DAZON

SERVICE MANUAL

Raider Classic 150S/D

Oil-Cooled&Internal Gearbox

EEC APPROVED ON ROAD

FOREWORD

This service manual has been specially prepared to provide all the necessary information for the proper maintenance and repair of the **RAIDER CLASSIC 150 (EEC-approved for on-road use).**

The **Buggy** fits the needs of a wide variety of buggy users above 16 years old. Those who will service this **Buggy** should carefully review this manual before performing any repair or service.

All information, illustrations, photographs and specifications contained in this manual are based on the latest product information available at the time of publication. Due to the improvements or other changes, there may be some discrepancies in this manual. Therefore, if the newest information is requested in future, please contact the local distributor.

Distributors reverse the right to make production changes at any time, without prior notice or incurring any obligation to make the same or similar changes for the vehicles previously built or sold.

CONTENTS

1. General Information

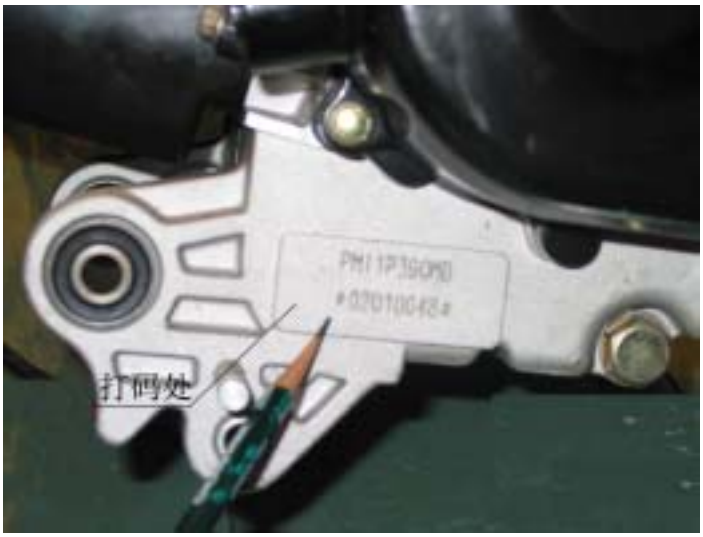
1.1 Model Identification

1.1.1 Frame Number

The frame number or VIN is stamped under the seat on the frame cross member and stuck behind the seat.

1.1.2 Engine Number

The engine number is located on the lower front left side of the engine case.



1.2 Fuel and Oil Recommendations

Be sure to use the specified fuel and oil

1.2.1 Fuel

Please use the gasoline of SAE 90# or above.

Also we recommend you to use the unleaded gasoline.

1.2.2 Engine Oil

Please use the high-quality engine oil of SAE 10w/30SF.

1.3 Break-in Procedure

For your first 2 hours of riding, don't exceed 2/3 throttles.

Vary the engine speed for the first 5 hours.

Never hold the engine at full throttle for long periods of time.

1.4 Specifications

DIMENSIONS	**SINGLE-SEAT / DOUBLE-SEAT**
Overall Length	2330mm / 2300mm
Overall Width	1310mm / 1460mm
Overall Height	1425mm / 1425mm
Wheelbase	1475mm / 1520mm
Ground Clearance	200mm
VIN	Accord with GMVR A01-01
Statutory Plate& Safety Labels	Accord with GB 7258-1997

ENGINE	
Model	DZ1P57QMJ
Type	Oil-cooled, single cylinder, 4-Stroke
Engine Capacity	150cc
Displacement	149.6ml
Bore X Stroke	57.4mm X 57.8mm
Max Power	7.0kw or 7000r/m
Max Torque	10.0N.m or 6500 r/m
Idle Speed	1700 ± 100 r/m
CO Emission	7.0g/km
HC Emission	1.0g/km
Fuel Type	SAE 90# or above (unleaded)
Lubricate Oil Type	SAE 10W/30SF
Lubrication	Force & Splash
Cooling	Oil-cooled
Ignition	C.D.I.
Starting	Electric
Spark Plug	C7HSA (NGK)
Spark Plug Gap	0.6~0.7mm
Transmission	Chain Transmission
Gearbox Transmission Ratio	F.:7.8:1 ; B.:11.297:1
Compression Ratio	9.5 ± 0.1 : 1
Carburetor	MIKUNI BS 24-1005
Absorber	Normal (in 10^5 times of experiments)

CAPACITIES	
Front/ Rear Tire Load Coefficient	36
Front/ Rear Tire Speed Level	L
Fuel Tank	7.0L, 130kpa (no leakage in experiments)
Engine Oil	1000ml
Gear Oil	200ml
Starting Time	⩽15s
Climbing	⩾20%

Top Speed	60kmph
Tachometer	33~40km/h (meter scale: 40km/h)
Turning Radius	3m / 3.5m
Acceleration Noise Level	≤80dB(A)
Horn	DL80-90 12V 3A 105dB, 93<dB (A) <112
Headlight	12V 35W/35W
Headlight High Beam Intensity	Accord with laws & regulations
Taillight	12V 21W /5W
Turning Light	12V 10W
License Light	12V 5W
Battery	12V 8Ah
Anti-theft Lock	≥200N m
Rearview Mirror	Accord with laws & regulations

CHASSIS

Front/Rear Brake	Hydraulic disc, foot control
Front Wheel Brake Force	764N / 1117N
Rear Wheel Brake Force	1000N / 1176N
Parking Brake	Hydraulic disc, hand control
Braking Distance	≤ 7 m@30km/h
Front Tire	20.5 X 8.0–10
Rear Tire	20.5 X 8.0–10

PRESSURE

Front Tire	175kPa
Rear Tire	200kPa

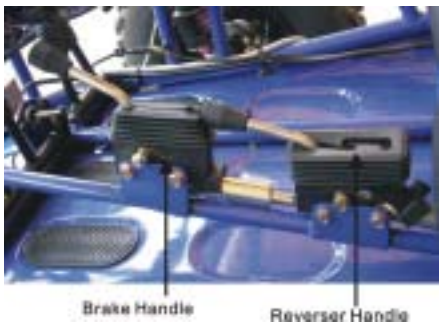
WEIGHT

Net Weight	219kg / 241kg

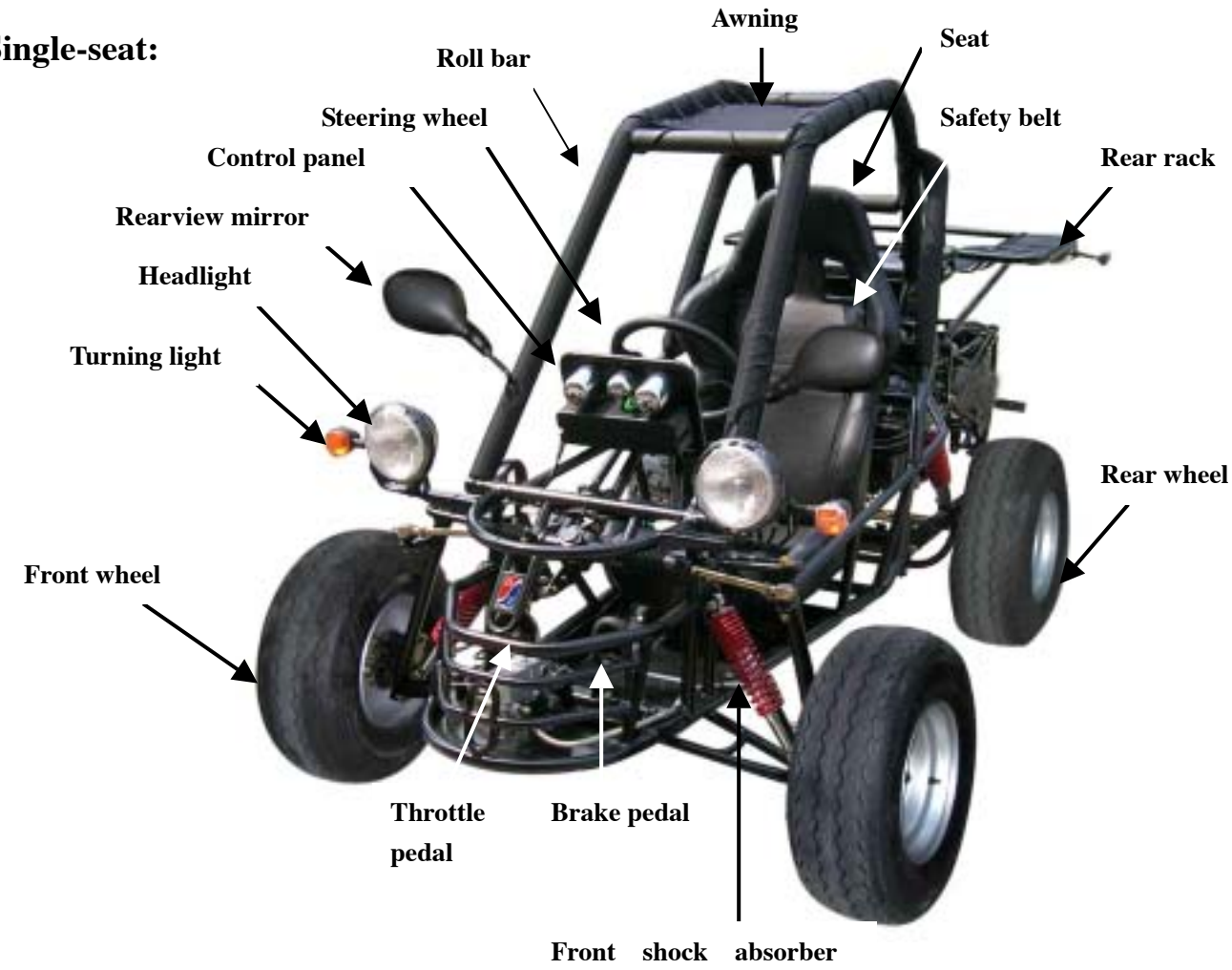
* The specifications are subject to change without prior notice.

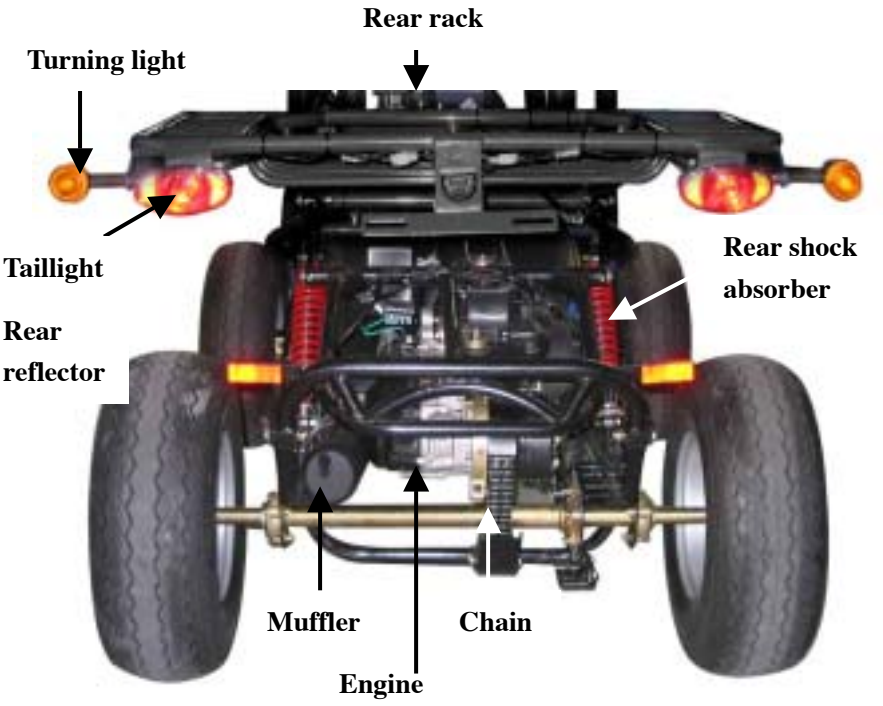
1.5 Location of Parts

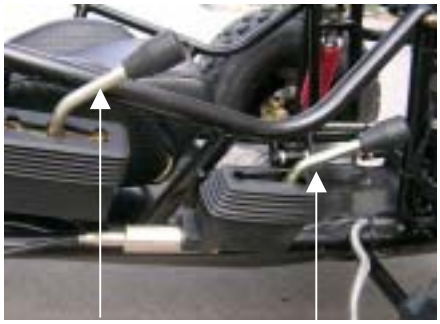
Double-seat:



Single-seat:







* Please demand for a copy of the Parts Book from your dealer and locate each component location.

2. Periodic Maintenance and Tune –up Procedures

2.1 Periodical Checks and Services

The maintenance intervals in the following table are based upon average riding conditions.
Riding in unusually dusty areas requires more frequent services.

Time of Service / Items	Initial Service (First Week)	Monthly	Quarterly	Yearly
Tire Pressure/Wear	I	I		
Brake Performance	I	I		
Bolt Tightness	I	I		
Air Cleaner		C	C	I
Carburetor	I	A		C
Spark Plug			C, A	
Drive Chain	I	I	C, A, L	
Brake Fluid			I	
Replacement Of Gearbox Oil		I	R	
Chassis		C, I	L	
Fuel Switch/Fuel Tank				C
Chassis	I		I	
Engine Oil		R		
Valve Clearance Of Engine			A	

Notes: A: Adjust; C: clean; I: inspect, clean or replace if necessary; L: lubricate; R: replace.

2.2 Maintenance and Tune-up Procedures

This section describes the servicing procedures of every item in the Periodic Maintenance Intervals Table above.

2.2.1 Spark Plug

Clear up the carbon around the spark plug to prevent it from dripping into the cylinder when removing the spark plug.

Remove the spark plug:

a) In general, it should be carried on after the engine has cooled down;
b) If the spark plug is too tight to remove, spray some rust inhibiter on The spark plug washer and the thread part; after the inhibiter has soaked the washer and thread part, rotate the spark plug;
c) Clear up the filth and carbon accumulation on the spark plug with a steel brush or a blade;

d) Inspect the spark plug gap (in general, it should be about 0.6 - 0.7 mm.);
e) When the carbon accumulation and wear of the spark plug are too serious, replace the spark plug with a new one of the same specification.

2.2.2 Tire Pressure / Wear

Check the tire pressure before each of your driving.
The tire pressure is very important for the riding stability.
Specifications: Front Tire: 175kpa
Rear Tire: 200kpa

2.2.3 Brake Performance

a) Always check if there is plenty of brake fluid in the brake fluid reservoir;
b) Check if the front/rear brake pad is in good condition;
c) Check the brake rotor for abnormal wear.

2.2.4 Air Cleaner

Clean the air cleaner quarterly, or more often when driving in dusty conditions.
If the air cleaner is clogged with dust, its performance will be severely decreased; even the engine damages will probably be caused.

Inspection and Cleaning of Filters

- **Paper Filter**

a) Remove the filter from its housing;
b) Lightly tap the filter on an object to knock out the dust;
c) Replace the filter element if it is wrinkled or torn.

- **Foam Filter**

a) Remove the filter out of its steel cage;
b) Wash the filter in non-flammable cleaning solvent;
c) Submerge the filter in oil and squeeze it to remove excess oil;
d) Install the filter element back into the air box.

CAUTION

- Before and during the cleaning, inspect the element for tears; replace it if it's torn.
- Make sure that the element is seated properly and no foreign material can pass by it

2.2.5 Nuts and Bolts in Chassis

Inspect the nuts and bolts in the chassis during the first week and every month thereafter.
The nuts and bolts become loose normally after use, please check for the looseness regularly.

2.2.6 Tightening Torque Table

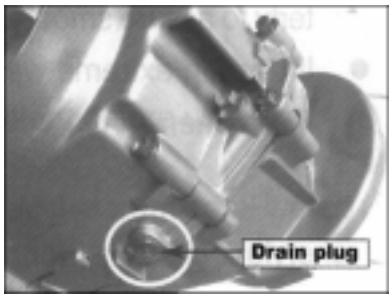
Bolt Diameter (mm)	Conventional marked bolt			8.8 marked bolt		
	N•m	Kg•m	lb-ft	N•m	Kg•m	lb-ft
4	1-2	0.1-0.2	0.7-1.5	1.5-3	0.15-0.3	1.0-2.0
5	1-4	0.2-0.4	1.5-3.0	3-6	0.3-0.6	2.0-4.5
6	4-7	0.4-0.7	3.0-5.0	8-12	0.8-1.2	6.0-8.5
8	10-16	1.0-1.6	7.0-11.5	18-28	1.8-2.8	13.0-20.0
10	22-35	2.2-3.5	16.0-25.5	40-60	4.0-6.0	29.0-43.5
12	35-55	3.5-5.5	25.5-40.0	70-100	7.0-10.0	50.5-72.5
14	50-80	5.0-8.0	36.5-58.0	110-160	11.0-16.0	79.5-115.5
16	80-130	8.0-13.0	58.0-94.0	170-250	17.0-25.0	123.0-181.0
18	130-190	13.0-19.0	94.0-137.5	200-280	20.0-28.0	144.5-202.5

2.2.7 Fuel Switch (Petcock) Service

a) Periodically clean the petcock outside with the grease remover and water;
b) . Check for any leak or seeping fuel;
c) Replace the petcock if there is any leakage.

2.2.8 Final Gear Oil

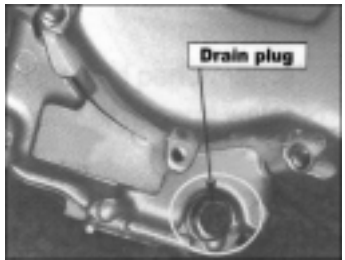
a) Inspect the final gear oil monthly and replace it quarterly.
b) Check the oil level: remove the oil level screw on the left rear engine case;
c) Drain out the oil: remove the drain plug at the rear bottom of the engine case;



Recommendation: before draining the final gear oil, please warm the engine for at least 10 minutes.

Notes: We recommend the Mobile 85w/90 gear oil for the final drive case. However, in extreme cold weather conditions, the vehicle may becomehard to start, so we advise some lighter viscous oil, such as 75 wt or the equivalent motorcycle transmission fluid.

Gear Oil Capacity	0.2L 85w/90

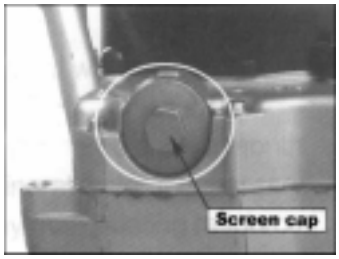


2.2.9 Engine Oil

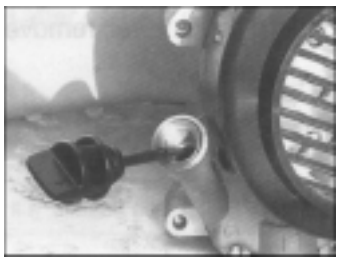
Inspect the engine oil before every riding and replace it monthly.

a. Remove the drain plug from the left side bottom of the engine, and drain out the left oil into an oil pan for disposal;

b. Remove the large cap on the left bottom of the engine, and remove the screen;



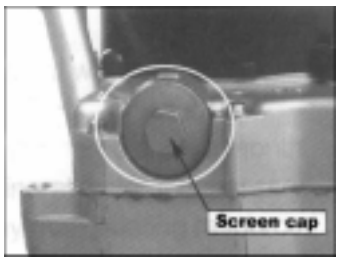
c. Wash the screen with some cleaning solvent and reassemble it; make sure that the O-ring is still in good conditions;



d. Refill the engine with the SAE10W/30SF engine oil and run the engine for 5 minutes;

e. Check the oil level on the filler cap stick to assure that it's proper;

f. Screw back the large cap.



2.2.10 Chassis

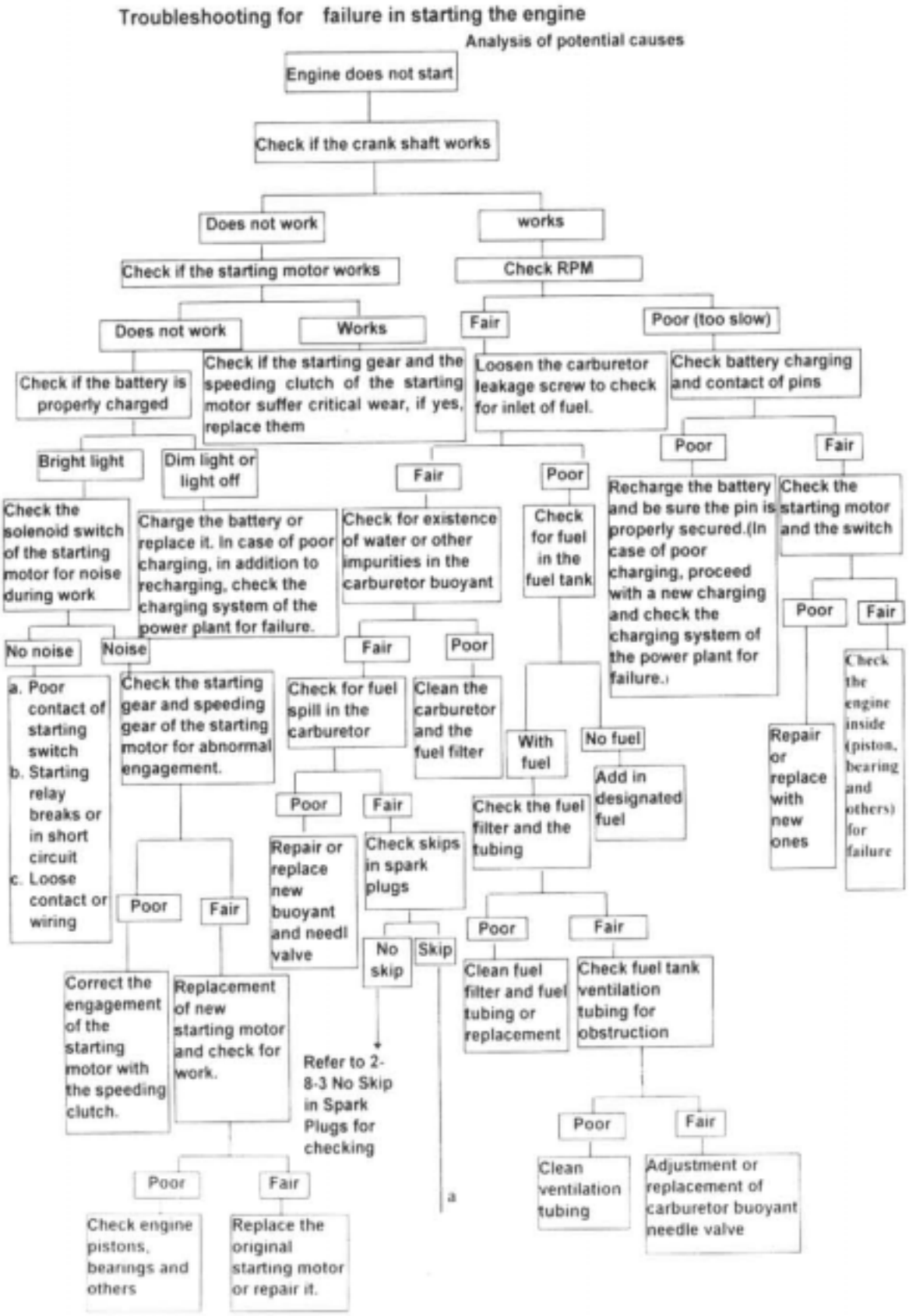
Inspect, clean or replace it monthly if necessary and lubricate it quarterly.

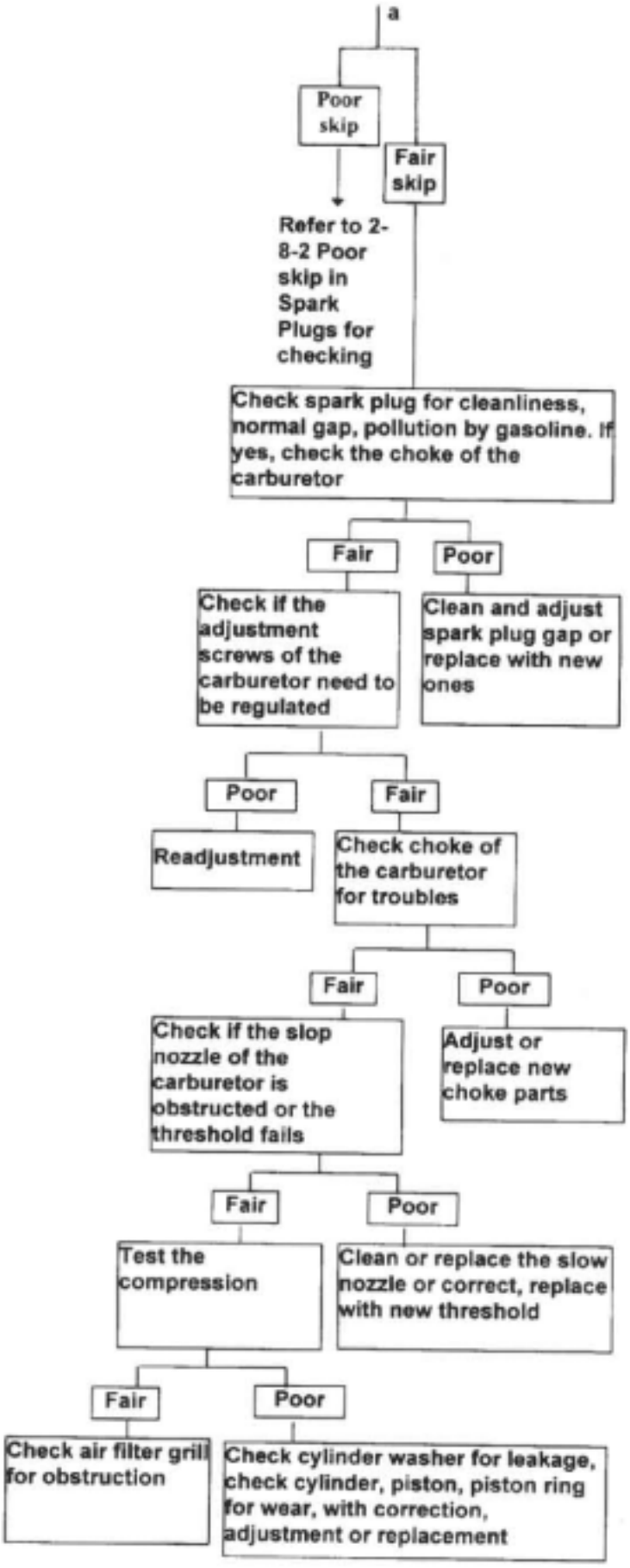
a. Grease the chassis bushings and bearings with some grease quarterly to make sure that they can operate smoothly and enjoy an extended life;

b. If it's used in extremely wet, muddy or dusty conditions, we recommend you to service it more often.

3. Engine

- **Troubleshooting for Failure in Starting Engine**




a
Poor skip
Fair skip
Refer to 2-8-2 Poor skip in Spark Plugs for checking
Check spark plug for cleanliness, normal gap, pollution by gasoline. If yes, check the choke of the carburetor
Fair
Poor
Check if the adjustment screws of the carburetor need to be regulated
Clean and adjust spark plug gap or replace with new ones
Poor
Fair
Readjustment
Check choke of the carburetor for troubles
Fair
Poor
Check if the slop nozzle of the carburetor is obstructed or the threshold fails
Adjust or replace new choke parts
Fair
Poor
Test the compression
Clean or replace the slow nozzle or correct, replace with new threshold
Fair
Poor
Check air filter grill for obstruction
Check cylinder washer for leakage, check cylinder, piston, piston ring for wear, with correction, adjustment or replacement

- **Troubleshooting for Failure in Starting Carburetor**

Reason Analysis: After the tryout, the carburetor has been exposed in the air for a long period, so that a layer of mucous membrane has formed and blocked the main jet. As a result, the oil can't flow smoothly and the engine starting becomes difficult, or the engine stops soon after starting.

Solvent:

a. Check if there is any damage or leakage on the pressurized tube of oil cock;

Pressurized Tube

b. Clean the carburetor and readjust the idle speed according to the steps below:

a) Open the connecting tube between the air cleaner and carburetor.

Connecting Tube

b) Spray a little carburetor cleanser into the carburetor.

Spray Cleanser

c) Start the engine and run for a while, then quickly step on the throttle pedal for several times .If the engine works well, assemble the connecting tube; otherwise, repeat the steps above several times.

Readjust the idle speed if it is unstable.

3.1 Cylinder

3.1.1 Cylinder Removal

The removal can be done on the vehicle body.

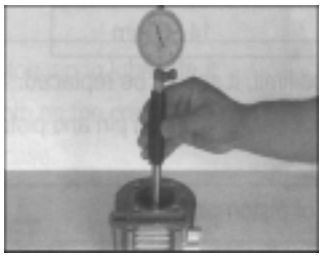
a) Remove the cylinder head;
b) Remove the cylinder;
c) Remove the cylinder gasket and bolts;
d) Clean the cylinder gasket.

⚠ CAUTION

- Don't damage the bond area of the cylinder.
- Don't drop sundries like the cylinder gasket material into the crankcase.

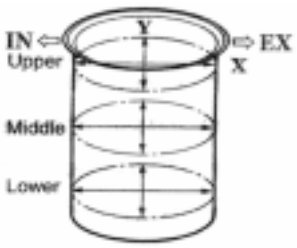
3.1.2 Cylinder Inner Wall Wear Inspection

Use a bore diameter dial gauge to measure the degree of wear.



The measuring point is divided into three sectional planes in the axial direction: upper, middle, lower. Measure every plane each time on the mutually perpendicular directions (X, Y).

The least measured dimension is the cylinder bore, the data measured at the most upper position is the largest diameter, and the data measured at the lower position is the smallest diameter. At the same cross section, measure the difference of diameter between the two points mutually perpendicular, which is the circularity of the cylinder.



⚠ CAUTION

- In order to make the measuring point perpendicular with the bore axis of the cylinder, and to ensure the precision of the measurement, the bar of the gauge can be slightly swung in the direction of the gauge bar, and take the smallest reading number as the result.

In the situation without a dial gauge, a feeler gauge can be used to make the relativity measurement. Put a new piston into the cylinder, and use the feeler gauge to measure the gap between the piston skirt and the cylinder wall, and then figure out the abrasion loss of the cylinder.

If the circularity of the cylinder exceeds the limit, a cylinder-reboring machine should be used to re-bore the cylinder, and to enlarge its diameter by 0.50mm or 1.00mm, then fit the piston and piston ring whose sizes are also enlarged.

If the wear is too severe and cannot be reworked, a new cylinder should be installed.

Cylinder bore	57.4mm
Cylindricality	0.05mm
Circularity	0.05mm

3.2 Crank Connecting Rod Mechanism

3.2.1 Piston Set

- Inspection and Service of Piston Pin

a) Insert the piston pin horizontally into the pinhole of the piston, and inspect the clearance between the piston and piston pin. If the free play is too much, the worn condition of the piston pin and pinhole of the piston must be inspected respectively.

Service limit	0.02 mm

b) Measure the external diameter of the piston pin. If the result is less than the service limit, it should be replaced.

Service limit	14.96 mm

c) After replacement, the clearance between the piston pin and pinhole must comply with the requirement.

d) Measure the inner diameter of the piston pin. If the result is more than the service limit, it should be replaced.

Service limit	15.04 mm

e) After replacement, the clearance between the pinhole of the piston and the piston pin must comply with the requirement.

3.2.2 Inspection and Service of Piston Rings

a) Inspect if there is a flaw, serious wear, or serious conglutination on the piston ring; if there is, it should be replaced.

b) If the lateral clearance and notch clearance of the piston ring are too large or too small, malfunction may be caused. So it must be measured.

c) Measure the clearance of the piston ring in the piston ring groove. This clearance is the piston ring's lateral clearance.

First ring	0.09 mm
Second ring	0.09 mm

3.2.3 Inspection of Connecting Rod End

a) Put the piston ring and bearing into the connecting rod end; inspect the tightness degree of the piston pin in connecting rod end.

b) Measure the inner diameter of the connecting rod end.

Service limit	15.06 mm

c) When the abrasion of the bore exceeds the limitation, it should be replaced.

3.2.4 Piston Ring Set

Before setting up, apply some oil on every piston ring, and then enlarge the piston rings. AT the same time, cover them on the piston and move forwards gradually until the piston rings fall into the ring groove.

3.2.5 Installation of Piston Ring

a) Remove the gasket attached to the crankcase.

b) Mount the piston onto the small end of the connecting rod.

- The top of the piston with “IN” mark should be mounted towards the direction of the inlet port (If the mark is “EX”, it should be mounted towards the direction of the exhaust port.)

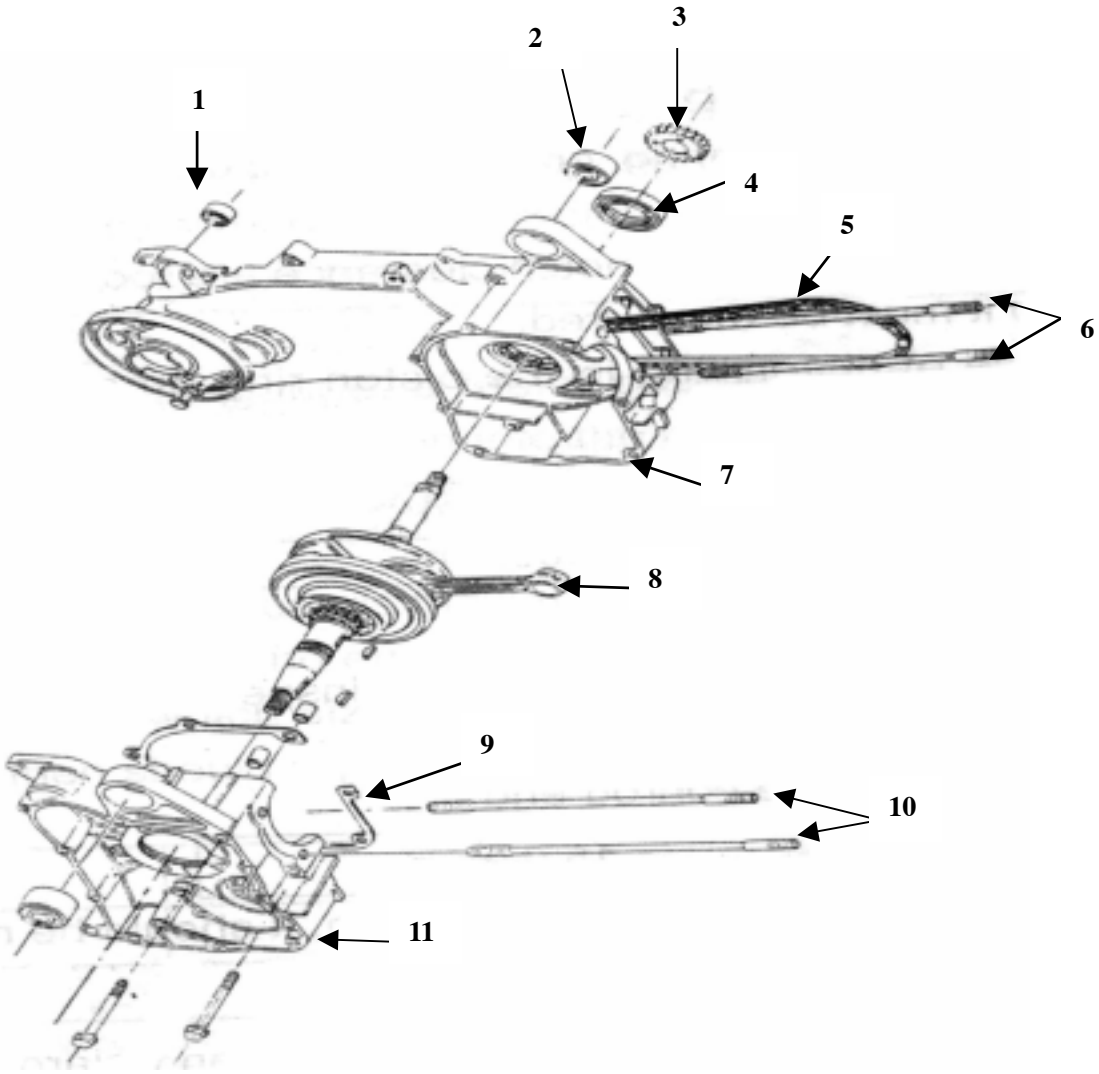
c) Mount the piston pin and piston pin clip.

- Apply some oil on the piston pin to lubricate it.
- Cover a piece of cloth on the crankcase port to avoid the piston pin clip from dropping into the crankcase.

3.2.6 Crank Connecting Rod Set

The connecting rod is the component that links the piston and crank.

The picture shows the structure and assembly relations of the crank connecting rod component.

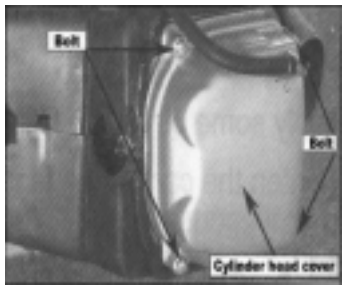


1. Shock Absorber Cover, Rear.
2. Shock Absorber Cover, Front.
3. Starter Gear
4. Oil Seal 19.8×30×5
5. Timing Chain
6. Stud Bolt M8×208
7. Crankcase Body, Left
8. Crankshaft
9. Crankcase Paper Washer
10. Stud Bolt M8×198
11. Crankcase Body, Right

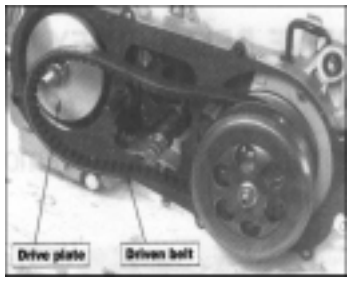
3.3 Crankcase and Crankshaft

3.3.1 Removal

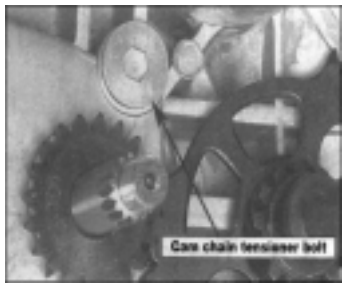
a) Remove the engine, cylinder cover, cylinder and piston one by one.



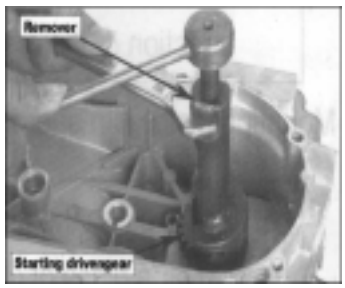
b) Remove the drive plate, driven plate, AC generator, starting motor and oil pump.



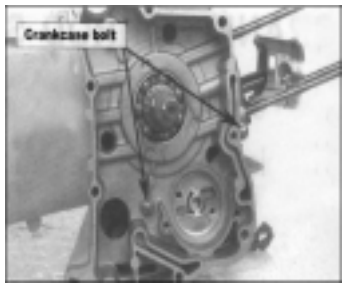
c) Remove the cam chain tensioner bolt and cam chain tensioner.



d) Use the special tools to remove the starting driven gear.

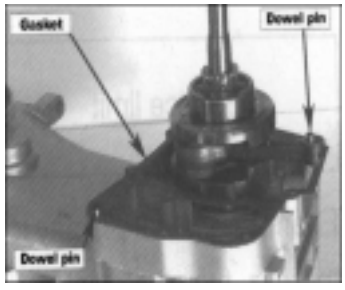


e) Remove the crankcase positioning bolts;
Separate the right crankcase and the left crankcase.



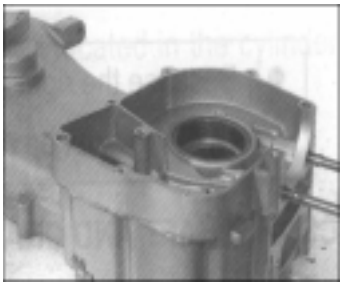
The joint face can't be damaged.

g) Remove the gasket and the dowel pins.

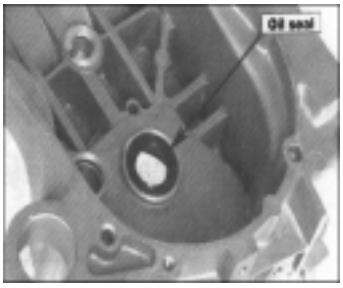


h) Remove the crankshaft from the crankcase;
Take out the cam chain.

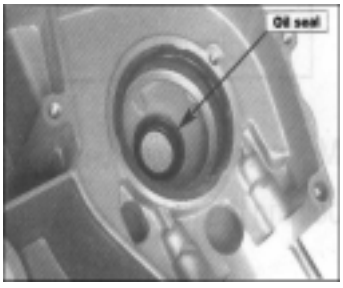
i) Clean up the gasket on the crankcase joint face;
Pay attention not to damage the joint face.



j) Remove the oil seal from the left crankcase.



j) Remove the oil seal from the right crankcase.



3.3.2 Inspection of Crankshaft and Crankcase

Replace the whole set of the crankshaft if any serious wear is found while inspecting.

a) Measure the axial clearance of the big end of the connecting rod.
When measuring, make one side of the connecting rod big end close to the crank, and insert the feeler gauge between the other side and crank, and get the correct end play.

Service limit	0.55 mm

b) Measure the radial (X, Y) clearance of the big end of the connecting rod.

Service limit	0.05 mm

c) Measure the main shaft jump of the crankshaft.
If the crank jump is too much, it will cause the engine to shake abnormally, and shorten the life of the engine. So it must be examined carefully when inspecting.

Service limit	0.10mm (A = 90)
	0.10mm (B = 105)

e) Examine if there is any looseness or unusual sound when the crank journal bearing turns; If there is, the whole set should be replaced.

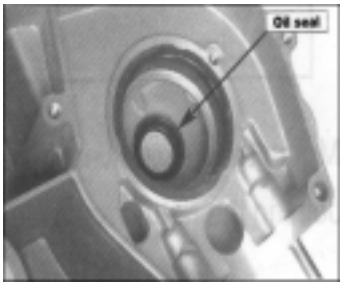
f) Inspect if the joint face of the crankcase is smooth and clean; Notice if it will affect the sealing performance between the left and right crankcase while reassembling.

g) After the above inspection, use the oilstone to furnish the crankcase if it has some surface damages; Replace the cover if the damages are too severe.

- The right and left crankcase axle hole must be concentric, so generally they must be replaced at the same time.

3.3.3 Installation of Crankshaft and Crankcase

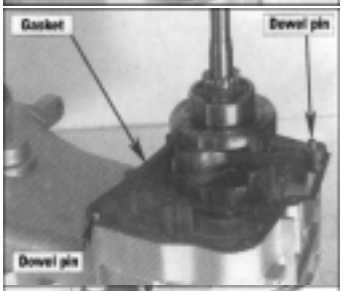
a) Mount the crankcase oil seal.



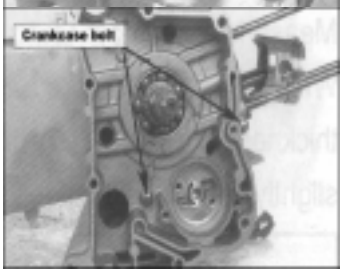
b) Put the cam chain and crankshaft into the left crankcase.

- Pay attention to avoid the cam chain damaging the oil seal.

c) Mount the new dowel pins and gasket on the left crankcase; Join the right crankcase and left crankcase together

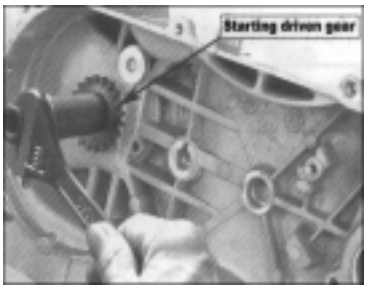


d) Tighten the crankcase positioning bolts.



Tightening torque	1.98 lbs· m

e) Mount the starting driven gear.

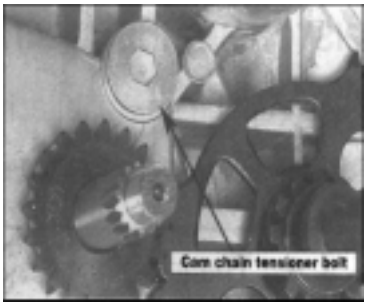


f) Mount the cam chain tensioner;

Mount the new O-ring on the cam chain tensioner bolt;

Apply some oil on the O-ring;

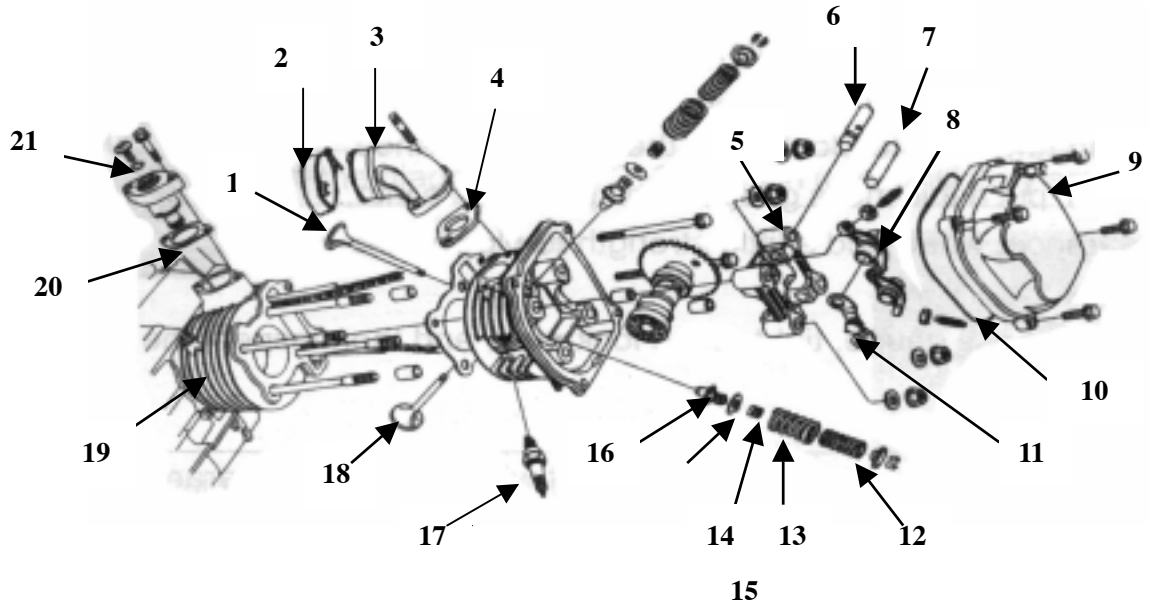
Tighten the cam chain tensioner bolt.



- The o-ring must be mounted in the groove.

3.4 Valve Mechanism

The picture shows the common valve train of a four-stroke engine. This is a kind of overhead valve; its intake port, exhaust port, camshaft are all located in the cylinder head; the valve bottoms up over the combustion chamber.



1 Exhaust Port
2 Clamp, Intake Pipe
3 Intake Pipe
4 Heat Insulating Washer
5 Camshaft Carrier, Outer
6 Rockshaft, Intake Port
7 Rockshaft, Exhaust Port
8 Rocker Arm
9 Cover, Cylinder Head
10 Sealing Washer, Cylinder Head Cover
11 Limit Board
12 Valve Spring, Inner
13 Valve Spring, Outer
14 Oil Seal, Valve

15 Valve Spring Holder, Outer
16 Guide Pipe, Valve
17 Spark Plug
18 Intake Port
19 Cylinder
20 Washer
21Chain Adjustor

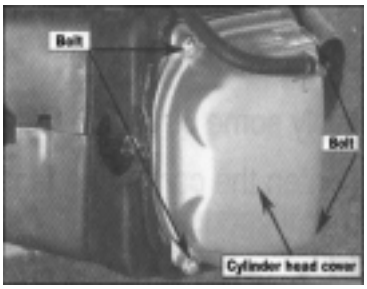
3.4.1 General Introduction

The four-stroke engine completes its four strokes with one piston stroke. The four strokes: Intake stroke, Compression stroke, Expansion stroke, and Exhaust stroke.

3.4.2 Valve Clearance Adjustment

The valve clearance is an important technical parameter. Make sure that the valve can closely tightened under any conditions, especially when the engine is overheated; there must be certain clearance kept when the valve is in the cold condition. This clearance is called the valve clearance. When the engine is running, the valve clearance should be neither too big, nor too small. So the valve clearance adjustment is an important procedure in the valve maintenance.

a) Remove the cylinder head cover.

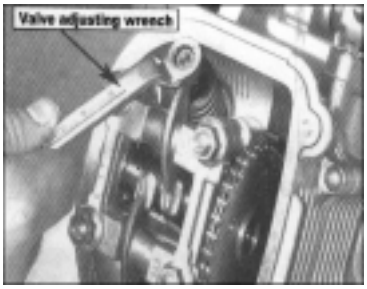


- Inspection and adjustment must be done in cold conditions (below 35°C).

b) Turn the cooling fan clockwise until the mark of the timing drive sprocket on the camshaft is at the top dead center, and the "T" symbol (or other mark) of the magneto flywheel aligns with the crankcase mark.

- The crankshaft should co-rotate; otherwise the exhaust port may not be adjusted.

c) When adjusting, loosen the lock nuts; adjust the bolts with a valve-adjusting wrench; if turning clockwise, the valve clearance decreases; and if turning counterclockwise, the valve clearance increases.



d) Then, put a feeler gauge with the specific size between the valve and rocker to check for correct clearance.

e) Take out the feeler gauge; tighten the lock nuts, and then inspect the valve clearance again.

- Sometimes when tightening the lock nuts, it will change the clearance. So it must be rechecked for the proper clearance.

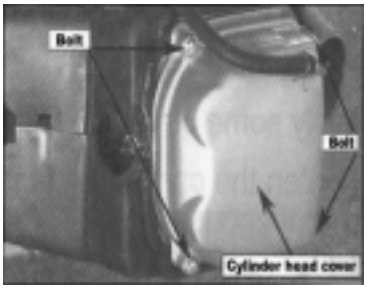
Valve clearance	0.06~0.07 mm

3.5 Camshaft

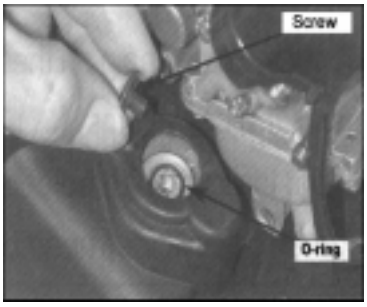
The camshaft is a main driving unit of the valve train. There are the air inlet cam, the exhaust cam, and the cam journal on the shaft. It controls the intake and exhaust valves to open and close at the correct time. The camshaft wear will affect the engine performance and cause excessive noise.

3.5.1 Removal

a) Loosen the valve cover bolts and remove the cover.



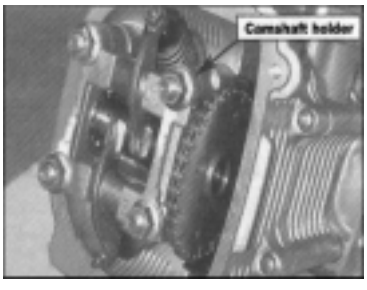
b) Remove the cam chain tensioner screw and the O-ring.



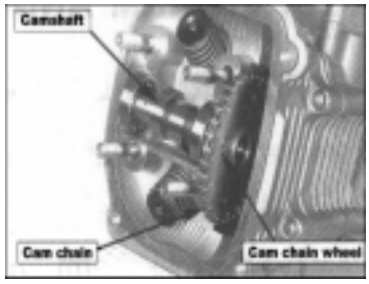
c) Tighten the cam chain tensioner-adjusting bolt clockwise.

d) Turn the flywheel counterclockwise to make the "T" mark on the flywheel align with the mark on the crankcase. When the hole on the cam chain (timing drive chain wheel) is up, it is the top dead center position.

e) Remove the cylinder head positioning bolt;
Remove the camshaft holder bolt cap and washer.



f) Remove the camshaft holder and dowel pin;
Remove the cam chain wheel from the cam chain, and remove the camshaft.



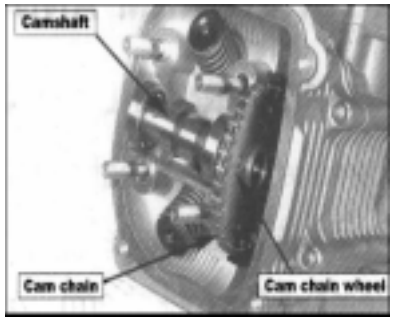
3.5.2 Inspection

a) Inspect the camshaft bearings for play. If there is any play, replace the whole set;
b) Inspect the cam surface for damages;
c) Measure the height of the cam.

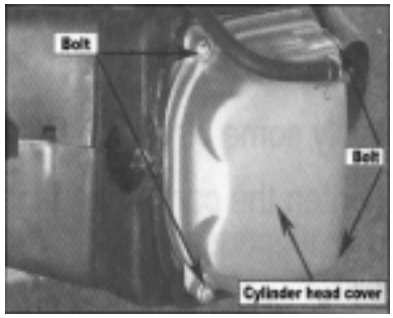
Inlet Cam	25.96 mm
Exhaust Cam	25.815 mm

3.5.3 Installation

a) Rotate the flywheel to align the "T" mark on the flywheel with the camshaft mark. At this time, the round hole on the cam chain wheel should be up, and the left and right should be parallel with the cylinder head (the lobes of the camshaft are down).



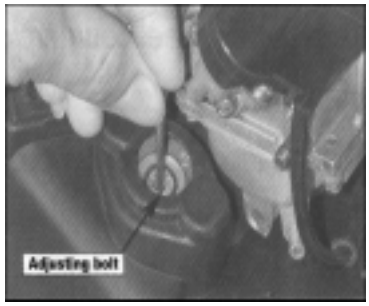
b) Install the camshaft on the cylinder head;
Mount the cam chain on the cam chain wheel;
Install the dowel pins.



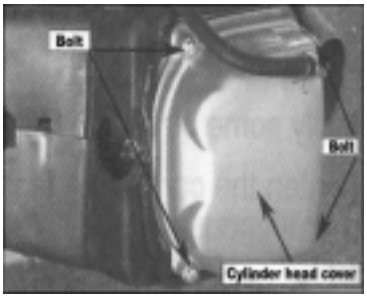
b) Mount the camshaft holder, washer, and nut on the cylinder head;
Tighten the cylinder head bolt and nut.

- While installing, first apply some oil on the thread part of the camshaft holder bolt.
- The camshaft nuts should be tightened diagonally in a 3-step process.
- After installing, adjust the valve clearance.

c) Turn the cam chain tensioner adjusting bolt anticlockwise and release the lock;
Apply some oil on the new O-ring;
Mount and tighten the cam chain tensioner cover bolt.



- The o-ring must be mounted properly in the groove.



e) Replace the valve cover gasket;
Mount the cover.

- The valve cover gasket must be mounted properly in
- the groove.

f) Tighten the valve cover-positioning bolt

3.6 Rocker Arm and Rockshaft

3.6.1 Removal

a) Remove the camshaft holder;
b) Take out the rockshaft by removing the bolt;
c) Remove the rocker arm.

3.6.2 Inspection

a) Inspect if there is any abrasion or damage on the rocker arm and rockshaft or if the oil hole is clogged.

- If there is abrasion on the surface of the rocker arm, the camshaft should also be inspected.

b) Measure the inner diameter of the rocker arm. Service limit 10.10 mm
c) Measure the outer diameter of the rockshaft. Service limit 9.91 mm

3.6.3 Installation

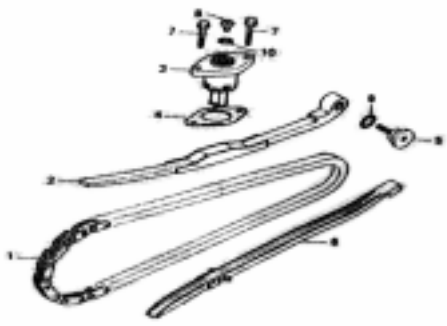
a) Read the "EX" mark on the camshaft holder, then mount the exhaust port rocker arm and the rockshaft.
b) Mount the inlet port rocker arm and rockshaft.

- Apply some oil on the rockshaft before mounting it on.

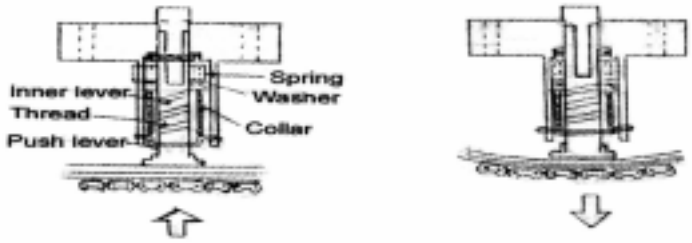
3.6.4 Cam Chain Tensioner

- The chain tensioner must be in good working order for the proper chain tension.

1.Cam chain 2.Tensioner
3.Lifter 4.Gasket
5.Pivot 6.Chain guide
7.Bolt 8.Screw pan
9,10 O-ring

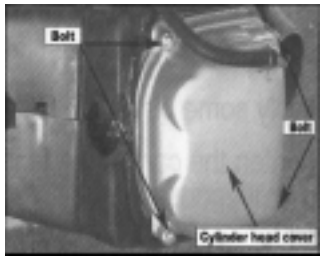


- The operational principle of the tensioner is as shown in the picture.



- As for the adjustment of the cam chain tensioner, turning clockwise is tightening, and turning anticlockwise is loosening.

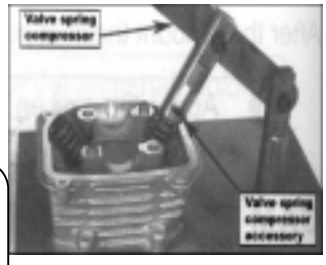
3.7 Valve and Valve Spring



3.7.1 Removal

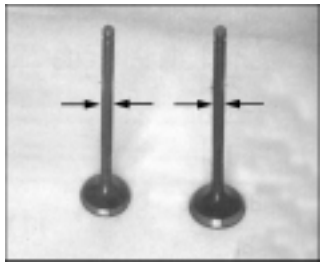
a) Remove the cylinder head.

b) Remove the valve cotter with the valve compressor,;
Remove in turn the upper spring race, valve spring, lower spring race, and valve stem oil seal.



c) Remove the valve from the other side.

- The removed parts should be placed properly in order. It's better to place the intake valve parts and exhaust valve parts separately.



3.7.2 Inspection

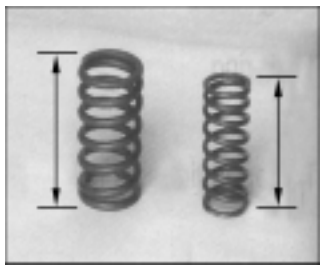
a) Inspect if the valve is bent or burned.

b) Inspect if the action is smooth between the valve and the valve guide.

c) Measure the outer diameter of the valve stem.

Service limit	4.9 mm

d) Measure the free length of the inner and outer valve spring.



Valve	Inlet Valve	Exhaust Valve
Inner Spring	31.2mm	31.2mm
Outer Spring	34.1 Mm	34.1 Mm

3.7.3 Installation

a) Mount the spring retainer and valve guide oil seal.

- It is recommended to replace the valve guide oil seal with a new one.

b) After applying oil on the valve stem, mount it into the valve guide.

c) Mount the inner and outer valve springs;

Mount the valve lock with a spring compressor.

- When mounting, the twisting direction of the inner and outer springs must be opposite, and can't be the same.

d) Tap the valve gently two or three times with a rubber hammer to make the valve and valve lock match well.

- Don't damage the valve.

3.8 Valve Guide

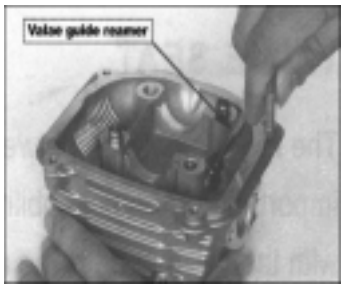
Carbon accumulation of the valve guide will make the valve move rough, causing the valve not to open or close properly.

Valve guide abrasion is one of the reasons that cause the exhaust pipe fuming white smoke.

3.8.1 Clean of Carbon Accumulation

a) Remove the valve and valve springs.

b) Clean the carbon accumulation with a valve guide reamer.



- Turn right when using the reamer, and do not push in or out directly with the reamer.

3.8.2 Measurement of Inner Diameter

Service limit	5.03 mm

a) Calculate the clearance between the valve stem and valve guide.(The inner diameter of the guide subtracts the outer diameter of the valve stem).

Valve	Inlet Valve	Exhaust Valve
Service Limit	0.08mm	0.10mm

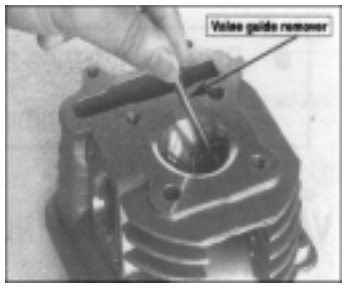
- When the abrasion of the valve guide exceeds the use limit, it should be replaced; after replacing a new valve guide, the valve retainer must be adjusted.

3.8.3 Replacement

a) Heat the cylinder head to 100 – 150 ºC.

- The cylinder head must be wholly and quickly heated to the specific degree, and can't be heated partly; otherwise it'll cause the cylinder head distortion.
- The temperature is very high, so two technicians are recommended.

b) Tap the valve guide out with a valve guide remover or the similar tool.



- Don't damage the cylinder joint face.

c) After tapping the valve guide, you need to trim it with a reamer.

- The reamer can only be turned right; do not push in or out directlv

d) Clean the cylinder head and eliminate the scraps generated while reaming.

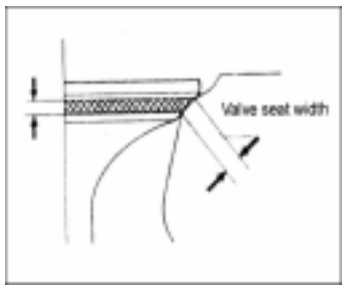
3.9 Valve Seat

The relative position between the valve seat and the working surface of the valve is very important for the valve to seal properly.

3.9.1 Width Measurement

a) Clean the carbon accumulation in the combustion chamber.

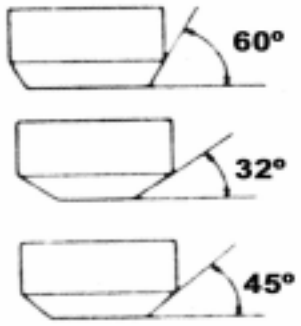
b) Measure the width of the valve seat with a vernier caliper.



Standard	1.0mm
Service Limit	1.8mm

When the abrasion causes the valve seat width uneven, too wide or too narrow, it will result in bad contact between the valve and valve seat, and can't seal tightly. At this time, it must be reamed with a customized valve seat-grinding cutter.

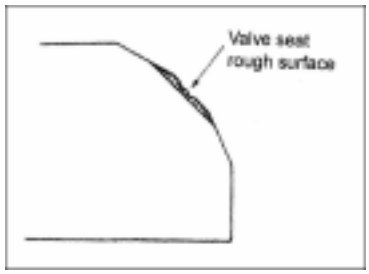
The valve seat-grinding cutter is the customized trimming tool for the valve seat, and it has three cutting angles: 32º, 45º, and 60º. While trimming, press the valve seat-grinding cutter to make the rotary motion with 40 - 50N force.



- Some oil must be applied on the valve seat-grinding cutter to eliminate scraps when trimming.

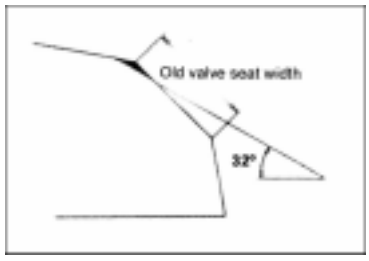
3.9.2 Finishing

a) Ream out the defects on the working surface with a 45º coarse tooth-grinding cutter.



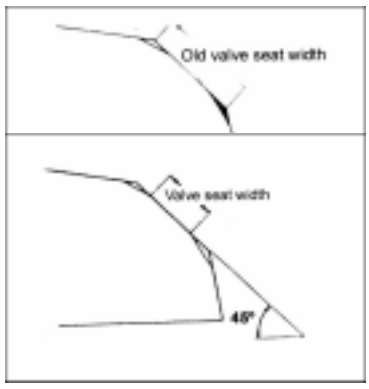
- Don't ream too much.

b) Ream the upper angle of the valve seat working surface with a 30º grinding cutter.



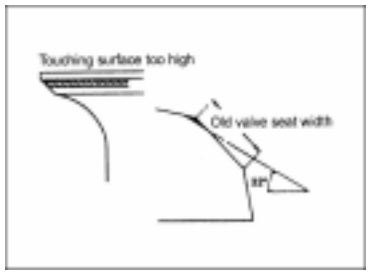
c) Ream the lower angle of the valve seat working surface with a 60º grinding cutter.

d) Ream the valve seat to the specific seat width with a 45º grinding cutter.

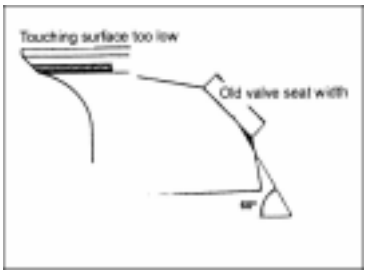


3.9.3 Touching Position Inspection

a) Apply a thin layer of the fluid on the valve seat, and put the valve on the seat rotate joint, then take out the valve and observe the contact surface on the valve face.

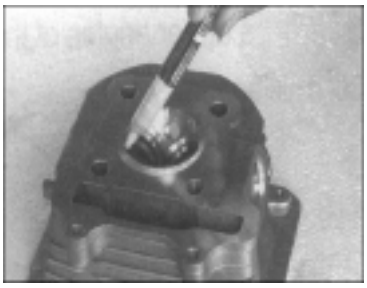


b) If the contact position is too high, then cut out some of the upper part of the valve seat with a 32º grinding cutter to reduce the working face of the valve seat; if the contact position is too low, then cut out some of the lower part of the valve seat with a 60º grinding cutter to raise the working face of the valve seat.



c) Finally, grind the working face of the valve seat to the specific width with a 45º grinding cutter.

If the valve seat still can't contact evenly with the valve after trimming, the valve should be revised or replaced.



3.9.4 Valve and Valve Seat Lapping

After finishing, the valve and valve seat should be lapped in order to make them seal properly.

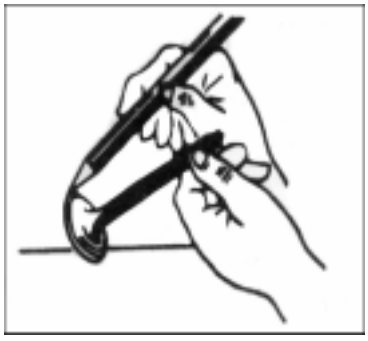
Spread a thin layer of the silicon carbide on the working bevel of the valve, and repeatedly rotate the valve suction cup to lap the valve and valve seat evenly until they match tightly.

- Before lapping, clean the valve, valve seat and valve guide.
- When lapping, don't use too much force.
- During lapping, don't drop any silicon carbide into the place between the valve lever and the valve guide.

3.9.5 Inspection of Valve and Valve Seat Air Impermeability

After lapping the valve and valve seat, the air impermeability of their joint surface should be inspected.

Method one: the same as the method of "valve seat contact position inspection".



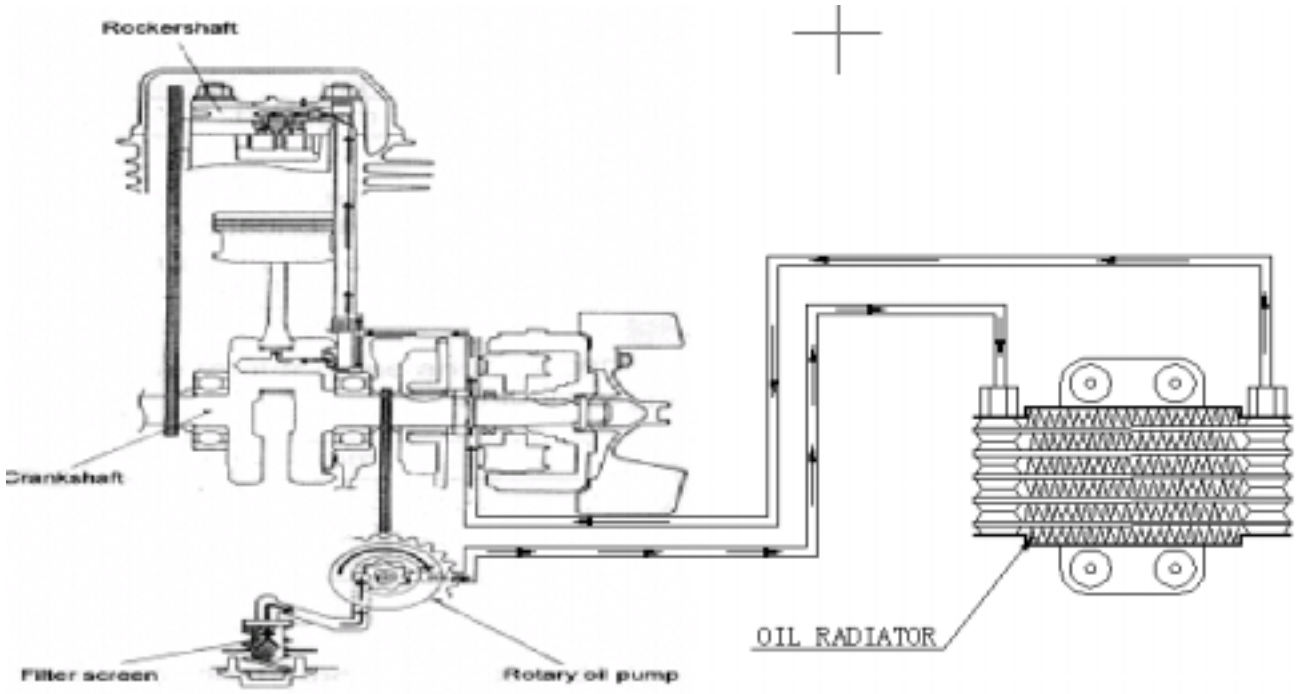
Method two: evenly draw several lines on the working surface of the valve with a pencil. Put the valve into the valve seat, if the lines are all broken after turning 1/8 - 1/4 rings, then it shows the air impermeability is good.

Method three: mount the valve on the cylinder head, and fill the inlet and exhaust vents with non-flammable solvent, and preserve for 5 minutes. If there is no leaking, the valve is seated correctly.

3.10 Lubrication System

3.10.1 General Introduction

The picture shows the functional diagram of the lubrication system.

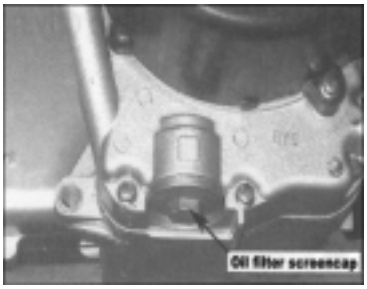


After the lubrication oil crosses the filter screen, it is pumped by the rotator oil pump; some of the oil goes into the big end of the connecting rod, and splashes on the cylinder wall and the small end of the connecting rod; all the other goes through the oil passages, such as the shaft neck of the camshaft, and splashes on the cam rockshaft and cam chain. The lubrication oil that falls back into the oil groove can be re-circulated.

3.10.2 Inspection and Replacement of Oil

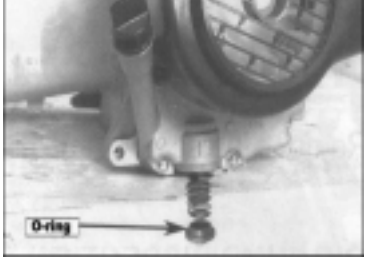
a) Tighten the dipstick;

Remove the oil filter screen cap and screen to let the oil flow out.



b) Step on the kick-starter for several times to drain out all the remaining oil;

Inspect if there is any damages on the screen and O-ring; if so, they should be replaced.



e) Install the oil filter screen and screen cover, and tighten them.

e) Supply the specified oil to the specified level.

Oil level	Disassembling	Replacing
	1.0 L	0.8 L

f) Start the engine and run for several minutes in the idle position to make sure there is no oil leakage.

g) Stop the engine and inspect if the oil level is proper.

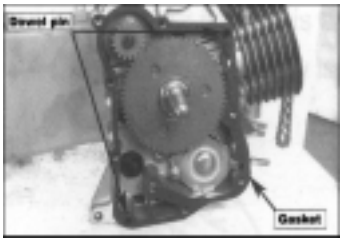
3.10.3 Rotary Oil Pump

The oil pump is the critical component of the lubrication system, so it should be maintained periodically, and should be replaced as a unit if damaged seriously

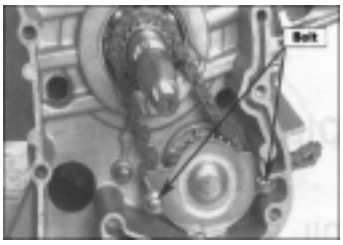
- **Oil Pump Removal**

a) Remove the flywheel of the magneto;
Remove the stator coil and trigger winding.

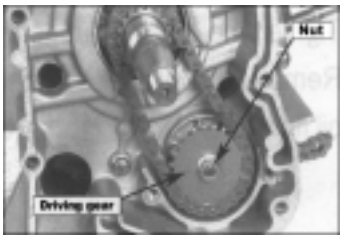
b) Remove the right crankcase cover bolts and right crankcase cover;
Remove the gasket and dowel pins.



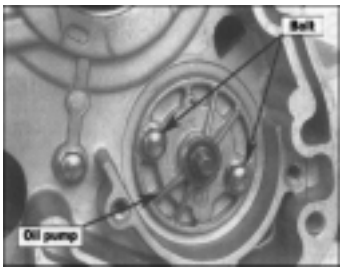
c) Remove the starting reduction gear and starting clutch;
Remove the oil pump partition plate positioning bolts and oil pump partition plate.



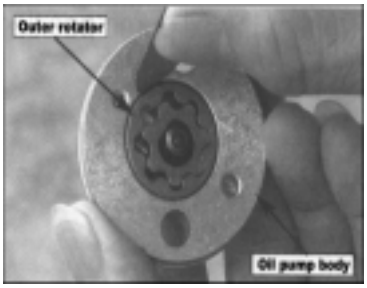
d) Remove the oil pump driving gear nut, drive gear and chain.



e) Remove the oil pump positioning bolts and oil pump assembly;

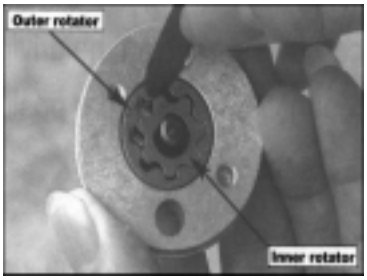


f) Remove the screws, and disassemble the oil pump.



- **Oil Pump Inspection**

a) Inspect the clearance between the oil pump body and outer rotator.



Service limit:	0.12 mm

b) Inspect the clearance between the inner rotor and outer rotor.

Service limit:	0.12 mm

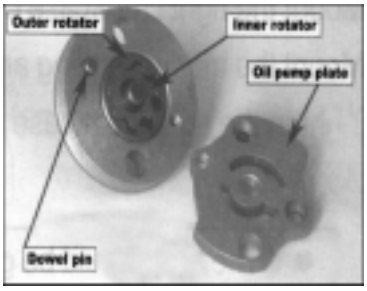
c) Inspect the clearance between the rotor plane and the oil pump.

Service limit:	0.20 mm

- If the inspection result exceeds the above stated service limit, the whole set should be replaced.

- **Oil Pump Assembly**

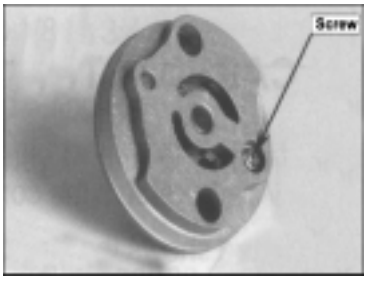
a) Assemble the inner and outer rotors of the oil pump, and mount the oil pump shaft.



- When assembling, align the unfilled corner of the oil pump shaft with the corner of the inner rotor, and then assemble.

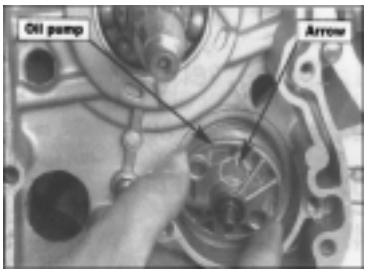
b) Mount the dowel pin;

After aligning the oil pump plate with the dowel pin, install the oil pump plate.



c) Tighten the oil pump plate screws;

After assembling, gently turn the oil pump shaft, and make sure the oil pump can turn smoothly.



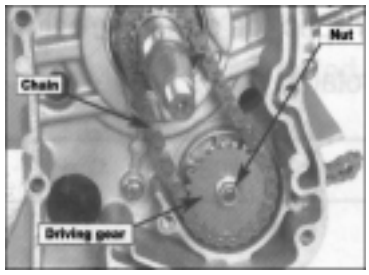
- **Oil Pump Installation**

a) Install the oil pump on the crankcase.

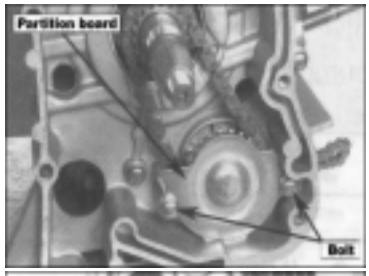
- Before installing, fill the oil pump with oil.
- When installing the oil pump on the crankcase, the arrow of the oil pump body must be upwards.

b) Tighten the oil pump positioning bolts.

b) Align the oil pump driving gear with the oil pump shaft unfilled corner, and then assemble the drive gear and chain.

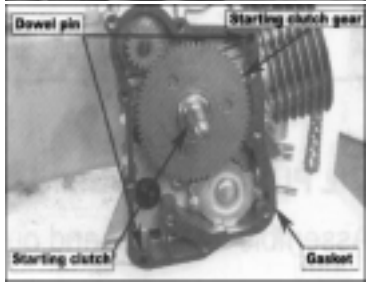


c) Install the partition board, and tighten the bolts.



d) Install the starting reduction gear and starting clutch;
Assemble the gasket and dowel pins.

e) Assemble the right crankcase cover-positioning bolt;
Assemble the trigger winding and stator coil;
Tighten the right crankcase cover-positioning bolt.



- The bolt should be gradually diagonally tightened in two or three steps.
- After finishing the installation, inspect for any oil leakage.

3.11 Fuel Supply System

3.11.1 Carburetor Idling Adjustment

- **Air Adjusting Screw Adjustment**

Step one: Turn on the air adjusting screw in, then turn out by the prescribed number of turns;

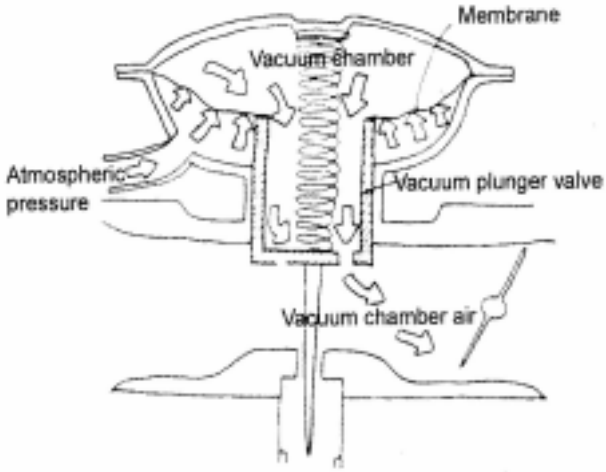
Turn out numbers of turns	3 1/8 +/- 3/4

Step two: Adjust the throttle adjusting screw to the prescribed idle rpm;

Step three: Adjust the air adjusting screw slightly to find the highest position of the rpm.;
Add throttle quickly and gently (the rpm is from low to high), and return the throttle immediately, and then observe for 10 to 15 minutes to check if the idle remains the same.

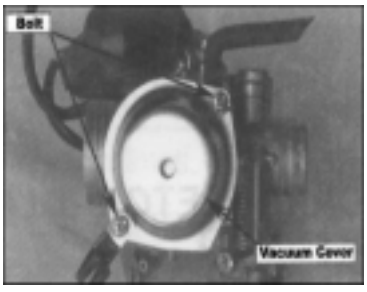
3.11.2 Vacuum Chamber

The picture shows the structure of the vacuum chamber of the CV carburetor.



- **Removal**

a) Remove the body cover;
Remove the automatic choke lead wire.
b) Loosen the fuel drain bolt, and drain the fuel in the float chamber.
c) Remove the fuel line and the vacuum pipe.
d) Loosen the throttle cable-adjusting nut and positioning nut;
Remove the throttle cable.
f) Loosen the carburetor air inlet vent clip and the inlet manifold clip;



Remove the carburetor;

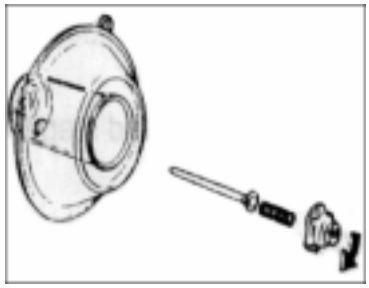
Remove the vacuum cover bolt and vacuum cover.

Notice: Move slowly to prevent the spring from ejecting.

g) Take out the spring, the vacuum membrane and the plunger;

Press down the holding clamp of the needle valve top, and turn left to take out the clamp;

Take out the spring and needle valve.



- Don't damage the vacuum membrane.

- **Inspection**

a) Inspect if the needle valve is worn or not.

b) Inspect if there are damages on the vacuum membrane.

c) Inspect if the plunger is damaged.

- **Installation**

a) Assemble the plunger and vacuum membrane into the carburetor body.

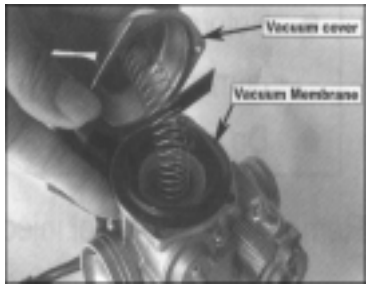
b) Push the plunger upwards in the direction of the vacuum chamber cover to make the carburetor jet tube totally open.

c) Put the spring in.

d) Align the bulge part of the vacuum membrane with the fillister of the carburetor body.

e) Assemble the vacuum chamber cover;

Tighten the bolt.



3.12 Inspection of Automatic Side Starter (Choke)

a) Remove the fuel hose from the carburetor;

Turn out the carburetor float chamber drain screw, and drain the fuel in the carburetor;

Remove the automatic side starter lead wire and wire clip;

Remove the carburetor clamp and carburetor;

Check the connecting condition between the two lead wires.

c) Check the choke value. It should be below 10Ω; if it exceeds the specific value, it should be replaced.

d) When the engine is cold, link a hose on the reserve supply fuel line and blow very gently.

If the auto side starter is abstracted, it is faulty and should be replaced.

e) Remove the auto side starter cover, positioning bolts and pieces;
Remove the auto side starter;
Inspect the auto side starting valve and fuel injection needle for wear.
Inspect the O-ring for wear.

3.13 Float Chamber

3.13.1 Removal

a) Remove the carburetor.
b) Remove the clamp and float chamber.
c) Remove the O-ring, and turn out the float chamber screw.
d) Remove the float pin float and float valve.
e) Remove the choke adjusting screw and air adjusting screw.

- Before removing, tighten the two screws gently and meanwhile counter the number of turns, then remove the screws.
- Don't use too much force; otherwise it will damage the air adjusting screw head surface.

f) Remove the main fuel injection nozzle and fuel injection needle seat.

3.13.2 Inspection

a) Inspect the float for any damage and fuel in the float.
b) Inspect the float valve and float valve seat for wear. If there is any wear, they should be replaced.
c) Clear every fuel line and airline on the carburetor body with the compressed air

3.13.3 Installation

a) Install the main fuel injection nozzle and fuel injection needle seat.
b) Install the air adjusting screw and choke adjusting screw, and turn them according to the noted number of turns while removing.
c) Assemble the float valve, float, and float pin.
d) Tighten the float pin positioning screw.
e) Measure the fuel level.

Fuel level	18.5 mm

f) Inspect the float for any damage and inspect the float valve for excess wear.
g) Confirm the up and down movement of the float is normal.

3.13.4 Carburetor Installation

Reverse the removal procedure for installation.

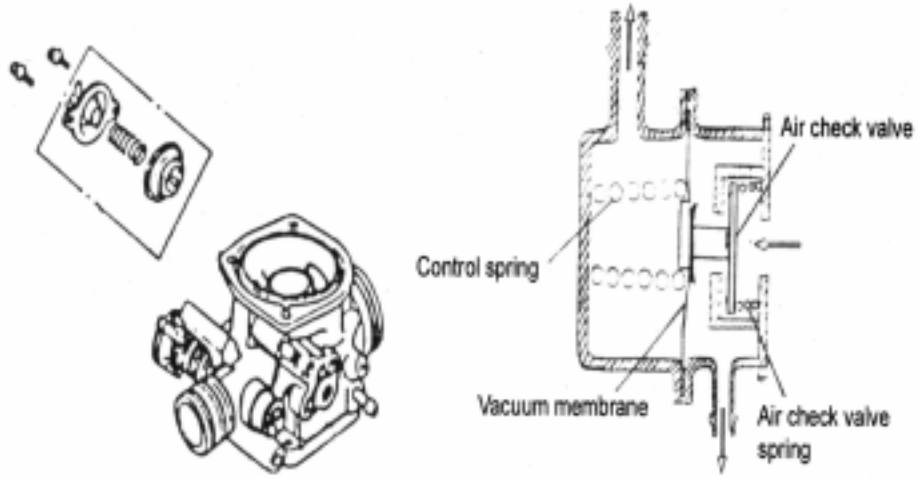
After installing, make sure that all carburetor linkages and cables are in correct position, and the carburetor is in idle position.

3.14 Air Cut Valve (ACV)

3.14.1 General Information

The air cut valve can avoid some abnormity once the throttle closes too quickly; for example, when the mixed gases are too thin.

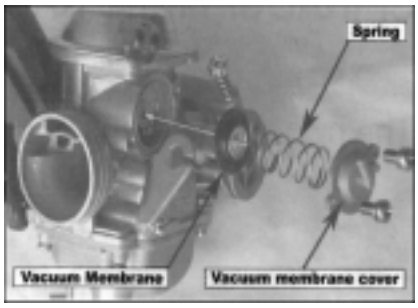
The structure of the air cut valve is shown in the picture.



3.14.2 Removal

a) Remove the air inlet manifold of the air cut valve.

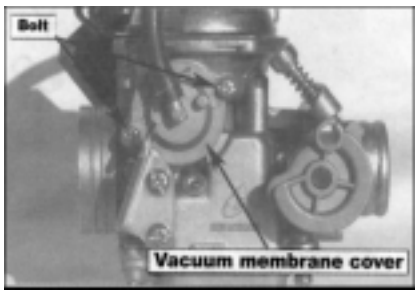
b) Remove the bolt, vacuum membrane cover, spring, and vacuum membrane.



3.14.3 Installation

a) Assemble the vacuum membrane on the carburetor bolt.

b) Assemble the spring, vacuum member cover and lock bolt.



- The bottom side of the vacuum membrane should be aligned with the carburetor, and the topside should be aligned with the vacuum membrane.

3.15 Air Check Valve

The air check valve starts working under 50km/h, impels the second air inlet to burn, and reduce the CO displacement.

3.15.1 Installation

Reverse the removal procedure for installation.

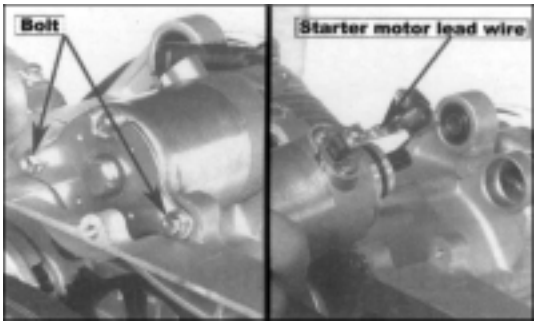
- When installing, make sure every connecting pipes are connected properly, and they cannot be squeezed, bent, or clogged up.

3.16 Electrical Starting Mechanism

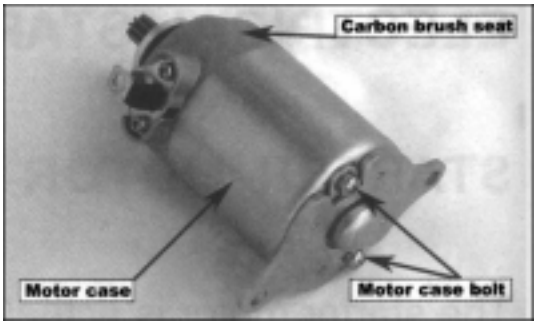
- **Removal of Starter Motor**

- 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. This must be done for insuring safety.

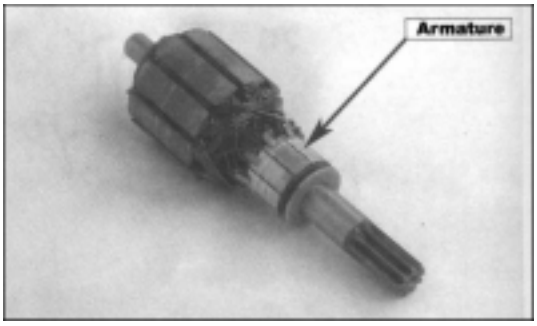
a) Remove the starter motor lead wire clamp;
Remove the starter motor holding bolt and starter motor.



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

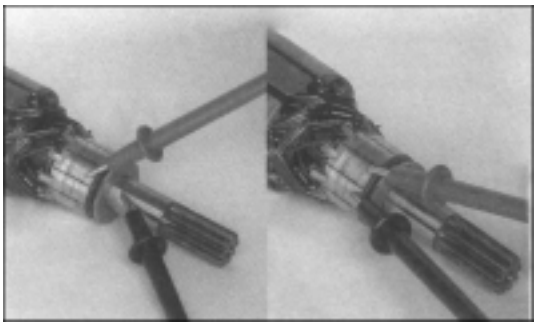


- **Armature Inspection**



a) Inspect the armature surface for uneven wear or damages or burn;
When where are metal fines attached to the gap of the armature surface, use a cleaning cloth to remove them.

- Please don't use the sandpaper to grind the armature, or wash it in any solvent that can dissolve or damage its insulation.

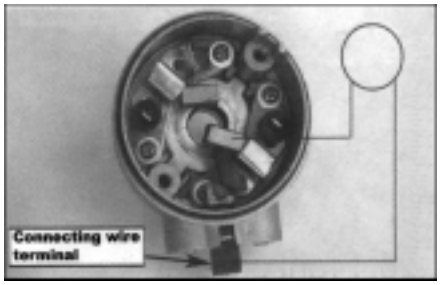


b) Measure the conducting condition of the armature coil according to the picture; it should be conductive.

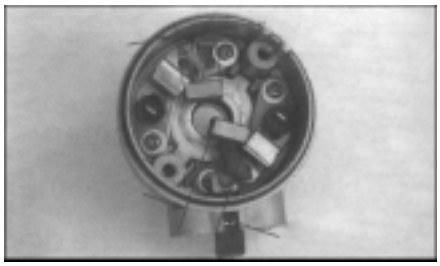
c) Measure the conducting condition between the armature coil and armature according to the right picture; it should be non-conductive; If not, it should be replaced.

- **Carbon Brush Inspection**

a) Inspect the insulating condition between the connecting wire terminal and starter motor case; it should be non-conductive.

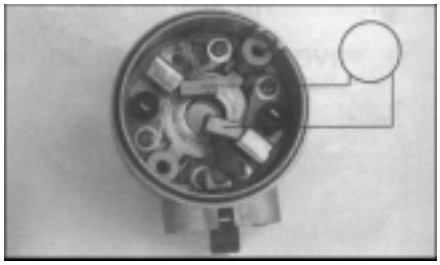


b) Inspect the conducting condition between the connecting wire terminal and the carbon brush, and it should be conductive.

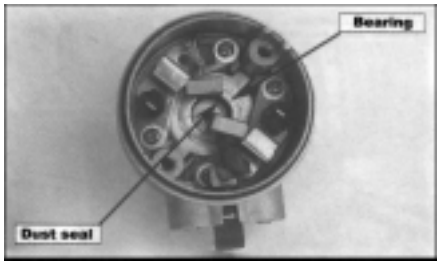


c) Measure the length of the carbon brush;
Replace it if the length value exceeds the service limit.

d) Measure the insulating condition of the carbon brush bracket, it should be non-conductive;
If not, it should be replaced.

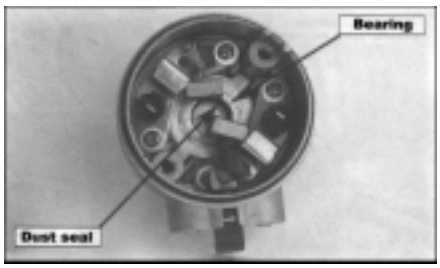


e) Inspect the needle bearing in the carbon brush base; it should be able to move smoothly with no play.



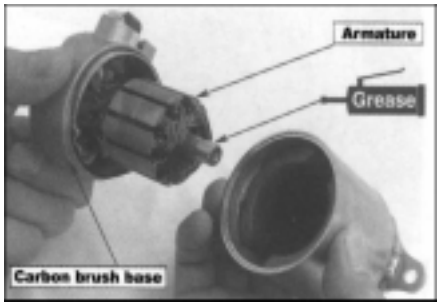
- Before installing, apply a little grease on the groove of the rotary retaining spring on the idler shaft.
- The rotary retaining spring should be aligned with the specific groove of the crankcase for installation.

f) Inspect the dust seal for wear and damages;
If so, it should be replaced.

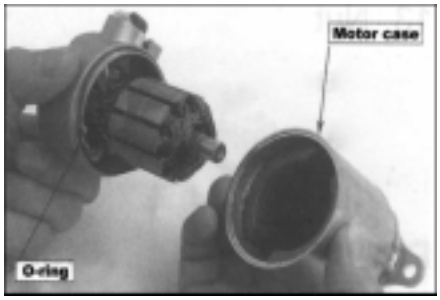


- **Starter Motor Installation**

a) Apply some oil on the dust seal;
Install the carbon brush on the carbon brush base.

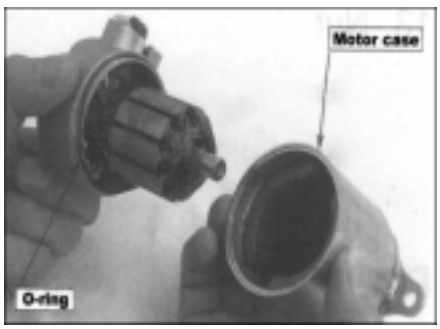


b) Apply a little oil on the moving part of the armature ends;
Put the carbon brush into the bracket, and then install the carbon brush base.



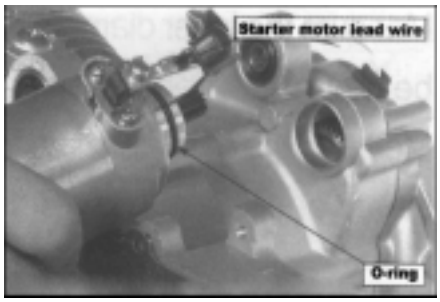
- Don't damage the contact area of the carbon brush and the armature.
- While installing, do not damage the lip of the dust sea.

c) Assemble the new O-ring on the carbon brush base;
Install the armature into the starter motor case, making sure not to damage the carbon brush;
Tighten the 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 inspect if the motor runs normally.

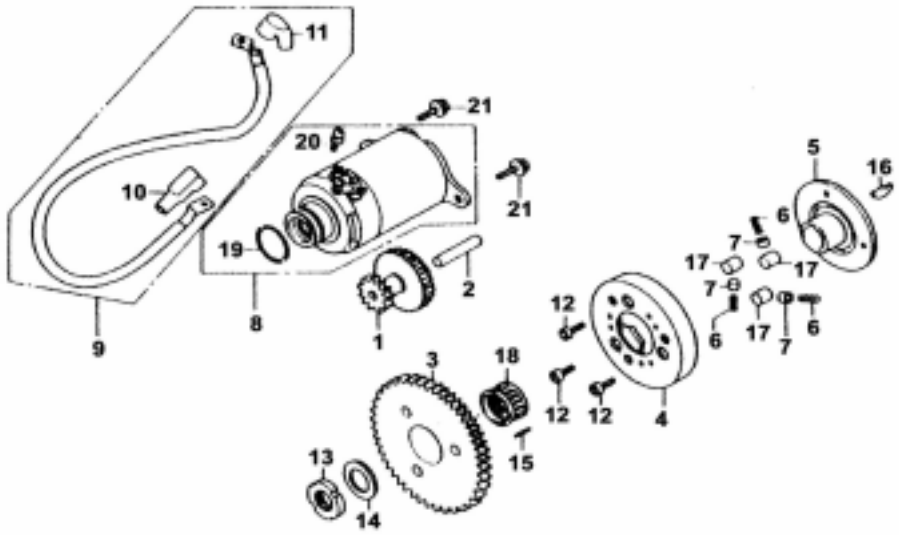
d) Apply oil on the O-ring, and install the starter motor; Tighten the holding bolts.



3.17 Reduction Mechanism

3.17.1 General Information

The picture shows the structure of the reduction mechanism.

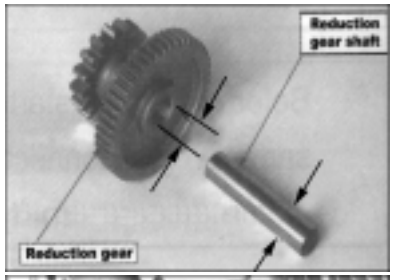


1. Starter reduction gear
2. Starter reduction gear shaft
3. Starting clutch gear comp.
4. Starting clutch outer comp.
5. Flange starting clutch
6. Starting clutch roller spring
7. Spring holder
8. Starter motor
9. Starter motor lead wire
11. Clamp
12, 21. Bolt
13. Nut
14. Washer
15. Dowel pin
16. Key woodruff
17. Roller
18. Needle bearing
19. O-ring

10. Clamp 20. Screw

3.17.2 Reduction Gear Inspection

a) Remove the starting clutch.
Remove the reduction gear to inspect its wearing degree.



b) Measure the inner diameter of the reduction gear.
It should be replaced when the diameter is more than 10.05 mm.

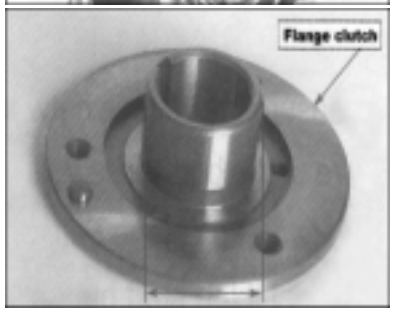
c) Measure the outer diameter of the reduction gear shaft.
It should be replaced when the diameter is less than 9.94mm.

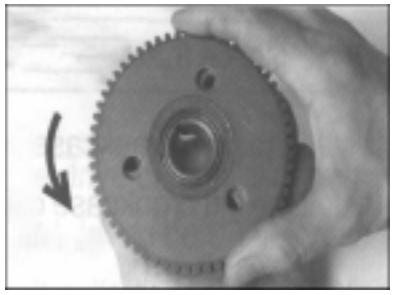
3.18 Engaging Mechanism

3.18.1 Starting Clutch

- **Removal**

a) Remove the right crankcase cover;
Remove the left crankcase cover.
b) Hold the drive face with a universal set wrench.
c) Remove the starting clutch fixing nut.





- Notice that the thread of the fixing nut should be left-handed rotation.

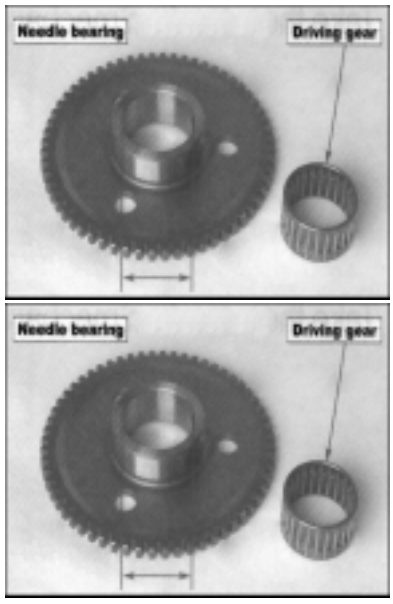
d) Remove the starting clutch (the whole set).

- **Inspection**

a) Inspect if the movement between the clutch and the driving gear is normal. The driving gear should smoothly turn clockwise, and should not move anticlockwise;

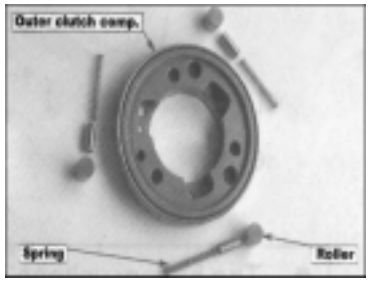
Inspect if there is any abrasion or damage on the contact surface between the driving gear and needle bearing. It should be replaced if the surface is damaged;

Measure the inner diameter of the driving gear. It should be replaced when the diameter is more than 32.06mm.

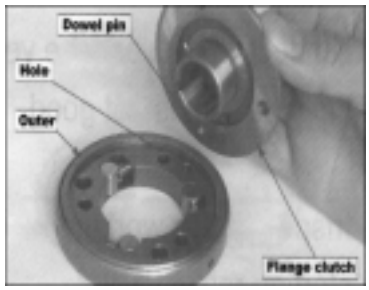


b) Inspect the condition of the needle bearing. It should be replaced if there is any damage.

c) Inspect if there is any abrasion or damage on the contact surface between the outer clutch component and roller;
Inspect if there is any injury on the roller;
Inspect if there is any distortion on the spring. If the damage is serious,it should be replaced.

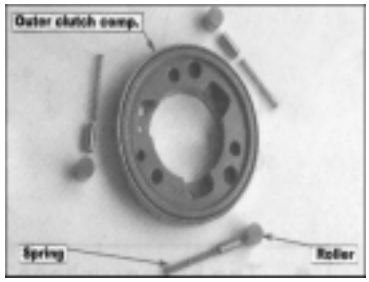


d) Measure the inner diameter of the flange clutch. It should be replaced when the diameter is more than 27.94mm.

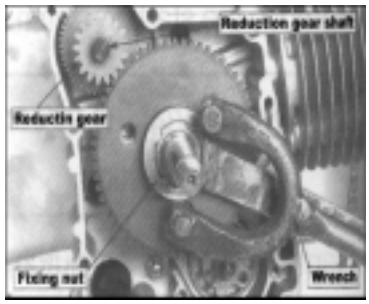


- **Installation**

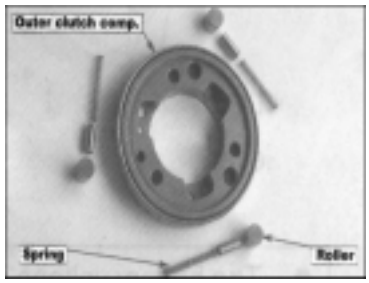
a) Install the spring, roller and top pin on the body of the clutch.



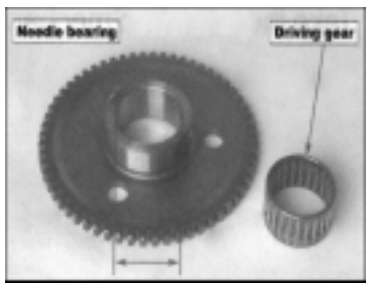
b) Align the dowel pin on the flange clutch with the hole on the clutch body, and then install the dowel pin.



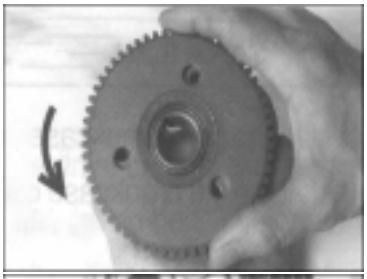
c) Apply some thread locks on the outer clutch component bolt, and tighten them.



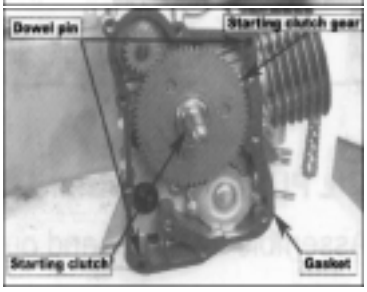
d) Apply some oil on the needle bearing and drive gear, and then put the outer clutch component on.



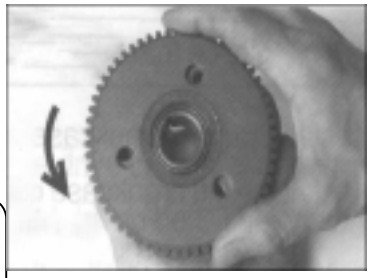
e) Align the groove of the woodruff key on the crank, and install the starting clutch.



f) Apply some oil on the reduction gear and reduction gear shaft, and then install them.



g) Hold the drive face with a universal wrench. At the same time fasten the clutch nut.



- Notice that the thread of the nut should be left-handed rotation.

h) Install the right crankcase cover;
Install the left crankcase cover.

Note: Take the reduction mechanism and engaging mechanism as a whole unit, and then this unit is called the starter.

3.18.2 Controlling Mechanism

- **Starter Relay Inspection**

a) Turn the main switch to the "ON" position, and press down the starting motor button, and listen if there is a "click" sound.
If there is, it is normal; if there isn't, follow the below procedures.

b) Inspect if the brake switch is conductive; at this time, turn the main switch on and hold the brake lever.

- The battery voltage should be at 12 volts.

d) Measure the voltage between the inlet line (the green/yellow line) starting relay and ground wire of the body. The voltmeter reading should be close to the magnitude of voltage between the two ends of the battery. If not, the brake switch, its wire or the wire connector is not good.

d) Inspect if the start button is conductive; at this time, remove the starting relay inlet line (the green/yellow line.

e) Connect the yellow/red line with the ground wire, and press the start button. It should be conductive between the yellow/red line and the ground wire; otherwise the start button, its wire, or the wire connector is not good.

e) Inspect the working condition of the starting relay; at this time, remove the starting relay.

g) Connect the C end and the D end of the starting relay with the battery, and the A and B end with the millimeter.

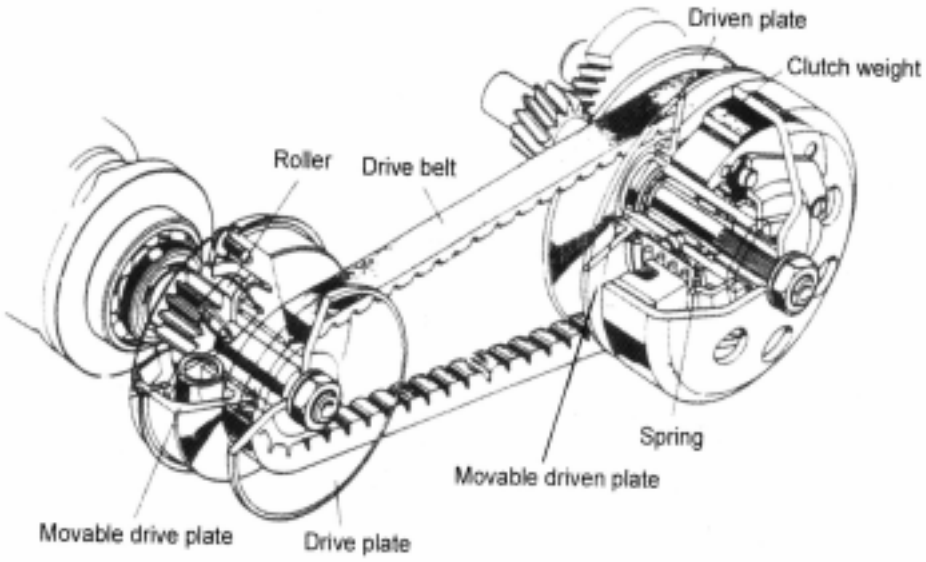
- The battery voltage should be at 12 volts.

At this time the millimeter should indicate the conductive condition; otherwise, the starting relay is not good.

3.19 Belt Driven CVT Mechanism

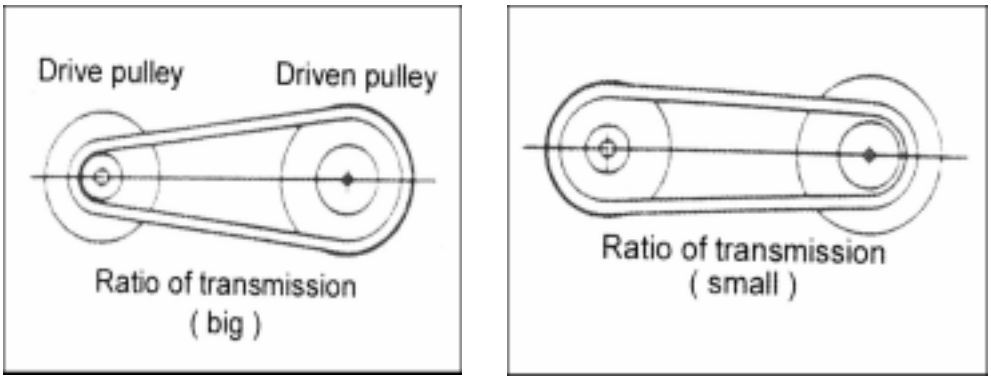
3.19.1 General Introduction

The belt driven CVT mechanism is made up of two belt pulleys (the drive belt pulley and the driven belt pulley) whose diameter can be changed, and a notched driven belt. The driving belt pulley is mounted on the engine crankshaft, and the driven belt pulley connects with the rear driven mechanism.

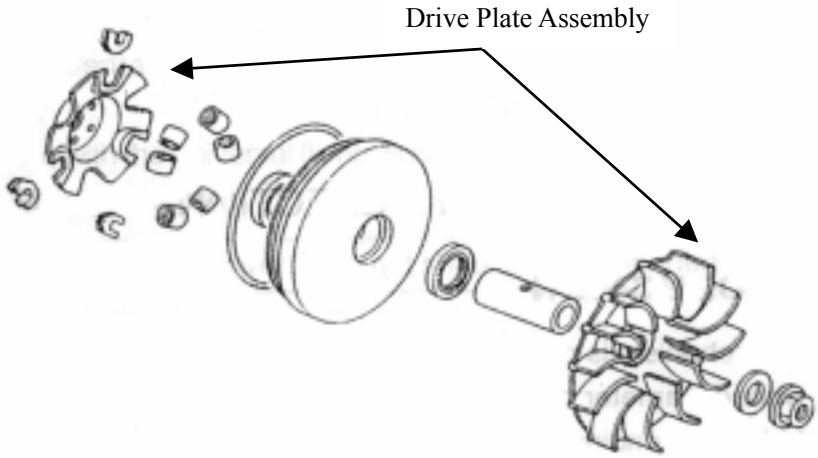


Its basic operational principle is to realize the automatic CVT by the diameter changes (the transmission ratio changes) of the driving and driven belt pulley.

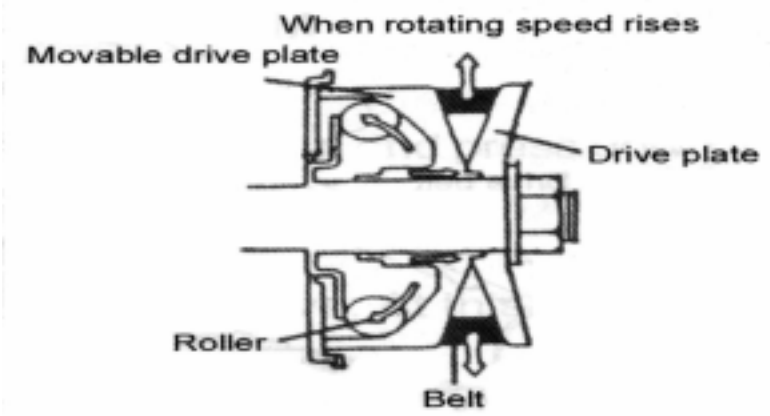
When the diameter of the driving belt pulley changes form small to big, proportionally the diameter of the driven belt pulley changes from big to small (because the perimeter of the driven belt is constant). AT this time the speed increases; on the contrary, the speed decreases.



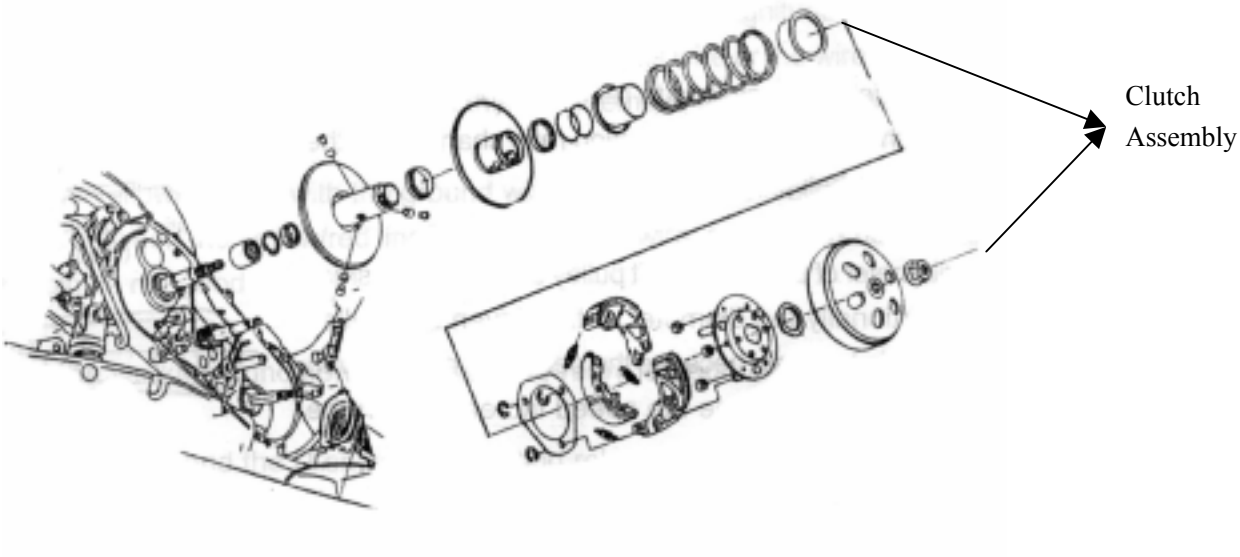
The structure of the driving belt pulley is shown in the picture.



The picture shows the working theory of the driving belt pulley.



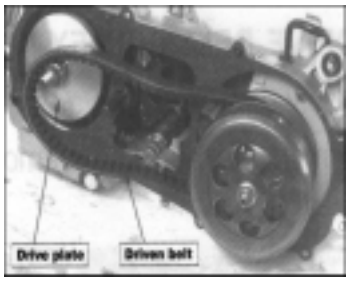
The picture shows the structure of the driven belt pulley. The clutch showed in the picture is the automatic dry centrifugal weight clutch.



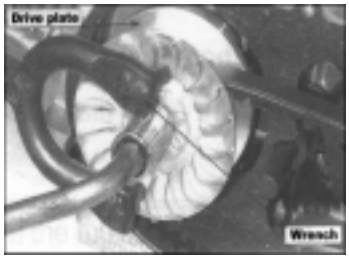
3.19.2 Drive Belt Pulley

- **Removal**

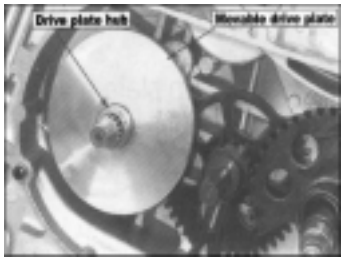
a) Remove the left crankcase air pipe lock bolt;
Remove the kick-starter and left crankcase fixing bolt.



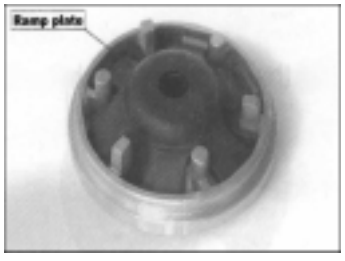
b) Remove the left crankcase cover;
Hold the drive plate with a universal wrench, and then remove the nuts and gasket on the drive plate shaft;
Remove the drive plate;
Remove the driven belt from the drive plate;
Remove the gasket and dowel pin.



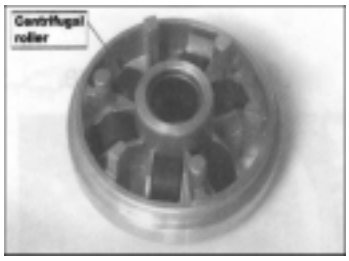
c) Remove the movable drive plate (the whole set).



d) Remove the ramp plate.

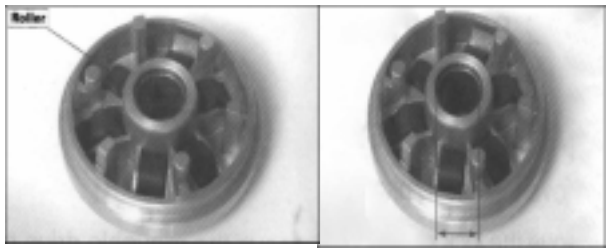


e) Remove the centrifugal rollers.



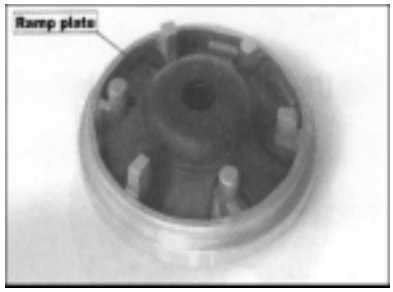
- **Inspection**

a) Inspect if there is any abrasion or damage on the centrifugal roller;
Measure the outer diameter of the centrifugal roller.



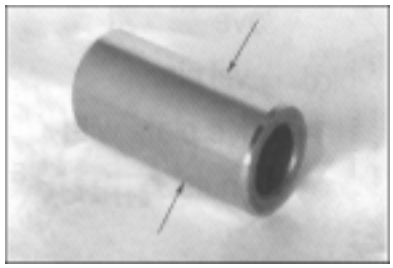
Service limit	17.0mm

b) Measure the inner diameter of the movable drive plate.



Service limit	24.06mm

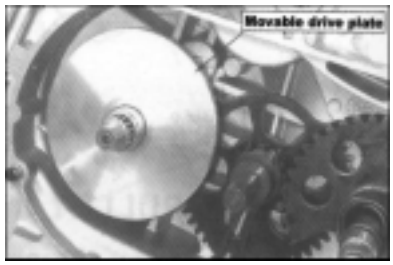
c) Inspect if there is any abrasion or damage on the drive plate hub;
Measure the outer diameter of the drive plate hubs movable surface.



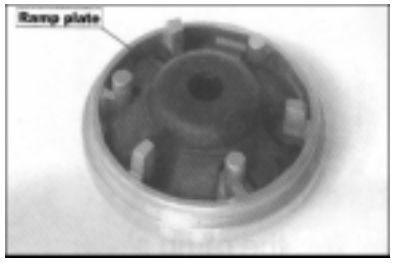
Service limit	23.94mm

- **Installation**

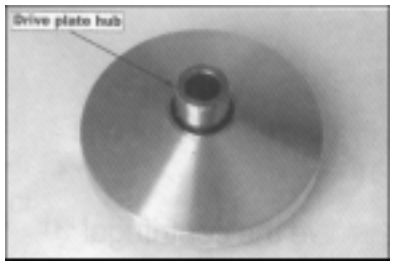
a) Apply some grease evenly in the movable drive plate;
Put the centrifugal roller into the movable drive plate.



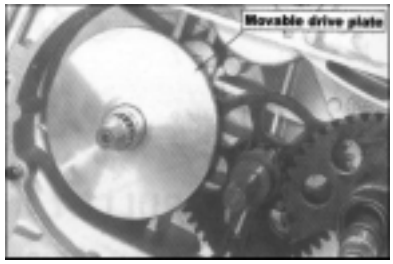
b) Install the ramp plate.



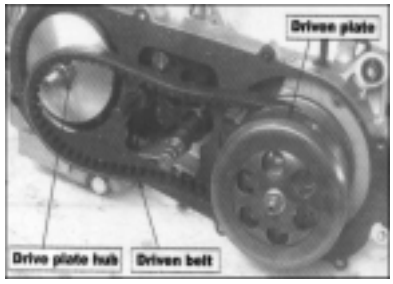
c) Put the drive plate hub into the drive plate.



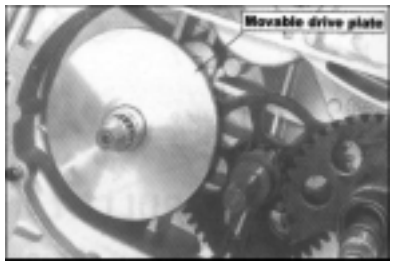
d) Install the movable drive plate on the crankshaft.



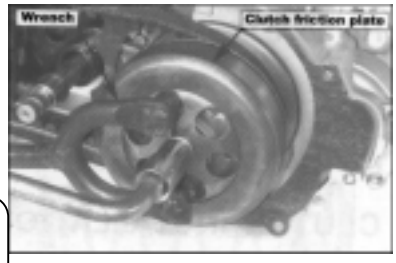
e) Enlarge the driven plate belt groove, and mount on the driven belt;
Mount the other end of the driven belt on the drive plate hub.



f) Assemble the drive plate, the drive plate washer and nut.



f) Hold the drive plate with a multiuse holder to make it unmovable;
At the same time fasten the nut on the shaft.



- Don't allow any grease or oil on the surface of the movable drive plate and the driven belt.

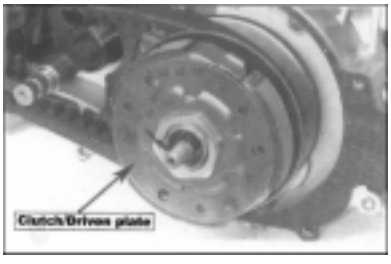
3.19.3 Clutch

- **Removal**

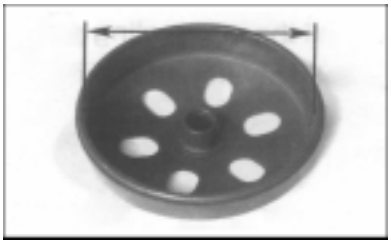
a) Remove the left crankcase cover.
b) Remove the drive plate and driven belt.
c) Hold the clutch friction plate with a multiuse holder, and remove the nut.
d) Remove the clutch friction plate.

- **Inspection**

a) Inspect if there is any abrasion or damage on the clutch friction plate.

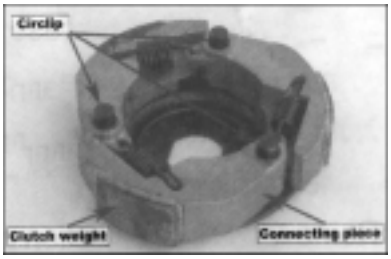


b) Measure the inner diameter of the clutch friction plate.



Service limit	125.5mm

b) Inspect if there is any abrasion or damage on the clutch centrifugal weight friction piece.



d) Measure the thickness of the clutch centrifugal weight friction piece.

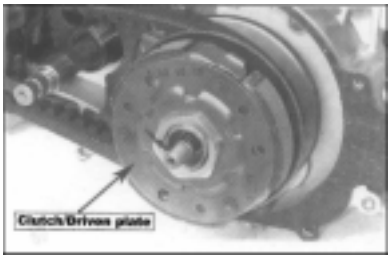
Service limit	1.5mm

- **Disassembly**

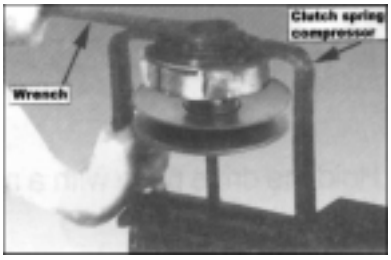
If it is needed to replace the centrifugal weight set, you must disassemble the clutch.

- When the friction piece is worn, it should be replaced with the centrifugal weight set.

a) Remove the clutch friction plate;
Remove the whole set of clutch/driven plate.



b) Compress the driven pulley spring with the clutch spring compressor, and at the same time, remove the nut on the shaft.



c) Disassemble the clutch with the driven pulley.

d) Remove the circlip, and remove the connecting piece.

e) Remove the clutch centrifugal weight set and spring.

- **Installation**

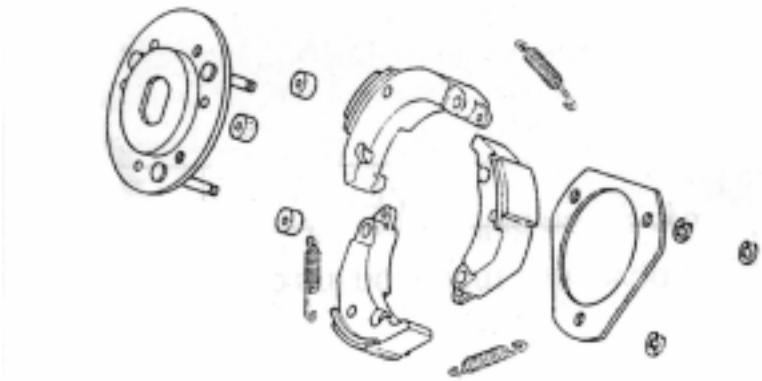
a) Mount the clutch damper rubber on the drive plate pin.
b) Mount the new clutch weight set and spring on the drive plate.

c) Install the connecting piece, circlip and bottom plate.

d) Reverse the removal procedure for installation.

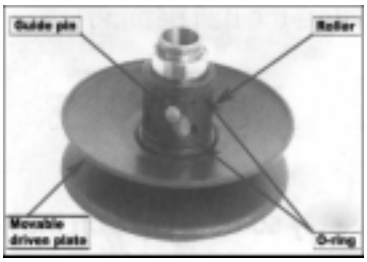
- When assembling the clutch and driven plate, you must use a clutch spring compressor; otherwise it will damage the spring.
- No grease on the driven pulley.

3.19.4 Driven Belt Pulley

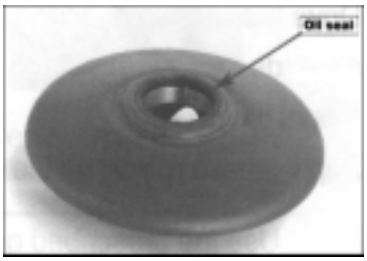


- **Removal**

a) After removing the clutch friction plate, remove the guide pin, roller and movable driven plate.

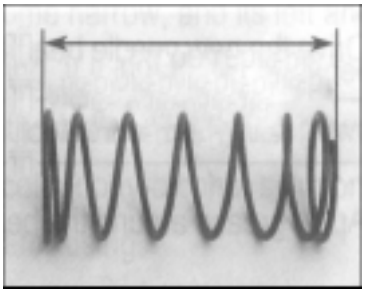


b) Remove the oil seal on the movable driven plate.



- **Inspection**

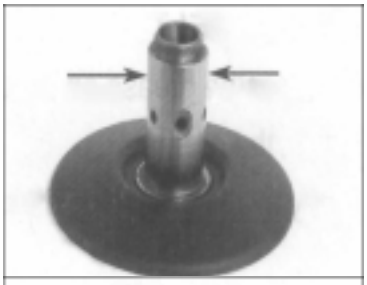
a) Measure the free length of the driven belt pulley spring.



Service limit	163.7mm

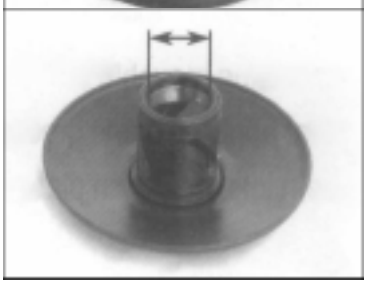
b) Inspect if there is any abrasion or damage on the driven plate;
Measure the outer diameter of the driven plate pulley hub.

Service limit	33.94mm



c) Inspect if there is any abrasion or damage on the movable driven plate;
Measure the inner diameter of the movable driven plate.

Service limit	34.06mm



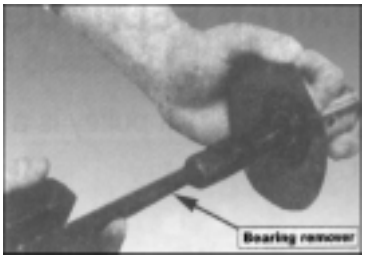
d) Inspect if the groove of the guide pin is worn.

- **Replacement of Driven Plate Bearing**

- If the driven plate needle bearing and ball bearing are loose, damaged, or have some unusual sound, they should be replaced.

a) Remove the needle bearing from the driven plate.

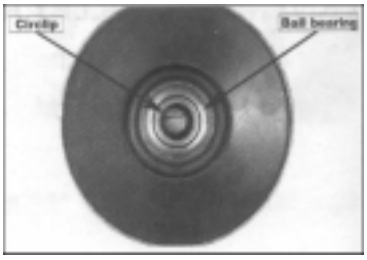
- The removed bearing can't be reused.



b) Remove the circlip from the driven plate.

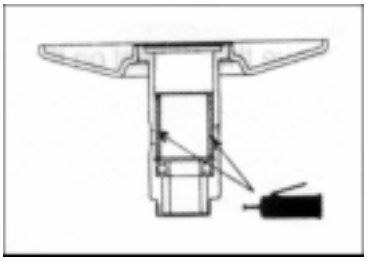
c) Drive the ball bearing out.

- The removed bearing can't be reused



d) y some grease on the new ball bearing.

e) Drive the ball bearing into the driven plate with its front face upwards.

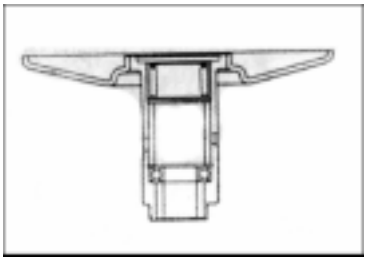


e) Assemble the circlip.

g) Apply grease evenly on the inner wall of the driven plate.

- Use the prescribed grease.

h) Drive the new needle bearing into with its mark upwards.

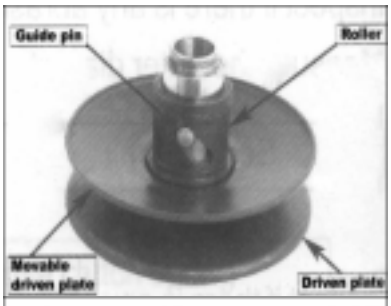


- Use the special tool.

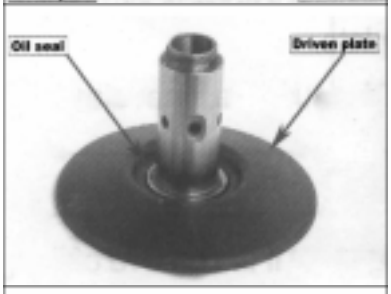
i) Apply some grease around the bearing.

- **Installation**

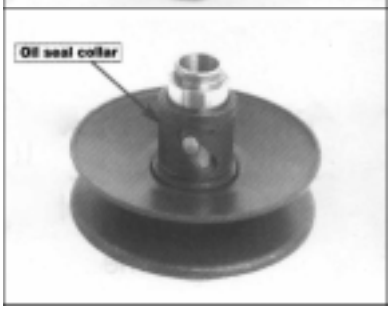
a) Remove the grease on the driven plate;
Assemble the oil seal.
Apply a little grease on the O-ring.



b) Assemble the movable driven plate into the driven plate;
After applying some grease on the roller and guide pin, assemble them into the driven plate hole.

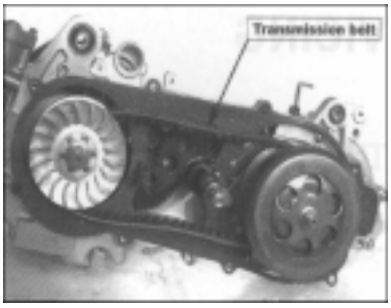


c) Install the oil seal collar;
Remove the excessive grease.



- No grease on the movable face of the driven plate.

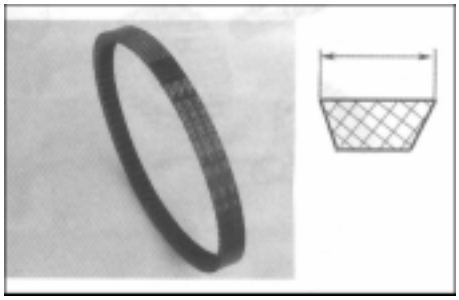
d) Assemble the clutch on the left crankcase.



3.19.5 Transmission Belt

- **Inspection**

a) Remove the left crankcase cover;
Inspect if the transmission belt is chapped or worn;
Measure the width of the belt.



Service limit	19.0mm

b) Replace the belt if its width is less than the above limitation.

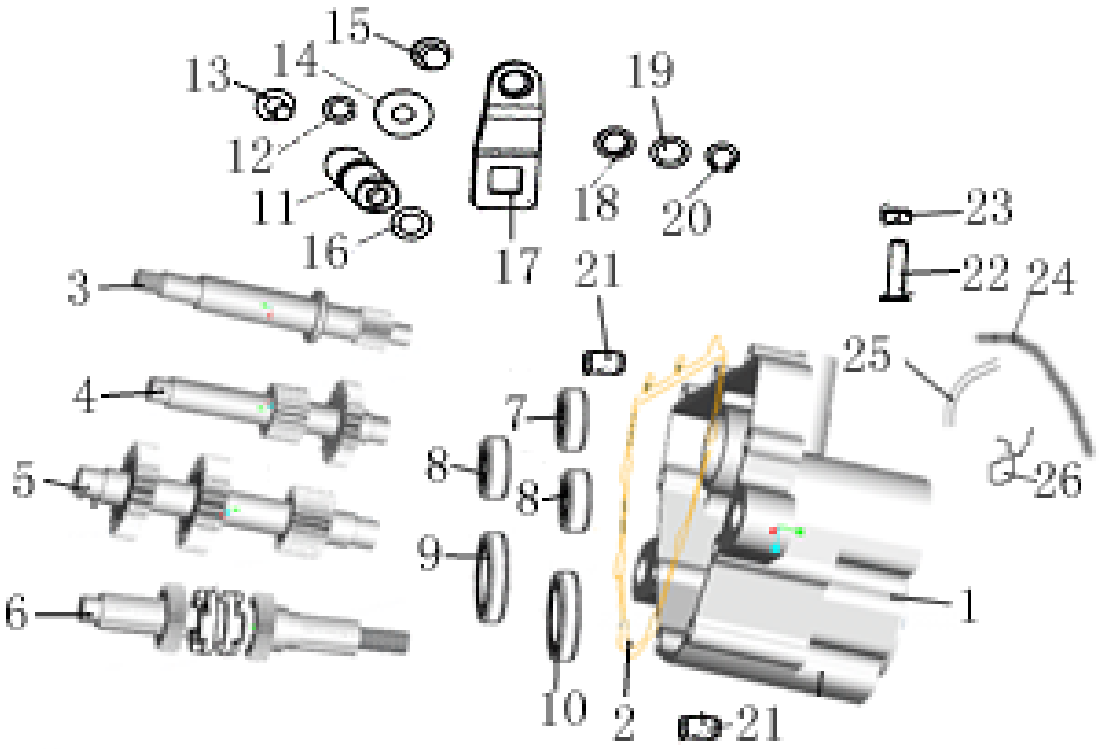
- When replacing, you must use the OEM part for the correct fit.

c) See the drive pulley removal and installation procedure for the replacement.

3.20 Rear Transmission Mechanism

3.20.1 General Information

The structure of the rear transmission mechanism is shown in the following picture.



1.Cover, Gear Box
2.Gasket, Gear Box Cover
3. Shaft, Drive
4. Shaft, Counter
5. Shaft, Center
6. Axle, Rear Wheel
7. Bearing 6201
8.Bearing 6202
9. Oil Seal 30*47*7
10.Bearing 6005LLU
11. Shaft, Fork
12. Spring Washer ф 6
13.Flange Bolt (Concave) M6*16
14. Flat Washer 6.4*18*1
15. Pin
16.O-ring 9.4*2.4
17.Fork
18. Ring, Pin
19. Flat Washer 8.5*12*0.5
20. Shaft Circlip ф 8
21 Dowel Pin 8*14
22 Round-head Screw M5*25
23.Hex Nut M5
24.Breather Pipe, Right Cover
25.Breather Mouth, Cylinder Head Cover
26.Clamp 26

3.20.2 Transmission Case Oil

- **Inspection**

> - When inspecting the oil level of the transmission case, stay the vehicle on the flat ground and keep the body level.

a) Inspect if there is oil leakage around the transmission case.

b) After the engine stops, remove the transmission case oil level bolt.

c) Observe the oil level: it is correct when the oil level is parallel with the observing hole;
When the oil level is too low, add until the oil flows from the level screw.

> - Supply the same kind of oil according to the prescribed brand and specification.

d) Mount the transmission case oil level bolt and the washer

> - Inspect if the bolt oil seal is damaged.

- **Replacement**

a) Remove the transmission case oil level bolt.

b) Remove the oil drain bolt to drain the oil.

c) Mount the drain bolt and its oil seal, and fasten.

d) Supply the oil with the prescribed specification and oil level.

e) Mount the level bolt.

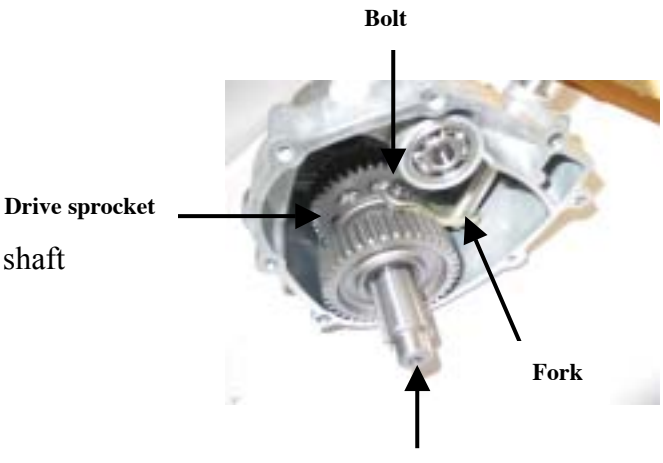
f) After replacing the oil, inspect for any oil leakage.

3.20.3 Transmission Case

- **Transmission Case Removal**

a) Remove the driven belt pulley;
Drain out the oil in the transmission case.

b) Remove the drive sprocket;
Remove the bolt, rear wheel axle comp. and fork shaft comp.;

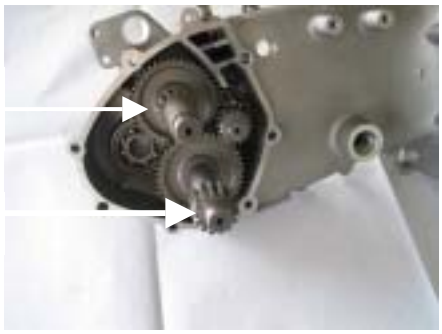


c) Remove the gasket and dowel pin.

d) Remove the center shaft comp. and idle gear comp.;

Idle gear comp.

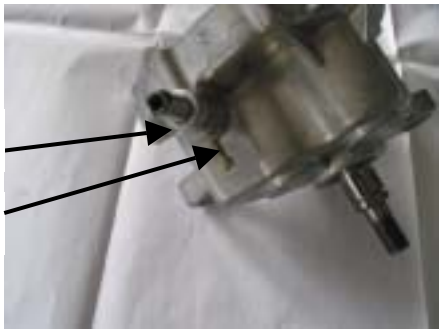
Center gear comp.



e) Remove the nut M5 and bolt M5*25;

Nut M5.

Bolt M5*25



f) Remove the fork comp. and rear gear shaft comp..

- **Transmission Case Gear Inspection**

a) Inspect if the rear gear and rear gear shaft are damaged or worn.

b) Inspect if the center shaft, idle gear and idle gear shaft are damaged or worn.

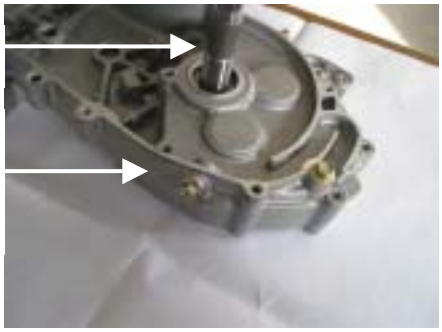
- **Replacement of Bearing on Left Crankcase Body**

> - When removing or installing the bearing on the transmission case cover, you must use the special tool shown in the picture.

a) Press the driven belt pulley shaft out of the left crankcase body;

Pulley shaft

Left crankcase body



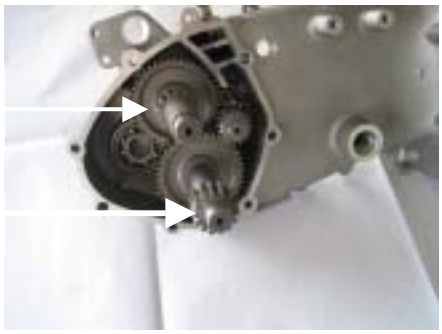
b) Remove the oil seal, and drive out the bearing.

c) Remove the other 3 bearings;
d) Assemble the new bearings;

e) Install the driven belt pulley shaft on the left crankcase;

f) Assemble the oil seal;

g) Assemble the idle gear shaft comp. and center shaft comp..



- **Replacement of Bearing on Transmission Case Cover**

> - When removing or installing the bearing on the left crankcase body, you must use the special tool.

a) Inspect the bearing and oil seal on the transmission case cover for wear and damage;
If they are damaged, they must be replaced;
Remove the oil seal;
Drive out the rear gear shaft bearing.

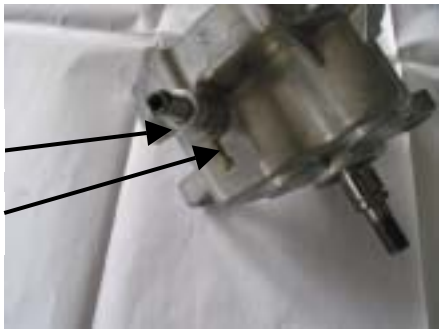
b) Remove the other 3 bearings.

c) Assemble the new bearings and oil seals;

d) Assemble the rear wheel axle comp.;

e) Assemble the fork shaft comp.;

g) Assemble nut M5 and screws;



- **Check and Service**

a) Every time before driving, check if the forward gear and backward gear/reverse gear can work agilely and smoothly;
b) For the safety of traveling, the vehicle must be in the parking state when the reverse gear is working.
c) In order to maintain the excellent performance and long service time of the reverse gear, please don't shift gear when traveling at high speed;
d) Service the reverse gear periodically. Replace the gear oil every 5000km or 6-month of running.
Capacity 200ml

4. Electric System

4.1 Inspection of Charging System

4.1.1 Electric Leakage Test

a) Turn the main switch to the "OFF" position.

b) Disconnect the negative ground wire from the battery.

c) Connect the positive end of the ammeter with the negative end of the battery;
Connect the negative end of the ammeter with the ground wire.

d) Test the electric leakage.
In general, it demands the number less than 1mA; if it is unusual, inspect if there is short circuit of the main switch or the main wiring.

4.1.2 Inspection of Charging Status

a) Install the fully charged battery.

b) Connect the voltmeter between the binding posts of the battery.

c) Remove the fuse, and connect the ammeter with the two ends of the fuse.

d) Connect the tachometer with the engine (it's not needed when there is a rpm indicator on the vehicle).

e) Start the engine, and accelerate slowly;
Measure the charging voltage and current.

Charging voltage (V)	13.5-15.5
Charging current (A)	0.5

Note: Measuring condition: 5000 r/min

If the voltage isn't in the range of the above-specified value, please inspect the voltage regulator.

4.2 Battery

The battery is an important component of the electric system. This battery used on the vehicle is a maintenance-free battery. For long periods of storage, the battery will discharge by itself, so it should be charged every 3 months. After 2 - 3 years of regular usage, the capacity of the battery will descend, so it will need to be replaced with a new one of the same type.

4.2.1 Removal

- Shut down the main switch to make sure that no electric current goes through the vehicle.

a) Disconnect the negative battery lead wire;

b) Disconnect the positive battery;

- The disconnecting order can't be reversed.
- When disconnecting the positive cable, don't touch the body of the vehicle with the removal tool; otherwise the short circuit will occur and the gas will be ignited to damage the battery.

4.2.2 Installation

a) Connect the positive cable;

b) Connect the negative cable.

4.2.3 Inspection of Battery Open-Circuit Voltage

a) Disconnect the cable on the battery terminals.

- Disconnect the negative pole first, and then the positive pole.

f) Measure the voltage between the two poles of the battery.

Full charging	13.1V
Under charging	12.3V

4.2.4 Battery Charging

a) Lift the battery out of the vehicle.

b) Connect the positive pole of the charger with the positive pole of the battery;
Connect the negative pole of the charger with the negative pole of the battery.

c) Charge the battery for the charging time marked on the battery.

- Don't use fast charging unless it is emergent.
- No smoking or open fire near the battery when charging.
- At the beginning or the end of charging, turn off the charger first to avoid the connecting part arcing.

g) Measure the voltage 30 minutes after the charging is finished;
It should reach the specified value; otherwise it needs recharging.

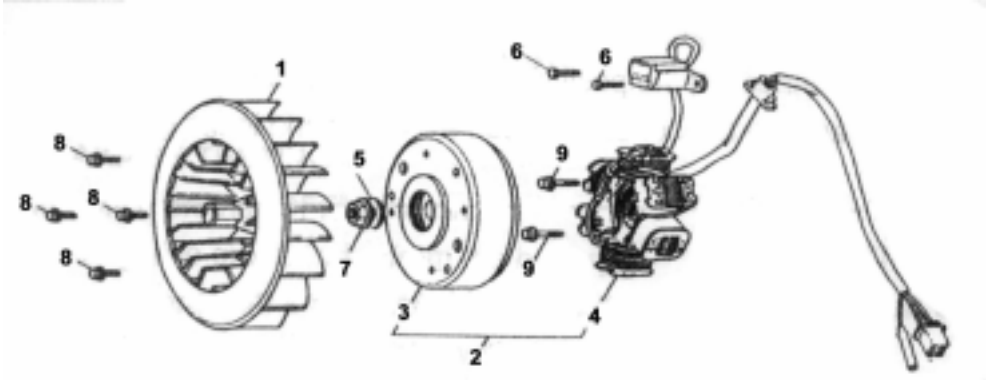
Charging Current	Normal	0.7A
	Fast	3.0A

Charging Time	Normal	5-10 hours
	Fast	30 minutes
Charging Result		Open-circuit voltage >=12.8V

4.3 Primary Coil

4.3.1 Structure

The picture shows structure of a common generator.



1. Cooling fan
2. Generator assembly
3. Flywheel comp.
4. Stator comp.
5. Washer
6. Bolt
7. Nut
8. Bolt
9. Bolt

4.3.2 Primary Coil Inspection

- The inspection work can be done on the engine, and there is no need to remove the generator.

a) Remove the 4-core connector of the generator.

b) Measure the resistance value between the white wire of the generator and the connecting wire of the vehicle body.

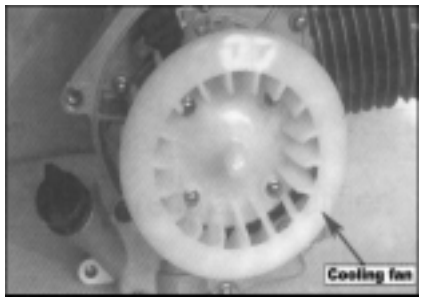
Standard value	0.2-0.4 Ω(20℃)

c) When the actual value is more than the standard value, the coil should be replaced.

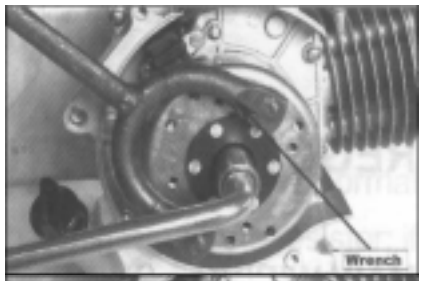
4.4 Generator

4.4.1 Generator Removal

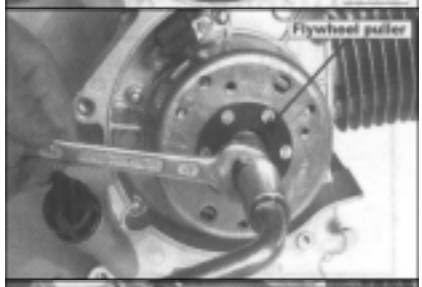
a) Remove the cooling fan cover bolt and screw;
Remove the cooling fan cover;
Remove the cooling fan bolt and cooling fan.



b) Hold the flywheel with a universal holding wrench; at the same time, remove the flywheel nut.

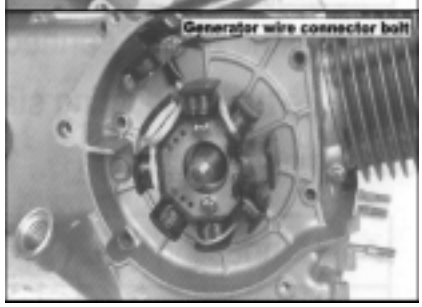


c) Remove the flywheel with a flywheel puller;
Remove the solid key.



d) Remove the generator wire connector.

e) Remove the generator wire holder;
Remove the generator coil bolt;
Remove the generator wire rubber bushing from the right crankcase;
Remove the coil set.



- Don't damage the coil when removing.

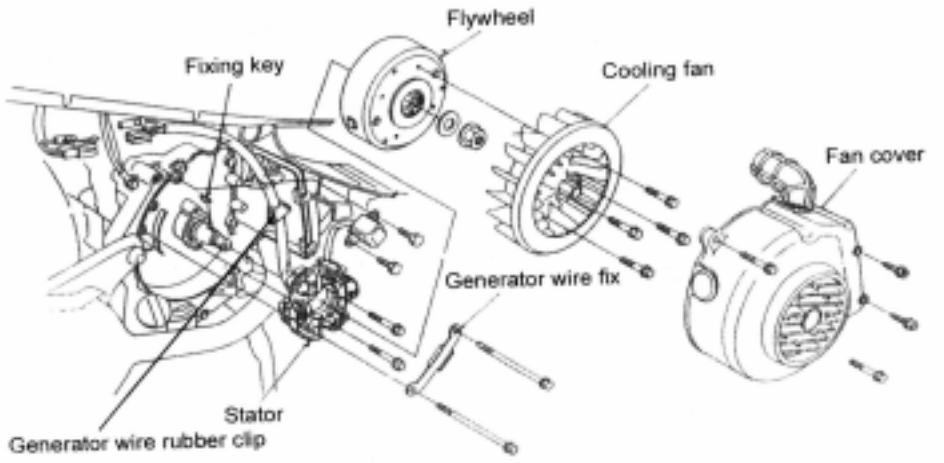
4.4.2 Generator Installation

Reverse the removal procedure for installation.

- When installing the flywheel, make sure that there are no metal pieces, such as bolts or nuts, attaching to the inner wall of the flywheel.
- After the installation is finished, start the engine to inspect and adjust the ignition timing.

4.5 Regulator –Rectifier

4.5.1 Inspection of Main Wiring-Sub Electric Circuit Condition



- Take the voltage regulate rectifier inspection procedure by two steps:
  First inspect the main wiring—sub electric circuit condition, and then inspect the voltage regulator.
- Inspect only when the engine is cold.

a) Remove the 4-core connector of the regulate rectifier.

b) Measure the conducting status between the main wiring terminals according to the previous wiring diagram.

Connecting Type	Normal Condition
Battery (The Red Wire) –Vehicle Body	Battery Voltage Value
Connecting Wire (the Green Wire) –Vehicle Body	Conductive
Lighting Wire (the Yellow Wire)—Vehicle Body (Remove the resistor, side auto-starter plug, and turn the lighting switch to off)	Generally : 0.1-0.8Ω
Charging Wire (the White Wire)—Vehicle Body	Generally: 0.2-2.0Ω

	W (White)	Y (Yellow)	R (Red)	G (Green)
W (White)		∞	3 - 100 KΩ	∞
Y (Yellow)	∞		∞	5 - 100 KΩ
R (Red)	∞	∞		∞

G (Green)	∞	5 - 100 KΩ	∞	

4.5.2 Inspection of Regular -Rectifier

- When the main wiring—sub electric circuit condition is normal, inspect the regulator-rectifier.

a) Inspect if the regulator- rectifier plug contacts well.

b) Measure the resistance value between every regulator- rectifier terminal.

b) If the resistance value between the terminals is unusual, replace the regulator- rectifier.

4.6 Resistor

4.6.1 Resistor Resistance Value Measurement

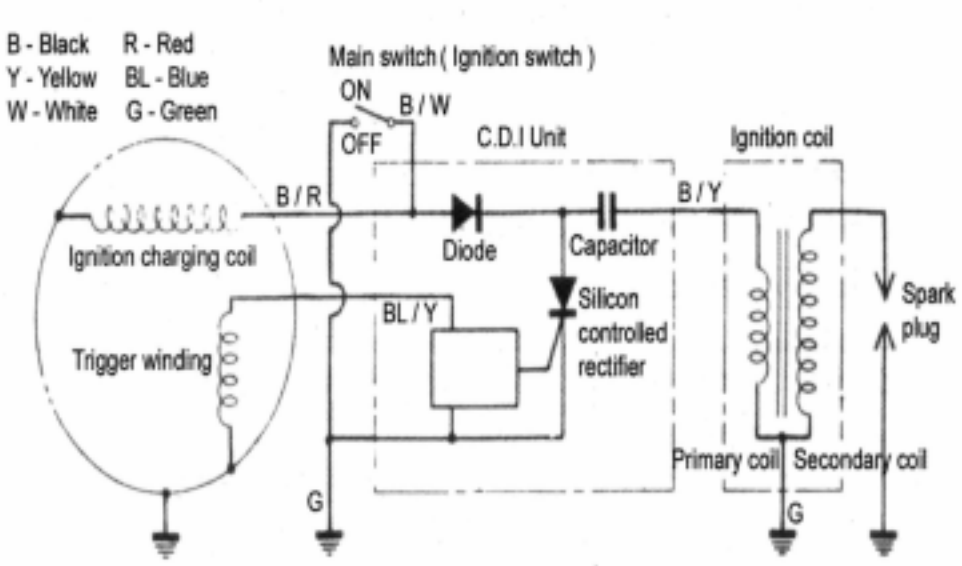
a) Measure the resistance value between the resistor wire and vehicle body;

If the actual value is in the range of +/- 1Ω value marked on the diagram or the resistor, it's normal; if not, it should be replaced.

4.7 Ignition System

4.7.1 Working Principle

The circuit working principle is shown in the picture.



4.7.2 Ignition Timing Inspection

- The CDI ignition system has already been adjusted in the factory, so there is no need to readjust it. If the ignition function inspection is necessary, take following steps to inspect the ignition timing

a) Remove the ignition timing hole cover (or remove the fan cover).

b) Rotate the generator rotor, and align the "F" mark on the motor with the crankcase timing ignition mark.

b) Clip the ignition timing indicator light wire clip on the high-voltage end of the ignition coil.

d) Start the engine and let it run at idle; at this time, observe if the mark on the crankcase aligns with the "F" mark on the rotor;
If the difference is between +/-3º, it indicates the ignition timing is correct; otherwise it should be adjusted.

e) Slowly increase the engine rpm (when the 150 model increases to 5000 r/min); at this time, if the mark on the crankcase aligns with the rotor ignition advance angle mark, the advance angle device is good; if not, it should be adjusted or replaced;
When adjusting, the trigger winding can be loosened to adjust the angle ,and the ignition-charging coil can be loosened to adjust the ignition timing.

4.7.3 Ignition System Inspection

When the spark plug does not spark, first inspect the wires, and if the connecting part is loose or contacts bad, you can follow the electric circuit and take the method of measuring the voltage of every point to find out the trouble. Please refer to the previous picture for the following inspection.

a) Remove the original spark plug and install a new one if the plug is bad;

- It is important that every electric circuit wire connects correctly.
- It is important that the cylinder compression pressure is normal.

Connect the negative end of the multimeter with the positive connecting iron of the primary ignition coil (the black/yellow wire);
Press the starting button or use the kick starter, and read the voltage value on the multimeter.

Note: The highest voltage value should be above 112V.

- When measuring the voltage, don't touch the metal part of the multimeter you're your finger; otherwise an electric shock can happen.

b) Remove the 4-core and 2-core connector of the CDI component;
Connect the positive end of the multimeter with the ignition charging coil (the black/red wire end) of the 2-core connector, and connect the negative end with the ground wire end (the green end) of the 4-core connector;
Press the starting button, or use the kick starter, and measure the highest voltage of the ignition charging coil. It should be more than 122V.

c) If the measured highest voltage of the ignition-charging coil isn't normal, disconnect the generator connector to make further measurement;
If the measured terminal voltage of CDI component end is abnormal, but the terminal voltage of the generator is normal, there is a bad wire or bad connection;
If both are abnormal, the ignition-charging coil is bad.

d) Remove the 4-core and 2-core of the CDI component;
Connect the positive end of the multimeter with the trigger winding (the green/red wire terminal) on the 4-core connector, and connect the negative end with the green wire terminal on the 4-core connector;
Press the starting button or kick-starter, and measure the highest voltage of the trigger winding; it should be more than 2.1V.

e) If the measured highest voltage of the trigger winding is abnormal, remove the generator connector, and make further measurement;
If the measured terminal voltage of the CDI component is abnormal, but the generator terminal voltage is normal, there is a bad wire or bad connection.
If both aren't normal, the trigger winding isn't good.

4.7.4 Ignition Charging Coil

a) Remove the connector of the ignition charging coil wire.
b) Measure the resistance value between the ignition charging coil (the black/red wire) and body ground wire.
c) When the actual value is more than the standard value, it should be replaced.

Standard value	300-1000Ω(20℃)

4.7.5 Trigger Winding Inspection

a) Remove the connector of the trigger winding wire.
b) Measure the resistance value between the trigger winding (the green/red wire) and body ground wire.
c) When the actual value is more than the standard value, it should be replaced.

Standard value	4-300Ω(20℃)

4.7.6 CDI Component Inspection

- It is similar with the regulator inspection. The CDI component inspection is also divided into two steps: first, inspect every wiring, winding or coil connected with CDI; then, inspect the CDI component.

a) Remove the CDI component.
b) Inspect if the connector is loose or eroded.
c) Inspect the conduction condition and the resistance value of the main switch, ignition charging coil, trigger winding and ignition coil;
When the main switch is at the "OFF" position, it should be conducted, and the resistance value of every coil should be the standard value.
h) Inspect the resistance value between every CDI component terminal;
If the actual value isn't in the range of the value in the chart, the CDI component is faulty.

Note: The CDI component can also be inspected and measured with the CDI testing instrument.

- Please carefully read the instrument specification so as to operate properly.

a) Connect the CDI component with the special wire of the testing instrument.
c) Observe the spark condition on the instrument when the switch is turned at different positions.

4.8Ignition Coil

4.8.1 Removal

a) Remove the spark plug cap.
b) Remove the primary ignition coil wire.
c) Remove the ignition coil-positioning bolt and ignition coil.

4.8.2 Installation

Reverse the removal procedure for installation.

- When installing, connect the black/yellow wire of the primary ignition coil with the black/yellow connector of CDI, and the green wire with the green connector of CDI.

4.8.3 Primary Ignition Coil Inspection

Standard value	0.1~1.0 kΩ (20℃)

If the resistance value is ∞, the coil is bad and should be replaced.

4.8.4 Secondary Ignition Coil Inspection

a) Install the spark plug cap, and measure the resistance value of the secondary ignition coil;
If the resistance value is in the standard range, the coil is good; otherwise the coil is bad.

Standard value	7-9 kΩ (20℃)

b) Remove the spark plug cap, and measure the resistance value of the secondary ignition coil;
If the resistance value is in the standard range, it indicates it is good; however, ∞indicates the coil is bad.

Standard value	2-4 kΩ(20℃)

Note: The ignition coil also can be inspected and measured with the ignition testing instrument

- Please operate properly according to the instructions.

a) Set the measuring switch of the ignition coils on the 1.2V position, and connect the ignition coil.
b) Turn the switch of the testing instrument to the "ON" position;
Observe the spark over window and inspect the spark over the ignition coil;
If it is a normal consistent spark, it is good; if the spark doesn't flash consistently, it is bad.

4.9 Spark Plug

a) Clean the carbon around the spark plug to prevent it from dropping into the cylinder when removing the spark plug.
b) Remove the spark plug.

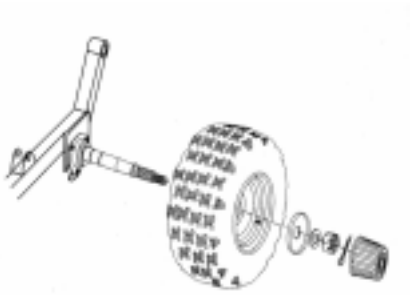
- When installing, connect the black/yellow wire of the primary ignition coil with the black/yellow connector of CDI, and the green wire with the green connector of CDI.

c) Clean the filth and carbon accumulation on the spark plug with a steel brush or a blade.
d) Inspect the spark plug gap;
In general, it should be about 0.6 - 0.7mm.
e) When the carbon accumulation and wear of the spark plug are too much, replace the spark plug with a new one of the same specification

5. Chassis

5.1 Rear Axle Removal

a) Disassemble the rear Wheel.
b) Remove the cotter pins on the rear wheel axle nut.
c) Remove the axle nut.
d) Block up the rear end of the machine.
e) Remove the rear wheel and hub assembly by sliding off splines of the axle.
f) Remove the chain.
g) Loosen the nuts on the bearing carrier, and remove the bolts.
h) Remove the axle and bearing carriers as a unit.



5.2 Rear Swing Arm Removal

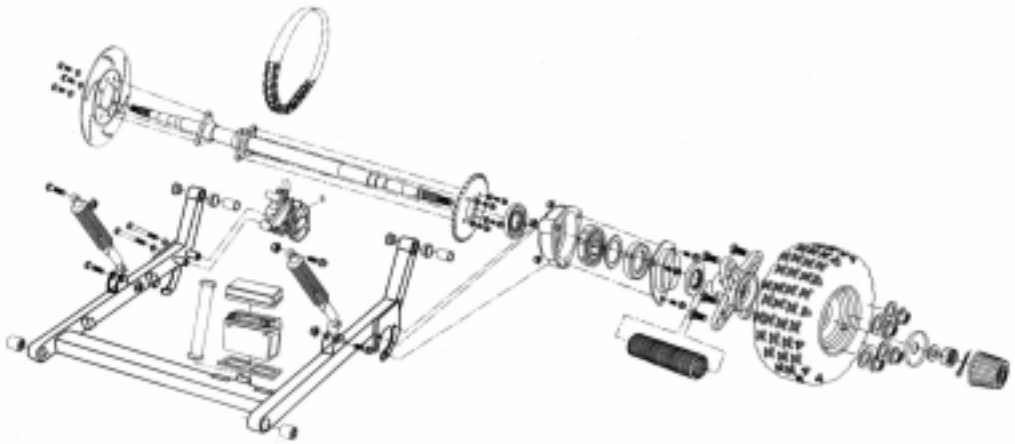
- Please operate properly according to the instructions.

Note: The swing arm, axle and motor can be removed as a unit if needed.

a) Remove the rear. shock.
b) Remove the rear brake caliper, and set it aside.

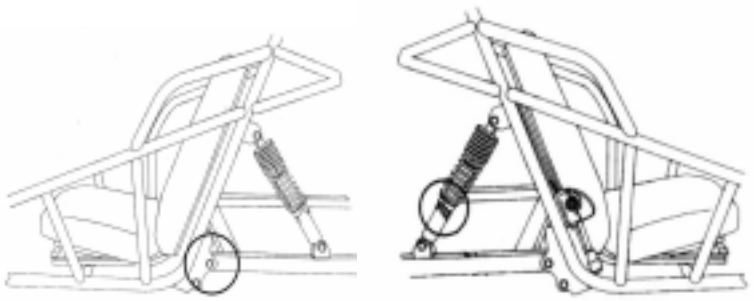
Note: Don't remove the brake hose!

c) Unplug the brake light wiring from the electrical box.
d) Remove the throttle cable.
e) Remove the bolts from the swing arm pivot
f) Check the buffer rubber bushing for wear;
If there is any wear on the bushing, it should be replaced.



5.3 Front & Rear Shocks

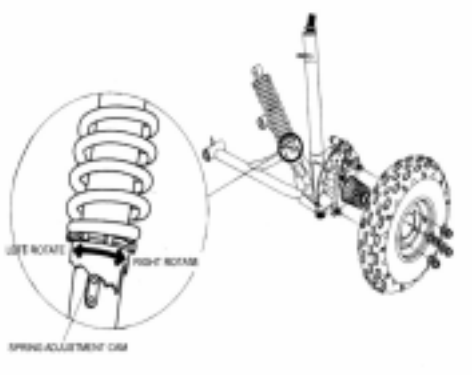
The front and rear shocks are oil dampened units.
They are non-re-build able.
If any oil seepage is noticed, the shock should be replaced.



5.4 Adjustment of Front Shock

There are 5 adjustment positions on the front shock. The default position would be set by the manufacture in the middle (the third position).

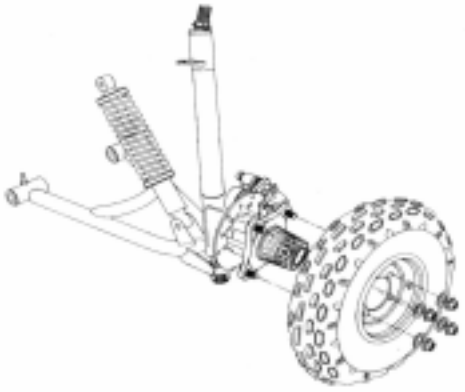
Please use a round nut wrench as you adjust the position, the tension of the shock spring would increase as you turn the screw left, and decrease as you turn the screw right.



5.5 Front Wheel Replacement

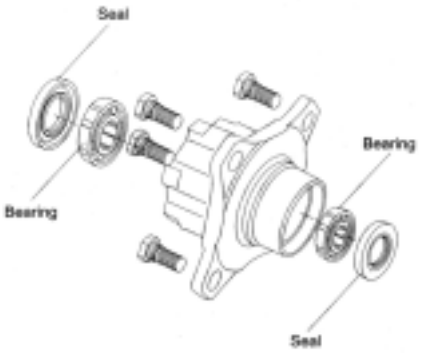
Don't disassemble the castle nuts when you replace the front wheels.

It is only necessary to tighten the nuts so that the wheel turns freely on the axle with the minimum end play. Please tighten the nuts after replacing the wheels.



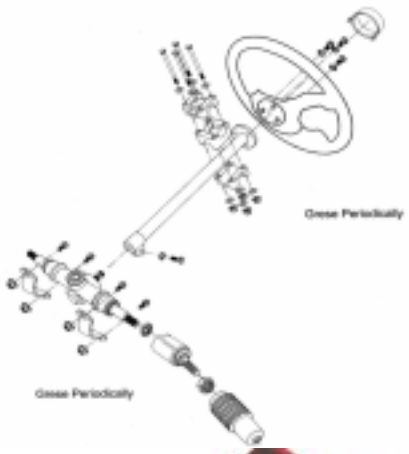
5.6 Front Hubs

a) Check the seals for rips or tears, and replace them if any exist.
b) Remove the bearings with a punch from the opposite side.
c) Inspect the bearings for easy movements;
   If any dirt or mud has gotten into them, wash them in the cleaning solvent and spin with your finger.



Note: Never spin them with the compressed air.

d) Apply an ample amount of grease to the bearing and reinstall it with a bearing tool, making sure that they go in straight;
If the bearing isn't straight, damages to the hubs can occur.
e) Install the seals into the hubs;
It is recommended to apply a small amount of grease to the lip of the seal;
If the retention spring is in bad shape, replace the seal with a new one



5.7 Seat

a) Remove all the nuts and bolts underneath the seat rail.

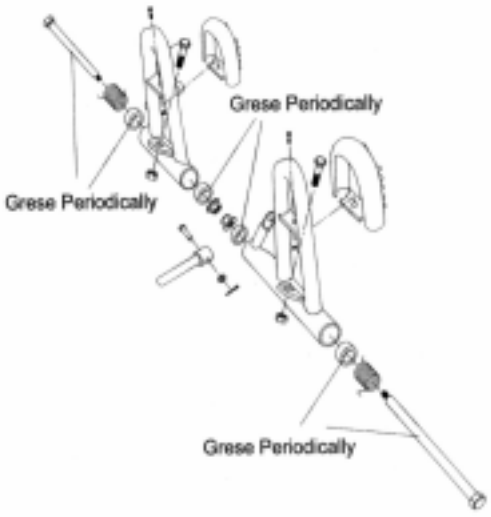
b) Remove the seat.

5.8 Steering Shaft

a) Remove the nuts on the steering block, and grease the inside of the steering block periodically.
b) Loosen the steering shaft and clamp nut on the steering gear box.
c) Remove the steering shaft.

5.9 Steering Gear Box and Ball Head

a) Remove the four bolts of the LH&RH clamp nuts on the steering gear box.
b) Remove and check the ball head dust cover on the steering gear box for wear.
c) Check the steering cover on both sides of the steering gear box and grease the ball head.
d) Fill the steering gear box with Grease after cleaning the dust; It is recommended to replace the ball joint if it is loose or not smooth.



5.10 Throttle & Brake Pedal

a) Remove the throttle, throttle pedal and axle nut.
b) Check the throttle and brake pedal for signs of wear;

Replace if any wear is present.

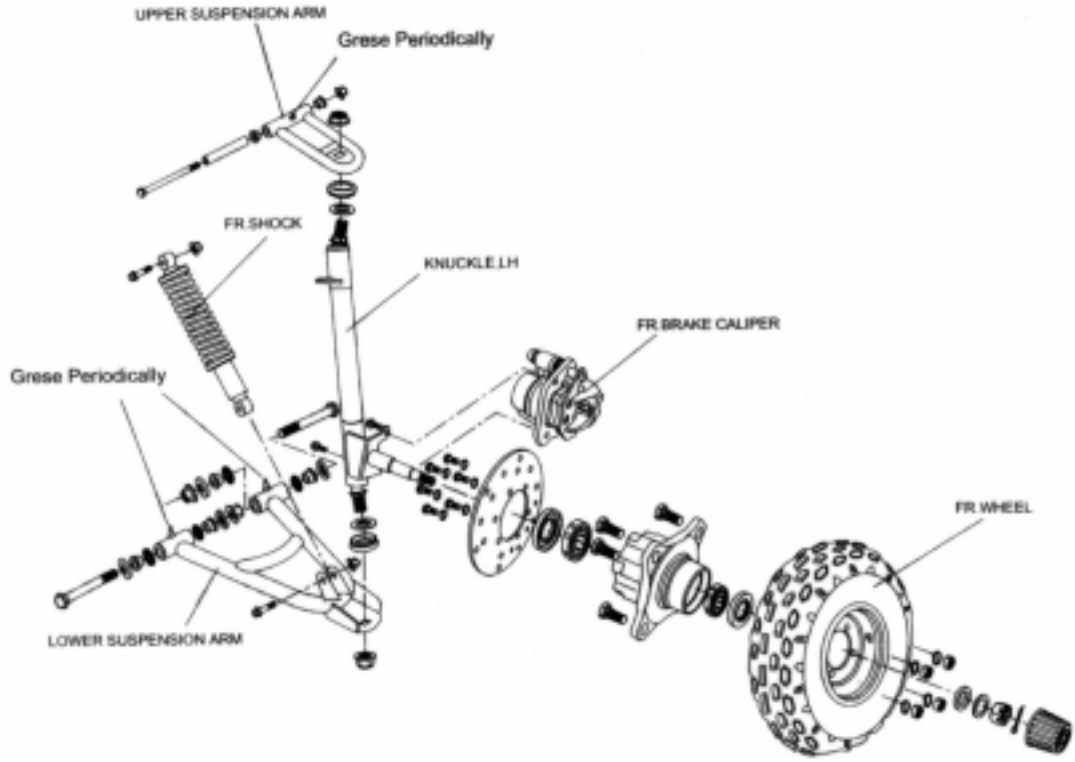
c) Before installation, apply enough grease on the throttle and brake pedal in order to make them swing more flexibly.

5.11 A-Arms

a) Grease the nipples of the upper & lower a-arms on the front wheel periodically.

b) Remove the bolts on the upper & lower a-arms of the front wheel.

c) Check the nylon bushing of the upper & lower a-arms on the front wheel for wear;
Replace them immediately if any wear is present.



5.12 Steering Knuckle Support

a) Remove the rubber dust cover of the knuckle support.

b) Check the grease of the ball joint;
Clean it if it's dirty and fill with grease.

c) Replace the steering knuckle support if the ball joint is loose or the steering isn't flexible.

5.13 Tie Rod

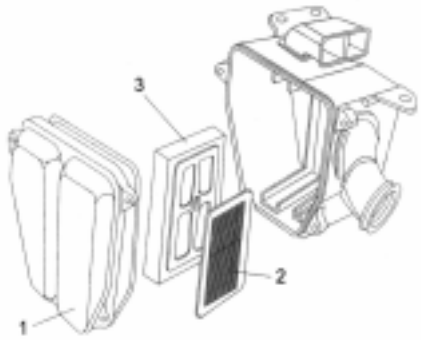
a) The tie rods should be checked for the ease of movement in their full rotation.

b) Remove the protective boot and apply some grease.
c) Check the tie rod ends periodically for tightness at their adjusting nuts.
d) Always use a new cotter pin after the removal.

5.14 Reverser Adjustment

a) Press down the reverse lever to the "FW" position so that the units can move forward;
Pull back the lever to "BW" so that the units can move backward.
b) Adjusting Nut #1 on the top of the reverse cable can adjust the mesh status inside the reverse gear box. In the forward position there should be about 1/4 inch play in the cable for the correct adjustment.

5.15 Service Air Cleaner

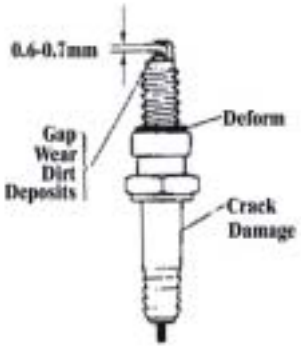


Service the air cleaner every 100 hours.
a) Remove the cleaner cover 1.
b) Remove the air cleaner element 2, 3.
Note: Service more often when driving in dusty conditions.

- **Service Foam Filter / Paper Filter**

a) Clean the foam filter with the no-flammable cleaner;
If the filter is paper, tap it on an object to knock out the dust, or replace it with a new one.
c) Dry the filter after cleaning, dip it into the engine oil specified by the manufacturer and wring the excess oil out of the filter.

5.16 Spark Plug



a) Remove the spark plug and inspect it with a spark plug wrench each time you change the oil;
If possible, check the spark plug gap (the area between the two electrodes) with a wire feeler gauge, and this specification should be 0.6-0.7mm.

Note: The electrodes should be kept clean and free of carbon. The presence of carbon or excess oil will greatly deter the proper engine performance.
b) Before installing the spark plug, apply some graphite grease on the threads if possible to ensure the easy removal next time when the spark plug needs inspection.

c) It is advisable to replace the spark plug at least once a year to insure the easy starting and good engine performance.

5.17 Front Wheel Alignment

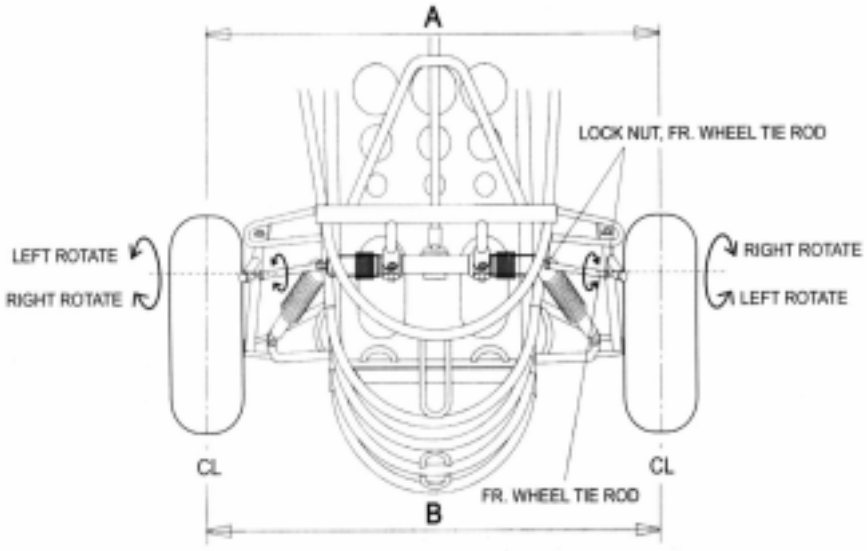
a) The front wheels should be "toed-in" from 1/8" to 1/4"; for the proper toe-in dimension, Dimension A should be 1/8"-1/4"longer than Dimension B.

b) Check the alignment measure distance from A /B to the centerline (CL) of the tires with the wheels pointed straight ahead.

c) Loosen the lock nuts on both sides of the front tie rods;

To make Dimension B shorter, screw the rod left; if Dimension B needs to be longer, screw the rod right;

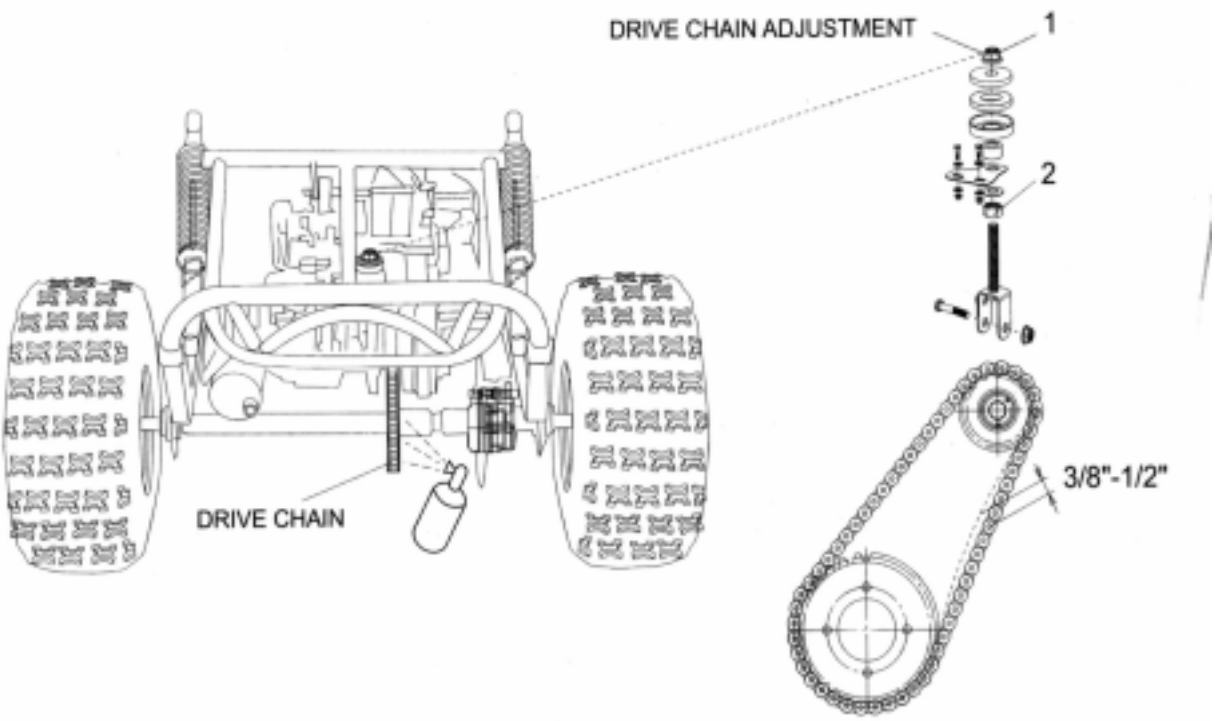
Tighten the jam nut tightly against the rod end, recheck the distance and repeat the above steps until the Dimensions are the same as the required.



5.18 Chain Adjustment

After the first two hours of operation, check the chain adjustment, and readjust it if it has more than 1/2” flex.

a) Loosen Nut 1.
b) Adjust Nut 2
c) Tighten Nut 1, verify if the chain is loose.
d) Repeat the above-mentioned steps until it is good enough.


DRIVE CHAIN ADJUSTMENT
1
2
DRIVE CHAIN
3/8"-1/2"

6. Wiring Diagram