

ALL TERRAIN VEHICLE

DINLI
Metal Industrial Co., Ltd.



DL-801

Service Manual



DINLI 270 cc QUAD Service Manual

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Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Dinli vehicle parts. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any replaced parts.

How to Use This Manual

In preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

The Quick Reference Guide shows you all of the product's system and assists in location their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Spark Plug section.

Whenever you see these WARNING and CAUTION symbols, heed their instructions! Always follow safe operating and maintenance practices.

△WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

This manual contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

- This note symbol indicates points of particular interest for more efficient and convenient operation.
- Indicates a procedural step or work to be done.
- Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.
- ★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

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GENERAL INFORMATION

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Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a quad, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following:

(1) Dirt

Before removal and disassembly, clean the quad. Any dirt entering the engine will shorten the life of the quad. For the same reason, before installing a new part, clean off any dust or metal fillings.

(2) Battery Ground

Disconnect the ground (-) wire from the battery before performing any disassembly operations on the quad. This prevents the engine from accidentally turning over while work is being carried out, sparks from being generated while disconnecting the wires from electrical parts, as well as damage to the electrical parts themselves. For reinstallation, first connect the positive wire to the positive (+) terminal of the battery.

(3) Installation, Assembly

Generally, installation or assembly is the reverse of removal or disassembly. However, if installation or assembly sequence is given in this Service Manual, follow it. Note parts locations and cable, wire, and hose routing during removal or disassembly so they can be installed or assembled in the same way. It is preferable to mark and record the locations and routing whenever possible.

(4) Tightening Sequence

When installing bolts, nuts, or screws for which a tightening sequence is given in this Service Manual, make sure to follow the sequence. When installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit, thus ensuring that the part has been installed in its proper location. Then, tighten them to the specified torque in the tightening sequence and method indicated. If tightening sequence instructions are not given, tighten them evenly in a cross pattern. Conversely, to remove a part, first loosen all the bolts, nuts, or screws that are retaining the part a 1/4-turn before removing them.

(5) Torque

When torque values are given in this Service Manual, use them. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(6) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removing screws held by non-permanent locking agent) in order to avoid damaging the screw heads.

(7) Edges

Watch for sharp edges, as they could cause injury through careless handling, especially during major engine disassembly and assembly. Use a clean piece of thick cloth when lifting the engine or turning it over.

(8) High-Flash Point Solvent

A high-Flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is standard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(9) Gasket, O-Ring

Replace a gasket or an O-ring with a new part when disassembling. Remove any foreign matter from the mating surface of the gasket or O-ring to ensure a perfectly smooth surface to prevent oil or compression leaks.

(10) Liquid Gasket, Locking Agent

Clean and prepare surfaces where liquid gasket or non-permanent locking agent will be used. Apply them sparingly. Excessive amount may block engine oil passages and cause serious damage.

(11) Press

When using a press or driver to install a part such as a wheel bearing, apply a small amount of oil to the area where the two parts come in contact to ensure a smooth fit.

(12) Ball Bearing and Needle Bearing

Do not remove a ball bearing or a needle bearing unless it is absolutely necessary. Replace any ball or needle bearings that were removed with new ones. Install bearings with the manufacturer and size marks facing out, applying pressure evenly with a suitable driver. Apply force only to the end of the race that contacts the press fit portion, and press it evenly over the base component.

(13) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. Oil or grease seals should be pressed into place using a suitable driver, applying a force uniformly to the end of seal until the face of the seal is even with the end of the hole, unless instructed otherwise. When pressing in an oil or grease seal, which has manufacturer's marks, press it in with the marks facing out.

(14) Cir-clip, Retaining Ring, and Cotter Pin

When installing cir-clips and retaining rings, take care to compress or expand them only enough to install them and no more. Install the cir-clip with its chamfered side facing load side as well. Replace any cir-clips, retaining rings, and cotter pins with new ones, as removal weakens and deforms them, they could become detached while the quad is driven, leading to a major problem.

(15) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the sliding surfaces have an adequate lubrication film. During assembly, make sure to apply oil to any sliding surface or bearing that has been cleaned. Old grease or dirty oil could have lost its lubrication quality and may contain forging particles that act as abrasives; therefore, make sure to wipe it off and apply fresh grease or oil. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended.

(16) Direction of Engine Rotation

To rotate the crankshaft manually, make sure to do so in the direction of positive rotation. Positive rotation is counterclockwise as viewed from the left side of the engine. To carry out proper adjustment, it is furthermore necessary to rotate the engine in the direction of positive rotation as well.

(17) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed.

Always replace these parts with new ones every time they are removed. Although the previously mentioned gasket, O-ring, ball bearing, needle bearing, grease seal, oil seal, cir-clip, and cotter pin have not been so designated in their respective text, they are replacement parts.

(18) Electrical Wires

All the electrical wires are either one-color or two-color. A two-color wire is identified first by the primary color and then the stripe color. For example, a yellow wire with thin red stripes is referred to as a “yellow/red” wire; it would be a “red/yellow” wire if the colors were reversed. Unless instructed otherwise, electrical wires must be connected to wires of the same color.

(19) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration		Seizure

(20) Specifications

Specification terms are defined as follows:

“Standards” show dimensions or performances which brand-new parts or systems have.

“Service Limits” indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

Engine serial number

Vehicle identification number

ENGINE SERIAL NUMBER (Ex. 13G6500xxx)



VEHICLE IDENTIFICATION (ex. RKWAJ74C45Txxxxxx)



Whenever corresponding with **Dinli** about a particular issues, the engine number and serial number are important for vehicle identification.

General Specification

NOTE:

Specifications subject to change without notice.

Model	DL-801
Engine	4-stroke, DOHC
Bore and stroke	ϕ 72.7 x 63.0 mm
Compression ratio	12.0
Displacement	261.5 cm ³
Coolant system	Liquid cooled
Coolant	1:1 water/anti-freeze[ethylene glycol(containing corrosion inhibitors for aluminum engines and radiators)]
Starting system	Electric
Carburetor	WVF-13
Transmission	CVT
Final drive	2WD/chain
Engine idle speed	1600 \pm 100 min ⁻¹
Spark plug, standard	DPR7EA (NGK)
Spark plug gap	0.6 – 0.7 mm
Lubrication system	Wet. sump
Lubricant	4-cycle motorcycle engine oil 10W-40, Grade SF or higher
Ignition system	DC-CDI
Compression ratio	Unleaded Automobile Premium Gasoline (Ron 98 or higher)
Alternator Output	10.5 A / 5000 min ⁻¹
Thermostat Opening Temperature	60°C \pm 2°C

Note: Permissible operating temperature: -10°C~45°C °

CHASSIS

Frame	Steel
Overall length	1682 mm
Overall width	1060 mm
Overall height	1082 mm
Seat height	810 mm
Wheel base	1176 mm
Front tire	21 x 7 – 10
Rear tire	20 x 11 – 9
Recommended cold tire pressure (front/rear)	30kpa/ 30kpa
Turning radius (Inner Radius of Tire)	1650
Fuse	15A
Loading limit (Incl. rider, cargo, etc....)	150 kg
Voltage	12V
Battery	GS, GTX12-BS
Ground clearance, unloaded	220 mm
Water crossing maximum depth	350 mm
Front suspension travel	150 mm
Rear suspension travel	180 mm
Dry weight (approx KGs)	190
Fuel tank capacity	11.5 liters
Throttle lever free play	5~6 mm
Air filter	Foam
Brake fluid	DOT 4
Brake pad thickness (MIN)	2.0 mm
Brake disc thickness (MIN)	3.5 mm
Drive chain type	530 (O-ring type)

Periodic Maintenance Chart

Perform a Pre-Ride inspection before every ride and at schedule maintenance periods.

C=Clean R=Replace L=Lubricate I=Inspect, Verify, Clean, Adjust, Lubricate, Replace if necessary.		Interval (whichever comes first)								
		Regular Maintenance Interval (hours)						Regular Maintenance (Riding Km)		
		Break-in (1 hour)	Initial After 10 hr	Every 1 month	Every 3 month	Every 6 month	Note	200 Km	500Km	1000Km
	WARNING LABELS (condition, readable)	I	I	I	I	I	I	I	I	I
○	FRAME (mainframe,subframe,swingarm)	I	I	I						
▲	FUEL SYSTEM (hoses, tank, level)	I	I							I
	BATTERY (terminals)			I,C				I		
▲	THROTTLE OPERATION	I	I		I				I	
	AIR FILTER	I	C	C		R	★	I		I
	AIRBOX DRAIN TUBE		I,C		I		★	I		I
	SPARK PLUG		I		R					R
○	IDLE SPEED		I		I			Adjust as required		
▲	EXHAUST (spark arrester)			C						C
	SWITCH (engine, stop, start, tether, ignition)	I			I		★			
▲	LIGHTING (headlight, tail light, turning lights)	I		I						
	ENGINE OIL	I	R			R	*	R		R
	ENGINE OIL FILTER(s)	C	R			R		R		R
	DRIVE CHAIN (sag, stretch, buffer, guide, sprockets (condition/tightness), guards.	I	I		I		★		I	
○	BRAKE FLUID	I				I	*			I
▲	BRAKE SYSTEM (cables, discs, pads, hoses, etc.)	I			I		★	I		
	BRAKE, REAR, DISC CARRIER	I	I		I	R		I		
	COOLANT (radiator, cap, hoses, level, strength)	I			I	R	*		I	
	SUSPENSION (front/rear shocks, condition, setting)	I	I	I	I					
	NUTS,BOLTS AND FASTENERS		I	I		I			I	
○	SEAT (condition, wear, damage)	I								
▲	WHEELS/TIRES (pressure, condition, wear)	I	I	I		I				I
	SWINGARM (bearings)		I	I			★			
▲	STEERING ASSEMBLY (fasteners, operation)		I				★			I
	A-ARM (Bushing ball Joint)			I			★		I	
	TIE ROD ENDS	I	I	I			★			

▲Dinli dealer service suggested that servicing owners should have the proper tools, service data, and be mechanically qualified.
 ○Operational safety involved, The service should be performed by a Dinli dealer.
 ★Service more frequently if operation in dusty, sandy or snowy area or conditions.
 * Change every 2 years.

Wheels/Tires

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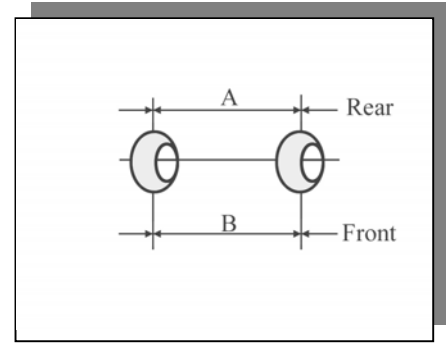
Specifications

Item	Standard	Service Limit
Wheel Alignment: Toe-in 2WD	25~40 mm	- - -
Tires:		
Standard tire: Front	AT 21×7-10 25N MAXXIS M-971-1, Tubeless	- - -
Rear	AT 20×11-9 38N MAXXIS M-972-2, Tubeless	- - -
Tire air pressure (when cold): Front	35 kPa (0.35 kgf/cm ² , 5.0psi)	- - -
Rear	35 kPa (0.35 kgf/cm ² , 5.0psi)	- - -
Maximum tire air pressure (to seat beads, when cold)	250 kPa (2.5 kgf/cm ² , 36 psi)	- - -

Wheel Alignment

Toe-in is the amount that the front wheels are closer together in front than at the rear at the axle height. When there is toe-in, the distance A (Rear) is the greater than B (Front) as shown.

The purpose of toe-in is to prevent the front wheels from getting out of parallel at any time, and to prevent any slipping or scuffing action between the tires and the ground, if ton-in is incorrect, the front wheels will be dragged along the ground, scuffing and wearing the tread knobs. Measure the distance between vehicle center and each wheel. This will tell you which tie rod needs adjusting.



Caster and camber are build-in and require no adjustment.

$A \text{ (Rear)} - B \text{ (Front)} = \text{Amount of Toe-in}$
(Distance A and B are measured at axle height)

CAUTION:

During the tie rod adjustment, it is very important that the precautions be taken when tightening tie rod end jam nuts.

Steering Centering Inspection

- Test ride the vehicle.
- ★ If the handlebar is straight when the vehicle is traveling in a straight line, go on to the Toe-in Inspection procedure.
- ★ Otherwise, go on to the Steering Centering Adjustment procedure.

Steering Centering Adjustment

- Support the vehicle so that the front wheels are off the ground and the front axles about the same height as the rear axle.
- Hold a straightedge [A] against the rear wheel rim on one side at axle height.
- With the handlebar straight ahead, loosen the locknuts [A] [B] and Turn the tie-rod adjusting sleeve [C] until the front wheel on that side is parallel to the straightedge.

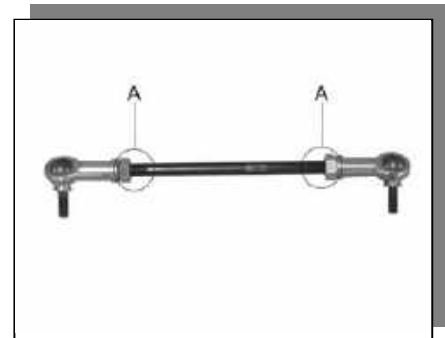


NOTE

The locknut [A] on the tie-rod has left-hand threads. Turn the wrench clockwise for loosening.

CAUTION

Adjust the tie-rod so that the visible thread length [A] is even on both ends of the tie-rod, or the threads could be damaged.



- Repeat the straightedge procedure on the other side of the vehicle, now the front wheels are parallel to each other and to the center line of the vehicle.
- Go on to the Toe-in Inspection procedure.

Toe-in Inspection

- Support the vehicle on a stand or the jack so that the front wheels are off the ground.
- Apply a heavy coat of the chalk near the center of the front tires.
- Using a needle nose scriber, mark a thin mark near the center of the chalk coating while turning the wheel.
- Keeping the front wheels off the ground, set the handlebar straight ahead.
- At the level of the axle height, measure the distance between the scribed lines for both front and rear of the front tires.
- Subtract the measurement of the front from the measurement of the rear to get the toe-in.
- ★ If the toe-in is not in the specified range, go on to the Toe-in adjustment procedure. Toe-in of Front Wheels Standard:

Standard 0~2 mm

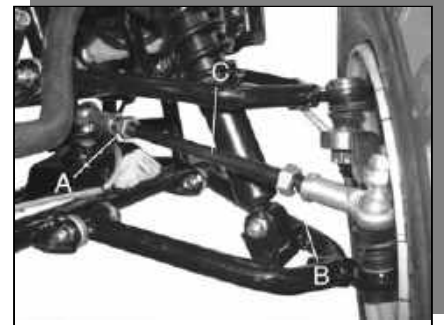


Toe-in Adjustment

- Loosen the locknuts [A] [B] and turn the adjusting sleeves [C] the same number of turns on both sides to achieve the specified toe-in.

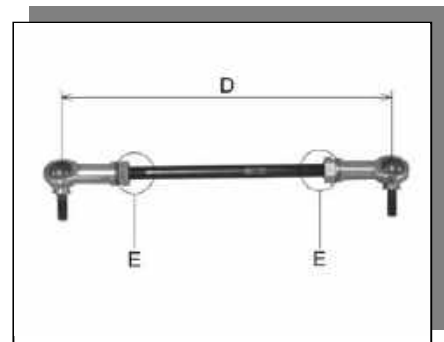
NOTE

- The nut [A] on the tie-rod has left-hand threads. Turn the nut clockwise for loosening.
- The toe-in will be near the specified value, if the tie-rod length [D] is 385 mm on each tie-rod.



CAUTION

Adjust the tie-rod length so that the visible thread length [E] is even on both ends of the tie-rod. Uneven length could cause tie-rod damage.

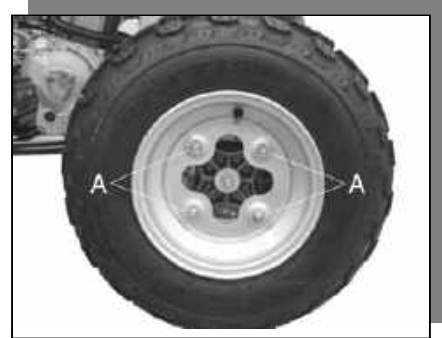


- Check the toe-in.
- Tighten:
 - Torque - Tie-Rod Adjusting Sleeve Locknuts: 33 N-m (3.4 kgf-m, 45 ft-lb)**
- Test ride the vehicle.

Wheels (Rims)

Wheel Removal

- Loosen the wheel nuts [A]
- Support the vehicle on a stand or the jack so that the wheels are off the ground.
- Take off the wheel nuts and remove the wheel.

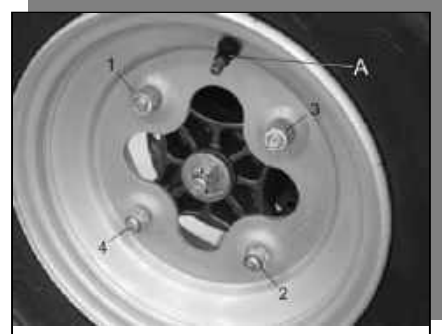


Wheel Installation

- Check the tire rotation mark [A] on the tire, and install the wheel accordingly.

NOTE

- The direction of the tire rotation is shown by an arrow on the tire sidewall.



- Position the wheel so that the air valve [A] is toward the outside of the vehicle.
- Tighten the wheel nuts in a criss-cross pattern.
 - Torque- Wheel Nuts: 52 N-m (5.3 kgf-m, 38 ft-lb)**



Wheel (Rim) Inspection

- Examine both sides of the rim for dents [A]. If the rim is dented, replace it.



- If the tire is removed, inspect the air sealing surfaces [A] of the rim for scratches or nicks. Smooth the sealing surfaces with fine emery cloth if necessary



Wheel (Rim) Replacement

- Remove the wheel (see Wheel Removal)
- Disassemble the tire from the rim (see Tire Removal).
- Remove the air valve and discard it.

CAUTION

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

- Install a new air valve in the new rim.
- Remove the valve cap, lubricate the stem with a soap and water solution, and pull the stem [A] through the rim from the inside out until it snaps into place.



CAUTION

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

- Mount the tire on the new rim (see Tire Installation).
- Install the wheel (see Wheel Installation).

TIRES

Tire Removal

- Remove the wheel.
- Unscrew the valve core to deflate the tire.
- Use a paper valve core tool [A].
- Lubricate the tire beads and rim flanges on both sides of the wheel with a soap and water solution, or water [A]. This helps the tire beads slip off the rim flanges.



CAUTION

Do not lubricate the tire beads and rim flanges with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

- The tires cannot be removed with hand tools because they fit the rims tightly.

Tire Installation

- Inspect the rim (see Wheel (Rim) Inspection).
- Replace the air valve with a new one.

CAUTION

Replace the air with whenever the tire is replaced. Do not reuse the air valve.

- Check the tire for wear and damage (see Tire Inspection)
- Lubricate the tire beads and rim flanges with a soap and water.

△WARNING

Do not use the lubricant other than a water and soap solution, or water to lubricate the tire beads and rim because it may cause tire separation.

- Check the tire rotation mark [A] on the tire, and install the tire on the rim accordingly.
- The tires should be installed on the rims so that each air valve is toward outside of the vehicle.

NOTE

- The direction of the tire rotation is shown by an arrow on the tire sidewall.

- Install the tire on the rim using a suitable commercially available tire changer.
- Lubricate the tire beads again and center the tire on the rim.



- Support the wheel rim [A] on a suitable stand [B] to prevent the tire from slipping off.
- Inflate the tire until the tire beads seat on the rim.

Maximum Tire Air Pressure (to seat beads when cold)
Front and Rear: 250kpa (2.5 kgf-cm², 36 psi)

△WARNING

Do not inflate the tire to more than the maximum tire air pressure. Over inflation can explode the tire with possibility of injury and loss of line.



- Check to see that rim lines [A] on both sides of the tire are parallel with the rim flanges [B].
- ★ If the rim lines and the rim flanges are not paralleled, deflate the tire, lubricate the sealing surfaces again, and re-inflate the tire.
- After the beads are properly seated, check for air leaks.
- Apply a soap and water solution around the tire bead and check for bubbles.
- Deflate the tire to the specified pressure.
- Check the tire pressure using an air pressure gauge.



Tire Air Pressure (when cold)

Front: 50 kPa (7.0 psi)
Rear: 50 kPa (7.0 psi)

- Install the wheel (see Wheel Installation).
- Wipe off the soap and water solution on the tire and dry the tire before operation.

△WARNING

Do not operate the vehicle with the water and soap still around the tire beads. They will cause tire separation, and a hazardous condition may result.

Tire Inspection

- Examine the tire for damage and wear.
- If the tire is cut or cracked, replace it.
- Lumps or high spots on the tread or sidewalls indicate internal damage requiring tire replacement.
- Remove any foreign objects from the tread. After removal, check for leaks with a soap and water solution.
- Check the shape of the tread knobs. If no vertical side is left on the drive side of the knobs, replace the tire.

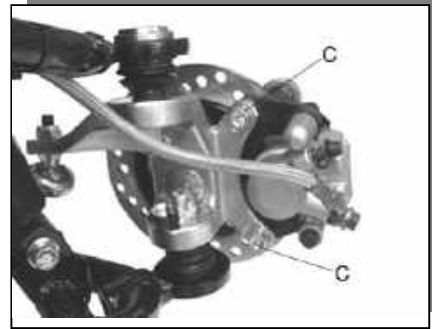


Front Hub Removal

- Remove the cotter pin [A] and loosen the axle nut [B].
- Remove the wheel (see Wheel Removal).

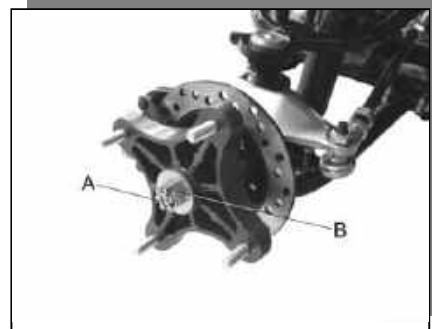


- Remove the caliper by taking off the mounting bolts [C], and let the caliper hang free.
- Remove the axle nut and pull off the front hub brake disc.
- Separate the brake disc from the front hub.



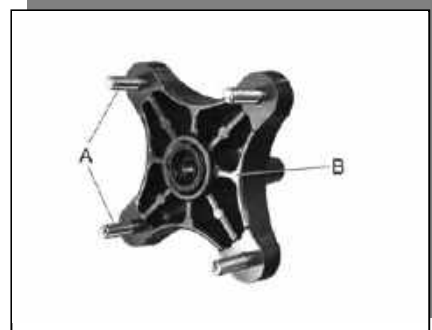
Front Hub Installation

- Grease::
 - Seal
 - Front Spindle
- Tighten:
 - Torque - Front Spindle Nut: 145 N-m (15.0 kgf-m, 110 ft-lb)**
- Insert a new cotter pin [A] and bead it over the nut [B]



Front Hub Disassembly/Assembly

- Don not press the hub bolts out.
- ★ If any hub bolt [A] is damaged, replace the hub [B] and bolts as a unit.



Rear Hub

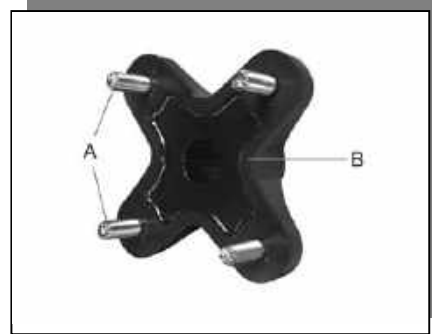
Rear Hub Installation

- Grease the axle spindle.
- Apply non-permanent locking agent: Rear Axle Nuts [A]
- Tighten:
Torque - Rear Axle Nut: 265 N-m (27.0 kgf-m, 195ft-lb)
- Insert a new cotter pin [B] and bend it over the nut.



Rear Hub Disassembly/Assembly

- Do not press the hub bolts [A] out.
- ★ If any hub bolt is damaged, replace the hub [B] and bolts as a nut.



Brake

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Brake Fluid

△WARNING

When working with the disc brake, observe the precautions listed below.
--

1. *Never reuse old brake fluid.*
2. *Do not use fluid from a container that has been left unsealed or that has or that has been open for a long time.*
3. *Do not mix two types and brand of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.*
4. *Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.*
5. *Don't change the fluid in the rain or when a strong wind is blowing.*
6. *Except for the disc pads and disc, use brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any parts will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.*
7. *When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Replace the pads with new ones if they cannot be cleaned satisfactorily.*
8. *Brake fluid quickly ruins painted surface; any spilled fluid should be completely washed away immediately.*
9. *If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE LINE.***

Brake Fluid Recommendation

Recommended fluid is given in the table below. If none of the recommended fluid is available, use extra heavy-duty brake fluid only from a container marked DOT 3 or 4.

Brake Fluid Level Inspection

- Position the reservoir horizontal, and check that the fluid level in the reservoir is higher than the lower level line.
- ★ If the fluid level is lower than the lower level line, check for fluid leakage of the brake line, and add the fluid as follow.
- Removal the reservoir cap, and fill the reservoir to the upper level line [A] in the reservoir with the same type and brand of the fluid that is already in the reservoir.

And then install the reservoir cap.

△WARNING

Change the fluid in the brake line completely if the fluid must be refilled but the type and brand of the fluid that is already in the reservoir are unidentified.

- Tighten:

Torque - Reservoir Cap Screws: 1.5 N-m (0.15 kg-m, 13 in-lb)

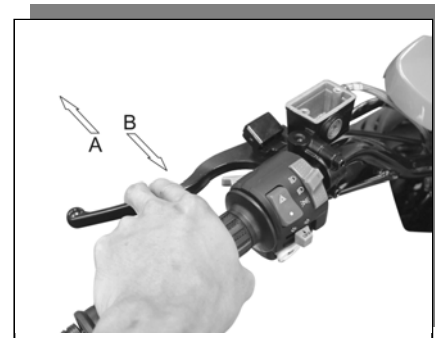
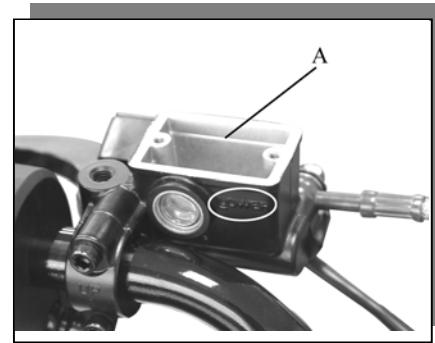
Brake Fluid Change

- Removal the reservoir cap and the rubber cap on the bleed valve.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Fill the reservoir with new brake fluid.
- Change the brake fluid as follows:
 - Open the bleed valve [A].
 - Apply the brake level and hold it [B].
 - Close the bleed valve [C].
 - Release the brake level [D].
- Check the fluid level in the reservoir often, replenishing it as necessary.

NOTE

- If the fluid in the reservoir runs completely out any time during fluid change, air will enter the line, and the system must be bled.

- Repeat this operation until fresh brake fluid comes out into the plastic hose or the color of the fluid change.



△WARNING

Do not mix two brand of fluid. Change the brake fluid in the brake line completely if the fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.

●Tighten:

Torque - Bleed Valve: 5.4 N-m (0.55 kg-m, 48 in-lb)

●Apply the brake lever forcefully for a few second, and check for fluid leakage around the fittings.

△WARNING

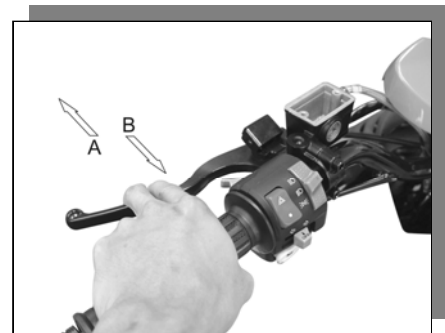
If the brake lever has a soft or "spongy feeling" when it is applied, there might be air in the brake line or the brake may be defective. Since it is dangerous to operate the vehicle under such condition, bleed the air from the brake line immediately.

Brake Line Air Bleeding

- Bleed the air whenever brake parts are replaced or reassembled.
- Remove the reservoir cap and fill the reservoir with new brake fluid.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the hose at the bottom of the reservoir. This bleeds the air from the master cylinder and the brake line.

NOTE

- Tap the brake hose lightly going from the caliper to the reservoir side and bleed the air off at the reservoir.
- Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
- Bleed the brake line and the caliper as follows:
 - Hold the brake level applied [B].
 - Quickly open and close the valve [C].
 - Release the brake level [A].
- The fluid level must be checked several times during the bleeding operation and replenished as necessary.



NOTE

- If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- If the brake level action still feels soft or "spongy", tap the brake hose from bottom to top and air will rise up to part of the hose. Slowly pump the brake level in the same manner as above.

● Tighten:

Torque - Bleed Valves: 5.4 N-m (0.55 kg-m, 48 in-lb)

- Apply the brake level forcefully for a few seconds, and check for fluid leakage around the fittings.

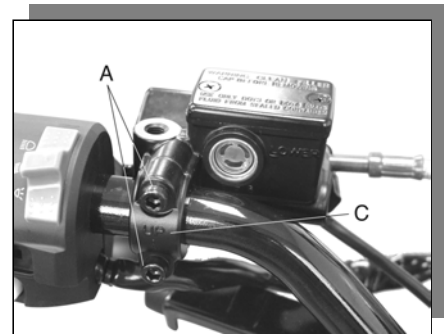
Master Cylinder Removal

● Removal:

Brake Hose Banjo Bolt [B]

Master Cylinder Clamp Bolts [A]

Master Cylinder

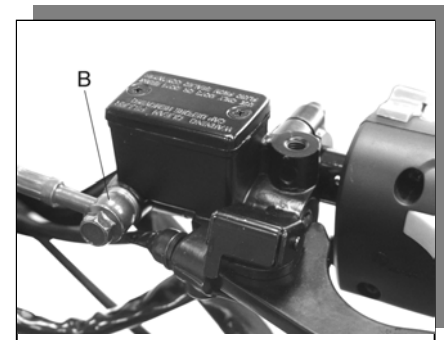


CAUTION

Brake fluid quickly ruins painted surface; any spilled fluid should be completely washed away immediately.

Master Cylinder Installation

- The master cylinder clamp must be installed with the "UP" mark [C] upwards.
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.



Torque - Master Cylinder Clamp Bolts:

8.8N-m(0.90kg-m,78in-lb)

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt.

Torque - Brake Hose Banjo Bolt:25N-m(2.5kg-m,18.0ft-lb)

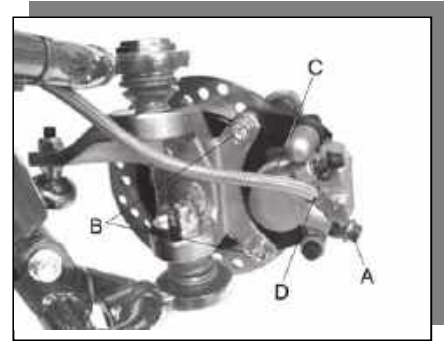
- Bleed the brake line after master cylinder installation (see Brake Line Air Bleeding).
- Check the brake for good braking power, no braking brag, and no fluid leakage.

△WARNING

Do not attempt to drive the vehicle until a full brake level is obtained by pumping the brake level until the pads are against each disc. The brakes will not function on the first application of the level if this is not done.

Caliper Removal

- Removal the front wheel (see Wheels/Tires chapter).
- Loose the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper.



CAUTION

Immediately wash away any brake fluid that spills.

NOTE

- If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Caliper Disassembly).

Caliper Installation

- Install the caliper and brake hose lower end.
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:

Torque -Caliper Mounting Bolts:25N-m(2.5kg-m,18.0ft-lb)

Brake Hose Banjo Bolt:25N-m(2.5kg-m,18.0ft-lb)

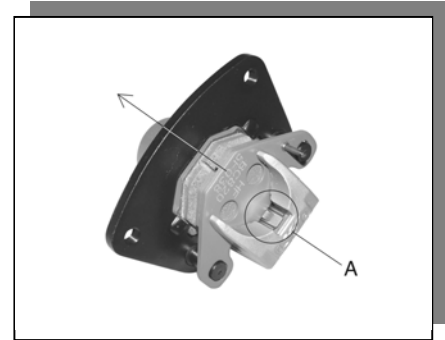
- Check the fluid level in the brake reservoir.
- Bleed the brake line (see Brake Line Air Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

△WARNING

Do not attempt to drive the vehicle until a full brake level is obtained by pumping the brake level until the pads are against each disc. The brakes will not function on the first application of the level if this is not done.

Brake Pad Removal

- Remove the front wheel (see Wheels/Tires chapter).
- Remove the caliper (see Caliper Removal)
- Push the anti-rattle spring [A], remove the pads [B] [C].



Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Be sure that the anti-rattle spring is in place.
- Install the pads
- Tighten:



Torque - Pad Mounting Bolts: 18N-m(1.8kg-m,13.0ft-lb)

△WARNING

Do not attempt to drive the vehicle until a full brake level is obtained by pumping the brake level until the pads are against each disc. The brakes will not function on the first application of the level if this is not done.

Brake Pad Wear Inspection

- Check the lining thickness [A] of the pads in each caliper.
- ★ If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

Pad Lining Thickness:

Standard: 4.5mm

Service Limit: 2mm



Disc Cleaning

Poor braking can be caused by oil on a disc. Oil on a disc must be cleaned off with an oil cleaning fluid such as trichloroethylene or acetone.

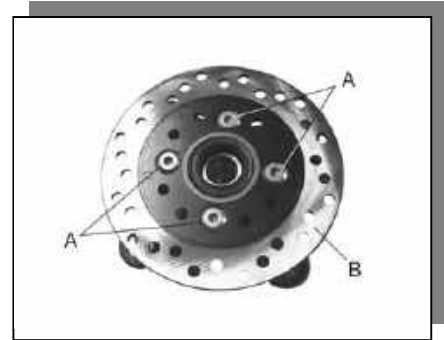
△WARNING

These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.

Disc Removal

●Remove:

- Front Hub (see Wheels/Tires chapter)
- Brake Disc Mounting Bolts [A]
- Brake Disc [B]



Disc Installation

- The disc must be installed with the marked side [A] facing toward the steering knuckle.
- Tighten:



Non-permanent Locking Agent - Disc Mounting Bolts

Torque - Disc Mounting Bolts: 37N-m(3.8kg-m,27ft-lb)

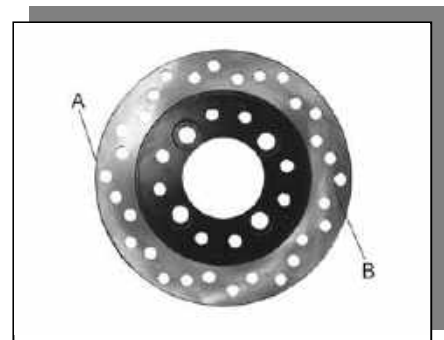
- After installing the discs, check the disc runout. Completely clean off any grease that has gotten on either side of the disc with a high flash point solvent.

Disc Wear Inspection

- Measure the thickness of each disc at the point [A] where it has worn the most.
 - ★ Replace the disc if has worn past the service limit.
- [B] Measuring Area

Disc Thickness

- Standard: 3.5mm
- Service Limit: 3mm

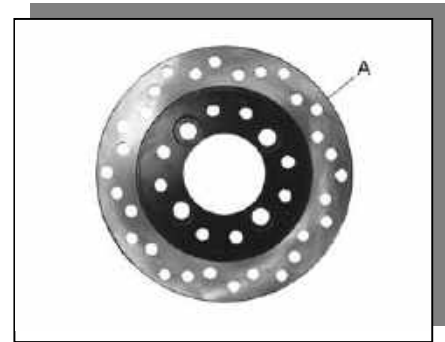


Disc Runout

- Jack up the vehicle so that the wheels are off the ground.
- Remove the front wheels and turn the handlebar fully to one side.
- Set up a dial gauge against the disc [A], and measure the disc runout.
- ★ If the runout exceeds the service limit, replace the disc.

Disc Runout

Standard:	TIR	0.2 mm or less
Service Limit:	TIR	0.3 mm



Brake Hose Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the brake hose while examining it.
- ★ Replace it if any cracks or bulges are noticed.

Brake Hose Replacement

- Pump the brake fluid out of the line as explained in the Brake Fluid Change.
- Remove the banjo bolts at both ends of the brake hose, and pull the hose off the vehicle.
- Immediately wipe up any brake fluid that spills.

CAUTION

Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely washed away immediately.

- Use a new flat washer for each side of the hose fittings.
- Install the new brake hose in its place, and tighten the banjo bolts.

Torque - Brake Hose Banjo Bolts: 25N-m(2.5kg-m,18.0ft-lb)

Brake Pedal Position Inspection

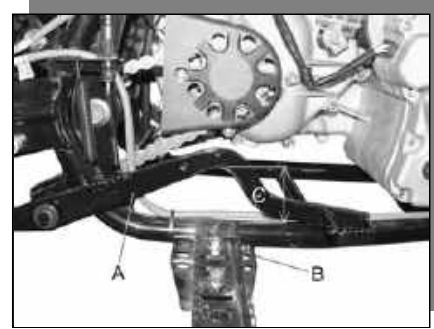
- Check that the brake pedal [A] is in the correct position as shown.

[B] step

Pedal Position [C]

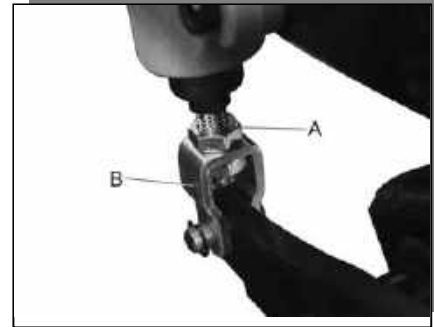
Standard: 49.8 ~ 54.8 mm above footrest

- ★ If it is correct, adjust the brake pedal position.



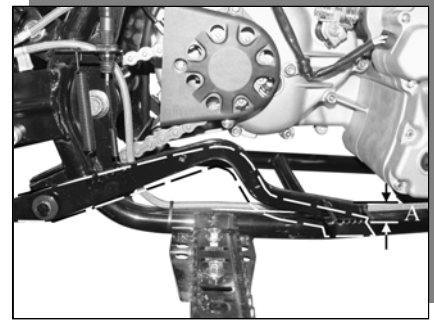
Brake Pedal Position Adjustment

- Remove the brake pedal (see Brake Pedal Removal).
- Loosen the nut [A], and turn the bracket [B] until pedal is correctly positioned.
- Tighten the nut [A].
- Check the brake pedal free play (see Brake Pedal Free Play Inspection).



Brake Pedal Free Play Inspection

- Check the brake pedal free play [A].
- Depress the brake pedal lightly by hand until the brake is applied.
- ★ If the free play is incorrect, adjust it.

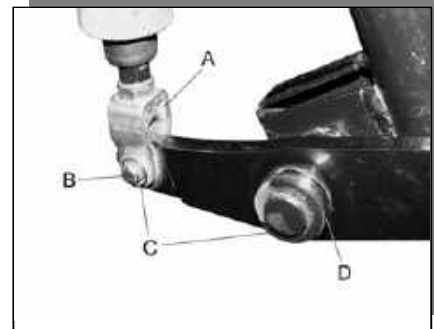


Pedal Free Play

Standard: 2.6 ± 0.5 mm

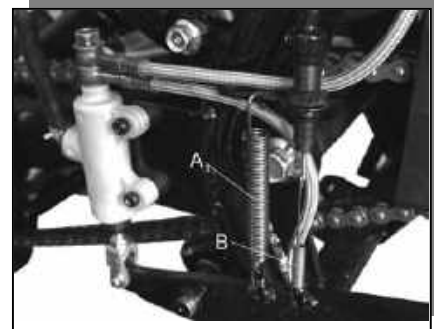
Brake Pedal Removal

- Remove:
 - Cir-clip [C]
 - Washer [D]
 - Pin [B]
 - Master Cylinder Joint [A]
- Pulling down the springs [A][B], remove the brake pedal.



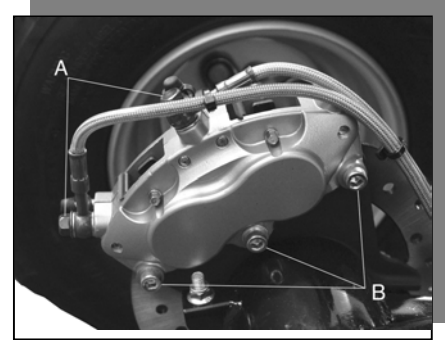
Brake Pedal Installation

- Please reverse the Removal steps to install the brake pedal.



Caliper Removal

- Removal the Rear wheel (see Wheels/Tires chapter).
- Loose the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper from the disc.
- Unscrew the banjo bolt and remove the brake hose from the caliper.



CAUTION

Immediately wash away any brake fluid that spills.

NOTE

- If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed.

Caliper Installation

- Install the caliper and brake hose lower end.
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:

Torque –

Caliper Mounting Bolts: 25N-m (2.5kg-m, 18.0ft-lb)

Brake Hose Banjo Bolt: 25N-m (2.5kg-m, 18.0ft-lb)

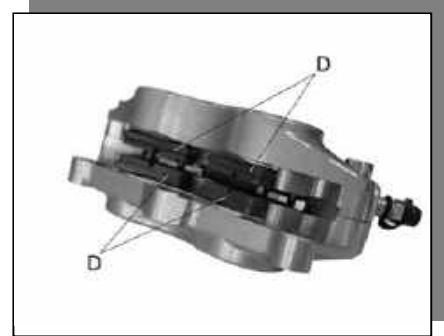
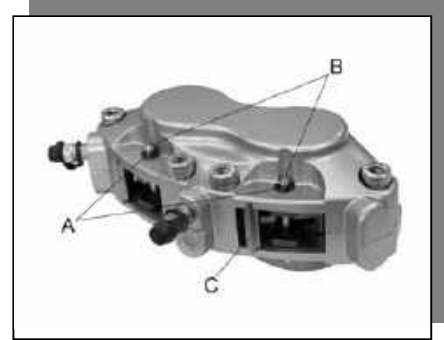
- Check the fluid level in the brake reservoir.
- Bleed the brake line (see Brake Line Air Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

△WARNING

Do not attempt to drive the vehicle until a full brake level is obtained by pumping the brake level until the pads are against each disc. The brakes will not function on the first application of the level if this is not done.

Rear Brake Pads Removal

- Remove the caliper (see Caliper Removal)
- Remove the Cir-clip [A] and bolt [B]
- Remove:
 - Anti-rattle Spring [C]
 - Brake Pads [D]



Brake Pad Installation

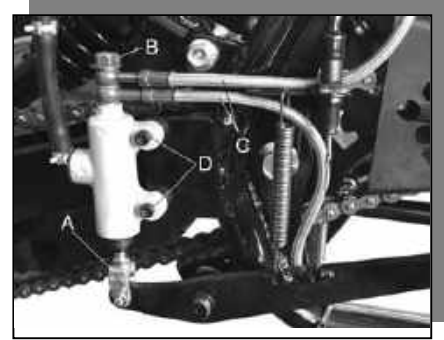
- Check the lining thickness (see Brake Pad Wear Inspection).
- Push the caliper piston in by hand as far as it will go.
- Be sure that the anti-rattle spring is in place.
- Install the pads.
- Be careful not mix it up inboard pads with the out board pad.
- Tighten:
 - Torque - Pad Mounting Bolts: 18N-m(1.8kg.m,13.0ft.lb)**

△WARNING

Do not attempt to drive the vehicle until a full brake level is obtained by pumping the brake level until the pads are against each disc. The brakes will not function on the first application of the level if this is not done.

Master Cylinder Removal

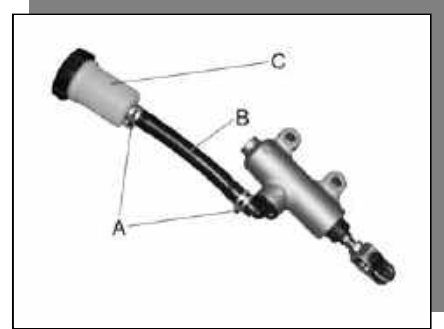
- Remove the master cylinder joint [A] and the banjo bolt [B] at the brake hose lower end, and tighten it loosely.
- Remove the brake hose [C].
- Loose the master cylinder mounting bolts [D].



CAUTION

Brake fluid quickly ruins painted surface; any spilled fluid should be completely washed away immediately.

- Remove:
 - Fastener [A]
 - Hose [B]
 - Reservoir [C]

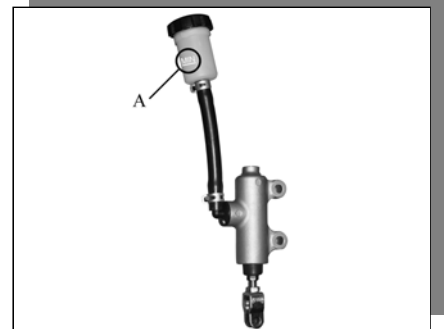


Master Cylinder Installation

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt.

Torque -Brake Hose Banjo Bolt: 25N-m(2.5kg-m,18.0ft-lb)

- Check the fluid level [A] in the brake reservoir.
- Bleed the brake line after master cylinder installation(see Brake Line Air Bleeding).
- Check the brake for good braking power, no braking brag, and no fluid leakage.



△WARNING

Do not attempt to drive the vehicle until a full brake level is obtained by pumping the brake level until the pads are against each dis. The brakes will not function on the first application of the level if this is not done0

Brake Disc Removal

- Remove the rear caliper, unscrew the banjo bolt and remove the brake hose from the caliper.
- Loosen the brake disc mounting bolts [A] and nut [B].
- Support the vehicle.
- Remove the rear wheel (see Wheel Removal).
- Remove the disc.



Brake Disc Installation

- The disc must be installed with the marked side [A] facing toward the steering knuckle.

- Tighten:

Non-permanent Locking Agent - Disc Mounting Bolts

Torque - Disc Mounting Bolts: 37N-m (3.8kg-m, 27ft-lb)

- After installing the discs, check the disc runout (see Disc Runout). Completely clean off any grease that has gotten on either side of the disc with a high flash point solvent.
- Check the disc wear (see Disc Wear).



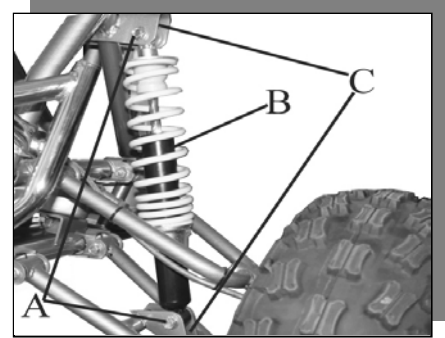
Suspension & Steering

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Front Shock Absorber Removal

- While supporting the vehicle to up with the jack.
- Remove:
 - Front Shock Absorber Mounting Bolt and Nut [A]
 - Front Shock Absorber [B]



Front Shock Absorber Installation

- Insert the shock absorber into the bracket [C].
- Tighten:

Torque - Mounting Bolts and Nuts:

47 N-m (4.8 kgf-m, 35 ft-lb)

- While supporting the vehicle to down with the jack.

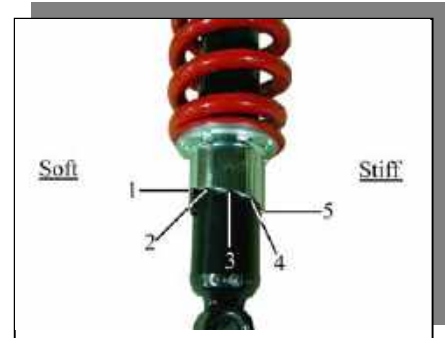
Front Shock Absorber Inspection

Since the front shock absorbers are sealed units, which cannot be disassembled, only external checks are necessary.

- ★ If one unit is damaged, replace both shock absorbers as a set. If only one unit is replaced and the two are not balance, vehicle at high speed may endanger driver's safety.

Front Shock Absorber Preload Adjustment

The spring adjusting sleeve on rear shock absorber has 5 positions so that the spring can be adjusted for different terrain and loading conditions. If the spring action feels too soft or too stiff, adjust it in accordance with the following photograph.



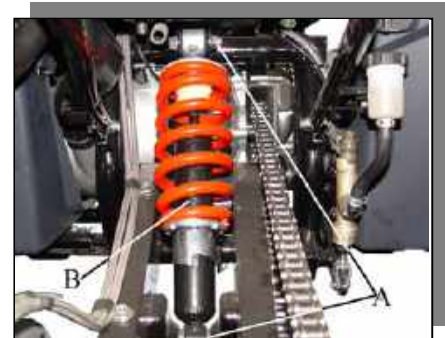
- Turn the adjusting sleeve on front shock absorber to the desired position with the wrench.

Rear Shock Absorber Removal

- Support the vehicle on a stand or the jack so that the rear wheels are off the ground.
- While holding the rear wheels, remove the lower and upper shock absorber mounting bolts [A] and nuts.
- Remove the rear shock absorber [B].

Rear Shock Absorber Installation

- Tighten-Torque-Rear Shock Absorber Mounting Nuts:
 - 6.2 N-m (6.3 kgf-m, 46ft.lb)
- See the Front Shock Absorber Preload Adjustment.

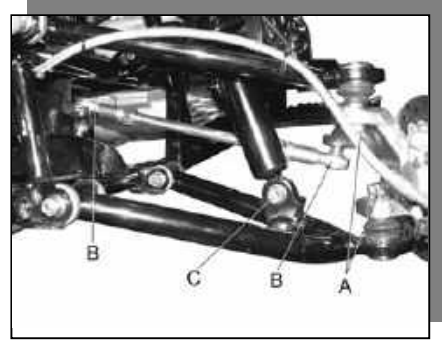


Rear Shock Absorber Preload Adjustment

- See the Front Shock Absorber Preload Adjustment

Suspension Arm Removal

- Remove:
 - Front Wheel (see Wheels/Tires chapter)
 - Front Hub (see Wheels/Tires chapter)
 - Cotter Pin, Nut and Bolt [A]
 - Tie-Rod End [B]
 - Front Shock Absorber Mounting Bolts [C]
 - Suspension Arm Pivot Bolts [D]

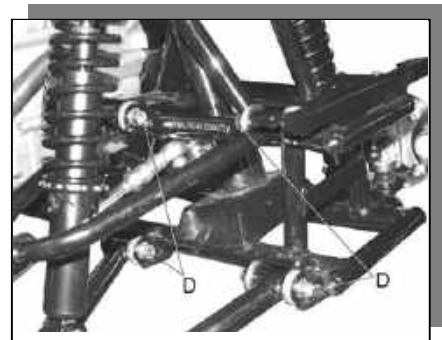


Suspension Arm Installation

- Tighten:

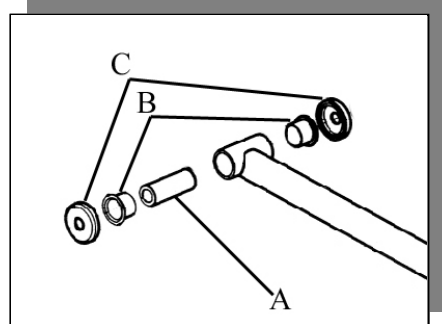
Torque –

- Suspension Arm Pivot Bolts: 88 N-m (9.0 kgf-m, 65 ft-lb)**
- Steering Knuckle Joint Nut: 42 N-m (4.3 kgf-m, 31 ft-lb)**



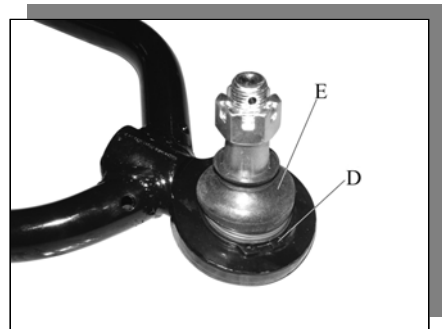
Suspension Arm Disassembly

- Tighten:
 - Collar [A]
 - Bearing Collar [B]
 - Seal Cover [C]



- Holding the suspension arm with a vise, remove the cir-clip [D] and unscrew the knuckle joint [E].

CAUTION
Do not remove the knuckle joint grease seal. It is packed with grease.



Suspension Arm Assembly

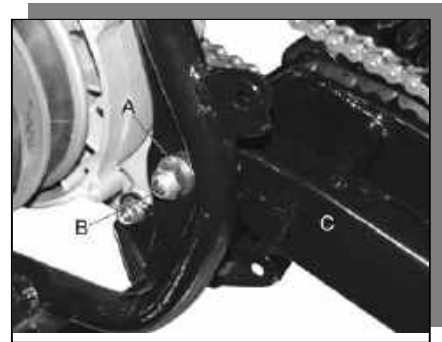
- When installing the rubber bushing into the arm, lubricate the outer surface of the bushings with a soap and water solution.

CAUTION
Do not lubricate the rubber bushings with engine oil or petroleum distillates because they will deteriorate the rubbers.

- Position the bushings in the suspension arm as shown using a suitable bearing driver in the bearing driver set.

Swingarm Removal

- Support the vehicle on a stand or the jack so that the rear wheels are off the ground.
- Remove:
 - Rear Wheels
 - Rear Brake Disc (see Caliper Removal)
 - Rear shock Absorber Mounting Bolt and nut
 - Chain
 - Speedometer Cable
 - Rear Axle
 - Swingarm Shaft Nut [A] and Shaft [B]
 - Swingarm [C]

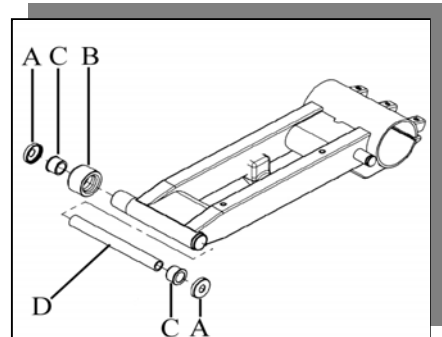


Swingarm Installation

- Position the swingarm as shown.
- The distance between the frame and left end of the swingarm is 0.5 mm; also right side distance is 0.5 mm.
- Tighten:
 - Torque -**
 - Swingarm Shaft Nuts: 110 N-m (11.0 kgf-m, 80 ft-lb)**

Swingarm Bush Removal

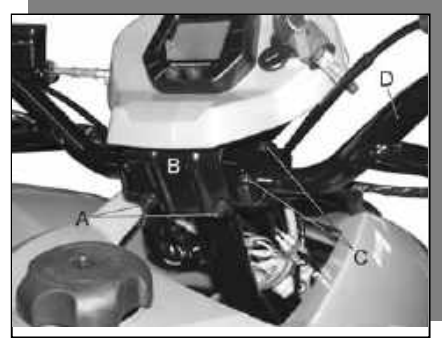
- Remove:
 - Seal Cover [A]*2
 - Chain Guide [B]
 - Bush [C]*2
 - Space Tube [D]



Steering Stem Removal

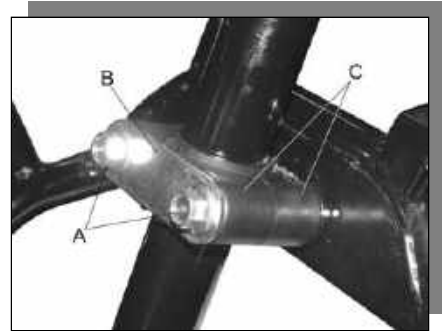
● Remove:

- Speedometer Bracket Bolts [A]
- Speedometer Bracket [B]
- Handlebar Holder Bolts [C]
- Handlebar [D]
- Front Cover (see Frame Chapter)



● Remove:

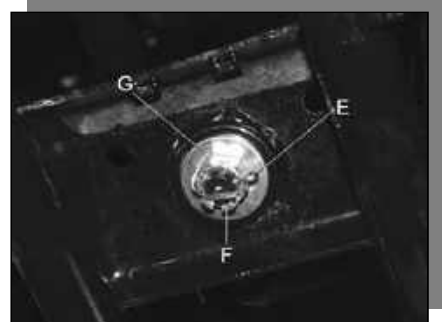
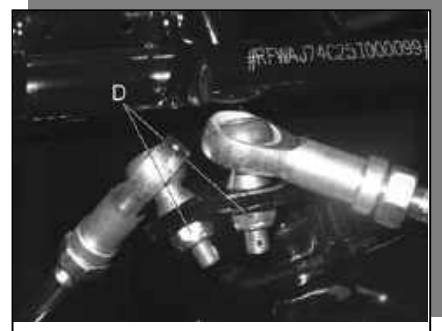
- Steering Clamp Bolts [A]
- Steering Clamp Support Plate [B]
- Steering Clamp [C]
- Tie-Rod End Nuts [D]
- Steering Stem Cotter Pin [E] and Nut [F]
- Washer [G]



CAUTION

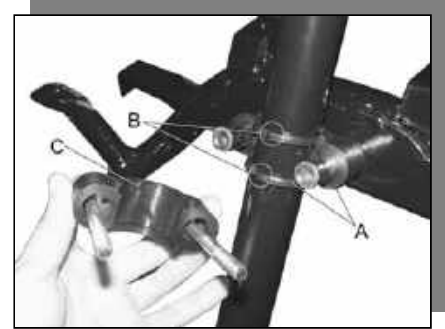
Do not loosen the locknut at the ends of the tie-rod adjusting sleeve, or the toe-in of the front wheels will be changed.

● Pull the steering stem out of the frame.



Steering Stem Installation

- Lubricate the steering stem clamp, grease seals, (see Steering Lubrication).
- Install the grease seals [A] facing the end [B] rearward to prevent the entry of dirt.
- Install the steering stem clamps on both grease seals fit into the grooves on the steering stem clamps [C].



- Tighten:

Torque –

Bottom End Nut: 29 N-m (3.0 kgf-m, 22 ft-lb)

Bearing Housing Bolts: 20 N-m (2.0 kgf-m, 14.5 ft-lb)

Clamp Allen Bolts: 25 N-m (2.5 kgf-m, 18.0 ft-lb)

Tie-Rod End Nuts: 47 N-m (4.8 kgf-m, 35 ft-lb)

- Inspect the toe-in if necessary.

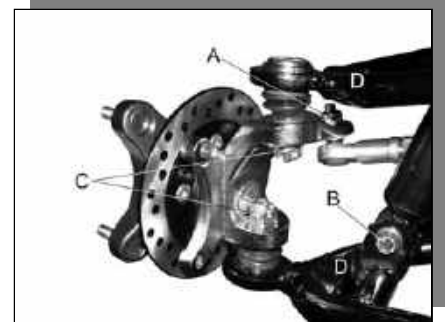
Steering Knuckle Removal

- Remove:
 - Front wheel and Hub (see Wheels/Tires chapter)
 - Brake Hose Clamp
 - Tie-Rod End Nut [A] and Tie-Rod End

CAUTION

Do not loosen the locknuts at the ends of the tie-rod adjusting sleeve, or the toe-in of the front wheels will be changed.

- Remove:
 - Front Shock Absorber Clamp Bolt [B] and Nut
 - Knuckle Joint Bolt [C] and Nut
 - Suspension Arm [D]



Steering Knuckle Installation

- Clean the sealing surface [A] and the hole [B].
- Grease the sealing surface.
- Tighten:

Torque –

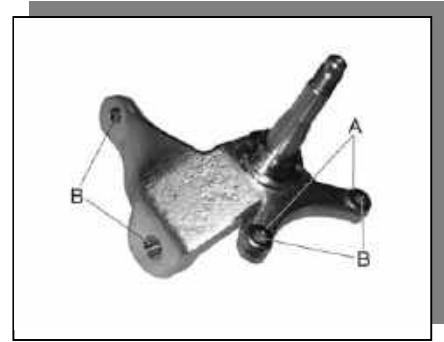
Suspension Arm Pivot Bolts: 88 N-m (9.0 kgf-m, 65 ft-lb)

Steering Knuckle Joint Nut: 42 N-m (4.3 kgf-m, 35 ft-lb)

Front Shock Absorber Clamp Nut:

52 N-m (5.3 kgf-m, 38 ft-lb)

Tie-Rod End Nut: 47 N-m (4.8 kgf-m, 35 ft-lb)

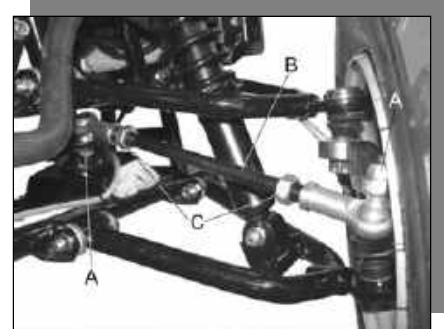


Tie-Rod Removal

- Remove:
 - Tie-Rod End Nuts [A]
 - Tie-Rod [B]

CAUTION

When removing the tie-rod, be careful not to bend it. Do not loosen the locknut [C] at the end of the tie-rod adjusting sleeve, or the toe-in of the front wheel will be changed.



Tie-Rod Installation

- The right and left tie-rods are identical.
- Install the tie-rod with the flattened area [A] located inboard.
- Tighten:
 - Torque - Tie-Rod End Nuts: 47 N-m (4.8 kgf-m, 35 ft-lb)**
- Inspect the toe-in if necessary

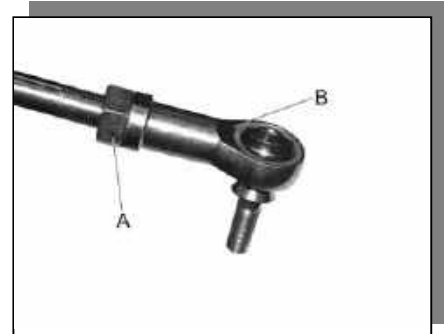


Tie-Rod End Removal

- Remove the tie-rod (see Tie-Rod Removal)
- Holding the tie-rod flattened area, loosen the locknut [A] and unscrews the tie-rod end [B].

NOTE

- The while locknut on the tie-rod has left-hand threads. Turn the wrench clockwise for loosening.



CAUTION

Do not remove the grease seal. It is packed with grease.

Tie-Rod End Installation

- Install the tie-rod ends so that the tie-rod has the correct length [A], and the both visible thread length [B] make equal.

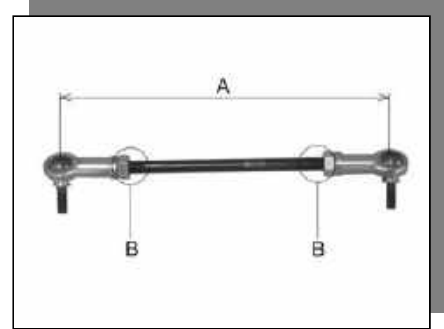
Tie-Rod Length Standard: 385 mm

- Tighten:

Torque –

Tie-Rod adjusting Sleeve Locknut:

27 N·m (2.8 kgf·m, 20 ft·lb)



Steering Inspection

- Turn the handlebar left and right, and check the steering action.
- ★ If the steering is not smooth, or if the steering binds or catches before the stop, lubricate the steering.

NOTE

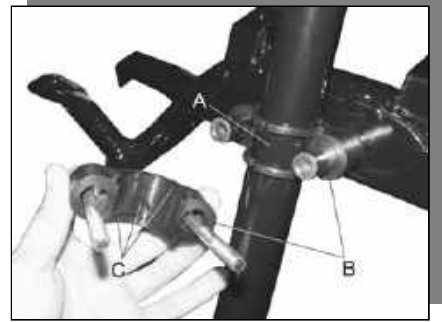
- The cables and wires will have some effect on the steering action which must be taken into account.
- Check the steering action again.
- ★ If the steering lubrication does not remedy the problem, inspect the steering stem warp, steering stem clamps, and tie-rod bearings.
- ★ If you feel looseness, or if the steering rattles as it turns, check the tightness of the steering bolts and nuts.
- Tighten loose bolts and nuts to the specified torque (see Exploded View), and check the steering action again.
- ★ If the steering action does not change by tightening the bolts and nuts, inspect the steering stem clamps, steering stem bearing, tie-rod bearings, and steering knuckle joints.

Steering Stem Warp

- Remove the steering stem (see Steering Stem Removal).
- Check the steering stem for straightness.
- Use a straightness along the stem.
- ★ If the steering stem is bent, replace the steering stem.

Steering Lubrication

- Lubricate the steering stem clamps.
- Remove the steering stem (see Steering Stem Removal).
- Wipe all the old grease off the steering stem, and clamps, and out of the grease seals.
- Apply grease to the steering stem [A], grease seal lips and mating surface [B] of the clamp, and pack the grooves [C] in the clamp with grease.



Steering Stem Clamp Inspection

- Inspect the steering stem clamps [A].
- ★ If roughness, excessive play, or seizure is found, replace both clamps.



Tie-Rod End and Steering Knuckle Joint Inspection

- Inspect each spherical bearing [A].
- ★ If roughness, excessive play, or seizure is found, replace the tie-rod end, or steering knuckle joint.
- ★ If damage, wear or deterioration is found, replace the tie-rod end.



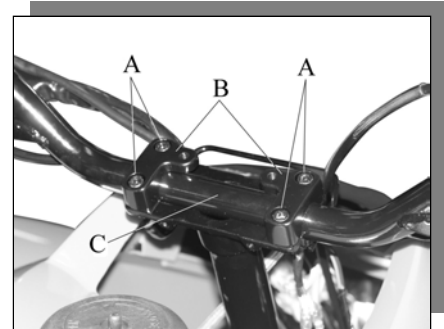
Handlebar Removal

● Remove:

- Throttle Switch (see Steering Stem Removal)
- Front Brake Master Cylinder
- Left-hand Switch Housing
- Handlebar Cover Screw
- Handlebar Cover

● Remove:

- Handlebar Holder Bolts [A]
- Handlebar Holders [B]
- Handlebar [C]



Handlebar Installation

- Install the handlebar so that the angle of the handlebar matches the angle of the steering stem as shown.
- Tighten the holder rear bolts first [A] and then the front bolts [B].

Torque –

Handlebar Holder Bolts: 27 N-m (2.8 kgf-m, 20 ft-lb)

- If the holder is correctly installed, there will be no gap at the rear and an even gap at the front after tightening.



Frame

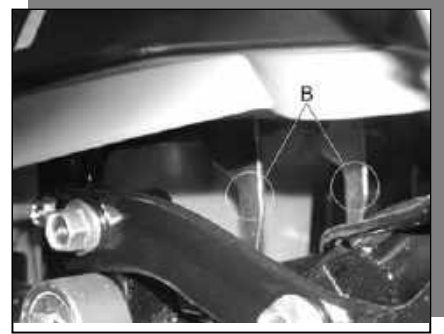
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Seat

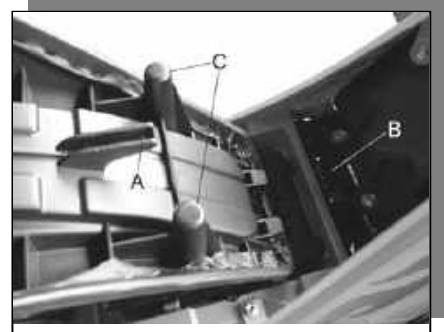
Seat Removal

- To remove the seat [A] by pulling the seat latch lever [B] up and then pulling the seat up to the rear.



Seat Installation

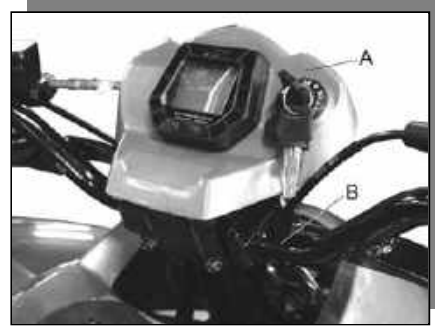
- Slip the seat hook [A] under the brace [B] on the frame, and put the stoppers [C] into the holes on the frame.
- Push down the rear parts of the seat until the lock clicks.



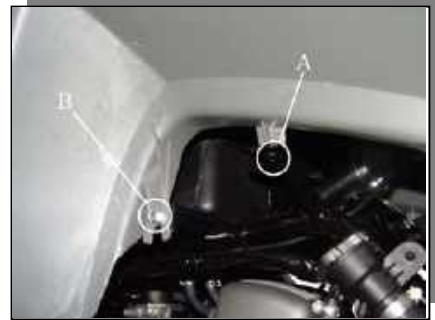
Front and Rear Fenders

Front Fender Removal

- Remove:
 - Handlebar Cover [A] (see Handlebar Removal)
 - Handlebar [B]
 - Fuel Tank Cap



- Remove:
 - Front Fender Screws [A]*2
 - Front Fender Bolts [B]*2 [C]*6
 - Front Fender



Front Fender Installation

- Please reverse the Removal steps to install.

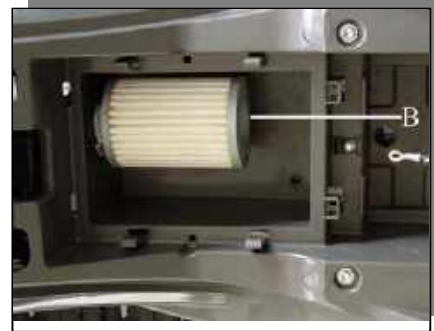
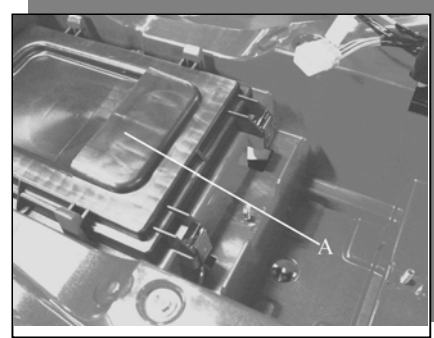
Rear Carrier Removal

- Remove:
 - Rear Carrier Bolts [A], [B]*4
 - Rear Carrier

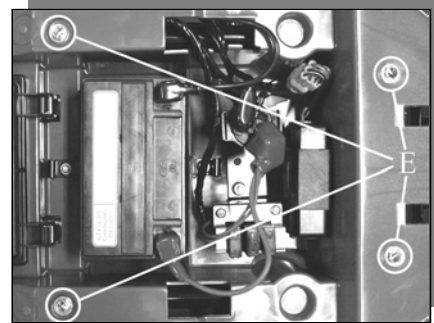
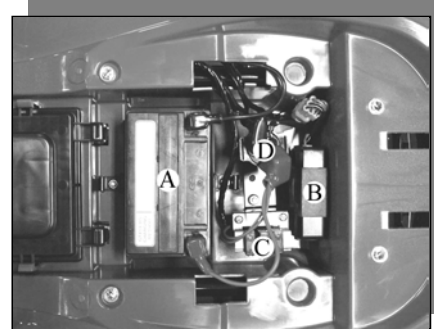


Rear Fender Removal

- Remove:
Air Cleaner Cover [A]
Air Cleaner [B]



- Remove:
Battery [A]
CDI Unit [B]
Fuse [C]
Starter Relay [D]
Rear Fender Bolts [E]
Rear Fender Bracket [F]
Rear Fender

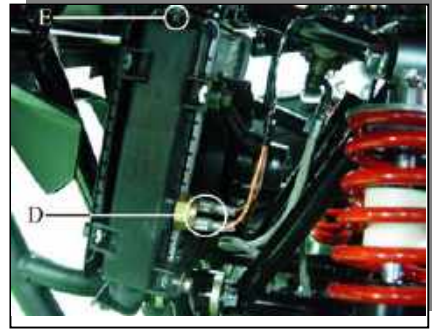


Rear Fender Installation

- Please reverse the Removal steps to install.

Radiator Removal

- Remove:
 - Water Tube [A], [B] and [C]
 - Connector [D]
 - Fan Connector
 - Radiator Bolts [E] *2
 - Radiator



- Remove:
 - Radiator Cover Bolts [A]*4
 - Radiator Protector [B]

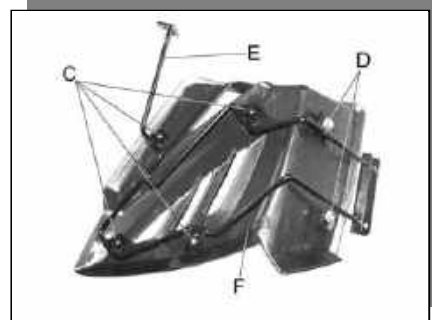
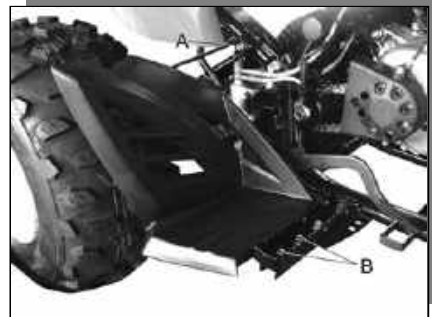


Radiator Installation

- Please reverse the Removal steps to install.

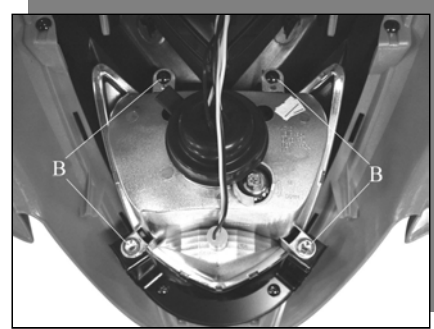
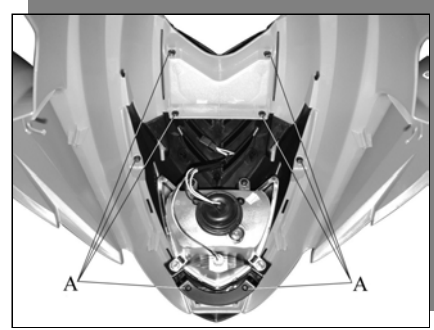
Foot Steps Removal

- Remove:
 - Step Bracket Bolts [A] [B]
 - Bracket Screw [C]
 - Bracket Bolts [D]
 - Step Bracket [E]
 - Step [F]



Headlight Holder Removal

- Remove:
 - Handlebar (see Handlebar Removal)
 - Front Fender (see Front Fender Removal)
 - Headlight Holder Screw [A]
 - Headlight Bolts and Screw [B]
 - Headlight Holder



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ENGINE REMOVAL

- Drain engine oil and transmission oil.
- Remove frame covers (Refer to the “Frame” chapter).
- Remove the carburetor.
- Remove the Exhaust Pipe.

Torque Value:

Engine Oil Drain Plug	1.5kgf-m
Exhaust Pipe Nut	1.8 – 2.2kgf-m



- Disconnect the water hose from water pump cover.



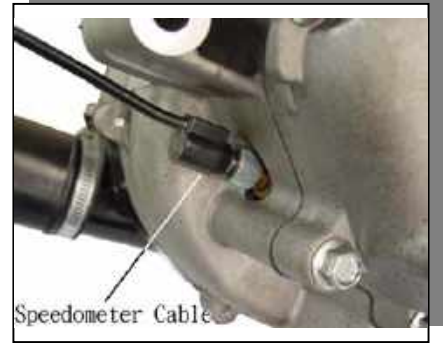
- Remove the bolt at the thermostat and disconnect the thermo sensor wire, then disconnect the thermostat from the cylinder head.



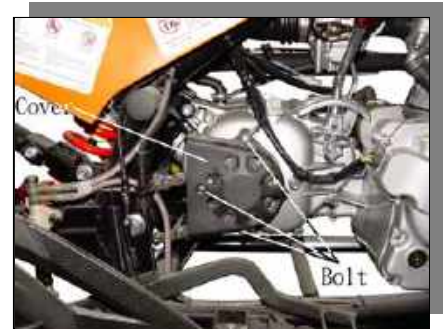
- Remove the bolt at the drive select arm and then disconnect the drive select arm from engine assembly.



- Disconnect the speedometer cable.



- Remove the three bolts at the drive sprocket cover and then remove the drive sprocket cover.



- Remove the two bolts on the drive sprocket.
- Remove the drive sprocket and washer.



- Slide the rubber sleeve back to expose the starter motor wire nut.



- Remove the starter motor wire nut for disconnect the starter motor wire.



Remove the A.C. Generator, pulser and gear change switch couplers.

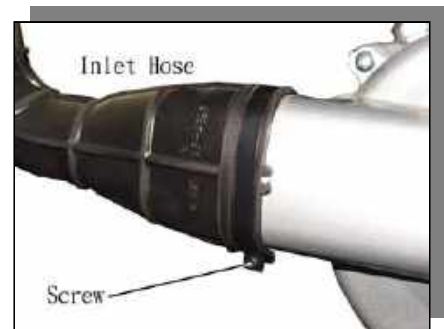
- Disconnect the spark plug cap.



- Unscrew the clamp and then disconnect the outlet hose from the left crankcase cover.



- Unscrew the clamp and then disconnect the inlet hose from the left crankcase cover.



- Remove the left foot step and the left foot holder (refer to “Frame” chapter).
- Remove the drive select lever.



- Remove the three bolts and nuts for remove the left and right engine brackets.



- Remove the engine assembly to the left side of the machine.

CYLINDER HEAD/VALVES

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The cylinder head can be serviced with the engine installed in the frame. When assembling, apply molybdenum disulfide grease or engine oil to the valve guide movable parts, valve arm and camshaft sliding surfaces for initial lubrication.

The camshaft is lubricated by engine oil through the cylinder head engine oil passages. Clean and unclog the oil passages before assembling the cylinder head.

After disassembly, clean the removed parts and dry them with compressed air before inspection.

After removal, mark and arrange the removed parts in order.

When assembling, install them in the reverse order of removal.

SPECIFICATIONS

Item		Standard (mm)	Service limit (mm)
Valve clearance (cold)	IN	0.10 ± 0.02	---
	EX	0.15 ± 0.02	---
Cylinder head compression pressure		15kgf-cm ²	---
Cylinder head warpage		0.05	0.05
Camshaft cam height	IN	34.205 ± 0.05	34.14
	EX	34.076 ± 0.05	34.01
Valve rocker arm to shaft clearance		0.005 – 0.033	0.10
Valve stem-to-guide clearance	IN	0.010 – 0.035	---
	EX	0.015 – 0.050	---
Valve spring free length	IN	31.0	30.0
	EX	41.0	40.0

TORQUE VALUES

Cylinder head cover bolt 0.8 – 1.2kgf-m

Cam shaft hold nut 2.8 – 3.2kgf-m

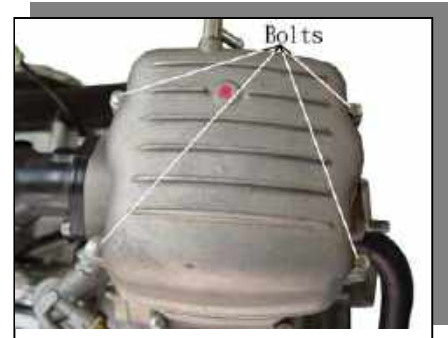
Tappet adjusting nut 1.4 – 1.8kgf-m

Apply engine oil to threads

CYLINDER HEAD COVER

REMOVAL

- Remove the four bolts at the cylinder head cover and then remove the cylinder head cover.



INSTALLATION

- Install a new cylinder head cover O-ring and install the cylinder head cover.
- Install and tighten the cylinder head cover bolts.

Torque: 0.8_ 1.2kgf-m

NOTE:

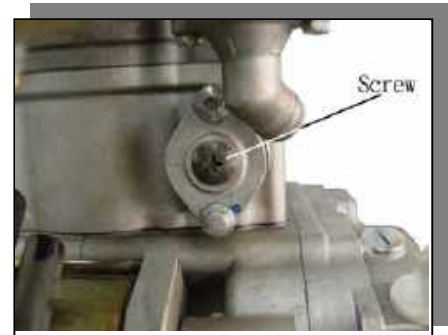
Be sure to install the O-ring into the groove properly.



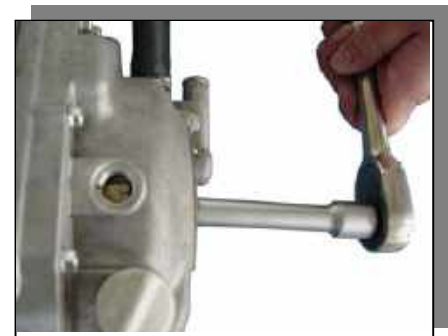
CAMSHAFT/CAMSHAFT HOLDER

REMOVAL

- Remove the cylinder head cover. (Refer to the cylinder head cover removal)
- Remove the cam chain tensioner cap screw and the O-ring.



- Turn the cam chain tensioner screw clockwise to tighten it as show.

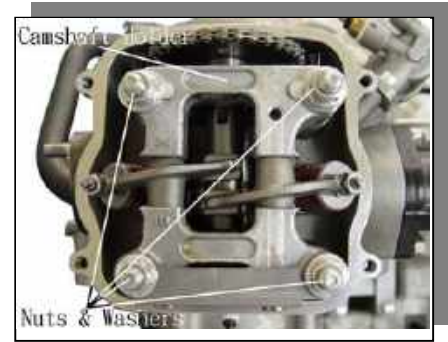


- Remove the four camshaft holder nuts and washers.

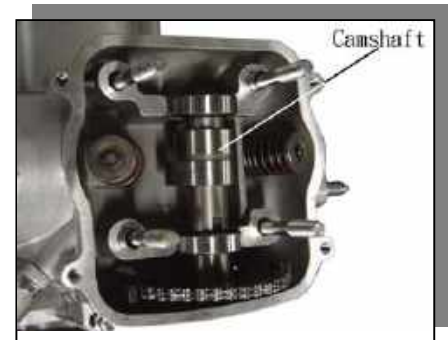
NOTE:

Diagonally loosen the cylinder head nuts in 2 or 3 times.

- Remove the camshaft holder and dowel pins.



- Remove the camshaft gear from the cam chain and remove the camshaft.

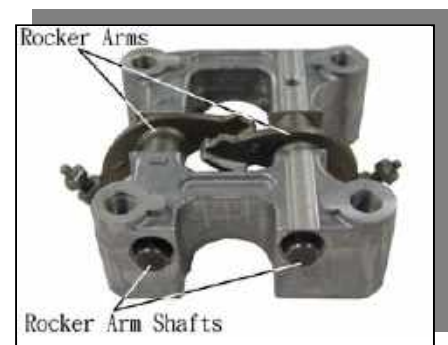


CAMSHAFT HOLDER DISASSEMBLY

- Take out the valve rocker arm shafts.
- Remove the valve rocker arms and arm shafts.

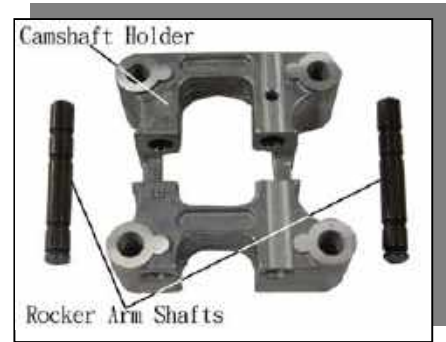
Torque Valves

Adjuster Nut 1.4 – 1.8kgf-m

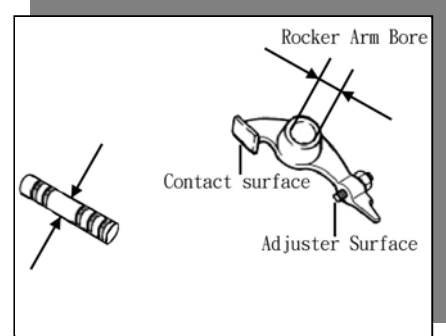


CAMSHAFT HOLDER INSPECTION

- Inspect the camshaft holder for wear or damage.
- Inspect the rocker arm shaft for blue discoloration or grooves.
- If any defects are found, replace the rocker arm shaft with a new one and then inspect lubrication system.



- Inspect the rocker arm bore, cam lobe contact surface and adjuster surface for wear/pitting/scratches/blue discoloration. If any defects are found, replace the rocker arm shaft with a new one and then inspect the lubrication system.



- Measure each rocker arm shaft O.D.
Service limits: $\phi 9.96$
- Measure the I.D. of each valve rocker arm.
Service limits: $\phi 10.04$ above
- Measure arm to shaft clearance.
Service limits: 0.12 above
- Replace as a set if out of specification.

CAMSHAFT HOLDER ASSEMBLY

Reverse the “CAMSHAFT HOLDER DISASSEMBLY” procedures.

NOTE:

Align the cross cutout on the exhaust valve rocker arm shaft with the bolt or the camshaft holder



CAMSHAFT INSPECTION

- Check each camshaft bearing for play or damage. Replace the camshaft assembly with a new one if the bearings are noisy or have excessive play.

- Inspect camshaft lobes for pitting/scratches/blue discoloration.
- Measure the cam lobe height.

Service Limits:

IN : 34.14mm replace if below

EX: 34.01mm replace if below

If any defects are found, replace the camshaft with a new one and then inspect lubrication system.



INSTALLATION

Reverse the "CAMSHAFT REMOVAL" procedures.

Note the following points:

- Turn the flywheel so that the "T" mark on the flywheel aligns with the index mark on the crankcase.
- Keep the round hole on the camshaft gear facing up and align the punch marks on the camshaft gear with the cylinder head surface (Position the intake and exhaust cam lobes down.) and install the camshaft onto the cylinder head. (Refer to point 3.)
- Install the camshaft dowel pins and holder.

NOTE:

Apply engine oil to the threads of the cylinder head nuts. Diagonally tighten the cylinder head nuts in 2 – 3 times.

Torque:

Cam shaft hold nut: 2.8 – 3.2kgf-m

- Turn the cam chain tensioner screw counter-clockwise to release it. Apply engine oil to a new O-ring and install it.
- Tighten the cam chain tensioner cap bolt.

NOTE:

Be sure to install the O-ring into the groove properly.

Adjust the valve clearance as following:

- Turn the flywheel clockwise so that the "T" mark on the flywheel aligns with the index mark on the right crankcase cover to bring the round hole on the camshaft gear facing up to the top dead center on the compression stroke.
- Inspect and adjust the valve clearance.

Valve Clearance: IN: 0.10 ± 0.02 mm

EX: 0.15 ± 0.02 mm

- Loosen the lock nut and adjust by turning the adjusting nut.

NOTE:

Check the valve clearance again after the lock nut is tight.



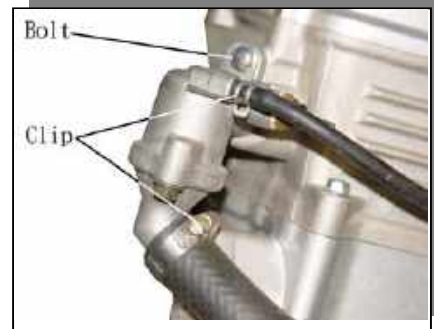
CYLINDER HEAD

REMOVE

- Remove the camshaft. (Refer to the “Camshaft Remove” section)
- Remove the carburetor and exhaust muffler..
- Remove the two bolts and then remove the carburetor intake manifold as show.



- Remove the clip to disconnect the thermostat (Remember to drain the water in the hoses first)
- Remove the bolt to disconnect the thermostat.

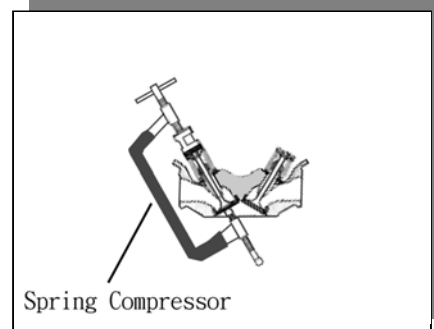


- Remove the two cylinder head bolts.
- Remove the cylinder head.



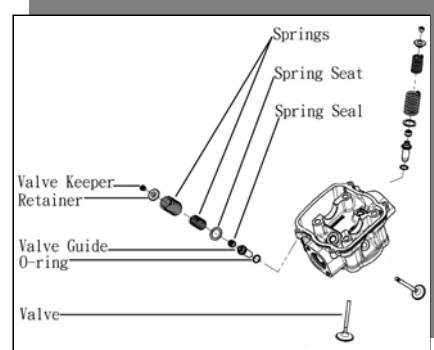
CYLINDER HEAD DISASSEMBLY

- Remove the valve keepers, retainers, springs, spring seats, spring seals, valve guides, o-rings and valves by using a valve spring compressor.



NOTE:

Be sure to compress the valve springs with a valve spring compressor. Mark all disassembled parts to ensure correct reassembly.



VALVE /VALVE GUIDE INSPECTION

- Inspect each valve for bending, burning, scratches or abnormal stem wear.

If any defects are found, replace the valve with a new one.

Check valve movement in the guide.

- Measure each valve stem O.D.
- Measure each valve guide I.D.
- Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem-to-guide clearance.

Service limits: IN : 5.420mm replace if over
EX: 5.400mm replace if over

NOTE:

If the stem-to-guide clearance exceeds the service limits, replace the cylinder head as necessary.



CYLINDER HEAD INSPECTION

- Check the spark plug hole and valve areas for cracks.
- Check the cylinder head for warpage with a straight edge and feeler gauge.

Service Limit:
0.05mm repair or replace if over

Torque Value:

Spark Plug 2.2 – 2.8kgf-m



VALVE SPRING INSPECTION

- Measure the free length of the inner and outer valve springs.

Service Limit: Inner: 30.0mm replace if below
Outer: 40.0mm replace if below



ASSEMBLY

- Install the valve spring seats and oil seal.

NOTE:

Be sure to install new oil seal.

- Lubricate each valve with engine oil and insert the valves into the valve guides.
- Install the valve springs and retainers.
- Compress the valve springs using the valve spring compressor, then install the valve cotters.

NOTE:

When assembling, a valve spring compressor must be used. Install the cotters with the pointed ends facing down from the upper side of the cylinder head.

- Tap the valve stems gently with a plastic hammer for 2 – 3 times to firmly seat the cotters.

NOTE:

Be careful not to damage the valves

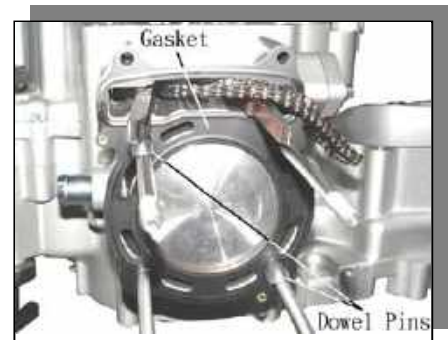
INSTALLATION

- Install the dowel pins and a new cylinder head gasket.
- Reverse the “CYLINDER HEAD REMOVAL” procedures.

Torque: Cylinder head bolt: 2.8 – 3.2kgf-m

NOTE:

Install the new cylinder head gasket each removal.



CYLINDER/PISTON

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The cylinder and piston can be serviced with the engine installed in the frame. After disassembly, clean the removed parts and dry them with compressed air before inspection.

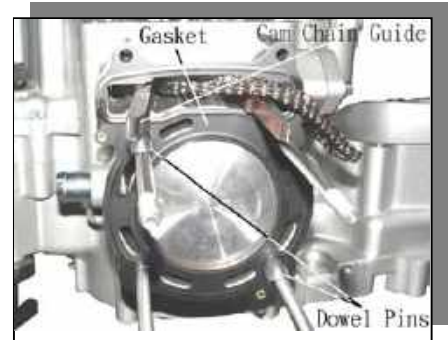
SPECIFICATIONS

		Standard (mm)	Service Limit (mm)	
Cylinder	I.D.	$\phi 72.70 - 72.715$	$\phi 72.8$	
	Warpage	---	0.050	
	Cylindricity	---	0.012	
	True roundness	---	0.012	
Piston, piston ring	Ring-to-groove clearance	Top	0.02	
		Second	0.015 - 0.050	
	Ring end gap	Top	0.10 - 0.25	
		Second	0.15 - 0.30	
		Oil ring	0.25 - 0.7	
	Piston O.D.		$\phi 72.67 - 72.66$	$\phi 72.60$
	Piston O.D. measuring position		10.0	---
	Piston-to-cylinder clearance		0.030 - 0.055	0.10
Piston pin hold I.D.		$\phi 17.002 - 17.008$	$\phi 17.04$	
Piston pin O.D.		$\phi 16.995 - 16.990$	$\phi 17.960$	
Piston-to-piston pin clearance		0.007 - 0.018	0.025	
Connecting rod small end I.D. bore		$\phi 17.010 - 17.028$	$\phi 17.05$	

CYLINDER/PISTON

REMOVAL

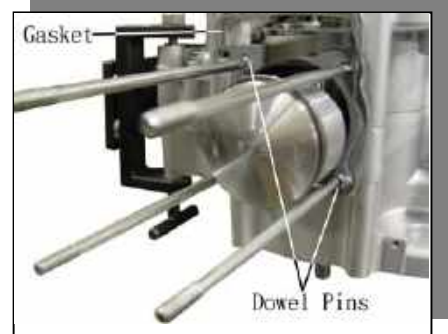
- Remove the cylinder head. (Refer to “Cylinder Head/Valves”)
- Remove the two dowel pins, cylinder head gasket and cam chain guide.
- Disconnect the water hose.
- Remove the cylinder



- Remove the cylinder gasket and dowel pins.
- Clean any gasket material from the cylinder surface.

NOTE:

Be careful not to drop foreign matters into the crankcase.

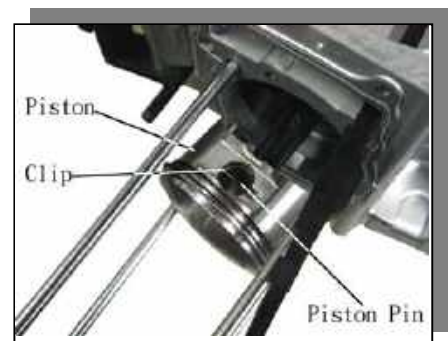


- Remove the piston pin clip.

NOTE:

Be careful to keep the piston pin clip from falling into the crankcase.

- Press the piston pin out of the piston and remove the piston.



INSPECTION

- Inspect the piston, piston pin and piston rings.
- Remove the piston rings.

NOTE:

Take care not to damage or break the piston rings during removal.

- Clean carbon deposits from the piston ring grooves.
- Inspect the piston wall for wear/scratches/damage.

If any defects are found, replace the piston with a new one.
Install the piston rings onto the piston and measure the piston ring-to-groove clearance.

Service Limits: Top: 0.09mm replace if over
2nd: 0.09mm replace if over

- Remove the piston rings and insert each piston ring into the cylinder bottom.

NOTE:

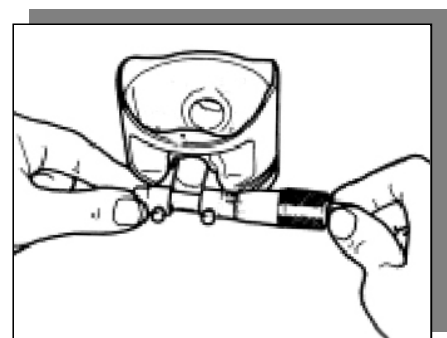
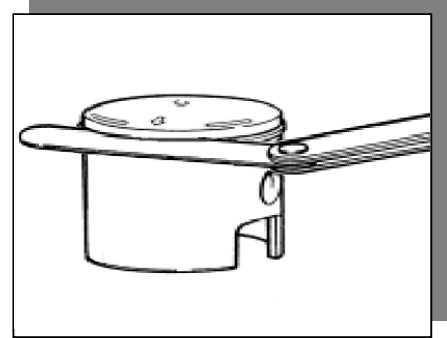
Use the piston head to push each piston ring into the cylinder

- Measure the piston ring end gap.

Service Limit: Top: 0.50mm replace if over
2nd: 0.50mm replace if over
Oil ring: 0.50mm replace if over

- Measure the piston pin hole I.D.

Service Limit: ϕ 17.04mm replace if over



- Measure the piston pin O.D.

Service Limit: ϕ 17.06mm replace if below

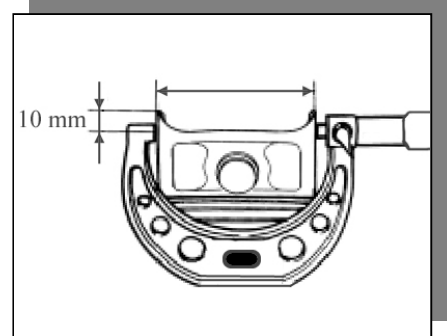


- Measure the piston O.D.

NOTE:

Take measurement at 10mm from the bottom and 90° to the piston pin hole.

Service Limit: ϕ 72.60mm replace if below



- Measure the piston-to-piston pin clearance.

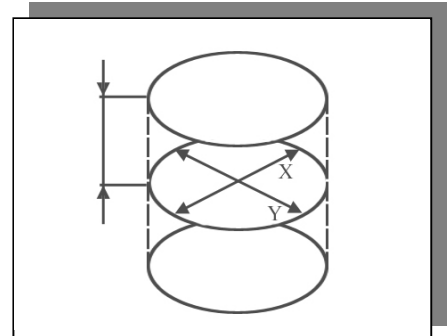
Service Limit: 0.025mm replace if over

CYLINDER INSPECTION

- Inspect the cylinder bore for wear or damage.
- Measure the cylinder I.D. at three levels of top, middle and bottom at 90° to the piston pin (in both X and Y directions).

Cylinder I.D.:

Service Limit: ϕ 72.8mm replace if over



- Measure the cylinder-to-piston clearance.

Service Limit: 0.10mm repair or replace if over

The true roundness is the difference between the values measured in X and Y directions. The cylindricity (difference between the values measured at the three levels) is subject to the maximum value calculated.

Service Limits:

True Roundness: 0.012mm repair or replace if over

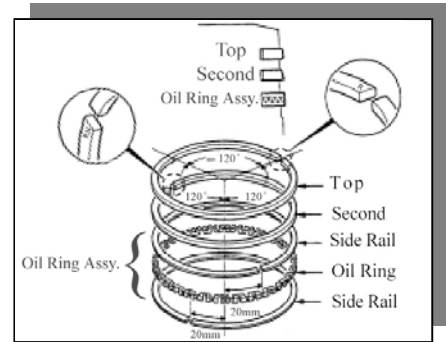
Cylindricity: 0.012mm repair or replace if over

PISTON RING INSTALLATION

- Install the piston rings onto the piston.
- Apply engine oil to each piston ring.

NOTE:

Be careful not to damage or break the piston and piston rings. All rings should be installed with the markings facing up. After installing the rings, they should rotate freely without sticking.



- Measure the connecting rod small end I.D.

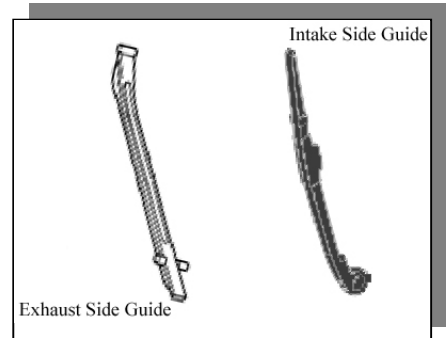
Service Limit: ϕ 17.05mm replace if over

- Measure the connecting rod to piston pin clearance.

Service Limit: 0.025mm replace if over



- Inspect the exhaust side and intake side chain guides. Wear/Damage – Replace.



PISTON INSTALLATION

- Remove any gasket material from the crankcase surface.

NOTE:

Be careful not to drop foreign matters into the crankcase.

- Install the piston, piston pin and a new piston pin clip.

NOTE:

Position the piston “IN” mark on the intake valve side.
Place a clean shop towel in the crankcase to keep the piston pin clip from falling into the crankcase.



CYLINDER INSTALLATION

- Install the dowel pins and a new cylinder gasket on the crankcase.
- Coat the cylinder bore, piston and piston rings with clean engine oil.
- Carefully lower the cylinder over the piston by compressing the piston rings.

NOTE:

Apply proper clean engine oil around cylinder wall. Be careful not to damage or break the piston rings. Stagger the ring end gaps at 120 to the piston pin.

DRIVE AND DRIVEN PULLEYS

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The drive pulley, clutch and driven pulley can be serviced with the engine installed in the frame.

Avoid getting grease and oil on the drive belt and pulley faces. Remove any oil or grease from them to minimize the slipping of drive belt and drive pulley.

SPECIFICATIONS

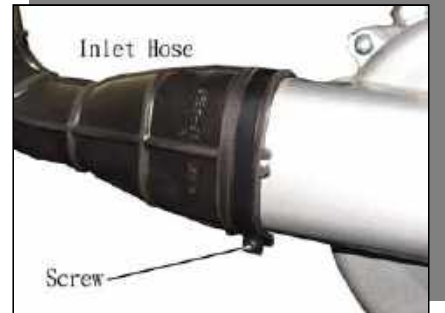
Item	Standard (mm)	Service Limit (mm)
Movable drive face bushing I.D.	ϕ 27.00 – 27.035	ϕ 27.06
Drive face collar O.D.	ϕ 26.984 – 26.96	ϕ 26.94
Drive belt width	23.6 – 24.4	22.0
Clutch lining thickness	3.963 – 4.037	2.0
Clutch outer I.D.	ϕ 153 – 153.2	ϕ 153.5
Driven face spring free length	---	131
Weight roller O.D.	ϕ 22.92 – 23.08	ϕ 22

TORQUE VALUES

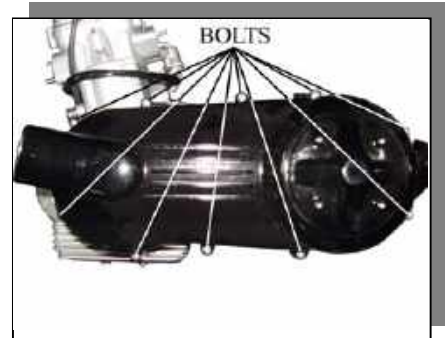
Drive face nut	5.0 – 6.0kgf-m
Clutch outer nut	5.0 – 6.0kgf-m

LEFT CRANKCASE COVER REMOVAL

- Loosen the drive belt air inlet and outlet hose band screws and disconnect them from the left crankcase cover.



- Remove the left crankcase cover bolts and left crankcase cover.
- Remove the gasket and dowel pins.



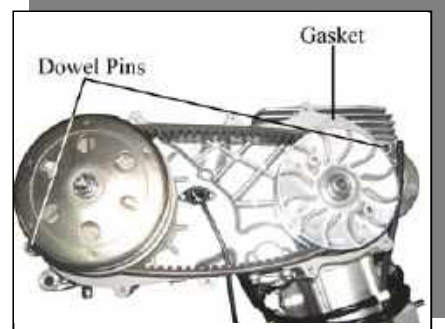
INSPECTION

- Inspect the bearing for allow play in the left crankcase cover or the bearing turns roughly – Replace.



INSTALLATION

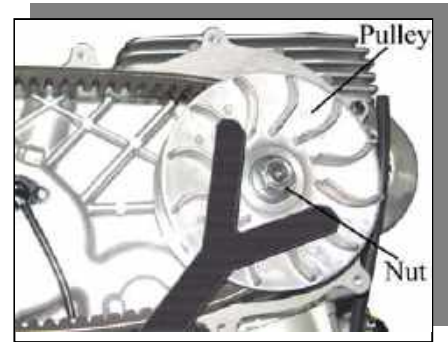
- Install the dowel pins and new gasket.
- Reverse the “LEFT CRANKCASE COVER REMOVAL” procedures.
- Install the left crankcase cover and tighten the bolts.
- Connect the drive belt air inlet and outlet hose and tighten band screws.
- Install the starting cover and outlet hose cover.



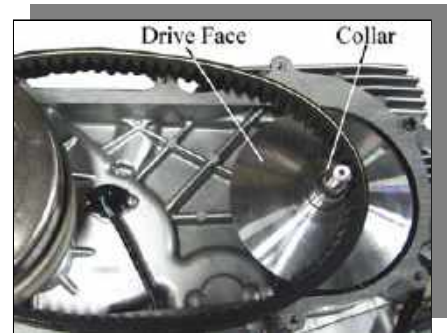
DRIVE PULLEY

REMOVAL

- Remove the left crankcase cover. (Refer to the “LEFT CRANKCASE COVER REMOVAL” section)
- Hold the drive pulley using a universal holder and remove the drive face nut and washer.
- Remove the drive pulley.



- Remove the movable drive face assembly and drive pulley collar.



DISASSEMBLY

- Remove the ramp plate.



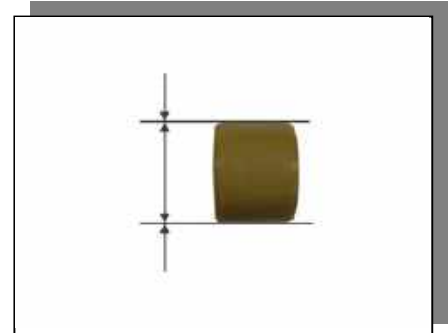
- Remove the six weight rollers.



INSPECTION

- Check each weight roller for wear or damage.
- Measure each weight roller O.D.

Service Limit: ϕ 22mm replace if below.



- Measure the movable drive face bushing I.D.

Service Limit: ϕ 27.06mm replace if over

ASSEMBLY

- Install the weight rollers into the movable drive face.
- Install the ramp plate.



- Check the drive pulley collar for wear or damage.
- Measure the O.D. of the drive pulley collar sliding surface.

Service Limit: ϕ 26.94mm replace if below



INSTALLATION

- Install the drive pulley face assembly and collar.



- Reverse the Removal procedure to install the drive pulley, wash and nut.

NOTE:

When installing the drive pulley face, compress it to let the drive belt move downward to the lowest position so that the drive pulley can be tightened. Install the washer with the "OUT SIDE" mark facing out. DO NOT get oil or grease on the drive belt or pulley faces.

CLUTCH/DRIVEN PULLEY

REMOVAL

- Remove the left crankcase cover. (Refer to “LEFT CRANKCASE COVER REMOVAL”)
- Remove the drive pulley. (Refer to “DRIVE PULLEY REMOVAL”)
- Remove the o-ring, nut, washer and clutch outer.
- Remove the clutch/driven pulley and drive belt.

SUGGESTION:

If the clutch/driven pulley is damaged, please replace the whole clutch/driven Assy. to make sure the engine functioning well.

DRIVE BELT INSPECTION

- Check the drive belt for cracks, separation or abnormal or excessive wear.
- Measure the drive belt width.

Service Limit: 22mm replace if below

NOTE:

Use specified genuine parts for replacement.

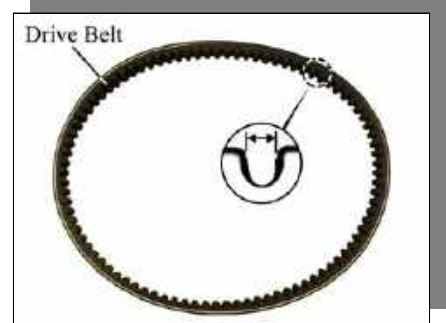
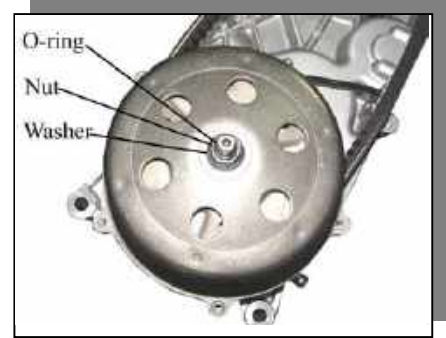
CLUTCH OUTER INSPECTION

- Inspect the clutch outer for wear or damage.
- Measure the clutch outer I.D.

Service Limit: ϕ 153.5mm replace if over

INSTALLATION

Reverse the “Removal” procedure to install the clutch/driven pulley and driven belt onto the drive shaft.



FINAL REDUCTION/TRANSMISSION SYSTEM

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The transmission system can be serviced with the engine installed in the frame. When replacing the drive shaft, use a special tool to hold the bearing inner race for this operation.

SPECIFICATIONS

Specified Oil: GEAR OIL SAE ??#

Oil Capacity:	At change :	0.8 liter
	At disassembly :	0.78 liter

TORQUE VALUES

Transmission case cover bolt

M8 x 1.25	2.6 – 3.2kgf-m
M6 x 1.25	1.0 – 1.4kgf-m

TRANSMISSION CASE COVER

REMOVAL

- Drain transmission gear oil into a clean container. (Refer to “Engine Removal” section)
- Remove drive sprocket cover and drive sprocket. (Refer to “Engine Removal” section)
- Remove the drive select lever. (Refer to “Engine Removal” section)
- Remove the transmission case cover attaching bolts.



- Remove the transmission case cover, dowel pins and gasket.
- Inspect the bearings for allow play in the transmission case cover or the bearings turn roughly.

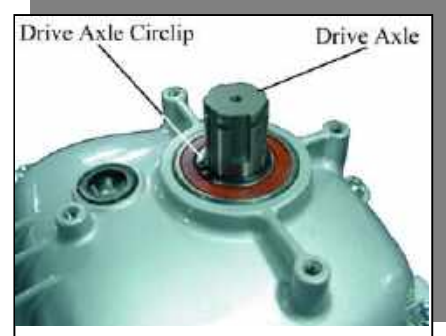
If any defects are found, replace the bearing with a new one.



TRANSMISSION CASE COVER

DISASSEMBLY

- Remove the drive axle cir-clip.
- Remove the drive axle from the transmission case cover.
- Remove the bearing.



- Inspect the bearing for allow play in the transmission case cover or the bearing turns roughly.

If any defects are found, replace the bearing with a new one.



- Inspect the drive axle gear teeth for wear or damage.



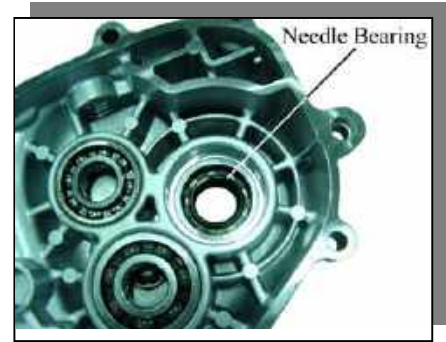
- Remove the bearing to expose the oil seal.
- Inspect the oil seal for wear or damage.

If any defects are found, replace the oil seal with a new one.



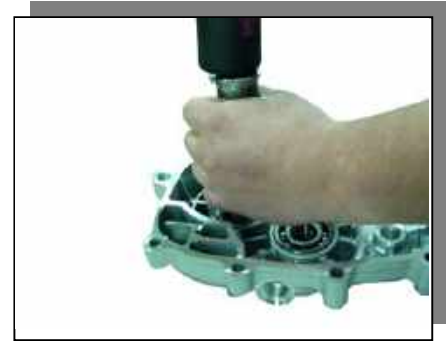
- Inspect the needle bearing for allow play in the transmission case cover or the bearing turns roughly.

If any defects are found, replace the bearing with a new one.



ASSEMBLY

- Install the needle bearing.
- Install the oil seal and bearing.
- Install the bearing cir-clip.
- Install the drive axle and drive axle cir-clip.



TRANSMISSION

REMOVAL

- Remove the transmission cover. (Refer to “TRANSMISSION CASE COVER REMOVAL”)
- Check the transmission operation.

Unsmooth operation – Repair.

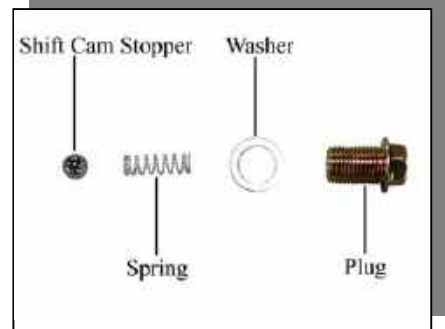
- Remove the shift shaft.



- Remove the stopper plug.



- Remove spring, washer and shift cam stopper.



- Remove the transmission guide bar.
- Measure the guide bar runout.

Out of specification – Replace.

NOTE:

Do not attempt to straighten a bent guide bar.



- Remove shift cam.
- Check the shift cam groove and shift cam gear.

Wear or damage – Replace.



- Remove the shift fork.
- Inspect the shift fork cam.

Scoring/beads/wear – Replace.



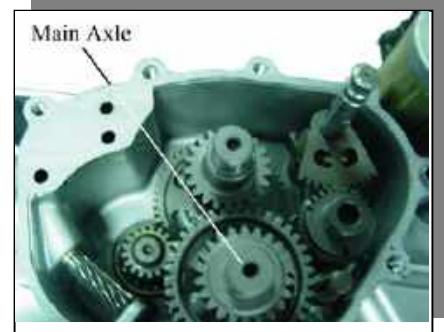
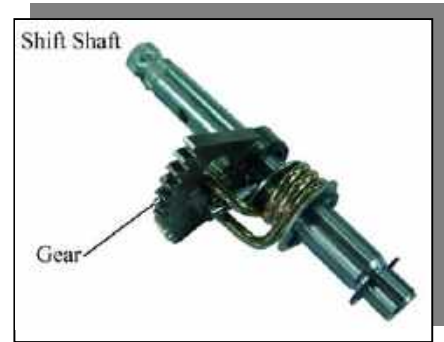
- Inspect shift shaft gear.

Damage – Replace.

- Inspect shift shaft.

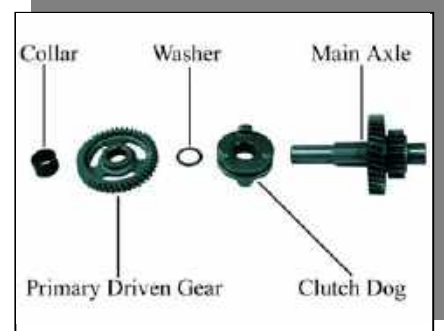
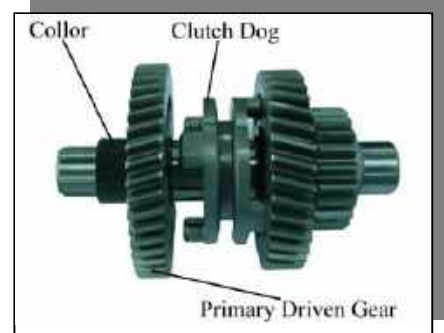
Damage/bends/wear – Replace.

- Remove the main axle.



MAIN AXLE DISASSEMBLY

- Remove the washers, collar, primary driven gear and clutch dog.



- Remove the cir-clip and then remove the washers, reverse wheel gear and needle bearing.



- Inspect the gear teeth.

Blue discoloration/pitting/wear – Replace.

- Inspect the mated dogs.

Rounded edges/cracks/missing portions – Replace.



- Remove the counter axle.



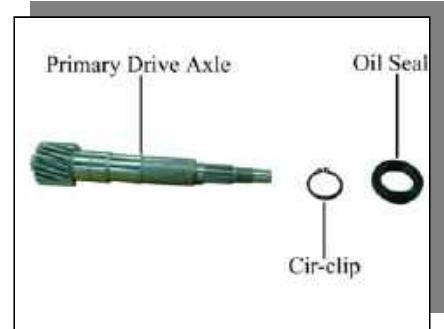
- Inspect the gear teeth.

Blue discoloration/pitting/wear – Replace.



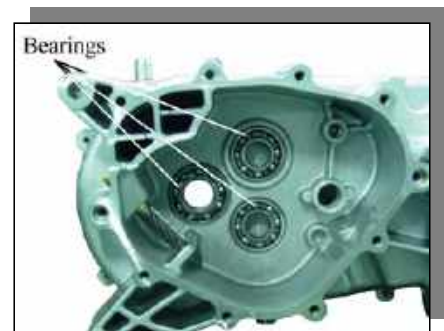
PRIMARY DRIVE AXLE REMOVAL

- Remove the clutch/driven pulley. (Refer to “DRIVE AND DRIVEN PULLEYS”)
- Remove the oil seal and cir-clip.
- Remove the primary drive axle.



- Inspect the bearings for allow play in the transmission case cover or the bearing turns roughly.

If any defects are found, replace the bearing with a new one.

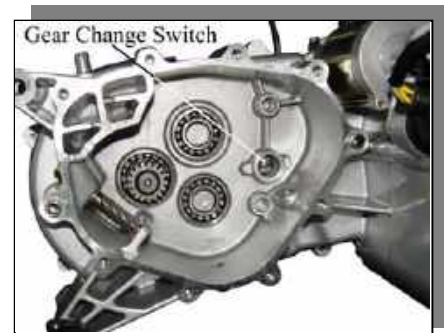


INSTALLATION

Reverse the “TRANSMISSION REMOVAL” procedure to install the primary drive axle, the counter axle, the main axle, the shift cam, the shift fork, guide bar and shift shaft.

NOTE:

Make sure that the lever on the gear change switch correctly engages with the locating slot on the shift shaft. Align the mark on the shift shaft gear with the mark on the shift cam gear.



- Fill the engine oil and transmission oil.



CRANKCASE/CRANKSHAFT/BALANCE SHAFT

SERVICE INFORMATION

GENERAL INSTRUCTIONS

This section covers crankcase separation to service the crankshaft. The engine must be removed for this operation. The following parts must be removed before separating the crankcase.

Cylinder head/Cylinder/piston/Drive and driven pulleys
/A.C. generator/Starter clutch/Oil pump

SPECIFICATIONS

	Item	Standard (mm)	Service Limit (mm)
Crankshaft	Connecting rod big end side clearance	0.15 – 0.35	0.60
	Connecting rod big end radial clearance	0.004 – 0.013	0.05
	Run out	0.03	0.10

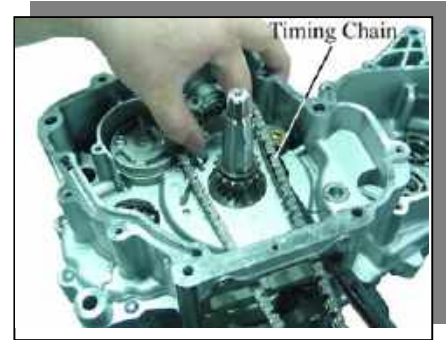
TORQUE VALUES

Crankcase bolt	1.0 – 1.4kgf-m
Cam chain tensioner slipper bolt	1.0 – 1.4kgf-m
Cam chain cover bolt	1.0 – 1.4kgf-m

CRANKCASE/CRANKSHAFT/BALANCE SHAFT

REMOVAL

- Remove the timing chain from right crankcase.



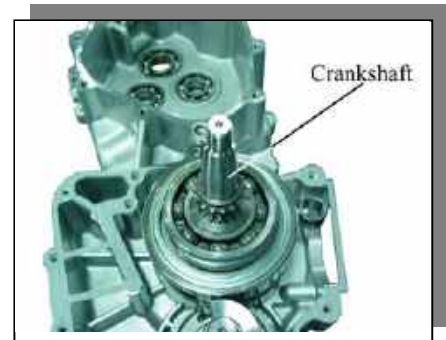
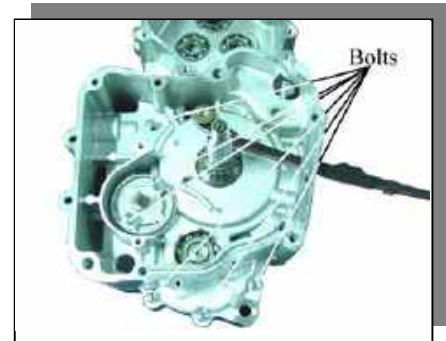
- Remove the left and right crankcase attaching bolts.
- Remove the right crankcase..

NOTE:

Do not damage the crankcase gasket surface.

- Remove the gasket and dowel pins.

- Remove the crankshaft from the left crankcase.



- Remove balance shaft from the left crankcase.



- Clean off all gasket material from the crankcase mating surfaces.

NOTE:
Avoid damaging the crankcase mating surfaces.



- Inspect the balance shaft gear teeth.

Burrs/chips/roughness/wear – Replace.



CRANKSHAFT INSPECTION

- Inspect the crankshaft gear teeth.

Burrs/chips/roughness/wear _ Replace.

- Measure the connecting rod small end I.D.

Service Limit: ϕ 17.05 mm replace if over



- Measure the crankshaft run out (A).

Service Limit: 0.10mm replace if over

- Measure the connecting rod big end side clearance (B).

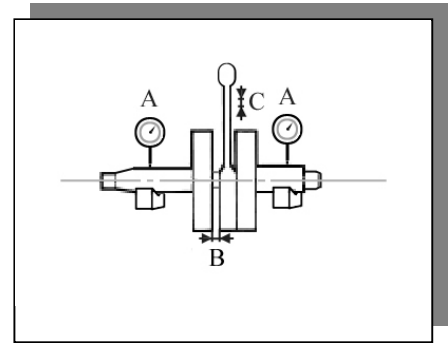
Service Limit: 0.6mm replace if over

- Measure the connecting rod big end radial clearance (C).

Out of specification (0.05 mm) – Replace the crankshaft.

- Turn the crankshaft bearings and check for excessive play.
- Measure the crankshaft bearing play.

Pitting/wear/damage – Replace



CRANKCASE/BALANCER INSTALLATION

- Install the balance shaft and crankshaft into the left crankcase.

NOTE:

Align the mark on the balance shaft with the mark on the crankshaft

- Install the dowel pins and new gasket.
- Install the right crankcase and tighten the crankcase attach bolts.
- Install the timing chain.



Electrical System

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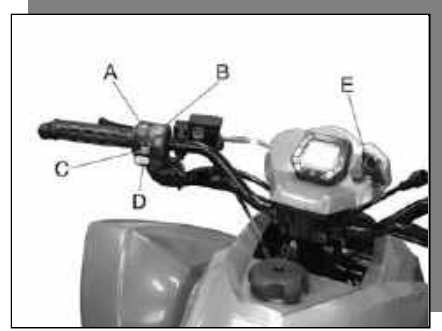
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Specifications

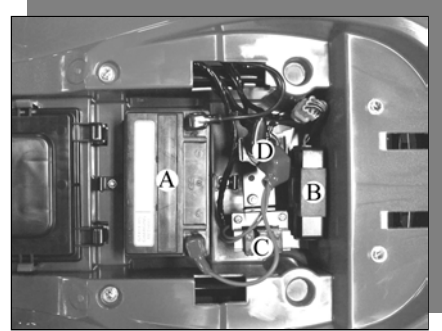
Item		Standard
Battery Capacity		12V ; 12Ah (10hr)
Alternator type		CDI
Charging voltage (Regulator/rectifier output)		14.5V \pm 0.5V
Alternator output voltage		244V
Stator Resistance	Charge Coil	0.3 – 1.0 Ω
	Pulser Coil	110 Ω \pm 15%
Ignition Coil Resistance	Primary	1.5 – 3.5 Ω
	Secondary	12 – 21 Ω
Spark plug	Gap	0.6 – 0.7 mm
Starter motor	Nominal Output	12V ; 0.6KW

Parts Location

- Light/Dimmer Switch [A]
- Switch [B]
- Indicator Switch [C]
- Starter Button [D]
- Ignition Switch [E]
- Horn Switch [F]



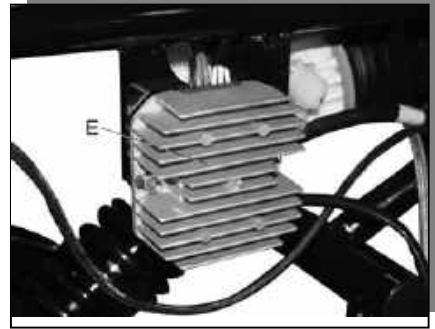
- Battery [A]
- CDI Unit [B]
- Fuse [C]
- Starter Circuit Relay [D]



- Indicator Relay [A]
- Flasher Relay [B]
- Ignition Coil [C]
- Spark Plug [D]



Regulator/Rectifier [E]



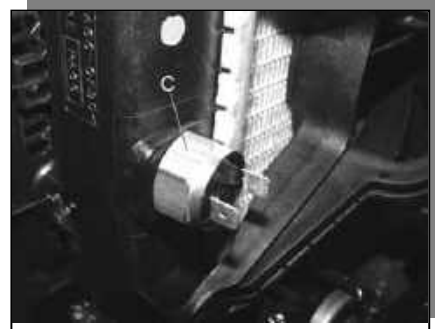
Magneto CP [A]
Starter Motor [B]



Horn [B]



Temperature Sensor[C]



Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Do not use a illumination bulb rated for other than the voltage or wattage specified in the wiring diagram, as the handle cover could be warped by excessive heat radiated from the bulb.

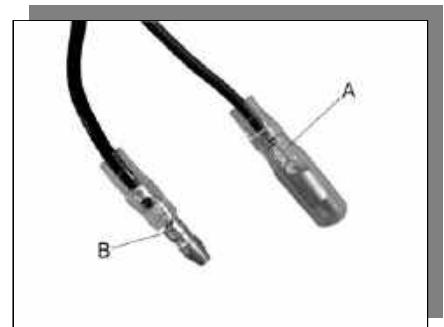
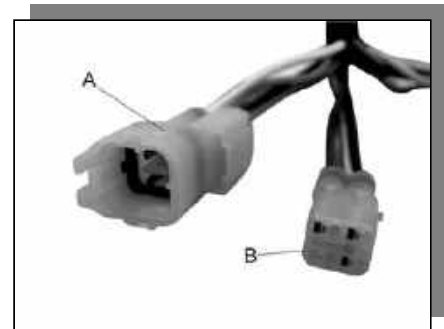
Caution

Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.

- Troubles may involve one or in some cases all items.
Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the parts is cold (at room temperature).
- Color codes:

B	Black	G	Green	P	Pink
BU	Blue	GY	Gray	PU	Purple
BR	Brown	LB	Light blue	R	Red
CH	Chocolate	LG	Light green	W	White
DG	Dark green	O	Orange	Y	Yellow

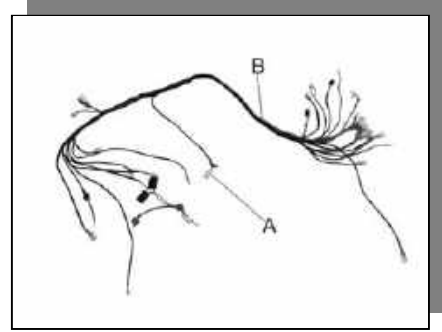
- Electrical Connectors:
Female Connectors [A]
Male Connectors [B]



Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect the hand tester between the ends of the leads.
- Set the tester to the x 1 Ω range, and read the tester.
- ★ If the tester does not read 0 Ω the lead is defective.
Replace the lead or the wiring harness [B] if necessary.



Battery Removal

- Disconnect the battery negative (-) cable [Black] first and then the positive (+) cable [red].
- Take out the battery.

Battery Installation

- Connect the positive cable first and then the negative cable.



Battery

Battery Charging

△WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals, which could ignite any battery gases.

The battery is a maintenance-free design and construction. Use of conventional lead-acid batteries is not recommended. No electrolyte or refilling water is required. Because this battery is a completely sealed type, abuse of the battery can cause an explosion.

Please adhere to the following points:

1. Follow the instructions shown on battery package for preparation and filling with battery electrolyte.
2. Never interfere with the sealed state of the battery.
3. Check the charging conditions with a voltmeter (Normal charging voltage should be 12.8V)
4. This battery may be installed on if replaces a similar sealed type battery.
5. Keep away from high temperature of fire.
6. In the case of an accident sulfuric acid may escape. Avoid contact with skin, eyes or clothing.

Charging Method

Normal Charge: 1.2A 5~10 hrs
Fast Charge : 4.0A 0.5 hrs

New Battery:

Use of conventional lead-acid batteries is not recommended.

Batteries must be

CAUTION

NEVER attempt to add electrolyte or water to the maintenance-free design and construction. Doing so will damage the case and shorten the life of the battery.

Charging Procedure

- Remove the battery (see Battery Removal).
- Connect a charger to the battery BEFORE plugging it in or turning it on.
- Set the charging rate and time according to the battery condition previously determined

CAUTION

Always remove the battery from the vehicle for charging. Do not use a high rate battery charger, as is typically employed at automotive service stations, unless the charger rate can be reduced to the level required. Charging the battery at a rate higher than specified may ruin the battery. Charging at a high rate causes excess heat, which can warp the plates and cause internal shorting. Higher-than-normal charging rates also cause the plates to shed active material. Deposits will accumulate, and can cause internal shorting

- Turn the charger off or unplug it, then disconnect it from the battery.
- Check battery condition.
- ★ If the battery condition indicates that is not fully charged, additional charging time is necessary.

Battery Test Charging

- If the battery is suspected of being defective, sulfated, or unable to take a charge, consult the table.
- To test charge a battery, perform the ordinary charging procedure and monitor the battery voltage and other signs as mentioned below.
- ★ If the battery voltage suddenly jumps to over 13 V just after the start of charging, the plates are probably sulfated. A good battery will rise to 12 V immediately and then gradually go up to 12.5 or 13 V in about 30 min. to an hour after the start of charging.
- If there does not appear to be enough sediment in a cell to short the plates, but that cell has a very low specific gravity after the battery is fully charged, the trouble may be that there is not enough acid in that one cell. In this case only, sulfuric acid solution may be added to correct the specific gravity.
- ★ If a fully charged battery not in loses its charge after 2 to 7 days; or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1% per day.

Regulator / Rectifier Output Voltage Inspection

- Check the battery condition (see Battery section)
- Warm up the engine to obtain actual alternator operating conditions.
- Check that the ignition switch is turned off, and connect the hand tester to the battery terminal.
- Start the engine, and note the voltage readings at various engines speeds with the headlight turned on and then turned off. The readings should show nearly battery voltage when the engine speed is low, and as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

Regulator/ Rectifier Output Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
25 VDC	Battery (+)	Battery (-)	14 – 15 V

- Turn off the ignition switch to stop the engine, and disconnect the hand tester.
- ★ If the regulator/rectifier output voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the battery voltage does not rise as the engine speed increases, then the regulator/rectified is defective or the alternator output is insufficient for the loads, check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by again, will result in low output.

- To check the alternator output voltage, do the following procedures.
- Disconnect the alternator connector
- Connect the hand tester. **(+) to red/white; (-) to white**
- Start the engine.
- Run it at the rpm.
- Note the voltage readings (total 3 measurements).

Alternator Output Voltage:

Minimum of 7.5 Amps at 2000RPM

CDI Output Test: (Using Peak Reading Adaptor)

Connect all CDI wires to stator wires. Disconnect CDI module wire from ignition coil primary terminal. Connect one lead to engine ground and the other to the ignition coil primary wire leading from the CDI module. Set meter to read DC Volts. Crank engine and check output of CDI wire to coil. Reconnect CDI wire to coil.

Average Output w/Digital Voltmeter with or without Peak Reader:

200 – 400 DCV

Ignition System

△WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil, or spark plug lead while the engine is running, or you could receive a severe electrical shock.

CAUTION

Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent CDI unit damage. Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and CDI unit. Use the standard regulator/rectifier, or the CDI unit will be damaged.

Spark Plug Removal/Installation

- Remove or install the spark plug [A] using the spark plug wrench from the vehicle right side.

Torque - Spark Plug: 2.2 – 2.8kgf-m

Spark Plug Cleaning/ Inspection

- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool. If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard spark plug or its equivalent.

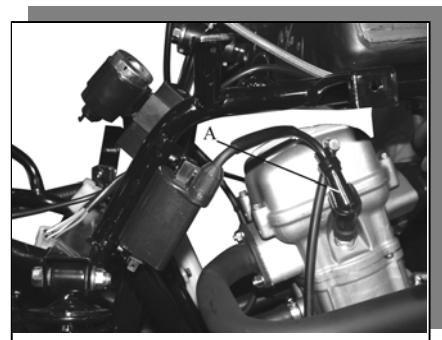
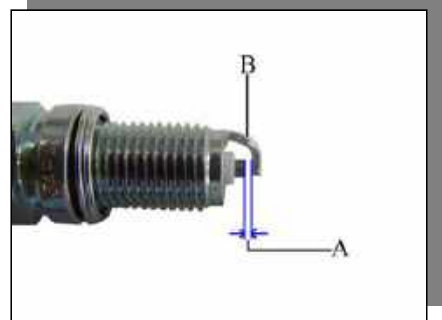
Spark Plug Gap

- Measure the gap [A] with a wire-type thickness gauge.
- If the gap is incorrect, carefully bend the side electrode [B] with a suitable tool to obtain the correct gap.

Spark Plug Gap 0.6 – 0.7mm

Ignition Coil Removal

- Remove:
 - Front Side Covers (see Frame Removal)
 - Spark Plug Cap [A]
 - Primary Lead connectors
 - Bolt*2
 - Ignition Coil



Ignition Coil Installation

- Connect the primary winding leads to the ignition coil terminals

Ignition Coil Inspection

- Remove the ignition coil.
- Measure the primary winding resistance as follows:
 - Connect the tester between the coil terminals.
 - Set the tester to the $\times 1\Omega$ range, and read the tester.
- Measure the secondary winding resistance as follows:
 - Remove the plug cap by turning it counterclockwise.
 - Connect the tester between the spark plug lead and terminal.
 - Set the tester to the $\times 1\text{ k}\Omega$ range, and read the tester.
- ★ If the hand tester does not read as specified, replace the coil.
- To install the plug cap, turn it clockwise.

Ignition Timing Test

- Remove the plug to expose the timing hole [A].
- Attach the timing light and a tachometer in the manner prescribed by the manufacturer.
- Start the engine and aim the timing light at the timing mark on the Alternator rotor.
- Run the engine at the speeds specified and note the alignment of the timing marks.



NOTE

Do not mix up the timing marks with the top mark “T”

- ★ If the ignition timing is incorrect, replace the CDI unit and the pickup coil.

Ignition Timing: (“F” Mark) BTDC $10^{\circ} \pm 2^{\circ}$ / 1600RPM

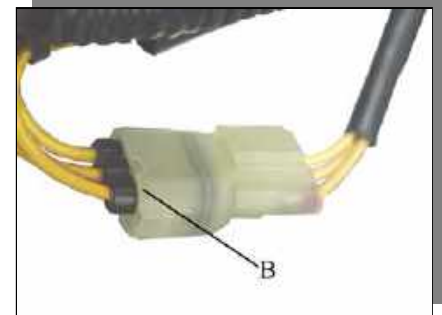
CDI Unit Inspection

CAUTION

When inspecting the CDI unit, observe the following to avoid damage to the CDI unit. Do not disconnect the CDI unit with the ignition switch on. This may damage the CDI unit. Do not disconnect the battery leads while the engine is running. This may damage the CDI unit.

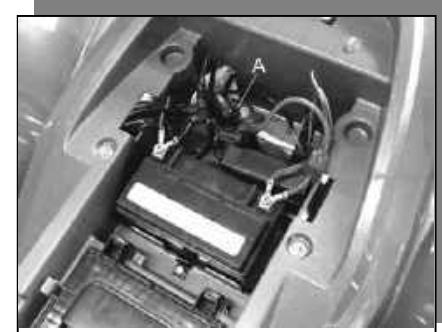


- Remove the seat (see Frame chapter).
- Remove the CDI unit [A] and disconnect the connectors [B].
- Set the hand tester to the $\times 1k\Omega$ range and make the measurements shown in the table.
- ★ If the tester readings are not as specified, replace the CDI unit.



Starter Relay Inspection

- Remove:
 - Seat (see Frame chapter)
 - Starter Relay [A]
- Connect the hand tester and 12V battery to the starter relay as shown.
- If the relay does not work as specified, the relay is defective, replace the relay.



Testing Relay

Hand Tester Range: $\times 1\Omega$ range

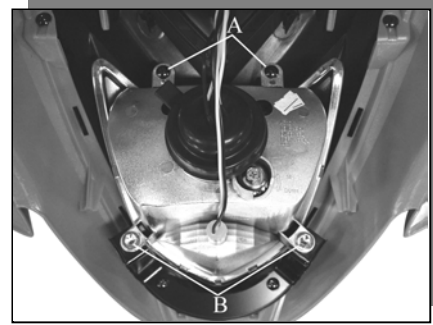
Criteria: When battery is connected $\rightarrow 0\Omega$

When battery is disconnected $\rightarrow \infty\Omega$

Lighting System

Headlight Bulb Replacement

- Remove:
 - Bulb Holder Screws [A]*2
 - Bulb Holder Bolts [B]*2
 - Bulb Holder
 - Bulb



- Turn the holder counterclockwise and pull it out.
- Be sure the socket is clean.
- Insert the new bulb by aligning the tang with the notch in the headlight unit.
- Push the holder in, turn it clockwise, and release it, it should lock in position.

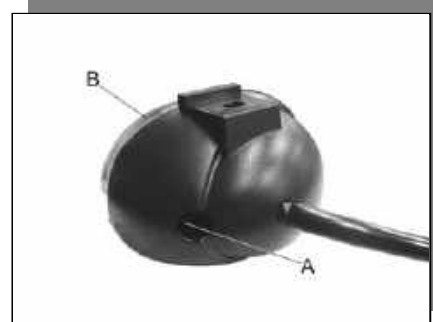


Turn Signal Bulb Replacement

- Remove:
 - Turn Signal Connector [A]
 - Turn Signal Screw [B]
 - Turn Signal [C]



- Remove:
 - Turn Signal Lens Mounting Screws [A] and Nuts
 - Turn Signal Lens [B]

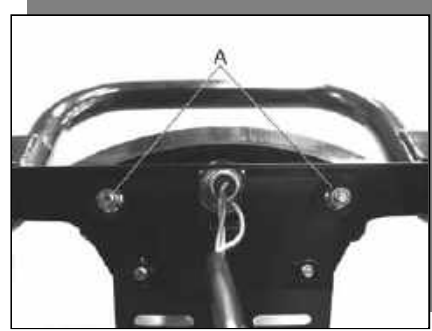


- Remove the bulb [A] by turning it counterclockwise.
- Insert the new bulb by turning it clockwise.



Taillight Bulb Replacement

- Remove:
 - Taillight Holder Nut [A]
 - Taillight



- Remove:
 - Taillight Lens Screws [B]
 - Taillight Lens [C]



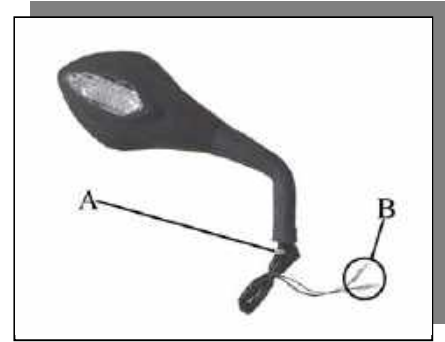
- Turn the Taillight Bulb [A] counterclockwise to Remove it.
- Insert a new bulb by turning it clockwise.



Rear-View Mirror Replacement

- Loosen the nut [A] anti-clockwise and disconnect the front indicator light wire [B] to remove the mirror.
- Reverse above procedure to assemble the new mirror.
- Be sure to connect wiring with correct color as following chart.

Color	Mirror Wiring	Wiring Harness
L-Mirror	Green	Green
	Black	Black
R-Mirror	Green	Brown
	Black	Black



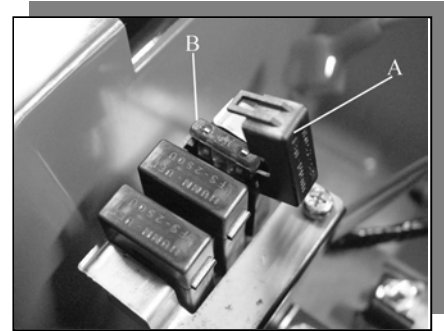
Neutral Light Bulb Replacement

- Please refer the Headlight Bulb Replacement

Fuses

Main Fuse Removal

- Remove the seat (see Frame chapter)
- Remove the fuse case cap [A] and take out the fuse [B].



Fuse Inspection

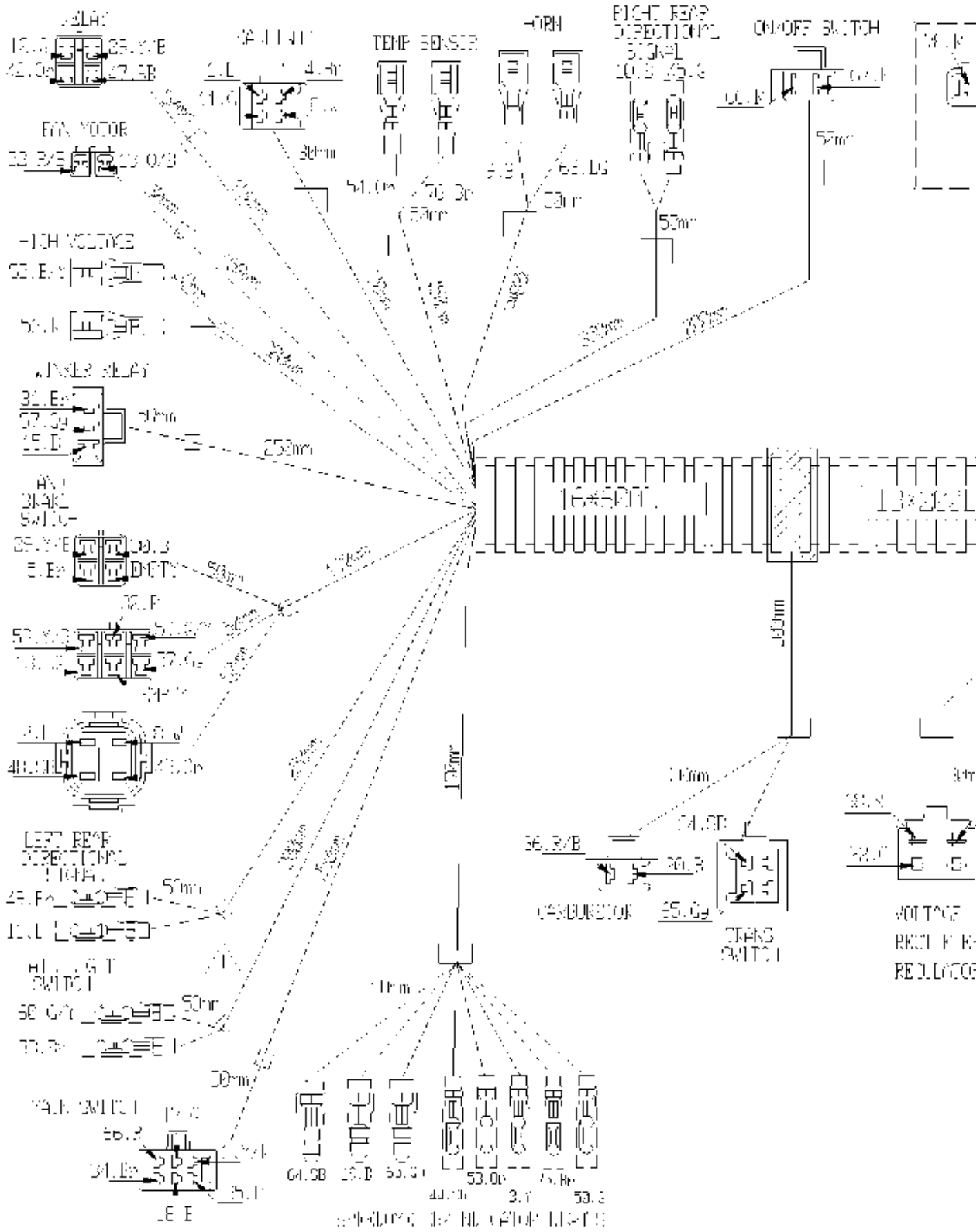
- Inspect the fuse element [A]
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.



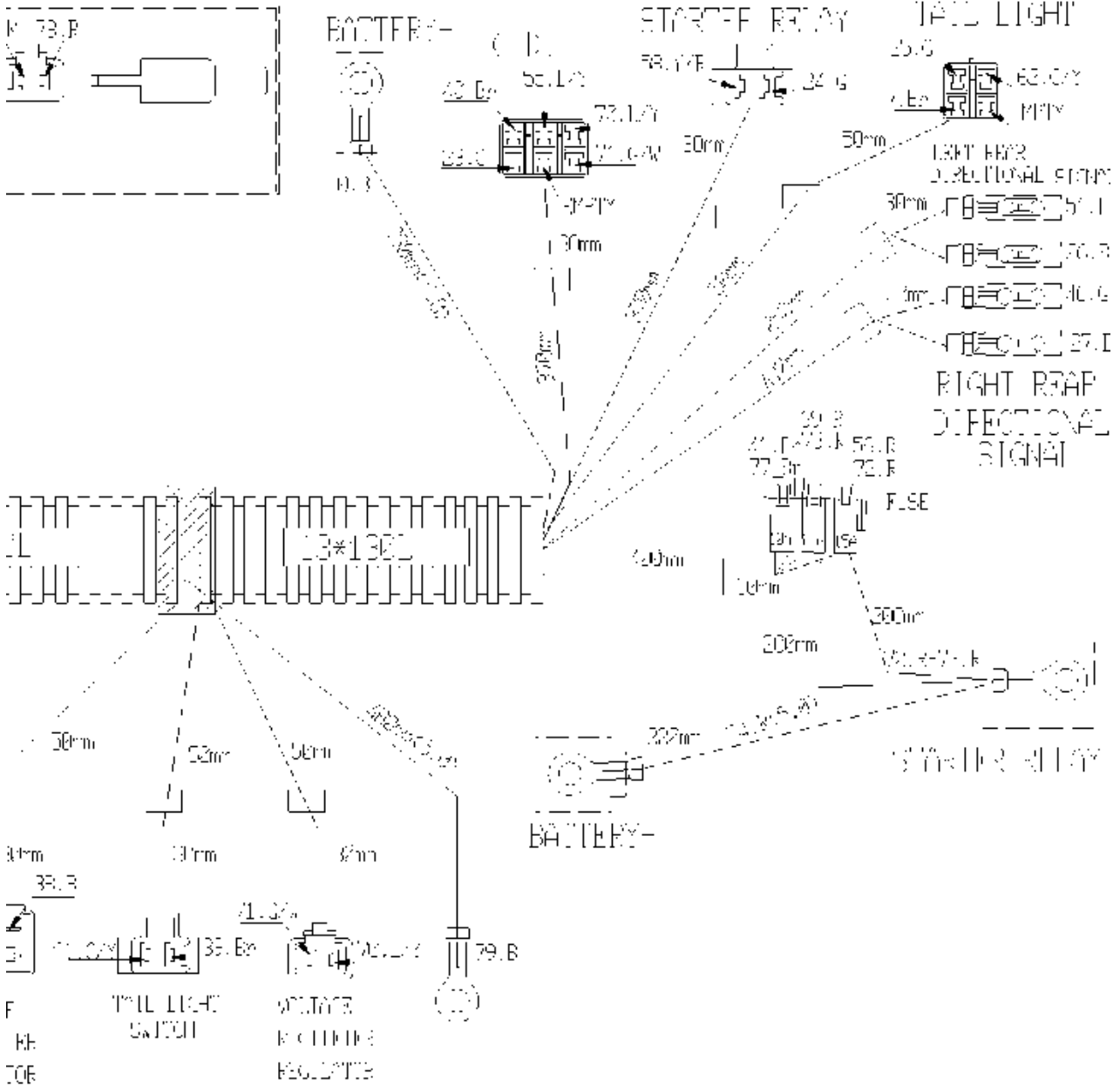
CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Wiring Diagram



Wiring Diagram



NOTE:

Appendix

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Considerations for Various Riding Conditions

This vehicle has been designed and manufactured to operate under a wide range of riding conditions. However, it is not feasible to anticipate all of the conditions under which this vehicle might be used. Extremes of temperature, altitude, and riding usage may make changing some carburetor parts or the spark plug desirable to maintain the vehicle in peak operating condition.

Carburetor:

Some an alteration may be desirable for good performance under different riding conditions when proper mixture is not obtained after the carburetor has been adjusted, and all parts cleaned and found to be functioning properly.

If the engine still exhibits symptoms of overly rich or lean carburetion after all maintenance and adjustments are correctly performed, the main jet can be replaced with a smaller or larger one. A smaller numbered jet gives a leaner mixture and a larger numbered jet a richer mixture.

Carburetor Pilot Screw Adjustment:

Note:

Pilot screw is covered by a welsh plug. Plug removal will be required to perform these procedures.

- Start engine and warm it up to operating temperature (about 10 minutes).
- With engine off, turn pilot screw in (clockwise) until lightly seated.

Note:

Do not tighten the pilot screw forcefully against the seat or the screw and/or seat will be permanently damaged.

- Connect an accurate tachometer that will read in increments of + or – 50 RPM. Start engine.
- Set idle speed to 1600 RPM.

Note:

Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.

- Slowly turn mixture screw clockwise using the pilot screw wrench until engine begins to miss.
- Slowly turn mixture screw counterclockwise until idle speed increases to maximum RPM. Continue turning counterclockwise until idle RPM begins to drop.
- Center the pilot screw between the points in Step 5 and 6.



- Readjust idle speed to specification.

Note:

Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.

Idle Speed Adjustment

- Start engine and warm it up thoroughly.
- Adjust idle speed by turning the idle adjustment screw in (clockwise) to increase or out (counterclockwise) to decrease RPM.

Note:

Adjusting the idle speed affects throttle cable freeplay and electronic throttle control (ETC) adjustment. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.

Idle Speed: 1600 +/- 100 RPM

Spark Plug:

The spark plug ignites the fuel and air mixture in the combustion chamber. To do this effectively and at the proper time, the correct spark plug must be kept clean and the gap adjusted.

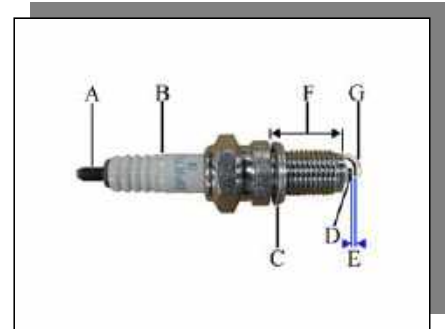
Tests have shown the plug listed in the General Information chapter to be the best plug for general use.

Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of the correct heat range is used should be determined by removing and inspecting the plug.

Terminal [A]	Insulator [B]
Gasket [C]	Center Electrode [D]
Gap [E] (0.6 – 0.7 mm)	Reach [F]
Side Electrode [G]	

When a plug of the correct heat range is being used, the electrodes will stay hot enough to keep all the carbon burned off, but cool enough to keep from damaging the engine and the plug itself. This temperature is about 400 ~ 800 °C (750 ~ 1,450 °F) and can be judged by noting the condition and color of the ceramic insulator around the center electrode. If the ceramic is clean and of a light of a light brown color, the plug is operating at the right temperature.

A spark plug for higher operating temperatures sometimes may be needed for severe conditions, such as continuous high-speed riding, or towing heavy loads. Such a plug is designed for better cooling efficiency so that it will not overheat and thus is often called a “colder” plug. If a spark plug with a heat range is used – that is, a “cold” plug that cools itself too well, - the plug will stay too cool to burn off the carbon, and the carbon will collect on the electrodes and the ceramic insulator.



The carbon on the electrodes conducts electricity, and can short the center electrode to ground by either coating the ceramic insulator or bring across the gap. Such a short will prevent an effective spark. Carbon build-up on the plug can also cause other troubles. It can heat up red-hot and cause pre-ignition and knocking, which may eventually burn a hole in the top of the piston.

Spark Plug Inspection

- Remove the spark plug and inspect the ceramic insulator.
- ★ Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is black, it indicates that the plug is firing at too low a temperature, so the next hotter type should be used instead. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

CAUTION

If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug. If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and marking it very difficult to insert the correct spark plug later. If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, pre ignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.

CAUTION

The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).

Fuel System

WARNING

Gasoline is extremely flammable and explosive under certain conditions.

- Always stop the engine and refuel outdoors or in a well ventilated area.
- Do not smoke or allow open flames or sparks in/near the area where refueling is performed or where gasoline is stored.
- Do not overfill the tank. Do not fill the tank neck.
- If you get gasoline in your eyes or if you swallow gasoline, seek medical attention immediately.
- If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.
- Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can result in loss of consciousness or death in a short time.
- Never drain the float bowl when the engine is hot. Severe burns may result.

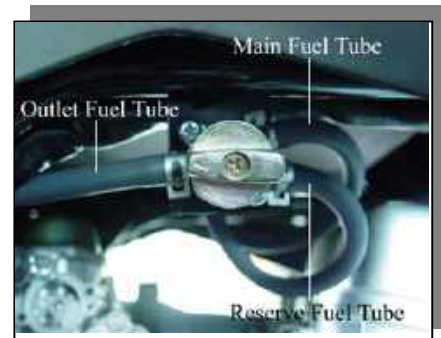
Fuel Lines

- Check fuel lines for signs of wear, deterioration, damage or leakage. Replace if necessary.
- Be sure fuel lines are routed properly and secured with cable ties.

CAUTION

Make sure lines are not kinked or pinched.

Replace all fuel lines every two years.



Troubleshooting Guide

NOTE

○ This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:

- Neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:

- Starter motor clutch trouble

Recoil starter not operating

- Recoil starter spring broken
- Recoil starter pawl not engaging

Engine won't turn over:

- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Balancer bearing seizure

No fuel flow:

- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

Engine flooded:

- Fuel level too high
- Float valve worn or stuck open
- Starting technique faulty
(when flooded, crank the engine with the throttle fully opened to allow more air to reach the engine.)

Fuel/air mixture incorrect:

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet, or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Starter jet clogged.

No spark; spark weak:

- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- Pickup coil trouble

CDI unit trouble

- Ignition coil trouble
- Battery voltage low
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Compression Low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:

- Spark plug dirty, broken, or maladjusted
- Spark plug cap or Spark plug lead trouble.
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- CDI unit trouble
- Pickup coil trouble
- Ignition coil trouble
- Battery voltage low

Fuel/air mixture incorrect:

- Pilot screw and/or idle adjusting screw maladjusted
- Pilot jet, or air passage clogged
- Starter plunger stuck open
- Air cleaner clogged, poorly sealed, or missing
- Fuel level too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose
- Air cleaner duct loose

Compression low:

- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Other:

Carburetor vacuum piston doesn't slide smoothly
Engine oil viscosity too high
Brake dragging
CDI unit trouble
Front or rear final gear case oil viscosity too high

Poor Running or No Power at High Speed:**Firing incorrect:**

Spark plug dirty, broken, or maladjusted
Spark plug cap or Spark plugs lead trouble.
Spark plug cap shorted or not in good contact
Spark plug incorrect
Pickup coil trouble
CDI unit trouble
Ignition coil trouble

Fuel/air mixture incorrect:

Main jet clogged or wrong size
Jet needle or needle jet worn
Main air jet clogged
Bleed holes of air bleed pipe or needle jet clogged
Fuel level too high or too low
Air cleaner clogged, poorly sealed, or missing
Starter plunger stuck open
Water or foreign matter in fuel
Carburetor holder loose
Air cleaner duct loose
Fuel tank air vent obstructed
Fuel tap clogged
Fuel line clogged

Compression low:

Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston rings bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

Knocking:

Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
CDI unit trouble

Miscellaneous:

Throttle valve won't fully open
Carburetor vacuum piston doesn't slide smoothly
Brake dragging
Overheating
Engine oil level too high
Engine oil viscosity too high
Balancer mechanism malfunctioning
Front or rear final gear case oil viscosity too high.

Overheating:**Firing incorrect:**

Spark plug dirty, broken, or maladjusted
Spark plug incorrect
CDI unit trouble

Fuel/air mixture incorrect:

Main jet clogged
Fuel level too low
Carburetor holder loose
Air cleaner poorly sealed, or missing
Air cleaner duct loose
Air cleaner clogged

Compression high:

Carbon built up in combustion chamber

Engine load faulty:

Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging

Lubrication inadequate:

Engine oil level too low
Engine oil poor quality or incorrect

Front or rear final gear case overheating:

Insufficient oil
Bevel gears maladjusted

Converter Operation Faulty:**Belt slipping:**

Belt dirty, worn, or wetted
Drive or driven pulley sheave dirty or worn
Drive pulley spring broken or weak

Converter engagement speed too low:

Drive pulley spring broken or weak.

Converter engagement speed too high:

Belt drive or worn
Drive or driven pulley sheave dirty worn.
Drive pulley weight doesn't move smoothly.
Drive pulley movable sheave doesn't move smoothly
Drive or driven pulley movable sheave bush worn
Drive pulley weight or roller worn.

Shifting too quickly:

Drive pulley spring weak
Driven pulley spring weak or incorrectly installed (too loose)

Shifting too slowly:

Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Drive pulley weight doesn't move smoothly.
Drive pulley movable sheave doesn't move smoothly
Driven pulley spring incorrectly installed (too tight)
Drive pulley movable sheave doesn't move smoothly

Gear Shifting Faulty:**Doesn't go into gear:**

Shift arm bent or seized
Gear stuck on the shaft
Shift tie-rod maladjusted
Shift tie-rod damaged

Jumps out of gear:

Shifter groove worn
Gear dogs worn
Shift block worn
Shift arm positioning bolt spring weak or broken
Shift tie-rod maladjusted
Drive shaft, output shaft, and/or gear worn

Over shifts:

- Shift arm positioning bore spring weak or broken
- Shift tie-rod maladjusted

Abnormal Engine Noise:

Knocking:

- CDI unit trouble
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- Overheating

Piston Slap:

- Cylinder/piston clearance excessive
- Cylinder, piston holes worn
- Connecting rod bent
- Piston pin, piston holes worn

Valve noise:

- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing worn
- Rocker arm worn

Other noise:

- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring worn, broken, or stuck
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mounts loose
- Crankshaft bearing worn
- Camshaft chain pensioner trouble
- Camshaft chain, sprocket, guides worn
- Balancer bearing worn
- Balancer gear worn or shipped
- Loose alternator rotor

Abnormal Drive Train Noise:

Converter noise:

- Belt worn
- Drive or driven pulley sheave worn
- Drive or driven pulley movable sheave bush worn
- Drive or driven pulley mount loose.
- Drive pulley shoe worn
- Drive pulley weight or roller side washer worn
- Drive pulley weight or roller worn
- Wear guides worn

Transmission noise:

- Bearing worn
- Transmission gears worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient or too thin

Front or rear final gear case noise:

- Insufficient lubricant
- Incorrect oil (Front final gear case)
- Bevel gear bearings worn
- Bevel gears worn or chipped
- Bevel gears maladjusted

Front axle or propeller shaft noise:

- Constant velocity universal joint damaged

Abnormal Frame Noise:

Shock absorber noise:

- Shock absorber damaged

Disc brake noise:

- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper trouble

Other noise:

- Bracket, nut bolt, etc. not properly mounted or tightened.

Exhaust Smokes Excessively:

White smoke:

- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Cylinder head gasket damaged
- Engine oil level to high

Black Smoke:

- Air cleaner clogged
- Main jet too large or fallen off
- Starter plunger stuck open
- Fuel level too high

Brown smoke:

- Main jet too small
- Fuel level too low
- Air cleaner duct loose
- Air cleaner poorly sealed or missing

Handling and/or stability Unsatisfactory

Handlebar hard to turn:

- Tire air pressure too low
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Damaged steering knuckle joint
- Damage tie-rod end

Handlebar shakes or excessively vibrates:

- Tire worn
- Wheel rim warped
- Rear axle runout excessive
- Wheel bearing worn
- Handlebar clamp loose

Handlebar pulls to one side:

- Frame bent
- Wheel maladjustment
- Suspension arm bent or twisted
- Steering stem bent
- Front or rear tire air pressure unbalanced
- Front shock absorber unbalanced

Shock absorption unsatisfactory:

- Too hard:
 - Tire air pressure too high
 - Shock absorber maladjusted
- Too soft:
 - Shock absorber oil leaking
 - Shock absorber spring weak
 - Tire air pressure too low
 - Shock absorber maladjusted

Break Doesn't Hold

Front brake:

- Air in the brake line
- Brake fluid leakage
- Brake fluid deteriorated
- Primary or secondary cup trouble
- Master cylinder scratched inside
- Pad over worn or worn unevenly
- Oil, grease on pads and disc
- Disc worn or warped
- Brake overheated

Rear Brake:

- Brake not properly adjusted
- Linings over worn or worn unevenly
- Drum worn unevenly or scored
- Oil, grease on lining and drum
- Dirt, water between lining and drum
- Overheated

Battery Discharged:

- Battery faulty (e.g., plates sulfated, shorted through Sedimentation, electrolyte level too low)
- Battery leads making poor contact
- Load excessive (e.g., bulb of excessive wattage)
- Ignition switch trouble
- Regulator/ rectifier trouble
- Alternator trouble
- Wring faulty

Battery Over charged:

- Regulator/rectifier trouble
- Battery trouble



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