2003-2004

SERVICE MANUAL

Yerf-Dog Spiderbox

First Edition

Yerf-Dog™
Go Karts
& A.T.V.s

Rev. 8.28.03

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GENERAL SPECIFICATIONS

Model: Yerf-dog Spiderbox

ENGINE

Model	Howhit 150cc LY6
Type	horizontal single cylinder, 4-stroke, 2-valve
Cooling System	Forced Fan Air Cooled
Bore x Stroke	57.0 x 57.8 mm
Lubrication System	Forced and Splash
Output Power	7.8 hp/7500 rpm
Maximum Torque	9.87 Nm @ 5500 RPM
Corrected Compression Ratio	9.2:1
Ignition	CDI, electronic
Idle Speed	1750 ± 100 RPM
Valve Clearance	0.003 ~ 0.005 in.

DRIVE TRAIN

CVT	AUTOMATIC

CARBURATOR

Model	Deni PD24JH
Choke	Automatic
Air Filter	Replaceable Paper Cartridge

OTHER FEATURES:

Push Button Electric Start
12-Volt Electrical System
Automatic Engine Braking

QUICK REFERENCE DATA

	RECOMMENDED LUBRICANTS AND FUEL	Capacity
ENGINE OIL	API Classification SF – SG (SAE 10W – 40)	25 ~ 31 oz.
GEAR OIL	API Classification GL – 5, GL – 4, GL – 3 (SAE 80W – 90)	4 oz. (115cc)
FUEL	Unleaded only; 85 to 93 octane	

SPARK PLUG		
TYPE	NGK	C7HSA
GAP	0.6 ~ 0.7 mm	0.024 ~ 0.028 in.

BATTERY

Battery Service Limit:

Fully charged
12.8 V

Needs charging
12.3 V

Charging Rate:

	Normal	Fast
Charging current	0.7 A / hr.	3.0 A / hr.
Charging time	5 ~ 10 hours	30 minutes

ELECTRICAL

CDI Component
(values displayed in K_)

– Negative —+ POSITIVE +

SW (B / W)
EXT (B / R)
PC (G / R)
E (G or G / W)
IGN (B / Y)

SW (B / W)

100 ~ :
50 ~ :
100 ~ :

EXT (B / R)
0.5 ~ 50

100 ~ :

PC (G / R)
10 ~ 1000
10 ~ 1000

1 ~ 100

E (G or G / W)
0.5 ~ 50
0.5 ~ 50
1 ~ 10

IGN (B / Y)

B- Black W- White R - Red G- Green Y - Yellow

Regulator Rectifier
(values displayed in K_)

W(White)
Y(Yellow)
R(Red)
G(Green)

W(White)

3 ~ 100

Y(Yellow)

5 ~ 100

R(Red)

G(Green)

5 ~ 100

Stator Values

IGNITION CHARGING COIL	300 ~ 1000 _ (20° C)
TRIGGER WINDING	40 ~ 300 _ (20° C)
PRIMARY IGNITION COIL	0.1 ~ 1.0 _ (20° C)
SECONDARY IGNITION COIL	7 ~ 9 _ (20° C)

TIGHTENING TORQUE CHART

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 ~ 6.0	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

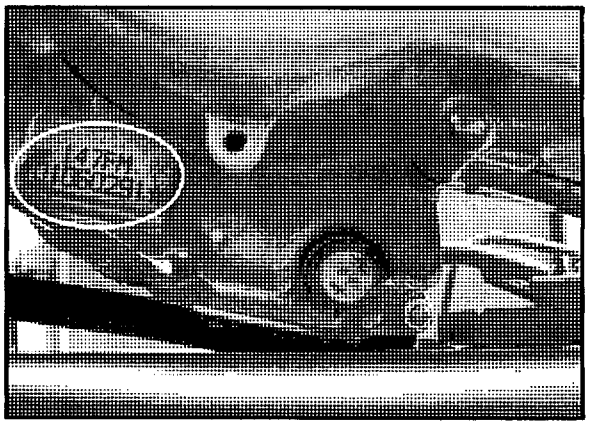
⚠ WARNING

- **To avoid serious burn or injury, always take caution when working with gasoline.**
- **DO NOT refuel when engine is hot.**
- **Always refuel with the engine stopped and outdoors or in a well-ventilated area.**
- **Be sure to tighten fuel cap after refueling.**
- **Avoid all spilling.**
- **If you get gasoline on your skin or clothing immediately wash it off with soap and water and change clothing.**
- **DO NOT smoke around gas container or go kart and keep away from open flame.**
- **Follow all gasoline producer directions.**

MODEL IDENTIFICATION

ENGINE NUMBER

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

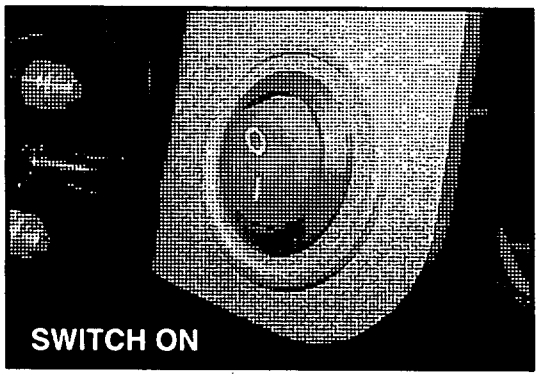


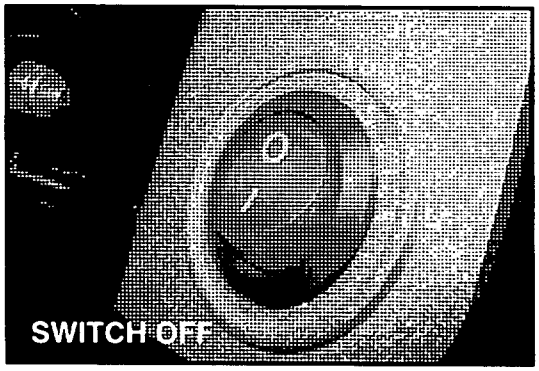
STARTING THE ENGINE

- Always wear a helmet and other essential safety gear.
- Get in the kart slowly. Do not jump in.
- Fasten seat belt.
- Adjust seat position to comfort using lever directly in front and under seat.
- Apply brake.
- Flip green ON/OFF switch to ON position.
- With brake still depressed, start engine by pressing red starter button.

  Note: Engine will not turn over unless brake pedal is depressed.

  Note: Do not depress accelerator pedal prior to starting. This unit has an automatic choke and depressing the accelerator overrides the choke and makes it difficult to start.
- To immediately kill engine -- flip green ON/OFF switch to OFF position.





⚠ WARNING

- **The exhaust pipe, muffler, and heat shields are very hot during and after operation. DO NOT touch them until they have cooled.**
- **The engine exhaust from this product contains chemicals known to cause cancer, birth defects, or other reproductive harm.**

Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and / or death. Avoid prolonged inhalation.

BREAK-IN PROCEDURE

- For the first 2 hours of operation do not exceed 2/3 throttle.
- Do not use 100% throttle for first 10 hours of operation.
- Vary engine speed for the first 5 hours of operation.
- After 10 hours of operation, adjust valves.
- Change oil after first 5 hours of operation.

PERIODICAL CHECK AND SERVICES

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

A: adjust
C: clean
L: lubricate
R: replace
I: inspect, clean or replace if necessary

	Frequency of Service				
Items	**Initial service**	**Daily**	**Monthly**	**Quarterly**	**Yearly**
Brake performance	I	I	I		
Torque of nuts and bolts	I	I	I		
Air filter				C	I
Carburetor	I		A		C
Spark plug				C,A	
Drive Chain	I	I	I	C,A,L	
Brake fluid		I		I	
Replace gearbox oil			I	R	
Battery	I			I	
Engine oil	R	I	R		
Valve clearance of engine				A	

MAINTENANCE AND TUNE-UP PROCEDURE

This section describes the servicing procedures for each item in the Periodic Maintenance requirements.

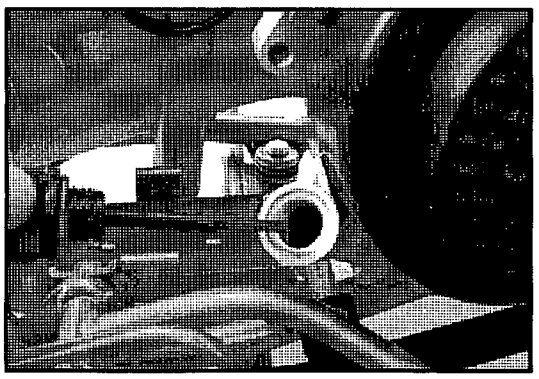
ENGINE OIL

API Classification SF – SG (SAE 10W – 40)

Frequency: Inspect engine oil before each period of operation. Replace monthly.

CHECKING THE ENGINE OIL:

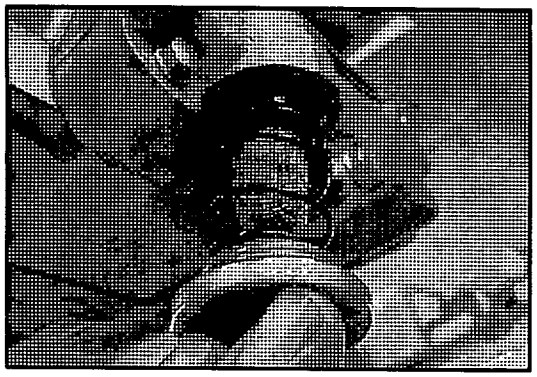
- Place unit on flat surface.
- Remove dipstick and wipe off with a clean cloth.
- Put dipstick in hole without screwing it in.
- Check oil level to see if it is between min and max indicators.



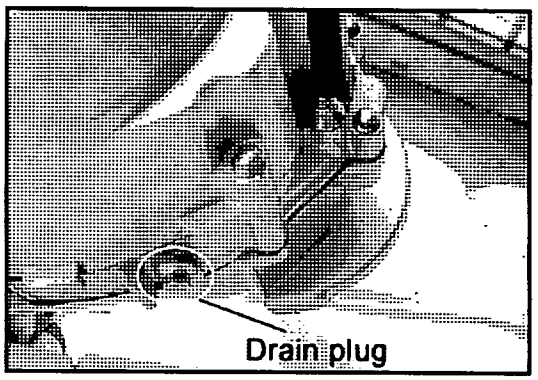
- Add oil as necessary to reach required level.

CHANGING THE ENGINE OIL:

- Run unit for at least 5 minutes or until warm, shut off.
- Place suitable container for draining oil beneath engine.
- Container should be capable of holding at least 1 gallon.
- Remove the engine drain plug, oil filter cap, spring, and oil filter screen. Drain the oil completely.

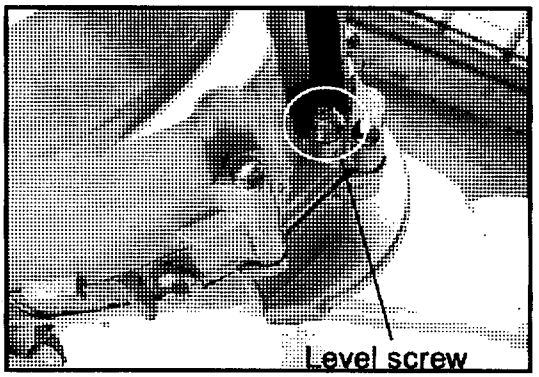


- Check condition of O-ring and filter screen for foreign material before installing.
- Install the drain plug and torque to 12 ft. / lbs.
- Fill with **25 to 31 oz**. of API classification SF – SG (SAE 10W – 40) oil.
- Start engine and check for leaks.
- Shut off engine and check the oil level with dipstick, do NOT screw the dipstick in when making this check. Add oil if necessary to reach safe amount.

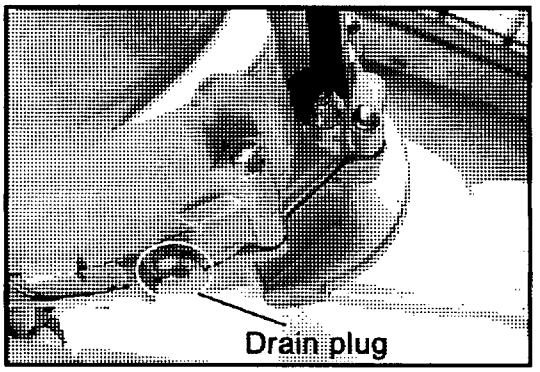


FINAL GEAR OIL

Inspect final gear oil level monthly and change final gear oil every 3 months.



- To check level, remove level screw on the left rear engine case. If gear oil does not come out of hole, add until it does.



- To drain gear oil, remove the drain plug at the rear bottom of the engine case. It is recommended to warm the engine for 10 minutes or more before draining final gear oil.

Note:
API Service Standard GL-5, GL-4, GL-3 SAE 80W 90 gear oil is recommended in the final drive case. However, in extreme cold weather conditions it is then advised to use lighter viscosity oil, such as 75 wt.

Final drive capacity: 115 cc 4 oz.

SPARK PLUG - **NGK C7HSA**

- Clean up the carbon around the spark plug to prevent the carbon from dropping into the cylinder when removing the spark plug.
- Remove the spark plug.

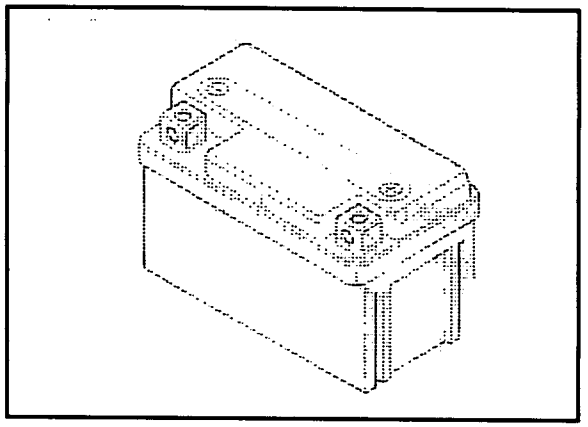
Clean up carbon accumulation on the spark plug with a steel brush or a blade.
Inspect the spark plug gap, in general it should be about

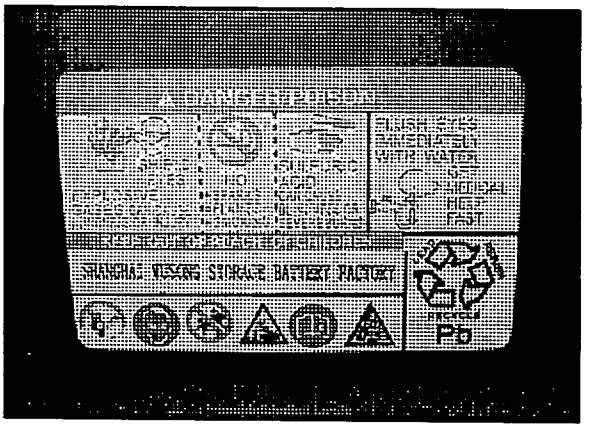
Spark plug gap: .024 in. ~ .028 in. (0.6 ~ 0.7mm).

Note: If the carbon accumulation and wear on the spark plug appear to be excessive, replace it with a spark plug of the same specification.

BATTERY INSTALLATION

INITIAL SERVICE AND INSTALLATION OF BATTERY:





⚠ WARNING

The following procedure is very dangerous and should be performed with utmost care and attention. Wear protective eyewear, rubber gloves, and have water available should electrolyte come in contact with skin or eyes. KEEP ALL CHILDREN AWAY FROM THE AREA WHILE THIS PROCEDURE IS BEING PERFORMED.

POISON – CAUSES SEVERE BURNS
Contains sulfuric acid.
Avoid contact with skin, eyes, or clothing
TO prevent accidents, rinse empty container with water.

ANTIDOTE:
External – flush with water
Internal – Drink large quantities of water or milk. Follow with milk of magnesia, beaten eggs or vegetable. Call physician immediately.
Eyes – Flush with water for 15 minutes and get prompt medical attention.

KEEP OUT OF THE REACH OF CHILDREN

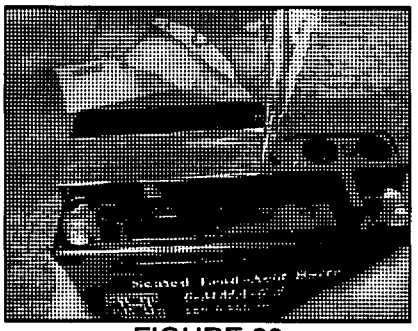


FIGURE 20

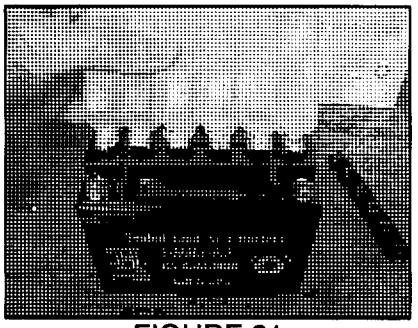


FIGURE 21

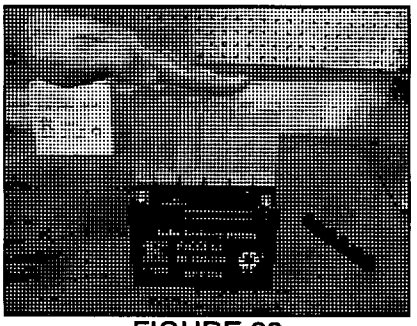


FIGURE 22

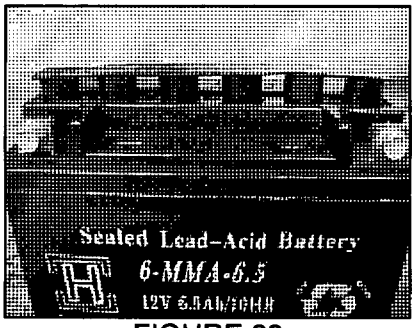


FIGURE 23

Preparing the battery:

- Place battery on level surface. Remove sealing tape from top. **(see figure 20)**
- Take the electrolyte container out of the plastic bag.
- Place electrolyte container upside down with the sealed silver mouths of the electrolyte bottles in line with the six filler holes of the battery. **(see figure 21)**
- Push the container down strongly enough to break the silver seals. **(see figure 22)**
- As electrolyte starts flowing into battery, air bubbles will come up from the mouths of the plastic electrolyte bottles.
- Leave bottles upside down in battery holes until electrolyte is completely drained.
  - Never leave children unattended around battery.
- If air bubbles cease to float to the top of the electrolyte bottles, tap lightly on top.
  - DO NOT remove container from battery while it is draining.
  - Never cut or pierce electrolyte container.
- After all the electrolyte has drained from the bottles into the battery, pull plastic electrolyte bottles gently out of the battery.
- Discard empty electrolyte bottles in a waste area that is inaccessible to children and animals.
- After filling let battery stand for at least 30 minutes before charging. This allows the electrolytes to penetrate plates for optimum performance and ensures longer battery life.
- After 30 minutes the battery is ready for its initial charge. Place cap strip loosely over the filling holes as shown in the picture. **(see figure 23)**

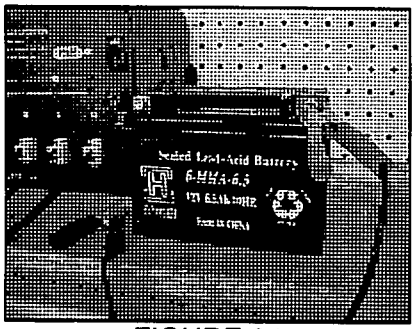


FIGURE 24

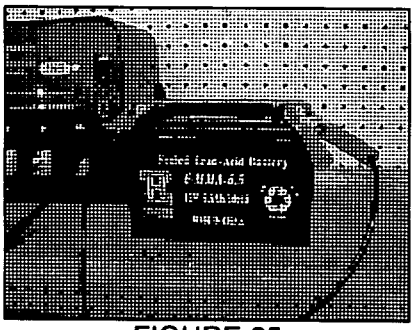


FIGURE 25

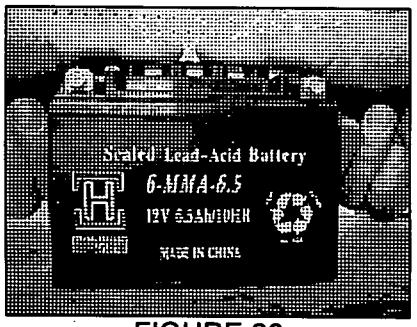


FIGURE 26

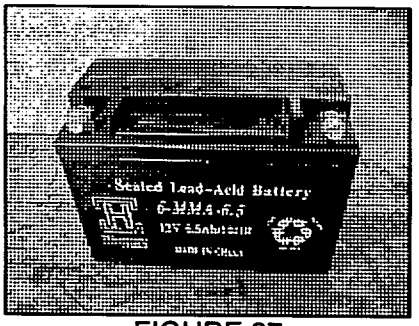


FIGURE 27

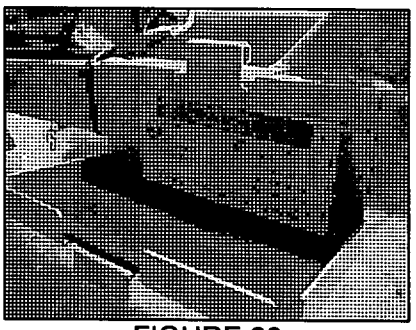


FIGURE 28

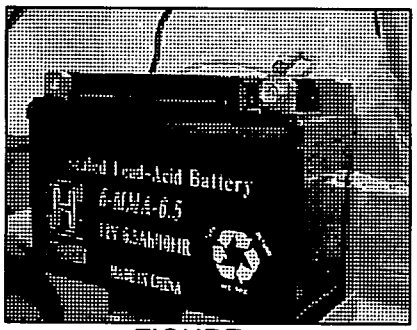


FIGURE 29

• How to Initially Charge the battery:

1 Connect the red positive (+) cable to the red positive (+) pole of the battery. **(see figure 24)**

2 Connect the black negative (-) cable to the black negative (-) pole of the battery. **(see figure 25)**

Note: The red positive (+) cable has a larger diameter than the black negative y cable.

3 Charging rate: Charge battery @ 0.7 Amps for 5 ~ 10 hours.

• After charging is complete, press down firmly with both hands to seat the caps. (Do not pound or hammer.) The battery is now sealed. **(see figure 26 and 27)**

⚠ WARNING

NEVER REMOVE THE STRIP OF CAPS NOR ADD ANY WATER OR ELECTROLYTE.

• Install battery into battery tray making sure that the rubber mat is in place. The warning label on the battery should be facing the warning label on the gray tray. **(see figure 28)**

• Once battery is firmly seated in gray tray with rubber mat under it, attach the red positive wire to the red positive terminal on the battery. **(see figure 29)**

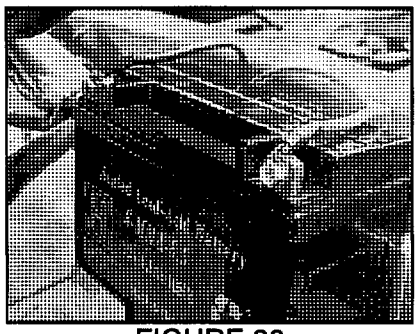


FIGURE 30

- Then attach the black negative wire to the black negative terminal on the battery. **(see figure 30)**

- Place grey plastic battery cover on top of the battery and thread wires through the cover cuts – outs. Finally, secure the battery with the wide black rubber strap using the hooks on both ends. **(see figure 31 and 32)**

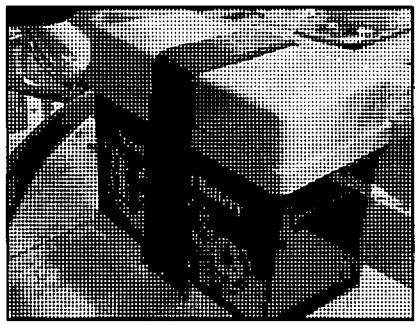


FIGURE 31

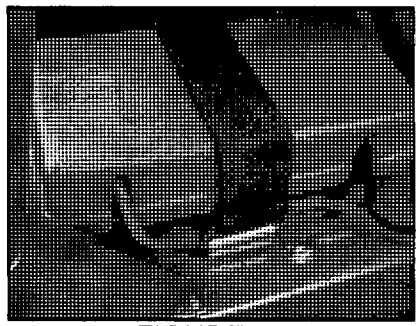


FIGURE 32

BATTERY CHARGING

Note: Use a battery charger with 2 amps or less.
Charging Rate: 0.7 A x 5 ~ 10 h
(Charge for 5 – 10 hours @ 0.7 Amps)

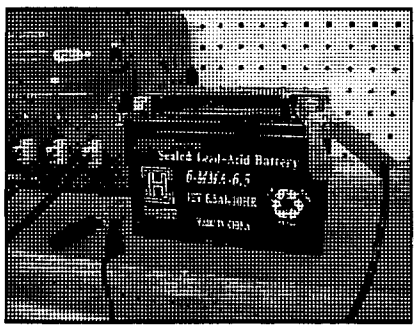
- Remove the wide, black battery cover strap and the gray battery cover.
- First remove the black negative y lead from the battery.
- Then remove the red positive ≈ lead from the battery.
- Remove the battery from the battery tray.
- Check the battery voltage with a meter.
- If the voltage reading is below 12.3V, recharge the battery.

Battery Service Limit:

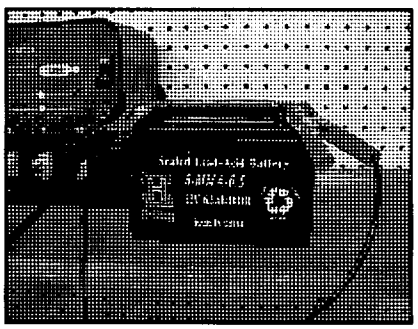
Fully charged 12.8 V
Needs charging 12.3 V

- How to charge the battery:

Connect the red positive (+) cable to the red positive (+) pole of the battery.



Connect the black negative (-) cable to the black negative (-) pole of the battery.



Note: Always keep the battery clean. Apply dielectric grease around the battery terminals to prevent corrosion.

⚠ WARNING

- **DO NOT open sealed caps to add water to battery.**
- **Always wear safety glasses and charge in a ventilated area.**
- **If battery gets hot to the touch, discontinue charging and allow battery to cool down.**
- **Do not use fast charging unless it is an emergency.**
- **At the beginning or end of charging, turn off the charger first, in order to prevent electric spark and explosion.**
- **Charge in a well ventilated area.**
- **DO NOT smoke around batteries and keep away from open flame.**

BATTERY REPLACEMENT:

- Remove old battery. Mark which cable is connected to the positive terminal (+) and which cable is connected to the negative (-) terminal.
- Clean cable connectors with wire brush or sandpaper to remove oxidation.
- After charging, install new battery. Put dielectric grease on the battery terminals to avoid corrosion. Connect cables to the proper terminals. Positive cable to positive terminal (+) and negative cable to negative terminal (-).
- Positive (+) cable is red and larger in diameter. Negative (-) cable is black and smaller of the two in diameter. CONNECT NEGATIVE CABLE LAST.
- Torque terminal bolts to 40 in. / lbs.
- Place rubber pad in bottom of battery tray.
- Securely fasten battery to the vehicle using cover and strap.

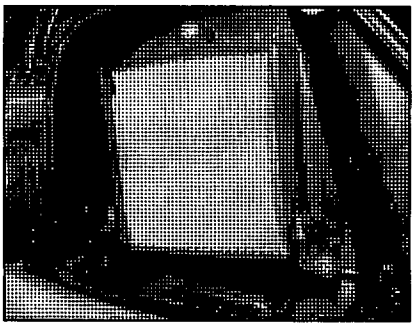
⚠ WARNING

- **To avoid possibility of explosion, always connect battery cable in the order specified: RED (+) first; BLACK (-) last. An exploding battery can cause serious injury or death.**
- **Batteries contain sulfuric acid.**
- **Always shield eyes with protective eyewear when working around battery acid.**
- **Battery acid is poisonous and can cause severe burns.**
- **DO NOT smoke around batteries and keep away from open flame.**

AIR FILTER

Clean at least every 3 months. More often if operating in dusty conditions.

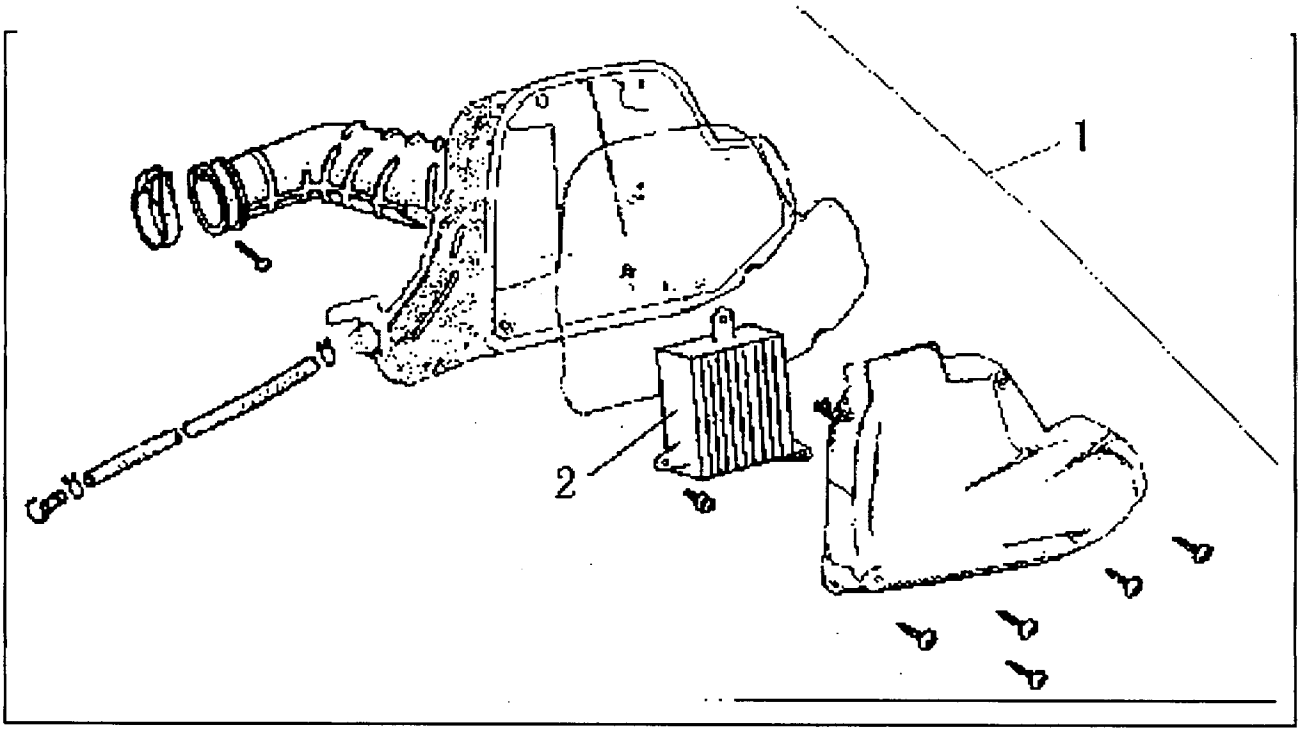
If the air filter is clogged with dust, performance will be adversely affected and if left unserviced, engine damage can occur. Check and clean in the following manner:



- Remove the 5 screws on air filter and remove the cover. Remove the 3 screws of the air filter and remove element.

- Clean the air filter cover with mild, sudsy water. Rinse and allow to dry.

- Install a new air filter element and reattach cover. Tighten screws.



⚠ WARNING

Before and during service, inspect the element for rips. A torn element must be replaced.

Make sure that the element is seated properly and no foreign material can pass by it.

NUTS AND BOLTS

Inspect first week and every month thereafter.

Because frequent operation can cause the kart's nuts and bolts to loosen, they should be checked and tightened often. Use the chart below as a torque reference.

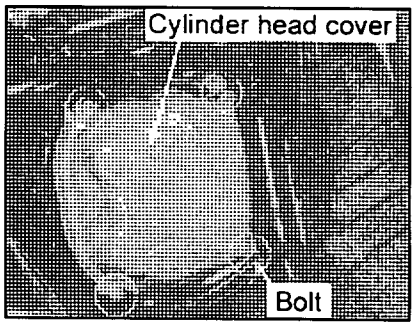
TIGHTENING TORQUE CHART

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 ~ 6.0	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

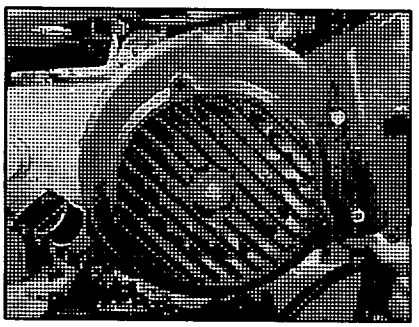
VALVE CLEARANCE INSPECTION

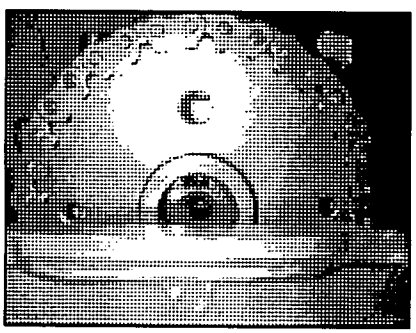
Note: Inspection and adjustment must be done when the engine is cold. (Below 95° F / 35° C).

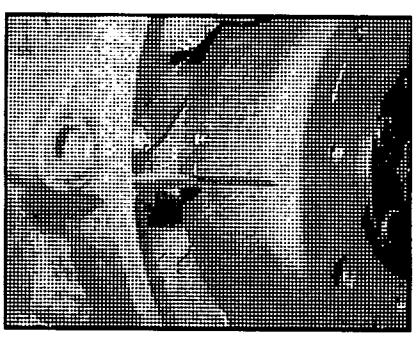
Remove the cylinder head cover. Take care not to damage O-ring gasket. If damaged, replace with a new gasket.



Unfasten the fan cover by unscrewing the 4 six mm bolts. Remove fan cover.







Turn the crankshaft so that the "T" mark on the flywheel lines up with the corresponding mark on the engine case. Timing marks on cam sprocket must be aligned with cylinder surface. Cam lobes must be pointing downward.

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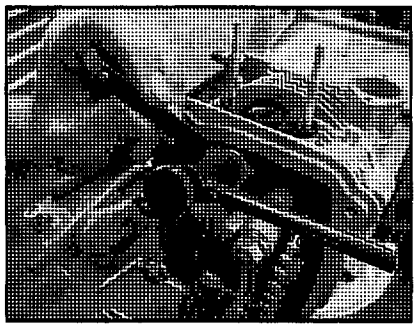


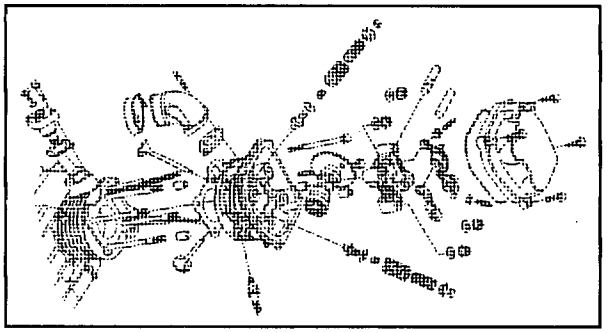
- Loosen the lock nuts on tappet screws to adjust valves.
- To adjust the valves use a valve adjusting wrench.
- To decrease valve clearance: turn tappet screw clockwise.
- To increase valve clearance: turn tappet screw counterclockwise.
- Use a thickness gauge to measure the valve clearance to .003 ~ .005 in.
- Take out the thickness gauge, tighten the lock nuts, and inspect the valve clearance to assure that it falls within the range of compliance.

Valve clearance:

Intake & Exhaust Valve clearance	0.003 ~ 0.005 in.

Note: Tightening the lock nuts often affects the amount of valve clearance. Readjust as necessary.

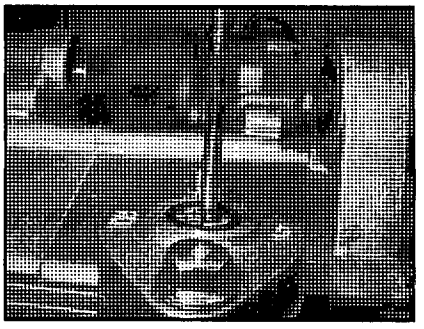
VALVE MECHANISM INSPECTION AND SERVICING



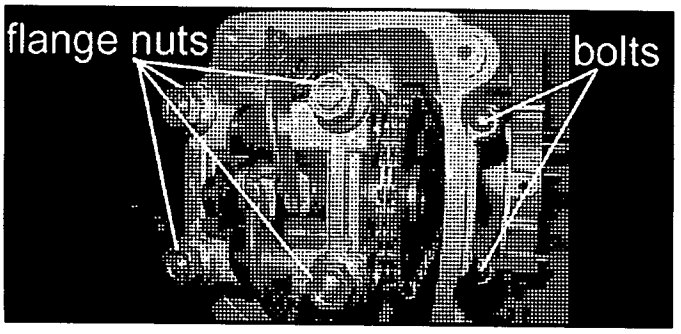
The diagram below depicts the common valve train of a four-stroke engine. It consists of an over-head valve train with the intake port, exhaust port, and cam shaft located in the cylinder head. The valves are located in the top of the combustion chamber.

CYLINDER HEAD REMOVAL

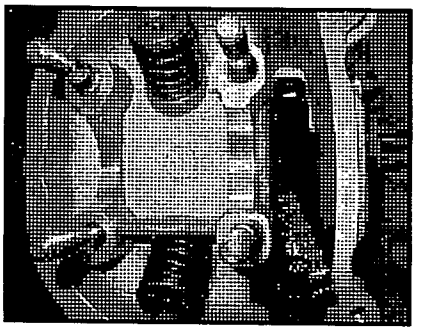
- Remove carburetor
- Remove exhaust
- Remove fan shroud assembly
- Remove cylinder shroud assembly
- Remove valve cover
- Remove Philips screw and O-ring from cam chain tensioner.
- Insert small, straight screwdriver and turn clockwise until spring loaded tensioner locks. This allows slack in cam chain for removal of cam shaft.



Remove the 2 bolts and 4 flange nuts and washers.

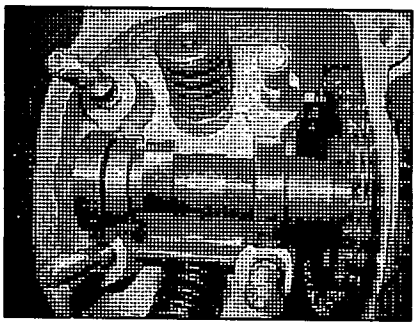


Remove cam shaft holder and dowel pins.



Remove cam chain from sprocket and remove cam shaft.

Remove cylinder head and gasket.



CYLINDER HEAD INSTALLATION

- Install new gasket and dowel pins onto cylinder.
- Install cam chain guide.
- Install cylinder head.
- Align the "T" mark on the flywheel with the index mark on the engine case by turning the flywheel.
- Position the camshaft gear with cam chain so that timing marks on sprocket align with the cylinder head surface and the large hole is on the top. (The lobes of the camshaft should be pointing downward.)
- Install the dowel pins.
- Install camshaft holder with "EX" pointing towards exhaust.

Note: Apply some oil on the thread part of the camshaft holder bolt.

The camshaft holder nuts should be tightened gradually in 2 ~ 3 times diagonally.

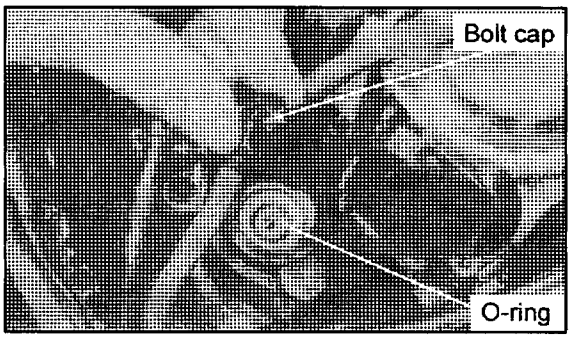
After installing, adjust the valve clearance.

- Torque the cylinder head nuts and bolts.
  Bolts: 95 in. / lbs.
  Nuts: 16 ft. / lbs.

- Insert small straight screwdriver and turn the cam chain tensioner bolt counter-clockwise and release the lock. Do NOT tighten.

- Apply oil on the new O-ring.

- Install and tighten the cam chain tensioner cover bolt.



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

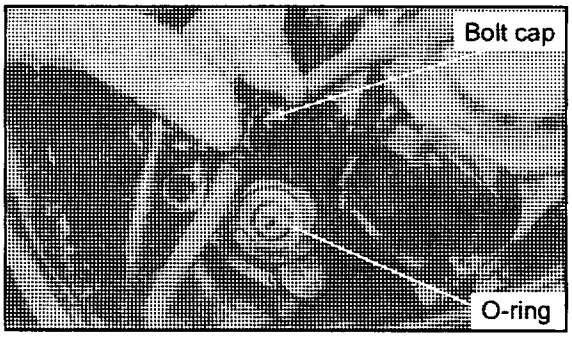
CAMSHAFT

The camshaft is the main driving unit of the valve train. There is an air inlet cam lobe and an exhaust cam lobe. The camshaft wear will affect the correct operation of the valve.

CAMSHAFT REMOVAL

- Remove cylinder head cover.

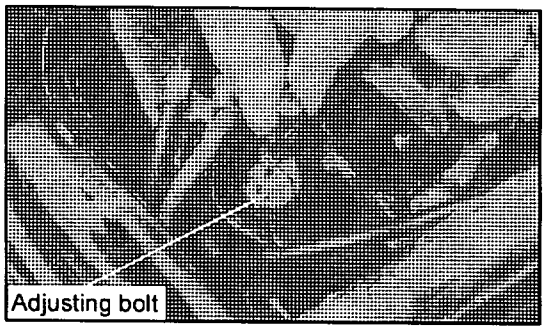
- Remove the cam chain tensioner bolt cap, and remove the O-ring



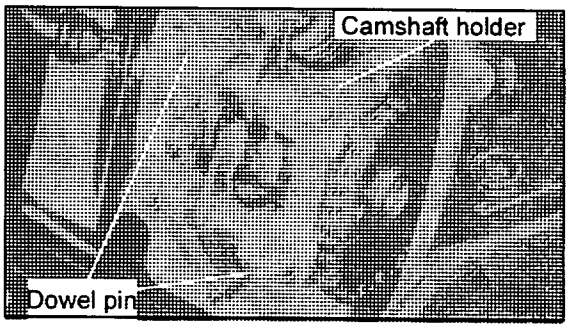
- Insert small straight screwdriver into hole and turn clockwise until it locks.

- Turn the flywheel counter-clockwise to make the "T" mark on the flywheel align with the mark on the crankcase.

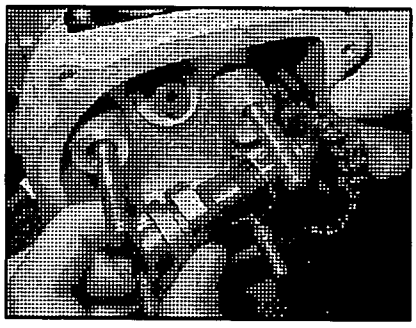
- When the hole on the cam chain sprocket is pointing upwards and cam lobes are pointing down, it is at top dead center position.



- Remove the cylinder head bolts.
- Remove the camshaft holder nuts and washers.

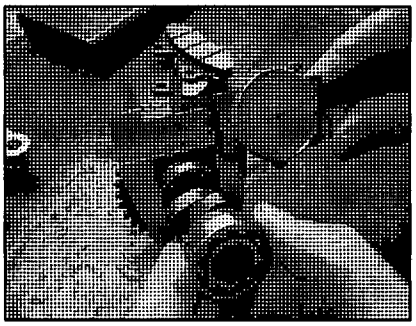


- Remove the camshaft holder and dowel pin.
- Lift the cam chain off the sprockets.



CAMSHAFT INSPECTION

- Inspect if the camshaft bearings are loose or worn. If there are excessive signs of wear – replace the whole set.
- Inspect if there is any damage on the cam surface. If the cam surface appears to be excessively damaged – replace it.
- Measure the height of the cam.

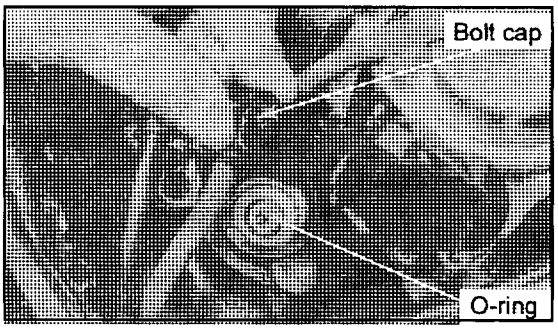


Inlet cam	25.960 mm	1.022 in.
Exhaust cam	25.815 mm	1.016 in.

CAMSHAFT INSTALLATION

- Align the "T" mark on the flywheel with the index mark on the engine case by turning the flywheel.
- Position the camshaft gear with cam chain so that timing marks on sprocket align with the cylinder head surface and the large hole is on the top. (The lobes of the camshaft should be pointing downward.)
- Install the dowel pins.
- Install camshaft holder with "EX" pointing towards exhaust.

  Note: Apply some oil on the thread part of the camshaft holder bolt.
  The camshaft holder nuts should be tightened gradually in 2 ~ 3 times diagonally.
  After installing, adjust the valve clearance.
- Torque the cylinder head nuts and bolts.
  Bolts: 95 in. / lbs.
  Nuts: 16 ft. / lbs.
- Insert small straight screwdriver and turn the cam chain tensioner bolt counter-clockwise and release the lock. Do NOT tighten.
- Apply oil on the new O-ring.
- Install and tighten the cam chain tensioner cover bolt.



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

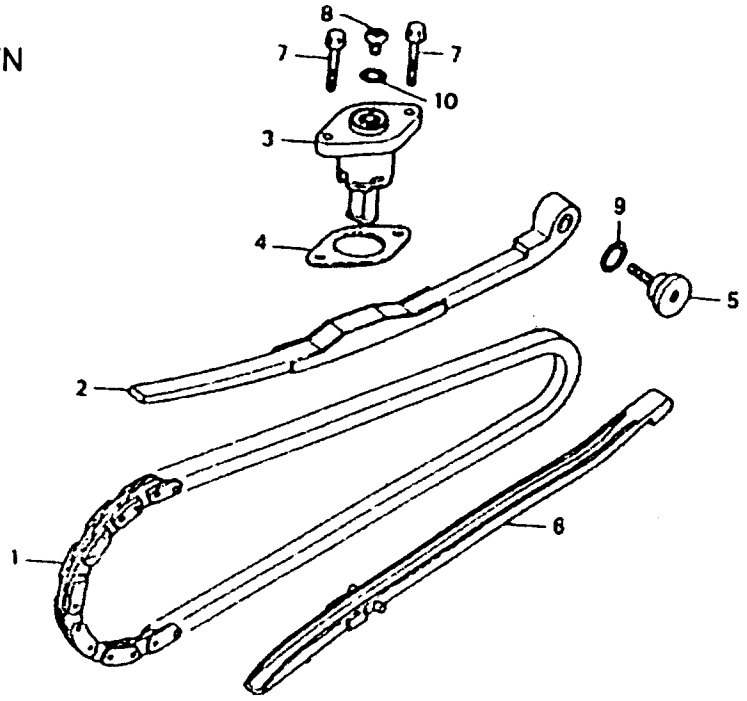
CAM CHAIN TENSIONER

The cam chain tensioner prevents the cam chain from being vibrated off when the engine is running. It is a common feature found in most four-stroke engines.

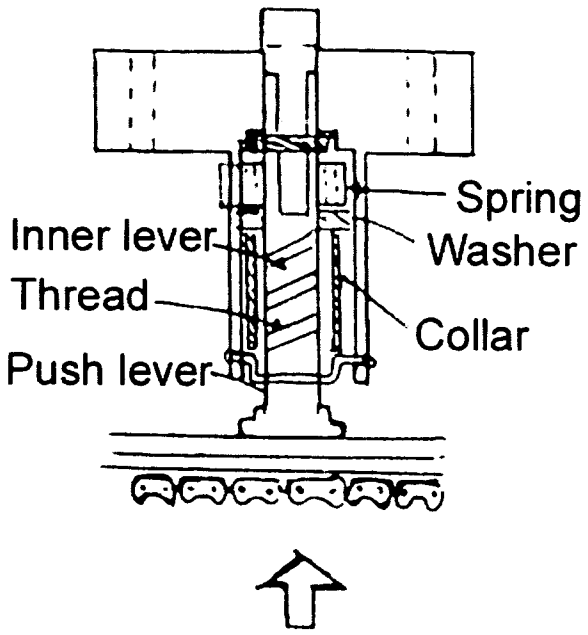
Note: the cam chain tensioner is a spring loaded device and should not need to be adjusted unless you are removing and installing camshaft.

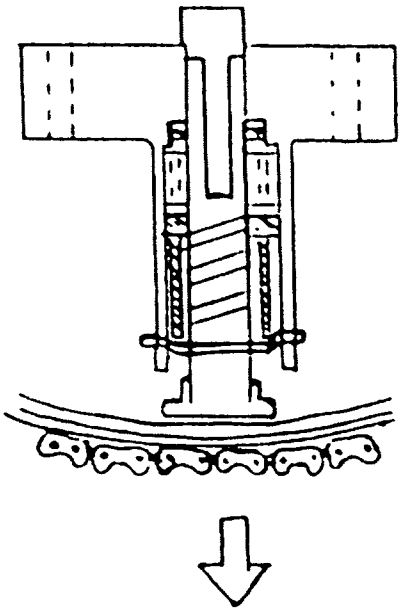
CAM CHAIN PARTS BREAKDOWN

1. Cam chain
2. Cam chain tensioner
3. Cam chain tensioner lifter
4. Gasket
5. Cam chain tensioner pivot
6. Cam chain guide
7. Bolt
8. Nut
9. O-ring
10. O-ring



The operational principle of the tensioner is as shown in the picture below:

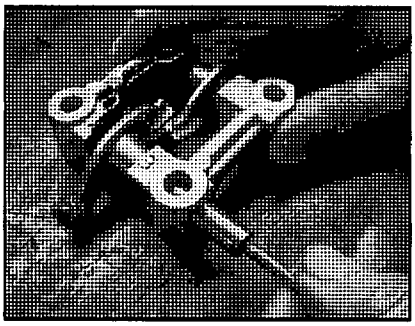




ROCKER ARM AND ROCKERSHAFT

ROCKER ARM AND ROCKERSHAFT REMOVAL

- Remove the camshaft holder.
- Pull rockershafts out by inserting a 5 mm bolt in the rockershaft.
- Remove rockerarm



ROCKER ARM AND ROCKERSHAFT INSPECTION

Inspect for damage on the rocker arm and rockershaft and check if the oil hole is clogged.

- If there is abrasion on the working surface of the rocker arm, the cam should be inspected for damage to the cam lobe.

Measuring the *inner* diameter of the rocker arm:

Service limit
10.10 mm
0.398 in.

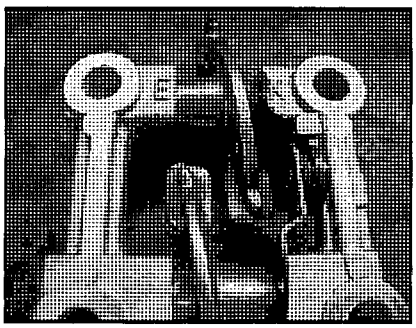
Measuring the *outer* diameter of the rockershaft:

Service limit
9.91 mm
0.390 in.

ROCKER ARM AND ROCKERSHAFT INSTALLATION

The camshaft holder has "EX" stamped on the exhaust side. Pay close attention when installing rockers and rocker arm shafts because the shafts are different.

Note: apply some oil on the rockershaft before installing.



VALVE AND VALVE SPRING

VALVE AND VALVE SPRING REMOVAL

REMOVING THE CYLINDER HEAD:

- Remove the valve keeper with the valve spring compressor.
- Remove the upper spring retainer, valve spring, lower spring seat, and valve stem oil seal. Note: remove the parts and place them aside in order to aid reassembly.
- Remove the valve from the other side. Keep the intake valve and exhaust valve parts separate.

VALVE AND VALVE SPRING INSPECTION

- Inspect if the valves are bent or burned.
- Inspect if the action is smooth between the valve and the valve guide.

Measuring the outer diameter of the valve stem:

Service limit	4.9 mm	1.930 in.

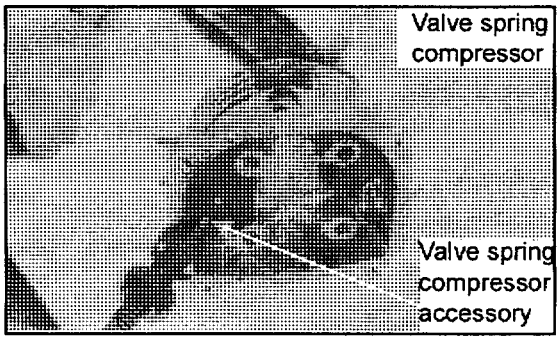
Measuring the free length of the inner and outer valve spring:

Valve	Inlet Valve	Exhaust Valve	
Inner spring	31.2 mm	31.2 mm	(1.228 in.)
Outer spring	34.1 mm	34.1 mm	(1.342 in.)

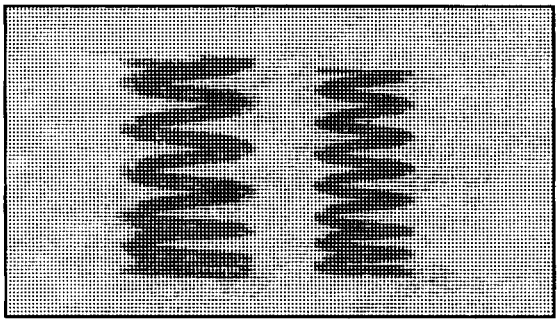
VALVE AND VALVE SPRING INSTALLATION

- Mount the spring retainer, valve guide oil seal.
- Replace the valve guide oil seal with a new one.
- After applying oil on the valve stem, mount it into the valve guide.
- Mount the inner and outer valve springs.

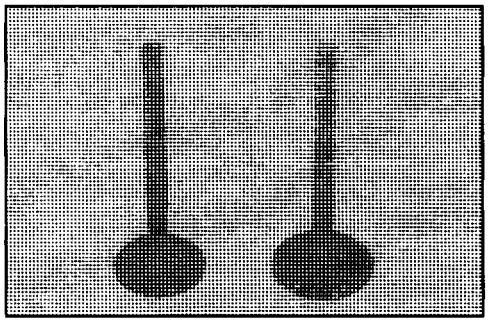
- Mount the valve keeper with a spring compressor.



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



- Seat the keepers on the valve by tapping the valve tip with a small hammer.

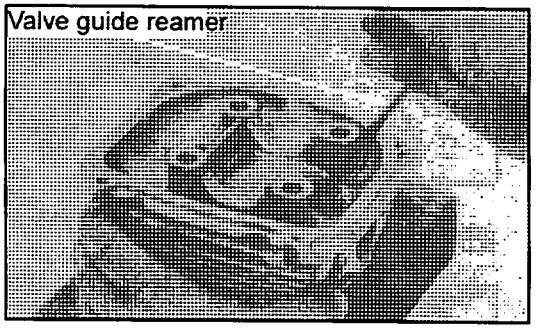


VALVE GUIDE

Carbon accumulation on the valve guide restricts play and can even cause the valve to not open and close properly. If the exhaust pipe is emitting white smoke it may be a result of valve guide abrasion.

CLEANING THE VALVE GUIDE:

- Remove the valve and valve springs
- Use a valve guide reamer to clean up the carbon accumulation.

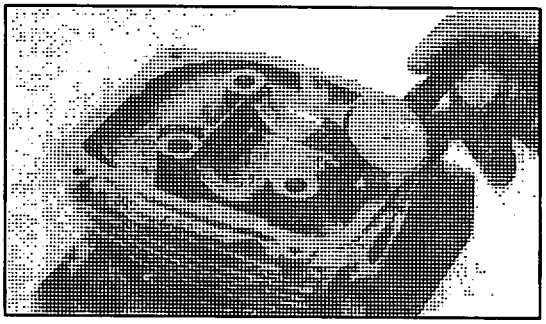


Note: only turn right when using the reamer and do not push in or out directly with the reamer.

MEASURING THE VALVE GUIDE INNER DIAMETER:

Service limit 5.03 mm 0.198 in.

- Calculate the clearance between the valve stem and the valve guide.



- (The inner diameter of the valve stem minus the outer diameter.)

Valve guide Service limit

Inlet valve	Exhaust valve
0.08 mm	0.10 mm
0.0035 in.	0.004 in.

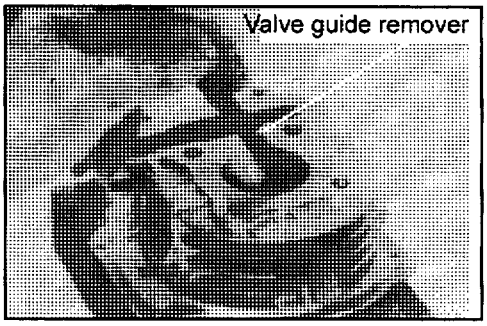
- If the abrasion of the valve guide exceeds the service limit, it should be replaced.
- After installing a new valve guide, the valve seat must be reconditioned.

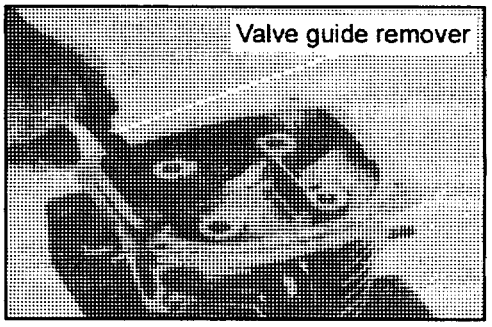
VALVE GUIDE REPLACEMENT

- Heat the cylinder head to 212°F ~ 302°F. (100°C ~ 150°C)

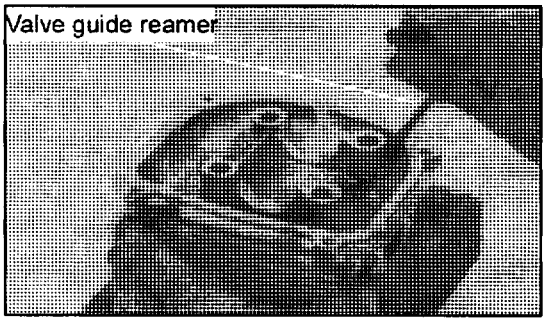
Note: The cylinder head must be heated quickly and in its entirety. Warping may occur if it is heated partly or not quickly enough. However, do take care around the high level of heat.

- Tap the valve guide out with a valve guide remover or similar tool. Do not damage the cylinder joint face





After tapping the valve guide in, ream to size.



⚠ WARNING

When using the reamer, cutting oil must be used.
Only turn right, do not push in or out directly.

VALVE SEAT

The relative position between the valve seat and the working surface of the valve is very important for attaining a proper valve seal. The purpose of the inspection is to make the valve seat joint well with the valve head.

VALVE SEAT WIDTH MEASUREMENT

- Clean up the carbon accumulation in the combustion chamber.
- Measure the width of the valve seat with a vernier caliper.

Standard	1.0 mm	0.0395 in.
Service limit	1.8 mm	0.071 in.

When abrasion causes the valve seat width to be uneven, too wide or too narrow, it will result in bad contact between the valve and the valve seat and the seal will not be tight. When this happens the valve seat must be reconditioned with a customized valve seat milling cutter.

The valve seat milling cutter is a customized trimming tool for the valve seat. It has three cutting angles: 32°, 45°, and 60°.

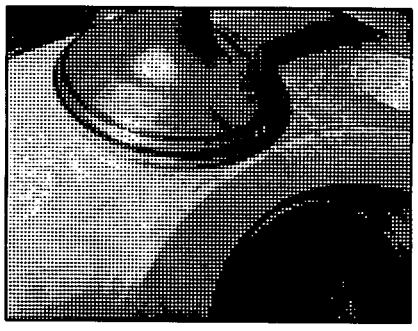
VALVE SEAT FINISHING

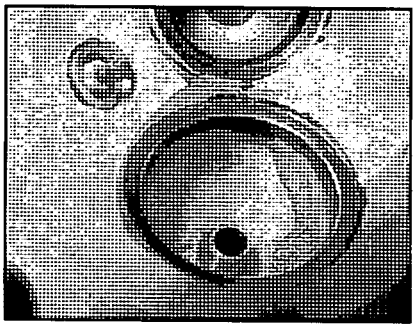
- Ream out the defects on the working surface with a 45° coarse tooth milling cutter but be careful to not ream too much.
- Ream the upper angles of the valve seat working surface with a 30° milling cutter.
- Ream the lower angles of the valve seat working surface with a 60° milling cutter.
- Finally, ream the valve seat to the specific seat width with a 45° milling cutter.

VALVE AND VALVE SEAT SEAL INSPECTION

The seal between the valve seat and valve can be inspected by coating the seat and valve seating surface with layout fluid or a magic marker.

- Put valve in seat; spin valve back and forth with very light pressure.
- Remove valve and inspect.





The die or marker should be wiped off all the way around the valve and seat sealing areas. If any marker is still on the sealing area it will leak pressure.

VALVE AND VALVE SEAT LAPPING

If the inspection reveals leaks in the seal, the valve and valve seat should be lapped.

Notes:

Before lapping, clean up the valve, valve seat, and valve guide.

When lapping do not use too much force; press down the valve suction cup lever gently.

During lapping, do not drop any lapping compound into the place between the valve lever and the valve guide.

Lapping the valve seat:

- Spread a thin layer of lapping compound on the working bevel of the valve.
- Use a valve suction cup with rubber cup to catch up the top of the valve and repeatedly rub the valve suction cup lever to lap the valve and valve seat evenly, until they match tightly.
- Lapping will clean small pits on sealing surface but if lapping does not clean up the seal you may have to replace the valve and recondition the valve seat.

ENGINE COMPONENTS INSPECTION AND SERVICING

INSPECTION AND SERVICING: ENGINE COMPONENTS AND CRANK CONNECTING ROD MECHANISM

CYLINDER

CYLINDER REMOVAL:

- Remove cylinder head (See Cylinder Head Removal under Valve Mechanism Inspection).
- Remove cylinder
- Clean gasket surface

CYLINDER BORE INSPECTION:

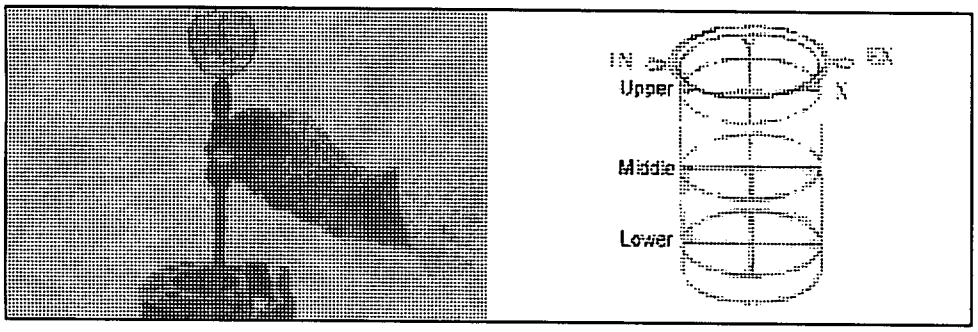
- Remove all gasket material from the cylinder sealing surfaces.
- Inspect the top of the cylinder for evidence of warping using a straight edge and feeler gauge.

Service Limit	0.04 mm	0.002 in.

- Inspect cylinder for wear, scratches, or damage.

- Inspect cylinder for taper and out of round. Measure in two different directions, front-to-back and side-to-side, on three different levels:
  - 1/2" down from top
  - in the middle
  - 1/2" up from bottom

- Record measurements. If cylinder is tapered or out of round beyond 0.04 mm or 0.002 in., the cylinder must be replaced.



Service Limit	52.05 mm	2.049 in.
Cylinder Taper	0.05 mm	0.002 in.
Cylinder Out of Round	0.05 mm	0.002 in.

PISTON SET

PISTON PIN INSPECTION AND SERVICING:

- Insert the piston pin horizontally into the piston pin hole, and inspect the clearance between piston and piston pin.

  Service limit 0.02 mm 0.001 in.

MEASURING THE EXTERNAL DIAMETER OF PISTON PIN:

- If the measurement is less than the service limit, the piston pin should be replaced.

  Service limit 14.96 mm 0.589 in.

- After replacement, the clearance between piston pin and piston pin hole should be checked again to ensure compliance with the proper diameter.

MEASURING THE INNER DIAMETER OF PISTON PIN HOLE:

Service limit 15.04 mm 0.5925 in.

- If the result is more than the service limit, replace the piston.

INSPECTION AND SERVICING PISTON RINGS:

- Measure piston ring-to-groove clearance by placing the ring in the ring core and measuring with a thickness gauge.
- Replace piston and rings if ring-to-groove clearance exceeds service limits.

First Ring
Service limit 0.09 mm 0.0035 in.

Second Ring
Service limit 0.09 mm 0.0035 in.

Oil Ring
Service limit 0.12 mm 0.0045 in.

CONNECTING ROD END INSPECTION:

- Measure the inner diameter of the connecting rod at the small end.

Service limit 15.06mm 0.593 in.

- If the connecting rod is damaged beyond the service limit, the crankshaft should be replaced.

PISTON RING INSTALLATION GAP:

- Apply oil on every piston ring.
- Enlarge piston rings, while placing them on the piston and move downwards gradually, until piston rings fall into ring groove.

PISTON INSTALLATION

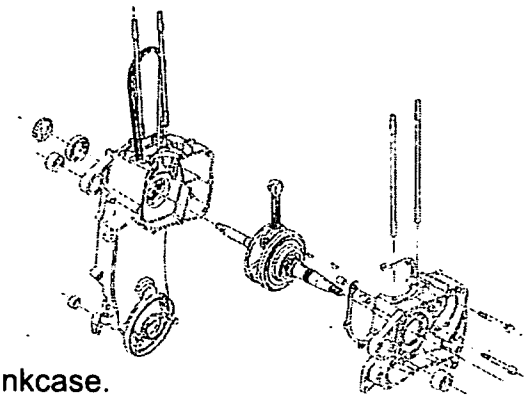
- Mount piston onto the small end of the connecting rod.
- Apply oil on the piston pin to lubricate it.
- Place a piece of cloth on the crank case port to prevent the piston pin clip from dropping into the crankcase.

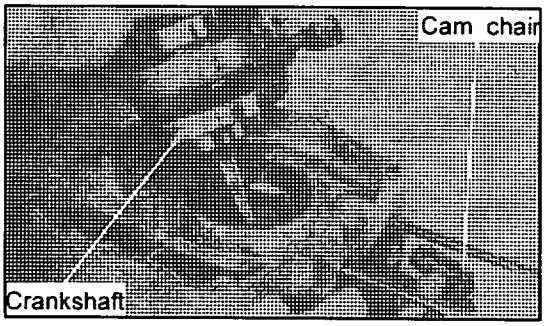
CRANK CONNECTING ROD SET

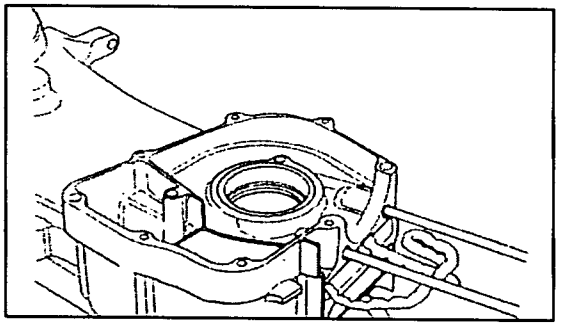
CRANKCASE AND CRANKSHAFT REMOVAL:

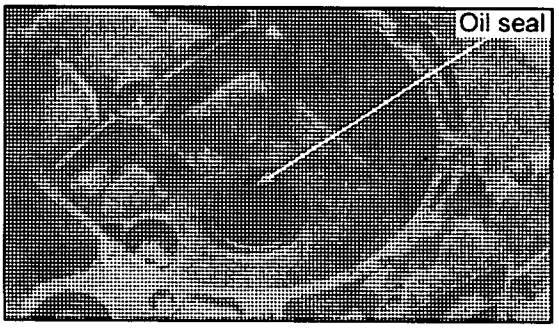
In order to remove the crankcase and crankshaft, one must first:

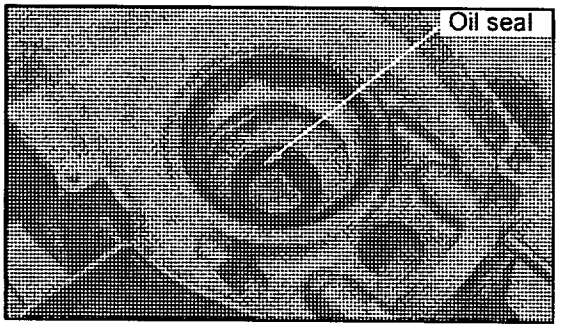
1. Remove the engine.
2. Remove the covers for the cylinder head, clutch, and fan.
3. Remove the cylinder shroud.
4. Remove the cam holder
5. Remove the cam chain tensioner bolt and cam chain tensioner.
6. Remove the cylinder head.
7. Remove the cylinder.
8. Remove the piston
9. Remove the drive clutch.
10. Remove the AC generator.
11. Remove the starting motor.
12. Remove the right hand crankcase cover.
13. Remove the oil pump.
14. Remove the starter clutch. *
15. Remove the starting driven gear
16. Remove all crankcase bolts.
17. Separate the right crankcase and the left crankcase.
18. Remove the gasket and the dowel pins.
19. Remove the crankshaft from the crankcase.
20. Clean gasket surface.
21. Remove the oil seal from the left crankcase.
22. Remove the oil seal from the right crankcase.











*see Starter clutch under ELECTRICAL STARTING MECHANISM

CRANKSHAFT INSPECTION

CONNECTING ROD *SIDE* CLEARANCE:

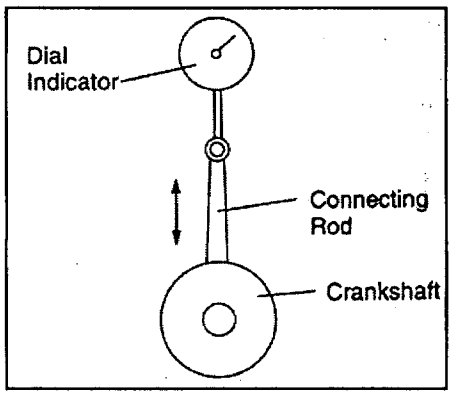
- Measure connecting rod big end side clearance with a feeler gauge.
- Compare to specifications.
- If the clearance is greater than service limit the crankshaft assembly must be replaced.

Service limit 0.55 mm 0.022 in.

CONNECTING ROD *RADIAL* CLEARANCE:

- Rotate rod on crankshaft and check for rough spots.
- Check radial end play in rod by securing crankshaft in a holding fixture such as a vice.

- Set up a dial indicator as shown in Figure 1.
- Support connecting rod against one side of crank shaft and apply up and down pressure on connecting rod.
- Read total movement of indicator and compare to specifications.
- Replace crankshaft if clearance is excessive.



Service limit 0.05 mm 0.002 in.

MEASURING THE RUNOUT OF THE CRANKSHAFT:

- Support crankshaft with V-blocks.
- Setup up dial indicator on end of crankshaft.
- Rotate crankshaft and measure runout.
- Runout must be less than 0.10 mm 0.004 in.

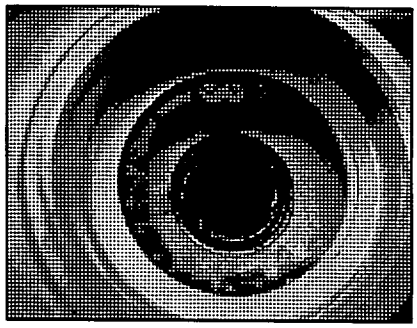
Service limit 0.10mm 0.004 in.

⚠ WARNING

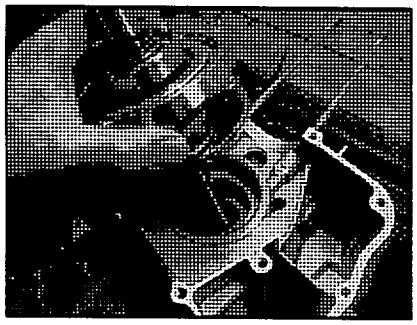
A crank runout that is too large will cause abnormal engine shaking and can potentially damage the life of the engine. Because this is an important factor in proper engine operation, examine the runout carefully.

CRANKSHAFT AND CRANKCASE INSTALLATION

- Install the crankcase oil seal.
- Place the cam chain into the left crankcase.

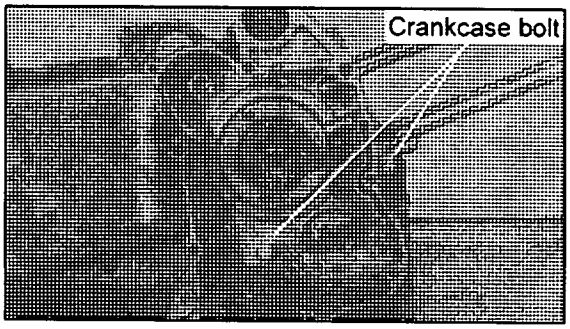


- Put the crankshaft into the left crankcase.



Do not allow the cam chain to damage the oil seal.

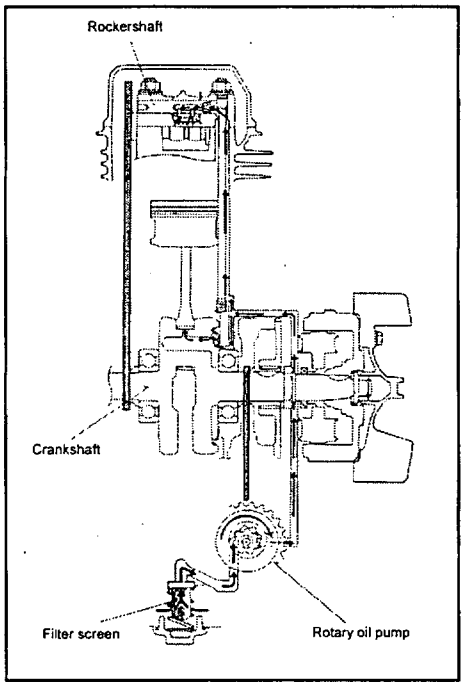
- Mount the new dowel pins and gasket on the left crankcase -- joining the right crankcase and the left crankcase together.
- Tighten the crankcase bolts.



Tightening torque 0.9 kg/m 78 in./lbs.

- Install the starter clutch.
- Reassemble in reverse order of dissasembly.

LUBRICATION SYSTEM INSPECTION AND SERVICING



Explanation of lubrication system process:

After the lubrication oil crosses the filter screen, it is pumped by the 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. Another amount of oil goes through some oil passages, such as the shaft neck of the camshaft, and splashes on the cam rockershaft and cam chain.

The picture is a functional diagram of the lubrication system:

OIL SYSTEM INSPECTION AND REPLACEMENT

OIL PUMP REMOVAL

- Remove the fly wheel from the magneto.
- Remove the stator coil and trigger winding.
- Remove the right crankcase cover bolts and remove the right crankcase cover.
- Remove the gasket and dowel pins.
- Remove the starting reduction gear and starting clutch.
- Remove the oil pump partition plate bolts and then the oil pump partition plate.
- Remove the oil pump driving gear nuts, and remove the driving gear and chain.
- Remove the oil pump positioning bolts and the oil pump assembly.
- Remove the screw and disassemble the oil pump.

OIL PUMP INSPECTION

Inspect the clearance between the oil pump body and the outer rotor.

Service limit 0.12 mm 0.005 in.

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

Service limit 0.12 mm 0.005 in.

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

Service limit 0.20 mm 0.008 in.

Note: if the inspection result exceeds the above stated service limit, the whole set should be replaced.

OIL PUMP ASSEMBLY

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

Note: when assembling, align the unfilled corner of the oil pump shaft with the corner of the inner rotator, and then mount.

- Mount the dowel pin.
- Once the oil pump plate is aligned with the dowel pin -- mount it.
- Tighten the oil pump plate screw.
- After assembling, gently turn the oil pump shaft to ensure that the oil pump turns smoothly.

OIL PUMP INSTALLATION:

- Install the oil pump on the crankcase.

Note: before installing, fill the oil pump with oil. When installing, the arrow of the oil pump body must be upwards.

- Tighten the oil pump positioning bolts to **95 in. / lbs**.
- Align the oil pump driving gear with the oil pump shaft.
- Install the driving gear and chain.
- Install the driving gear positioning nut and tighten it to **95 in. / lbs**.
- Install the partition board and tighten bolts to **87 in. / lbs.**
- Install the starting reduction gear and starting clutch (left-handed threads).
- Install the gasket and dowel pins.
- Install the right crankcase cover bolt.
- Install the trigger winding and the stator coil.
- Tighten the right crankcase cover bolts to **95 in. / lbs.**

Note: the bolt should be gradually diagonally tightened in two to three times. After finishing the installation, inspect if there is any oil leaking in every component.

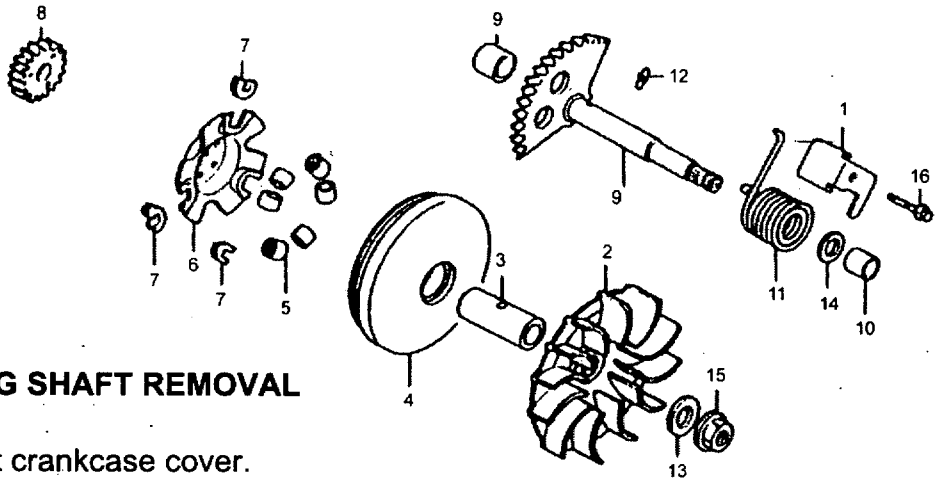
TRANSMISSION COMPONENTS INSPECTION AND SERVICING

STARTING MECHANISM INSPECTION AND SERVICING

KICK RETURN STARTING MECHANISM

This unit has a non-functioning kick start that is being used to mount the exhaust system.

The picture below shows the structure of the spiral exhaust mounting shaft:



EXHAUST MOUNTING SHAFT REMOVAL

- Remove the left crankcase cover.
- Remove the crankcase gasket, dowel pins.
- Remove the movable driving plate set.
- Remove the starting spindle washer.
- Remove the return spring stopping plate and return spring.
- Remove the starting lever set.
- Disassemble the starting spindle.

EXHAUST MOUNTING SHAFT INSPECTION

Inspect if there is any damage to the starting spindle.

1. Kick starter spring stopping plate
2. Drive face
3. Drive face boss
4. Movable drive face comp.
5. Weight roller set
6. Ramp plate
7. Slide piece
8. Kick start drive gear
9. Bushing
10. Bushing
11. Kick starter spring
12. Special pin
13. Washer
14. Washer
15. Nut
16. Bolt

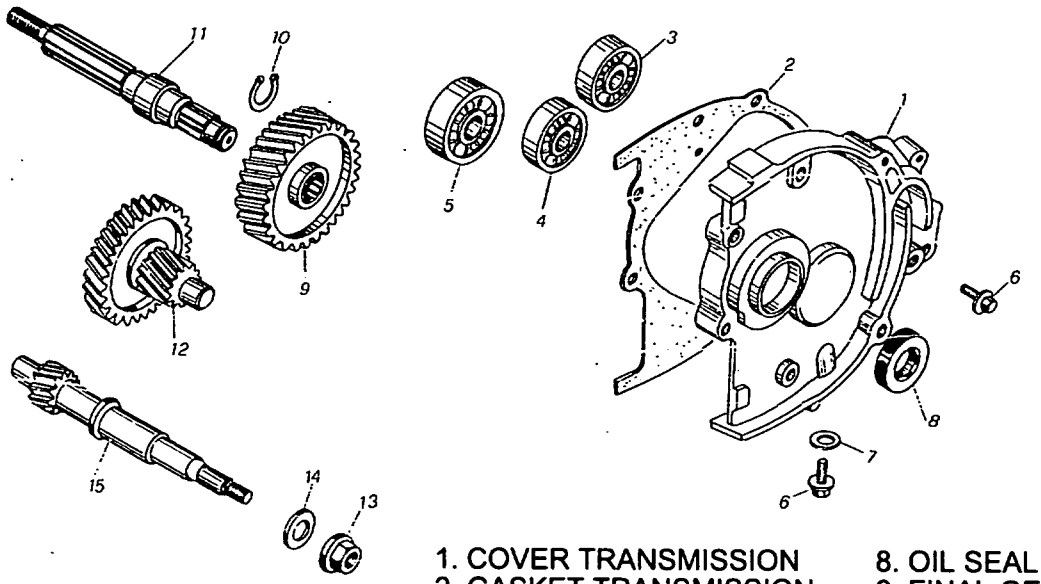
Inspect if there is any damage to the starting spindle bushing.

EXHAUST MOUNTING SHAFT INSTALLATION

- Assemble the starting spindle, the return spring, and the spring holding pin.
  - A little grease should be applied under stress of the starting spindle.
- Hook on the two ends of the return spring.
- Install the return spring stopping plate.
- Install the crankcase dowel pin and gasket.
- Install the driven belt and the driving plate.
- Install the left crankcase cover and lock tightly.

REAR TRANSMISSION MECHANISM INSPECTION AND SERVICING

The structure of the rear transmission mechanism is shown in the picture below:



1. COVER TRANSMISSION
2. GASKET TRANSMISSION COVER
3. RADIAL BALL BEARING
4. RADIAL BALL BEARING
5. RADIAL BALL BEARING
6. FILL AND DRAIN PLUG
7. SEALING WASHER
8. OIL SEAL
9. FINAL GEAR
10. EXTERNAL CIRCLIP
11. OUTPUT SHAFT
12. COUNTER SHAFT GEAR
13. NUT
14. WASHER
15. INPUT SHAFT

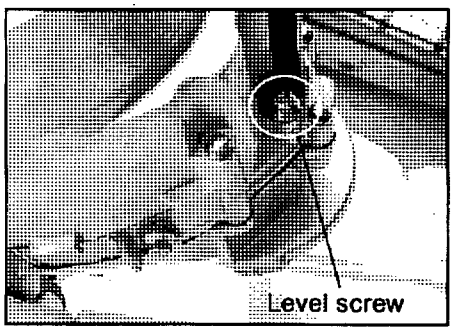
TRANSMISSION CASE OIL REPLACEMENT

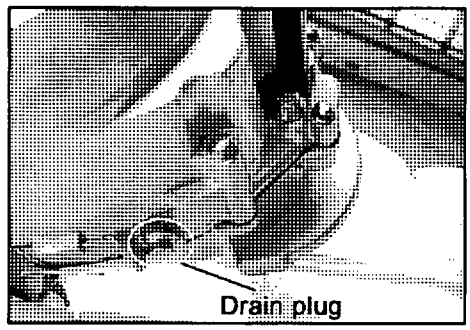
TRANSMISSION CASE OIL INSPECTION

Note: Use a level surface when inspecting the oil level of the transmission case.

- Inspect if there is oil leaking around the transmission case.
- After the engine stops, remove the transmission case oil viewing bolt.
- Observe the oil level when the oil level is parallel with the observing hole.
- When the oil level is too low, use the appropriate oil and add until oil flows from the level screw.
- Mount the transmission case oil viewing bolt and washer.
- Assure that the bolt oil seal is undamaged.

TRANSMISSION CASE OIL REPLACEMENT
Inspect final gear oil level monthly and change final gear oil every 3 months.





- To check level, remove level screw on the left rear engine case. If gear oil does not come out of hole, add until it does.

- To drain gear oil, remove the drain plug at the rear bottom of the engine case. It is recommended to warm the engine for 10 minutes or more before draining final gear oil.

Note:
API Service Standard GL-5, GL-4, GL-3 SAE 80W 90 gear oil is recommended in the final drive case. However, in extreme cold weather conditions it is then advised to use lighter viscosity oil, such as 75 wt.

Final drive capacity:
115 cc 4 oz.

TRANSMISSION CASE

TRANSMISSION CASE REMOVAL

- Remove the driven belt pulley.
- Drain the oil from the transmission case.
- Remove the drive sprocket.
- Remove the bolts and remove the transmission case cover.
- Remove the gasket and dowel pin.
- Remove the final gear from the output shaft, and remove the counter shaft.

TRANSMISSION CASE GEAR INSPECTION

- Inspect the counter shaft gear for damage.
- Inspect the final gear and the output shaft for damage.

TRANSMISSION CASE COVER BEARING REPLACEMENT

- Press the driven belt pulley shaft to make it separate with the transmission cover.
- Remove the oil seal and drive out the bearing.
- Remove the final gear shaft bearing.
- Remove the sub shaft bearing.
- Drive in the new final gear shaft and bearing.

Note: When driving in the final gear shaft bearing, keep the bearing parallel. Do the same and keep the bearing parallel when installing the sub shaft bearing and the driven pulley shaft bearing.

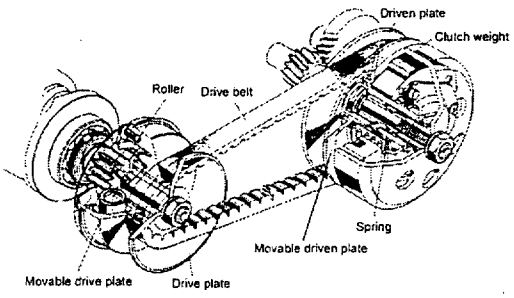
- Drive in the new sub shaft bearing.
- Drive in the driven pulley shaft bearing.

LEFT CRANKCASE BODY BEARING REPLACEMENT

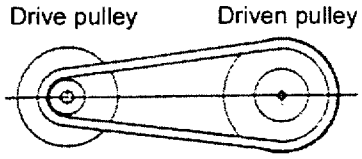
- Replace the bearing and oil seal on the left crankcase if it is worn or damaged.
- Remove the oil seal.
- Drive out the final gear shaft bearing.
- Remove the sub shaft bearing.
- Remove the driven belt pulley shaft bearing.
- Drive in the new driven belt pulley shaft bearing.
- Drive in the new sub shaft bearing.
- Drive in the new final gear shaft bearing.
- Install the driven belt pulley shaft on the transmission case cover.
- Drive in the transmission case cover oil seal.
- Install the sub shaft/sub shaft gear and the final gear shaft into the left crankcase.
- Mount the final gear on the final gear shaft.
- Install the new dowel pin and gasket.
- Install the transmission case cover and torque bolt to **85in. / lbs**.
- Mount the driven pulley / clutch set.
- Mount the drive pulley, the transmission belt, and the left crankcase cover.
- Add 80W-90 gear oil in the transmission case until it gets to the proper level.

Gear Oil Amount: 115 cc ml 4 oz.

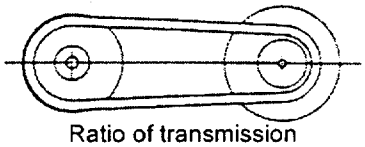
BELT DRIVEN CVT MECHANISM INSPECTION AND SERVICING



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



Ratio of transmission
(big)

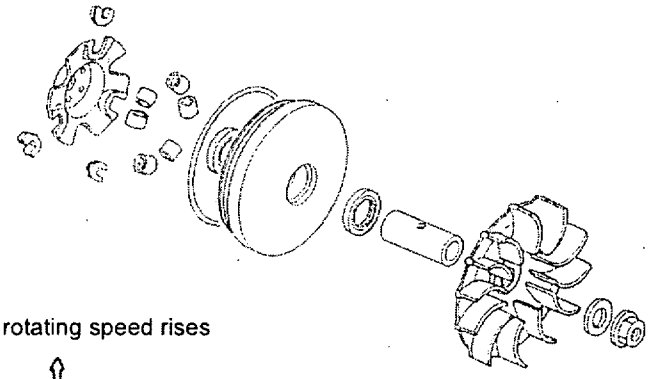


Ratio of transmission
(small)

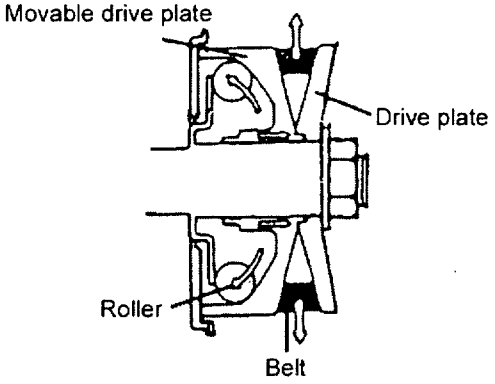
When the diameter of the driving belt pulley changes from small to big, proportionally the diameter of the driven belt pulley changes from big to small (because the perimeter of the driven belt is constant.

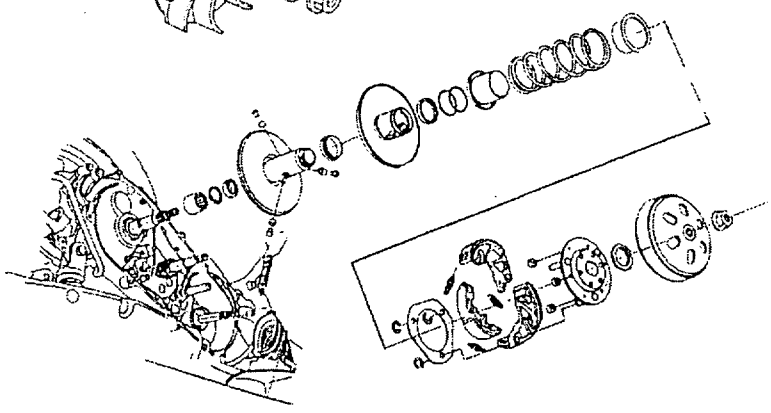
The structure of the driving belt pulley is shown in the picture below:

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



When rotating speed rises





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DRIVE BELT PULLEY

DRIVE BELT PULLEY REMOVAL

- Remove the left crankcase airpipe lock bolt.
- Remove the kick starter and remove the left crankcase fixing bolt.
- Remove the left crankcase cover.
- Remove the gasket and the dowel pin.
- Remove the drive plate.
- Remove the driven belt from the drive plate.
- Remove the movable drive plate set.
- Remove the ramp plate.
- Remove the centrifugal rollers.

DRIVE BELT PULLEY INSPECTION

- Inspect if there is any damage to the centrifugal roller.
- Measure the outer diameter of the centrifugal roller.

  Service limit 17.0 mm 0.6695 in.

- Measure the inner diameter of the movable drive plate.

  Service limit 24.06 mm 0.947 in.

- Inspect if there is any damage to the drive plate hub.
- Measure the outer diameter of the drive plate hub movable surface.

DRIVE BELT PULLEY INSTALLATION

Apply some grease evenly in the movable drive plate. Put the centrifugal rollers into the movable drive plate.

- Install the ramp plate.
- Put the drive plate hub into the drive plate.
- Install the movable drive plate on the crankshaft.
- 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.
- Mount the drive plate, the drive plate washer, and nut.
- Torque nut to **40 ft. / lbs.**

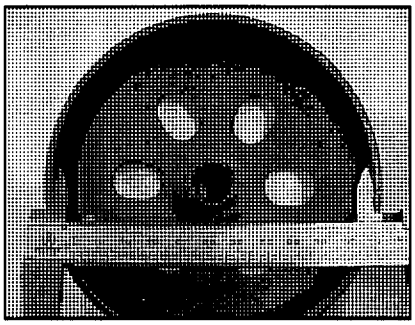
CLUTCH

CLUTCH REMOVAL

- Remove the left crankcase cover.
- Remove the drive plate and the driven belt.
- Remove the clutch drum plate.

CLUTCH INSPECTION

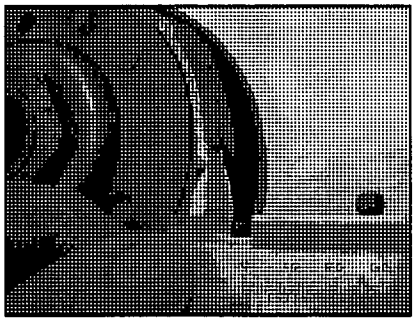
- Inspect if there is any abrasion or injury on the clutch drum.



- Measure the inner diameter of the drum.

Service limit 125.5 mm 4.941 in.

- Inspect if there is any abrasion or injury of the clutch centrifugal weight friction piece.
- Measure the thickness of the clutch shoes.



Service limit 1.5 mm 0.059 in.

CLUTCH DISASSEMBLY

- When the centrifugal weight set needs to be replaced, the clutch must first be disassembled.
  Note: If the drum is seriously worn it should be replaced with the shoes.
- Remove the clutch drum.
- Remove the whole set of clutch/shoes.
- Compress the driven pulley spring, and at the same time remove the nut on the shaft.
- Disassemble the driven pulley and the clutch.
- Remove the circlip and remove the connecting piece.
- Remove the clutch shoes and the spring.

CLUTCH INSTALLATION

- Mount the clutch damper rubber on the drive plate pin.
- Mount the new clutch shoes set and spring on the drive plate.
- Install the connecting piece, the circlip, and the bottom plate.
- Reverse the removal procedure to install.

DRIVEN BELT PULLEY

DRIVEN BELT PULLEY REMOVAL

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

- Remove the oil seal on the movable driven plate.

DRIVEN BELT PULLEY INSPECTION

- Measure the free length of the driven belt pulley spring.

  Service limit 163.7 mm 6.420 in.

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

  Service limit 33.94 mm 1.3365 in.

- Inspect if there is any abrasion or damage of the movable driven plate.
- Measure the inner diameter of the movable driven plate.

  Service limit 34.06 mm 1.341 in.

- Inspect if the groove of the guide pin for wear.

DRIVEN PLATE BEARING REPLACEMENT

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

- Remove the needle bearing from the driven plate.

Note: The removed bearing cannot be reused.

- Remove the circlip from the driven plate.
- Drive the ball bearing out.

Note: The removed bearing cannot be reused.

- Apply some grease on the new ball bearing.
- Drive the ball bearing into the driven plate with its front face upwards.
- Mount the circlip.
- Using the appropriate grease, apply lubricant evenly on the inner wall of the driven plate.
- Drive the new needle bearing in with its mark pointing upwards.
- Apply grease around the bearing.

DRIVEN BELT PULLEY INSTALLATION

- Clean the driven plate of grease.
- Install the oil seal.
- Apply a small amount of grease on the O-ring.
- Install the movable driven plate into the driven plate.
- After applying some grease on the roller and the guide pin, install them into the driven plate hole.
- Install the oil seal collar.
- Clean away the excessive grease.
- Assemble with the clutch and install on the left crankcase.

TRANSMISSION BELT

TRANSMISSION BELT INSPECTION

- Remove the left crankcase cover.
- Inspect if the transmission belt is worn.
- Measure the width of the belt.
- Replace the belt if its width is less than the service limit below:

Service limit 19.0 mm 0.748 in.

- Refer to the drive pulley removal and installation procedure for replacement. Only use a brand identical belt when replacing.

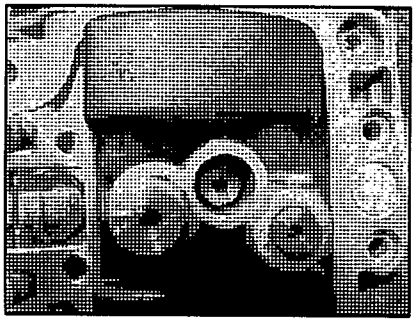
DENI CARBURETOR – PD24JH

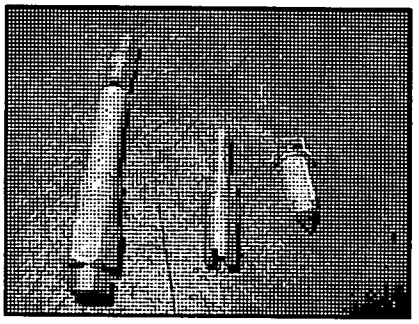
CARBURETOR REMOVAL

- Turn fuel to OFF position
- Remove throttle cable, choke wire, fuel line, and vacuum line.
- Loosen clamps on intake manifold and air filter.
- Remove carburetor.

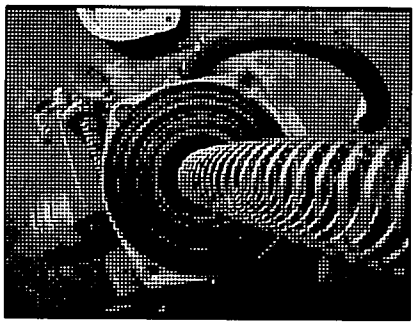
CARBURETOR DISASSEMBLY AND INSPECTION

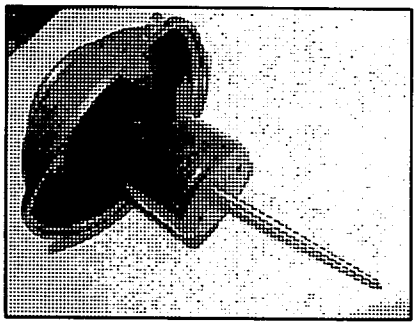
- Remove the four screws on float bowl and remove float bowl.
- Check float bowl for dirt and fuel residue.
- Remove float, float needle valve, main jet, needle jet holder, needle jet, and pilot jet.
- Clean and inspect float and float needle valve for wear.
- Clean and inspect main jet, needle jet holder, needle jet, and pilot jet.



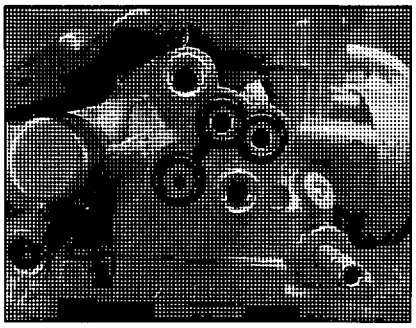


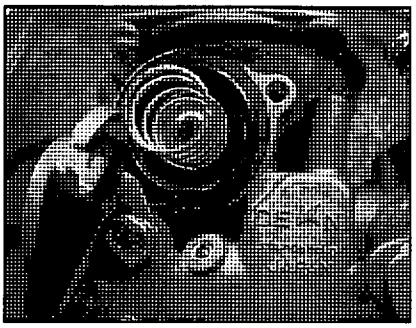
- Remove the two screws that hold vacuum top on body.
- Remove spring and slide assembly
- Inspect diaphragm for tears or holes.



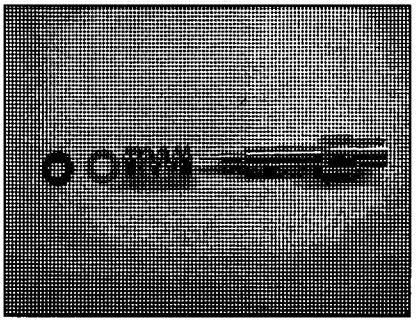


- Remove the two screws holding choke to body of carburetor and inspect seal.
- Remove the two screws holding vacuum pod to body.
- Remove spring and pod; inspect pod for tares or holes.





- Remove air adjusting screw, spring, washer and o-ring.
- Inspect air adjusting screw tip and o-ring for damage.



CARBURETOR CLEANING

⚠ WARNING

Always wear eye protection when working with cleaning agents.

- Clean the carburetor body, jets, and all the air passages in body with carburetor cleaner.

Note: It may be necessary to soak parts in a high caustic carburetor cleaner.
Do not soak rubber parts. (O-rings, needle valve, vacuum slide diaphragm etc.)
Instead, clean rubber parts with mild detergent and hot water.

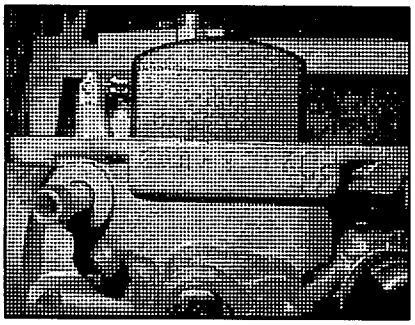
- Use carburetor cleaner or contact cleaner to check passages in body making sure that they are not obstructed.

- Use low-pressure air to dry all components.

CARBURETOR ASSEMBLY

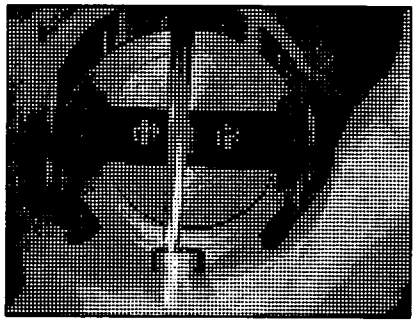
Replace parts in proper order:

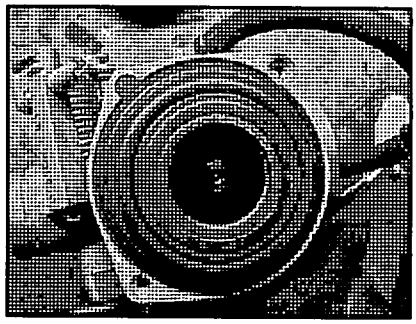
- Install pilot jet needle jet, jet holder, and main jet.
- Install needle valve with float sliding pin locating in place.
- Check float level by placing carburetor at angle so that float adjustment tab contacts needle valve. Float seam should be diagonal with carburetor float bowl surface.



Bending tab on float that contacts needle valve can make adjustment of float level.

- Inspect float bowl seal for damage.
- Install float bowl and the four screws.
- Install slide assembly making sure that jet needle slides into needle jet. Also ensure that tab on diaphragm is inserted correctly on body of carburetor.





- Install diaphragm spring, top, and two screws.
- Lubricate O-ring on air mixture screw with grease and install in carburetor.
- Turn screw in until lightly seated then screw back out 1.5 turns.

⚠ WARNING

Do NOT tighten air mixture screw.
Damage to air screw and carburetor body will occur.

- All final adjustments will have to be made after unit has run for at least 5 minutes and engine is at operating temperature so that cold enrichment system has had time to set.
- Idle speed needs to be set at 1750 ± 100 RPM.

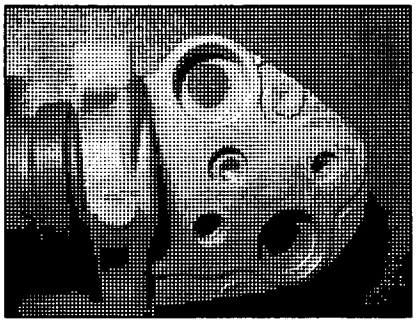
CARBURETOR STARTER SYSTEM (CHOKE OR ENRICHMENT)

This carburetor is equipped with an automatic enrichment system that is controlled by the charging system.

After engine is started the charging system supplies voltage to solenoid on carburetor causing solenoid to heat up (3 ~ 5 minutes running time) pushing plunger into mount stopping fuel flow.

ENRICHMENT INSPECTION

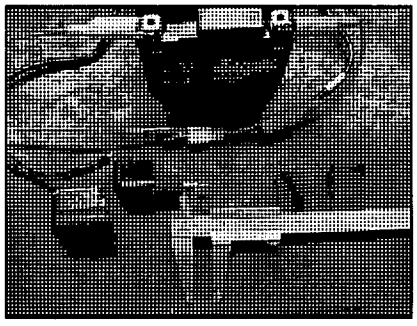
- Unplug wire from harness.
- Remove mount and solenoid from body of carburetor by removing two screws.
- Inspect seal for damage.
- Locate the small hole in the middle of mount and you should see the brass plunger.
- When plunger is covering hole completely the fuel flow is shut off.



ENRICHMENT TESTING

- Remove the two screws and clamp that secure the solenoid to mount.
- Pull solenoid out of mount.
- Measure the distance from the base of solenoid to sealing edge of plunger.
- Connect a good 12-volt battery to the solenoid using jumper wire for 5 minutes and measure the distance again.

Cold 11mm ~ .433 in. Hot 14mm ~ .552 in.



⚠ WARNING

Solenoid becomes hot during testing.

- Inspect O-ring on solenoid for damage.
- Install plunger into mount making sure that plunger moves freely in mount.
- Install assembly on carburetor.

CARBURETOR TROUBLESHOOTING

RICH MIXTURE

Symptoms: Fouls spark plug, black exhaust smoke, rough idle, skipping, poor performance, bog, backfire.

Possible causes:

- Air filter dirty or plugged
- Air intake restricted
- Choke plunger stuck
- Float level to high
- Faulty float needle valve
- Loose jets
- Worn jet needle or needle jet
- Dirt in air passages

LEAN MIXTURE

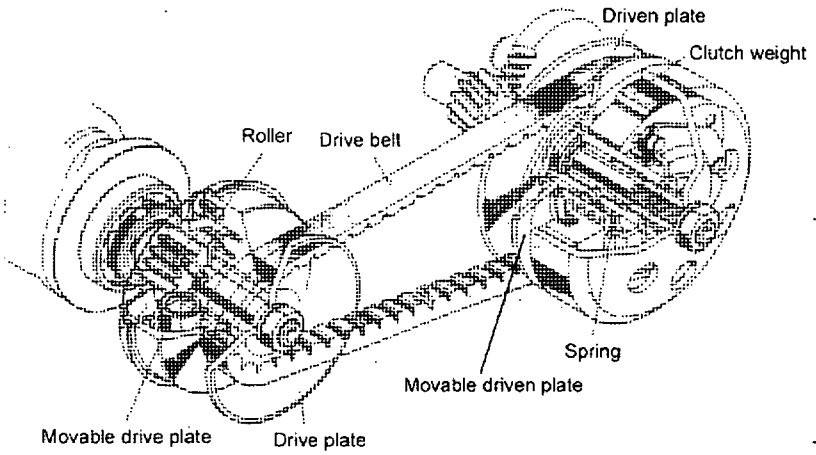
Symptoms: Hard starting, popping through intake, low power, runs hot, detonation, surging, idle speed erratic.

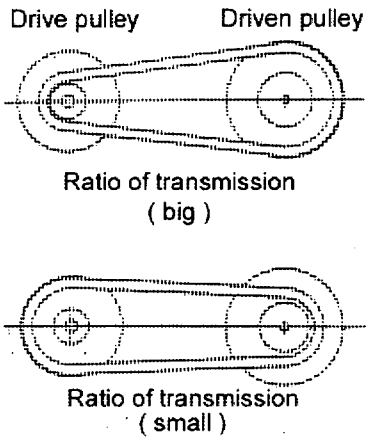
Possible causes:

- No fuel in tank.
- Fuel tank not venting.
- Carburetor vent restricted.
- Clogged jets or air passage.
- Float level to high.
- Air filter not sealing.
- Intake leaking.
- Air mixture screw adjustment.

CHAIN AND AXLE

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

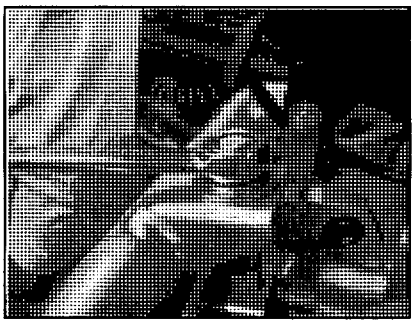




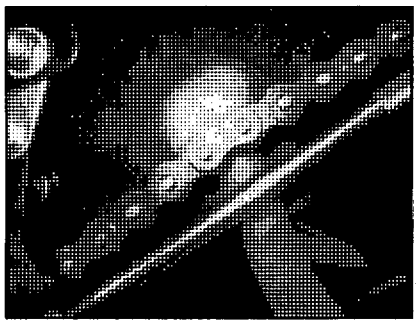
CHAIN ADJUSTMENT

Loosen the jam nuts

Turn adjustments nut clockwise to remove deflection.



Leave 3/8 – 3/4 in. deflection in chain.

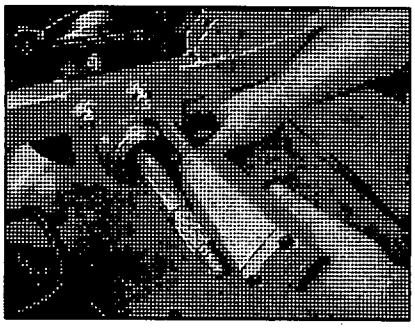


LUBRICATION OF CHAIN

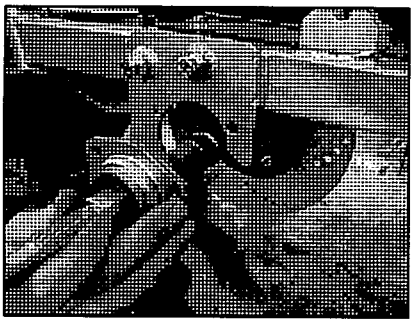
- Lubricate chain after every use while chain is still warm
- Use aerosol chain lube or 80W – 90 gear lubricant

REAR AXLE REMOVAL

- Raise and secure rear end of the machine.
- Remove cotter pins on rear axle nuts.
- Remove axle nuts.
- Remove rear wheel and hub assembly by sliding off splines of axle.
- Remove the chain.
- Loosen nuts on bearing carrier and remove bolts.

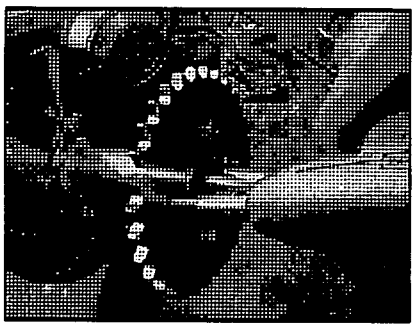


- Remove axle and bearing carriers as a unit.



REAR SPROCKET REMOVAL

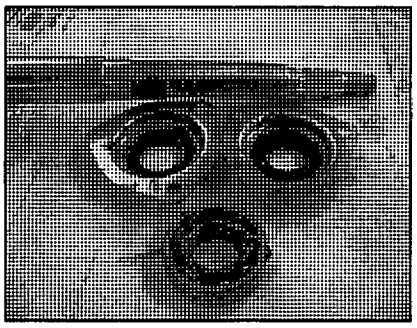
- Remove the rear axle.
- Remove four bolts holding sprocket to axle



- Install new sprocket and reattach four bolts
- Torque to 20 ft. / lbs.

AXLE BEARING REMOVAL AND INSPECTION

- Remove rear hubs
- Remove 3 bolts holding axle bearing housing to frame
- Remove bearing from bearing housing and inspect bearings and seals for damage.
- Pack bearing in grease before installing



- Torque axle bearing bolts 18 ft. / lbs.

SWINGARM

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

- Remove shock absorbers.
- Remove rear brake caliper and set aside. Do **NOT** remove brake hose.
- Unplug wiring from the electrical box.
- Remove throttle cable.
- Remove bolts from swingarm pivot.
- Check bushings and pivot bolts for wear. If wear is present both the bolt and bushing should be replaced.

CHARGING SYSTEM

BATTERY

The battery is an important component of the electrical system. This battery used on the vehicle is a maintenance-free battery. For long period of storage, the battery will discharge by itself, so it should be charged every 3 months. After 2 to 3 years of regular use, the capacity of the battery will diminish so it will need charging.
Should the battery need to be replaced, use the same type of battery.

BATTERY DRAIN TESTING

- Turn the main switch to the "OFF" position.
- Disconnect the negative ground wire from the battery.
- Connect the positive end of the meter with the negative end of the battery.
- Connect the negative end of the meter with the ground wire.
- Test the electric drain. In general, the number should be less than 1 mA. Inspect for a short circuit of the ignition switch and the main wiring harness.

CHARGING STATUS INSPECTION

- Install a fully charged battery.
- Connect the voltmeter to the battery.
- Remove the fuse, and connect the meter with two ends of the fuse.
- Connect the tachometer with the engine (not necessary if rpm indicator is on vehicle).
- Start the engine and accelerate slowly; measure the charging voltage and current.

Charging voltage (V)	13.5 ~ 15.5	@ 5000 RPM
Charging current (A)	0.5	@ 5000 RPM

If the voltage is not in the range of the above specified value, please inspect the voltage regulator.

BATTERY REMOVAL

- Disconnect the negative battery lead wire first.
- Disconnect the positive battery second.

BATTERY INSTALLATION

Apply grease on battery terminals to prevent corrosion.

Connect the positive cable first, then connect the negative cable.

BATTERY VOLTAGE INSPECTION

Disconnect the cable from the battery terminals. First the negative pole, then the positive.

Measure the voltage between the two poles of the battery:

Battery Service Limit:

Fully charged	12.8 V
Needs charging	12.3 V

BATTERY CHARGING

- Remove the battery from the vehicle.
- 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.
- Charge the battery for the charging time indicated on the battery.
- Recheck the voltage after 30 minutes of charging. If it still below 13.1 V continue to charge at 15 minute intervals, checking voltage levels for the appropriate charge. Continue as needed.

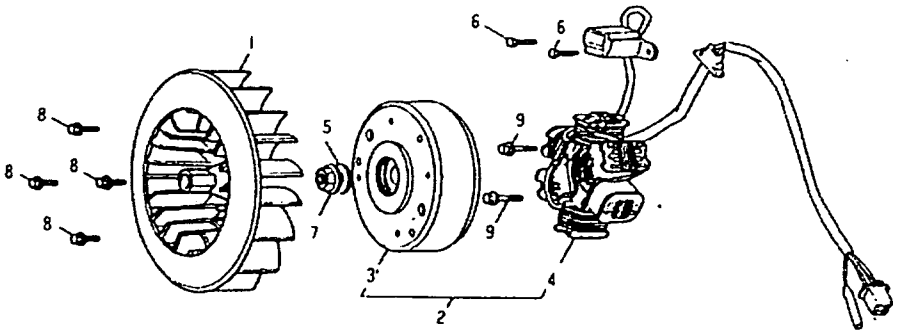
	Normal	**Fast**
Charging current	0.7 A / hr.	3.0 A / hr.
Charging time	5 ~ 10 hours	30 minutes

SAFETY Notes:

- Do not use fast charging unless it is an emergency
- Do not smoke or allow open flame near battery when charging.
- At the beginning or end of charging, turn off the charger first, in order to prevent electric shock.

PRIMARY COIL

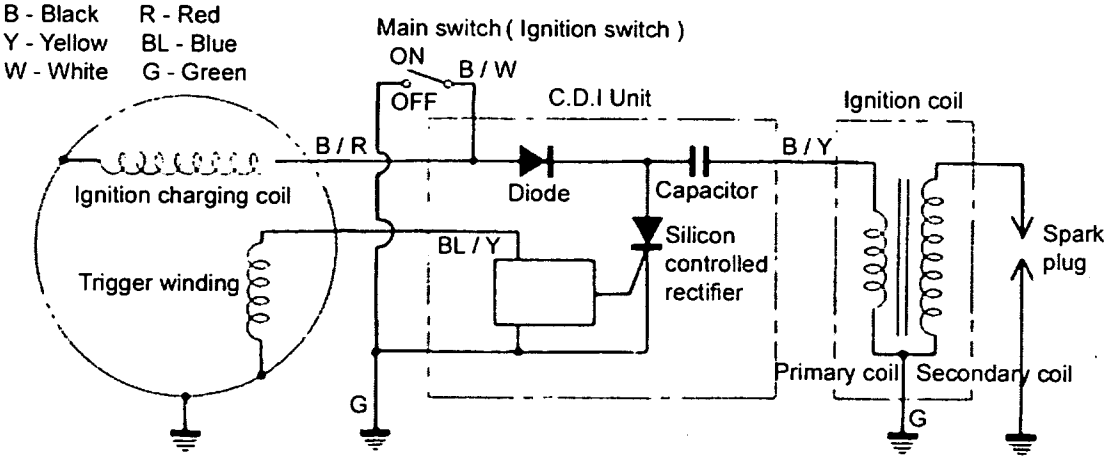
The picture below shows the structure of the generator:



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

PRIMARY COIL INSPECTION

Note: Inspection work can be done on the engine without removing the generator.



- Remove the 4-pin connector of the generator.
- Remove the 2 bullet connectors.
- Measure the resistance value between the wire and engine ground.

White	0.2 ~ 0.4_ (20° C)
Yellow	0.1 ~ 0.8 _
Blue & Yellow	148 _
Black & Red	502 _
Black	∞

When the measured value is more than the standard value, the coil should be replaced.

GENERATOR REMOVAL AND INSPECTION

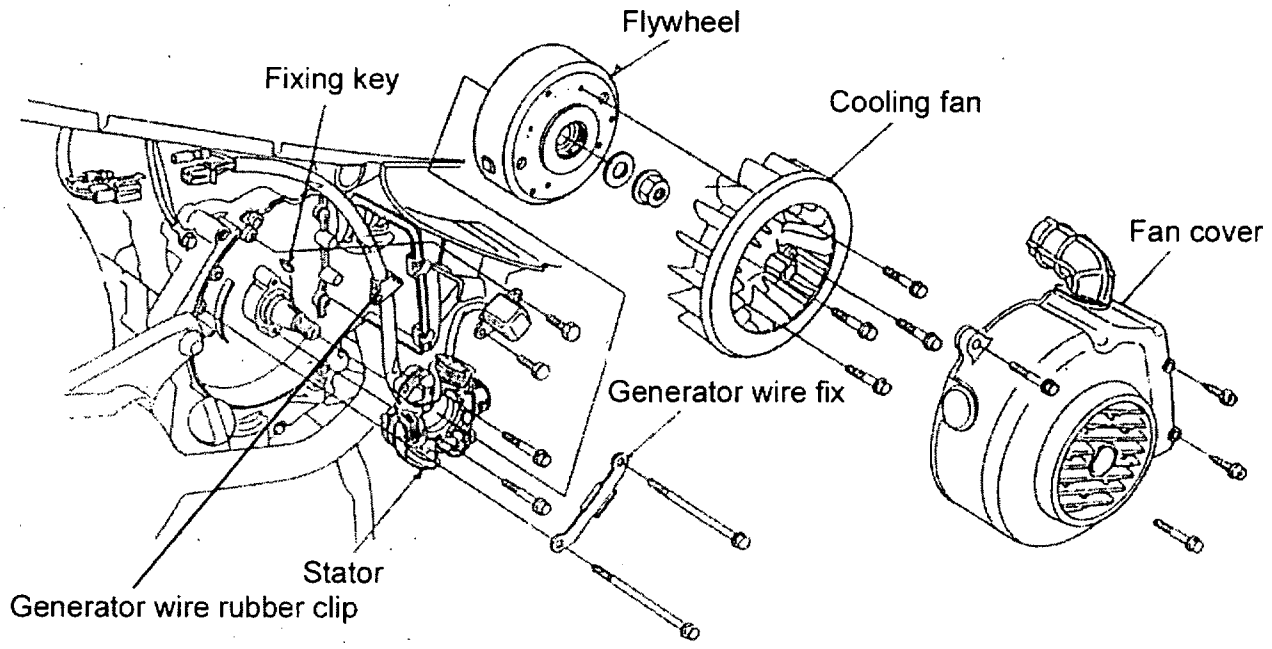
GENERATOR REMOVAL

- Remove the cooling fan cover bolt and screw.
- Remove the cooling fan cover.
- Remove the cooling fan bolt and remove the cooling fan.
- Hold the flywheel and remove the flywheel nut.
- Remove the flywheel with a flywheel puller, and remove the solid key.
- Remove the generator wire connector.

GENERATOR INSTALLATION

Reverse the removal procedure for installation.

- When installing the flywheel, make sure 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 and inspect the ignition timing.



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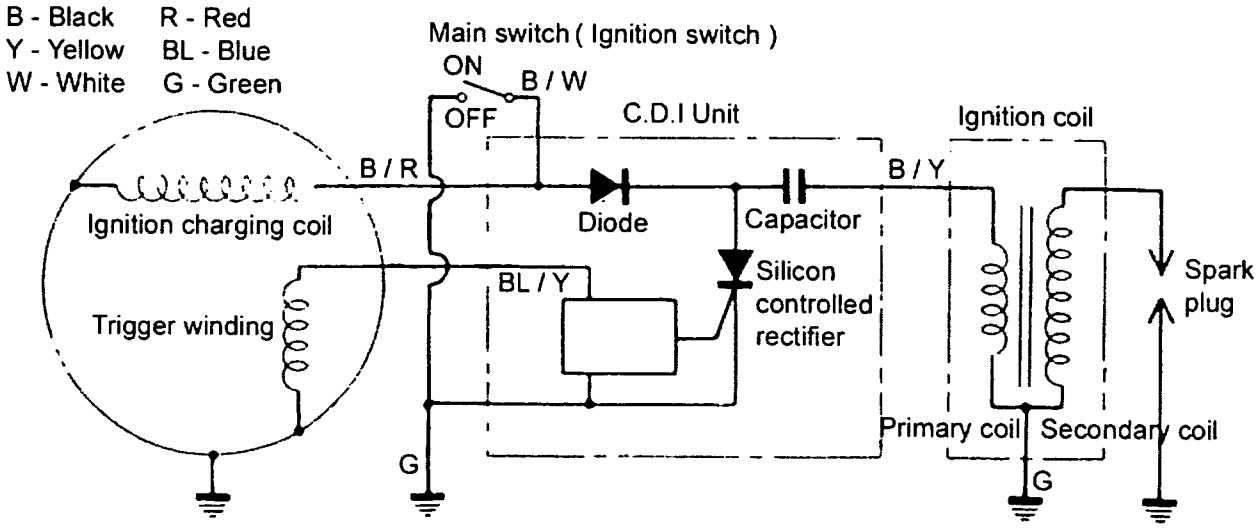
IGNITION SYSTEM INSPECTION AND SERVICING

The circuit working principle is shown in the picture below.



IGNITION TIME INSPECTION

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

- Remove the ignition timing hole cover (or remove the fan cover).
- Rotate the generator rotor, and align the "F" mark on the rotor with the crankcase timing ignition mark.
- Clip the ignition timing indicator light wire clip on the high-voltage end of the ignition coil.
- Start the engine and keep it in idling condition.
- Observe if the mark on the crankcase aligns with the "F" mark on the rotor.
- Slowly increase the engine rpm to 5000 r/min. At this time the mark on the crankcase aligns with the rotor ignition advance mark.

IGNITION SYSTEM INSPECTION

- If the spark plug is not sparking, first inspect the wires for a bad connection. Follow the electric circuit and measure the voltage of every point to troubleshoot.
- If the connections appear to be undamaged and well seated, remove the old spark plug, and install a new one.
- Connect the negative end of the multimeter with the positive connecting iron of the primary ignition coil (black / yellow wire).

- Press the ignition button and read the voltage value on the multimeter. The peak voltage value should be above 112V.
- Remove the 4-pin and 2-pin connectors of the CDI component.
- Connect the positive end of the multimeter with the ignition charging coil (black/red) of the 2-core connector, and the negative end with the ground wire end (green) of the 4-core connector.
- Press the ignition button and measure the peak voltage of the ignition charging coil. It should be greater than 122V.
- When measuring peak voltage of the ignition charging coil disconnect the generator connector to take measurements.
- Remove the 4-pin and 2-pin of the CDI component.
- Connect the positive end of the multimeter with the trigger winding (green/red wire terminal) on the 4-pin connector, and the negative end with the green wire terminal on the 4-pin connector.
- Press the starting button, or kickstarter, and measure the peak voltage of the trigger winding, which should be more than 2.1V.
- When the measured peak voltage of the trigger winding is abnormal, remove the generator connector and take further measurements.

IGNITION CHARGING COIL

- Remove the connector of the ignition charging coil wire.
- Measure the resistance value between the ignition charging coil (black/red wire) and the body ground wire.

  Standard Value 300 ~ 1000 _ (20° C)

- When the measured value is more than the standard value, it should be replaced.

TRIGGER WINDING

- Remove the connector of the trigger winding wire.
- Measure the resistance value between the trigger winding (green/red wire) and the body ground wire.

  Standard Value 40 ~ 300_ (20° C)

- When the measured value is more than the standard value, it should be replaced.

CDI COMPONENT

The CDI component inspection is divided into two steps:

1. Inspect every wiring, winding or coil connected with CDI
2. Inspect the CDI component.

- Remove the CDI component.
- Inspect the connector.
- Inspect the conduction condition and the resistance value of the main switch, the ignition charging coil, the trigger winding, and the ignition coil. When the main switch is in "OFF" position, it should be conducted, and the resistance value of every coil should be the standard value.
- Inspect the resistance value between every CDI component terminal. If the actual value is not in the range of the value in the chart, then the CDI component is faulty.

CDI Component
(values displayed in K†)

- NEGATIVE -	+ POSITIVE +					
		SW (B / W)	EXT (B / R)	PC (G / R)	E (G or G / W)	IGN (B / Y)
	SW (B / W)		100 ~	50 ~	100 ~	
	EXT (B / R)	0.5 ~ 50		100 ~		
	PC (G / R)	10 ~ 1000	10 ~ 1000		1 ~ 100	
	E (G or G / W)	0.5 ~ 50	0.5 ~ 50	1 ~ 10		
	IGN (B / Y)					

B- Black W- White R - Red G- Green Y - Yellow

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IGNITION COIL

IGNITION COIL REMOVAL

- Remove the spark plug cap.
- Remove the primary ignition coil wire.
- Remove the ignition coil bolt the ignition coil.

IGNITION COIL INSTALLATION

- Reverse the removal procedure for installation.

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

PRIMARY IGNITION COIL INSPECTION

Standard Value 0.1 ~ 1.0 _ (20° C)

If the resistance value is ???, it indicates the coil is broken and should be replaced.

SECONDARY IGNITION COIL INSPECTION

Install the spark plug cap, and measure the resistance value of the secondary ignition coil.

Standard Value 7 ~ 9_ (20° C)

The resistance value is in the standard range indicates it is good; however, ??? indicates the coil is broken.

Remove the spark plug cap, and measure the resistance value of the secondary ignition coil.

Standard Value 2 ~ 4_ (20° C)

SPARK PLUG – NGK C7HSA

- Clean up the carbon around the spark plug to prevent it from dropping into the cylinder when removing the spark plug.
- Remove the spark plug.

Note: 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.

- Clean up the filth and carbon accumulation on the spark plug with a steel brush or a blade.
- Inspect the spark plug gap, in general it should be about:

  0.6 ~ 0.7mm 0.024 ~ 0.028 in.

- When the carbon accumulation and wear of the spark plug are too serious, replace the spark plug. Replace with the spark plug of the same specification.

REGULATOR RECTIFIER

MAIN WIRING – SUB ELECTRIC CIRCUIT CONDITION INSPECTION

- Remove the 4-pin connector of the regulate rectifier.
- Measure the conducting status between the main wiring terminals according to the previous wiring diagram.

To check the wiring harness:

Positive lead on battery + (red wire) – Negative to ground (black wire)	Measures battery voltage
Positive lead + (green wire) – Negative to ground	Tests Conductivity
Lighting coil + (yellow wire) – Negative to ground • (remove the resistor, side auto-starter plug, and turn the lighting switch to OFF)	Generally 0.1 ~ 0.8 V
Charging coil + (the white wire) – Negative to ground	Generally 0.2 ~ 2.0 V

To check the regulator rectifier:

	W(White)	Y(Yellow)	R(Red)	G(Green)
W(White)		:	3 ~ 100 K †	:
Y(Yellow)	:		:	5 ~ 100 K †
R(Red)	:	:		:
G(Green)	:	5 ~ 100 K †	:	

REGULATOR RECTIFIER INSPECTION

- Inspect the regulator rectifier connection.
- Measure the resistance value between every regulator rectifier terminal.
  - If the resistance value between the terminals does not match the value in the table above, replace the regulator rectifier.

RESISTOR

RESISTOR RESISTANCE VALUE MEASUREMENT
Measure the resistance value between the resistor wire and the vehicle body. It is normal when the actual value is in the range of ?1? value marked on the resistor. If the resistance value is out of the ?1? range then it needs to be replaced

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ELECTRICAL STARTING MECHANISM

CONTROLING MECHANISM

STARTER RELAY INSPECTION

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

Inspect if the brake switch is conductive. Turn the main switch on and hold the brake lever.

Measure the voltage between the inlet line (the green/yellow line) starting relay and the ground wire of the body.

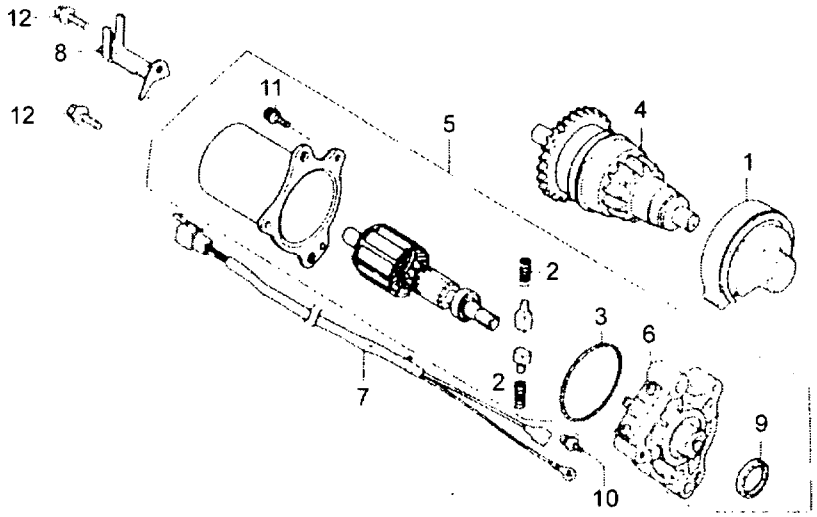
The voltmeter reading should be close to the battery voltage. If not, then the brake switch is bad.

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

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, or the start button, is bad.

STARTER MOTOR

The starter motor is a direct current (DC) motor. Its structure is shown in the picture below:



1. Starting gear holder
3. Carbon brush spring
3. Gasket
4. Starting gear assembly
5. Starter motor
6. Front bracket
7. Lead wire
8. Wire clamp
9. Washer
10. Screw
11. Screw
12. Bolt

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STARTER MOTOR REMOVAL

SAFETY Note: Before removal, shut off the main switch and disconnect the battery connecting wire. Then press the starting button to ensure that the starter motor will not run.

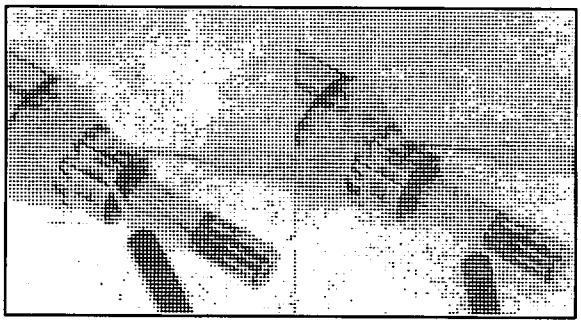
- Remove the starter motor lead wire clamp.
- Remove the starter motor holding bolt and remove the starter motor.
- Roll up the rubber, water-resistant, cover and remove the starter motor joint.
- Remove the motor case bolt, the carbon brush seat, and the motor case.

ARMATURE INSPECTION

Inspect the armature surface for uneven wear, damage, or a change in color caused by high temperatures.

Note: Do not use sandpaper to grind. Do not wash with any solvent which can damage insulation.

- Measure the conducting condition of the armature coil according the picture. It should be conductive.



- Measure the conducting condition between the armature coil and the armature according to the picture. It should be non-conductive.
  If it is conductive, it should be replaced.

CARBON BRUSH INSPECTION

- Inspect the insulating condition between the connecting wire terminal and the starter motor case. It should be non-conductive.
- Inspect the conducting condition between the connecting wire terminal and the carbon brush. It should be conductive.
- Inspect brush set for excessive wear or damage.
- Measure the insulating condition of the carbon brush bracket. It should be non-conductive. If it is conductive, it should be replaced.
- Inspect the needle bearing in the carbon brush base.
  - It should be able to move smoothly with no looseness while pressing.
- Inspect the dust seal for wear or damage.
  - If the wear or damage is excessive, it should be replaced.

STARTER MOTOR INSTALLATION

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

Note: Do not damage the contact area of the carbon brush and the armature.
While installing, do not damage the lip of the dust seal.

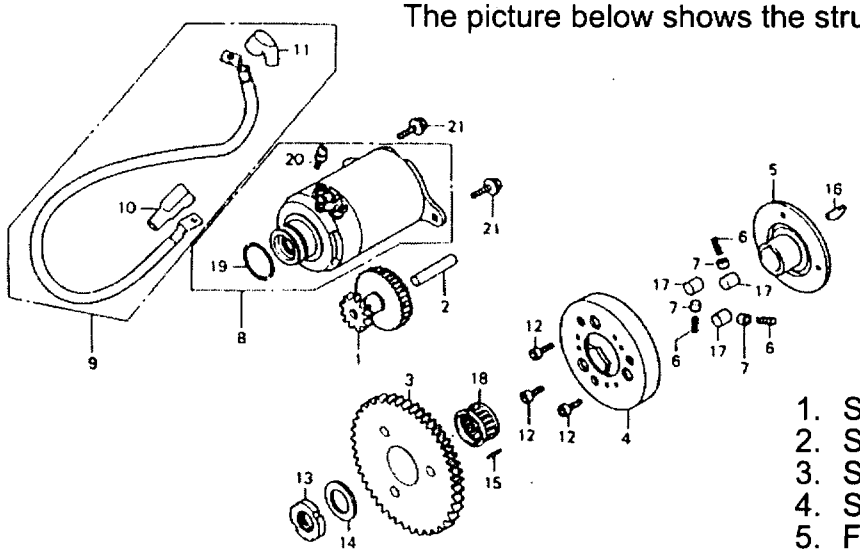
- Mount the new O-ring on the carbon brush base.
- Install armature into starter motor case, making sure not to disturb the carbon brushes.
- Tighten motor case bolts.

Note: Because motor case is magnetic, make sure the starter motor case is free of metal particles.
Before install the starter motor on the vehicle after assemble it, first connect the lead wires and inspect if the motor can run normally.

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

STARTER CLUTCH

The picture below shows the structure of the starter clutch.



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

REDUCTION GEAR INSPECTION

- Remove the starting clutch.
- Remove the reduction gear to inspect for wear.
- Measure the inner diameter of the reduction gear shaft.
- Replace if diameter is greater than **10.05 mm (0.396 in.)**
- Measure the outer diameter of the reduction gear shaft.
- It should be replaced when the diameter is less than **9.94mm (0.3915 in.)**

ENGAGING MECHANISM

STARTING CLUTCH REMOVAL

- Remove fan.
- Remove flywheel.
- Remove stator plate assembly.
- Remove the right crankcase cover.
- Remove the left crankcase cover.
- Remove the starting clutch nut.

  Note: The nut is a left-handed thread.

- Remove the starting clutch set.

STARTING CLUTCH INSPECTION

- Inspect if the movement between the clutch and the driving gear is normal.
  - When turning clockwise, the driving gear should turn smoothly.
  - The driving gear should lock when turned counterclockwise.

- Inspect if there is any abrasion or damage on the surface between the driving gear and the needle bearing. It should be replaced when the surface is unusual.

- Measure the inner diameter of the driving gear. It should be replaced when the diameter is more than the service limit.

  Service limit 32.06 mm 1.2625 in.

- Inspect the condition of the needle bearing. If damage is extensive it should be replaced.

- Inspect if there is any damage to the surface between the outer clutch component and the roller.
- Inspect for damage to the roller.
- Inspect for damage to the spring.
- Measure the inner diameter of the flange clutch. It should be replaced when the diameter is more than the service limimt.

  Service limit 27.94mm 1.100 in.

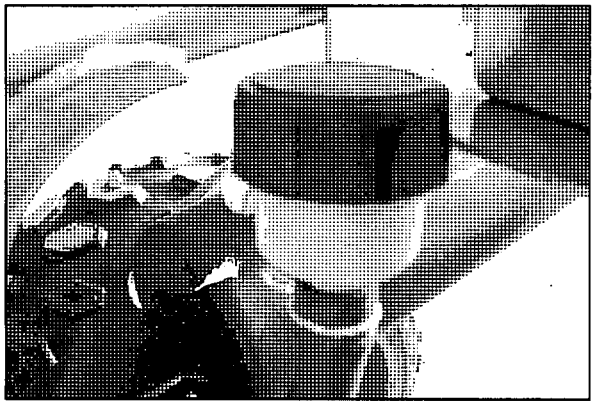
STARTING CLUTCH INSTALLATION

- Install the spring, the roller, and the top pin on the body of the clutch.
- Align the dowel pin on the flange clutch with the hole on the clutch body, then install.
- Apply Loctite 242 on the outer clutch component bolt and fasten.
- Apply some oil on the needle bearing and the driving gear and put the outer clutch component on.
- Align the groove of the woodruff key on the crank and install the starting clutch.
- Apply some oil on the reduction gear and the reduction gear shaft, then install.
- Hold the drive while simultaneously fastening the clutch nut.
- Install the right crankcase cover.
- Install the left crankcase cover.

BRAKES

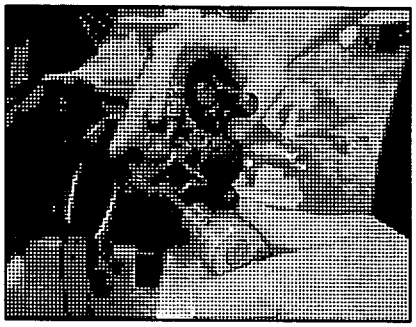
BRAKE PERFORMANCE

- Always check that there is plenty of brake fluid in the brake fluid reservoir.
- Ensure that the rear brake pads are in good condition.
- Check the brake rotor for abnormal wear.
- DOT 3 – 4 brake fluid



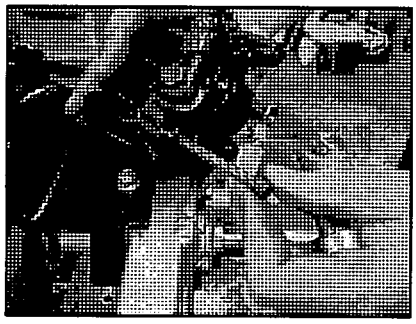
BRAKE SHOE AND CALIPER INSPECTION

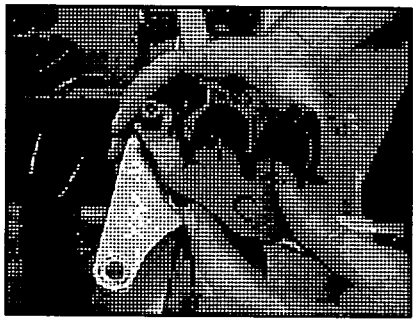
- Remove 2 bolts holding caliper to frame.



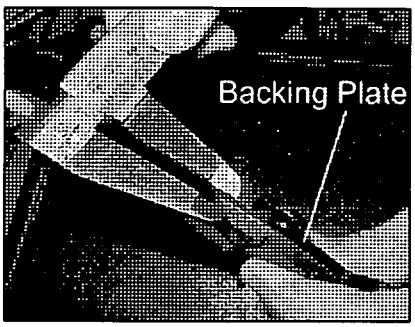
- Remove both outer plugs.

- Remove brake pad pins and remove brake pads.



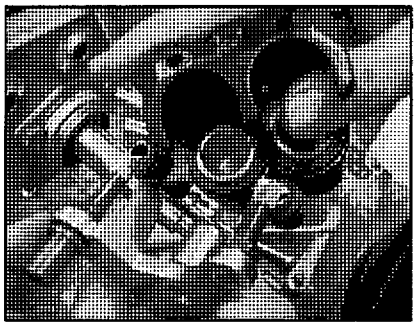


- Check thickness of pads and replace if out of service limit.



	Service Limit	
Measuring thickness without backing plate	2.0 mm	0.080 in.
Measuring thickness with backing plate	3.0 mm	0.120 in.

- Remove caliper from mounting plate and inspect pins for bending, rust, or corrosion.

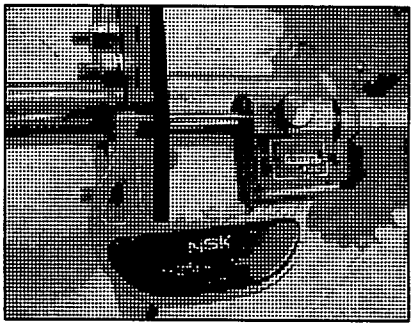


- Lubricate brake mounting pins with grease and reinstall caliper on mounting plate. Check for proper movement of caliper on pins.

- Make sure to not get grease or oil on brake pads or rotor.
- Install new pads making sure shoe spring is in place.

- Check master cylinder, break lines, and calipers for signs of leaking.

- Check condition of brake rotor and thickness.

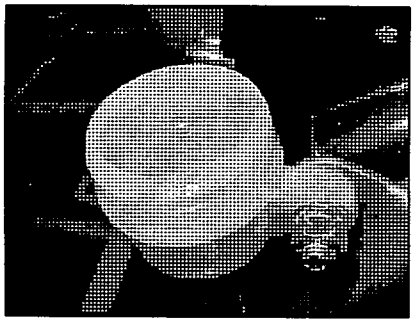


Service Limit 3.0 mm 0.120 in.

BRAKE BLEEDING FLUID CHANGE

This procedure should be used to change the fluid or bleed the brakes.

- Remove reservoir cap and diaphragm. Clean and inspect.



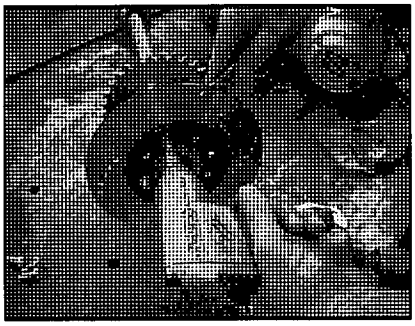
- Drain old fluid from reservoir. Add brake fluid to upper mark on reservoir.
- Slowly pump break pedal until pressure builds and holds.
- While maintaining pedal pressure, open bleeder valve. To bleed air off, close valve.

- Repeat procedure until all air has been purged from system and clean fluid appears.

Note: Maintain fluid in reservoir while performing procedure.

REAR BRAKE DISK REMOVAL

- Remove the rear axle.
- Remove four bolts holding disc to axle

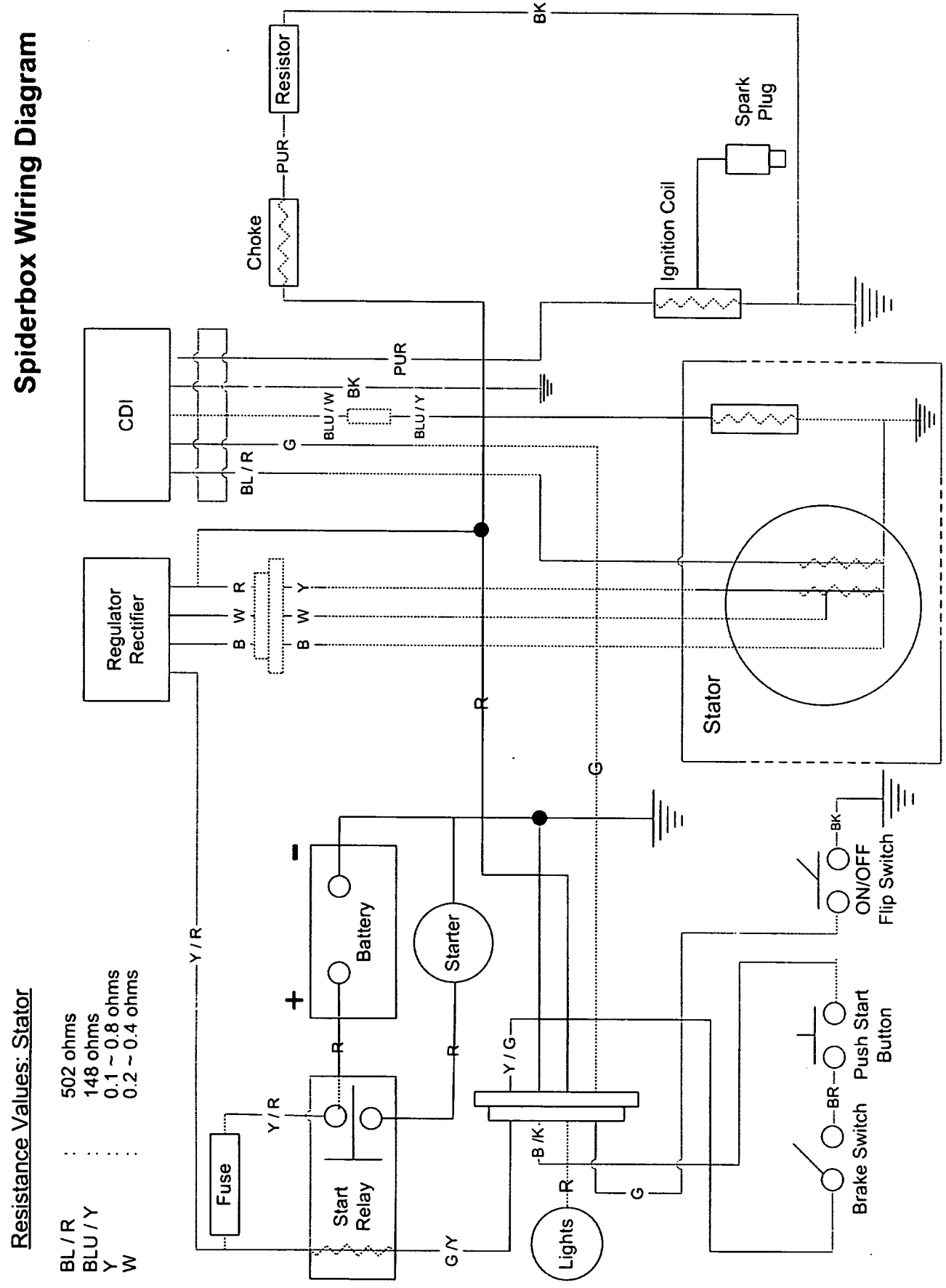


- Visually inspect disc for wear or damage. If measurements fall beyond service limit, replace disc.

  Service Limit: 3 mm 0.120 in.

- Install new disc and reattach four bolts using Loctite 242.
- Torque to **18 ft. / lbs**.

Spiderbox Wiring Diagram



Resistance Values: Stator

BL / R	502 ohms
BLU / Y	148 ohms
Y	0.1 ~ 0.8 ohms
W	0.2 ~ 0.4 ohms

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MODEL 3206 REPLACEMENT PARTS IDENTIFICATION

Item	Part No.	Description	Item	Part No.	Description
1	5524	WLDMT;RACK;RED;3206	29	H32505W	SCREW;HEX;1/4-20X5/8;SELF-TAP
2	5541	TUBE;FRONT;RIGHT;BGUARD;SILVER	30	5593	ASSY;DRIVE TRAIN w/batt.;3206
3	5621	TUBE;FRONT;LEFT;BGUARD;SILVER	31	5826	BOLT;HXHD;7/16"-14X2-3/4"
4	5544	TUBE;BRUSH GUARD;CROSS;SILVER	32	4730	NUT;LOCK;7/16;BLACK ZINC;CUV
5	5518	TUBE;REAR;BRUSHGUARD;SILVER	33	5594	ASSY;FRONT END;3206
6	5590	ASSY;OWNERS PACKET;3206	34	2200040	BOLT;HEX;5/16-18X1.0
7	5547	HEADLIGHTS;FRONT;3206	35	5634	ASSY;CLAMP STEERING HOOP&COLUM
8	5549	WLDMT;CHASSIS COMPLETE;RED;SB	36	5640	STEERING SECTION;3206
9	5672	PEDAL;THROTTLE;1-1/4";3206	37	5665	BOLT;8MMX1-1/4"CP;CLAMP BOLT
10	4002	BOLT;HEX;5/16-18X2";CZ	38	5666	WASHER;LOCK;8X12MM;CLAMP BOLT
11	HH1256T	NUT;NYLOCK;5/16-18;CZ	39	5635	ASSY;RACK & PINION W/TIE RODS
12	5673	PEDAL;BRAKE;1-1/4";3206	40	1400	BOLT;HEX;5/16-18X2.50
13	5639	PLATE;BRAKE PIVOT;3206	41	5667	NUT;NYLOCK;10MM;RACK & PINION
14	4682	BOLT;HEX;1/4-20X1;ZINC	42	5668	WASHER;10MMX18MM;RACK & PINION
15	H32503W	BOLT;HEX;1/4-20X1-3/4;CZ	43	5636	UNIVERSAL U JOINT;3206
16	001203P	NUT;NYLOCK;1/4-20;ZINC	44	5595	SEAT;BUCKET;ROTOCAST;3206
17	5912	SPACER;1/4" X 1/4";ZINC	45	5629	SHOCK;FRONT;12.6"L;3206
18	001205P	NUT;HEX;3/8-16;NYLOCK;CZ	46	922	BOLT;HEX;3/8-16X1.5";CZ
19	1474	SPACER;0.625"ODX0.406"IDX0.375	47	5630	SHOCK;BACK;12.6"L;3206
20	5637	PLATE;BRAKE;MASTER;CYLINDER	48	22000300	BOLT;HEX;3/8-16X1.75;ZINC
21	5886	BOLT;HXHD;1/4-18X2"	49	5642	ASSY;WHEEL;REAR;20";NO HUB
22	5803	ROD;THROTTLE;ZINC;3206	50	2451	ASSY;WHEEL;FRONT;TURF;3203
23	001618P	WASHER;FLAT;5/16IDX11/16OD;CZ	51	H56251W	WASHER;FLAT;5/8;NARROW;BLK OX
24	5969	CLEVIS;BRAKE;ROD;3206	52	513	SPACER;SPINDLE
25	5942	ROD;BRAKE;THRD BOTH END;3206	53	HH62518	NUT;5/8-18;THIN;NYLOCK;CZ
26	5974	WIRE;BRK;STP;SWTCH;3206	54	5597	WRAP;VINYL;FOAM;KIT;3206
27	H55030W	SPRING;COMP;1/2X3.0;CZ	55	5600	GAS TANK;3206
28	H91480W	COLLAR;7/16 BORE X 7/8 OD;CZ	56	5791	ASSEMBLY;HARDWARE;SEATRAIL;SEATBELT

MODEL 3206 DRIVETRAIN REPLACEMENT PARTS IDENTIFICATION

Item	Part No.	Description	Item	Part No.	Description
1	05824	CYLINDER HEAD COVER	36	05963	OIL SEAL 27 X 42 X 7
2	05890	WASHER SEALING 6.5MM	37	05959	BOLT STUD 8 X 195
3	05893	CRANK SHAFT COMP	38	05968	O-RING 7.5 X 1.5
4	05896	CLIP PISTON PIN 15MM	39	05877	KICK BUSHING
5	05894	KEY WOODRUFF	40	05958	BOLT STUD 8 X 187
6	05900	DOWN SHROUD COMP	41	05964	PIN DOWEL 8 X 14
7	05899	UP SHROUD COMP	42	05970	BOLT DRAIN PLUG 12MM
8	05905	CLAMPER CARB DRAIN TUBE	43	05971	WASHER DRAIN PLUG 12MM
9	05902	COVER COMP FAN	44	05953	GASKET CRANKCASE
10	05901	DUCT CARBURATOR COOLING	45	05957	TUBE BREATHER
11	05910	PAN COMP COOLING	46	05967	PIN BRAKE SHOE ANCHOR
12	05823	TUBE BREATHER	47	05939	SHAFT COMP COUNTER
13	05907	GENRATR FLYWHEEL TYPE A.C.	48	05946	OIL SEAL 20 X 32 X 16
14	05906	COIL ASSY IGNITION	49	05936	COVER MISSION ASSY
15	05932	STARTER CLUTCH	50	05945	WASHER 8MM
16	05930	SHAFT STARTER REDUCTION GEAR	51	05944	BOLT DRAIN PLUG 8MM
17	05929	GEAR STARTER REDUCTION	52	05941	GEAR FINAL
18	05933	WASHER THRUST	53	05938	SHAFT DRIVE
19	05934	NUT LOCK	54	05937	GASKET MISSION COVER
20	05917	SCREEN OIL FILTER	55	05977	CHAIN OIL PUMP
21	05914	RIGHT CRANK CASE COVER	56	05975	SPROCKET OIL PUMP DRIVEN
22	05926	BOLT FLANGE 6 X 95	57	05978	SEPARTOR OIL
23	05915	GASKET R CRANKCASE COVER	58	05875	KICK AXLE ASSY
24	05916	CAP TAPPET ADJUSTING HOLE	59	05887	GEAR KICK
25	05918	SPRING OIL FILTER SCREEN	60	05874	KICK SPRING
26	05919	GAUGE OIL LEVEL	61	05876	KICK AXLE PIN
27	05923	O-RING	62	05873	WASHING
28	05927	BOLT FLANGE 6 X 110	63	05872	KICK AXLE BUSHING
29	05920	CLAMPER A.C. GENERATOR CORD	64	05871	KICK SPRING PLATE
30	05841	BOLT FLANGE M6 X 100	65	05827	CAMSHAFT
31	05825	GASKET HEAD COVER	66	05982	LIFTER ASSY TENSIONER
32	05951	CRANKCASE ASSY RIGHT	67	05981	TENSIONER CAM CHAIN COMP
33	05952	BUSH ENGINE HANGER RUBBER	68	05980	CHAIN CAM
34	05921	OIL, SEAL 19.8 X 30 X 5	69	05987	GUIDE COMP CAM CHAIN
35	05956	BUSH RR CUSHION UNDER RUBBER	70	05983	GASKET TENSIONER LIFTER

Item	Part No.	Description	Item	Part No.	Description
71	05986	PIVOT CAM CHAIN TENSIONER	116	05842	GASKET CYLINDER HEAD
72	05985	O-RING 15.2 X 1.5	117	05852	VALVE EX
73	05835	SHAFT COMP IN ROCKER ARM	118	05853	VALVE IN
74	05836	PLATE COMP STOPPER	119	05859	CARBURETOR ASSY
75	05828	SHAFT EX ROCKER ARM	120	05860	AIR CLEANER
76	05831	NUT TAPPET ADJUSTING	121	05861	ELEMENT COMP AIR CLEANER
77	05832	SCREW TAPPET ADJUSTING	122	05955	AIR CLEANER CONNECT FRONT
78	05833	WASHER M8	123	05972	AIR CLEANER CONNECT REAR
79	05834	NUT FLANG M8	124	05954	CRANKCASE ASSY LEFT
80	05839	SEAL VALVE STEM	125	05940	SHAFT FINAL
81	05845	PIPE COMP IN	126	05943	BOLT FLANGE 6 X 28
82	05846	BAND INSULATER	127	05840	PLUG SPARK
83	05850	BOLT 2 STUD M6 X 35	128	05949	BEARING RADIAL 202
84	05844	INSULATOR CARBURETOR	129	05950	BEARING RADIAL 203
85	05849	PIN DOWEL 10 X 16	130	05948	BEARING RADIAL 204
86	05847	NUT FLANGE M6	131	05960	BEARING RADIAL BALL 102
87	05857	RETAINER VALVE SPRING	132	05966	BEARING RADIAL BALL 301
88	05858	COTTER VALVE	133	05961	BEARING RADIAL BALL 180104
89	05855	SPRING VALVE OUTER	134	05922	O-RING 18 X 3
90	05856	SPRING VALVE INNER	135	05848	O-RING 18 X 3
91	05854	SEAT VALVE SPRING OUTER	136	05909	BOLT FLANGE M5X12
92	05843	GASKET CARBURETOR INSULATOR	137	05892	BOLT FLANGE M6X12
93	05931	MOTOR ASSY STARTER	138	05870	BOLT FLANGE M6X14
94	05862	COVER LEFT	139	05869	BOLT FLANGE M6X16
95	05879	BRAND COVER	140	05911	BOLT FLANGE M6X18
96	05880	GASKET BRAND COVER	141	05908	BOLT FLANGE M6X20
97	05863	CLAMPER BRETHR DRAIN TUBE	142	05984	BOLT FLANGE M6X22
98	05864	GASKET LEFT COVER	143	05903	BOLT FLANGE M6X25
99	05865	PLATE LEFT COVER	144	05925	BOLT FLANGE M6X32
100	05878	AIR STRAINER	145	05924	BOLT FLANGE M6X35
101	05883	PULLEY ASSY. MOVEABLE DRIVEN	146	05867	BOLT FLANGE M6X40
102	05881	PULLEY ASSY DRIVEN	147	05965	BOLT FLANGE M6X50
103	05882	BELT DRIVE	148	05868	BOLT FLANGE M6X65
104	05884	WASHER PLAIN 12MM	149	05892	BOLT FLANGE M6X12
105	05885	NUT FLANGE 12 X 1.25MM	150	05885	NUT FLANGE 12X1.25MM
106	0537	HOLDER CAMSHAFT ASSY	151	05847	NUT FLANGE M6
107	05888	CYLINDER COMP	152	05866	SCREW TAPPING 4X6
108	05889	GASKET CYLINDER	153	05904	SCREW TAPPING ST4.8X16
109	05898	PISTON RING	154	05947	CIR CLIP EXTERNAL 20MM
110	05895	PISTON	155	05851	BOLT 2 STUD M6X50
111	05897	PIN PISTON	156	05913	WASHER PLAIN 12MM
112	05973	OIL PUMP COMP			
113	05829	ARM VALVE ROCKER			
114	05830	HOLDER CAMSHAFT			
115	05838	HEAD COMP CYLINDER			