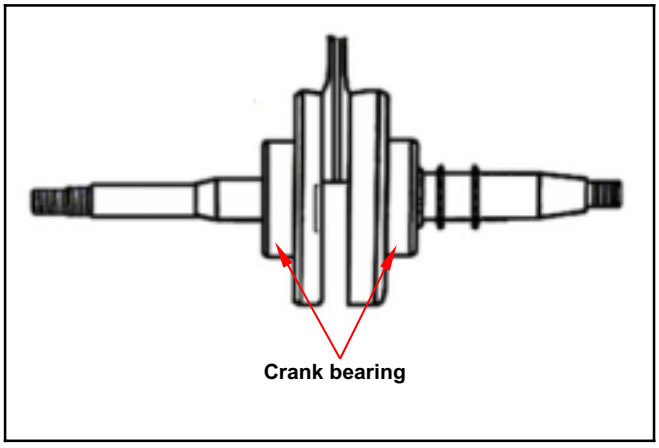
Check crankshaft bearing

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

⚠ Caution

The bearing should be replaced in pair.

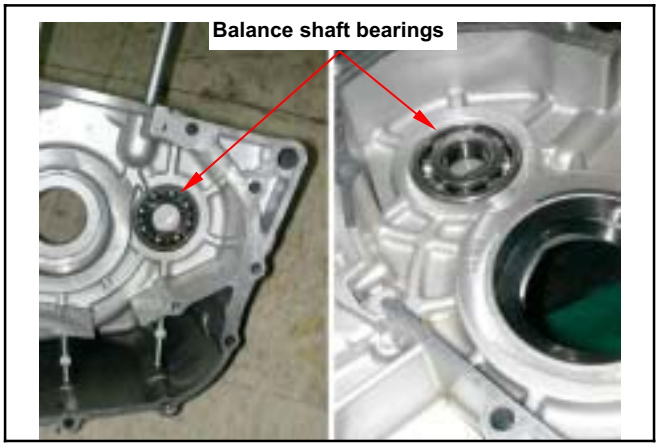
Special tool: outer bearing puller



Check balance shaft bearing

Check bearings on right and left crankcase.
Rotate each bearings inner ring with fingers.
Check if bearings can be turned in smooth and silent, and also check if bearing outer ring is mounted on gear tightly.
If bearing rotation is uneven, noisy, or has loose bearing mount, then replace it.

Special tool: Inner bearing puller
Bearing driver

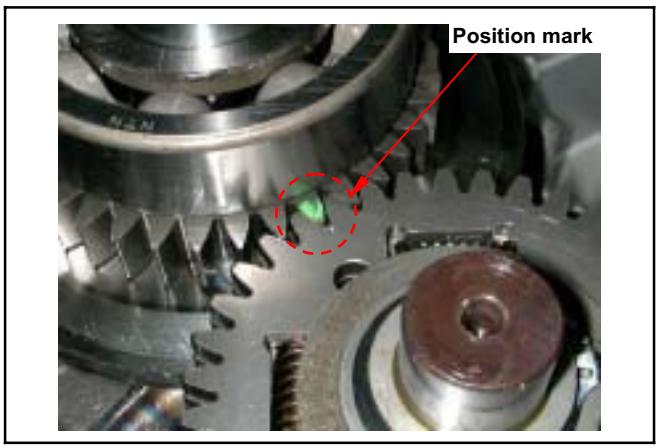


Assembly of crankcase

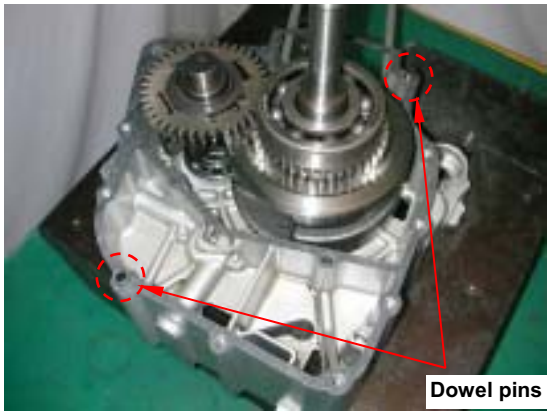
Install wave washer into right crank bearing seat.

Install crank shaft on the right crankcase.

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

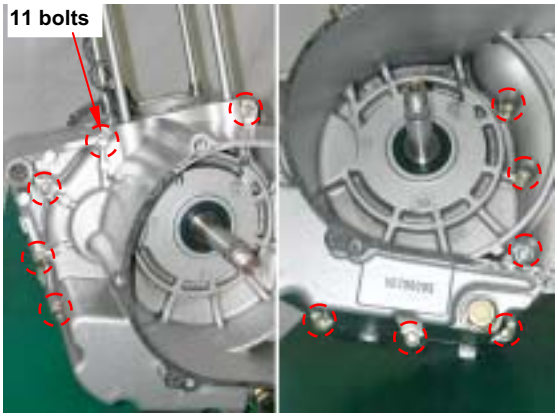


Install 2 dowel pins and new gasket.

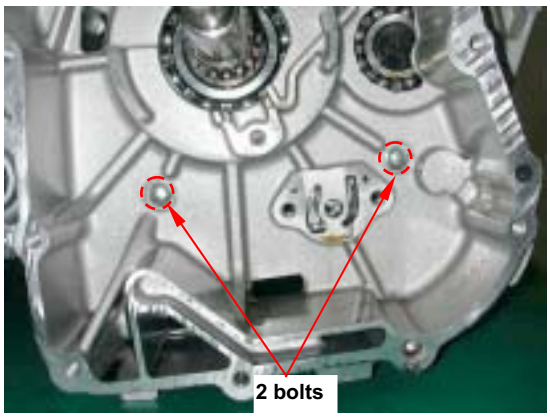


Install the left crankcase onto the right crankcase.

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



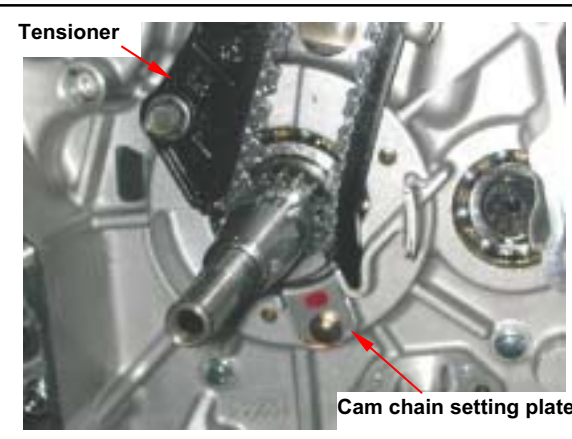
Tighten 2 bolts on the right crankcase.
Torque value: 0.8~1.2kgf-m



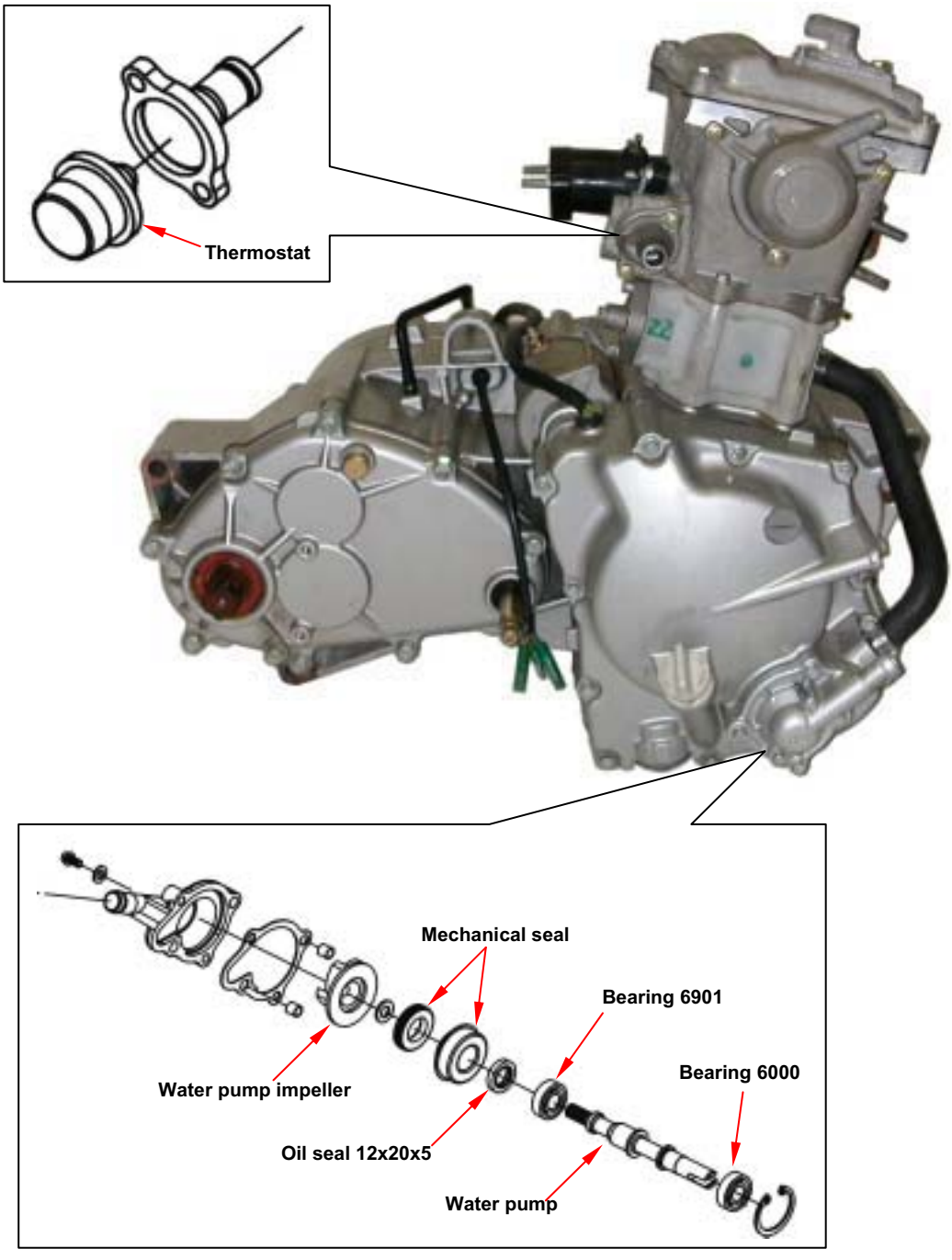
Clean the crankshaft.
Apply a layer of grease on the lip of oil seal, put on the left crank shaft.
Install the oil seal in the left crankcase with care so it does not damage the lip of the oil seal.

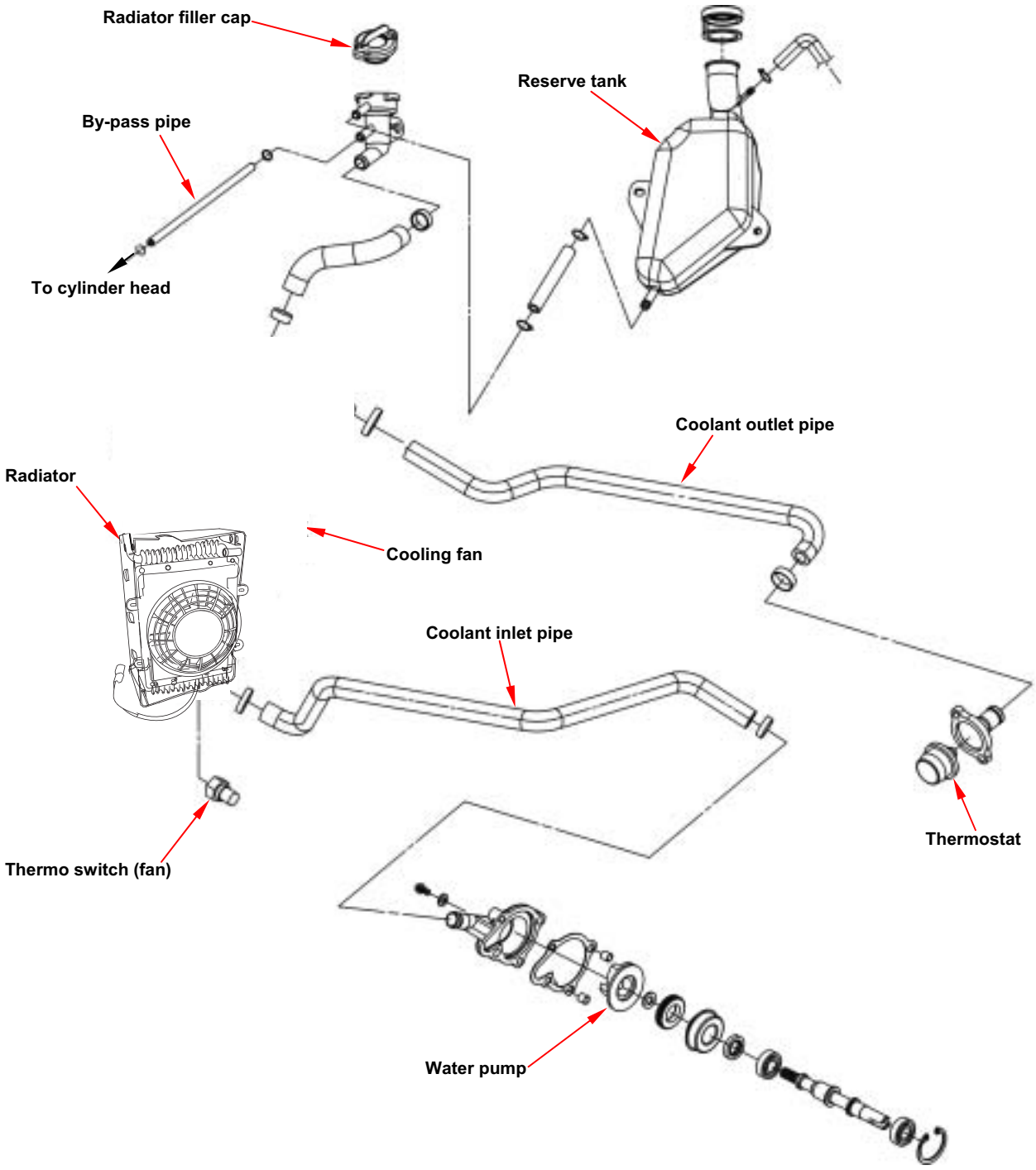
Apply by oil seal driver (27×42×7), oil seal will knock into location.
Special tool:
Oil seal driver (27×42×7)

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



Mechanism Diagram




Radiator filler cap
Reserve tank
By-pass pipe
To cylinder head
Coolant outlet pipe
Radiator
Cooling fan
Coolant inlet pipe
Thermostat
Thermo switch (fan)
Water pump

General Information

General

Warning:

While the engine is running, never attempt to open the radiator filler cap, the pressurized hot coolant may shoot out and cause serious scalding injury. No maintenance work should be performed unless the engine is completely cooled down.

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

Technical Specification

Item	Specification
Pressure to open filler cap	0.9±0.15 kgf/cm^2
Capacity of coolant: Engine + radiator Reservoir upper	850c.c. 420c.c.
Thermostat	Begins to activate at 82~95℃ Stroke: 0.05~3mm
Thermos switch (fan)	Begins to activate at 98±3℃
Boiling point	Not-pressure: 107.7℃ Pressurized: 125.6℃

Torque Value

For water pump impeller 1.0~1.4kgf-m

Tools Requirement

Special tools

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

Trouble Diagnosis

The engine temperature is too high

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

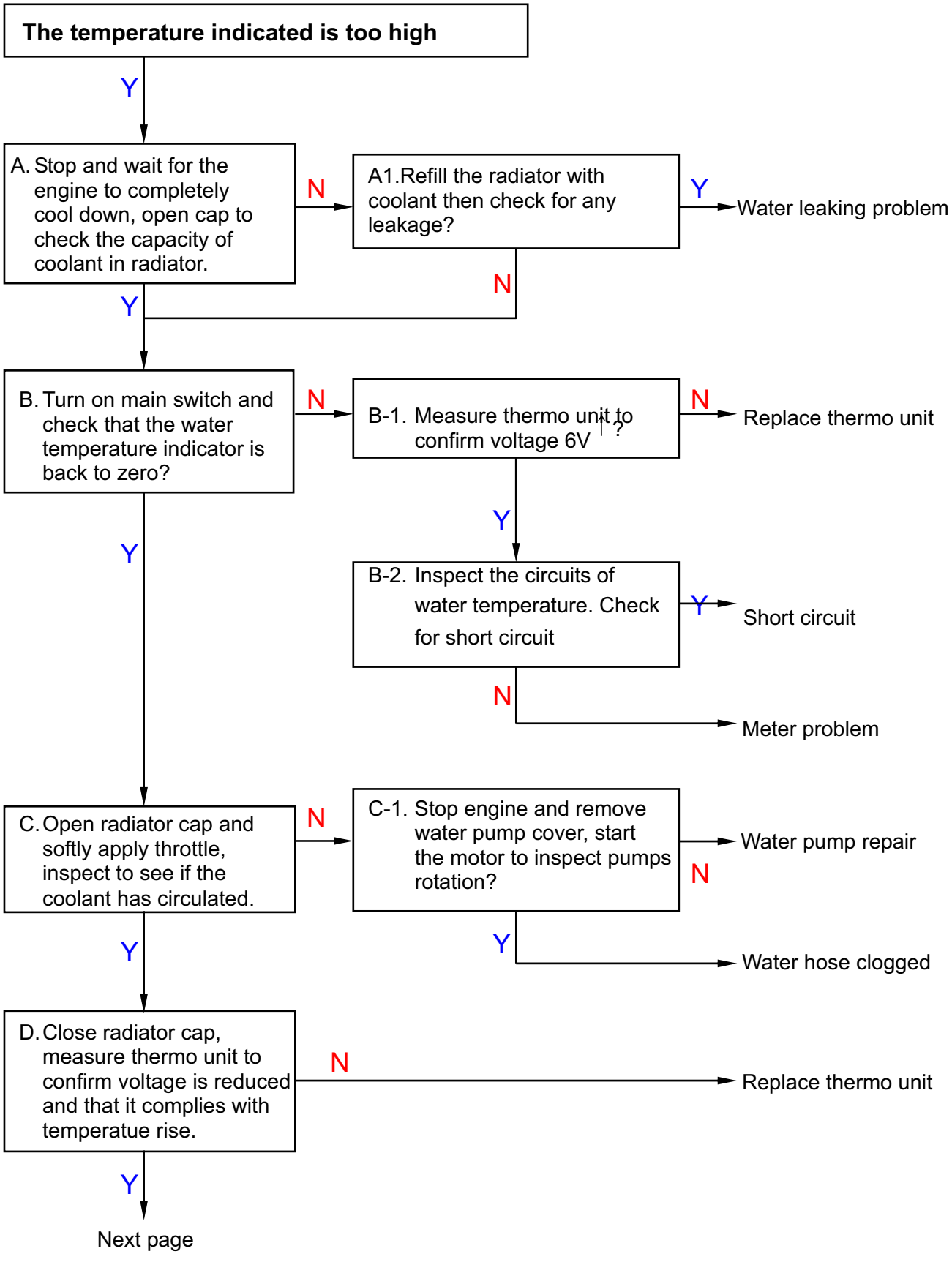
The engine temperature is too low

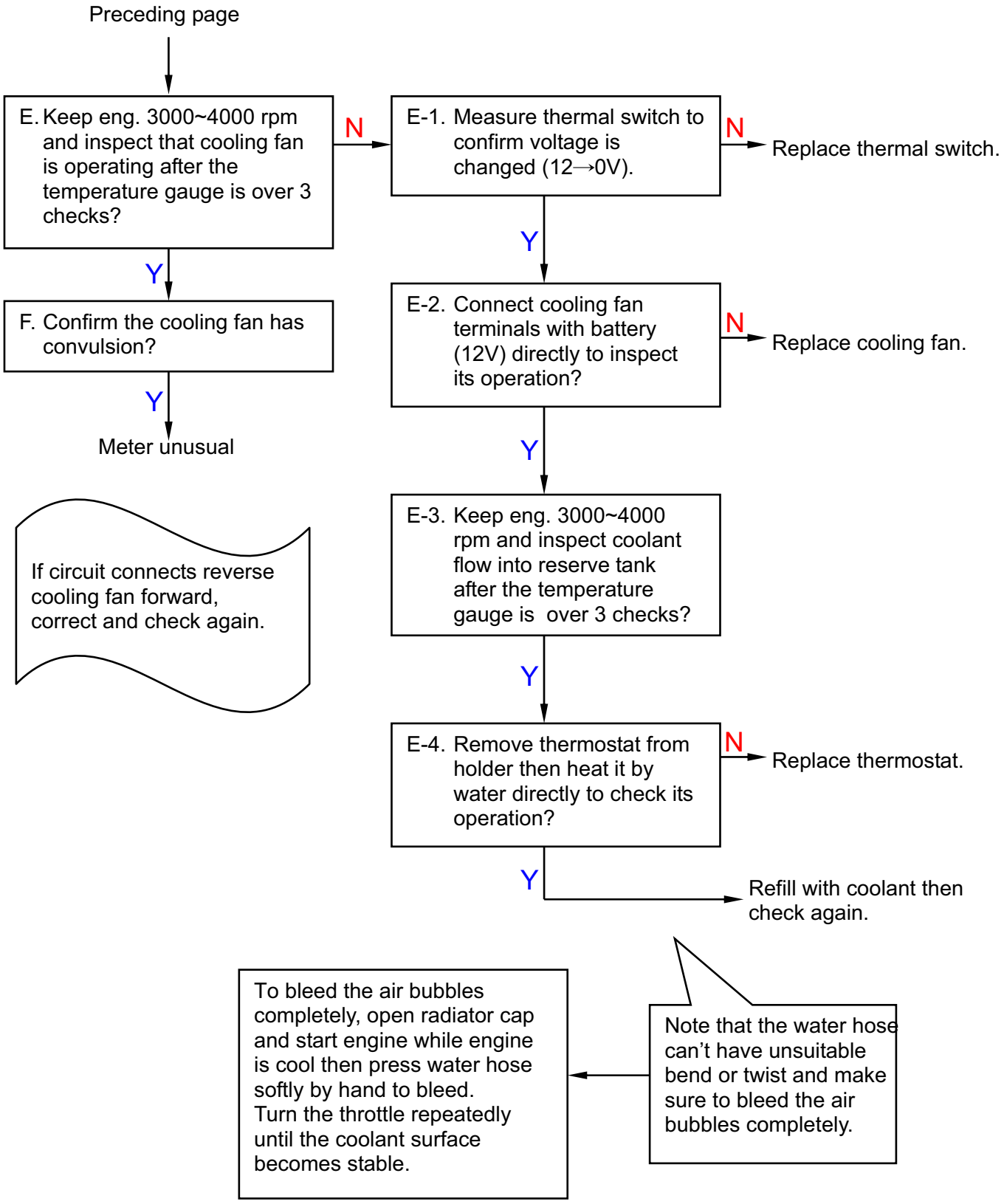
- The water thermometer and the temperature sensor malfunction.
- The thermostat is stuck open.

Coolant is leaking

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

Trouble Diagnosis for Cooling System




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

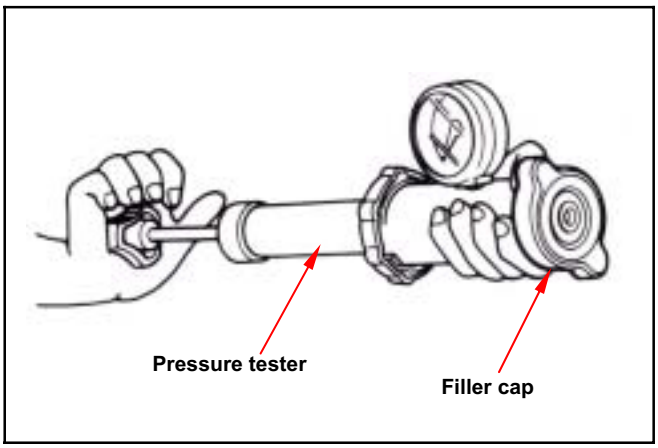
System Test

Test on the filler cap

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

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

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



Caution

Pressure which is too high may damage the radiator. Never use pressure which exceeds 1.05 kg/cm^2.

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

Change of coolant

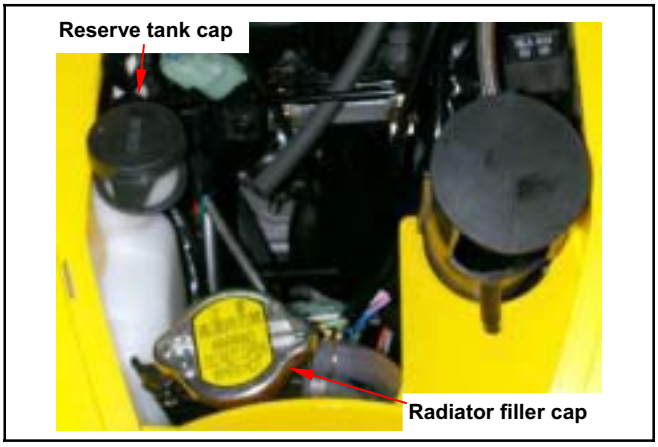
Warning

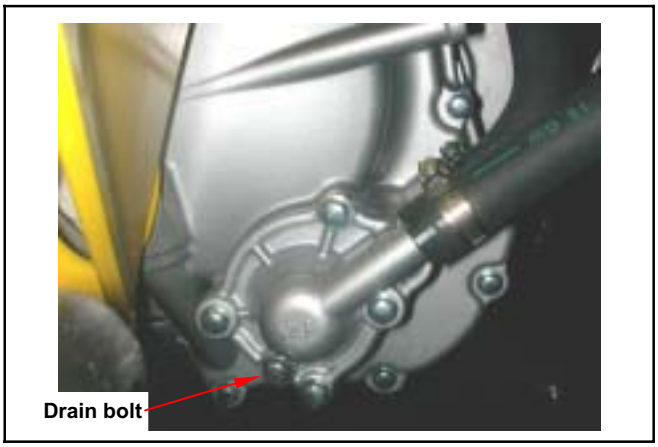
Never attempt to carry out service work on the cooling system unless the engine is completely cooled down, otherwise, you may get scalded.

Remove filler cap.

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

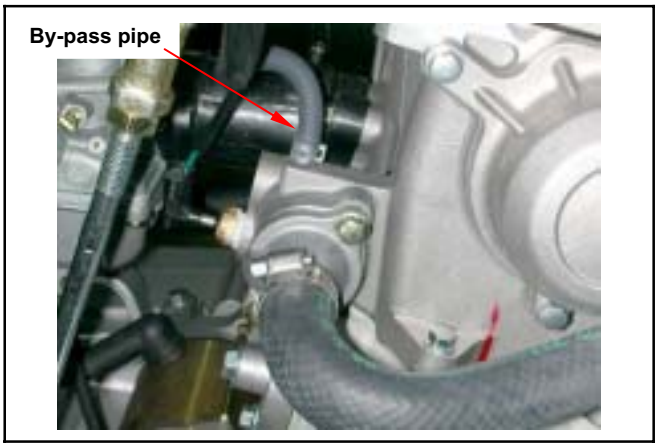
Reinstall the drain bolt.





Refilling system with coolant and bleed the air bubbles.

- Run the engine, and remove by-pass pipe.
- Check the by-pass hole to see if there is any air bubbles
- If emits without the air bubble, only has the coolant to flow out, then reinstall the by-pass pipe.
- Remove radiator filler cap.
- Start the engine, inspects does not have the air bubble in the radiator coolant, also the coolant liquid level is stable.
- Stop the engine. Add coolant to proper level if necessary.
- Screw and tighten up the radiator filler cap.



Caution

In order to avoid the water tank rusting, please do not use the unclear trade mark refrigerant.

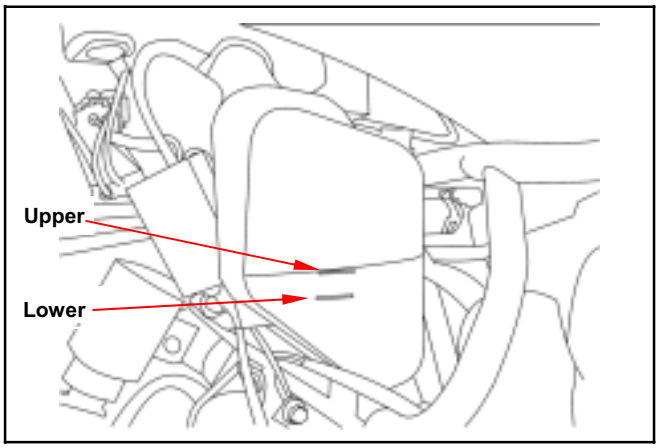
Coolant recommended: SYM Bramax radiator agent.

Concentration: 50%

Check reserve tank

- Remove reserve tank filler cap.

- Check the liquid level
  Add coolant to proper level if too low.
- Reinstall the reserve tank filler cap.



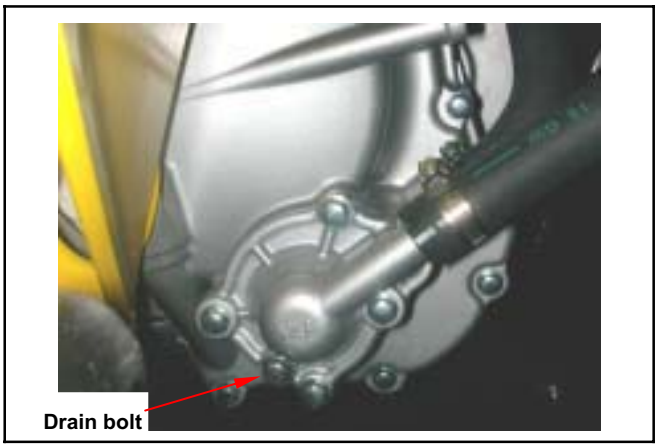
Radiator

Check

Check for any leakage from weld seam.

Blow radiator clean using compressed air. If the radiator is blocked by dirt, use low pressure water jet to clean it.

Care should be taken when straightening the fan.

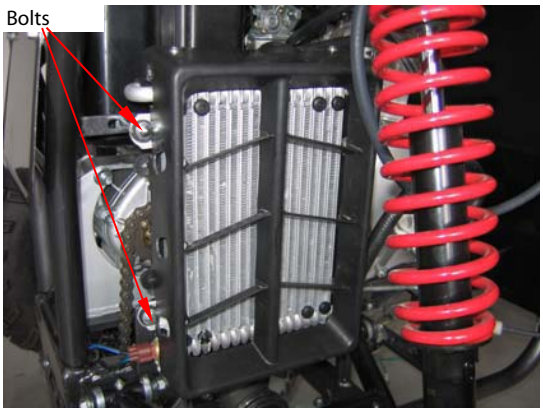


Removal

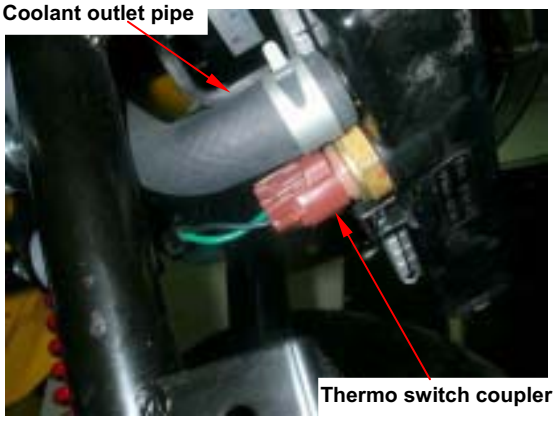
Place a water pan under the water pump; loosen the drain bolt to drain out the coolant.

Remove coolant filler pipe.

Loosen the radiator 4 bolts.
Remove coolant upper side pipes.

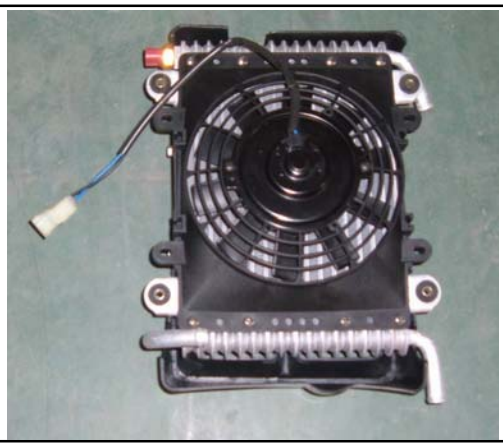


Remove coolant outlet pipe.
Disconnect the couplers for the thermo switch and fan motor, and then remove radiator and cooling fan.



Disassembly

Loosen the 3 bolts from the fan duct, and then remove the fan duct.
Loosen 3 screws from the fan motor, and take off the fan motor.
Remove nut to remove the fan from fan motor.

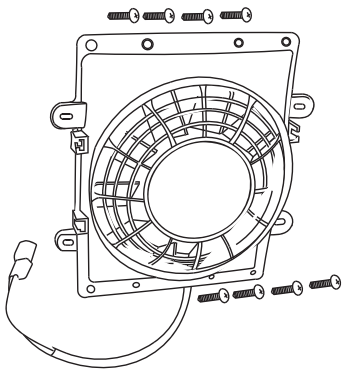


Assembly

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

⚠ Caution

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



Installation

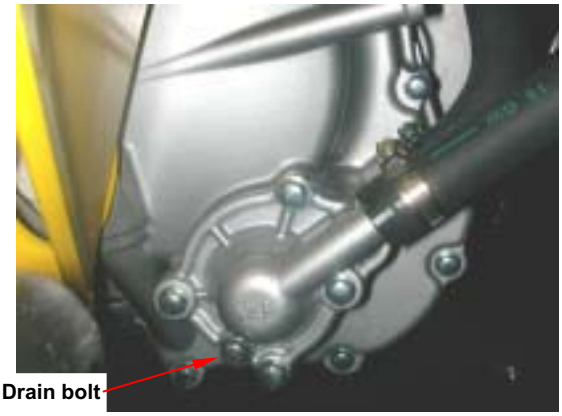
Install the removed parts in the reverse order of removal.
Install radiator in the reverse order of removal.
Upon completion, check for any leakage.

Water Pump

Check water pump seal / Conduct cooling system inspection

- Disassemble the refrigerant drain bolt, if there is an overflow then the refrigerant is compromised through the outer seal.
- Check engine oil gauge and inspect to see whether engine oil has emulsified with refrigerant. if so, it has been compromised through the inner seal.

If either of the two above conditions have occured then it is possible that there is damage to either the inner or outer seal. To check water seal, first dismantle the right crank case. If there is no damage to water seal there may be damage to the cyclinder, or cylinder head gasket. If there is damage to the cylinder, or cylinder head gasket then the cooling sytem needs to be overhauled.



Removal of water pump

Loosen the drain bolt to drain out the coolant.
Remove the water hose.
Loosen 4 bolts and remove the pump cover.
Loosen 9 bolts and remove the right cover.
Take off the gasket and dowel pins.

Turn pump impeller clockwise and remove.

⚠ Caution

The impeller is provided with left turn thread.

Remove the cir clip from the right crankcase cover.
Remove the water pump shaft and the inner bearing.
Remove the outside bearing by inner bearing puller.
Rotate the inner ring of bearing, the bearing should move smoothly and quietly.
If the bearing does not rotate smoothly or produces a noise, replace it with new one.

Special tool:

Inner bearing puller

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

Caution

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

Replacement of Mechanical Seal

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

Special tools:
Inner bearing puller
Water pump bearing driver

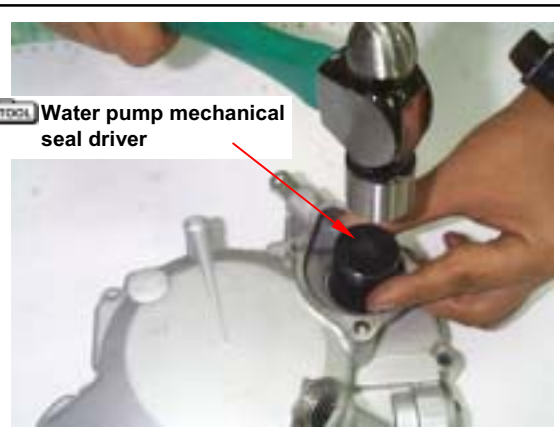
Caution

Replace a new mechanical seal after removing it.

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

Install the mechanical seal onto the right crankcase.

Special tools:
Water pump mechanical seal driver

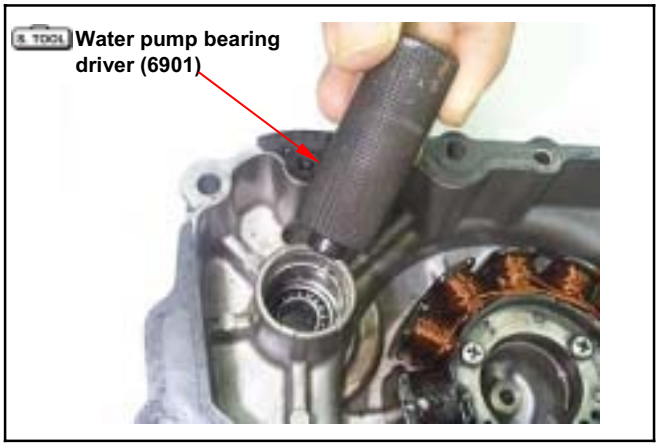


Install the new inner seal onto the right crankcase.
Special tools:
Water pump oil seal driver (inner)

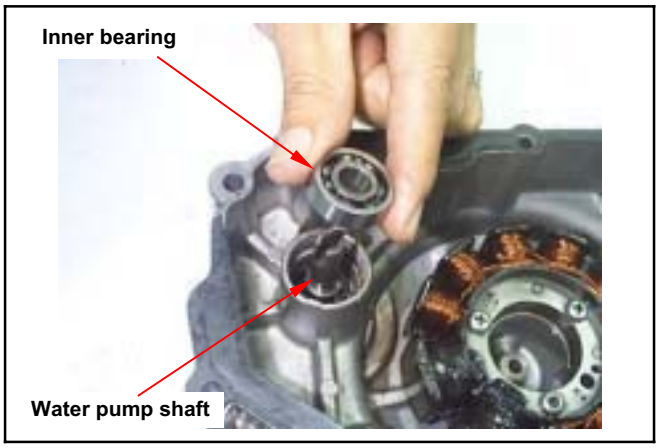
Install a new outside bearing to the right crankcase cover.
Special tools:
Water pump bearing driver (6901)

Caution

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



Mount the water pump shaft and the inner bearing to the right crankcase cover.



Install the cir clip to hold the inner bearing.

Install the seal washer into the impeller.

⚠ Caution

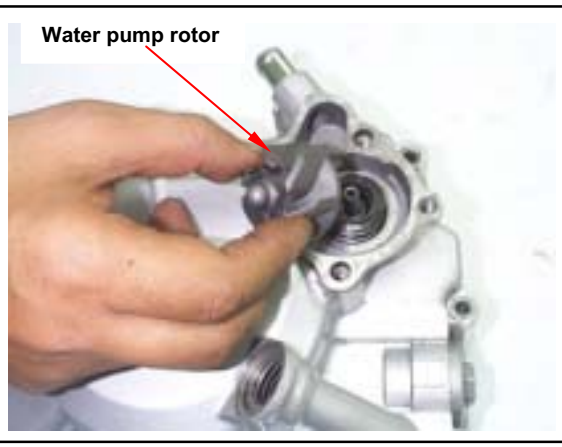
Washer must be replaced together with the mechanical seal.

Install the impeller onto the water pump shaft and tighten.

Torque Value: 1.0~1.4kgf-m

⚠ Caution

The impeller is left thread.



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

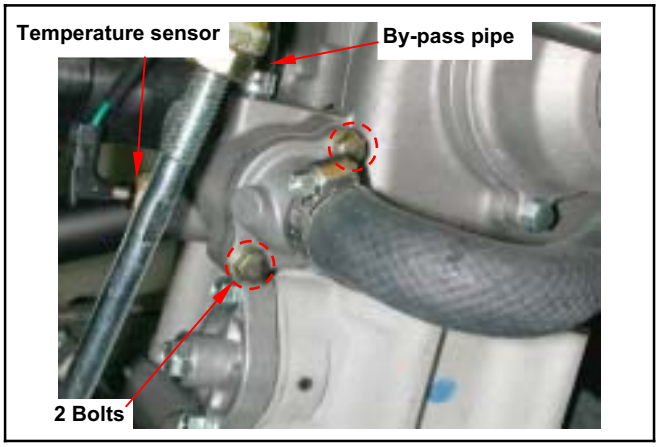
Install the dowel pin and new gasket.
Install the water pump cover with 4 bolts.

Thermostat

Please refer to chapter 17 for inspection of temperature sensor.

Removal

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



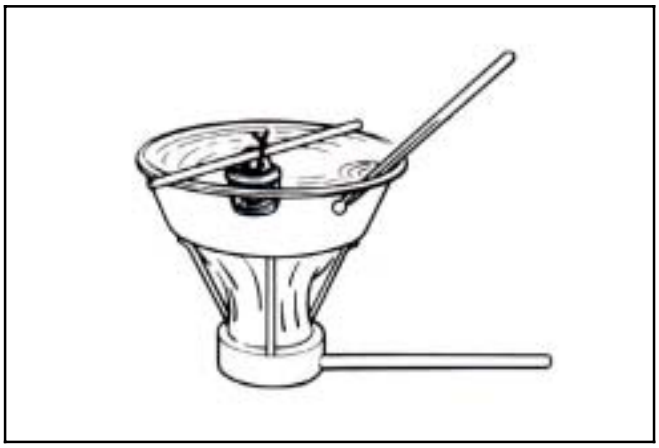
Inspection

Visually inspect thermostat for any damage.

Place the thermostat into heated water to check its operation.

Caution

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



Technical Data

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

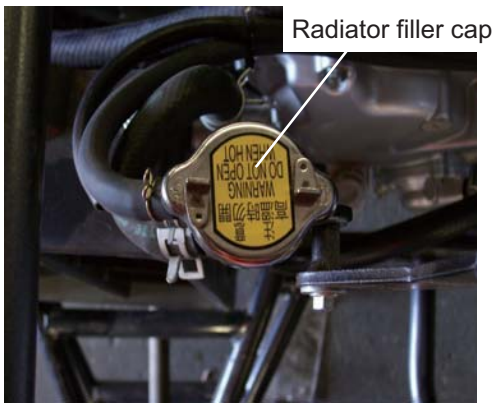
Installation

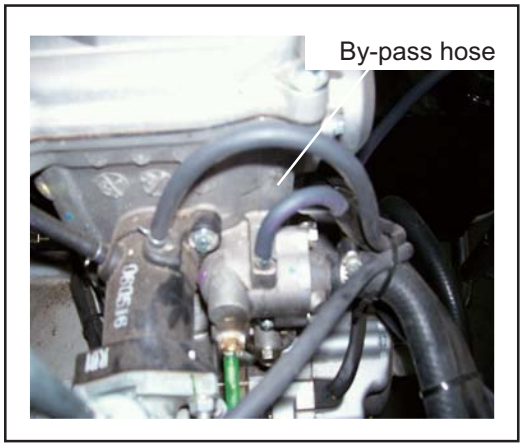
Install the thermostat.
Install the thermostat cover. (2 bolts)
Refill the coolant and bleed out the air bubble (Page 12-5).

FILLING THE COOLING SYSTEM WITH COOLANT

It is very important that you do not just fill the radiator and reservoir with coolant and begin to ride the unit. The cooling system MUST have all the air bled from it or the system will not cool the engine.

1.Remove the radiator filler cap and by-pass hose from the by-pass valve.





2.With the engine running at idle fill the radiator with coolant. Fill the radiator until coolant comes out of the by-pass valve. When ONLY coolant comes out of th**e** by-pass valve and there are no air bubbles in the coolant, reconnect the by-pass hose.

3.Continue to fill the radiator until the coolant level reaches the top of the radiator neck where the cap goes. After several minutes of idling the coolant level will drop. Refill the radiator to the same level and monitor for several more minutes for air bubbles. If the coolant level drops again, refill. Once the coolant level is stable and you no longer see air bubbles, screw the radiator cap back on and fill the reservoir to the appropriate level.

Maintenance Data

Operational precaution

- When removing the battery, the disconnection sequence of cable terminals should 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 an emergency never change battery rapidly.
- 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.

Technical Specification

Charging system

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

Ignition system

Description		Specification
Spark plug	Model	NGK CR8E (Recommended)
	Gap	0.8mm
Ignition coil and resistance	Primary winding	0.17 ±10% Ω
	Secondary winding	Without cap: 3.1 ±10K Ω
		With cap:8.1 ±10K Ω
Ignition timing "F" mark		10° TDC / 1700rpm
		27° TDC / 4000rpm

Trouble Diagnosis

No voltage
- Battery discharged.
- The cable disconnected.
- The fuse is blown.
- Improper operation of the main switch .

Low voltage
- The battery is not fully charged .
- Poor contact.
- Poor charging system.
- Poor voltage regulator.

No spark produced by spark plug
- The spark plug is out of work.
- The cable is poorly connected, open or short-circuited.
  - B.etween 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.

Starter motor does not work
- The fuse is blown.
- The battery is not fully charge.
- Poor main switch.
- Poor starter switch.
- The front and rear brake switches do not operate correctly.
- Starter relay is out of work.
- The ignition coil is poorly connected, open or short-circuited.
- The starter motor is out of work.

Intermittent power supply
- The connector of the charging system becomes loose.
- Poor connection of the battery cable.
- Poor connection or short-circuit of the discharging system.
- Poor connection or short-circuit of the power generation system.

Charging system does not operate properly
- Burnt fuse.
- Poor contact, open or short circuit.
- Poor regulator.
- Poor ACG.

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

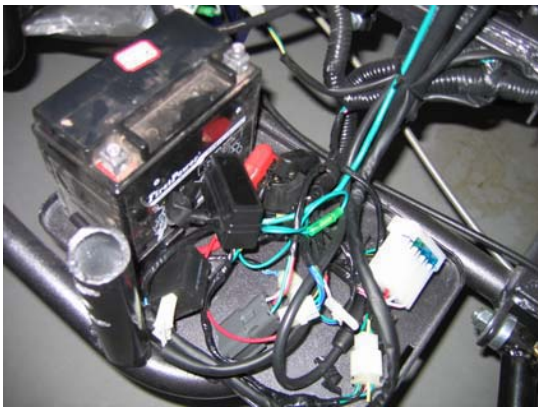
Weak starter motor
- Poor charging system.
- The battery is not fully charged.
- Poor connection in the windings.
- The motor gear is jammed by foreign material.

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

Battery

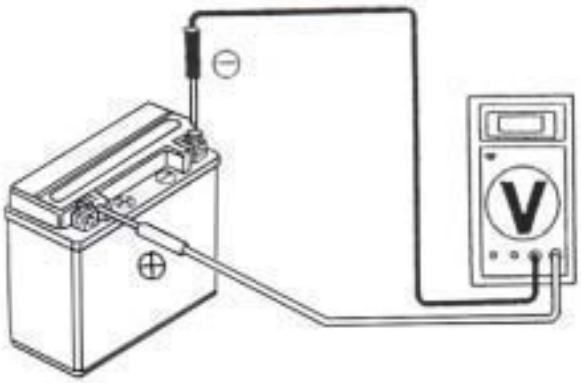
Removal

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



Voltage Check

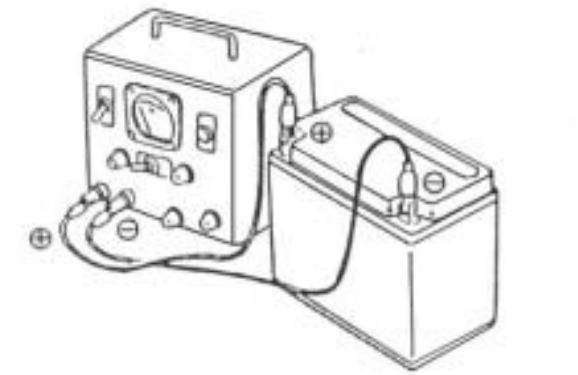
Use the digital voltmeter to check the voltage of the battery.
Voltage:
Fully charged: 13.0~13.2 V at 20℃
Undercharged: Below 12.3 V at 20℃



Charging

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

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



⚠ Warning

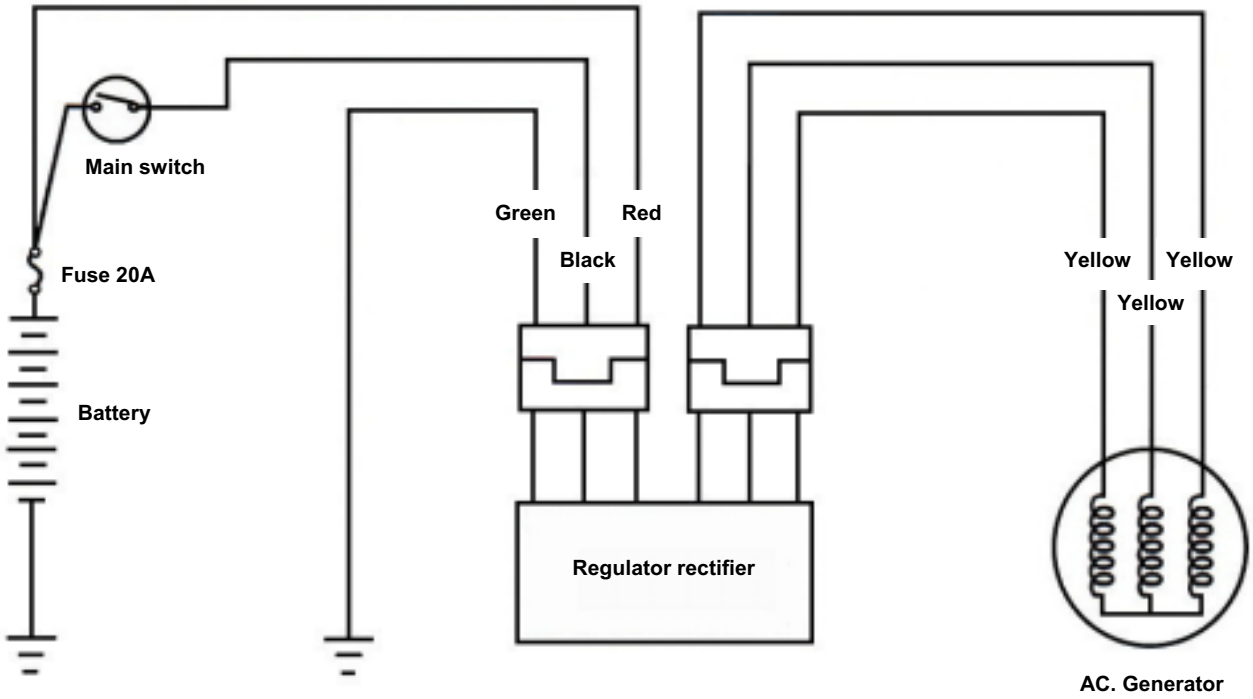
- Keep flames away while recharging.
- Charging is completely controlled by the ON/OFF switch on the charger, not by battery cables.

⚠ Caution

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

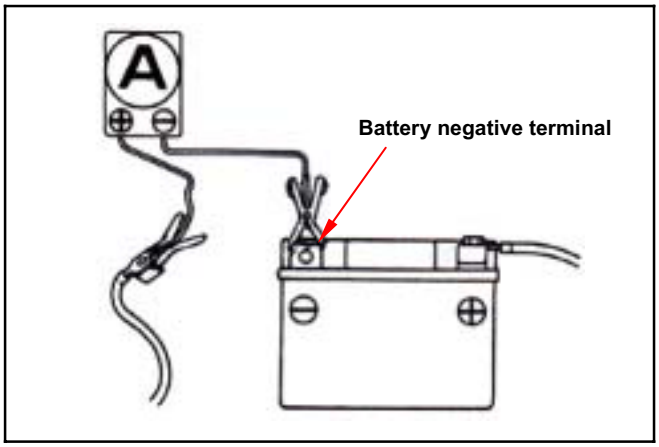
Charging System

Charging circuit



Current Leakage Inspection

Turn the main switch to OFF position, and remove the negative cable terminal (-) from the battery. Connect an ammeter between the negative cable terminal and the battery negative terminal.



Caution

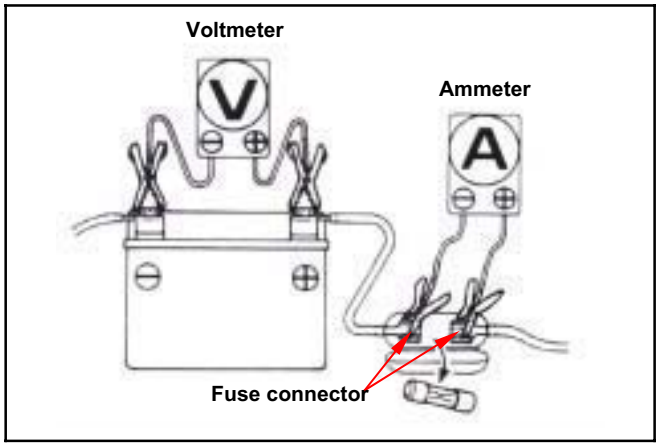
- In the current leakage test, set the current range at the largest scale, then gradually decrease to the lower scale as the test process goes to avoid possible damage to the ammeter and the fuse.
- Do not turn the main switch to ON position during test.

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

Allowable current leakage: Less than 1mA

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

Inspection on Charging Voltage



Caution

- Before conducting the inspection, be sure that the battery is fully charged. If undercharged, the current changes dramatically.
- Use a fully charged battery having a voltage larger than 13.0 V
- While starting the engine, the starter motor draws large amounts of current from the battery.

After the engine is warmed up, replace original battery with a fully charged battery.
Connect a digital voltmeter to the battery terminals.
Connect an ammeter between both ends of the main fuse.

Caution

When the probe is reversibly connected, use a voltmeter having an indication that the current flows from the positive or the negative direction and the measurement is at zero, ammeter at only one direction.

Caution

- Do not use short-circuit cable.
- It is possible to measure the current by connecting an ammeter between the battery positive terminal and the cable position terminal, however, while the starter motor is activated, the surge current the motor draws from the battery may damage the ammeter. Use the kick starter to start the engine.
- The main switch should 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. This may damage the ammeter.

Connect a tachometer.
Turn on the headlight to high beam and start the engine.
Accelerate the engine to the specified revolution per minute and measure the charging voltage.

Specified Charging Current:
1.2 A / 6000 rpm
Control Charging Voltage:
14.5 + 0.5 V / 2000 rpm

Caution

To replace the old battery, use a new battery with the same current and voltage.

The following problems are related to the charging system; follow the instructions provided in the checking list to correct it if any one of the problems takes place.

(1) The charging voltage can not exceed the voltage between two battery terminals and the charging current in the discharging direction.
(2) The charging voltage and current are much higher than the standard values.

The following problems are not related to the charging system; correct it if any following steps indicate in the checking list.

(1) The standard charging voltage and current can only reach the revolution of the engine when exceeding the specified rpm.
- Bulbs used exceed their rate and consume too much power.
- The replacement battery is aged and does not have enough capacity.

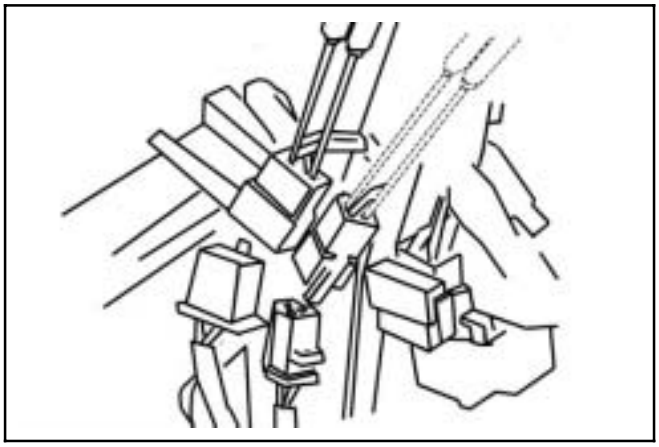
(2) The charging voltage is normal, but the current is not.
- The replacement battery is aged and does not have enough capacity.
- Battery used does not have enough electricity or is over charged.
- The fuse of the ammeter is blown.
- The ammeter is improperly connected.

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

Inspection on regulator rectifier

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

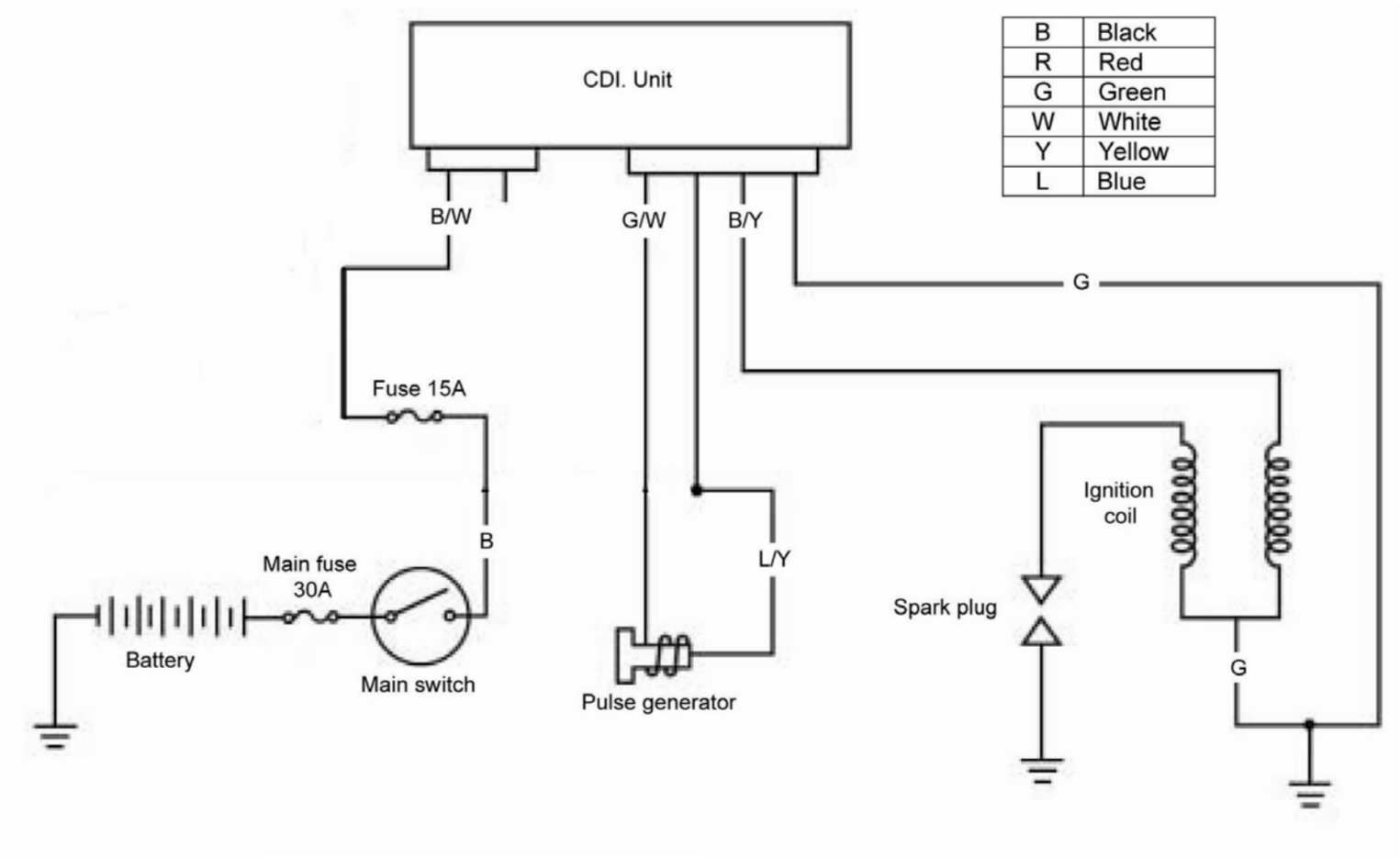
Item	Check Points	Standard Value
Main switch connection	R – B	Battery voltage (ON)
Battery connection	R – G	Battery voltage
Charging coil	Y – Y	0.17 ~ 0.8 Ω



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.

Ignition System

Ignition Circuit Diagram



C.D.I Unit

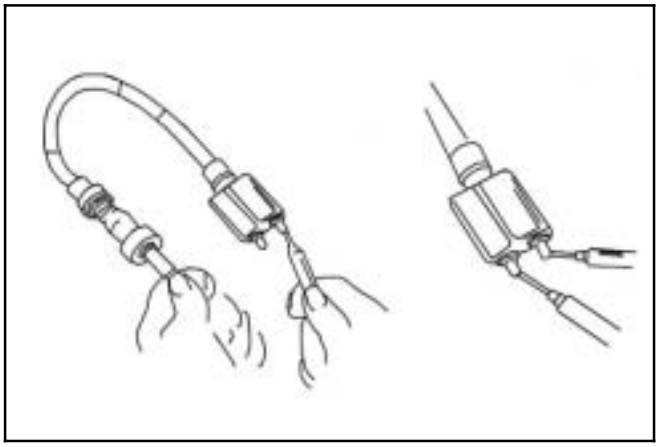
Disconnect connectors of the C.D.I unit.
Check the following connectors as indicated in the table at the harness side.

Item		Points to check	Result
Main switch turn to "ON" position		Black/white ~ green	Battery voltage
Pulse generator		Green/White ~ Blue/yellow	50~170Ω
Ignition coil	Primary circuit	Black/yellow ~ green	0.17 ±10% Ω
	Secondary circuit	Black/yellow ~ with no cap	3.6 ±10% Ω
		Black/yellow ~ with cap	7.3~11K Ω

Inspection on Ignition Coil

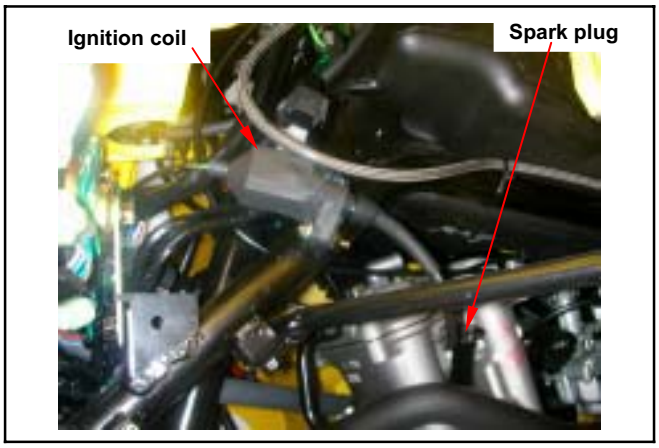
Disengage the connector of the ignition coil and the spark plug cap.
Measure the resistance between the terminals of the primary winding.
Standard resistance: 0.17Ω ± 10%
Remove the cap from the spark plug and measure the resistance between the spark plug and the primary winding.
Standard resistance:

With no cap: 3.6Ω ± 10%
With cap: 7.3~11 KΩ



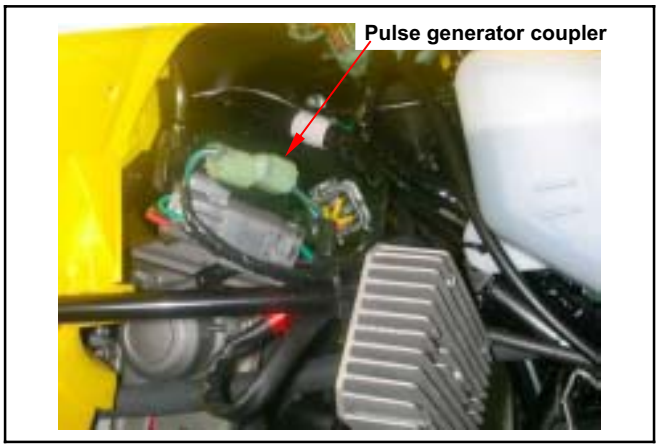
Ignition Coil Replacement

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



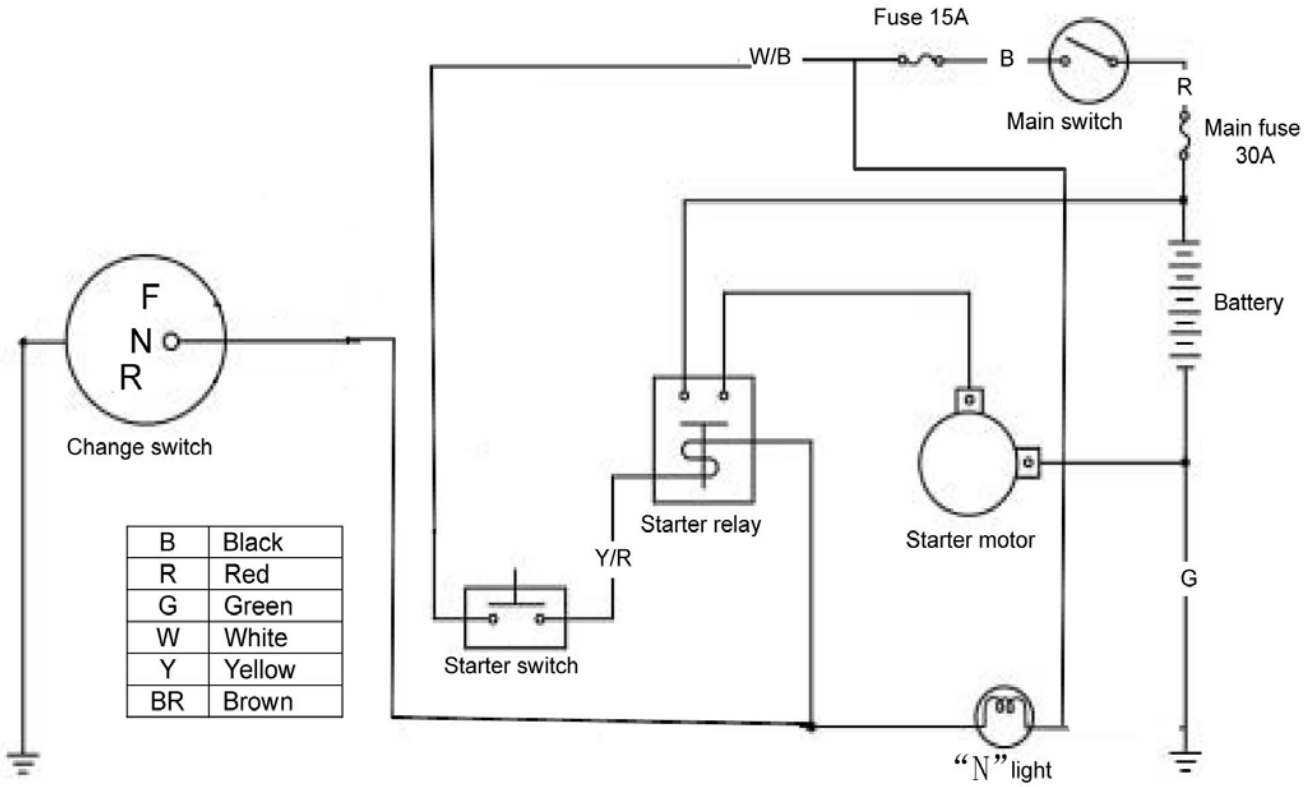
Inspection of Pulse Generator

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



Starting System

Starting Circuit Diagram



Inspection of Starter Relay

Turn the key switch

Press the brake.

If the engine turns over the relay is normal.

Disconnect the negative cable terminal of the battery.

Disconnect the cable positive terminal from the

Disconnect the positive cable of the starter motor.

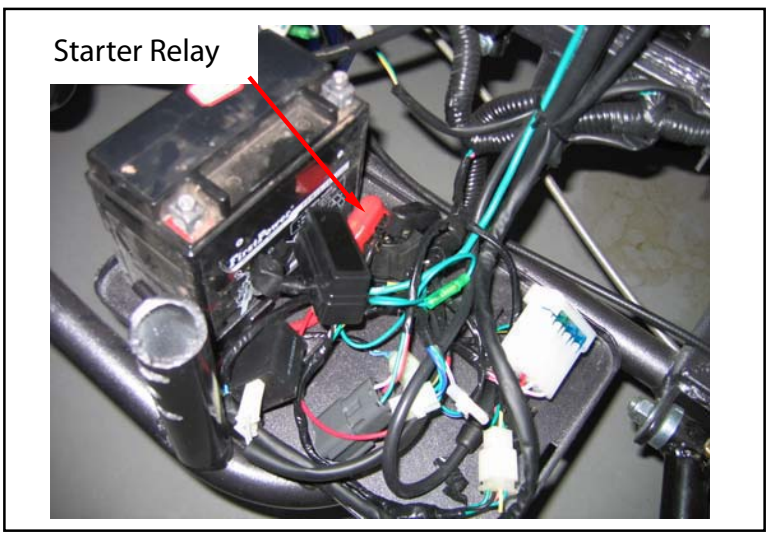
Disconnect the coupler of the relay.

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. relay.

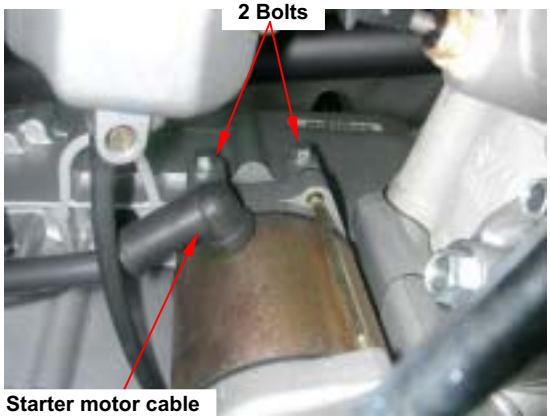
If there is no continuity, replace the relay.



Removal of Starter Motor

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

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

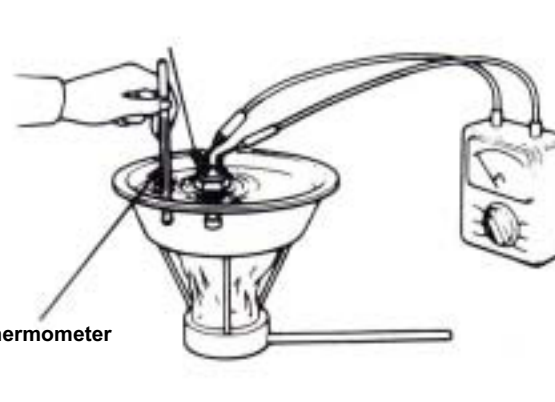


Installation of Starter motor

Install in reverse order of removal procedures.

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, increase the coolant temperature gradually. The switch should have continuity at 98±3 ℃.



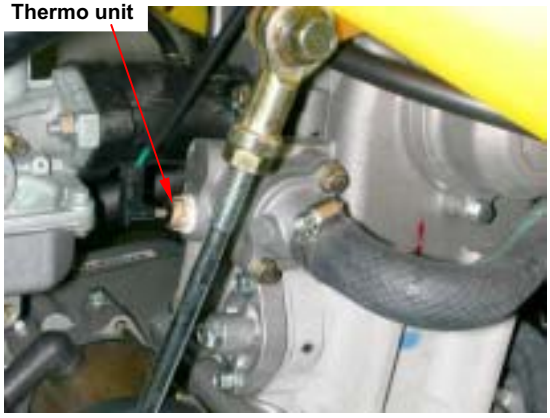
⚠ Caution

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

Thermo unit

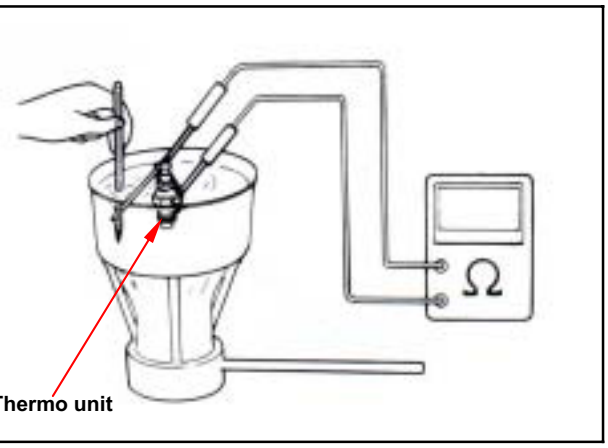
Remove the thermo unit.
Hang the thermo unit in an oil heater, heat the oil and measure the resistance at each temperature.

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



Caution

- Wear gloves and goggles when performing this test.

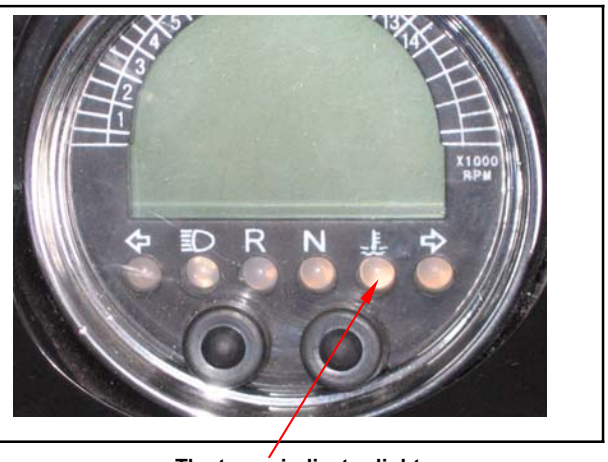


Caution

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

Water Temperature Indicator Light

When the water temp. is below 100°C, the temp. indicator light will remain blank off.
When the engine's water temp. reaches 100°C~110°C, the temp. indicator light will show dimmed or blinking. Operator should reduce speed and lower the engine RPM to insure cool down the water temp and keep engine safe.
When the engine's water temp. is greater than 110°C and the temp. indicator light is always on, operator must shot down the engine or the engine will be damaged.



Meter removal instruction

a. Unplug meter wiring connector.

b. Remove meter by pressing the locating lock from the meter casing.

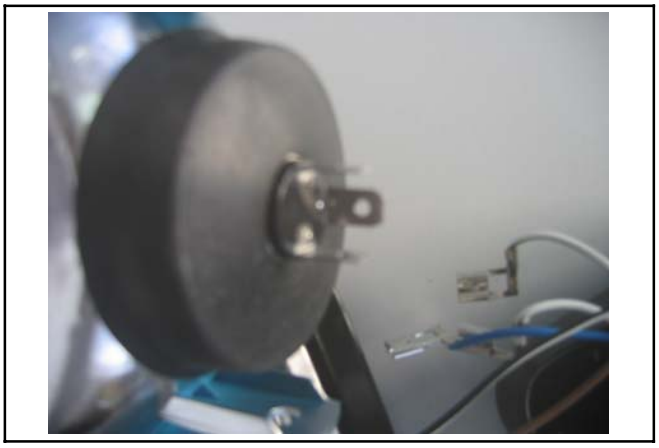
c. Install new meter and press down in to the meter casing.

d. Reconnect the plug.

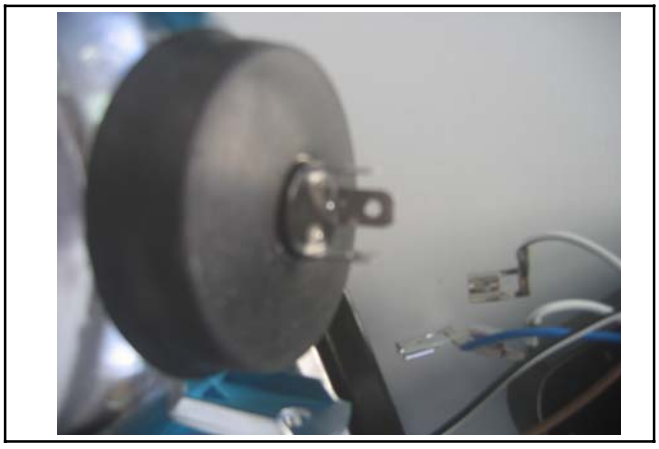
Procedure to change head light bulb

Remove head light cover.

Remove wiring connectors.



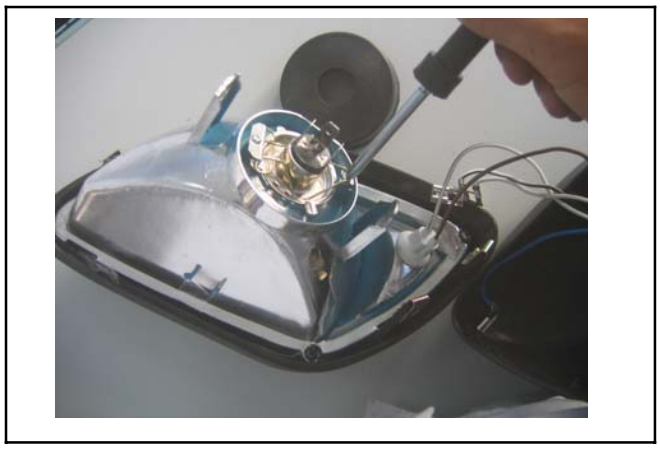
Remove light bulb dust boot.



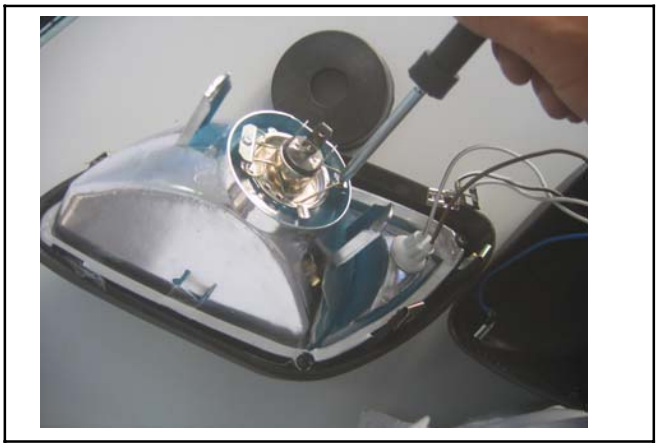
Remove light bulb clamp

Remove light bulb.

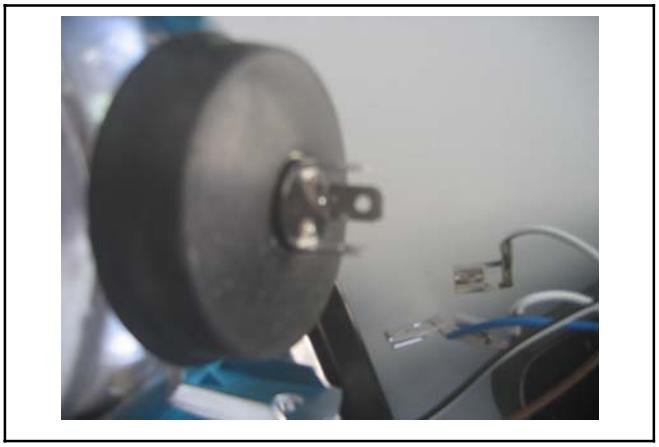
Clip back the light bulb clamp.



Clip back the light bulb clamp.

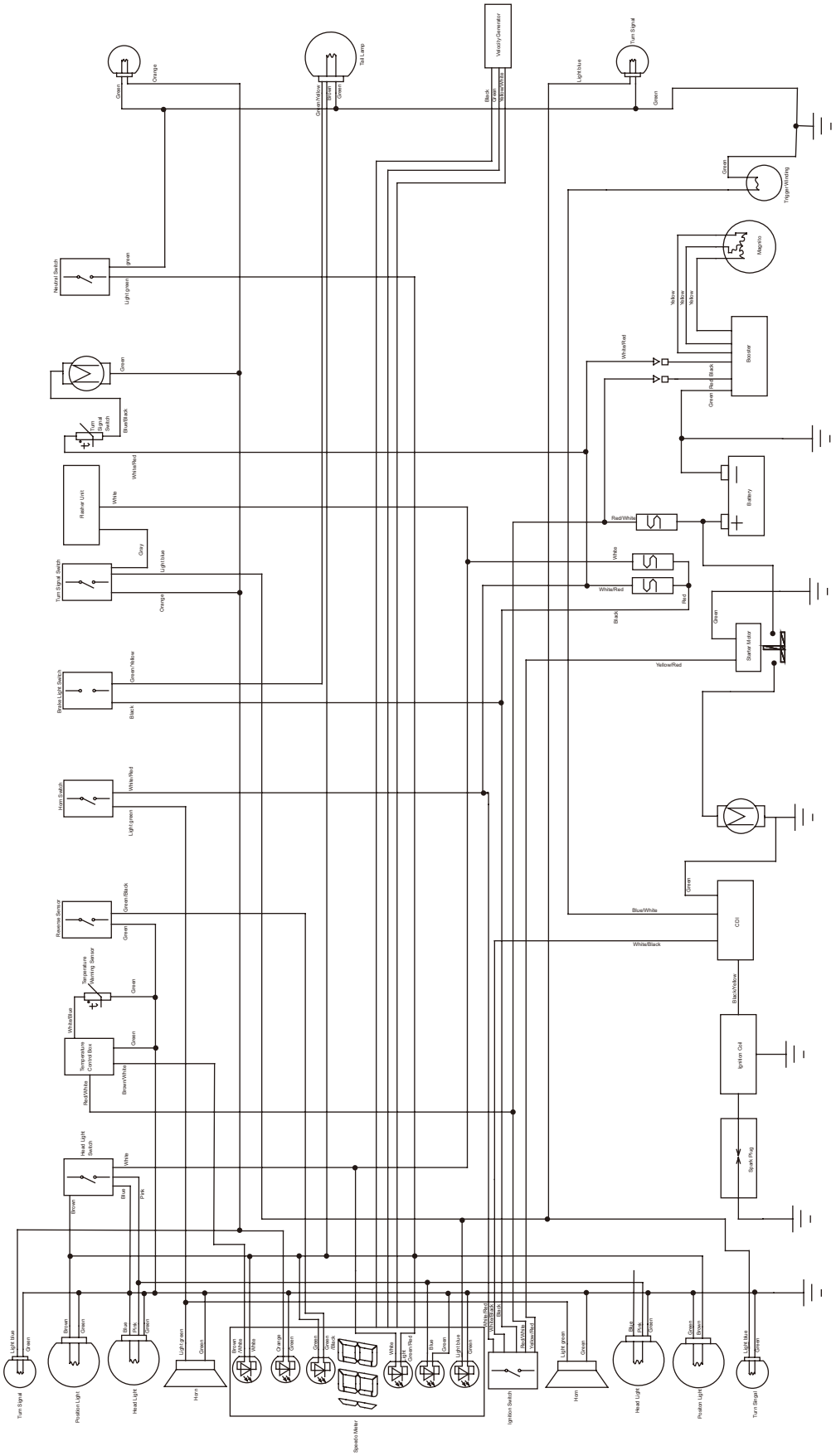


Install dust boot and wiring connectors.



Reinstall the head light cover.

Electrical Diagram



Center Axle and Drive Hub Removal

a. Remove stump guard.

b. Remove drive chain.

c. Lift rear of kart off ground.

d. Remove each rear wheel hub and carrier.

e. Remove each CV shaft; you may have to tap on the CV shaft housings with a hammer.

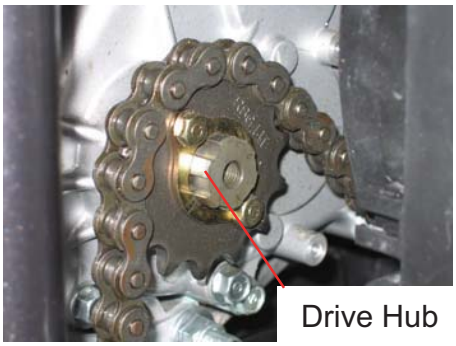
f. Loosen set scews in axle bearings.

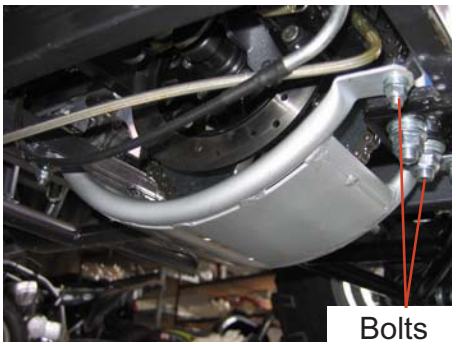
g. Remove the axle bearings by loosening the 4 bolts that hold the bearings to the frame.

h. The axle should drop once the bearings are out of the way.

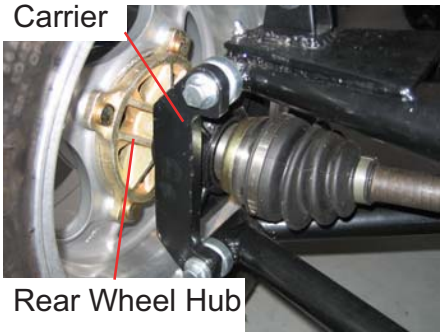
NOTE: You many have to remove the rear brake caliper.

I. Remove axle from drive hub.

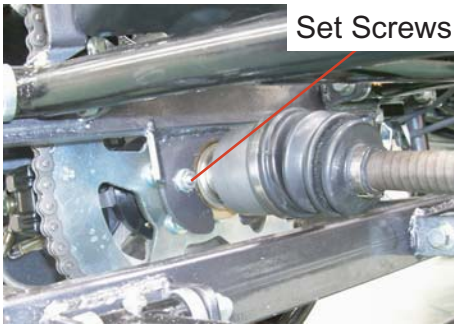

Drive Hub

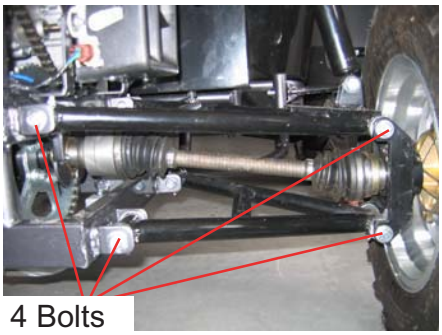

Bolts

Carrier


Rear Wheel Hub

Set Screws

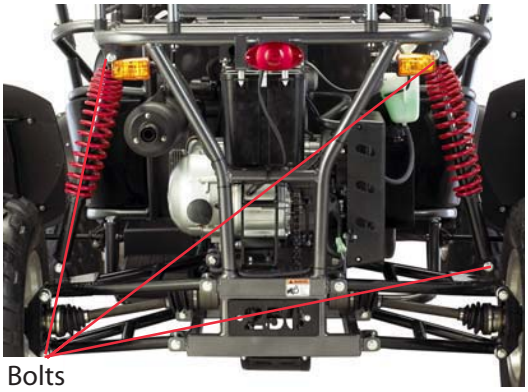



4 Bolts

13. Final Drive Components

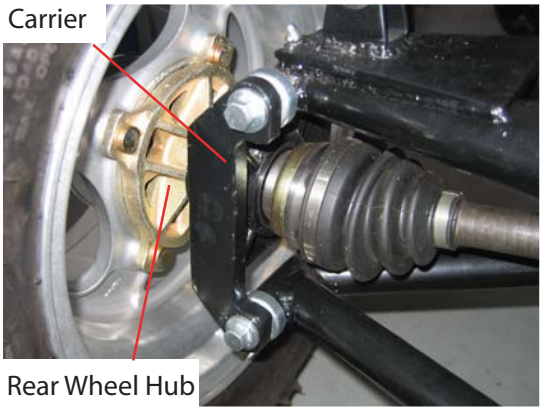
CV Shaft Removal

LIft rear of kart off the ground.



Remove each rear shock.
NOTE: This is optional, it makes it easier to get to the CV shafts.

Remove each rear wheel, hub, and wheel carrier.

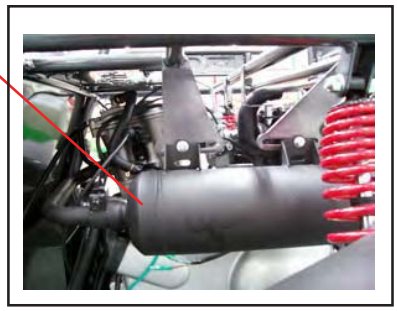


Remove each CV shaft; you may have to tap on the CV shaft housings with a hammer.

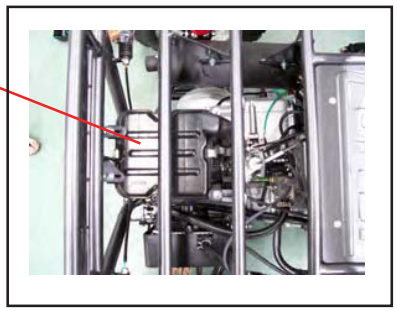
The shafts are locked into place with compression type lock rings.

Engine Removal

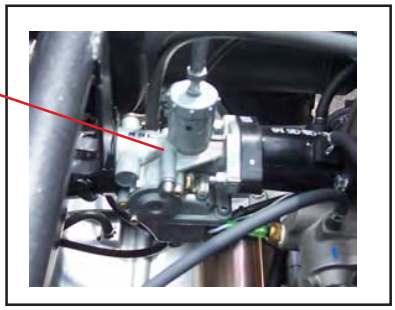
Remove the muffler.



Remove the air box.

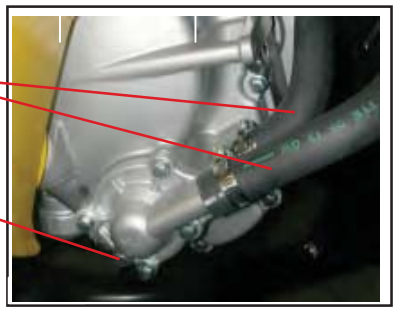


Remove the carburetor.



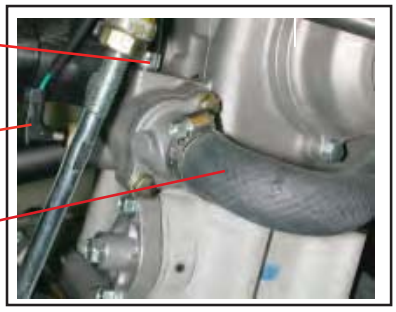
Lift the rear of the unit off the ground and remove the driver's side shock.

Remove coolant drain bolt, and drain out coolant.



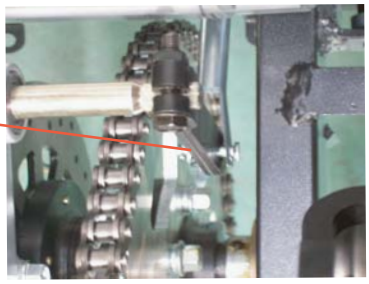
Remove coolant inlet hoses from water pump.

Remove the thermo-sensor wire, by-pass pipe, and coolant outlet hose.



Engine Removal (continued)

gear shift lever



Remove gear change lever.

chain

Remove chain.

regulator and stator plugs

Unplug the regulator and stator plugs.

stater motor wire

Remove starter motor wire.

spark plug wire

Remove the spark plug wire.

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Engine Removal (continued)

Remove the 4 engine mounting bolts, 2 front and 2 rear.

Remove chain by way of master link.

Remove engine from kart