ETON America

Lightning-50
Thunder-90
Service Manual

Spartanburg, SC 29303

Rev 2.0.0 **06/30/2000**

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1. INFORMATION

1.1 SAFETY

Gasoline is extremely flammable and is explosive under certain condition. Do not smoke or allow sparks or flames in your work area.

Never run the engine in a closed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and lead to death.

The battery electrolyte contains sulfuric acid. Protect your eyes, skin and clothing. If you contact it, flush thoroughly with water and call a doctor if electrolyte gets in your eyes.

1.2 NOTES

All information, illustrations, directions and specifications included in this publication are base on the latest product information available at the time of approval for printing.
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1.3 SPECIFICATION

ENGINE	
Type	Air-Cooling 2-Stroke
Displacement	TXL-AXL-50 - 49.3cc TXL/AXL/DXL-90 - 82.5cc
Bore and Stroke	40.0*39.2mm/50.0*42.0mm
Compression	6.8:1/5.8:1
Maximum Torque	5.4N-m@6000rpm/7.2 N-m@6000rpm
Carburetor	Mikuni VM16
Ignition	Capacitor Discharge
Starting	Electric
Lubrication	Oil Pump Separate Supply
Oil Capacity	1. 0 liter
Transmission	Automatic (C.V.T V-belt)
CHASSIS	
Overall	1,330mm(52.4inch)
Overall Width	830mm(32.7inch)
Overall Height	830mm(32.7inch)
Seat Height	630mm(24.8inch)
Wheel base	900mm(35.4inch)
Ground Clearance	130mm(5.1inch)
85kg/95kg	85kg/95kg
Fuel Tank Capacity	4.5liter
SUSPENSION	
Front	Dual Arm
Rear	Swing Arm
BRAKES	
Front	Drum
Rear	Drum
TIRES	
Front	16"*8"-7"
Rear	19"*7"-8
COLORING	Red/Yellow /Blue/Green

***Specifications subject to change without notice.

1.4 SERIAL NUMBER

The frame serial number is stamped on the front of the frame.
The engine serial number is stamped on the left side of the crankcase.

Frame serial number

Engine serial number

1.5 TORQUE VALUES

ENGINE

Cylinder head nut	28-30 N.m (20.7-22.1 lb./ft)
Spark plug	12-19 N.m (8.9-14.0 lb./ft)
Cylinder head bolt	20-30 N.m (14.8-22.1 lb./ft)
Alternator bolt	8-12 N.m (5.9- 8.9 lb./ft)

FRAME

Handlebar upper holder bolt	24-30 N.m (17.7-22.1 lb./ft)
Steering shaft nut	50-60 N.m (36.9-44.3 lb./ft)
Steering shaft bushing holder nut	24-30 N.m (17.7-22.1 lb./ft)
Wheel rim bolt	18-25 N.m (13.3-18.4 lb./ft)
Tie rod lock nut	35-43 N.m (25.8-31.7 lb./ft)
King pin nut	30-40 N.m (22.1-29.5 lb./ft)
Handlebar lower holder nut	40-48 N.m (29.5-35.4 lb./ft)
Front wheel bolt	24-30 N.m (17.7-22.1 lb./ft)
Front axle nut	55-65 N.m (40.6-47.9 lb./ft)
Front brake arm nut	4-7 N.m (3.0- 5.2 lb./ft)
Rear brake arm nut	7-12 N.m (5.2- 8.9 lb./ft)
Rear axle nut	60-80 N.m (44.3-59.0 lb./ft)
Rear wheel bolt	24-30 N.m (17.7-22.1 lb./ft)
Exhaust muffler mounting bolt	30-35 N.m (22.1-25.8 lb./ft)
Engine hanger bolt	24-30 N.m (17.7-22.1 lb./ft)

2. MAINTENANCE

2.1 MAINTENANCE DATA

SPECIFICATION

SPARK PLUG:

PARK PLUG GAP:	0.6-0.7 mm
RECOMMENDED SPARK PLUGS:	NGK BPR7HS

THROTTLE LEVER FREE PLAY:	5-10 mm
IDLE SPEED:	1800±100 rpm
BRAKE LEVER FREE PLAY:	15-25 mm
DRIVE CHAIN SLACK	10-25 mm
FRONT/REAR TIRE SIZE	16X8-7/ 19X7-8
FRONT/REAR TIRE PRESSURE	2.2± 0.3 psi(0.15 kgf/cm2)
TOE-IN	5±10 mm

TORQUE VALUES

SPARK PLUG	12-19 N.m
TIE-ROD LOCK NUT	35-43 N.m

ENGINE OIL	JASO FC Grade or same degree oil
GEAR LUBRICATION OIL	SAE 40

2.2 MAINTENANCE SCHEDULE

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

	INITIAL SERVICE (First week)	REGULAR SERVICE (Every 30 operating days)	EVERY Year
FUEL LINE			I
THROTTLE OPERATION	I	I	
AIR CLEANER		C	
SPARK PLUG		I	
CARBURETOR IDLE SPEED	I	I	
DRIVE CHAIN	I, L	I, L	
BRAKE SHOE WEAR			I
BRAKE SYSTEM	I	I	
NUT, BOLT, FASTENER	I	I	
WHEEL	I	I	
STEERING SYSTEM			I
SUSPENSION SYSTEM			I
C.V.T. AIR FILTER		C	
GEAR OIL			R

Note - **I:** Inspect and Clean, Adjust, Lubricate or Replace, if necessary
C: Clean
L: Lubricate
R: Replace

2.3 FUEL TUBE

Inspect the fuel lines for deterioration, damage or leakage and replace if necessary.

2.4 THROTTLE OPERATION

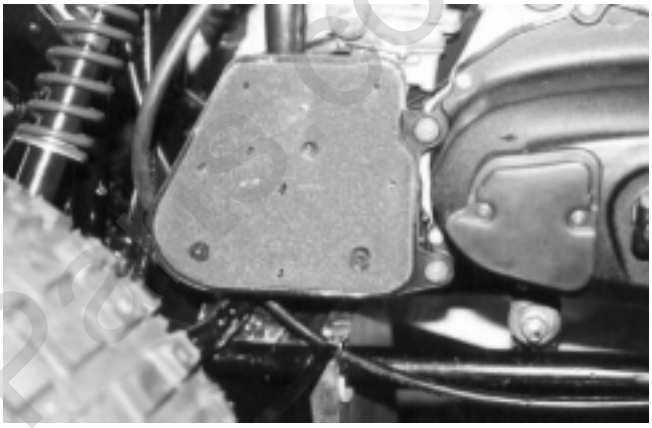
Inspect for smooth throttle lever full opening and automatic full closing in all steering positions.
Inspect if there is no deterioration, damage or kinking in the throttle cable, replace it if necessary.
Check the throttle lever, free play is 5-10 mm at the tip of the throttle lever.
Disconnect the throttle cable at the upper end.
Lubricate the cable with commercially lubricant to prevent premature wear.

2.5 THROTTLE CABLE ADJUSTMENT

Slide the rubber cap of the adjuster off the throttle Housing, loosen the lock nut and adjust the free play of the throttle lever by turning the adjuster on the throttle housing. Inspect the free play of the throttle lever.

2.6 AIR CLEANER

Unscrew the air cleaner cover screws.
Pull out the air filter element from the air cleaner case.
Wash the element in non-flammable solvent, squeeze out the solvent thoroughly. Let it dry.
Soak the filter element in gear oil and then squeeze out the excess oil.
Install the element into air cleaner carefully.

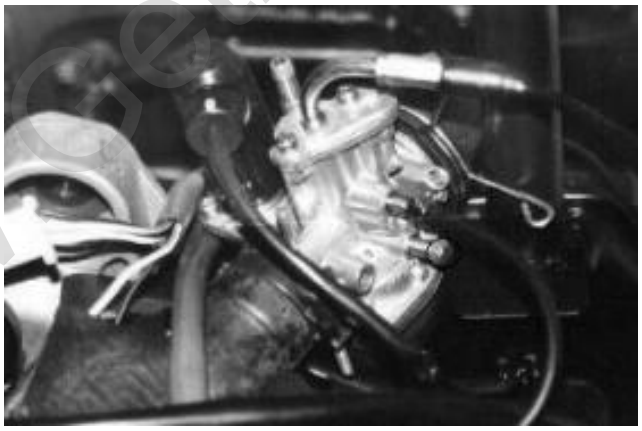


2.7 SPARK PLUG

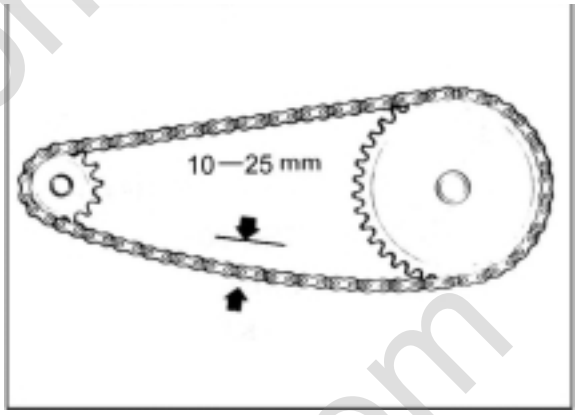
This spark plug located at the front of the engine.
Disconnect the spark plug cap and unscrew the spark plug.
Check the spark plug electrodes for wear.
Change a new spark plug if the electrodes and insulator tip appear unusually fouled or burned.
Discard the spark plug if there is apparent wear or if the insulator is cracked or chipped.
The spark plug gap shall keep in 0.6-0.7mm.
With the sealing washer attached, thread the spark plug in by hand to prevent cross threading.
Tighten the spark plug with 12-19 N.m

2.8 IDLE SPEED

Connect a engine speed meter.
Warm up the engine, 10 minutes are enough.
Turn the idle-speed adjust screw on the carburetor to obtain the idle speed. "Turn in" (clockwise) will get higher speed. "Turn out" (counter clockwise) will

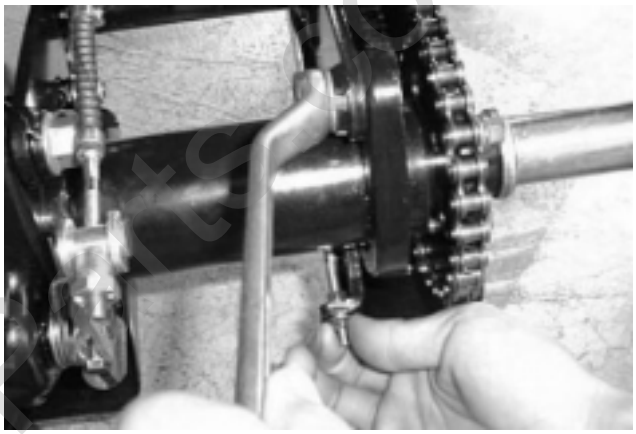


get lower speed.
IDLE SPEED: 1800±100 rpm



2.9 DRIVE CHAIN

Inspect the chain slack. The standard is 10-25mm.

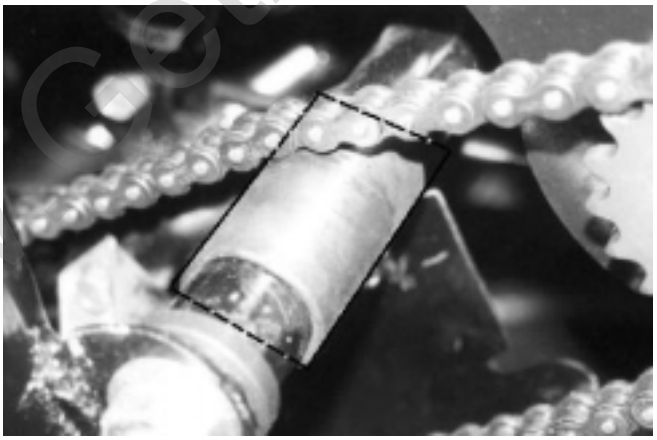


Adjust the chain slack.
Loose the lock bolts (4) then adjust the drive chain slack by turn the adjusting nut. Tighten the four lock bolts.

When the drive chain becomes very dirty, it should be removed, cleaned and lubricated by specify lubricator. Using commercial chain lubricant to lubricate the drive chain.

Clean the drive chain with kerosene and wipe it dry. Inspect the drive chain for possible wear or damage. Replace the chain, if it is worn excessively or damaged.

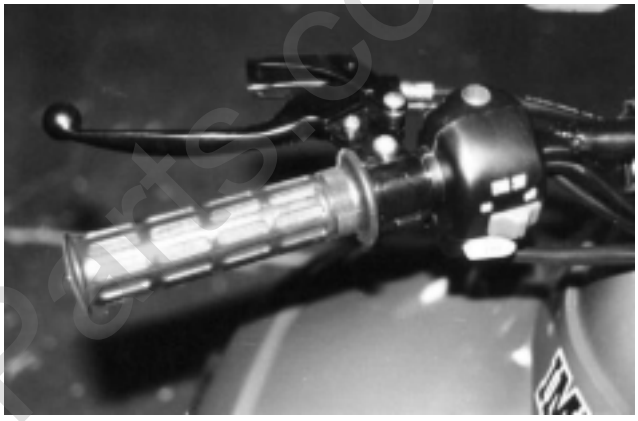
Inspect the sprocket teeth. If it is excessive wear or damage, replace it.



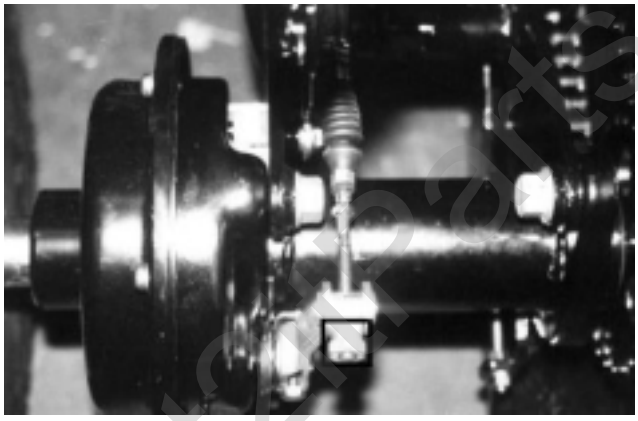
Inspect the chain-tensioned roller.
Replace it, if necessary.

2.10 BRAKE SYSTEM

Inspect the front brake lever and cable for excessive play or other damage.
Replace or repair if necessary.
Measure the free play of the brake lever at the end of the brake lever. The standard of free play is 15-25 mm.



Inspect the rear rake lever and cable for excessive play or other damage.
Replace or repair if necessary.
Measure the free play of the rear brake lever at the end of the lever. The standard is 15-25 mm.



Adjust the free play of the rear brake lever by turning the adjuster on the rear axle.

2.11 WHEELS AND TIRES

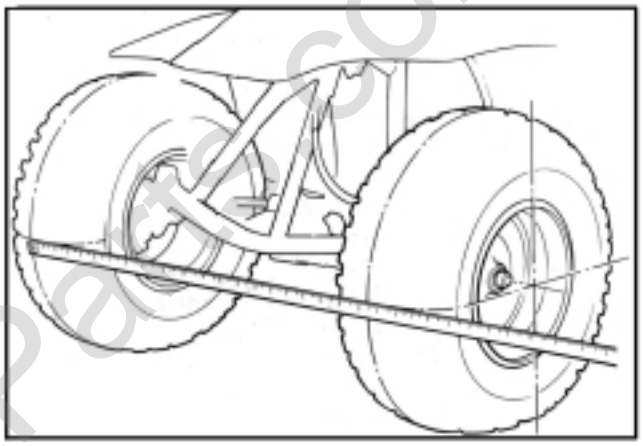
Inspect the tire surfaces for cuts, nails or other sharp objects.
Check the tire pressure at cold tire condition.
The standard of tire pressure is 2.2±0.3 psi. (015 kgf/cm2)

2.12 STEERING SYSTEM

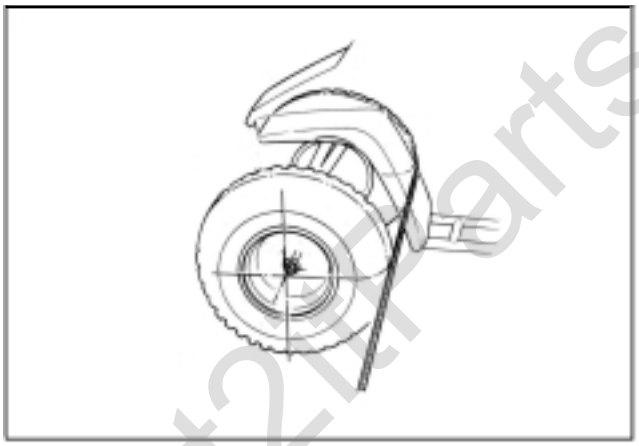
Check the free play of the steering shaft with the front wheels, turned straight ahead.
When there is excessive play, inspect the tie-rod, kingpin bushing and ball joint.

2.13 TOE-IN

Let the vehicle on level ground and the front wheels facing straight ahead.
Mark the centers of the tires to indicate the axle center height.
Measure the distance between the marks.



Carefully move the vehicle back, let the wheels have turned 180 °, so the marks on the tires are aligned with the axle center height.
Measure the distance between the marks.
Calculate the difference in the front and rear measurements.
Toe-in: 5±10mm



If the toe-in is out of standard, adjust it by changing the length of the tie-rods equally by turning the tie-rod while holding the ball joint.
Tighten the lock nuts.
Torque: 35-43 N.m

2.14 GEAR OIL

Gear oil needs to be changed every year.
There is a gear oil release bolt at the rear of engine.
Unscrew this release bolt and can let the dirty oil flow out.
The re-add oil hole is on the engine case beside gear box.

3.1 ENGINE SHOULD NOT BE REMOVED UNLESS IT IS NECESsARY TO REPAIR OR MAKE ADJUSTMENTS TO THE TRANSMISSION AND/OR COMBUSTION SYSTEM!

3.2 ENGINE REMOVAL

Remove the seat and rear fender. (See chapter 10)
Remove the spark plug cap from the spark plug.
Remove the exhaust pipe.
Disconnect the carburetor cable by unscrew two screws on top of the carburetor.
Take off oil pump cable from the oil pump control plate.
Oil pump is under the right side of engine.

Disconnect the wire connectors. There are three connectors for carburetor auto-choke, starter motor and generator respectively.
Remove the drive chain cover. This is under the chain.
Remove the drive chain retaining clip and master link, and remove the drive chain.
Remove the three engine hanger nuts and bolts.
Remove the engine from the right side of frame.

3.3 ENGINE INSTALLATION

Engine installation is essentially the reverse order of removal.
The torque of engine hanger bolt is 24-30 Nm
Route the wires and cable in reverse order properly.

4.1 TROUBLESHOOTING

ENGINE CAN NOT START	NO FUEL IN TANK NO FUEL TO CYLINDER TOO MUCH FUEL GO INTO CYLINDER NO SPARK AT PLUG AIR CLEANER CLOGGED
ENGINE IDLES ROUGH, STALLS OR RUNS POORLY	IMPROPER ADJUSTMENT TO IDLE SPEED SCREW IGNITION MALFUNCTION FUEL/AIR MIXTURE RATIO NO GOOD AIR CLEANER DIRTY INSULATOR LEAKS FUEL TANK CAP BREATHING HOLE CLOGGED
LEAN MIXTURE	FUEL JET OF CARBURETOR CLOGGED FUEL TANK CAP BREATHING HOLE CLOGGED FUEL FILTER CLOGGED FUEL FLOWS IN THE TUBE ROUGHLY FLOAT LEVEL IN CARBURETOR TOO LOW
RICH MIXTURE	FLOAT NEEDLE VALVE IN CARBURETOR FAULTY FLOAT LEVEL TOO HIGH AIR DUCT IN CARBURETOR IS CLOGGED AIR CLEANER DIRTY

4.2 FUEL TANK

REMOVAL

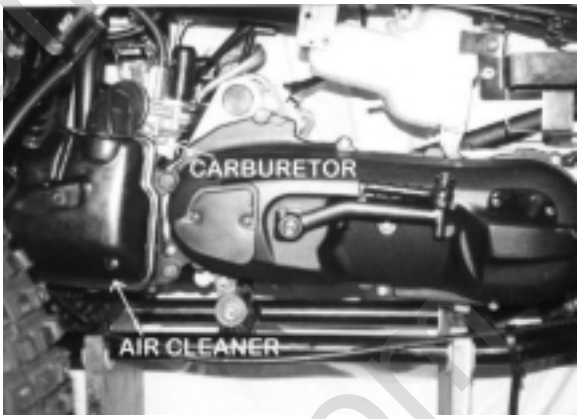
Remove the seat and rear fender.
Disconnect the fuel line from the carburetor.
Remove the fuel tank cap and front fender.
Unscrew the fuel tank fixed bolts.

Note: Keep gasoline away from flames or sparks.
Wipe up spilled gasoline at once.

4.3 CARBURETOR

REMOVAL

Remove the air cleaner.
Disconnect the fuel line and auto-choke electric wire.
Unscrew the intake pipe mounting bolts at the carburetor then remove the carburetor.



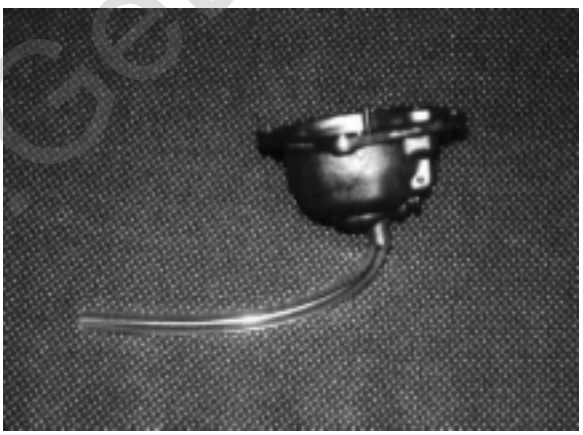
Note: Turn fuel cup on (off) position

Remove the carburetor cap.
Remove the throttle cable from the throttle valve while depressing the throttle valve spring.

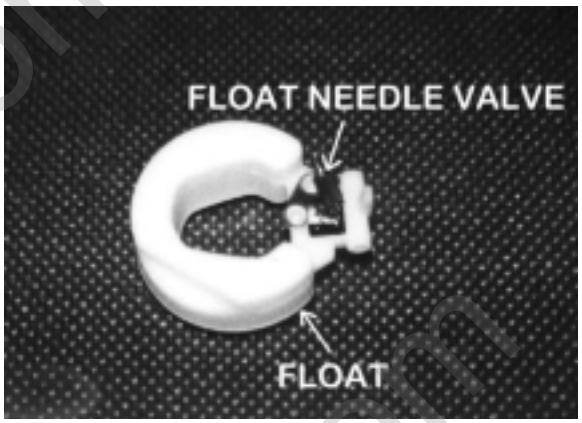
Remove the needle clip retainer, the jet needle and needle clip.
Inspect the throttle valve and jet needle surface for wear.,
scratches or dirt.

DISASSEMBLY

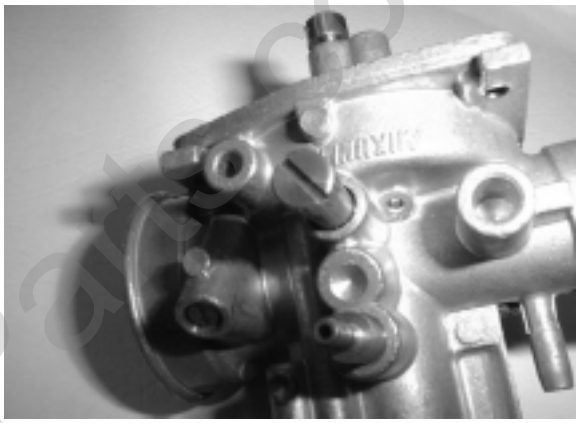
Unscrew the float chamber screws and remove the float chamber.



Disassembly the float arm pin, float and float needle valve.
Inspect the seat of the float needle valve for wear or damage.

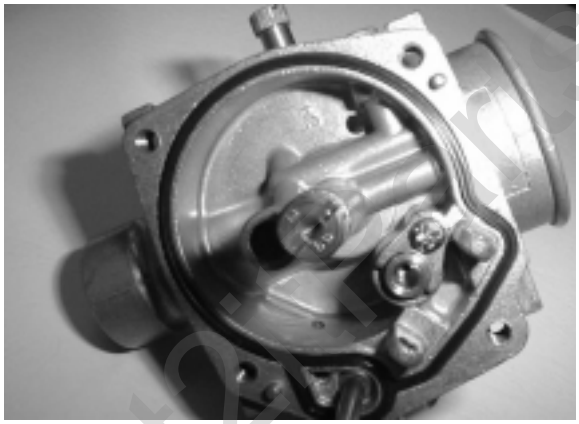


Disassembly the idle jet, main jet, idle speeds adjust screw and idle mixture adjusts screw.
Inspect all the jets and screws for wear or damage.
Clean the passages and jets with compressed air.



ASSEMBLY

Clean all parts in solvent and blow it dry with compressed air.
Assembly is essentially the reverse order of disassembly.



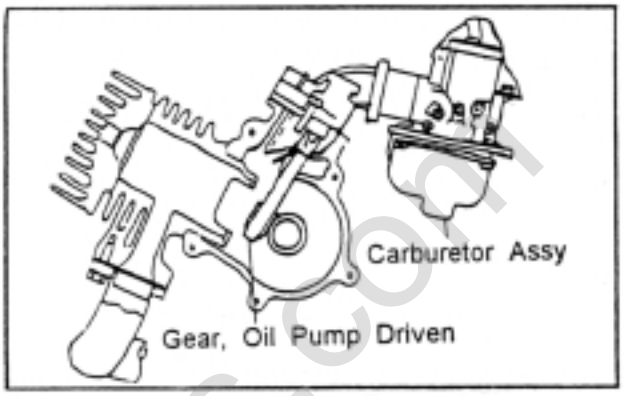
THROTTLE VALVE ASSEMBLY

Install the needle clip on the jet needle.
Install the jet needle into the throttle valve.
Assemble the throttle cable, spring and the throttle valve.
Align the throttle valve groove with the idle speed adjust screw and install the carburetor cap to the carburetor.

5. ENGINE LUBRICATION AND COOLING SYSTEM

5.1 ENGINE LUBRICATION SYSTEM

The engine crankshaft drives the pump gears of oil pump. The gears rotate the plunger shaft in oil pump. This shaft sent the lubricating oil into the crankcase to mix with the air-fuel mixture and flow evenly.
The oil drops and foam cover the cylinder inner wall, piston surface and piston rings.



5.2 CAUTION

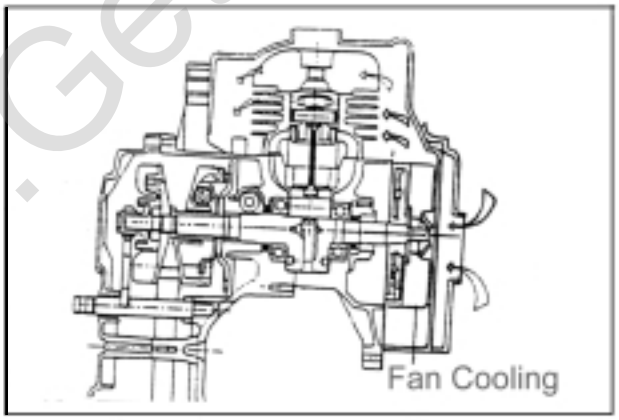
Having enough oil supply to engine is very important.
If the oil quantity is not enough, this engine will be serious scratched, and then this engine will stop, even cannot work again.
When this engine is serious scratched, you need to change the piston, piston rings and cylinder together.
Also you need to check the combustion system and lubrication system carefully.

5.3 OIL PUMP

The quantity of oil that is delivered from oil pump increases with the engine speed and the carburetor throttle open width. Oil pump is under the right side of the engine and connected by a control cable of throttle.

5.4 COOLING SYSTEM

The engine-cooling fan circulates the air.
The cooling fan is on the right-hand side of engine.
The air is forced to flow through cylinder fin and cylinder head. So, the cylinder and piston will not overheat.



5.5 TROUBLESHOOTING

NO ENOUGH OIL SUPPLY TO ENGINE →	THE OIL LEVEL IN OIL TANK IS TOO LOW. OIL TUBES WERE NOT FIXED WELL. OIL HAS LEAK FROM TUBE ENDS.
OIL TUBES WERE BROKEN.	OIL TUBES WERE CLOGGED. OIL PUMP NOT WORKING.
ALWAYS LOW OIL LEVEL IN LUBRICATE OIL TANK →	EXTERNAL OIL LEAKS WORN CYLINDER HEAD GASKET WORN PISTON RINGS

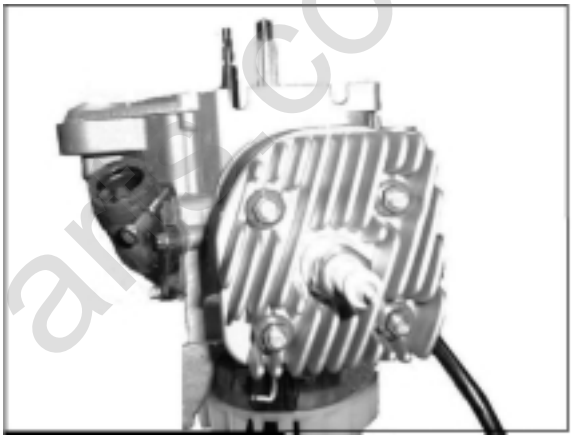
6. ENGINE COMBUSTION SYSTEM

6.1 TROUBLESHOOTING

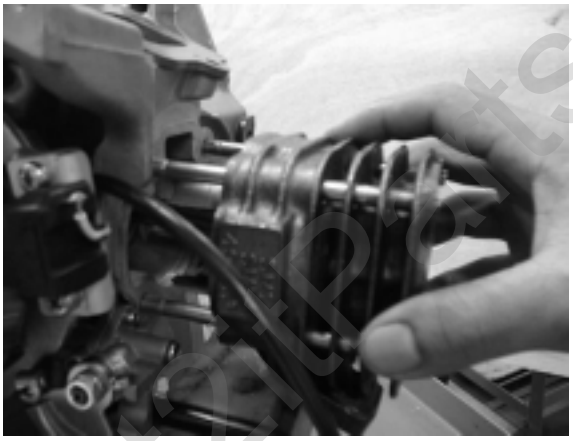
LOW COMPRESSION	CYLINDER HEAD HEAD GASKET LEAKING OR DAMAGED WARPED OR CRACKED CYLINDER HEAD CYLINDER OR PISTON RINGS WORN OUT
HIGH COMPRESSION	EXCESSIVE CARBON BUILD-UP ON PISTON HEAD OR COMBUSTION CHAMBER
EXCESSIVE NOISE	PISTON AND CYLINDER WORN OUT EXCESSIVE CARBON BUILD-UP
EXCESS SMOKE	CYLINDER OR PISTON RINGS WORN OUT IMPROPER INSTALLATION OF PISTON RINGS PISTON OR CYLINDER WALL SCORED OR SCRATCHED
OVERHEATING	EXCESSIVE CARBON BUILD-UP ON THE PISTON OR COMBUSTION CHAMBER ENGINE COOLING SYSTEM (FAN, CYLINDER COVER) WORKS BADLY. OIL SUPPLY IS OUT OF ORDER. WRONG IGNITION TIMING

6.2 CYLINDER AND PISTON REMOVAL

Remove the seat and rear fender.
Remove the exhaust pipe.
Remove the spark plug cap.
Disconnect the wire.
Drag out the engine.
Disassemble the air cleaner and carburetor.



Remove the intake pipe mounting bolts.
Remove the cylinder bolt nuts.



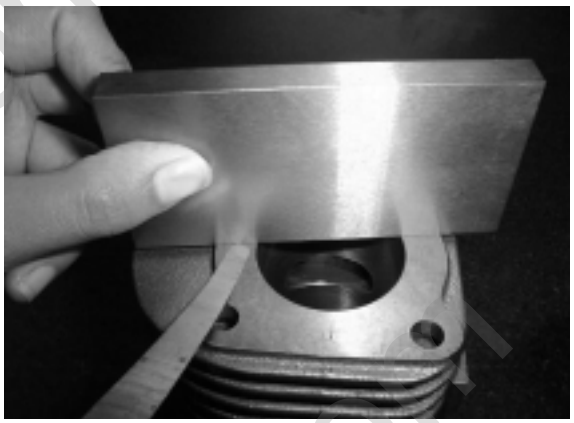
Remove the cylinder head.
Remove the cylinder carefully, then you can see the whole piston.
Remove one piston pin clip.
Remove the piston and piston pin.
Spread each piston ring and remove it by lifting up at a point just opposite the gap.

Note: Don't let the clip drop into engine crankcase.

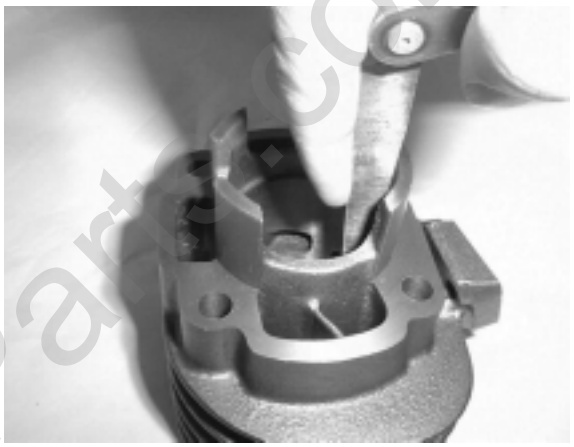
6.3 CYLINDER AND PISTON INSPECTION

Inspect the cylinder bore for wear or damage.
Measure the cylinder inner diameter at three levels in X and Y-axis.
Taper limit: 0.10 mm
Out of round: 0.10 mm

Check the cylinder head mating surface for warp with a straight edge and feeler gauge.
Service limit: 0.10 mm



Insert each piston ring into the cylinder, and measure the end gap.
Service limit: 0.5 mm



Measure the clearance between ring and groove.
Service limit: 0.09 mm

Measure the piston outer diameter at 10 mm high from the skirts bottom.
Service limit: 39.9 mm (for 50cc engine)
49.9 mm (for 90cc engine)

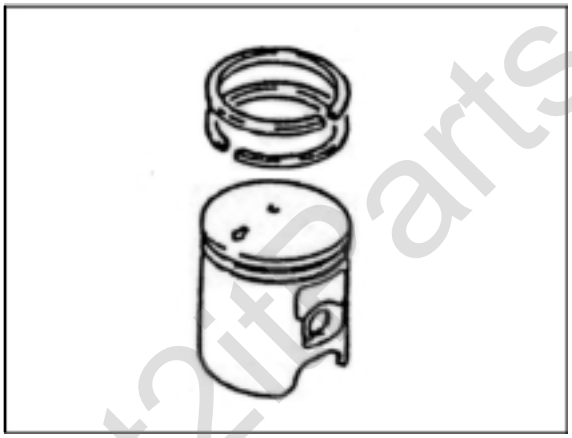
Measure the piston pin bore, and the piston pin outer diameter.

Pin outer diameter service limit:
9.96 mm (for 50cc engine)
11.96 mm (for 90cc engine)
Pin bore service limit:
10.04 mm (for 50cc engine)
12.04 mm (for 90cc engine)

Measure the connecting rod small end inner diameter with a small hole gauge.
Service limit: 14.06 mm (for 50cc engine)
15.06 mm (for 90cc engine)

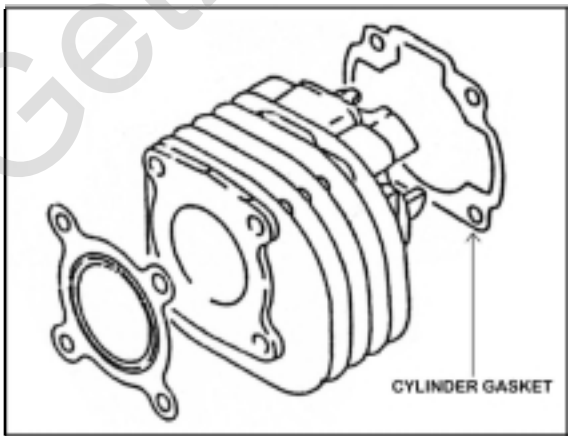
6.4 INSTALLATION

Install the piston rings with the marks facing up.
Do not damage the piston rings by spreading the ends too far.



Clean the cylinder gasket surface being careful not to drop any gasket material into the crankcase.

Apply some oil to inside of the connecting rod small end.
Install the piston, piston pin and clip.
Install the piston with the arrow mark facing the exhaust pipe.
Do not align the piston pin clip end gap with the piston cutout. Install a new cylinder gasket.
Apply a thin coat of engine oil to the piston rings and cylinder wall.



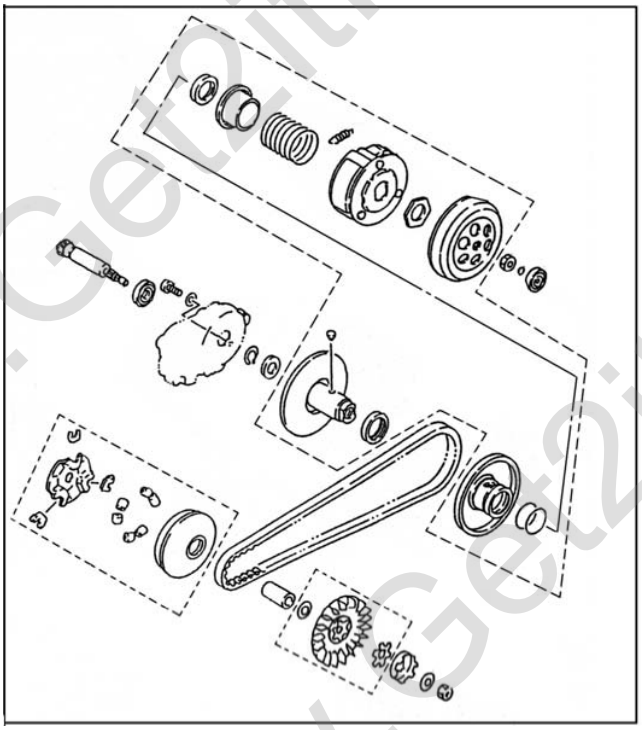
Install the cylinder, compressing the piston rings.
Replace a new cylinder head gasket.
Install the cylinder head.
Tighten the cylinder-mounting bolt.
The torque is 10-14N.m

7. TRANSMISSION AND C.V.T. DRIVE PULLEYS AND STARTERS

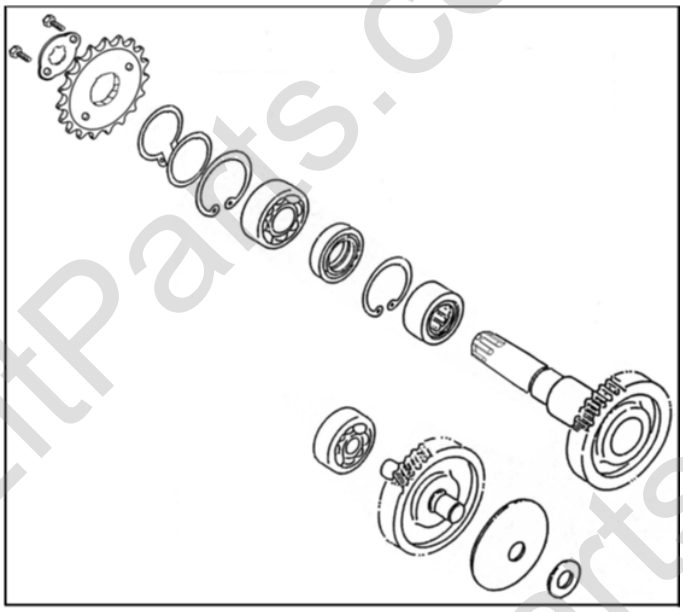
7.1 Trouble Shooting

ATV will not move and/or has low power.	**Drive belt worn or broken** **Front Drive pulley worn or damaged** **Clutch shoe worn or contaminated** **Clutch roller weight worn or damaged** **Clutch roller ramp plate worn or damaged**
ATV will not run at higher speeds.	**Drive belt worn or broken** **Clutch roller weight worn or damaged** **Clutch roller ramp plate worn or damaged** **Rear Driven pulley spring weak or damaged**

7.2 TRANSMISSION SYSTEM DRAWING

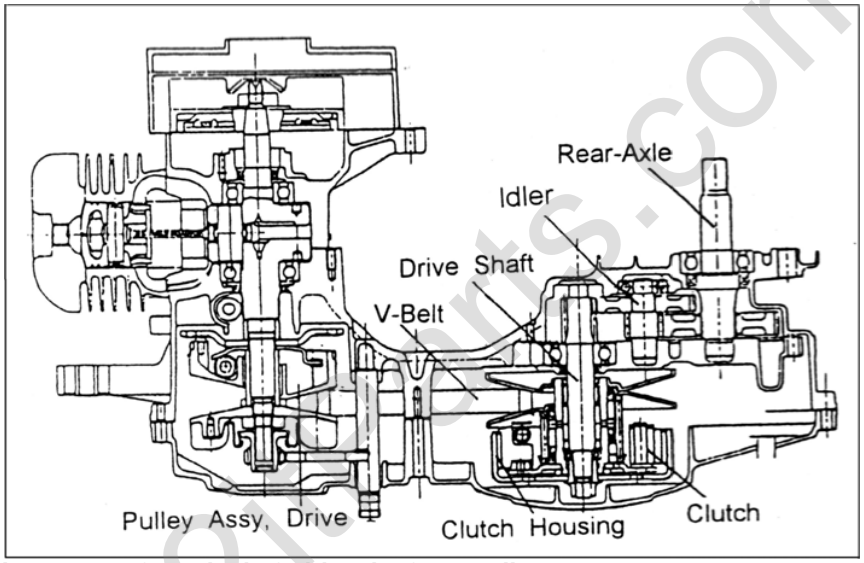


C.V.T. Drive pulley system



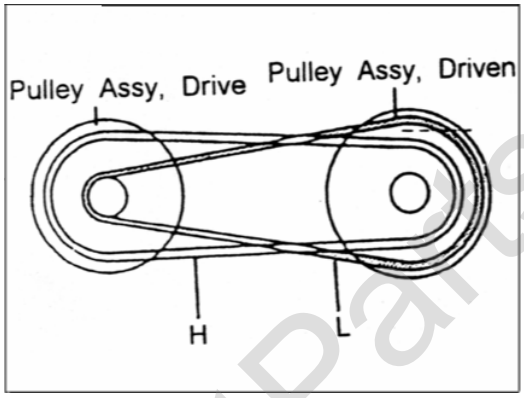
Transmission Gearing System

7.3 PATH OF POWER TRANSMISSION



The torque of crank-shaft drive the front pulley
The torque (drive) pulley turns the belt
The belt drive the rear (driven) pulley
The force through the clutch shoe, clutch housing and drive shaft
The drive shaft turns the idle gear in gear box
Turning speed reduced by final-gear and transmits to rear-axle shaft to move rear wheel

7.4 AUTOMATIC CONTINUOUS VARIABLE TRANSMISSION



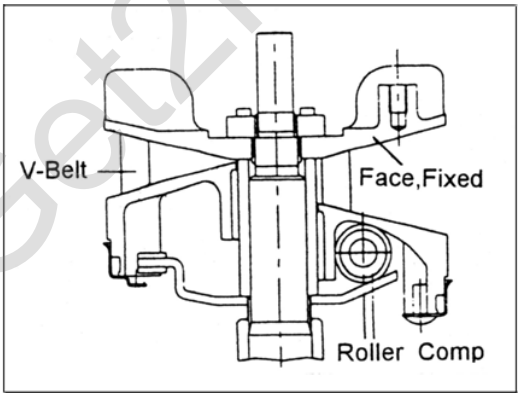
This transmission is the combination of automatic centrifugal clutch and V-belt continuous variable transmission, which changes the transmission ratio automatically.

When engine speed increases, the drive pulley pushes the belt by the centrifugal force from six rollers.
Then the pitch circle of belt in drive pulley increase. The belt at driven pulley is forced to move to the center of shaft, thus the radius of pitch circle is decreased.

The transmission ratio is therefore altered by the alteration of pitch circle's radius.

(In the drawing, "H" means high speed, "L" means low speed)

7.5 CONTINUOUS VARIABLE TRANSMISSION V-Belt



Made of rubber fiber, resistant to head, pressure and abrasion. The inner side of the Belt is toothed.

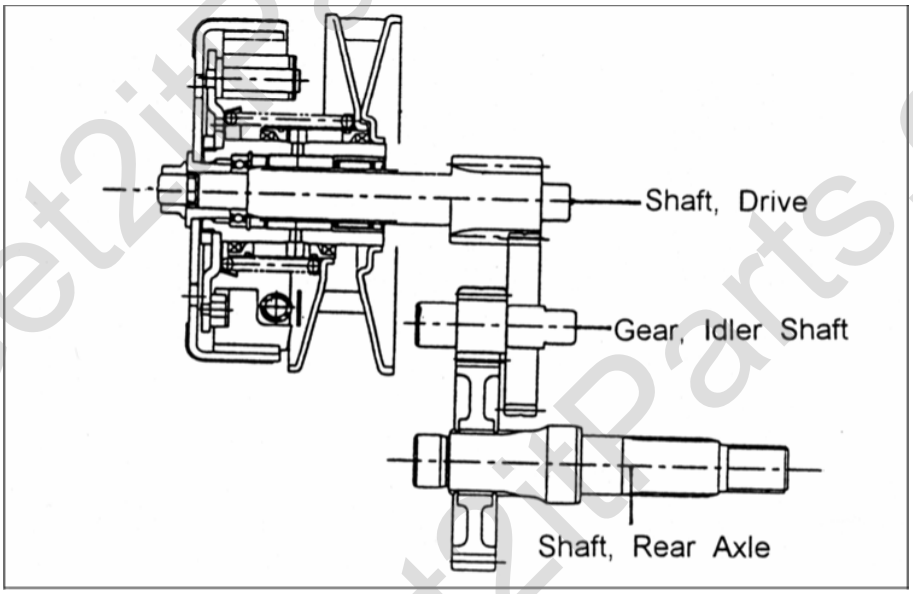
Drive Pulley

Due to the increasing engine speed, the rollers push the movable drive face by centrifugal force. Then the belt is pressed and enlarges its turning radius.
The aluminum fan is installed on the exterior of fixed drive face aids in cooling the C.V.T. and drive belt. C.V.T ventilation is required ant the filter should be change at the start of each season.

Driven Pulley

Because the revolving radius of V-Belt at the Drive End is enlarged, the Face Comp Movable Drive is squeezed out by the V-Belt at the Driven End to shorten the revolving radius. There is a Torque Cam on the Movable Drive Face.
Torque Cam is loaded from outside. When the outside load is higher than the engine's output, the pulley of fixed shaft and belt slip to make the Movable Drive Face move along the inner side of Cam and compensate to increase to high torque (toward
to low speed) and make the engine maintain smooth running with original revolution.

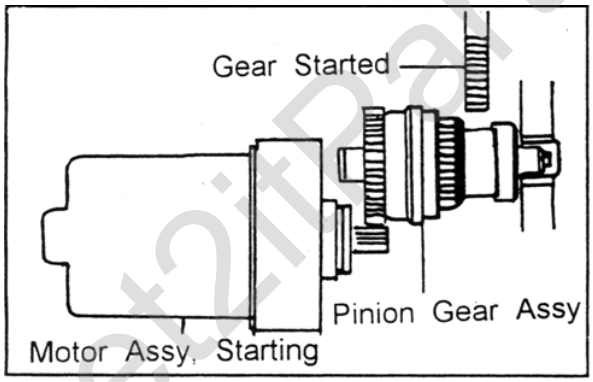
7.6 GEAR BOX

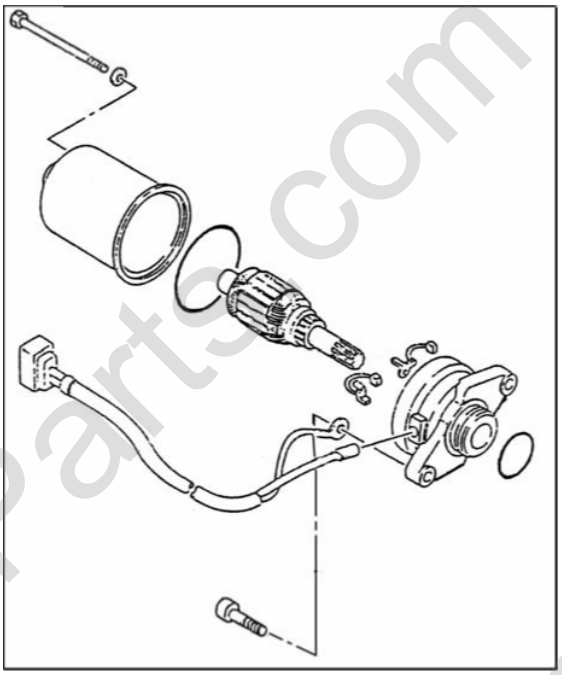


The torque received by the Drive shaft will be transmitted by the speed reduction of two sets to rear axle shaft.
The first gear ratio is 36/13.
The second gear ratio is 48/12.

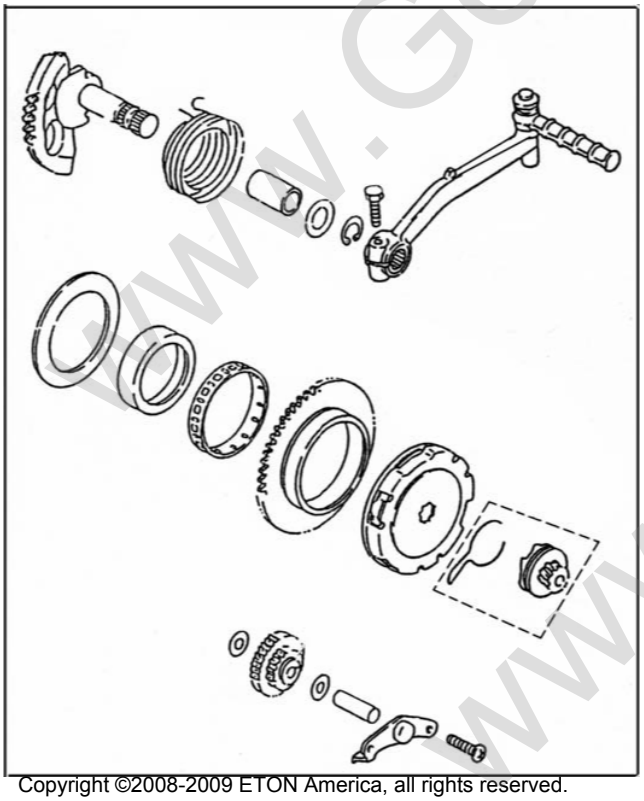
7.7 ELECTRIC SELF-STARTER MECHANISM

Starter Motor is installed on the upper side of engine. The starter motor can only be activated when the left hand brake is fully applied. The starter motor will not engage until the rear brake is fully applied.





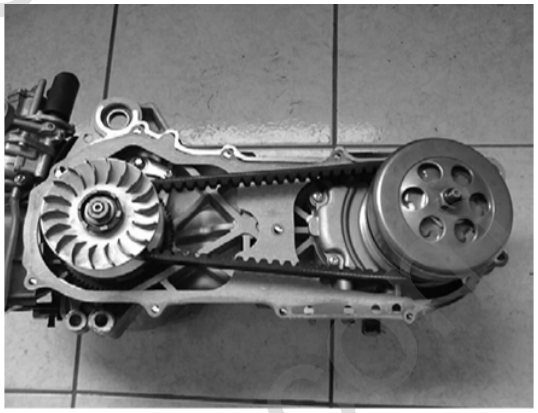
7.8 KICK STARTER



This kick starter arm is located on the left side of engine. When the kick-starter arm is kicked, the gear of start shaft will drive the kick starter to revolve the crankshaft to start the engine.

After the engine is started, the kick-started will stop transfer the power to the kick-starter driven gear. When the kick-starter lever is released, the kick-starter gear will return to its original position.

7.9 DISASSEMBLY AND CHECK OF C.V.T. SYSTEM



Remove the engine clutch cover, by removing the cover bolts.

Remove the retaining nut from the crankshaft end of the drive pulley to disassembly the drive pulley. Remove the fixed drive pulley face.

Remove the drive belt.

Check the belt for wear, cracks and contamination, replace the belt as needed.

Remove the movable drive face of the front drive pulley, check the six rollers for wear or damage replace as needed.

Check the roller ramp plate for wear or damage, replace as needed.

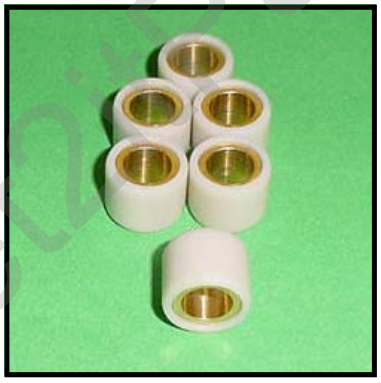
Clean the roller ramp plate, movable and fixed pulley faces and reinstall. Apply a drop of lock-tight to the crankshaft threads and torque the retaining nut to 80flb.

Remove the retaining nut from the drive shaft of the driven pulley, rear pulley.

Remove the clutch drum. Inspect the drum for wear and abraded surface. The clutch drum interior surface should be smooth and shiny. If the drum face has visible scratches or is discolored replace the drum. Check the drum interior diameter for roundness using a set of calipers. The drum roundness tolerant is .005". Replace the drum if out of tolerance

Inspect the clutch shoes for wear, damage or contamination. Replace as needed.
Clutch face thickness should not be less than 0.15625". Replace the clutch shoes if less than the limit.
Remove the clutch shoe housing and inspect the torsion spring for wear or damage. If the torsion spring looks deformed or is discolored, replace.

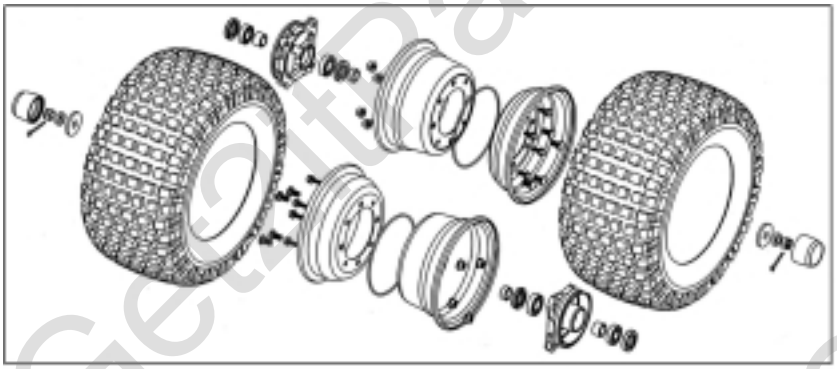
Clean all parts and reassemble the driven pulley. Apply a drop of lock-tight to the threads of the drive shaft and torque the retaining nut to 80flb.



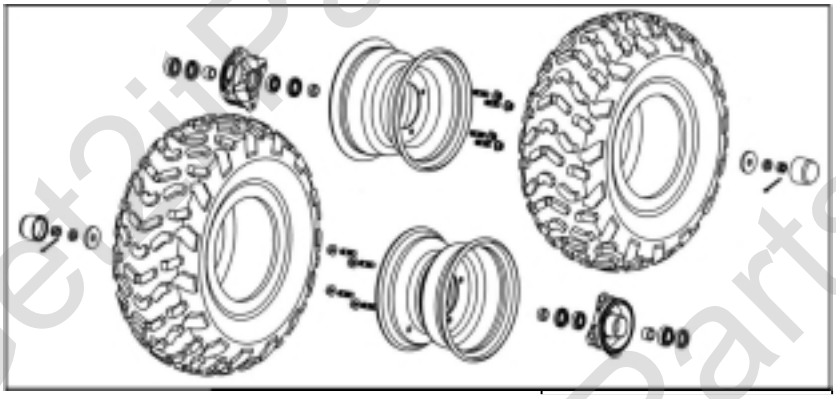
Item Number	Mass (Per roller)	Mass (Per set of 6)	Models
811525	7.5 grams	45.0 grams	AXL-50 PN2 PN2B PN2C RXL-50 RXL-50M
811526	6.5 grams	39.0 grams	AXL-90 DXL-90U RXL-70 RXL-90 RXL-90R
811490	15.0 grams	90.0 grams	CXL-150 RXL-150R YXL-150

8. FRONT WHEEL AND STEERING SYSTEM

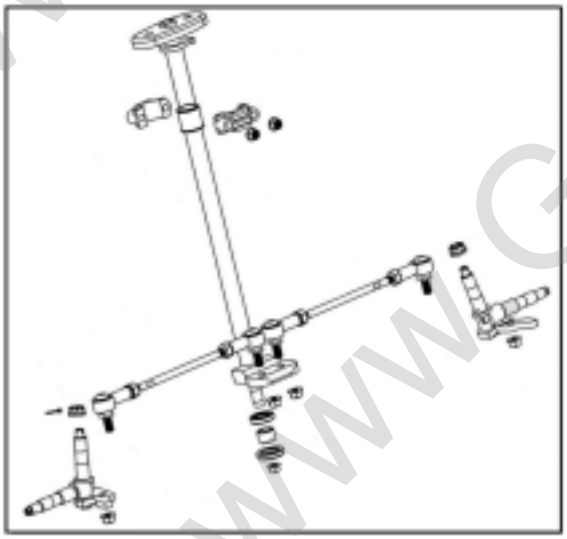
8.1 THE PARTS DRAWING OF FRONT WHEELS AND STEERING SYSTEM



AXL/TXL -50



AXL/TXL -90



8.2 TROUBLE SHOOTING

HARD STEERING →	FAULTY TIRE STEERING SHAFT HOLDER TOO TIGHT INSUFFICIENT TIRE PRESSURE FAULTY STEERING SHAFT BEARINGS DAMAGED STEERING SHAFT BEARING
FRONT WHEEL WOBBLING →	FAULTY TIRE WORN FRONT BRAKE DRUM BEARING BENT RIM AXLE NUT NOT TIGHTENED PROPERLY
BRAKE DRAG →	INCORRECT BRAKE ADJUSTMENT STICKING BRAKE CABLE
STEERS TO ONE SIDE →	BENT TIE RODS WHEEL INSTALLED INCORRECTLY UNEQUAL TIRE PRESSURE BENT FRAME WORN SWING ARM PIVOT BUSHINGS
POOR BRAKE PERFORMANCE →	BRAKE SHOES WORN WORN BRAKE DRUM BRAKE LINING OILY, GREASY OR DIRTY IMPROPER BRAKE ADJUSTMENT
FRONT SUSPENSION NOISE →	LOOSE FRONT SUSPENSION FASTENER BINDING SUSPENSION LINK
HARD SUSPENSION →	FAULTY FRONT SWING ARM BUSHINGS IMPROPERLY INSTALLED FRONT SWING ARMS BENT FRONT SHOCK ABSORBER SWING ROD
SOFT SUSPENSION →	WEAK FRONT SHOCK ABSORBER SPRINGS WORN OR DAMAGE FRONT SWING ARM BUSHINGS

8.3 HANDLEBAR

REMOVAL

Remove the throttle lever housing on the right handle bar.
Remove brake lever bracket.

Remove engine switch housing on the left handle bar.
Remove rear brake level bracket.

Remove the bolts attaching the upper holder cover.
Remove the handlebar holder and handlebar.

INSTALLATION

Put the handlebar on the lower holders.
Make sure the handlebar punch mark with the top of the handlebar lower holders.
Install the handlebar upper holders with the L or R marks facing forward.
Tighten the forward bolts first, and then tighten the rear bolts.
Install the handlebar upper holder's cover.

Install the switch housing, aligning the boss with the hole.
Tighten the upper screw first then tighten the lower one.

Install the rear brake lever bracket, aligning the boss with the hole.
Tighten the screw securely.

Aligning the split line of the throttle housing and holder with the punch mark.
Tighten the screw securely

8.4 FRONT WHEEL

REMOVAL

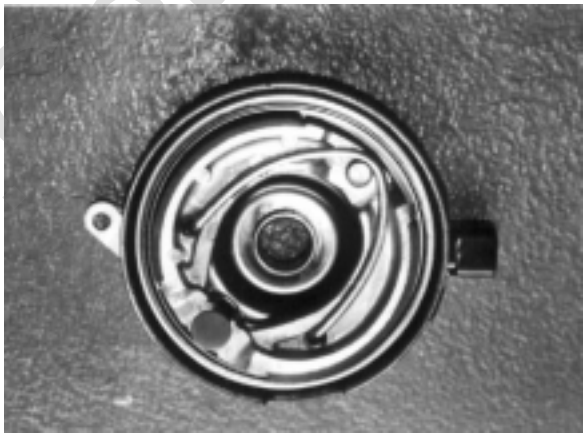
Raise the front wheels off the ground by placing a block under the frame.
Remove the front wheel nuts, washer and wheels.

INSTALLATION

Install and tighten the four-wheel nuts
Torque: 50-60 N.m
Remember put a cotter pin in the castle nut.

8.5 FRONT BRAKES

FRONT BRAKE INSPECTION



Remove the front wheel.
Remove the brake drum.
Measure the brake lining thickness.
The minimum limit: 1.5 mm
If they are thinner than the minimum limit, replace the brake lining.

Measure the brake drum inner diameter.
The maximum limit: 86 mm

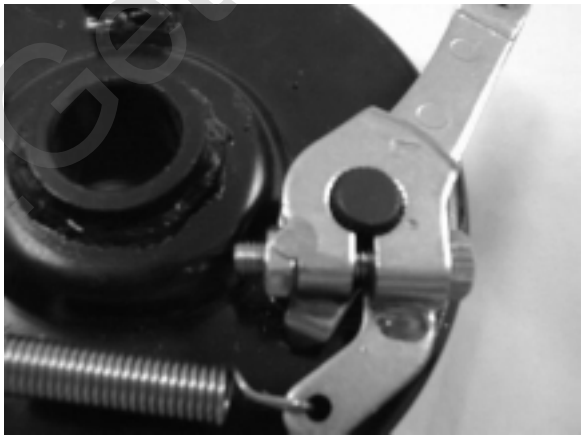
Turn the inner race of each bearing with fingers.
The bearings should turn smoothly and quietly.
If the race does not turn smoothly or quietly, remove and discard the bearings
.

BRAKE PANEL REMOVAL

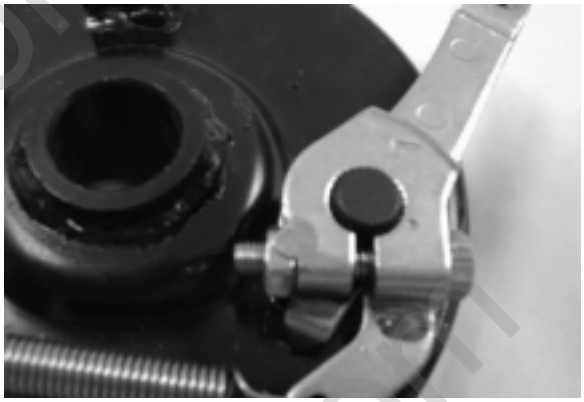
Disconnect the brake cable from the brake arm.
Remove the brake panel from the knuckle.
Remove brake arm and cam.
Remove return spring.
Remove indicator plate and felt seal.

INSTALL BRAKE PANEL

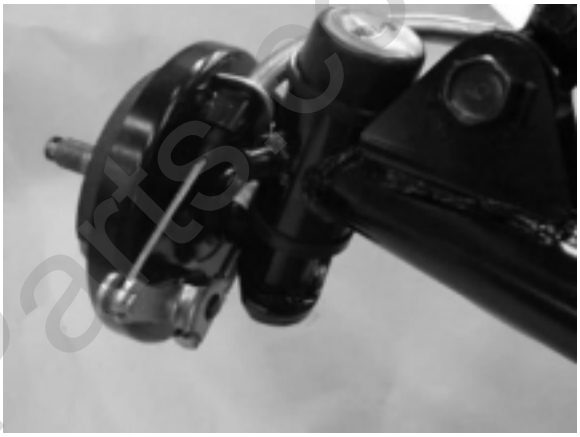
Apply grease to the brake cam and anchor pin and install the cam in the brake panel.
Soak the felt seal in the engine oil and install the seal on the brake cam.



Install the brake arm on the cam by aligning the punch mark and the groove on the cam.
Tighten the brake arm bolt and nut.
Torque: 4-7 N.m
Install the return spring.



Install the brake panel on the knuckle.
Connect the brake cable to the brake arm.



Install the brake arm cover.
Tighten the screws securely.
Position the brake shoes in their original locations and install the brake shoe spring.
Install the brake drum and front wheel.
Install the castle nut and cotter pin.

8.6 STEERING SYSTEM

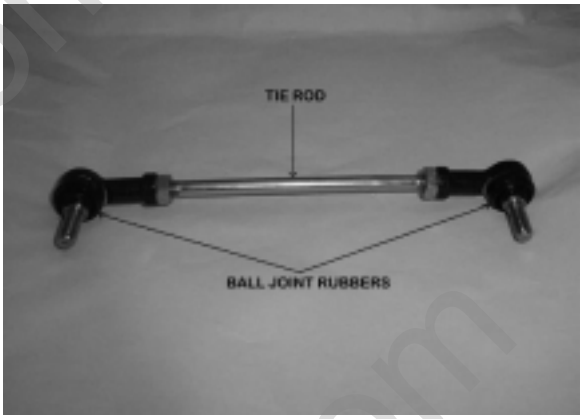
REMOVAL OF KINGPIN AND TIE-ROD

Remove the front wheels and brakes plates.
Remove the four self-lock nuts from the tie-rod ball joints and take off the two tie-rods.

Take off the rubber cap on the kingpin and remove the cotter pin on the kingpin.
Unscrew the castle nut and remove the kingpin.

TIE-ROD INSPECTION

Inspect the tie-rod for damage or bending.
Inspect the ball joint rubbers for damage, wear or deterioration.
Turn the ball joints with fingers. The ball joints should turn smoothly and quietly.

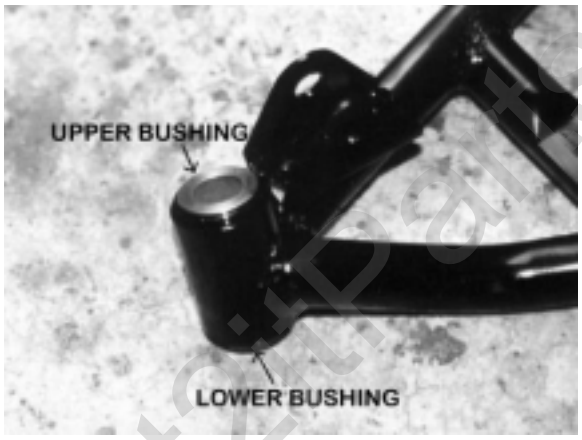


KINGPIN INSPECTION

Inspect the kingpin for damage or cracks.
Measure the kingpin outer diameter.
Upper minimum limit: Ø15.40 mm
Lower minimum limit: Ø16.90 mm

KINGPIN BUSHING INSPECTION

There are two bushing in the sleeve of front swing arm, the upper and lower bushing.
Check the kingpin bushings for wear or damage.
Measure the inner diameter of the bushings.
Upper minimum limit: Ø15.69 mm
Lower minimum limit: Ø17.19 mm

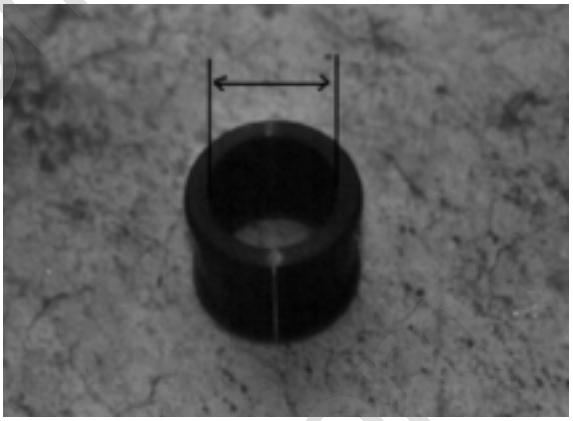


STEERING SHAFT REMOVAL

Remove the handle bar and handle bar cover. (See paragraph 8-1)
Remove the front fender. (See paragraph 10-1)
Unscrew the steering shaft fixed out below shaft.
Pull steering shaft carefully.

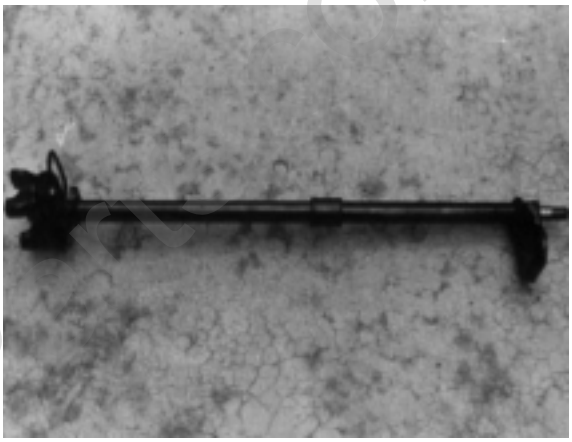
BUSHING INSPECTION

Remove the steering shaft.
Remove the bushing from the shaft.
Inspect the bushing for damage or wear, replace if necessary.
Measure the bushing inner diameter.
Maximum limit: Ø22.8 mm



STEERING SHAFT INSPECTION

Inspect the steering shaft for damage or cracks.
Measure the steering shaft outer diameter in the location of the bushing.
Minimum limit: Ø22.0 mm

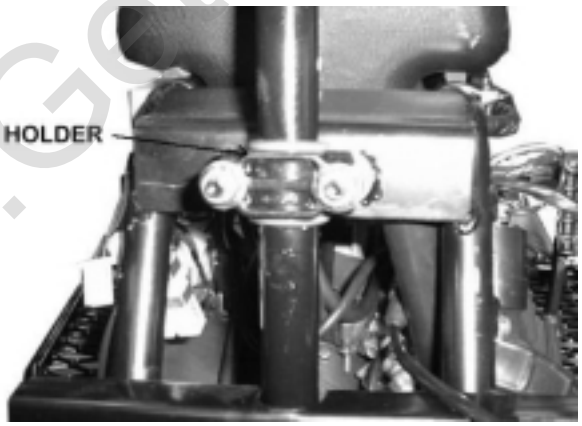


STEERING SHAFT BEARING INSPECTION

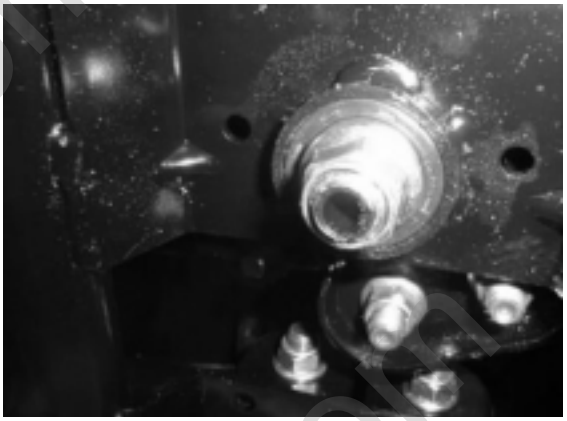
Turn the shaft bearing with finger.
The bearing is on the front part of frame.
The bearing should turn smoothly and quietly.
Also check that the bearing outer race fits in the holder.
Replace the bearing if necessary.

INSTALLATION OF STEERING SHAFT

Install the steering shaft with the bushing.
Apply grease to the bushing.
Install the bushing holder and tighten the nuts.
Torque: 24-30 N.m



Install the steering shaft nut and tighten it.
This nut is under this steering shaft.
Torque: 50-60 N.m



INSTALLATION OF TIE-ROD

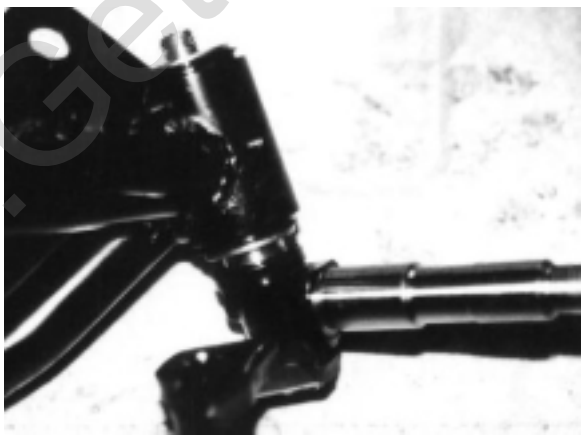
Install the ball joint with " L" mark on the steering shaft side.
Install the tie-rod with the mark on the wheel side.

Let the distance between the ball joints be 164 mm for AXL/TXL 50 and AXL/TXL 90.
This is temporary setting.

INSTALLATION OF KINGPIN

Use grease to the kingpin lower dust seal lips and install it.
Pump grease to bushing and install the kingpin.
Tighten the kingpin nut; the setting torque is 30-40 N.m.
Fix the waterproof rubber cap.

Temporarily, set the distance 147mm between the ball joints.
Install the tie-rod and tighten the nuts.
The setting torque: 35-43 N.m
Install the front brake.
Install the front wheel.
Adjust the toe in. (see chapter 2)

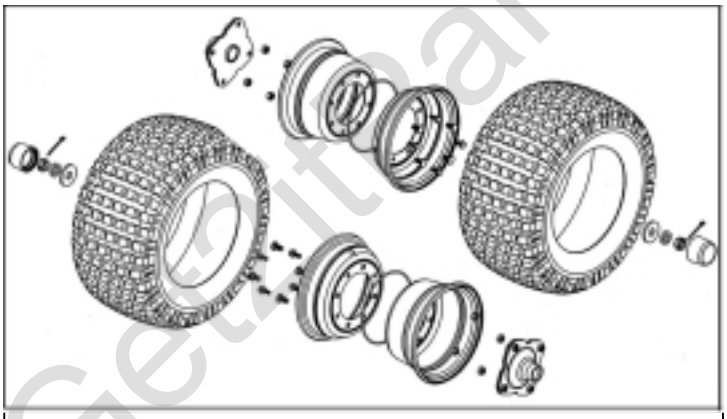


9. REAR WHEEL SYSTEM

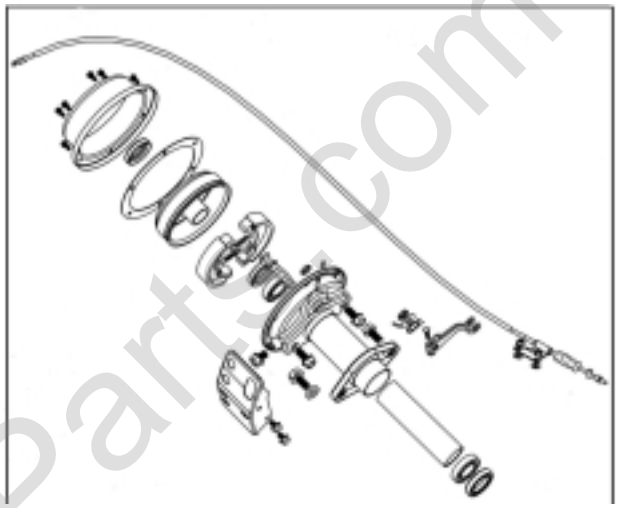
9.1 THE PARTS DRAWING OF REAR WHEEL SYSTEM

9.3 REMOVE REAR WHEEL AND BRAKE

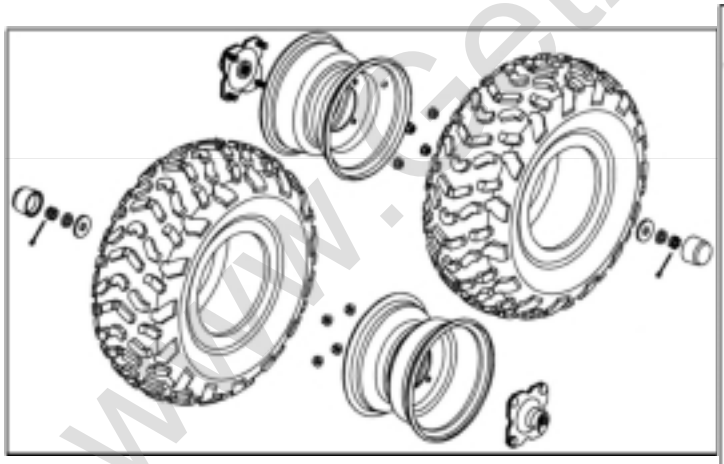
Let the rear wheels off the ground.
Release the cotter pin, axle nut and washer.



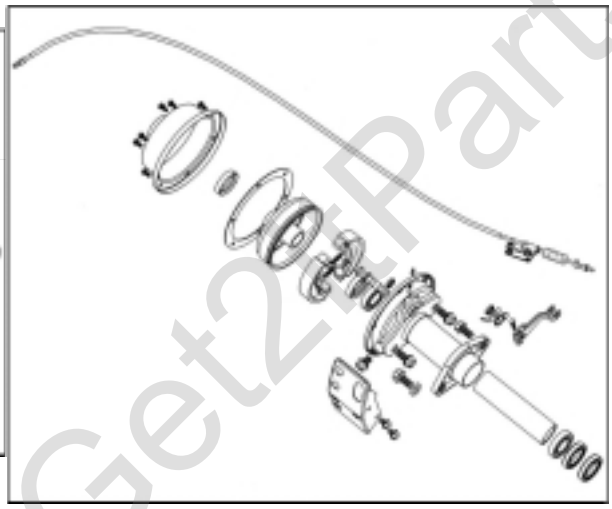
AXL-TXL-50



Release the wheel and wheel hub.



AXL-TXL90



Remove the brake drum cover.

Remove the axle collar and brake drum.

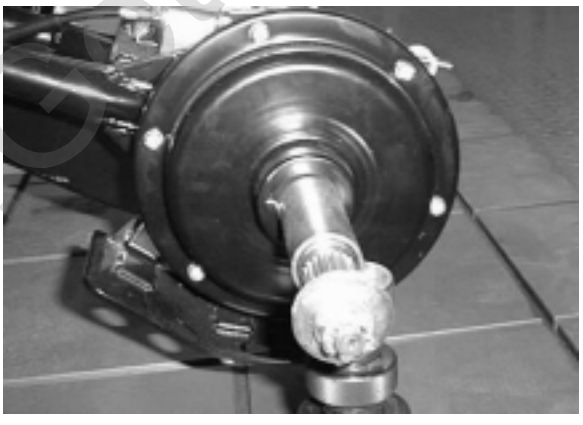
9.2 TROUBLESHOOTING

BAD BRAKE PERFORMANCE →	BRAKE SHOES ARE WORN BAD BRAKE ADJUSTMENT BRAKE LINING ARE OILY, GREASY OR DIRTY BRAKE DRUMS ARE WORN BRAKE ARM SETTING IS IMPROPERLY ENGAGE
VIBRATION OR WOBBLE →	AXLE IS NOT TIGHTENED WELL BENT RIM AXLE BEARINGS ARE WORN FAULTY TIRES REAR AXLE BEARING HOLDER IS FAULTY
BRAKE DRAG →	INCORRECT BRAKE ADJUSTMENT STICKING BRAKE CAM STICKING BRAKE CABLE

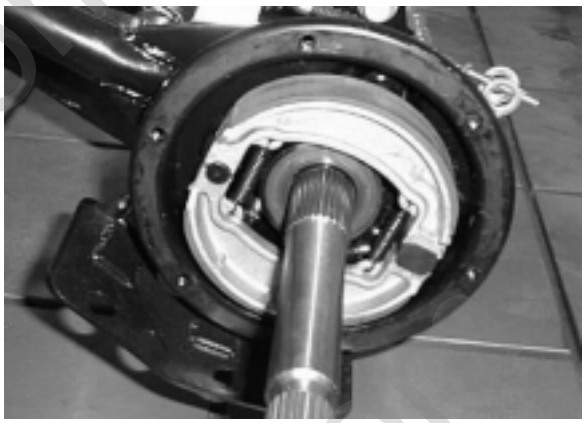
9.3 REMOVE REAR WHEEL AND BRAKE

Let the rear wheels off the ground.
Release the cotter pin, axle nut and washer.
Release the wheel and wheel hub.

Remove the brake drum cover.



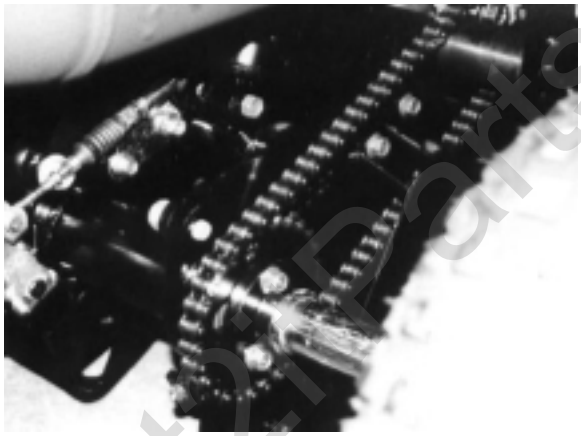
Check the brake lining thickness.
The minimum limit is 2.0 mm.



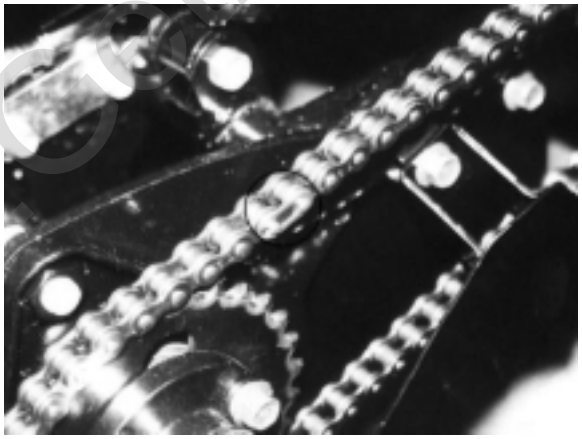
Check the brake drum for damage.
Replace if necessary.
Check the brake drum inner diameter.
The maximum limit is 131 mm.

9.4 DRIVE MECHANISM REMOVAL AND INSPECTION

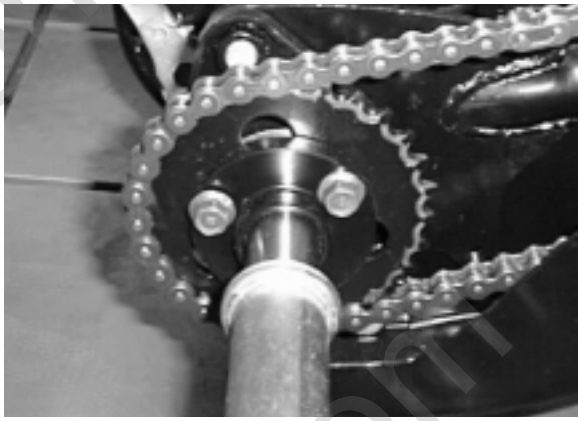
Remove the rear wheel and the rear brake
Remove the drive chain under cover.



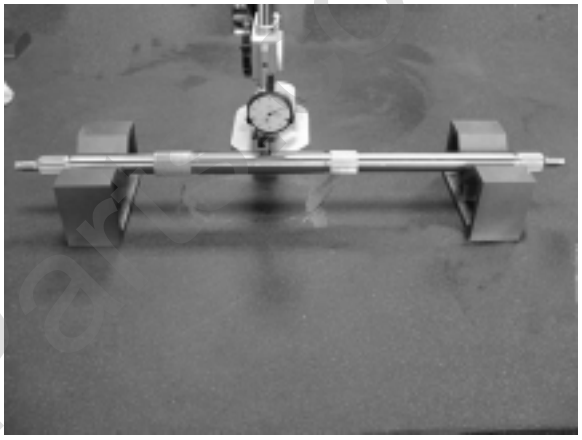
Disassemble the chain retaining clips and master link.



Disassemble the driven sprocket, axle and sprocket collar.
Check the driven sprocket for damage or wear.



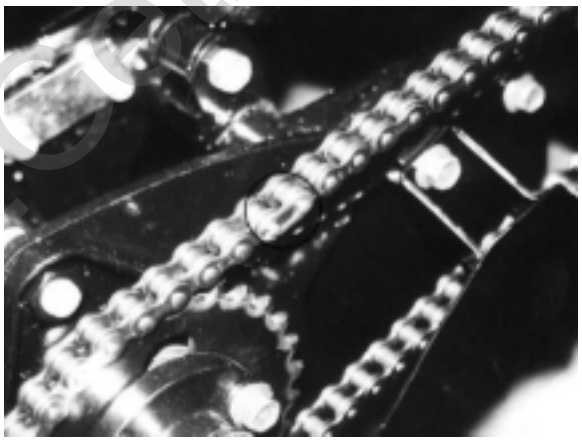
Let the rear axle lie in V-blocks and check the run out.
The run out limit is 0.5 mm
Check the turning of bearing with fingers.
The bearings should turn smoothly and quietly.
Replace if necessary.



INSTALLATION

Add grease to the dust seal lips and install dust seals.
Assemble the rear axle and the driven sprocket.

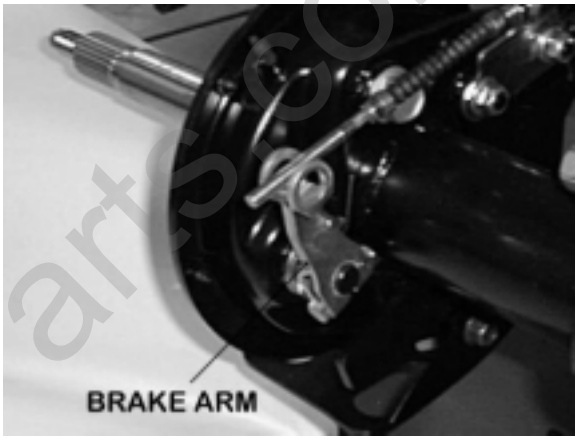
Assemble the drive chain on the driven sprocket.
Assemble the master link and retaining clip.
Note the retaining clip direction.
Install the drive chain cover.
Assemble the chain under cover.

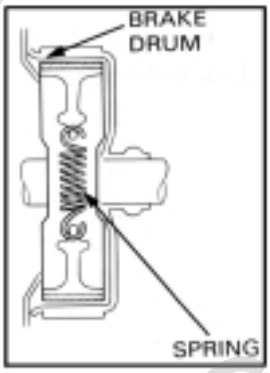


9.5 REAR BRAKE AND WHEEL INSTALLATION

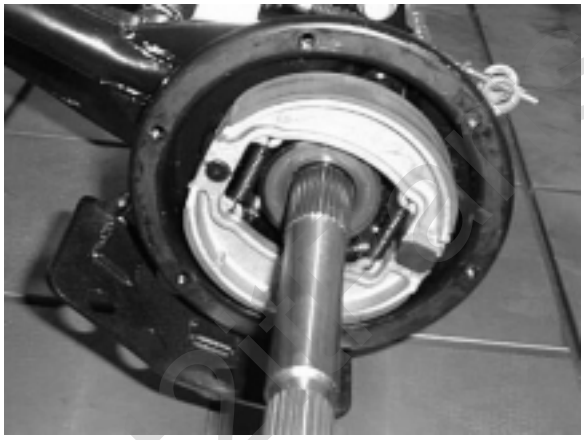
Install the brake panel
Add grease to the brake cam and anchor pin.
Install the brake arm spring and oil seal.

Assembly the brake arm aligning the punch marks on the cam and the arm.
Tighten the brake arm bolt and nut with 7-12 N.m torque.
Install the adjusters.





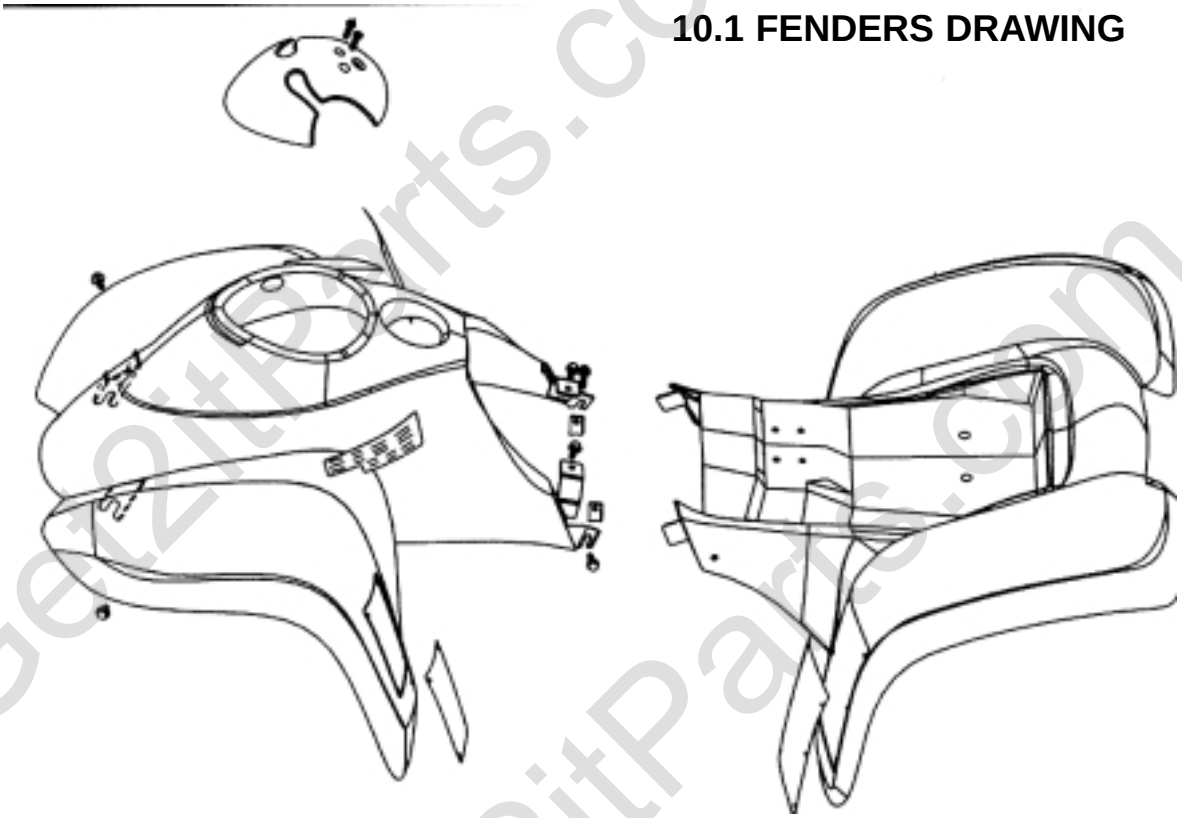
Install the brake shoes and springs to their original positions.



Assembly the brake drum, axle collar and brake drum cover. Assemble the wheel.
Tighten the rear axle nut with 60-80 N.m.
Install a new cotter pin.
Adjust rear brake level free play.
Adjust chain slack.

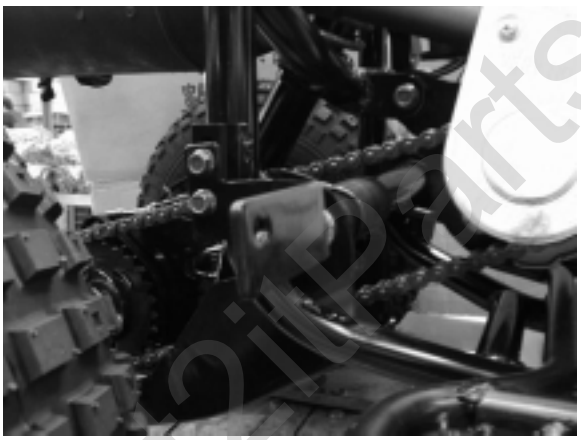
10. FENDERS AND EXHAUST PIPE

10.1 FENDERS DRAWING



10.2 REAR FENDERS REMOVE

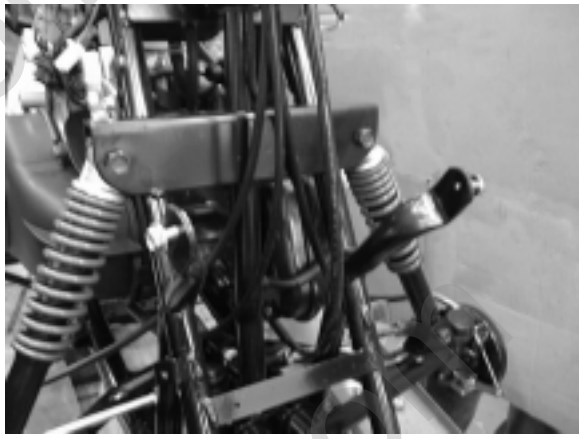
You should remove the rear fender before removing the front fender.
Rear fender is fixed with seat, so you must remove the rear fender and seat together.



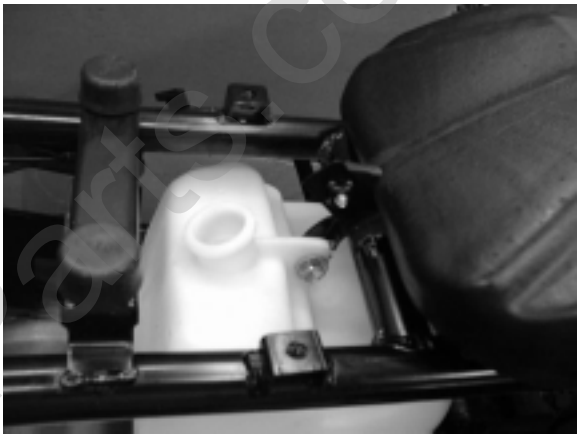
Procedure for removal of the rear fender:
Unscrew the two bolts, which connect the front fender and rear fender.
Unscrew the two bolts, which fix the rear fender on the fixed plate just on the front of the rear wheel. (See the up-left picture.)
Unscrew the two bolts which below the seat and on the seat fixer. (See the left picture.)

Pull the seat releaser unit.
Pull the rear fender and seat up and backward.
So the rear fender and seat can be removed together.

10.3 FRONT FENDER REMOVE

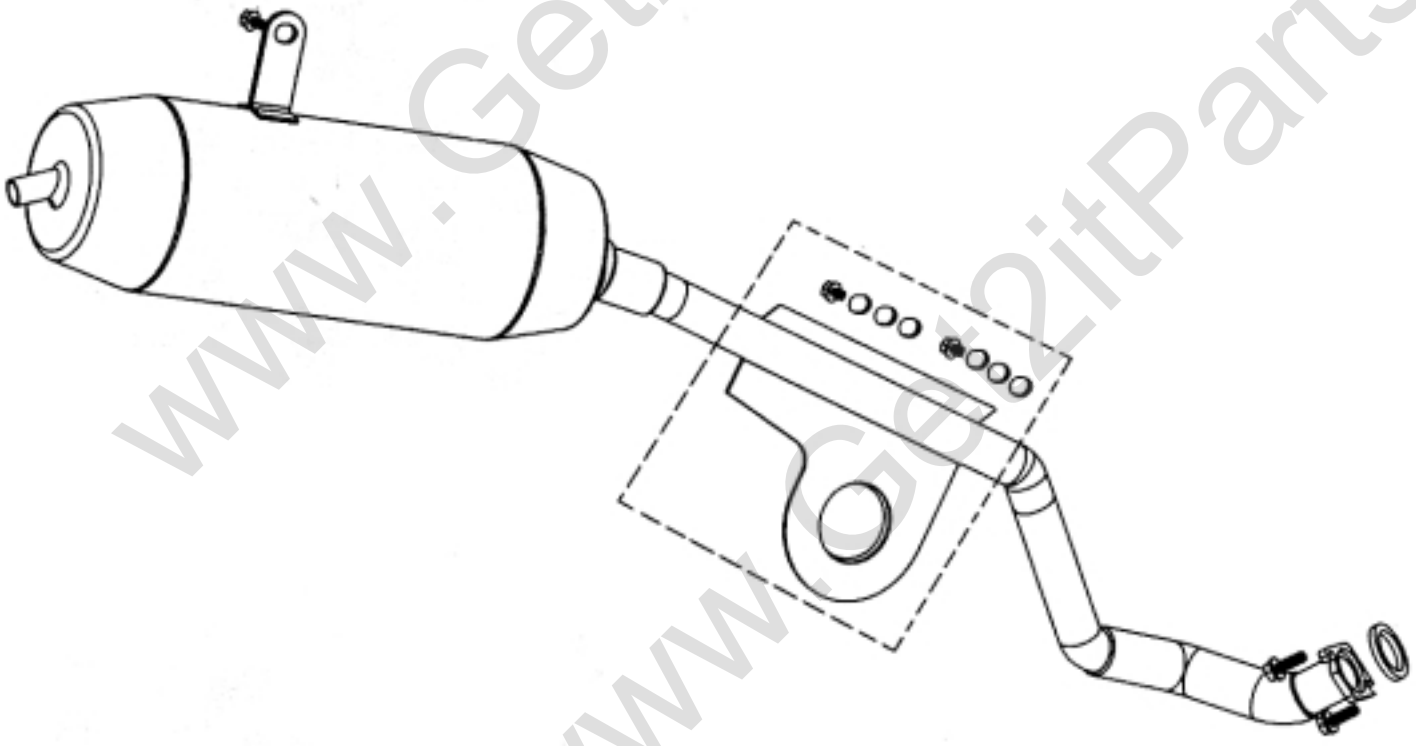


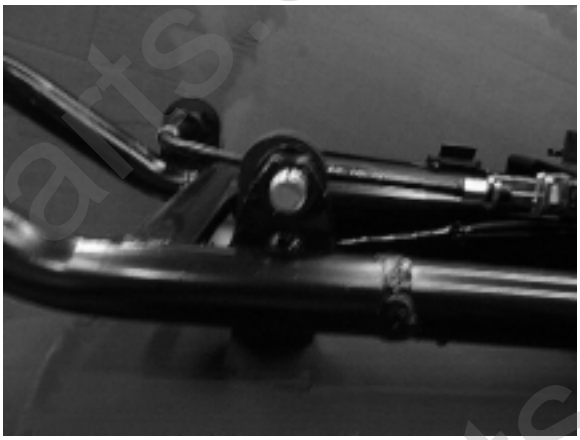
Remove the rear fender and seat. (See previous paragraph)
Pull the front fender upward.
Remove the handle bar assembly and handle bar cover.
Unscrew the two fixed screws under the front fender, just above front wheels. (See up-left picture)



Unscrew the two fixed screws beside the oil tank. (See at right picture)
Unscrew the fuel tank cap. Then the front fender can be removed.

10.4 EXHAUST PIPE DRAWING





10.5 EXHAUST PIPE REMOVE

Do not service the exhaust pipe while they are hot.
Unscrew the exhaust pipe nuts that fixed with engine.

Remove the exhaust pipe mounting bolts that beside the muffler body.
Remove the exhaust pipe carefully.

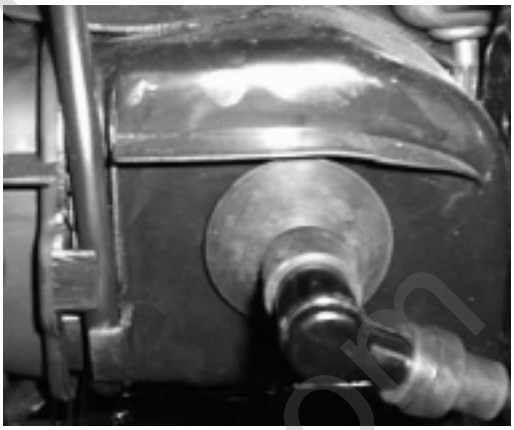
11. ELECTRICAL SYSTEM

11-1 Trouble Shooting

ENGINE STARTS BUT STOPS →	IMPROPER IGNITION TIMING FAULTY SPARK PLUG
NO SPARK AT PLUG →	ENGINE STOP SWITCH AT " OFF " FAULTY IGNITION COIL FAULTY GENERATOR FAULTY CDI UNIT POOR CONNECTION: Between CDI and ignition coil Between alternator and CDI unit Between CDI and engine stop switch Between ignition coil and spark plug Between generator and CDI unit
ENGINE STARTS BUT RUNS POORLY →	IGNITION PRIMARY CIRCUIT Faulty generator Faulty CDI unit Faulty alternator exciter coil Loosen contacted terminals Faulty ignition coil IGNITION SECONDARY CIRCUIT Faulty plug Loosen contacted spark plug wire IMPROPER IGNITION TIMING Faulty generator Faulty CDI unit
CHARGING SYSTEM FAILURE →	LOOSE, BROKEN OR SHORTED WIRE FAULTY ALTERNATOR FAULTY IGNITION SWITCH
ENGINE INTERMITTENT POWER →	LOOSE BATTERY CONNECTION LOOSE CHARGING SYSTEM CONNECTION
STARTER MOTOR WILL NOT TURN →	DEAD BATTERY FAULTY IGNITION SWITCH LOOSE OR DISCONNECTED WIRE
STARTER MOTOR AND ENGINE TURN BUT ENGINE DOES NOT START →	FAULTY IGNITION SYSTEM PROBLEMS FAULTY ENGINE STOP SWITCH

11.2 IGNITION COIL

Remove the spark plug cap from the spark plug.
Disconnect the ignition coil primary wire.



Measure the primary coil resistance.
STANDARD: 0.1 - 0.3O(20?)
Measure the secondary coil resistance with the spark plug cap
in place.
Standard: 7.4 - 11 kO(20?)

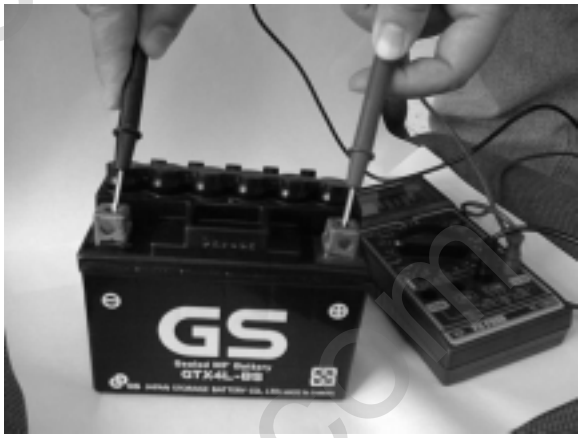
11.3 IGNITION TIMING

The ignition advance is 15°± 3°/4000rpm
The Capacitive Discharge Ignition (CDI) system is factory pre-set and does not require adjustment.

11.4 ALTERNATOR EXCITER COIL

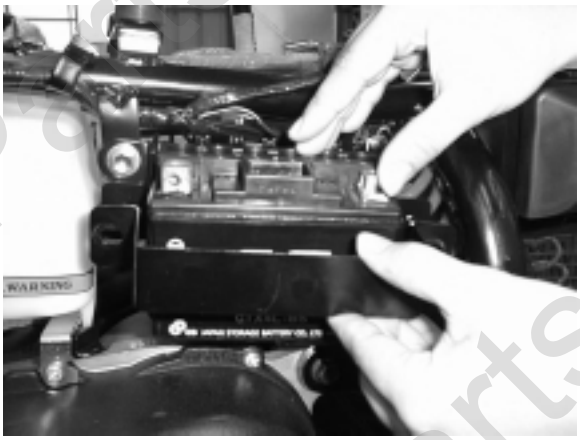
Remove the seat / rear fender and front fender. (see chapter 10)
Disconnect the exciter coil wire.
Measure the resistance between the yellow / red wire and ground.
Standard: 460-700O (AT 20?, 68?)

11.5 BATTERY CAUTION



The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an open area. The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield. Electrolyte is poisonous. If swallowed drink large quantities of water or milk and call a physician.

11.6 BATTERY INSPECTION



Battery is under the seat; you can see this battery from the left side.
Measure the battery voltage using a voltmeter.
VOLTAGE: Fully charged: 13.1 V
Undercharged: Below 12.0 V

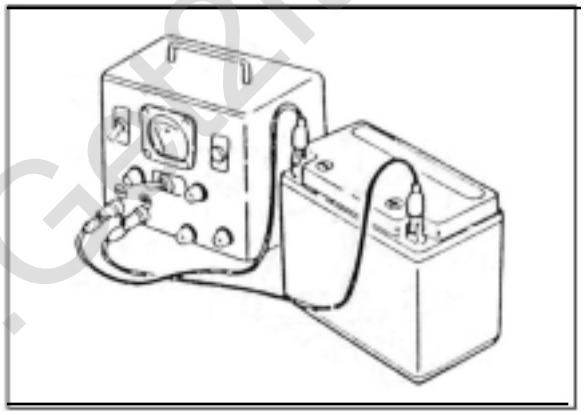
BATTERY REMOVAL

Remove the battery holder bolt nuts.
Disconnect the negative cable and then the position cable and remove the battery.

BATTERY INSTALLATION

Install the battery in the reverse order of removal.
After installing the battery, coat the terminals with clean grease.

11.7 CHARGING



Connect the charge positive cable to the battery position terminal. Connect the charge negative cable to the battery negative terminal.
Using 0.9A-charging current about 5 hours. (Normal charging)
Using 4A-charging current about 1 hour. (Quick charging)
Keep flames and sparks away from a battery being charged.
Quick charging should be limited to an emergency; Normal charging is preferred.

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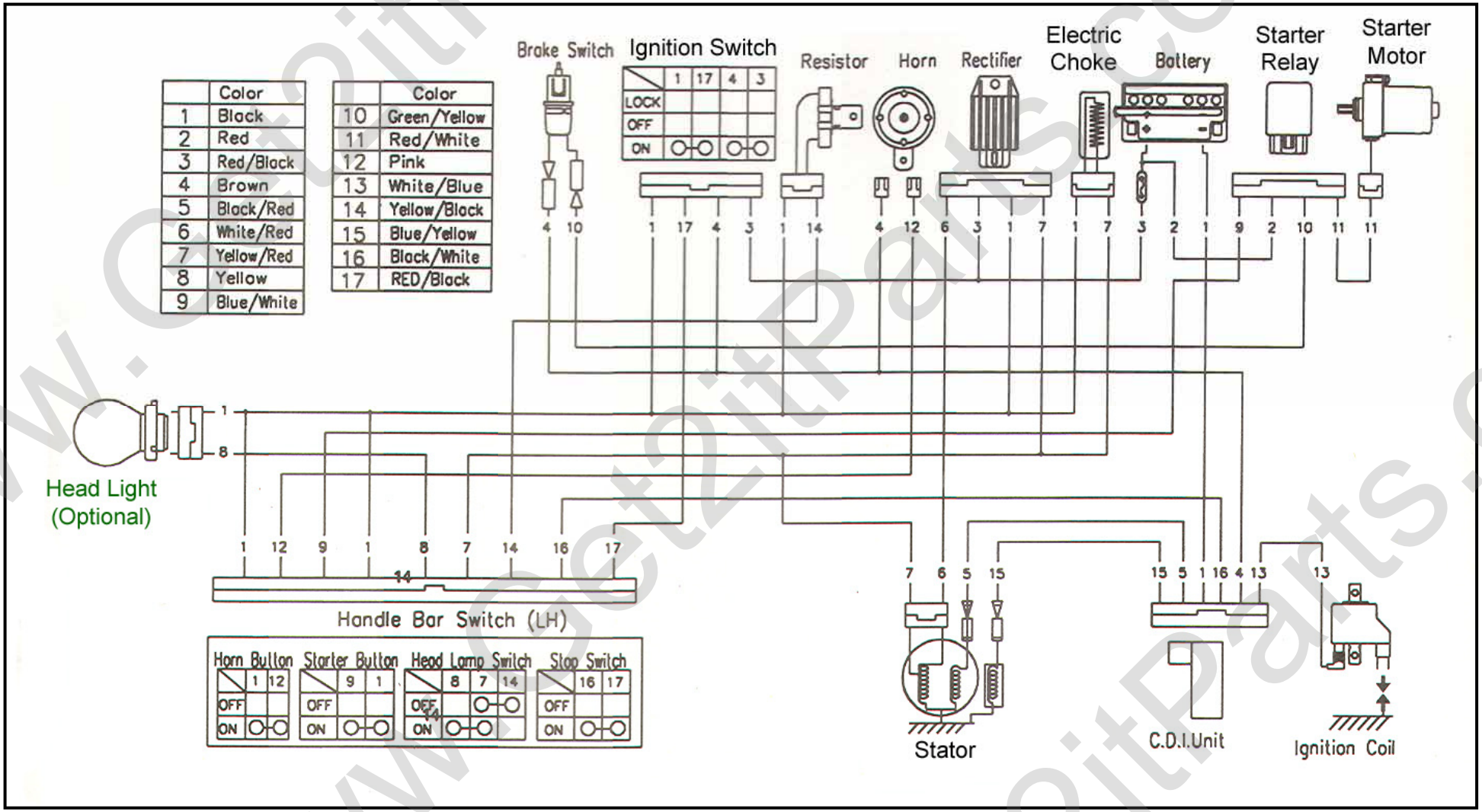
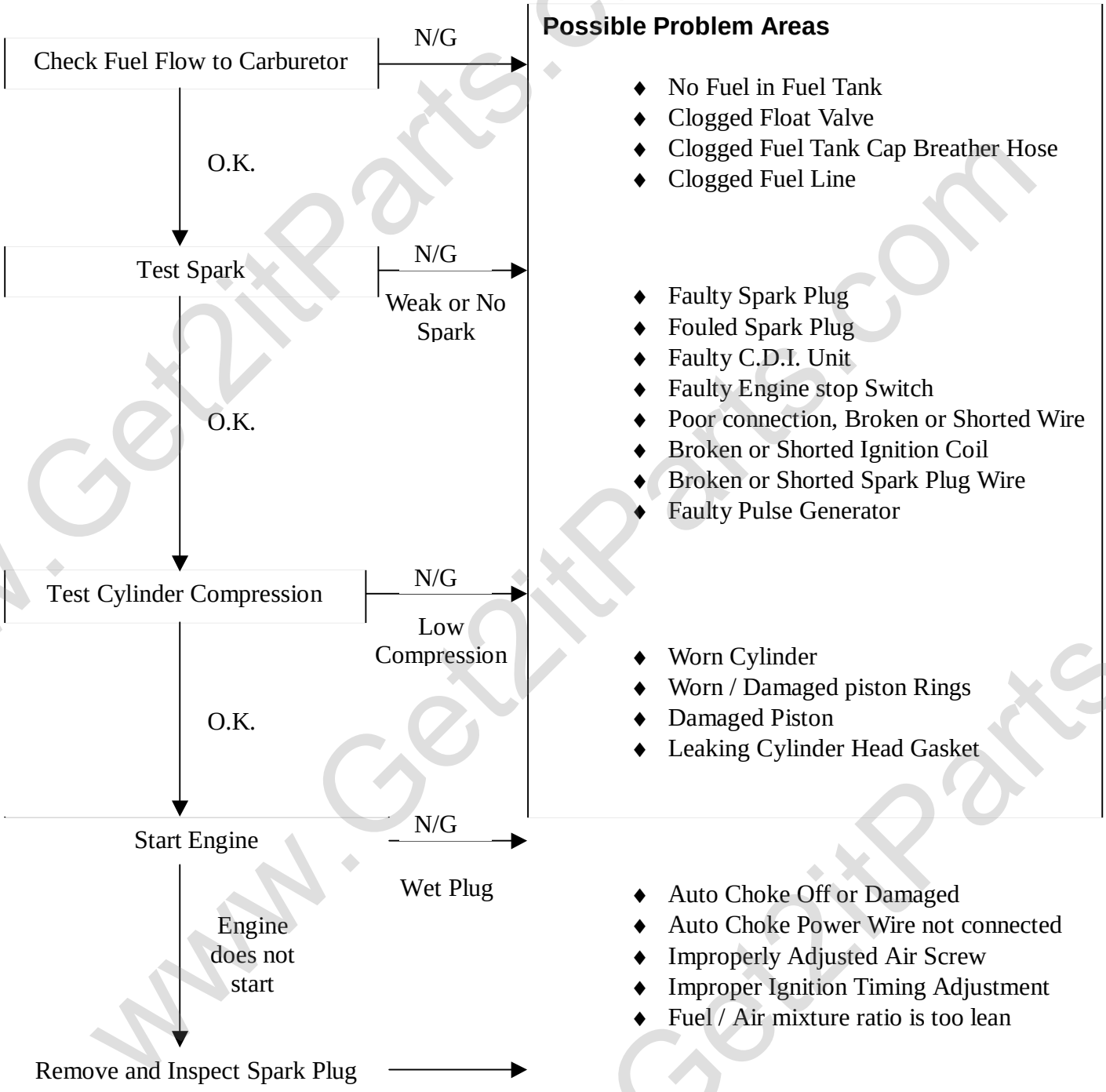
Thunder 90
(AXL/NXL/TXL)

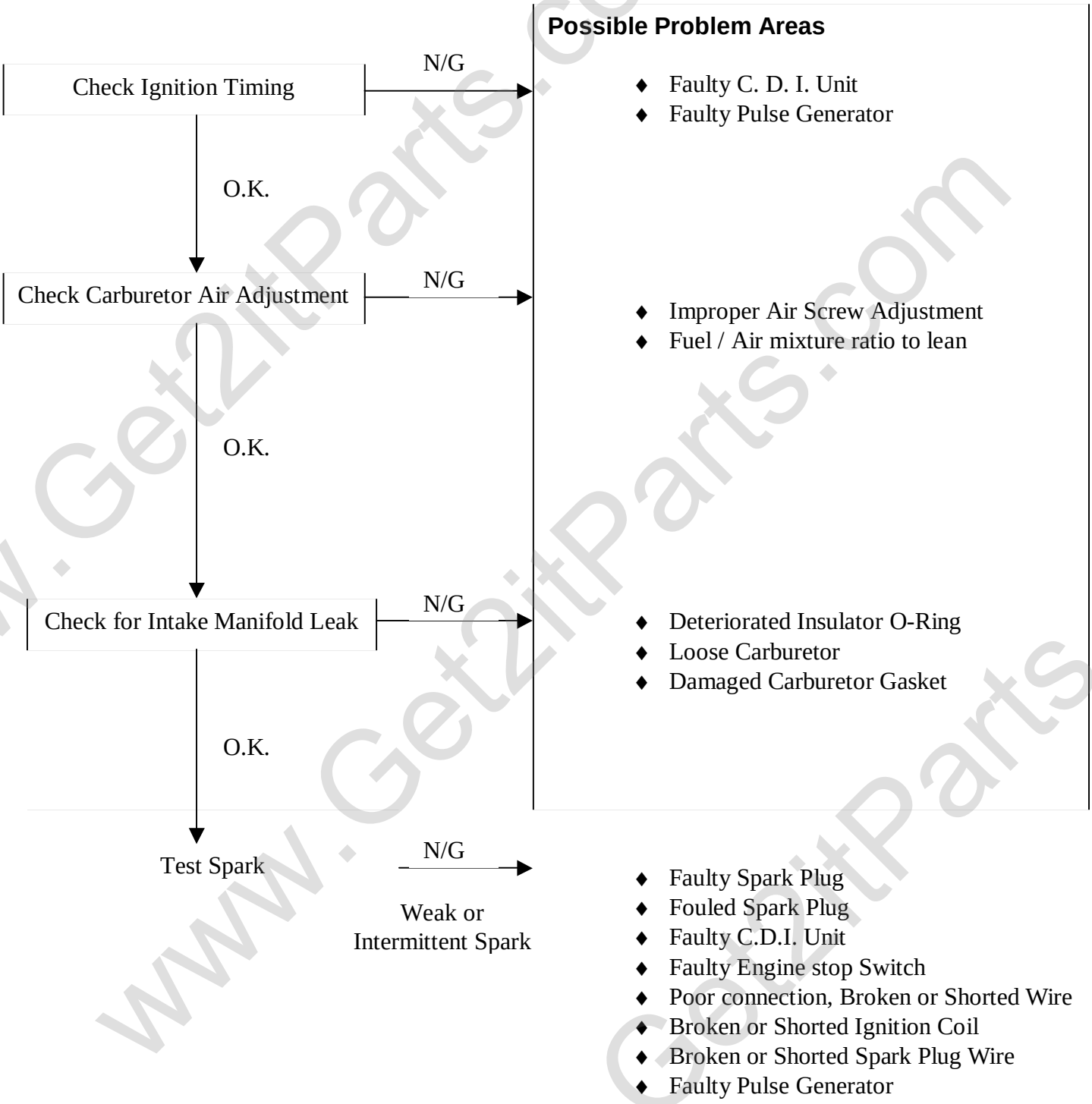


12. TROUBLE SHOOTING

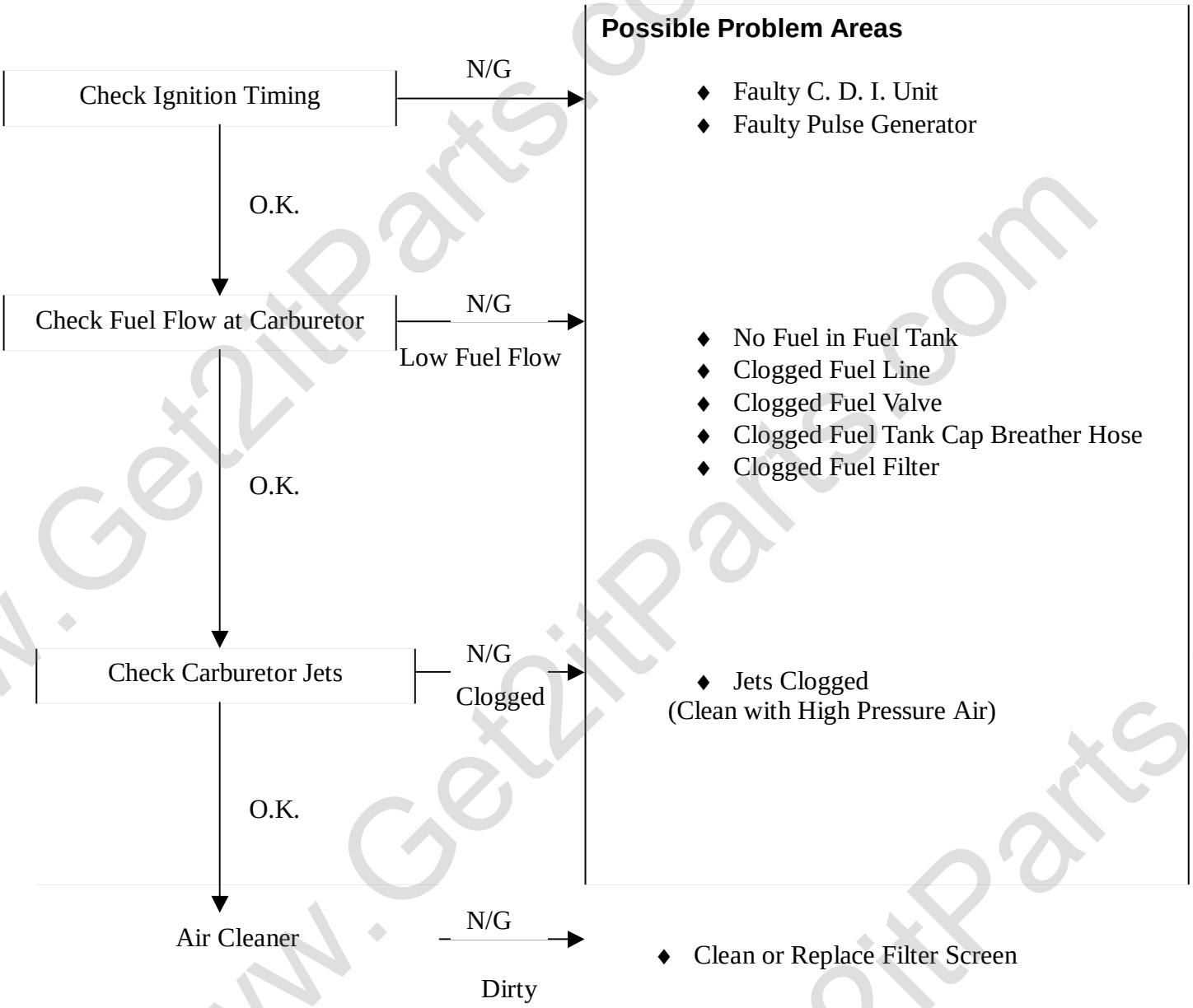
12.1 Engine does not start



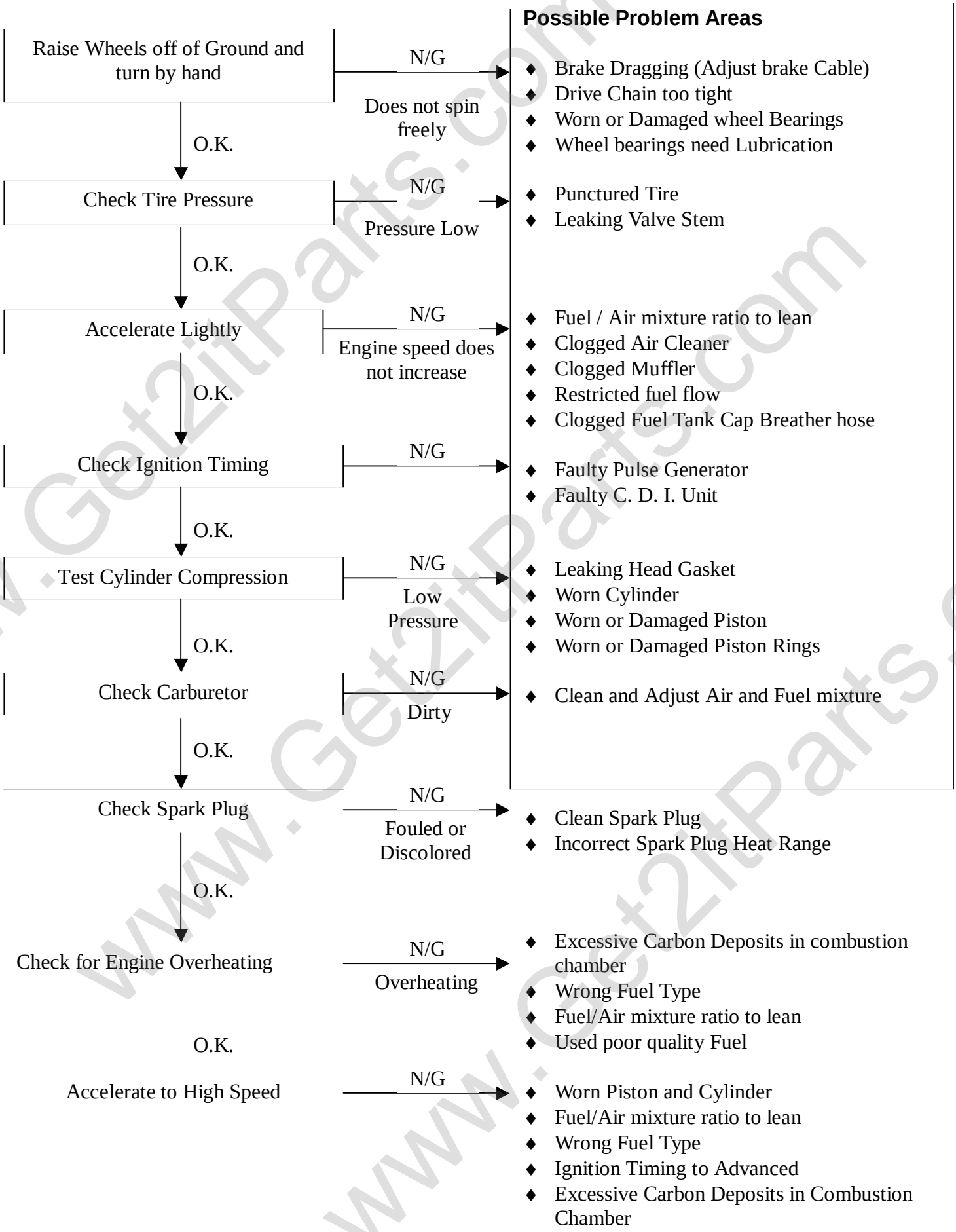
12.2 POOR PERFORMANCE AT LOW IDLE SPEED



12.3 POOR PERFORMANCE AT HIGH SPEED



12.4 LOSS OF POWER



ETON America, LLC

Service Bulletin

Bulletin: **SB-0003**
Date: 05/01/2000

Air/Fuel Ratio adjusting procedure 50cc 70cc & 90cc 2 Cycle Engines

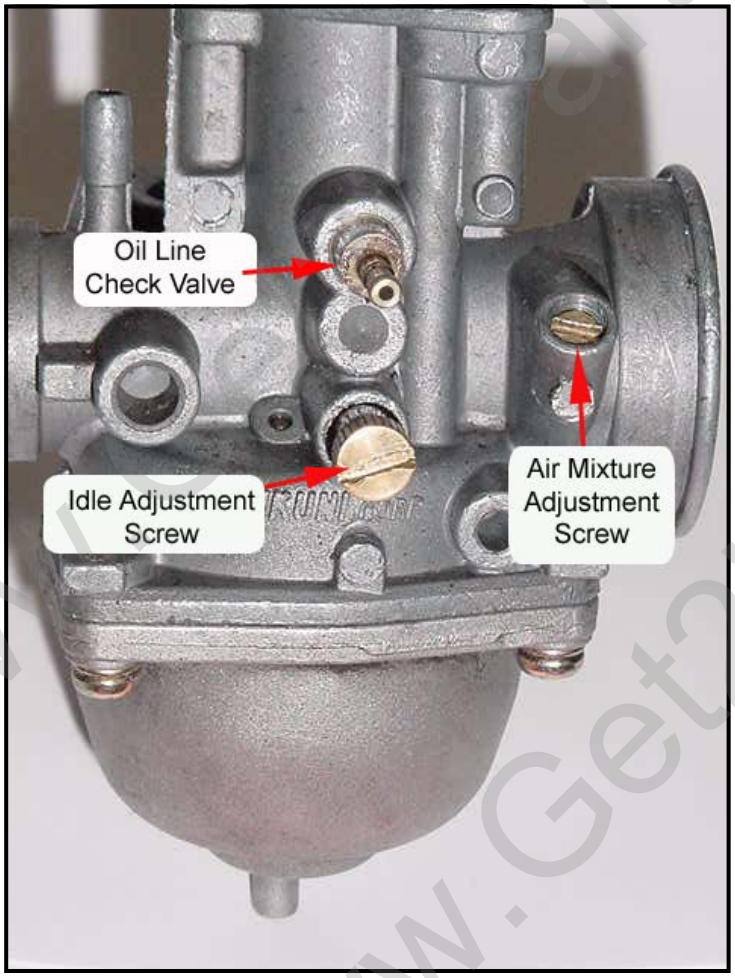
Air/Fuel Ratio adjusting procedure

Step 1: Air adjusting screw,

Turn adjusting screw all the way in then back off
¾ to 1¼ turn on 50 & 70cc engine
1 to 1½ turns on 90cc engine.

Step 2: Adjust idle RPM. (Warm Engine)

Turn the adjustment screw in or out to adjust the engine idle speed to Between 1700—1900 RPM.



ETON America, LLC

Service Bulletin

Bulletin No:	**0006**
Date:	**07/21/2000**

Oil Tank Bracket Bolts Come Loose

Lightning 50 / Thunder 90 (AXL/TXL-50 & 90)

REASON FOR BULLETIN:

OIL TANK BOLTS COMING LOOSE AND DROPPING TANK ON ENGINE AND BURNING HOLE IN TANK.

AFFECTED UNITS:

ALL AXL-TXL 50 & 90cc MODELS

REPAIR:

INSTALL LOCK TIGHT TO ALL 3 OIL TANK BOLTS FOLLOW STEPS BELOW

STEP 1: REMOVE THREE OIL TANK MOUNT BOLTS.

STEP 2: APPLY A QUALITY LOCK TIGHT TO ALL THREE OIL TANK MOUNT BOLTS. TIGHTEN THREE BOLTS. (A HIGH TEMP STYLE IS RECOMMENDED)

STEP 3: ROAD TEST AND RE-TIGHTEN BOLTS IF NECESSARY.

ETON America, LLC

Service Bulletin

Bulletin No:	**0008**
Date:	**08/25/2000**

Technical Tips

1. PAPER FUEL FILTERS -CAUSE: RESTRICTIVE FUEL FLOW

THEY CLOG EASIER
THEY WILL SHOW FUEL IN FILTER, BUT THERE WILL BE NO FUEL IN CARBURATER BOWL.
REPAIR: REPLACE WITH AN E-Z FLO WITH FILTER OR A STONE TYPE FILTER.

2. EXHAUST RESTRICTERS-CAUSE: LACK OF POWER

LOSS OF POWER
FOULED PLUGS
REPAIR: CLEAN RESTRICTER ONCE A MONTH OR REMOVE RESTRICTER AND USE THROTTLE STOP SCREW.

3. AIR FILTERS ----------CAUSE: LACK / LOSS OF POWER

LEAN CONDITIONS
POOR THROTTLE RESPONSE
REPAIR: CLEAN AFTER EVERY 3-5 RIDES, MORE FREQUENTLY IN DUSTY CONDITIONS.
USE A GOOD QUALITY FOAM FILTER SPRAY.(BEL-RAY FOAM FILTER SPRAY)

4. BATTERIES----THE BATTERIES FOR ALL ETON VEHICLES ARE MAINTANCE-FREE .

PROPER SERVICE PROCEDURES ARE AS FOLLOWS:

1. FILL BATTERY WITH BATTERY PACK SUPPLIED.
2. REMOVE FUNNEL AND LET BATTERY STAND WITH CAP OFF FOR AT LEAST 1 HR.
3. ALL FLUID IN BATTERY SHOULD ABSORBED BY BATTERY PLATES BEFORE CAP IS INSTALLED.
4. BATTERY IS READY TO BE CAPPED WHEN ALL ELECTROLYTE IS ABSORBED. (YOU SHOULD BE ABLE TO TURN BATTERY UPSIDE DOWN AND NO FLUID COME OUT)
5. MEASURE BATTERY VOLTAGE ACROSS TERMINALS AND IT SHOULD BE ABOVE 12.8 VOLTS IF PLATES HAVE ABSORBED ALL ELECTROLYTE.
6. NEVER ADD WATER OR HYDRO-SULFURIC ACID TO BATTERY HYDRO-SULFURIC ACID WILL CAUSE A SERIOUS CHEMICAL REACTION AND COULD CAUSE HARM TO YOU AND WILL DAMAGE BATTERY. ADDING WATER WILL ALSO DAMAGE BATTERY.
7. IF CHARGING IS REQUIRED SLOW CHARGE @ 5 AMPS FOR 5 HRSAND FAST CHARGE @ 5 AMPS FOR 30 MIN.

ETON America, LLC

Service Bulletin

Bulletin No:	0011
Date:	09/14/2000

2 Wire Ignition Switch Replaced by 4 Wire Switch

4 WIRE IGNITION SWITCH HARD WIRE PROCESS

REASON FOR BULLETIN:

2 WIRE IGNITION SWITCHES NO LONGER AVAILABLE

AFFECTED UNITS:

Lightning 50 & Thunder 90

REPAIR:

WHEN REPLACING A 2 WIRE SWITCH WITH A 4 WIRE SWITCH ,YOU MUST HARD WIRE SWITCH TO HARNESS. FOLLOW THE STEPS BELOW.

1. REMOVE IGNITION SWITCH AND PULL HARNESS CONNECTOR OUT FROM UNDER FENDER SO YOU HAVE ROOM TO DO WIRE REPAIRS.
2. CUT CONNECTOR OFF OF NEW SWITCH (IGNITION) AND AT MAIN HARNESS.
3. WIRE THE BLACK WIRE OFF THE MAIN HARNESS TO BLACK WIRE ON NEW SWITCH.
4. WIRE THE BLACK/RED WIRE OFF THE MAIN HARNESS TO THE BLACK/WHITE WIRE ON THE NEW SWITCH.
5. CUT THE BROWN AND RED WIRES ON THE NEW SWITCH BACK TO THE WATER PROOF COVER ON THE SWITCH.
6. TEST CONNECTION BY SWARTING ENGINE.
7. REPLACE IGNITION SWITCH .

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Service Bulletin

Bulletin No:	**0021**
Date:	**09/10/03**

ATV Break-In Procedure

Your ATV requires a break-In period just as with all other internal combustion engines. This period allows the engine parts to seat and wear properly without undue strain which can cause premature failure.

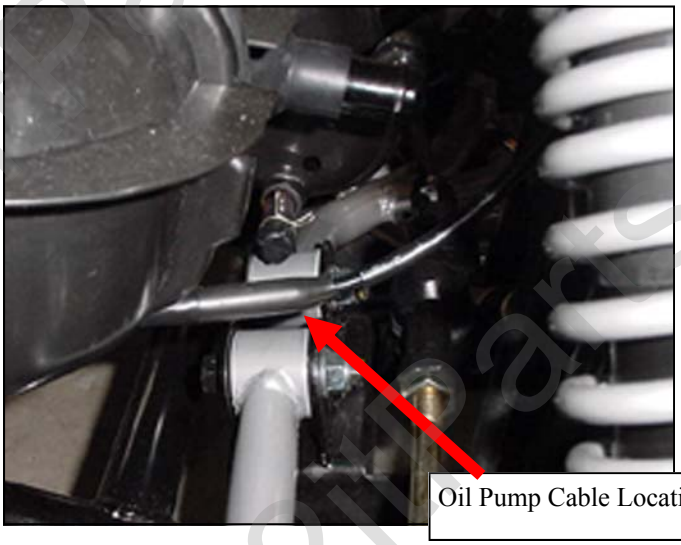
1. For the first two weeks of operation do not run your ATV at full throttle for extended periods of time.
2. Viper 50M/50/70/90/90R
   Your first tank of fuel should be a pre-mixture of fuel and oil at a 50:1 ratio. This will insure that the oil pump system has been primed and bled of air that may have occurred in shipping.
3. Viper Jr.
   All fuel should be a pre-mixture of fuel and oil at a 50:1 ratio.
4. Do not operate the unit at more than 85% of maximum speed.
5. Do not over rev the engine.
6. Use light braking pressure to allow the brake pads to seat to the rotor and drums.

ETON America, LLC

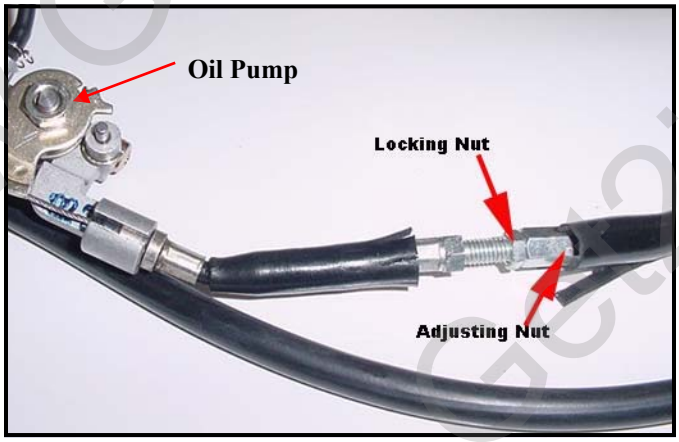
Service Bulletin

Bulletin No: **0033** Date: **04/01/2004**	Oil Pump Flow Adjustment all Oil Injected two cycle Engines

To adjust the oil pump flow on a two cycle oil injected engine you must adjust the oil pump cable length. . The Oil pump cable is located on the right hand side of the engine just above the (RH) A-arm



To reduce the oil flow you must lengthen the cable by loosening the lock nut and turning the adjusting nut counter clockwise then retighten the locking nut. To increase the oil flow you would shorten the cable by turning the adjusting nut clockwise.



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Service Bulletin

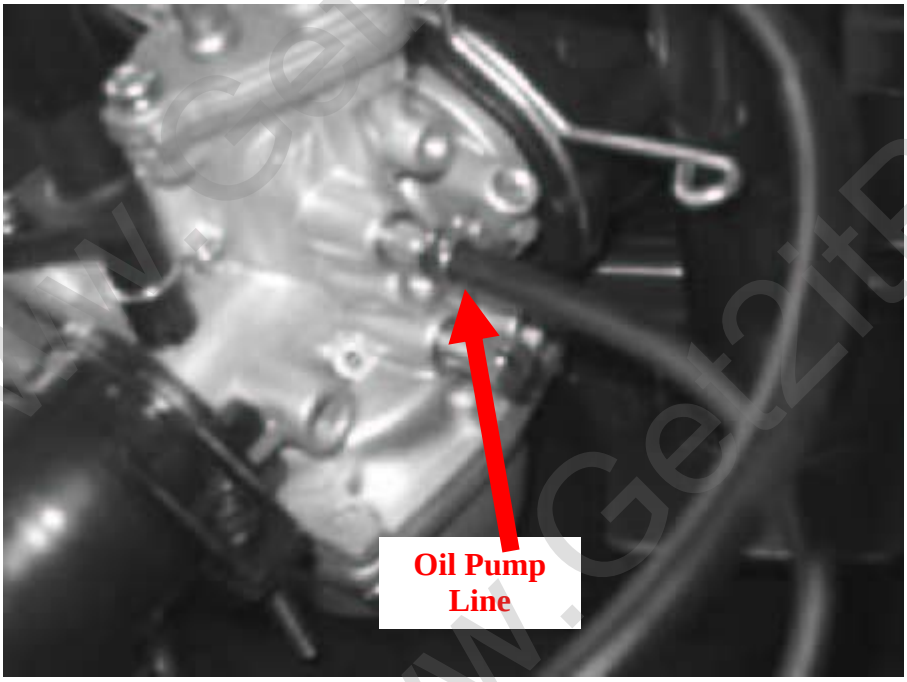
Bulletin No:	0052
Date:	06/12/2007

E-TON 50 & 90cc 2 cycle engine Oil pump testing

The following steps are used to determine if the 2 cycle oil injector pump is functioning properly on E-TON 50cc and 90cc 2 cycle engines.

1. Fill the fuel tank with a pre mix fuel / 2 cycle oil mixture at a 50 : 1 ratio.
2. Disconnect the oil pump line at the carburetor.
3. Start the engine and count the drops per minute at the various RPM listed in the table below.

RPMs	50cc	90cc
1700 (idle)	3-4	5-6
4000	5-9	12-14
7000	8-12	20-22



Note: 32 Drop = aporx -1cc