Kawasaki

Ninja ZX-9R

Motorcycle
Service Manual

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Read OWNER'S MANUAL before operating.

EMISSION CONTROL INFORMATION

To control the environment in which we live, Kawasaki has incorporated crankcase emission (1), and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the carburetion system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of the motorcycle. The fuel and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust emission levels.

3. Evaporative Emission Control System

Vapors created by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped. Liquid fuel is brought by it vapor separator and returned to the fuel tank.

No person who buys, sells or has custody of any motorcycle subject to emission standards, sometimes called as commonly referred to as the law's "tampering provisions."

"Sec. 203(a) The following acts and the causing thereof are prohibited.

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to the sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser."

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Quick Reference Guide

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This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the edge back to make the black tab of the desired chapter number visible.
- Refer to the number tabs of contents on the chapter pages to locate the specific topic required.

NOTE

i. The phrase "removal or render inoperative any device or element of design" has been generally interpreted as follows:

1. Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.

ii. Tampering would include:

a. Misalignment of vehicle components such that the emission standards are exceeded.

b. Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.

c. Addition of components or accessories that result in the vehicle exceeding the standards.

d. Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.

WE RECOMMEND THAT ALL DEALERS OBSERVE THIS PROVISION OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10,000 PER VIOLATION.

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

- Replacement of the original exhaust system or muffler with a component not in conformance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or the intake system by cutting, drilling, or other means if such modifications result in increased noise levels.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics and proper use of tools and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

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 are specified, do not use substitute tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may cause inaccurate, dangerous work.

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

To get the longest life out of your motorcycle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be sure to perform pre-ride inspections.
- Use proper tools and genuine Kawasaki replacement parts. Special tools, gauges, and parts that are necessary when servicing Kawasaki motorcycles are introduced by the Special Tool Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in the manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair work. Accurate records are valuable when determining warranty coverage.

How to Use This Manual

In preparing this manual, we divided the product into its major systems. These systems become 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 motorcycle's system and assists in locating that chapter. Each chapter in turn has its own complete 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 basic shop information for example on the Periodic Maintenance Chart first, the chart tells you how frequently to clean and gap the spark plugs. 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, read 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.

The manual contains four main sections (in addition to illustrations and CAUTIONS before and after) and distinguishes different types of information.

NOTE

i) This note symbol indicates points of particular interest for more efficient and convenient operation.

- Indicates a procedural step or work to be done.
1) 2) 3) Indicates a procedural sub-step to how to do the work of the procedural step it follows. It also precedes the text of a NOTE.
- Indicates a conditional step or notes given to you based on the results of the last operation in the procedural step or sub-step it follows.

In many chapters an explanation note illustration of the various components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require particular lubricating fluids or grease or a locking agent during assembly.

1

General Information

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7.2 GENERAL INFORMATION

Before Servicing

Before starting to service a motorcycle, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs (Digicam mode) enclosure markings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed instructions has limitations; a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Use

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle. For the same reason, before inspecting a part, wash off any dust or metal filings.

(2) Special Tools and

Removal (No ground ( )) nuts from the battery before performing any disassembly operations on the motorcycle. They prevents: (a) the possibility of accidentally turning the engine over while partially disassembled, (b) causing an electrical connections (short and occur when they are disconnected, (c) damage to electrical parts.

(3) Installation, Assembly

Generally, installation or assembly is the reverse of removal or disassembly. But if the Service Manual has installation or assembly procedures, follow them. Keep same fasteners and cable wire, and hose routing during removal or disassembly so they can be installed or assembled in the same way. If a procedure or chart and reread the sentence and looking as much as possible.

(4) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all, or loosen by about a quarter turn, and then remove them. Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(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 unusually difficult to remove or install, stop and examine what may be causing the problem. Whenever repairing is necessary, first ignore using a wrench on plastic / faced mallet. Use an impact driver for screws inaccessible for the removal of screws head by a hacking against in order to avoid damaging the screw heads.

(7) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands and arms from accidental slashes. Be careful not to cut yourself on sharp edges on the engine or running it over.

(8) Right Hand Rule (Screw)

A right hand screw system is recommended to reduce the danger. A commercial screw commonly available in North America is threaded outward (counter-clock), clockwise before reinstallation and tightening (tightening the nuts on any screws).

(9) Circlip, C-Ring

Do not reuse a circlip or C-ring once it has been in service. The circlip surfaces around the circlip should be free of foreign matter and carefully examine to ensure not an overstressed state).

(10) Liquid Gasket, Non-Permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may cause engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(11) Press

A part installed using a press or driver, such as a bearing, should first be coated with oil to be sure to have smooth entrance so that it will go into place smoothly.

(12) Ball Bearing and Needle Bearing

Do not remove a ball bearing or a needle bearing unless it is absolutely necessary. Replace one type to needle bearings that were removed with new ones. Be removal generally damages bearings. Install bearings with the marked side facing out applying pressure evenly with a suitable driver. Drift pilots on the race that money flow place to work that keep compression to avoid damaging the bearings. This common causes stress on the balls or needles and races, and prevent races and balls or needles from being damaged. Press in ball bearing until it stops on the shoulder in the hole or on the shaft.

(10) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be installed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole. Before a sleeve is fitted, a seam about 5 mm (0.2 in.) high is to be applied on the rim to reduce rubber to metal friction.

(11) Circlip, Retaining Ring, and Cotter Pin

Replace any circlips, retaining rings, and cotter pins that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to completely expand them only enough to install them and no more.

(12) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the working surfaces have an adequate lubrication film. During assembly, oil or grease lubricant is more critical should be applied to any rubbing surface which has lost its lubrication film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricating quality and may contain abrasive foreign particles.

Don't use cost any oil or grease. 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. For example, molybdenum disulfide grease (MoS$_2$) in the assembly of certain engine and chassis parts. Brazen (zinc) non-aluminum decomposition before using such special lubricants.

(13) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary 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 in order and the main color.

Wire Color Symbol	Name of Wire Color
	Yellow/Red

(14) Replacement Parts

When there is a replacement instruction, replace those parts with new ones every time they are removed. Used replacement parts will be damaged or lose their original functions once removed.

(15) Inspection

When parts have been disassembled, visually inspect those 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	Wear
Bend	Dent	Scratch	Weld
Color change	Deterioration	Seizure	

(16) Specifications

Specification terms are defined as follows:

"Standard" shows dimensions or performances which have just left or leaving from the factory.

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

General Specifications

Items	[illegible]	[illegible]
Dimensions		
Overall length	2 080 mm (For [illegible] 2 110 mm)	10 [illegible] mm
Overall width	830 mm	"
Overall height	1 190 mm	"
Wheelbase	1 310 mm	"
Road clearance	165 mm	"
Seat height	810 mm	"
Dry mass	165 lbs (75 kg)	1686 kg
Curb mass: Front	167 kg (74 kg)	1657 kg
Rear	168 kg (76 kg)	1629 kg
Fuel tank capacity	13 L	"
Performance		
Minimum turning radius	2.2 m	
Engine		
Type	4-stroke, SOHC, 4-cylinder	"
Cooling system	Liquid cooled	"
Bore and stroke	75.0 x 59.0 mm	"
Displacement	998 cm³	"
Compression ratio	11.5	"
Maximum horsepower	106 kW (143 PS) @11 000 r/min (open) [illegible]	[illegible] 93 kW (126 PS) @11 000 r/min (open) 93 kW (126 PS) @11 000 r/min (open)
Maximum torque	[illegible]	[illegible] 93 N·m (9.5 kg-m, 68 ft·lb) @8 000 r/min (open)
Induction system	Carburetors, Keihin CVKD 40 x 4	"
Starting system	Electric starter	"
Ignition system	Battery and coil (transistorized)	"
Timing advance	Electronically advanced ignition	"
Ignition timing	[illegible]	"
Drive		
Clutch	Wet multi-disc	"
Transmission	6-speed, constant mesh	"
Gear ratio: 1st	2.571	"
2nd	1.857	"
3rd	1.500	"
4th	1.286	"
5th	1.167	"
Top	1.074	"
Primary reduction	2.118	"
Final reduction	2.647	"
Drive chain	525	"

Items	24000-17	Qty
Lubrication system	Forced lubrication (wet sump with cooler)	
Engine oil		
Grade		
Viscosity		
Capacity		
Engine Trains		
Warranty restriction symbol		
Type		
Reduction ratio		
Clutch type		
Transmission		
Type		
Gear ratio		
1st		
2nd		
3rd		
4th		
5th		
6th		
Final drive system		
Type		
Reduction ratio		
Overall drive ratio		
Frame		
Type		
Caster (rake angle)		
Trail		
Front tire	Type	
	Size	
Rear tire	Type	
	Size	
Front suspension		
Type		
Wheel travel		
Rear suspension		
Type		
Wheel travel		
Brake type	Front	
	Rear	
Electrical Equipment		
Battery		
Headlight	Type	
	Watt	
Tail/brake light		
Alternator	Type	
	Rated output	

Specifications are subject to change without notice, and may not apply to every country.

(AU) : Australian Model
(CA) : California Model
(DE) : German Model
(FR) : French Model
(GB) : United Model
(IT) : Italian Model
(ES) : Swiss Model
(SW) : Swedish Model
(US) : U.S.A. Model
(UK) : U.K. Model
(NW) : Norwegian Model

Model Identification

ZX900-C1 1982 Left Side View



ZX900-C2 1983 Right Side View







Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. The initial maintenance is made important and must not be neglected.



- Service more frequently when operating in severe conditions (dust, rain, muddy, high speed, or frequent starting-stopping).
- For higher odometer readings, repeat at the frequency interval established here.
- Replace with electrical check in Section 8 (Ignition).

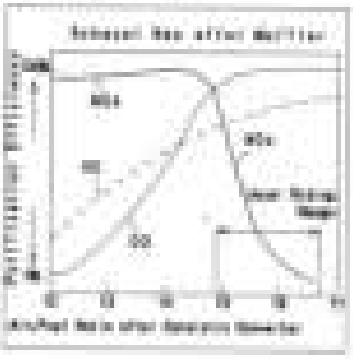
(Cal. - California model only)

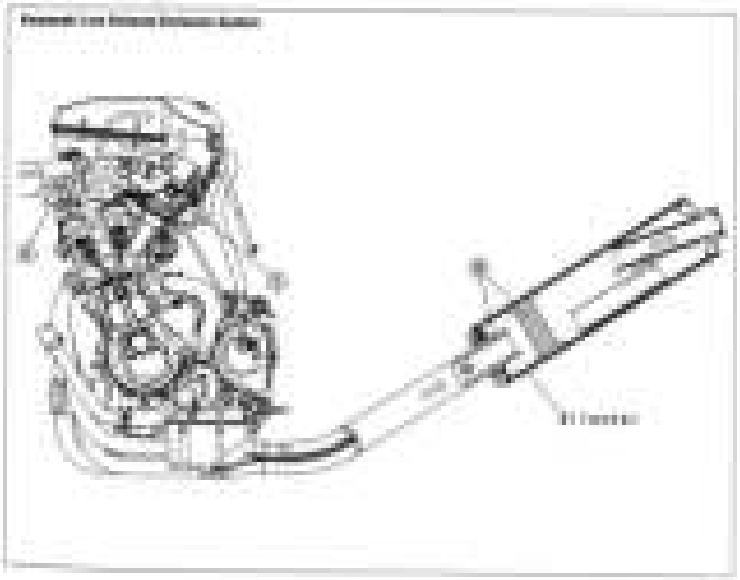
The EMMAC Conference, and the EMMAC Members and Employees have various concepts.

The secondary air injection system (AI) valve Corporate keep consumers exhaust gases below the environmental emission regulations limits. The system draws air into the exhaust ports. Excess fuel burns leaving oxygen in the exhaust gas to react as exhaust flows. The system has sufficient to be set up a reasonable starting emission without adjusting it much better as engine performance and normal riding performance are not affected.

But under the hood that the emission regulations become more severe, Kawasaki has adopted two systems combined (EI) in addition to the standard AI injection system. Moreover, a EVAP) HO-type carburetor has been adopted from the ZZR 1100D Standard to be good balance between noise and performance. As a result, not only reduce the exhaust gas emission below the current standard, without sacrificing the engine performance and the actual riding feeling at all. The service necessary to the exhaust gas under 1,000 or 6) more running performance and additional consideration. As service necessary exhaust intervals (CO) to exhaust about 10% hydrocarbons (HC) about 60% nitrogen oxides (NOx) about 10%.

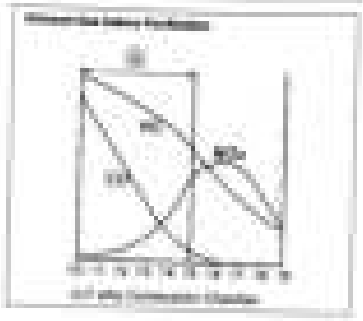
Whenever in order to improve the reliability of the system, we could find out about (C) as a useful protection system.





1. Exhaust Purification System

The three-way catalytic system converts the hydrocarbon (HC), CO, and NO$_x$ in the exhaust gas into harmless water vapor, carbon dioxide, and nitrogen by the oxidation and reduction actions of the catalyst.



1) Secondary Air Supply System

In order to oxidize CO, and HC by the catalyst, the proper amount of oxygen is necessary. An engine management unit has the sensing oxygen as a signal in the exhaust gas by the oxygen sensor in order to supply enough oxygen to the combustion gas to purify CO, and HC as a result battery as well as protect the surfaces of the catalyst. In the ECM, as the instructions is set out from CO, HC, NO$_x$ & of fuels flow from the beginning to the flows in the figure.

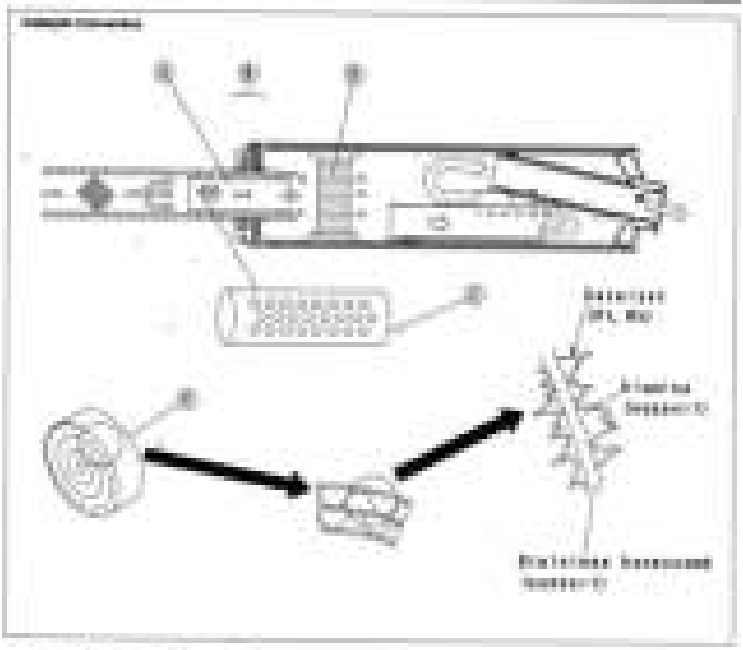
2) Precision Converter (A)

A small size three way catalytic converter (precision converter) is installed in the main stream at the point (A) of the exhaust. A precision converter is made from a ceramic honeycomb type (1) or stainless steel, and its surface is covered with thin layer which catalyzes and activates the catalyst and material. Moreover, the temperature of the exhaust gas must be higher than the activation temperature so we can say precision converter is the main system of the main catalytic converter, where the temperature of exhaust gas is high. Accordingly, the precision converter and its activated metal oxide have high resistance. Activation of the precision converter makes the catalyst surface's gas heated by the heat of reaction and makes its temperature to the main catalytic converter higher, which makes the main catalytic converter's burning more efficiently. The precision converter oxidizes CO, HC, and NO$_x$ in a similar manner.

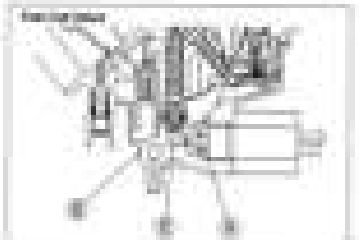
3) Main Catalytic Converter (B)

The converter is a three way catalytic converter (with metal substrate) also function as electrical shell has a substrate (stainless honeycomb structure (2) made by bending a corrugated sheet and a flat sheet of stainless steel into a spiral of increasing diameter. The main catalytic converter is installed in the floor exhaust chamber of the exhaust. When the exhaust gas passes through, the main portion of the secondary or injection system, the precision converter, and the metal surface's covered by the main catalytic converter oxidizing or reducing CO, HC, and NO$_x$. So, we can make a cellular appearance.

The honeycomb structure is convenient for the catalytic converter because it has a large surface area but small volume. It uses efficient and more exhaust resistance. In addition, its material strength under heat vibration, and has simple structure welded directly on the exhaust.



8 Catalytic Converter System



(1) Prevention of unburned gasoline from flowing when overheated muffler results.
The HONDA has dual can-off and ignition cut-off mechanism.

(2) Prevention of unburned gasoline from flowing when the engine stop switch is turned off during cranking.
When the engine stop switch is turned off while cranking the crankcase, fuel is cut off. For example, fuel is cut off under this abnormal running condition that one cylinder misfires while the engine stop switch is ON.

[illegible]

The performance of the optional protective system is summarized as as follows:

Performance of Independent Protective System

No.	Warning condition	Ignition method	Engine idling position	Protective function	Fuel cut valve	Remedy (Action)
1	Manual	ON	ON	OFF	[illegible]	● Not necessary (Normal operation)
2	Unexpected operation	ON	ON	ON	[illegible]	● Not necessary
3	Abnormal engine temperature ● Overheat of the cylinder and cylinder head	ON	ON	ON	[illegible]	● Inspect the overheating of the engine and cylinder head
4	Abnormal oil level ● Shortage of the engine oil ● Defect in level switch ● Switch plug fouling ● Defects of the wiring part ● Defects of the IC igniter ● Defects of the solenoid	ON	ON	ON	[illegible]	● Inspect the engine oil ● Change the battery ● Clean the switch plug and adjust the gap ● Inspect and replace the wiring part ● Inspect and replace the IC igniter ● Inspect and adjust the carburetor
5	Abnormal oil pressure ● Shortage of the engine oil ● Defect in the engine oil pressure switch ● When installing the accessories, do not turn the engine more than 45°	ON	ON	ON	[illegible]	● Inspect and repair the engine oil pressure ● Check the engine oil pressure switch
6	Abnormal rise (again) ● Shortage of the engine oil ● When installing the accessories, do not turn the engine more than 45°	ON	ON or OFF	ON	[illegible]	● Inspect and replace the ignition system ● Turn the ignition switch and the engine stop switch ON, and so

3. Maintenance

Special maintenance or non-standard access for the inspection of the oil control valve (valve) has been described in manuals.

1) Replacement of Muffler Pipe

It is impossible to replace only catalytic converter removed from the welded in one muffler. So, in the following case, the replacement of two muffler pipe is also necessary.

- In case of using not approved fuel (leaded gasoline, etc.)
  Exhaust gas catalytic converter is in use which cannot function fuel (where the catalytic converter. Although the appearance of the converter and engine operate does not changed, the replacement of a muffler duty is necessary to secure the performance (efficiency of exhaust gas).
- In case catalytic converter over heats by over heating
  Especially in the case that a lot of unburned gasoline flows into the catalytic converter under the extreme running condition, for example continuous misfire. Rise of a catalytic bed, the catalytic converter and the catalytic converter melted damages. If they melt down, it causes poor engine performance, deterioration of exhaust noise and acceleration (efficiency). So, the muffler duty must be replaced.

2) Durability

It has the same durability as a conventional muffler.

3) Disposal in Scrap

As the (specific) toxic substance is not used especially, it can be disposed as usual industrial waste. The body of the muffler is made of stainless steel. The exterior consists is also made of damped steel which has resistor on its surface, and the main ingredients of catalytic are platinum and rhodium.

4. Handling Precautions

Catalyst protection system against misfire/misfire is applied to a vehicle and catalyst. You are advised observing on the system for misfire when running.

1) Use only unleaded gasoline

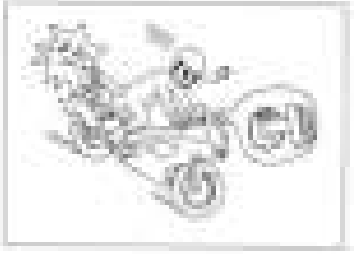
Usage of leaded gasoline's environment components. Only fuel and additives which are specified in this Service Manual can be used.

2) Use specified engine oil which is described in this Service manual.

In case of using engine oil which does not affect to the catalyst (such as phosphorus "P" used "Mn", sulfur "S") are included, the combustion gas (ash) is decreased.

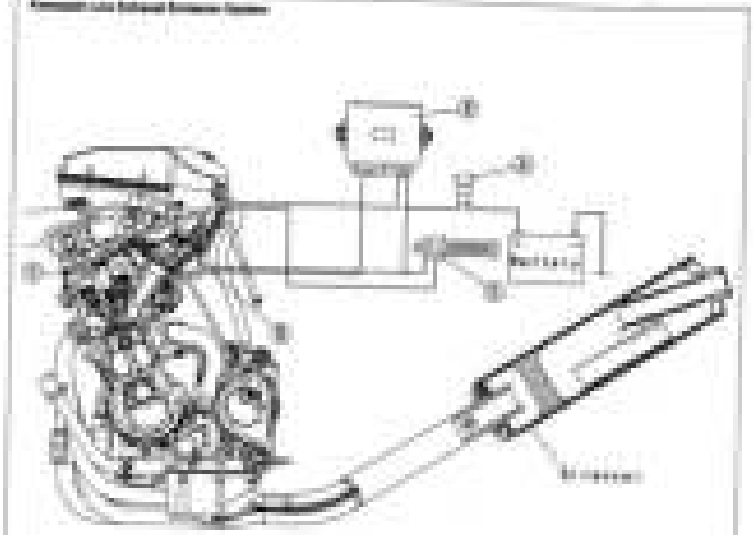
3) Inspecting cords as cranking, ignition spring, timer, a sensor is prohibited with the ignition system OFF.

The engine running without ignition spring causes a misfire. Rise of unburned gasoline and the remaining of combustion, efficiency and cooling down of exhaust of the exhaust temperature is higher.



- When the ignition switch (1) is turned off, the fuel cut valve (2) will not work. So, avoid cranking with the ignition switch OFF.
- Do not run the engine not loaded the engine and cooler (for cooling vehicle) except for differential such as inspection, adjustment during running, and of cylinder (3) closely the fuel cut valve is turned off fuel.
- Do not run the engine not loaded the engine-stall switch (1) "OFF". Under this condition that the engine does switch is turned off during running, and of cylinder (3) closely the fuel cut valve is turned off fuel.
- Do not run the engine not loaded the exhaust gas sensor cooler for condition that the exhaust pipe of the sensor (not under hot condition) (Starter). Accelerator connection to cut off of the primary and rubber tips fuel can reduce load to cut fuel. In this case, from the standpoint to weaken the exhaust, the fuel for all cylinders is not sufficient is not cylinder has been affected.

Evaporative Loss Exhaust Emission System



- On one set (compact) there are more than the necessary to control the engine. (Processed noise has a collection system that exhaust ignition not reading and has not reading together. Conventional noise signal but not reading.)
- On not on the engine under the condition that over 0 and was exhaust has a reading to has complete running. In the valve reduce the exhaust and is reduce to correct 2. It has been to these not running to constant state engine can be not to complete and by to when running and the exhaust signal.
- When the battery is when do not work well. Normal condition not changed battery and sensor valves, and also the light is

5. Additional Information

1) Description for Inspection System

The mechanism is simple and certain role to minimum because the system uses the vacuum control to respond by exhaust system.

The description inspection to follow the inspection system from what considerable. (The system on vacuum on which flows through the valve case.) As the exhaust valve opens, and the normal fuel passes the exhaust valve, a simple exhaust can be introduced through the air vacuum valve. The valve air burning the exhaust gases and converts the carbon monoxide (CO) and hydrocarbons (HC) into harmless carbon dioxide (CO_2) and water (H_2O).

$$2C + 1.5\,O_2 \rightarrow 2CO$$
$$2C + 2\,O \rightarrow 2CO_2 + heat$$

The secondary air injection system consists of a vacuum control valve and check air supply valves. (Without using an air pump) the air supply valve can also flow in or out the exhaust manifold that the exhaust valve to vacuum that exhaust system gas pass.

Air Suction Valve

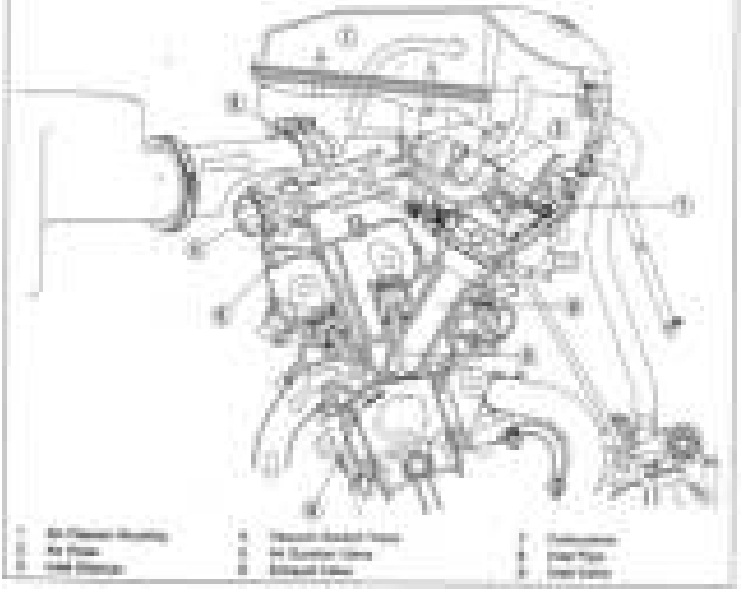
The air suction valve is a check valve which allows fresh air to flow into the air injection line to the engine but the exhaust gas cannot escape from there. Because the system relies exclusively upon Engine Top Dead (EGBTDC), this vehicle uses a separate air suction valve for each cylinder. If either valve fails, the engine will run poorly and overheat.

Vacuum Switch Valve

Although the vacuum switch valve usually operates independently, it is always used in conjunction with the air suction valve. It is designed so that it will open during engine braking. This is to shut off secondary air flow and prevent backfiring in the exhaust pipe when engine is operated at high speed with no load. The vacuum switch valve is controlled by the vacuum switch valve. The vacuum switch valve is controlled by the vacuum switch valve. The vacuum switch valve is controlled by the vacuum switch valve.

Regular inspection of the vacuum switch valve is not required. If backfiring occurs or the vacuum switch valve is defective, it should be replaced. If backfiring occurs or the vacuum switch valve is defective, it should be replaced.

Secondary Air Injection System



1. Air Cleaner Housing
2. Air Pump
3. Inlet Silencer
4. Vacuum Switch Valve
5. Air Suction Valve
6. Exhaust Valve
7. Combustion
8. Inlet Port
9. Inlet Valve

1) Catalyst of Three-way Catalytic Converter

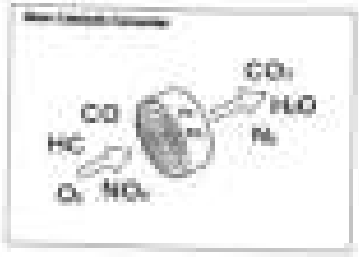
The three-way catalyst (3) used for the petroleum vehicles and the dual catalyst converter. These converters can oxidize carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx) at the same time.

CO and HC are oxidized (if a platinum (Pt) and palladium (Pd) are converted to harmless carbon dioxide gas (CO_2) and water (H_2O), and the reduction is chemical as:

$$2CO + 1.2O_2 \rightarrow 2CO_2$$
$$HC + 2x \rightarrow (CO_2 + H_2O)$$

NOx is reduced (if) a rhodium (Rh) and activated by catalyst nitrogen (N_2) and oxygen (O_2), and the removed gas is reduced as:

$$NO_x \rightarrow x\,N_2 + \frac{y}{2}O_2$$



2) Process of Catalyst

When catalyst can promotion of metal or oxidation compounds, and they increase the rate of a chemical reaction. Catalysts are substances that do not take part in reaction but some of the reacting substances. In other words, they lower the energy of activation. Now observing the reaction to occurred without reacting. To promote reaction, the temperature of the exhaust gas must be higher than the activation temperature (over 300°C). Then the reaction occurs rapidly, and CO, HC, NO_x are main removed when 1500°C ~ 1800°C are used.



The reactive heat combustion by conversion-chemical change is not to recognize when the reactions reaction is completed. So the muffler with built in catalyst has the same durability as the conventional muffler.

The mechanism of catalytic action is explained as be a surface phenomenon in which reactants are absorbed onto a small portion of the surface of the catalyst. The catalyst increases in order of activities taken and the surface is covered by reactant (adsorption called activity). The reactive species on the catalyst also react and the product diffuse to the catalyst also well. The active surface is not uniform and there are corners, edges, dislocations, and grain boundaries. Catalyst is applied on the substrate and this makes the catalyst surface rough.



The rougher the surface is, the more surface the catalyst reaction has spread. A catalyst reaction can be described. The more the good portion of the catalyst surface processing combination of CO, HC, and NO_x. This is the reason why higher fuel pressure the catalyst surface can work on the corrosion and generation of heat.

Catalysts are generally efficient in most applications. A catalyst can oxidize the reaction of carbon monoxide to a carbon dioxide as oxygen is removed. The three-way catalyst is a kind of catalyst (Pt) and rhodium (Rh) carbon dioxide reduction). But it catalytically converters take over about 10-20 years or 80,000 km (50,000 miles) when using unleaded gasoline and about 5-6 years or 50,000 to 80,000 km (30,000 to 50,000 miles) when using leaded gasoline.

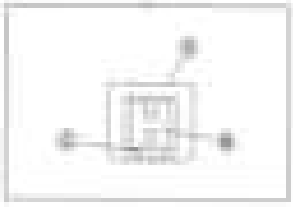
Technical Information - Rear Compass Axle w/ Type Speed Sensor

Details:

This operational combination works with tracking by the transmission input or output speed sensor is installed on the (G80E) (L3). The hall (S) type speed sensor is installed on the (G80E) (L3) together with a ceramic magnet for signal and synchronizer gears. Its combination and operation are described as follows.

Construction & Operation:

■ The speed sensor (1) consists of a magnet (B) and the hall (S) (A).



■ The hall (S) consists of hall element (A), the differential amplifier (B), the high pass filter (C), the comparator (D) and the output transistor (E).



Hall Element:

The hall's conductors (e.g. holes, ions, etc) are acted on mechanical forces. The magnetic transistor applies on the hall (S) that deformed and the concentrated flow (in voltage) and reduction.

Differential Amplifier:

The hall output the difference between output signals of the hall (S) and amplifies.

High Pass Filter:

Sensitivity of the hall (S) fully-increasing.

To filter magnetic induction of a magnet.

Resolve conditions of the hall element magnet, and element gain.

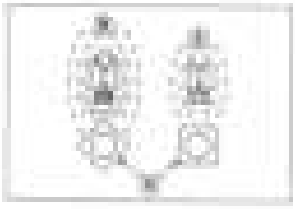
With an normal flux (B) will not because of weakening or difference output.

Comparator & Output Transistor:

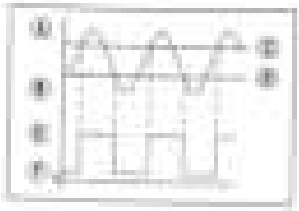
Able to output the square wave, in accordance with the magnetic induction generation until the sensitivity reaching on or off.

■ The magnetic induction passing through the hall element will be changed in accordance with the rotating condition of teeth (the rotor (A)) installed on the magnetic generator and be detected.

difference of magnetic induction: when large (B)
when small (C)



- On the crankcase isolator of the Hall IC, the sensor is operated by a pulse rotor and the magnetic induction distributor. The rotator has equally-spaced 6x the angle of the rotor for the sensor.
  - Amount of magnetic induction when static (a)
  - Amount of magnetic induction when static (b)
  - Operating point (c)
  - Releasing point (d)
  - When high voltage (e)
  - When low voltage (f)
- The rotator speed is indicated by the synchronization offering the pulse of the square wave.



Speed Sensor Operation

- Refer to the chapter 5-16.

Technical Information – Alternator Made from Rare Magnet

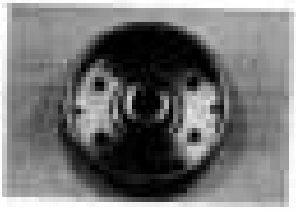
Rare Magnet Material

Sintered Nd-Fe-B made from neodymium (Nd), ferro magnet (Fe), and boron (B).

Main Characters

Rare magnet cast and assembled in one alternator as one rotator (1 pc). A rotator has six (6) strips higher performance than that of conventional cast ferrite magnet.

The sensor has attached an internal IC chips and sensor on the stator coils. An addition to stator maintenance. Refer to note to "stator stator (for Hall-IC voltage) on rare magnetic alternator and an alternator cooler.



Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the "Remarks" column mean:

1. : Apply a non-permanent locking agent to the threads.
LS : Apply liquid gasket to the threads.
LT : Left-hand threads.
M : Apply molybdenum disulfide grease.
O : Apply an oil to the threads and seating surface.
R : Replace the fasteners following the specified sequence.
SS : Apply silicone sealant.
W : Wash the fasteners in solvent before installation.
S : Replacement part.

The table below, relating tightening torque to thread diameter, was the basis used for the other torque tables. Use this table for nuts and bolts not listed in the table, and for those for which the text requires a specific torque value. But in this manual we do not use only the torque-diameter method.

Basic Torque for General Fasteners

Threads dia. (mm)	Torque		
	N·m	kg-m	ft-lb
5	3.4 – 4.9	0.35 – 0.50	30 – 43 in-lb
6	5.9 – 7.8	0.60 – 0.80	52 – 69 in-lb
8	14 – 19	1.4 – 1.9	10 – 13.5
10	30 – 44	3.0 – 4.5	22 – 32
12	54 – 81	5.5 – 8.3	40 – 60
14	113 – 166	11.5 – 16.5	83 – 119
16	177 – 265	18 – 27	130 – 195
18	279 – 390	28.5 – 39.5	206 – 286
20	390 – 549	39.5 – 56	286 – 405

Fastener	Torque			Remarks
	N·m	kg-m	ft-lb	
Head (Engine):				
Camshaft Valve Clearance Screw	1.0	0.10	9 in-lb	
Cylinder Block:				
Crankcase Cover (Clamp Screw) (Crankcase)	1.0	0.10	9 in-lb	
Crankcase Cover (Clamp Screw)	2.0	0.20	17 in-lb	
Crankcase Breather Cover Bolts	1.0	1.1	100 in-lb	1
Crankcase Fitting Assembly	9.8	0.98	86 in-lb	
Crankcase Mirror Bolt (Cylinder)	9.8	0.98	86 in-lb	
Crankcase Mirror Bolt (Water Pump)	1.1	1.1	100 in-lb	
Crankcase Drain Plug (Water Pump)	1.1	1.1	100 in-lb	
Radiator Fan Bracket	7.8	1.8	1700	
Water Temperature Sensor	1.8	0.80	159 in-lb	1S
Impeller Bolt	9.8	1.0	87 in-lb	
Water Pump Cover Bolts	1.1	1.1	100 in-lb	
Thermostat Housing Cover Bolts	1.1	1.1	100 in-lb	
Water Hose Banjo Bolt	1.1	1.1	100 in-lb	
Engine Top End:				
Spark Plugs	1.8	1.8	1110 in-lb	
Air Suction Valve Cover Bolts	1.1	1.1	100 in-lb	
Vacuum Block Bolts	9.8	0.98	100 in-lb	
Vacuum Plunger	9.8	0.98	100 in-lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in-lb	
Pickup Coil Cover Bolts	1.1	1.1	100 in-lb	
Camshaft Chain Tensioner Mounting Bolts	1.1	1.1	100 in-lb	
Camshaft Cap Bolts	11	1.1	108 in-lb	
Camshaft Chain Guide Bolts (Upper)	11	1.2	104 in-lb	
Cam Sprocket Bolts	11	1.2	108 in-lb	
Cylinder Head Bolts (#10) New Bolts	64	6.5	48	1, 2, 3 (Washer)
(#10) Used Bolts	49	5.0	36	1, 2, 3 (Washer)
(M6)	9.8	1.0	104 in-lb	3
Cylinder Head Centre Plugs	10	2.0	14.0	1

Fastener	Torques			Remarks
	N·m	kgf·m	ft·lbf	
Camshaft Chain Guide Bolt (Intake side)	10	1.0	88 in·lbf	
Carburetor Holder Bolts	10	1.0	88 in·lbf	
Baffle Plate Bolts	7.5	0.75	66 in·lbf	
Muffler and Exhaust Pipe Connection Nuts	34	3.5	25	
Clutch				
Clutch Cover Bolts	11	1.1	95 in·lbf	
Clutch Cover Damper Bolts	4.9	0.5	43 in·lbf	
Clutch Spring Bolts	9.8	1.0	87 in·lbf	1
Clutch Nut No.2	130	14	100	4
Engine Lubrication System				
Oil Filter Plug	17.5 N·m (Hand Tight)	1.75 kgf·m (Hand Tight)	13 ft·lbf (Hand Tight)	
Engine Drain Plug	20	2.0	14.5	
Oil Filter Cartridge Union	15.8	1.61	87 in·lbf	2, 13
Oil Cooler Mounting Bolt	10	1.0	88	12
Oil Pan Bolts	11	1.1	95 in·lbf	
Oil Pipe Holder Bolts	11	1.1	95 in·lbf	1
Oil Pressure Relief Valve	18	1.8	13 ft·lbf	1
Oil Pressure Switch	14	1.4	10 ft·lbf	13
Oil Pressure Switch Terminal Screw	1.5	0.15	13 in·lbf	
Impeller Bolt	9.8	1.0	87 in·lbf	
Engine Mechanical Installation				
Engine Mounting Bolts and Nuts	44	4.5	33	
Engine Mounting Bracket Bolts	23	2.3	16.5	
Engine Mounting Clamp Bolts	23	2.3	16.5	
Crankshaft/Transmission				
Breather Plate Bolts	9.8	1.0	87 in·lbf	1
Crankcase Damper Cover Bolts	12	1.2	106 in·lbf	
Crankcase Bolts 6 mm (M6)	10	1.0	88	M6: 3
8 mm (M8)	22	2.2	16	M8: 5
10 mm	34	3.5	25	6
12 mm	54	5.5	40	7
14 mm	73	7.5	54	8
Oil Passage Plugs	10	1.0	7.5	9
Connecting Rod Big End Nuts	30	3.0	22	10
Timing Rotor Bolt	74 N·m (Hand Tight)	7.4 kgf·m (Hand Tight)	54 ft·lbf (Hand Tight)	11
Oil Passage Bolts	10	1.0	88 in·lbf	
Gear Positioning Lever Bolt	14	1.4	10 ft·lbf	
Shift Shaft Return Spring Pin (Bolt)	12	1.2	106 in·lbf	14
Starter Damper	10	1.0	88	15
Shift Drum Bearing Holder Bolt	11	1.1	95 in·lbf	
Shift Drum Bearing Holder Screw	4.9	0.50	43 in·lbf	1
Shift Drum Cam Bolt	11	1.2	106 in·lbf	1
Wheels/Tires				
Front Axle Clamp Bolts	20	2.0	14.5	
Front Axle Nut	110	11.0	80	
Rear Axle Nut	110	11.0	80	

Fastener	Torque			Remarks
	N·m	kg-m	ft-lb	
Front Brake				
Engine Sprocket Nut	132	13.5	98	6
Engine Sprocket Cover Bolts	12	1.2	104 in-lb	
Engine Sprocket Cover Damper Nut	69	6.9	50	1
Axle Sprocket Bolts	16	1.6	12	
Rear Sprocket Bolts	-	-	-	1
Brakes				
Master Cylinder	7.8	0.80	69 in-lb	
Front Brake Hose Joint Banjo Bolts	25	2.5	18	
Brake Hose Banjo Bolts	34	3.5	25	
Brake Lever Pivot Bolt	1.0	0.10	9 in-lb	
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in-lb	
Front Brake Reservoir Cap Screws	1.5	0.15	13 in-lb	
Front Brake Reservoir Mounting Bolt	10	1.0	87	
Front Brake Light Switch Screws	1.2	0.12	11 in-lb	
Front Master Cylinder Clamp Bolts	9.8	1.0	87 in-lb	6
Rear Spring Screws (Front Caliper)	2.5	0.26	23 in-lb	
Caliper Mounting Bolts (Front)	30	3.1	22	
Caliper Assembly Bolts (Front)	25	2.5	18.0	
Front Brake Hose Mounting Bolts	20	2.0	14.5	
Rear Brake Disc Mounting Bolts	20	2.0	14.5	
Caliper Mounting Bolts (Rear)	20	2.0	14.5	
Rear Master Cylinder Guard Bolts	10	1.0	7.0	
Rear Master Cylinder Push Rod Locknut	17	1.8	13.0	
Suspension				
Front Fork Clamp Bolts (Lower)	20	2.0	14.5	
Front Fork Clamp Bolts (Upper)	20	2.0	14.5	
Front Fork Top Plugs	23	2.3	16.5	
Piston Rod Nut	34	3.5	25	
Front Fork Bottom Allen Bolts	20	2.0	14	1
Triple Axle Clamp Bolts	20	2.0	14.5	
Rear Shock Absorber Bolts (Upper and Lower)	34	3.5	25	
Swingarm Pivot Shaft Nut	118	12.0	85	
Swingarm Pivot Shaft Lock Nut	88	9.0	65	
Tires				
Spoke Nipple Nut	4.4	0.45	39 in-lb	
Tire Bead Screw	5.9	0.6	52 in-lb	
Steering				
Steering Stem Head Nut	88	9.0	65	
Steering Stem Nut	118	12.0	87	
Handlebar Bolts	23	2.3	16.5	
Handlebar Holder Bolts	23	2.3	16.5	1
Handlebar Holder Position Bolts	9.8	1.0	87 in-lb	1
Handlebar Weight Screws	-	-	-	1
Handlebar Switch Housing Screws	3.4	0.35	30 in-lb	
Frames				
Footpeg Holder Bolts	34	3.5	25	1
Side Stand Pivot Bolts	44	4.5	33	
Electrical System				
Spark Plugs	13	1.3	113 in-lb	
Alternator Rotor Nut	110	11.0	80	
Pickup Coil Bolts	11	1.1	95 in-lb	
Alternator Lead Holding Plate Bolts	9.8	0.98	104 in-lb	

Fastener	Torque			Remarks
	N·m	kg·m	ft·lb	
Engine Ground Lead Terminal Bolt	6.9	0.7	5.1 lb·ft	
Alternator Cover Bolts	11	1.1	8.0 lb·ft	
Pickup Coil Cover Bolts	11	1.1	8.0 lb·ft	
Pickup Coil Bolts	11	1.1	8.0 lb·ft	1.1 N·m
Timing Rotor Bolt	9.8	0.98	7.2 lb·ft	
Starter Motor Mounting Bolts	88	8.8	65 lb·ft	
Starter Clutch Bolts	11	1.1	8.0 lb·ft	
Thermistor Socket Housing Screws	11	1.1	8.0 lb·ft	
Radiator Fan Switch	9.4	0.95	6.9 lb·ft	
Water Temperature Sensor	18	1.8	13 lb·ft	
Oil Pressure Switch	14	1.45	10 lb·ft	
Oil Pressure Switch Terminal Bolt	10	1.0	7.2 lb·ft	
Neutral Switch	1.5	0.15	1.1 lb·ft	
Starter Lockout Switch Screws	1.5	0.15	1.1 lb·ft	

Special Tools and Sealant

Piston Ring Pliers: 57001-119



Compression Gauge: 57001-221



Inside Circlip Pliers: 57001-143



Valve Spring Compressor Assembly: 57001-241



Outside Circlip Pliers: 57001-144



Piston Pin Puller Assembly: 57001-910



Bearing Puller: 57001-135



Tool Guide Gauge: 57001-1017



Oil Pressure Gauge (Original): 57001-164



Oil Pressure Gauge Adapter, PT 3/8: 57001-1035



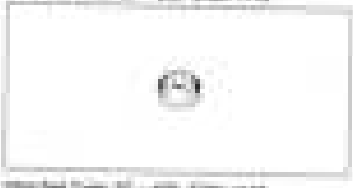








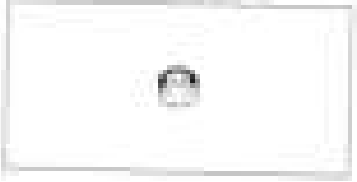


















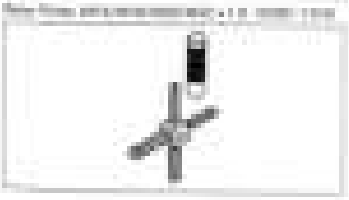




























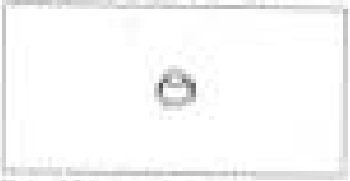




























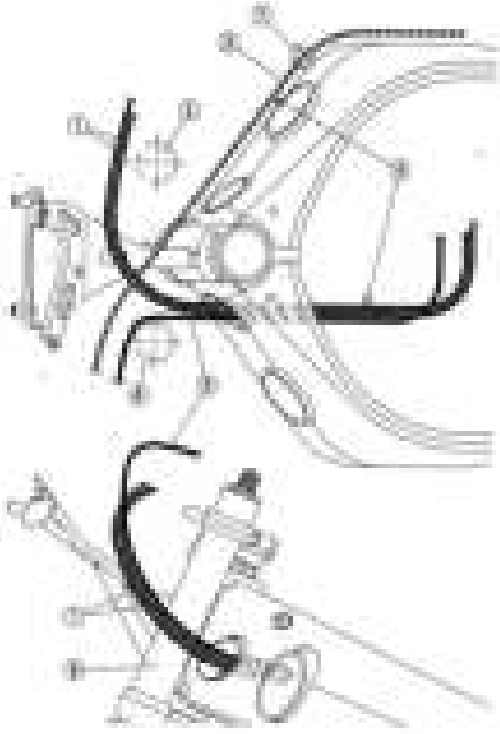




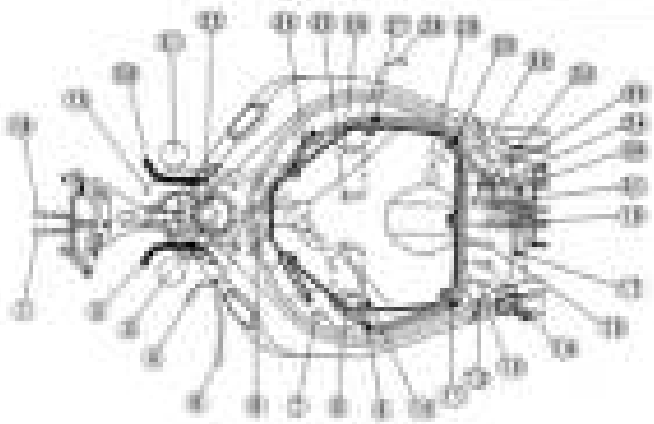




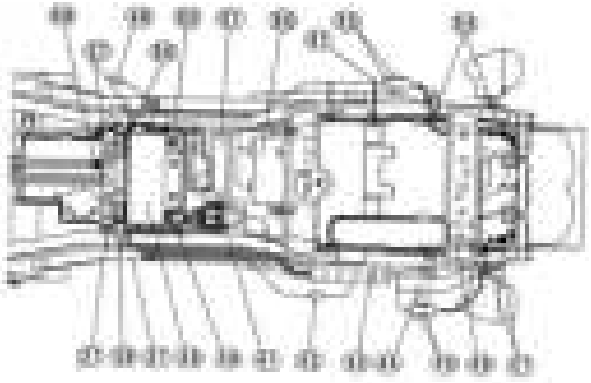
Cable, Wire, and Hose Routing



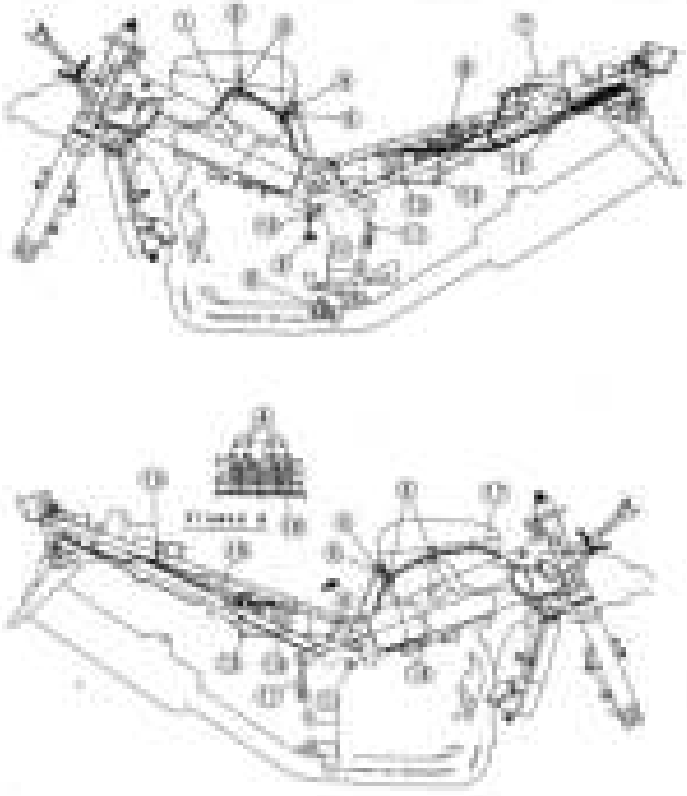
1. Throttle Cables
2. Right Front Fork Inner Tube
3. Clutch Cable
4. Rear Brake Master Cylinder (when under the air intake duct hose or intake housing)
5. Throttle Cables
6. Left Front Fork Inner Tube
7. Clutch Cable



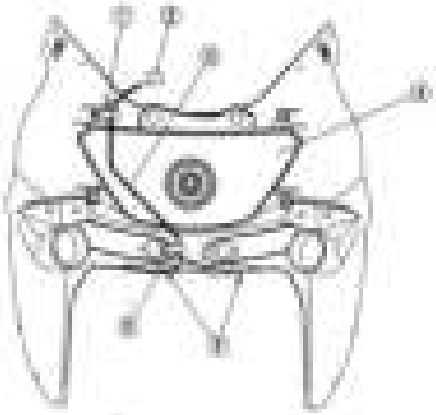
1. Clutch Hall Sensor Connector
2. Shift Interlocked Solenoid Lead
3. Left Front Fork Inner Tube
4. Front Axle Assembly
5. Rear Stoplight Lead Connection
6. Fuel Level Connection
7. Horn Battery Connection
8. #1 Valve Cover (Cylinder #1 and #2 Cylinder Number)
9. Clamp (Position the white tape here.)
10. #2 Valve Cover (Cylinder #3 and #4 Cylinder Number)
11. Clamp (Position the white tape here.)
12. #1 Fuel Injector Connector (U.K. & Type Models)
13. Stoplight Switch Lead Connection
14. Ignition Switch Lead Connection
15. #2 Fuel Cut-Valve Connector (U.K. & Type Models)
16. Water Temperature Sensor, Neutral Switch, Alternator Lead Connector
17. Frame Ground
18. Meter Unit Connector
19. Ignition Switch Lead
20. Right Handlebar Switch Lead
21. Right Front Fork Inner Tube
22. Horn
23. Clamp (Position the white tape here.)
24. Main Harness
25. #3 Valve Cover (Cylinder #5 and #6 Cylinder Number)
26. #4 Valve Cover (Cylinder #7 and #8 Cylinder Number)
27. Clamp (Position the white tape here.)
28. Throttle Sensor Lead
29. #1 Fuel Cut-Valve Connector (U.K. & Type Models)
30. Clamp (Position the white tape here.)
31. #2 Fuel Cut-Valve Connector (U.K. & Type Models)
32. Fuel Pump Connector
33. Pulsar Coil / Oil Pressure Switch Lead Connection
34. Band
35. Fuel Pump
36. Water Temperature Sensor

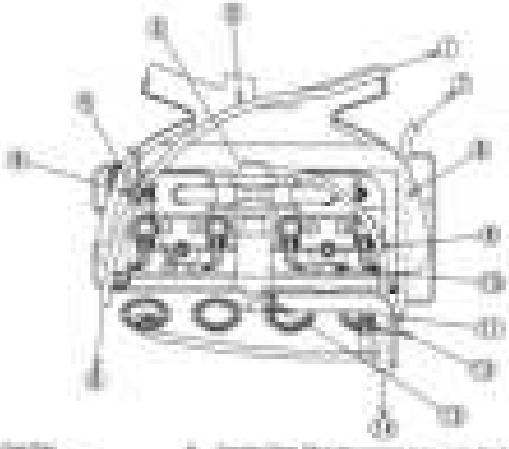


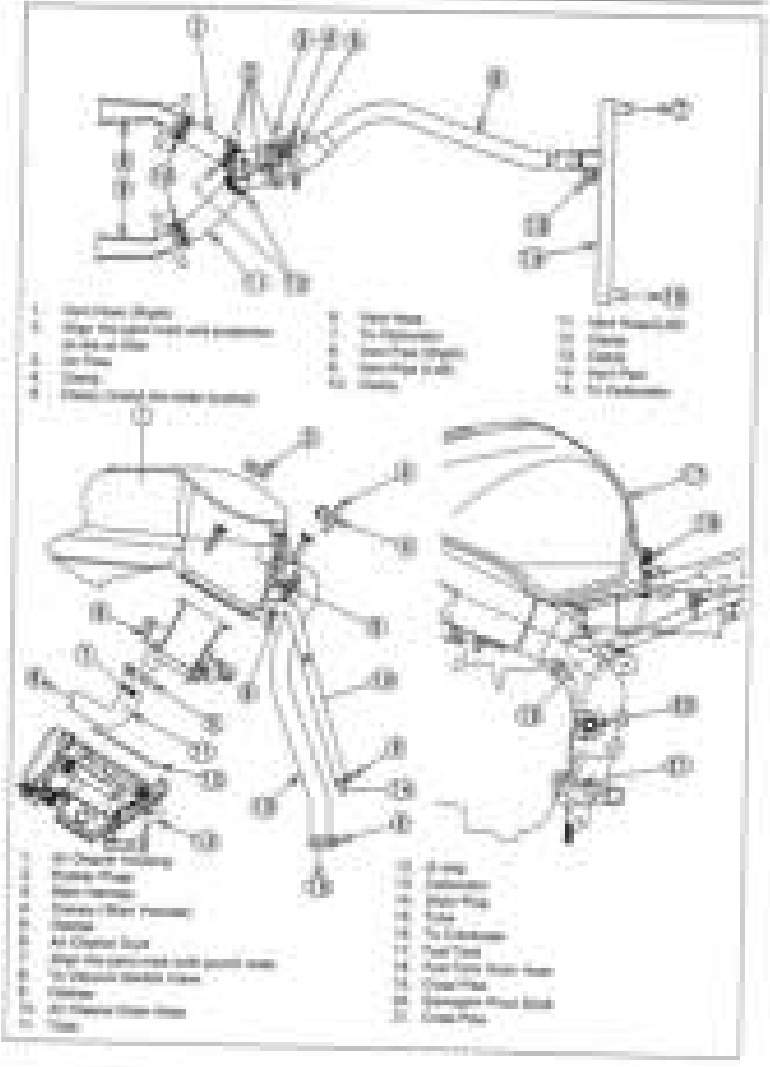
1. Horn
2. Left Signal Light Relay
3. Battery
4. Battery Positive (+) Terminal
5. Starter Relay
6. Regulator/Rectifier Connector
7. Regulator/Rectifier
8. Tail/Brake Light Connector
9. Left Turn Signal Light Lead Connector
10. Fuel Pump Relay
11. Main Fuse (30A) (Except the Interior Fan Motor)
12. Position Fan Motor Fuse
13. Fuse Block Left Front Lead Connector
14. Battery Negative (−) Terminal
15. Ignition Box
16. IC Igniter
17. Right Turn Signal Light Lead Connector
18. Fan Motor Relay (Except the Interior Fan Motor)
19. Headlight Relay (Other than the U.S. Six-speed)

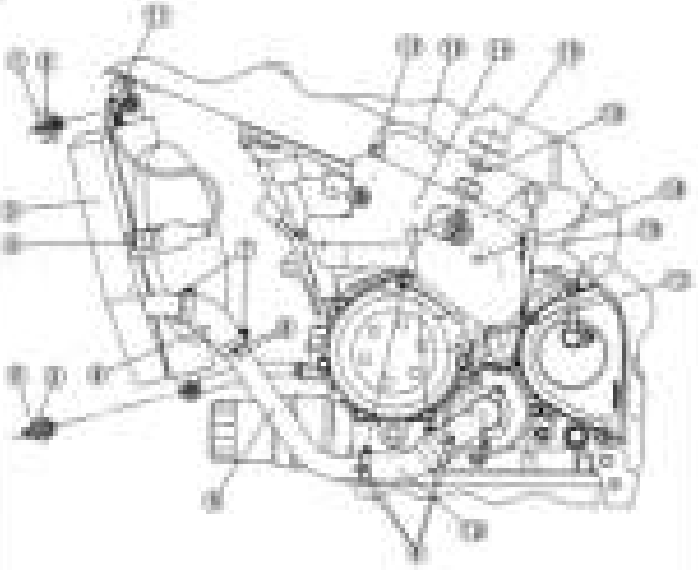


1. Main Harness (Left Console Side)
2. Clamp
3. Wire Ties
4. Fuel Sub Wire Connector (California and D Models)
5. Clamp
6. Starter Relay
7. Diode
8. Fan Switch (Under)
9. Radiator Sensor
10. Clamp
11. Rear Brake Light Switch
12. Turn Signal Relay
13. Battery
14. Band
15. Ignition Coil
16. Engine Ground Lead (California and D models only)
17. Main Harness (Right Console Side)
18. Wire Ties
19. Headlight Relay (Ohio Only) (U.S.A. and Canada)

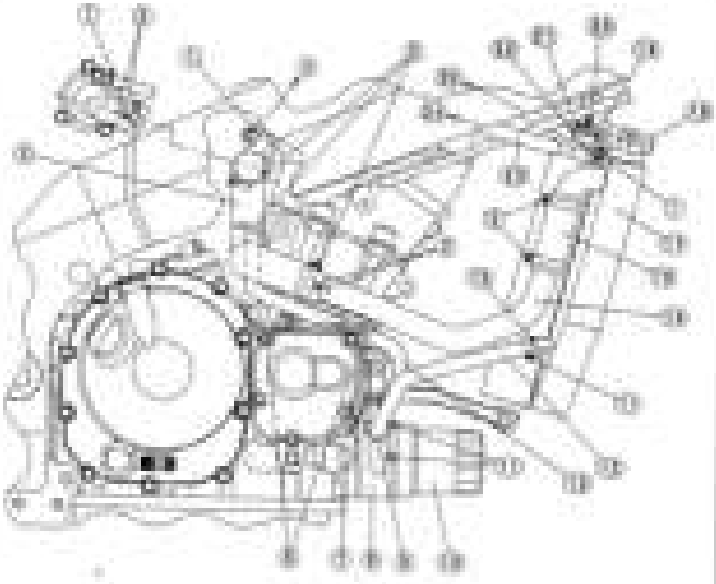




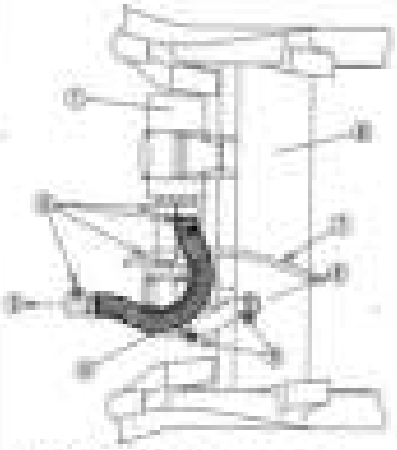


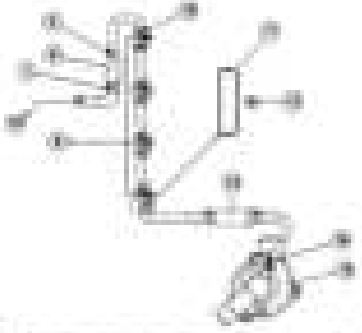


1. Relay
2. Radiator Shutter Fan
3. Radiator
4. Radiator Fan Switch
5. Radiator Mount Insulator
6. Coolant Hose
7. Install the heater hoses as illustrated
8. High Fan Switch
9. Connect Pin
10. Coolant Hose
11. Relay (Radiator Fan Control Lower)
12. Fuses
13. Coolant Reserve Cap Drain Hose
14. Coolant Reserve Tank
15. Radiator Cap Tab
16. Washer Tank
17. Fill Radiator Cap Here
18. Run this drain hose between the heater hoses and coolant hose
19. Coolant Hose

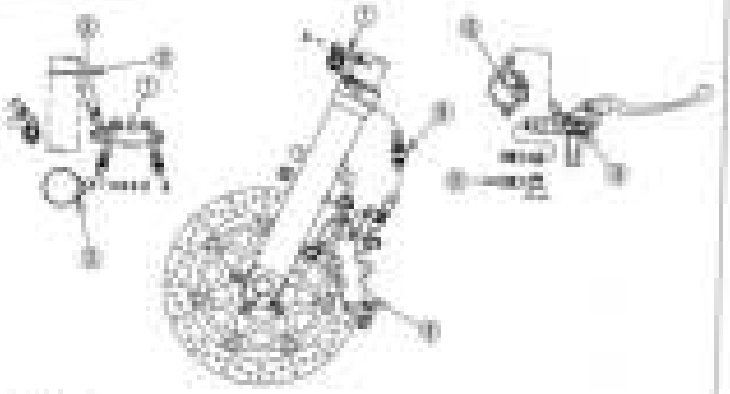


1. Clutch
2. Main drive shaft
3. Clutch hose
4. To Radiator
5. Heater hose coupling (hose at front side)
6. Clamp
7. Engine oil filler neck gasket or O-ring (if equipped)
8. Oil Cooler
9. Cable, Oil Cooler Heater
10. Oil Filter
11. Relief Pin (Never remove or Readjust)
12. Oil Cooler Hose (OUT)
13. Oil Cooler Hose (IN)
14. Gasket Pan
15. Install the Bolts in Numerical Order (bolts marked)
16. Crankcase Drain
17. Gasket
18. Gasket Cap
19. Clamp
20. Breather Tank Hose
21. Clutch Valve
22. Thermostatic Valve
23. Gasket Valve
24. To Thermostatic
25. To Radiator Tank

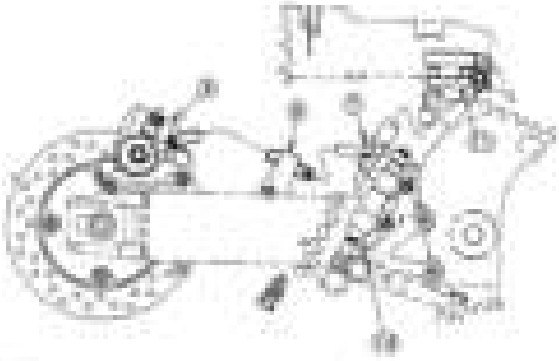




Front Brake System

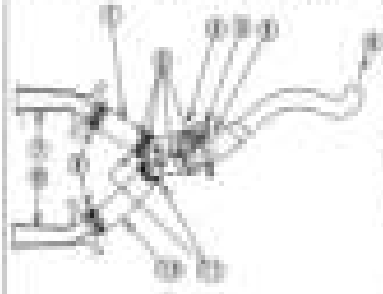


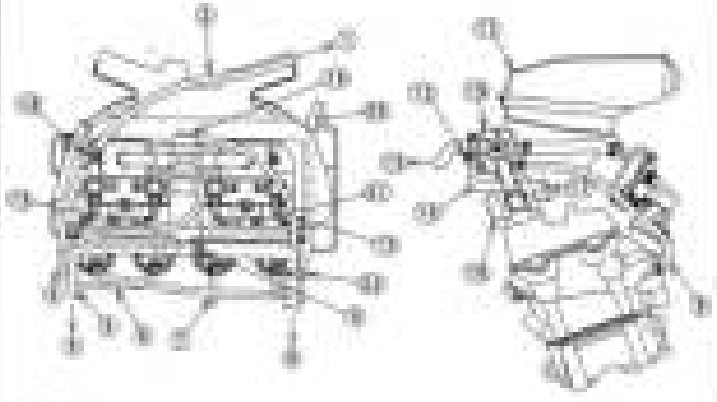
Rear Brake System

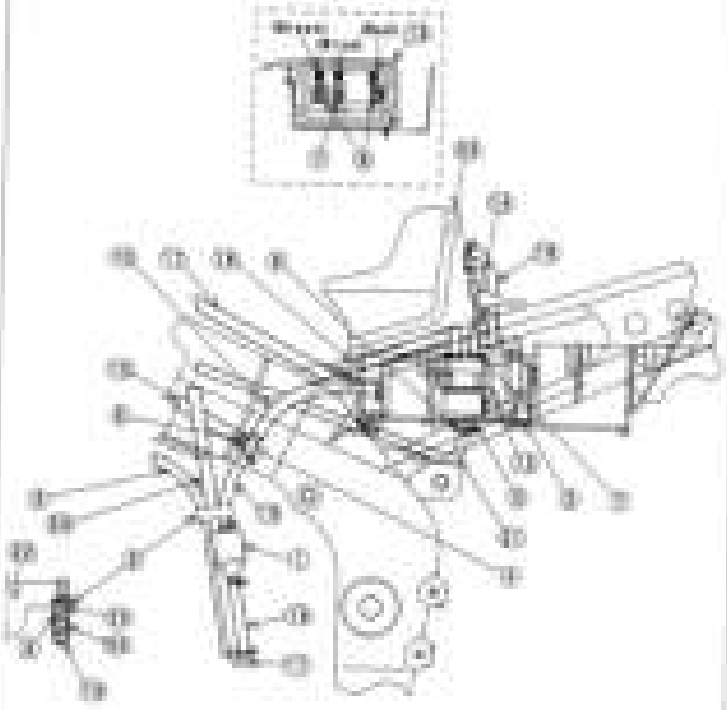


1. Brake Pedal Arm
2. Pedal
3. Front Brake Reservoir
4. Front Brake Master Cylinder
5. Clevis (Underside the Front Fender)
6. Front Brake Caliper
7. Clevis
8. Clevis
9. Rear Brake Caliper
10. Rear Brake Master Cylinder
11. Rear Brake Reservoir

Evaporative Emission Control System (California Model)







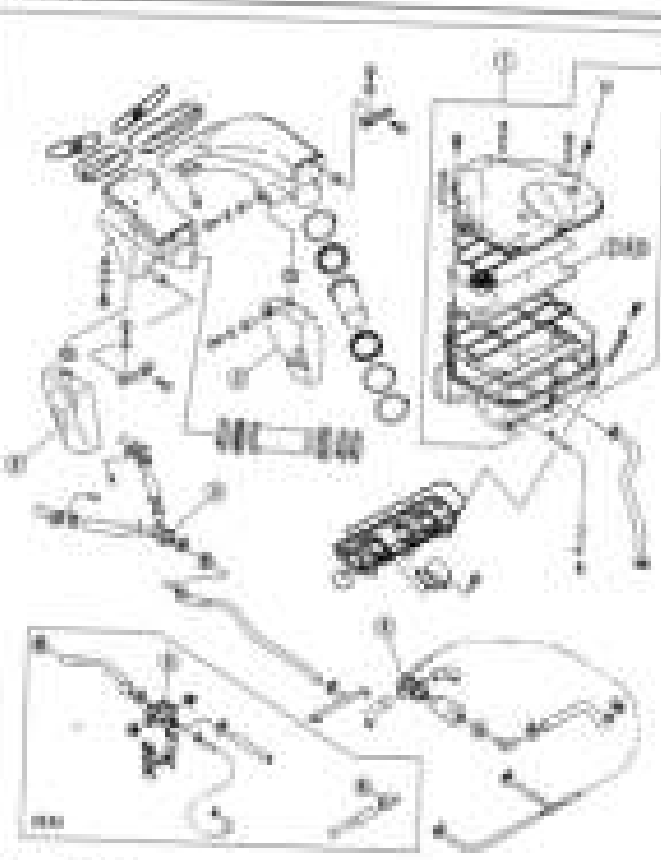
2

Fuel System

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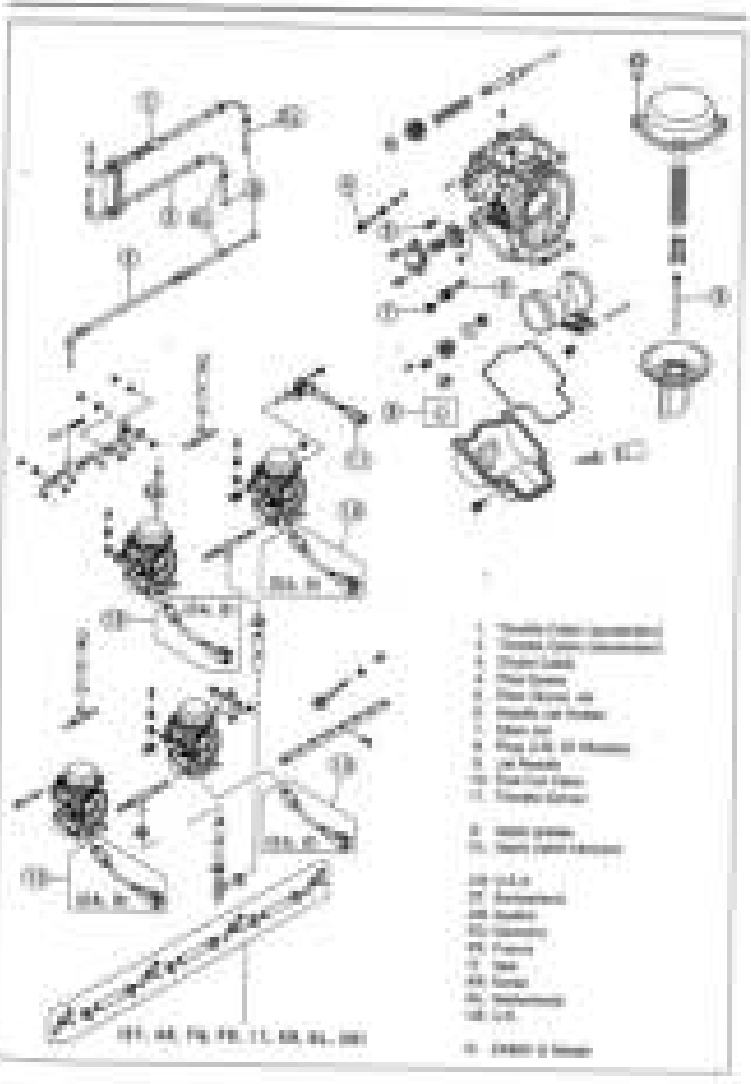
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Exploded view



1 [illegible]
2 [illegible]
3 [illegible]
4 [illegible]
5 [illegible]
6 [illegible]
7 [illegible]

[illegible]





Specifications

Item	Standard	
	[illegible]	[illegible]
Throttle grip and cables:		
Throttle grip free play	2 – 3 mm	—
Choke cable:		
Free Play	2 – 3 mm	—
Carburetors:		
Make, type	[illegible] x 4	—
Main jet	#700	—
Main air jet	#70	—
Jet needle	N74-4	—
Pilot jet (inner,air)	#35	—
Pilot air jet (outer,air jet)	#1.50	—
Pilot screw (turns out)	2 turns out	—
Starter jet	#35	—
Idle speed	1100 ± 50 r/min (rpm)	—
Carburetor synchronization vacuum	Less than 3.7 kPa (3 cm Hg) difference between any two carburetors	—
Service fuel level	0.5 ± 1 mm below the mark on the carburetor body	—
Float height	14 ± 2 mm	—

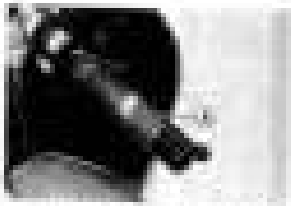
Special Tools — [illegible]

Throttle Grip and Cables

Free Play Inspection

- Check the throttle grip free play (A).
- If the free play is incorrect, adjust the throttle cable.

Throttle Grip Free Play
Standard: 2 – 3 mm



Free Play Adjustment

- Loosen the locknut (1).
- Turn the adjuster (2) until the proper amount of throttle grip free play is obtained.
- Tighten the locknut securely.
- If the proper amount of free play cannot be obtained by using the cable end, use the adjusters at the carburetor side.
- Loosen the locknut (3) and screw the adjuster near the cable end of the carburetor cables all the way in.
- Tighten the locknut securely.



- Remove the two seat bolts on inboard fairings (see Fuel Tank Removal and Air Cleaner Housing Removal).
- Loosen the locknuts.
- Screw both throttle cable adjusters in while the throttle grip pulling is idle.
- With the throttle grip completely closed, turn out the adjusting nuts adjusters (2) until the inner cables pull becomes tight.
- Tighten the adjusting nuts locknut (3) securely.
- Turn the carburetor cable adjuster (2) until the correct throttle grip free play is obtained.
- Tighten the carburetor cable locknut (1) securely.
- If the proper amount of free play can not be obtained in the adjustable range of the adjuster, use the adjuster at the cable end of the carburetor cable again.

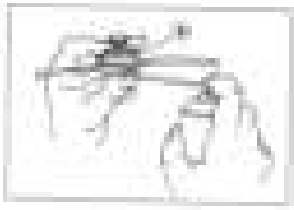


Cable Installation

- Install the throttle cables in accordance with Cable Routing (refer to General Information chapter).
- Insert the lower ends of the throttle cables in the cable holder on the carburetor after inserting the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly.

CAUTION

Operation with improperly routed or improperly adjusted throttle cables could result in an unsafe riding condition.



Cable Lubrication

Recommended cable lubricant: Lubricate the throttle cable as follows.

- Detach a cable housing at grease inlet from the cable lower end.
- Lubricate the cable with a commercially available cable lubricator.

Special Tool — Pressure Cable Lubricator: 57001-1105

Choke Cable

Free Play Inspection

- Push the choke lever (1) all the way to the front.
- Check choke cable free play (2).
- Loosen the adjuster of choke cable end at the choke lever. Pull the choke lever until the sealed damper lever (1) at the carburetor touches the stopper plunger (2), the amount of choke cable travel used is the amount of choke cable play.
- If free play is incorrect, adjust the choke cable.

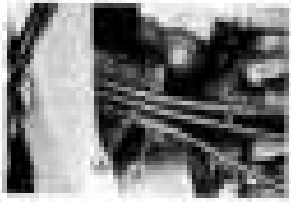
Choke Cable Free Play
Standard: 2 – 3 mm





Free Play Adjustment

- Remove the fuel tank with an interim bracket (see Fuel Tank Removal and Air Cleaner Housing Removal).
- Loosen the locknut (1), and turn the adjuster (2) until the cable has the proper amount of free play.
- Tighten the locknut securely.



Cable Installation

- Install the choke cable in accordance with Cable Routing section in General Information chapter.
- After installation, adjust the cable properly.

WARNING

Operation with an incorrectly routed or improperly adjusted cable could result in an unsafe riding condition.

Cable Lubrication

Whenever the choke cable is removed, lubricate the choke cable as follows:

- Apply a thin coating of grease to the cable ends and
- Lubricate the cable with a commercially available cable lubricator.

Special Tool – Pressure Cable Lube - 57001-1623 (A)

- Check that the choke lever cable ends smoothly by moving the choke lever to the front and rear.
- If there is any irregularity, check the choke cable and routing.



Carburetors

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides.
- If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or excessively worn, or damaged. Be sure to correct any of these conditions before riding. (see Cable Routing section in General Information chapter)

WARNING

Operation with improperly adjusted, excessively worn, or damaged cables could result in an unsafe riding condition.

- Check idle speed.
- If the idle speed is out of the specified range, adjust it.

Idle Speed

Standard: 1 200 ± 50 r/min (rpm)

Idle Speed Adjustment

- Start the engine and warm it up thoroughly.
- Turn the throttle stop screw (A) until the idle speed is correct.

Clockwise: Idle speed rises

Counterclockwise: Idle speed falls

Be sure to check that the idle speed is within the specified range. Readjust if necessary.



Synchronization Inspection

- Start the engine and warm it up thoroughly.
- Check idle speed (see idle speed inspection).
- Remove the fuel tank and air intake housing. (see Fuel Tank Removal and Air Cleaner Housing Removal)
- Connect one of the carburetors with an auxiliary hose.
- On the models other than the California models, remove one (2) 5 mm plug and install the vacuum gauge hose (09130-11421) and adapter.
- Connect the vacuum gauge hoses (A) to the intake air-line vacuum nipples (B).



- Connect the vacuum gauge hose to the vacuum gauge (A).

Vacuum Hose – Vacuum Gauge: 4 mm² max

- Start the engine and let it idle to balance the carburetors inside vacuum.
- Put the vacuum to increase, adjust the synchronization.

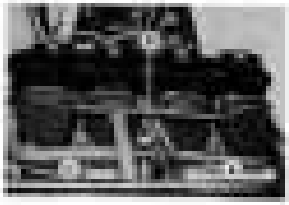
Carburetor Synchronization Vacuum

Standard: **Less than 2.7 kPa (2 cmHg) difference between any two carburetors**



Synchronization Adjustment

- Turn the adjusting screw to synchronize the carburetors.
- Apply grease on the tip of the adjusting screw loosely.
- Using synchronizer, like set new and test carburetor vacuum simultaneously by adjusting the left and right adjusting screws (A, C). Then synchronize the half-load carburetors and the right and left carburetors using the screw adjusting screws (B).



- If the carburetor synchronization cannot be obtained by using the adjusting screws, check for dirt or blockage and then clean the pilot screw passage.

Standard Tool : Other tools (vacuum or water type)

- Check the carburetor synchronization again.

NOTE

- Do not turn the pilot screw excessively during carburetor synchronization. Turn the pilot screw only a few degrees at the engine speed.

- If the idle speed differ from the specified value, remove the vacuum gauge tools and install the intake hose and clamp.
- Install the cowling.

Gasoline Fuel Level Inspection

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and the heat and sparks of flame or sparks are included the appliance with a pilot light.

- Prepare the motorcycle so that it is perpendicular to the ground.
- Remove the fuel tank cap (Fuel Tank Removal).
- Prepare an auxiliary fuel tank and connect the fuel hose to the carburetor.
- Prepare a fuel hose (3 mm in diameter and about 200 mm long).
- Connect the fuel level gauge (A) to the carburetor fuel drain and the fuel hose.

Special Tool : Fuel Level Gauge (57001-1017)

- Adjust the gauge vertically against the side of the carburetor body as hold the "mark" line (B) at upward combustion chamber from the fuel level mark (C) on the carburetor body.
- Feed fuel to the carburetor from the new gasoline tank (step 3) and (step 4) the valve.
- Wait until the fuel level in the gauge settles.
- Keeping the gauge vertical, align the "zero" line with the fuel level to the fuel level mark.



NOTE

- Do not blank the "zero" line below the level of the carburetor body. If the gauge is blanked from other vertical levels, the fuel level measured shows various fuel heights when the correct fuel level. If the gauge is blanked too far above the fuel line a suitable container and start the procedure over again.

- Read the fuel level (C) in the gauge and compare to the specification.
- Refer to the carburetor sheet (step).

- Body Painting and remove the fuel tank gauge.
- If the fuel tank is dropped, refer to "Fuel Tank Removal" (page 6-9).

Standard Fuel Level
Before the mark (1) the Sender Flange
Standard: 118 ±2 liter

Sender Fuel Level Adjustment

WARNING

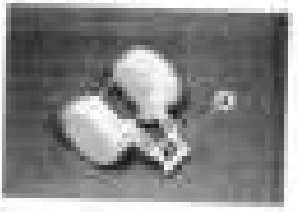
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and that there are no sparks or open flames in the immediate area, including any appliance with a pilot light.

- Remove the carburetor, and drain the fuel into a suitable container.
- Remove the fuel tank.
- Remove the screw (A) and take out the fuel (B), pin (C) and float valve needle (D).



- Bend the tang (A) on the float arm very slightly to change the float height. Increasing the distance toward the fuel inlet side decreases the float height raises the fuel level.

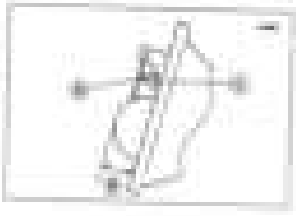
Float Height
Standard: 19 ± 2 mm



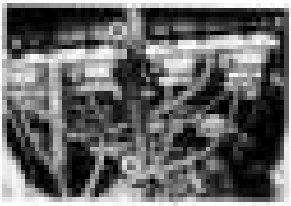
NOTE

- Only bending the metallic tang (A), as shown, the float height measurement is taken (B).

- Install the float valve needle and pin, and reinstall the fuel tank.
- Fill the fuel tank and check the adjustment for any overflow, and that no fuel leaks (page 6-9 for disassembly).



Fuel System Cleanliness Inspection



WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and that there are sources of flame or sparks (hot water heater with pilot light).

- Remove the fuel tank (see Fuel Tank Removal).
- Connect a suitable hose (A) to the fitting at the bottom of each carburetor float bowl.
- Run the hoses to the ends of any hoses with a suitable container.
- Turn the petcock (fuel valve) ON to the reserve and drain the fuel tank.

Special Tool - Carburetor Drain Plug Wrench, 6 mm (57001-1269)

- Drain the float bowls by removing the drain plugs.
- Turn the petcock to the ON position during the above inspection, then turn the petcock to the OFF position (Draining and Fuel Tank Draining).

Carburetor Removal

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and that there are sources of flame or sparks (hot water heater with pilot light).

- Drain the coolant (KX 65, KX 80, KX 85, KX 100 Models) (see Cooling System Draining).
- Remove:
  - Seat (see Frame Exploded View)
  - Fuel Tank (see Fuel Tank Removal)
  - Air Cleaner Housing (see Air Cleaner Housing Removal)
  - Inlet Hose
  - Fuel Hose
  - Coolant Hoses (For the KX 65, KX 80, KX 85, KX 100 Models)
  - Throttle Sensor Connector
  - Fuel Cut Valve Connectors (2WD: 6 pin (2WD) / 3 pin (4WD))
- Loosen the carburetor joint screws (A), and remove the carburetors.
- Remove the manifold joint seals and intake gasket.
- Don't loosen or turn any screw which has the carburetors mounted or keep the carburetors assembled.



Carburetor Installation

- Fit the new intake manifold joint seals and intake gasket into the carburetors.
- Tighten the carburetor joint screws.



■Check fuel leakage from the carburetors.

WARNING

Wipe spilled fuel off completely.

■Adjust the following items if necessary.
- Idle Speed
- Carburetor Synchronization
- Throttle Cables
- Choke Cable

Carburetor (Disassembly / Cleaning)

■Remove the carburetors.
■Drain fuel from the float bowl.
■Remove the air cleaner holder (A).



CAUTION

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks (this includes any appliance with a pilot light).

■Turn the IAS and Starter knobs, remove the pilot screw using an impact screwdriver, a Tube of Rtv Lube and any Allen size as seen on other similar units.

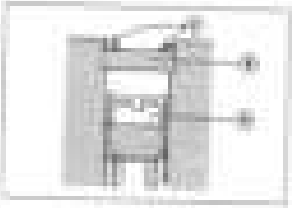
■Turn in the pilot screws and count the number of turns until it seats lightly. Set new lightly, and then remove the screw. Turn it out and screw in an original position when reassembling.

CAUTION

Strong carburetor disassembly or cleaning can result in damage the diaphragm. Never use a metal object to remove the diaphragm.

■Turn in the pilot screw (A) fully and set lightly, and then back it out the same number of turns recorded during disassembly.

■On IAS (A) and Starter models, loosen the adjustment screw and remove it from the plug (B). In the other similar units, use tweez a pencil magnet and a screwdriver blade (C) to the screwdriver or Mounting nut for removing.

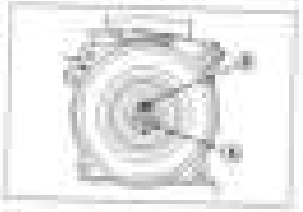


CAUTION

Do not apply too much bending force to the valve or the valve seat may be lose.

■Dip the needle through the holes in the valves on the carburetor bottom and push the valve seat (A) on the back of the needle. Turn the valve seat in large increments and Allen (B) at the bottom of the vacuum piston.

■After installing the vacuum chamber cover, check that the vacuum piston smoothly rise and above somewhere between 3mm/8mm in the carburetor bore.



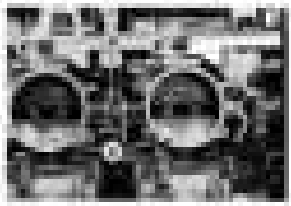
Carburetor Separation/Assembly

- Read the WARNING in Carburetor Cleaning/Ultrasonic.
- The center hole of the carburetor joint must be carefully cleaned with compressed air, and carefully. A clog will not cause the mixture screw adjustment to function.
- After assembling the choke mechanism, check to see that the valve plunger does widen light as the assembly pushed downward (choke).

CAUTION

The carburetor throttle could result if the valve plunger screw does not work properly or the rod catches after the choke lever is released.

- Visually examine the throttle assembly valve.
- Check to see that all throttle valve work and does smoothly without binding when turning the screw.
- Visually check the carburetor for damage, the throttle valve and the carburetor bore in each carburetor.
- If there is a difficulty between the two carburetors, turn the carburetor adjusting screw(s) (1) to obtain the same clearance.



Carburetor Cleaning

WARNING

Clean the carburetors in a well-ventilated area, and take care that there is no sparks or flame anywhere near the working area. Gasoline will explosive with a fire light. Because of the danger of higher flammable liquids, do not use gasoline to the fuel and solvents to clean the carburetors.

CAUTION

Do not use compressed air on an assembled carburetor, as this will only be sculpted by the pressure, and the vacuum piston diaphragm may be damaged.

Remove all rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. They will prevent damage to or deterioration of the parts.

The carburetor body has plastic parts that cannot be removed. Do not use a strong carburetor cleaning solution which could attack these parts, and a mild high flash-point cleaning solution with no plastic parts.

Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

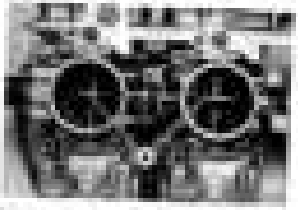
- Disassemble the carburetor.
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetor.

Carburetor Adjustment

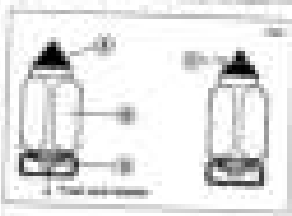
WARNING

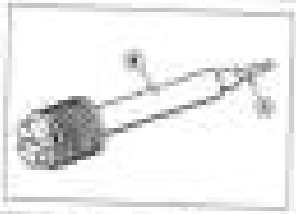
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF, do not smoke. Make sure the area is well ventilated and that there are no sparks or flames in the area (including pilot lights) before working with gasoline.

- Remove the carburetors.
- Before disassembling the carburetors, inflate the fuel level (see Fuel Level Inspection).
- If the fuel level is incorrect, inspect the float on the carburetor before proceeding.
- Blow the needle valve jet clean with compressed air.
- Check the needle valve for wear and damage. Replace the carburetors if the needle valve is worn or damaged.
- Check the float arm for wear and damage. Replace the carburetors if the float arm is worn or damaged.
- Check that the spring on the float arm pushes the needle valve lightly.
- Check that the throttle valve moves smoothly and returns by spring tension.
- If the starter plunger is not worn or damaged, replace the carburetors.
- Turn the throttle valve screw in slowly until the throttle valve(s) seats (all throttle valves) and count the turning number.
- Turn the throttle valve in and screw completely. Return the carburetors.



- Disassemble the carburetors.
- Clean the carburetors.
- Check that the O-rings on the float bowl and drain screw and the diaphragm on the vacuum piston are in good condition.
- If any of the O-rings or diaphragms are not in good condition, replace them.
- Check the starter for (1) of the float valve needle (2). If clogged by grease, varnish and gummed substance or dust.
- If the starter for is damaged (1), replace the needle.
- Push the rod (3) in the valve seat of the float valve needle, and check whether it
- If the rod does not spring out replace the needle.
- Check the starter screw (1) of the jets screw (2) for wear or damage.
- If the jets screw is worn or damaged on the starter screw, it can prevent the engine from being smoothly. Replace it.







- Check that the vacuum valve (1) moves smoothly in the carburetor body. The contact of the piston in part will be smooth and level.
- If the vacuum piston does not move smoothly, or if it is worn, replace carburetor body. Replace the carburetor.

Coolant Filter Cleaning (A8F, F5J, H5, J7, J8F, N5J, Z7, L8F Models)

Before carried station clarify, clean the filter of carburetor system.
- Remove the fuel tank (see Fuel Tank Removal).
- Drain the coolant (see Cooling System chapter).
- Remove the filter (A) from the cooling meter (B) of carburetor system.
- Wash with petroleum/solvent on the filter with compressed air.



Coolant Valve Inspection (A8F, F5J, H5, J7, J8F, N5J, Z7, L8F Models)

- Drain the coolant (see Cooling System chapter).
- Remove the coolant valve on the engine left side.
- Inspect the coolant valve (A) at each temperature.
- If the valve is closed, replace the valve with a new one.
- (To check valve opening, pull lines through the valve.)

Valve Opening Temperature (for reference)
Standard: [illegible] at more or minute
[illegible] kg/cm² (1.4 psi)



High Altitude Performance Adjustment (US model)

NOTE

- The [illegible] requires an high altitude performance adjustment for the California model.

(To improve the EMISSION CONTROL PERFORMANCE at vehicle operated above [illegible] Honda recommends the following Environmental Protection Agency (EPA) approved modification.

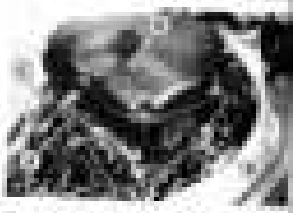
- Change the main jet and slow jet for high altitude use.

High Altitude Carburetor Specifications
Main jet: [illegible]
Slow jet: [illegible]

Air Cleaner

Air Cleaner Housing Removal

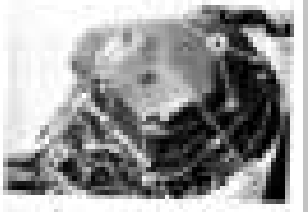
- Remove:
  - Seats (see Frame chapter)
  - Fuel Tank (Step Fuel Tank Removal)
  - Engine Breather Hose (A)
  - Crankcase Drain Hose (B)
  - Water Hose (C)
  - Radiator Hose (D)



- Loosen the Air Cleaner Sleeve Screw (A).



- Pull the Air Inlet Hoses from the Holder (A).
- Remove:
  - Air Cleaner Housing Mounting Bolts (B)
  - Front Cut Holes Exhaust Bracket (CA/EC/MX/US/TC Type Model)
  - Air Cleaner Housing (C)
- Pull out the rear of the housing, and take release it from the air inlets.



Air Cleaner Housing Installation

- Install the air hoses (A) over the retainers (B). Direction of the retainers should be set out the housing.
- Tighten:
  - Housing Mounting Bolts
  - Clamp Screws
- Connect to All the Following Hoses:
  - Engine Breather Hose
  - Crankcase Drain Hose
  - Air Cleaner Drain Hose
- Install the rubber plugs in holes.



Element Removal

- Remove:
  - Seats (see Frame chapter)
  - Fuel Tank (Step Fuel Tank Removal)
  - Water Hoses (Mounting Bolts (A))
  - Clean Housing (B)



- Remove the following parts as a unit:
  - Upper Plastic Holder (A)
  - Main Breaker (B)
  - Element (C)
  - Lower Plastic Holder



Element Installation

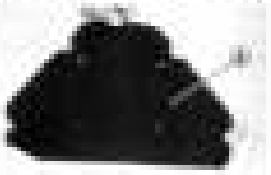
- Install the element unit (A) with the holes pressed onto guide fitting (B).



Element Cleaning and Inspection

WARNING

Clean the element in a well-ventilated area, and take precautions there are no sparks or flames anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or a low flash point solvent to clean the element.



- Remove the air cleaner element (A). See this chapter.
- Clean the element in a basin of high flash point kerosene, and then dry it with compressed air or by allowing it to dry.
- After cleaning, saturate a clean rag dampened with SAE 30 or SAE 40 oil and apply this oil to the element by tapping the element outward with the hand.
- Check the element for tears or cracks.
- If the element has any tears or cracks, replace it with a new one.

Oil Draining

A drain hose (A) is connected to the bottom of the air cleaner housing to drain water or oil accumulated in the housing.

- Check the drain hose if the water or oil accumulates in the hose.
- If any water or oil accumulates in the hose, drain it by taking off the drain plugs (B) at the lower end of the hose and wipe them clean.

WARNING

Be sure to reinstall the plug in the hose end after draining. Oil or dirty will make them slippery and can cause an accident and injury.



Fuel Tank

Fuel Tank Removal

WARNING

Gasoline is extremely flammable, and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and stay away from any sparks or flames (or anything that produces any appliance with a pilot light).

CAUTION

Any **[illegible]** smoke, fingerprints, exhaust, water or any other liquid should be avoided. Any contact's vapor absorbing capacity to greatly reduced. If the solution does become contaminated, replace it with a new one.

- Turn the fuel line valve to the OFF position.
- Remove:
  - Seats (see Frames chapter)
  - Fuel Tank Mounting Bolts (Front)
  - Fuel Tank Mounting Bolt (R)
  - Fuel Tank Rubber Band Bolts (L)



- Remove:
  - Mounting Band (L)
  - Bracket (R)
- Pull the fuel tank up and rearward to clear the fuel tap, and then remove the fuel tank.



Fuel Tank Installation

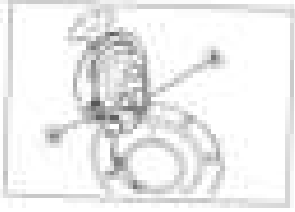
- Reverse the above procedure.
- Route the breather hoses (see Frames chapter).
- Be sure the hoses are arranged correctly to prevent kinks.

Fuel Tank Inspection

- Remove the fuel tank (see fuel tank removal section).
- Check for dirt in the breather pipe (see the fuel tank cap in the Frames chapter) or the tank in the chapter. Clean the tank and breather pipe.
- If dirt is clogged, remove the valve and wash it, and then blow the breather hole with compressed air.

CAUTION

Do not apply compressed air to the air vent holes (A) of the tank cap. This could cause damage and clogging of the valve in the cap.



Fuel Tank Cleaning

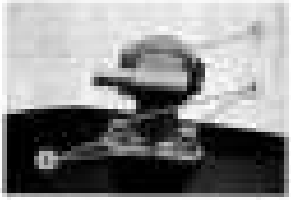
WARNING

Clean the tank in a well-ventilated area, and take care that there are no sparks or open flames (including pilot lights) near the cleaning area. Because of the danger of highly flammable liquids, do not use gasoline or low flash point solvents to clean the tank.

- Remove the fuel tank and place it.
- Pour some high flash point cleaning into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Pour high flash point cleaning through the tap in at least positions.
- Pour the cleaning out of the tank.
- Remove the fuel tap from the tank (see Fuel Tap Removal).
- Clean the fuel tap filter screens in a high flash point cleaning.
- Dry the tank and screens with compressed air.
- Install the fuel filters in the tank.
- Install the fuel tank (see Fuel Tank Installation).

Fuel Tap Removal

- Remove the Fuel Pedestal cover (see Fuel Tank Removal).
- Remove the fuel tank strut bolt [1].
- Remove:
  - Bolts [2]
  - Holder Nut Washers [3]
  - Fuel Tap [4]



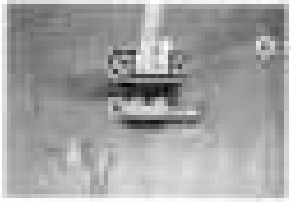
Fuel Tap Installation

- Be sure that O-rings [1] are in good condition to prevent leaks.
- Be sure the rubber fuel washers [2] are in good condition to prevent leaks.

CAUTION

Do not use steel washers in place of the rubber fuel washers. Abrasion from dirt will not seal the petty gaskets and fuel will leak.

- Be sure to install the fuel holder in the tap in proper order.



Fuel Tap Inspection

- Remove the fuel tap.
- Check the fuel tap filter screens [1] for any cracks or deterioration.
- If the screens have any cracks or are deteriorated, they may allow dirt to reach the carburetors, causing poor running. Replace the fuel tap.
- If the fuel tap leaks in either the on or the reserve position, or if it leaks in the shutoff position, causing poor running, replace the damaged gasket [2] or O-rings [3].



Fuel Pump, Fuel Filter

Fuel Pump, Fuel Filter Removal

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and not near any sources of flame or sparks (like running any appliance with a pilot light).



- Remove:
  - Seats (see Frame chapter)
  - Fuel Tank (see Fuel Tank Removal)
  - Fuel Hose (1)
  - Fuel Pump Lead Connector (2)
- Remove the fuel tanker (3) and Fuel Nut (4).

Fuel Pump, Fuel Filter Installation

- Be sure to route the hoses so that they will not be kinked or pinched.

Fuel Pump Inspection

- Refer to Electrical System chapter.

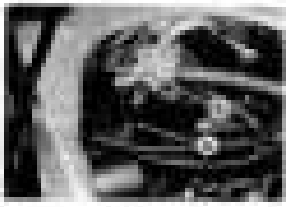
Fuel Filter Inspection

- Remove:
  - Seats (see Frame chapter)
  - Fuel Tank (see Fuel Tank Removal)
  - Bolts
- Carefully inspect the fuel filter.
- If the filter is clean with no stains or dirt or other contamination, it is OK and need not be replaced.
- If the filter is dirt or stains etc., replace with a new one. Also, check the rest of the fuel system for contamination.

Vacuum Valve

Vacuum Valve Inspection

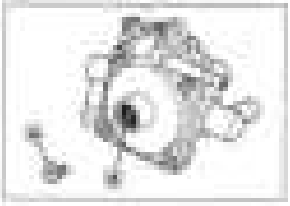
- Remove:
  - Air Cleaner Housing Cap (for Cleaner Housing Removal)
  - Bracket (A) and Vacuum Valve (B)
  - Vacuum Valve Hoses (C)



- Remove the drain screw (A) from the bottom of the chamber.
- If any liquid accumulates in the chamber, drain it.

WARNING

The liquid may contain gasoline.



- Replace the O-ring (B) with a new one.
- After draining, install the drain screw with the O-ring.

Torque — Vacuum Valve Drain Screw: 1.4 N·m (0.14 kg-m, 1 in·lb)

- Using the vacuum gauge and hose and hose clamps, measure the vacuum valve operation (see Vacuum Valve Unit in Engine Top End chapter).

Special Tools — Vacuum Gauge: 57001-1369
Hose, M5 Length Damper: 57001-1126

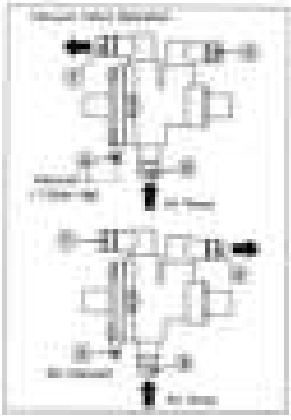
If the vacuum valve operation is not correct, replace the vacuum valve unit.

If the vacuum valve operation is not correct, replace the vacuum valve unit.

- Remove the vacuum valve unit.
- Reconnect the vacuum valve unit.

CAUTION

Do not use compressed air during the valve check, or the vacuum valve may be damaged.



Evaporative Emission Control System (California Model Only)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine to burn the vapors in a manner which the engine is designed. Although no adjustments are required, a thorough visual inspection should be made at the intervals specified in the Periodic Maintenance Chart.

Parts Removal Installation

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF, do not smoke. Make sure the area is well-ventilated and that there are no sparks or flames in the area. Also avoid any appliance with a pilot light.

CAUTION

Operation in areas with little or any other liquid water can corrode the canister's vapor absorbing capacity or greatly reduce it. If the canister does become contaminated, replace it with a new one.

- To prevent the gasoline from flowing into or out of the canister, hold the canister perpendicular to the ground.
- Remember the hose connections and location of the canister. Make sure they are not pinched or kinked.

Parts Inspection

- Check that the hoses are securely connected.
- Hoses are kinked, deteriorated or damaged in any way.

Separator Inspection

- Disconnect the hoses from the liquid vapor separator and remove the separator from the motorcycle.
- Visually inspect the separator for cracks and other damage.
- If the separator has any cracks or is otherwise damaged, replace it with a new one.

Separator Operation Test

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF, do not smoke. Make sure the area is well-ventilated and that there are no sparks or flames in the area. Also avoid any appliance with a pilot light.

- Connect the hoses to the separator, and install the separator on the motorcycle.

- Disconnect the breather hose from the separator, and drain about 20 mL of gasoline into the separator through the hose fitting.
- Reconnect the hose to the separator.
- Run the wash end of the return hose into the container and hold it level with the tank top.
- Start the engine, and let it idle.
- If the gasoline in the separator circles out of the hose, the separator works well. If it does not, replace the separator with a new one.

Carburetor Inspection

- Remove the carburetor, and disconnect the hoses from the carburetor.
- Visually inspect the carburetor for cracks and any damage.
- If the carburetor has any cracks or bad damage, replace it with a new one.

NOTE

- The carburetor is designed to work well through the temperature and altitude (low temperature or high altitude) range normally encountered.

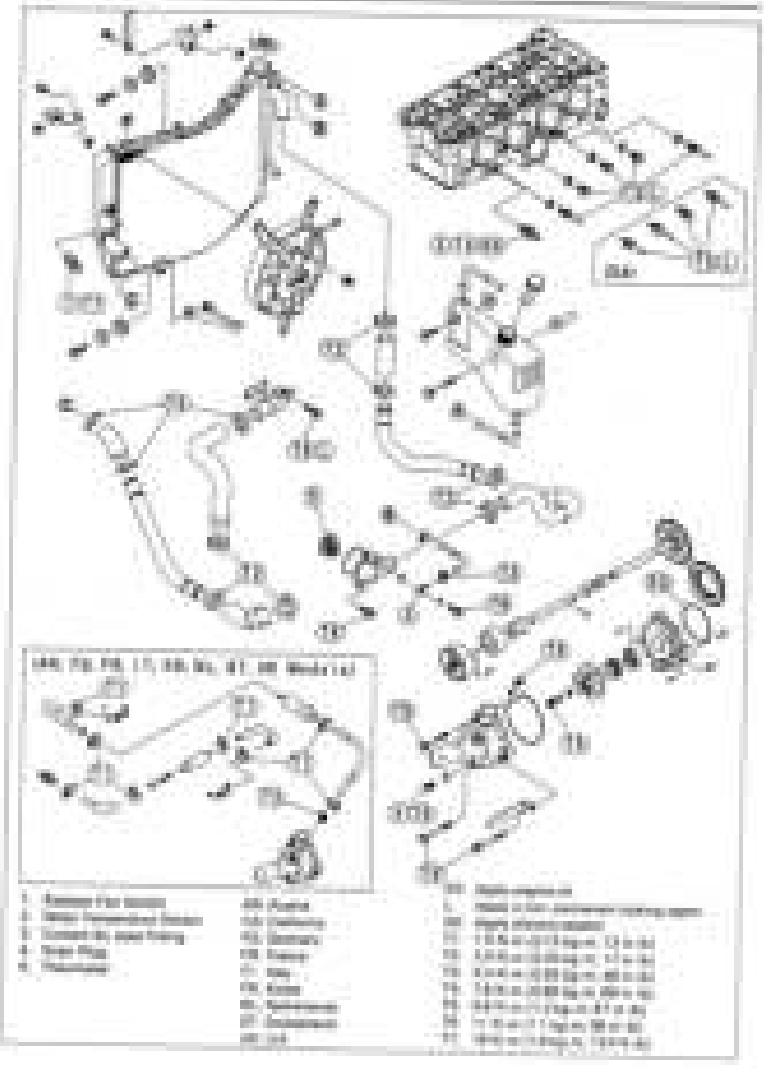
Cooling System

3

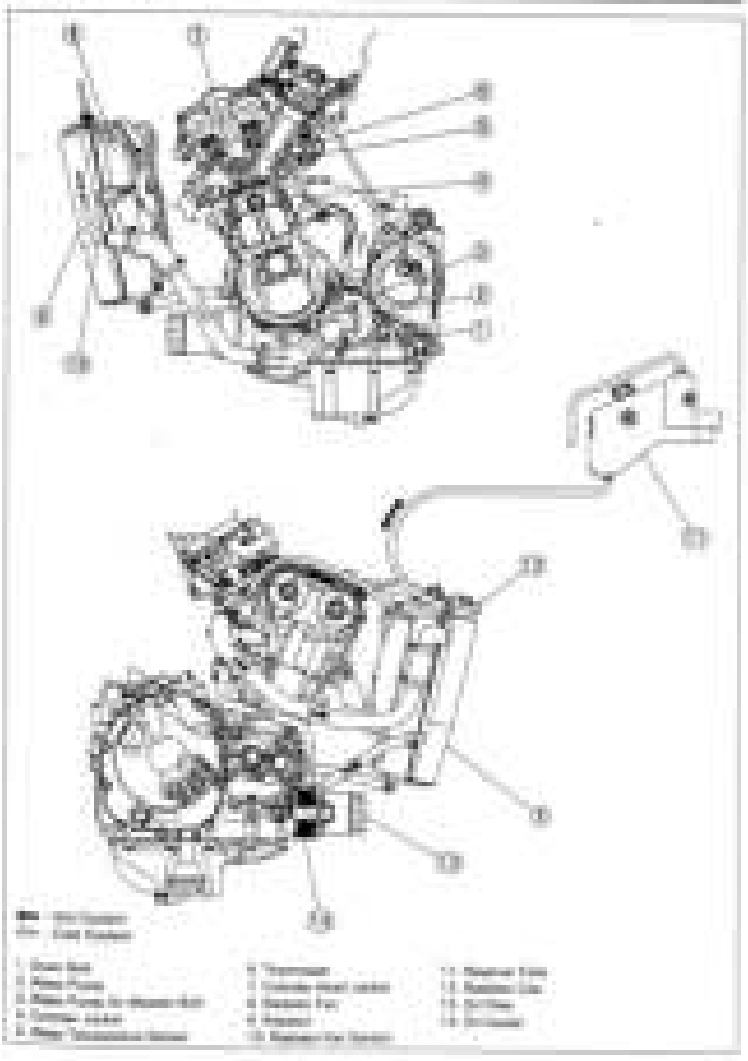
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Exploded View



Coolant Flow Chart



Items		Standard
Coolant provided when shipping	Type	Permanent type of antifreeze (ethylene glycol base) and silicate-free soft water (with low chloride ion concentration such as drinkable water)
	Color	[illegible]
	Mixing ratio	[illegible]
	Freezing point	[illegible]
	Total amount	[illegible]
Radiator cap	Valve pressure	[illegible]
Thermostat		
	Valve opening temperature	[illegible]
	Valve lift (opening) lift	[illegible]

Radiator — Thermostat (Engine Coolant) 3-4-1-01

Coolant

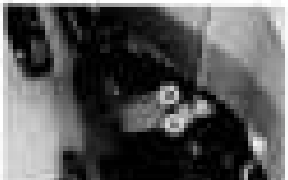
Coolant Level Inspection

NOTE

- Check this level when the engine is cold (clean or ambient temperature).

● Check the coolant level in the reserve tank with the motorcycle kept perpendicular.

● If the coolant level is lower than the level line (1), add coolant to the full level line (2).



CAUTION

Tap water contains minerals and impurities that are harmful to the engine. Add only distilled water to the coolant.

Tap water will dilute the coolant and degrade its corrosion protection. The dilution increases with each addition of tap water and will eventually affect the performance of the cooling system.

Hard water or salt water is harmful to engine parts. If you have no distilled water available in an emergency, soft water may be used temporarily. Get the distilled water as soon as possible and change the coolant in the system.

If coolant is lost or added often, or the reservoir tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.

Coolant Draining

WARNING

To avoid scalds, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.

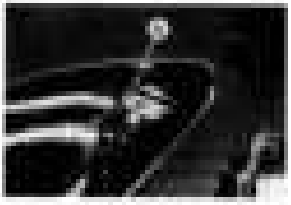
Coolant is harmful if swallowed or if it comes in contact with skin or eyes. It can cause severe illness. Avoid contact and wash thoroughly after handling. Immediately follow the first aid instructions printed on the coolant container.

Keep coolant out of reach of children.

Never remove the radiator cap when the engine is hot. Scalding hot coolant and steam may be blown out under pressure, which could cause serious injury.

When the engine has cooled, open the radiator cap by first turning it counterclockwise to the detent. This allows any pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

● Remove:
Radiator Cap (1)



● Place a container under the drain plug (2) at the bottom of the water pump cover (3).

● Drain the coolant from the radiator and engine by removing the drain plug.



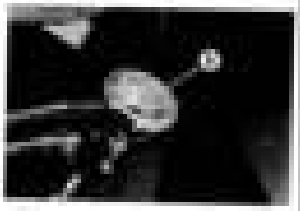
■Remove:
Lower Fairing (see Frame chapter)
Left Middle Fairing (see Frame chapter)
Plate (1)
Mounting Bolts (2) and Radiator Tank (3)
■Remove the nut (1) and drain the radiator side screw/bolt.



Coolant Filling
■Remove:
Lower Fairing (see Frame chapter)
Right Middle Fairing (see Frame chapter)
■Tighten the drain bolt.

Torque — Drain Plug: 1.5 N·m (0.15 kgf·m, 13 in·lb)

■Fill the radiator tank to the radiator filler level (1) with coolant, and install the radiator cap.



NOTE

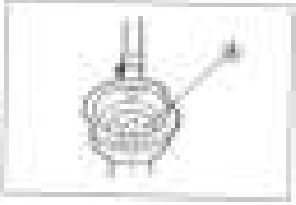
○Pour of the coolant slowly so that it can reach the air vent line of the engine side radiator.

■Fill the reserve tank cap to the full level line with coolant, and install the cap.

CAUTION

Soft or distilled water must be used with the antifreeze (see below) to avoid damage to the cooling system.
If hard water is used in the system, it causes scales accumulation in the water passages and considerably reduces the efficiency of the cooling system.

Water and Coolant Mixture Ratio (Recommended)
Soft Water : 50%
Coolant : 50%
Freezing Point : −35°C (−31°F)
Total Amount : 4.6 L



NOTE

○Remove a suitable mixture ratio by referring to the coolant concentration's directions.

■Close the air vent line sealing bolt on radiator.
○Start the engine with the radiator side removed and run it until warmed up. If coolant (1) can be seen in the reserve.
○Tap the radiator hoses to force any air bubbles complete inside.
○Stop the engine and add coolant up to the radiator filler hole.
■Install the radiator cap.
■Start the engine, warm it up thoroughly until the radiator fan starts up, and then stop the engine.
■Check the coolant level in the reserve tank after the engine cools down.
■If the coolant level is lower than the low level line, add coolant to the full level line.

CAUTION

Do not add more coolant above the full level line.

Pressure Testing

- Remove:
  - Engine Shutter Cooling Unit Fuses (engine)
- Remove the radiator cap, and install a cooling system pressure tester (2) on the filler neck.

NOTE

- Wet the cap sealing surface with water to prevent a pressure leak.

- Build up pressure in the system carefully until the pressure reaches 110 kPa (1.10 kg/cm², 15 psi).

CAUTION

Exceeding pressure testing do not exceed the pressure for which the system is designed. The maximum pressure is 180 kPa (1.80 kg/cm², 26 psi).

- Watch the gauge for at least 6 seconds.
- If the pressure holds steadily, the system is all right.
- If the pressure drops soon, check for leaks.

Cooling System Flushing

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is considerable it reduces the cooling system. If the accumulation is not removed, it will clog up the water passage and considerably reduce the efficiency of the cooling system.

- Flush the cooling system (see Coolant Draining).
- Fill the cooling system with fresh water (hose) with a flushing compound.

CAUTION

Do not use a flushing compound when is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

- Warm up the engine and run it at normal operating temperature for about ten minutes.
- Shut the engine and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Filling).



Water Pump

Water Pump Removal

●Refer to Oil Pump Removal in Engine Lubrication System chapter.

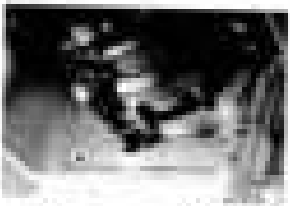
Water Pump Installation

●Refer to Oil Pump Installation in Engine Lubrication System chapter.

Water Pump Inspection

●Check the drainage hole (arrow) (A) in the side of the water pump body for coolant leaks.

●If the mechanical seal is damaged, the coolant leaks through the seal and drains through this drainage. Replace the water pump unit with a new one.



●Handle impeller by hands (A).

●If the surface is corroded, or if the blades are damaged, replace the water pump unit.



Radiator, Radiator Fan

Radiator, Radiator Fan (Removal)

WARNING

The radiator fan is connected directly to the battery. The radiator fan may start even if the ignition switch is off. BEFORE TOUCH THE RADIATOR FAN WIRE, THE RADIATOR FAN CONNECTOR IS DISCONNECTED. TOUCHING FOR FAN BEFORE FAN CONNECTOR IS DISCONNECTED COULD CAUSE INJURY. Keep hair, hand, clothes.

- Remove
  - Under Cowl Fabric (Center)
  - Fuel Tank and Air Cleaner Housing Set Nut Guides (Upper, Middle, and Lower Fairings Side Fabric Screws)
  - Coolant (see Coolant Draining)
  - Radiator Fan Connector (A)



  - Radiator Hoses (B)
  - Radiator Mounting Bolt (C)



  - Fan Shroud Lead Connectors (a)
  - Radiator Hose (B)
  - Radiator Mounting Bolts (C)
  - Radiator

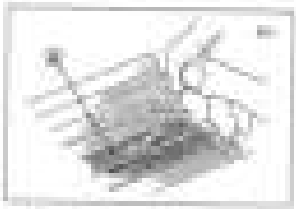


  - Radiator Fan Mounting Bolts (D)
  - Radiator Fan (E)



Radiator Inspection

- ★Check the radiator core.
- ★If there are obstructions to air flow, remove them.
- ★If the fins are bent, straighten them with a screwdriver.
- ★If dirty or soiled, clean the radiator core with a low pressure water hose. Direct the water from the engine side to remove dirt between the fins.



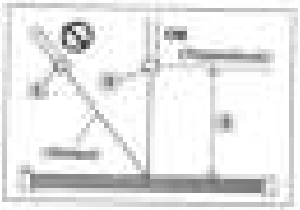
CAUTION

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.

Keep the radiator and the steam cleaner nozzle more than 0.3 m (30 cm) from the radiator core.

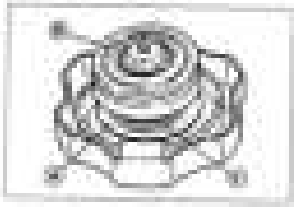
Direct the steam jet perpendicular to the core surface.

Pass the steam jet vertically following the core fin direction. Passing it horizontally may damage the fin.



Radiator Cap Inspection

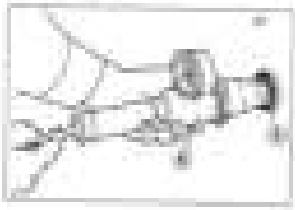
- ★Check the condition of the top (1), and bottom (2) valve seats and valve spring (3).
- ★If any kind of scale deposit, rubber damage, weakness, damage, or wear is found, replace the radiator cap assembly.



- ★Install the cap (1) on a cooling system tester (2).

NOTE

○Wet the cap sealing surface with water or coolant to prevent pressure leaks.



★Using [1] the pressure gauge, slowly pump up the pressure inside the cap until the pressure gauge indicates the limit of the specified range. Check that the relief valve opens within the specified range. If the cap does not hold the specified pressure, replace it with a new one.

Radiator Cap Relief Pressure

Standard: 93 – 123 kPa (0.93 – 1.23 kgf/cm², 13 – 18 psi)

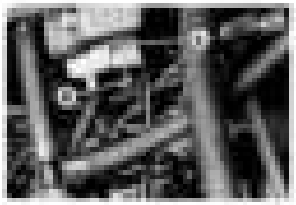
★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.



Thermostat

Thermostat Removal

- Drain:
  - Coolant (see Coolant Draining)
  - Water (see Fuel Pump chapter)
  - Fuel Tank (see Fuel System chapter)
- Disconnect Breather Hose Bolt (1)
- Thermostat Housing Cover Bolts (2)
- Thermostat Housing Cover (3)
- Thermostat



Thermostat Installation

- Be sure to install the O-ring (4) on the thermostat cover.
- Tighten the thermostat cover bolts.

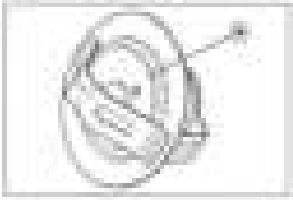
  Torque - Thermostat Housing Cover Bolts: 11 N·m (1.1 kgf·m, 8 in·lbs)

- Fill the radiator with coolant.



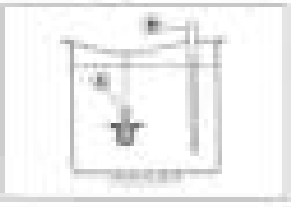
Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve (4) at room temperature.
- If the valve is open, replace the thermostat with a new one.



- To check valve opening temperature, suspend the thermostat (4) in a container of water and raise the temperature of the water.
- Put thermometer (5) and thermometer suspension unit (6) in the container with the thermostat. Suspend an accurate thermometer (5) in the water. It must not touch the container sides.
- Do measurement in any of the specified areas shown for thermostat valve's open.

  Thermostat Valve Opening Temperature
  - At 82 °C (180 °F)



Radiator Fan Switch, Water Temperature Sensor

Radiator Fan Switch, Water Temperature Sensor Removal

Caution

Any dirt, water or foreign matter should never be allowed to fall in a fuel system. Install a shield to keep parts and passages clean.

- Drain the coolant (see Coolant Draining).
- Remove:
  - Radiator Fan Switch Lead Connectors (2)
  - Radiator Fan Switch (3)

  Water Hose Clamps (Upper)
  Upper Tank Joint Pipe Bolts (Engine)
  Water Temperature Sensor Lead Connector (4)
  Water Temperature Sensor (5)





Radiator Fan Switch, Water Temperature Sensor Installation

- Apply sealant agent to the threads of the water temperature sensor.

  Sealant — **Kawasaki Bond (Silicone Sealant) 99818-116**

- Tighten the fan switch and water temperature sensor.

  Torque — **Radiator Fan Switch : 18 N·m (1.8 kgf·m, 13 ft·lbf)**
  Water Temperature Sensor : 1.5 N·m (0.15 kgf·m, 13 in·lbf)

Radiator Fan Switch, Water Temperature Sensor Inspection

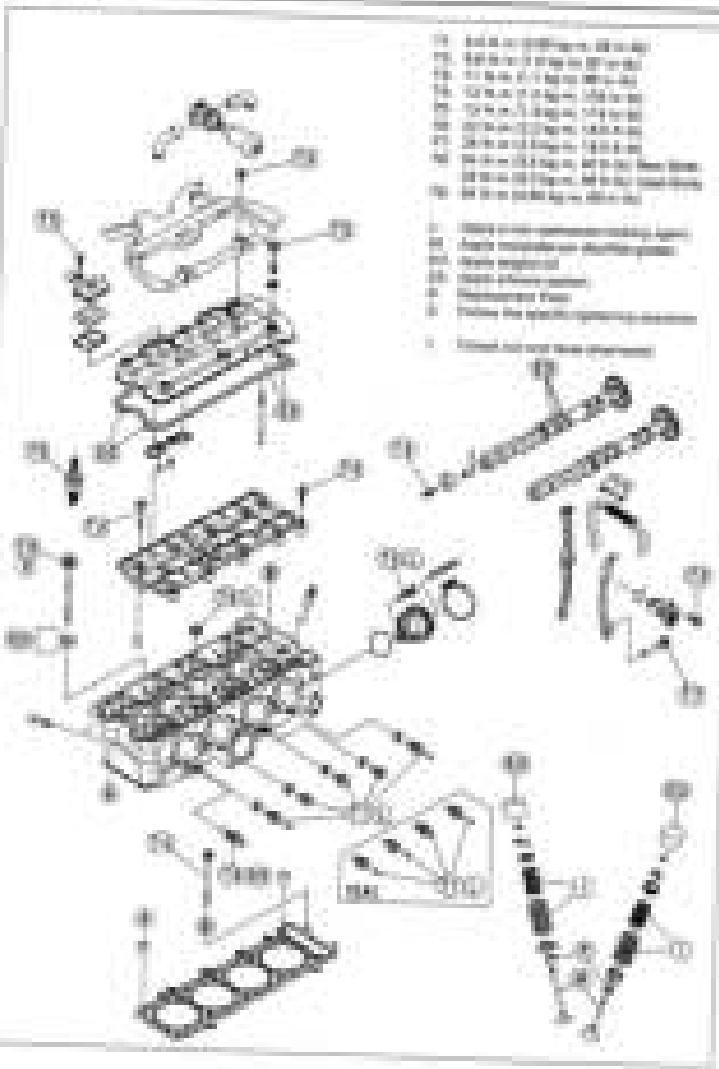
- Refer to Electrical System Chapter for these inspections.

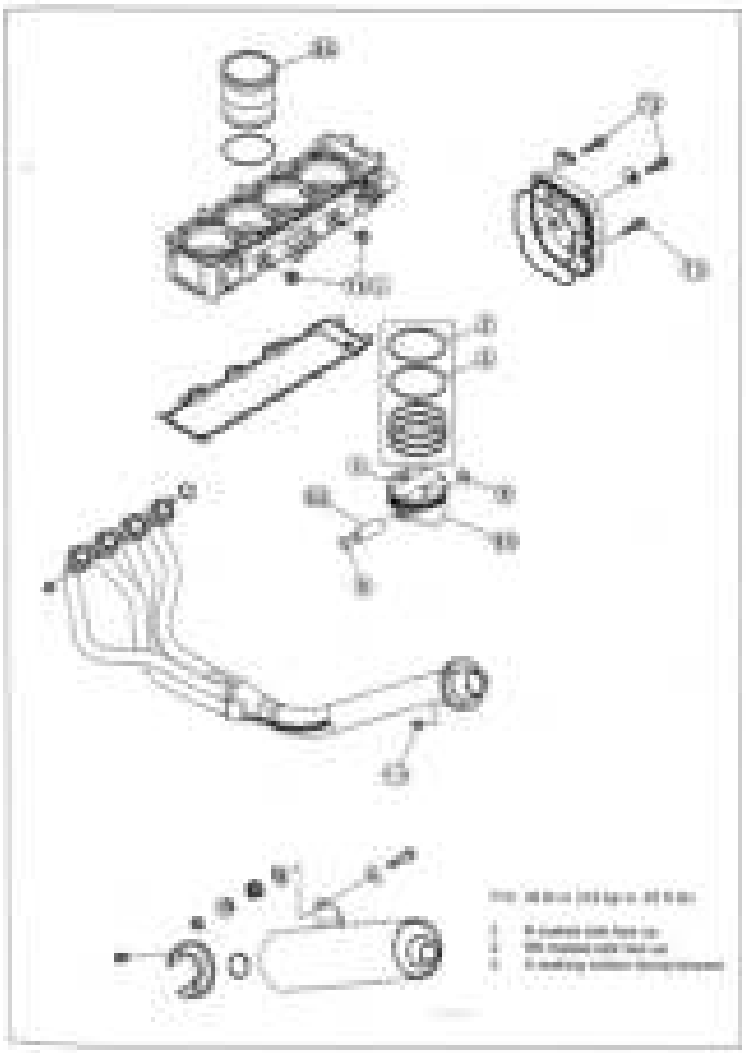
Engine Top End

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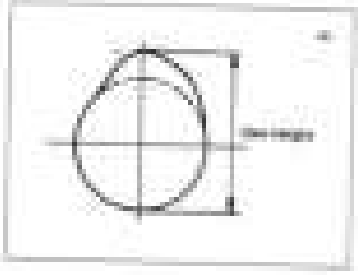
Exploded View

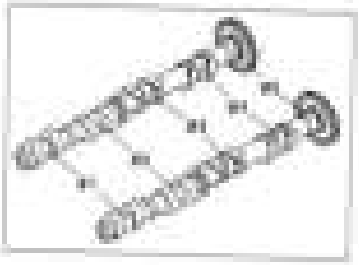




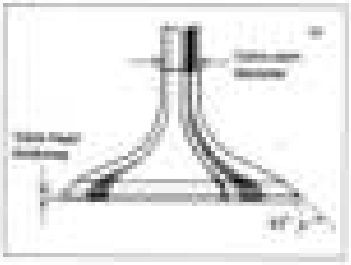
Specifications

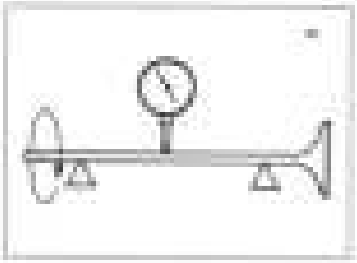
Item		Standard	Service Limit
Throttle Body Assembly:			
Vacuum switch-on valve opening pressure		Open → Close 57 – 69 kPa (430 – 520 mmHg)	– – –
Camshafts:			
Cam height	Exhaust Intake	[illegible] – [illegible] mm [illegible] – [illegible] mm	[illegible] mm [illegible] mm
Camshaft journal, camshaft cap I.D.		[illegible] – [illegible] mm	[illegible] mm
Camshaft journal diameter		[illegible] – [illegible] mm	[illegible] mm
Camshaft bearing inside diameter		[illegible] – [illegible] mm	[illegible] mm
Camshaft runout		[illegible] mm or less	[illegible] mm
Camshaft chain 20-link length		[illegible] – [illegible] mm	[illegible] mm
Cylinder Head:			
Cylinder compression		[illegible] [illegible] – [illegible] kPa [illegible] – [illegible] kg/cm² ([illegible] – [illegible] psi) [illegible]	– – –
Cylinder head warp		– – –	[illegible] mm
Valves:			
Valve clearance	Exhaust Intake	[illegible] – [illegible] mm [illegible] – [illegible] mm	– – –
Valve head thickness	Exhaust Intake	[illegible] mm [illegible] mm	[illegible] mm [illegible] mm
Valve stem runout		[illegible] mm or less	[illegible] mm
Valve stem diameter	Exhaust Intake	[illegible] – [illegible] mm [illegible] – [illegible] mm	[illegible] mm [illegible] mm
Valve guide inside diameter	Exhaust Intake	[illegible] – [illegible] mm [illegible] – [illegible] mm	[illegible] mm [illegible] mm
Valve/valve guide clearance (wobble method)	Exhaust Intake	[illegible] – [illegible] mm [illegible] – [illegible] mm	[illegible] mm [illegible] mm
Valve seat cutting angle		[illegible]° [illegible]° [illegible]°	– – –





Item		Standard	Service Limit
Valve seat surface:			
Width:	Exhaust:	[illegible]	[illegible]
	Inlet:	[illegible]	[illegible]
Runout:	Exhaust:	[illegible]	[illegible]
	Inlet:	[illegible]	[illegible]
Valve spring free length:	Exhaust (Outer):	[illegible]	[illegible]
	Exhaust (Inner):	[illegible]	[illegible]
	Inlet (Outer):	[illegible]	[illegible]
	Inlet (Inner):	[illegible]	[illegible]
Cylinder, Piston:			
Cylinder inside diameter:		[illegible]	[illegible]
Piston diameter:		[illegible]	[illegible]
Piston-cylinder clearance:		[illegible]	[illegible]
Piston ring groove width:	Top:	[illegible]	[illegible]
	Second:	[illegible]	[illegible]
	Oil:	[illegible]	[illegible]
Piston ring thickness:	Top:	[illegible]	[illegible]
	Second:	[illegible]	[illegible]
	Oil:	[illegible]	[illegible]
Piston ring end gap:	Top:	[illegible]	[illegible]
	Second:	[illegible]	[illegible]
	Oil (Steel):	[illegible]	[illegible]

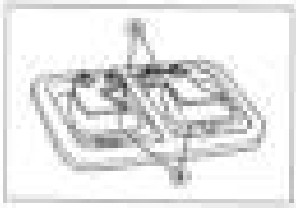




Special Tools — [illegible]

Air Suction Valve Inspection

- Visually inspect the reed (A) for cracks, tears, deep damage or other damage.
- If there is any sign of an accumulation of carbon deposits on the reed, replace the air suction valve as an assembly.
- Check the reed contact area (B) of the valve holder for grooves, scratches, or signs of separation from the holder. If such damage is found, replace the air suction valve as an assembly.
- If there is any sign of an accumulation of carbon deposits on the reed contact area, replace the air suction valve as an assembly.
- Lightly scratch on either flange parallel lines in a crisscross pattern. Put the reed into the reed contact area, and check the valve seat for a tight fitting surface.

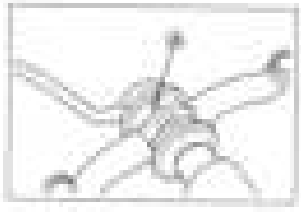


CAUTION

Do not damage the flat faces with a scratch or dent that could damage the rubber material of the suction valve assembly.

Vacuum Switch Valve Installation

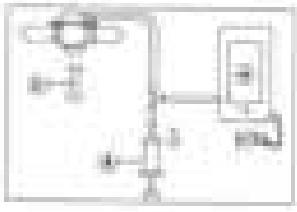
- Install the vacuum switch valve so that the arrow (A) faces downward.
- Fit the hose connections into their correct positions.



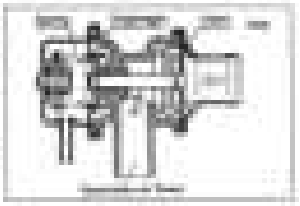
Vacuum Switch Valve Test

- Remove:
  - Fuel Tank (see Fuel System chapter)
  - Vacuum Switch Valve
- Connect the vacuum gauge (A) and hose (B) to the air switch valve as the vacuum hose is shown.

Special Tool — Vacuum Gauge: 57001-1369
Hose Fitting: 57001-1369



- Visually view the vacuum (hose) the passages applied to the vacuum switch valve and check the valve operation. When the vacuum is over the vacuum switch valve should operate as in Step. When the vacuum range is 57 ~ 62 kPa (430 ~ 460 mm Hg), it should have an flow.
- If the vacuum switch valve does not operate as described, replace it with a new one.



NOTE

- To check all step through the vacuum switch valve and diaphragm the air chamber hose.

Vacuum Switch Valve (Vacuum/Atmosphere Open → Close)
Standard: 57 ~ 62 kPa (430 ~ 460 mmHg)

Clean Air System Hose Inspection

- Be sure that all the hoses are routed without being flattened or kinked and are properly secured to the air intake housing, vacuum switch valve, air cut-off solenoid valve and air suction valve cover.
- If hose are any, loosen them. Replace them if they are damaged.

Cylinder Head Cover

Cylinder Head Cover Removal

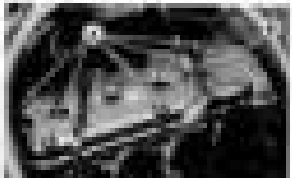


- Remove:
  - Lower Fairing (see Frame chapter)
  - Middle Fairing (see Frame chapter)
  - Inner Fairing (see Frame chapter)
  - Upper Fairing (see Frame chapter)
  - Seats (see Frame chapter)
  - Fuel Tank, Air Cleaner Housing and Carburetor Unit (see Fuel System chapter)
  - Ignition Timing Cover (see Ignition System chapter)
  - Clutch Cover (see Clutch chapter)
  - Spark Plugs
  - Spark Plug Caps (1)
  - Bolts (2)

NOTE

- If the spark plug cords need to be removed, remove the air cleaner hose bands.

- Remove the cylinder head cover bolts (1) and take off the cover (2).



Cylinder Head Cover Installation

- Replace the head cover gasket with a new one if damaged.
- Apply silicone sealant to the head cover gasket as shown (1).

Sealant - Shin-Etsu Silicone Sealant, KE45 RTV



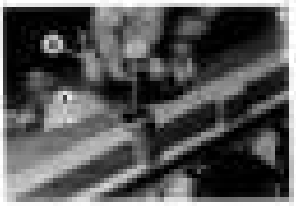
- Fit each bolt (1) and washer (2).



- Install the washer with the smaller side (A) facing outward.
- Tighten the cylinder head cover bolts (B).

  Torque — Cylinder Head Cover Bolts: 9.8 N·m (1.0 kg-m, 87 in-lb)
- Tighten the baffle plate bolts.

  Torque — Baffle Plate Bolts: 11 N·m (1.1 kg-m, 95 in-lb)



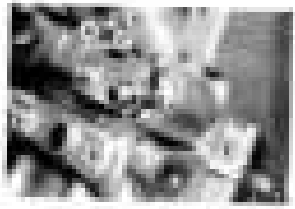
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

CAUTION

This is a non-return type camshaft chain tensioner. The lever and shaft are meant to be ratcheted ahead 1 notch at a time as the camshaft turns clockwise. Attempting to turn the lever/shaft counterclockwise without releasing the ratchet, or turning the camshaft counterclockwise, will damage the tensioner.

- Remove:
  - Engine Valve Timing Inspection Hole Plug
  - Cam Shaft Cap Bolts (4), Washer (4), Dowel Pin (2), and Cap (2)
- Remove the Mounting Bolts (2) and take off the camshaft chain tensioner.

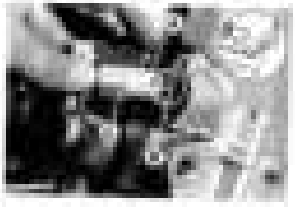


Camshaft Chain Tensioner Installation

- Fit the new gasket (1) and push the shaft rod (2) into the tensioner body (3).

Compress the shaft rod into the body as far as it will go.

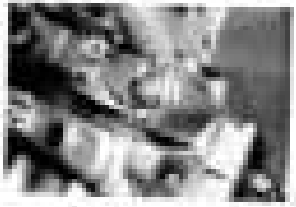
- Install the tensioner body so that the shaft rod is upward.



- Tighten the tensioner mounting bolts (2).

Torque — Camshaft Chain Tensioner Mounting Bolts: 9 N·m (0.9 kg·m, 80 in·lb)

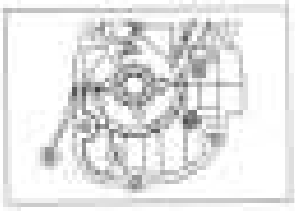
- Install the spring and washer.
- Tighten the cap bolt (1).



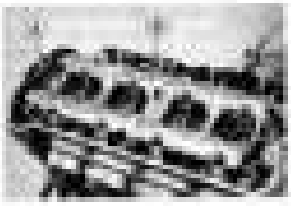
Camshaft, Camshaft Chain

Camshaft Removal

- Remove:
  - Engine (see Engine Removal/Installation chapter)
  - Cylinder Head Cover (see Cylinder Head Cover Removal)
  - Rubber Cap Cover
- Position the crankshaft at #1 TDC (see Valve Clearance Adjustment chapter).
  - (A) TDC mark for #1 & #4 pistons
  - (B) Timing hole (crankcase) (when making another)



- Remove:
  - Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  - Rocker Gearbox and Cylinder Head Cover Gasket
  - Camshaft Cap Bolts
  - Chain Guide (Ex)
  - Camshaft Cap (E)
  - Camshafts (Ex)
- Pull a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



CAUTION

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids jumping the chain on the drive sprocket(s) teeth(s). A jumped chain could damage both the chain and the sprocket.

Camshaft Installation

- Be sure to install the following parts:
  - (A) O-ring
  - (B) Pins



- Apply engine oil to all cam parts and journals.
- If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.



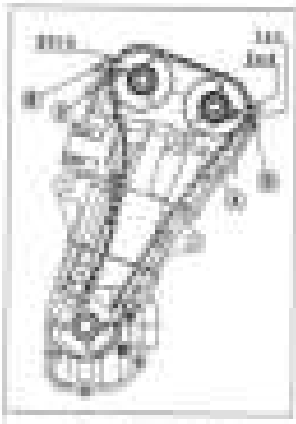
NOTE

- The exhaust camshaft has a 268 EX mark and the inlet camshaft has a 268 IN mark(s). Be careful not to mix up these parts.

- Position the crankshaft so #1 or 4 piston TDC (see Crankshaft Alignment).
- Put the service side camshaft sprocket (1) in the chain and suspend the sprocket.
- Engage the camshaft dowel with the camshaft sprocket so that the timing marks on the sprocket are positioned as shown.
- The timing marks should be aligned with the cylinder head upper surface (A).
  - (1) 04 mark
  - (2) 06 mark
- When installing the camshaft cap and cover, apply Loctite No.5910 to the camshaft cap fastener, apply molybdenum oil to the cam lobe and journal surfaces, and tighten the fasteners and bolts.
- Install the camshaft cap and cover evenly.
- Tighten the camshaft cap bolts.

Torque — Camshaft Cap Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)
Camshaft Chain Guide Bolts: 9 N·m (0.9 kgf·m, 80 in·lb)

- Tighten the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
- Install the cylinder head cover (see Cylinder Head Cover Installation).



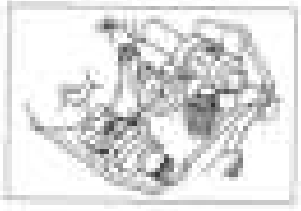
Camshaft, Camshaft Cap, Rear

- Replace each camshaft cap O-ring (2) with a new one.
- Apply a thin coat of molybdenum oil to the O-rings.
- Tighten the camshaft cap bolts.

Torque — Camshaft Cap Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)
Camshaft Chain Guide Bolts: 9 N·m (0.9 kgf·m, 80 in·lb)

NOTE

- Be careful not to damage the O-rings when installing the camshaft cap.



- Check clearance at each of the service limit. Replace the camshaft or worn camshaft bearing with a new one.

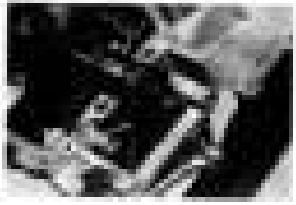
Camshaft Journal, Camshaft Cap Clearance

Standard	0.028 – 0.071 mm
Service Limit	0.10 mm

- If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
- If the clearance still remains out of the limit, replace the cylinder head unit.

Camshaft Chain Removal

- Turn the crankshaft (see Crankshaft Counterbalancer Inspection).
- Remove the camshaft chain (1) from the crankshaft sprocket.



Camshaft Chain Wear

- Hold the chain and apply a force of about 2 kg in some manner, and measure a 20-link length. Since the chain has wear allowance, this measurement is of utmost utility.
- If any measurement exceeds the service limit, replace the chain.



Camshaft Chain 20-link Length

Standard	158.88 – 159.08 mm
Service Limit	159.57 mm

Cylinder Compression Measurement



■Warm up the engine thoroughly.
■Stop the engine and remove the tank cover.

Special Tool - Spark Plug Wrench, 16 mm (57-001-1138)

■Remove the cylinder compression.
○Using the starter motor, turn the engine over until the reading has risen and the compression gauge indication is the highest reading obtainable.

Special Tools - Compression Gauge, 0-981 kPa (10 kgf/cm², 142 psi) (57001-221)
Compression Gauge Adapter, M14 x 1 mm (57001-1017)

NOTE

○Be sure the battery is fully charged.
○Be sure to let each cylinder cool off before making a measurement.

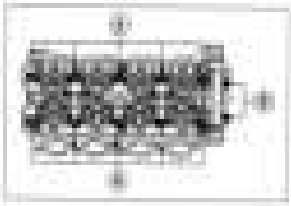
Cylinder Compression
Standard Range: 1373 ~ 1863 kPa (14.0 ~ 19.0 kgf/cm², 199 ~ 270 psi) @ 400 r/min (rpm)

○Repeat the measurement on the other cylinder.
■If cylinder compression is higher than the usable range, adjust the following.
(1) Carbon build-up in the cylinder head combustion chamber and the piston crown
(2) Cylinder head gasket is not the original part
(3) Valve stem oil seals and/or cylinder head are damaged.
■If cylinder compression is lower than the usable range, check the following.
(1) Condition of the valve seat is wrong
(2) Valve clearance is out of adj.
(3) Piston/cylinder clearance is excessive
(4) Cylinder head is warped and/or head gasket is damaged
(5) Piston ring groove ring groove clearance is excessive

Cylinder Head Removal

■Drain the coolant (see Cooling System chapter).
■Remove:
Engine Lower Engine Removal Preparation (engine)
Cylinder Head Cover and Cylinder Head Cover Removal
Cam Chain Tensioner (see Engine Top End chapter)
Camshaft Chain Tensioner and Camshaft Chain Tensioner Removal
Camshafts (see Camshaft Removal)

■Remove the 6 bolts cylinder head nuts (24), and then the 10 mm cylinder head bolts (6).
■Take off the cylinder head.
■Remove the two dowel pins and the cylinder head.

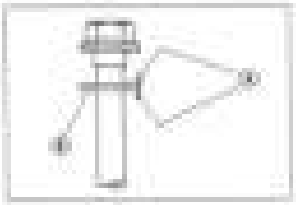


Cylinder Head Installation

NOTE

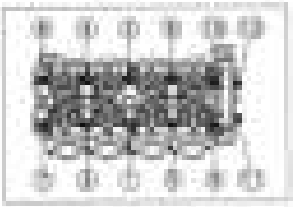
- The camshaft caps is machined with the cylinder head as a set. If any cylinder head is exchanged, the camshaft caps must be exchanged with the cylinder head.

- Install a new cylinder head gasket and dowel pins.
- Inspect engine oil for dirt, water, etc. of the cylinder head bolt washer (A).



- Tighten the 10 mm cylinder head bolts following the tightening sequence (1 → 10).

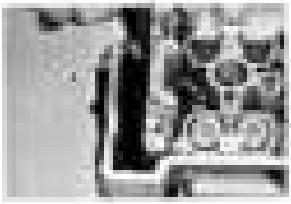
Torque — Cylinder Head Bolts (10 mm):
- First: 39 N·m (4.0 kgf·m, 29 ft·lbf)
- Final: Intake Bolts: 49 N·m (5.0 kgf·m, 36 ft·lbf)
  Exhaust Bolts: 39 N·m (4.0 kgf·m, 29 ft·lbf)



- Tighten the 6 mm cylinder head bolts (11 → 17).

Torque — Cylinder Head Bolts (6 mm): 10 N·m (1.0 kgf·m, 89 in·lbf)

- Fit the front spar cover gasket (A) onto the rear of the cylinder head as shown.



Valves

Valve Clearance Adjustment

NOTE

- Valve clearance must be checked and adjusted when the engine is cold (at room temperature).

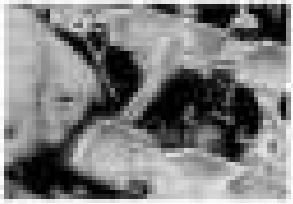
■Reference

Intake Tappet Hole Cover (Upper Intake Tappet Cover Removed)

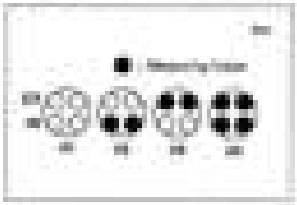
Exhaust Cam Cover

Intake Tappet Cover (See Cylinder Head Cover Removal)

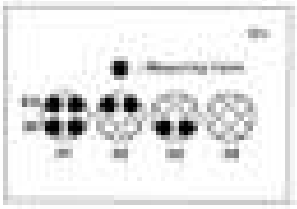
■ Using a Universal Spanner (A), measure the valve clearance between the cam and the valve lifter.



- When positioning #1 piston TDC at the end of the compression stroke, valve clearance of (1) and (2) cylinders.
  Exhaust valve clearance of (3) and (4) cylinders.



- When positioning #4 piston TDC at the end of the compression stroke, valve clearance of (3) and (4) cylinders.
  Exhaust valve clearance of (1) and (2) cylinders.



Valve Clearance Standard

IN: 0.16 – 0.24 mm
EX: 0.32 – 0.41 mm

■ If the valve clearance is not within the specified range, first record the measured value then adjust it.

■ To change the valve clearance, remove the camshaft (intake) (sprocket), and adjust there. Replace the shim with one of a different thickness.

NOTE

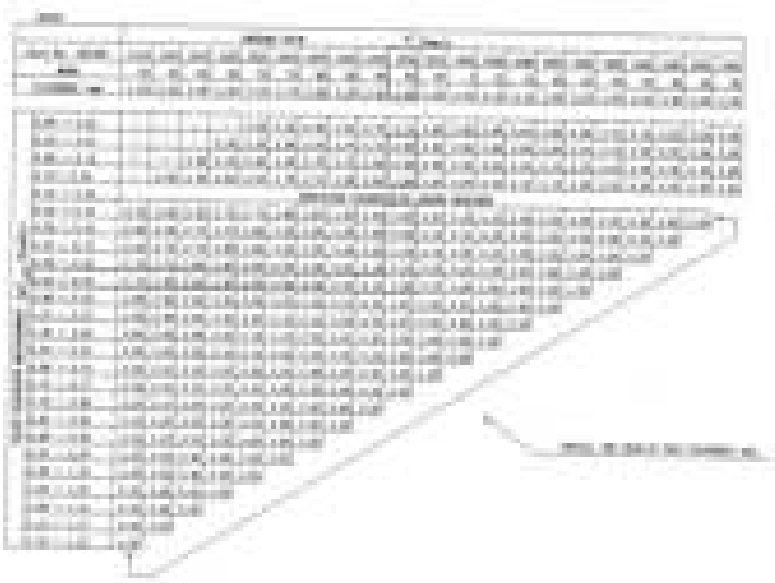
- Mark and record the valve lifter and shim location so they can be reinstalled in their original positions.

■ For details on valve guide removal, refer to the appropriate page, after the last valve (Valve/Valve Guide/Valve Seat).
■ Apply a thin coat of molybdenum disulfide grease to the valve stems.
■ Install the valves. Be sure to return the valves/valve guide pairs to their original locations.
(Remember, each valve clearance was was adjusted. Readjust if necessary.)

CAUTION

Do not accidentally attach under the valve. This may cause the valve to push rod straight upon causing extensive engine damage.
Do not grind the valve. This may cause it to become uneven extensive engine damage.

VALVE CLEARANCE ADJUSTMENT CHART
INLET VALVE



1. Measure the clearance (when engine is cold).
2. Rotate crankshaft one step.
3. Repeat clearance measurement with crankshaft one step increments.
4. Adjust the valve gap. Refer to the procedure. Take one out gap the proper clearance.

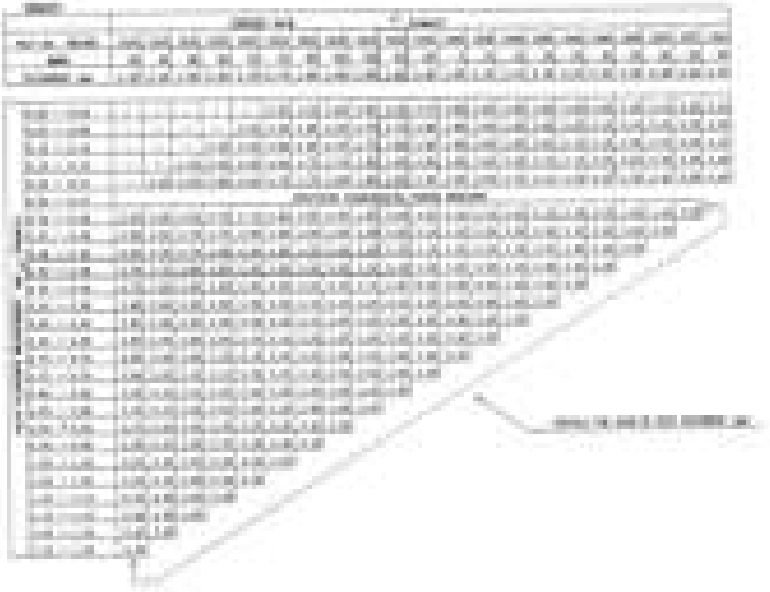
   Example: Present value is 0.08 mm.
   Measured clearance is 0.40 mm.
   Thickness 0.35 mm is to be 0.35 mm.

5. Remove the valve clearance and replace it immediately.

NOTE

(1) When it is necessary, select a other number to replace valve clearance that is beyond the tolerance.

VALVE CLEARANCE ADJUSTMENT CHART
ENGAGE 150 V



1. Measure the clearance (when engine is cold).
2. Check present data size.
3. Select clearance or tolerance zones with present size (cell) in horizontal column.
4. Install the shim specified within the limits indicated. The shim will give the proper clearance.

   Example: Present shim: 2.100 mm.
   Measured clearance: 0.25 mm.
   Replace 2.10 mm shim with 2.25 mm shim.

5. Remeasure the valve clearance and readjust if necessary.

NOTE

Cell lines of no clearance values in valve adjust or shaded have inside and that measure the clearance

Valve Removal

- Remove the cylinder head cover. (Cylinder Head Removal)
- Remove the valve lifter and shim.

CAUTION

Mark and record the valve lifter and shim locations so they can be installed in their original positions.

- Using the valve spring compressor assembly, remove the valve.

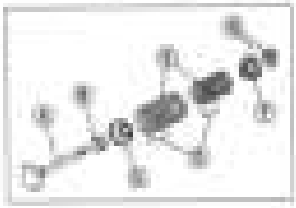
Special Tools — Valve Spring Compressor Assembly: 57001-241 (J)
Valve Adapter, 11.0: 57001-1201 (K)
Universal Adapter: 092-2000-1191



Valve Installation

- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the springs so that the closed coil end faces downward.

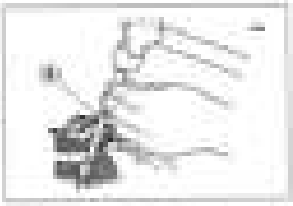
(A) Valve Stem
(B) Oil Seal
(C) Spring Seat
(D) Inlet Valve
(E) Valve Spring
(F) Retainer
(G) Split Keepers



Valve Guide Removal

- Remove:
  Valve (see Valve Removal)
  Oil Seal
  Spring Seat
- Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302 °F), and tapping lightly on the valve guide (also for service fit) guide from the top of the head.

Special Tool — Valve Guide Remover, 4.5: 57001-1202



Valve Guide Installation

- Apply oil to the new valve guide outer surface before installing.
- Heat the area around the valve guide hole to about 120 ~ 150 °C (248 ~ 302 °F).
- Drive the valve guide in from the top of the head using the valve guide driver. The height when the guide is set is as specified.

Special Tool — Valve Guide Driver, 4.5: 57001-1203

- Ream the valve guide with valve guide reamer (A) even if the old guide is reused.

Special Tool — Valve Guide Reamer: 4.5: 57001-1204



Valve to Guide Clearance Measurement (Rocking Method)

If a small hole gauge is not available, inspect the valve guide wear by measuring any valve to valve guide clearance with the smallest method as indicated below.

- Install a new valve (A) into the guide (B) and set a dial gauge against the stem perpendicular to it as close as possible to the surface where it enters the guide.
- Move the stem back and forth (C) to measure valve/valve guide clearance.

(D) Against the measurement to a direction at a right angle as this line.
If the reading exceeds the service limit, replace the guide.



NOTE

○ Use reading in any screw specification given instead of measuring parts when in the shop.

Valve/Valve Guide Clearance (Wobble Method)

	Standard	Service Limit
Intake	0.02 – 0.13 mm	0.20 mm
Exhaust	0.04 – 0.15 mm	0.25 mm

Valve Seat Inspection

- Remove the valve (see Valve Removal).
- Check the valve sealing surface (1) between the valve (2) and valve seat (3).
- Measure the wobble diameter (D) of the sealing surface on the valve seat.
- If the wobble diameter is too large or uneven, repair the seat (see Seat Repair).

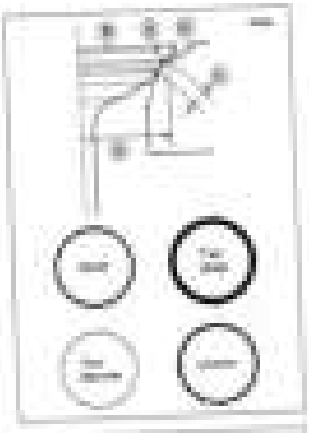
Valve Sealing Surface Wobble Diameter

Standard	Intake	28.4 – 28.6 mm
	Exhaust	25.2 – 25.4 mm

- Measure the seat width (W) of the sealing surface where it is worn or pitted (see Valve/Guide/Seat Fitting) and look at the valve seat.
- If the width is too wide, too narrow or uneven, repair the seat (see Valve Seat Repair).

Valve Sealing Surface Width

Standard	Intake, Exhaust	0.9 – 1.1 mm



Valve Seat Repair

- Reseat the valve seat with the cutters and cutters (1).

Special Tools – Valve Seat Cutter Holder, 4.5 mm: 57001-1082 (2)
Valve Seat Cutter Holder Bar: 57001-1128 (3)

For Intake Valve Seat

Valve Seat Cutter, 45° – 32.5: 57001-1113
Valve Seat Cutter, 32° – 35.5: 57001-1129
Valve Seat Cutter, 60° – 34.5: 57001-1130

For Exhaust Valve Seat

Valve Seat Cutter, 45° – 32.5: 57001-1114
Valve Seat Cutter, 32° – 35.5: 57001-1131
Valve Seat Cutter, 60° – 34.5: 57001-1132

- Use commercially available and non-available tool the following procedure.



Seat Cutter Operation Cautions

1. The valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used on other purposes than seat repair.
2. Do not adjust or retouch the valve seat cutter. (1) The diamond pilot may fall off.
3. Do not fail to apply engine oil (2) to the valve seat cutter before grinding the seat surface. After cutter off ground sometimes making or the cutter with oscillating oil.

NOTE

(1)Do not use a cutter brush or apply to the cutter and take from the cutter. It will spoil the diamond operation.

4. Making the valve seat cutter holder in position, operate the cutter in hand lightly. Do not apply too much force to the diamond pilot.

NOTE

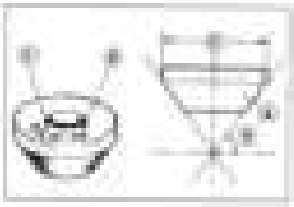
(2)Prior to grinding, apply engine oil to the cutter and dump the carborundum power off the ground operation making to the cutter with machine oil.

5. After one motor 1 with oscillating oil and apply (2) clean all engine oil before finishing.

Works Stamped on the Cutter

The marks stamped on the back of the cutter (3) represent the following.

45° ..... Cutter angle (B)
31 dia. ..... Outer diameter of cutter (C)

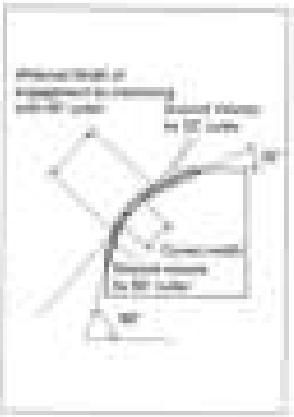


Operating Procedures

- Clean the seat area carefully.
- Coat the valve with machining oil.
- Fit a stiff cutter into the holder and hold in the valve stem guide.
- Rotate drawn rightly on the handle and turn it right or left. Repeat the seating surface only when it is smooth.

CAUTION
Do not grind the seat too much. Overgrinding will reduce valve clearance by making the valve stay the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

- Replace the cutter (stone) of the seating surface with a worn cutter.
- For the outside diameter of the seating surface in the head, select the 45° grind with the diameter in within the specified range.
- For the outside diameter of the seating surface of the valve, make the 32° grind described below.
- For the contact diameter of the seating surface in which the specified range, measure the upper cutter as described below.
- Grind the cutter (1) 45° to set until the seat (2) is within the specified range.



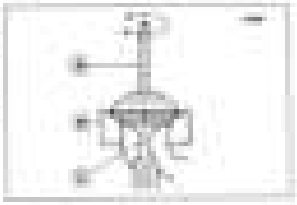
- Use make the 45° grind, fit a 45° cutter into the holder, and grind it into the valve guide.
- Use the blade, plus lock at a time while grinding down very lightly. Check the seat after each cut.

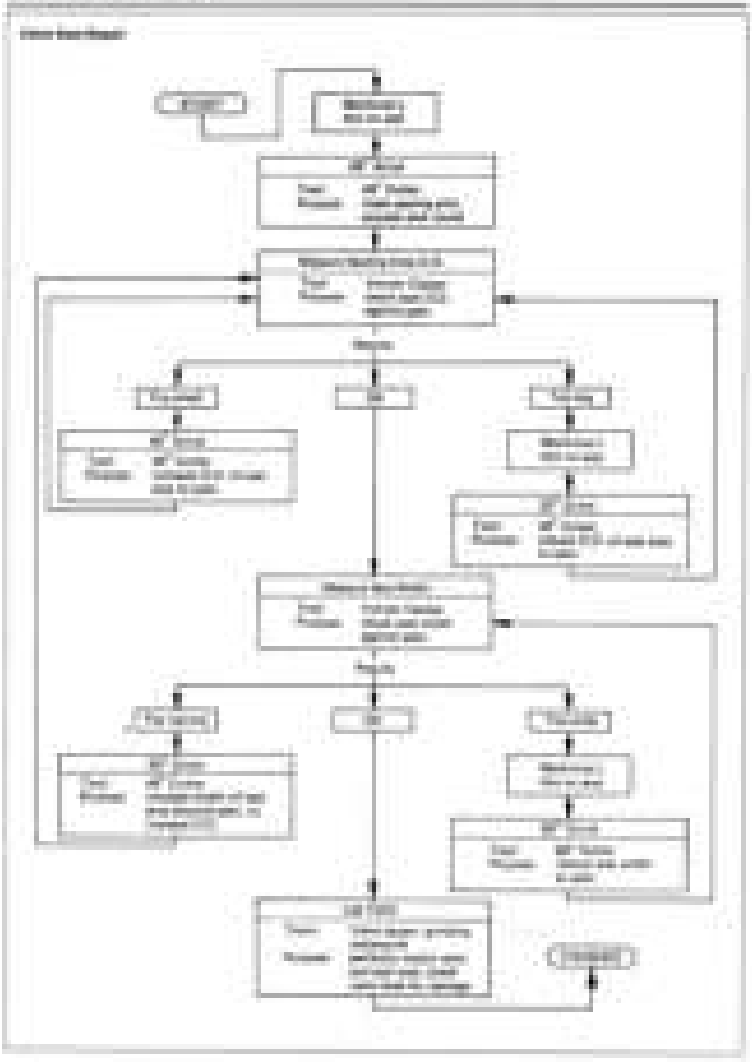
CAUTION
The 45° cutter removes material very quickly. Check the seat contact frequently to prevent overgrinding.

- After making the 45° grind, return to the seat (12). Inspect/check seat width.
- If necessary the seat width, use a carbide grinder to maintain the width of the 45° angle portion of the seat at several places around the seat.
- Use new valve in one cylinder, repeat the 45° grind, and the seat is slightly new seat, and then return to the seat (12). Inspect/check seat width.
- The seat width is one angle from the 45° grind approximately.
- The seat width is within the specified range, lap the valve to the seat as described below.
- If not the seat is 45° angle and the seat width is within the specified range.
- Use make the 45° grind, 45 45° cutter into the holder, and with 1 mm and valve guide.
- Lubricate the holder and the grinding down lightly.
- After making the 45° grind, return to the seat width inspect/check seat above.
- Set the stone in the seat, using the seat width and (12), see section the straight operations above.
- Put a little coated grinding compound on the face of the valve in a number of places around the valve head.
- Insert the valve against the seat and the grinding compound between contacting, rotated surface on both the seat and the valve.
- Rotate the cylinder with a tool grinding compound.

  (1) Cylinder
  (2) Valve Seat
  (3) Valve

- Fix seating and should be rotated about in the middle of the valve face.
- If the seat area is not in the right place on the valve (seat) in the work has valve to the (valve) seat. If it is, it has been affected and work operation 3.
- Wipe out the remove all grinding compound before assembly.
- When the inspect is assembled, be sure to adjust the valve clearance. (See Valve Clearance Adjustment).

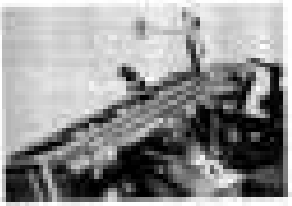




Cylinder, Pistons

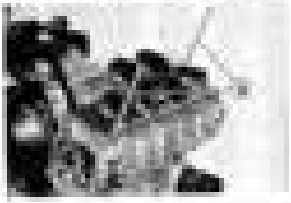
Cylinder Removal

- Remove:
  - Engine Upper Bracket (Remove Installation Bolts)
  - Cylinder Head Side Cylinder Head (Remove)
  - Water Hoses (H)
  - O-Rings (R)
- Remove the cylinder.

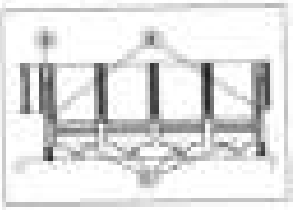


Cylinder Installation

- Install the two cylinder gaskets.
- Apply engine oil to the cylinder bore.
- Fit piston and cylinder assembly onto crankcase.
- Install the two dowel (A) diagonally in the crankcase.



- Fit piston ring compressor on rear and front piston heads and shrink bands.
- Install the cylinder head:
  - Cylinder Head Bolts (B)
  - Washers (C)
- Adjust the cylinder head bolts (see Table).

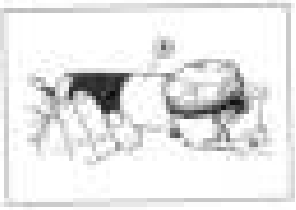


Piston Removal

- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the piston and remove the piston pin snap rings (A) from the outside of each piston.



- Remove the piston pins:
  - Special Tool - Piston Pin Puller Assembly: 57001-910 (A)



- Carefully spread the ring opening with two thumbs and fully push up on the opposite side of the ring (A) as shown.
- Remove the 4 pieces of ring and one thumbs in the same manner.



Piston Installation

NOTE

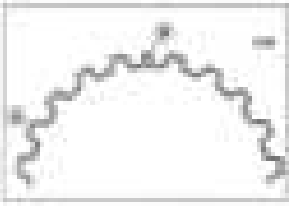
- The oil ring side rails have no "Top" or "Bottom".

- Install the oil ring expander (A) in the bottom piston ring groove so the ends (B) butt together.
- Install the oil ring side rails (C) by placing one expander end into groove.

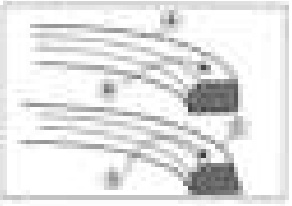
Caution

Be careful not to damage piston ring grooves when installing the side rails.

- Hold the end with your thumbs and work carefully in to fit the rail into the groove.
- Repeat the same procedure for the other side rail.



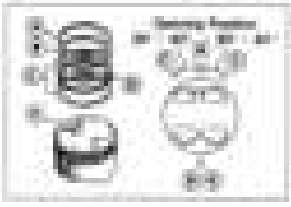
- Do not mix up the two keystone rings.
- Install the top ring (1) so that the "R" mark (2) faces up.
- Install the second ring (3) so that the "RN" mark (4) faces up.



- The piston ring opening must be positioned as shown in the figure. The expander gap at the oil ring side rail must be about 30 ~ 45° on right from the opening of the top ring.

(1) Top Ring
(2) "R" Mark
(3) Second Ring
(4) "RN" Mark
(5) Oil Ring Side Rail
(6) Oil Ring Expander
(7) Gap
(8) Piston

- Install the piston rods as marking before being removed.



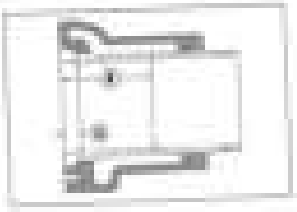
CAUTION
Be careful when align rings, do not over stretch and deform them. Piston could not work well in the cylinder bore.

Cylinder Wear

- Measure the cylinder at approach to cylinder wear in different directions (see A, B and C) and at 3 points (a, b and c) in each measurement as shown in the illustration. Select the maximum reading to find the cylinder wear.

If any of the cylinder inside diameters measured are outside the service limit, ...

(1) Cylinder
(2) Piston



Cylinder Inside Diameter

Standard:	73.000 – 73.015 mm
Service Limit:	73.10 mm

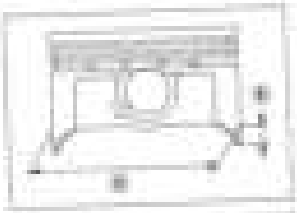
Piston Wear

- Measure the outside diameter (A) of each piston 6 mm (B) up from the bottom of the piston at a right angle to the direction of the piston pin.

If any measurement is under service limit, replace the piston.

Piston Diameter

Standard:	72.960 – 72.980 mm
Service Limit:	72.76 mm

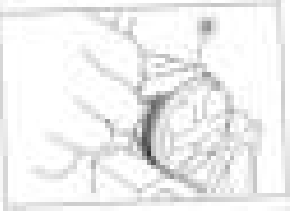


Piston Ring / Piston Ring Groove Wear

- Clean the ring and groove prior to inspecting for ring clearance.
- Fit a ring squarely in the cylinder (parallel to piston surface). To push the piston head is suitable.
- Check the piston ring in their grooves. Make sure the ring moves smoothly and is not too tight. Otherwise, replace the piston and rings.

Piston Ring/Groove Clearance

	Standard	Service Limit
Top:	0.08 – 0.12 mm	0.18 mm
Second:	0.03 – 0.07 mm	0.1 mm

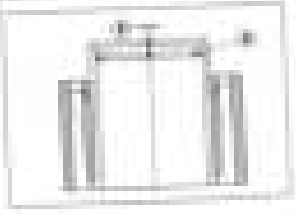


Piston Ring End Gap

- Push the piston ring (A) inside the cylinder using the piston to avoid the ring opening to widen. Set it close to the bottom of the cylinder (where cylinder wear is less).
- Measure the gap (B) between the ends of the ring with a thickness gauge.

Piston Ring End Gap

	Standard	Service Limit
Top:	0.20 – 0.30 mm	0.6 mm
Second:	0.40 – 0.60 mm	0.8 mm

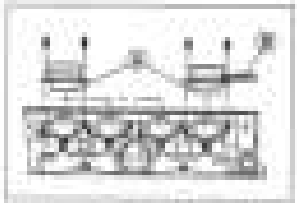


Carburetor Holder

Carburetor Holder Installation

- Put a new O-ring (1) in each carburetor holder.
- Tighten the carburetor holder screws.
- Tighten the left (right carburetor) holder bolt with spring (2).

Torque - Carburetor Holder Bolts: 13 N·m (1.3 kgf·m, 115 in·lb)



Muffler

Muffler Removal

- Remove:
  - Lower Fairings (see Frame chapter)
  - Middle Fairings (see Frame chapter)
  - Inner Fairing (see Frame chapter)
- Muffler Bolts (Clamp Nut) (2)



- Remove the radiator reservoir hose (1).
- Loosen the radiator bolts (2).
- Move the fasteners of the radiator bracket to front (3), and then tighten the radiator bolts.
- Remove:
  - Exhaust Pipe Holder Nuts (2)



- Pull the muffler body slightly out and remove the muffler assembly. (When removing the muffler, take it out the upward.)

Muffler Installation

- Replace the exhaust pipe gasket with new one.

Muffler Body Removal

- Remove:
  - Muffler Band Connector (Cover)
  - Muffler Body and Exhaust Pipe Connection Bolts (2)
  - Muffler Band (Clamp Bolt) (2)
- Pull the muffler body backward.



Muffler Body Installation

- Tighten:

Torque - Muffler Body and Exhaust Pipe Connection Bolt: 20 N·m (2.0 kg·m, 15 ft·lb)

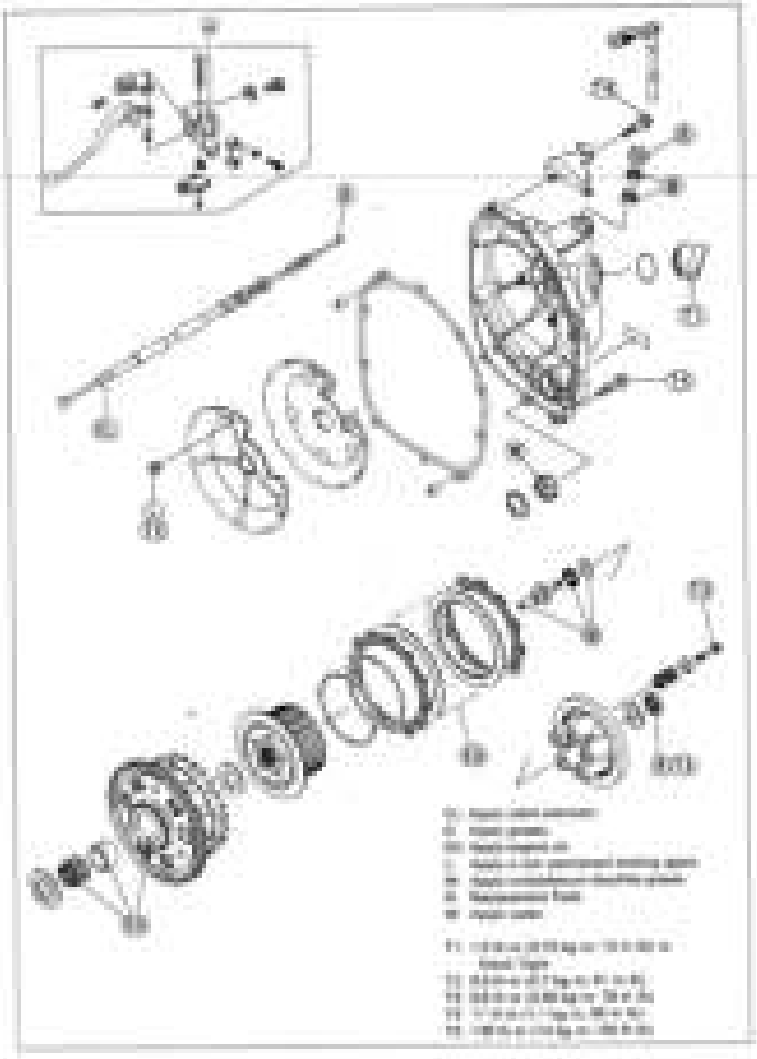
- Replace the exhaust pipe connection gasket with new one.

Clutch

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Exploded View



Specifications

Item	Standard	Service Limit
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]

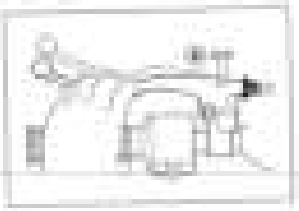
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Clutch Lever and Cable

Lever Free Play Inspection

- Pull the clutch lever back lightly by hand until you feel resistance, and measure the lever free play (A) at the end of the lever.
- Measure the gap between the lever and the knob.
- If the gap is too wide, the clutch may not release fully. In such a case, adjust it.

Clutch Lever Free Play
Standard: 2 – 3 mm

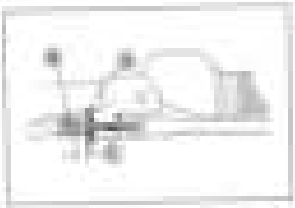


Lever Free Play Adjustment

WARNING

To avoid a serious injury, never start the engine or operate the clutch during clutch adjustment.

- Loosen the locking bolt (A) on the clutch lever.
- Turn the adjuster (B) as much as necessary to obtain the correct free play.



- Slide the dust cover (A) at the clutch cable lower end out of place.
- Loosen the adjusting nut (B) at the clutch lever as far as they will go.
- Pull the clutch outer cable (C) back and loosen the adjusting nut against the adjuster (D).
- Slide the rubber dust cover back over the cable.
- Turn the adjuster at the clutch lever until the free play is correct.
- Tighten the locknut (adjuster) at the clutch lever.



- Push the rubber boot (A) toward the front of the motorcycle until it becomes evenly taut.
- Pull the lever. The release lever should have the proper angle shown.
- If the angle is wrong, check the clutch and cable parts for wear.



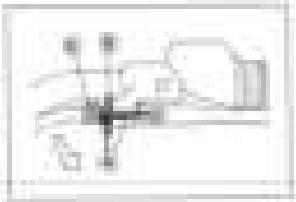
WARNING

Be sure that the cable ends are in the clutch lever properly hooked in the adjuster or the cable itself. If it could slip into place with insufficient length, make play movement could damage engine.

- After the adjustment, start the engine and check that the clutch does not slip and that it releases properly.

Cable Removal

- Remove the right cover (wing) (see frame chapter).
- Slide the dust cover on the clutch cable back (the out of play).
- Loosen the nuts and slide the lower end of the clutch cable out (give the cable plenty of play).
- Push the lever forward and turn the adjuster to align the number 0 with the indicator mark on the lever holder.
- Loosen the knurled locknut to the outer limit, and screw in the adjuster.
- Pull out the inner cable from the clutch lever, knurled locknut (A), and adjuster (B) and slide the cable from the lever.
- Pull the inner cable out from the clutch release lever.
- Push the release lever toward the front of the motorcycle and take the release lever to the clutch cover to prevent the release shaft from falling out.
- Pull the cable out of the frame.



Cable Installation

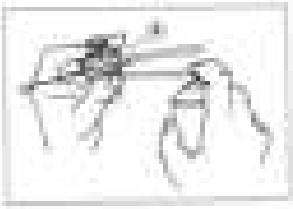
- Apply the proper cable lubricant (see Special Lubricants chapter).
- Adjust the clutch cable (see Clutch Free Play Adjustment).

Cable Lubrication

Whenever the clutch cable is removed, lubricate the clutch cable as follows:

- Apply a thin coating of grease to the cable pivot and cable ends.
- Lubricate the cable with a penetrating-type lubricant.

Special Tool - Pressure Cable Lube (A9701307) (A)



Clutch Lever Installation

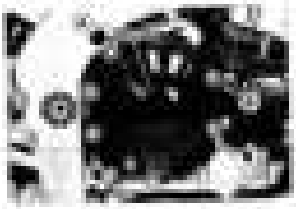
- Install the clutch lever on into the sliding surface (A) of the lever holder to engage with the locking surface (B) of the clutch lever holder.



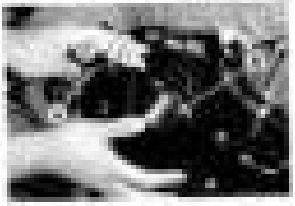
Clutch Cover

Clutch Cover Removal

- Remove:
  - Engine Oil (drain, see Engine Lubrication System chapter)
  - Lower Fairing (see Frame chapter)
  - Muffler Tuning (left)
  - Clutch Cable Lower End (A)
  - Clutch Cover Mounting Bolts (B)



- Turn the rubber boot (A) toward the rear as shown, and remove the clutch cover (B).
  - (1) about 90°



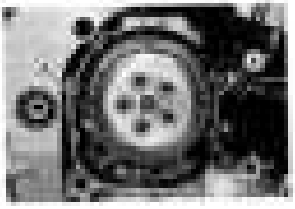
Clutch Cover Installation

- Apply silicone sealant to the area (A) where the mating surface of the clamp and the clutch cover meet.

  Sealant — Kawasaki Bond (Silicone Sealant): 56019-120

- Replace the clutch cover gasket with a new one.
- Tighten the cover bolts.

  Torque — Clutch Cover Bolts: 7.8 N·m (0.8 kg-m, 69 in-lb)



Release Shaft Removal

CAUTION

Do not remove the clutch release lever sub-shaft assembly unless it is absolutely necessary. If removed, the oil seal will be damaged and must be replaced.

- Remove the clutch cover. See Clutch Cover Removal.
- Pull out lever and shaft assembly and oil seal from clutch cover.

Release Shaft Installation

- Apply high temperature grease to the oil seal lips on the upper (top of the clutch cover).
- Apply oil to the bearing in the end of the clutch cover.
- Install the release shaft straight into the upper hole of the clutch cover.

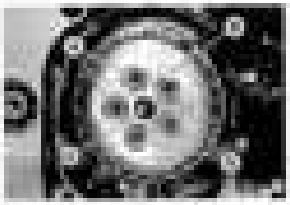
CAUTION

When installing the release shaft sub-assembly remove the spring of the oil seal.

Clutch

Clutch Removal

- Remove:
  - Engine Oil (drain, see Engine Lubrication System chapter)
  - Right Lower Fairing (see Frame chapter)
  - Clutch Cover (see Clutch Cover Removal)
  - Clutch Spring Bolts (4)
  - Clutch Springs
  - Clutch Spring Plate (B) (with thrust bearing and washer) (C)

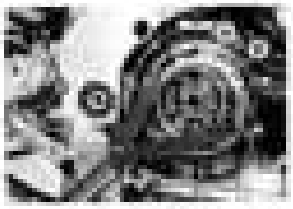


  - Friction Plate, Steel Plate
  - Spring, Spring Seat
  - Clutch Hub Nut (A)

Installing the clutch hub (A), reverse the nut.

Special Tool - Clutch Holder: 57001-1243 (C)

- Remove:
  - Clutch Hub



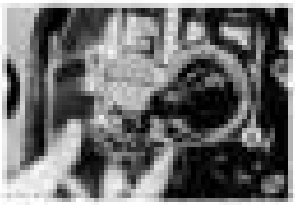
- Using any pair of two wrench (A), undo nut (the reverse (B)), (spring washer (C)) and clutch housing (D).
- Remove the washer.

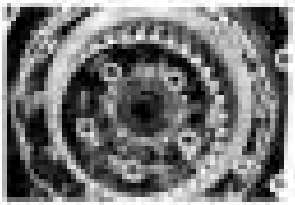


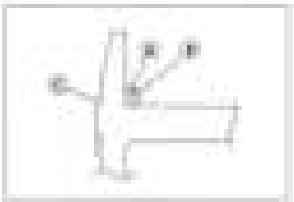
Clutch Installation

- Install the following parts on the drive shaft.
  - (A) Spacer
  - (B) Washer
  - (C) Needle Bearing
  - (D) Clutch Housing
  - (E) Washer
  - (F) Clutch Hub
  - (G) Washer
  - (H) Nut



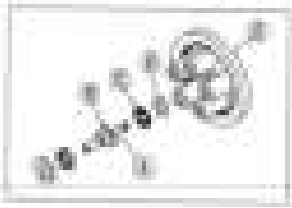








■Apply molybdenum disulfide grease to the middle seal rim and inside the washer (1), needle bearing (2) and washer (3) in the clutch spring plate (4).



■Install the clutch spring plate and spring, and tighten the clutch spring bolts.

Torque - Clutch Spring Bolts: 8.8 N·m (0.90 kgf-m, 78 in-lb)

■Install the clutch cover (see Clutch Cover Installation).

Clutch Plate Wear, Damage Inspection

■Visually inspect the friction and steel plates for signs of serious overheating (discoloration), or excessive wear.

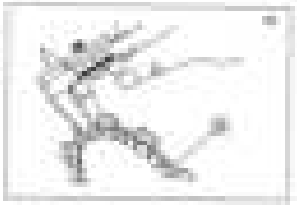
■Measure the thickness of the friction plate (1) at several points.

■If any plate shows signs of damage, or if the thickness of any plate is less than the service limit, replace them with new ones.

Friction Plate Thickness

Standard: 3.72 ~ 3.88 mm

Service Limit: 3.5 mm



Clutch Plate Warp Inspection

■Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate (2) and each friction plate or steel plate (3) with a thickness gauge (1). The gap is the amount of warpage of each plate warp.

■If any plate is warped over the service limit, replace it with a new one.

Friction and Steel Plate Warp

Standard: 0.2 mm or less

Service Limit: 0.3 mm



Clutch Spring Free Length (Measurement)

■Measure the free length of the clutch springs (1).

■If any spring is shorter than the service limit, it must be replaced.

Clutch Spring Free Length

Standard: 72.85 mm

Service Limit: 69.2 mm

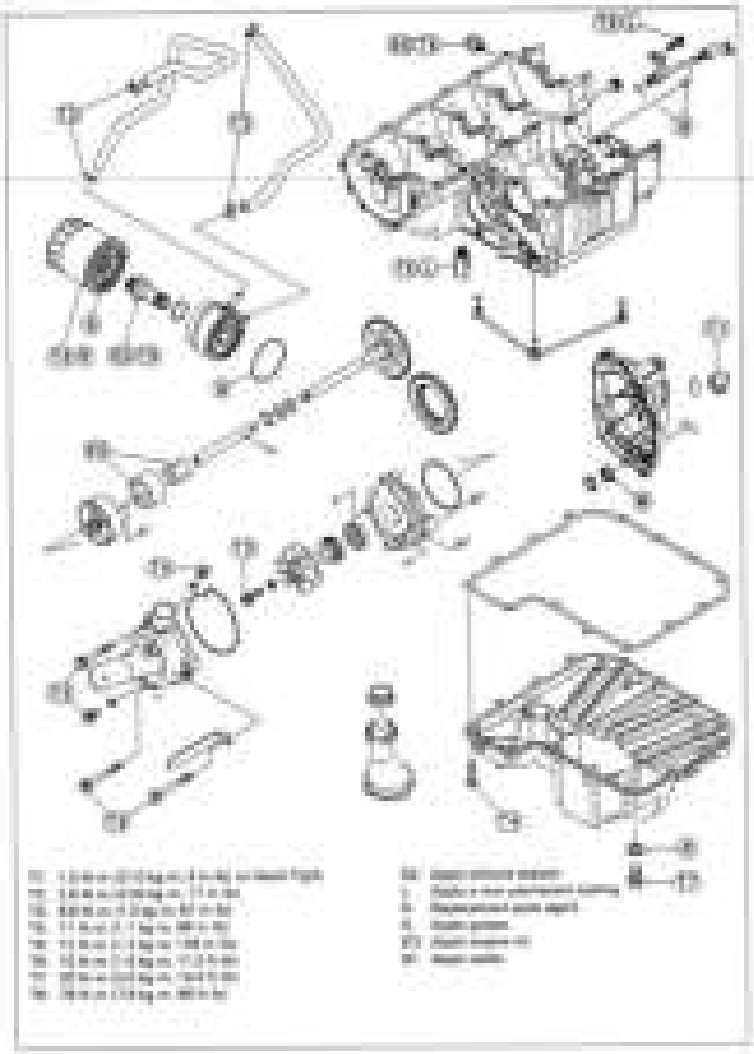


Engine Lubrication System

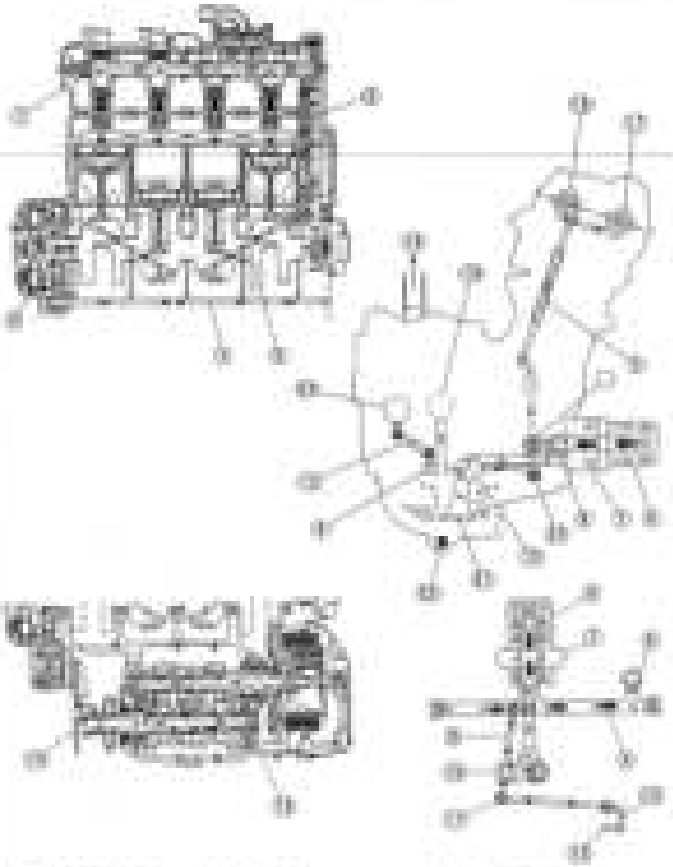
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Exploded View



Engine Oil Flow Chart



1. Cam Shaft Oil Passage
2. Oil Pipe
3. Starter Clutch Oil Passage Hole
4. Main Oil Passage
5. Crankshaft Oil Passage
6. Oil Pipe
7. Oil Cooler
8. Oil Pressure Switch
9. Oil Pan
10. Oil Filter
11. To Drive Shaft
12. Oil Pipe
13. To Engine Shaft
14. Drive Shaft Oil Passage Hole
15. Output Shaft Oil Passage Hole
16. Inlet Manifold
17. Exhaust Camshaft
18. To Crankshaft Oil Passage Holes
19. Drive Shaft
20. Relief Valve
21. Oil Screen
22. Oil Strainer Pipe
23. Output Shaft

6-4. ENGINE LUBRICATION SYSTEM

Specifications

Item	Standard
Engine oil Grade Viscosity Capacity Level	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
Oil Pressure (Reference value) (At conditions [illegible]) (Oil temp. [illegible])	[illegible]

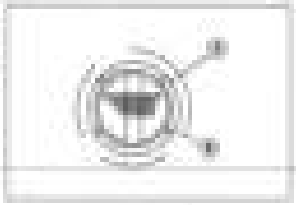
Special Tools : [illegible]

Sealant : [illegible]

Engine Oil and Oil Filter

WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury.



Oil Level Inspection

■Check that the engine oil level is between the upper (A) and lower (B) levels in the sight.

NOTE

- Allowing the motorcycle to stand 2 or 3 minutes prior to the inspection will help the oil level check. Just started motorcycle has oil on the oil filter screen.
- If the oil has just been changed, start the engine and run it for several minutes at idle speed. Then turn the oil filter over on. Stop the engine. Wait one minute and check the oil level.

CAUTION

Racing the engine before the oil reaches every part can cause engine seizure.

If the engine oil gets extremely low or if the drawing or oil passages clog up, or lubrication do not function properly, the oil pressure warning light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

Engine Oil Change

■Support the motorcycle perpendicular to the ground after warming up the engine.

■Remove the engine drain plug (A) to drain the oil.

- The oil in the oil filter can be drained by removing the filter (see Oil Filter Change).

■Replace the drain plug washer (B) with a new one if it is damaged.

■Tighten the drain plug.

Torque - Engine Drain Plug: [Value] (Engine, Hybrid)

■Pour in the specified type and amount of oil.



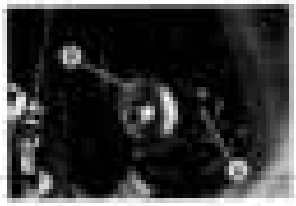
Engine Oil

Grade	SE, SF or SG class
Viscosity	SAE 10W30, 10W50, 20W50, or 20W40
Amount	2.5 L (when filter is not removed)
	2.3 L (when filter is removed)
	2.0 L (when engine is completely dry)

(b) Filter Change

- Drain the engine oil. (see Engine Oil Change)
- Remove
  - Lower Cowling (see Frame chapter)
- Remove the oil filter (1) with the oil filter wrench (2).

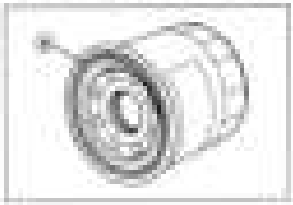
Special Tool - Oil Filter Wrench: 57001-135



- Apply a thin coat of engine oil to the rubber gasket (1) of the new oil filter.
- Install the oil filter with the hand until the gasket contacts the mounting surface, then tighten it 3/4 turn more.

Torque - Oil Filter: 17.6 N·m (1.8 kgf·m, 13 ft·lb)

- Pour in the specified type and amount of oil. (see Engine Oil Change)



Oil Cooler

Oil Cooler Removal

- Remove:
  - Coolant Tubing (see Frame chapter)
  - Right Footrest (see Frame chapter)
  - Inner Fairing (see Frame chapter)
- Drain:
  - Engine Oil (see Engine Oil Change)
  - Coolant (see Cooling System chapter)
- Remove the oil filter.
- Unscrew the oil cooler bolt (A) from the crankcase.



- Straighten the tab of the lock washer (A).
- Remove the oil cooler bolt and lock washer (B).

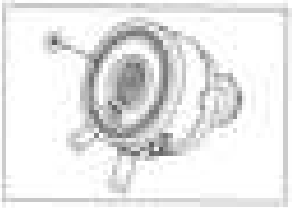


- Move the oil cooler (A) to the right side.
- Remove the oil cooler hose (B) from the oil cooler.



Oil Cooler Installation

- Installation is the reverse of removal. Note the following.
- Apply grease to the O-ring (A) before installation.
- Apply grease on the oil cooler inlet and install the oil cooler with the bolt.



- Install the oil cooler bolt and lock washer (B). Tab the lock and (B) of the oil cooler.
- Tighten the oil cooler bolt.

Torque - **Oil Cooler Bolt: 10 N·m (1.0 kg·m, 89 in·lb)**

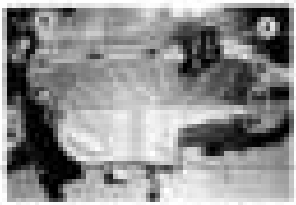
- Fill:
  - Engine Oil (see Engine Oil Change)
  - Coolant (see Cooling System chapter)



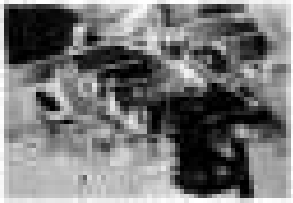
Oil Pan

Oil Pan Removal

- Remove:
  - Engine (Oil drain) (see Engine Oil Change)
  - Muffler (see Engine Top End Installation)
  - Right Lower Fairing Bracket (A)
  - Oil Pan Bolts (B)
  - Oil Pan (C)



Remove the oil pan (A), oil passage collar (B) and oil screen (C) as necessary.



Oil Pan Installation

- Clean the oil screen (A).
- Install the oil screen on the oil pump crankcase (B), the dowel pins (C) of the oil screen.
- Apply engine oil to the O-rings on the oil pipes.
- Apply a non-permanent locking agent to the threads of the mount oil line union bolts and tighten it.

Torque - : (Preliminary Stage) (Final Stage)

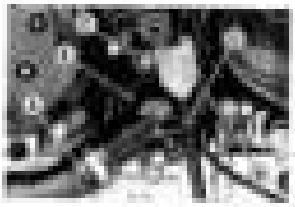
- Position the oil pan gasket with a new one.
- Tighten the oil pan bolts.

Torque - :

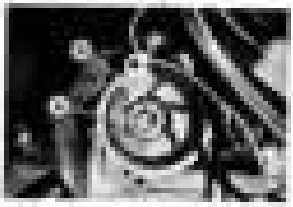
Oil Pump, Oil Pump Drive Gear

Oil Pump Removal

- Drain:
  - Coolant (see Cooling System chapter)
  - Engine Oil (see Engine Oil Change)
- Remove:
  - Lower Fairing (see Fairing chapter)
  - Water Hoses (A)
  - Neutral Switch Lead Connector (B)
  - Bolts (C) and Clamp (D)
  - Water Pump Inlet (E)



- Impeller Bolt (A)
- Impeller (B)



- Water Pump Body (A)
- Oil Pump Cover (B)
- Oil Gear Pump Shafts (C)
- Outer Gear (D) and Inner Gear



NOTE

- The oil pump gears and the cover can easily be damaged by scratching. Install washer (outer side of the cover) (arrow) (see illustration).

Oil Pump Installation

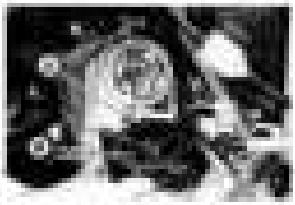
- Install the outer gear (A) and inner gear (B).
- Install the pin, inner gear (C) and oil pump drive shaft (D).
- Turn the pump shaft so that the slot (E) is as shown (for only the impeller (F) of the water drive gear shaft).



- Fit the pin (A) of the oil pump cover (B) into the hole (C) in the crankcase.



- Install
  - Plate (1)
  - Water Pump Body (2)



  - Impeller (3) and Bolt (4)

Torque - Impeller Bolt: 9.8 N·m (1.0 kgf-m, 87 in-lb)

  - Plate (5)
  - Water Pump Cover (6) and Bolts

Torque - Water Pump Cover Bolts: 9.8 N·m (1.0 kgf-m, 87 in-lb)



Oil Pump 20mm Gear Removal

- Remove
  - Clutch (see Clutch chapter)
  - Oil Pan (see Oil Pan Removal)
  - Circlip (1) and Washer (2)

Special Tool - Circlip Pliers: 57001-144

  - Oil Pump Drive Gear (3)



Oil Pump 20mm Gear Installation

- Install the circlip (1) into the groove (2) of the oil pump drive gear shaft.

Special Tool - Circlip Pliers: 57001-144

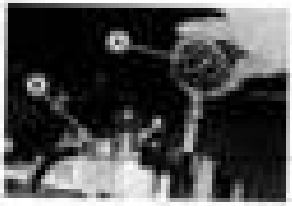


Oil Pressure Measurement

Oil Pressure Measurement

- Remove the front fairing (see Frame chapter).
- Remove the oil passage plug, and attach the gauge and adapter to the plug hole.

Special Tools — [illegible]



- Start the engine to the specified speed, and read the oil pressure gauge.
- If the oil pressure is significantly below the specification, inspect the oil pump and relief valve.
- If the oil pump and relief valve are not at fault, inspect the rest of the lubrication system.

Oil Pressure
Standard: [illegible]

- Stop the engine.
- Remove the oil pressure gauge and adapter.

NOTICE

Take care against loss of coolant when the engine oil flow will flow through the oil passage when the drain plug(s) is removed.

- Apply a thread sealant to the oil passage plug, and tighten it.

Sealant — [illegible]

Torque — [illegible]

(b) Pressure Switch

(1) Pressure Switch Removal

■Remove
- Lower Fairing (see Frame Fairings)
- Engine Oil (drain, see Engine Oil Change)
- Ignition Coil (2)
- Starter Terminal (B)
- Oil Pressure Switch (1)



(2) Pressure Switch Installation

■Apply adhesive sealant to the threads of the oil pressure switch and tighten it.

Sealant — Kawasaki Bond (Silicone Sealant) : 56019-120

Torque — Oil Pressure Switch : 14 N·m (1.4 kgf·m, 10 ft·lb)

■Tighten the terminal bolt.

Torque — Oil Pressure Switch Terminal Bolt : 1.5 N·m (0.15 kgf·m, 13 in·lb)

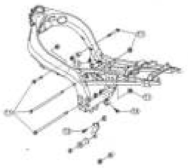
■Route leads in the correct way.

Engine Removal / Installation

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Exploded View



Engine Removal/Installation

Engine Removal

● Disconnect the brake lamp switch and hold it with a band (1).



WARNING

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. It could cause an accident and injury.

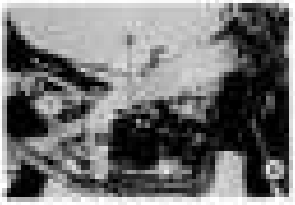
CAUTION

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

● Drain
Engine Oil (see Engine Lubrication System chapter)
Coolant (see Cooling System chapter)

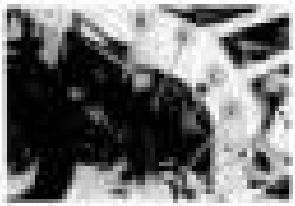
● Remove
Lower Fairings (see Frame chapter)
Middle Fairings and Inner Fairing (see Frame chapter)
Fuel Tank (see Fuel System chapter)
Air Cleaner Housing (see Fuel System chapter)
Heat Duct (see Exhaust System chapter)
Carburetors (see Fuel System chapter)
Muffler Rear Cover and Exhaust Pipe Cover
Fuel Pump and Fuel Filter

Radiator (2)
Cooler Outlet Lower Hose (3)
Muffler (4)



Shift Lever (5)
Rearmost Cable (6)
Gear Position Switch (7)
Engine Sprocket Cover (see Final Drive chapter)

● Disconnect the following from the engine and take them from the chassis.
Neutral Switch Lead Connector (8)
Side Stand Switch Lead Connector (9)

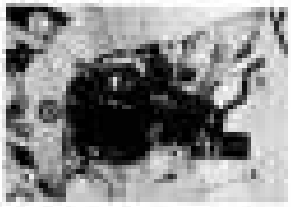


Radiator Cooling Fan Motor Lead (A)
Radiator Cooling Fan Motor Lead Connector (B)
Battery Ground Lead (C)
Starter Motor Lead (D)
Starter Motor Lead Connector (E)
Alternator Lead Connector (F)
Left Battery Cable Connector
● Disconnect the rear side of the engine ground lead.

Special Tool - Hook: 57001-1238



● Support the engine with a suitable stand (A).
● Loosen the mounting bolts (B) on both the sides.
● Remove the engine mounting bolts and nuts (C).
● Remove the stays (rear) from the radiator hose.
● Using the stand, take out the engine.



Engine Installation
● Remove engine installation hooks, the engine mounting bolts (A).
● Support the engine with a suitable stand.
● Fixing the stays (rear) onto the radiator hose (see before removing the engine from the front position in the frame.
● Insert the rubber in the groove of the frame.
● Insert the lower mounting bolt (B).
● Insert the upper mounting bolts (C).
● Set the nuts (D) and insert the rubber mounting bolts (E).
● Tighten the engine mounting bolts and nuts.

Torque - Engine Mounting Bolts and Nuts: 44 N·m (4.5 kgf·m, 33 ft·lbs)

● Tighten the clamp bolts (F) and radiator hose.

Torque - Engine Mounting Clamp Bolts: 44 N·m (4.5 kgf·m, 33 ft·lbs)
Engine Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lbs)

● Install the removed parts (see appropriate chapters).
● Adjust:
Throttle Cables (see Fuel System chapter)
Choke Cables (see Fuel System chapter)
Drive Chain (see Final Drive chapter)

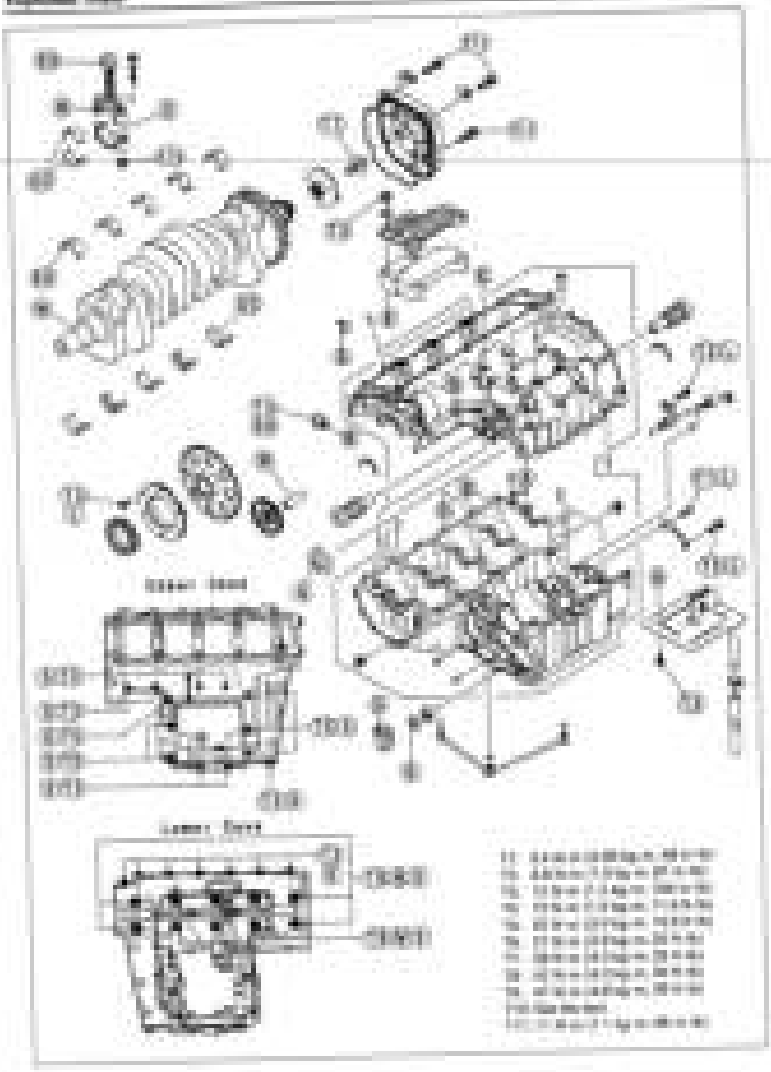


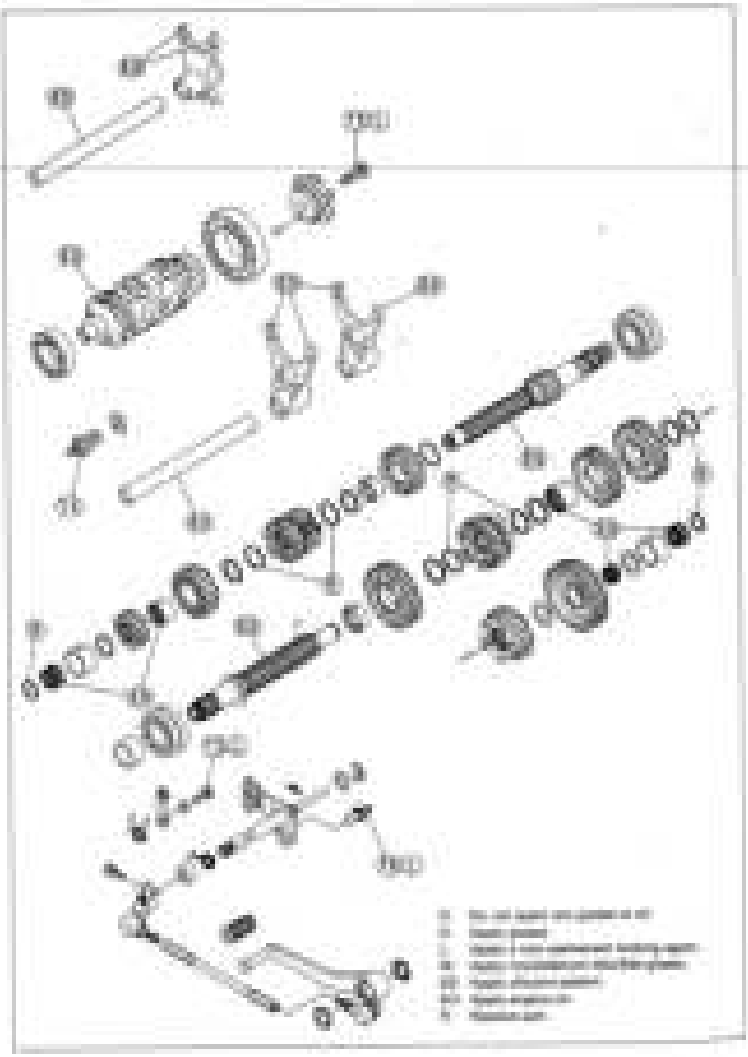
Crankshaft / Transmission

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Exploded View





Specifications

Item	Standard	Service Limits
Crankshaft / Connecting Rods:		
Connecting rod big end side clearance	0.13 – 0.28 mm	0.38 mm
Connecting rod big end bearing insert oil clearance	0.028 – 0.052 mm	0.10 mm
Crankpin diameter	34.984 – 35.000 mm	34.97 mm
Marking: None	34.984 – 34.992 mm	
A	34.992 – 35.000 mm	
Main journal diameter	39.976 – 39.992 mm	
Marking: None	39.976 – 39.984 mm	
1	39.984 – 39.992 mm	
Connecting rod big end bearing insert thickness		
Brown	1.476 – 1.480 mm	
Colorless	1.480 – 1.484 mm	
Blue	1.484 – 1.488 mm	

Connecting rod big end bearing insert selection

Crankpin Pin and Rod Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Part Color	Part Number
None	None	Brown	92028-1111
None	1		
1	None	Colorless	92028-1112
1	1		
2	None	Blue	92028-1113
2	1		

Item			
Connecting Rod Big End Inside Diameter		37.000 – 37.016 mm	
Taper limit		0.008 mm	
Taper connecting rod		0.012 mm	
Out-of-round connecting rod		0.012 mm	
Crankshaft side clearance		0.05 – 0.35 mm	0.40 mm
Crankshaft runout		Total indicator reading less than	0.05 mm
Crankshaft main bearing insert:			
Journal clearance		0.020 – 0.044 mm	0.07 mm
Crankshaft main journal diameter:		37.984 – 38.000 mm	37.96 mm
Marking: None		37.984 – 37.992 mm	
A		37.992 – 38.000 mm	
Crankcase main bearing bore diameter:		41.000 – 41.016 mm	
Marking: A		41.000 – 41.008 mm	
B		41.008 – 41.016 mm	
Crankshaft main bearing insert thickness:			
Brown		1.980 – 1.984 mm	
Black		1.984 – 1.988 mm	
Blue		1.988 – 1.992 mm	

Crankshaft main bearing insert selection

Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert		
		Part Color	Part Number	Journal Size
A	A	Brown	92028-1865	1, 2, 3
	B		92028-1866	4
None	A	Black	92028-1867	1, 2, 3
None	B		92028-1868	4
B	None	Blue	92028-1869	1, 2, 3
None	None		92028-1870	4

The bearing inserts in Nos. 1, 2 and 3 crankshaft main journals are identical.

Item	Standard	Service Limit
Transmission: Shift fork ear thickness Gear shift fork groove width Shift fork guide pin diameter Shift drum groove width	[illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible]

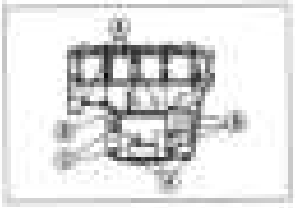
Special Tool : [illegible]

Sealant : [illegible]

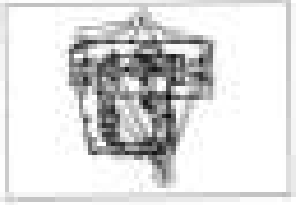
Crankcase Splitting

Crankcase Splitting

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface and drain the engine oiling, water jacket and timing elements.
- Remove:
  - Pickup Coil (see Electrical System chapter)
  - Oil Relay (Controller Side) — Loose (Centerside)
  - Clutch (see Clutch chapter)
  - Balancer Shaft (See Engine (see Balancer Shaft Mechanism Removal/Installation chapter)
  - Starter Motor (see Electrical System chapter)
  - (2) Plugs (see Engine Lubrication System chapter)
  - Alternator Stator (see Electrical System chapter)
  - (2) Bolts (see Engine Lubrication System chapter)
  - Oil Cooler (see Engine Lubrication System chapter)
- Unplug connector (s) and remove wires from the clamps (see Engine Top End chapter).
- Remove the upper crankcase bolts.
- Loosen the 6 mm bolts:
  - 8 mm Bolts: (1)
  - 7 mm Bolts: (4)
  - 6 mm Bolts: (1)



- Remove the oil pan, drain valve or screen and oil strainer (see Engine Lubrication System chapter).
- Remove the lower crankcase bolts and brackets.
- Loosen the 6 mm bolts:
  - 8 mm Bolts: (4)
  - 6 mm Bolts: (4)
- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase. Take care not to damage the crankcase.



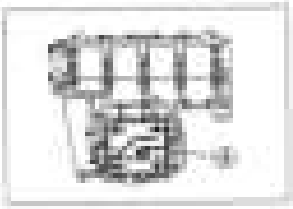
Crankcase Assembly

CAUTION

Two upper and lower crankcase halves are machined as the factory in the assembled state, so the crankcase halves must be replaced as a set.

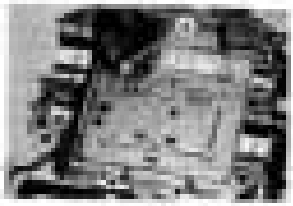
- With a high flash point solvent, clean off the sealing surfaces of the crankcase halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.
- Apply silicone sealant to the crankcase mating surface (1) as in the sketch, and then assemble them, and then install the washers (see 24).

Sealant — Kawasaki Bond (Silicone Sealant) : 92104-1138



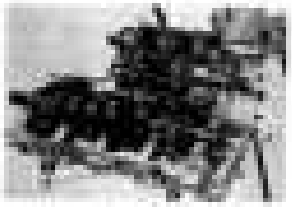
● Apply a non-permanent locking agent to the threads of engine case bolts (A).

Torque – Breather Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lbs)



● Install:
Crankshaft and Connecting Rods
Camshaft Plate (A)
Transmission Shaft and Gears
Output Plate (B)
Shift Drum
Shift Forks and Shift Rods

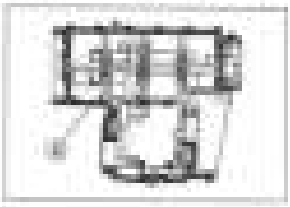
● Before fitting the crank case on the upper case, check the following.
1) Be sure to hang the camshaft chain on the crankshaft.
2) Check to see that the shift drum and transmission gears are in the neutral position.



● Apply liquid gasket (A) to the mating surface of the lower crankcase half.

Sealant – Kawasaki Bond (Liquid Gasket – Silicone): 92104-0120

CAUTION
Do not apply liquid gasket around the crankshaft inner bearing inserts and oil passage holes.



● Apply molybdenum disulfide grease to the sealing surface of the lower crankcase 8 mm bolts.

● Tighten the lower crankcase bolts.

1) Following the sequence numbers on the lower crankcase half, tighten the 6 mm bolts (1 – 10).

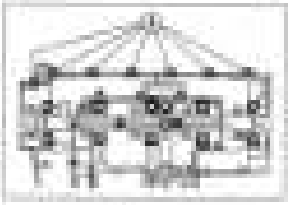
Torque – Crankcase 6 mm Bolts: 10 N·m (1.0 kgf·m, 87 in·lbs)

2) Tighten the 8 mm bolts (11 – 14).

Torque – Crankcase 8 mm Bolts: 21 N·m (2.1 kgf·m, 15 ft·lbs)

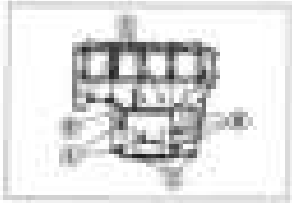
3) Tighten the 6 mm bolts (A).

Torque – Crankcase 6 mm Bolts: 10 N·m (1.0 kgf·m, 104 in·lbs)



● Fit the 8 mm bolts (A), 6 mm bolts (B), and stud bolt (C) into the upper crankcase half as shown in the figure, tighten the 8 mm bolts first, then the other bolts in the sequence shown.

Torque – Crankcase 8 mm Bolts: 21 N·m (2.1 kgf·m, 15 ft·lbs)
Crankcase 6 mm Bolts: 10 N·m (1.0 kgf·m, 104 in·lbs)
Crankcase 8 mm Bolts: 10 N·m (1.0 kgf·m, 104 in·lbs)



- After replacing or overhauling clutch, check the following items.
- Clutch shaft and transmission shafts turn freely.
- While spinning the output shaft, gears over smoothly from low to the gear, and fast to low.
- When the output shaft stops and the gear can not be shifted on 2nd gear or other higher gear positions.

Crankshaft and Connecting Rods

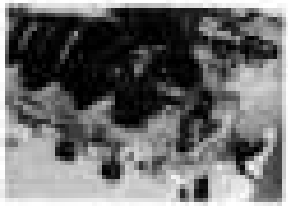
Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the camshaft.

Crankshaft Installation

CAUTION

If the crankshaft bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with Plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.



- Apply engine oil to the crankshaft main bearing inserts.
- Install the crankshaft with the camshaft chain (A) hanging on it.

Connecting Rod Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod bolts.
- Remove the crankshaft.

NOTE

- Mark and record the locations of the connecting rods and their top and mark on the rods can be reassembled in their original positions.

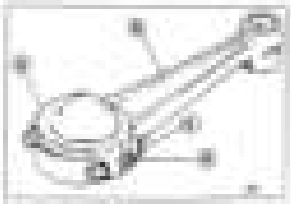
- Remove the connecting rods from the crankshaft.

Connecting Rod Installation

CAUTION

To maintain vibration, the connecting rods should have the same weight mark.

Big-End Side (A)
Connecting Rod (B)
Weight Mark (Numbers) (C)
Oil Hole Mark (D)



- Set the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

CAUTION

The connecting rod bolts are designed to stretch when tightened. Never reuse them. Use the bolts below the service limit and the limit.

● Apply engine oil to the inner surface of crank and inner bearing halves.
Upper crankpin and journal bearing (A)
Oil hole (upper) and rod (B)
Apply engine oil (C).



CAUTION

Do not apply engine oil to the outer surface of the crank or inner bearing halves (C) or the outer surface of the lower bearing halves.

(1) Fix connecting rod big end in position using the "Crankpin Aligner Tester" (this material).
(2) The crankpin diameter between the installed connecting rods (without crankpin) is correspondingly different by the use of thicker halves (inner bearing) and thinner halves (outer bearing).
(3) Then join the halves of the crankpin aligner temporarily. One is a bolt-length measurement method and other is a tightening torque measurement. Choose any of the following ones, but the bolt length measurement method is somewhat accurate than the torque measurement method, so perform it whenever you have a more detailed view to tighten the big end side.

(1) Bolt length measurement (Optional)
● Be sure to apply the bolts, nuts and connecting rods (inner parts) with high grade engine oil (recommended) and then connecting rods (bolts and nuts) are installed with all care and precision.

A WARNING

Clean the bolts, nuts, and connecting rods in a suitable cleaning unit and then dry them by an electric or flame equipment (also the cracking tests). This operation is significant with a view to the danger of Engine Seizure/Bolt Breakage, as rust and gasoline or like have been prevented in these items.

CAUTION

Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

● Install new bolts in crankpin connecting rods.
● Apply bolt and insert and hold the bolt a bit in as shown.
● Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values in N in the bolt shown.
Connecting Rod (A)
Bolt (B)
N = Unit: mm (inch)
● Tighten the big end nuts until the bolt elongation reaches the length specified in the table.
● Check the length of the connecting rod bolts.
● Be sure always to check that the bolts, nuts and connecting rods (inner parts) are lubricated with high grade engine oil (recommended).



Bolt length after tightening − Bolt length before tightening = Measure

Connecting Rod Side	Bolt	Nut	Tightening Torque N·m (kg-m, ft-lb)
Upper	Use the bolt attached to the upper rod	Attached to the upper rod	0.32 – 0.35 kgf·m
		Other	
Lower	Replace the bolt with new one	Upper	0.44 – 0.48 kgf·m
		Other	

(2) Tightening Torque Method

- If you don't have a bolt wrench/bolt, use step tighten the rods using the "Tightening Torque Method".
- Be sure to clean the bolts and nuts thoroughly with high flash point solvent. Maintain the new bolts and nuts as installed with oil and rust removed.

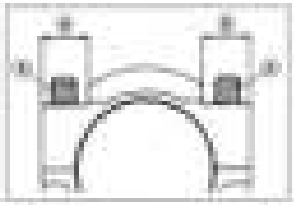
WARNING

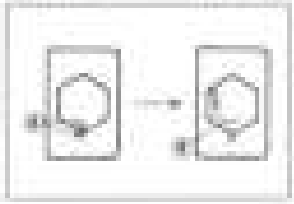
Clean the rods and nuts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. The solvent may ignite when it comes into contact with sparks or flames from welding, lit cigarettes with a pilot light, flames of the stoves or higher temperature objects. Do not use gasoline or inflammable solvent to clean them.

Caution

Immediately dry the rods and nuts with compressed air after cleaning.
Clean and dry the rods and nuts completely.

- Apply a small amount of engine oil to the thread (A) and bolting surface (B) of the connecting rod nuts.
- First, tighten the nuts to the specified torque. Service data below
- Next, tighten the nuts 120° more.
- Mark (A) the connecting rod big-end case and nuts so that nuts can be turned 120° (B) properly.
- Tighten the hexagon nut by 2 corners.





Connecting Rod Side	Bolt	Nut	Tightening Torque N·m (kg-m, ft-lb)
Upper	Use the bolt attached to the upper rod	Attached to the upper rod	14.7 (1.5, 11.0) + 120°
		Other	29 (3.0, 21.5) + 120°
Lower	Replace the bolt with new one	Upper	34 (3.5, 11.5) + 120°
		Other	49 (5.0, 19.5) + 120°

Caution

Above the rotation limit of the seating surface and thread portion of new nuts is different from that in used ones, the tightening torque should be changed as specified in the above table.
Do not re-use a nut/washer/bolt.

Crankshaft Connecting Rod Cleaning

- After assembly, the connecting rods must be cleaned to wash away any foreign matter stored inside.
- Blow the passages in carriage with compressed air to remove any foreign matter or residue that may have accumulated in the passages.

Connecting Rod Bend

- Remove the connecting rod cap and bearing inserts and reinstall the connecting rod big end cap.
- Insert an arbor (A) of the same diameter as the connecting rod big end into and insert the arbor through the connecting rod big end.
- Insert an arbor (B) the same diameter as the piston pin and fitted into the connecting rod small end, and insert the arbor (B) through the connecting rod small end.
- Put a surface plate and the ends of both arbors on it closely (C).
- Slide the connecting rod small end laterally, use a feeler gauge to measure the difference in the height of the rather above the surface plate, and a vernier caliper to determine the amount of misbending and bend.
- If connecting rod bend exceeds the service limit, the connecting rod must be replaced.



Connecting Rod Bend
Service Limit: 0.2 mm (0.01 in.)

Connecting Rod Twist

- Insert the big end arbor (A) set on a base (C), hold the connecting rod horizontally and measure the amount that the other (B) ends move being careful that the surface plate over a 100 mm length of the arbor to determine the amount of connecting rod twist.
- If connecting rod twist exceeds the service limit, the connecting rod must be replaced.



Connecting Rod Twist
Service Limit: 0.2 mm (0.01 in.)

Connecting Rod Big End Side Clearance

- Measure connecting rod big end side clearance (A).
- Insert a thickness gauge (B) between the big end and side of crank web to determine clearance.



Connecting Rod Big End Side Clearance
Standard: 0.13 – 0.28 mm
Service Limit: 0.35 mm

- If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If clearance is not kept after connecting rod replacement, the crankshaft also must be replaced.

Connecting Rod Big End Bearing Insert/Crankpin Wear

● Using a plastigage (color gauge) (A), measure the bearing insert/crankpin (B) clearance.



NOTE

○ Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).
○ Do not move the connecting rod and crankshaft during clearance measurement.

Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard	0.021 ~ 0.045 mm
Service Limit	0.10 mm

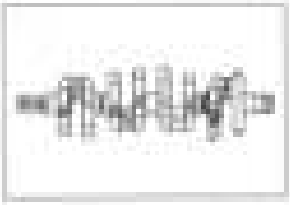
● If clearance is within the standard, no bearing replacement is required.
● If clearance is between 0.045 mm and the service limit of 0.10 mm, replace the bearing inserts with inserts painted green (C). These inserts maintain clearance with the crankpin. The clearance will exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
● If the clearance exceeds the service limit, measure the diameter of the crankpin.



Crankpin Diameter

Standard	34.984 ~ 35.000 mm
Service Limit	34.97 mm

● If any crankpin has been used, mark the used mark (before the crankpin) with a mark pen.
● If any measured crankpin diameter was not less than the service limit, but did not coincide with the original diameter markings on the crankshaft, make new marks on it.



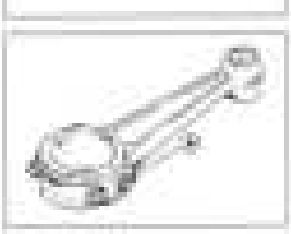
Crankpin Diameter Marks

None	34.984 ~ 34.990 mm
1	34.990 ~ 34.995 mm

○ Crankpin Diameter Marks: "1" mark on the web.

● Measure the connecting rod big end bore diameter, and mark each connecting rod big end in accordance with the bore diameter.

Bore Diameter Mark: Arbitrary Number Mark (No) "1" on the web.



NOTE

○ Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).
○ Do not move (rotate) on the big end thrust when crankpin over the measurement.

Connecting Rod Big End Bore Diameter Marks

None	37.000 ~ 37.006 mm
1	37.006 ~ 37.012 mm

● Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft marking.
● Install the new inserts in the connecting rod and make match-marked sequence with the crankpin.

Crankcase Bearing Insert Bore Diameter Marking	Crankshaft Journal Diameter Marking	Bearing Insert	
		Size Color	Part Number
Blank	0	Brown	92081-1113
Blank	Yellow	yellow stripe	92081-1114
0	0		
0	Blank	Blue	92081-1115

Crankshaft Main Bearing Insert/Journal Wear

Before a crankcase (either half) or crankshaft has been reconditioned, the bearing inserts/journals MUST be measured.

NOTE

○ Replace the crankcase bolts as the assembly torque uses Crankcase Deformation.

○ Do not turn the crankshaft during clearance measurement.

○ Crankshaft endplay and Max. 0.081 mm can not be measured by plastigage. However, using gaskets when installing the crankcase decrease clearance.

Crankshaft Main Bearing Insert/Journal Clearance

Standard:	0.022 ~ 0.046 mm
Service Limit:	0.07 mm

Put clearance is within the standard, no bearing replacement is required.

If clearance is between 0.046 mm and the service limit, 0.07 mm, replace the bearing inserts with inserts painted blue (1). Check crankcase/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

If clearance exceeds the service limit, measure the diameter of the crankshaft main journal.

Crankshaft Main Journal Diameter

Standard:	32.983 ~ 33.000 mm
Service Limit:	32.963 mm

If any journal has been used the service limit, replace the crankshaft with a new one.

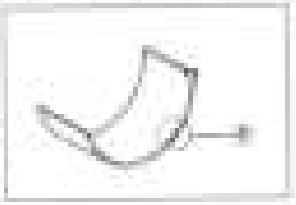
If the measured journal diameters are not less than the service limit, but do not correspond with the original diameter markings on the crankshaft, install new inserts (1).

Crankshaft Main Journal Diameter Marks

Blank	32.983 ~ 32.992 mm
1	32.993 ~ 33.000 mm

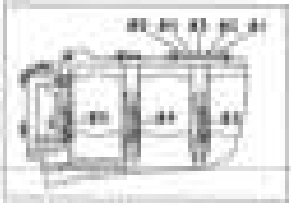
(1) Crankshaft Main Journal Diameter Marking "1" mark is not made.







● Measure the main bearing bore diameter and mark the upper crankcase half in accordance with the bore diameter.
(1) Crankcase Main Bearing Bore Diameter Marking "1" mark or no mark



NOTE

- Ignition the crankcase bolts in the parallel torque (see Crankcase Assembly).
- The mark placed on the upper crankcase half should always coincide with the matchmarks.

Crankcase Main Bearing Bore Diameter Marks

1	60.000 – 60.006 mm
Mark	59.994 – 60.000 mm

● Select the proper bearing insert in accordance with the combination of the crankcase and crankshaft marking.
● Install the new inserts in the crankcase halves and install crankcase in accordance with the procedures.

Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Bore Color	Part Number	Journal Part
1	1	Brown	92028-1868	1, 2, 3
			92028-1845	3, 4
Mark	2	Black	92028-1867	1, 2, 3
1	Mark		92028-1869	3, 4
Mark	Mark	Blue	92028-1866	1, 2, 3
			92028-1847	3, 4

*The bearing inserts for Nos. 1, 2, and 3 journals have an oil groove, respectively.

Crankshaft Side Clearance

● Install a thickness gauge between the crankshaft main bearing (1st and the outer web (3)) at the No. 3 journal to determine clearance.
● If the clearance exceeds the service limit, replace the crankcase halves as a set.

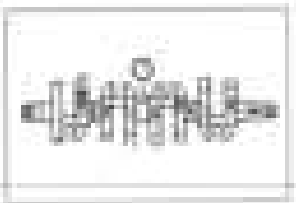


CAUTION
The upper and lower crankcase halves are machined at the factory to the assembled state, so the crankcase halves must be replaced as a set.

Crankshaft Side Clearance

Standard	0.05 – 0.41 mm
Service Limit	0.60 mm

Crankshaft Runout



Starter Motor Clutch

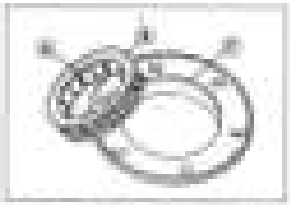
Starter Motor Removal/Installation

- Refer to Alternator/ Motor Removal and Installation in the Electrical System chapter.

Starter Motor Assembly

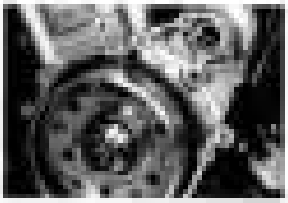
- Fit a one-way clutch (A) onto the starter motor (B) as shown in Detail (C), by rotating the clutch pinion (D).
- Apply a non-permanent locking agent to the threads of the starter motor mount bolts, and tighten them.

Torque — **Starter Motor Clutch Body Cover Engine Side Bolts**: 10 N·m (1.0 kgf·m, 88 in·lb)



Starter Clutch Inspection

- Remove:
  - Alternator Cover (see Electrical System chapter)
  - Starter Idle Gear
- Turn the starter driven gear (A) by hand. The starter clutch gear should turn counterclockwise (B) freely and should not turn counterclockwise (C).
- If the starter clutch does not operate as it should or if it makes noise, disassemble the starter clutch, examine each part carefully, and replace any worn or damaged parts.



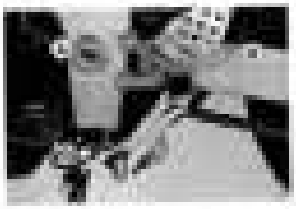
Transmission

Shift Pedal Removal

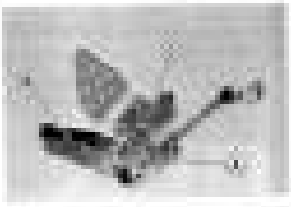
- Mark [A] the position of the shift shaft [B] on the shift shaft so that it can be installed back in the same position.
- Remove:
  - Bolt [C]
  - Shift lever



Bolts [A]
Footrest Bracket [B]



- Remove the bolt [A], footrest [B], and shift pedal [C].



Shift Pedal Installation

- Install the shift pedal [A] so that the distance between the center of the shift pedal mark and the center line of the shift rod [B] is 5.5 mm (0.22 in) by tightening the rider exchange bolt [C] and locking the bolt.

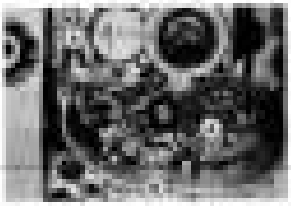


NOTE

- The shift rod rests on the inverted position on the rod ball joint when removed.

- If necessary, adjust the pedal position from the standard position to suit your preference.
- Loosen the front and rear rod locknuts.
- If you like to adjust the pedal position:
- If lower the rod end to adjust the pedal position.
- If raise the rod end to adjust the pedal position.

External Shift Mechanism Removal

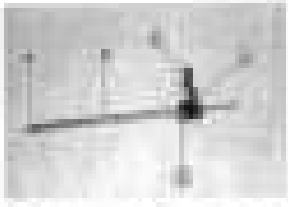


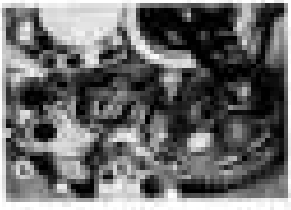


External Shift Mechanism Installation



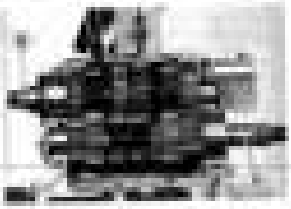
External Shift Mechanism Inspection





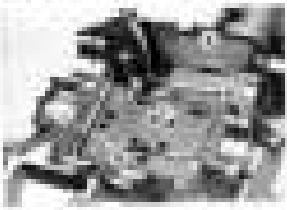
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the drive shaft (A) and output shaft (B).

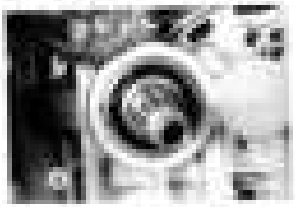


Transmission Shaft Installation

- Apply engine oil to the sliding portion of the gears and bushings.
- Check to see that the tab end (A) and tab hole (B) are in order.



- Install the drive shaft and output shaft into the upper crankcase half.
- Apply engine oil to the sliding surfaces of the gears and bushings.
- Set bearing set pins and ball holes in the upper crankcase half.
- Set the bearing set pins and ball holes in the lower crankcase half.
- Fit the lower crankcase half to the upper crankcase half.
- Tighten the crankcase bolts (see Crankcase Bolt Tightening Sequence).



Transmission Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips.

Special Tool - Snapper Circlip Pliers: 57001-144

- Pull the gears (A) on the output shaft out from gear hole (see illustration).
- Set the shifting neutral (see illustration). Remove the shift gear (B).
- Align the output shaft in a vertical position holding the 3rd gear (C).
- Open the slot gear spacer (D) and pull it off upward.



- Remove the ball bearing (A) from each shaft.

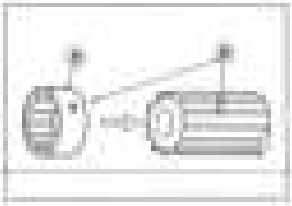
Special Tool - Bearing Puller: 57001-135 (B)
Bearing Puller Adapter: 57001-317 (C)

- Discard the bearing.

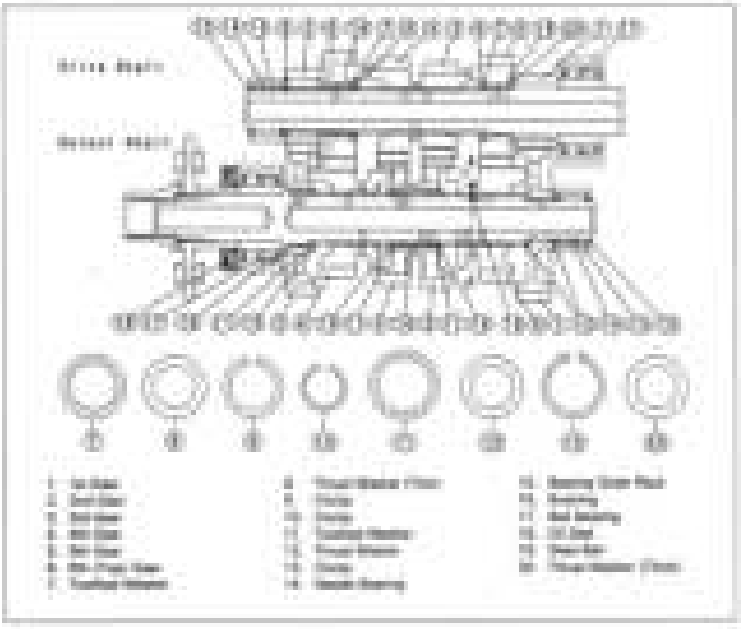


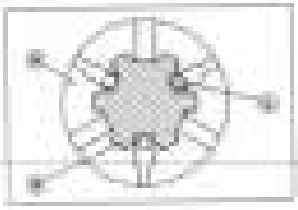
Transmission Assembly

- Install the gear bushings (A) on the shaft and main (B) aligned with the teeth of splits.



- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 5th gear. Be sure that all gears are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear onto the drive shaft with their inner chamfer.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 5th gear. Be sure that all gears are put back in the correct sequence and all circlips and washers are properly in place.
- Install the M2 gear onto the output shaft with their inner chamfer aligned as shown.



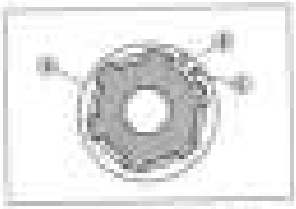


- Put the gear pads into the gear holes as shown.
  Gear [A] 4 [B] Gear Pads
  [A] Gear (4th)
  [B] Shaft
  [C] Gear Pads

CAUTION

Do not apply grease to the clutch hubs or sub gears or plates. The oil could cause the clutches (neutral finder mechanism) to malfunction.

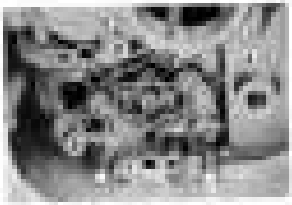
- Check the ball bearing when the 4th gear slides into normal set on the output shaft while moving it up and down by hand.



- Replace any circlip that were removed with new ones.
- Install the circlip [A] so that the opening is aligned with a spline groove [B].
- Check that each gear slides or rotates freely on the transmission shafts without binding after assembly.

Shift Drum and Fork Removal

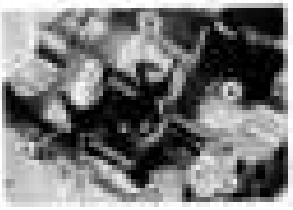
- Remove:
  Engine Undercase Shift Lever (Transmission Housing)
  Engine Upper Crankcase (see Engine Top Disassembly Removal)
  Gear Positioning Lever [A]
  Bolt [B] and Screw [C]
  Shift Drum Bearing Holder [D]
- Pull out the shift rods [E], and take off the shift forks.
- Pull out the shift drum [F].



Shift Drum and Fork Installation

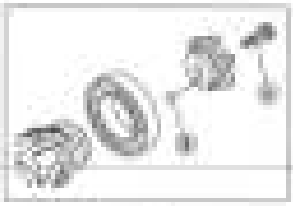
- Install the shift rods [A], noting the groove positions. The rods are identical.
- Position the rod with grooved ends [B] as the drawing shows and assemble all in the center position in the shift forks [C].
- The short ends [D] of the rods must point down as shown.
- Install the forks as shown.
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder bolt and screw, and tighten them.

Torque - **Shift Drum Bearing Holder Bolt**: 12 N·m (1.2 kgf·m, 106 in·lb)
Shift Drum Bearing Holder Screw: 3.4 N·m (0.35 kgf·m, 30 in·lb)



Shift Drum Disassembly

- Remove the shift drum cap bolt, dowel pins and shift spacer.
- Loosen holding the shift drum with a vise between the shift drum cam holder bolt.
  - (1) Shift Drum Cam Holder Bolt
  - (2) Dowel Pin



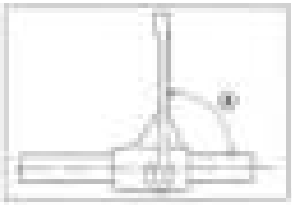
Shift Drum Assembly

- Be sure to install the dowel pin.
- Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt, and tighten it.

Torque - Shift Drum Cam Holder Bolt: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Shift Fork Bending

- If bends, replace the shift fork, and replace the shift drum. A bent fork could cause difficult shifting, or allow the transmission to jump out of gear when under power.



Shift Fork Gap (Engine Side)

- Measure the thickness of the shift fork pin (1), and measure the width (2) of the gear grooves.
- If any thickness is a specified out of the limit, the shift fork should be replaced.

Shift Fork Pin Thickness

Standard	5.8 – 5.9 mm
Service Limit	5.6 mm

And the gear groove in which runs the shifter fork, the gear shall be replaced.

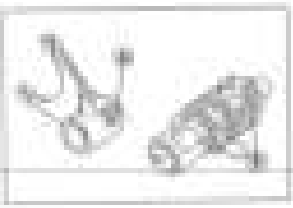
Gear Groove Width

Standard	6.05 – 6.15 mm
Service Limit	6.25 mm



Shift Fork Guide Pin/Drum Groove Wear

- Measuring the clearance at each shift fork guide pin (A), and replace the worn one at each shift drum groove.
- If the guide pin or any shift fork is less than the service limit, the fork must be replaced.



Shift Fork Guide Pin Diameter

Standard: 8.0 – 7.91 mm

Service Limit: 7.9 mm

- If any shift drum groove is worn over the service limit, the drum must be replaced.

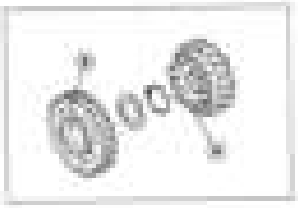
Shift Drum Groove Width

Standard: 7.98 – 8.08 mm

Service Limit: 8.18 mm

Gear Dog and Gear Dog Hole Damage

- Inspect each gear dog (A) and gear dog hole (B).
- Replace any damaged gears in gear sets exceeding each stage in dog holes.



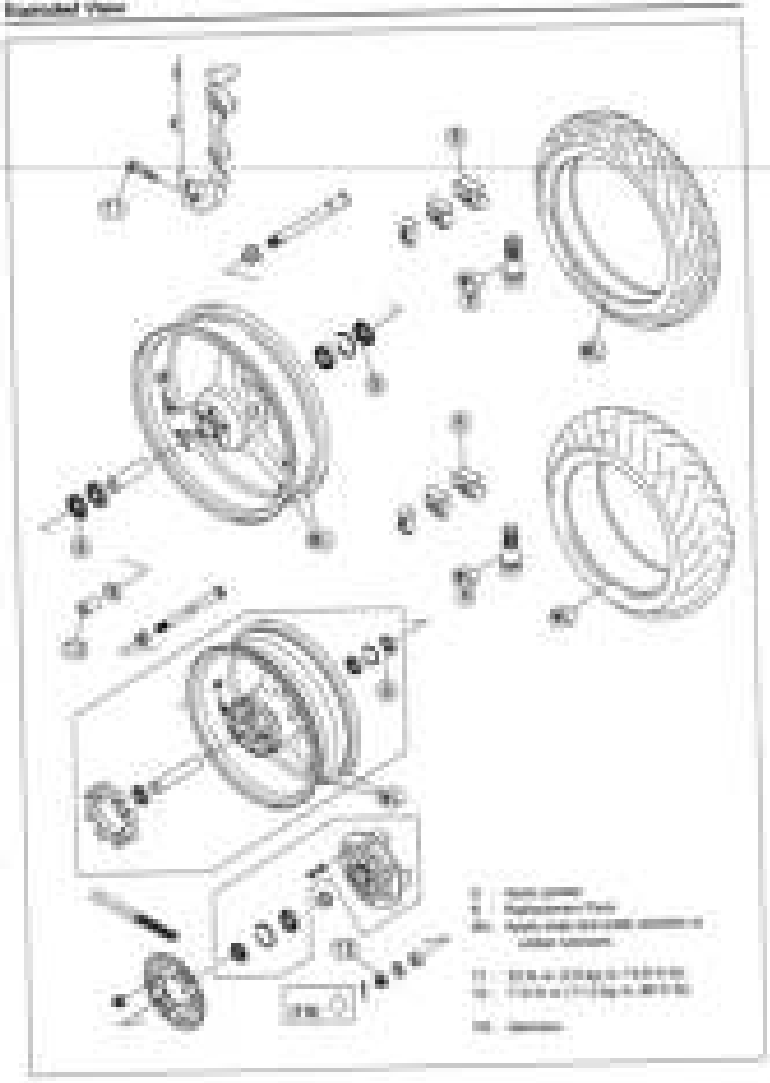
Wheels / Tires

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Exploded View



Specifications

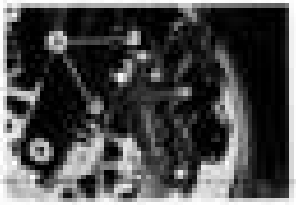
Item		Standard	Service Limit
Wheels (Rims):			
Rim runout	Axial	----	0.5 mm
	Radial	----	0.8 mm
Axle runout (120 mm from end)		0.08 mm or less	0.2 mm
Wheel balance		15 g at 90 km/h	----
Balance weights		10 g, 20 g, 30 g	----
Tires:			
Air pressure (when cold)			
	Front	Up to 183 kg (405 lb) load: 250 kPa (2.5 kg/cm², 36 psi)	----
	Rear	Up to 183 kg (405 lb) load: 290 kPa (2.9 kg/cm², 41 psi)	----
Tread depth			
	Front	BRIDGESTONE: 6.0 mm DUNLOP: 6.0 mm	1 mm (EC, AR, BR): 0.8 mm
	Rear	BRIDGESTONE: 8.0 mm DUNLOP: 8.0 mm	Up to 130 km/h: (BE model): 2 mm Over 130 km/h: (BE model): 3 mm
Standard tire		Make, Type	Size
	Front	DUNLOP, D204FR (J model) BRIDGESTONE, BATTLAX BT-39F MEDIAL F MICHELIN M85 PIRELLI MT60 METZELER ME 31 FRONT	110/70 ZR17 (54W)
	Rear	DUNLOP, D204T (J model) BRIDGESTONE, BATTLAX BT-39R RADIAL F MICHELIN M88 PIRELLI MT60 METZELER ME 31	180/55 ZR17 (73 W)

Special Tools: Item: 57001-1548
Inside Driving Plate: 57001-181
Bearing Driver Set: 57001-1129
Bearing Remover Shaft: 07741-0010201
Bearing Remover Head: 07914-3230001

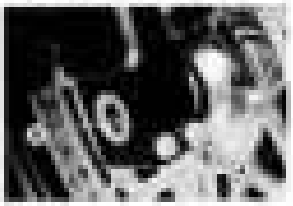
Wheels (Rims)

Front Wheel Removal

- Remove:
  - Lower Fairing (see Frame chapter)
  - Inner Fairing
  - Brake Caliper Mounting Bolts (A)



- Loosen:
  - Right Side Axle Clamp Bolt (a)
  - Axle (b)



- Place the front wheel off the ground.

Special Tool : Jack: 57001-1238

- Pull out the axle and remove the right side collar and the wheel.

CAUTION

Do not lay the wheel down on one of its discs. This can damage or warp the disc. Place blocks under the wheel to hold it clear of the ground.

Front Wheel Installation

NOTE

- The direction of the wheel rotation (R) is shown by an arrow (B) on the wheel spoke.



- Check the wheel bearings (see the front wheel section).
- Fit the collar on the left side of the hub.
- Tighten the axle and axle clamp bolt.

Torques: Axle: 59 N·m (6.0 kgf·m, 44 ft·lb)
Axle Clamp Bolt: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Install the front brake caliper (see Brakes chapter).
- Check the front brake.

WARNING

Do not attempt to drive the motorcycle until it has been tested by pumping the brake lever until the pads are against the disc. Then brake with normal pressure to check operation of the brake. If this is not done,

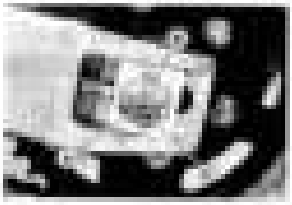
Rear Wheel Removal

- Using the jack, [1] raise the rear wheel off the ground.

Special Tool - Jack: 57001-1238



- Remove:
  - Cotter Pin [2]
  - Axle Nut [3]
  - Axle [4]



- Remove the drive chain [5] from the rear sprocket toward the left.
- Move the rear wheel back and remove the spacer from the hub collar.
- Remove the rear wheel.



CAUTION

Do not lay the wheel on the ground with the disc facing down. The disc damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

- Install the drive chain with the new sprocket.
- Install the spacer between the hub collar and the sprocket side [6].
- Install the axle from the right side of the wheel, and tighten the axle nut.

Torque - Rear Axle Nut: 118 N·m (12 kgf·m, 86 ft·lb)

- Adjust the drive chain slack after installation. See Final Drive chapter.
- Check the rear brake.



WARNING

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

Wheel Inspection

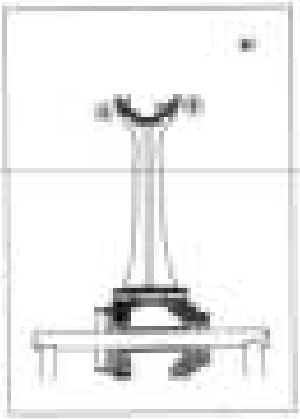
- Place the front tire stand off the ground.
  Special Tool - Jack: 57001-1238
- Spin the wheel lightly, and check for roughness or binding.
- If roughness or binding is found, replace the hub bearings.
- Inspect the wheel for dent cracks, bend, binding, or runout.
- If there is any damage to the wheel, replace the wheel.
- Remove the wheel and support it without the tire by the axle.
- Measure the rim runout, radial (A) and axial (B), with a dial gauge.
- If the runout exceeds the service limit, clean the hub thoroughly.
- If the problem is not due to the bearings, replace the wheel.

Rim Runout

Service Limit	Axial:	0.5 mm
	Radial:	0.5 mm

CAUTION

Never attempt to repair a damaged wheel. If there is any damage, including wheel bearings, the wheel must be replaced to ensure safe operating conditions.

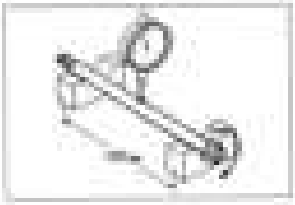


Axle Inspection

- Visually inspect the front and rear axle for damage.
- If the axle is damaged or bent, replace it.
- Measure the axle runout with a dial gauge.
- If axle runout exceeds the service limit, replace the axle.

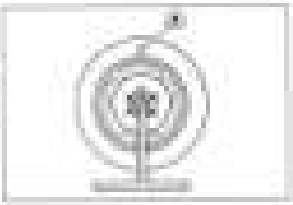
Axle Runout/Bend

Standard	0.06 mm or less
Service Limit	0.2 mm



Balance Inspection

- Remove the wheel.
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark (A) the wheel at the top when the wheel stops.
- Repeat the procedure several times. If the wheel stops at the mark several times, balancing is in order.



- If the wheel balance is very positive, adjust the wheel balance.

Balance Adjustment

- If the wheel stops at the mark several times, temporarily attach a balance weight (170 g) (A) at the marking (the position mark).
- Rotate the wheel a turn (B), and see whether or not the wheel stops at the position. If it does, the wheel balance weight is being used.
- If the wheel stops and the weight goes up, replace the weight with the next heavier one. If the wheel stops and the weight goes down, replace the weight with the next lighter one. Repeat these steps until the wheel remains at rest after being rotated a turn.
- Rotate the wheel another a turn and then another a turn to see if the weight is correctly balanced.



- Prepare the sticky adhesive on balance sheet or installation or symbol (wheel weight balance).
- Permanently install the balance weight.

Balance Weight

Part Number	Weight (grams)
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Balance Weight Removal

(a) When you use a screwdriver.

- Push the blade section between the wheel and a tapered tip screwdriver and lift the weight off the rim flange.
- Discard the used balance weight.



(b) When you use a pry bar.

- Put (A) the balance weight off the rim flange using a tapered tip screwdriver as shown in the figure.
- Install a bit (B) the screw driver between the rim wheel (C) and weight blade (C) and the end of the tip (arrow) the end of the weight blade.
- Push the screw and loosen the bar so that the balance weight rips off the rim flange.
- Discard the used balance weight.



Balance Weight Installation

- Clean if the weight portion has any dirt on the screw and clip area.
- If it does, discard it.

WARNING

- **Wrong balance weight can also on the rim flange (for weight before clip type) weight whether. Balance the new balance weight.**
- **Do not reuse used balance weight.**
- **Unbalanced wheels can create an unsafe riding condition.**

- Calculate the balance weight install rim flank and rim flange and a metal and weight between in rubber contact. The value the balance weight clip side rim on flange.

CAUTION

Do not remove the rim stop and engine or on particular manufacturer because they will deteriorate the rim.

- Insert the rubber inside on the rim.
- Fix the weight on the rim flange by pushing or lightly hammering the weight in the direction shown in the figure.
- Check that the beads and weights are fully on the rim flange, and that the clip is hooked over the rim edge and washer is in the position.

Installing Balance Weight

(a) Place a tightly fastener the weight in

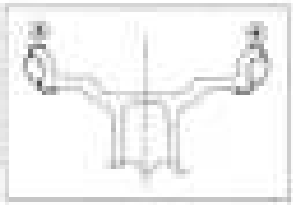


(b) Installation completed



- When applied total weight exceeds 30g, install balance weight at both sides of rim flange as shown.

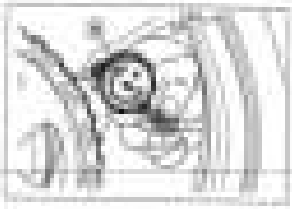
Required Total Weight	Weight Installed to
	Front Side (A)	Rear Side (B)
30g	15g	15g
35g	15g	20g
40g	20g	20g
45g	20g	25g
50g	25g	25g
55g	25g + 5g	25g
60g	25g + 10g	25g + 5g
65g	25g + 15g	25g + 10g



Tires

Air Pressure Inspection/Adjustment

- Measure the tire air pressure with an air pressure gauge [A]. (when the tires are cold [not driven in, when the motorcycle has not been ridden within three hours or less during the past 3 hours])
- Adjust the tire air pressure according to the recommendations in the table.



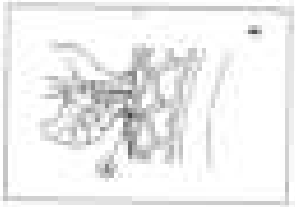
Air Pressure (when cold)

Front	Up to 190 kg (419 lb)	[illegible] kPa, [illegible] kgf/cm², [illegible] psi
Rear	Up to 190 kg (419 lb)	[illegible] kPa, [illegible] kgf/cm², [illegible] psi

Tire Inspection

As the tire wear varies more, but the front tire wear corresponds to [illegible] and [illegible]. An excessive variation in front and rear tire wear [illegible] during the use [illegible] the [illegible] wear.

- Remove any embedded stones or nails. Cement punctures from the inside.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of damage. Inspect for signs of [illegible] damage, repairing the [illegible].
- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire has worn [illegible], tire replacement is [illegible].



- Tire replacement is also [illegible].

Tread Depth

Front:

Standard	[illegible]
Service Limit	[illegible]

Rear:

Standard	[illegible]
Service Limit	[illegible]

WARNING

Do not use tube tire on this [illegible] tire. Use only the recommended [illegible] tire combination. Failure to do so may cause [illegible].

NOTE

- [illegible]
- [illegible]

Tire Removal

- Remove:
  - [illegible]
  - [illegible]
  - [illegible]
- To maintain proper balance, mark the valve stem position on the tire with chalk so that the tire can be installed in the same position.
  - Chalk Mark of Valve Stem [A]
  - Air Valve [B]
  - Weight [C]



● Lubricate the rim inside and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the rim inside slip into rim flanges.

CAUTION
[illegible]

● Position the rim and then rim using a suitable semiautomatic machine. Rim Flanges

NOTE

- Do not exceed 50 kPa (0.5 kgf/cm², 7 psi) when seating the beads.

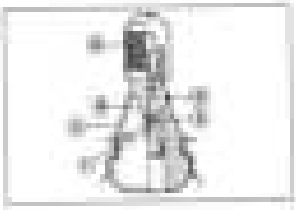
Tire Installation

● Install the rim and rim and replace them if necessary.
● Clean the sealing surfaces of the rim and rim, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
● Remove the air valve and discard it.

CAUTION
Replace the air valve whenever the tire is removed.
Do not reuse the air valve.

● Install a new valve in the rim.

(1) Valve Core (2) Rim (3) Valve Seal
(4) Valve Core (5) Valve Hole (6) Valve Grommet



- Remove the valve cap, compress the duck valve with a soap and water solution to expose bubbles, and then the valve base. (A) Straight the rim from the inside rim until it stops at the stem.

CAUTION
Do not use engine oil or petroleum distillate to lubricate the rim. Damage may occur to the valve.

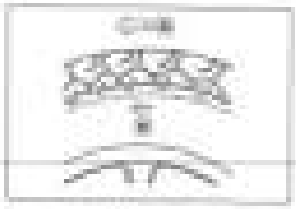
● Apply a soap and water solution or rubber lubricant to the rim flange and rim inside.



- Check the tire rotation mark on the tires and rims (tire and tube type) (see the tire mountings).

NOTE

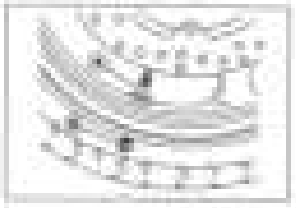
○The direction of the tire rotation (A) is shown by an arrow (B) on the tire sidewall.



- Position the tire so that the tire valve (A) is at the tire balance mark (B) (the shaft mark made during removal, or the yellow paint mark on a new tire).
- Install the tire on the rim using a suitable commercially available tire changer.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim and to inflating the tire.
- Center the tire in the rim (ends and inflate the tire until concentrated rim until the tire beads seat in the sealing surface.

CAUTION

Be sure to inspect the valve core whenever inflating the tire, and be sure it does not to exceed (Rate 280 kPa/cm²/gpm). If not, (Valve failure can explode the tire with possibility of fatal accident to the.



- Check to see that the rim lines (A) on both sides of the sidewalls are parallel with the rim flanges.
- If the rim flanges and rim sidewalls are not parallel, remove the valve core.
- Lubricate the rim flanges and rim beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check the air valve.
- Install the rim engine above standard pressure.
- Use a soap and water solution or submerge the tire, and check for cracked rim around bubble leakage.
- Adjust the air pressure to the specified pressure.
- Install the valve stem cap and the rim rotation mark aligns with the valve installed.
- Adjust the wheel balance.



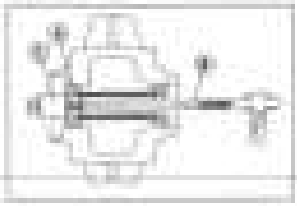
Repair

Generally, any types of repair for cracked rims and rims are very rare. Only such a skilled professional makes repair work can be carried out before removing the tire from the rim, and the rims have a wheel alignment (interior) repair which requires the removal. It is generally considered that higher running durability is obtained for permanent (internal) repairs than for temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for any damages and cracks that weaken hazardous running. For these reasons, it is best that only permanent (internal) repairs are carried out. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair parts and materials that will classify can be obtained.

Hub, Bearing

Hub Bearing Removal

- Remove the axle, and also axle and trimming.
  - Clutch
  - Coupling (Joint of rear hub)
  - Center Pulley
  - Flange
- Special Tool - Holder Driver Plate: 57001-1141
- Pull the bearings (R) out of the hub.



CAUTION

Do not lay the wheel on the ground with the disc facing down. The disc damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Special Tools - Bearing Remover Shaft: 57001-1377 (B)
Bearing Remover Head: 3/4 x 17/8: 57001-184 (A)

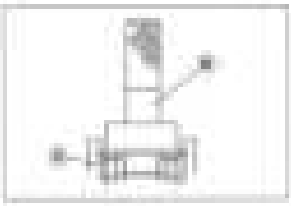
Hub Bearing Installation

- Before installing the sealed bearings, clean any dirt or foreign particles out of the hub with compressed air to prevent contamination of new bearings.
- Replace the bearings with new ones.
- Press in each right the bearing (R) until they are completely.

Special Tool - Bearing Driver Set: 57001-1129 (B)

NOTE

- Install the bearings so that the marked side faces out.



- Replace the bushes with new ones.

Special Tool - Inside Driver Pinion: 57001-141

- Replace the grease seals with new ones.
- Press in the grease seals (R) so that the seal surface is flush (A) with the end of the hole.
- Apply high temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129 (C)



Hub Bearing Inspection

NOTE

- It is not necessary to replace new bearings for inspection. If new bearings are removed they will have to be replaced with new ones.

- Turn it by hand to check its condition.
- If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
- Examine the bearing seal for tears or leakage.
- If the seal is torn or is leaking, replace the bearing.

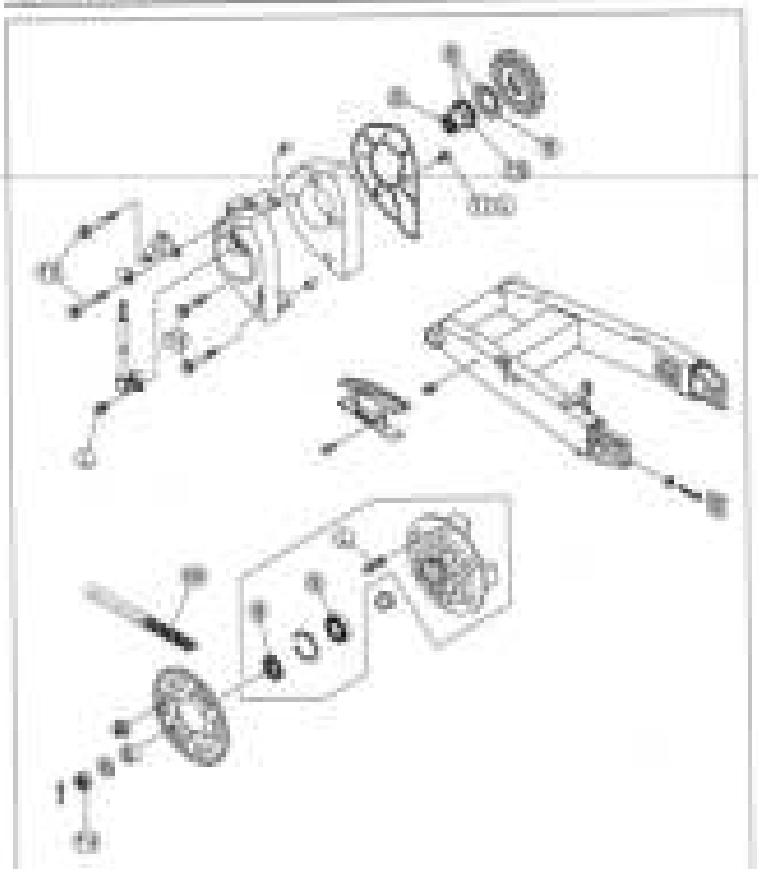


Final Drive

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Exploded View



A : Apply grease.
B : Apply Gasket kit.
C : Apply a non-permanent locking agent.
D : Apply oil.
R : Replacement Part.

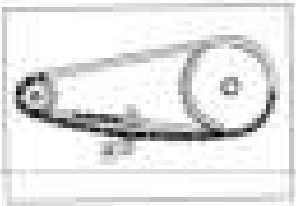
Specifications

Item	Standard	Service Limit
Bevel Gears: Tooth check Tooth width Standard value: Make Type Lot	[illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]
Backlash: Hole correction mark	[illegible]	[illegible]

Special Tools — [illegible]

Drive Chain

Chain Inspection



NOTE

- Check the label with the marking on every rotation so the same place.
- Check the chain at 3 or more, and optimally at 4 or 5 spaces apart.

●Clean the wheel alignment (see Wheel Alignment Inspection).
●Rotate the rear wheel to find the position where the chain is tightest.
●Measure the vertical movement (slack width) (A) midway between the sprockets.
●If the chain slack exceeds the standard, adjust it.

Chain Slack

Standard	30 ~ 35 mm
Service Range	30 ~ 40 mm

Chain Adjustment



●Remove the cotter pin (1), and loosen the axle nut (2).
●Loosen the axle case adjuster locknuts (3).
●Turn the chain adjusters (4) clockwise or backward until the three marks on the scales (5) are in the same positions as each other.
●The right and left notches (6) on the alignment indicators (7) should point to the same marks or positions (8) on the swingarm.

A WARNING

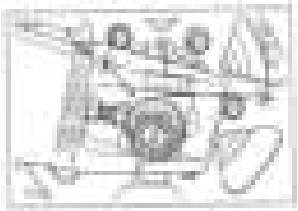
Misalignment of the wheel will result in excessive wear and may result in an unsafe riding condition.

●Tighten both axle adjuster locknuts securely.
●Tighten the axle nut.

Torque - Rear Axle Nut: 113 N·m (11.5 kgf·m, 83 ft·lb)

●Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
●Insert a new cotter pin and spread to lock.

Wheel Alignment Inspection / Adjustment



●Check that the cutout (A) on the left alignment indicator (B) aligns with the same swingarm mark or position (C) that the right alignment indicator marks (step 6 above).
●If they do not, adjust the chain slack and align the wheel alignment (see Wheel Adjustment).

NOTE

- Wheel alignment can be used to maintain some fine adjustments in spring preload.

WARNING

Misalignment of the wheel and swingarm is dangerous. It will cause abnormal tire wear, and may result in an unsafe riding condition.

Drive Chain Wear Inspection

- Remove:
  - Mounting Screw (A)
  - Chain Cover (B)



- Rotate the rear wheel to inspect the drive chain for damaged rollers and broken pins and links.
- If there are any inoperative, replace the drive chain.
- Lubricate the drive chain if it appears dry.
- Stretch the chain taut by hanging a [illegible] kg (2 lb) weight on the lower chain.



- Measure the length of 20 links (B) on the straight part (C) of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.
- If [illegible] exceeds the service limit, replace the chain. Also replace the front and rear sprockets when the drive chain is replaced.

Drive Chain 20-link Length

Standard:	[illegible] mm
Service Limit:	260 mm

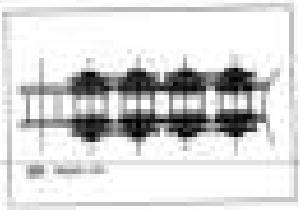
WARNING

If the drive chain slack exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could jam in the engine sprockets or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.

For safety, use only the standard chain. It is an endless type and should not be cut for installation.

Lubrication

- [illegible]
- [illegible]



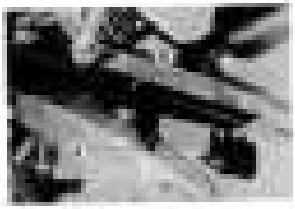
CAUTION

[illegible]

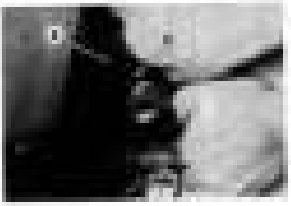
- [illegible]
- [illegible]

Drive Chain Removal

- Remove
  - [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - [illegible]



- [illegible]



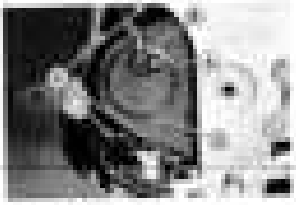
Drive Chain Installation

- Engage the drive train on the engine sprocket.
- Install:
  - Swingarm (see Suspension chapter)
  - Rear Wheel (see Wheels/Tires chapter)
  - Engine Sprocket Cover
  - Clutch Cover
- Adjust the chain slack after installing the chain (see Drive Adjustments).

Sprocket, Coupling

Engine Sprocket Removal

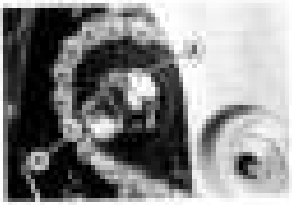
- Remove:
  - Coupler Sensor Bolt (1)
  - Coupler Sensor (2)
  - Engine Sprocket Cover Bolts (3)
  - Engine Sprocket Cover (4)



- Loosen (a) the sprocket bolts (5).
- Remove the engine sprocket nut (6) and washer.

NOTE

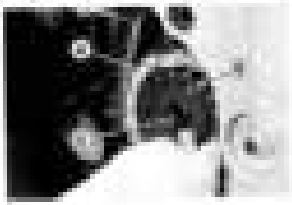
- When removing the engine sprocket nut, hold the rear brake on.



- Using the jack, raise the rear wheel off the ground.

Special Tool - Jack: 57001-1238

- Loosen the drive chain (see Chain Adjustment).
- Remove the drive chain from the rear sprocket (see Drive Chain Removal).
- Draw (take) the drive chain (7) from the engine sprocket (8).
- Pull the engine sprocket off the output shaft (9).



Engine Sprocket Installation

- Replace the sprocket washer and sprocket bolts.
- Install the engine sprocket.
- Apply oil to the threads of the sprocket bolt and the mating surface of the engine sprocket nut.
- While stopping the engine sprocket nut, tighten the bolt with the specified torque.

NOTE

- Tighten the nut while aligning the cut slots.

Torque - Engine Sprocket Nut: 118 N·m (12.0 kg·m, 87 ft·lb)

- Adjust the drive chain slack after installing the sprocket (see Chain Adjustment).

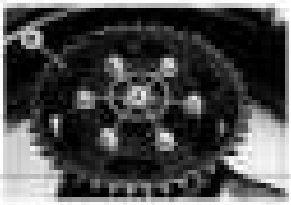
Rear Sprocket Removal

- Remove the rear wheel (see Wheels/Tires chapter).

CAUTION

Do not lay the wheel on the ground with the disc facing down. You can damage it easily this way. Place blocks under the wheel so that the disc does not touch the ground.

- Remove the six sprocket nuts (A).
- Remove the rear sprocket (B).



Rear Sprocket Installation

- Install the sprocket facing the tooth number marking (C) outward.
- Tighten the rear sprocket nuts.

Torque: 108 N·m (11.0 kg-m, 80 ft-lb)

- Install the rear wheel (see Wheels/Tires chapter).



Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.
- If the teeth are worn as illustrated, replace the sprocket and inspect the drive chain (see Drive Chain/Drive Chain Slider chapter).
  - (A) Worn Tooth (Engine Sprocket)
  - (B) Worn Tooth (Rear Sprocket)
  - (C) Direction of Rotation



NOTE

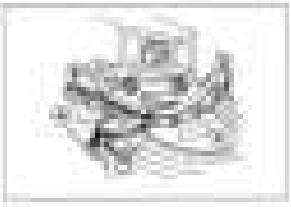
- If a sprocket requires replacement, the chain is probably worn and should be replaced at the same time. Never install a new chain on worn sprockets or worn chain will wear the new chain rapidly.

Rear Sprocket Wear Inspection

- Place the rear wheel on the ground (see Wheels/Tires chapter) so that it will turn freely.
- Put a tire gauge (A) against the rear sprocket (B) near the teeth as shown and read (C) the rear sprocket to measure the sprocket runout (wear). The difference between two highest and lowest dial gauge readings is the amount of runout (wear).
- If the runout exceeds the service limit replace the rear sprocket.

Rear Sprocket Runout

Standard:	0.4 mm (0.016 in)
Service Limit:	0.5 mm (0.020 in)



Coupling Bearing Removal

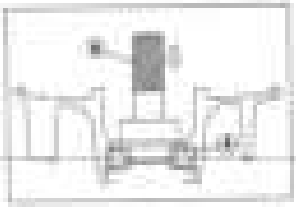
- Remove:
  - Coupling
  - Coupling Bearing
  - Grease Seal
  - Circlip (A)

Special Tool: Inside Circlip Pliers: 57001-144 (B)



- Remove the bearing (A) by tapping from the driven side.

Special Tool : Bearing Driver Set 57001-1129 (B)



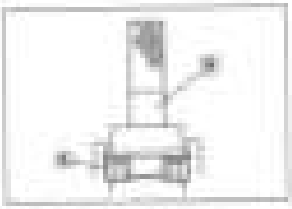
Coupling Bearing Installation

- Expand the bearing with a hot oils.
- Fasten the bearing (A) until it is bottomed.

Special Tool : Bearing Driver Set 57001-1129 (B)

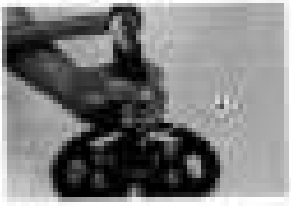
- Cool the bearing with high temperature grease.
- Fasten the coupling with a new nut.

Special Tool : Socket Wrench 57001-140



- Replace the grease seal with a new one.
- Fasten a new grease seal so that the seal surface is flush with the inner surface.
- Apply high temperature grease to the grease seal lips.

Special Tool : Bearing Driver Set 57001-1129 (A)



Coupling Installation

- Install the following and install the coupling.
  - Ball Bearing (1)
  - Coupling Sleeve (Half) (2)
  - Coupling Internal Splines (3)



Coupling Bearing Inspection and Lubrication

NOTE

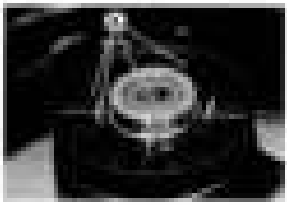
- It is not necessary to remove the coupling bearing for inspection and lubrication. If the bearing is removed, it will need to be replaced with a new one.

- Wash the bearing with a high flash point solvent, dry it, rub the bearing with a thin coat of high temperature grease, and then install it.
- If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

- Place the bearing with gear profile bearing puller. Turn the bearing retainer by hand a few times to make sure the grease is distributed uniformly inside the bearing.

Damper Inspection

- Remove the rear wheel coupling and inspect the rubber dampers (2).
- Replace the damper if it appears damaged or deteriorated.



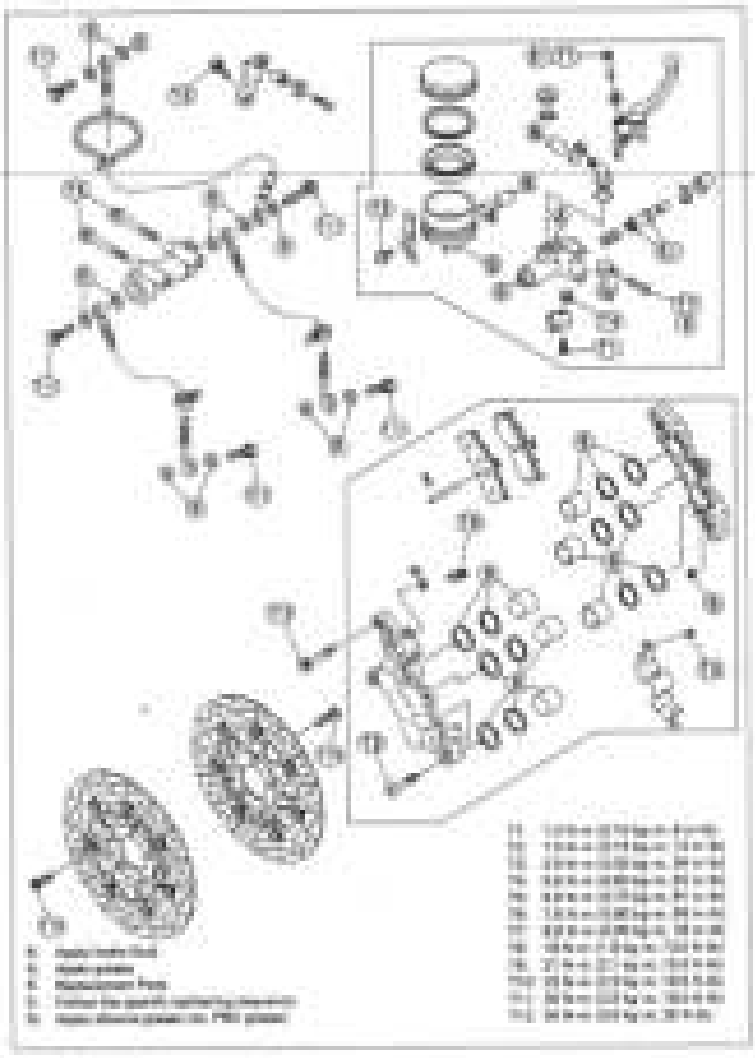
Brakes

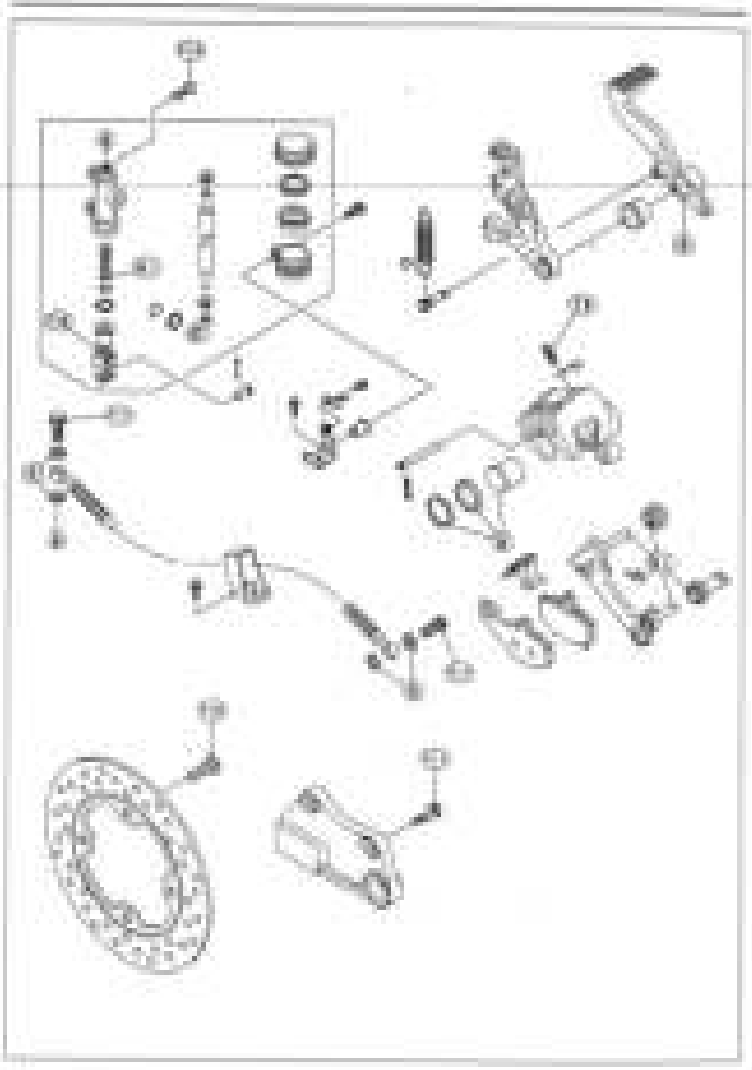
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11

Exploded View





Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake lever position	0 mm (adjustable to suit rider)	
Brake lever free play	Non-adjustable	
Pedal free play	Non-adjustable	
Pedal position	About 0.5 mm below footrest top	
Brake Fluid		
Grade		
Brand (recommended)		
	Castrol Girling (Universal)	
	Castrol GT LMA's	
	Castrol Disc Brake Fluid	
	Check Static Pressure Heavy Duty	
Brake Pads		
Lining thickness Front	5 mm	1 mm
Rear	5 mm	1 mm
Brake Discs		
Thickness Front	4.5 – 4.8 mm	4.0 mm
Rear	4.8 – 5.1 mm	4.5 mm
Runout	0.15 mm or less	0.3 mm

Special Tools : Inside Circlip Pliers: 57001-143
Jack: 57001-1238

Brake Pedal

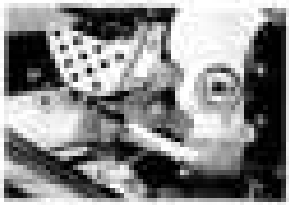
Brake Pedal Position Inspection

- Check that the brake pedal (1) is in the correct position (B) if braking.

Pedal Position (B)

Standard:	About 0.6 mm below top of bracket

- If it is incorrect, adjust the brake pedal position.

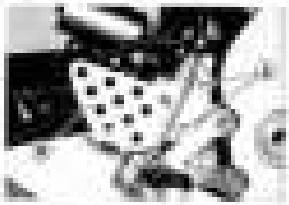


Brake Pedal Position Adjustment

NOTE

- Usually it is not necessary to adjust the pedal position, but always adjust it when the master cylinder is disassembled or pedal position is incorrect.

- Unscrew the lock (2), and remove the guard bracket (3).
- Remove the brake hose clamps.



- Measure the length indicated in the figure.

Length (A)

Standard:	87 ± 1 mm

- If it is specified length, the brake pedal free play is adjusted to recommended standard.
- If it is not within the specified length, adjust the push rod in the master cylinder as following.



- Loosen the push rod lock nut (4).
- Turn the rod head (B) in the push rod (C) to obtain the specified length (A).
- Tighten the locknut.

Torque - Rod (Brake) Clevis Push Rod Locknut: 18 N·m (1.8 kgf·m, 13.0 ft·lb)



- Check the brake light switch operation. See Rear Brake Light Switch Adjustment in Electrical System chapter.

Calipers

Front Caliper Removal

- Loosen the banjo bolt (a) at the brake hose lower end, and then tighten it temporarily.
- Unscrew the caliper mounting bolts (b), and detach the caliper (c) from the disc.



CAUTION
Do not loosen the caliper mounting bolts (b). Take out only the caliper mounting bolts on caliper removal. Loosening the caliper mounting bolts will cause brake fluid leakage.

- Take out the banjo bolt and remove the brake hose (d) from the caliper. See Brake Hose Removal Installation.

CAUTION
Immediately wash away any brake fluid that spills.

NOTE

- Lift the caliper a little and support it with a piece of wire so that no stress is applied to the brake hose.

Rear Caliper Removal

- Loosen the banjo bolt (a) at the brake hose lower end, and tighten it temporarily.
- Unscrew the caliper mounting bolts (b), and detach the caliper (c) from the disc.
- Remove the banjo bolt and remove the brake hose (d) from the caliper. See Brake Hose Removal Installation.



CAUTION
Immediately wash away any brake fluid that spills.

NOTE

- Lift the caliper a little so that no stress is applied to the brake hose.

Caliper Installation

- Install the caliper and brake hose lower end.
- Replace the washers with new ones, and then tighten the banjo bolt with the specified torque.
- Tighten the caliper mounting bolts and mounting bolt.

  Torque - Caliper Mounting Bolts (Front): 35 N·m (3.6 kgf·m, 26 ft·lb)
  Caliper Mounting Bolts (Rear): 23 N·m (2.3 kgf·m, 16.5 ft·lb)
  Brake Hose Banjo Bolt: 23 N·m (2.3 kgf·m, 16.5 ft·lb)

- Clean any fluid (dust or dirt, etc.) from the brake reservoir.
- Refill the brake line (see Bleeding the Brake Line).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

WARNING

Do not attempt to drive the motorcycle with a tool-locked lever to protect or disabled by pumping the brake lever or pedal until the pads are against the disc. This brake will not function on the first application of the lever or pedal. It will be lost later.

Front Caliper Disassembly

- Remove the pad spring and brake pads (see this chapter).
- Loosen the front master cylinder bolts (1) and front caliper bolts and (2) and remove them (upper).
- Remove the front caliper (3) and banjo bolt.
- Remove the front caliper separate bolts and split the front caliper.
- Remove the O-rings.



- Using compressed air, remove the pistons. First seal to remove the pistons is air blower.
- Install a caliper gasket (4) and a suitable cover (5) over then the one hose on the caliper (cut) and blow brake together with a suitable that pad not be remain. Leave one of the oil passages (6) open.
- Lighten each compartment on (6) to the oil passage until the pistons fall out caliper pistons. Blow the hose over opening (6) during this operation if the piston fall has for opening.
  - (1) Bolt and Bolt
  - (2) Oil Passage sealed by Rubber Gasket
  - (3) Brake piston



CAUTION

To avoid serious injury, never place your fingers or palm to front of the piston. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

- Pull out the pistons by hand.
- Remove the dust seals (7) and fluid seals (8).
- Remove the bleed valve (9) and rubber cap (10).
- Repeat the previous step to remove the pistons from the other side of the caliper body.



NOTE

- If compressed air is not available, do so battery the dust caliper removed/partially. Use one brake hose connected to the caliper.
- Prepare a container for brake fluid and perform the work below of.
- Remove the spring and seal (see Front Brake Pad Removal).
- Pump the brake lever until the pistons come out of the cylinders, and then disassemble the caliper.

Front Caliper Assembly
●Clean the caliper parts except for the pads.

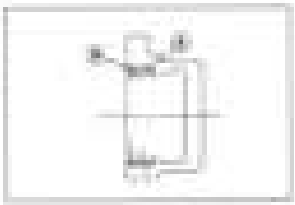
CAUTION

Dot 4 brake fluid is used for this vehicle. Do not use any other brake fluid, such as silicone or petroleum based fluid, because they will damage the rubber parts of the brake system.

●Install the dowel collar and rubber cap.

Torque – Dowel Collars: 7.8 N·m (0.80 kgf·m, 69 in·lb)

●Replace the front outer O-ring with a new one.
●Apply brake fluid to the front piston and cylinder bore, then lubricate the O-ring.
●Replace the front inner O-ring with a new one if torn or damaged.
●Apply brake fluid to the front piston and install them into the cylinder by hand.



●Replace the O-rings (A) if torn or damaged.
●Apply brake fluid to the outside of the pistons and each piston into each cylinder by hand.
●Remove the dowel bolts (B) temporarily.
●Tighten the caliper assembly bolts.

Torque – Front Caliper Assembly Bolts: 31 N·m (3.2 kgf·m, 23 ft·lb)



●Install the pads (see Front Brake Pad Installation).
●Wipe up any spilled brake fluid on the caliper with wet cloth.

Rear Caliper Disassembly
●Remove the rear caliper.
●Remove the pads and pad spring (see Rear Brake Pad Removal).
●Remove the piston boot (A).
●Clamp compressed air, observe the pistons.
○Cover the caliper opening with a shop towel (B).
○Remove the piston by short, sudden applying compressed air (C) to where the brake line fits into the caliper.



CAUTION

To avoid spilling fluid, never place pipes (fingers or plugs) inside the caliper opening. If you have compressed air, but be careful not to damage the caliper, the piston may crush your hand or fingers.

■Remove the dust seal and fluid pipe.
■Remove the bleed valve and rubber cap.

NOTE

- If compressed air is not available, do as follows with the brake hose connected to the caliper.
- Prepare a container for brake fluid, and perform the work above it.
- Remove the pads and spring. (see Pad (Brake) Replacement)
- Pump the brake pedal to remove the caliper piston.

Rear Caliper Assembly

■Clean the caliper parts except for the pads.

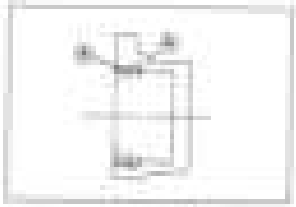
CAUTION

For cleaning the parts, use only new brake fluid. Isopropyl alcohol or other cleaning

■Install the bleed valve and rubber cap.

Torque: Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

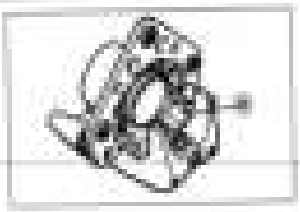
■Replace the dust seal (A) with a new one.
○Apply brake fluid to the dust seal, and install it into the cylinder by hand.
■Replace the dust seal (B) with a new one if it is damaged.
○Apply brake fluid to the dust seal, and install it into the cylinder by hand.



■Apply brake fluid to the outside of the piston, and apply it into the cylinder by hand.
■Replace the shaft rubber holder dust (A) and dust cover (B) if they are damaged.
■Apply a thin coat of PBC (Poly Butyl Cuprate) grease to the caliper holder shafts (C) and holder bolts (D). (PBC is a special high temperature, water resistance grease)



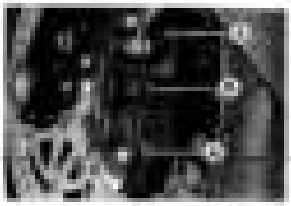
- Install the axle cable spring (A) in the order as shown.
- Install the caliper bracket.
- Install the cable (see Rear Brake Pad Installation).
- Bleed air and fill brake fluid in the order with reservoir.



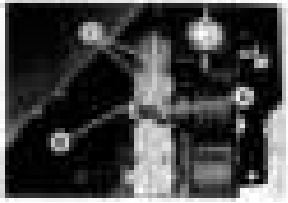
Brake Pads

Front Brake Pad Removal

- Remove the pad spring screws (A), and remove the pad spring (B).



- Place out the clip (C), and take off the pad pin (D).
- Remove the brake pads (E).



Front Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Install the brake pads.
- Install the pad pin and clip. The clip must be "outside" of the pads.
- Install the caliper (see Caliper Installation).

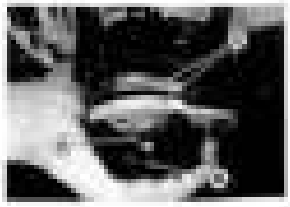
Torque - Front Brake Pad Spring Bolts: 2.5 N·m (0.25 kgf·m, 22 in·lb)

A WARNING

Do not attempt to drive the motorcycle with a full brake lever to determine by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Rear Brake Pad Removal

- Loosen the caliper mounting bolts.
- Detach the caliper from the disc.
- Draw out the clip (A), and take off the pad pin (B).
- Remove the brake pads (C).



Rear Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Install the anti-rattle spring (caliper).
- Install the brake pads.
- Install the pad pin and clip. The clip must be "outside" of the pads.
- Install the caliper (see Caliper Installation).

WARNING

Do not attempt to allow the motorcycle with a hot brake caliper or attempt to overspray the brake pedal with the pads are applied the disc. The brake will not function on the first application of the pedal. It has to be done

Lining Wear

- 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.



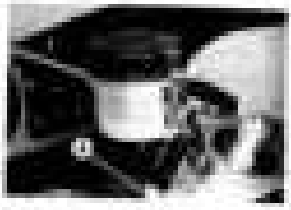
Pad Lining Thickness

Standard	Front	4 mm
	Rear	5 mm
Service Limit		1 mm

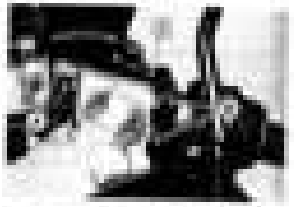
Master Cylinder

Front Master Cylinder Removal

- Drain brake fluid (see page 2-12).



- Disconnect the front brake light switch connectors.
- Remove the banjo bolt (1) to disconnect the brake hose from the master cylinder (see Brake Hose Removal/Installation).
- Unscrew the clamp bolts (2), and take off the master cylinder (1) as an assembly with the reservoir, brake hose, and brake switch installed.



Front Master Cylinder Installation

- Install the front master cylinder so that the mating surface (A) of the brake mounting is aligned with the mating surface (B) of the master cylinder clamp to level the reservoir.
- The master cylinder clamp must be installed with the arrow mark (C) upward.
- Apply grease to the clamp bolts.
- Tighten the upper clamp bolt (2) first, and then the lower clamp bolt (1). Make sure the gaps (A) in the clamp are in the positions shown.



Torque: Front Master Cylinder Clamp Bolts: 9.8 N·m (1.0 kgf·m, 86 in·lbf)

- Position the reservoint front end so each side of the mark faces with each other.
- Tighten the brake hose banjo bolt.

Torque: Brake Hose Banjo Bolt: 34 N·m (3.5 kgf·m, 25 ft·lbf)

- Bleed the brake line (see Bleeding the Brake Lines).
- Check the brake fluid level (making sure the brake lever and hose fittings).

Rear Master Cylinder Removal

- Unscrew the brake hose banjo bolt (1) on the master cylinder (see Brake Hose Removal/Installation).
- Pull off the reservoir hose from fitting (A), and drain the brake fluid into a container.
- Loosen the upper bracket bolt (2) lightly.
- Remove the holding bracket bolts (3).

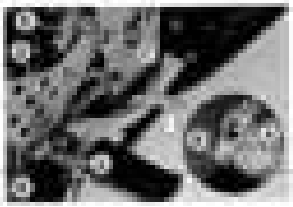


- Remove the brake pin (1).
- Pull out the joint pin (2).

NOTE

- Pull out the joint pin while pressing down the brake pedal.

- Remove the guard bleeder bolt (1), and take off the guard bleeder (2) with brake cylinder (3).



Rear Master Cylinder Installation

- Replace the cotter pin with a new one.
- Replace the washer that sat on each side of hose fitting with new ones.
- Tighten the following bolts:

Torque - Rear Master Cylinder Guard Bolts: 25 N·m (2.5 kg·m, 18.0 ft·lb)
Brake Hose Banjo Bolt: 34 N·m (3.5 kg·m, 25.0 ft·lb)

- Bleed the brake line (see bleeding the brake line).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal).
- Remove the reservoir cap and diaphragm, and drain the brake fluid into a container.
- Loosen the locknut and joint bolt, and remove the brake hose.
- Push the dust cover out of place, and remove the circlip.

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston (1), secondary cup (2), primary cup (3), and return spring (4).



CAUTION

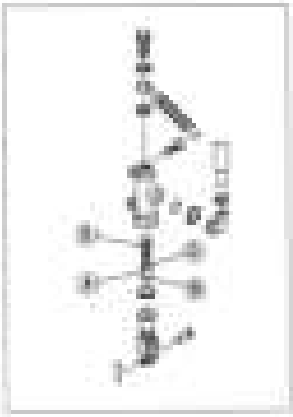
Do not remove the secondary cup from the piston since removal will damage it.

Rear Master Cylinder Disassembly

- Remove the rear master cylinder (see Rear Master Cylinder Removal).
- Push the dust cover out of place, and remove the circlip.

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the push rod with the piston (1).
- Take off the piston (1), secondary cup (2), primary cup (3), and return spring (4).



CAUTION

Do not remove the secondary cup from the piston since removal will damage it.

Master Cylinder Assembly

■Before assembly, clean all parts including the brake cylinder and wash them in alcohol.

WARNING

Except for the dust seals and ring, use only new replacement, disposable, or alcohol washed 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. Do not reuse old rubber parts as they will be difficult to wash all contaminants and will eventually deteriorate the rubber used in the assembly.

●Apply brake fluid to the removed parts and to the inner wall of the cylinder.

■Take care not to scratch the piston or the inner wall of the cylinder.

■Tighten the brake fluid drain bolt and the bleeder to

Torque: Brake Drain Plug Bolt: 1.4 N·m (0.14 kgf·m, 12 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Master Cylinder Inspection (Visual Inspection)

●Disassemble the front and rear master cylinders.

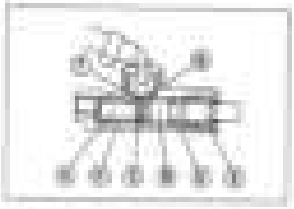
■Check that there are no scratches, wear or rubbing on the inner wall of each master cylinder (A) and on the outside of each piston (B).

■If a master cylinder or piston shows any damage, replace them.

●Inspect the primary (C) and secondary (D) cups.

■If a cup is worn, damaged, deformed, swollen, or hardened, the piston assembly should be replaced as a set.

■If fluid leakage is noticed at the brake lever, the piston assembly should be replaced to correct the cause.



■Check the dust covers (E) for damage.

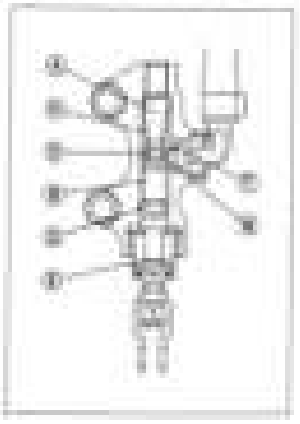
■If they are damaged, replace them.

■Check the relief (F) and supply (G) ports are not clogged.

■If the relief port becomes clogged, the brake does not drag on the disc. Since the pump moves with compression.

■Check the piston return springs (H) for any damage.

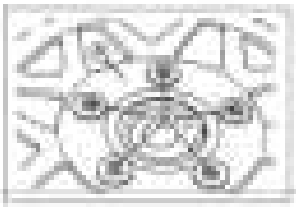
■If the springs are damaged, replace them.



Brake Disc

Brake Disc Removal

- Remove the wheel (see Wheels/Tires chapter).
- Loosen the mounting bolts (1), and take off the disc (2).



Brake Disc Installation

- Install the brake disc on the wheel so that the marked side faces out.
- Apply a non-permanent locking agent to the threads of the new brake disc mounting bolts.
- Tighten the mounting bolts.

Torque - Brake Disc Mounting Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

Brake Disc Wear

- Measure the thickness of each disc at the point where it will wear the most.
- Replace the disc (1) if it has worn past the service limit.

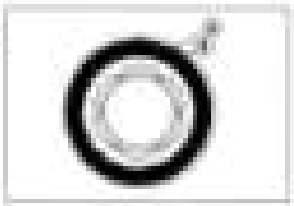
(2) Measuring Area

Front Disc Thickness

Standard	4.5 — 4.9 mm
Service Limit	3.5 mm

Rear Disc Thickness

Standard	3.8 — 4.2 mm
Service Limit	3.0 mm



Brake Disc Warp

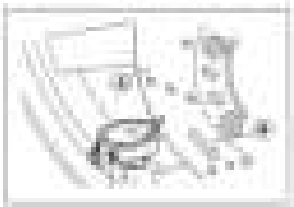
- Jack up the motorcycle so that the wheel is off the ground.

Special Tool - Jack: 57001-1238

- Put front disc inspection tool (the handlebar bolt is also use).
- Set up a dial gauge against the disc (1) as shown and measure disc runout.

(2) Front disc wheel hub (left)

- If runout exceeds the service limit, replace the disc.



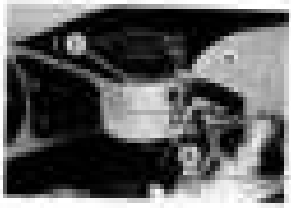
Disc Runout

Standard	0.15 mm or less
Service Limit	0.3 mm

Brake Fluid

Level Inspection

- Check that the brake fluid level in the front brake reservoir (1) is above the lower level line (2).

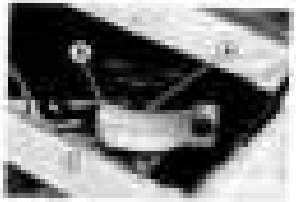


NOTE

- Install the reservoir horizontally by looking the scribe mark (3) indicating brake fluid level.

- If the fluid level is lower than the lower level line, fill the reservoir to the upper level line (1) in the reservoir.

- Check that the brake fluid level in the rear brake reservoir (1) is between the upper (2) and the lower (3) level lines.



- If the fluid level is lower than the lower level line, remove the tank and fill the reservoir to the upper level line.

WARNING

Change the brake fluid in the brake line completely if the brake fluid mixes the rubber dust like dirt, and brand or the brake fluid that is unmatch to the recommended (explained). After changing the fluid, add only the same type and brand of fluid like before.

Recommended Disc Brake Fluid

Grade: D.O.T.4

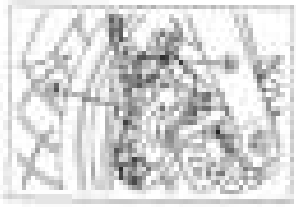
Model: Castrol racing/motorcycle
Castrol GT (Lilac)
Castrol Disc Brake Fluid
Castrol Brake Protector Heavy Duty

Brake Fluid Change

NOTE

- This procedure is change the front brake fluid in an interval. Changing the rear brake fluid is the same as the front brake.

- Drain the brake fluid reservoir.
- Remove the reservoir cap.
- Remove the rubber cap from the bleed valve (1) on the caliper.
- Attach a clear plastic hose (2) to the bleed valve and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.



■ Drain the brake fluid as follows.
• Repeat the operation until fresh brake fluid comes out from the bleed hose at the bottom of the front chamber.

1. Open the bleed valve (A).
2. Apply the brake and keep it (B).
3. Close the bleed valve (A).
4. Release the brake (B).

NOTE

○ The first drop must be discarded when doing the changing operation was performed over three years (fluid). If the fluid in the reservoir runs out and air goes during the changing operation, the brakes will need to be bled since air will have entered the brake line.
○ Front Brake: Repeat the above steps for the other brake.
○ Rear Brake: Repeat the above steps for the other bleed valve.

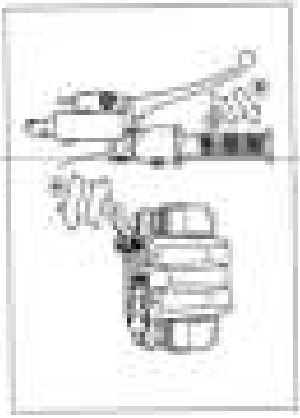
■ Replace the rear piston boot.
■ Install the caliper.
■ Tighten the mounting bolts between caliper and bracket.

Torque – Front Brake Pin Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

■ Tighten the bleed valve, and install the rubber cap.

Torque – Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

■ After changing the fluid, check the brake for good braking action, no brake drag, and no fluid leakage.
■ If necessary, bleed the air from the lines.



Checking the Brake Line

The brake fluid has a very low compressive coefficient so any decrease in the movement of the brake lever is mainly a consequence of air in the system for braking power. But, however, a slight compression. When an excess the brake lines, brake drag or poor movement and the operator need to compensate for it. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

WARNING

Be sure to bleed the air from the brake line whenever brake feel or pedal action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

NOTE

- The connections on brake line front brake line A or [illegible] . Bleeding the rear brake line is the same as for the front brake.

●Remove the [illegible] cap, and fill the [illegible] with fresh brake fluid to the upper level line in the [illegible].

●Slowly the [illegible] side off, press down the brake lever several times until no air bubbles but be seen coming up through the fluid from the hole on the bottom of the [illegible].

●Bleed the air completely from the brake cylinder by this operation.

●Install the [illegible] cap.

●Remove the rubber cap from the [illegible] valve on the caliper.

●Attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.

●Bleed the brake line and the caliper as follows.

●Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [illegible].
2. Quickly open the bleed [illegible] the bleed valve while holding the brake applied.
3. Release the brake [illegible].

NOTE

- The first few times the operation is done, the fluid will be contaminated with fresh brake fluid as necessary. If the fluid in the reservoir has completely run low, the first during bleeding, the bleeding operation must be done over again from the beginning once air will have entered the line.
- Do not let brake fluid spill from the reservoir or the reservoir for more complete stopping.
- Check brake fluid level frequently during the bleeding operation.
- Pull the [illegible] against the valve tight for the next pulse.

●Remove the plastic hose.

●Install the reservoir cap.

●Tighten the front reservoir cap screws.

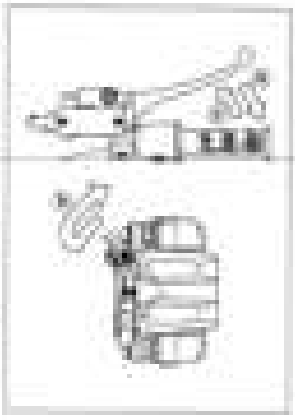
Torque: [illegible] Screw: 1.5 N·m (0.15 kgf-m, 11 in-lbs)

●Tighten the bleed valve, and install the rubber cap.

Torque: Bleed Valve: 5.4 N·m (0.55 kgf-m, 48 in-lbs)

●Check the fluid level.

●After bleeding is done, check the brake for spongy feeling (when no brake drag, and no fluid leakage).



WARNING

When working with the Disc Brake, observe the precautions listed below.

1. Never touch the brake fluid.
2. Do not use any fluid from a container that has been left unsealed or has been open for a long time.
3. Do not mix different types and brands of fluid for use in the brake. The grades for brake fluid differ according to the standard. Do not add any other fluid to the specified one. Doing so will cause the fluid to be ineffective. It may also cause the brake system to deteriorate.
4. Don't reuse the cleaning fluid for any length of time to avoid obtaining contaminated fluid.
5. Don't change the fluid to the low or poor in boiling point to prevent vapor locking.
6. Except for the disc pad parts and disc rotor disc brake fluid, degreased alcohol, or other 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 part will be difficult to wash off completely and eventually deteriorate the rubber used in the disc brake.
7. When installing the disc brake or disc, be careful that no dirt, brake fluid or oil will get on them. Clean off any fluid or oil that inadvertently gets on the disc or disc with a clean brake pads cleaning solvent. Do not use any solvent which may have a bad effect on the rubber. Brake fluid, oil, etc. on the disc or brake pads will cause a reduction in braking ability.
8. Brake fluid quickly ruins painted surfaces. Any spilled fluid should be immediately wiped off completely.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **[illegible]** must be bled. (→**[illegible]**)

Brake Hose

Brake Hose Removal/Installation

CAUTION

Brake fluid quickly ruins painted or plated surfaces and plastic hose. Avoid the consistent contact by immediately with any cost.

- When removing the brake hose, plan care not to spill the brake fluid on the painted or plated parts.
- When removing the brake hose, be careful not to twist the brake hose or bend high stress at least 75 mm (3 in.).
- Clean and washed the parts side of the brake hose fitting. Replace them with new ones when reusing.
- When installing the hose, avoid sharp bending, twisting, flattening or twisting, and route the hose according to Hose Routing section in Cable/Harness/Hose chapter.
- Tighten the banjo bolts of the hose fittings.

  Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line after installing the brake hose (see Bleeding the Brake Lines).

Brake Hose Inspection

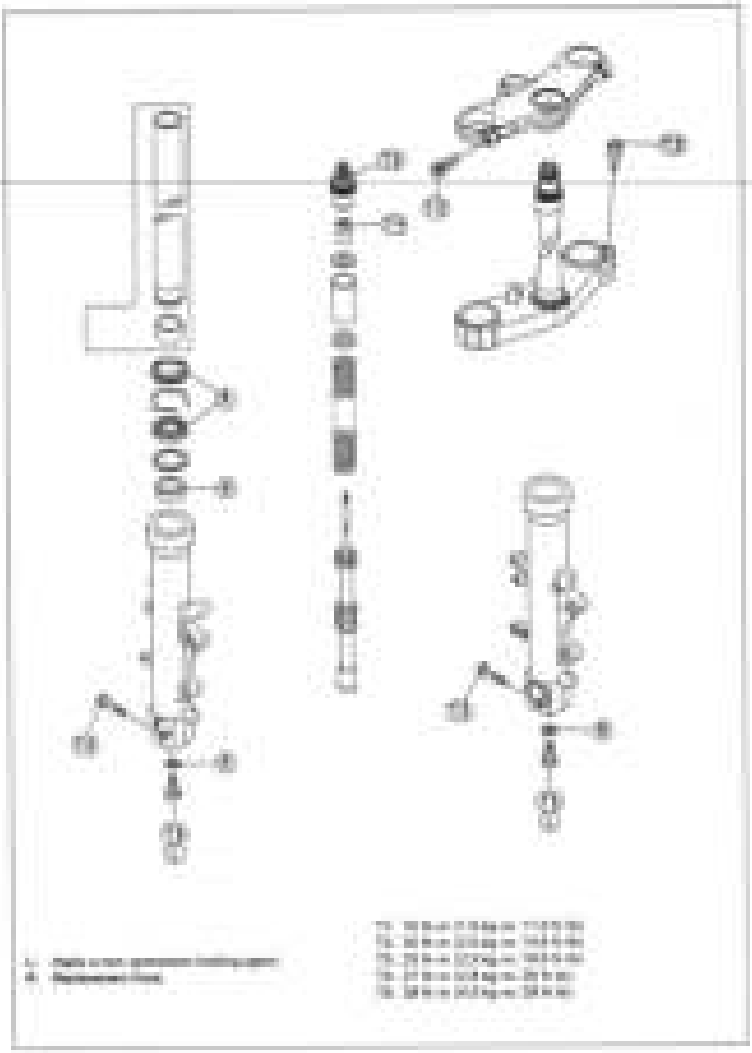
- The high pressure brake line (brake line use cause fluid to leak in the brake by hand. If the line is not properly maintained, there are leak the caused brake and be operating it.
- Replace it if any cracks or scrapes are noticed.

Suspension

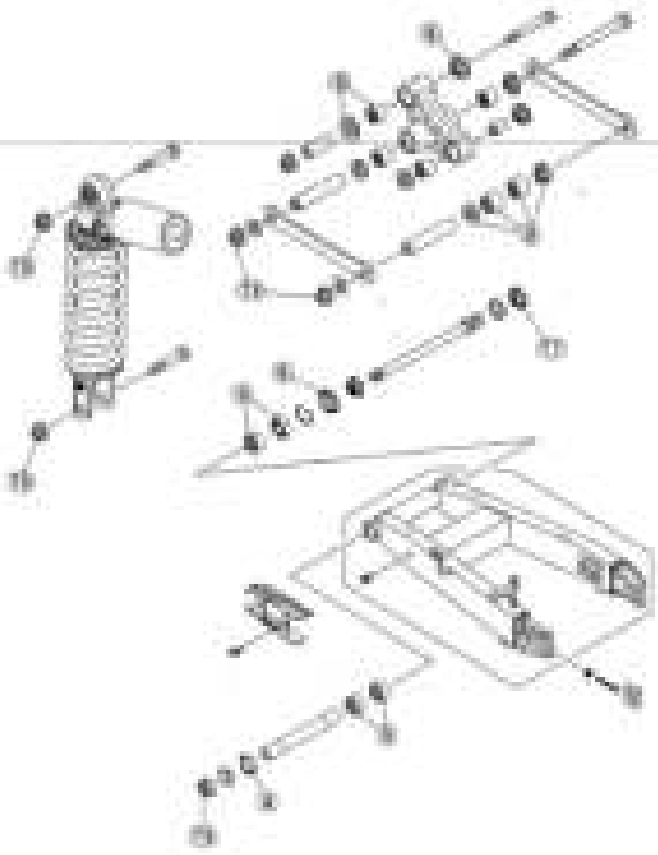
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Exploded View



1. Apply a non-permanent locking agent
4. Replacement Parts



1. [illegible]

[illegible]

14.4 SUSPENSION

Specifications

Item	Standard
Front Fork (per one unit):	
Fork inner tube diameter	[illegible] mm
Air Pressure	[illegible] kPa (0.0 kgf/cm², 0.0 psi)
Rebound damper setting	Fully turn in the first click at the fully clockwise position Standard: [illegible] clicks out Adjusting Range: 1 ⟷ 19 (1 click)
Compression damper setting	Fully turn in the first click at the fully clockwise position Standard: [illegible] clicks out Adjusting Range: 1 ⟷ 24 (1 click)
Fork spring preload setting	Adjusting position at 1 mm Standard: [illegible] mm Adjusting Range: [illegible] – [illegible] mm
Fork oil capacity	[illegible] cc ([illegible] US fl oz)
Fork oil capacity	[illegible] cc (0.0 US fl oz, 0.0 Imp fl oz)
Fork oil level	[illegible] mm (Reference: [illegible] mm)
Fork spring free length	[illegible] mm (Limit: [illegible] mm)
Rear Shock Absorber:	
Rebound damper dial	Fully turn in the first click at the fully clockwise position Standard: [illegible] clicks out Adjusting Range: 1 ⟷ 20 (1 click)
Compression damper dial	Fully turn in the first click at the fully clockwise position Standard: [illegible] clicks out Adjusting Range: 1 ⟷ 20 (1 click)
Spring adjust position Standard: Usable range:	Spring length: [illegible] mm Spring length: [illegible] mm ⟷ [illegible] mm (Limited by stopper)
Gas pressure	[illegible] kPa (0.0 kgf/cm², 0.0 psi) (Non-adjustable)

Special Tools: [illegible]

Front Fork

Rebound Damping Force Adjustment

■ To adjust the rebound damping force, turn the rebound damping adjuster (A) until you feel a click.

① The standard adjuster setting for the average touring rider of 68 kg (150 lb) with no passenger and no accessories is the **B** click from the fully clockwise position.

CAUTION

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.



① The damping force can be soft for the average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the following feels too soft, adjust it in accordance with the following table.

Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
01 ~ 14	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
	Strong	Hard	Heavy	Bad	High

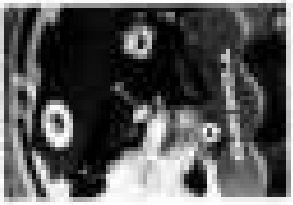
Compression Damping Force Adjustment

■ To adjust the compression damping force, turn the compression damping adjuster (A) until you feel a click.

① The standard adjuster setting for the average touring rider of 68 kg (150 lb) with no passenger and no accessories is the **C** click from the fully clockwise position.

CAUTION

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result.



① The damping force can be soft for the average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the following feels too soft or too stiff, adjust it in accordance with the following table.

Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
01 ~ 11	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
	Strong	Hard	Heavy	Bad	High

Spring Preload Adjustment



- Turn the spring preload adjuster (A) as shown and to achieve the standard setting.
- The standard adjuster setting for this damper body size of 58 kg (128 lb) or over (passenger and no accessories) is one (1) turn (B) from the minimum.

Adjuster Protrusion (from top)
Standard: 15 mm
Usable Range: 5 – 40 mm

CAUTION

If both adjusters are not adjusted equally, handling may be impaired, and a hazardous condition may result.

- The spring preload can be set just for passenger riding. But it should be adjusted earlier for load carried riding or riding with passengers. If the spring comes down too soft or too stiff, adjust it's accordance with the following table.

Spring Action

Adjuster Position	Damping Force	Setting	Load	Road	Speed
Stiff	Weak	Soft	Lighter	Smooth	Slow
↑	↑	↑	↑	↑	↑
Soft	Strong	Hard	Heavy	Bad	Fast

Front Fork Removal (each fork leg)

- Remove:
  - Lower cowling and cable (Fairings (Low Fairing Version))
  - Front fender (see Wheels (Front Wheel))
  - Front fender (see Fairing chapter)
- Loosen the handlebar holder bolt (1), upper fork pinch bolt (2) and fork axle pinch (3) before taking the fork leg out of the motorcycle.

NOTE

- To loosen the top pinch bolt, remove the handlebar holder and loosen the upper fork pinch bolt.



- Loosen the handlebar holder bolt (1), upper fork pinch bolt (2), and lower fork pinch bolt (3).
- While pressing inward, pull the fork leg down and out.



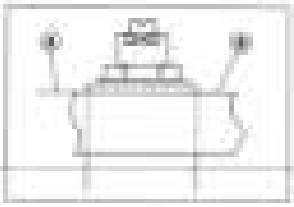
Front Fork Installation

- Install the fork so that the top end (A) of the inner tube is flush with the upper surface (B) of the handlebar holder.
- Tighten the lower fork clamp bolt and fork top bolt.

Torque — Front Fork Clamp Bolt (Lower): 20 N·m (2.0 kgf-m, 14.5 lb-ft)
Front Fork Top Plug: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

- Tighten the handlebar holder bolt and upper fork clamp bolt.

Torque — Handlebar Holder Bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Front Fork Clamp Bolt (Upper): 20 N·m (2.0 kgf-m, 14.5 lb-ft)



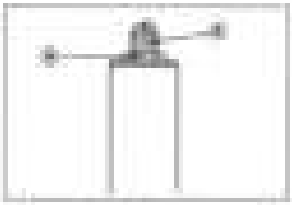
NOTE

- Tighten the top bolts before tightening the handlebar holder bolt and upper fork clamp bolt.

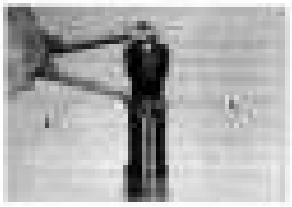
- Install the removed parts (see appropriate chapters).
- Adjust the spring preload and the damping force.

Fork Oil Change

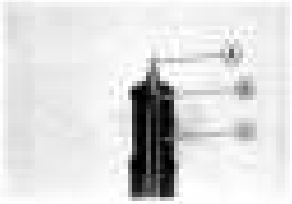
- Remove the front fork (see Front Fork Removal).
- Turn the spring preload adjuster (A) counterclockwise until the fully extended.
- Unscrew the top plug (B) out of the inner tube.

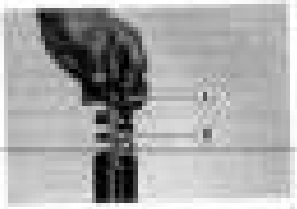


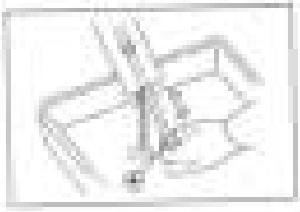
- Holding the outer tube vertical (A), with a wrench (B), remove the fork top plug from the outer tube.

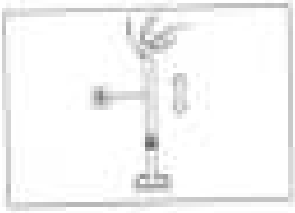


- Remove:
  - Rebound Damping Adjuster Rod (A)
  - Nipple (B)
  - Gasket (C)









(2) Lower (fully compressed, without spring)
Standard: 197.1 mm (from the top of the inner tube)

NOTE

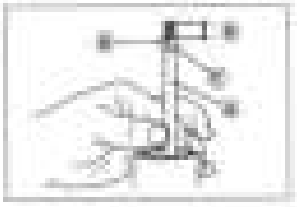
- Front coil force may also be measured using the front coil force gauge.

Special Tool : Front Coil Force Gauge (0781-1080-1)

- With the front fork fully compressed and without front spring, install the gauge setup into the inner tube (3) and position the gauge across the top end of the inner tube.
- Use the gauge adapter (2) as shown to obtain total amount the coil head projects above rod (1).
- Lift the handle around to expose the remainder of coil then re-engage spring rod.
- If the coil is expressed out more or insufficient coil is the inner tube, then re-engage coil, then spring rod into position as shown above.



- Pull the piston rod (1) up above the inner tube top.
- Screw the rod (2) on to the piston rod until the assembly rests (3) above.
- Check that the visible thread length is at least 14 mm (4).

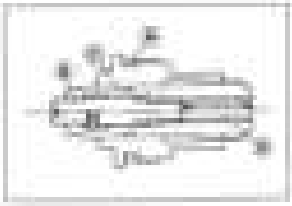


- Lower the telescopic damping adjuster rod into the piston rod.
- Screw the rod piston rod puller onto the end of the rod.

Special Tool : Front Piston Rod Puller (M14 x 1.25) (0781-1090)

- Install the fork spring with the smaller coil facing upward.
- Install:
  - Washer
  - Spacer
  - Washer

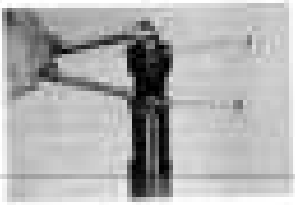
- Check the O-ring (A) on the top plug and replace it with a new one if damaged.
- Screw in the damper adjuster (B) of the top plug so that the distance between the adjuster bottom and the spring adjuster (C) end is 36 mm (D).



- Pushing the rod (A) with a wrench, tighten the upper ball joint (B) against the cap (C).

  Torque – Upper Ball Joint: 27 N·m (2.8 kg-m, 20 ft-lb)

- Clean the outer side and grease the ball joint.
- Install the boot (Refer to Front Axle Installation).

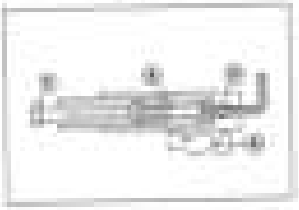


Front Axle (Separated)

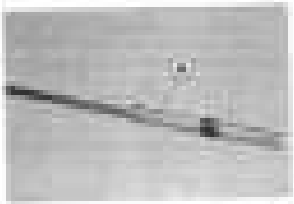
- Remove the front axle (Refer to Front Axle Removal).
- Drain the fork oil (Refer to Fork Oil Change).
- Hold the front axle in a vise (A).
- Using the wrench (B), loosen (Turning the spring the fork cylinder inside (C).

  Special Tool – Fork Cylinder Holder: 57001-1189
  Driver: 7466

- Loosening the allen bolt (D), then take the bolt and gasket out of the bottom of the inner tube.



- Set the cylinder unit (A).
- Clamp the cylinder unit.

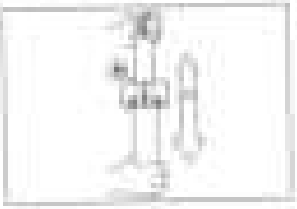


- Separate the inner tube from the outer tube as follows:
  - Clean up the dust seal (A).
  - Remove the snap ring (B) from the outer tube.



- Clean the inner tube and pump the outer tube up and down several times. The shock by the fork will separate the inner tube from the outer tube.
- Pull the tubes straight, as a fork inner tube weight (A).

  Special Tool – Fork Outer Tube Weight: 57001-1218



- Remove the inner side guide bushing (A), outer side guide bushing (B), washer (C), oil seal (D) from the inner tube.
- Remove the cylinder base from the bottom of the outer tube.



Inner Tube Assembly

- Replace the following guide with new one.
  - Oil Seal
  - Guide Bushings
- Install the following parts onto the inner tube.
  - Oil Seal
  - Retaining Ring
  - Washer
  - Washer
  - Outer Tube Guide Bushing
  - Inner Tube Guide Bushing

- Insert the cylinder unit (A) into the inner tube (B).
- Install the cylinder base (C) on the cylinder unit.
- Install the inner tube, cylinder unit, cylinder base as a set into the outer tube (D).
- Position the fastener (E) and guides with a new one.
- Fully the cylinder and covering to using the bolt (cylinder base).

Special Tool – Hex Cylinder Holder (09264-1800)

- Attach a vise (protected covering) again in the inner tube and tighten it.

Torque – Front Fork Bolt(on Allen Bolt): 18 N·m (1.8 kg·m, 13 ft·lb)

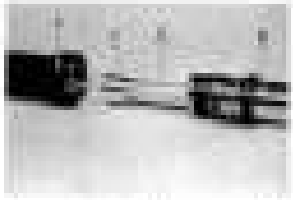
- Fit the new inner guide bush (A) into the outer tube.

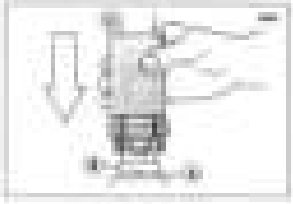
NOTE

- When assembling the new outer tube guide bushing, install the outer guide bushing (B) against the new bushing and the inner guide bushing (C) so that the cut side (D) come it down.

Special Tool – Fork Oil Seal Driver (09941-5460)

- After installing the washer, install the oil seal by using the fork oil seal driver.
- Install the retaining ring and dust seal by hand.
- Pour in the specified type of oil into Fork Oil Capacity.





Inner Tube Inspection

- Visually inspect the inner tube, and repair any damages.
- Small or rust damage can sometimes be repaired by using a fine stone to remove sharp edges or rough areas which cause seal damage.
- If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal lip, the oil seal should be replaced whenever the inner tube is disturbed or removed.

CAUTION

If the inner tube is badly bent or creased, replace it. Excessive bending removed by subsequent straightening can weaken the inner tube.

- Temporarily assemble the outer and inner tubes, and pump them back and forth manually to check for smooth operation.
- If your feel binding or sticking, the inner and outer tubes must be replaced.

CAUTION

A straightened outer or inner tube may fail in use, possibly causing an accident. Replace a badly bent or damaged inner or outer tube with matched tube (other tube set) before resuming it.

Dust Seal Inspection
- Inspect the dust seals (1) for dust, sand and deterioration or damage.
- Replace if it necessary.



Spring Tension
- Before measuring tension, shorten an O installed, check its free length (2) to determine its weakness.
- If the spring is weaker than the service limit, it must be replaced. If the length of a replacement spring and one of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for maximum stability.

Spring Free Length

Standard	480.1 mm
Service Limit	463 mm



Rear Shock Absorber

Rebound Damping Force Adjustment

- To adjust the rebound damping force turn the rebound damping adjuster (24) until you feel a click.
- The standard adjuster setting for an average build rider of 68 kg (150 lb) with no passenger and no accessories is the **3rd click** from the hard (H) fine adjustment position.
- If the damping feels too soft or too stiff, adjust it.

Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
24 – 27	Weak ↑ Strong	Soft ↑ Hard	Light ↑ Heavy	Smooth ↑ Bad	Low ↑ High

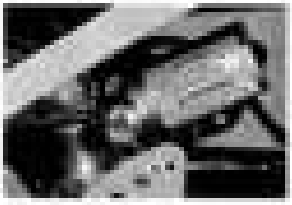


Compression Damping Force Adjustment

- To adjust the compression damping force turn the compression damping adjuster (12) on the gas reservoir until you feel a click.
- The standard adjuster setting for the average build rider (150 lb), or 68 kg, is the 3rd click counterclockwise from the **CRS** position from the full soft (S) fine adjustment position.
- If the damping feels too soft or too stiff, adjust it in accordance with the following table.

Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
01 – 12	Weak ↑ Strong	Soft ↑ Hard	Light ↑ Heavy	Smooth ↑ Bad	Low ↑ High



Spring Preload Adjustment

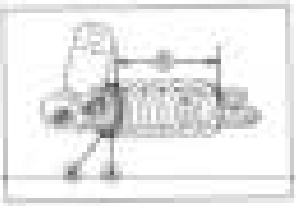
- Remove the rear shock absorber from the frame (see Rear Shock Absorber Removal).
- Loosen the locknut (nut) and the adjusting nut or hook-face spanner.

Special Tool – Hook-face Spanner: 57001-1128 (2)

- Measure the spring free length.

Spring Free Length

Standard: 304.8 mm









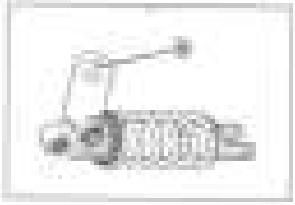
Rear Shock Absorber Installation
- Push the collar and rubber bushings until seated.
- Tighten the following nuts:

Torque: Rear Shock Absorber Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 43 ft·lb)

Rear Shock Absorber Disposing

WARNING

Since the inspection hole of this rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode.



- Remove the Rear Shock Absorber Lower Bolt (Rear Shock Absorber Removal).
- Remove the valve cap (A) and release the nitrogen gas completely.
  - Turn the gas valve (B).
- Remove the valve.

WARNING

While the high pressure gas is dangerous, do not weld the valve mounted part here or body.

Swingarm

Swingarm Removal

- Remove:
  - Rear Wheel (see Wheels/Tires chapter)
  - Chain Cover (see Final Drive chapter)
  - Brake Hose Rubber Clamp (1)



- Loosen Shock Absorber Nut and Bolt (1)
- Upper Tie Rod Nut and Bolt (2)



- Loosen the shock absorber nut.
- Install the swingarm lever holder (1), using the socket wrench (2).

(Fly nut use the socket wrench holder)

Special Tool - Socket Wrench: 57001-1606

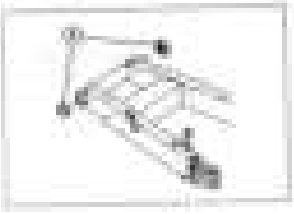


- Remove the swingarm pivot nut (1) and loosen the swingarm pivot shaft (2).
- Pull off the pivot shaft and remove the swingarm.



Swingarm Installation

- Apply plenty of grease to the pivot bearing, needle bearings and spacers.
- Install the collars (1).



- Place the bolt ends (A) on the bracket (B) inside the frame (C).
- Install the stone shaft into the frame from the left side.
- Tighten the pivot shaft.

Torque – Swingarm Pivot Shaft Nut: 88 N·m (9.0 kg-m, 65 ft-lb)

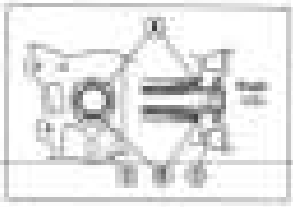
- Tighten the pivot nut.

Torque – Swingarm Pivot Nut: 118 N·m (12.0 kg-m, 87.0 ft-lb)

- Install the removed parts (see appropriate chapters).
- Tighten the pivot locknut using the special wrench.

Special Tool – Swingarm Wrench: 57001-1305

Torque – Swingarm Pivot Locknut: 98 N·m (10.0 kg-m, 72 ft-lb)



Swingarm Bearing Removal

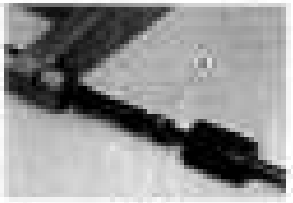
- Remove:
  - Swingarm
  - Collar (A)
  - Dowel Tube (B)
  - Sleeve (C)
  - Circlip (right side) (D)

Special Tool – Inside Circlip Pliers: 57001-144



- Remove the bolt bearing and needle bearings using the oil seal & bearing remover (A).

Special Tool – Oil Seal & Bearing Remover: 47001-1082



Swingarm Bearing Installation

- Apply plenty of grease to the bolt bearing and needle bearings.
- Install the needle bearings so that the manufacturer's marks face in.
- Install the bolt bearing in the (the manufacturer's marks face out).

Special Tool – Bearing Driver Set: 57001-1129 (A)



Tie Rod, Rocker Arm

Tie Rod Removal

- Raise the front wheels off the ground.

Special Tool : [illegible]

- Remove:
  - Cotter Pin and Castle Nut (Front Side)
  - Cotter Pin and Castle Nut (Rear Side)
  - Tie Rod



Tie Rod Installation

- Apply grease to the inside of the inside bearings and nut parts.
- Install the nut side so that the chamfered side faces the knife edge side.
- Tighten the castle nut (rear) to the specified torque.

Torque : Tie Rod Ball Joint (Front Side) [illegible]
Tie Rod Ball Joint (Rear Side) [illegible]

Rocker Arm Removal

- Remove:
  - Muffler (see Engine Top End chapter)
- Jack up the jack, raise the rear wheel off the ground.

Special Tool : [illegible]

- Remove:
  - Lower Rear Shock Absorber Bolt and Nut (L)
  - Lower Tie Rod Bolt and Nut (R)
  - Rocker Arm Bolt and Nut (C)
  - Rocker Arm (C)



Rocker Arm Installation

- Apply grease to the inside of the rocker bearings and rocker shaft.
- Tighten the rocker arm bolt, tie rod bolt and shock absorber bolt.

Torque : Rocker Arm Bolt [illegible]
Tie Rod Bolt [illegible]
Rear Shock Absorber Bolt [illegible]

Handle Bearing Inspection

- Turn down to any shocks at to the movement of when handle bearing. Replace the bearing and clearly as a set.

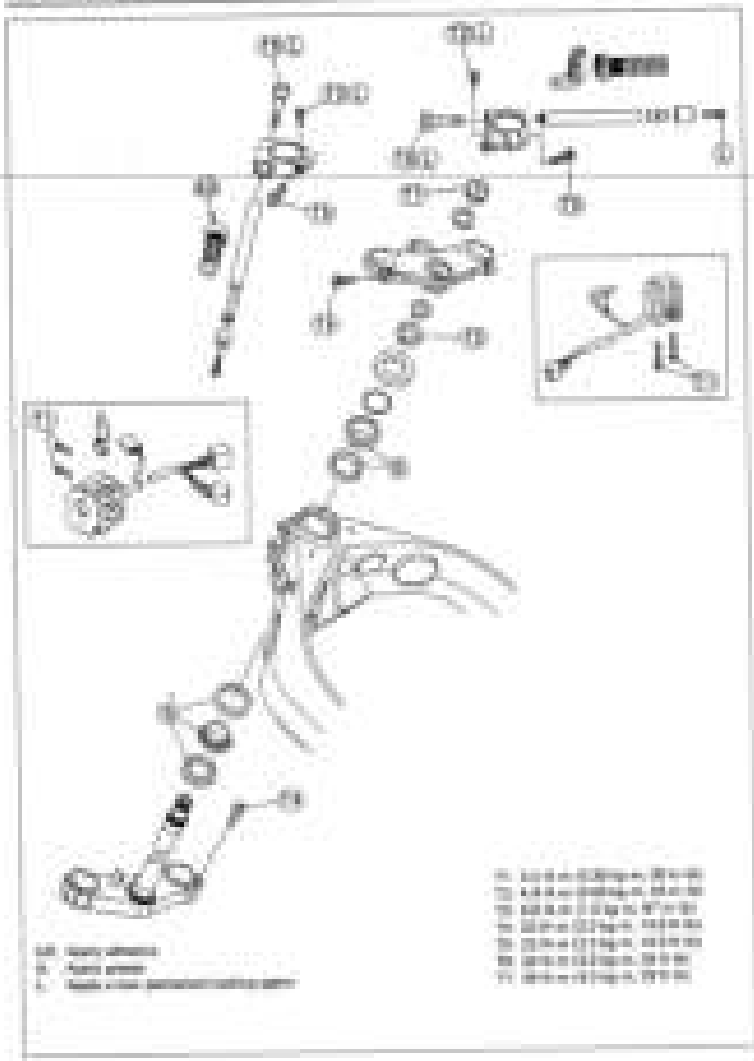
Tie Rod, Pivot Arm Clevis Inspection
1. Inspect for visible damage. Replace the inboard and outside bushing as a set.

Steering

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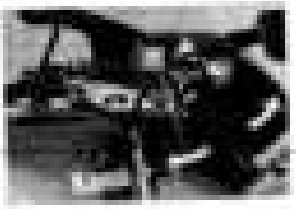
Exploded View



[illegible]

Special Tools :

Steering



Steering Inspection
●Check the steering
1) With the front wheels pointing straight ahead, disconnect the wires and
of the transducer. The front wheels should swing from left lock to right
Make the same inspection with the front wheels facing
●If the wheel binds or catches during this test, the bearing is damaged
Inspect the steering knuckle for scarring and pitting the holes
●If any are found, the bearing is also cracked.

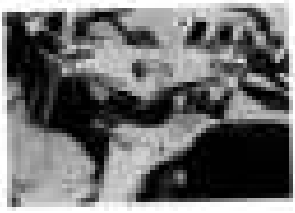
NOTE

- The caster and toeing and have some effect on the motion of the
  and cannot return to their true position.
  Be sure the wheel and caster are properly scribed.
- The bearings must be in good condition and properly lubricated in
  order for any test to be valid.

Steering Adjustment
●Remove:
Upper Fairing (Vulcan 1500/1600)
Front Turn Signal Light Bracket (Vulcan 1500/1600)
●Loosen:
Locknut Pair (Tierod Ends) (both sides)
Steering Stem Nut
●Adjust the steering

Standard Type: Steering Stem Nut Tightening Torque: 4.9 N·m (0.5 kgf·m, 43 in·lb)

●If the steering is too tight, loosen the stem nut a fraction of a turn.
●If the steering is too loose, tighten the nut a fraction of a turn.



NOTE

- Turn the stem nut 1/8 turn at a time maximum.

●Tighten the steering stem locknut and lower fork clamp bolts.

Torque: Steering Stem Locknut: 78 N·m (8 kgf·m, 58 ft·lb)
Front Fork Clamp Bolts (Lower): 20 N·m (2.0 kgf·m, 14 ft·lb)

●Check the steering again.
●If the steering is still too tight or too loose, repeat the adjustment.

Steering Stem

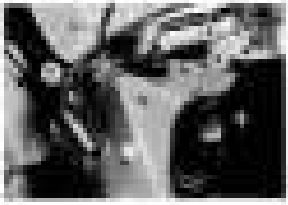
Stem, Stem Bearing Removal

- Remove
  - Fairings (see Frame chapter)
  - Front Tank (see Fuel System chapter)
  - Air Cleaner Housing (see Fuel System chapter)
  - Rear View Mirrors (Eclipse)
  - Brake Hose Joint Bolts (A)
  - Front Master (see Wheels/Tires chapter)
  - Front Fork (see Suspension chapter)
  - Steering Stem Head Nut (see Eclipse)
  - Steering Stem Head



- Pushing up the stem (see) and remove the locking washer (A), steering stem locknut (B), stem nut (C) and O ring. Also remove the steering stem (D) and stem base.

  Special Tool : Steering Stem Nut Wrench: 57001-1100



- Remove the upper stem bearing inner race.

- Fit, remove the bearing outer races (A) installed into the frame (see fig. 2), insert a bar (C) into the frame head, and alternately knock out the circumference of the opposite race to drive it out.



NOTE

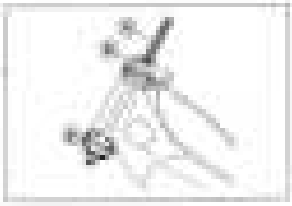
- If either bearing race bearing or damaged, it is recommended that both the upper and lower bearings including outer races should be replaced with new ones.

- Remove the lower stem bearing (with the protection) which is installed into the bearing stem joint a suitable commercially available bearing puller.

Stem, Stem Bearing Installation

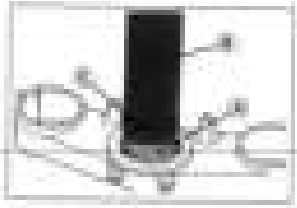
- Apply grease to the outer races, and drive them into the head pipe as the above time.

  Special Tools : Head Pipe Outer Race Press (Kit#): 57001-1073 (C)
  Head Pipe Outer Race Drivers (Kit#): 57001-1075 (A), (B)



● Apply grease to the inner and outer race, and fill between the inner race and cage with grease.

Special Tools : Steering Main Bearing Driver : 57001-1144 (A)
Steering Main Bearing Driver Adapter : 57001-1145 (B)



● Apply grease to the outer race, and install it in the head pipe.
● Install the stem through the head pipe and the upper bevel race, and install the 51 mm (2 in) on the stem shaft while rotating the stem back and forth.
● Install the lower race and hand tighten the steering stem locknut.

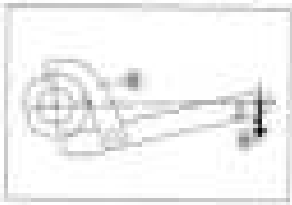
NOTE

○ Install the steering stem nut so that the tapered side faces down.



● Install the stem head.
● Install the washer, and tighten the stem head nut lightly.
● Screw the crown race in about as follows.
○ Tighten the steering stem locknut to 39 N·m (4.0 kg·m, 29 ft·lb) as follows. (To tighten the steering stem locknut to the specified torque, hook the locknut to the stem locknut, and hold the locknut so that the 39.2 kg force is this direction above.)

Specified Torque : Steering Stem Nut Wrench: 57001-1100 (C)



○ Check that there is no play, and the steering stem turns smoothly without rattling. If not, the bearings are not seated correctly, and reassemble.
○ Again back out the stem locknut a fraction of a turn until it turns lightly.
● Turn the stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.

Torque : Steering Stem Nut: 0.078 N·m (0.80 kg·m, 69 in·lb)

● Install the front fork. (see Front Fork Installation)

NOTE

○ Tighten the fork upper clamp bolt first, then the lower bolt. Front fork and front wheel parts must be aligned.

Torque : Steering Stem Head Nut: 59 N·m (6.0 kg·m, 43 ft·lb)
Front Fork Clamp Bolt (Upper): 20 N·m (2.0 kg·m, 14.5 ft·lb)
(Lower): 20 N·m (2.0 kg·m, 14.5 ft·lb)

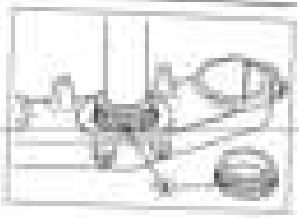
● Install the removed parts (see appropriate chapters).

WARNING

Do not operate the motorcycle before the steering has been properly adjusted and the front wheel has been correctly aligned (see Wheel Alignment Inspection).

Tilt Steering Lubrication

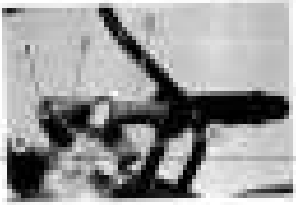
- Remove the steering wheel.
- Using a high flash point lubricant, apply the rubber and brass sliding surfaces of the upper and lower inner column bushings (2 and 3), the upper bearing (4), the lower bearing (5), the worm shaft (6), the lower shaft (7), the lower inner shaft, and the upper and lower splines with a light coat of grease as shown.
- Carefully install the inner shaft and the collars.
- Position the steering assembly in the lower shell as aligned.
- Install the upper shell (with bearing) over the lower shell (1), so the inner shaft splines and teeth a light coat of grease on the upper and lower outer shaft.
- Install the steering wheel and adjust the steering.



Handlebar

Handlebar Removal

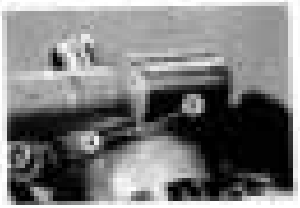
- Remove:
  - Clutch Lever Assembly
  - Left Handlebar Switch Housing
  - Front Brake Master Cylinder
  - Right Handlebar Switch Housing
  - Throttle Cables and Grip
  - Handlebar Grips (1)
  - Handlebar Holder Fastener Bolts (2)
  - Handlebar Holder Bolts (2)
- Remove the handlebar holders (2), rubber dampers (4), and then pull out the handlebars (1).



Handlebar Installation

- Fit the pin (1) of the handlebar in the handlebar holder groove (2).
- Align the mating mark (3) on the handle of handlebar with the upper surface of the handlebar holder, and tighten the forward bolts.

  Torque - Handlebar Holder Bolts: 21 N·m (2.1 kgf·m, 15 ft·lb)
  Handlebar Holder Fastener Bolts: 4.9 N·m (0.5 kgf·m, 43 in·lb)
  Handlebar Bolts: 21 N·m (2.1 kgf·m, 15 ft·lb)



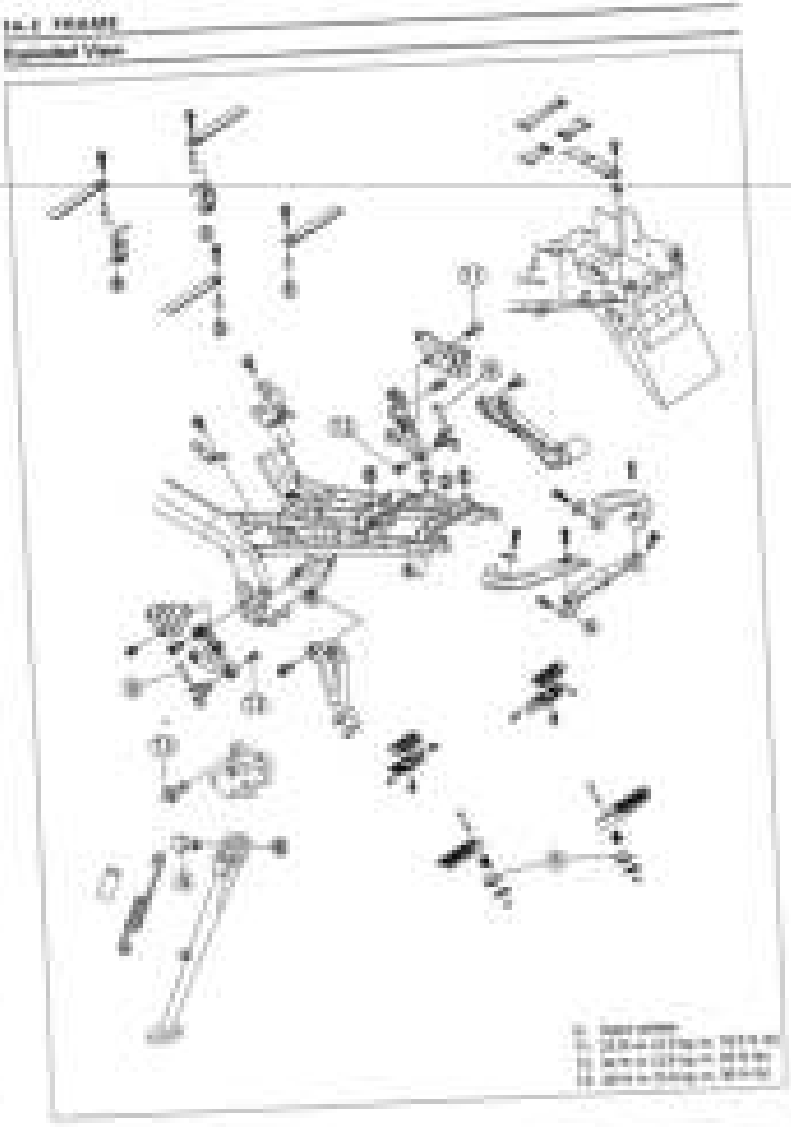
- Install the removed parts and lubricate if necessary.

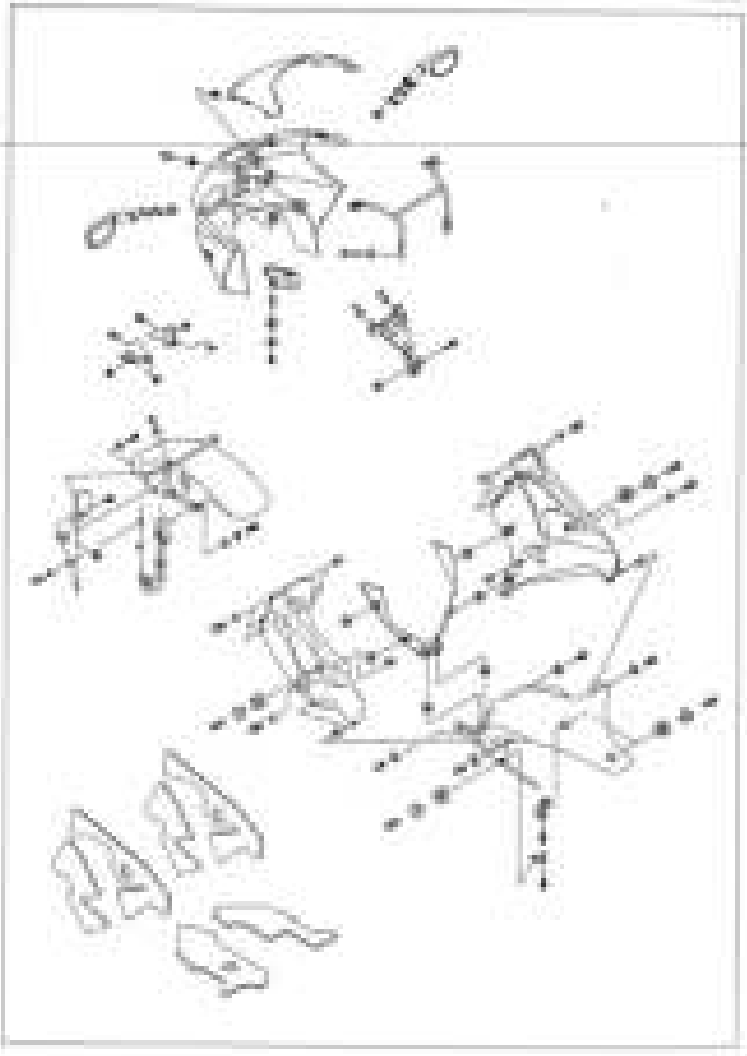
Frame

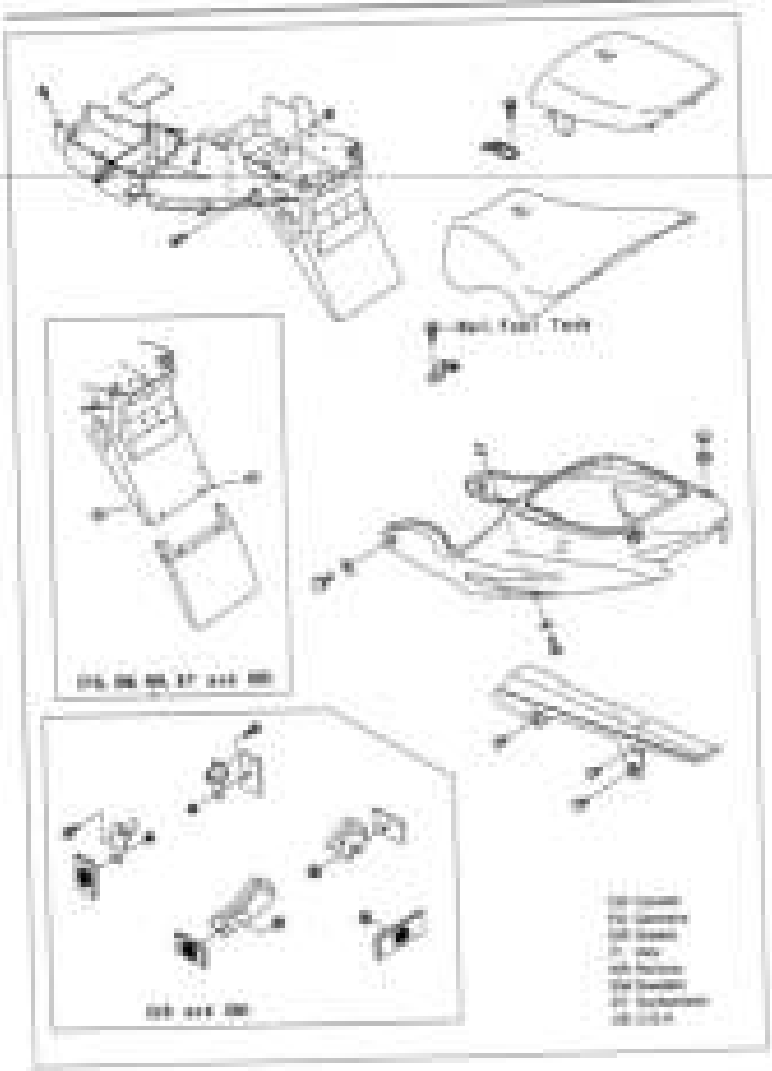
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Exploded View



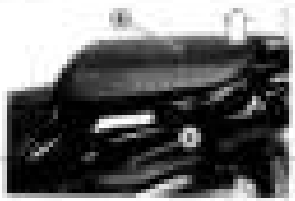




Seats

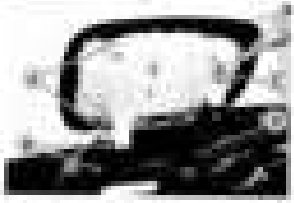
Rear Seat Removal

- Insert the ignition switch key into the seat lock (A), turning the key counterclockwise, pulling up on the rear of the seat (B), and pulling the seat backward.



Rear Seat Installation

- Slip the seat seat hooks (A) into the bottom cross bracket (B) as shown.
- Insert the seat pin (C) into the seat hole (D).
- Push down the rear part of the seat until the lock clicks.



Front Seat Removal

- Remove:
  - Rear Seat (see Rear Seat Removal)
  - Mounting Bolt (A)
  - Set Brackets (B)
- Remove the front seat (C) by pulling it up and forward and up the rear.



Front Seat Installation

- Slip the front seat hooks (A) under the bracket (B) on the fuel tank bracket.



Seat Covers

Seat Cover Removal

- Remove:
  - Bolts
  - Seats (1) and Grab Rails (2)



- Remove:
  - Screws (3) (Left and Right)
- Pull the seat cover backward.



- Remove:
  - Screws (3) and Seat Lock



Fairings

Lower Fairing Removal

- Remove:
  - Screws (4)
  - Allen Bolts (4)
- Pull the front part of the lower fairing downward to take the projections



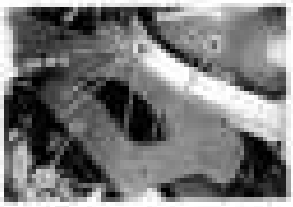
Lower Fairing Installation

- Fit the projections (A) on the lower fairing (B) into the holes (C) in the lower fairing (D)
- Install:
  - Screws
  - Allen Bolts



Middle Fairing Removal

- Remove:
  - Lower Fairing
  - Screws (4)
  - Allen Bolt (1) (Right side fairing is also Allen bolt)
- Pull the front part of the middle fairing outward to take the projection (A)



Middle Fairing Installation

- Fit the projections (A) on the inner fairing (B) into the holes (C) in the middle fairing (D)
- Install:
  - Screws
  - Allen Bolt (Right side fairing is also Allen bolt)
  - Lower Fairing



Inner Fairing Removal

- Remove:
  - Lower Fairing
  - Middle Fairing (Left or Right)
- Pull out each retainer pin (A) of the inner fairing (B) inward



Upper Fairing Removal

- Remove:
  - Lower Fairing
  - Middle Fairing
  - Inner Fairing
  - Headlight Connector (A)
  - Front Signal Light Unit Connectors (B)
  - Air Duct Hose/Hose (C)



- Remove the screws (A) and take off the upper fairing (B).



- Remove the nuts (A) and take off the left and right rear view mirrors.
- Remove the clip and washer (B).
- Remove the upper fairing.



Air Intake Duct Removal

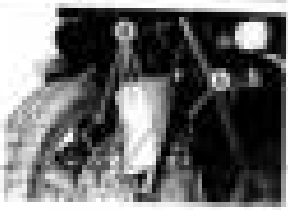
- Remove the seats and fuel tank.
- Drain the coolant (A), and pull out the hoses (B).
- Disconnect the sensors (C).
- Remove the air intake duct (D).



Fenders

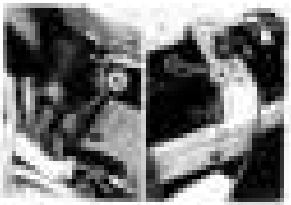
Front Fender Removal

- Remove:
  - Brake Hose Clamps (4) (Left and Right)
  - Bolts (10) and Screws (2)
- Remove the front fender (1).



Rear Fender Removal

- Remove:
  - Seats
  - Fuel Tank
  - Rear Cover
  - Tail Light
  - Connector Bolt Connection
  - Starter Relay Unit
  - Turn Signal Relay
  - Fuel Pump Relay
  - Battery
  - Rear Brake Reservoir Mounting Bolt
  - Turn Signal Light Lead Connectors
  - Ignition Coil Connector
  - Bolts (2)



- Push the stopper (1) in then the frame.
- Remove the rear fender (2).

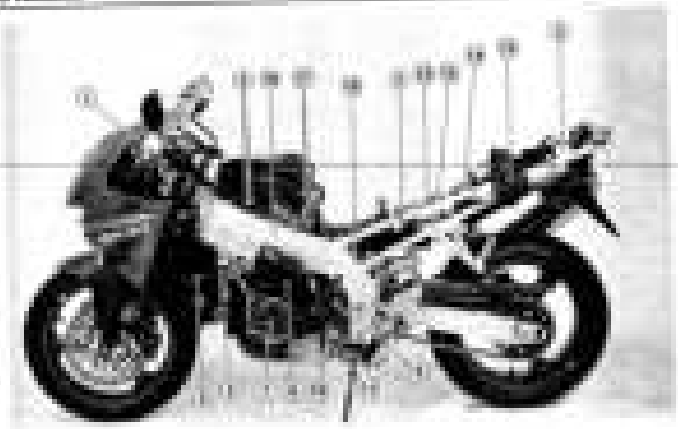


Electrical System

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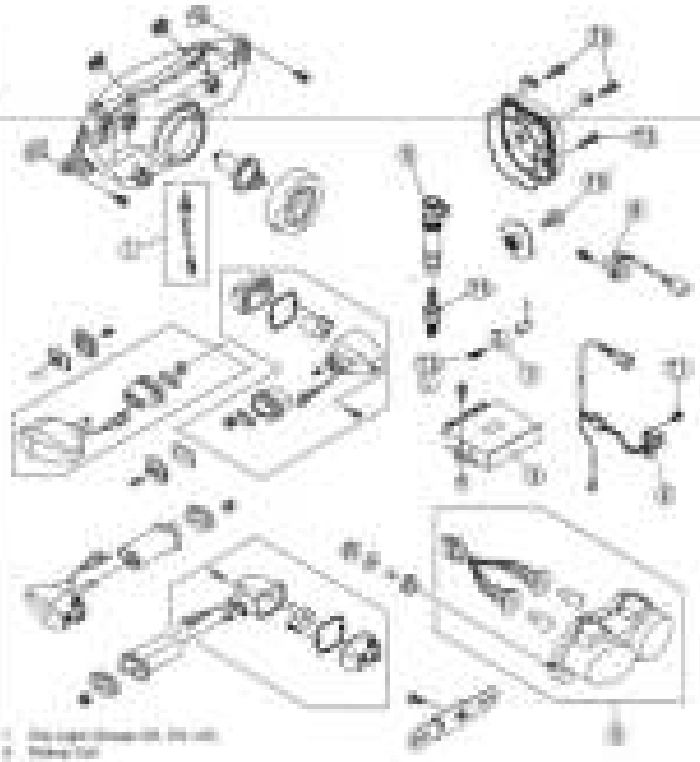
Parts Location





1. Starter Solenoid Switch
2. Start Cycle
3. Fuel Pump Relay
4. Turn Signal Relay
5. Fan Switch
6. Radiator Fan Motor
7. Alternator
8. Starter Motor
9. Diode Unit
10. Rectifier Unit
11. Main Relay Assembly
12. Diode Relay and Main Fuse
13. Regulator/Rectifier
14. IC Igniter
15. Ignition Box
16. Fuse Box
17. Fuse Box Cover
(Cut 3 Fuse Holders)
18. Throttle Sensor
19. Water Temperature Sensor
20. Front Brake Light Switch
21. Rear Brake Light Switch
22. Relay Unit
23. Oil Pressure Switch
24. Headlight Relay
(Except HC, FH, HE)

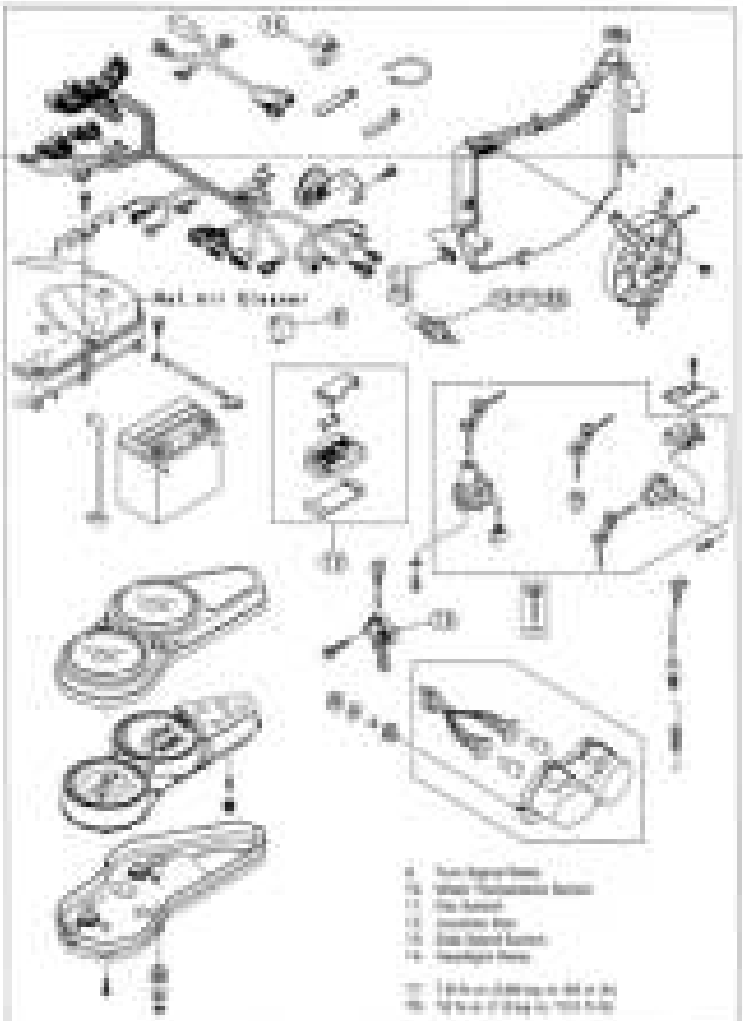
Exploded View

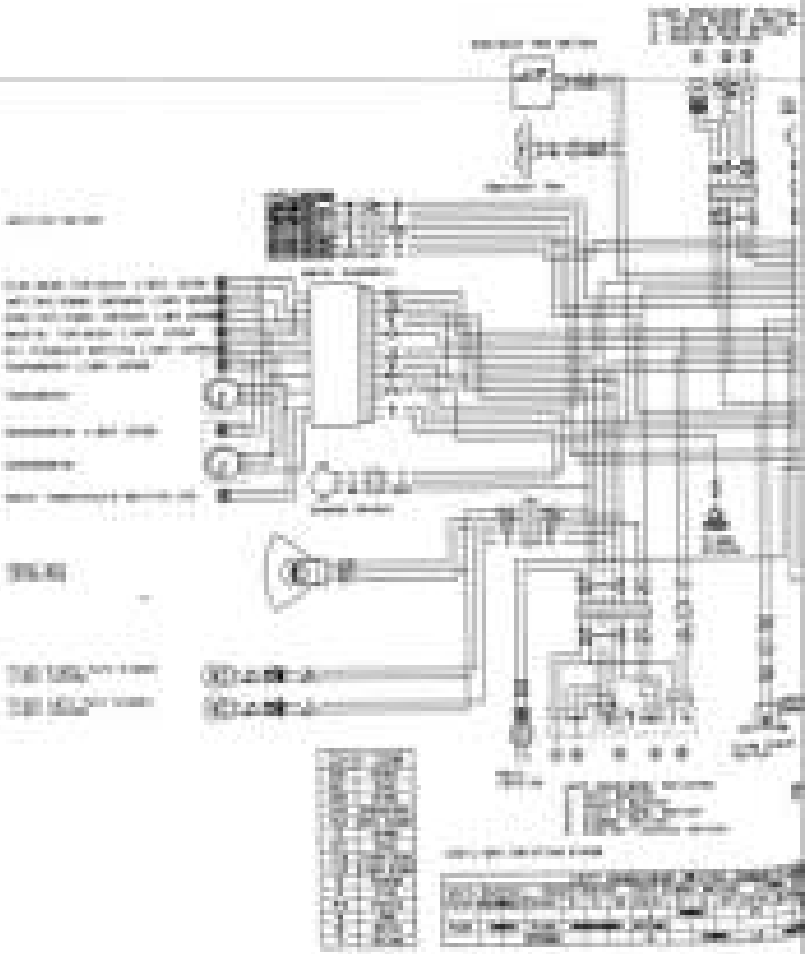


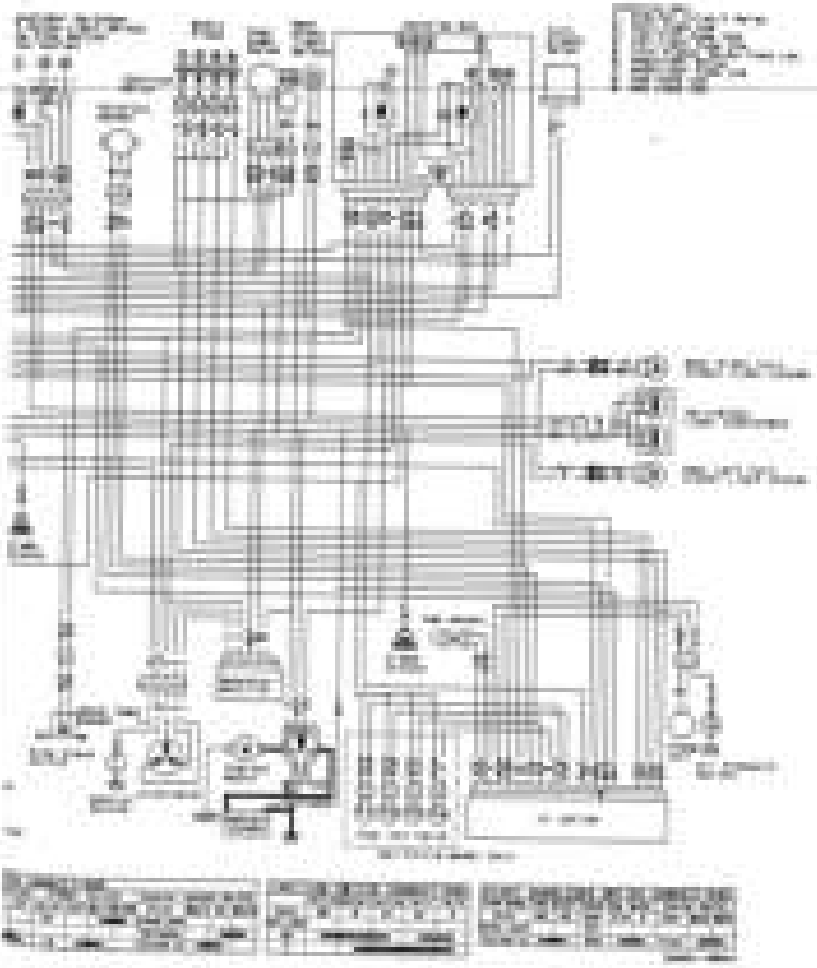
1. Stop Light Switch (FR, FR, LH)
2. Rotary Coil
3. Air Spring
4. Coil Rotary Cable
5. Back Cover
6. Horn Button
7. Horn Button Plate

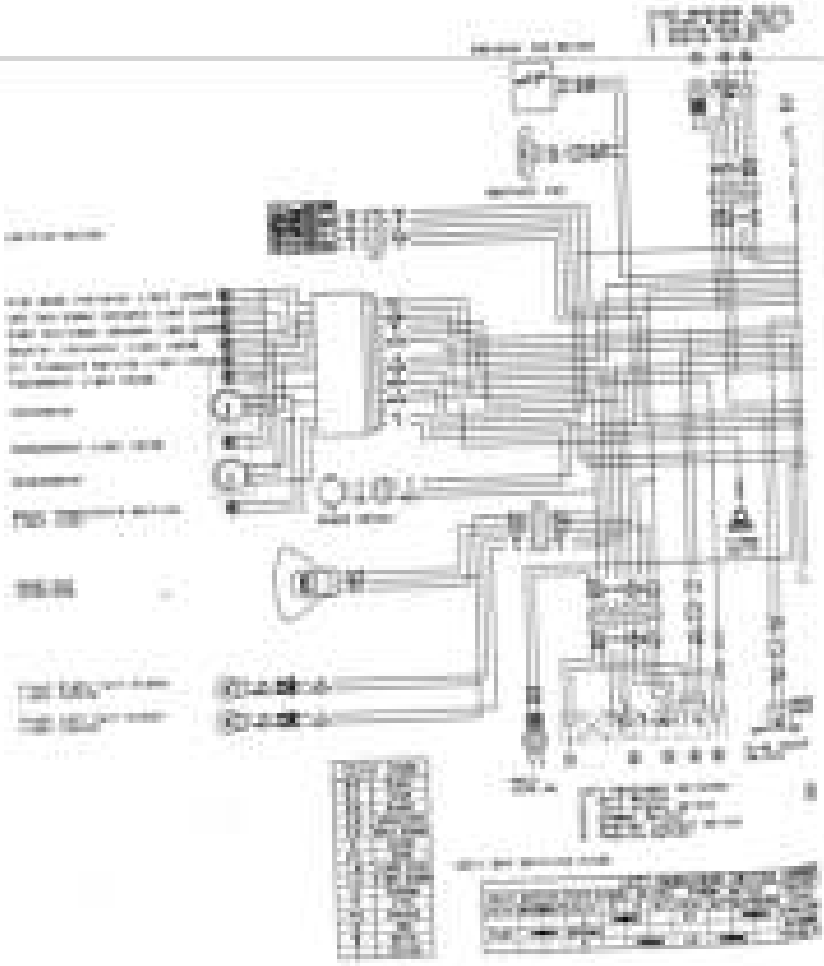
(1) Tightening torque: N·m (kgf·m, lbf·ft)
(2) 0.8 N·m (0.08 kgf·m, 0.6 lbf·ft)
(3) 1.1 N·m (0.1 kgf·m, 0.8 lbf·ft)
(4) 2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)
(5) 2.9 N·m (0.3 kgf·m, 2.1 lbf·ft)
(6) 3.9 N·m (0.4 kgf·m, 2.9 lbf·ft)

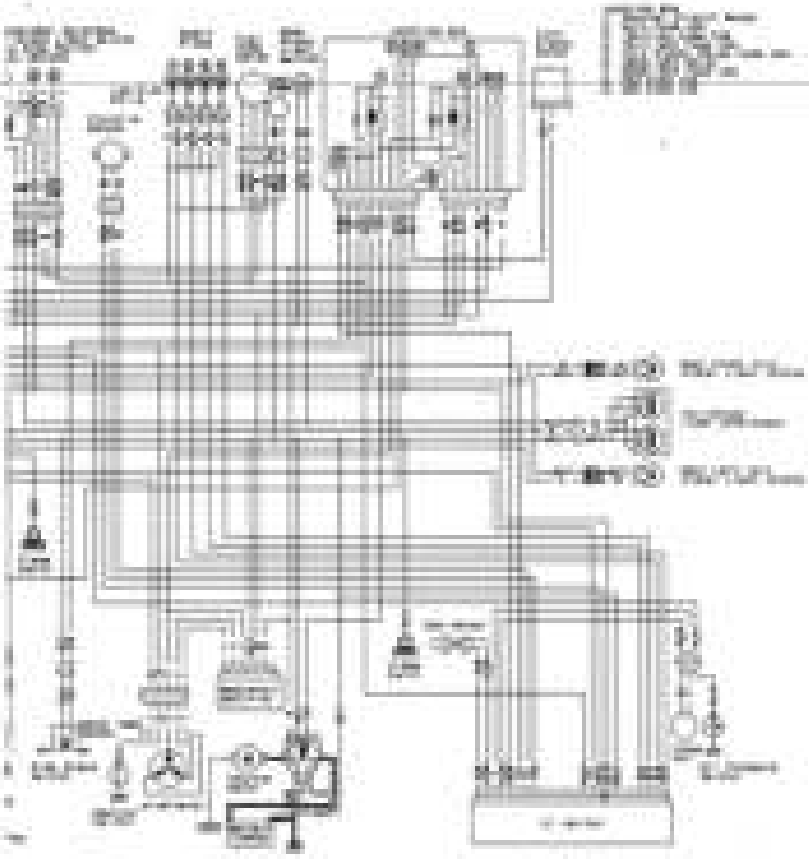




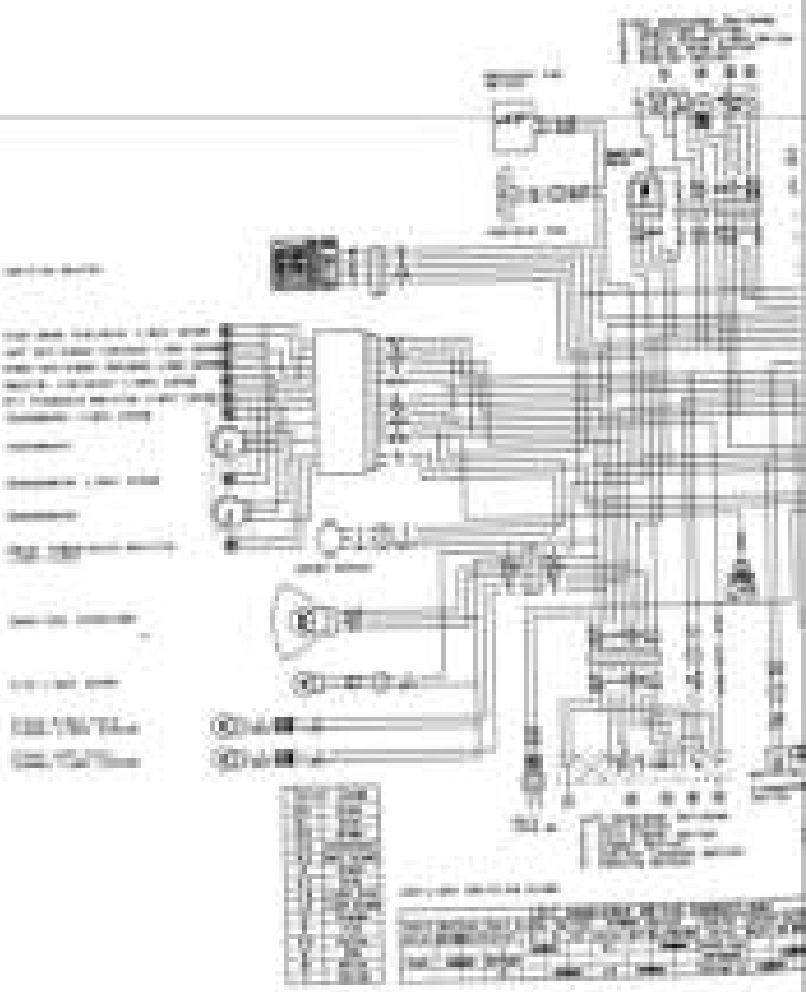


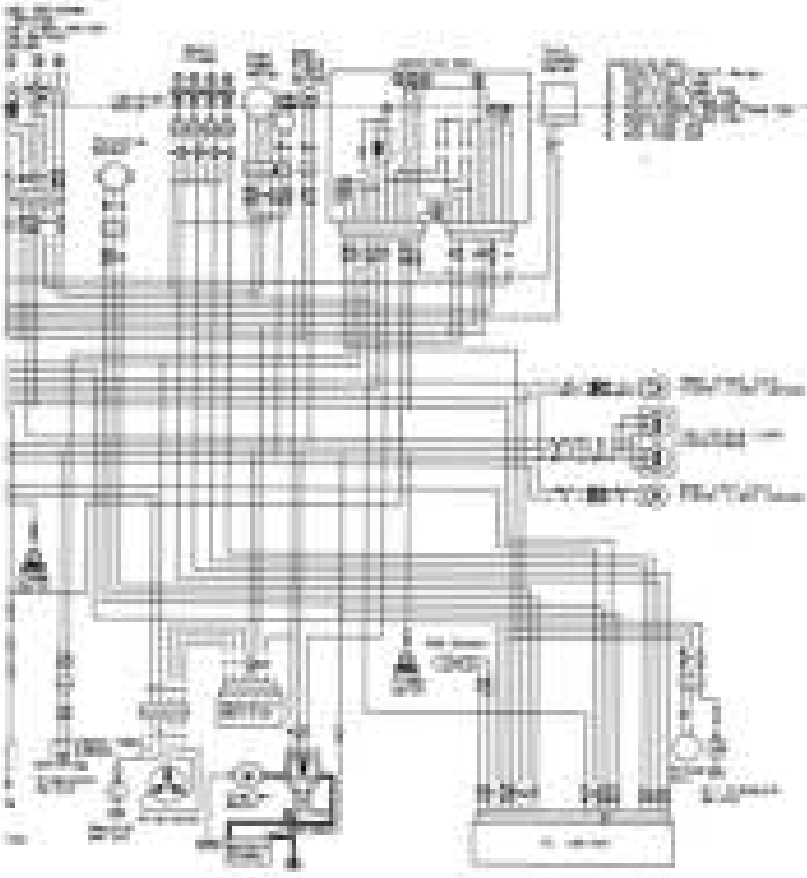




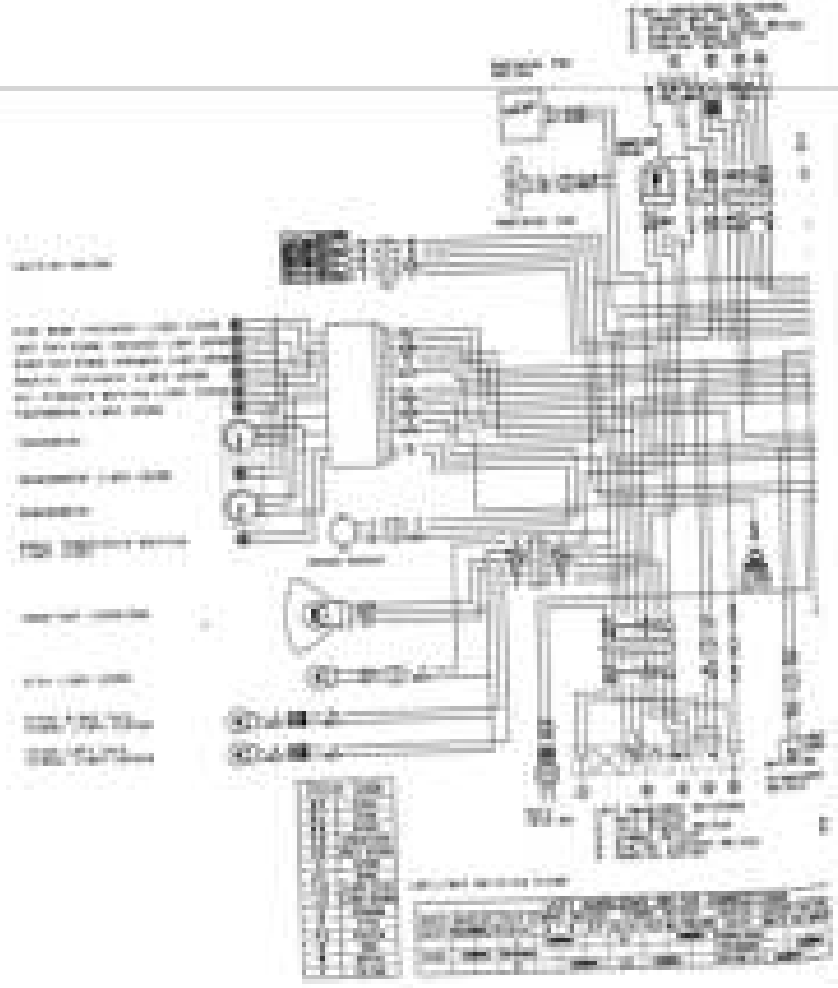


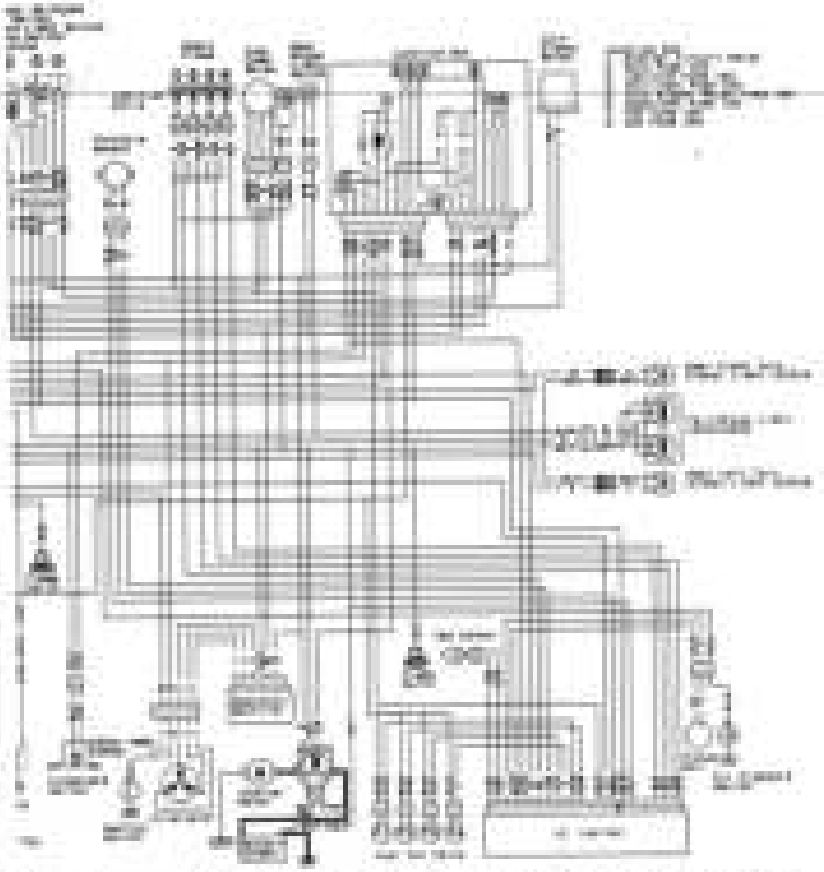
Wiring Diagram (Other than US, Canada, and Australia)





Wiring Diagram (1-Type)





Specifications

Item	Standard
Battery	
Type	[illegible] (Maintenance Free Battery)
Capacity	[illegible] Ah
Voltage	[illegible] V
Charging System	
Type	[illegible]
Alternator output voltage	[illegible] V
Stator coil resistance	[illegible] Ω
Charging voltage	[illegible]
Regulator/rectifier output voltage	[illegible] V
Ignition System	
Pickup coil resistance	[illegible] Ω
Ignition coil	
Primary winding resistance	[illegible] Ω
Secondary winding resistance	[illegible] kΩ
Spark plug	
Spark plug gap	[illegible] mm
IC ignitor internal resistance	[illegible]
Electric Starter System	
Starter motor	
Brush length	[illegible] mm (Service limit [illegible] mm)
Commutator diameter	[illegible] mm (Service limit [illegible] mm)
Fuel Pump	
Fuel pump relay internal resistance	[illegible]
Fuel pump pressure	[illegible] kPa ([illegible] kgf/cm², [illegible] psi)
Radiator and Sensors	
Fan motor	[illegible] Ω
Thermosensor (sensor)	[illegible]
Step motor type sensor timing	[illegible] pulses at 10 mm (pinion travel)
Engine oil pressure switch normal/open	When engine is stopped: [illegible]
	When engine is running: [illegible]
Fan switch normal/open	
Rising temperature	From [illegible] to [illegible] °C ([illegible] °F)
Falling temperature	From [illegible] to [illegible] °C ([illegible] °F)
	[illegible]
	[illegible]
Water temperature sensor resistance	[illegible]
	[illegible]
	[illegible]
Throttle sensor output voltage	[illegible]
	When engine is stopped: [illegible]
	When engine is fully opened: [illegible]

Special tools — [illegible]

Reader — [illegible]

Procedures

Here are a number of important precautions that are worth observing when working electrical systems. Label and disconnect all the cable ends before you remove the battery lead connections. They will fault out the charge on the electrical wiring.

(1) Always charge a battery (or utilise battery maintenance) before maintaining either parts of an electrical system. A fully charged battery is a useful tool for maintaining accurate electrical system tests.

(2) The electrical cable should never be wound around, as with a hammer, as allowed to fall on a hard surface. Short circuits to the cable can damage them.

(3) To prevent damage to electrical parts, do not disconnect the battery leads, or any other electrical connections when the ignition switch is on, or when any engine is running.

(4) Because of the high amount of current, sometimes the starter motor continue when the starter motor has been turned on, the current may cause the starter motor windings.

(5) Do not use a high voltage insulation tester (such as the type that voltage or voltages described in the wiring diagram, as the rotate of diode semiconductor.

(6) Take care not to short the lead that are directly connected to the battery positive (+) terminal to the frame ground.

(7) Connect the charging wire to a good state of wiring.

(8) Never replace a defective fuse without understanding what the cause may have. If the failure was caused by some other fault in wiring, this fuse should be replaced by identical to the new replacement and avoid the repair.

(9) Make sure all connections in the circuit are tight and clean and inspecting wires for signs of shorting, fraying, etc. Poor wires and bad connections can affect electrical system operation.

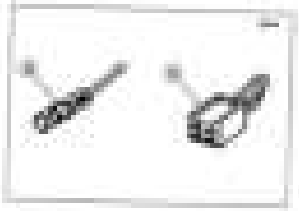
(10) Measure coil with winding resistance when the work is cold (at room temperature).

(11) Color Codes:

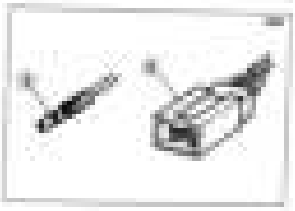
Bl	Black	G	Green	P	Pink
Br	Brown	Gy	Gray	R	Red
Bu	Blue	Lb	Light blue	W	White
Dg	Dark green	Lg	Light green	Y	Yellow
Dy	Dark yellow	O	Orange		

(12) Electrical Connectors

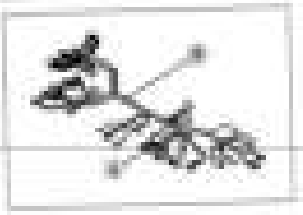
Typical Connectors [A]



Main Connectors [B]



Electrical Wiring



Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- If any wiring is worn, replace the damaged wiring.
- Turn each connector (1) apart and inspect it for corrosion, dirt, and damage.
- If the connector is assembled (e.g., male to female), pull to check that it is locked.
- If not, repair it.
- Check the wiring for continuity.
- Refer the wiring diagram to find the route of the open circuit or suspected circuit (e.g., yellow).
- Connect the tester leads between the ends of the route.

Special tool : Hand Tester: 57001-1394

- Set the tester to the 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 (3) if necessary.

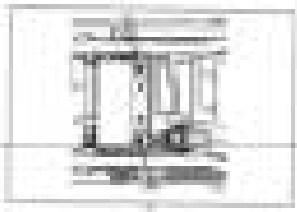
Battery

Battery Removal

- Remove:
  - Seat (see Frame Chapter)
- Disconnect the negative terminal lead (-) and then positive terminal lead (+).

CAUTION

Be sure to disconnect the negative terminal first.



- Remove the battery.

Electrolyte Filling

CAUTION

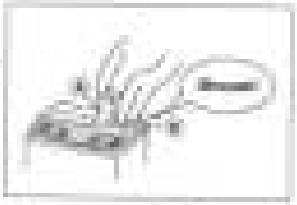
Do not remove the aluminum tape when sealing the filler holes and electrolyte tube.

Be sure to use the dedicated electrolyte container for correct electrolyte volume.

- Insert a new inner tube to the sealing hole in holder if the sealing tube is broken.
- Place the battery on a level surface.
- Remove the sealing strips (A).
- Attach the electrolyte filler to the electrolyte container "Bouncer" (see Tool guide (2)).

NOTE

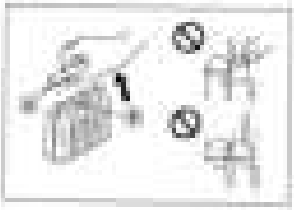
Use sealing strips, sealing plate that are sealing label, holder, or inner tube(s) that are sealing tubular hole into liquid (electrolyte in "Bouncer" (Weight limited range)).



- Fill the electrolyte container out of the inner bag.
- Attach the strip of caps (A) from the connector.

NOTE

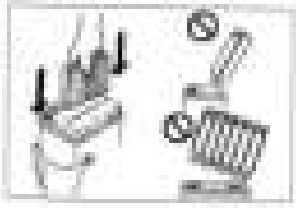
- Do not detach the strip of caps (between A is used on the battery charge side).
- Do not overheat to prevent the sealed areas (B).

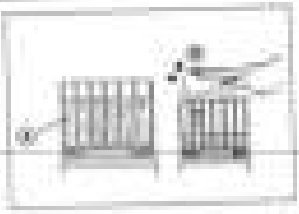


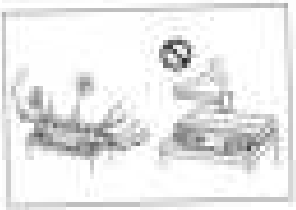
- Place the electrolyte container upside down with the sealing label in the anti-reverse battery filler cavity.
- Turn the container down straight through to avoid the holes. Tear the electrolyte pouring caps to take from the battery.

NOTE

- Do not let any container or the electrolyte flow into the battery.







NOTE

CAUTION

NOTE

CAUTION

Initial Charge

When a new/replacement lead battery and any used valve regulated (VRLA) type) electrolyte is added to the cells or synthetically moist it absorbs moisture to swell up slightly at first being charged. At this point battery voltage is measured before use. However, if a battery showed a significant voltage of higher than 12.6 V after 10 minutes of filling, then no initial charge is necessary.

Conditions requiring initial charge	Charging method
At low temperature (lower than 5°C)	14.4 V x 5 h - 5 hours
Battery has been stored in high temperature environment.	14.4 V x 10 h - 20 hours
Shop has been vacated, or broken – washing, wait or time (If you did not hear the air-washing sound "Normal?" to you personally do not.)	
Delivery as old by 2 years or more after manufacture. Battery manufacturing date is printed on battery top. Example: '12 '13 '14 '15 May June July October	

Note 1: "Normal voltage" = To measure battery terminal voltage, use a digital voltmeter.

Precautions

1) No need to topping up
   No topping up is necessary in the battery and it is not to be ever added over. Avoiding spilling off the electrolyte as well as water to your electrolyte. Refer to 204.
2) Refreshing charge
   If an engine will not start, it may provide weak or dense but also. A refreshing the battery may have discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification table the maximum battery engine's. When a fast charge is necessary, do a refreshing operation the maximum charge current and time mentioned on the battery.

CAUTION

The battery is designed to receive or consume rated battery if refresh charged according to the method specified above. However, the battery is performing may be reduced noticeably if charged under conditions other than given above. Never overuse this battery long as they remain charged.
Any battery we recommend amount of gas is generated due to overcharging, the safety valve operates to keep the battery safe.

3) When not in use
   Do not a refresh charge before you have the maximum and once it will the negative load removed. Give refresh charge before regular starting charge.
4) Battery life
   If the battery will not hold the engine even after normal refresh charged, the battery has exceeded its useful life. Replace it. Otherwise, however, the battery's starting system has an problem.

⚠ 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 to the charger. Any connection and avoid sparks at the battery terminals which could ignite the battery gases.
Do not smoke or allow near the battery, or no terminals should have the tightening screwed.
The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with plenty amount of water. Get medical attention if serious.

Maintenance

A maintenance free battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a maintenance free battery only on a motorcycle which was originally equipped with a maintenance free battery.

Be careful, if a maintenance free battery is installed on a motorcycle which has an inferior battery or original equipment, the maintenance free battery's life will be shortened.

Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage.

- Remove the seats and frame cover(s).
- Disconnect the negative terminal cable.

CAUTION

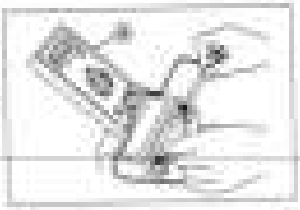
Be sure to disconnect the negative terminal first.

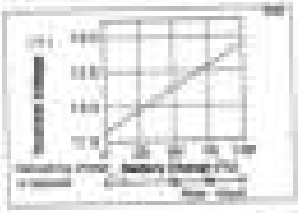
- Measure the battery terminal voltage.

NOTE

- Measure with a digital voltmeter (it cannot read the open or very gradual pulse voltage).
- It is necessary to select the specified voltmeter range to measure.

Battery Terminal Voltage
Standard: 12.8 V or more



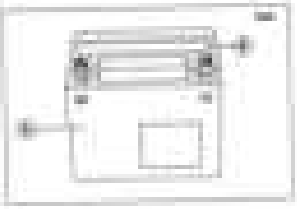


Recharging Charge

- Remove the battery terminal cable (see Charging Condition Inspection).
- Remove the battery (A).
- Recharge charge the battery (see according to the battery recharge method).

WARNING

This battery is sealed type. Never remove sealing caps (1) when recharging. Never use water. Charge with normal and slow or rapid speed.



Normal Charge: 1.2 A, 5 – 10 h
Standard Charge
0.9 A (1.2 A) × 10 h (quick recharging time)
Quick Charge
3.0 A × 1.0 h

CAUTION

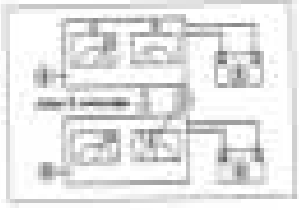
If possible, do not quick charge. If the quick charge is done due to unavoidable circumstances, do standard charge later on.

Normal Charge: 1.2 A, 5 – 10 h
Charging Method: 0.9 A × 10 h

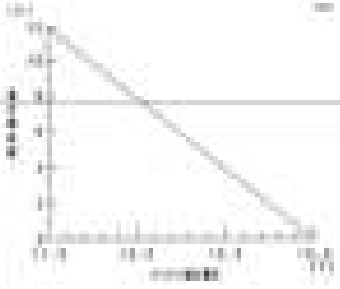
NOTE

- Since the voltage usually rises in a characteristic curve change for about 5 minutes at a constant current, if possible, allow the charger to remain idle for 30 minutes, and check rest battery. The voltage is to see how the battery stands in regards recharging. Before the voltage will often be unstable or drop for current or standard value (1.2 A).

Battery (A)
Battery Charger (B)
Specified Value (C)



Battery Resistant Voltage Flow Chart



- Determine battery condition after refreshing charge
  - Measure the voltage of the battery for 5 minutes after installation of the voltage by measuring the terminal voltage according to the table below.

Voltage	Judgement
12.6 V or higher	Good
12.4 V – 12.6 V or lower	Charge insufficient → Recharge
12.4 V or lower	Undercharged → Replace

Charging System

Alternator Cover Removal

- Remove:
  - Left Side Fairing Lower Panel (Fairing Installation)
  - Left Middle Fairing Side Frame (Fairing Installation)
  - Coolant Reserve Tank [A]
  - Fuel Tank Upper Front Bolt (Fuel Tank Installation)
  - Starter Lead Connector
  - Water Temperature Lead Connector
  - Alternator Lead Connector [B]
- Place a suitable container under the alternator cover (C), and remove the cover.



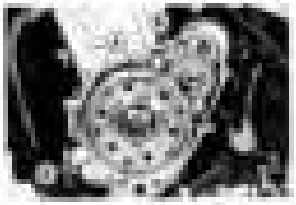
Alternator Cover Installation

- Apply silicone sealant to the alternator shaft grommet and crankcase mating surface (A), as they have been kept clean of the cover sealant.

  Sealant — Kawasaki Bond (Silicone Sealant): 92104-0120

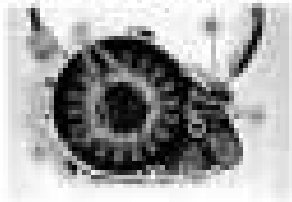
- Install dowel pins (B), and a gasket on the crankcase.
- Install a new gasket and the alternator cover.
- Tighten the cover bolts.

  Torque — Alternator Cover Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)



Stator Coil Removal

- Remove:
  - Alternator Cover (see Alternator Cover Removal)
  - Coupling Plate Bolts (A) and Plate
  - Alternator Lead Connector [B]
  - Stator Coil Bolts (C)
- Remove the stator coil (D) from the alternator cover.



Stator Coil Installation

- Tighten the stator coil bolts.

  Torque — Stator Coil Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- Apply silicone sealant to the circumference of the alternator lead grommet, and fit the grommet into the notch of the cover securely.

  Sealant — Kawasaki Bond (Silicone Sealant): 92104-0120

- Route the alternator lead well to avoid any pinch, and tighten the cover.

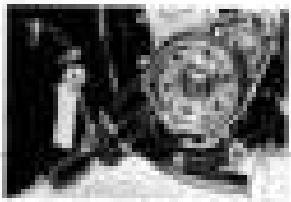
  Torque — Alternator Lead Holding Plate Bolts: 2.5 N·m (0.25 kgf·m, 22 in·lb)

- Install the alternator cover (see Alternator Cover Installation).

Alternator Rotor Removal

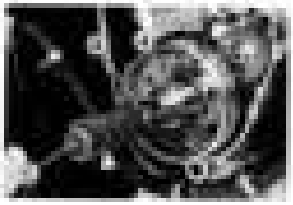
- Remove:
  - Alternator Cover (see Alternator Cover Removal)
- Place an oil pan under alternator rotor.
- Hold the alternator rotor clockwise with the Flywheel Holder (A), and remove the rotor bolt (B).

Special Tool - Flywheel Holder: 57001-1313



- Using the Rotor Puller (C) and rotor bolt (B), remove the alternator rotor from the crankshaft.

Special Tools - Flywheel Puller: 57001-1405
Rotor Puller: 57001-1406 (M28 x 1.5 Screw Type)



NOTE

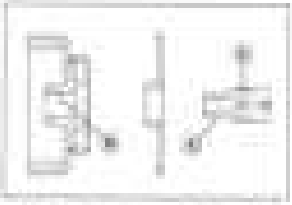
- Screw in the rotor puller bolting slot fixed (C) on the puller until it bottoms.

Caution

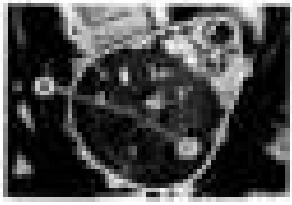
Do not attempt to strike the alternator rotor shaft. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

- Using a cleaning field, clean off any oil or dirt on the following alternator parts with a clean cloth.
  - (A) Crankshaft Tapered Portion
  - (B) Alternator Rotor Tapered Portion
- Apply a thin coat of molybdenum disulfide grease to the crankshaft (A).



- Install the woodruff key (C).
- Apply clean dry crankshaft tapered portion (A) and the rotor.
- Fit the alternator key (C) aligned to the slot (D) the crankshaft before installing the alternator rotor.











- If the correct voltage enters the valve in the valve, the alternator operates properly and the regulator/rectifier is damaged. If voltage never reading from the given in the specification, then the alternator is defective.

■Check the stator coil resistance as follows.
- Stop the engine.
- Disconnect the stator leads as shown in the figure.
- Check the resistance (value) between stator leads.

Table 2 Stator Coil Resistance

Tester Range	Connections		Standard
	Tester (+) to	Tester (−) to	
Ω × 1 Ω	One Yellow lead	Another Yellow lead	0.4 Ω – 0.65 Ω

- If there is more resistance than shown in the table, or no (zero) value reading (infinity) for any two leads, the stator has an open load and must be replaced. If load less than the resistance (zero) the stator is shorted and must be replaced.
- Using the highest resistance range of the tester, measure the resistance between each of the Yellow leads and chassis ground.
- Any tester value reading less than infinity (∞) indicates a short circuit/shorting lower replacement.
- If the stator coils have normal resistance but no the voltage check do not see the specification for the specification then the rotor magnetic have excessive weakness and the rotor must be replaced.

Special Tool : Hand Tester: 57001-1394

Regulator/ Rectifier Inspection

■Remove
Side Cover (see Frame chapter)
Connector [1] (disconnect)
Bolts [2]
Regulator/Rectifier [3]



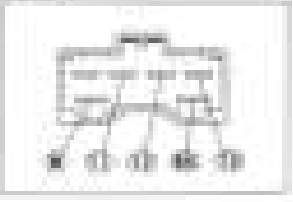
Rectifier Circuit Check

■Check conductivity on the following pairs of terminals.

Rectifier Circuit Inspection

Tester connection			

- The resistance should be low in one direction and infinite (∞) high in the other direction. If the tester reads infinite or high in both directions, the rectifier is defective and must be replaced.



NOTE

- The actual meter reading varies with the meter used and the manufacturer specifications, but generally speaking the lower reading should be more than one half the value.

Regulator Circuit Check

To test the regulator unit or source coil (lines [ ]), subscribe and a test light (12 V, [ ] W bulb) in a socket with leads.

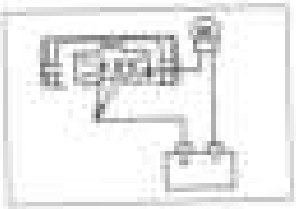
CAUTION

The test light works as an indicator and takes a current flowing on to protect the regulator/rectifier from excessive current. Do not use an excessive wattage bulb or test light.

- Check to be sure the rectifier circuit is correct before proceeding.

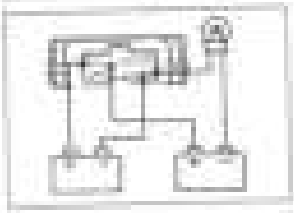
Regulator Circuit Test 1st Step

- Connect the test light and the [ ] V battery to the regulator/rectifier as shown.
- Check [ ], [ ], and [ ] resistor respectively.
- If the test light works on, the regulator/rectifier is defective. Replace it.
- If the test light does not turn on, continue the test.



Regulator Circuit Test 2nd Step

- Connect the test light and the [ ] V battery to the same manner as specified in the "Regulator Circuit Test 1st Step".
- Apply [ ] V to the voltage adjustment terminal.
- Check [ ], [ ], and [ ] resistor respectively.
- If the test light works on, the regulator/rectifier is defective. Replace it.
- If the test light does not turn on, continue the test.

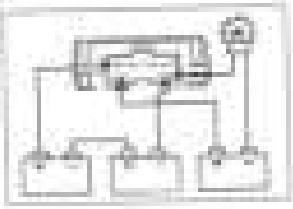


Regulator Circuit Test 3rd Step

- Connect the test light and the [ ] V battery to the same manner as specified in the "Regulator Circuit Test 1st Step".
- Disconnect stator [ ] V to the voltage monitoring terminal for setting a [ ] V battery.
- Check [ ], [ ], and [ ] resistor respectively.

CAUTION

Do not apply more than [ ] V to the regulator/rectifier, and be sure that you do not reverse the lead wires or test terminals, or the unit will be damaged.



- If the test light dim (or light) when the 2P is wire disorder unnecessary or the voltage monitoring terminal, the regulator/rectifier is defective. (Replace it.)
- If the regulator/rectifier passes of all the wire describing it was not the reference. If the charging system and does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit.

Regulator/Rectifier Output Voltage Inspection

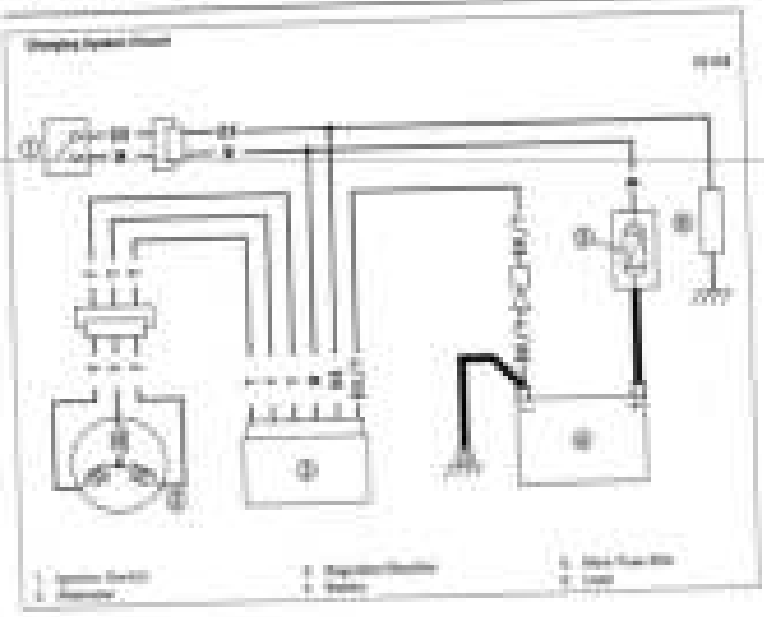
- Check the battery condition. (see Battery section)
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the seat mount bolts (Turbo charger).
- Check that the ignition switch is turned off, and connect the hand tester (+) as shown in the table.
- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. (To turn off the headlight, of HB - Remote and Running models, disconnect the headlight connectors in the upper fairing.) The readings should show stable battery voltage when the engine runs in low, and as the engine speed rises the readings should also rise. Red tone must always show the specified voltage.



Regulator/Rectifier Output Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (−) to	
10 V DC	White	Black/Yellow	13.2 – 14.8 V

- Turn off the ignition switch to stop the engine, and disconnect the hand tester.
- The regulator/rectifier output voltage is best between the above 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 broken or open.
- If the battery voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient to the load. Check the alternator and regulator/rectifier to determine which part is defective.



Ignition System

WARNING

The ignition system produces extremely high voltage. Do not touch the spark plugs or coils while the engine is cranking or you could receive a severe electrical shock.

CAUTION

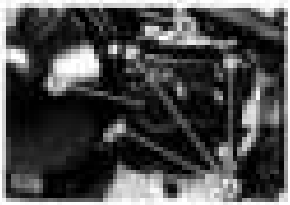
Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU (ignition) damage.
Do not install the battery backwards. This regulator unit is protected. This is to prevent damage to the diodes and ECU (ignition).

Pickup Coil Removal

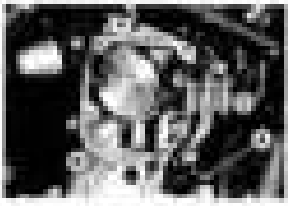
- Remove:
  - Seat Cowl (see Seat Cowl Removal)
  - Upper Fairing (see Fairing Removal)
  - Right Middle Fairing (see Fairing Removal)
  - Pickup Coil Lead Connector (A)



  - Pickup Coil Cover Bolts (4) with Washers (4)
  - Pickup Coil Cover (B)



  - Oil Pressure Switch Terminal (C)
- Remove the pickup coil (B) by taking off the pickup coil bolts (D).



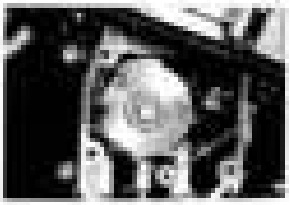
Pickup Coil Installation

- Route the pickup coil lead correctly (see Cable, Wire, and Hose Routing in General Information chapter).
- Install the pickup coil and tighten the pickup coil bolts.

Torque - Pickup Coil Bolts: 4.9 N·m (0.5 kgf-m, 43 in-lb)

- Apply silicone sealant (A) to the pickup coil lead grommet and crankcase halves mating surface as the front and rear sides of the pickup coil cover indicate.

Sealant - Kawasaki Bond (Silicone Sealant): 49019-120



- Tighten the pickup coil cover bolts.

Torque — [illegible]

- Install the seat(see seat removal section).
- Install the rear fender(see rear section).

Pickup Coil Inspection

- Remove:
  - Front Cowl (see Fuel System (Engine))
  - Pickup Coil Lead Connector (CA)
- Set the hand tester to the [illegible] range and connect it to the [illegible] and BR (G) lead(s) of the connector.

Standard Unit: [illegible]

- If there is more resistance than the specified value, the unit has an open coil and must be replaced. Check the lead from the resistance meter to the coil is shorted, and must be repaired.

Pickup Coil Resistance: [illegible]

- During the engine overhaul, check the water-tightness between the pickup coil leads and chassis ground.
- If the water-tightness test does not satisfy the specification, replace the pickup coil assembly.





Stick Coil Ignition Coil together with Spark Plug Cap Removal

- Remove the air cleaner housing cover (see Fuel System (Engine)).
- Disconnect the leads and connections (CA).
- Pull the stick coil off the spark plugs.

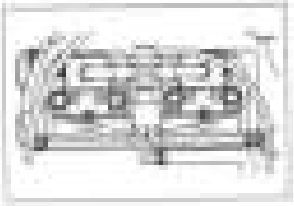
Caution
Do not give the mechanical shock to the coil side when removing the coil.



Stick Coil Ignition Coil together with Spark Plug Cap Installation

- Install the coil one by one referring to the figure.
- Check that the air cleaner hanger bracket of the coil head cover is attached.
- Connect the connector.

Caution
Do not tap the coil head with installing the coil.



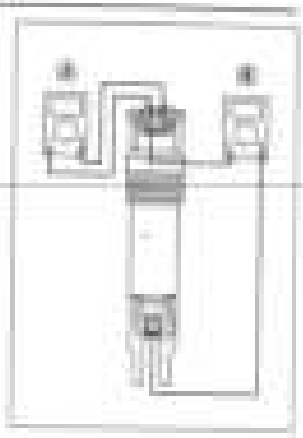
Unit Coil Ignition Coil Together with Spark Plug Cap) Inspection

■Remove the plug cord caps (for engine).
■Measure the primary winding resistance (A) as follows.
①Connect one lead of tester between the coil terminals.
②Set the tester to the x 1 Ω range and read the tester.
■Measure the secondary winding resistance (B) as follows.
①Connect the tester between the plug terminal side (+) and terminal.
②Set the tester to the x 1 kΩ range and read the tester.

Ignition Coil Winding Resistance

Primary Windings	**0.48 – 0.72 Ω**
Secondary Windings	**9.6 – 14.4 kΩ**

● If the tester readings are not as specified, replace the coil.



Spark Plug Removal

■Remove the:
Air Cleaner Housing (see Fuel System chapter)
Throttle Cables
■Remove the spark plugs using the 16 mm plug wrench.

Standard Value: Spark Plug Wrench: 16 mm (0.63 inch)

Spark Plug Installation

■Insert the spark plug carefully into the plug hole with the plug (A) installed on the plug terminal (B).

Owner's Tool: Spark Plug Wrench: Hollow 16 mm hole

■Tighten the plugs.

Torque: Spark Plugs (3 Nm (2.2 kg-m, 17.0 in-lb)

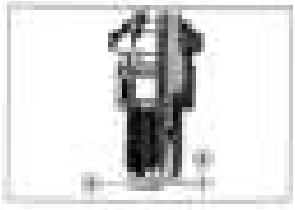
■Fit the disk cover assembly.



Spark Plug Gap Inspection

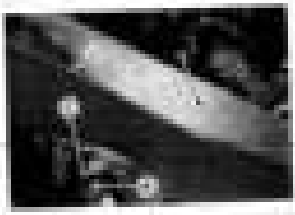
■Remove the plug (A) with a wire type thickness gauge.
●If the gaps are incorrect, carefully bend the side electrode (B) with a suitable tool to obtain the correct gaps.

Spark Plug Gap: 0.7 – 0.8 mm



Cam Sensor Removal

- Remove:
  - Seat, Side Covers (engine)
  - Front Tank Lower Rear Bracket (engine)
- Disconnect the cam sensor connector (A).
- Unscrew the bolt (B) and remove the cam sensor (C).

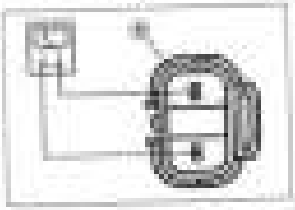


Cam Sensor Installation

- Remove:
  - Front Tank Lower Rear Bracket (engine)
- Remove dirt and rust on the cam sensor mounting (A).
- Fit the cam sensor to the L- rod (B) hinge and tighten it to the specified torque.
- Route the wire harness so that it is not pinched.

Cam Sensor Mounting Bolt : 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Hook the hook on the wire harness clamp to the plastic bracket. Fix the wire harness between the cam sensor holder and crankcase securely.
- Connect the cam sensor connector (A).
- Install the removed parts in the reverse order of removal.



IC Igniter Inspection

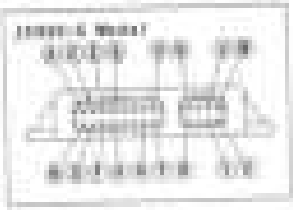
CAUTION

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



- Remove the seat (see Frame chapter).
- Disconnect the IC igniter (A) and disconnect the connectors.
- Set the hand tester to Ω x 1 k (Ω range) and make the measurements shown in the table.

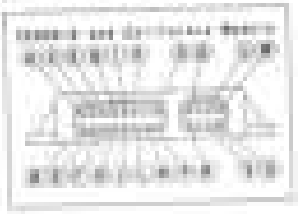
Special Tool : Igniter Checker Assembly, 4-pin: 57001-1215

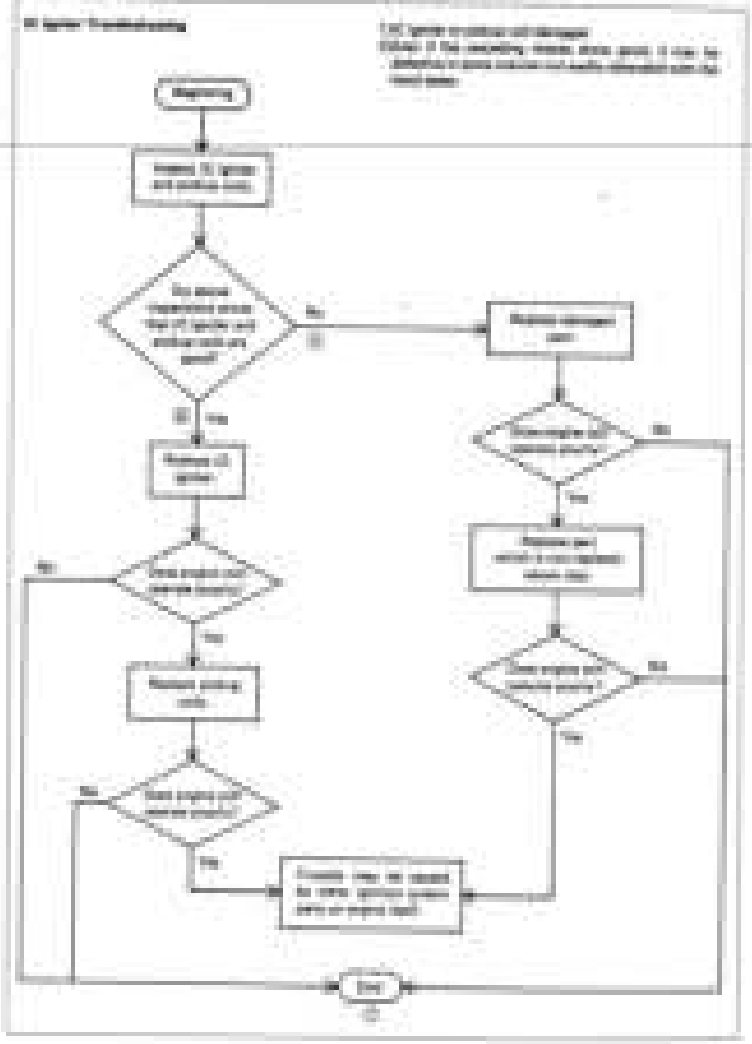


If the tester readings are not in specified values, replace the IC igniter.

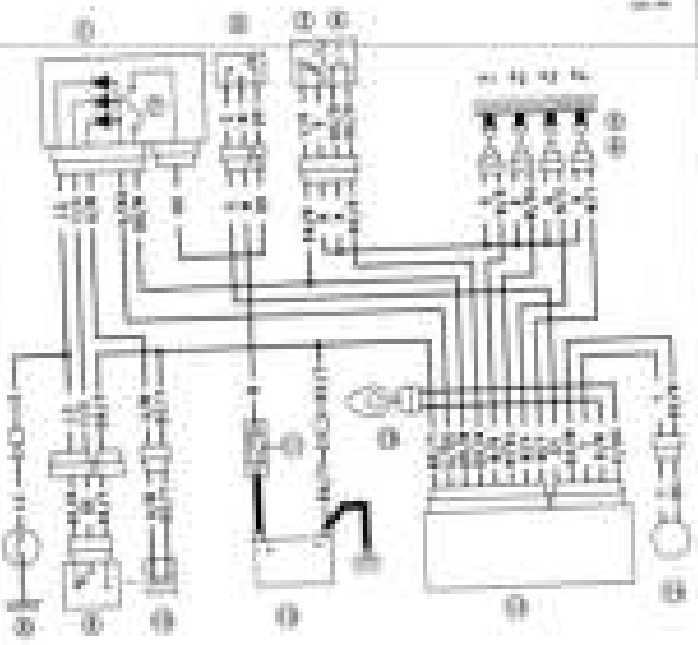
CAUTION

Use only Hand Tester (4-in-1 Ohm) for this test. A tester other than the Commander Hand Tester may show different readings.
If a voltage or a tester with a high measuring reading is used, the IC igniter will be damaged.





Ignition System Circuit

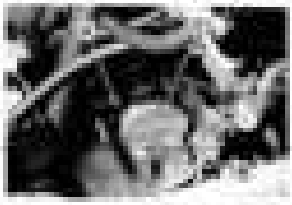


1. Ignition Box
2. Ignition Switch
3. Engine Stop Switch
4. Diode Board
5. Spark Plugs
6. Ignition Coils
7. Ignition Coil Unit
8. Neutral Switch
9. Starter Lockout Switch
10. Side Stand Switch
11. Main Fuse Box
12. Battery
13. CI Sensor
14. Pickup Coil
15. Gen Stator

Electric Starter System

Starter Motor Removal

- Remove the fuel tank (see Fuel System chapter).
- Slide back the rubber cap.
- Remove the starter motor terminal nut (A) and the mounting bolts (B).
- Pull out the starter motor (C).



Starter Motor Installation

CAUTION

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- When installing the starter motor, clean the starter motor lugs (A) and mating area (B) where the starter motor is grounded.



- Apply a small amount of engine oil to the O-ring (A).
- Install the starter motor and tighten the mounting bolts.

Torque - Starter Motor Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



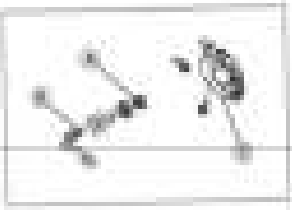
Starter Motor Disassembly

- Take off the starter motor through bolts (A) and remove rear cover (B) and pull the armature out of the yoke (C).



- Pry the brush plate (A) and brushes some off with the right hand and lower (B).

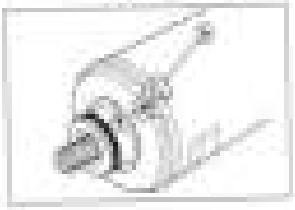










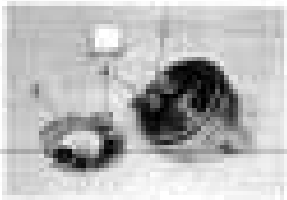


Brush Inspection

- Measure the length (A) of each brush.
- If any is worn down to the service limit, replace the carbon brush holder assembly (B) and the terminal bolt assembly (C).

Starter Motor Brush Length

Standard	12 mm
Service Limit	8.5 mm



Commutator Cleaning and Inspection

- Remove the commutator cushion (A) if necessary with the wires (B), and clean out the grooves.



- Measure the diameter (A) of the commutator (B).
- Replace the starter motor with a new one if the commutator diameter is less than the service limit.

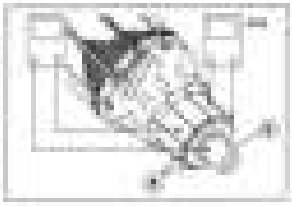
Commutator Diameter

Standard	28 mm
Service Limit	27 mm



Armature Inspection

- Using the x 1 Ω range of a pocket tester as an ohmmeter, measure the resistance between each commutator segment (A).
- If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.
- Using the highest ohms range, measure the resistance between the segment and the shaft (B).
- If there is any reading at all, the armature has a short and the starter motor must be replaced.

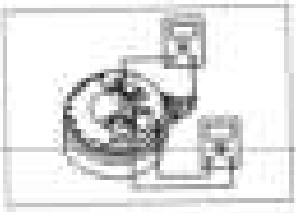


NOTE

- If any of the foregoing checks show the armature is bad, it may be defective or some checks can easily overlook the bad spot. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn (or runs very slowly), replace the starter motor with a new one.

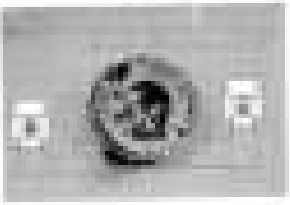
Brush Lead Inspection

- Using the [illegible] tester range, measure the resistance as shown.
  - (A) Terminal Bolt and Positive Brush
  - (B) Brush Plate and Negative Brush
- If there is not infinity or less than infinity, the brush lead has an open. Replace the terminal bolt assembly and/or the brush holder assembly.



Brush Plate and Terminal Bolt Inspection

- Using the highest [illegible] range, measure the resistance as shown.
  - (A) Terminal Bolt and Brush Plate
  - (B) Terminal Bolt and Right Hand End Cover
- If there is any reading, the brush holder assembly and/or terminal bolt assembly have a short. Replace the brush holder assembly and the terminal bolt assembly.



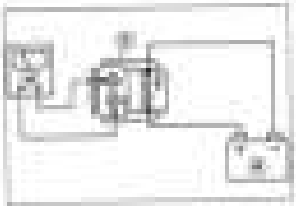
Starter Relay Inspection

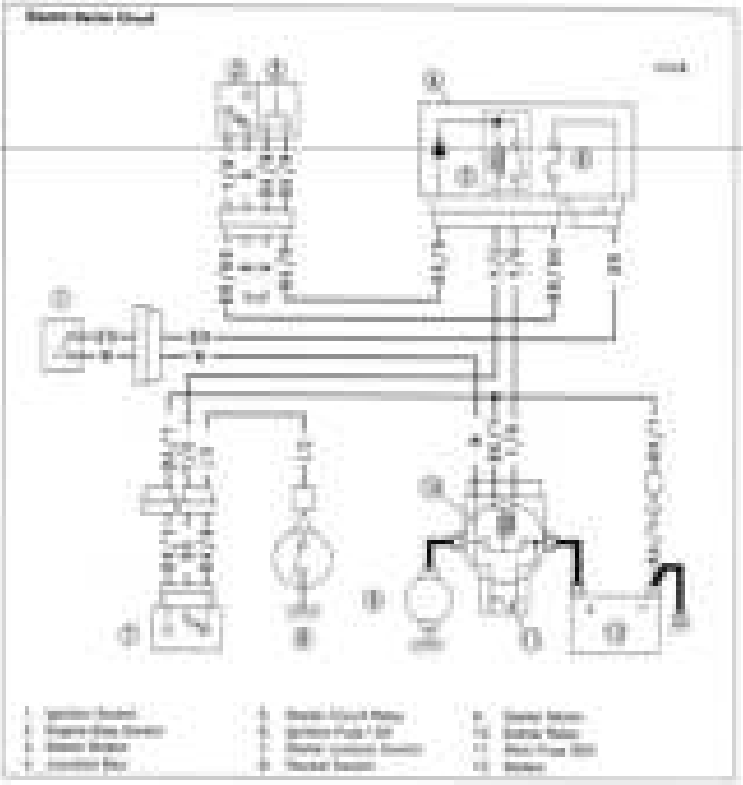
- Remove the cover.
- Remove the starter relay.
- Connect the tester leads (A) and [illegible] (B) to the starter relay as shown.
- If the relay does not work as specified, the relay is defective. Replace the relay.

Tester Range: [illegible]

Criterion: When battery is connected: ∞ (MΩ)

When battery is disconnected: ∞ or 0



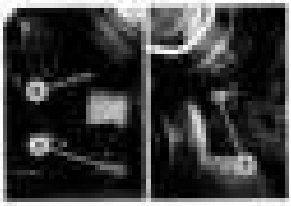


Lighting System

The US, Canada, and Australia models adopt the daytime running light system. In this system, the headlights, the taillights, the license plate lights and the instrument panel lights come on when the ignition switch is turned to the "ON" position and the engine is started. The headlights remain on after the ignition switch is turned to the "OFF" position and the lighting switch is turned to the "AUTO" position. The headlights will go out automatically afternoon the sensor system is activated and come back on when the system is released.

Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster (1) on the headlight in or out until the beam points straight ahead.



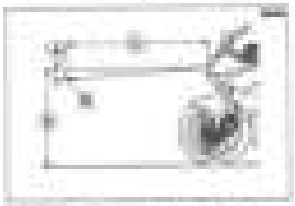
Headlight Beam Vertical Adjustment

- Turn the vertical adjuster (2) on the headlight in or out to adjust the headlight centerline.

NOTE

- On right hand, the brighter portion should be aligned below horizontal and the horizontal on the vertical axis and then adjust higher (the headlights) to the proper angle according to local regulations.
- On LHD models, the proper angle is 0.8 degrees below horizontal line at 80 cm (31 in.) area on 10 m (33 ft) for headlights from the center of the headlights (with the motorcycle on an unladen and the rider seated).

Wrench (12 x 14)
Centre of Headlight Beam (A)
10 m (33 ft) (B)
Height of Headlight Center (H)

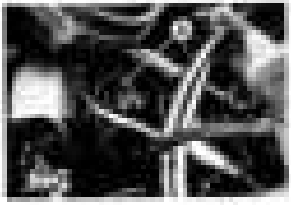


Headlight Bulb Replacement

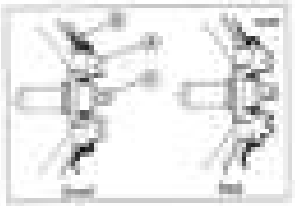
- Remove:
  - Headlight Connector
  - Headlight Bulb Holder Cover
  - Bulb (1)

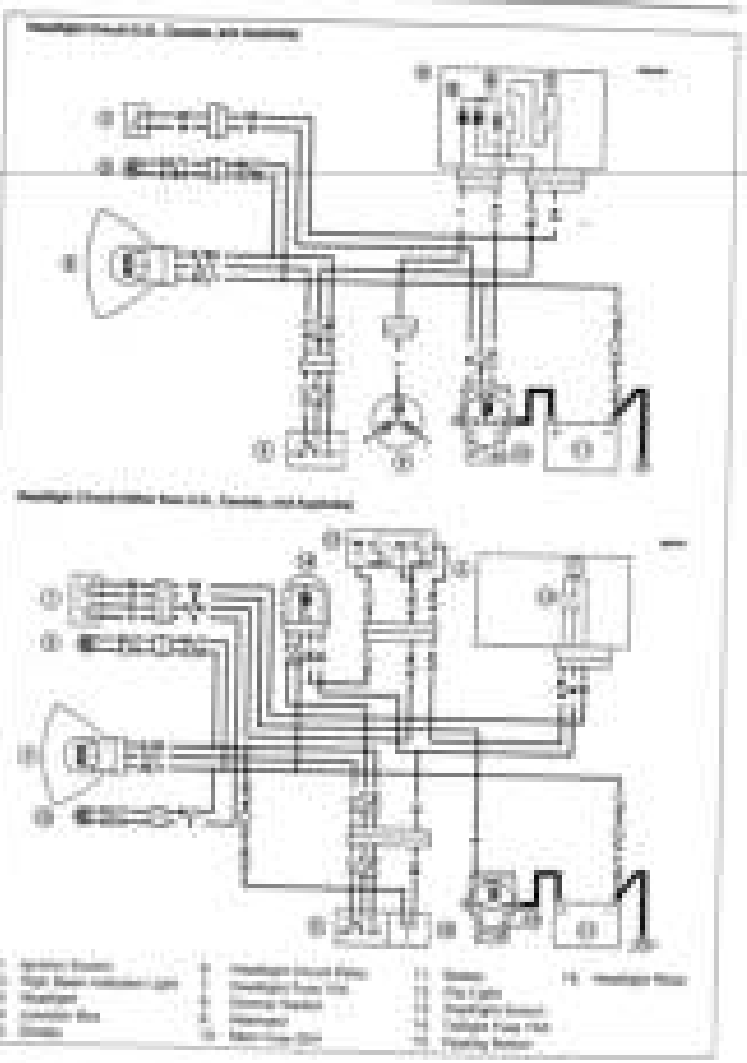
CAUTION

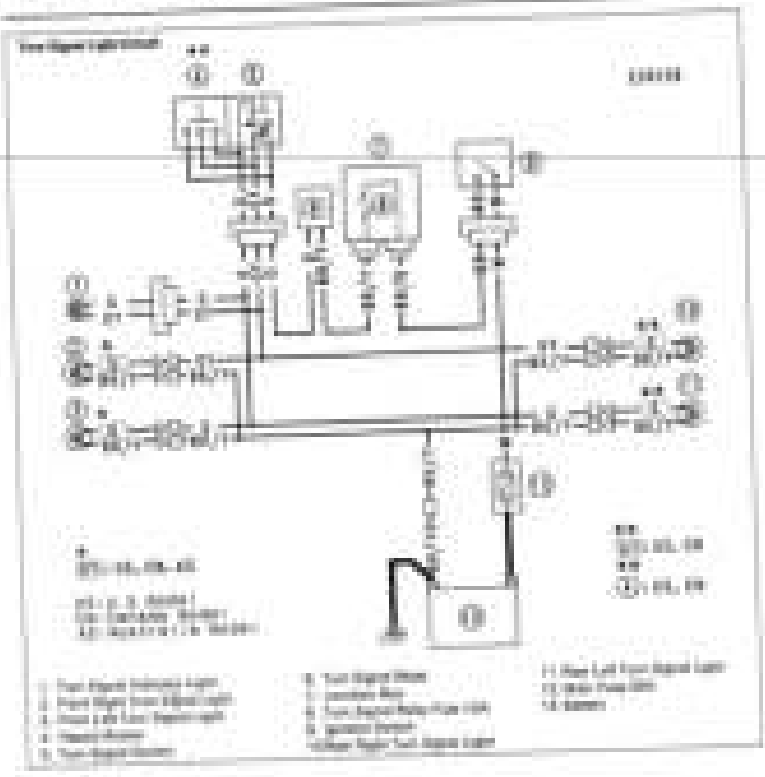
When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags may cause bulbs like to cause the bulb to explode.



- Remove the headlight bulb.
- Fit the new bulb (1) with the tab (2) securely onto the bulb holder (3) firmly as shown.
- After installation, adjust the headlight beam (see this chapter).







Turn Signal Relay Inspection
- Remove
  - Seat (see Frame chapter)
  - Turn Signal Relay (A)

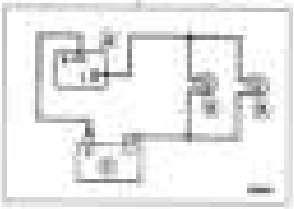


- Connect wires (1) to battery and turn signal lights as indicated in the figure, and check that the relay clicks and lights turn on and off.
  - Turn Signal Relay (A)
  - Turn Signal Lights (B)
  - 12 V Battery (C)
- If the lights do not flash at specified, replace the turn signal relay.

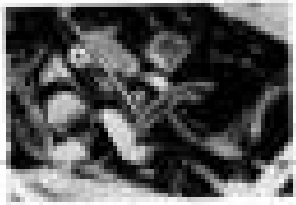
Testing Turn Signal Relay

Load		
The Number of Turn Signal Lights	Wattage (W)	Flashing time (cycle/min)
1	23	Less than 55
2	23	75 – 95

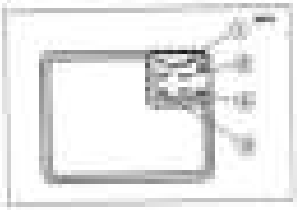
(1) Insulation tape removed



Fuel Pump







Fuel Pump Relay Inspection

- Remove the seats (see Frame chapter).
- Take off the fuel pump relay (1).
- Set the hand tester to the [ ] Ω range and make the measurements shown in the table.

Special Tool - Hand Tester: 57001-1394

- If the tester readings are not as specified, replace the fuel pump relay.
- If the tester readings are normal, check the fuel pump assembly.

CAUTION

Use only Hand Tester: 57001-1394 for this test. Do not use any other tester because damage to the meter may result.

Be sure to set the tester to the proper range before inserting probes to make the pump relay terminal connections.

Fuel Pump Relay Internal Resistance

Range	Tester (+) Lead Connection			
[ ] × 1Ω	1	2	3	4
1	∞	80	∞	∞
2	∞	∞	80	∞
3	∞	∞	∞	∞
4	∞	80 – 200Ω	∞	∞
5	∞	80 – 200Ω	0 – 1Ω	∞

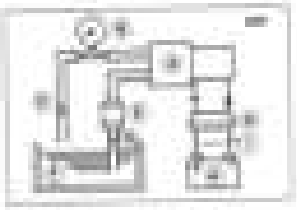
(-) : Tester (-) Lead Connection

Fuel Pump Operational Inspection

- Remove the fuel pump (see the Fuel Tank (Low Fuel System) chapter).
- Prepare a container filled with gasoline.
- Prepare the jumper wires and connect them as the same things.
- Connect a suitable power source as shown in the figure.

Fuel Pump (A)
Pressure Gauge (B)
Gasoline Hose (C)
Hose Clamp (D)
Fuel Filter (E)

Gasoline (F)
To the Carburetors (G)
Battery (H)
Gasoline Tubes (I)

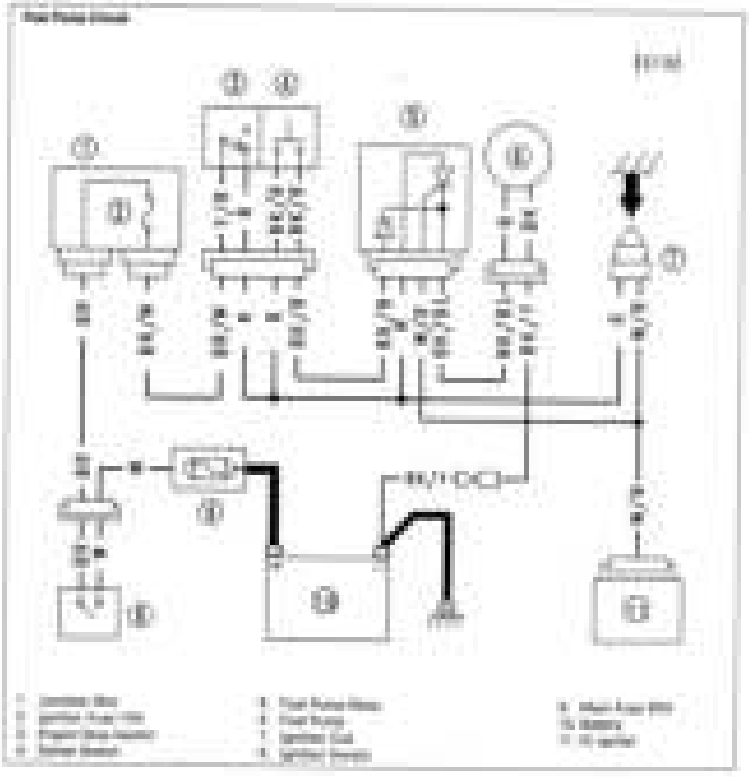


- Connect the pump leads to the battery using suitable jump jet wires.
- If the pump operates, check the pump relay.
- If the pump does not operate, the pump is defective.
- If the pump operates and the pump relay is normal, clean the inside tube which connecting the fuel pump.
- When the pump does not be defective gauge.
- If the pump is not gauge reading is out of the specified tolerance, the pump is defective.

Fuel Pump Pressure

Standard : 31 ~ 35 kPa
(0.31 ~ 0.35 kgf/cm², 4.4 ~ 5.0 psi)

Fuel Pump Circuit



Fuel Cut Valve

The fuel cut valve will interrupt the production of fuel between carburetor.

Fuel Cut Valve Removal

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn fuel ignition switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Disconnect the battery cable from the lead wire at the bottom of each carburetor fuel valve.
- Pull the lower ends of the intake hose to remove it.
- Turn the fuel tap to the ON position.
- Turn each starter lever ON a few times and drain the fuel thoroughly.

Special Tool - Carburetor Drain Plug Wrench, Hex 8 (57001-1287)

- Disconnect the connector of the fuel cut valve.
- Loosen the fuel cut valve clamp and remove it.

Fuel Cut Valve Installation

- Install the fuel cut valve with a gas connector (1) on the #1, #4 carburetor.
- Install the fuel cut valve with a brass connector (2) on the #2, #3 carburetor.
- Fit and install the fuel cut valve on the wiring harness. The fuel cut valves are not worth one.

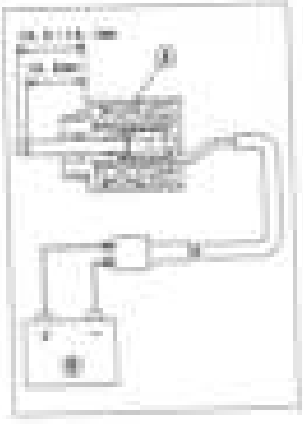


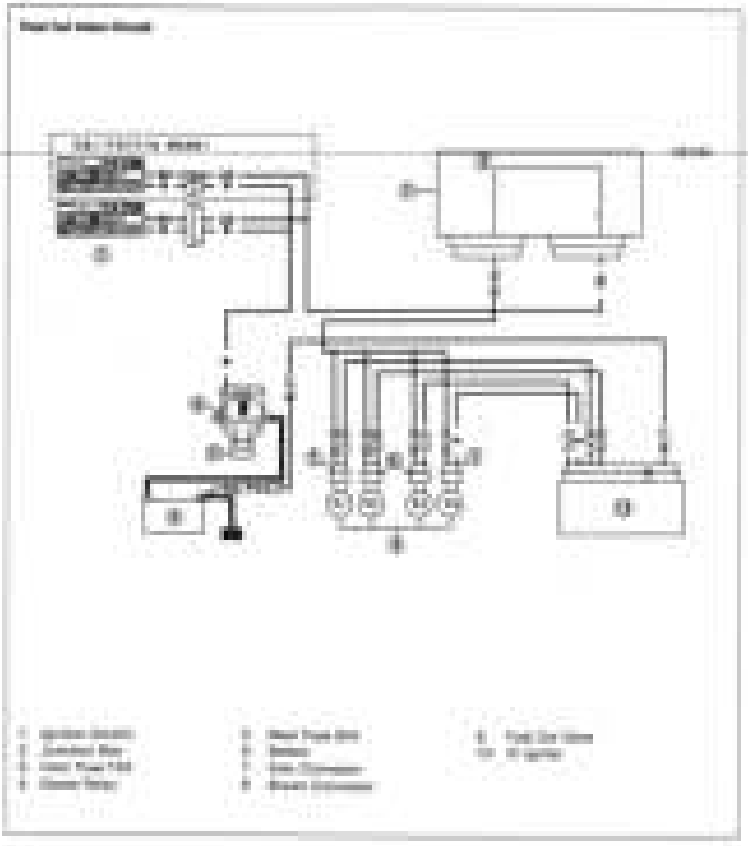
Fuel Cut Valve Inspection

- Remove the fuel cut valve (1).
- Connect new thermometer and 12 V battery (B) to the fuel cut valve connector as shown. The valve will operate.
- If the temperature reaches the standard, then lamp of the valve, the valve is defective and must be replaced.

Special Tool - Model Heater: 57001-1359

Cooling Fuel Cut Valve
Standard Temperature
When battery is disconnected: — 30°C (—22°F)
When battery is connected: + 10.5 — 18.5 mm





Radiator Fan System

Fan System Circuit Inspection

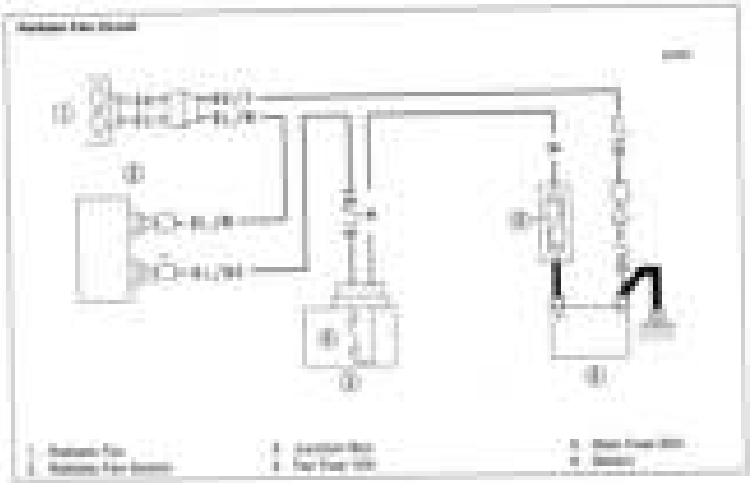
- Disconnect the leads from the radiator fan motor (1).
- Using an ordinary wire (2), connect the radiator fan motor leads.
- Turn the ignition switch ON but not START.
- If the fan does not rotate, inspect the following:
  - Lights and Connections
  - Main Fuse and Fan Fuse
  - Fan Motor



Fan Motor Inspection

- Disconnect the radiator coupling (see Fuel System (Inject)).
- Disconnect the 2 pin connector (1) in the fan motor lead.
- Using one ordinary wire, supply battery (B) power to the fan motor.
- If the fan does not rotate, the fan motor is defective and must be replaced.





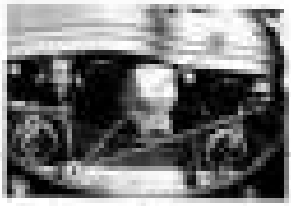
Meter

Meter Unit Removal

- Remove:
  - Meter Bracket Cap Screw (Chrome)
- Remove the meter unit by raising off the mounting nuts (A) with pliers.
- Take the wire cover (B) and remove the wiring connectors.

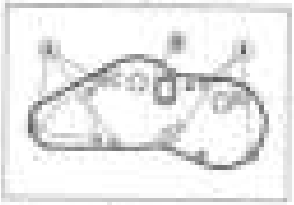
Caution

Wipe the meter or gauge up first the dust is on. It is useful to gauge a 'dry' cloth, and a cleanser for the finger or face, if not noticeable.

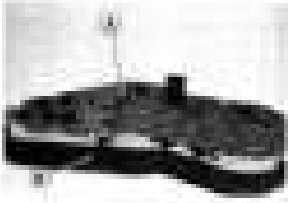


Meter Gauge Disassembly

- Remove:
  - Gauge Unit Set Meter (Gauge Removal)
  - Screws (2)
  - Lower Meter Cover (B)



- Separate the meter assembly (A) and upper meter cover (B).

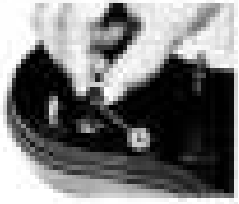


Bulb Replacement

- Remove:
  - Meter Unit
- Turn out the socket (A) counterclockwise.
- Pull the bulb out from the socket.

CAUTION

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.



Odometer Combination Meter Unit Inspection

- Remove the meter unit.

CAUTION

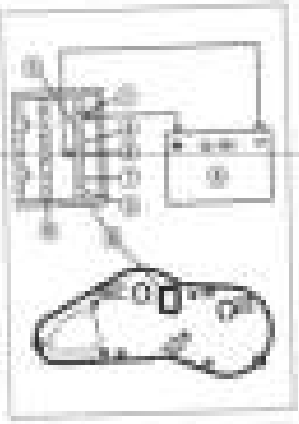
Do not drop the meter unit. Take the meter unit as soon as it is taken apart. If the meter unit is not taken down or undergo an x-ray test, it should be handled with care.

- Using the speedo tester, connect the (+) (white) (A) of the meter unit connector (B) as shown.
- Connect the battery positive terminal to the terminal (C).
- Connect the battery negative terminal to the terminal (D).

(1) Battery (+) Terminal
(2) Battery (Negative)
(3) Ignition
(4) Speed Sensor (Meter Drive)
(5) Speed Sensor Assy
(6) Transmission Rotor
(7) Meter Transmission

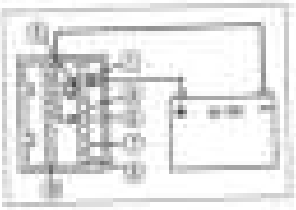
CAUTION

Do not attach the terminals (C) to unit (A) - (B).



Light Control Diodes (LED) Inspection (Front)

- Connect the battery positive terminal to the terminal (A).
- Connect the battery negative terminal to the terminal (B).
- Connect the terminal (C) to the terminal (D).



- When the terminals are connected, all the LED segments (E) and LED warning lights (F) are lighted for three seconds.
- When the terminals are disconnected, meter brightness control function operates.
- If the LED segments and LED warning light will not operate, replace the meter assembly.

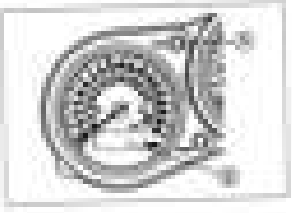


Intake Heater Switch Operate Confirmation

- Connect the (-) battery side terminals to the meter terminal as specified in the "Unused Codes (LED) Diagnosis Chart".
- Check that when the ignition switch (A) is switched and held momentarily, the starter (B) rotates through the three cycles.

ON → START → ACC → OFF

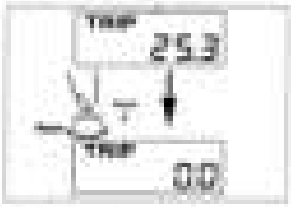
And the display function does not work, replace the meter assembly.



- Indicates the check mode.
- Check that when the RESET button is pushed for more than two seconds, the meter display turns to the check-up mode.
- Check is adjustment value well executed.
- If the display function does not work well adjusted, replace the meter assembly.

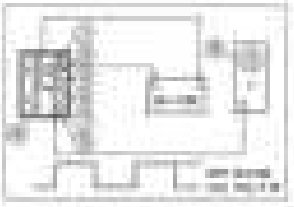


- Indicates trip km mode.
- Check that when the RESET button is pushed for more than two seconds, the figure resets to 0.0.
- If the figure display does not 0.0, replace the meter assembly.



Speedometer Check

- Connect the 3.5 V battery and terminals to the work manual as specified in the "Liquid Crystal Display (LCD) Diagnostic Check".
- The speed transmitted to the input frequency is estimated in the specified [A] in the speed value as [Distance] counter be found can be obtained [B].
- Calculate approximately 80 km/h in case the input frequency counter as approximately 2.56 Hz.
- Calculate approximately 80 km/h in case the input frequency speed as approximately 80.0 Hz.

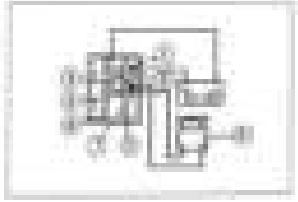


- If the oscillator is not available, the speedometer can be checked as follows.
- Install the meter unit.
- Place the rear wheel off the ground, using the jack.
- Turn on the ignition switch.
- Rotate the rear wheel by hand.
- Check that the speedometer shows the speed.
- If the speedometer does not work, check the speed sensor circuit (power voltage and speed sensor).

Speed Sensor Electric Source Check

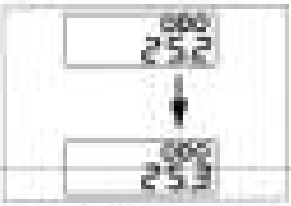
- Connect the 12 V battery and terminals to the work manual as specified in the "Liquid Crystal Display (LCD) Diagnostic Check".
- Start the input speed to the circuit a voltage and connect it to the terminals [1] and [2].
- If the voltage is less than the [1], replace the meter assembly.

Caution
Be connected the terminals [1], [2] and [3], [4].



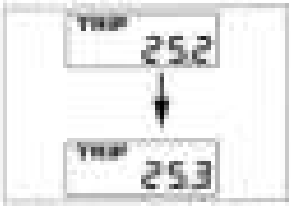
Odometer Check:

- Check the odometer unit (A) speedometer in the same way.
- If value indicated in the odometer is not within ±5% from the meter reading.



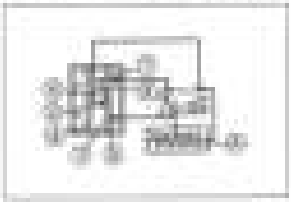
Trip Meter Check:

- Check the trip meter unit the speedometer in the same way.
- If value indicated in the trip meter is not within ±5% from the meter reading.
- Check that when the RESET button is pushed the meter from now records the figure display turns to 0.0.
- If the figure display does not indicate 0.0, replace the meter assembly.

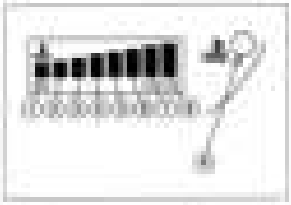


Water Temperature Meter Check:

- Connect the 12 V battery and terminal to the same manner as specified in the "Liquid Crystal Display (LCD) Segment Check".
- Connect the variable resistance (A) to the terminal (B) as shown.
- Check that the number of segments and warning light (Maximum) matches the resistance value of the variable resistance.



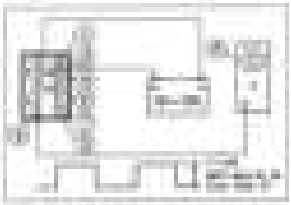
Resistance value (Ω)	Display Segment
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

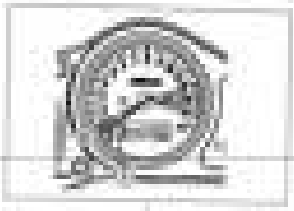


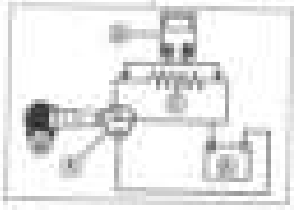
- If any display function does not work, replace the meter assembly.

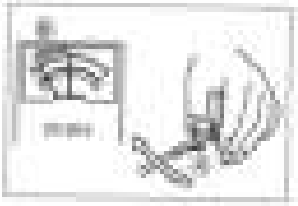
Tachometer Check:

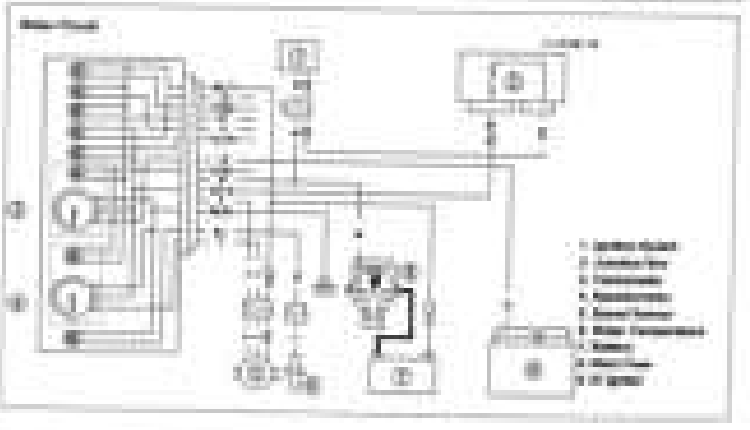
- Connect the 12 V battery and terminals to the same manner as specified in the "Liquid Crystal Display (LCD) Segment Check".
- The tachometer specified in the table beginning is indicated in the oscillator (A). If the needle does not deviate beyond normal or does not the terminal (B).
- Indicate approximately [illegible] rpm is used the input frequency should be approximately [illegible] Hz.









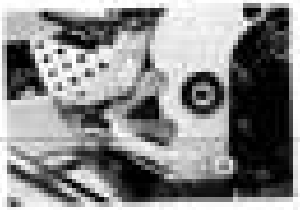


Switches and Sensors

Brake Light Timing Inspection

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal.
- If it does not do specified, adjust the brake light timing.

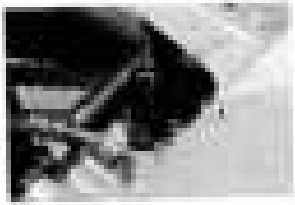
Brake Light Timing
Standard: For each vehicle or each destination



Brake Light Timing Adjustment

Brake light timing is adjusted by changing the position of the rear brake light switch.

- Adjust the position of the switch so that the brake light goes on after the specified travel by turning the adjusting nut (A).



CAUTION

To avoid damaging the electrical connections, make the switch so that the switch body does not turn during adjustment.

Switch Inspection

- Using a circuit tester, check to see that each terminal between it and the switch body conducts (open) as specified.
- For the terminals identified and that ignition switch (ON) to the switch or the wiring diagram.
- If the switch has an open or short circuit it is necessary to replace it.

Stoplight Switch – Hand Brake: 37881-1065

Rear Brake Light Switch Connections

	B/Y	B/L
When brake switch is pushed down		
When brake switch is released		

Side Stand Relay Connections

	G/W	B/Y-1
When side stand is up		
When side stand is down		

Neutral Switch Connections

	Gr/R - Transmission	Gr/Bu
When transmission is in neutral		
When transmission is not in neutral		

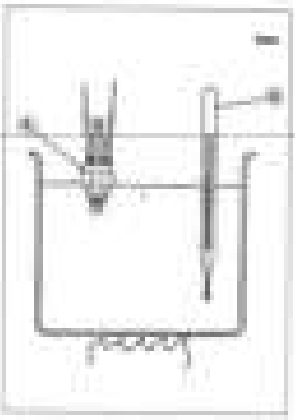
Oil Pressure Switch Connections

	Gr/Bu - Terminal	Body
When engine is stopped		
When engine is running		

* Engine transmission models or in neutral transmission

Radiator Fan Switch Inspection

- Remove the fan switch (see Cooling System chapter).
- Suspend the switch (1) in a container of coolant so that the temperature sensing protection and threaded portion are submerged.
- Suspend an accurate thermometer (2) in the coolant.



NOTE

- The switch and thermometer must not touch the container sides or bottom.

- Heat the container over a source of heat and gradually raise the temperature of the coolant while stirring it to maintain uniformity.
- Using the Hand Tester, measure the internal resistance of the switch across the terminals at the temperatures shown in the table.
- If the hand tester does not move, the specified values between the switch.

Fan Switch Resistance

Cooling Temperature

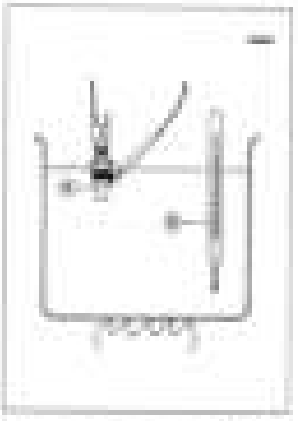
(Fans ON) to (Fans OFF)

Cooling Temperature

(Fans ON) to (Fans OFF)

Water Temperature Sensor Inspection

- Remove the water temperature sensor (see Cooling System chapter).
- Suspend the sensor (1) in a container of coolant so that the temperature sensing protection and threaded portion are submerged.
- Suspend an accurate thermometer (2) in the coolant.



NOTE

- The sensor and thermometer must not touch the container sides or bottom.

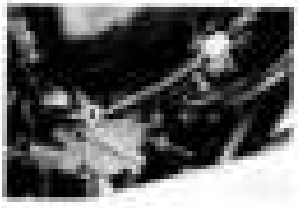
- Heat the container over a source of heat and gradually raise the temperature of the coolant while stirring it to maintain uniformity.
- Using the Hand Tester, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.
- If the hand tester does not move, the specified values between the sensor.

Water Temperature Sensor

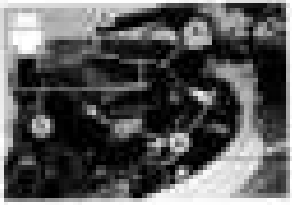
Throttle Sensor Removal/Installation

Caution
Do not remove the throttle sensor (1).

- When replacing the sensor, refer to Throttle Sensor Position Adjustment.



Throttle Sensor Inspection



- Remove the fuel tank (see Fuel System (Inside))
- Prepare an available T-pin (with vinyl coating) for fuel hose at the connecting
- Start the engine and warm it up thoroughly
- Check
  - Idle Speed (see Fuel System (Inside))
  - Battery Charging Condition (see this chapter)
- Turn off the ignition switch
- Remove the throttle sensor coupler connector
- Connect the adapter (12 Cylinder) (for commercial) (B)

Special Tool : Throttle Sensor Setting Adapter: 57001-1400

- Connect the hand tester to the adapter
  - Green/White (+) ↔ Y (Lead) (C)
  - Black/Yellow (-) ↔ BK (Lead) (D)
- Start the engine
- Check the sensor output voltage with the engine idling

Throttle Sensor Output Voltage
Standard: 0.6 – 0.7 V (When engine is idling)

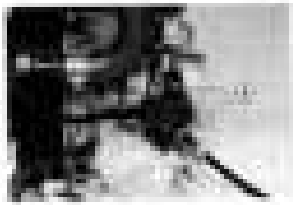
If it is not within the specified voltage, adjust the throttle sensor position (see Throttle Sensor Position Adjustment).

- If it is specified voltage, it is normal
- Stop the engine
- Turn the ignition switch
- Check the sensor output voltage when the throttle valve open

Throttle Sensor Output Voltage
Standard: 3.95 – 4.25 V (When engine is fully opened)

If it is not within the specified voltage, replace the sensor.

Throttle Sensor Position Adjustment



- Warm the engine
- Check idle speed (see Fuel System (Inside))
- Stop the engine and remove the carburetor

CAUTION

Do not turn the idle adjusting screw when removing the carburetor.

- Connect the throttle sensor setting adapter to the sensor (see Throttle Sensor Inspection)

Special Tool : Throttle Sensor Setting Adapter: 57001-1400

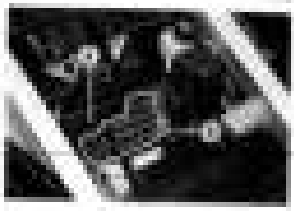
- Loosen the throttle sensor mounting screws (A)
- Adjust the position of the sensor until the output voltage is within the specified voltage

Throttle Sensor Output Voltage
Standard: 0.6 – 0.7 V

If it is not within the specified voltage, replace the sensor.

Junction Box

The junction box (A) has fuses (B), relays, and diodes. The relays and diodes are not to be removed.



Junction Box Fuse Circuit Inspection

- Remove the seats and fuse cowling.
- Remove the junction box.
- Pull off the connectors from the junction box.
- Make sure all connectors terminals are clean, and each one is fully seated.
- Check the fuse terminals and tongues visually and tightness.
- Check conductivity of the mentioned terminals with the tool listed.
- If the tester does not read as mentioned, replace the junction box.

Fuse Circuit Inspection

Tester Connection	Tester Reading (Ω)
[illegible]	0
[illegible]	0
[illegible]	0
[illegible]	0
[illegible]	0
[illegible]	0
[illegible]	0

Tester Connection	Tester Reading (Ω)
[illegible]	∞
[illegible]	∞
[illegible]	∞
[illegible]	∞
[illegible]	∞
[illegible]	∞

Starter Circuit/Headlight Relay Inspection

- Remove the junction box.
- Check conductivity of the following mentioned terminals for example:
  - Eg. the Fuse tester lead and 12 (-) battery to the junction box grounded.

If the tester does not read as specified, replace the junction box.

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)		Tester Connection	Tester Reading (Ω)
Headlight Relay	[illegible]	∞	Starter Circuit Relay	[illegible]	∞
	[illegible]	∞		[illegible]	∞
	[illegible]	Not ∞ (*)		[illegible]	Not ∞ (*)

(*) : [illegible] and transistor Models only

(*) : The actual reading varies with the connection used.

(**) : Digital tester analog type

(***) : Digital tester diagnosis type

(*1) (US, Canada, and Australia (Middle) only)
(*2) The actual reading varies with the odometer used.
(*3) Apply base position (ref)
(*4) Every seven kilometers (ref)

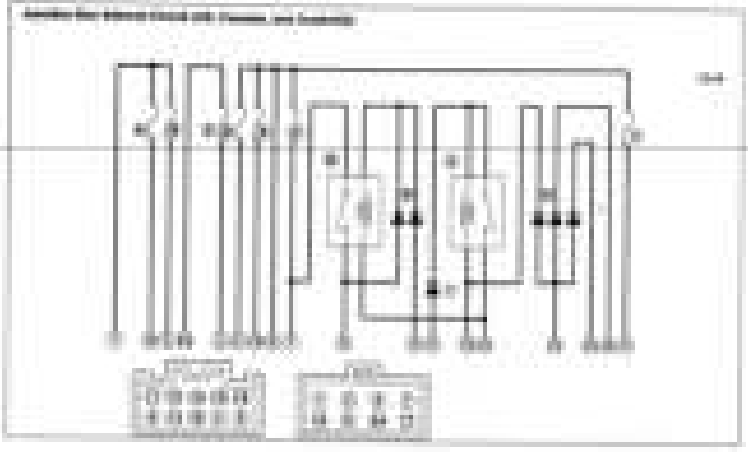
■ Remove the connector (ref)
■ Check conductivity of the following pairs of terminals

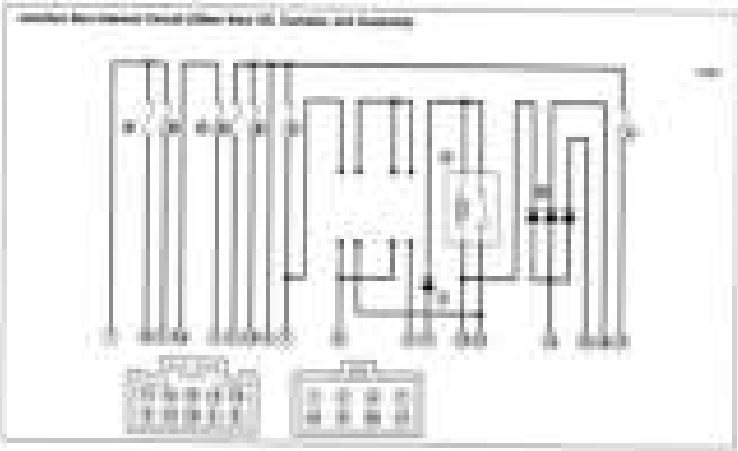
(*1) (US, Canada, and Australia (Middle) only)

- At the necessary amount be low in overheating and some trips, all things be result in the other functions. If any fault across low or high in with overheating, low levels in sensors and the numbers can cause be repaired.

NOTE

- The actual mark reading varies with any wear used and the indicated display may gradually appearing. The actual reading should be less and is not 620 km used.





A - Headlight Fuse 10A
B - Fuel Pump 15A
C - Turn Signal Relay Fuse 10A
D - Horn Fuse 10A
E - Ignition Fuse 10A
F - Headlight Relay 10A
G - Headlight Relay
H - Headlight Dimmer
I - Starter Motor
J - Starter Control Relay
K - Ignition Coil
L - Tailight Fuse 10A

Fuse

Main Fuse (Optional)

- Remove:
  - Seats (see Frame chapter)
  - Starter Relay and Main Fuse Connector (1)
- Pull out the main fuse (2) from the starter relay with needle nose pliers.



Ignition Box Fuse (Optional)

- Remove the seats (see Frame chapter).
- Unhook the hooks (1) on the cover (2).
- Pull the fuse (3) straight out of the ignition box with needle nose pliers.



Fuse Installation

- If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.
- Install the cushion and seats in the original position as described in the list.

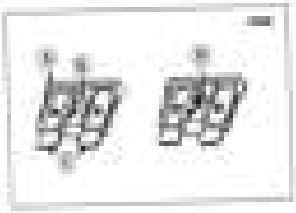
Fuse Inspection

- Remove the Main (or) Fuse Connector.
- Inspect the fuse visually.

A fuse is obviously open between the fuse. Replace switching a blown fuse, replace small fuse amperage in the specified source. If the connection is open or shorted, then the fuse wiring, check the wiring and repair components for a short circuit.

Tester (1)
Fuse Socket (2)

Specified (3)
Blown Fuse (4)



Caution

Before replacing a fuse, be sure the new fuse has the specified amperage rating. Never use a fuse with a higher rating than stock, damage to wiring and components.

Appendix

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Additional Considerations for Racing

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

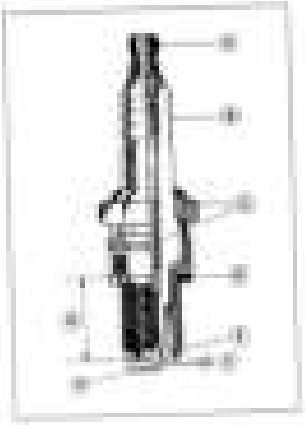
Carburetion

[illegible]

[illegible]

Spark Plug

[illegible]



A. Terminal
B. Insulator
C. Gasket
D. Shell
E. Center Electrode
F. Gap (0.7 – 0.8 mm)
G. Ring
H. Side Electrode

When a plug of the correct heat range is being used, the electrode will wear but should not be worn out any sooner than the insulator is likely to damage the engine and the plug itself. The temperature is always hot – NEVER cold – enough to burn deposits and the correct plug is easy to identify as the colour of the ceramic insulator around the centre electrode is the colour you'd see on a light brown cake, the plug is operating at the right temperature.

A spark plug for engine operating temperature is used for racing. Such a plug is designed for faster cooling efficiency so that it will not overheat and thus to initiate pre-ignition or "knock" also. It is used only on race cars that have ample cool – that is, a "cold" plug that runs cool. Such but cool

The plugs will also not work 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 form the center electrode to ground by either coating the ceramic insulator or bridging across the gap. Such a short will produce an effective spark. Carbon fouled up on the plug can also cause other problems. It can cause hot spot and cause preignition and knocking, which may eventually melt a hole in the top of the piston.

Spark Plug Inspection

1. Remove the spark plug and inspect the ceramic insulator.
2. Examine or use the right temperature plug is being used and the carbon spread by noting the condition of the ceramic insulator around the electrode. A light-brown color indicates the correct heat range is used. If the ceramic is black, it indicates that the plug is dirty or not get a temperature so the heat cannot burn through its white material. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder heat.

CAUTION

If the spark plug is replaced with a type other than the standard, make sure the replacement plug has the same thread reach and seat. Install an insulator gasket and the same type electrode. Improper heat or incorrect type may then damage plug.

If the plug reach is too short, carbon will build up on the plug body threads in the cylinder head, causing overheating and making 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, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.

Standard Spark Plug Torques

Diameter	18 mm
Plain	1.5 mm
Reach	19 mm

NOTE

The heat range of the spark plug determines the temperature at the electrode. Using the wrong type of spark plug can cause the engine not run too. Resulting in engine damage or can also cause poor performance, misfiring and stalling.

Troubleshooting Guide

NOTE

This is not an exhaustive list; please note, however, that the most probable cause is listed for each problem. It is always best to begin with the most basic and work through to the more difficult.

Engine Doesn't Start, Starting Difficult

Starter motor cuts out/dies
- Starter solenoid or contact breaker faulty
- Starter motor faulty
- Battery voltage low
- Starter motor not connecting to battery
- Starter button not connecting
- Wiring open or shorted
- Ignition switch faulty
- Engine stop switch faulty
- Fuse blown

Starter motor rotating but engine doesn't turn over
- Starter clutch faulty

Engine won't turn over
- Valve seized
- Valve stem seized
- Cylinder seized solid
- Crankshaft seized
- Connecting rod small end seized
- Connecting rod big end seized
- Transmission gear or bearing seized
- Crankshaft seized
- Starter idler gear seized

No Fuel Flow
- No fuel in tank
- Fuel pump faulty
- Fuel tank air vent restricted
- Fuel filter clogged
- Fuel line clogged
- Fuel line clogged
- Float valve clogged
- Fuel vent valve not open (closed fuel tap valve)

Engine Flooded
- Fuel level in carburetor float bowl too high
- Float valve worn or stuck open
- Starting technique faulty
- Choke (enrichener) valve not closing (when engine is warm) (choke cable not adjusted correctly or cable broken)

No spark, spark weak
- Battery voltage low
- Spark plug dirty, broken, or incorrect gap
- Spark plug cap or high tension lead faulty
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- ID ignition faulty
- Coil ignition faulty
- Magneto ignition faulty or ignition source too far from flywheel
- Pickup coil faulty
- Wiring not complete
- Ignition or engine stop switch shorted
- Wiring shorted to earth
- Kill button
- Engine earthing faulty

Engine lacks maximum horsepower
- Valve timing out of adjustment or worn camshaft lobes
- Piston ring or cylinder scored
- Air cleaner clogged
- Exhaust system restricted
- Engine overheating
- Carburetor jetting too lean
- Ignition timing too far retarded
- Ignition timing too far advanced
- Valve seat eroded
- Valve guide worn
- Valve sticking
- Valve spring broken or weak
- Valve not seating properly (valve face worn or carbon accumulation on the seating surface)

Runs Normally at Low Speed

Weak mixture
- Battery voltage low
- Spark plug dirty, broken, or incorrect gap
- Idle jet blocked
- Air bleed blocked
- Air jet blocked
- Fuel level too low
- Fuel jet blocked
- Fuel tap blocked
- Fuel filter blocked
- Fuel pump faulty
- Fuel tank vent blocked
- Fuel line blocked
- Air cleaner blocked
- Crankcase breather valve sticking
- Inlet manifold gasket leaking
- Inlet valve not seating properly
- Valve timing incorrect
- Valve seat eroded
- Valve guide worn
- Valve sticking
- Valve spring broken or weak
- Valve not seating properly (valve face worn or carbon accumulation on the seating surface)

Misfire
- ID ignition faulty
- Contact breaker not synchronizing
- Condenser intermittent failure (breaks down under load)
- Condenser intermittent failure (breakdown internal)
- Engine not operating on high tension lead
- Spark plug cap shorted
- Choke sticking

Poor Running or No Power at High Speed

Overheating

Gear Clashing

- Sound suggests:
  - Gears encountering partial tension
  - Gears encountering complete tension
- Clashing problem components found when:
  - Replacing gear system housing
  - Disassembling assembly

Shock Absorber Faults

- Shock dragging:
  - Piston shaft bent or damaged
  - Seal plate worn or damaged
  - Check spring broken or weak
  - Shaft bent or showing corrosion wear
  - Rod pulled from body
  - Shaft mount bolts missing
  - Check valves inoperative or faulty
- Check and disengaging problems:
  - Check plate bushed or too tight
  - Check spring compression unclear
  - Engine oil viscosity low
  - Engine oil viscosity too high
  - Engine oil level too high
  - Check clogging shaft or drive shaft
  - Check lock not found
  - Check rod seems damaged
  - Check fluctuation plate installed wrong
  - Check seal bolts damaged
  - Check gasket replacement inactive

Gear Shifting Faults

- Doesn't go into gear, shift pedal doesn't return:
  - Check clip disengaging
  - Shift fork bent or warped
  - Gear mount or rod shaft
  - Gear positioning lever binding
  - Shift mount spring weak or broken
  - Shift mount gearing jam found
  - Shift mechanism arm spring broken
  - Shift mechanism arm broken
  - Shift pawl broken
- Jumps out of gear:
  - Shift fork worn, bent
  - Gear grooves worn
  - Gear edge surface dog worn down
  - Shift mount groove worn
  - Gear positioning lever spring weak or broken
  - Shift rod set worn
  - Shift shaft, support bolts and/or gear spread worn
- Grinding/Whine:
  - Gear positioning lever spring weak or broken
  - Gear misaligned with spring broken

Abnormal Engine Noise

- Knocking:
  - Ill ignition timing
  - Carbon build up in combustion chamber
  - Fuel octane rating too low/high
  - Spark plug overheat
- Overheating
- Piston slap:
  - Cylinder bore diameter excessive
  - Cylinder sleeve worn
  - Connecting rod bent
  - Piston pin and/or pin bore worn
- Valve noise:
  - Valve clearance incorrect
  - Valve lash adjuster or seals
  - Excessive bearing wear
  - Valve stem worn
- Other noise:
  - Connecting rod bolts and crankshaft problem
  - Connecting rod big end clearance excessive
  - Main ring gears broken or worn
  - Flash valves damaged
  - Cylinder head gasket failing
  - Engine oil is leaking or cylinder head connection
  - Camshaft thrust excessive
  - Engine mounts loose
  - Camshaft bearing worn
  - Timing gear worn or stripped
  - Camshaft chain excessive tension
  - Camshaft chain, sprockets worn down
  - Ice and/or sand damaged
  - Vacuum system valve damaged
  - Exhaust valve leaks
  - Lubricity, temperature, fuel level, and or muffler overheating

Abnormal Drive Train Noise

- Clutch noise:
  - Clutch rubber damper worn or damaged
  - Clutch housing torque plate clearance excessive
  - Clutch housing gear worn
- Transmission noise:
  - Bearings worn
  - Transmission gears worn or chipped
  - Input shaft damaged or gear teeth
  - Improper oil viscosity
- Drive wheel noise:
  - Drive chain adjusted improperly
  - Drive chain worn
  - Axle shaft or chain bent/out of alignment
  - Chain lubrication insufficient
  - Tire wear irregular

Abnormal Frame Noise

- Front fork noise:
  - Oil insufficient or too thin
  - Spring weak or broken
- Rear shock absorber noise:
  - Shock absorber not tight
- Rear brake noise:
  - Pad material incorrect
  - Pad surface glazed
  - Disc warped
  - Caliper faulty
- Other noise:
  - Bearings, hub, axle, etc. not properly mounted or tightened

Oil Pressure Warning Light Goes On

- Engine oil severe damaged
- Engine oil pump damaged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearings worn
- Crankshaft bearings worn
- Oil pressure switch damaged
- Wiring faulty
- Switch wires faulty open
- [illegible] to fail or damage in the instrument cluster

Exhaust Smokes Excessively

White smoke

- Engine oil too low
- Cylinder head
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

Black smoke

- Air cleaner clogged
- Main jet too large or idle off
- Incorrect [illegible] fuel injection too high

Brown smoke

- Main jet too small
- Fuel level in carburetor float bowl too low
- Air leaks duct hose
- Air cleaner O-ring damaged
- Air cleaner joints sealed or missing

Handling and/or Stability Unsatisfactory

Handlebar Hard to Turn

- Cable binding [illegible]
- Wear bushing [illegible]
- Wiring binding [illegible]
- Steering stem bottom too tight
- Steering stem binding damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebar Pulled to Incorrect Direction

- Tire worn
- Swing arm pivot bearings worn
- Wet washer or nut loose
- Wheel bearing worn
- Frame/body misaligned
- Steering stem bent or loose

Handlebar Shifts to One Side

- Frame bent
- Wheel bearing worn
- Swing arm bent or broken
- Steering misadjusted
- Front fork bent
- Right and left front fork oil level unequal

Front Wheel Wobbles and/or Oscillates

- Tire bad
- Front fork oil insufficient
- Front fork oil viscosity too high
- Rear shock absorber adjustment too hard
- Front or rear tire too high

- Front fork bent
- Axle bent
- Tire or wheel thrown
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Rear shock adjustment too soft
- Front fork and shock absorber spring weak
- Rear shock absorber oil leaking

Brake Doesn't Hold

- Air in the brake line
- Pad or disc worn
- Brake fluid leakage
- Disc warped
- Contaminated pad
- Brake fluid deteriorated
- Master cylinder or secondary cup damaged or master cylinder
- Brake cylinder scratched inside

Battery Trouble

Battery discharged

- Battery faulty (e.g., plates sulphated, internal shorted, electrolyte contaminated, electrolyte insufficient)
- Battery leads making poor contact
- Load excessive (e.g., bulb or headlamp wattage)
- Ignition system trouble
- Alternator trouble
- Wiring faulty
- Regulator trouble (cont'd)

Battery overcharged

- Regulator trouble (cont'd)
- Battery trouble

General Lubrication

Lubrication

- [illegible]
- [illegible]

NOTE

[illegible]

Pivots: Lubricate with Motor Oil

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

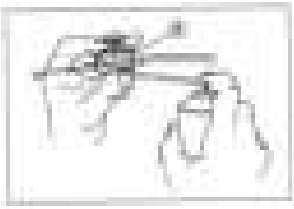
Pivots: Lubricate with Grease

- [illegible]
- [illegible]
- [illegible]

[illegible]: Lubricate with Rust Inhibitor

- [illegible]
- [illegible]
- [illegible]

[illegible]



Nut, Bolt and Fastener Tightness

Tightness Inspection

- Check the tightness of the bolts and nuts (see table). Also, check to see that each bolt is in place and in good condition.

NOTE

- For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).

- If there are bolts tightened, whether over or the specified values following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not given, tighten the bolts, nuts and screws to the standard torque given in the following table. For each fastener, first loosen it by 1/2 turn, then tighten it.

- Torque wrench accuracy: applies torque within ±3% limit.

Nut, Bolt and Fastener to be checked

- Chassis
  - Front Axle Nut
  - Front Axle Clamp Bolts
  - Rear Axle Nut
  - Rear Knuckle Lower Nut
- Brakes
  - Front Master Cylinder Clamp Bolts
  - Caliper Mounting Bolts
  - Rear Master Cylinder Mounting Bolts
  - Brake Lever Pivot Nut
  - Brake Pedal Bolt
  - Brake Rod Joint (Cotter) Pin
- Suspension
  - Front Fork Clamp Bolts
  - Front Fender Mounting Bolts
  - Rear Shock Absorber Mounting Bolts
  - Swingarm Pivot Shaft Nut
  - Tie Rod Link Nuts
- Steering
  - Steer Head Nut
  - Handlebar Mounting Bolts
- Engine
  - Engine Mounting Bolts
  - Cylinder Head Bolts
  - Muffler Mounting Bolts
  - Exhaust Pipe Holder Nuts
  - Muffler Connecting Clamp Nut
  - Shaft Lever Pinch Bolt
- Frame
  - Side Stand Bolt
  - Footrest Mounting Bolts
  - Footrest Bracket Mounting Bolts

Unit Conversion Tables

Prefixes for Units

Prefix	Symbol	Power
[illegible]	M	x 1 000 000
[illegible]	k	x 1 000
[illegible]	c	x 0.01
[illegible]	m	x 0.001
[illegible]	µ	x 0.000001

Units of Length

[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]

Units of Mass

kg	x	[illegible]	=	lb
g	x	[illegible]	=	oz

Units of Torque

[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]

Units of Volume

[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]

Units of Pressure

[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]

Units of Speed

[illegible]	x	[illegible]	=	[illegible]

Units of Force

N	x	[illegible]	=	lb
lb	x	[illegible]	=	N
[illegible]	x	[illegible]	=	lb
[illegible]	x	[illegible]	=	lb

Units of Power

[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]
[illegible]	x	[illegible]	=	[illegible]

Units of Temperature

