

AEON MOTOR CO., LTD



SERVICE MANUAL

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1. INFORMATION

1.1 Safety

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1.3 Specifications

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1.5 Torque valve

1.1 SAFETY

GASOLINE

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

CARBON MONOXIDE

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.

BATTERY ELECTROLYTE

The battery electrolyte contains sulfuric acid. Protect your eyes, skin and clothing. If you come into contact with the electrolyte, flush the area thoroughly with water. If you get the electrolyte in your eyes, flush with water and contact a doctor immediately.

HOT PARTS

Engine and exhaust pipe become very hot and remain hot for one hour after the engine is run. Wear insulated gloves before handling these parts.

USED ENGINE /GEAR OIL

Used engine oil and gear oil may cause skin disease after repeated contact with the skin for long periods. Keep out of reach of children.

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-cooled 4-stroke , vertical cylinder
Displacement	195.8 cc
Bore and Stroke	65×59mm
Compression	9.6:1
Maximum Torque	1.45 N-m @ 5000 rpm
Carburetor	Mikuni
Ignition	C.D.I Electronic
Starting	Electrical & Kick-Start
Lubrication	Wet Sump

CHASSIS

Air Cleaner	AE-9
Transmission	Automatic(C.V.T sysetm with reverse gear)
Overall Length	68.5 inches (1740mm)
Overall Width	41.3 inches (1050mm)
Overall Height	49.6 inches (1260mm)
Seat Height	31.1 inches (790mm)
Wheel Base	44.9 inches (1140mm)
Ground Clearance	7.0 inches (178mm)
Dry Weight	175kg (385.8lb)
Fuel Tank Capacity	8.5 liter

SUSPENSION

Front	Double Wishbone
Rear	Swing Arm

BRAKES

Front	Disc
Rear	Disc

TIRES

Front	21" × 7" - 10"
Rear	20" × 10" - 9"

**Specifications subject to change without notice.*

1.4 SERIAL NUMBER

The frame serial number is stamped on the front frame.

And stick a bar code paper to cover it.



The engine number is stamped under the crankcase.



1.5 TORQUE VALVES

STANDARD

5mm bolt and nut	5 N.m (3.5 lbs.ft)
6mm bolt and nut	10 N.m (7.2 lbs.ft)
8mm bolt and nut	22 N.m (16 lbs.ft)
10mm bolt and nut	35 N.m (25 lbs.ft)
12mm bolt and nut	55 N.m (40 lbs.ft)

ENGINE

Cylinder head nut	18~22 N.m (13~16 lbs.ft)
Spark plug	12~14 N.m (9~11 lbs.ft)
Cylinder head bolt	7~9 N.m (5~7 lbs.ft)
Alternator bolt	8 N.m (5.9 lbs.ft)

FRAME

Handlebar upper holder bolt	24 N.m (17.7 lbs.ft)
Throttle housing cover screw	4 N.m (2.9 lbs.ft)
Steering shaft nut	50 N.m (36.9 lbs.ft)
Steering shaft holder bolt	33 N.m (24 lbs.ft)
Wheel rim bolt	18 N.m (13.3 lbs.ft)
Tie rod lock nut	35 N.m (25.8 lbs.ft)
Handlebar lower holder nut	40 N.m (29.5 lbs.ft)
Front wheel bolt	24 N.m (17.7 lbs.ft)
Front axle nut	60 N.m (44 lbs.ft)
Front brake arm nut	4 N.m (3.0 lbs.ft)
Rear brake arm nut	7 N.m (5.2 lbs.ft)
Rear axle nut	60 N.m (44.3 lbs.ft)
Rear wheel bolt	24 N.m (17.7 lbs.ft)
Exhaust muffler mounting bolt	30 N.m (22.1 lbs.ft)
Engine hanger bolt	30 N.m (22 lbs.ft)
Rear axle holder bolt	90 N.m (65 lbs.ft)
Swing arm pivot nut	90 N.m (65 lbs.ft)
Rear shock absorber mounting nut	45 N.m (33 lbs.ft)

2. Maintenance

- 2.1 Maintenance data
- 2.2 Maintenance schedule
- 2.3 Throttle operation
- 2.4 Air cleaner maintenance
- 2.5 Spark plug
- 2.6 Idle speed setting
- 2.7 Drive chain adjustment
- 2.8 Brake system adjustment
- 2.9 Wheels and tires
- 2.10 Steering system
- 2.11 Toe-alignment
- 2.12 Transmission lubrication

2.1 MAINTENANCE DATA

SPECIFICATION

SPARK PLUG

Spark plug cap	0.6-0.7mm
Recommended spark plugs	NGK CR7HSA
Throttle lever free play:	5-10mm
Idle speed	1500±100rpm
Brake lever free play:	10~20mm
Drive chain slack	15-25mm
Front/rear tire size	21×7-10 / 20×10-9
Front/rear tire pressure	4±0.3psi (0.2 kgf/cm ²)
Toe-in	5±10mm

TORQUE VALVES

SPARK PLUG	12-14 N.m
TIE-ROD LOCK NUT	35-43 N.m

ENGINE OIL

Viscosity:	SAE 15W-40
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GEAR LUBRICATION OIL

Viscosity:	SAE 85W-140
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2.2 MAINTENANCE SCHEDULE

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

Item		Maintenance Interval (whichever comes first)			Remarks
		Hours	Calender	Miles(Km)	
♦ E	Engine breather filter (if equipped)	25H	6 M	250 (400)	Inspect; replace if necessary
	Engine breather hose	100H	3 M	1000 (1600)	Inspect
♦	General lubrication	50H	6 M	500 (800)	Lubricate all fittings, pivots, cables, etc.
	Shift Linkage	50H	6 M	500 (800)	Inspect, lubricate, adjust
♦ ■	Steering	50H	6 M	500 (800)	Inspect daily, Lubricate
♦	Front suspension	50H	6 M	500 (800)	Inspect, lubricate, Tighten Fasteners
♦	Rear suspension	50H	6 M	500 (800)	Inspect, lubricate, Tighten Fasteners
	Carburetor float bowl	50H	6 M	500 (800)	Drain bowl periodically and prior to storage
■ E	Throttle Cable/ETC Switch	50H	6 M	500 (800)	Inspect; adjust; lubricate; replace if necessary
■ E	Choke cable	50H	6 M	500 (800)	Inspect; adjust; lubricate; replace if necessary
E	Carburetor air intake ducts/flange	50H	6 M	500 (800)	Inspect ducts for proper sealing/air leaks
	Drive belt	100H	12 M	1000 (1600)	Inspect; adjust; replace as needed
	Cooling system (if applicable)	50H	6 M	500 (800)	Inspect coolant strength seasonally; pressure test system yearly
♦ E	Engine oil change *Severe Duty **Normal Duty	25H 50H	6 M 12 M	500 (800) 1000 (1600)	Perform a break-in oil change at 25 hours/one month, change more frequently during cold weather
♦ E	Engine oil change *Severe Duty **Normal Duty	25H 50H	6 M 12 M	500 (800) 1000 (1600)	Replace at oil change
♦ E	Oil filter change	100H	6 M	1000 (1600)	Replace with oil change
♦ E	Valve clearance	100H	12 M	1000 (1600)	Inspect; adjust

♦ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

■ Have an authorized Polaris dealer perform these services.

Item		Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	Miles(Km)	
■ E	Fuel system	100H	12 M	1000 (1600)	Check for leaks at tank cap, lines, fuel valve, filter, pump, carburetor; replace lines every two years
■ E	Fuel filter	100H	12 M	1000 (1600)	Replace yearly
◆	Radiator (if applicable)	100H	12 M	1000 (1600)	Inspect; clean external surfaces
◆	Cooling hoses (if applicable)	100H	12 M	1000 (1600)	Inspect for leaks
◆	Engine mounts	100H	12 M	1000 (1600)	Inspect
	Exhaust muffler/pipe	100H	12 M	1000 (1600)	Inspect
■ E	Spark plug	100H	12 M	1000 (1600)	Inspect; replace as needed
■ E	Ignition Timing	100H	12 M	1000 (1600)	Inspect
◆	Wiring	100H	12 M	1000 (1600)	Inspect for wear, routing, security; apply dielectric grease to connectors subjected to wear, mud, etc.
■	Clutches (drive and driven)	100H	12 M	1000 (1600)	Inspect; clean; replace worn parts
■	Front wheel bearings	100H	12 M	1000 (1600)	Inspect; replace as needed
■	Brake fluid	200H	24 M	2000 (3200)	Change every two years
	Spark arrestor	300H	36 M	3000 (4800)	Clean out
E	Idle speed		Adjust as needed		
■	Toe adjustment		Inspect periodically; adjust when parts are replaced		
◆ ■	Auxiliary brake	Pre-Ride	Inspect daily; adjust as needed		
	Headlight aim		Adjust as needed		

◆ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

■ Have an authorized Polaris dealer perform these services.

2.3 THROTTLE OPERATION

Inspect for smooth lever operation, full opening and automatic full closing in steering positions.

Inspect for deterioration, damage, cuts and nicks, or kink in the throttle cable, replace it if necessary.

Check the throttle lever, free play should be not more than 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.

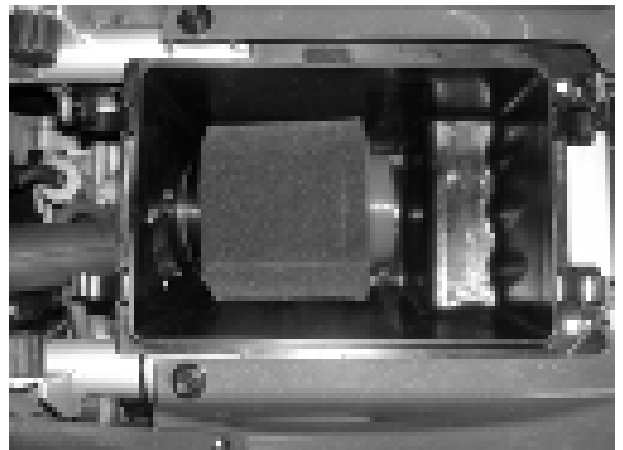
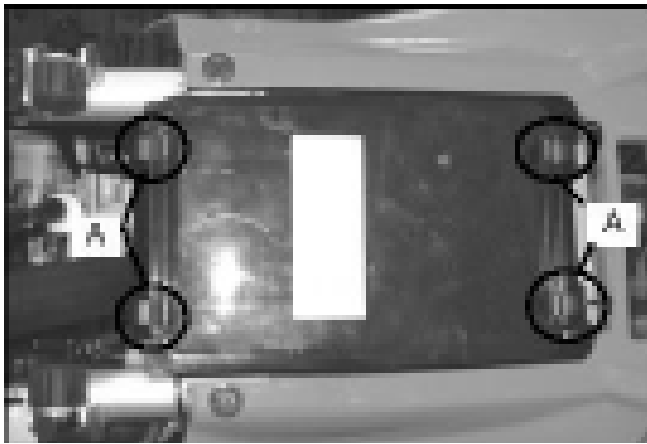


2.4 AIR CLEANER MAINTENANCE

- (1) Lift up on the rear of the seat.
- (2) Pull the seat back and free of the tabs.

NOTE: When reinstalling seat, make sure the slots in the seat engage the tabs in the fuel tank.

- (3) Remove clips from air box cover (A) and remove cover. Inspect the gasket. It should adhere tightly to the cover and seal all the way around.



- (4) Install the new one.
- (5) Reinstall filter on main filter mount. Place filter clamp over the assembly and tighten.

NOTE: Apply a small amount of general purpose grease to the sealing edges of the filter before reinstalling.

2.5 SPARK PLUG

The spark plug is located at the front of the engine.

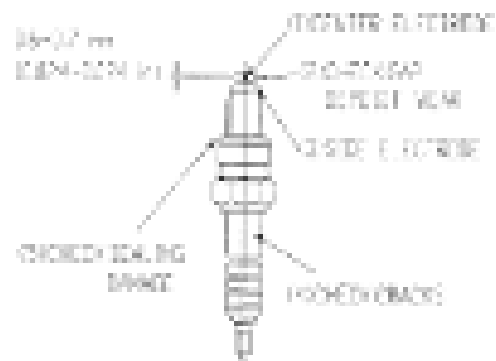
- (1) Disconnect the spark plug cap and remove the spark plug
- (2) Visually inspect the spark plug electrodes for wear or cracks in insulator. Replace if needed.
- (3) The center electrodes should have square edges and the side electrodes should have a constant thickness.
- (4) Discard the spark plug if there is apparent wear or if the insulator is cracked or chipped.
- (5) Measure the gap with a wire-type feeler gauge and adjust if necessary by carefully bending the side electrode.

SPARK PLUG GAP: 0.6~0.7 mm

RECOMMENDED REPLACEMENT PLUG:

NGK CR7HSA

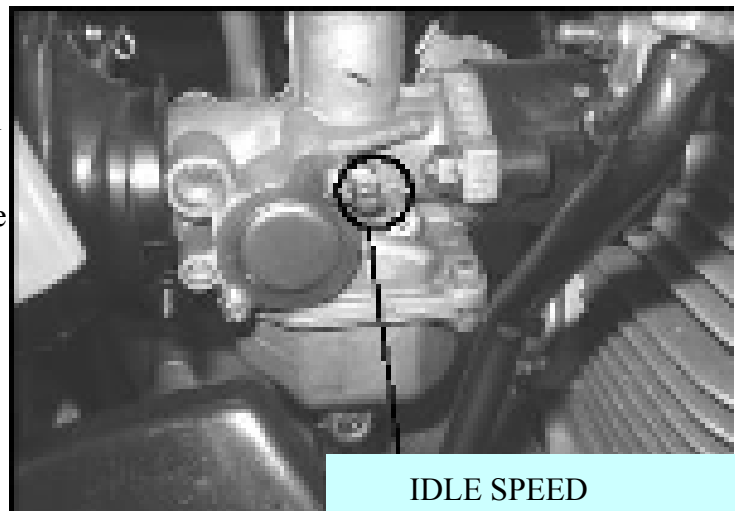
- (6) Check the sealing washer and replace with a new one if damaged.
- (7) With the sealing washer attached thread the spark plug in by hand to prevent cross threading. Tighten the spark plug. TORQUE: 12-14 N-m



2.6 IDLE SPEED SETTING

- (1) Inspect and adjust the idle speed after all other engine maintenance items have been performed and are within specifications. The engine must be warm for accurate idle speed inspection and adjustment.
- (2) Warm up the engine for about ten minutes and connect a tachometer.
- (3) Turn the throttle stop screw as required to obtain the specified idle speed.

IDLE SPEED: 1500 ± 100 rpm



IDLE SPEED

2.7 DRIVE CHAIN ADJUSTMENT

Stop ATV and shift transmission into neutral. Inspect the chain slack midway between the sprockets. The standard is 10-25 mm (5/8-1 inch).

If needed remove the chain protective cover and adjust the chain slack.



Loosen the axle holder lock nut then adjust the drive chain slack by turning the adjusting nut. Tighten the axle holder lock nut.

Torque = 90N.m (65 Ft. lbs)

When the drive chain becomes very dirty, it should be removed, cleaned and lubricated with the specified lubricant.

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 has excessive wear or damage, replace if needed.

Use a commercial chain lubricant to lubricate the drive chain, replace and adjust the slack as described above.



2.8 BRAKE SYSTEM ADJUSTMENT

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 lever. The standard is 10~20 mm.

Adjust the free play of the front brake lever by turning the adjuster on the brake lever assembly.



Inspect the rear 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 lever. The standard is 10-20 mm.



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



2.9 WHEELS AND TIRES

Inspect the tire surface for cuts, nails or other sharp objects.

Check the tire pressure at cold tire conditions.
The standard tire pressure is 4psi.
(0.28kgf/cm²)



2.10 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.



Steering shaft holder bushing

Remove the front fender.

Remove the steering shaft holder and check the steering shaft bushing for wears or damage.

If the bushing is worn or damaged, change a new one.

Grease the steering shaft bushing and install the parts in the reverse order of removal.

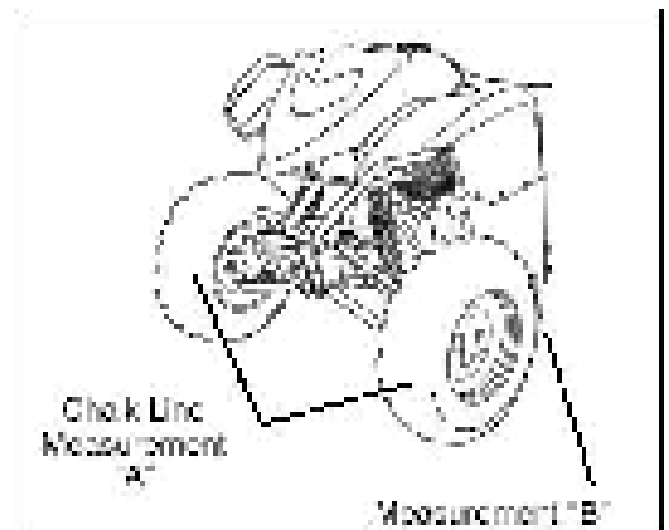
Torque: steering shaft holder bolt: 33N.m (24 Ft. lbs)



2.11 TOE-ALIGNMENT

1. Place machine on a smooth level surface.
2. Set handlebars in a straight ahead position and secure handlebars in this position.
NOTE: The steering arm can be used as an indicator of whether the handlebars are straight. The arm should always point straight back from the steering post.
3. Place a chalk mark on the center line of the front tires approximately 10" (25.4cm) from the floor or as close to the hub/axle center line as possible. **NOTE:** It is important that the height of both marks be equally positioned in order to get an accurate measurement.

4. Measure the distance between the marks and record the measurement. Call this measurement "A".
5. Rotate the tires 180° by moving vehicle forward or backward. Position chalk marks facing rearward, even with the hub/axle centerline.
6. Again measure the distance between the marks and record. Call this measurement " B" . Subtract measurement " B" from measurement " A" . The difference between measurements " A" and " B" is the vehicle toe alignment. The recommended vehicle toe tolerance is 1/8" to 1/4" (0.3 to 0.6 cm) toe out. This means the measurement at the front of the tire (A) is 1/8" to 1/4" (0.3 to 0.6 cm) wider than the measurement at the rear (B).



2.12 TRANSMISSION LUBRICATION

Transmission fluid needs to be changed every 400 km.

There is a gear oil drain hole bolt at the rear of the engine.

(STEP1)

Place a drain pan beneath oil pan and remove drain plug from the crankcase. Allow oil to drain completely.



(STEP2)

Reinstall the drain plug. Tighten to specification.

(STEP3)

Add the proper amount of lubricant to bring level into operating range as shown. Do not over fill.

(STEP4)

Verify fluid level is correct and no leaks are present.

3 ENGINE REMOVALS AND INSTALLATION

3.1 ENGINE REMOVAL

3.2 ENGINE REPLACEMENT

ENGINE SHOULD ONLY BE REMOVED IN THE CONDITIONS OF NECESSARY REPAIRS OR ADJUSTMENT TO THE TRANSMISSION AND COMBUSTION SYSTEM ONLY!

3.1 ENGINE REMOVAL

1. Clean work area.
2. Thoroughly clean the ATV engine and chassis.
3. Disconnect battery cables.
4. Drain engine oil.
5. Disconnect spark plug high tension lead.
6. Disconnect all electrical wires from the engine.
7. Remove the following parts as required.
 - Seat
 - Left and Right Side Covers
 - Fuel Tank Cover / Front Cab
 - Fuel Tank
8. Remove exhaust pipe.
9. Remove airbox.
10. Remove carburetor. Insert a clean shop towel into the carburetor flange to prevent dirt from entering the intake port.
11. Starter motor. Note ground cable location. Mark positive (+) cable mounting angle and remove cable.
12. Remove transmission link rod(s) from gear selector and secure out of the way.
13. Remove engine to chassis ground cable.
14. Remove the swing arm and drive shaft assemblies.
15. Remove all engine mount nuts and / or engine mount plates.
16. Remove engine through left side of frame.

3.2 ENGINE REPLACEMENT

Engine installation is essentially the reverse order of removal.

The torque of engine hanger bolt is 30 Nm

Route the wires and cable properly in reverse order of removal.

4. LUBRICATION

4.1 Service Information

4.2 Trouble Shooting

4.3 Engine Oil Level

4.4 Engine Oil & Filter Change

4.5 Oil Pump Removal /Installation

4.1 SERVICE INFORMATION

GENERAL

This section describes inspection and replacement of the engine oil, oil filter screen and assembly of the oil pump.

Fill the oil pump with clean oil when reassembling the pump.

SPECIFICATIONS

Engine Oil Capacity	0.8-1.0 Liters /
Engine Oil Recommendations	Viscosity: (<i>SAE 15W-40</i>)
	API Service classification: SF-SG

OIL PUMP	STANDARD	SERVIC	LIMIT
	Cover-to-rotor clearance	-----	0.12
	Rotor tip clearance	-----	0.12
	End clearance	0.01-0.10	0.2

TORQUE VALUE

Oil Drain Bolt	14 ft. lbs. (19 Nm)
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4.2 TROUBLE SHOOTING

Oil level too low / high oil consumption

Normal oil consumption.

External oil leaks.

Oil not changed often enough.

Worn piston rings.

Faulty heat gasket.

Oil contamination

Worn piston rings.

Faulty heat gasket.

Oil or filter not changed often enough.

4.3 ENGINE OIL LEVEL

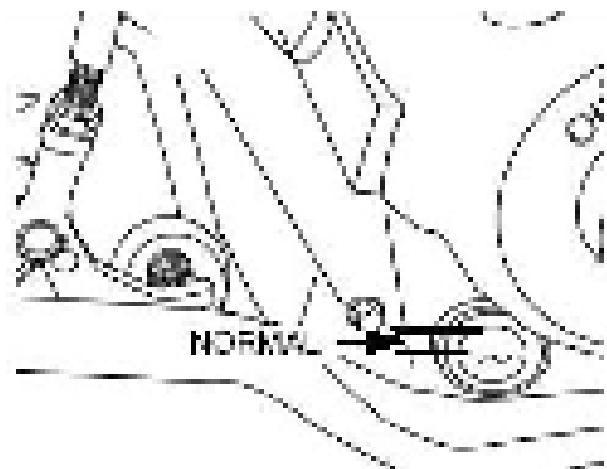
To check the oil level:

1. Set machine on a level surface.
2. Start and run engine for 20-30 seconds. This will return oil to its true level in the engine sump.
3. Stop engine and check oil level sight glass.
4. Check to see that the oil level is in the “normal” range. The level should be, at minimum, halfway between to the top of the viewing area. Add oil as needed to reach the indicated level shown. Do not overfill.



NOTE: Do not fill the over the normal oil operating range. Filling over the normal operating range could cause a mist of oil to enter the air box.

NOTE: Rising oil level between checks in cool weather driving, can indicate moisture collecting in the oil reservoir. If the oil level is over the full mark, change the oil.



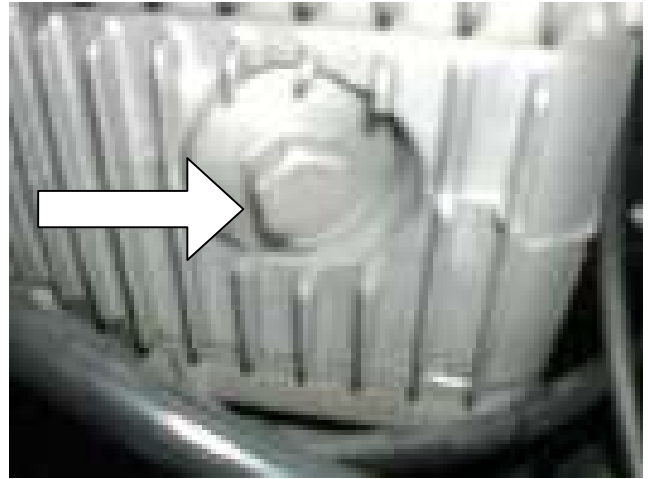
4.4 ENGINE OIL & FILTER CHANGE

1. Place vehicle on a level surface.
2. Clean area around drain plug at bottom of oil pan.
3. Run engine two to three minutes until warm. Stop engine.
4. Place a drain pan beneath oil pan and remove drain plug from under the crankcase.

CAUTION: Oil may be hot. Do not allow hot oil to come into contact with skin as serious burns may result.

5. Allow oil drain completely.
6. Replace sealing washer on drain plug.
NOTE: The sealing surfaces of the drain plug and crankcase should be clean and free of burrs, nicks or scratches.
7. Reinstall drain plug and torque to 14 ft. lbs. (19Nm).

8. The oil filter is located on the right side of the machine. Place drain pan beneath oil filter. Using an oil filter wrench, turn filter counterclockwise to remove.
9. Using a clean dry cloth, clean filter sealing surface on crankcase.
10. Lubricate O-ring on new filter with a film of engine oil. Check to make sure the O-ring is in good condition.
11. Install new filter and turn by hand until filter gasket contacts the sealing surface, then turn and additional 1/2 turn.
12. Remove oil cap.



13. Place gear selector in neutral and set parking brake.
14. Start the engine and let it idle for one to two minutes, Stop the engine and inspect for leaks.
15. Re-check the oil level and add oil as necessary to bring the level to the upper level.
16. Dispose of used filter and oil properly.

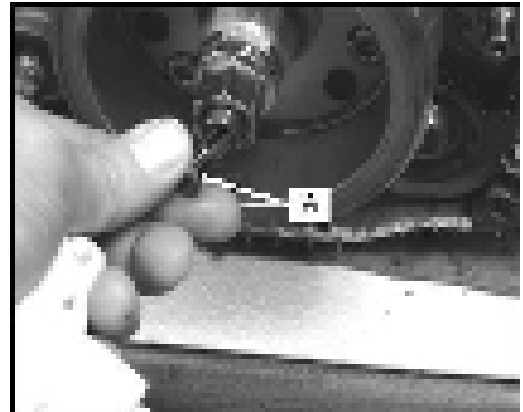
ENGINE OIL CAPACITY: 1.2 liter at draining.

4.5 OIL PUMP REMOVAL / INSTALLATION

1. Remove stator housing bolts and remove housing.
2. Remove the start drive gear and shaft by pulling the shaft and tilting the gear slightly. Flywheel removal generally is not required.
3. Measure the OD of the starter drive shaft on both ends for out-of-round.
4. Measure the ID of the bushing in the stator housing (A) and in the crankcase (B) in two directions 90° apart to determine if out-of-round. Calculate clearance. Replace components if clearance is excessive.
5. Inspect gear teeth on starter drive. Replace starter drive if gear teeth are cracked, worn, or broken.



CAUTION: The crankshaft end contains an oil passage plunge joint (A) as shown below. The plunger must be able to move in and out freely. Avoid damage to the crankshaft end or plunge joint and spring, which can cause loss of oil pressure, resulting in severe engine damage.



6. Remove the oil passage plunge joint, flywheel nut and washer.
7. Install Flywheel Puller (PN PA-47308) and remove flywheel. **CAUTION:** Do not hammer or strike the tool while attached to the crankshaft end, which may become damaged.



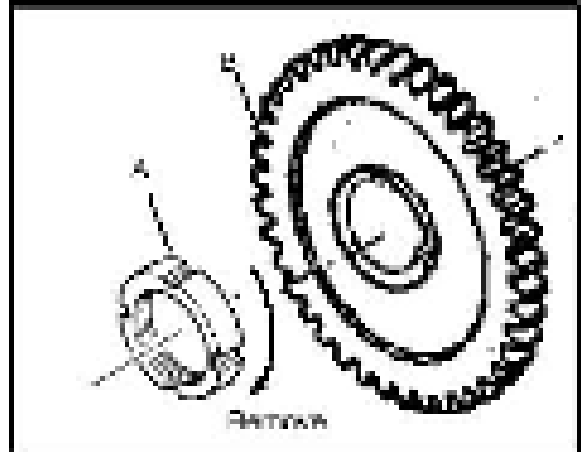
8. Remove the hex bolts that attach the one-way drive clutch to the flywheel.
9. Inspect the bearing surfaces and drive teeth for signs of wear or gouging. Replace the one-way clutch as assembly if it is not working properly.



Note: One-way clutch components are not serviceable. Replace the component as an assembly.



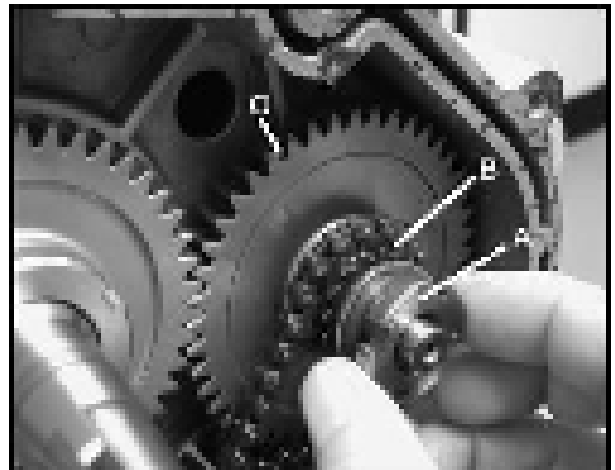
10. Using the Slotted Nut Socket, remove the crankshaft slotted nut (A). **NOTE:** Slotted nut is left hand thread.



11. Remove cam chain drive sprocket (B) and Woodruff key from crankshaft..
12. Inspect sprocket teeth for wear or damage.
13. Inspect Woodruff key for wear.
14. Replace any worn or damaged parts.

15. Using the Slotted Nut Socket , remove the balance shaft slotted nut (A). **NOTE:** Slotted nut is a right-hand thread.

16. Remove cam chain drive sprocket (B), drive sprocket (C) and woodruff key from balance shaft.



17. Remove the oil pump galley cover, oil pump gear and chain to facilitate removal of the balance shaft sprocket.
18. Inspect sprocket teeth for wear or damage.
19. Inspect woodruff key for wear.
20. Replace any worn or damaged parts.
21. Remove the screws on the oil pump galley cover.



22. Remove the oil pump drive gear.



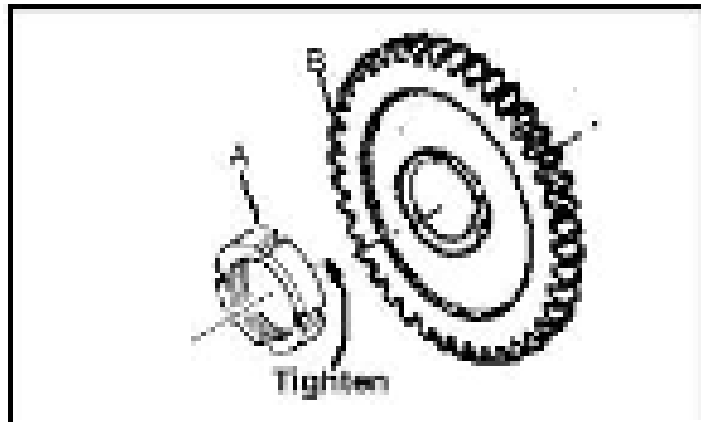
23. Remove the oil pump retaining screws.

24. Inspect the sprockets and chain for wear or damage. Inspect chain for worn or missing rollers or damage. Replace chain anytime the oil pump is replaced or if excessively worn.



OIL PUMP ASS'Y / INSTALLATION

1. Install the crankshaft gear, woodruff key and slotted nut.



2. Install the balance shaft gear and align the mark with the crankshaft gear mark as shown.



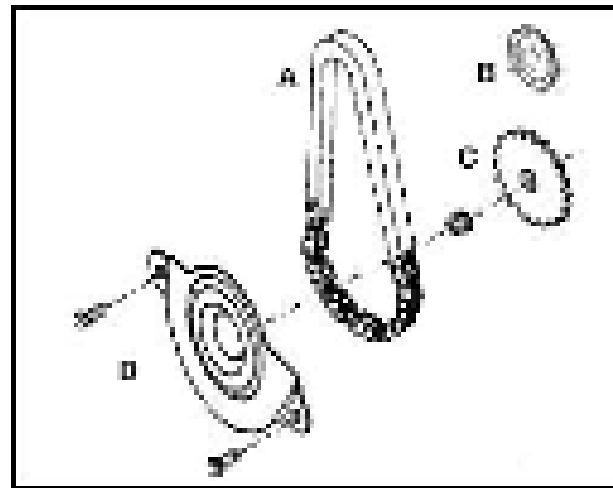
3. Install the woodruff key.



4. Install the oil pump.



5. Install the chain (A) over the sprocket on the balance shaft gear (B).



6. Install the washer and nut. Torque to specification.



7. Install the oil pump galley.



8. Install flywheel key, flywheel washer, and nut.



9. Install stator housing.



5. CYLINDER HEAD / VALVES

5.1 SERVICE INFORMATION

5.2 TROUBLESHOOTING

5.3 CAMSHAFT ASS'Y REMOVAL

5.4 CYLINDER HEAD REMOVAL

5.5 CYLINDER HEAD INSTALLATION

5.1 SERVICE INFORMATION

GENERAL

This section describes the maintenance of cylinder head, valves, camshaft and the other parts.

The engine must be removed from the frame to service cylinder head.

Camshaft lubrication oil is fed to the cylinder head through an oil orifice in the engine case.

Before installing the cylinder head is sure the orifice is not clogged and the gasket, O-ring and dowel pins are in place.

SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Cylinder compression		160-190 PSI	-----
Cam lobe height	IN	29.795	29.40
	EX	29.56	29.16
Rocker arm I.D.		10.000-10.018	10.10
Rocker arm shaft O.D.		9.972-9.987	9.91
Valve spring free length	IN	32.3	31.2
	EX	35.0	34.1
Valve stem O.D.	IN	4.975-4.980	4.90
	EX	4.955-4.970	4.90
Valve guide I.D.	IN/EX	5.000-5.012	5.03
Stem-to-guide clearance	IN	0.010-0.037	0.08
	EX	0.030-0.057	0.10
Valve seat width	IN	1.0	1.6
	EX	1.0	1.6

TORQUE VALUES

Cylinder head bolts	8~12 n-m (0.8~12 kg-m)
Camshaft holder flange nuts	20~24 n-m (2.0~2.4 kg-m)
Tappet adjusting nut	9~12 n-m (0.9~1.2 kg-m)

5.2 TROUBLE SHOOTING

Engine top-end problems usually affect engine performance. These problems can be diagnosed by a compression test, or by tracing engine noise to the top end with a sounding rod or stethoscope.

Low compression valve

- Incorrect valve adjustment.
- Worn or damaged valve seats.
- Burned or bent valve.
- Incorrect valve timing.
- Weak valve spring.

Cylinder head

- Leaking or damaged head gasket.
- Warped or cracked cylinder head.
- Faulty cylinder or piston

Excessive noise

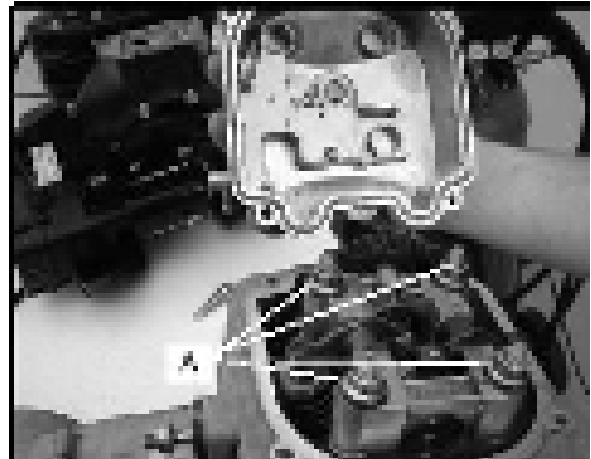
- Incorrect valve adjustment
- Sticking valve or broken valve spring.
- Worn or damaged rocker arm or camshaft.
- Worn or damaged cam chain.
- Worn or damaged cam chain tensioned.
- Worn cam sprocket teeth.

Excessive smoke

- Damaged valve stem seal.
- Faulty cylinder or piston rings.

5.3 CAM SHAFT ASS'Y REMOVAL

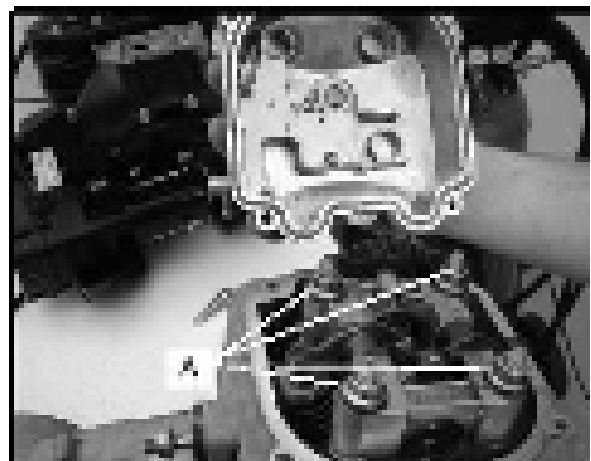
Remove the cylinder head cover.



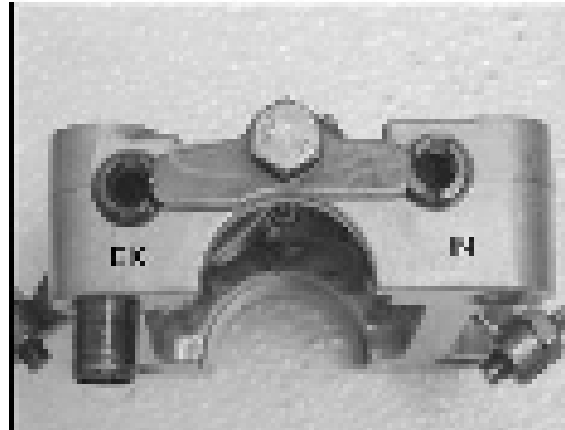
Remove the two cam chain tensioner flange bolts.



Remove the nuts(A) and washers
Remove the camshaft holder and dowel pins.



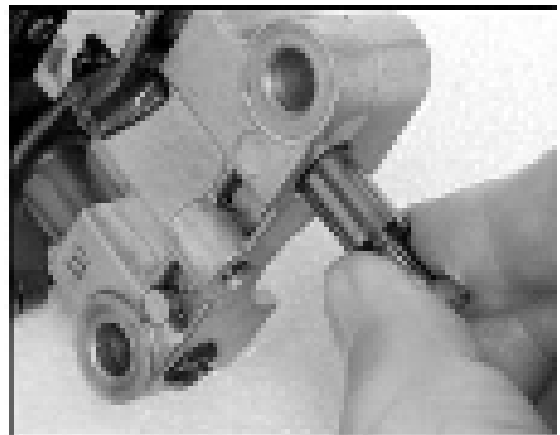
Remove the rocker shaft locking plate.



Inspect each rocker arm cam follower surface. If there is any damage or uneven wear, replace the rocker arm. **NOTE:** Always inspect camshaft lobe if rocker arms are worn or damaged.



Remove each rocker arm shaft using the 10 mm hex bolt that secures the lock plate.

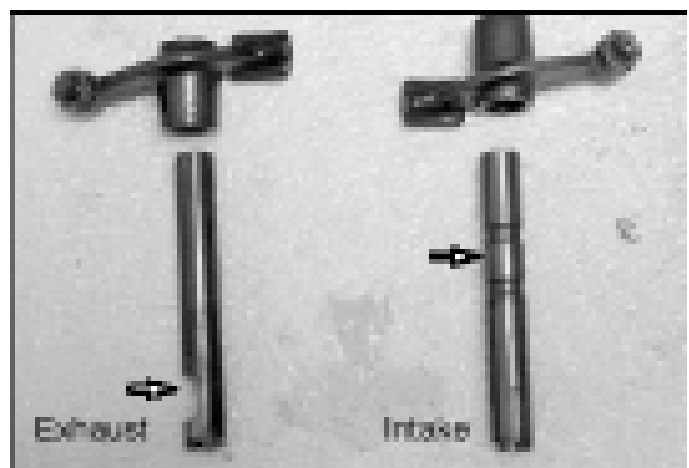


Measure the I.D. of each rocker arm.

SERVICE LIMIT: 10.10 mm

Measure the O.D. of each rocker arm shaft.

SERVICE LIMIT: 9.91 mm



Remove the 4 cylinder head bolts evenly by loosening each one 1/4 turn at a time until loose.



Remove the cam chain from the sprocket by tilting the cam assembly and simultaneously lifting the chain.

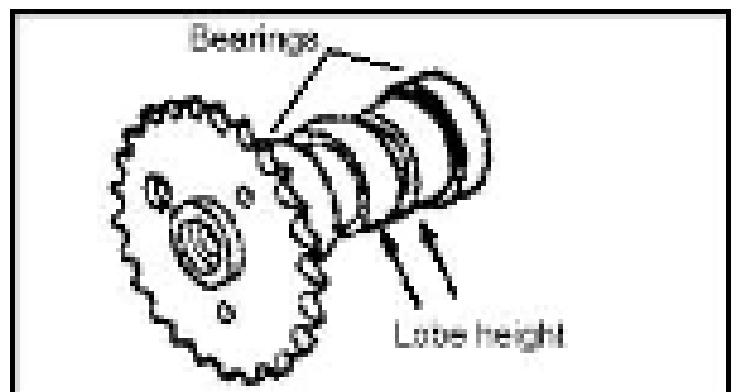


INSPECTION

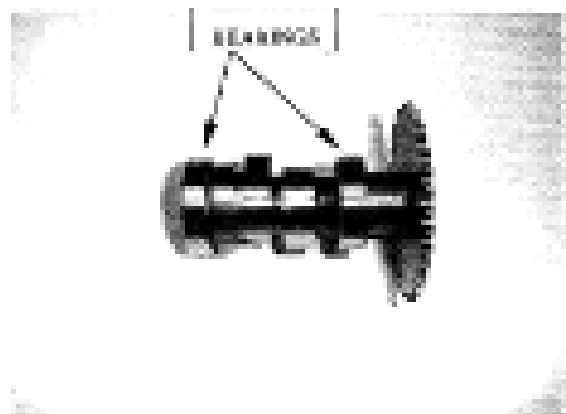
Inspect the cam lobes surface and height of cam lobes for wear or damage.

SERVICE LIMIT: IN 29.40 mm

EX 29.16 mm



Inspect the camshaft and bearings for wear or damage and replace them if necessary.



5.4 CYLINDER HEAD REMOVAL

Loosen each of the four cylinder head bolts evenly 1/4 turn each time in a cross pattern until loose.

Remove bolts (A)



Remove cylinder head and head gasket.



CYLINDER HEAD DISASSEMBLY

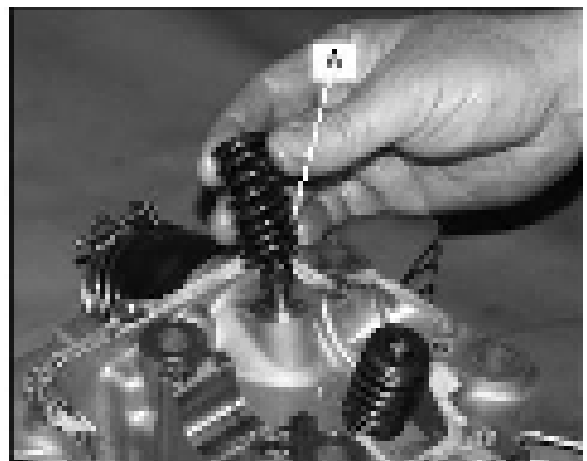
Using a valve spring compressor, compress the valve spring and remove the spilt keeper.

NOTE: To prevent loss of tension, do not Compress the valve spring more than necessary.



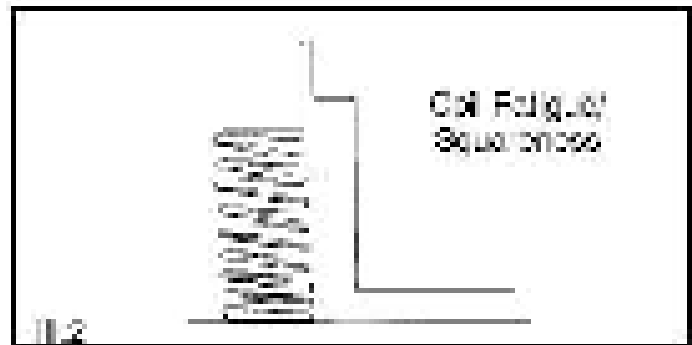
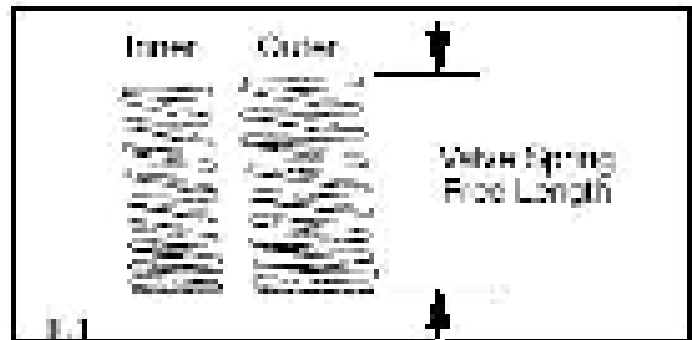
Remove spring retainer and spring.

NOTE: The valve springs should be positioned with the tightly wound coils against the cylinder head on progressively wound springs (A).



Push valve out, keeping it in order for reassembly in the same guide.

Measure free length of the inner and outer springs with a Vernier caliper, |||.1. Check spring for squareness as shown in |||.2. Replace spring if measurements are out of specification.

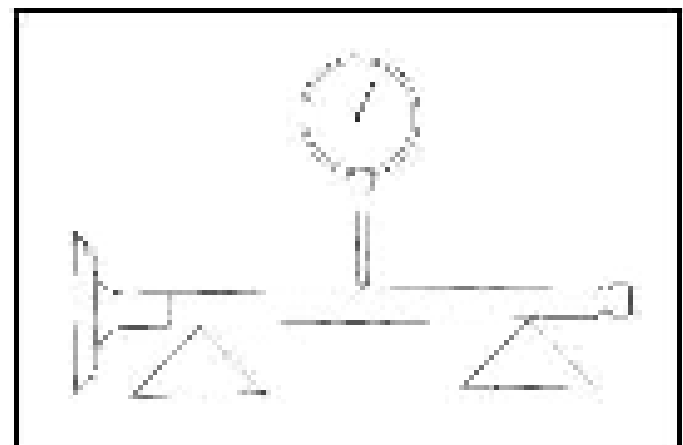


Remove valve seals. **Note:** Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.



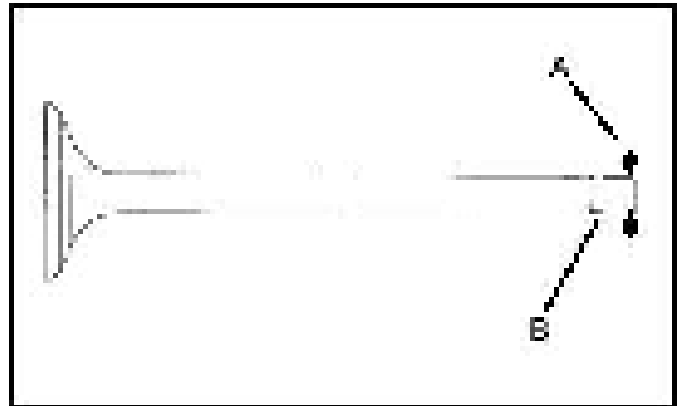
INSPECTION

Remove all carbon from valve with a soft wire wheel. Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use “V” blocks and a dial indicator.

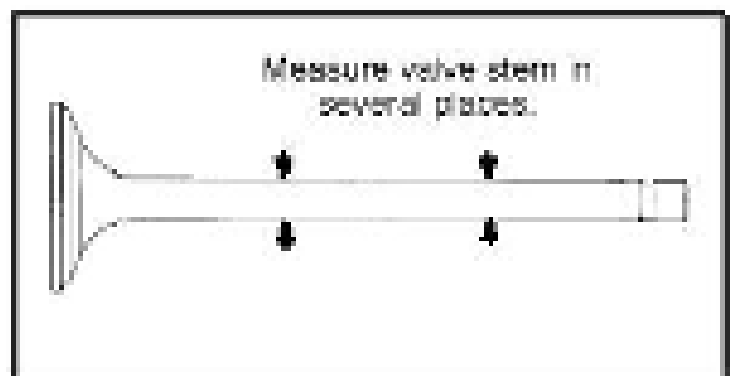


Check end of valve stem for flaring, pitting, wear or damage (A).

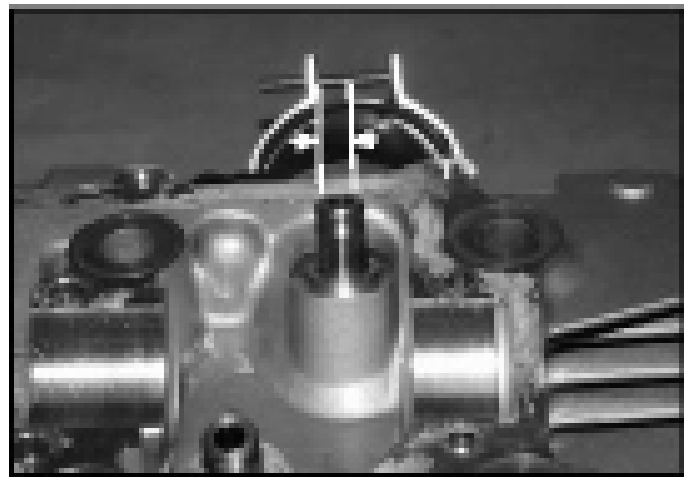
Inspect split keeper groove for wear or flaring of the keeper seat area (B) **NOTE:** The valves cannot be re-faced or end ground. They must be replaced if worn, bent, or damaged.



Measure diameter of valve stem with a micrometer in three places and in two different directions (six measurements total). Replace if excessive wear is evident.



Measure valve guide inside diameter at the top middle and end of the guide using a small hole gauge and a micrometer. Measure in two directions, front to back and side to side.



CYLINDER HEAD ASS'Y

CAUTION: Wear eye protection during assembly.

NOTE: Assemble the valves one at a time to maintain proper order.

Install new valve seals on valve guides.

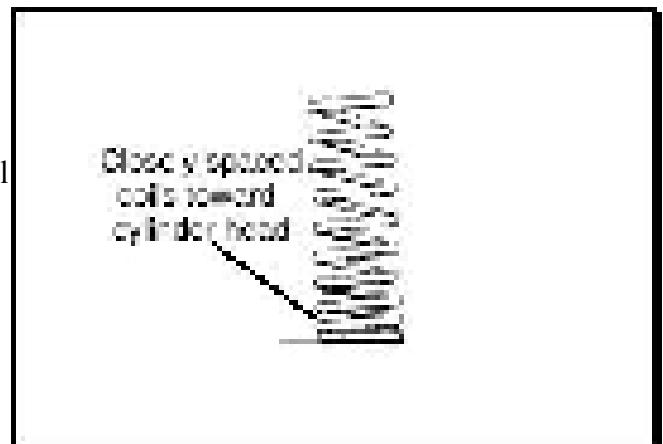
Apply engine oil to valve guides and seats.

Coat valve stem with molybdenum disulfide grease.



Install valve carefully with a rotating motion to avoid damaging valve seal.

Dip valve spring and retainer in clean engine oil and install spring with closely spaced coils toward the cylinder head.



Place retainer on spring and install valve spring compressor. Compress spring only enough to allow split keeper installation to prevent loss of spring tension. Install split keepers with the gap even on both sides.

Repeat procedure for remaining valve.

When all valves are installed, tap lightly with soft faced hammer on the end of the valves to seat the split keepers.



5.5 CYLINDER HEAD INSTALLATION

Install the dowel pin(s) and a new cylinder head gasket.

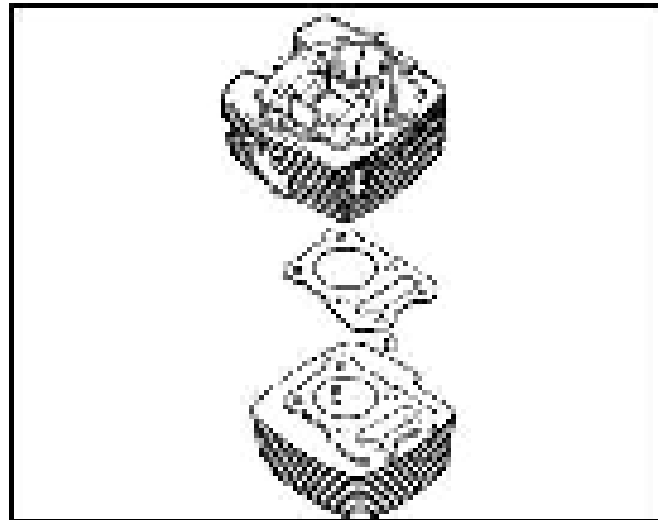
Pull the cam chain through the cylinder head chain room and secure with mechanic's wire.

Place the cylinder head on the cylinder.

Install the two 6 mm bolts, but do not tighten.

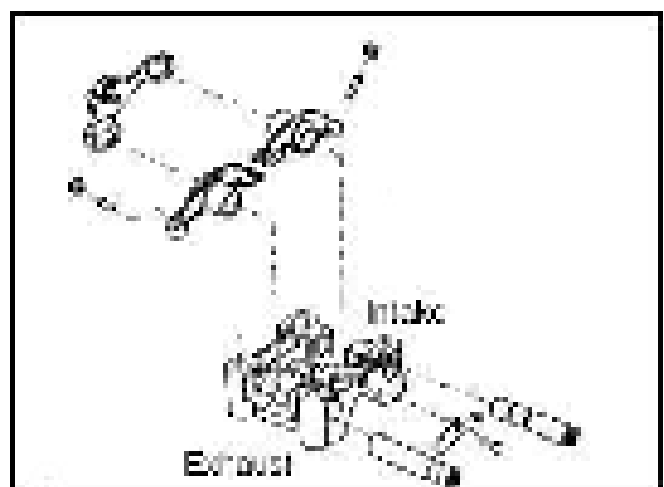
Install the cam according to the "Cam shaft Timing" procedure. Verify the cam chain is in place around the crankshaft gear.

NOTE: Verify camshaft timing procedure before installing the rocker shaft assembly.



CAMSHAFT ASS'Y INSTALLATION

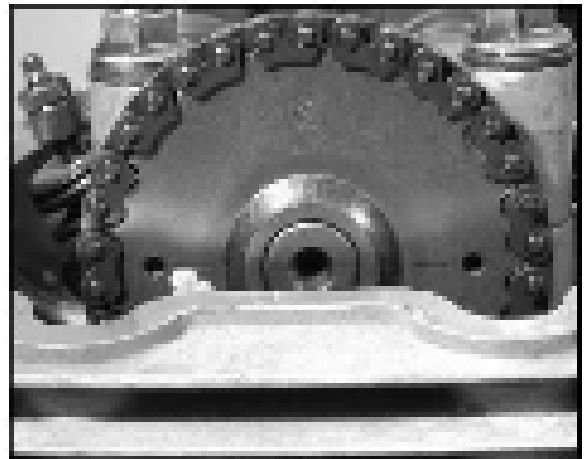
Install the rocker arms and rocker arm shafts into the camshaft holder.



Install the camshaft.

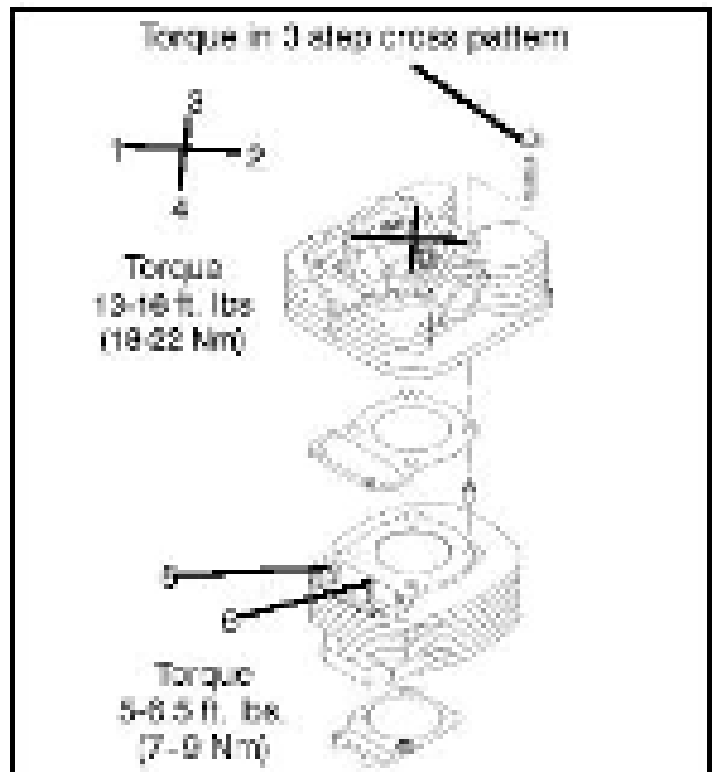


Disconnect the wire securing the cam chain and loop the cam chain over the sprocket while verifying the cam is inserted with the alignment marks parallel to the gasket surface.



Apply clean engine oil liberally to the valve springs, cam chain, rocker arms, and camshaft.

Install cylinder head nuts and torque to specification.



6. CYLINDER AND PISTON

6.1 SERVICE INFORMATION

6.2 TROUBLESHOOTING

6.3 CYLINDER REMOVAL

6.4 PISTON REMOVAL

6.5 PISTON INSTALLATION

6.6 CYLINDER INSTALLATION

6.1 SERVICE INFORMATION

GENERAL

Camshaft lubrication oil is fed to the cylinder head through an oil orifice in the cylinder head and engine case. Before installing the cylinder head be sure the orifice is not clogged and the gasket, O-ring and dowel pins are in place.

SPECIFICATION

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		65-65.01	-----
	Taper		-----	0.05
	Out of round		-----	0.05
	Warp across top		-----	0.05
Piston	Piston O.D.		64.96-64.98	-----
Piston pin	Piston pin bore		15.997-16	-----
Piston rings	Piston pin O.D.		14.994-15.000	14.960
	Piston-to-pin clearance		0.004-0.012	-----
	Piston ring	TOP	0.1-0.25	0.5
		SECOND	0.3-0.45	0.5
	Groove Clearance	TOP/SEC	0.02-0.06	0.09
	Piston ring end gap	OIL	0.2-0.7	1.5
Cylinder-to-piston clearance			0.02-0.05	0.1
Connecting rod small end I.D.			16.01-16.028	-----

TORQUE VALUES

Cylinder head bolts	8~12 n-m (0.8~1.2 kg-m)
Camshaft holder flange nuts	20~24 n-m (2.0~2.4 kg-m)
Tappet adjusting nut	9~12 n-m (0.9~1.2 kg-m)

6.2 TROUBLESHOOTING

Low or unstable compression

Worn cylinder or piston rings.

Overheating

Excessive carbon build-up on piston or combustion chamber wall.

Knocking or abnormal noise

Worn piston and cylinder.

Excessive carbon build-up.

Excessive smoke

Worn cylinder, piston, or piston rings.

Improper installation of piston rings

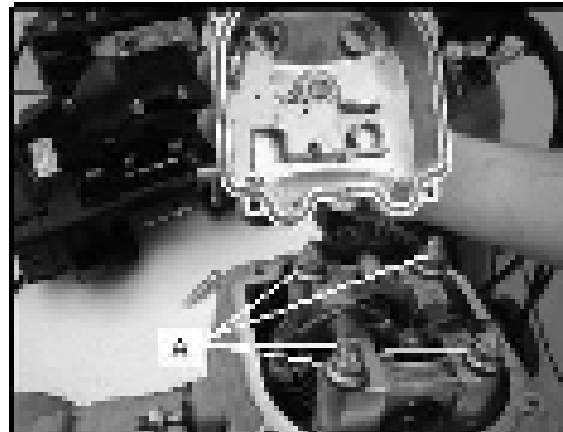
Scored or scratched piston or cylinder wall.

Damaged valve stem seal.

6.3 CYLINDER REMOVAL

Remove bolts (A) and tap the cam support tower with a plastic hammer until loose.

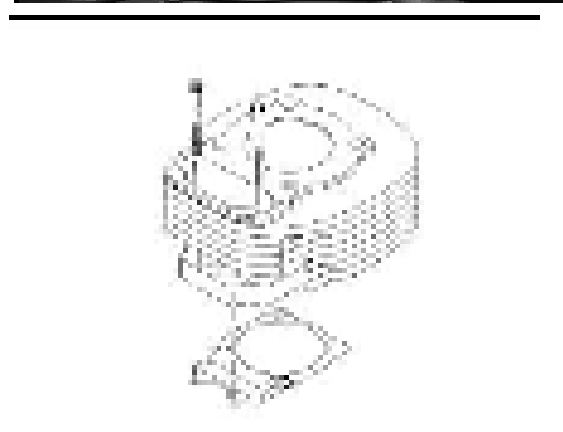
After removing the camshaft and securing the cam chain, tap cylinder head lightly with a plastic hammer until loose.



Remove the cylinder head and head gasket.



Remove cam chain guide at front of cylinder.
Remove the two 6 mm cylinder base bolts.



Tap cylinder lightly with a plastic hammer in reinforced areas only until loose.

Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod.

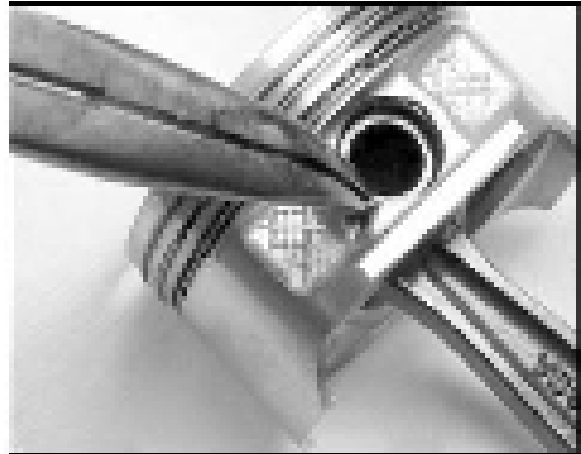


6.4 PISTON REMOVAL

Remove circlip. Note that opening for circlip access is on the exhaust side.

Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston slightly with a propane torch.

CAUTION: Do not apply heat to the piston rings. The ring may lose radial tension.



Remove the compression rings, starting with the top ring.

***Using a piston ring pliers:** Carefully expand ring and lift it off the piston. **CAUTION:** Do not expand the ring more than the amount necessary to remove it from the piston, or the ring may break.



***By hand:** Placing both thumbs as shown, spread the ring open and push up on the opposite. Use care to not scratch the ring lands.

Repeat procedure for second ring.

The oil control ring is a three piece design consisting of a top and bottom steel rail and a center expander section. Remove the top rail first followed by the bottom rail and expander.

INSPECTION

Remove all gasket material from the cylinder sealing surfaces.

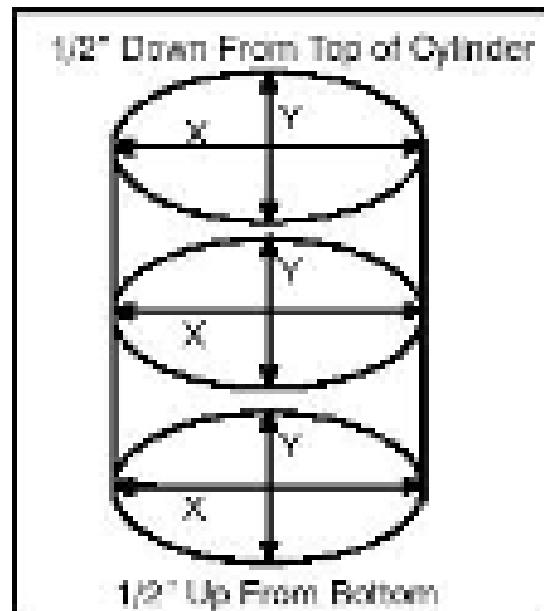
Inspect the top of the cylinder for warpage using a straight edge and feeler gauge.



Inspect cylinder for wear, scratches, or damage.

Inspect cylinder for taper and out of round with a telescoping gauge or a dial bore gauge.

Measure in two different directions, front to back and side to side, on three different levels (1/2" down from top, in the middle, and 1/2" up from bottom).

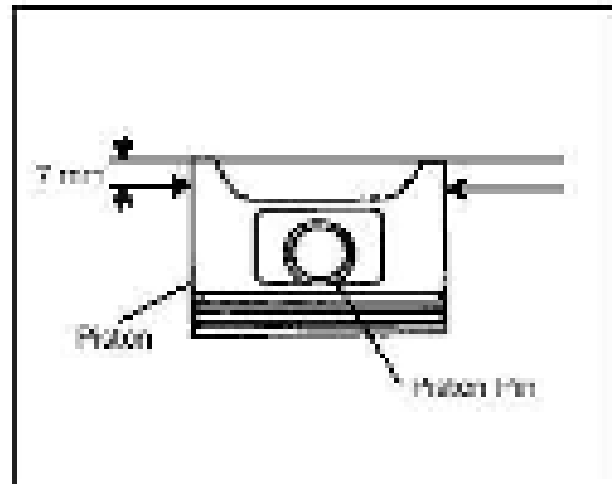


Record measurements. If cylinder is tapered or out of round beyond specification, the cylinder must be honed, bored, or replaced.

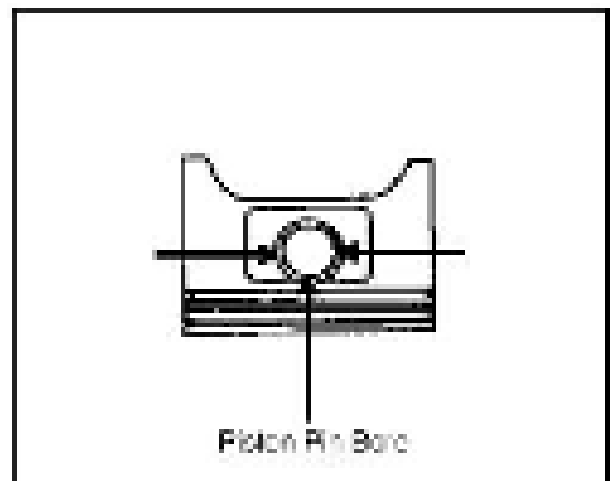
PISTON INSPECTION

Measure piston outside diameter at a point 7 mm up from the bottom of the piston at a right angle to the direction of the piston pin.

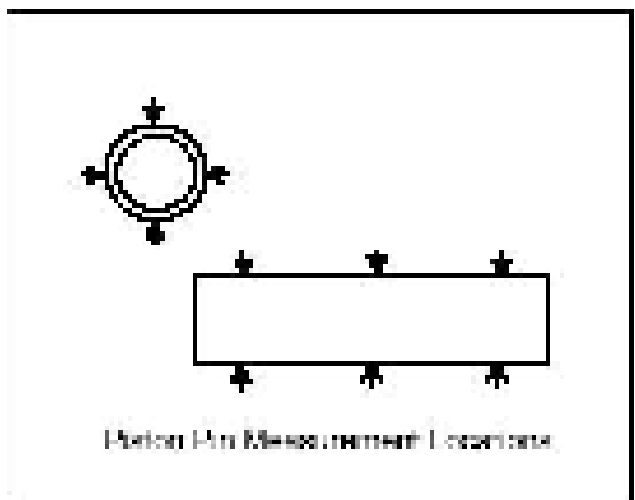
Subtract this measurement from the maximum cylinder measurement obtained earlier.



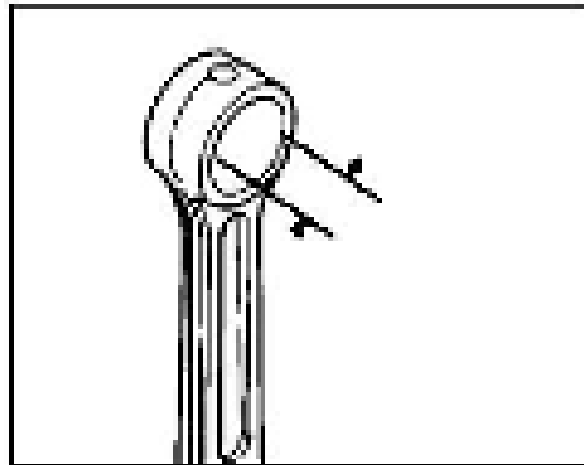
Measure piston pin bore. Replace piston if out-of-round.



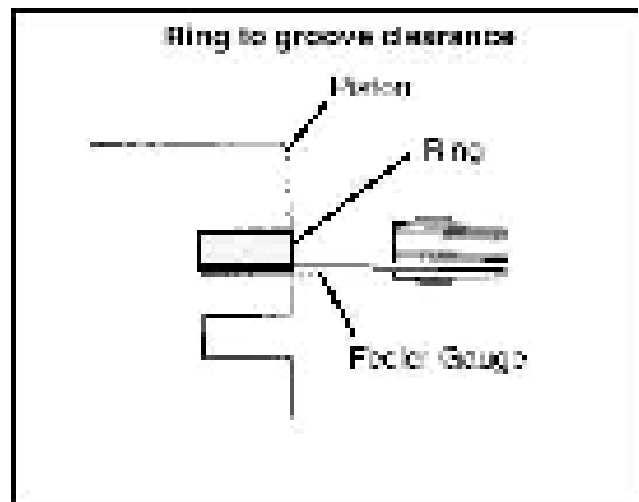
Measure piston pin O.D. Replace piston pin if out-of-round.



Measure connecting rod small end ID. Replace crankshaft if out-of round.



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



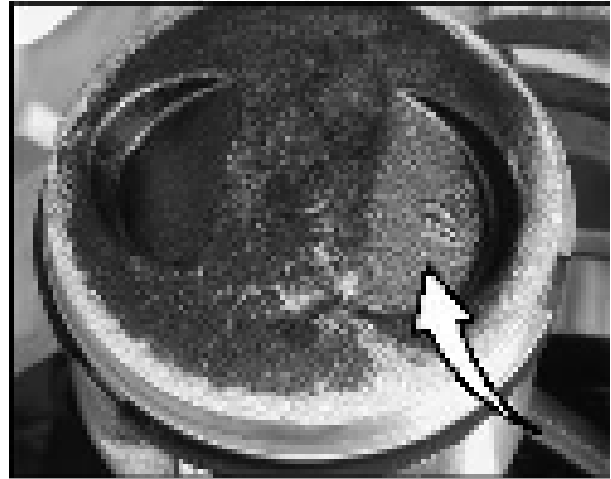
6.5 PISTON INSTALLATION

CAUTION: Do not re-use circlips. Circlips become deformed during the removal process. Do not compress the new clip more than necessary to prevent loss of radial tension. Severe engine damage may result if circlips are re-used or deformed during installation.

Install a new circlip on one side of the piston with the end gap facing up or down.

Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt. Lubricate the connecting rod (both ends) and crankshaft main bearing area.

IMPORTANT- Install the piston on the connecting rod with the “IN” casting mark facing the intake side of engine. The piston pin should be a push fit into the piston.



Install the other circlip with the gap facing up or down. Push the piston pin in both directions to make sure the clips are properly seated in the groove.

Place the dowel pins in the crankcase and install a new cylinder base gasket.

Lubricate the piston and rings with assembly lube and install a ring compressor on the piston assembly. Verify that the ring gaps are 120° degrees apart from each other before installation.

6.6 CYLINDER INSTALLATION

NOTE: Clean the gasket surfaces on the crankcase and cylinder. Remove all traces of old gasket material and apply a new base gasket.

Install the dowel pin(s). Install a new base gasket onto the mating surface.

NOTE: Route cam chain through the cylinder chain room and secure it, holding it up while rotating the engine to avoid damage to the chain, drive sprocket teeth or tensioner blade.

Apply clean engine oil liberally to the bore and tapered area of the cylinder. Place the cylinder on to the studs.

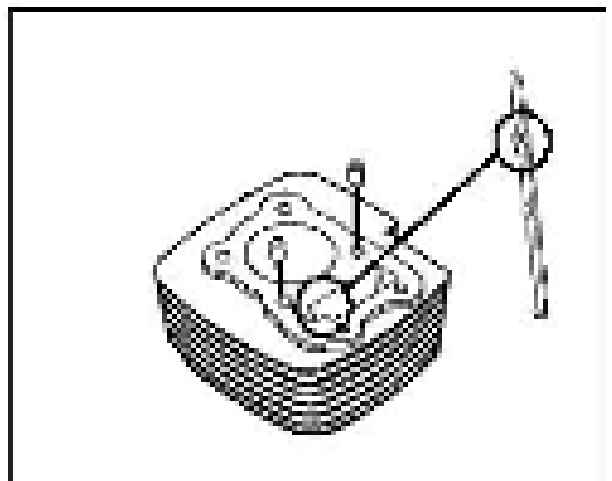
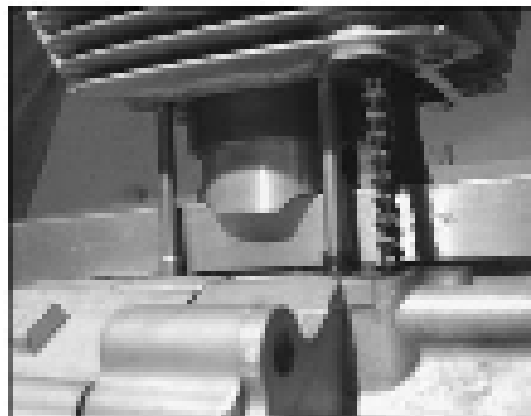
Loop the cam chain through the cylinder chain room and secure with mechanic's wire. Allow cylinder to fully seat on the piston and support block.

NOTE: Clean the gasket surfaces on the cylinder head and cylinder. Remove all traces of old gasket material.

Push the rings into the taper using a non-metallic, blunt-edge tool while holding the cylinder down. This will help push the piston past the ring taper into the cylinder.

Remove the support block. Seat the cylinder firmly on the base gasket.

Install the cam chain guide and dowel pins into the cylinder. Verify the bottom end is seated properly in the crankcase.



7. TRANSMISSION & KICK STARTER

7.1 SERVICE INFORMATION

7.2 TROUBLESHOOTING

7.3 C.V.T SYSTEM DISASSEMBLY / DRIVE CLUTCH

7.4 KICK STARTER ASSEMBLY

7.5 KICK STARTER ASSEMBLY

7.6 C.V.T REASSEMBLY

7.1 SERVICE INFORMATION

If the drain tube ass'y fills with water, the tube should be drained.

SPECIFICATIONS

ITEM	STANDARD (mm)	SERVICE LIMIT (mm)
Driven the width	19.8-20.2	19.0
Weight roller O.D.	17.9-18.1	17.40
Movable drive face I.D.	27.98-28.0	28.03
Drive face collar I.D.	24.06-24.09	24.098
Drive face boss O.D.	23.96-23.98	23.92
Clutch outer I.D.	124.8-125.2	125.5
Clutch weight lining thickness	-----	1.5
Driven face spring length	168.4-169.4	164.0

TORQUE VALUES

Clutch outer nut	55 N-m (5.5 kg-m)
Drive face nut	55 N-m (5.5 kg-m)

7.2 TROUBLESHOOTING

Engine starts but can't travel

Worn driven belt.

Worn clutch lining.

Damaged driven face spring.

Low engine power

Worn driven belt.

Worn weight roller.

Dirty driven face.

7.3 C.V.T SYSTEM DISASSEMBLY / DRIVE CLUTCH

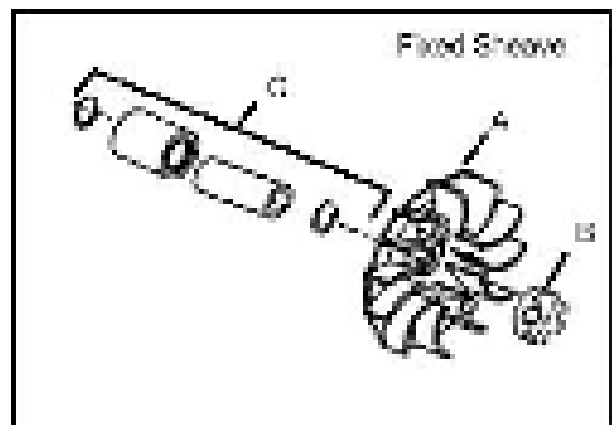
Remove the side cover and drive belt.



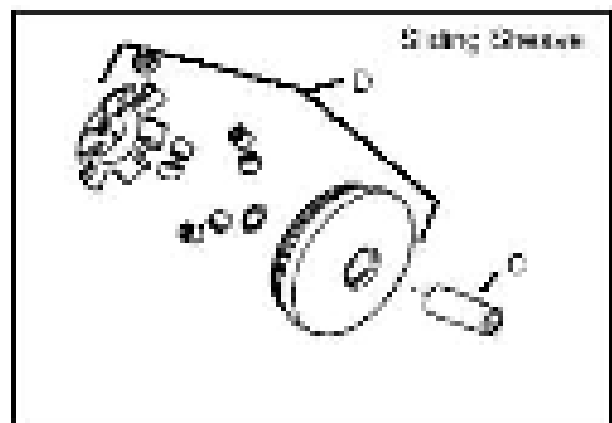
Remove the lock nut, washer, and the kick-start pawl from the crankshaft.



Remove the fixed sheave (A), starter pawl (B) and slide bushing (C). Inspect the fixed sheave and slide bushing for scoring, grooving, or abnormal wear. Replace any worn or damaged parts.

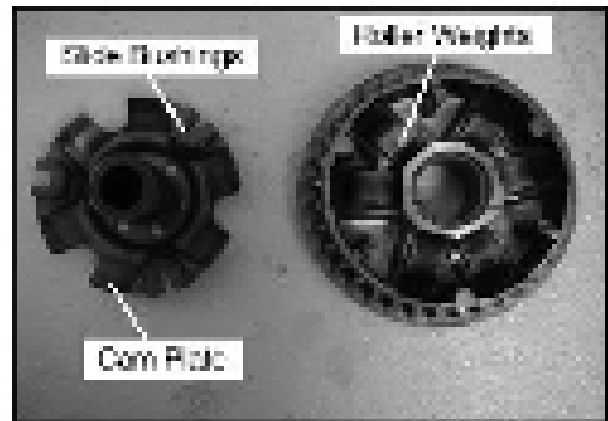


Remove the primary sliding sheave and cam plate assembly (D) as one assembly. Inspect the movable sheave for scoring, grooving, or abnormal wear.



NOTE: Use two hands to hold the cam plate and the primary sliding sheave together when removing the primary sliding sheave and the cam plate assembly. This prevents the roller weights from falling out of the assembly.

Remove the roller weights from the primary sliding sheave. Check the rollers for wear and scoring. Remove and inspect the slide bushings and cam plate. Replace any components that found to be worn excessively or appear abnormal.



To reassemble, reverse the procedures. Do not apply any lubricants to the components. Torque the retaining nut to **40 ft. lbs. (55 Nm)**.

CVT SYSTEM / DRIVEN CLUTCH **SERVICE**

NOTE: This assembly utilizes a torque limiting system to prevent transmission damage. Use care removing the clutch assembly, as the torque-limiting components become free and could fall apart. Mark or note parts during disassembly.

Remove the driven clutch assembly by releasing the set screw and removing the nut from the shaft. Pull the entire clutch off as an assembly.



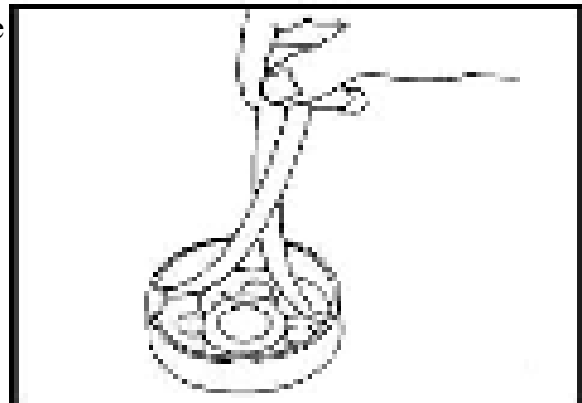
Set the driven clutch assembly on a flat surface. Remove the cover, spring washer stack, and ball bearing retainer. Inspect components for excessive wear or damage. Replace components as required.



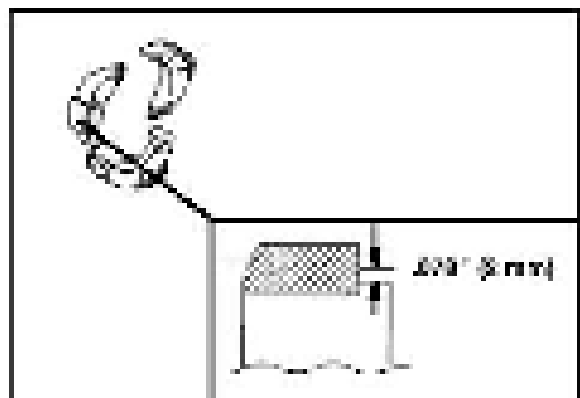
Remove the ball bearings. Use a snap-ring pliers to remove the retainer on the hold cam. Remove the washer. Inspect the hold cam for excessive spline wear or damage. Replace the component if required.



Inspect the condition of the clutch drum. Measure the inside diameter of the cover at 90 degree intervals using a caliper. Inspect the condition and diameter of the drum lining. If either the measurements or the lining indicates excessive wear, replace the clutch cover.



Inspect the condition of the friction pads. Measure the amount of remaining pad using a depth caliper. Inspect the condition of the pads. If either the measurements or the pad condition indicates excessive wear, replace the friction pads.



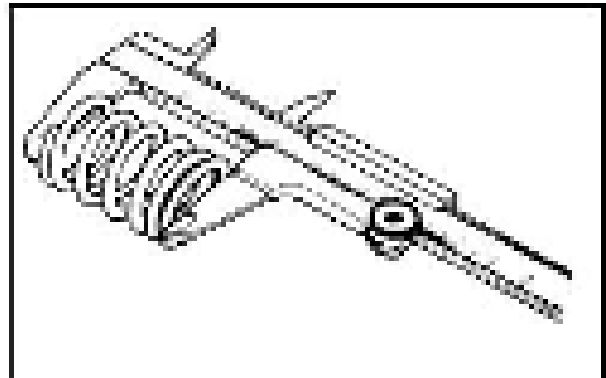
Secure the assembly in a clamping device. To access the driven spring, mark and remove the outer sheave retaining nut. Remove the friction pad assembly and driven spring.



CAUTION: Spring Pressure can cause components to eject suddenly. Use care during removal.

NOTE: Outer sheave retaining nut replacement is strongly recommended. Use Loctite™ 272 upon reassembly.

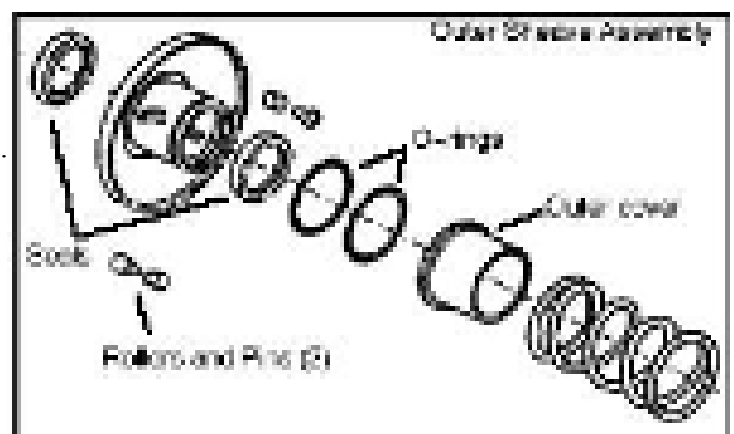
Use a vernier caliper to check the length of the compression spring. At full extension, the measurement should be no less than 3.50" (89 mm). If out of specification, replace the spring.



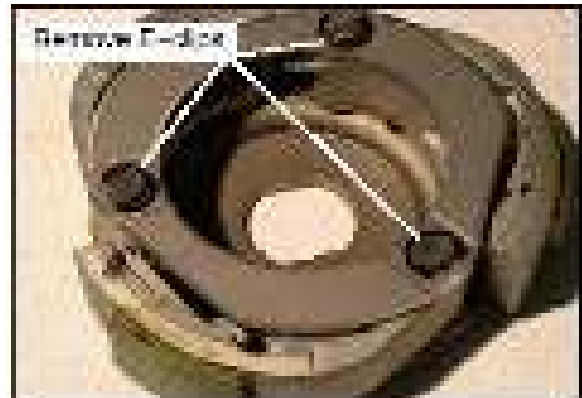
Remove the outer roller pin cover by turning and pulling up on the cover. Replace the 2 o-rings.



Remove the rollers and pins using a needle-nose pliers and inspect all components. Replace if any damage or excess wear is found. Replace the o-rings and seals anytime the driven is apart.



To replace the friction shoes, remove the e-clips that retain the backing plate. Use a suitable tool to remove and install the springs connecting the shoes, using care not to over-stretch the springs more than is necessary.



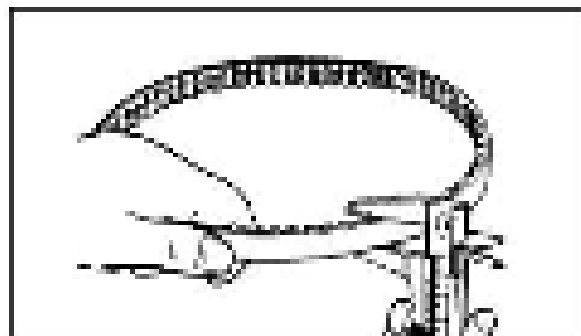
To reassemble the driven assembly, reverse the disassembly procedures. Fill the outer sheave cavity with fresh grease and slide onto the inner sheave shaft. Align and insert the (2) roller/pin assemblies. Install new o-rings and the outer roller pin cover. Place the washer onto the threaded shaft and apply Loctite™ 272 to the threads.



Have an assistant available for final assembly. Install the compression spring. Place the friction pad assembly over the spring and compress the driven assembly together with both hands. With the assembly compressed and the threads exposed, have an assistant thread a new retaining nut onto the shaft. Secure the assembly in a clamping device and torque the retaining nut to **50-54 ft lbs (68-73 Nm)**.



Inspect the surface of the drive belt for uneven wear or grease deposits. Using a vernier caliper, measure the width of the belt. The service limit of the belt is **0.708" (18mm)**.



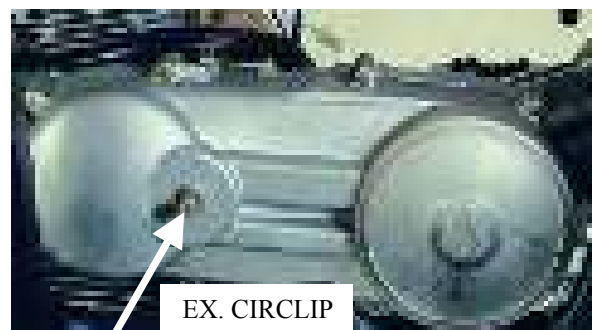
7.4 KICK STARTER DISASSEMBLY

Remove the crankcase cover.

Remove the Kick starter.

Remove the ex. Circle-clip and washer from kick starter spindle composition.

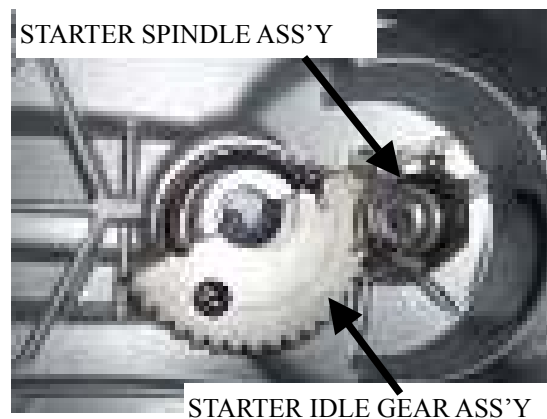
KICK STARTER CRANKCASE COVER



Remove the kick-starter spindle ass'y.

Remove the kick-starter idle gear ass'y

Remove the kick spindle bush.



INSPECTION

Inspect the kick-starter spindle composition for wear or damage.



Inspect the kick-starter return spring for fatigue or damage.

Inspect the kick-starter spindle bush for wear or damage.



Inspect the kick driven gear and spring for wear or damage.



KICK DRIVEN SPRING

7.5 KICK-STARTER ASSEMBLY

Install the kick driven gear and spring.

Install the kick spindle bush, return spring and spindle ass'y.



Install the kick-starter.



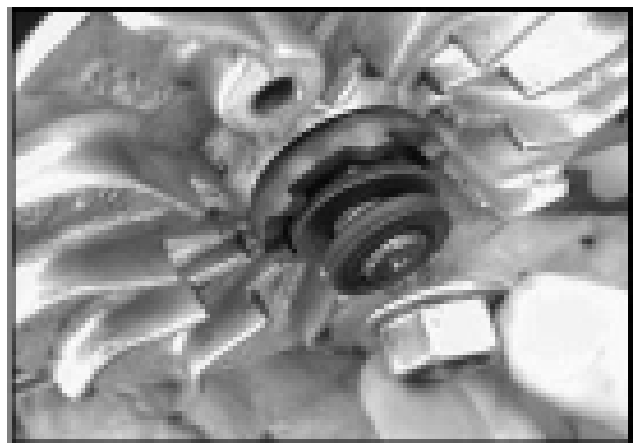
7.6 C.V.T REASSEMBLY

Install the driven assembly onto the transmission input shaft. Do not tighten the nut at this time.



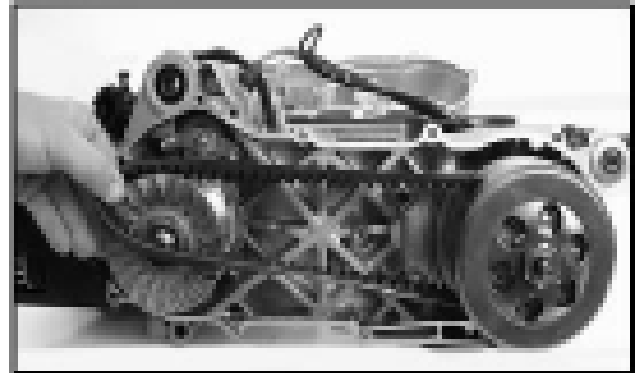
Install the bushing, the primary sliding sheave, and the cam plate assembly.

NOTE: When installing the primary sliding sheave and the cam plate assembly, hold the cam plate and the primary sliding sheave together. The weight rollers will fall out if the assembly is not installed properly.



Install the primary fixed sheave, washer, starter pawl and nut. Do not tighten the nut at this time

Install the drive belt by looping the belt over the loosened drive and driven clutches.



Finish installing the lock nut and washer onto the crankshaft. Torque the drive clutch nut to specification.

CVT Drive Clutch Nut Torque 40 ft. lbs. (55 Nm).

Install the driven clutch assembly and driven clutch nut. Torque the nut to specification.

Apply Loctite™ 272 to the set screw and tighten securely.

Driven Clutch Nut Torque: 60-80 ft. lbs. (81-108 Nm).



Install the clutch cover and ducting. Tighten the cover bolts to **6-8 ft. lbs. (8-11 Nm)**.

8. FRONT WHEEL, SUPENSION AND STEERING

8.1 PARTS DRAWING

8.2 TROUBLESHOOTING

8.3 HANDLEBAR SYSTEM

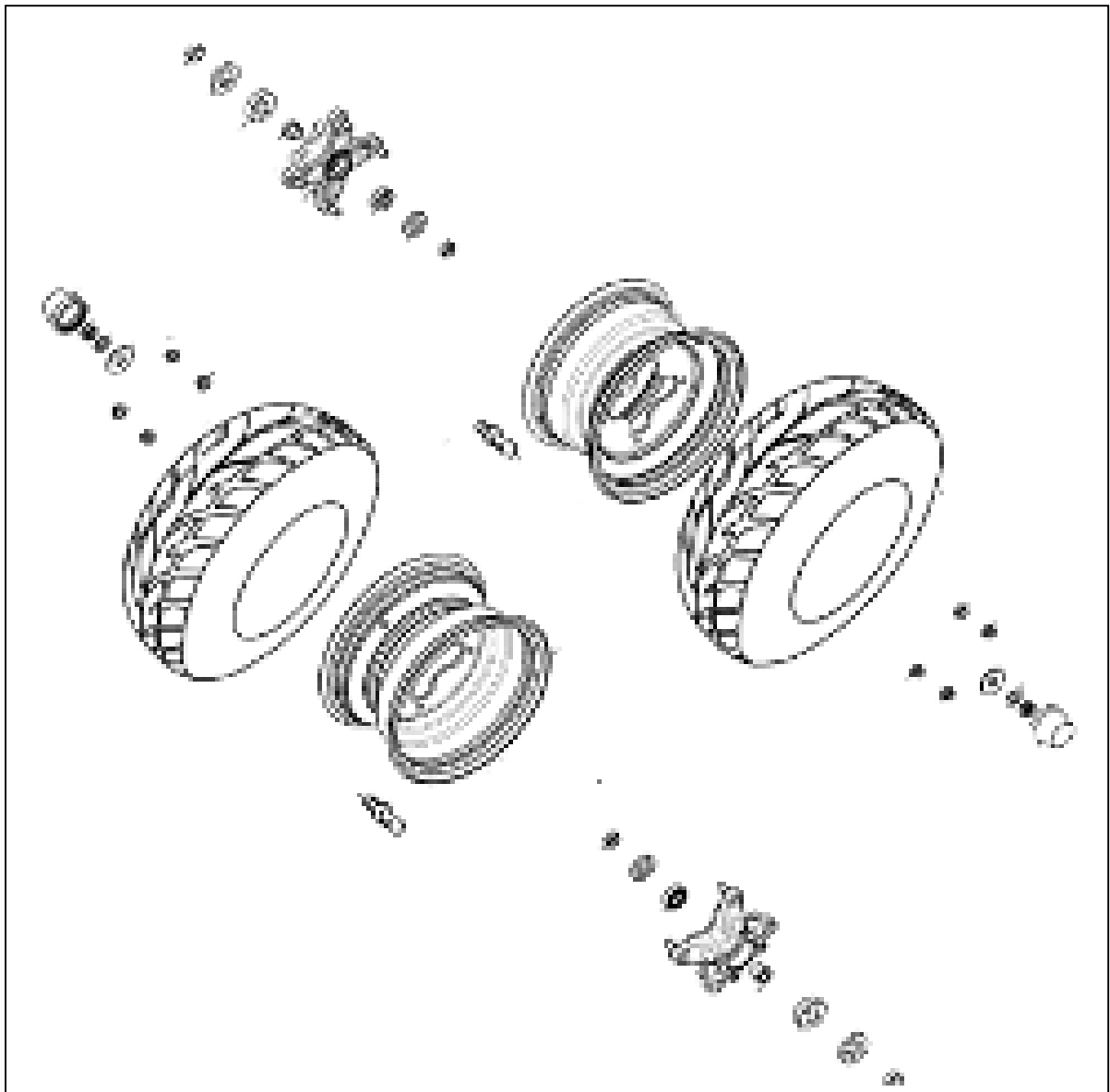
8.4 THROTTLE HOUSING

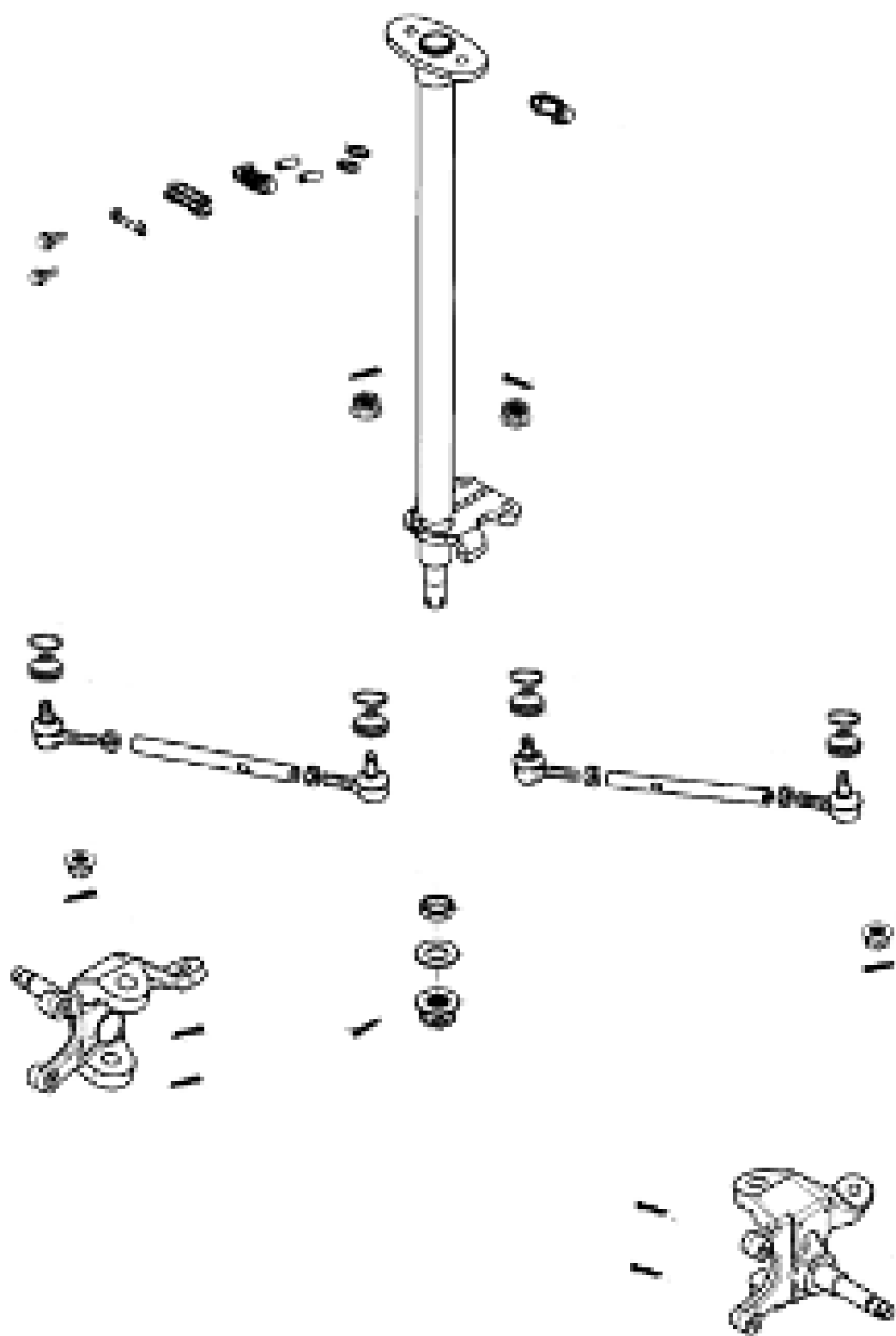
8.5 FRONT WHEEL

8.6 FRONT BRAKES

8.7 STEERING SYSTEM

8.1 PARTS DRAWING





8.2 TROUBLESHOOTING

HARD STEERING	Faulty tire Steering shaft holder too tight Insufficient tire pressure Faulty steering shaft bushing Damaged steering shaft bushing
FRONT WHEEL WOBBLING	Faulty tire Worn front 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 bushing Incorrect wheel alignment
POOR BRAKE PERFORMANCE	Brake shoes worn Worn brake drum Brake lining oily, greasy or dirty Improper brake adjustment
FRONT SUSPENSION	Loose front suspension fastener Binding suspension link
HARD SUSPENSION	Faulty front swing arm bushing Improperly installed front swing arms Bent front shock absorber swing rod
SOFT SUSPENSION	Wear front shock absorber springs Worn or damage front swing arm bushing

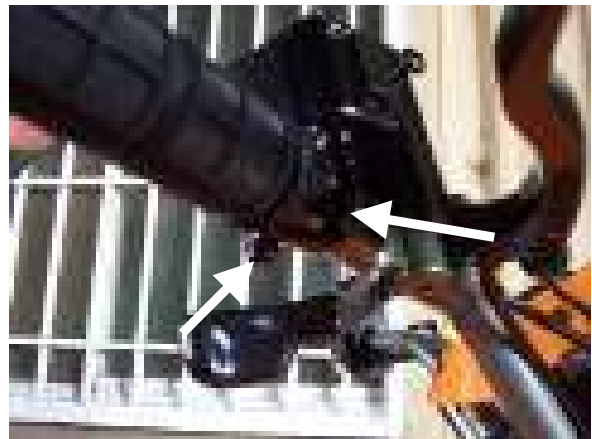
8.3 HANDLEBAR SYSTEM

Removal

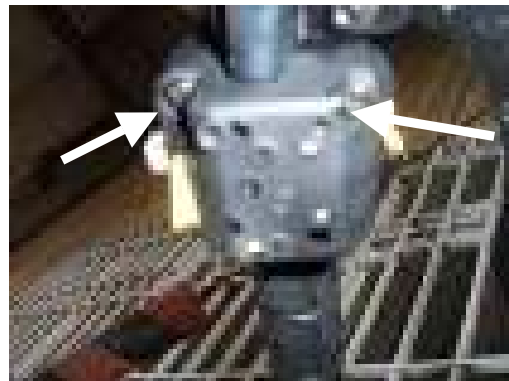
Remove the handlebar cover by unscrew two fix screws.



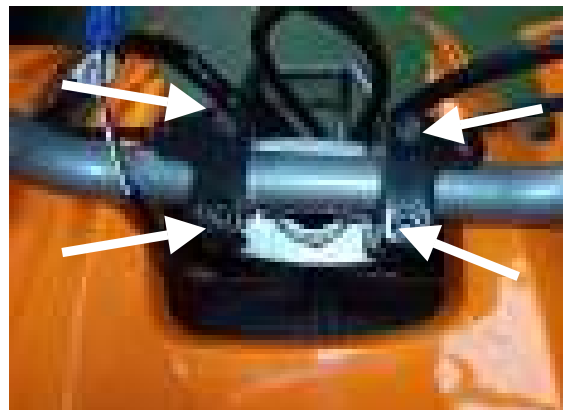
Remove the throttle lever housing on the right handlebar. Remove brake lever bracket assembly.



Remove the handlebar switch on the left handlebar. Remove rear brake lever bracket ass'y.



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



Installation

Install the switch housing. Tighten two screws securely.



Install the throttle lever housing, and brake lever bracket ass'y.



8.4 THROTTLE HOUSING

Disassembly

Unscrew the screws on the throttle housing cover.

Remove throttle housing cover and gasket.

Disconnect throttle cable from the throttle arm and remove from the throttle housing.

Assembly is in the reverse order of disassembly.

8.5 FRONT WHEEL

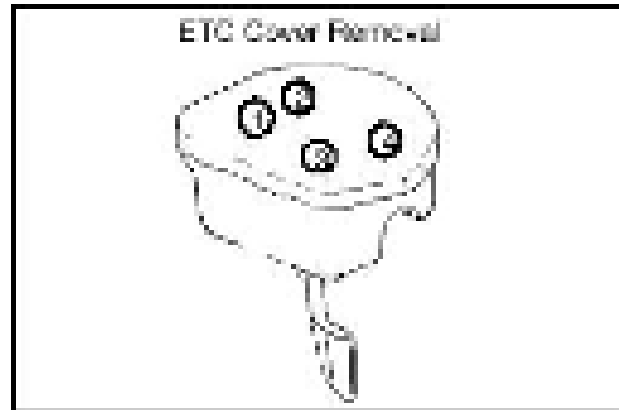
Remove

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

Remove the front wheel nuts, washer and wheels.

Installation

Install and tighten the four-wheel nuts torque: 54 N.m (40 lbs.ft) Remember put a cotter pin in the castle nut.



8.6 FRONT BRAKES

FRONT PAD REMOVAL

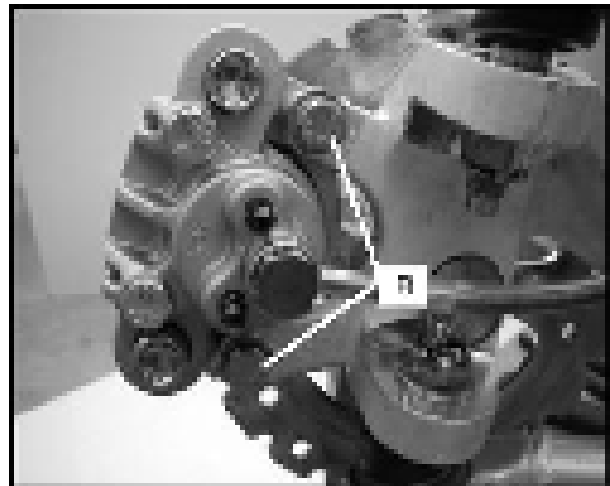
Elevate and support front of machine.

CAUTION: Use care when supporting vehicle so that it does not tip or fall. Severe injury or damage may occur if machine tips or falls.

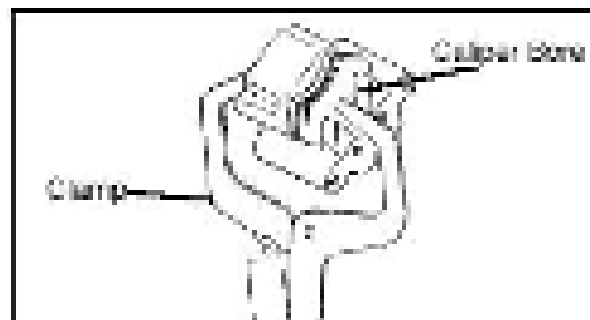
Remove the front wheel. With the caliper installed loosen the brake caliper slide bolts (A).



Remove the caliper bolts (B) and caliper from the mount bracket.



With pads installed, push caliper piston into caliper bore slowly using a C-clamp or locking pliers.



NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

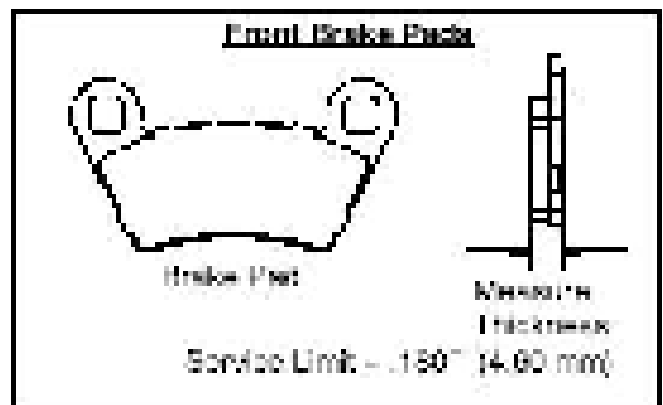
Remove the c-clips (C) from the end of the caliper slide bolts.



Remove the loose caliper slide bolts. The brake pad (D) will slide out of the caliper assembly when the caliper slide bolt is removed.



Measure the thickness of the pad material. Replace pads if worn beyond the service limit.



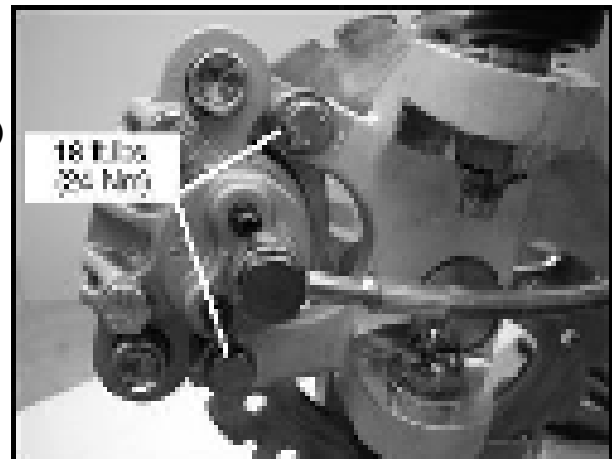
FRONT PAD ASSEMBLY

WARNING: If the brake pads are contaminated with grease, oil, or liquid soaked do not use the pads, use only new clean pads.

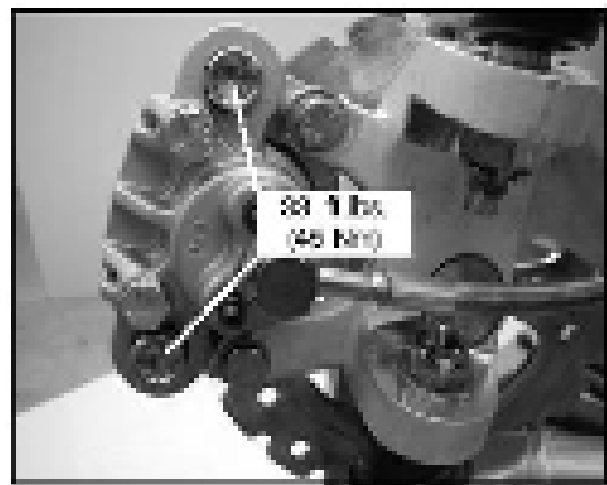
Install pads with friction material facing each other. Install the slide bolts through the brake pads and tighten the slide bolts hand tight. Be sure pads and disc are free of dirt or grease.



Install caliper on the steering knuckle, and torque mounting bolts. (If previously removed.)



Use an Allen wrench or socket to torque the front caliper bolts to **33 ft. lbs. (45 Nm)**.



Slowly pump the brake lever until pressure has been built up. Maintain at least 1/2" (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.

Be sure fluid level in reservoir is between MIN and MAX lines and install reservoir cap.
Install wheels and torque wheel nuts.

BRAKE BURNISHING: *It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat this procedure 10 times, allowing brakes to cool sufficiently after each run.*

FRONT DISC INSPECTION

Visually inspect the brake disc for nicks, scratches, or damage.

Measure the disc thickness at 8 different points around the pad contact surface using a 0-1" micrometer. Replace disc if worn beyond service limit.



Brake Disc Thickness

New 0.150-0.164" (3.810-4.166 mm)

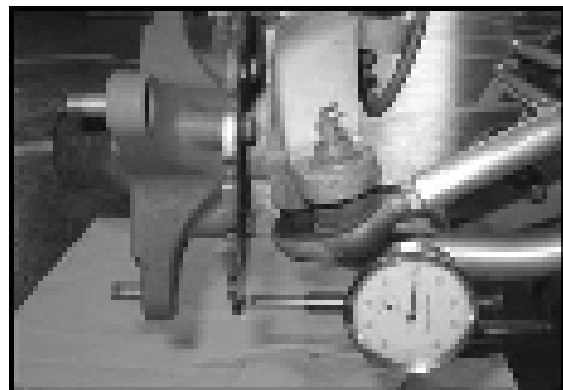
Service Limit 0.140" / 3.556 mm

Brake Disc Thickness Variance

Service Limit 0.002" (0.051 mm)

difference between measurements.

Mount dial indicator as shown to measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.



Brake Disc Runout

Service Limit 0.010" (0.254 mm).

FRONT BRAKE DISC REMOVAL / REPLACEMENT

Apply heat to the hub in the area of the brake disc mounting bolts to soften the bolt locking agent.

Remove bolts and disc.

Clean mating surface of disc and hub.

Install disc on hub.

CAUTION: Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.



Install new bolts and tighten to specified torque.

Front Brake Disc Mounting Bolt Torque.

18 ft. lbs. (24 Nm).

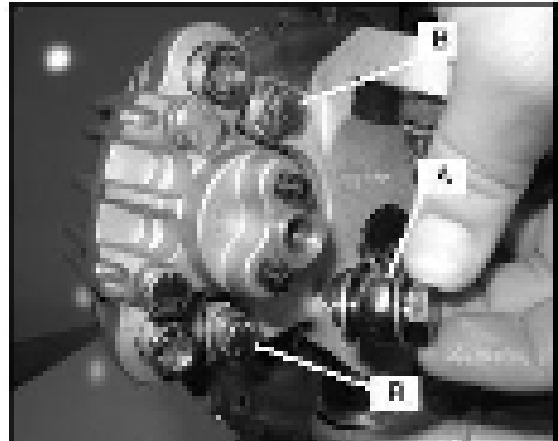
FRONT CALIPER REMOVAL

CAUTION: Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

Remove brake pads.

Using a line wrench, loosen and remove brake line (A) to caliper. Place a container under caliper to catch fluid draining from brake line. Drain the fluid into the container.

Remove the two brake caliper mounting bolts (B) and remove the brake caliper.



FRONT CALIPER INSTALL

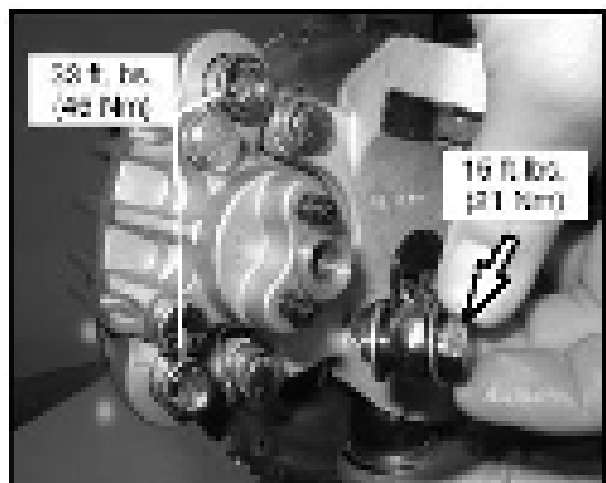
Install caliper on hub strut, and torque mounting bolts to **18 ft. lbs. (24 Nm)**.



Install brake line and tighten securely with a line wrench.

Torque the caliper slide bolts to **33 ft. lbs. (45 Nm)**. Torque the banjo line bolt to **15 ft. lbs. (21 Nm)**.

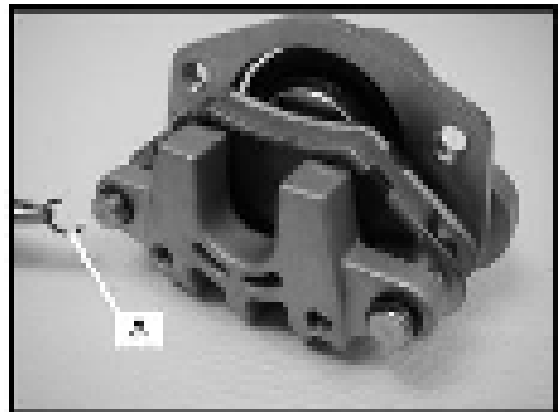
Install wheels and torque wheel nuts to specification.



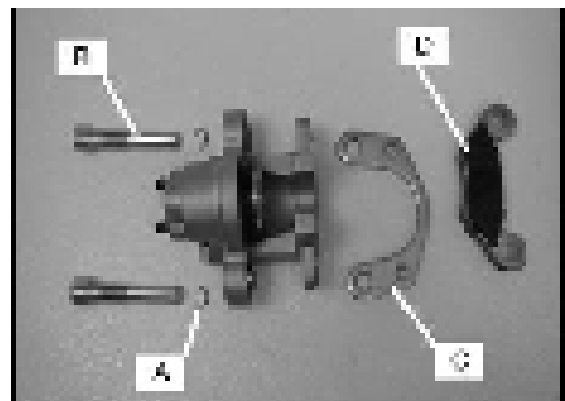
Front Wheel Nut Torque
30 ft. lbs. (41 Nm).

FRONT CALIPER DISASSEMBLY

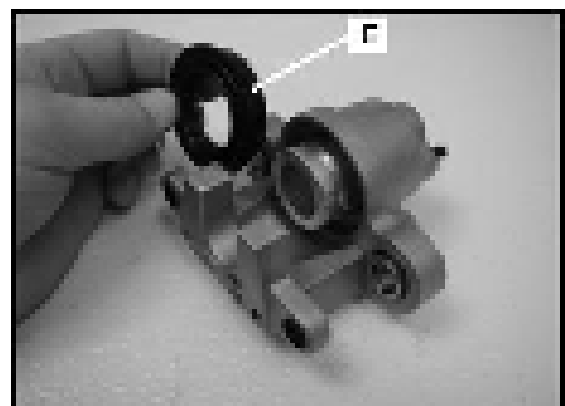
Remove the c-clips (A) from the caliper sliding bolts.



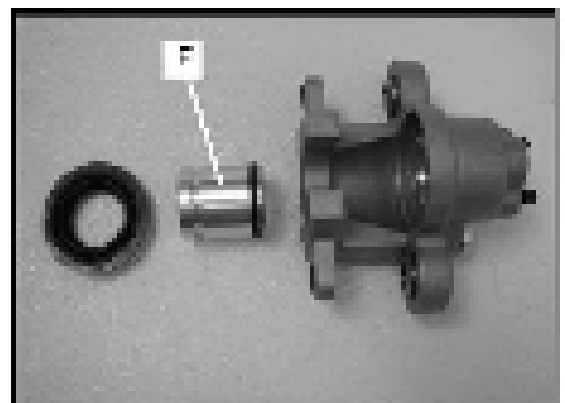
Remove the caliper slide bolts (B), mounting bracket (C), and brake pads (D).



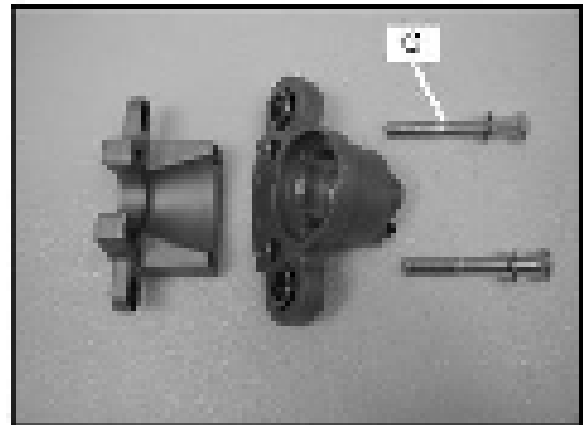
Remove the outside dust boot (E).



Remove the piston and dust seal (F).



Remove the caliper body bolts (G). Pull the caliper bodies apart (if necessary).



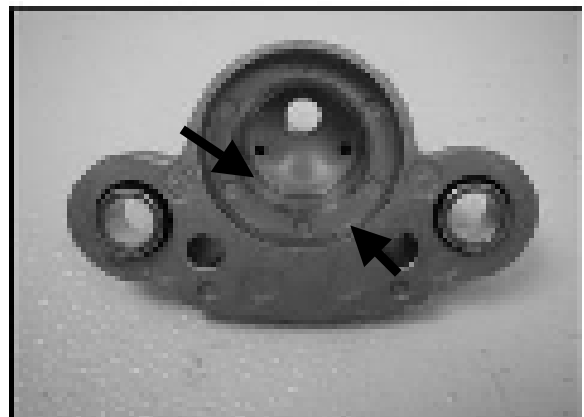
Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.

NOTE: Be sure to clean seal grooves in caliper body.



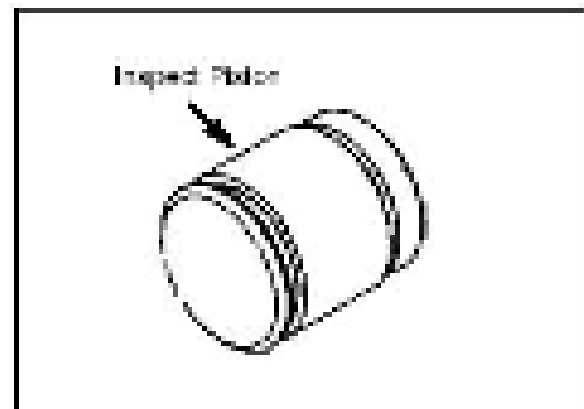
FRONT CALIPER INSPECTION

Inspect caliper body bore for nicks, scratches or wear. Measure bore for roundness. Replace if damage is evident.



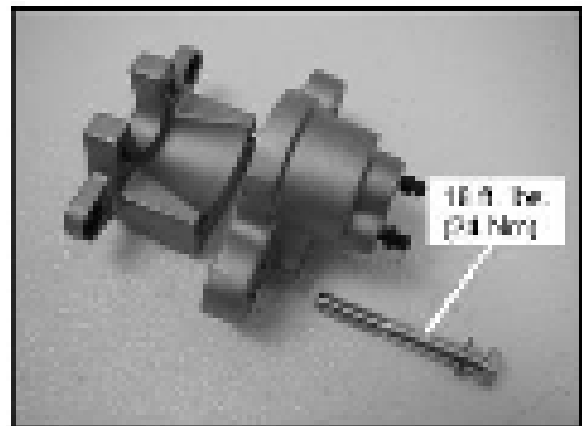
Inspect piston for nicks, scratches, wear or damage. Replace if damage or worn.

Inspect the brake disc and pads as outlined for brake pad replacement this section.



FRONT CALIPER ASSEMBLY

Reassemble the two caliper halves if previously disassembled. Torque the caliper body bolts to **18 ft. lbs. (24 Nm)**.



Install new O-ring (A) in the caliper body.
Install the dust boot over the caliper and seat the dust boot into caliper groove. Be sure groove is clean and free of residue or brakes may drag.



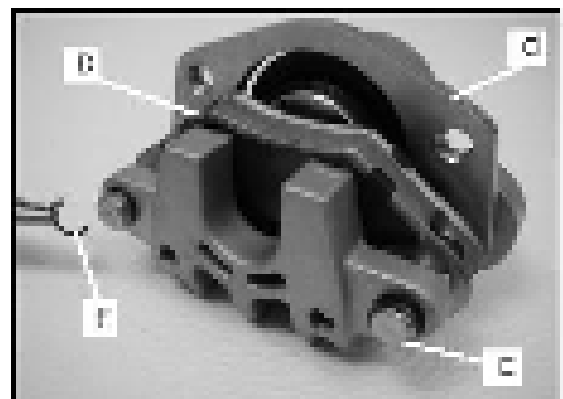
Install piston with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly, with light resistance.

Seat the boot securely onto the caliper body.



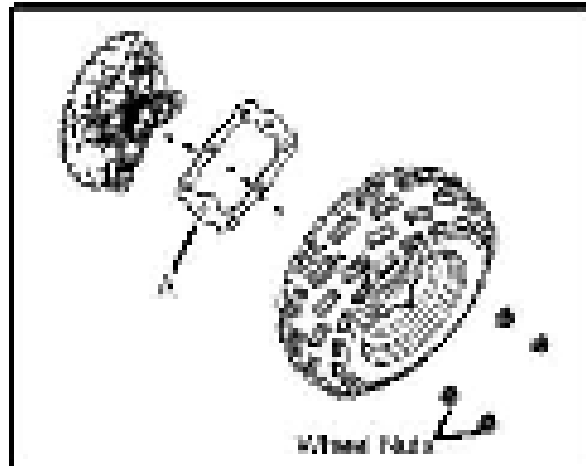
Install the caliper mount (C), brake pads (D), caliper slide bolts (E), and c-clips (F).

Torque the caliper slide bolts (E) to **33 ft. lbs. (45 Nm)**.

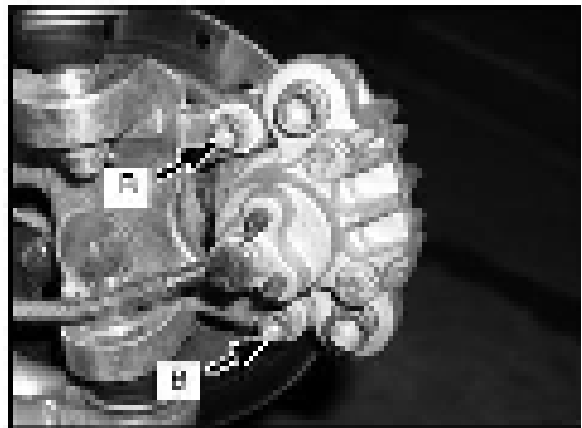


8.7 STEERING SYSTEM

Remove wheel nuts and wheel. Remove the spacer (A) located on the backside of the wheel.



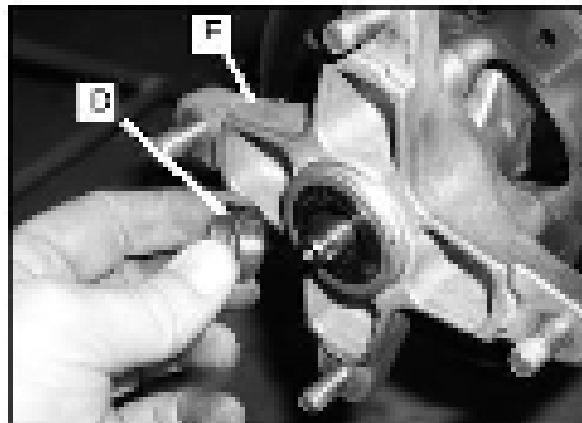
Remove the two brake caliper hex bolts (B) and the brake caliper.



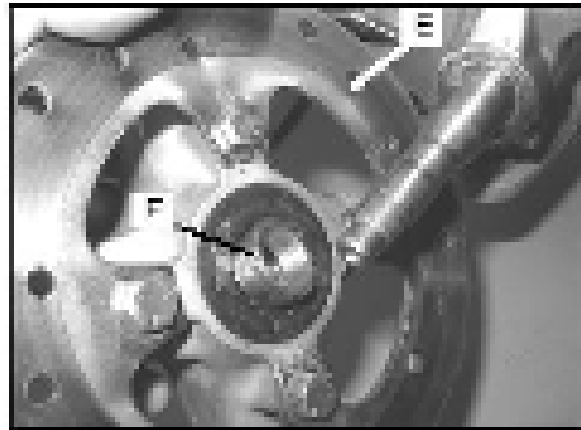
Remove hub cap (C), cotter pin, front spindle nut, and washer.



Remove the outer spacer (D) from the spindle. Inspect outer spacer for wear, replace if needed. The spacer maybe embedded in the hub.



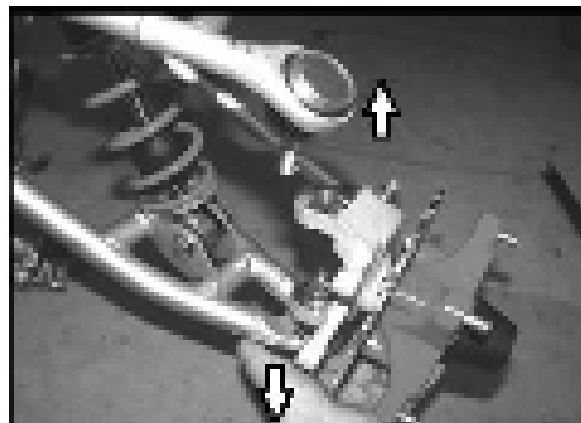
Remove the hub (E) from the spindle. Remove the inner spacer (F), the spacer may be in the hub or located on spindle during removal. Inspect the inner spacer for wear, replace if needed.



Remove the upper and lower ball joint cotter keys and castle nuts.



Lift up on the upper A-arm and pull the top ball joint from the steering spindle. Push down on the lower A-arm to move the lower ball joint from the steering spindle.



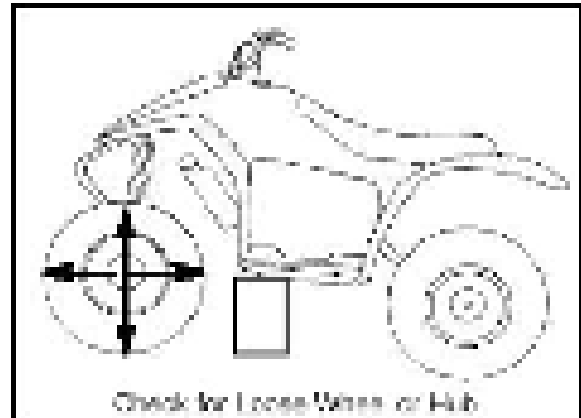
Tie-rod inspection

To check for play in the tie rod end, grasp the steering tie rod, pull in all directions feeling for movement.

- Repeat inspection for inner tie rod end (on steering post).
- Replace any worn steering components. Steering should move freely through entire range of travel without binding.



- Elevate front end of machine so front wheels are off the ground. Check for any looseness in front hub / wheel assembly by grasping the tire firmly at top and bottom first, and then at front and rear. Try to move the wheel and hub by pushing inward and pulling outward.



If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause.

Steering shaft removal

Remove the handle bar cover and handle bar.

Remove the front fender.

Remove handlebar lower holder.

Unscrew steering shaft holder bolt, remove steering shaft holder.

Take off the cotter pin below steering shaft.

Unscrew the steering shaft fix out below shaft.

Pull steering shaft carefully.



Steering shaft holder inspection

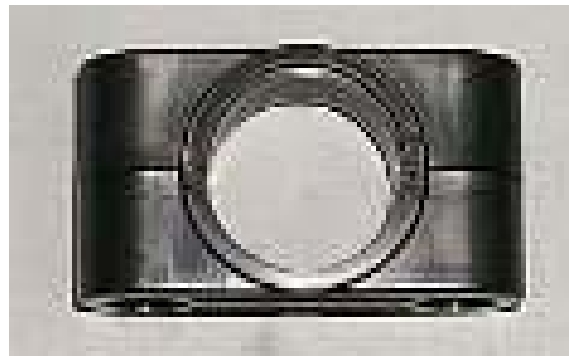
Remove the steering shaft.

Remove the bushing from the shaft.

Inspect the bushing for damage or wear, replace if necessary.

Measure the bushing inner diameter.

Maximum limit: Ø39.5 mm



Steering shaft inspection

Inspect the steering shaft for damage or cracks.

Installation of steering shaft

Apply grease to the holder. Install the holder and oil seal tighten with the nuts.

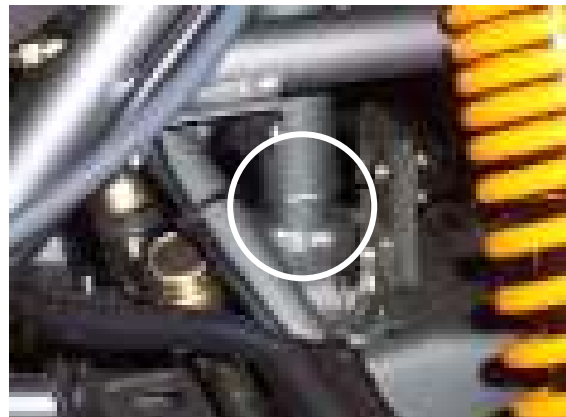
Torque : 33 N.m(24 lbs-ft)



Installation of steering shaft

Install the steering shaft nut and tighten it.
This nut is under this steering shaft.

Torque : 50 N.m (37 lbs.ft)



Installation of Tie-rod

Install the tie-rod on the wheel side.

Installation is in the reverse order of removal.

9. REAR WHEEL SYSTEM

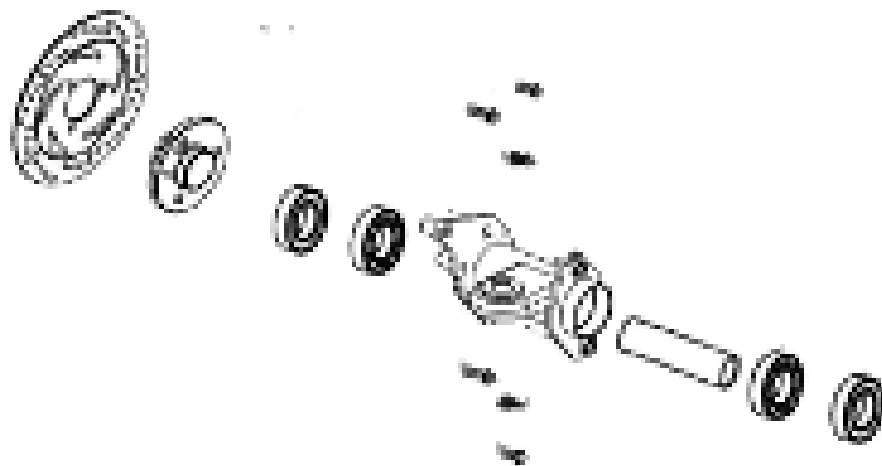
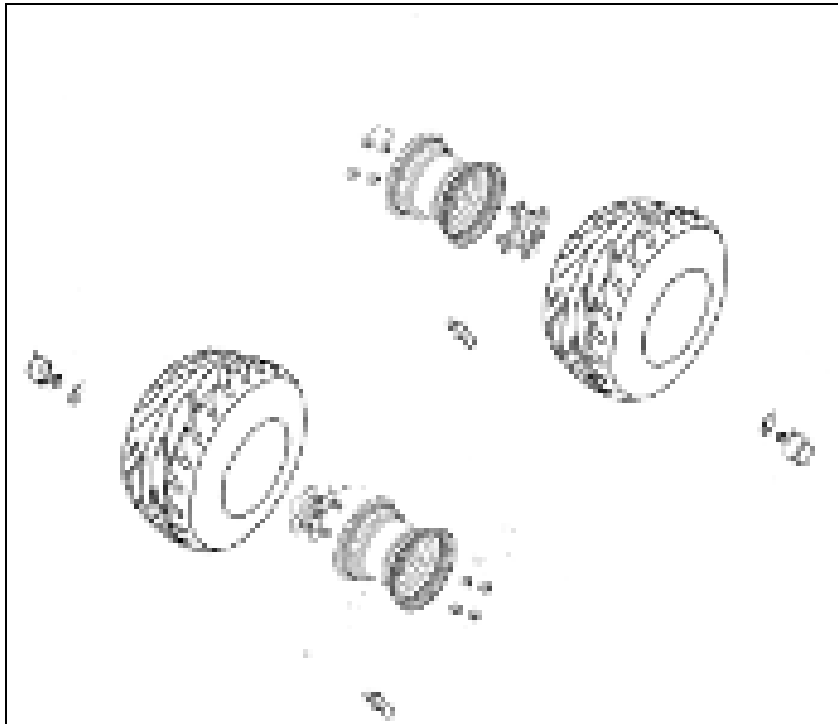
9.1 PARTS DRAWING

9.2 TROUBLESHOOTING

9.3 REMOVE REAR WHEEL AND REAR BRAKE

9.4 DRIVE MECHNISM

9.1 Parts Drawings



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
Hard Suspension	Bent damper rod Faulty swing arm pivot bushing
Soft Suspension	Wear shock absorber damper Wear shock absorber spring

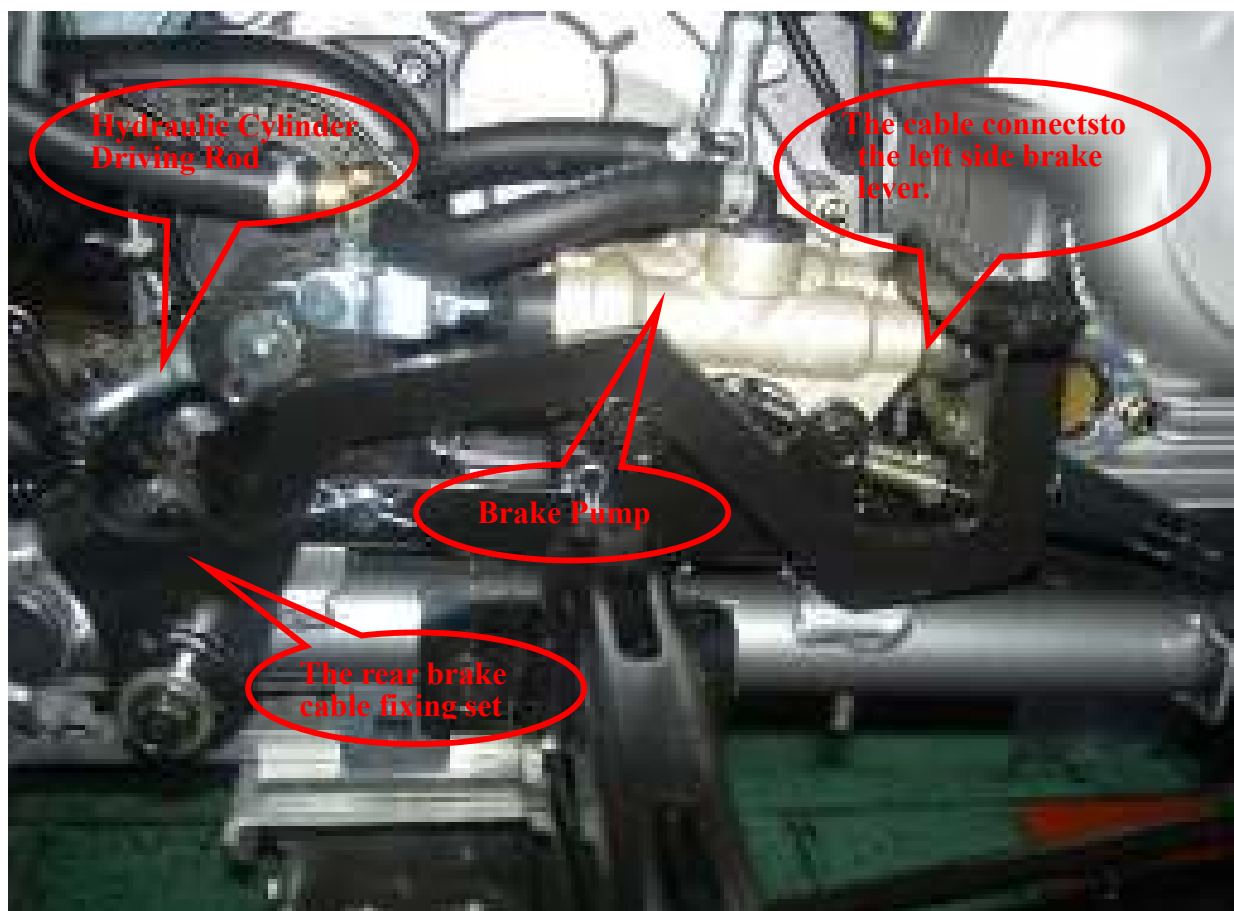
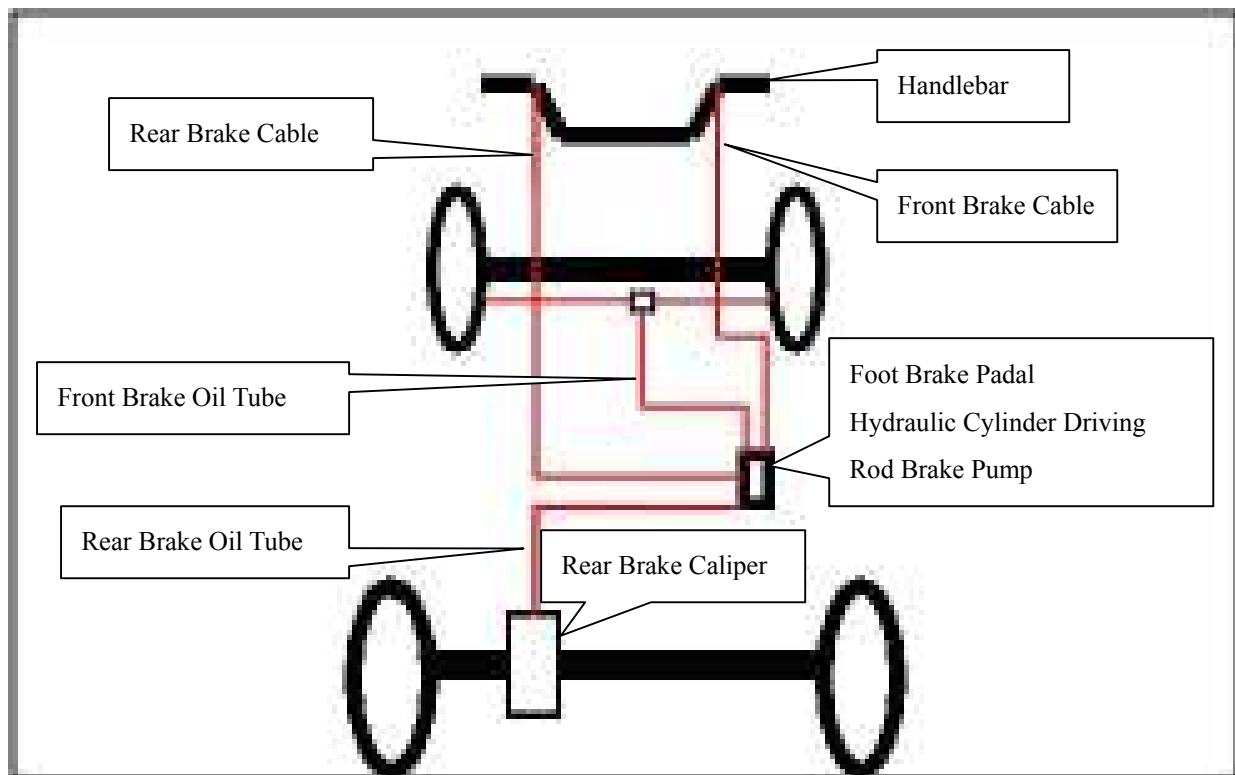
9.3 REMOVE REAR WHEEL & REAR BRAKE

Loosen the cotter pin, and wheel nuts, raise the rear wheel off the ground by placing a support under the frame.

Release the wheel and wheel hub.



Brake Parts & Location

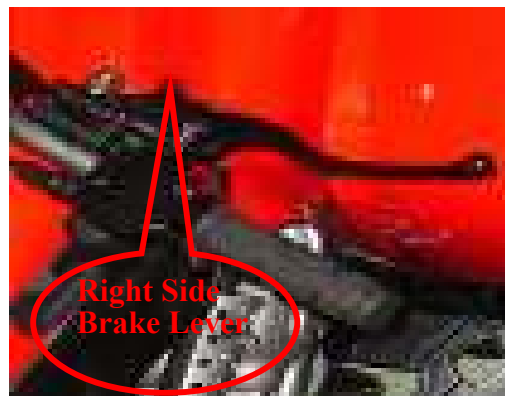




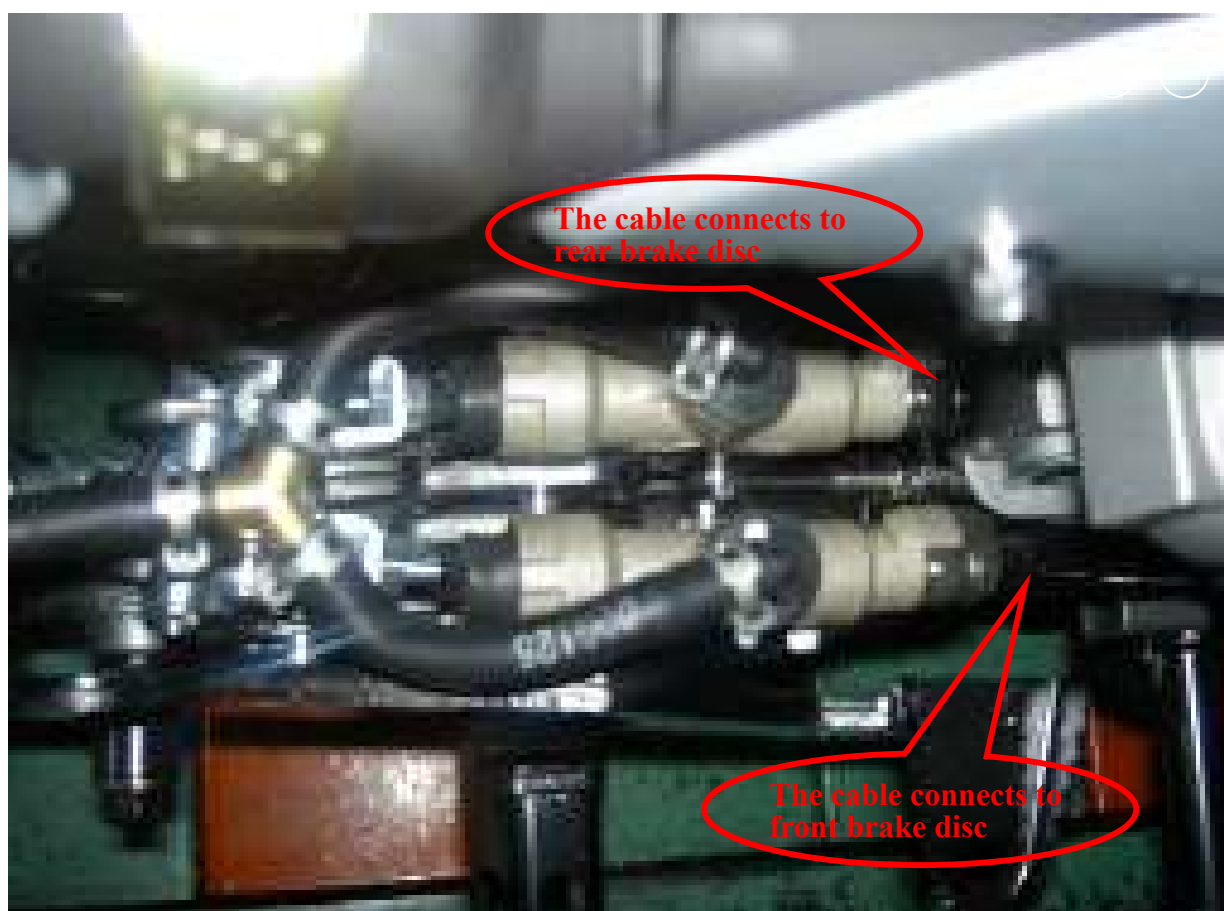
Brake Oil Tank



Left Side
Brake Lever

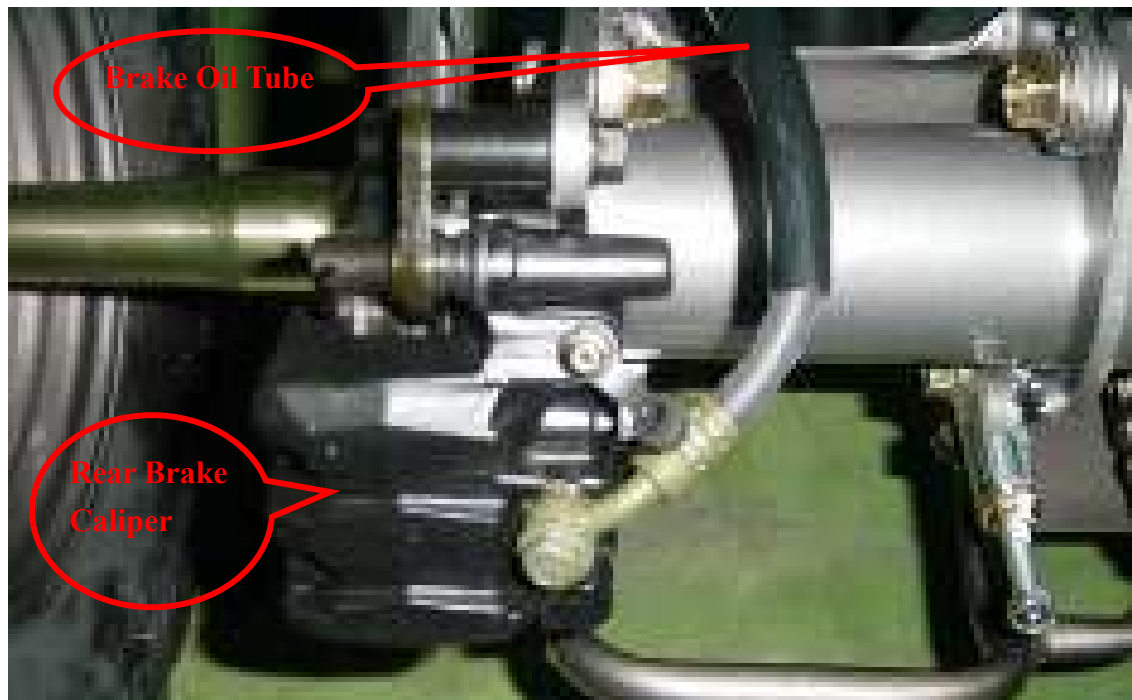


Right Side
Brake Lever



The cable connects to
rear brake disc

The cable connects to
front brake disc



The Brake Adjustment



(STEP.1) Take off the rear brake fixing set and the bolt of brake pump.



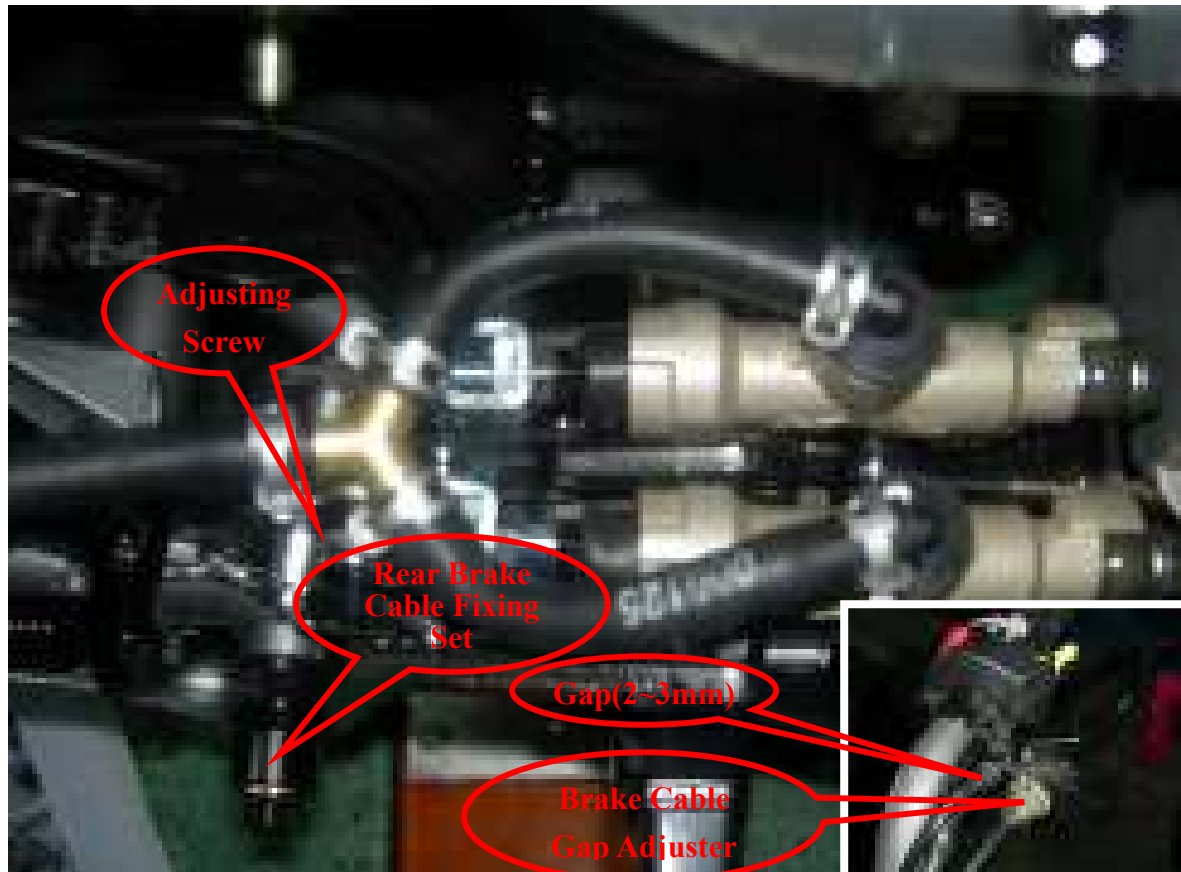
(STEP.2) The setup of the adjusting nut of the brake pump:

1. The brake pedal should be in the highest location under the function of the returning spring.
2. The adjusting nut changes the distance between the brake pump and the hydraulic cylinder driving rod. Make the nut touch the surface of the rod and revolve 1 circle (360°), then confirm the nut location and spin the rod till the nut is locked.
3. Notice: If adjust the nut over 1 circle, it might result in the brake pump malfunction and jam the brake.



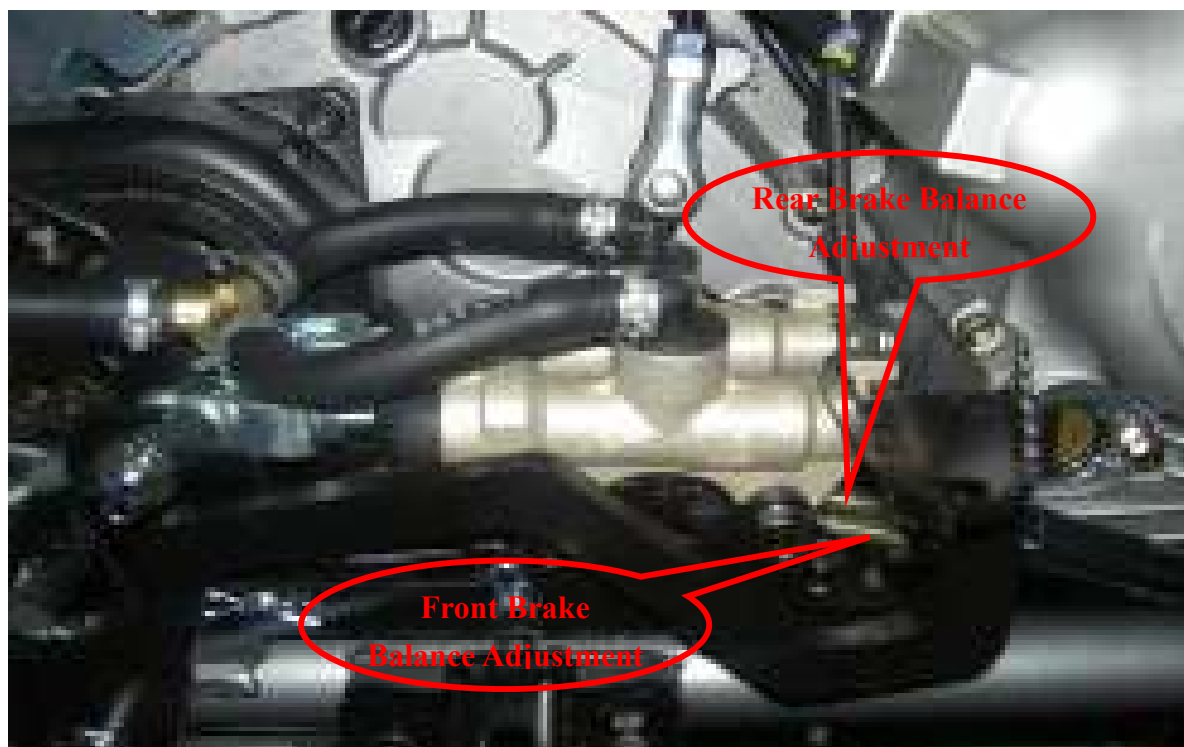
(STEP.3) Drain the air in the brake oil tube in order to prevent the brake pump malfunction in power delivering.

1. Open the brake oil tank, lose the drain screw of the brake caliper without braking motion. It functions normal if the brake oil could drain automatically, please try this for couple times for confirmation. If it doesn't work, please be back to *STEP 2.* and *decrease the distance until the oil could run out normally.*
2. Press on the brake pedal or the brake lever for several times then hold press, release the drain screw and lock it on immediately until no air bubble in the brake oil. Be careful for the splashing oil when operating.



(STEP.4) Install the rear brake cable fixing set & adjust the brake cable.

1. Spin the gap adjuster on the left lever till the shortest position.
2. Adjust the adjusting screw and keep the gap being 2-3 mm.





(STEP.5) The brake balance adjuster on right lever.

9.4 DRIVE MECHNISM

Removal and inspection.

Remove the rear wheel and the rear brake.

Remove the skid plate under swing arm.

Remove the drive chain cover.



Disassemble the chain retaining clips and master link. Remove the chain.



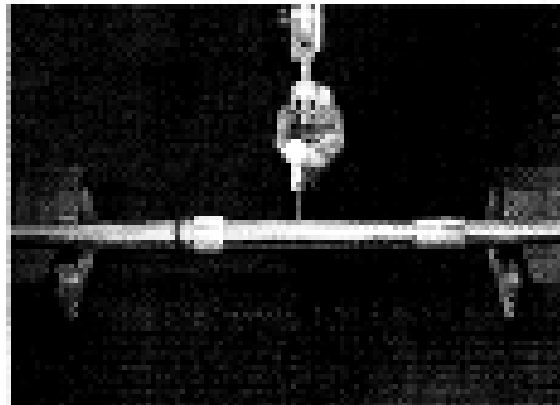
Disassemble the driven sprocket, axle and sprocket collar.

Check the driven sprocket for damage or wear.
Replace if necessary.



Let the rear axle lie in V-blocks and check the runout.

The runout limit is 0.5 mm.



Check the turning of inner race of bearing with fingers. The bearings should turn smoothly and quietly. Replace if necessary.
Also check that the bearing outer race fits tightly in the axle holder. Replace if necessary.

NOTE: Replace the bearings in pairs.

Installation

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



Assemble the drive chains 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.



Install the skid plate.

Install the drive chain cover.



10. FENDER AND EXHAUST PIPE

10.1 REAR FENDER REMOVAL

10.2 FRONT FENDER REMOVAL

10.3 EXHAUST PIPE REMOVAL

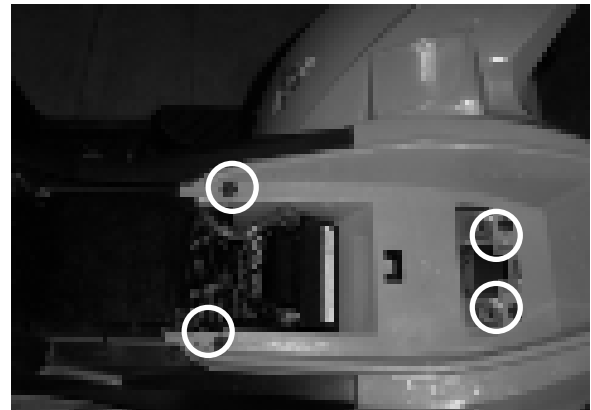
10.4 EXHAUST PIPE INSTALLATION

10.1 REAR FENDER REMOVAL

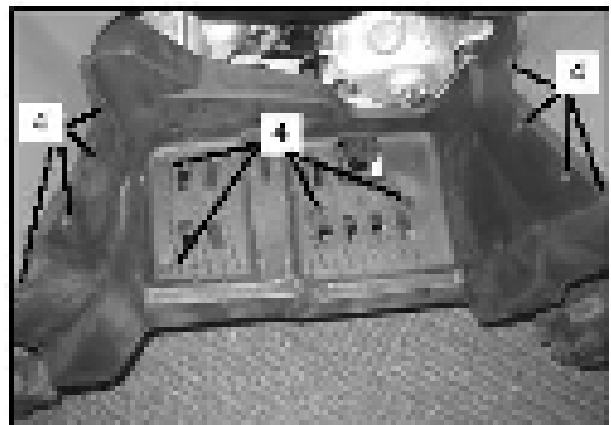
Pull the “Seat Release Bar” to take off the seat.
This seat release bar is under the right side of the rear fender.



Rear Cab: 4 bolts at rear of cab, 8 screws secure footwell to rear cab (unless removed previous).



Footwell: 4 screws at bottom of footwell, 4 screws to front cab, 4 screws to rear cab.

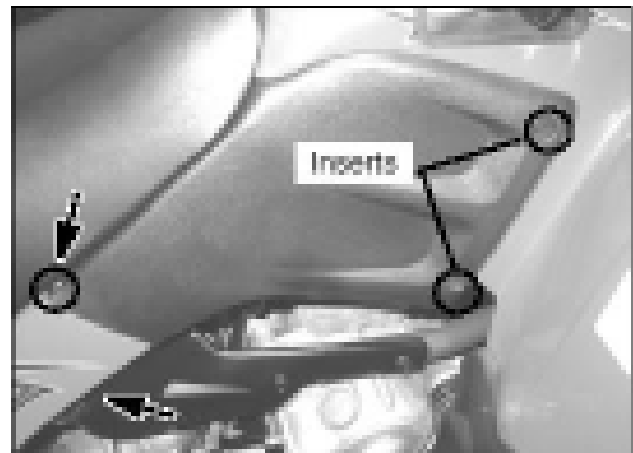


10.2 FRONT FENDER REMOVAL

Front Cab: 2 screws at rear of cab to frame, 2 screws at front of cab to frame, 8 screws secure footwell to front cab (unless removed previous).



Side Covers: 2 plastic inserts and 1 screw (each side)

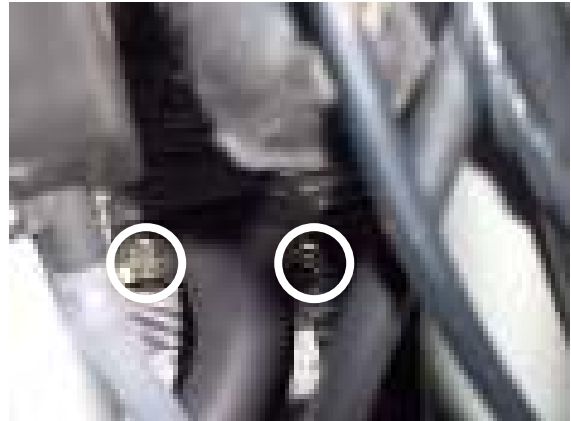


10.3 EXHAUST PIPE REMOVAL

You must wait at least 15 minutes after turn off the engine. You need to remove the seat, rear fender and footrest plate, before you take off the exhaust pipe. Unscrew the two exhaust pipe bolts that fixed with engine.

NOTE: *Do not service the exhaust pipe while they are hot.*

Remove the exhaust pipe bolts mounting on the frame below the rear fender.
Remove the exhaust pipe carefully.



10.4 EXHAUST PIPE INSTALLATION

Installation is the reverse order of removal.

Torque: Exhaust muffler bolts 30 N.m (22 lbs.ft)

NOTE: After installation, check entire system to make sure that there are no exhaust leaks.

11. ELECTRICAL SYSTEM

11.1 TROUBLESHOOTING

11.2 IGNITION COIL

11.3 IGNITION TIMING

11.4 ALTERNATOR EXCITER COIL

11.5 BATTERY CAUTION

11.6 BATTERY VOLTAGE INSPECTION

11.7 CHARGING

11.8 ELECTRIC STARTER

11.9 HEADLIGHT LAMP REPLACEMENT

11.10 WIRING DIAGRAMS

11.1 Troubleshooting

ENGINE STARTS BUT STOPS	IMPROPER IGNITION TIMING FAULTY SPARK PLUG
NO SPARK AT PLUG	ENGINE STOP SWITCH AT LEFT OR RIGHT POSITION GEARSHIFT BAR IS NOT AT NEUTRAL POSITION FAULTY IGNITION COIL FAULTY GENERATOR FAULTY CDI UNIT POORLY CONNECTED: 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 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

INTERMITTENT ENGINE 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 FAULTY ENGINE STOP SWITCH ENGINE PROBLEMS
HEAD LIGHT DO NOT WORK	THE SWITCH DO NOT PUSH TO THE “ON” POSITION THE LIGHT BULB IS BURN OUT, NEED BE REPLACED

11.2 IGNITION COIL

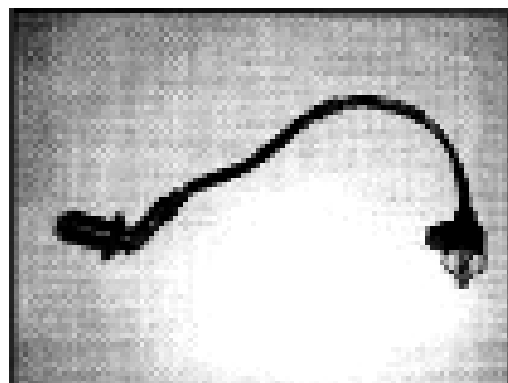
Remove the spark plug cap from the spark plug.
Disconnect the ignition coil primary wire.

Measure the primary coil resistance.

STANDARD: 0.5-1.0Ω

Measure the secondary coil resistance with the spark plug cap in place.

STANDARD: 5-9 KΩ



11.3 IGNITION TIMING

The ignition advance is $32^{\circ} \pm 2^{\circ} / 3000\text{rpm}$

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. disconnect the exciter coil wire.
Measure the resistance between the yellow or white or green wire and ground.

STANDARD : 467-700Ω

Electrolyte is poisonous. Drink large quantities of water or milk and call a physician if swallowed.

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. Drink large quantities of water or milk and call a physician, if swallowed.***

11.6 BATTERY VOLTAGE INSPECTION

Battery is under the seat; you can see this battery after removing the seat.
Measure the battery voltage using a voltmeter.

VOLTAGE: Fully charged : 13.1 V
Undercharged : Below 12.0 V

BATTERY REMOVAL

Remove the seat, then you can see the battery.
Disconnect the negative cable and then the position cable and remove the battery.

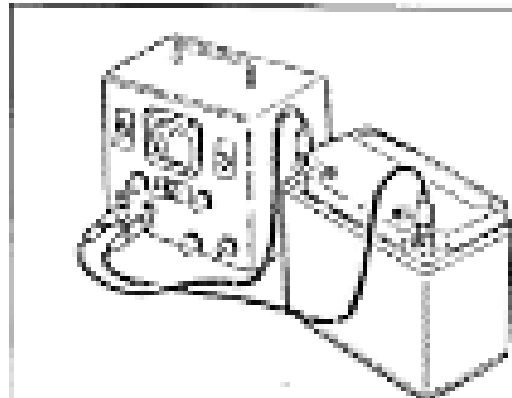
BATTERY INSTALLATION

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



11.7 CHARGING

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



11.8 ELECTRIC STARTER

Information

A weak battery may be unable run the starter motor quickly enough.

If the battery voltage is enough while the engine is not cranking, the starter motor may be damaged.

Troubleshooting

Starter motor turns slowly

- Weak battery.
- Poorly connected starter motor cable.
- Faulty starter motor.
- Poorly connected battery ground cable.

Starter motor will not turn

- Engine stop switch at left or right position.
- Gearshift bar is not at neutral position.
- Check for a blown fuse near battery.
- Make sure that the battery is fully charged and in good condition.

11.9 HEADLIGHT LAMP REPLACEMENT

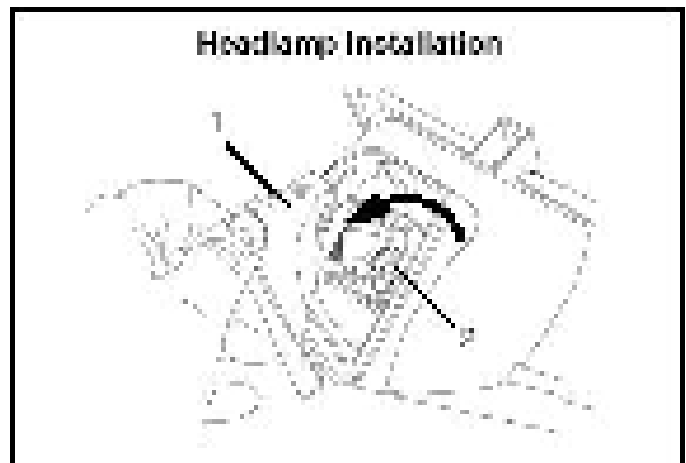
NOTE: Allow lamp to cool before proceeding. Do not touch a halogen lamp with bare fingers. Oil from your skin leaves a residue, causing a hot spot which will shorten the life of the lamp. Hold the bulb by the base only.

To access the headlight assembly without removing the front cover, reach up under the front cab.

Rotate the socket (2) counterclockwise and pull it away from the headlight assembly.

Install the new headlamp.

Reinstall all components.



TAILLIGHT/BRAKELIGHT LAMP REPLACEMENT

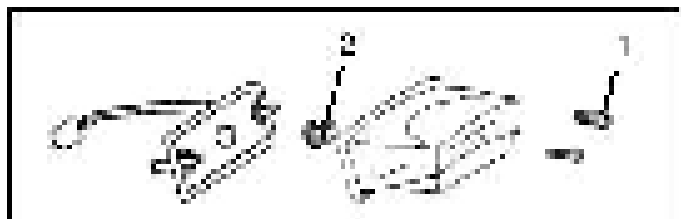
If the taillight/brakelight does not work the lamp may need to be replaced.

(Step 1) From the rear of the taillight remove two screws (1) holding lens cover in place and remove lens cover.

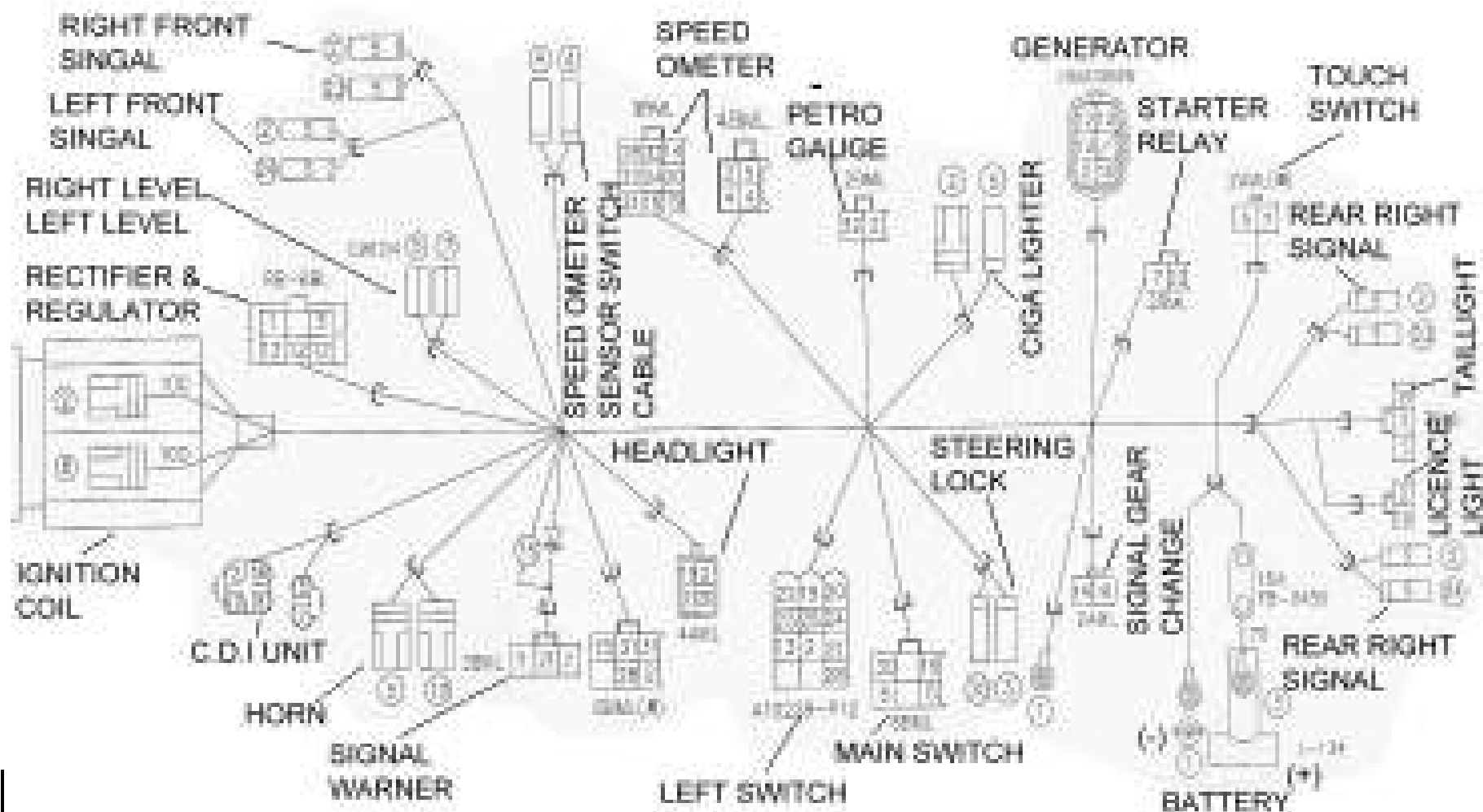
(Step 2) Remove lamp (2) and replace it with recommended lamp.

Reinstall the lens cover removed in Step 1.

Test the taillight/brakelight.



11.10 WIRING DIAGRAMS



BLACK (THICK)	1(2)2	BLACK/WHITE	9	GRAY	17	BRAON/WHITE	25
BLACK (THIN)	2(0.85)	BLUE/YELLOW	10	GREEN/WHITE	18	YELLOW/BLACK	26
RED (THICK)	3(2)2	WHITE	11(1.25)	YELLOW/RED	19(0.85)	WATHET BLUE	27
BLACK/BLUE	4	YELLOW	12(1.25)	BLUE	20(0.85)	BLUE/RED	28
BROWN	5(0.85)	PINK	13	BLUE/WHITE	21(0.85)	YELLOW/BLUE	29
GREEN	6(0.85)	WHITE/BLACK	14	GREEN/RED	22	RED/WHITE	30(0.85)
GREEN/YELLOW	7	ORANGE	15	DARK GREEN	23	RED (THIN)	31(0.85)
BLACK/YEKKOW	8	BLUE/WHITE	16	DARK BROWN	24	BROWN/WHITE	32

12.TROUBLE SHOOTING

12.1 Engine does not start

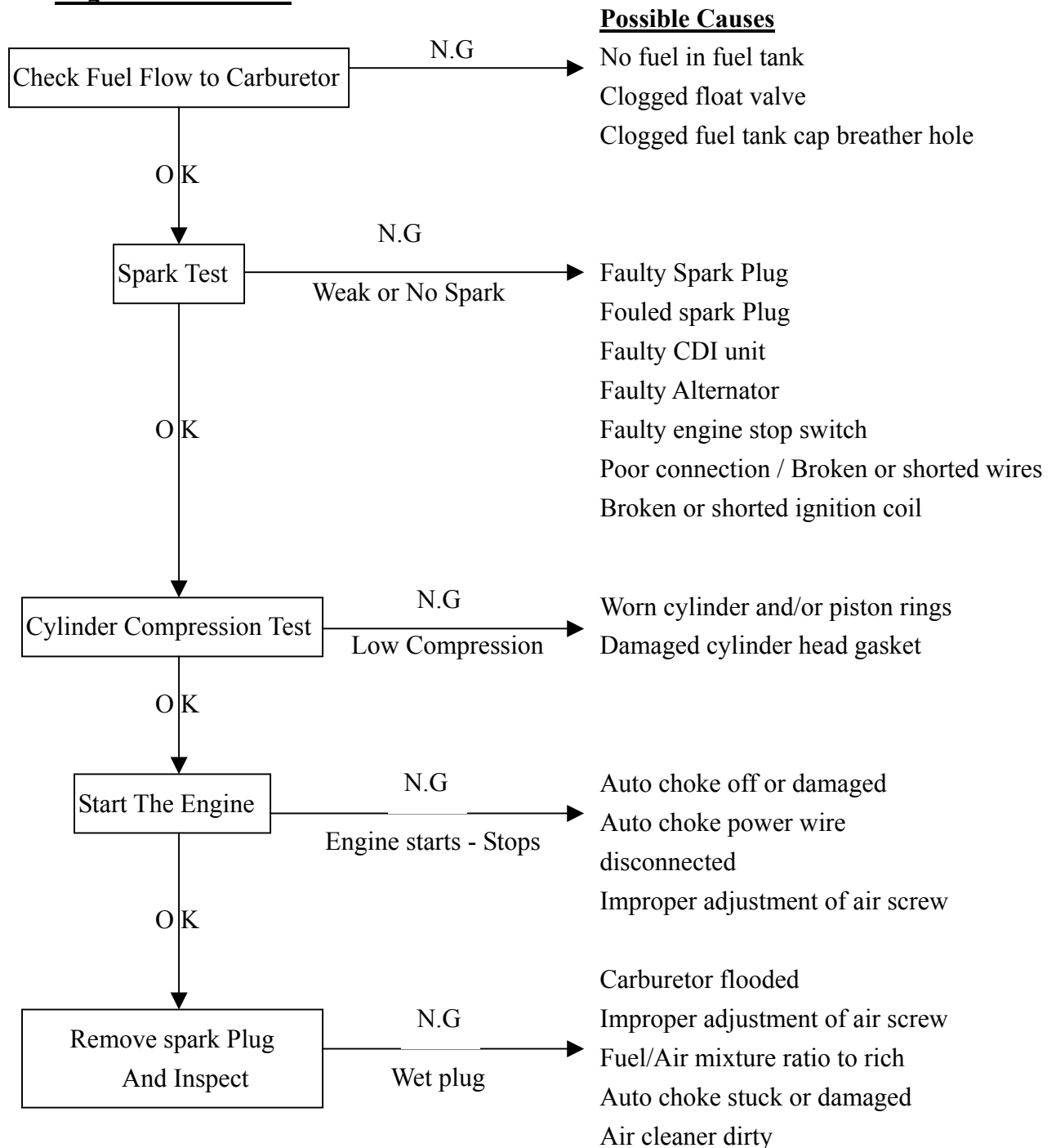
12.2 Poor Performance at low and idle speed

12.3 Poor Performance at high speed

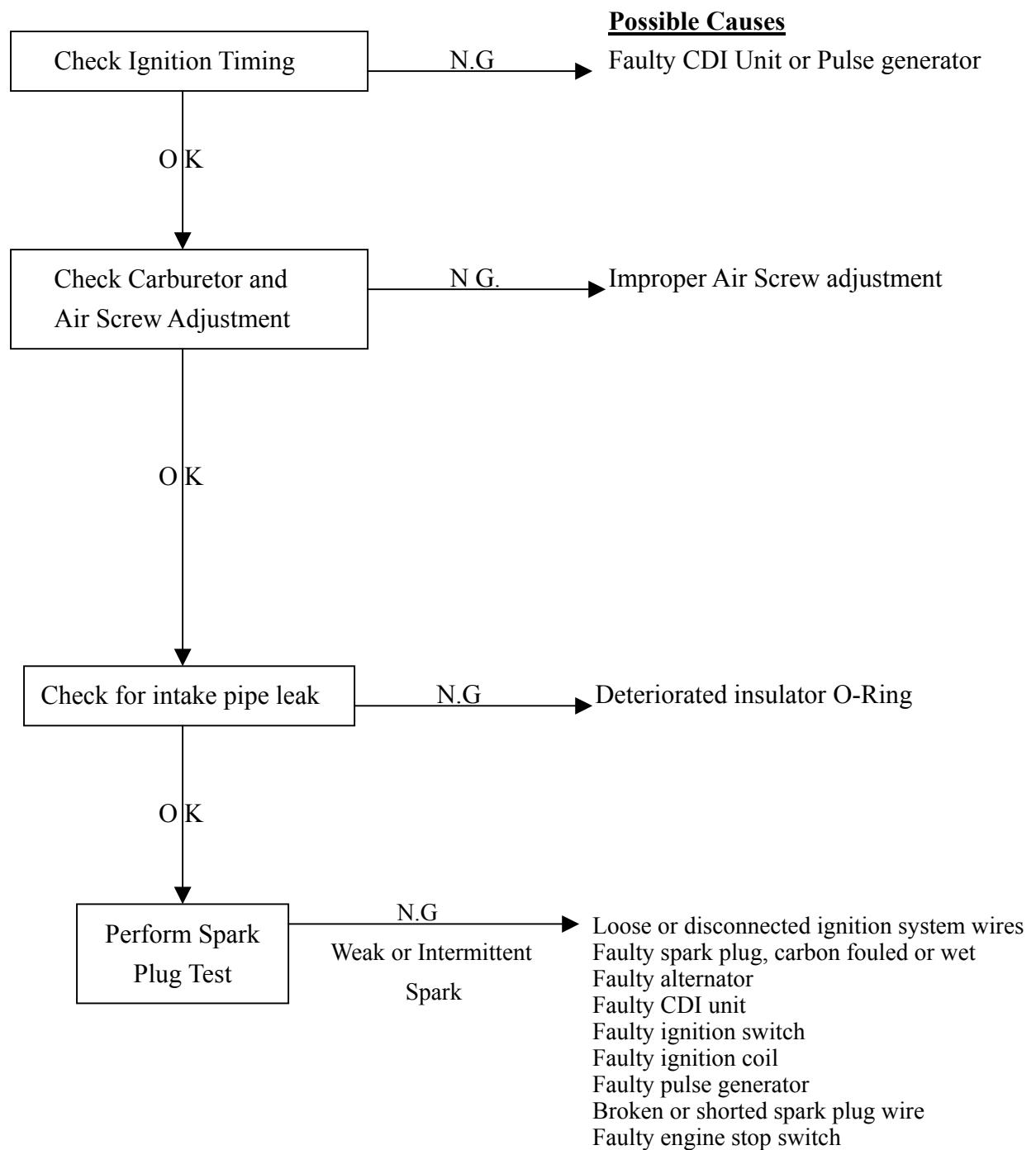
12.4 Loss of power

12.5 Poor handling

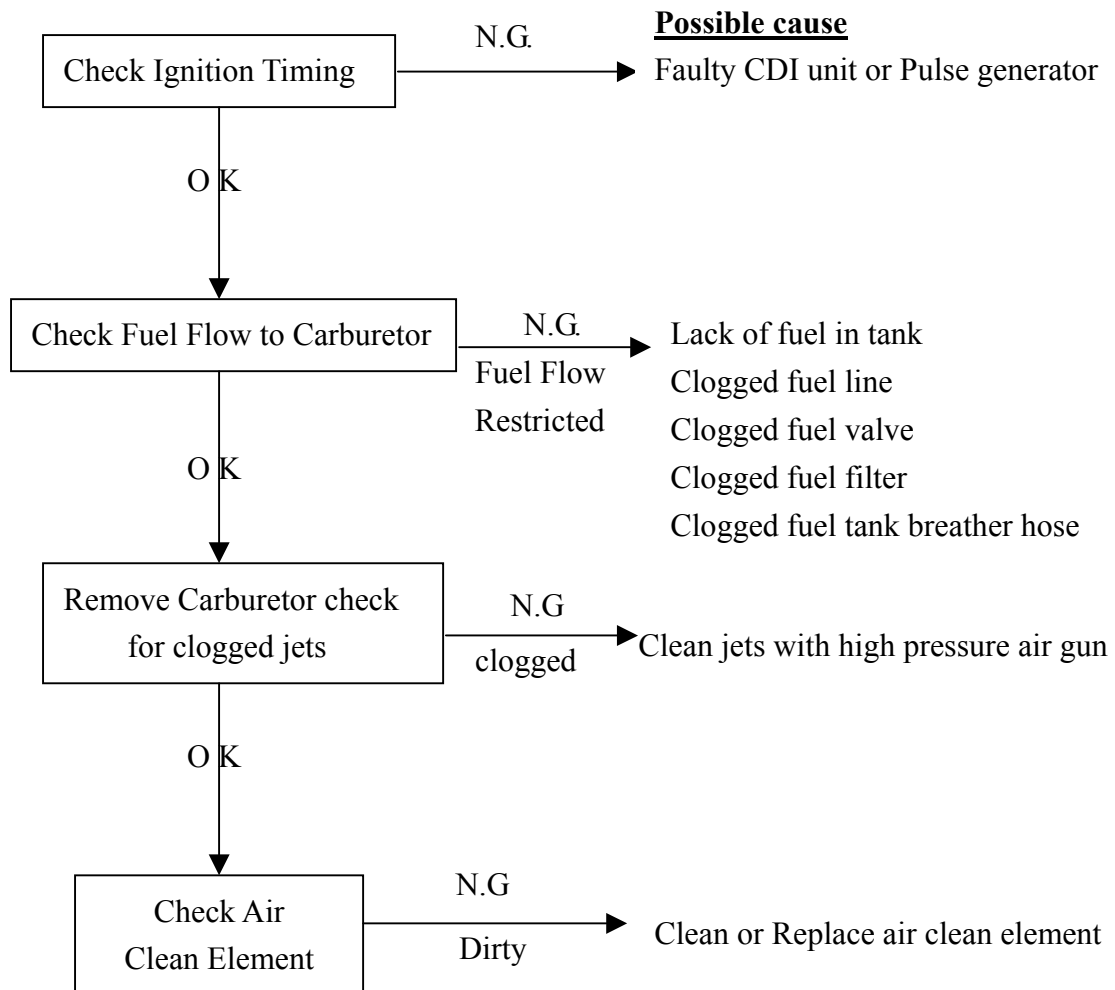
12.1 Engine does not start



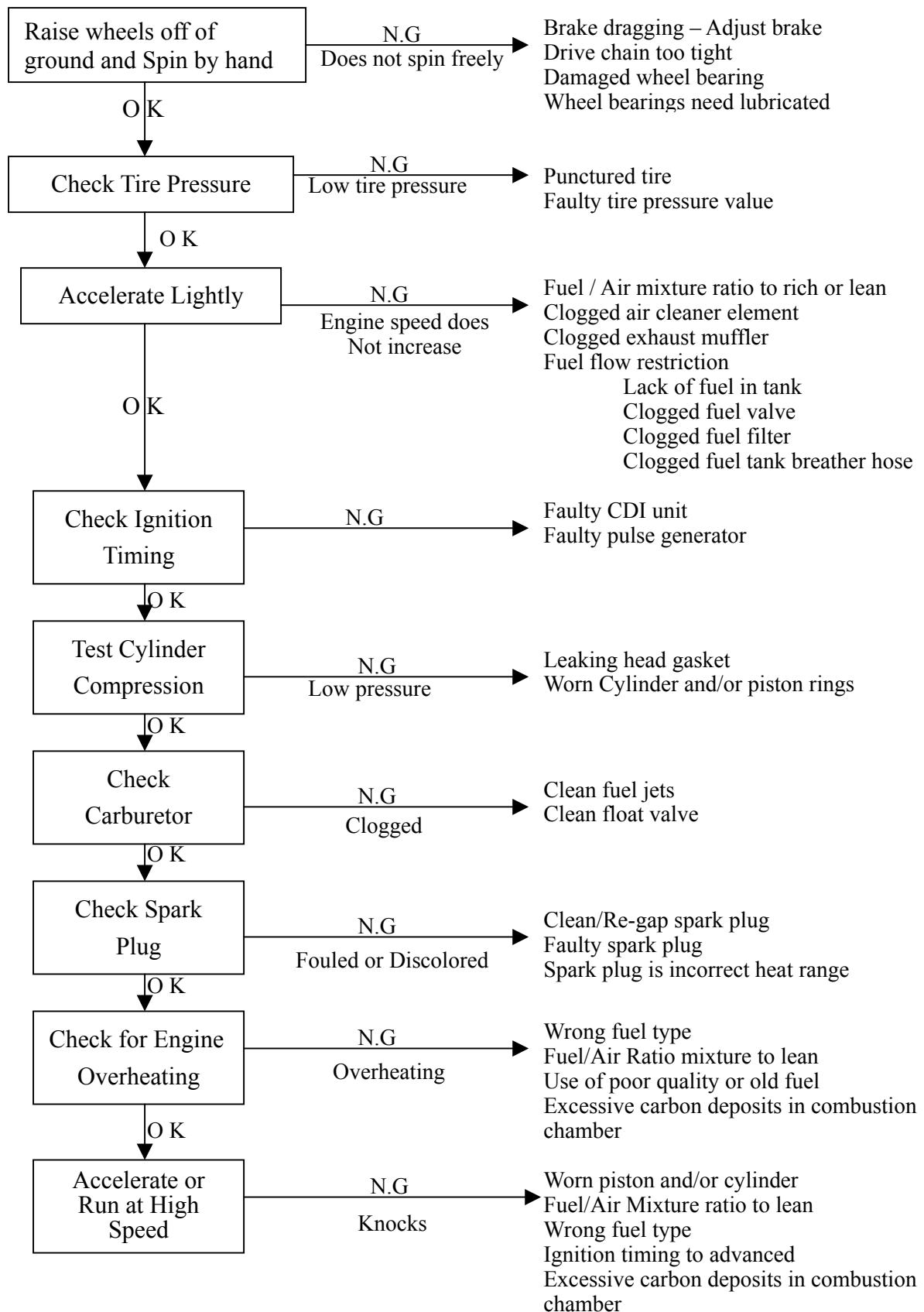
12.2 Poor Performance at Low / Idle Speed



12.3 Poor performance at high speed



12.4 Loos of power



12.5 Poor Handling

